Mark VII - Another journey begins

Breakdown and reassembly efforts with a Mark VII that I am restoring – original post by JPG

As advertised on E-Bay

Mark VII upper assembly breakdown

Started taking the MVII apart today. This thread documents the disassembly of the upper section that includes the way and lower tubes along with the headstock and table carriage. Since the lower tubes are not strictly 'bench' tubes I will refer to them as the 'lower' tubes. The lower tubes have the dual pivots and 'clamps' attached binding them as a pair.

Tis a bit different since the lower tubes always travel with the way tubes. The table tubes in this case maintain the tube spacing rather than raising the way tubes on one end for headstock removal.

Hmmmmm! Where have I seen way tube retaining screws on top of the end castings before?:rolleyes: There is another set on the bottom of the casting that secures the lower tubes.

After a bit of selective tapping and pulling, the end castings came off.

In this case any of the four tubes can create a jamming situation, so small increments of motion is needed.

Next step was pull the headstock off the end of the way tubes. Doing so created a surprise! One of the way tubes pulled out of the other end casting. Reminds me of the common M5/V loose bench tube problem.

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In addition to the set screw at the opposite end being 'loose', a burr on this end contributed to the 'pull out'.

Solution was to gently remove the burr by filing.

This pix shows the clamp details. The cam is secured to the clamp shaft by a tension(roll) pin. The spring loaded ball provides a lock for the shaft when the tubes are horizontal.

The lever is attached to the cam by a pair of screws.

The tube clamp drops down into this 'socket' and when rotated the tubes are secured to the base. The notch supplies the detent for the spring loaded ball to drop into.

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The round holes in the center of the end castings are for medallions. Both were damaged and were removed for shipping.

Mark VII Trunion Tweak

The table was very hard to move. I worked with it after removing the table and before using it to maintain way/lower tube spacing. The reason for the 'stiffness' was a buildup of crud on the pivot. Probably the result of using grease on the pivot.

First step was to remove the segment clamp post by backing the nut all the way out and applying considerable torque to back out the post threads in the trunion itself. The post was staked, and I will use blue locktite when reassembling. The Mark VII has two separate trunion clamps(a second one at the rear segment).

Not too clear, but the crud buildup caused the stiffness (both pivot posts).

A second problem(also observed by me on other models) was a scraping noise when tilting the table. Closer looks revealed the segment was rubbing on the trunion pad that the segment clamps to. The pad showed rough wear and apparently was also initially painted. I filed the burrs off to create a flatter surface. The scraping diminished, but was still occurring at one end position.

The segment was not perfectly perpendicular to the post so it was closer to the trunion pad at one end of the tilt range. A minimal filing of the segment surface that clamped to the trunion pad eliminated the scraping. The rear segment was also scraping at the same location and was similarly filed.

You can see in the pix above where I filed the area of the segment that the stop(45 degree) screw is located. I then realized that a burr on the trunion pad was causing that. The burr was around the outer periphery of the trunion pad.
Not clearly shown, but the Mark VII differs from other models in that it tilts 90 degrees both ways.

Mark VII headstock initial breakdown

Some of the pix in this thread(and later ones as well) will illustrate differences in the Mark VII from a Mark 5/V.
The motor pan was removed first. It will be detailed in a separate thread.

Then the belt cover screws were removed, but a problem arose immediately.

The headstock lock was 'engaged' and the interference went away.

Well this is certainly 'different'. It is to disengage the drive gear that engages the gear rack on the way tube to allow positioning the headstock sans crank(just like a 'normal' SS).

And here it is on the inside. Notice the end of the shaft has a cam. What that does will be explained later in this thread.

The most noticeable thing here is the larger size of the eccentric(other than those gears - more about them below).

Belt jam inside also. The eccentric can be moved to release it.

This is something not on a Mark 5/V. The latch detents into grooves in the rod extending from the carriage. When latched, the carriage and headstock move together. It also eliminates the need for the way tube headstock/carriage spacer. This is located in the right end(quill end).

.....disengaged.....
.....engaged

There is **only one** headstock lock and it is located at the opposite end(left) from the Mark 5/V. Subsequent tear down reveals a second wedge between the worm gear and the headstock lateral movement crank.

The speed control changed very little near the slow range, and wanted to jam near the fast range. The reason is shown here - badly worn belt.

Now about those gears and the cam on the belt cover. The spur gear(on top) engages the gear rack on the way tube. The bevel gear is manually driven by a crank that also controls the headstock lock.

Notice the pin that is partially pulled down. The pin engages a recess in the spur gear. The cam on the belt cover pushes the plate below the bevel gear as I am doing manually. The cam is located between the lower plate and the bevel gear.

The plate when fully lowered pulls the pin entirely out of the recess in the spur gear thus allowing it to free wheel. The shiney surface in the recess is the shaft, not a pin.

The eccentric in addition to being larger than that on a Mark 5/V appears to be split on the bottom as well. It may be two pieces as indicated by the difference in the distance extending from the bore(or it may be 'broken'). **It is NOT broken. It is ONE piece.**

Well the idler shaft itself looks different. That nut secures the idler shaft and prevents it moving into the headstock. The 'tab' prevents the nut from loosening.

And the headstock end after a bath. Notice the 'crank' on the right. When pulled 'down' and rotated the bevel gear turns. When the red knob is 'flipped up'(as shown), the headstock lock is engaged. The wedge is to the left and presses against the rear way tube.

Inside after a bath.

Outside after a bath. Me thinks the 'cleaner' used resembles grandma's lye soap since it loosened(dissolved) some of the paint.

Inside motor pan(no bath yet!). A difference here is that ALL wiring is contained within the motor pan sub assembly.

Outside motor pan. One of the mysteries is why it says Mark '7' here and Mark VII elsewhere. The three 'buttons' control forward, reverse and stop. The stop must be pressed prior to changing directions and the key switch must be be set to enable either direction. The key switch is actually a mechanical interlock. Rotating the key counter clockwise allows the forward switch(on the left) to be depressed. Rotating the key clockwise allows the reverse switch(on the right) to be depressed. When the key is in the center position(and removable as shown) neither forward or reverse switches can be depressed. Thus to change directions, the stop button must be pushed, the key repositioned and the other direction button pushed.

One last 'difference' is that there are two screws in the quill end of the motor pan. The vacuum housing is in the center.

The motor belt could not be removed from the motor pulley due to close spacing to the pan.

'Solution' was to loosen the pan to motor screws which allowed raising the motor away from the pan.

Mark VII vacuum breakdown

One very distinguishing 'feature' of a Mark VII is the 'vacuum' driven by a shaft from the 'back' end of the motor. This thread describes the disassembly of the vacuum housing etc. from the motor pan.

The vacuum housing is secured to the motor pan end with two large headed screws. This housing is plastic and shows some cracking. After all it is almost a half century old.

The exit port(s) are screwed to the side of the motor pan.

The plastic parts are also held together by these clips.

The impeller is secured to the motor shaft by a castle nut and a cotter pin.

After removing the cotter pin, the castle nut was removed. An external tooth lock washer and flat washer were behind the nut.

After removing the housing and exit ports, the impeller was removed. It was stubborn to pull off the shaft.

Behind the impeller was a flat washer and a retaining ring and a back plate.

Apparently a PO decided the impeller was too loose on the shaft. These explain why the impeller did not easily slide off the shaft.

Mark VII switch interlock lock and motor mount

The power switch is interlocked internally to prevent reversing direction without pressing the stop button. The key lock adds to that interlocking. The key must be in either the forward or reverse direction position in addition to the corresponding switch button being pushed. The lock also prevents any power switch depression when the key is removed. The lock has three positions - forward - off - reverse.

This shows the cam that is moved by the lock. The cam when moved away from the switch button(s) allows that button to be depressed.

The key interlock parts.

This shows the motor mount is different from the Mark 5/V in that one side is screwed to the front of the motor pan and the other side to the bottom of the pan.

Mark VII power switch

The power switch has power on indication. When off, no light.

When running forward, a green light 'lights'.

When running in reverse, an amber light 'lights'.

The pilot lamp is an 'S6' bulb. I found thisun at HD, 2/$2.??.

Wiring side of switch.

Line cord wires attach to lower 'L1'(black) and 'L2'(white) terminals.

For A.O.Smith motor wires connect as follows: (507231)
Black 'L1' (upper)

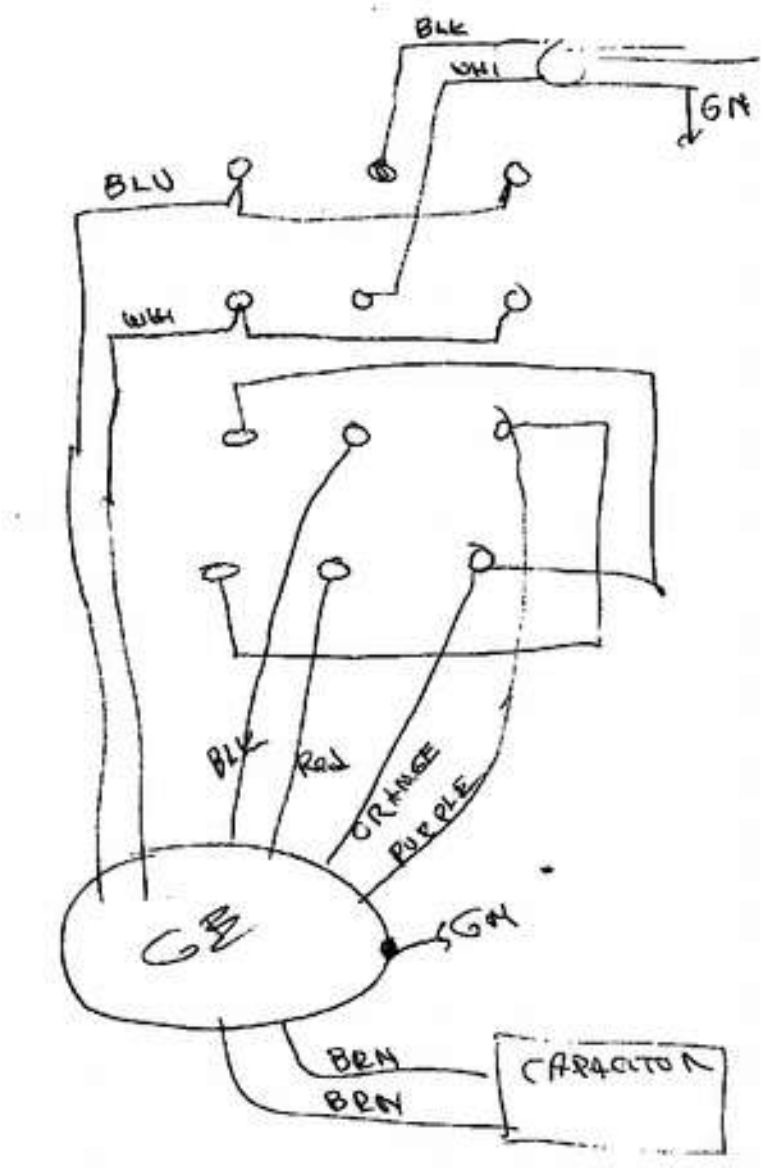
White 'L2' (upper)
Red 'T5'

Red Tracer 'T9'

Yellow '5' The two '5' switch terminals are jumpered.
Black tracer '2' from capacitor
Black tracer from motor to other capacitor terminal

For General Electric motor wires connect as follows: (507232)

Line cord wires as described above to lower L1,L2.
Blue 'L1'
White 'L2'
Red 'T5'
Black 'T9'
Purple '5' The two '5' terminals are jumpered.
Orange '2'



two brown wires(one to each capacitor terminal).

For A.O.Smith motor with an external start relay (501210)
Line cord wires as described above to L1/L2.
Black 'L1'
White 'L2'
Red 'T5'
Red tracer 'T9'
Yellow relay(5) and both '5' switch terminals
Jumper from switch '2' to relay(2)

Black tracer from motor to one capacitor terminal
Black tracer from other capacitor terminal to relay(1)

Mark VII quill breakdown

The Mark VII quill feed and quill are identical to the Mark 5/V except for the shape of the wing nuts.

The quill lock bushing and stop dial are missing from this pix. The bushing is shown in the last pix below. As is typical for quill stops made in the 1950's, the inner serrated keyed washer does NOT have a flat washer between it and the retaining ring.

The quill at the top is a Mark V quill. The lower one is the Mark VII quill.

Apparently a PO installed the lock bushing forcibly with the woodruf key not fully inserted.

The Mark VII is essentially the same as a Mark 5/V, but this quill had a couple of unexpected 'features'.

The knurled collar is 'normal'.

First time I have encountered a broken retaining ring.

Inside is a surprise. A two piece shaft.

I am suspicious of the pedigree of this quill. The shaft is blox that is not typical of that era. The two piece quill shaft. The spline end of the shaft appears to have been cut(PO or SS????). The bearing is different from all other models(10mm width rather than 11mm)

The quill described above was NOT an original Mark VII quill.

The following is of a Mark VII quill purchased on e-bay.

This looks more like I expected. Essentially the same as a Mark 5 of the same vintage. The splined shaft is shorter.

Mark VII speed control breakdown

The Mark VII speed control is almost identical to the Mark 5/v, except for the method in which the control sheave is moved. A single dial is rotated by hand. That in turn rotates a cam which bears against the control sheave. Two 'bullet' detents fall into notches in the back of the dial thus preventing drifting. The control sheave has a cam follower in place of the button/bearing.

The original cam was plastic and is one of the major design flaws. This machine had it's plastic cam replaced with what appears to be an aluminum casting.

the logo needs to be removed from the face of the dial. Those three fingers really really hang on. That explains the outer edges of the logo being chipped off.

The shaft is held captive by a retaining clip and a wave washer.

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The cam is secured to the shaft by a tension pin. I refrained from attempting the remove the pin at this time.

The speed control base is attached to the headstock by the three screws in the 'slots'. At this point I am not sure why the base has such a large positioning range. The 'bullet' (spring loaded detents) can be seen near the top. Perhaps the base positioning range is related to the detents. An additional adjustable stop is located below the 'bullets'. As will be seen later, a stop pin on the back of the 'dial' rides in the inner groove and the adjustable plate provides the stop. I assume the combination of the base positioning and that plate correspond to a Mark 5/V high speed adjustment and dial calibration. Realize the cam and dial are indexed by the tension pin on one end, and the double flat on the other end of the shaft.

Once the base is removed, the cam and shaft become free. That large 'snout' in the earlier pix is the rear of the base.

The back of the dial has the detent notches and near the center the stop pin can be seen.

I initially thought the dial need be removed to make the adjustments, but I think the 'high speed stop' screw is accessible with the dial set to highest speed, and the other three are accessible at the slowest setting as shown in the first pix.

Mark VII Main Shaft breakdown

Removing the shaft was quite difficult. It was essentially glued in place. A PO had punctured the bearing seals and forced grease into them. The grease I believe migrated to the bearing/headstock gap, broke down and hardened there.

After removing both the inner and outer retaining rings I could not get it to move either out or in.

I had to seek advice from the sage in Plant City. I did not have a piece of rebar, but a cut off grounding rod worked well. I was afraid that too much force would crack the headstock - he assured me he had never had one break. He uses a 4# sledge, I used a 2# ball peen hammer.

Thanks Bill!!!!

Free at last! The 'push rod' fit into the quill shaft bore and the force of striking the rod essentially pulled the shaft/bearing rather than pushing the bearing as is typically done. I had NO intention of salvaging the old bearings.

In this pix, a Mark 5/V shaft is on top, but in the following two pix the Mark VII shaft is on top. This shows the shaft disassembled and shows it is ALMOST the same as a Mark 5/V. All the parts are identical except the shaft itself which is longer on each end.

The rear shaft is about 1/4" longer.

As is the quill end.

This is 'premature', since reassembly comes later, but here it is after replacing the bearings and stop rings beside a Mark 5/V shaft assembly.

Mark VII Belt Cover breakdown

The Mark VII has a release lever for the headstock moving crank mounted to it. That allows manually moving the headstock.

It is attached by two screws and tinnerman clips. The access hole is plugged like earlier Mark 5 of this vintage. This was **supposed** to allow oiling the floating sheave without removing belt cover.

The inside-note the tinnerman clips, and the hole plug 'fingers'.

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Notice the 'mount' is tapered to match the belt cover slope.

The knob is cracked.

I will 'seep' some thin CA into the cracks anyway.

Markl VII Idler Shaft breakdown

The Mark VII idler shaft is slightly different from the Mark 5/V. I has a dual bearing similar to the later Mark V and Powerpro. It has a nut securing the shaft to the bearings. The eccentric is larger than the Mark 5/V eccentric.

Once the idler shaft and sheaves are out of the headstock, the various parts separate easily. The sheaves slide off the inner end of the shaft since there is no hair pin clip like the Mark 5/V. This allows the key to be removed. It is retained by a recess in the shaft and an offset in the key just like a Mark 5/V.

The inner end of the bearing/eccentric is 'stopped' by a retaining clip. The outer end is secured by a nut. The shaft is a slip fit in the bearings.

The/a PO liked grease over machine oil. ugh!

The idler sheave balance was achieved by drastic spot drilling(all the way through in some).

The nut is prevented from backing off the shaft by a keyed and tabbed washer that is bent over a flat on the nut. The nut is removed by carefully prying the tab off the nut(limited number times before the tab breaks off)

This pix shows the set screw which resembles the Mark 5/V water pump bearing retainer. It will be shown below that it's function is quite different.

Here is the next puzzle. How to get the bearings out of the eccentric. There is a bearing on both ends. They appear to be stopped internally, so they need to be pulled out each end.

I made a crude bearing extraction tool to push the bearings out of the eccentric from the opposite end. The 'tool' has 4 slits that create 4 fingers with lips that are expanded by driving a gradual taper shank punch into a hole in the center of the 'tool'.

Once the bearing is free of the eccentric, the punch is driven back out from the opposite end(the hole extends from end to end).

The 'tools' used. Two punches and the crude tool(and hammer).

Once both bearings were out, the purpose of the set screw became apparent. The point of the set screw positions and retains an internal spacer that provides an internal stop for both bearings. So bearing removal could have been accomplished by removing the set screw and pressing the bearings and spacer from one end out the opposite end.

Mark VII Headstock Lock & Crank

The Mark VII headstock lock is activated by the same handle/crank as the headstock positioning. When the knob faces out, rotating the crank moves the headstock along the way tubes. When the knob is flipped over and pushed in, the headstock lock wedges clamp the headstock to the way tubes.

Since the shaft has a compressed spring, the first stop is to remove the nut on the end of the shaft.

The nut is a 'castle' nut that can be adjusted for wedge wear, but does not require a jam nut. A washer is under the nut.

This bracket retains the worm gear. The worm gear rotating rotates a counter shaft that has a spur gear that engages a gear rack on the front way tube.

The worm gear is keyed to the headstock lock shaft by a woodruff key.

All the parts in order.

Now a puzzle. How to get to the pivot of the knob to the shaft.

This has a small ding that was preventing it being removed from the shaft.

The pivot is a tension pin that is driven out.

Apart at last.

Last three screws remove the shaft cover.

Mark VII Counter Shaft Breakdown

For lack of a better name, I refer to this shaft as the 'countershaft'. Its purpose is to impart rotation of the headstock positioning gear by way of a worm gear pair. It also has a clutch that allows manual positioning of the headstock.

A ring on the end of the shaft retains the clutch 'plate'.

Removal frees the spring and clutch 'plate'. The plate has two pins that extend through the worm gear and into the spur gear. Moving the plate away from the gears withdraws the pins from the spur gear allowing free wheeling.

The worm gear is also retained by a ring.

Removal of the worm gear reveals the spur gear and the two slots which the clutch plate pins engage.

An additional retaining ring does not actually retain anything. Since it appears the shaft is pressed into the headstock casting. I believe it's purpose is as a stop for that operation.

Mark VII Headstock Misc Breakdown

A few parts remain attached to the headstock.

The tinnerman clips are all too easy to remove.

There are 8(one more than Mark 5/V since two are on the vac blower end).

Last there are the set screws.

The headstock is now completely disassembled. I will be cleaning up all the pieces and prepping for painting etc. I do not intend to document that effort since it is already well covered in other threads. Eventually the base will be 'attacked'.

The Motor will be 'addressed' next.

Mark VII Motor Breakdown

The Mark VII motor is a 1 1/8 hp similar to the Mark 5/V, but it has a double shaft. The extra shaft drives a vacuum impeller etc.

First the cap and spring and floating sheave were removed. I am fortunate to be able to do that by hand(with good retaining ring pliers). The parts are the same as the current Mark V.

Next the start capacitor is removed. The mounting bracket snaps onto depressions in the end of the capacitor etc. The leads are soldered, so I cut the wire going to the motor(there is more than adequate wire length). I will resolder it when putting motor back together.

An interesting 'alteration' by a PO. Not sure this was a wise move, but I will use it 'as is'.

The fan sheave set screw was misplaced. It should have been tightened against the key.

A 'problem' that is common to later versions as well. The spacer has worn INTO the fan sheave which allowed the sheave to rub against the motor end cap. This may have been the result of the set screw misplacement. The spacer sets against the bearing inner race and **should** rotate with the shaft and sheave and bearing.

Next comes removal of the end caps. This shows the 4 screws that pull the two end caps onto the motor shell.

Before removing the end caps, make a mark on the shell and end caps(both ends) so the end caps and shell can be realigned the same later. A simple scratch across the joint will suffice. Just make sure it is 'permanent'.

The screws that hold the end caps on are quite small(but long), but typical and adequate.

Shaft end cap removed. A bit:D of saw dust buildup! Notice the bearing retaining flange that is secured by two screws through the end cap which must be removed to get the end cap off.

The vacuum end cap pulls off easily. More sawdust.

Armature removed. Notice the start switch actuator. The brass weights merely pivot slightly(when shaft rotating), but that causes the ring to move in away from the end of the shaft.

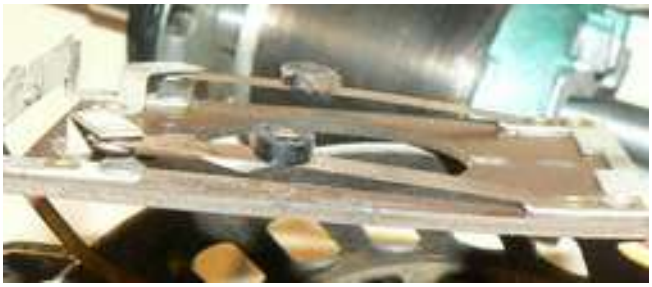
Notice the parts on the 'output' shaft end. There is both an inner and an outer retaining ring. The spacer was between the inner retaining ring and the bearing. Both rings and the spacer need to be moved away so a bearing puller can access the inner race.

The bearing on the vacuum shaft end also has an inner retaining ring and spacer that need to be moved out of the way for the bearing puller. The end cap retains the bearing from the outer end.

The start switch has two contacts in parallel. This helps prevent a dust particle from holding the switch open. The contacts are closed(made) when the actuating ring presses against the two buttons on the contact leaves.

The end cap bearing cavity holds a flat washer and the bearing end play spring.

The switch is secured to the end cap by two screws and a nut on the outside of the end cap. Three washers space the switch board away from the end cap on each screw.



This shows the start switch contacts. The actuator presses the leaves down(in the pix) and close the contacts.

Lower tubes breakdown

I would refer to them as bench tubes, but they do not function as such. They remain part of the 'upper' assembly that includes the way tubes and headstock etc.

There are two tilt locks, one for each 'direction.

The rear end lock cam is retained by a tension pin.

As is the front lock cam that also has the lock handle attached.

The handle is secured to the cam by two screws.

The two lock levers are identical, but have the opposite pair of holes tapped. This is so each locks in opposite directions

One lever had a bit of damage(PO attempted to remove bullet detent?)

Not pretty, but more 'normal'.

Finally all the parts there are ready for cleanup.

Mark VII Carriage Breakdown

The Mark VII does not use a way tube spacer to position the carriage to the headstock(blade to slot etc.), but instead has a notched rod with three indexed positions. Resembles an arrow protruding from the carriage.

The rod is threaded and screws into the outer(bottom in the pix) side of the carriage. The carriage end of the rod is slotted to enable adjusting the stops. A jam nut secures it in position.

The table height lock nut and crank are similar(smaller) to Mark V 505-520.

The pinion gears are the same as all Mark 5 through Mark 7.

Both pinion gears are merely pulled out from the carriage.

The pinion shaft resembles other models and has a c-clip on the rear end.

Now where have I seen a carriage lock similar to this?

First the locking nut must be removed. It is shallow and is not easy to move, so a good socket wrench must be used to 'adjust' or remove it.

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This pix is to remind me how it came apart(so far).

And all the stuff in front disassembled. I do not yet understand the handle/white piece/collar function, but do know the handle steps fit against the white piece steps and the collar nibs go into the white piece slots, and the collar fits over the pin in the carriage. I am guessing the white piece creates a stop to prevent too much pressure to the wedges.* That long tension pin secures the handle to the shaft.

* Nope! The white piece provides a camming surface that squeezes the wedges together. The step is a 'loose' stop.

Mystery nubbin????

Mark VII Main table breakdown

First a tour of the table underside. There are differences that make it unique.

It has two trunions with clamps. This is the rear one.

And this is the front one. Notice the tilt scale range is + - 90.

No surprises here. Just like Mark 5 etc.

The extension table can be attached to the main table. Notice the two set screws. They provide the 90 degree stop adjustment. The extension table tube bores have tapped holes for securing(1/4" -20), but nothing to put into them. I do not know what the original design was(I have misplaced my MVII manuals). The right stop screw is jammed - it obviously was not 'functional'.

And the left side. Notice two more 90 degrees stop set screws.

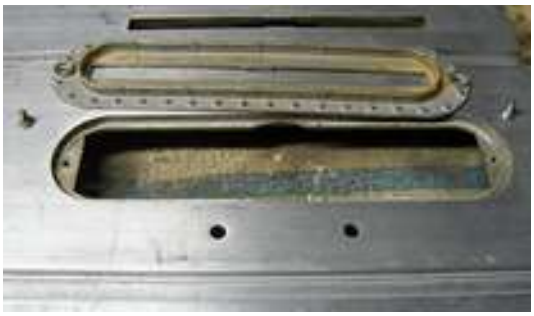
The trunion attaches with 4 screws and 4 thick washers. No shims were there.

The rear trunion (just like a Mark 5). I will use blue loctite rather than additional peening on the wrench retainer.

Front trunion same as rear but scale is unpainted and has the tilt stop adjustment screws. There are only two stops [90 and 45 right]. There is no 45 left tilt stop.

The tilt scale is also just like a Mark 5. I do not understand why, but almost all used tables I have taken apart have a bent stop pin. Not good since the pin has been reduced in od for the mark V etc.

Again just like a Mark 5.



Again just like a Mark 5.

I was surprised that there are two pins(one on each side) holding the tubes to the trunion. The pins are not tapered, but the inner end has been squeezed to increase the 'interference'.

Still 'attached' after trying to force from the 'access' hole. Notice the depressed end of the tube. If heat does not help get them off, they will stay.

Mark VII Extension Table Breakdown

The Mark VII extension table has both a horizontal and a 'vertical' rail for attaching the rip fence. More about that below.

Both short rails are attached with two screws and washers like the main table rail.

One of them 'off'.

The posts are not 'detachable'.

The extension table not only mounts like a Mark 5/V/7 extension table to the base end, but also can 'extend' the main table width.

Notice that the extension table post interfere with the saw blade when positioned near the main table. The 'extra' blade slot allows sawing with the tables adjacent.

Mark VII Rip Fence Breakdown

The Mark VII rip fence is a hybrid between the Mark 5 and a 510. A single lever clamp handle operates a rod that actuates both the front and rear clamps that are spring loaded to the open position.

The elongated nut and jam nut are similar to a 510. The Mark 5 had a barrel nut behind the clamp. This adds an adjustment that the Mark 5 did not have.

The spring opens the clamp when released. IMHO, a washer is missing between the spring and the clamp. The manual says not.

Once the nuts are removed, the control rod is free to slide towards the front. Make sure the spring 'behaves'.

When I removed the spacer nylon another steel one 'appeared'. I assume a po lost it in thar!:D

The clamp pivots on and is retained by a tension pin like the Mark 5.

This is identical to a Mark 5.

This is identical to a Mark 5.

I believe there should be only two washers here. Also notice there is a washer between the spacer and the front clamp. The spacer and that washer are hidden from view when assembled.

I next removed the front casting. The rear screw is longer than the front screw. It is Mark 5 'sized' but has a second biasing screw hole and is identical to the band saw fence casting(original single clamp version). More about biasing screws below!:mad:

The front clamp also pivots and is retained by a tension pin.

Wrapping up.

As noted above the front clamp casting has two bias screw tapped holes.

An illustration of why I get resonant regarding the improper use of these screws(to align the fence to the blade/miter gauge slot etc.) Obviously a po used the right screw as a 'permanent' alignment setting. This is a pix of the main table front rail. Fortunately that surface is not affecting 'normal' clamping/alignment.

A brief departure to notice fence design changes(and a return to a original design detail).

The Mark VII fence has tapped holes(5/16-18) for jig attaching. The Mark 5 fence(lower in pix) are 1/4" through holes(slightly over sized). Notice the locations differ.

Adding a 510 fence in the bottom of the pix shows the original jig mounting holes are returned to their location relative to the arbor and are again through holes(not tapped).

Finally there is the set screw for the mortising hold down post etc. Actually I took it out before the last two pix.

MARK VII BASE ASSEMBLY BREAKDOWN

Rear panel removed first. Two plastic knob screws.

ext the front panel. Secured with 'normal' screws.

Front and back screws use tinnerman 'nuts'.

Next the tilt support bracket. There are screws attaching it to the side also. The larger screws on top, the smaller ones on the side.

Top screws.

The vertical clamp mounts with a screw that includes a spring washer.

Clamp with screw etc.

From the bottom, the side retaining screws.

Screws out.

The end caps have two teeny screws securing the top.

Mark VII Miter Gauge, Tail Stock, Tool Rest Breakdown

I am lumping these together since other than the miter gauge, they are quite simple or very similar to Mark 5/V versions.

The distinguishing detail of the Mark VII miter gauge is the segment clamp. Instead of a knob, a lever clamp is used.

This clamp 'handle' has 'wings' that allow accessing it from either side of the safety grip handle(which has been removed in the pix).

The only adjustment possible is the accumulation of washers between the lever and the segment. Originally(OEM) they consisted of two flat washers and a 'conical' washer. The conical washer provides some 'spring' action. This screws directly into a tapped hole in the miter bar with no 'stop' to make the screw tight.

FWIW a pair of 'special washers'(thin) were between the segment pivot and the clamp area bottom. I will determine if they provide proper squaring of the face of the miter gauge at reassembly. The segment appears flat across the bottom. The second 'special' washer rests over the hole to the left which is for the lever clamp screw.

The clamp actuator separates from the clamp holder just like the newer design.

The lathe tool rest is included here although it is **almost** identical to current version.

The tool rest bar is retained by a single set screw.

FWIW that is a T25(torx) bit in the screwdriver. Works on 5/32 allen screws.

Same for the arm to the post.

Here you can see Mark VII differences. The tool bar and arm are shaped differently. The post has the circular grooves like the Mark 5 instead of the one sided rack gear on the current posts(this allows the post to swivel - opinions differ on the good/bad of that). The arm is short like the Mark 5/V 500 to match the carriage post location(closer to the spindle).

The tail stock stop collars are removed.

The off center cam is removed.

It does not appear the PO did any off center turning.

Well it would have been difficult since the 'cam' would not rotate freely. I initially thought paint buildup was causing it to bind, but after paint removal, it still wanted to bind. Closer examination revealed flash in the bore that was causing the binding. This is **after** I removed most of the flash. There is a seam(flash) in the middle of the entire tailstock.

Mark VII shaper Fence Breakdown

One of the 'extras' that came with the my Mark VII was a shaper fence. I do not know if it did so when new, but that would make sense with the dual tilt.
It is different from both the earlier Mark 5/V,500 and the later Mark V,505 - 520.

It is a hybrid between the other two versions. It is closer to the later 505-520 models than the earlier Mark 5. Both fence 'halves' are 'micro-adjustable'. It mounts to the Mark VII table with two screws, but they are spaced closer together. The Mark VII table pivots +- 90 degrees so the mounting holes for the shaper fence are to the right of the table insert. The 505-520 table accomplishes the same thing by reversing the table.

I realize this is almost identical to later models, but this will expose the few differences and could be referenced for working on the later models.

Before breakdown. Notice the location of the mounting screws.

A 'design' modification common to later models with which I grumble! The casting was(and still is) dimensioned for 1/4-20 screws and square nut. When screw sizes became 'standardized', the 1/4" screw was no longer available with a 5/32" hex socket so the screw was changed to a 3/16 -24.
The 'standard' 3/16" square nut is too small to fit snugly into the notch intended for the nut. That causes the nut to turn in the notch when adjusting the screw. I call that a PITA.

With removal of the clamping screw and mini nut, the fence half can be removed by adjusting the knob until the fence separates from the knob screw. Notice the clamping screw hole is proper for the 3/16" screw. The earlier Mark 5 version had a 1/4" screw hole.

Only thing left to remove is the detent spring. It can be pushed out from the bottom(reluctant, but it will come out).

One side disassembled. The other side is identical.

The mounting screws, washer and unique nut are all that is left.

Exploded view

A look at a 1/4-20 square nut in the Mark VII shaper fence 'notch'.

A pix of the Mark 5 version with 1/4-20 screw and nut.

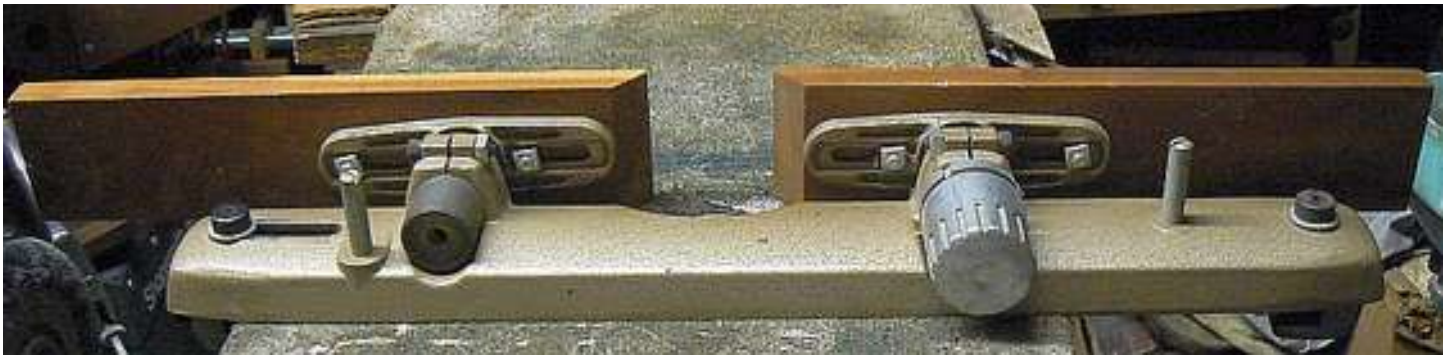
The 1/4-20 screw with 5/32" hex socket.

The 3/8-16 mounting screw with 5/32" hex socket.

The Mark 5 mounting screw, washer and under table clamp(a pair fits over the front and rear edges of the work table).

Shaper Fence Versions

These are the three Mark 5/V/VII versions.



I will identify items that are of particular interest by their 'size'.

Bearings:
Main shaft..... 25 x 52 x 15 mm - Same as 10E/er, Mark 5, Mark V
A O Smith Motor..... 17 x 40 x 12 mm - same as all but Emerson 1 1/8 which has one with 5/8" id.
Quill .....5/8" x 35mm x 11mm - same as M5/V etc.
Tension pins:
Speed control cam to shaft..... 1/8" x 3/4"
Speed control cam follower..2 pins..... 1/8" x 1/2"
Carriage - headstock connect stop..... 1/8" x 1/2"
Tilt clamps ..... 1/8" x 5/8"
Carriage lock handle ..... 1/8" x 1 1/2"
Rip fence lock handle pivot ..... 1/8" x 7/8"
Rip fence rear clamp pivot..... 3/16" x 1 1/4"
Rip fence front clamp pivot ..... 3/16" x 1 1/4"
Miter Gauge clamp pivot ..... ?? x ??
Foot pedal ..... 5/32" x 1 1/2"

Paint is gray wrinkle.

There are several design details that were a precursor to the Mark V 505-520.
The table height crank and lock.
The carriage lock.
The shaper fence mounts to two holes in the main table.

Paint chipped on headstock and slight rust spots on base.

When examining the condition of 'the cam' I discovered a surprise = it is cast aluminum. Paperwork indicates the cam was purchased in 1990 with a few other parts.

Also indicated in this pix is the other less desirable 'surprise'. The control sheave is not 'whole'. Hopefully JB Weld etc. will remedy that.