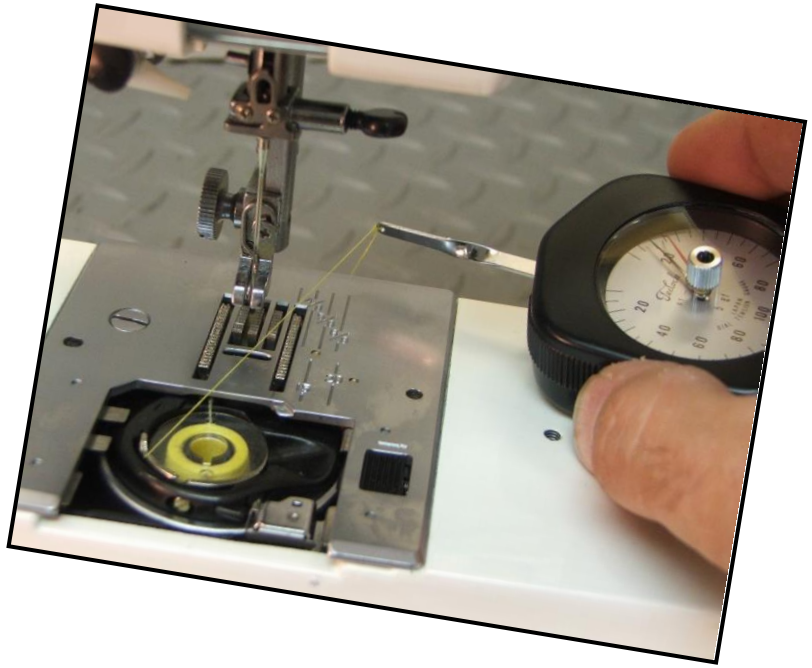
Servicing Competitive Brand Sewing Machines



Al Hunt

Purpose

The purpose of this manual is to describe and illustrate some commonly required service procedures on a variety of popular sewing machine designs. Think of this as an introduction to other brands.

Service manuals for specific models can sometimes be found online.

The information contained herein is for informational purposes only. BERNINA does not accept any responsibility for the accuracy or omissions included in these accompanying instructions. Any product repairs are undertaken at the sole risk of the person performing the repairs.

Appropriate measures must be taken to protect the circuit boards from electrostatic discharge (ESD).

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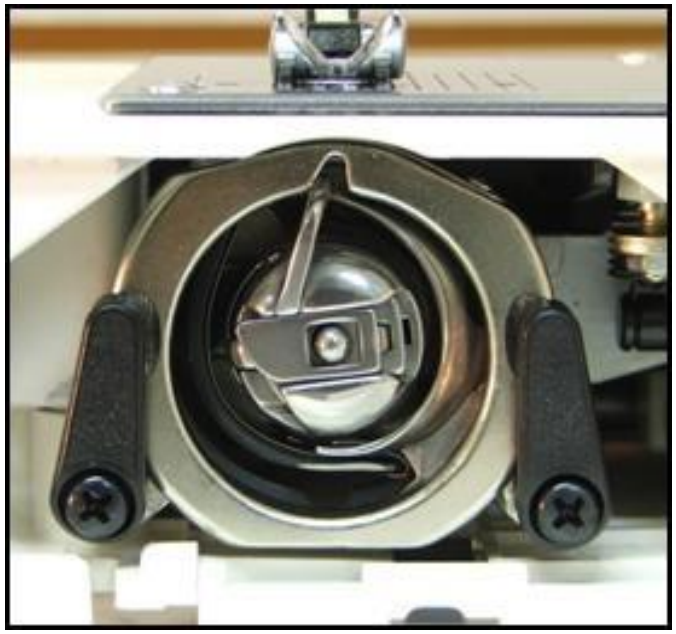
Editor: **Hans Herzog**
Release: **1.07 Date: May 22, 2017**

Content

Servicing Competitive Machines

Asian Built Machines with Front Loading Bobbin

Late 1950's to present



The bernette sew & go, b33, and b35 , share many design and maintenance characteristics as other Asian built, front loading bobbin machines. Many of the service procedures and specifications listed in the bernette service manuals are the same or similar as those used by other manufacturers. The bernette service manuals could prove to be a useful resource.

Index

Common Issues / Cause / Solution

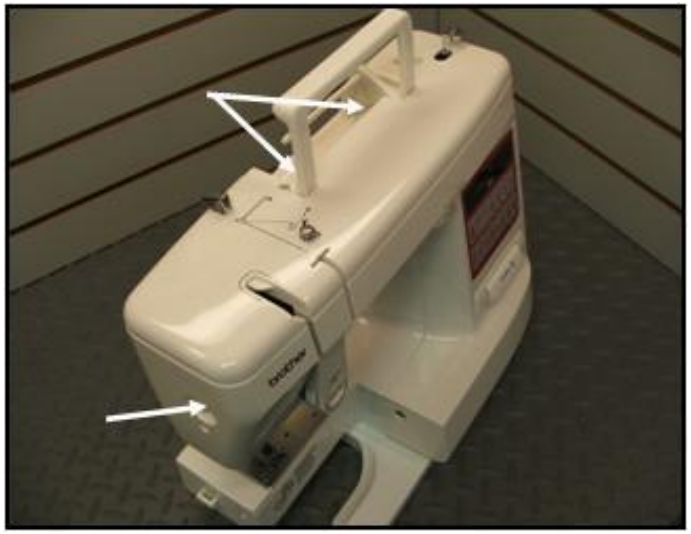
•Issue: Poor stitches quality, caused by burrs on the hook or throat plate. Solution: De-burr the hook with emery paper. De-burr the throat plate with emery tape.

•Issue: Improper needle position. Solution: Adjust the needle distribution.

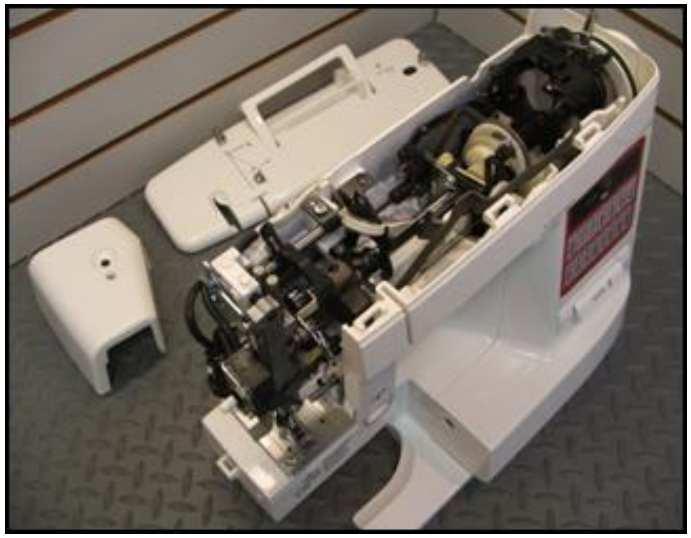
•Issue: Skipped stitches or broken needle thread, caused by improper hook back-run (sometimes referred to improperly as hook timing). Solution: Adjust the hook back-run.

•Issue: Skipped stitches or broken needle thread, caused by improper needle bar height. Solution, adjust the needle bar height.

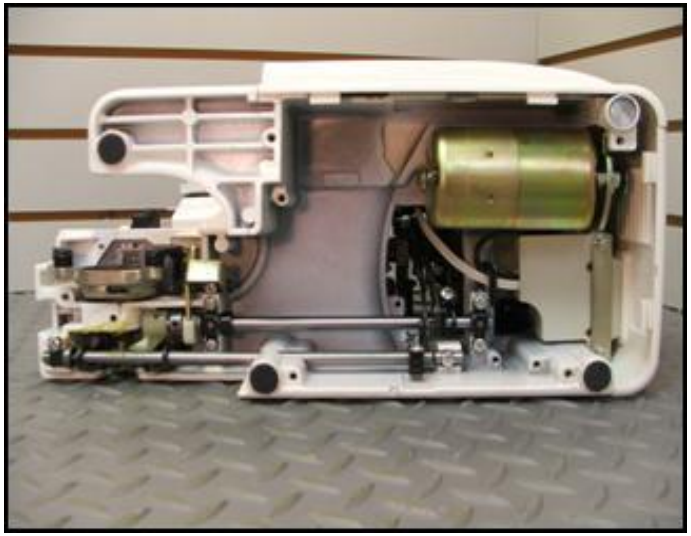
Cover Removal

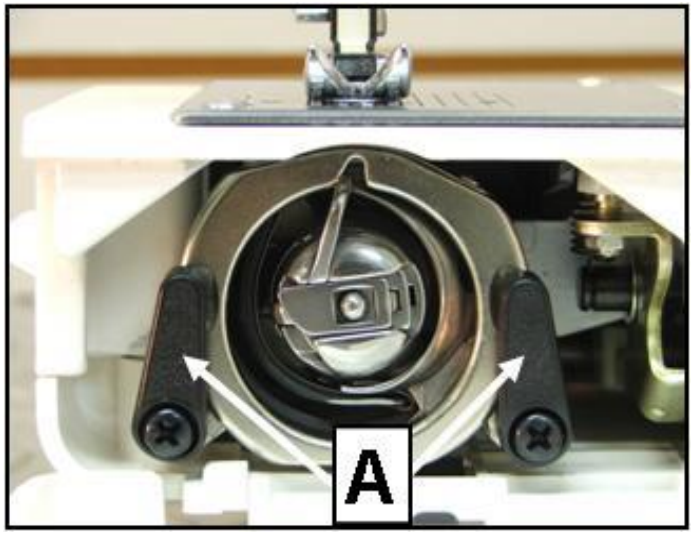


1. Remove the lid and face plate. There are usually two screws holding the lid and one holding the face plate.



2. Remove the base plate and lower free-arm cover. There are usually four base plate screws and two free-arm cover screws.

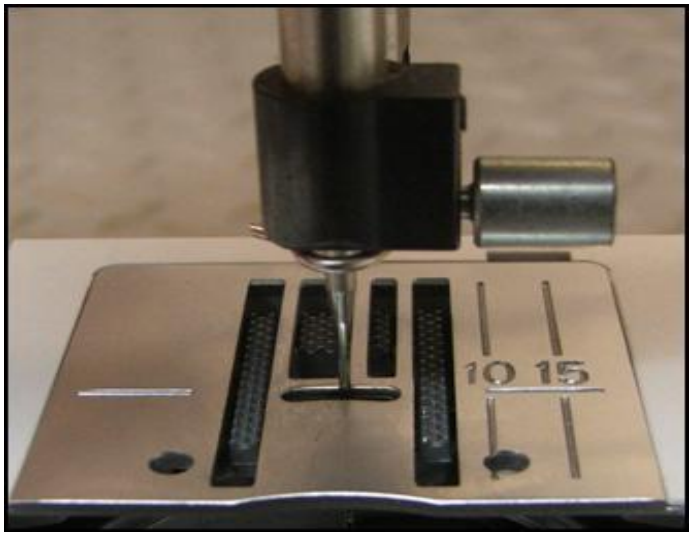




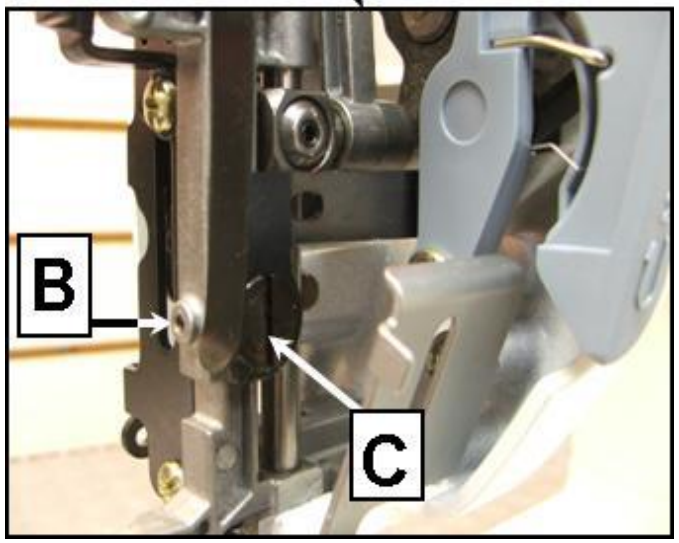
Remove the bobbin case, then remove the race cover and hook by swinging out the two race cover latches (A).

Adjustments & Maintenance

Needle Position

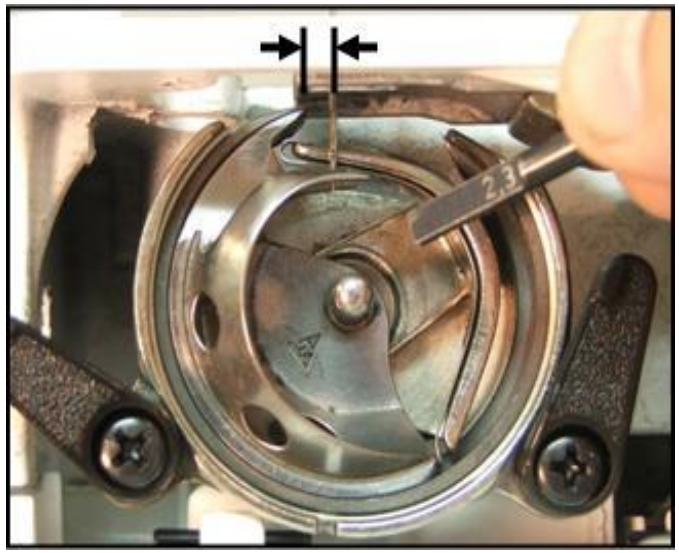


1. Set the machine for straight stitch, center needle position. With the hand wheel, lower the needle into the throat plate. The needle should be in the center of the needle hole.
2. If adjustment is needed, loosen the set screw (B), then rotate the eccentric screw (C) to move the needle left or right as needed.

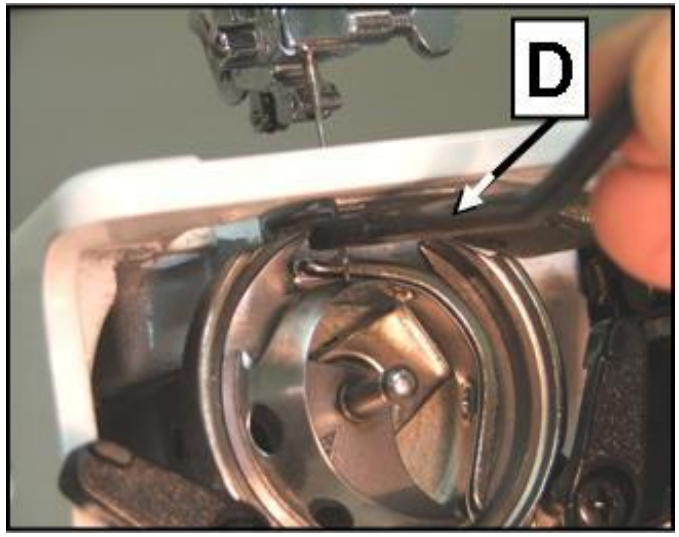


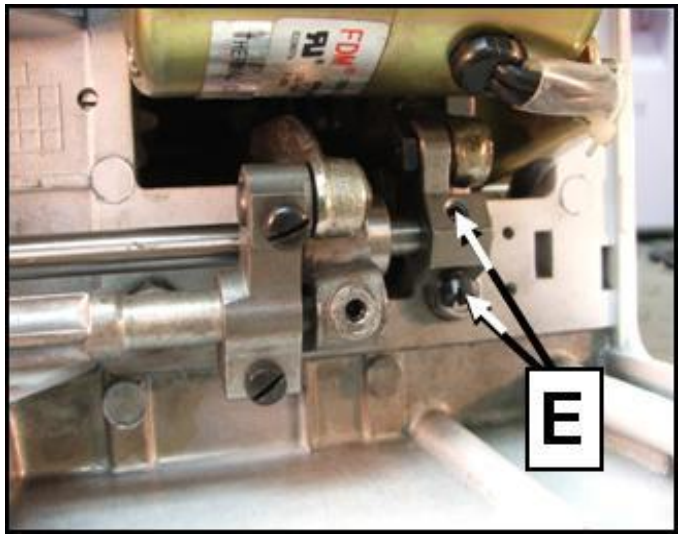
Hook Back-run

1. Set the needle position to the full left position.



2. With the hand wheel, position the hook tip to its full left position.
3. Using the 2.3mm BERNINA back-run feeler gauge (D), check the distance between the hook tip and the left side of the needle.



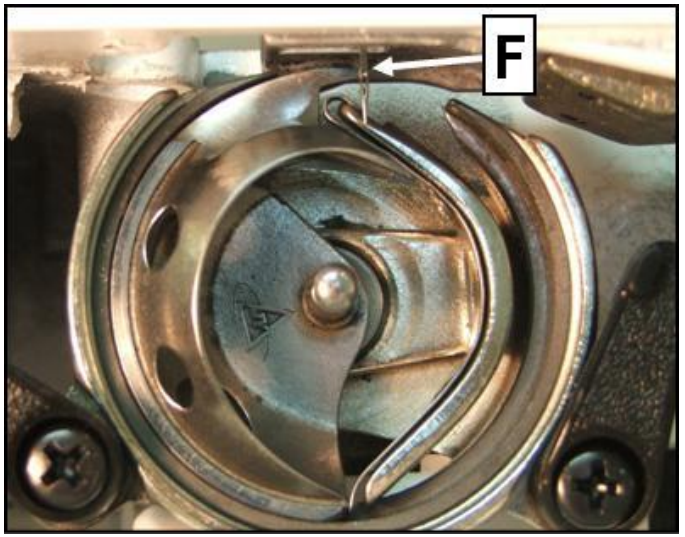


4. If the back-run is not approximately 2.3mm, loosen the two set screws (E) on the hook rock shaft and position the hook as needed.

Note: With “loose” or worn machines, setting the back-run to 2.0mm may be necessary.

Needle Bar Height

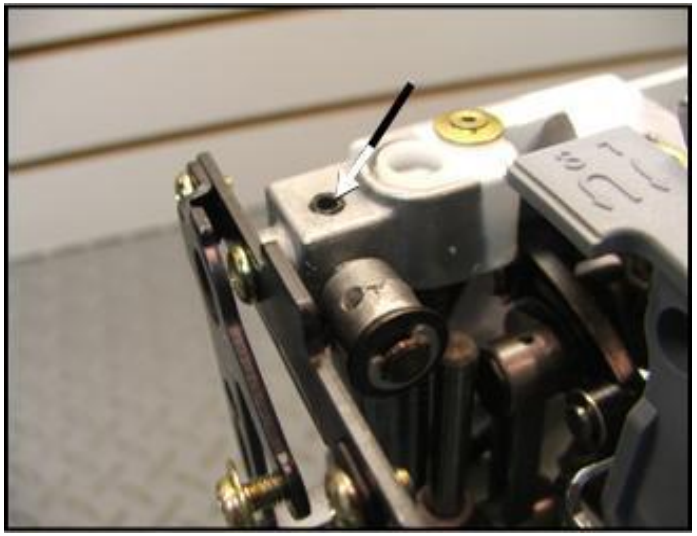
The tip of the hook is the reference when adjusting the needle bar height. Make certain that the hook back-run is adjusted correctly before continuing.
1. Set the needle position to the full right position.
2.With the hand wheel, position the tip of the hook so that it is flush with the right side of the needle. The needle must be on its upward stroke.



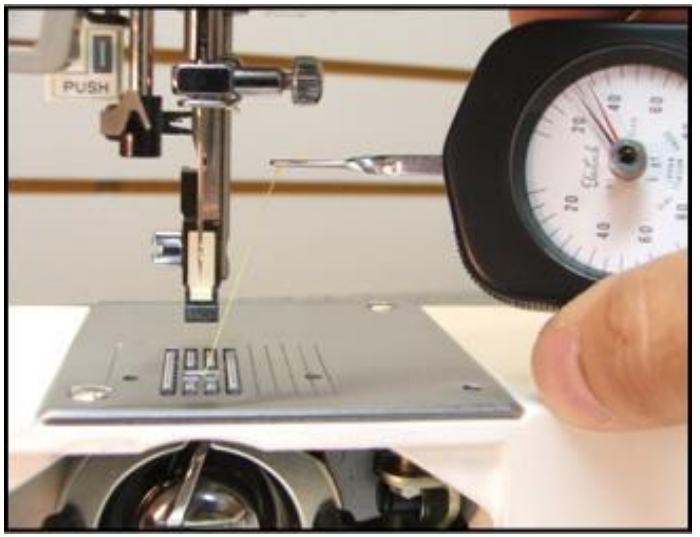
3. The needle bar height is correct if the hook tip (F) is just slightly above the top of the needle eye. No part of the hook tip should be visible through the needle eye.
4. If the needle bar height requires adjustment, this can be done by loosening set screw (G).

Other Common Adjustments

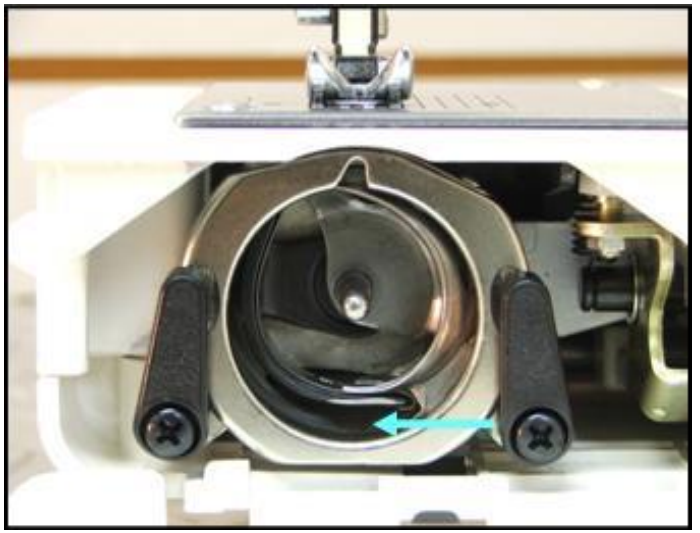
Needle / Hook Clearance



Needle / hook clearance should be close, but not touching.



Lubrication

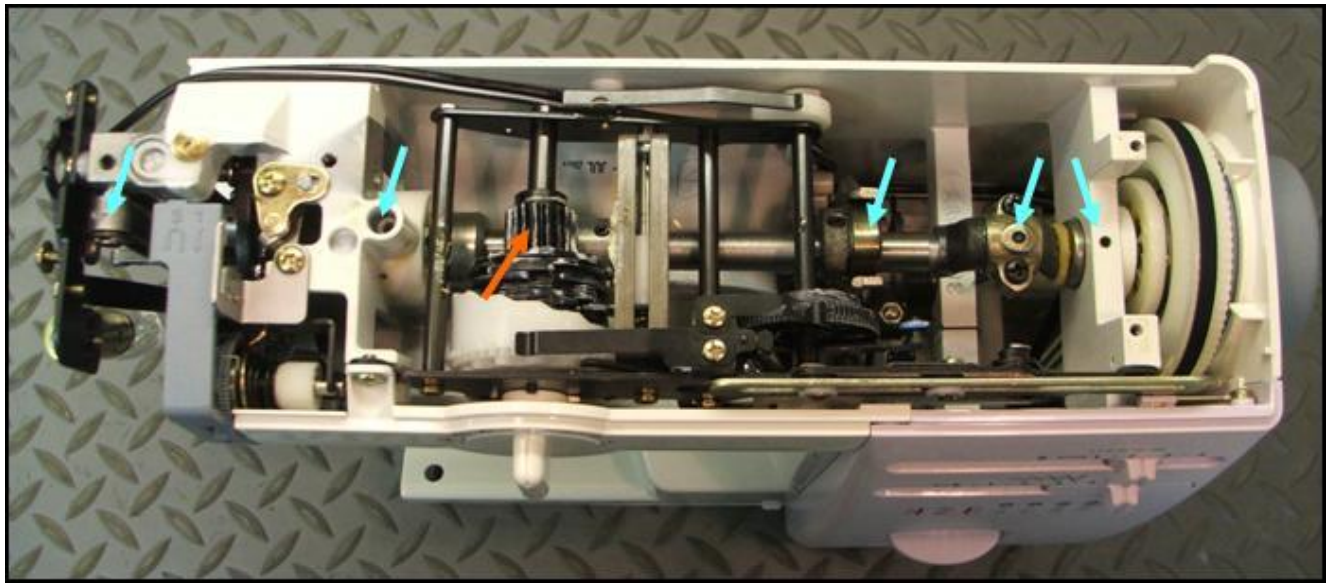


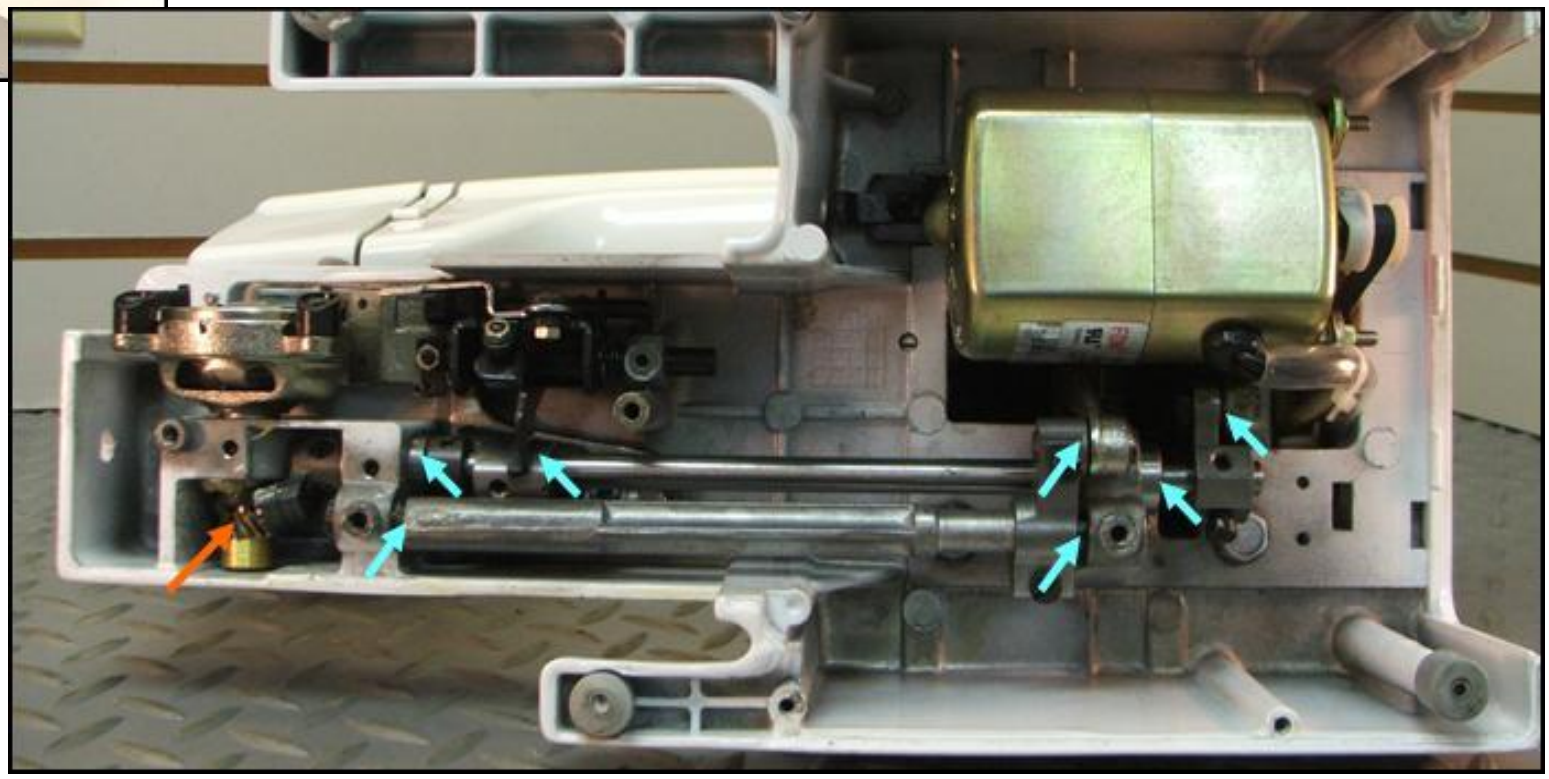
Oil →

Grease →

Bobbin Tension

20 grams of bobbin tension is usually appropriate with Metrosene thread .



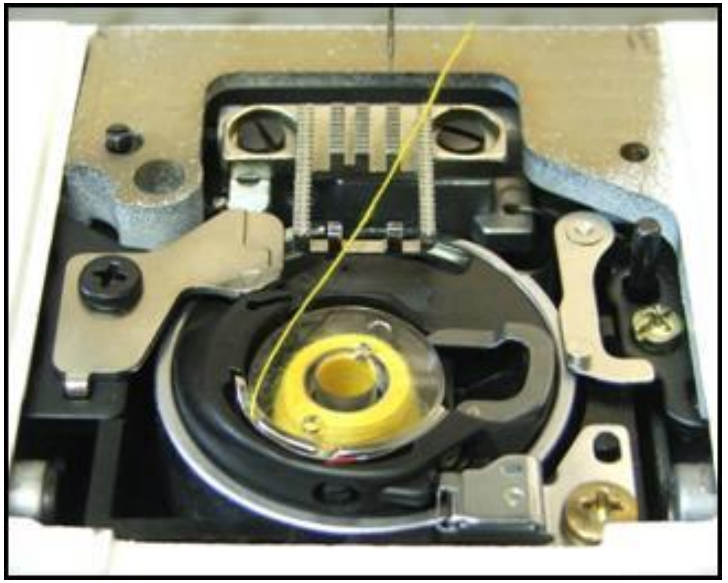


Oil →

Grease →

Asian Built Machines with Top Loading Bobbin

1970's to present



The bernette b37, b38 share many design and maintenance characteristics as other Asian built, top loading bobbin machines. Many of the service procedures and specifications listed in the bernette service manuals are the same or similar as those used by other manufacturers. The bernette service manuals could prove to be a useful resource.

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Common Issues / Cause / Solution

•Issue: A damaged bobbin case. It is a common occurrence for the bobbin case to have spun counter clockwise past the bobbin case stopper. This results in needle damage to the bobbin case and gouging of the bobbin case by the bobbin case stopper and the hook. The most common causes are operator error, such as misthreading or the use of heavy weight thread; bobbin case wear or a poorly adjusted bobbin case stopper. Solutions include fixing or replacing the bobbin case and adjustment of the stopper.

•Issue: Skipped stitches, caused by improper loop lift (hook timing). This is often accompanied by a damaged bobbin case. Solution: Adjust the loop lift.

•Issue: Skipped stitches or broken needle thread, caused by improper needle bar height. Solution: Adjust the needle bar height.

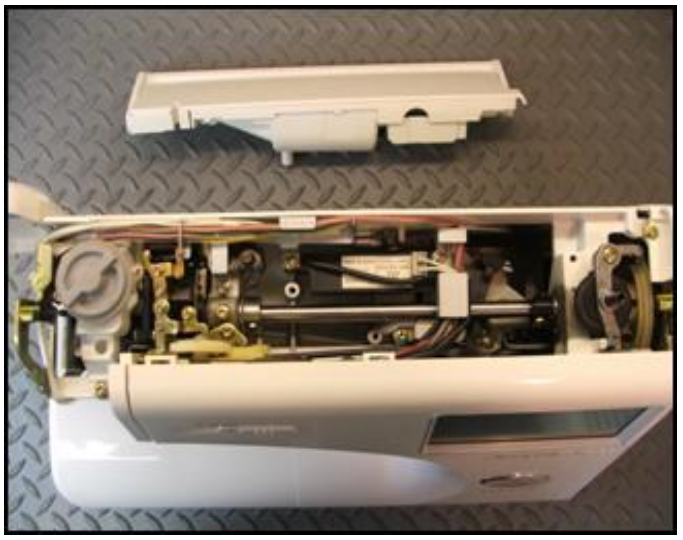
•Issue: Poor stitches, caused by burrs on the hook or throat plate. Solution: De-burr the hook with emery paper. De-burr the throat plate with emery tape.

•Issue: Fabric feeds poorly due to improper feed dog height. Solution: Adjust feed dog height.

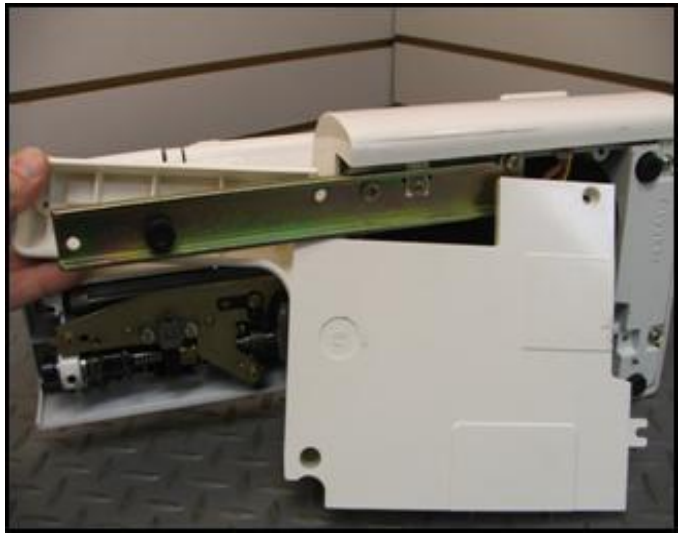
Cover Removal

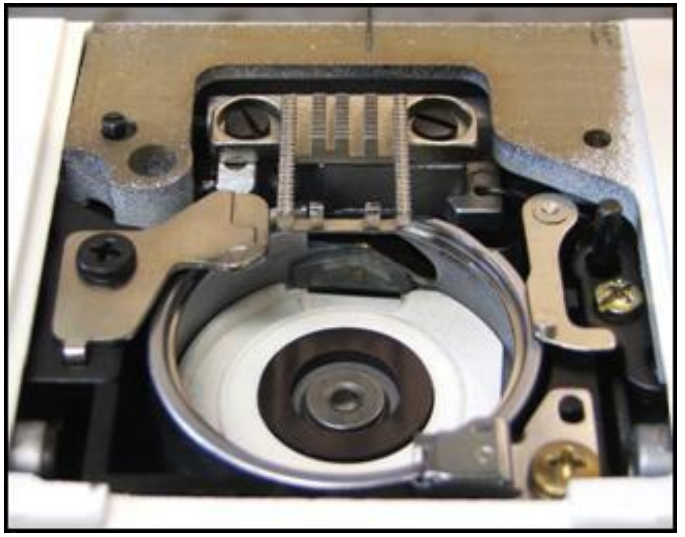
Remove the lid and face plate. On most machines there are two screws holding the lid and one holding the face plate. On this Janome 9000, there are three screws holding the lid, and the face plate is hinged.

On some machines the handle may come off by slipping it off it's hinge.



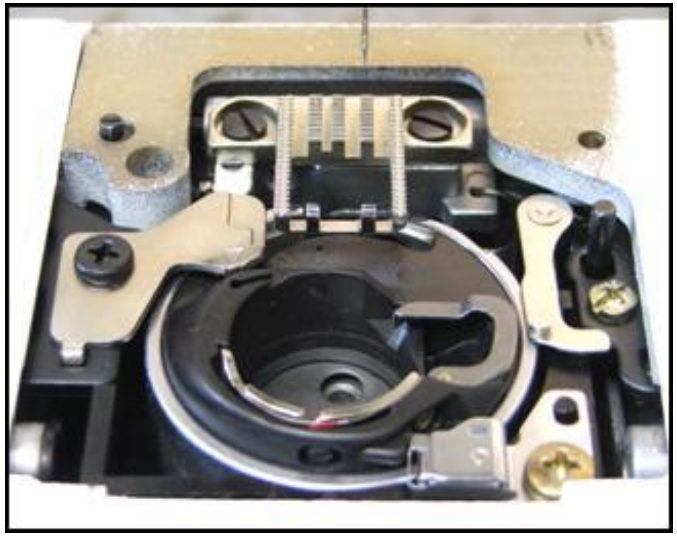
Remove the base plate and lower free-arm cover. There are usually four base plate screws and two free-arm cover screws. This New Home 23X uses five base plate screws.



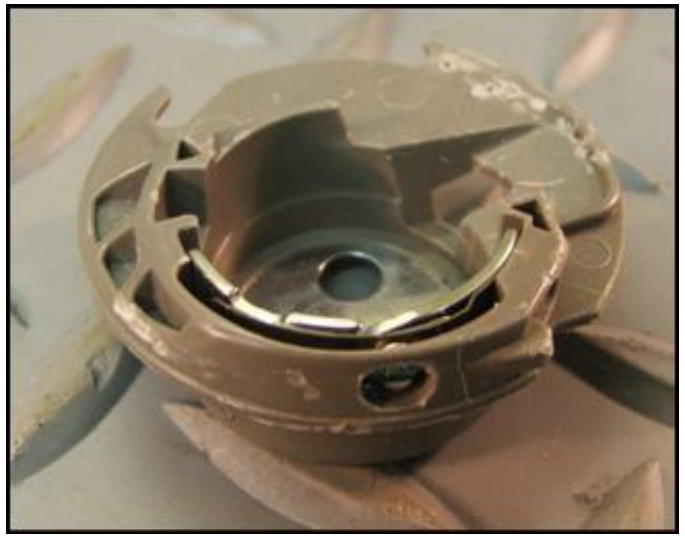


Adjustments & Maintenance

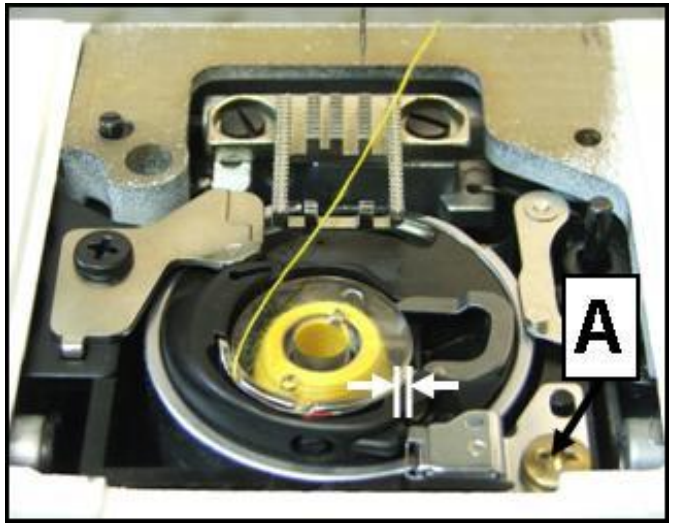
Remove the throat plate, then lift out the bobbin case.



Bobbin Case Stopper



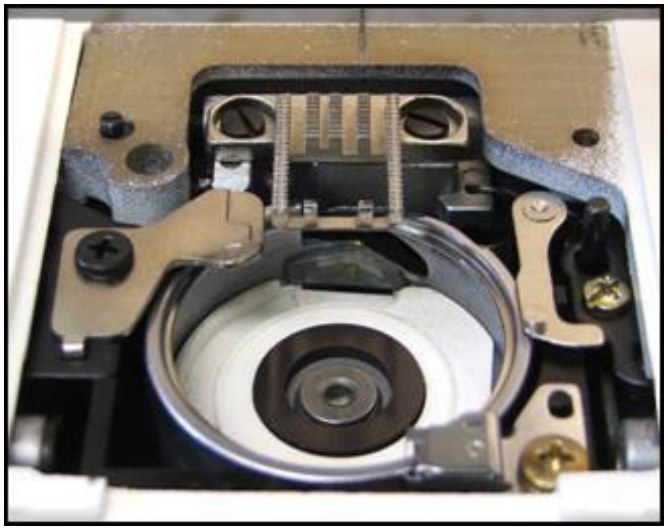
Here's an example of a bobbin case that had become dislodged, rotated past the bobbin case stopper and been damaged beyond repair. This bobbin case will need to be replaced.



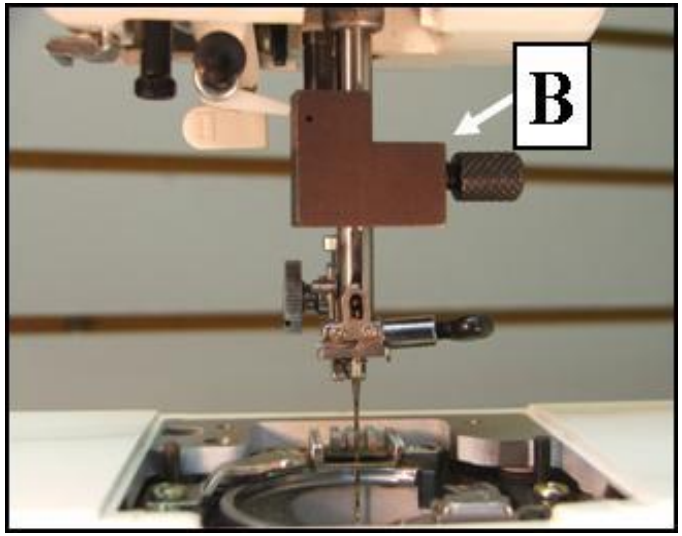
The bobbin case stopper is adjusted correctly when there is 1.2mm to 1.8mm clearance between the stopper and the bobbin case. Adjustment is made with one Phillips head screw (A).

In addition, move the stopper towards the front or rear of the machine and reform it up or down very slightly if necessary. Do this with the intent of preventing the bobbin case from rotating past the stopper.

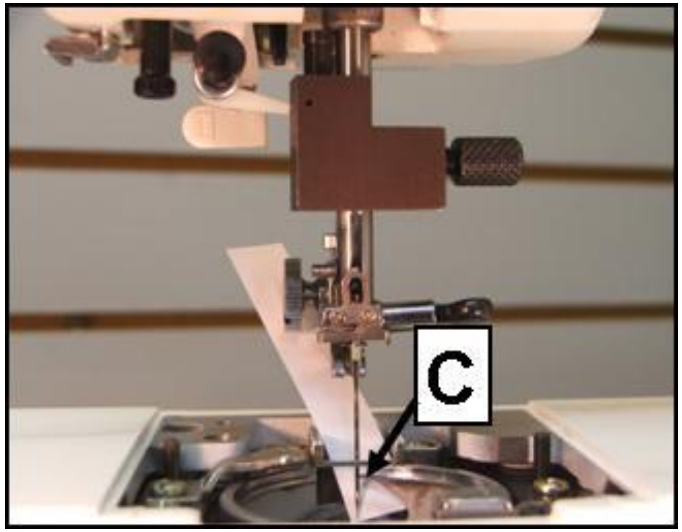
Loop Lift (Needle/Hook Timing)



1. Install a good needle.
2. Set the needle position to the center.
3. With the hand wheel, position the needle bar to its lowest position.



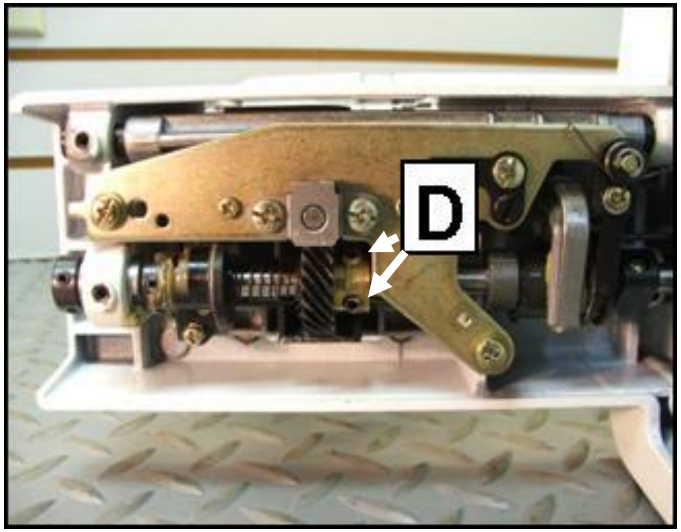
4. Place the spring loaded timing gauge (B) around the needle bar. Slide the gauge upward until the retractable pin just makes contact with the needle bar bushing or any stable structure convenient to the gauge. Tighten the thumb screw.



5. Rotate the hand wheel toward you until the needle bar rises and fully compresses the gauge's retractable pin.

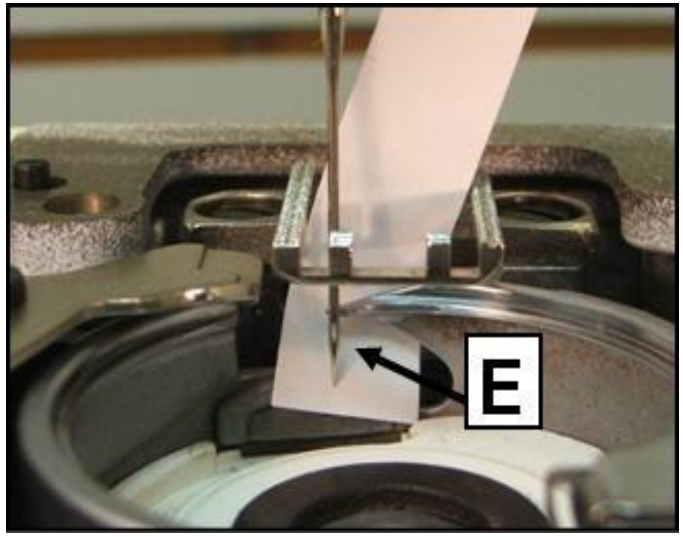
At this point the hand wheel will not turn any farther because the gauge has stopped the needle bar. You have now caused the needle bar to raise precisely 2.3mm. The machine is now in it's timed position.

If the needle/hook timing is correct, the tip of the hook will be approximately behind the left edge of the needle (C).



6. If an adjustment is needed, loosen the two screws (D) on the hook drive gear and reposition the hook as needed.

Needle Bar Height

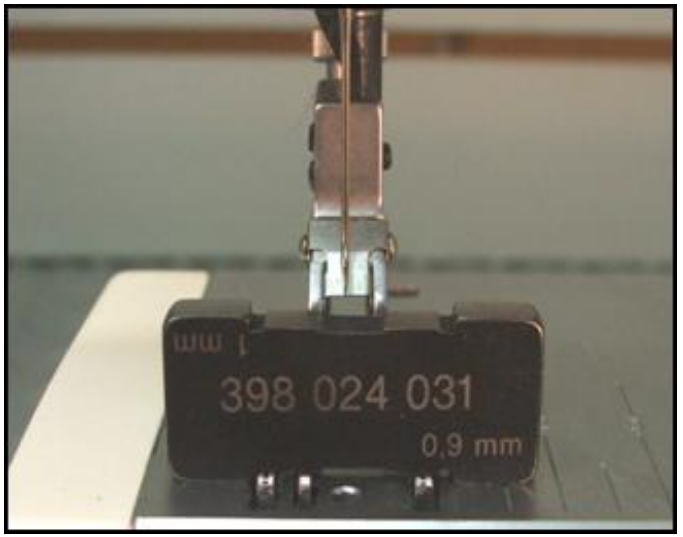


.You will be using the tip of the hook as your reference when adjusting the needle bar height. Make certain that the needle/hook timing is adjusted correctly before continuing.

1. Set the needle position to the full left position.
2. With the hand wheel, position the tip of the hook so that it is flush with the left side of the needle.
3. The needle bar height is correct if the hook tip (E) is just slightly above the top of the needle eye. No part of the hook tip should be visible through the needle eye.

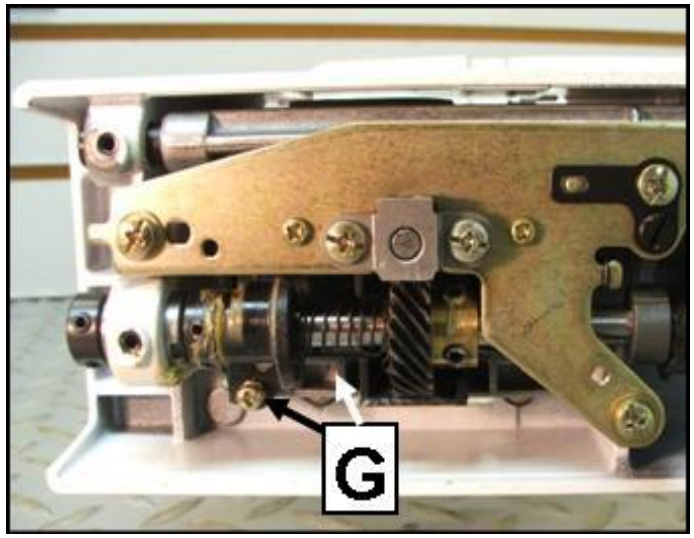
4. If the needle bar height requires adjustment, loosen set screw (F) and move the needle bar up or down as needed..

Feed Dog Height



The feed dog height should be approximately 0.9mm to 1.0mm.

Use the BERNINA feed dog height gauge to check this.

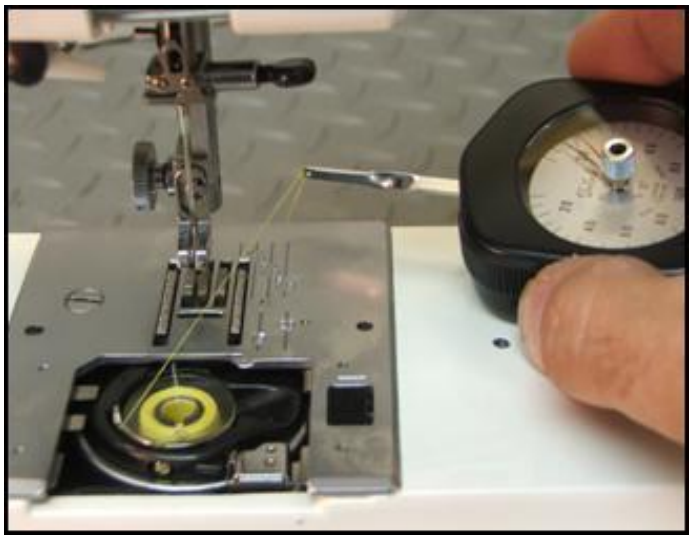


Depending on the model, adjust the feed dog height with screw (G) after loosing the lock nut.

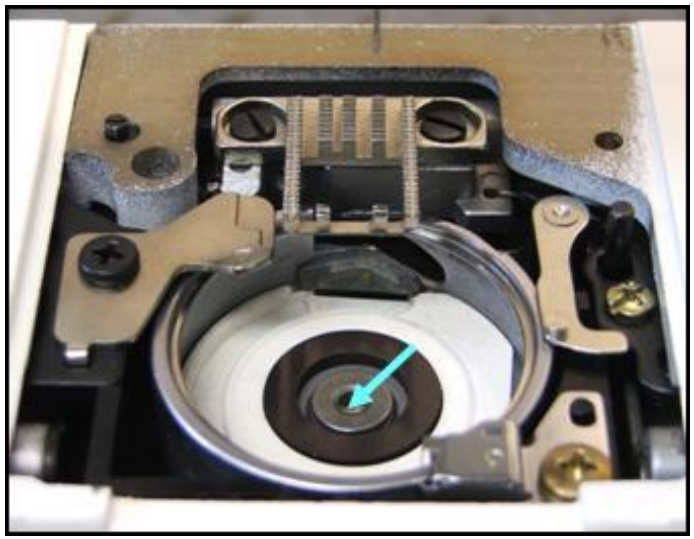
Other Common Adjustments

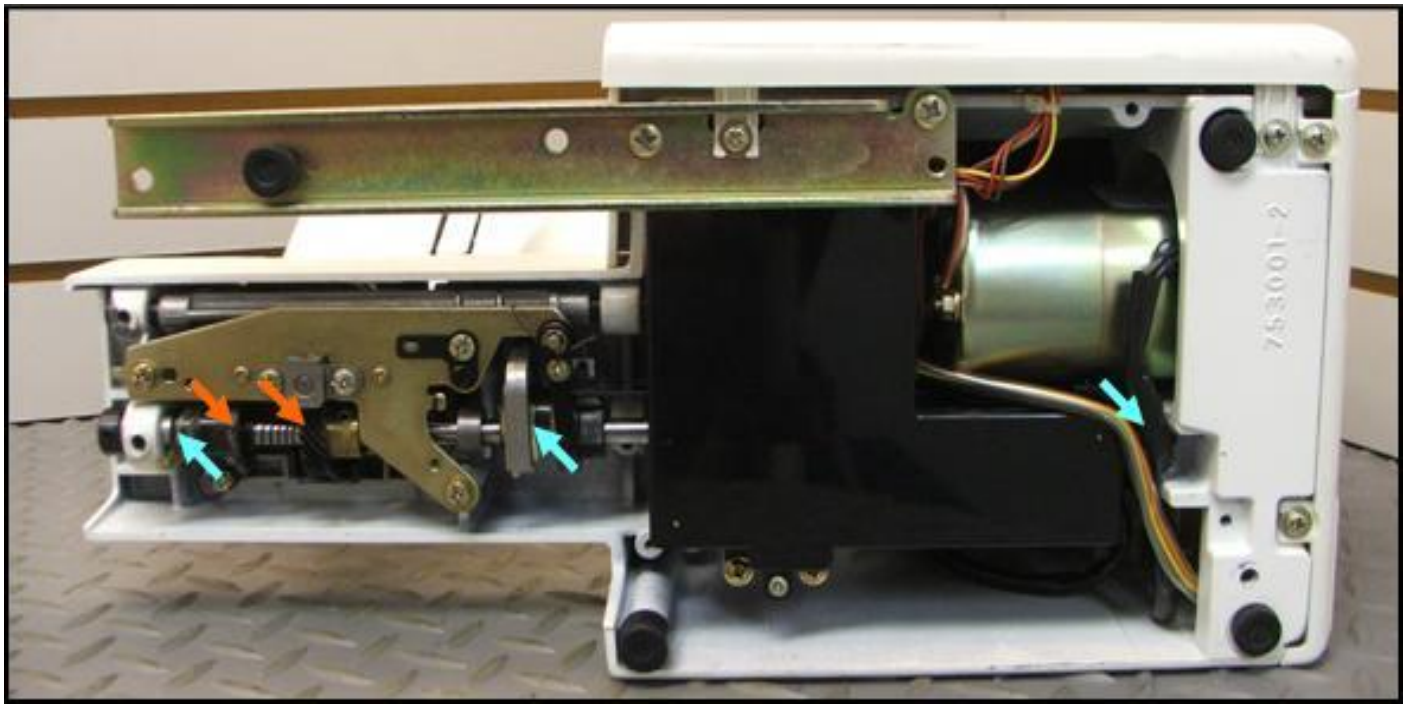
Bobbin Tension

15 to 22 grams of bobbin tension is usually appropriate with Metrosene thread.



Lubrication





Oil →

Grease →

Singer® 221 Featherweight

1933 to 1970

Index

Common Issues / Cause / Solution

•Issue: The hand wheel will not turn. This is usually caused by thread debris in the hook. The stray thread binds the rotating hook to the stationary hook basket. The solution can sometimes be as simple as rotating the hand wheel backwards to remove the bind, but often you will need to remove and disassemble the hook to get the thread out.

•Issue: Skipped stitches, caused by improper needle bar height or hook timing. Solution: Check both adjustments.

•Issue: The machine jams constantly. The cause could be that the throat plate was not installed properly. This is usually the result of the consumer cleaning the machine, and not reinstalling the throat plate correctly. Solution: Make certain that the throat plate is installed with the finger of the hook basket properly inserted in the bobbin case stopper slot on the underside of the throat plate.

•Issue: The machine skips stitches. This is often caused by a needle installed backwards. The solution is to install a new needle with the flat side to the left, and to thread it from right to left.

•Issue: The needle moves while winding a bobbin. This is caused by a dry, sticky or misadjusted hand wheel clutch, or a motor belt that is too tight. The solution is to remove, clean and lubricate the hand wheel clutch, then adjust the motor belt.

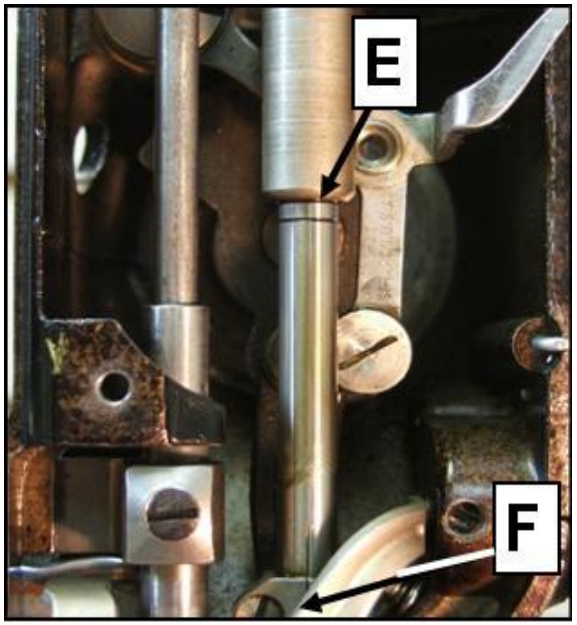
•Issue: The motor belt and/or power cord need to be replaced due to old age. Solution: Replace these parts if needed.

Cover Removal

Remove the spool pin base (top cover), face plate, and bottom cover. Each are held in place with a single screw. Remove the throat plate.

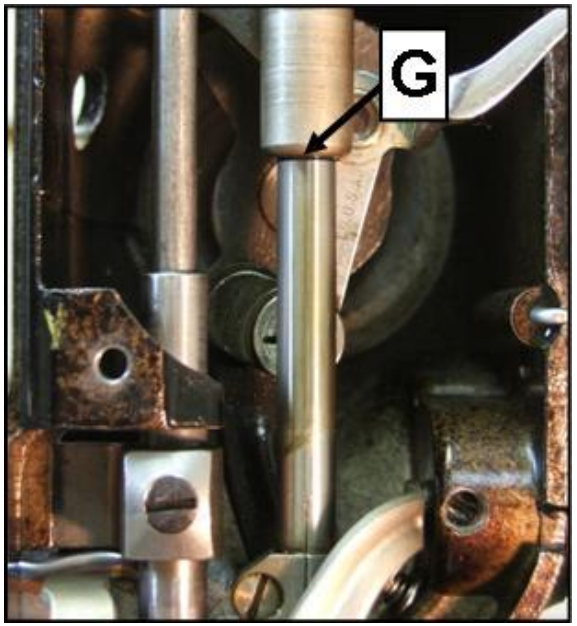
Adjustments & Maintenance

Needle Bar Height



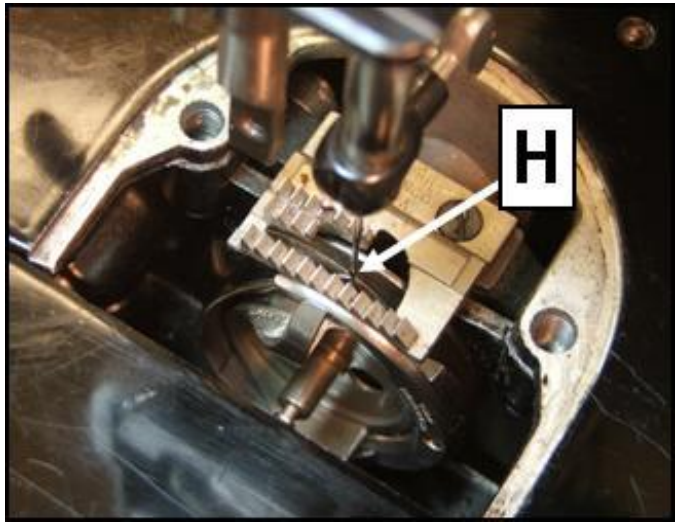
1. Rotate the hand wheel until the needle bar is at it's lowest position. When the needle bar height is correct, the upper mark (there are two) on the needle bar should be even with the needle bar bushing (E).
2. Adjustment is made by loosening the needle bar set screw (F), and moving the bar as needed.

Loop Lift (Needle/Hook Timing)



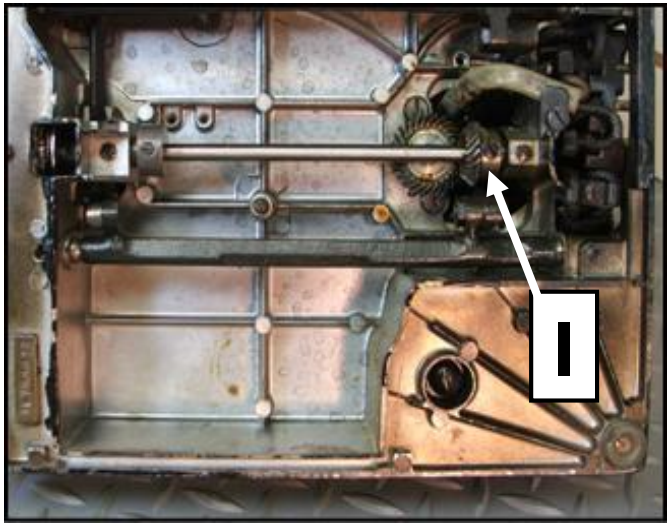
Adjustment of the loop lift (needle hook timing) is done by referring to a timing mark that is located on the needle bar. For this reason, the height of the needle bar must be correct first. Refer to the previous section, titled "Needle Bar Height" for instructions.

1. To check the loop lift (needle hook timing), rotate the hand wheel until the needle bar is at its lowest position. Continue rotating the hand wheel toward you until the lower mark has risen to a point even with the needle bar bushing (G).

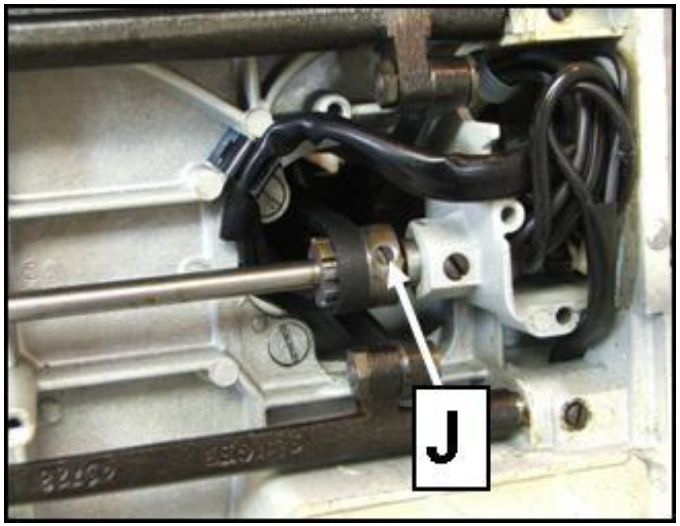


2. With the lower mark even with the needle bar bushing (G), you have caused the needle bar to raise the correct loop lift amount. The machine is now in it's timed position. If the needle/hook timing is correct, the tip of the hook will be next to the needle (H)

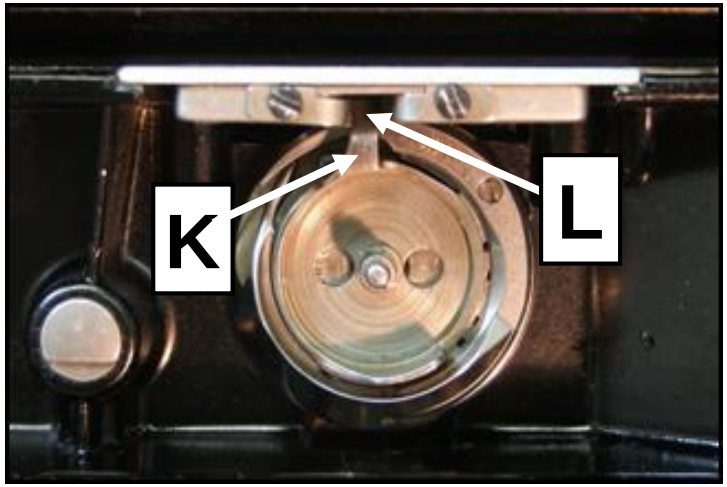
3. If the hook tip is not next to the needle, loosen the two timing screws (I) on the hook drive gear, and rotate the hook into the correct position.



If your Featherweight is white in color, then it will have a timing belt rather than gears. If an adjustment is needed, loosen the two timing screws (J) on the lower timing belt pulley, and rotate the hook into the correct position.



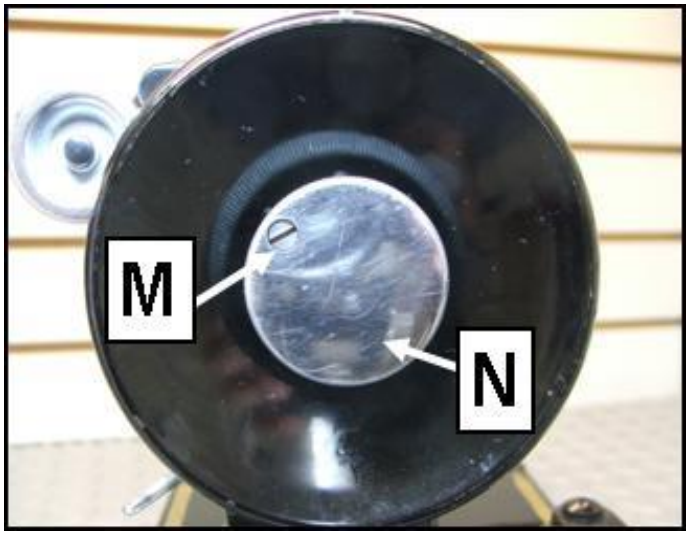
Throat Plate Installation



Installation of the throat plate is correct when the finger of the hook basket (K) fits within the bobbin case stopper slot (L) on the throat plate.

Cleaning a Sticky Hand Wheel Clutch

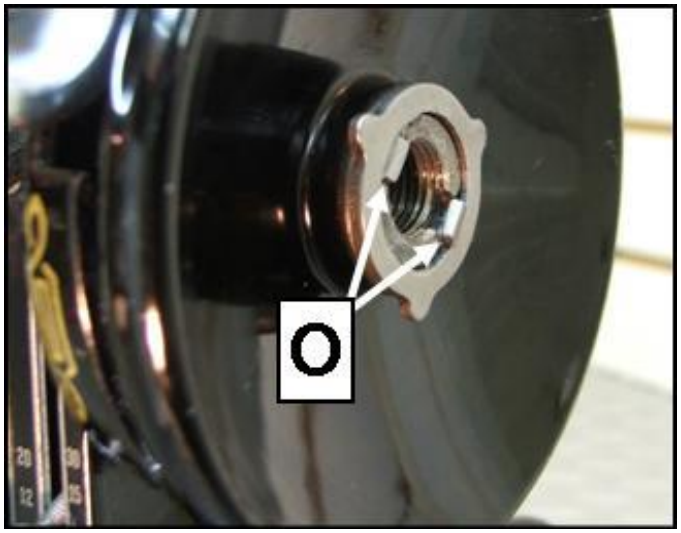
1. To remove and clean the hand wheel and clutch, start by removing the motor belt. You may need to loosen the belt tension first with the screw located at the front of the motor.
2. Remove the hand wheel clutch screw (M), then remove the clutch knob (N) by unscrewing it off the end of the top shaft.
3. Remove the stop-washer, then slide the hand wheel off the shaft.



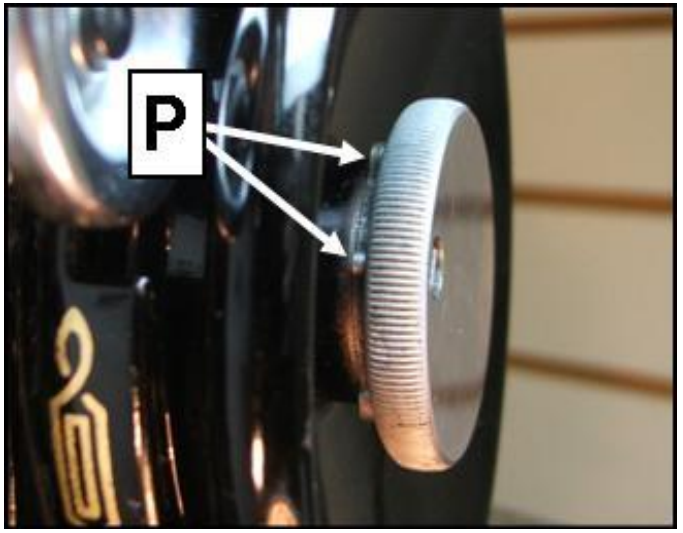
4. Clean the inside of the hand wheel, the outside of the shaft, the knob and the washer with WD-40®. Wipe the parts dry, then lubricate with oil before assembly.

5. To reassemble the hand wheel and clutch, start by sliding the hand wheel onto the shaft.
6. Install the stop-washer with the two tabs (O) facing outwards.

Notice that there are three tabs on the outside of the stop-washer. These work with the screw (M) on the clutch knob to control how tight you can get the clutch when you want to sew, and how loose you can get the clutch when you want to wind a bobbin. Due to its design, the stop-washer can be installed at two different angles, so the clutch can both be tightened and loosened properly.



7. Screw the clutch knob (N) all the way onto the shaft, then install the clutch screw (M).



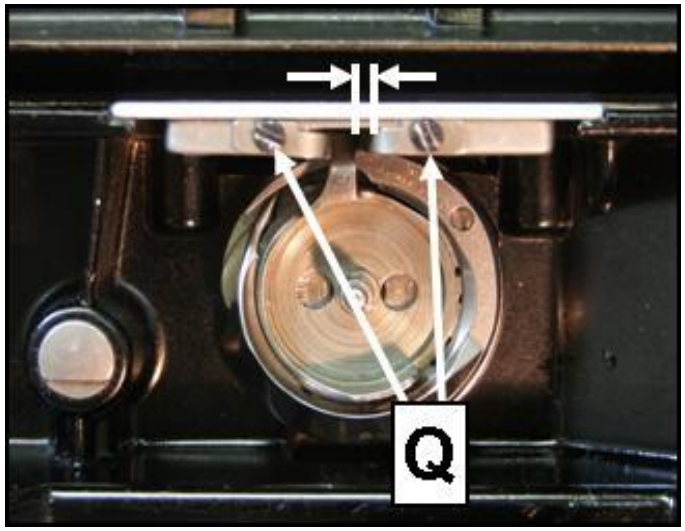
If the clutch stop-washer is in the correct position, the knob (N) can be tightened without one of the stop-washer tabs interfering (P). If the stop-washer keeps the knob from being tightened fully, rotate the stop-washer 180 degrees.

Motor Belt Tension

The motor belt tension is best when set light, as these motors tend to lack power. It is held with one screw.

Bobbin Case Stopper Clearance

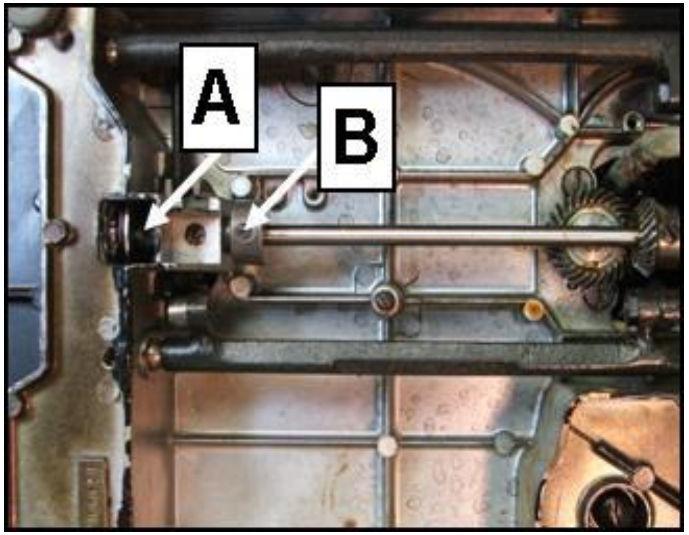
The clearance between the bobbin case stopper (located on the throat plate) and the finger of the basket is approximately 1.0mm.
Adjustment can be made by loosening either screw (Q) and moving the stopper cushion spring until the correct clearance is achieved.



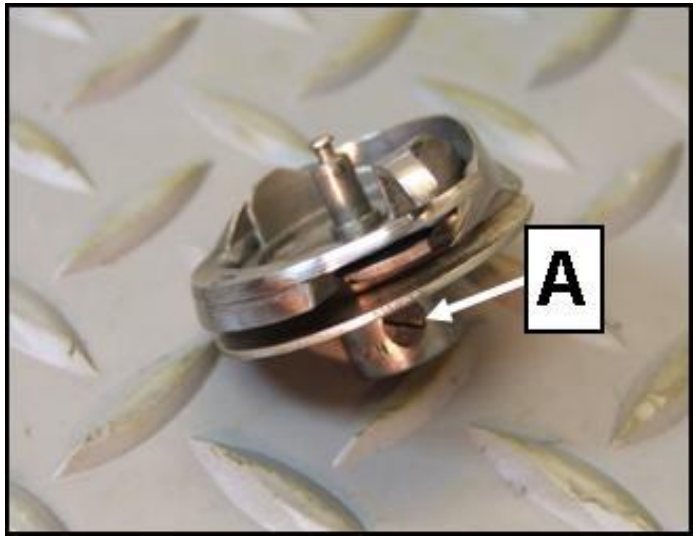
Other Common Adjustments & Maintenance

Hook removal, Disassembly & Assembly

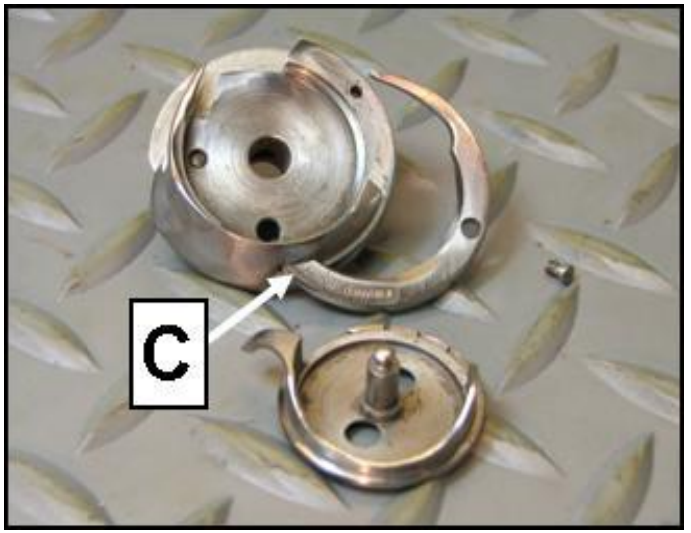
The hook is held to the bottom shaft by two set screws (A). One of these screws rests on a flat spot on the shaft. If you can mark, or somehow remember which screw this is, it will most likely save you from retiming the hook after you have reinstalled it!
Note that the flat for the hook, and the flat for the balance wheel (B) are inline with each other.



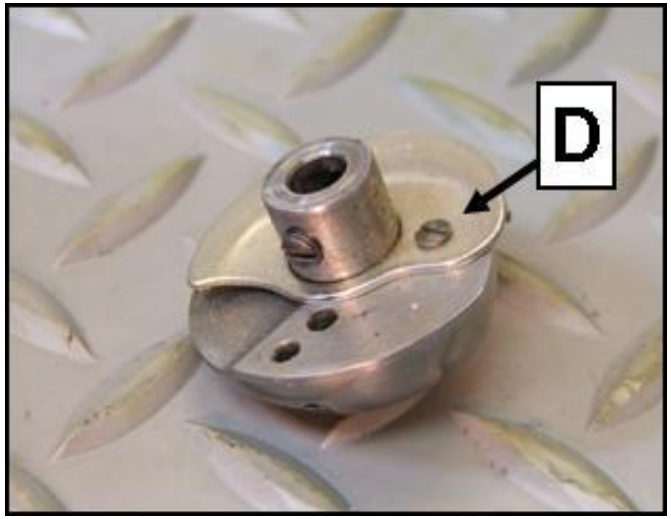
1. To remove the hook, first remove the throat plate.
2. Loosen the two hook screws (A) and slide the hook off the shaft.



3. Remove the gib screw.



4. Swing the gib out of the way.
5. Rotate and lift the basket out of the hook. If the basket doesn't come out easily, completely remove the gib from the hook, by removing the gib hinge screw (C) from the rear of the hook.

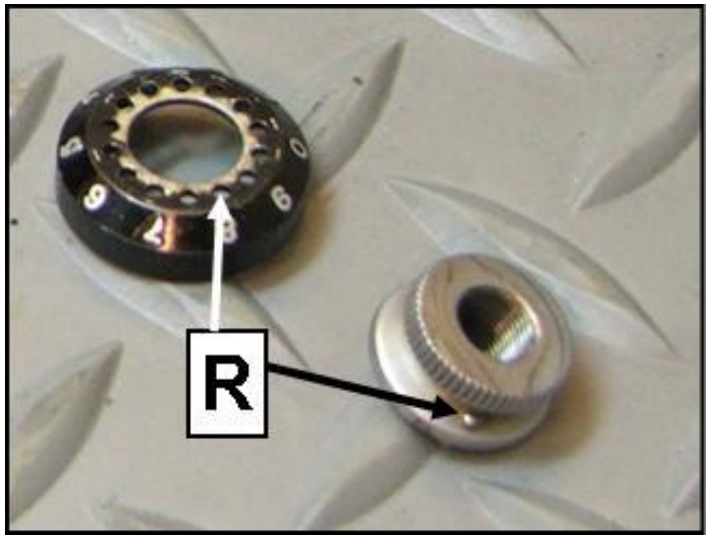


6. The rear plate can be removed if necessary, such as to remove thread lodged behind it. To do this, remove the two hook set screws (A), then the rear plate screw (D). Note the direction the plate faces and the hole used to secure it, as these are easily reinstalled backwards.

7. Reassembly is done in the reverse order.

When installing the hook back into the machine, slide it all the way onto the shaft. There can be no end-play (left to right movement) of the bottom shaft after the hook screws are tightened.
Be sure that the same hook set screw as before is tightened against the flat on the bottom shaft.
This may eliminate the need to retime the hook, and save you some time.
Check the needle/hook timing when it is back together.

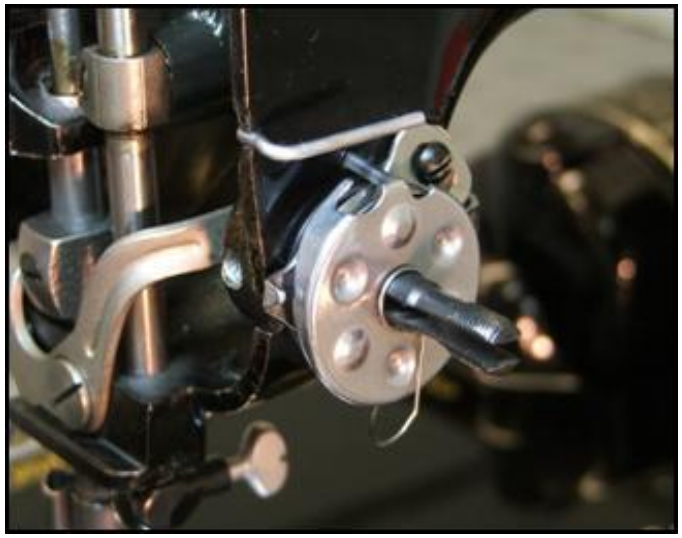
Disassembly & Assembly of the Thread Tension Unit



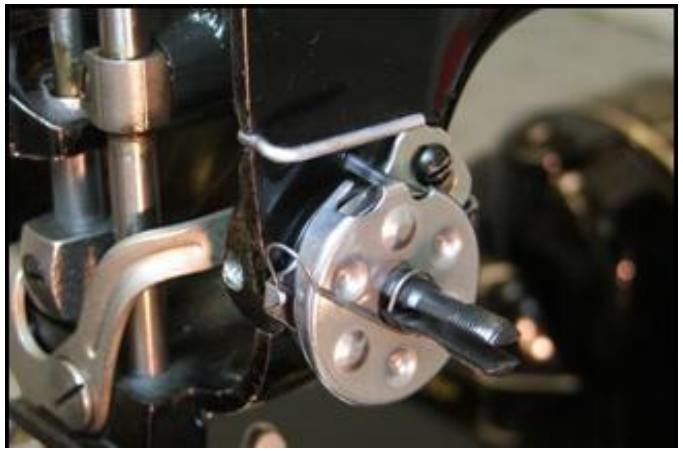
1. To disassemble the tension, rotate the tension knob to zero. Push the numbered bezel to the rear until it clears the small pin that extends from the back of the silver knob (R).
2. While holding the numbered bezel to the rear, unscrew the silver knob off the tension shaft.

3. The remaining parts can now be removed.

Notice the tension release pin which sits inside the tension shaft. You may also remove this if you like.



To reassemble:
1. install the tension release pin.
2. Slip the two tension disks and the guide plate into the check spring. Slide these parts as one unit onto the tension shaft. The guide plate pin will fit into a small hole at 12 o'clock, and the check spring should be allowed to hang down at 6 o'clock. This 6 o'clock position will give the desired check spring tension.



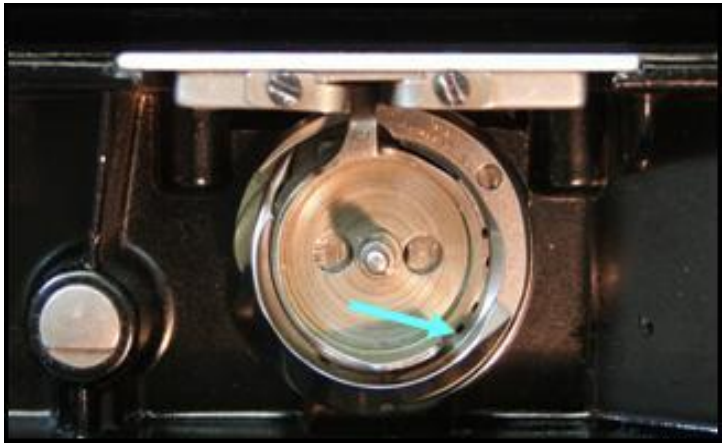
3. Install the tension release cup, cone spring and the tension dial stop-washer. Note that the hook on the washer points up and toward you.

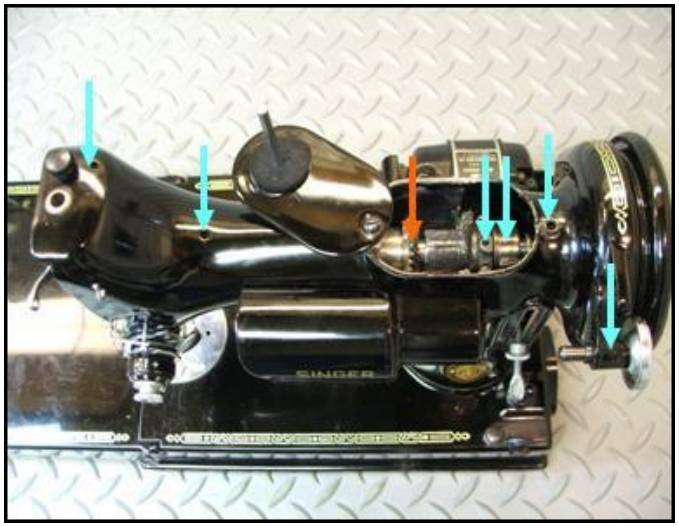
4. With "4" pointing up at 12 o'clock, push the numbered bezel onto the tension shaft as far as you comfortably can. Hold the bezel in this position and screw the silver tension knob onto the shaft until its pin engages the bezel. If done right the upper thread tension will not be too far off. Once the tension is fine tuned during sewing, the numbered bezel can be pushed in and rotated to the number of your choice, usually "4".

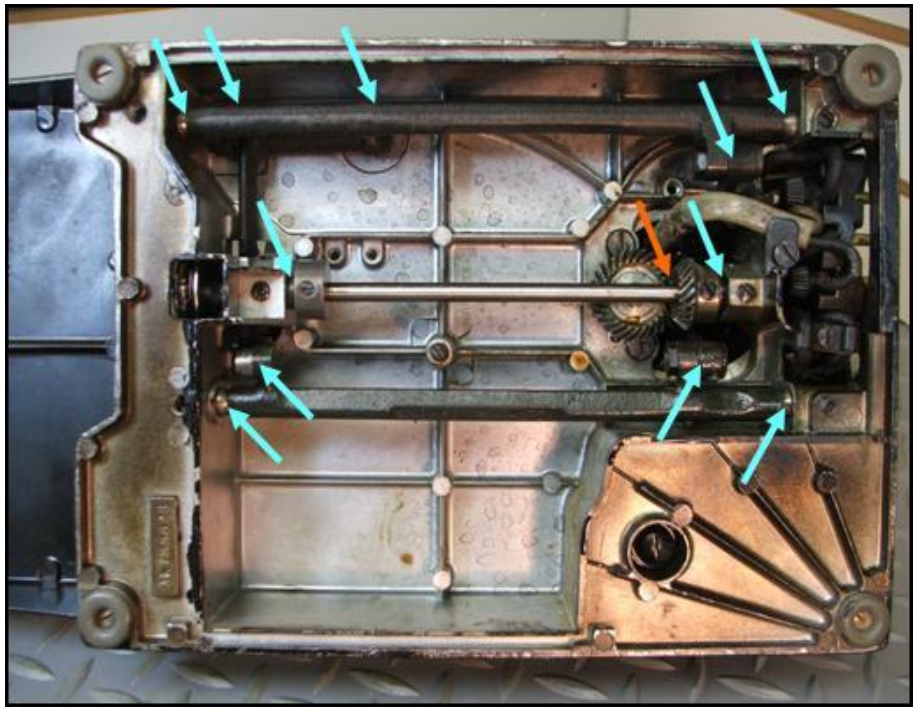
Bobbin Tension

Before adjusting the bobbin tension, clean any stray thread or debris from under the bobbin case tension spring. 25 grams of bobbin tension is usually appropriate with Metrosene thread .

Lubrication







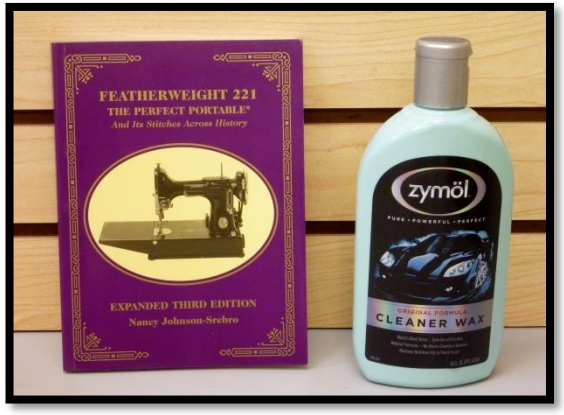
Oil
Grease

Cleaning & Polishing

A Word of Caution: When cleaning the painted surfaces on any classic black finish, do not use any type of all purpose cleaner such as 409, Fantastic, Simple Green or Windex. These will cause permanent spotting and dulling of the finish.

The accepted products for cleaning and polishing classic black finishes are Kerosene, and Zymol car polish.

1. The finish can be cleaned with Kerosene and a soft cloth.
2. Then polished, one small area at a time with Zymol polish. Never let the Zymol dry before wiping it off and polishing the finish with a clean, soft, dry cloth.



An excellent Featherweight resource is the book “FEATHERWEIGHT 221, THE PERFECT PORTABLE” by Nancy Johnson-Srebro.

Singer® 401 / 500 Class

1957 to 1963

Index

Common Issues / Cause / Solution

•Issue: Machine runs slow, pattern selector will not move properly or needle will not shift for zig-zag. caused by gum and lack of lubrication. Solution, clean and lubricate mechanisms.

• Issue: Machine runs slow, and the motor is very loud. caused by gum and pollutants within the motor. Solution, chemically clean the motor and lubricate the lower motor bushing.

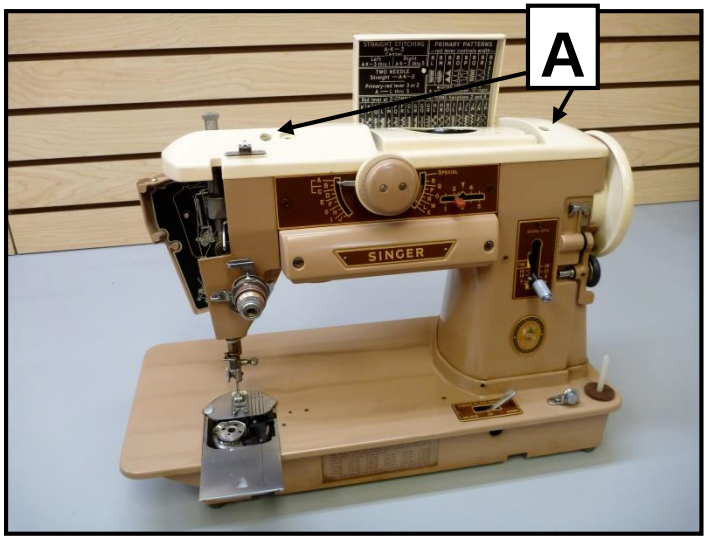
•Issue: Skipped stitches, caused by improper needle bar height. Solution: Adjust the needle bar height.

•Issue: Skipped stitches, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

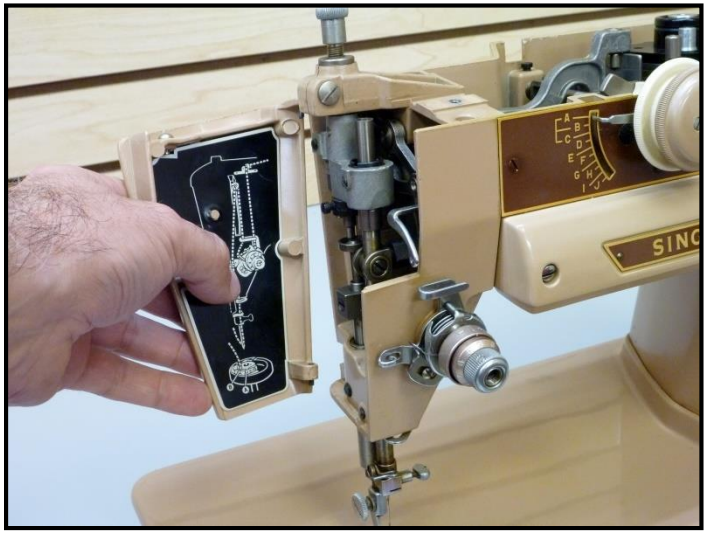
•Issue: Thread loops under the fabric and jams in the bobbin area, caused by a poorly adjusted bobbin case stopper. Solution: Adjust the bobbin case stopper.

•Issue: Poor stitches or thread breakage, caused by burrs on the throat plate or the tip of the hook. Solution: De-burr the throat plate and hook tip with emery paper.

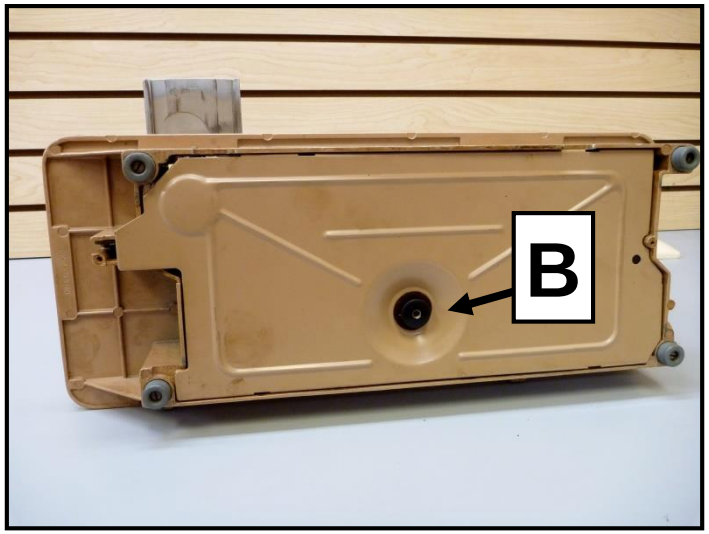
Cover Removal



1. Remove the top cover with 2 screws (A).

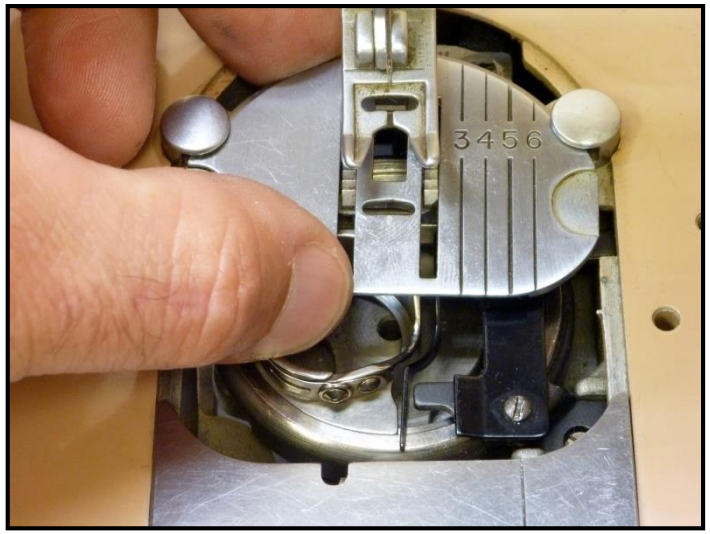


2. The face plate can be lifted slightly and removed.

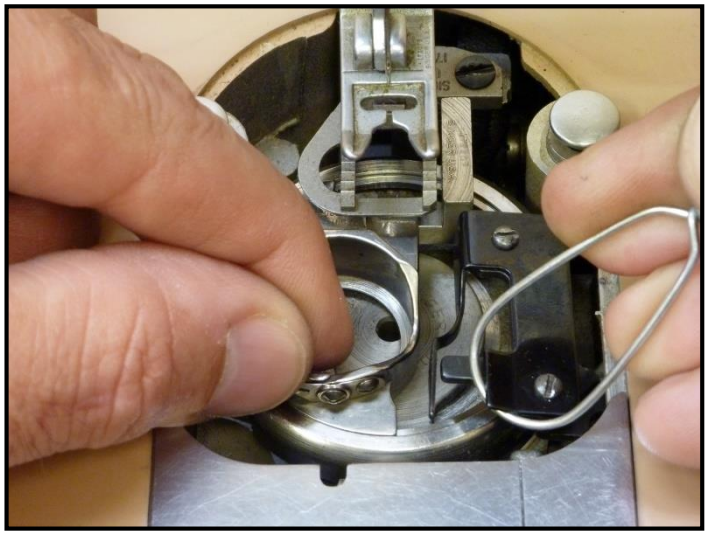


3. Remove the base plate cover with thumb screw (B).

4. Remove the throat plate by first moving the throat plate position lever to the unlock position



Then the throat plate can be removed.

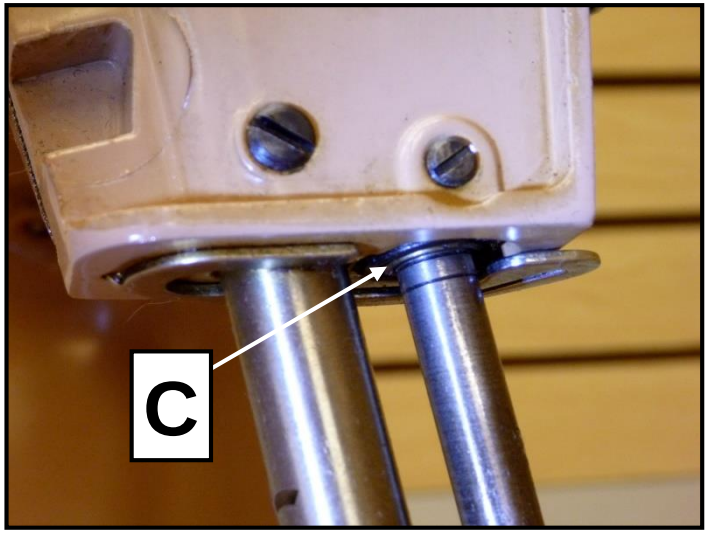


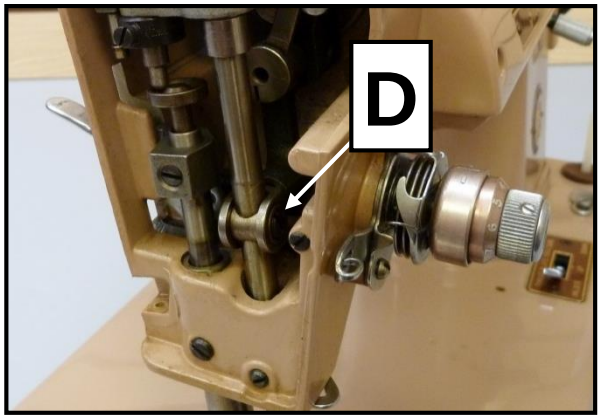
5. Remove the bobbin case by lifting the bobbin case stopper up and to the right. The loop at the end of your lint brush is a good tool for this.

Adjustments & Maintenance

Needle Bar Height

Rotate the hand wheel until the needle bar is at its lowest position. When the needle bar height is correct, the upper mark (there are two) on the needle bar should be even with the needle bar bushing (C). Adjustment is made by loosening the needle bar set screw (D), and moving the bar as needed.



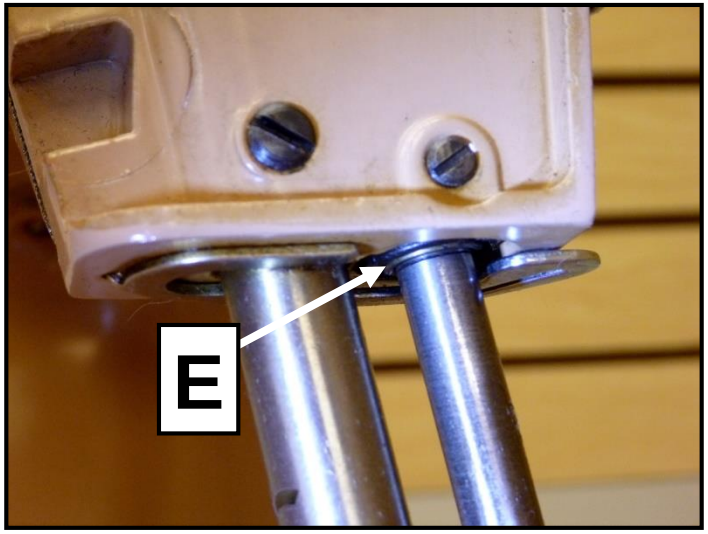


Loop Lift (Needle/Hook Timing)

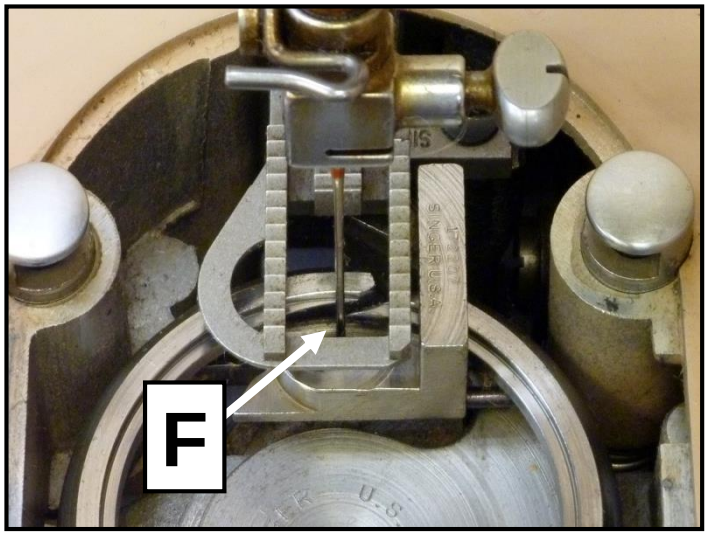
1. Adjustment of the loop lift (needle hook timing) is done by referring to a timing mark that is located on the needle bar. For this reason, the height of the needle bar must be correct first. Refer to the previous section, titled “Needle Bar Height” for instructions.

2. To check the loop lift (needle hook timing), rotate the hand wheel until the needle bar is at its lowest position.

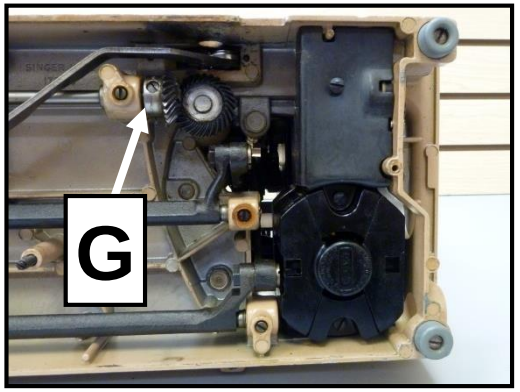
3. Continue rotating the hand wheel toward you until the lower needle bar mark has risen to a point even with the needle bar bushing (E).



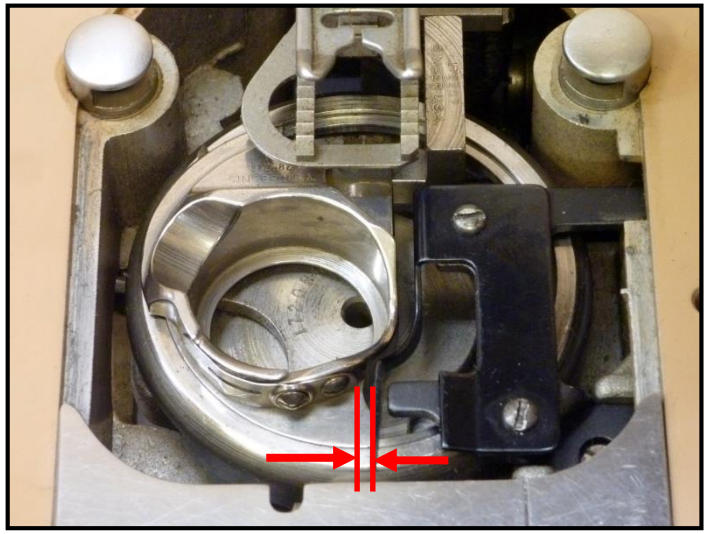
4. With the lower mark even with the needle bar bushing (E), you have caused the needle bar to raise the correct loop lift amount. The machine is now in its timed position. If the needle/hook timing is correct, the tip of the hook will be behind the needle (F).



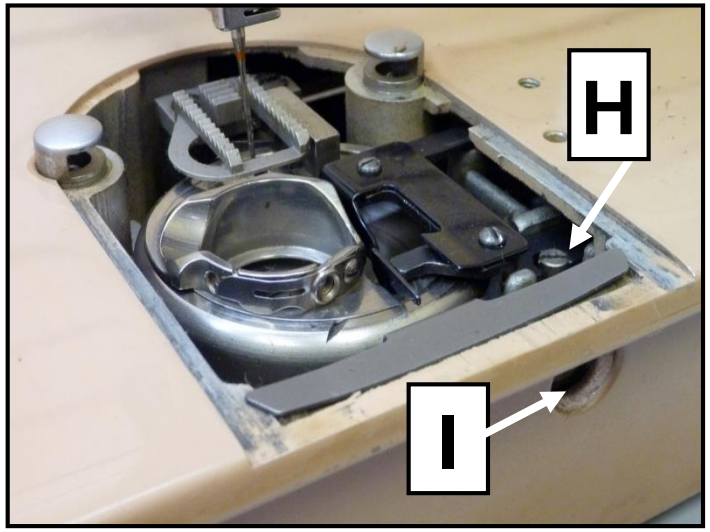
5. If the hook tip is not behind the needle, loosen the two timing screws (G) on the timing gear, and rotate the hook into the correct position.



Bobbin Case Stopper



The bobbin case stopper is adjusted correctly when there is approximately 1.0mm to 1.2mm clearance between the stopper and the bobbin case.



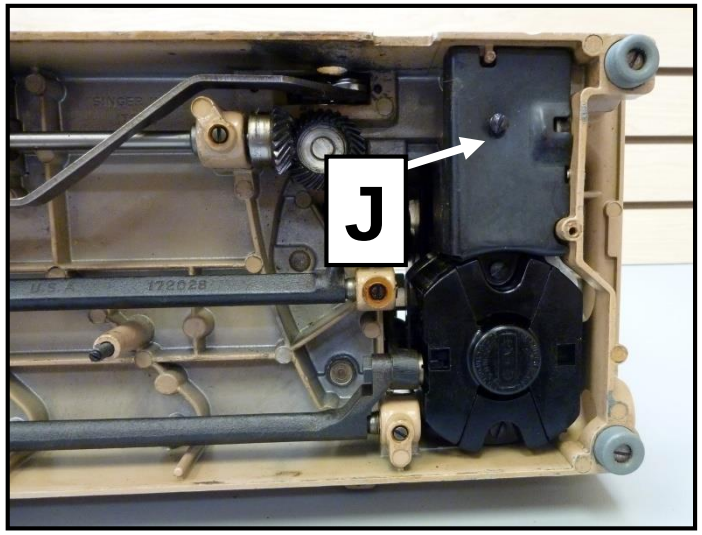
Adjustment is made with eccentric screw (H) after loosening set screw (I). Removal of the slide plate is not necessary.

Reattaching the Slide Plate

Reattach the slide plate by positioning the plate over the feed dogs, then sliding it toward you until it reaches the slide plate clip. Gently lift each end of the clip, and slide the plate toward you.

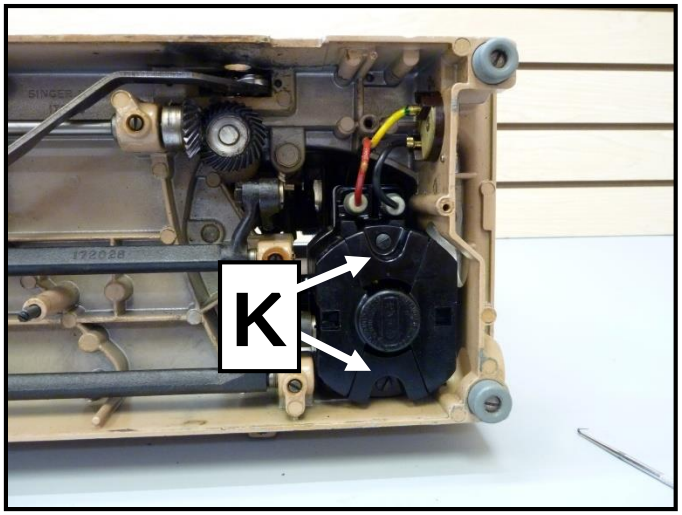
Motor Cleaning

If necessary, the motor can be cleaned internally with C-60 spray motor solvent. C-60 is a non-conductive, non flammable solvent that can be sprayed into a motor to flush out excess carbon and gum.
CAUTION: Be sure to read the cautions printed on the can. Never let C-60 come in contact with a plastic machine housing, touch screens, or your eyes.



1. Remove the motor retaining bracket with screw (J).

2. Remove the motor brush covers with 2 screws (K), then the brushes and sleeves.

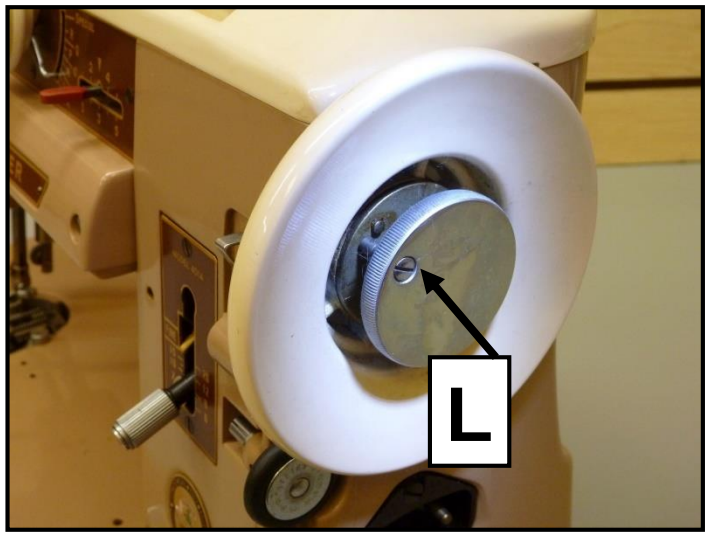


3. After unplugging the 2 wires from the motor, the motor can be easily pulled out through the bottom of the machine.

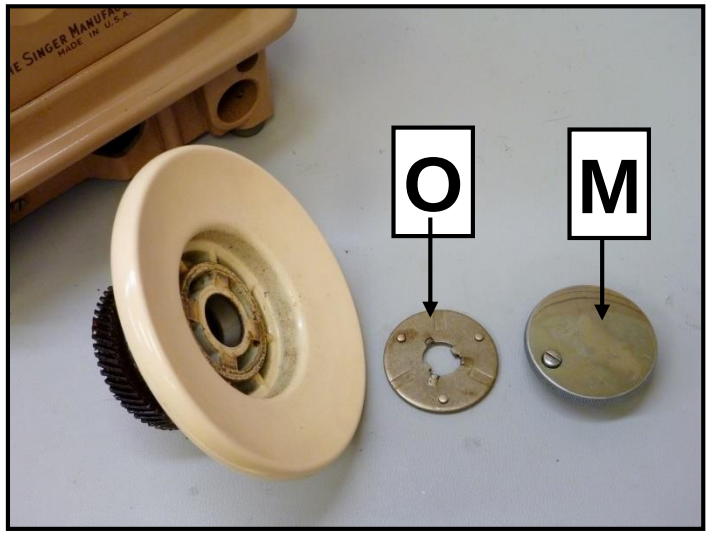
4. Going through the openings exposed by the brush covers, spray out the motor until the runoff becomes clear. Be sure to collect the runoff with a towel, and don't let the solvent get on any visible parts of the machine. Follow cautions printed on the can.

Cleaning a sticky Hand wheel Clutch

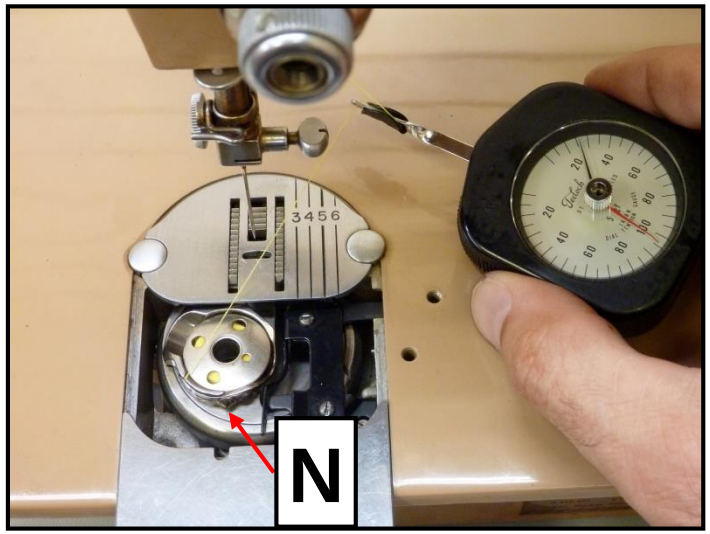
1. Remove the hand wheel clutch screw (L), then remove the clutch knob (M) by unscrewing it off the end of the top shaft.
2. Remove the stop-washer (O), then slide the hand wheel off the shaft.



3. Clean the inside of the hand wheel, the outside of the shaft, the knob and the washer with WD-40®. Wipe the parts dry, then lubricate with oil before assembly.



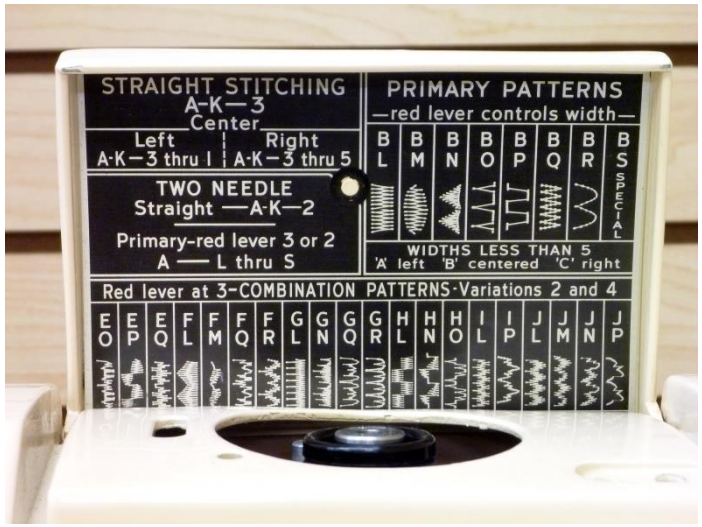
Bobbin Tension



20 grams of bobbin tension is usually appropriate with Metrosene thread. Make adjustments with the left bobbin case screw (N).

Selecting Stiches for Sewing

A stich chart is printed on the inside of the hinged top cover. The letter knobs select a stitch pattern, and the numbered lever sets either the needle position or the stitch width. The lettered knobs are released by being pushed or pulled. Popular stitches are AK3 (straight stitch, center needle position), BL3 (medium width zig-zag), BL5 (wide zig-zag) and BO3 (medium width blind stitch).



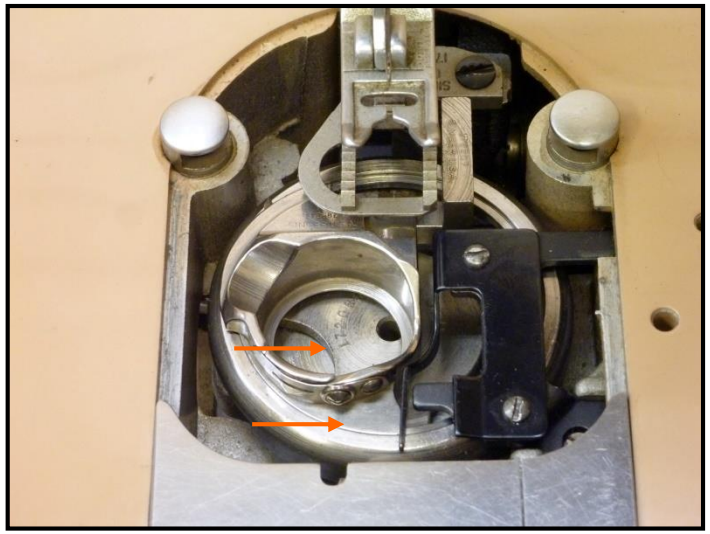
Exterior Cleaning & Polishing

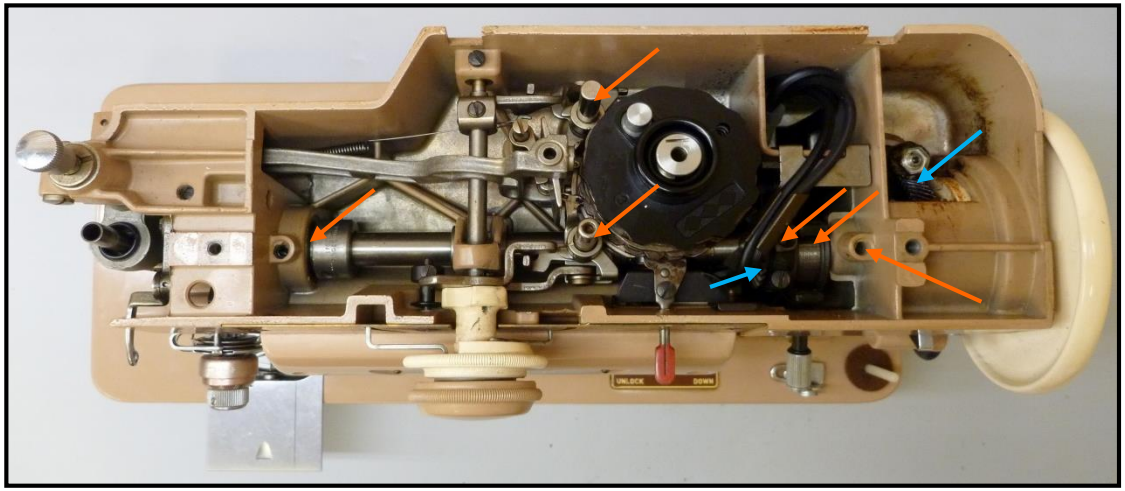
A Word of Caution: When cleaning the painted surfaces on any classic tan finish machine, do not use any type of all purpose cleaner such as 409, Fantastic, Simple Green or Windex. These will cause permanent spotting and dulling of the finish.

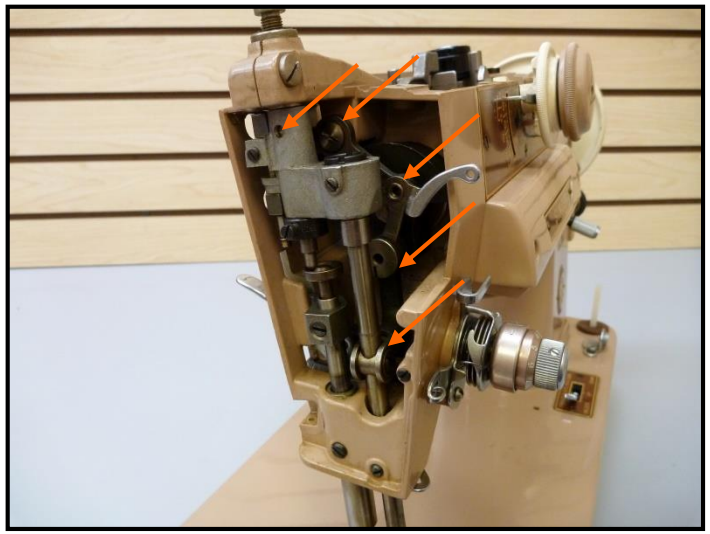
The accepted products for cleaning and polishing classic tan finishes are Kerosene, and Zymol car polish.

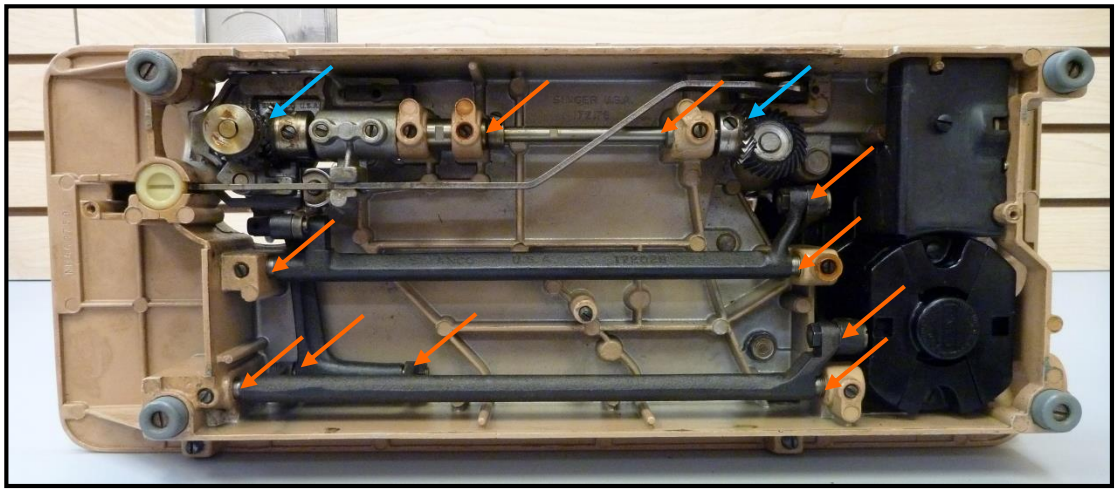
1. The finish can be cleaned with Kerosene and a soft cloth.
2. Then polished, one small area at a time with Zymol polish. Never let the Zymol dry before wiping it off and polishing the finish with a clean, soft, dry cloth.

Lubrication









Oil

Grease

Singer® Touch & Sew, 600 Class

1962 to 1970

Index

Common Issues / Cause / Solution

•Issue: Will not pick up the bobbin thread, caused by broken hook drive gears. Solution: Replace any broken gears.

•Issue: Skipped stitches, caused by improper needle bar height. Solution: Adjust the needle bar height.

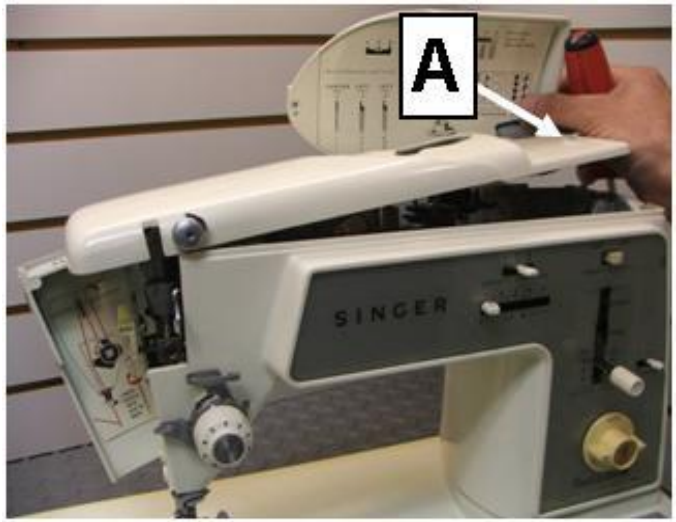
•Issue: Skipped stitches, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

•Issue: Thread loops under the fabric and jams in the bobbin area, caused by a poorly adjusted bobbin case stopper. Solution: Adjust the bobbin case stopper.

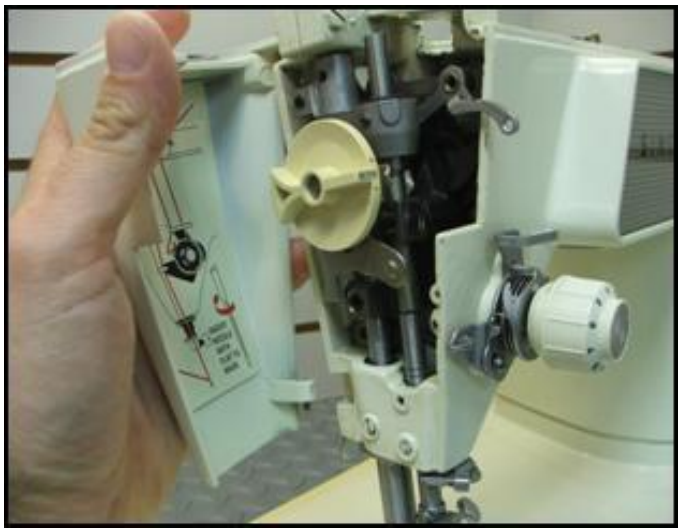
•Issue: Knocking noise when sewing a zigzag. The cause is likely a cracked top shaft collar. Solution: Replace or adjust the collar.

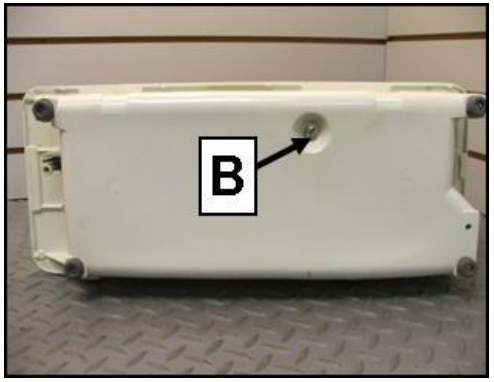
•Issue: Poor stitches or thread breakage, caused by burrs on the throat plate or the tip of the hook. Solution: De-burr the throat plate and hook tip with emery paper.

Cover Removal



To remove the top cover, first swing open the face plate (left side cover). Remove the top cover screw (A), then lift up on the right end of the top about one inch. The top cover can now be slid to the left a few inches and removed from the machine.

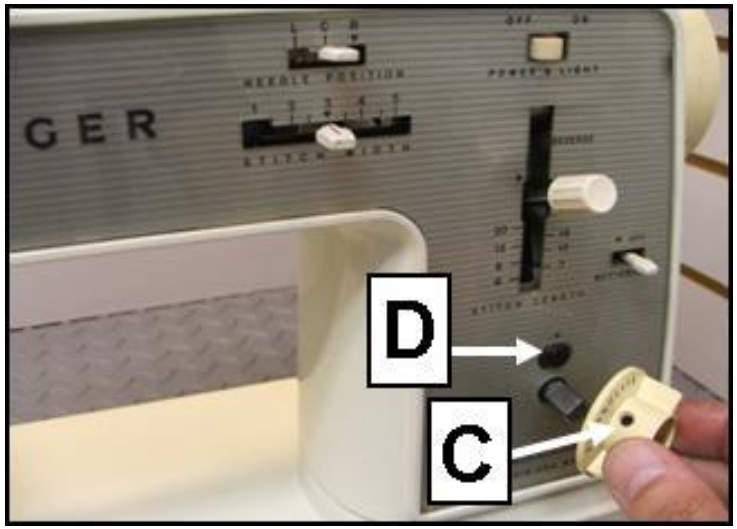




Remove the base plate with screw (B), and all four casters.

Remove the bobbin case by lifting the bobbin case stopper up and to the right. The loop at the end of your lint brush is a good tool for this.

Removal of the front cover is not usually necessary during a regular service. You will most likely only remove it to replace the top gear.



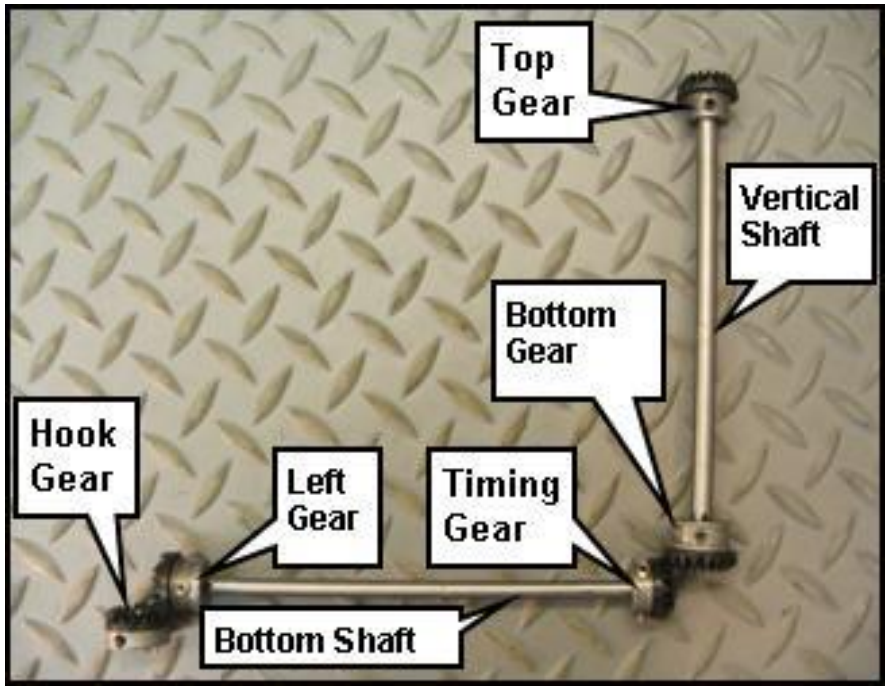
To remove the front cover, loosen the set screw (C) on the button hole knob, if equipped. Remove the front cover screw (D).

Center all the various levers that protrude through the front cover. The front cover is held in place by several tabs that fit into notches in the machine frame (marked with arrows). Starting on the right, remove the cover.

Adjustments & Maintenance

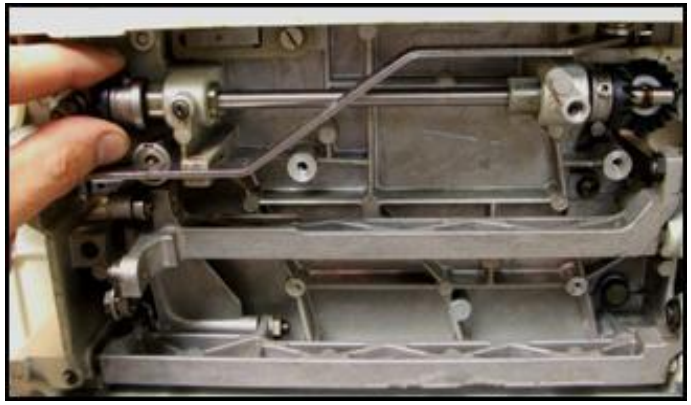
Replacement of Broken Gears

Singer® 600 Class Touch & Sews are well known for their fragile gears. There are six gears that drive the hook, five of which break. They are known as the Top, Bottom, Timing, left, and hook gear. Over the years, these gears have been made of many different materials. If the gears are black or white in color, then you would be fine to just replace the gears that are broken or show noticeable wear. It's advisable to replace any gears that are yellow in color, as they are the oldest and most brittle.



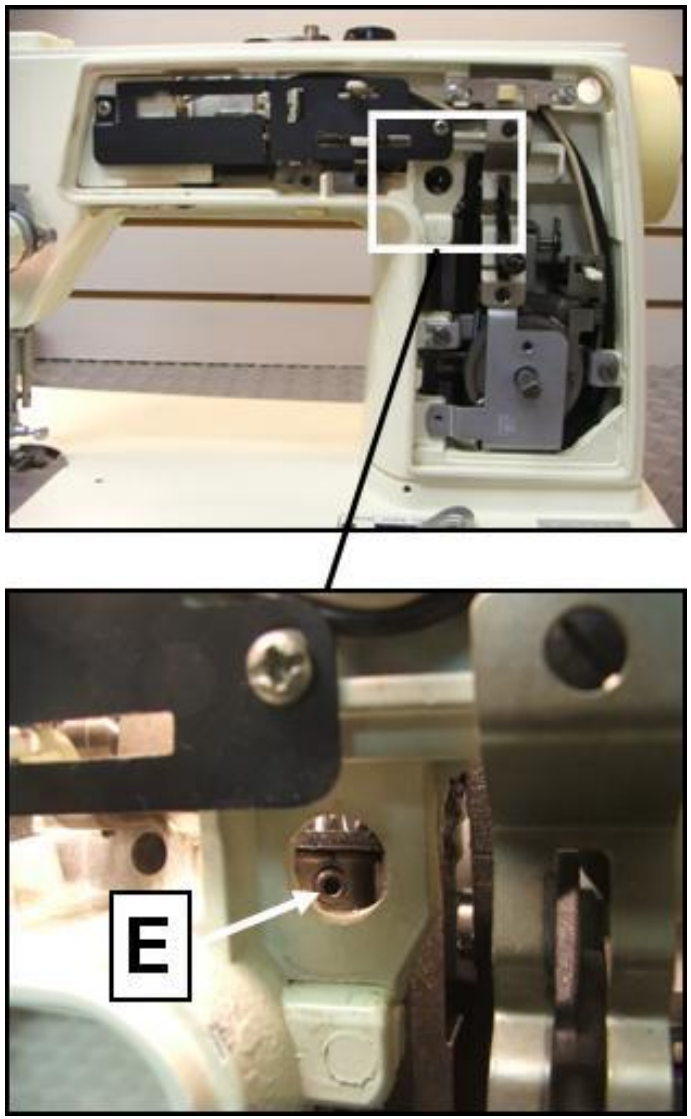
The same basic procedure is used for replacing each one of the five gears, with the exception of the hook gear. I will explain, one gear at a time.
Be aware that each gear is secured to its drive shaft by one or two set screws. These screws are usually 3/32", or may be 2.5mm on replacement gears. In many cases, the set screw is tightened against a flat that is cut into the drive shaft. Because of the flat, it is important to sufficiently loosen or even remove the set screws from the gear. This will prevent difficulty removing the gear or damage to the drive shaft.

Left gear removal



1. Loosen or remove the left gear set screw.
2, Loosen or remove the two timing gear set screws.
3. Slide the bottom shaft to the right, far enough to exit the left gear.
4. Remove the gear.

Top gear removal



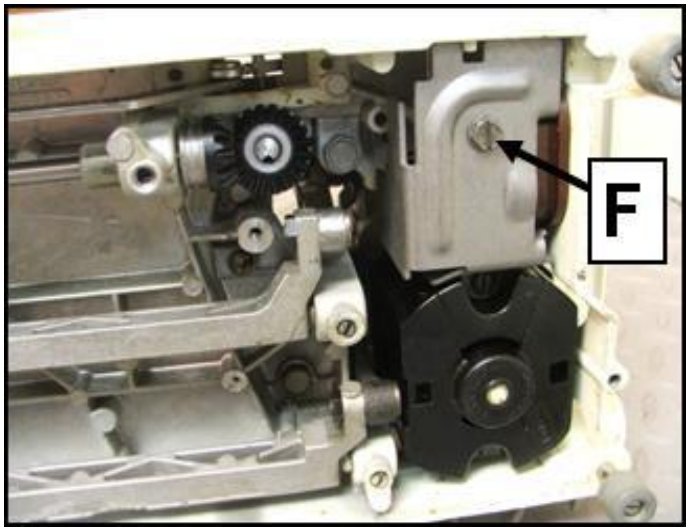
1. Remove the front cover.
2. Loosen or remove the top gear set screw (E).
3. Loosen or remove the bottom gear set screw.
4. Slide the vertical shaft down, far enough to exit the top gear.
5. Remove the gear.

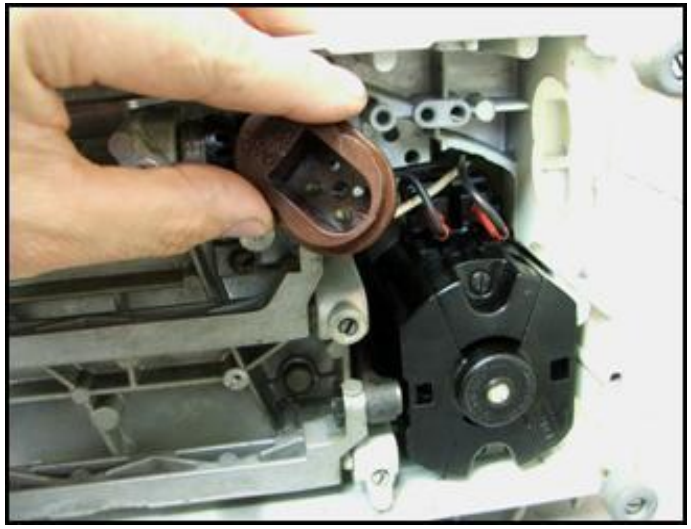
Bottom gear removal:

1. Remove the Top gear as described on the previous page.
2. Slide the vertical shaft down, far enough to exit the bottom gear.
3. Remove the gear.

Timing gear removal:

1. Loosen or remove the left gear set screw.
2. Loosen or remove the two timing gear set screws.

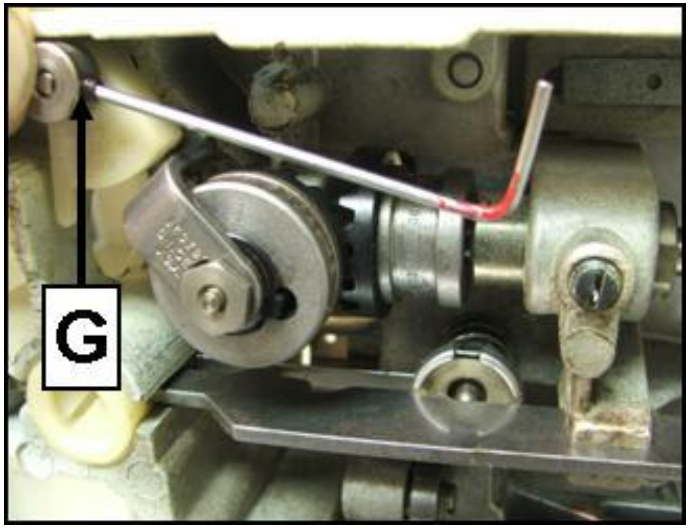


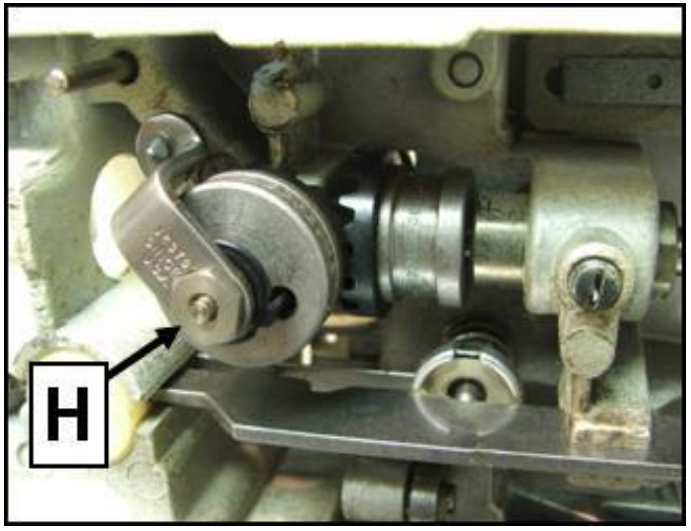


3. Remove the motor/electric socket bracket, with one screw (F).
4. Hold the electric socket out of the way, and slide the bottom shaft to the right, far enough to exit the timing gear.
5. Remove the gear.

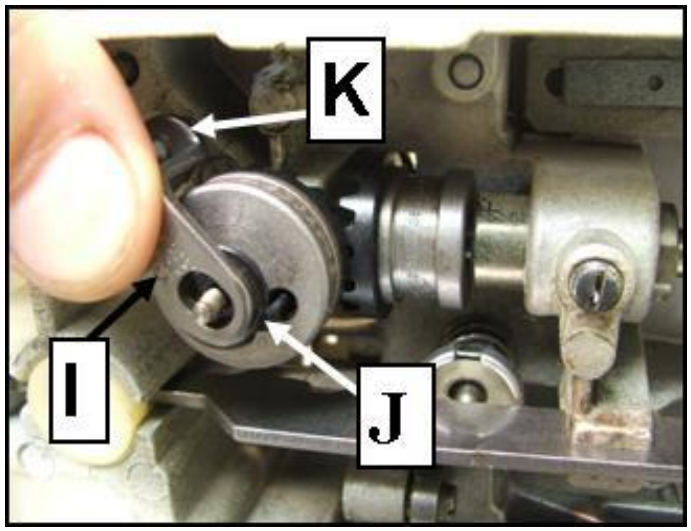
<u>Hook gear removal</u>

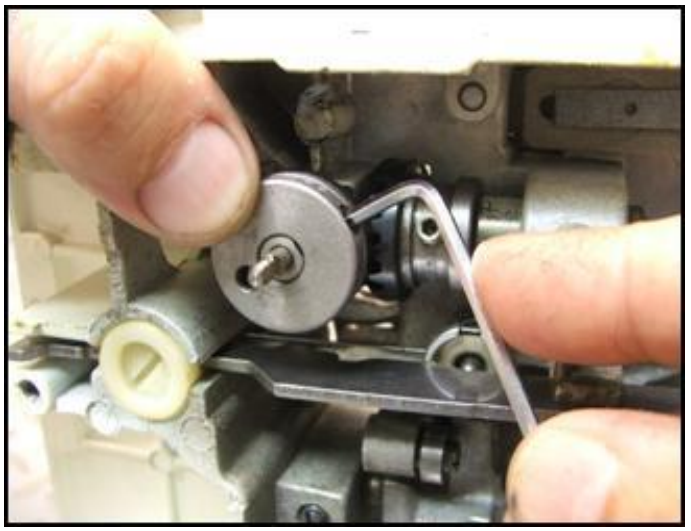
1. Loosen bobbin winder cam screw (G), and remove bobbin winder cam.
2. While carefully holding the hook still, remove the bobbin winder shaft nut (H), by turning it <u>clockwise</u>. Note that this is one of three <u>left hand threaded fasteners</u> in this machine.





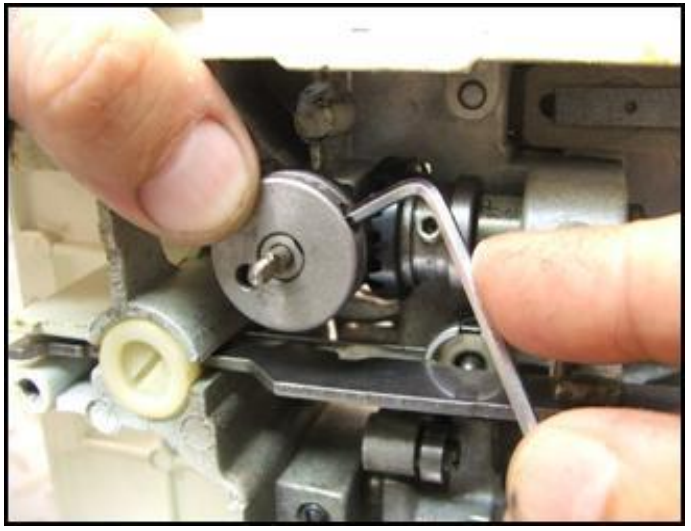
3. Remove the bobbin winder lifter (I) and drive washer (J). Note that there is a spring within the machine frame (K), located above the bobbin winder lifter. This spring will usually stay in place.





Installation of Gears

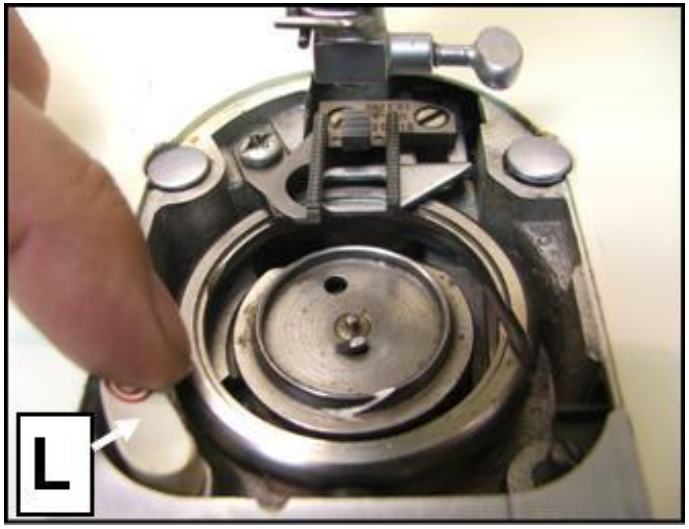
Hook gear installation



4. Loosen or remove the hook gear set screw.
5. Remove the gear.

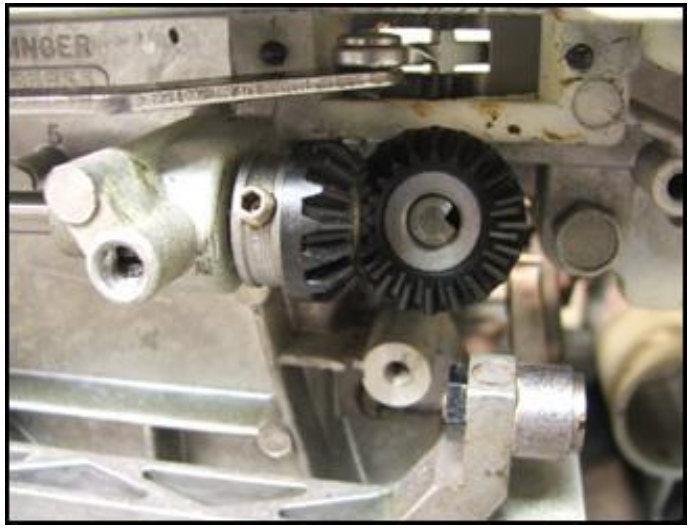
1. While holding down on the hook, slide the hook gear all the way onto the hook shaft. Tighten the gear set screw against the flat portion of the hook shaft. Note, there can be no end play (up and down movement) of the hook shaft when you are done. Note, do not over tighten the gear set screw, as it can crush the hook shaft and disable the bobbin winder.
2. Reinstall the bobbin winder parts in reverse order. Make sure that the spring is in the machine frame (K), above the bobbin winder lifter (I). Remember that the bobbin winder shaft nut (H) has left hand threads, so you will tighten it counter clockwise.

3. Adjust the height of the bobbin winder cam (G). This is done by holding the bobbin winder lever (L) to the left, while lightly holding parts (I) and (J) up against the hook gear, then tightening the bobbin winder cam screw. The screw needs to be tightened against the flat portion of the shaft.
4. After the hook gear and bobbin winder parts are installed, check the needle bar height, adjust the loop lift (needle/hook timing), and check the bobbin winder.



Top and bottom gear installation

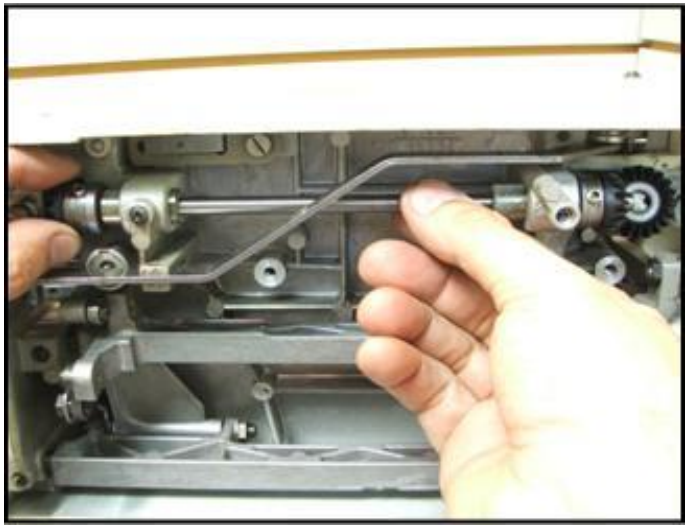
1. Hold the bottom gear in place while sliding the shaft through it and up into the machine. Before the shaft is all the way into the machine, position and hold the top gear in place.
2. Slide the shaft up into the top gear.
3. Tighten the top gear set screw, making sure it rests on the flat portion of the shaft.
4. While Lightly pressing the top gear down and the bottom gear up, to prevent end play (up and down movement of the shaft), tighten the bottom gear set screw against the flat portion of the shaft.
5. After the top and bottom gears are installed, check the needle bar height, then adjust the loop lift (needle/hook timing).



Left and timing gear installation

1. Hold the timing gear in place while sliding the shaft through it and into the machine.

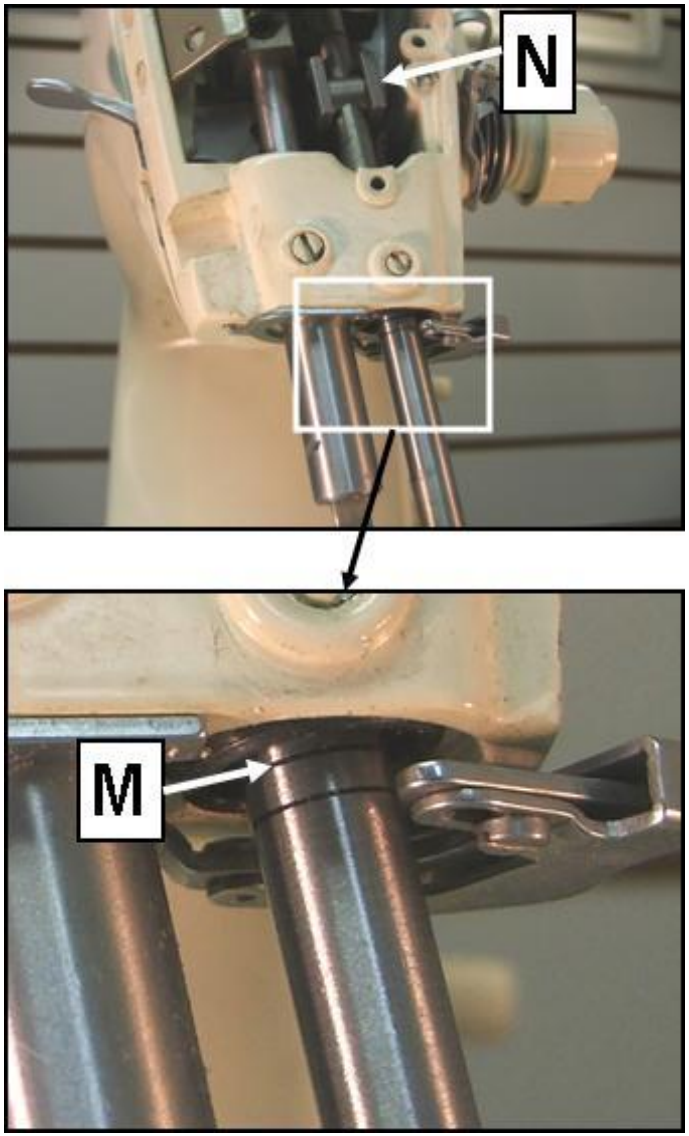
2. Before the shaft is all the way into the machine, position and hold the left gear in place.
Slide the shaft over, into the left gear, so the end of the shaft is flush with the left side of the gear .
Tighten the left gear set screw, making sure it rests on the flat portion of the shaft.



3. After the left and timing gears are in place, and the left gear set screw is tight, check the needle bar height, then adjust the loop lift (needle/hook timing).

Adjustments & Maintenance

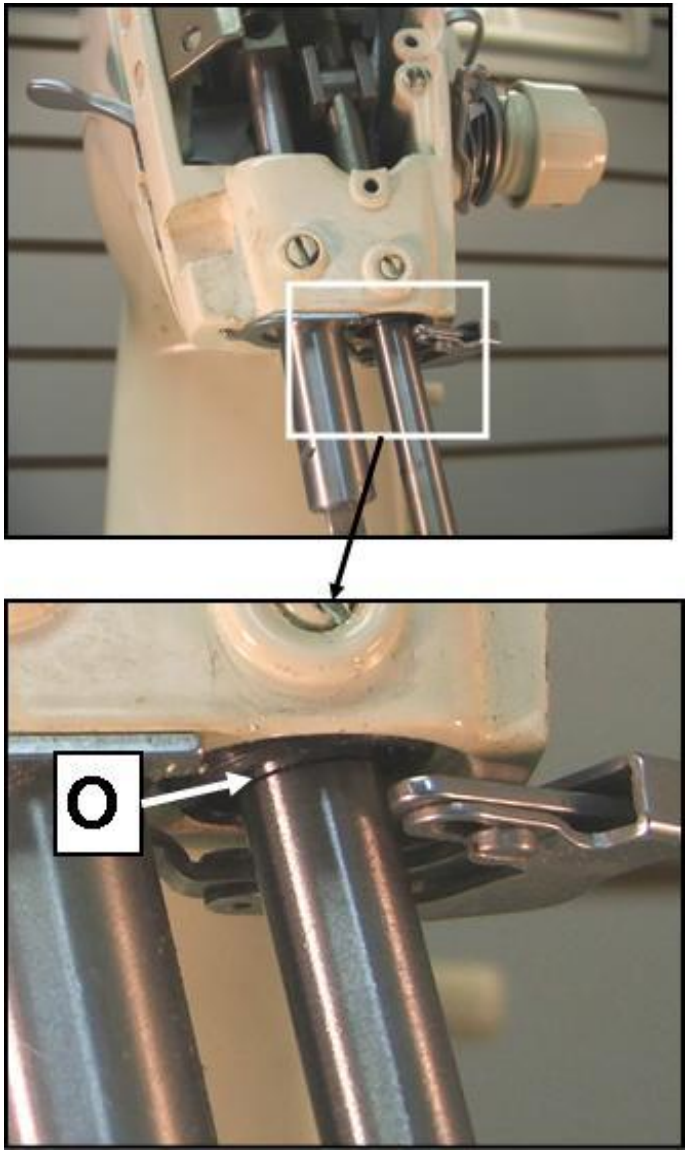
Needle Bar Height



Rotate the hand wheel until the needle bar is at its lowest position. When the needle bar height is correct, the upper mark (there are two) on the needle bar should be even with the needle bar bushing (M).
Adjustment is made by loosening the needle bar set screw (N), and moving the bar as needed.

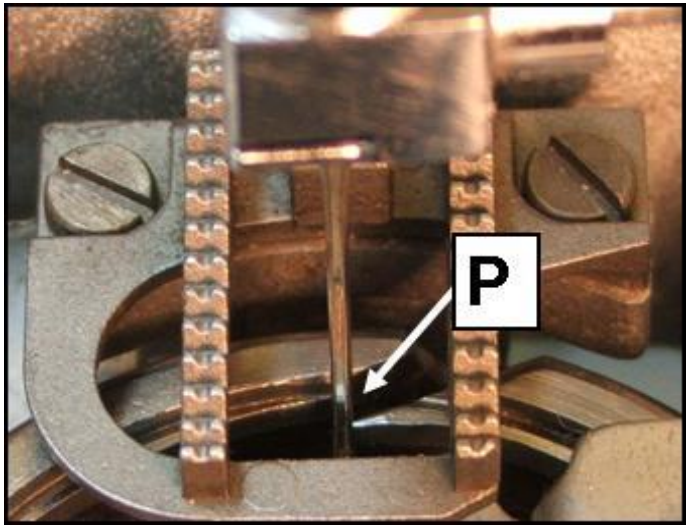
Loop Lift (Needle/Hook Timing)

1. Adjustment of the loop lift (needle hook timing) is done by referring to a timing mark that is located on the needle bar. For this reason, the height of the needle bar must be correct first. Refer to the previous section, titled “Needle Bar Height” for instructions.



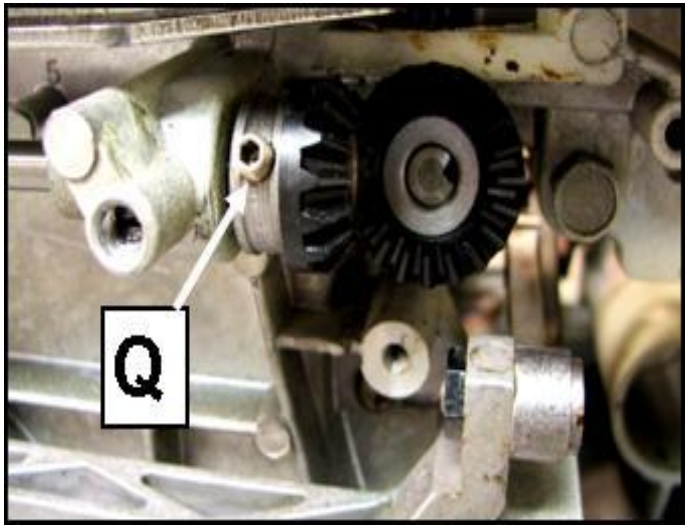
2. To check the loop lift (needle hook timing), rotate the hand wheel until the needle bar is at its lowest position.

3. Continue rotating the hand wheel toward you until the lower mark has risen to a point even with the needle bar bushing (O).

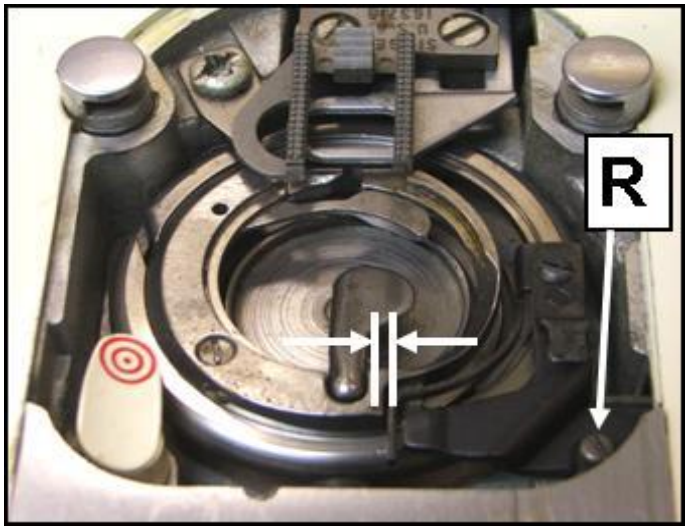


4. With the lower mark even with the needle bar bushing (O), you have caused the needle bar to raise the correct loop lift amount. The machine is now in its timed position. If the needle/hook timing is correct, the tip of the hook will be behind the needle (P).

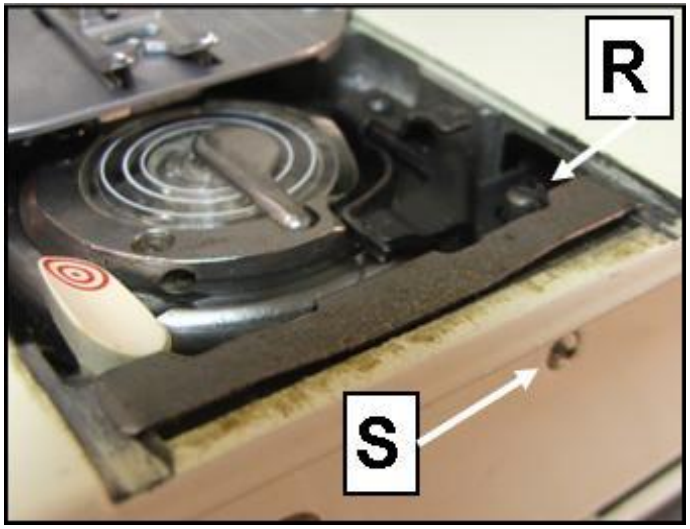
5. If the hook tip is not behind the needle, loosen the two timing screws (Q) on the timing gear, and rotate the hook into the correct position.



Bobbin Case Stopper



The bobbin case stopper is adjusted correctly when there is approximately 1.0mm to 1.2mm clearance between the stopper and the bobbin case.



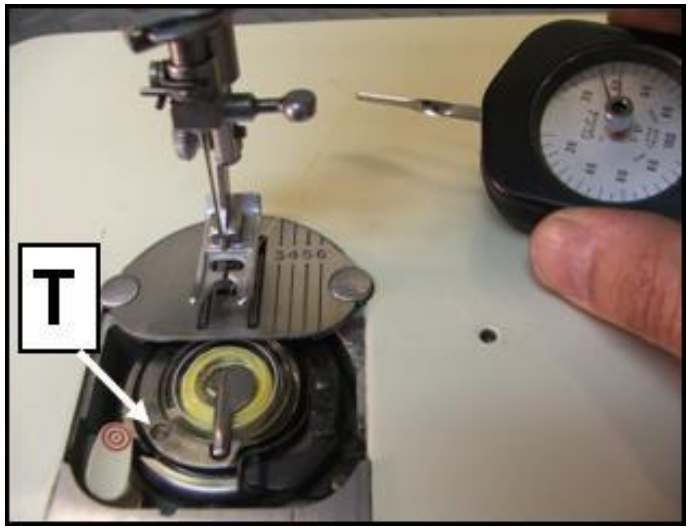
Adjustment is made with eccentric screw (R) after loosening set screw (S). Removal of the slide plate is not necessary.

Top Shaft Collar

Examine the plastic top shaft collar for cracks. Replace it if needed. Adjust its position left or right to eliminate any end play (left or right movement) of the top shaft.

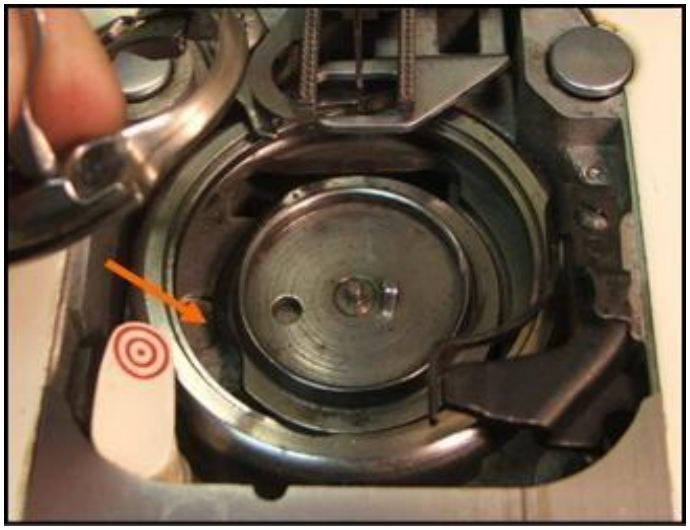
Other Common Adjustments & Maintenance

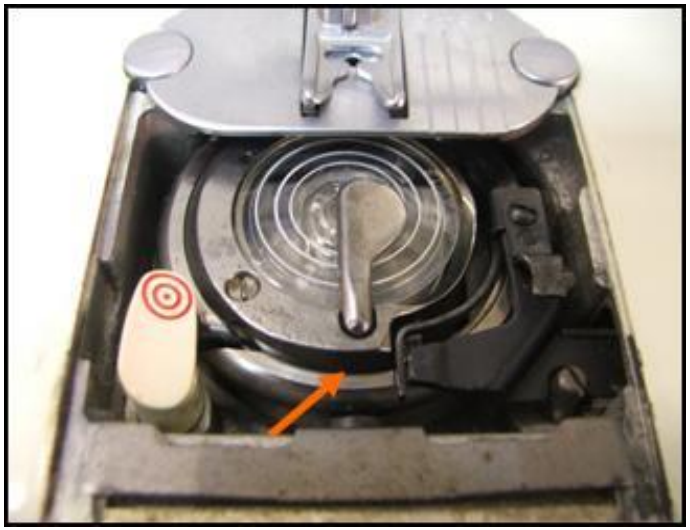
Bobbin Tension



25 grams of bobbin tension is usually appropriate with Metrosene thread . Note that due to the design of the Touch & Sew bobbin case, bobbin tension varies quite a bit depending on how much thread is on the bobbin.
The bobbin tension can be adjusted with the screw located on top of the bobbin case (T).

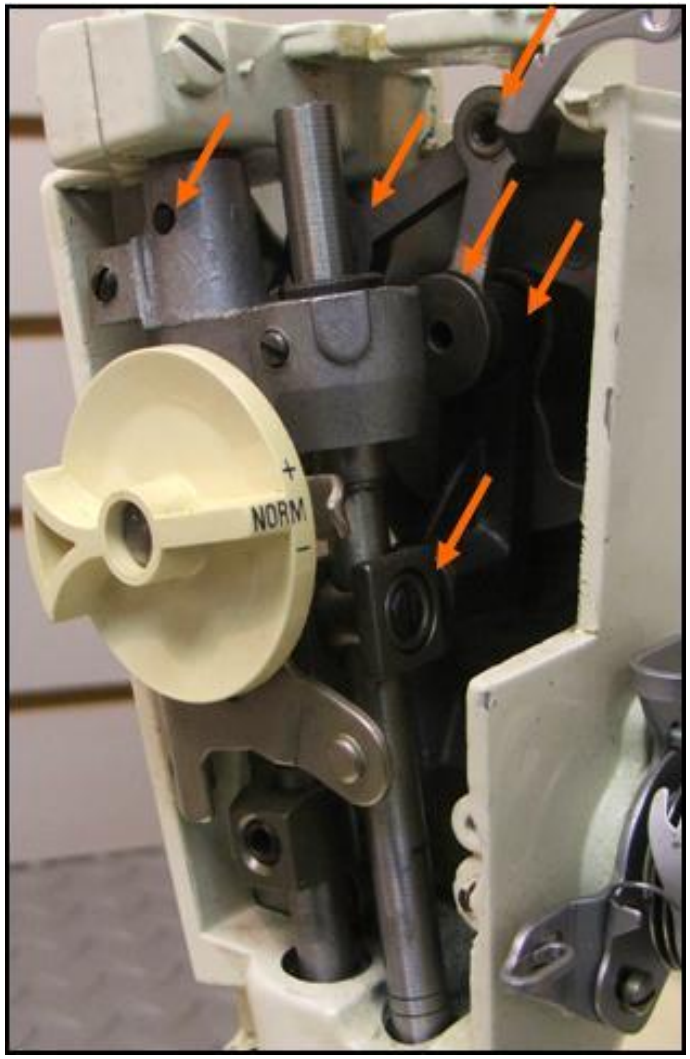
Lubrication





Oil

Grease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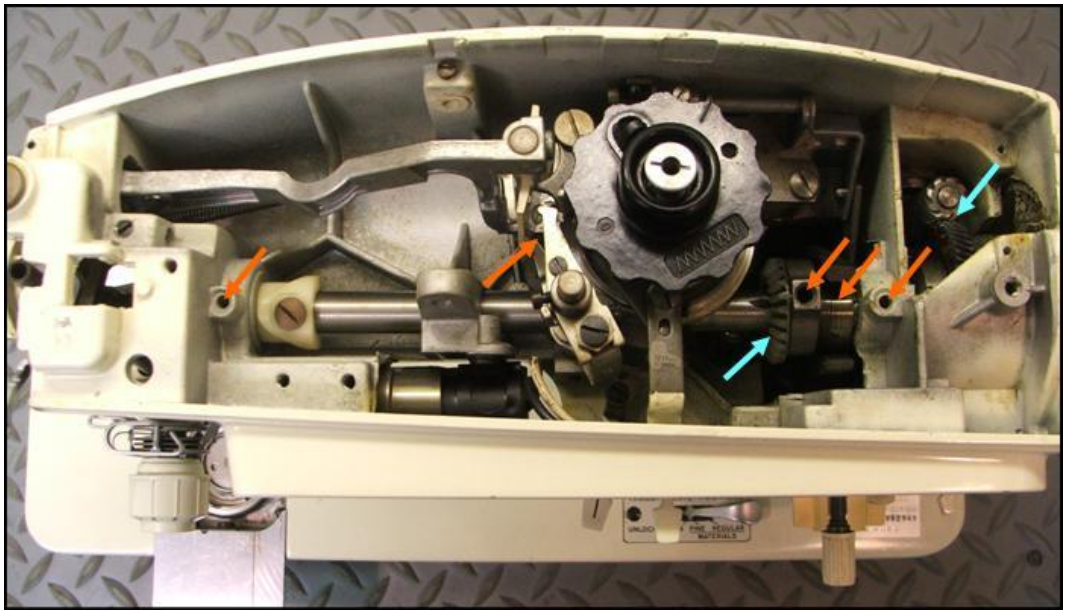

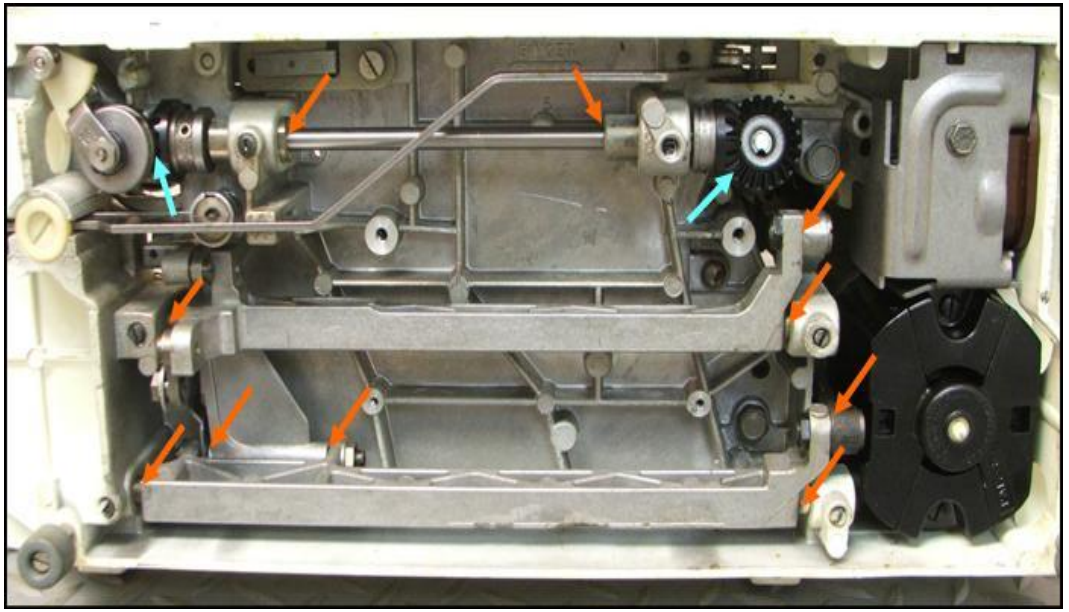

Singer® 6200/9000 Class

1985 to early 2000's

Index

Common Issues / Cause / Solution

•Issue: The fabric feeds poorly, the presser foot will not lift, or it's height is not correct, or the presser bar pivots out of position easily. This is often caused by a loose presser bar guide set screw, or a cracked presser bar guide. Solution: Replace or adjust the presser bar guide

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•Issue: The machine skips stitches and breaks needles. There is excessive front to back movement of the needle bar. This is often caused by a loose needle bar bushing set screw, or a cracked needle bar support. Solution: If the needle bar support is cracked, it will need to be replaced. Repair of the machine may not be feasible, due to availability of parts (you will likely need an entire head frame).

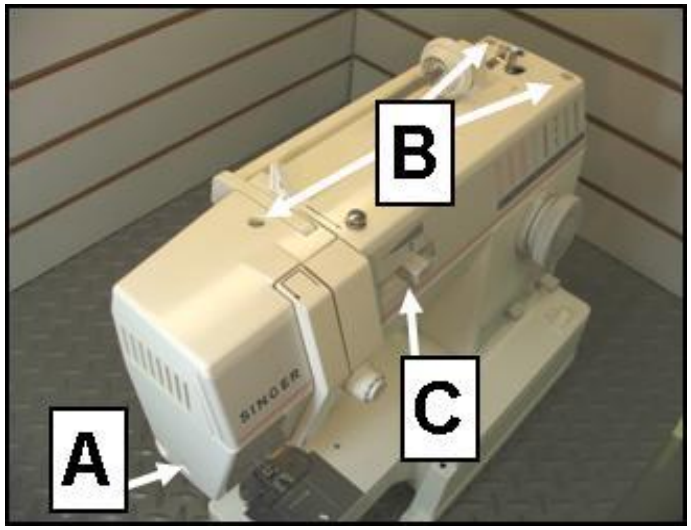
•Issue: Thread loops under the fabric and jams in the bobbin area, caused by a damaged bobbin case or a poorly adjusted bobbin case stopper. Solution: Replace the bobbin case, and/or adjust the bobbin case stopper.

•Issue: Skipped stitches, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

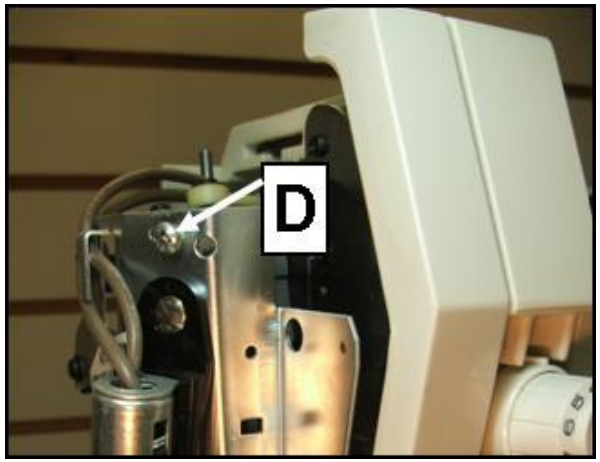
•Issue: Skipped stitches, caused by improper needle bar height. Solution: Adjust the needle bar height.

•Issue: Poor stitches or thread breakage, caused by burrs on the throat plate. Solution: De-burr the throat plate with emery tape.

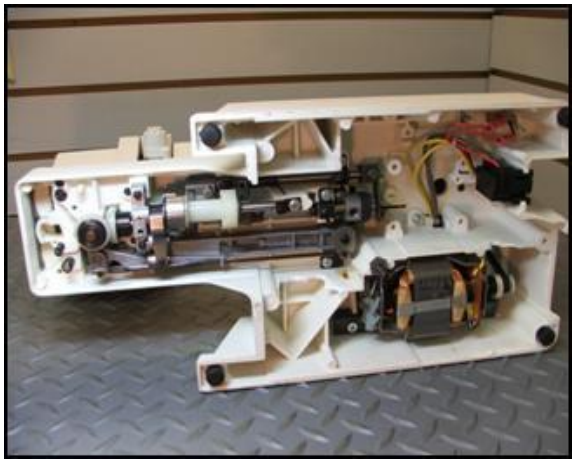
Cover Removal



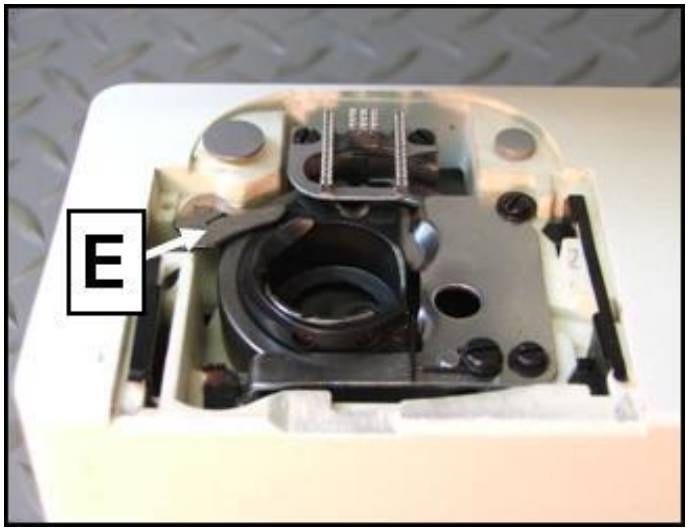
1. Remove the face plate with one screw (A).
2. Prepare to remove the top cover by removing the three top screws (B), and the stitch width knob (C). Do not remove the bobbin winder stopper.
Place the stitch width lever in the center position.
Loosen the phillips head screw (D.



3. Remove the top cover by lifting the right end and swinging it clockwise. When it just clears the stitch width lever, you can carefully lift it off of the machine.



4. Remove the bottom cover by removing one nut located in the center, and one or two phillips head screws located near the edge of the cover.
5. Remove the free arm cover by removing one screw.

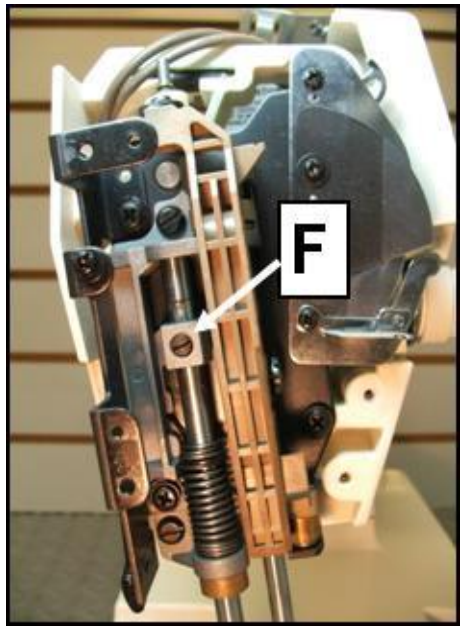


Remove the bobbin case by pivoting the bobbin case retainer (E) counter-clockwise. Use the slot in the center of the retainer, and a small screw driver to prevent damaging the bobbin case. The photo above was taken with the slide plate removed to improve visibility. It is not necessary to remove the slide plate when removing the bobbin case.
When reinstalling the bobbin case, be sure to close the bobbin case retainer.

Adjustments & Maintenance

Presser Bar Height & Allignment

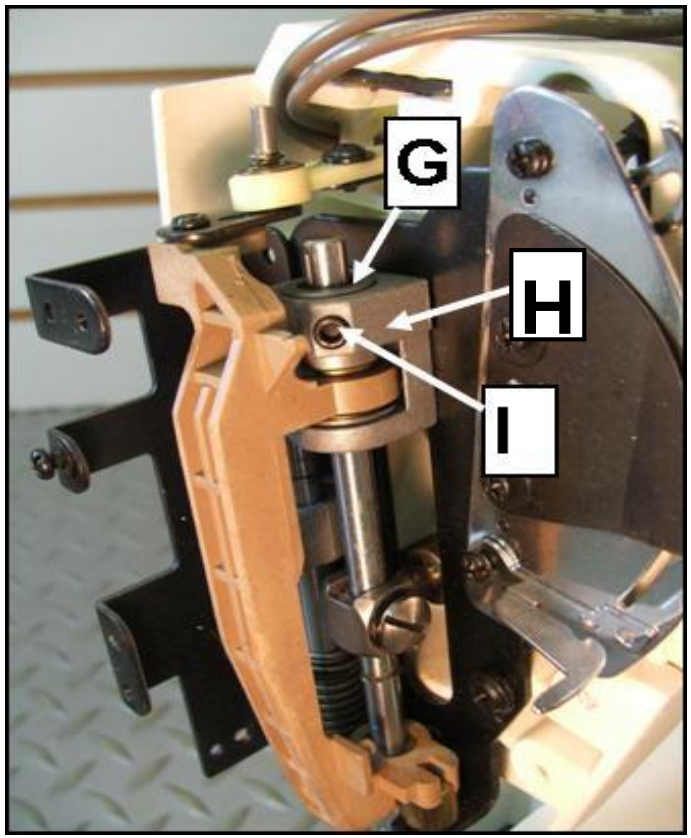
When the presser bar guide (F) is adjusted properly, the presser foot can be lifted an appropriate amount, and the presser foot will be straight in relationship to the feed dogs.



If this is not the case, check to see if the presser bar guide is cracked, or if the set screw is just loose. The photo above was taken with the sewing light removed to improve visibility.

If the presser bar guide is cracked, it will need to be replaced. I usually advise against this, due to the fact that the new guide seems to be no stronger than the old one, and will likely crack again. The customers tend not to have the repair done either for this reason, or due to the cost. I would suggest the customer purchase a new BERNINA.
If the set screw is simply loose, you can adjust the presser bar position, apply Loctite® to the screw, and *lightly* tighten the screw.

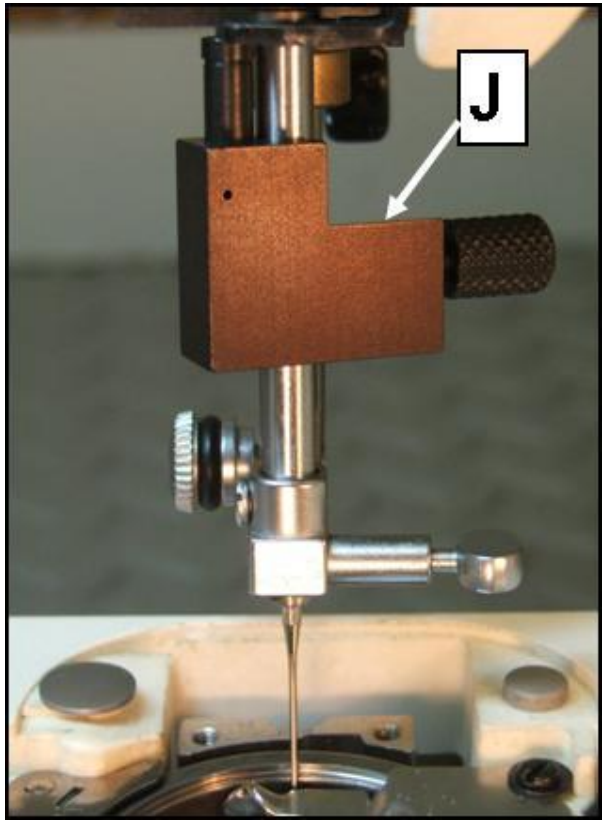
Needle Bar Bushing/Support



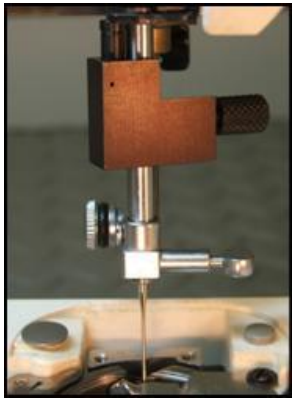
When the needle bar bushing (G) is adjusted properly, the needle bar will have minimal play side to side and front to back when held by the needle clamp. If the needle bar moves excessively, check to see if the needle bar support (H) is cracked near the bushing, or if the needle bar bushing set screw (I) is just loose. The photo above was taken with the sewing light removed to improve visibility.
If the set screw is simply loose, you can adjust the bushing. To do this, rotate the hand wheel until the needle bar is in its lowest position. Loosen the bushing set screw (I), and apply a small amount of Loctite® to the threads. Hold down lightly on the bushing (G), and *lightly* tighten (snug) the screw. Do not over-tighten the set screw, as you can easily crack the needle bar support.

Loop Lift (Needle/Hook Timing)

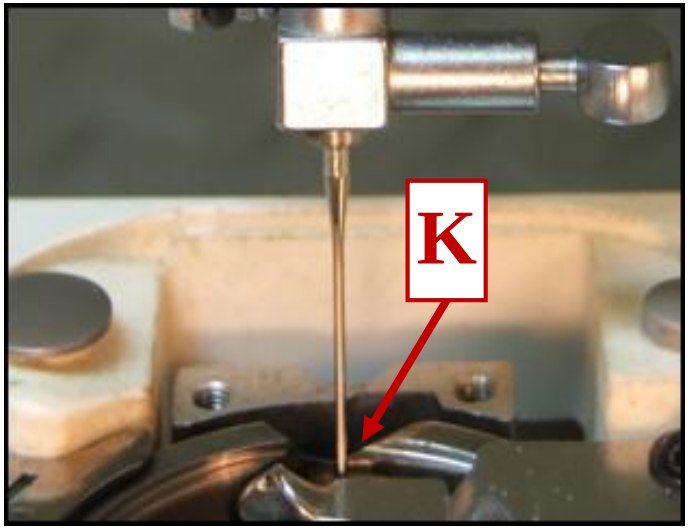
1. Install a good needle.
2. Set the needle position to the center.
3. With the hand wheel, position the needle bar to it's lowest position.

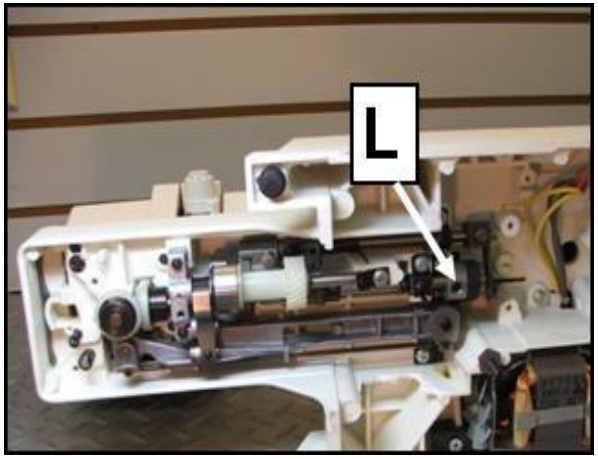


4. Place the spring-loaded timing gauge (J) around the needle bar. Slide the gauge upward until the retractable pin just makes contact with the needle bar bushing or any stable structure convenient to the gauge. Tighten the thumb screw.



5. Rotate the hand wheel toward you until the needle bar rises and fully compresses the gauge's retractable pin. At this point the hand wheel will not turn any farther because the gauge has stopped the needle bar. You have now caused the needle bar to raise precisely 2.3mm. The machine is now in its timed position. If the loop lift (needle/hook timing) is correct, the tip of the hook will be approximately behind the left edge of the needle (K).



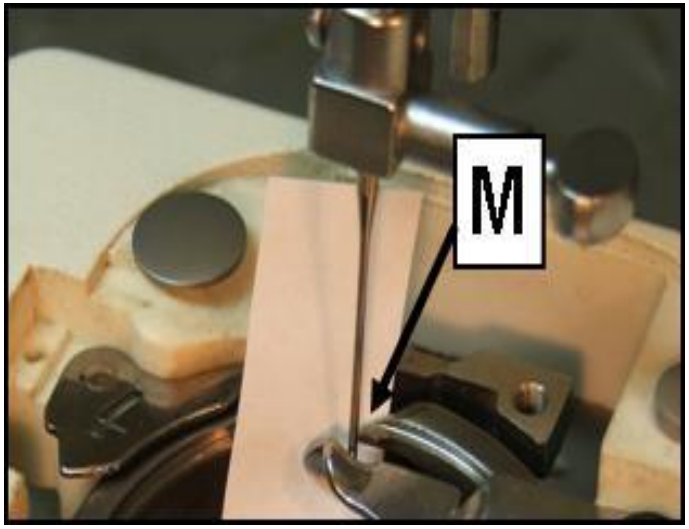


6. If an adjustment is needed, loosen the two screws (L) on the lower timing belt pulley and reposition the hook as needed. Before tightening the set screws, check to see that the feed dogs are in the low position. If not, rotate the hook one turn to get the feed system in sync. Tighten the two set screws.

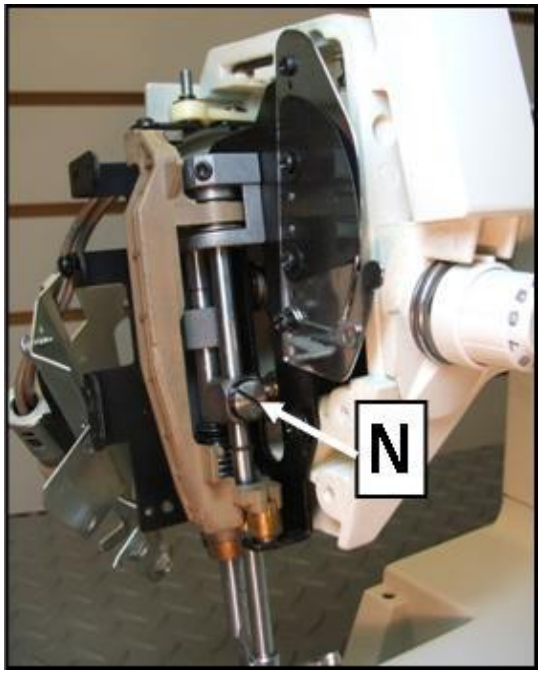
Needle Bar Height

You will be using the tip of the hook as your reference when adjusting the needle bar height. Make certain that the loop lift (needle/hook timing) is adjusted correctly before continuing.

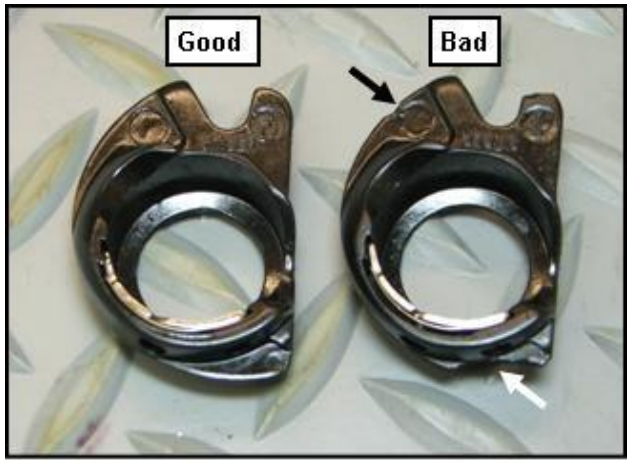
1. Set the needle position to the full left position.
2. With the hand wheel, position the tip of the hook so that it is flush with the left side of the needle. The needle bar height is correct if the hook tip (M) is just slightly above the top of the needle eye. No part of the hook tip should be visible through the needle eye.



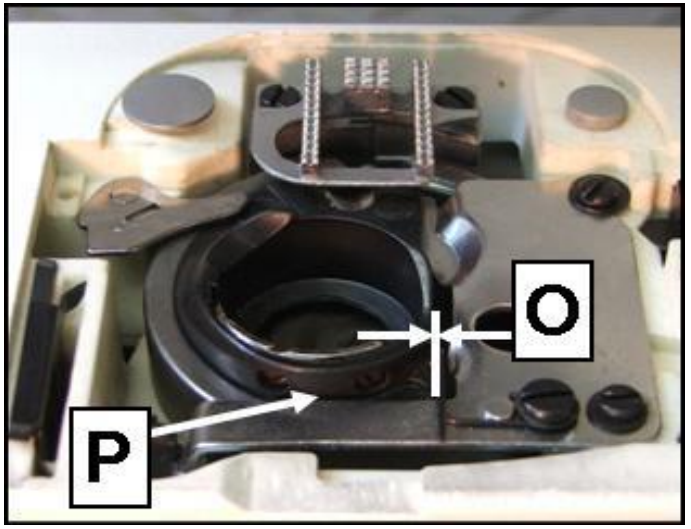
3. If the needle bar height requires adjustment, loosen set screw (N) and move the needle bar up or down as needed.



Bobbin Case Stopper



Here are examples of two bobbin cases (Apollo Class). The one on the left is new. The one on the right had become dislodged while sewing, rotated past the bobbin case stopper, and been damaged beyond repair. This bobbin case will need to be replaced. The arrows point to damage that will keep it from working.

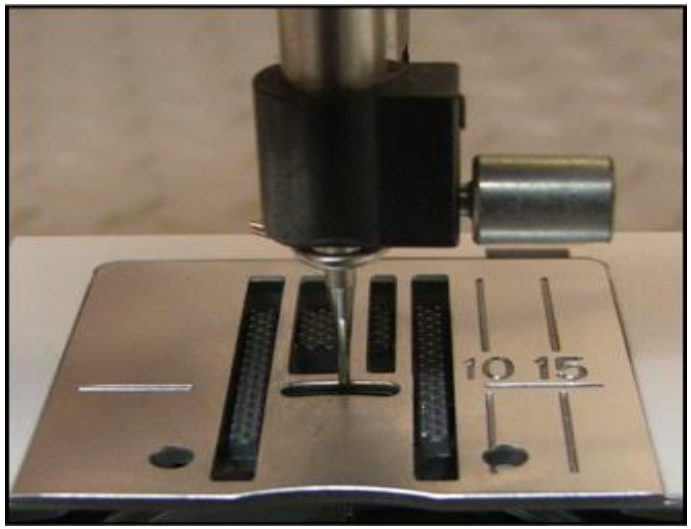


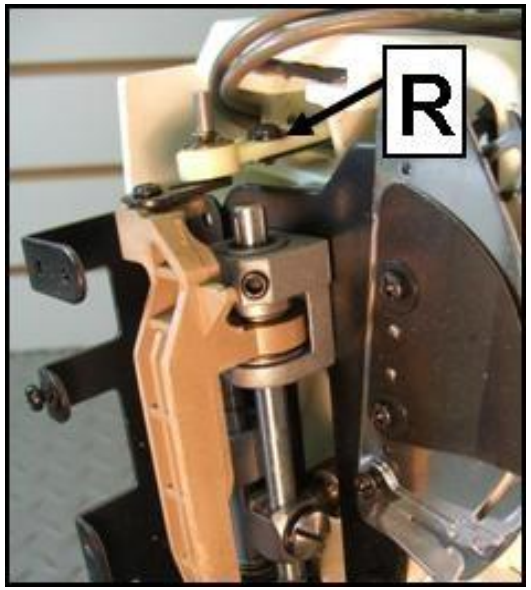
The bobbin case stopper is adjusted correctly when there is approximately 1.0mm clearance between the stopper and the bobbin case at locations (O) and (P).

The bobbin case stopper can be moved left, right, forward, and back, by loosening two screws (Q).

Other Common Adjustments & Maintenance

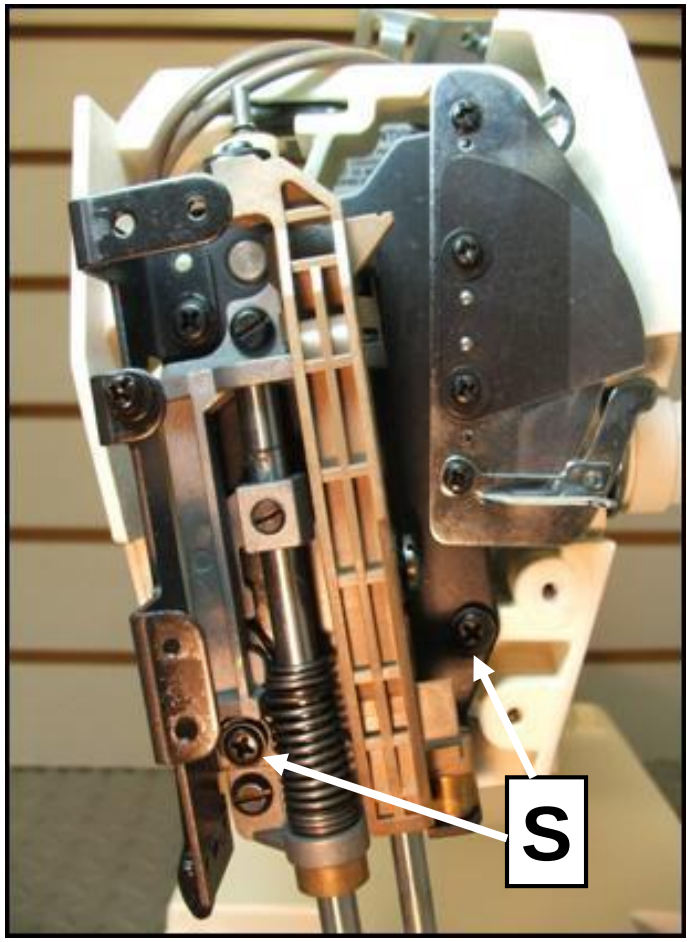
Needle Position





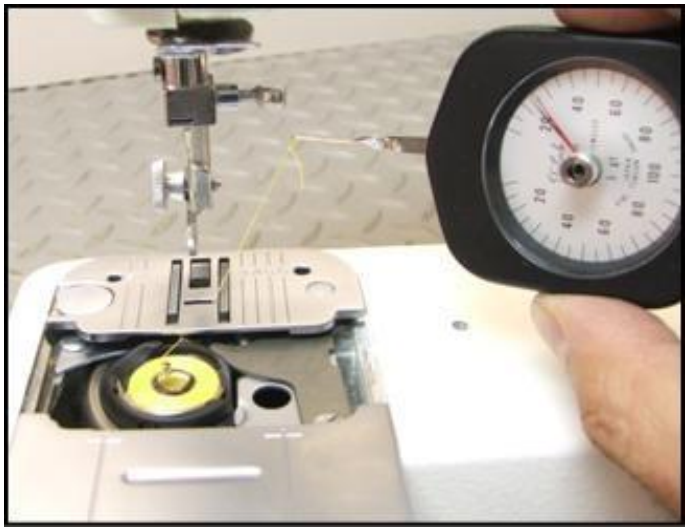
Set the machine for straight stitch; center needle position. With the hand wheel, lower the needle into the throat plate. The needle should be in the center of the needle hole. If adjustment is needed, loosen the set screw (R), then move the needle left or right as needed.

Needle / Hook Clearance



The clearance between the needle and the hook should be close without touching. Adjust by loosening two phillips head screws (S) slightly, and swinging the entire head frame as needed.

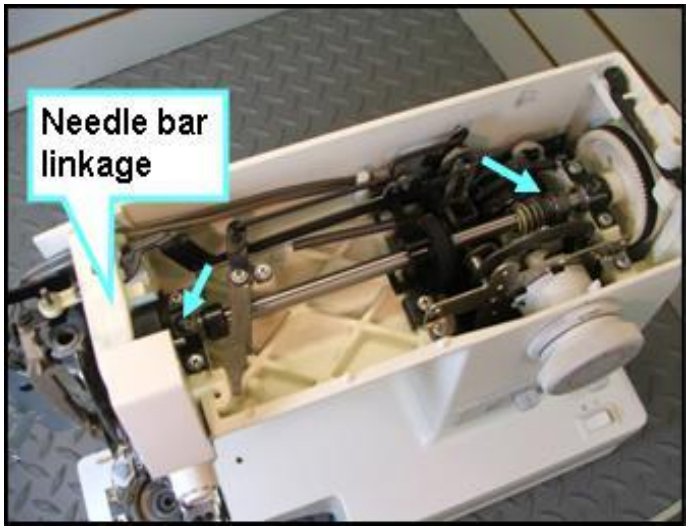
Bobbin Tension

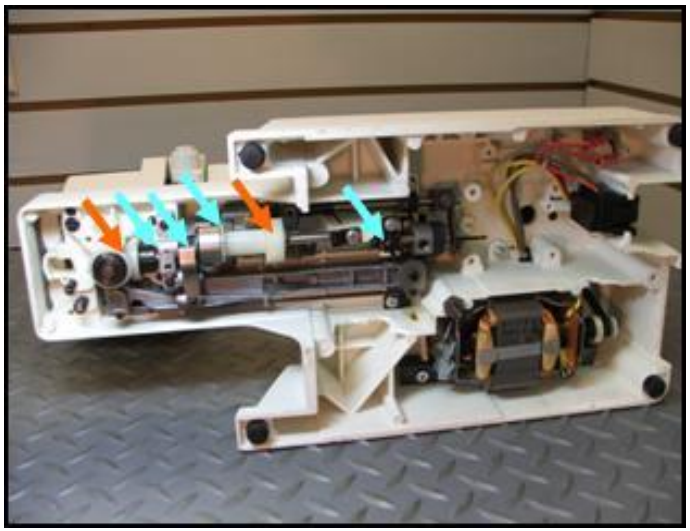


20 grams of bobbin tension is usually appropriate with Metrosene thread.

Make adjustments with the left bobbin case screw.

Lubrication





Oil

Grease

Pfaff®

1983 to 2010

Index

Common Issues / Cause / Solution

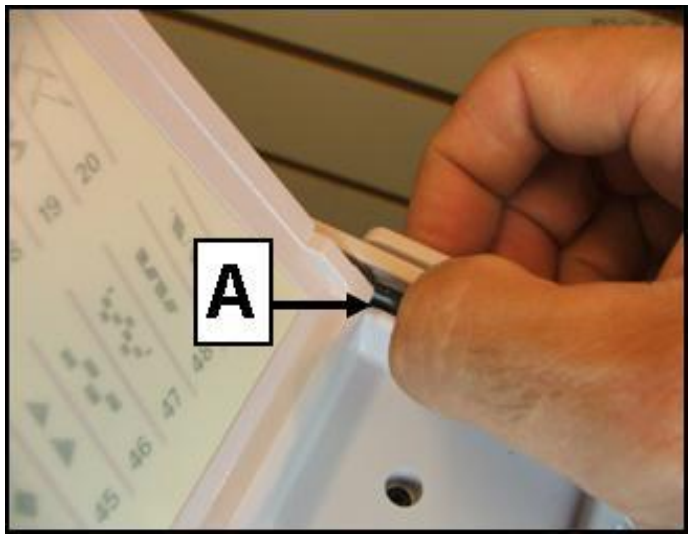
•Issue: Skipped stitches, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

•Issue: Presser foot won't lower, won't raise, or lowers slowly after you've completely lowered the presser foot lifting lever. The cause is likely dried or gummy oil/grease around the presser bar, bushings and spring. The dried residue on the presser bar binds the presser bar to the bushings. The pressure spring, located within the presser bar is also effected. Solution: Clean all residue from the presser bar, bushings, pressure spring and pressure spring pin, then lubricate with oil.

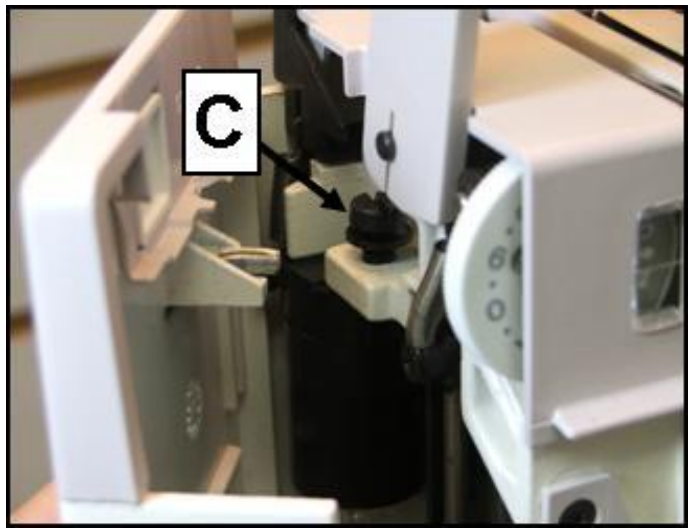
•Issue: Needle continues to move up/down when winding a bobbin. The cause is likely dried or gummy grease within the hand wheel clutch. Solution: Clean all old grease from within the hand wheel and clutch, then lubricate with oil.

•Issue: Poor quality stitches or breaking top thread caused by a bur on the outside of the hook. Solution: De-bur the hook with emery paper.

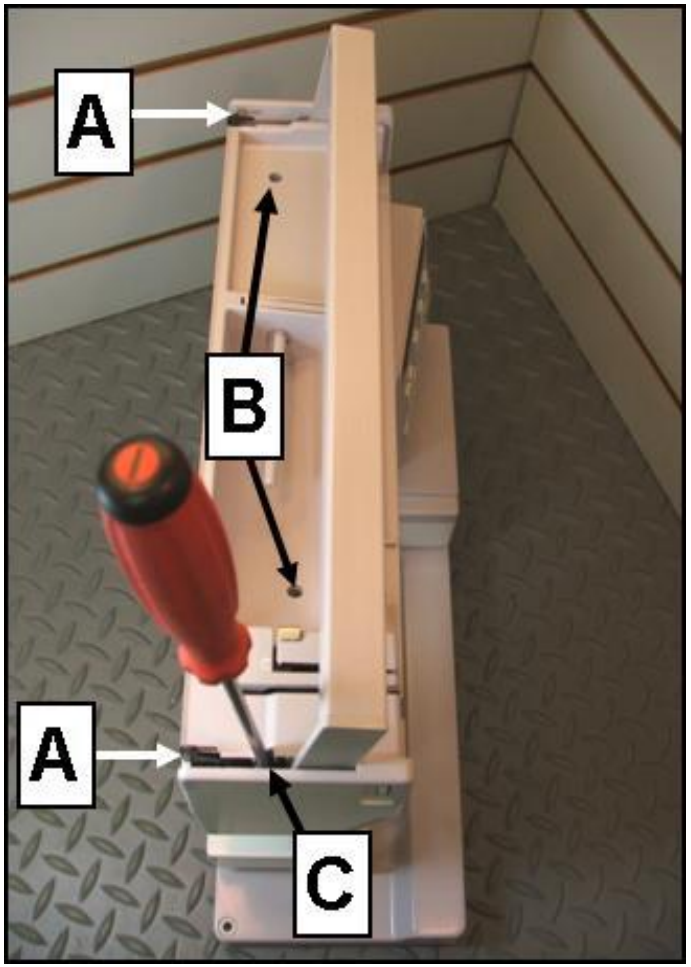
Cover Removal

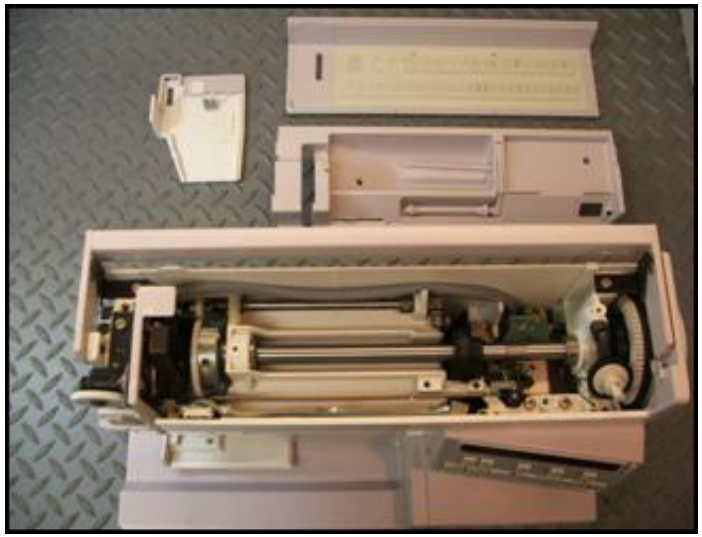


1. Remove the hinged top cover by pushing on one of the hinges (A) and lifting the cover off.

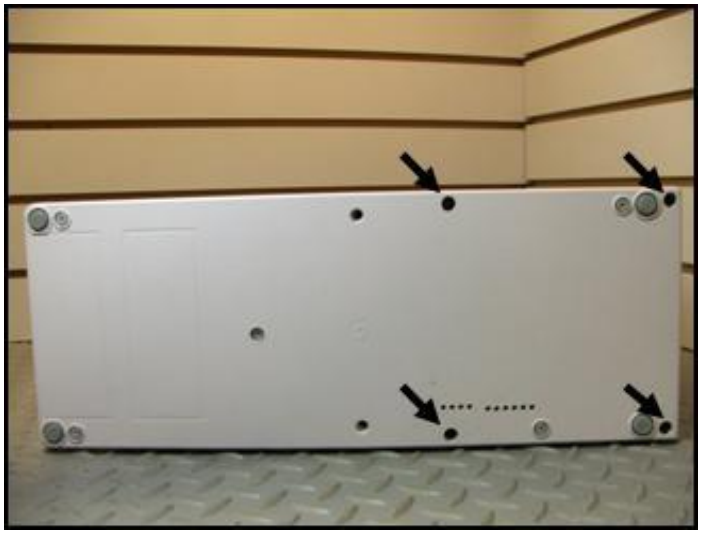


2. Remove the top cover and face plate. It will depend on the machine model number which of these two covers will need to be removed first. To accomplish this, there are two lid screws (B) and one face plate screw (C). The face plate screw will only need to be loosened. Note that the lid tends to hang up on the hinges (A) and the bobbin winder.

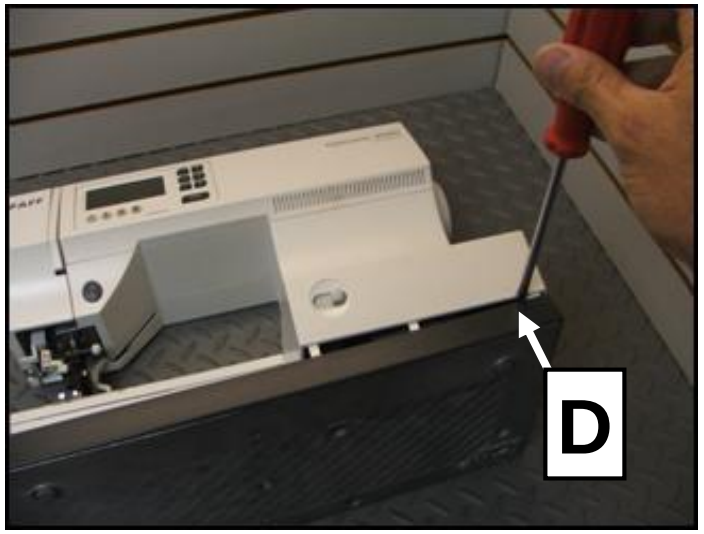




3. Remove the base plate by unscrewing the three or four base plate screws.

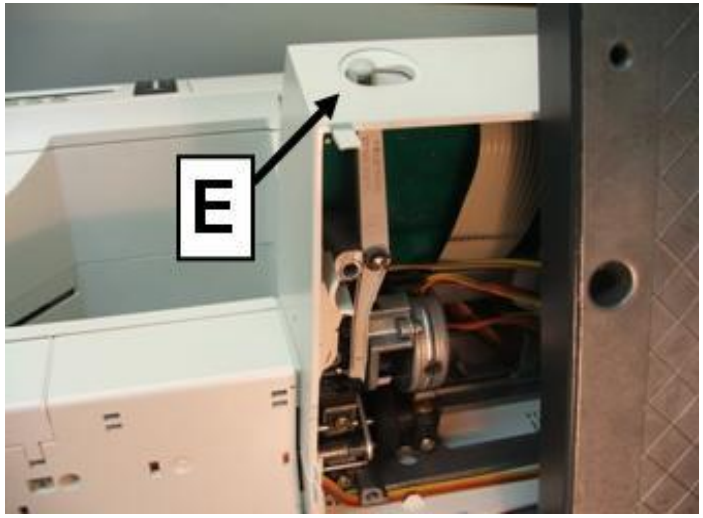


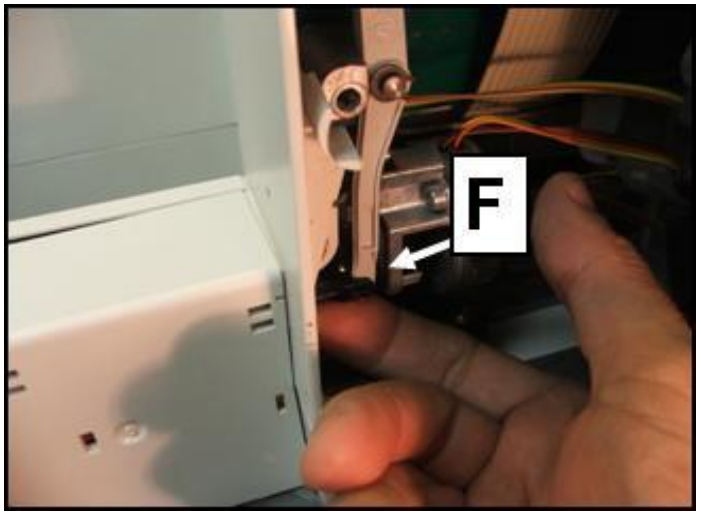
Some models may require you to pop the base plate free in location (D) with a screwdriver.



On some computerized models, such as the one pictured, you can simply swing the base plate (with it's cables connected) over to the right and stand it on it's end to service the machine. Other models may require you to unplug them.

4. Next, remove the lower free-arm cover. Be aware that on some models, there is a linkage from the feed dog drop lever (E), that must be disconnected first (F).
The lower free-arm cover is usually held in place by two screws (G).



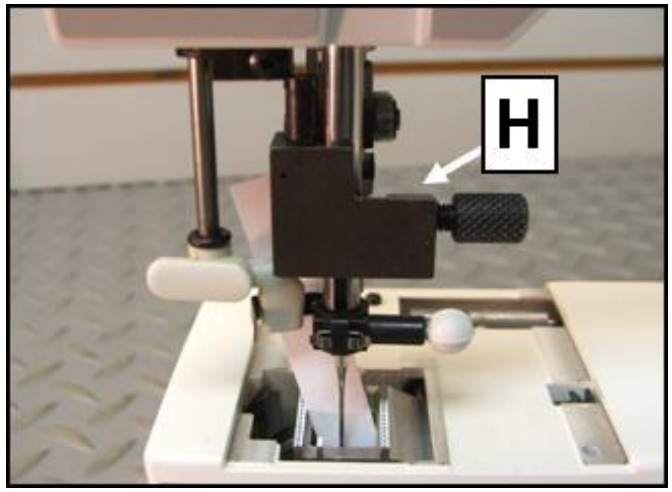


Adjustments & Maintenance

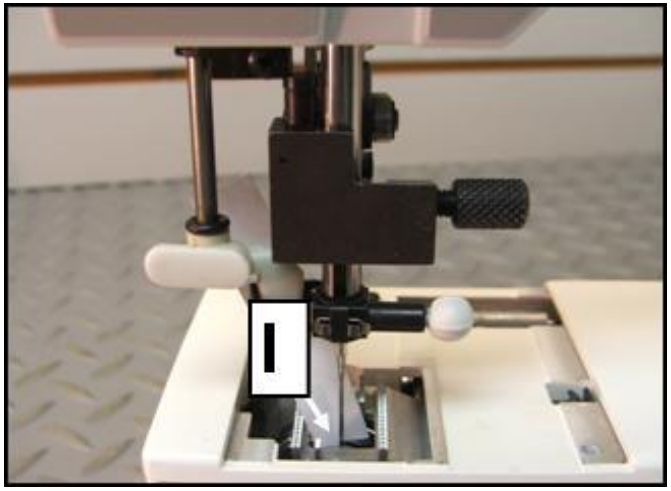
Loop Lift (Needle/Hook Timing)

1. Install a good needle.
2. Set the needle position to the center.
3. With the hand wheel, position the needle bar to it's lowest position.

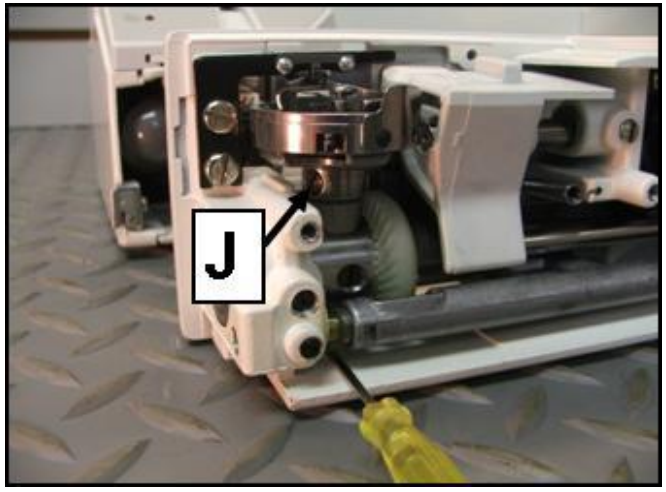
4. Place the spring loaded timing gauge (H) around the needle bar. Slide the gauge upward until the retractable pin just makes contact with the needle bar bushing or any stable structure convenient to the gauge. Tighten the thumb screw.



5. Rotate the hand wheel toward you until the needle bar rises and fully compresses the gauge's retractable pin.
At this point the hand wheel will not turn any farther because the gauge has stopped the needle bar. You have now caused the needle bar to rise precisely 2.3mm. The machine is now in it's timed position.
If the needle/hook timing is correct, the tip of the hook will be approximately behind the left edge of the needle (I).



6. If an adjustment is needed, loosen the two timing screws (J) on the hook and rotate the hook into position. Before tightening the screws, use a small screwdriver (pictured) or your finger to press the small hook gear against the large gear.



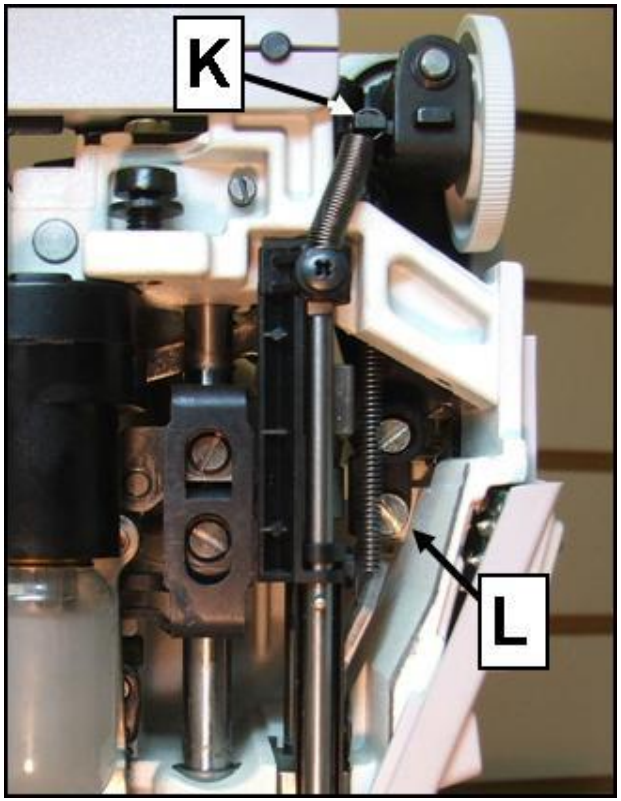
Deburr the hook

Using very fine Emory paper, such as 400-600 grit, remove any burrs on the hook tip and thread guide plate. Burrs on the hook tip are often removed with 2-3 swipes of the abrasive, where the thread guide plate my require more work.

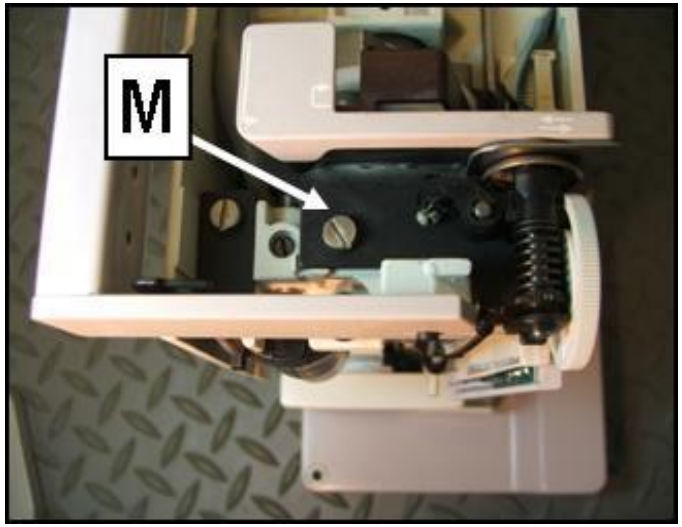
Cleaning a Sticky Presser Bar

To gain access to the presser bar, pressure spring and pin, you will need to remove the tension unit. It will come out in one piece and the thread tension adjustment will not be affected.

1. Using the hand wheel, position the needle bar to it's lowest position.

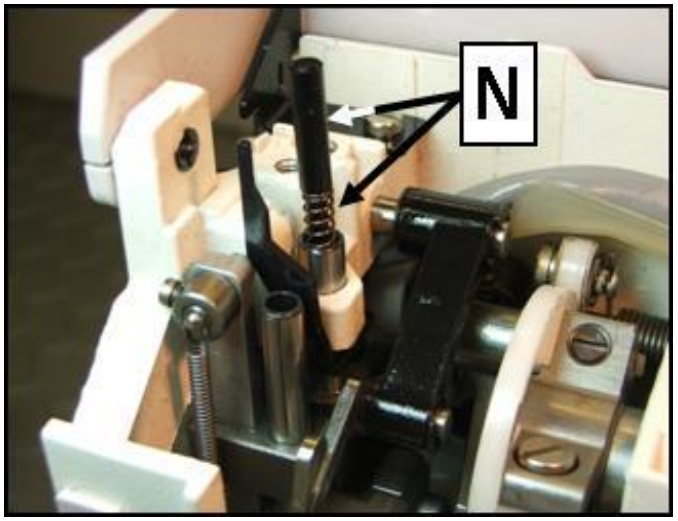


2. Disconnect the top loop of the needle threader return spring (K), if equipped.
3. Loosen the lower tension unit screw (L) a few turns. It's right below the thread check spring screw.



4. While holding onto the tension unit, remove the top tension unit screw (M). The tension unit complete can now be lifted off of the machine.

Tension unit after removal.



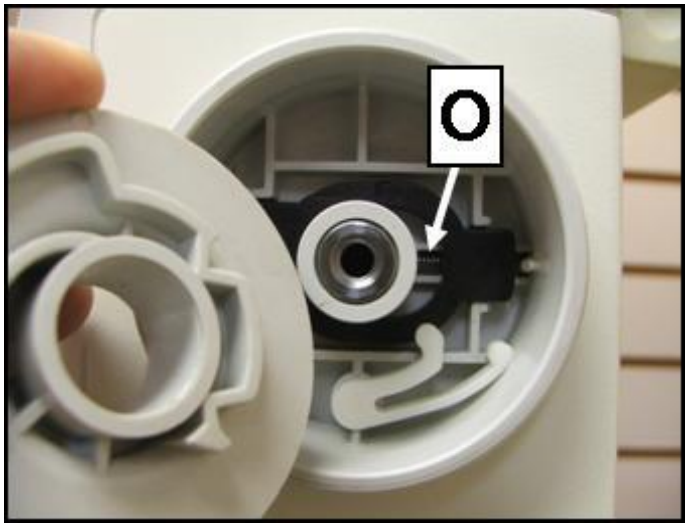
5. Remove the pressure spring and pin (N). Clean these parts and the presser bar with a nylon brush, WD-40® and compressed air to remove the old grease and gum.

6. Lightly lubricate all parts with machine oil and reassemble in the opposite order.

Cleaning a Sticky Hand wheel Clutch

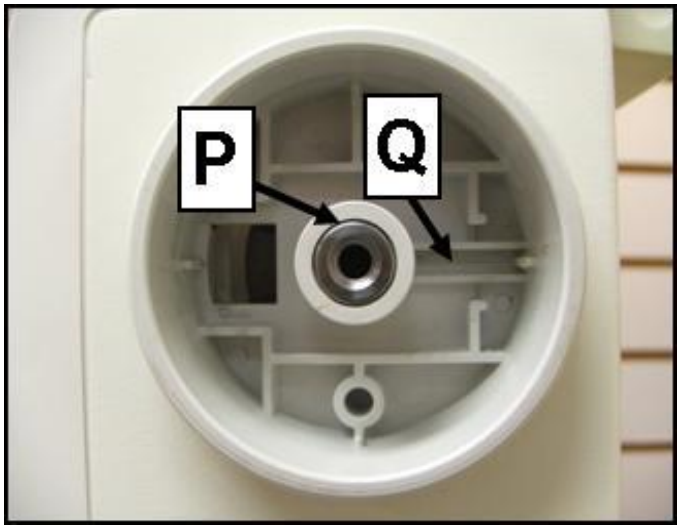
1. To remove and clean the hand wheel clutch, start by removing the decorative screw cover (if present).

2. Remove the screw and washer.



3. Remove the clutch knob and the three parts located behind it. Note that one part is a spring (O).

4. Clean the parts with a nylon brush, WD-40® and compressed air to remove the old grease and gum.

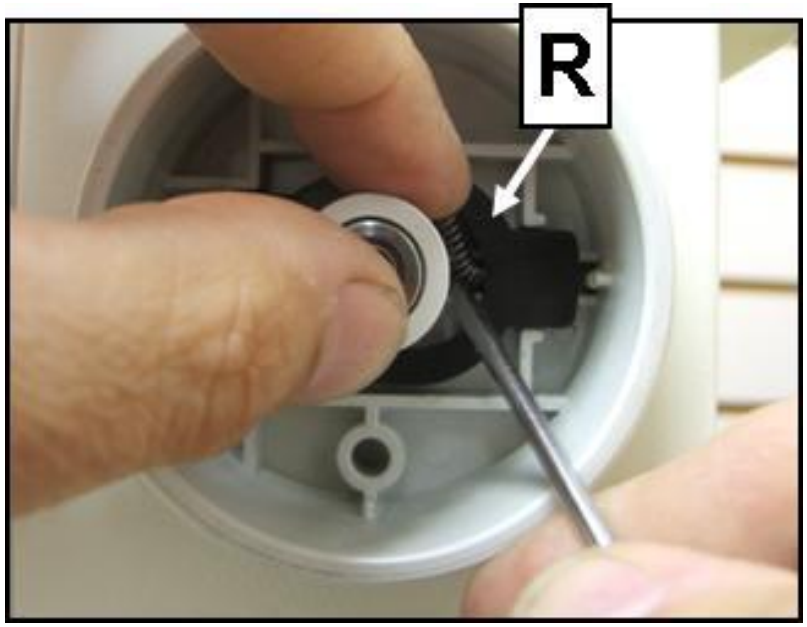


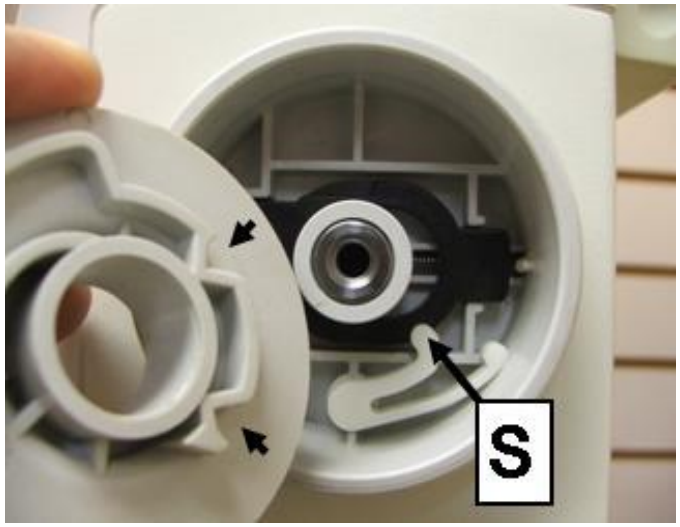
5. Slide the hand wheel out 2mm to 3mm and clean the end of the shaft and inside of the hand wheel (P) with a nylon brush, WD-40® and compressed air to remove the old grease and gum.

6. To reassemble, install the black latch and hold it tightly in place. With the top shaft in the correct position, the latch will move towards the rear of the machine enough for you to insert the spring as shown (R). Gently, use a small screwdriver to pivot, then slide the spring into its track (Q).

7. Install the white latch (S).

8. Snap the clutch knob in place, making sure that the bump on the white latch fits into one of the two notches in the knob.



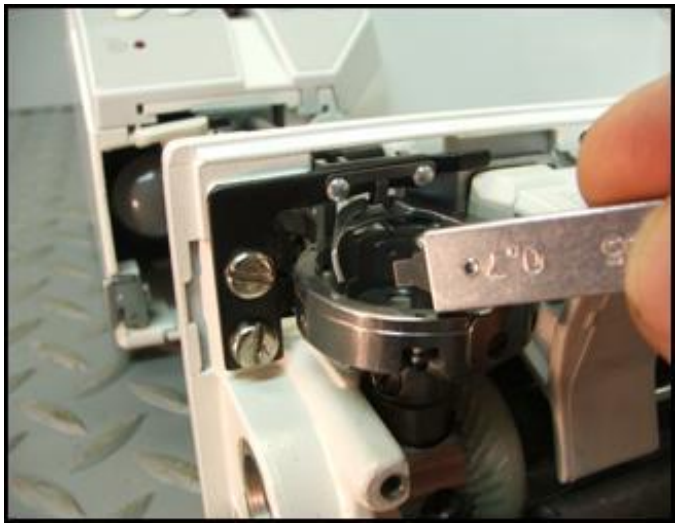


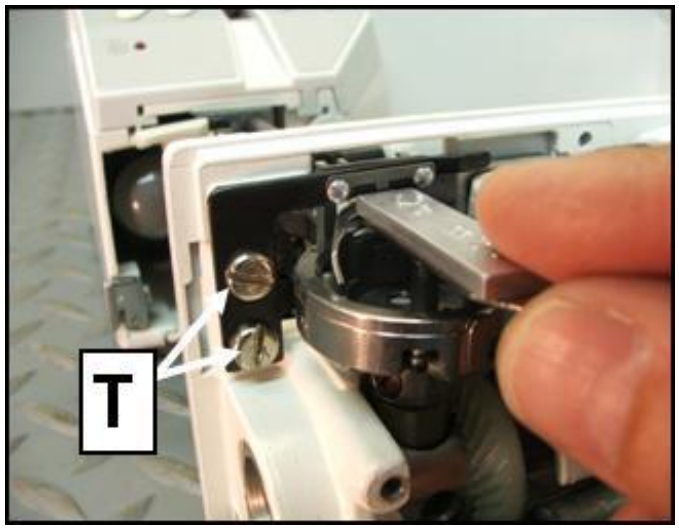
9. Apply a drop of light machine oil to the end of the shaft (P), then install the washer, screw and screw cover.

Other Common Adjustments

Bobbin Case Stopper Clearance

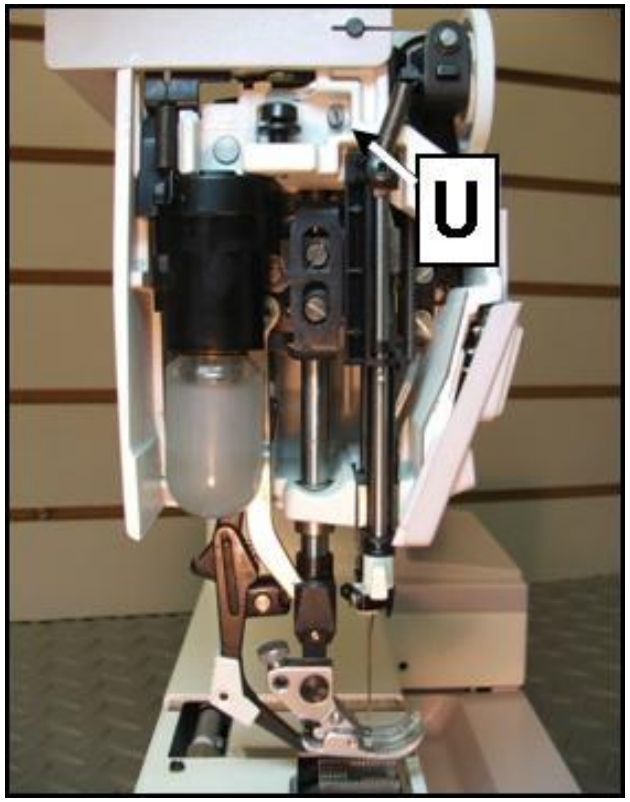
The clearance between the bobbin case stopper and the hook basket on most Pfaff ® machines is 0.7mm. The feeler gauge for the BERNINA 8 Series bobbin case stopper works well here. It is 0.7mm.





Adjust the stopper for a slightly snug fit with screws (T).

Needle / Hook Clearance

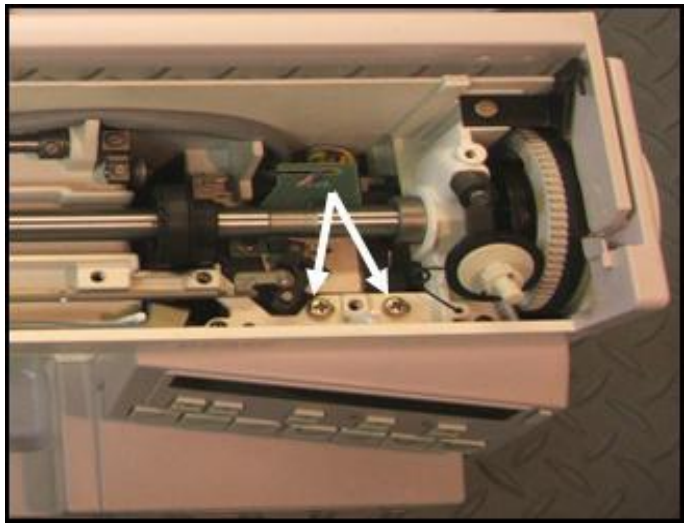


The clearance between the needle and the hook should be .05mm, close without touching. Adjust with screw (U), if needed.

Feed Balance

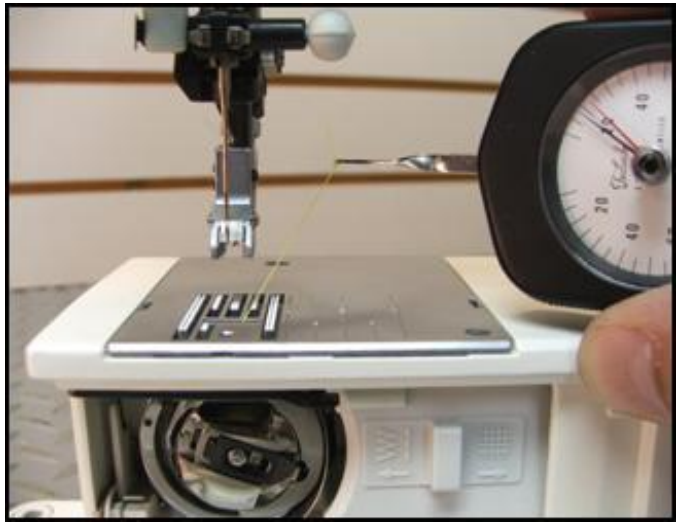
This requires a small slotted screwdriver.

Needle Position



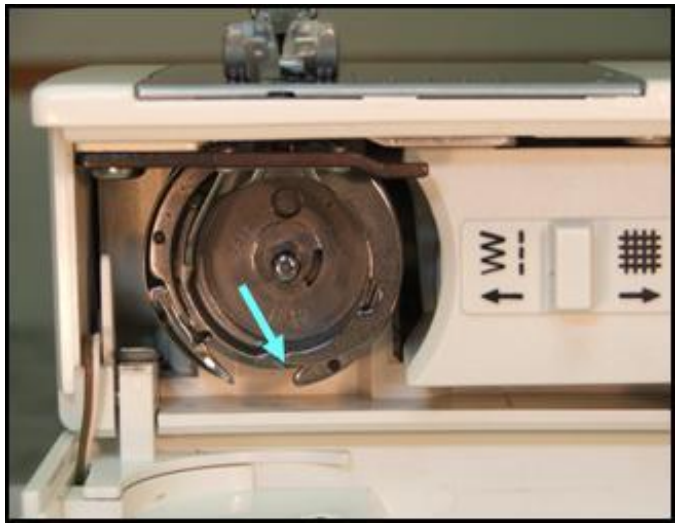
Loosen both screws slightly to allow for changes to the needle position.

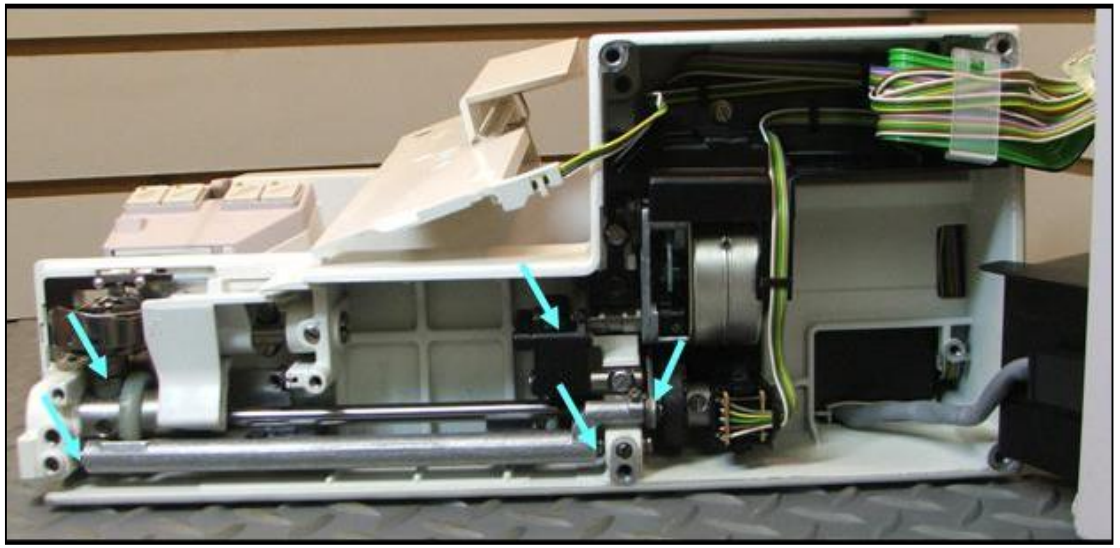
Bobbin Tension



15 to 18 grams of bobbin tension is usually appropriate with Metrosene thread

Lubrication





Oil →

Grease →

Pfaff®

2010 to present

Many Pfaff® sewing machines, including the model shown in this chapter, manufactured from 2010 to the present, share many design and maintenance characteristics as the Viking® machines of the same time period. Therefore only cover removal is included in this chapter. Refer to the Viking® chapter of this manual for adjustments, maintenance and lubrication suggestions.

Index

Common Issues / Cause / Solution

•Issue: Skipped stitches or broken needle thread, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

•Issue: Skipped stitches or broken needle thread, caused by improper needle bar height. Solution: Adjust the needle bar height.

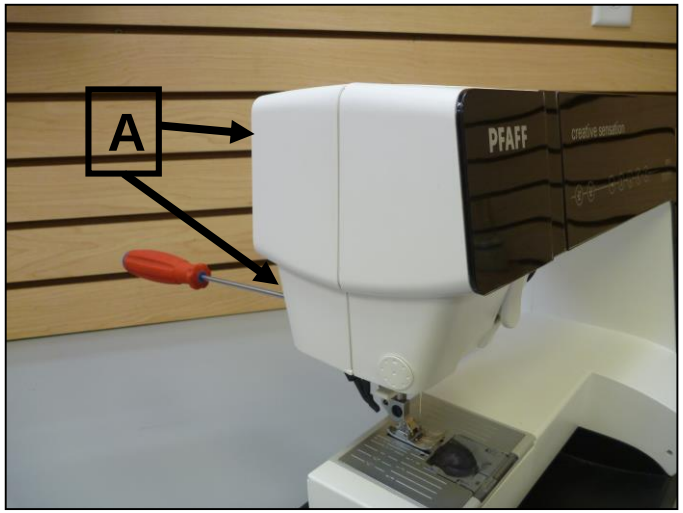
•Issue: Skipped stitches or broken needle thread, caused by improper needle/hook clearance. Solution: Adjust the needle/hook clearance.

•Issue: Damaged bobbin case, caused by a needle strike, or rotation of the bobbin case during a thread jam. Solution: replace the bobbin case.

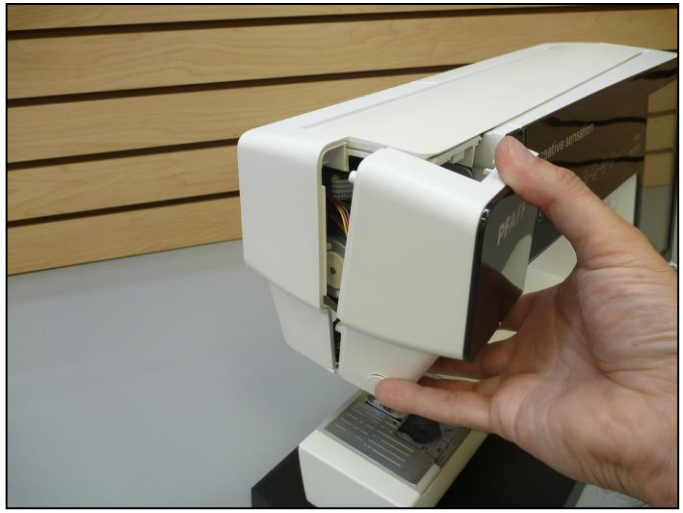
•Issue: Fabric feeds poorly due to improper feed dog height. Solution: Adjust feed dog height.

•Issue: Poor stitches, caused by burrs on the throat plate. Solution: De-burr the throat plate with emery tape.

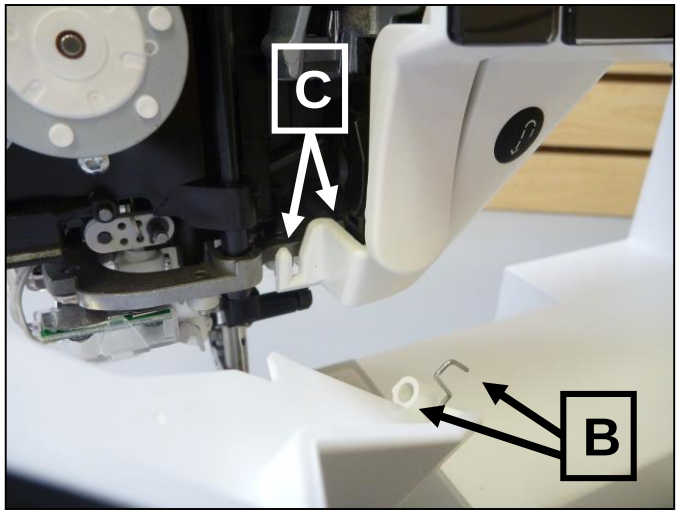
Cover Removal



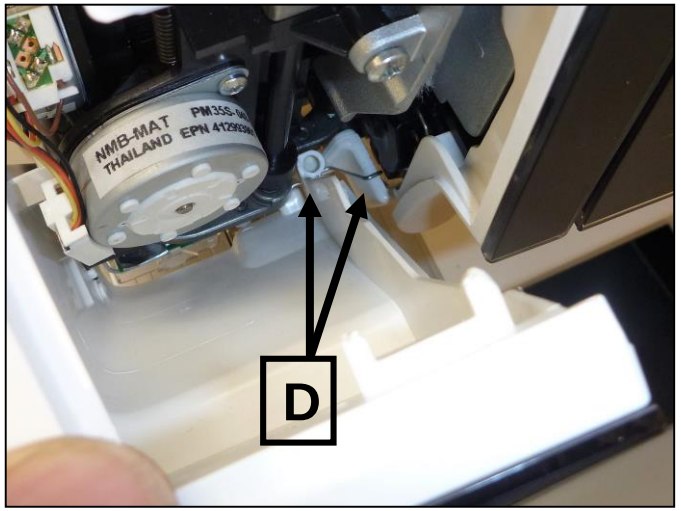
1. Remove the face plate by removing the two #10 Torx screws (A) located in the back cover

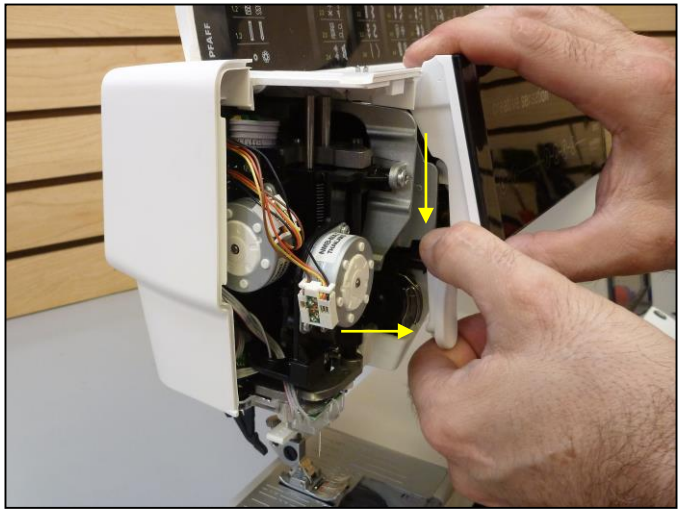


Tilt the top of the face plate towards you, then lift it off of the machine.

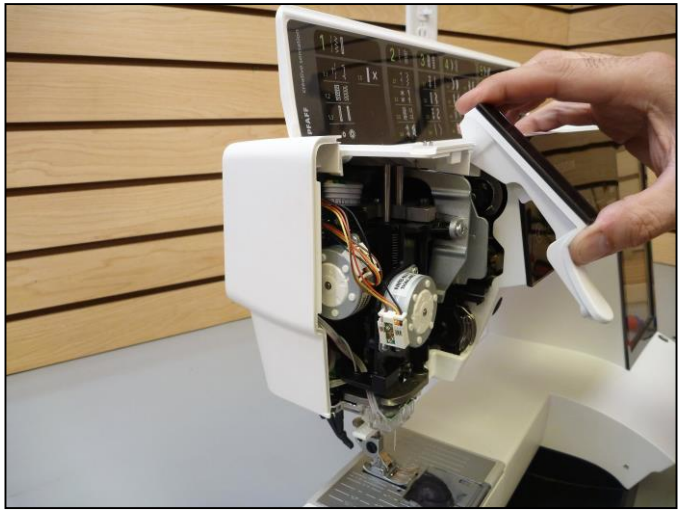


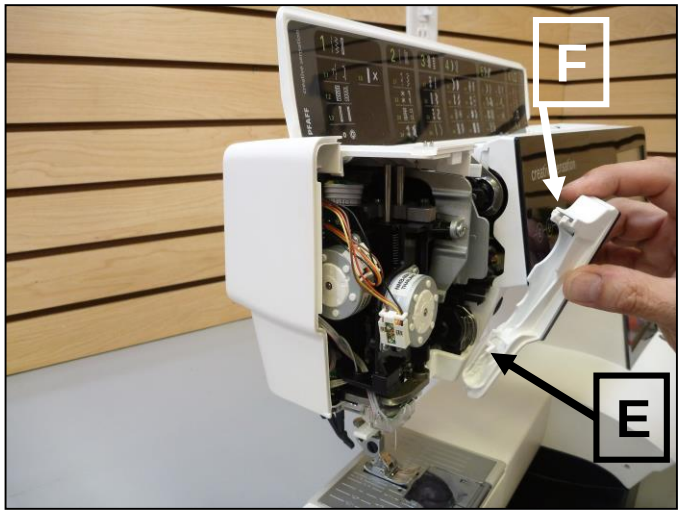
Note that in addition to the two screws (A), the face plate was fastened to the front cover by way of a hole and wire (B) located inside the lower right side of the face plate. These connected to the pin and ridge (C) within the front cover. Upon reinstallation of the face plate, be sure to reconnect them (D).



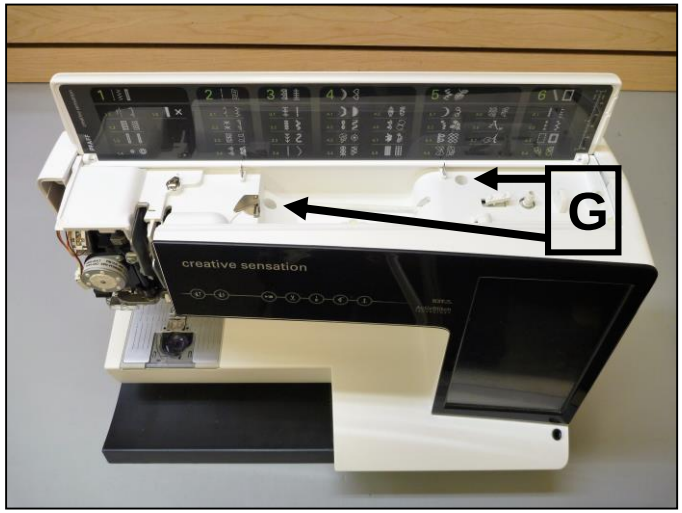


2. Remove the take-up lever guard by gripping the guard as shown. Apply downward pressure with your left thumb to release tab (E), then swing the guard toward you with your left index finger. Tabs (F) at the top of the guard will act as a hinge.





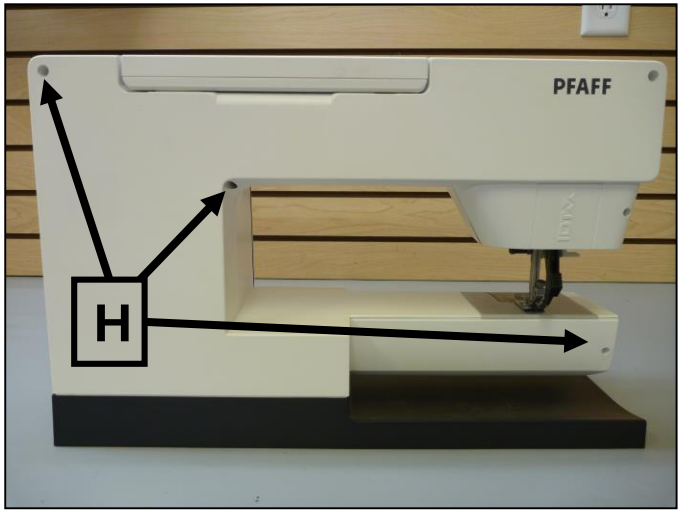
When reinstalling the take-up lever guard, attach at the top (F) first, then click into place at the bottom (E) last.



3. Remove the top cover after removing the two #20 Torx screws (G). Note that It may hang up on the bobbin winder stopper during removal or installation.

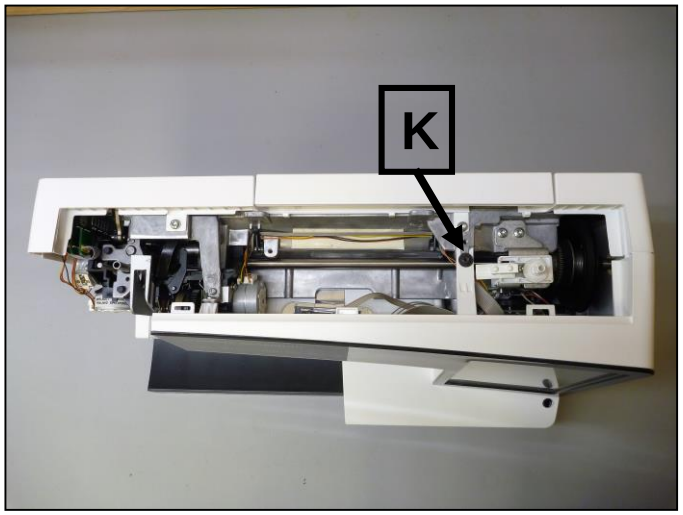
4. Remove the four #20 Torx screws from the underside of the machine that secure the machines front and rear covers to the base plate. Note the position and length of the screws as they vary. Also, there is no need to remove the base plate from the machine.

5. Pull the hand wheel straight off the end of the top shaft.

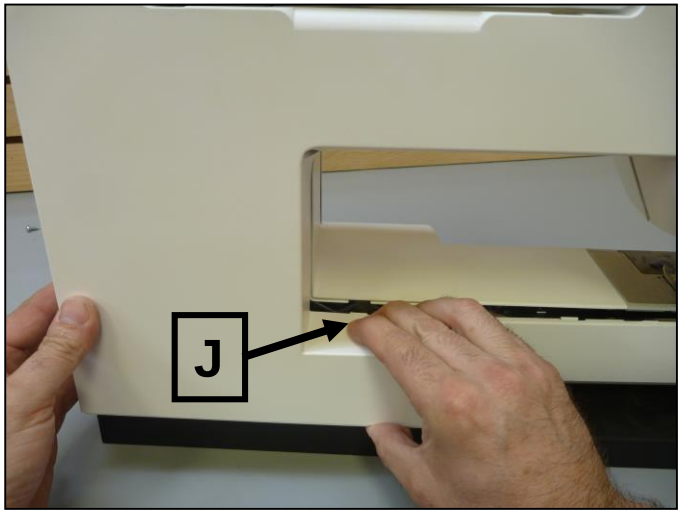


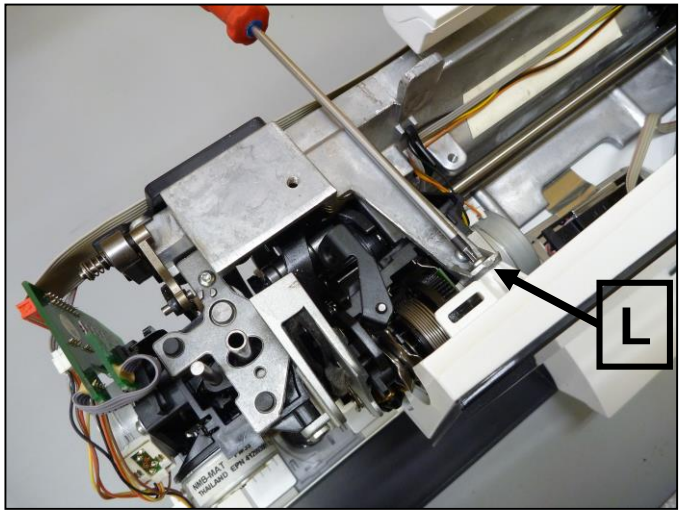
6. To remove the rear cover, remove the three #10 Torx screws (H).

Depress the locking tabs (I) and (J), then remove the rear cover..

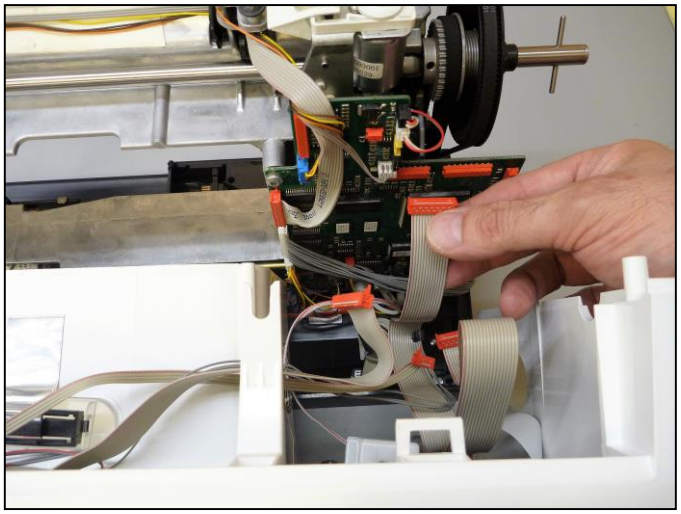


7. To remove the front cover, loosen one #20 Torx screw (K), and remove one #10 Torx screw (L).

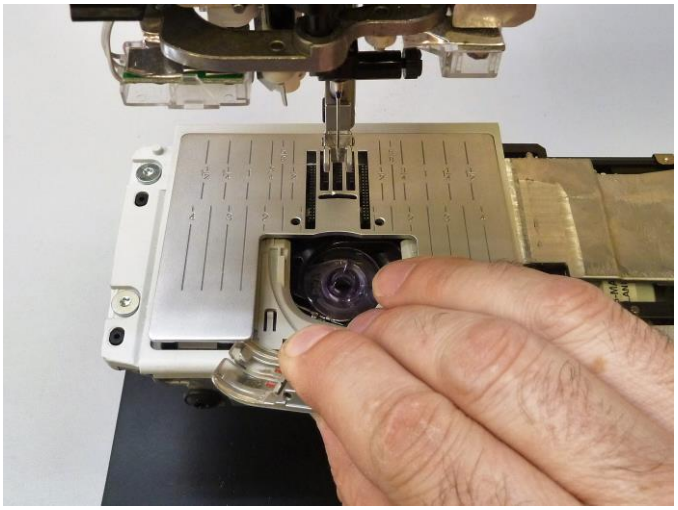




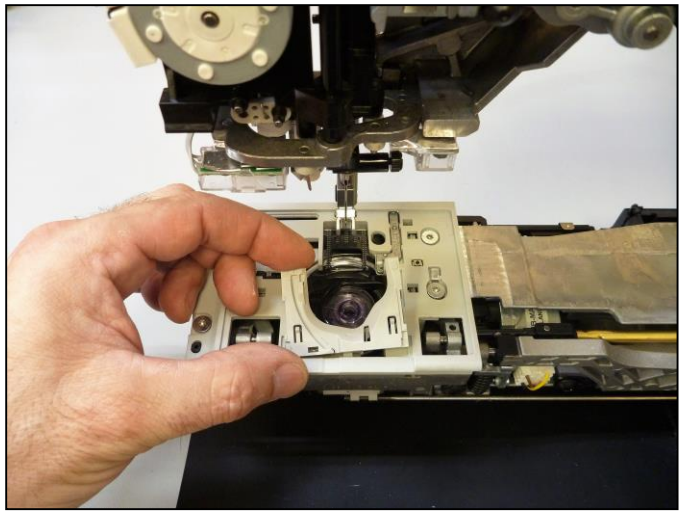
The front cover is removed by working it straight off the front of the machine. Note how the front cover fits under the edges of the bobbin area cover. It may hang-up in this area.

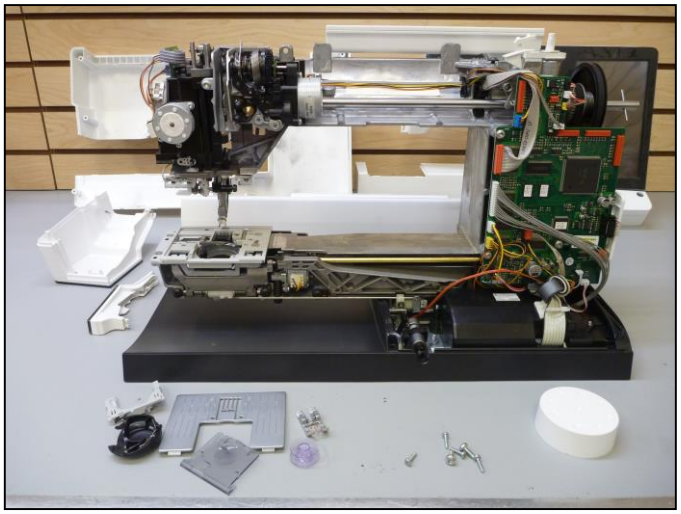


Unplug the cables connecting the front cover to the main circuit board on the chassis. Follow electrostatic discharge rules to safeguard the boards from static electricity damage.

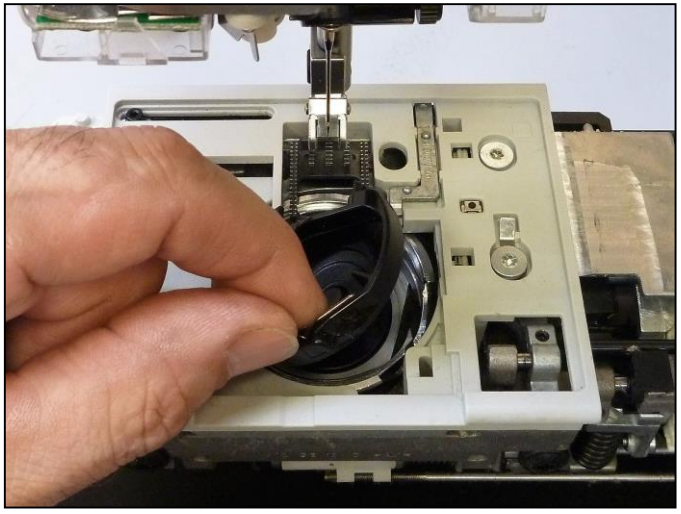


8. Remove the throat plate by lifting the front edge. The toe of the presser foot works well as a tool. You can then lift out the gray bobbin case cover, then the bobbin case.





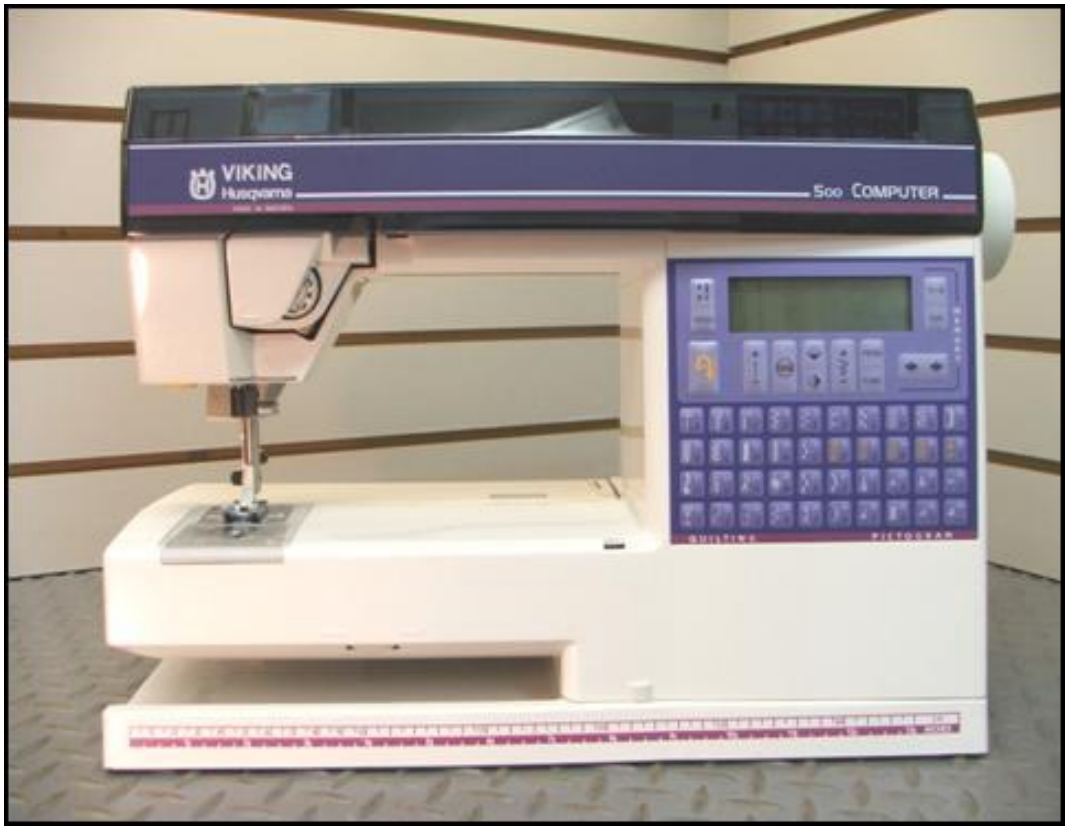
Pictured, a Pfaff® ready for service.

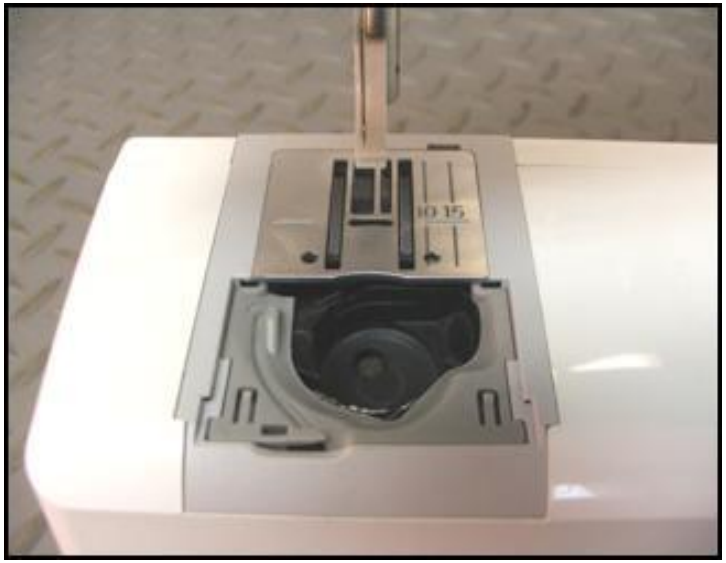


Many Pfaff® sewing machines, including the model shown in this chapter, manufactured from 2010 to the present, share many design and maintenance characteristics as the Viking® machines of the same time period. Therefore only cover removal is included in this chapter. Refer to the Viking® chapter of this manual for adjustments, maintenance and lubrication suggestions.

Viking®

1998 to present





Index

Common Issues / Cause / Solution

•Issue: Skipped stitches or broken needle thread, caused by improper loop lift (hook timing). Solution: Adjust the loop lift.

•Issue: Skipped stitches or broken needle thread, caused by improper needle bar height. Solution: Adjust the needle bar height.

•Issue: Skipped stitches or broken needle thread, caused by improper needle/hook clearance. Solution: Adjust the needle/hook clearance.

•Issue: Damaged bobbin case, caused by a needle strike, or rotation of the bobbin case during a thread jam. Solution: replace the bobbin case.

•Issue: Fabric feeds poorly due to improper feed dog height. Solution: Adjust feed dog height.

•Issue: On mechanical/non-electronic models, the needle position is not centered in the throat plate. The needle position is too far to the left. Solution: Adjust the needle position.

•Issue: Poor stitches, caused by burrs on the throat plate. Solution: De-burr the throat plate with emery tape.

•Issue: Tapping or scraping noise while sewing, caused by thread wound around the take-up lever linkage. Solution: Remove the thread.

Cover Removal

Electronic & Mechanical Models

Rotate the hand wheel until the needle bar is in its lowest position. Then, pull the hand wheel straight off the end of the top shaft.

Gently, pull the bobbin winder stop straight off the front of the bobbin winder unit. Upon reassembly, adjust the bobbin fullness with a #20 Torx in the end of the bobbin winder stop.

If present, remove this small plug, by gently prying it out with a small screwdriver.

Remove the screws from the underside of the machine that secure the machines front and rear covers. Depending on the models, there will be between two and four screws. There is no need to remove the base plate from the machine.

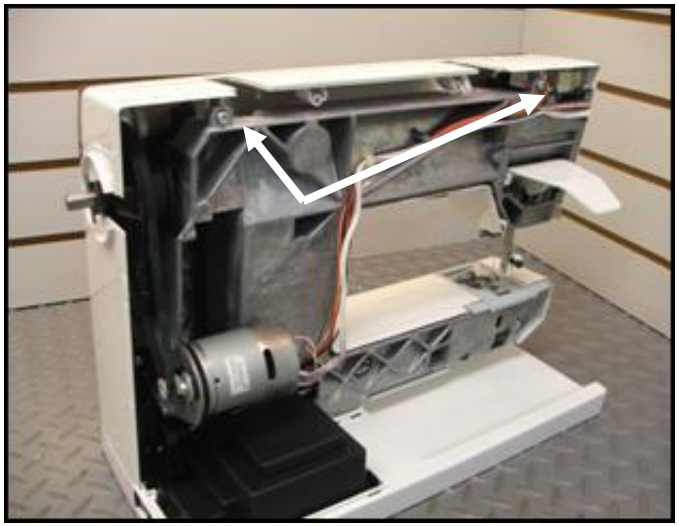
To remove the rear cover, first remove the two #20 Torx screws located under the handle. Then examine the back of the machine for # 10 Torx screws. Depending on the model, there will be between one and five of these screws that will need to be removed.

The model in this photo only uses one of the #10 Torx screws.

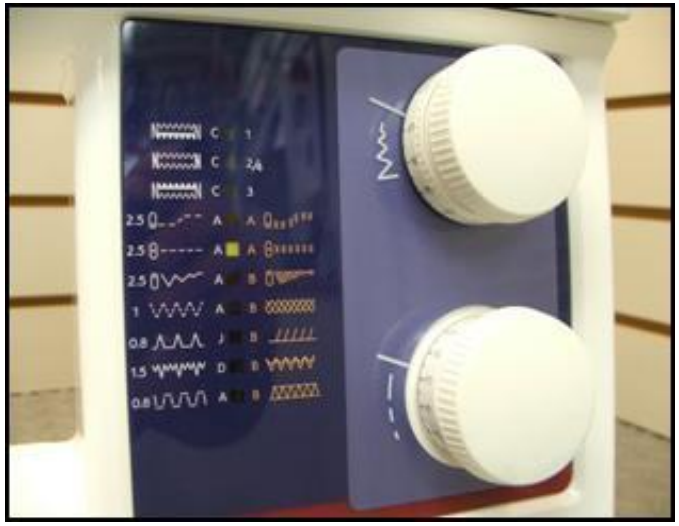
Raise the presser foot lifting lever.
Then with your #10 Torx, depress the small tab (if present) and pull the rear cover out a few millimeters.

On some models, the rear free arm cover is removed from the machine along with the main rear cover. On other models, it is removed second. Either way, you will need to use a small screwdriver and pop the rear free arm cover away from the throat plate.

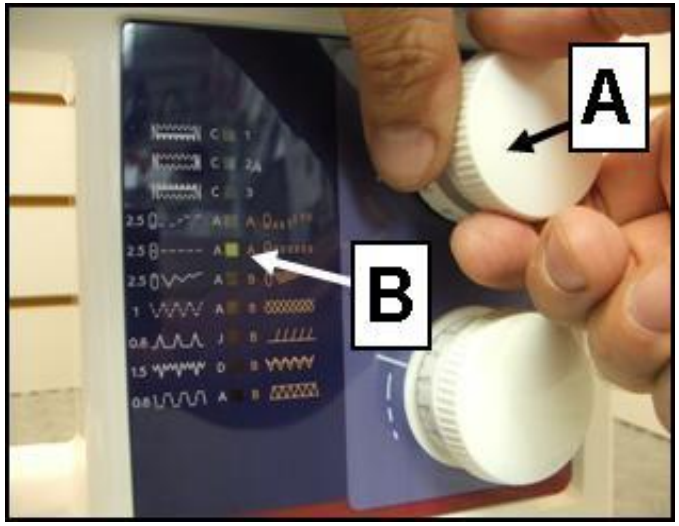
You can now pop off the rear cover. Note that they rarely come off gracefully!



To remove the front cover, first remove two #20 screws.



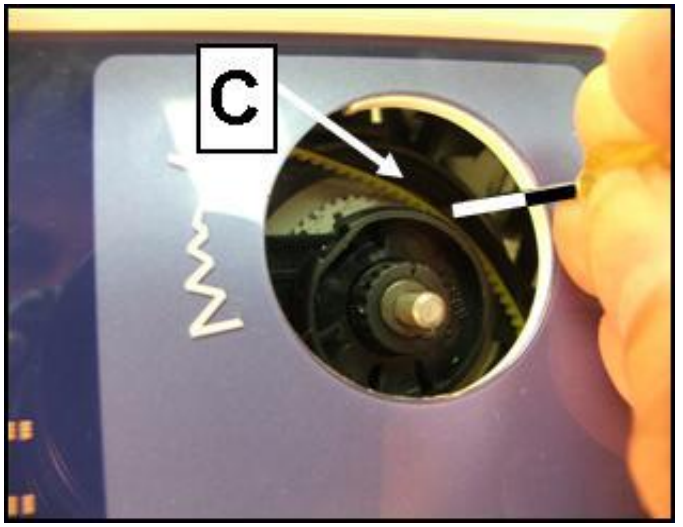
If you have a mechanical machine with a pattern selector and stitch length and width knobs, you'll need to remove the knobs carefully. If you have a computerized machine, skip ahead to page 96.



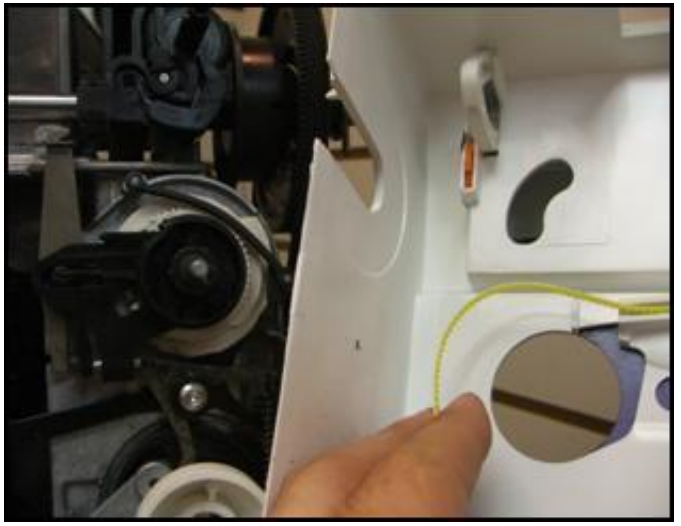
First, using the pattern selector knob (A), select straight stitch / center needle position (B).
Next, gently remove the pattern selector knob (A).

Next, carefully remove the stitch width knob by inserting your finger behind the knob at the ten o'clock position.

Remove the stitch length knob.

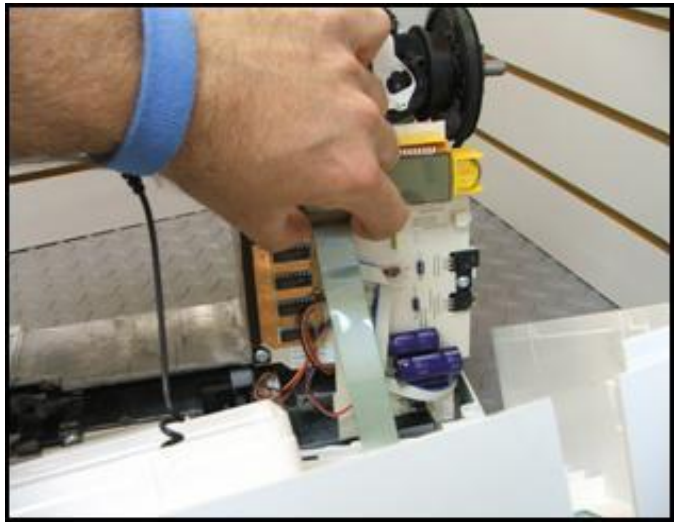


Next, you'll need to disconnect the colored plastic cable that runs from the pattern selector dial to the pattern display. Do this by carefully lifting the black plastic guide (C) with a small screwdriver and slipping the cable out from under it. Be careful not to crimp or cut the cable.

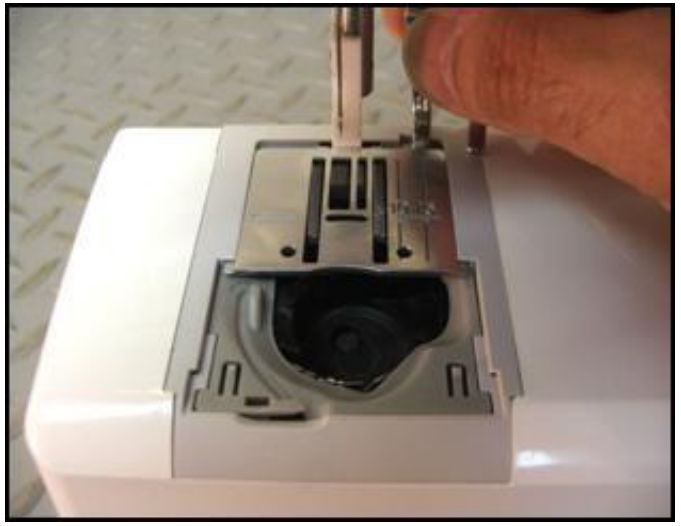


Here's a view with the front cover removed. I'm holding the cable.

The front cover is removed by working it straight off the front of the machine. It will often hang-up along the base, just to the right of the free-arm, and above the take-up lever slot.



Computerized machines will have cables connecting the front cover to the main circuit board on the chassis. Carefully unplug these cables. Follow electrostatic discharge rules to safeguard the boards from static electricity damage.

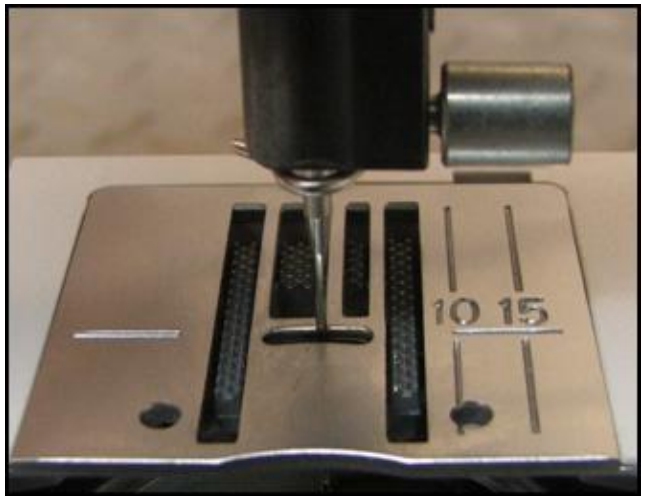


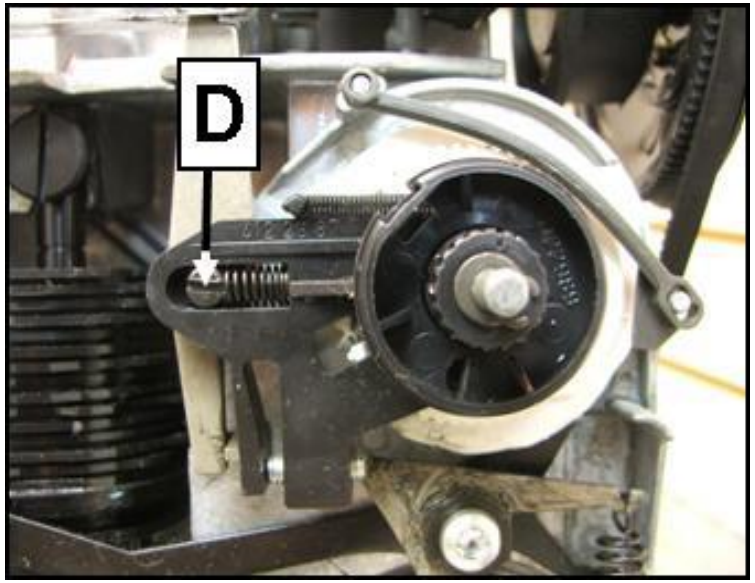
Remove the throat plate by sliding it towards you and lifting it out. The toe of the presser foot works well as a tool.
You can then lift out the gray bobbin case cover (on some models, this is held in with a #10 Torx screw), then lift out the bobbin case.

Pictured, a computerized Viking® ready for service.

Adjustments & Maintenance

Needle Position, on Mechanical/Non-electronic Models

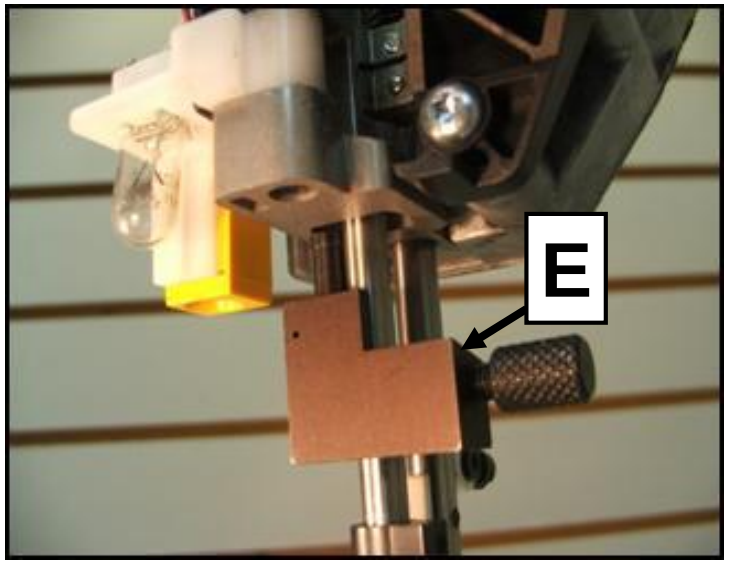




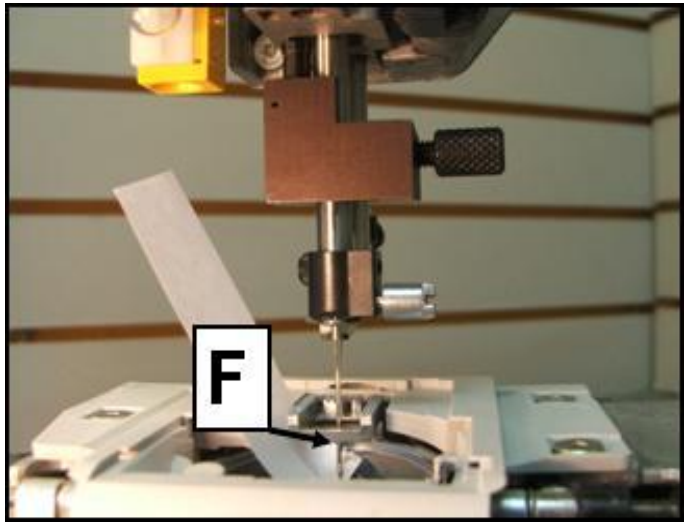
The needle position is adjusted with eccentric screw (D)

Loop Lift (Needle/Hook Timing)

1. Install a good needle, and set the needle position to the center.
2. With the hand wheel, position the needle bar to its lowest position.

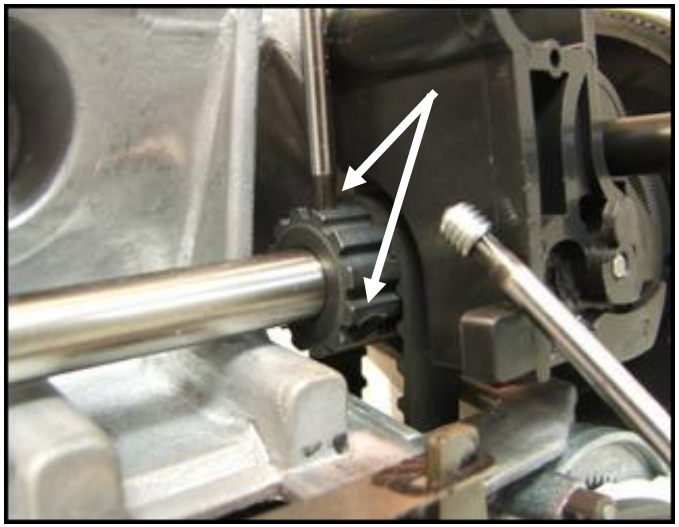


3. Place the spring loaded timing gauge (E) around the needle bar. Slide the gauge upward until the retractable pin just makes contact with the needle bar bushing or any stable structure convenient to the gauge. Tighten the thumb screw.

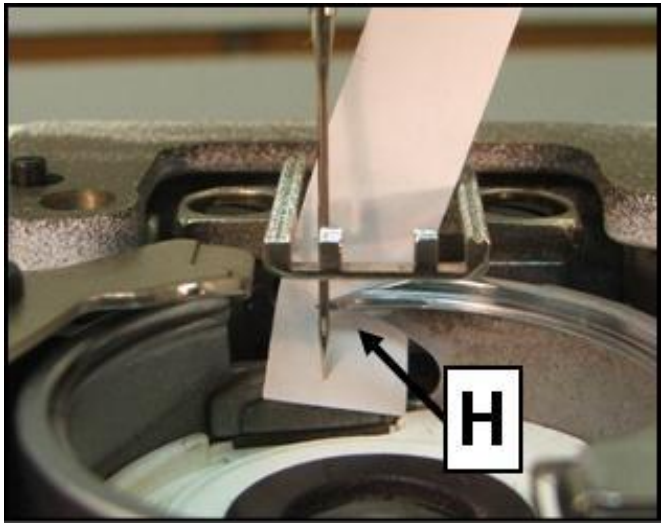


4. Rotate the hand wheel toward you until the needle bar rises and fully compresses the gauge's retractable pin. At this point the hand wheel will not turn any farther because the gauge has stopped the needle bar. You have now caused the needle bar to rise precisely 2.3mm. The machine is now in it's timed position.
If the needle/hook timing is correct, the tip of the hook will be approximately behind the left edge of the needle (F).

5. If an adjustment is needed, loosen the three timing screws (G) on the top shaft timing belt pulley and rotate the hook into position. The pulley is near the hand wheel, usually behind the bobbin winder. Tighten the black set screws first. It may be necessary to exchange positions between the silver (pointed) set screw, and one of the black screws.

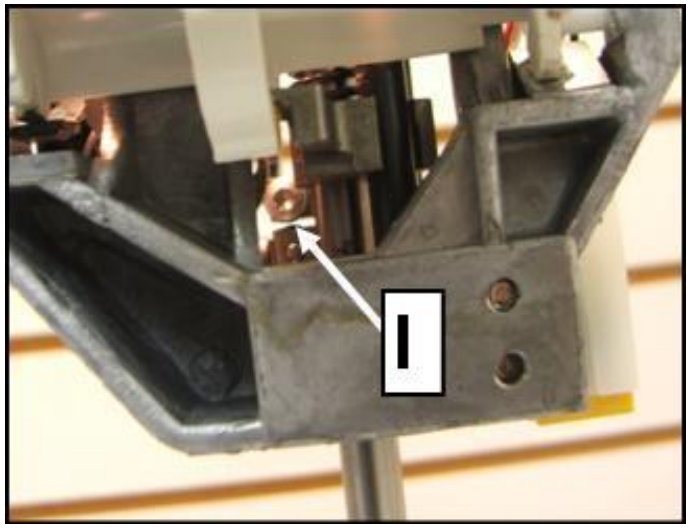


Needle Bar Height



You will be using the tip of the hook as your reference when adjusting the needle bar height. Make certain that the needle/hook timing is adjusted correctly before continuing.
1. Set the needle position to the full left position.
2. With the hand wheel, position the tip of the hook so that it is flush with the left side of the needle.

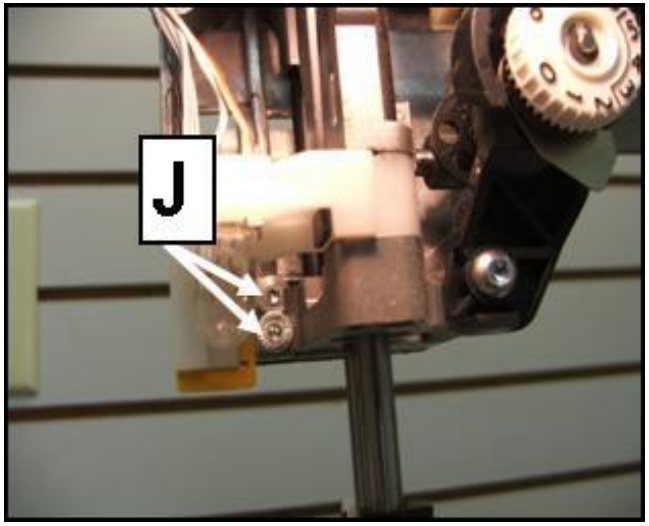
The needle bar height is correct if the hook tip (H) is just slightly above the top of the needle eye. No part of the hook tip should be visible through the needle



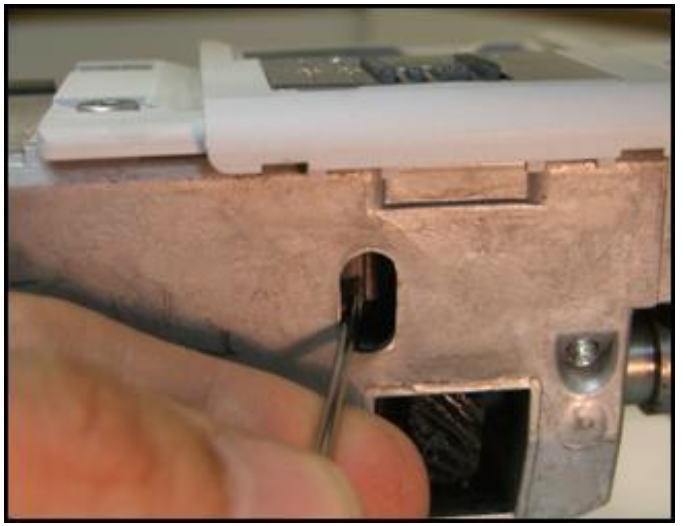
3. If the needle bar height requires adjustment, loosen set screw (I), through the rear of the machine, and move the needle bar up or down as needed. This screw does not need to be very tight. Do not over-tighten!

Needle/Hook Clearance

The clearance between the needle and the hook should be 0.05mm. In other words; the needle should be close to, but not quite touching, the hook. Adjust with the two screws (J), if needed. Note that the two screws work together to position and hold the adjustment.



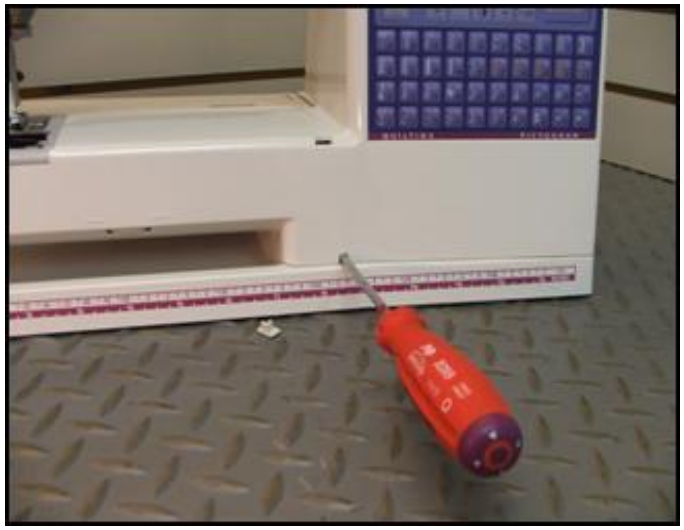
Feed Dog Height



The feed dog height should be approximately 0.9mm to 1.0mm. The BERNINA feed dog height gauge works well to check this. Adjustment is made by rotating a small wheel, which is located beneath the feed dogs, within the rear of the free-arm.

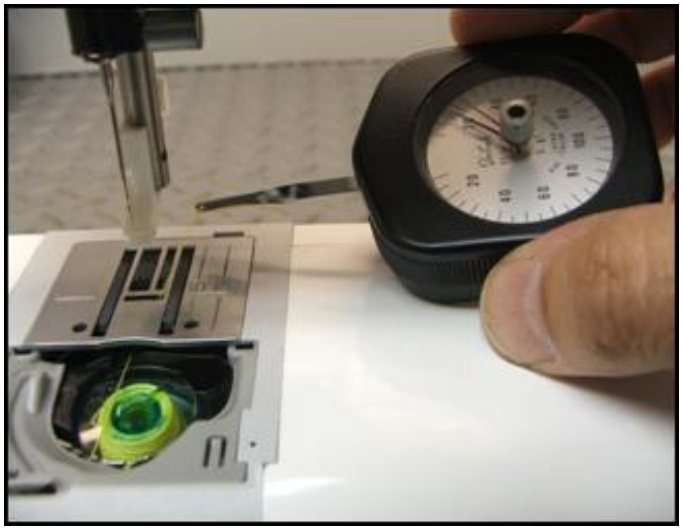
Other Common Adjustments

Feed Balance



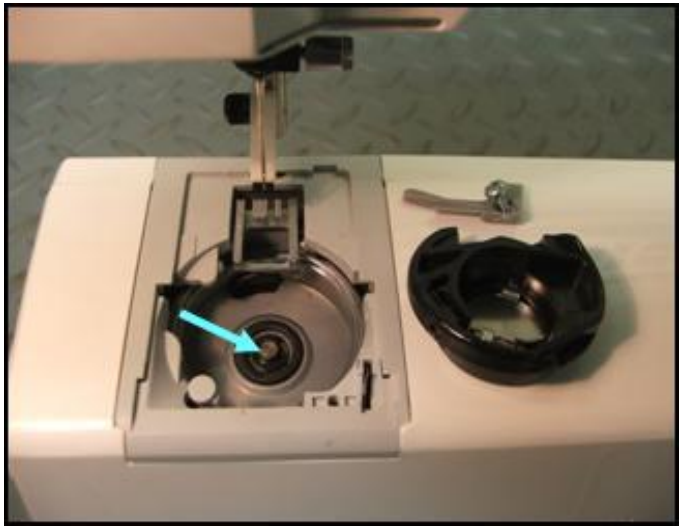
The feed balance is adjusted either through a hole on the front of the machine (shown), or one on the underside of the machine.

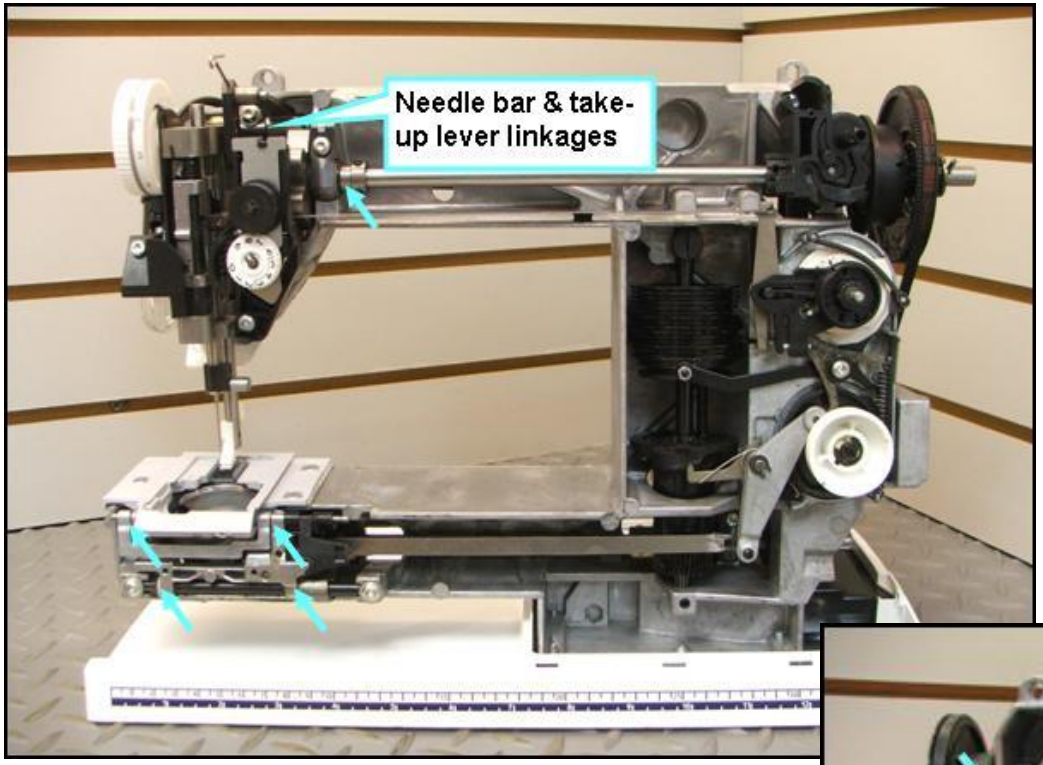
Bobbin Tension

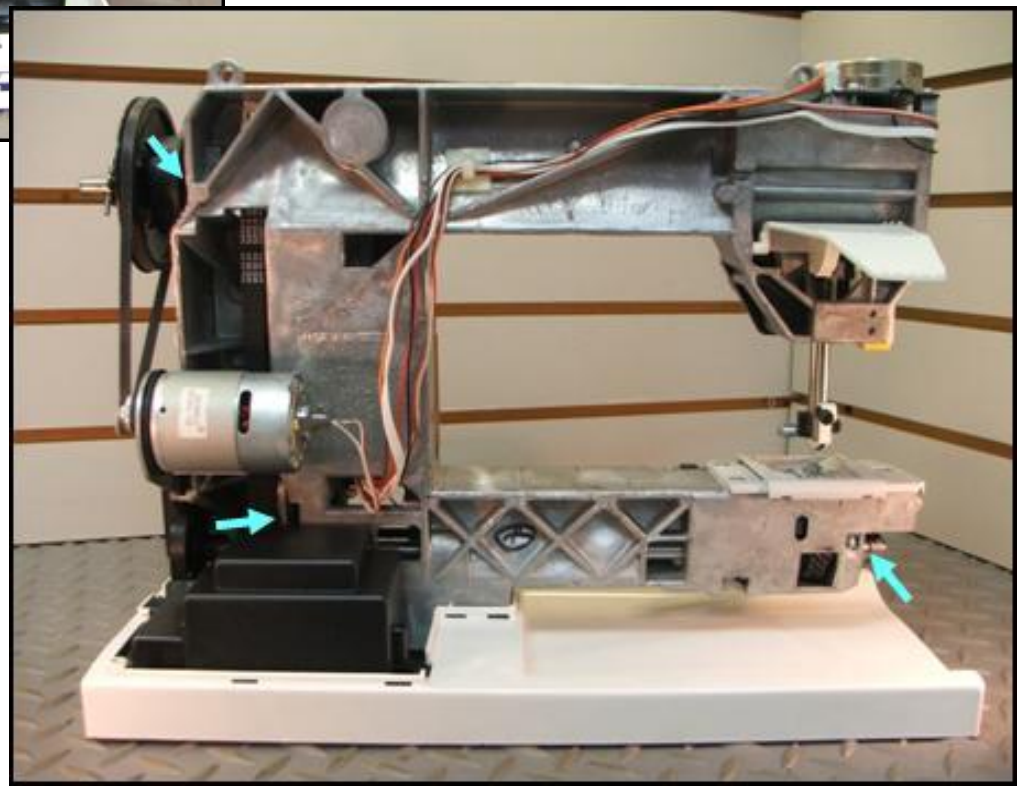


20 grams of bobbin tension is usually appropriate with Metrosene thread.

Lubrication







Oil →

Grease →

Suggested Shop Supplies & Tools

✓Timing gauge, Part #101360-20, Brewer
✓Dial tension gauge, Part #DT-100G, Brewer
✓Allen wrenches, (Inch sizes)
✓Zymol car polish
✓Kerosene, clear
✓Solvent cleaner/degreaser spray, Sprayway® C-60 Part# SW-60, Brewer,
✓WD-40®
✓Emory paper, 400 and 600 grit
✓Emory tape Part #E56, Brewer
✓Lint Brush Part #1305 Brewer
✓Book, “FEATHERWEIGHT 221, THE PERFECT PORTABLE”
✓“Selling From the Tech Room” presentation, available on the 2017 BERNINA University CD
✓Service reminder stickers #STR1 BERNINA (or make your own, pictured, www.pamcolable.com)
✓Service reminder postcards

Brewer #101360-20

Brewer #DT-100G