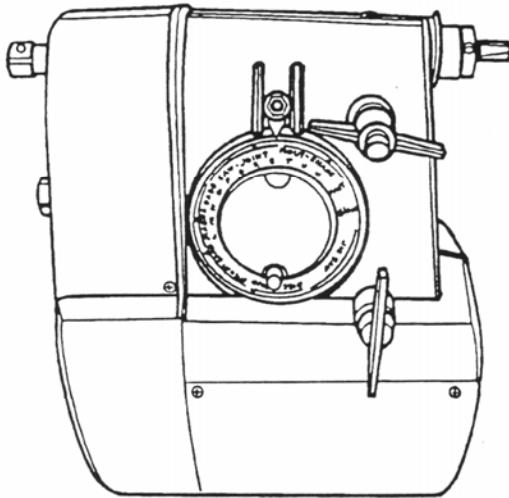


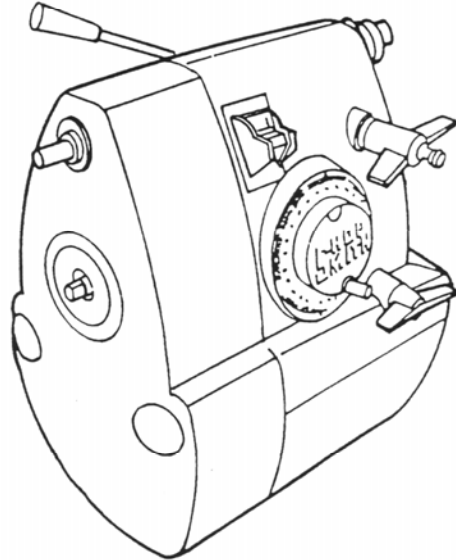


Headstock Service Manual

For both the "B" and "C" Model headstocks ...



Mark V "B" Headstock



Mark V "C" Headstock

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Common Repair Procedures for Your MARK V

Even the best machines, no matter how well they are designed, require occasional maintenance and repair. The Shopsmith MARK V is no different. It contains some parts that wear slightly each time you use the machine. Over a period of years these parts eventually wear out.

To keep downtime to a minimum, the MARK V's built with as few of these parts as possible. The few wearing parts in the machine are made of durable materials, to extend their useful life. And when one of these parts wears out, your MARK V is designed to be simply and quickly repaired.

If you should need to repair your MARK V, follow some simple guidelines:

WARNING

Turn off and unplug the MARK V (unless otherwise instructed), before you start a repair procedure. Wear proper eye protection.

- Strip the machine down, removing all accessories, so that you don't injure yourself on sharp blades or bits.
- Refer to the exploded views that appear with each repair procedure and the "Parts List" in the Service section to see how parts are disassembled and reassembled.

- Disassemble the MARK V in an organized manner. Make notes so that you can easily remember the sequence of bolts, washers, and nuts. It also helps to lay things out in neat rows on your workbench.

- Plug the machine in and run the motor when you need to change the speed setting, unless otherwise instructed. In some cases, you can turn the speed dial very slowly with one hand while turning the main spindle or sanding disc with the other. When you've reset the speed dial, remember to unplug the machine before you continue with the repair procedure.

- As you reassemble the MARK V, be sure to tighten all parts properly. All parts should be secure, of course, but some parts can be easily overtightened. Overtightening may crack a casting or cause a bearing to wear prematurely.

- When you've reassembled the MARK V, align and adjust the machine, following the procedure described in the Alignment and Adjustment section.

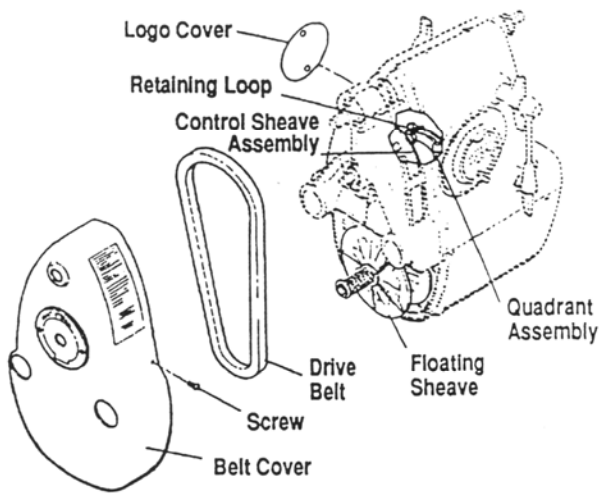
- Once you have finished with your repairs, check that the power switch is "Off" before you plug your MARK V back into a power source.

WARNING

NEVER use non-Shopsmith replacement parts on your MARK V. Using non-Shopsmith parts may create a hazardous condition and will void your warranty.

NOTE

Illustrations show using Model 510. All procedures work equally well on Model 500.



3. Remove the drive belt from the motor sheaves. Hook the drive belt that connects the drive shaft and the idler shaft over the rim of the floating sheave. Slowly turn the motor by hand, letting the belt ride off the sheave. See Fig. 1.

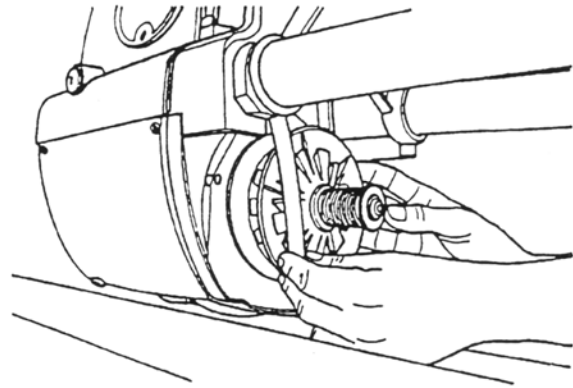


Fig. 1

How to Replace the Drive Belt

To replace the drive belt that connects the motor shaft to the idler shaft, follow this procedure:

1. Loosen the drive belt. Turn on the MARK V, run it down to "Slow" speed, then turn it off and unplug it.

WARNING

Turn off and unplug the MARK V.

With the motor off, reset the speed dial to "Fast". This will loosen the drive belt on the sheaves.

2. Remove the belt cover. Slide the headstock and carriage to the right (toward the base mount) along the way tubes as far as they will go. Secure the headstock and carriage locks, then remove the two screws holding the belt cover to the headstock. Slide the belt cover off the headstock and to the left along the way tubes, out of the way.

NOTE

If you have mounted drive hubs on the auxiliary spindles, you'll have to remove the hubs before you can remove the belt cover.

4. Open the logo cover by removing the bottom screw and turning the cover 180 degrees.

5. Detach the retaining loop from the speed changer. Look inside the headstock through the access hole opening. On the end of the control sheave is a retaining loop hooked over a leaf spring. The leaf spring is attached to the quadrant assembly, (part of the speed changing mechanism). Depress the leaf spring and pull the retaining loop toward you, off the spring. See Fig. 2.

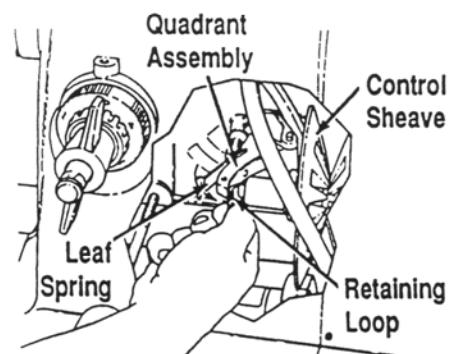


Fig. 2

6. Slide the belt completely off the drive shaft, then push it up and back into the headstock, away from the control sheave. See Fig. 3.

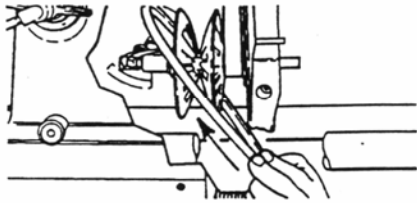


Fig. 3

7. Remove the drive belt. Squeeze the upper sheaves together. Then work the drive belt around the upper sheaves and pull it down and out through the opening between the motor and headstock housing.

8. Replace the drive belt. To replace the drive belt reverse this procedure.

9. Make high speed adjustment, following the procedures in "How to Make High Speed Adjustment Setting."

How to Make High Speed Adjustment Setting

The MARK V comes with the speeds preset. The low speed setting is automatic and does not require adjustment. However, if you need to adjust the high speed setting, follow this procedure:

NOTE

A tachometer (available at a tool rental store) is helpful to make the high speed adjustment.

WARNING

Since some steps of this procedure are performed with the MARK V plugged in and/or running, keep your hands and other parts of your body away from moving and/or electrified parts of the machine. Also, do not stand in line with moving parts.

1. Remove the belt cover. Slide the headstock and carriage to the right along the way tubes as far as they will go. Secure the headstock and carriage locks, then remove the two screws

holding the belt cover to the headstock. Slide the belt cover off the headstock and to the left along the way tubes, out of the way.

2. Plug in and turn on the machine. Turn the speed dial toward "Fast" until the tachometer reaches 5,200 rpm or until the top of the drive belt is $1/8"$ - $1/16"$ below the outside diameter of the lower sheaves, or the high speed stop is engaged (see Fig. 4). Use a grease pencil to mark the location of the access hole in the speed control handle on the headstock casting. Then turn the speed control handle part of a revolution toward "Slow" until the access hole in the side of the speed control handle is facing up.

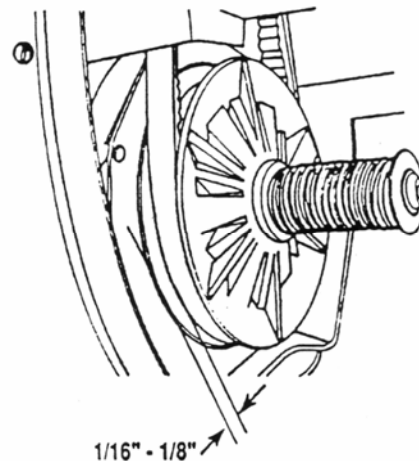


Fig. 4

3. Turn off and unplug the MARK V.

4. Remove the speed control handle. With the access hole in the side of the speed control handle facing up, insert a $3/32"$ Allen wrench in the hole and loosen the setscrew holding the handle to the worm control shaft, as seen in Fig. 5. Pull the control handle assembly free of the shaft.

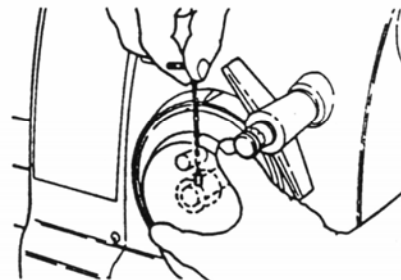


Fig. 5

5. Loosen the jam nut. Hold the setscrew with a screwdriver and loosen the jam nut with a 7/16" open end wrench, as shown in Fig. 6.

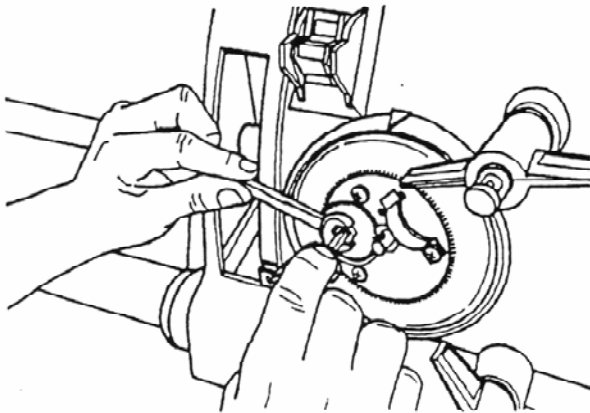


Fig. 6

6. Plug in and turn on the MARK V. Turn the worm control shaft by hand (or with padded pliers) until the recess in the shaft lines up with the mark on the headstock.

7. Adjust the setscrew. With the jam nut loose, turn the setscrew until it contacts the control arm quadrant.

8. Turn off and unplug the MARK V.

9. Lock the jam nut. Make sure that the control arm quadrant is engaged against the setscrew and the drive belt is 1/8"-1/16" below the outside diameter of the lower sheaves. Then hold the setscrew with a screwdriver and tighten the jam nut with a 7/16" open end wrench.

10. Install the speed control handle. If after the setscrew was adjusted, the recess in the shaft is not facing up, pull the motor sheaves apart and push the drive belt up inside the headstock. This will loosen the drive belt in the upper sheaves. This setting will be less than "Fast" and the speed dial needs to be adjusted accordingly. Replace the control handle on the worm control shaft so that the setscrew lines up with the recess in the shaft. Then tighten the setscrew.

11. Mount the sanding disc on the main spindle. Turn the disc by hand and gently turn the speed dial from "Fast" to "Slow". See Fig. 7. Remove the disc.

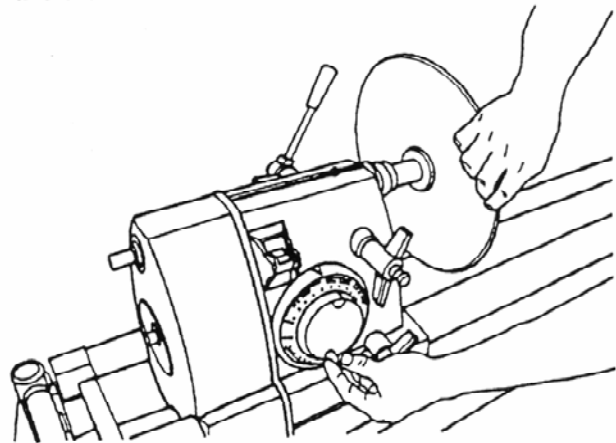


Fig. 7

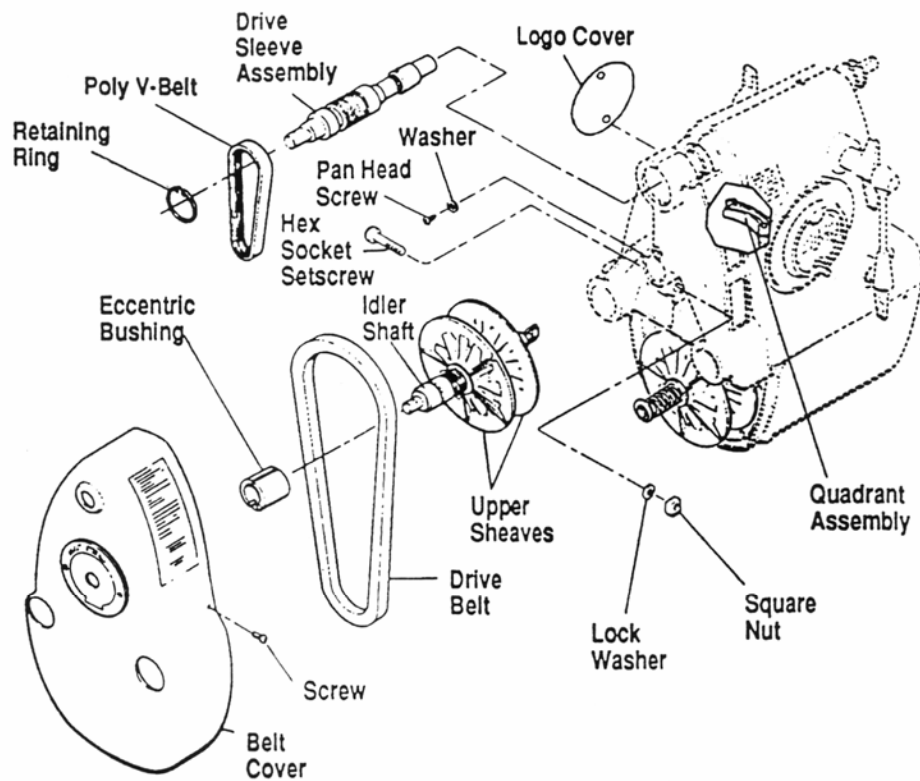
12. Plug in and turn on the MARK V. Turn the speed control handle until the access hole returns to the position marked at "Fast." If the speed control handle comes up against the high speed stop before the access hole reaches the mark, the high speed stop is set at too low of a speed. If the access hole continues past the mark before coming up against the high speed stop, the high speed stop is set at too high of a speed.

13. Repeat Steps 3 through 12 until the high speed stop is set at 5,200 rpm. Run the machine through the speed ranges. Check to see that the speed dial stops at "Slow" and "Fast."

CAUTION

The MARK V runs at a maximum speed of 5,200 rpm. Do not exceed 5,200 rpm.

14. Install the belt cover.



How to Replace the Poly V-Belt

NOTE

Replacing the Poly V-belt is a complicated procedure. If you encounter problems, call Customer Service or your local Showroom.

To replace the Poly V-belt that connects the idler shaft and the drive shaft, follow this procedure:

WARNING

Turn off and unplug the MARK V.

1. Remove the drive belt, following Steps 1 through 7 of "How to Replace the Drive Belt."
2. Remove the speed control handle. With the access hole in the side of the speed control handle facing up, insert a 3/32" Allen wrench in the hole and loosen the setscrew holding the handle to the worm control shaft gear. See Fig. 8. Pull the control handle assembly free of the shaft.

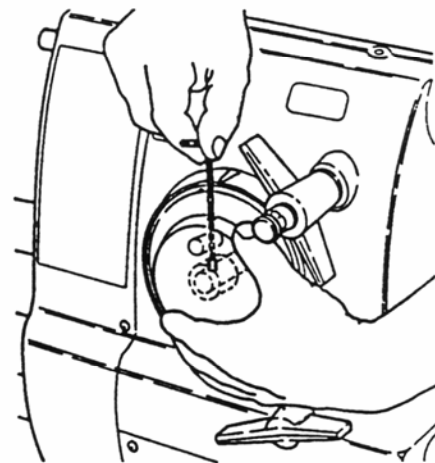


Fig. 8

3. Loosen the tension on the Poly V-belt. With a 1/4" Allen wrench, remove the hex socket capscrew, lock washer, and square nut under the idler shaft See Fig. 9. This hex socket capscrew secures the eccentric bushing in the headstock. Also remove the pan head screw and washer that keep the bushing and the idler shaft from slipping out of the headstock See Fig. 10.

4. Insert a medium blade screwdriver into the large slot in the eccentric bushing, and turn the bushing so that the slot points straight down, toward the motor. This will loosen the Poly V-belt. See Fig. 11. Slip the eccentric bushing out of the headstock housing and over the idler shaft. See Fig. 12. You may have to pry the eccentric bushing part way out. Then push the shaft in and finish prying out the bushing. Push shaft to loosen belt.

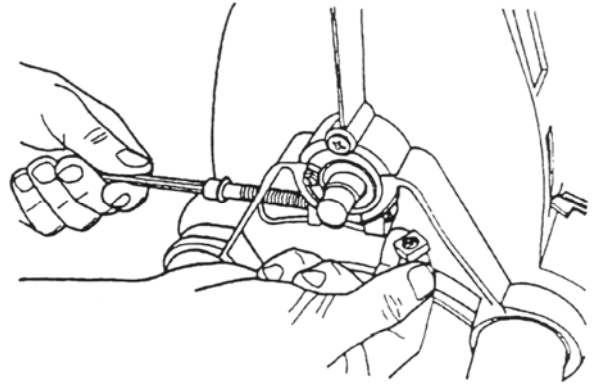


Fig. 9

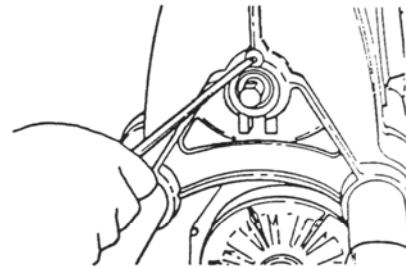


Fig. 10

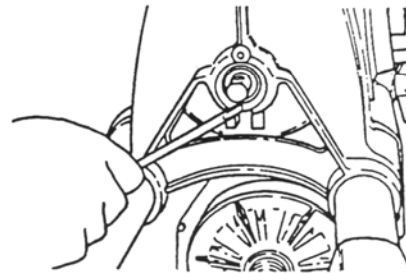


Fig. 11

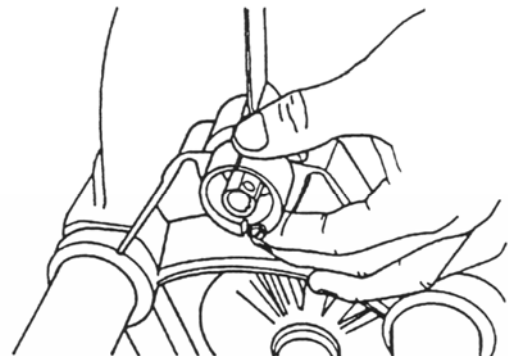


Fig. 12

5. Remove the drive sleeve assembly. Advance the quill feed as far as it will go, and secure the quill lock to keep it from retracting. See Fig. 13. With a small blade screwdriver, pry out the retaining ring that holds the drive sleeve assembly in the headstock. See Fig. 14. Take hold of the upper auxiliary spindle and pull the assembly from the headstock. See Fig. 15. Be sure the Poly V-belt is loose and doesn't catch on the drive sleeve assembly as you pull it free.

NOTE

The drive sleeve assembly fits very snug in the headstock, and may be difficult to remove by hand. If this is the case, loosen setscrew in top of headstock, extend quill and place a small block of wood between the end of the quill shaft and the drive and ring assembly. Then push the drive sleeve assembly out of the headstock by retracting the quill. Retract quill and readjust setscrew.

CAUTION

Do not hit the quill with a hammer to remove the drive sleeve assembly. This will ruin both the quill bearings and drive sleeve assembly bearings.

6. Remove the Poly V-belt. Working through the service access hole and headstock openings, maneuver the upper sheaves back into the headstock. See Fig. 16. Remove the belt from the idler shaft when the shaft is free of the headstock. Let the shaft and sheaves sit on the motor until you're ready to install a new belt.

7. Install the Poly V-belt. To install a new belt reverse the procedure described previously.

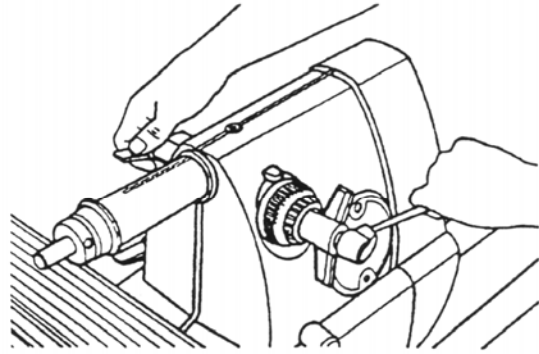


Fig. 13

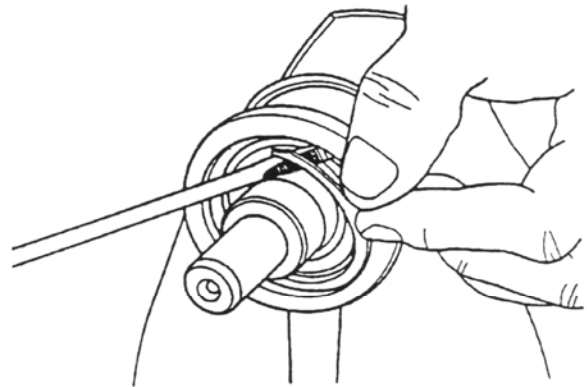


Fig. 14

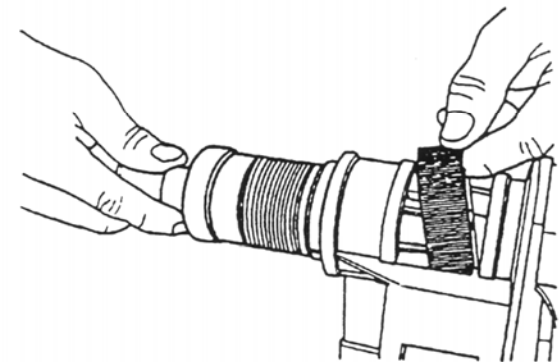


Fig. 15

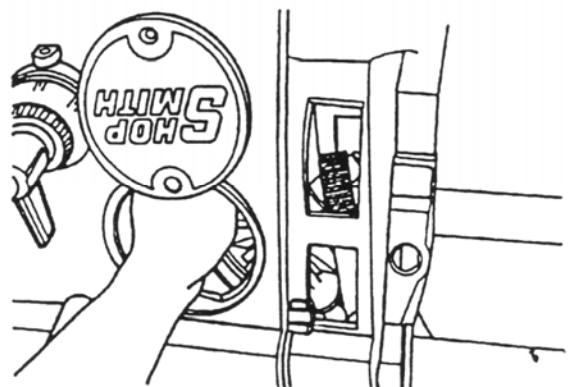


Fig. 16

8. Tension the Poly V-belt. Before you tighten the hex socket capscrew, lock washer, and square nut that secure the eccentric bushing in the headstock, tension the Poly V-belt. To tension, insert a blade screwdriver in the slot of the eccentric bushing and turn the bushing clockwise in the casting until it stops. See Fig. 17. With your fingers push in on the Poly V-belt as demonstrated in Fig. 18. If you can push the belt in more than 1/8" when applying heavy pressure, the belt needs to be retensioned. Retighten the 1/4" socket capscrew when proper tension is achieved. Do not overtighten the capscrew. Only tighten it until you can no longer rotate the eccentric bushing.

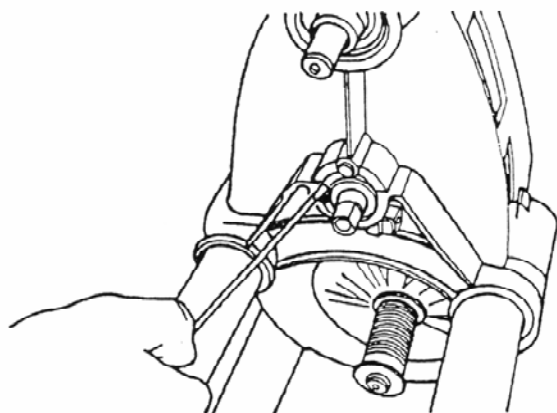


Fig. 17

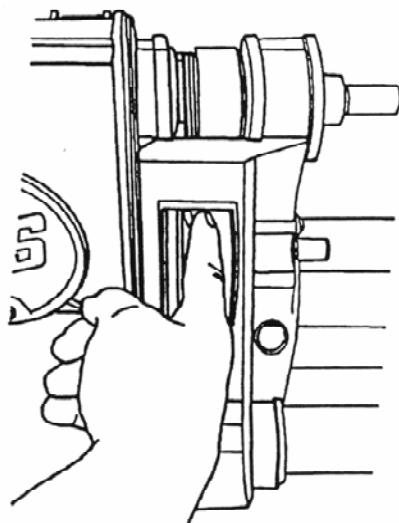


Fig. 18

NOTE

If the Poly V-belt seems tight but it still slips, don't increase the belt tension—this will just stretch the belt out of shape. Instead, apply a little "belt dressing" to the inside of the belt.

9. Hook the retaining loop on the end of the control sheave over the quadrant assembly.

10. Secure the logo cover by reinstalling screw in lower hole.

11. Install the speed control handle. If after the setscrew was adjusted, the recess in the shaft is not facing up, pull the motor sheaves apart and push the drive belt up inside the headstock. This will loosen the drive belt in the upper sheaves. This setting will be less than "Fast" and the speed dial needs to be adjusted accordingly. Replace the control handle on the worm control shaft so that the setscrew lines up with the depression in the shaft. Then tighten the setscrew.

12. Mount the sanding disc on the main spindle. Turn the disc by hand and gently turn the speed dial from "Fast" to "Slow." Once setting is at "slow," remove disc.

13. Plug in and turn on the MARK V. Turn the speed control handle until the access hole returns to the position marked at "Fast." If the speed control handle comes up against the high speed stop before the access hole reaches the mark, the high speed stop is set at too low of a speed. If the access hole continues past the mark before coming up against the high speed stop, the high speed stop is set at too high of a speed.

14. Repeat Steps 3 through 12 until the high speed stop is set at 5,200 rpm. Run the machine through the speed ranges. Check to see that the speed dial stops at "Slow" and "Fast."

CAUTION

The MARK V runs at a maximum sp of 5,200 rpm. Do not exceed 5,200 rpm.

15. Install the belt cover.

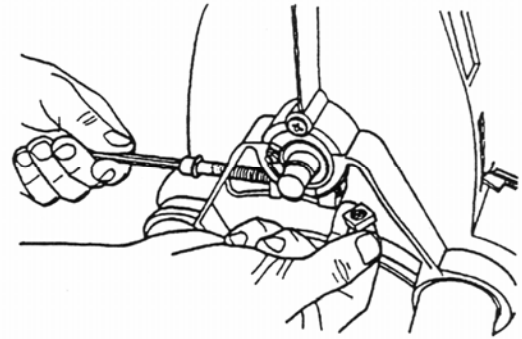
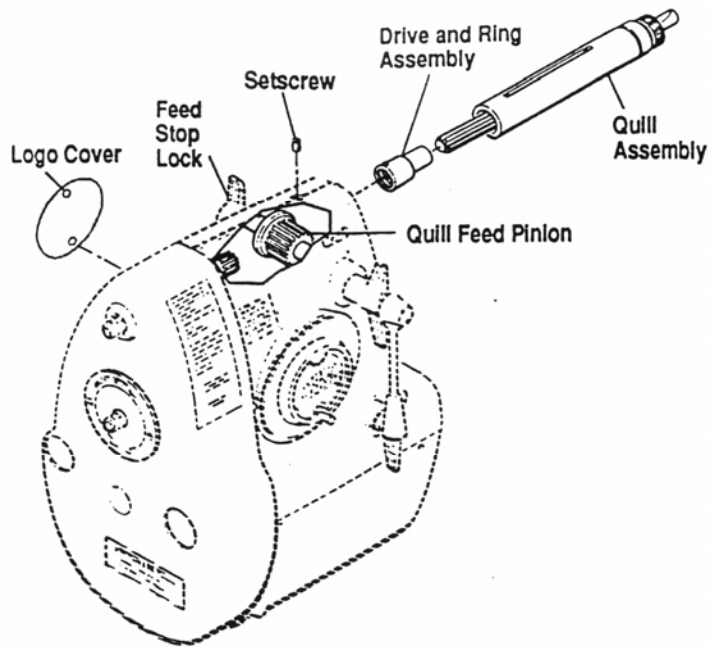


Fig. 19

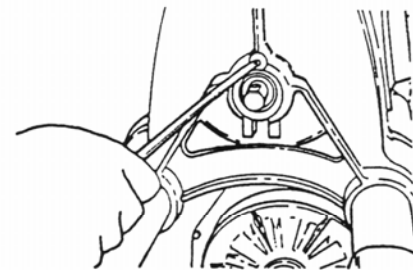


Fig. 20

How to Replace the Drive and Ring Assembly

To replace the drive and ring assembly that connects the drive shaft to the main spindle, follow this procedure:

WARNING

Turn off and unplug the MARK V.

1. Open the logo cover by removing the bottom screw and turning the cover 180 degrees.
2. Remove the drive belt, following Steps 1 through 7 of "How to Replace the Drive Belt."
3. Loosen the tension on the Poly V-belt. With a 1/4" Allen wrench, remove the hex socket capscrew, lock washer, and square nut under the idler shaft See Fig. 19. This hex socket capscrew secures the eccentric bushing in the headstock. Also remove the pan head screw and washer that keep the bushing and the idler shaft from slipping out of the headstock See Fig. 20.

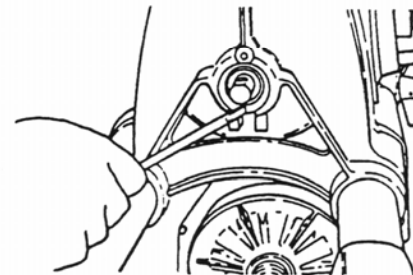


Fig. 21

Insert a medium blade screwdriver into the large slot in the eccentric bushing, and turn the bushing so that the slot points straight down, toward the motor. This will loosen the Poly V-belt. See Fig. 21. Slip the eccentric bushing out of the headstock housing and over the idler shaft. See Fig. 22. (You may have to pry the eccentric bushing part way out. Then push the shaft in and finish prying out the bushing. Push shaft to loosen belt.)

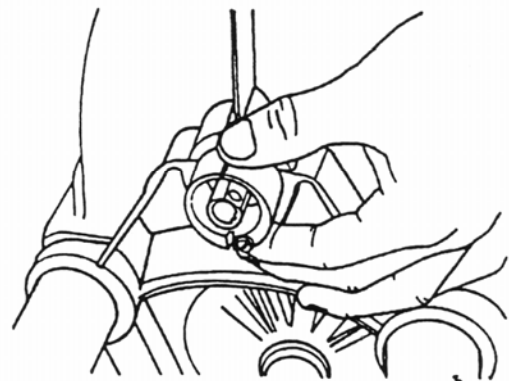


Fig. 22

4. Remove the drive sleeve assembly. Advance the quill feed as far as it will go, and secure the quill lock to keep it from retracting. With a small blade screwdriver, pry out the retaining ring that holds the drive sleeve assembly in the headstock. See Fig. 23. Take hold of the upper auxiliary spindle and pull the assembly from the headstock. See Fig. 24. Be sure the Poly V-belt is loose and doesn't catch on the drive sleeve assembly as you pull it free.

NOTE

The drive sleeve assembly fits very snug in the headstock, and may be difficult to remove by hand. If this is the case, loosen setscrew in top of headstock, extend quill and place a small block of wood between the end of the quill shaft and the drive and ring assembly. Then push the drive sleeve assembly out of the headstock by retracting the quill. Retract quill and readjust setscrew.

5. Remove the drive ring and assembly. With a large blade screwdriver insert the blade of the screwdriver behind the drive and ring assembly then twist the screwdriver to loosen the assembly on the shaft. See Fig. 25. When prying the drive ring from the drive sleeve assembly shaft the blade of the screwdriver must pry against the inner race (ring) of the bearing to avoid damaging the bearing. This will take a good strong twist, since the assembly has an internal ring clip that seats in a groove on the drive sleeve assembly shaft. See Fig. 26. Once you have popped the ring out of the groove, work the assembly off the shaft by wiggling it with your hand.

6. Replace the drive and ring assembly. Replace the assembly or install a new one by pressing or gently tapping it back onto the shaft until you feel the internal ring clip into the groove in the shaft. Once you've got the assembly started on the shaft, you can easily tap it on the rest of the way by using a soft face mallet.

NOTE

To make it easier to replace the drive and ring assembly, apply paste wax to the inside of the drive and ring assembly.

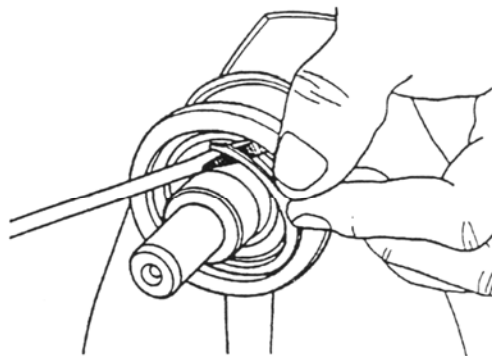


Fig. 23

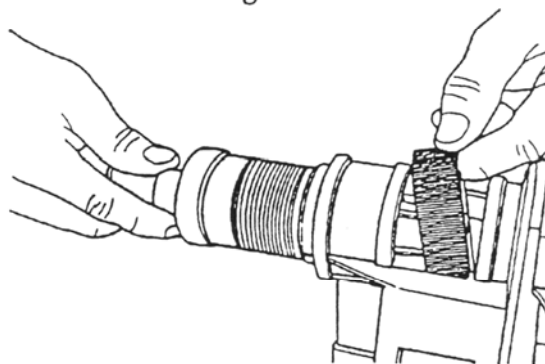


Fig. 24

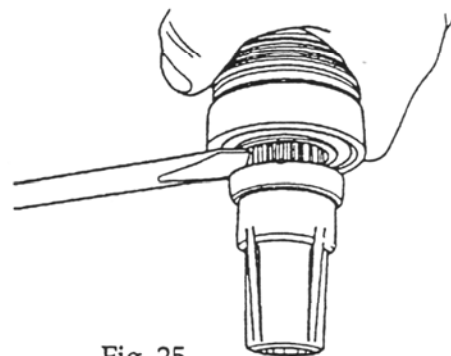


Fig. 25

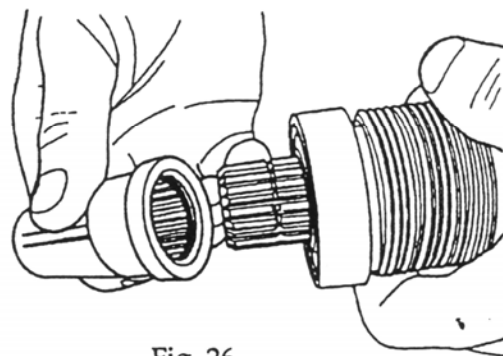


Fig. 26

7. Install the drive and ring assembly. To reinstall the drive and ring assembly reverse the procedures described previously.

8. Tension the Poly V-belt. Before you tighten the hex socket cap screw, lock washer, and square nut that secure the eccentric bushing in the headstock, tension the Poly V-belt. To tension, insert a blade screwdriver in the slot of the eccentric bushing and turn the bushing clockwise in the casting until it stops. See Fig. 27. With your fingers push in on the Poly V-belt as demonstrated in Fig. 28. If you can push the belt in more than 1/8" when applying heavy pressure, the belt needs to be retensioned. Retighten the 1/4" socket cap screw when proper tension is achieved.

NOTE

If the Poly V-belt seems tight but it still slips, don't increase the belt tension—this will just stretch the belt out of shape. Instead, apply a little "belt dressing" to the inside of the belt.

9. Hook the retaining loop on the end of the sheave over the quadrant assembly.

10. Secure the logo cover by reinstalling screw in lower hole.

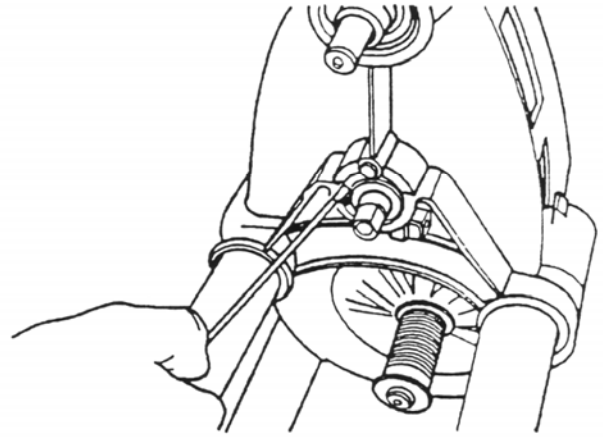


Fig. 27

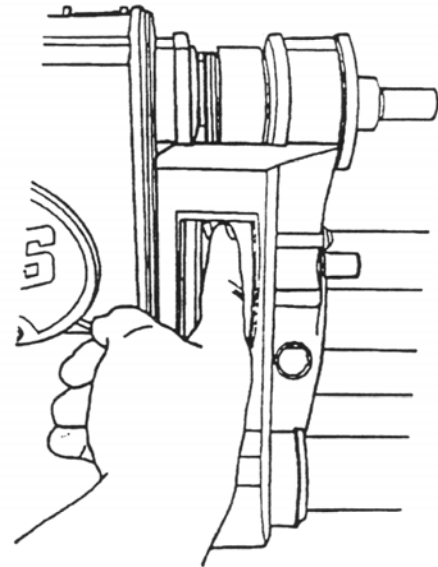


Fig. 28