

## Maintenance and Troubleshooting

This section of the Mark V Owner's Manual contains maintenance information and a troubleshooting guide. It should cover topics and answer most questions you may have for normal maintenance and problem solving. Follow the maintenance schedule below for as long as you own your Mark V. Regular maintenance is essential for any tool and machine to perform at its best.

The maintenance intervals shown here are based on normal operation. If you work the machine

unusually hard, you'll need to maintain it more often.

To estimate "running time", use this rule of thumb: The average woodworker will use his power tools only 20% of the total time spent in the shop—at the most. If you work in your shop for 25 hours, you've probably logged 4-6 hours on your Mark V. Average the time you spend in your shop to determine the proper maintenance interval for your machine. But the 50-hour procedure should be performed at least once a year.

### MAINTENANCE SCHEDULE

As needed	<ul style="list-style-type: none"> <li>• Clean the saw guards and sanding disc. Refer to <b>Maintaining Accessories</b>.</li> <li>• Sharpen saw blades, drill bits and lathe chisels.</li> </ul>
Every 5 hours of running time	<ul style="list-style-type: none"> <li>• Clean the Mark V. Refer to <b>Cleaning</b>.</li> <li>• Wax the Mark V. Refer to <b>Waxing</b>.</li> </ul>
Every 10 hours of running time	<ul style="list-style-type: none"> <li>• Repeat the preceding steps.</li> <li>• Lubricate the drive shaft and idler shaft.</li> <li>• Check the action on the anti-kickback system and the lower guard, wax the splitter on the lower guard and lubricate the chuck. Refer to <b>Maintaining Accessories</b>.</li> <li>• Check the alignment and adjustment of the headrest and carriage locks, worktable stops, table tilt indicator, miter gauge slots, miter gauge, rip fence, extension table and lathe centers. Refer to the <b>Alignment</b> instructions for your Mark V model.</li> </ul>
Every 25 hours of running time, or once a year (if not used)	<ul style="list-style-type: none"> <li>• Lubricate the sheaves. Refer to <b>Lubricating</b>.</li> </ul>
Every 50 hours of running time or once a year (if not used)	<ul style="list-style-type: none"> <li>• Repeat the preceding steps.</li> <li>• Lubricate the headstock lock. Refer to <b>Lubricating</b>.</li> </ul>

## Preparation

### WARNING

Turn off and unplug the Mark V BEFORE you begin any maintenance procedure.

Before you begin a maintenance procedure, remove the blades, bits or any other accessories that are mounted on the machine. Set the machine in the horizontal position and secure the headstock lock. Finally, move the worktable and carriage as far to the right as it will go.

### Cleaning

As you work, sawdust will accumulate on and in your Mark V. This residue can affect its performance. To prevent problems, clean your Mark V thoroughly inside and out once every 5 hours of running time or monthly.

#### *Blowing Out the Headstock*

1. With a medium Phillips screwdriver, remove the two screws that hold the belt cover. Then slide the belt cover back along the way tubes toward the left. Open the access hole by removing the bottom screw and turning the nameplate 180°.
2. Working through the openings, completely blow out all the sawdust from the inside of the headstock. Use an air compressor. Replace the screw.

#### *Cleaning the Table*

3. Clean the miter gauge slots with a clean rag and mineral spirits. With a 5/32" Allen wrench, remove the two screws that secure the table insert. Using a small stick, scrape out any sawdust that has accumulated under the insert.

#### *Cleaning the Racks*

4. With a small, stiff brush, reach in through

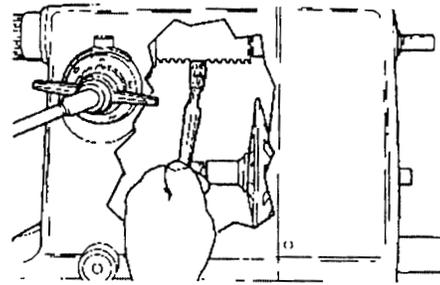


Figure D-1

the nameplate opening and brush off the teeth on the portion of the quill inside the headstock, as demonstrated in Figure D-1. Then extend the quill out from the headstock as far as it will go and brush off the outside teeth.

5. To clean the table rack, remove the table from the carriage. Brush the sawdust from between the teeth on the table support tubes and the pinions in the carriage.

#### *Brushing Off*

6. Give the entire machine a good going over with a soft brush to remove any remaining sawdust or dirt. If you find any grease or grime on the way tubes, or any other part, clean it off with mineral spirits.
7. When your Mark V is clean, wax and buff all parts (refer to Waxing), replace the table in the carriage, reinstall the table insert and belt cover, and reposition the nameplate.

### Lubricating

All the bearings are shielded and permanently lubricated so they do not need lubrication. However, there are several other parts that require lubrication.

8. To lubricate your Mark V, first clean the machine thoroughly, as described in Cleaning. But don't reinstall the belt cover or nameplate. Then follow these procedures:

*Lubricating the Sheaves*

9. Every ten hours of running time or once a month if not in use, lubricate the floating sheaves (pulleys) with a good 10w30 non-detergent motor oil. Be sure to oil both upper and lower sheaves. Apply the oil sparingly (2-5 drops only) as too much will mix with a sawdust and cause parts to stick.

**NOTE**

**Do not use penetrating oils or oils in aerosol cans. They tend to gum up at low temperatures.**

10. To lubricate the sheaves, first plug in the Mark V, turn it on and run the speed dial up to the highest speed. Then turn the machine off and unplug it.
11. Oil the upper control sheave first. While looking through the nameplate opening, turn the main spindle by hand until you locate the hole in the sheave. With the oil can tube inside the headstock apply 2-5 drops of oil in the hole, as seen in Figure D-2.

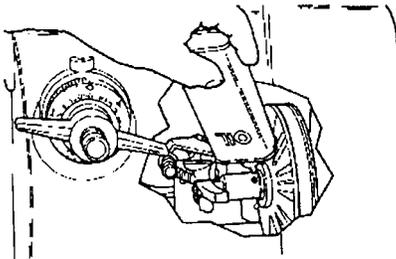


Figure D-2

12. To oil the lower floating sheaves, rotate the main spindle by hand until you find the hole in its sleeve. This hole may be difficult to find because of the spring that fits over the sleeve. When you find the hole, spread the coils of the spring over the hole with a large blade screwdriver. Then apply 2-5 drops of oil in the hole, as shown in Figure D-3. (You can also accomplish this by oiling the shaft directly. With a screwdriver push the spring back towards the sheave and apply 2 - 5 drops of oil.

13. When you've lubricated both sheaves, replace the nameplate and the belt cover. Plug in the Mark V and turn it on. Run the machine completely through the speed range several times to help spread the oil out over the shaft and to distribute grease throughout bearings.

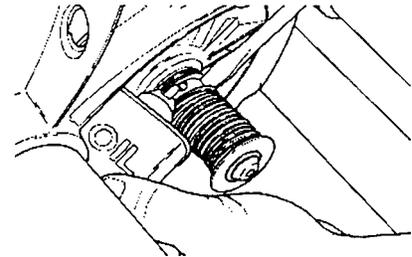


Figure D-3

*Lubricating the Locks*

Every 50 hours of running time or at least once a year, apply a dry lube product to the threads of the headstock lock.

14. First inspect the threaded rods of the headstock lock (found inside the headstock), the carriage lock (underneath the carriage), and the rip fence lock rod (inside the rip fence). Brush off or wipe off any foreign materials.
15. To lubricate the **headstock lock**, loosen the lock as far as possible. Then reach inside the nameplate opening and apply a small amount of powdered graphite to the points where the threaded rod screws into the wedge locks, as illustrated in Figure D-4. Replace the nameplate and secure the headstock lock.

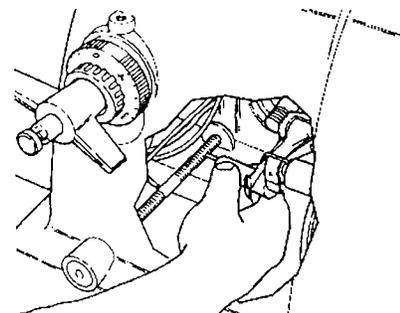


Figure D-4

## Waxing



Use paste floor or furniture wax. Do not use car wax or spray furniture polish. The Mark V needs wax for both protection and lubrication. Car wax offers good protection for metal, but it is extremely hard and has little value as a lubricant. Furniture polish isn't hard enough. Paste floor or furniture wax protects and lubricates.

Every 5 hours of running time, wax and buff the following parts:

- Bench and way tubes
- Worktable surface, miter gauge slots, table support tubes, and the table tubes
- Quill
- Rip fence (both sides)
- Miter gauge bar
- Extension table surface, support tubes, and table tubes
- Mounting holes in the power mount, base mount and carriage.

16. Apply the wax sparingly and buff it thoroughly. If you apply too much wax or don't buff it out, the wax will mix with sawdust, impede moving parts, and leave residue on the wood.

17. Some of the parts that need waxing require special care:

- a. **Way Tubes** - Don't slide the headstock and/or carriage over new wax before you buff it out. Otherwise, wax may accumulate inside the headstock or carriage and impede movement.
- b. **Quill** - Extend the quill as far as it will go, lock it in place, then wax. After waxing, brush the rack with a stiff brush to remove all the residue between the teeth, as shown in Figure D-7.
- c. **Table Support Tubes** - After waxing, brush tubes to remove all residue from the racks.

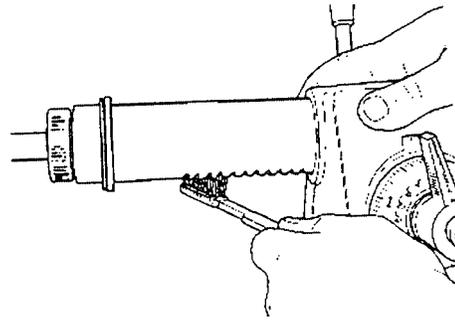


Figure D-7

- d. **Mounting Holes** - Wrap a rag around a dowel to apply wax inside these holes. Use the same technique to buff it out.

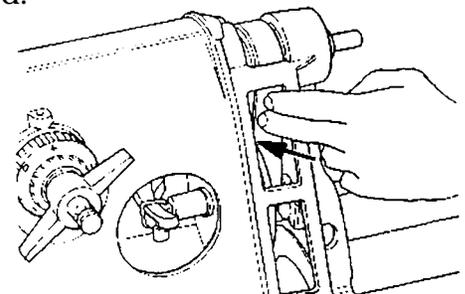
## Checking Belt Tension

**NOTE**

**If the poly V-belt seems tight but it still slips, DO NOT 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 to increase its traction.**

Every 50 hours of running time or once a year, check the tension of the poly V-belt. You may also need to check the tension on this belt if the drive train seems to be "slipping" or the top of the headstock gets too hot when you are working.

18. To check the belt tension, remove the belt cover. With your fingers, push in on the poly V-belt, as demonstrated in Figure D-8. If you can push the belt in more than 1/8" when applying pressure, the belt needs to be tensioned.



Check Tension

Figure D-8

19. To adjust the tension, loosen the bolt that holds the idler shaft eccentric bushing in the headstock casting, as shown in Figure D-9. Insert a blade screwdriver in the slot of the eccentric bushing and turn the bushing clockwise in the casting until it stops, as seen in Figure D-10. With your finger, test the tension to see that you have taken the "slack" out of the belt. Retighten the bolt. **Do not overtighten.**

Adjust belt tension

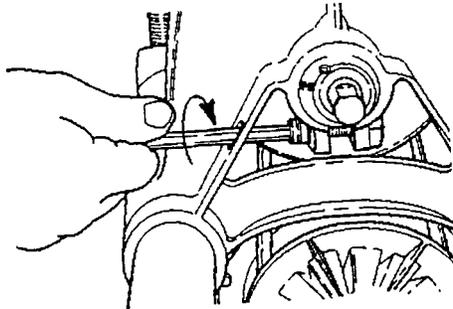


Figure D-9

Turn eccentric bushing

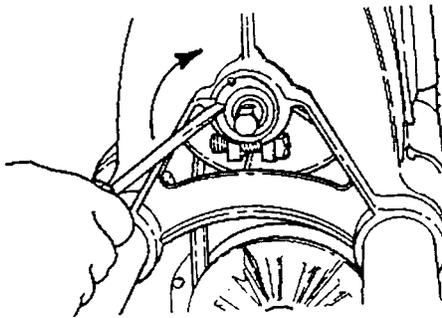


Figure D-10

## Maintaining Accessories

In addition to maintaining the basic machine and the parts you use in more than one mode (such as the miter gauge or rip fence), you must maintain the individual accessories for each separate mode—saw guards, sanding discs, drill bits, etc...

### Saw Guard System

20. As needed, brush off and blow away the sawdust that accumulates in the saw guards. The upper saw guard has a plastic insert toward the front, where most of the sawdust builds up. This can easily be removed, cleaned, and reinstalled. Dissolve the impacted sawdust with mineral spirits.



**DO NOT** use lacquer thinner to clean the saw guards. This solvent dissolves the plastic parts, distorting them or making them cloudy.

21. Every 10 hours of running time, wax and buff the riving knife on the upper saw guard. Check that the anti-kickback system and the spring-loaded lower saw guard operate smoothly. If either of these seems stiff, apply powdered graphite or a dry lube product to the rods. Do not use oil on these parts.

### Sanding Disc

22. As you work, sawdust, wood oils, glues and other materials will "load up" on sandpaper. As needed, hold an abrasive cleaner against the disc while the Mark V is running at low speed. The soft rubber reaches in between the grit and digs out the impacted materials without stripping the abrasive off the sandpaper.

### Drill Chuck

23. Every 10 hours of running time, apply a small amount of powdered graphite or a dry lube product to the inside of the drill chuck to keep it operating smoothly.

### Saw Blades, Lathe Chisels and Drill Bits

24. These cutters will become dull with use. Sharpen as needed. A sharp cutter performs better and is safer.

### Storing

25. In normal use, regular cleaning, lubrication, and waxing will prevent the ferrous parts of the Mark V from rusting. However, if the machine is to be stored for an extended period or under unusually humid or corrosive conditions, spray the way tubes, saw

blades, drill chuck and bits, and any other ferrous parts and accessories with a rust-inhibiting light oil. Remove this oil with mineral spirits and re-wax the Mark V before using it again.

## Tensioning the Quill Feed

26. The quill feed should be tensioned so that the quill retracts easily and smoothly, but not so tight that the spring binds when the quill is fully extended. If you should need to adjust or restore the tension on the quill, follow this procedure:

### WARNING

- Turn off and unplug the Mark V before performing the following procedures.

- Do not prematurely release control of the quill feed lever during removal and/or installation of the quill. Attached to the quill is a tight, "loaded" spring. If the quill feed lever is released before the spring has "unloaded" its tension, the quill could cause injury.

- Remove the quill. On top of the headstock, between the quill lock and quill feed stop, there is a setscrew that keeps the quill from advancing all the way out of the headstock. If your machine has never been worked on before, this screw is covered with gray lead. Dig out the lead system with a pen knife, and back out the setscrew 2 full turns.
- Advance the quill until you feel the rack disengage from the quill feed pinion. Do not let go of the quill feed lever. Continue to hold onto the lever and pull the quill assembly out of the headstock. When you have removed the quill assembly, set the quill feed stop at 4-1/4". Tighten the stop lock.



Do not tighten the quill lock. This will damage parts.

- Adjust the tension. With your hand holding the quill feed lever, release the quill feed stop lock and slowly let the lever unwind. When the tension has been relieved, rewind the lever 3 full turns clockwise (as you look at the headstock from the speed dial side). This will restore the tension to its original factory setting.
- Install the quill assembly, by simply reversing the procedure you used to remove it. Turn the main spindle until it slips into the drive and ring assembly. Also, the groove in the top of the quill must line up with the setscrew in the top of the headstock. Tighten this setscrew until it "bottoms out" in the groove, then back it out 1/16" turn.

## Adjusting the High Speed Setting

27. 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. Remove all accessories and attachments, including the saw blade.

- 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.
- b. 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. 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.
  - c. Turn off and unplug the Mark V.
  - d. 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 or a slotted screwdriver in the hole and loosen the setscrew holding the handle to the worm control shaft, as seen in Figure D-11.

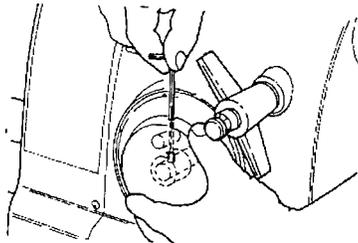


Figure D-11

- e. Loosen the jam nut. Hold the setscrew with a  $1/8"$  Allen wrench and loosen the jam nut with a  $7/16"$  open end wrench.
- f. 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.
- g. Adjust the setscrew. With the jam nut loose, turn the setscrew until it contacts the control arm quadrant.
- h. Turn off and unplug the Mark V.
- i. 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  $1/8"$  Allen wrench and tighten the jam nut with a  $7/16"$  open end wrench.
- j. 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.
- k. Mount the sanding disc on the main spindle. Turn the disc by hand and gently turn the speed dial from "Fast" to "Slow." Remove the sanding disc.
- l. 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.
- m. 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."



The Mark V headstock runs at a maximum speed of 5,200 RPM. Do not exceed 5,200 RPM. Reset speed dial.

- n. Install the belt cover.

## Cleaning the Speed Changer

28. Fine sawdust can accumulate on various parts of the speed changing mechanism and interfere with its operation, even if you blow out the headstock regularly. If the speed dial becomes hard to turn and lubricating the motor shaft and idler shaft does not relieve the problem, clean the speed changing mechanism according to the following procedure. See Figure D-13 and the Parts List to identify parts.

- a. Set the speed dial to "Fast," with the Mark V running. Observe where the opening is for access to the setscrew on the speed control handle. This opening must be facing straight up. Turn the speed dial until this position is achieved. Note which letter is closest to the arrow on the headstock.

## NOTE

**When the speed control handle is reinstalled, this same position must be located so that the speed dial is in calibration with the speed control handle.**

## WARNING

Turn off and unplug the Mark V.

- b. Detach the speed changer from the sheaves. Open the access hole by removing the bottom screw and turning the nameplate 180°. Look inside the headstock through the nameplate opening. On the end of the upper floating sheave is a retaining loop hooked over a leaf spring. The leaf spring is attached to the quadrant assembly. Depress the leaf spring that is attached to the quadrant assembly. Depress the leaf spring and swing the retaining loop toward you, off the spring.
- c. Remove the speed control handle. With the access hole in the side of the speed control handle facing up, insert a 3/32"

## SPEED CHANGING MECHANISM

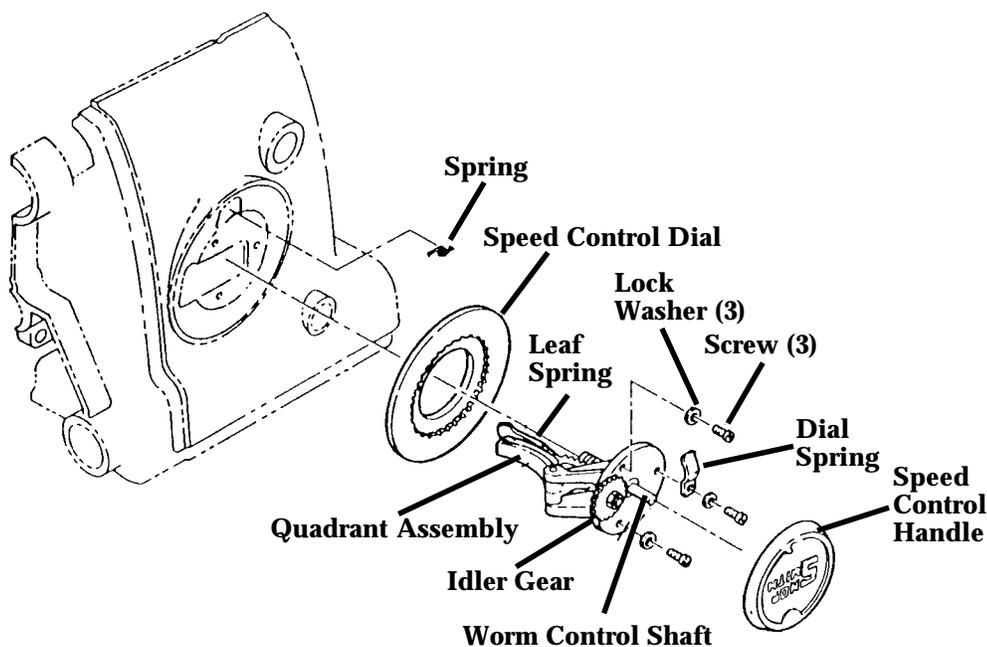


Figure D-13

Allen wrench in the hole and loosen the setscrew holding the handle to the worm control shaft, as shown in Figure D-14. Pull the handle free of the shaft.

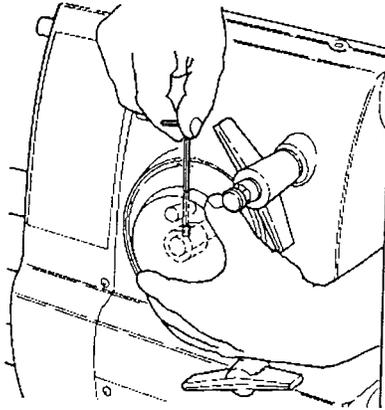


Figure D-14

- d. Remove the speed dial and speed changer. Remove the three screws and washers that hold the speed dial and speed changer in the headstock. The screw toward the right also holds a dial spring on the outside and a nylon clip inside the headstock. To keep from losing the clip, reach inside the headstock through the nameplate opening and hold it while loosening the screw, as demonstrated in Figure D-15. When you have removed all three screws, pull the speed dial and the speed changer out of the headstock.

### NOTE

**Do not remove the spring behind the dial. This spring keeps the speed dial from rattling when the machine is running.**

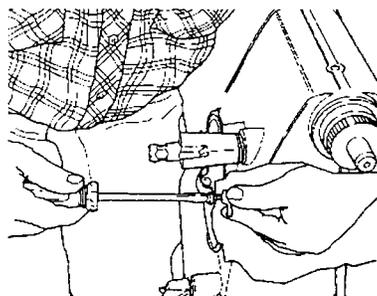


Figure D-15

- e. Clean the speed changing mechanism. To clean the speed changer, thoroughly scrub the idler gear and the interlocking teeth of the speed control dial on the front of the assembly with a small, stiff brush (toothbrush) soaked in mineral spirits or turpentine. Then turn the worm control shaft until the quadrant assembly swings free of the worm control shaft. Scrub the shaft and quadrant teeth until they are free of grease and sawdust.
- f. Wipe all parts dry with a clean rag. Put a tiny dab of cup grease or "furnace bearing" grease (beeswax) on the worm control shaft and rack of the quadrant assembly. Then reengage the shaft and the quadrant assembly. Turn the shaft clockwise until it stops, so parts will remain calibrated.
- g. Install the speed changer and speed control dial. Install the speed control dial and speed changer, taking care not to turn the worm control shaft. Fasten the speed changer in the headstock with the two screws on the left, then install the screw on the right, along with the dial spring on the outside. The dial spring helps keep the speed control handle from turning when the machine is running. The end of the spring should rest between two small bumps on the speed changer.
- h. Hook the retaining loop on the end of the sheave over the quadrant assembly and replace the nameplate.
- i. Install the speed control handle on the worm control shaft so that the setscrew lines up with the depression in the shaft, then tighten the setscrew.
- j. Mount the sanding disc. Spin the disc by hand while turning the speed dial to "Slow."

- k. Plug in and turn on the Mark V. Run the machine through its range. Check to see that the dial stops at "Slow" and "Fast." Additional adjustment may be necessary to calibrate the dial to the handle.
  
- l. Replace the belt cover.



The drive hub which is installed on the intermediate shaft is used to power Major Accessories. It also serves as a heat sink, reducing temperature caused by friction in the bearing seal on the intermediate shaft.

DO NOT remove the drive hub unless you require service of internal components. If service is done on the internal components, be sure to replace the drive hub after service is completed.

---

**NOTES**

---