brother

SERVICE MANUAL FOR COMPUTERIZED SEWING MACHINE

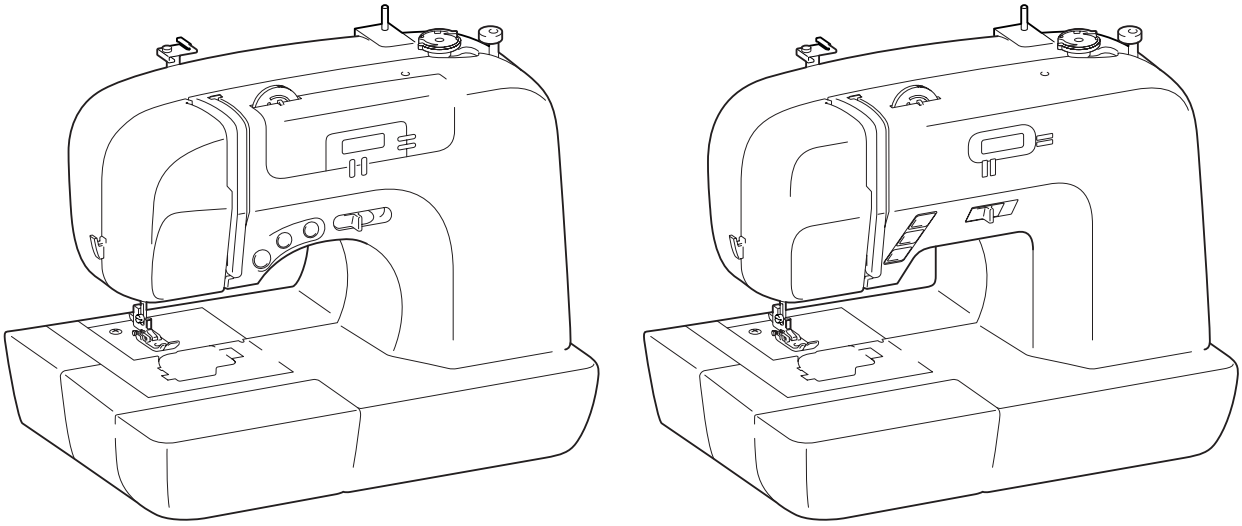
LOW-END COMPUTER SERIES

CS4000
BC2100
BC2300
RS240

ES2000
ES2200
ES2010
ES2210
ES2020
ES2220

CS6000
CS6000t
BC2500
RS260

ES2400
ES2410
ES2420



The CD-ROM version of service manual contains movie!

CD-ROM version of service manual contains movies "2. Disassembly" "3. Assembly".Please click on mark to start the movie.

12.2004.

GENERAL INFORMATION

This service manual has been compiled for explaining repair procedures of this MODEL.
This was produced based on up-to-date product specifications at the time of issue, but there may have been changes of specifications for the purpose of improvements.
Contact manufacturer or local sales company for information concerning such changes.

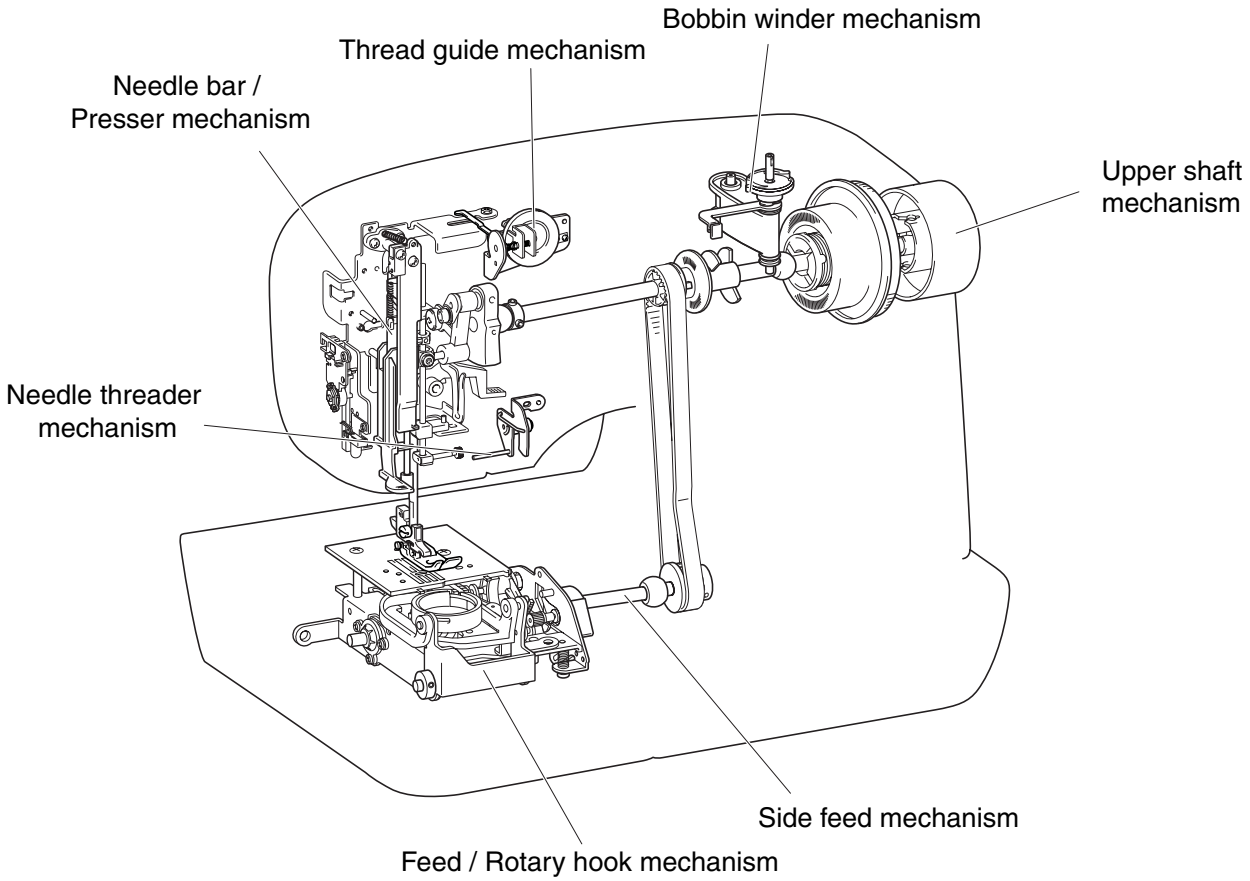
Brother Industries, Ltd.
Nagoya, Japan

CAUTION

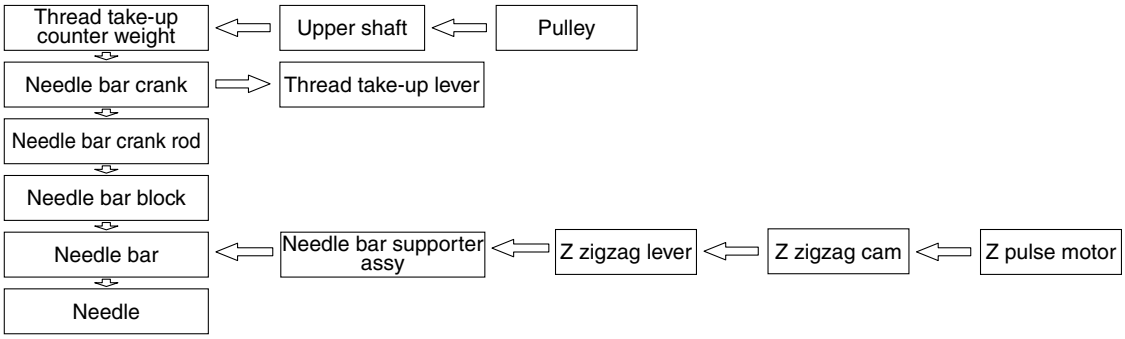
1. Always use rubber gloves when handling printed circuit boards and never touch the metal portion of a printed circuit board with bare hands.
2. Keep your body earthed in order to avoid generating static electricity.
3. Pack printed circuit boards in aluminum foil and avoid subjecting them to any form of impact during storage or transportation.
4. Do not touch or damage the metal portion of a printed circuit board with a screwdriver or any other tool while making repairs or the like.

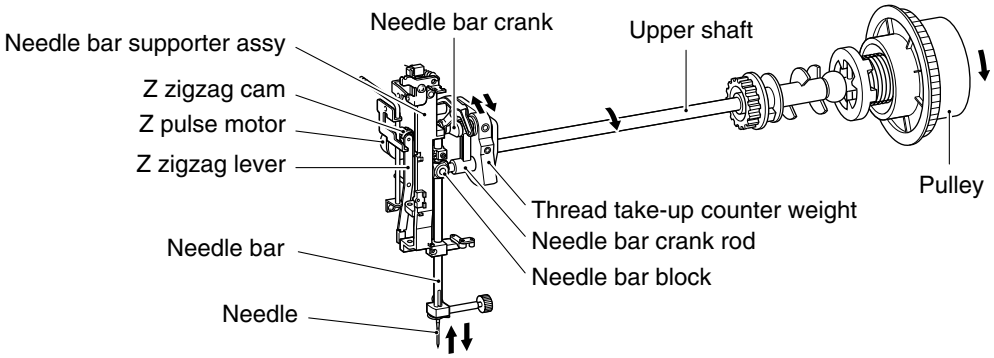
1 Outline of Mechanism

Sewing Machine

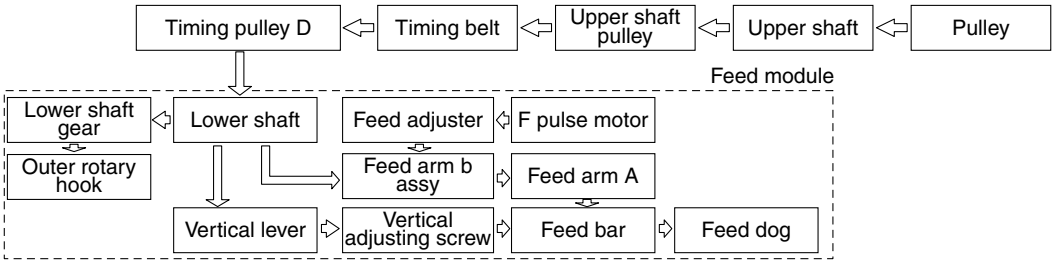


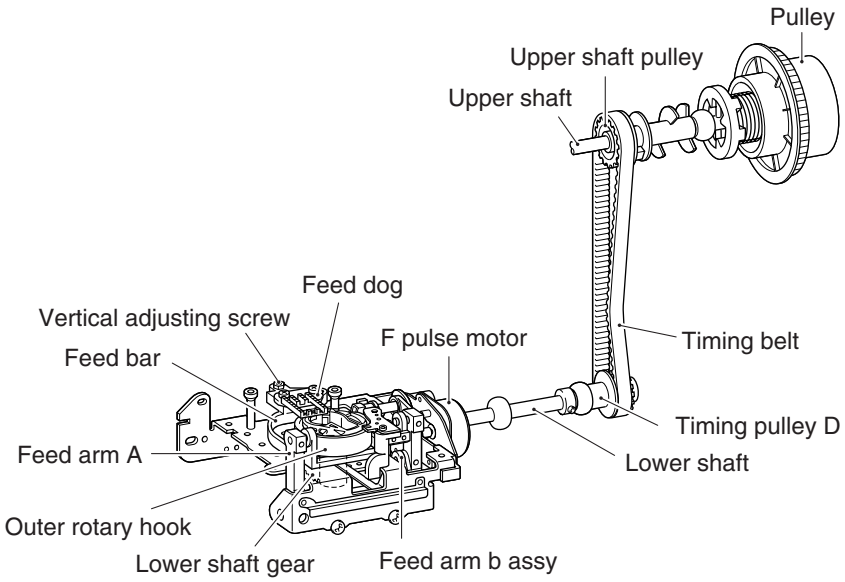
A) Up and down movement of needle bar, movement of thread take-up lever and zigzag mechanism



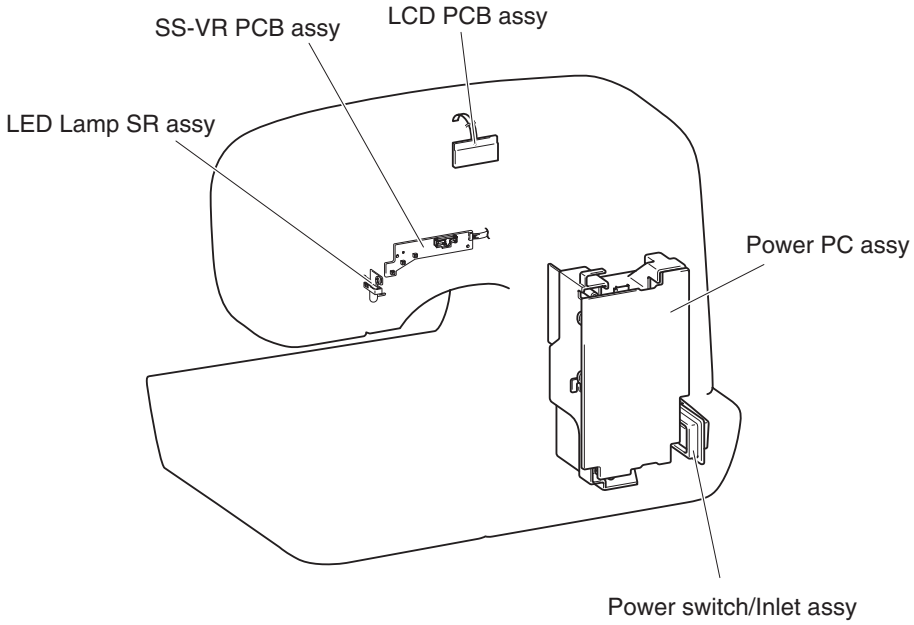


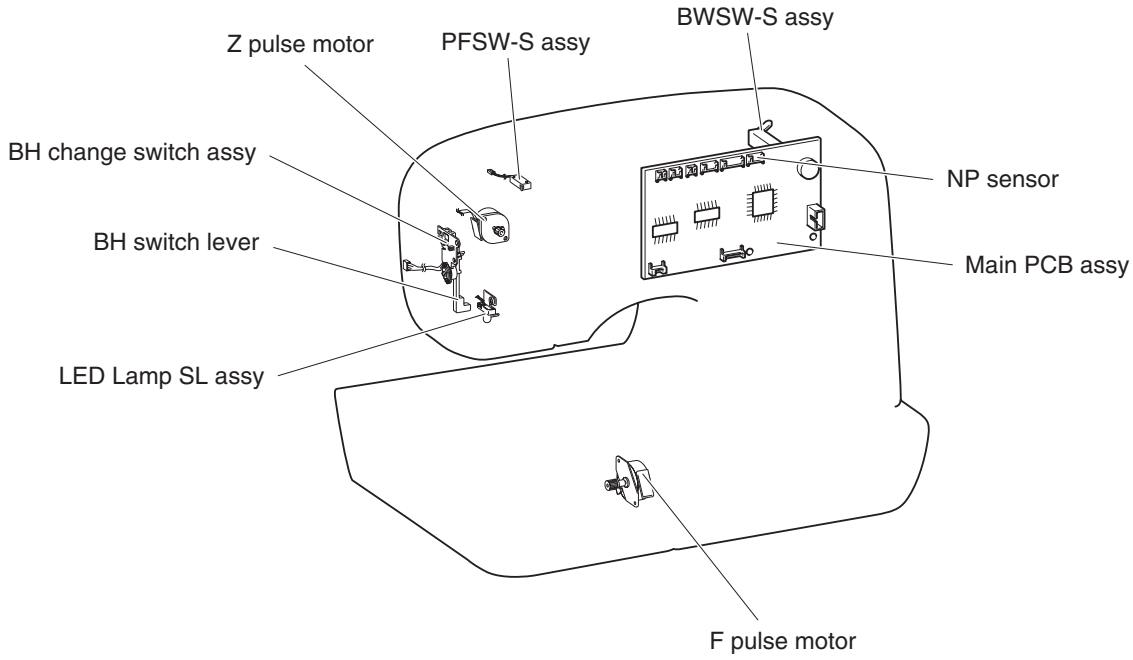
B) Movement of feed dog and rotary hook



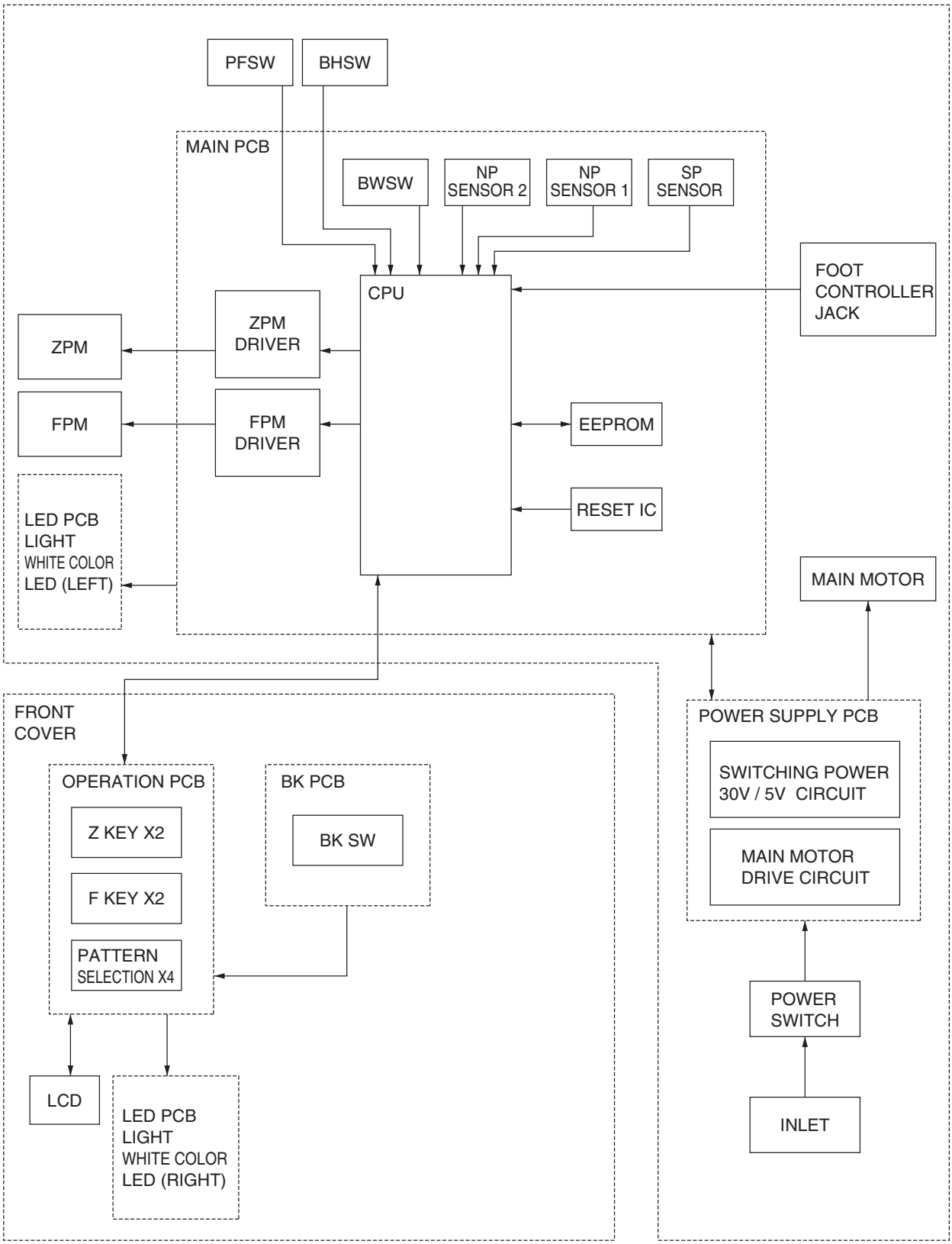


Sewing Machine

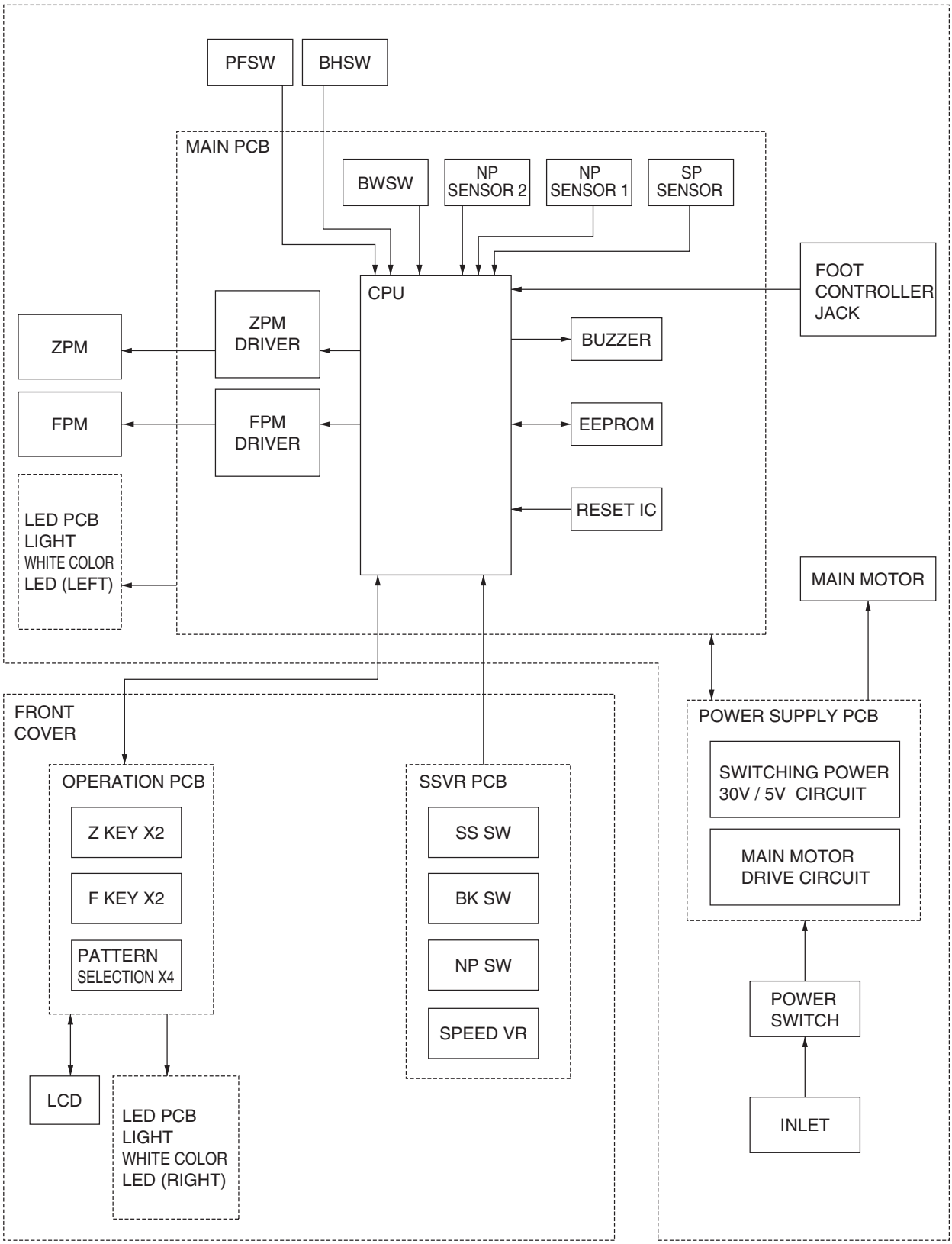




CPS33 S34



CPS36 S37

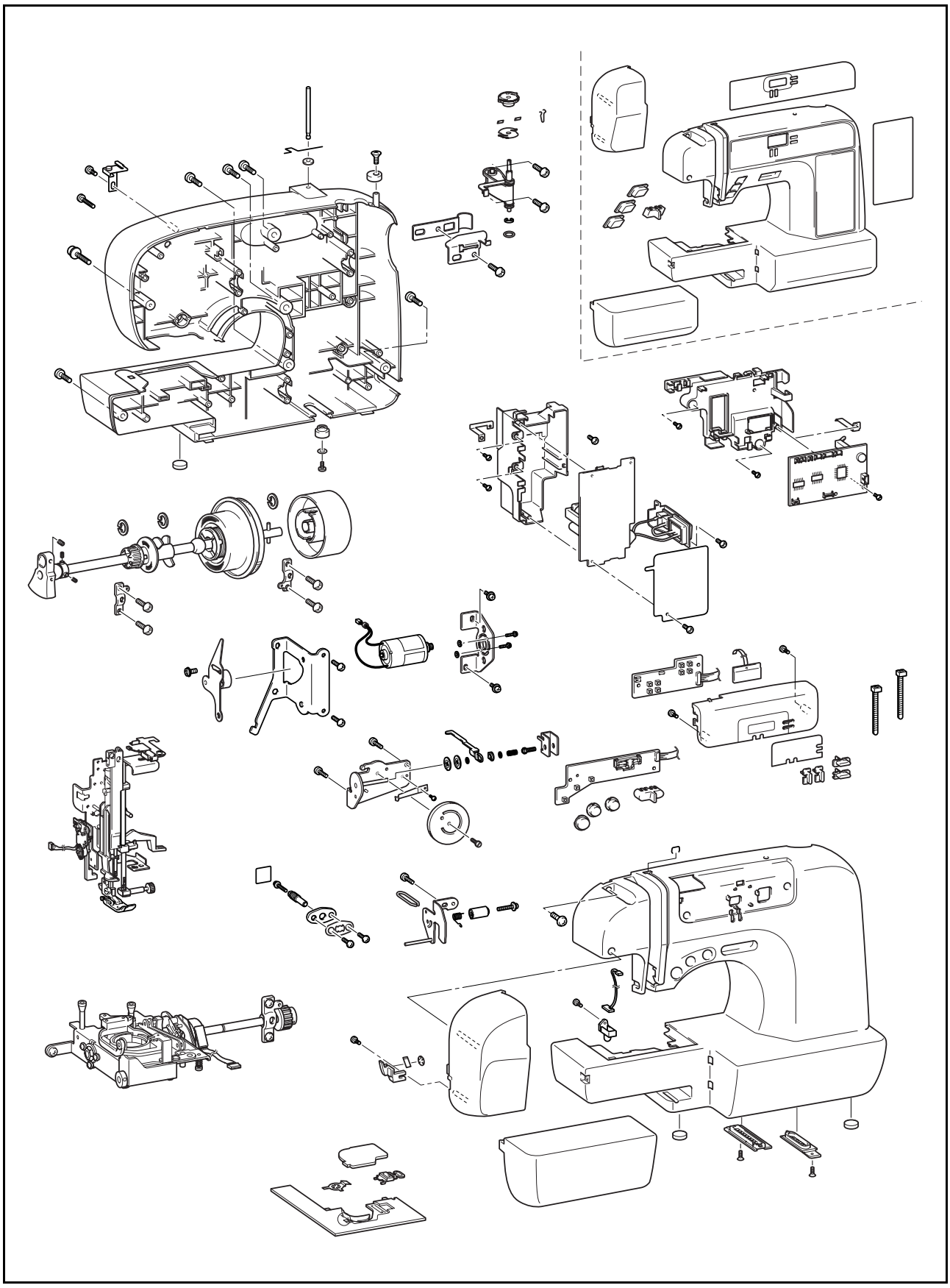


Start/Stop (SS) Switch	Switch for starting and stopping the sewing machine. The machine operates at a slow speed while the switch is being held down.
Reverse switch	This switch is for backtracking or ending a seam. If the switch is pushed, it makes three to four stitches in that place and stops automatically. If the switch is held down, it sews at a slow speed in the reverse direction as long as the switch is held.
Raise needle switch	This switch toggles the needle between the up and down positions.
Operation PCB assembly	Input for pattern selection and other conditions necessary for sewing.
BH (buttonhole) switch	This switch is for detecting the forward and rear ends of the buttonhole according to the BH presser and lever.
BH (button hole) lever switch	This switch detects whether the BH lever is up or down.
NP sensor	This sensor detects the drive timing for the pulse motor for zigzagging and feed, the vertical stop position for the needle. It detects the upper shaft angle of rotation using a shutter attached to the upper shaft and an optical sensor.
Speed sensor	This sensor detects the rotational speed of the main motor. It detects the upper shaft rotational speed using a shutter attached to the upper shaft and an optical sensor.
Presser switch	This switch detects the vertical position of the presser foot lifter.
BW (bobbin winder) switch	When the bobbin thread is wound, this switch detects whether the bobbin is set for winding or not.
Foot control jack	This is the jack for plugging in the foot controller when it is used.
LED lamp SR assy., SL assy.	White LED lamps for illuminating the work space.

2 Disassembly

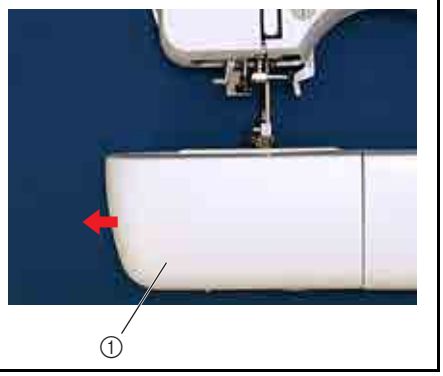
 With the CD-ROM version, click  to start the movie clip.

Main parts location diagram



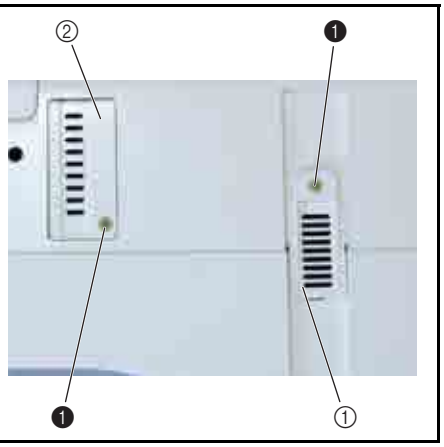
1 Accessory table removal

1. Remove the accessory table ①.



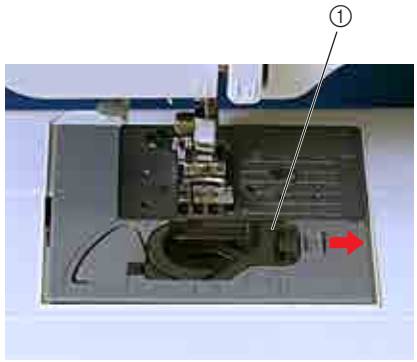
2 Bottom cover removal

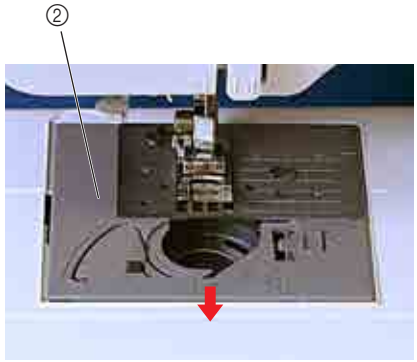
1. Remove the screw ❶, and then remove the base cover ①.
2. Remove the screw ❷, and then remove base cover A ②.



3 Needle plate B assembly removal

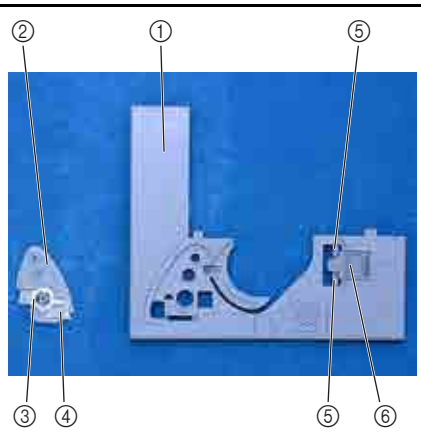
1. Remove the needle plate cover ①.
2. Remove the needle plate B assembly ②.





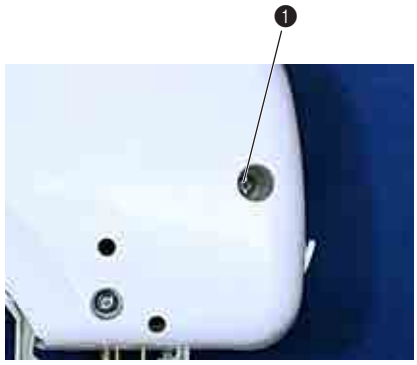
3-1 Needle plate B ASSY disassembly

1. Remove the cutter cover ② from the needle plate B assembly ①.
2. Remove the spring plate ③ from the cutter cover ②, and then remove the NT lower thread cutter ④.
3. Remove the 2 slide button hooks ⑤, and then remove the slide button ⑥.



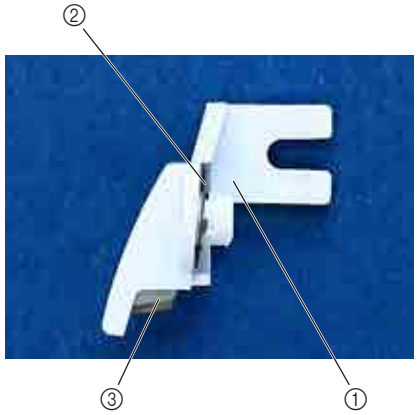
4 Face plate assembly removal

1. Remove the screw ❶, and then remove the face plate assembly ①.



4-1 Face plate A ASSY disassembly

1. Remove the screw ❶, and then remove the cutter cover assembly ①.
2. Remove the CS retaining ring ②, and then remove the NT lower thread cutter ③.

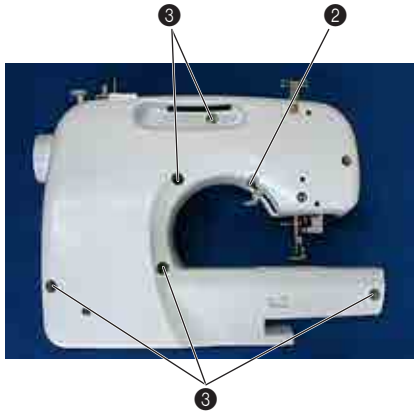


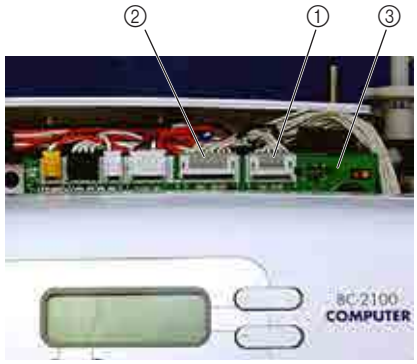
5 Front cover removal

1. Remove screws ❶ (front, 1 pc.), ❷ (rear, 1 pc.), and ❸ (rear, 5 pcs.), and then remove the front cover.

***Key point**

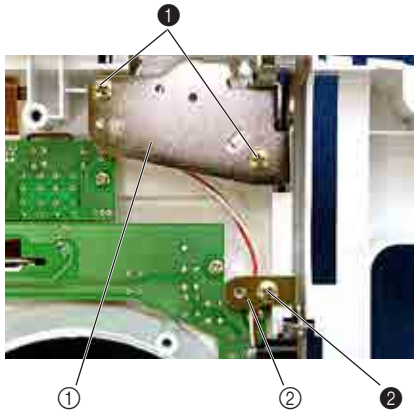
- Disconnect the SSVR PCB lead wire connector ① and the operation PCB lead wire connector ② from the main PCB assembly ③ located near the front cover.





6 Thread tension holder assembly and thread take-up holder B removal

1. Remove the two screws ❶.
2. Remove the thread guide A assembly ①.
3. Remove the screw ❷.
4. Remove the thread guide B assembly ②.



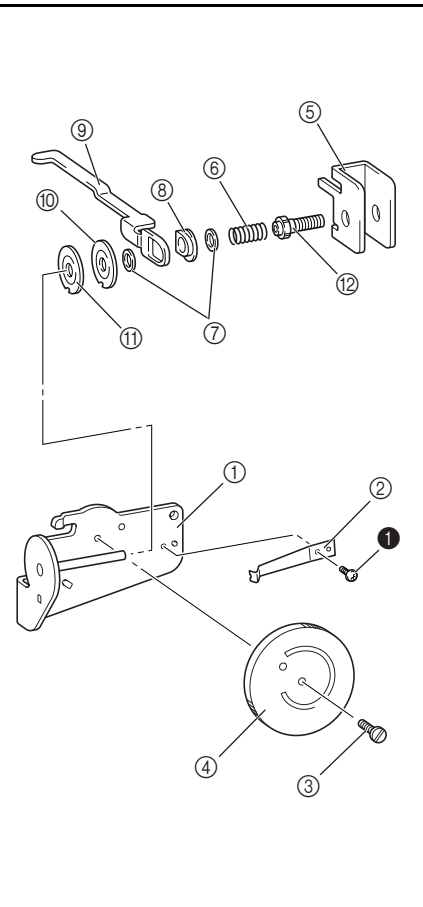
6-1 Thread tension holder ASSY disassembly

1. Remove the screw ❶, and then remove the notch spring ② from the thread tension holder assembly ①.
2. Remove the thread dial shaft ③.

***Key point**

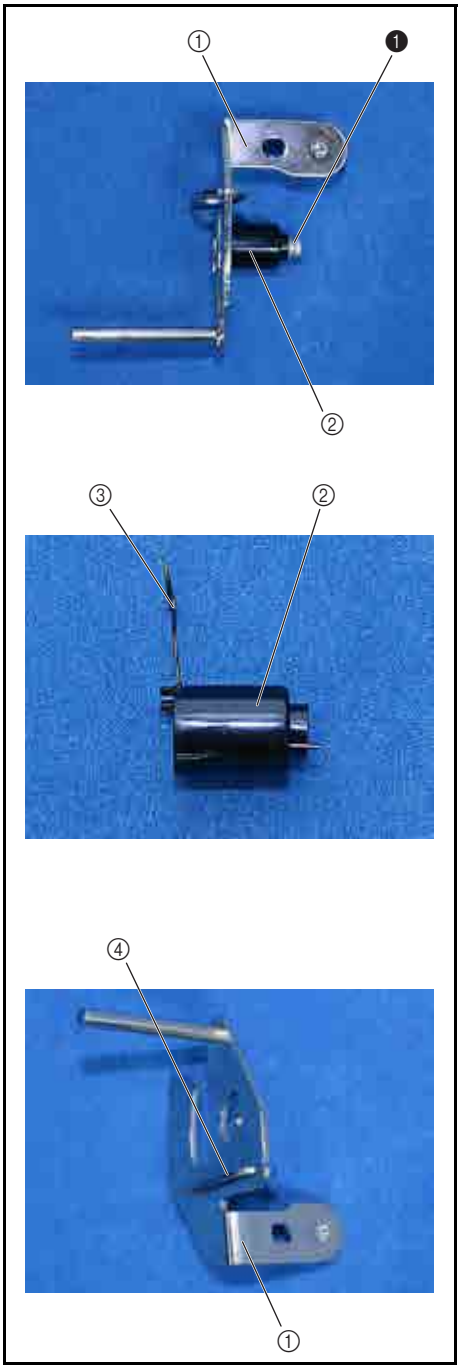
- Turn the dial clockwise until it stops.

3. Remove the thread tension dial ④ and the thread tension plate assembly ⑤.
4. Remove the spring ⑥, washer ⑦, tension disc washer ⑧, thread release plate ⑨, washer ⑦, tension disc B ⑩, and then tension disc A ⑪ in this order from the caulking shaft of the thread tension holder assembly ①.
5. Remove the thread tension adjusting screw ⑫ from the thread tension plate assembly ⑤.



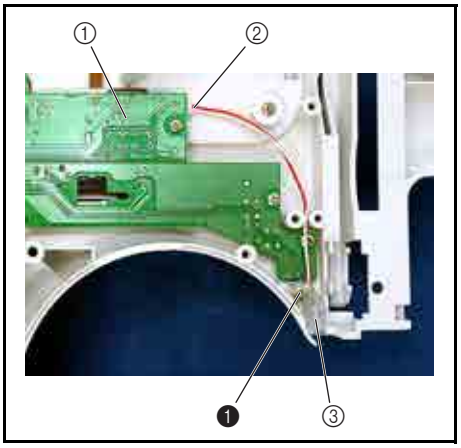
6-2 Thread take-up holder B disassembly

1. Remove the screw ❶.
2. Remove the thread catching spring case ② from thread take-up holder B ①.
3. Remove the thread take-up spring ③ from the thread catching spring case ②.
4. Remove the thread guide wire ④ from thread take-up holder B ①.



7 LED lamp removal

1. Disconnect the LED lamp connector ② from the operation PCB ①.
2. Remove the screw ❶, and then remove the LED lamp ③.

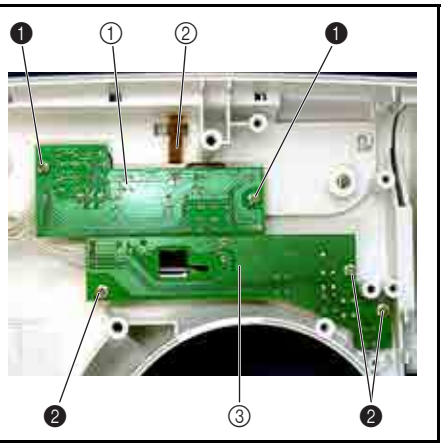


8 Operation PCB assembly and SSVR PCB assembly removal

1. Remove the 2 screws ❶, and then remove the operation PCB assembly ①.
2. Disconnect the LCD cable ② from the operation PCB assembly ①.
3. Remove the 3 screws ❷, and then remove the SSVR PCB assembly ③.

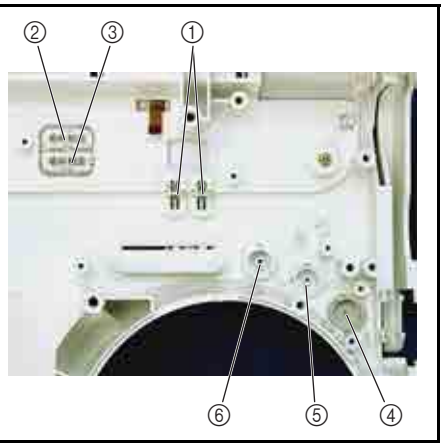
***Key point**

- Remove the bands (2 locations) securing the cords of the operation PCB assembly ① and the SSVR PCB assembly ③.



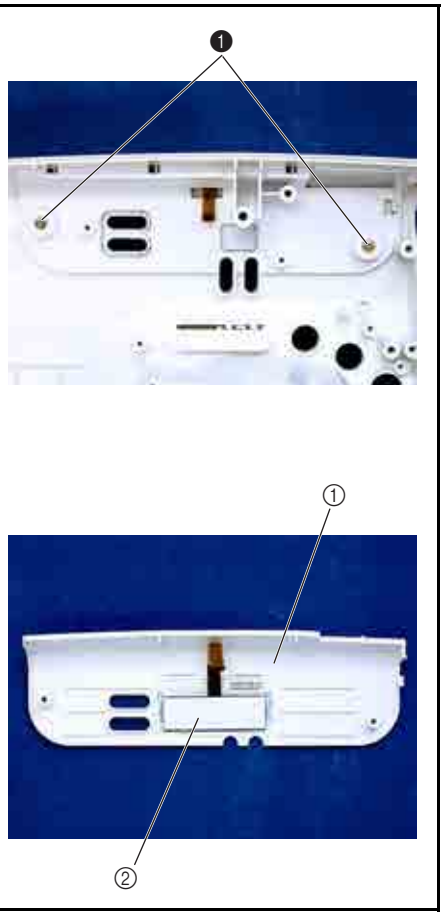
9 Button removal

1. Remove the 2 selecting buttons ①.
2. Remove manual button A ② and manual button B ③.
3. Remove the SS button ④, the backstitching button ⑤, and the NP button ⑥.



10 Front panel and LCD removal

1. Remove the 2 screws ❶.
2. Remove the front panel ① and the LCD ②.

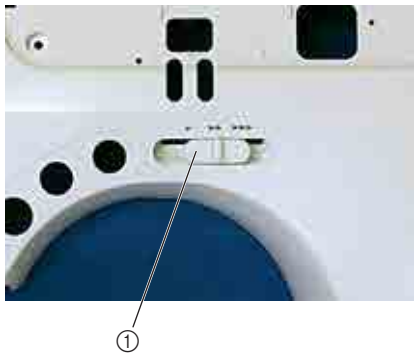


11 SV keytop removal

1. Remove the SV keytop ①.

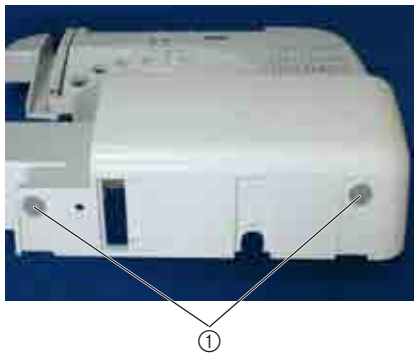
***Key point**

- Press the SV keytop hooks (2 locations) from the inside of the front cover to remove the SV keytop.



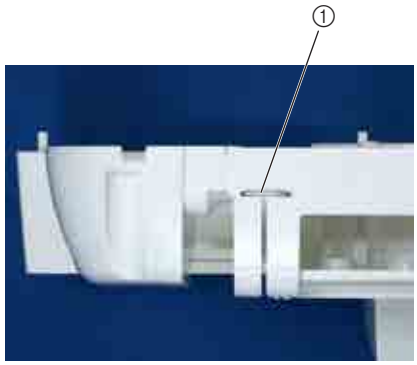
12 Base plate rubber removal

1. Remove the 2 base plate rubbers ①.



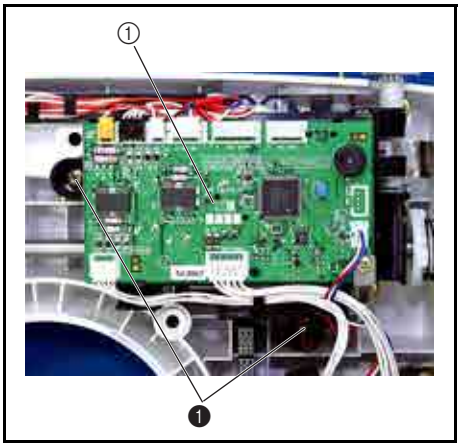
13 Upper cover thread guide removal

1. Remove the upper cover thread guide ①.



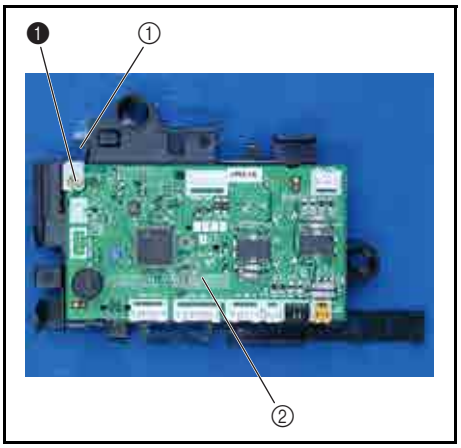
14 Main PCB assembly removal

1. Remove the 2 screws ❶.
2. Remove the main PCB assembly ①.



14-1 Main PCB ASSY disassembly

1. Remove the screw ❶.
2. Remove the main PCB plate spring ①, and then remove the main PCB ②.

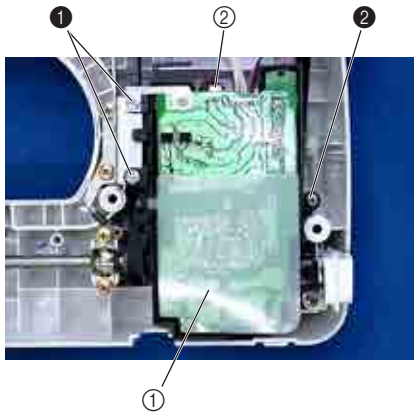


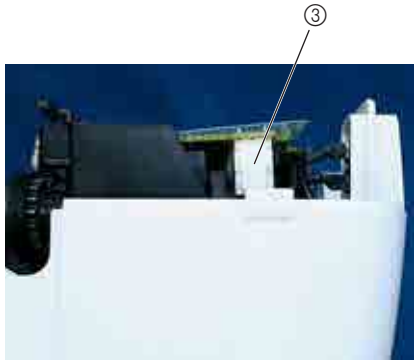
15 Power PCB assembly removal

1. Remove screws ❶ and ❷ (2 pcs. /1pc.), and then remove the power PCB assembly ①.
2. Disconnect the main motor lead wire ② and the inlet assembly connector ③.

***Key point**

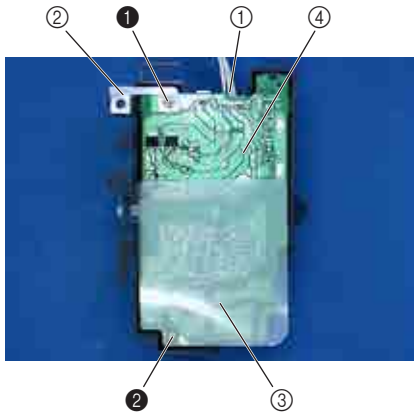
- Hold the hook on the inlet assembly connector ③ and pull it out.





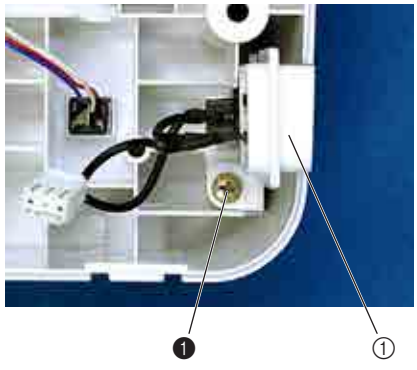
15-1 Power PCB ASSY disassembly

1. Disconnect the power lead wire assembly connector ①.
2. Remove the screw ❶, and then remove the power plate spring ②.
3. Remove the screw ❷, and then remove the insulator sheet ③.
4. Remove the power PCB ④.



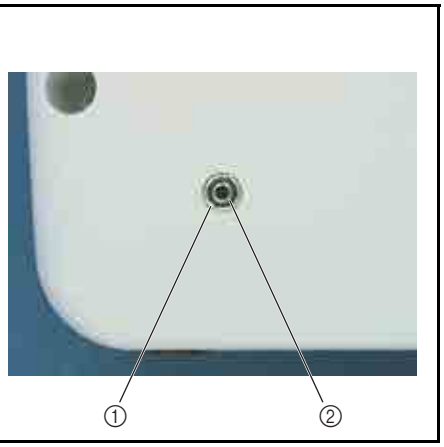
16 Inlet assembly removal

1. Remove the screw ❶, and then remove the inlet assembly ①.



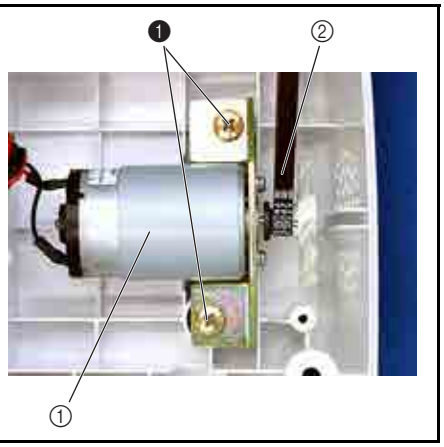
17 FC jack removal

1. Remove the jack nut ①, and then remove the FC jack assembly ②.



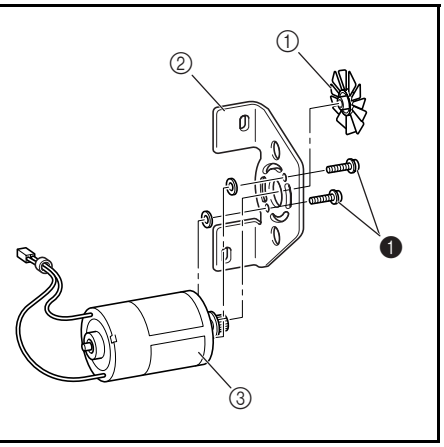
18 Main motor assembly removal

1. Remove the 2 screws ❶, and then remove the main motor assembly ①.
2. Remove the motor belt ② from the main motor assembly ①.



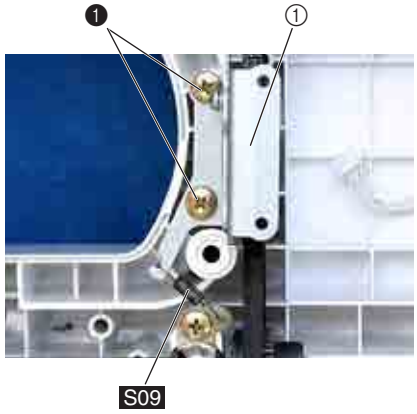
18-1 Main motor ASSY disassembly

1. Remove the motor fan ①.
2. Remove the 2 screws ❶, and then remove the main motor ③ from the motor holder ②.



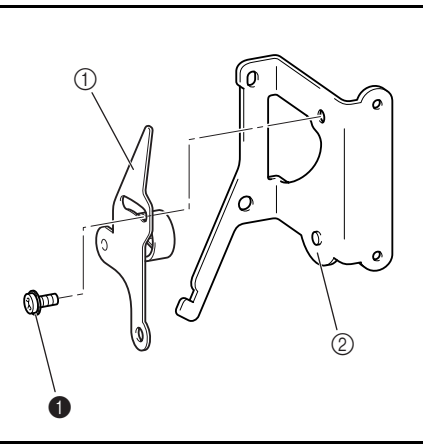
19 Tension pulley assembly removal

1. Remove spring S09 .
2. Remove the 2 screws ❶, and then remove the tension pulley assembly ①.



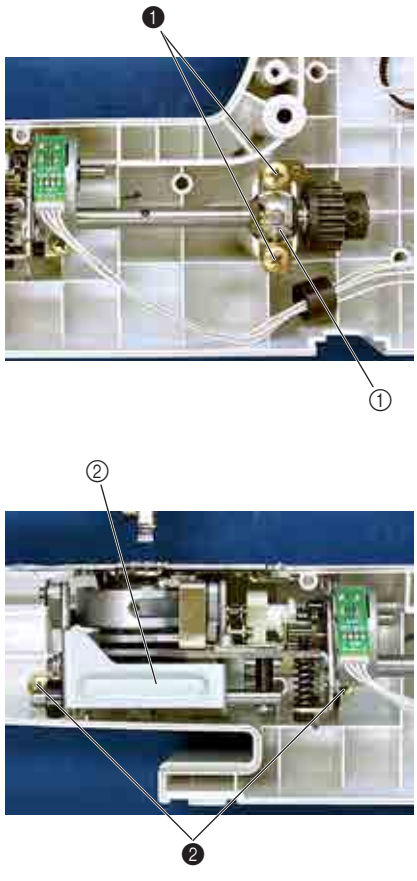
19-1 Tension pulley ASSY disassembly

1. Remove the screw ❶, and then remove the tension pulley holder ② from the tension pulley assembly ①.



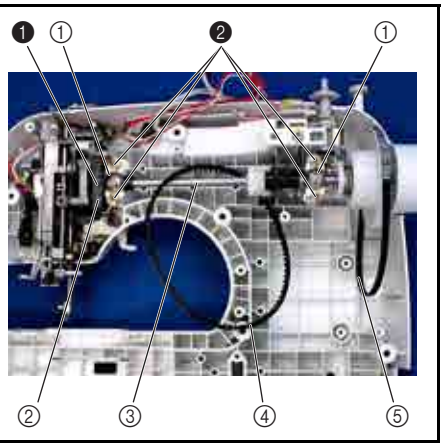
20 Feed unit assembly removal

1. Remove the 2 screws ❶, and then remove the upper shaft bearing presser ①.
2. Remove the 2 screws ❷, and then remove the feed unit assembly ②.



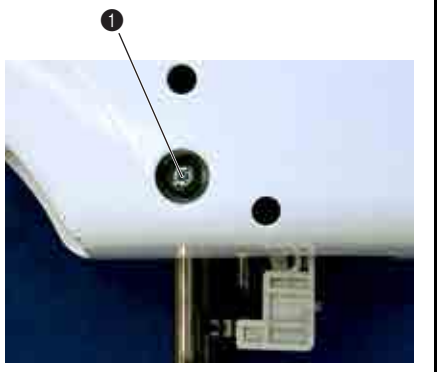
21 Upper shaft assembly removal

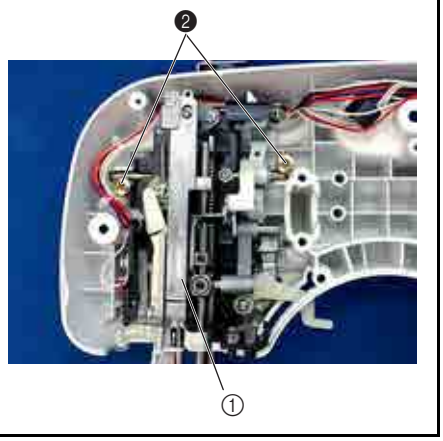
1. Remove the screw ❶.
2. Remove the 4 screws ❷, and then remove the 2 upper shaft bearing pressers ①.
3. Remove the upper shaft assembly ③ from the needle bar crank ②, and then remove timing belt 420-5GT-6 ④ and timing belt 372-2GT-6 ⑤.



22 Needle-presser unit removal

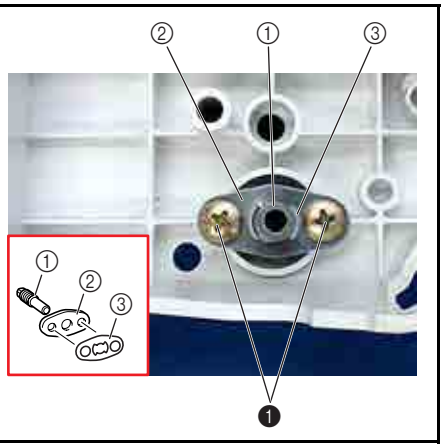
1. Peel the label, and then remove the screw ❶.
2. Remove the 2 screws ❷, and then remove the needle-presser unit ①.





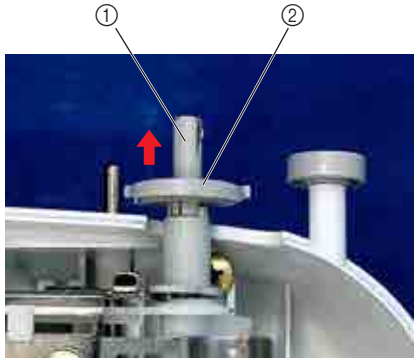
23 Plate spring removal

1. Remove the adjusting screw ①.
2. Remove the 2 screws ❶, and then remove the adjusting plate ② and the plate spring ③.



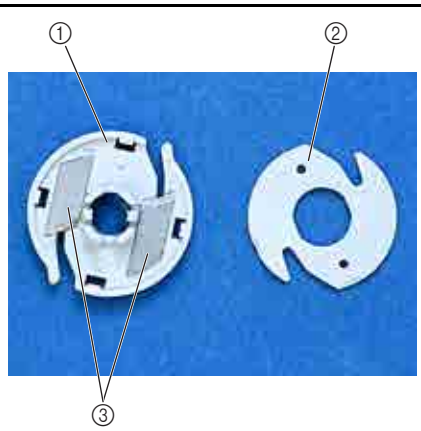
24 Bobbin base assembly removal

1. Remove the bobbin base assembly ② from the bobbin winder shaft ①.



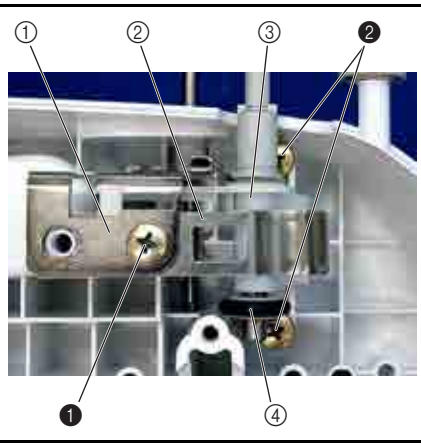
24-1 Bobbin base ASSY disassembly

1. Remove the bobbin thread cutter holder ② from the bobbin base assembly ①, and then remove the NT lower thread cutter ③.



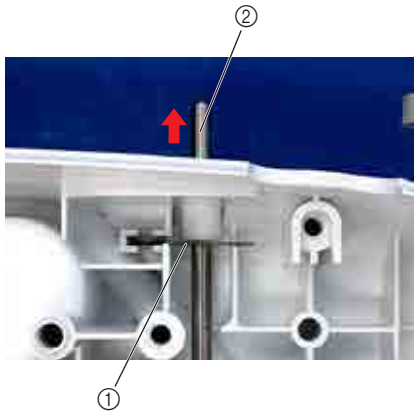
25 Bobbin winder assembly removal

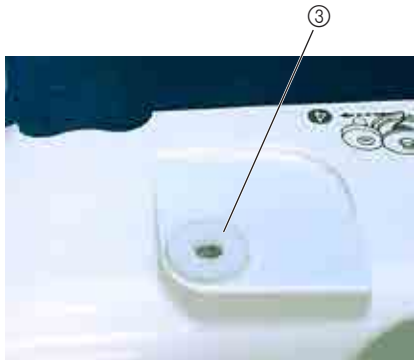
1. Remove the screw ❶, and then remove the bobbin winder shaft stopper ① and the bobbin winder spring ②.
2. Remove the 2 screws ❷, and then remove the bobbin winder assembly ③.
3. Remove the rubber ring ④ from the bobbin winder pulley.



26 Spool pin removal

1. Remove the spool pin spring ① and pull out the spool pin ②.
2. Peel the spool pin stand ③.



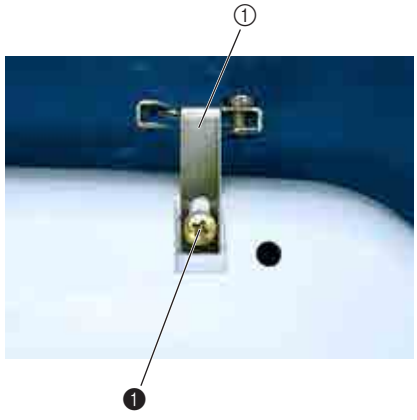


27 Bobbin presser removal

1. Remove the screw ❶, and then remove the bobbin presser ①.

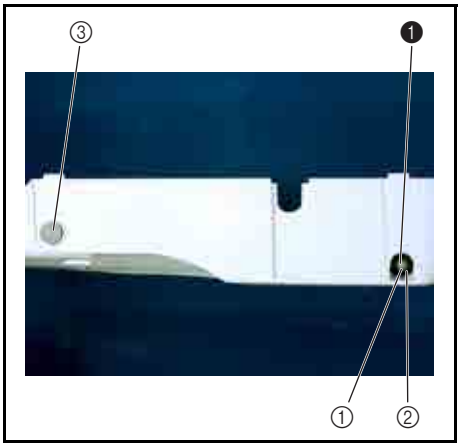
28 Thread guide assembly removal

1. Remove the screw ❶, and then remove the thread guide assembly ①.

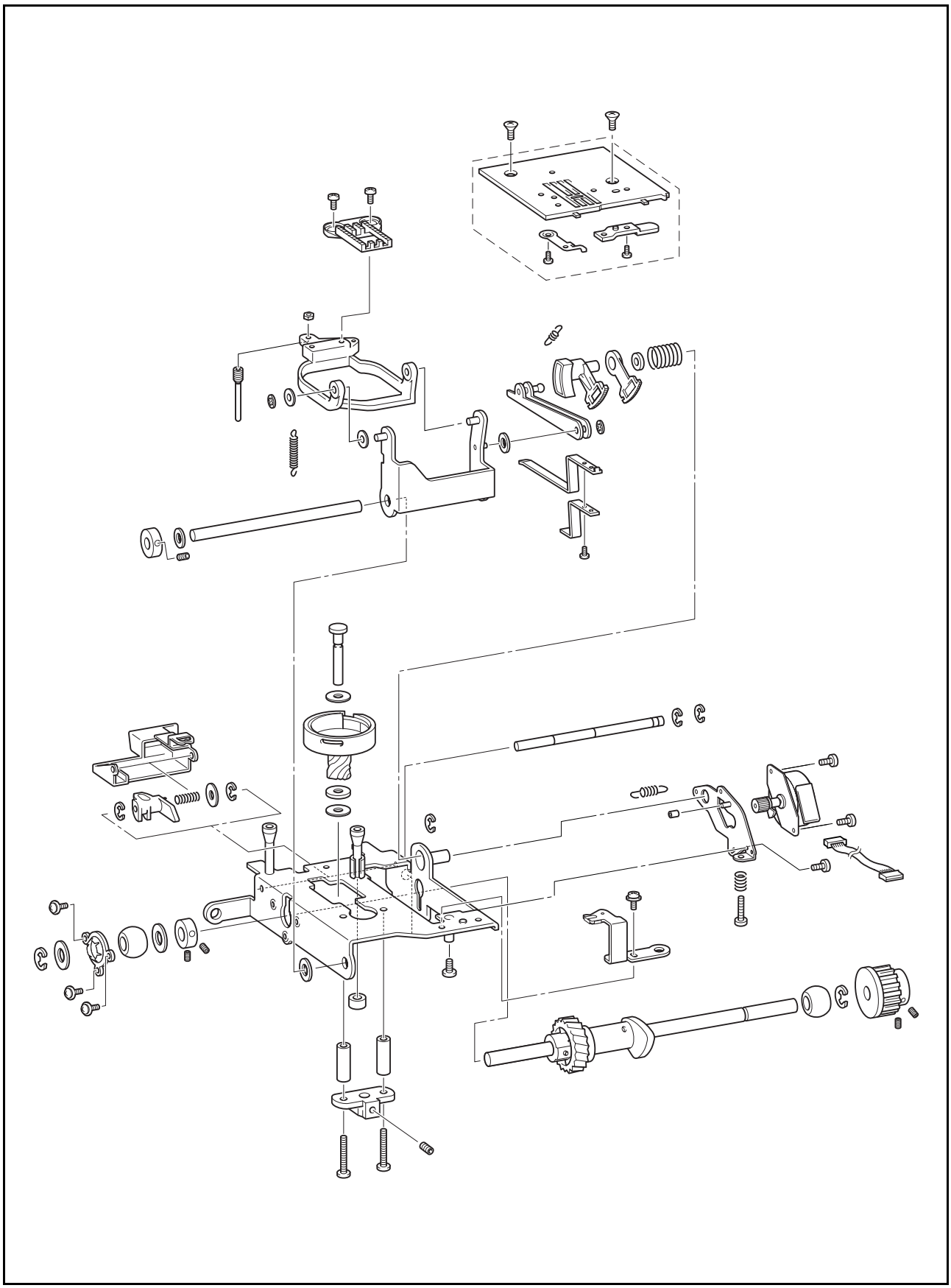


29 Base plate rubber removal

1. Remove the screw ❶, and then remove the plain washer (M 3.5) ① and rubber cushion A ②.
2. Remove the base plate rubber ③.

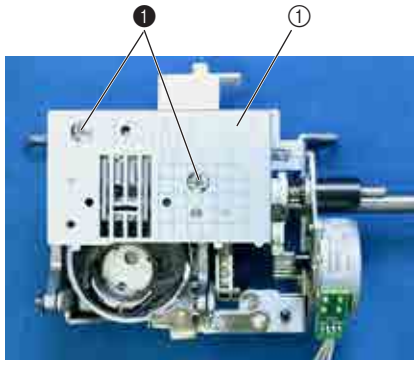


Feed unit location diagram



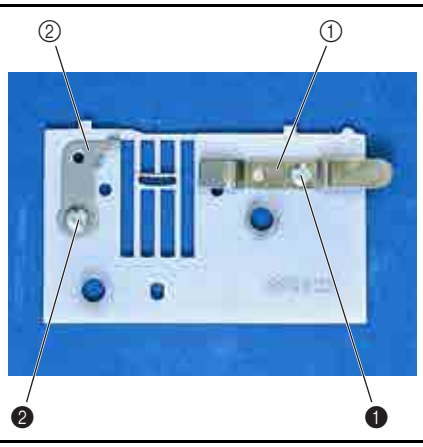
1 Needle plate A assembly removal

1. Remove the 2 screws ❶, and then remove the needle plate A assembly ①.



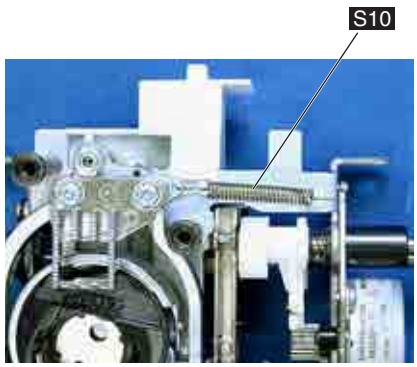
1-1 Needle plate A ASSY disassembly

1. Remove the screw ❶, and then remove the F gear stopper plate ①.
2. Remove the screw ❷, and then remove the stopper plate ②.



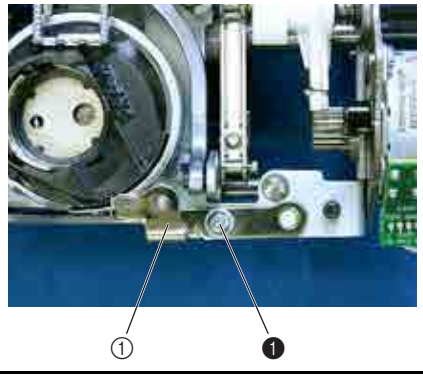
2 Spring removal

1. Remove the spring S10 .



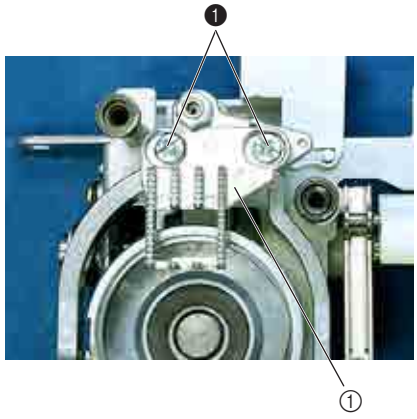
3 Inner rotary hook bracket assembly removal

1. Remove the screw ❶, and then remove the inner rotary hook bracket assembly ①.



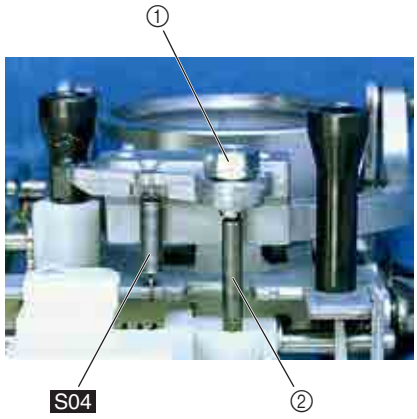
4 Feed dog removal

1. Remove the 2 screws ❶, and then remove the feed dog ①.



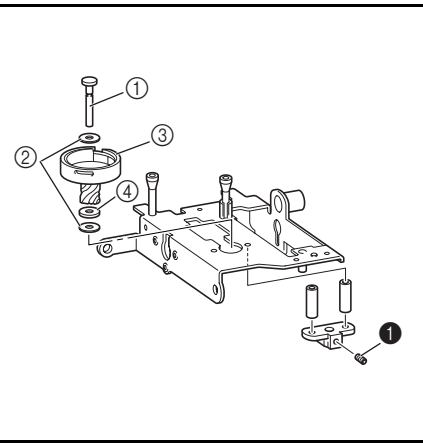
5 Vertical adjuster screw assembly removal

1. Remove spring S10 .
2. Remove the M5 nut ①
3. Remove the vertical adjuster screw assembly ②.



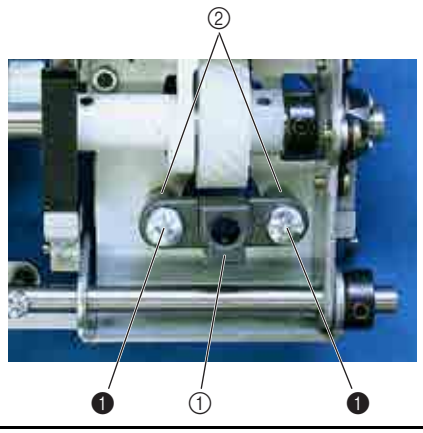
6 Outer rotary hook removal

1. Remove the screw ❶, and then remove the outer rotary hook shaft ①, washer 6 ②, outer rotary hook assembly ③, spacer ④, and washer 6 ② .



7 Shaft supporter removal

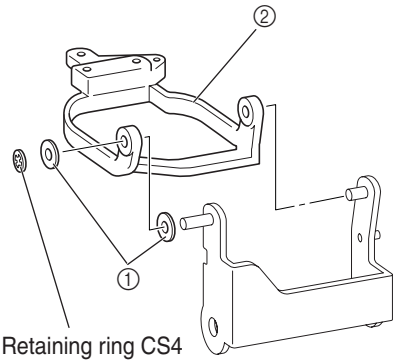
1. Remove the 2 screws ❶, and then remove the shaft supporter ① and the collar ②.



8 Feed bar removal

1. Remove the retaining ring (CS4).
2. Remove the polyester slider ①, feed bar ②, and polyester slider ① in this order.

Start movie clip (CD-ROM version only)



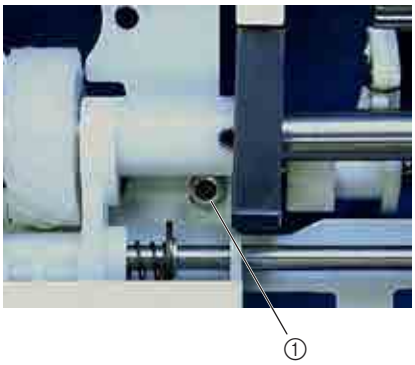
9 Needle plate supporter shaft B removal

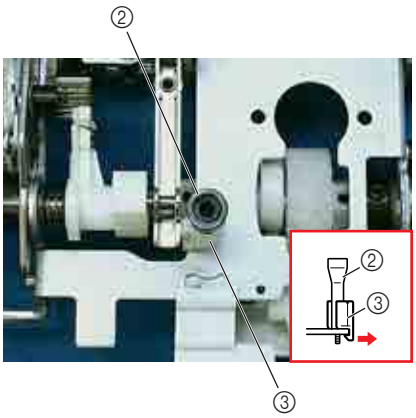
1. Remove nut 1 (M3) ①.
2. Remove needle plate supporter shaft B ②, and feed arm supporter ③.

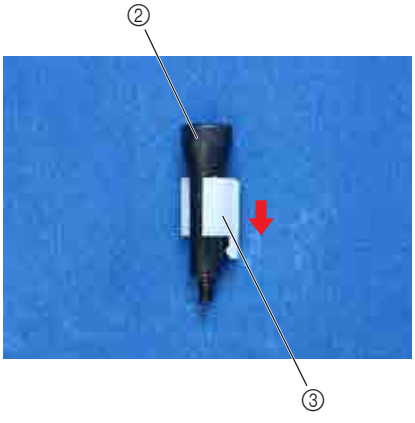
***Key point**

- Press the hook on the feed arm supporter ③ from the rear of the feed bar to remove the supporter.

3. Remove the feed arm supporter ③ from the needle plate supporter shaft B ②.



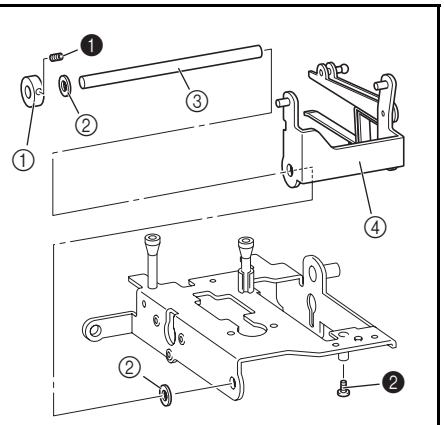




10 Feed arm A assembly removal

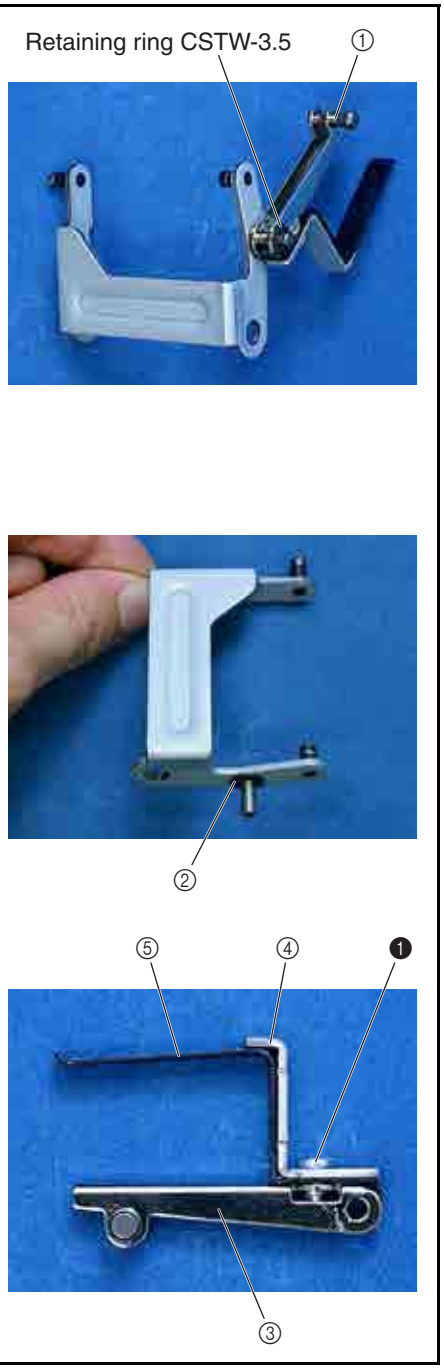
1. Remove the screw ❶, and then remove the set collar ① and the thrust wafer ② in this order.
2. Remove the screw ❷, and then remove the horizontal feed shaft ③.
3. Remove the feed arm A assembly ④ and the thrust wafer ②.

Start movie clip (CD-ROM version only)



10-1 Feed arm B ASSY disassembly

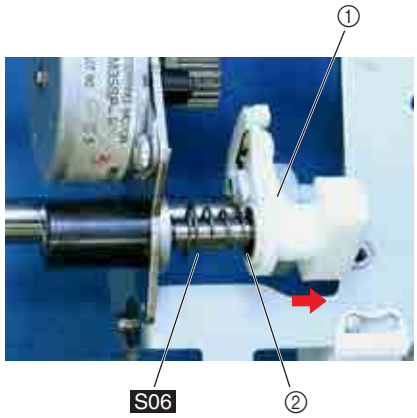
1. emove the retaining ring (CSTW-3.5), and then remove the feed arm B assembly ① and the polyester slider ②.
2. Remove the screw ❶, and then remove the feed supporting plate ④ and feed supporting plate B ⑤ from the feed arm B ③.



11 Feed adjuster assembly removal

1. Remove the feed adjuster assembly ①, polyester slider ②, and spring S06 in this order.

Start movie clip (CD-ROM version only)



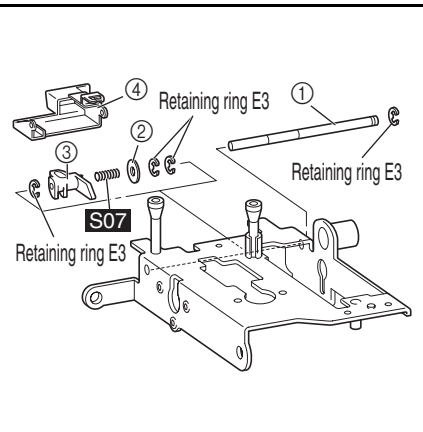
11-1 Feed adjuster disassembly

1. Remove spring S05 , and then remove the F gear ② from the feed adjuster ①.

12 Vertical lever removal

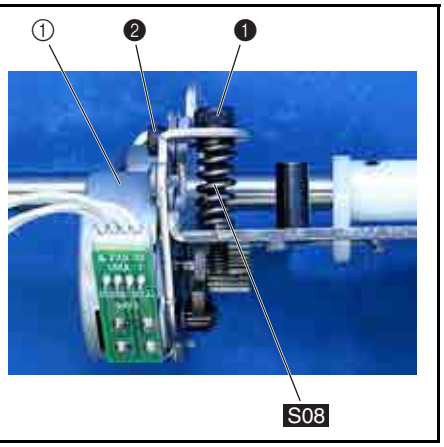
1. Remove the 4 retaining rings (E3).
2. Pull out the vertical feed shaft ①, and then remove the plain washer (L4) ②, spring S07 , vertical lever ③, and drop knob ④.

Start movie clip (CD-ROM version only)



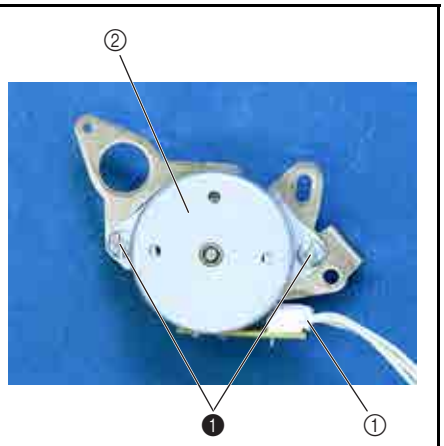
13 FPM holder assembly removal

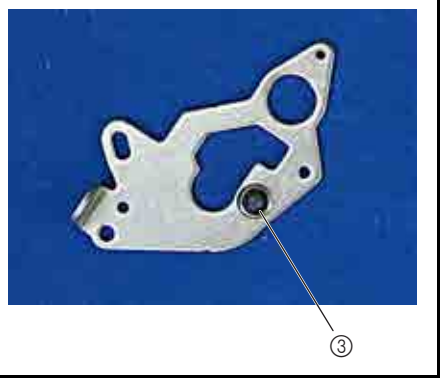
1. Remove the screw ❶, and then remove spring S08 .
2. Remove the screw ❷, and then remove the FPM holder assembly ①.



13-1 FPM disassembly

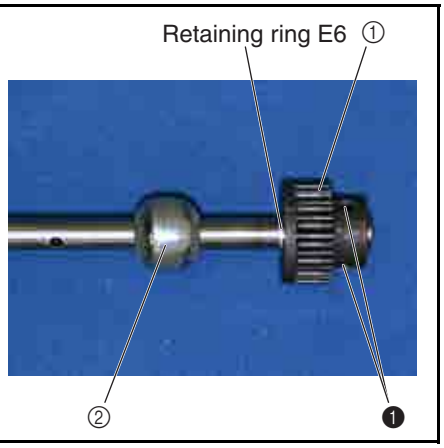
1. Remove the lead wire assembly (FPM-LE) ①.
2. Remove the 2 screws ❶, and the remove the FPM ②.
3. Remove the rubber ③.





14 Timing pulley D removal

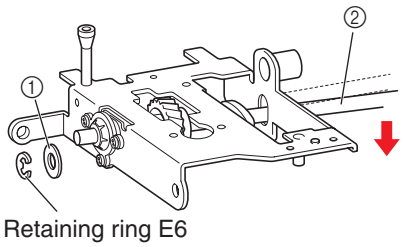
1. Remove the 2 screws ❶, and then remove timing pulley D ①.
2. Remove the retaining ring (E6), and then pull out the lower shaft bushing ②.

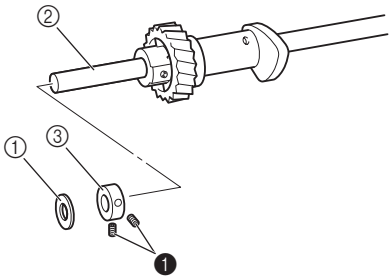


15 Lower shaft assembly removal

1. Remove the retaining ring (E6), and then remove the thrust washer ①.
2. Remove the lower shaft assembly ②.

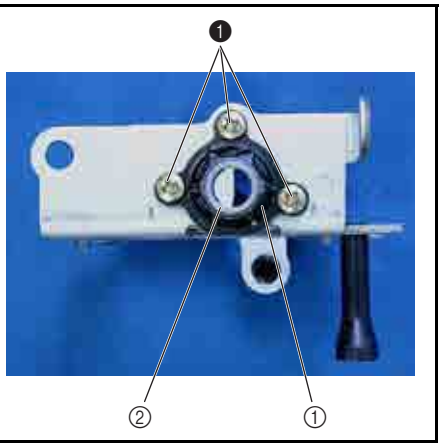
   ***Key point**
   - Push down the lower shaft assembly ② to remove it.
   - Check that the gear does not contact the base plate.
3. Remove the 2 screws ❶, and then remove the thrust wafer ① and the set collar ③.



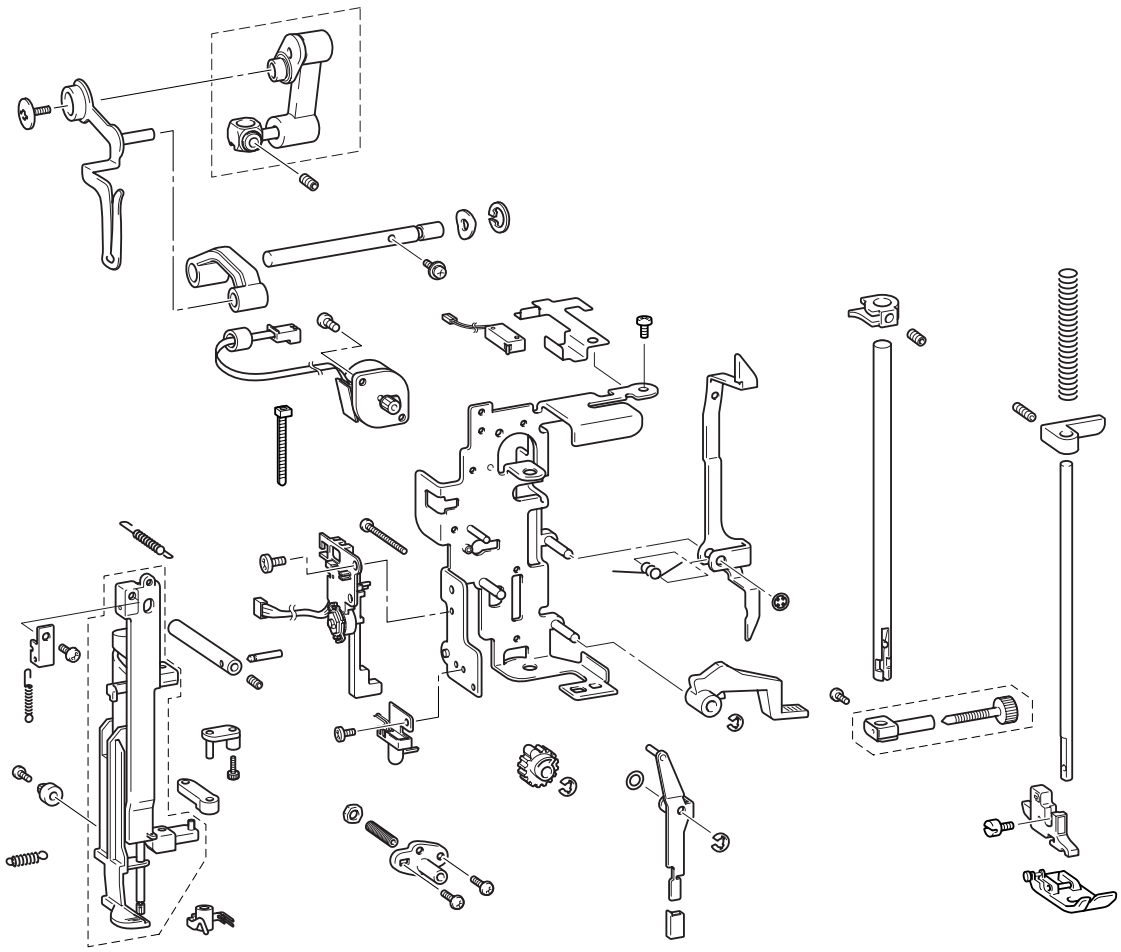


16 Lower shaft bushing removal

1. Remove the 3 screws ❶.
2. Remove bushing presser B ① and the lower shaft bushing ②.

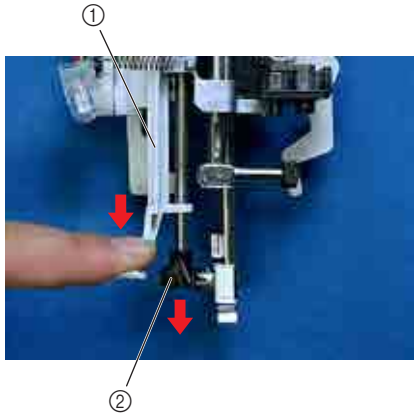


Needle-presser unit location diagram



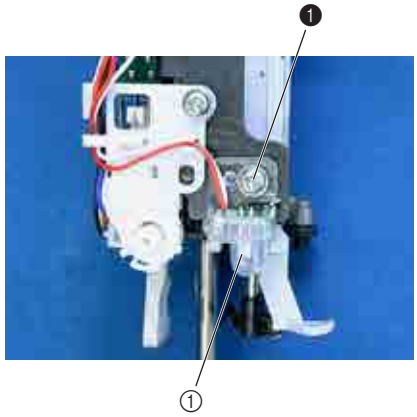
1 Threader hook assembly

1. Pull the needle thread slider ① toward you, and then remove the threader hook assembly ②.



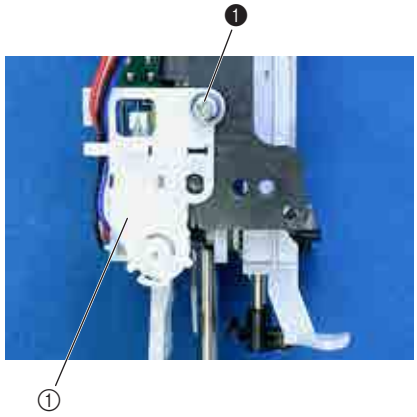
2 LED lamp left assembly removal

1. Remove the screw ❶, and then remove the LED lamp left assembly ①.



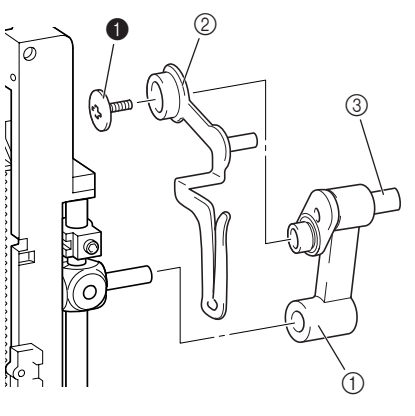
3 BH switch assembly removal

1. Remove the screw ❶, and then remove the BH switch assembly ①.



4 Thread take-up lever and needle bar crank removal

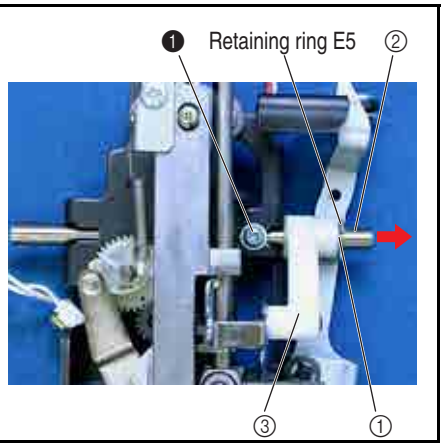
1. Remove the needle bar crank rod ①.
2. Remove the screw ❶, and then remove the needle bar crank ③ from the thread take-up lever ②.



5 Thread take-up lever link removal

1. Remove the retaining ring (E5) and spring washer ①, and then remove the thread take-up lever link ③ from the shaft ②.
2. Remove the screw ❶, and then pull the shaft ② out of the base holder.

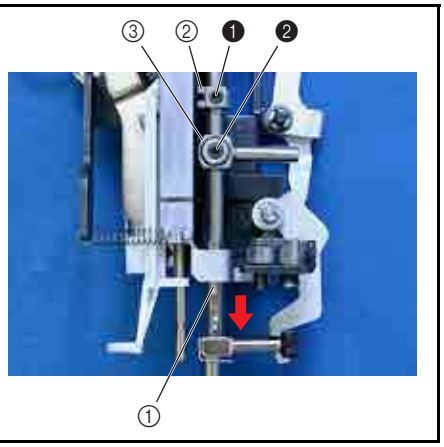
Start movie clip (CD-ROM version only)



6 Needle bar assembly removal

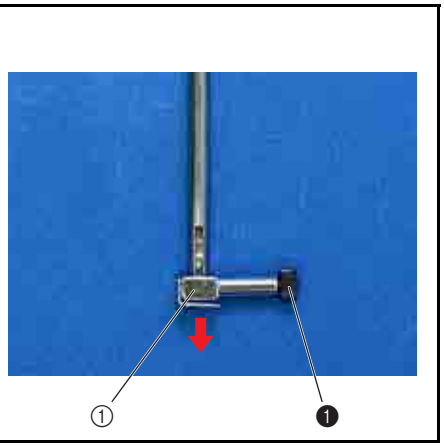
1. Loosen the screws ❶ and ❷, and then pull the needle bar ① down and remove the needle thread block ② and the needle bar block ③.

Start movie clip (CD-ROM version only)



6-1 Needle bar ASSY disassembly

1. Remove the screw ❶, and then remove the needle block assy ①.



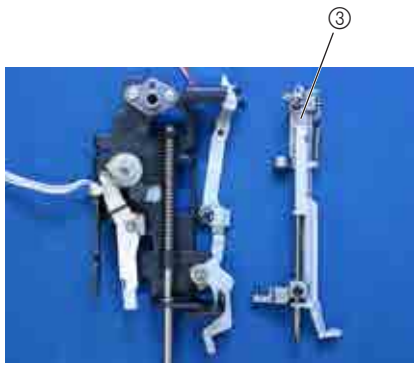
7 Needle holder assembly removal

1. Remove springs S02 and S03 .
2. Remove the screw ❶, and then remove the shaft ①, needle holder block ②, and needle holder assembly ③.

***Key point**

- Pull out the needle holder assembly from the top.

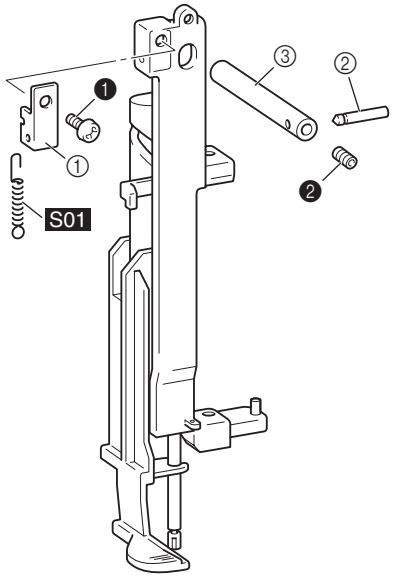
Start movie clip (CD-ROM version only)

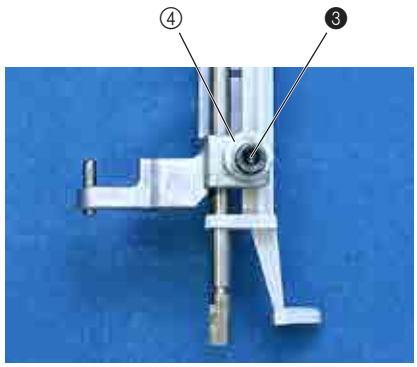


7-1 Needle holder ASSY disassembly

1. Remove spring S01 .
2. Remove the screw ❶, and then remove the plate ①.
3. Remove the screw ❷. Pull out the shaft ②, and then remove needle holder shaft A ③.
4. Remove the screw ❸, and then remove the zigzag adjusting nut ④.

Start movie clip (CD-ROM version only)



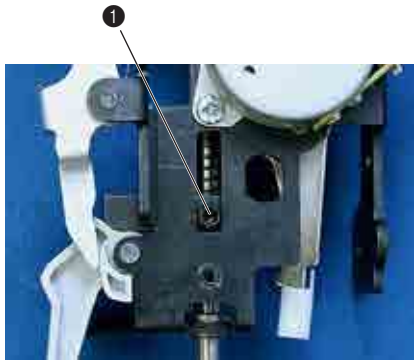


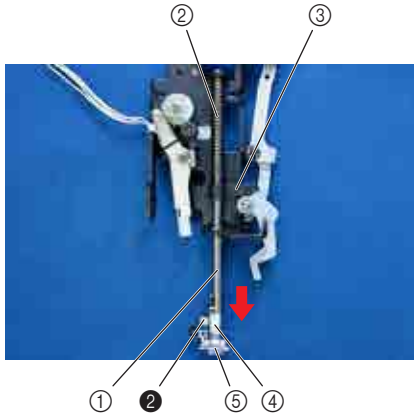
8 Presser bar removal

1. Remove the screw ❶. Pull out the presser bar ①, and then remove the spring ② and the presser bar clamp ③.

   ***Key point**
   - Remove the presser bar ① and the presser feed holder assembly ④.
2. Remove the J foot ⑤ from the presser feed holder assembly ④.
3. Remove the screw ❷, and then remove the presser feed holder assembly ④.

Start movie clip (CD-ROM version only)

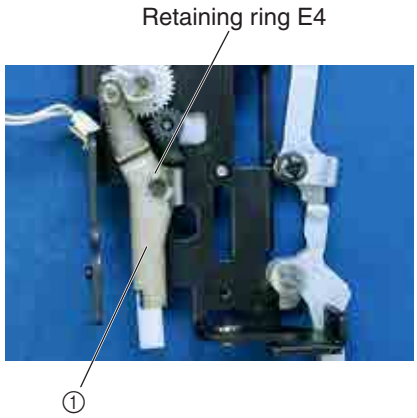


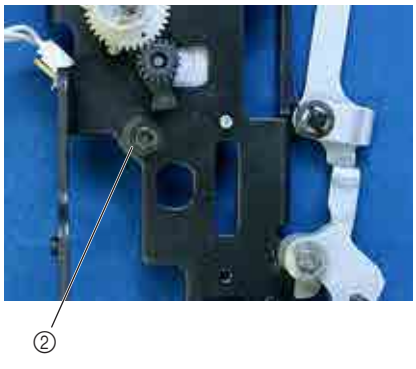


9 Z zigzag lever assembly removal

1. Remove the retaining ring (E4), and then remove the Z zigzag lever ①.
2. Remove the polyester slider ②.

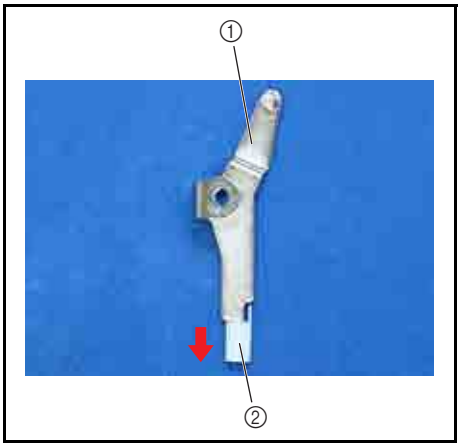
Start movie clip (CD-ROM version only)





9-1 Z zigzag lever disassembly

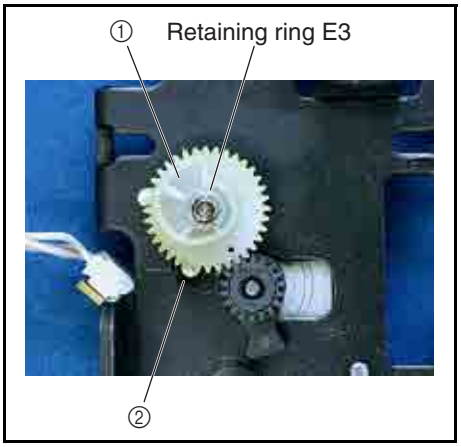
1. Pull out the Z zigzag cap ② from the Z zigzag lever ①.



10 Z zigzag camp removal

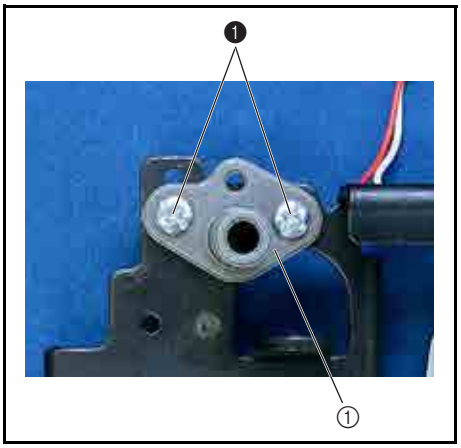
1. Remove the retaining ring (E3), and then remove the Z zigzag cam ①.
2. Remove the rubber ②.

Start movie clip (CD-ROM version only)



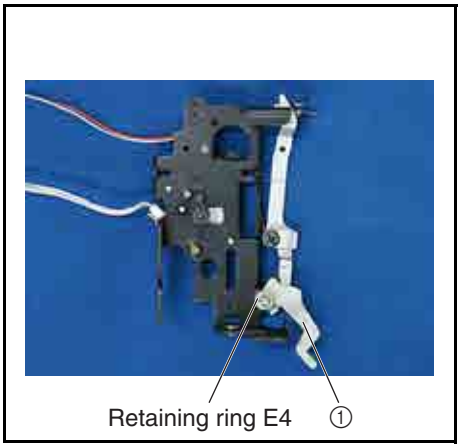
11 Shaft bushing removal

1. Remove the 2 screws ❶, and then remove the shaft bushing ①.



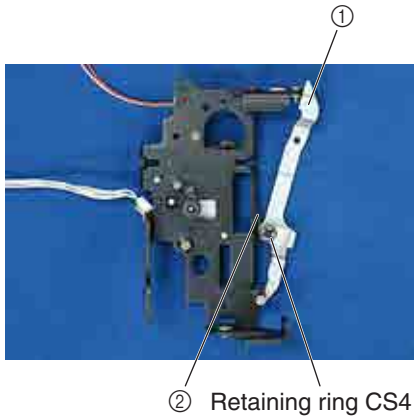
12 Presser foot lifter removal

1. Remove the retaining ring (E4), and then remove the presser foot lifter ①.



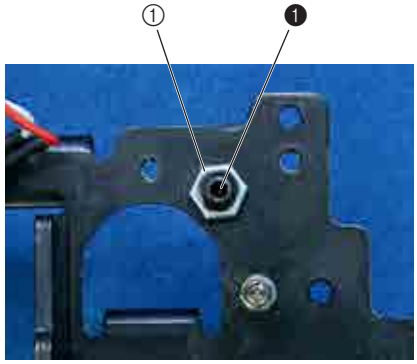
13 Thread release lever removal

1. Remove the retaining ring (CS4), and then remove the thread release lever ① and the spring ②.



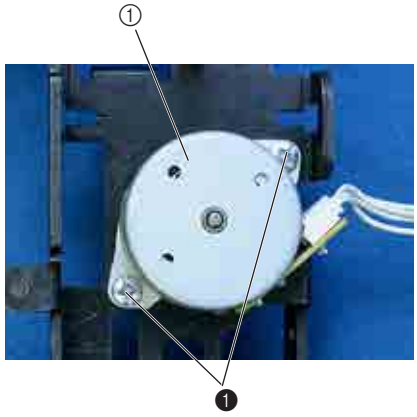
14 Lock nut removal

1. Remove the lock nut ①, and then remove the screw ❶.



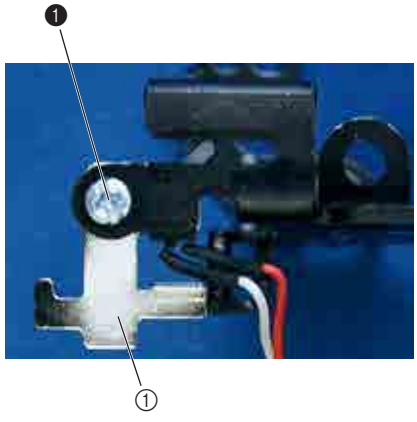
15 Z pulse motor removal

1. Remove the 2 screws ❶, and then remove the Z pulse motor ①.



16 Presser switch assembly removal

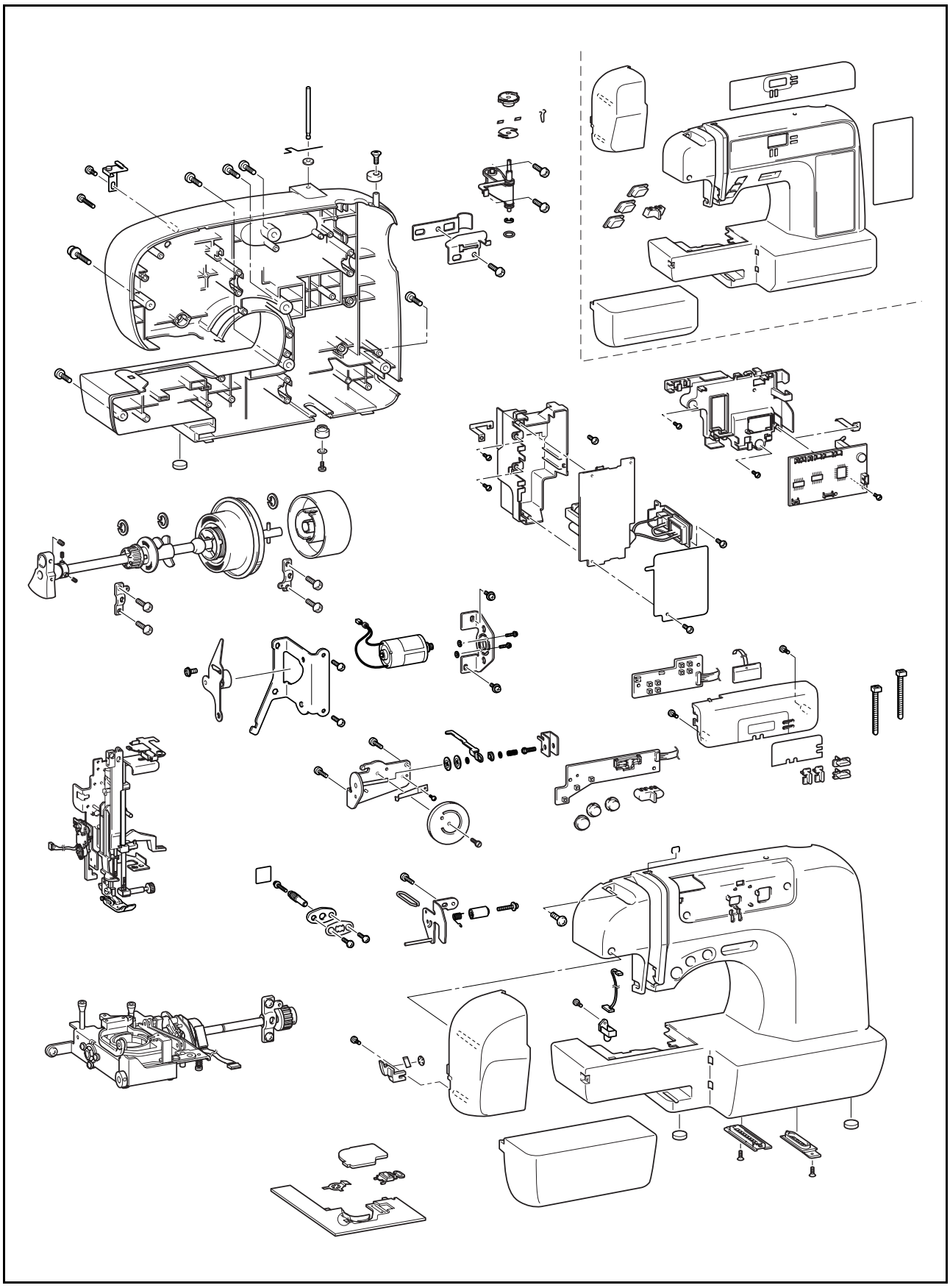
1. Remove the screw ❶, and then remove the presser switch ①.



3 Assembly

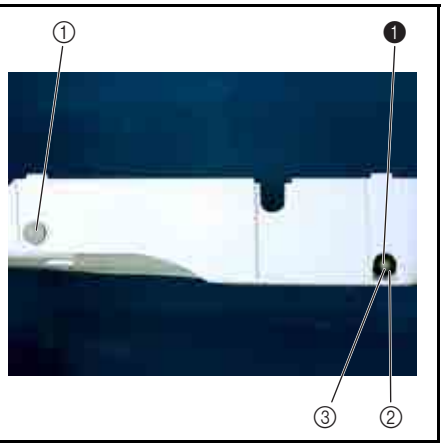
 With the CD-ROM version, click  to start the movie clip.

Main parts location diagram



1 Base plate rubber attachment

1. Attach the base plate rubber ① to the arm bed cover.
   - Attach rubber cushion A ② and the plain washer (M3.5) ③ to the arm bed cover with the screw ❶.



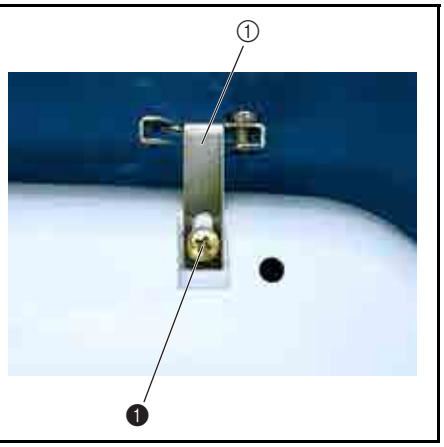
❶		Taptite, Pan B M3X12 Color; Silver	Torque 0.59 – 0.78 N·m

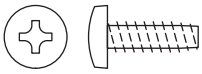
2 Thread guide assembly attachment

1. Attach the thread guide assembly ① to the arm bed cover.
2. Temporarily tighten the screw ❶.

***Key point**

- Tighten the screw after performing "4 - 16 Bobbin winder (uneven bobbin winding and bobbin winding amounts) adjustment"



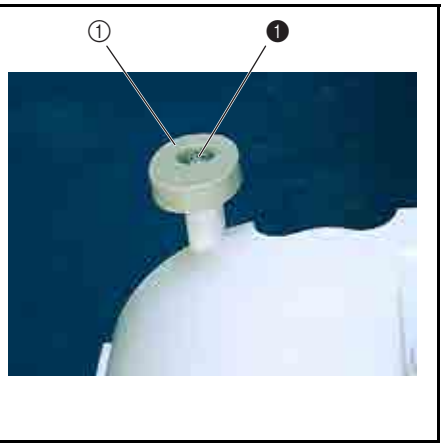
❶		Giza Tite 4X12 Color; Gold	Torque 0.88 – 1.18 N·m

3 Bobbin presser attachment

1. Attach the bobbin presser ① with the screw ❶.

***Key point**

- Place the bobbin presser with the smaller end facing the rear.
- Tighten the screw after performing "4 - 16 Bobbin winder (uneven bobbin winding and bobbin winding amounts) adjustment"



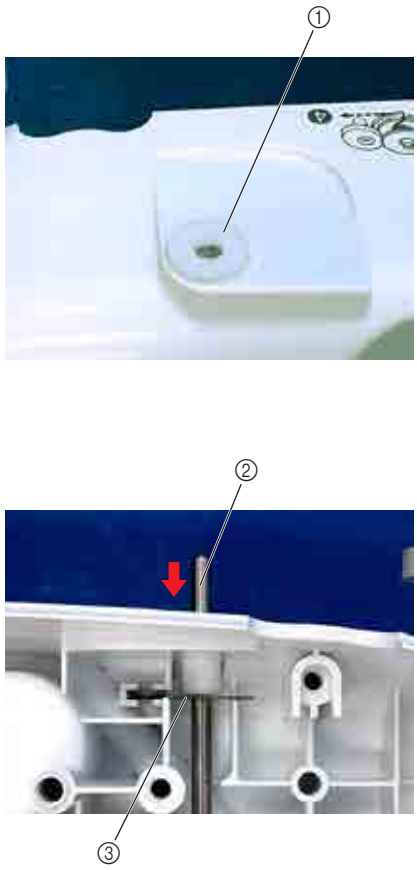
❶		Taptite, Pan B (S/P washer) M3X12 Color; Silver	Torque 0.39 – 0.78 N·m

4 Spool pin attachment

1. Attach the spool pin stand ① so that it does not protrude from the attachment section.
2. Insert the spool pin ② into the arm bed cover. Insert the pin from the grooved end.
3. Attach the spool pin spring ③ to the arm bed cover.

***Key point**

- Check that the spool pin ② moves lightly.

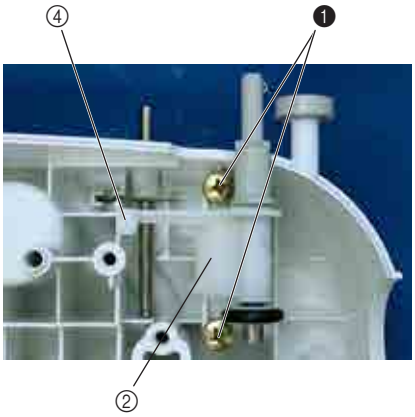


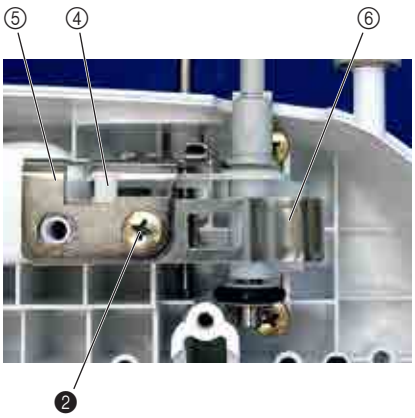
5 Bobbin winder assembly attachment

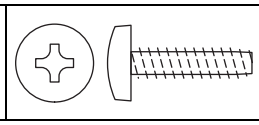
1. Attach the rubber ring ① to the bobbin winder pulley.
2. Insert the bobbin winder shaft ② into the groove on the arm bed cover, and secure the shaft with the 2 screws ❶.
3. Insert the BW switch lever ③ into the bobbin winder shaft stopper ④.
4. Set the bobbin winder spring ⑤ and then the bobbin winder shaft stopper ④ to the stopper attachment section of the arm bed cover, and secure them with the screw ❷.

***Key point**

- Check that the bobbin winder spindle base passes over the bobbin winder spring when the bobbin winder is switched.
- Check that the bobbin winder spring returns to the original position when the bobbin winder is switched.



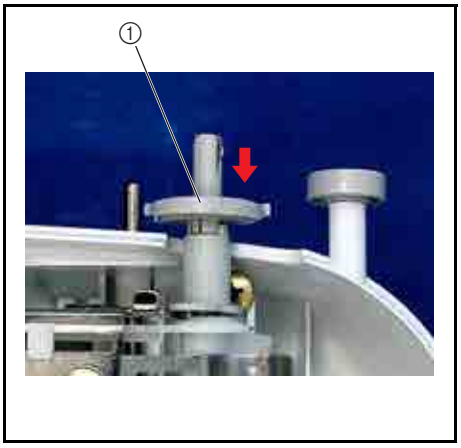


❶ ❷		Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m

Assembly

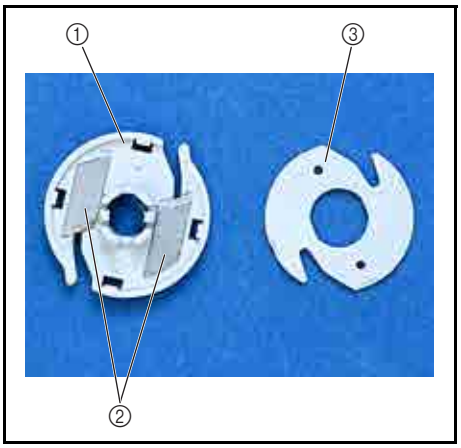
6 Bobbin base assembly attachment

1. Attach the bobbin base assembly ①.



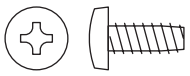
6-1 Bobbin base ASSY assembly

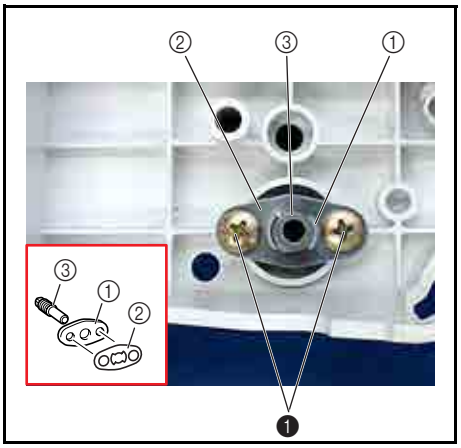
1. Attach the 2 NT lower thread cutters ② and the bobbin thread cutter holder ③ to the bobbin base assembly ①.



7 Plate spring attachment

1. Attach the adjusting plate ① and then the plate spring ② from the inside of the arm bed cover with the 2 screws ❶.
2. Tighten the adjusting screw ③ to the plate spring ②.

❶		Taptite, Bind B M4X10 Color; Gold	Torque 0.78 – 1.18 N·m



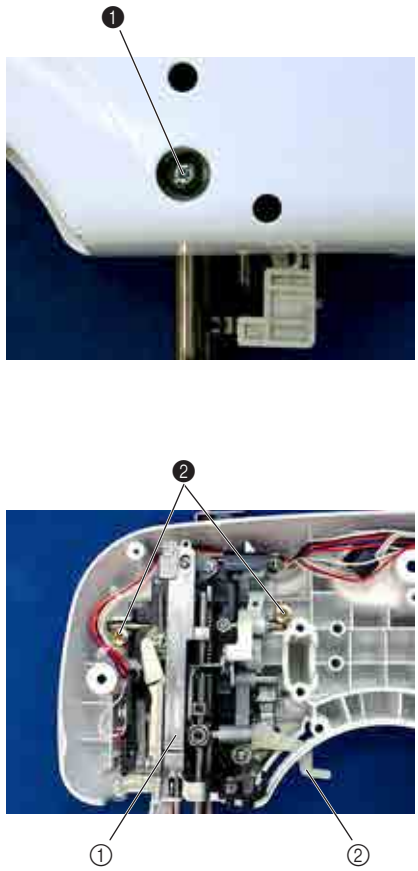
8 Needle-presser unit attachment

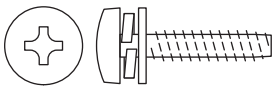
1. Attach the needle-presser unit ① to the arm bed cover with screws ❶ and ❷ (1 pc. and 2 pcs. respectively).

***Key point**

- Lift the presser foot lifter ② and insert it into the hole on the arm bed cover ③ to set the needle-presser unit ① to the attachment position.

Start movie clip (CD-ROM version only)



❶		Screw, Pan M3X25 Color; Silver	Torque 0.78 – 1.18 N·m
❷		Giza Tite 5X20 Color; Gold	Torque 1.18 – 1.57 N·m

9 Upper shaft assembly attachment

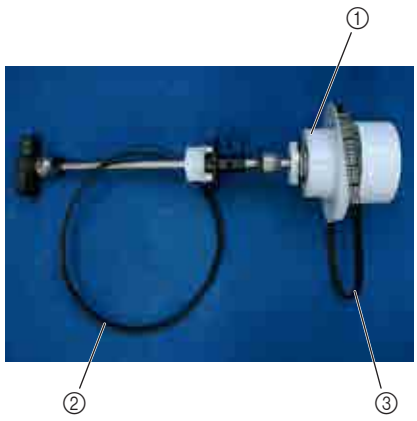
1. Pass timing belt 420-5GT-6 (timing belt) ② and timing belt 372-2GT-6 (motor belt) ③ to the upper shaft assembly ①.
2. Attach the needle bar crank ⑤ to the thread take-up lever crank ④.
3. Set the upper shaft bushing ⑥ to the arm bed cover attachment position.
4. Attach the 2 upper shaft bearing pressers ⑦⑧ with the 4 screws ❶.

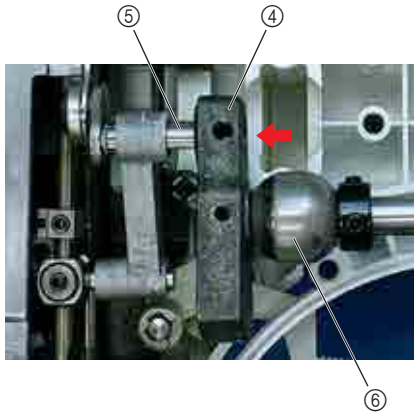
***Key point**

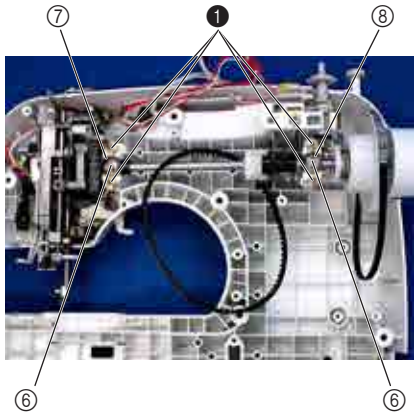
- Check that the bobbin base assembly is on the left side.
- Attach the left upper shaft bearing presser ⑦ so that the projecting part of ⑦ is positioned at the upper right. And attach the right upper shaft bearing presser ⑧ so that the projecting part of ⑧ is positioned at the lower shaft.

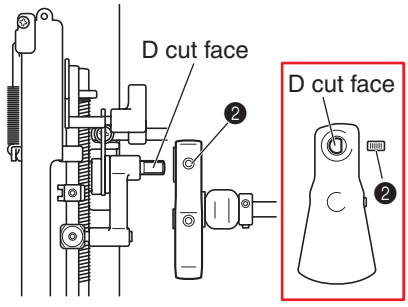
5. Apply 1 or 2 drops of OILER to the matching section of the upper shaft and the upper shaft bushing.
6. Align the D-cut face of the needle bar crank with the screw hole on the thread take-up lever crank, and tighten the screw ❷.

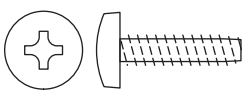
Apply OILER to the matching section of the upper shaft and the upper shaft bushing.	1 - 2 drops XZ0206***









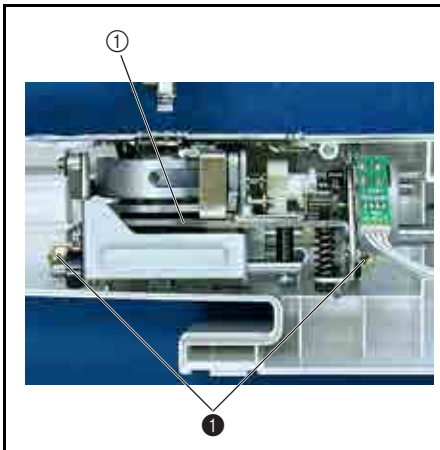
❶		Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m
❷		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.18 – 1.57 N·m

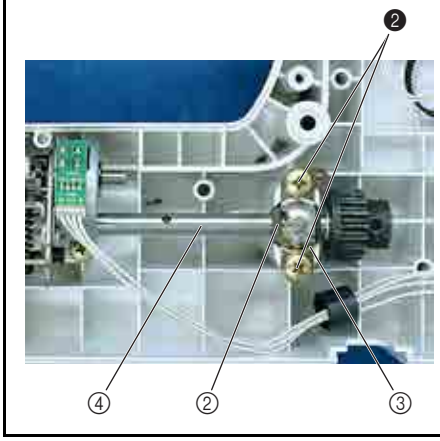
10 Feed unit assembly attachment

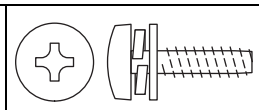
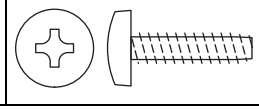
1. Fit the feed unit ① to the arm bed cover attachment position, and secure them with the 2 screws ❶.
2. Fit the lower shaft bushing ② to the arm bed cover attachment position, set the lower shaft bearing presser ③, and secure them with the 2 screws ❷.

   ***Key point**
   - Set the lower shaft bearing presser ③ so that the projecting part of ③ is positioned at upper right.
3. Apply 1 or 2 drops of OILER to the matching section of the lower shaft ④ and the lower shaft bushing ②.

Apply OILER to the matching section of the lower shaft and the lower shaft bushing.	1 - 2 drops XZ0206***



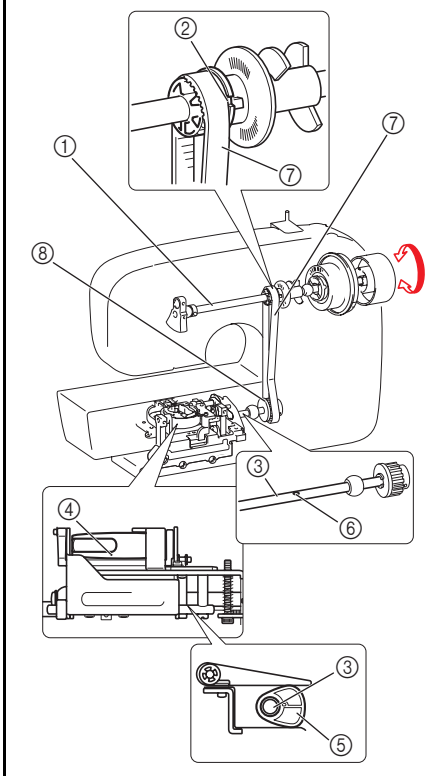


❶		Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m
❷		Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m

11 Upper shaft and lower shat phase matching

1. Rotate the upper shaft ① until the trench on the upper shaft pulley ② is at the front.
2. Turn the lower shaft ③ to the point where the mark on the outer rotary hook ④ is at the front, the larger feed cam ⑤ is at the rear, and the hole on the lower shaft ⑥ is at the top.
3. Pull the timing belt ⑦ and hang it over the timing pulley D ⑧.

Start movie clip (CD-ROM version only)



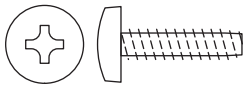
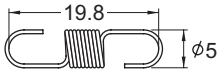
Assembly

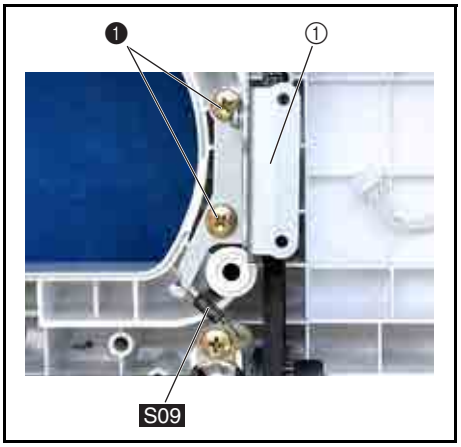
12 Tension pulley assembly attachment

1. Attach the tension pulley assembly ① to the arm bed cover with the 2 screws ❶.
2. Attach spring S09 .

***Key point**

- Perform "4 - 3 Timing belt tension adjustment.

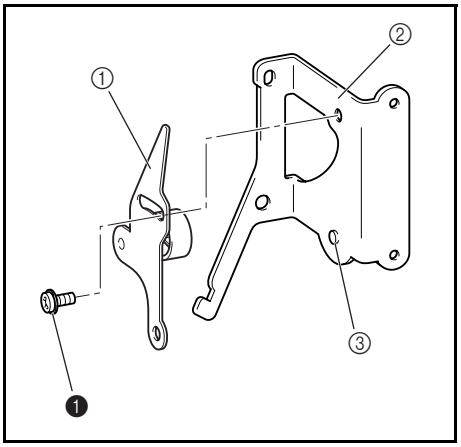
❶		Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m
S09			SPRING XC2538***



12-1 Tension pulley ASSY assembly

1. Align the boss ③ on the tension pulley holder ② with the hole on the tension pulley assembly ①, and secure the tension pulley assembly with the screw ❶.

❶		Screw, Pan (S/P washer) M4X8DA Color; Silver	Torque 1.18 – 1.57 N·m

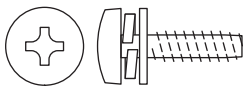


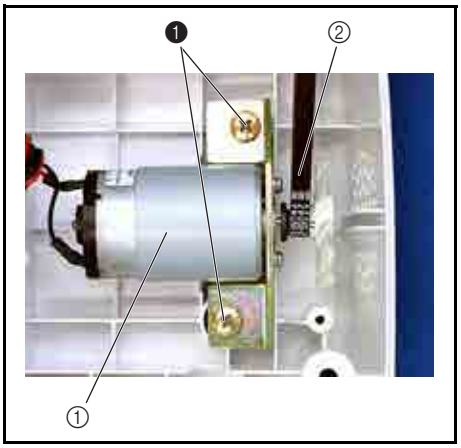
13 Main motor assembly attachment

1. Hang the motor belt ② over the main motor assembly ①.
2. Attach the main motor assembly ① to the arm bed cover assembly with the 2 screws ❶.

***Key point**

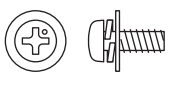
- Perform "4 - 4 Motor belt tension adjustment.

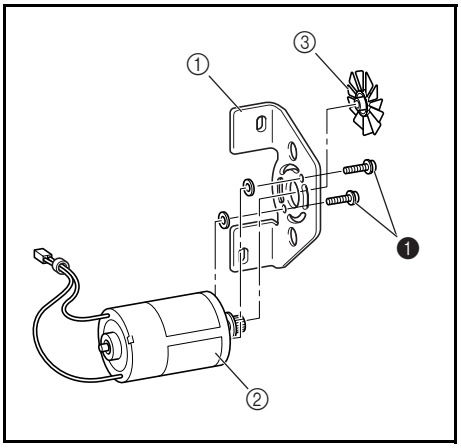
❶		Giza Tite 5X16 Color; Gold	Torque 0.29 – 0.49 N·m



13-1 Main motor assembly

1. Attach the main motor ② to the motor holder ① with the 2 screws ❶.
2. Attach the motor fan ③.

❶		Screw, Pan (S/P washer) M3X8DB Color; Silver	Torque 0.59 – 0.78 N·m

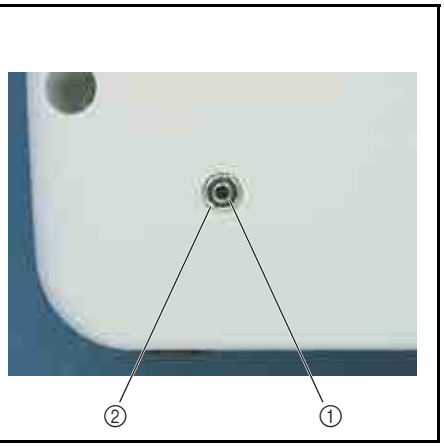


14 FC jack attachment

1. Insert the FC jack assembly ① from the inside of the arm bed cover assembly.
2. Attach the jack nut ② from the outside of the arm bed cover assembly.

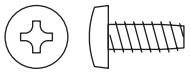
***Key point**

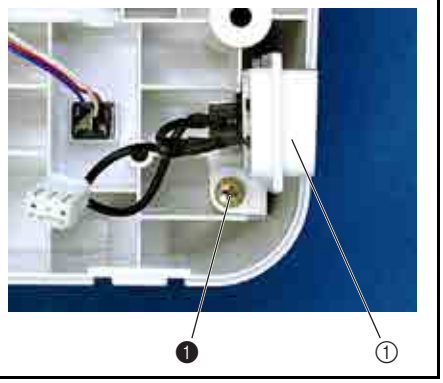
- Pass the lead wire of the FC jack assembly ① through the rear of the main motor.



15 Inlet assembly attachment

1. Attach the inlet assembly ① with the screw ❶.

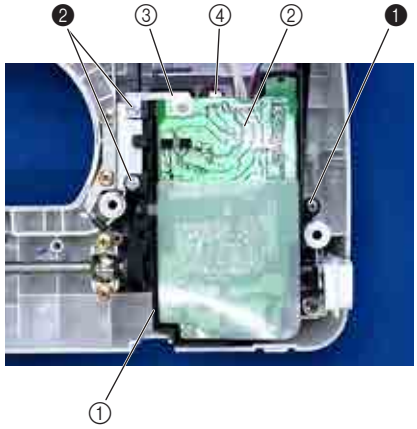
❶		Taptite, Bind B M4X10 Color; Gold	Torque 0.78 – 1.18 N·m

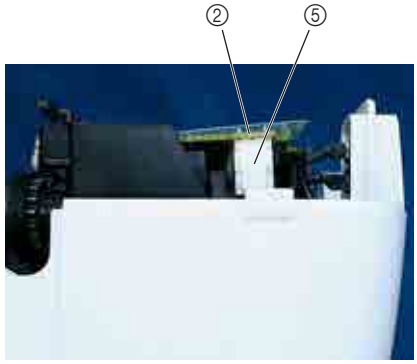


16 Power PCB assembly attachment

1. Attach the power unit assembly ① with screws ❶ and ❷ (1 pc. and 2 pcs. respectively).

   ***Key point**
   - Attach the power plate spring ③ to the upper screw ❷.
2. Attach the main motor lead wire assembly connector ④ to the power PCB ②.
3. Attach the inlet assembly connector ⑤ to the power PCB ②.

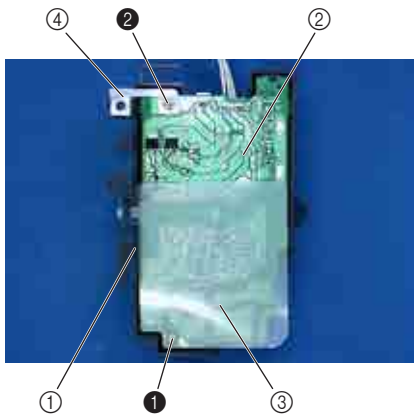




❶	Taptite, Bind B M4X10 Color; Gold	Torque 0.78 – 1.18 N·m
❷	Screw, Bind M4X8 Color; Silver	Torque 1.18 – 1.57 N·m

16-1 Power PCB ASSY assembly

1. Attach the power PCB ② and the insulator sheet ③ to the insulation cover ① with the screw ❶.
2. Attach the power plate spring ① with the screw ❷.



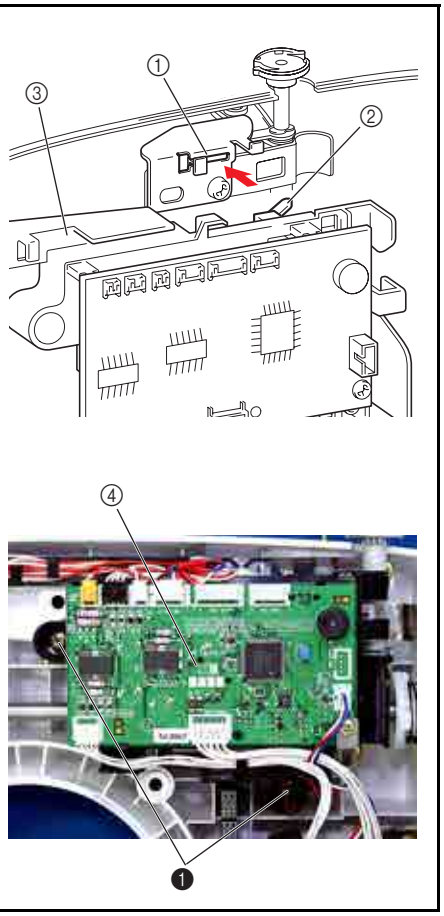
❶ ❷	Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

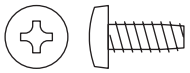
17 Main PCB assembly attachment

1. Insert the bobbin winder switch of the main PCB ② into the slot on the bobbin winder stopper plate ①, and then insert the boss on the arm bed cover into the screw hole on the shutter cover ③.
2. Main PCB assembly ④ with the 2 screw ❶.

***Key point**

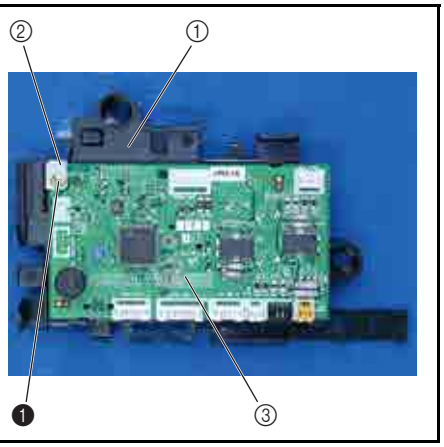
- Refer to "5 - 1 Special Instructions of Wiring" for wiring details.



❶		Taptite, Bind B M4X10 Color; Gold	Torque 0.78 – 1.18 N·m

17-1 Main PCB assembly

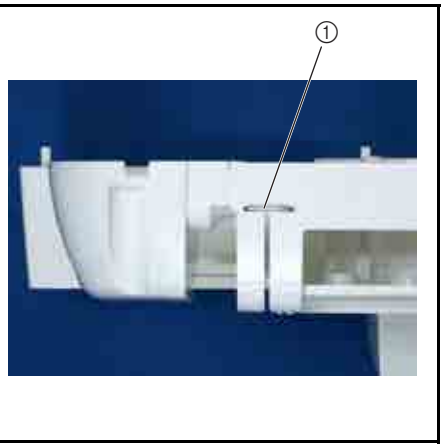
1. Attach the main PCB plate spring ② and the main PCB ③ to the shutter cover ① with the screw ❶.



❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

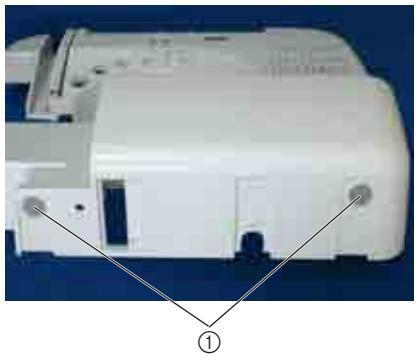
18 Upper cover thread guide attachment

1. Attach the upper cover thread guide ①.



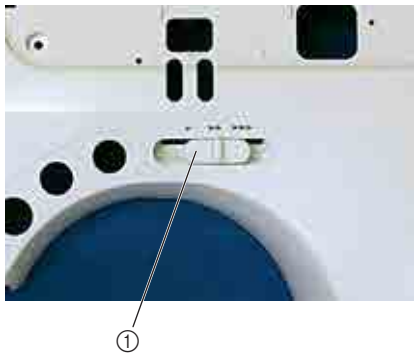
19 Base plate rubber attachment

1. Attach the 2 base rubber plates ①.



20 SV keytop attachment

1. Attach the SV keytop ①.

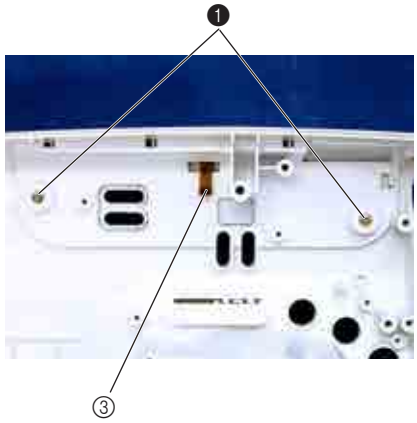


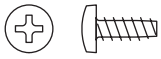
21 Front panel LCD attachment

1. Attach the LCD ① and the front panel ② with the 2 screws ❶.

***Key point**

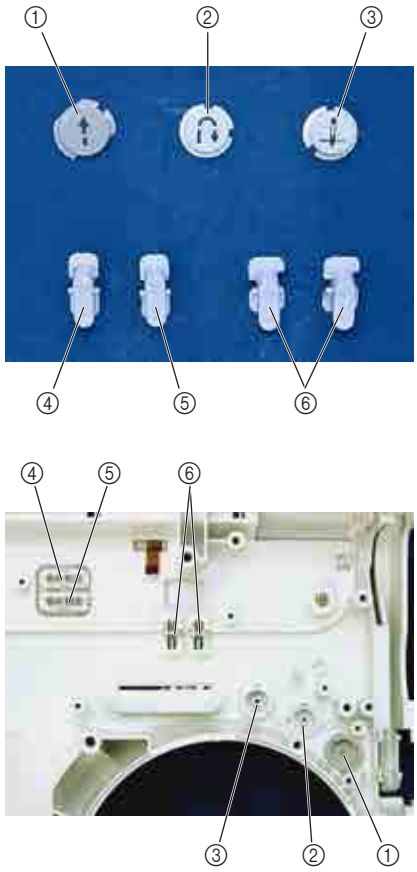
- Insert the LCD cable ③ into the hole in the upper section of the front cover.



❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

22 Button attachment

1. Attach the SS button ①, the backstitching button ②, and the NP button ③.
2. Attach manual button A ④, manual button B ⑤, and 2 selecting buttons ⑥.



23 Operation PCB assembly and SSVR PCB assembly attachment

1. Attach the operation PCB assembly ① with the 2 screws ❶.
2. Attach the SSVR PCB assembly ② with the 3 screws ❷.

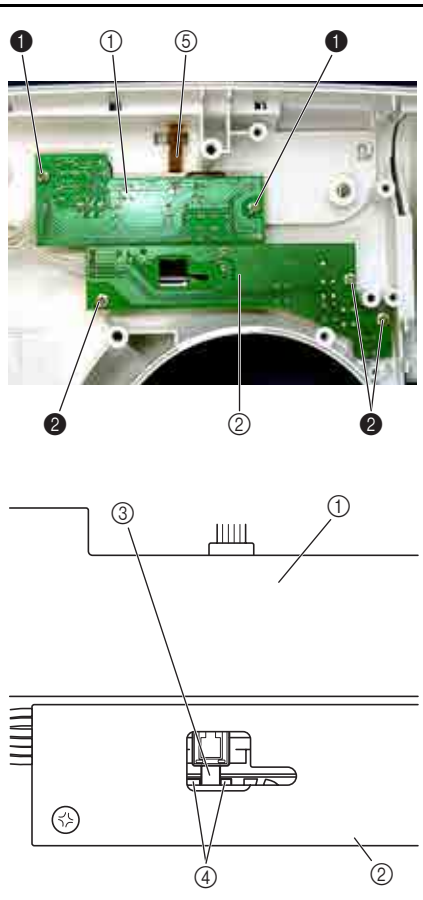
***Key point**

- Insert the speed dial of the SSVR PCB assembly ③ into the slot on the SV keytop ④.

3. Connect the LCD cable ⑤ to the operation PCB assembly ①.

***Key point**

- Bind the operation PCB cord and SSVR PCB cord, and secure these with two bands. <Refer to "5 - 1 Special Instructions of Wiring" for wiring details.>



❶ ❷	Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

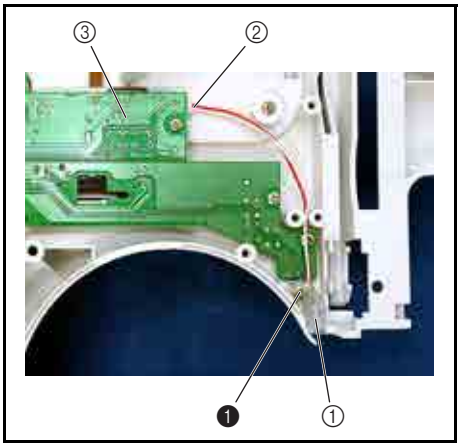
Assembly

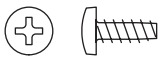
24 LED lamp attachment

1. Attach the LED lamp ① with the screw ❶.
2. Attach the LED lamp connector ② to the operation PCB ③.

***Key point**

- Secure the LED lamp lead wire ① to the rib on the front cover.
- <Refer to "5 - 1 Special Instructions of Wiring" for wiring details.>



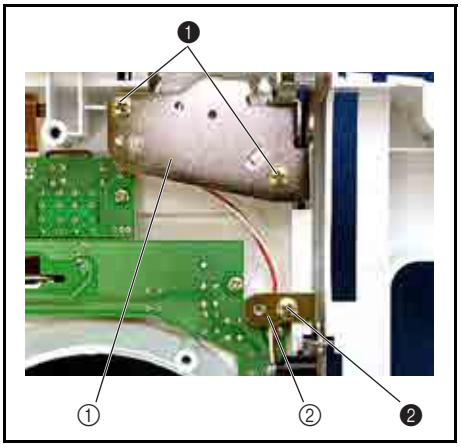
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

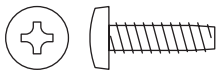
25 Thread tension holder assembly and thread take-up holder B attachment

1. Attach the thread tension holder assembly ① with the 2 screws ❶.
2. Attach the thread take-up holder B ② with the screw ❷.

***Key point**

- Insert the wire of the thread tension holder assembly B ② into the groove on the front cover, and then insert the boss into the hole on the front cover.



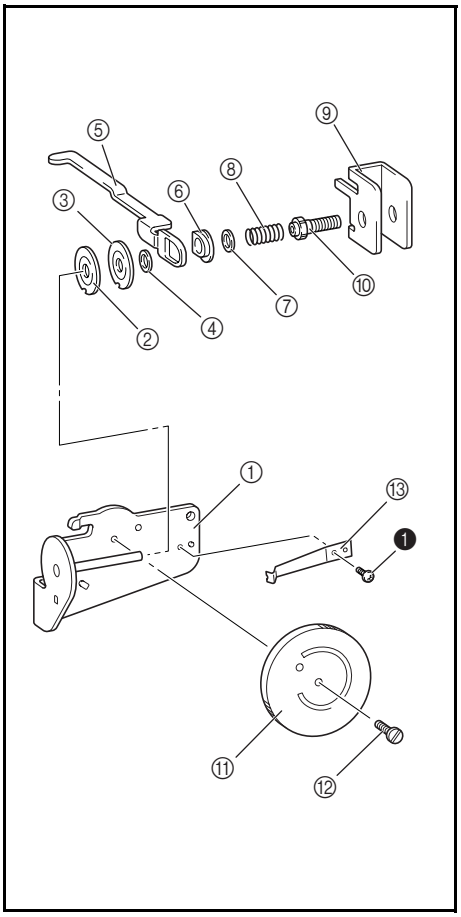
❶ ❷		Taptite, Bind B M4X14 Color; Gold	Torque 0.78 – 1.18 N·m

25-1 Thread tension holder ASSY assembly

1. Attach tension disc A ②, tension disc B ③, washer ④, thread release plate ⑤, tension disc washer ⑥, washer ⑦, and spring ⑧ in this order to the caulking shaft of the thread tension holder assembly ①.
2. Attach the thread tension adjusting screw ⑩ to the thread tension plate ⑨.
3. Engage the ridge of the thread tension plate ⑨ with the groove on the thread tension dial ⑪, insert them into the caulking shaft of the thread tension holder assembly ①, and secure them with the tension dial shaft ⑫.
4. Attach the notch spring ⑬ to the thread tension holder assembly ① with the screw ❶.

***Key point**

- Hold the notch spring with the ridge side up, and insert it into the lower thread tension dial ⑪. Align the round hole with the boss on thread tension holder assembly ①.



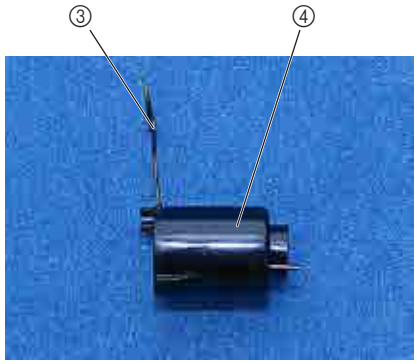
❶		Screw, Pan M3X4 Color; Silver	Torque 0.78 – 1.18 N·m

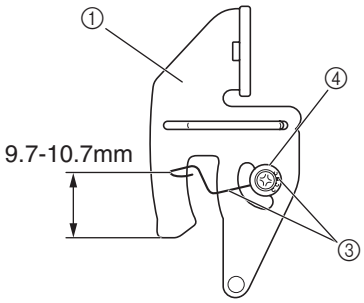
25-2 Thread take-up holder B assembly

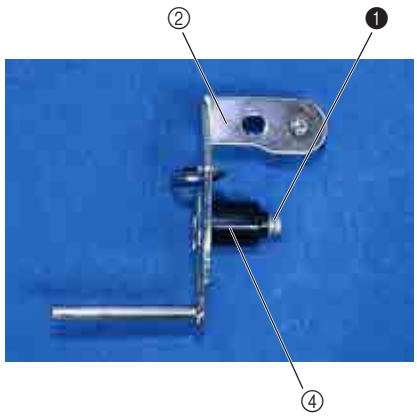
1. Attach the wire ② to thread take-up holder B assembly ①.
2. Insert the tip of the thread take-up spring ③ into the second hole from the bottom on the thread catching spring case ④, secure 9.7 to 10.7 mm from the top of the groove on thread take-up holder B assembly ① to the ridge of the thread hanging section on the thread take-up spring, and attach the thread take-up spring to thread take-up holder B assembly ① with the screw ❶.

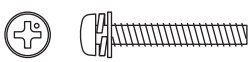
***Key point**

- Attach the thread hanging section on the thread take-up spring to the section between the ribs of the thread catching spring case.
- Insert the 2 ribs of the thread catching spring case into the slot on thread take-up holder B ①.







❶		Screw, Pan (S/P washer) M3X18DA Color; Silver	Torque 0.59 – 0.78 N·m

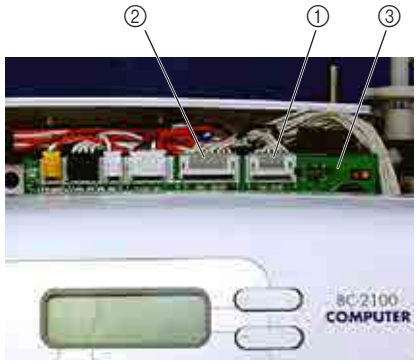
Assembly

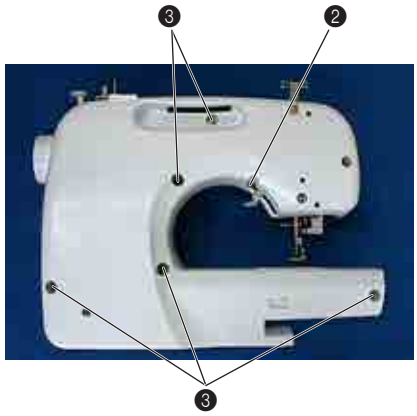
26 Front cover attachment

1. Connect the SSVR PCB connector ① and the operation PCB connector ② to the main PCB ③.

   ***Key point**
   - Pass the lead wires to the hook section of the shutter cover ④ while preventing them from lifting or disconnecting.
     <Refer to "5 - 1 Special Instructions of Wiring" for wiring details.>

2. Attach the front cover to the arm bed cover with screws ❶ (front, 1 pc.), ❷ (rear, 1 pc.), and ❸ (rear, 5 pcs.).

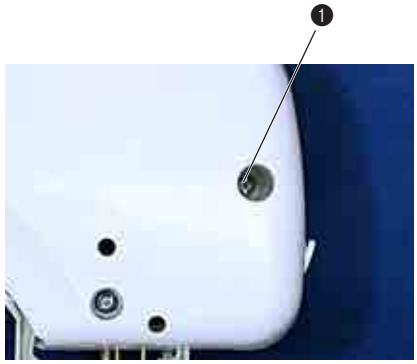


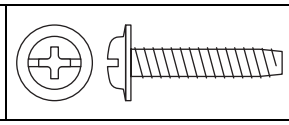


❶	Giza Tite 4X12 Color; Gold	Torque 0.88 – 1.18 N·m
❷	Giza Tite 4X25 Color; Gold	Torque 0.88 – 1.18 N·m
❸	Giza Tite 5X16 Color; Gold	Torque 1.18 – 1.57 N·m

27 Face plate A assembly attachment

1. Attach the face plate A assembly ① with the screw ❶.

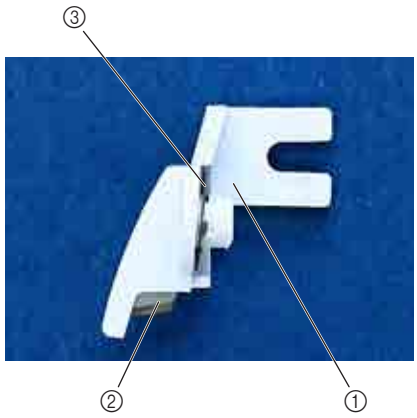


❶		Taptite, Cup P M4X20 Color; Silver	Torque 0.78 – 1.18 N·m

27-1 Face plate A ASSY assembly

1. Attach the NT lower thread cutter ② to the cutter cover ①, and then attach the CS retaining ring ③.

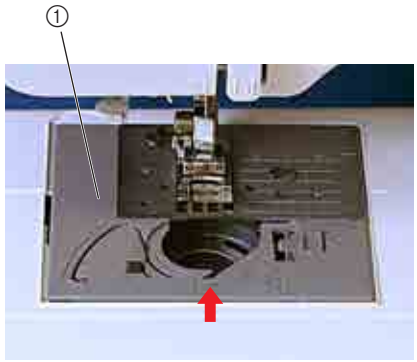
   ***Key point**
   - Insert the narrow edge of the NT lower thread cutter ② into the cutter cover ① first.
   - Align the tab of the CS retaining ring with the groove on the shaft of the cutter cover ①.
2. Attach the cutter cover assembly to face plate A ④ with the screw ❶.

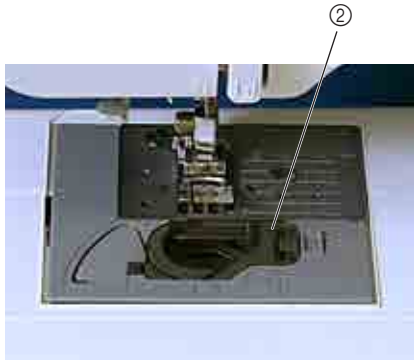


❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

28 Needle plate B assembly attachment

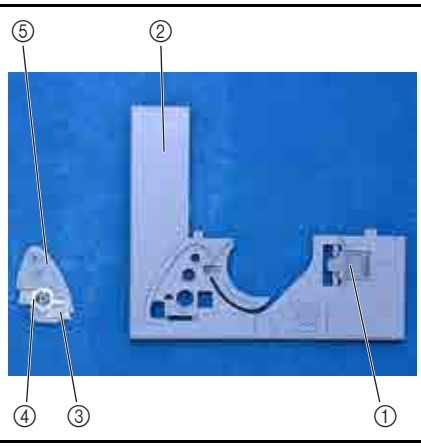
1. Attach the needle plate B assembly ①.
2. Attach the needle plate cover ② to the needle plate B assembly ①.





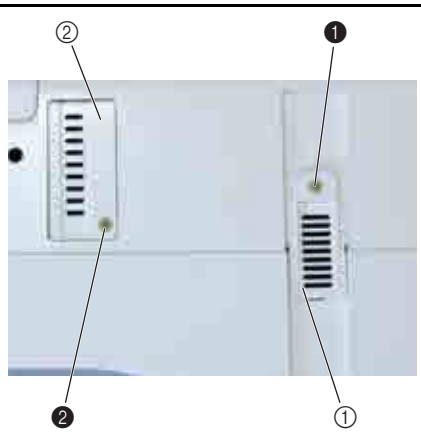
28-1 Needle plate B ASSY assembly

1. Attach the slide button ① to needle plate B ②.
2. Attach the NT lower thread cutter ③ and the spring plate ④ to the cutter cover ⑤.
3. Attach the cutter cover to needle plate B ②.



29 Base cover attachment

1. Attach the base cover ① with the screw ❶.
2. Attach base cover A ② with the screw ❷.

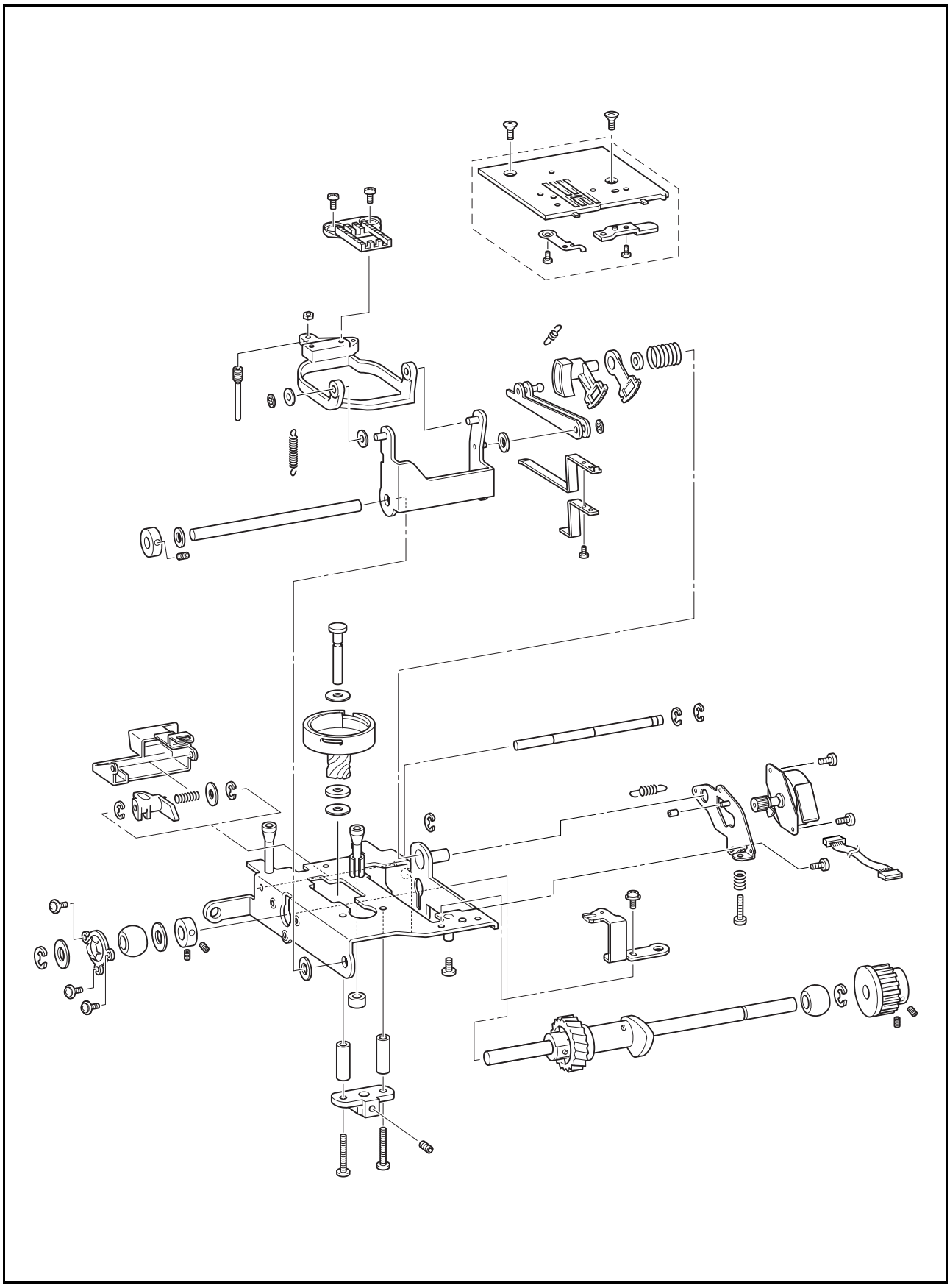


❶		Screw, Flat B M3X8 Color; Gold	Torque 0.39 – 0.78 N·m

30 Accessory table attachment

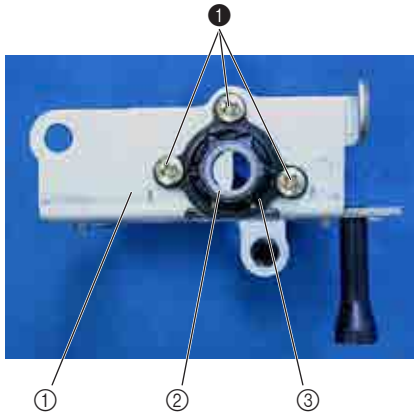
1. Attach the accessory table ①.

Feed unit location diagram



1 Lower shaft bushing attachment

1. Attach the lower shaft bushing ② and bushing presser B ③ to the base plate assembly ① with the 3 screws ❶.



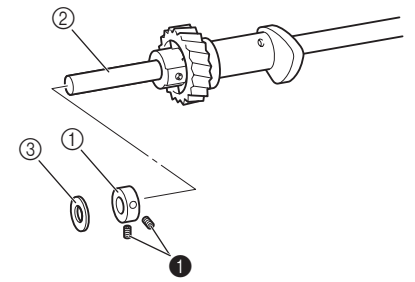
❶		Taptite, Bind B M3X6 Color; Gold	Torque 0.39 – 0.78 N·m

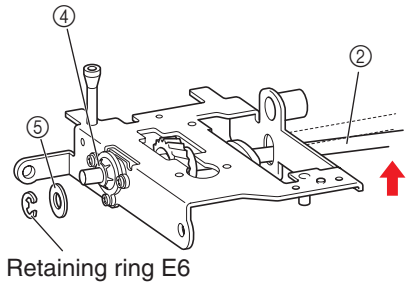
2 Lower shaft assembly attachment

1. Temporarily tighten the 2 screws ❶ to the set collar ①, and attach the set collar to the lower shaft assembly ②.

   ***Key point**
   - Set the set collar with the machined surface facing out.
2. Insert the thrust washer ③ into the lower shaft assembly ②, and attach them to the lower shaft bushing ④.
3. Insert the thrust washer ⑤ into the lower shaft assembly ②, and attach the retaining ring (E6).
4. Push the lower shaft assembly ② from the retaining ring side, move the set collar ① to the lower shaft bushing ④, and then secure them with the 2 screws ❶.

Start movie clip (CD-ROM version only)



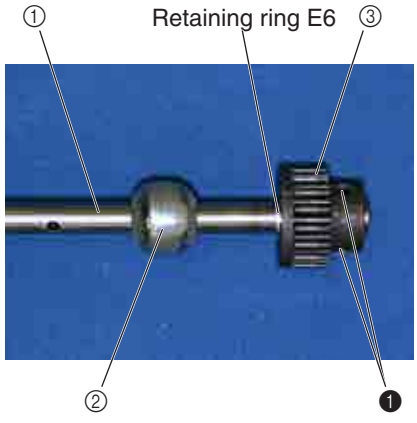


❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 – 1.18 N·m

3 Timing pulley D attachment

1. Insert the upper shaft bushing ② into the lower shaft assembly ①, and attach the retaining ring (E6).

Insert the timing pulley D ③ into the lower shaft assembly ①, and secure them with the 2 screws ❶.



❶		Set Screw, Socket (CP) M5X5 Color; Black	Torque 1.18 – 1.57 N·m

4 FPM holder assembly attachment

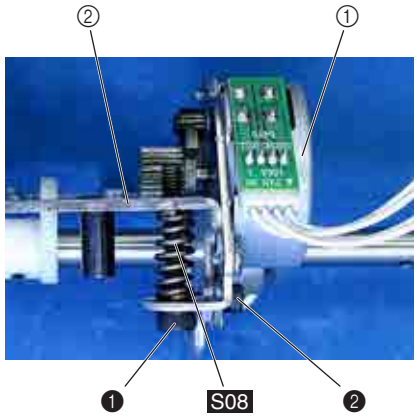
1. Insert the FPM holder assembly ① into the feed adjuster shaft ③ of the base plate assembly ②.
2. Insert spring S08 between the base plate assembly ② and the FPM holder assembly ①, and secure them with the screw ❶.

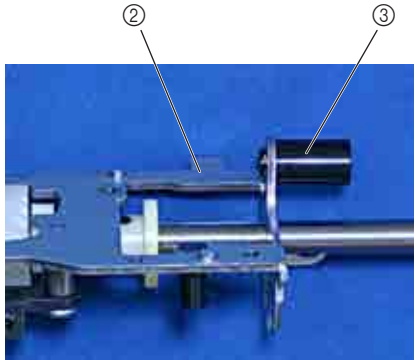
***Key point**

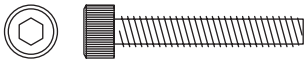
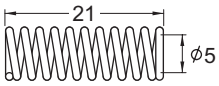
- Tighten the screw ❶ until the tip of the screw protrudes 7 mm.

3. Attach the screw ❷.

Start movie clip (CD-ROM version only)



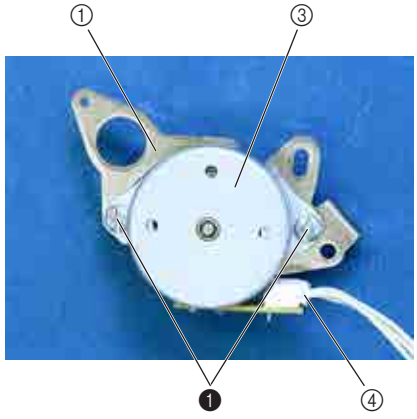


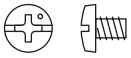
❶		Bolt, Socket M4X25 Color; Black	
❷		Screw M3X8 Color; Black	Torque 0.59 – 0.78 N·m
S08			SPRING XC2537***

4-1 FPM assembly

1. Attach the rubber ② to the caulking shaft of the FPM holder assembly ①.
2. Attach the FPM ③ with the 2 screws ❶.
3. Apply 1 or 2 drops of FBK OIL RO 100 to the shaft bushing of FPM ③.
4. Attach the lead wire assembly (FPM-LE) ④.

Apply FBK OIL RO 100 to the shaft bushing of FPM.	1 - 2 drops XC8388***

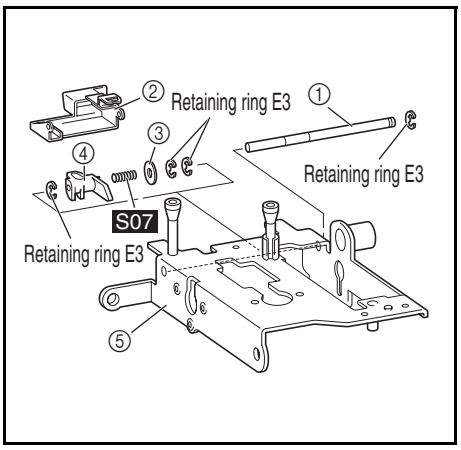


❶		Screw, Bind M3X4 Color; Silver	Torque 0.78 – 1.18 N·m

5 Vertical lever attachment

1. Insert the vertical feed shaft ① into the inside of the drop knob ②, and then insert the plain washer (L4) ③, spring S07 , vertical lever ④, and drop knob ⑤ in this order.

   ***Key point**
   - Determine which end of the vertical feed shaft ① is closer to the retaining ring and hold this end, and insert the shaft from the left side of the base plate assembly.
2. Attach the 2 retaining rings (E3).
3. Place the groove on the vertical feed shaft ① inside the base plate assembly ⑥, and attach the retaining ring (E3).
4. Move the vertical feed shaft to the left, and attach the retaining ring (E3).



Start movie clip (CD-ROM version only)

S07	11, ø5.7	SPRING XC2550***

6 Feed adjuster assembly attachment

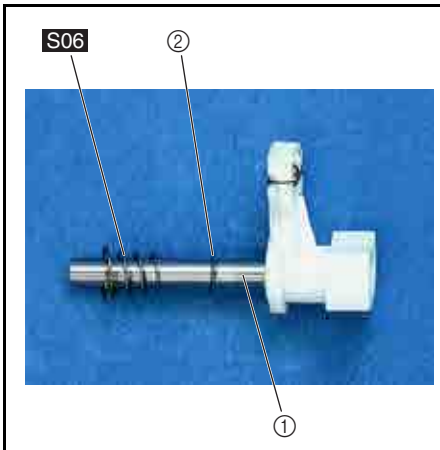
1. Insert the polyester slider ② into the shaft of the feed adjuster assembly ①, and then attach spring S06 .

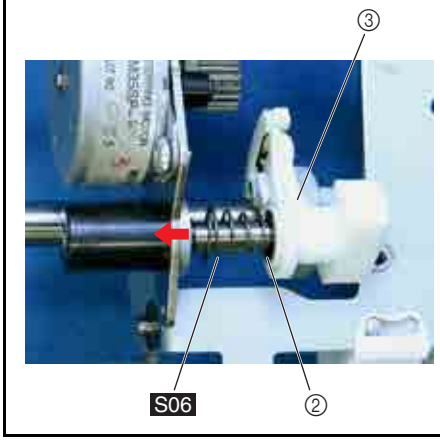
***Key point**

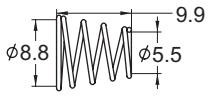
- Insert the spring from the smaller end.

2. Apply 1 or 2 drops of OILER to the shaft of the feed adjuster assembly ①.
3. Attach the feed adjuster assembly ③ to the base plate assembly.

Apply OILER to the shaft of the feed adjuster assembly.	1 - 2 drops XZ0206***

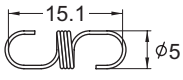




S06		SPRING XC2531***

6-1 Feed adjuster ASSY assembly

1. Attach the flat side of the F gear ① to the shaft of the feed adjuster ②, and then attach the ends of spring S05 to the F gear ① and the feed adjuster gear ②.

S05		SPRING XC2530***

7 Feed arm A assembly attachment

1. Insert the feed arm A assembly ① from the rear of the base plate assembly ②, and then insert the square shaft ④ of the feed arm B assembly ③ into the feed adjuster ⑤.
2. Insert the thrust washer ⑦ between the feed arm A assembly ① and the base plate assembly ⑥.
3. Apply a bead of EPCON AP(N) 0 to the hole on the feed arm A assembly ① and the hole on the base plate assembly ⑥.
4. Insert the horizontal feed shaft ⑧ into the feed arm A assembly ①, and secure them with the screw ❶.

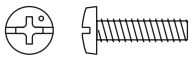
***Key point**

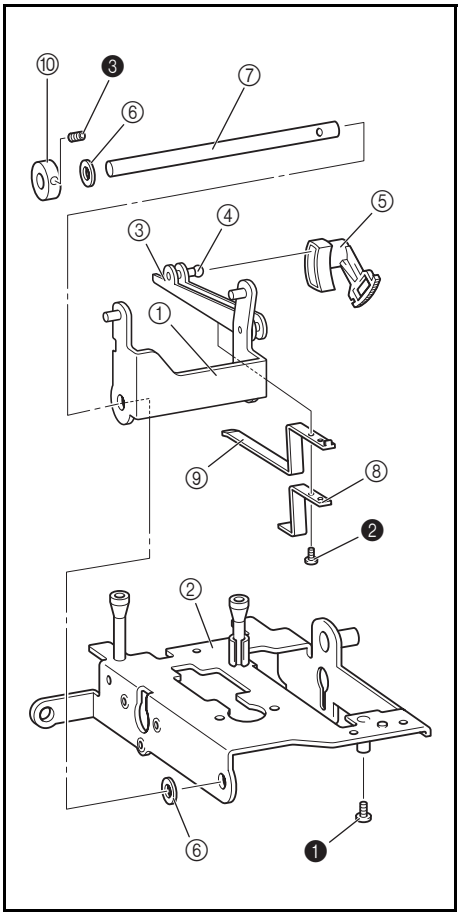
- Insert the horizontal feed shaft ⑧ through the feed arm A assembly ① so that the hole on the shaft faces FPM, and align this hole with the hole on the base plate assembly ⑥.

5. Attach the feed supporting plate ⑨ and feed supporting plate B ⑧ to the feed arm B assembly ③ with the screw ❷.
6. Insert the thrust washer ⑦ and the set collar ⑨ into the horizontal feed shaft ⑧, and then secure them with the screw ❸.

Start movie clip (CD-ROM version only)

Apply EPCON AP(N) 0 to the hole on the feed arm A assembly and the hole on the base plate assembly.	Bead XC8387***

❶		Screw, Bind M3X12 Color; Silver	Torque 0.78 – 1.18 N·m
❷		Taptite, Bind B M3X6 Color; Gold	Torque 0.00 – 0.00 N·m
❸		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 – 1.18 N·m

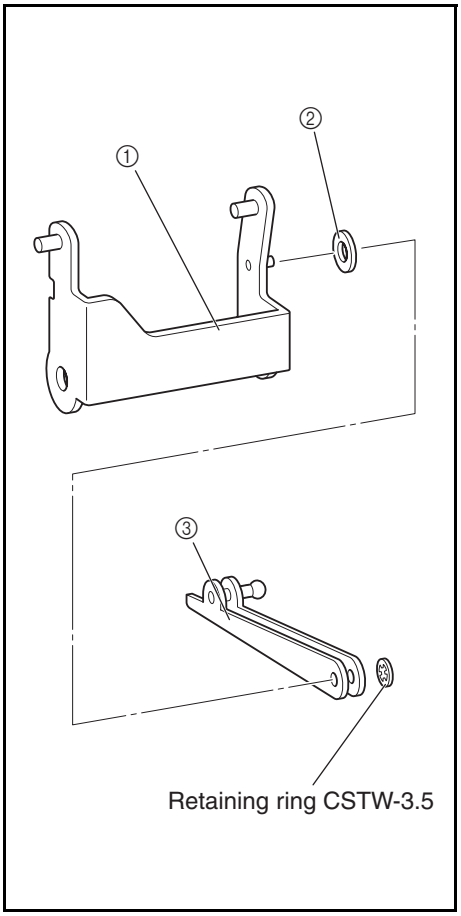


Assembly

7-1 Feed arm B ASSY assembly

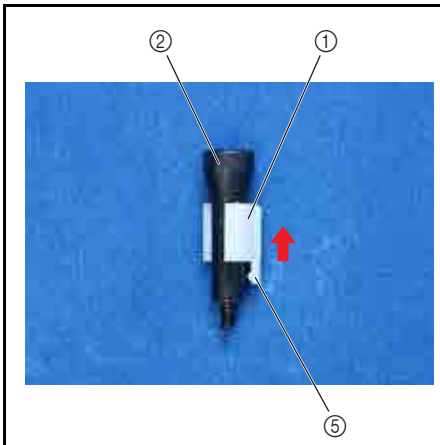
1. Insert the polyester slider2 into the shaft of the feed arm A assembly ①.
2. Apply a bead of MOLYKOTE EM-30L to the shaft of the feed arm A assembly ①.
3. Attach the feed arm B assembly ③ to the shaft of the feed arm A assembly ①, and then attach the retaining ring (CSTW-3.5).

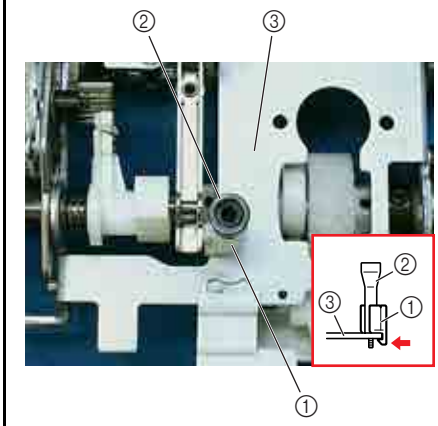
Apply MOLYKOTE EM-30L to the shaft of the feed arm A assembly.	Bead XC8385***

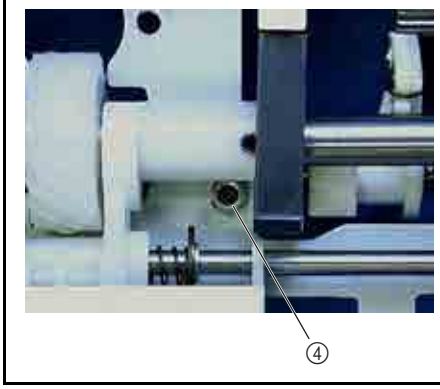


8 Needle plate supporter shaft B attachment

1. Insert the feed arm supporter ① into the needle plate supporter shaft B ②, and attach them to the base plate assembly ③.
2. Tighten nut 1 (M3) ④.
3. Move the feed arm supporter ① down, and fit the hook ⑤ to the base plate assembly ③.







9 FPM gear engagement

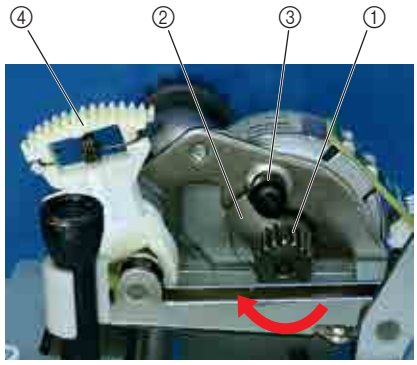
1. Rotate the FPM gear ① clockwise until the stopper ② of the FPM gear ① contacts the shaft ③ of the bushing B assembly .
2. Rotate the feed adjuster assembly ④ to the point ⑤ it contacts the FPM gear ①.

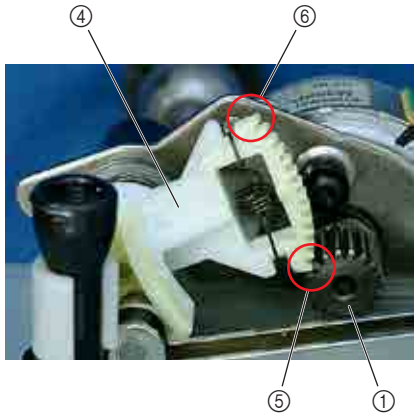
   ***Key point**
   - Hold the F pulse motor gear with your finger to prevent it from rotating when the feed adjuster assembly ④ contacts the F pulse motor gear.
3. Align the feed adjuster assembly ④ with the F gear teeth ⑥, and engage them with the FPM gear ①.

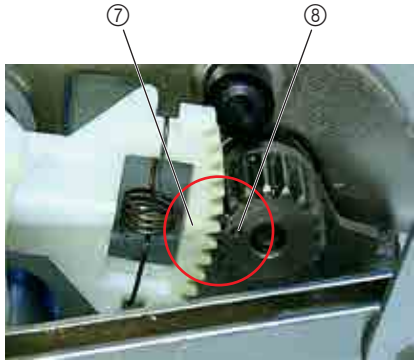
   ***Key point**
   - Check that the mark ⑦ on the feed adjuster assembly ④ is aligned with the mark ⑧ on the FPM gear.
4. Apply a bead of EPNOC AP (N) 0 to the circumference of the F gear ⑥.

Start movie clip (CD-ROM version only)

Apply EPNOC AP (N) 0 to the entire circumference of the F gear.	Bead XC8387***



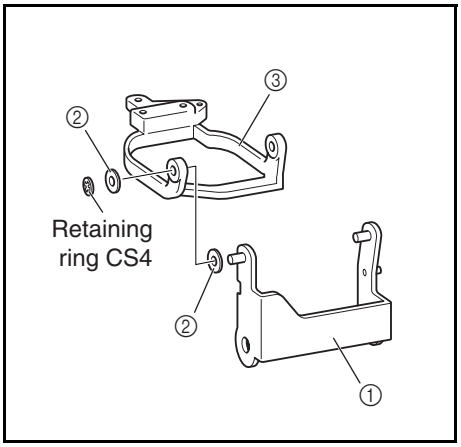




10 Feed bar attachment

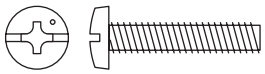
1. Insert the polyester slider ② to the left shaft of the feed arm A assembly ①.
2. Apply a bead of MOLYKOTE EM-30L to the shaft of the feed arm A assembly ①.
3. Insert the feed bar ③ into the shaft of the feed arm A assembly ①.
4. Insert the polyester slider ② into the left shaft of the feed arm A assembly ①, and then attach the retaining ring (CS4).

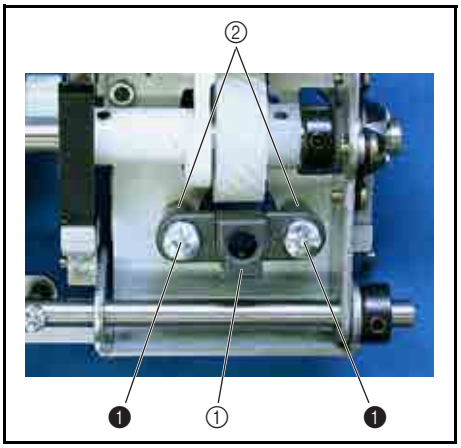
ApplyMOLYKOTE EM-30L to the shaft of the feed arm A assembly.	Bead XC8385***



11 Shaft supporter attachment

1. Insert the collar ② between the shaft supporter ① and the base plate assembly, and secure the shaft supporter with the 2 screws ❶.

❶		Screw, Bind M4X20 Color; Silver	Torque 0.78 – 1.18 N·m

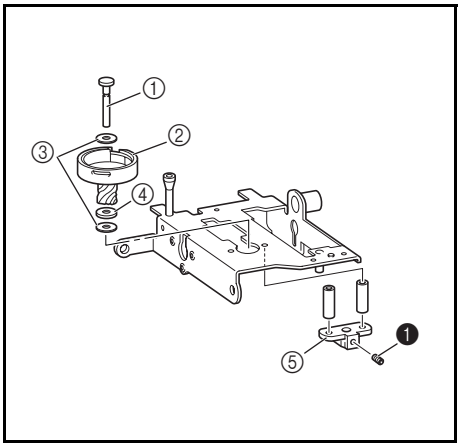


12 Outer rotary hook attachment

1. Apply a light covering of EPNOC AP (N) 0 to the groove on the outer rotary hook shaft ①.
2. Insert the outer rotary hook shaft ① into the the spacer ④ and outer rotary hook assembly ② .
3. Place spacer ④ and then the washer 6 ③ onto the outer rotary hook shaft ①.
4. Attach the outer rotary hook assembly ② to the shaft supporter ⑤ with the screw ❶.

***Key point**

- Rotate the lower shaft until the larger feed cam is at the rear and the hole on the lower shaft is at the top, and attach the outer rotary hook assembly so that the mark is at the front.



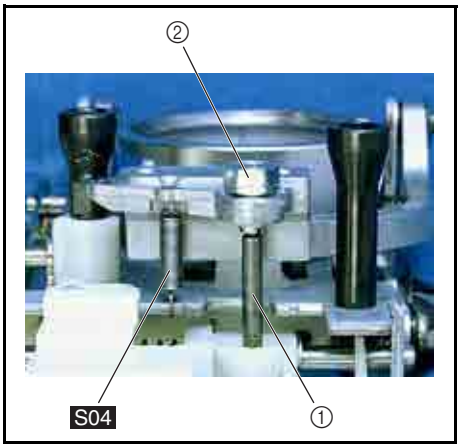
Start movie clip (CD-ROM version only)

Apply EPNOC AP (N) 0 to the groove on the outer rotary hook shaft.	Light covering XC8387***

❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 – 1.18 N·m

13 Vertical adjuster screw assembly attachment

1. Attach the vertical adjuster screw assembly ①.
2. Attach the M5 nut ② to the vertical adjuster screw assembly ①.
3. Attach spring S04 .



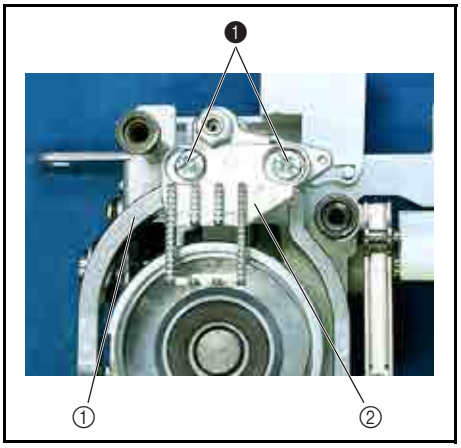
S04	18.8	SPRING XC4935***

14 Feed dog attachment

1. Temporarily tighten the 2 screws ❶ to attach the feed dog ② to the feed bar ①.

***Key point**

- Tighten the screws after performing "4 - 19 Feed dog forward/ reverse and left/right adjustment"



❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

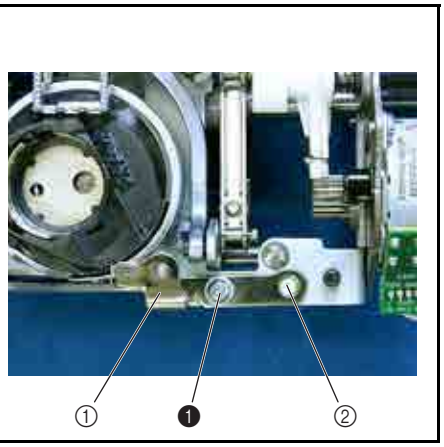
15 Inner rotary hook bracket assembly attachment

1. Align the inner rotary hook bracket ① with the boss on the base plate assembly ②, and temporarily tighten the screw ❶.

***Key point**

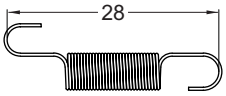
- Tighten the screw after performing "4 - 21 Inner rotary hook bracket position adjustment."

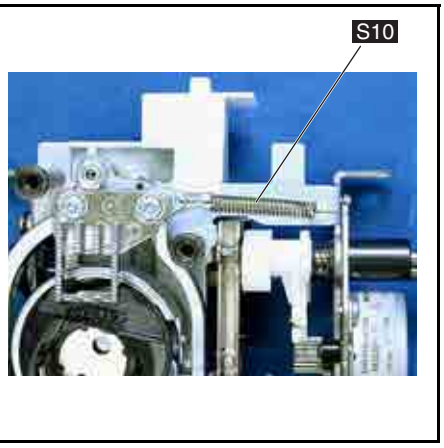
❶		Screw, Pan (S/P washer) M3X6 Color; Silver	Torque 0.59 – 0.78 N·m



16 Spring attachment

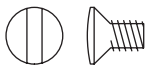
1. Attach the spring S10 .

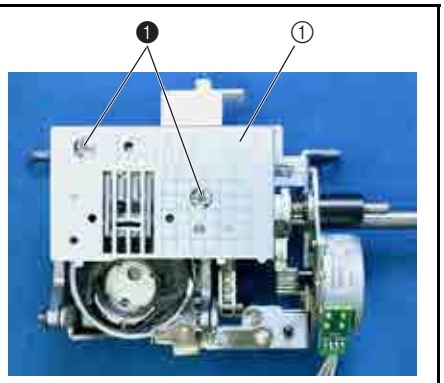
S04		SPRING XC6364***	



17 Needle plate A assembly attachment

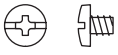
1. Attach the needle plate A assembly ① with the 2 screws ❶.

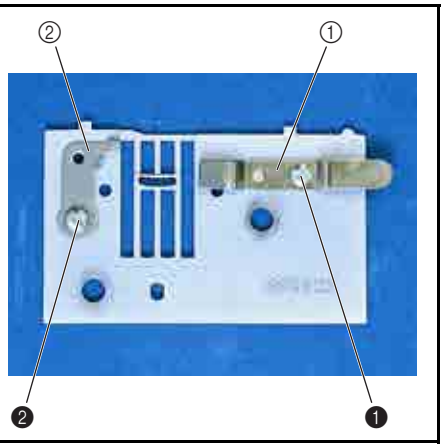
❶		Screw M4 Color; Silver	Torque 0.78 – 1.18 N·m



17-1 Needle plate A ASSY assembly

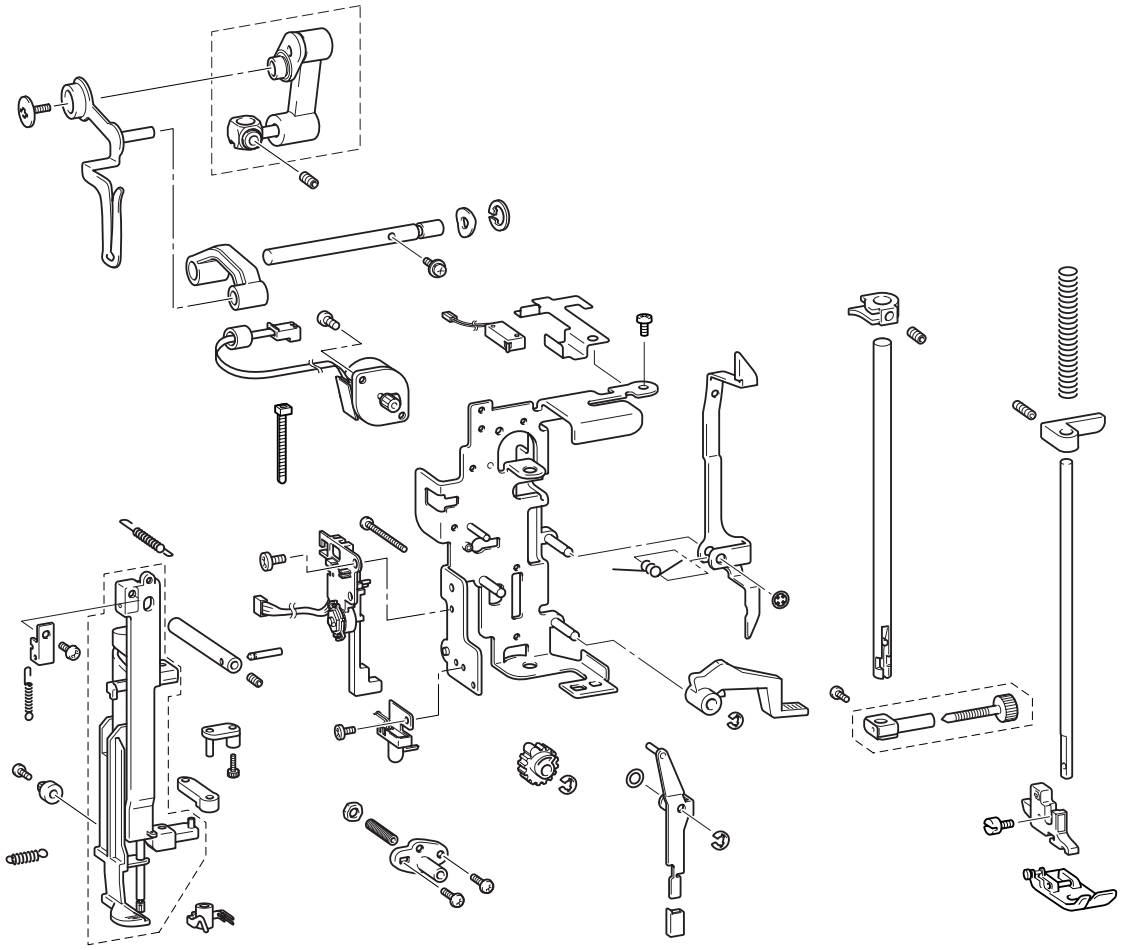
1. Attach the F gear stopper plate ① with the screw ❶.
2. Attach the stopper plate ② with the screw ❷.

❶ ❷		Screw, Bind M2.6X3 Color; Silver	Torque 0.59 – 0.78 N·m



Assembly

Needle-presser unit location diagram

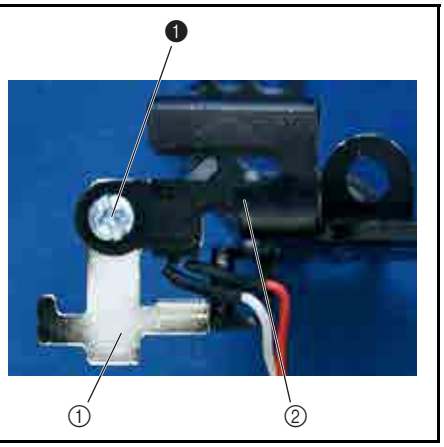


1 Presser switch assembly attachment

1. Attach the presser switch assembly ① to the base holder assembly with the screw ❶.

NOTE

- Engage the ridge of the presser switch ① with the trench of the base holder assembly ②.

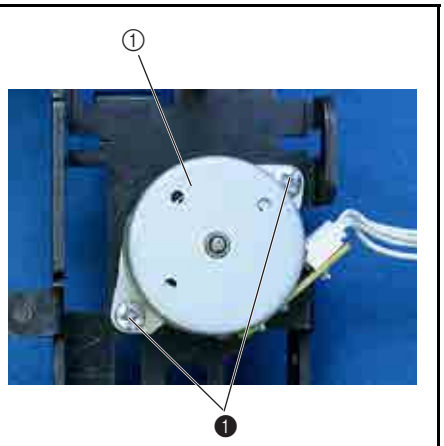


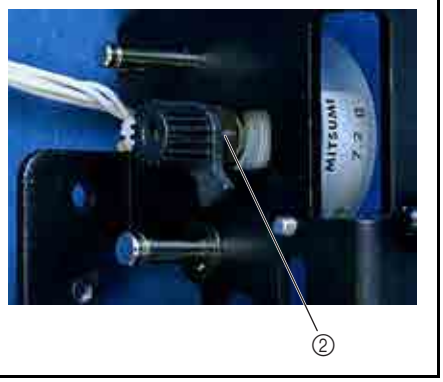
❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

2 Z pulse motor attachment

1. Attach the Z pulse motor ① to the base holder assembly with the 2 screws ❶.
2. Apply 1 or 2 drops of FBK OIL RO 100 to the shaft bushing ② of the Z pulse motor ①.

Apply FBK OIL RO 100 to the shaft bushing of the Z pulse motor.	1 - 2 drops XC8388***





❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

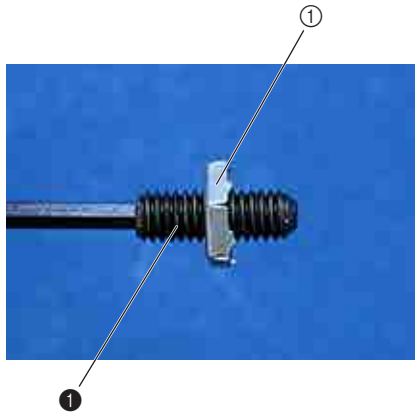
3 Lock nut attachment

1. Attach the screw ❶ to the lock nut ①.

   ***Key point**
   - Screw ❶ the screw in half way.

2. Attach the screw ❶ to the base holder assembly.

   ***Key point**
   - Tighten the screw until the lock nut ① contacts the base holder assembly.



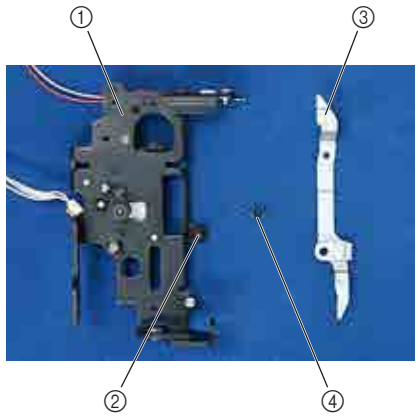
❶		Set Screw, Socket (CP) M4X12 Color; Black	

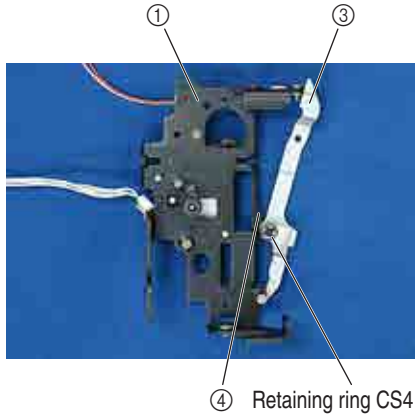
4 Thread release lever attachment

1. Apply a bead of EPNOC AP (N) 0 to the caulking shaft ② of the base holder assembly ①.
2. Attach the thread release lever ③ and the spring ④ to the caulking shaft ② of the base holder assembly ①, and then attach the retaining ring (CS4).

   ***Key point**
   - Position the tip of the spring at the top, and align the spring with the hole on the thread release lever ③.
   - Secure 0.2 mm between the thread release lever ③ and the base holder ⑤.

Apply EPNOC AP (N) 0 to the caulking shaft of the base holder assembly.	Bead XC8387***

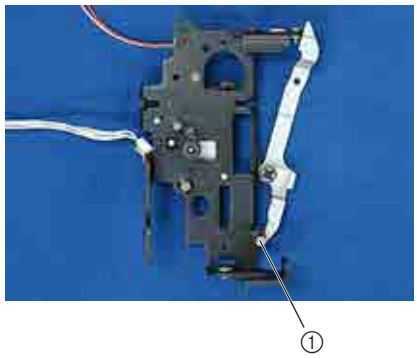


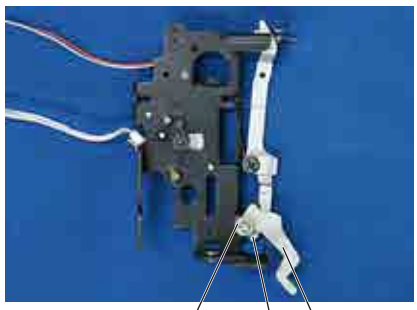


5 Presser foot lifter attachment

1. Apply a bead of EPNOC AP (N) 0 to the presser foot lifter shaft ① of the base holder assembly.
2. Attach the presser foot lifter ② to the shaft ①.
3. Attach the retaining ring (E4).
4. Apply a bead of EPNOC AP (N) 0 to the cam face ③ of the pressure foot lifter ②.

Apply EPNOC AP (N) 0 to the presser foot lifter attachment shaft of the base holder assembly.	Bead XC8387***
Apply EPNOC AP (N) 0 to the cam face of the pressure foot lifter.	Bead XC8387***





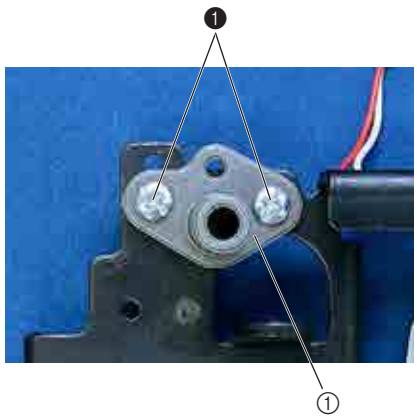
6 Shaft bushing attachment

1. Attach the shaft bushing ② to the base holder assembly ① with the 2 screws ❶.

***Key point**

- Tighten the 2 screws ❶ in the following order: temporarily tighten the left screw, tighten the right screw, and then tighten the left screw.

❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

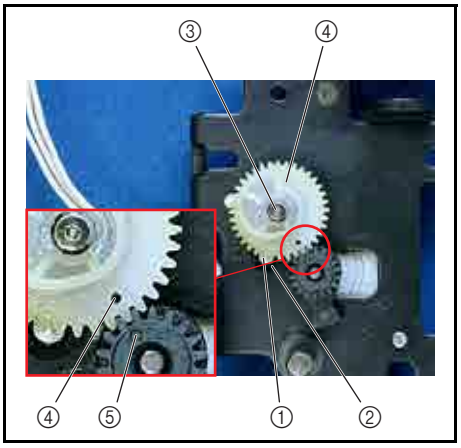


Assembly

7 Z zigzag cam attachment

1. Attach the rubber ② to the shaft ① of the base holder assembly.
2. Apply a bead of EPNOC AP (N) 0 to the Z zigzag cam shaft ③ of the base holder assembly.
3. Attach the Z zigzag cam ④ to the shaft ③.

   ***Key point**
   - Align the mark on the Z zigzag cam ④ with the mark on the Z pulse motor ⑤.
4. Attach the retaining ring (E3).
5. Apply a light covering of EPNOC AP (N) 0 to the gear of the Z zigzag cam ④ and the circumference of the cam.



Start movie clip (CD-ROM version only)

Apply EPNOC AP (N) 0 to the Z zigzag cam shaft of the base holder assembly	Bead XC8387***
Apply EPNOC AP (N) 0 to the gear of the Z zigzag cam and the circumference of the cam.	Light covering XC8387***

8 Z zigzag lever assembly attachment

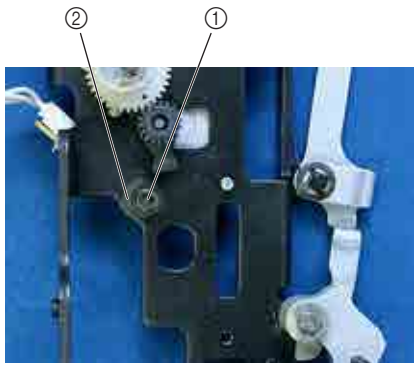
1. Attach the polyester slider ② to the Z zigzag lever shaft ① of the base holder assembly.
2. Apply a bead of EPNOC AP (N) 0 to the Z zigzag lever shaft ① of the base holder assembly.
3. Attach the Z zigzag lever assembly ③, and then attach the retaining ring (E4).

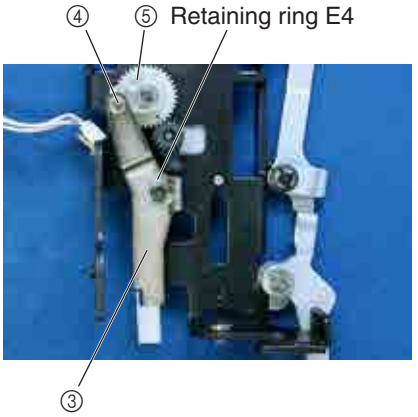
***Key point**

- Place the caulking shaft ④ on the left side of the Z-zigzag cam ⑤.

Start movie clip (CD-ROM version only)

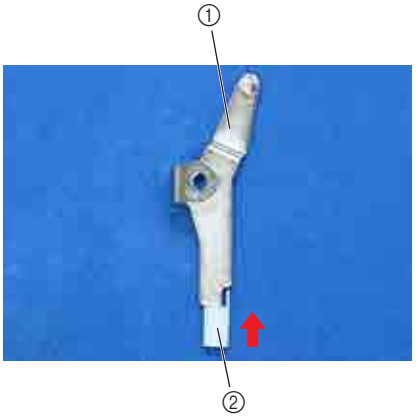
Apply EPNOC AP (N) 0 to the Z zigzag lever shaft of the base holder assembly.	Bead XC8387***





8-1 Z zigzag lever ASSY assembly

1. Attach the Z zigzag cap ② to the Z zigzag lever ①.



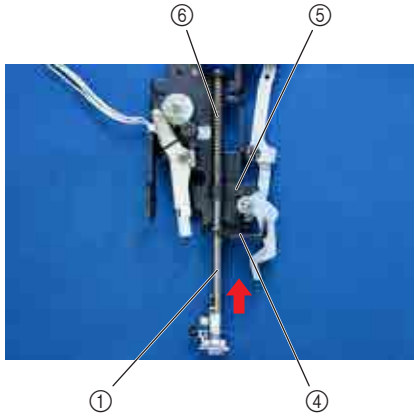
9 Presser bar attachment

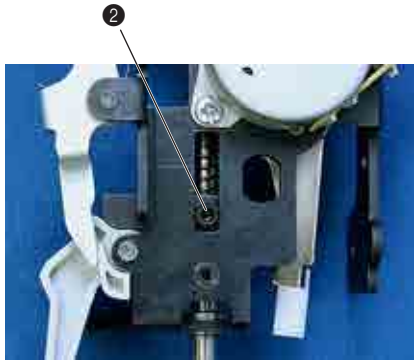
1. Attach the presser feed holder assembly ② to the presser bar ① with the screw ❶.
2. Attach the J foot ③.
3. Apply a light covering of OILER to the circumference of the presser bar ① (upper 20 mm).
4. Insert the lower end of the presser bar ① into the base holder ④, and then attach the presser bar ①, presser bar clamp ⑤, and spring ⑥ in this order to the base holder ④.
5. Temporarily tighten the screw ❷ to the presser bar clamp ⑤.

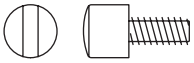
***Key point**

- Tighten after performing "4 - 13 Presser bar height and parallel adjustment".
- Adjust the distance from the base holder bottom face to the tip of the presser bar ① to approximately 50 mm.

Apply OILER to the circumference of the presser bar (upper 20 mm).	**Light covering** XZ0206***





❶		Screw 3.57 Color; Silver	Torque 1.18 – 1.57 N·m
❷		Set Screw, Socket (CP) M5X8 Color; Black	Torque Hand tighten

10 Needle holder assembly attachment

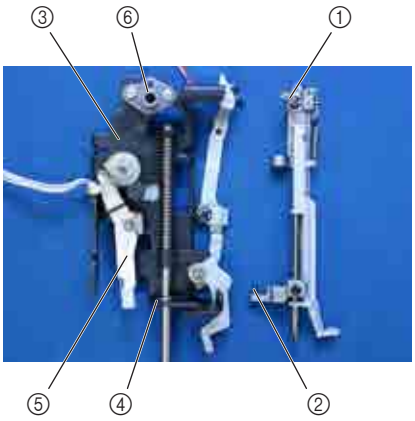
1. Apply 1 or 2 drops of FBK OIL RO 100 to the circumference of needle holder shaft A ① of the needle holder assembly.
2. Apply 1 or 2 drops of MOLYKOTE M DISPERSIOIN to the circumference of the needle holder assembly ②.
3. Insert the needle holder assembly between the H holder attachment section ④ of the base holder ③ and the Z zigzag lever ⑤, and then attach the needle holder shaft A ① to the shaft bushing ⑥.
4. Insert the shaft of the needle holder assembly into the small hole on the needle holder block ⑦, and then insert the shaft of the shaft assembly ⑧ into the hole on the needle holder block ⑦ and the hole on the base holder ③. Secure them with the screw ❶.
5. Attach springs S02 and S03 .

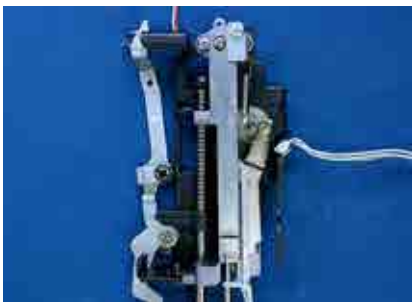
***Key point**

- Set spring S03 with the longer hook down.

Start movie clip (CD-ROM version only)

Apply FBK OIL RO 100 to the circumference of needle holder shaft A of the needle holder assembly.	**1 - 2 drops** XC8388***
Apply MOLYKOTE M DISPERSIOIN to the circumference of the needle holder assembly.	**1 -2 drops** XC8386***





❶	Screw□ 3X10□ Color; Black	Torque 0.59 – 0.78 N·m
S02	14.3, ϕ5 A decided hook form is the same.	SPRING-Z XC2748***
S03	24.5	SPRING XC2429***

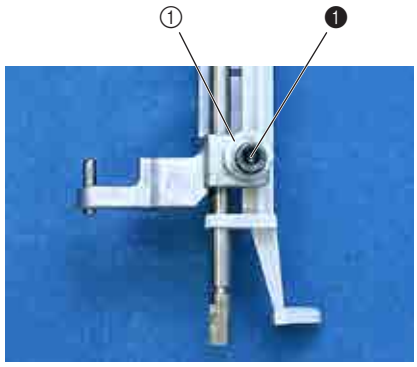
Assembly

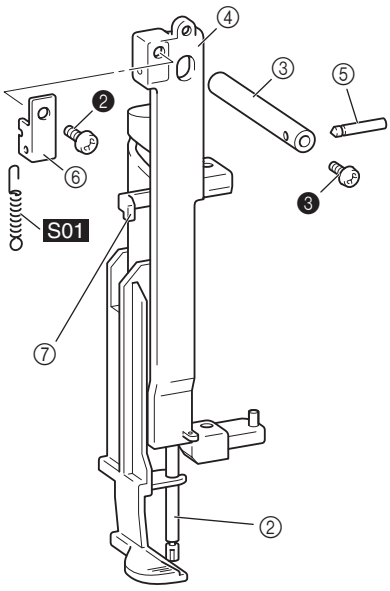
10-1 Needle holder ASSY assembly

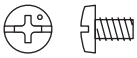
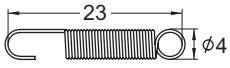
1. Attach the zigzag adjusting nut ① with the screw ❶.
2. Apply OILER to the circumference at the top of the needle holder ②.
3. Pass the needle holder shaft A ③ from the end with the hole through the rear of the needle holder assembly ④, and then pass the shaft ⑤ through the hole on the needle holder assembly ④ and the hole on needle holder shaft A ③ so that the narrow end of the shaft is on the left side.
4. Insert the plate ⑥ into the groove on the shaft ⑤, and then attach them to the needle holder assembly ④ with the screw ❷.
5. Attach the screw ❸.
6. Attach spring S01 to the plate ⑥ and the needle thread slider ⑦.

Start movie clip (CD-ROM version only)

Apply OILER to the circumference at the top of the needle holder.	**1 - 2 drops** XZ0206***





❶		Bolt, Socket M3X10 Color; Black	Torque 0.78 – 1.18 N·m
❷		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N·m
❸		Screw, Bind M2X4 Color; Silver	Torque 0.29 – 0.49 N·m
S01			SPRING X50476***

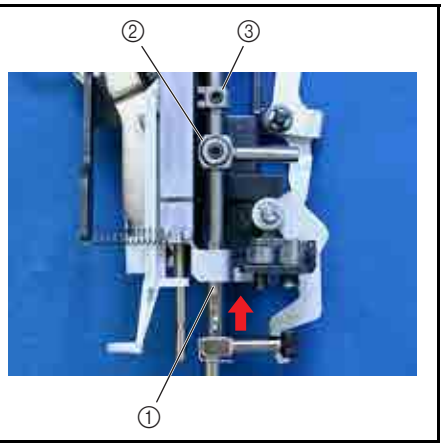
11 Needle bar assembly attachment

1. Insert the needle bar assembly ① from the bottom of the needle holder assembly, and then insert the needle bar block ② and the needle thread block ③ through the needle bar assembly and then through to the upper hole.

***Key point**

- Insert the needle bar block ② and the needle thread block ③ so that the shaft of the needle bar block ② is on the right side and the tab of the needle thread block ③ is on the left side.

Start movie clip (CD-ROM version only)

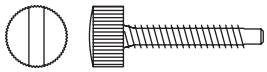


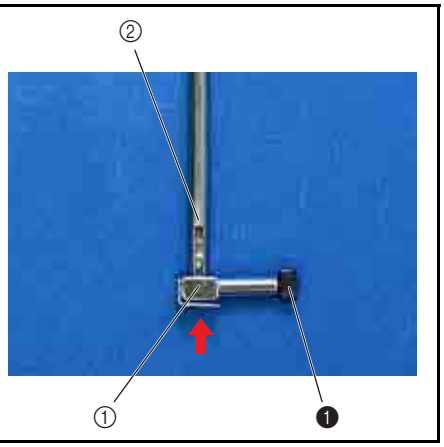
11-1 Needle bar ASSY assembly

1. Attach the presser feed holder assembly ① to the needle bar assembly ② with the screw ❶.

***Key point**

- The screw ❶ should be on the right side when the groove on the needle bar assembly ② faces the front.

❶		Needle Clamp Screw Color; Black	

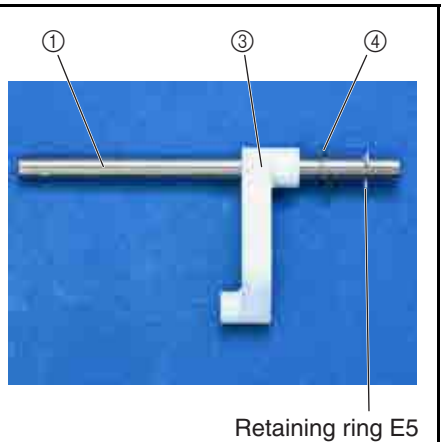


12 Thread take-up lever link attachment

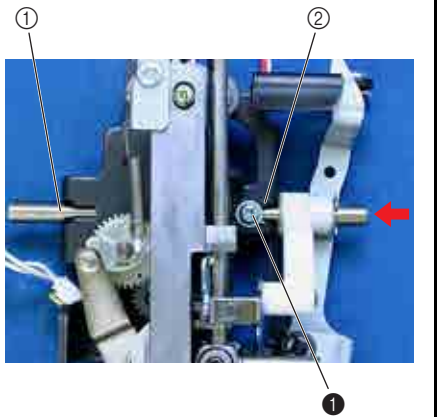
1. Insert the shaft ① into the base holder ②, and then align the screw ❶ with the trench on the base holder ②, and tighten it temporarily.
2. Attach the thread take-up lever link ③.
3. Apply a light covering of MOLYKOTE EM-30L to the circumference of the shaft within 10 mm of the retaining ring.
4. Insert the spring washer ④ into the shaft ①.
5. Attach the retaining ring (E5) to the groove on the shaft ①.

Start movie clip (CD-ROM version only)

Apply MOLYKOTE EM-30L to the circumference of the shaft within 10 mm of the retaining ring.	**Light covering** XC8385***



Retaining ring E5



❶		Screw, Pan (S/P washer) M3X8DB Color; Silver	Torque Hand tighten

Assembly

13 Thread take-up lever and needle bar crank attachment

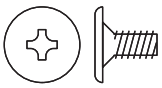
1. Apply a light covering of MOLYKOTE EM-30L to the thread take-up lever attachment section of the needle bar crank ①.
2. Attach the thread take-up lever ② to the needle bar crank ① with the screw ❶.
3. Apply a light covering of MOLYKOTE EM-30L to the shaft of the thread take-up lever ③.
4. Attach the thread take-up lever assembly ④ to the thread take-up lever link ⑤, and then attach the needle bar crank rod ⑥ to the needle bar crank ① and the needle bar block ⑦.

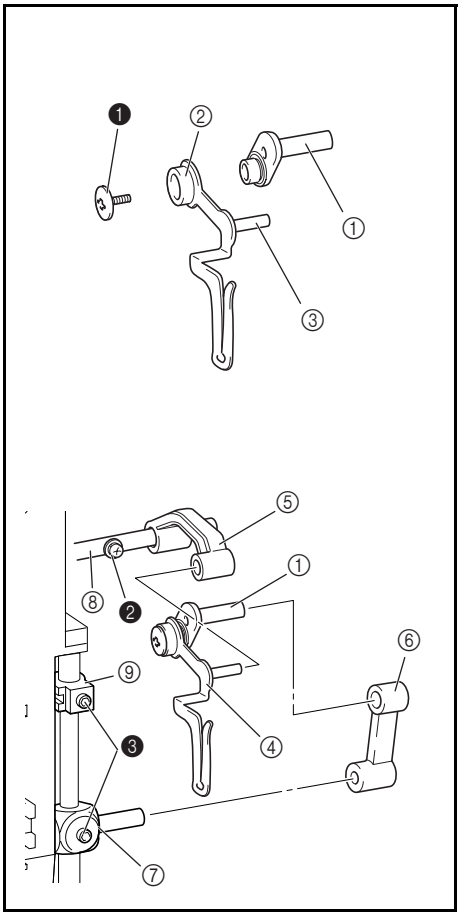
***Key point**

- Move the shaft ⑧ to the right, and then attach the thread take-up lever assembly ④.

5. Tighten the screw ❷.
6. Temporarily tighten the needle bar block ⑦ and the needle thread block ⑧ with the screw ❸.

Apply MOLYKOTE EM-30L to the thread take-up lever attachment section of the needle bar crank.	**Light covering** XC8385***
Apply MOLYKOTE EM-30L to the shaft of the thread take-up lever.	**Light covering** XC8385***

❶		Screw, Flat SM3.57-40X7 L Color; Black	Torque 1.18 – 1.57 N·m
❷		Screw, Pan (S/P washer) M3X8DB Color; Silver	Torque 0.59 – 0.78 N·m
❸		Set Screw, Socket (FT) M4X4 Color; Black	Torque Hand tighten



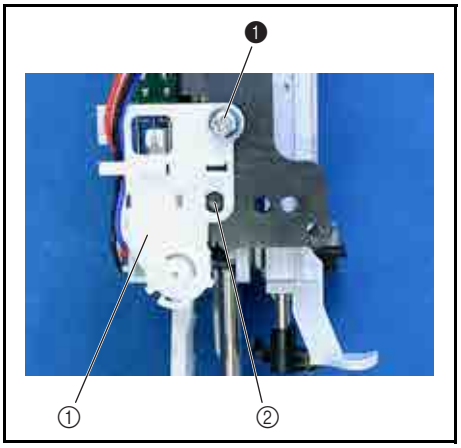
14 BH switch assembly attachment

1. Attach the BH switch assembly ① with the screw ❶.

NOTE

- Align the boss ② on the base holder with the hole on the BH switch assembly ①.

❶		Screw, Pan (S/P washer) M4X8DA Color; Silver	Torque 1.18 – 1.57 N·m



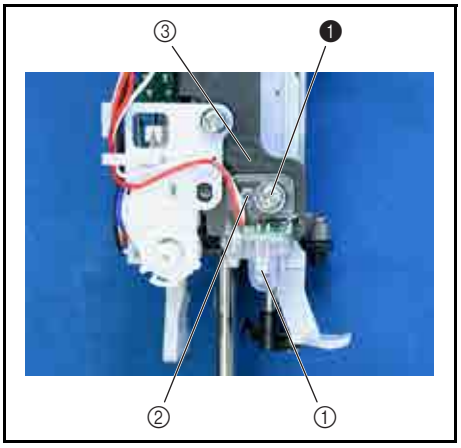
15 LED lamp left assembly

1. Attach the LED lamp L assembly ① with the screw ❶.

NOTE

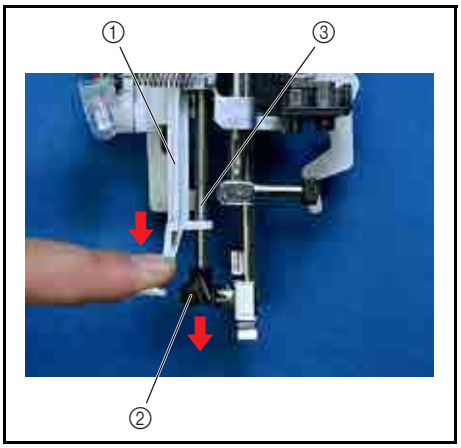
- Align the boss ② on the LED lamp L assembly ① with the hole on the base holder ③.

❶		Screw, Pan (S/P washer) M4X8DA Color; Silver	Torque 1.18 – 1.57 N·m



16 Threader hook attachment

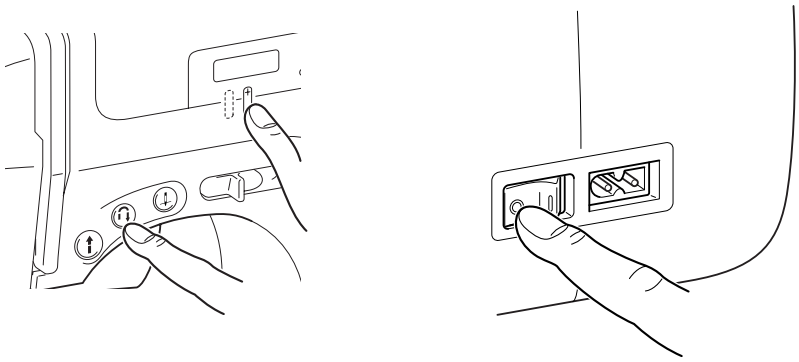
1. Pull the needle thread slider ① toward you, and then align the D-cut of the threader hook assembly ② with the D-cut of the needle thread shaft ③.



4 Adjustment

1. Starting in test mode

   • With the front cover in place press and while turning the power on; the buzzer will sound four times, and test mode will start.



U1 or U0

2. Mode selection

   • Press and select pattern number (mode).

3. Starting and stopping test mode

   • Press (If not , use foot controller)

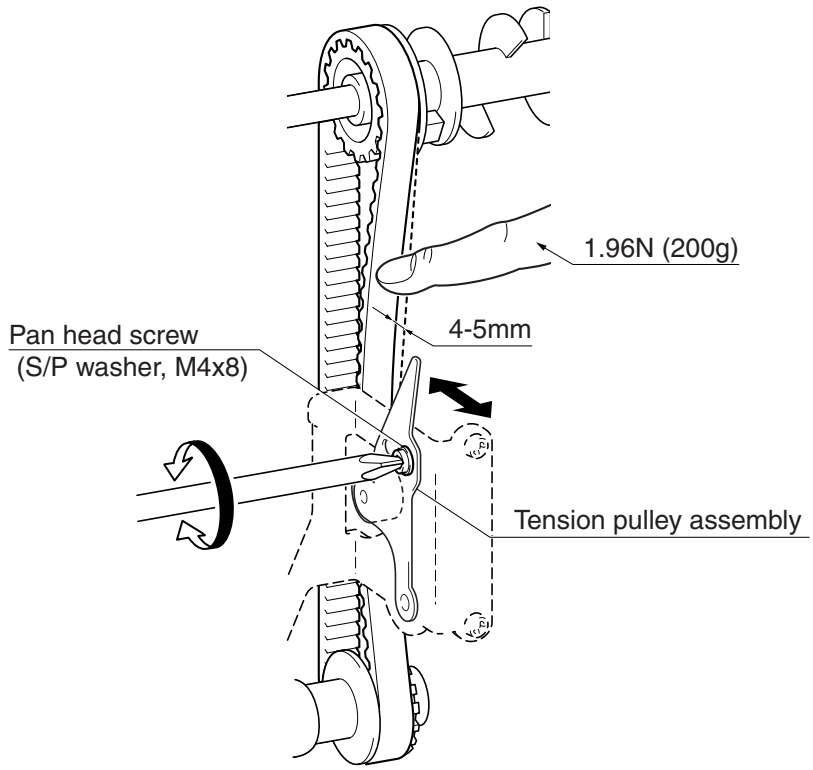
4. Test modes (used for adjustments)

Mode	Mode selection Screen number	Z (zigzag) operations	F (feed) operations	Operating speed
3 point needle drop	Press 2 times and select pattern number. 02	Switches left base line / center base line / right base line with each stitch *Pressing stops the base line from changing.	0 mm (none)	Any speed may be selected using the speed control key
Feed adjustment	Press 5 times and select pattern number. 05	100 stitches forward on the left base line 100 stitches reverse on the right baseline		Switches low / middle / high speed with each push of .

When the test mode will be changed the power off and the test mode will start again.

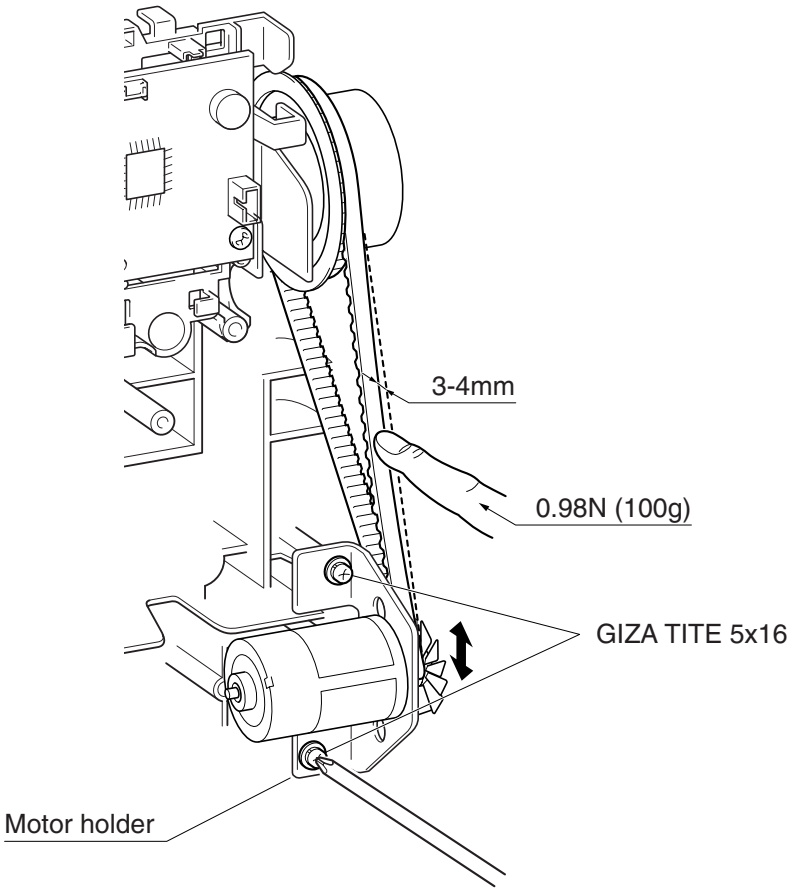
1. Loosen the pan (S/P washer) M4X8 screw on the tension pulley assembly.
2. With a force of 1.96 N (200 g) pushing on the center of the belt, adjust the tension pulley assembly position for a deflection of 4 - 5 mm.
3. Tighten the pan (S/P washer) M4X8 screw on the tension pulley assembly.

XC2277001	Push-pull gauge (3 N)



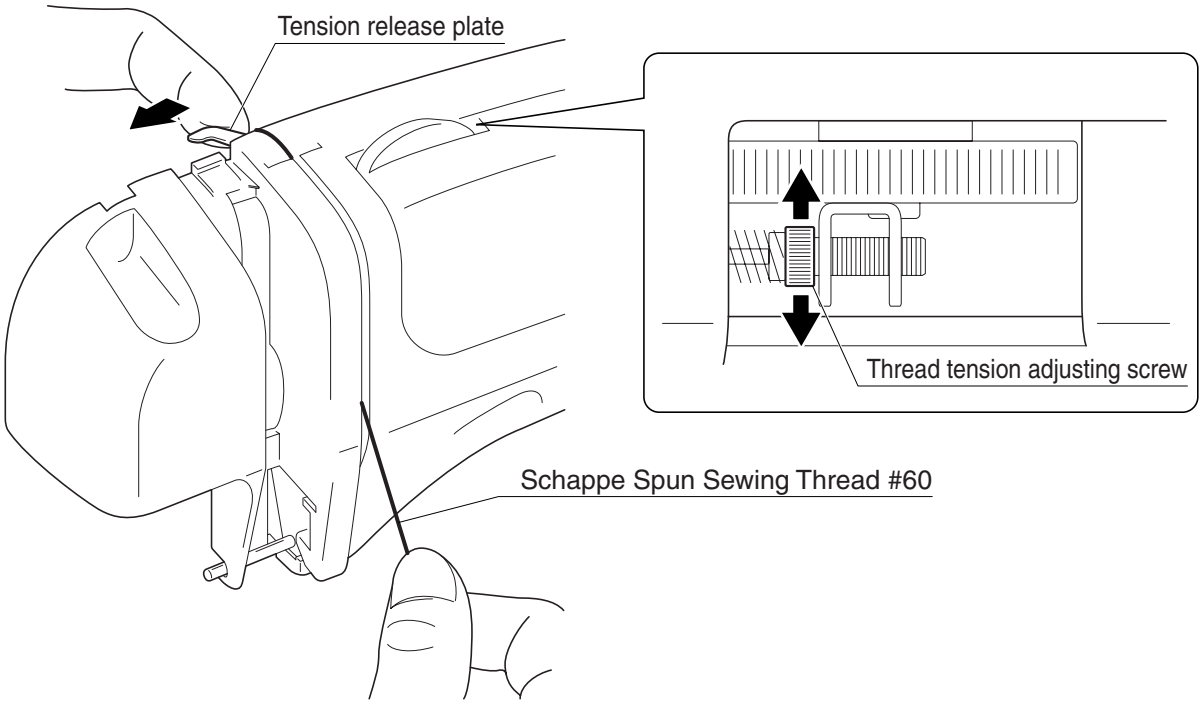
1. Loosen the giza tite 5 x 16 (two) in the motor holder.
2. With a force of 0.98 N (100 g) pushing on the center of the belt, adjust the motor pulley position for a deflection of 3 - 4 mm.
3. Tighten the giza tite 5 x 16 (two) in the motor holder.

XC2277001	Push-pull gauge (3 N)



1. Remove the front cover.
2. Remove the 2 screws, and then remove the thread guide A assembly.
3. Remove the 2 screws, and then remove the front panel and manual buttons A/B.
4. Attach the thread guide A assembly with the 2 screws.
5. Set the thread tension dial to [4].
6. Open the thread release plate (move to the right to open the tension disc), and then pass the Schappe Spun Sewing Thread #60 through the tension disc.
7. Pull the thread with a tension gauge, and adjust the thread tension adjusting screw depth for 0.372 - 0.421 N (38 - 43g).
8. Remove the 2 screws, and then remove the thread guide A assembly.
9. Attach the front panel and manual buttons A/B with the 2 screws.
10. Attach the thread guide A assembly with the 2 screws.

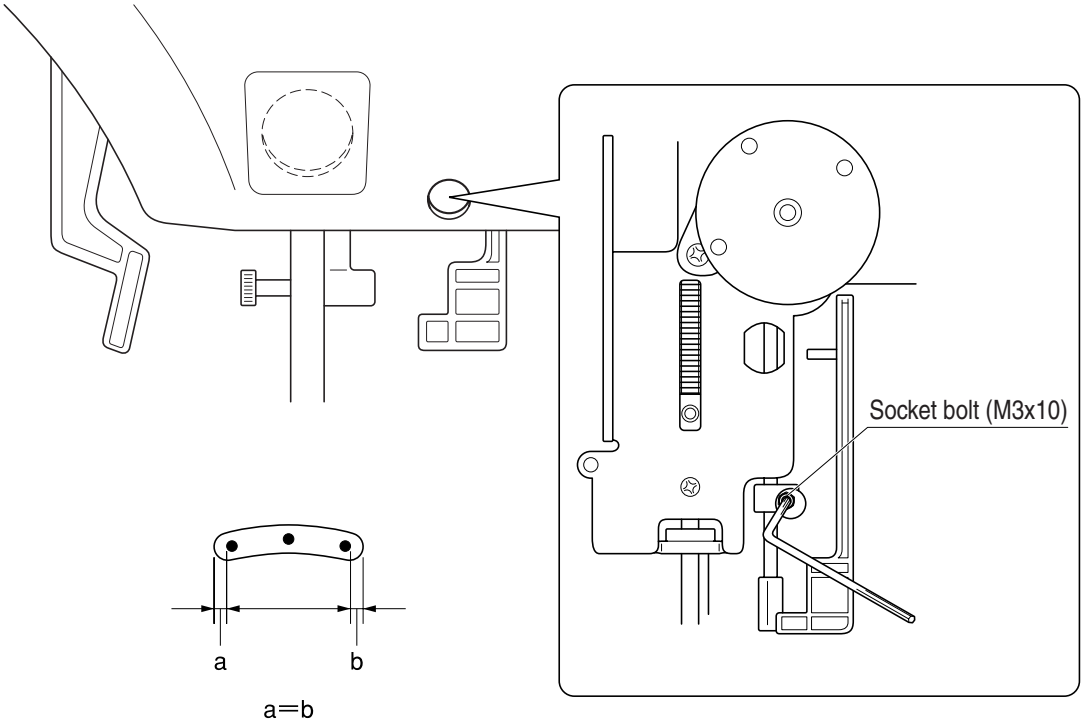
XA9154001	Tension gauge 50 (0.5 N)



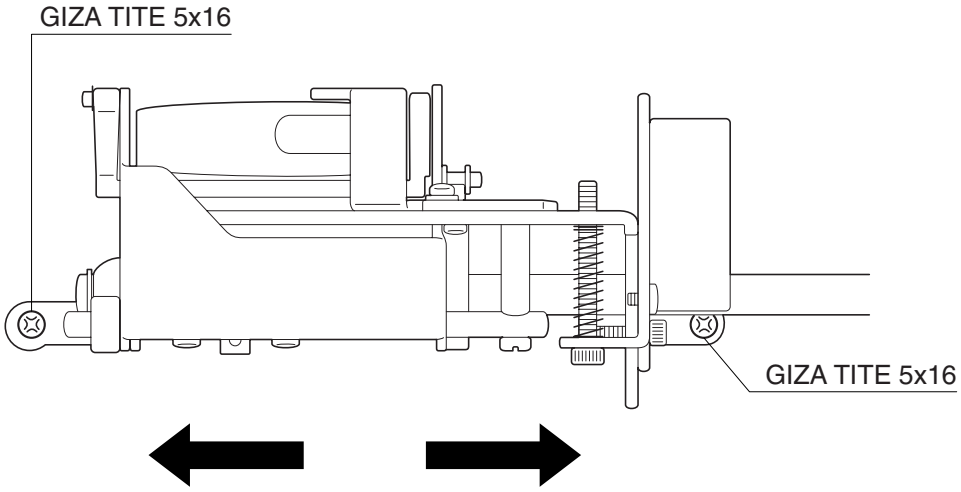
1. Attach the front cover.
2. Turn the power on while holding down the backstitching button and the selecting button (right). (The buzzer must sound four times.)
3. Select pattern number [02].
4. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
5. Loosen the zigzag adjusting nut screw (3X10).
6. Adjust the zigzag adjusting nut so that the left base line / center base line / right base needle drop is uniform to the left and right of the needle plate A needle hole.
7. Tighten the zigzag adjusting nut screw (3X10).

***Key point**

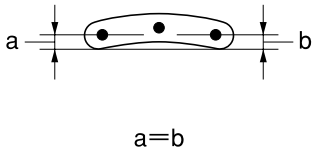
- Refer to the next page to adjust the needle drop position when it cannot be adjusted correctly using the above procedure.



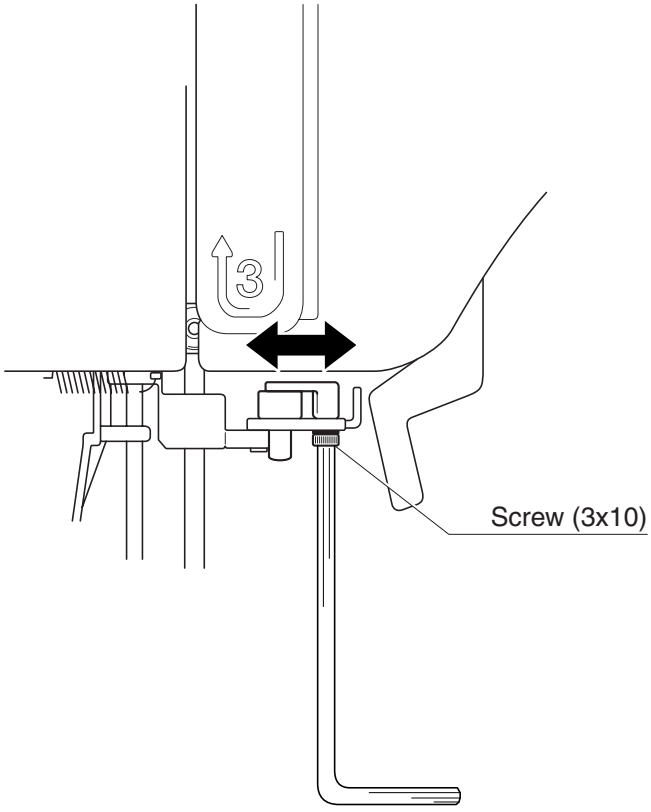
1. Attach the front cover temporarily.
2. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
3. Select pattern number [02].
4. Press the [REV] key four times to select the left base line.
5. Turn the pulley manually so that the top of the needle passes through the needle hole.
6. Loosen GIZA TITE 5X16 (2 locations).
7. Move the rotary hook unit right and left to adjust the position so that the needle top is aligned with the V-groove in the needle hole.
8. Tighten GIZA TITE 5X16 (2 locations).



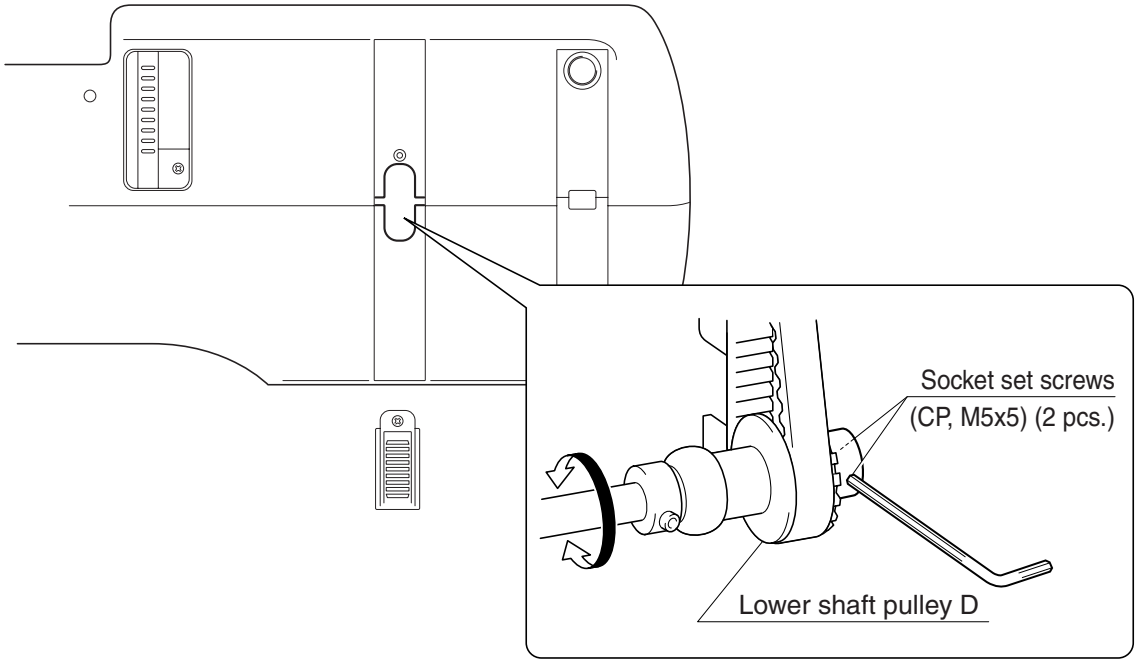
1. Attach the front cover.
2. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
3. Loosen the screw (3 x 10).
4. Adjust the needle holder shaft block to the left or right so that the left base line / right base line needle drop is uniform forward and back with respect to the needle plate A hole.
5. Tighten the screw (3X10).

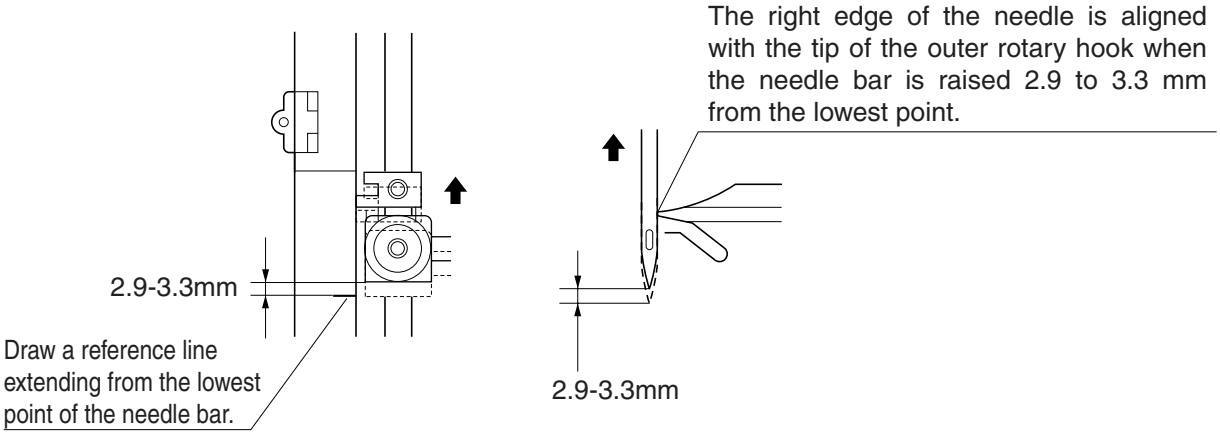


a=b



1. Attach the front cover.
2. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
3. Select pattern number [02].
4. Press the [REV] key four times to select the left base line.
5. Attach the J foot and lower the presser hoot lifter.
6. Turn the pulley by hand, moving the needle bar to its lowest point.
7. Remove the base cover.
8. Loosen the set screws (socket (CP) M5 x 5) (two) on lower shaft pulley D.
9. Rotate the outer rotary hook manually so that the right edge of the needle is aligned with the tip of the outer rotary hook when the needle bar is raised 2.9 to 3.3 mm from the reference line of the lowest point.
10. Fully tighten the set screws (socket (CP) M5 x 5) on lower shaft pulley D.
11. Attach the base cover.

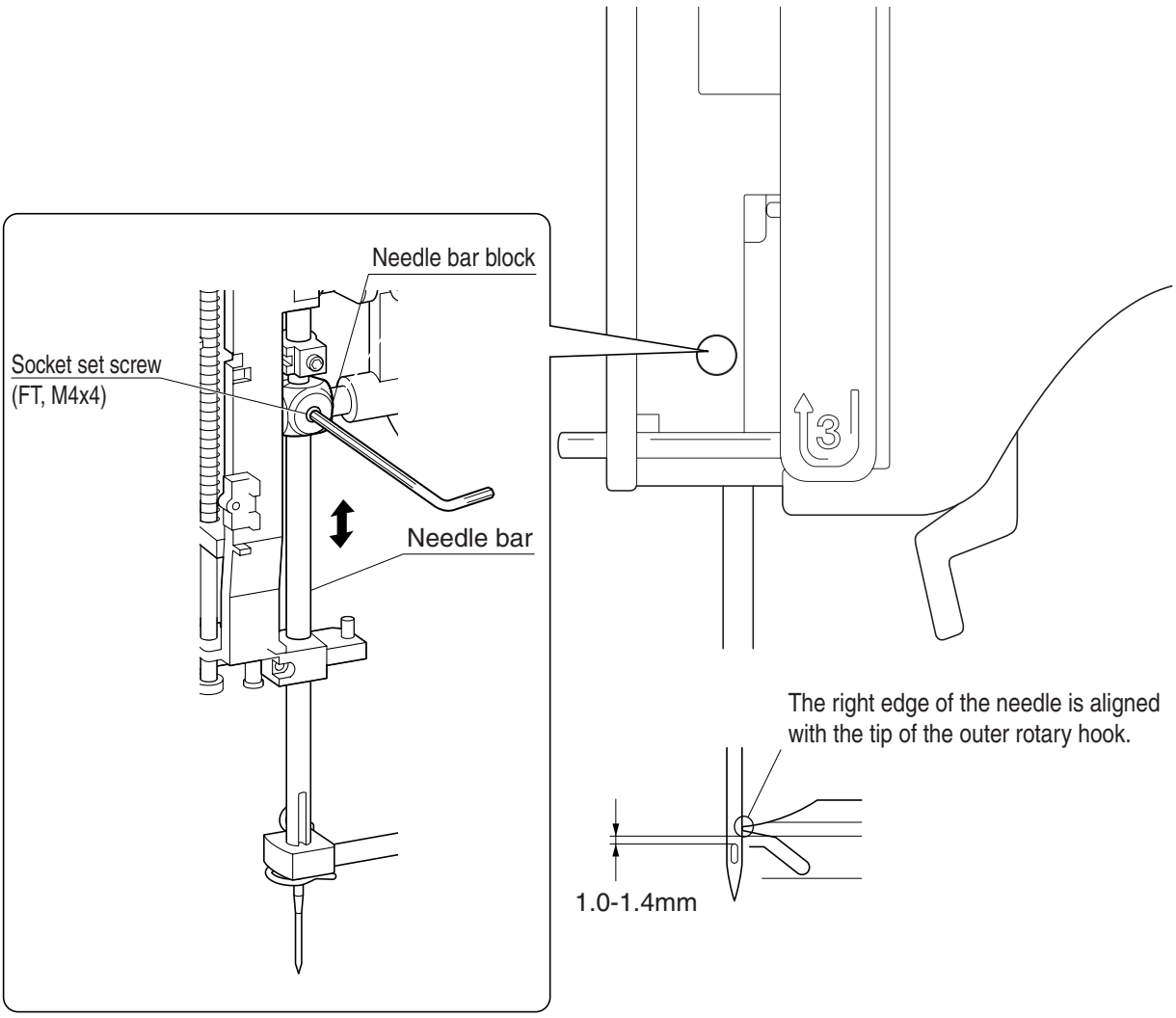




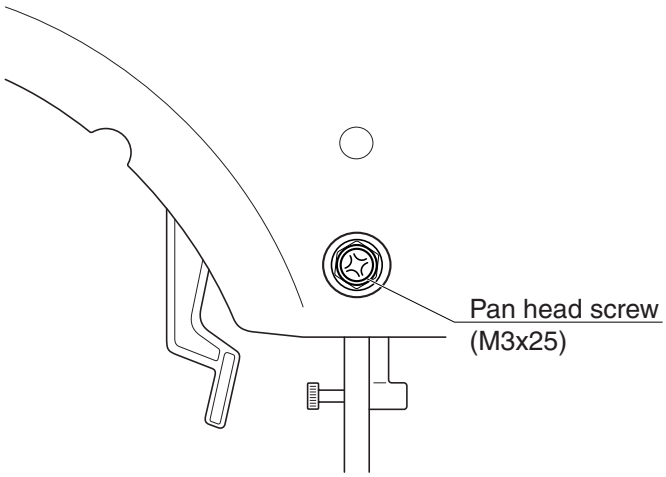
1. Attach the front cover.
2. Remove needle plate B.
3. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
4. Select pattern number [02].
5. Press the [REV] key four times to select the left base line.
6. Attach the J foot and lower the presser hoot lifter.
7. Turn the pulley by hand until the right edge of the needle and the tip of the outer rotary hook meet.
8. Loosen the set screw (socket (CP) M4 x 4) in the needle bar block.
9. Adjust the height of the needle bar for 1.0 - 1.4 mm between the top of the needle hole and lower edge of the outer rotary hook tip.

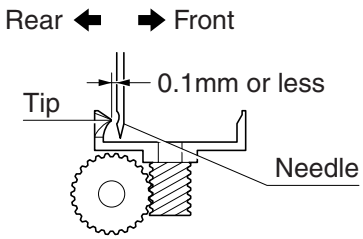
   NOTE
   - Needle hole turned forward.

10. Tighten the socket set screw (FT, M4X4) to secure the needle bar block.
11. Perform "Adjust the needle thread block ".



1. Attach the front cover.
2. Remove the label.
3. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
4. Select pattern number [02].
5. Remove screws M4 (two), and remove needle plate A (1).
6. Loosen screw, pan M3 x 25
7. Hand turn the pulley until the right edge of the needle and the outer rotary hook tip meet.
8. Adjust the gap between the needle and the outer rotary hook tip (front and back) to 0.1 mm or less using the tightening depth of the adjusting screw.
9. Install and fully tighten screw, pan M3 x 25.





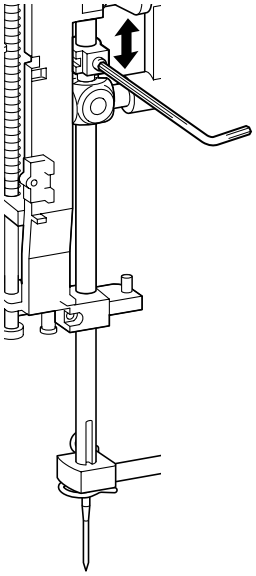
1. Attach a needle.
2. Turn the pulley by hand, and set the needle bar at the highest point.
3. Loosen the set screw (socket FT 4 x 4).
4. Adjust the height of the needle thread block so that the threading hook passes through the needle hole, and secure the needle thread block with the socket set screw (FT, M4X4).

***Key point**

- Slant the needle thread block slightly to the left (approximately 1 degree) and attach it.
- Adjust so that the upper edge of the threading hook and the upper edge of the needle hole are at the same height.

NOTE

- If the needle thread block is slanted to far to the left, the hook will not operate, and threading cannot be done (Fig. 1).
- If the needle thread block is slanted too far to the right, the needle bar supporter assy. and the needle thread block will come into contact and be damaged (Fig. 2).



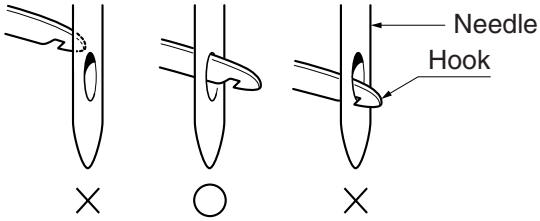


Fig. 1

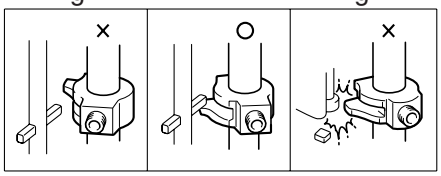
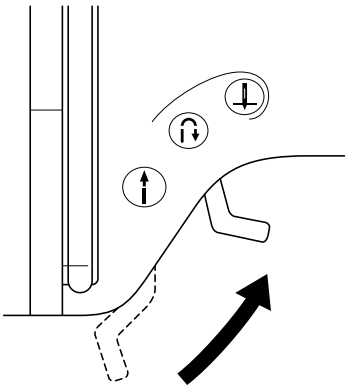


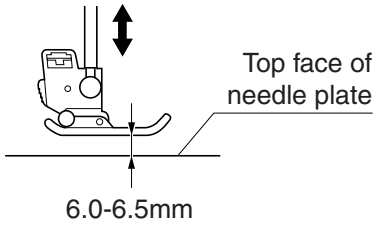
Fig. 2

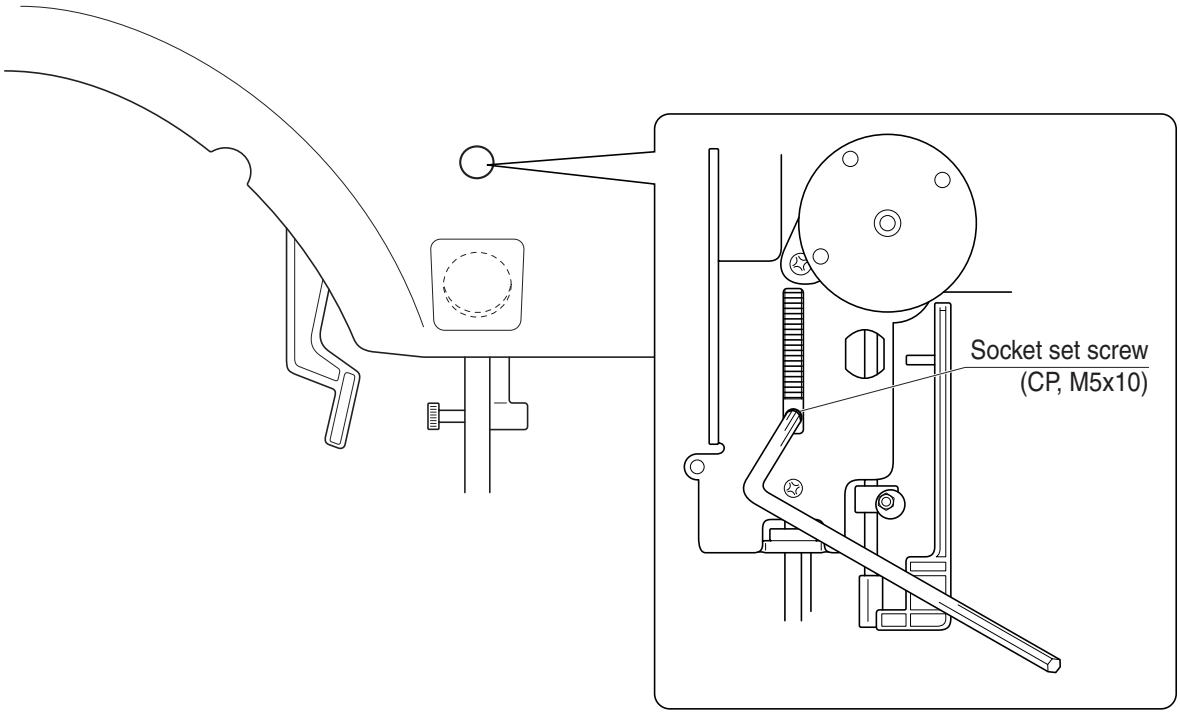
1. Attach the J foot.
2. Raise the presser foot lifter.
3. Turn the pulley by hand, and lower the feed dog below needle plate A.
4. Loosen the set screw (CP) M5 x 10 in the presser bar clamp assy.
5. Adjust the height of the presser bar so that there is 6.0 - 6.5 mm between the top of needle plate A and the bottom of the presser foot.

NOTE

- Adjust the presser bar so that the needle plate feed dog hole and the presser are parallel (to prevent slanting during serging and damage to the needle).

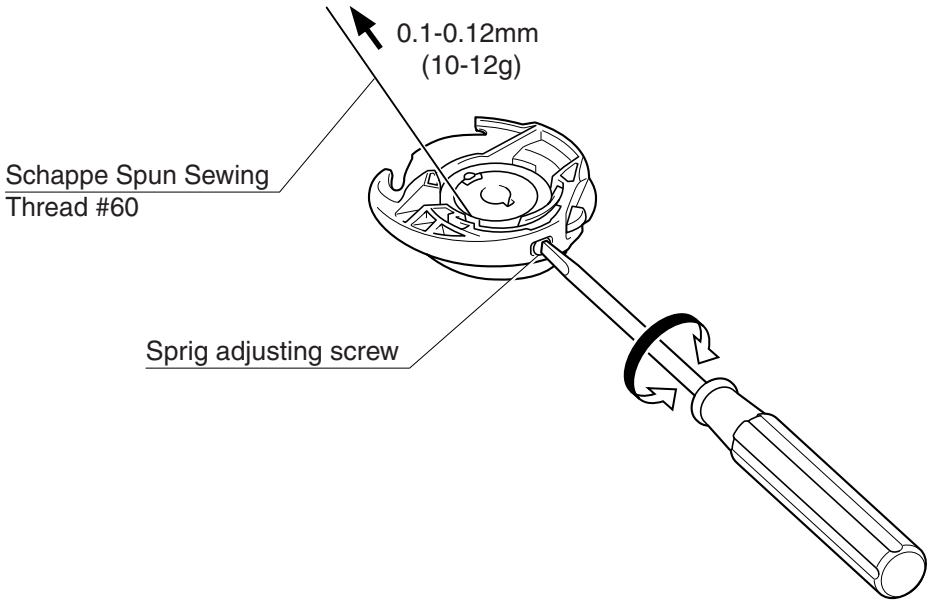






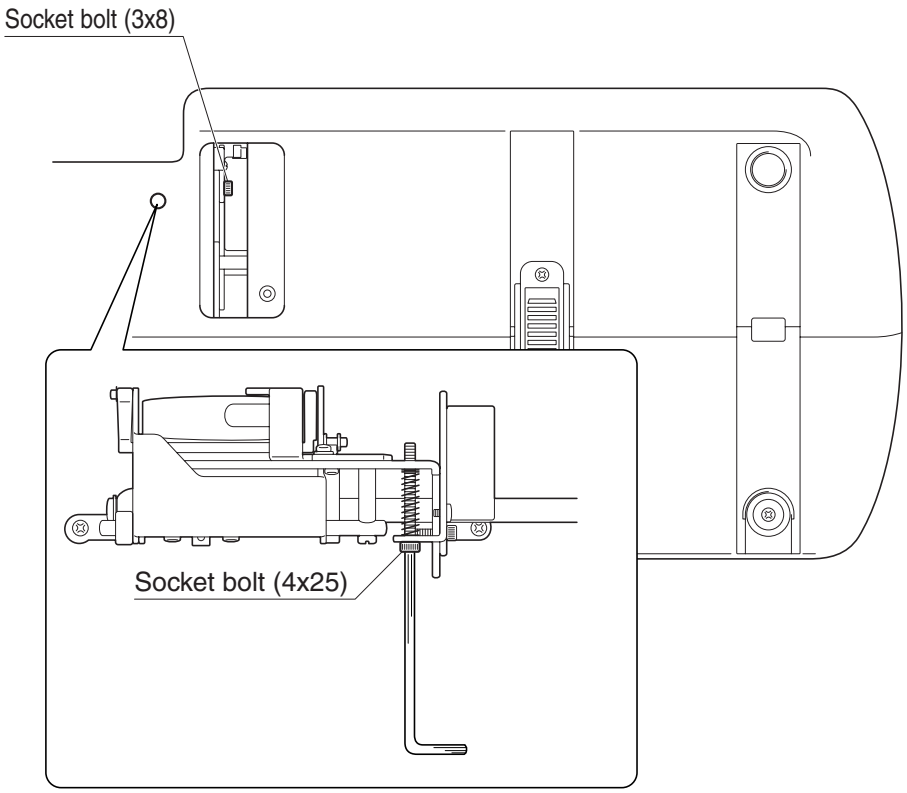
1. Set a bobbin (wound with Schappe Spun Sewing Thread #60) in the inner rotary hook and thread.
2. Pull the thread with a tension gauge, and adjust the tension adjusting screw so that it is 0.1 - 0.12 N (10 - 12 g).

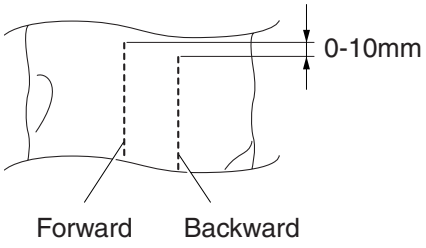
XA9153001	Tension gauge 30 (0.3 N)



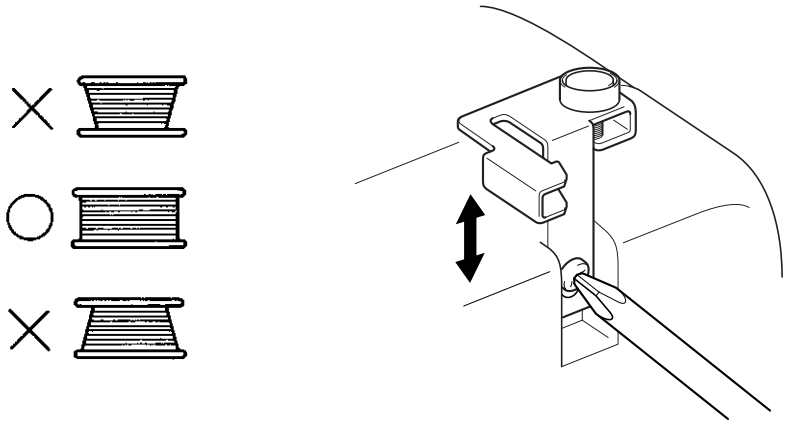
1. Attach the front cover.
2. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
3. Select pattern number [05] to enter "Feed forward and backward mode."
4. Press [Start/Stop] to run the machine in "Feed forward and backward mode," checking the forward and backward feed length.
5. Remove base cover A.
6. Loosen the FPM holder assy. screw (3 x 8)
7. Adjust the forward and reverse feed using the FPM holder assy. screw (4 x 25).

   ***Key point**
   - When a material of two layers of broadcloth with paper in between is given 100 stitches forward and reverse ("Feed forward and reverse" mode), the forward side should be 0 - 10 mm longer than the reverse side.
   - Tightening the screw (4 x 25) ® shortens the reverse side.
   - Loosening the screw (4 x 25) ® lengthens the reverse side.
8. Attach base cover A.





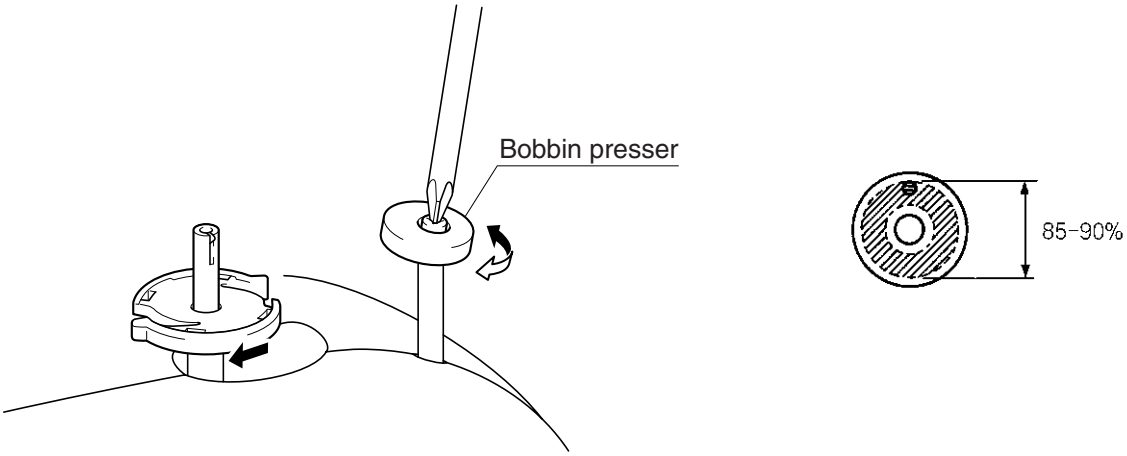
1. Move the bobbin winder tension assy. up and down to adjust uneven bobbin winding.



2. Turn the bobbin presser left and right, and adjust the winding quantity

***Key point**

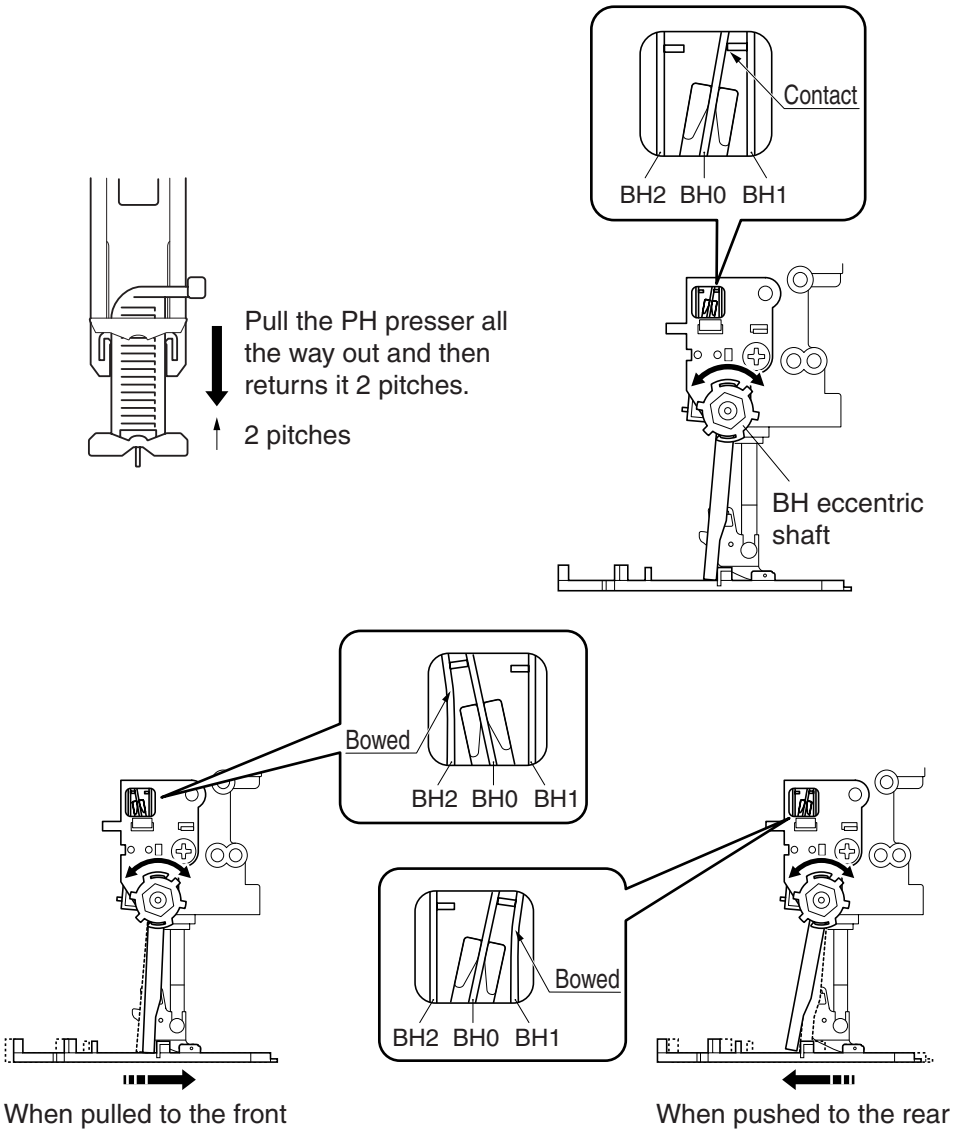
- The target for the bobbin winding quantity is filling 80 - 90% of the diameter..



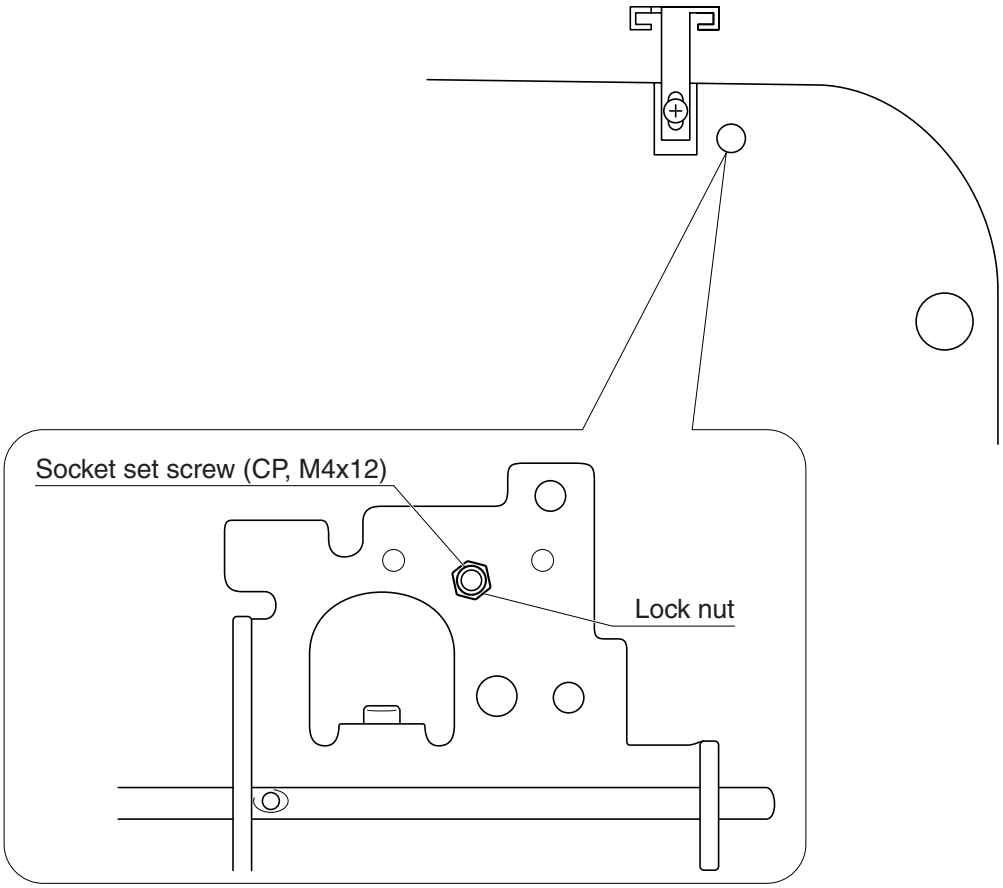
1. Raise the presser foot lifter.
2. Set the BH presser two marks smaller than the maximum length.
3. Attach the BH presser foot.
4. Lower the presser foot lifter.
5. Lower the BH lever, and set to BH presser foot.
6. Rotate the BH eccentric shaft so that BH0 comes into contact with BH1.

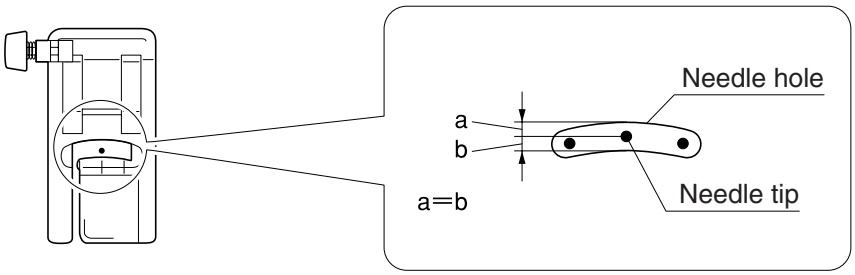
***Key point**

- With the presser foot lifter raised, pull the BH presser foot forward as much as possible, and check that BH0 comes into contact with BH2 and that BH2 has some slack.
- With the presser foot lifter raised, push the BH presser foot back as much as possible, and check that BH0 comes into contact with BH1 and that BH1 has some slack.



1. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
2. Loosen the locknut.
3. Adjust the needle tip to the front/back center position of the needle hole using the set screw (socket (CP) M4X12).
4. Tighten the lock nut.

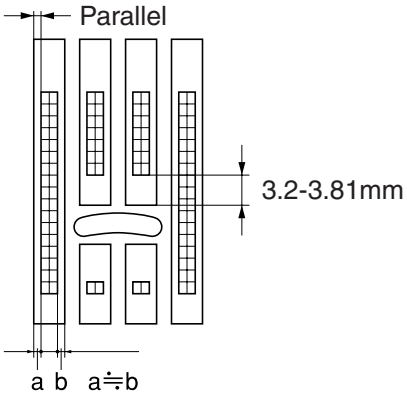




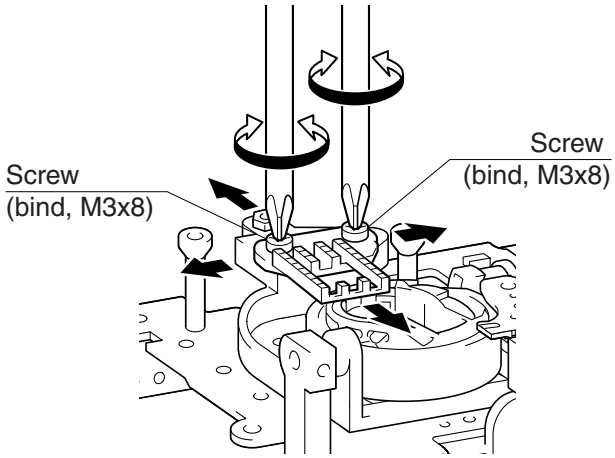
1. Hold down the backstitching button and the selecting button (right), and turn the power on (the buzzer must sound four times).
2. Select pattern number [07].
3. Remove needle plate A.
4. Press the [REV] key twice to set the feed length to 0 mm. (Check that the mark on the feed adjusting gear is aligned with that on the F pulse motor gear.)
5. Loosen the screw (bind 3 x 8), temporarily install needle plate A, and adjust the forward/reverse and left/right positions of the feed dog.

***Key point**

- Adjust the gap between the forward edge of the feed dog middle tooth and feed plate A front to back to 3.2 - 3.8 mm.
- Adjust the left and right gaps between the feed dog and needle plate A to be approximately the same.
- Make sure that the feed dog and needle plate A are not at an angle to each other.



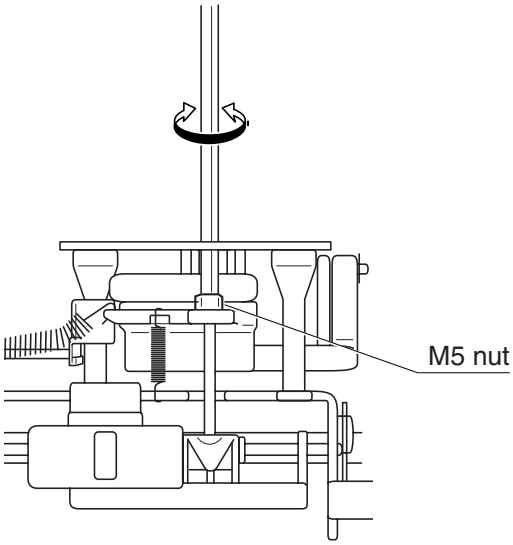
6. Tighten screw (bind 3X8).
7. Tighten screw M4 (two).

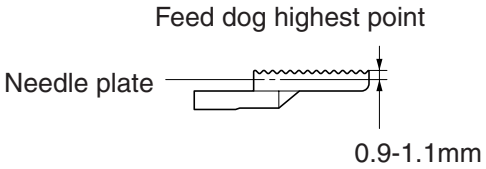


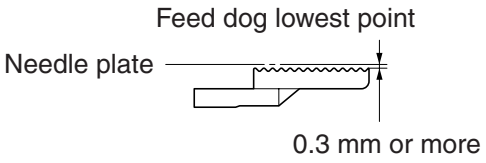
1. Turn lower the pulley, and bring the feed dog to its highest position.
2. Loosen the M5 nut.
3. Adjust the feed dog height so that it is 0.9 - 1.1 mm from the upper surface of needle plate A by the amount the vertical feed adjuster assembly is screwed in.
4. Tighten the M5 nut being careful that the vertical feed adjuster assembly does not turn.
5. With the feed dog in the lowest position, check that the feed dog is 0.3 mm or more below the upper surface of needle plate.

NOTE

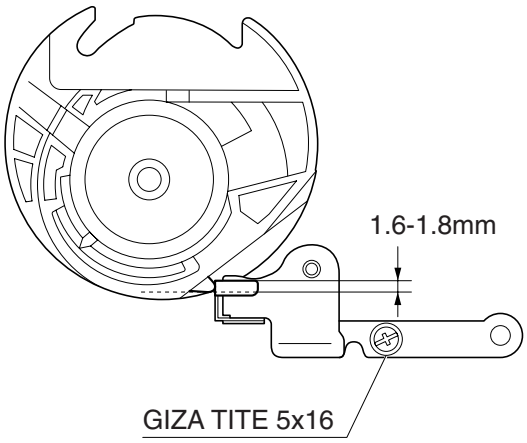
- When the feed dog is too high, problems such as abnormal noise, bad feed quantities and the cloth not being fed arise.
- When the feed dog is too low, problems such as bad feed quantities and the cloth not being fed arise.



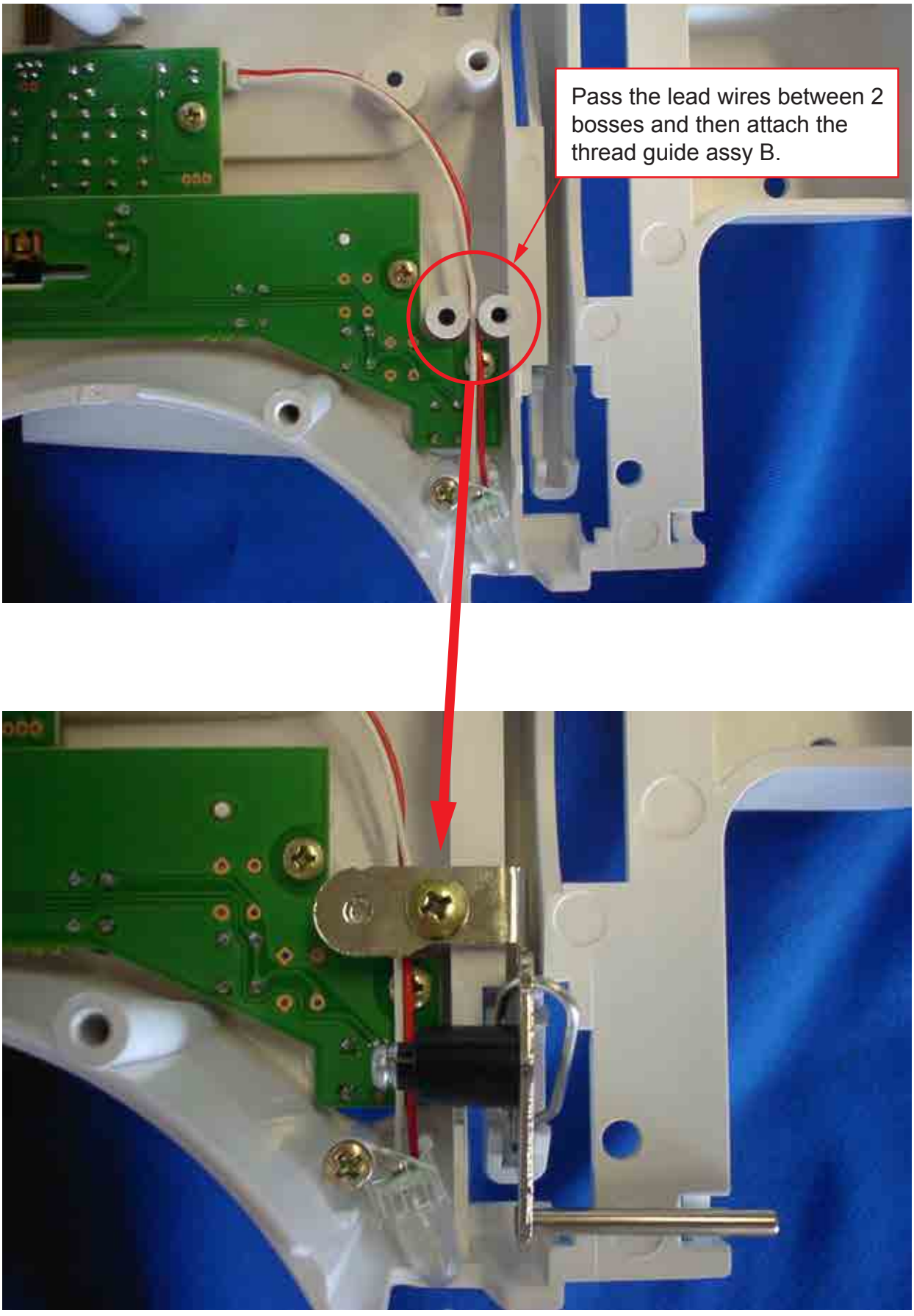


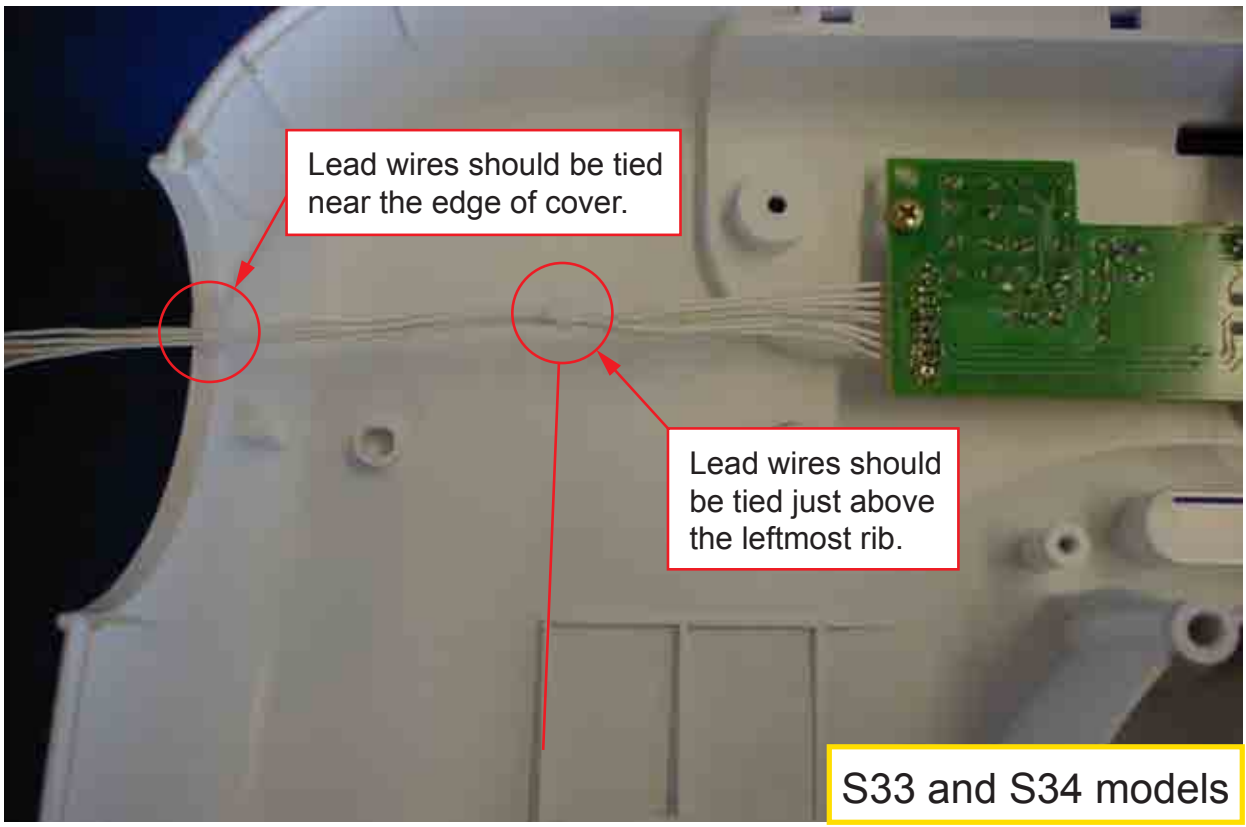


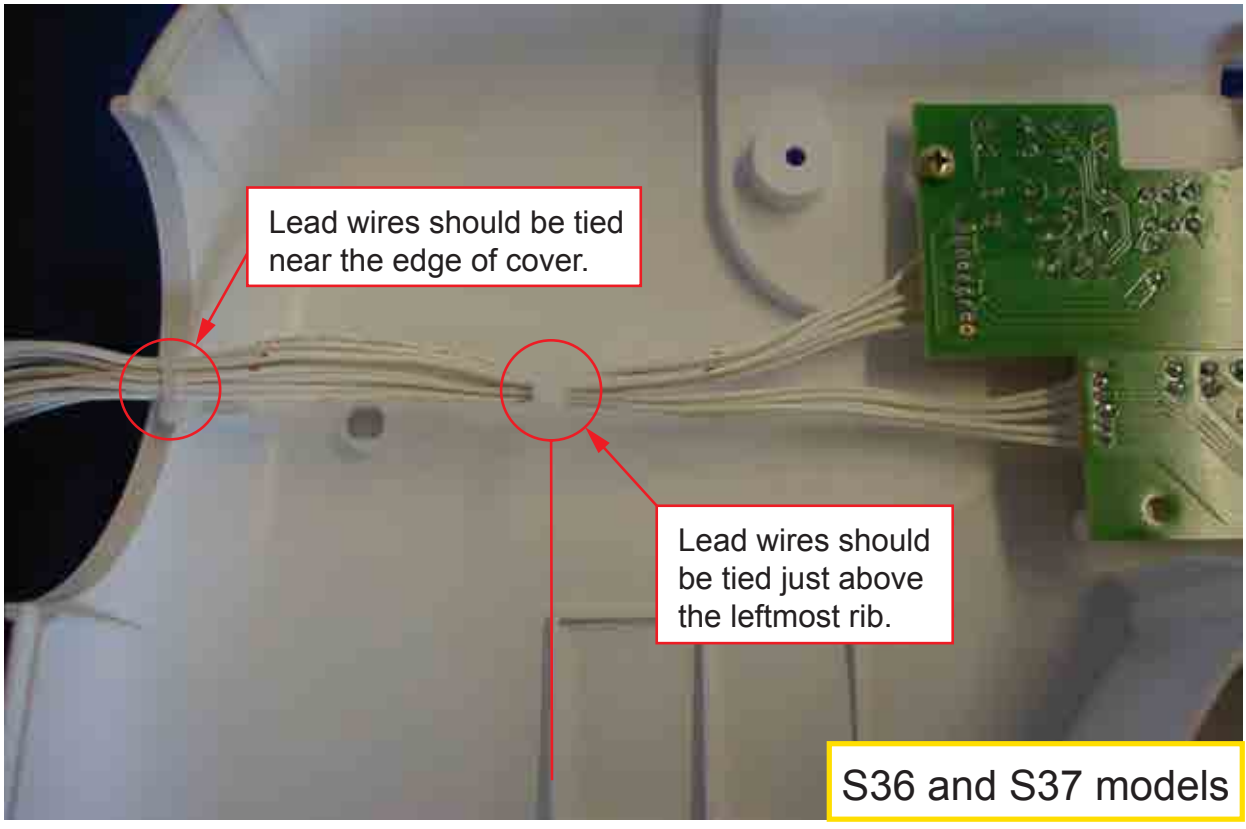
1. Set the inner rotary hook in the outer rotary hook.
2. Loosen screw (bind 3X6).
3. Adjust the inner rotary hook bracket assy. attachment position so that contact between the inner rotary bracket assy. and inner rotary hook is 1.6 - 1.8 mm, and fully tighten screw (bind 3X6).

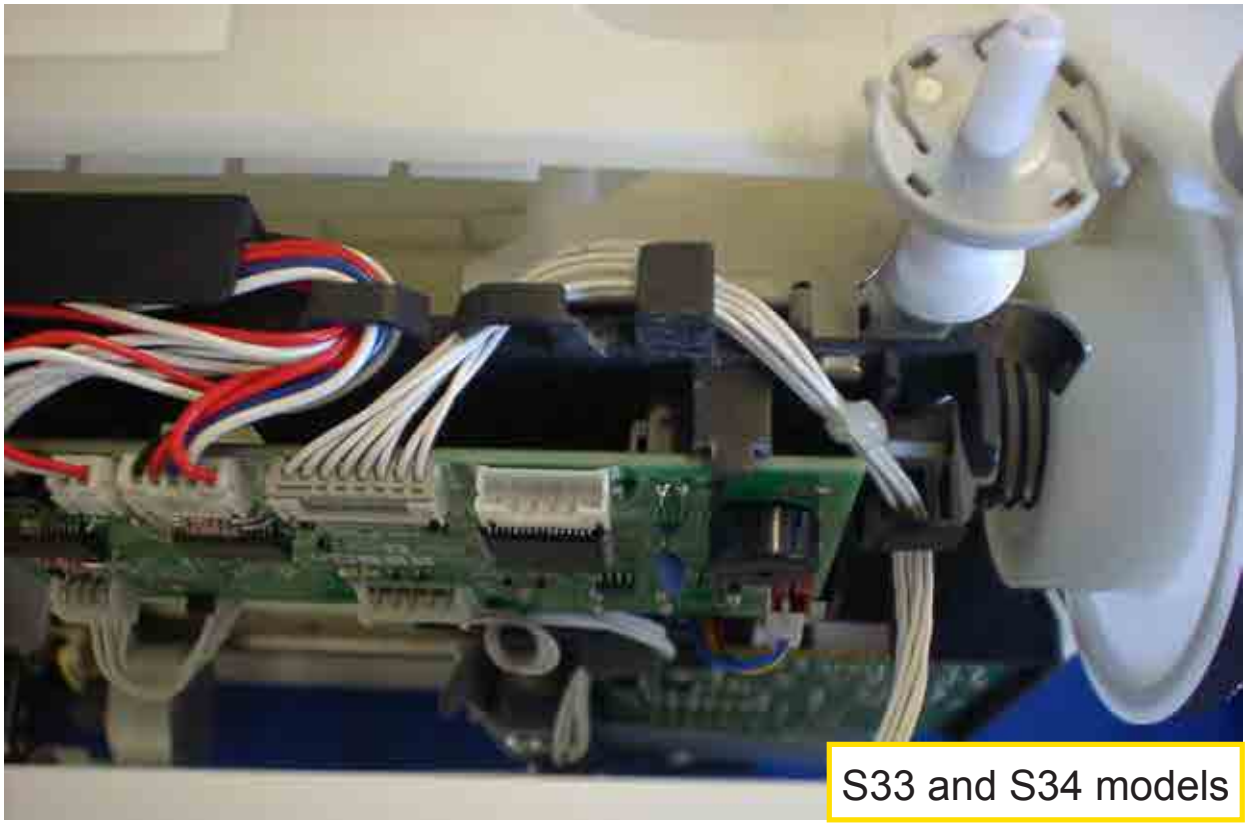


5 Special Instructions of Wiring



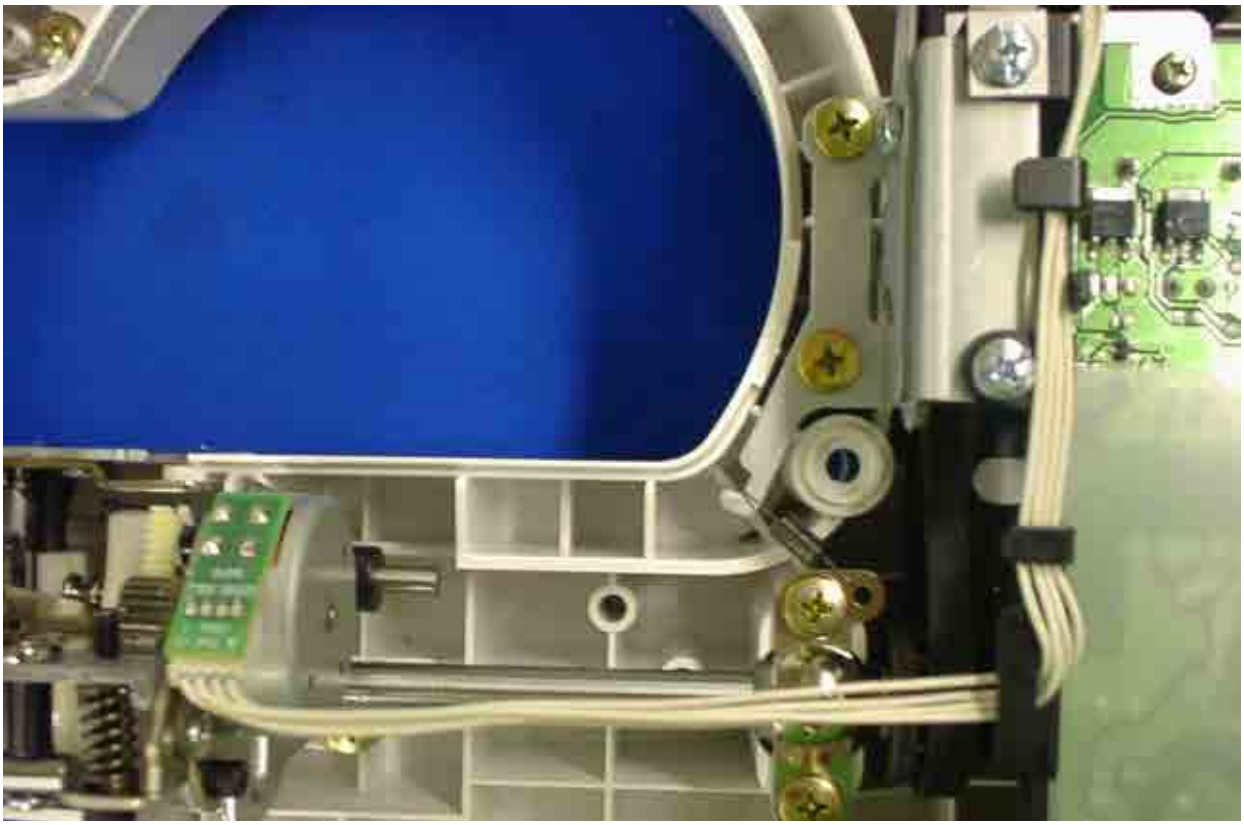


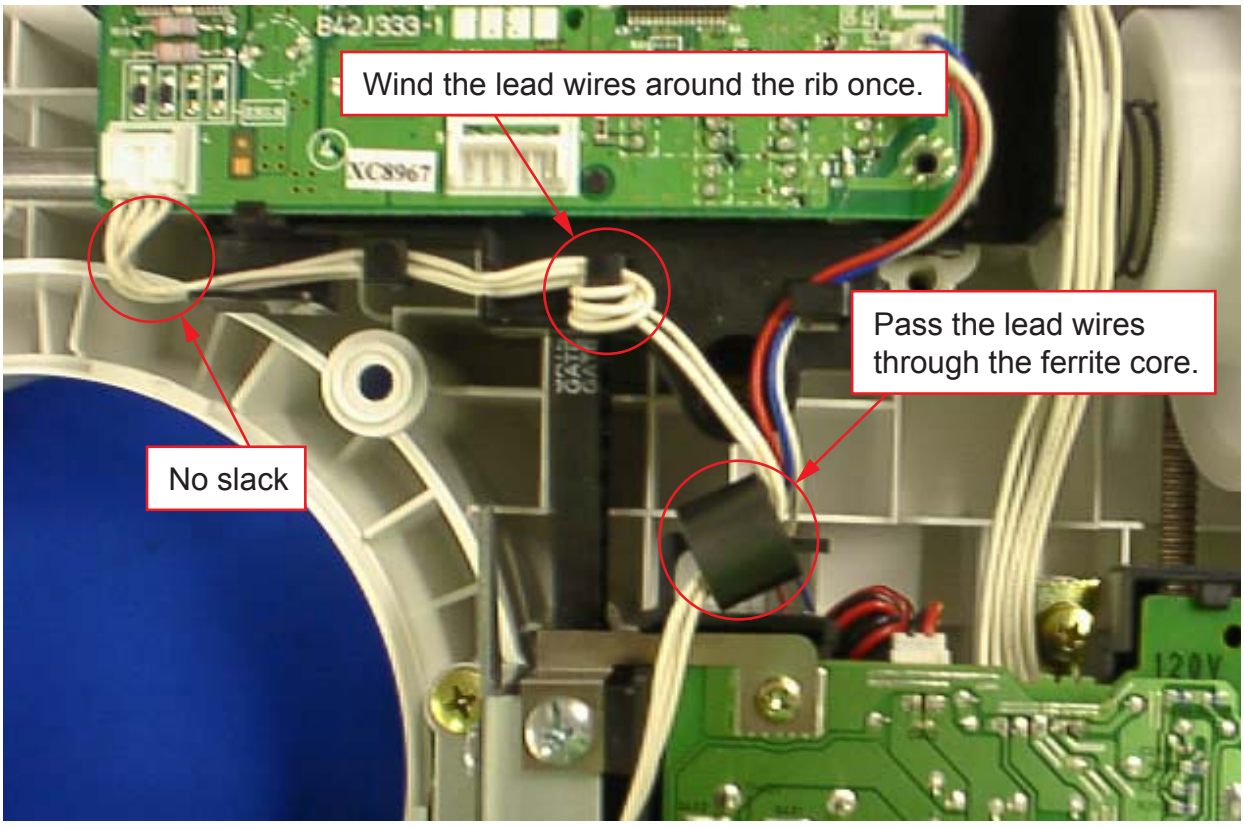


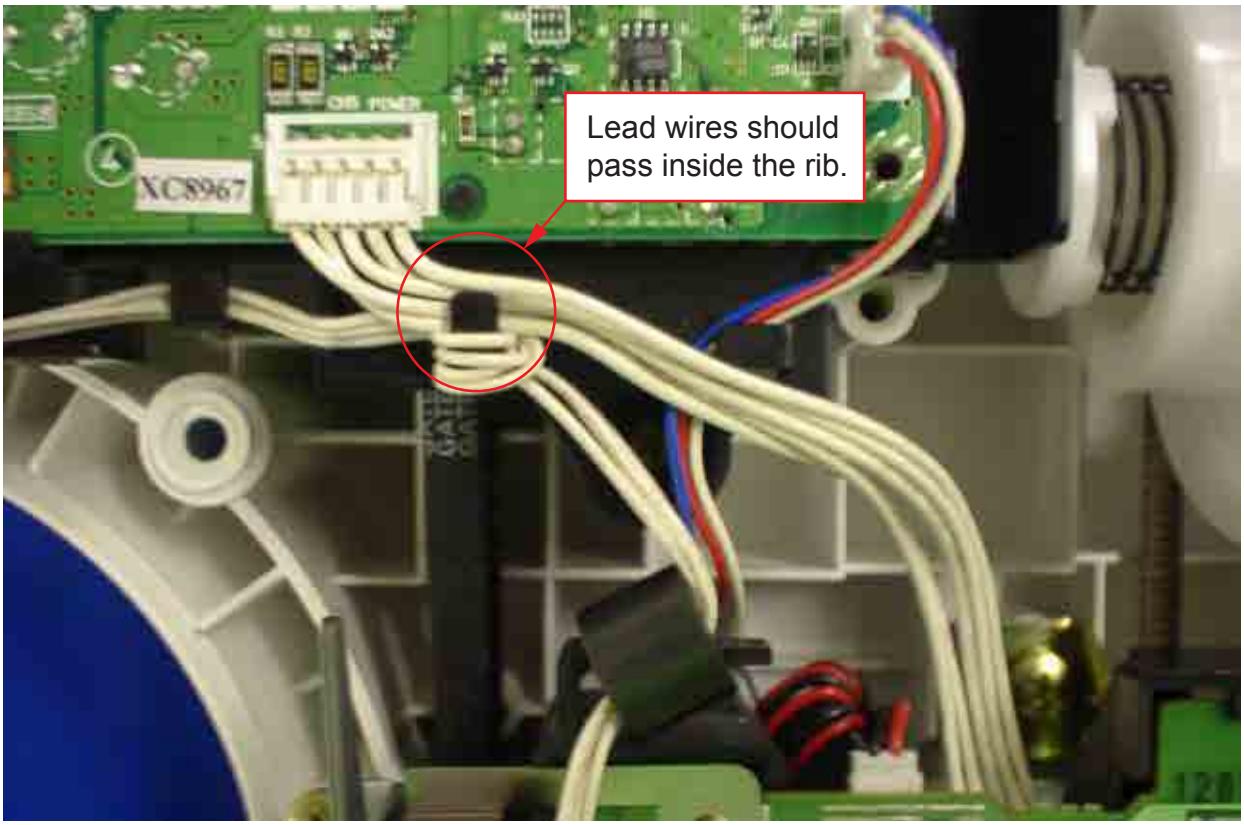


S33 and S34 models

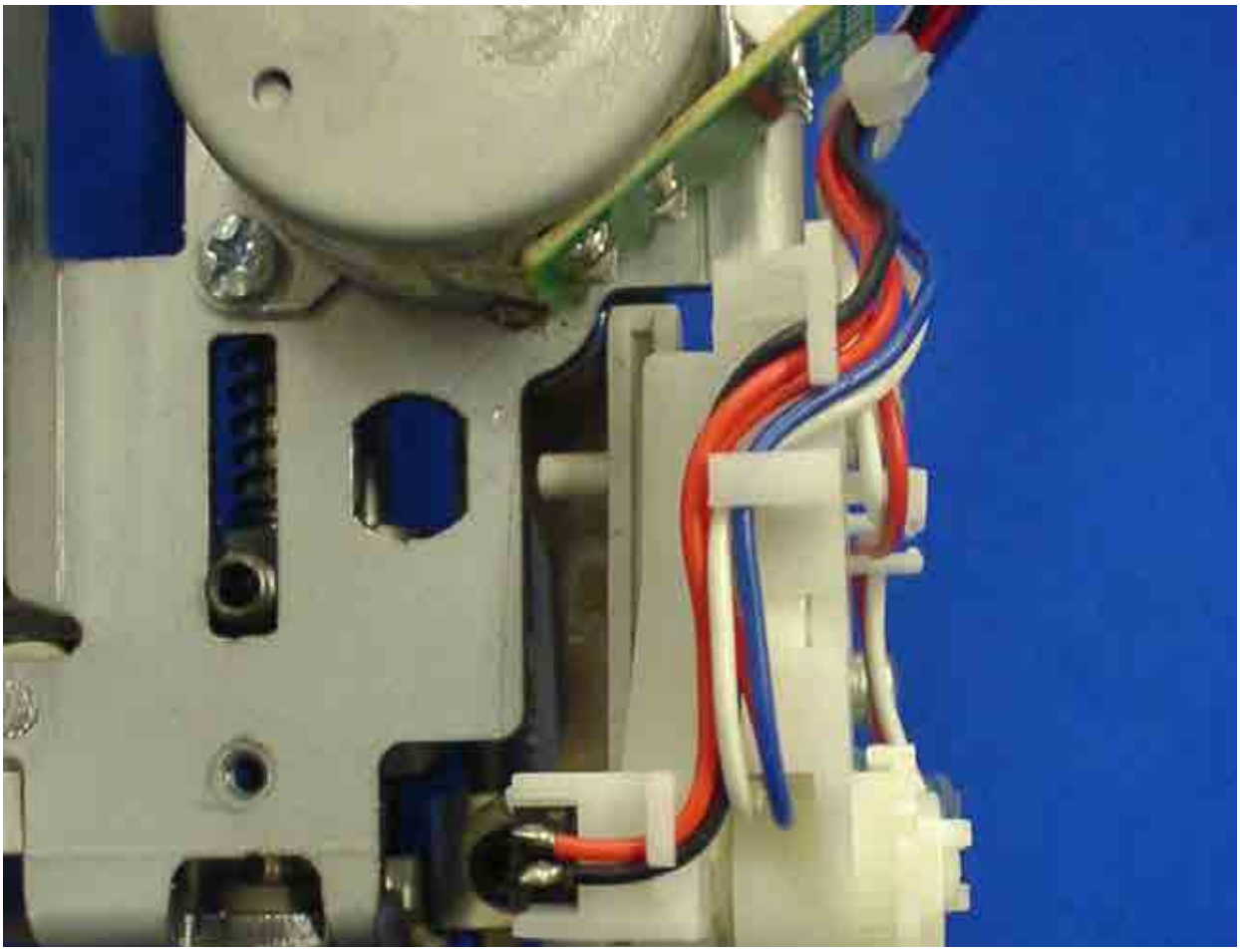
S36 and S37 models

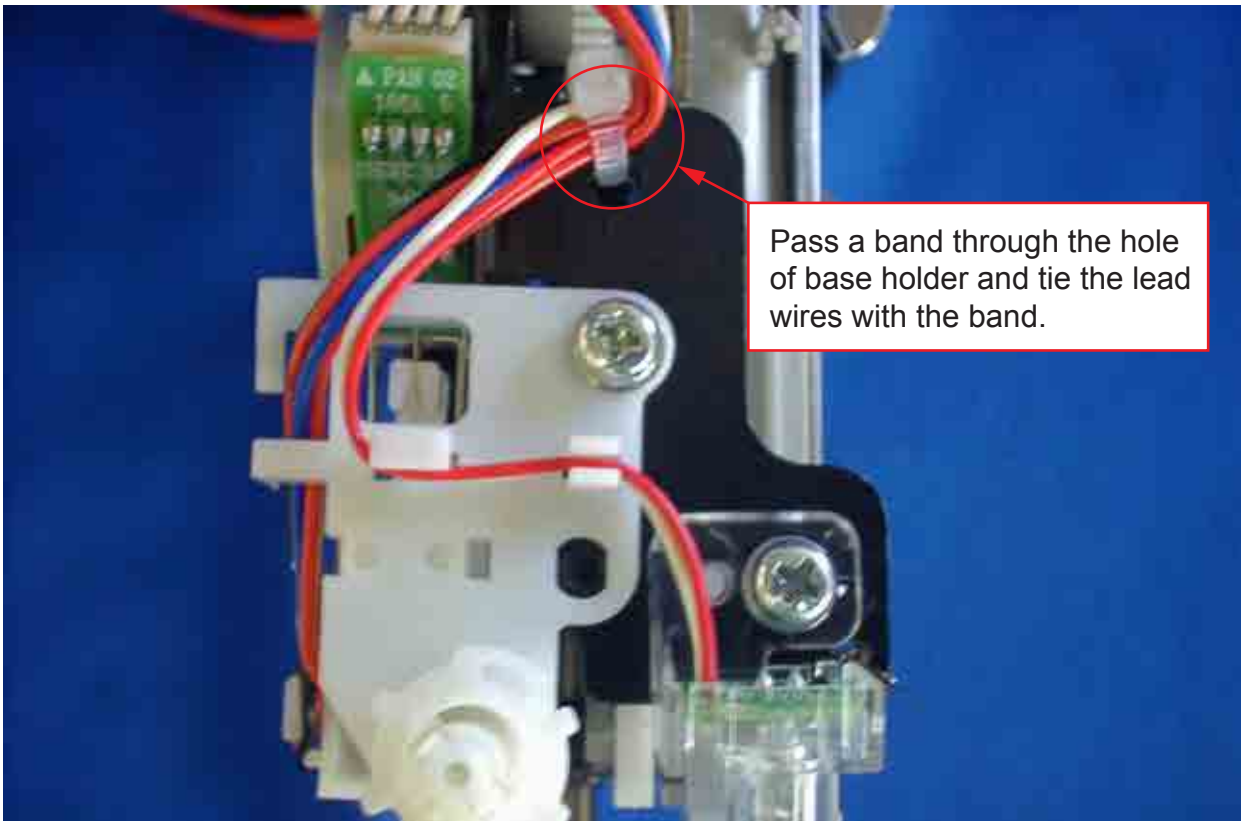


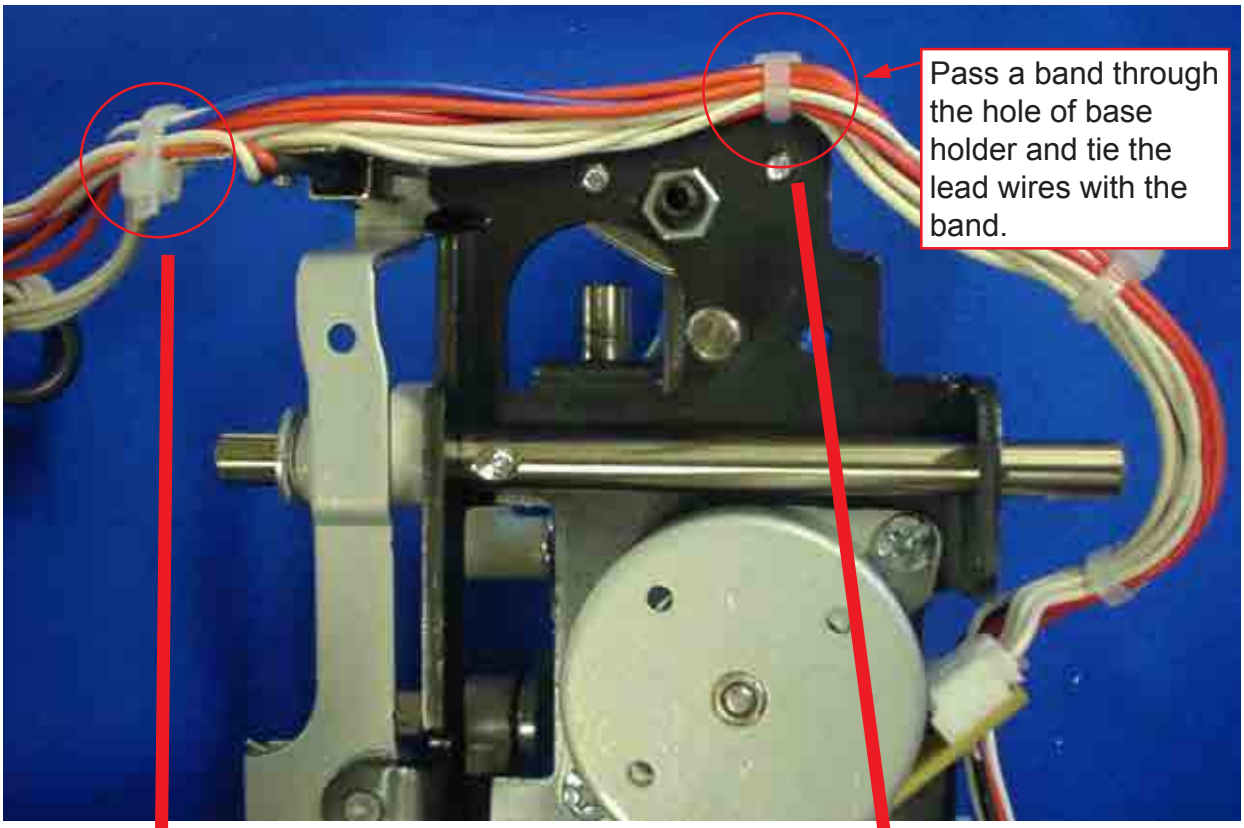


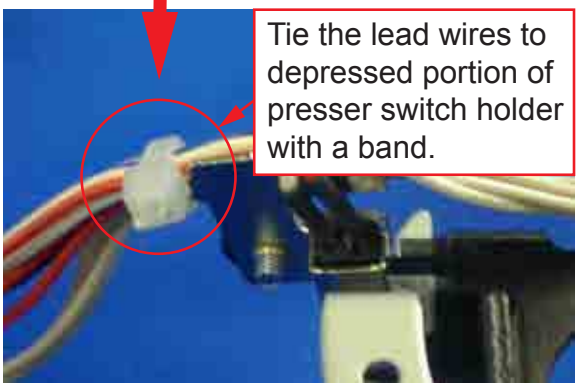


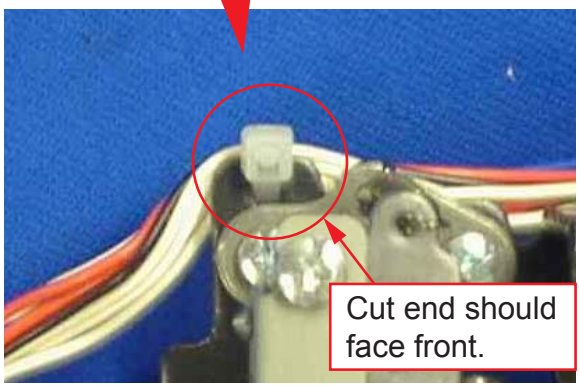
Adjustment	BH switch assy



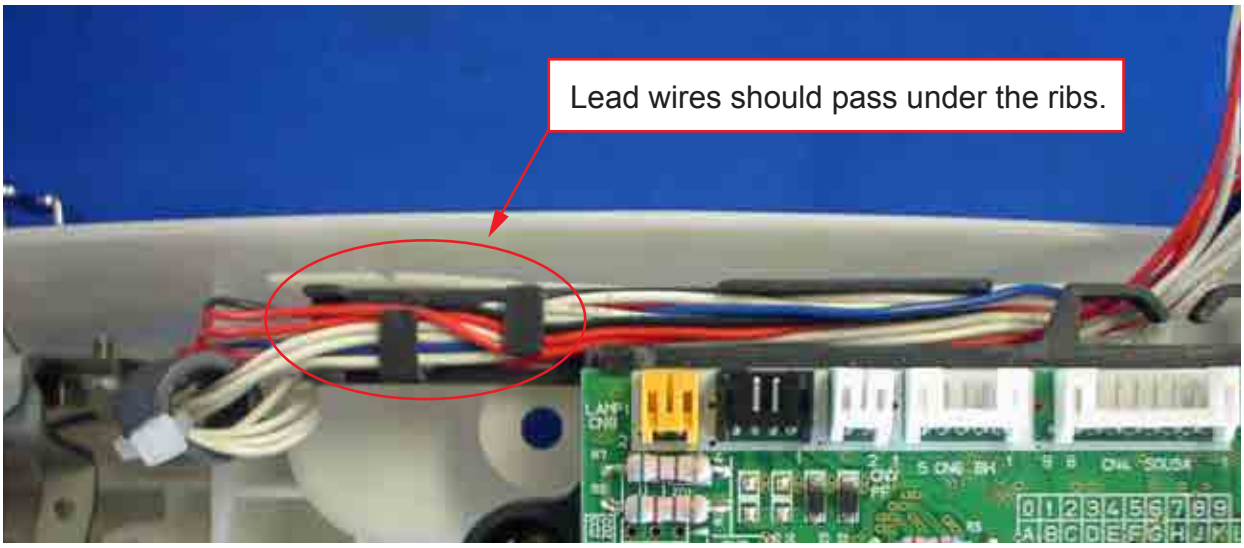


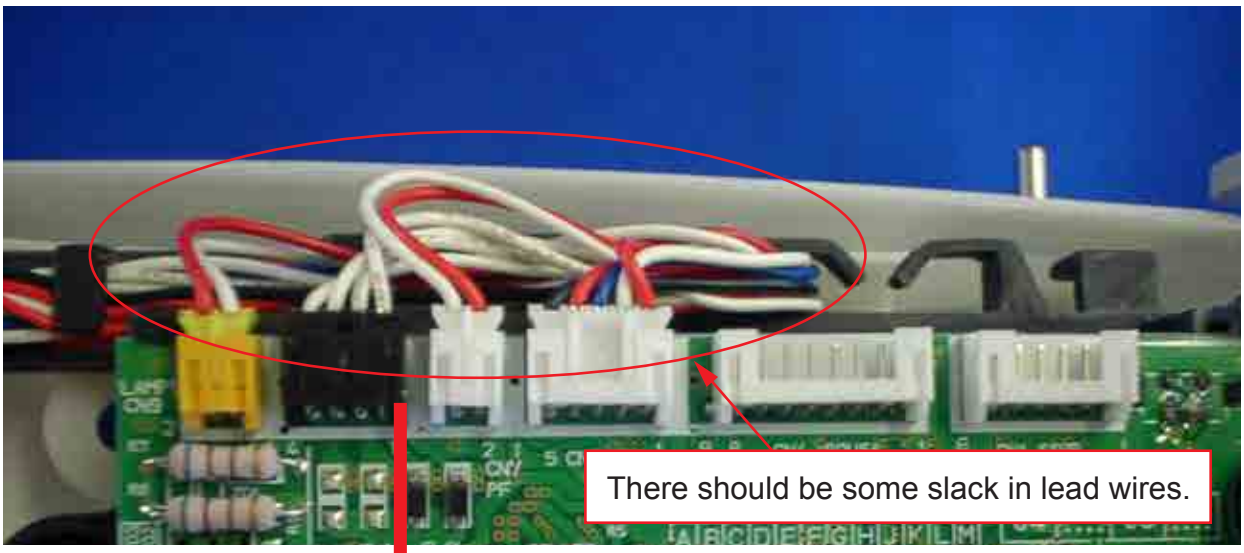


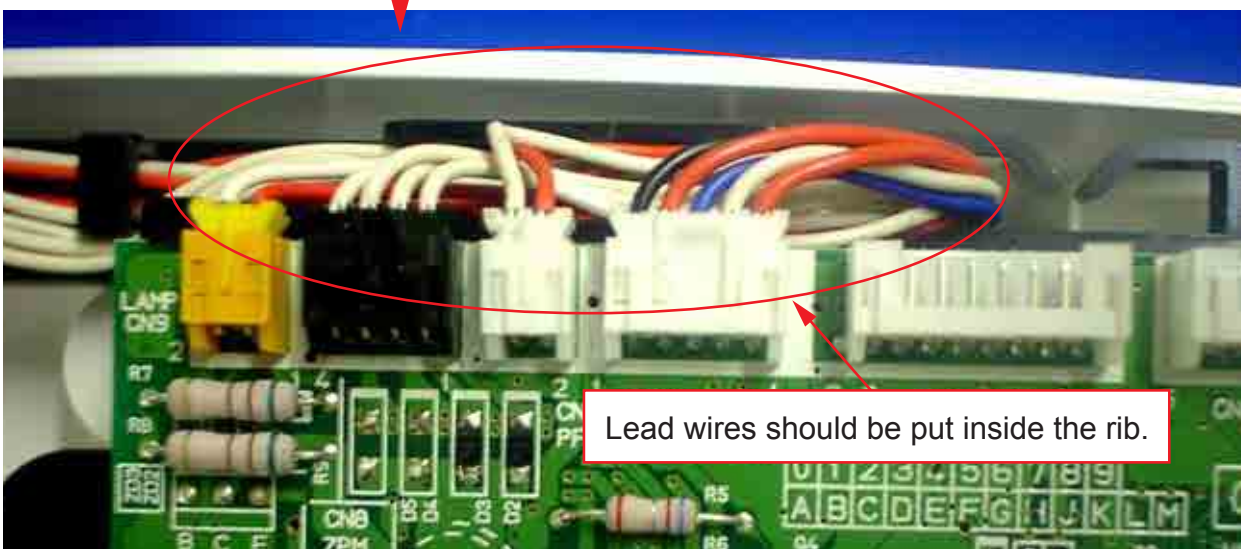


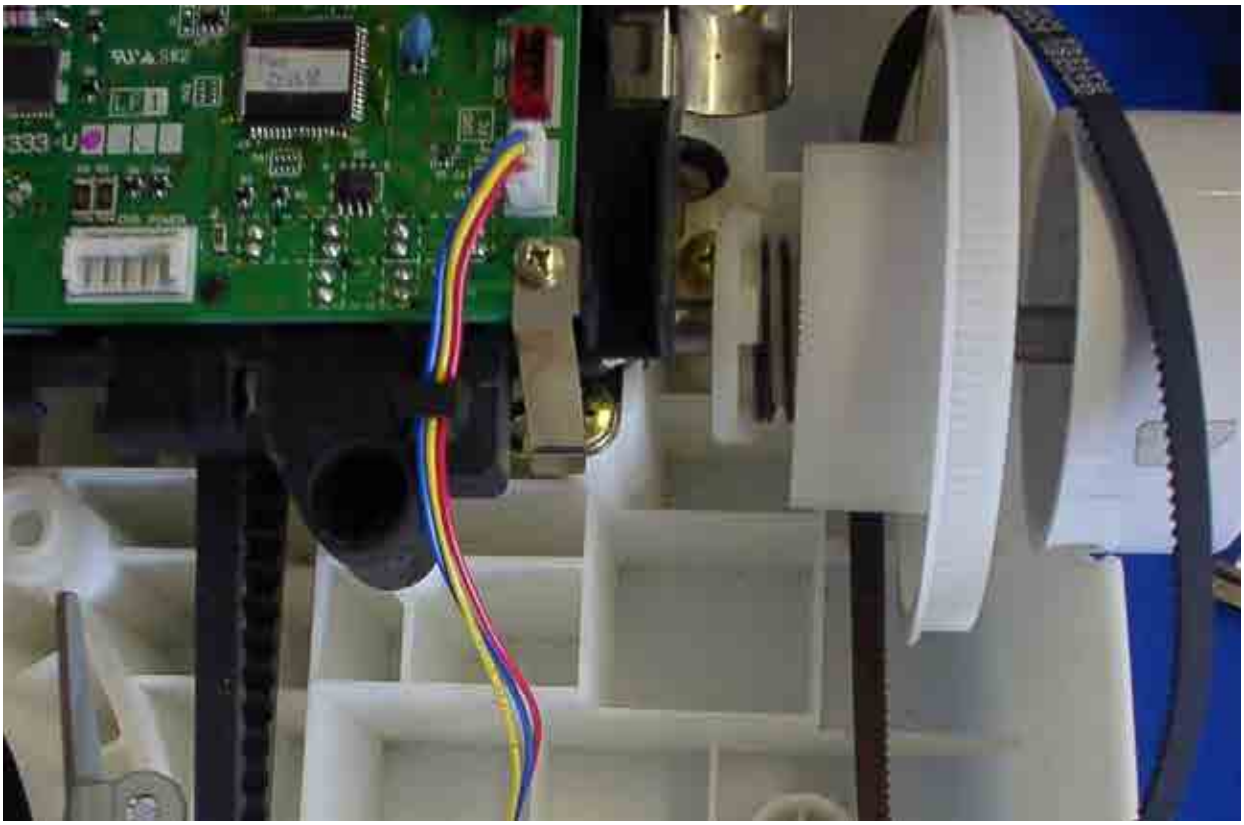


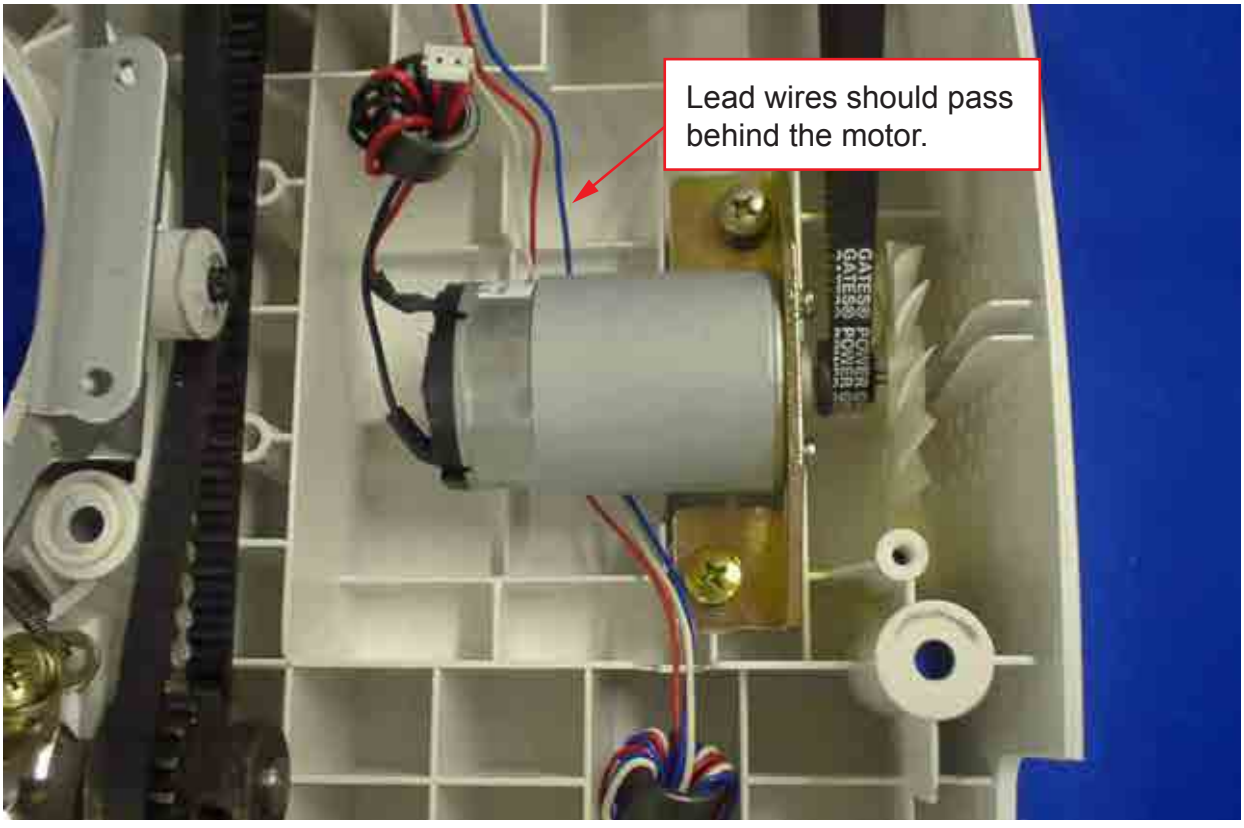
Adjustment	Upper side of shutter cover

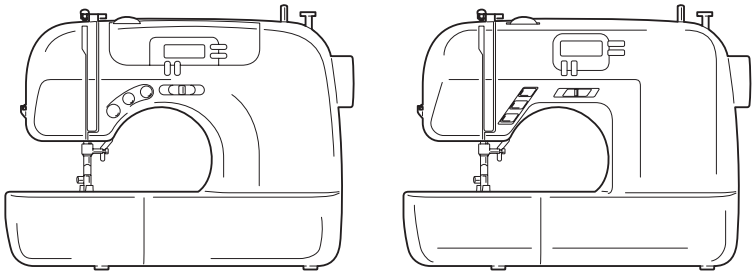












LOW-END COMPUTER SERIES

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