

## SECTION 2 - CHASSIS

# MERCURY

## SNOWMOBILES

## PART C - DRIVE SYSTEMS



A BRUNSWICK COMPANY

# INDEX

	Page
220 and 250 Models .....	2C-1
Drive Sheave .....	2C-1
Driven Sheave .....	2C-4
Jackshaft .....	2C-6
200 Model .....	2C-7
Drive Sheave .....	2C-7
Driven Sheave .....	2C-10
Jackshaft .....	2C-12
Rocket and Lightning Models .....	2C-13
Drive Sheave .....	2C-13
Driven Sheave .....	2C-17
Jackshaft .....	2C-19
Hurricane Model .....	2C-20
Drive Sheave .....	2C-20
Driven Sheave .....	2C-24
Jackshaft .....	2C-26
440 MAX, 440 S/R, 340 S/R, 440 M/X and 440 T/T Models .....	2C-27
Drive Sheave .....	2C-27
Driven Sheave .....	2C-30
Jackshaft .....	2C-32
Mark I and Mark II Models .....	2C-34
Drive Sheave .....	2C-34
Driven Sheave .....	2C-37
Jackshaft .....	2C-39
Sno-Twister Model .....	2C-41
Drive Sheave .....	2C-41
Driven Sheave .....	2C-45
Jackshaft .....	2C-48
440 S/R (Mercury Clutch) Model .....	2C-49
Mercury D-69248A1 Drive Sheave .....	2C-49
Mercury D-75201A1 Drive Sheave .....	2C-52
Mercury D-69271A6 Driven Sheave .....	2C-54
"Twister" Models .....	2C-57
Drive Sheave (Arctic Series) .....	2C-57
Driven Sheave Alignment .....	2C-62
Driven Sheave Spring Preload .....	2C-63
Driven Sheave (Arctic Series) .....	2C-65



# DRIVE SHEAVE - 220-250 MODELS

## REMOVAL and DISASSEMBLY

1. Remove grease fitting from flywheel stud. (Figure 1)

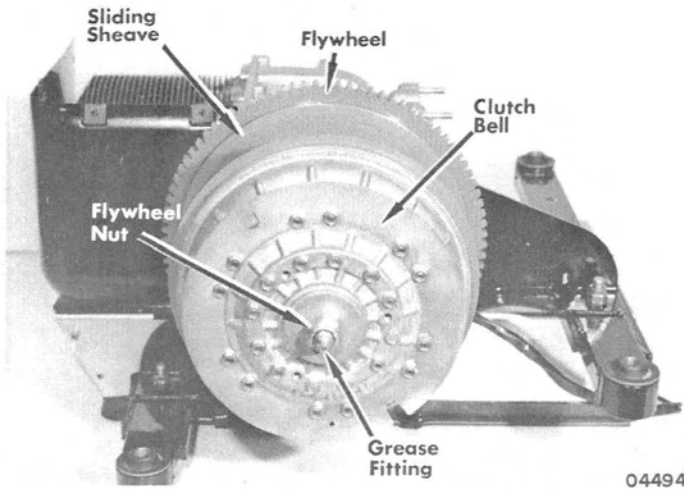


Figure 1. Removing Grease Fitting from Flywheel Stud

2. Hold flywheel with flywheel holder (C-91-52344) and remove flywheel nut and washer.
3. Place Thread Protector (C-91-54360) over flywheel stud. Install Universal Puller (C-91-25733A2) on clutch bell. Hold flywheel with flywheel holder and tighten center screw of puller until clutch bell snaps loose from flywheel shaft. (Figure 2)

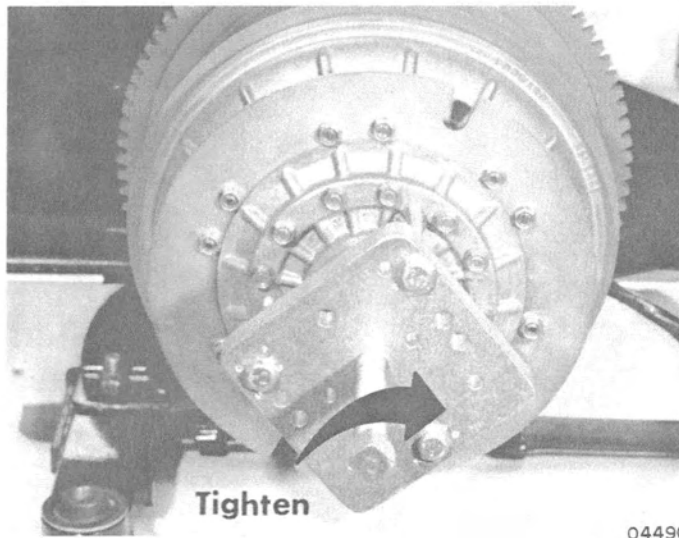


Figure 2. Loosening Clutch Bell from Flywheel Shaft

4. Push sliding sheave in slightly and remove clutch bell key from flywheel shaft. Remove thrust washer (on sliding sheave), sliding sheave, return spring, spring retainer cup and idler bearing from flywheel.
5. Remove flywheel stud with a suitable stud remover (cam lock type) or double nut procedure. (Figure 3)

6. Hold flywheel with Flywheel Holder (C-91-52344). Place wrench on inner nut and turn stud counterclockwise to remove.
7. Place Flywheel Plug (C-91-54071) into center of flywheel shaft. Thread  $5/8 \times 18$  screw (C-10-53970), which is a part of Clip Former Tool C-91-53971A1, into flywheel shaft.

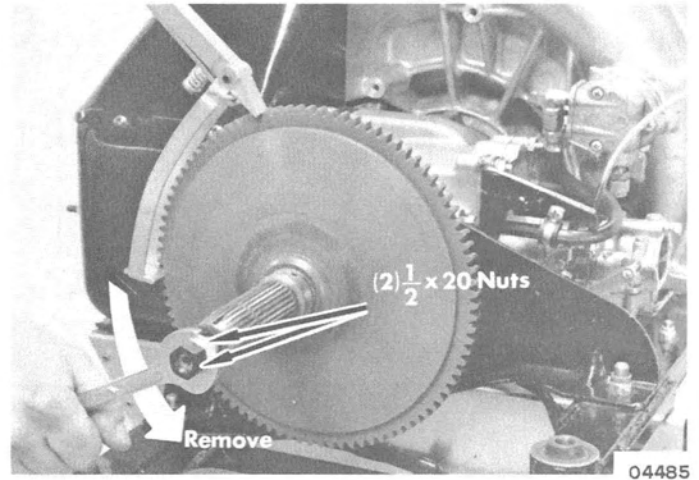


Figure 3. Removing Flywheel Stud

8. Hold flywheel with flywheel holder and tighten screw until flywheel snaps loose from crankshaft. Remove flywheel and screw. (Figure 4)
9. The clutch bell assembly can be further disassembled as outlined below.
  - a. Remove clutch weight retainer bolts.
  - b. Remove clutch weights and bushings from clutch bell. When clutch weight bolts are removed, emergency starter disc is removed also.

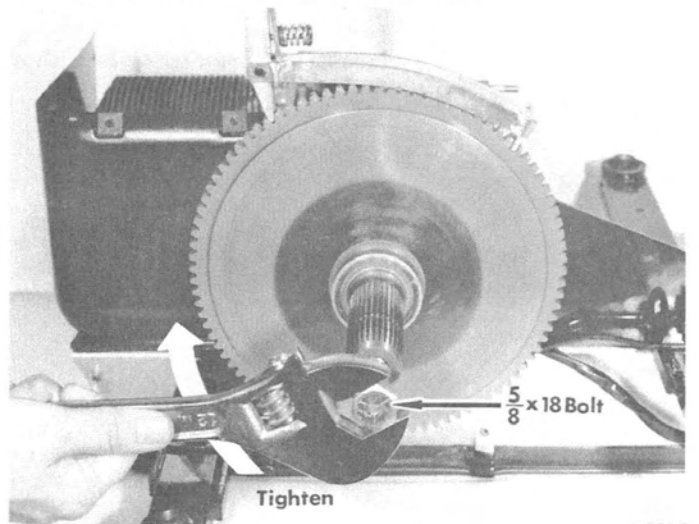


Figure 4. Removing Flywheel from Crankshaft

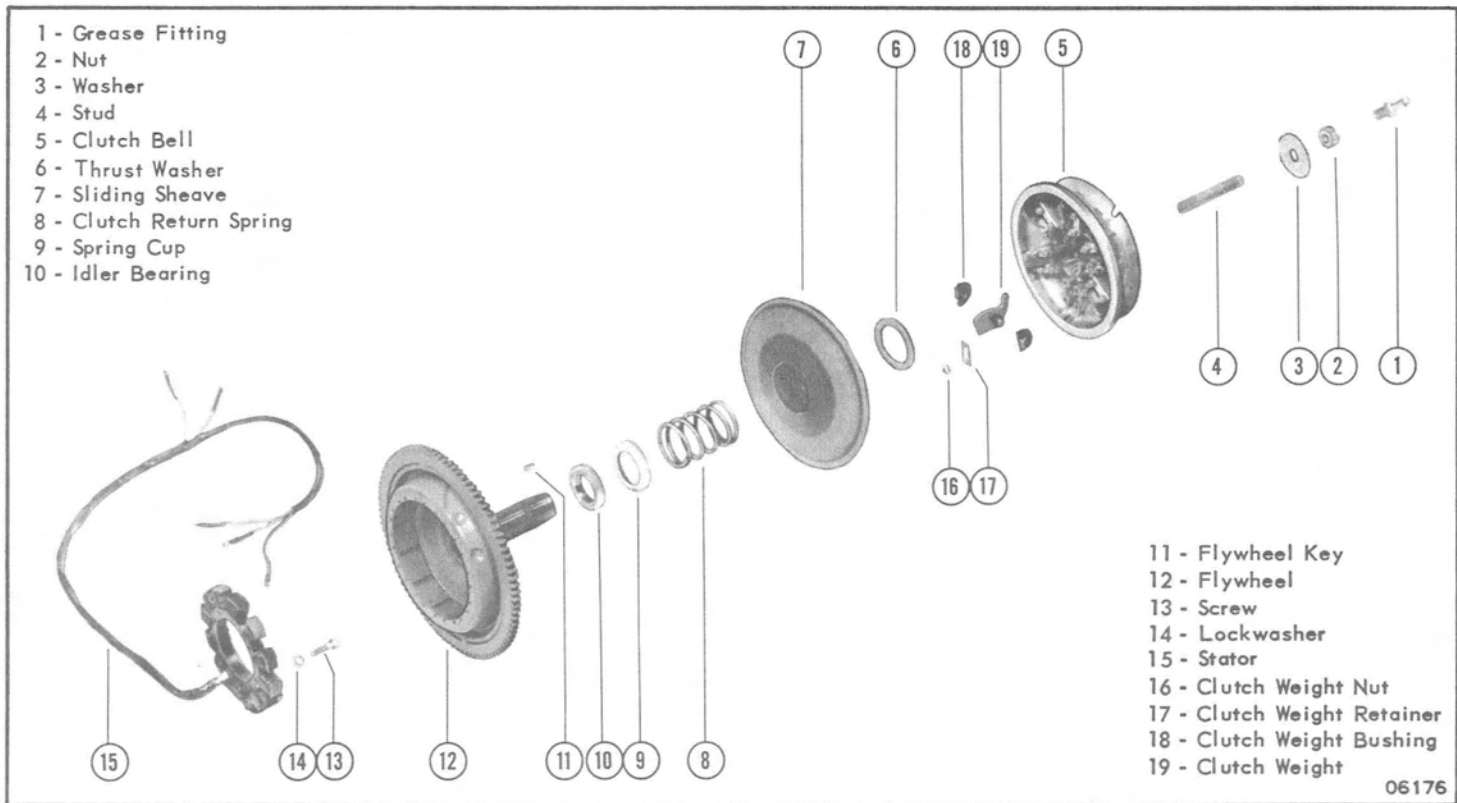
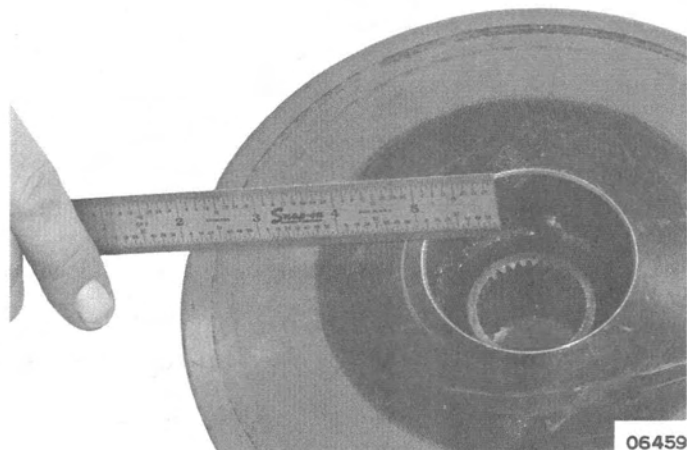


Figure 5. Clutch Bell, Flywheel and Stator

## CLEANING and INSPECTION

1. Check ring gear of flywheel for chipped or broken teeth.
2. Check splines for abnormal wear.
3. Check idler bearing for rough operation and/or excess play between inner and outer races.
4. Check thrust washer for abnormal wear. Thrust washer can be inverted if one side is worn.
5. Clean sheave face surfaces and check for wear with a straight edge. (Figure 6)
6. Replace all damaged parts.

Figure 6. Checking Belt Faces with Straight Edge

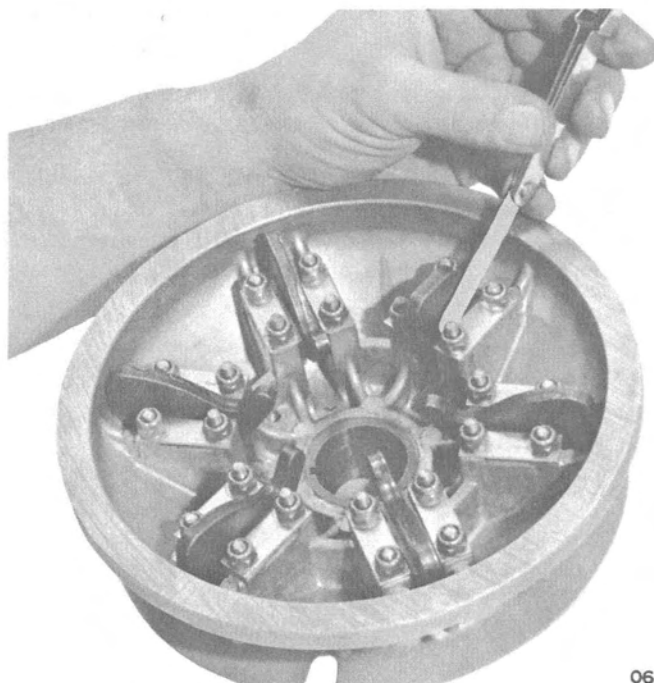




## REASSEMBLY

1. Place clutch weights and bushings in position in clutch bell. Lubricate clutch weight wear plates with Low Temperature Lubricant (C-92-59999-12).
2. Place emergency starter disc in position and secure weights and bushings with retainer plates, bolts and nuts.
3. Adjust clutch weight total side clearance by inserting .015" feeler gauge between wear plate and weight. (Figure 7)
4. Torque clutch weight retaining screws to specifications.

Figure 7. Checking Clutch Weight Clearance



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## INSTALLATION

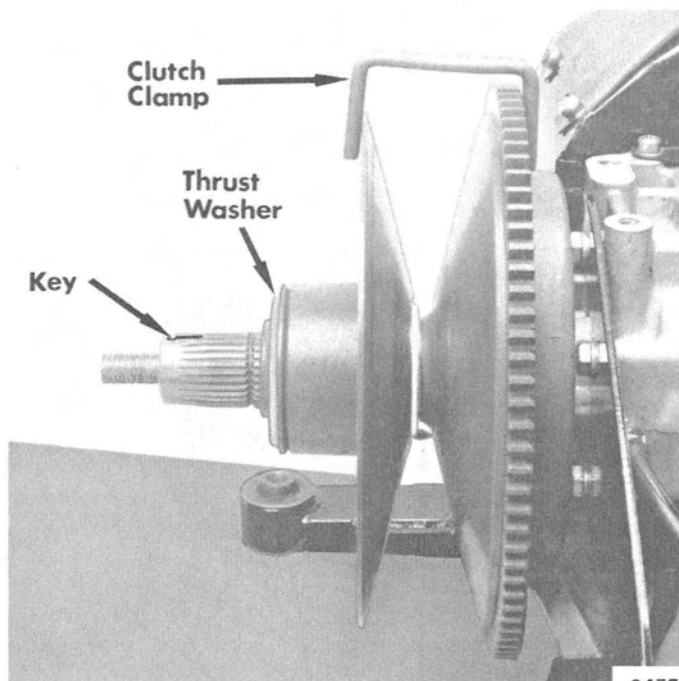
1. Apply Loctite Type "A" (C-92-32609-1) to threads of flywheel stud and install stud in crankshaft.
2. Place flywheel on crankshaft. Make sure that crankshaft key engages keyway in flywheel.
3. Install idler bearing and lubricate clutch splines with Low Temperature Lubricant (C-92-59999-12). Install spring retainer cup (cup toward sliding sheave), return spring and sliding sheave on flywheel shaft. (Figure 5, Items 7-8-9-10)

*NOTE: DO NOT over-lubricate, as excessive lubricant may be thrown onto drive belt.*

4. Push in sliding sheave and install Clutch Clamp (C-91-54702).
5. Place thrust washer on sliding sheave. Lubricate thrust washer with Low Temperature Lubricant (C-92-59999-12). Install key in flywheel shaft. (Figure 5, Items 6-11)
6. Place clutch bell on flywheel shaft. Be sure that flywheel key engages keyway in clutch bell.
7. Install washer and thread nut on flywheel stud. Hold Flywheel with Flywheel Holder (C-91-52344) and torque nut to "Specifications" Section 8.

**CAUTION: KEEP HANDS** from between sliding sheave and clutch bell when removing clutch clamp.

8. Remove clutch clamp by pulling straight up.
9. Reinstall grease fitting into end of flywheel stud.



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Figure 8. Installing Clutch Clamp

# DRIVEN SHEAVE - 220-250 MODELS

## REMOVAL and DISASSEMBLY

1. Remove handlebar support bolts from each side of chassis above foot rest. Remove 2 dash assembly screws.
2. Insert reverse lockout tool (electric reverse model). Remove variable speed drive belt.
3. Check to see if sheave has index mark. If not present, scribe a mark on sliding and fixed sheave. (Figure 9)

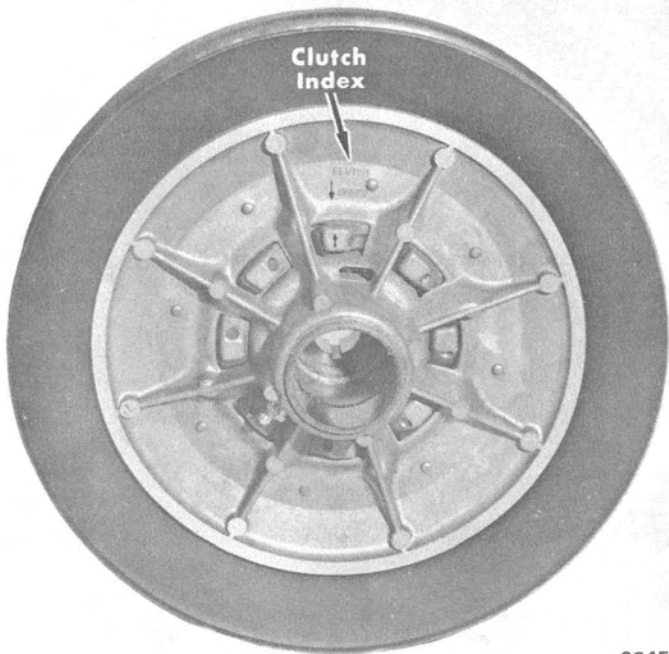
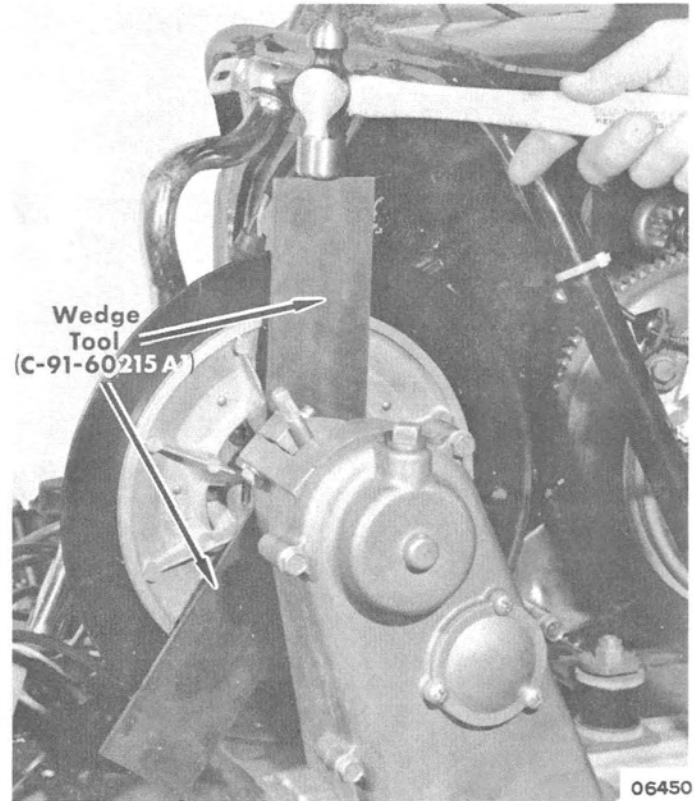


Figure 9. Locating Index Mark

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4. Remove cotter pin and loosen brake tension adjusting nut and two 5/16-24 thru bolts, holding brake assembly together to permit removal of sheave assembly from between brake pads. Remove 2 brake bracket mounting bolts and move brake bracket out of way. Remove brake assembly from sheave.

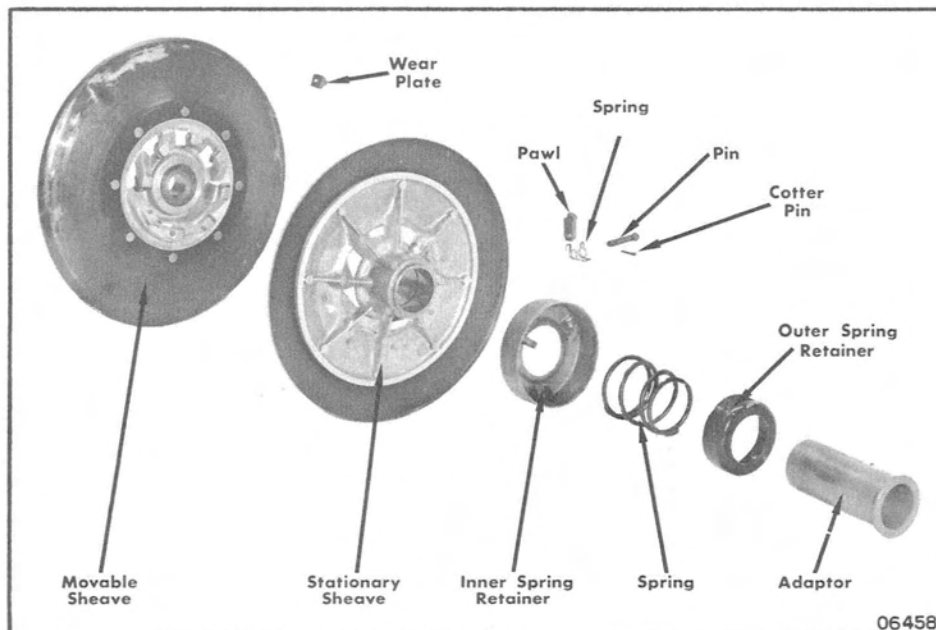
5. Remove adaptor, washer (manual and electric models only), outer spring retainer, spring, inner spring retainer and sheave. (Figure 10)
6. Using Wedge Tool Set (C-91-60215A1), insert one tool from top side and one from bottom side (between chain-case and fixed half of sheave).
7. Hammer top wedge (Figure 11) to loosen sheave from tapered jackshaft.
8. Remove fixed sheave.



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Figure 11. Loosening Sheave

Figure 10.  
Exploded View of  
Driven Sheave



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## CLEANING and INSPECTION

1. Inspect wear plates for excessive wear or broken plates. Replace as necessary. Wear plates are replaced as a set only.
2. Inspect bronze bushing in sliding half of sheave for

- wear. If worn, replace sliding half of sheave (bushing and sheave are not separable).
3. Inspect sheave surface for wear.
4. Replace any worn or damaged parts.

## TROUBLESHOOTING

If trouble is experienced, whereby the sliding half of the driven sheave assembly does not return to a fully closed position when the clutch disengages, check the following:

### LUBRICATION

Use Low Temperature Lubricant (C-92-59999-12). Proper type of lubricant is an important factor in clutch operation, particularly in extreme cold temperatures.

### WEAR PLATES - FIXED SHEAVE

Plastic wear plates (D-54900) for fixed sheave (8) have been modified to reduce possibility of binding on the sliding sheave. (Figure 1)

#### Late Style D-54900

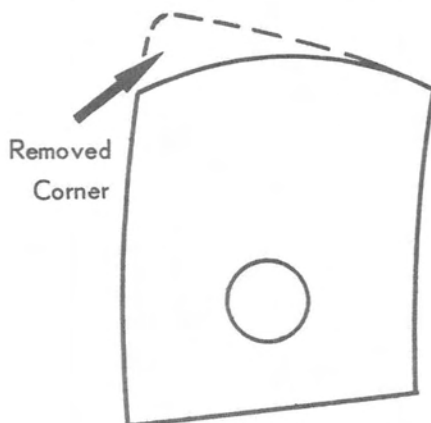


Figure 1. Wear Plate

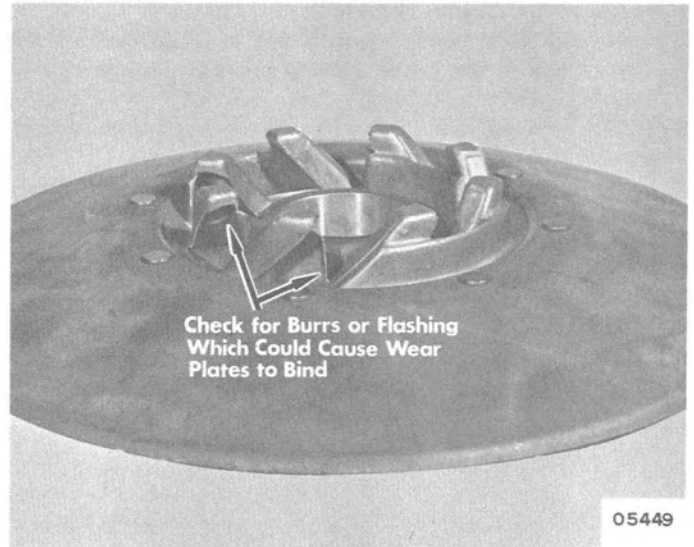


Figure 2. Sliding Sheave Casting

Install new-style wear plates in fixed sheave and make sure that no burrs or flashing exist on sliding sheave casing. (Figure 2)

*NOTE: To prevent wear plates from shifting or coming out, they are a tight press fit into fixed sheave. If a plate is loose fitting, cement it with C-92-33673-1 Epoxy or equivalent.*

## REASSEMBLY and INSTALLATION

1. Place fixed half of sheave on jackshaft.
2. Align index marks and install sliding half of sheave on jackshaft.
3. Install inner spring retainer, spring with large end toward sheave and small end toward outer spring retainer. (Figure 8)
4. Lubricate outside of sheave adaptor with Low Temperature Lubricant (C-92-59999-12).
5. Install washer (not present on electric-reverse models) onto sheave adaptor and insert sheave adaptor onto spring and sheave.
6. Start sheave retaining nut onto jackshaft.
7. Reinstall brake and brake bracket and adjust brake. See "Miscellaneous" Section 7A.

8. Hold brake and torque sheave retaining nut to specifications.

**CAUTION:** On electric-reverse models, the lock-out pawls must be held in neutral position (with reverse lockout tool from tool kit) when installing sheave retaining nut, or pawls will be on inside of spring retainer cup and sheave will not operate. See "Chassis" Section 2B.

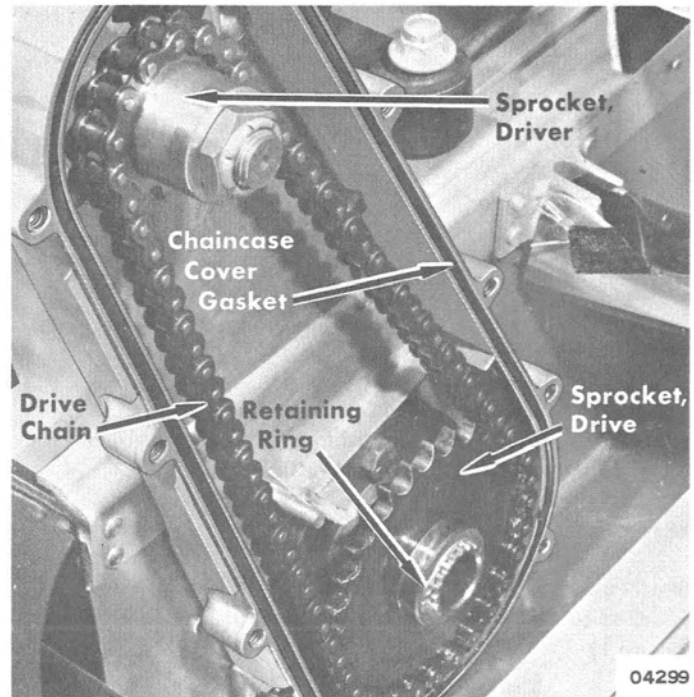
9. Reassemble handlebar support bracket and dash.

# JACKSHAFT

## REMOVAL and DISASSEMBLY

1. Remove bottom plug from chaincase and drain lubricant.
2. Remove driven sheave as outlined previously in this section.
3. Remove 9 cap screws and remove chaincase cover.
4. Loosen eccentric clamp nut and bolt.
5. Remove adjusting stud from eccentric.
6. Remove snap ring from drive shaft and remove drive sprocket and chain. (Figure 1)
7. Pull jackshaft and eccentric out of chaincase. Pull toward chaincase cover side to prevent damage to oil seals.
8. Place jackshaft in vise with vise jaw protectors and remove nut.
9. Using Puller Tool C-91-58164 and C-91-25733A2, remove sprocket.
10. Press jackshaft from eccentric. A hydraulic press may be necessary. Replace jackshaft assembly as necessary.

Figure 1. Removing Snap Ring



## INSPECTION

1. Spin outer race of bearings. Discard if bearing sounds or feels rough. Bearing should have smooth action and no rust marks.
2. Check jackshaft for straightness, using "V" blocks. If jackshaft is bent, discard jackshaft.
3. Check for smashed or damaged threads on jackshafts.

## REASSEMBLY and INSTALLATION

1. Press jackshaft into eccentric with bearings flush with eccentric surface. Hydraulic press may be necessary.  
*NOTE: The Part No. stamp on the eccentric must face sprocket end of shaft.*
2. Install eccentric into chaincase from handlebar side. This will prevent damaging oil seal.
3. Slide jack shaft assembly past adjusting stud hole and install driven sheave assembly onto jackshaft. Install eccentric adjusting stud.
4. Install bushing and center bolt.
5. Install brake bracket and adjust brake. Make sure that brake does not rub on sheave.
6. Hold brake and torque sheave center bolt to specifications.
7. Install drive sprocket, driver sprocket and drive chain all at the same time.
8. Secure driver sprocket with nut and torque to specification.
9. Secure drive sprocket with snap ring.
10. Adjust drive tension. See "Chain and Sprocket" Section 2D.
11. Install chaincase cover and retaining cap screws and torque to specification.
12. Reinstall chaincase drain plug and fill chaincase with lubricant. Refer to "Maintenance" Section 7C.

# DRIVE SHEAVE - 200 MODEL

## REMOVAL

1. Remove top cowl.
2. Remove clutch guard and drive belt. Remove primer hose (if applicable).
3. Remove 2 nuts and washers from exhaust pipe. (Figure 1)

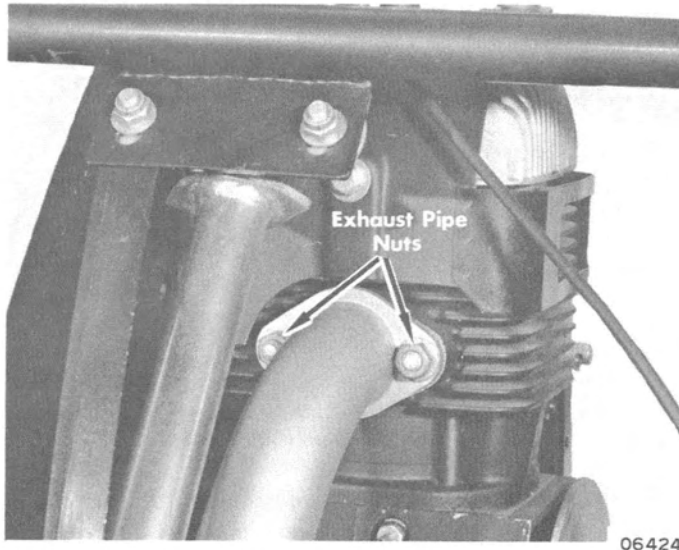


Figure 1. Removing Exhaust Pipe Nuts

4. Remove exhaust pipe from exhaust port and insert a rag at top of piston to prevent piston from moving. (Figure 2)
5. Remove retaining bolt, washers and cupped washer. (Figure 2)
6. Insert Drive Clutch Removal Tool (C-91-59873) into center hub and remove clutch assembly. (Figure 3) It may be necessary to rap tool with hammer to loosen clutch.

**CAUTION: DO NOT** use gear-type puller on ramp or fixed face to remove, as this will damage ramp or fixed face.

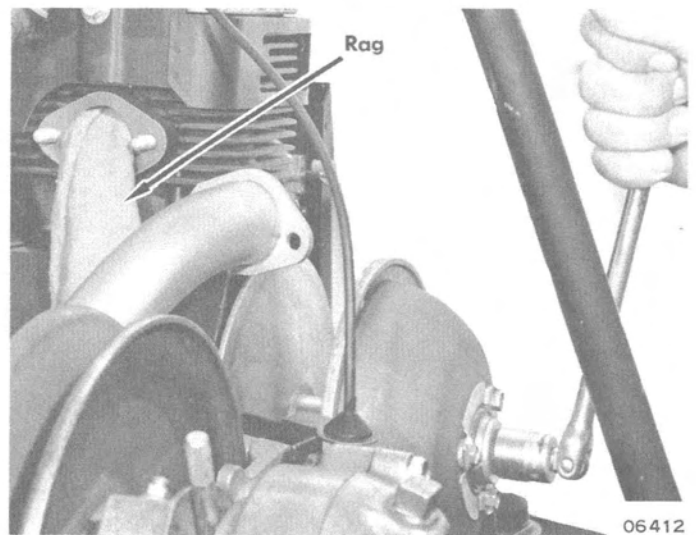


Figure 2. Rag Inserted to Stop Piston Movement

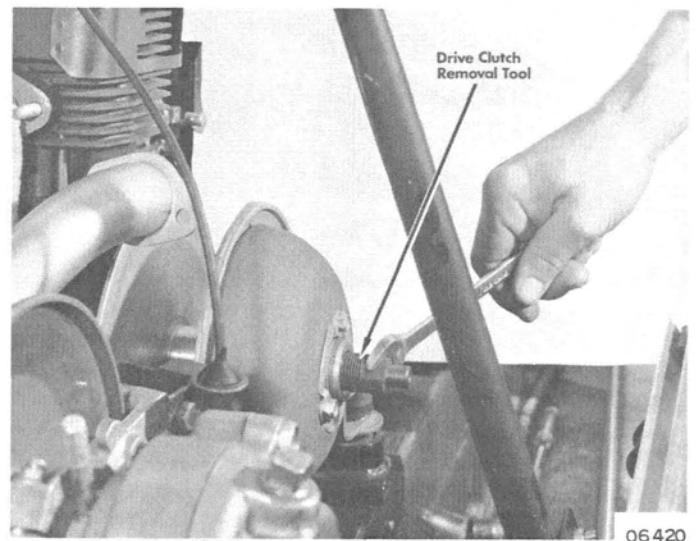
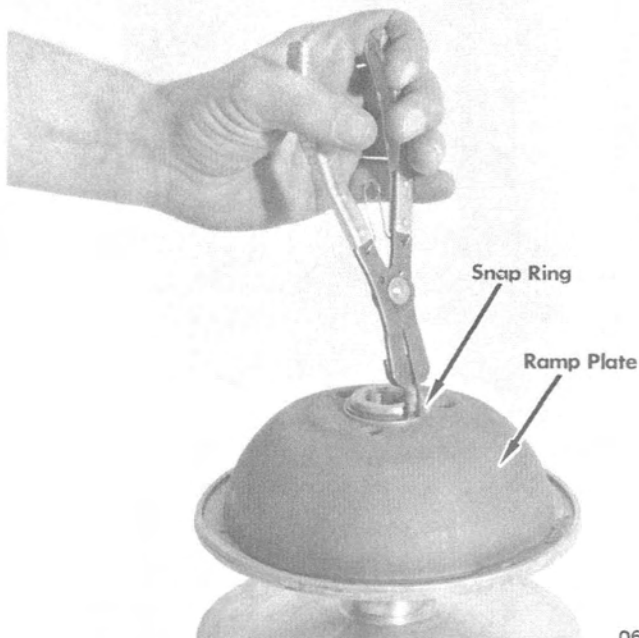


Figure 3. Removing Clutch



## DISASSEMBLY

1. Scribe a mark across hub and ramp plate for correct reinstallation.
2. Flatten lock plate tabs, which secure ramp plate retaining bolts, and remove bolts.
3. Remove snap ring and spacer from ramp plate and remove ramp plate. (Figure 4)

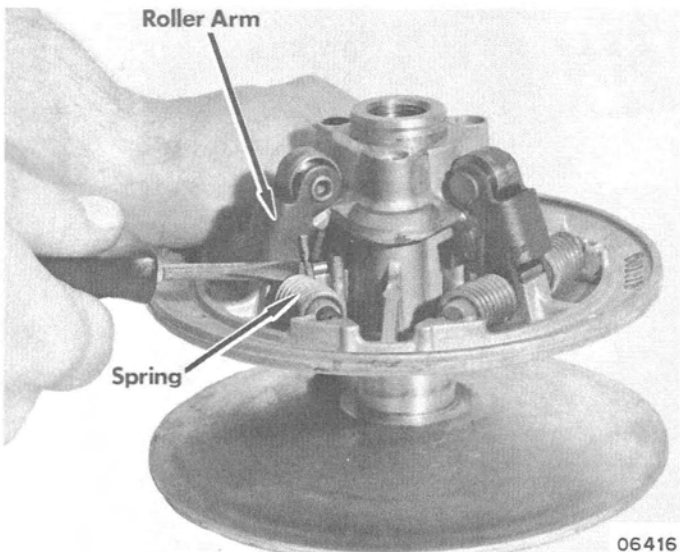


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**Figure 4. Removing Snap Ring and Spacer**

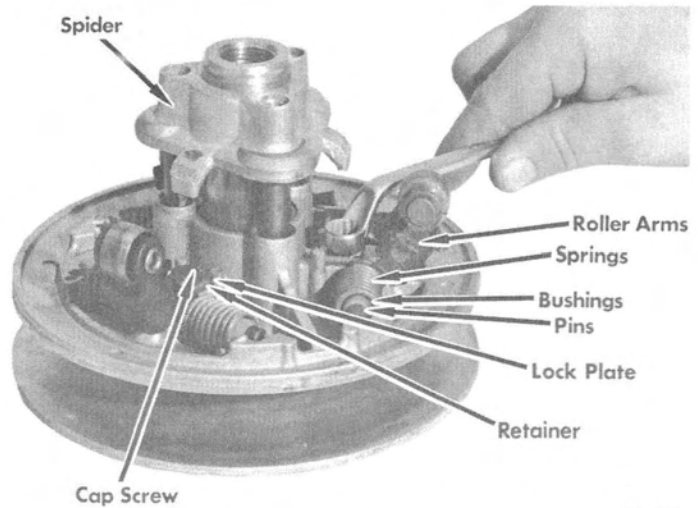
4. Using a screwdriver, release roller arm spring tension. (Figure 5)

*NOTE: Use caution (to avoid damaging nylon bushing) when releasing spring tension with a screwdriver.*



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**Figure 5. Releasing Spring Tension**



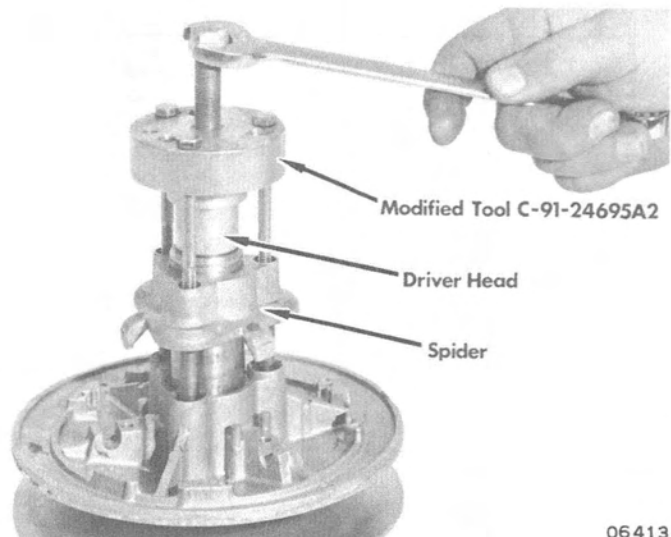
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**Figure 6. Removing Roller Arms**

5. Flatten lockplates on roller arm retaining screws. Remove screw, lockplate and retainer. (Figure 6)
6. Remove roller arms, pins, bushings and springs.

*NOTE: If any indication of wear exists, replace roller arm components in complete sets. Do not intermix new and used like parts.*

7. The spider is an interference fit on hub of fixed sheave half. Replace spider if any movement is present.
8. To remove spider, install suitable driver head from Bearing Mandral Kit (C-91-31229A1) into center of hub. Install suitable universal puller with three  $\frac{1}{4}$ -20 x 3" cap screws on top of driver head. Turn center screw and pull spider. (Figure 7)



06413

**Figure 7. Removing Spider**



## CLEANING and INSPECTION

1. Check springs, pins, bushings and roller arms for wear.
2. Examine movable face. Replace if bushings are worn or other damage is noted.
3. Check belt surface of both faces with a straight edge (Figure 8) Replace if worn, grooved or pitted.

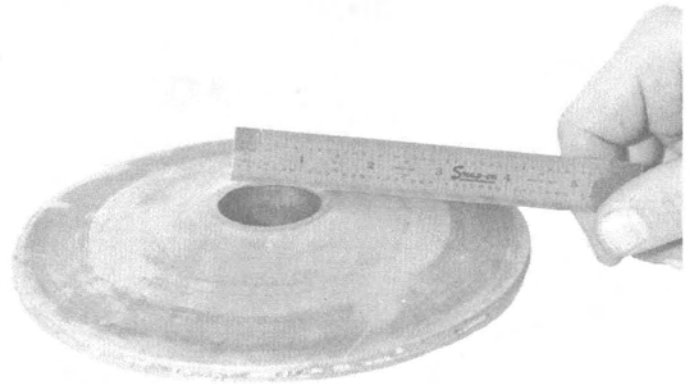


Figure 8. Checking Belt Faces with Straight Edge

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## REASSEMBLY

1. Position moveable half of sheave, spider and ramp plate on fixed half of sheave. Place the following on the sheave, one at a time, and pull assembly together. Spacer washer, snap ring and cupped washer. (Figure 9) Using Tool C-91-31229A1, pull assembly until snap ring slips into FIRST GROOVE IN HUB.

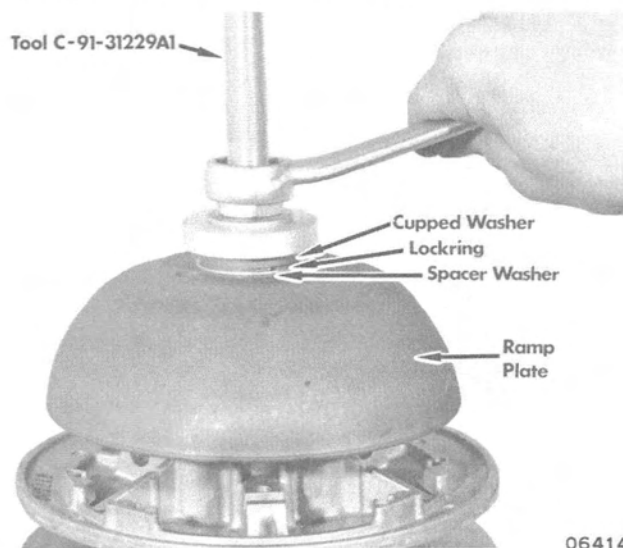
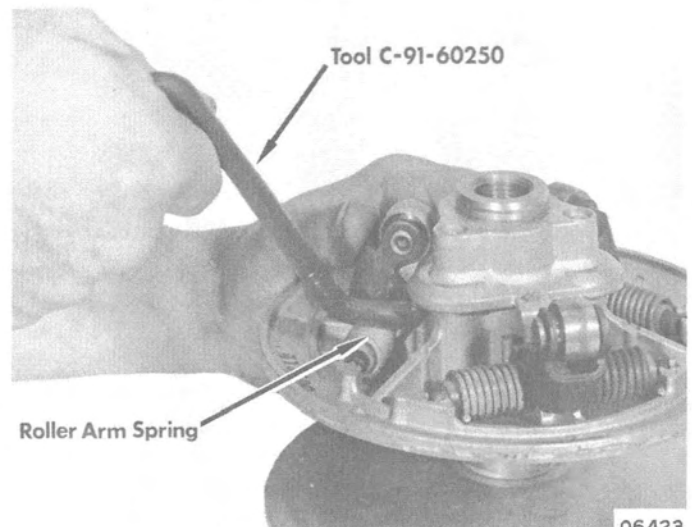


Figure 9. Pressing Spider onto Hub

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2. Remove cupped washer, snap ring, spacer and ramp plate. Moveable half of sheave should move freely.
3. Install roller arms, pins, springs and bushing.
4. Secure with retainer lock plate and retaining bolts.

5. Torque roller arm retaining bolts to 5-7 ft. lbs. and secure by bending lock tabs.
6. Lift moveable ramp up and engage roller arm springs with Tool C-91-60250. (Figure 10)



06423

Figure 10. Engaging Roller Arm Springs

7. Align scribe marks on ramp plate made during removal. Install ramp plate, spacer washer and snap ring.
8. Secure ramp plate with 3 retaining screws, washers and lockplate and torque to 8-10 ft. lbs. Place one washer under lockplate with each retaining bolt. Bend tabs of lockplates to secure bolts.

## INSTALLATION

1. Clean tapers of drive sheave and crankshaft. Sheave and crankshaft must be clean, dry and NOT lubricated.
2. Install drive sheave on crankshaft and secure with cupped washer and retaining bolt. Replace cupped washer if distorted.
3. Torque retaining bolt to 25 ft. lbs.
4. Install drive belt and clutch guard.

5. Install top cowl.

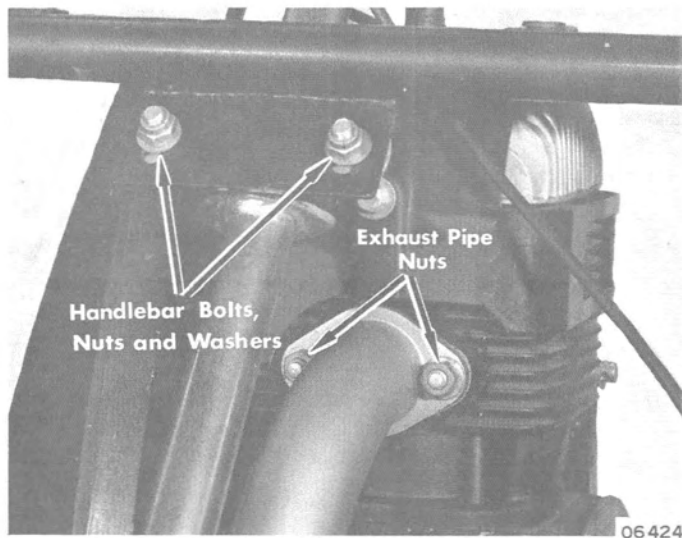
**NOTE:** If the drive sheave sticks or binds in the closed (high speed) position, the cause may be an over-torqued drive sheave retaining bolt. To remedy this problem, remove drive clutch, complete, from crankshaft and reinstall at correct torque.

# DRIVEN SHEAVE

## 200 MODEL

### REMOVAL and DISASSEMBLY

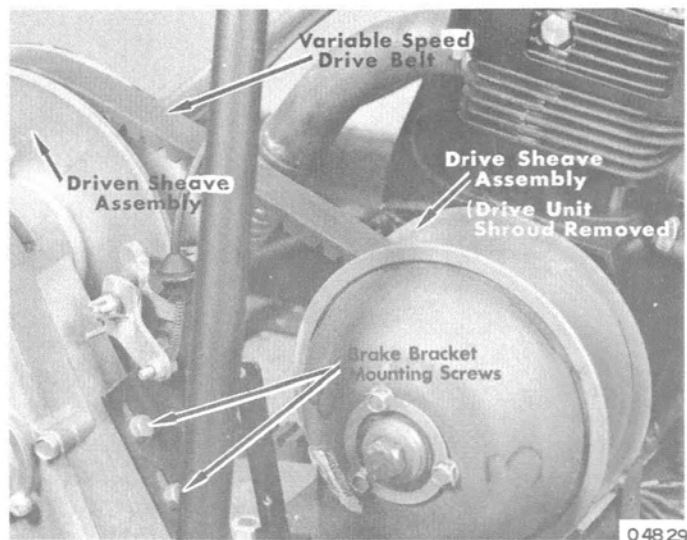
1. Remove top cowl.
2. Remove drive belt.
3. Remove 2 nuts from exhaust pipe and remove exhaust pipe from exhaust port. (Figure 1)
4. Remove 2 upper handlebar bolts, nuts and washers. (Figure 1)
5. Remove cotter pin and washer and pull up on handlebar to remove from lower mount.



**Figure 1. Removing Exhaust Pipe and Handlebar Nuts and Bolts**

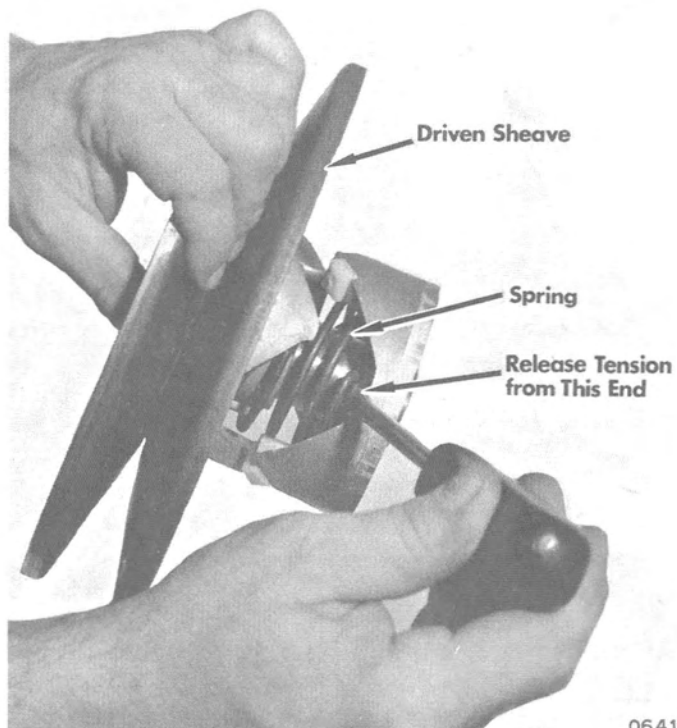
6. Hold vehicle brake and remove driven sheave retaining bolt.
7. Remove cotter pin and loosen brake tension adjusting nut and two 5/16-24 thru bolts which hold brake assembly together.
8. Remove 2 brake bracket mounting bolts and remove sheave assembly from between brake pads. (Figure 2) Remove sheave assembly.
9. Place sheave assembly on bench.
10. Release tension on sheave spring with a screwdriver inserted between torque bracket and sliding half of sheave. (Figure 3)
11. Rotate movable half of sheave so that torque bracket may be pressed downward.
12. Press down torque bracket with heels of hands to clear key (Figure 4) and turn torque bracket so that keyway does not line up with key.

**CAUTION: DO NOT** allow body or head over sheave assembly, as the key alone holds the torque bracket down.



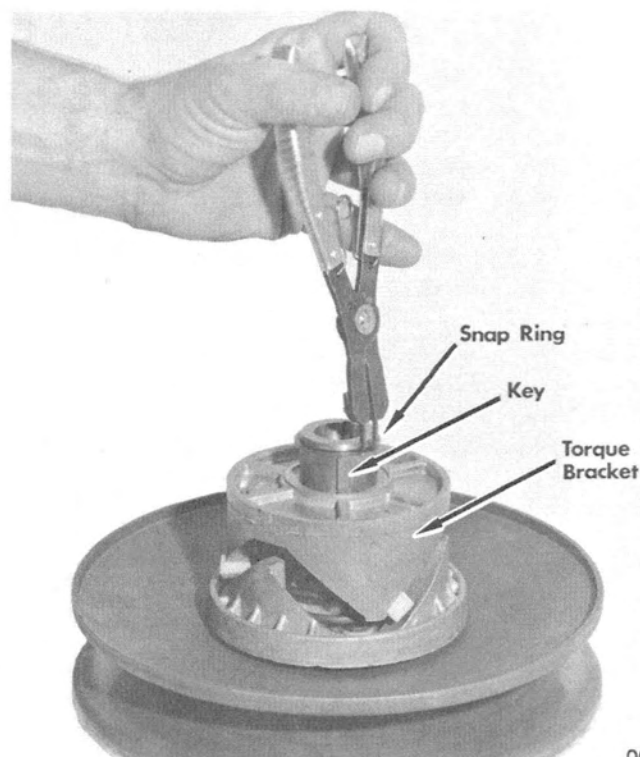
**Figure 2. Removing Sheave from Brake Assembly**

13. Remove snap ring.
14. Hold torque bracket securely and rotate so that key and keyway line up.
15. Carefully slide torque bracket up to release spring tension.
16. Remove spring and key from fixed hub.
17. Separate halves of sheave.



**Figure 3. Releasing Tension on Sheave Spring**

Figure 4. Locking Torque Bracket under Key



06419

## CLEANING and INSPECTION

1. Check sheave faces for wear and alignment. (See Figure 8 of drive sheave cleaning and inspection, preceding).
2. Inspect bushing in sliding half of sheave for wear.
3. Check nylon wear plates on torque bracket.
4. Replace any worn or damaged parts.

## REASSEMBLY and INSTALLATION

1. Place sliding half of sheave on fixed half of sheave hub and install key in hub.
2. Install spring over hub.
3. Engage spring (either end) in anchor point of sliding half of sheave.
4. Align torque bracket keyway with key in fixed half hub and engage spring in anchor point.
5. Compress spring until  $\frac{1}{16}$ " to  $\frac{1}{8}$ " in clearance is obtained between ramps. (Figure 5)
6. Turn sliding half  $\frac{1}{3}$  turn ( $120^\circ$ ) or one ramp to apply tension to spring. Press torque bracket below key and rotate bracket so that key and keyway do not line up. (Figure 4)

**CAUTION:** DO NOT allow body or head over sheave assembly, as the key is the only thing holding torque bracket down.

7. Replace snap ring and rotate torque bracket to align key to keyway.
8. Reinstall sheave on jackshaft. Install bolt and bushing.
9. Reassemble brake bracket and brake to sheave and adjust brake as outlined in "Miscellaneous" Section 7A.
10. Torque sheave retaining bolt to specifications.
11. Reinstall handlebar, washer and cotter pin.
12. Reinstall handlebar bolts and exhaust pipe nuts. (Figure 2) Torque to specifications.

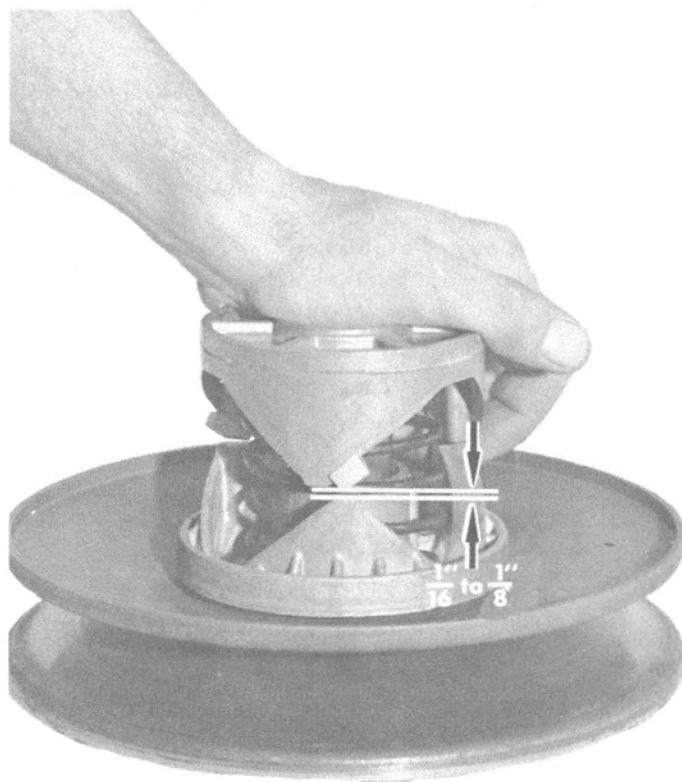


Figure 5. Installing Torque Bracket

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# JACKSHAFT REMOVAL and DISASSEMBLY

1. Remove bottom plug from chaincase and drain lubricant.
2. Remove driven sheave as outlined previously in this section.
3. Remove 9 cap screws and remove chaincase cover.
4. Loosen eccentric clamp nut and bolt.
5. Remove adjusting stud from eccentric.
6. Remove snap ring from drive shaft and remove driver sprocket and chain. (Figure 6)
7. Pull jackshaft and eccentric out of chaincase. Pull toward chaincase cover side to prevent damage to oil seals.
8. Place jackshaft in vise with vise jaw protectors and remove nut.
9. Using Puller Tool C-91-58164 and C-91-25733A2, remove sprocket.
10. Press jackshaft from eccentric. A hydraulic press may be necessary. Replace jackshaft assembly as necessary.

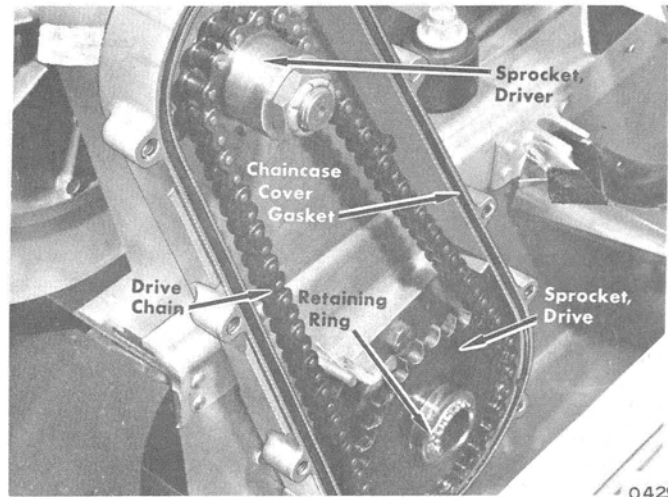


Figure 6. Removing Snap Ring

## INSPECTION

1. Spin outer race of bearings. Discard if bearing sounds or feels rough. Bearing should have smooth action and no rust marks.
2. Check jackshaft for straightness, using "V" blocks. If jackshaft is bent, discard jackshaft.
3. Check for smashed or damaged threads on jackshafts.

## REASSEMBLY and INSTALLATION

1. Press jackshaft into eccentric with bearings flush with eccentric surface. Hydraulic press may be necessary.  
*NOTE: The Part No. stamp on the eccentric must face sprocket end of shaft.*
2. Install eccentric into chaincase from handlebar side. This will prevent damaging oil seal.
3. Slide jackshaft assembly past adjusting stud hole and install driven sheave assembly onto jackshaft. Install eccentric adjusting stud.
4. Install bushing and center bolt.
5. Install brake bracket and adjust brake. Make sure that brake does not rub on sheave.
6. Hold brake and torque sheave center bolt to specifications.
7. Install drive sprocket, driver sprocket and drive chain all at the same time.
8. Secure driver sprocket with nut and torque to specification.
9. Secure drive sprocket with snap ring.
10. Adjust drive tension. See "Chain and Sprocket" Section 2D.
11. Install chaincase cover and retaining cap screws and torque to specification.
12. Reinstall chaincase drain plug and fill chaincase with lubricant. Refer to "Maintenance" Section 7C.

# DRIVE SHEAVE

## ROCKET (339cc) and LIGHTNING (398cc) MODELS

### REMOVAL

1. Lift top cowl.
2. Remove clutch guard and drive belt.
3. Hold drive sheave with C-91-60228 tool and remove retaining bolt and washer. (Figure 1)

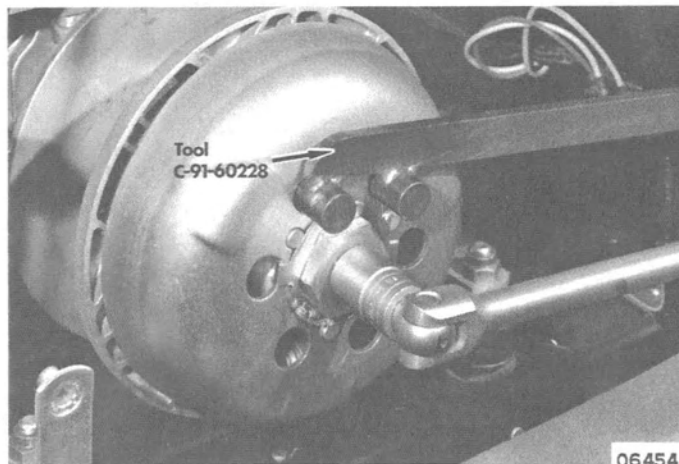


Figure 1. Holding Drive Sheave with C-91-60228 Tool

4. Flatten lockplate which secures ramp plate retaining nut.
5. Scribe a mark on ramp plate and spider boss to ensure correct installation. (Figure 2)
6. Remove ramp plate nut (right hand thread and torqued to 150 ft. lbs.).
7. Install Tool C-91-59874 in drive sheave. Hold ramp plate in position with Sheave Holder (C-91-60228) and operate puller to remove sheave assembly. (Figure 3)

**WARNING! DO NOT**, under any circumstances, attempt to repair or handle a **DRIVE** clutch (either on or off engine) that has stuck or jammed in the open (high gear) position, **UNTIL** a reasonable effort first has been made to close said clutch.

**ALWAYS** approach a stuck or jammed clutch with caution, keeping clear of the open area between the movable face and the clutch ramp plate, as a sudden closure of the ramp plate could result in serious bodily injury; ie., broken, smashed or severed fingers.

**WARNING! DO NOT** run a snowmobile engine, which is equipped with the **DRIVE** clutch, if the drive belt **IS NOT** engaged with the driven clutch. **ALWAYS** remove the **DRIVE** clutch before attempting a high speed, no-load engine test.

**IMPORTANT:** When servicing the **DRIVE** clutch (Salsbury 910 Series) on a Rocket (339cc), Lightning (398cc) or Hurricane (644cc), it is essential to performance and durability of the drive clutch that the ramp plate retaining

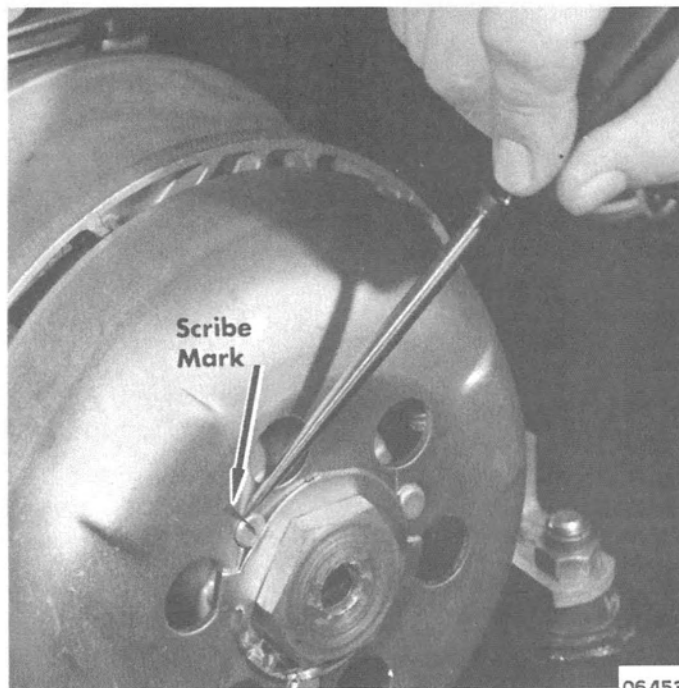


Figure 2. Scribing Location of Ramp Plate

nut be torqued to 140-160 ft. lbs. when the clutch is reassembled.

In the interests of safety and proper maintenance, it always is good practice to also check torque on the drive clutch retaining bolt (center, thru bolt) when servicing any snowmobile, regardless of the nature of repair.

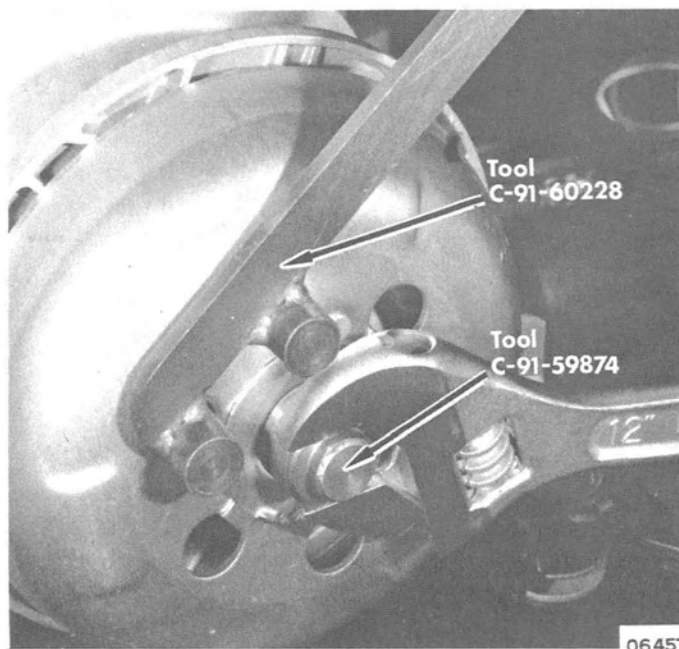


Figure 3. Removing Sheave from Crankshaft with Tools C-91-59874 and C-91-60228



## DISASSEMBLY

1. Remove springs from roller arms with a screwdriver. (Figure 4)

*NOTE: To avoid damaging nylon bushing, use caution when releasing spring tension with screwdriver.*

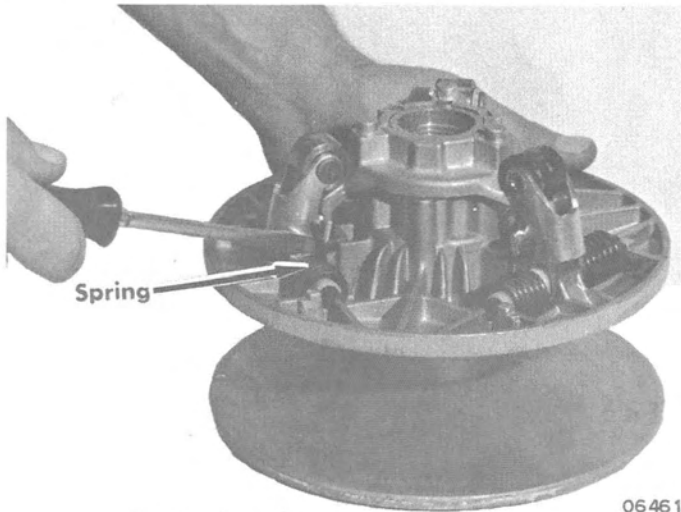


Figure 4. Releasing Spring Tension

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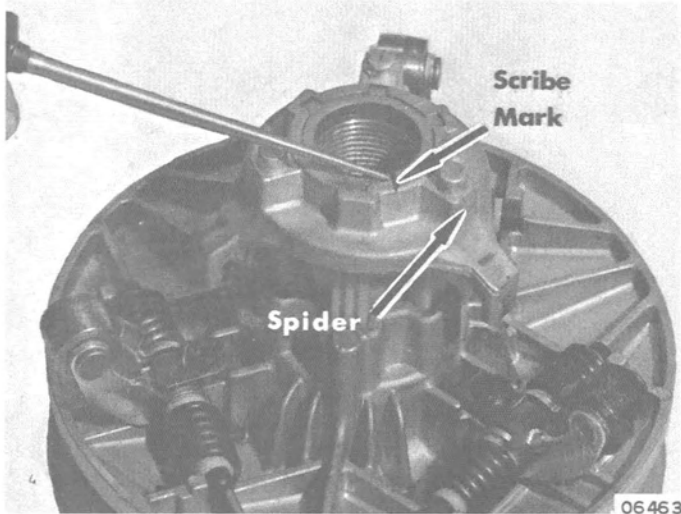


Figure 5. Scribing Spider

06463

2. Scribe a mark to show position of spider. (Figure 5)
3. Flatten locktab (located under pin retaining screw) (Figure 6) and remove screw, lockplate and retainer.

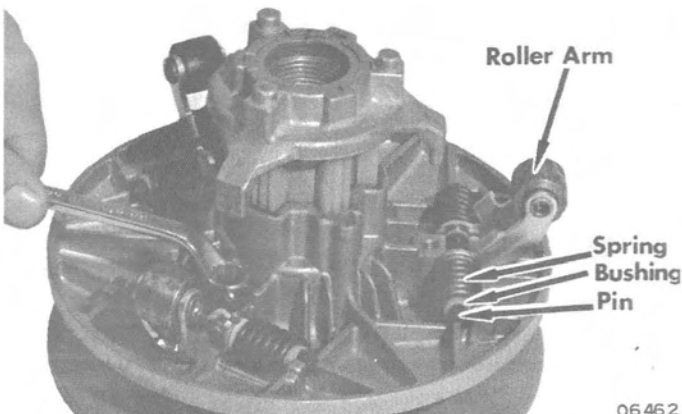


Figure 6. Removing Roller Arms

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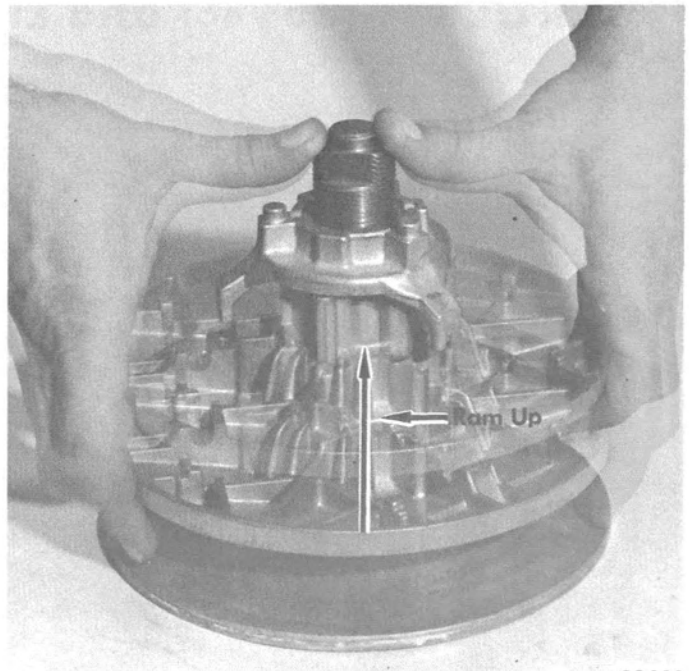


Figure 7. Removing Spider

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4. Remove roller arms, pins, springs and bushings.
5. Slide sliding half of drive sheave sharply against retractor to remove from hub. (Figure 7) It may be necessary to use a mallet.
6. Remove spline liners, spacer washer and idler bushing. (Figure 8)

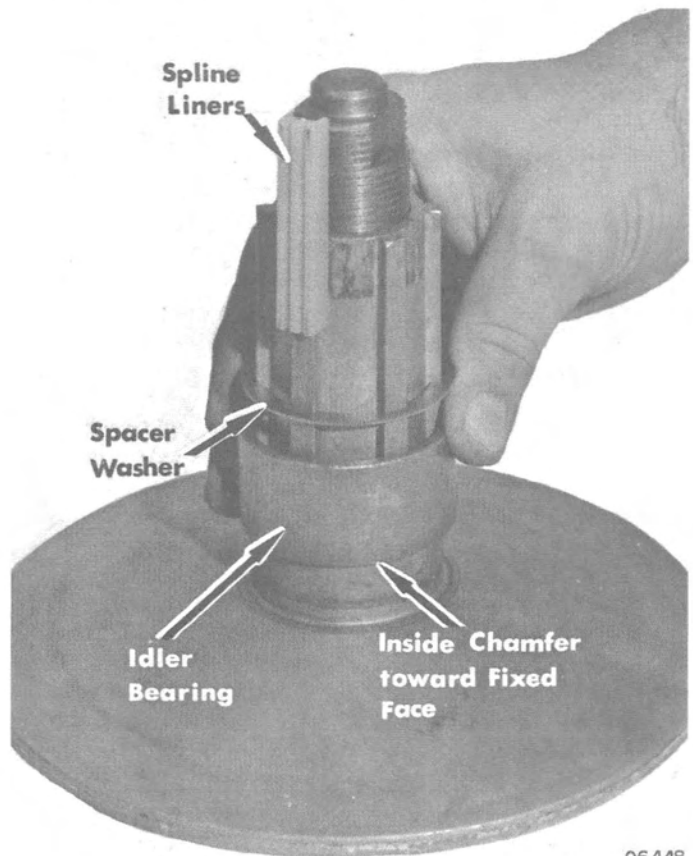


Figure 8. Removing Spline Liners, Spacer Washer and Idler Bushing

06448



## CLEANING and INSPECTION

1. Examine roller arms, springs, pins and bushings for wear at bearing points. Replace if worn. Replace parts in sets as indicated in parts list. DO NOT intermix new and used like parts.
2. Inspect spline liners and sliding half of sheave for excessive wear. Replace if worn.
3. Inspect inside taper of fixed half of sheave (crankshaft taper) for burrs and smooth condition (must be clean and dry for installation).
4. Clearance is maintained between spline liners and idler bushing by keyed washer. Service as required.
5. Examine belt surface of pulley faces and replace if worn, grooved, pitted, scored or other damage. Check for wear by placing straight edge across surface (Figure 9)
6. Idler bushing is a free-turning, close fit on the hub. Replace if worn excessively or binding. DO NOT use lubrication. Clean idler bushing with dry cloth; DO NOT use solvent.

**NOTE:** If a drive sheave malfunction occurs on Rocket (339cc) or Lightning (398cc) Snowmobiles (CHASSIS Serial No. 3124269 thru 3263262), it is recommended

that the brass idler bushing (located between 2 halves of drive sheave) be removed.

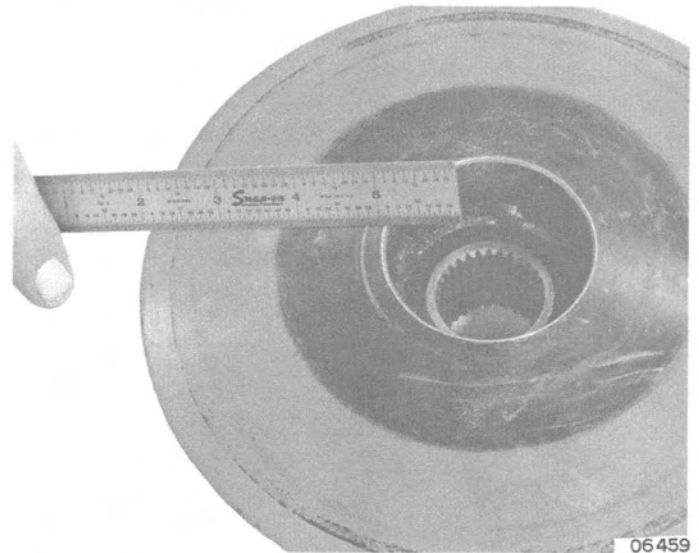


Figure 9. Checking Belt Faces with Straight Edge

## REASSEMBLY

1. Install roller pins, bushings, springs and rollers in position on sliding sheave and secure with retaining plate and screw. Torque lock plate screws to 5-7 ft. lbs. and bend locktab against screw.
2. Install idler bushing with inside chamfer toward fixed half of drive sheave. (Figure 8)
3. Install spacer washer on top of idler bushing.
4. Install sliding half of drive sheave.
5. Install nylon spline liners between sliding sheave and hub. Spline liners have tapered inner surface and should slide in position within minimum resistance. DO NOT lubricate spline liners or sheaves.

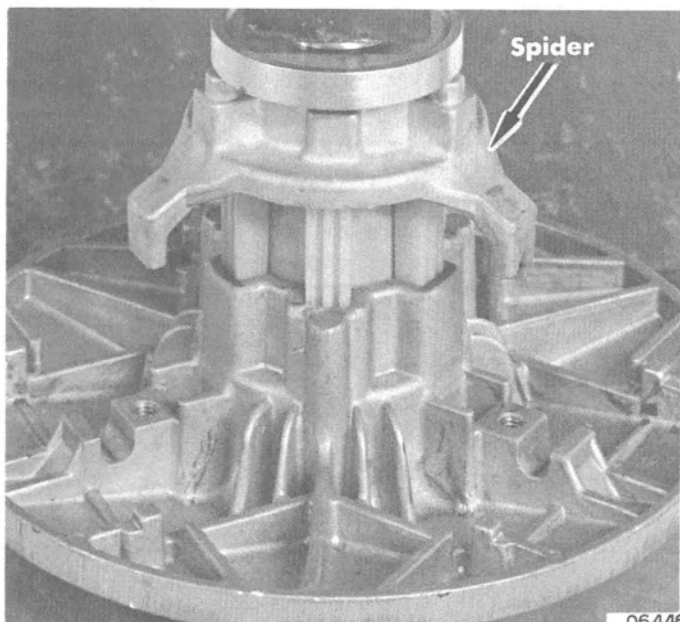


Figure 10. Installing Retractor

6. Align scribe marks on spider with scribe mark on fixed half of sheave and press spider flush with splined hub of fixed half of sheave. (Figure 10)
7. Install roller arms with cap screw and bend locktab up.
8. Move sliding sheave up-and-down to be certain that sliding half does not bind on spline liners.
9. Lift sliding sheave up and engage springs on roller arms with C-91-60250 tool. (Figure 11)

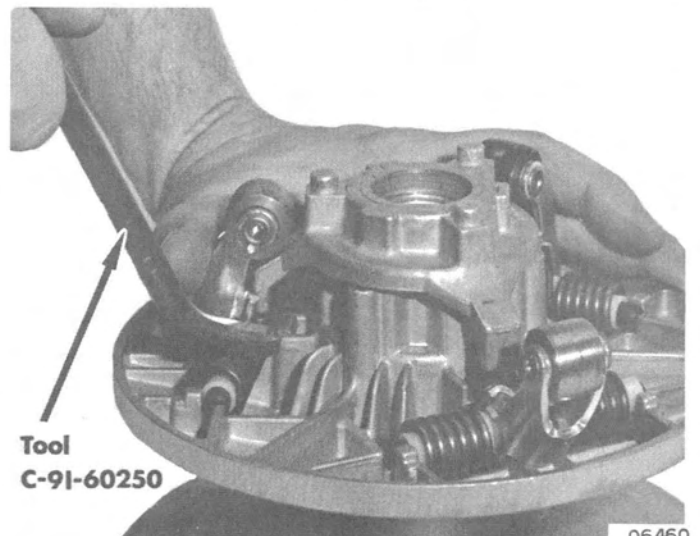


Figure 11. Engaging Roller Arm Springs

10. Place sheave on a suitable shaft or 8" bolt clamped in vise. (Figure 12) Align scribe mark on ramp plate with scribe mark on spider base. Install tab washer and ramp plate retaining nut. Using C-91-60228 tool, hold drive sheave and torque retaining nut 140-160 ft. lbs. Bend tab washer tab against nut.

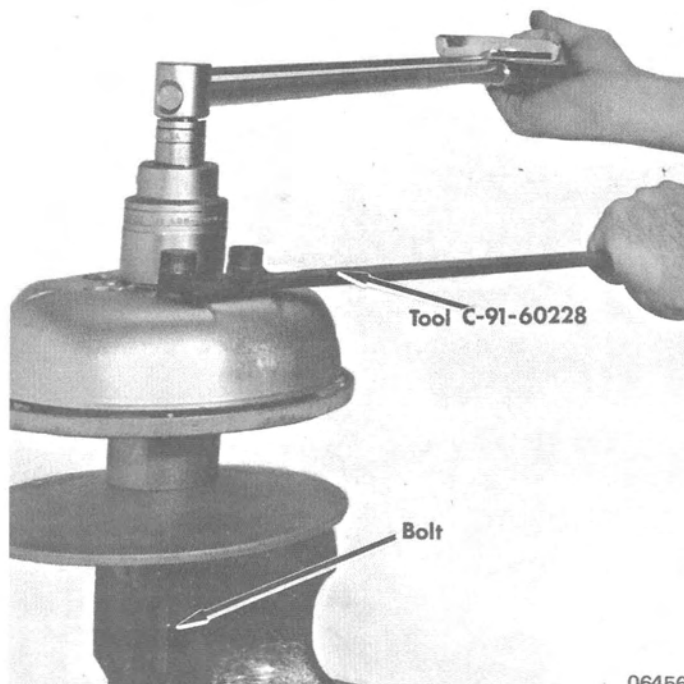


Figure 12. Placing Sheave on Bolt

**IMPORTANT:** Lightning (398cc) Model CHASSIS Serial No. Below 2984489 - Before installing drive sheave assembly onto crankshaft, inspect crankshaft OD at end of crankshaft (Figure 13) for sharp edge. If sharp edge is present, use a wetstone to break edge .015 to .020 radius to prevent possible damage to inside taper of fixed half of drive sheave.

**WARNING! DO NOT** run a snowmobile engine, which is equipped with the DRIVE clutch, if the drive belt IS NOT engaged with the driven clutch. ALWAYS remove the DRIVE clutch before attempting a high speed, no-load engine test.

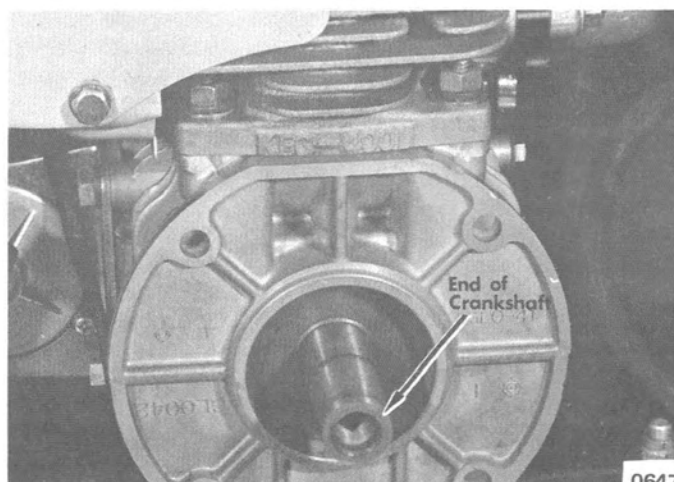


Figure 13. Crankshaft End

## INSTALLATION

1. Clean the tapers of drive sheave and crankshaft. Sheave and crankshaft must be clean, dry and NOT lubricated.
2. Place drive sheave on crankshaft and install retaining bolt and washer.
3. Torque retaining bolt 50-60 ft. lbs.
4. Install drive belt and clutch guard.

5. Close top cowl.

**CAUTION:** DO NOT operate engine, which is equipped with drive sheave, if drive belt is not engaged with driven sheave. Remove drive sheave BEFORE making high-speed, no-load engine test.

**WARNING! DO NOT**, under any circumstances, attempt to repair or handle a DRIVE clutch (either on or off engine) that has stuck or jammed in the open (high gear) position, UNTIL a reasonable effort first has been made to close said clutch.

ALWAYS approach a struck or jammed clutch with caution, keeping clear of the open area between the movable face and the clutch ramp plate, as a sudden closure of the ramp plate could result in serious bodily injury; ie., broke, smashed or severed fingers.

**IMPORTANT:** When servicing the DRIVE clutch (Salsbury 910 Series) on a Rocket (339cc), Lightning (398cc) or Hurricane (644cc), it is essential to performance and durability of the drive clutch that the ramp plate retaining nut be torqued to 140-160 ft. lbs. when the clutch is reassembled.

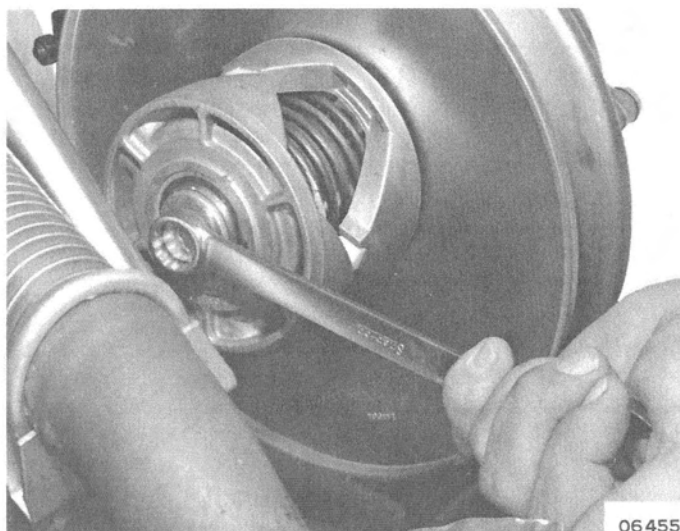
In the interests of safety and proper maintenance, it always is good practice to also check torque on the drive clutch retaining bolt (center, thru bolt) when servicing any snowmobile, regardless of the nature of repairs.

# DRIVEN SHEAVE

## ROCKET (339cc) and LIGHTNING (398cc) MODELS

### REMOVAL and DISASSEMBLY

1. Lift top cowl.
2. Remove drive belt from driven sheave.
3. Hold vehicle brake and remove driven sheave retaining bolt. (Figure 1)

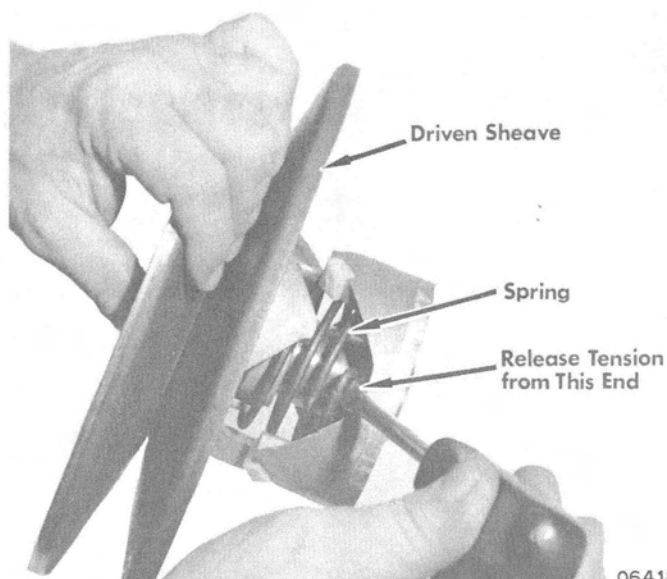


**Figure 1. Removing Sheave**

4. Remove cotter pin and loosen brake tension nut and two 5/16-24 thru bolts while holding brake assembly together to permit removal of sheave assembly from between brake pads. Remove 2 brake bracket mounting bolts and move brake bracket out of the way.
5. Remove 2 bolts, nuts and washers which secure handlebar to upper steering support.
6. Remove cotter pin and washer from handlebar in lower steering support.
7. Remove louvered dash panel and pull handlebar up and out of lower support bracket.
8. Slide driven sheave assembly off shaft and spacer and place on bench.
9. Release tension on sheave spring with a screwdriver inserted between torque bracket and sliding half of sheave. (Figure 2)
10. Rotate movable half of sheave so that torque bracket may be pressed downward.
11. Press down torque bracket with heels of hands to clear key and turn torque bracket so that keyway does not line up with key. (Figure 3)

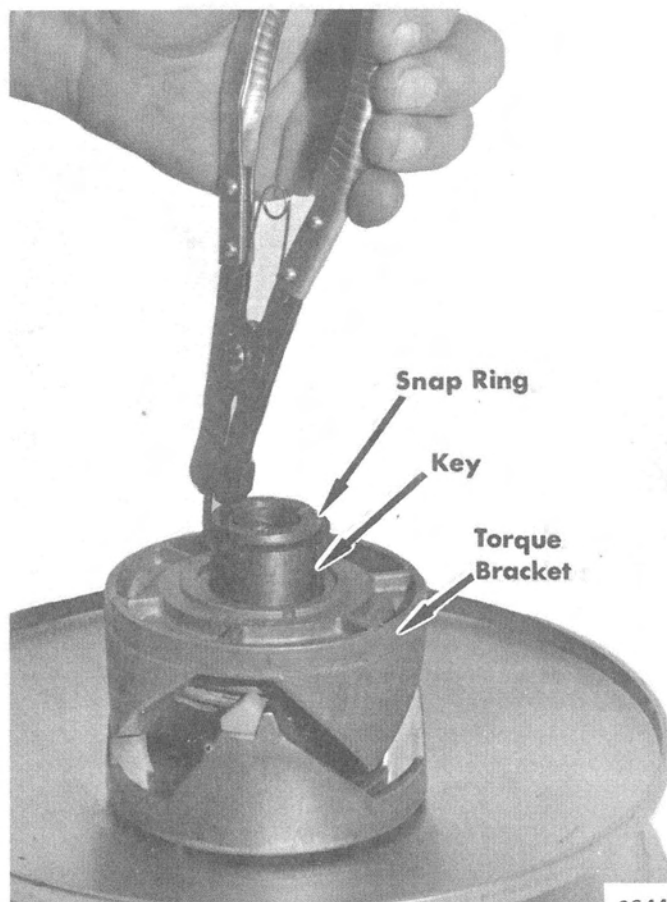
**WARNING: DO NOT** allow body or head to extend over sheave assembly, as the key is the only object which secures the torque bracket.

12. Remove snap ring.
13. Hold torque bracket securely and rotate so that key and keyway line up.
14. Carefully slide torque bracket up to release spring tension.



**Figure 2. Releasing Tension on Sheave Springs**

15. Remove spring and key from fixed hub and separate halves of sheave.



**Figure 3. Locking Torque Bracket under Key**

## CLEANING and INSPECTION

1. Check sheave faces for abnormal wear. (See Figure 9 of drive sheave "Cleaning and Inspection".)
2. Inspect bushing in sliding half of sheave for wear.
3. Check nylon wear plates on torque bracket. If excessive wear is indicated, replace as necessary.
4. Replace any worn or damaged parts.

**IMPORTANT:** Check spacer (located on jackshaft between driven sheave and chaincase assembly. If spacer is chamfered on inside diameter, IT MUST BE REPLACED with spacer C-23-58701 which is not chamfered and will reduce excessive wobble and vibration of driven sheave assembly.

## REASSEMBLY and INSTALLATION

1. Place sliding half of sheave on fixed half of sheave hub and install key in hub.
2. Install spring over hub.
3. Engage spring (either end) in anchor point of sliding half of sheave.
4. Align torque bracket keyway with key in fixed half hub and engage spring in anchor point.
5. Compress spring until  $1/16''$  to  $1/8''$  clearance is obtained between ramps. (Figure 4)

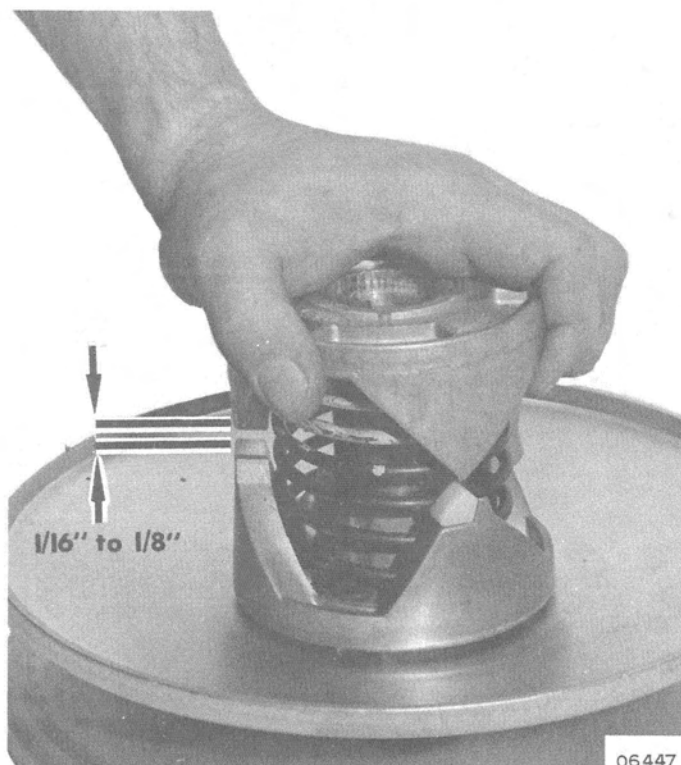


Figure 4. Installing Torque Bracket

6. Turn sliding half  $1/3$ -turn ( $120^\circ$ ), or one ramp, to apply tension to spring. Press torque bracket below key and rotate bracket so that key and keyway do not line up. (Figure 3)

**CAUTION:** DO NOT allow body or head to extend over sheave assembly, as the key is the only object which secures the torque bracket.

7. Install snap ring.

**CAUTION:** Be certain that snap ring is in groove.

8. Rotate torque bracket to align key to keyway.
9. Reinstall spacer and driven sheave assembly on jackshaft. Secure with bushing, lockwasher and bolt.

**CAUTION:** When installing spacer C-23-58701 on jackshaft between driven sheave and chaincase, make certain that spacer is placed on jackshaft next to chaincase and behind the ground recess in jackshaft. (Figure 5)

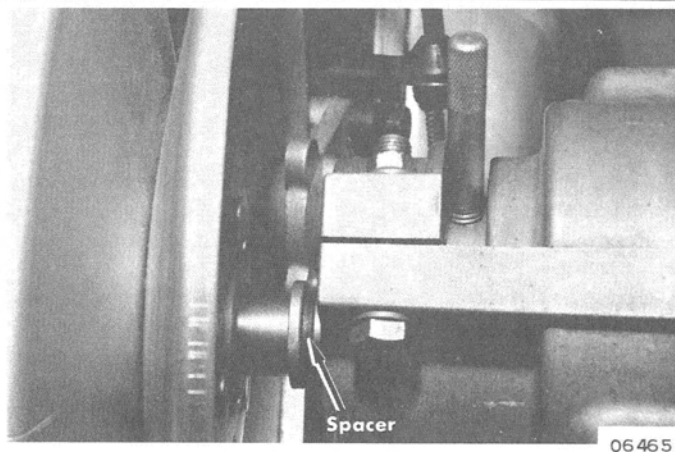


Figure 5. Spacer Position

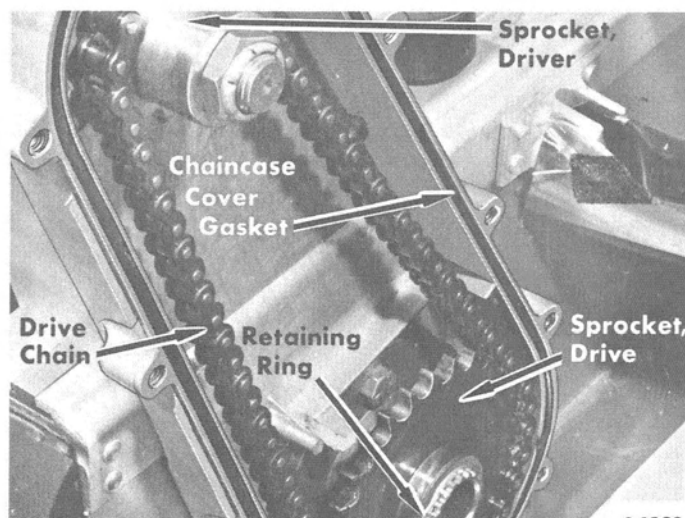
10. Reassemble brake bracket and brake to sheave. Refer to "Miscellaneous" Section 7A and adjust brake.
11. Torque sheave retaining bolt to specification.
12. Reinstall handlebar, nuts, bolts, washers and cotter pin.
13. Reinstall drive belt on driven sheave.



# JACKSHAFT - ROCKET and LIGHTNING MODELS

## REMOVAL and DISASSEMBLY

1. Remove bottom plug from chaincase and drain lubricant.
2. Remove driven sheave as outlined previously in this section.
3. Remove 9 cap screws and remove chaincase cover.
4. Loosen eccentric clamp nut and bolt.
5. Remove adjusting stud from eccentric.
6. Remove snap ring from drive shaft and remove driver sprocket and chain. (Figure 1)
7. Pull jackshaft and eccentric out of chaincase. Pull toward chaincase cover side to prevent damage to oil seals.
8. Place jackshaft in vise with vise jaw protectors and remove nut.
9. Using Puller Tool C-91-58164 and C-91-25733A2, remove sprocket.
10. Press jackshaft from eccentric. A hydraulic press may be necessary. Replace jackshaft assembly as necessary.



04229

Figure 1. Removing Snap Ring

## INSPECTION

1. Spin outer race of bearings. Discard if bearing sounds or feels rough. Bearing should have smooth action and no rust marks.
2. Check jackshaft for straightness, using "V" blocks. If jackshaft is bent, discard jackshaft.
3. Check for smashed or damaged threads on jackshafts.

## REASSEMBLY and INSTALLATION

1. Press jackshaft into eccentric with bearings flush with eccentric surface. Hydraulic press may be necessary.

*NOTE: The Part No. stamp on the eccentric must face sprocket end of shaft.*

2. Install eccentric into chaincase from handlebar side. This will prevent damaging oil seal.
3. Slide jackshaft assembly past adjusting stud hole and install driven sheave assembly onto jackshaft. Install eccentric adjusting stud.
4. Install bushing and center bolt.
5. Install brake bracket and adjust brake. Make sure that brake does not rub on sheave.

6. Hold brake and torque sheave center bolt to specifications.
7. Install drive sprocket, driver sprocket and drive chain all at the same time.
8. Secure driver sprocket with nut and torque to specification.
9. Secure drive sprocket with snap ring.
10. Adjust drive tension. See "Chain and Sprocket" Section 2D.
11. Install chaincase cover and retaining cap screws and torque to specification.
12. Reinstall chaincase drain plug and fill chaincase with lubricant. Refer to "Maintenance" Section 7C.

# DRIVE SHEAVE HURRICANE (644cc) REMOVAL

1. Lift top cowl.
2. Remove clutch guard and drive belt.
3. Hold drive sheave with Sheave Holder (C-91-62273) and remove retaining bolt and washer. (Figure 1)

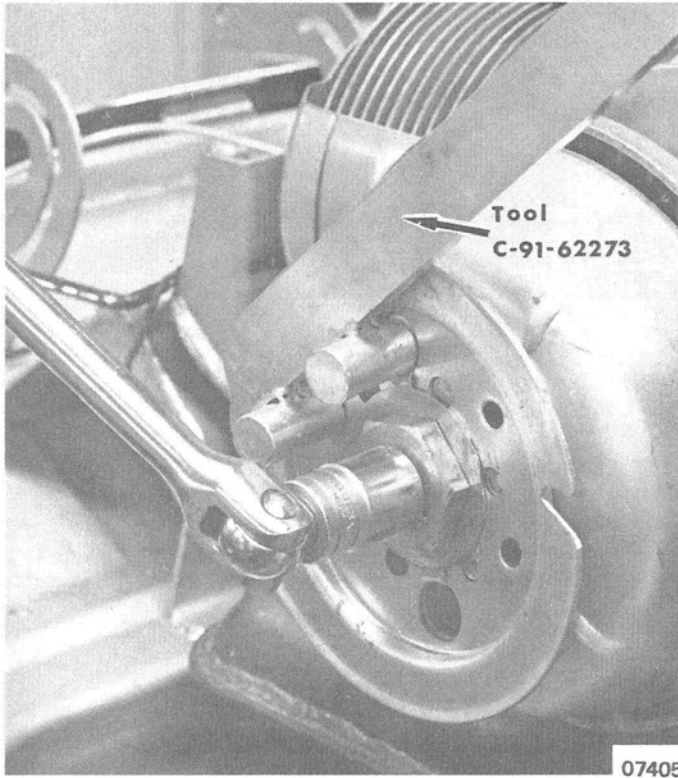


Figure 1. Holding Drive Sheave with C-91-62273 Tool

4. Flatten lockplate which secures ramp plate retaining nut.
5. Scribe a mark on starter rope plate and spider boss to ensure correct installation. (Figure 2)
6. Remove ramp plate nut (right hand thread and torqued to 150 ft. lbs.).
7. Install Tool C-91-59874 in drive sheave. Hold ramp plate in position with Sheave Holder (C-91-62273) and operate puller to remove sheave assembly. (Figure 3)

Figure 3. Removing Sheave from Crankshaft with Tools C-91-59874 and C-91-62273

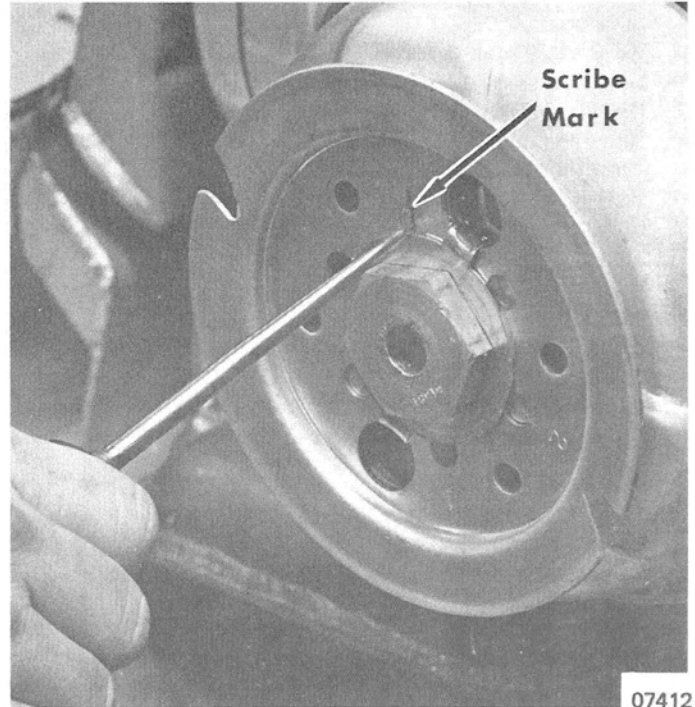
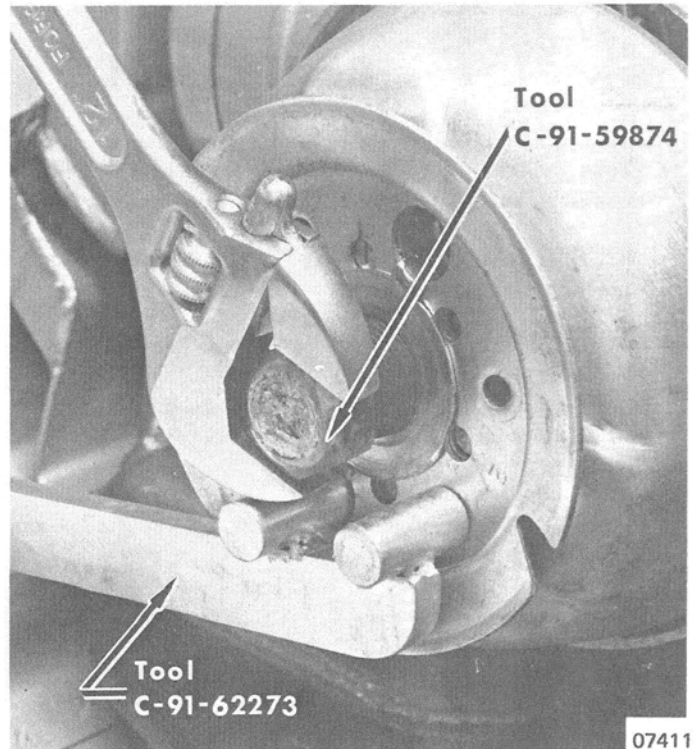


Figure 2. Scribing Location of Ramp Plate





# DISASSEMBLY

1. Remove springs from roller arms with a screwdriver. (Figure 4)

*NOTE: To avoid damaging nylon bushing, use caution when releasing spring tension with screwdriver.*

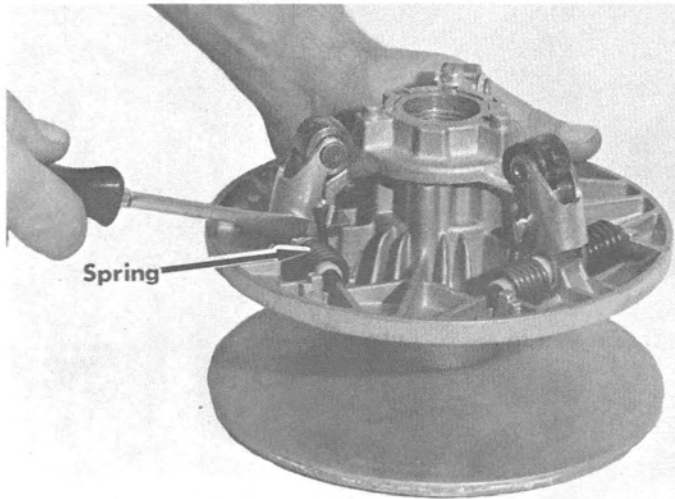


Figure 4. Releasing Spring Tension

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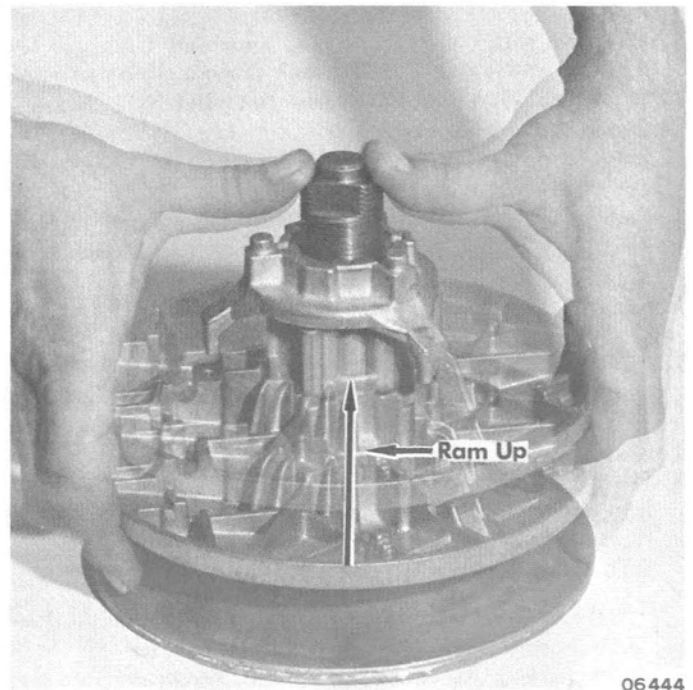


Figure 7. Removing Spider

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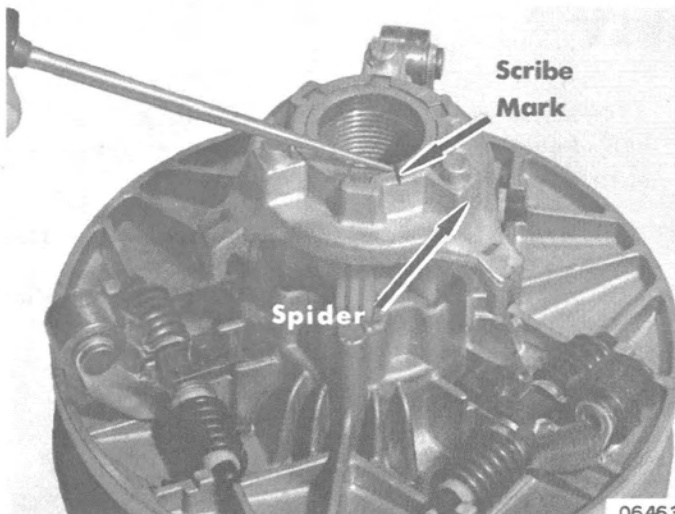


Figure 5. Scribing Spider

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2. Scribe a mark to show position of spider. (Figure 5)
3. Flatten locktab (located under pin retaining screw) (Figure 6) and remove screw, lockplate and retainer.

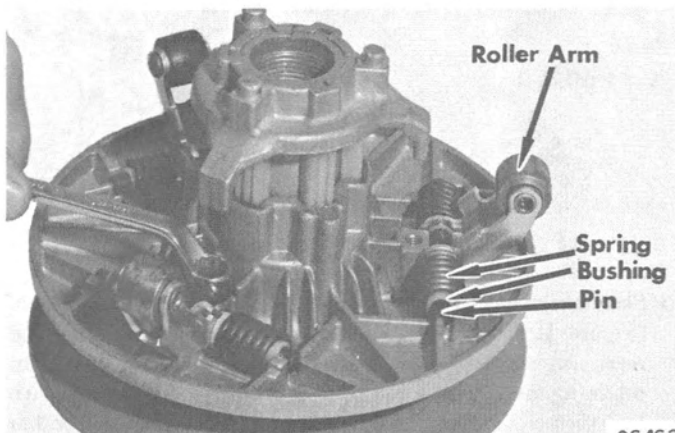


Figure 6. Removing Roller Arms

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4. Remove roller arms, pins, springs and bushings.
5. Slide sliding half of drive sheave sharply against retractor to remove from hub. (Figure 7) It may be necessary to use a mallet.
6. Remove spline liners, spacer washer and idler bushing. (Figure 8)

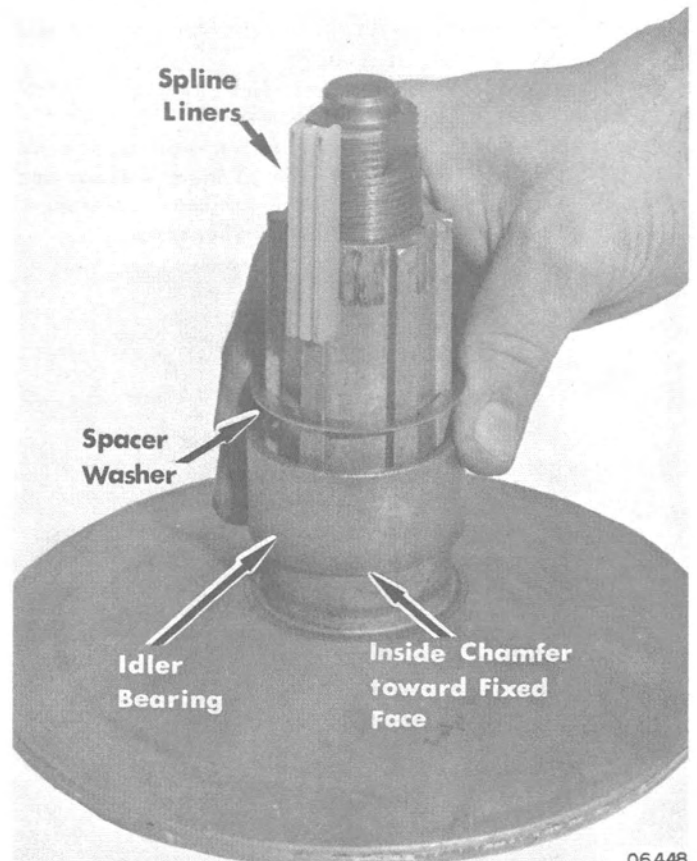


Figure 8. Removing Spline Liners, Spacer Washer and Idler Bushing

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## CLEANING and INSPECTION

1. Examine roller arms, springs, pins and bushings for wear at bearing points. Replace if worn. Replace parts in sets as indicated in parts list. DO NOT intermix new and used like parts.
2. Inspect spline liners and sliding half of sheave for excessive wear. Replace if worn.
3. Inspect inside taper of fixed half of sheave (crankshaft taper) for burrs and smooth condition (must be clean and dry for installation).
4. Clearance is maintained between spline liners and idler bushing by keyed washer. Service as required.
5. Examine belt surface of pulley faces and replace if worn, grooved, pitted, scored or other damage. Check for wear by placing straight edge across surface (Figure 9)
6. Idler bushing is a free-turning, close fit on the hub. Replace if worn excessively or binding. DO NOT use lubrication. Clean idler bushing with dry cloth; DO NOT use solvent.

*NOTE: To eliminate the possibility of damage to drive sheave components, it is recommended that the brass idler bushing (located between 2 halves of drive sheave)*

*be removed from all Hurricane (644cc) Snowmobiles (CHASSIS Serial No. 3202073 thru 3205072).*

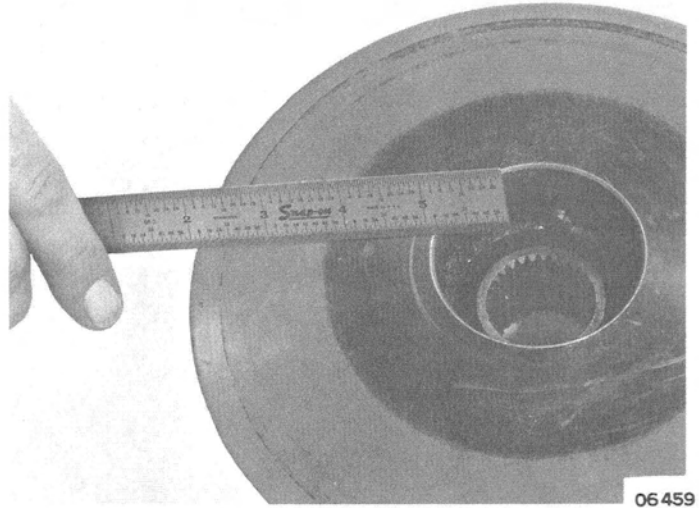


Figure 9. Checking Belt Faces with Straight Edge

## REASSEMBLY

1. Install roller pins, bushings, springs and rollers in position on sliding sheave and secure with retaining plate and screw. Torque lock plate screws to 5-7 ft. lbs. and bend locktab against screw.
2. Install idler bushing with inside chamfer toward fixed half of drive sheave. (Figure 8)
3. Install spacer washer on top of idler bushing.
4. Install sliding half of drive sheave.
5. Install nylon spline liners between sliding sheave and hub. Spline liners have tapered inner surface and should slide in position within minimum resistance. DO NOT lubricate spline liners or sheaves.

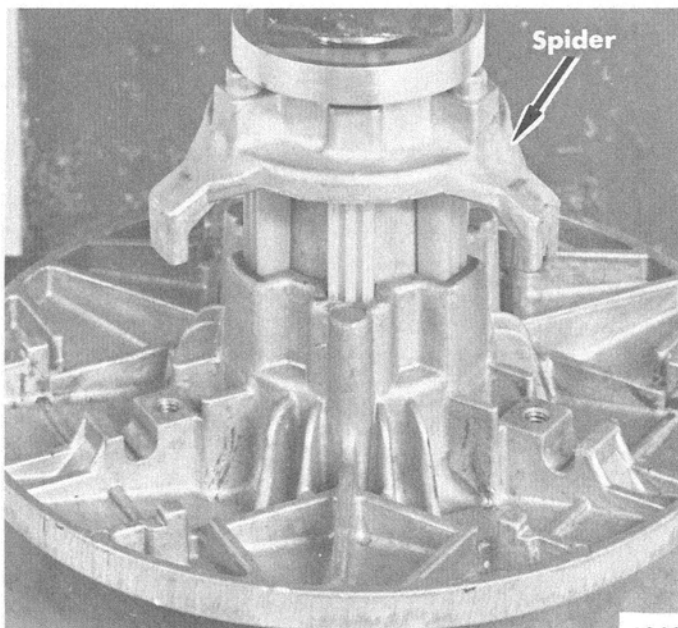


Figure 10. Installing Retractor

6. Align scribe marks on spider with scribe mark on fixed half of sheave and press spider flush with splined hub of fixed half of sheave. (Figure 10)
7. Install roller arms with cap screw and bend locktab up.
8. Move sliding sheave up-and-down to be certain that sliding half does not bind on spline liners.
9. Lift sliding sheave up and engage springs on roller arms with C-91-60250 tool. (Figure 11)

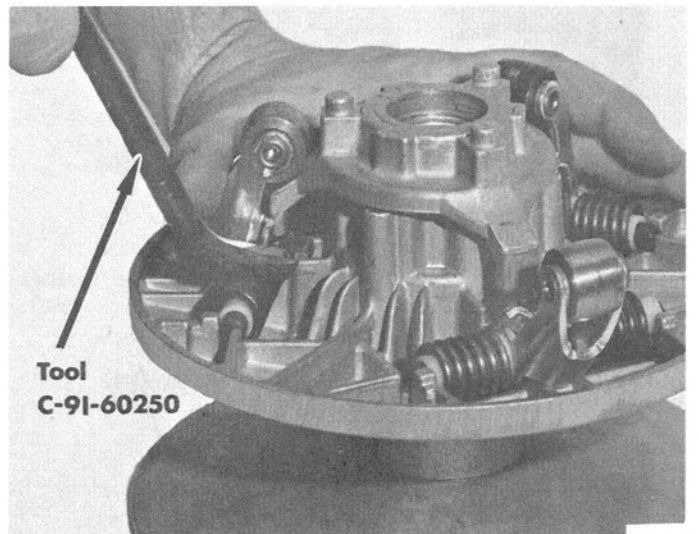
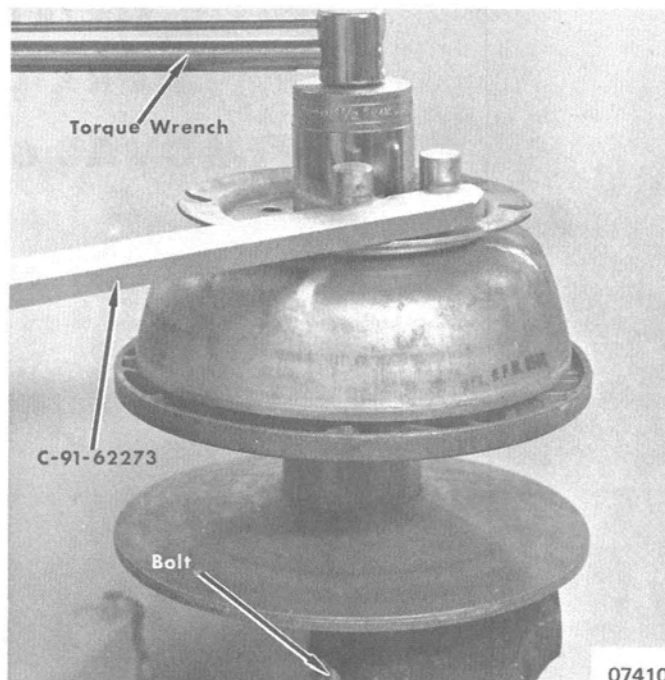


Figure 11. Engaging Roller Arm Springs

10. Place sheave on a suitable shaft or 8" bolt clamped in vise. (Figure 12) Align scribe mark on ramp plate with scribe mark on spider base. Install tab washer and ramp plate retaining nut. Using C-91-62273 tool, hold drive sheave and torque retaining nut 150 ft. lbs. Bend tab washer tab against nut.

Figure 12. Placing Sheave on Bolt



## INSTALLATION

1. Clean the tapers of drive sheave and crankshaft. Sheave and crankshaft must be clean, dry and NOT lubricated.
2. Place drive sheave on crankshaft and install retaining bolt and washer.
3. Torque retaining bolt 50-60 ft. lbs.
4. Install drive belt and clutch guard.

5. Close top cowl.

**CAUTION: DO NOT** operate engine, which is equipped with drive sheave, if drive belt is not engaged with driven sheave. Remove drive sheave **BEFORE** making high-speed, no-load engine test.

# DRIVEN SHEAVE HURRICANE (644cc) REMOVAL and DISASSEMBLY

1. Lift top cowl.
2. Remove drive belt from driven sheave.
3. Hold vehicle brake and remove driven sheave retaining bolt. (Figure 1)

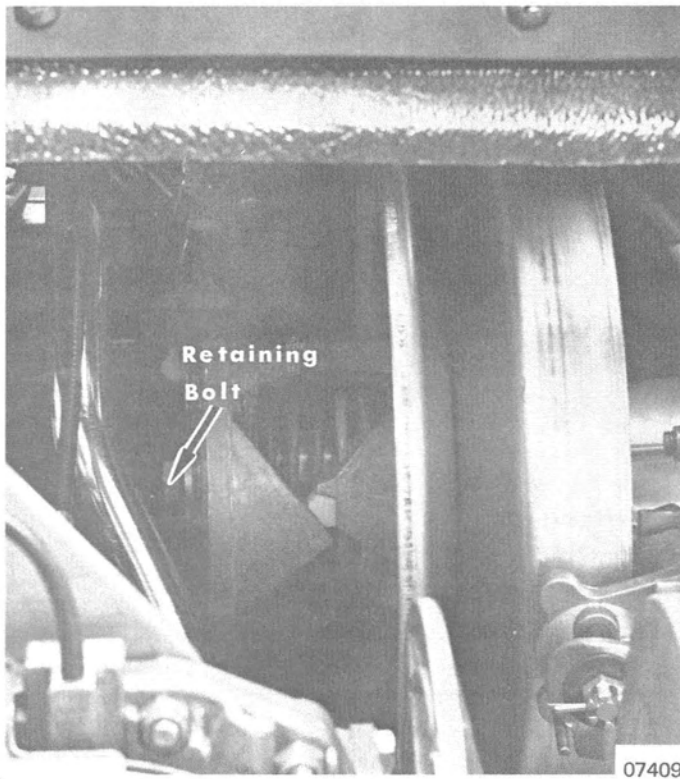


Figure 1. Removing Sheave

4. Turn skis to right to remove driven sheave from jackshaft and brake.
5. Turn skis to left to remove driven sheave from under dash. (Figure 2)

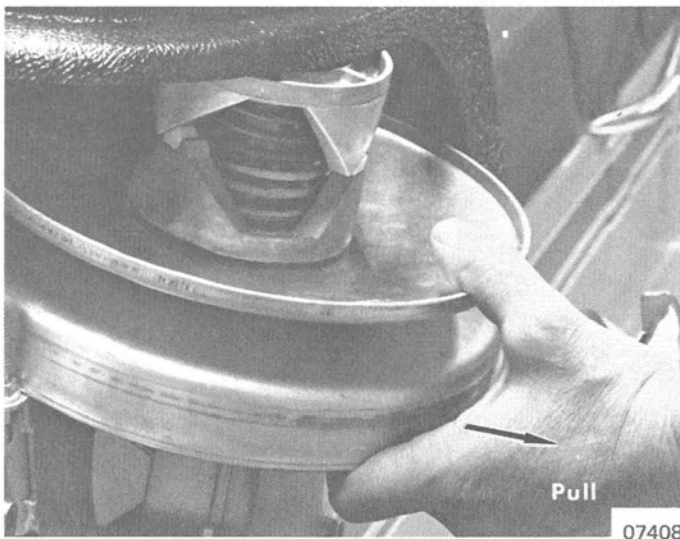


Figure 2. Removing Driven Sheave from Under Dash

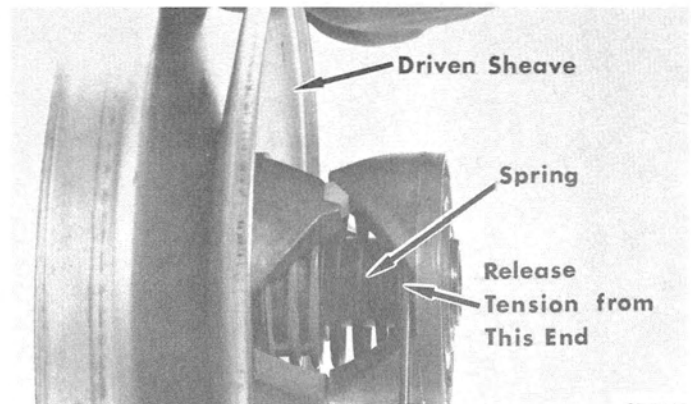


Figure 3. Releasing Tension on Sheave Springs

6. Release tension on sheave spring with a screwdriver inserted between torque bracket and sliding half of sheave. (Figure 3)
7. Rotate movable half of sheave so that torque bracket may be pressed downward.
8. Press down torque bracket with heels of hands to clear key and turn torque bracket so that keyway does not line up with key. (Figure 4)

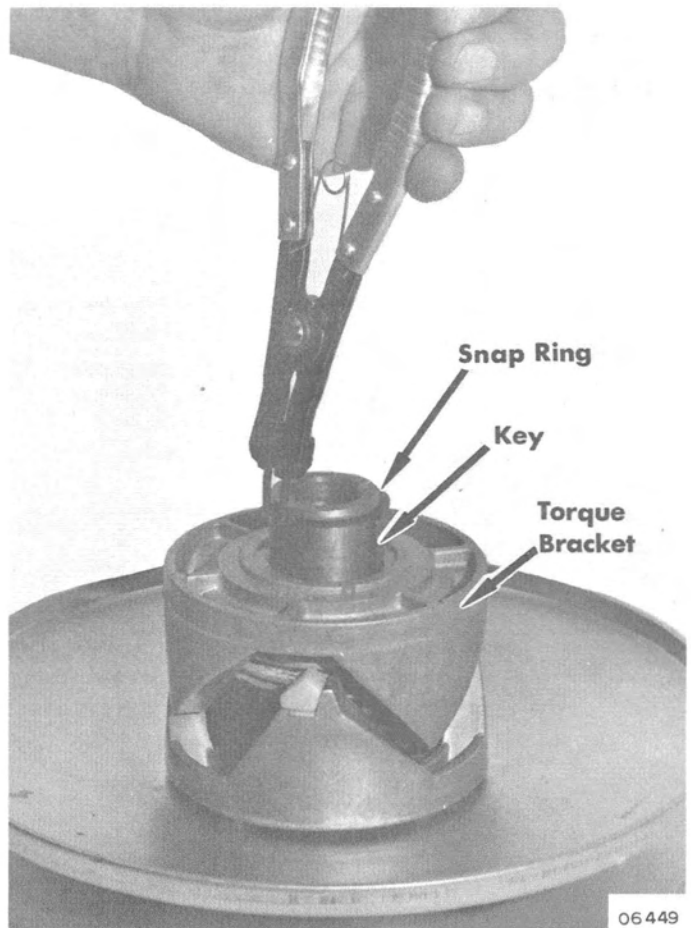


Figure 4. Locking Torque Bracket under Key



**WARNING: DO NOT** allow body or head to extend over sheave assembly, as the key is the only object which secures the torque bracket.

9. Remove snap ring.

## CLEANING and INSPECTION

1. Check sheave faces for abnormal wear. (See Figure 9 of drive sheave "Cleaning and Inspection".)
2. Inspect bushing in sliding half of sheave for wear.
3. Check nylon wear plates on torque bracket. If excessive wear is indicated, replace as necessary.
4. Replace any worn or damaged parts.

10. Hold torque bracket securely and rotate so that key and keyway line up.
11. Carefully slide torque bracket up to release spring tension.
12. Remove spring and key from fixed hub and separate halves of sheave.

**IMPORTANT:** Check spacer (located on jackshaft between driven sheave and chaincase assembly). If spacer is chamfered on inside diameter, IT MUST BE REPLACED with spacer (C-23-58701) which is not chamfered and will reduce excessive wobble and vibration of driven sheave assembly.

## REASSEMBLY and INSTALLATION

1. Place sliding half of sheave on fixed half of sheave hub and install key in hub.
2. Install spring over hub.
3. Engage spring (either end) in anchor point of sliding half of sheave.
4. Align torque bracket keyway with key in fixed half hub and engage spring in anchor point.
5. Compress spring until  $1/16''$  to  $1/8''$  clearance is obtained between ramps. (Figure 5)
6. Turn sliding half  $1/3$ -turn ( $120^\circ$ ), or one ramp, to apply tension to spring. Press torque bracket below key and rotate bracket so that key and keyway do not line up. (Figure 4)

**CAUTION: DO NOT** allow body or head to extend over sheave assembly, as the key is the only object which secures the torque bracket.

7. Install snap ring.

**CAUTION:** Be certain that snap ring is in groove.

8. Rotate torque bracket to align key to keyway.
9. Reinstall driven sheave assembly between brake pads and onto jackshaft. Secure with bushing, lockwasher and bolt.
10. Torque sheave retaining bolt to specification.
11. Reinstall drive belt on driven sheave.

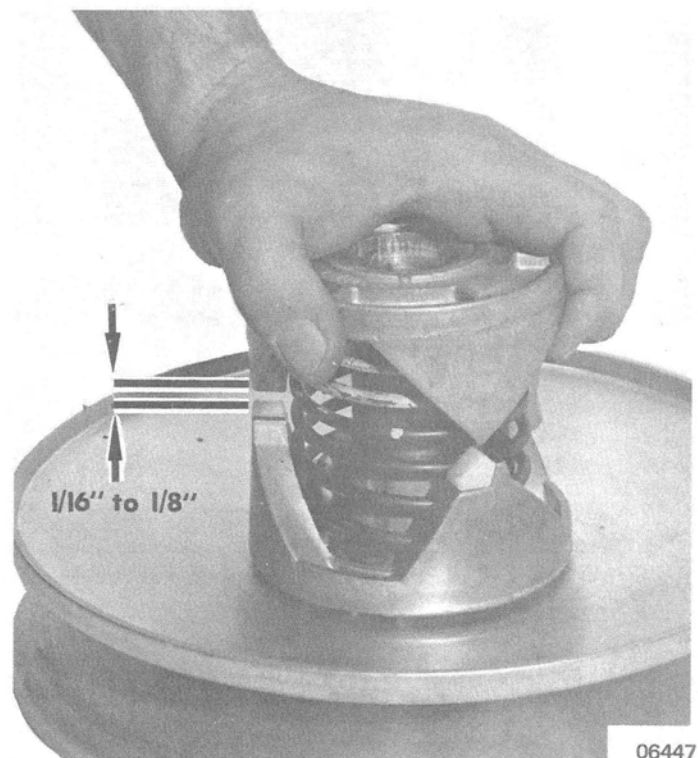


Figure 5. Installing Torque Bracket

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# JACKSHAFT - HURRICANE (644cc) MODEL

## REMOVAL and DISASSEMBLY

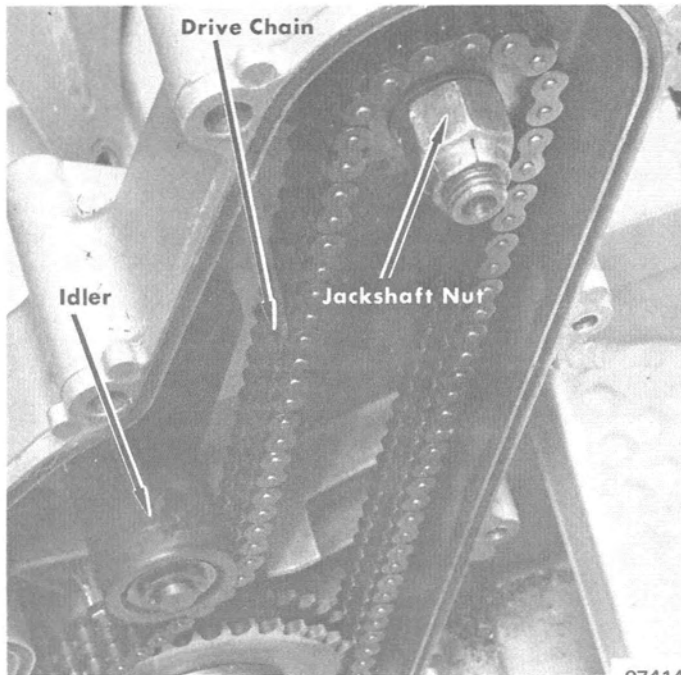


Figure 1. Chain and Jackshaft Nut

1. Remove bottom plug from chaincase and drain lubricant.
2. Remove driven sheave as outlined previously in this section.
3. Remove 9 cap screws and remove chaincase cover.

4. Loosen tension on chain.
5. Remove nut from jackshaft and remove sprocket and chain. (Figure 1)
6. Pull jackshaft out of chaincase. Pull toward chaincase cover side to prevent damage to oil seals.
8. Remove snap ring and remove ball bearing. (Figure 2)

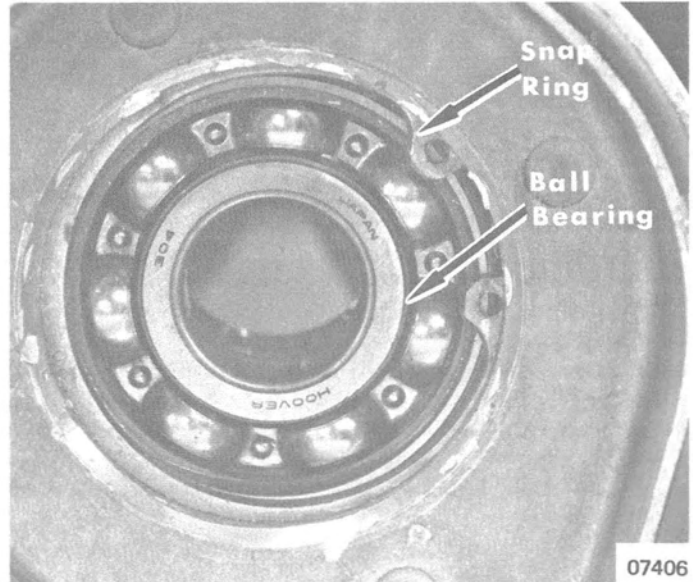


Figure 2. Removing Jackshaft Ball Bearing

## INSPECTION

1. Spin outer race of bearings. Discard if bearing sounds or feels rough. Bearing should have smooth action and no rust marks.
2. Check jackshaft for straightness, using "V" blocks. If jackshaft is bent, discard jackshaft.
3. Check for smashed or damaged threads on jackshafts.

## REASSEMBLY and INSTALLATION

1. Slide jackshaft adjusting stud hole and install driven sheave assembly onto jackshaft.
2. Install bushing and center bolt.
3. Install brake bracket and adjust brake. Make sure that brake does not rub on sheave.
4. Hold brake and torque sheave center bolt to specifications.
5. Install drive sprocket, driver sprocket and drive chain all at the same time.
6. Secure driver sprocket with nut and torque to specification.
7. Secure drive sprocket with tab washer and nut.
8. Adjust drive tension. See "Chain and Sprocket" Section 2D.
9. Install chaincase cover and retaining cap screws and torque to specification.
10. Reinstall chaincase drain plug and fill chaincase with lubricant. Refer to "Maintenance" Section 7C.



# 440 MAX, 440 S/R (Chassis Serial No. 3795657 and Below), 340 S/R, 440 M/X and 440 T/T (Chassis Serial No. 4210249 and Below)

## DRIVE SHEAVE GENERAL

Drive sheave is an essential part of drive mechanism and functions basically as a variable pitch, belt-type drive. Drive sheave is fully automatic and operates as a clutch and a transmission.

Under normal use, it is recommended that drive sheave be completely disassembled, cleaned and inspected at least ONCE each season. If snowmobile is continuously operated under severe use, drive sheave should be inspected more frequently.

## REMOVAL

**WARNING:** DO NOT, under any circumstances, attempt to repair or handle a DRIVE SHEAVE (either on or off engine), that has stuck or jammed in the closed (high gear) position, UNTIL a reasonable effort first has been made to open the sheave. ALWAYS approach a stuck or jammed sheave with caution, keeping clear of area between moveable face and sheave housing, as a sudden closure of moveable face could result in serious bodily injury; ie, broken, smashed or severed fingers.

1. Raise top cowl.
2. Remove drive sheave shroud and variable speed drive belt. (Refer to this section, Part B.)

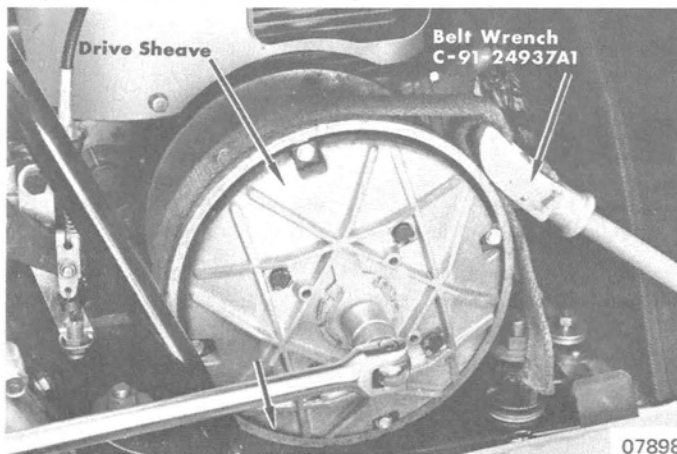


Figure 1. Drive Sheave Retaining Cap Screw Removal

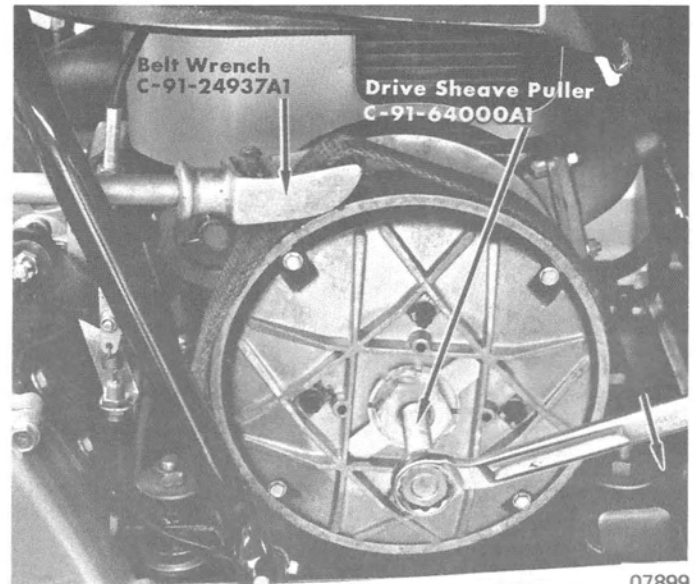


Figure 2. Removing Sheave from Crankshaft

3. Hold drive sheave with Belt Wrench (C-91-24937A1) and remove retaining cap screw and lockwasher. (Figure 1)
4. Install Drive Sheave Puller (C-91-64000A1) in drive sheave.
5. Hold drive sheave with Belt Wrench (C-91-24937A1) and operate Drive Sheave Puller (C-91-64000A1) to remove sheave assembly. (Figure 2)

**NOTE:** For ease of removal, an air or electric impact wrench may be used to operate puller.

## DISASSEMBLY

**WARNING:** Use caution when disassembling drive sheave, as moveable face and sheave housing are under spring tension when released from tapered hub on fixed half of sheave.

1. Straighten lockplate tab which secures sheave housing retaining screw.

**WARNING:** Keep hands clear of area between housing retaining screw and top of housing.

2. Hold drive sheave with Belt Wrench (C-91-24937A1) and loosen housing retaining screw. DO NOT remove screw; back screw out approximately 1/4" (6.4mm).
3. Lift and suspend sheave by holding moveable face and sheave housing. Using a mallet, tap housing retaining screw to release moveable face and housing from taper on fixed hub.
4. Depress and hold housing securely while removing retaining screw. After removing screw, slowly let up on housing until spring tension is released. Separate housing assembly from moveable face assembly. Remove coil spring from spindle on fixed hub.

5. Disassemble moveable sheave as follows:
  - a. Straighten tab washers on screws which hold roller retainers in place.
  - b. Remove screws, tab washers and roller retainers. (Figure 3)
  - c. Remove rollers, pins and washers from sheave.

**CAUTION: DO NOT** remove sheave slide bearings or plastic center bearing (Figure 3), unless replacement is necessary.

- d. Remove slide bearing retaining screws and pull slide bearings out. If slide bearings cannot be pulled out,

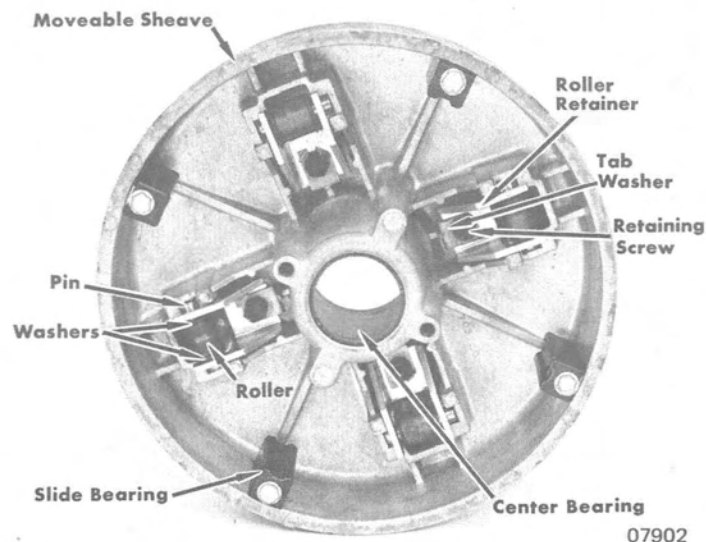


Figure 3. Moveable Sheave and Rollers

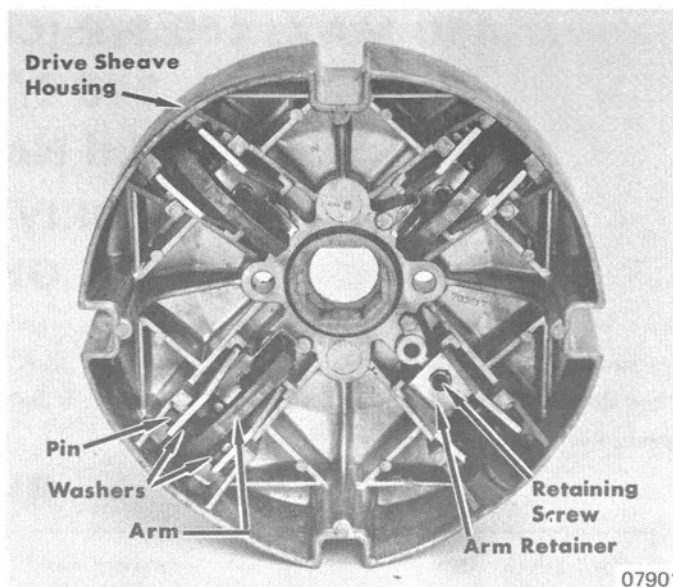


Figure 4. Drive Sheave Housing and Arms

carefully pry bearings up from bottom. Discard slide bearings.

- e. Using a drift and hammer, drive plastic center bearing out past staking. Discard bearing.
6. Disassemble sheave housing as follows:
  - a. Straighten tab washers on screws which secure arm assembly retainers.
  - b. Remove screws, tab washers and arm retainers. (Figure 4)
  - c. Remove arms, pins and washers from sheave housing.

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Examine arms, rollers, pins, slide bearings and plastic center bearing for cracks and wear at bearing points. Replace parts as necessary.

**IMPORTANT:** Replace parts in sets, as indicated in parts list. **DO NOT** intermix new and used like parts. If a center bearing failure is reason for repair, **MAKE CERTAIN** that all bearing material is removed from hub of moveable face and spindle on fixed half of sheave.

3. Inspect sheave for cracks, chips and excessive wear. Replace all damaged parts.
4. Inspect inside taper of fixed half of sheave (crankshaft taper) for burrs and smooth condition (must be clean and dry for installation).
5. Examine belt surface of sheave faces and replace if grooved, pitted, scored or excessively worn.

## REASSEMBLY

1. Reassemble drive sheave housing (Figure 4) as follows:
  - a. Insert pins into arms. Place a washer on each end of the pins.
  - IMPORTANT: DO NOT** use any lubrication on pins or arms.
  - b. Install pins, arms and washers into sheave housing.
  - c. Install arm retainers and secure with tab washers and screws. Torque screws to specification. (Refer to "Specifications" Section 8.)
  - d. Bend tabs on tab washers.
2. Reassemble moveable sheave (Figure 3) as follows:
  - a. Insert pins into rollers. Place a washer on each end of pins.

**IMPORTANT: DO NOT** use any lubrication on pins or rollers.

- b. Position pins, rollers and washers in moveable sheave.
- c. Install roller retainers and secure with tab washers and screws. Torque screws to specification. (Refer to Section 8.)
- d. Bend tabs on tab washers.
- e. If removed, install new slide bearings and torque retaining screws to specification. (Refer to Section 8.)
- f. If removed, install new center bearing as shown in Figure 5. Stake moveable sheave on belt surface side to secure bearing. (Figure 6)

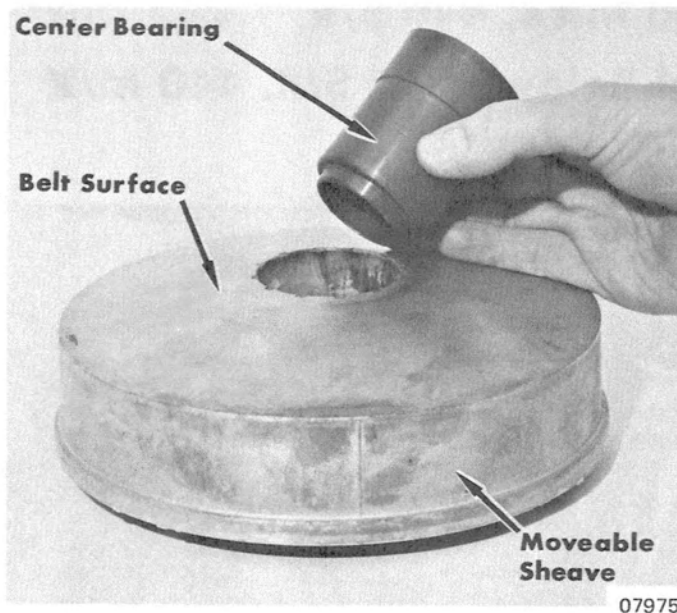


Figure 5. Installing Plastic Center Bearing

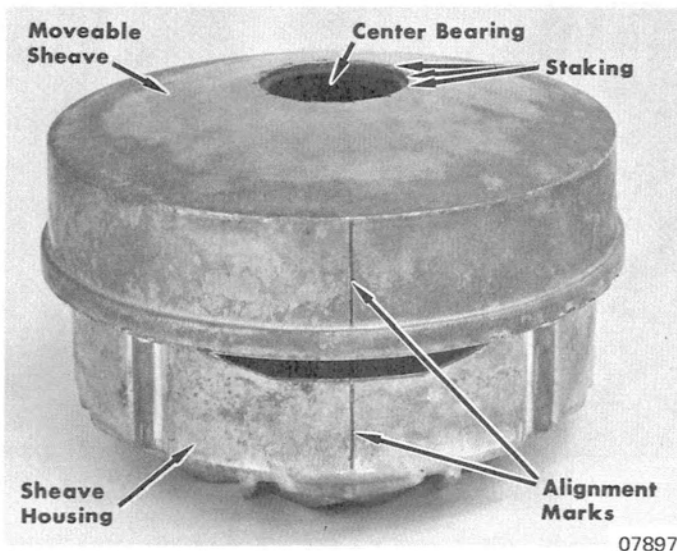


Figure 6. Drive Sheave Reassembly

- NOTE:** Before staking moveable sheave, be sure that center bearing is firmly seated. Check fit between moveable sheave half and spindle.
3. Match alignment marks (straight line) on sheave housing and moveable face. (Figure 6) Install moveable face onto sheave housing.
  - IMPORTANT:** DO NOT lubricate center bearing or spindle on fixed hub.
  4. Place coil spring over spindle on fixed hub.
  5. Install moveable face and sheave housing assembly over spindle on fixed hub. Align square in top of housing with square on spindle of fixed hub (will fit only one way). Depress housing assembly onto spindle taper and install lockplate tab and housing retaining screw.
  6. Place drive sheave on a suitable shaft or 8" bolt clamped in vise. Using Belt Wrench (C-91-24937A1), hold sheave and torque retaining screw to specification as shown in Figure 7. (Refer to Section 8.)
  7. Bend one lockplate tab against retaining screw.

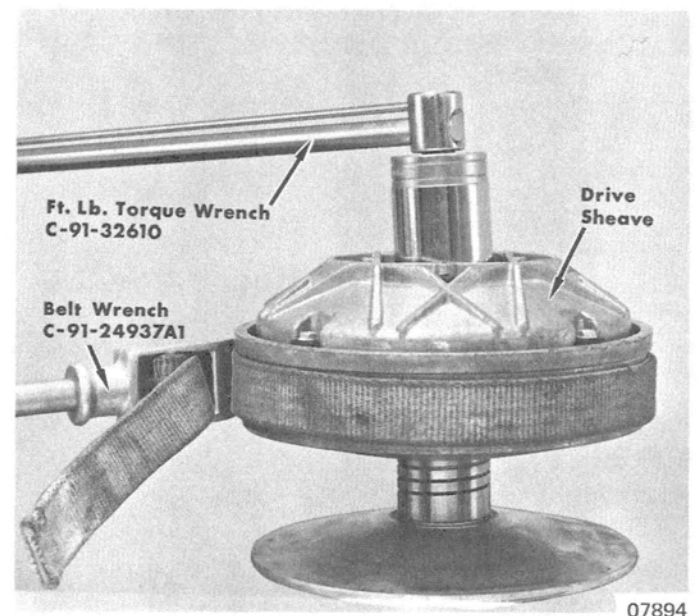


Figure 7. Torquing Retaining Screw

## INSTALLATION

1. Clean the tapers of drive sheave and crankshaft. Sheave and crankshaft must be clean, dry and NOT lubricated.
2. Place drive sheave on crankshaft and secure sheave with lockwasher and retaining cap screw.
3. Hold drive sheave with Belt Wrench (C-91-24937A1) and torque cap screw to specification. (Refer to "Specifications" Section 8.)

**IMPORTANT:** Drive sheave must be RETORQUED after engine warmup.

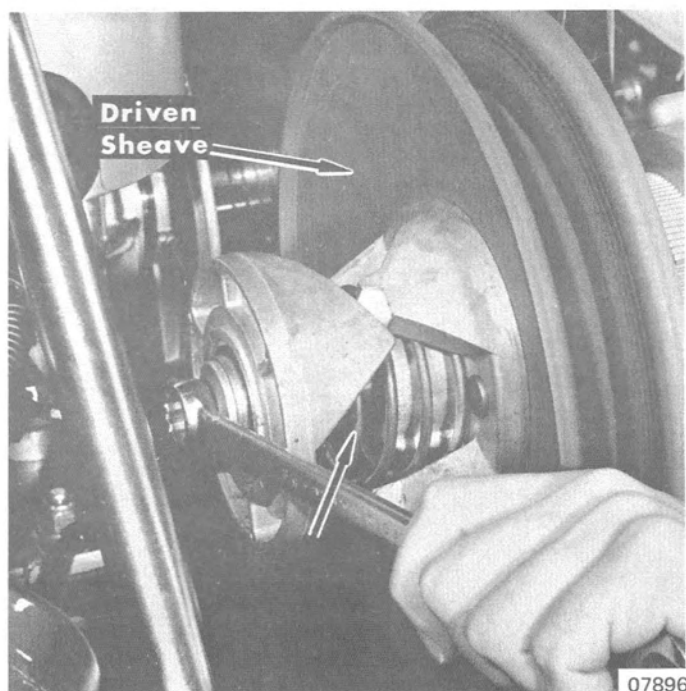
4. Install variable speed drive belt. (Refer to this section, Part B.)
5. Install drive sheave shroud and torque nuts to specification. (Refer to Section 8.)
6. Close top cowl.

**WARNING:** DO NOT operate engine which is equipped with drive sheave, if drive belt is not engaged with driven sheave. Remove drive sheave BEFORE making high-speed, no-load engine test.

# DRIVEN SHEAVE - 440 MAX, 440 S/R (Chassis Serial No. 3795657 and Below), 340 S/R, 440 M/X REMOVAL and DISASSEMBLY

**NOTE:** On 440 MAX (Chassis Serial No. 3709838 and above), 440 S/R, 340 S/R and 440 M/X Models, sliding half of driven sheave is equipped with a guide cup. When servicing these snowmobiles, loosen steering shaft and remove driven sheave as an assembly. Driven sheave should be disassembled after removal and reassembled before installation. Tighten steering shaft after installation of driven sheave.

1. Raise top cowl.
2. Remove variable speed drive belt from driven sheave. (Refer to this section, Part B.)

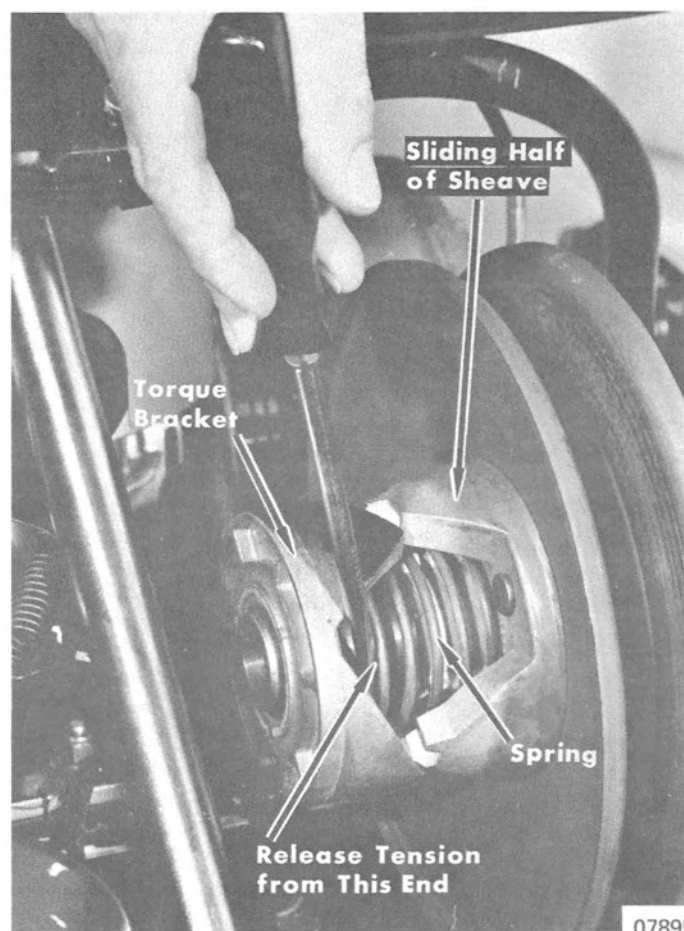


**Figure 1. Removing Sheave Retaining Cap Screw**

3. Hold snowmobile brake and remove driven sheave retaining cap screw. (Figure 1)
4. Remove cotter pin and loosen brake tension nut and 2 thru bolts on brake assembly. Remove 2 brake bracket mounting bolts, then remove brake assembly from around driven sheave and move brake assembly to one side.
5. Release tension on sheave spring with a screwdriver inserted between torque bracket and sliding half of sheave. (Figure 2)
6. Rotate moveable half of sheave so that torque bracket may be pressed in toward sheave.
7. Press in on torque bracket until key is cleared. Turn torque bracket so that keyway does not line up with key. (Figure 3)

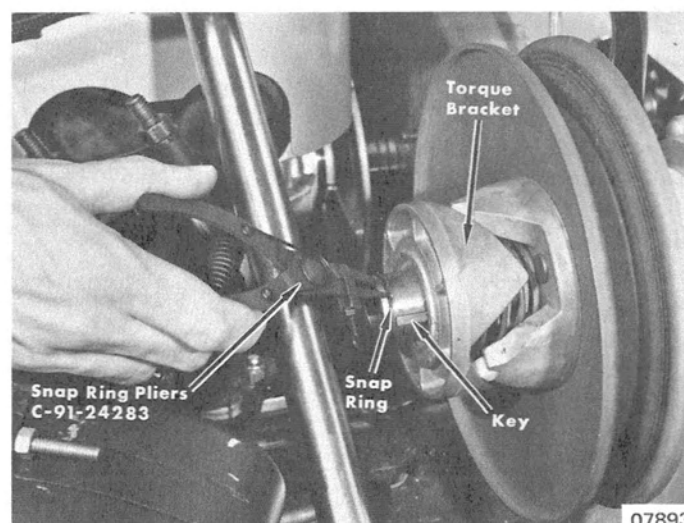
**WARNING:** DO NOT allow body or head to extend over sheave assembly, as the key alone secures the torque bracket.

8. Remove snap ring. (Figure 3)
9. Hold torque bracket securely and rotate so that key and keyway line up.



**Figure 2. Releasing tension on Sheave Spring**

10. Carefully slide torque bracket off to release spring tension. Remove spring.
11. Remove driven sheave from jackshaft.
12. Remove key from fixed hub and separate halves of sheave.



**Figure 3. Locking Torque Bracket under Key**



## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Check sheave faces for abnormal wear.
3. Inspect bushing in sliding half of sheave for wear.

4. Check nylon wear plates on ramps of sliding sheave half. If excessive wear is indicated, replace as a set.
5. Inspect sheave halves and torque bracket for cracks and chips. Replace parts as necessary.

## REASSEMBLY and INSTALLATION

*NOTE: On 440 MAX (Chassis Serial No. 3709838 and above) and 440 S/R Models, sliding half of driven sheave is equipped with a guide cup. When servicing these snowmobiles, loosen steering shaft and remove driven sheave as an assembly. Driven sheave should be disassembled after removal and reassembled before installation. Tighten steering shaft after installation of driven sheave.*

1. Place sliding half of sheave on fixed half of sheave hub and install key in hub.

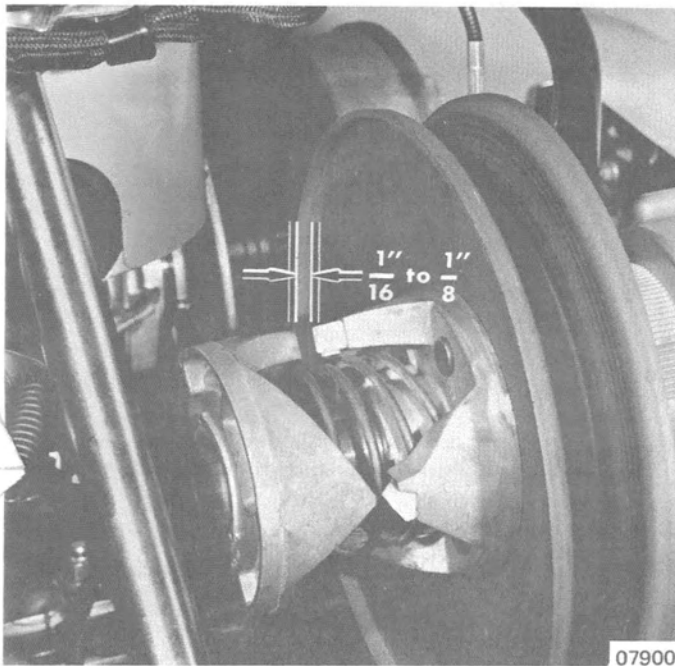


Figure 4. Installing Torque Bracket

2. Install driven sheave on jackshaft.
3. Place spring over hub.
4. Engage spring (either end) in anchor point of sliding half of sheave.
5. Align torque bracket keyway with key in fixed half hub and engage spring in anchor point.
6. Compress spring until 1/16" to 1/8" (1.6mm to 3.2mm) clearance is obtained between ramps. (Figure 4)
7. Turn sliding half of sheave 1/3 turn (120°), or one ramp, to apply tension to spring. Press torque bracket below key and rotate bracket so that key and keyway do not line up. (Figure 3)

**WARNING:** DO NOT allow body or head to extend over sheave assembly, as the key alone secures the torque bracket.

8. Install snap ring.

**WARNING:** Be certain that snap ring is in groove.

9. Rotate torque bracket to align key to keyway.
10. Reassemble brake bracket and brake to sheave and fasten to chaincase. Torque to specification. (Refer to "Specifications" Section 8.) Refer to "Miscellaneous" Section 7A and adjust brake.
11. Secure driven sheave with bushing, lockwasher and cap screw. Torque sheave retaining screw to specification. (Refer to Section 8.)
12. Install variable speed drive belt around driven sheave. (Refer to this section, Part B.)
13. Close top cowl.



# JACKSHAFT - 440 MAX, 440 S/R, 340 S/R and 440 M/X

## REMOVAL and DISASSEMBLY

1. Remove drain plug from chaincase and drain lubricant.
2. Remove driven sheave retaining cap screw and chaincase cover.
3. Loosen eccentric clamp nut. (Refer to this section, "Drive Chain Tension", Part D.)
4. Remove adjusting cap screw from eccentric.
5. Bend locking tabs on tab washer (located under drive sprocket retaining screw). (Figure 1)

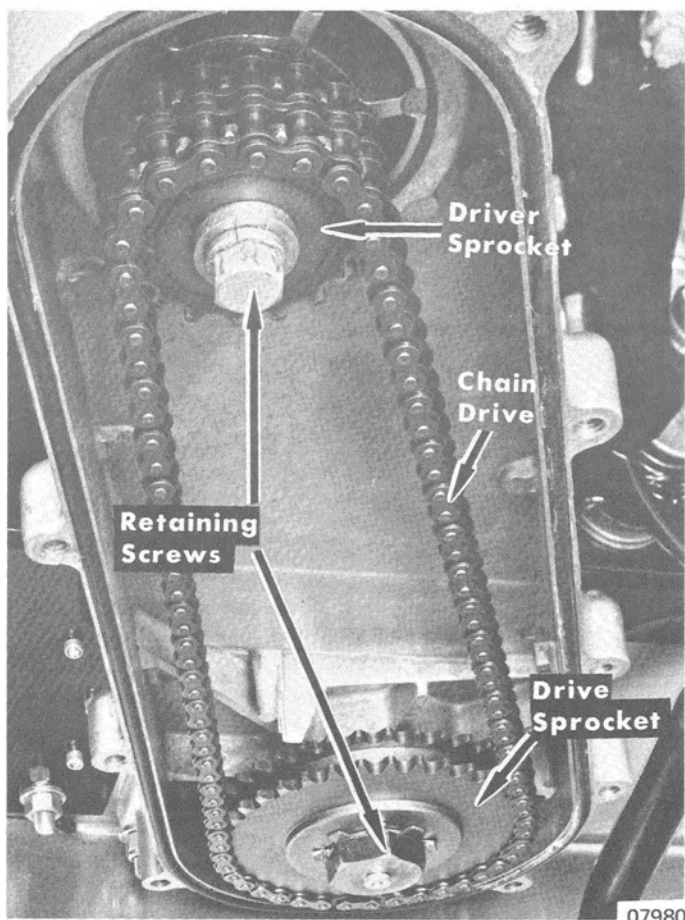


Figure 1. Sprockets and Drive Chain

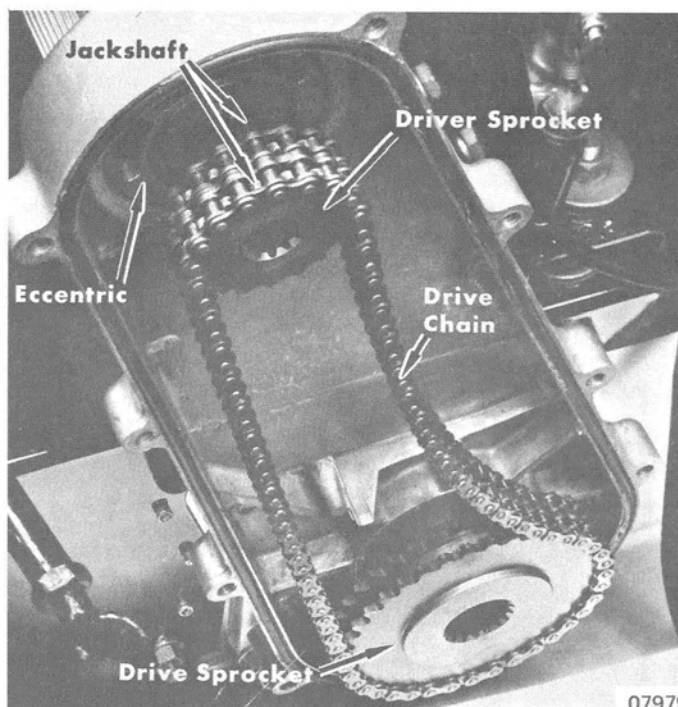


Figure 2. Removing Sprockets

6. Remove drive sprocket and driver sprocket retaining cap screws. (Figure 1)
7. Remove drive sprocket, driver sprocket and chain as an assembly. (Figure 2) Note the side of driver sprocket that is against eccentric.
8. Pull jackshaft and eccentric out of driven sheave and chaincase. Pull toward chaincase cover side to prevent damage to "O" ring.
9. Press jackshaft from eccentric.

**CAUTION:** DO NOT remove eccentric bearings unless bearing failure is indicated.

10. Remove eccentric bearings with a drift punch and hammer.

## INSPECTION

1. Spin outer race of eccentric bearings. Remove and discard if bearing sounds or feels rough. Bearings should have smooth action and no indication of rust.
2. Check jackshaft for straightness, using "V" blocks. If

jackshaft is bent, discard jackshaft.

3. Check for damaged threads and worn splines on jackshaft.
4. Check "O" rings on eccentric and chaincase for cuts or cracks.

## REASSEMBLY and INSTALLATION

1. If removed, install new bearing(s) into eccentric with spacer located between bearings. Bearings should be flush with eccentric surfaces, with inner bearing races tight against spacer.
2. Press jackshaft into eccentric. The "O" ring groove on the eccentric must be toward the sprocket end of jackshaft.
3. Lubricate "O" ring and chaincase with Multipurpose Lubricant (C-92-63250).
4. Install eccentric into chaincase from chaincase cover side.
5. Align key on jackshaft with keyway in driven sheave.
6. Slide jackshaft assembly into chaincase and driven sheave. Adjusting hole in eccentric should be visible thru slot in chaincase.
7. Install drive sprocket, driver sprocket and chain as an assembly. (Refer to this section, "Chain and Sprockets", Part D.)

*NOTE: The shoulder on the driver sprocket MUST be toward eccentric.*

8. Install washers and retaining screws which secure drive and driver sprockets. Be sure that washers are correctly positioned under sprocket retaining screws. Torque screws to specifications. (Refer to "Specifications" Section 8.)
9. Bend tabs on tab washer which secure drive sprocket.
10. Install driven sheave bushing and center bolt. Torque to specification. (Refer to Section 8.)
11. Install eccentric adjusting cap screw. Adjust chain tension. (Refer to this section, "Drive Chain Tension", Part D.)
12. Using cap screws, install chaincase cover. Torque to specification. (Refer to Section 8.)
13. Reinstall chaincase drain plug and fill chaincase with lubricant. (Refer to Section 7, "Maintenance", Part D.)

# MARK I (644cc) and MARK II (644cc) MODELS

## DRIVE SHEAVE

### GENERAL

The drive sheave is an essential part of drive mechanism and functions basically as a variable pitch, belt-type drive. Drive sheave is fully automatic and operates as a clutch and a transmission.

Under normal use, it is recommended that drive sheave be completely disassembled, cleaned and inspected at least ONCE each season. If snowmobile is operated continuously under severe use, drive sheave should be inspected more frequently.

### REMOVAL

**WARNING:** DO NOT, under any circumstances, attempt to repair or handle a DRIVE SHEAVE (either on or off engine), that has stuck or jammed in the closed (high gear) position, UNTIL a reasonable effort first has been made to open the sheave. ALWAYS approach a stuck or jammed sheave with caution, keeping clear of area between moveable face and sheave housing, as a sudden closure of moveable face could result in serious bodily injury; ie, broken, smashed or severed fingers.

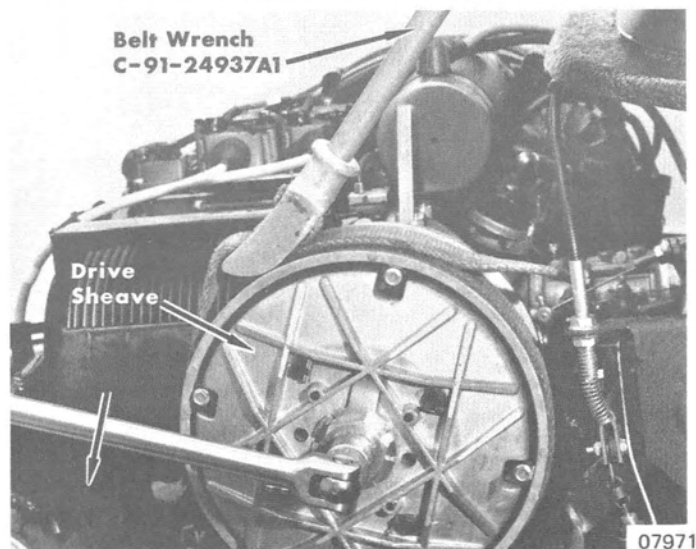


Figure 1. Drive Sheave Retaining Cap Screw Removal

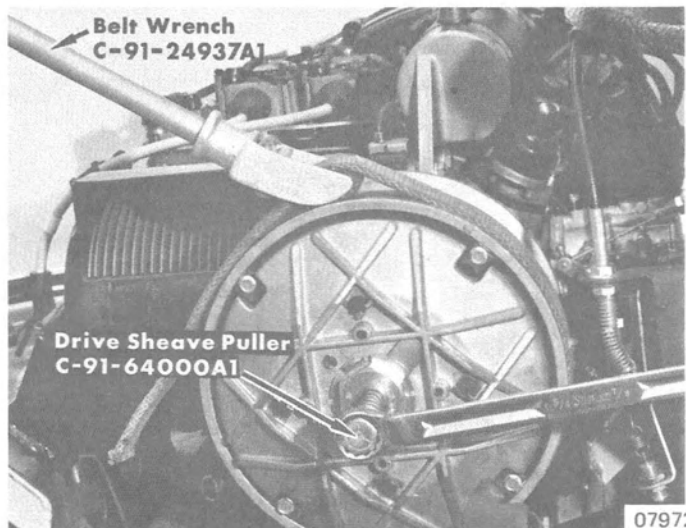


Figure 2. Removing Sheave from Crankshaft

1. Raise top cowl.
2. Remove variable speed drive belt from drive sheave. (Refer to this section, Part B).
3. Hold drive sheave with Belt Wrench (C-91-24937A1) and remove retaining cap screw and lockwasher. (Figure 1)
4. Install Drive Sheave Puller (C-91-64000A1) in drive sheave.
5. Hold drive sheave with Belt Wrench (C-91-24937A1) and operate Drive Sheave Puller (C-91-64000A1) to remove sheave assembly. (Figure 2)

*NOTE: For ease of removal, an air or electric impact wrench may be used to operate puller.*

### DISASSEMBLY

**WARNING:** Use caution when disassembling drive sheave, as moveable face and sheave housing are under spring tension when released from tapered hub on fixed half of sheave.

1. Straighten lockplate tab which secures sheave housing retaining screw.

**WARNING:** Keep hands clear of area between housing retaining screw and top of housing.

2. Hold drive sheave with Belt Wrench (C-91-24937A1) and loosen housing retaining screw. DO NOT remove screw; back screw out approximately 1/4" (6.4mm).
3. Lift and suspend sheave by holding moveable face and sheave housing. Using a mallet, tap housing retaining screw to release moveable face and housing from taper on fixed hub.
4. Depress and hold housing securely while removing retaining screw. After removing screw, slowly let up on housing until spring tension is released. Separate housing assembly from moveable face assembly. Remove coil spring from spindle on fixed hub.

5. Disassemble moveable sheave as follows:
  - a. Straighten tab washers on screws which hold roller retainers in place.
  - b. Remove screws, tab washers and roller retainers. (Figure 3)
  - c. Remove rollers, pins and washers from sheave.

**CAUTION:** DO NOT remove sheave slide bearings or plastic center bearing (Figure 3) unless replacement is necessary.

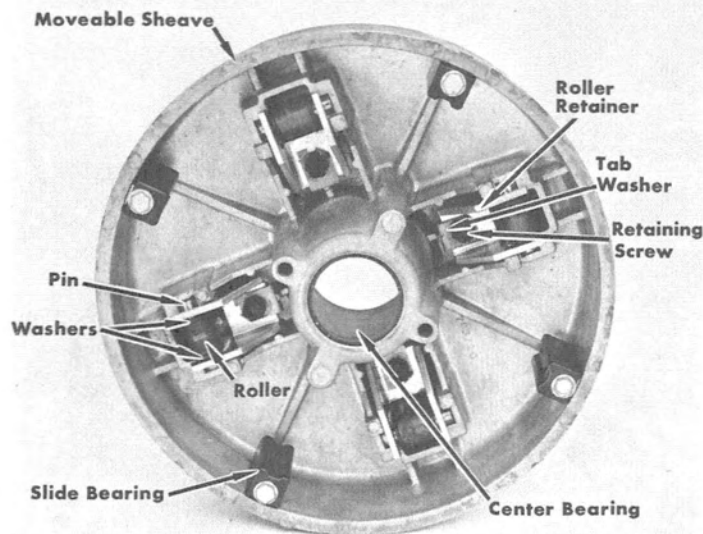


Figure 3. Moveable Sheave and Rollers

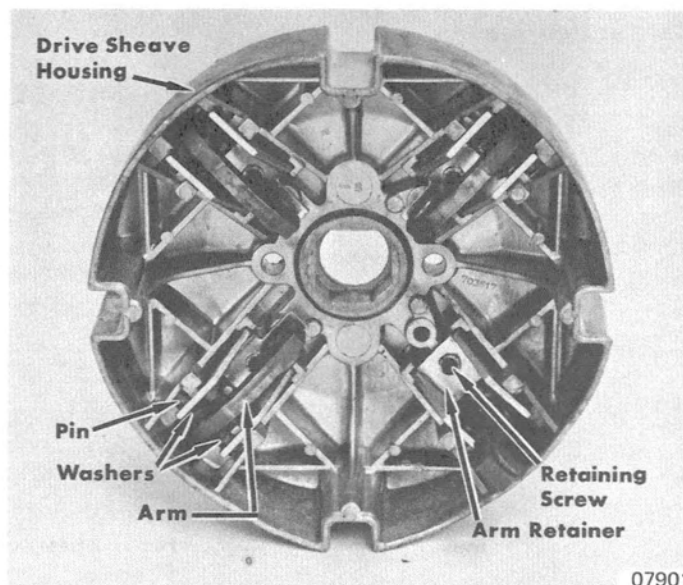


Figure 4. Drive Sheave Housing and Arms

- d. Remove slide bearing retaining screw and pull slide bearing out. If slide bearing cannot be pulled out, carefully pry bearing up from bottom. Discard slide bearing.
- e. Using a drift and hammer, drive plastic center bearing out past staking. Discard bearing.
6. Disassemble sheave housing as follows:
  - a. Straighten tab washers on screws which secure arm assembly retainers.
  - b. Remove screws, tab washers and arm retainers. (Figure 4)
  - c. Remove arms, pins and washers from sheave housing.

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Examine arms, rollers, pins, slide bearings and plastic center bearing for cracks and wear at bearing points. Replace parts as necessary.

**IMPORTANT:** Replace parts in sets as indicated in parts list. DO NOT intermix new and used like parts. If a center bearing failure is reason for repair, MAKE CERTAIN that all bearing material is removed from

hub of moveable face and spindle on fixed half of sheave.

3. Inspect sheave for cracks, chipped and excessive wear. Replace if damaged.
4. Inspect inside taper of fixed half of sheave (crankshaft taper) for burrs and smooth condition (must be clean and dry for installation).
5. Examine belt surface of sheave faces and replace if grooved, pitted, scored or excessively worn.

## REASSEMBLY

1. Reassemble drive sheave housing (Figure 4) as follows:
  - a. Insert pins into arms. Place a washer on each end of pins.

**IMPORTANT:** DO NOT use any lubrication on pins or arms.

- b. Install pins, arms and washers into sheave housing.
- c. Install arm retainers and secure with tab washers and screws. Torque screws to specifications. (Refer to "Specifications" Section 8.)
- d. Bend tabs on tab washers.

2. Reassemble moveable sheave (Figure 3) as follows:
  - a. Insert pins into rollers. Place a washer on each end of pins.

**IMPORTANT:** DO NOT use any lubrication on pins or rollers.

- b. Position pins, rollers and washers in moveable sheave.
- c. Install roller retainers and secure with tab washers and screws. Torque screws to specifications (Section 8).
- d. Bend tabs on tab washers.
- e. If removed, install new slide bearings and torque retaining screws to specifications. (Refer to Section 8.)



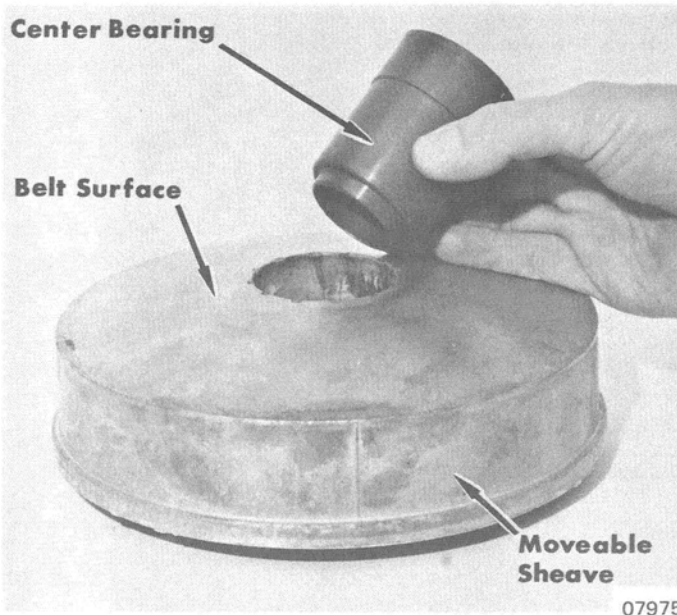


Figure 5. Installing Plastic Center Bearing

- f. If removed, install new center bearing as shown in Figure 5. Stake moveable sheave on belt surface side to secure bearing. (Figure 6)

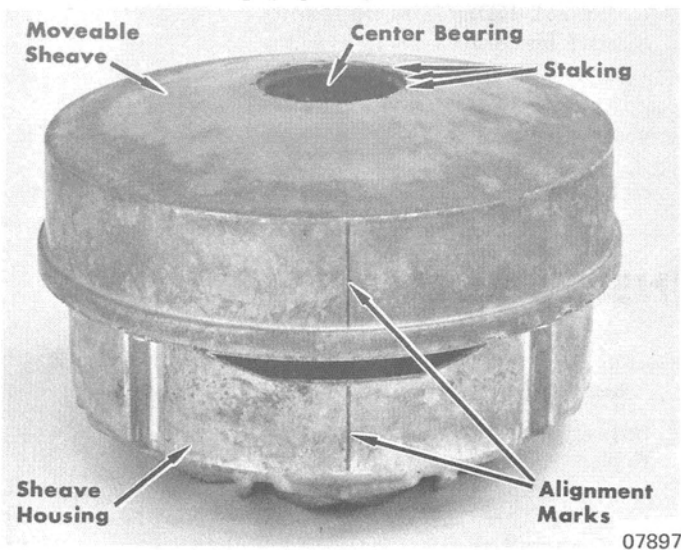


Figure 6. Drive Sheave Reassembly

**NOTE:** Before staking moveable sheave, be sure that center bearing is firmly seated. Check fit between moveable sheave half and spindle.

- Match alignment marks (straight line) on sheave housing and moveable face. (Figure 6) Install moveable face onto sheave housing.

**IMPORTANT:** DO NOT lubricate center bearing or spindle on fixed hub.

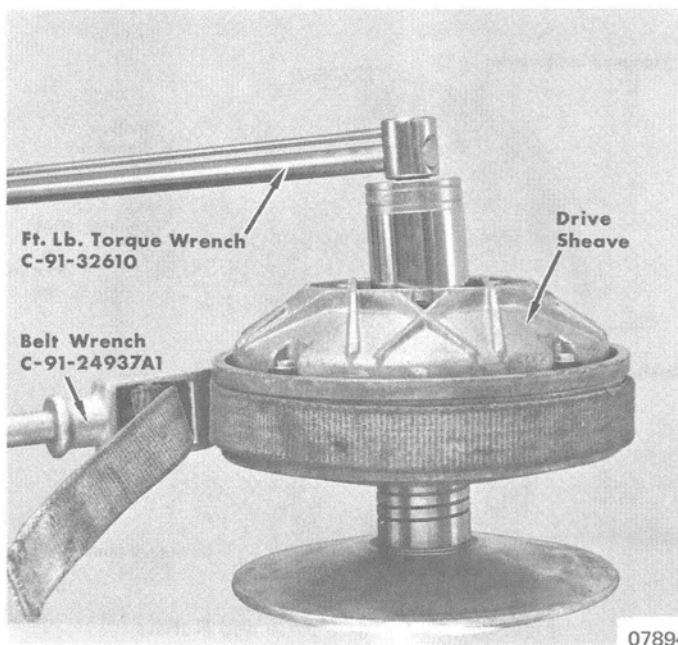


Figure 7. Torquing Retaining Screw

- Place coil spring over spindle on fixed hub.
- Install moveable face and sheave housing assembly over spindle on fixed hub. Align square in top of housing with square on spindle of fixed hub (will fit one way only). Depress housing assembly onto spindle taper and install lockplate tab and housing retaining screw.
- Place drive sheave on a suitable shaft or on 8" bolt clamped in vise. Using Belt Wrench (C-91-24937A1), hold sheave and torque retaining screw to specification as shown in Figure 7. (Refer to "Specifications" Section 8.)
- Bend one lockplate tab against retaining screw.

## INSTALLATION

- Clean tapers of drive sheave and crankshaft. Sheave and crankshaft must be clean, dry and NOT lubricated.
- Place drive sheave on crankshaft and secure sheave with lockwasher and retaining cap screw.
- Hold drive sheave with Belt Wrench (C-91-24937A1) and torque cap screw to specification. (Refer to Section 8.)

**IMPORTANT:** Drive sheave must be RETORQUED after engine warmup.

- Install variable speed drive belt. (Refer to this section, Part B.)
- Close top cowl.

**WARNING:** DO NOT operate engine, which is equipped with drive sheave, if drive belt is not engaged with driven sheave. Remove drive sheave BEFORE making high-speed, no-load engine test.



## DRIVEN SHEAVE

### MARK I (644cc) and MARK II (644cc) MODELS

### REMOVAL and DISASSEMBLY

1. Raise top cowl.
2. On Mark I and Mark II Snowmobiles with Chassis Serial No. 3591478 and below, disconnect battery cables and remove battery.
3. Remove variable speed drive belt. (Refer to this section, Part B.)

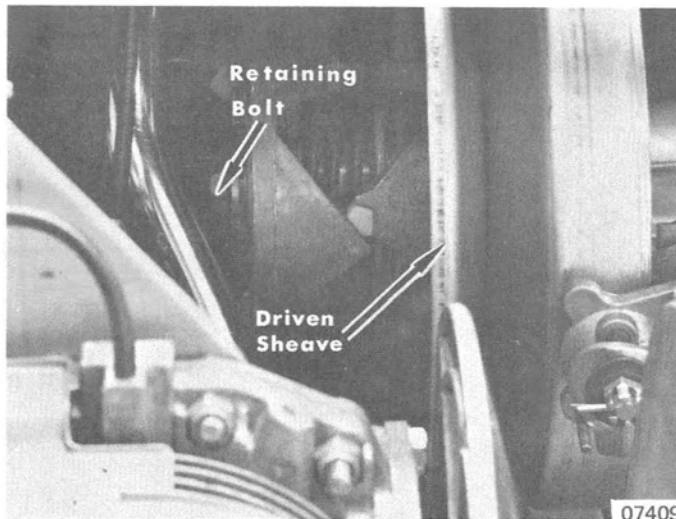


Figure 1. Driven Sheave

4. Hold snowmobile brake and remove driven sheave retaining bolt, lockwasher and bushing. (Figure 1)
5. Turn skis to left as far as possible.

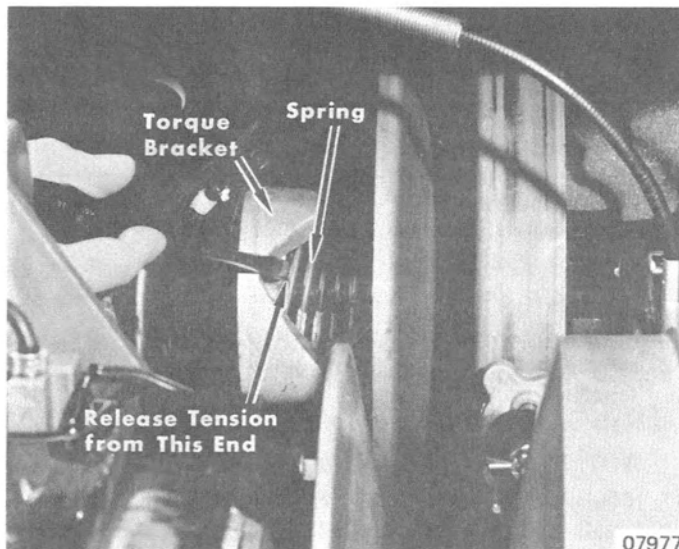


Figure 2. Releasing Tension on Sheave Spring

6. Release tension on sheave spring with a screwdriver inserted between torque bracket and sliding half of sheave. (Figure 2)

Figure 4. Removing Driven Sheave from under Dash

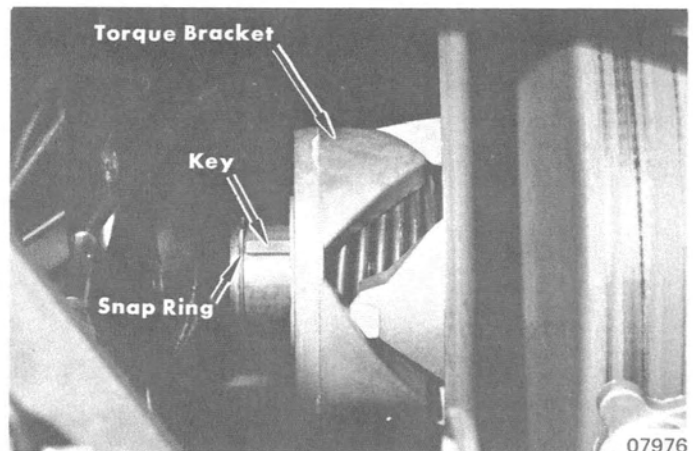


Figure 3. Locking Torque Bracket under Key

*NOTE: On Mark II Model with Chassis Serial No. 3787640 and above, sliding half of driven sheave is equipped with a guide cup. When servicing these snowmobiles, loosen upper steering shaft mount and remove driven sheave as an assembly.*

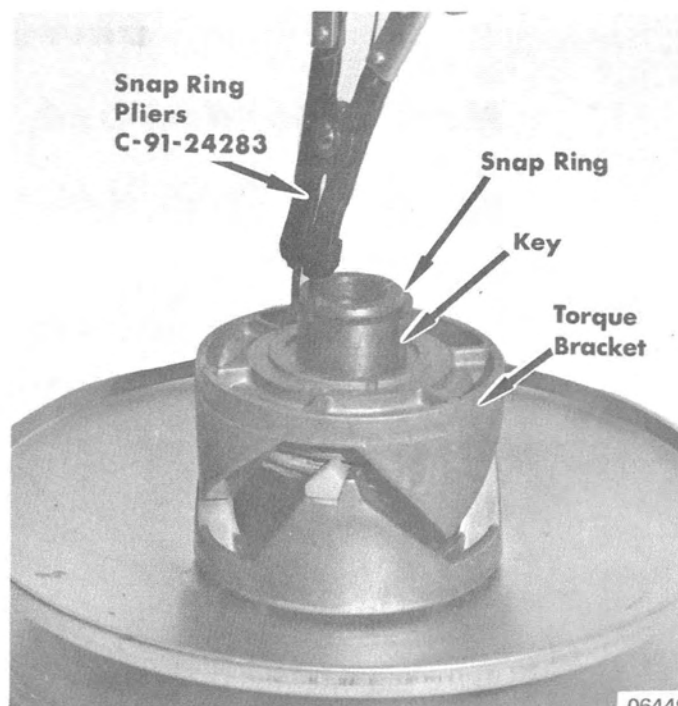
7. Rotate moveable half of sheave so that torque bracket may be pressed in toward sheave.
8. Press in on torque bracket until key is cleared. Turn torque bracket so that keyway does not line up with key. (Figure 3)

**WARNING: DO NOT** allow body or head to extend over sheave assembly, as the key alone secures the torque bracket.



9. Remove driven sheave assembly from jackshaft and between brake pads.
10. Remove driven sheave from under dash as shown in Figure 4.
11. Remove snap ring. (Figure 5)
12. Hold torque bracket securely and rotate so that key and keyway line up.
13. Carefully slide torque bracket up to release spring tension. Remove torque bracket.
14. Remove spring and key from fixed hub and separate halves.

Figure 5. Removing Snap Ring



06449

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Check sheave faces for abnormal wear.
3. Inspect bushing in sliding half of sheave for wear.

4. Check nylon wear plates on ramps of sliding sheave half. If excessive wear is indicated, replace as a set.
5. Inspect sheave halves and torque bracket for cracks and chips. Replace parts as necessary.

## REASSEMBLY and INSTALLATION

1. Place sliding half of sheave on fixed half of sheave hub and install key in hub.
2. Install spring over hub.
3. Engage spring (either end) in anchor point of sliding half of sheave.
4. Align torque bracket keyway with key in fixed half hub and engage spring in anchor point.

tate bracket so that key and keyway do not line up. (Figure 5)

**WARNING:** DO NOT allow body or head to extend over sheave assembly, as the key alone secures the torque bracket.

7. Install snap ring.

**WARNING:** Be certain that snap ring is in groove.

8. Reinstall driven sheave assembly between brake pads and onto jackshaft. (Figures 3 and 4)

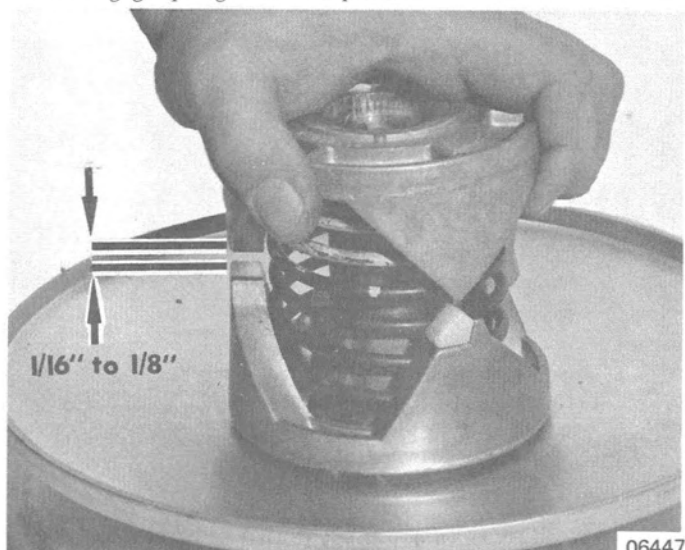
*NOTE:* Keyway in driven sheave must align with key on jackshaft. Skis **MUST** be turned to left.

9. Secure driven sheave with bushing, lockwasher and bolt. Torque sheave retaining bolt to specification. (Refer to "Specifications" Section 8.)
10. Rotate torque bracket to align keyway to key.

*NOTE:* Torque bracket **MUST** be tight against snap ring.

11. If loosened, tighten upper steering shaft mount.
12. Install variable speed drive belt. (Refer to this section, Part B.)
13. If removed, install battery and connect battery cables to battery.

**CAUTION:** Connect red cable to positive (+) terminal and black cable to negative (-) terminal. Failure to observe correct polarity will result in destruction of rectifier and/or switchbox.



06447

Figure 6. Installing Torque Bracket

5. Compress spring until 1/16" to 1/8" (1.6mm to 3.2mm) clearance is obtained between ramps. (Figure 6)
6. Turn sliding half 1/3-turn (120°), or one ramp, to apply tension to spring. Press torque bracket below key and ro-

14. Close top cowl.

# JACKSHAFT

## MARK I (644cc) and MARK II (644cc) MODELS

### REMOVAL

1. Remove drain plug from chaincase and drain lubricant.
2. Remove driven sheave assembly. (Refer to "Driven Sheave", preceding.)
3. Remove speedometer angle drive assembly and chaincase cover.
4. Loosen tension on chain. (Refer to this section, "Drive Chain Tension", Part D.)

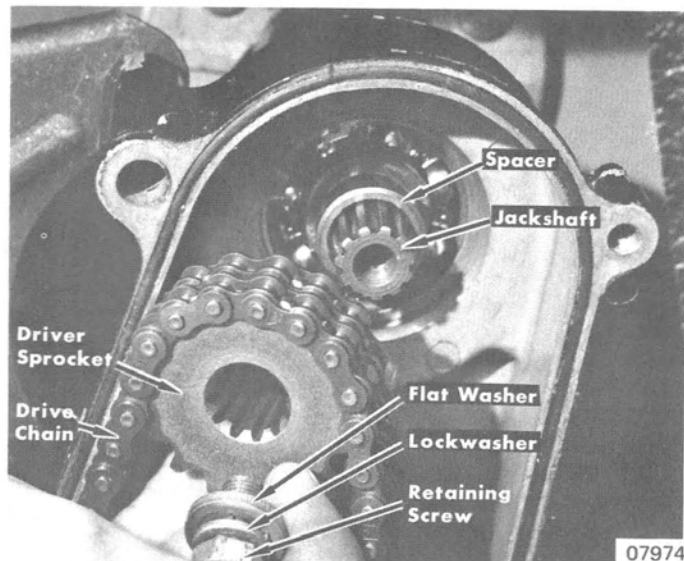


Figure 1. Chain and Driver Sprocket

5. Remove retaining screw from jackshaft. Remove driver sprocket (top) and drive chain. (Figure 1)
6. Remove spacer (Figure 1) and driven sheave key from jackshaft.

7. Pull jackshaft out of chaincase. Pull toward steering shaft.

**IMPORTANT:** DO NOT remove ball bearing, roller bearing or oil seal from chaincase, unless replacement is necessary.

8. Remove snap ring. (Figure 2)
9. Use Bearing Removing and Installing Kit (C-91-31229A1) to remove ball bearing.
10. Drive oil seal out of chaincase and remove roller bearing. Use Bearing Removing and Installing Kit (C-91-31229A1) to remove roller bearing.

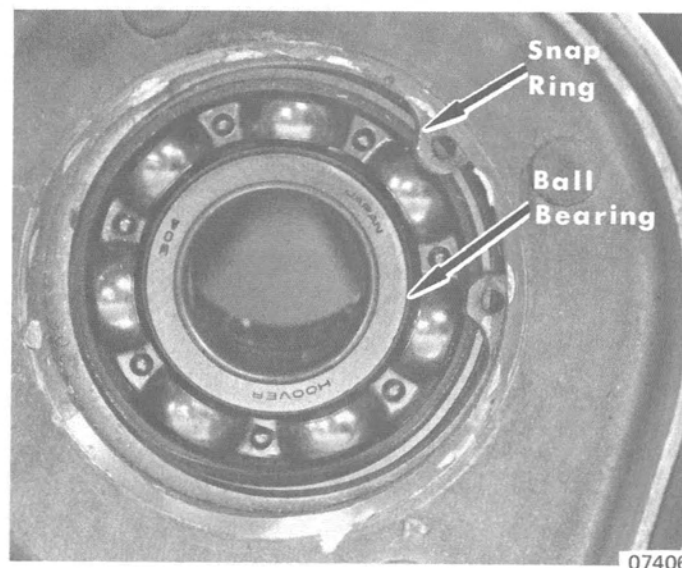


Figure 2. Jackshaft Ball Bearing

### INSPECTION

1. Spin inner race of bearings. Replace if bearing sounds or feels rough. Bearing should have smooth action and no rust marks.
2. Inspect oil seal for cuts and cracks. Replace if damaged, or if lubricant is leaking past seal.

*NOTE: If oil seal has been removed for replacement of roller bearing, install new oil seal during reassembly.*

3. Check jackshaft for straightness, using "V" blocks. Discard jackshaft if bent.
4. Check for smashed or stripped threads on jackshaft.
5. Inspect splines to be certain that they are not bent or twisted.
6. Inspect oil seal surface of jackshaft for grooves or pits. Replace as necessary.

## REASSEMBLY and INSTALLATION

1. Using Bearing Removing and Installing Kit (C-91-31229A1) and suitable mandrel, install new bearings and new oil seal, if removed.

*NOTE: Install bearings with numbers "out".*

**IMPORTANT:** Place a thin bead of Loctite Type "A" (C-92-32609) on metal edge of oil seal that contacts chaincase. Install oil seal with lips "in" and flush with chaincase. Loctite **MUST NOT** contact rubber lips of oil seal.

2. Install ball bearing snap ring. (Figure 2)
3. Lubricate jackshaft and lips of oil seal with Multipurpose Lubricant (C-92-63250).
4. Slide jackshaft into chaincase from oil seal side.
5. Install spacer (Figure 1) and driven sheave key on jackshaft.
6. Install driver sprocket and drive chain. (Figure 1)

*NOTE: Driver sprocket **MUST** be installed with shoulder toward ball bearing.*

7. Secure sprocket with washers and retaining screw and torque to specification. (Refer to "Specifications" Section 8.)
8. Install driven sheave assembly. (Refer to "Driven Sheave", preceding.)
9. Adjust chain tension. (Refer to this section, "Drive Chain Tension", Part D.)
10. Install chaincase cover and speedometer angle drive assembly. Torque cover to specification (Section 8).
11. Install chaincase drain plug and fill chaincase to lower edge of oil level hole in chaincase cover with Automatic Transmission Fluid (ATF) Type A, AA, or Dextron.

# SNO-TWISTER MODEL (400-D)

## DRIVE SHEAVE

### GENERAL

Periodic inspection and lubrication of drive sheave is essential to maintain maximum performance. If drive sheave is not properly maintained, rubber dust from drive belt and other foreign materials may cause sheave to "stick".

If snowmobile is used for trail riding, drive sheave maintenance should be performed approximately every 2 weeks during periods of constant use. During competition, drive sheave should be cleaned and lubricated before every race.

### DRIVE SHEAVE ADJUSTMENT

Drive sheave engagement RPM can be increased or decreased by installing or removing spacer washer(s) (D-15-67831) between drive sheave cover and return spring. (Figure 1)

Installing one (1) spacer washer will increase drive sheave engagement RPM approximately 200 RPM, and removing one (1) spacer washer will decrease engagement RPM approximately 200 RPM.

If an adjustment is necessary to maintain an engagement speed of 3800 RPM, refer to "Removal" and "Disassembly", following, and remove and partially disassemble drive sheave. Install or remove spacer washer(s) as required, then reassemble and install drive sheave. DO NOT install more than 3 spacer washers in drive sheave.

After performing a drive sheave adjustment, drive sheave engagement RPM should be checked with a calibrated tachometer to assure that engagement occurs at 3800 RPM.

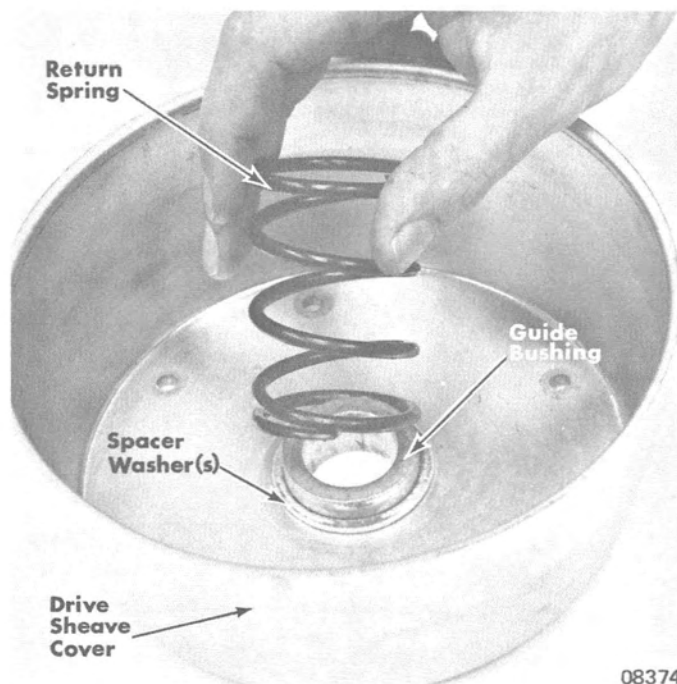


Figure 1. Drive Sheave Spacer Washers

### REMOVAL

**WARNING: DO NOT, under any circumstances, attempt to repair or handle a DRIVE SHEAVE (either on or off engine) that has stuck or jammed in closed (high gear) position, UNTIL a reasonable effort first has been made to open sheave. ALWAYS approach a stuck or jammed sheave with caution.**

1. Remove variable speed drive belt from drive sheave. (Refer to this section, Part B.)
2. Remove locknut, which attaches left bumper to lower cowl, and move bumper down out-of-way. (Figure 2)
3. Hold drive sheave from rotating counterclockwise by standing a  $\frac{1}{2}$ "x9/16" open end wrench on end (between drive sheave and engine crankcase) from one of the ribs on inside of drive sheave fixed face to front engine mount. (Figure 3) Remove drive sheave retaining bolt, lockwasher and bushing.

Figure 2. Drive Sheave

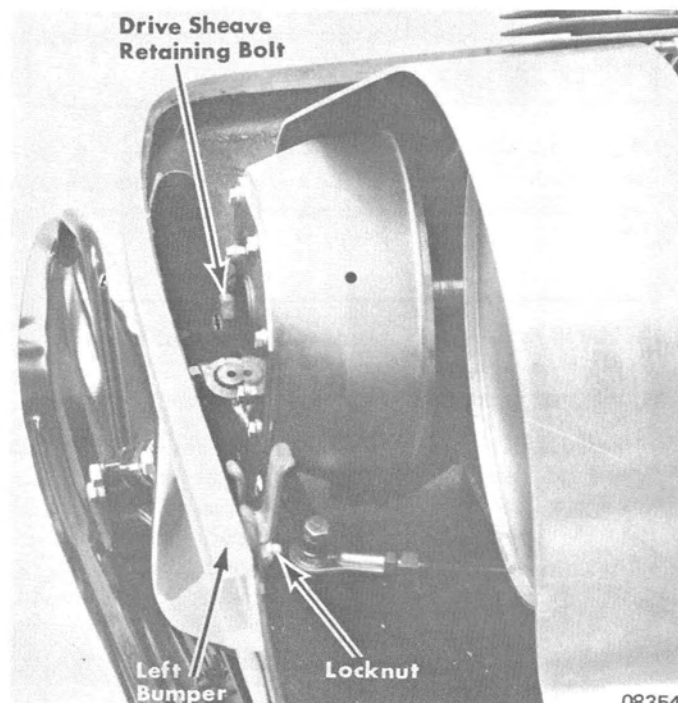
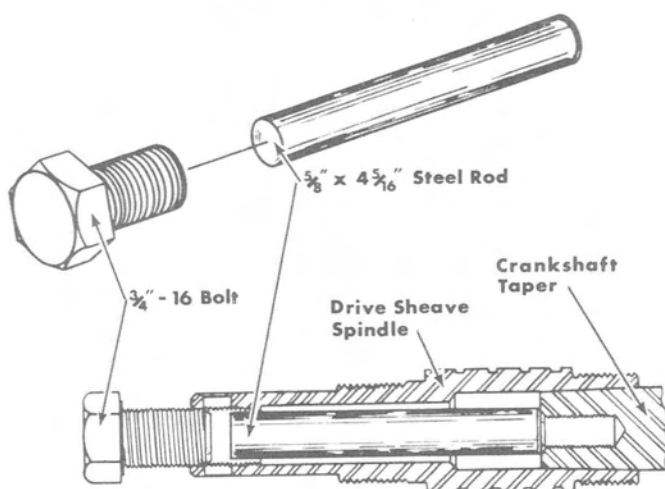






Figure 3. Holding Drive Sheave



4. Install a  $5/8$ " $\times$  $4-5/16$ " cold roll steel rod and a  $3/4$ "-16 bolt into drive sheave, as shown in Figure 4.
5. Hold drive sheave from rotating clockwise by standing a  $1/2$ " $\times$  $9/16$ " open end wrench on end from one of the ribs on inside of drive sheave fixed face to rear engine mount. (Figure 5) Tighten  $3/4$ "-16 bolt until drive sheave is forced off crankshaft taper.
6. Remove bolt and steel rod from drive sheave and open end wrench from chassis.

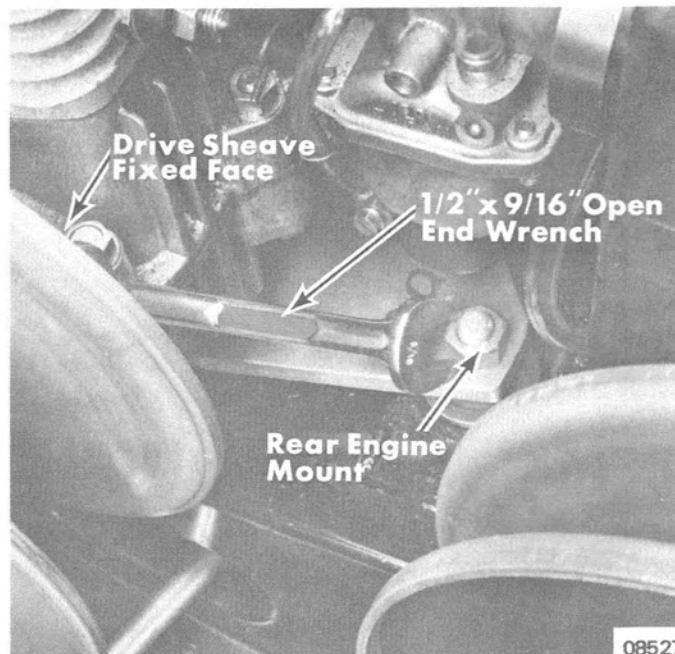


Figure 5. Holding Drive Sheave

Figure 4. Drive Sheave Removal

## DISASSEMBLY

**WARNING:** Use caution when disassembling drive sheave, as moveable face and sheave cover are under spring tension.

1. With drive sheave removed from engine, remove 6 drive sheave cover attaching bolts, cover plate, guide bushing, drive sheave cover, spacer washer(s) and return spring. (Figure 6)

**CAUTION:** DO NOT bend or mar moveable sheave half, spider or fixed half spindle.

2. Insert a  $3/8$ " $\times$ 2" pin or hardened bolt thru holes in end of fixed half spindle and clamp drive sheave in vise as shown in Figure 7. Protect sheave spindle from marring by using brass jaws and a heavy shop cloth in vise.
3. Lift up on moveable sheave and insert a steel bar (25" to 30" [64cm to 76cm] long) between spider and moveable sheave. Apply increasingly steady pressure against spindle and guide fingers until spider threads come loose from spindle threads. (Figure 7)

**CAUTION:** Spindle threads are right hand. During disassembly, rotate spider clockwise (as seen from above drive sheave). DO NOT "beat" on steel bar, spider or moveable sheave half in an attempt to break spider loose from spindle.

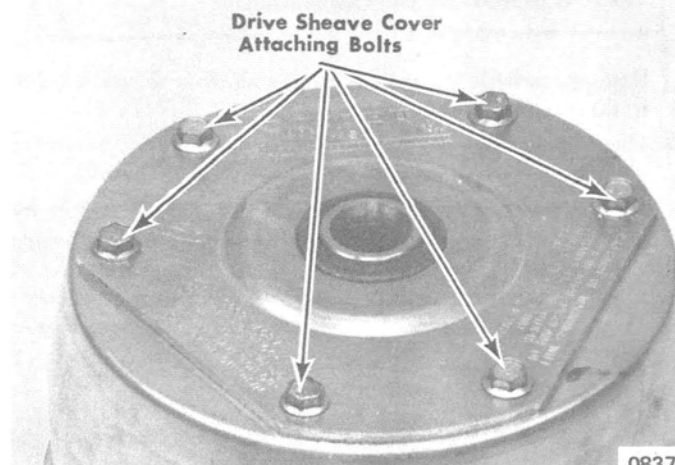


Figure 6. Drive Sheave

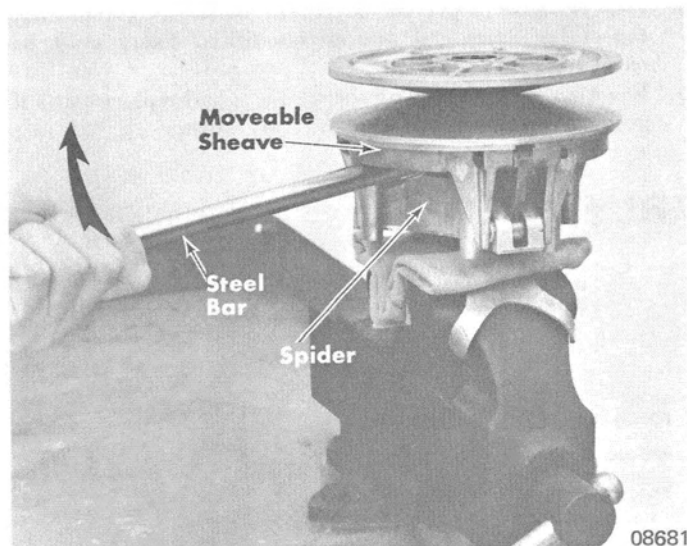
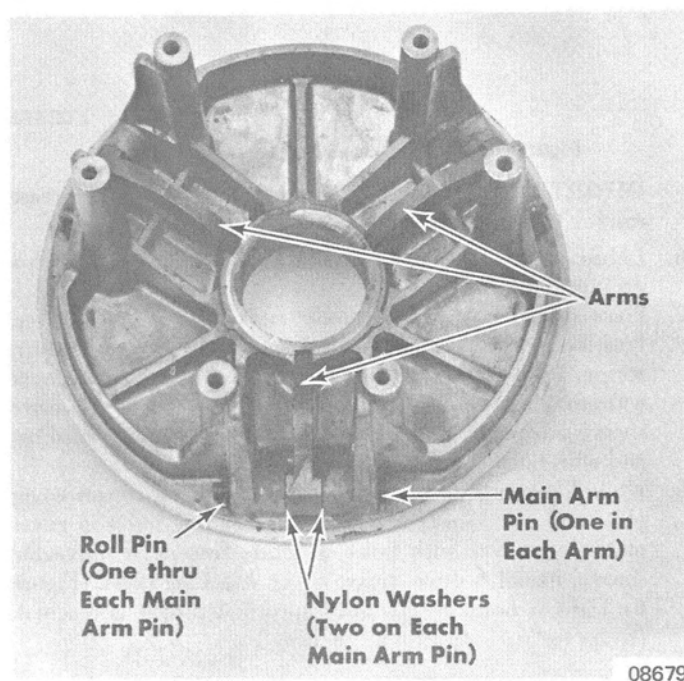


Figure 7. Removing Spider



4. After loosening spider, remove drive sheave from vise and pull 3/8"x2" pin from holes in end of fixed half spindle.
5. Remove spider and moveable sheave from fixed half spindle.
6. Disassemble moveable sheave as follows:
  - a. Remove roll pin from end of each main arm pin. (Figure 8)
  - b. Remove main arm pins, arms and nylon washers. (Figure 8)

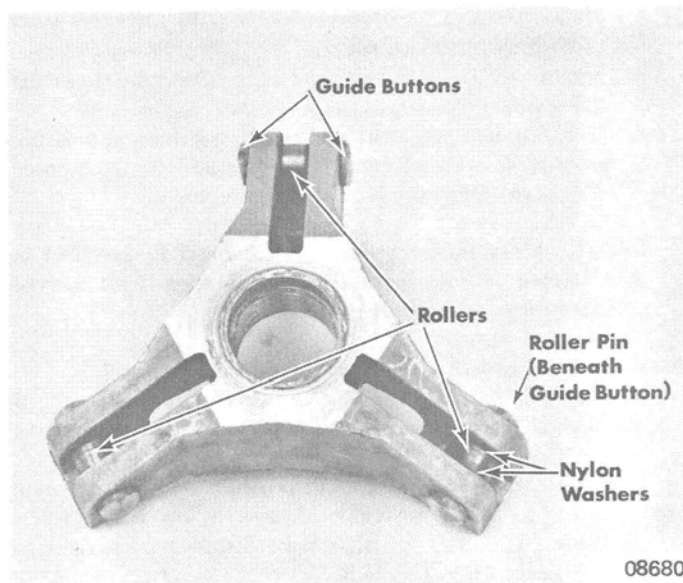


Figure 9. Spider and Rollers

7. Disassemble spider as follows:
  - a. Remove guide buttons from spider. (Figure 9)
  - b. Remove roller pins, rollers and nylon washers. (Figure 9)

Figure 8. Moveable Sheave and Arms

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Examine arms, rollers, pins, washers, guide buttons and guide bushing for cracks and wear at bearing points. Replace parts as necessary.

**IMPORTANT:** Replace parts in sets as indicated in parts list. DO NOT intermix new and used like parts.

3. Inspect sheave halves and spider for cracks, chips, excessive wear and damaged threads.
4. Inspect bronze bushing on spindle of fixed sheave half for cracks and wear. If replacement of bronze bushing is necessary, replace as follows:
  - a. If bronze bushing is tight on spindle, it will be necessary to cut it. If bushing is loose, pull bushing off spindle.

**CAUTION:** If bronze bushing must be cut, DO NOT cut or mar spindle.

- b. Remove bronze deposits and rough edges by lightly "dressing" bushing surface of spindle with a fine grade of emery cloth.
- c. Thoroughly clean and dry fixed sheave half. Be sure all emery dust is removed from sheave.
- d. Lubricate inside surface of new bronze bushing and bushing surface of spindle with S.A.E. 30W oil.

**IMPORTANT:** Bronze bushing **MUST BE** installed on spindle with beveled edge **AWAY** from belt surface of fixed sheave half.

- e. Using a suitable mandrel, press bronze bushing on spindle until bushing is seated against fixed sheave face.
- f. Remove all excess oil from bronze bushing and fixed sheave half.

5. Inspect inside taper of fixed half of sheave (crankshaft taper) for burrs and smooth condition. Taper must be clean and dry.
6. Examine belt surface of sheave faces and replace parts if grooved, pitted, scored or excessively worn.

## REASSEMBLY

1. Reassemble spider (Figure 9) as follows:
  - a. Place rollers in position on spider with a nylon washer at both ends of each roller.
  - b. Secure rollers and washers in position by inserting roller pins thru spider, nylon washers and rollers.
  - c. Install spider guide buttons by placing them in position over both ends of each roller pin and gently tapping them into their recess until they are seated.

**IMPORTANT:** Spider guide buttons must be installed so that curved surface of buttons will align with curved surface of moveable sheave guide fingers.

2. Reassemble moveable sheave (Figure 8) as follows:
  - a. Place arms in position between guide fingers of moveable sheave with a nylon washer on each side of each arm.
  - b. Secure arms and washers in position by inserting main arm pins thru moveable sheave, nylon washers and arms. Main arm pins should be installed from right to left as shown in Figure 8.
  - c. Install roll pins thru holes in end of main arm pins. Roll pins should be installed with an equal amount of roll pin protruding from each side of main arm pins.
3. Install moveable sheave on spindle of fixed sheave.
4. Place spider over spindle of fixed sheave with rollers and guide buttons positioned between guide fingers of moveable sheave. Thread spider on spindle by rotating spider and moveable sheave clockwise (when viewed from spindle side of fixed face) until spider is tightened down against shoulder of spindle.
5. Lubricate roller contact surface of arms and moveable sheave guide fingers (Figure 10) with a THIN coating of Low Temperature Grease (C-92-59999).

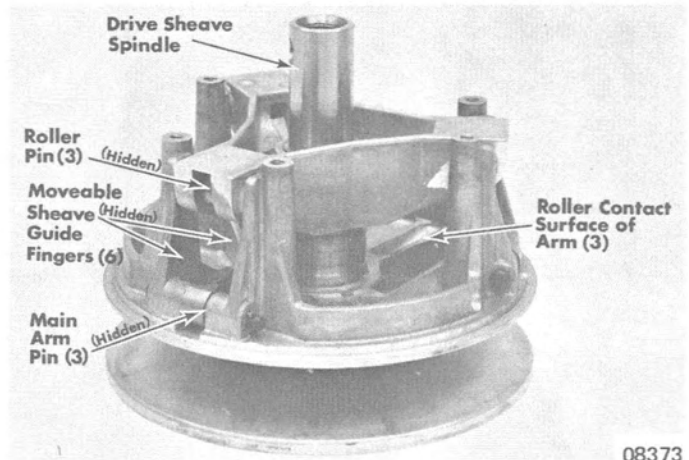


Figure 10. Drive Sheave Lubrication Points

**IMPORTANT:** DO NOT permit ANY grease or grease residue to remain on drive belt surfaces of drive sheave.

6. Lubricate roller pins and main arm pins (Figure 10) with a drop of light oil.
7. Place return spring over spindle and into recess of spider.
8. Position spacer washer(s) and drive sheave cover on return spring. Install guide bushing thru drive sheave cover, spacer washer(s) and return spring. Place cover plate on drive sheave and align holes in cover plate with guide bushing and with holes in drive sheave cover.
9. While lifting up on moveable sheave, push down on cover plate and drive sheave cover. After aligning holes in cover plate and cover with holes in guide fingers of moveable sheave, install 6 drive sheave cover attaching bolts. (Figure 6) Tighten bolts evenly until specified torque is reached. (Refer to "Specifications" Section 8.)

## INSTALLATION

1. Place drive sheave on crankshaft and secure with bushing, lockwasher and retaining bolt.
2. Hold drive sheave from rotating by standing a 1/2"x9/16" open end wrench on end from one of the ribs on inside of drive sheave fixed face to rear engine mount. (Figure 5)
3. Tighten drive sheave retaining bolt until torqued to specification. (Refer to "Specifications" Section 8.) Remove open end wrench from between drive sheave and engine mount.

4. Reattach left bumper to lower cowl with locknut.
5. Install variable speed drive belt. (Refer to this section, Part B.)

**WARNING:** DO NOT operate engine, which is equipped with drive sheave, if drive belt is not engaged with driven sheave. Remove drive sheave BEFORE making high-speed, no-load engine test.

# DRIVEN SHEAVE - SNO-TWISTER (400-D)

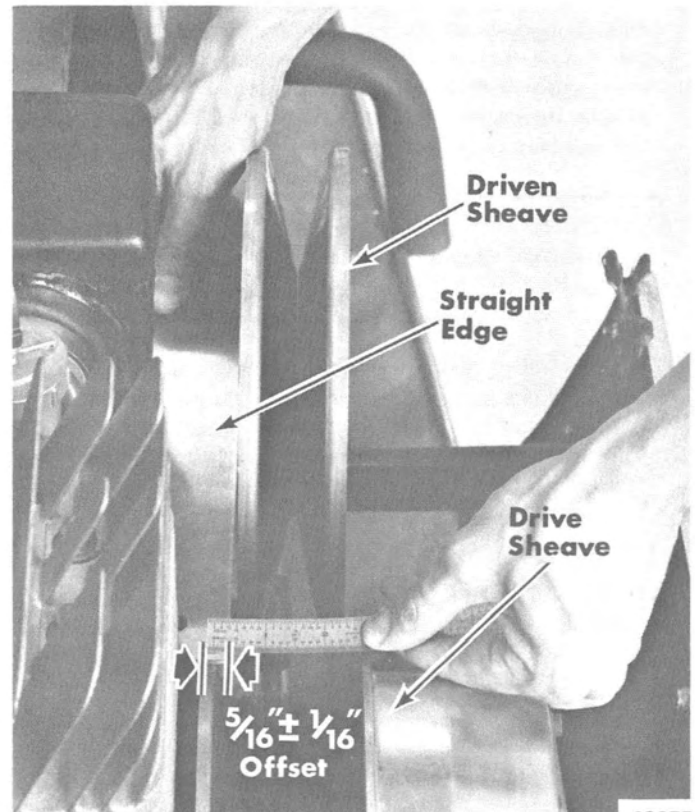
## DRIVEN SHEAVE ALIGNMENT

An improperly aligned driven sheave will result in a drop in snowmobile performance, premature variable speed drive belt failure and/or drive belt turning over in sheaves.

Driven sheave alignment occasionally should be checked and, if necessary, adjusted as follows:

1. Remove variable speed drive belt. (Refer to this section, Part B.)
2. Place a straight-edge across inside surfaces of driven sheave and extend over to drive sheave. Measure driven sheave "offset" as shown in Figure 1. Driven sheave is properly aligned when it is "offset"  $5/16"$  (8mm)  $\pm 1/16"$  (1.6mm) from drive sheave.
3. If driven sheave is not properly aligned, remove driven sheave and reposition spacer washer(s) on either side of driven sheave as required; i.e., decrease "offset" by removing spacer washer(s) from right side of driven sheave and reinstalling on left side of driven sheave.
4. Reinstall driven sheave and spacer washers and secure with snap ring. Refer to Step 2, preceding, and recheck driven sheave alignment. (Figure 1)
5. Reinstall variable speed drive belt.

Figure 1. Driven Sheave Alignment



08375

## DRIVEN SHEAVE ADJUSTMENT

Engine RPM at full throttle (accelerating) can be increased by tightening spring preload on driven sheave return spring and decreased by loosening spring preload on driven sheave return spring.

When driven sheave is properly adjusted, approximately 28 lbs. to 32 lbs. (12.7 to 14.5kg) of force (applied to the outside edge of sliding half) will be required to move sliding half of sheave.

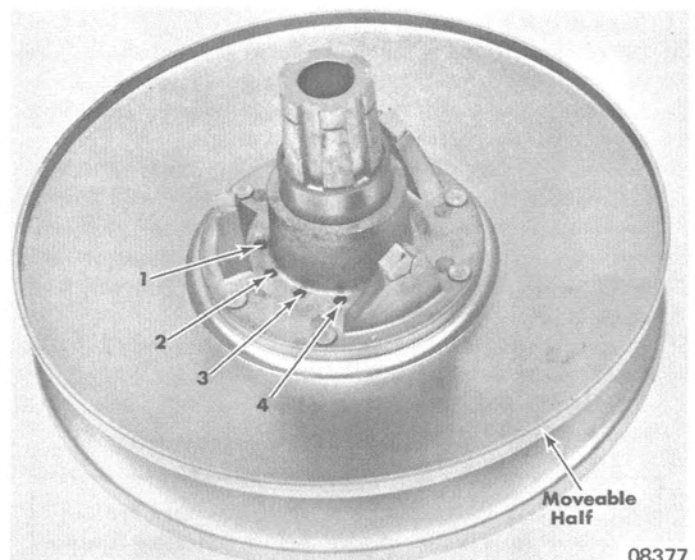
If an adjustment is necessary to maintain recommended maximum RPM at wide-open-throttle, adjust driven sheave as follows:

1. Remove variable speed drive belt. (Refer to this section, Part B.)
2. Remove and disassemble driven sheave as outlined following. Note location of spacer washers on each side of driven sheave. Spacer washers are used to adjust driven sheave alignment and must be installed in same positions.
3. Reinstall return spring "tang" into desired hole (1, 2, 3 or 4) in moveable half of driven sheave. (Figure 2)

**IMPORTANT:** If return spring is reinstalled in next higher numbered hole, spring preload will be increased, and engine RPM at full throttle (accelerating) will be increased by approximately 200 RPM. With return spring in next lower numbered hole, spring preload will be decreased, and engine RPM at full throttle (accelerating) will be decreased

by approximately 200 RPM. If additional spring preload is required, and spring is already installed in No. 4 hole, install spring in No. 1 hole and preload spring one additional ramp during reassembly.

4. Reassemble and install driven sheave as outlined following.
5. Install variable speed drive belt.



08377

Figure 2. Adjusting Spring Preload



## REMOVAL and DISASSEMBLY

1. Remove variable speed drive belt. (Refer to this section, Part B.)
2. Remove snap ring, which secures driven sheave to jackshaft, and remove spacer washer(s) and driven sheave. Note location of spacer washers on each side of driven sheave. Spacer washers are used to adjust driven sheave alignment and must be installed in the same position during reassembly to maintain proper alignment.
3. Rotate moveable half of driven sheave so that torque bracket may be pressed down toward sheave.

**WARNING:** DO NOT allow body or head to extend over driven sheave, as retaining rings alone secure torque bracket.

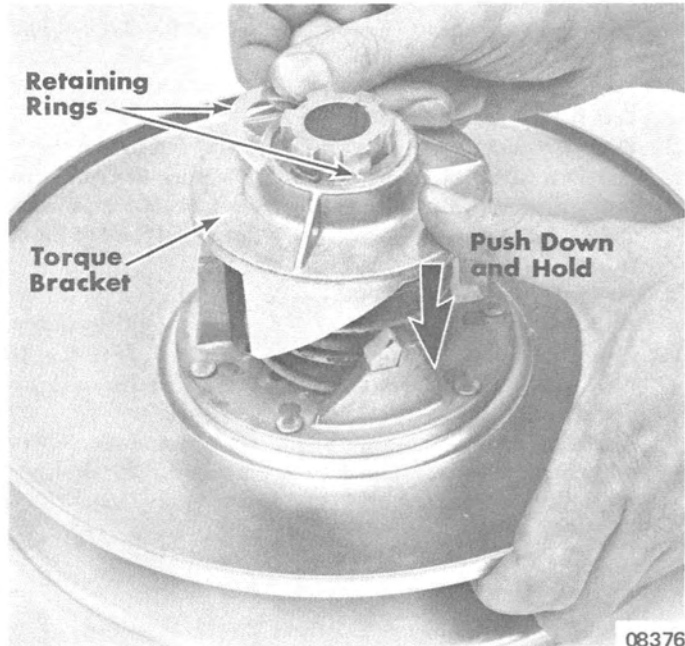
4. While holding torque bracket securely, press down on torque bracket until retaining rings are cleared, then remove retaining rings from groove in spindle. (Figure 3)
5. Carefully allow torque bracket to slide up on splined spindle, thus releasing spring preload. Remove torque bracket.

Figure 3. Removing Torque Bracket



**NOTE:** When removing torque bracket, note amount of spring preload on torque bracket for reference in reassembly.

6. Note hole (Figure 2) in sliding half of sheave in which return spring "tang" is installed. Remove spring and separate halves of sheave. Remove bushing from spindle of fixed sheave half.



## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Check sheave faces for abnormal wear.
3. Inspect spindle bushing for wear.
4. Inspect bushing contact surface of sliding half of sheave for wear.

5. Check nylon wear plates on ramps of sliding sheave half. If excessive wear is indicated, replace wear plates as a set.
6. Inspect sheave halves and torque bracket for cracks and chips.
7. Replace worn or broken parts as necessary.

## REASSEMBLY and INSTALLATION

1. Install bushing and moveable half of sheave on spindle of fixed sheave half.
2. Install return spring "tang" in hole of sliding half of sheave in which spring was previously installed. (Figure 2)
3. Align torque bracket with splines on spindle and engage spring on one of the torque bracket ramps.
4. Compress spring until  $1/16''$  to  $1/8''$  (1.6mm to 3.2mm) clearance is obtained between ramps. (Figure 4) With no preload on spring, ramps should be "tip-to-tip", as shown in Figure 4. If ramps are not properly positioned, re-insert return spring "tang" in a hole in sliding sheave which will allow desired alignment between ramps.
5. Rotate sliding half of sheave two (2) ramps ( $2/3$  turn,  $240^\circ$ ) to apply preload to spring. (Figure 4) Press torque bracket below groove in splined spindle and install retaining rings in groove. (Figure 3)

**WARNING:** Be certain that retaining rings are fully installed in spindle groove before releasing torque bracket.

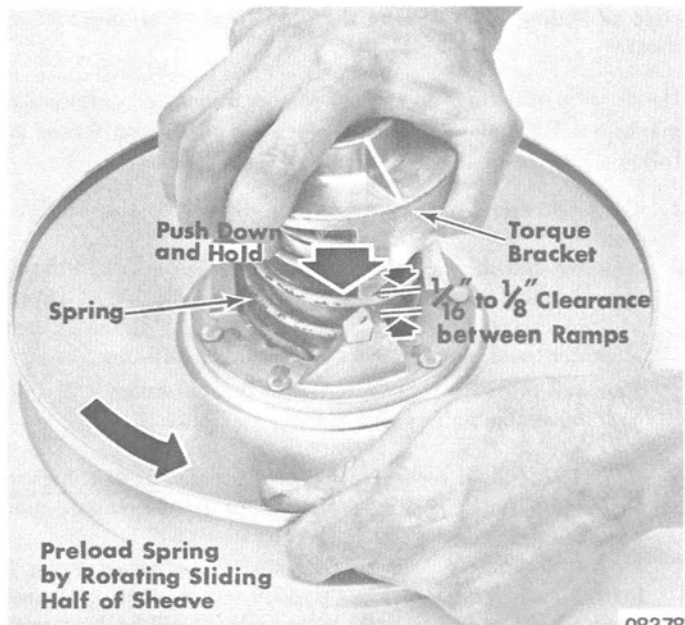


Figure 4. Installing Torque Bracket



6. Install driven sheave and spacer washer(s) on jackshaft and secure with snap ring.

**IMPORTANT:** If in doubt about positioning of spacer washers on each side of driven sheave, check driven sheave alignment as outlined in "Driven Sheave Alignment", preceding.

7. Install variable speed drive belt.
8. Check driven sheave adjustment by operating snowmobile at full throttle (accelerating). If driven sheave is properly adjusted, engine will reach and maintain maximum specified RPM at wide-open-throttle. If engine speed (RPM) is higher or lower than recommended, refer to "Driven Sheave Adjustment", preceding, and adjust driven sheave.

# JACKSHAFT - SNO-TWISTER (400-D)

## REMOVAL

1. Remove driven sheave assembly and spacer washers from jackshaft. (Refer to "Driven Sheave", preceding.)
2. Remove drive chain and driver sprocket from chaincase. (Refer to this section, "Sprocket and Drive Chain Replacement", Part D.)
3. Remove jackshaft bearing retainer from jackshaft support

attached to crossmember.

4. Remove jackshaft assembly from upper chaincase bearing, 5/8" (15.9mm) piece of hose, brake disc and jackshaft support by pulling from driven sheave side.
5. Loosen set screw in bearing collar and remove bearing and collar from jackshaft.

## INSPECTION

1. Spin inner race of jackshaft bearings. Replace if bearing sounds or feels rough. Bearing should have smooth action and no rust marks. If upper chaincase bearing is bad, replace as follows:
  - a. Remove drive sprocket from front axle and chaincase assembly from chassis.
  - b. Remove snap ring which secures upper chaincase bearing in chaincase.
  - c. Press jackshaft bearing out of chaincase.

**CAUTION: BE SURE that chaincase is supported with a suitable mandrel during removal and installation of bearing.**

- d. While pressing on outer race, press new jackshaft bearing in chaincase.
  - e. Install bearing snap ring in chaincase.
  - f. Place chaincase in position on chassis and secure with bolts.
  - g. Refer to this section, Part D, "Sprocket and Drive Chain Replacement", and install drive sprocket on front axle.
2. Use "V" blocks to check jackshaft for straightness. Discard jackshaft if bent.
  3. Check for smashed or stripped threads on jackshaft.
  4. Inspect jackshaft splines to be certain that they are not bent or twisted.
  5. Replace part as necessary.

## INSTALLATION

1. If removed, install brake disc key in jackshaft keyway.
2. Place bearing collar and jackshaft bearing on snap ring end of jackshaft.

**IMPORTANT: Bearing assembly MUST BE positioned on jackshaft with bearing collar toward splined end of jackshaft. DO NOT tighten set screw in bearing collar at this time.**

3. Place jackshaft in position by installing splined end of jackshaft thru hole in jackshaft support which is attached to crossmember on left side.
4. While holding brake disc in position between brake pads, align jackshaft key with keyway in brake disc and insert jackshaft thru brake disc, 5/8" (15.9mm) piece of hose and chaincase bearing.
5. Install driver sprocket and drive chain in chaincase. (Refer to this section, "Sprocket and Drive Chain Replacement", Part D.)
6. Install jackshaft bearing retainer over jackshaft and bearing. Concave surface of retainer must be toward bearing. Secure bearing retainer to jackshaft support with bolts and locknuts.

**NOTE: Install 7/8" (22.2mm) bolt in top hole of bearing retainer and 5/8" bolts in 2 lower holes of bearing retainer.**

7. Place jackshaft brace over 7/8" bearing retainer bolt and secure with locknut. (Figure 1)

8. Tighten set screw in bearing collar.
9. Install driven sheave assembly and spacer washers on jackshaft. (Refer to "Driven Sheave", preceding.)

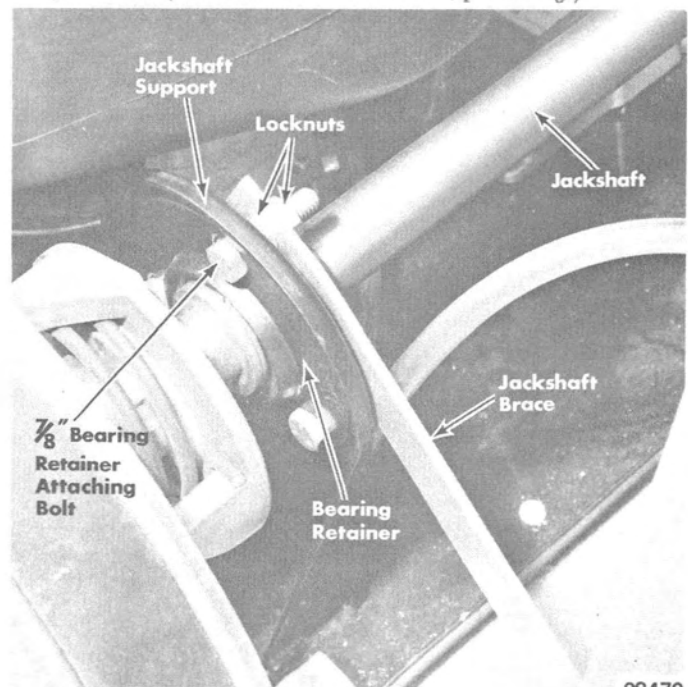


Figure 1. Jackshaft Support

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# 440 S/R MERCURY DRIVE SHEAVES (CLUTCHES)

## GENERAL

The drive sheave (clutch) is an essential part of the drive mechanism and functions basically as a variable pitch, belt-type drive. The drive sheave is fully automatic and operates as a clutch and a transmission.

Under normal use, it is recommended that the drive sheave be completely disassembled, cleaned and inspected at least ONCE each season. If the snowmobile is operated continuously under severe use, the drive sheave should be inspected more frequently.

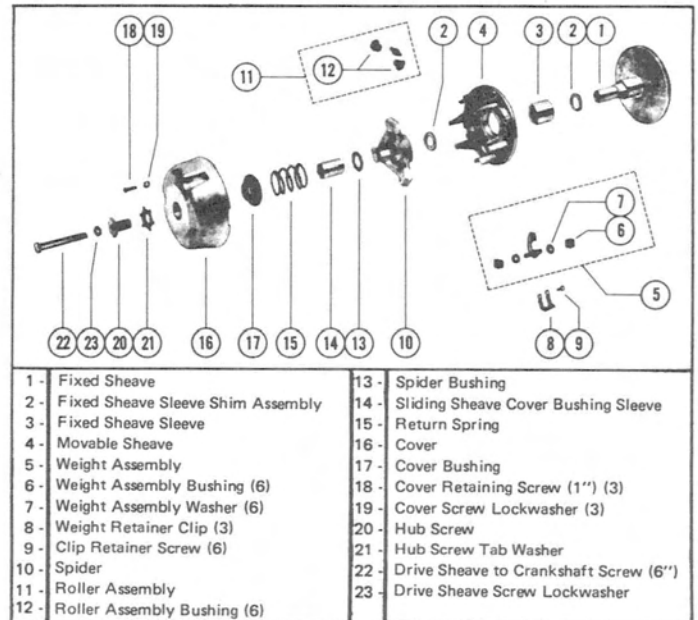


Figure 1. Original Equipment Mercury Drive Sheave (Clutch) (D-69248A1)

## MERCURY D-69248A1 TYPE DRIVE SHEAVE (CLUTCH) (Figure 1)

**IMPORTANT:** This repair procedure IS NOT APPLICABLE to a D-69248A1 type drive clutch that has been updated to the improved clutch by installing new design

"Fixed Sheave and Spider Assembly" (D-75200A2). Refer to "Mercury D-75201A1 Type Drive Clutch", following, for repair information on an improved clutch.

## REMOVAL and DISASSEMBLY

**CAUTION:** DO NOT attempt to remove this clutch from the engine as an assembly. Clutch may be disassembled on engine.

1. Remove variable speed drive belt from drive clutch. (Refer to this section, Part B.)
2. Hold drive clutch with Belt Wrench (C-91-24937A1) and remove retaining bolt and lockwasher. (Figure 2)

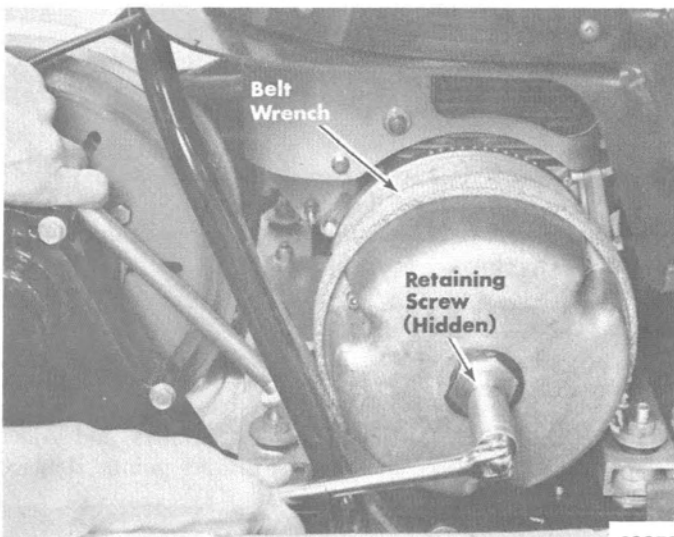


Figure 2. Removing Drive Clutch Retaining Bolt

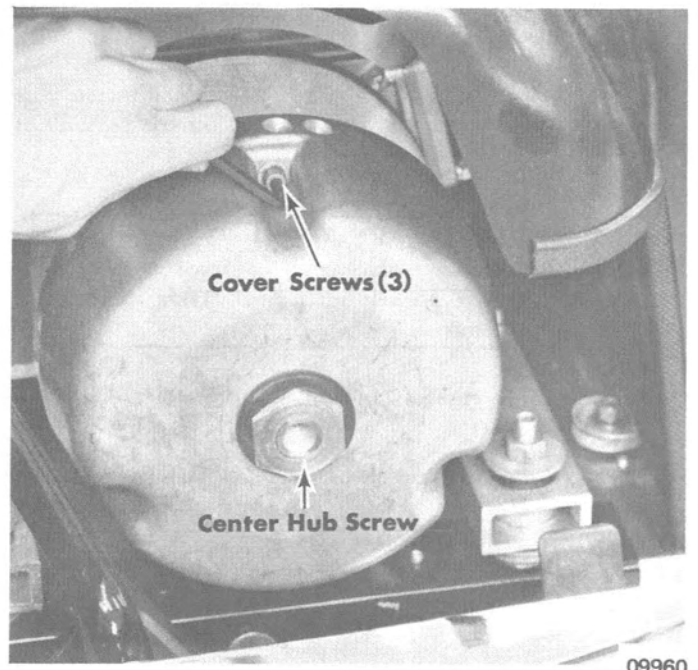


Figure 3. Removing Cover Screws

3. Remove 3 cover retaining screws and lockwashers. (Figure 3)

**CAUTION:** As large, center hub screw is removed, cover will be forced off by spring tension.

4. Hold cover securely while removing large, center hub screw and tab washer. After removing screw, slowly let out on cover until spring tension is released and remove cover and cover bushing from clutch. (Figure 1)

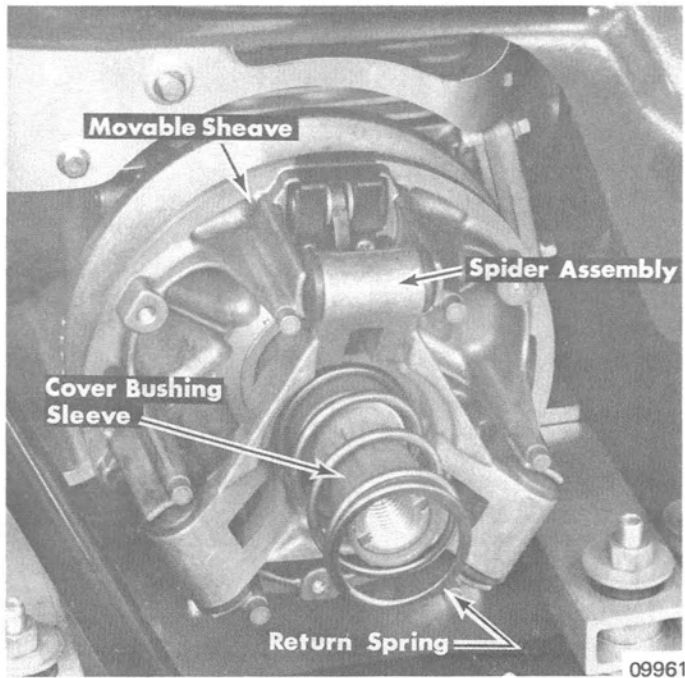


Figure 4. Internal Clutch Components

5. Remove return spring, cover bushing sleeve and spider bushing from clutch. (Figures 1 and 4)

**IMPORTANT:** Spider has been epoxied to spindle of fixed sheave. It may be necessary to heat hub of spider (Torch Lamp C-91-63209 works well) to remove spider.

6. Remove spider assembly, triangular shaped shim, movable sheave, fixed sheave sleeve and inner shim from spindle of fixed sheave. (Figures 1 and 4)

**CAUTION:** DO NOT REMOVE fixed sheave from crankshaft, unless replacement of fixed sheave is necessary. It may be helpful to heat spindle of fixed sheave to aid removal.

7. Remove roller bushings and rollers from spider. (Figures 1 and 5)

*NOTE: Roller bushings may have been cemented to spider, and it may be necessary to warm spider SLIGHTLY to aid removal of bushings.*

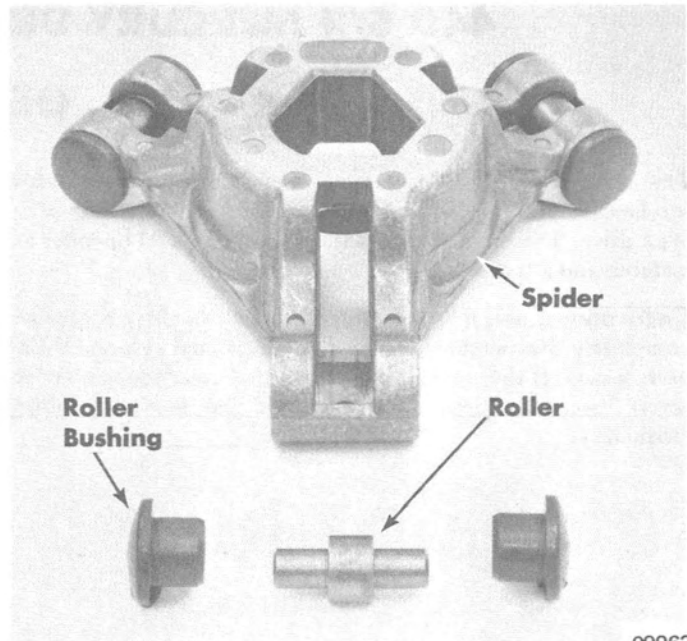


Figure 5. Spider, Rollers and Roller Bushings

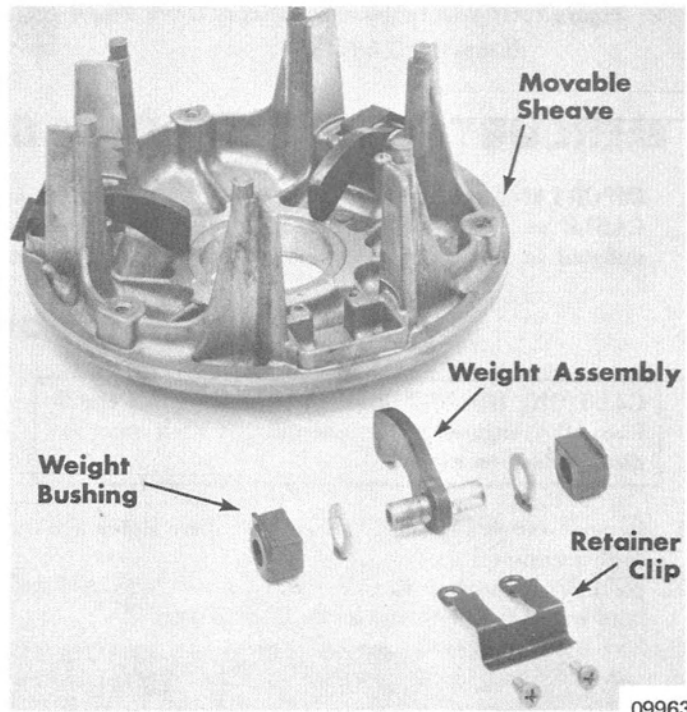


Figure 6. Movable Sheave and Weights

8. Disassemble movable sheave as follows:
  - a. Remove screws and retainer clips which secure weights to movable sheave. (Figures 1 and 6)
  - b. Remove weights, washers and bushings from movable sheave. (Figures 1 and 6)

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Inspect drive clutch cover, fixed sheave, movable sheave and spider for cracks, chips, excessive wear and damaged threads.

**IMPORTANT:** If replacement of original fixed sheave or spider is required, a new design "Fixed Sheave and Spider Assembly" (D-75200A2) must be installed. Installation instructions are included with parts.

3. Examine belt surface of sheave faces and replace if grooved, pitted, scored or excessively worn.
4. Examine weights, weight bushings, rollers and roller bushings for cracks and wear at bearing points. Replace parts as necessary. (Figures 1, 5 and 6)

**IMPORTANT:** Replace parts in sets, as indicated in parts list. DO NOT intermix new and used like-parts.



## REASSEMBLY and INSTALLATION

**IMPORTANT:** DO NOT use any lubrication on this drive clutch.

1. Reassemble movable sheave (Figure 6) as follows:
  - a. Place washers and weight bushings in position on each end of weight pin.
  - b. Install weight assemblies in position in movable sheave.
  - c. Coat threads of weight attaching screws with Loctite Type "A" (C-92-32609).
  - d. Secure weight assemblies to movable sheave with retainer clips and attaching screws.
2. Install rollers and roller bushings in spider (Figure 5) with Bellows Adhesive (C-92-36340A1) applied to OD of roller bushings. DO NOT permit adhesive to get on rollers.
3. Reinstall inner shim (Figure 1) on fixed sheave spindle.
4. Apply a coating of Epoxy (C-92-65150) to ID of fixed sheave sleeve and install sleeve (holes toward face of fixed sheave) on fixed sheave spindle. (Figure 1) Remove any excess Epoxy from fixed sheave.

*NOTE: Mix Epoxy (parts "A" and "B") in a 1:1 ratio.*

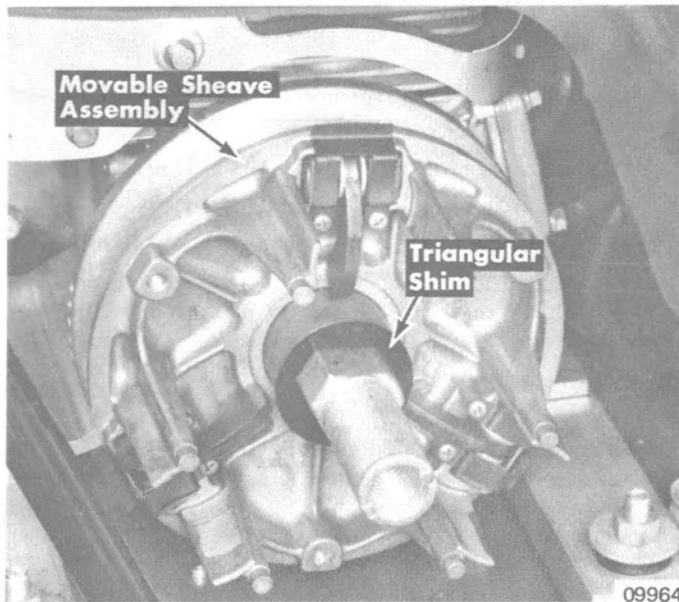


Figure 7. Reassembling Drive Clutch

5. Install movable sheave assembly and triangular shaped shim on fixed sheave spindle. (Figure 7)
6. Apply a coating of Epoxy on "triangle" ID of spider and "triangle" of fixed sheave spindle.
7. Align spider reference marks ("X" stamped on spider) between movable sheave reference marks ("X" stamped on

2 roller guide posts) and install spider on spindle of fixed sheave. (Figure 8)

8. Reinstall spider bushing, cover bushing sleeve and return spring on clutch. (Figures 1 and 4)
9. Install cover assembly, aligning the 2 small locating holes (inside the cover) with the roller guide posts which have been stamped "X". Secure cover assembly by installing tab washer and center hub screw. Torque hub screw to 50 ft. lbs. (7mkg) and bend one side of tab washer against flat of hub screw.

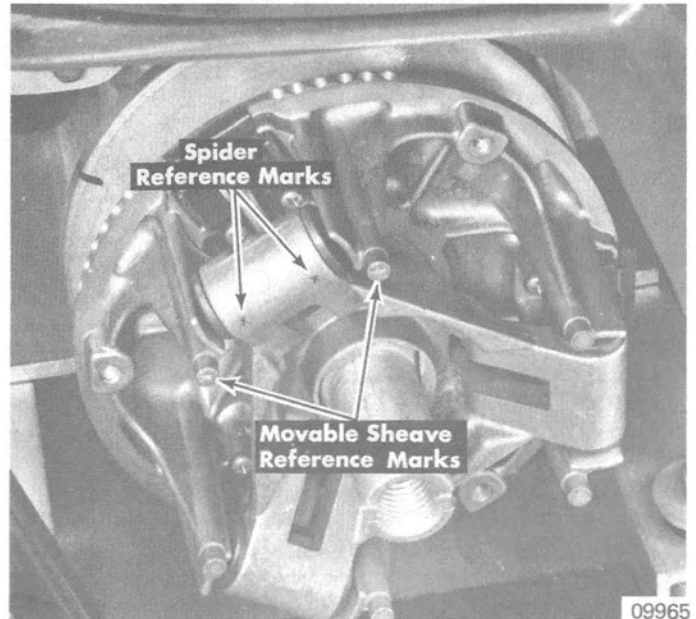


Figure 8. Reassembling Drive Clutch

10. Secure cover to movable sheave with 3 lockwashers and cover retaining screws. (Figure 3) Torque screws evenly to 90 in. lbs. (104kg-cm).
11. Secure clutch to engine with lockwasher and retaining bolt. While holding drive clutch with Belt Wrench (C-91-24937A1), torque bolt to 50 ft. lbs. (Figure 2)

**IMPORTANT:** Allow Epoxy to cure for at least 12 hours before operating clutch.

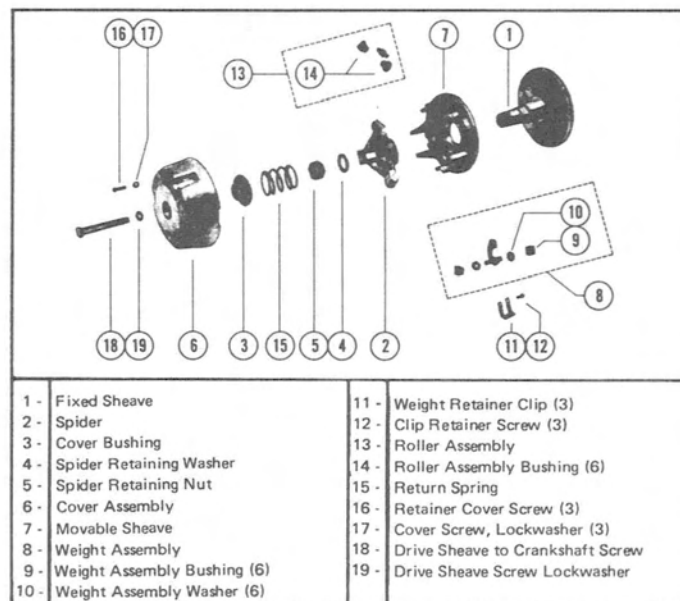
12. Install variable speed drive belt and drive clutch guard. (Refer to this section, Part B)

**WARNING:** DO NOT operate engine, that is equipped with drive clutch, if drive belt is not engaged with driven sheave. Remove drive clutch BEFORE making high-speed, no-load engine test.

## MERCURY D-75201A1 TYPE DRIVE CLUTCH (Figure 9)

**IMPORTANT:** This repair procedure also is applicable to a D-69248A1 type drive clutch that has been updated to the improved clutch by installing the new design "Fixed Sheave and Spider Assembly" (D-75200A2).

Figure 9. Improved Mercury Drive Clutch (D-75201A1)



## REMOVAL

**WARNING:** DO NOT, under any circumstances, attempt to repair or handle a DRIVE CLUTCH (either on or off engine) that has stuck or jammed in closed (high gear) position, UNTIL a reasonable effort first has been made to open sheave. ALWAYS approach a stuck or jammed sheave with caution.

1. Remove variable speed drive belt from drive clutch. (Refer to this section, Part B.)

2. Hold drive clutch with Belt Wrench (C-91-24937A1) and remove retaining bolt and lockwasher. (Figure 2)
3. Install Drive Sheave Puller (C-91-64000A1) in drive clutch.
4. Hold drive clutch with Belt Wrench (C-91-24937A1) and operate Drive Sheave Puller to remove clutch assembly.

*NOTE: For ease of removal, an air or electric impact wrench may be used to operate puller.*

## DISASSEMBLY

**WARNING:** Use caution when disassembling drive clutch, as movable sheave and clutch cover are under spring tension.

1. With drive clutch removed from engine, hold cover securely while evenly removing 3 cover retaining screws and lockwashers. After removing screws, slowly let up on cover assembly until spring tension is released and remove cover, cover bushing and return spring from clutch. (Figure 9)
2. Place drive clutch on a suitable shaft or on 8" (20cm) bolt clamped in vise. Using Belt Wrench to hold fixed sheave part of clutch, remove spider retaining nut and spring washer. (Figure 9)

3. While heating hub of spider, gently TAP up on spider (with movable sheave) until spider slides off taper of fixed sheave spindle. Remove spider and movable sheave from spindle of fixed sheave. (Figure 9)

*NOTE: Roller bushings have been cemented to spider, and it will be necessary to warm spider SLIGHTLY to aid removal of bushings.*

4. Remove roller bushings and rollers from spider. (Figures 5 and 9)
5. Disassemble movable sheave as follows:
  - a. Remove screws and retainer clips which secure weights to movable sheave. (Figures 6 and 9)
  - b. Remove weights, washers and bushings from movable sheave. (Figures 6 and 9)

*NOTE: Spider has been epoxied to spindle of fixed sheave. It will be necessary to heat hub of spider (Torch Lamp C-91-63209 works well) to remove spider.*

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts. BE SURE that all old Epoxy is removed from spider and fixed sheave spindle.
2. Inspect drive clutch cover, fixed sheave, movable sheave and spider for cracks, chips, excessive wear and damaged threads.
3. Examine belt surface of sheave faces and replace if grooved, pitted, scored or excessively worn.

4. Examine weights, weight bushings, rollers and roller bushings for cracks and wear at bearing points. Replace parts as necessary. (Figures 5, 6 and 9)

**IMPORTANT:** Replace parts in sets as indicated in parts list. DO NOT intermix new and used like-parts.

## REASSEMBLY

**IMPORTANT: DO NOT use any lubrication on this drive clutch.**

1. Reassemble movable sheave (Figure 6) as follows:
  - a. Place washers and weight bushings in position on each end of weight pin.
  - b. Install weight assemblies in position in movable sheave.
  - c. Coat threads of weight attaching screws with Loctite Type "A" (C-92-32609).
  - d. Secure weight assemblies to movable sheave with retainer clips and attaching screws.
2. Install rollers and roller bushings in spider (Figure 5) with Bellows Adhesive (C-92-36340A1) applied to OD of roller bushings. DO NOT permit adhesive to get on rollers.
3. Install movable sheave on spindle of fixed sheave.
4. Apply a coating of Epoxy (C-92-65150) on ID taper of spider and OD taper of fixed sheave spindle.

*NOTE: Mix Epoxy (parts "A" and "B") at a 1:1 ratio.*

5. Align spider reference marks ("X" stamped on spider) between movable sheave reference marks ("X" stamped on 2 roller guide posts) and install spider on spindle of fixed sheave. (Figures 8 and 9)

**IMPORTANT: Movable sheave must slide freely on spider. If "binding" or sticking occurs, disregard reference marks and reposition spider arms between different guide posts of movable sheave until free movement is obtained.**

6. Place drive clutch on a suitable shaft or on 8" (20cm) bolt clamped in vise.
7. Use Epoxy (C-92-65150) on threads of spider retaining nut. Secure spider to clutch with spring washer (convex side toward spider) and retaining nut. (Figure 9) While holding fixed sheave part of clutch with Belt Wrench (C-91-24937A1), torque spider retaining nut to 25 to 32 ft. lbs. (3.46 to 4.43mkg).

**CAUTION: DO NOT exceed 32 ft. lbs. when torquing spider retaining nut.**

8. Wipe excess Epoxy from drive clutch.
9. Place return spring in position in drive clutch. (Figure 9)
10. If removed, reinstall cover bushing in position in drive clutch cover. (Figure 9)
11. Install cover assembly, aligning the 2 small locating holes (inside the cover) with the roller guide posts stamped "X". While lifting up on movable sheave, push down on cover assembly and install 3 lockwashers and 3 cover screws. Tighten screws evenly until torqued to 90 in. lbs. (104kg-cm).

**IMPORTANT: Allow Epoxy to cure for at least 12 hours before operating clutch.**

12. After reassembling drive clutch, clutch MUST BE checked for binding as follows:
  - a. Push down on cover of drive clutch until clutch is fully closed.
  - b. Carefully release pressure from drive clutch cover, allowing clutch to reopen. Clutch must return to full open position (by action of return spring only) without binding. If clutch does not bind, proceed to "Installation" instructions, following, and install clutch. If clutch is binding, proceed to "Step c", following.
  - c. With movable part of clutch at position where it is binding, loosen and retighten drive clutch cover screws (one-at-a-time) until the screw is found which, when loosened, allows drive clutch to open fully. Mark location of this screw.
  - d. Remove cover attaching screws from drive clutch.
  - e. Install a shim washer (C-12-35950) (between cover and movable sheave) around cover attaching screw which was previously marked.
  - f. Reinstall cover attaching screws and torque evenly to 90 in. lbs.
  - g. Recheck clutch for binding. If binding is still affecting operation of clutch, refer to "Step c", preceding.

## INSTALLATION

**IMPORTANT: Allow Epoxy to cure for at least 12 hours before operating clutch.**

1. Clean tapers of drive clutch and crankshaft. Clutch and crankshaft must be clean, dry and NOT lubricated.
2. Secure clutch to engine with lockwasher and retaining bolt. While holding drive clutch with Belt Wrench (C-91-24937A1), torque bolt to 50 ft. lbs. (6.9mkg). (Figure 2)

**WARNING: DO NOT operate engine, that is equipped with drive clutch, if drive belt is not engaged with driven sheave. Remove drive clutch BEFORE making high-speed, no-load engine test.**

3. Install variable speed drive belt and drive clutch guard. (Refer to this section, Part B.)

# MERCURY DRIVEN SHEAVE (D-69271A6)

## DRIVEN SHEAVE ADJUSTMENT

Spring preload (tension) of driven sheave return spring can be changed if a change in maximum engine speed at full throttle (accelerating) or shifting characteristics of drive system is desired. Changes in temperature, elevation, snow conditions and load may necessitate a readjustment of spring preload to maintain recommended maximum engine speed at full throttle (accelerating).

*NOTE: A snowmobile engine is designed to deliver maximum power when operated at recommended maximum engine speed. Variation (above or below) from this engine speed will result in a loss of power.*

Engine RPM at full throttle (accelerating) can be increased by tightening spring preload or decreased by loosening spring preload on driven sheave return spring.

*NOTE: Factory preload setting of driven sheave return spring was 1/3-turn (120°). This setting will be suitable for operation under most conditions, if the Mercury drive clutch is still being used. If a Salsbury "850" clutch has been installed, readjust spring preload to 1/6-turn (60°). Keep in mind that final setting must be determined by actually test-running the snowmobile under normal operating conditions.*

If a driven sheave adjustment is necessary to maintain recommended maximum engine speed (refer to "Specifications", Section 8), adjust driven sheave as follows:

1. Remove variable speed drive belt. (Refer to this section, Part B.)
2. Scribe a mark on spring retainer and another mark on movable sheave (aligned with mark on spring retainer) for reference during readjustment. (Figure 1)

**WARNING:** The spring retainer and movable sheave are under spring tension and may cause injury if precautions are not taken during readjustment of driven sheave.

## REMOVAL and DISASSEMBLY

1. Remove variable speed drive belt. (Refer to this section, Part B.)

**WARNING:** The spring retainer and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly of driven sheave.

2. Apply snowmobile brake. Release tension on driven sheave return spring by pushing in on spring retainer and allowing

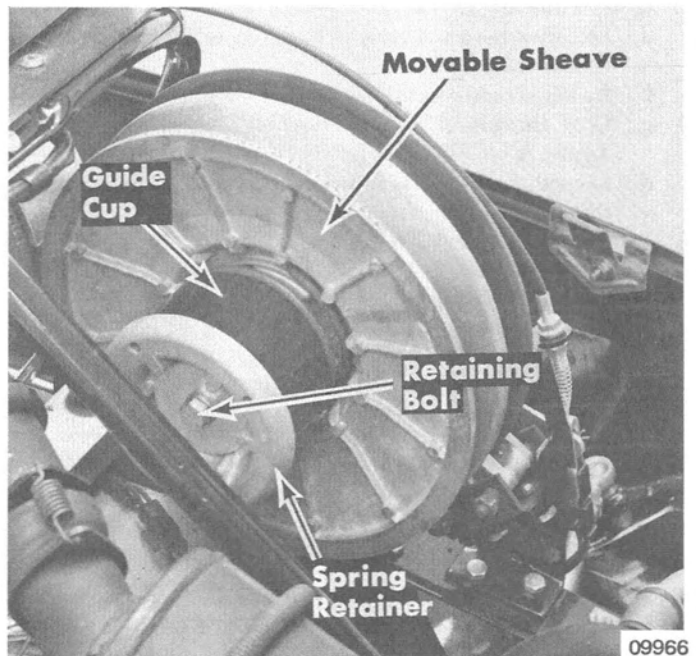


Figure 1. Mercury Driven Sheave

3. Apply snowmobile brake. Using marks scribed on driven sheave as reference, push in on spring retainer and increase (rotate retainer clockwise) or decrease (rotate retainer counterclockwise) spring preload of driven sheave return spring as desired, then allow spring retainer to return to locked position. (Figure 1)
4. Reinstall variable speed drive belt and guard.
5. Operate snowmobile at full throttle (accelerating) and check maximum engine RPM. If engine is not operating at recommended maximum engine speed, readjust driven sheave return spring preload (as outlined immediately preceding) until specified RPM is attained.

retainer to rotate counterclockwise until tension is released. (Figure 1)

**WARNING:** Although spring tension has already been released, return spring is still compressed and will force parts off driven sheave as retaining bolt is removed.

3. With snowmobile brake still applied, remove driven sheave retaining bolt, lockwasher, large spring retainer washer, spring retainer, spring guide cup and return spring from driven sheave.



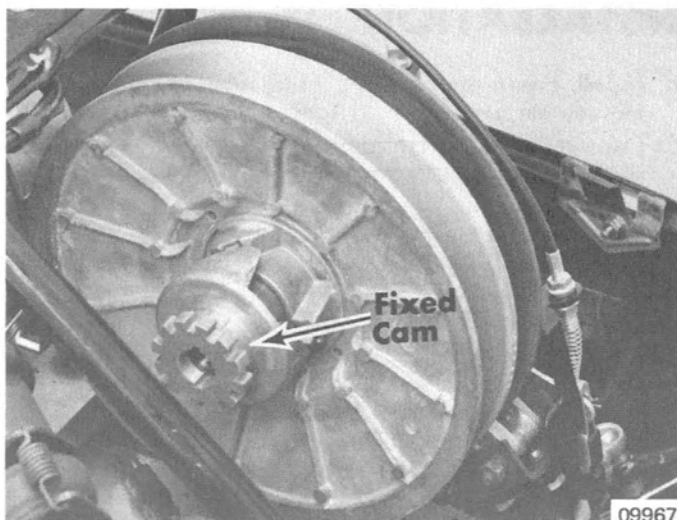


Figure 2. Mercury Driven Sheave

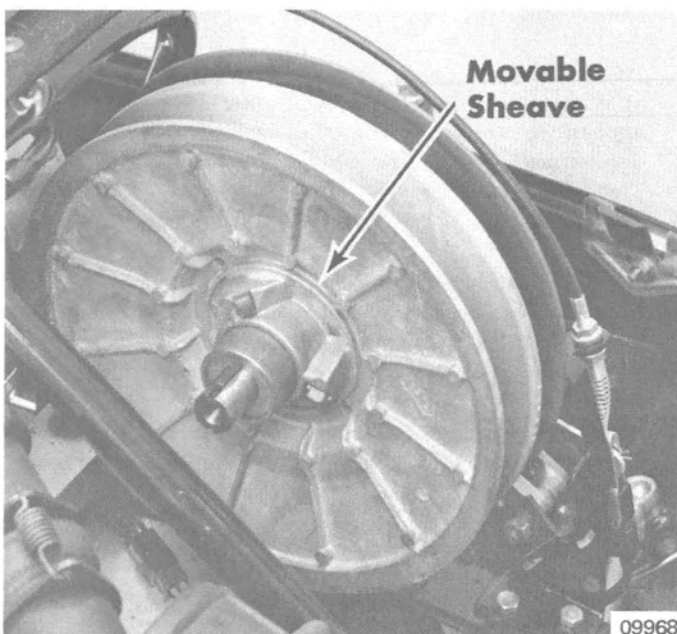


Figure 3. Mercury Driven Sheave

4. Remove fixed cam (Figure 2) and movable half of sheave (Figure 3) from driven sheave assembly.
5. Pull bushing and spacer washer from spindle of fixed half of sheave. (Figure 4)
6. Remove bolts and locknuts (Figure 4), which secure brake assembly to front crossmember, then pull brake assembly off brake disc. (Figure 5)

## CLEANING and INSPECTION

1. Thoroughly clean and dry all parts.
2. Check belt surface of sheave faces and replace if grooved, pitted, scored or excessively worn.
3. Inspect sheave halves and fixed cam for cracks and chips. Check ramps of fixed cam for excessive wear. Replace parts as necessary.
4. Check 3 wear buttons on ramps of movable sheave. If excessive wear is indicated, replace as a set.

**IMPORTANT:** The movable sheave ramps (where the 3 wear buttons are installed) must be spot-faced and

7. Pull fixed sheave half with brake disc (Figure 5) from jackshaft.
8. If desired, remove brake disc from fixed sheave half by removing attaching bolts and lockwashers.

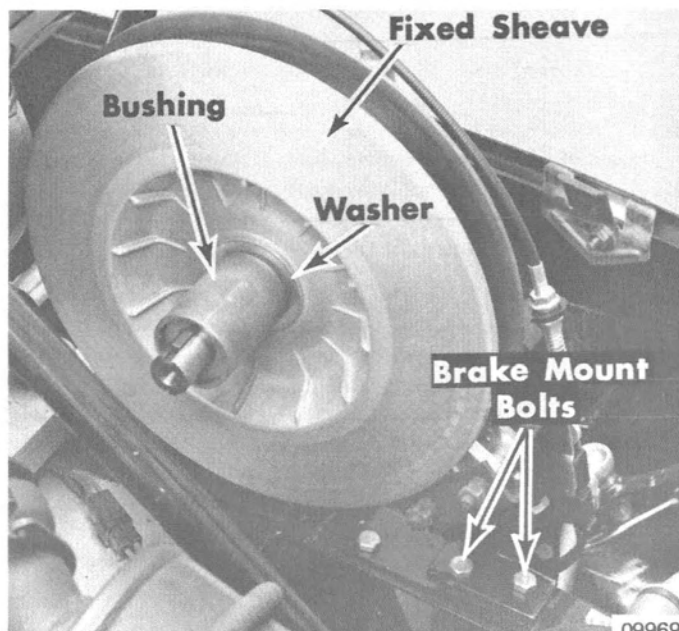


Figure 4. Mercury Driven Sheave

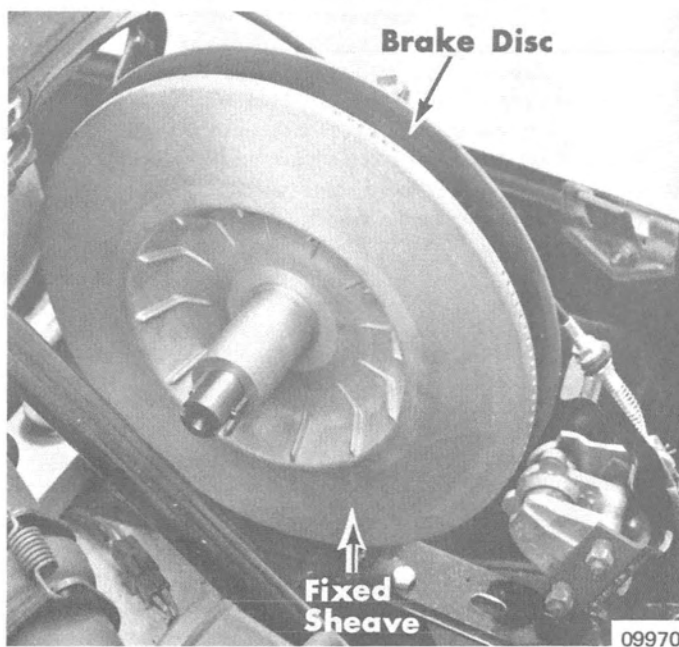


Figure 5. Mercury Driven Sheave

countersunk, otherwise the 3 wear buttons cannot be properly installed, and breakage of buttons may result. If a movable sheave is not correctly machined, it should be replaced. Reinstall replacement wear buttons, using Bel-lows Adhesive (C-92-36340A1) to secure buttons to movable sheave.

5. Inspect driven sheave bushing (Figure 4) for wear by checking fit between bushing and movable half of sheave. Replace bushing if excessively worn.

## REASSEMBLY and INSTALLATION

1. If brake disc was removed from fixed half of sheave, reinstall to sheave with attaching lockwashers and bolts. Coat threads of attaching bolts with Loctite No. 35 (C-92-59328) and torque to 180 in. lbs. (205kg-cm).
2. If removed, reinstall both jackshaft keys in position in keyways of jackshaft. (Figure 5)
3. Align keyways of fixed sheave half with jackshaft keys and reinstall fixed sheave on jackshaft. (Figure 5)
4. Reinstall brake assembly in position around brake disc and secure brake to cross-member with bolts and locknuts. (Figure 4) Tighten bolts securely and check operation of brake.

**IMPORTANT:** Spacer washer (Figure 4) is installed in driven sheave to maintain a pre-determined drive belt tension. If drive belt is too loose, it can be tightened by removing spacer washer from driven sheave. If drive belt is too tight, install this spacer washer (if not already installed) to loosen drive belt tension. A malfunctioning drive clutch (binding or sticking components) could cause a tight drive belt and must be repaired before installing a spacer washer in driven sheave. **DO NOT** install more than one (1) spacer washer in driven sheave.

5. Coat ID of bushing and spindle of fixed sheave half with Loctite Type "A" (C-92-32609).
6. If 3 wear buttons (Figure 3) were removed from movable sheave ramps, reinstall replacement wear buttons, using Bellows Adhesive (C-92-36340A1) to secure buttons to movable sheave.
7. Reinstall movable half of sheave onto bushing that was installed on spindle of fixed sheave half. (Figure 3)
8. Align keyways of fixed cam with jackshaft keys and reinstall fixed cam on jackshaft. (Figure 2)

9. Install return spring "tang" into one of the holes in movable sheave half.
10. Place spring guide cup around return spring with outer spring "tang" installed in one of the slots in guide cup. (Figure 1)
11. Place spring retainer over spring and guide cup, with outer spring "tang" installed in hole of spring retainer which is next to boss marked "0/360". (Figure 1)
12. Apply snowmobile brake. Push in on spring retainer until splines of retainer are properly positioned on splines of fixed cam. Securely hold retainer in this position and install large spring retainer washer, lockwasher and retainer bolt. Torque retainer bolt to 45 ft. lbs. (6mkg), then release spring retainer. (Figure 1)
13. With snowmobile brake still applied, push in on spring retainer and rotate retainer 1/3-turn (120°) clockwise, then allow retainer to lock by re-engaging splines of fixed cam. (Figure 1)

*NOTE: Return spring "tangs" (one each end) will be approximately aligned with each other when no preload is applied to spring. Amount of spring preload can be determined easily by comparing positions of spring "tangs". If a Salsbury "850" drive clutch has been installed, set spring preload to 1/6-turn (60°).*

14. Install variable speed drive belt.
15. Check driven sheave adjustment by operating snowmobile at full throttle (accelerating). If driven sheave is properly adjusted, engine will reach and maintain maximum specified RPM at wide-open-throttle. If engine speed (RPM) is higher or lower than recommended, refer to "Driven Sheave Adjustment", preceding, and adjust driven sheave.

# "TWISTER" DRIVE SHEAVE (CLUTCH) (ARCTIC SERIES)

## GENERAL

The drive sheave is an essential part of the drive mechanism and functions basically as a variable pitch, belt-type drive. The drive sheave is fully automatic and operates as a clutch and a transmission.

Under normal use, it is recommended that the drive sheave be completely disassembled, cleaned and inspected at least ONCE each season. If the snowmobile is operated continuously under

severe use, the drive sheave should be inspected more frequently.

Periodic cleaning and inspection of drive sheave is essential to maintain maximum performance. If drive sheave is not properly maintained, rubber dust from drive belt and other foreign materials may cause sheave to "stick".

During competition, drive sheave should be cleaned and inspected BEFORE EVERY RACE.

## INTERNAL DRIVE CLUTCH COMPONENT INFORMATION

### "Stock" Drive Clutch Component Chart

MODEL NAME	1975 340 S/T	1975 440 S/T	1976 340 T/T	1976 440 T/T	1976 250 S/T	1976 340 S/T	1976 440 S/T
CHASSIS Serial No.	Below 4207500	Below 4206250	Below 4347125	Above 4347124	Below 4495560	Above 4495559	Above 4349324
MERCURY PART NO.	D-52-71571	D-52-71572	D-52-74255	D-52-74256	D-52-75098	D-52-75099	D-52-75100
LAST 3 DIGITS of NO. STAMPED ON OUTSIDE of DRIVE CLUTCH COVER	061	062	077	080	081	088	089
DRIVE CLUTCH SPRING							
Color	Blue	Blue	Blue	Blue	Green	Green	Green
No. of Turns	3.9	3.9	3.9	3.9	5.0	5.0	5.0
Mercury Part No.	C-24-71517	C-24-71517	C-24-71517	C-24-71517	C-24-74992	C-24-74992	C-24-74992
DRIVE CLUTCH WEIGHTS							
Color	Red	Black	Red	Yellow	Red	Black (2)	Red
No. Stamped on Weights	0146-106	0146-105	0146-106	0146-286	0146-106	0146-135 (2)	0146-106
Gram Weight	5.958g	7.858g	5.958g	8.800g	5.958g	4.479g	5.958g
Outside Diameter	0.530"	0.598"	0.530"	0.629"	0.530"	0.471"	0.530"
Mercury Part No.	D-71717	D-71716	D-71717	D-74125	D-71717	D-71737 (2)	D-71717
DRIVE CLUTCH RAMPS							
No. Stamped on Ramps	None	None	292	293	None	None	None
Drawing of Ramp Profile	Figure 1 (1)	Figure 1 (1)	Figure 3	Figure 4	Figure 5	Figure 6	Figure 6
Mercury Part No.	D-71496 (1)	D-71496 (1)	D-74123	D-74124	D-75908	D-75177	D-75177

(1) Optional Clutch Ramps (D-74857A1, Figure 2) are available for trail riding.

(2) A few 1976 Model 340 S/T snowmobiles were shipped from the factory with INCORRECT drive clutch weights. Weights stamped 0146-135 (D-71737) MUST BE INSTALLED in these clutches.

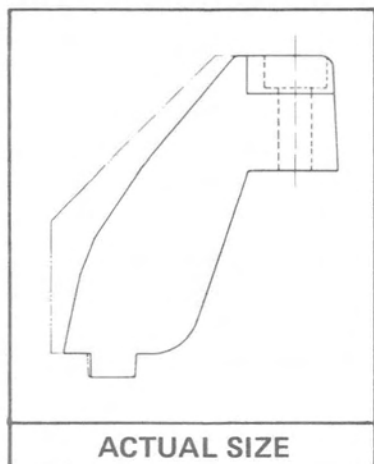


Figure 1. D-71496 Drive Clutch Ramp Profile (1975 340 S/T & 440 S/T)

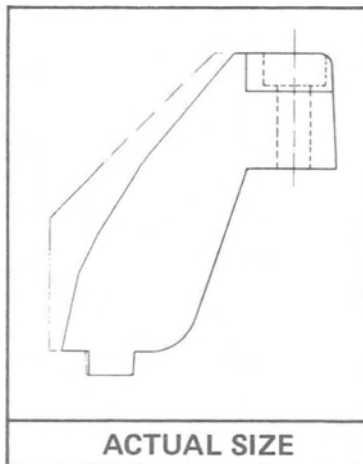


Figure 2. D-74857A1 Drive Clutch Ramp Profile (Trail Ramp for 1975 340 S/T & 440 S/T)

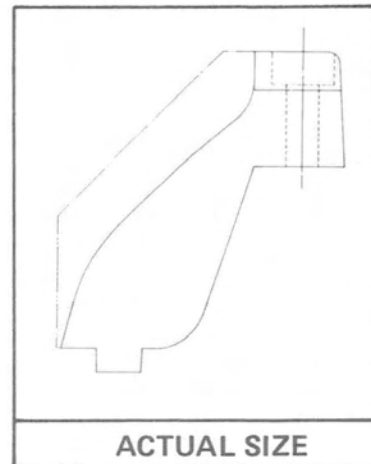


Figure 3. D-74123 Drive Clutch Ramp Profile (1976 340 T/T)

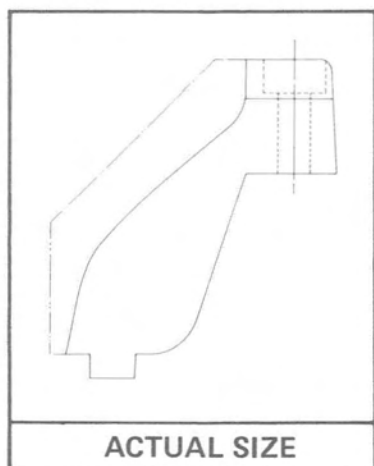


Figure 4. D-74124 Drive Clutch Ramp Profile (1976 440 T/T)

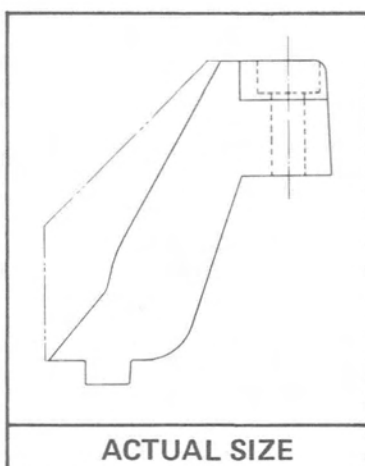


Figure 5. D-75908 Drive Clutch Ramp Profile (1976 250 S/T)

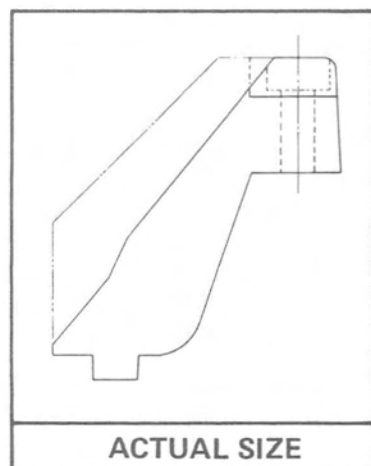


Figure 6. D-75177 Drive Clutch Ramp Profile (1976 340 S/T & 440 S/T)

## Drive Clutch Weight Chart

Full Throttle Engine RPM	Gram Weight	No. Stamped on Weight	Color of Weight	Outside Diameter of Weight	Part No.
Increase Engine RPM ↑ ↓ Decrease Engine RPM	Light ↑ ↓ Heavy	3.058g 0146-108 ① ②	Yellow	0.406"	D-71731 ① ②
		3.725g 0146-175 ① ② ④	Red	0.437"	D-71735 ① ② ④
		4.479g 0146-135 ① ② ③ ④ ⑥	Black	0.471"	D-71737 ① ② ③ ④ ⑥
		4.958g 0146-107 ③ ④ ⑥	White	0.491"	D-71736 ③ ④ ⑥
		5.958g 0146-106 ③ ④	Red	0.530"	D-71717 ③ ④
		6.992g 0146-123 ① ② ⑤	Yellow	0.568"	D-71734 ① ② ⑤
		7.858g 0146-105 ⑤	Black	0.598"	D-71716 ⑤
		8.800g 0146-286 ②	Yellow	0.629"	D-74125 ②

- ① Six of these weights are included in Drive Clutch Modification Kit (D-71711A1).
- ② Six of these weights are included in Drive Clutch Modification Kit (D-71711A2).
- ③ Six of these weights are included in Drive Clutch Elevation Kit (D-71712A1).
- ④ Six of these weights are included in Drive Clutch Elevation Kit (D-71712A2).
- ⑤ Six of these weights are included in Drive Clutch Elevation Kit (D-71716A1).
- ⑥ Six of these weights are included in Drive Clutch Elevation Kit (D-74124A1).



## CLUTCH ENGAGEMENT - ADJUSTMENT

On Twister Snowmobiles equipped with the blue (C-24-71517) return spring, drive sheave engagement RPM can be increased or decreased by installing or removing spacer(s) (D-23-71729) between cup washer and split ring in drive sheave. (Figure 7)

Installing one (1) spacer will increase drive sheave engagement RPM approximately 200 RPM, and removing one (1) spacer will decrease engagement RPM approximately 200 RPM.

If an adjustment is necessary to maintain specified engagement speed, refer to "Removal and Disassembly", following, and remove and disassemble drive sheave. Install or remove spacer(s), as required, then reassemble and install drive sheave. DO NOT install more than 4 spacers in drive sheave.

After performing a drive sheave adjustment, drive sheave engagement RPM should be checked with a calibrated tachometer to assure that engagement occurs at correct engine RPM.

**IMPORTANT:** If Twister will be used competitively, a calibrated tachometer **MUST** be used when checking drive sheave engagement RPM to be certain that engagement RPM is within racing limits. DO NOT rely on the snowmobile tachometer, which was built to production tolerances, to give an exact reading.

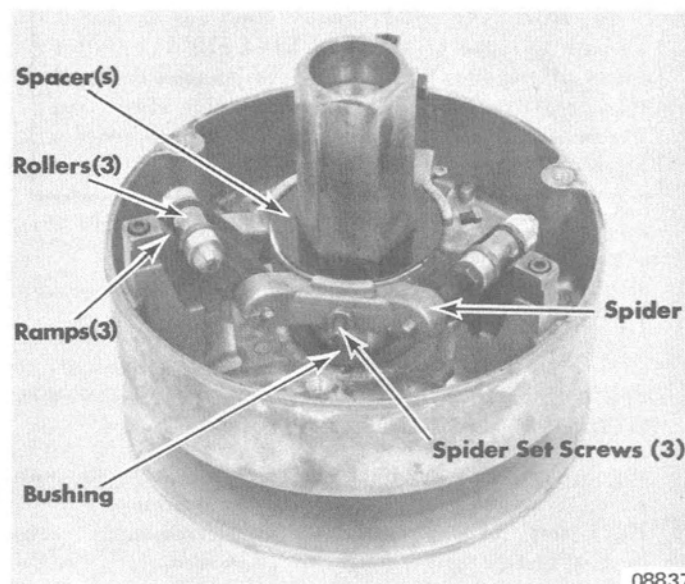


Figure 7. Drive Sheave Spacer

## DRIVE CLUTCH BEARING TOLERANCE

Maximum allowable bearing wear or clearance between hex shaft and bearing is critical for correct drive clutch operation. The flats on drive clutch are directly associated with the large bearing area. This bearing area, added to the high bearing load capacity and low coefficient of friction, results in improved life expectancy of the clutch.

For assembly purposes, radial clearance between hex shaft and bearing is necessary, and a slightly greater clearance does not adversely affect clutch operation. However, maximum allowable bearing wear tolerance is limited by clearance between ramp and inside surface of the roller arm.

If the bearing is considered to be worn, roller arm and ramp clearance can be visually inspected by looking into the clutch.

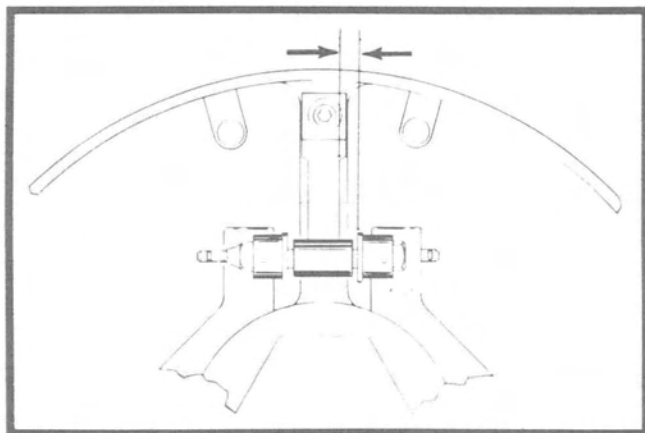


Figure 8. Roller Arm/Ramp - No Contact

1. Look into clutch and rotate it clockwise and counter-clockwise (a flashlight may be necessary to see inside of clutch). Look at inside surface of the roller arm; there must not be any contact between roller arm and ramp. (Figure 8)

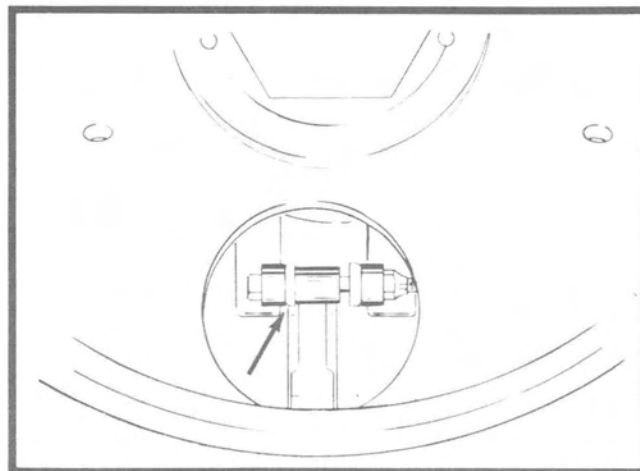


Figure 9. Roller Arm/Ramp - Contact

2. If no contact exists between roller arm and ramp, maximum allowable drive clutch bearing wear is within tolerance. Drive clutch is acceptable.
3. If there is contact between roller arm and ramp (Figure 9), the maximum allowable drive clutch bearing wear is not within tolerance. Drive clutch movable sheave and sheave housing must be replaced.

## REMOVAL (TYPICAL)

**WARNING:** DO NOT, under any circumstances, attempt to repair or handle a DRIVE SHEAVE (either on or off engine), that has stuck or jammed in closed (high gear) position, UNTIL a reasonable effort first has been made to open sheave. ALWAYS approach a stuck or jammed sheave with caution.

Remove drive sheave as follows:

1. Remove variable speed drive belt. (Refer to this section, Part B.)

*NOTE: On some Twister models, it will be necessary to raise engine slightly in order to install Drive Sheave Puller (C-91-64000A1).*

Remove the 2 left locknuts and loosen the 2 right locknuts which secure engine mount plate to crossmember. Block left side of engine (between crossmember and mount plate) high enough to allow removal of drive sheave.

2. Hold drive sheave with Belt Wrench (C-91-24937A1) and remove retaining bolt and lockwasher.
3. Install Drive Sheave Puller in drive sheave.

4. Hold drive sheave with Belt Wrench and operate Drive Sheave Puller to remove sheave assembly from crankshaft taper. (Figure 10)

*NOTE: For ease of removal, an air or electric impact wrench may be used to operate puller.*

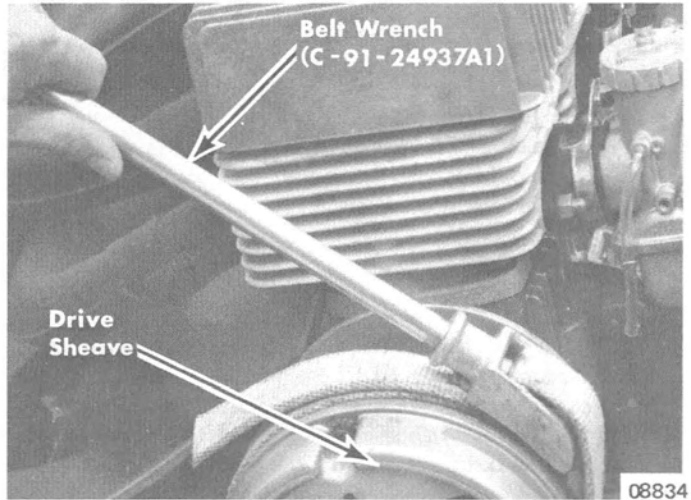


Figure 10. Drive Sheave Removal

## DISASSEMBLY

**IMPORTANT:** To prevent scarring or chipping the inside diameter of the cover bushing, TAKE PARTICULAR CARE to keep cover "SQUARE" on shaft (prevent cocking and binding), as cover is removed and/or installed. This task is made somewhat easier if the complete drive clutch is removed from the engine before disassembly.

1. With drive sheave removed from engine, remove 3 allen screws and lockwashers which secure sheave housing to movable sheave. (Figure 11)
2. Remove sheave housing, compression spring, cup washer and spacer(s) from around drive sheave spindle.

*NOTE: Spacers (located between cup washer and split ring) are intended for adjusting drive sheave engagement RPM. Refer to "Clutch Engagement - Adjustment", preceding, if drive sheave adjustment is desired.*

3. Loosen spider locknuts, then set screws, until spider is loose on hex shaft. (Figure 7)
4. Force spider assembly down against movable sheave and remove split ring halves from groove in hex shaft.
5. Mark spider assembly in relation to hex shaft (for reassembly alignment), then remove spider assembly and movable sheave from hex shaft.

*NOTE: Construction and use of the simple tool (Figure 12) is a real time-saver when removing and installing the roller assemblies.*

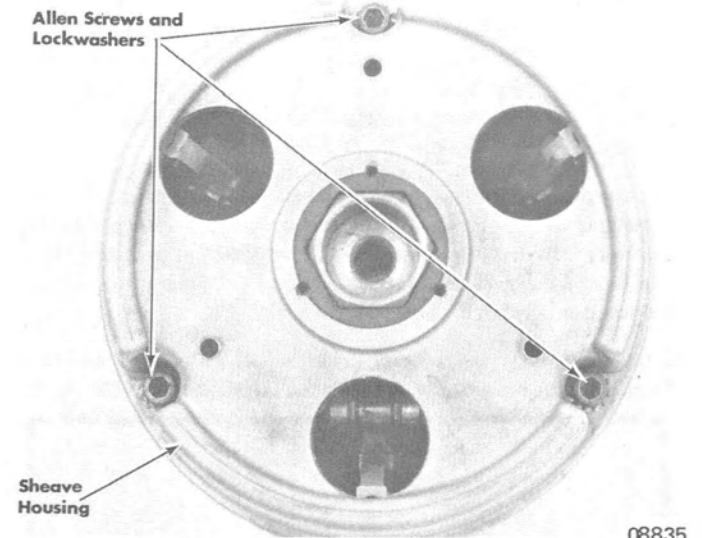
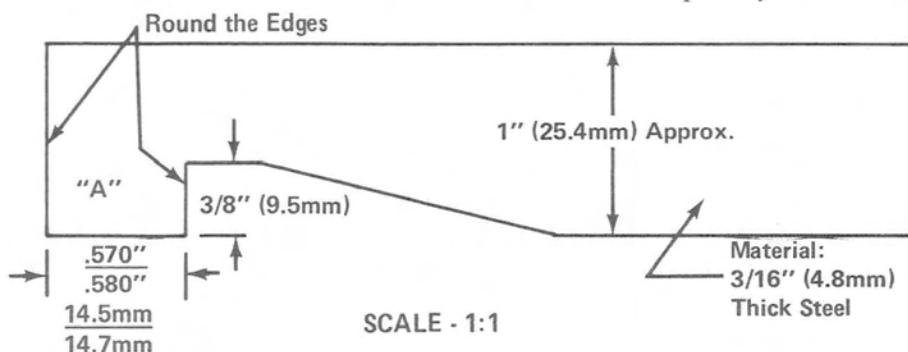


Figure 11. Twister Drive Sheave

6. Remove weights and rollers from spider assembly.
7. Remove ramps from movable sheave.

**IMPORTANT:** Roller arms (affixed to the spider) and the hex bushings in the movable sheave and sheave housing are not available separately. DO NOT remove these items.

Figure 12.  
Roller Arm Tool



Insert Tang "A"  
between Roller Arm  
and Twist Tool  
to Spread Arms.

## CLEANING and INSPECTION

1. Clean all parts with solvent and dry with compressed air.
2. Inspect the stationary sheave, movable sheave and cover housing for cracks and imperfections in the casting.
3. Inspect the spider for cracks and imperfections in the casting. Arms, weights and rollers with bushings must have no damage or wear.
4. Inspect ramp "seats" on inside of movable sheave for wear and cracks.
5. Inspect spring for distortion, crystallization or breaks.

6. Inspect ramps for wear pattern that may develop after usage.
7. Inspect all threaded components for stripped or otherwise damaged threads.
8. Inspect hex shaft (no burrs or rough edges are to be evident). Use a fine file to remove burrs and rough edges.
9. Inspect set screws that hold the Duralon bearing in the movable sheave. Set screws should be 1/16" (1.6mm) below casting on inside surface of movable sheave. Set screws should be staked on inside of movable sheave.

## REASSEMBLY

**IMPORTANT:** New ramps should be installed in sets of 3 only.

1. Install ramps in movable sheave (making certain that ramps are properly seated) and secure in place with lockwashers and socket-head cap screws. Torque screws to specifications (Section 8).
2. Slide movable sheave onto fixed sheave hex shaft. Alignment marks on both sheaves must line up to keep the clutch balanced. (Figure 13)

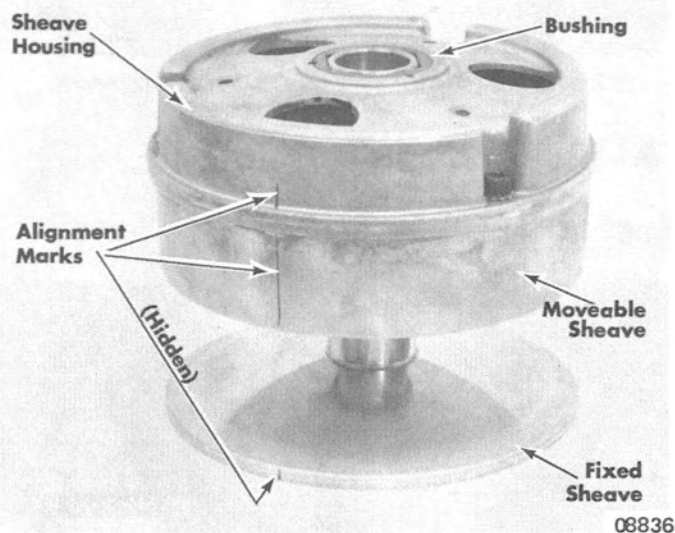


Figure 13. Twister Drive Sheave

3. Install rollers and weights in spider assembly.

**IMPORTANT:** New rollers should be installed as a complete kit (set of 3) only.

- a. Slide bushing into roller and install both parts between the roller arm. Make sure that the bushing "cut-outs" slide over the 2 small "ears" on inside surface of roller arm.

**NOTE:** Head of cap screw must be positioned on side of roller arm that has the 2 small "ears".

- b. Slide a weight onto the cap screw, then push cap screw through roller arm, roller and bushing.
  - c. Slide another weight onto opposite end of cap screw and secure it in place with locknut (torqued to specification in Section 8).
4. Position spider assembly on hex shaft in accordance with alignment marks placed during disassembly. Side of spider with stamped part number faces up.
  5. Install split ring halves in hex shaft groove.

**NOTE:** End of set screws must slide into recess in hex shaft to ensure proper spider retention.

6. Pull spider assembly up against split ring halves, then bottom the locknuts against the spider. Torque set screws to specifications (Section 8).
7. Install spacer(s) (refer to "Clutch Engagement - Adjustment", preceding), cup washer and return spring on hex shaft.
8. Match alignment marks (straight line cast into housings) on sheave housing and movable sheave. (Figure 13) Install sheave housing and secure with 3 lockwashers and allen screws. Torque screws to specifications (Section 8).

## INSTALLATION

1. Place drive sheave on crankshaft and secure with lockwasher and retaining bolt. Torque bolt to specifications (Section 8).
2. If engine was loosened during drive sheave removal, secure engine. Tighten locknuts to specifications.

**WARNING:** DO NOT operate engine, which is equipped with drive sheave, if drive belt is not engaged with drive and driven sheaves. Remove drive sheave BEFORE making high-speed, no-load engine test.

3. Install variable speed drive belt (refer to this section, Part B).

**CAUTION:** If service is performed on drive clutch, or a new drive clutch is installed, alignment of drive clutch and driven sheave must be checked. When alignment is not as specified, accelerated belt wear, poor performance and component failure may occur.

4. Check alignment between drive sheave and driven sheave (refer to "Driven Sheave Alignment", following).
5. Check drive belt tension (refer to this section, Part B).

## DRIVEN SHEAVE ALIGNMENT

### (Arctic Drive Sheave to Salsbury Driven Sheave)

Driven sheave must be properly aligned with drive sheave to maintain maximum snowmobile performance. An improperly aligned driven sheave will result in a drop in snowmobile performance, premature variable speed drive belt failure and/or drive belt turning over in sheaves.

Driven sheave alignment should be checked occasionally and, if necessary, adjusted as follows:

1. Remove variable speed drive belt (refer to this section, Part B).
2. Place a straight-edge across inside surfaces of driven sheave and extend over to drive sheave. Measure driven sheave "offset" as shown in Figure 1. Driven sheave is properly aligned when it is "offset"  $5/16"$  (8mm)  $\pm 1/16"$  (1.6mm) from drive sheave.
3. If driven sheave is not properly aligned, remove driven sheave and reposition spacer washer(s) on either side of driven sheave as required; i.e., decrease "offset" by removing spacer washer(s) from right side of driven sheave and reinstalling on left side of driven sheave.
4. Reinstall driven sheave and spacer washers and secure with snap ring. Refer to Steps 2 and 3, preceding, and recheck driven sheave alignment.
5. Reinstall variable speed drive belt (refer to this section, Part B).

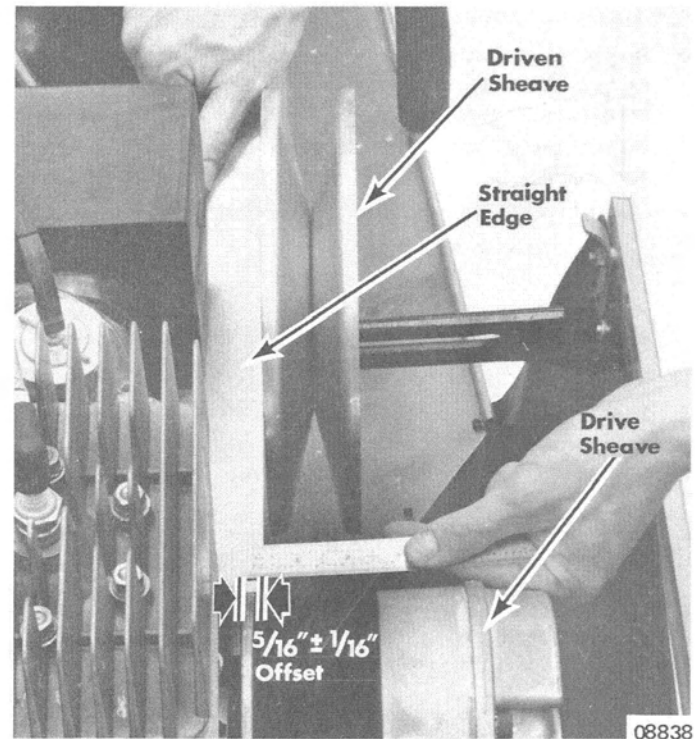


Figure 1. Arctic Drive/Salsbury Driven - Alignment

## DRIVEN SHEAVE ALIGNMENT

### (Arctic Drive Sheave to Arctic Driven Sheave)

Driven sheave must be properly aligned with drive sheave to maintain maximum snowmobile performance. An improperly aligned driven sheave will result in a drop in snowmobile performance, premature variable speed drive belt failure and/or drive belt turning over in sheaves.

Driven sheave alignment should be checked occasionally and, if necessary, adjusted as follows:

1. Remove variable speed drive belt (refer to this section, Part B).
2. Place a straight-edge across inside surfaces of driven sheave and extend over to drive sheave. Measure driven sheave "offset" as shown in Figure 2. Driven sheave is properly aligned when it is "offset"  $7/16"$  (11mm)  $\pm 1/16"$  (1.6mm) from drive sheave.
3. If driven sheave is not properly aligned, remove driven sheave and reposition spacer washer(s) on either side of driven sheave as required; i.e., decrease "offset" by removing spacer washer(s) from right side of driven sheave and reinstalling on left side of driven sheave.
4. Reinstall driven sheave and spacer washers and secure with snap ring. Refer to Steps 2 and 3, preceding, and recheck driven sheave alignment.
5. Reinstall variable speed drive belt (refer to this section, Part B).

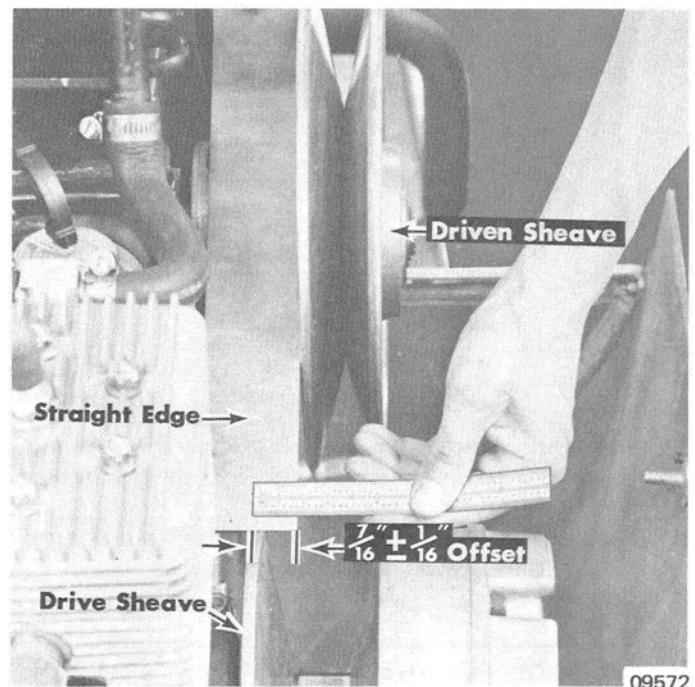


Figure 2. Arctic Drive/Arctic Driven - Alignment



# DRIVEN SHEAVE RETURN SPRING PRELOAD ADJUSTMENT (Salsbury Driven)

Spring preload of driven sheave return spring is an important factor to consider when adjusting your snowmobile for peak performance. Changes in temperature, elevation, snow conditions and load may necessitate a readjustment of spring preload to maintain recommended maximum engine speed at full throttle (accelerating).

Engine RPM at full throttle (accelerating) can be increased by tightening spring preload on driven sheave return spring and decreased by loosening spring preload on driven sheave return spring.

If an adjustment is necessary to maintain recommended maximum engine speed (as specified in "Specifications" Section 8), adjust driven sheave as follows:

1. Remove variable speed drive belt (refer to this section, Part B).
2. Remove driven sheave. Note location of spacers on each side of driven sheave. Spacers are used to adjust driven sheave alignment and must be installed in the same position.
3. Reverse the driven sheave and reinstall on jackshaft with torque bracket and movable sheave facing outwards (installed backwards).
4. Scribe a mark on torque bracket and another mark on movable sheave (aligned with mark on torque bracket) for reference during reassembly.

**WARNING:** DO NOT allow body or head to extend in front of driven sheave assembly, as the snap ring alone secures the torque bracket and return spring. The torque bracket and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly and reassembly of driven sheave.

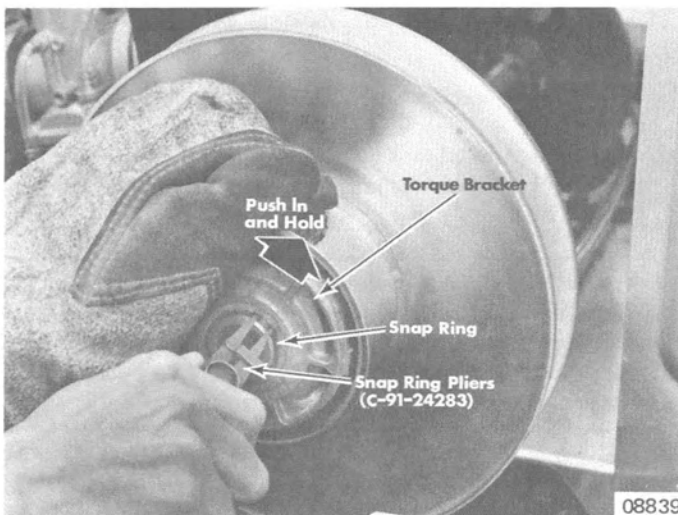


Figure 3. Removing Driven Sheave Torque Bracket

5. While one person applies snowmobile brake and rotates movable sheave so that torque bracket may be pressed in toward sheave, another person (wearing heavy protective gloves and safety glasses) must push torque bracket in approximately  $\frac{1}{4}$ " (6.4mm), then remove driven sheave snap ring from spindle. (Figure 3)

6. CAREFULLY allow torque bracket to slide out on driven sheave spindle, thus releasing spring preload as movable sheave is free to unload. Remove torque bracket.
7. Engage spring (either end) in desired anchor point of movable sheave.
8. Engage spring in desired anchor point of torque bracket and align torque bracket keyway with key in spindle of fixed sheave half.
9. Push in on torque bracket (compressing spring) until  $\frac{1}{16}$ " to  $\frac{1}{8}$ " (1.6mm to 3.2mm) clearance is obtained between ramps. (Figure 4)

**WARNING:** DO NOT allow body or head to extend in front of driven sheave assembly. The torque bracket and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly and reassembly of driven sheave.

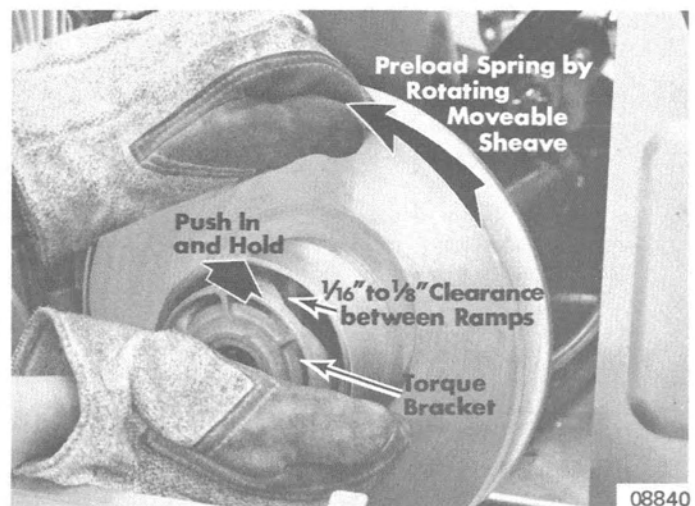


Figure 4. Installing Driven Sheave Torque Bracket

10. Apply snowmobile brake. Using marks made during disassembly as reference, rotate movable sheave approximately  $180^\circ$  (depending upon spring preload required) to apply preload to spring. (Figure 4) Press torque bracket past snap ring groove.

**WARNING:** Be certain that snap ring is fully seated in spindle groove before releasing torque bracket.

11. Install snap ring in groove of driven sheave spindle. Release torque bracket and snowmobile brake.
12. Remove driven sheave from jackshaft, reverse sheave and reinstall on jackshaft in proper manner.

**IMPORTANT:** If in doubt about positioning of spacers on each side of driven sheave, check driven sheave alignment as outlined in "Driven Sheave Alignment" preceding.

13. Install variable speed drive belt (refer to this section, Part B).
14. Operate snowmobile at full throttle (accelerating) and check maximum engine RPM. If engine is not operating at recommended maximum engine speed (as specified in "Specifications" Section 8), readjust driven sheave return spring preload (as outlined immediately preceding) until specified RPM is attained.

# DRIVEN SHEAVE RETURN SPRING PRELOAD ADJUSTMENT (Arctic Driven)

Spring preload of driven sheave return spring is an important factor to consider when adjusting your snowmobile for peak performance. Changes in temperature, elevation, snow conditions and load may necessitate a readjustment of spring preload to maintain recommended maximum engine speed at full throttle (accelerating).

**IMPORTANT:** Your snowmobile is designed to deliver maximum power when operated at recommended maximum engine speed. Variation (above or below) from this engine speed will result in a loss of power.

Engine RPM at full throttle (accelerating) can be increased by tightening spring preload on driven sheave return spring and decreased by loosening spring preload on driven sheave return spring.

If an adjustment is necessary to maintain recommended maximum engine speed (as specified in "Specifications" Section 8), adjust driven sheave as follows:

1. Remove variable speed drive belt (refer to this section, Part B).
2. Remove driven sheave. Note location of spacers on each side of driven sheave. Spacers are used to adjust driven sheave alignment and must be installed in the same position.
3. Reverse the driven sheave and reinstall on jackshaft with torque bracket and movable sheave facing outwards (installed backwards).
4. Scribe a mark on torque bracket and another mark on movable sheave (aligned with mark on torque bracket) for reference during reassembly.

**WARNING:** DO NOT allow body or head to extend in front of driven sheave assembly, as the snap ring alone secures the torque bracket and return spring. The torque bracket and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly and reassembly of driven sheave.

5. While one person applies snowmobile brake and rotates movable sheave so that torque bracket may be pressed in toward sheave, another person (wearing safety glasses) must push torque bracket in approximately  $\frac{1}{4}$ " (6.4mm), then remove driven sheave snap ring from spindle. (Figure 5)

**NOTE:** When removing torque bracket, note into which torque bracket anchor hole (1, 2, 3 or 4 in Figure 5) the tab of return spring was installed.

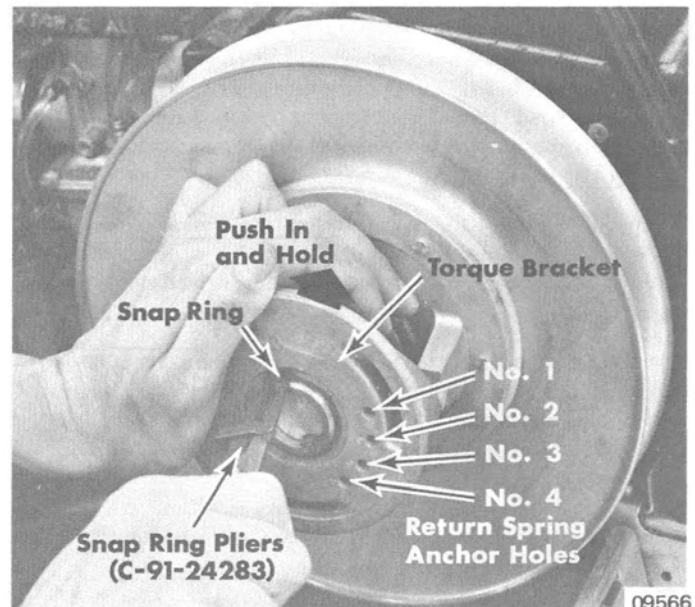


Figure 5. Removing Driven Sheave Torque Bracket

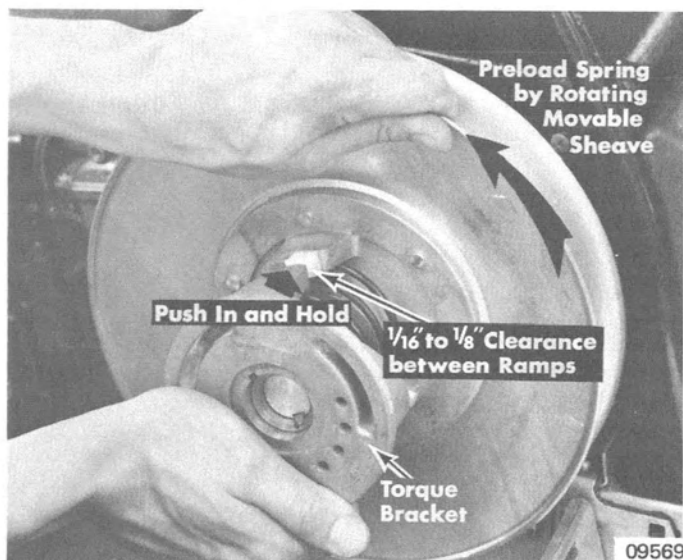
6. CAREFULLY allow torque bracket to slide out on driven sheave spindle, thus releasing spring preload as movable sheave is free to unload. Remove torque bracket.
7. Engage return spring tab in desired anchor hole (1, 2, 3 or 4) of torque bracket.

**IMPORTANT:** If return spring tab is reinstalled in next higher numbered hole in torque bracket, spring preload will be increased, and engine RPM at full throttle (accelerating) will be increased. (If additional spring preload is required and spring is already installed in No. 4 hole, install spring in No. 1 hole and preload spring one additional ramp during reassembly.) With return spring tab installed in next lower numbered hole, spring preload will be decreased, and engine RPM at full throttle will be decreased.

8. Align torque bracket keyway with key in spindle of fixed sheave half.
9. Push in on torque bracket (compressing spring) until  $\frac{1}{16}$ " to  $\frac{1}{8}$ " (1.6mm to 3.2mm) clearance is obtained between ramps. (Figure 22)

**WARNING:** DO NOT allow body or head to extend in front of driven sheave assembly. The torque bracket and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly and reassembly of driven sheave.

10. Apply snowmobile brake. Using marks made during disassembly as reference, rotate movable sheave approximately 180° (depending upon spring preload required) to apply preload to spring. (Figure 6) Press torque bracket past snap ring groove.



**WARNING:** Be certain that snap ring is fully seated in spindle groove before releasing torque bracket.

11. Install snap ring in groove of driven sheave spindle. Release torque bracket and snowmobile brake.
12. Remove driven sheave from jackshaft, reverse sheave and reinstall on jackshaft in proper manner.

**IMPORTANT:** If in doubt about positioning of spacers on each side of driven sheave, check driven sheave alignment as outlined in "Driven Sheave Alignment", preceding.

13. Install variable speed drive belt (refer to this section, Part B).
14. Operate snowmobile at full throttle (accelerating) and check maximum engine RPM. If engine is not operating at recommended maximum engine speed (as specified in "Specifications" Section 8), readjust driven sheave return spring preload (as outlined immediately preceding) until specified RPM is attained.



Figure 6. Installing Driven Sheave Torque Bracket

## "TWISTER" DRIVEN SHEAVE (Arctic Series)

### REMOVAL and DISASSEMBLY

1. Remove variable speed drive belt (refer to this section, Part B).
2. Remove driven sheave. Note location of spacers on each side of driven sheave. Spacers are used to adjust driven sheave alignment and must be installed in the same position.
3. Reverse the driven sheave and reinstall on jackshaft with torque bracket and movable sheave facing outwards (installed backwards).
4. Scribe a mark on torque bracket and another mark on movable sheave (aligned with mark on torque bracket) for reference during reassembly.

**WARNING:** DO NOT allow body or head to extend in front of driven sheave assembly, as the snap ring alone secures the torque bracket and return spring. The torque bracket and movable sheave are under spring tension and may cause injury if precautions are not taken during disassembly and reassembly of driven sheave.

5. While one person applies snowmobile brake and rotates movable sheave so that torque bracket may be pressed in toward sheave, another person (wearing safety glasses) must push torque bracket in approximately ¼" (6.4mm), then remove driven sheave snap ring from spindle. (Figure 5)

*NOTE:* When removing torque bracket, note into which torque bracket anchor hole (1, 2, 3 or 4 in Figure 5) the tab of return spring was installed.

6. CAREFULLY allow torque bracket to slide out on driven sheave spindle, thus releasing spring preload as movable sheave is free to unload. Remove torque bracket, spring and sheaves from jackshaft.
7. Separate movable sheave from fixed sheave hub.
8. Remove key from fixed sheave hub and remove bushing from hub.

### CLEANING and INSPECTION

1. Clean all parts with solvent and compressed air.
2. Inspect sliding shoes for wear and damage.
3. Inspect fixed and movable face for any broken or loose rivets which hold sheaves in position.
4. Check torque bracket for cracks, wear and other noticeable damage.
5. Inspect stationary and movable sheave for rough surfaces, grooves and scratches. Use fine emery cloth to repair minor damage.
6. Inspect spring for distortion, crystallization or breaks.

## REASSEMBLY and INSTALLATION

1. Install fixed sheave on jackshaft with sheave hub facing outward.
2. Slide stationary sheave bearing onto sheave hub.
3. Install woodruff key in stationary face hub. Tap into place with a rubber mallet.
4. Place movable sheave on stationary sheave shaft.
5. Place spring over fixed face shaft and hook turned-down end into hole in casting on movable face.

6. Position torque bracket over the spring and engage return spring tab in desired anchor hole (1, 2, 3 or 4) of torque bracket.

*NOTE: Production preload setting for return spring was No. 4 hole in torque bracket and 120° of preload.*

7. For remainder of reassembly, refer to "Driven Sheave Return Spring Preload - Arctic Driven", preceding.