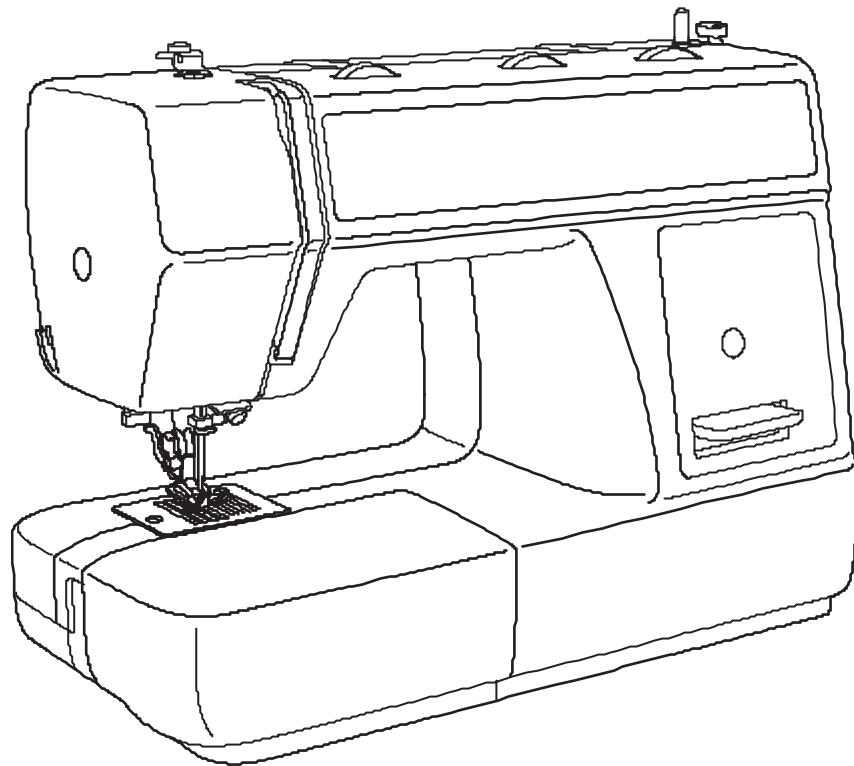


Service Manual



E20

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ATTENTION

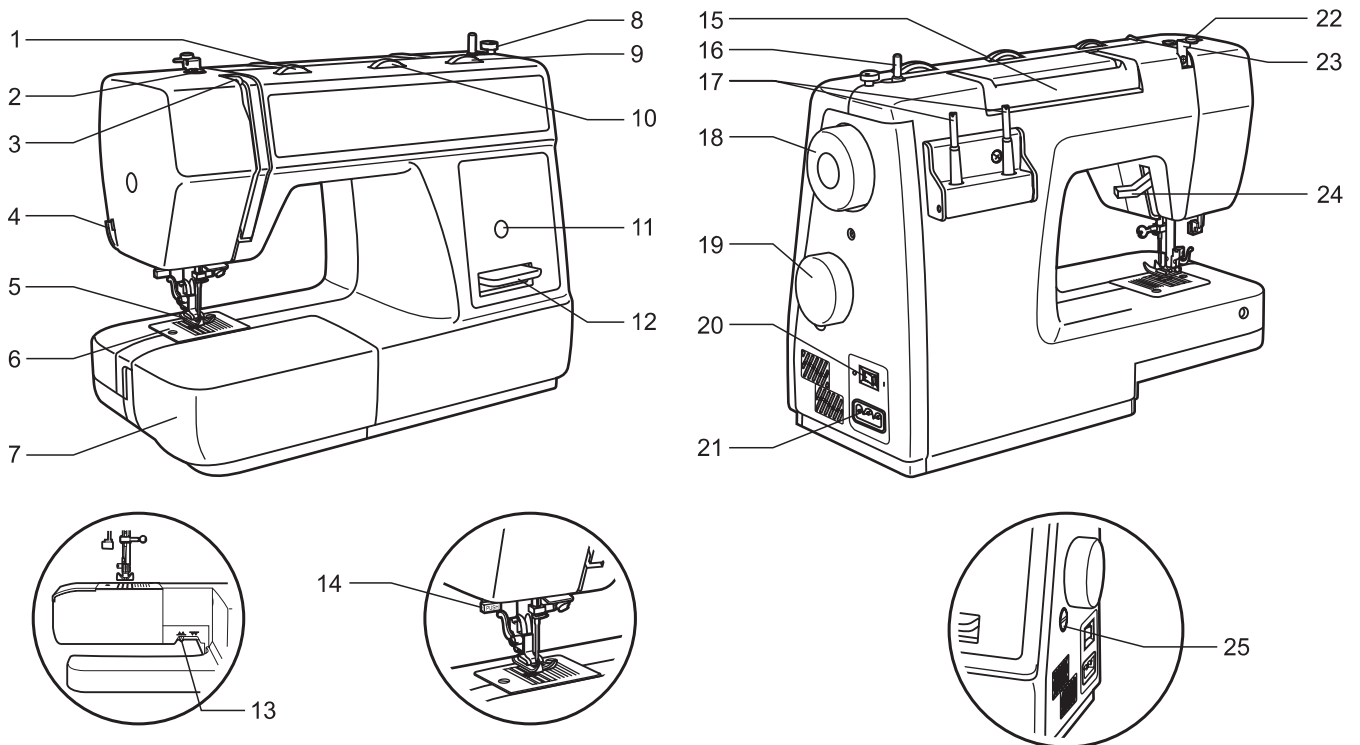
Be sure to observe the following, as they may well become causes for fire, electric-shock, injuries, and damage to parts.

- Be sure to unplug power source before engaged in disassembly, installation, adjustment.
- In case of installing please pay special care to clamp electrical cords, etc., scars to sheath, mis-circuit, etc.
- Be sure to use regular standard part in replacing.

Products specification

ITEM	TYPE	E20
Machine style		Free arm
Size of machine (mm) L x W x H		398 x 175 x 285
Weight (kg)		7.2 (only machine)
Max rotation speed (rpm)		750 ± 50
Motor power / Light power (W)		North America 60W / 10W Europe 60W / 15W
Motor type		AC
Rotation control method		Electronic
Needle position		Center and left position
Zigzag out-breaking device		Multiple-player cams conversion type
Hook system		Semi rotary hook
Thread take up lever		Slit type
Presser foot lift		Two-steps type
Needle threader		No
Needle plate		Screw fixing type
Upper thread tension adjust device		Top of upper plate inclusive turning knob
Drop feed		Yes
Bobbin winder		Self releasing with automatic stop
Reverse		Press down type
Press-bar pressure regulating device		Yes
Kinds of stitches		34
BH micro adjust device		Yes
Dials		3
Zigzag conversion device		Dial type
Stitch length adjust device		Dial type
Button hole system		1 step
Pattern indicating device		Indicated in a transparent window pattern to be selected
Max. length of stitch (mm)		4.2
Max. width of zigzag (mm)		5
Face cover, upper cover		Plastic
Sewing table		Coupled with accessories / Spare parts box
Lamp		Inclusive within face cover
Speed control device		Controller
Power supply switch		Pulsating, two steps
Protective cover		No
Nos. of accessories		Option

Names of principal parts

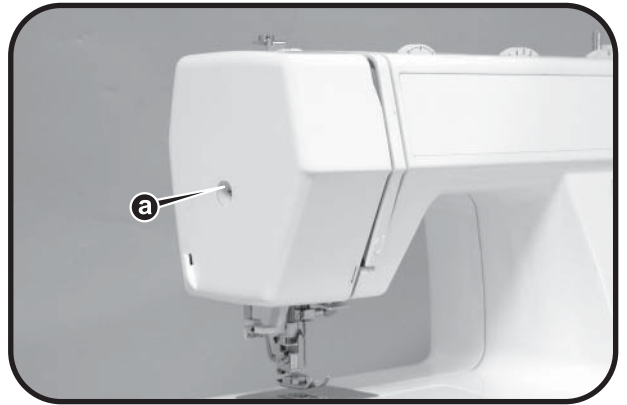


-
- | | |
|-----------------------------------|-----------------------------------------------|
| 1. Thread tension dial | 14. One step buttonhole lever |
| 2. Presser foot pressure | 15. Handle |
| 3. Thread take-up lever | 16. Bobbin winder |
| 4. Thread cutting | 17. Spool pin |
| 5. Presser foot | 18. Handwheel |
| 6. Needle plate | 19. Pattern selector dial |
| 7. Sewing table and accessory box | 20. Power switch |
| 8. Bobbin stopper | 21. Main plug socket |
| 9. Stitch length dial | 22. Bobbin thread guide |
| 10. Stitch width dial | 23. Upper thread guide |
| 11. Stitch display | 24. Presser foot lever |
| 12. Reverse sewing lever | 25. Buttonhole stitch balance adjustment slot |
| 13. Drop feed control | |

Removing methods of external parts

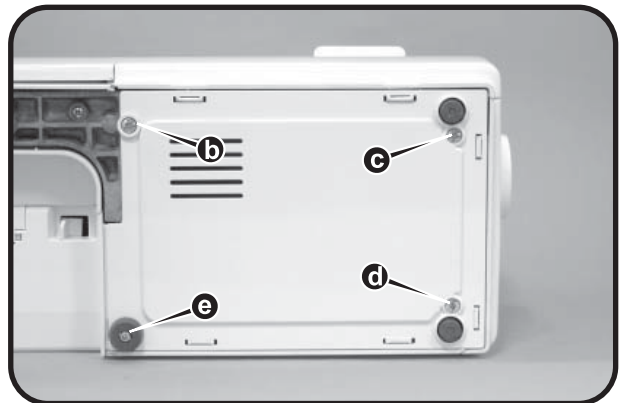
1. Face cover

- Remove screw (a)
- Remove the face cover.



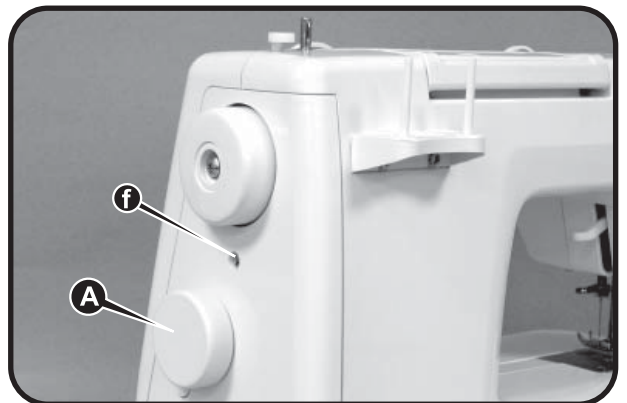
2. Base cover

- Lay down machine. Remove 3 screws (b, c, d).
- Remove free arm base cushion rubber (e).
- Remove base cover.



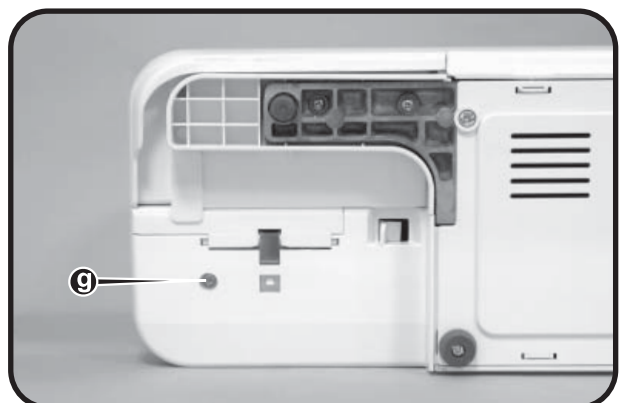
3. Belt cover

- Remove base cover.
- Remove screw (f) and pull out pattern selector dial (A).
- Remove belt cover.



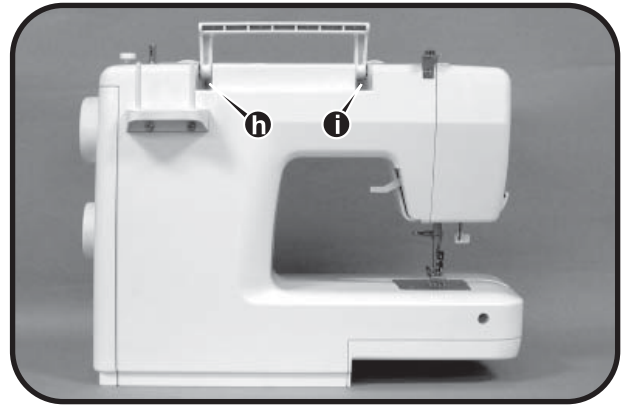
4. Free arm cover

- Remove screw (g)
- Remove free arm cover.

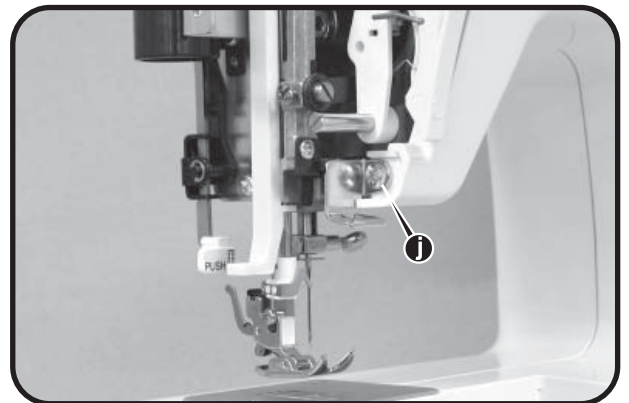


5. Front cover

- Remove face cover, base cover, belt cover and free arm cover first.
- Lift handle and remove 2 screws (h, i).



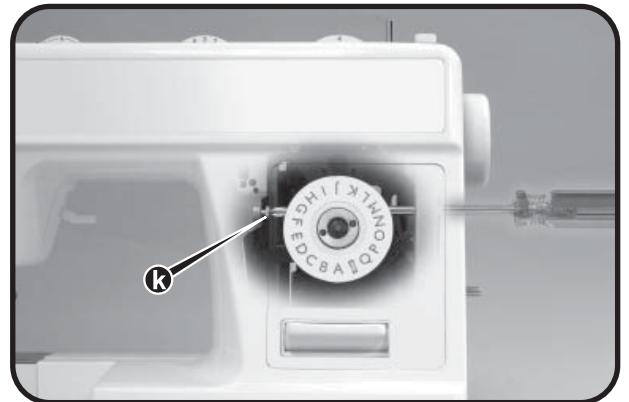
- Loosen screw (j) about 3mm.



- Loosen screw (k) about 3mm.

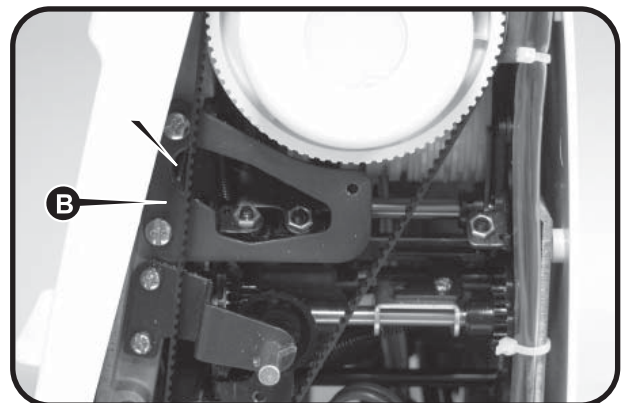
Note 1:

First using electric torch (flash light) etc to locate screw (k) positioned deeply inside the machine.

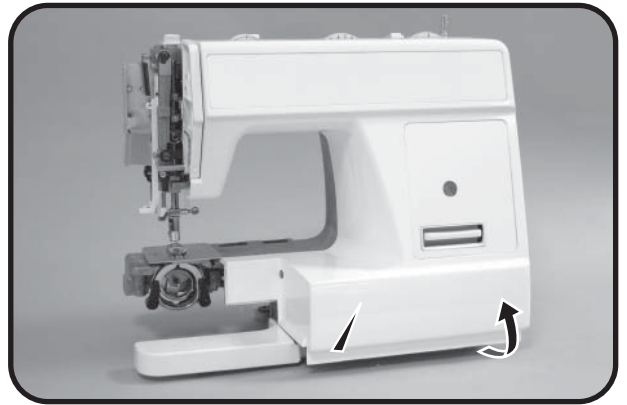


Note 2:

To reach the screw (k), use Philips type screwdriver through the operation hole on plate (B).

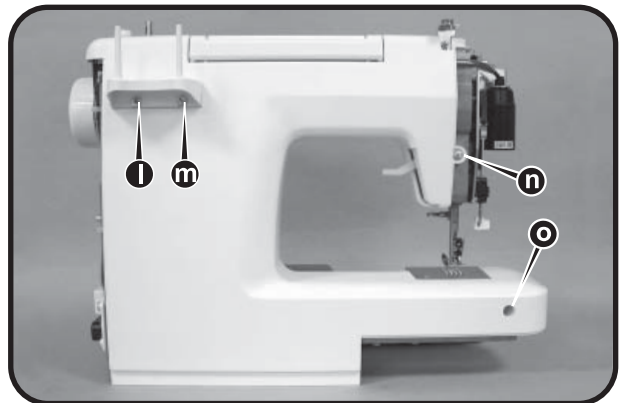


-
- Remove front cover following direction of arrow.



6. Back cover

- Remove front cover first.
- Remove 4 screws (l, m, n, o).
- Raise the handle.
- Lower the presser foot.
- Remove the back cover.



Lower thread tension

Check

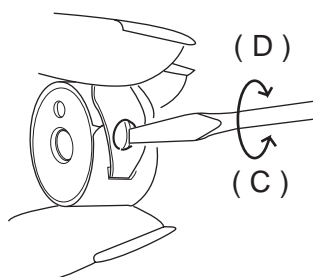
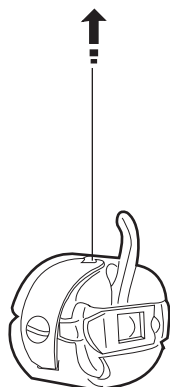
Set the bobbin in the bobbin case and pass a thread through the tension spring.

The lower thread tension should be between 25 and 40 grams when pulling the thread in the direction of (A).

Adjustment

1. If the lower thread tension is too tight, turn the adjusting screw in the direction of (C).
2. If the lower thread tension is too loose, turn the adjusting screw in the direction of (D).

(A)



Upper thread tension

Check

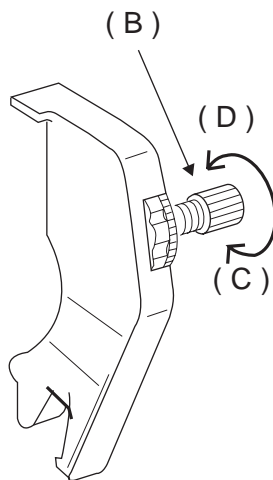
A correct interlacing of the upper thread and the bobbin thread (cotton thread 50/2 or synthetic fiber thread 100/35) must take place approximately in the middle of the fabric at straight and zigzag stitch setting with the tension dial at "4".

alt. Check

The standard upper thread tension should be between 60-70 grams when pulling a cotton thread 50/2 or synthetic fiber thread 100/35 with the tension dial at "4". The presser foot should be lowered when checking the upper thread tension.

Adjustment

1. Remove the face cover and the front cover.
2. Turn the adjusting nut (B) in the direction of (C) when the upper thread tension is too tight.
Turn the adjusting nut (B) in the direction of (D) when the upper thread tension is too loose.
3. Attach the front cover.



Presser bar height and alignment

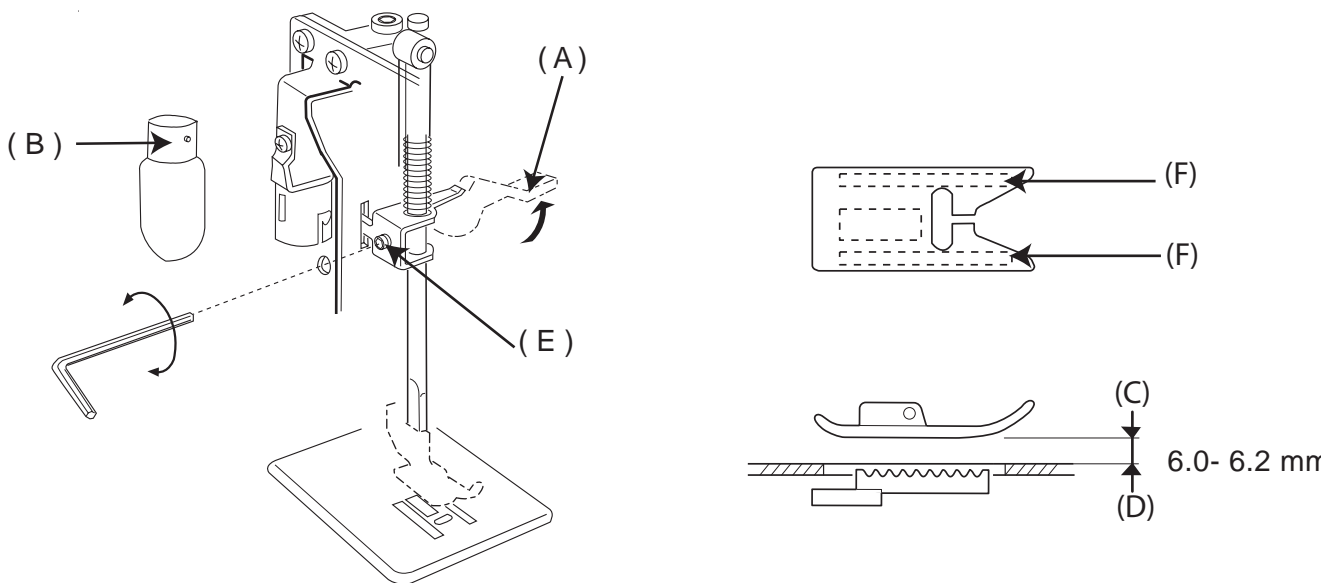
Check

1. Raise the presser foot lever (A).
2. The distance between the presser foot (C) and the needle plate (D) should be 6.0-6.2 mm.

Adjustment

1. Remove the face cover.
2. Raise the presser foot lever and loosen the 2mm Allen screw (E) on the back side of the presser bar holder. Adjust the distance between the zigzag foot (C) and the needle plate (D) to 6.0-6.2 mm.
3. Tighten the screw (E) securely.
4. Attach the face cover.

NOTE! When you tighten the screw (E), make sure that both sides of the presser foot are parallel to the feed dog slots (F) on the needle plate.



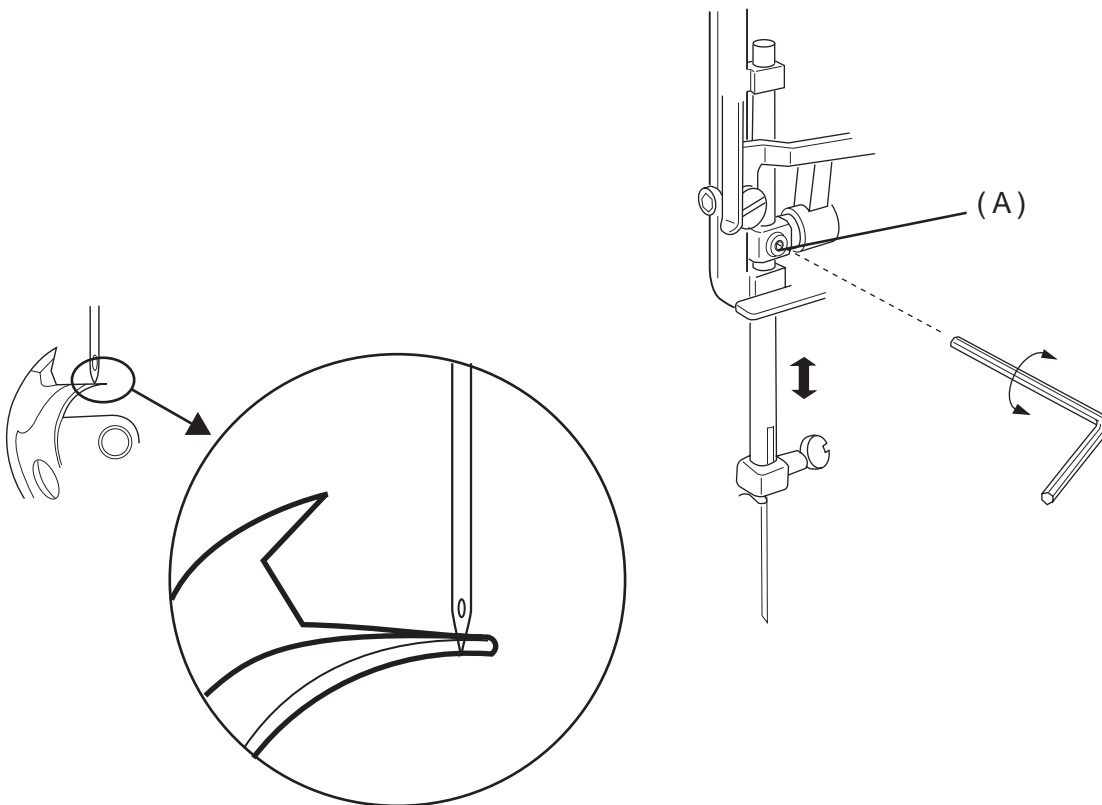
Height of needle bar

Check

1. Set pattern selector dial to "B". Turn stitch width dial to "0".
2. Remove shuttle hook holder.
3. Set needle at its lowest point.
4. Check that the point of the needle and the bottom surface of shuttle hook will align.

Adjustment

1. Remove the face cover
2. Set pattern selector dial to "B". Turn stitch width dial to "0".
3. Remove the shuttle hook holder.
4. Set needle at its lowest point.
5. Loosen 2mm Allen screw (A) of needle bar bracket.
6. Adjust height of needle by moving the needle bar upward / downward.
7. Stop at the position when the point of the needle and bottom surface of shuttle hook will align.
8. After adjustment, tighten screw (A) of needle bar bracket.
9. Re-assemble the shuttle hook holder accordingly.
10. Attach the face cover.



Turning movement of the needle in zigzag and the play of the worm gear

Check 1

The needle should start swinging when the needle tip is 5 - 10 mm above the needle plate (G) and should stop swinging 10 - 5 mm before entering into the hole of needle plate.

Check 2

It is impossible to obtain an equally large play in one rotation of the cog wheel, but it should be as small as possible at the tightest spot during the revolution.

Rotate the cogwheel (C) back and forth and check the play. It should be zero or as small as possible.

Adjustment

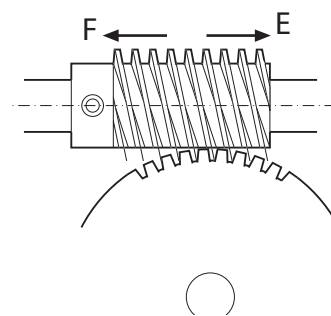
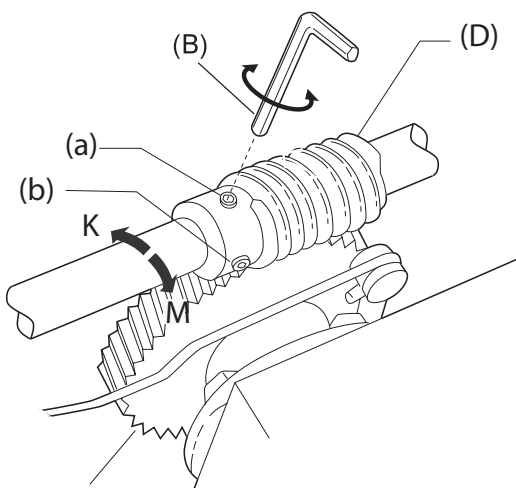
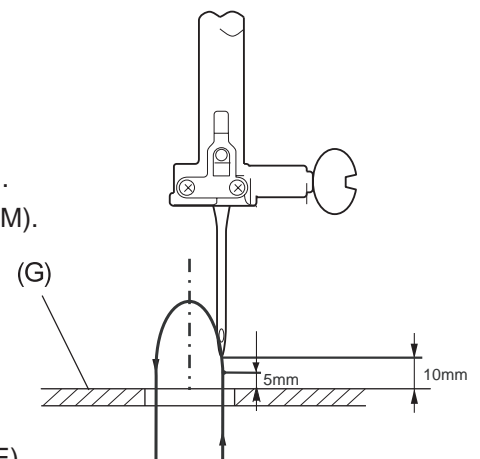
1. Remove the face cover and front cover.
 2. Select the zigzag stitch "B" and set the width at "5".
 3. Turn the hand wheel to set the needle bar at the right needle position.
 4. Loosen the 2mm Allen screws (a, b).
 5. Insert the Allen key into one of the Allen screws (a,b).
 6. Turn the hand wheel so that the needle tip comes 5 - 10 mm above the needle plate (G) in upward travel as shown.
- If needle flow is less than 5 mm, turn arm shaft worm gear (D) toward back (K).
 - If needle flow is more than 10 mm, turn arm shaft worm gear (D) toward front (M).
7. Tighten the 2 Allen screws.
 8. Check the swing of the needle.
 9. Check that setting play of worm gear (D) sideways hasn't changed.

If so ...

Loosen the 2 Allen socket screws (a, b) again and move the worm gear:

- to increase the backlash, move the worm gear (D) to the direction of (E).
- to decrease the backlash, move the worm gear (D) to the direction of (F).

10. Tighten the 2 Allen screws.
11. Re-Check "Turning movement of the needle in zigzag" again.



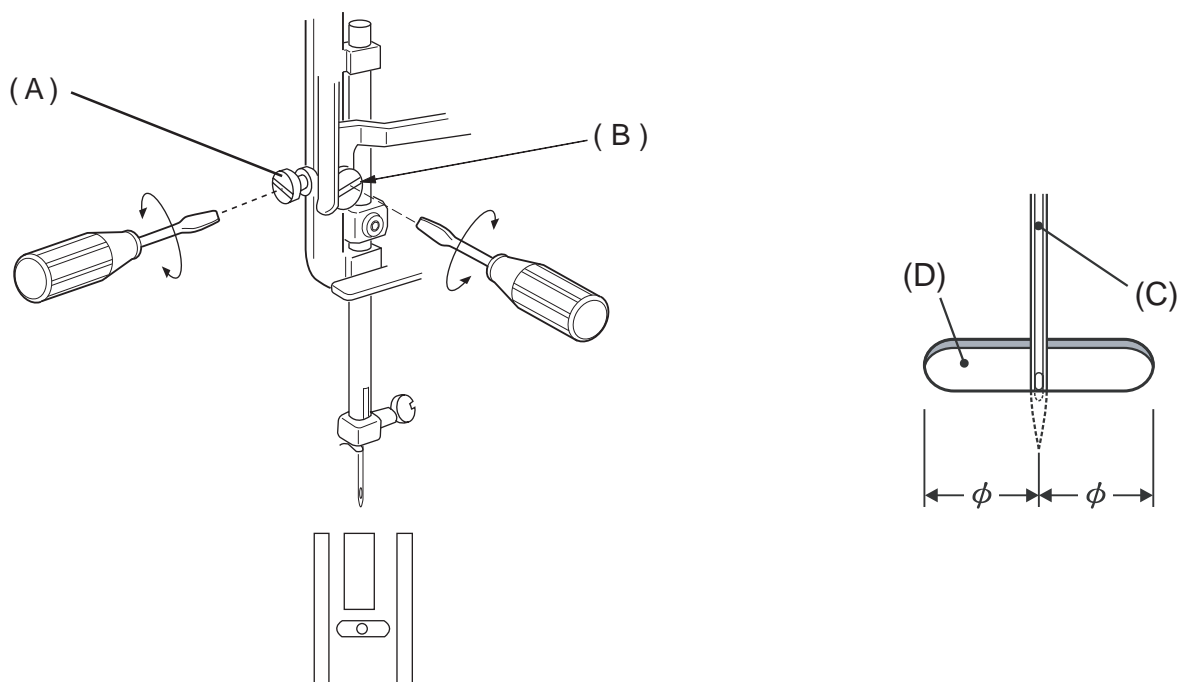
The centre position of the needle in straight stitching

Check

1. Set the pattern selector dial to zigzag "B", and turn stitch width dial to "0".
2. Insert a new #90 needle.
3. The point of needle (C) shall pass through the centre of the needle hole (D) in the needle plate.

Adjustment

1. Remove the face cover.
2. Loosen the screw (A) of needle bar driving rod pin (B).
3. Adjust the needle:
 - To the right by turning screw (B) clockwise.
 - To the left by turning it counter-clockwise.
4. Set the point of needle (C) so it passes through the centre of the needle hole (D) in the needle plate.
5. Tighten screw (A).



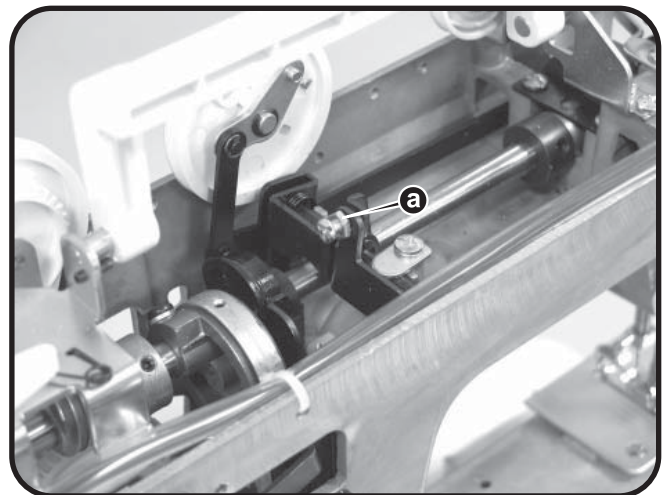
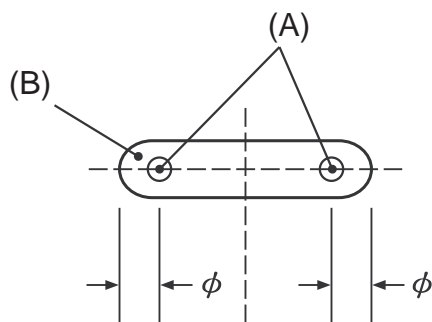
Needle position of zigzag

Check

When the needle (A) swings in maximum zigzag width, the distance between both ends of the needle hole (B) on the needle plate and the needle drop positions should be equal .

Adjustment

1. Remove the face cover and the front cover
2. Set the pattern selector dial to zigzag "B" and maximum width.
3. Adjust needle position by turning screw (a) of zigzag regulator crank complete clockwise / counter-clockwise.
Clockwise = needle moves right.
Counter-clockwise = needle moves left.
4. Re-check so the distance between both ends of the needle hole on the needle plate and the needle drop positions is equal
5. Attach the front cover and the face cover.



Play of arm shaft

Check

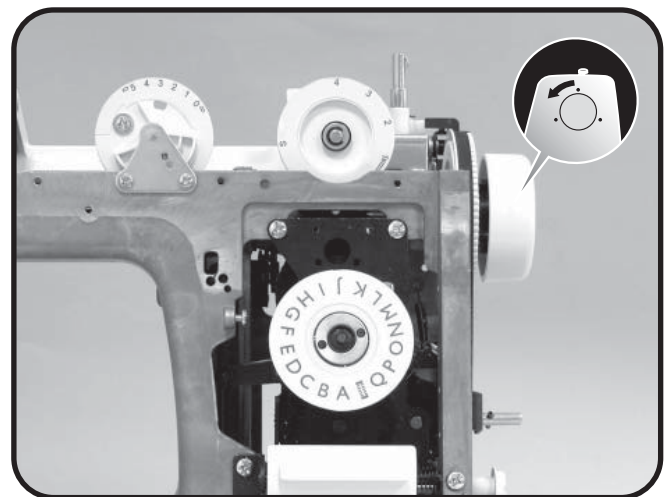
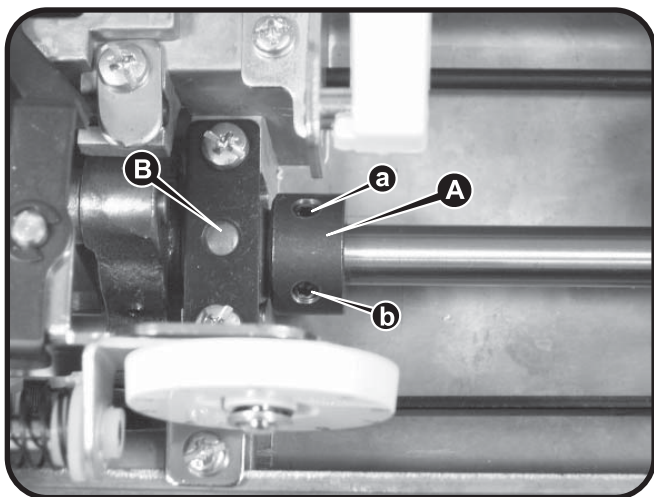
The axial play of the arm shaft should not be larger than 0.005 mm.

Adjustment

1. Remove the free arm cover, face cover and the front cover.
2. Loosen the 2 screws (a, b) of arm shaft collar (A).
3. Pull hand wheel backward.
4. Push arm shaft collar (A) to left tightly against arm shaft bushing (B) and then fasten and secure screws (a, b).
5. Re-check the distance between arm shaft collar and arm shaft bushing.

NOTE! Be sure arm shaft operates smoothly after adjustment.

Arm shaft collar and arm shaft bushing being too tightly closed might cause insufficient operation of arm shaft.



Clearance between needle and hook

Check

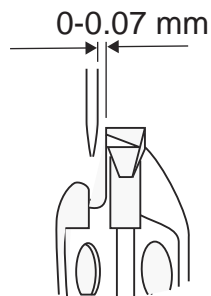
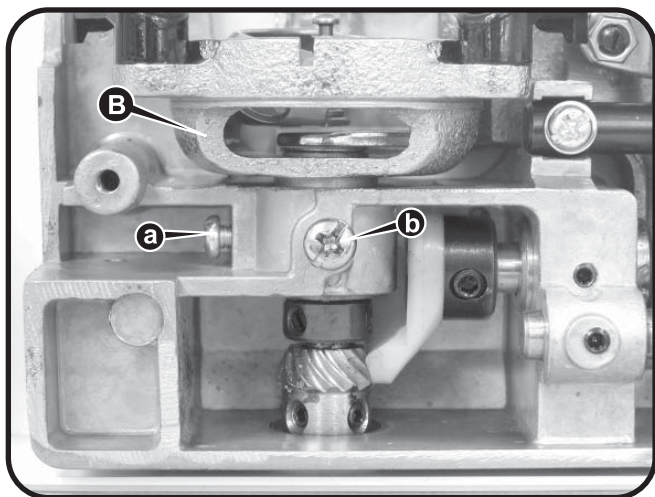
1. Insert a new #90 needle.
2. Set pattern selector dial to "B". Turn stitch width dial to "5".

The clearance between the needle and shuttle hook should be 0 to +0.07 mm.

Adjustment

1. Remove free arm cover.
2. Remove shuttle hook holder.
3. Set needle at its lowest point when it swings to right, stop at the position when point of the needle and shuttle hook align.
4. Loosen screws (a, b) of open shuttle race.
5. Move shuttle race (B) forward / backward to adjust movement.
 - Forward = tighten the distance
 - Backward = lengthen the distance
6. Make sure space between needle and tip of hook is 0- 0.07mm.
7. After adjustment, re-tighten the screws.
8. Re-assemble shuttle hook holder and covers.

NOTE! This adjustment affect "Timing of needle and hook" and "Play between shuttle driver shaft gear and lower shaft gear"



Play between shuttle driver shaft gear and lower shaft gear

It's impossible to obtain an equal large play in the rotation of a cogwheel, but it should be as small as possible at the tightest spot during the revolution.

Check

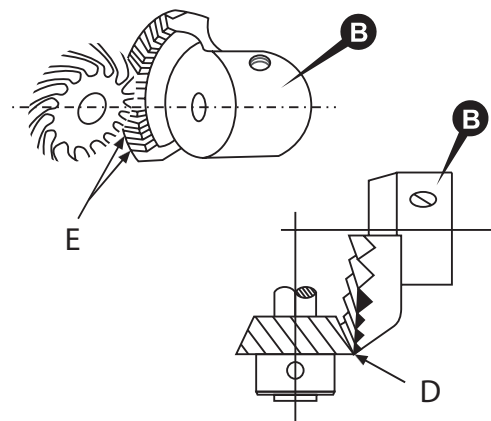
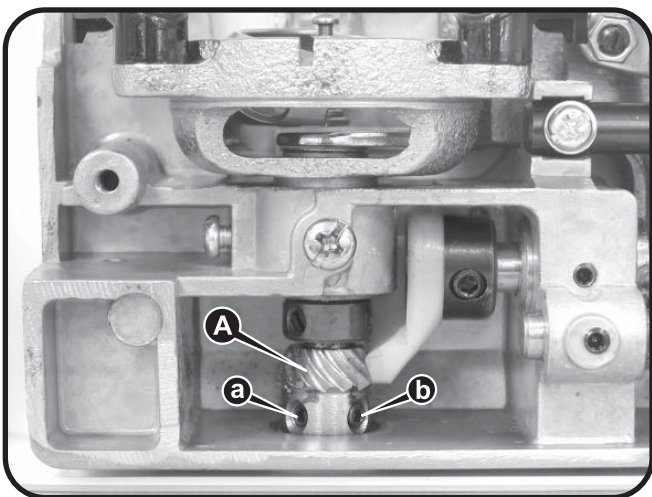
1. Remove the bobbin case, the shuttle hook holder and the shuttle.
2. Turn the shuttle driver back and forth with a finger and check the play.
3. Turn the hand wheel and check the play in at least three positions during the stroke of the shuttle driver.
4. The play shall be noticeable, but not exceed 0.5mm in sideways.

Adjustment of play

1. Remove the free arm cover.
2. Loosen 2mm Allen screws (a, b) of shuttle driver shaft gear.
3. Move the lower shaft gear (A):
 - backward if there is a tight spot.
 - forward if the play is too big.
4. Re-tighten the screws of the shuttle driver shaft gear.
5. Insert shuttle hook and check "Timing of Needle and Hook".
6. Re-assemble free arm cover, shuttle, shuttle hook holder and bobbin case.

Adjustment of timing between shuttle driver shaft gear and lower shaft gear

1. Loosen 2mm Allen screws (a, b) of shuttle driver shaft gear.
2. Remove shuttle driver shaft gear (A).
3. Set needle to its lowest point. At this position the flat side of rear end of the shuttle driver shaft shall face 5 o'clock seen from the rear side of the machine.
4. Re-assemble shuttle driver shaft gear (A), align it with lower shaft gear (B) to mesh with each other at one point (D). If you need to move lower shaft gear, follow "Distance adjustment between shuttle driver shaft gear and lower shaft gear".
5. Tighten screws of shuttle driver shaft gear. Tighten first the Allen screw positioned at flat side of the shaft.
6. Check the play of the shuttle driver, above.
7. Insert shuttle hook and check "Timing of Needle and Hook".
8. Re-assemble back cover, free arm cover, shuttle, shuttle hook holder and bobbin case.



Distance adjustment between shuttle driver shaft gear and lower shaft gear

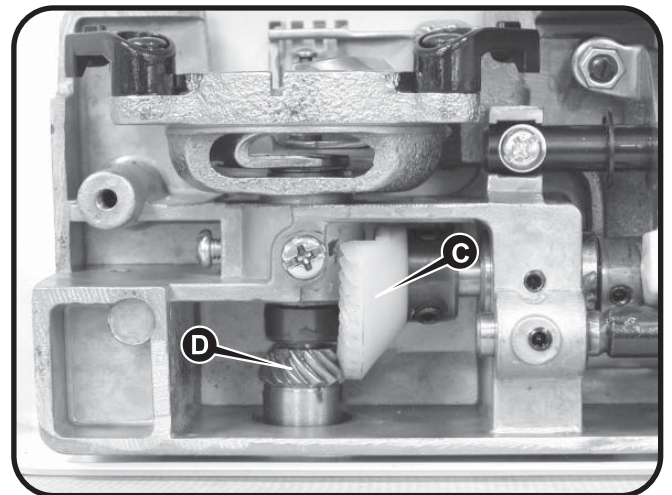
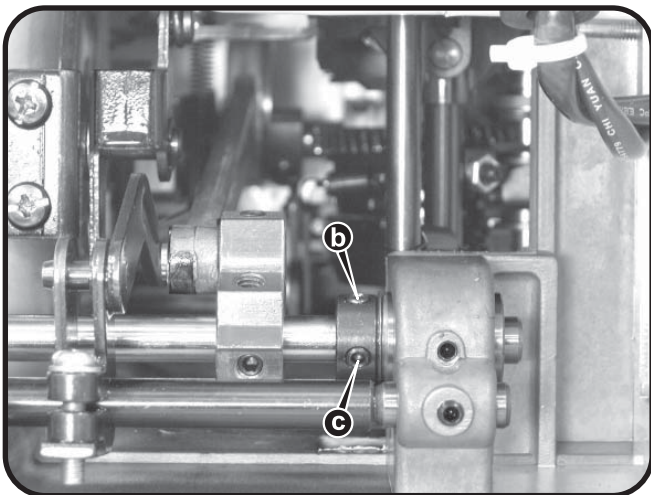
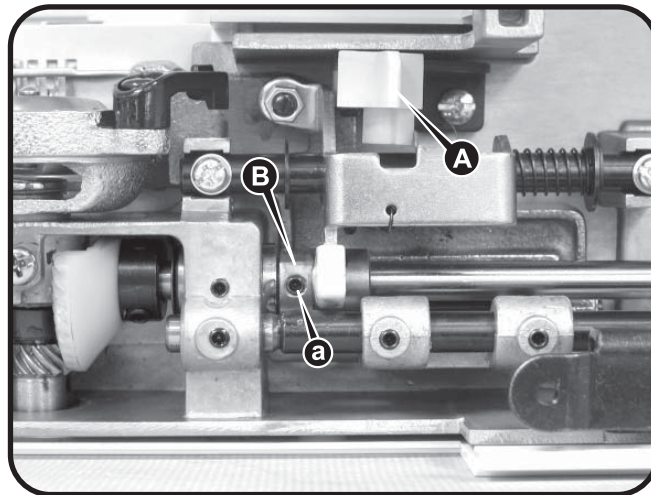
Check

The axial play of the lower shaft should not be larger than 0.005 mm.

Adjustment

1. After remove free arm cover and base cover, push feed lifting shaft (A) to right until 2mm Allen screw (a) of feed lifting rod cam is revealed. Proceed to loosen screw (a) slightly and push feed lifting rock cam (B) to right.
2. Loosen 2mm Allen screws (b, c) of lower shaft collar.
3. Push lower shaft gear (C) to left tightly against shuttle driver shaft gear complete (D).
4. Push lower shaft collar to right and secure screws (b, c).
5. Push feed lifting rock cam (B) back toward left and secure it tightly.
6. Avoid over-tightening shuttle driver shaft gear and lower shaft gear. If gears are too tight then the torque will be bigger causing noise and shaking.

NOTE! This adjusting affect "Play between shuttle driver shaft gear and lower shaft gear"



Timing of needle and hook

Check

1. Set pattern selector dial to "B". Turn stitch width dial to "5".
2. Set needle bar at its lowest point when it swings to left.
3. Check that clearance between point of hook and left side of needle is 3.2 - 3.6mm.

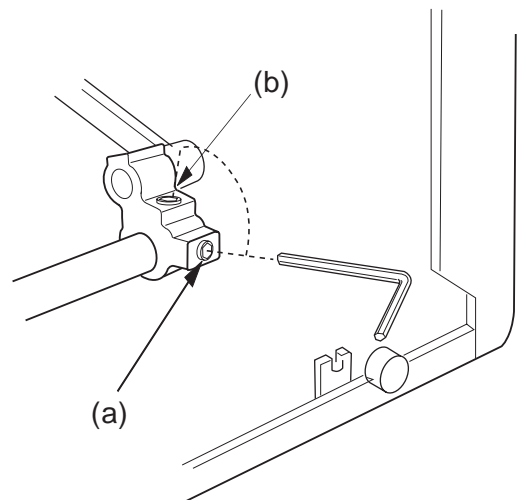
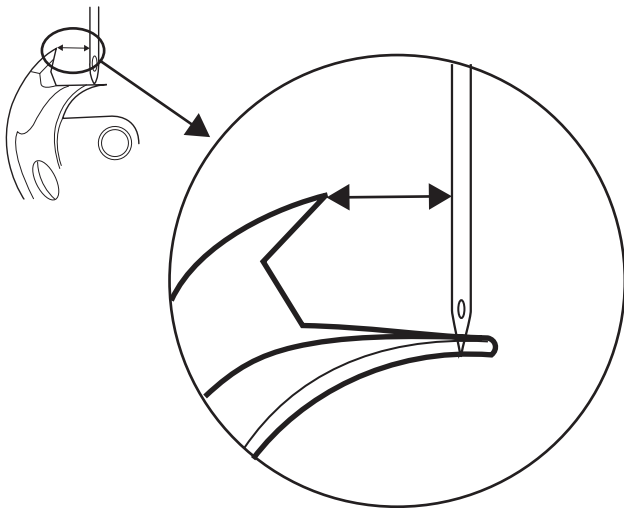
Adjustment

1. Set pattern selector dial to "B". Turn stitch width dial to "5".
2. Remove free arm cover and base cover.
3. Remove shuttle hook holder.
4. Set needle bar at its highest point and loosen the 2.5mm Allen screw (a) of crank connecting rod crank.
5. Set needle bar at its lowest point when it swings to left.
6. Loosen the 2.5mm Allen screw (b) of crank connecting rod crank.
7. Turn shuttle driver to adjust timing of needle and hook.
8. Tighten the screws of crank connecting rod crank when clearance between point of hook and left side of needle is 3.2 - 3.6mm.

Clockwise = timing is smaller

Counterclockwise = timing is bigger.

9. Re-assemble shuttle hook holder and covers.



Feeding length

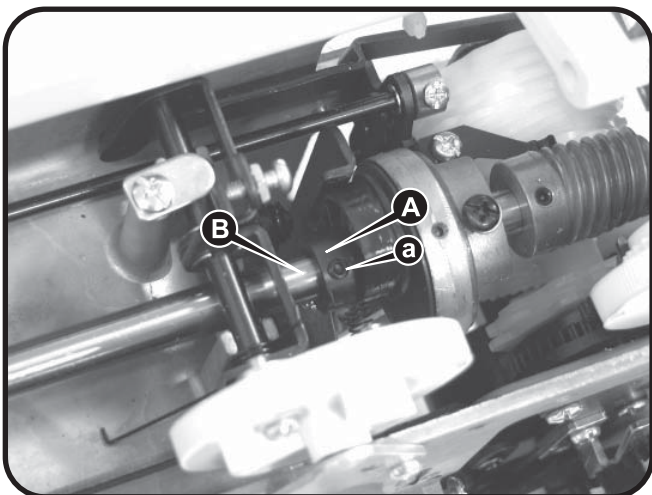
Check

Problems associated with delivery amount, stitch unbalance and needle breakage, make the following check:
The line in the feed cam collar (A) should be right in front of the line in the arm shaft (B).

Adjustment

1. Loosen screw (a) in the feed cam (A).
2. Turn the feed cam until the the line in it comes right in front of the line in the arm shaft.

NOTE! The feed cam must be centred in the forked rod.



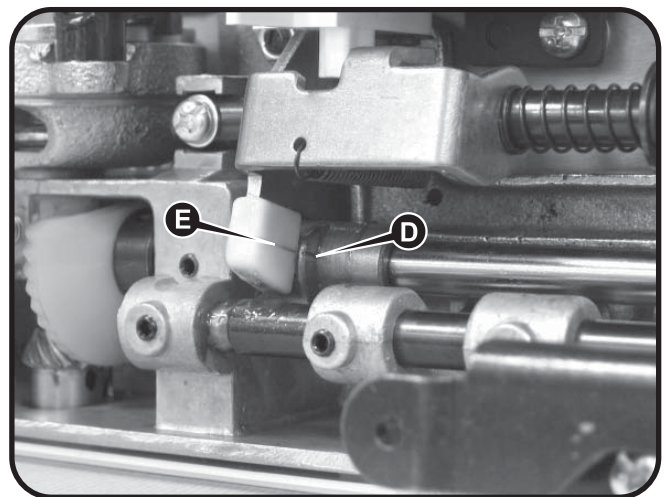
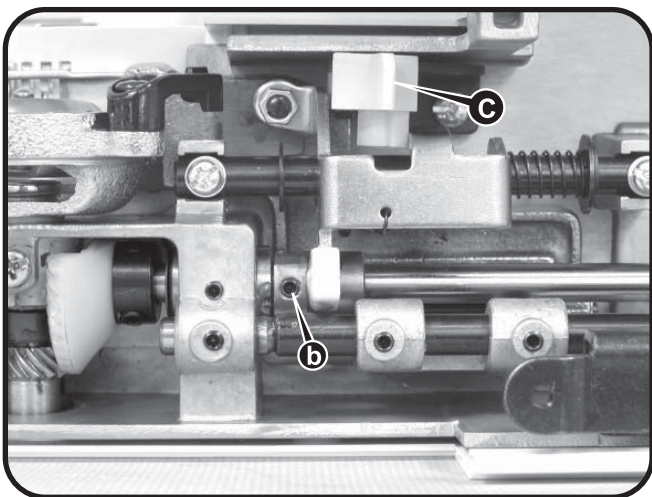
Setting the feed lifting in relation to the needle

Check

1. Turn the hand wheel until the needle is in its highest position.
2. The feed lifting (D) should be lined up with marking (E) of the feed rock crank (E).

Adjustment

1. Dismount rear cover and free arm cover.
2. Set needle at its highest position.
3. Push feed lifting shaft (C) to right until screw (b) is revealed.
4. Loosen screw (b) and turn it until the hair line of the feed lifting (D) is lined up with marking (E) of the feed rock crank (E).
5. Tighten the screw (b).
6. Attach covers.



Feed dog height

Check

When the feed dog is in its highest position it should be 0.9 to 1.05 mm from the surface of the needle plate.

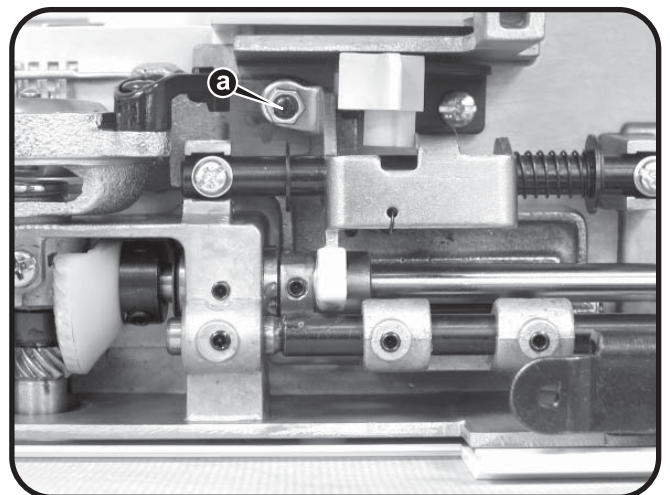
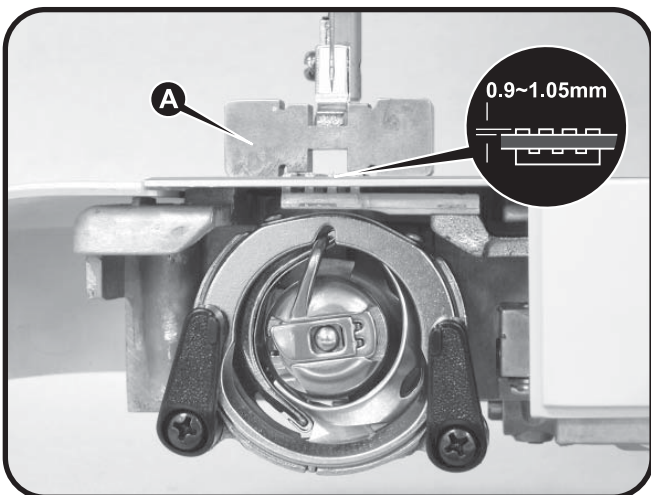
Adjustment

1. Turn the hand wheel until the feed dog comes to its highest position.
2. Remove the lower free arm cover.
3. Turn the adjusting screw (a) so that the feed dog height is between 0.9 mm to 1.05 mm from the surface of the needle plate (A).

Clockwise = the feed dog will be raised.

Counter-clockwise = the feed dog will be lowered.

4. Attach the lower free arm cover.



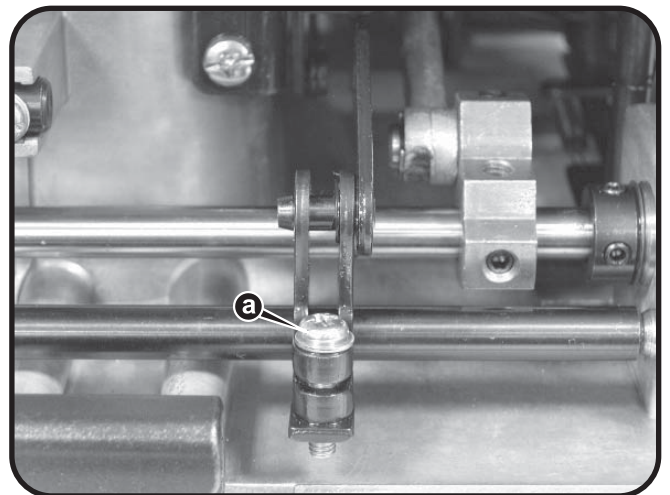
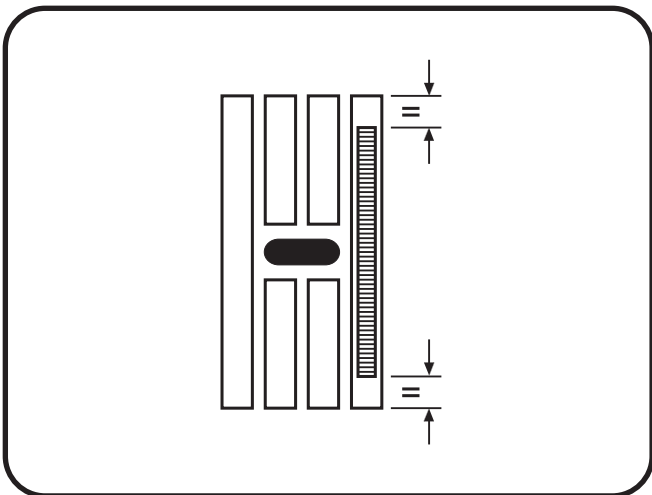
Clearance between feed dog and the needle plate – Front to Back

Check

1. Set pattern selector dial to "B". Turn stitch length dial to "4".
2. Turn hand wheel to move feed-dog forward and backward.
3. The feed dogs shall not at any point touch the needle plate in the back side or the front side.

Adjustment

1. Remove the base cover.
2. Loosen screw (a) of feed rock crank.
3. Moving feed-dog forward / backward until it is centered in the needle plate.
4. Tighten screw (a) after adjustment.
5. Attach covers.



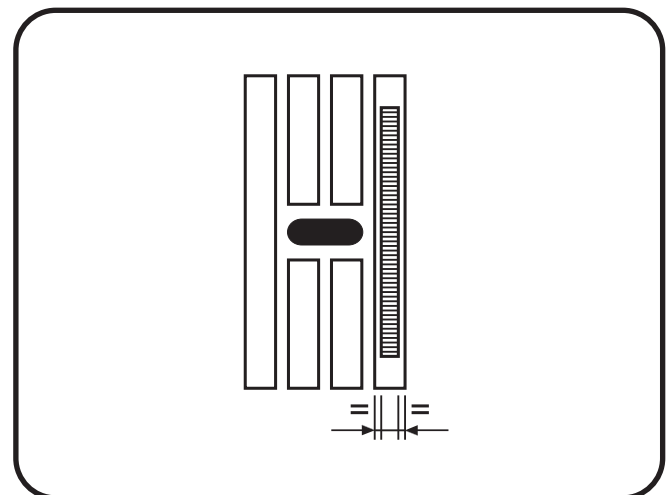
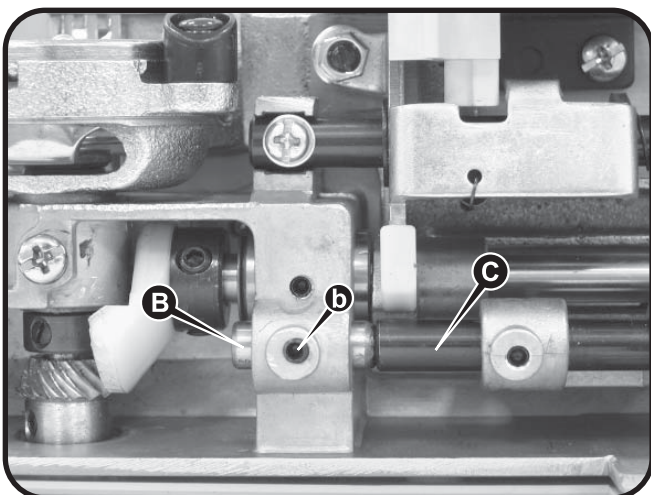
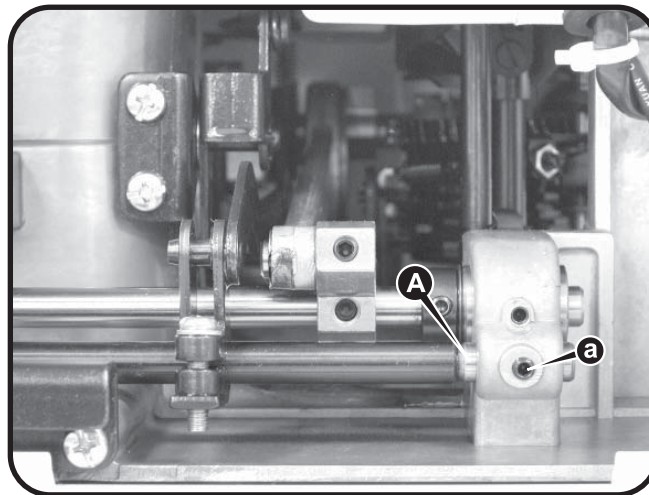
Clearance between feed dog and the needle plate – Side ways

Check

1. Set pattern selector dial to "B". Turn stitch length dial to "4".
2. Turn hand wheel to move feed-dog forward and backward.
3. The feed dogs shall not at any point touch the needle plate in the left side or the right side.

Adjustment

1. Remove the base cover and the free arm cover.
2. Loosen the screw (a) on the the right side of the feed crank shaft (A).
3. Loosen the screw (b) on the left side of the feed crank shaft (B).
4. Adjust the distance between the feed dog and the needle plate by moving feed crank shaft (B) left / right in accordance with feed rock shaft (C) left / right so that it's equal distance between the feed dog and the needle plate.
5. Tighten screw (b) to fix the left side of feed crank shaft (B).
6. Push right side feed crank shaft (A) to left and fasten the screw (a).
7. Attach covers.



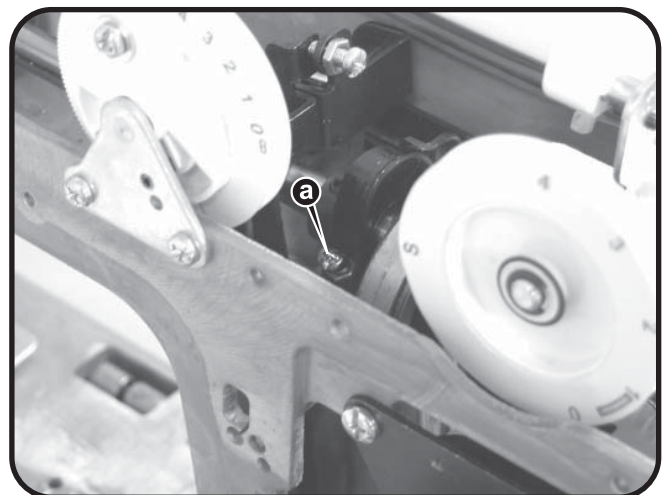
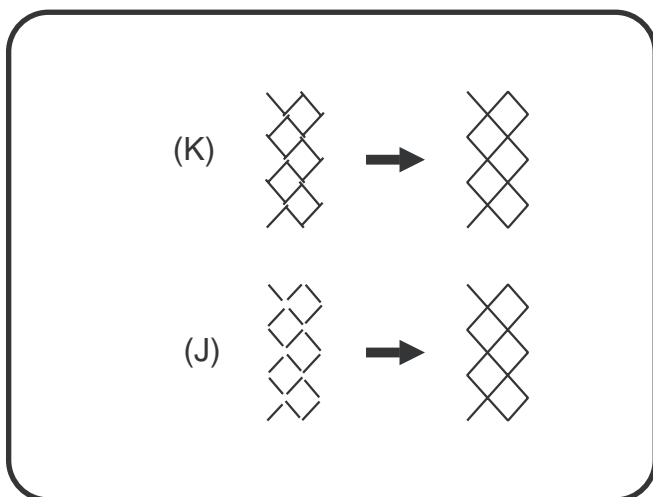
Stretch stitch balance

Check

When a stretch stitch is sewn the forward feeding and backward feeding should be equal when sewing stretch stitch pattern.

Adjustment

1. Remove the face cover, free arm cover and front cover.
2. Set pattern selector dial to "E". Turn stitch width dial to "5", stitch length dial to "S"
3. Put a piece of paper under the presser foot, and turn the hand wheel to check the needle drop position in forward and backward feeding.
4. If the stitch gap is
 - too big (J), turn the adjusting screw (a) clock-wise.
 - too tight (K), turn the adjusting screw (a) counter clock-wise.
5. Attach the the front, free arm and face covers.



Buttonhole - feed balance, the columns

Check

When sewing a buttonhole, the stitches on each side of the buttonhole should be sewn with the same density.

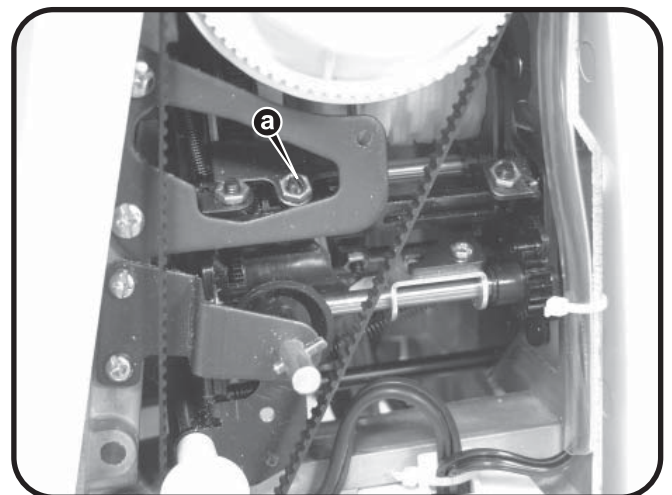
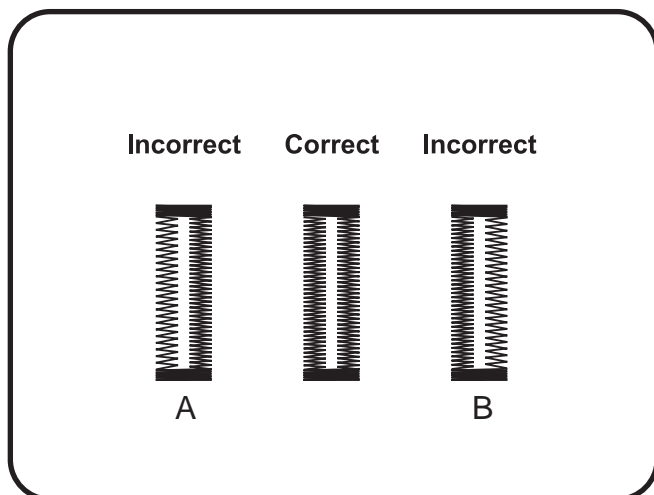
Adjustment

1. Set pattern selector dial to button hole.
2. Set stitch length dial to "0.5" to "1".
3. Set stitch width to "5".
4. Remove the belt cover.

If the right row is denser (A), turn the adjusting screw (a) counter-clockwise.

If the left row is denser (B), turn the adjusting screw (a) clockwise.

5. Attach the belt cover.



Buttonhole - bar tack, zero feeding

Check

When a button hole's bar tack is selected there should not be any feeding.

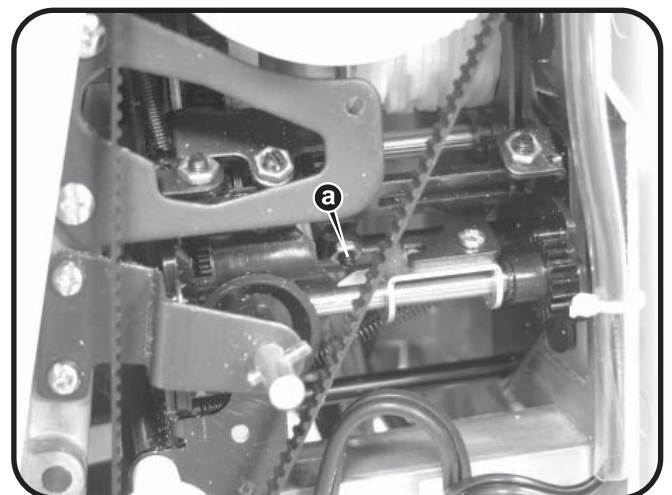
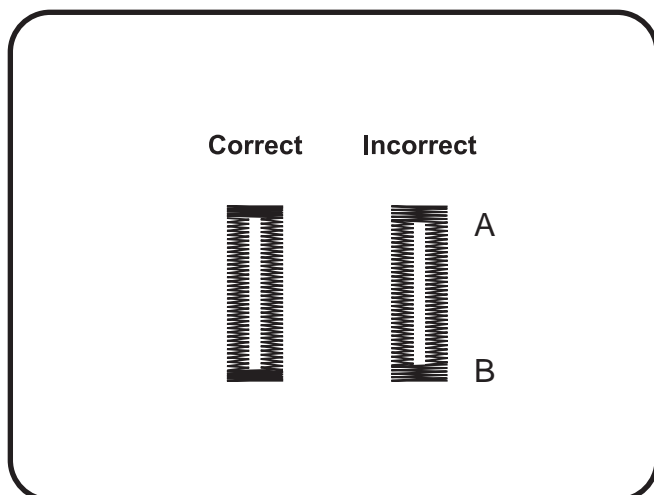
Adjustment

1. Set pattern selector dial to button hole.
2. Set stitch length dial to "0.5" to "1".
3. Set stitch width to "5".
4. Sew a buttonhole to check if the fabric is feeding while sewing the bar tacks.
5. Remove the belt cover.

If the fabric is fed on the upper bartack (A), turn the adjusting screw (a) counter clock wise .

If the fabric is fed on the lower bartack (B), turn the adjusting screw (a) clock-wise.

6. Attach the belt cover.



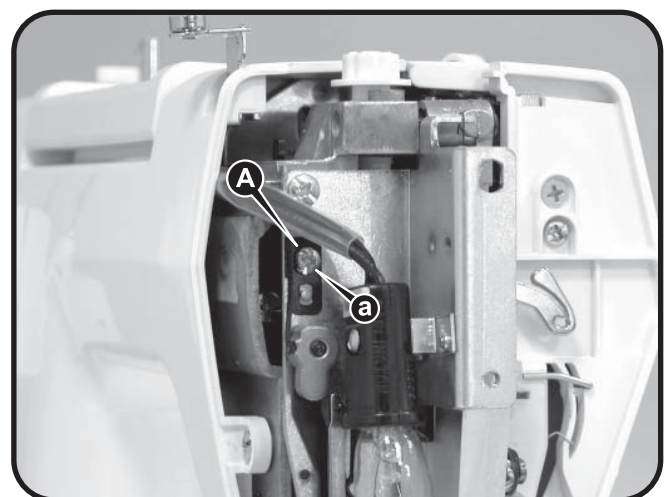
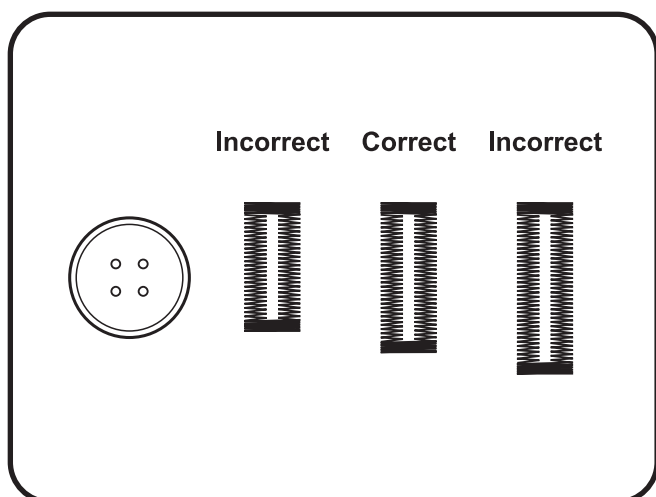
Buttonhole - bar tack, the length

Check

A buttonhole sewn with the buttonhole foot will be 3mm longer than the actual button.

Adjustment

1. Set pattern selector dial to button hole.
2. Set stitch length dial to "0.5" to "1".
3. Set stitch width to "5".
4. Remove the face cover.
5. Loosen the screw (a)
6. If the buttonhole is:
 - Too short, move the buttonhole lever adjusting plate (A) up.
 - Too long, move the buttonhole lever adjusting plate (A) down.
7. Attach face cover.



Motor belt tension

Check

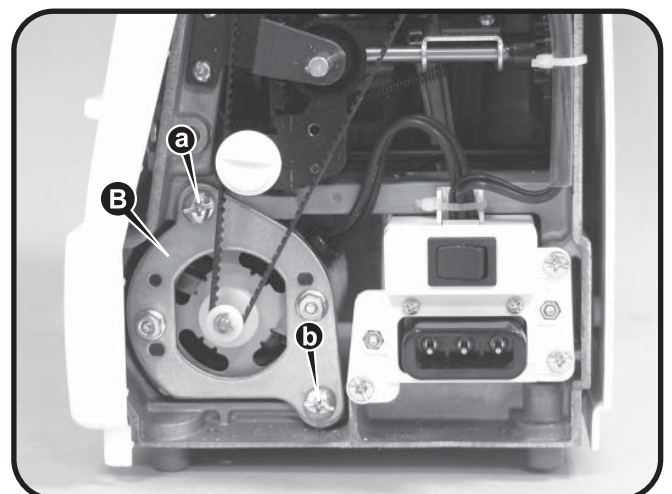
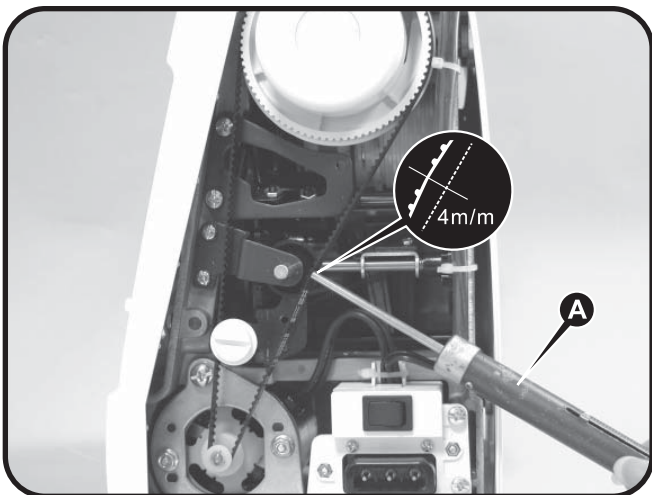
Too tight or too loose motor belt tension can cause belt noise.

Too tight motor belt tension can make the machine to run slow and overload the motor.

Too loose motor belt tension may cause jumping of the belt teeth on the motor pulley.

Adjustment

1. Remove the belt cover.
2. Loosen the screws (a) and (b) of adjusting plate (B).
3. Move the motor
 - upwards, the belt will become more loose.
 - downwards, the belt will become more tight.
4. Tighten the set screws (a) and (b).
5. Attach the cover.



Bobbin winding

Check

When winding up the lower thread onto the bobbin it should wind it 80 percent full and filled evenly.

Adjustment

1. Place an empty bobbin on spindle and push it to the right.
2. Lead thread from spool to back side of thread guide.
3. Wind thread clockwise around bobbin winder tension disc.
4. Turn on the power switch and step on the foot controller to run the machine.
5. Observe the shape of bobbin winding:
 - When the lower part of bobbin winding is thicker, loosen the screw (a) and push the threader guide up
 - When the upper part of bobbin is thicker, loosen the screw (a) and push the threader guide down
6. Observe the intensity:
 - If bobbin is less than 80 percent full, loosen the screw (b), adjust bobbin winder bracket shaft (B) clockwise.
 - If bobbin is over 80 percent full, loosen the screw (b), adjust bobbin winder bracket shaft (B) counter-clockwise.
7. Tighten the screw (b).
8. Bobbin should be 80 percent full and evenly filled after adjustment.
9. Push bobbin to left after adjustment before sewing.

