brother

SERVICE MANUAL FOR COMPUTERIZED SEWING MACHINE

The CD-ROM version of servie manual contains movie!

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

4.2003.

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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.

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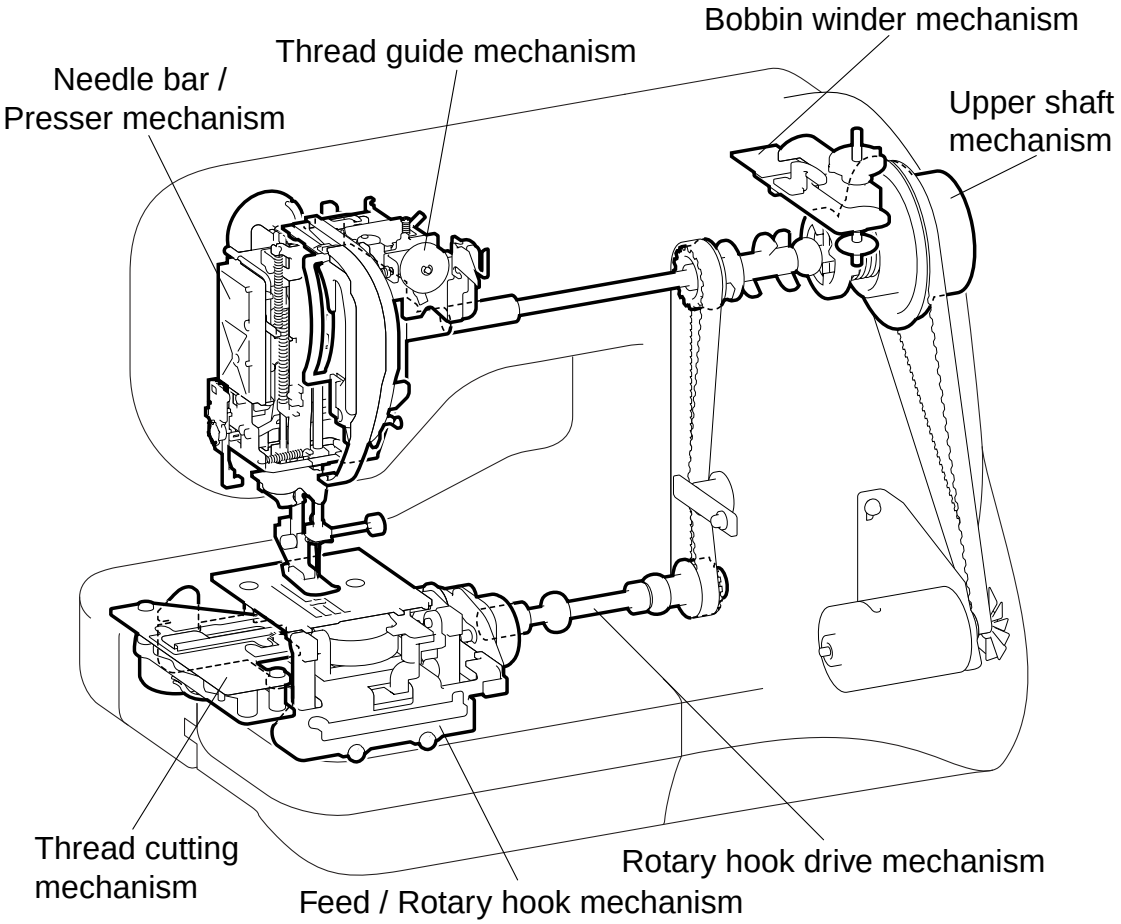
Sewing Machine



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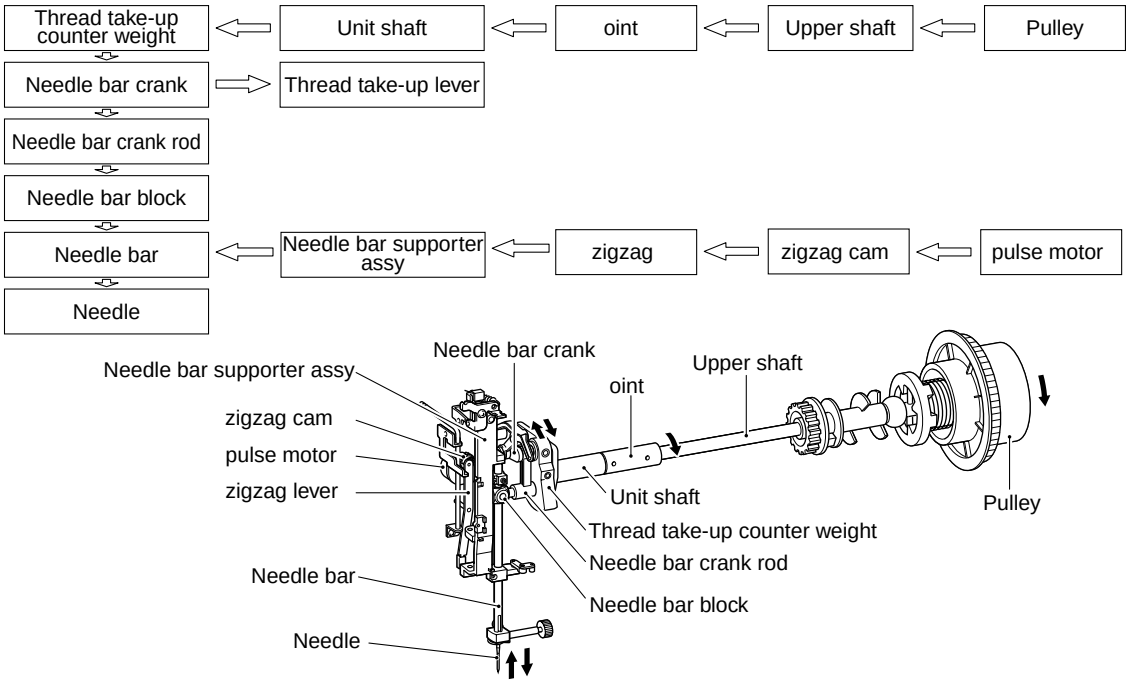
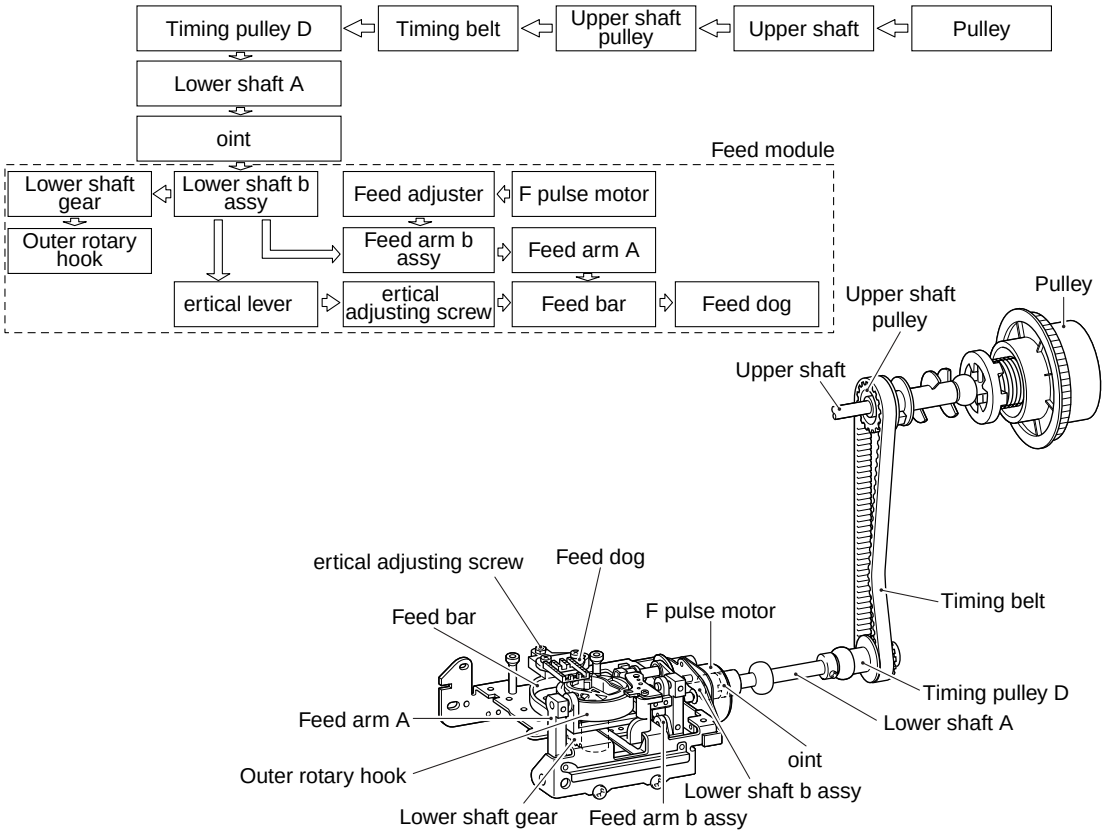
A) Up and down movement of needle bar, movement of thread take-up lever and zigzag mechanism



B) Movement of feed dog and bobbin



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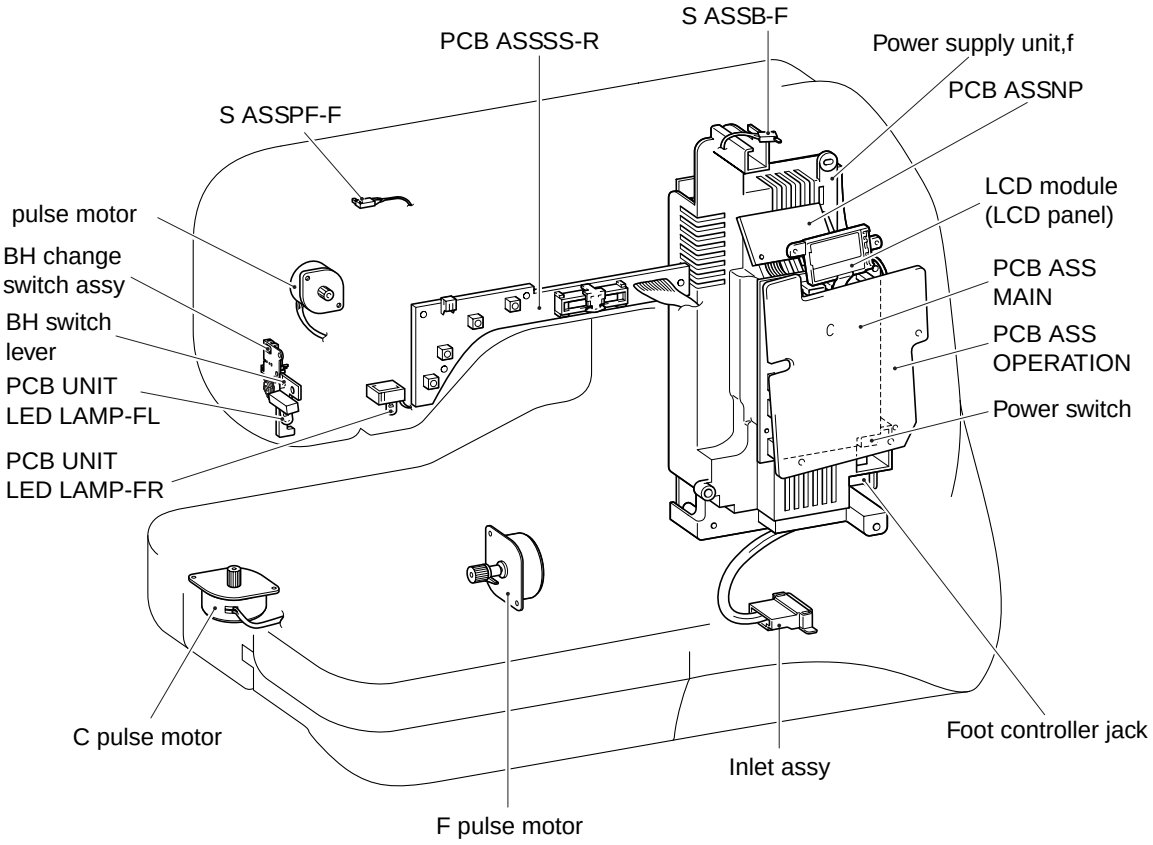

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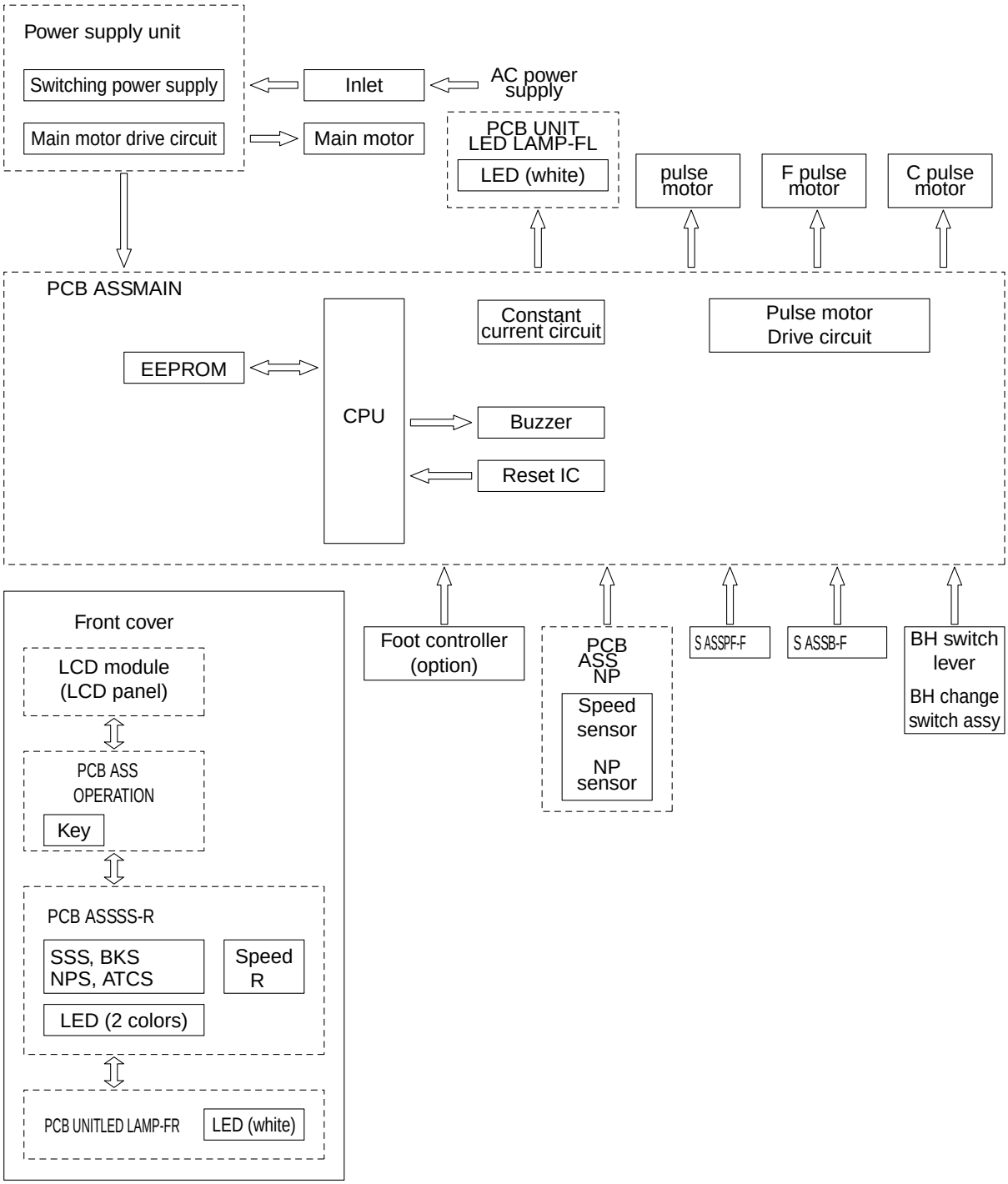
Control system block diagram



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The sewing machine motor must run stably at low speeds and high speeds even with load temperature and other changes. Therefore, the main motor is run by PMW control that makes use of FETs.

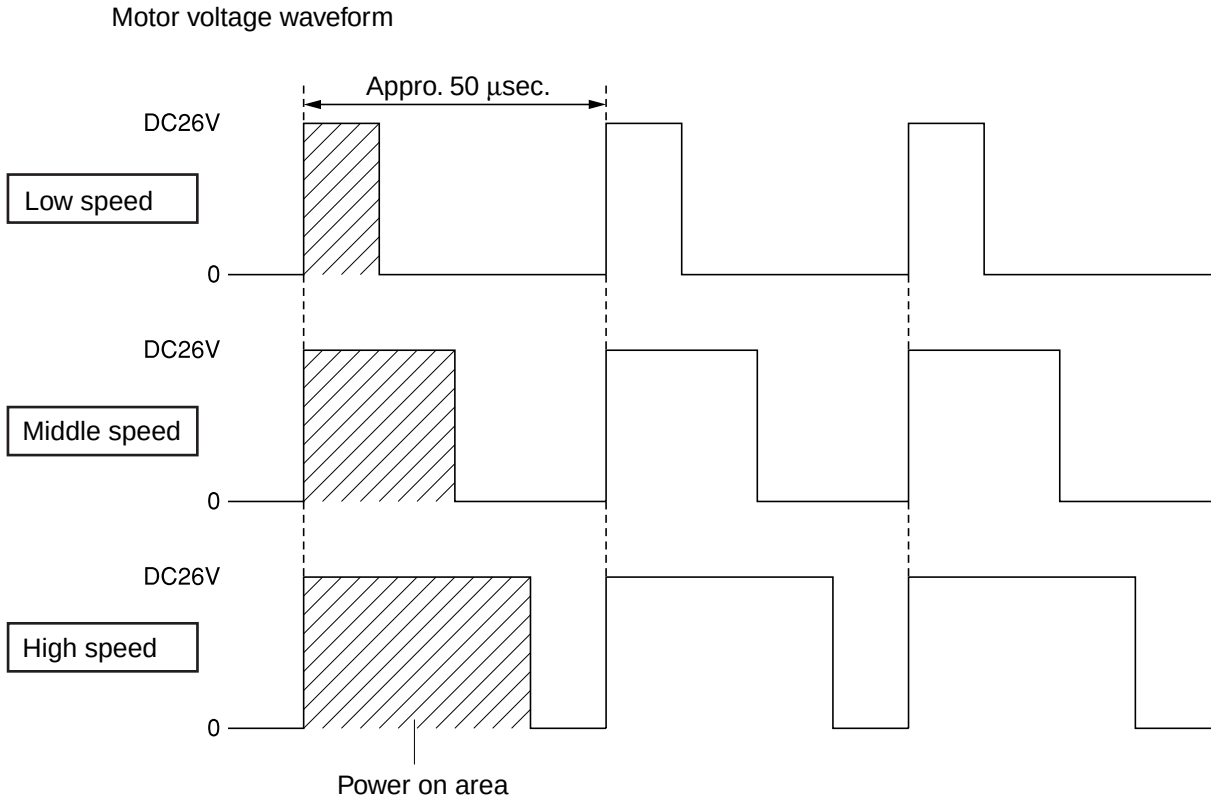

Fig. 1 Outline of pulse width modulation (PM) control

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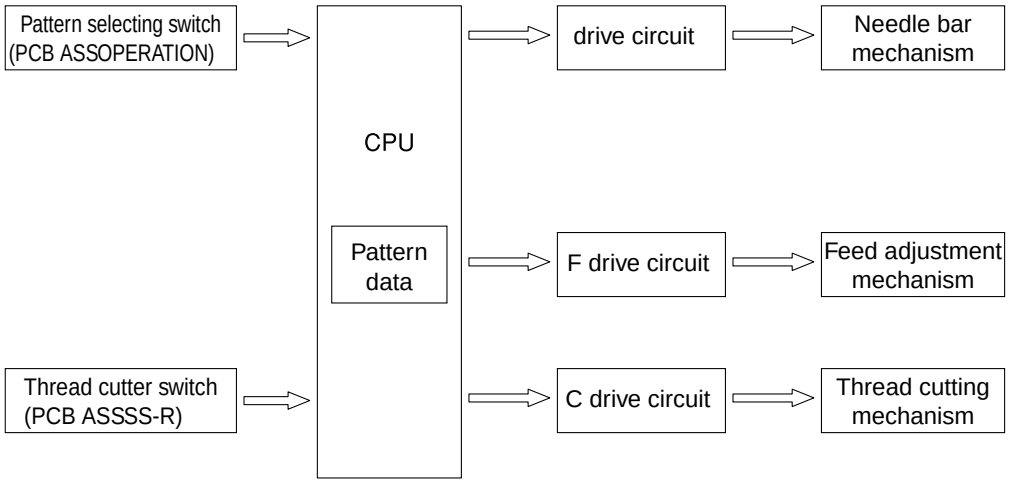
Pattern generator

Conventionally, a cam that has the mechanical data cut into it has been used to move the adjuster and needle bar and generate the pattern. However, this sewing machine operates an F pulse motor and Z pulse motor, moves the feed adjuster and needle bar and generates the pattern using data (532 types) stored in internal CPU memory.

Thread cutter

Conventionally, the thread cutter mechanism has been driven by the rotation of the lower shaft. However, in this machine, the thread cutter mechanism is driven by the rotation of an independent pulse motor to make for greater accuracy in thread feed.
Since high positioning precision and response speed are required of the pulse motor, a PM pulse motor is used, and a simple open loop circuit configuration is used.

Pattern generator control block diagram



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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.**
Cut thread switch	**This switch is for cutting the thread. If the switch is pressed, the thread is cut regardless of the position of the needle, and the machine stops with the needle up.**
Rubber switches	**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 button hole 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 pulse motor drive timing for zizag, feed and thread cutting, as well as the vertical stop position of 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.**
FR assembly and FL assembly LED lamps	**White LED lamps for illuminating the work space.**

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The threader provided on this sewing machine is a device for making threading easy, but there are cases where it cannot be used because of the combination of sewing machine thread and needle type.

At present, there are various types of sewing machine thread and sewing machine needles on the market for handling a variety of sewing conditions. Not only may it be impossible to carry out the threading operation due to the combination, but also there is a danger of damaging the threader. Be sure to check the combinations for which it can be used, those for which it cannot and those for which it can but which do not give full performance in the following table to deal with customer claims.

<Cautions>

1. **The threader cannot be used with sewing machine thread and needle combinations that are not in the table or those marked with an x.**
2. **Since combinations marked with an asterisk have a greater possibility of damaging the threader or not working properly, do your best to encourage users to avoid them.**
3. **When using the threader, lower the presser.**
4. **When transparent nylon thread is used, use a #14 - #16 sewing machine needle, regardless of what is in the table below.**
5. **Do not turn the pulley while using the threader.**
6. **To not push the needle thread lever down when the sewing machine is in use. Not only could the threader be damaged, but this could be a cause of needle breakage and injury.**
7. **When a #9 sewing machine needle is used, threading may be difficult. (This is caused by variations in needle precision.)**
8. **If the needle tip is less than 8 mm from the upper surface of needle plate A, threading may not be possible.**
9. **When a side cutter is being used, the threader cannot be used. Perform the threading operation before attaching the side cutter.**

Thread size / Needle size	#30	#50	#60	#80	#100	#120
#9	×	×	×	○	○	○
#11	×	○	○	○	○	※
#14	×	○	○	○	※	※
#16	※	○	○	※	※	※
#18	※	※	※	※	※	※

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2 Disassembly

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

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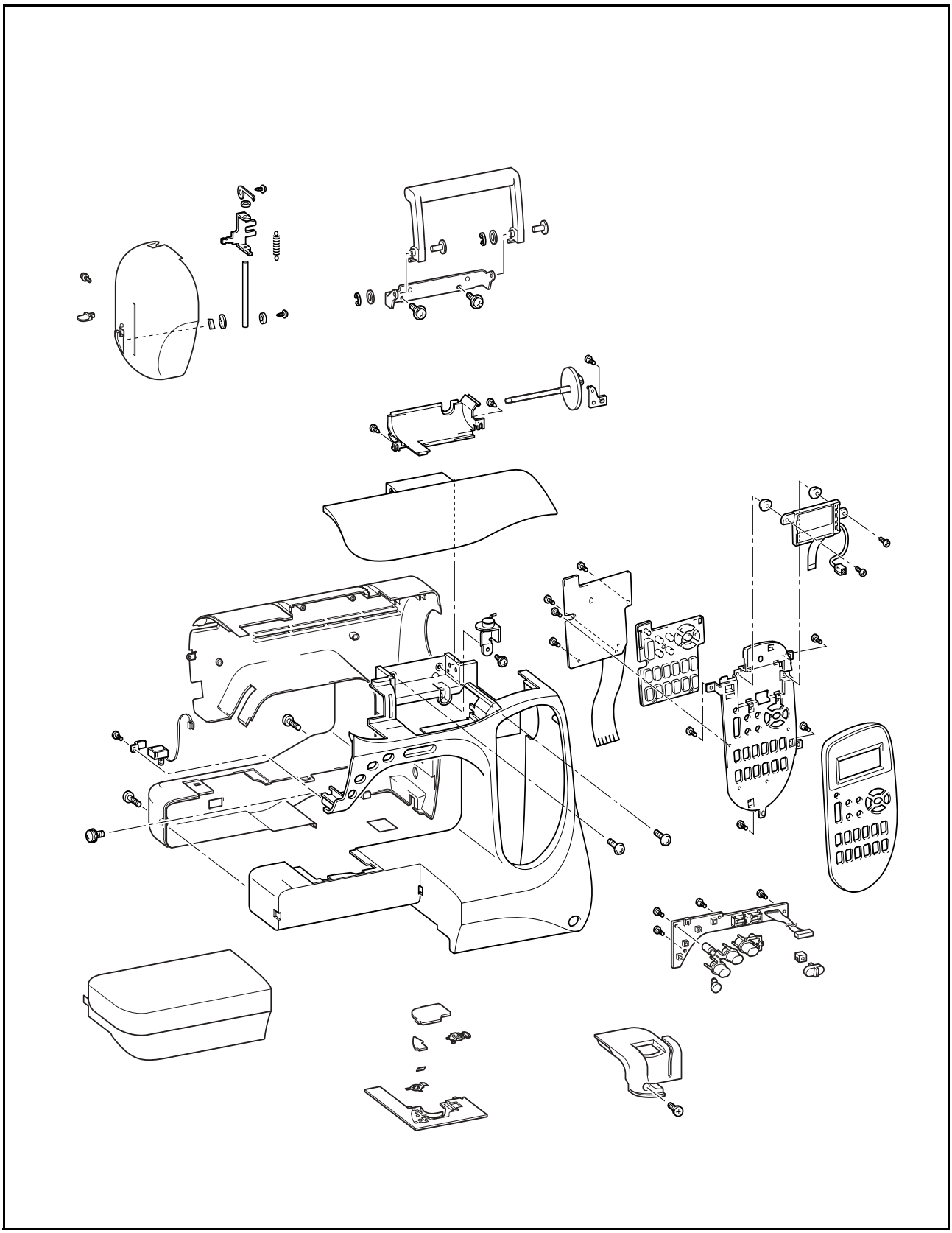
Main parts location diagram



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1 Accessory table removal

1. **Remove accessory table ①.**
2. **Remove the accessory table door from the accessory table ①.**

2 Top cover removal

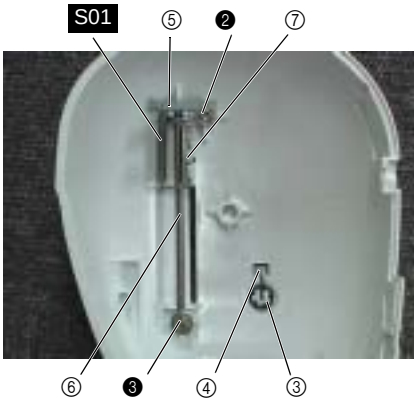
1. **Remove top cover ①.**

   ***Key point**
   - Push the attached part toward the inside and remove.

3 Face plate removal and disassembly

1. **Remove the screw ❶, and remove the face plate ①.**
2. **Remove the needle thread lever knob ②.**
3. **Remove the CS5 retaining ring ③ and remove the NT lower thread cutter ④.**
4. **Remove the screw ❷ and the screw ❸, and remove the shaft presser plate and washer ⑤.**
5. **Remove S01.**
6. **Remove the needle thread lever shaft ⑥.**
7. **Remove the needle thread lever ⑦ from the needle thread lever shaft ⑥, and remove the rubber washer.**

Start movie clip (CD-ROM version only)



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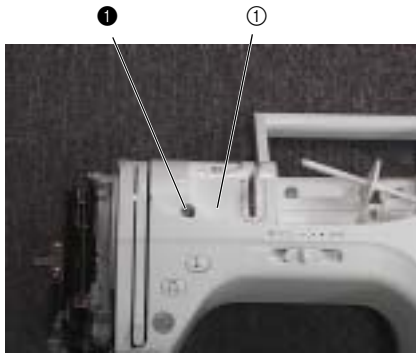
4 Front thread guard cover removal.

1. **Remove the screw ❶, and remove the front thread guard cover ①.**

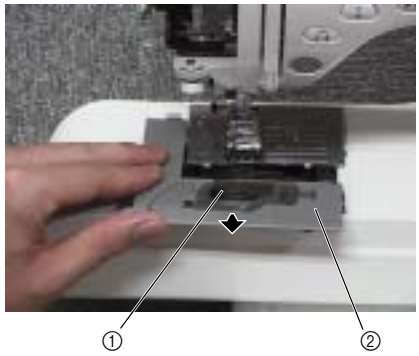
Start movie clip (CD-ROM version only)

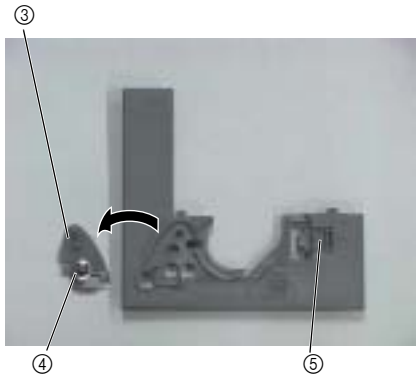


5 Needle plate B removal and disassembly

1. **Remove the needle plate cover ①.**
2. **Remove needle plate B ②.**
3. **Remove the cutter cover ③.**
4. **Remove the spring plate ④ from the cutter cover ③, and remove the NT lower thread cutter.**
5. **Undo the slide button hook (two locations), and remove the slide button ⑤.**

Start movie clip (CD-ROM version only)





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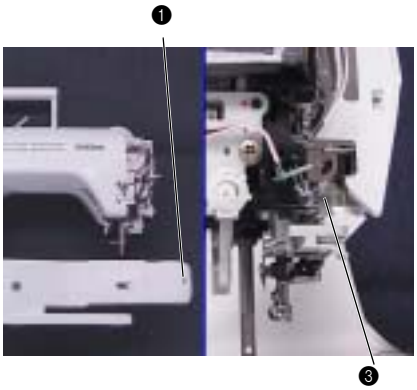
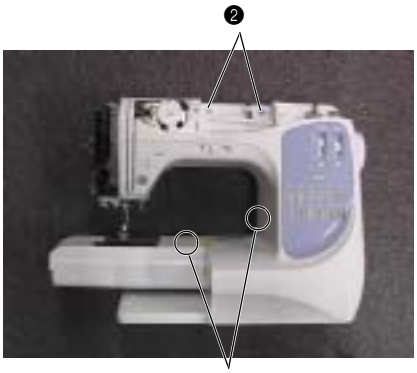
6 Front cover removal

1. **Remove the screw ❶.**
2. **Remove the screws ❷ (two).**
3. **Loosen the screw ❸.**
4. **Undo the hooks ① from the center of the front cover (2 locations), and remove the rear cover.**
5. **While sliding the front cover to the right, undo the lower hooks ② (2 locations) from the base plate.**
6. **Unplug the flat cable from the main F3 PCB assy., and remove the front cover.**

NOTE •Do this so as to avoid damage to the PCB unit LED lamp-FR.

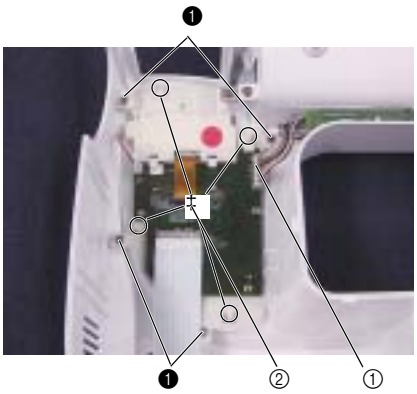
Start movie clip (CD-ROM version only)





7 Front cover disassembly (operation PCB holder removal)

1. **Remove the SS-VR F PCB assy. connector ①.**
2. **Undo the hooks ② (4 locations), and remove the indication plate.**
3. **Remove the screws ❶ (four), and remove the operation PCB holder.**



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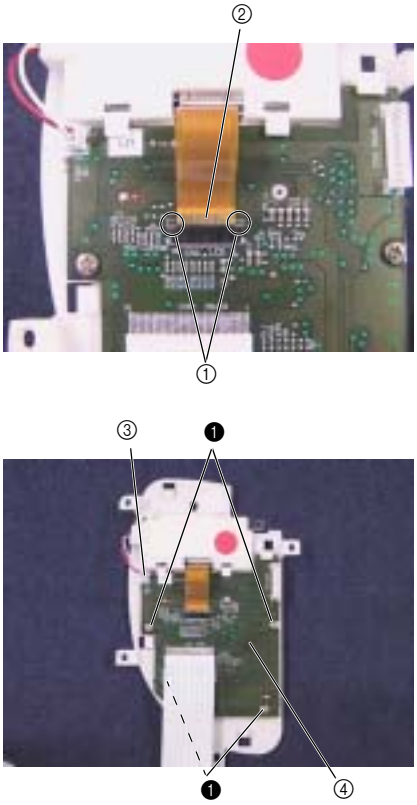
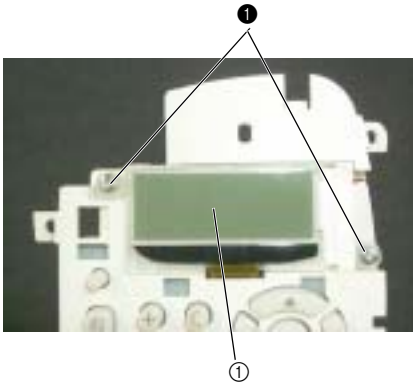
8 Front cover disassembly (operation PCB assy. disassembly)

1. **Slide the stopper ① up.**
2. **Unplug the LCD panel flat cable ②.**
3. **Unplug the CN3 connector ③.**
4. **Remove the screws ❶ (four), and remove the operation F3 PCB assy. and rubber keys.**



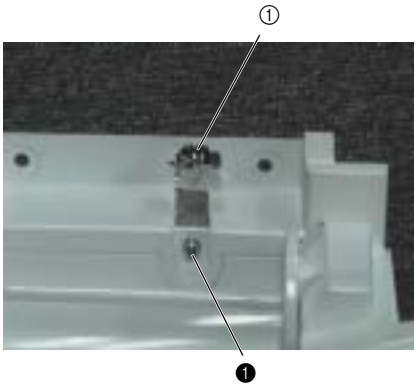
9 LCD panel removal

1. **Remove the screws the screws ❶ (two), and detach the LCD panel ① and board pressers (two).**



10 Front cover disassembly (bobbin winder guide assembly removal)

1. **Remove the screw ❶, and remove the bobbin winder guide assembly ①.**



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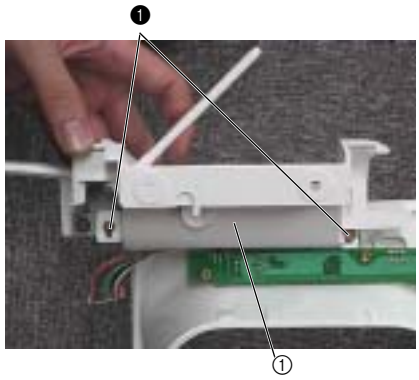
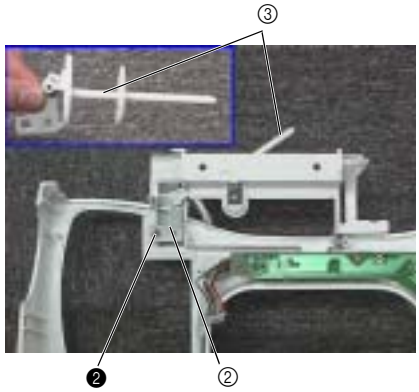
11 Front cover disassembly (spool pin removal)

1. Remove the screws ❶ (two), and remove the thread bobbin cover ①.
2. Remove the screw ❷, and remove the spool pin holder assy. ② and the spool pin ③.

Start movie clip (CD-ROM version only)

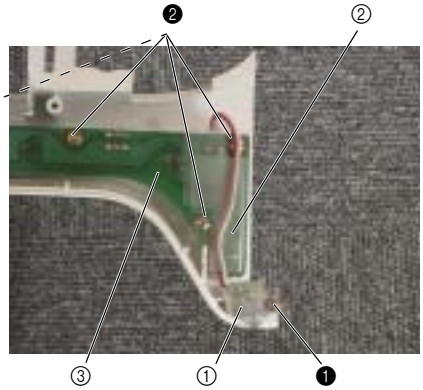


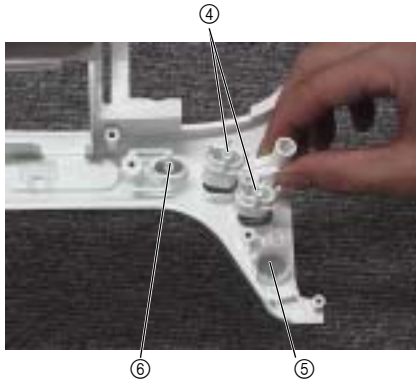


12 Front cover disassembly (SS-VR F PCB assy. removal)

1. Remove the screw ❶, and remove LED lamp holder R supporter ①.
2. Remove the screws ❷ (four), and remove the insulation sheet ② and the SS-VR F PCB assy. ③.
3. Undo the PCB unit LED lamp FR connector.
4. Remove the reverse button ④, SS-button ⑤ and thread cut button ⑥.

Start movie clip (CD-ROM version only)





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13 Front cover disassembly (SV keytop removal)

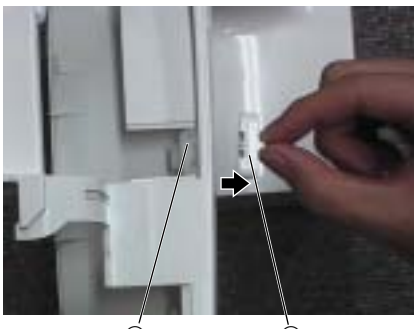
1. **Remove the SV keytop ①.**

   ***Key point**
   - Insert a standard screwdriver between ① and ②, and push the SV keytop ① out on the front side.

2. **Remove the SV joint plate ②.**

Start movie clip (CD-ROM version only)

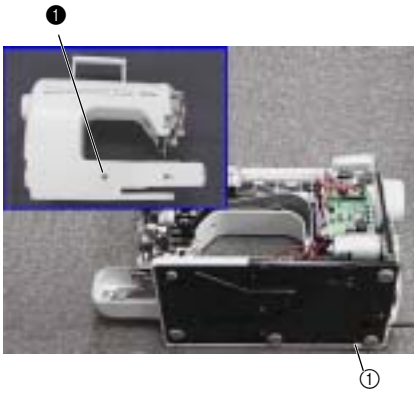
*Top view



14 Rear cover removal

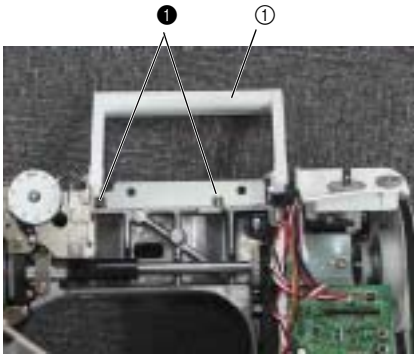
1. **Lower the presser lever, and pull the cord in the cord real assembly out approximately 5 cm.**
2. **Remove the screw ❶.**
3. **Undo the hooked places ① and remove the rear cover.**

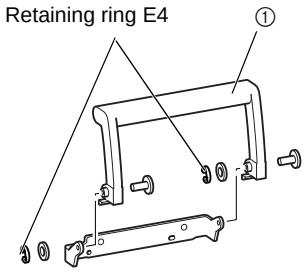
Start movie clip (CD-ROM version only)



15 Handle removal

1. **Remove the screws ❶ (two), and remove the handle ①.**
2. **Remove the retaining rings E4 (two) from the handle shafts, and remove the handle ①, the handle shafts (two) and the polyester sliders (two) from the handle holder.**





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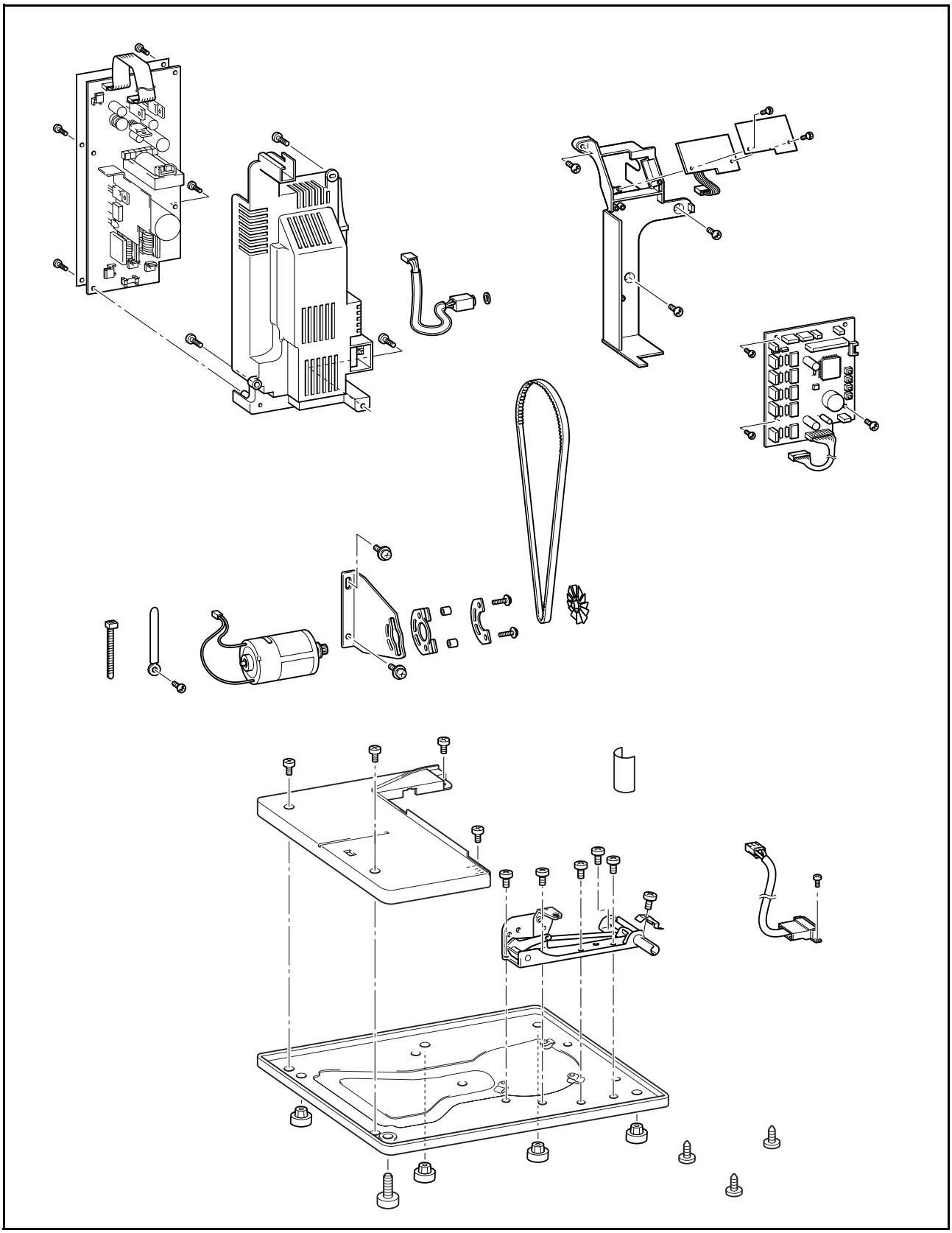
Electrical parts and motors location diagram



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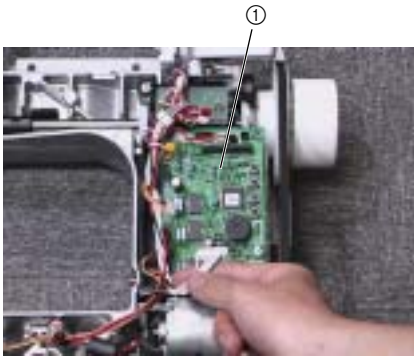
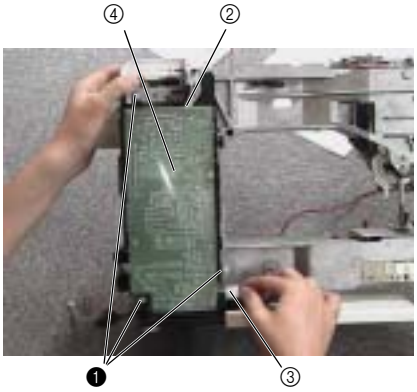
1 Power supply unit F removal

1. **Unplug all of the connectors on the main PCB assy. ①.**
2. **Remove the main motor connector ②.**
3. **Disconnect the inlet assy. connector ③.**
4. **Remove the screws ❶ (three), and remove power supply unit F ④.**

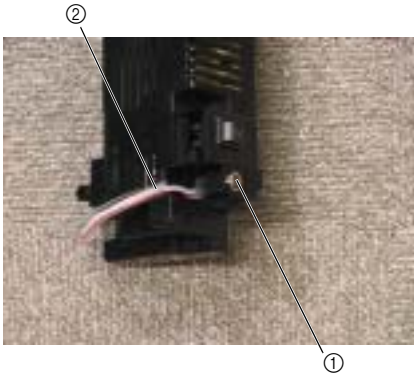
Start movie clip (CD-ROM version only)





2 Assy. pin jack F removal

1. **Remove the nut ①, and remove the assy. pin jack F ②.**

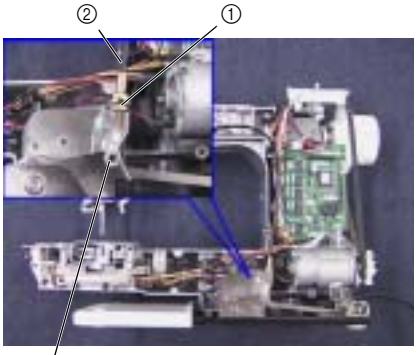


3 Wire assy. removal

1. **Remove retaining ring E3.**
2. **Loosen nut M8 ①, and remove the wire assy. ②.**

***Key point**

- Completely loosen the nut and remove from the shaft.



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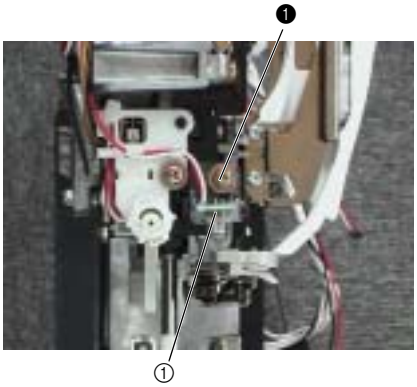
4 PCB Unit LED lamp FL removal

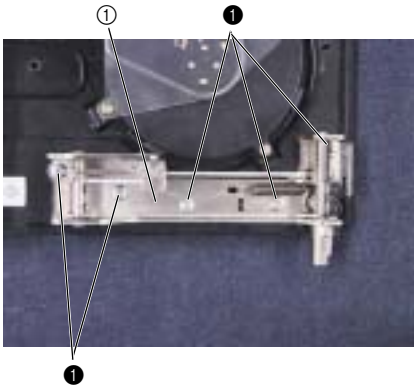
1. **Disconnect the bands on the back of the arm bed (3 locations).**
2. **Remove the screw ❶, and remove PCB unit LED lamp FL ①.**

Start movie clip (CD-ROM version only)



5 Knee lifter assy. removal

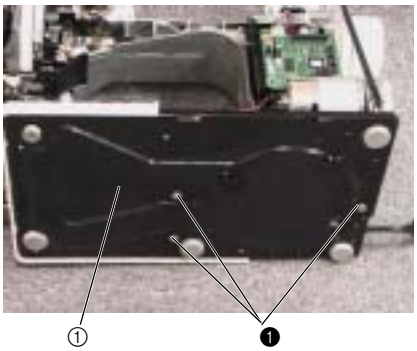
1. **Remove the screws ❶ (five), and remove the knee lifter assy. ①.**



6 Base plate sub assy. removal

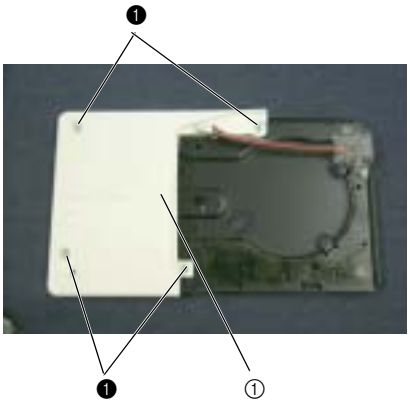
1. **Remove the screws ❶ (three), and remove the base plate sub assy. ①.**

Start movie clip (CD-ROM version only)



7 Base plate cover removal.

1. **Remove the screws ❶ (four), and remove the base plate cover ①.**



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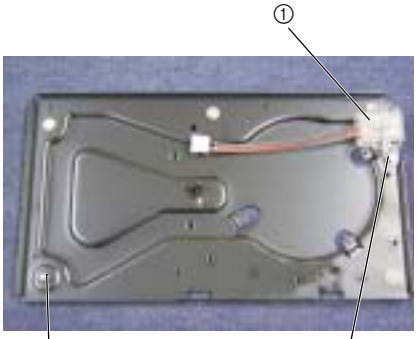
8 Inlet assy removal

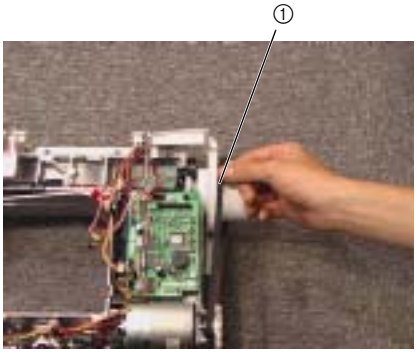
1. **Remove the screw the screw ❶, and remove the inlet assy. ①.**
2. **Remove base rubber A (four).**
3. **Remove the regulator adjusting screw assy. ②.**



9 Timing belt (motor belt) removal

1. **Remove timing belt ①.**

Start movie clip (CD-ROM version only)

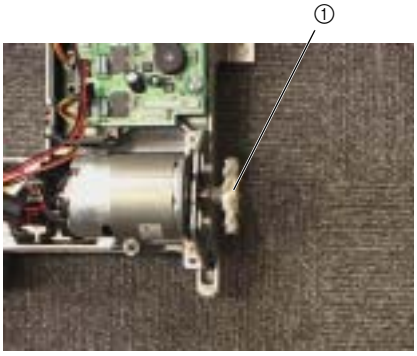


10 Motor fan removal

1. **Remove motor fan ①.**

NOTE •Be careful not to bend the fins of the motor fan ①.

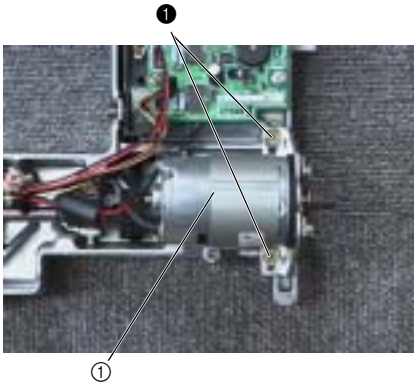
Start movie clip (CD-ROM version only)



11 Main motor assembly removal

1. **Remove the screws ❶ (two), and remove the main motor assembly ①.**

Start movie clip (CD-ROM version only)



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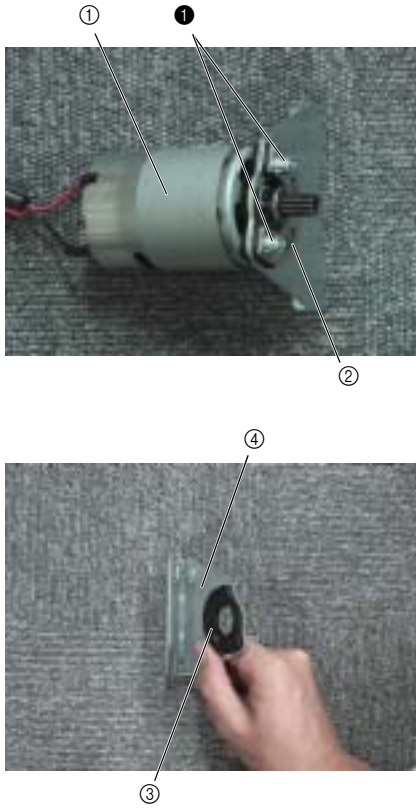
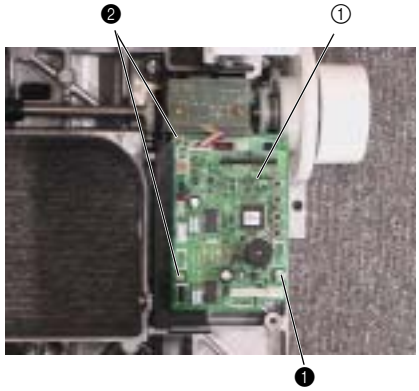
12 Main motor assembly disassembly

1. **Remove the screws ❶ (two), and remove the main motor assembly ① and the motor spacer presser ②.**
2. **Remove the fender rubber ③ from the motor holder ④.**
3. **Remove the spacer 4x6(two) from the fender rubber ③.**



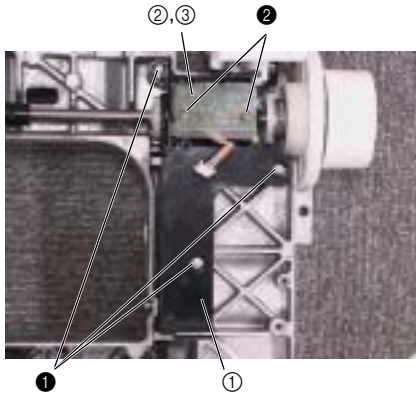
13 main PCB assy. removal

1. **Remove the screw ❶ and the screws ❷ (two), and remove the main PCB assy. ①.**



14 NP PCB assy. removal

1. **Remove the screws ❶ (three), and remove the PCB holder ①.**
2. **Remove the screws ❷ (two), and remove the insulation sheet ② and the NP PCB assy. ③ from the PCB holder ①.**



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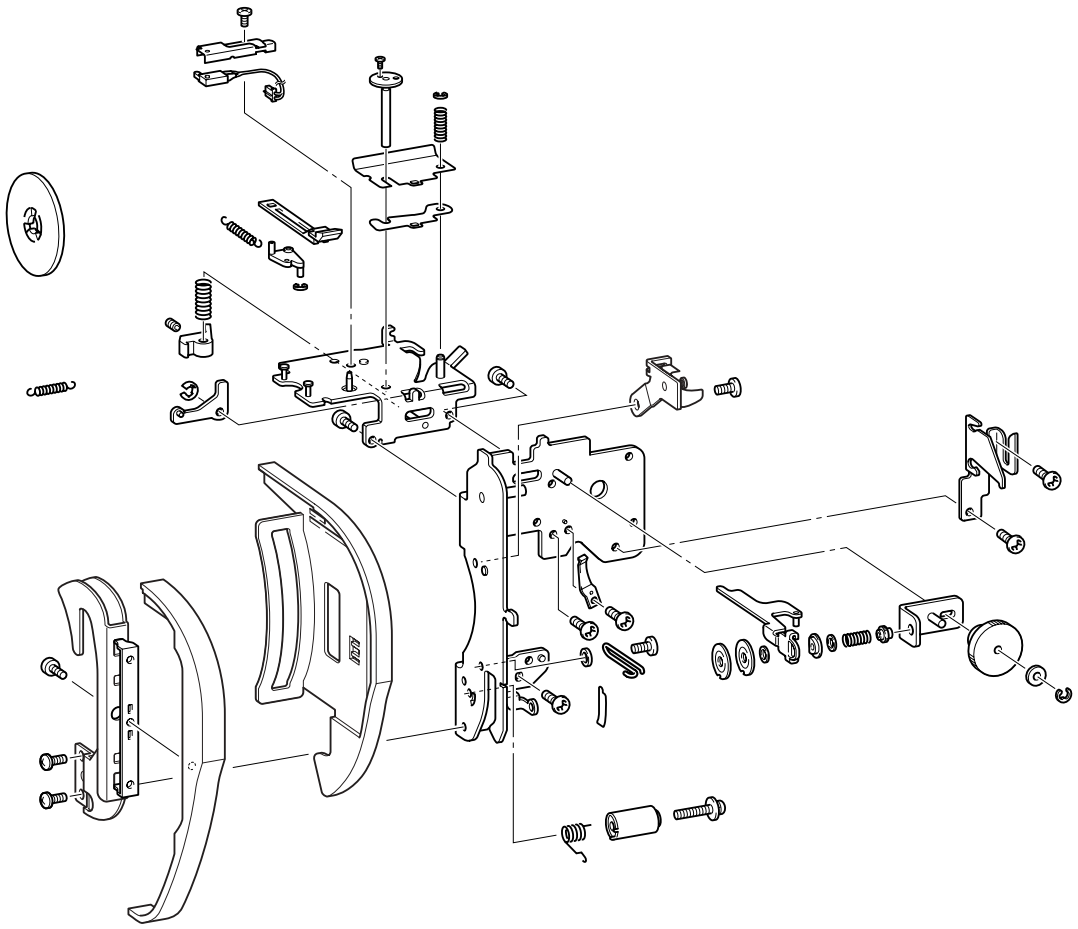
Thread tension mechanism location diagram



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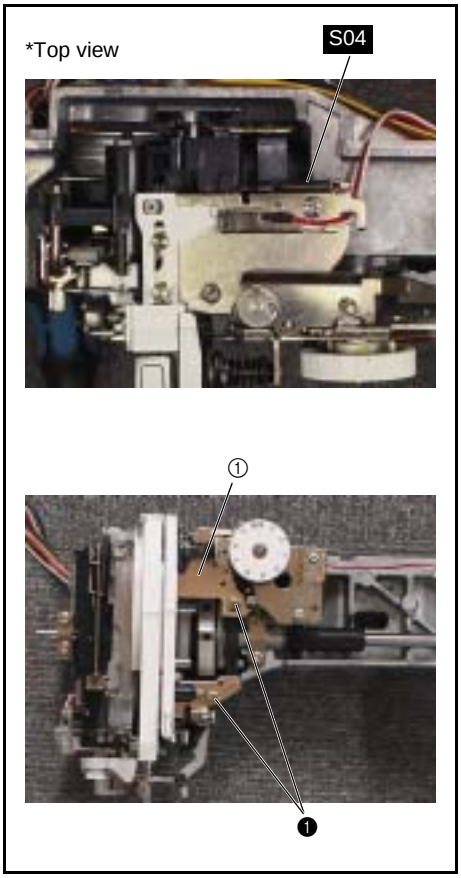
1 Thread tension assy removal

1. Remove S04.
2. Remove the screws ❶ (two), and remove the thread tension assy ①.

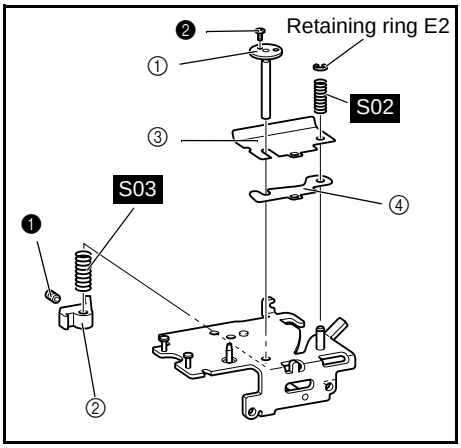
Start movie clip (CD-ROM version only)



2 Tension plate removal

1. Remove retaining ring E2, and remove the S02.
2. Remove the screw ❶, and remove the tension pressure assy. ① the S03 and the tension release cam ②.
3. Remove the tension plate ③ and the spacer ④.
4. Remove the screw the screw ❷.

Start movie clip (CD-ROM version only)



Disassembly

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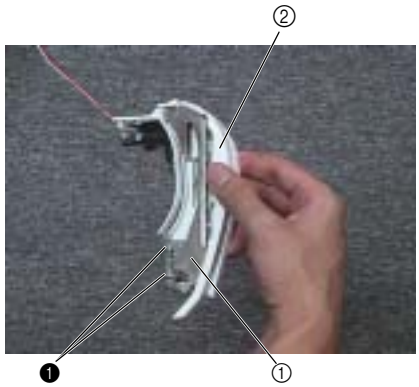
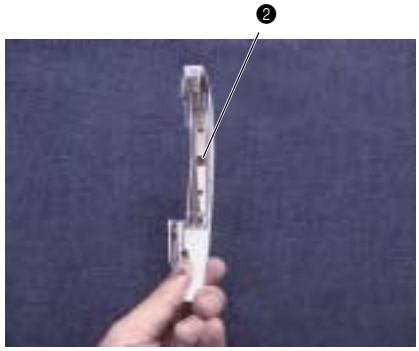
3 Thread guide removal

1. **Remove the screws ❶ (two), and remove the thread guide assy. ①.**
2. **Remove the screw ❷, and remove the thread guide cover ②.**





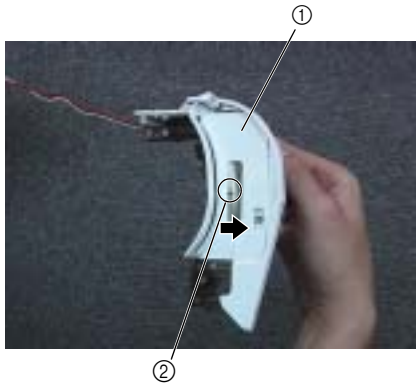
4 Thread guide cover removal

1. **Remove the thread guide cover ①.**

***Key point**

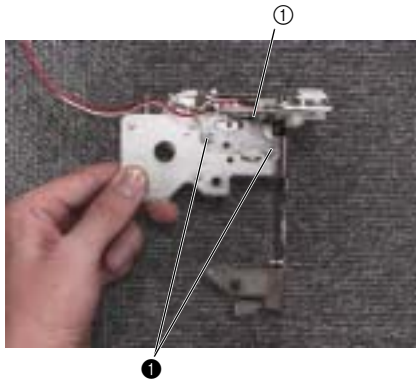
- Lift the protrusion ② and slide to the right.

Start movie clip (CD-ROM version only)



5 Thread release holder assy. F removal

1. **Remove the screws ❶ (two), and remove the thread release holder assy. ①.**



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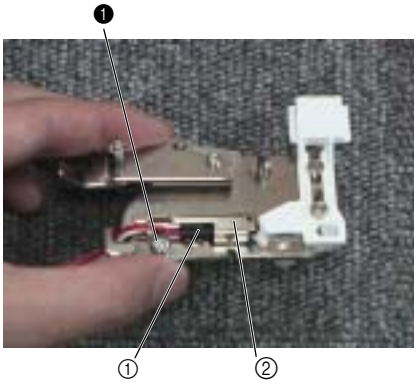
6 PF-F SW assy. removal

1. **Remove the screw ❶, and remove the PF-F SW assy. ① and the presser switch holder ②.**

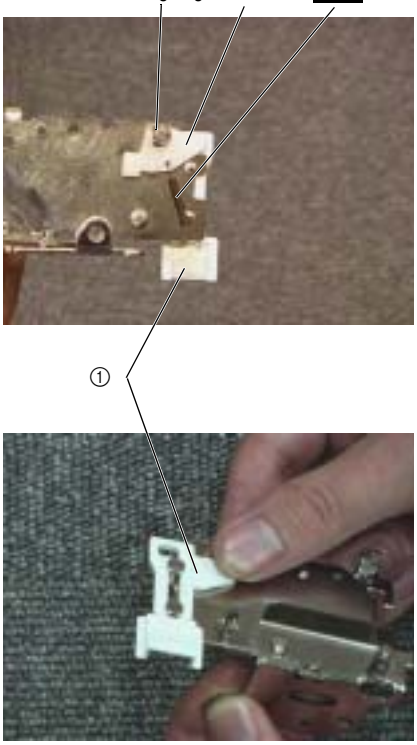
Start movie clip (CD-ROM version only)



7 Thread guide shutter removal

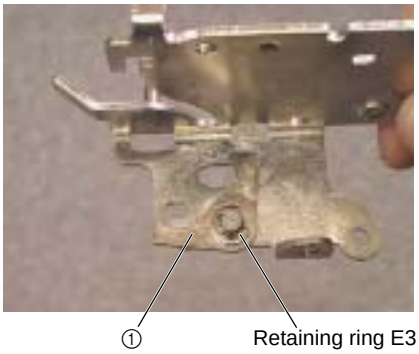
1. **Remove S19.**
2. **Remove retaining ring E3, and remove the thread guide shutter ① and the thread guide shutter link ②.**

Start movie clip (CD-ROM version only)



8 Tension releaser link removal

1. **Remove the retaining ring E3 and remove the tension releaser link ①.**



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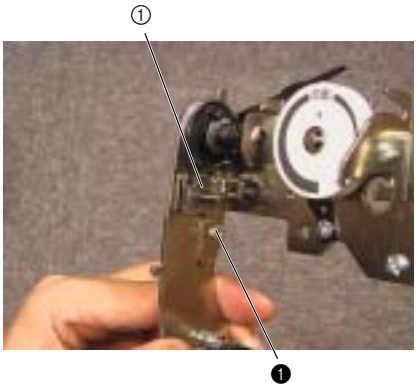
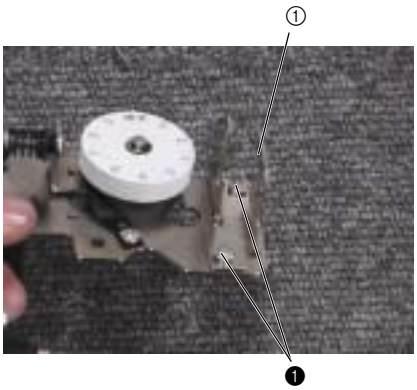
9 Plate assembly removal

1. **Remove the screw ❶, and remove the plate assembly ①.**



10 Thread guide removal

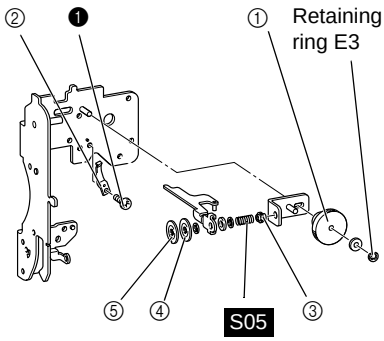
1. **Remove the screws ❶ (two), and remove the thread guide ①.**



11 Tension disk removal

1. **Remove the retaining ring E3, and remove the thread tension dial ① and polyester slider.**
2. **Remove the screw ❶, and remove the spring plate.**
3. **Loosen the thread tension adjusting screw ③, and remove the tension plate assy.**
4. **Remove the thread tension adjusting screw ③, S05, washer, tension disc washer, tension release plate assy., washer, tension disk B ④ and tension disk A ⑤.**

Start movie clip (CD-ROM version only)



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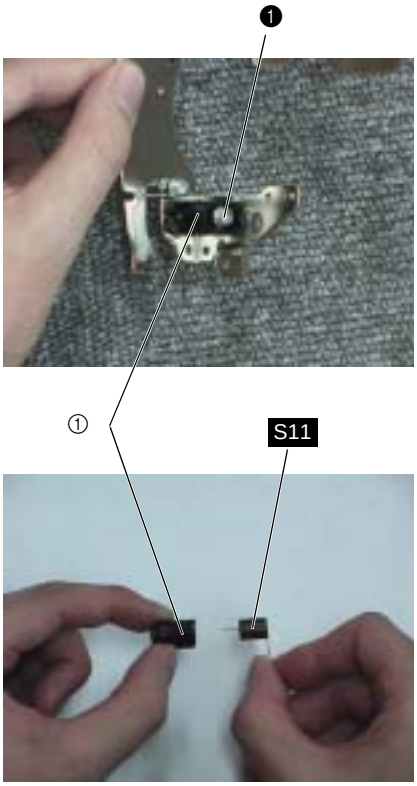
12 Thread take up spring removal

1. **Remove the screw ❶, and remove the thread catching spring case ①.**
2. **Remove the S11 from the thread catching spring case ①.**

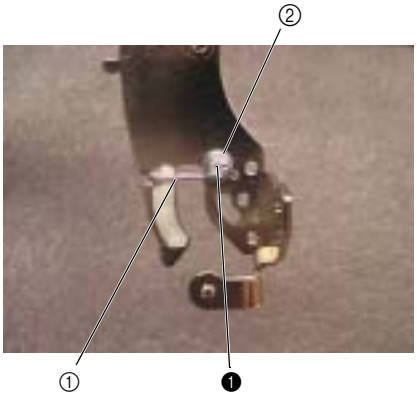
Start movie clip (CD-ROM version only)



13 Thread guide wire removal

1. **Remove the screw ❶, and remove the thread guide wire ① and washer ②.**

Start movie clip (CD-ROM version only)



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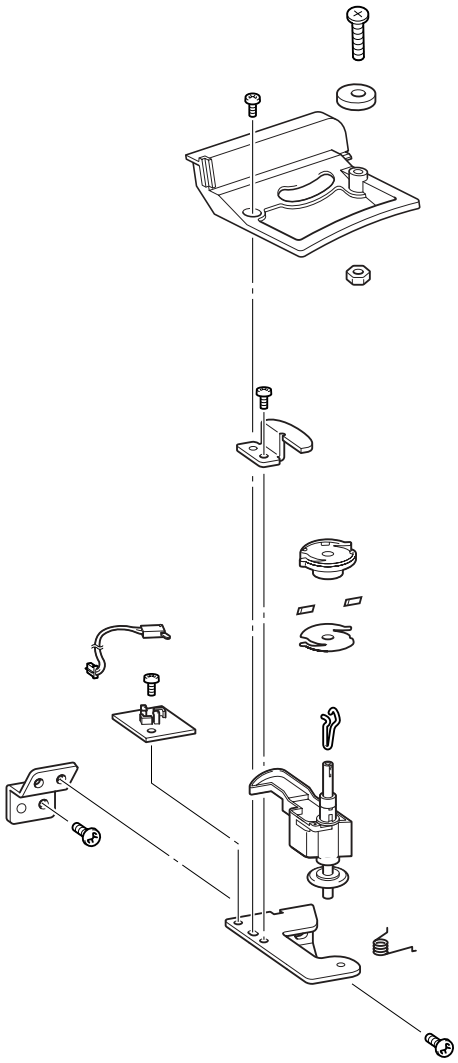
Bobbin winder mechanism location diagram



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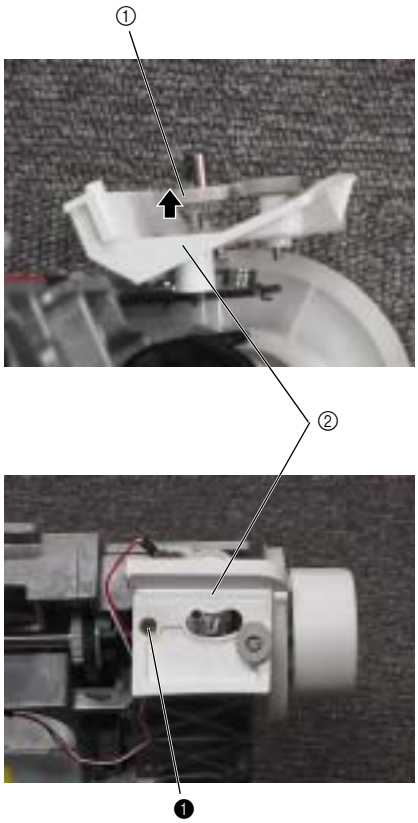
1 Bobbin winder cover removal

1. **Remove the bobbin base ①.**
2. **Remove the screw ❶, and remove the bobbin winder cover ②.**

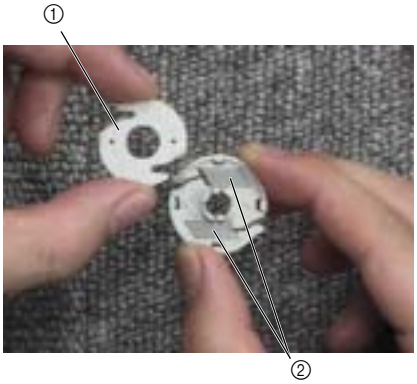
Start movie clip (CD-ROM version only)



2 Bobbin base disassembly

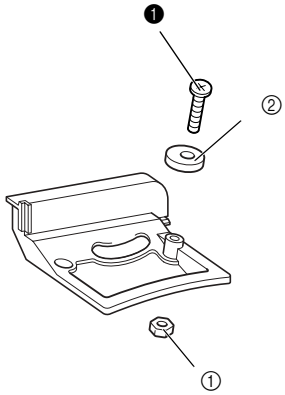
1. **Remove the bobbin thread cutter holder ①.**
2. **Remove the NT lower thread cutters (two) ②.**

Start movie clip (CD-ROM version only)



3 Bobbin presser removal

1. **Remove the screw ❶ and the 1 M3 nut ①, and remove the bobbin presser ②.**



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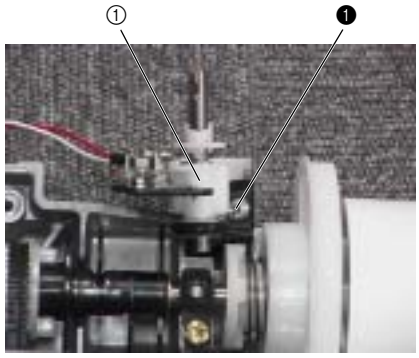
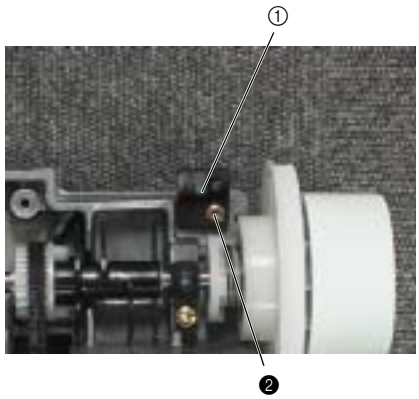
4 Bobbin winder assembly removal

1. **Remove the screw ❶, and remove the bobbin winder assembly ①.**



5 BW holder supporter removal

1. **Remove the screw ❷, and remove the BW holder supporter ①.**

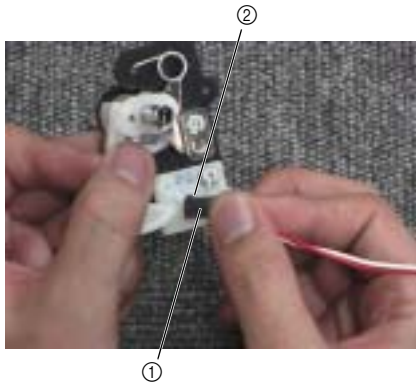


6 BW-F SW assy. removal

1. **Remove the BW-F SW assy. ①.**

   ***Key point**
   - Open the SW adjust plate ② clip and remove it.

Start movie clip (CD-ROM version only)



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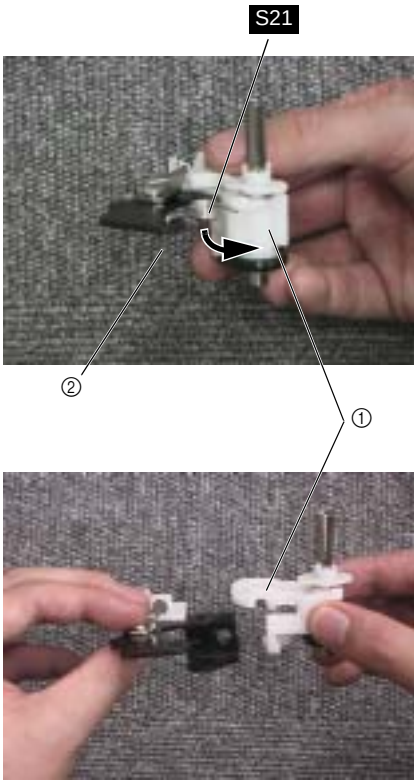
7 BW shaft holder assembly removal

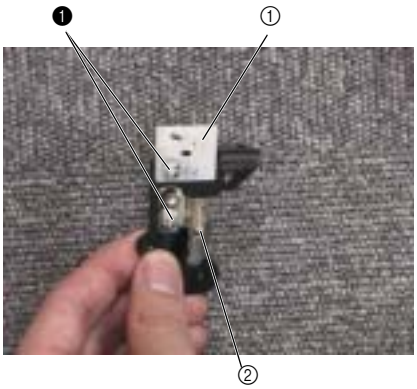
1. **Move the BW shaft holder assembly ① to the right ② (bobbin winding ON).**
2. **Remove S21.**
3. **Remove the BW shaft holder assembly ①.**

Start movie clip (CD-ROM version only)



8 Bobbin winder shaft stopper removal

1. **Remove the screws ❶ (two), and remove the SW adjust plate ① and the bobbin winder shaft stopper ②.**



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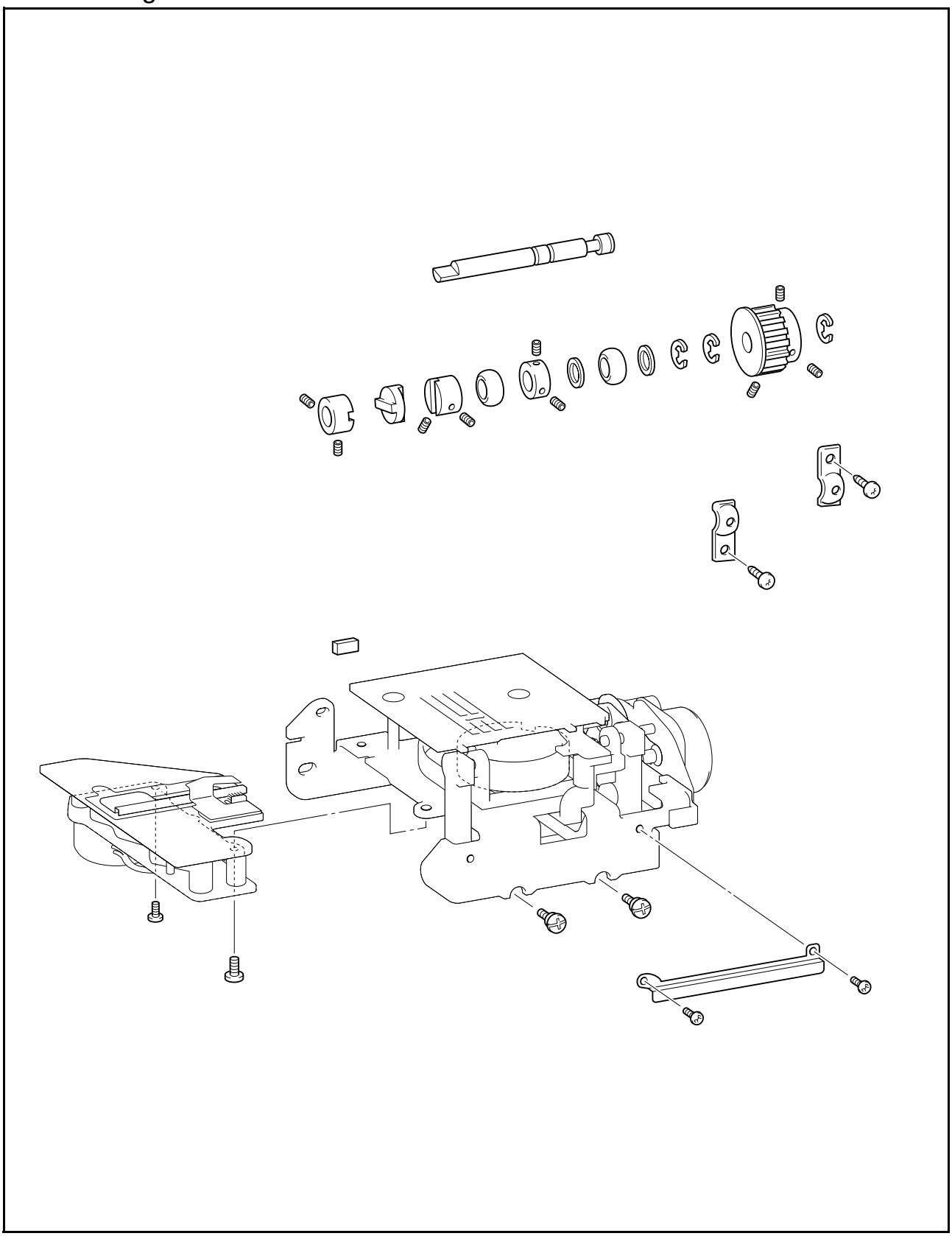
Rotary hook drive mechanism / Feed and bobbin mechanism / Cutter assy. location diagram



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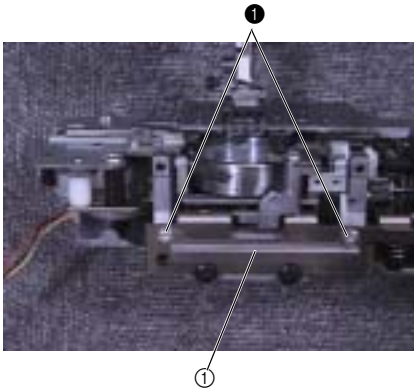
1 Leadline guide holder removal.

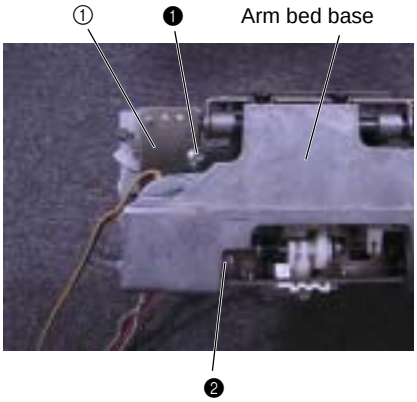
1. **Remove the screws ❶ (two), and remove the leadline guide holder ①.**

Start movie clip (CD-ROM version only)



2 Thread cutter module removal

1. **Remove the screw ❶ and the screw ❷, and detach the thread cutter module ①.**



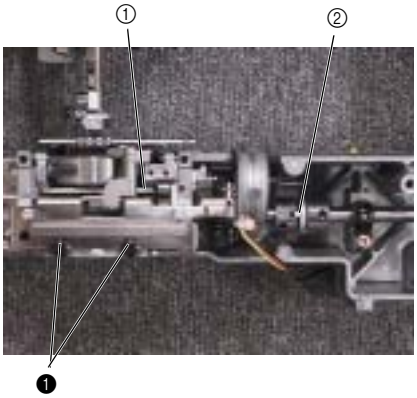
3 Feed module removal

1. **Rotate the upper shaft, and bring the needle bar to its highest point**
2. **Remove the screws ❶ (two), and detach the feed module ① and the disk ②.**

***Key point**

- Raise the needle bar to the top position.

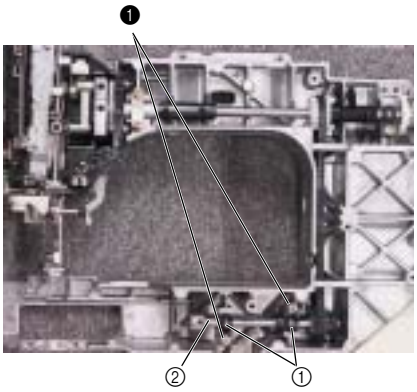
Start movie clip (CD-ROM version only)



4 Lower shaft A assy. removal

1. **Remove the screws ❶ (two), and remove the bushing pressers (two) ①.**
2. **Remove the lower shaft A assy. ②.**

Start movie clip (CD-ROM version only)



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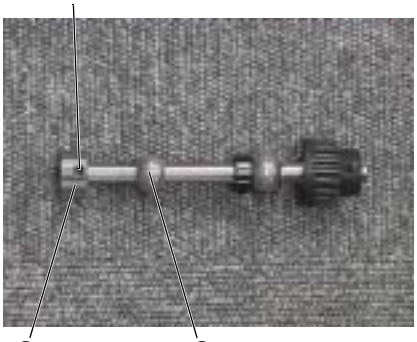
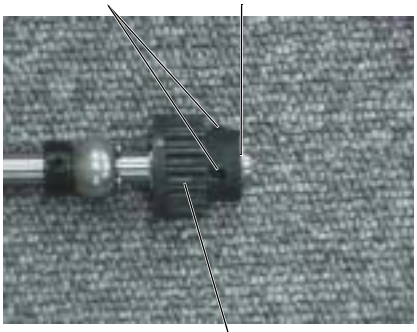
5 Joint removal

1. **Remove the screws ❶ (two), and remove the joint ① and the lower shaft bushing ②.**



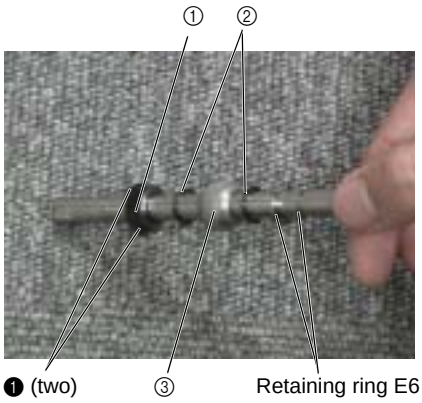
6 Timing pulley D removal

1. **Remove the screws ❶ (three).**
2. **Remove retaining ring E6, and remove timing pulley D ①.**



7 Lower shaft bushing removal

1. **Remove the screws ❶ (two), and remove the set screw collar ①, thrust washer ②, lower shaft bushing ③ and thrust washer ②.**
2. **Remove the retaining rings E6 (two).**



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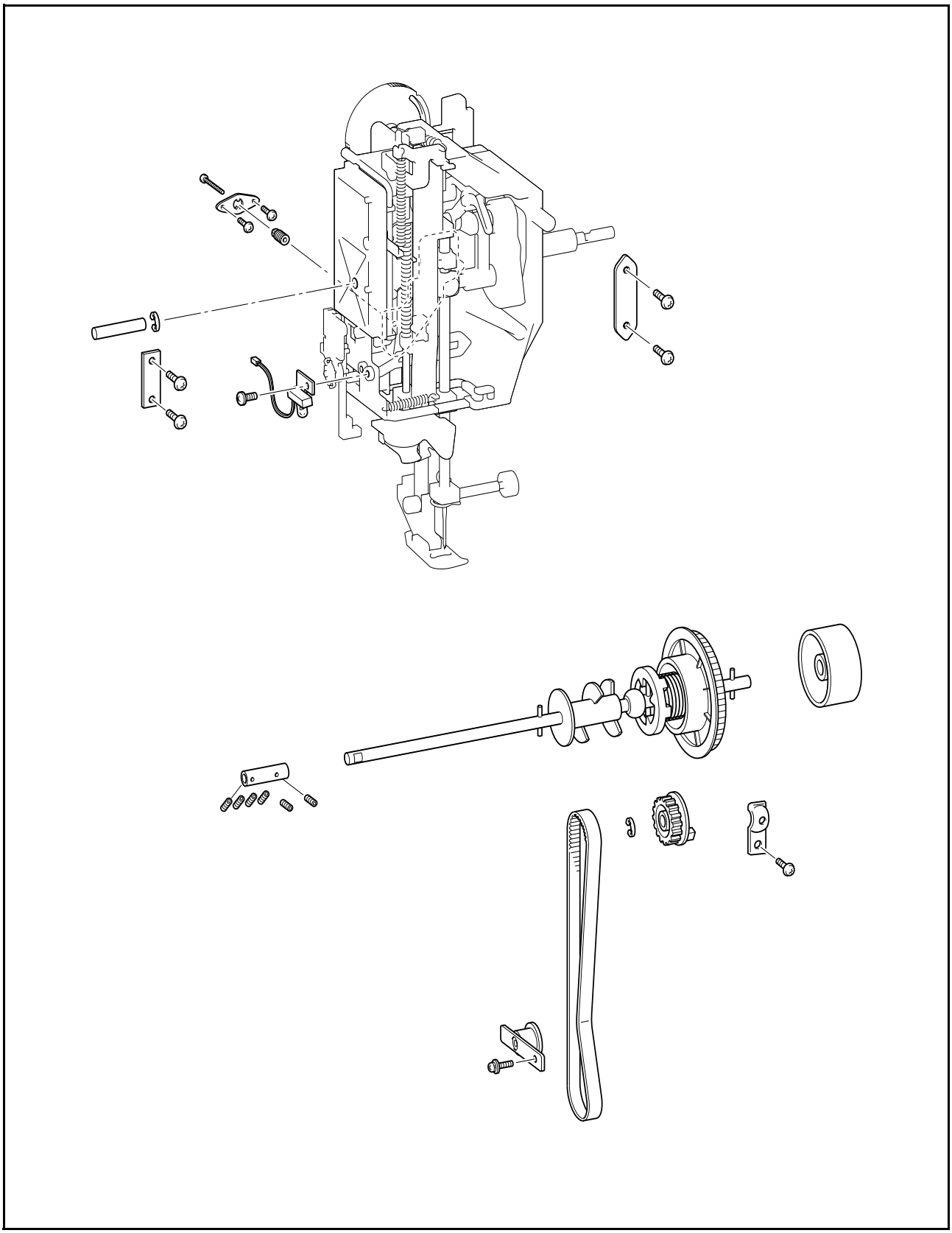
Needle bar, presser mechanism / Upper shaft mechanism location diagram



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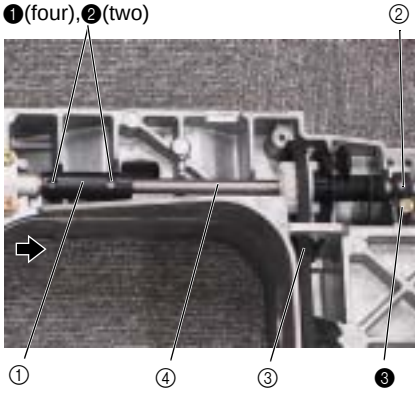
1 Upper shaft removal

1. **Remove the screws ❶ (four) and the screws ❷ (two), and slide the fixed joint ① to the right.**
2. **Remove the screw ❸, and detach the bushing presser ②.**
3. **Remove the timing belt ③ and the upper shaft ④.**
4. **Remove the fixed joint ① from the upper shaft ④.**

Start movie clip (CD-ROM version only)



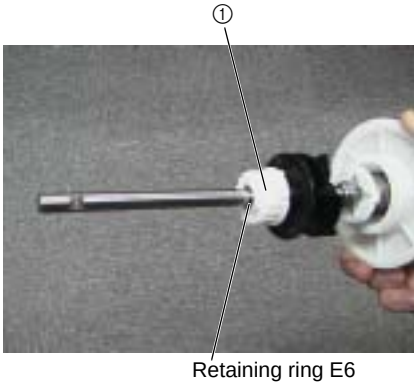
2 Pulley removal

1. **Remove the pulley ①.**

Start movie clip (CD-ROM version only)

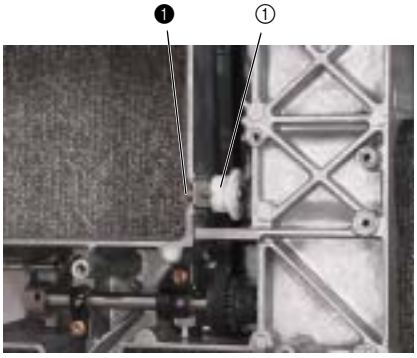
3 Upper shaft pulley removal

1. **Remove retaining ring E6, and remove the upper shaft pulley ①.**



4 Tension pulley assembly removal

1. **Remove the screw ❶, and remove the tension pulley assembly ①.**



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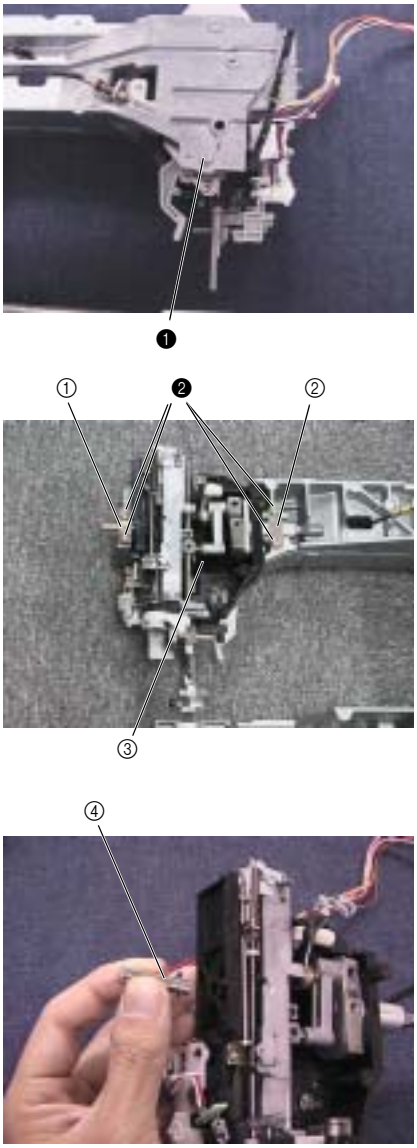
5 Needle-presser module removal

1. **Remove the screw ❶.**
2. **Remove the screws ❷ (four), and detach presser plate A ① and presser plate B ②.**
3. **Remove the needle-presser module ③.**
4. **Detach the shaft ④ from the needle-presser module ③.**

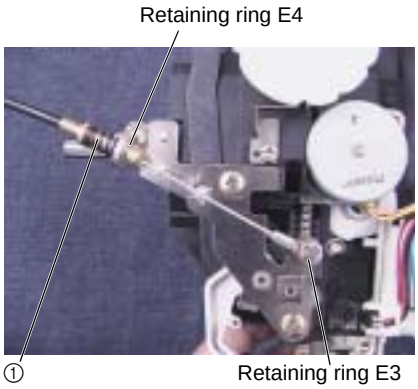
Start movie clip (CD-ROM version only)

*Rear view



6 Wire assy. removal

1. **Remove retaining ring E3.**
2. **Remove retaining ring E4, and remove the wire assy. ①.**



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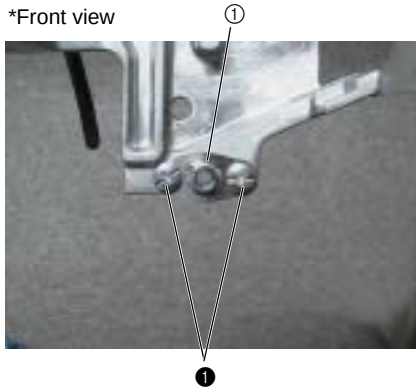
7 Plate spring removal

1. **Remove the adjusting screw ①**
2. **Remove the screws ❶ (two), and remove the plate spring ①.**

*Rear view

*Front view



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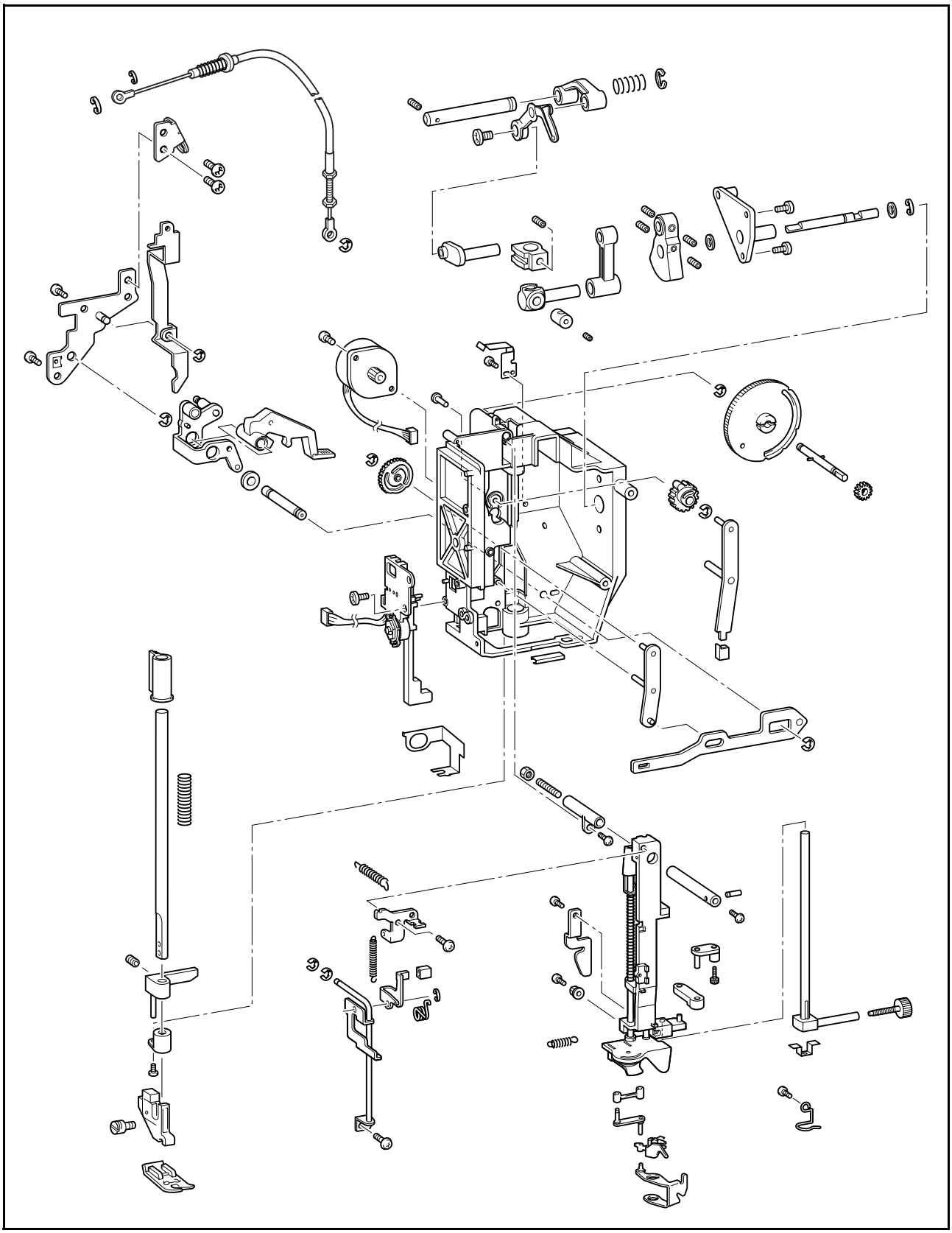
Needle-presser module breakout diagram



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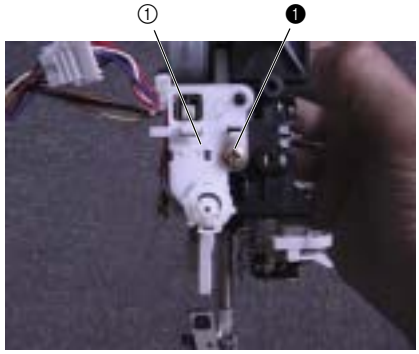
1 BH switch assy. removal

1. **Remove the screw ❶, and detach the BH switch assy. ①.**

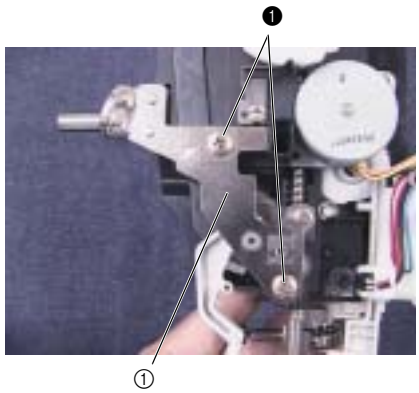


2 Presser feed holder assy. removal

1. **Remove the screw ❶, and detach the presser feed holder assy ①.**

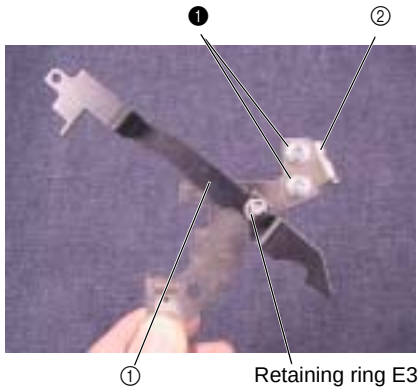
3 Adjusting plate assy. removal

1. **Remove the screws ❶ (two), and remove the adjusting plate assy. ①.**



4 Adjusting plate assy. disassembly

1. **Remove the retaining ring E3, and detach the tension releaser C ①.**
2. **Remove the screws ❶ (two), and detach wire guide plate U ②.**



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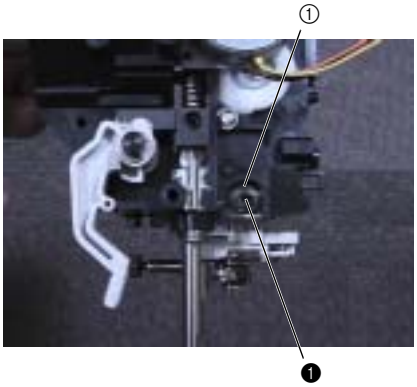
5 Spring-Z removal

1. **Remove S20.**

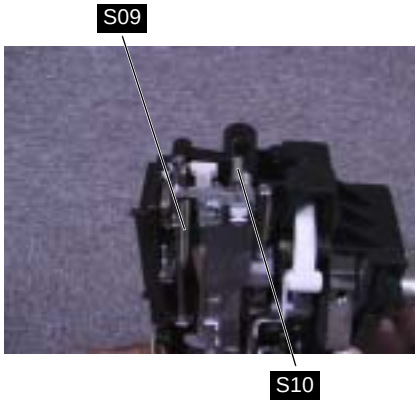
6 Zigzag adjusting nut removal

1. **Remove the screw ❶, and remove the zigzag adjusting nut ①.**



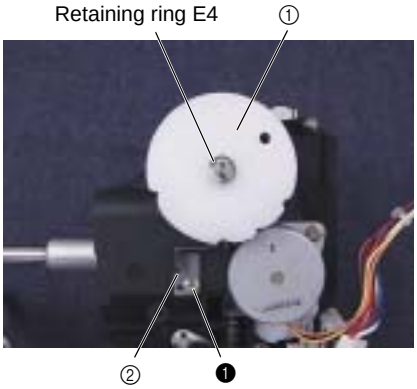
7 Lever A spring and spring removal

1. **Detach S09 and S10.**



8 Presser dial removal

1. **Remove retaining ring E4, and presser dial ①.**
2. **Remove the screw ❶, and remove the spring plate ②.**



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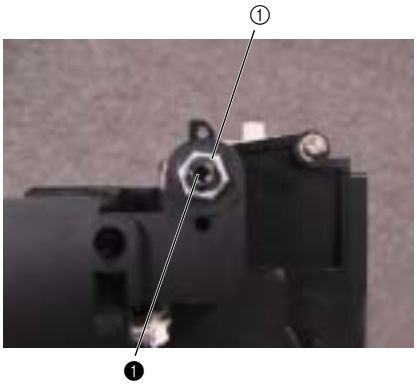
9 Lock nut removal

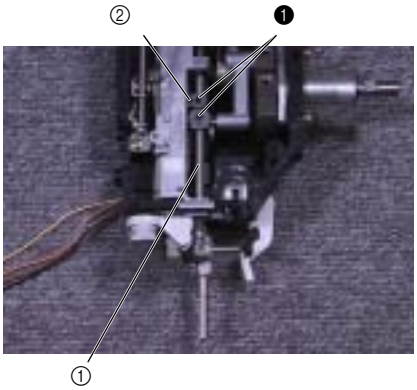
1. **Remove the lock nut ① and the screw ❶.**



10 Needle bar assembly removal

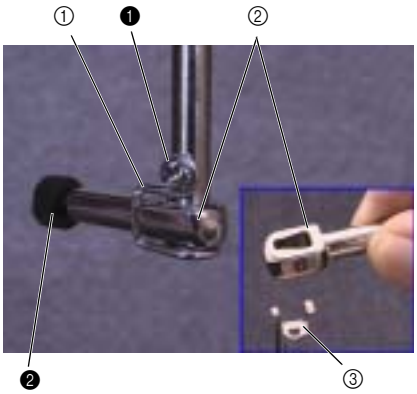
1. **Remove the screws ❶ (two).**
2. **Remove needle bar ① and needle thread block ②.**

Start movie clip (CD-ROM version only)



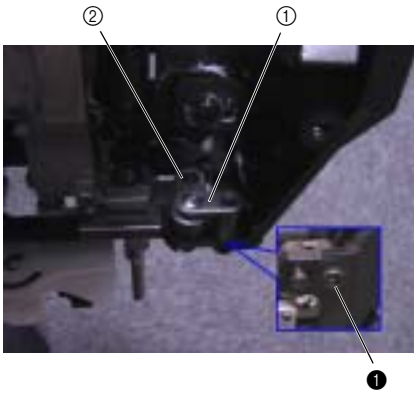
11 Needle bar assy. disassembly

1. **Remove the screw ❶, and detach needle bar thread guide ①.**
2. **Remove the screw ❷, and remove the needle block ②.**
3. **Remove the needle thread plate ③ from the needle block ②.**



12 Needle holder shaft block removal

1. **Remove the screw ❶, and remove the needle holder shaft block ① and needle holder block ①.**



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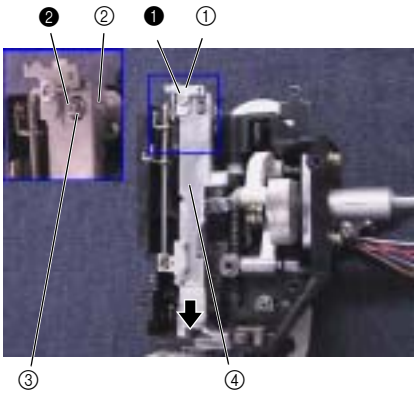
13 Needle bar supporter assy. removal

1. **Remove the screw ❶, and remove the plate ①.**
2. **Remove the screw ❷, and remove the shaft ②.**
3. **Remove the shaft ③.**
4. **Remove the needle bar supporter assy. ④.**

***Key point**

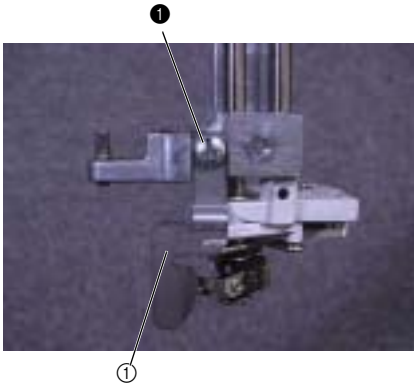
- Move the Z zigzag lever assy. to the right.

Start movie clip (CD-ROM version only)



14 Hook release plate removal

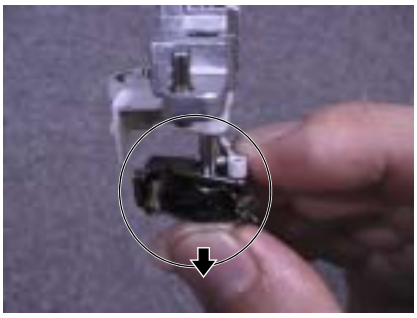
1. **Remove the screw ❶, and detach the hook release plate ①.**



15 Threader hook assy. disassembly

1. **Remove the thread guide assy., threader hook assy., link A assy., and link B.**

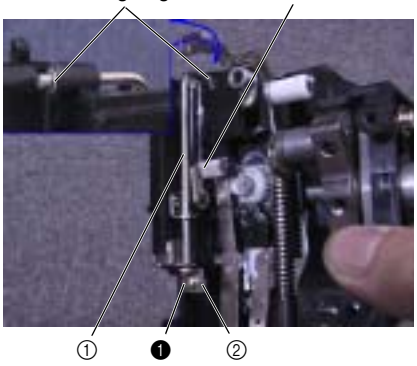
Start movie clip (CD-ROM version only)



16 Lever AB assy. removal

1. **Remove retaining ring E2.**
2. **Remove the screw ❶, and remove the lever guide shaft ①, lever presser plate ② and lever AB assy. ③.**
3. **Remove retaining ring E2 from the lever guide shaft ①.**

Start movie clip (CD-ROM version only)



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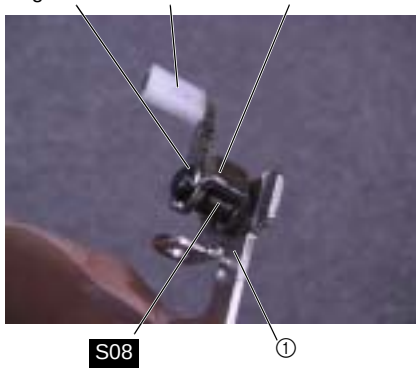
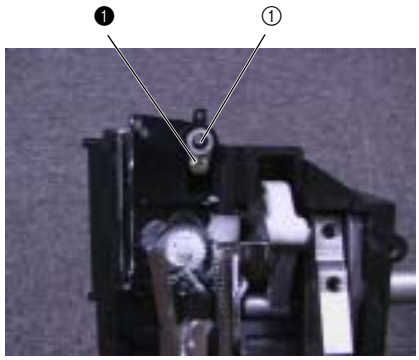
17 Lever AB assy. disassembly

1. **Remove retaining ring E3, and remove lever B ② and S08 from the lever A assy. ①.**
2. **Remove the cap ③ from lever B ②.**



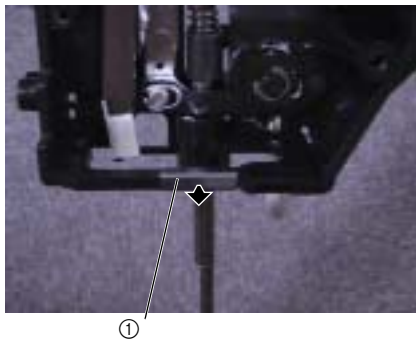
18 Shaft bushing A removal

1. **Remove the screw ❶, and detach shaft bushing A ①.**



19 Thread guide plate removal

1. **Remove thread guide pate ①.**



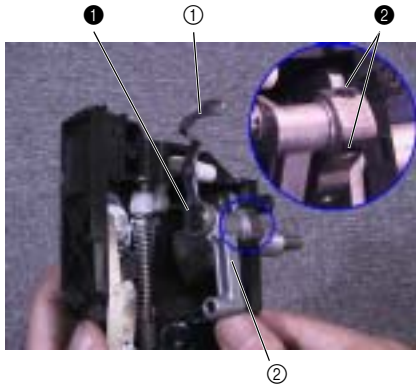
20 Thread take-up assy. disassembly

1. **Remove the screw ❶, and detach the thread take-up lever assy. ①.**

NOTE •The screw ❶ is reverse threaded.

2. **Remove the screws ❷ (two), and detach the needle bar crank rod assy. ②.**

Start movie clip (CD-ROM version only)



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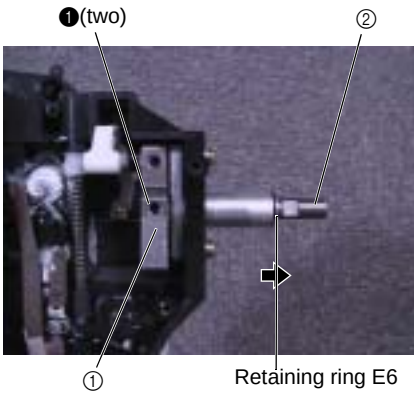
21 Thread take-up counter weight removal

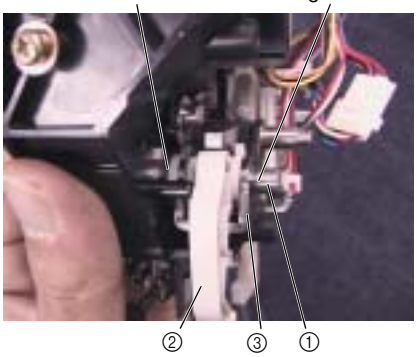
1. **Remove the screws ❶ (two), and thread take-up counter weight ①, thrust washer, unit shaft ② and thrust washer.**
2. **Remove retaining ring E6 from the unit shaft ②.**

Start movie clip (CD-ROM version only)



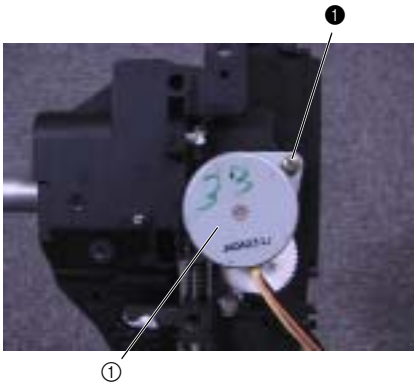
22 Presser foot lifter removal

1. **Remove retaining ring E4.**
2. **Remove the presser lift shaft ①, presser foot lifter ②, lifter assy. ③ and washer ④.**
3. **Remove retaining ring E4 from the presser lift shaft ①.**



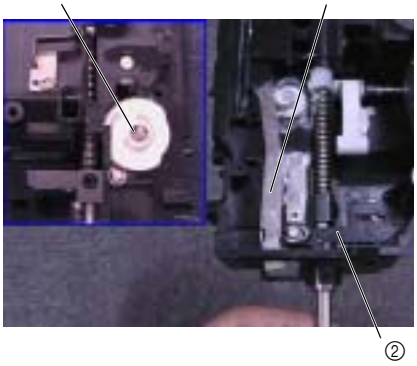
23 Z pulse motor removal

1. **Remove the screw ❶, and detach the Z pulse motor (ZPMSMJ35-4840-A) ①.**



24 Z zigzag lever and thread releaser assy. removal

1. **Remove retaining ring E3.**
2. **Detach the Z zigzag lever ① and thread releaser assy. ②.**
3. **Remove the Z lever cup from the Z zigzag lever ①.**



Disassembly

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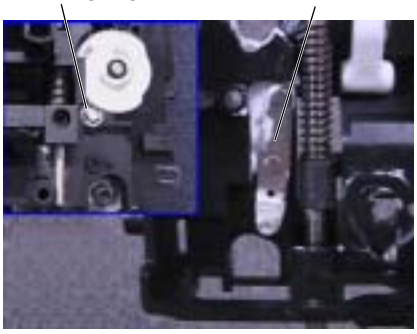
25 Thread release lever assy. removal

1. **Remove retaining ring E3.**
2. **Remove the thread release lever assy. ① and the polyester slider.**



26 Remove the Z zigzag cam and shaft.

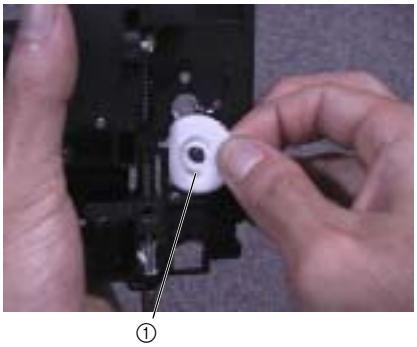
1. **Remove retaining ring E2, and remove the Z zigzag cam ①.**
2. **Remove the shaft ②.**

Start movie clip (CD-ROM version only)

27 T cam removal

1. **Remove the T cam ①.**

Start movie clip (CD-ROM version only)



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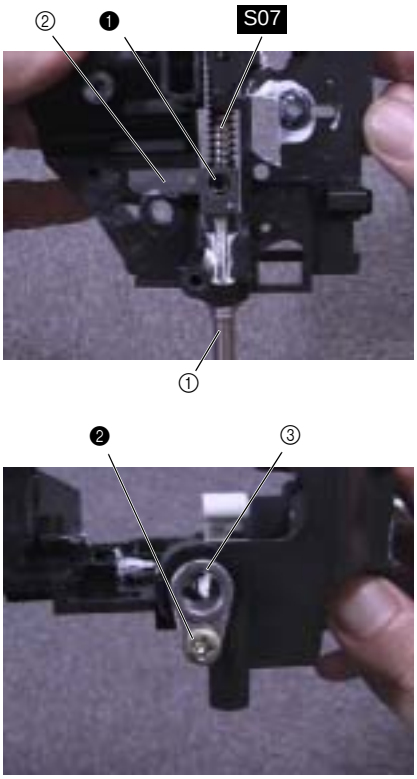
28 Presser bar removal

1. Remove the screw ❶, and remove the presser bar ①, presser bar clamp assy. ②, S07 and presser spring supporter.
2. Remove the screw ❷, and detach the presser bar bushing ③.

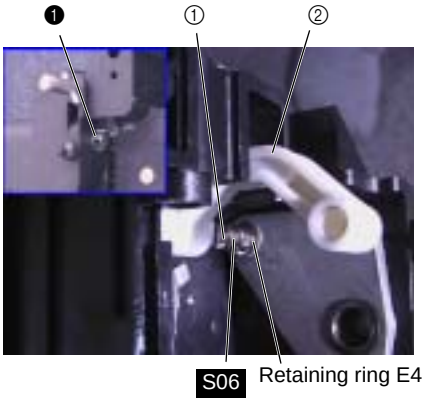
Start movie clip (CD-ROM version only)



29 Thread take-up lever link removal

1. Remove the screw ❶.
2. Remove retaining ring E4, and remove the shaft ①, S06 and thread take-up lever link ②.

Start movie clip (CD-ROM version only)



30 Shaft bushing assembly removal

1. Remove the screws ❶ (two), and remove the shaft bushing assembly ①.

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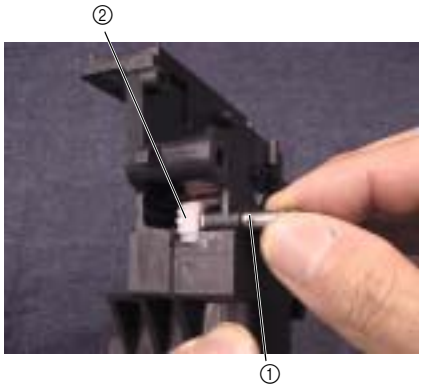
31 Presser dial gear removal

1. **Remove the presser dial gear shaft assy. ①, and remove the presser dial gear ②.**



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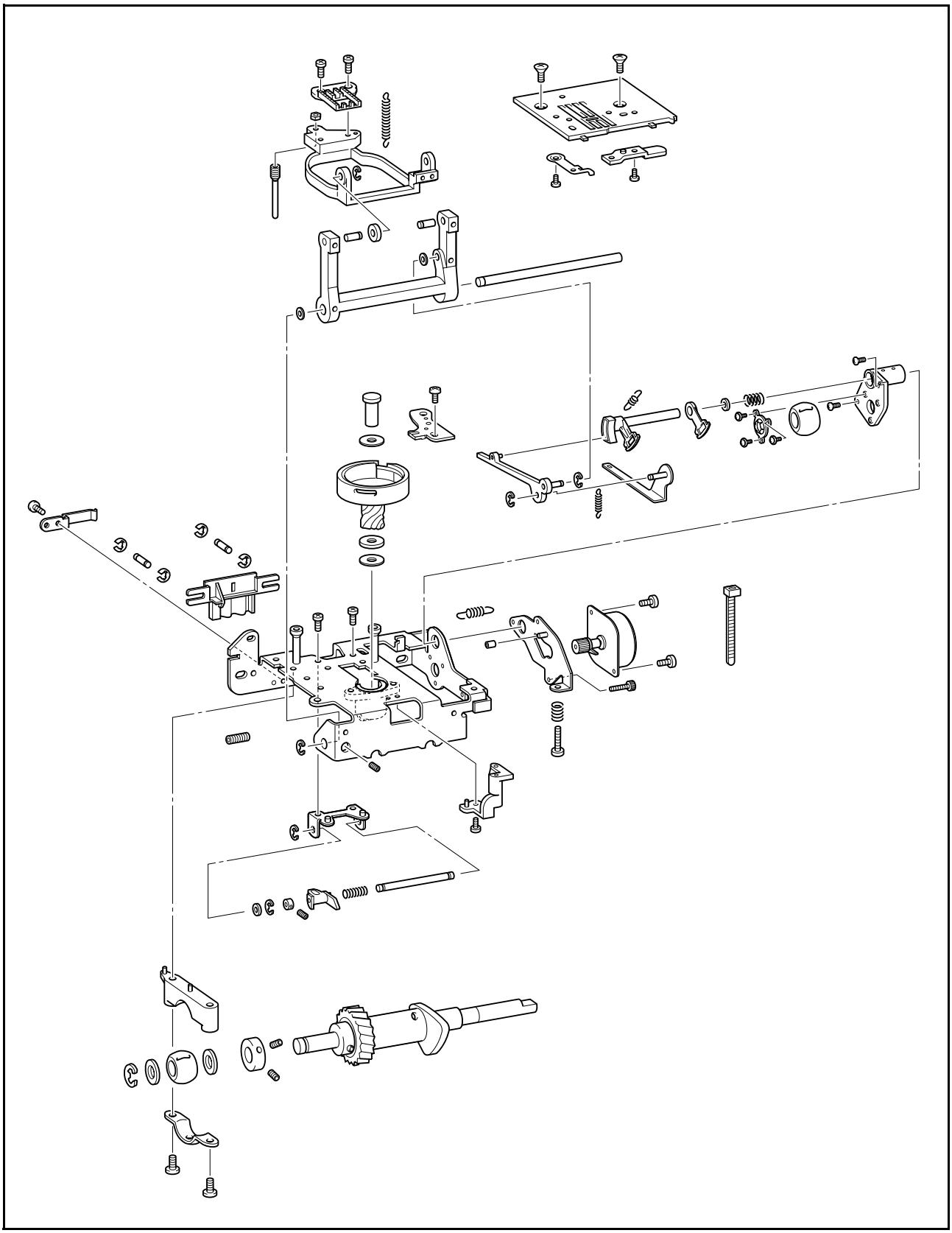
Feed and bobbin module breakout diagram



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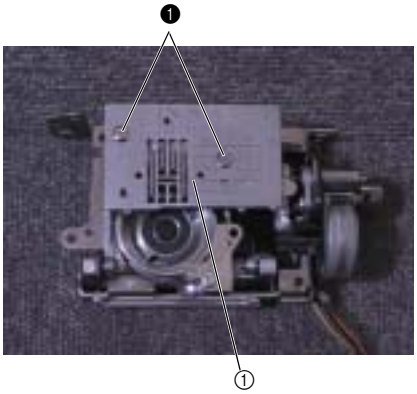
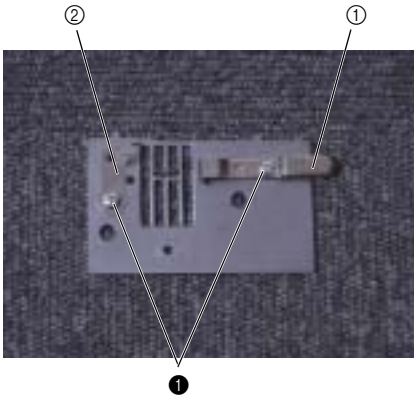
1 Needle plate A removal

1. **Remove the screws ❶ (two), and remove needle plate A ①.**



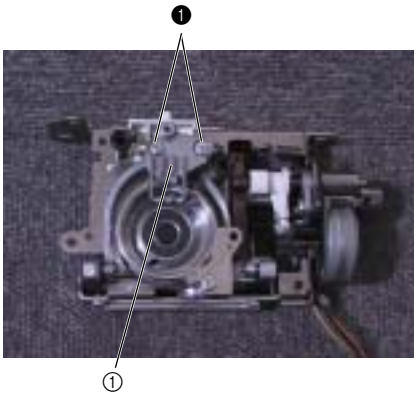
2 Needle plate A disassembly

1. **Remove the screws ❶ (two), and remove the F gear stopper plate ① and the stopper plate ②.**



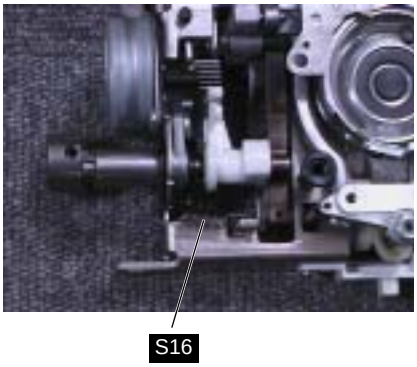
3 Feed dog removal

1. **Remove the screws ❶ (two), and remove the feed dog ①.**



4 FPM spring removal

1. **Remove S16.**



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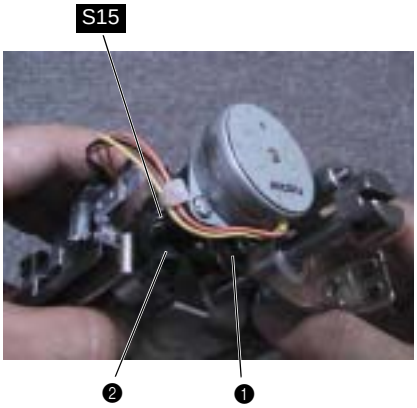
5 F pulse motor assembly removal

1. **Remove the screw ❶ and the screw ❷, and detach the S15 and the F pulse motor assembly.**

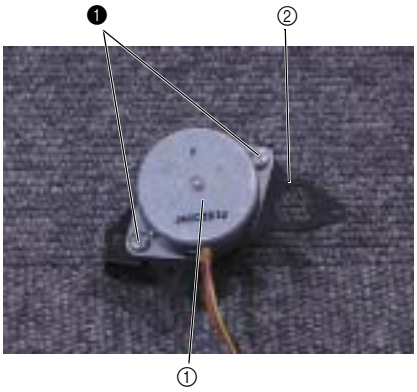
Start movie clip (CD-ROM version only)



6 F pulse motor disassembly

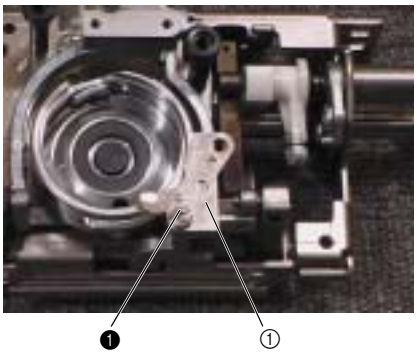
1. **Remove the screws ❶ (two), and remove the F pulse motor (FPMSMJ35-4840-C) ①.**
2. **Remove the rubber from the FPM holder assy. ②.**

Start movie clip (CD-ROM version only)



7 Inner rotary hook bracket assy. removal

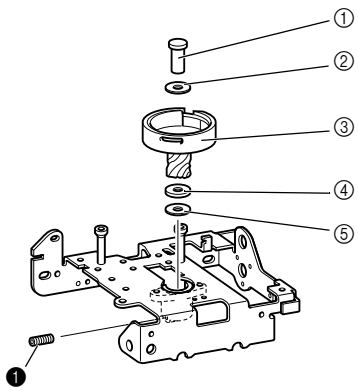
1. **Remove the screw ❶, and remove the inner rotary hook bracket assy. ①.**



8 Outer rotary hook assy. removal.

1. **Remove the screw ❶, and remove the outer rotary hook shaft ①, spacer ②, outer rotary hook assy. ③, washer 6 ④ and the spacer ⑤.**

NOTE •Spacer and washer 6 attachment order
outer rotary hook shaft --> spacer (thin) --> outer rotary hook assy. ① --> washer 6 (thick) --> spacer (thin)



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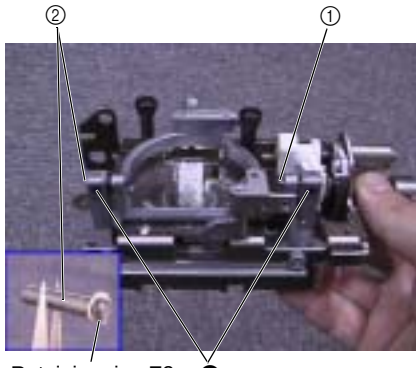
9 Feed bar spring removal

1. **Remove S17.**

10 Feed bar removal

1. **Remove the screws ❶ (two), and remove the feed bar shaft A ①, feed bar spacer and feed bar shaft B ②.**
2. **Remove the feed bar.**
3. **Remove retaining ring E2 from feed bar shaft B ②.**

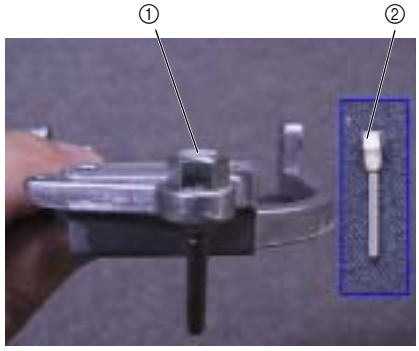
Start movie clip (CD-ROM version only)



11 Vertical adjusting screw removal

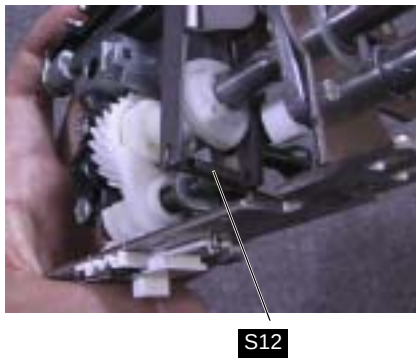
1. **Remove the vertical adjusting screw ①.**
2. **Remove the M5 nut ② from the vertical adjusting screw ①.**

Start movie clip (CD-ROM version only)



12 Feed supporting plate spring removal

1. **Remove S12.**



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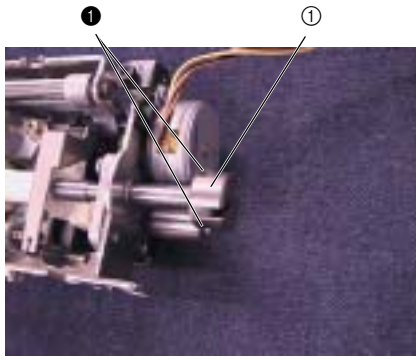
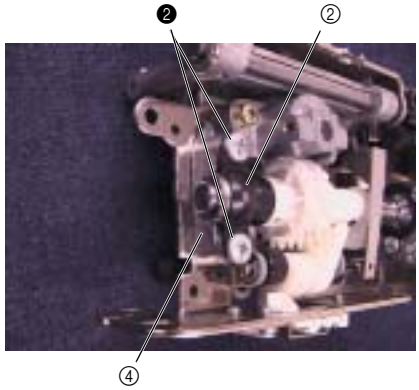
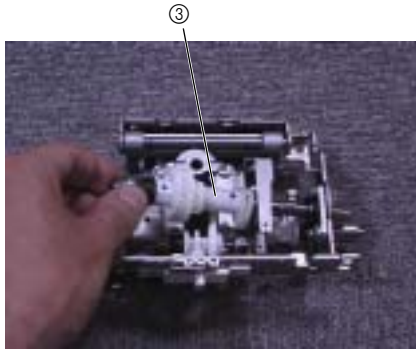
13 Lower shaft B assy. removal

1. **Remove the screws ❶ (two), and remove the joint ①.**
2. **Remove the screws ❷ (two), and remove bushing presser A ②.**
3. **Remove the lower shaft B assy. ③.**
4. **Remove the bushing supporter A ④ from the feed base.**

Start movie clip (CD-ROM version only)

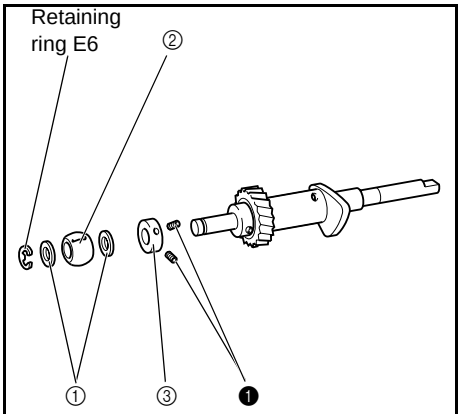






14 Lower shaft B assy. disassembly

1. **Remove retaining ring E6, and remove the thrust washer ①. lower shaft bushing ② and thrust washer ①.**
2. **Remove the screws ❶ (two), and remove the set screw collar ③.**



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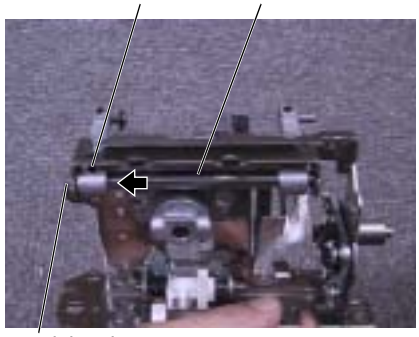
15 Feed arm assy. removal

1. **Remove the screw ❶, and remove the horizontal feed shaft ① and the polyester slider.**
2. **Remove the feed arm assy.**
3. **Remove retaining ring E5 from the horizontal feed shaft ①.**

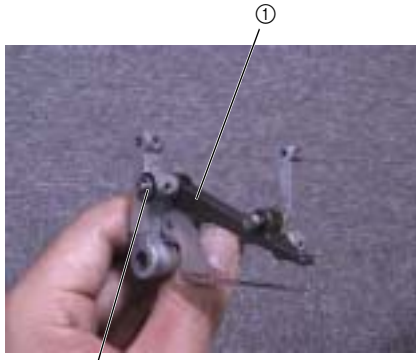
Start movie clip (CD-ROM version only)

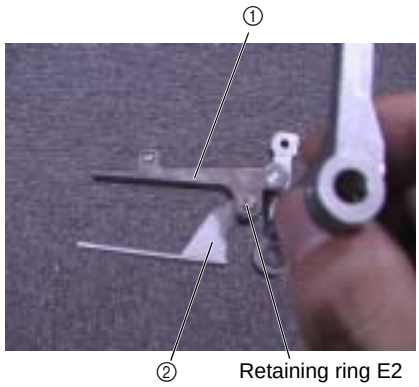


16 Feed arm assy. disassembly

1. **Remove the retaining ring E3, and remove feed arm B assy. ① and the polyester slider.**
2. **Remove the retaining ring E2, and remove the feed supporting plate assy. ② from the feed arm B assy ①.**

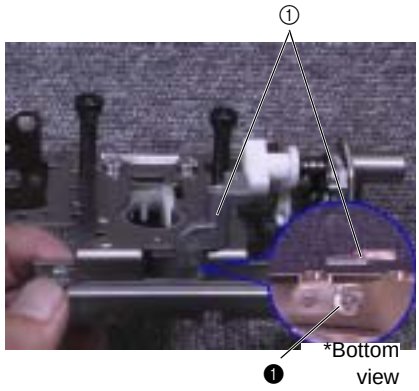
Start movie clip (CD-ROM version only)





17 Stopper plate block assy. removal

1. **Remove the screw ❶, and remove the stopper plate block assy. ①.**



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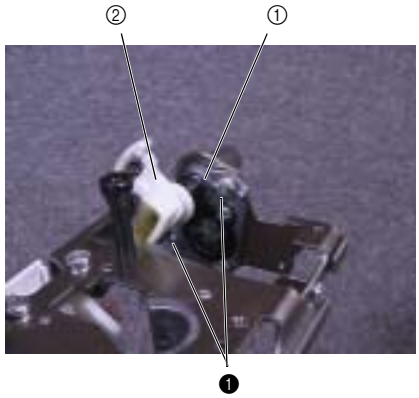
18 Feed adjuster assembly removal

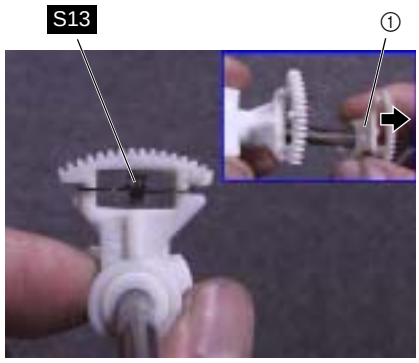
1. **Remove the screws ❶ (two), and remove the bushing supporter assy. ①, feed adjuster assembly ②, S14 and polyester slider.**

Start movie clip (CD-ROM version only)



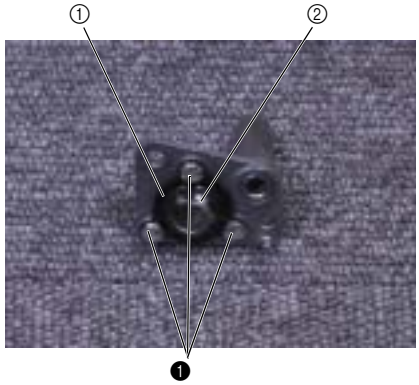
19 Feed adjuster assembly disassembly

1. **Remove S13, and detach the F gear ①.**



20 Bushing presser B removal

1. **Remove the screws ❶ (three), and remove bushing presser B ① and the lower shaft bushing ②.**



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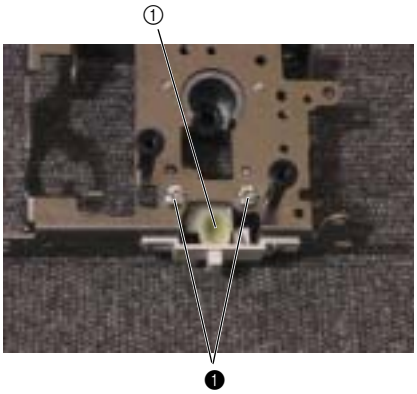
21 Drop assy. removal

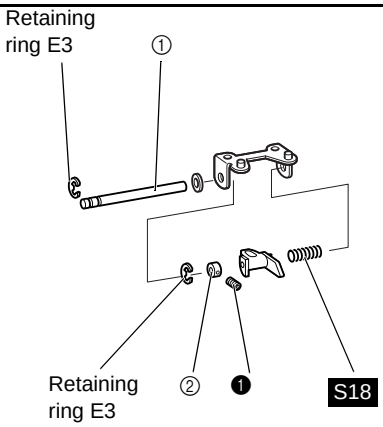
1. **Remove the screws ❶ (two), and remove the drop assy. ①.**



22 Drop assy. disassembly

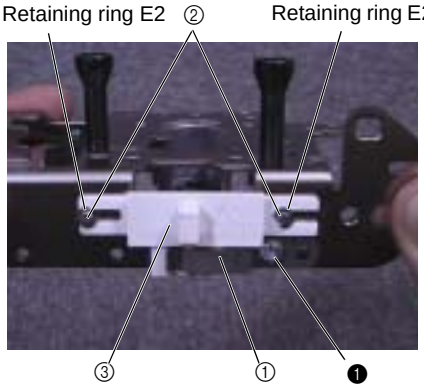
1. **Remove the screw ❶.**
2. **Remove retaining ring E3, and remove the vertical feed shaft ①, polyester slider, set screw collar 4 ② and S18.**
3. **Remove retaining ring E3 from the vertical feed shaft ①.**

Start movie clip (CD-ROM version only)



23 Drop knob removal

1. **Remove the screws ❶, and remove the spring plate ①.**
2. **Remove retaining rings E2 (two), and remove slide shafts B ② (two) and the drop knob ③.**
3. **Remove retaining rings E2 (two) from the slide shafts B ② (two).**



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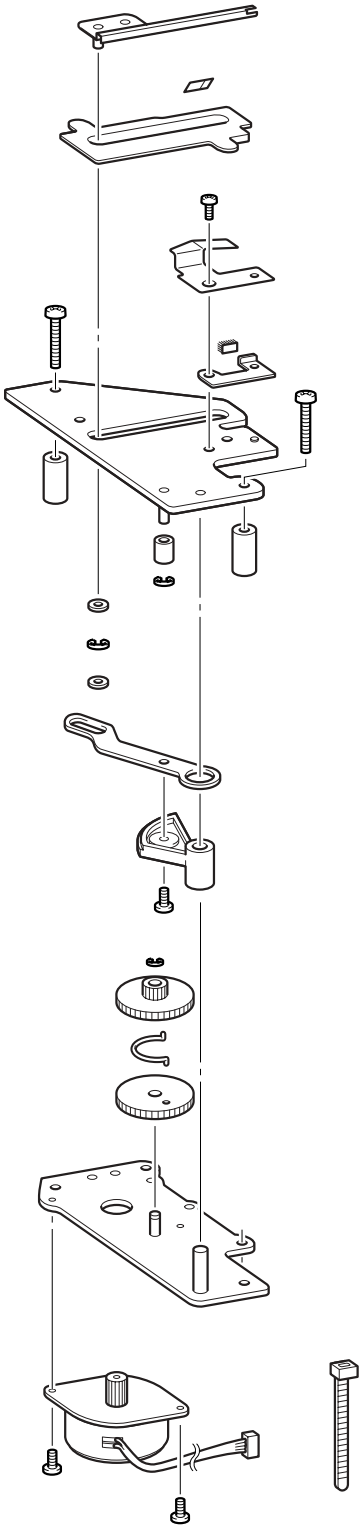
Thread cutter module breakout diagram



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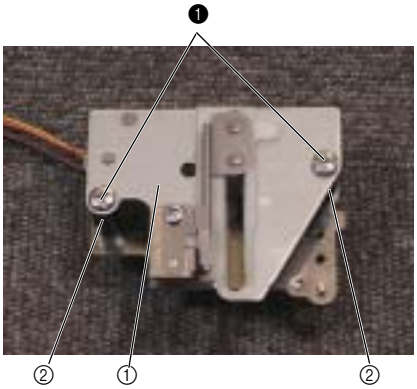
1 Thread cutter frame assy. removal

1. **Remove the screws ❶ (two), and remove the thread cutter frame assy. ①, collars ② (two) and polyester slider.**

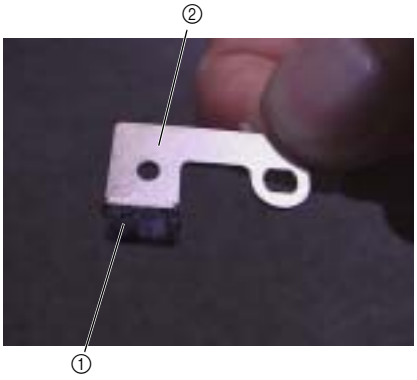


2 Presser plate removal

1. **Remove the screw ❶, and detach the presser plate and spring plate ①.**

3 Pile 4 x 8 removal

1. **Remove the pile 4 x 8 ①.**



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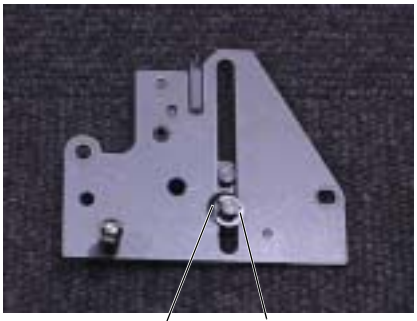
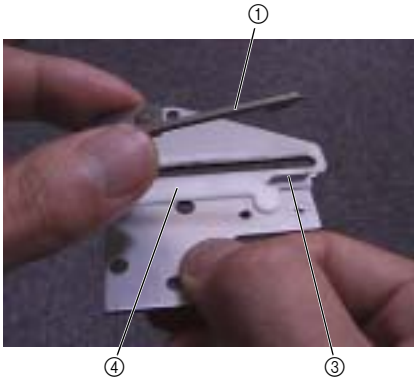
4 Thread hook assy. disassembly

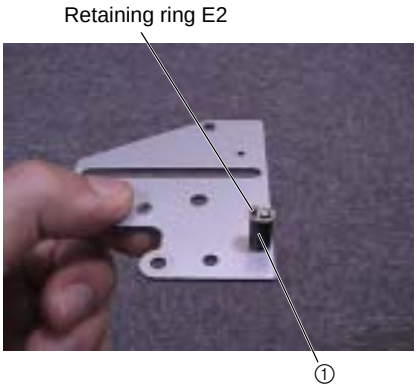
1. **Remove retaining ring E4, and remove the thread hook assy. ①, polyester slider ② and NT lower thread cutter ③.**
2. **Detach the spacer ④.**





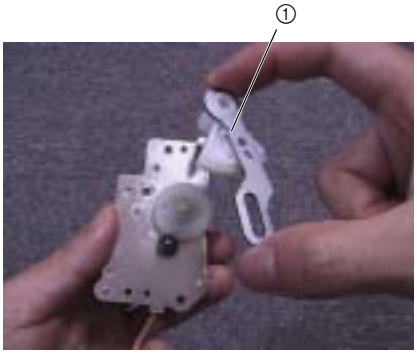
5 Rubber removal

1. **Remove retaining ring E2, and remove the rubber ①.**



6 Thread cutter lever assy. removal

1. **Remove the thread cutter lever assy. ①.**



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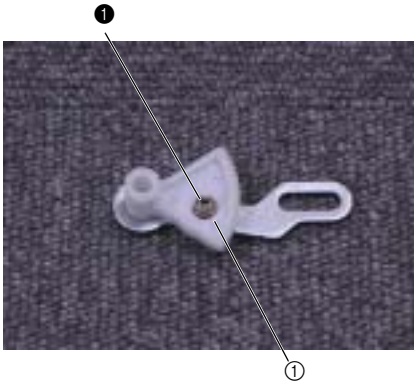
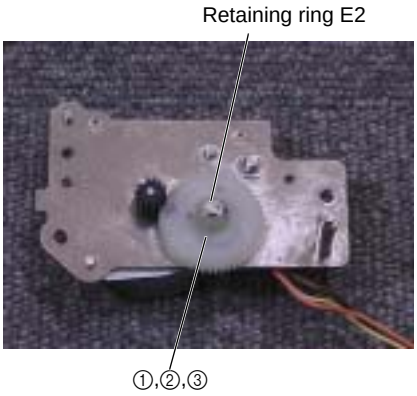
7 Thread cutter lever assy. disassembly

1. **Remove the screw ❶, and remove the thread cutter lever gear ①.**



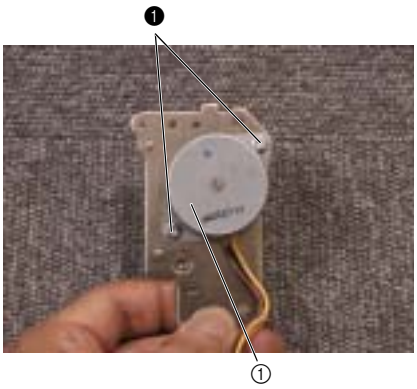
8 Idle gear A and idle gear B removal

1. **Remove the retaining ring E2, and remove idle gear A ①, idle gear B ② and the spring ③.**



9 C pulse motor removal

1. **Remove the screws ❶ (two), and remove the C pulse motor (CPMSMJ35-4840-B) ①.**



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3 Assembly

When disassembly and assembly are performed, make adjustments according to "4 Adjustments."

Main unit	Needle bar, presser mechanism / upper shaft mechanism	3 - 2
	Rotary hook drive mechanism / Feed and bobbin mechanism / Cutter assy.	3 - 7
	Bobbin winder mechanism	3 - 12
	Thread tension mechanism	3 - 16
	Electrical parts and motors	3 - 23
	Main parts	3 - 31
Modules	Needle-presser module	3 - 39
	Feed module	3 - 56
	Thread cutter module	3 - 70

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

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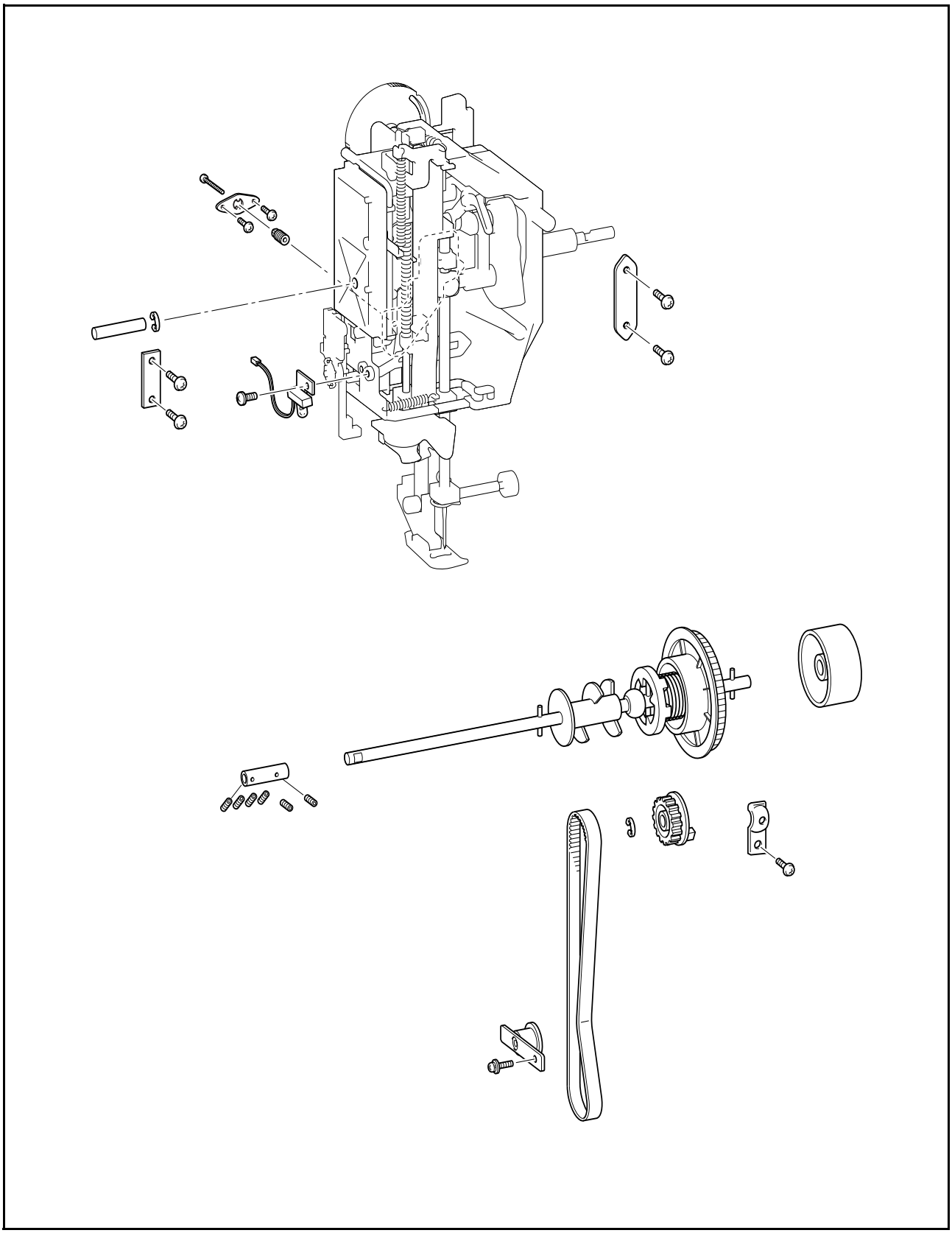
Needle bar, presser mechanism / upper shaft mechanism location diagram



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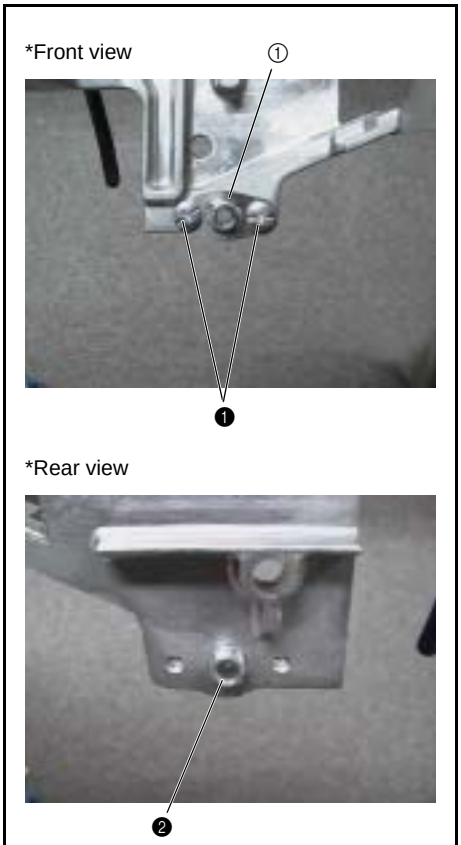
1 Plate spring attachment

1. **Attach the plate spring ① from the front of the arm bed using the screws ❶ (two).**
2. **Attach the plate spring ① from the back of the arm bed using the adjusting screw ②.**

***Key point**

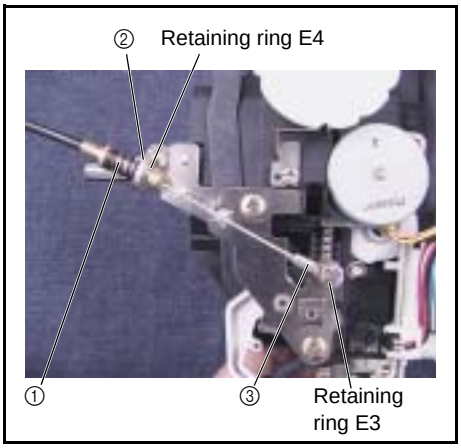
- Tighten adjusting screw ② so that the screw threads are completely hidden.

❶	Screw, Bind M4X5 Color; Silver	Torque 1.18 – 1.57 N·m



2 Wire assy. attachment (lifter assy.)

1. **Insert the fitting ① (on the spring side) on the end of the wire assy. into the wire holder ② on the lifter assy., and attach retaining ring E4.**
2. **Attach the hook ③ on the end of the wire assy. to the lifter assy. shaft, and attach retaining ring E3.**



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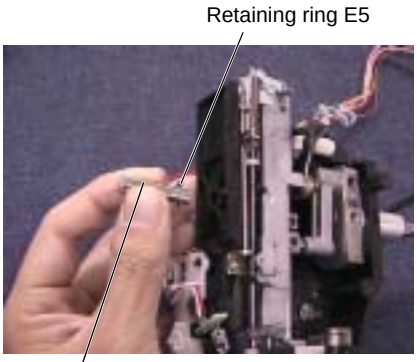
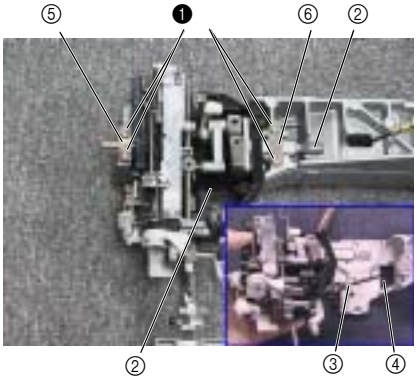
3 Needle-presser module attachment

1. **Attach retaining ring E5 to the shaft ①.**
2. **Insert the shaft ① into the shaft hole on the left side of the needle bar and presser module ②.**

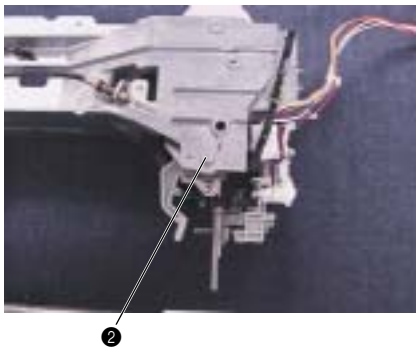
   ***Key point**
   - With retaining ring E5 as the stop point, insert the short side.
3. **Attach the needle-presser module ②, taking the wire assy. ③ through the arm bed hole ④ to the back.**
4. **Move the shaft ① to the needle-presser module ② side, and attach presser plate A ⑤ using the screws ❶ (two).**
5. **Attach presser plate B ⑥ using the screws ❶ (two).**
6. **Hand start the screw ❷.**
   (4 - 11 Fully tighten after "Needle interference adjustment.")

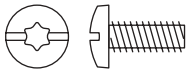
Start movie clip (CD-ROM version only)





*Rear view

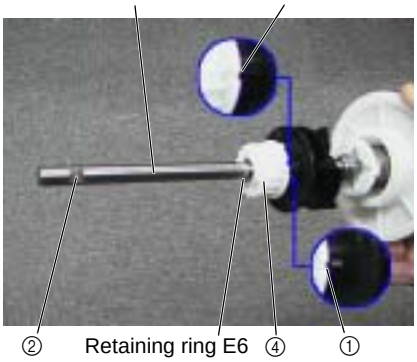


❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.98 N·m
❷		Screw, Pan M3X20 Color; Silver	Torque Hand tighten

4 Upper shaft pulley attachment

1. **Align the base line on the rotation shutter ① (on the same surface as the upper shaft ② D cut) and the base line on the upper shaft pulley ③, and attach the upper shaft pulley ④ to the upper shaft assy. ⑤.**
2. **Attach retaining ring E6.**

Start movie clip (CD-ROM version only)



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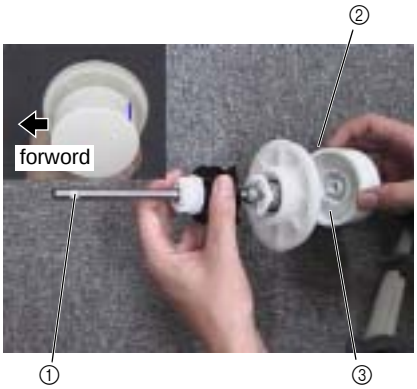
5 Pulley attachment

1. **Attach the pulley ① to the upper shaft assy.**

   ***Key point**
   - When the D cut ② on the upper shaft is facing forward, the pulley base line ③ is on the upper side.

Start movie clip (CD-ROM version only)



6 Upper shaft assy. attachment

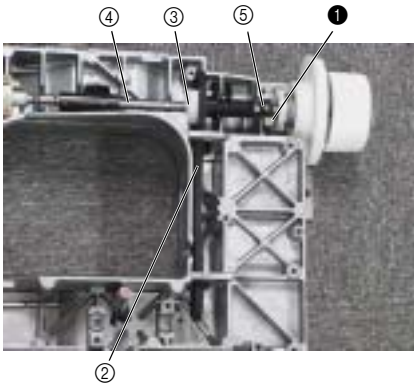
1. **Attach the fixed joint ① to the upper shaft.**

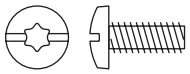
   ***Key point**
   - Attach so that the fixed joint ① screw holes are toward the left side.
2. **Place the timing belt ② around the upper shaft pulley ③, and insert the upper shaft assembly ④.**
3. **Attach the bushing presser ⑤ using the screw ❶.**

   ***Key point**
   - Move the fixed joint ① to the left side of the upper shaft.

Start movie clip (CD-ROM version only)

Screw holes toward the left side



❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.98 N·m

Assembly

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7 Connecting the needle-presser module and upper shaft

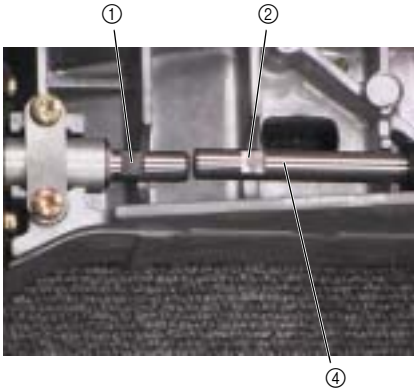
1. **Face the unit shaft D cut ① and the upper shaft D cut ② forward.**
2. **Screw the screws ❶ (two) into the fixed joint ③.**

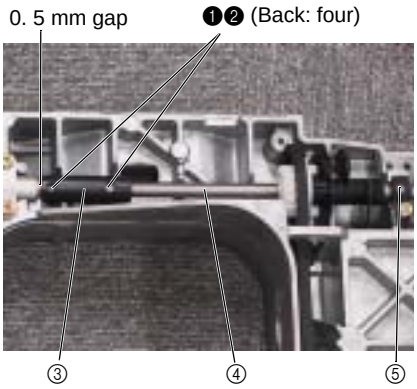
   ***Key point**
   - Adjust the gap on the left side of the fixed joint ③ to 0.5 mm.
   - Align the screw holes for **the screw ❶** with the D cuts, ① and ②.
3. **Rotate the upper shaft ④ 180 degrees, and screw the screws ❷ (four) into the fixed joint ③.**
4. **Tap the lower shaft bushing ⑤ on lightly so that the upper shaft ④ turns easily.**

Needle bar and presser unit assy. and fixed joint gap	0.5 mm

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.37 – 1.79 N·m
❷		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 – 1.18 N·m





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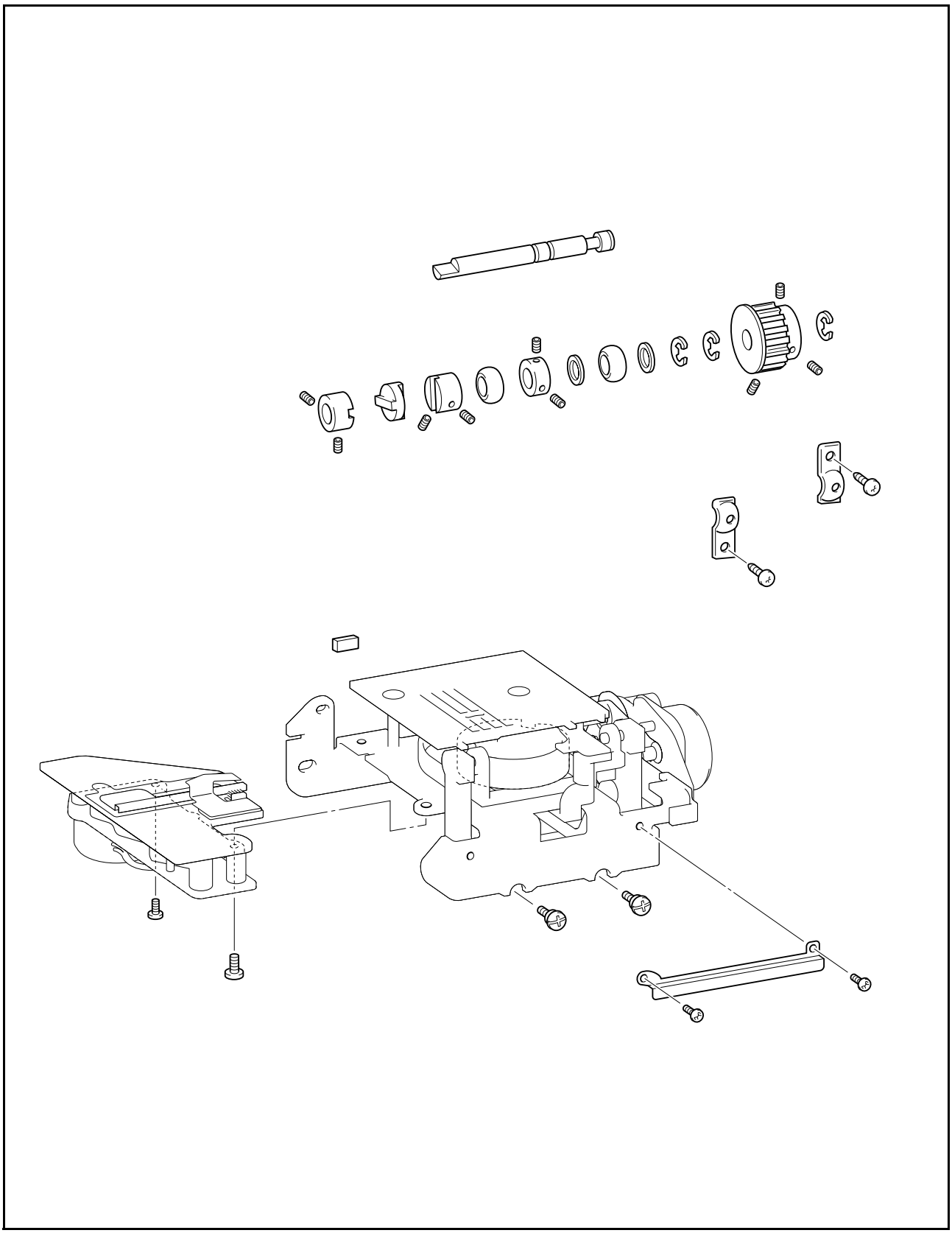
Rotary hook drive mechanism / Feed and bobbin mechanism /Cutter assy. location diagram



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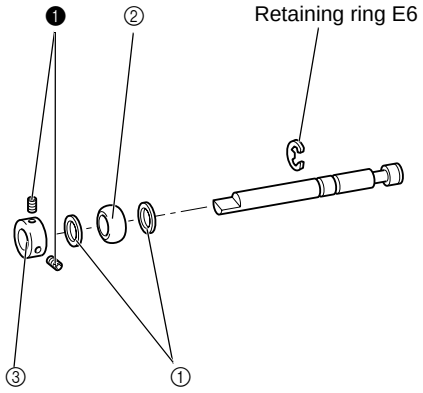
1 Assembling the Lower shaft A assembly

1. **Attach retaining ring E6 to lower shaft A.**
2. **Attach the thrust washer ①, lower shaft bushing ②, thrust washer ① and set screw collar ③ (Face the ground surface toward the lower shaft bushing).**
3. **Move the set screw collar ③ to the right and secure it with the screws ❶ (two).**

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque 1.47 – 1.98 N·m



2 Timing pulley D attachment

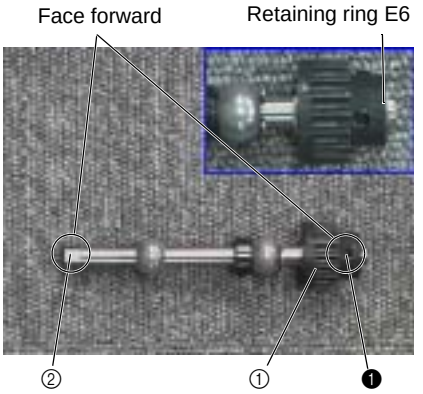
1. **Attach retaining ring E6 to lower shaft A.**
2. **Attach timing pulley D ① to lower shaft A, and attach retaining ring E6.**
3. **Hand start the screws ❶ (three) in timing pulley D ①.**
   (Fully tighten after 4 - 7 "Needle bar rise adjustment".)

***Key point**

- With the lower shaft A D cut ② facing forward, secure using one of the three screw holes in timing pulley D ① in the forward facing position.

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque Hand tighten



3 Joint attachment

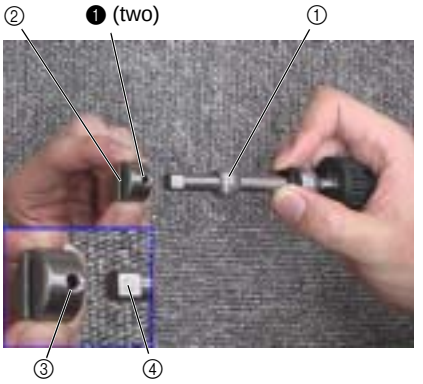
1. **Put the lower shaft bushing ① on the lower shaft A assy.**
2. **Put the joint ② on the lower shaft A assy., and hand start the screws ❶ (two) (fully tighten after 3 - 10 "6 feed module attachment.)**

***Key point**

- Align the screw hole ③ in the joint with the D cut ④ in lower shaft A.

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque Hand tighten



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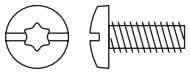
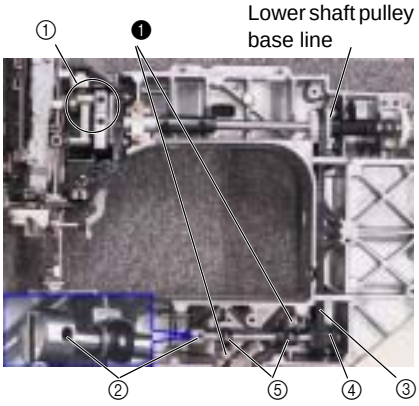
4 Lower shaft A attachment

1. **Rotate the lower shaft, and bring the needle bar to its highest point ① (lower shaft pulley base line forward).**
2. **Insert lower shaft A.**

   ***Key point**
   - Face the screw hole ② in the joint forward, and attach the timing belt ③ to timing pulley D ④.
3. **Attach the bushing pressers (two) using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.98 N·m

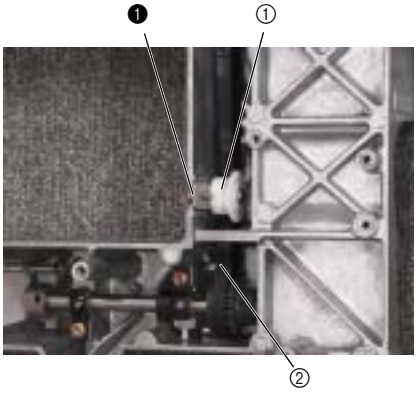


5 Tension pulley assembly attachment

1. **Hand start the screw the screw ❶ in the tension pulley and attach to the arm bed (fully tighten after 4 - 5 "Timing belt tension adjustment.").**

Start movie clip (CD-ROM version only)

❶		Screw, Pan (S/P washer) M4X10DA Color; Gold	Torque Hand tighten



Assembly

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6 feed module attachment

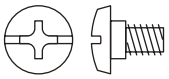
1. **Rotate the lower shaft, and bring the needle bar to its highest point (lower shaft pulley base line forward).**
2. **Apply Epnoc Grease AP to the disk ①, and attach it to the lower shaft joint.**
3. **Rotate feed module lower shaft B, and bring the solid dot on the outer rotary hook to the front, directly above the D cut in lower shaft B.**
4. **Attach the feed module attachment.**

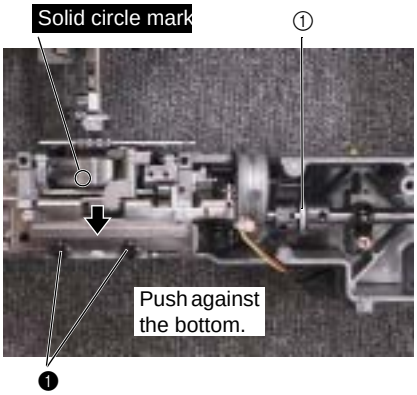
   ***Key point**
   - The needle bar should be at the highest point.
   - The solid circle mark on the outer rotary hook should be forward.
   - (Feed module side) D cut in lower shaft B is directly above
5. **Attach the screws ❶ (two).**

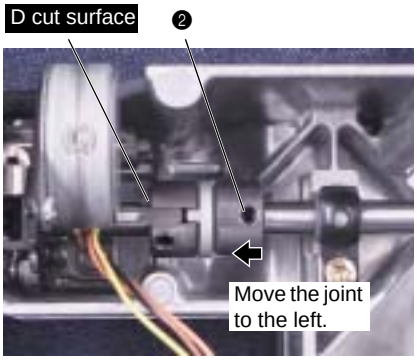
   ***Key point**
   - While holding the feed module against the bottom, tighten the screw ❶ on the left.
6. **Move the lower shaft A joint to the left, and fully tighten the screws ❷ (two).**

Application of Epnoc Grease AP to joint contact area	Small amount

Start movie clip (CD-ROM version only)

❶		Screw M4 Color; Black	Torque 1.18 – 1.57 N·m
❷		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.47 – 1.96 N·m





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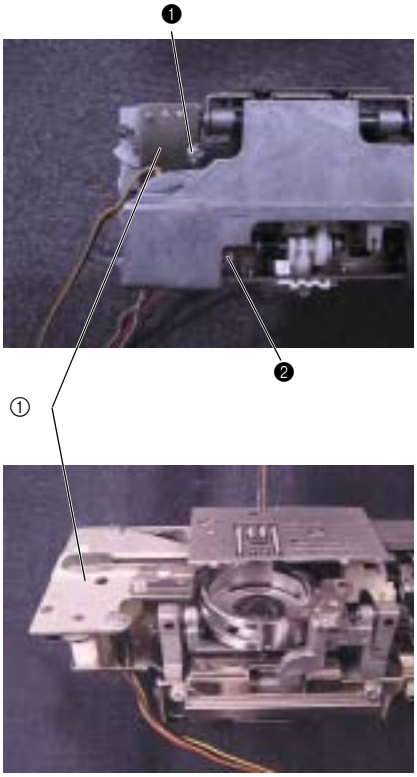
7 Thread cutter module attachment

1. **Attach the thread cutter module ① using the screw ❶ and the screw ❷.**

Start movie clip (CD-ROM version only)

❶		Screw, Bind M4X5 Color; Silver	Torque 1.18 – 1.57 N·m
❷		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N·m

*Bottom view

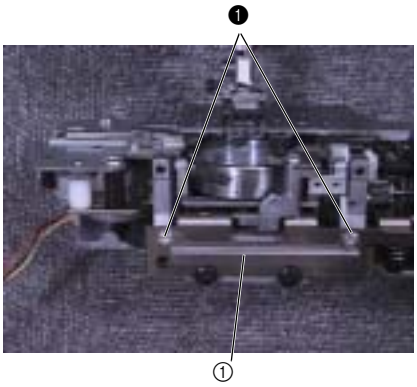


8 Leadline guide holder attachment.

1. **Attach the leadline guide holder ① to the feed module using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

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



Assembly

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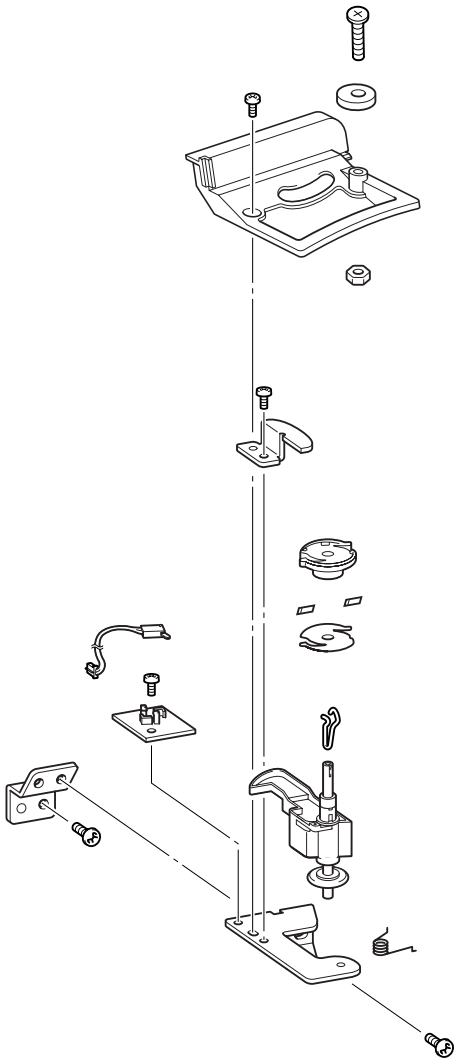
Bobbin winder mechanism location diagram



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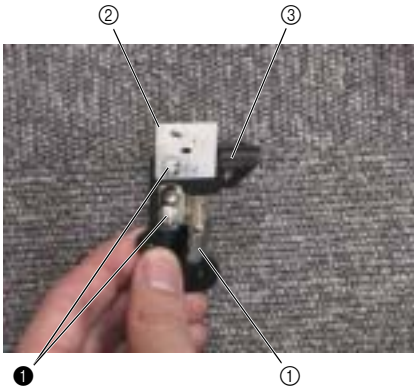
1 Bobbin winder shaft stopper (bobbin winder assembly holder) assembly

1. **Attach the bobbin winder shaft stopper ① and SW adjust plate ② to the bobbin winder assembly holder ③, and hand start the screws ❶ (two). (Fully tighten after 3 - 14 "5 Bobbin winder holder assembly attachment.")**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X6 Color; Gold	Torque Hand tighten



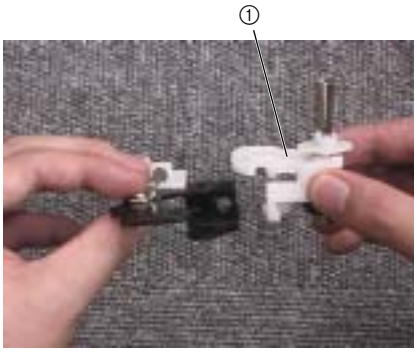
2 BW shaft holder assembly attachment

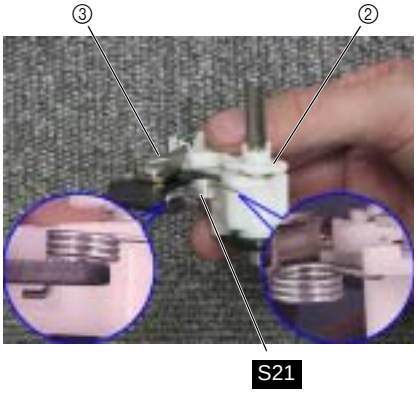
1. **Attach the BW shaft holder assembly ① to the bobbin winder assembly holder.**
2. **Attach S21 to the BW shaft holder assembly ① and bobbin winder assembly holder.**

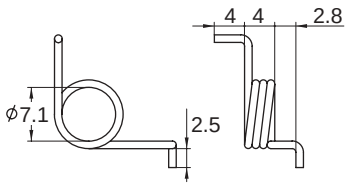
***Key point**

- Set the BW shaft holder assembly ① to the right (sewing machine on).

Start movie clip (CD-ROM version only)



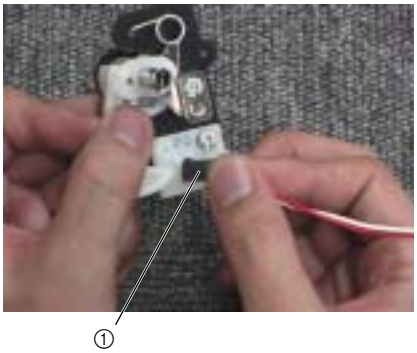


S21		BOBBIN WINDER SPRING XZ0070***

3 BW-F SW assy. attachment

1. **Attach the BW-F SW assy. ① to the SW adjust plate.**

Start movie clip (CD-ROM version only)



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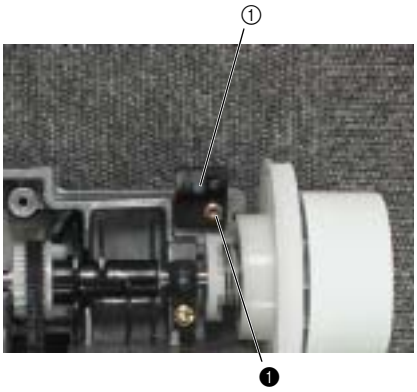
4 BW holder supporter attachment

1. **Attach the BW holder supporter ① using the screw ❶.**

Start movie clip (CD-ROM version only)

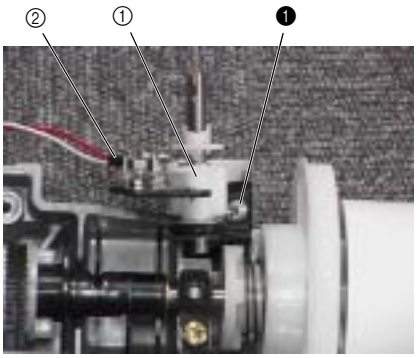


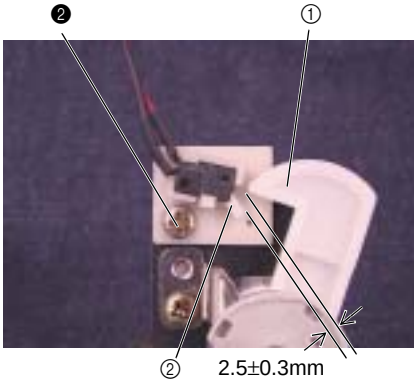
❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.18 – 1.57 N·m

5 Bobbin winder holder assembly attachment

1. **Attach the bobbin winder assembly ① using the screw ❶.**
2. **With the bobbin winder OFF, adjust the SW adjust plate left or right so that the gap between the BW shaft holder assembly ① and the BW-F SW assy. ② is 2.5 ±0.3 mm, and fully tighten the screw ❷.**

Start movie clip (CD-ROM version only)





❶		Screw, Bind M4X8 Color; Silver	Torque 1.18 – 1.57 N·m
❷		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

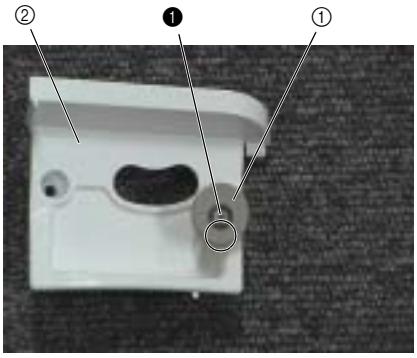
6 Bobbin presser assembly

1. **Attach the bobbin presser ① to the bobbin winder cover ② using the screw ❶ and a type 1 M3 nut.**

***Key point**

- Set the side of the bobbin presser ① with the least eccentricity to the near side (see figure to the right).

Start movie clip (CD-ROM version only)



❶		Screw, Pan (S/P washer) M3X20DA Color; Silver	Torque 1.18 – 1.57 N·m

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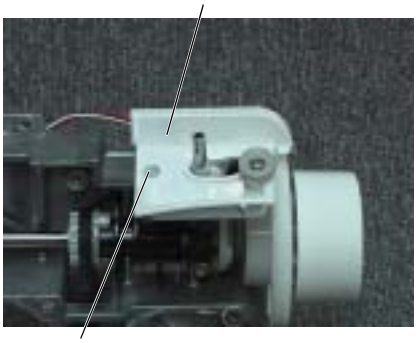
7 Bobbin winder cover attachment

1. **Attach the bobbin winder cover ① using the screw ❶.**

Start movie clip (CD-ROM version only)

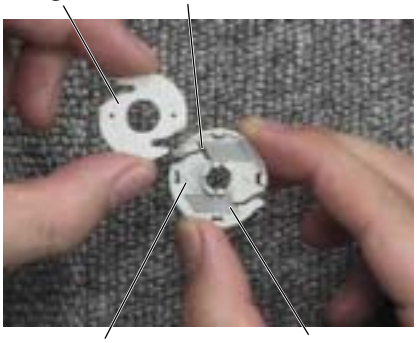
❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N·m



8 Bobbin base assembly

1. **Attach the NT lower thread cutters (two) and the bobbin thread cutter holder ② to the bobbin base ①.**

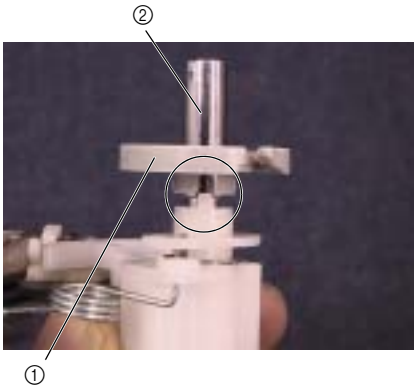
Start movie clip (CD-ROM version only)

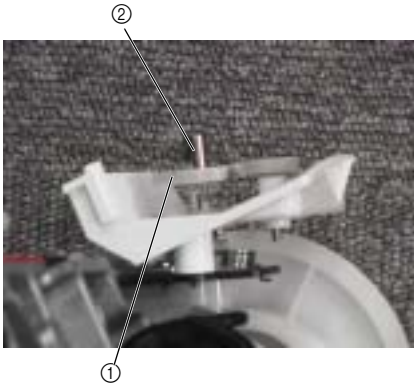


9 Bobbin base attachment

1. **Attach the bobbin base ① to the bobbin winder shaft ②.**

Start movie clip (CD-ROM version only)





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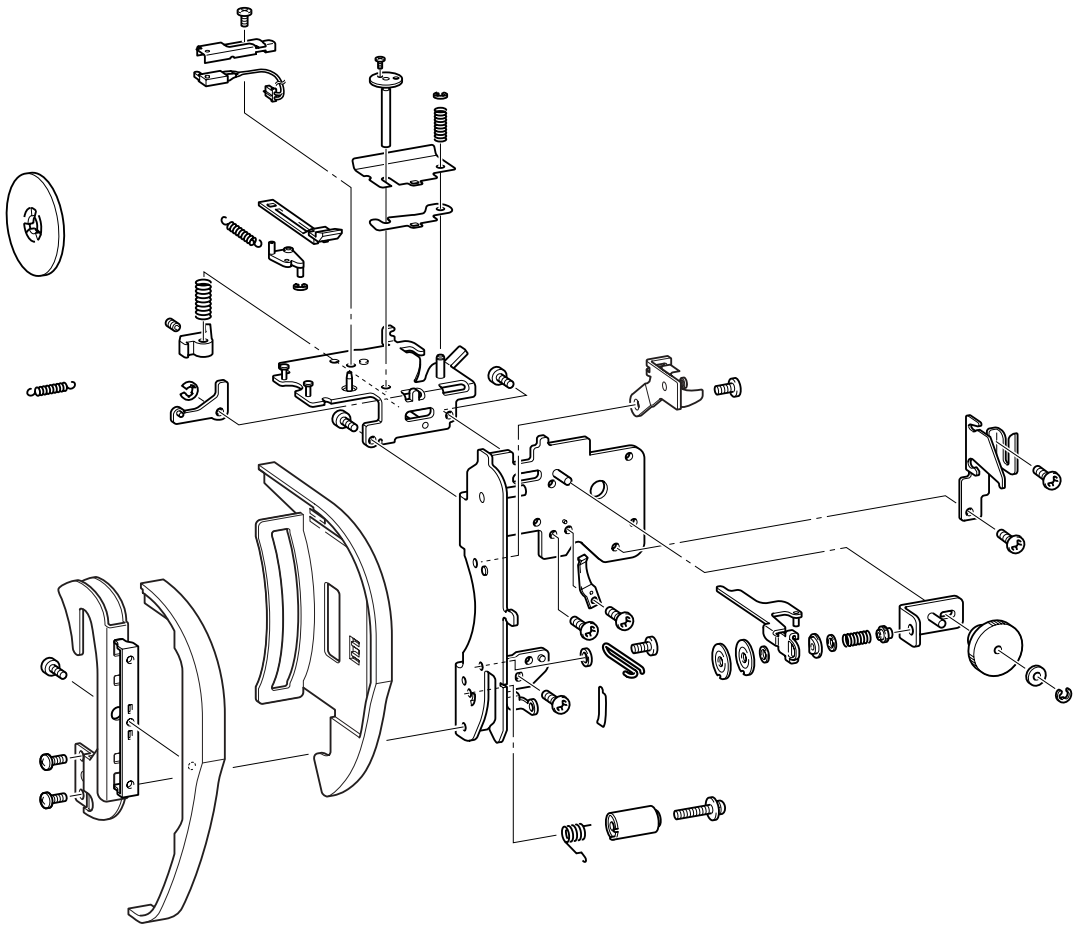
Thread tension mechanism location diagram



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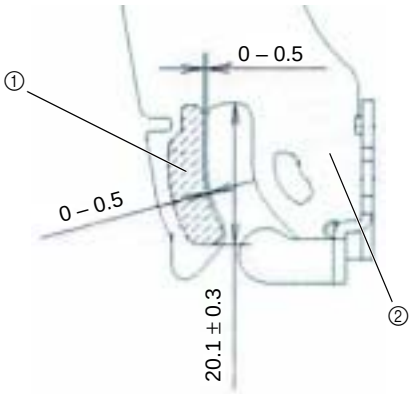
1 Spring tape attachment

1. **Attach the spring tape ① to the thread guard assembly ②.**

   ***Key point**
   - See the figure to the right for positioning.

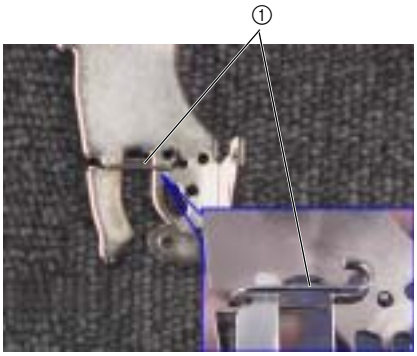


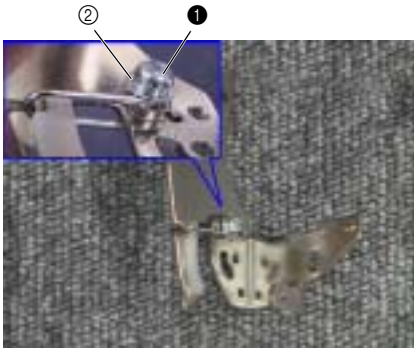
2 Thread guide wire attachment

1. **Attach the thread guide wire ① and washer ② using the screw ❶.**

   ***Key point**
   - While holding the thread guide wire ① up, tighten the screw ❶.

Start movie clip (CD-ROM version only)





❶		Screw, Pan (S/P washer) M3X6 Color; Silver	Torque 0.78 – 1.18 N·m

3 Thread take up spring attachment

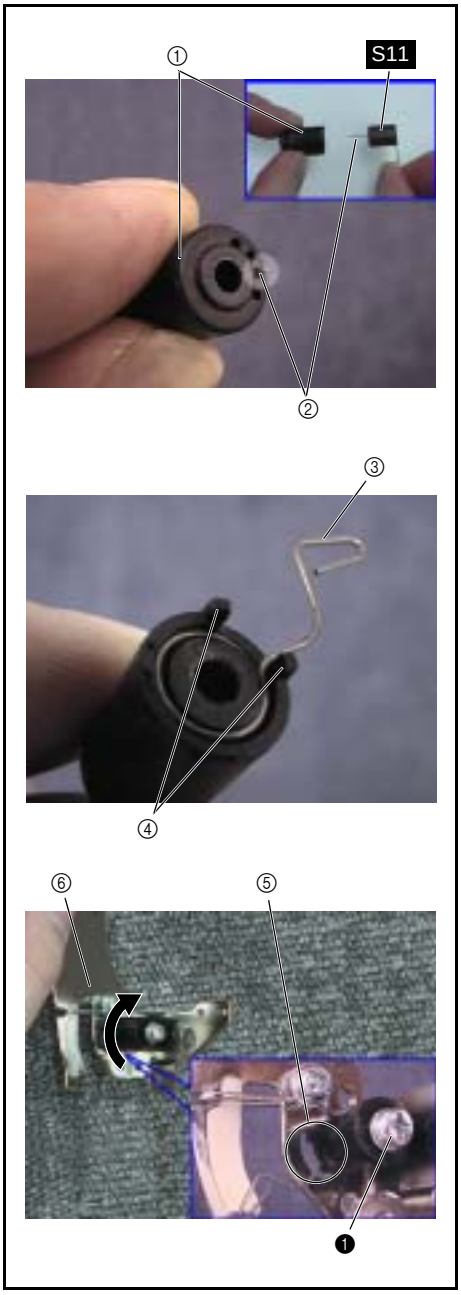
1. **Attach the S11 to the thread catching spring case ①.**

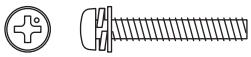
   ***Key point**
   - Insert the end ② of S11 into spring tensile position hole (second from bottom).
   - Insert the bent side of S11 ③ between the protrusions on the thread catching spring case ④ (two locations).

2. **Attach the thread catching spring case ① to the thread guard assembly ⑥ using the screw ❶**

   ***Key point**
   - Align the protrusions ⑤ (two) on the bottom of the thread catching spring case ① with the oval hole in the thread guard assembly ④, and turn clockwise to the end of the hole to attach.

Start movie clip (CD-ROM version only)



❶		Screw, Pan (S/P washer) M3X18DA Color; Silver	Torque 0.78 – 1.18 N·m
S11			THREAD TAKE UP SPRING XZ0145***

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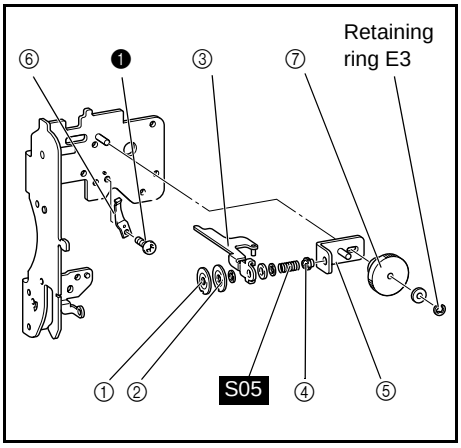
4 Tension disk attachment

1. **Attach tension disk A ①, tension disk B ②, a washer, tension release plate A ③, thread tension disk washer, washer, S05 and thread tension adjusting screw ④ to the thread tension disk shaft.**
2. **Attach tension plate assy. F ⑤ to the thread tension dial shaft, and attach the thread tension adjusting screw ④ to tension plate assy. F ⑤.**

   ***Key point**
   - Screw it in until the tip of the screw protrudes 0.5 mm from the tension plate assy. ⑤.
3. **Attach the spring plate ⑥ using the screw ❶.**
4. **Attach the thread tension dial ⑦ and polyester slider to the thread tension dial shaft.**

Start movie clip (CD-ROM version only)

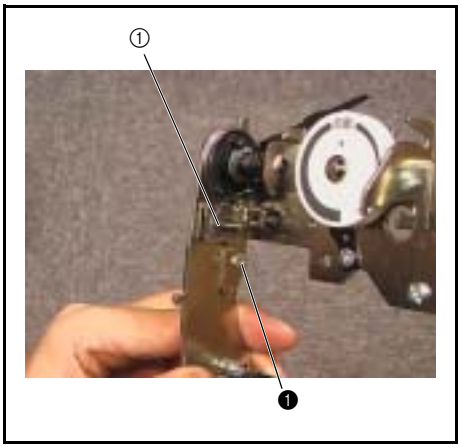


❶		Screw, Bind M3X4 Color; Silver	Torque 0.78 – 1.18 N·m
S05	12.5 ϕ6.9		THREAD TENSION SPRING XA9900***

5 Plate assembly attachment

1. **Attach the plate assembly ① using the screw ❶.**

Start movie clip (CD-ROM version only)

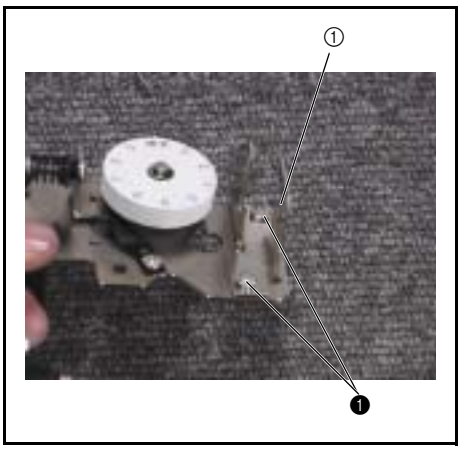


❶		Screw, Bind M3X4 Color; Silver	Torque 0.78 – 1.18 N·m

6 Thread guide attachment

1. **Attach the thread guide ① using the screws ❶ (two).**

Start movie clip (CD-ROM version only)



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

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7 Tension releaser link attachment

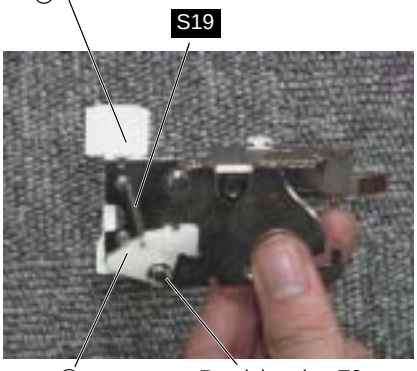
1. **Attach the tension releaser link ① to the thread release holder assy., and attach retaining ring E3.**

Start movie clip (CD-ROM version only)

8 Thread guide shutter assembly

1. **Attach the thread guide shutter ① to the tension release holder assy.**
2. **Attach the thread guide shutter link ② to the tension release holder assy., and attach retaining ring E3.**
3. **Attach S19 to the thread guide shutter link ② and the tension release holder assy.**

Start movie clip (CD-ROM version only)



S19	16	SPRING XC2650***

9 PF-F SW assy. assembly

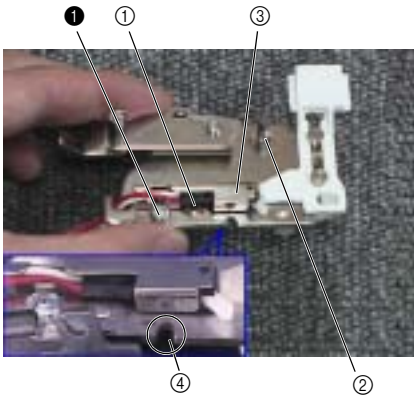
1. **Attach the PF-F SW assy. ① and presser switch holder ③ to the thread release holder assy. ② using the screw ❶.**

***Key point**

- Align the edge ④ of the thread release holder assy. ② and the presser switch holder ③.

Start movie clip (CD-ROM version only)

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



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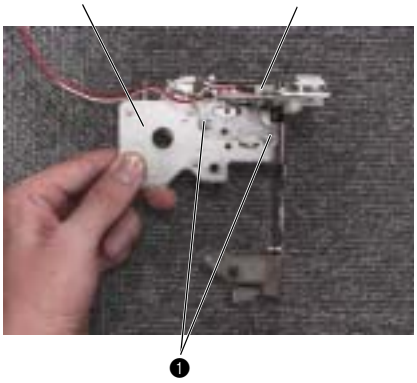
10 Thread release holder assy. attachment

1. **Attach the tension release holder assy. ① to the thread guard assembly ② using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

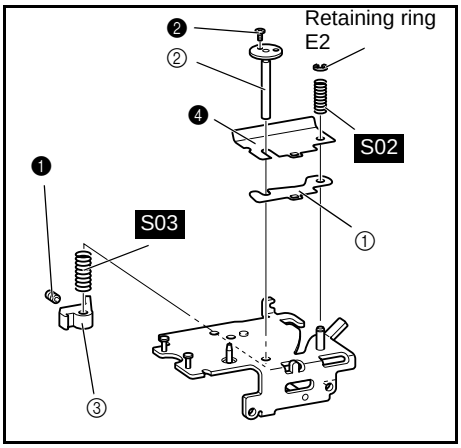


❶	Screw, Bind M3X4 Color; Silver	Torque 0.78 – 1.18 N·m

11 Tension plate attachment.

1. **Attach the spacer ① to the tension release holder assy.**
2. **Attach the tension pressure assy. ② S02 and the tension release cam ③.**
3. **Attach the tension plate (4).**
4. **Install the screw ❶ in the tension release cam ③.**
5. **Hand start the screw ❷ in the tension pressure assy. ②**
   (after assembly, perform 4 - 14 "Fine tension adjustment").
6. **Attach S03 to the tension release holder assy. shaft, and attach retaining washer E2.**

Start movie clip (CD-ROM version only)



❶	Set Screw, Socket (FT) M3X4 Color; Black	Torque 0.78 – 1.18 N·m
❷	Power Lock 2X3 Color; Silver	Amount screw should be tightened Screw head should protrude 0.2 - 5.0 mm
S02	9, ϕ3.7	SPRING X57605***
S03	13.2, ϕ4.1	SPRING XA9577***

12 Thread guide cover attachment

1. **Attach the thread guide cover to the thread guard assembly.**

Start movie clip (CD-ROM version only)

Assembly

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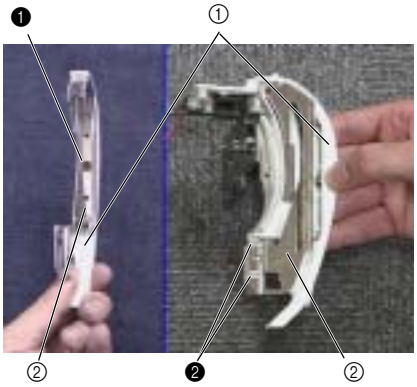
13 Thread guide cover assembly.

1. **Attach the thread guide cover ① to the thread guide assy. ② using the screw ❶.**
2. **Attach the thread guide cover assembly ① to the thread guard assembly using the screws ❷ (two).**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X6 Color; Gold	Torque 0.78 – 1.18 N·m
❷		Screw, Pan (S/P washer) M3X6 Color; Silver	Torque 0.78 – 1.18 N·m



14 Thread tension assy. F2 attachment

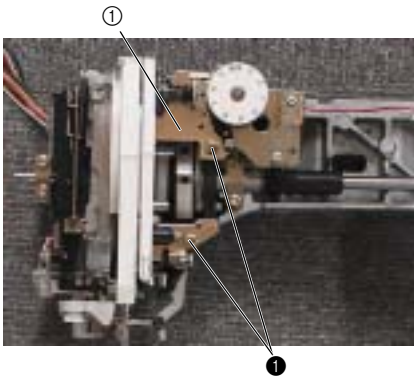
1. **Attach the thread tension assy. F2 ① using the screws ❶ (two).**

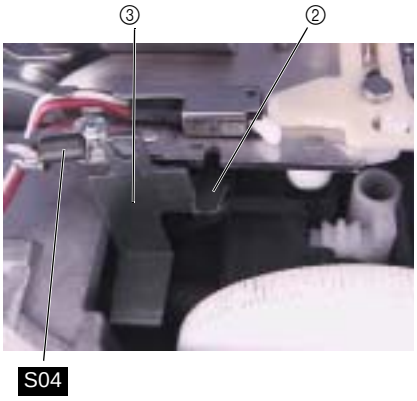
   ***Key point**
   - For the position of the thread release lever assy. A ②, see the diagram to the right.

2. **Attach S04 to the tension release holder shaft and tension release plate C ③ on the needle-presser module.**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M4X10 Color; Gold	Torque 1.18 – 1.57 N·m
S04	14 φ4		SPRING XA9787***





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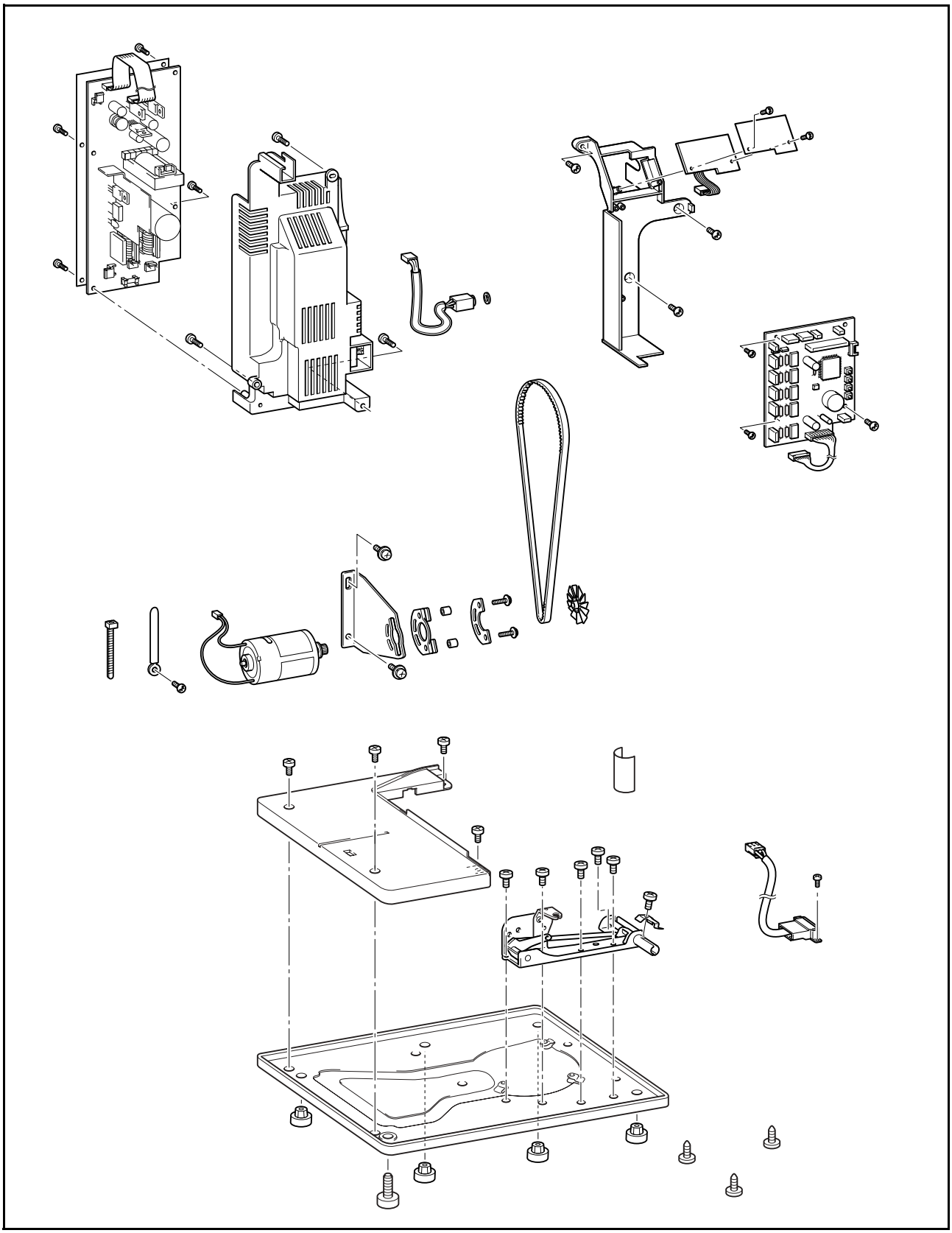
Electrical parts and motors location diagram



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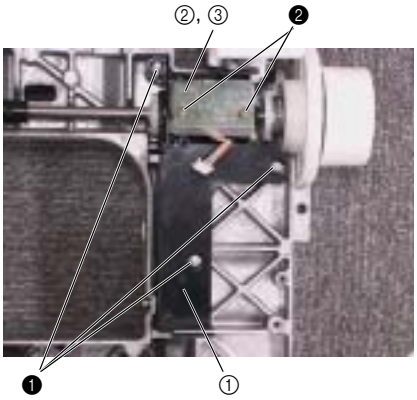
1 NP PCB assy. attachment

1. **Attach the PCB holder ① to the arm bed using the screws ❶ (three).**
2. **Attach NP PCB assy. ② and the insulation sheet ③ to the PCB holder ① using the screws ❷ (two).**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.59 – 1.78 N·m
❷		Screw, Bind M4X8 Color; Silver	Torque 0.78 – 1.18 N·m



2 main PCB assy. attachment

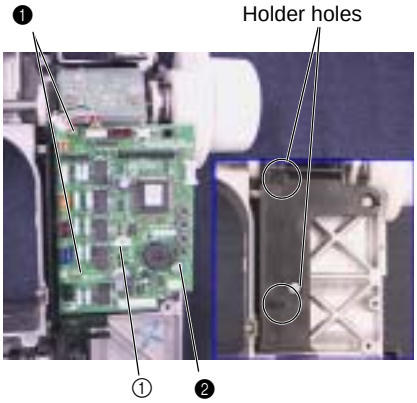
1. **Attach the main PCB assy. ① to the PCB holder and arm bed using the screws ❶ (two) and the screw ❷.**

***Key point**

- Fully tighten the screw ❶ in the PCB assy. holder holes (four) in the two locations on the right side.

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.59 – 1.78 N·m
❷		Screw, Bind M4X8 Color; Silver	Torque 0.78 – 1.18 N·m



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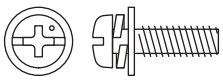
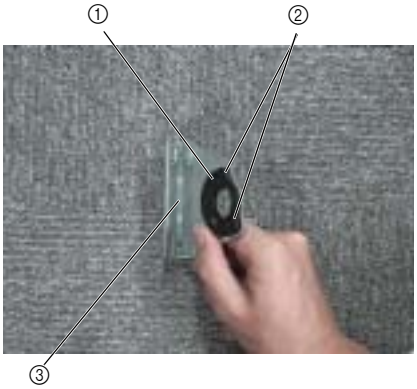
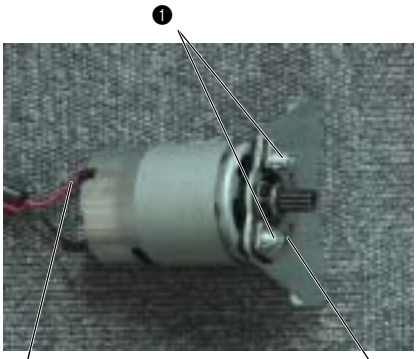
3 Assembly of main motor assembly

1. **Attach the spacers 4x6 ② (two) to the fender rubber ①.**
2. **Attach the fender rubber ① to the motor holder ③.**
3. **Attach the main motor and the motor spacer presser ④ to the motor holder ③ using the screws ❶ (two).**

Start movie clip (CD-ROM version only

❶		Screw, Pan (S/P washer) M4X14 Color; Silver	Torque 1.18 – 1.57 N·m

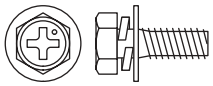


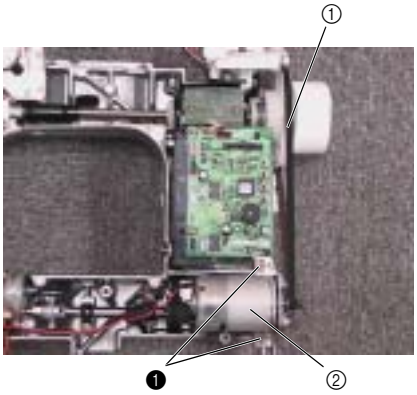


4 Main motor assembly attachment

1. **Attach the timing belt ① to the upper shaft timing pulley and the motor pulley, align the main motor assembly ② with the arm bed and hand start the screws ❶ (two).**
   (Fully tighten after 4 - 6 "Motor belt tension adjustment").

Start movie clip (CD-ROM version only)

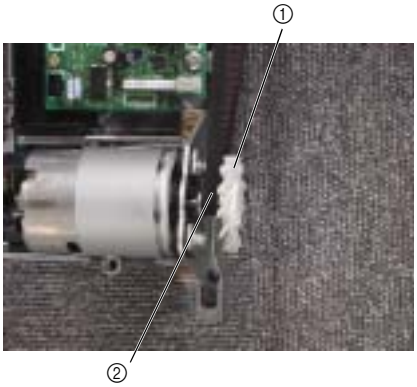
❶		Upset 4X12DB Color; Gold	Torque Hand tighten



5 Motor fan attachment

1. **Attach the motor fan ① to the main motor assembly ②.**

Start movie clip (CD-ROM version only)



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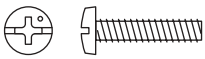
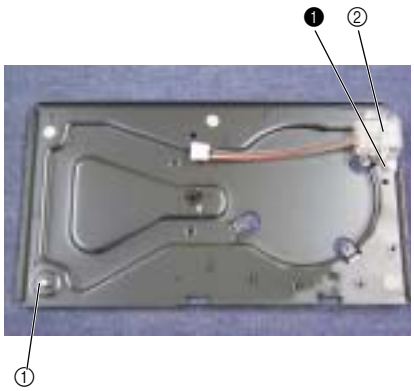
6 Inlet assy. attachment

1. **Attach the regulator adjusting screw assy. ① to the base plate.**
2. **Attach base rubbers A (four) to the base plate.**
3. **Attach the inlet assy. to the base plate using the screws the screw ❶.**

***Key point**

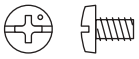
- With the base plate on a flat board, adjust the regulator adjusting screw assy. ① so that the regulator adjusting screw assy. ① and the base rubbers A (four) are uniformly in contact with the surface.

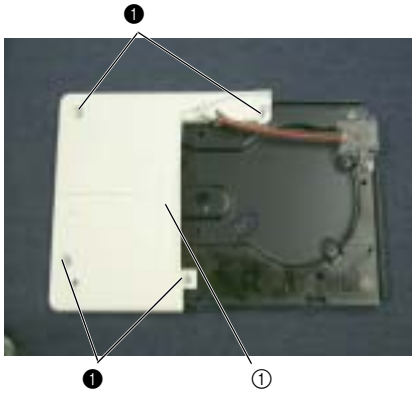
❶		Screw, Bind M3X14 Color; Gold	Torque 0.59 – 0.78 N·m



7 Base plate cover attachment

1. **Attach the base plate cover ① to the base plate with the screws ❶ (four).**

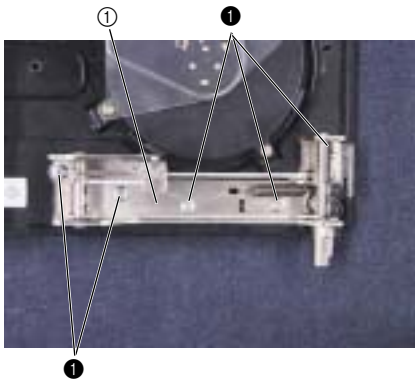
❶		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N·m



8 Knee lifter assy. attachment

1. **Attach the knee lifter assy. ① to the base plate with the screws ❶ (five).**

❶		Screw, Bind M4X6 Color; Silver	Torque ** – ** N·m



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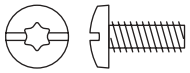
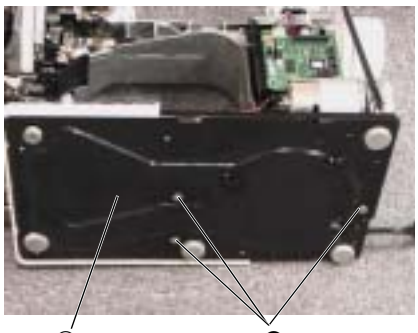
9 Base plate attachment

1. **Attach the base plate assembly ① to the arm bed using the screws ❶ (three).**

   ***Key point**
   - Pull the power cord approximately 5 cm out of the cord reel assembly.

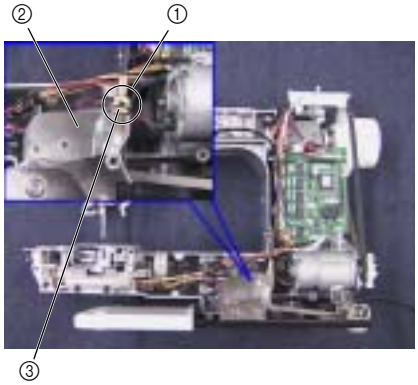
Start movie clip (CD-ROM version only)

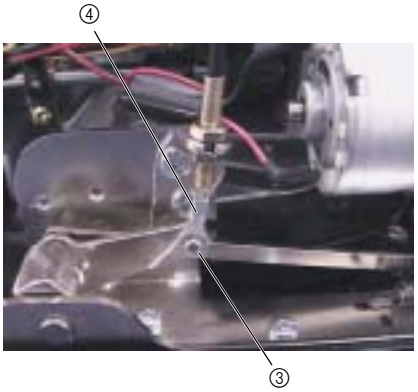
❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.96 N·m



10 Wire assy. and knee lifter assy. attachment

1. **Attach the fitting ① on the end of the wire assy. (side with two M8 nuts on it) to the wire holder ② on the knee lifter assy., and hand tighten the M8 nut ③ on the lower side.**
   (Fully tighten after 4 - 20 "Knee lifter adjustment.")
2. **Attach the hook ④ on the end of the wire assy. to the knee lifter assy. shaft, and attach retaining ring E3.**

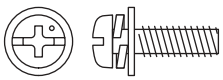


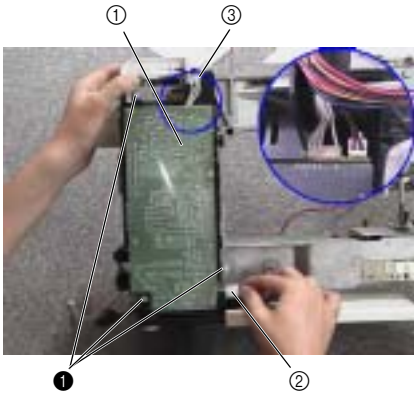


11 Power supply unit F attachment

1. **Attach power supply unit F ① to the arm bed using the screws ❶ (three).**
2. **Attach the connector ② for the inlet assy. to the power supply unit F.**

Start movie clip (CD-ROM version only)

❶		Screw, Pan (S/P washer) M4X14 Color; Silver	Torque 0.78 – 1.18 N·m



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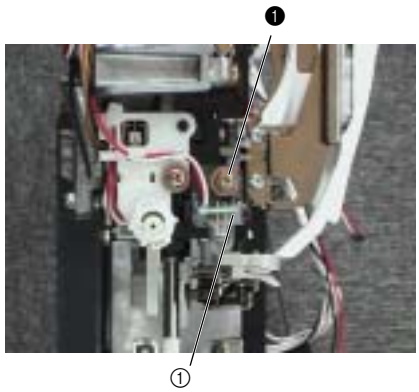
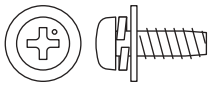
12 PBC unit LED lamp-FL attachment

1. **Attach the PBC unit LED lamp-FL ① to the needle-presser module using the screw ❶.**

Start movie clip (CD-ROM version only)

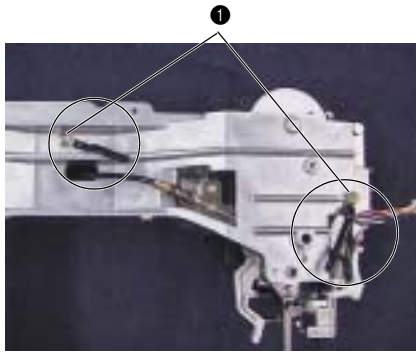


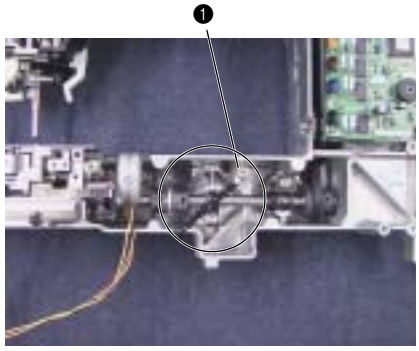
❶		Taptite,Pan B M4X12 Color; Gold	Torque 0.78 – 1.18 N·m

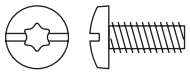
13 Wire clip attachment

1. **Attach the wire clips (four in three locations) using the screws ❶ (three).**

Start movie clip (CD-ROM version only)





❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.96 N·m

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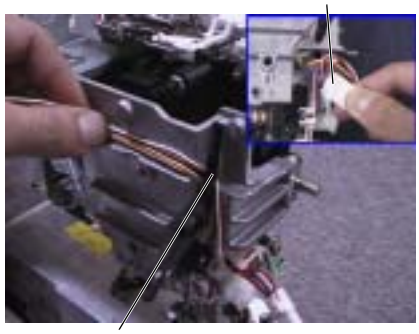
14 Lead assy. processing

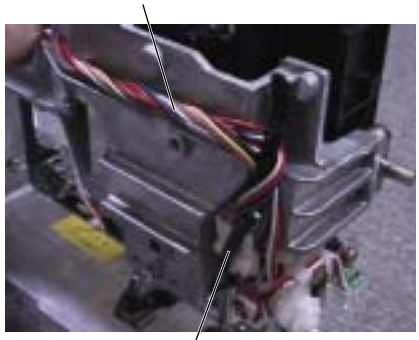
1. **Attach the BH lead assy. to the BH switch assy.**
2. **Pass the Z pulse motor and LED lamp FL leads over the wire clip.**
3. **Fasten the BH switch assy. connector using the lower wire clip, and fasten the other leads using the upper wire clip.**
4. **Fasten the various leads with a band on the upper side of the wire clip.**

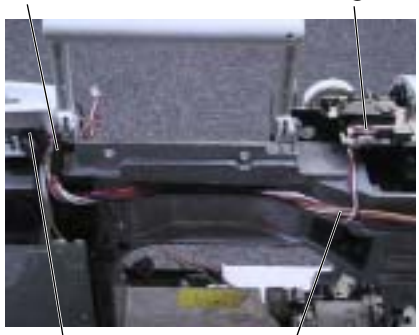
   ***Key point**
   - When cutting off the excess band, face the band toward the inside so that it does not fly outward.
5. **Pass the lead bundle along the top of the arm bed rib, hold together with a band.**
6. **Pass the leads from the presser switch ① as shown in the diagram to the right, and bind to the other leads with a band.**
7. **Fasten the lead bundle with the wire clip on the middle of the back of the arm bed and pass to the front of the arm bed from the lead assy. guide of power supply unit F.**
8. **Run the BW-F SW assy. ② leads to the front of the arm bed from the lead assy. guide of power supply unit F.**
9. **Pass the C pulse motor leads to the inside of the feed module leadline guide holder.**
10. **Tie the C pulse motor, F pulse motor and main motor leads together with a wire clip.**

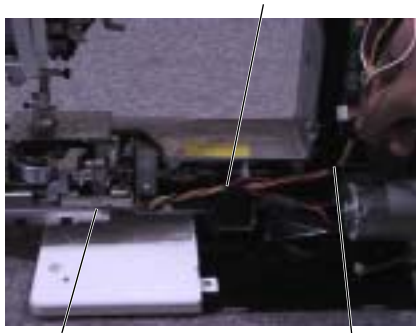
    ***Key point**
    - Leads should not have slack.
11. **Pass to the upper side from the lower PCB holder hook.**

Start movie clip (CD-ROM version only)









Assembly

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15 Main PCB assy connector connection (lower)

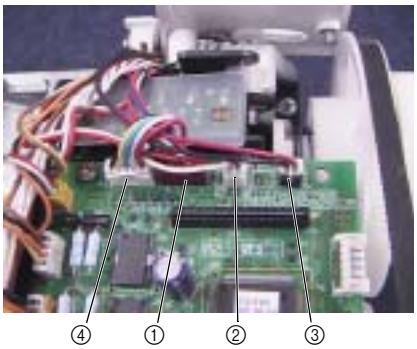
1. Connect the main motor leads to CN301 (white) ① on the power supply unit F.
2. Connect the power supply unit F leads ② to CN14POWER on main PCB assy..
3. Connect the F pulse motor leads ③ (black) to CN13FPM on the main PCB assy. after wrapping them around the power supply unit F leads and the main motor leads.
4. Connect the C pulse motor leads ④ (red) to CN11CPM on the main PCB assy. after wrapping them around the power supply unit F leads and the main motor leads.
5. Connect the assy. pin jack F leads ⑤ to CN15FC on main PCB assy. F.

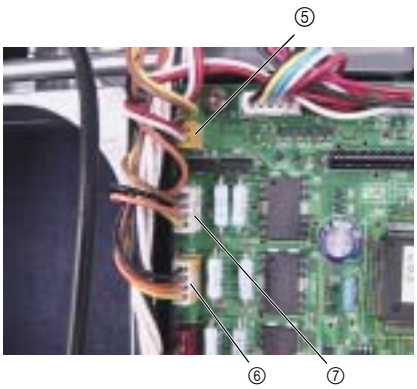
Start movie clip (CD-ROM version only)

16 Main PCB assy connector connection (upper)

1. Connect the BH lead assy. leads ① (red connector) to CN3BH on the main PCB assy..
2. Attach the PF-F SW assy. leads ② (white connector) to CN4POT on the main PCB assy. F.
3. Connect the BW-F SW assy. leads ③ (black connector) to CN6BW on the main PCB assy..
4. Pass the NP PCB assy. leads ④ (white connector) above the BH, presser and BW leads and connect to CN2.
5. Connect PCB Unit LED lamp FL leads ⑤ (yellow connector) to CN1LAMP on the main PCB assy. after wrapping them around the power supply unit F leads and the main motor leads.
6. Connect the AT pulse motor leads ⑥ (yellow connector) to CN10ATPM on the main PCB assy. after wrapping them around the power supply unit F leads and the main motor leads.
7. Connect the Z pulse motor leads ⑦ (white connector) to CN7ZPM on the main PCB assy. after wrapping them around the power supply unit F leads and the main motor leads.

Start movie clip (CD-ROM version only)





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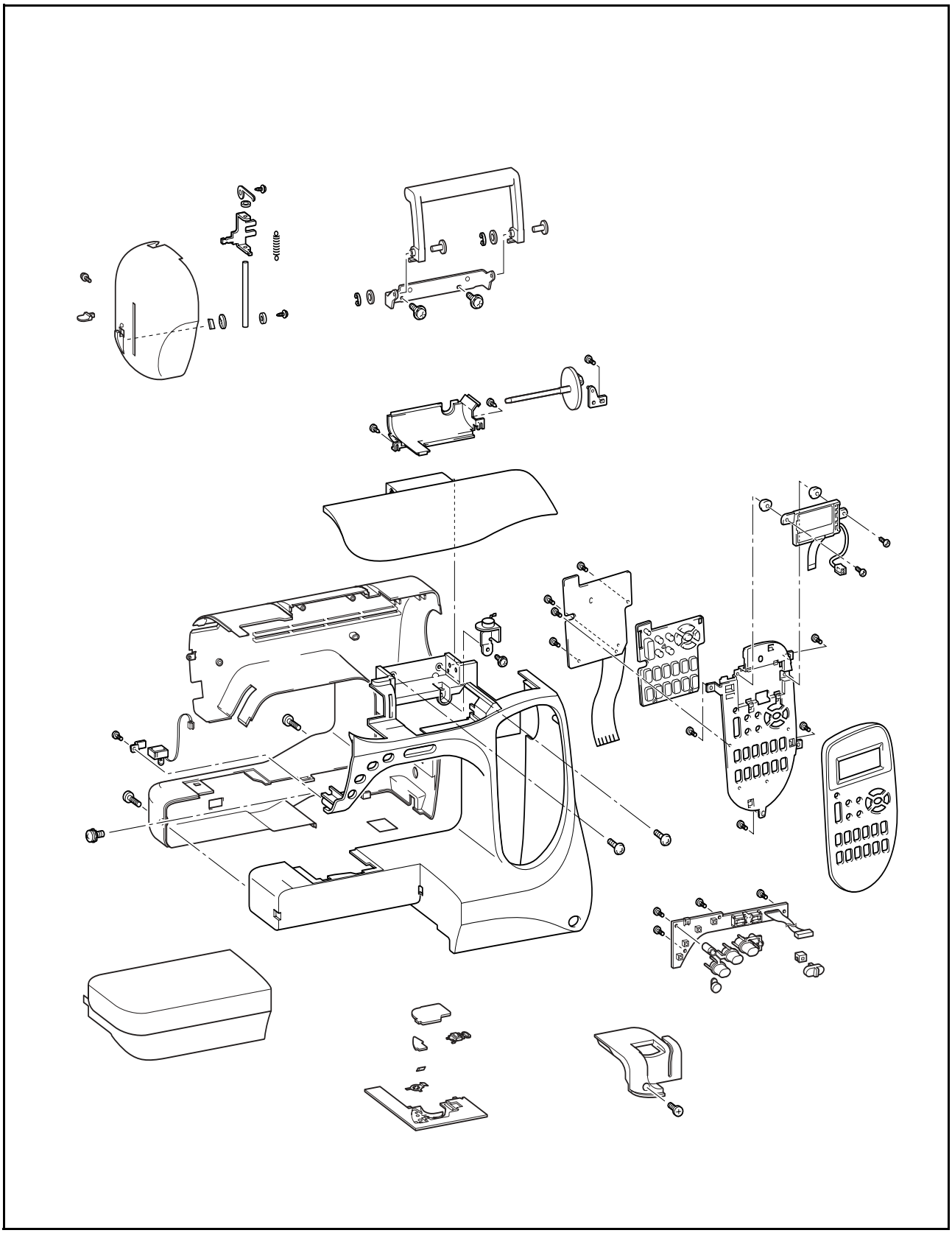
Main parts location diagram



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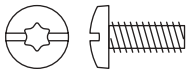
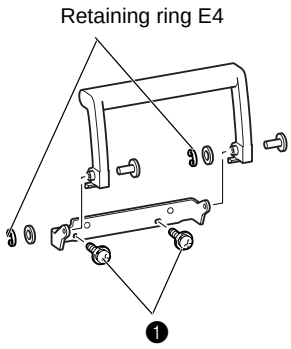
1 Handle assembly and attachment

1. **Attach the handle, handle holder and polyester slider to the handle shafts, and attach retaining rings E4 (two).**
2. **Attach the handle to the arm bed using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

❶		Taptite, Bind S M4X10 Color; Gold	Torque 1.47 – 1.96 N·m

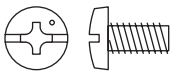


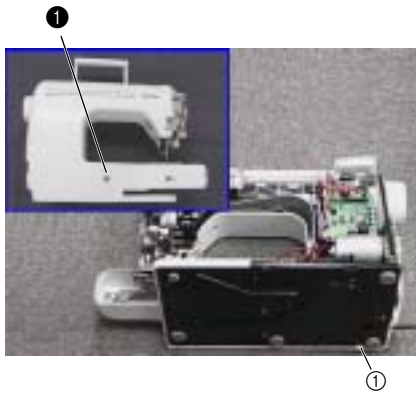
2 Rear cover attachment

1. **Lower the presser foot lifter and pull the power cord out approximately 20 cm.**
2. **Attach the rear cover.**

   ***Key point**
   - **First insert the rear cover hook ① into the base plate.**
3. **Secure the rear cover to the arm bed with the screw ❶.**

Start movie clip (CD-ROM version only)

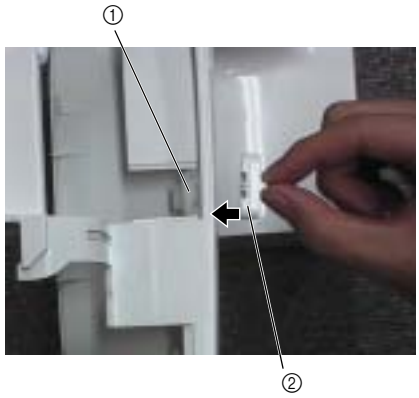
❶		Screw, Bind M4X8 Color; Silver	Torque 0.78 – 1.18 N·m



3 Front cover assembly (SV keytop attachment)

1. **Attach the SV joint plate ① to the speed control key part of the front cover.**
2. **Attach the SV keytop ② to the SV joint plate ①.**

Start movie clip (CD-ROM version only)



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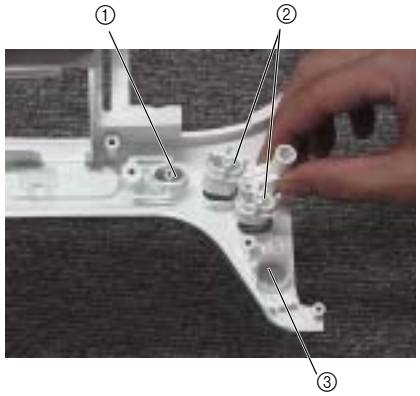
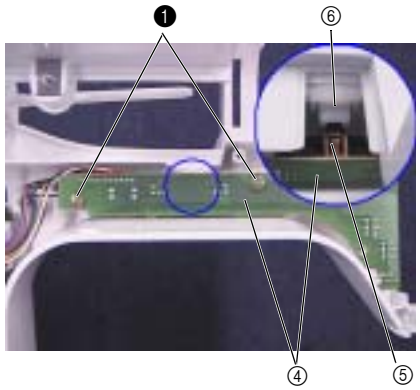
4 Front cover assembly (SS-VR F PCB assy. attachment)

1. **Attach the thread cut button ①, reverse button ② and SS-button ③.**
2. **Align the SS-VR F PCB assy. ④ VR1 ⑤ and the SV joint plate ⑥, and attach the SS-VR F PCB assy. ④ to the front cover using the screws ❶ (two).**

Start movie clip (CD-ROM version only)



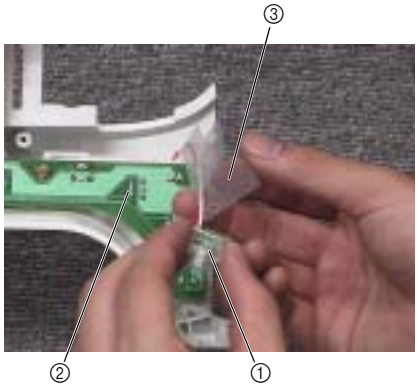


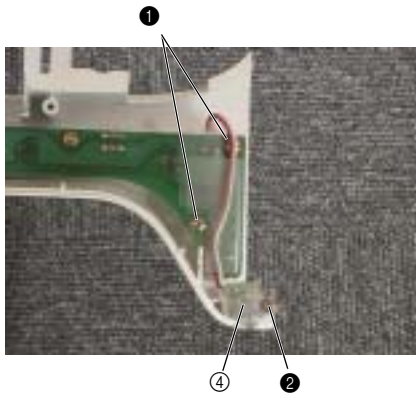
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 – 0.78 N·m

5 Front cover assembly (LED lamp FR attachment)

1. **Attach the PCB unit LED lamp-FR connector ① to the SS-VR F PCB assy. ②.**
2. **Cover the PCB unit LED lamp-FR leads ① with the SS-VR insulation sheet ③, and attach the SS-VR F PCB assy. ② to the front cover using the screws ❶ (two).**
3. **Attach the PCB unit LED lamp-FR ① to the front cover, and attach the LED lamp holder R supporter ④ using the screw ❷.**

Start movie clip (CD-ROM version only)





❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 – 0.78 N·m
❷		Taptite,Pan B M2.6X10 Color; Gold	Torque 0.29 – 1.47 N·m

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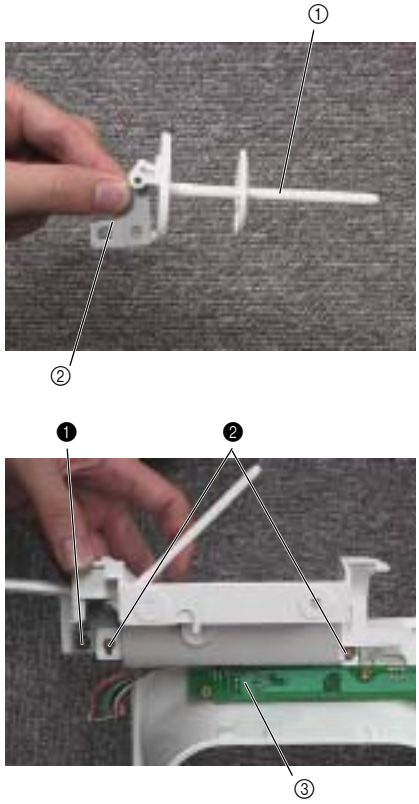
6 Front cover assembly (spool pin attachment)

1. **Attach the spool pin ① to the spool pin holder assembly ②.**
2. **Attach the spool pin holder assembly ② using the screw ❶.**
3. **Attach the thread bobbin cover ③ using the screws ❷ (two).**

Start movie clip (CD-ROM version only)

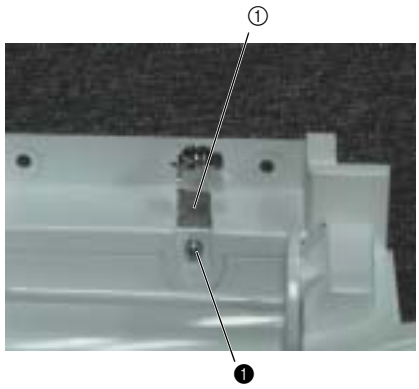


❶		Taptite, Cup B M3X10 Color; Gold	Torque 0.57 – 0.78 N·m
❷		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 – 0.78 N·m

7 Front cover assembly (assembling bobbin winder guide assembly)

1. **Attach the bobbin winder guide assembly ① to the front cover.**
2. **Hand start the screw ❶.**
   (Fully tighten after 4 - 17 "Bobbin winder adjustment.")

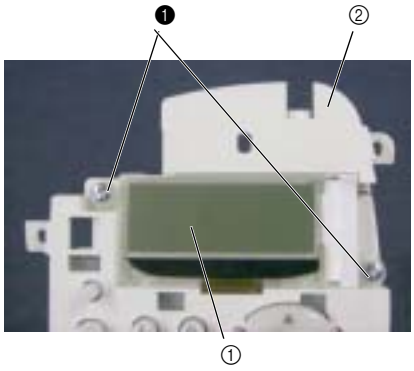
Start movie clip (CD-ROM version only)



❶		Screw, Pan (S/P washer) M3X8DA Color; Gold	Torque 0.57 – 0.78 N·m

8 LCD panel attachment

1. **Attach the LCD panel ① and the board pressers (two) to the operation PCB holder using the screws ❶ (two).**



❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 – 0.78 N·m

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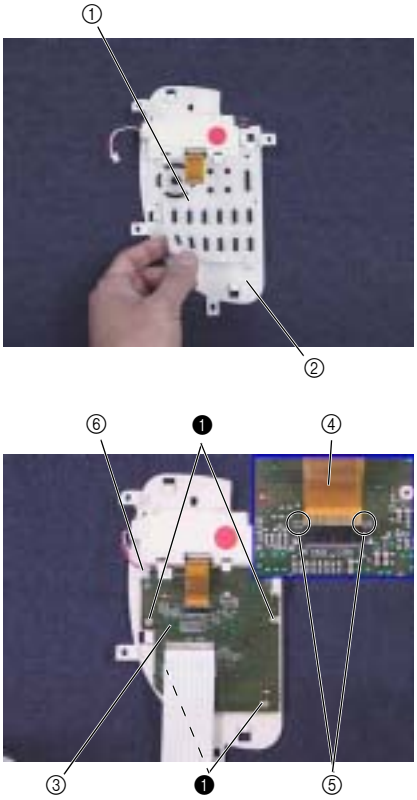
9 Front cover assembly (assembling the operation PCB holder)

1. **Attach the rubber keys ① to the operation PCB holder ②.**
2. **Attach the operation F3 PCB assy. ③ using the screws ❶ (four).**
3. **Attach the flat cable ④ from the LCD panel to CN1 on the operation F3 PCB assy., and secure it by sliding the stoppers ⑤ on both sides of CN1 downward.**
4. **Connect the LCD panel connector to CN3 ⑥ on the operation F3 PCB assy.**

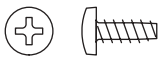
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 – 0.78 N·m

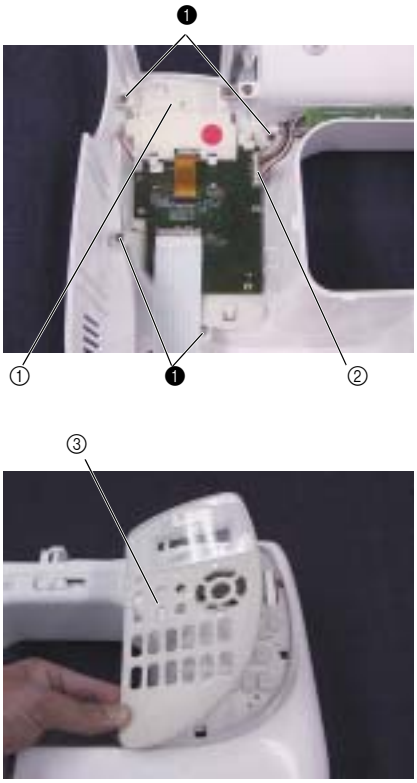


10 Front cover assembly (attaching the operation PCB holder)

1. **Attach the operation PCB holder ① to the front cover using the screws ❶ (four).**
2. **Attach the SS-VR F PCB assy. connector ② to the operation F3 PCB assy.**

   ***Key point**
   - Press down the indication plate hooks (four).
3. **Attach the indication plate ③.**

❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 – 0.78 N·m



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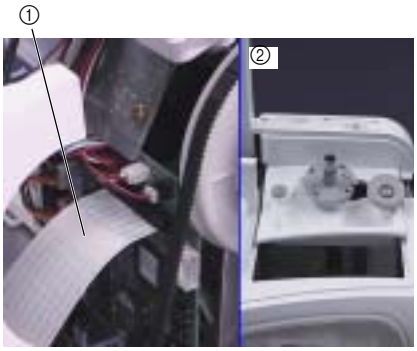
11 Front cover attachment

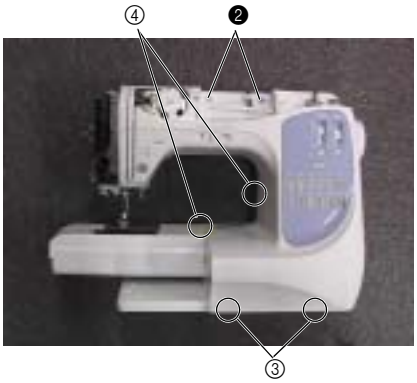
1. **Hand start the screw ❶.**
2. **Attach the flat cable ① from the operation F3 PCB assy. to CN7 on the main PCB assy.**
3. **Attach the front cover.**

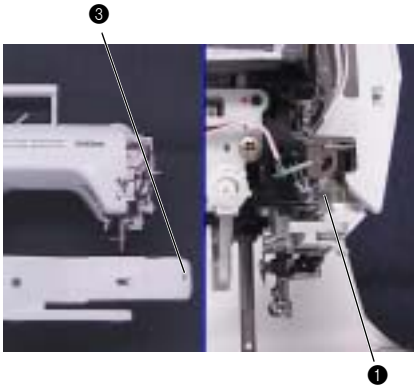
   ***Key point**
   - Attach starting with the bobbin winder cover ②.
   - Attach the lower hooks ③ (two).
   - Slide to the left, and attach the center hook ④.
4. **Fully tighten hand started the screw ❶ in the thread guard assembly.**
5. **Attach the screws ❷ (two).**
6. **Attach the screw ❸.**

NOTE •Attach so that the flat cable is not shifted to the left or right.

Start movie clip (CD-ROM version only)





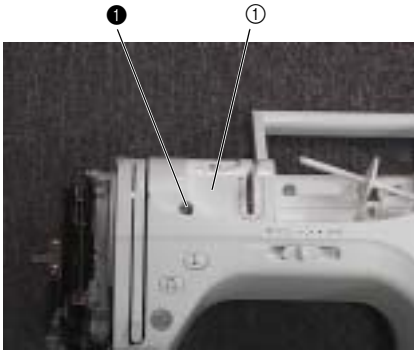


❶		Screw, Pan (S/P washer) M3X6F Color; Silver	Torque 0.57 – 0.78 N·m
❷		Taptite, Cup B M4X14 Color; Silver	Torque 0.78 – 1.18 N·m
❸		Taptite, Cup B M4X20 Color; Silver	Torque 0.78 – 1.18 N·m

12 Front thread guide cover attachment

1. **Attach the front thread guide cover ① using the screw ❶.**

Start movie clip (CD-ROM version only)



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

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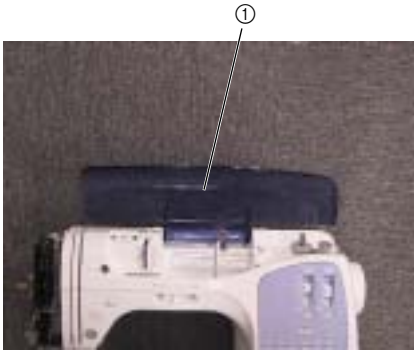
13 Top cover attachment

1. **Attach the top cover ① to the front cover.**

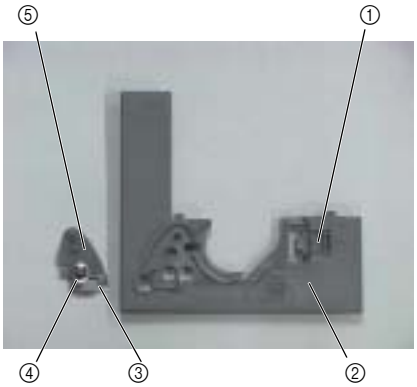
   ***Key point**
   - The attachments (two, left and right) for the top cover ① fall to the inside.



14 Assembling needle plate B assy.

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

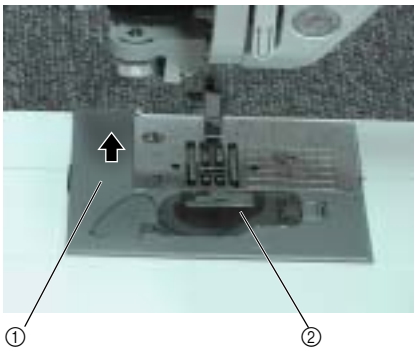
Start movie clip (CD-ROM version only)



15 Needle plate B assy. attachment

1. **Attach the needle plate B assy. ① to the main unit.**
2. **Attach the needle plate cover ② to the needle plate B assy. ①.**

Start movie clip (CD-ROM version only)



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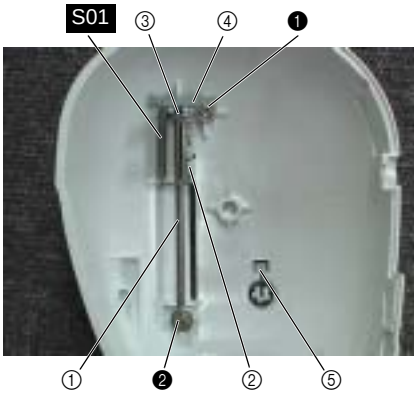
16 Face plate assembly

1. Attach the needle thread lever shaft ①, needle thread lever ② and rubber washer ③ to the face plate.
2. Attach S01 to the presser plate ④.
3. Attach the presser plate ④ to the face plate using the screw ❶.
4. Attach the screw ❷ and a washer.
5. Attach the S01 that was attached to the presser plate ④ in 2. to the needle thread lever ②.
6. Attach the retaining ring, CS5 and the NT lower thread cutter ⑤ to the face plate.
7. Attach the needle thread lever knob ⑥.

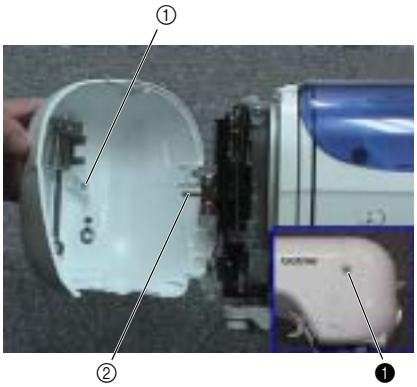


❶		Taptite, Pan B M3X6 Color; Silver	Torque 0.57 – 1.78 N·m
❷		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 – 0.78 N·m
S01	23 ϕ4	THREAD THROUGH LEVER SPRING 138260***	

17 Face plate assy. attachment

1. Align and attach the hole ① in the center on the inside of the face plate to the shaft ② on the needle-presser module.
2. Secure the face plate assy. to the arm bed with the screw ❶.

Start movie clip (CD-ROM version only)



❶		Screw, Pan (S/P washer) M4X14 Color; Silver	Torque 0.78 – 1.18 N·m

18 Accessory table assembly and attachment

1. Attach the accessory table door to the accessory table ①.
2. Attach the accessory table ① to the main unit.

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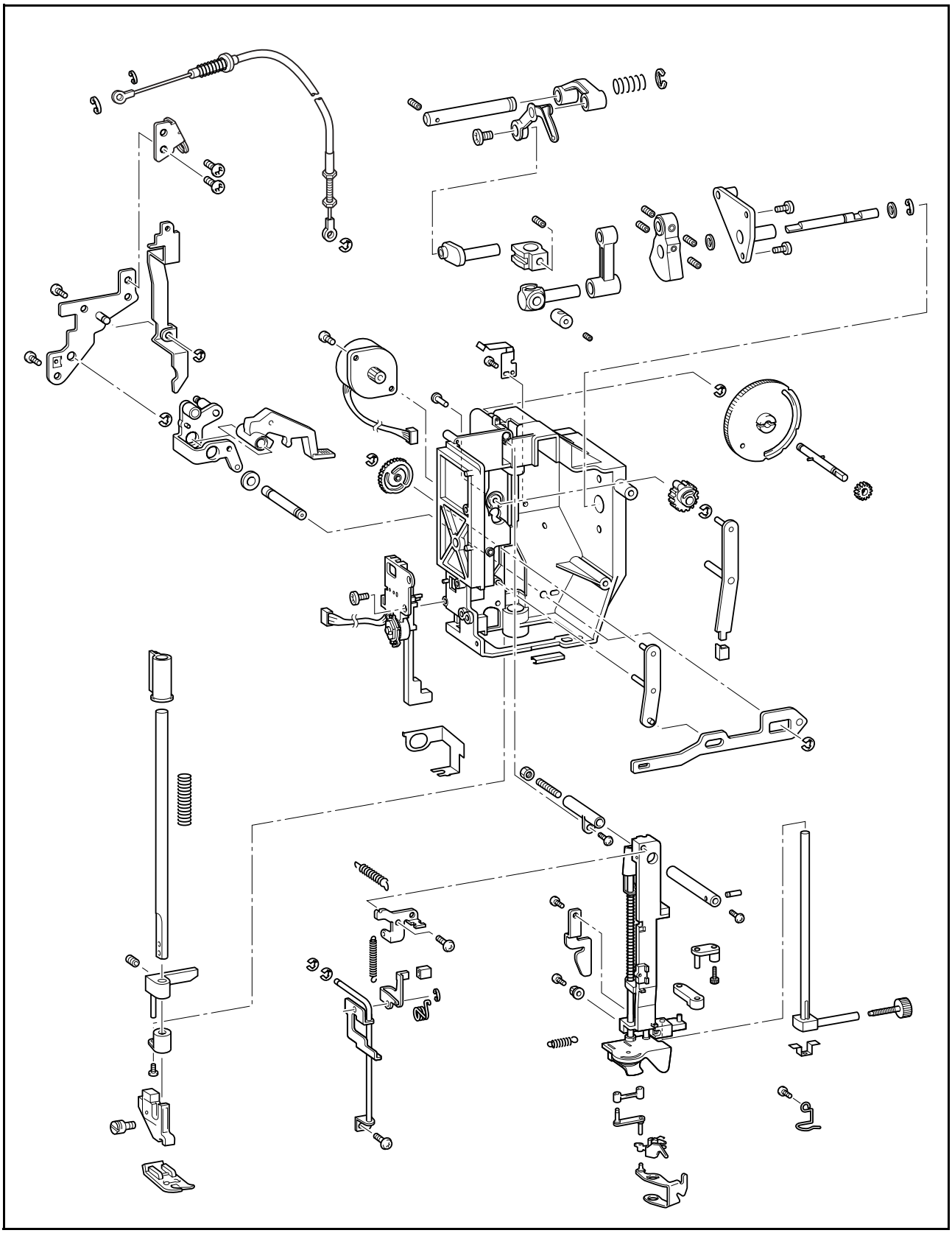
Needle-presser module breakout diagram



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1 Shaft bushing assembly attachment

1. **Using the screws ❶ (two), attach the shaft bushing assembly ① to the upper unit holder.**

Start movie clip (CD-ROM version only)

❶	Screw, Pan (S/P washer) M4X14DB Color; Silver	Torque 1.18 – 1.57 N·m

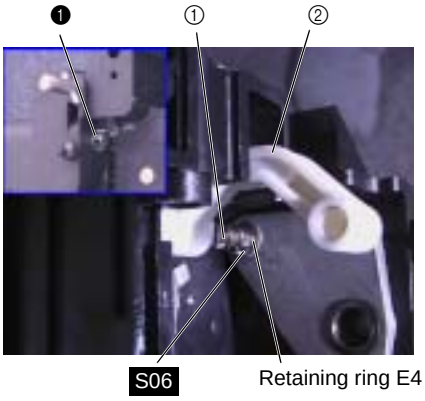
2 Thread take-up lever link assembly

1. **Attach the shaft ①, S06 and thread take-up lever link ② to the upper unit holder, and attach retaining ring E4.**
2. **Install the screw ❶ in the shaft ①.**

Apply Molykote EM 30L grease all the way around the shaft hole in the thread take-up lever link.	small amount

Start movie clip (CD-ROM version only)

S06	20.7 ϕ5.2	SPRING XC2441***



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3 Presser bar attachment

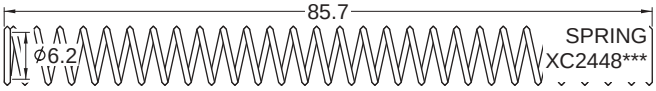
1. **Attach the presser bar bushing ① to the upper unit holder using the screw ❶.**
2. **Apply a small amount of Molykote Em30L to the presser bar clamp ②.**
3. **Lubricate the end of the presser bar ③ with Sewing Lube.**
4. **Attach the presser bar ③, presser bar clamp ②, S07 and presser spring supporter ④ to the upper unit holder.**
5. **Hand start the screw ❷ in the presser bar clamp ②.**
   (Fully tighten after 4 - 12 "Presser bar height and parallel adjustment.")

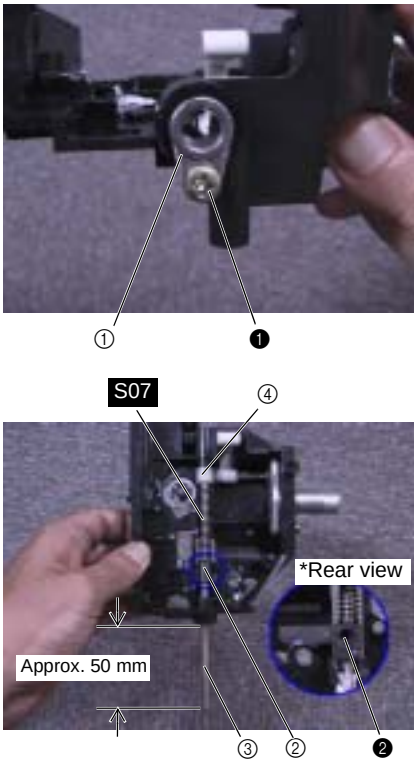
***Key point**

- Face the D cut in the presser bar to the left, and adjust the length from the upper unit holder base plate to the end of the presser bar ③ to approximately 50 mm.

Apply Molykote EM30L grease to the sliding part of the presser bar clamp assy. locking pin	Small amount
Lubricate the end of the presser bar with Sewing Lube.	Apply liberally to the end

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.78 – 1.18 N·m
❷		Set Screw, Socket (CP) M5X10 Color; Black	Torque Hand tighten
S07			

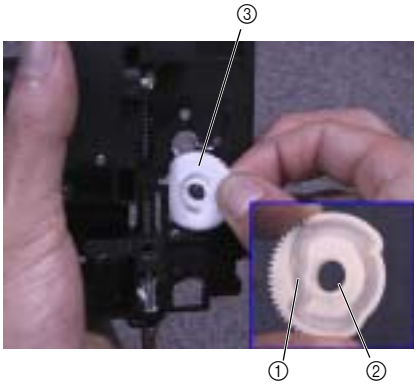


4 T cam attachment

1. **Apply a small amount of Molykote Em30L to the cam groove ① and shaft hole ② of the T cam.**
2. **Attach the T cam ③ to the upper unit holder.**
3. **Apply a small amount of Molykote EML30L to the gear for the T cam ③.**

Apply Molykote EM30L grease to the entire cam groove in the T cam	Small amount
Apply Molykote EM30L grease to the shaft hole in the T cam	Small amount
Apply Molykote EM30L grease to the entire surface of the gear for the T cam	Small amount

Start movie clip (CD-ROM version only)



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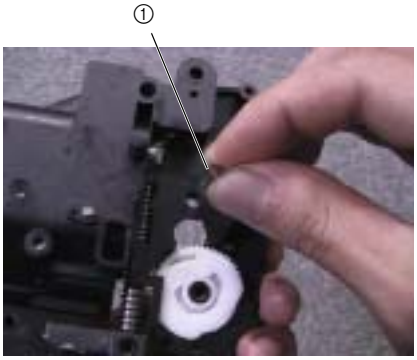
5 Shaft attachment

1. **Attach the shaft ①.**

Start movie clip (CD-ROM version only)



6 Thread release lever assy. attachment

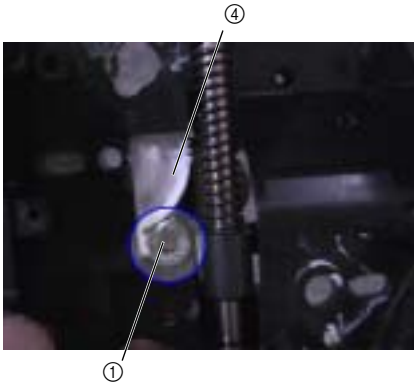
1. **Apply a small amount of Molykote EM30L to the thread release lever assy. hole ① in the upper unit holder.**
2. **Attach the thread release lever assy. ② and polyester slider to the upper unit holder, and attach retaining ring E3.**

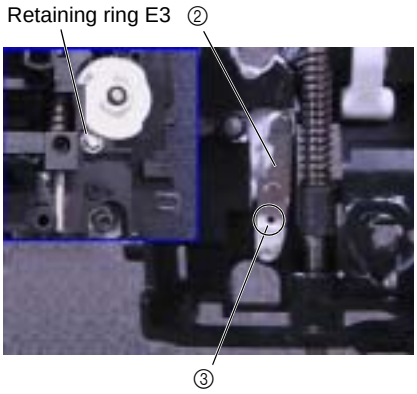
***Key point**

- The side of the thread release lever assy. ② with the hole ③ is the bottom.
- Align the pin on the thread release lever assy. ② with the cam groove ④ in the T cam.

Apply Molykote EM30L grease to the thread release attachment hole	Small amount
Apply Molykote EM30L grease to thread release assembly shaft B	Small amount

Start movie clip (CD-ROM version only)





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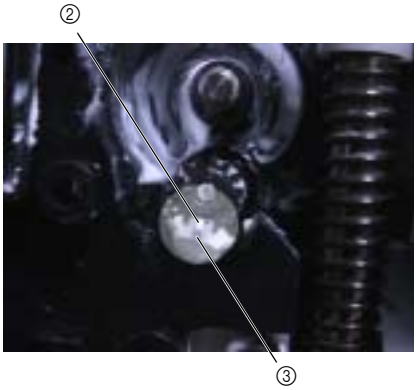
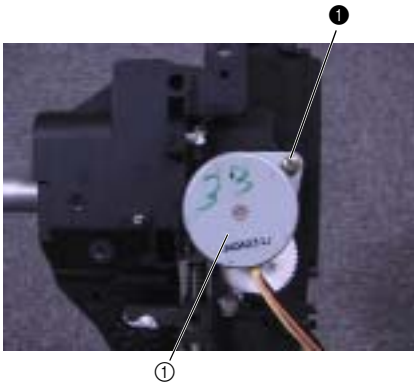
7 Z pulse motor attachment.

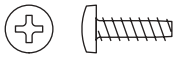
1. **Attach the Z pulse motor (ZPMSMJ-35-4840-A) ① to the upper unit holder using the screw ❶.**

   ***Key point**
   - Align the match mark ② on the Z pulse motor gear and the match mark ③ on the T cam gear.

Start movie clip (CD-ROM version only)





❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.78 – 1.18 N·m

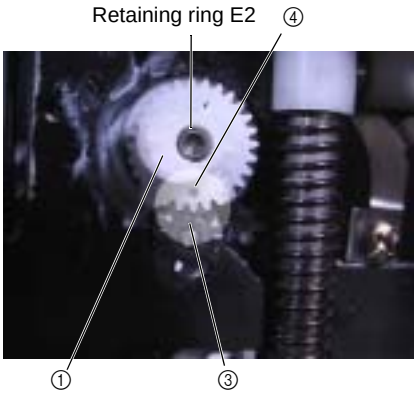
8 Z zigzag cam attachment

1. **Install the Z zigzag cam ① on the Z zigzag cam shaft, and attach retaining washer E2.**

   ***Key point**
   - Align the match mark ③ on the Z pulse motor gear and the match mark ④ on the Z zigzag cam.
2. **Apply a small amount of Molykote EM30L to the Z zigzag cam ① gear part and cam part.**

Apply Molykote EM30L grease to all of the sliding part of the Z zigzag cam pin	Small amount
Apply Molykote EM30L grease to all of the Z zigzag cam	Small amount
Apply Molykote EM30L grease all around the Z zigzag cam gear	Small amount

Start movie clip (CD-ROM version only)



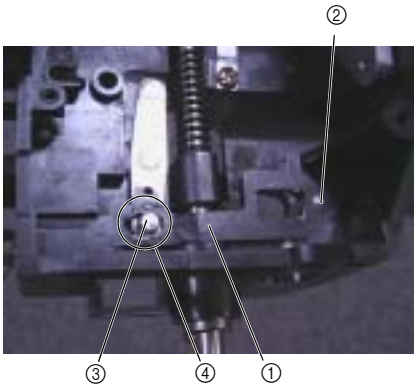
9 Thread releaser assy. attachment

1. **Apply Molykote EM30L to the thread releaser assy. ①.**
2. **Attach the thread releaser assy. ① to the upper unit holder.**

   ***Key point**
   - Align the thread releaser assy. ① pin ② and upper unit holder hole as well as the thread release lever pin ③ and the round hole ④ in the thread releaser assy. ①.

Apply Molykote EM30L grease to all of the sliding part of the thread releaser assy. ①.	Small amount

Start movie clip (CD-ROM version only)



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10 Z zigzag lever assy. attachment

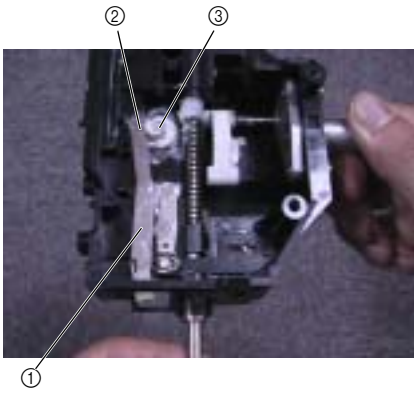
1. **Attach the cap to the Z zigzag lever assy. ①.**
2. **Apply a small amount of Molykote EM30L to the Z zigzag lever assy. ① pins (two).**
3. **Attach the Z zigzag lever assy. ① to the upper unit holder, and attach retaining ring E3.**

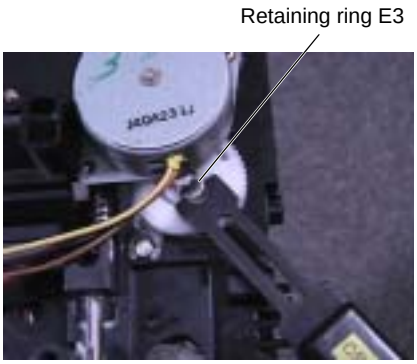
***Key point**

- The end ② of the Z zigzag lever ① is the left side of the Z zigzag cam ③.

Apply Molykote EM30L grease to the two pins on the Z zigzag lever	Small amount

Start movie clip (CD-ROM version only)





11 Thread take-up counter weight attachment

1. **Attach retaining ring E6 to the unit shaft ①.**
2. **Attach the thrust washer ②, unit shaft ①, thrust washer ② to the shaft bushing assembly ③.**
3. **Attach the thread take-up counter weight ④ using the screws ❶ (two).**

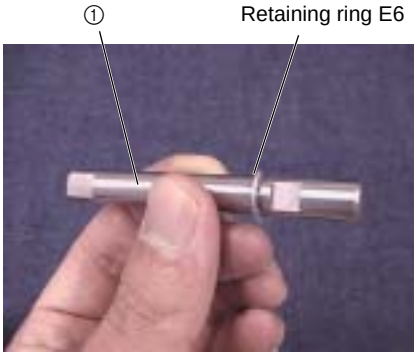
***Key point**

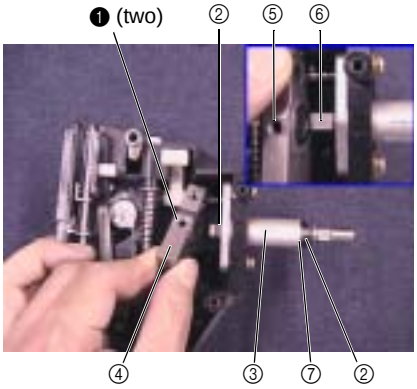
- Align the screw hole ⑤ in the thread take-up counter weight and the unit shaft D cut surface ⑥.

4. **Lubricate part ⑦ of the shaft bushing assembly ③ with one to two drops of Sewing Lube.**

Lubricate the unit shaft with Sewing Lube.	1 – 2 drops
Lubricate the inside of the shaft bushing with Sewing Lube	1 – 2 drops

Start movie clip (CD-ROM version only)





❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.37 – 1.77 N·m

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12 Thread take-up lever assy. attachment

1. **Lubricate surface of the thread take-up lever ① on the needle bar crank rod assy. and the thread take-up lever assy. shaft ② with a small amount of Molykote EM30L.**
2. **Attach the needle bar crank rod assy. ③ to the thread take-up counter weight ④ using the screws ❶ (two).**

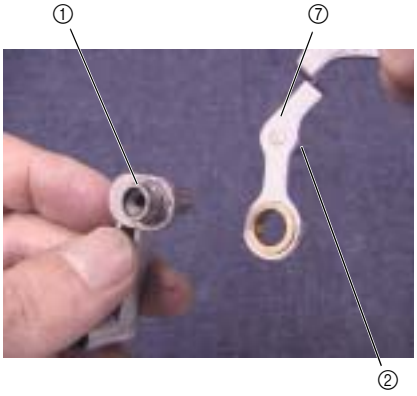
   ***Key point**
   - Align the needle bar crank D cut surface ⑤ with the thread take-up counter weight screw hole ⑥.

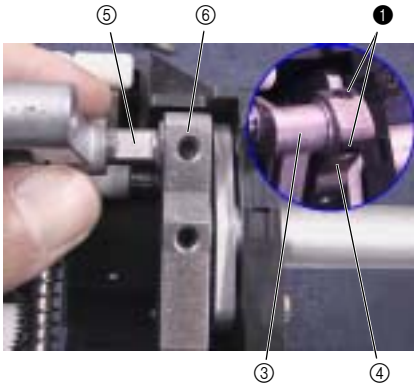
3. **Attach the thread take-up lever assy. ⑦ to the needle bar crank rod assy. ③ and thread take-up lever link ⑧.**

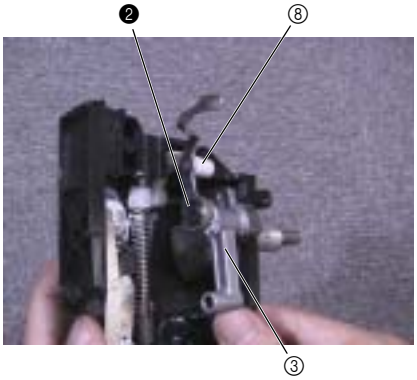
   ***Key point**
   - The screw ❷ is reverse threaded.

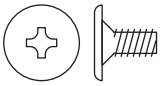
Apply Molykote EM30L grease to the needle bar crank	Small amount
Apply Molykote EM30L grease to the thread take-up lever.	Small amount
Apply Molykote EM30L grease to the to the needle bar crank thread take-up attachment (left screw attachment) surface.	Small amount

Start movie clip (CD-ROM version only)







❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.37 – 1.77 N·m
❷		Screw, Flat SM3.57-40X7 L Color; Black	Torque 1.18 – 1.57 N·m

Assembly

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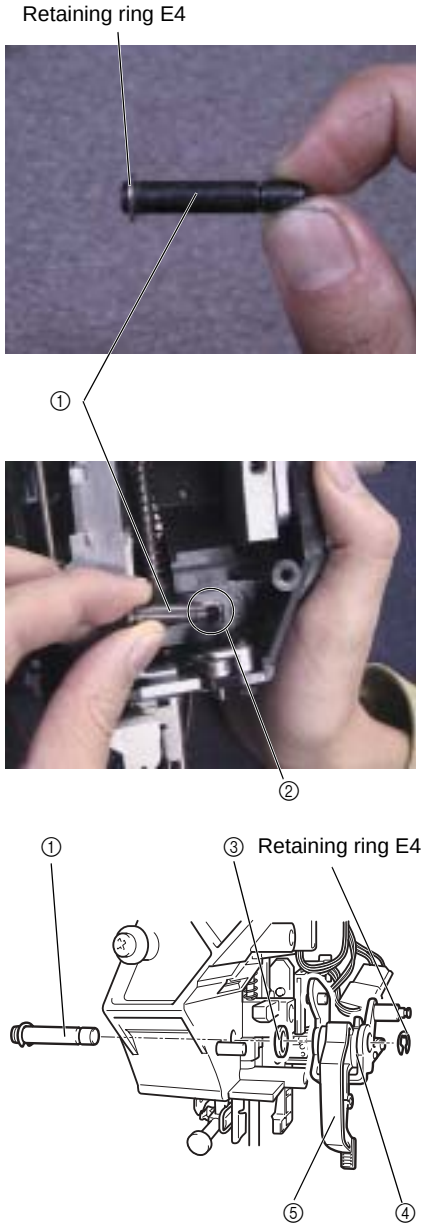
13 Presser foot lifter attachment

1. **Attach retaining ring E4 to the presser lift shaft ①.**
2. **Apply a small amount of Molykote EM30L to the presser lift shaft ①.**
3. **Insert the presser lift shaft ① into the hole ② in the thread releaser assy., and attach the washer ③, lifter assy. ④ and presser foot lifter ⑤.**
4. **Attach retaining ring E4 to the presser lift shaft ①.**

Apply Molykote EM30L grease to the operating surface of the presser lifter shaft presser foot lifter.	Small amount
Apply Molykote EM30L grease to the operating surface of the presser foot lifter presser bar clamp	Small amount



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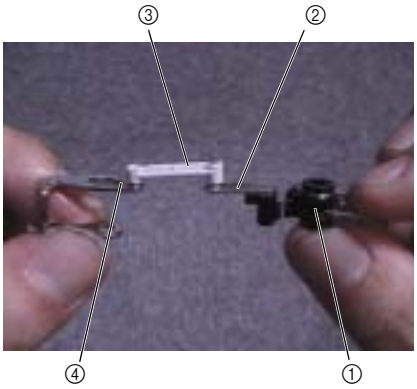
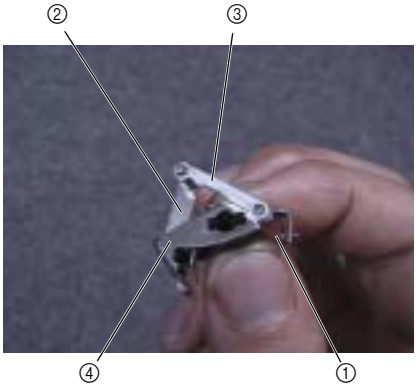
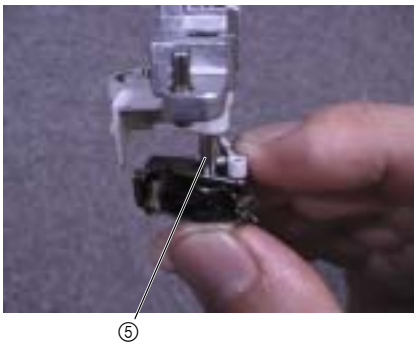
14 Threader hook assy. attachment

1. **Assemble the threader hook assy. ①, link A assy. ②, link B ③ and thread guide assy. ④.**
2. **Align needle thread shaft A ⑤ to the shape of the threader hook assy. ① shaft hole, and attach the threader hook assy. ① to needle thread shaft A.**

Start movie clip (CD-ROM version only)



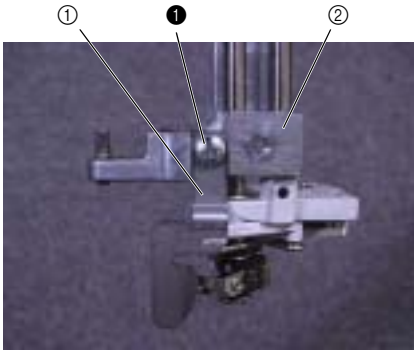


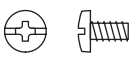


15 Hook release plate attachment.

1. **Attach the hook release plate ① to the needle bar supporter assy. ② the screw ❶.**

Start movie clip (CD-ROM version only)



❶		Screw, Bind M2.6X5 Color; Silver	Torque 0.29 – 0.49 N·m

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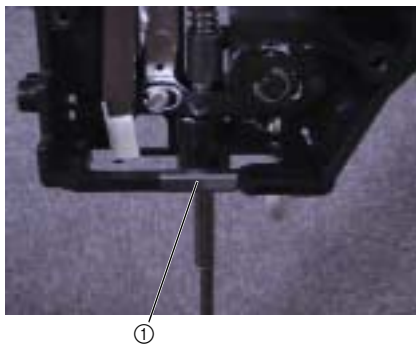
16 Thread guide plate attachment

1. **Attach the thread guide plate ① to the upper unit holder.**

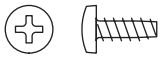
Start movie clip (CD-ROM version only)

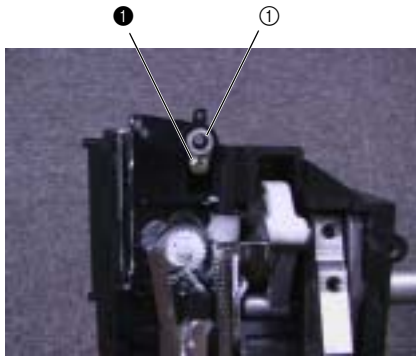


17 Shaft bushing A attachment

1. **Attach shaft bushing A ① to the upper unit holder using the screw ❶.**

Start movie clip (CD-ROM version only)

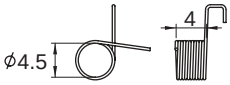
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.78 – 1.18 N·m

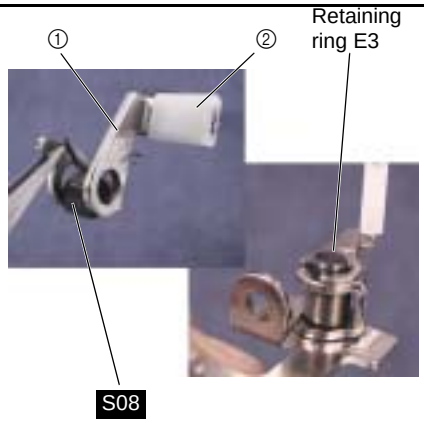


18 Assembling the Lever AB assy.

1. **Put the cap ② on lever B ①.**
2. **Attach lever B ① and S08 to the lever A assy., and attach retaining ring E3.**

Start movie clip (CD-ROM version only)

S08		TORSION SPRING XC2460***



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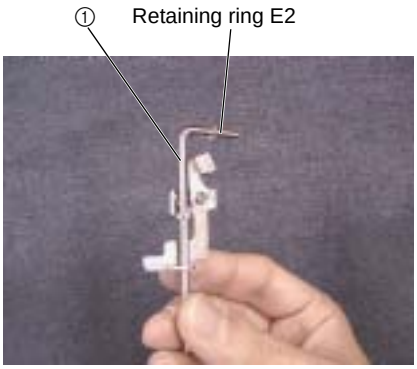
19 Lever AB assy. attachment

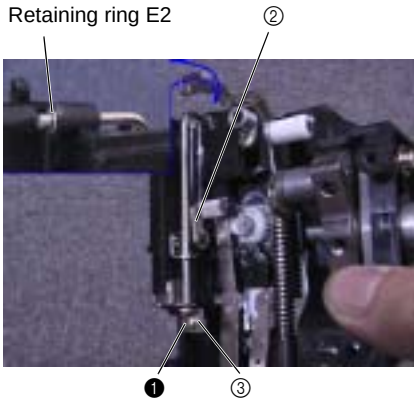
1. **Attach retaining ring E2 to the lever guide shaft ①.**
2. **Apply a small amount of Epnoc Grease AP to the lever guide shaft ①.**
3. **Apply a small amount of Molykote EM30L to the upper unit holder slide groove.**
4. **Attach the lever AB assy. ② to the lever guide shaft ①.**
5. **Attach the lever guide shaft assy. ① to the upper unit holder, and attach the lever presser plate ③ using the screw ❶.**
6. **Attach retaining ring E2 to the lever guide shaft ①.**

Apply Epnoc Grease AP to the lever guide shaft	Small amount
Apply Molykote EM30L grease to the full width of the slide lever groove	Small amount
Apply Molykote EM30L grease to the operating surfaces of the lever B cap and the thread guide slider.	Small amount

Start movie clip (CD-ROM version only)

❶		Taptite, Bind B M3X6 Color; Gold	Torque 0.78 – 1.18 N·m





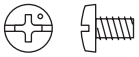
20 Needle bar supporter assy. attachment.

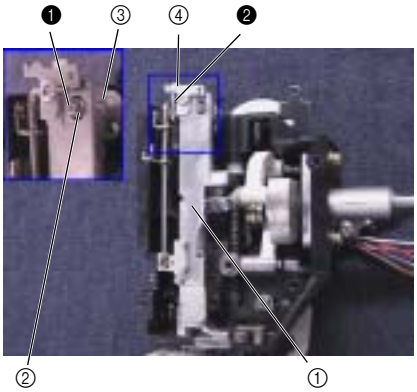
1. **Attach the needle bar supporter assy. ① to the upper unit holder.**

   ***Key point**
   - Move the lever AB assy. up.
   - Turn the T cam, and move the lower end of the Z zigzag lever to the left.
2. **Attach the shaft ②.**
3. **Attach the shaft ③, and install the screw ❶.**
4. **Attach the plate ④ using the screw ❷.**

Lubricate the shaft with turbine oil #100.	1 – 2 drops

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (FT) M4X4 Color; Black	Torque 0.78 – 1.18 N·m
❷		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N·m



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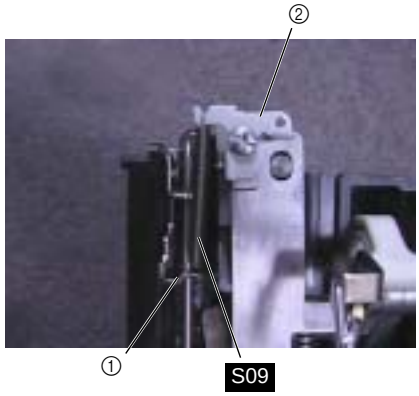
21 Lever A spring attachment

1. **Attach S09 to the lever AB assy. ① and the plate ②.**

Start movie clip (CD-ROM version only)



S09	30.1 φ3.2 A decided hook form is the same.	SPRING XC2461***

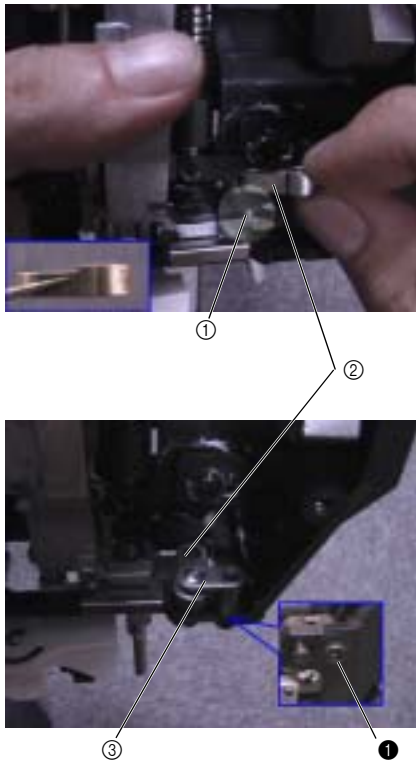
22 Shaft assy. attachment

1. **Apply a small amount of Epnoc Grease AP to the needle bar supporter assy. needle roller ①.**
2. **Attach the needle holder block ② to the needle bar supporter assy. needle roller ①.**

   ***Key point**
   - The flat surface of the needle holder block is the bottom.
3. **Apply a small amount of Epnoc Grease AP to the shaft assy. ③ shaft.**
4. **Attach the shaft assy. ③ to the needle holder block ② and upper unit holder, and hand start an the screw ❶.**
   (Fully tighten after 4 - 10 "Needle interference left/right adjustment.")

Apply Epnoc Grease AP to the upper unit holder needle roller	Small amount
Apply Epnoc Grease AP to the shaft assy. shaft.	Small amount

Start movie clip (CD-ROM version only)



❶		Screw 3X10 Color; Black	Torque 0.78 – 1.18 N·m

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23 Needle bar assembly

1. **Attach the needle thread plate ① to the needle block ②.**
2. **Attach the needle block ② to the needle bar ③ using the screw ❶.**

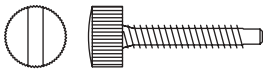
   ***Key point**
   - With the needle bar groove ④ facing forward, $$$neji38$$ is on the right side.

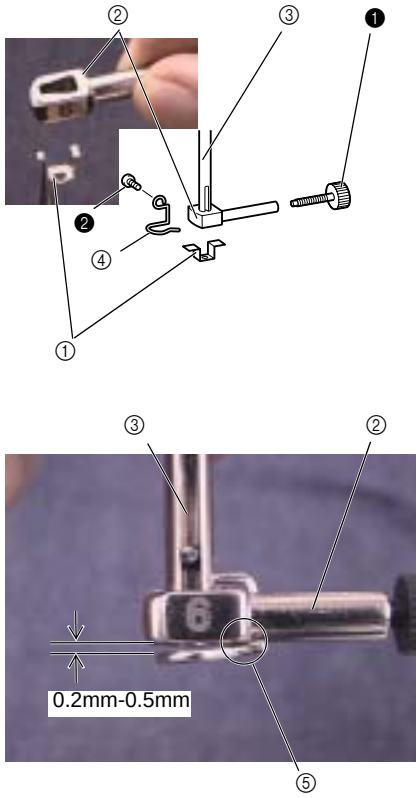
3. **Attach the needle bar thread guide ④ to the needle bar ③ using the screw ❷.**

   ***Key point**
   - There should be no gap ⑤ on the right side of the needle bar thread guide ④ and needle block ②.
   - There should be a 0.2 mm – 0.5 mm gap on the left side of the needle bar thread guide ④ and needle block ②.

Gap on right side of needle bar thread guide and needle block	None
Gap on left side of needle bar thread guide and needle block	0.2 mm – 0.5 mm

Start movie clip (CD-ROM version only)

❶		Needle Clamp Screw Color; Black	
❷		Screw SM2.38 Color; Silver	Torque 0.39 – 1.78 N·m



24 Needle bar assembly attachment

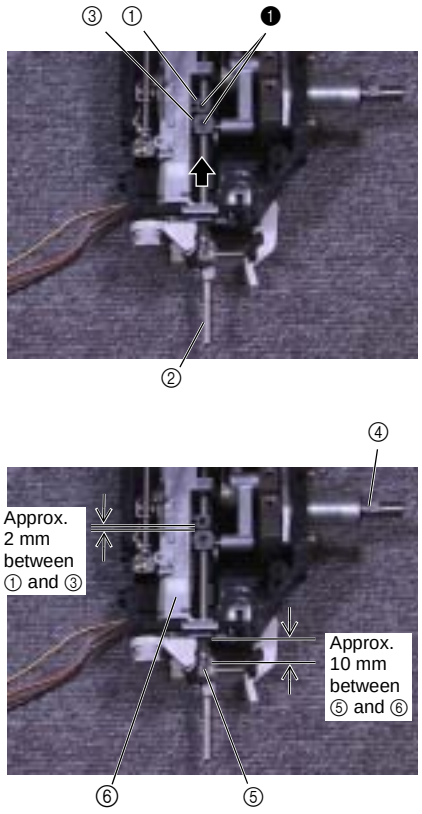
1. **Apply a small amount of Epnoc Grease AP to the needle thread block ①.**
2. **Attach the needle bar ② to the needle bar crank rod assy. needle bar block ③ and the needle thread block ①, and hand start screws the screws ❶ (two).**
   (Fully tighten after 4 - 8 "Needle bar height adjustment," and 4 - 24"Threading adjustment.")

   ***Key point**
   - With the unit shaft D cut ④ facing forward, the upper surface of the needle block ⑤ and the needle bar supporter assy. ⑥ should be adjusted to approximately 10 mm separation.
   - Adjust the space between the needle thread block ① and the needle bar block ③ to approximately 2 mm.
   - When the needle thread block ① is viewed from the front, it is secured in a position turned slightly counterclockwise (see 4 - 24 "Threading adjustment").

Lubricate the needle bar crank joint area with Molykote (Sewing Lube 90% + Molykote dispersion).	1 – 2 drops
Apply Epnoc Grease AP to the sliding pin part of the needle thread block.	Small amount
Lubricate the needle bar supporter assy. needle operating area with Sewing Lube.	1 – 2 drops

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (FT) M4X4 Color; Black	Torque Hand tighten



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25 Lock nut attachment

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

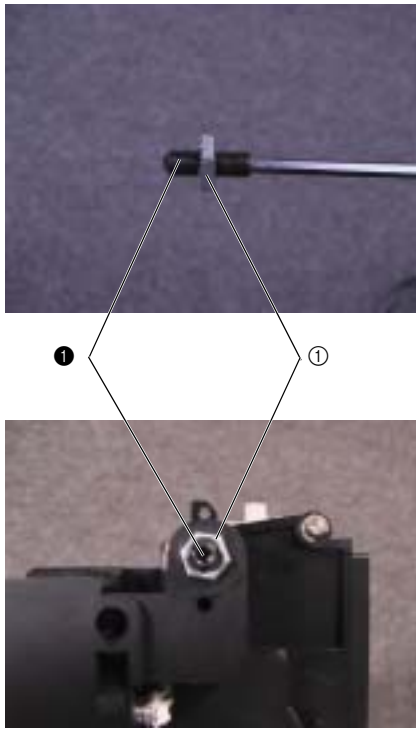
   ***Key point**
   - The screw ❶ in approximately half its length.

2. **Install the screw ❶ in the upper unit holder.**

   ***Key point**
   - Tighten until the lock nut ① hits the upper unit holder.

3. **Tighten the lock nut ①.**

Start movie clip (CD-ROM version only)



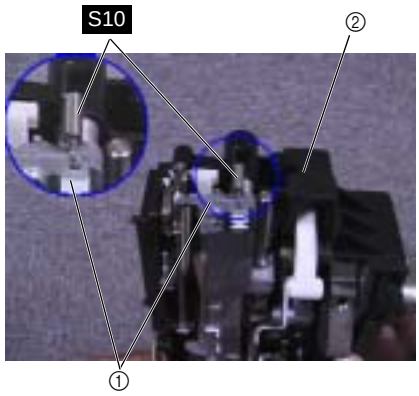
❶	Set Screw, Socket (CP) M4X12 Color; Black	

26 Spring (for needle bar supporter assy.) attachment

1. **Attach S10 to the needle bar supporter assy. plate ① and the upper unit holder ②.**

   ***Key point**
   - Connect the side with the short hook to the needle bar supporter assy. plate ① and the long side to the upper unit holder ②.

Start movie clip (CD-ROM version only)



S10	24.5	SPRING XC2429***

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27 Presser dial attachment

1. **Attach the presser dial shaft assy. ① to the presser dial ②, and attach retaining ring E4.**

   ***Key point**
   - See the figure to the right for the presser dial shaft assy. ① D cut ③ and presser dial ② hole ③.

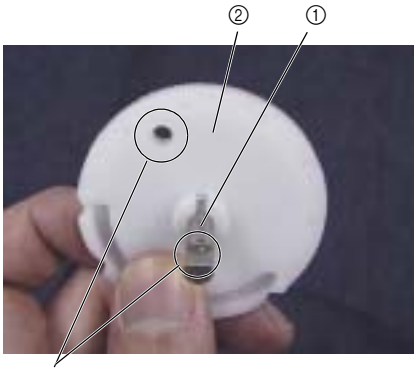
2. **Attach the presser dial gear ④.**

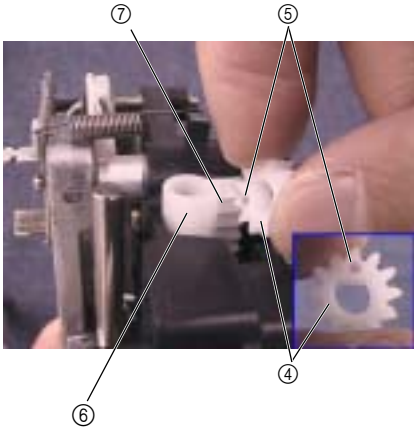
   ***Key point**
   - Align the presser dial gear ④ match mark ⑤ and the first indentation ⑦ from the top in the tension spring receiving gear ⑥ .

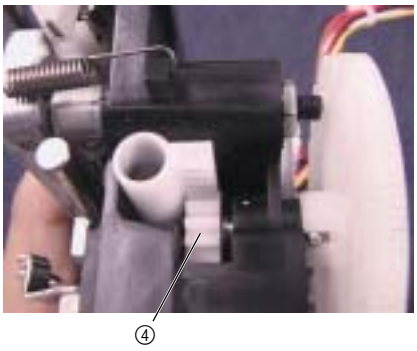
3. **Attach the presser dial assy.**

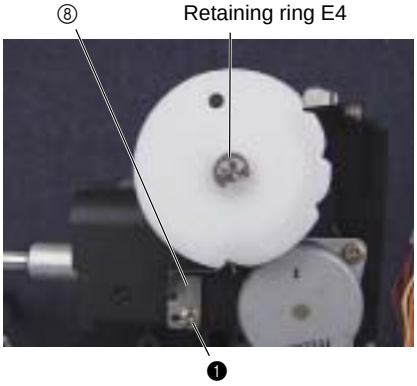
   ***Key point**
   - Align the presser dial shaft assy. ① D cut ③ and the presser dial gear ④ D cut.

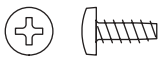
4. **Attach the spring plate ⑧ to the upper unit holder using the screw ❶.**









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

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28 Zigzag adjusting nut attachment

1. **Apply a small amount of Epnoc Grease AP to the zigzag adjusting nut ①.**
2. **Hand tighten the zigzag adjusting nut ① on the needle bar supporter assy. using the screw ❶.**
   (Fully tighten after 4 - 9 "Three point needle drop adjustment.")

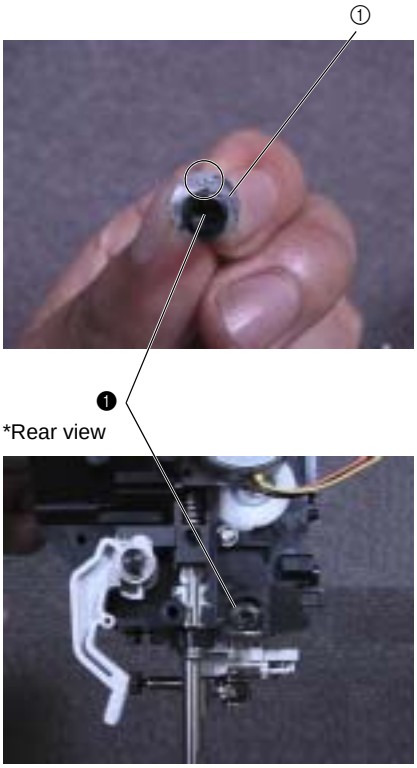
***Key point**

- Set the side of the zigzag adjusting nut ① with the greatest eccentricity toward the top (see figure at the right).

Apply Epnoc Grease AP to the zigzag adjusting nut Z zigzag lever contact surface	Small amount

Start movie clip (CD-ROM version only)

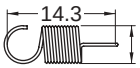
❶		Bolt, Socket M4X25 Color; Black	Torque 0.78 – 1.18 N·m

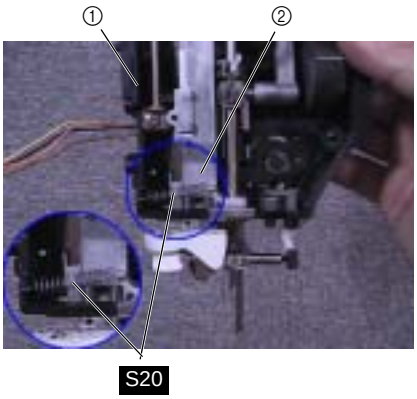


29 Spring-Z attachment

1. **Attach S20 to the upper unit holder ① and needle bar supporter assy. ②.**

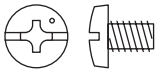
Start movie clip (CD-ROM version only)

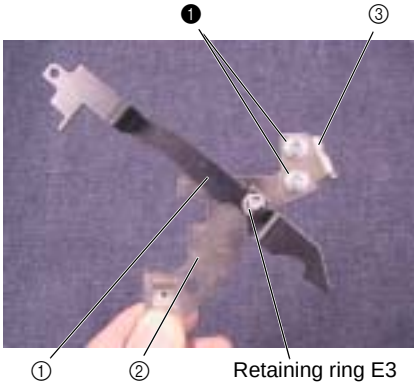
S20	 A decided hook form is the same.	SPRING-Z XC2748***



30 Adjusting plate assy. assembly

1. **Attach tension release plate C ① to the adjusting plate assy. ②, and attach retaining ring E3.**
2. **Attach wire guide plate U ③ to the adjusting plate assy. ② using the screws ❶ (two).**

❶		Screw, Bind M4X6 Color; Silver	Torque ** – ** N·m



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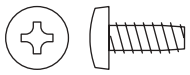
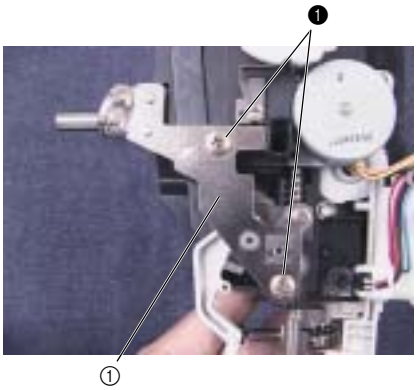
31 Adjusting plate assy. attachment

1. **Attach the adjusting plate assy. ① to the upper unit holder using the screws ❶ (two).**

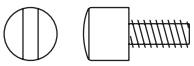
   ***Key point**
   - Hold the adjusting plate assy. ① against the right stopper and attach.
   - Align the presser lifter shaft and the adjusting plate assy. hole ①.

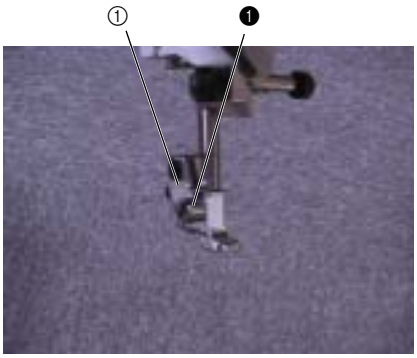
❶		Taptite, Bind B M4X10 Color; Gold	Torque 1.18 – 1.57 N·m



32 Presser feed holder assy. attachment.

1. **Attach the presser feed holder assy. ① to the presser bar using the screw ❶.**

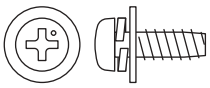
❶		Screw 3.57 Color; Silver	Torque 1.18 – 1.57 N·m

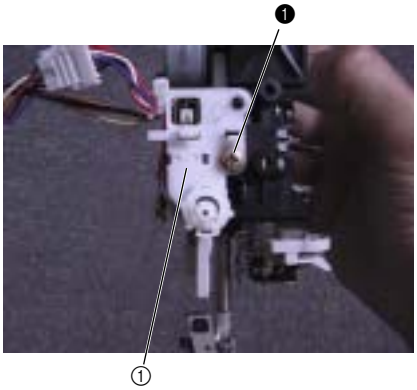


33 BH switch assy. attachment

1. **Attach the BH switch assy. ① to the upper unit holder using the screw ❶.**

Start movie clip (CD-ROM version only)

❶		Taptite,Pan B M4X12 Color; Gold	Torque 1.18 – 1.57 N·m



Assembly

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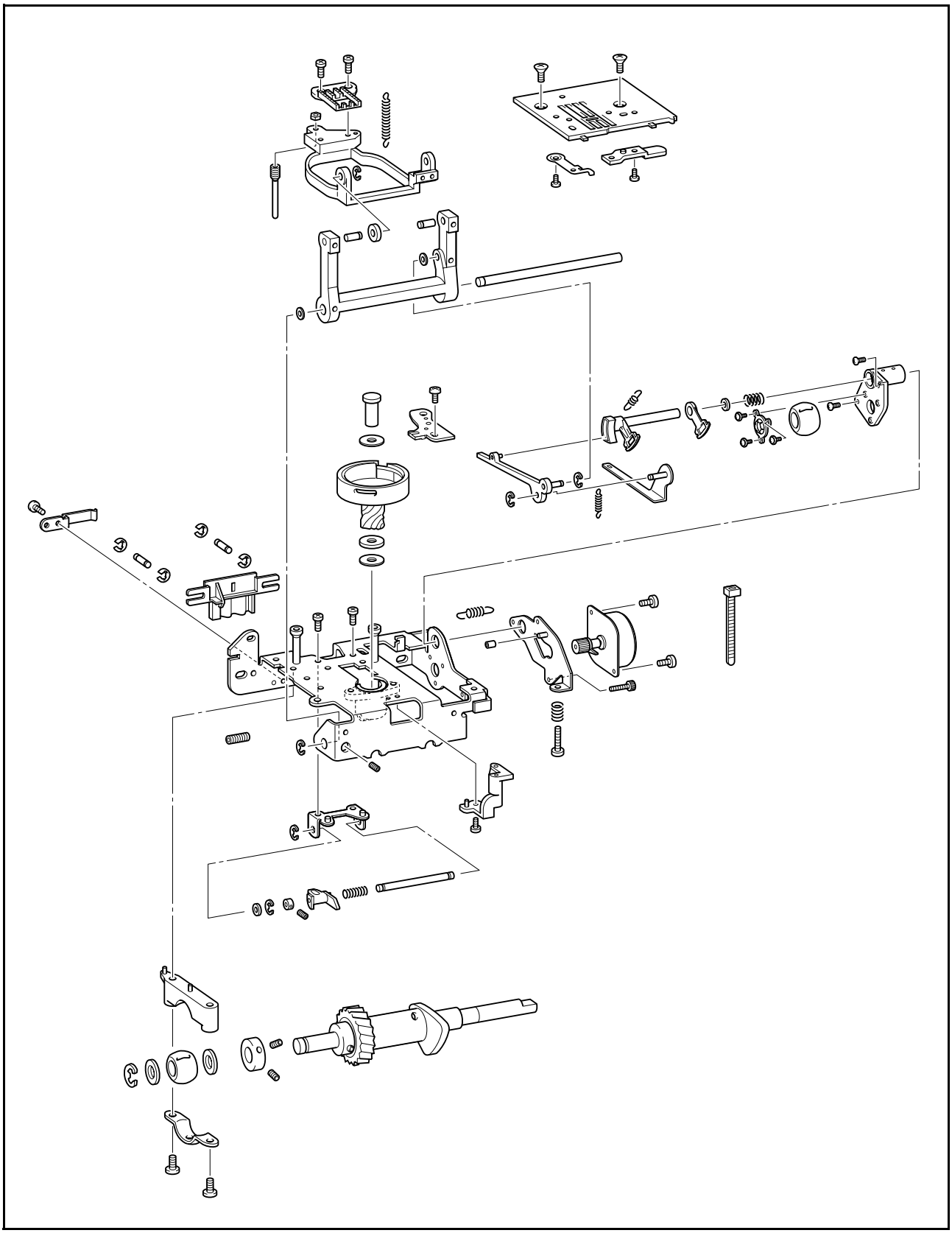
Feed module breakout diagram



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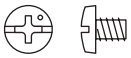
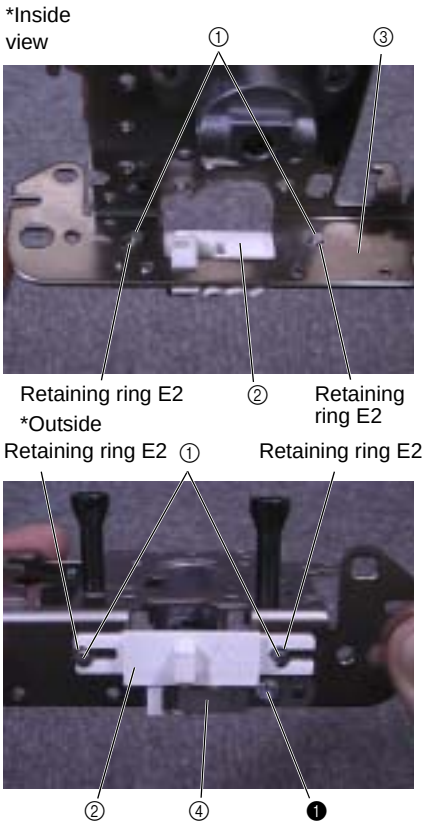
1 Drop knob attachment

1. **Attach retaining rings E2 (two) to slide shafts B ① (two).**
2. **Attach the drop knob ② and to slide shaft B assembly ① (two) to the feed base ③, and attach retaining rings E2 (two).**
3. **Apply a small amount of Molykote EM30L to the drop knob ②.**
4. **Attach the spring plate ④ using the screw ❶.**

Apply Molykote EM30L grease to the sliding parts of the drop knob and spring plate	Small amount

Start movie clip (CD-ROM version only)

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

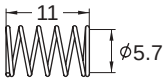


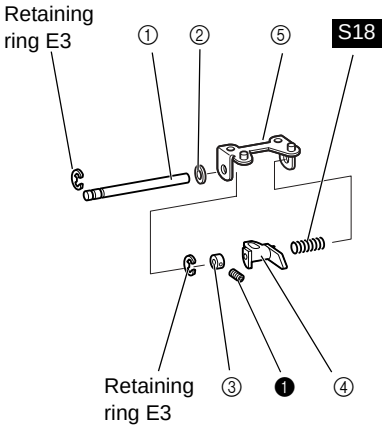
2 Drop assy. assembly

1. **Attach retaining ring E3 to the vertical feed shaft ①.**
2. **Attach the vertical feed shaft assy. ①, polyester slider ②, set screw collar 4 ③, vertical lever ④, and S18 to the vertical supporting plate ⑤, and attach retaining ring E3.**
3. **Hand start the screw ❶ in set screw collar 4 ③.**
   (Fully tighten after 3 - 63 "11. Lower shaft B assy. attachment.")
4. **Apply 1 – 2 drops of Sewing Lube to the vertical feed shaft assy. ①.**

Lubricate the vertical feed shaft with sewing lube.	1 – 2 drops

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque Hand tighten
S18			SPRING XC2550***



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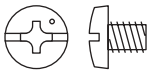
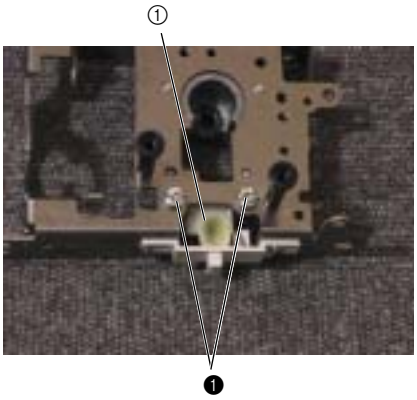
3 Drop assy. attachment

1. **Attach the drop assy. ① using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

❶		Screw, Bind M4X5 Color; Silver	Torque 1.18 – 1.57 N·m

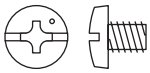


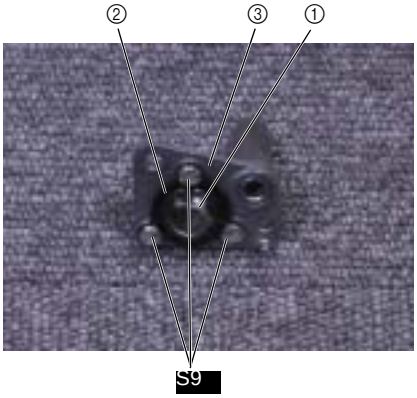
4 Bushing supporter assy. assembly

1. **Attach the lower shaft bushing ① and bushing presser B ② to the bushing supporter assy. ③ using the screws ❶ (three).**
2. **Lubricate the lower shaft bushing ① with 1 – 2 drops of turbine oil #100.**

Lubricate the lower shaft bushing round surface with turbine oil #100.	1 – 2 drops

Start movie clip (CD-ROM version only)

❶		Screw, Bind M4X5 Color; Silver	Torque 0.78 – 1.18 N·m

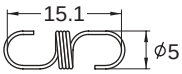


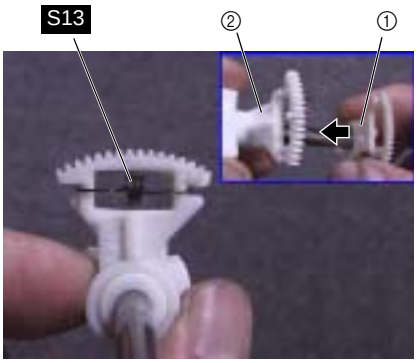
5 Feed adjuster assembly

1. **Apply a small amount of Epnoc Grease AP to the F gear ①.**
2. **Align the F gear ① and the feed adjuster assy. ② and attach S13.**

Apply Epnoc Grease AP to the entire operating surface of the feed adjuster assy. F gear	Small amount

Start movie clip (CD-ROM version only)

S13		SPRING XC2530***



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6 Feed adjuster assembly attachment

1. **Attach the feed adjuster assy. ①, polyester slider ② and S14 to the bushing supporter assy. ③.**

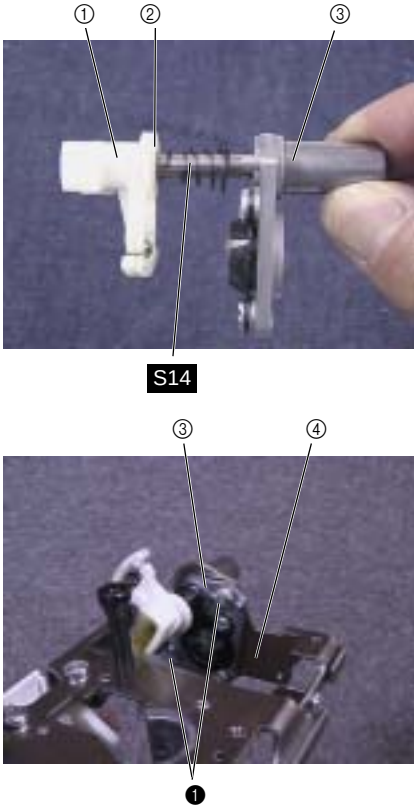
   ***Key point**
   - Attach S14 to the feed adjuster assy. ② starting with the side having the smaller spring diameter.

2. **Attach the bushing supporter assy. ③ and feed adjuster assy. ② to the feed base ④ using the screws ❶ (two).**

Lubricate the feed adjuster assembly shaft with turbine oil #100	1 – 2 drops
Apply Epnoc Grease AP to the entire operating part of the feed adjuster feed regulator slide block.	Small amount

Start movie clip (CD-ROM version only)

❶	Screw, Bind M4X6 Color; Silver	Torque 1.18 – 1.57 N·m
S14	9.9 ø8.8 ø5.5	SPRING XC2531***



7 Stopper plate block assy. attachment

1. **Attach the stopper plate block assy. ① using the screw ❶.**

Start movie clip (CD-ROM version only)

❶	Screw, Bind M4X5 Color; Silver	Torque 1.18 – 1.57 N·m

Assembly

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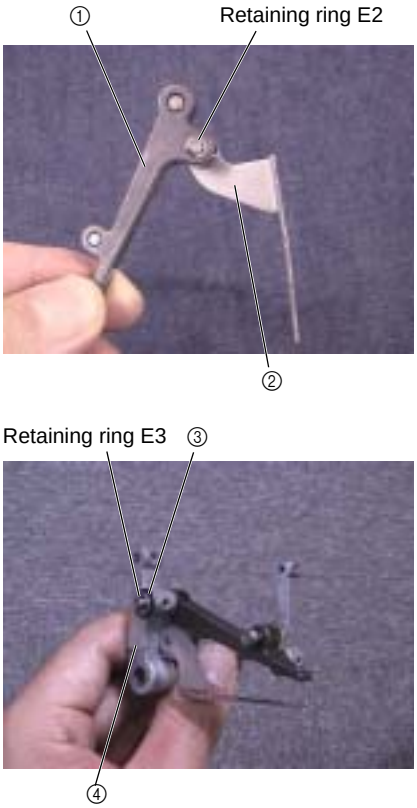
8 Assembling the feed arm assy.

1. **Attach the feed arm B assy. ① to the feed supporting plate assy. ②, and attach retaining ring E2.**
2. **Lubricate the feed supporting plate assy. ② shaft with 1 – 2 drops of turbine oil #100.**
3. **Attach the feed arm B assy. ① and polyester slider ③ to feed arm A ④, and attach retaining ring E3.**
4. **Lubricate the feed arm B assy. ① with 1 – 2 drops of turbine oil #100.**

Lubricate the feed supporting plate assy. shaft with turbine oil #100	1 – 2 drops
Lubricate the feed arm B assy. with turbine oil #100	1 – 2 drops

Start movie clip (CD-ROM version only)



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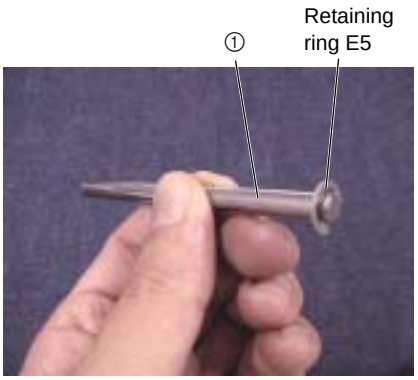
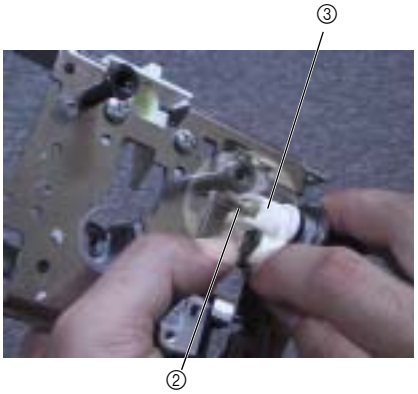
9 Feed arm assembly attachment

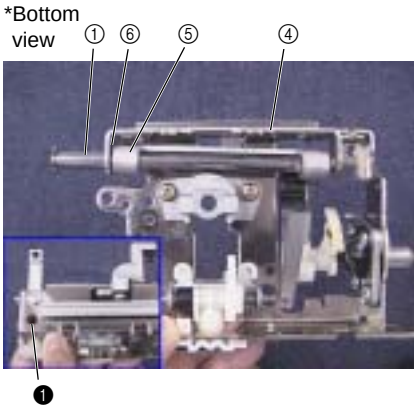
1. **Attach retaining ring E5 to the horizontal feed shaft ①.**
2. **Align the feed arm B assy. feed regulator slide block shaft ② with the feed adjuster assembly hole ③.**
3. **Align the feed arm assy. ⑤ with the feed base ④, and attach the horizontal feed shaft assembly ① and polyester slider ⑥.**
4. **Install the screw ❶.**
5. **Apply 1 – 2 drops of Sewing Lube to the horizontal feed shaft ①.**

Lubricate the three operating areas of the horizontal feed shaft with Sewing Lube	1 – 2 drops each

Start movie clip (CD-ROM version only)







❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque 1.18 – 1.57 N·m

Assembly

10 Assembling the lower shaft B assy.

1. **Attach the set screw collar ①, thrust washer ②, lower shaft bushing ③ and thrust washer ② to the lower shaft B assy. ④, and attach retaining ring E6.**

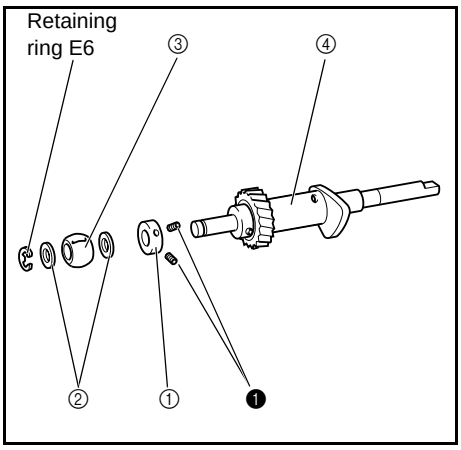
   ***Key point**
   - Attach the set screw collar ① with the ground surface facing the lower shaft bushing ③.

2. **Install the screws ❶ (two) in the set screw collar ①.**

   ***Key point**
   - Attach the set screw collar ① in a position that allows the lower shaft bushing ③ to turn smoothly.

3. **Lubricate the lower shaft bushing ③ with 1 – 2 drops of Sewing Lube.**

Lubricate the lower shaft bushing with Sewing Lube	1 – 2 drops



Start movie clip (CD-ROM version only)

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

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11 Lower shaft B assy. attachment

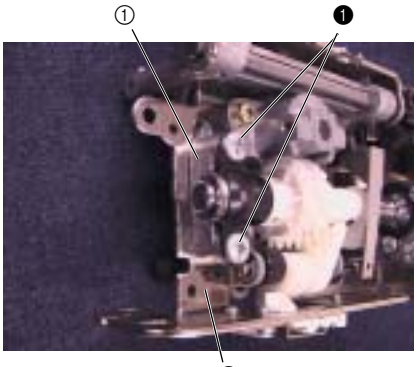
1. **Attach the bushing supporter A ① to the feed base ②.**
2. **Attach the lower shaft B assy. ③.**
3. **Attach bushing presser A ④ using the screws ❶ (two).**
4. **Attach the joint ⑤ using the screws ❷ (two).**

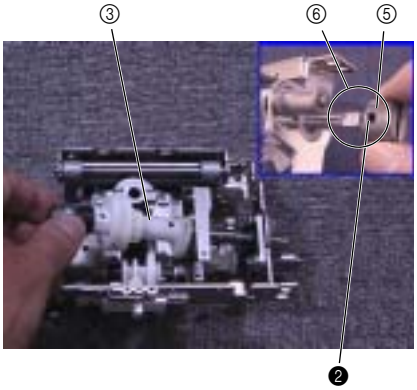
   ***Key point**
   - Align the screw hole ⑥ in the joint ⑤ and the D cut surface ⑥ in the lower shaft B.

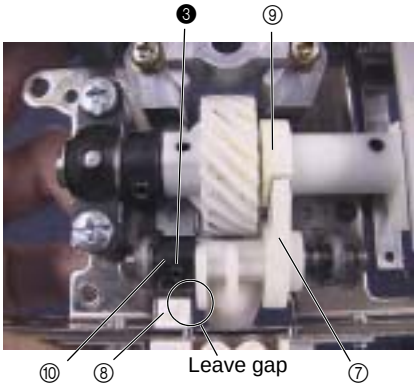
5. **Adjust the right-left position of the set screw collar 4 ⑩ so that there is a gap between the vertical lever ⑦ and the drop knob ⑧ and so that the contact area of the vertical feed cam vertical lever ⑦ does not come off of the vertical feed cam ⑨, and fully tighten the screw ❸.**

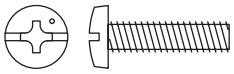
Lubricate the lower shaft (inserted side of bushing supporter assy.) with Sewing Lube.	1 – 2 drops

Start movie clip (CD-ROM version only)





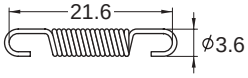


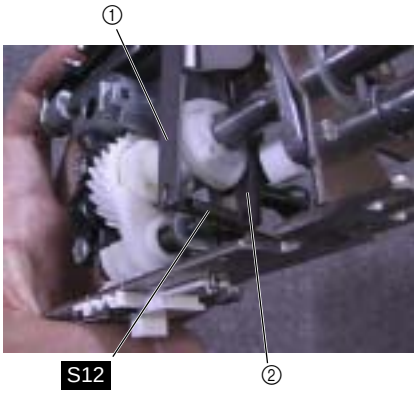
❶		Screw, Bind M4X16 Color; Silver	Torque 1.18 – 1.57 N·m
❷		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.18 – 1.57 N·m
❸		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 – 1.18 N·m

12 Supporting plate spring attachment

1. **Attach S12 to the feed supporting plate assy. ① and feed arm B assy. ②.**

Start movie clip (CD-ROM version only)

S12		SPRING XC2524***



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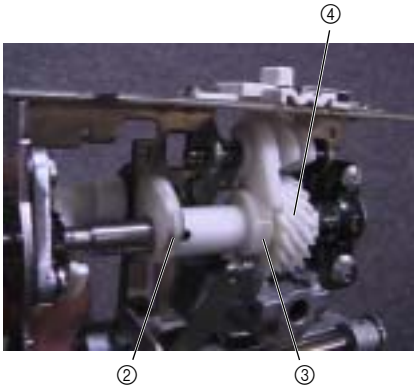
13 Grease applications

1. **Apply a small amount of Epnoc Grease AP to the vertical rod seat ① on the vertical lever, the lower shaft horizontal feed cam surface ② and the vertical feed cam surface ③.**
2. **Apply a small amount of Molykote EM30L grease to the lower shaft gear ④.**

Apply Epnoc Grease AP to the vertical rod seat	Small amount
Apply Epnoc Grease AP to the vertical feed cam surface	Small amount
Apply Epnoc Grease AP to the horizontal feed cam surface	Small amount
Apply Molykote EM30L grease to all of the teeth around the lower shaft gear	Small amount



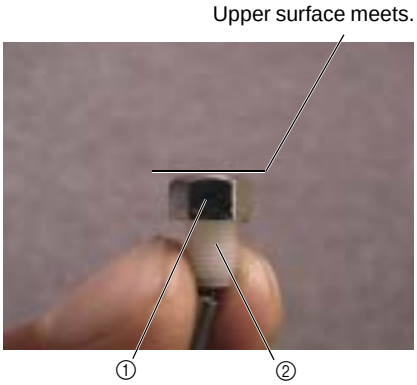
14 Vertical adjusting screw attachment

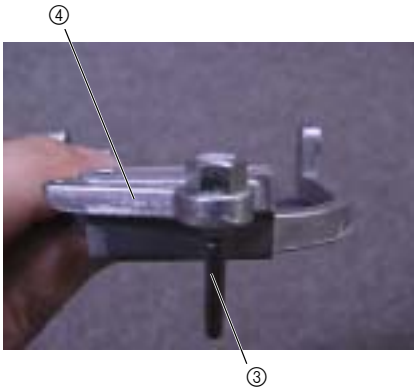
1. **Attach the M5 nut ① to the vertical adjusting screw ②.**

   ***Key point**
   - Tighten the M5 nut ① until the M5 nut ① and the upper surface of the vertical adjusting screw ② meet.
2. **Attach the vertical adjusting screw assembly ③ to the feed bar ④.**

   ***Key point**
   - Tighten until the bottom of the M5 nut ① touches the feed bar ④.

Start movie clip (CD-ROM version only)





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15 Feed bar attachment

1. **Apply a small amount Molykote EM30L to the shaft holes ① (two) in the feed bar.**
2. **Attach retaining ring E2 to feed bar shaft B ②.**
3. **Attach the feed bar ③, feed bar shaft A ④, feed bar shaft B ⑤ and feed bar spacer ⑥ to feed arm A ⑦ using the screws ❶ (two).**

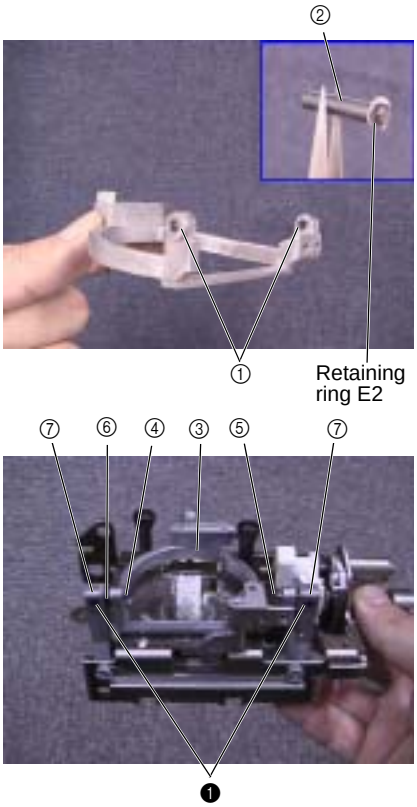
***Key point**

- Feed bar shaft A ④ is attached from the inside of the feed bar ③.
- Move feed bar shaft B ⑤ to the right.

Apply Molykote EM30L grease to feed shaft holes in the feed bar	Small amount
Apply Molykote EM30L grease to feed bar shaft A	Small amount
Apply Molykote EM30L grease to feed bar shaft B	Small amount

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque 1.18 – 1.57 N·m



16 Feed bar spring attachment

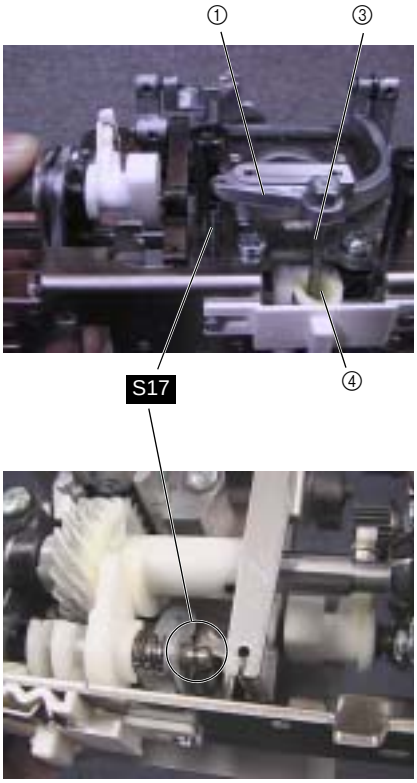
1. **Attach S17 to the feed bar ① and vertical feed shaft ②.**

***Key point**

- Align the vertical rod ③ with the vertical lever seat ④.

Start movie clip (CD-ROM version only)

S17	22.8 ϕ2.6 A hook form is a Left-right object.	SPRING XC2547***



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17 Outer rotary hook assy. attachment

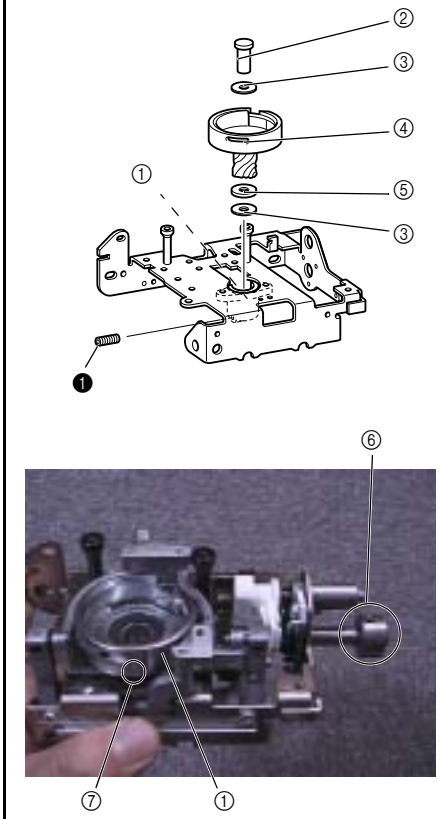
1. **Apply a small amount of Molykote EM30L to the shaft supporter ①.**
2. **Install the outer rotary hook shaft ②, spacer (thin) ③, outer rotary hook assy. ④, washer 6 (thick) ⑤ and the spacer (thin) ③.**

   ***Key point**
   - With the D cut ⑥ in the lower shaft B facing upward, attach so that the solid dot ⑦ on the rotary hook assy. faces forward.
     *Attach from a position where ⑦ is 45 deg. to the right.
3. **Install the screw ❶ in the shaft supporter.**

Apply Molykote EM30L grease to the shaft supporter surface	Small amount
Lubricate the outer rotary hook shaft with Sewing Lube	Apply liberally

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (CP) M4X6 Color; Black	Torque 1.18 – 1.57 N·m

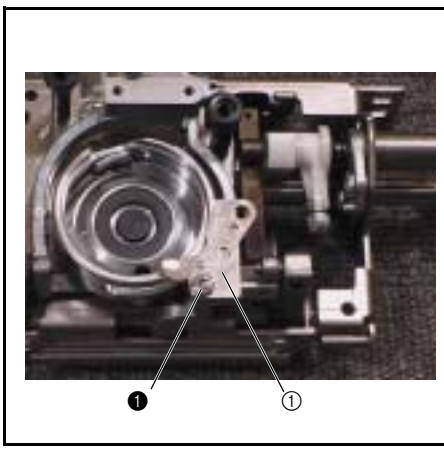


18 Inner rotary hook bracket assy. attachment

1. **Align the inner rotary hook bracket assy. ① with the stopper plate block, and hand start the screw ❶**
   (Fully tighten after 4 - 23 "Inner rotary hook bracket position adjustment.")

Start movie clip (CD-ROM version only)

❶		Screw, Bind M2X3 Color; Silver	Torque 0.78 – 1.18 N·m



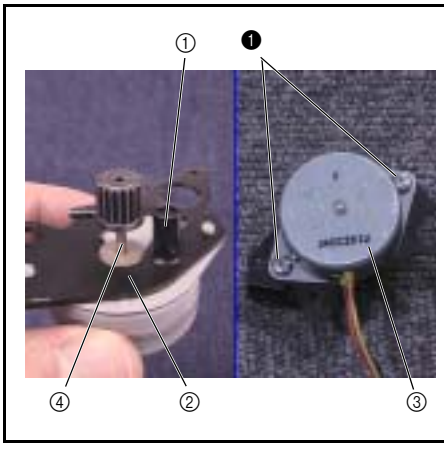
19 Assembling F pulse motor assembly

1. **Attach the rubber ① to the FPM holder assy. ②.**
2. **Attach the F pulse motor (FPM35SP-9N) ③ to the FPM holder assy. ② using the screws the screws ❶ (two).**
3. **Lubricate the F pulse motor (FPM35SP-9N) ② bearing ④ with turbine oil #100.**

Lubricate the FPM bearing with turbine oil #100.	1 – 2 drops

Start movie clip (CD-ROM version only)

❶		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N·m



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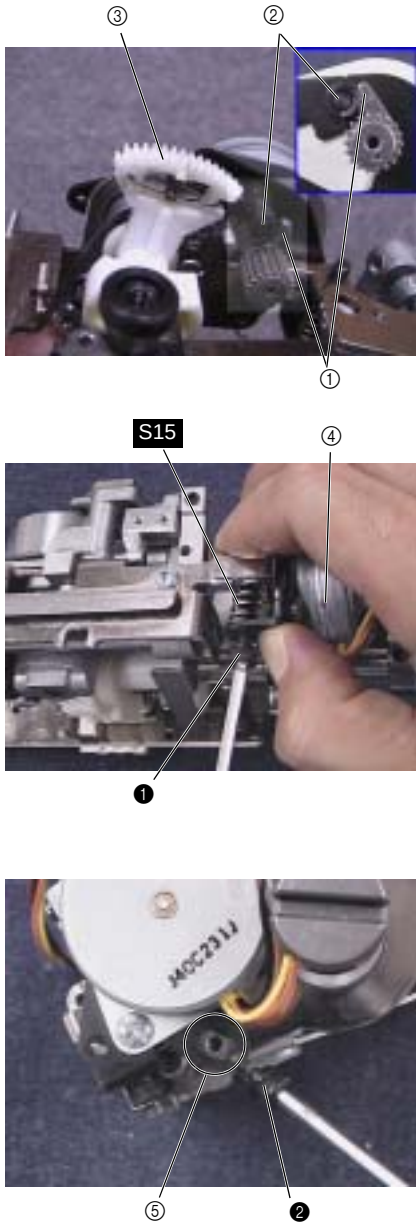
20 FPM holder assy. attachment

1. **Turn the F pulse motor gear counterclockwise until the stopper ① on it touches the FPM holder assy. shaft. ②.**
2. **Set the feed adjuster assy. ③ to the position in the figure to the right.**
3. **Attach the F pulse motor assy. ④.**
4. **Attach S15 and the screw ❶.**

   ***Key point**
   - To prevent the screw ❶ from being tightened into the spacer at an angle, tighten the screw ❶ with S15 compressed.
   - Tighten the screw ❶ until the screw hole in the feed base comes approximately to the center of the hole ⑤ in the FPM holder assy.
5. **Hand start the screw ❷.**
   (Fully tighten after 4 - 16 "Feed forward/reverse adjustment.")

Start movie clip (CD-ROM version only)



❶	Bolt, Socket M4X25 Color; Black	
❷	Screw M3X8 Color; Black	Torque 0.27 – 0.48 N·m
S15	21, ø5	SPRING XC2537***

Assembly

21 F gear teeth alignment

1. **Apply a small amount of Epnoc Grease AP to the feed adjuster assy. F gear ①.**
2. **Turn the F pulse motor gear clockwise until the stopper ② on it touches the bushing supporter assy. shaft ③.**
3. **Turn the feed adjuster assy. ④ until it touches ⑤ the F pulse motor gear.**

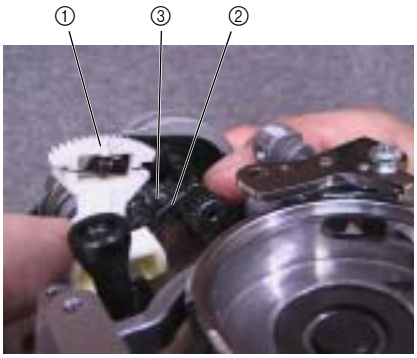
   ***Key point**
   - Once the feed adjuster assy. ④ and F pulse motor gear are touching, hold the F pulse motor gear with your finger ⑥ so that it does not turn.

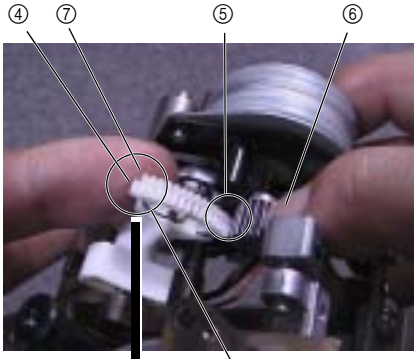
4. **Push the feed adjuster assy. ④ until it and the F gear ⑦ have their gears aligned ⑧.**
5. **With the gears ⑧ aligned, push them down, and mesh the feed adjuster assy. ④ and F pulse motor gears.**

   ***Key point**
   - Check that the feed adjuster assy. ④ gear match mark ⑨ and the F pulse motor gear match mark ⑩ are together.

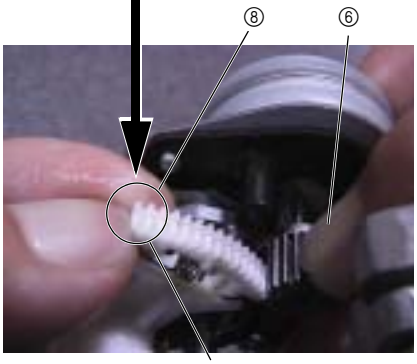
Apply Epnoc Grease AP to the all of the teeth on the feed adjuster assy. F gear	Small amount

Start movie clip (CD-ROM version only)





Gear is offset



Gear aligned

⑨,⑩

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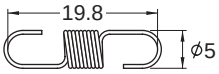
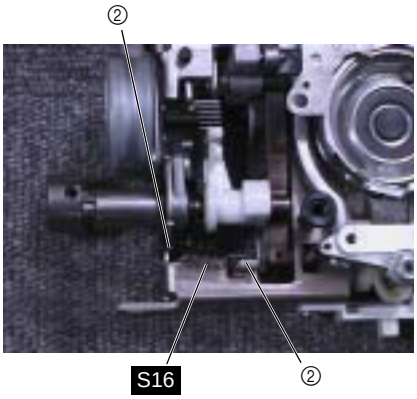
22 Spring attachment (for FPM holder assy.)

1. **Attach S16 to the feed base ① and FPM holder assy. ②.**

Start movie clip (CD-ROM version only

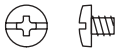
S16		SPRING XC2538***

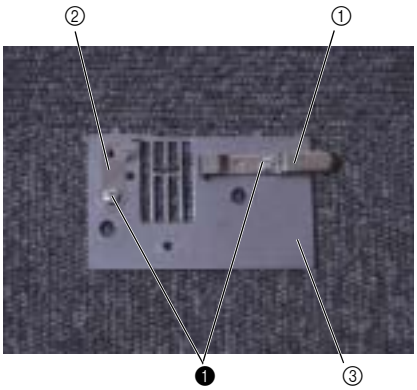


23 Assembling needle plate A assy.

1. **Attach the F gear stopper plate ① and stopper plate ② to needle plate A ③ using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

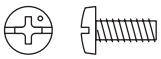
❶		Screw, Bind M2.6X3 Color; Silver	Torque 0.57 – 1.78 N·m

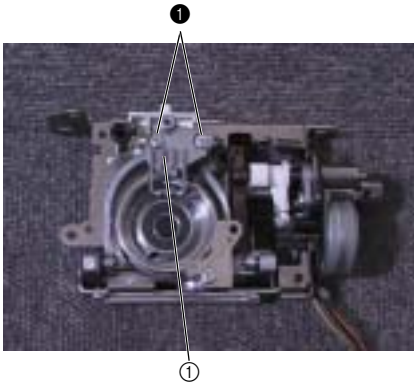


24 Feed dog attachment

1. **Attach the feed dog ① and hand start screws the screws ❶ (two). (Fully tighten after 4 - 21 "Feed dog forward/reverse and left/right adjustment.")**

Start movie clip (CD-ROM version only)

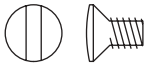
❶		Screw, Bind M3X8 Color; Silver	Torque 0.78 – 1.18 N·m

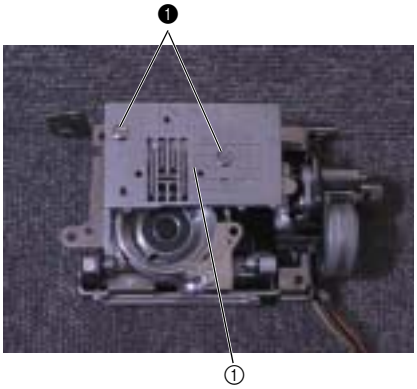


25 Needle plate A assy. attachment

1. **Attach the needle plate A ① using the screws ❶ (two).**

Start movie clip (CD-ROM version only)

❶		Screw M4 Color; Silver	Torque 1.18 – 1.57 N·m



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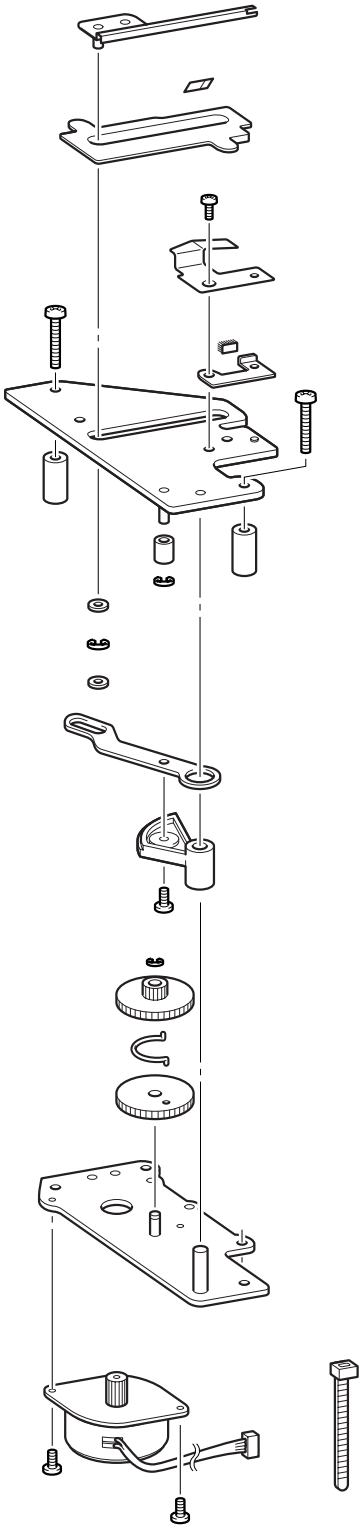
Thread cutter module breakout diagram



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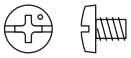
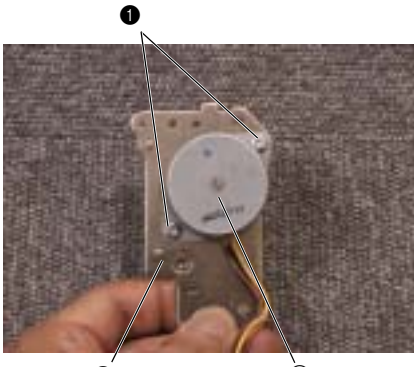
1 C pulse motor attachment.

1. **Attach the C pulse motor (ZPMM35SP-9N) ① to the motor holder assy. ② using the screws ❶ (two).**
2. **Lubricate the C pulse motor ① bearing with 1 – 2 drops of turbine oil # 100.**

Lubricate the CPM bearing with turbine oil #100.	1 – 2 drops

Start movie clip (CD-ROM version only)

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



2 Idle gears A and B attachment

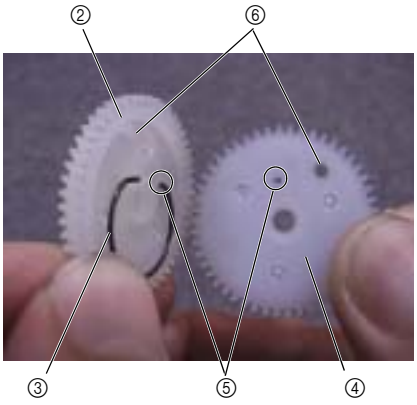
1. **Apply a small amount of Epnoc Grease AP to the idle gear shaft ①.**
2. **Attach idle gear A ②, the spring ③ and idle gear B ④ to the idle gear shaft ①, and attach retaining ring E2.**

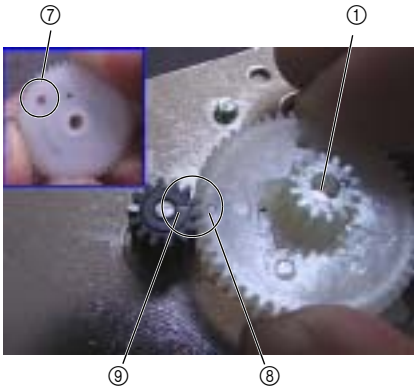
***Key point**

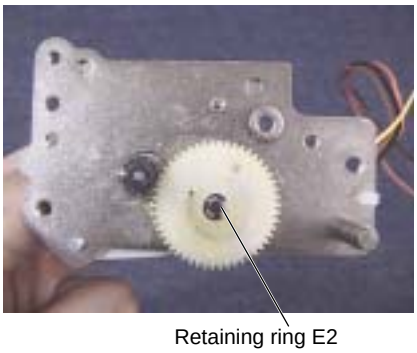
- Insert the spring ③ into the small holes ⑤ in idle gear A ② and idle gear B ④, and turn idle gear A ② clockwise until the large holes ⑥ in idle gear A ② and idle gear B ④ overlap ⑦.
- With the large holes ⑥ aligned ⑦, align the match mark ⑧ on the idle gear assy. and the match mark ⑨ on the C pulse motor gear, and attach the idle gear assy. to ①.

Apply Epnoc Grease AP to the lever guide shaft	Small amount

Start movie clip (CD-ROM version only)







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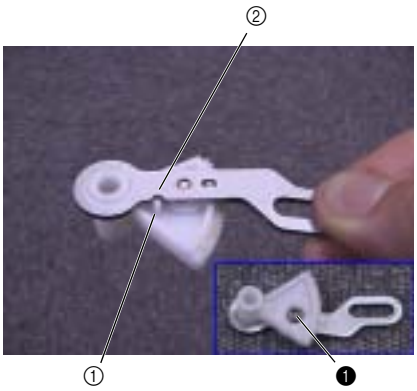
3 Assembling the thread cutter lever assy.

1. **Attach the thread cutter lever gear ① to the thread cutter lever ② using the screw ❶.**

Start movie clip (CD-ROM version only)

❶		Screw, Pan (S/P washer) M3X6DA Color; Gold	Torque 0.78 – 1.18 N·m



4 Thread cutter lever assy. attachment

1. **Apply a small amount of Epnoc Grease AP to the thread cutter lever shaft.**
2. **Attach the thread cutter lever assy. ① to the thread cutter lever shaft.**

***Key point**

- Align the thread cutter lever ① match mark ② with the idle gear assy. match mark ③.

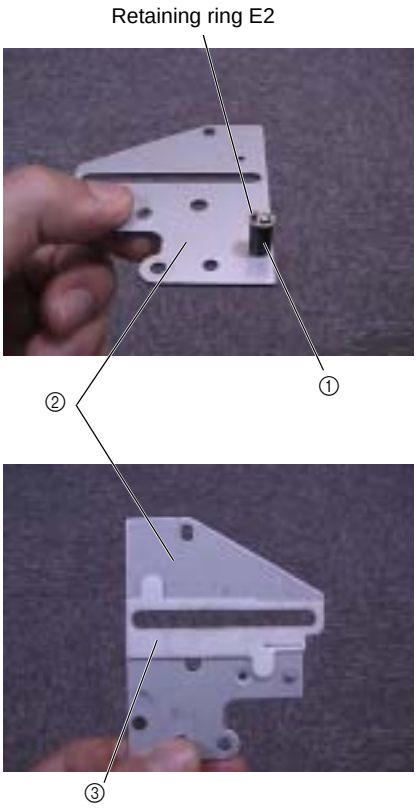
Apply a small amount of Epnoc Grease AP to the thread cutter lever shaft.	Small amount

Start movie clip (CD-ROM version only)

5 Rubber and spacer attachment

1. **Attach the rubber ① to the thread cutter frame ② shaft, and attach retaining ring E2.**
2. **Attach the spacer ③ to the thread cutter frame ②.**

Start movie clip (CD-ROM version only)



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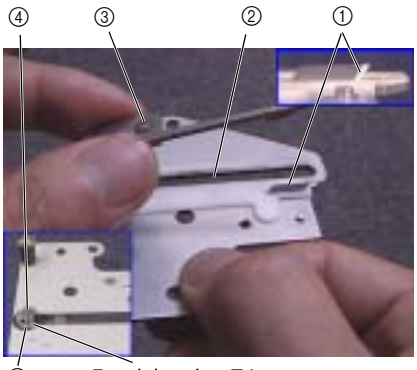
6 Assembling the thread hook assy.

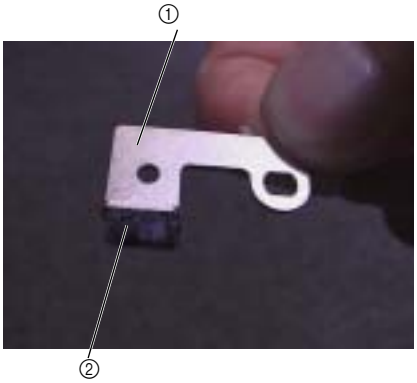
1. **Attach the NT lower thread cutter ① to the spacer ②.**
2. **Attach the thread hook assy. ③ to the spacer ②.**
3. **Attach a polyester slider ⑤ to pin A ④, and attach retaining ring E4.**

Start movie clip (CD-ROM version only)



7 Pile 4 x 8 attachment

1. **Wipe the pile attachment surface of the presser plate ① with a cloth soaked in alcohol.**
2. **Attach the pile 4 x 8 ②.**

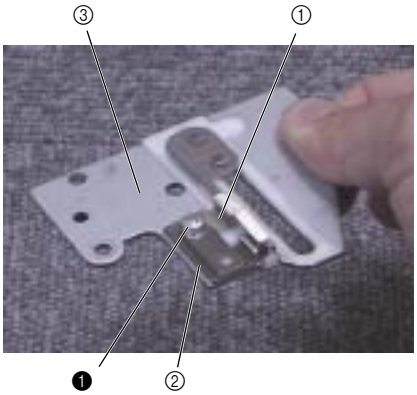


8 Presser plate assy. attachment

1. **Attach the spring plate ① and the presser plate assy. ② to the thread cutter frame ③ using the screw ❶.**

Start movie clip (CD-ROM version only)

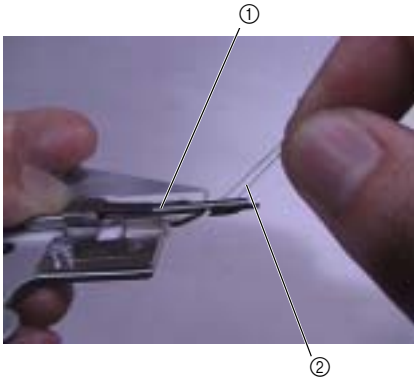
❶	Screw, Bind M3X4 Color; Silver	Torque 0.78 – 1.18 N·m



9 Thread cutter check

1. **Pull the thread hook assy ① from the thread cutter frame assy.**
2. **Attach Schappe Spun Sewing Thread #30 ② to the end of the thread hook assy. ①, and check that the thread is cut when the thread hook assy. returns.**

Start movie clip (CD-ROM version only)



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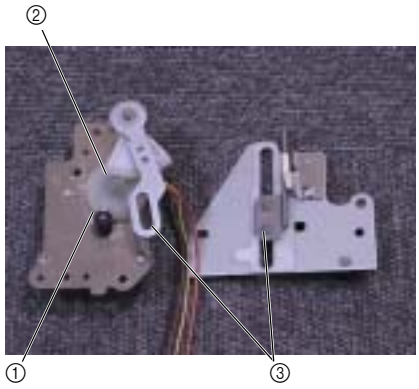
10 Grease applications

1. **Apply a small amount of Epnoc Grease AP to the all of the operating surfaces ① of the idle gear assy. and C pulse motor gear.**
2. **Apply a small amount of Epnoc Grease AP to the all of the operating surfaces ② of the thread cutter lever gear and idle gear assy.**
3. **Apply a small amount of Epnoc Grease AP to the entire operating surface ③ of the thread cutter lever thread hook pin A.**

Apply Epnoc Grease AP to the entire operating surfaces of idle gears A and B and the CPM gear.	Small amount
Apply Epnoc Grease AP to the to the operating surfaces of the thread cutter lever gear and idle gears A and B	Small amount
Apply Epnoc Grease AP to the operating surface of thread hook pin A	Small amount



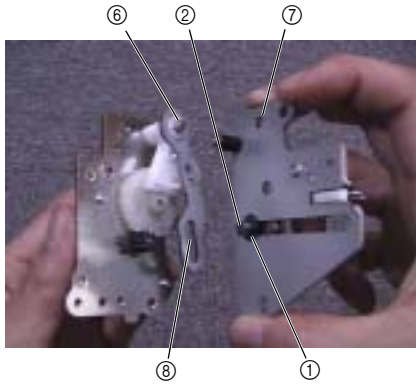
11 Thread cutter frame assy. attachment

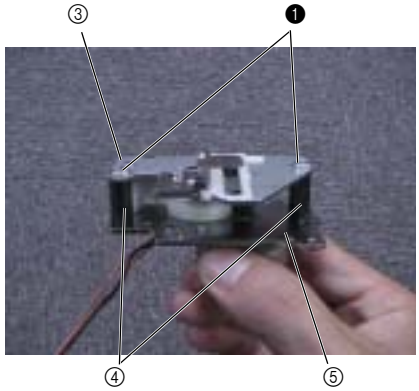
1. **Attach a polyester slider ① to thread hook pin A ②.**
2. **Attach the thread cutter frame assy. ③ and collars ④ (two) to the motor holder assy. ⑤ using the screws ❶ (two).**

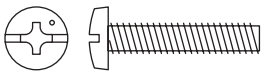
***Key point**

- Align the thread cutter lever shaft ⑥ and thread cutter frame hole ⑦, and the thread hook pin A and thread cutter lever hole ⑧.

Start movie clip (CD-ROM version only)



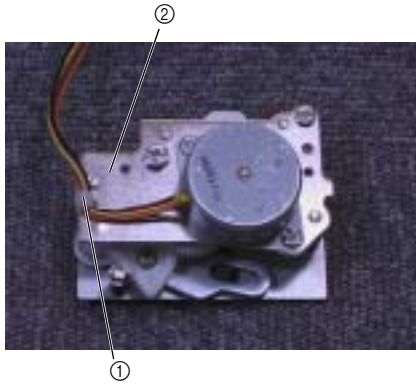


❶		Screw, Bind M4X20 Color; Silver	Torque 1.18 – 1.57 N·m

12 CPM lead processing

1. **Attach the CPM leads to the motor holder ② using a band ①.**

Start movie clip (CD-ROM version only)



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4 Adjustment

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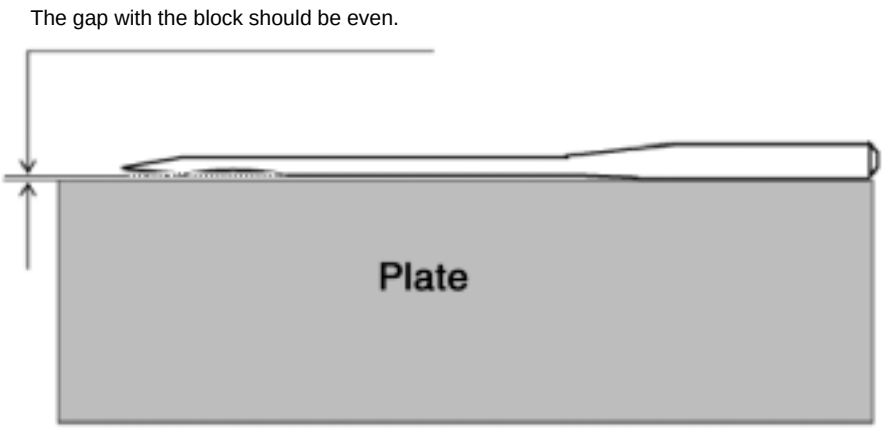
Inspection	Needle curvature

1. **Check to be sure that there is no curvature in the needle on a level block (horizontal block).**



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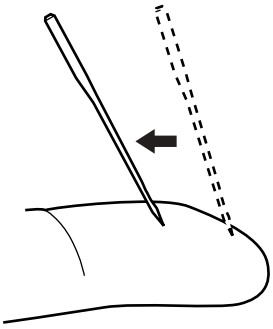
Inspection	Tip damage to needle

1. **Touch the tip of the needle to your finger, and check to be sure it does not catch.**



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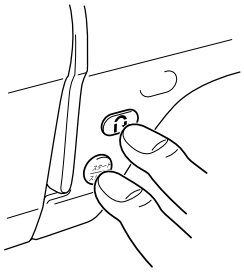
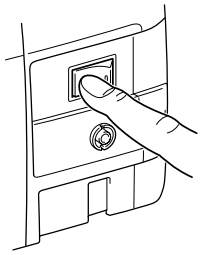
Starting test mode

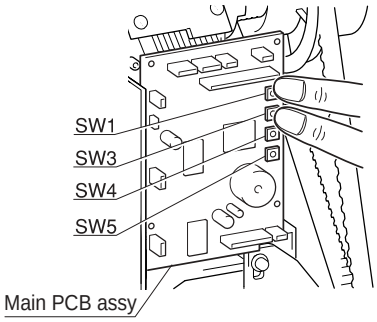
- **With the front cover in place**

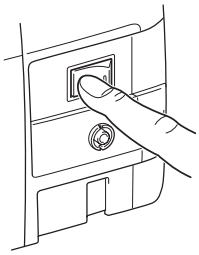
  Press (Start/Stop) and (🎧) while turning the power on; the buzzer will sound four times, and test mode will start.





- **With the front cover in place**
  Press SW1 and SW3 on the main PCB assy. while turning the power on; the buzzer will sound four times, and test mode will start.





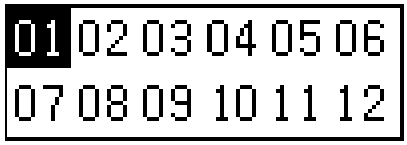
Starting and stopping operation

- **With the front cover in place**

  Press the (Start/Stop) switch.

- **With the front cover in place**
  Press SW1

Test mode selection screen



Return to test mode selection screen.

- **Press (↩).**

Test Modes (When changing modes, turn the power off, and restart the test mode)

Mode	Mode selection button		Z (zigzag) operations	F (feed) operations	Operating speed
3 point needle drop	With front cover in place	Press (▸) twice, select 03 and press (OK).	Switches left base line / center base line / right base line with each stitch *Pressing (🎧) / SW5 stops the base line from changing	0 mm (none)	Any speed may be selected using the speed control key
	Without front cover in place	SW5			Switches low / middle / high speed with each push of SW3.
Feed forward and reverse	With front cover in place	Press (▸) five times, select 06 and press (OK).	100 stitches forward on the left base line 100 stitches reverse on the right baseline		Switches low / middle / high speed with each push of the (🎧).
	Without front cover in place	SW3			Switches low / middle / high speed with each push of SW5.

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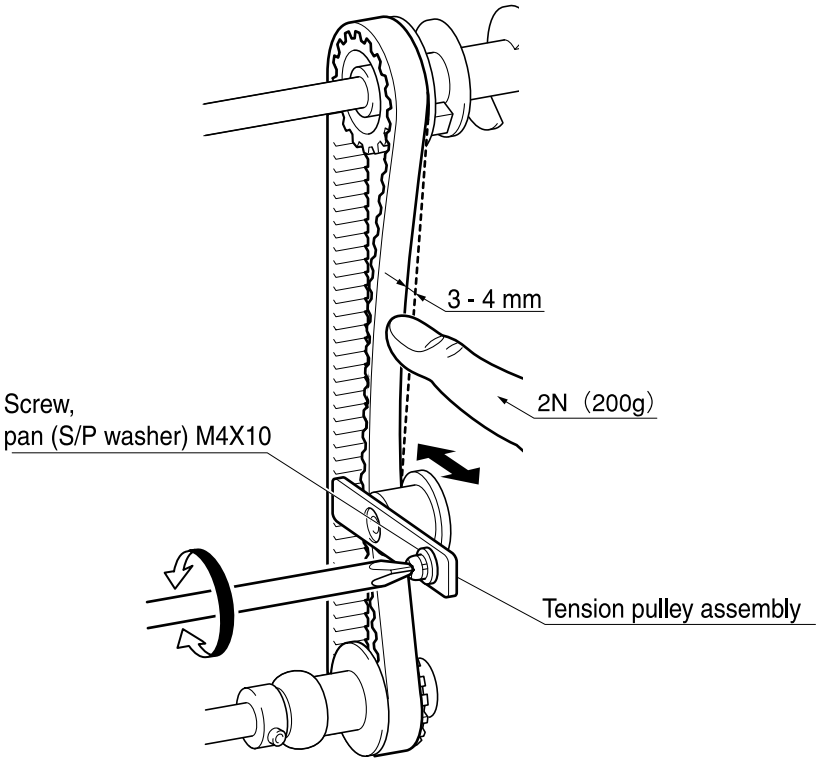
Timing belt tension adjustment

1. **Loosen the pan (S/P washer) M4X10 screw on the tension pulley assembly.**
2. **With a force of 2 N (200 g) pushing on the center of the belt, adjust the tension pulley assembly position for a deflection of 3 – 4 mm.**
3. **Tighten the pan (S/P washer) M4X10 screw on the tension pulley assembly.**

XC2277001	Push-pull gauge (3 N)



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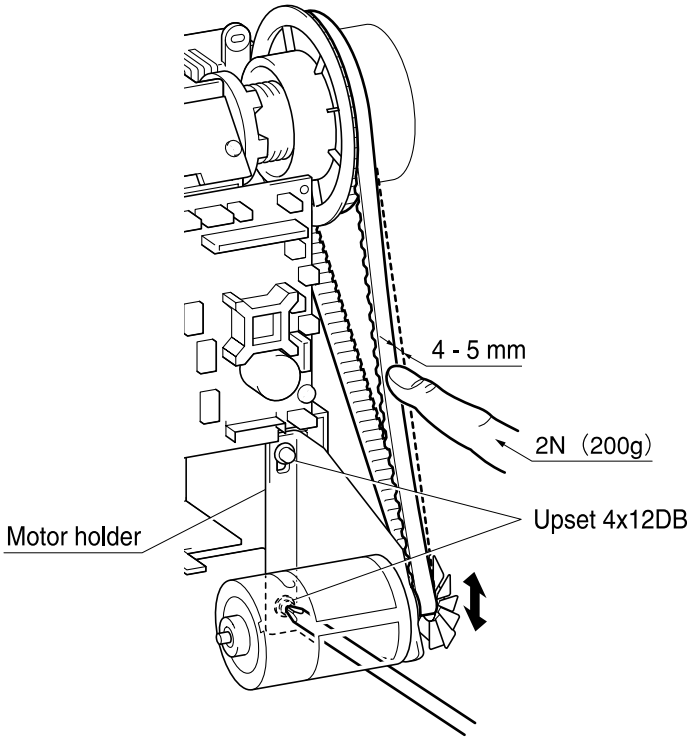
Motor belt tension adjustment

1. **Loosen the upset 4 x 12 DB (two) in the motor holder.**
2. **With a force of 2 N (200 g) pushing on the center of the belt, adjust the motor pulley position for a deflection of 4 – 5 mm.**
3. **Tighten the upset 4 x 12 DB (two) in the motor holder.**

XC2277001	Push-pull gauge (3 N)



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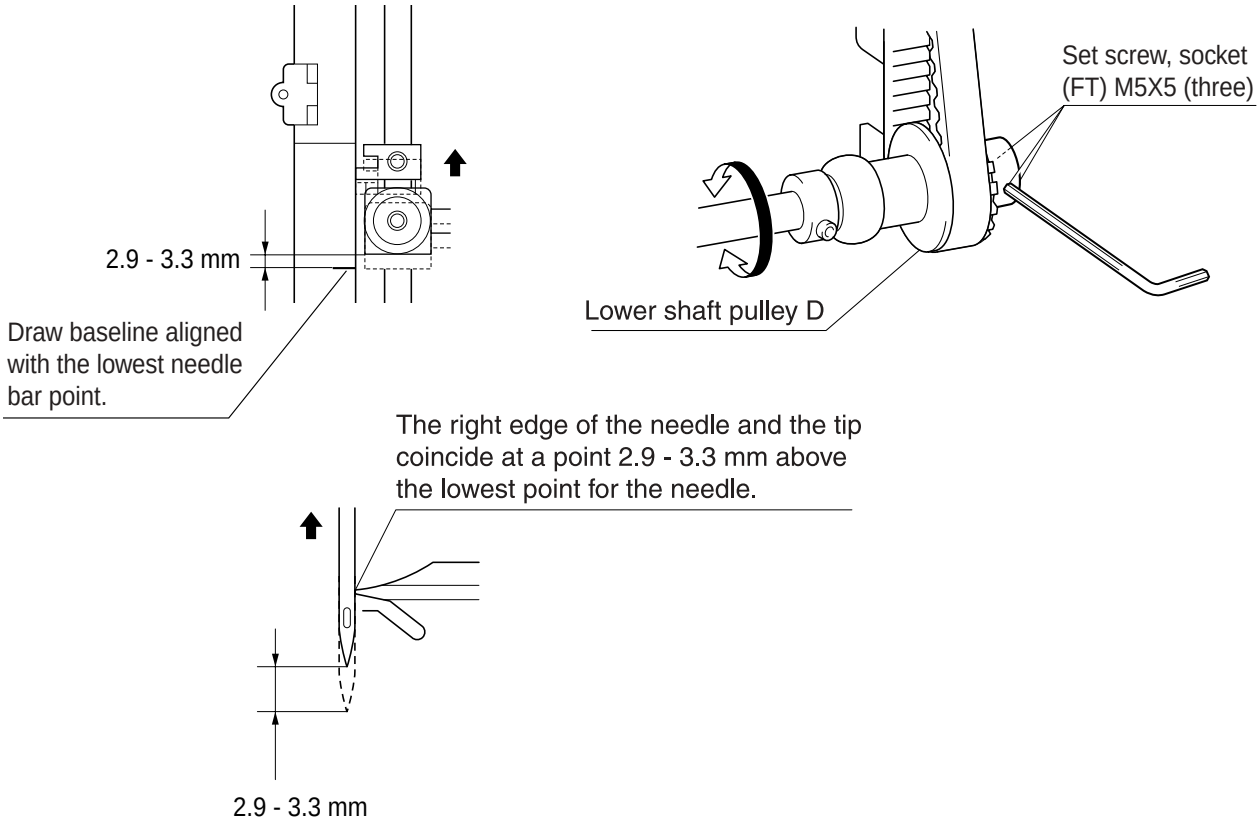
Needle bar rise adjustment

1. **Remove the front cover, and turn on the power while pushing SW1 and SW3 on the main PCB assy. (the buzzer sounds four times and test mode starts).**
   ***See (4 - 4 'Test Mode') for starting test mode with the front cover in place.**
2. **Press SW5 six times (with the front cover in place, press twice and select 03, and after pressing OK, press once.), and move the needle bar to the left base line position.**
3. **Turn the pulley by hand, and set the needle bar at its lowest point.**
4. **Draw a needle bar low point reference line on the needle bar supporter assy.**
5. **Loosen the set screws (socket (FT) M5X5) (three) on lower shaft pulley D.**
6. **With the needle bar raised 2.9 - 3.3 mm from the needle bar low point reference line, adjust by moving the lower shaft pulley D and lower shaft A assembly so that the right edge of the needle and the outer rotary hook tip come together.**
7. **Secure the set screws (socket (FT) M5X5) (three) on lower shaft pulley D.**



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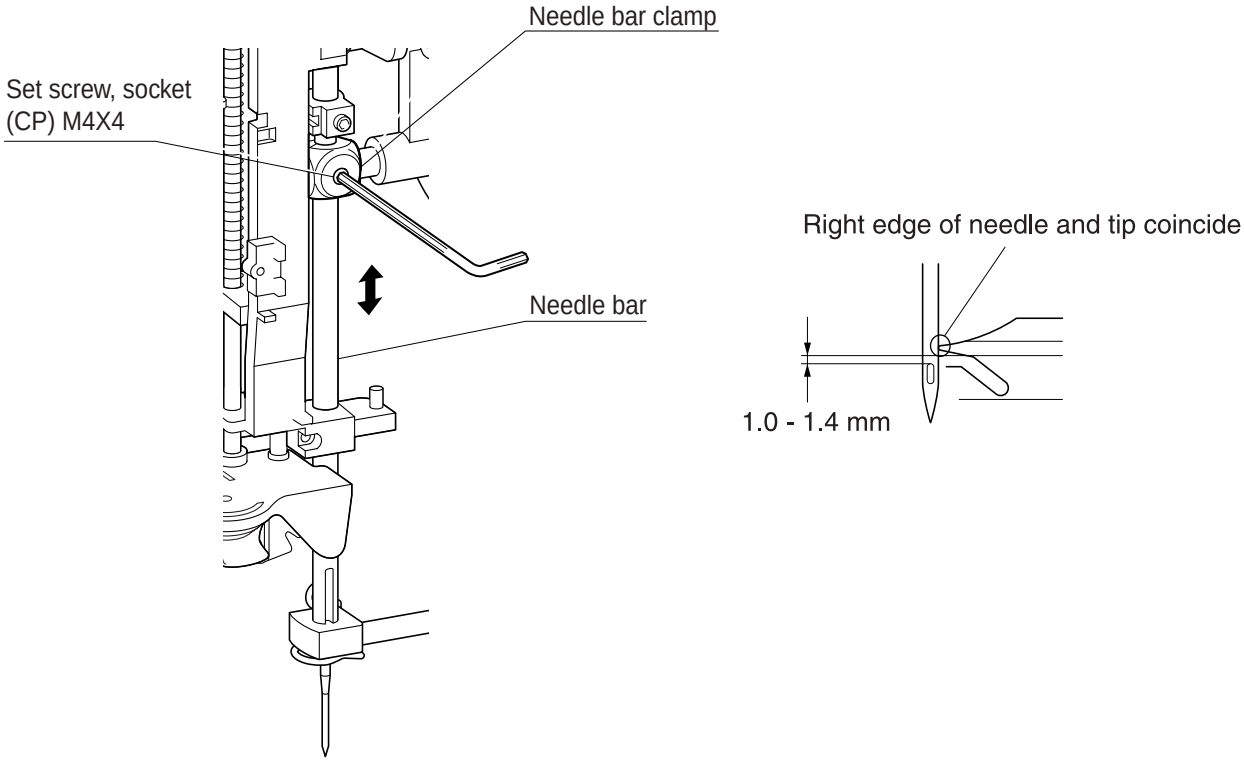
Needle bar height adjustment

1. **Remove the front cover, and turn on the power while pushing SW1 and SW3 on the main PCB assy. (the buzzer sounds four times and test mode starts).**
   ***See (4 - 4 "Test Modes (When changing modes, turn the power off, and restart the test mode)") for starting test mode with the front cover in place.**
2. **Press SW5 six times (with the front cover in place, press twice and select 03, and after pressing OK, press once.) and move the needle bar to the left base line position.**
3. **Remove the M4 screws (two), and remove needle plate A from the feed base.**
4. **Hand turn the pulley until the right edge of the needle and the outer rotary hook tip meet.**
5. **Loosen the set screw (socket (CP) M4X4) in the needle bar block**
6. **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 •Make sure the needle bar block is not positioned at a slant.

7. **Perform "Threading adjustment" (4 - 24).**
8. **Attach needle plate A to the feed base using M4 screws (two).**



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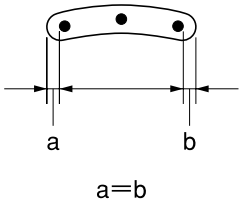
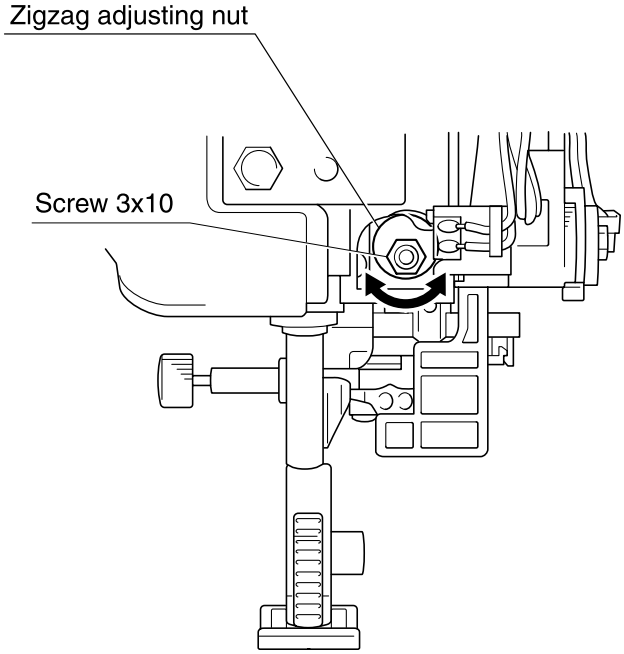
Three point needle drop adjustment

1. **Remove the front cover, and turn on the power while pushing SW1 and SW3 on the main PCB assy. (the buzzer sounds four times and test mode starts)**
   ***See (4 - 4 "Test Modes (When changing modes, turn the power off, and restart the test mode)") for starting test mode with the front cover in place.**
2. **Press SW5 (with the front cover in place, press twice and select 03 and press OK), and select "3 point drop mode." (with each push of SW5 or , the needle bar switches left base line / center base line / right base line).**
3. **Turn the pulley by hand, and insert the tip of the needle into the needle hole.**
4. **Loosen the zigzag adjusting nut screw (3X10).**
5. **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.**
6. **Tighten the zigzag adjusting nut screw (3X10).**





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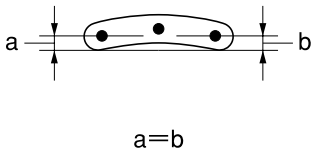
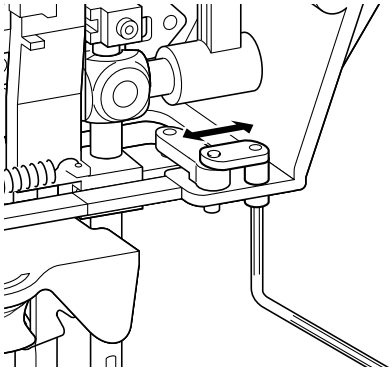
Needle interference left/right adjustment.

1. **Turn the pulley by hand, and insert the tip of the needle into the needle hole.**
2. **Loosen the screw (3X10).**
3. **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.**
4. **Tighten the screw (3X10).**





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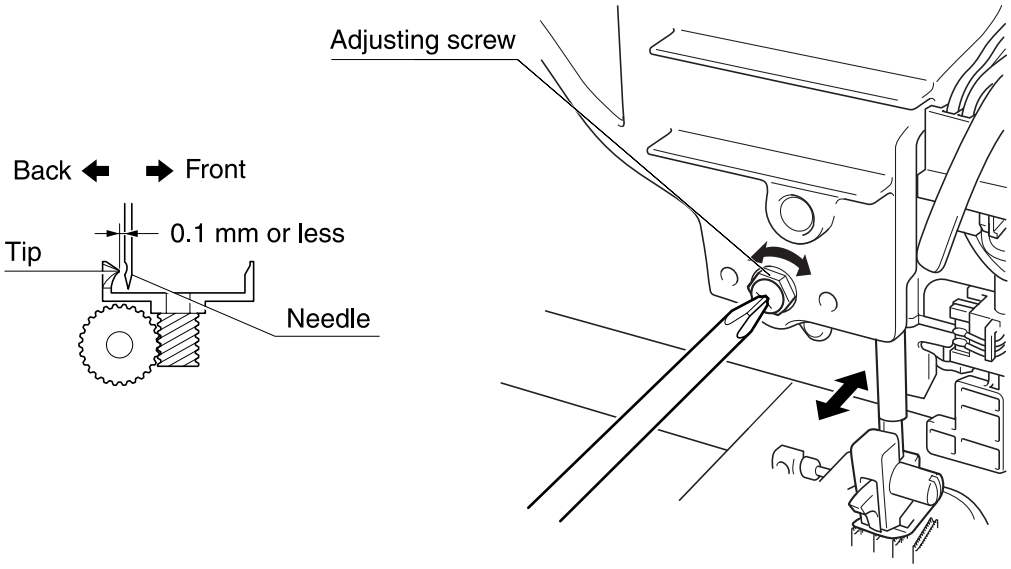
1. **Remove the front cover, and turn on the power while pushing SW1 and SW3 on the main PCB assy. (the buzzer sounds four times and test mode starts)**
   ***See (4 - 4 "Test Modes (When changing modes, turn the power off, and restart the test mode)") for starting test mode with the front cover in place.**
2. **Press SW5 four times (with the front cover in place, press twice and select 03, and after pressing OK), press three times.), and move the needle bar to the right base line position.**
3. **Remove the M4 screws (two), and remove needle plate A from the feed base.**
4. **Loosen the screw (3X20).**
5. **Hand turn the pulley until the right edge of the needle and the outer rotary hook tip meet.**
6. **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.**
7. **Tighten the screw (3X20).**



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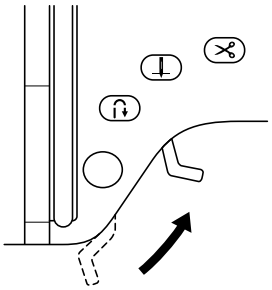
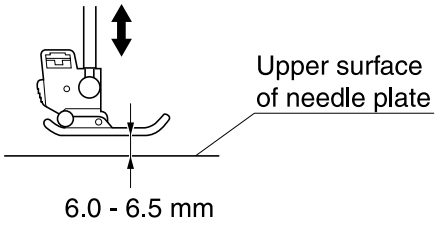
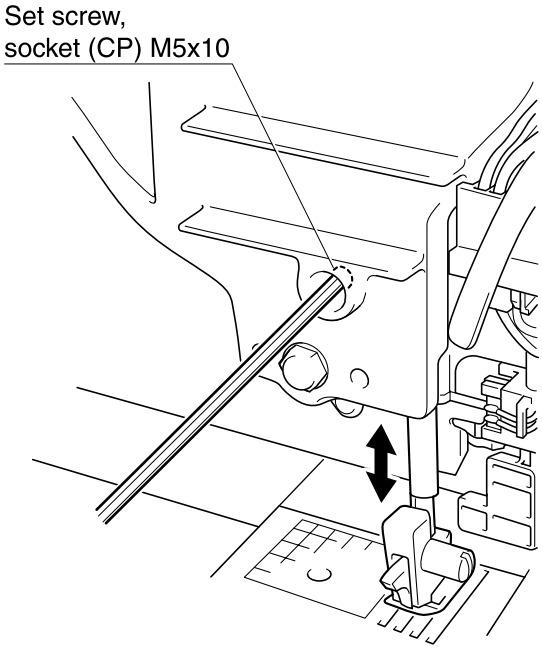
Presser bar height and parallel adjustment

1. **Raise the presser foot lifter.**
2. **Turn the pulley so that the feed dog drops below needle plate A.**
3. **Loosen the set screw (CP) M5X10 in the presser bar clamp assy.**
4. **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.**

NOTE •Use the J presser.
•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).







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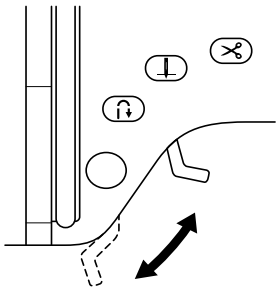
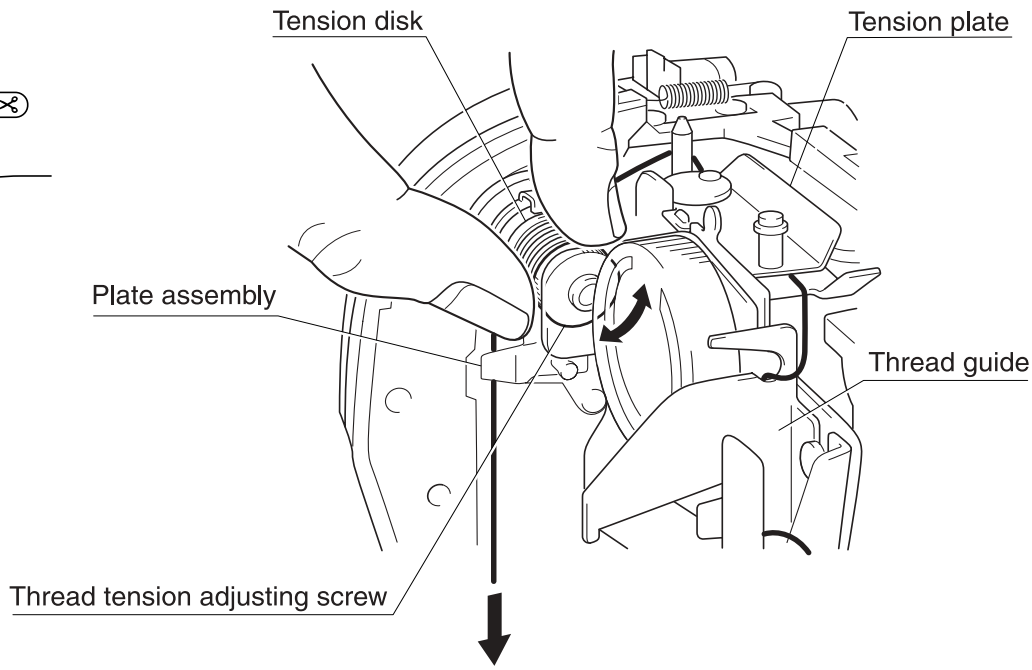
Upper thread tension adjustment

1. **Raise the presser foot lifter.**
2. **Turn the thread tension dial to the "Auto" position.**
3. **Pass a Schappe Spun Sewing Thread #60 through the thread guide => tension plate => tension disk => plate assembly.**
4. **Lower the presser foot lifter.**
5. **Pull the thread with a tension gauge, and adjust the thread tension adjusting screw depth for 0.3 – 0.35 N (30 – 35 g).**
6. **Apply a small amount of screw locking compound to the thread tension adjusting screw.**

Screw locking compound for thread tension adjusting screw	Small amount
XA9154001	Tension gauge 50 (0.5 N)





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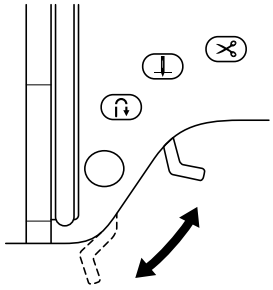
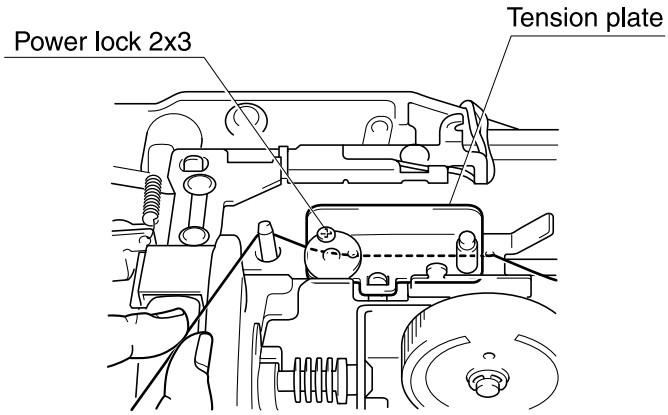
Fine tension adjustment

1. **Raise the presser foot lifter.**
2. **Pass Schappe Spun Sewing Thread #60 through the thread guide => tension plate.**
3. **Lower the presser foot lifter.**
4. **Pull the thread with a tension gauge, and adjust the power lock 2x3 so that it is 0.08 – 0.11 N (8 – 11 g).**

XA9153001	Tension gauge 30 (0.3 N)





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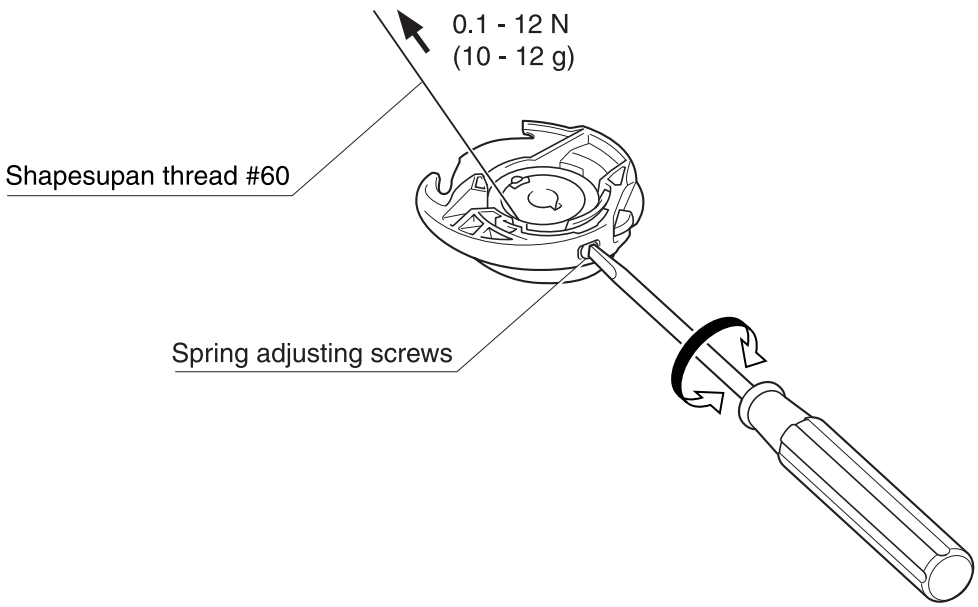
Inner rotary hook (lower thread) tension adjustment

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

XA9153001	Tension gauge 30 (0.3 N)



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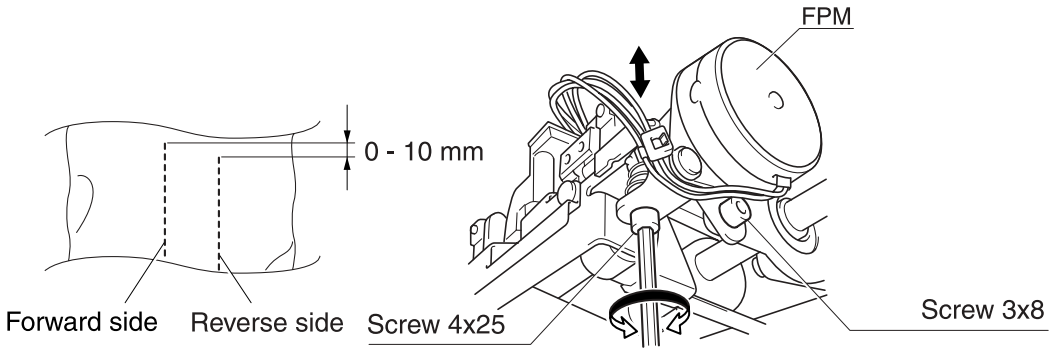
Feed forward/reverse adjustment

1. **Remove the front cover, and turn on the power while pushing SW1 and SW3 on the main PCB assy. (the buzzer sounds four times and test mode starts)**
   ***See (4 - 4 "Test Mode") for starting test mode with the front cover in place.**
2. **Press SW3 (with the front cover in place, press ▸ five times, select 06 and press OK), and select "Feed forward and reverse mode."**
3. **Press SW1 (with the front cover in place, Start/Stop) and run "Feed forward and reverse mode," checking the forward and reverse feed amounts.**
4. **Loosen the FPM holder assy. screw (3 x 8).**
5. **Adjust the forward and reverse feed using the FPM holder assy. screw (4 x 25).**

***Key point**

- Confirm that 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 is 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.



Feed module lower right

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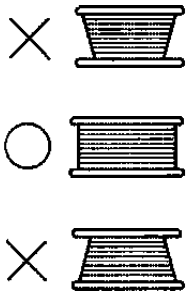
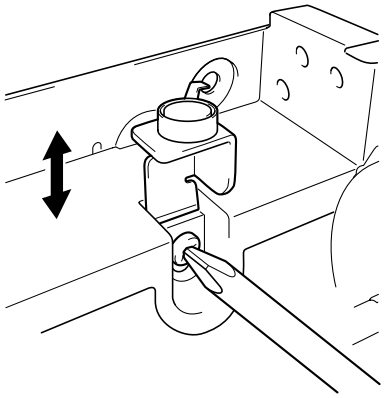
1. Move the bobbin winder guide assembly up and down and adjust uneven bobbin winding.

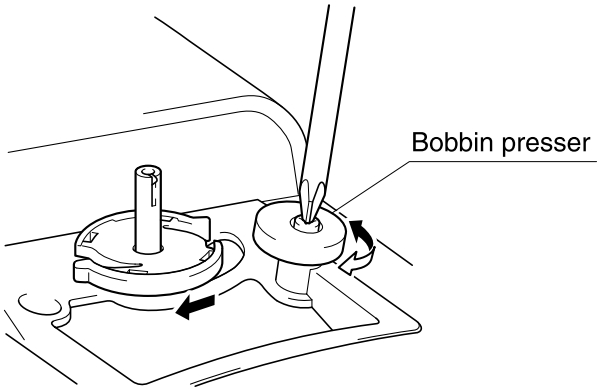


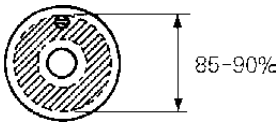


2. Turn the bobbin presser left and right, and adjust the winding quantity.

***Key point**

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





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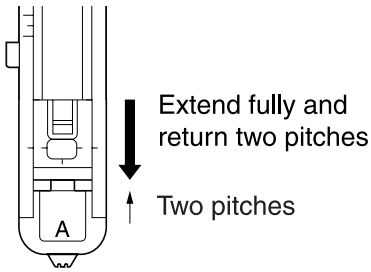
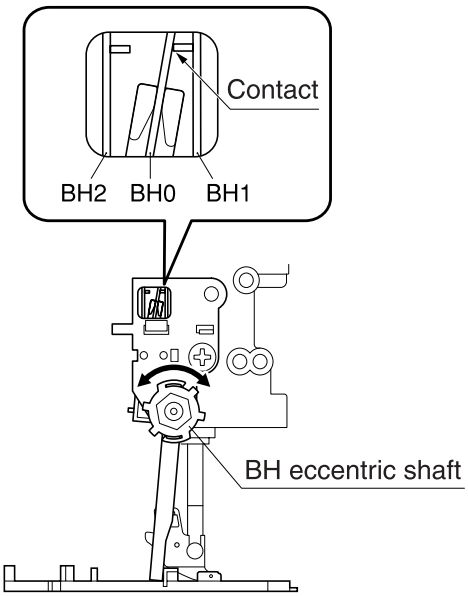
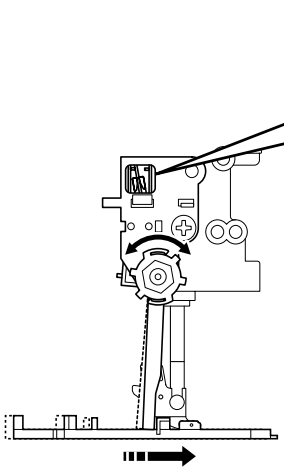
1. **Raise the presser foot lifter.**
2. **Set the BH presser two pitches smaller than the maximum length.**
3. **Attach the BH presser.**
4. **Lower the presser foot lifter.**
5. **Lower the BH lever, and set to the BH presser.**
6. **Rotate the BH eccentric shaft so that BH0 comes into contact with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

***Key point**

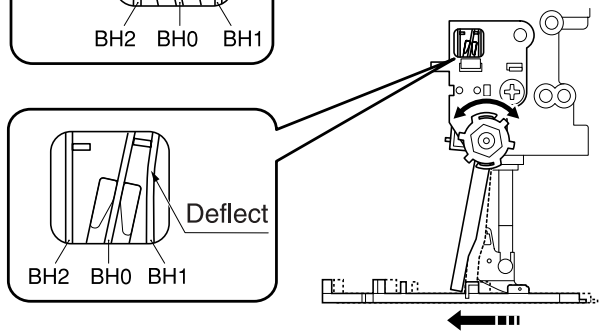
- With the presser foot lifter raised, pull the BH presser forward as much as possible, and check that BH0 comes into contact with BH2 and that BH2 has some deflection.
- With the presser foot lifter raised, push the BH presser back as much as possible, and check that BH0 comes into contact with BH1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







When pulled to the fullest forward



When pushed to the fullest backward

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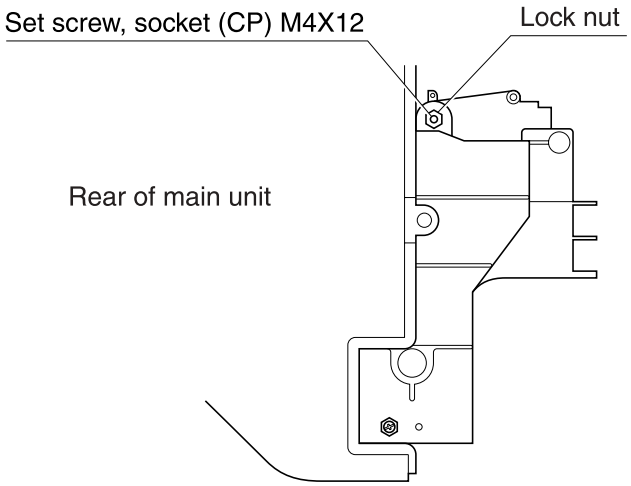
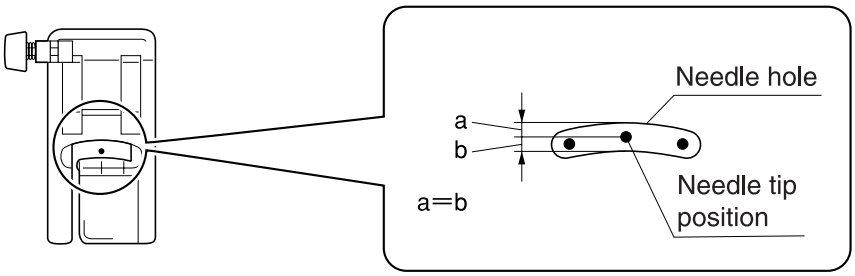
Forward and back adjustment of needle and presser.

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.**





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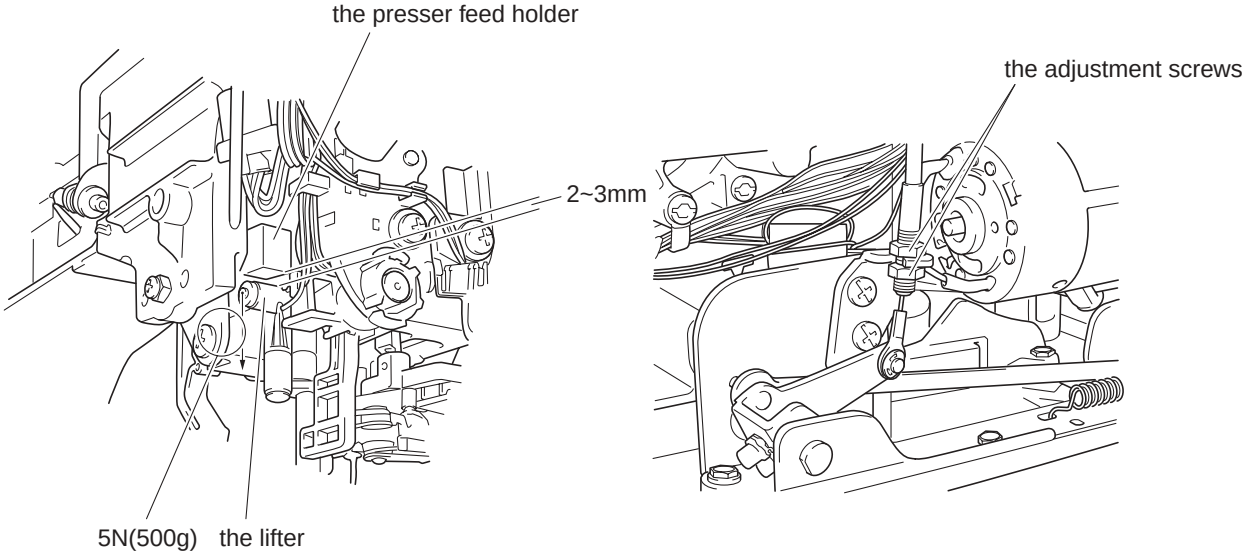
Knee lifter adjustment

1. **Lower the presser foot lifter.**
2. **Loosen the adjustment screws (two).**
3. **With a load of 5n (500 g) applied to the lifter, adjust the lifter and presser feed holder space.**

   ***Key point**
   - Space between lifter and presser feed holder is 2 - 3 mm.
   - Adjust by the amount the upper adjusting screw is tightened.
4. **Tighten the lower adjusting screw.**



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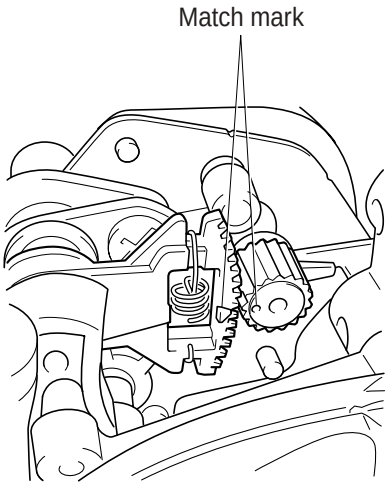
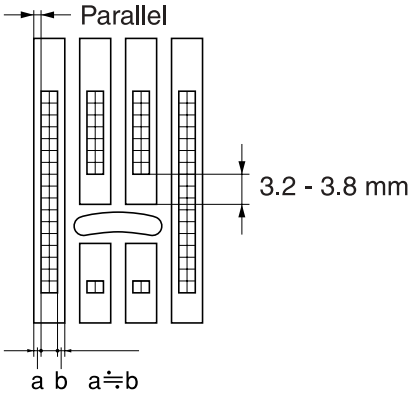
1. **Remove the M4 screws (two), and remove needle plate A from the feed base.**
2. **Align the feed adjuster assy. gear and F pulse motor gear match marks (feed in 0 mm position).**

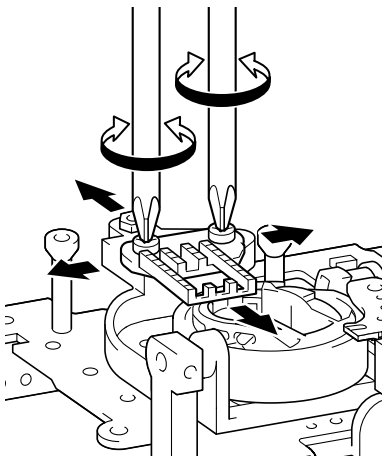


3. **Loosen the screw (bind 3 x 8), temporarily install needle plate A, and adjust the forward/reverse and left/right positions of the feed dog.**

   ***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.



4. **Secure the feed dog with screws (bind 3x8 torque) (two)**
5. **Fully tighten the M4 screws (two), and secure needle plate A.**



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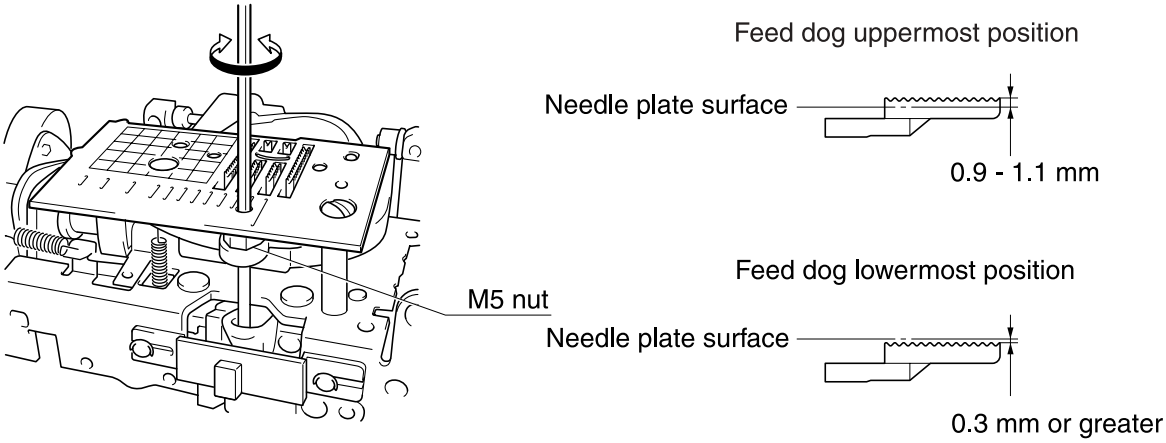
Feed dog height adjustment

1. **Turn lower shaft B, and bring the feed dog to its highest position (D cut of the lower shaft B facing up).**
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 adjuster screw assembly is screwed in.**
4. **Tighten the M5 nut being careful that the vertical adjuster screw 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.



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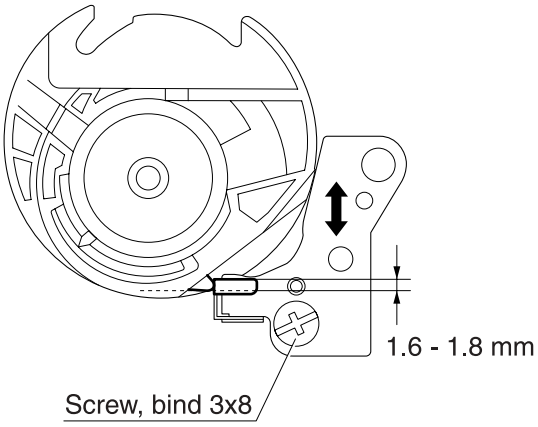
Inner rotary hook bracket position adjustment

1. **Set the inner rotary hook in the outer rotary hook.**
2. **Loosen the screw (bind 3x8) securing the inner rotary hook bracket assy.**
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 secure with the screw (bind 3x8)**



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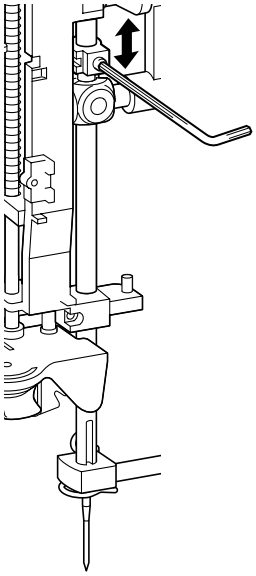
1. **Attach a needle.**
2. **Turn the unit shaft, and position the needle bar at its highest point (position where the D cut of the unit axis faces forward).**
3. **Loosen the set screw (socket FT 4 x 4).**
4. **Adjust the height of the needle thread block so that the threading hook passes through the needle hole, and secure with a set screw (socket FT 4 x 4).**

***Key point**

- Secure the set screw (socket FT 4 x 4) so that the position of the needle thread block set screw is seen to be slight to the left when viewed from the front.
- 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 set screw position is too far to the left, the hook will not operate and treading cannot be done. (Fig. 1).
•If the needle thread block set screw position is too far to the right, the needle bar supporter assy. and the needle thread block will come into contact and be damaged (Fig. 2).
•See the threading usage conditions "1. Outline of Mechanism".



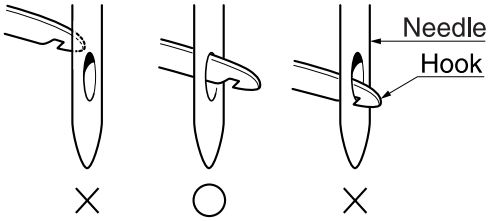
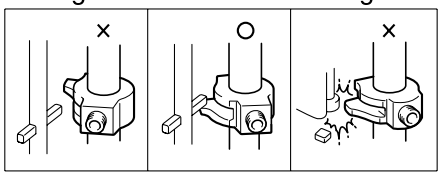


Fig. 1 Fig. 2



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5 Failure Investigation for Electronic Parts

* **Perform resistance measurements after turning off the power, and detaching the connectors to be measured from the PCB.**

Power does not come on ..... 5 - 2
Pulse motors do not return to starting point ..... 5 - 3
Pattern cannot be selected ..... 5 - 4
Main motor does not turn ..... 5 - 5
Main motor rotation abnormal ..... 5 - 7
Cannot sew pattern well..... 5 - 8
Cannot sew button holes well. ..... 5 - 9
Stitch length and zigzag width cannot be done by manual adjustment. ..... 5 - 10
Problems with vertical needle movement and reverse stitching ..... 5 - 11
Does not operate when the foot controller is used..... 5 - 12
Thread tensioning does not go well ..... 5 - 13
Thread cutter does not work normally... 5 - 14
LCD display is not normal ..... 5 - 15
LCD light does not come on.....5 - 16
Bobbin winding cannot be done.....5 - 17
The lamp at hand does not have light....5 - 18

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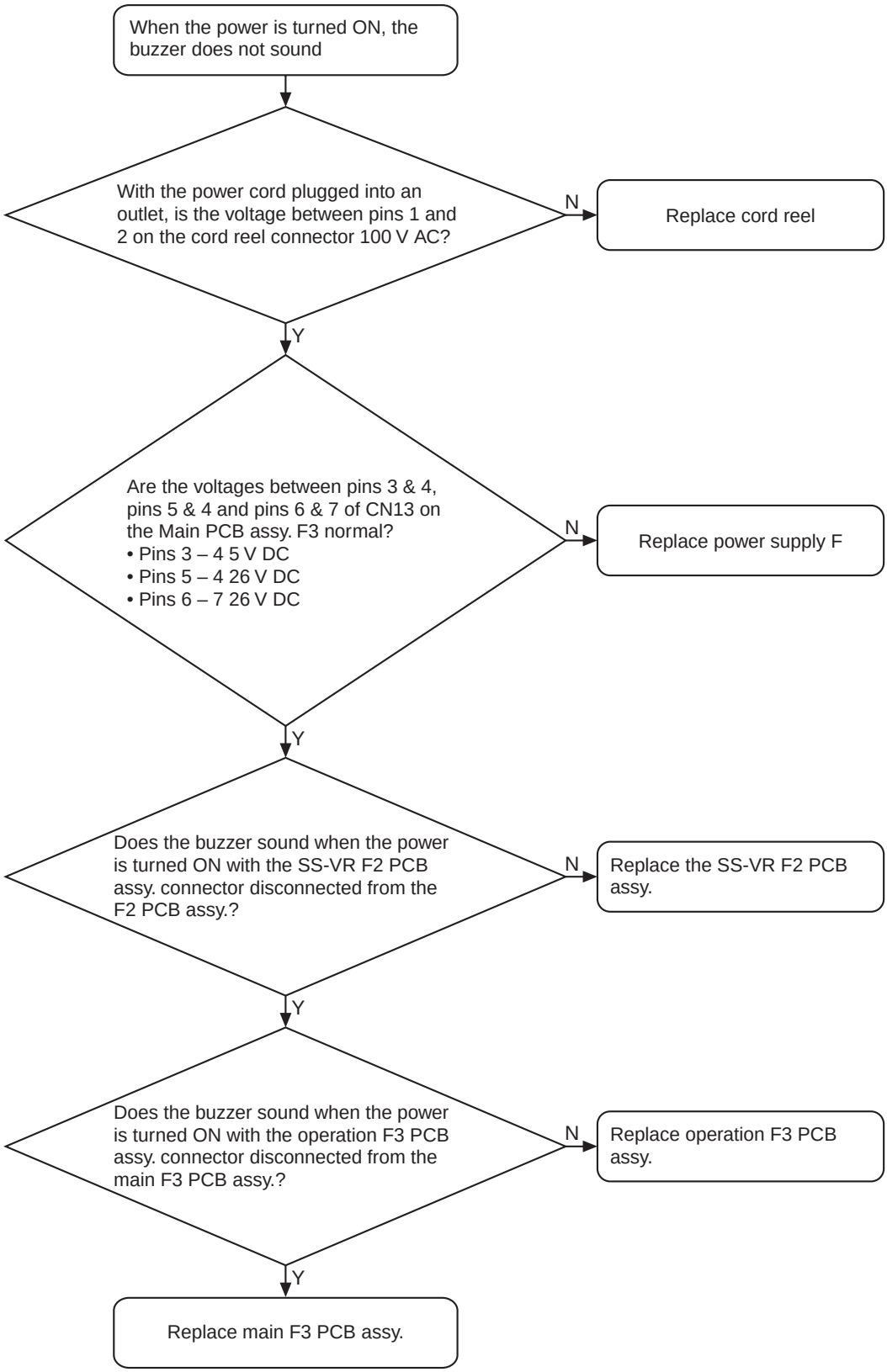

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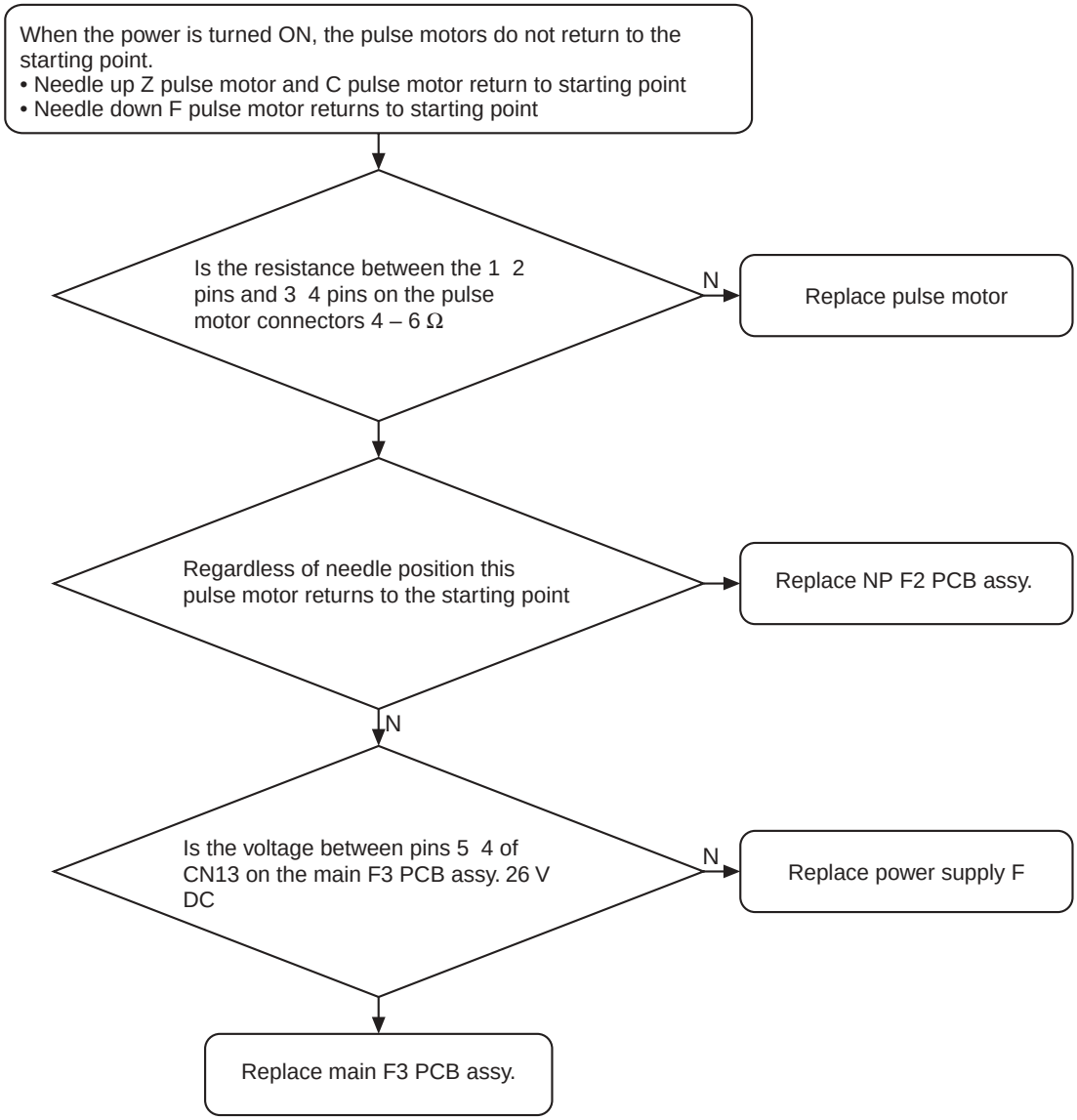

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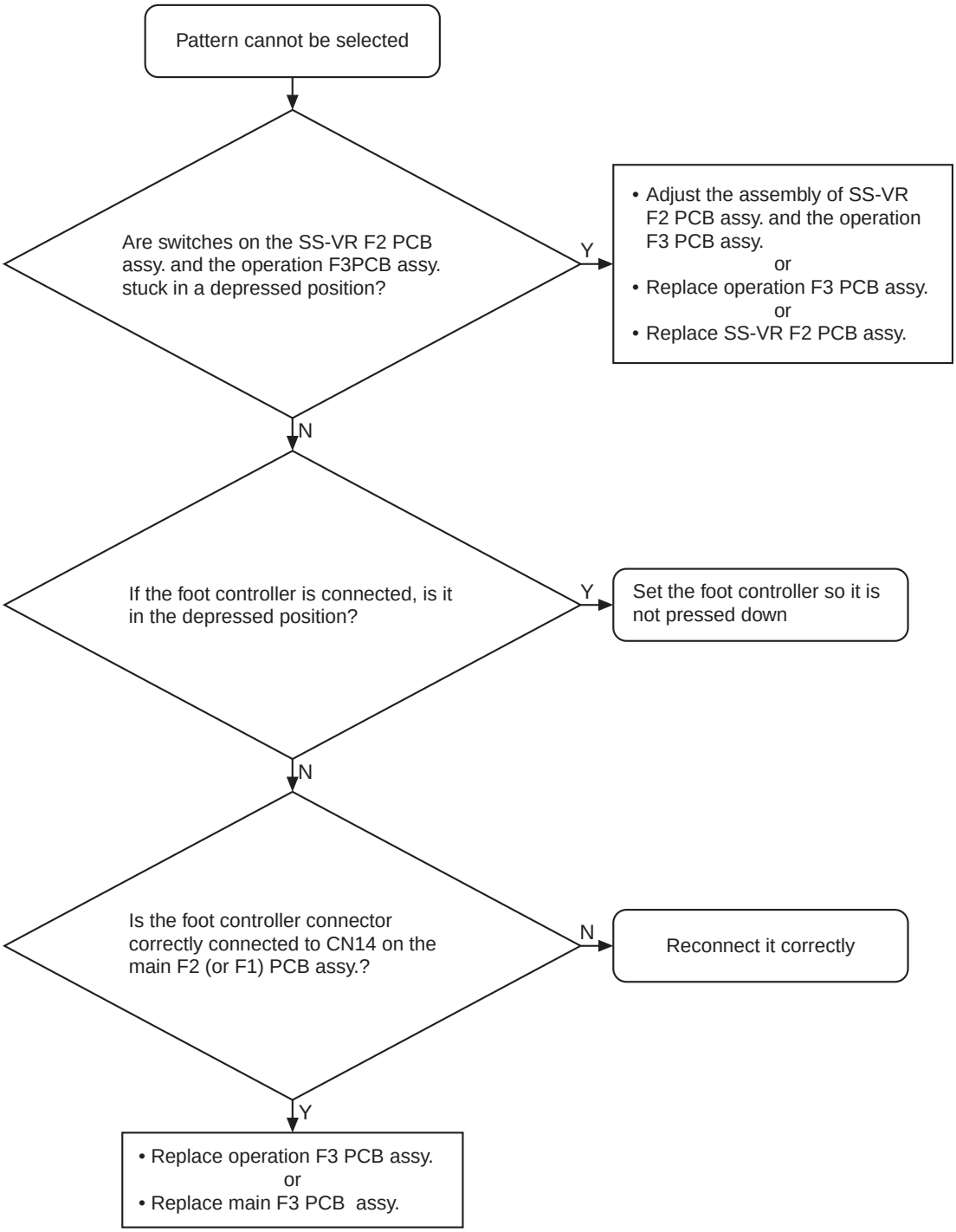

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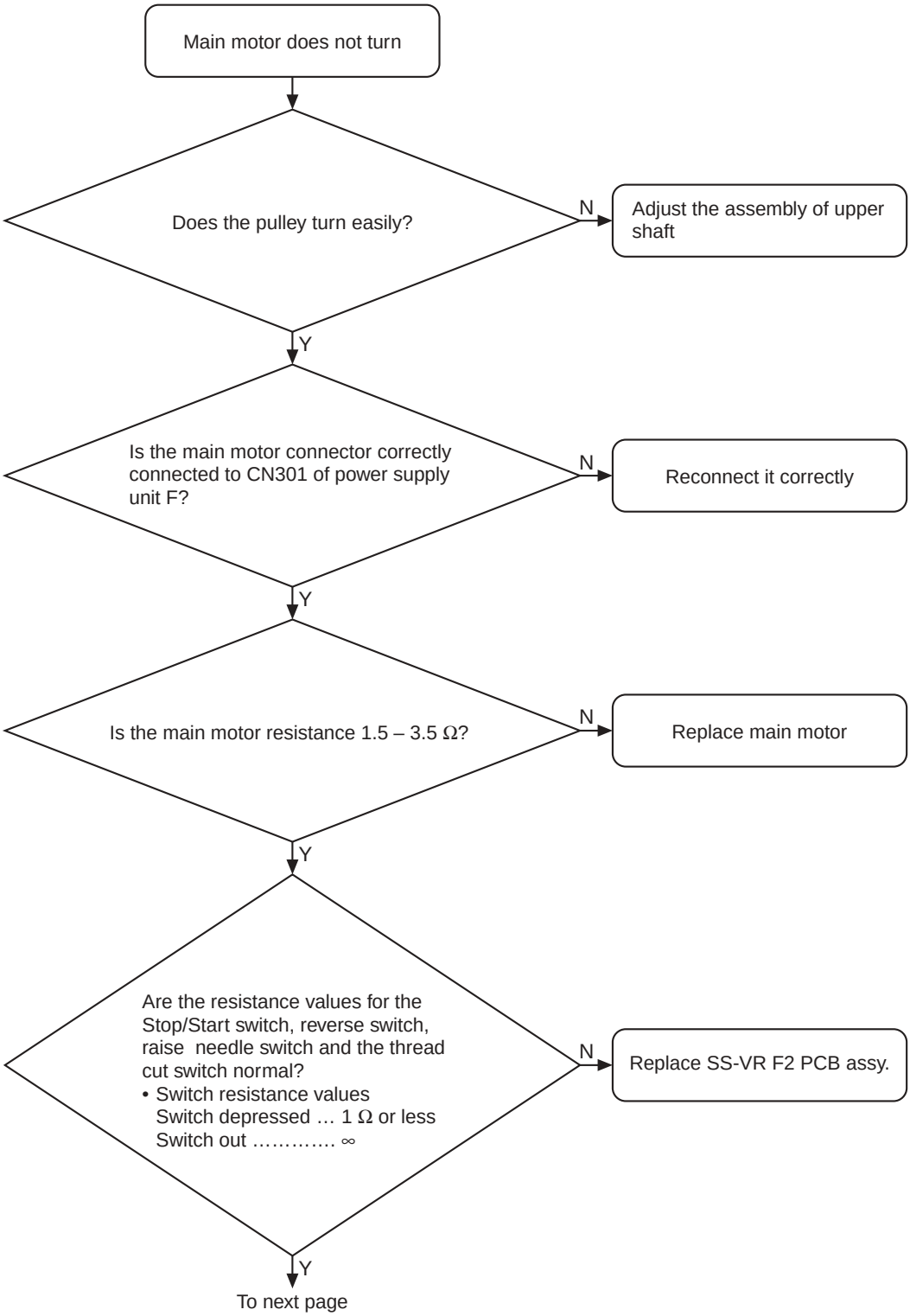

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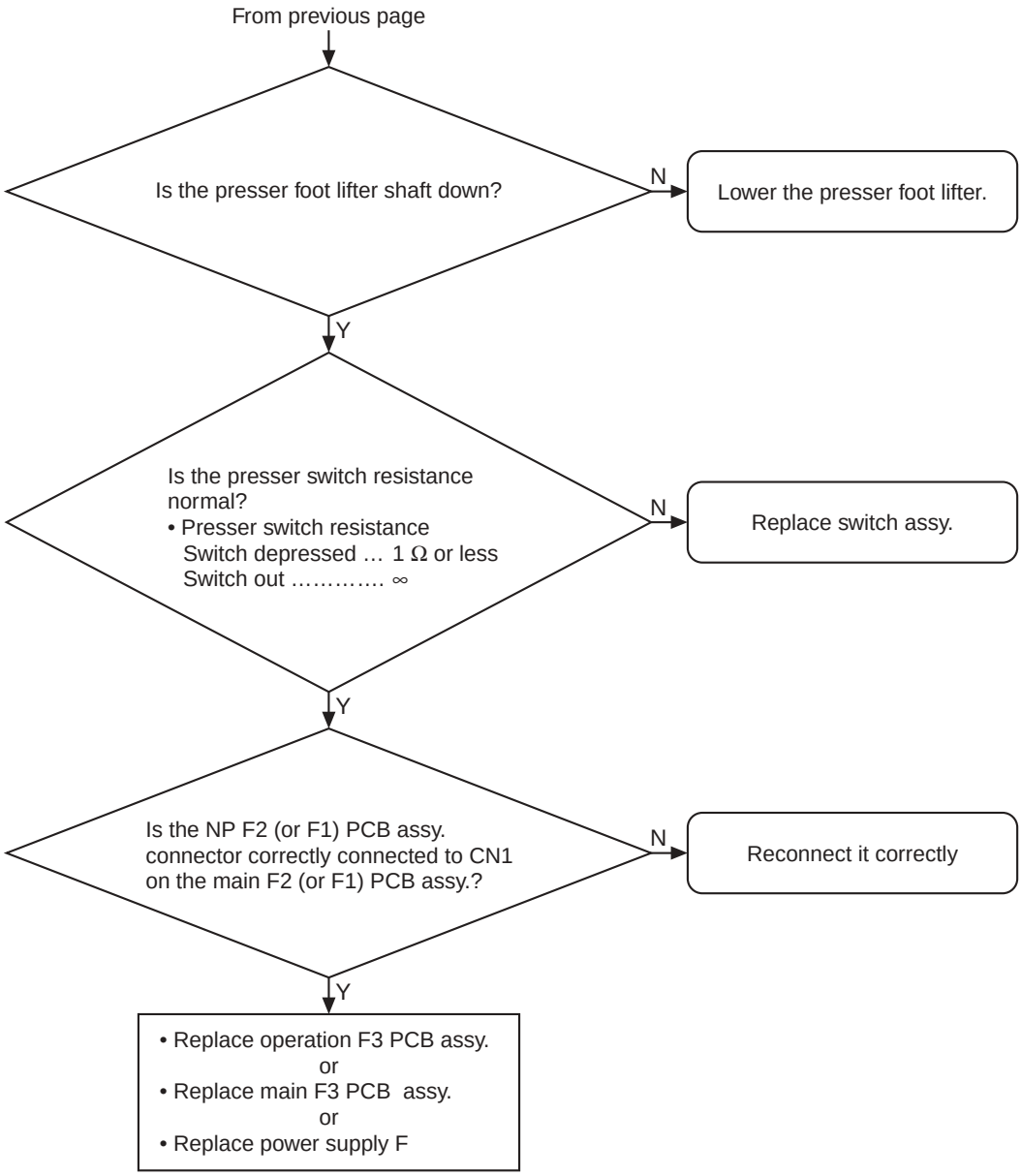

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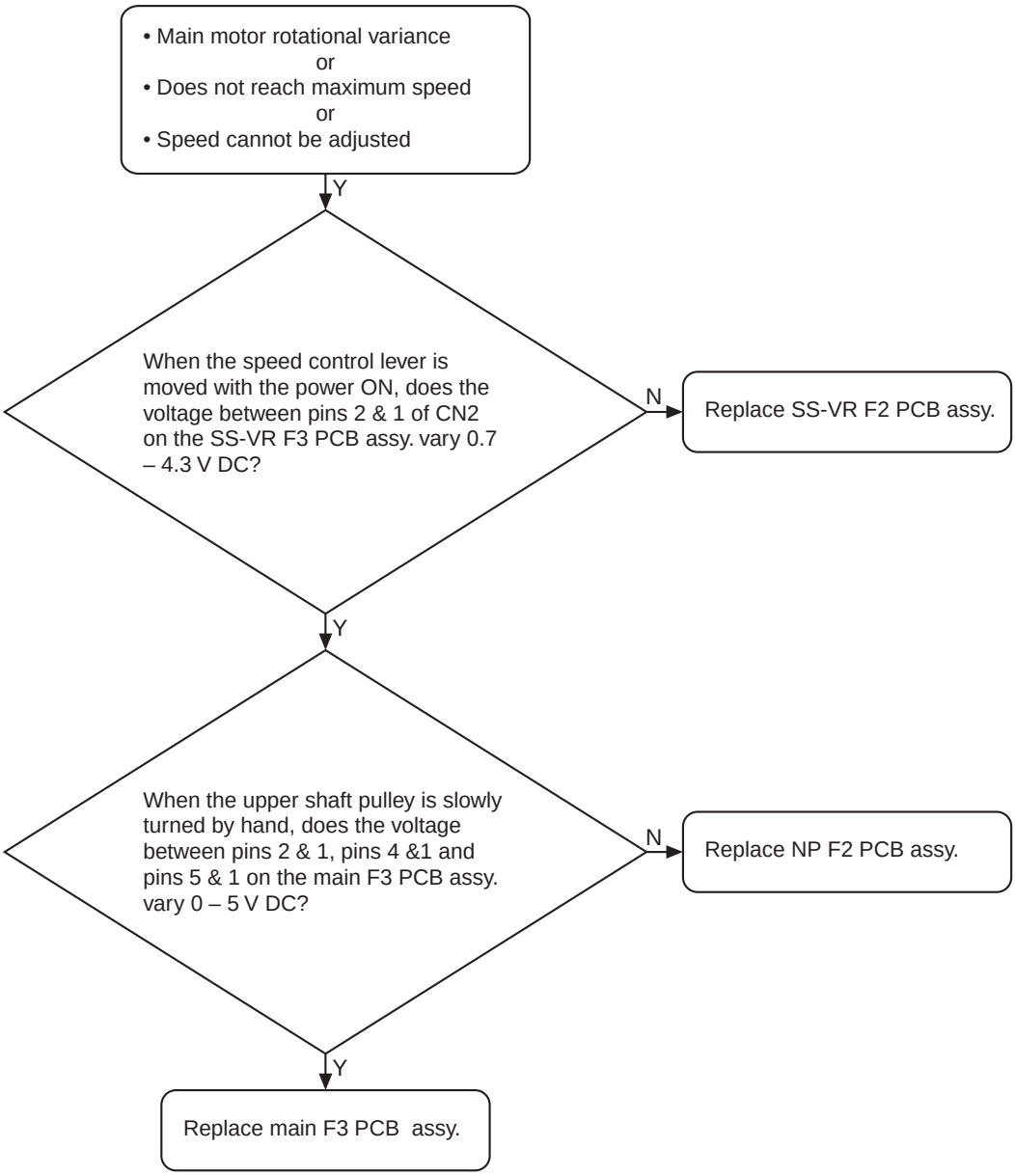

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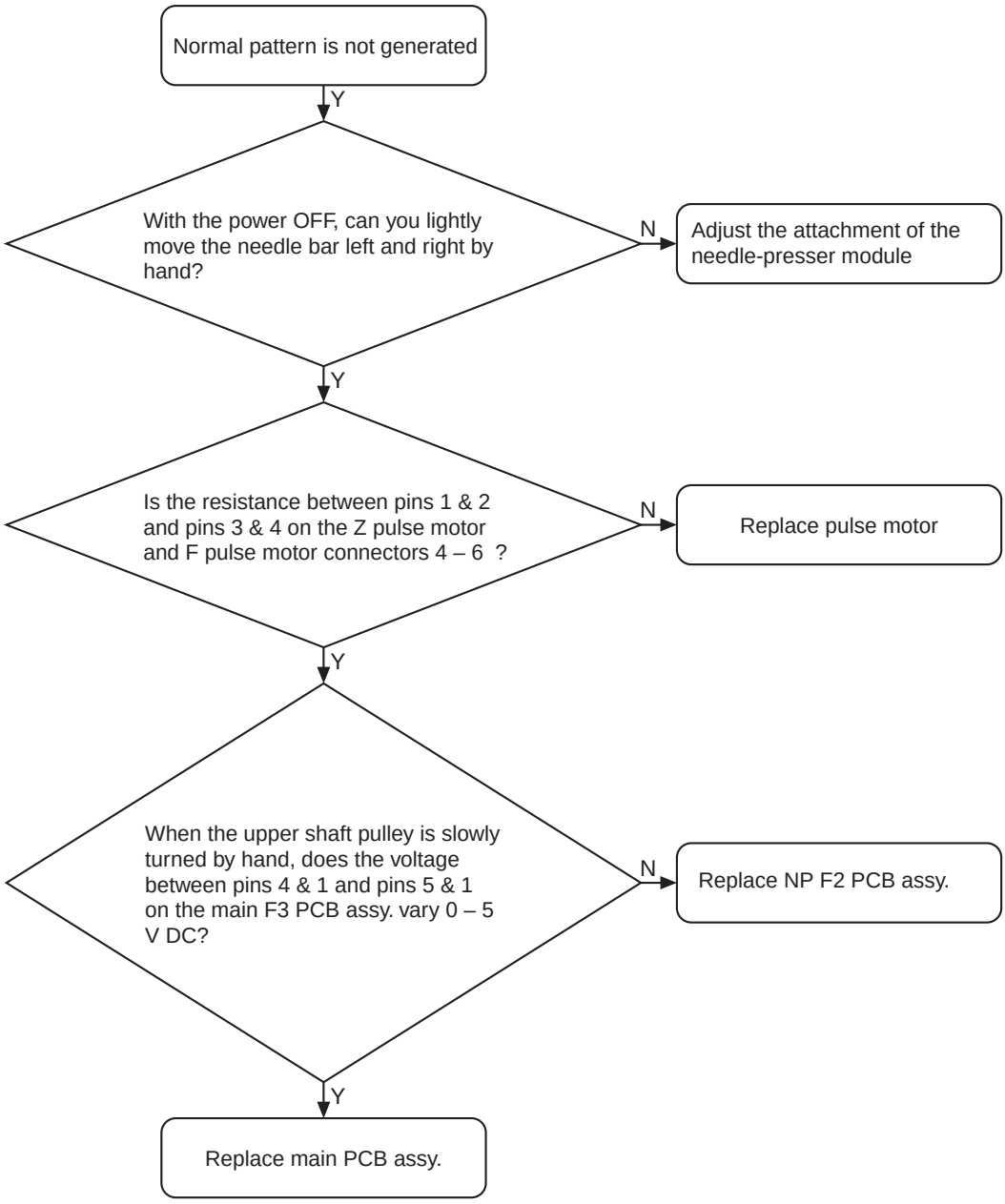

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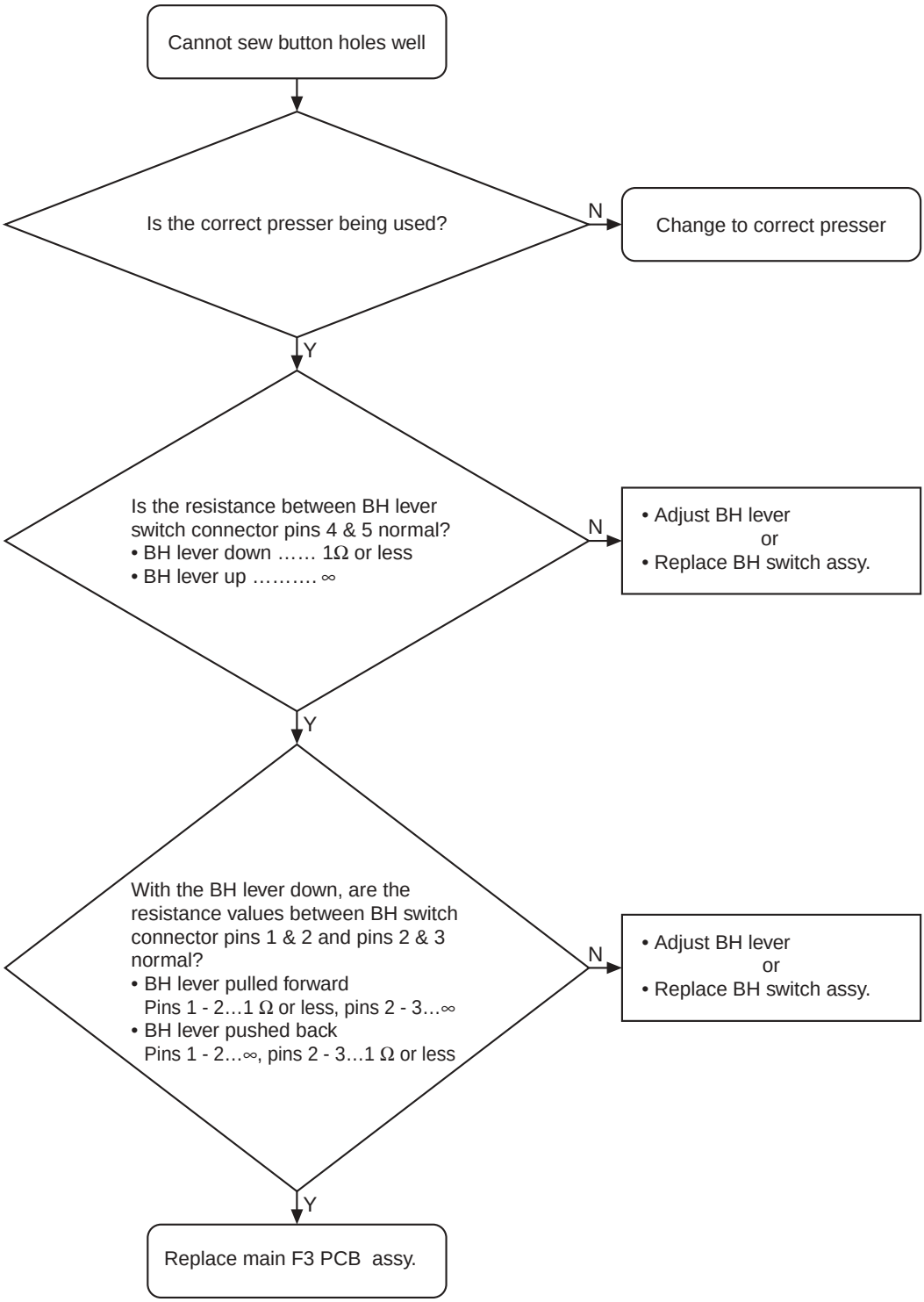

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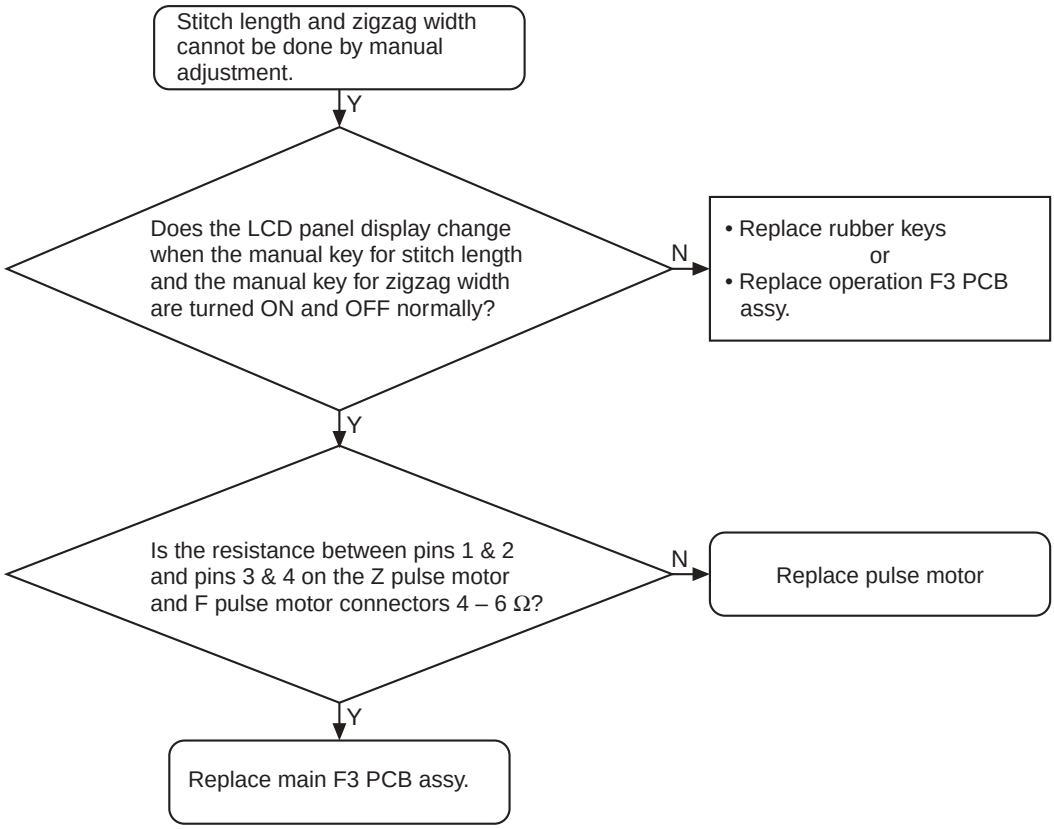

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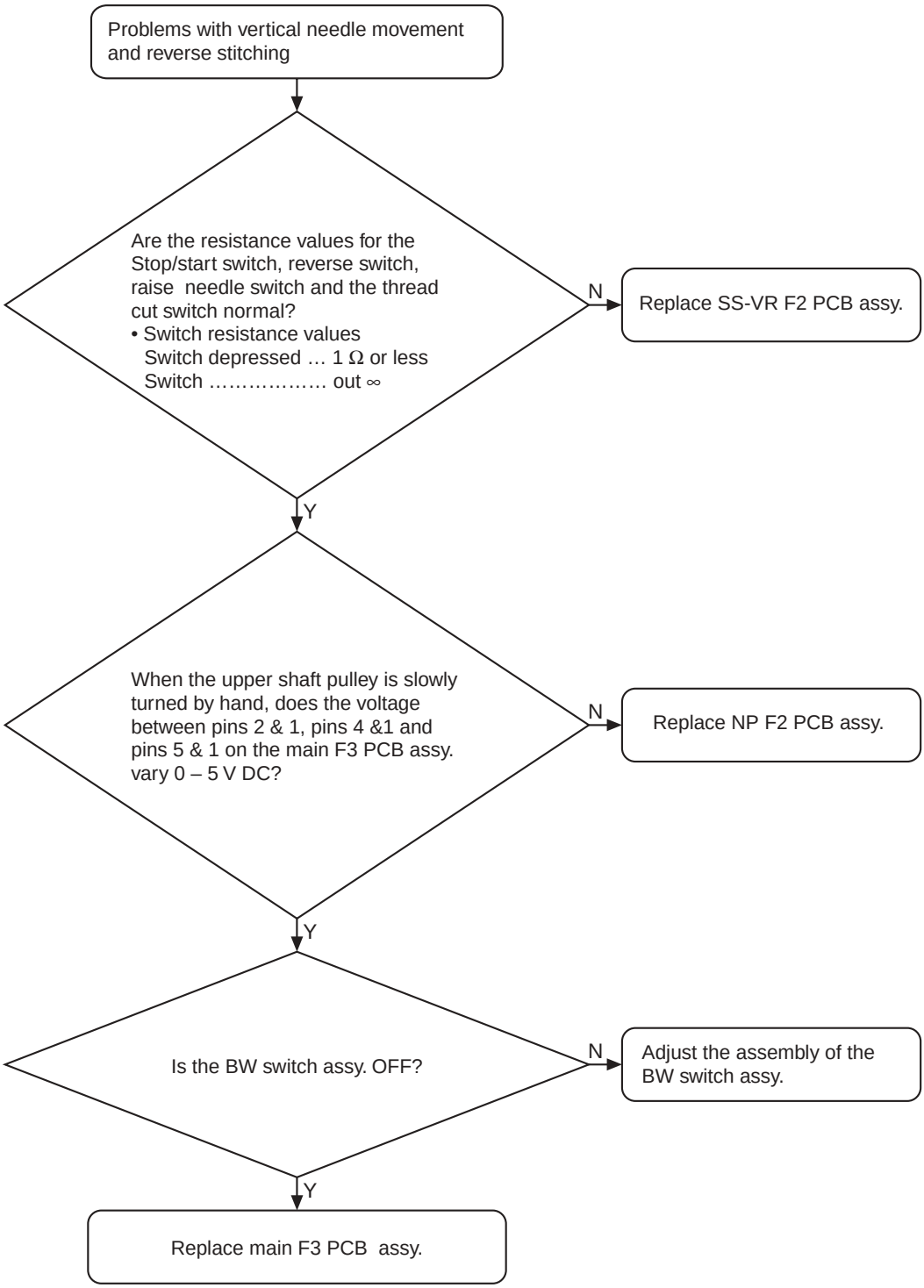

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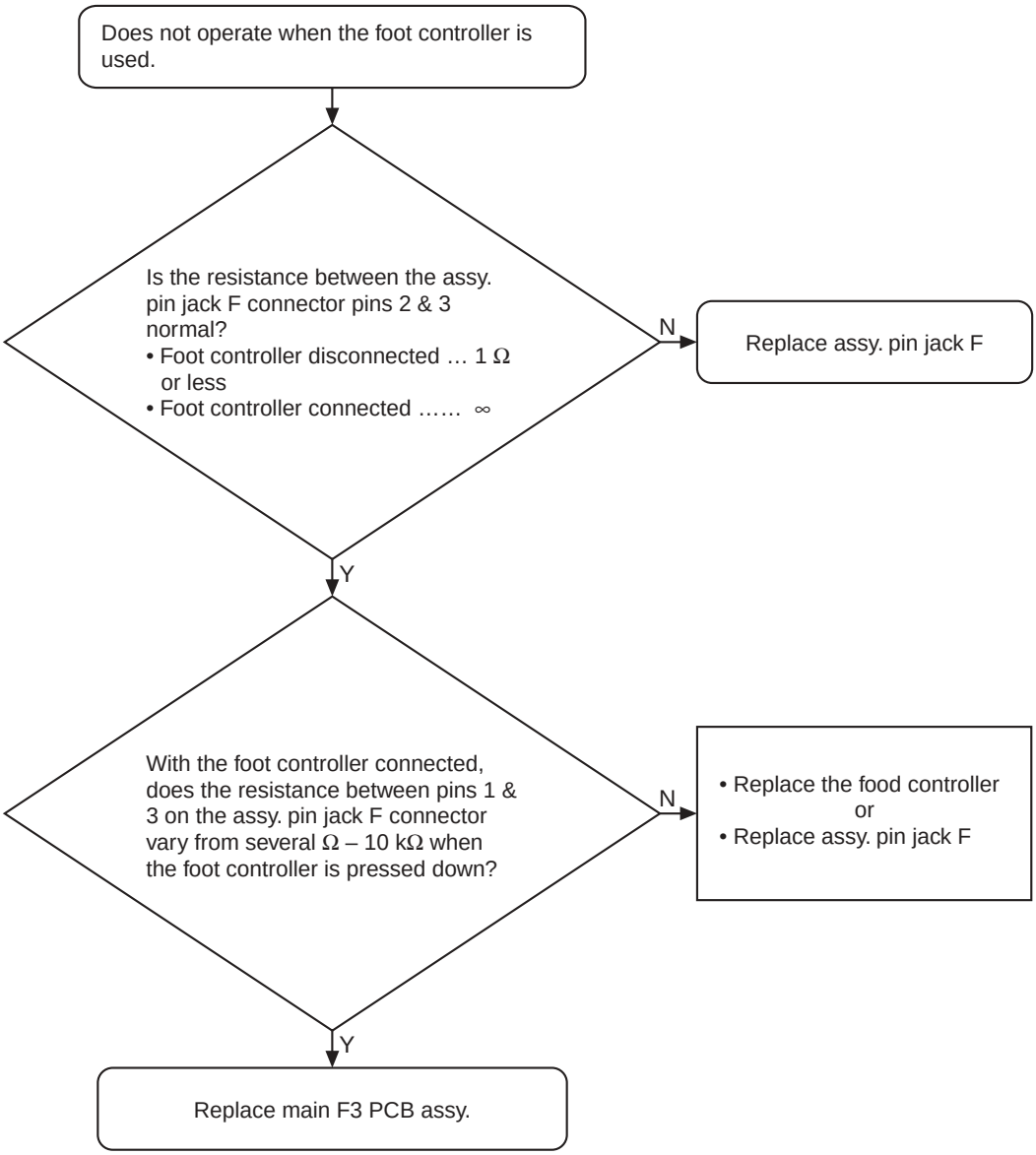

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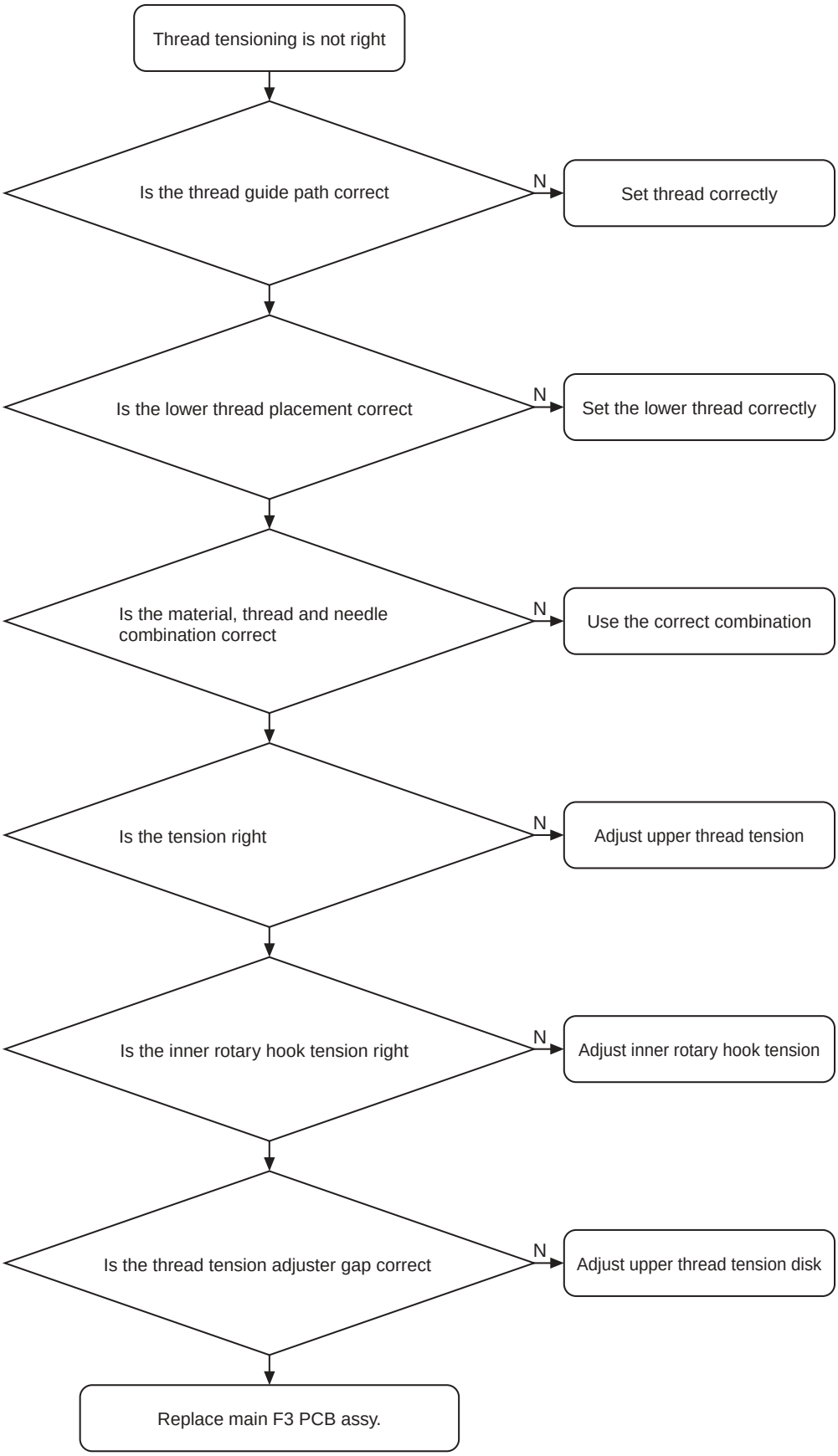

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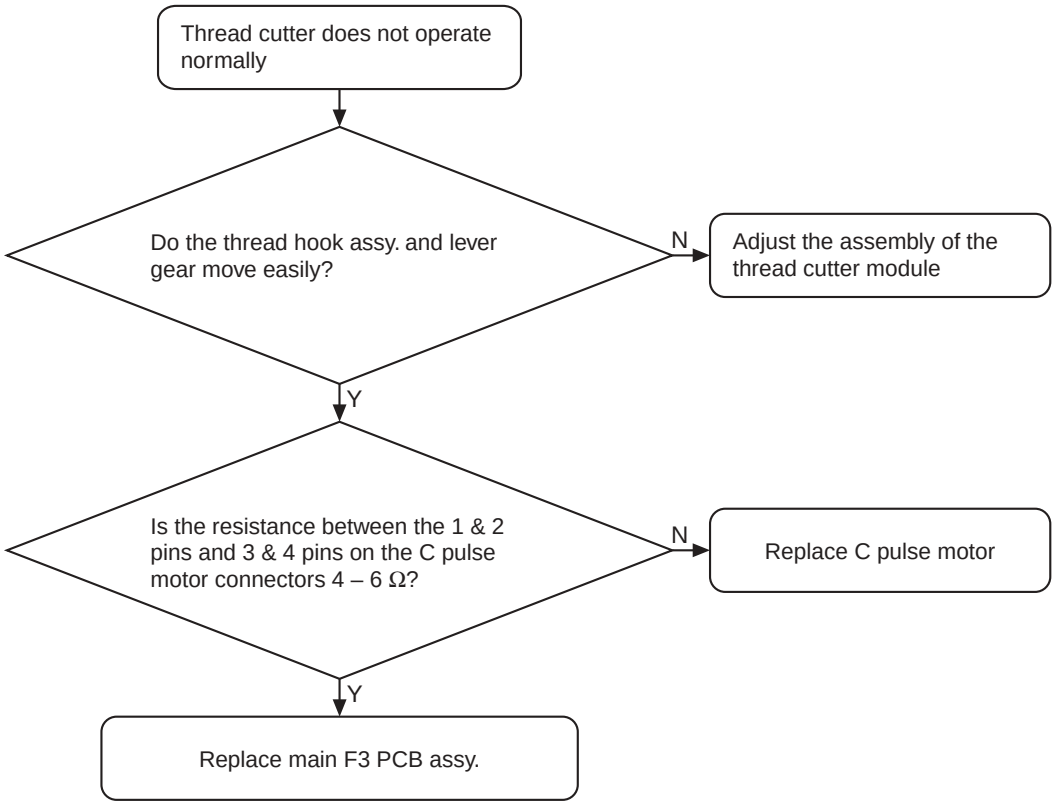

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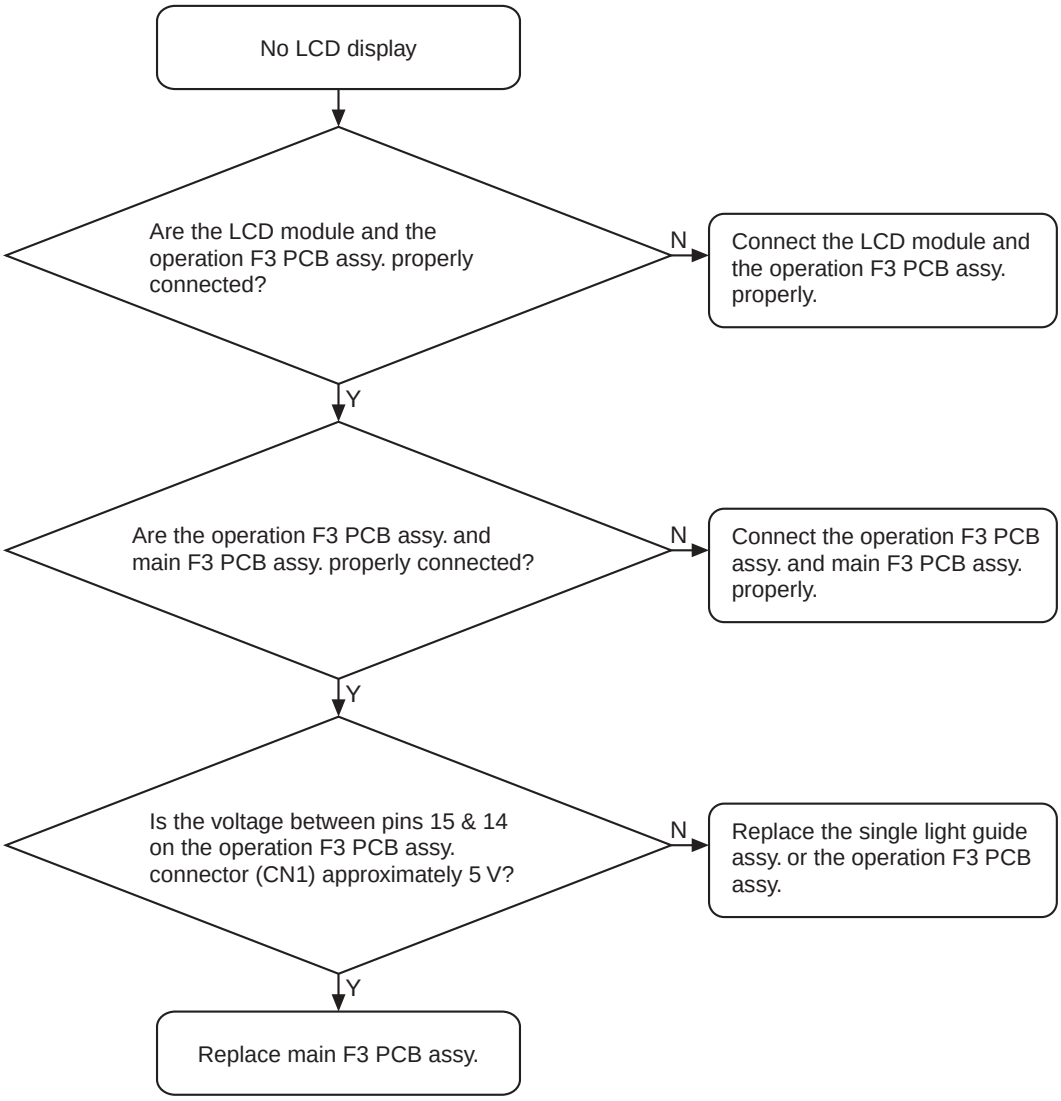

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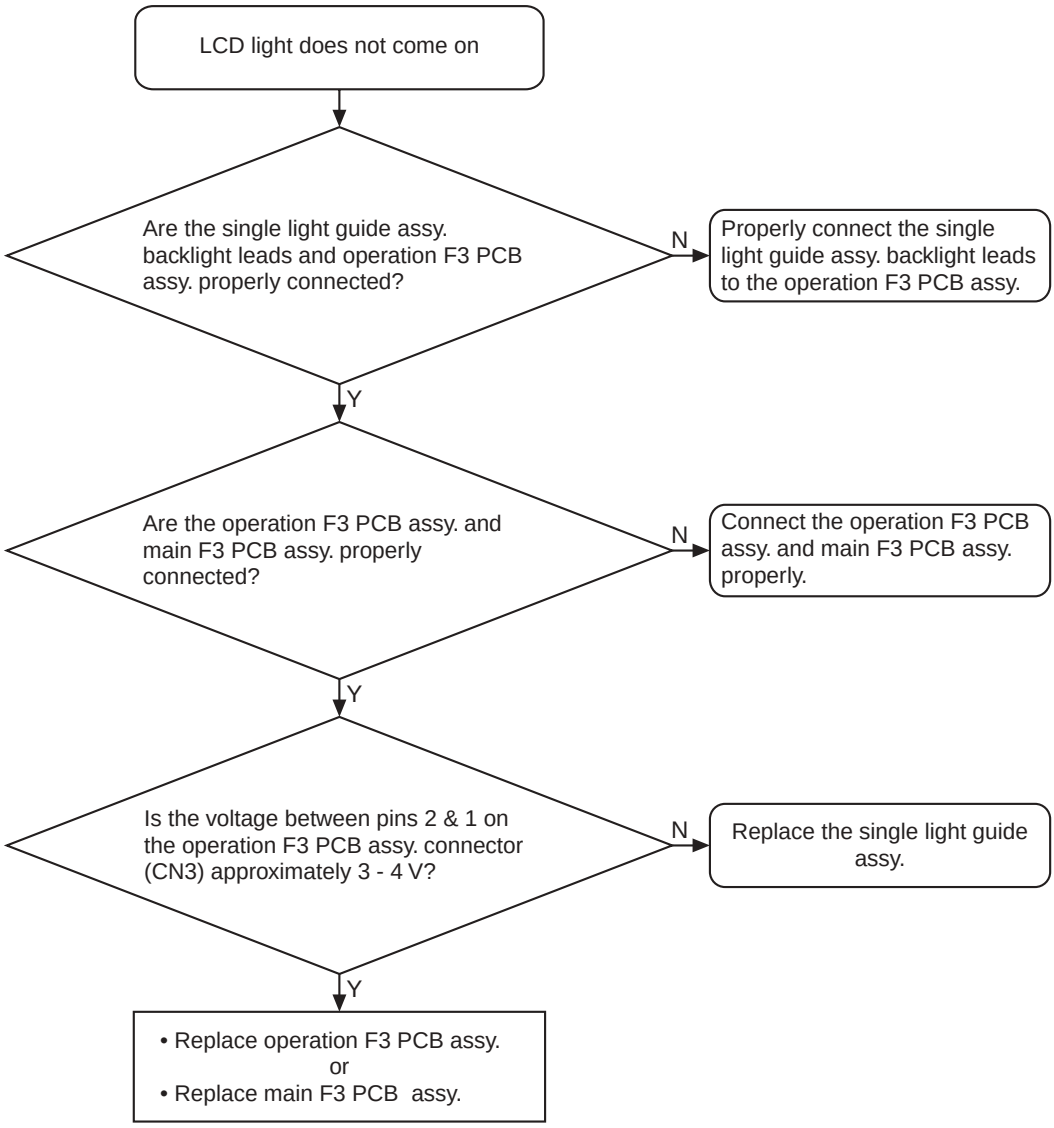

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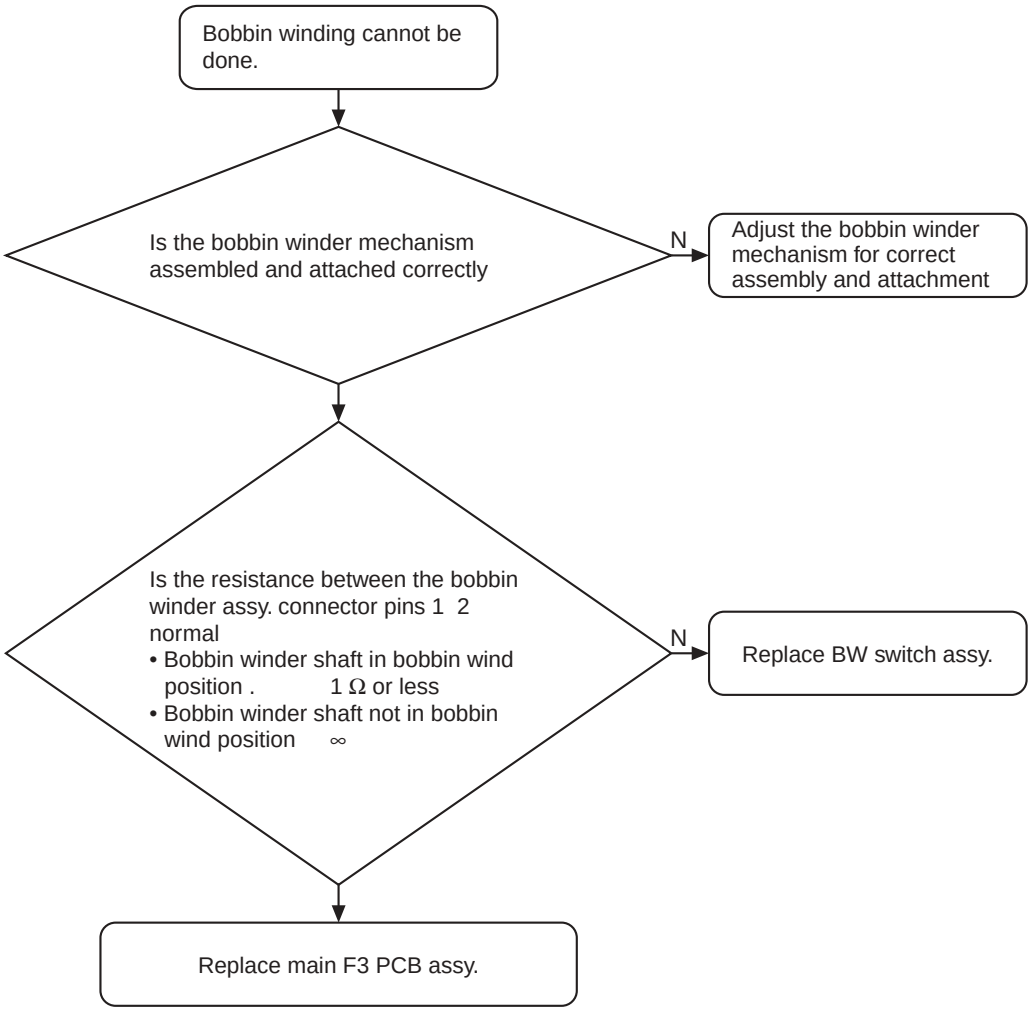

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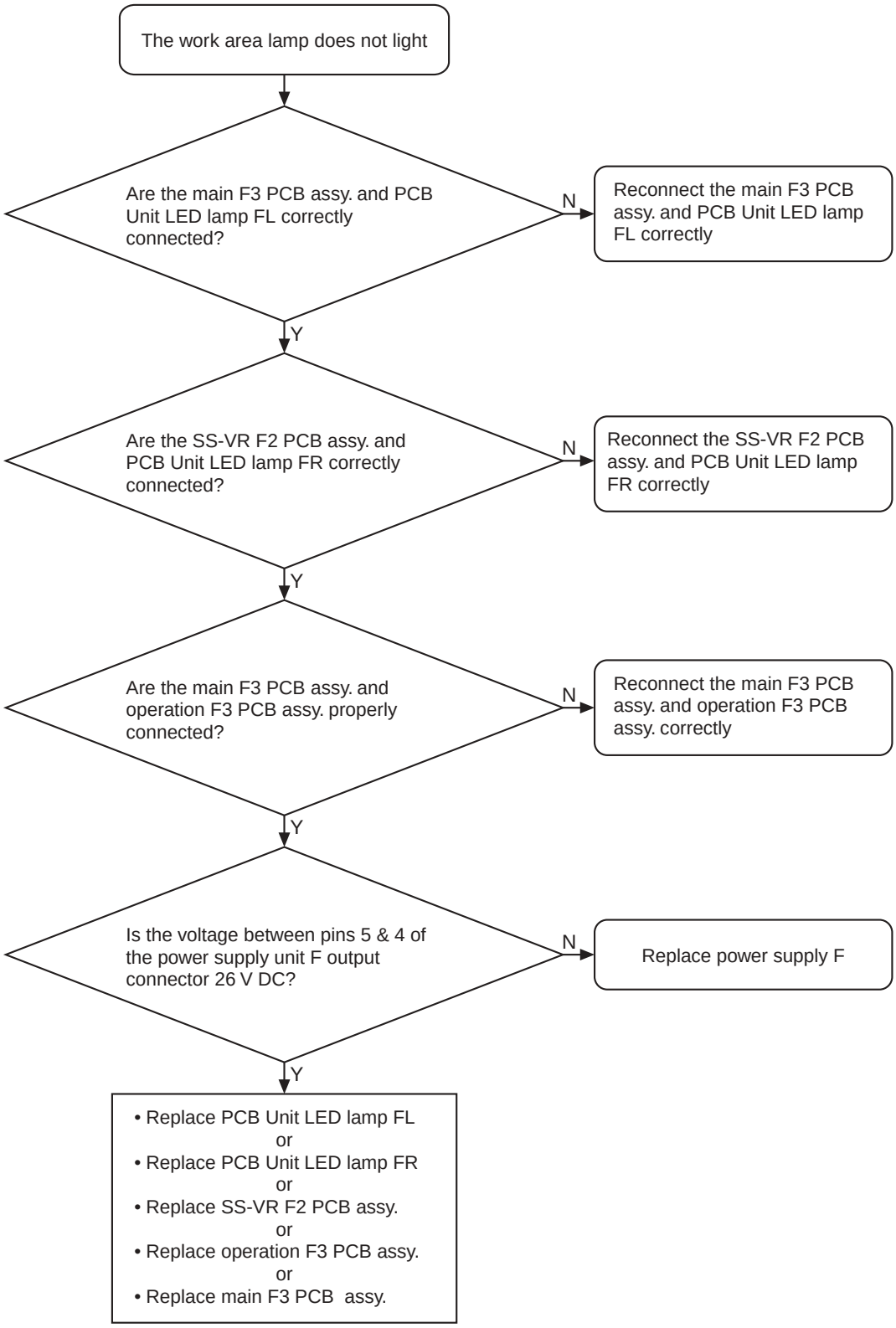

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6 Repair Manual

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
1	Stitch skipping Thread abrasion Thread breakage Seam unevenness Needle breaks	Needle tip damaged while sewing Needle catches and bends before or after sewing	Needle replacement	Needle curvature	Remove the needle, place on level block (horizontal block) and be sure there is no curvature.(4-2)
				Tip damage to needle	Touch the needle tip with your finger, be sure that it is not damaged. (4-3)
2	Indication lamps do not light (sewing machine does not operate)	Bad cord reel Cord reel connector disconnection Bad power supply unit F Power supply unit and main PCB assy. connector disconnected Bad main PCB assy. Main PCB assy. and operation F3 PCB assy. connector disconnected Operation F3 PCB assy. and SS-VR F PCB assy. connector disconnected	Replace cord reel assy.(3-26) Plug connector in Replace power supply unit F(3-27) Plug connector in Replace main PCB assy. (3-24) Plug connector in Plug connector in	Sewing machine runs when switched on	When power is switched ON Confirm that there is a beep, that the indication lamps and that the sewing machine lamp turns on.
	Indication lamps do not light, but safety timer operates (sewing machine does not operate)	Foot controller connector disconnected, broken wire Bad pin jack assy. Bad main PCB assy.	Plug connector in Replace pin jack assy.(2-10) Replace main PCB assy. (3-24)		
	Sewing machine lamp does not light (machine operation normal)	Bad PCB unit LED lamp-FR Broken PCB unit LED lamp-FR lead Bad PCB unit LED lamp-FL Broken PCB unit LED lamp-FL lead PCB unit LED lamp-FR connector disconnected PCB unit LED lamp-FL connector disconnected Bad main PCB assy. Bad operation PCB assembly Bad SS-VR F PCB assy. Selection switch remains depressed • Since two LED lamps are connected in series, two go out with one broken wire	Replace PCB unit LED lamp-FR (3-33) Replace PCB unit LED lamp-FL (3-28) Plug connector in Plug connector in Replace main PCB assy. (3-24) Replace operation PCB assembly(3-35) Replace SS-VR F PCB assy.(3-33) Reassemble stuck switch		
3	Even when the presser is raised with a straight line pattern, the sewing machine will not turn. (LED red, BH lever up)	Bad presser switch adjustment Bad presser switch Thread take-up shutter malfunction (thread take-up cover in place)	Adjust presser switch position (3-20) Replace presser switch(3-20) Correct thread guide gap	Presser switch function	Raise the presser foot lifter and check that the S/S button shines red and that it shines green when you lower the presser foot lifter

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
4	Dark display	Bad contrast adjustment	Select display and turn power on, and adjust according to display	Check display	Turn power on, check that the display is clear.
		Bad LCD panel	Replace LCD panel (3-34)		
		LCD panel cable disconnected	Connect LCD panel cable		
		Bad main PCB	Replace main PCB		
	No display	Bad LCD panel	Replace LCD panel (3-34)		
		Bad main PCB	Replace main PCB		
	Horizontal or vertical lines in display	Bad LCD panel	Replace LCD panel (3-34)		
		Bad LCD panel cable connection or bad cable	Reconnect or replace cable		
5	Straight left base line stitch unevenness (pitch)	Bad left-right needle drop adjustment Loose zigzag adjusting nut	Readjust 3 point needle drop(4-9) Readjust 3 point needle drop(4-9)	3 point needle drop (divide left and right)	Check that the needle positions are uniform to the left and right of the needle plate A needle hole.(4-9)
6	Stitch skipping, thread abrasion Thread breakage	Bad needle interference adjustment Loose needle interference adjustment screw	Adjust needle interference(4-11) Adjust needle interference(4-11)	Needle and tip gap	Lightly press the lower part (cover part) of the SS button while running on the right base line, and check for the faint sound of the needle and tip hitting. (4-11)
		Bad front-back needle drop adjustment Bad needle plate attachment position	Adjust needle interference(4-11) Adjust left-right needle interference Reattach the needle plate	Back-front needle drop position	Turn the pulley by hand, and confirm that there is a gap with the needle before and after the needle plate A needle hole.(4-20)
		Bad needle bar rise adjustment Loose timing adjustment screws	Adjust needle bar rise(4-7) Adjust needle interference(4-11)	Needle bar rise Needle interference	With a 2.9 – 3.3 mm rise from the lowest point for the needle, confirm that the tip of the rotary hook comes to the left side of the needle.(4-7)(make reference mark on needle bar supporter assy.)
	Stitch skipping, thread abrasion Thread breakage	Bad needle bar height adjustment Loose timing adjustment screws	Adjust needle bar height(4-8) Adjust needle bar height(4-8)	Needle bar height	When the needle and outside of the bobbin tip meet when turning the pulley on the left base line, confirm that the distance from the top of the needle hole to the bottom of the rotary hook tip is 1.0 – 1.4 mm. (4-8)

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
7	Does not turn (Electronic sounds and operating display lamps normal at startup)	Bad main motor Main motor connector disconnection Bad power supply unit F Bad SS-VR F PCB assy. SS-VR F PCB assy. and operation F3 PCB assy. connector disconnected	Replace main motor(3-25) Plug connector in Replace power supply unit F(3-27) Replace SS-VR F PCB assy. (3-33) Plug connector in	Sewing machine runs when S/S button is pushed	Check that the sewing machine starts and stops when the S/S button is pushed when green.
	Does not turn (No electronic sounds / operating display lamps normal at startup)	Bad NP PCB assy. NP PCB assy. and main PCB assy. connector disconnected Bad pin jack assy.	Replace NP PCB assy.(3-24) Plug connector in Replace pin jack assy.(2-10)		
8	Irregular rotation (rotation slow / fast / unstable)	Grease or dust adhering to speed sensor Grease or dust adhering to NP PCB assy. Bad NP PCB assy. Interference between speed sensor and NP PCB assy. • Damage to speed sensor • NP PCB assy. damage Bad main PCB assy.	Remove grease or dust Remove grease or dust Replace NP PCB assy.(3-24) Eliminate cause of interference • Replace upper shaft assy.(3-5) • Replace NP PCB assy.(3-24) Replace main PCB assy. (3-24)	Machine operation while rotating	Check that it switches to fast, middle and slow speed when the speed control lever is operated and that at high speed there is no rotational variation.
9	Even if the drop lever is returned to the left, the feed dog stays down and does not return (no material feed)	Drop knob damage Malfunction of vertical rod seat Bad vertical drop shaft Vertical drop shaft misalignment	Replace drop knob(3-57) Readjust vertical rod seat operation (3-63) Replace vertical adjusting screw (3-64) Readjust vertical adjusting screw (3-57)	Drop function	With the needle bar in the top position and the drop lever to the right, check that the feed dog is down, and moving the drop lever to the left and turning the pulley one turn by hand, that the feed dog returns to the original height.

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
10	Bad pattern shape Blocked by satin pattern Fine BH stitches Straight line feed too small Stitches uneven	Vertical rattle in feed dog Loose feed dog attachment screw Vertical rattle in feed bar Damage to horizontal feed cam Fork end spring slippage Rattle in feed adjuster assy.	Readjust feed dog attachment screw (4-21) Reattach the feed bar(3-65) Replace lower shaft B assy.(3-63) Assemble spring(3-63) Reattach the feed adjuster assy.(3-58)	Back/front rattle in feed dog	With the feed dog up, check that there is no rattle when the feed dog is lightly moved back and forth.(3-61)
		Horizontal rattle in feed dog Loose feed dog attachment screw Horizontal rattle in feed bar	Readjust feed dog attachment screw (4-21) Reattach the feed bar(3-65)	Left-right rattle in feed dog	With the feed dog up, check that there is no rattle when the feed dog is lightly moved left and right.(3-61)
		Bad feed dog height adjustment	Adjust feed dog height(4-22)	Feed dog height	With the feed dog in the highest position, check that the feed dog comes out 0.9 – 1.1 mm from the top of needle plate A at the center of the needle plate A needle hole. (4-22)
		Bad feed dog front-back position adjustment	Adjust feed dog front-back position(4-21)	Feed dog front-back position	Rotating the pulley by hand in a 0 mm feed position (test mode 3) with the feed dog aligned with needle plate A, check that the gap between the middle tooth and the needle plate is 3.3 – 3.9 mm.(4-21)
		Bad feed dog left-right position adjustment	Adjust feed dog left-right position(4-21)	Feed dog left-right position	Confirm that the feed dog has a 0.5 – 0.7 mm gap left and right parallel to the needle plate A needle hole.(4-21)
		Bad feed adjustment	Adjust the feed(4-16)	Feed	Check that the difference in forward and reverse feed is within 10 mm in the feed forward/reverse adjustment. (4-16)
		Bad presser dial position	Set presser dial to 3 (standard setting) (3-53)	Setting of presser dial	Check that each notches function work properly and presser dial is set to 3(standard setting)
		Malfunction of presser bar	Replace needle-presser module (3-4)	Operation of presser bar	Check that presser bar pressure is effective when presser dial is set to 1 and lower presser foot lifter slowly. (Check that there's some resistance when lower feed dog and insert a paper between needle plate and presser foot, and then pull the paper out of them.) (4-12)

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
11	Sewing sounds Inappropriate sounds			Operating noise	Check that there is no abnormal noise at fast, middle and slow speed in 3 point drop (test mode 3).
	• Thread take-up noise	Thread take-up lever shaft noise • Loose screws	Retighten the thread take-up lever shaft (3-45)		
	• Outer rotary hook vertical rattle noise	Outer rotary hook noise • Outer rotary hook vertical rattle	Reattach outer rotary hook(3-66)		
	• Upper shaft noise	Upper shaft bushing out of oil	Lubricate the sliding surfaces of the bushing and thread take-up counter weight		
		Rattle along the thread take-up counter weight shaft	Reattach the thread take-up counter weight (3-44)		
	• Motor noise	Belt too tight	Readjust the motor belt(4-6)		
		Motor fan noise	Replace main motor assy.(3-25)		
	• Lower shaft noise	Lower shaft axial rattle	Reassemble the lower shaft (3-8)		
	• Joint noise	Lower shaft joint rattle	Reassemble the lower shaft joint (3-10)		
	• Vertical feed cam noise	Vertical feed cam out of oil	Lubricate the lower shaft B assy.(3-63)		
	• Horizontal feed arm noise	Bad horizontal feed arm	Replace feed arm A (3-60)		
	• Noise from contact between needle plate A and feed dog	Back/front and left/right rattle in feed dog	Reattach the feed dog assy.(3-69)		
		Bad feed dog front-back position adjustment	Adjust feed dog front and back(4-21)		
		Bad feed dog left-right adjustment	Adjust feed dog left and right(4-21)		
		Needle plate A attachment position slippage	Reattach the needle plate A (3-69)		
	• Needle contact noise	Noise of contact between needle and outer rotary hook • Bad needle interference adjustment	Adjust needle interference(4-11)		
		• Loose needle interference adjustment screw	Adjust needle interference(4-11)		

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
12	Threading not possible.	Thread pushed out at the hook end.		Threading function	Confirm that when threading is carried out with Schappe Spun Sewing Thread #60 / #11 needle and Schappe Spun Sewing Thread #30 / #16 needle, that the threading lever moves smoothly and that threading through the needle hole is possible.
		• Vertical slippage in needle thread block	Readjust the needle thread block(4-24)		
		Hook extends right of the needle hole			
		• Wide gab between right side of needle and hook guide	Replace hook assy. (3-47)		
		• Needle curvature	Needle replacement		
		• Needle slant (hole slant with slanted attachment of needle block)	Replace needle bar (3-51)		
		• Threader hook assy. slippage	Replace hook assy. (3-47)		
		• Vertical slippage in needle thread block	Readjust the needle thread block(4-24)		
		Does not go into needle hole because of hook tip curvature.	Replace hook assy. (3-47)		
		Threading impossible even though hook goes into needle hole.			
		• Thread lost from hook guard B	Replace hook assy. (3-47)		
		• Because of bad hook spring shape, the thread is pushed out at the hook tip	Replace hook assy. (3-47)		
		• Hook spring operation is tight, so the thread cannot be held and the thread is pulled from the needle hole again.	Replace hook assy. (3-47)		
		• Thread lost from threader disk	Replace needle bar supporter assy. (3-49)		
	When the threader lever returns, it stops part way through.	Threader shaft tangling	Replace needle bar supporter assy. (3-49)		
		Bad thread guide shape	Replace hook assy. (3-47)		
		Hook guide and hook release plate touch	Replace hook assy. (3-47)		
		Bad needle thread lever shaft shape	Replace lever guide shaft (3-49)		
		Needle thread shaft and top gap too small	Replace needle bar supporter assy. (3-49)		
	Needle thread lever operation catches part way through.	Bad needle stop position			
		• NP sensor damage	Replace NP PCB assy. (3-24)		
		• Grease or dirt adhering to NP sensor	Remove grease and dirt		
		• Rotation shutter damage	Replace upper shaft assy. (3-5)		
		• Bad needle thread block rotational position	Adjust the needle thread block (4-24)		
	Needle thread lever knob out of place	Needle thread lever knob attachment loose	Replace needle thread lever knob (3-38)		

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
13	Either upper thread tension or lower thread tension	Upper thread tension is high/low (check the screw lock on the tension disk tension adjustment screw). Lower thread tension is too strong / weak (Check inner rotary hook screw lock) Upper thread or lower thread unsuitable	Upper thread tension with Schappe Spun Sewing Thread #60 is 0.53 - 0.62 N (53 - 62 g) Insert connector securely Lower thread tension with Schappe Spun Sewing Thread #60 is 0.1 – 0.12 N (10 – 12 g) (4-15) Replace upper thread or lower thread	Upper thread tension Lower thread tension	Check that the thread tension is good during actual sewing.
14	Actual sewing • Needle breakage	Needle breaks. • Inner rotary hook slips because the inner rotary hook and inner rotary hook bracket back/front overlap is too small • Inner rotary hook slips because the inner rotary hook and inner rotary hook bracket vertical overlap is too small • Thread catches on thread bobbin (thread falls down to the right because the spool pressure is insufficient) • Thread catches on spool presser (scratches on spool presser) Needle catches and bends before or after sewing.	Adjust inner rotary hook bracket assy. position (4-23) Adjust inner rotary hook bracket assy. position (4-23) Rethread Replace spool presser Needle replacement	Actual sewing (straight line / zigzag)	Check that the needle does not break during actual sewing. Check that there are no abnormal sounds during actual sewing.
	• Thread breakage stitch skipping	Thread breakage. • Thread catches on thread bobbin (thread falls down to the right because the spool pressure is insufficient) • Thread catches on spool presser (scratches) • Outer rotary hook scratches • Wrong thread guide path	Rethread Replace spool presser Replace outer rotary hook assy. (3-66) Rethread		Check that the thread does not break during actual sewing.

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
14	• Seam unevenness	Seam unevenness. • Bad presser position • Cloth presser is high and does not hold material completely • Inner rotary hook scratches • Outer rotary hook scratches • Scratches around needle plate needle hole • Scratches around presser foot needle hole • Burrs and scratches in thread guide path • Slippage from lower thread tension spring • Tension loosened by thread scraps and dirt adhering to the thread guide plate • Bad thread guide plate shape (bent) • Needle plate scratches	 Readjustment of presser bar height (4-12) Readjustment of presser bar height (4-12) Replace inner rotary hook Replace outer rotary hook(3-66) Replace needle plate A(3-69) Replace presser Replace parts with burrs and scratches Reset lower thread Remove thread and dust on stuck to thread guide plate Replace thread guide plate(3-19) Replace needle plate A(3-69)		Check that stitches are not uneven during actual sewing.
		Bad presser dial position	Replace needle-presser module (3-4)	Operation of presser bar	Check that presser bar pressure is effective when presser dial is set to 1 and lower presser foot lifter slowly. (Check that there's some resistance when lower feed dog and insert a paper between needle plate and presser foot, and then pull the paper out of them.) (4-12)
	• Stops during sewing	Stops during sewing. • No gap for bobbin winder switch • No gap for BH lever switch • No play in S/S button, reverse button or vertical stop button	 Readjust BW switch assy. position (3-13) Adjust BH lever switch position (4-18) Reassemble SS-VR F PCB assy. (3-33)		Check that it does not stop during actual sewing.
		Bad presser dial position	Replace needle-presser module (3-4)	Operation of presser bar	Check that presser bar pressure is effective when presser dial is set to 1 and lower presser foot lifter slowly. (Check that there's some resistance when lower feed dog and insert a paper between needle plate and presser foot, and then pull the paper out of them.) (4-12)

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
15	BH lever LED lights.	BH lever LED lights, and it cannot start. • Because of BH lever switch deformation, the switch is usually on • BH lever switch lead insulation is torn, and it is shorting with metal parts When started, BH lever LED lights. • BH connector disconnected • BH lever switch bent • BH lever switch guide broken / switch displaced	 Replace BH switch assy.(3-55) Replace BH switch assy.(3-55) Plug connector in Replace BH switch assy.(3-55) Replace BH switch assy.(3-55)	BH lever switch position function	With the BH pattern selected and the BH lever switch down, and when straight line is selected and the BH lever switch is up, confirm that the S/S button shines green.
16	Cannot sew BH • BH is blocked • BH cannot switch • BH switches part way through Becomes straight line	BH sewing impossible • Bad BH connecting point • BH lever detached • Connector disconnected • Operation drags • BH presser button attachment holder is pulled out fully. Bad feed forward/reverse adjustment (100 stitches forward and reverse)	 Readjust BH switch (4-18) Replace BH switch assy.(3-55) Plug connector in Replace BH switch assy.(3-55) Reset the range for the BH presser button attachment (Move back two marks from the maximum permissible range) Adjust feed forward/reverse(4-16)	Bar-tack Eyelet sewing	Check that there is no stitch skipping or clogging with BH pattern sewing. With the BH presser moved the extent of its range by hand, confirm that there is slack on the BH side and the other side. (4-18)

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
17	Cut thread switch is pushed but there is no thread cutting operation	Bad operation PCB assembly Bad SS-VR F PCB assy. Bad main PCB assy. Bad thread cutter pulse motor Thread cutter pulse motor connector disconnected Parts related to the thread cutter lever gear drag	Replace operation PCB assembly(3-35) Replace SS-VR F PCB assy. (3-33) Replace main PCB assy. (3-24) Replace C pulse motor (3-71) Plug connector in Reassemble the parts for which operations drag	Thread cutting function	Carry out thread cutting on the left base line and the right base line, and confirm that the Schappe Spun Sewing Thread #60 is actually cut. (3-73)
	Thread cutter operates, but the thread is not cut	Thread scraps and dirt adhering to the thread hook assy. Bad timing for thread hook assembly fly out. • Grease or dust adhering to NP sensor • Bad NP PCB assy. • NP PCB assy. connector disconnected • Interference between NP sensor and NP PCB assy. Thread hook assy. does not grab the thread. • Bad thread hook assy. shape • Thread hook lever presser spring floating • Lack of inner rotary hook pile Bad cutting edge on NT lower thread cutter.	Remove thread scraps and dirt Remove grease or dust Replace NP PCB assy.(3-24) Plug connector in Eliminate cause of interference Replace NP PCB assy.(3-24) Replace thread hook assy. (3-73) Replace presser spring(3-73) Replace inner rotary hook Replace NT lower thread cutter (3-73)		
18	Bobbin winder shaft not turning	Bad BW switch BW switch connector disconnected BW switch attachment position unsuitable Bad main PCB assy.	Replace BW switch (3-13) Plug connector in Replace BW switch (3-13) Replace main PCB assy. (3-24)	Bobbin winder function	Operate the bobbin winder with Schappe Spun Sewing Thread #60, and confirm that there is no uneven bobbin winding or abnormal noises.(4-17) Check that the amount of thread wound onto the bobbin is 80 – 90% of the bobbin diameter. (4-17)
	Bobbin winding amount unsuitable	Bad bobbin presser adjustment Loose bobbin presser attachment screw	Adjust bobbin presser position (4-17) Reassemble bobbin presser (3-14)		
	Bobbin winder winds unevenly	Bad bobbin winder guide assembly height adjustment Loose bobbin winder guide assembly screw	Adjust the bobbin winder guide assembly height (4-17)		
	Abnormal sound when the bobbin winder rotates	The bobbin is coming into contact with the bobbin presser Timing pulley scratches	Remove the front cover, and adjust the position using the bobbin winder holder attachment screw (3-14) Repair scratches or replace timing pulley (3-5)		

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	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
19	Foot controller not effective	Bad foot controller Bad pin jack assy. contact point Bad main PCB assy.	Replace foot controller Replace pin jack assy.(2-10) Replace main PCB assy. (3-24)	Foot controller function	Run the sewing machine using the foot controller, and check that the sewing machine speed changes according to the amount it is pressed down.
20	The presser foot does not rise when it is raised using the knee lever	Presser foot does not rise • Bad wire length adjustment • Wire retaining ring dislodged • Loose horizontal shaft screw	Adjust knee lifter (4-21) Attach retaining ring (3-27) Tighten screw	Knee lifter function	Put the needle bar in the highest position, and raise the presser foot with the feed dog up. When the knee lever is used to raise the presser foot, check that it is 9 mm or more.

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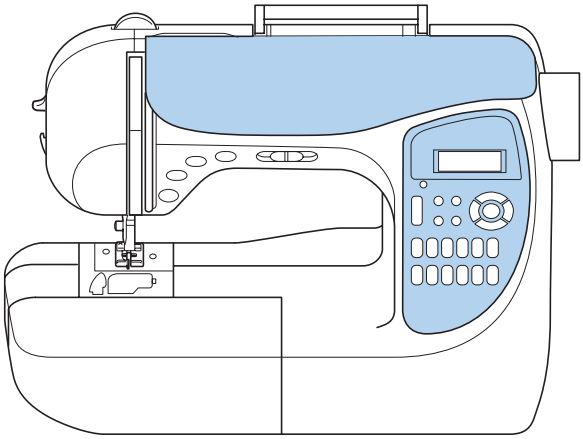

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