Base and Carriage Reassembly

Base Reassembly (A)

Notice the WAY(upper) tube is 3/4" shorter than the BENCH(lower) tube. This 3/4" difference in length should be the same for any "Mini" or "Shorty" SS which has been cut down in length(width).

Notice the Bench tube is butted up against a stop(rib) in the end casting(Hinge end). Push BOTH Bench tubes(the longer ones) up against their stop and tighten the two bolts securely. If you have an older model which did not include the washers under the bolt heads, I recommend you add some.

Push the other end cap(clamp end) onto the other end of the tubes. Notice the tubes are inserted just up to the edge of the casting. Tighten the two bolts securely. See washer recommendation above.

This thread is one of several which illustrate a method for reassembling a Mark V. Please post a reply and inform me of any errors or confusion. They WILL be fixed!

From billmayo
I go for around 20 ft pds of torque on the bench tube clamp bolts. I would set 25 ft pds as the maximum torque on the 3/8" bolts to use. If no torque wrench, then flatten the lock washer and just very little extra will hold nicely.

Base Reassembly (B)

Notice the possible problem with tightening the WAY tube set screws on the end casting with the hinge. This is perhaps the reason they were loose when I picked it up! The hinge pin needs to be cleaned up anyway! We will resume 'reassembly' in the next pix. Hinge pin etc. will be reassembled later(I need to clean it up!).

This pix shows the bore into which the way tubes are inserted into the hinge end casting. Notice the definite stop at the bottom.

Position the set screws in BOTH way tube bores so as to be just short of protruding into the bore. Notice the set screw has a serrated cup end!

Put both WAY tubes into the end casting and securely tighten the set screws. Notice the end casting has been separated from the lower portion.(the hinge pin has been removed. It IS easier to reassemble this way!

Base Reassembly (C) Hinge Pin

The Hinge Pin (and retaining roll pin). Make sure BOTH ends of the roll pin are tapered(Not mushroomed by previous attempts to insert/remove it). File end if necessary.

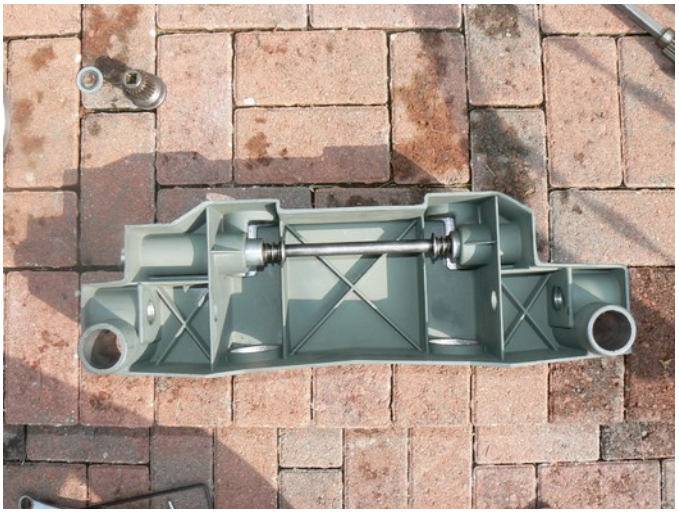
Insert the hinge pin through the lower part of the end casting and into the way tube end. When near totally inserted, rotate the pin so the hole in the pin will line up with the hole in the casting when inserted further.

Start the roll pin into the hinge pin hole through the hole in the end casting. Before pushing it in all the way, make sure(again) the end of the roll pin is still tapered(not mushroomed). Clean it up with a file if necessary before inserting it further.

Drive the end of the roll pin slightly into the end casting hole. This will allow easier removal if you need to later. The pin is removed by driving it ALL the way in and through a hole on the OTHER side of the hinge pin bore.

Carriage Reassembly(A)

Before starting the carriage reassembly, I recommend ONE DROP of oil on each end of the hinge pin.

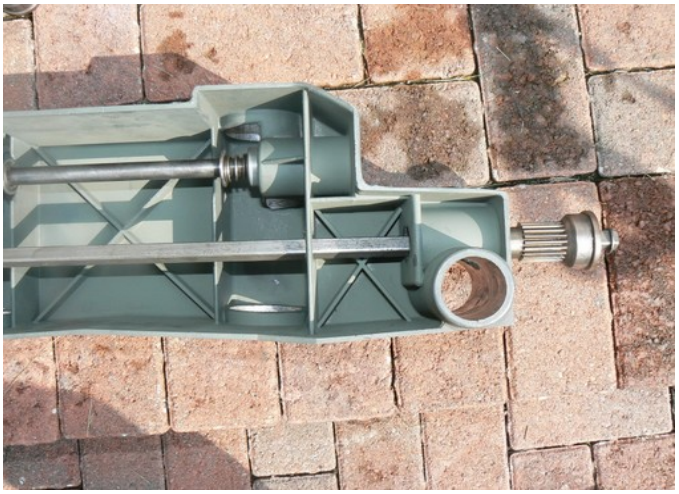


This shows the Carriage Lock Shaft etc. You probably will not disassemble it either! If you do be careful with the SPRINGS which will be under tension(both taking apart and putting together). Dry lubricant is IMHO a good thing to use on the parts which rotate. It WILL be a saw dust collector!

The assembly is simply inserted into one end and on through the holes in the other side. Make sure you start from the correct side! The correct side is the one with 'longer distance'. In the pix it is inserted into the left side. Notice the handle ends up on the left side. The 'other' end goes first.

Carriage Reassembly(B)

This shows the sequence the various parts go onto the square shaft which controls the height of the main table. All parts are inserted from the threaded end(on the left in the pix). Notice the orientation of the pinion gears(the bell shaped ends point OUT). Notice the ADDITION of an extra washer between the pinion gear on the left and the crank. I think that is a good idea.



The 'right' pinion gear is inserted onto the square shaft(fat end first). These are inserted into the bore on the back side(right in the pix) of the carriage and on through the bore on the front side(left side in the pix).

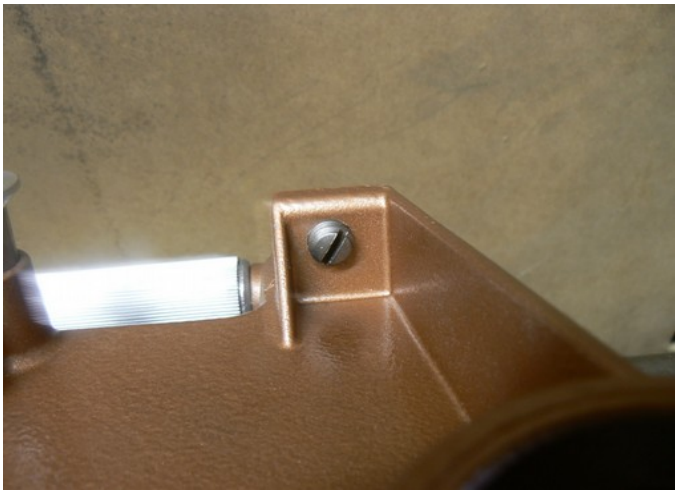
The second pinion gear(narrow end first), 'Extra' washer, the crank handle, the 'original' washer and the wing nut are placed onto the square shaft in that order. Snug the wingnut.

Rotate the Carriage Lock handle to its 'unlocked position'(up in the pix). Notice the clamp flat surfaces are up which will allow easy insertion of the carriage onto the way tubes. Reposition the lock shaft to this position WHEN putting the carriage onto the way tubes(NOT YET!).

Level Way tubes(A)

Level the bench tubes (both ends). This establishes a reference for adjusting the way tube stop. Shim the tubes if necessary.

Notice the stop for the way tubes in the tie bar. Insert the tie bar over both waytubes all the way to the stop. Do Not tighten the set screws at this time.



This shows the way tube leveling screw. You must access it from below while watching a level on the top(next thread).

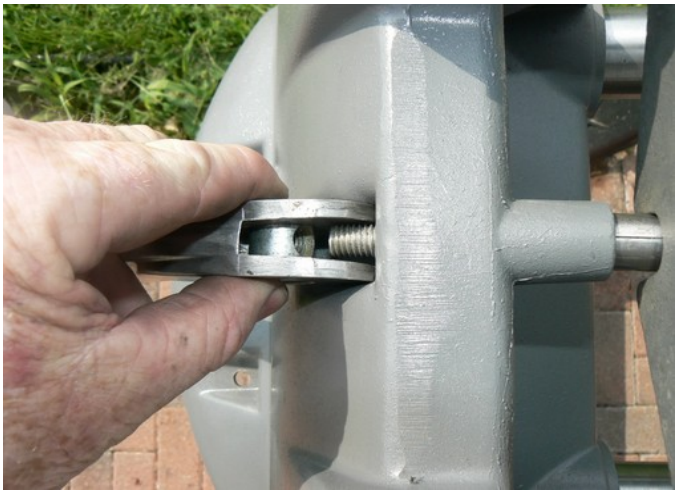
This pix shows the screw on an older mark 5.

Thanks to judaspre1982 for the following: Even older Mark 5's(pre 1955) did NOT have the adjusting screw and required you to file the casting!

Level Way tubes(B)

While watching the level from above,(adjust the leveling screw from below). If necessary, push down on the tie bar so both sides bottom against the end casting and leveling screw.

This shows the parts of the upper way tube lock and their order of assembly. Slide the two sleeves(one inside the other) and the spring over the end of the lock 'bolt'.



While holding the lock handle and cylindrically shaped 'nut' as shown, push the bolt into the nut and run it into the nut. Open and close the lock handle and adjust the bolt until the lock just bottoms out into the socket on the tie bar. Add 1/4 turn tighter. IMHO That is enough. Any tighter stresses the lock cam(handle).

While doing so, notice any motion of the tie bar either up & down or side to side. If up/down motion is observed, loosen the two tie bar set screws and allow the tie bar to 'float' while setting the lock. If side to side motion is observed, loosen both set screws in the OTHER end of the way tube and allow the tubes to 'float' while setting the lock. With the lock 'set', tighten the set screws just loosened. Securely tighten the 'other end' set screws. Snug the tie bar set screws.

Recheck the level. The tubes both bench and way should be level at both ends (4 locations). Readjust the lock bolt to just bottom plus 1/4 turn. Notice any movement of the tie bar when locking and repeat the steps above to eliminate it. It is this alignment of the four tubes which provides the rigidity of the base and non varying alignment end to end.

The whole purpose of all this 'leveling' is to align the way tubes so that they are not 'twisted'. We start with the bench tubes to make sure THEY are not twisted. If they were twisted when sitting on flat(not necessarily level) surface the adjustment to the way tubes would also be compensating for bench tube variation. The procedure included the leveling of the bench tubes by shimming.(If it is not there, it will be!)(I intended for it TO be!).

What we are trying to establish is that the plane defined by the bench tubes is parallel to a similar plane defined by the way tubes(parallel from 'front to back', not necessarily from end to end). Thus the 'height' MAY vary from end to end, but NOT front to back(infeed to outfeed). We want the headstock and carriage to always be coplaner with each other regardless of their relative positions along the way tubes. If the tubes were 'twisted', the head stock would be slanted more at the left end than the table at the right end.

At this point, the 'legs' have yet to be attached! the leveling is done strictly between tubes to tubes. We level the bench tubes so as to use the spirit level on the way tubes. If I had a Wixey or a Beall or any digital +-0.1° level device we could merely set them to the same angle. They DO need to be the same angle on both ends or a twist would be indicated.

Since there is no (reasonable) way to adjust the legs, the setting of all this without the legs is adequate. If doing it WITH the legs attached, the first step would to level the bench tubes by shimming the legs!

Surprisingly the tubes were in pretty decent shape when I picked this animal up. I cannot say that for most everything else. I believe the original owner took VERY GOOD care of it, but the last previous owner did NOT. FYI the speed would increase VERY slowly from slow to fast. The motor(floating) sheave would slide on the

motor shaft VERY reluctantly. You would not believe the 'crud' on that shaft. Considerable force was required to remove the pulley from the motor shaft. I realized this when I picked it up and he insisted I 'try it out'. I am not sure, but I do not think he realized it was NOT responding 'normally'. After 'trying it out" I expected to find 'stickey' sheaves.

I did overnight the tubes in evaporust and then a light 'polishing'. Again I was more concerned with the rust inside the tube than the outside(the insides are NOT plated like the outside). The bench tubes did have a bit of very light rust 'spots'. These later plated tubes do NOT polish up as nice as the non plated 10E/R tubes. These plated ones like to retain the scratches from courser abrading.

P.S. The BENCH tube leveling was done in the previous thread of this 'sequence'. "Level Way tubes(A)."

from billmayo
However having parallelism with the way tubes still allows bent way tubes and can make table alignment a bear of a job if even possible some of the times. I am finding over 50% of the way tubes that I have have cleaned and polished have been bent at different points on the way tubes. The way tubes with a more severe bend are cut into SHORTY and MINI way tubes. I can only guess as to why the way tubes get bent in various degrees and at different places.

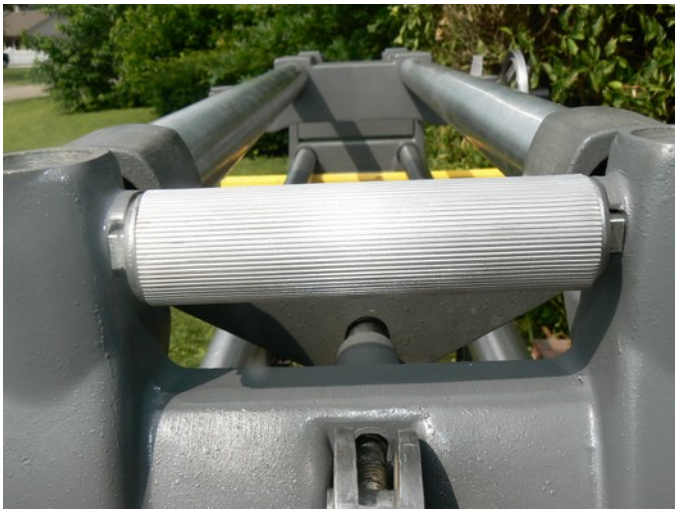
I find that marking the high point on each bent bench tube (not very many found) and by placing the mark on the outside (3:00 & 9:00) of the frame, I am able to reuse all the bench tubes.

I collect all the 10E/10ER way tubes (heavy ones, without shipping) I can find as I have not found a single bend tube among them. They clean up much better than the Mark V tubes and helps stabilize any operation where the way tubes can flex.

I would believe any new way tubes, PowerPro or as replacements would come from the same parts bin or supplier. It can depend on how much precision/accuracy you want from your Shopsmith and your work product. I recommend checking what you have currently before buying any replacement parts. If your table alignments are within Shopsmiths and/or your specifications, then I would not be concerned about the way tubes or frame alignments.

I used a Shopsmith frame for years that fell off the back of a pickup before replacing the way tubes. The headstock would only slide about 12" at one end before binding tight. I tried rotating one or both way tubes several times without any success. I got the way tubes to where the carriage would still slide so the headstock stayed at that end. This met my requirements at that time.

SPT Clamp



The SPT clamps have a right hand thread bolt in one end and a left handed bolt in the other. Screw them both all the way into the clamp handle. Back them out about 1 1/2 turn each(6 flats each). With the left hand thread on the left, slide it into the slots on the casting.

Rotate the handles(pull up on the outside) 2 to 3 turns. This pix shows the handle clamping onto SPT mounting tubes. When installed properly, the ends of the two screws will tighten against BOTH spt tubes and still NOT have either handle end press against the casting. The casting thickness is not always the same so the handle may not be centered when tight.

Install the clamp on the other end the SAME way(LH thread to the left again). If you want the clamping action to be when rotated down, reverse the handles end to end(pulling up on the outside will loosen etc.).

Reattaching Legs

The legs are secured to the end castings with 5 bolts, internal tooth lock washer and nut.

Older Models have oval head/counter sink bolts and nut only. IMHO the lock washers are a good thing to ADD!

An easy way to install the legs is to put the SS on horses and turn it upside down. The legs tend to be wider at the inside(open) end at the 'top' which attaches to the end casting.

Squeeze the 'wider' part so as to fit into the end casting. Put one end(Curved closed end OR open end) into the end casting and rock the other end into the casting.

The pix above shows the internal tooth lock washer. Even though the teeth do NOT lock against a flat surface, they DO grab the sides of the slots for the bolts. While tightening the bolts/nuts, push down so as to seat the legs into the end casting. They will want to drift to that position, so put them there to begin with and they won't move.
Note: if you have casters, it is the time to install the casters while it is still on the saw horses. You might have to clamps the casters to the legs to got them mounted.

Keep in mind the sequence of events here!

The HEADSTOCK(with heavy motor) has NOT YET been attached.

FWIW, the setup instructions which came with this 'unit' in 1986 has you attaching the extension table at the left end spt mount, attaching the main table with the carriage at the other end, raising them level ABOVE the top of the headstock and rolling it upside down so it rests on the tables. All that to position it so as to attach the legs.

If unpacking/assembly instructions came with my 1963 Goldie, then I have lost them. My recollection is that it was fully assembled when I got it, but then that WAS 45 years ago! I did not then have a way to transport it so I assume Montgomery Wards delivered it!

The reason for inverting it is so you can put the bolts/washers/nuts together without either crawling on the floor or standing on your head (bi-focals are not compatible with that option) or feeling your way without 'looking' at what you are doing. I have done ALL of the above - inverted IS easiest!