Mark VII Carriage Reassembly

Starting with the carriage lock parts.

On the front end, the washer, spring, wedge, cam, collar followed by the handle. Note the collar orientation. The 'anti-rotation' hole will face the casting, not the handle. Yes I did it wrong the first time! Note also the cam orientation. The camming end faces the handle. Finally the wedge small end faces inward.

A 'secret' that helps align the holes for the tension pin. All that stuff is under spring tension.

The handle will index to the cam in two positions. The collar anti-rotation hole will be at the top, so the handle 'top' must face the same.

Finally the rear washer, spring, wedge, added washer and locknut. I added the washer since the nut had worn into the softer wedge. Wedge small end again facing in.

The collar is registered to a tension pin in the carriage. This pin will hold the entire carriage lock mechanism in place when the way tubes are not present.
It must be forced onto the pin. Applying pressure to the locknut at the rear will force the collar off the pin (locknut need not be removed first).

Ready to lock to the way tubes.

All the table height control stuff.

The axle is inserted through the pinion with the retaining clip end outboard and the pinion large end facing outward.

The axle projects through the front and the other pinion again with the wide end facing outwards.

The crank slips on after a washer. This washer is too big(id) and I will be replacing it with a better fitting one.

A washer next.

Followed by the lock knob.

I decided to place the spacing rod jam nut on the inside of the casting. he nut has a 'good' side with a flat ring shaped surface that should face the casting.

Carriage complete!

Mark VII Rip Fence Reassembly

After penetrol over nite drying of the actuating rod, I waxed/cleaned off the areas where stuff needs to slide, and inserted the tension pin and connected the rod to the handle.

I like to apply in line force slowly, hence the vise.

Moving to the back end, I started the pin into one side.

Then positioned the rear clamp onto the pin and again squeezed the pin into place.

This shows the parts sequence on the front end of the rod. The large washer was not oem. I believe a po rightfully
* changed it to this one with a larger od. The handle/clamp was worn by pressing against a smaller washer. The next washer has a large id that allows the sleeve to penetrate it.(the washer slips over the sleeve) The washer on the inside end of the sleeve must be inserted after the sleeve is inserted into the bore in the fence.

The front clamp is retained/pivots on a tension pin. The rounded(convex) fingers face the washer at the inner end of the sleeve.

After trying to fit the fence onto the table(s), it became apparent all was **not** well. The large hole washer was causing the front clamp to not **clamp** fully. The sleeve was **not** being pushed in enough to pivot the clamp closed.

This is the latest set of parts.

The thick outer washer is still a good alteration(wear to the clamp cam surface). The extra thickness can be compensated by rear adjustment nut.

The clamp is not releasing fully to clear the front rail, but by either pulling on the clamp handle or pulling on the rear clamp(moves the rod) the clamp allows fence insertion or removal. Not sure if this is 'normal/typical' but I do not see a good way to increase the sleeve travel(the sleeve moves the clamp pivot).

The long front spring with a washer at each end is positioned so the rod can be inserted through them. The spring must be compressed slightly to get it and the rear washer inside the web.

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A similar arrangement at the rear clamp, but a much shorter and stiffer spring. I decided to add the washer between the rear end of the spring and the clamp. The clamp has a camming profile with a high point at the rod hole. All this added difficulty in getting these parts aligned. Once aligned, the rod slipped through them all. The spring being slightly bent did not help any!:(

The rear clamp is u shaped so that a sleeve is necessary(see next pix).

After slipping the sleeve onto the rod, the adjusting nut is screwed on.

After posting these pix I noticed one of the flat washers was 'thinner' than the other three. Next time I take the rod loose, I will relocate that 'odd' washer to the rear end of the back spring.

The jam nut goes on last. This will be adjusted later.

The bias screw hole threads are chased.

The bias screws inserted just flush with the outside end so as to not interfere wiuth the table rail.

The casting is secured with two screws and washers. The inner screw is longer than the outer screw. Blade alignment will be done later.

The mortising hold down shaft set screw is added last.

Three 'overviews'.

Mark VII Table Reassembly

The Mark VII differs from the Mark 5/V in that the extension table will also slip into bores under the main table and thus also extend the width of the main table. More about that later.

Starting with some simple(and familiar) things, the tilt scale and detent pin are attached first.

The longer screw also acts as a retainer for the detent pin. The screw passes through the cutout portion of the detent pin. Since these are self tapping screws, care must be taken to insure they are fitting into the original threads.

The scale is to be adjusted later.

When the trunion clamp screws were removed, both(front and rear) screws were bent. I believe a PO's attempt to secure the screws by peening them caused the bend. The screw in the hole verifies to me the need for them to be straight. The screw remains centered in the segment slot at all angles of 'tilt'. The Mark VII has both a front and a rear trunion clamp. They are identical. This is the rear clamp and does not have a tilt angle index.

Not as obvious in this pix as I had hoped, but the screw is bent at the inner end on the threads to the left(the end that screws into the trunion). I spent way too much time mulling over how to straighten them. I was concerned re thread damage. In the end, I placed the course end into a large vise, ran a nut onto the fine thread end, and whacked the nut with a wooden mallet. The screw is actually a square bar stock with threads cut into the four corners. So the vise clamped onto the flat part and no thread damage occurred. Not perfectly straight, but much improved and 'good nuf'.

The boss that the rear of the trunion segment presses against has wear and more staking by a PO. I want to 'overcome' both problems.

First thought was to add a washer, but it's thickness leads to requiring further alterations/spacers.

So a thin mylar washer was 'created' from a sheet.

The screw was secured with blue locktite.

The remaining washer, nut, lever and retaining collar are added to the screw. I neglected to take a pix at this point, but I did use blue locktite on the threaded stop collar.

The same steps were taken to assemble the rear trunion lock. The Mark VII requires manual locking of both segments separately(not as convenient as a 505...520).

This pix was taken later, but it shows the blue locktite applied to the stop collar threads.

The table tilt lock stop collar should not be screwed down flush with the end of the screw. It should provide more clamp in/out clearance as shown here.

Now for some more challenging 'fun'. I heated the trunion to get the posts removed, but I did not want to torch the new paint, so I chilled the posts in the freezer for several hours. The first attempt went smoothly until I attempted to line up the trunion and post holes. At that point I discovered that in spite of marking both the posts and the trunion, that I had inserted the wrong post. So the torch was again used to heat the trunion for 'post removal' again. This explains the scarring of the paint. This shows the 'correct' post being inserted.

This time the holes were more cooperative, but needed tweaking.

A pointed awl and mallet provided the necessary persuasion.

This looks better.

The trunion holes are slightly larger than the post holes. The pins are a tight fit into the post holes. The pins are swaged to provide a wedge fit into the larger trunion holes. There are two pins per post on opposite sides.

After starting the pins on both sides, I used a small vise to squeeze them in place. The span of the pins required me to use the inset at the top of the jaws.

Then the vise was moved to allow fully seating the pins.

The two tilt stop screws(90 and one 45) were installed. The 45 will be difficult to adjust with the table on the trunion, but I prefer the non slotted end of the screw pressing against the stop pin. These screws are 'nylock' impregnated so adjusting them requires considerable torque. As such they should not move on their own! Looks like I need to touch up some paint scaring.

On to mounting the fence rail extrusion to the front of the main table. Three screws and split washers just like a Mark 5/V. The rail was pushed tight against the front edge of the table.

A short rail is mounted to the extension table.

And another to the second 'front'. This second front is used when the extension table is mounted in the spt mount like other models. Again they are pressed tight against the 'front' edge of the extension table.

The trunion has slotted holes for the screws and thick washers that secure the table. For starters I centered them over the holes.

Ditto for the rear segment. This arrangement adds a step to table alignment. In addition to positioning the table on the trunions for blade alignment, each trunion must be positioned so as to align the pivots so smooth bindless tilting occurs.

This pix shows the extension table tight against what is normally the right side of the main table. Notice the extension table tubes extend past the 'normal' blade opening. This justifies the secondary blade slot. Later pix will show the extension table pulled away from the main table. Notice the small holes where the extension table tubes are inserted. Those 1/4-20 tapped holes are for securing the extension table. I will probably use 520 rail/tube knobs there.

Musta done something right since it fits into the Goldie carriage. The Mark VII post gear teeth are on the opposite side so we are looking at the rear of the Mark VII table.

The table tilt lock stop collar should not be screwed down flush with the end of the screw. It should provide more clamp in/out clearance as shown here.

Nothing new here! Insert identical to Mark 5/V 500.

The table width becomes 24" with the extension table pulled out.

The table depth is 21 ".

The gap when the extension table is pulled out.

A comparison of the rip fence lengths. Mark 5/V 500 on top, Mark VII in the center and a 510 fence in front. Small, medium and large so to speak.

Mark VII Tail Stock, Tool Rest Reassembly

These items are quite simple so I have lumped them into one thread.

The tail stock stop collars are attached.

The dimple caused by the set screw pressing against the eccentric was JB Weld filled and filed down.

A 3/8" wide strip of sheet metal was formed to a ring to slip over the area of the eccentric that the set screw presses against. This could be up to 18 Ga thick(this one is thinner). I believe this will serve as a sacrificial lamb rather than future dimpling of the eccentric. There really is room in the casting for the 'ring'.

All put together and ready to 'turn'.

The post is inserted into the tool rest arm and secured with the set screw. No Rob someone else added the 'knurl' marks:eek: before I acquired it.

Mark VII Miter Gauge Reassembly

A few differences from a Mark 5/V as will be shown.

A couple obvious ones here are the segment lock(no knob) and no t slot washer etc.

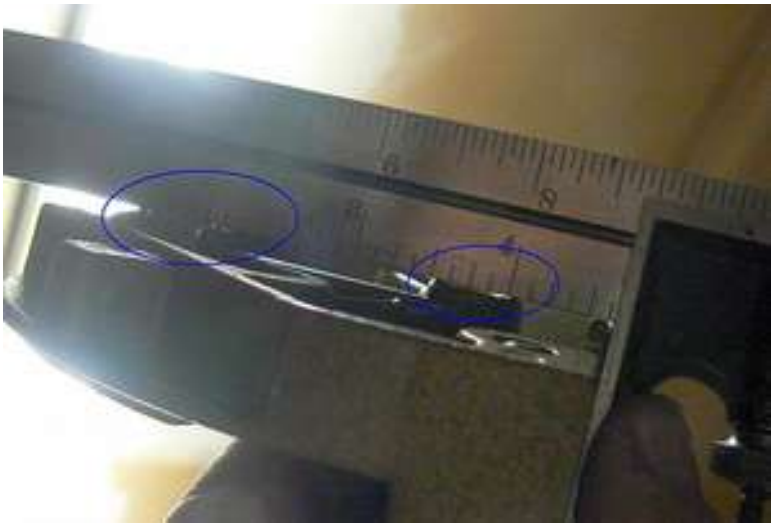
Less obvious is the 'feet'. The Mark VII has small nylon headless screws that ride against the table top. They are slotted on the top end and are adjusted from the top. Same as Mark 5 and early Mark V.

The 'feet' peek out from the bottom.

May not be OEM, but it works. I will show 'how' in the next post. I prefer set screws for this and will not be using the wing 'screw'.

The thumb screw is long enough so that it extends down to the miter gauge stop rod holes.

An 'alternate' screw. I do not like either one. I prefer 5/16-18 flat ended set screws that use the SS tool kit. They are accessed from above. They must be removed to adjust the feet, but that is seldom needed and the set screws are easily removed.



One area of consternation with newer miter gauges is the two thicknesses of 'shim' washers. The pivot boss and segment clamping area are not at a different height, so the shims are the same thickness on the Mark VII.

As received, there were 'extra' parts. There were two cupped or spring washers. I decided to try the 'weaker' one first. There was never a need to try the other one.

The segment clamp parts sequence starts with the thin shim washer between the bar and the segment and two flat washers separated by the spring washer on top of which the clamp cams against. A stud connected to the clamp screws into the bar. The clamp 'tightness' is affected by the distance the stud is screwed into the bar. That adjustment needs to be done before adding the safety grip etc.

The pivot has a shim washer between the pivot boss and the bar. A flat head screw secures the segment to the bar. The screw has nylon(?) embeded in the threads which allows tightening the screw and then backing it off until the segment pivots freely.

The clamp cam in the loose position('wings' raised).

And in the clamped position('wings' lowered). Notice the compressed spring washer between the two flat washers.(focus is better).

The angle stop pin mounting block is secured with two screws.

The clamp stud extends below the bottom of the bar, but the table slots are deeper in the center, so it does not drag. The stop screws will be adjusted later.

All the pix in this post are the same as the earlier safety grip.

Clamp rod and nuts.

Simple enough! Notice the nut orientation.

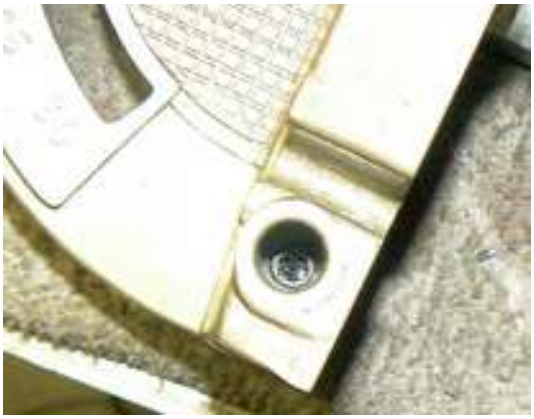
So is this, but assembly can be trying! Using a table vise and drift pin punch makes it easier. Notice how the parts nest. Squeeze handle in the groove, pivot plate in the notch and spring on the nubbin of the pivot plate and spring in the 'box'.

Not shown in the pix, is the mounting post which fits into the area under the pivot plate screw. The relief cut into the post sets on the narrow area of the 'hole'. The other half of the handle is placed onto the pin punch and meshed with the first half.
By inserting the screw as the assembly is drawn off the pin punch keeps the pivot plate from shifting out of position. The top two screws are tightened.

The mounting post is screwed down into the tapped hole above the pivot screw. The clamp wings must be oriented to straddle the handle. Then the last screw is inserted to secure the handle bottom to the detent pin block. This is a loose fit to the block.

One 'detail' is missing! If you noticed in the middle(third of five) pix, there are three screws of three different lengths. There are supposed to be four! During assembly a shop gremlin stole one of the screws. I believe the longest belongs at the bottom and the shortest belongs in the rear upper hole. If that is incorrect I shall alter this post when I find the gremlin:mad: and get my screw back!:D

As mentioned earlier, I prefer set screws for securing the miter gauge stop rod.



I assume everyone knows how to attach the safety grip clamp arm to the pivot plate so no pix/verbage about that is included.

Hey!!!!! We are done!!!!!:):):):):):):)(except for the missing screw:() P.S. Went back and looked at the disassembly thread. Only three screws there! So the Gremlin was falsely accused!!!!!!!!!!!!

Mark VII Shaper Fence Reassembly

The Mark VII version more closely resembles the current version than the earlier Mark 5 version. It is however a different size.

There are a couple of 'added' parts. More about them later!

The leaf springs are first to be put into place.

The 'micro adjust' knob is placed next.

It is threaded into the fence face bracket. It is easier to do this before the fence is added(bracket turns without detenting and is less like a helicopter rotor).

Next a screw to secure/clamp, but now we consider the 'added' parts and the reason for them.

The original shaper fence design(Mark 5 vintage) included 1/4-20 screws and nuts to clamp the fences. The casting had a square(half) shaped cavity into which a 1/4-20 square nut nested. This allowed adjusting the screw with the SS tool kit only. With the Mark VII redesign(and later Mark V) the 1/4-20 screw was replaced with a 3/16-24 screw(and hole) that has a smaller square nut. the casting was not changed, so the nut has excessive space and will turn partially when the screw is adjusted. Part of the reason for this change I believe was the 'standardization' of socket head screws socket sizes.

I initially set out to acquire some 3/16-24 nuts with the same outer dimension as 1/4-20 nuts, but ended up making the 'new parts' instead. A simple L shaped piece with a 3/16" hole.

The nut is now restrained from rotating as the original larger nut was.

The wooden fence can now be attached. Realize all that has preceded is duplicated for the other side. For you eagle eyed folks, that nut is not on backwards, both sides of that nut are flat.

All that is left is the clamping screws.

And nut plates

A little more to come.

While making the 'new parts', I made a set for my 510 shaper fence. FWIW, the red plastic safety shield will fit the Mark VII version. It would also fit the Mark 5 version except for the larger screws.

Well tis done! I will include a pix showing all three versions after I take it!

Mark VII Lower Tube Reassembly

The mark VII lower tubes(take the place of 'bench' tubes) are actually an assembly since the pair are connected to each other by two 'shafts' that serve as pivots when tilting(both ways). The 'shafts' also have cams and a lever that locks the upper assembly to the base when 'horizontal'.

Like the Mark 5/V casters, there are many identical parts that are assembled 'differently' depending upon where they are located.

I addition to the tubes, there are only 5 different parts including the screws.

The 'shafts' are inserted through holes in the tubes.

The 'cams' are attached to the shafts by a tension pin.

To aid attaching the cams, the tension pins were 'started' into the cams.

Now comes the 'moment of truth'. The cams will attach to the shaft either of two ways. Notice the 'ends' of the cams are different. The tapered 'end' allows the cam to slip into a 'socket/pivot' on the bottom assembly. The 'shafts are not straight, but bent. All that means they could be attached backwards.

A clue is found by looking at the front cams which are attached to the levers. The levers are identical, but have 4 holes for the mounting screws. This allows mounting the cams using either 'pair' of holes. The levers use alternate hole pairs. That still leaves the cams being able to mount to the levers either of two ways(remember the narrow ends).

A clue is found by looking at the front cams which are attached to the levers. The levers are identical, but have 4 holes for the mounting screws. This allows mounting the cams using either 'pair' of holes. The levers use alternate hole pairs. That still leaves the cams being able to mount to the levers either of two ways(remember the narrow ends).

The lever is rotated towards the near end of the tubes to lock the tubes down. Now for the 'final' 'kicker'. The shafts are bent in a 'U' shape so we still have to decide which of two ways to mount each cam. I went back and looked at breakdown pix, but nothing there was decisive. So pondering this I decided the shafts must be so shaped for a reason. Not having anything better to go on, I decided to assume they were 'bent' to increase clearance to the headstock. I am not completely satisfied with that conclusion, since the most clearance occurs at the release position, not the locked down position. Time will tell!

So the back cam was attached so the tapered end matched the front cam.

Similar(but mirror image) assembly for the right end clamp.

This concludes this mental exercise. Only those of us who have struggled with reassembling a caster set will appreciate the mental part of this.

Mark VII upper assembly

First step is to place the lower tubes in the base.

First step is to place the lower tubes in the base.

The tubes are secured by two set screws from the under side of the endcap.

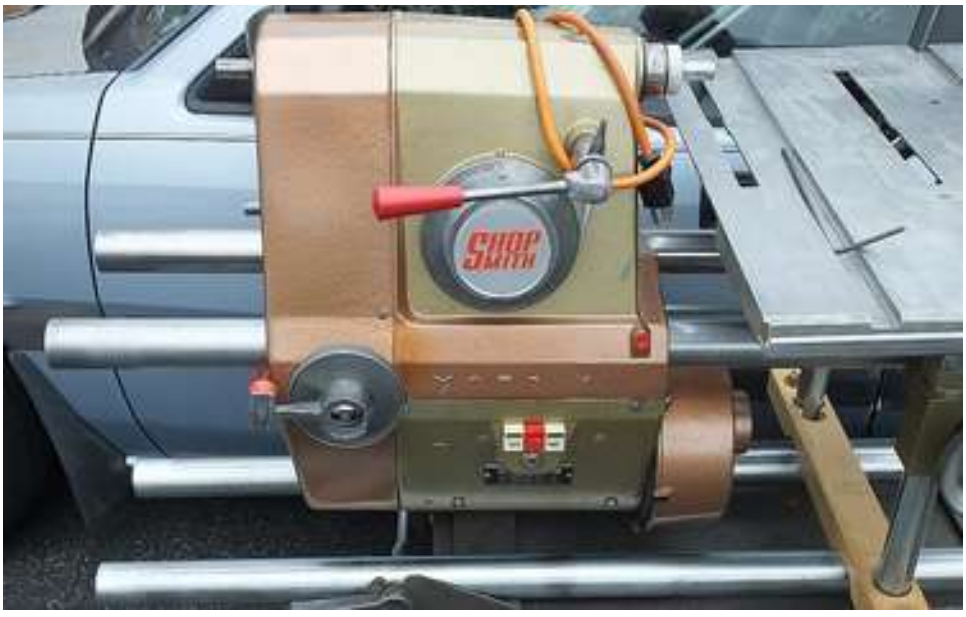
The rear way tube is inserted into the right endcap and secured with a set screw on the top side of the endcap.

Next the carriage is slid onto the rear way tube from the left.

Next the front way tube is inserted through the carriage and into the right endcap. Set screw is tightened after next step.

The way tube must be rotated to center the gear rack in the slot.

The table is inserted into the carriage and the table is 'lowered' against a block so the table posts supports the way tubes.



The headstock is 'slipped' onto the way tubes. This is not easy since that headstock is heavier than a Mark 5/V. Also the gear adds another thing to 'align' in addition to the headstock clamps. Fortunately these are visible from the outboard end.

The headstock rack clearance is checked.

The left endcap goes on next. This proved more difficult than the headstock. All tubes are the same length, so the tubes must line up(all 4 at once).

The endcap is pressed to bottoming out in the endcap bores. the set screws are tightened.

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The endcap is pressed to bottoming out in the endcap bores. the set screws are tightened.

And raised to vertical right(drill press). This thing is really difficult to raise with the headstock all the way to the left(high in drill press position). The headstock is heavier, and the pivot is closer. The table etc' are lower than a Mark 5/V.

Drill press close up.

Raised to vertical left(shaper mode).

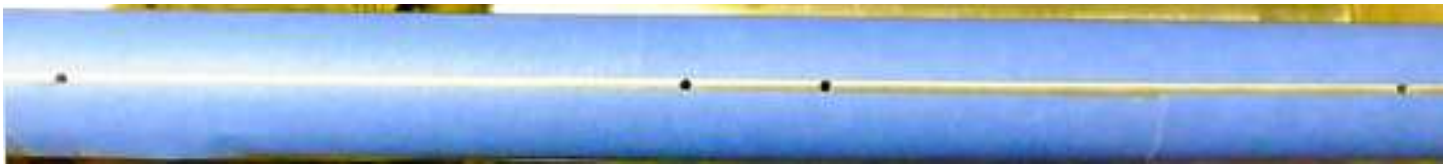
Finally a more 'traditional' setup.

The carriage lock has not yet been adjusted (nor a lot of other things).

Mark VII gear rack

I was fortunate to get my hands on four of these. I am attempting here to describe how to make use of them.

First step is to establish the location of the center for the new holes to be drilled in the way tube. By laying tape against the original rivet holes the center can be approximated.

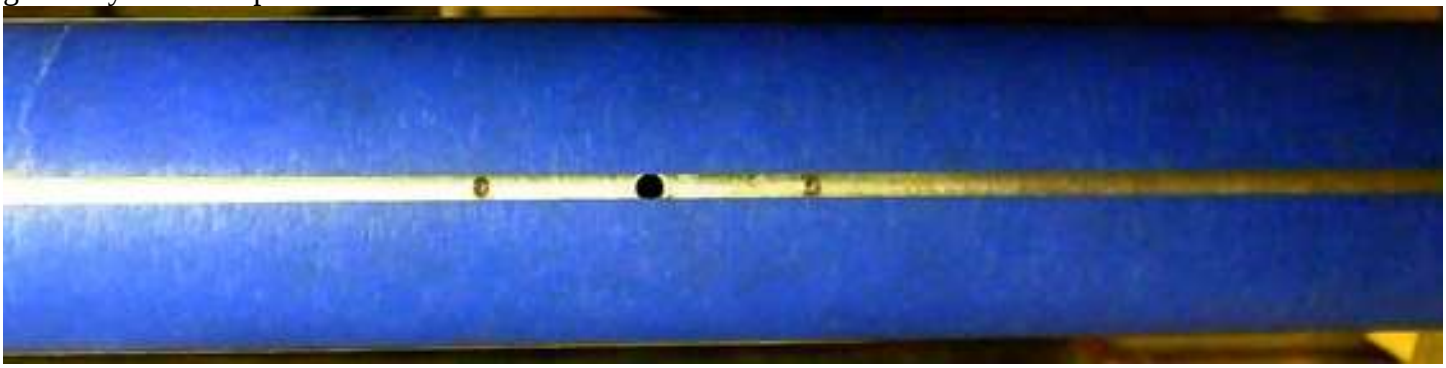


The original rack consisted of two pieces secured by three rivets each. The new rack pieces are half as long and are secured by two rivets each. One end of each new rack piece is to be riveted in the original holes at the end of the original rack pieces. Two new holes need be drilled for a rivet on both sides away from the original center hole to rivet the new rack pieces in place.

So align one new rack piece using a 0.120 drill bit by using one of the end holes securing the original piece. Then mark the location of the other hole centered between the two tape edges.

Repeat for the other 'half'.

You should have a mark on both sides away from the original center rivet hole. Carefully dimple each location with a center punch. Since the way tube is round, care must be exercised to make sure the dimple is properly located. I find that progressively deeper small 'licks' will allow one to shift the location as the dimple is gradually made deeper.

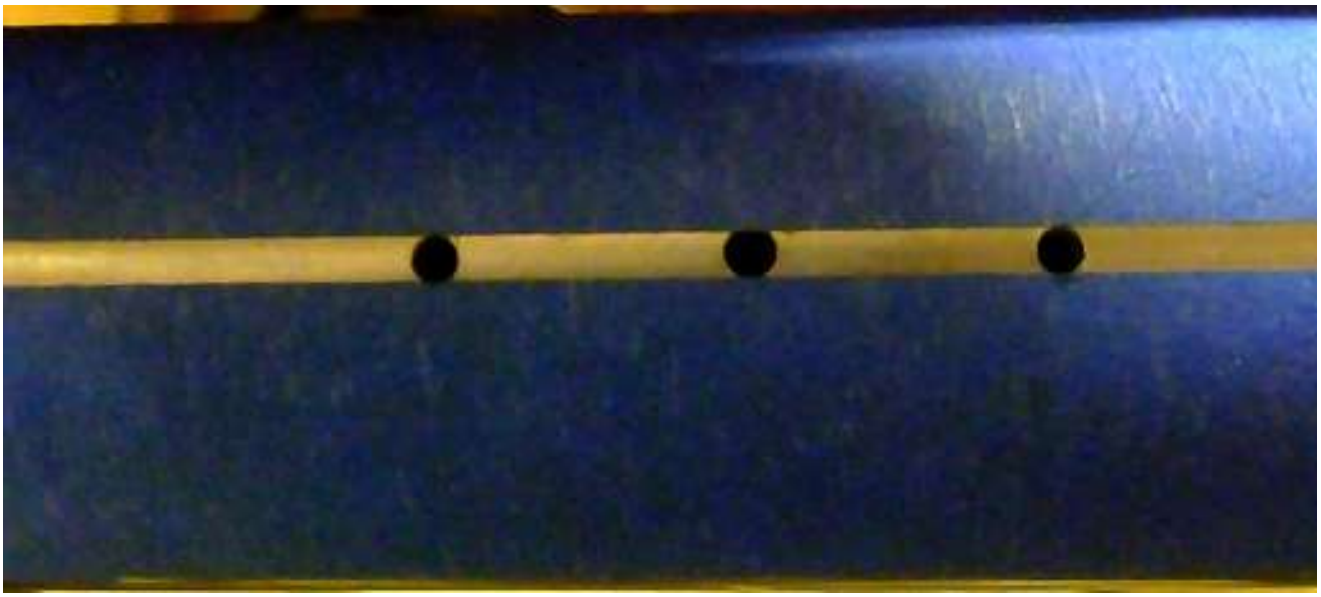


Repeat for the other 'half'.

Now for the dicey part. I located the table top 7/8" below the drill bit center. Then used the rip fence to back up the way tube. I manually positioned the way tube horizontally to place the dimple directly in line with the drill bit. I used the smallest bit the chuck would securely hold to drill a pilot hole. It is quite easy to break a bit unless you hold it all very tightly. I find that clamping does not allow me to make minute position adjustments. The drill bit will let you know the way tube needs tweaking without breaking. A product of much practice.

Repeat with a 1/8" bit. I originally drilled 0.120 holes, but could not locate any pop rivets of the original size(3mm I believe). So eventually the holes were enlarged to 1/8"(manually).

Holes drilled



Repeat (again).

As just mentioned pop rivets like the originals(I have never ever seen them elsewhere). The closest I could locate were supposedly 3mm(also 1/8"????) but measured 0.122" (3.09mm) so I bit the bullet and enlarged the holes. The new rack pieces needed to be enlarged also.

I feel steel rivets are preferable to aluminum ones but that leads to additional procurement issues. I found these at Lowes.

The grip range is a bit excessive, but they were available.

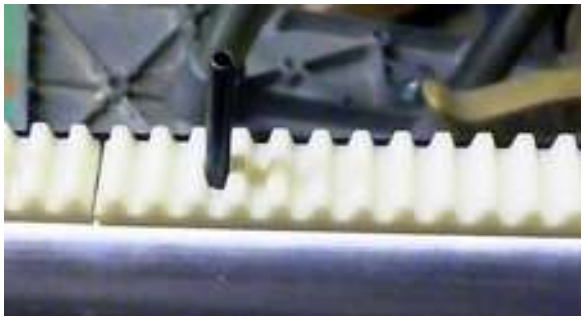
Now for the other shoe. The pop rivet heads are 1/4" od and the new piece holes are 0.200(matches the original(again)). So, they need to be 'resized'(fancy word for filed down). Slow with frequent measuring will get them down to 0.198 to 0.200".

Moving on the the next 'issue' is the rivet head must be recessed into the rack. So a spacer is needed that will fit into the rack 'counterbore' and longer than the bore is deep.

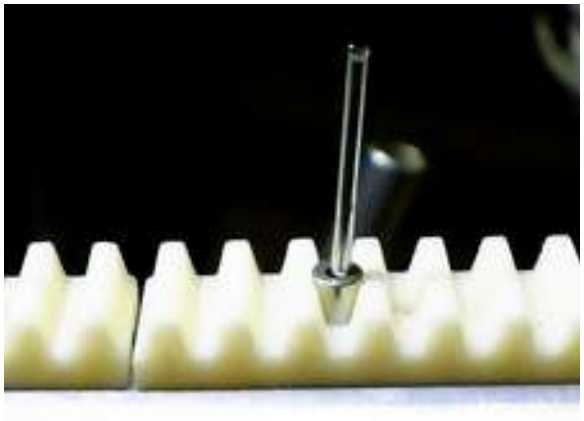
From the miscellaneous jun. . parts jar.

Hokay, we are now ready to actually mount these suckers! [Almost]

I think that seating the pop rivet firmly in that counter bore is cheap insurance to guarantee the pop rivet will not stray as the other end is being 'swaged' by pulling on the center pin. So another trip to the hardware store for a pair(only one needed unless you lose one) of these 'rivet sets'.



Used to tamp the rivet down to the bottom of the bore(in the new rack piece).



And then the spacer. Again use the 'tamping' tool to bottom the spacer onto the rivet head.

FINALLY! It is time to get out the pop rivet tool. I needed two squeezes to break the pin loose(a result of both the added spacer and the parts being less that the 'grip range'(1/4"). It is easier to only set a half pull the first time then go all the way the second pull(the tool gives greater leverage at the end of the pull where greater pulling is needed to break the 'pull pin').

One end done!!!!!

Repeat at the other end.

Repeat (again) . . . 3x.

Okay it should now look like this.

Finally compared to 'an original'.