



Technical Manual

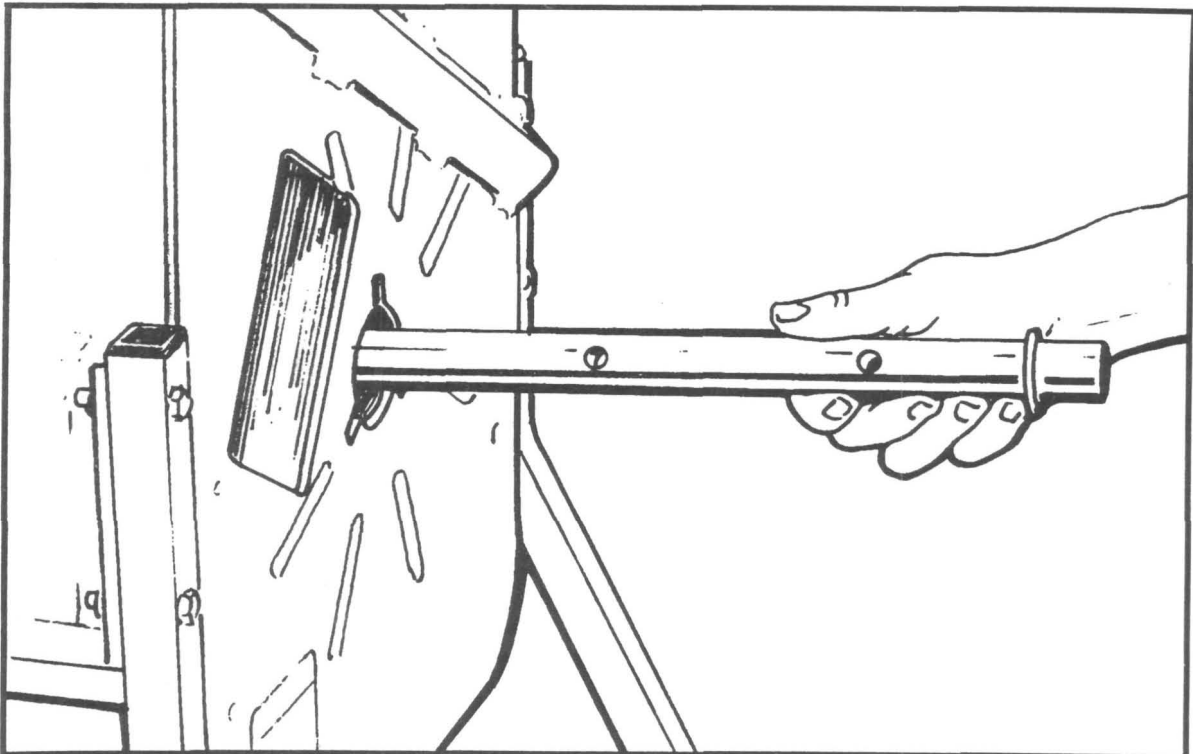
TOMAHAWK[®] **Chipper/Shredder**

4HP, 5HP & 8HP Models

DRIVE SHAFT/CYLINDER ASSEMBLY REPLACEMENT INSTRUCTIONS & OTHER SERVICE PROCEDURES AND INSPECTIONS

*TROY-BILT® 5HP & 8HP
SUPER TOMAHAWK® Chipper/Shredder
Models 15012, 15013, 15014, 15014S, 15015,
15016 & 47251*

*TROY-BILT® 4HP
TOMAHAWK® Chipper/Shredder
Models 15017, 15018, 15028, 15028S, 15029*



TOOL LIST—Have all tools below ready at hand and enlist the aid of a helper too, as a second person will make some steps easier.

Combo Open End/Box End Wrenches: two $\frac{7}{16}$ " ; two $\frac{1}{2}$ " ; one $\frac{9}{16}$ " • $\frac{1}{8}$ " and $\frac{5}{32}$ " Hex Key (Allen) Wrenches • $\frac{9}{16}$ " Socket Wrench with 6" Extension • Soft-Head Mallet (rubber or plastic) • 12" Long Drift Pin or Punch • Regular Pliers • 6-Foot Length of Clothesline or Strong Twine (capable of supporting at least 40 pounds) • Flatblade Screwdriver • Penetrating Oil • Flashlight • Emery Cloth • 5-Foot (approx) Long Broom Handle or Length of Pipe • Masking Tape • Rubber Bands (two), 3" long • Three-Foot Long 2"x4" Wood • Rags • Thick Gloves

DISASSEMBLY STEPS

WARNING

Moving parts on your equipment can cause serious personal injury. To help avoid injury, shut off the engine, let all moving parts stop completely, and disconnect the spark plug wire before performing any service procedures.

STEP 1.

Stop the engine and wait for the engine and muffler to cool before proceeding.

STEP 2.

Remove the spark plug boot from the spark plug and secure the boot safely away from the spark plug.

STEP 3.

Remove the battery on electric start models:

- A. Remove the key from the ignition switch.
- B. Using two $\frac{1}{2}$ " wrenches, remove the Whiz locknut that secures the negative (-) battery cable to the left-side axle support bracket (see Fig. 1). Slide the cable off and bend it safely away from any metal parts. Replace the nut on the screw for safekeeping.
- C. Using the $\frac{7}{16}$ " wrenches, disconnect the positive (+) cable from the positive battery post (see Fig. 1). Cover the end of the cable with the rubber boot and replace the nut on the battery bolt.
- D. Remove the battery hold-down clamp by using a $\frac{7}{16}$ " wrench to remove the two locknuts that secure the clamp to the battery platform. See Fig. 1. Keep the nuts with the clamp.
- E. Remove the battery and store it in a safe place.

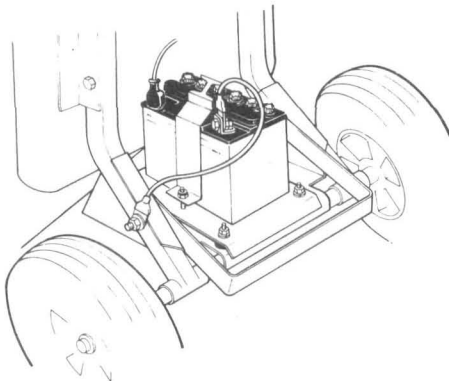


Fig. 1

DANGER

Improper handling of the battery can result in electrical burns, an electric shock, or an explosion of battery gases. To help avoid injury:

- Keep sparks and flames away from the battery.
- Do not touch either battery post simultaneously with any tools, jewelry, or metal objects.

STEP 4.

Using two $\frac{7}{16}$ " wrenches, remove the two screws and Whiz locknuts that secure the belt guard to the engine mounting plate (see Fig. 2). Save the screws and nuts with the belt guard.

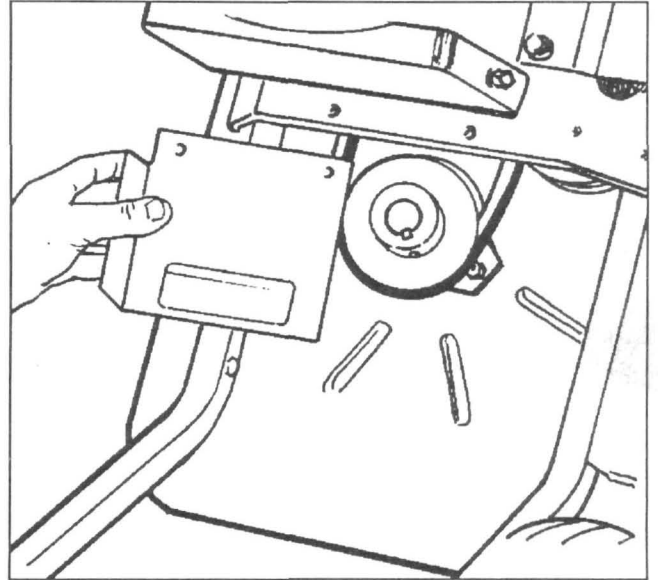


Fig. 2

STEP 5.

Place the Clutch Lever in the UP (Disengage) position (see Fig. 3). Then remove the drive belt from the cylinder shaft (lower) pulley by rotating the pulley with one hand while "riding" the belt off the pulley with your other hand. Finally, lift the belt up and off the engine (upper) pulley.

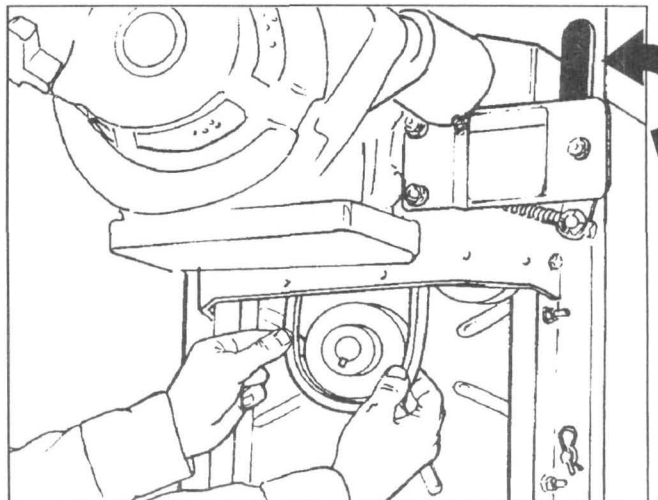


Fig. 3

STEP 6.

Remove the shredder discharge screen by sliding out the rod that secures the service door, lifting the service door, and then by taking out the two hair pin cotters and long rods that secure the screen in place (see Fig. 4). Next, take off the discharge tunnel at the bottom of the equipment (Fig. 4A). Remove three screws on each side of the mainframe and the tunnel is disconnected.

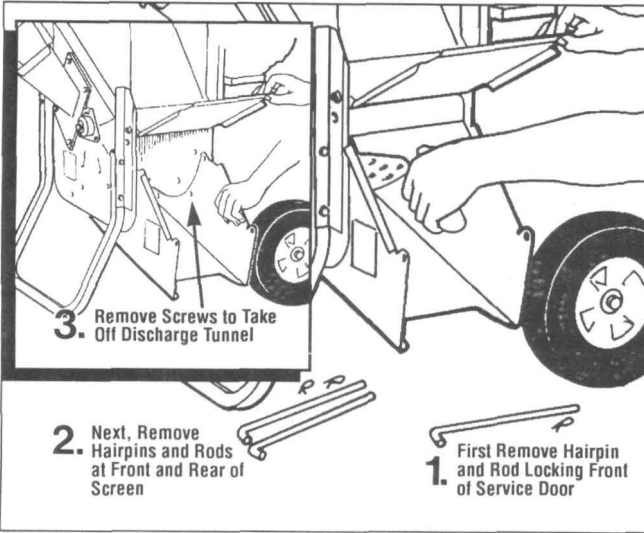


Fig. 4

STEP 7.

Remove the chipper chute using a 1/2" wrench to remove the four cap screws and lockwashers that secure it (see Fig. 5).

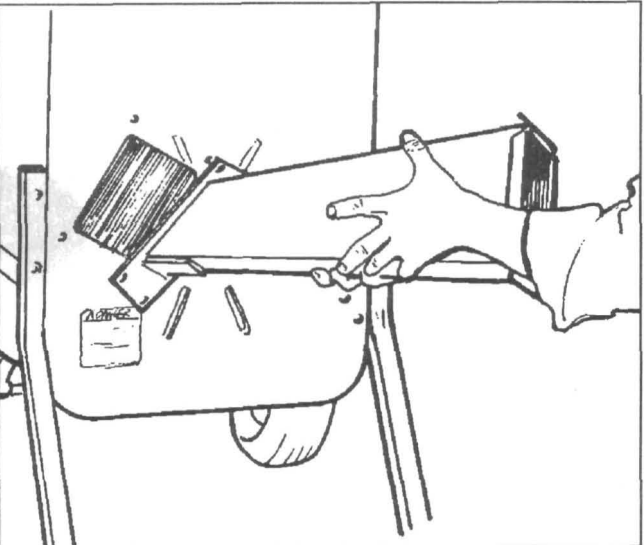


Fig. 5

CAUTION

While the chipper chute is removed, do not place your hands inside the chipper blade access opening.

The chipper blade that is located inside the opening (on the chipper flywheel) is extremely sharp and can cause personal injury.

STEP 8.

Remove the cylinder driveshaft pulley (lower pulley):

IMPORTANT:

Exercise care at all times when attempting to remove the pulley. The pulley is made of cast-iron and it could crack if excessive or sudden force is applied to it with either a mallet or a prying tool.

A. On the engine side of the cylinder shaft, rotate the lower pulley until the two set screws in its shoulder are visible (see Fig. 6). Using a 5/32" hex key (Allen) wrench, remove the two set screws.

B. Spray penetrating oil liberally into the two set screw holes. Next spray the cylinder shaft on both sides of the pulley. Allow the oil to soak in for several minutes.

C. Using a soft-head mallet, tap the pulley inward (toward the main frame) until it loosens on the shaft. Avoid striking the more fragile, outer edges of the pulley with the mallet. After loosening the pulley, add more penetrating oil to the newly exposed portion of the cylinder shaft.

D. Slide the pulley outward and off the shaft using two flat blade screwdrivers as levers behind the pulley to pry it off. Use even pressure around the pulley to avoid cocking it on the shaft. Save the pulley and its two set screws (removed in Step 8A) for reuse.

NOTE: On some machines, the location of the engine mounting plate may prevent the pulley from being removed from the cylinder shaft. If so, leave the pulley on the shaft and proceed to Step 9. The pulley will be removed later, in Step 17.

E. Using pliers, remove the 1 1/4" long rectangular key from the keyway in the shaft (unless key remains inside the keyway of the pulley). See Fig. 6. If necessary, tap the key with a mallet and a punch to help loosen it. Save the key for reuse.

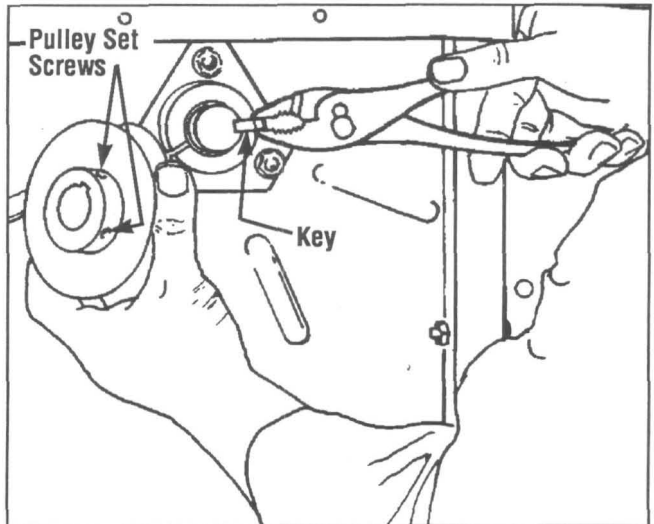


Fig. 6

F. Wipe the shaft clean and remove any rust or burrs with an emery cloth. This step is critical as any rust or burrs could prevent the shaft from being removed in the steps that follow. Finally, thoroughly lubricate the shaft with penetrating oil.

STEP 9.

On the engine side of the cylinder shaft, loosen the set screw in the bearing locking collar using a 1/8" hex key (Allen) wrench. See Fig. 7. If necessary, hold the bearing locking collar at the other end of the cylinder shaft to prevent the collar from turning while loosening the set screw. If the pulley was removed in Step 8, then remove and save the collar and the set screw (unless they are being replaced with new parts). If the pulley was not removed, leave the collar in place until Step 17.

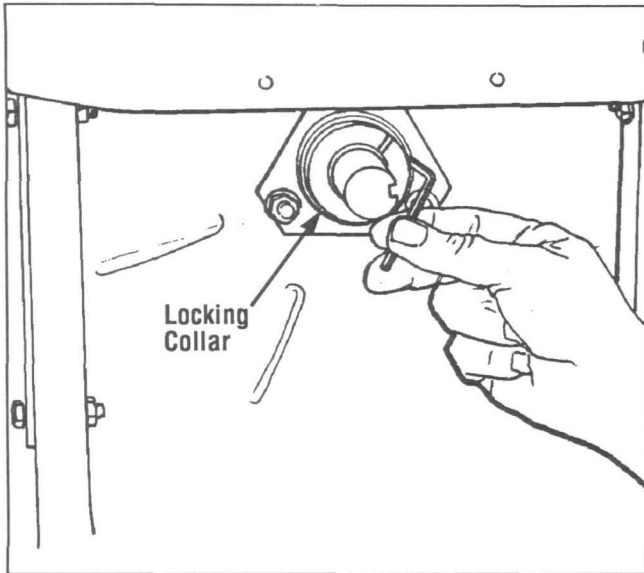


Fig. 7

STEP 10.

Insert a broom handle or similar long stick down through the top of the shredder hopper, wedging it behind one of the four horizontal cylinder pins (cutting flails are attached to cylinder pins). Doing so will prevent the cylinder assembly and cylinder shaft from rotating while you perform Step 11.

STEP 11.

On the chipper side of the cylinder shaft, use a 9/16" wrench to remove the screw, disc spring (conical) washer and heavy flat washer from the end of the shaft (see Fig. 8). Save the hardware for reuse.

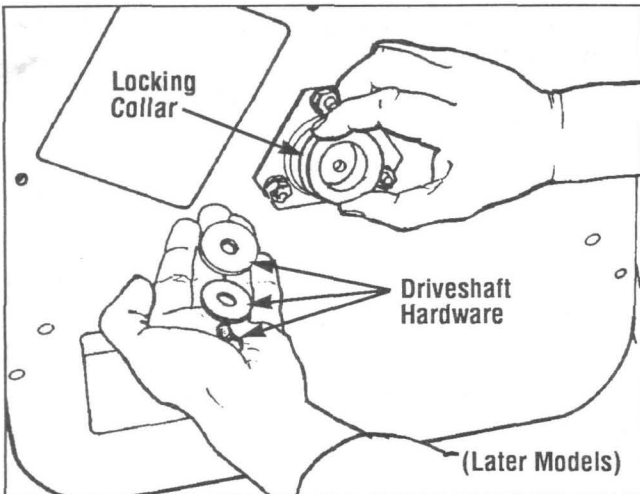


Fig. 8

STEP 12.

Remove the broom handle or stick from the shredder hopper. Using a flashlight, look up inside the cylinder chamber and locate the two screws that secure the cylinder assembly tube to the cylinder shaft (see Fig. 9). Being careful to avoid any sharp edges on the cutting flails or other metal parts (wear thick gloves for added protection), rotate the cylinder assembly until the locknuts on the screws are facing down. Remove the locknuts using a 9/16" wrench on the screw heads and a 9/16" socket wrench (with 6" extension adapter) on the locknuts. After removing the locknuts, gently tap the screws out with a long punch or drift pin. Save the screws and nuts for reuse.

STEP 13.

On the chipper side of the cylinder shaft, use a 1/8" hex key (Allen) wrench to loosen the set screw in the bearing locking collar (see Fig. 8). Slide the collar off and save the collar (unless being replaced with new parts).

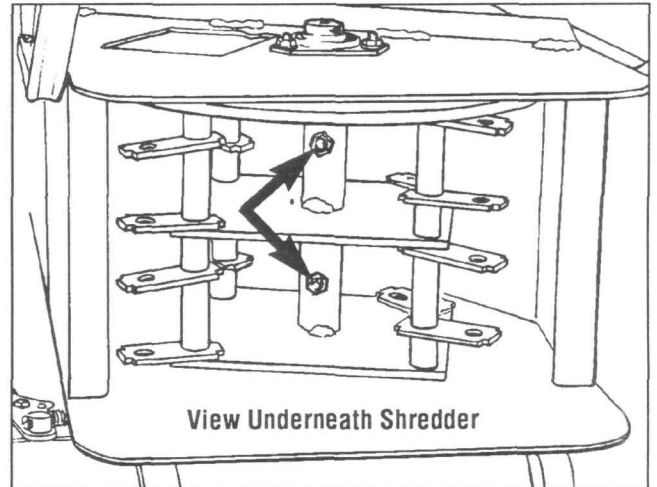


Fig. 9

STEP 14.

Being careful to avoid any sharp edges on the cutting flails or other metal parts (wear thick gloves for added protection), reach down inside the shredder hopper and securely fasten a clothesline or very strong twine around one of the cylinder pins just behind the flywheel so the entire assembly will be balanced. The rope or twine must be in good condition (not frayed or split) and be capable of supporting 40 or more pounds. Pull the rope or twine taut to remove any slack and securely fasten the upper end to a sturdy 2"x4" piece of wood (see Fig. 10) spanning the shredder hopper. Tying up the cylinder assembly in this manner will prevent it from falling to the ground when you remove the cylinder shaft in the following steps.

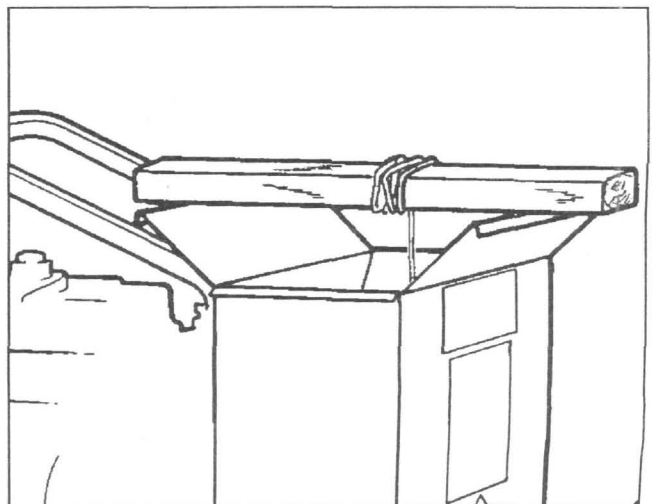


Fig. 10

STEP 15.

On the chipper side of the main frame, use a 1/2" wrench to remove the three Whiz locknuts that secure the two triangle-shaped bearing flangettes to the main frame (see Fig. 11). While loosening the nuts, apply slight outward pressure to the nuts to prevent the screws from turning.

CAUTION

While the chipper chute is removed, do not place your hands inside the chipper blade access opening. The chipper blade that is located inside the opening (on the chipper flywheel) is extremely sharp and can cause serious personal injury.

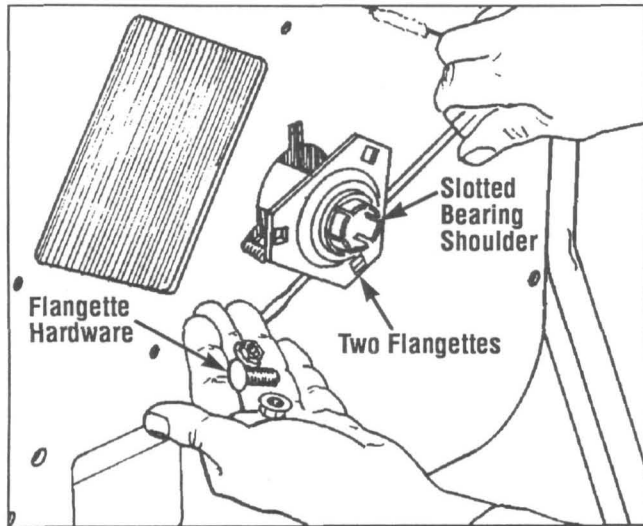


Fig. 11

STEP 16.

Remove the two flangettes and the bearing between them by prying out the inner flangette with a screwdriver, or by tapping the opposite end of the cylinder shaft with a soft mallet. If necessary, apply penetrating oil to the shaft to help free the bearing. Save the flangettes, bearing and three locknuts and screws for reuse.

STEP 17.

Remove the cylinder shaft:

A. Note the position of the cylinder shaft relative to the hole in the shredder wall (see Fig. 11). The shaft must be centered vertically in the hole of the main frame. If it isn't centered, reposition the cylinder shaft by adjusting the length of the rope or twine that supports the cylinder assembly.

B. On the engine side of the cylinder shaft, make certain that the shaft is clean and free of any burrs or rust. It also must be well-lubricated with oil. NOTE: If the pulley is still on the shaft, be sure to clean and lubricate the shaft after the pulley is removed in Step D below.

C. Spray penetrating oil into the two screw holes in the cylinder assembly tube from which you removed the screws in Step 12 (see Fig. 9).

D. On the engine side of the cylinder shaft, use a soft mallet to tap the shaft a little toward the chipper side. As the shaft moves forward, remove the pulley (if still on), its key, and the locking collar if not done so previously.

E. Continue driving the shaft inward until the keyway end of the shaft is flush with the slotted bearing sleeve on the engine side of the main frame (see Fig. 12). Now spray additional penetrating oil into the two screw holes mentioned in Step C above.

F. Using a long drift pin or punch, drive the shaft all the way out. If there is any binding along the way, spray additional oil into the two screw holes in the cylinder assembly tube.

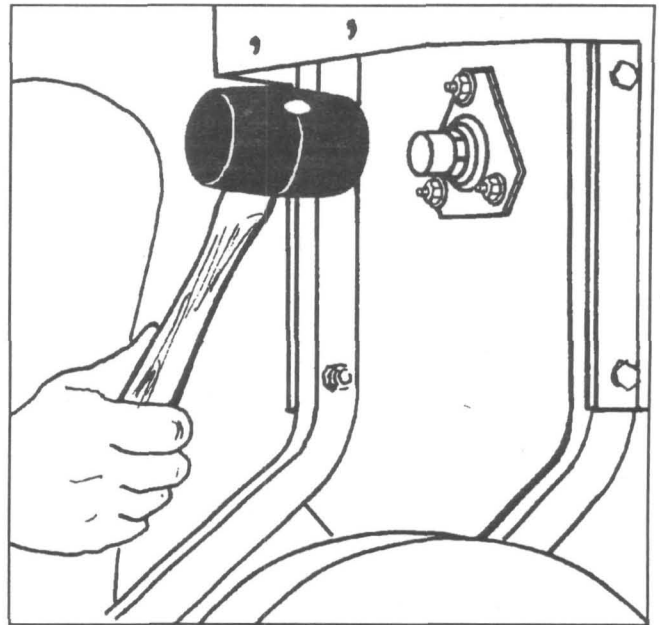


Fig. 12

STEP 18.

The cylinder assembly can now be slowly lowered to the ground by unwrapping the rope or twine from the 2"x4" wood at the top of the shredder hopper. Make certain that your feet are not below the cylinder assembly as you unfasten the rope. Now tilt the main frame back and roll it away from the cylinder assembly.

CAUTION

When handling the cylinder assembly, be careful to avoid contacting the chipper blade that is located on the chipper flywheel.

The chipper blade is extremely sharp and can cause personal injury.

STEP 19.

It is not necessary to remove the bearing from the engine side of the main frame unless it needs replacement (see "Inspection of Parts" below). To remove the bearing and its flangettes, follow the same procedures given in Steps 15 and 16.

INSPECTION OF PARTS

Before reinstalling the following parts, inspect them for wear or damage as described below.

1. BEARINGS:

A. Inner sleeve should turn freely. If action is rough, replace bearing.

B. Inner sleeve should feel secure inside outer race. If loose, replace bearing.

C. Keep bearings clean until reassembly.

2. DRIVE SHAFT:

A. Inspect shaft for excessive wear (especially in bearing areas), or cracks. Replace shaft if excessively worn or cracked.

B. Inspect shaft for rust or burrs and remove with emery cloth.

3. CYLINDER ASSEMBLY:

A. Rotate or replace shredder flail cutters as described in Owner/Operator Manual. While doing so, check that cylinder pins are not bent by rolling pins on a flat surface. Also: always use new roll pins coated with Loctite 242 sealant when securing the cylinder pins to the cylinder assembly.

B. Sharpen or replace chipper blade as described in Owner/Operator Manual.

C. Check weld joints where flywheel and two flat plates join cylinder assembly tube. Replace cylinder assembly if cracks are evident.

D. Check bore opening at each end of cylinder assembly tube for burrs or rough edges and remove with metal file or emery cloth.

E. Inspect the two bolt holes in the center of the cylinder assembly tube for cracks or excessive wear. Replace cylinder assembly if cracked or excessively worn.

F. Lubricate drive shaft with oil and carefully slide pulley end of shaft through chipper side of cylinder assembly tube. Shaft should slide easily through tube. If not, remove shaft and inspect shaft and tube for burrs or rough edges.

4. DRIVE BELT:

A. Inspect belt for cracks, cuts, or fraying. Replace belt if in poor condition.

5. INSIDE THE CHAMBER:

A. While the cylinder assembly is removed, now is a good time to clean the inside of your equipment.

B. Using a wire brush or putty knife, scrape off the built-up residue that's on the inner walls of the chipper/shredder chamber. Once clean, inspect all interior and exterior welds for cracks or breaks. It's important for structural integrity that cracked or broken welds be repaired.

REASSEMBLY

STEP 1.

If the bearing on the engine side of the main frame has been removed, install a new bearing by following Steps A through D. If the bearing has not been removed, proceed to Step 2.

A. The bearing must be free from dirt, rust or other foreign matter. Apply a light coating of oil to the inside wall of the bearing sleeve and outer race before installation.

B. Insert the slotted sleeve of the bearing into the recessed bore of one of the flangette plates (see Fig. 13).

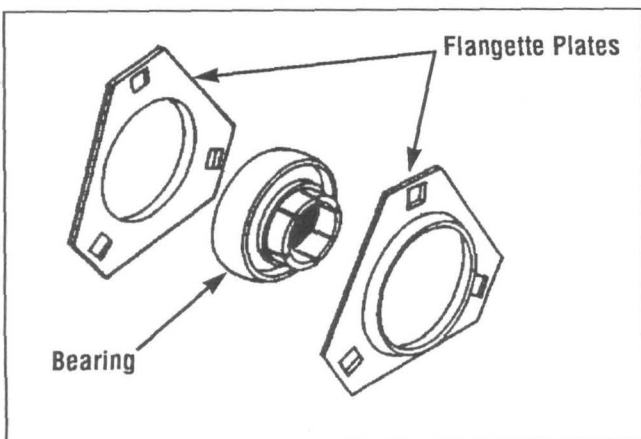


Fig. 13

C. Place the second flangette over the flat side of the bearing, with the lip of the flangette facing outward (see Fig. 13).

D. With the bearing sleeve facing out, line up the holes in the flangettes with the notches in the wall of the main frame. Loosely (hand-tighten only) secure the flangettes in place with three carriage bolts ($\frac{5}{16}$ "-18x $\frac{3}{4}$ ") and Whiz locknuts ($\frac{5}{16}$ "-18). Be sure to insert the bolts from inside the chamber wall so that the locknuts are on the outside (see Fig. 14). The locknuts will be securely tightened in a later step.

STEP 2.

If the bearing on the engine side of the main frame was not removed during the disassembly steps, loosen the three Whiz locknuts that secure the flangettes to the chamber wall (see Fig. 14). Loosen each locknut two or three turns. Then apply a light coating of oil to the inside walls of the slotted bearing sleeve.

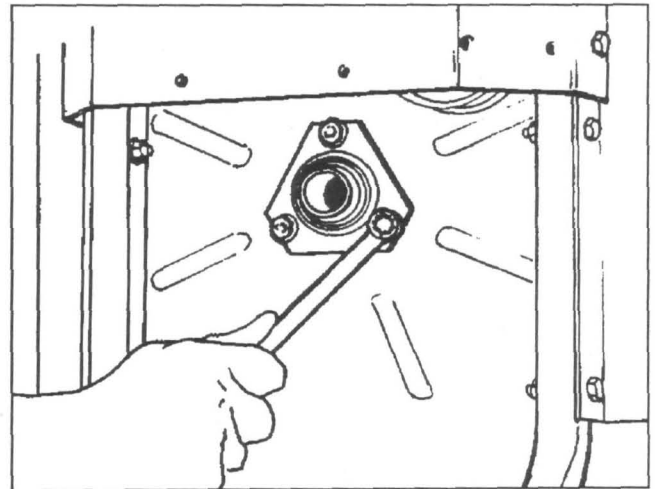


Fig. 14

STEP 3.

Install a flangette on the chipper side of the main frame:

A. Insert three carriage bolts ($\frac{5}{16}$ "-18x $\frac{3}{4}$ ") through the flangette mounting notches in the chamber wall (see Fig. 15). Be sure to insert the bolts from inside the wall so that the threads face outward.

B. Place masking tape over the bolt heads to hold the bolts in place.

C. Gently place the flangette with the deep bore over the bolts, with the lip of the recessed bore facing inward.

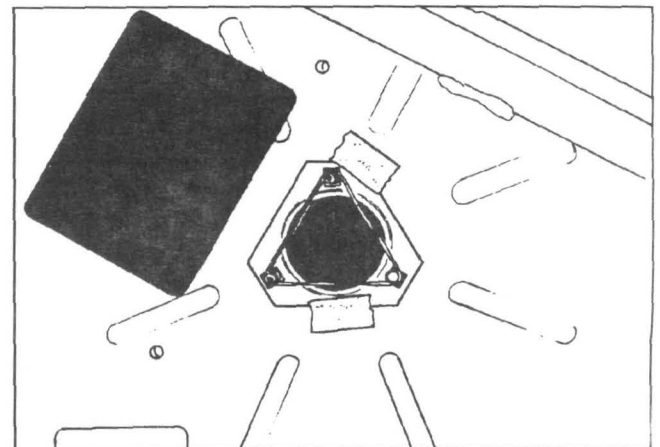


Fig. 15

D. Place masking tape along the edges of the flangette to hold it in place (see Fig. 15).

E. Carefully slip a rubber band over the three bolts to prevent them from moving (see Fig. 15). The bearing and the outer flangette will be installed in later steps.

STEP 4.

Install the cylinder assembly:

A. Be sure that the ends of the cylinder shaft tube have been carefully inspected for any nicks or burrs that would prevent free travel of the cylinder shaft through the tube. See "Inspection of Parts".

B. Position the main frame over the cylinder assembly, making sure that the chipper blade on the cylinder flywheel is facing the chipper chute side of the main frame (see Fig. 16).

CAUTION

When handling the cylinder assembly, be careful to avoid contacting the chipper blade that is located on the chipper flywheel.

The chipper blade is extremely sharp and can cause personal injury.

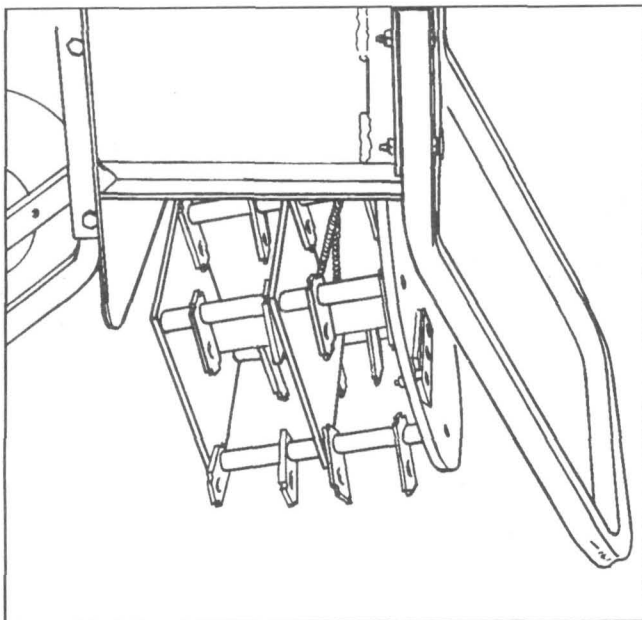


Fig. 16

C. If the clothesline was removed, retie it around one of the cylinder pins just behind the flywheel as described previously (see Fig. 16).

D. Feed the rope or twine up through the chamber and pull the cylinder assembly up until the cylinder shaft tube is at the same height as the two bearing mounting holes in the walls of the main frame. Securely fasten the rope or twine to the length of 2"x4" wood again.

STEP 5.

Install the cylinder shaft:

A. Make certain that the cylinder assembly is securely tied to a strong rope or cord.

B. Be sure that the cylinder shaft has been carefully inspected for any nicks or burrs and that it is lubricated with oil.

C. Insert the keyway end of the cylinder shaft through the chipper side of the main frame and into the cylinder shaft tube of the cylinder assembly.

D. Using a soft mallet, tap the shaft through the tube and out through the bearing on the engine side of the main frame. Stop when the end of the shaft extends approximately 1 1/2" past the bearing shoulder (see Fig. 17).

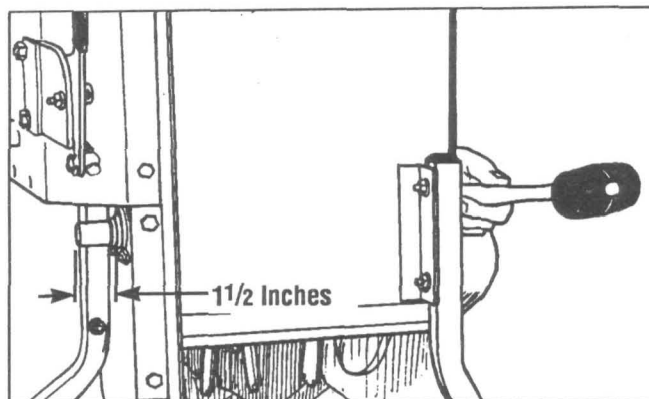


Fig. 17

STEP 6.

On the engine side of the equipment and with the writing side of the bearing locking collar facing outward, slide the collar over the keyway end of the cylinder shaft until the collar covers the slotted sleeve of the bearing (see Fig. 18). Do not tighten the set screw in the collar at this time.

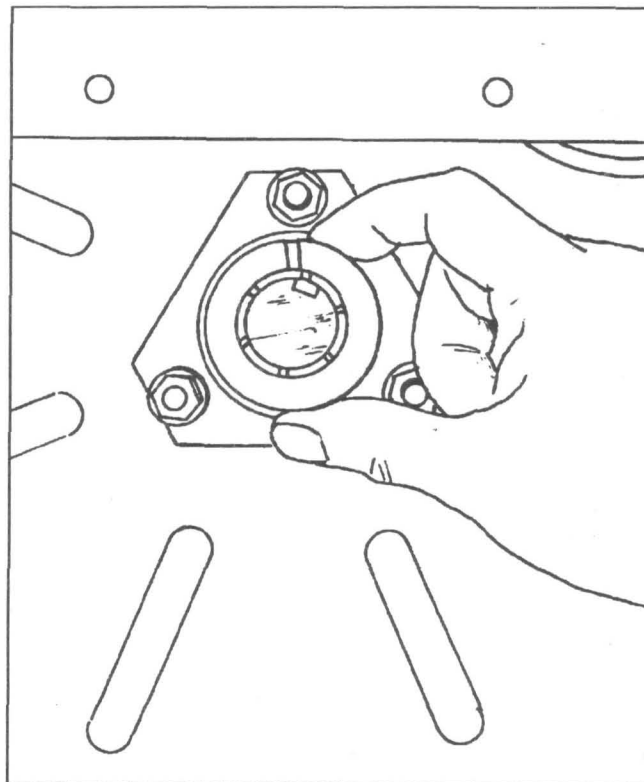


Fig. 18

STEP 7.

Install the key in the keyway of the cylinder shaft (see Fig. 19). Seat the key firmly in the keyway by tapping it in with a mallet.

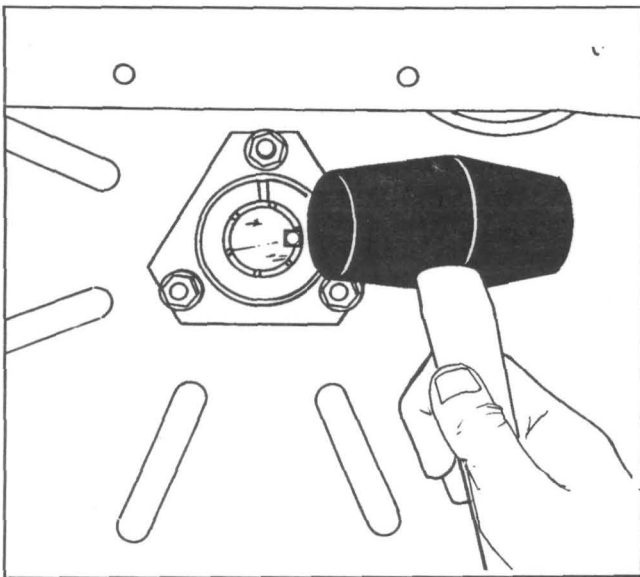


Fig. 19

STEP 8.

Install the pulley on the cylinder shaft, with the shoulder of the pulley facing outward (see Fig. 20). Do not tighten the two set screws in the pulley at this time.

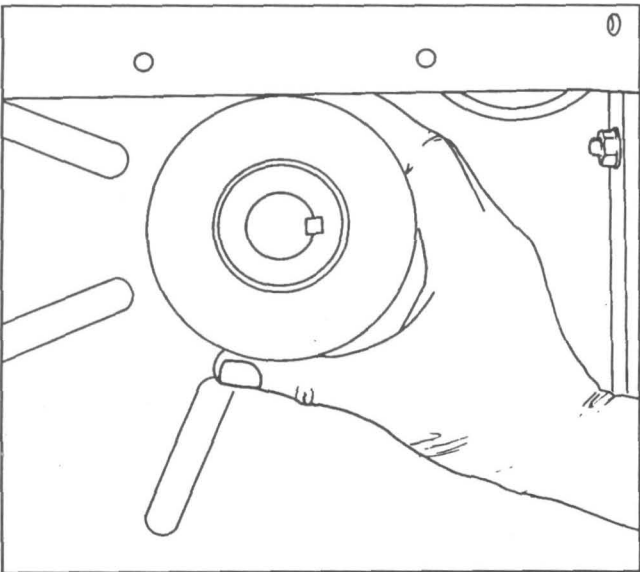


Fig. 20

STEP 9.

On the chipper side of the cylinder shaft, tap the shaft inward (see Fig. 21) if the pulley on the engine side of the cylinder shaft does not go all the way on the shaft. Back on the chipper side of the machine, be sure to reinstall on the shaft the shield washer and shim(s) which you removed earlier.

STEP 10.

Install the bearing and outer flangette on the chipper side of the main frame:

A. The bearing must be free from dirt, rust or other foreign matter. Apply a light coating of oil to the bearing slotted sleeve and outer race before installation.

B. With the slotted sleeve of the bearing facing outward, slide the bearing over the cylinder shaft until it is seated inside the recessed lip of the inner flangette (see Fig. 22). Be

sure that the rubber band on the three bolts is not caught between the bearing and the flangette.

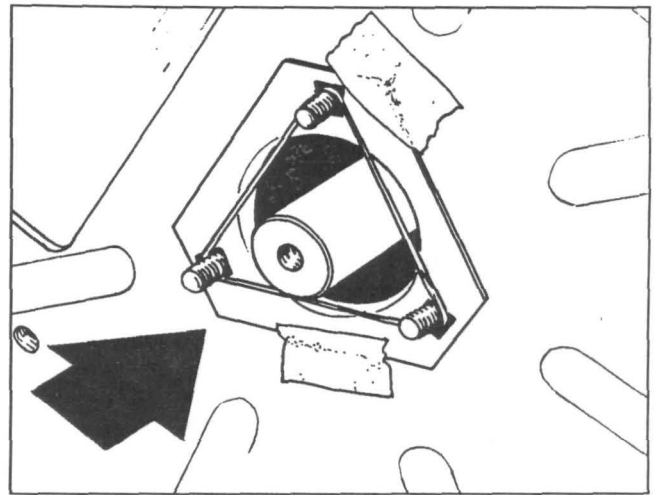


Fig. 21

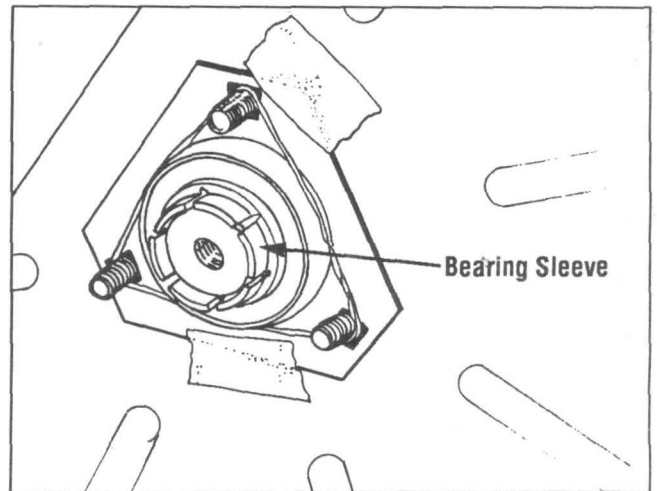


Fig. 22

C. Gently place the remaining flangette over the three bolts, with the lip of the recessed bore facing outward. Loosely (hand-tighten only) secure the flangettes with three Whiz locknuts ($5/16''-18$). See Fig. 23. The three locknuts will be securely tightened in a later step.

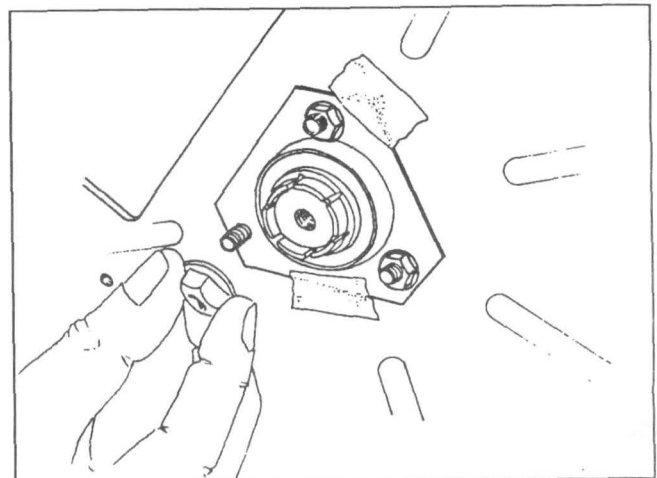


Fig. 23

D. Cut and remove the rubber band, along with the strips of tape on the edges of the inner flangette. Do not be concerned if you cannot remove all of the rubber band or tape.

STEP 11.

On the engine side of the cylinder shaft, tap the shaft inward until the chipper side end of the shaft is nearly flush with the end of the slotted bearing sleeve. The shaft should be slightly recessed inside the sleeve as shown in Fig. 24.

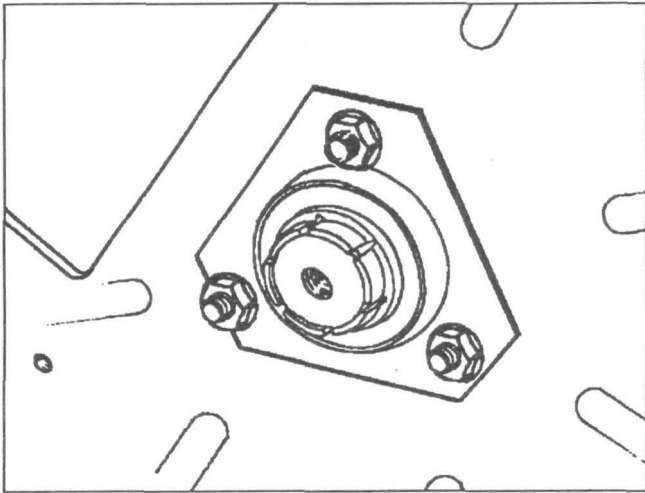


Fig. 24

STEP 12.

On the chipper side of the cylinder shaft, install the bearing locking collar over the bearing sleeve, covering the sleeve completely (see Fig. 25). Do not tighten the set screw in the collar at this time.

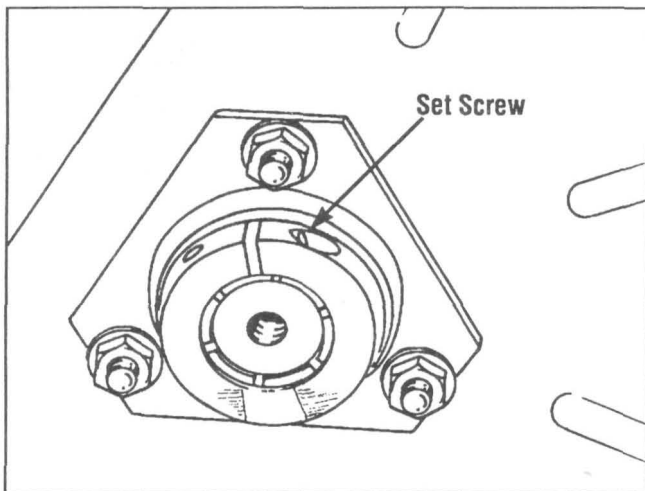


Fig. 25

STEP 13.

On the chipper side of the cylinder shaft, install the screw ($\frac{3}{8}$ "-16x $\frac{3}{4}$ "), conical washer and heavy flat washer (see Fig. 26). The conical washer goes on the screw first, with the domed side of the washer facing the screw head. Fingertighten the screw until it is snug.

STEP 14.

Being careful to avoid any sharp edges on the cutting flails or other metal parts (wear thick gloves for added protection), reach inside the shredder hopper and remove the rope or twine from the cylinder assembly.

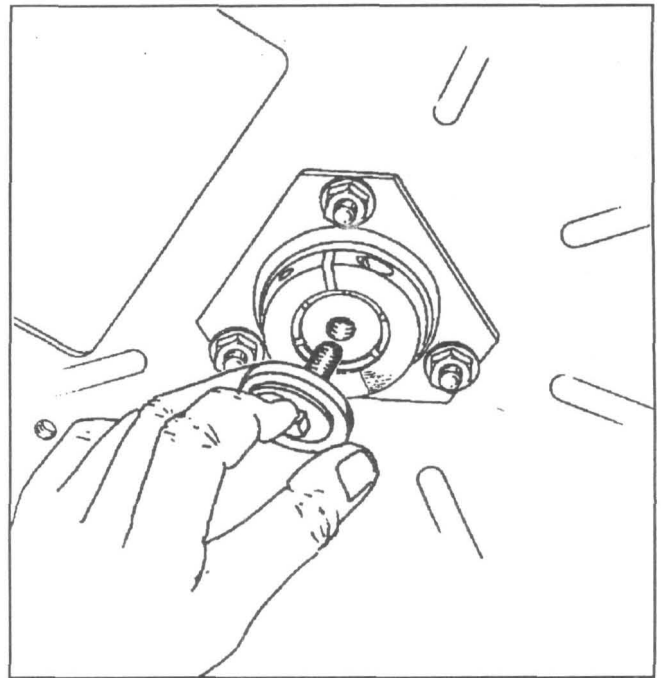


Fig. 26

STEP 15.

Rotate the cylinder shaft pulley so that the keyway is at either the 3 o'clock or 9 o'clock position (see Fig. 27). While holding the pulley in this position, rotate the cylinder assembly until the two screw holes in the cylinder assembly tube are aligned with the holes in the cylinder shaft. Use a nail or thin punch to help you align the holes. Replace the two screws ($\frac{3}{8}$ "-16x2") and locknuts, tightening them **very securely**.

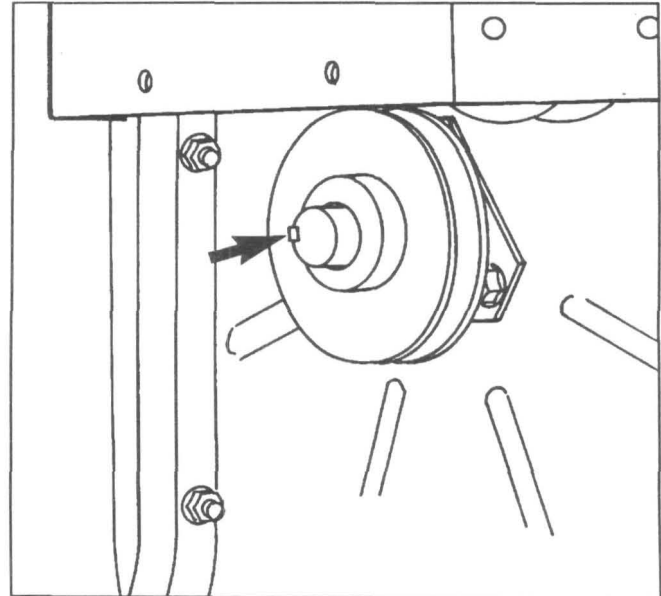


Fig. 27

STEP 16.

On the chipper side of the cylinder shaft, use a $\frac{1}{2}$ " wrench to tighten the three Whiz locknuts on the flangette mounting bolts (see Fig. 28). Tighten the nuts **very securely**.

IMPORTANT:

Be sure to follow Steps 17 through 19 exactly to assure cylinder shaft alignment.

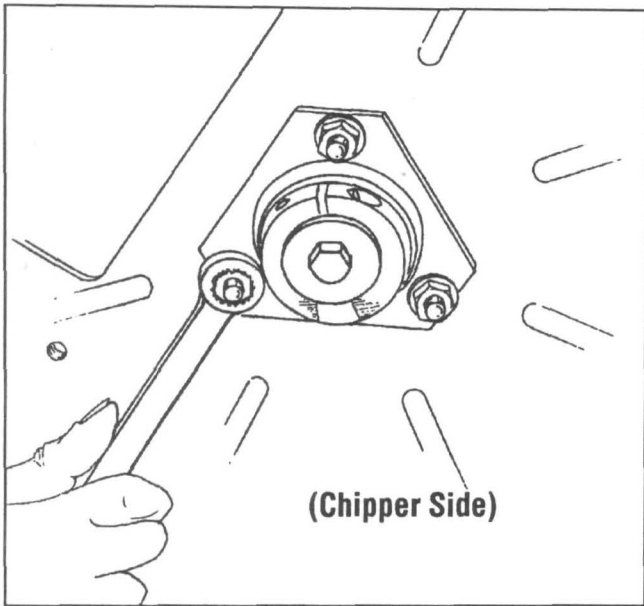


Fig. 28

STEP 17.

Replace the broom handle or stick down through the cylinder assembly. Using a $\frac{9}{16}$ " wrench, tighten the screw in the chipper side end of the cylinder shaft *very securely*. Then, loosen the screw one (1) full turn. See Fig 29.

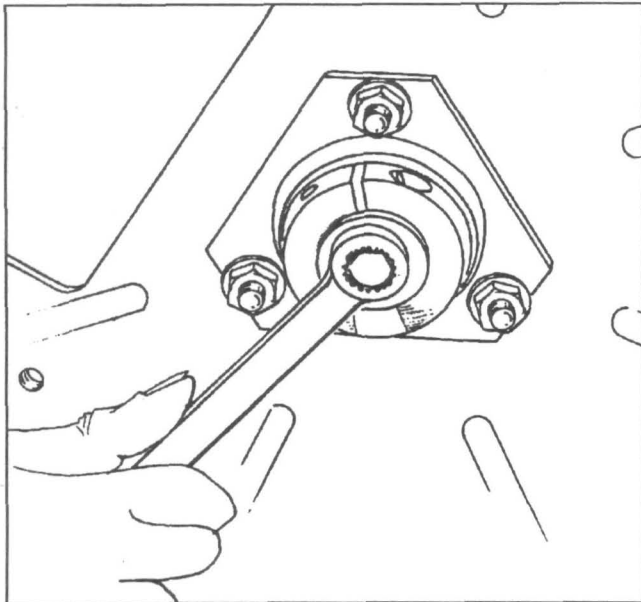


Fig. 29

STEP 18.

On the chipper side of the cylinder shaft, use a $\frac{1}{8}$ " hex key (Allen) wrench to tighten the set screw in the bearing locking collar *very securely*.

STEP 19.

Return to the screw in the end of the cylinder shaft (see Fig. 29) and tighten it *very securely*.

STEP 20.

On the engine side of the cylinder shaft, tighten the three Whiz locknuts on the flangette mounting bolts (see Fig. 30). Tighten the nuts *very securely*.

STEP 21.

While still on the engine side of the cylinder shaft, tighten the set screw in the bearing locking collar *very securely*. While doing so, make certain that the collar remains flush (all the way around) against the shoulder of the bearing. See Fig. 30.

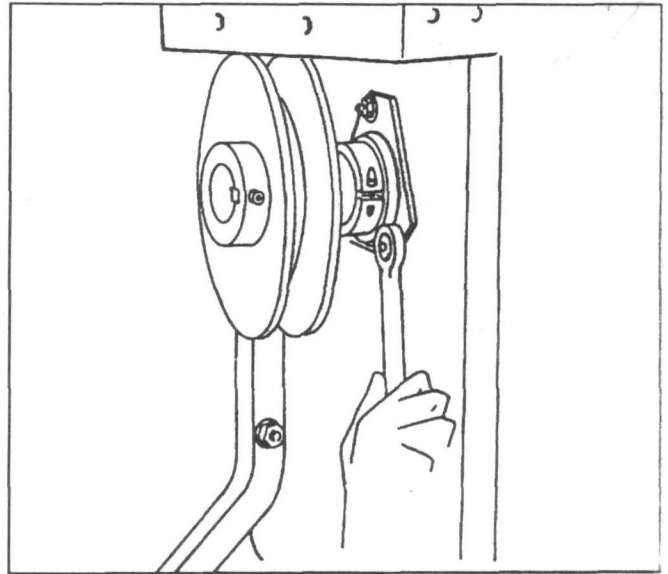


Fig. 30

STEP 22.

Align the cylinder shaft pulley directly under the engine (upper) pulley, apply Loctite 242 sealant liberally to the threads of the two set screws, and securely install the set screws ($\frac{5}{16}$ "-18x $\frac{3}{8}$ ") in the pulley, tightening them to 110 inch-lbs. Before tightening the set screws, make certain that the belt grooves in the two pulleys are perfectly aligned. See Fig. 31. Remove the broom handle or stick.

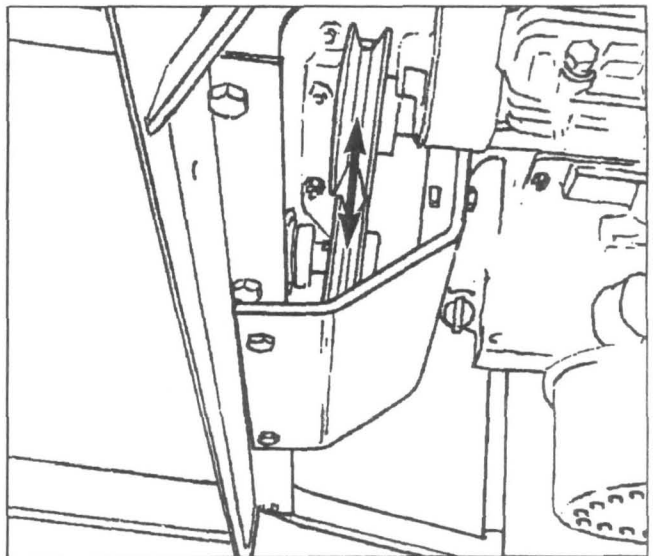


Fig. 31

STEP 23.

Install the drive belt on the pulleys by referring to the "Belt Replacement Instructions" in the Owner/Operator Manual.

STEP 24.

Replace the belt cover over the lower pulley and use two $\frac{7}{16}$ " wrenches to install the two screws ($\frac{1}{4}$ "-20x $\frac{3}{4}$ ") and Whiz locknuts.

STEP 25.

Replace the chipper chute and use a 1/2" wrench to install the four screws (5/16"-18x5/8") and lockwashers.

STEP 26.

Replace the shredder screen, securing the two long rods with the hair pin cotters. Also secure the service door with its rod and hair pin cotter.

STEP 27.

On electric start models, replace the battery and its cables by reversing Step 3 of the disassembly steps. Make certain that the negative (-) post on the battery is the post closest you on the battery platform as you face the engine. Last, you can reconnect the plug wire to the spark plug.

OTHER SERVICE PROCEDURES AND INSPECTIONS

Inspecting Welds

Inspect all exterior steel surfaces of the Tomahawk Chipper/Shredder mainframe to see if any of the welds have broken. Welding repairs must be completed before the Chipper/Shredder is used again.

Inspecting the Retainer Flap

The retainer flap is the rubber piece inside the shredder hopper by which you must pass all material that you wish to shred. The retainer flap should be in good condition and securely attached, as its function is to prevent kickback of materials that are being processed inside the Chipper/Shredder chamber. Flap replacement is quick—just loosen and remove the two screws that secure the flap to the chipper/shredder and replace the flap.

Torque Specifications

The following screws have specific torque tightening requirements:

- The set screw in the bearing locking collar: **60 inch/pounds.**
- The screw that holds the drive shaft in position within the bearings: **30 foot/pounds.**
- The two set screws in the lower belt pulley: **110 inch/pounds.**
- The three screws that hold the bearing flangettes: **140 inch/pounds.**

Troy-Bilt Manufacturing Co., 102nd Street & 9th Ave., Troy, New York 12180
Call Toll-Free: 1-800-833-6990

Garden Way Canada, Inc., 1515 Matheson Blvd., Unit B11, Mississauga, Ontario L4W 2P5
Local calls only (416 Area Code): 624-8423 • From Ontario & Quebec Provinces call Toll-Free: 1-800-387-3351
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