

Stripping Down the Headstock

For cleaning and inspection

After you have acquired a Mark V, it's natural that you will want to try it out first thing. Think twice before doing this, particularly if the machine hasn't been used for a long time. Parts rust and corrode; assemblies that should pivot or slide freeze up and become immobile, the insulation on electrical wires becomes brittle and cracked. If you run the machine in this state, you could damage it further. It's essential that you give the machine – and in particular, the headstock – a close inspection before turning it on. And the best way to make this sort of inspection is to disassemble the machine and give the parts a thorough cleaning.

Disassembly

- Remove the tie bar (25) from the way tubes (20) by loosening two 5/32" Allen screws on the underside.
- Slide the headstock off the way tubes (20).
- Remove the two pan head screws (97) that hold the belt cover (98) to the headstock and slide the belt cover off.
- Using a 3/4" x 2" x 18" board with a 1"-diameter hole drilled through the center, compress the motor spring (116) and remove it's retaining ring (114) with retaining ring pliers. Carefully let the spring expand, and then remove the spring (116), the retaining washer (115), and the floating sheave (117).
- Remove the logo cover (46) and unhook the retaining loop on the back of the control sheave (110) from the from the quadrant assembly (86).
- Using a 3/32" Allen wrench, remove the speed control handle (84) from the speed control.
- Remove the three screws (82) and dial spring (83) that hold the speed control in the headstock.
- Remove the speed dial (77), speed control, and quadrant assembly (86-96) from the headstock. Also remove the anti-rattle spring (73) behind the speed dial.
- Slide the control sheave (110) off the idler shaft (105).
- Remove the drive belt (113).
- Remove the retaining screw (104) from the eccentric bushing (103).
- Loosen the machine screw (47) that holds the eccentric bushing (103) in place. Using a screwdriver, turn the eccentric bushing (103) until the poly-v belt or Gilmer belt (55) is loose, the slide the eccentric out over the idler shaft bearing (105). The idler shaft and idler sheave (109) will hang loosely in place.
- Using a small screw driver, remove the retaining ring (54) that holds the drive sleeve assembly (56) in the headstock. This "ring" is more like a compressed spring – you must pry one end out of the groove inside the headstock and the rest of the ring will follow.
- Raise the belt (55) up so it is no longer resting on the drive sleeve (56), then slide the drive sleeve out of the headstock.
- Remove the lead or putty that covers the Allen screw (45) on the top of the headstock. Back the Allen screw out part way, then advance the quill assembly (59-66) until you feel the teeth (on the underside) disengage from the quill feed

- pinion (43). Pull the quill out of the headstock, then carefully let the quill feed lever (135) unwind to remove the tension on the quill spring (40).
- Remove the lead or putty the covers the Allen screw (45) on the back side of the headstock that holds the quill spring cover (39) in the headstock. Loosen the screw.
 - Remove the lever (135), quill lock handle (76), and washer (75) from the quill pinion shaft (43) where it protrudes from the front of the headstock.
 - Remove the feed stop handle (35), serrated washers (36), and washer (37) from the back end of the pinion shaft (43). Pull the quill pinion shaft, along with the quill spring (40) and spring cover (39) out of the headstock from the back. A spherical washer (53) may drop down into the motor pan (128) as you do this. Be sure to retrieve it. Also remove the quill feed sleeve (74) from the front of the headstock.
 - Make a drawing of the back of the switch (130) and note which colored wires attach to the switch leads. Detach the wires from the back of the switch. In older Mark Vs with a toggle switch, you can simply remove the barrel nut that holds the switch in the headstock and retract the switch inside the headstock – you don't have to detach the wires.
 - Remove the five screws (97) that hold the motor pan (128) to the headstock. Drop the motor (121) and the pan, along with the power cord (126).
 - Remove the control sheave (110), idler sheave (109), idler shaft (110) and upper belt (55) that are still inside the headstock.
 - Remove the four screws (129) that hold the motor (121) in the pan (128). Do *not* detach the wiring or remove the power cord (126) at this time. You simply want to loosen the motor in the pan so you can clean under it and inspect the surface of the pan.

Cleaning

Each part will be covered with its own special mixture of corrosion and grime. Generally, you will be dealing with four different types of gunk that you want to remove.

- **Sawdust and sawdust mixed with oil** – Loosen impacted sawdust with a soft brass wire brush or a stiff bristle brush. (Do *not* use a steel wire brush; it may scratch some parts.) Blow away the sawdust with compressed air or brush it away with a bench brush.
- **Grease and evaporated oil** – Dissolve grease and oil with mineral sprits. For small parts, it helps to partly fill a plastic container with sprits and immerse them. Larger parts will have to be wiped with a spirit-soaked rag. If the grime is particularly stubborn, scrub with a brass wire brush or a bristle brush.
- **Corrosion** – The aluminum parts and some others will have a thin layer of metal oxide covering them. Remove this with green Scotchbrite™, followed by 600-grit wet-dry sandpaper, and 1800-grit crocus cloth (available at automotive stores) to restore the surface and create a shine. If the corroded layer is particularly stubborn, remove it with a powered rotary brass wire brush (attached to a hand-held drill), followed by Scotchbrite, wet-dry sandpaper, and crocus cloth. You may not want to actually shine all the parts, but any part that has a sliding or pivoting surface (such as the motor shaft or the idler shaft) will benefit from a polish, and the lock handle, logo cover, and speed control will look better.

- **Rust** – Wherever there is steel or iron, it may have rusted. The bulk of the rust can be wiped away with several common chemicals such as Naval Jelly. Attack the rust stain that's left just as you would stubborn corrosion – rotary brass wire brush, follow by Scotchbrite, wet-dry sandpaper, and crocus cloth. In some cases, such as the inside of the motor pan, you may want to coat the surface with a durable metal lacquer or paint to prevent the rust from returning.

Inspection

As you clean, you will have an opportunity to closely examine each part and assembly. Some parts will simply need cleaning and lubrication to be restored to working order, others will be so damaged or worn that they must be replaced. Make the decisions whether to keep or replace the parts as you inspect them. Here's what to look for:

- **Dry or worn bearings** – The bearing is difficult to turn, makes a noise when you turn it, or the inside race seems loose and won't stay centered. These symptoms indicate the bearing is beyond saving and must be replaced.
- **Damaged bearing seals** – The bearing seal has been smashed, dented, or penetrated. Even if the bearing seems to operate properly, it will lose its lubrication sooner or later and fail. I recommend that you replace them. If you decide to keep them, keep an eye (and an ear) on them.
- **Pitted and galled surfaces** – Shafts and sleeves that have been badly rusted may be pitted after you remove the rust. Those that have been run without sufficient lubrication may be galled (badly scratched). Smooth the pits and galls with a file and polish them with a fine abrasive. Small pits and galls are of little matter. But large ones can easily become worse even if you smooth them. If the damage affects the operation of the part, making the action seem stiff or the fit loose, the part should be replaced.
- **Worn and missing teeth** – If the racks and pinions in the headstock have severely worn teeth or missing teeth they should be replaced. One or two teeth missing from the speed dial won't affect its operation, but several in a row may cause it to stop in one place. You'll have to test it before you can be sure whether or not it needs replacing.
- **Worn or damaged surfaces** – Pay particular attention to the surfaces of the wedge locks that secure the headstock to the way tubes and the surface of the quadrant that faces the control sheave. These see hard use and if their surfaces are badly dented, gouged, or otherwise deformed, they will need replacing.
- **Broken and missing springs** – The tiny springs that press against the speed dial and the speed control handle are very often missing – previous owners forget to replace them when they make a repair. If there was no tension on the quill before you disassembled the headstock, inspect the quill spring. Chances are, it's simply slipped off the rivet that holds it to the pinion shaft. But if it's broken, it will have to be replaced.
- **Worn or cracked belts** – The lower drive belt is 1/2" wide when new. It should be allowed to wear less than 7/16" wide – any less than that and you won't get the proper speeds from the speed changer. If the rubber of the upper or lower belt is cracked or there are chunks missing, replace it.
- **Deteriorating insulation** – If the insulation on the wires is cracked or brittle, they absolutely have to be replaced.

- **Missing or incorrect washers** – Check the illustration and make sure that all the washers are where they should be and that they are the correct washers. A flat washer won't do where the owner's manual drawing specifies a spring, serrated, or spherical washer.
- **Mismatched hardware** – Oftentimes, owners pick screws and bolts the work "well enough" from their own stores when they come up short during an assembly. Over the years, Mark Vs can accumulate an amazing amount of mismatched hardware. I suggest you discard these and invest in stainless steel hardware. This will give you years of trouble-free, corrosion-free service.

