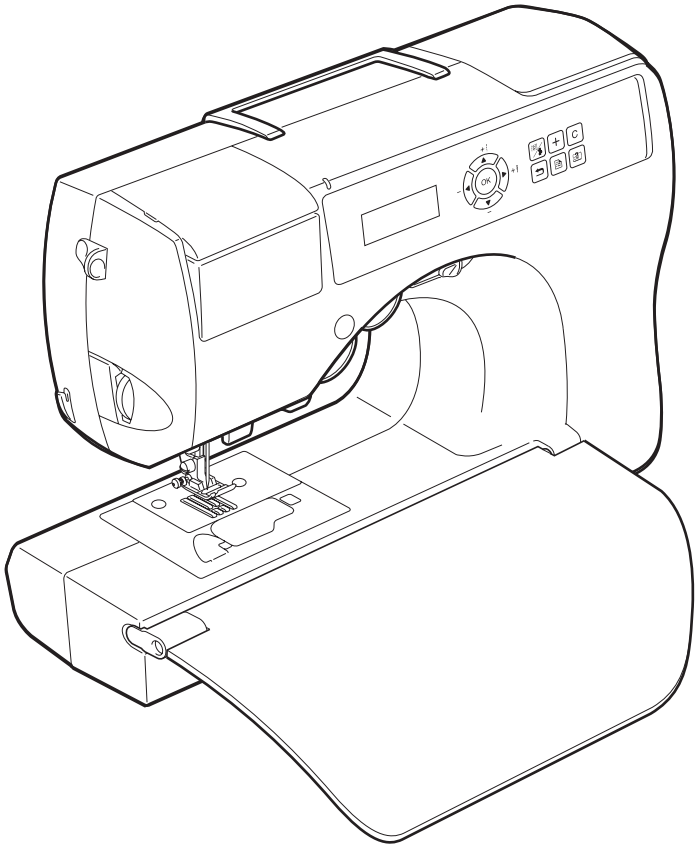
brother

SERVICE MANUAL FOR COMPUTERIZED SEWING MACHINE

CS8000 Series
CS8100 Series



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.

5.2003.

GENERAL INFORMATION

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

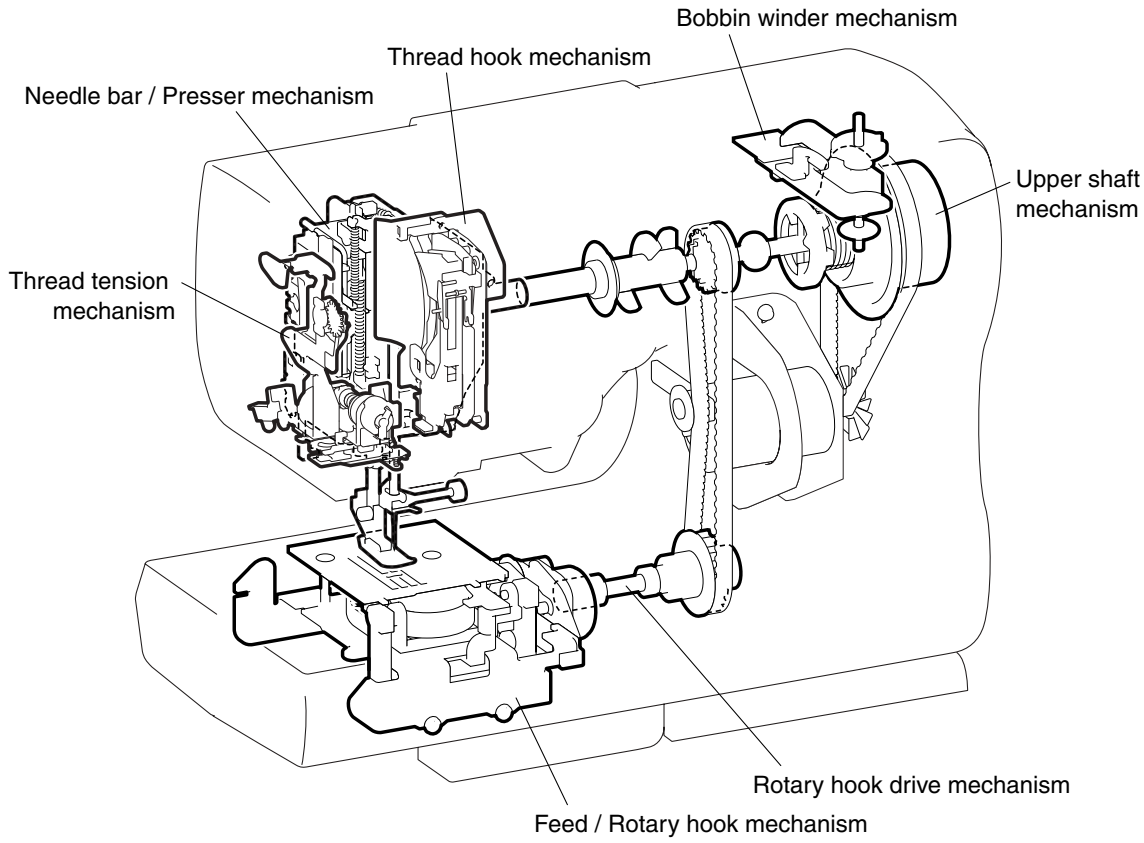
Brother Industries, Ltd.
Nagoya, Japan

CAUTION

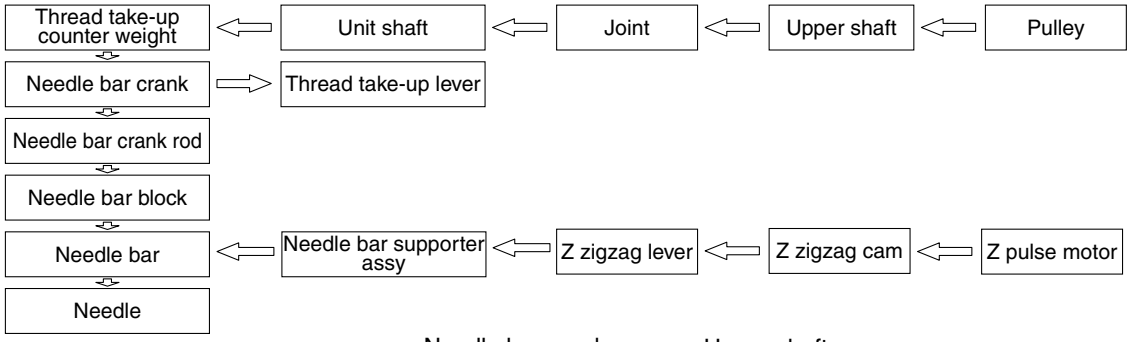
1. Always use rubber gloves when handling printed circuit boards and never touch the metal portion of a printed circuit board with bare hands.
2. Keep your body earthed in order to avoid generating static electricity.
3. Pack printed circuit boards in aluminum foil and avoid subjecting them to any form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

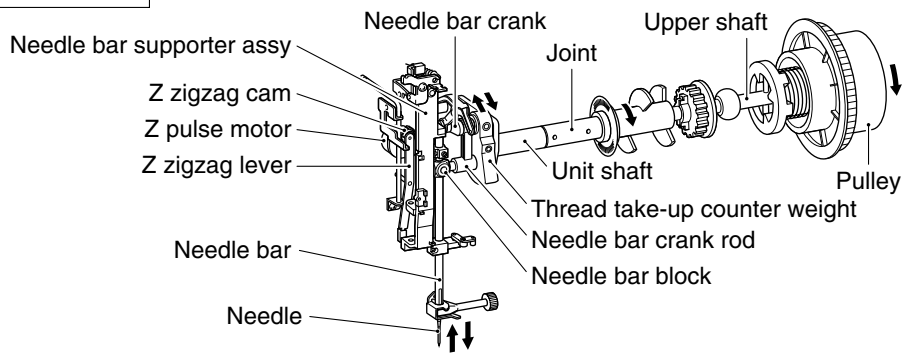
1 Outline of Mechanism

S2 : CS8000 Series
S3 : CS8100 Series

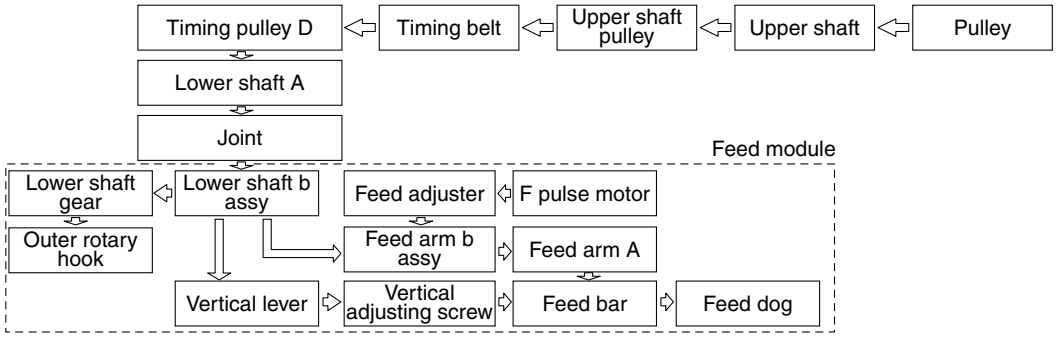

Bobbin winder mechanism
Thread hook mechanism
Needle bar / Presser mechanism
Upper shaft mechanism
Thread tension mechanism
Rotary hook drive mechanism
Feed / Rotary hook mechanism

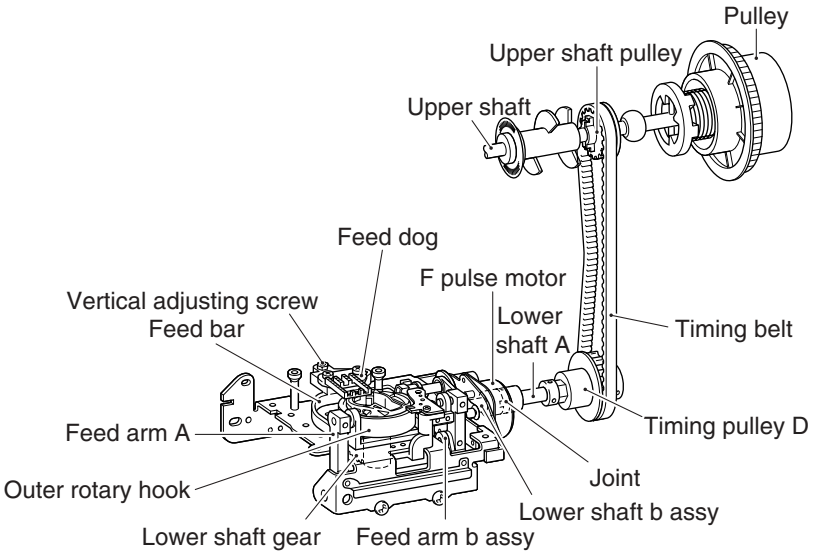
A) Up and down movement of needle bar, movement of thread take-up lever and zigzag mechanism



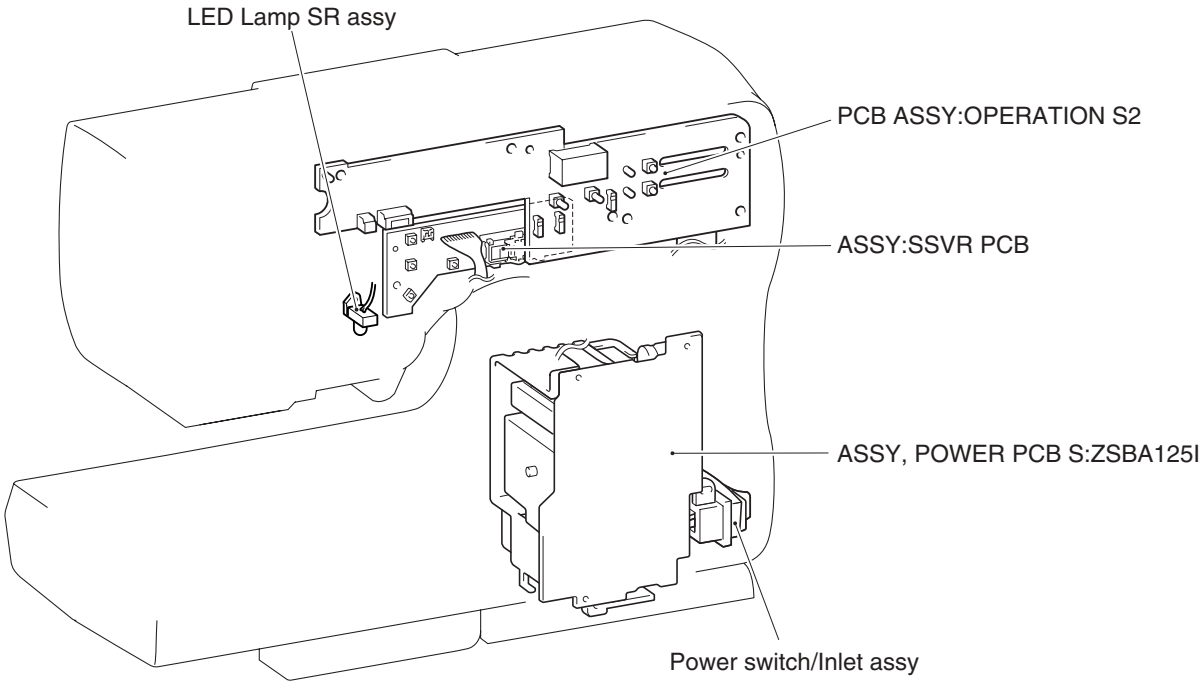


B) Movement of feed dog and rotary hook

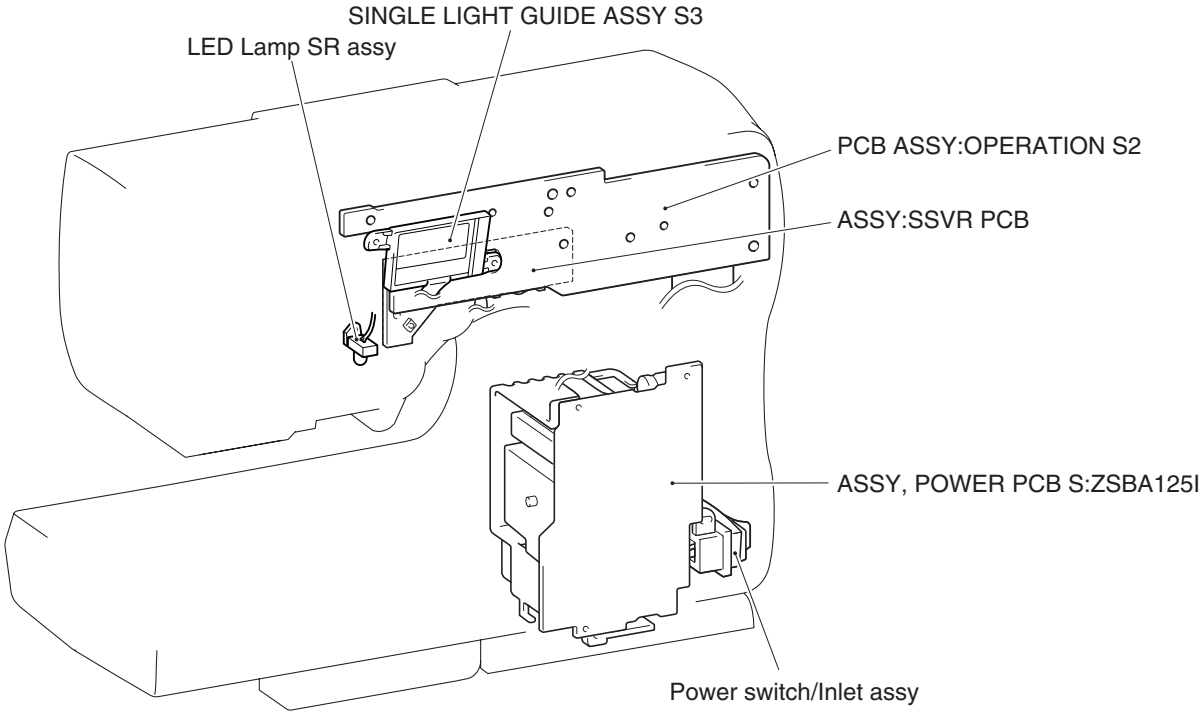


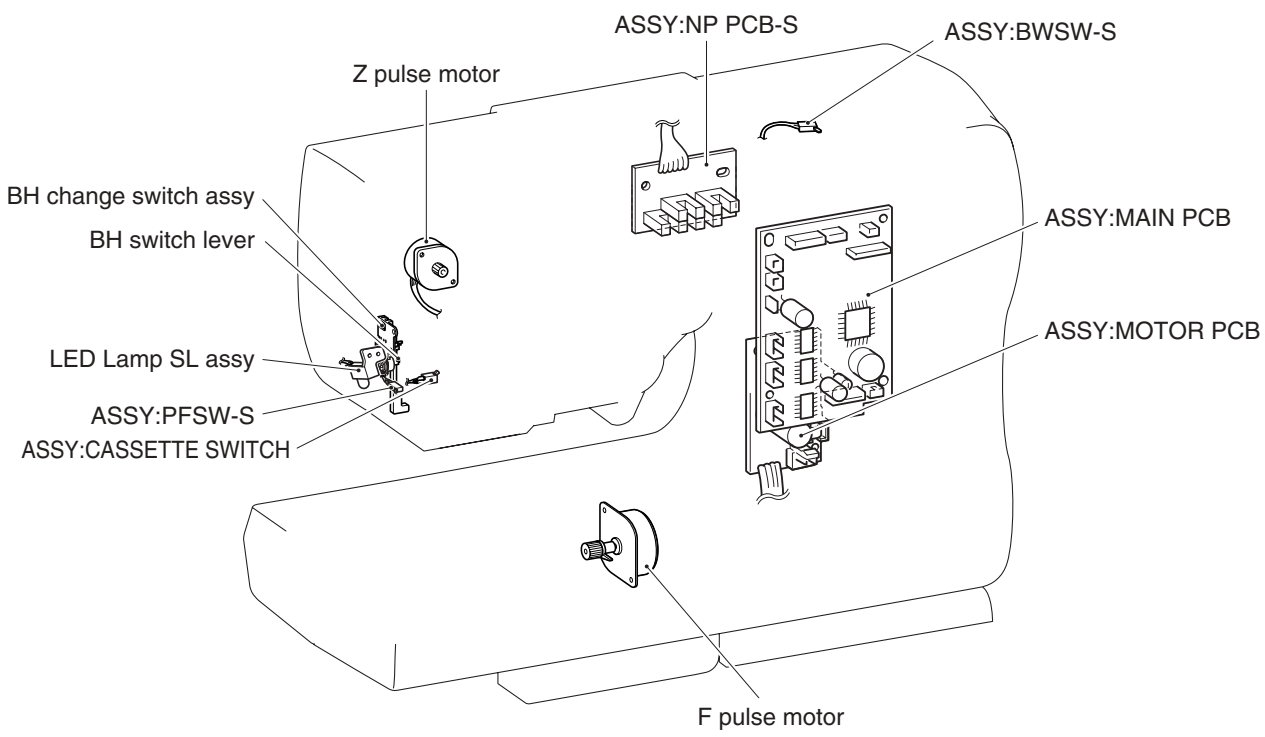


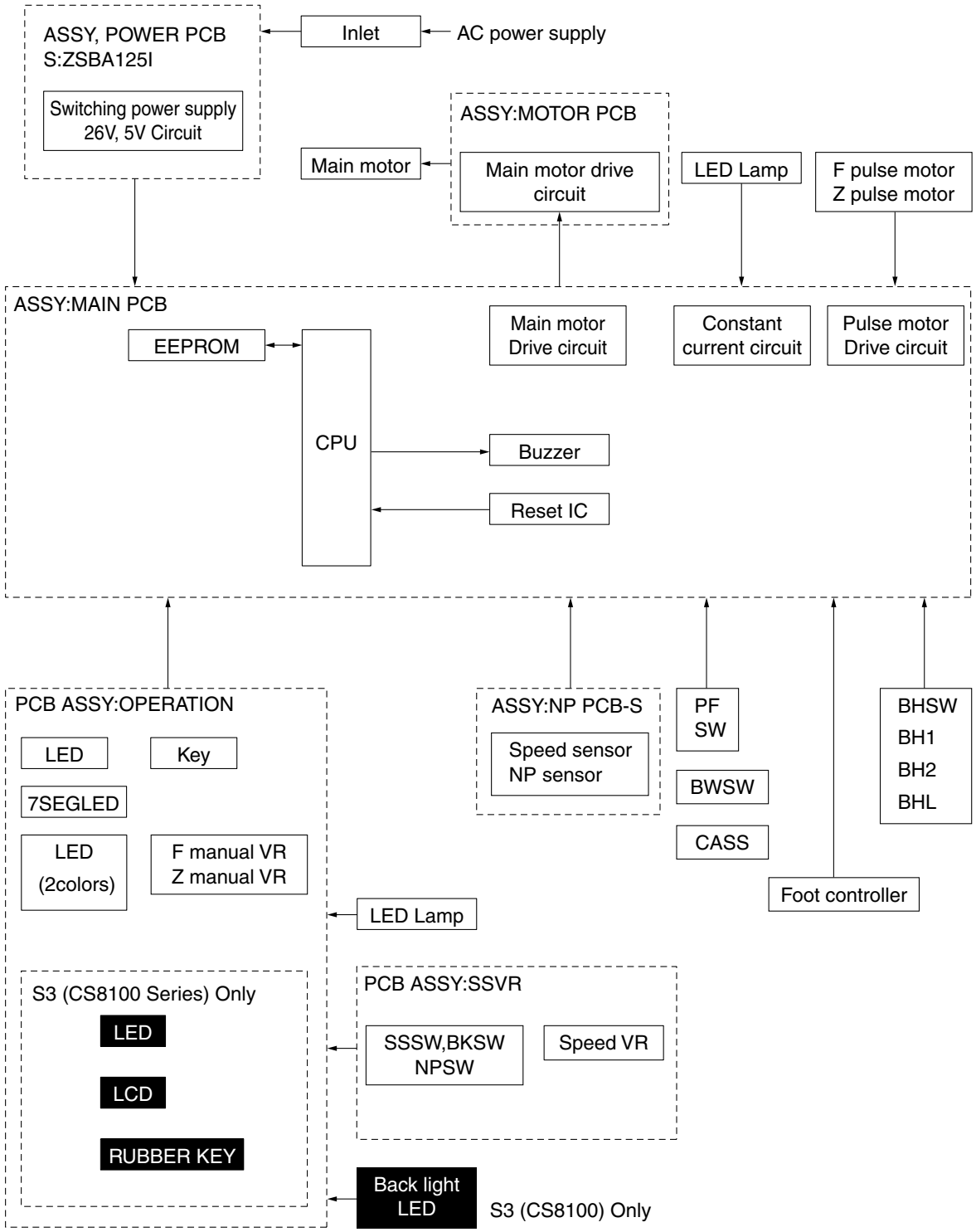
S2 (CS8000 Series)



S3 (CS8100 Series)




ASSY:NP PCB-S
ASSY:BWSW-S
Z pulse motor
BH change switch assy
BH switch lever
ASSY:MAIN PCB
LED Lamp SL assy
ASSY:MOTOR PCB
ASSY:PFSW-S
ASSY:CASSETTE SWITCH
F pulse motor


ASSY, POWER PCB
S:ZSBA125I
Switching power supply
26V, 5V Circuit
Inlet
AC power supply
ASSY:MOTOR PCB
Main motor
Main motor drive circuit
LED Lamp
F pulse motor
Z pulse motor
ASSY:MAIN PCB
EEPROM
CPU
Main motor
Drive circuit
Constant
current circuit
Pulse motor
Drive circuit
Buzzer
Reset IC
PCB ASSY:OPERATION
LED
Key
7SEGLED
LED
(2colors)
F manual VR
Z manual VR
ASSY:NP PCB-S
Speed sensor
NP sensor
PF
SW
BWSW
CASS
BHSW
BH1
BH2
BHL
Foot controller
LED Lamp
S3 (CS8100 Series) Only
LED
LCD
RUBBER KEY
PCB ASSY:SSVR
SSSW,BKSW
NPSW
Speed VR
Back light
LED
S3 (CS8100) Only

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.

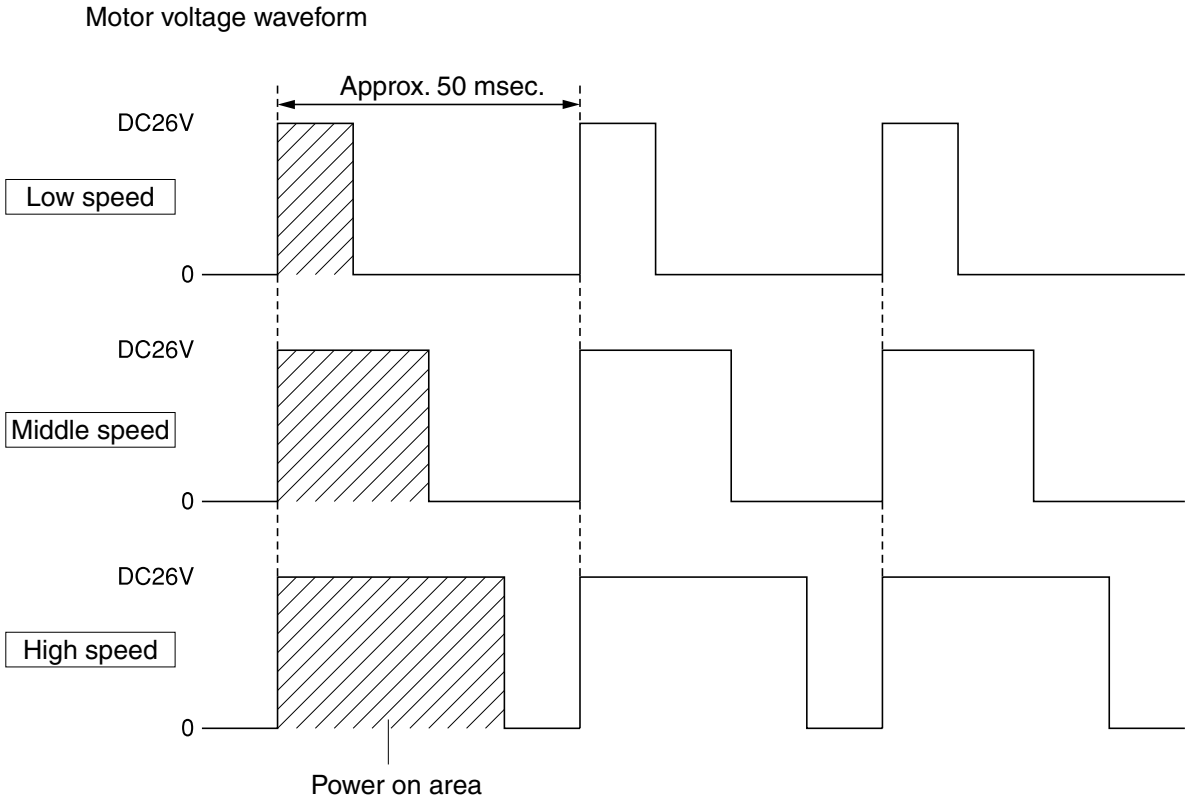
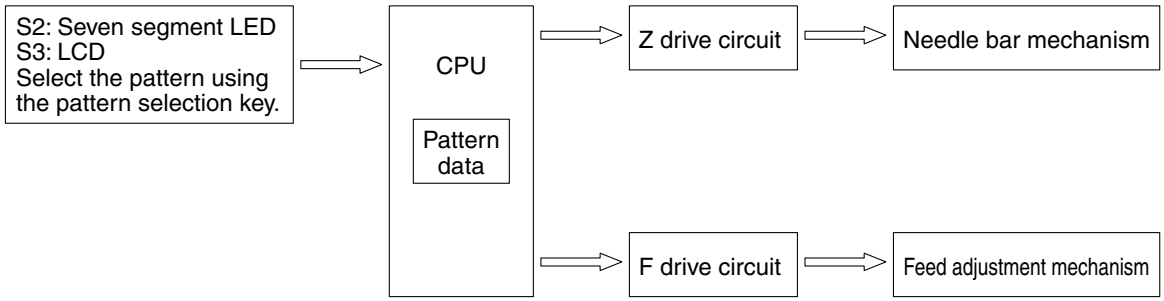


Fig. 1 Outline of pulse width modulation (PWM) control

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. In contrast, 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 (S2:50types, S3:119types) stored in internal CPU memory.

Pattern generator control block diagram



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

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 foot lifter.

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.

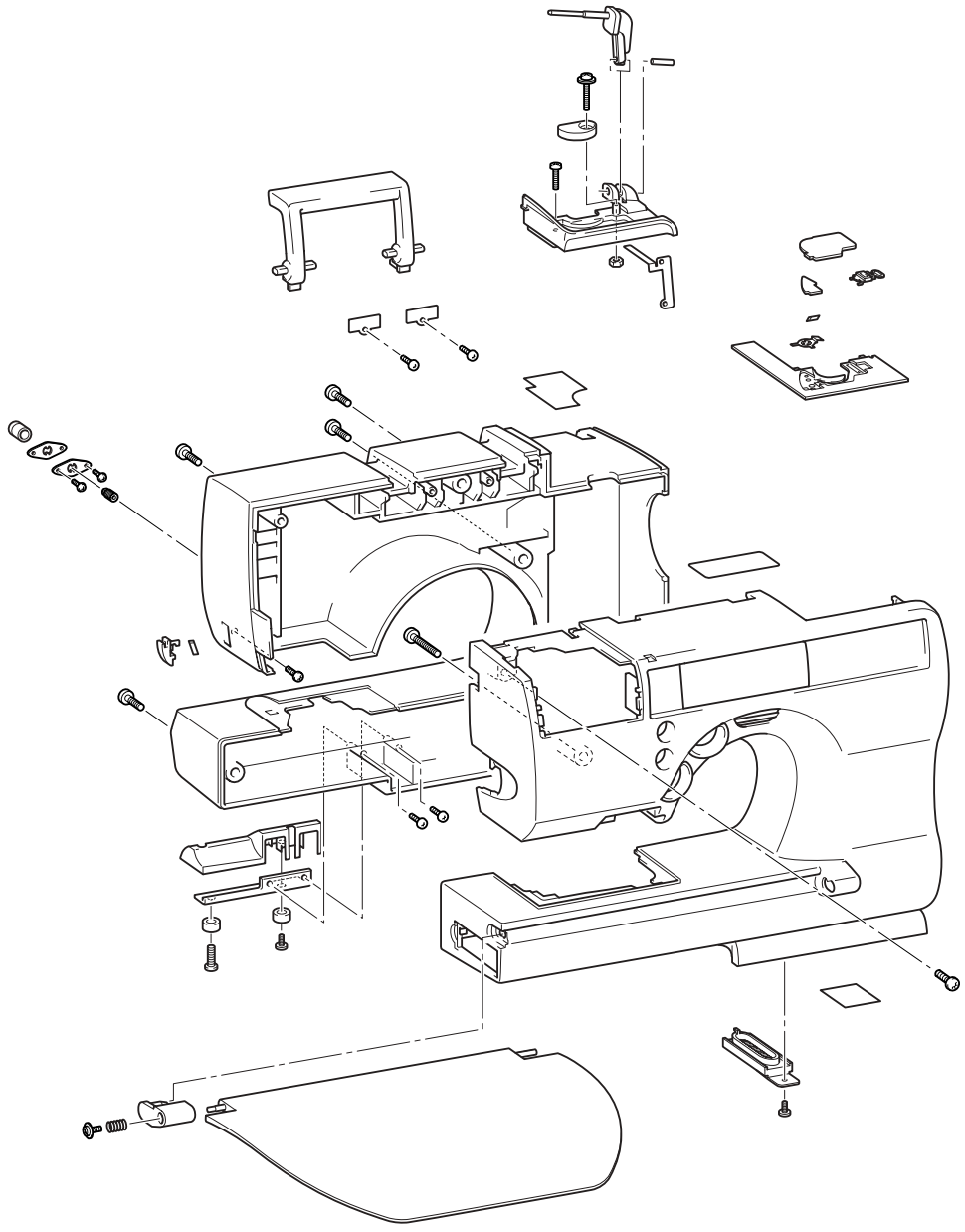
Thread size / Needle size	#30	#50	#60	#80	#100	#120
#9	×	×	×	○	○	○
#11	×	○	○	○	○	※
#14	×	○	○	○	※	※
#16	※	○	○	※	※	※
#18	※	※	※	※	※	※

2 Disassembly

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

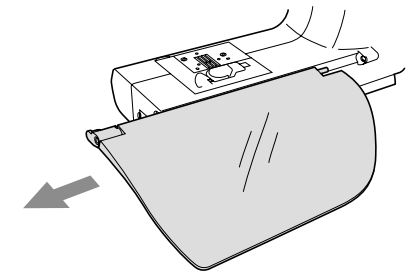
S2 : CS8000 Series
S3 : CS8100 Series

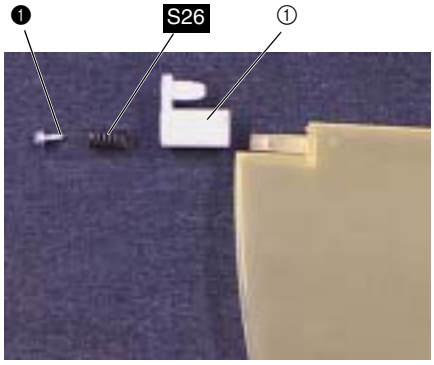
Main partslocation diagram



1 Flap table assy. disassembly

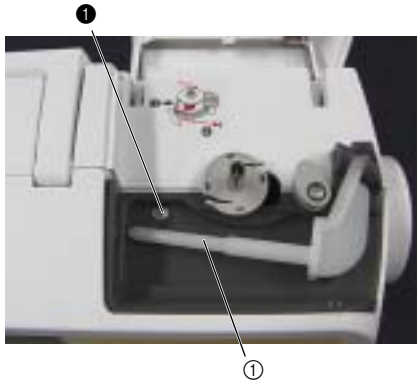
1. Remove the flap table.
2. Remove ❶, and remove spring S26 and the table bearing ① from the flap table.

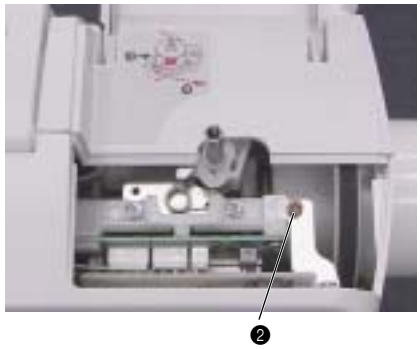




2 Bobbin winder assy. removal

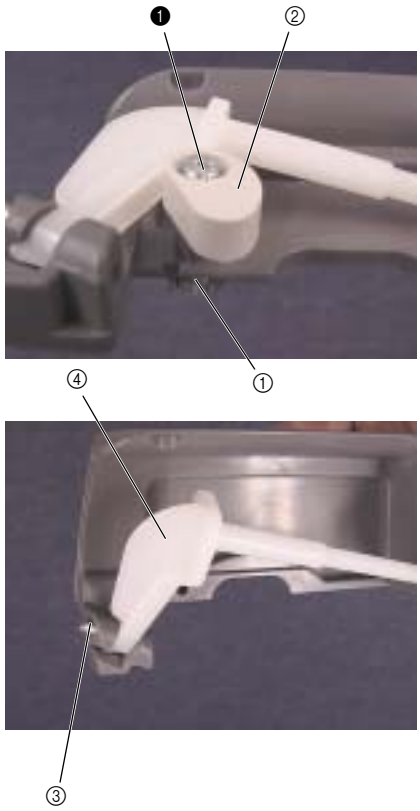
1. Remove the bobbin base.
2. Remove the screw ❶.
3. ①Remove the bobbin winder assy. from the front cover.
4. Remove the screw ❷.





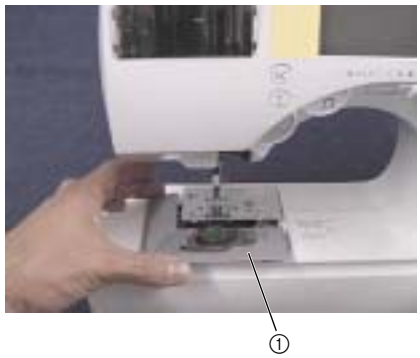
3 Bobbin winder assy. disassembly

1. Remove screw ❶ and the 1 M3 nut ①, and remove the bobbin presser ②.
2. ③Remove spring roll pin BW 3x12, and remove the lower thread pin ④.



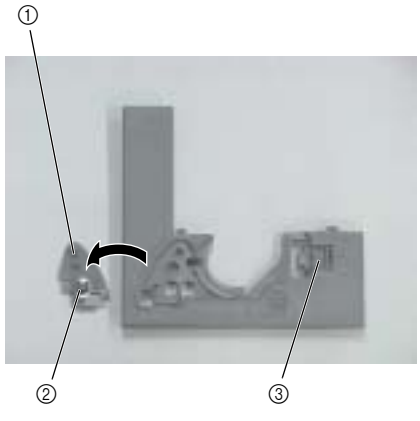
4 Needle plate B assy. removal

1. Remove the needle plate.
2. Remove the needle plate B assy. ①.



5 Needle plate B assy. disassembly

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

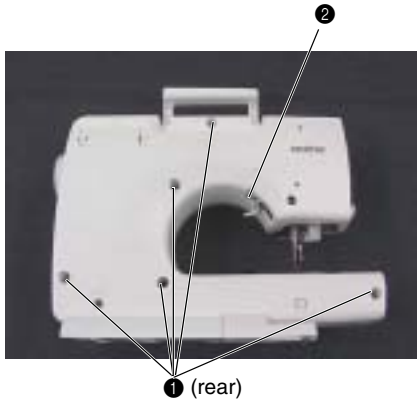


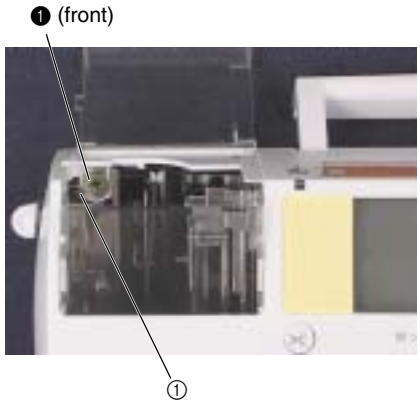
6 Front cover assy. removal

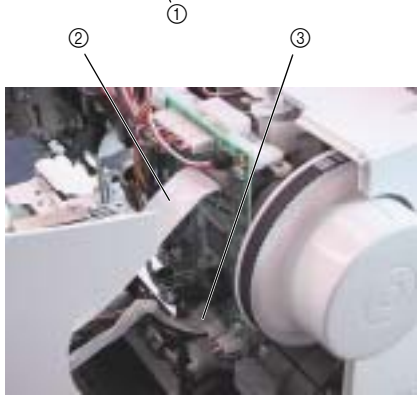
1. Remove screws ❶ (one on the front side, five on the rear side) and screw ❷ (one on rear side).
2. Remove the front cover from the arm bed.

***Key point**

- Be careful to push the thread tension mechanism spring ① to the left side, and not damage it when removing the front cover.
- When the front cover is removed, disconnect the operation S2 (or S3) PCB assy. flat cable ② and the power PCB assy. lead wire connector ③ from the main PCB assy. on the arm bed side.

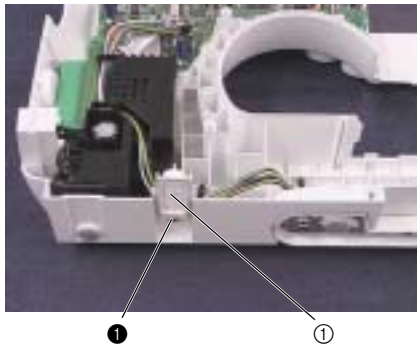






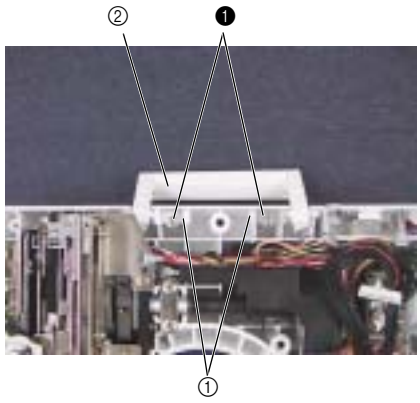
7 Base removal

1. Remove the screw ❶, and detach the base ① from the front cover.



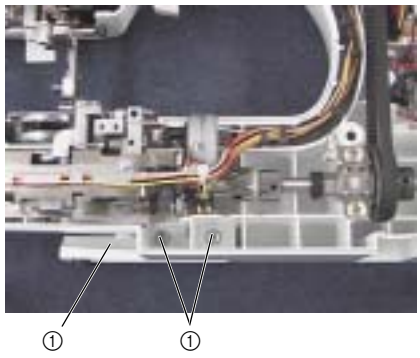
8 Handle removal

1. Remove the screws ❶ (two), and detach the handle and the handle fixed plates ① (two) and handle ② from the arm bed.



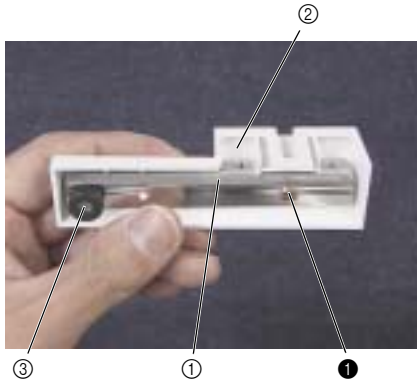
9 Base cover B assy. removal

1. Remove the screws ❶ (two), and remove the base cover B assy. ① from the arm bed.

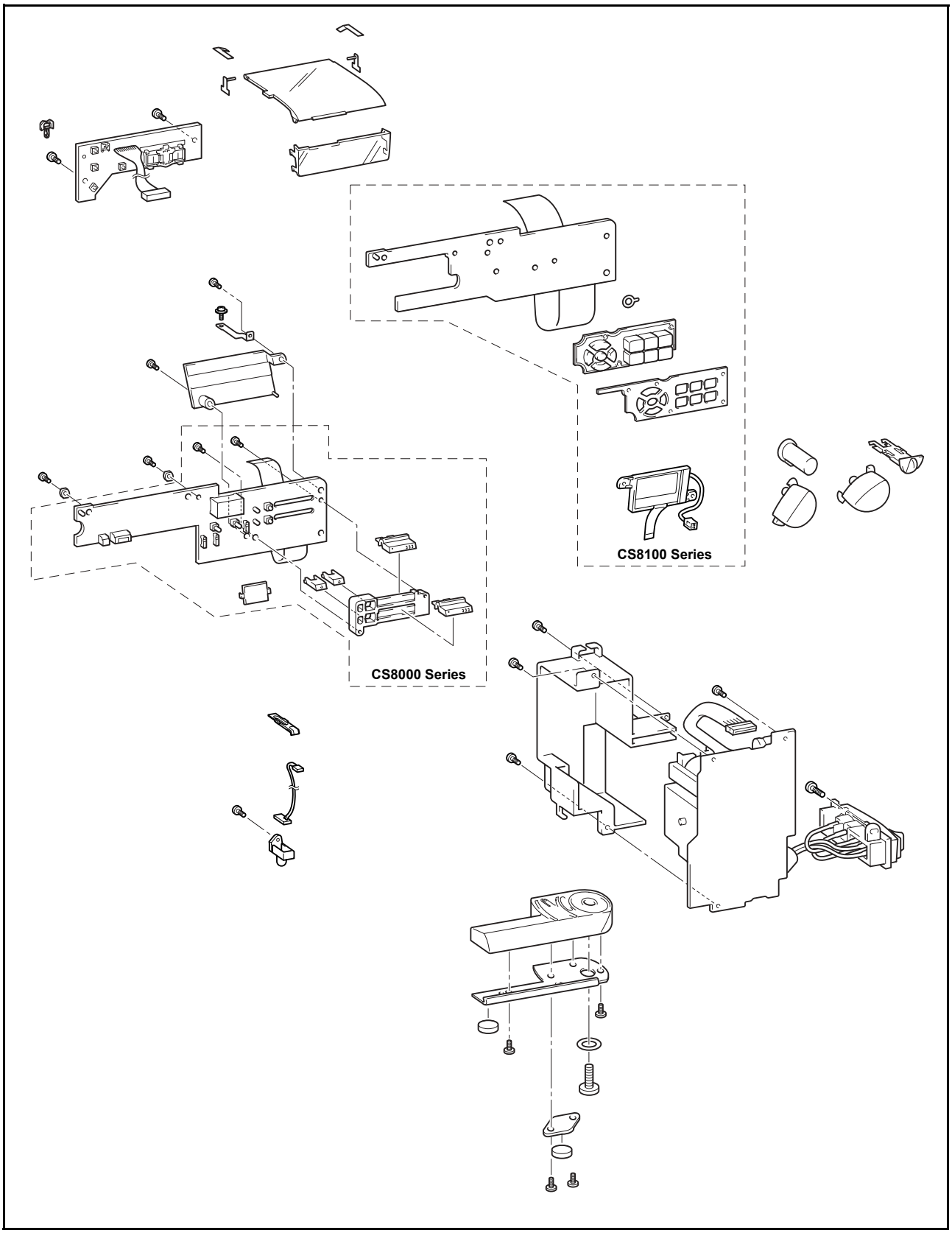


10 Base cover B assy. disassembly

1. Remove the screw ❶, and remove base cover B ② from base plate B ①.
2. Remove the adjusting screw ③ and base plate rubber from base plate B ①.



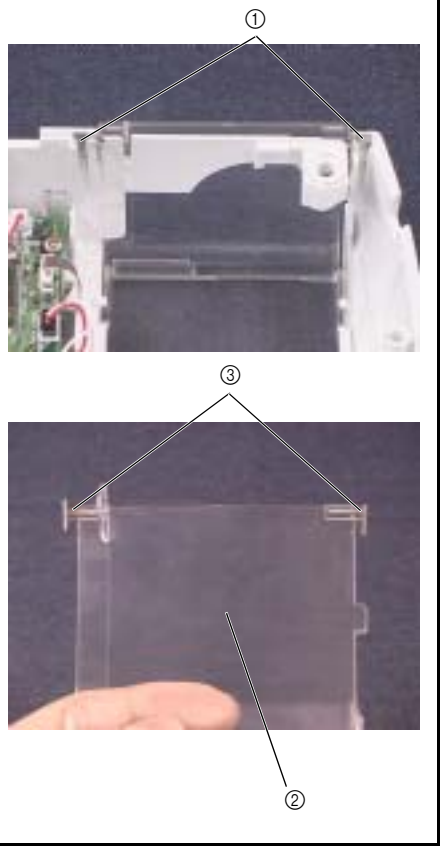
Front coverlocation diagram



1 Cassette cover removal

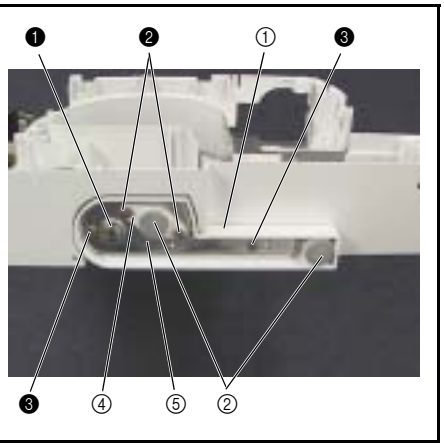
1. Remove the front cover for the cassette.
2. Remove the link hold plates ① (two).
3. Remove the cassette cover ② and cover link plates ③ (two).

Start movie clip (CD-ROM version only)



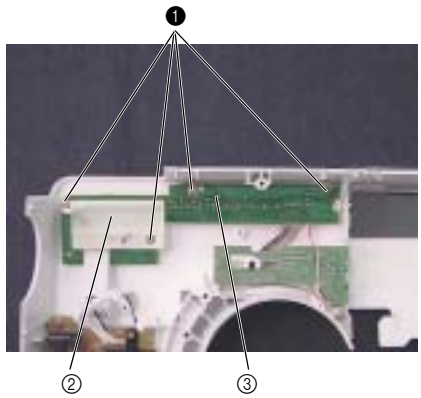
2 Remove base cover A.

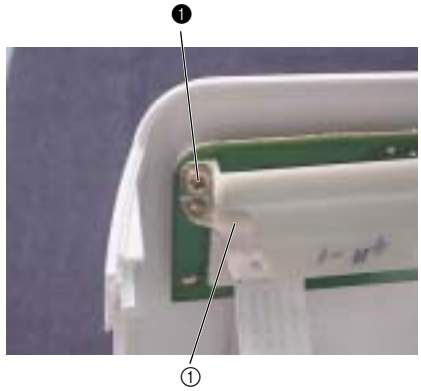
1. Remove the screw ❶, and remove the base cover A assy.① and base cover washer.
2. Remove the base plate rubbers ② (two).
3. Remove the screws ❷ (two), and remove rubber cushion plinth ④.
4. Remove the screws ❸ (two), and remove base plate A ⑤.

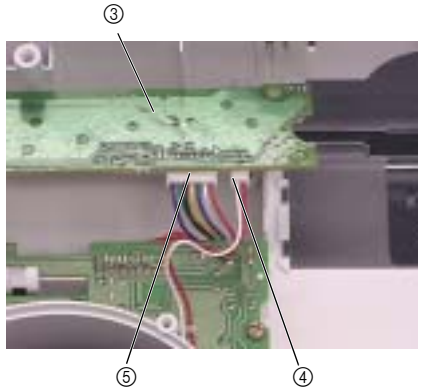


3 PCB assy : operation S2. removal (S2 only).

1. Remove screws ❶ (four), and remove the front cover fixed plate ①, PCB cover ②, Board pressers (two) and PCB assy : operation S2. ③.
2. Disconnect the LED PCB-SR assy. connector ④ and the SSVR PCB assy. connector ⑤ from the PCB assy : operation S2. ③.

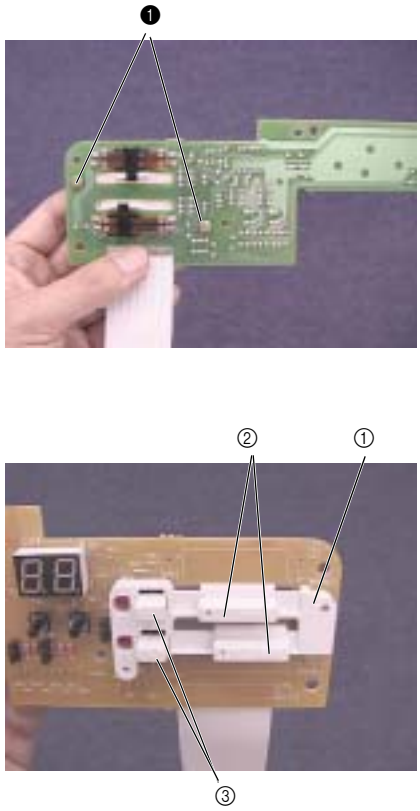






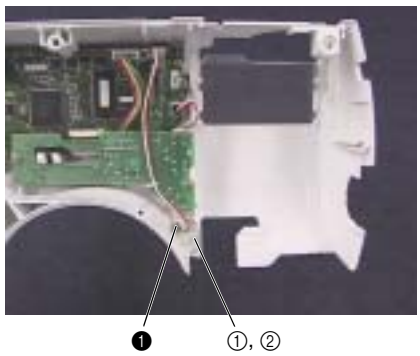
4 Operation PCB assy. disassembly (S2 only)

1. Remove screws ❶ (two), and remove the VR holder ①, SV key tops ② (two) and SW buttons ③ (two).



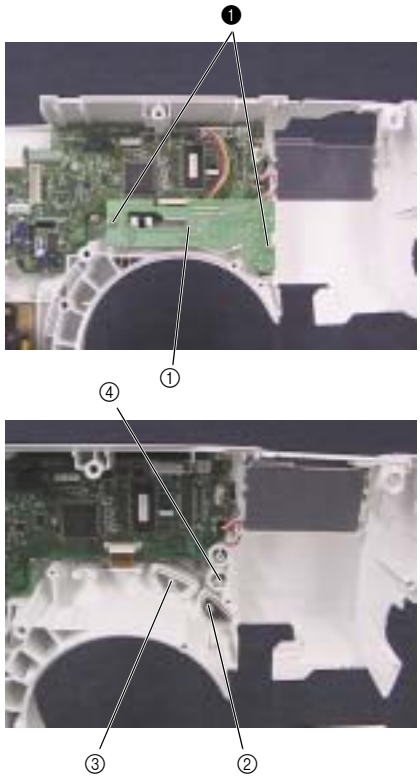
5 LED PCB-SR assy. removal

1. Remove the screw ❶, and remove the LED PCB-SR assy. ① and lamp holder ②.



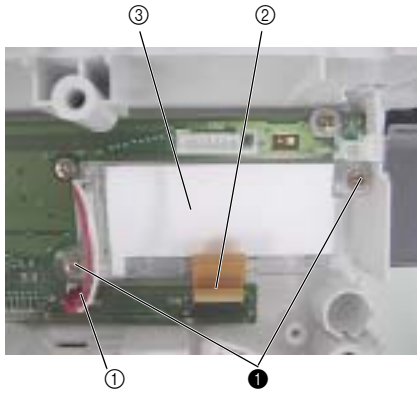
6 SSVR PCB assy. removal

1. Remove the screws ❶ (two), and remove the SSVR PCB assy. ①, SS button ②, backstitching button ③ and NP button ④.



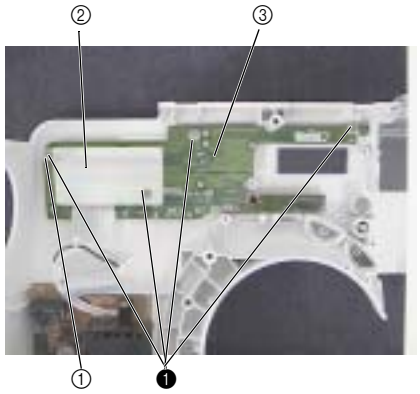
7 Single light guide assy S3. assy. removal (S3 only)

1. Disconnect the back light lead wire connector ① and Single light guide assy S3. connector ② from the PCB assy : operation S3.
2. Remove screws ❶ (two), and remove the Single light guide assy S3. assy. ③, and PCB hold plate.



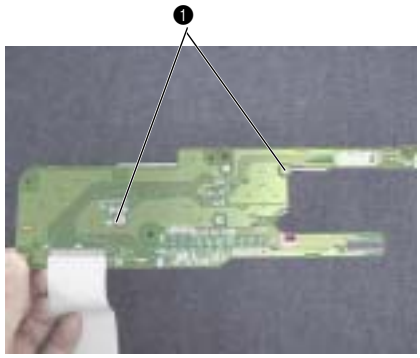
8 PCB assy : operation S3. removal (S3 only)

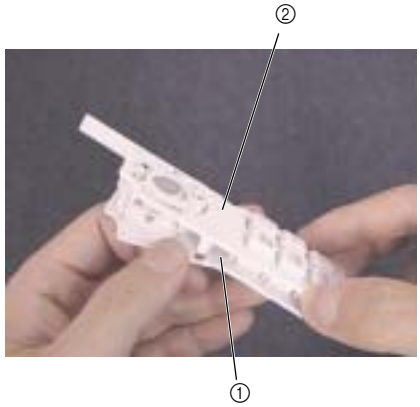
1. Remove screws ❶ (four), and remove the front cover fixed plate ①, PCB cover ②, Board pressers (two) and PCB assy : operation S3. ③.



9 Rubber key removal (S3 only)

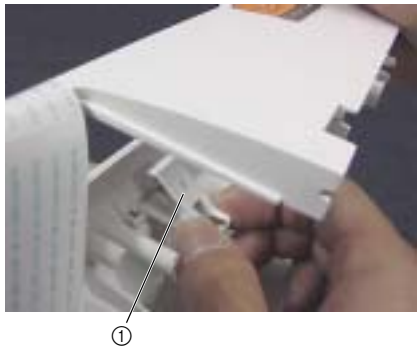
1. Remove screws ❶ (two), and remove the rubber keys ① and the rubber key holder ②.





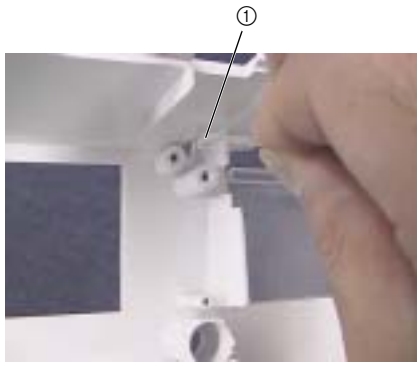
10 SV key top removal

1. Remove the SV key top ① from the front cover.



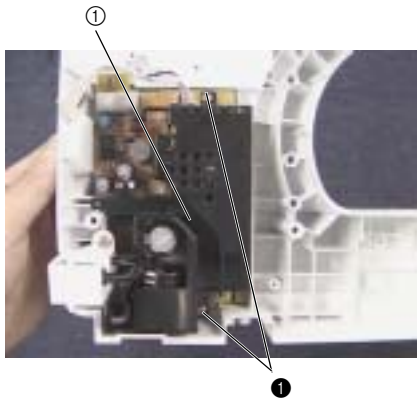
11 LED cover removal.

1. Remove the LED cover ① from the front cover.



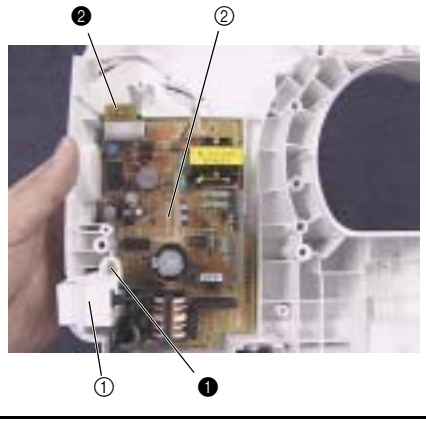
12 Break cover removal

1. Remove the screws ❶ (two), and remove the break cover ①.

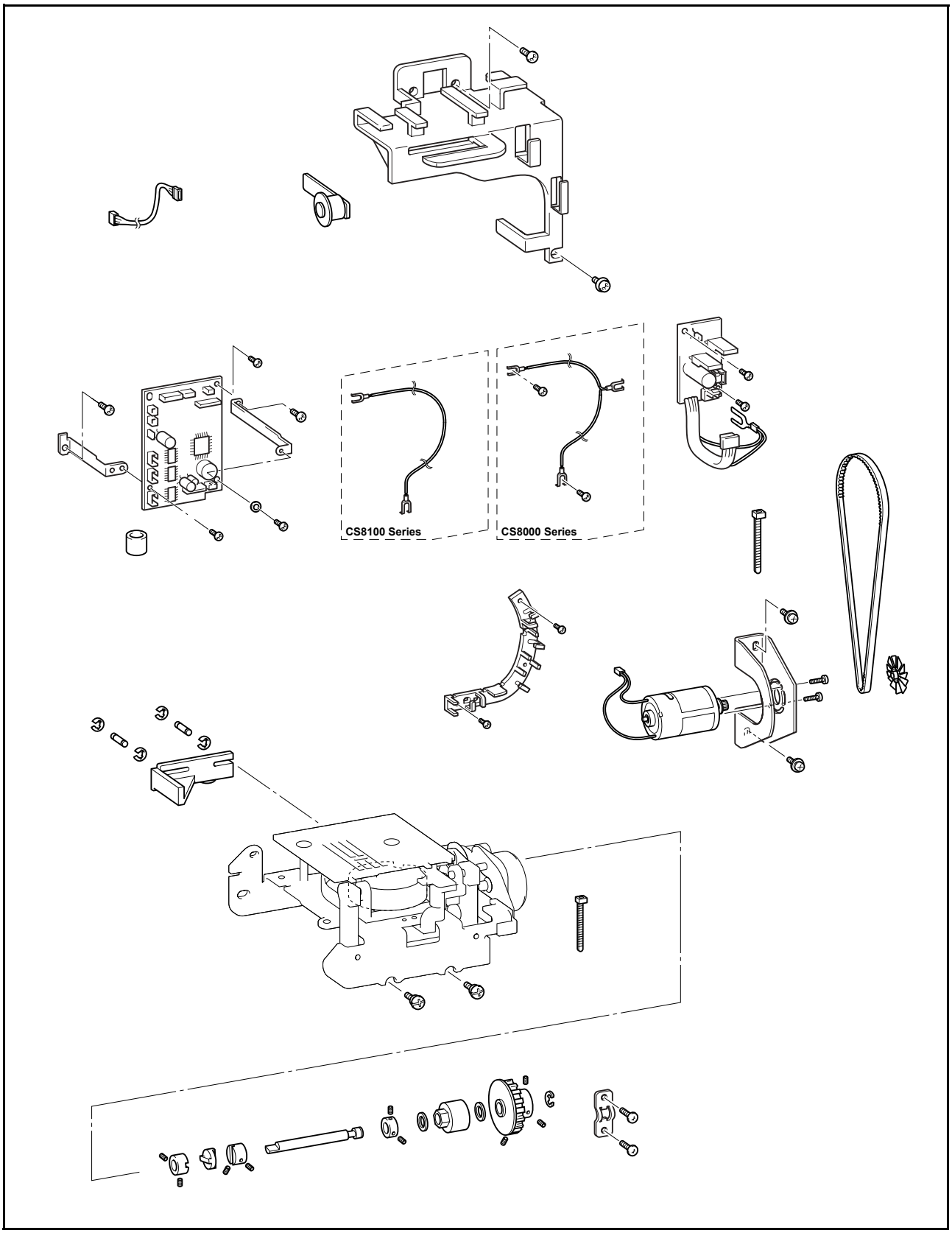


13 Power PCB assy. removal

1. Remove the screw ❶, and detach the inlet assy. ① from the front cover.
2. Remove the screw ❷, and remove the power PCB assy. ①.
3. Disconnect the inlet assy. connector from the power PCB assy. ②.

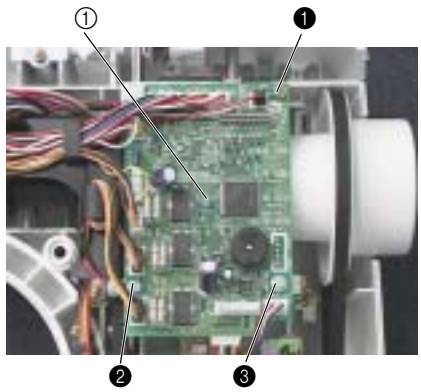


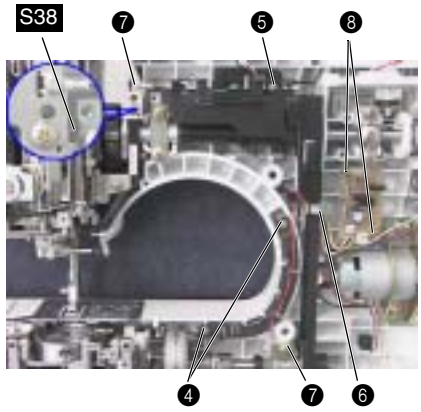
Rotary hook drive mechanismlocation diagram

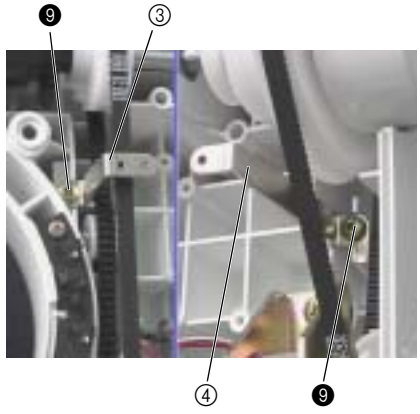


1 Main PCB assy./motor PCB assy. removal

1. Disconnect all of the connectors on the main PCB assy. and motor PCB assy.
2. Remove screw ❶, screw ❷, screw ❸ and the plain M3 washer, and remove the main PCB assy. ①.
3. Remove the screws ❹ (two), and remove the lead wire guide.
4. Remove screw ❺ and screw ❻, and remove the shutter cover.
5. Remove screws ❼ (two), and disconnect the ground lead wire assy. ②.
6. Remove spring S38.
7. Remove screws ❽ (two), and remove the motor PCB assy.
8. Remove screws ❾ (two), and remove Set plate L ③ and Set plate R ④.

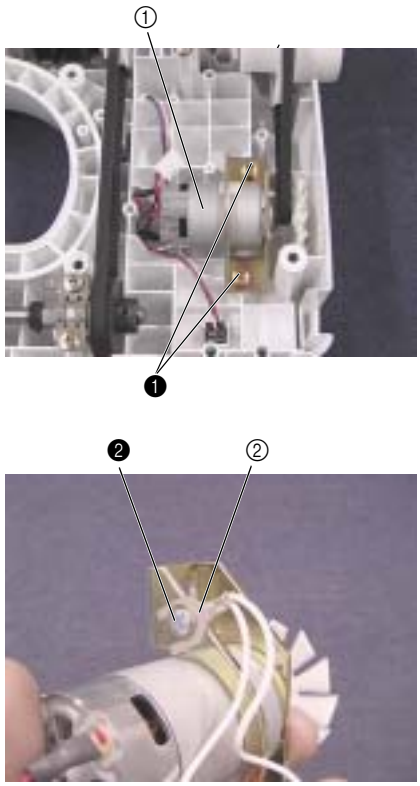






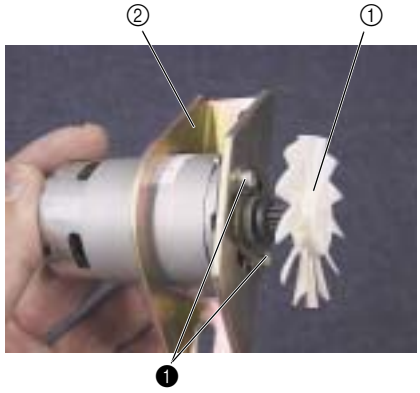
2 Main motor assembly removal

1. Remove the screws ❶ (two), and remove the main motor assy. ①.
2. Remove screw ❷, and remove the motor PCB assy. ground wire ②.



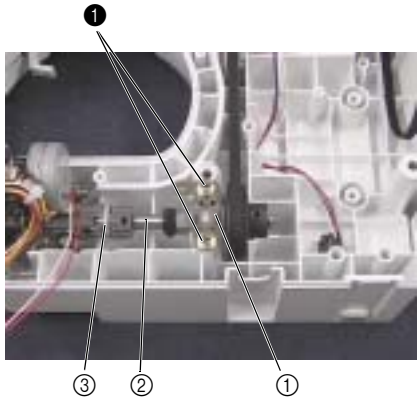
3 Main motor assembly disassembly

1. Remove motor fan ①.
2. Remove the screws ❶ (two), and remove the main motor from the motor holder ②.



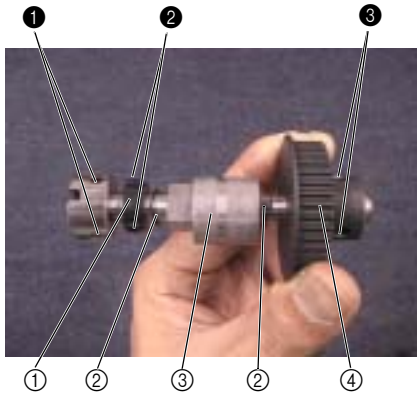
4 Lower shaft A assy. removal

1. Remove the screws ❶ (two), and remove the lower shaft bushing presser ①.
2. Remove the lower shaft A assy. ② and the disk ③.



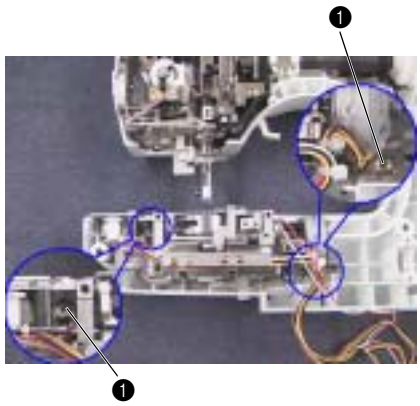
5 Lower shaft A assy. disassembly

1. Remove screws ❶ (set screw, socket (FT) M5X5) (two), and remove the joint.
2. Remove screws ❷ (set screw, socket (CP) M4X4) (two), and remove the set screw collar ①, thrust washer ②, eccentric shaft bushing ③ and thrust washer ②.
3. Remove the screws ❸ (set screw, socket (CP) M5X5) (three), and remove timing pulley D ④.
4. Remove retaining ring E6 from the lower shaft A.



6 Feed module removal

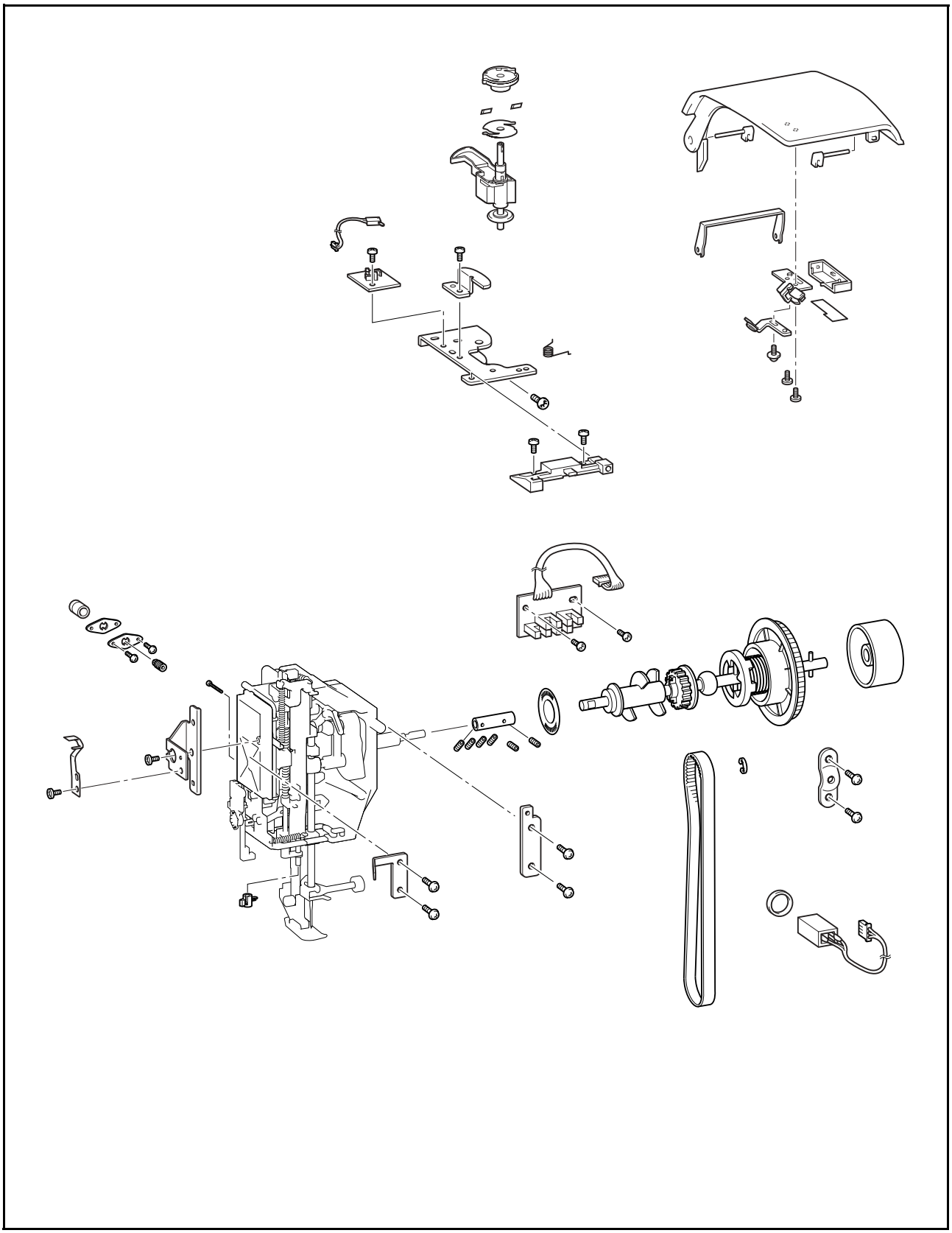
1. Remove screws ❶ (two), and remove the feed module.



7 Tension pulley assy. removal

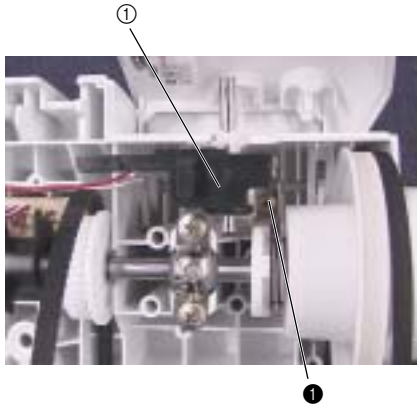
1. Remove the tension pulley assy. ①.

Upper shaft mechanismlocation diagram



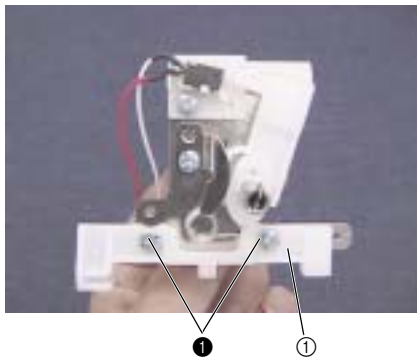
1 Bobbin winder assy. removal

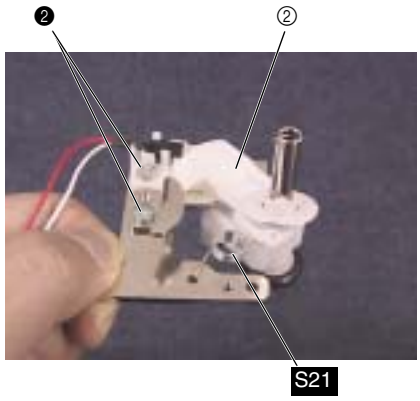
1. Remove screw ❶, and remove the bobbin winder assy. ① and washer.



2 Bobbin winder assy. disassembly

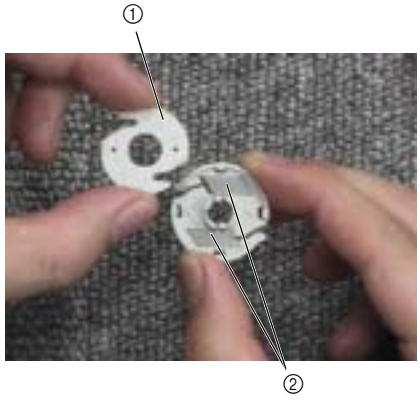
1. Remove the bobbin base.
2. Remove screws ❶ (two), and remove the Board presser ①.
3. Remove the Spring S21 .
4. Remove the BW shaft holder assy. ②.
5. Remove screws ❷ (two), and remove the bobbin winder shaft stopper and the SW adjust plate.
6. Remove the BW SW-S assy. from the SW adjust plate.





3 Bobbin base assy. disassembly

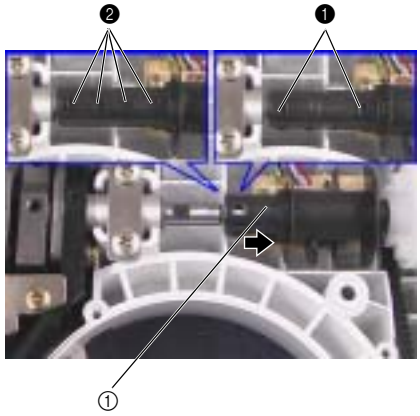
1. Remove the bobbin thread cutter holder ① from the bobbin base.
2. Remove the NT lower thread cutters ② (two) from the bobbin base.

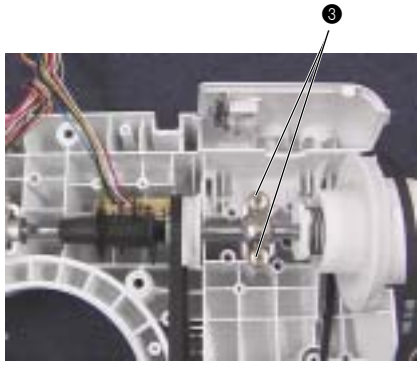


4 Upper shaft assy. removal

1. Remove screws ❶ (set screw, socket (FT) M5X5) (two) and screws ❷ (set screw, socket (CP) M4X4) (four), and move the fixed joint ① to the right side.
2. Remove the screws ❸ (two), and remove the upper shaft bearing presser.
3. Remove the upper shaft assy., timing belt (motor) and timing belt (rotary hook drive).
4. Remove the fixed joint from the upper shaft assy.

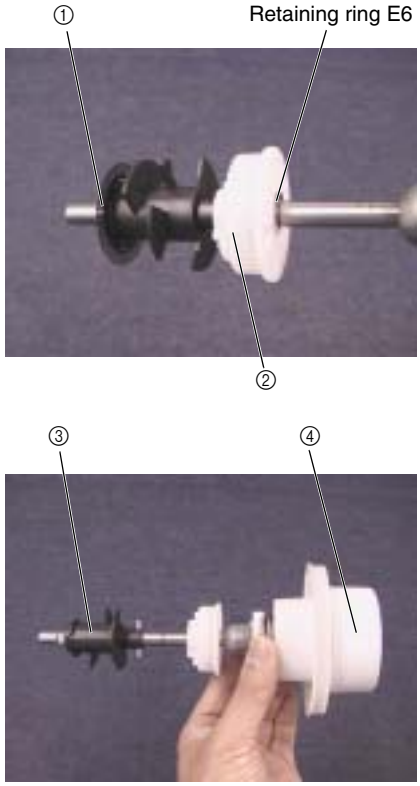
Start movie clip (CD-ROM version only)





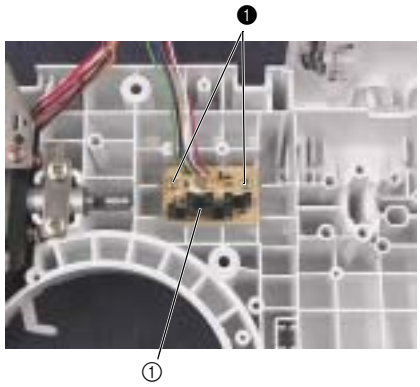
5 Upper shaft assy. disassembly

1. Remove the speed shutter ①.
2. Remove retaining ring E6, and move the upper shaft pulley ② to the right side.
3. Remove the timing shutter ③.
4. Remove the pulley ④.



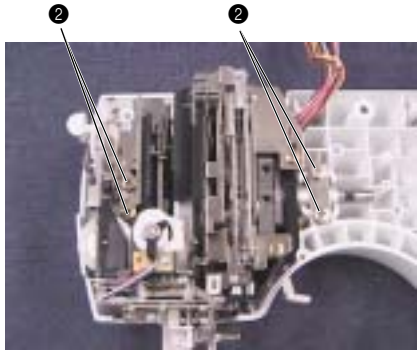
6 NP PCB assy. removal

1. Remove screws ❶ (two), and remove the NP PCB assy. ①.



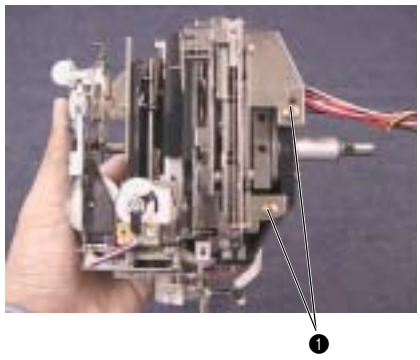
7 Needle-presser module removal

1. Remove screw ❶.
2. Remove screws ❷ (four), and remove the presser plate and the upper shaft bushing presser.
3. Remove the needle-presser module.



8 Thread hook assy. removal

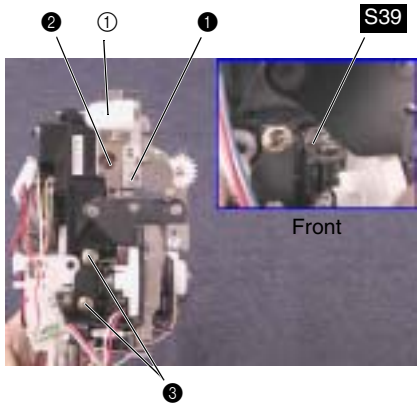
1. Remove screws ❶ (two), and remove the thread hook assy.



9 Thread unit removal

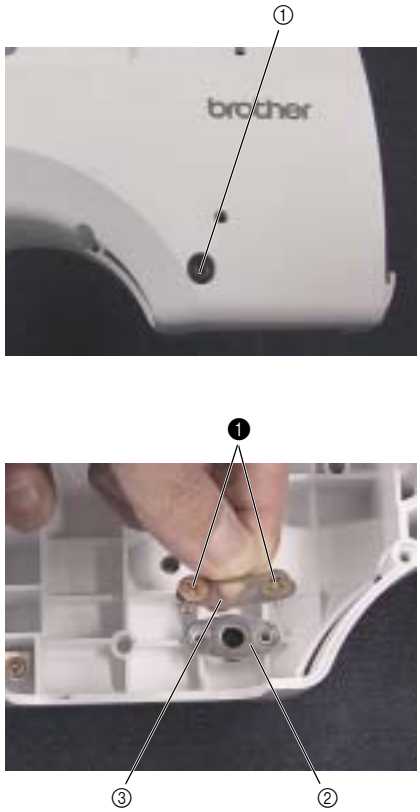
1. Remove the cassette release button ①.
2. Remove the Spring S39 .
3. Remove screw ❶, and remove the presser plate spring.
4. Remove screw ❷, and remove the cassette guide plate.
5. Remove screws ❸ (two), and remove the thread unit.

Start movie clip (CD-ROM version only)



10 Adjusting plate removal

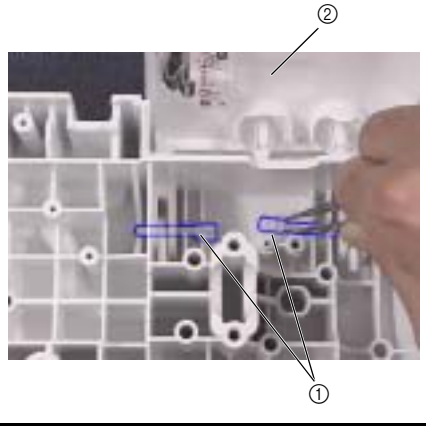
1. Remove arm cap.
2. Remove the adjusting screw ①.
3. Remove screws ❶ (two), and remove the adjusting plate ② and the plate spring ③.



11 Bobbin winder cover assy. removal

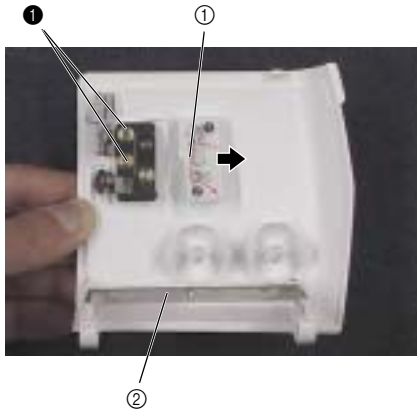
1. Remove the shafts ① (two) for the bobbin winder cover, and remove the bobbin winder cover assy. ②.

Start movie clip (CD-ROM version only



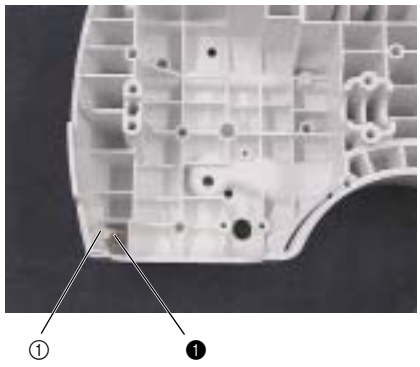
12 Bobbin winder cover assy. disassembly

1. Remove the thread tension cover ①.
2. Remove screws ❶ (two), and remove the thread tension plate.
3. Remove screw ❷, and remove the thread tension assy.
4. Remove the bobbin winder cover supporter ②.



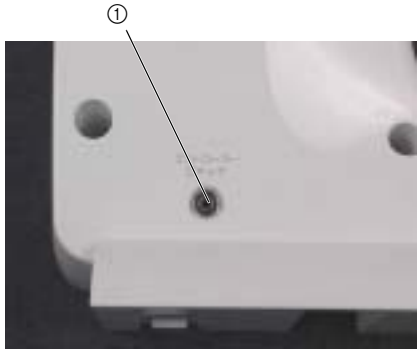
13 Lower thread cutter removal

1. Remove screw ❶, and remove the cutter cover ①.
2. Remove the NT lower thread cutter from the cutter cover ①.

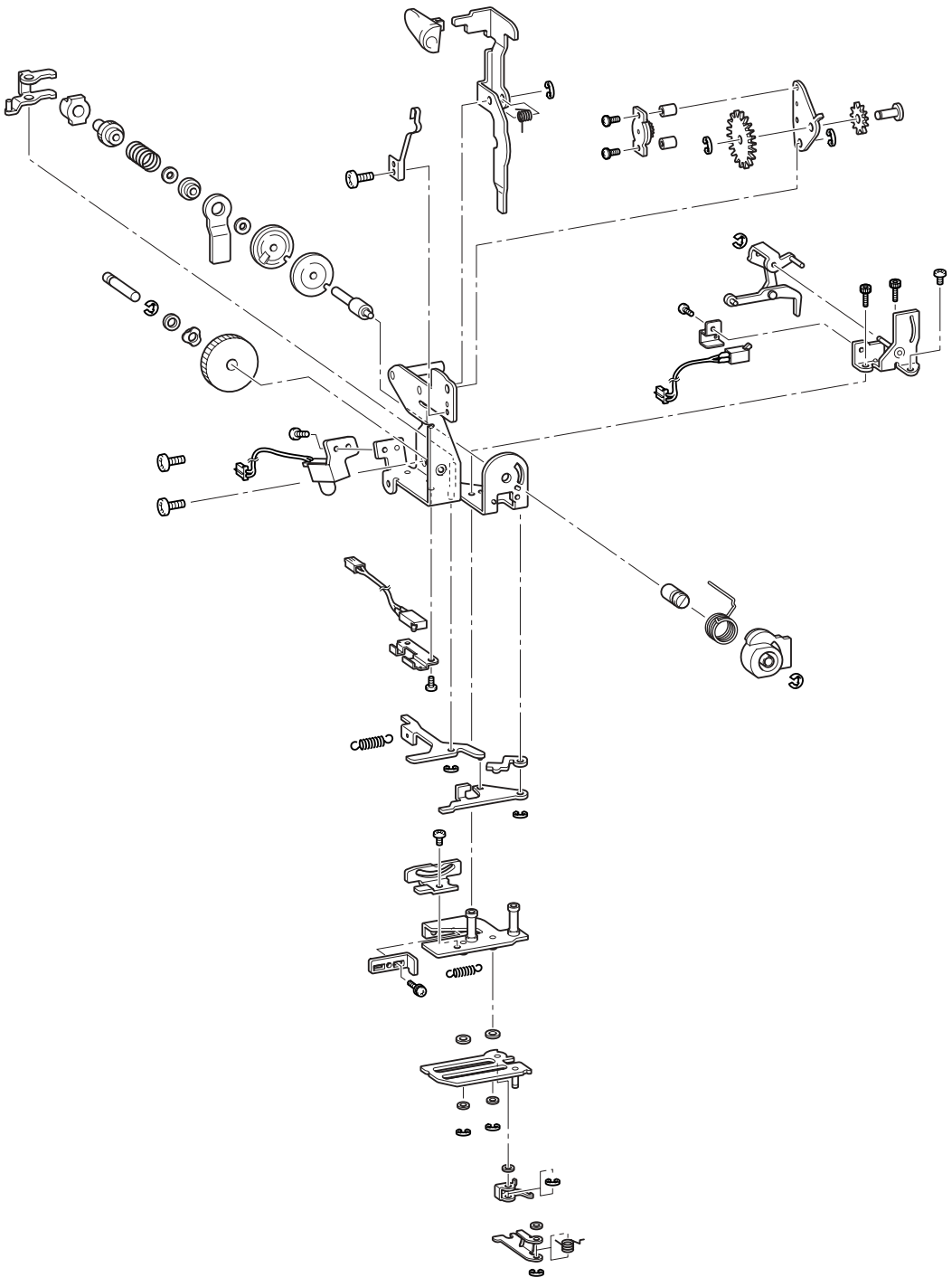


14 Foot controller jack assy. removal

1. Remove the nut ①, and remove the foot controller jack assy.

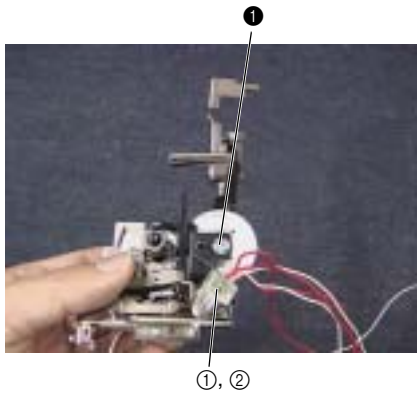


Thread tension mechanismlocation diagram



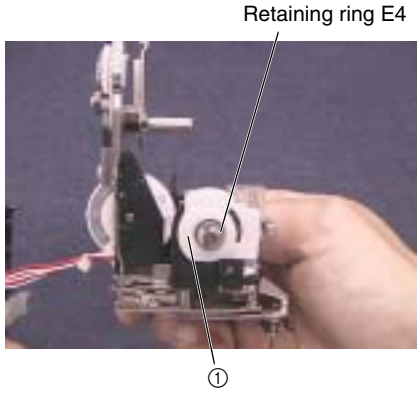
1 LED lamp removal.

1. Remove screw ❶, and remove LED lamp holder L ① and the LED lamp L assy. ②.



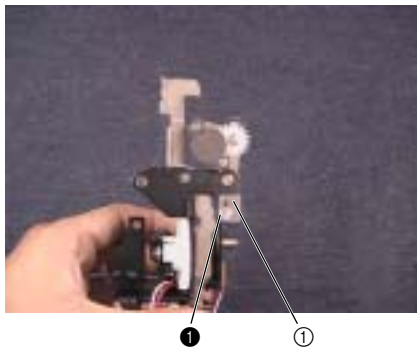
2 Thread take up spring removal

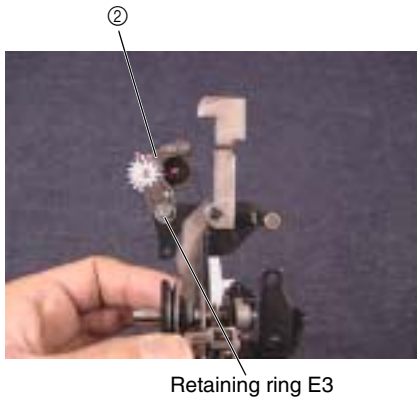
1. Remove retaining ring E4, and remove the thread take-up spring cover ① and thread take-up spring.



3 Damper holder assy. removal

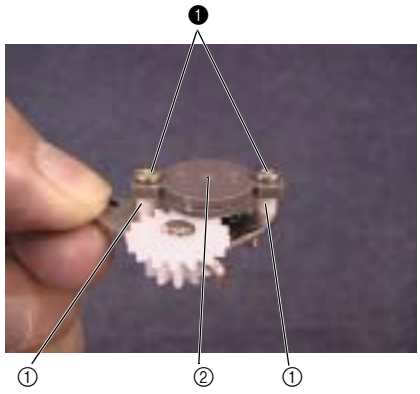
1. Remove screw ❶, and remove the damper holder spring ①.
2. Remove retaining ring E3, and remove the damper holder assy. ②.





4 Damper holder assy. disassembly

1. Remove the screws ❶ (two), and remove the spacers ① (two) and the oil damper ②.
2. Remove retaining ring E2, and remove the damper gear shaft, gear A and gear B.

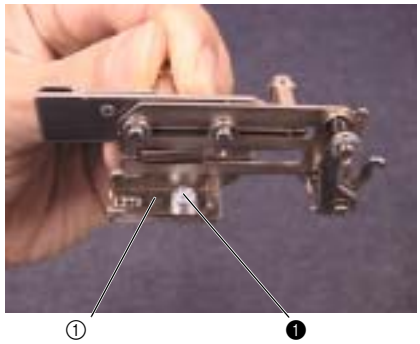


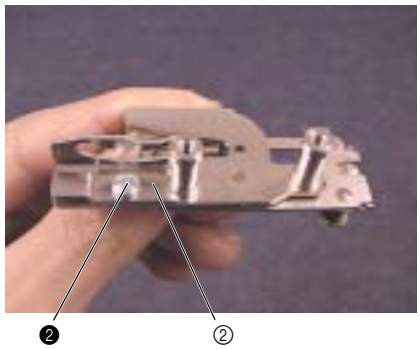
5 Thread hook assy. removal

1. Remove screws ❶ (bolt, socket M3X6) (two), and remove the thread hook assy.

6 Thread hook assy. disassembly 1

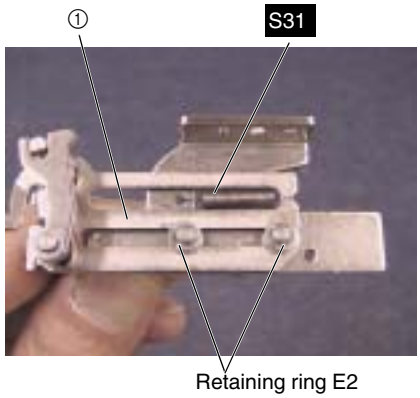
1. Remove screw ❶, and remove the link stopper ①.
2. Remove screw ❷, and remove the link D guide ②.

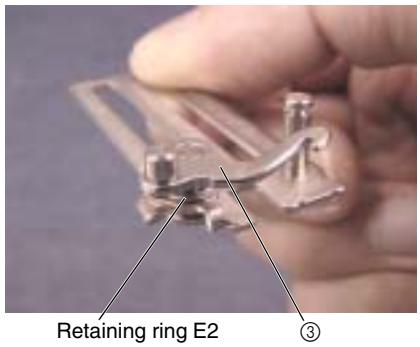




7 Thread hook assy. disassembly 2

1. Remove the Spring S31 .
2. Remove retaining rings E2 (two), and remove the plain 3.5 washers (two), slide plate assy. ① and the plain S3 washers (two).
3. Remove retaining ring E2, and remove thread hook link A ②, spring S30 and the plain S3 washer.
4. Remove retaining ring E2, and remove the thread hook link B assy. ③ and plain S3 washer.



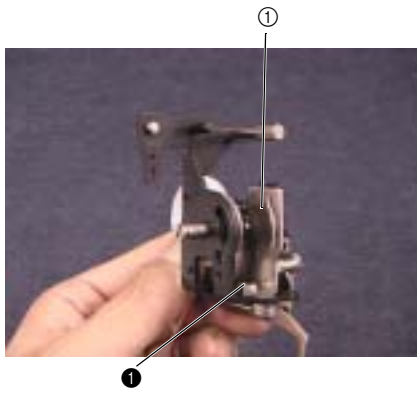


8 Cassette hold plate removal

1. Remove retaining ring E3, and remove spring S35 and the cassette hold plate ①.

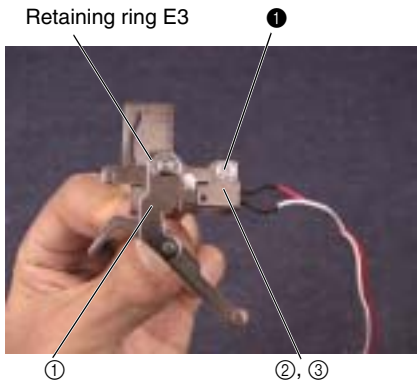
9 Spring guide assy. removal

1. Remove screw ❶, and remove the spring guide assy. ①.



10 Spring guide assy. disassembly

1. Remove retaining ring E3, and remove the thread hook link c assy. ①.
2. Remove screw ❶, and remove the cassette switch holder ② and cassette switch assy. ③.

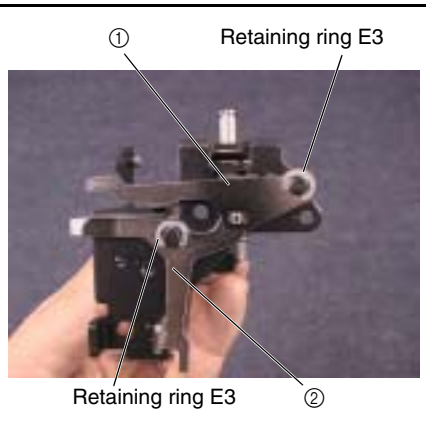


11 Presser switch removal

1. Remove the Spring S29 .
2. Remove screw ❶, and remove the presser switch holder ① and PFSW-S assy. ②.

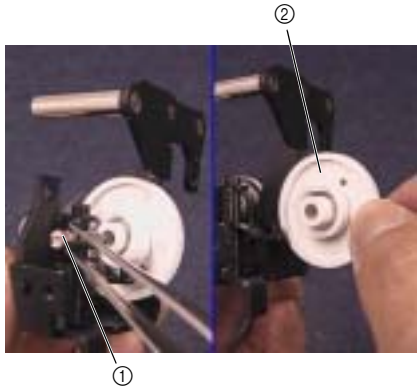
12 Thread release plate removal

1. Remove retaining ring E3, and remove thread release plate C ① and thread release plate B.
2. Remove retaining ring E3, and remove thread release plate D ②.



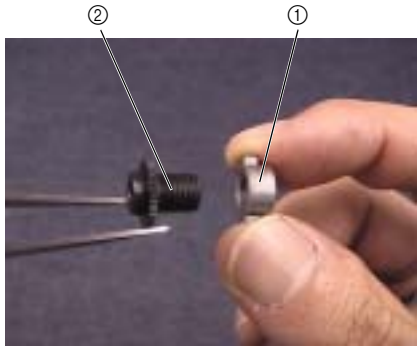
13 Thread tension dial removal

1. Remove retaining ring E3, and remove the plain S4 washer, polyester slider and spring washer.
2. Remove the thread tension dial shaft ①, and remove the thread tension dial ②.
3. Detach the link arm assy. ③.

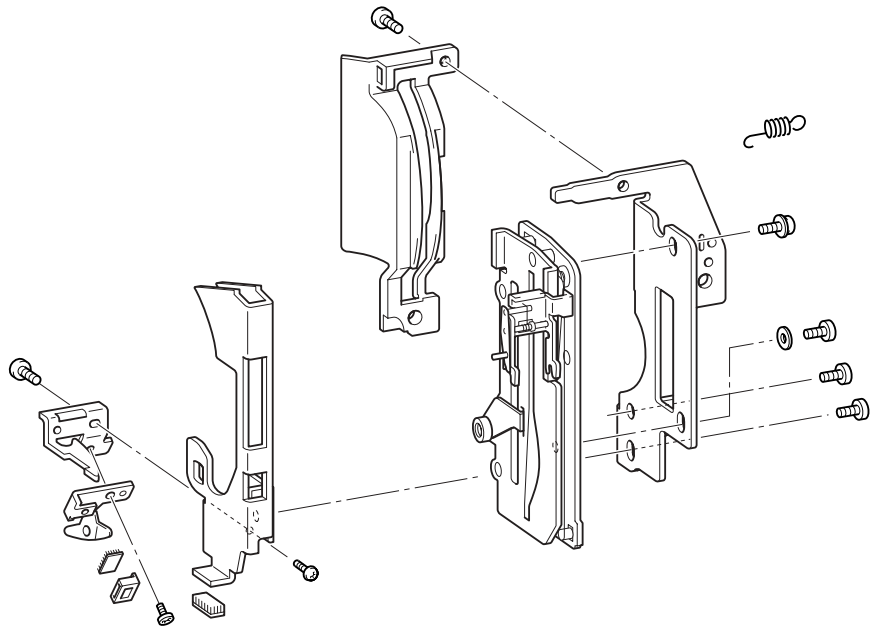


14 Tension disk removal

1. Remove the tension control nut assy. ①, spring S28 , washer, tension disc washer, thread release plate A, washer, tension disk B and tension disk A.
2. Remove the tension adjusting screw ② from the tension control nut assy. ①.
3. Remove the thread tension shaft ③ and the spring cover shaft ④.



Thread hook mechanism location diagram

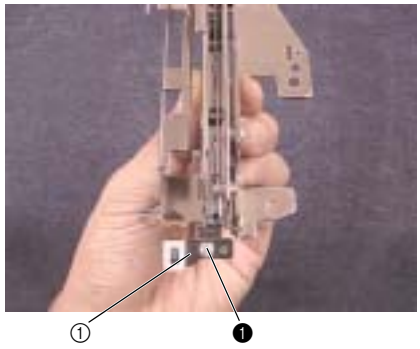


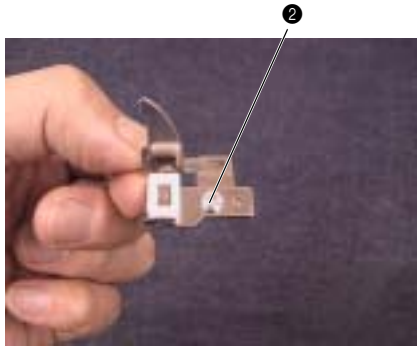
1 Thread take-up lever guide B removal

1. Remove screw ❶, and remove thread take-up lever guide B ①.

2 Thread take-up lever guide C removal

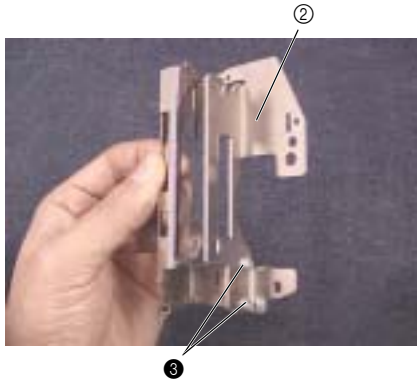
1. Remove screw ❶, and remove thread take-up lever guide C ①.
2. Remove the screw ❷, and remove the pile holder.
3. Remove the pile cap from the pile holder.



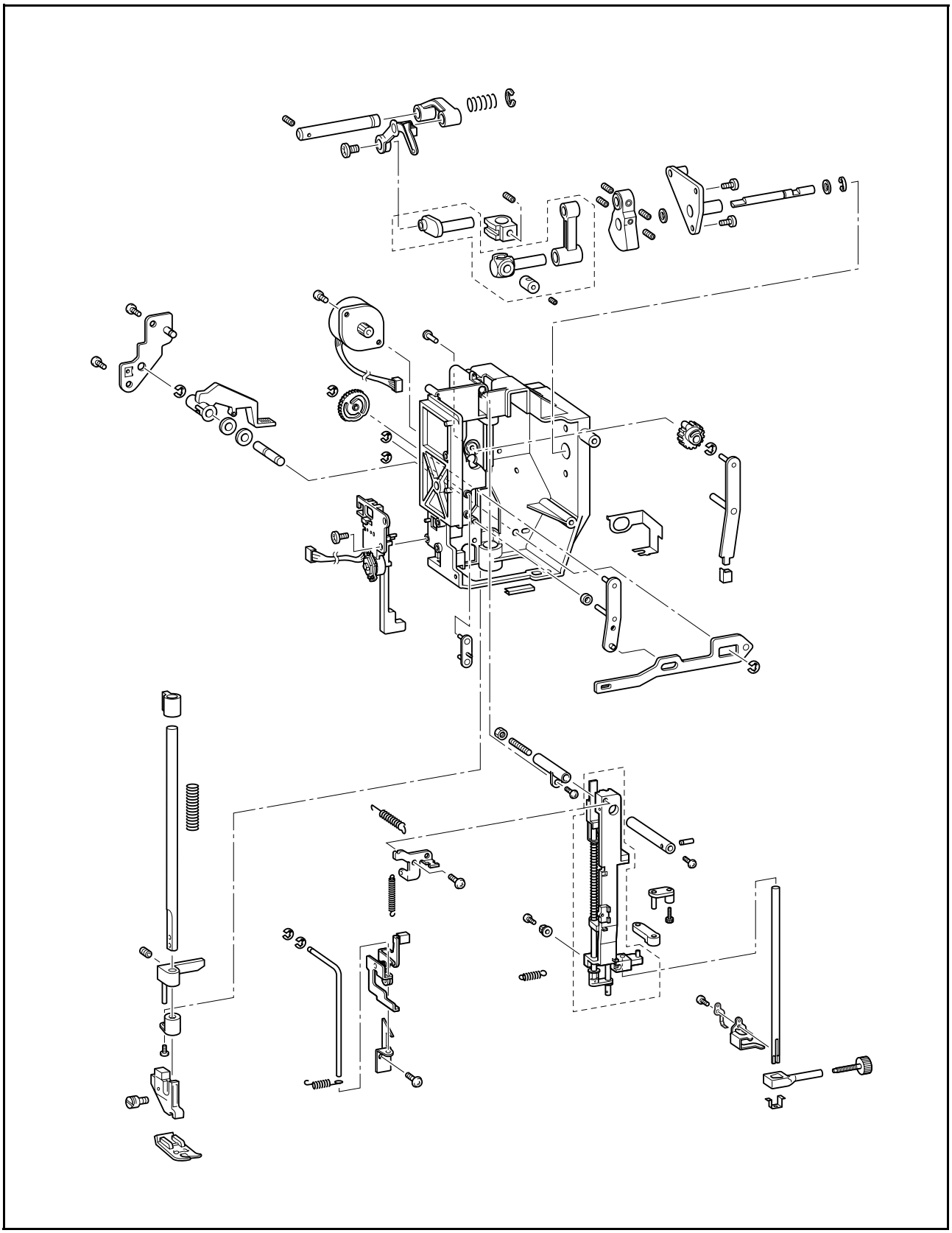


3 Thread guide base assy. removal

1. Remove screw ❶ and screw ❷, remove the plain M3 washer, and remove the thread guide base assy. ①.
2. Remove screws ❸ (two), and remove thread take-up lever guide A from the thread guide base supporter ②.

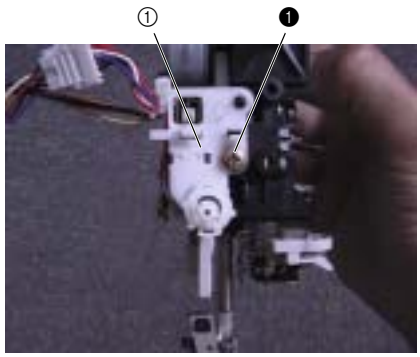


Needle-presser module breakout diagram



1 BH switch assy. removal

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

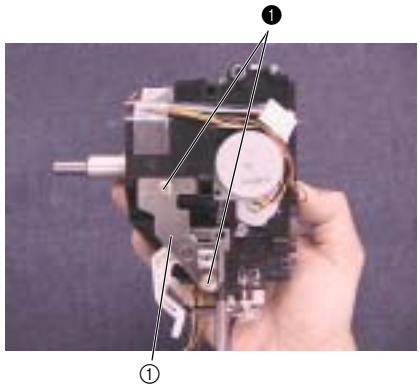


2 Presser feed holder assy. removal

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

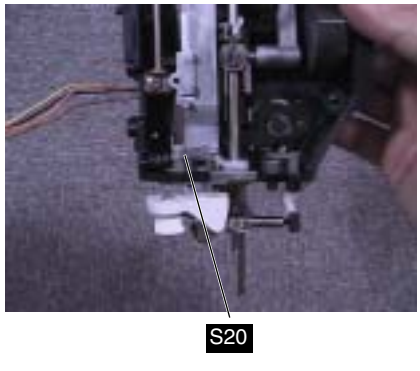
3 Adjusting plate assy. removal

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



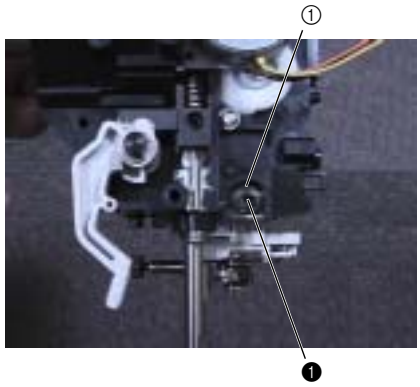
4 Spring-Z removal

1. Remove the spring S20 .



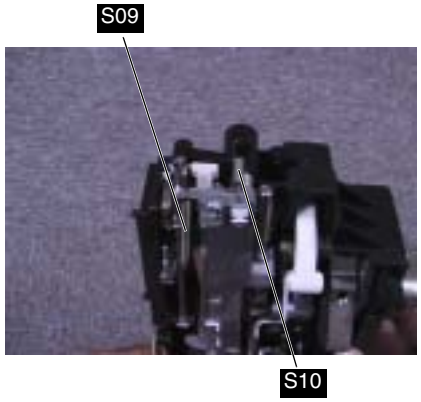
5 Zigzag adjusting nut removal

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



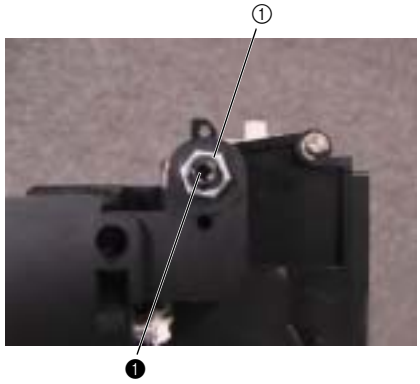
6 Lever A spring and spring removal

1. Remove the spring S09 and the spring S10 .



7 Lock nut removal

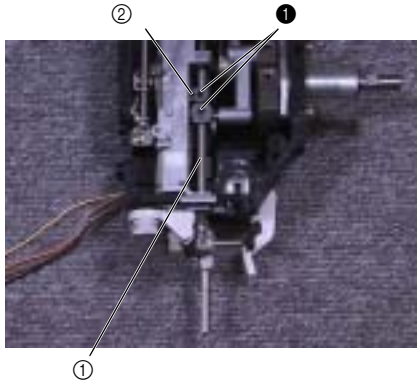
1. Remove the lock nut ① and screw ❶.



8 Needle bar assy. removal

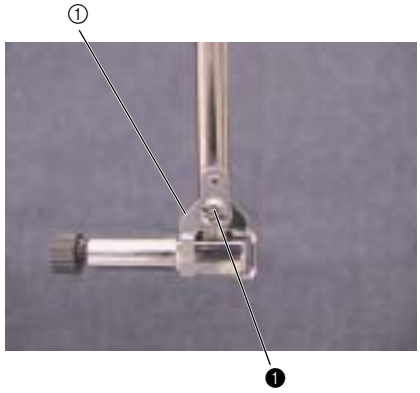
1. Remove screws ❶ (two).
2. Remove needle bar ① and needle thread block ②.

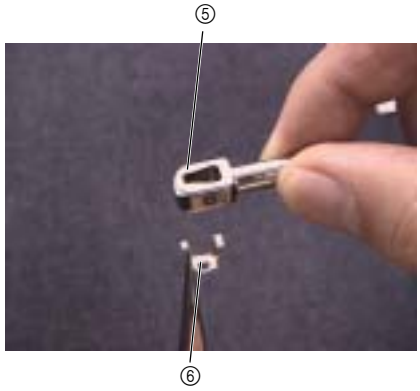
Start movie clip (CD-ROM version only)



9 Needle bar assy. disassembly

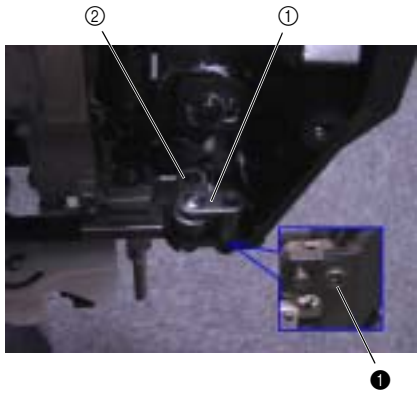
1. Remove screw ❶, and remove the needle block supporter ①.
2. Remove screw ❷, and remove the needle block ②, needle bar thread guide ③ and support spring ④.
3. Remove the needle thread plate ⑥ from the needle block ⑤.





10 Needle holder shaft block removal

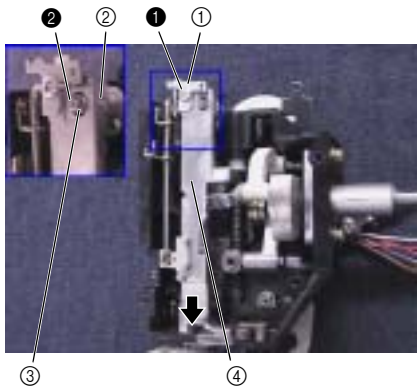
1. Remove screw ❶, and remove the needle holder shaft block ① and needle holder block ②.



11 Needle bar supporter assy. removal

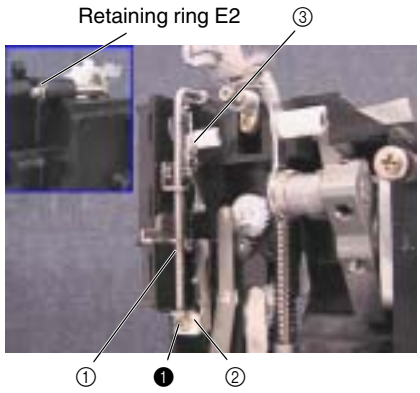
1. Remove screw ❶, and remove the plate ①.
2. Remove screw ❷, and remove the shaft ②.
3. Remove the shaft ③.
4. Remove the needle bar supporter assy. ④.
5. Remove the thread hook assy. ⑤ from the needle bar supporter assy.

Start movie clip (CD-ROM version only)



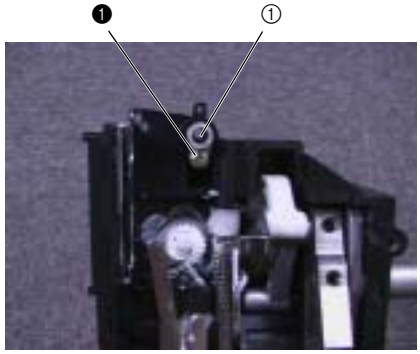
12 Lever AB assy. removal

1. Remove retaining ring E2.
2. Remove screw ❶, and remove the lever guide shaft ①, lever supporter plate ② and lever AB assy. ③, spring S39 .
3. Remove retaining ring E2 from the lever guide shaft ①.



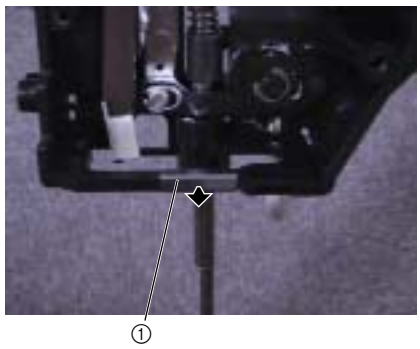
13 Shaft bushing A removal

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



14 Thread guide plate removal

1. Remove thread guide pate ①.



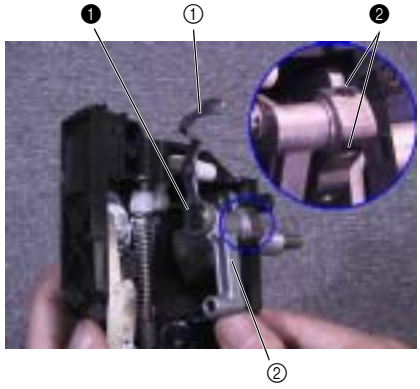
15 Thread take-up assy. disassembly

1. Remove screw ❶, and remove the thread take-up assy. ①.

NOTE •Screw ❶ is reverse threaded.

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

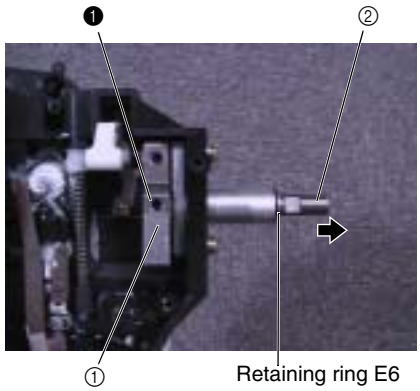
Start movie clip (CD-ROM version only)



16 Thread take-up counter weight removal

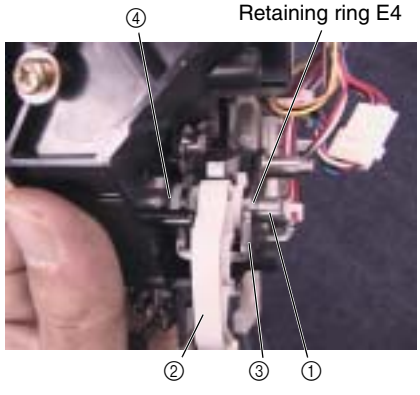
1. Remove ❶ (two), and remove the thread take-up counter weight ①, thrust washer, unit shaft ② and thrust washer.
2. Remove retaining ring E6 from the unit shaft ②.

Start movie clip (CD-ROM version only)



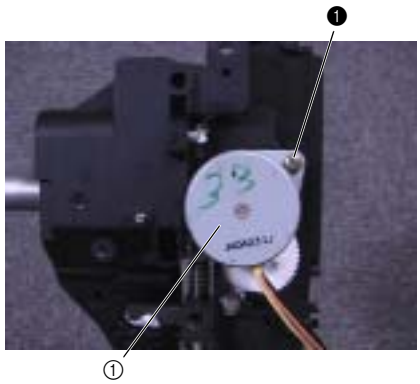
17 Presser foot lifter removal

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.



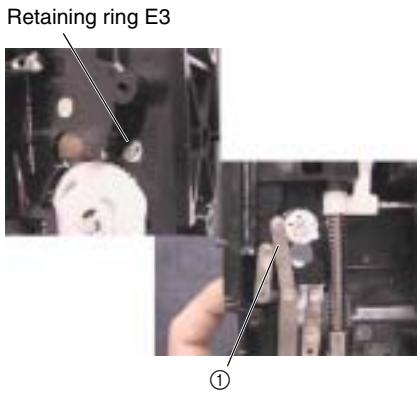
18 Z pulse motor removal

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



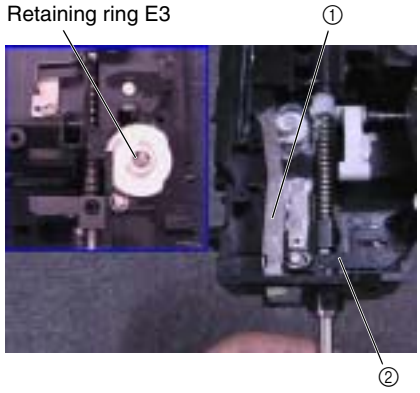
19 Lever release plate assy. removal

1. Remove retaining ring E3, and remove the lever release plate assy. ①.



20 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.



21 Thread release lever assy. removal

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

22 Z zigzag cam and shaft removal

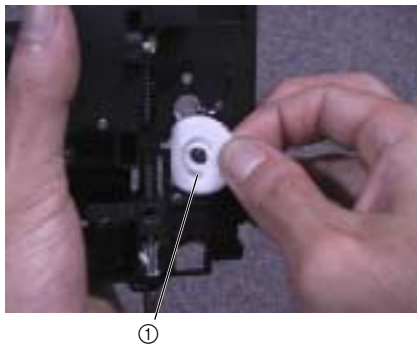
1. Remove retaining ring E2, and remove the Z zigzag cam ①.
2. Remove the shaft ②.

Start movie clip (CD-ROM version only)

23 T cam removal

1. Remove the T cam ①.

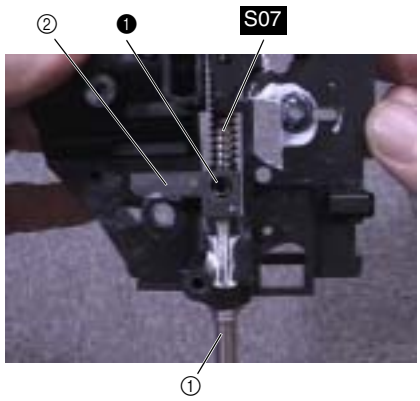
Start movie clip (CD-ROM version only)

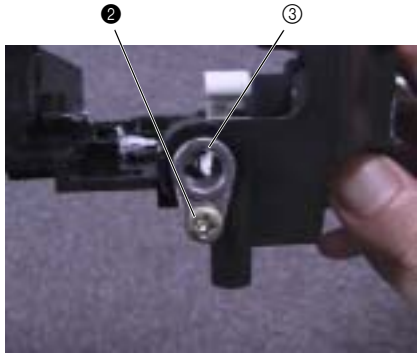


24 Presser bar removal

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

Start movie clip (CD-ROM version only)

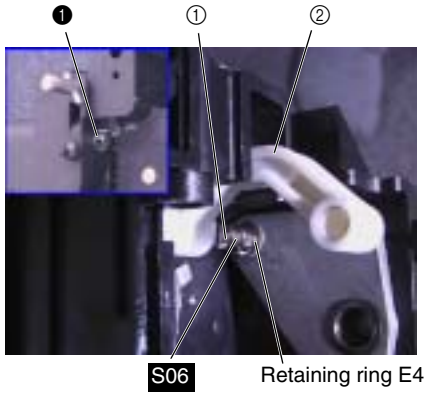




25 Thread take-up lever link removal

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

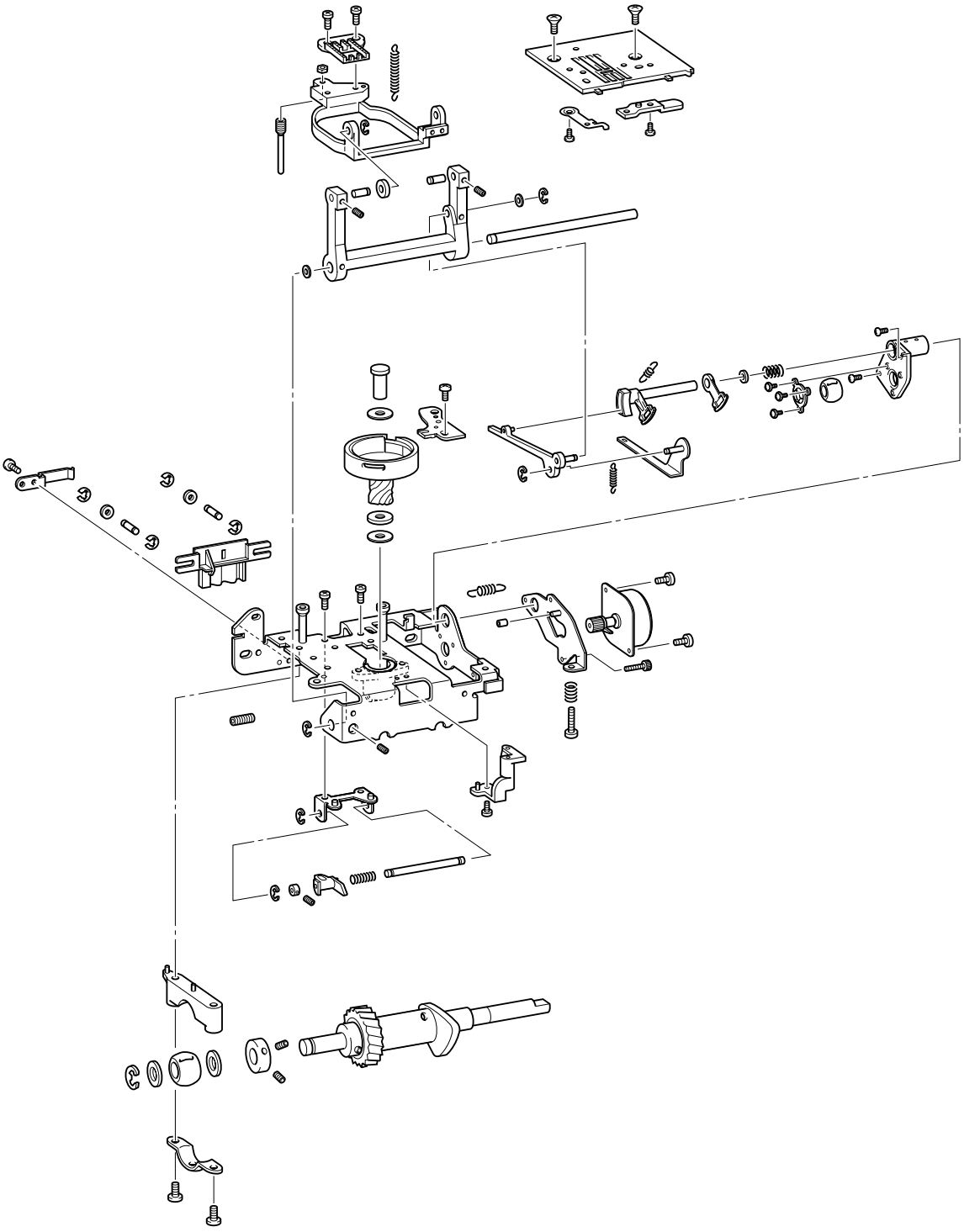
Start movie clip (CD-ROM version only)



26 Shaft bushing assembly removal

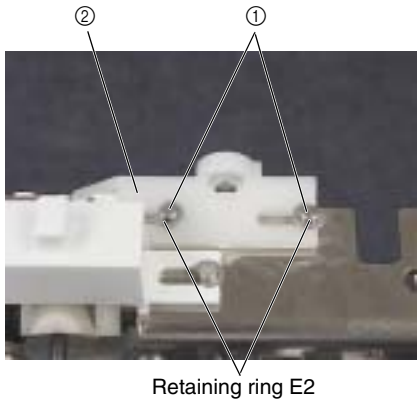
1. Remove screws ❶ (two), and remove the shaft bushing assembly ①.

Feed module breakout diagram



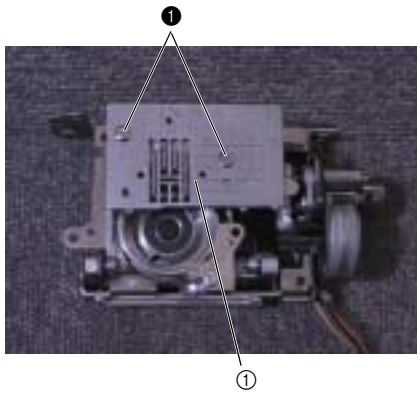
1 Drop lever SE removal

1. Remove retaining rings E2 (two), and remove slide shafts A ① (two) and drop lever SE ②.
2. Remove the retaining rings E2 (two) from slide shafts A (two).



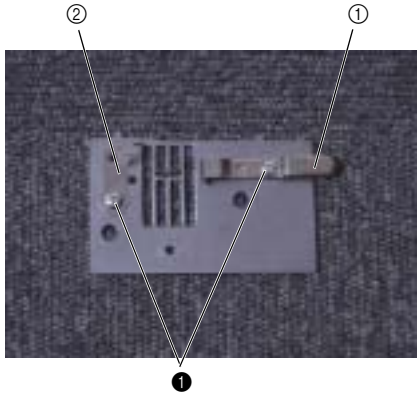
2 Needle plate A removal

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



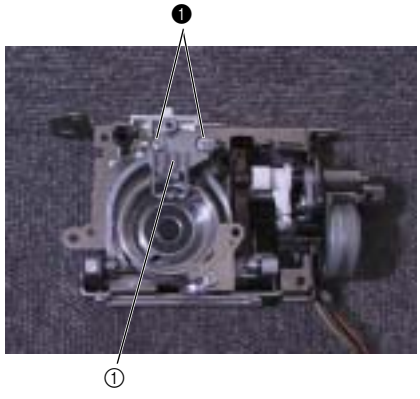
3 Needle plate A disassembly

1. Remove screws ❶ (two), and remove stopper plate ① and stopper plate ②.



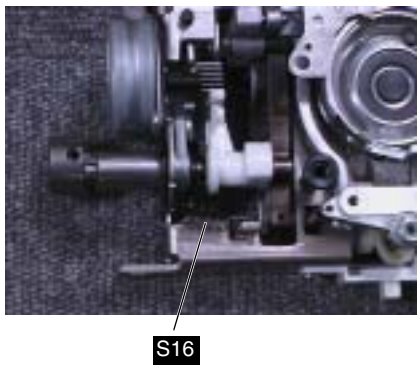
4 Feed dog removal

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



5 FPM spring removal

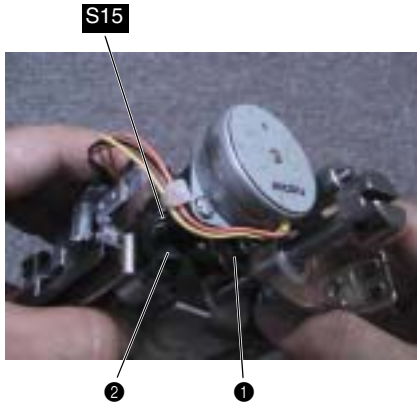
1. Remove the spring S16 .



6 F pulse motor assy. removal

1. Remove screw ❶ and screw ❷, and remove spring S15 and the F pulse motor assy.

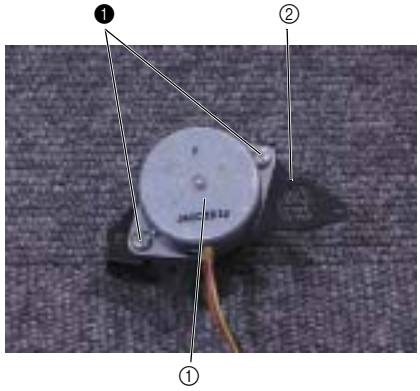
Start movie clip (CD-ROM version only)



7 F pulse motor disassembly

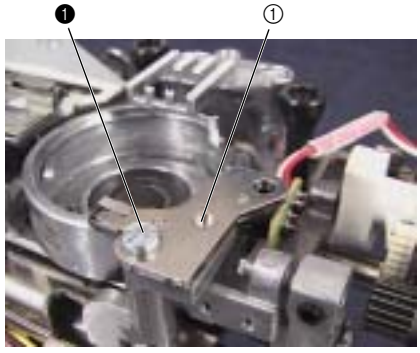
1. Remove screws ❶ (two), and remove the F pulse motor (FPMSMJ35-4840-C) ①.
2. Remove the rubber from the FPM holder assy. ②.

Start movie clip (CD-ROM version only)



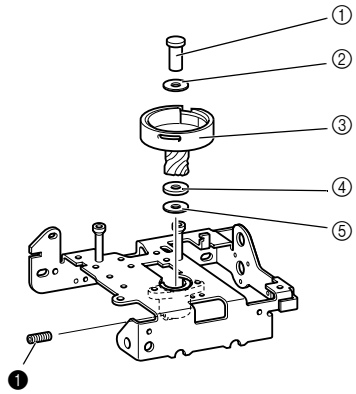
8 Inner rotary hook bracket assy. removal

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



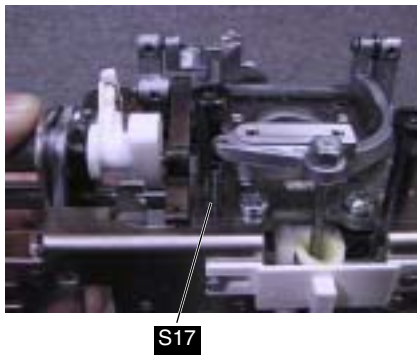
9 Outer rotary hook assy. removal.

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



10 Feed bar spring removal

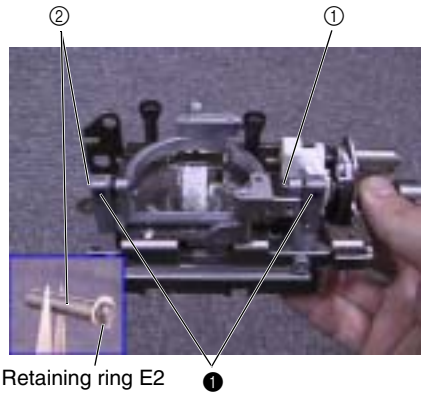
1. Remove the spring S17 .



11 Feed bar removal

1. Remove ❶ (two), and remove feed bar shaft A ①, the 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.

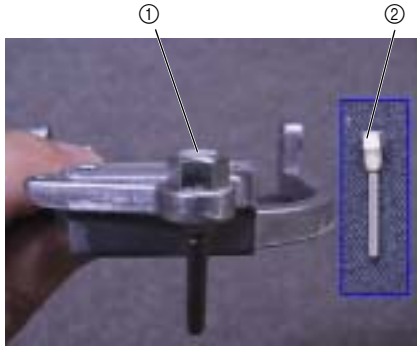
Start movie clip (CD-ROM version only)



12 Vertical adjusting screw removal

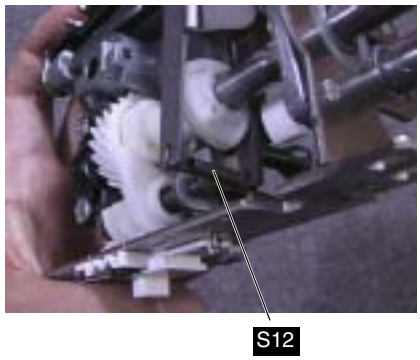
1. Remove the vertical adjusting screw ①.
2. Remove the M5 nut ② from the vertical adjusting screw ①.

Start movie clip (CD-ROM version only)



13 Feed supporting plate spring removal

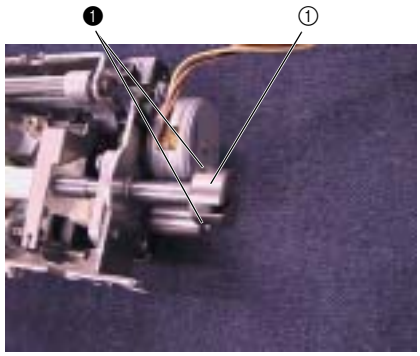
1. Remove the spring S12 .

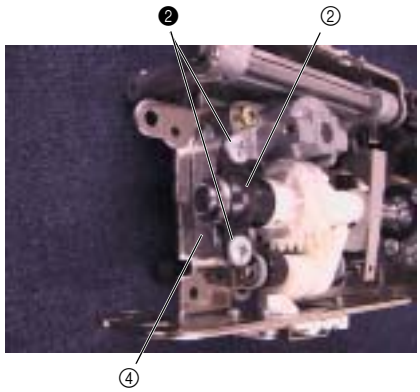


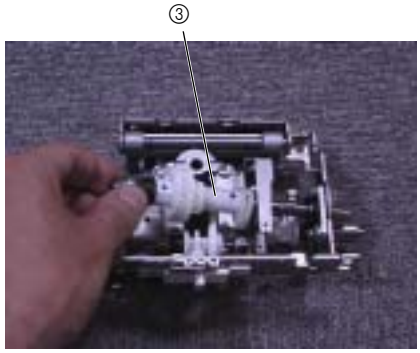
14 Lower shaft B assy. removal

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

Start movie clip (CD-ROM version only)

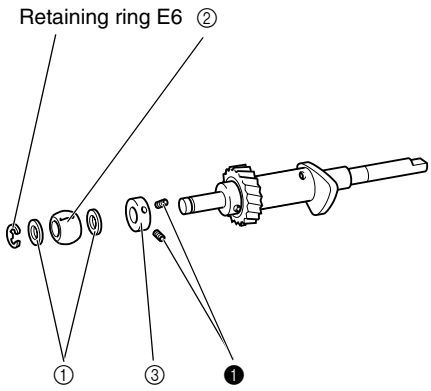






15 Lower shaft B assy. disassembly

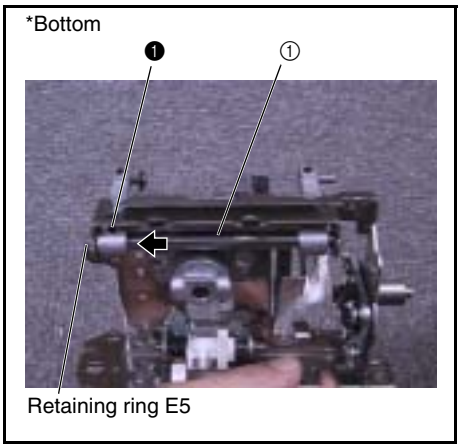
1. Remove retaining ring E6, the thrust washer ①, lower shaft bushing ② and thrust washer ①.
2. Remove screws ❶ (two), and remove the set screw collar ③.



16 Feed arm assy. removal

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

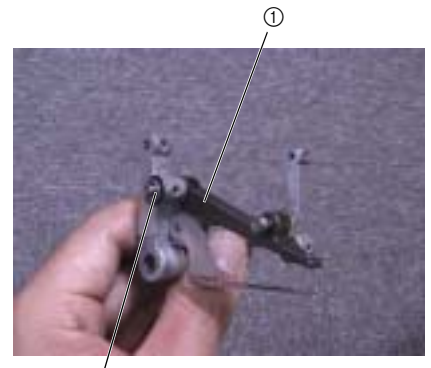
Start movie clip (CD-ROM version only)

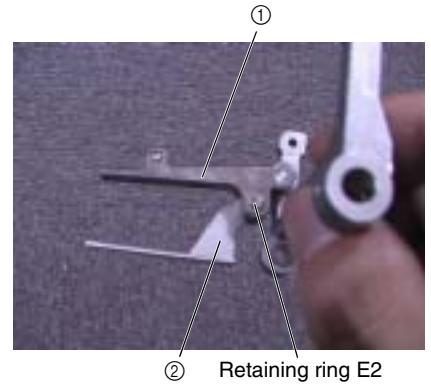


17 Feed arm assy. disassembly

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

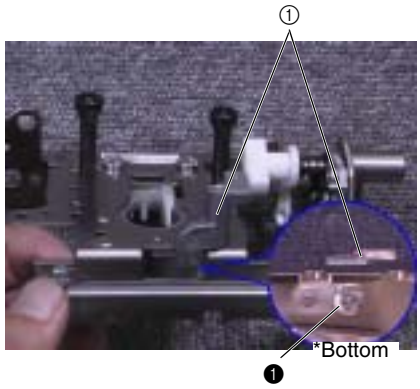
Start movie clip (CD-ROM version only)





18 Stopper plate block assy. removal

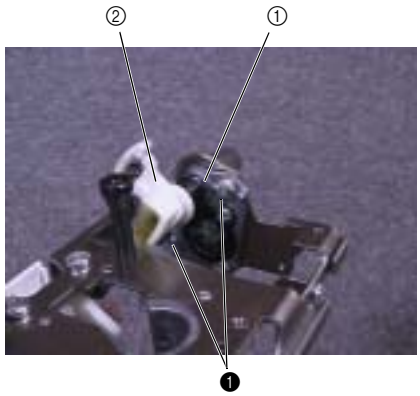
1. Remove screw ❶, and remove the stopper plate block assy ①.



19 Feed adjuster assy. removal

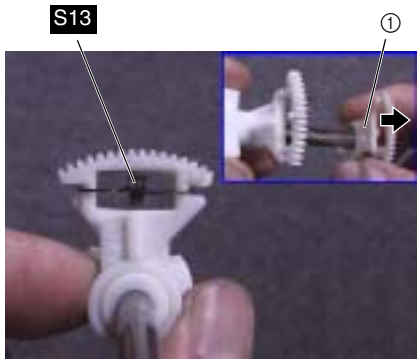
1. Remove screws ❶ (two), and remove bushing supporter B ①, the feed adjuster assy ②, spring S14 and the polyester slider.

Start movie clip (CD-ROM version only)



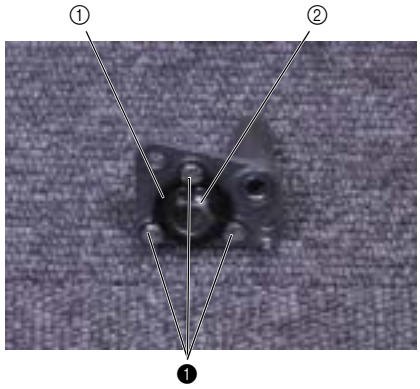
20 Feed adjuster assy. disassembly

1. Remove spring S13 and detach the F gear ①.



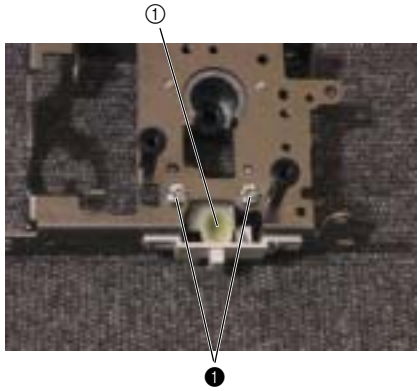
21 Bushing presser B removal

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



22 Drop assy. removal

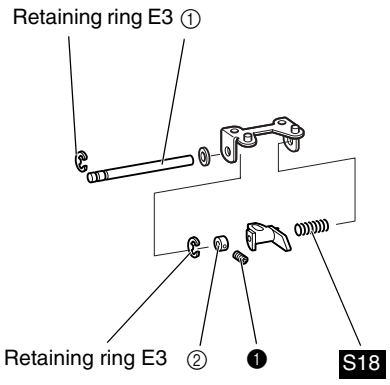
1. Remove screws ❶ (two), and remove the drop assy ①.



23 Drop assy. disassembly

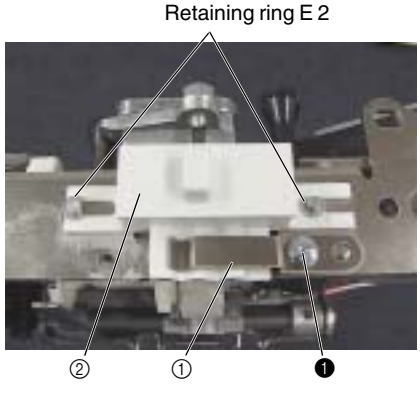
1. Remove screw ❶.
2. Remove retaining ring E3, and remove the vertical feed shaft ①, polyester slider, set screw collar ② and spring S18 .
3. Remove retaining ring E3 from the vertical feed shaft ①.

Start movie clip (CD-ROM version only)



24 Drop knob removal

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



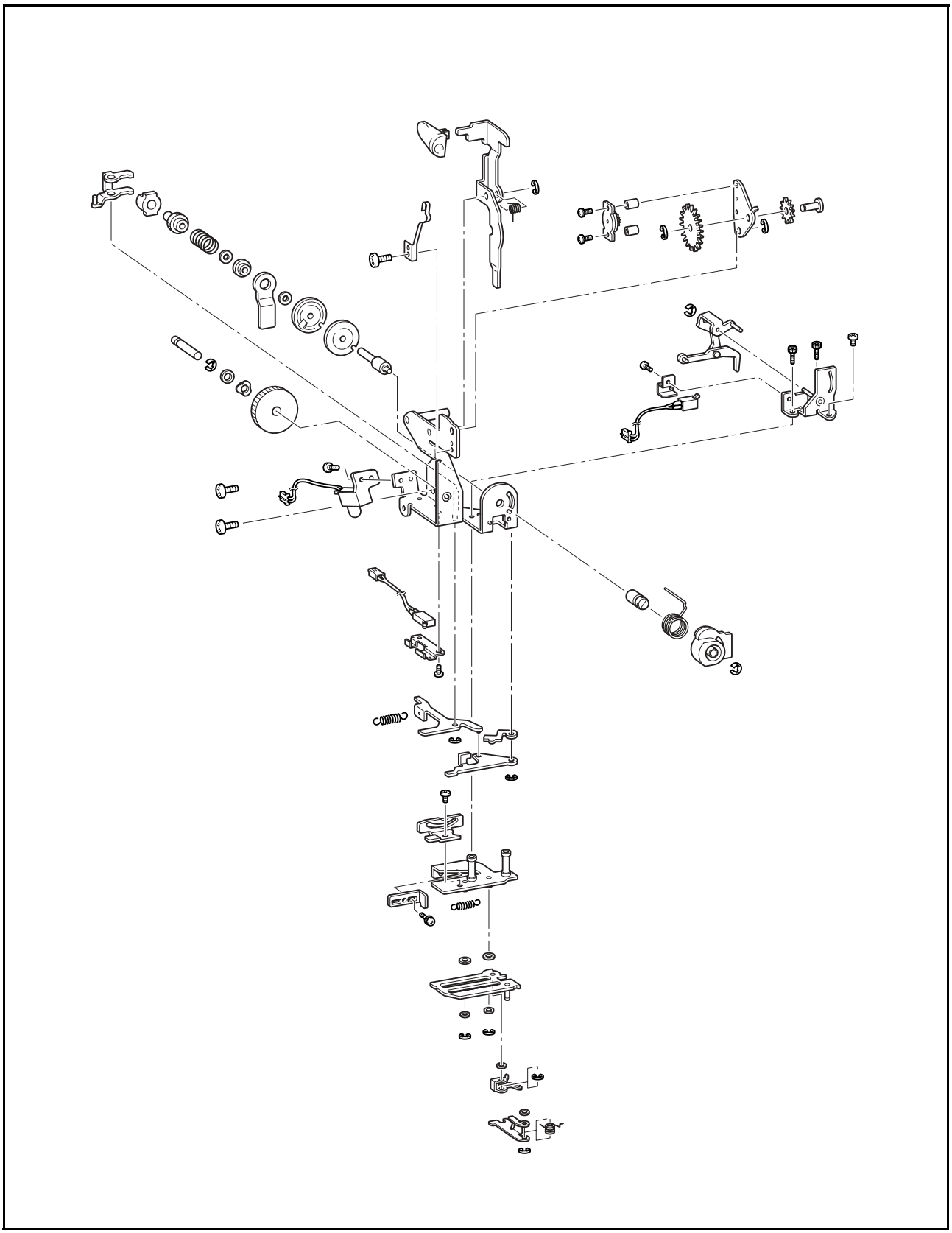
3 Assembly

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

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

S2 : CS8000 Series
S3 : CS8100 Series

Thread tension mechanism location diagram



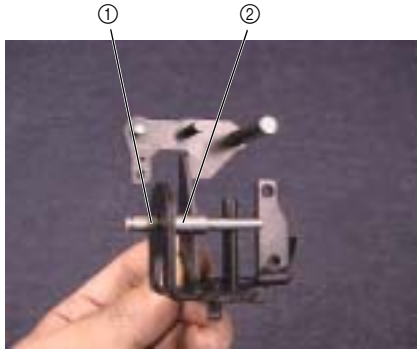
1 Tension disk attachment

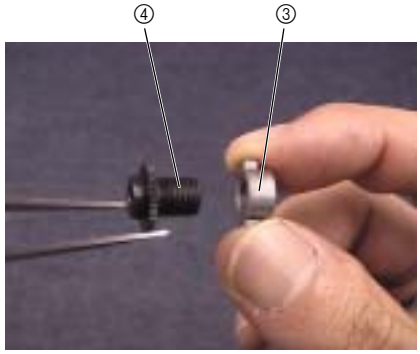
1. Attach the spring cover shaft ①, thread tension shaft ② and thread tension holder assy.
2. Attach the thread tension adjusting screw ④ to the tension control nut ③.

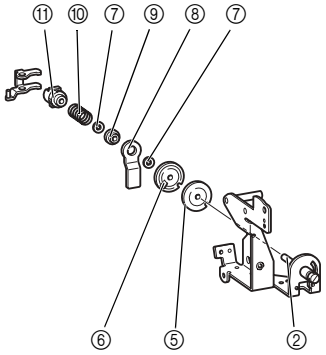
   ***Key point**
   - After assembling and attaching the thread tension mechanism, perform 4 - 13 "Upper thread tension adjustment."
3. Attach tension disc A ⑤, tension disk B ⑥, washer ⑥, thread release plate A ⑧, the tension disc washer ⑨, washer ⑦, thread tension spring ⑩ and tension control nut assy. ⑪ to the thread tension shaft ②.

Spring cover shaft	Torque 0.57 - 0.78 N-m

Start movie clip (CD-ROM version only)







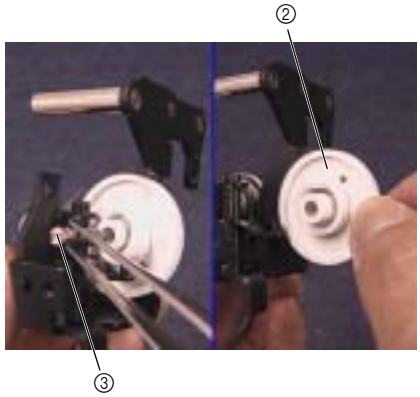
2 Thread tension dial attachment

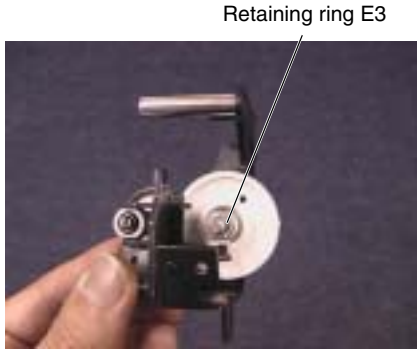
1. Attach the link arm assy. ① to the thread tension holder assy.
2. Attach the thread tension dial ② and thread tension dial shaft ③ to the thread tension holder assy.

   ***Key point**
   - Hand start the thread tension dial shaft, and fully tighten after attaching retaining ring E3.
3. Attach the spring washer, polyester slider, plain S4 washer to the thread tension dial ③, and attach retaining ring E3.
4. Fully tighten the thread tension dial shaft ③.

Thread tension dial shaft	Torque 0.78 - 1.18 N-m

Start movie clip (CD-ROM version only)





3 Tension release plate attachment

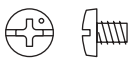
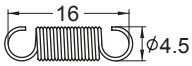
1. Attach thread release plate D ① to the thread tension holder assy., and attach retaining ring E3.
2. Attach thread release plate B ② and thread release plate C ③ to the thread tension holder assy., and attach retaining ring E3.

Start movie clip (CD-ROM version only)

4 Presser switch attachment

1. Attach the presser switch ① and presser feed holder ② to the thread tension holder assy. using screw ❶.
2. Attach spring S29 to the thread tension holder assy. and thread release plate D ③.

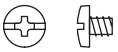
Start movie clip (CD-ROM version only)

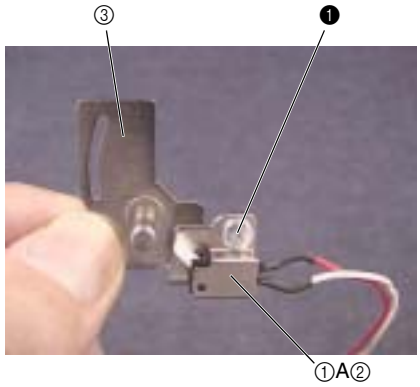
❶		Screw, Bind M3X4 Color; Silver	Torque 0.57 - 0.78 N-m
S29			SPRING XC3267***

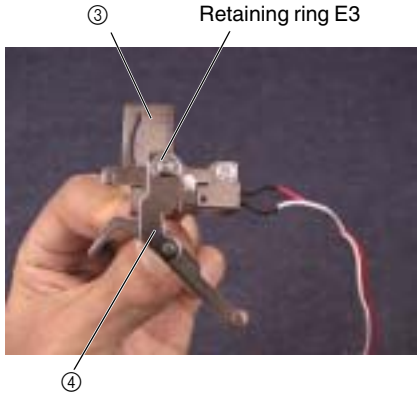
5 Spring guide assy. assembly

1. Attach the cassette switch holder ① and cassette switch assy. ② to the spring guide assy. ③ using screw ❶.
2. Attach the thread hook link C assy. ④ to the spring guide assy. ③, and attach retaining ring E3.

Start movie clip (CD-ROM version only)

❶		Screw, Bind M2.6X3 Color; Silver	Torque 0.57 - 0.78 N-m

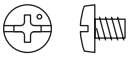


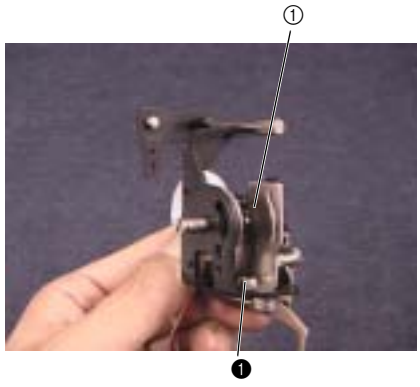


6 Spring guide assy. attachment

1. Attach the spring guide assy. ① to the thread tension holder assy. using screw ❶.

Start movie clip (CD-ROM version only)

❶		Screw, Bind M3X4 Color; Silver	Torque 0.57 - 0.78 N-m



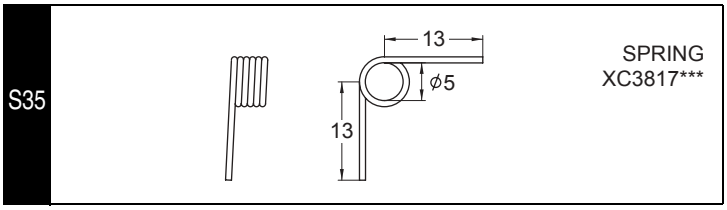
7 Cassette hold plate attachment

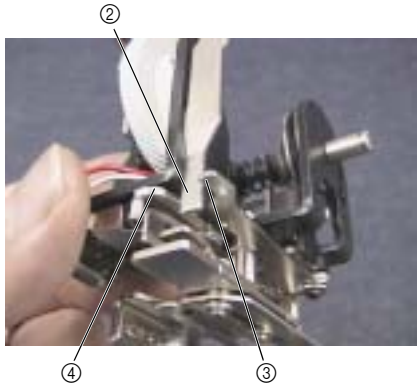
1. Attach spring S35 and the cassette hold plate ① to the thread tension holder assy., and attach retaining ring E3.

***Key point**

- The end ② of the cassette hold plate runs between tension release plate C ③ and tension release plate D 4.

Start movie clip (CD-ROM version only)

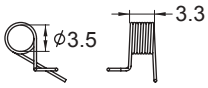
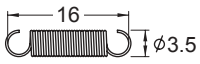


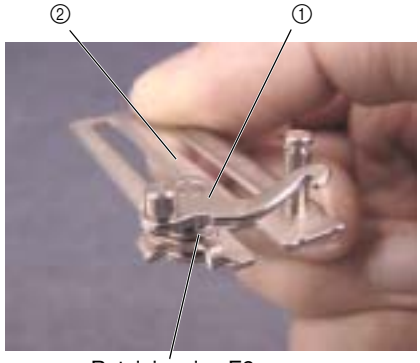


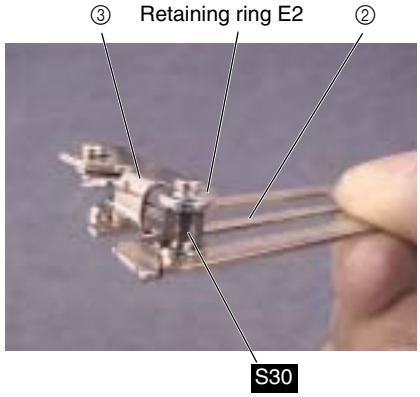
8 Thread hook assy. assembly 1

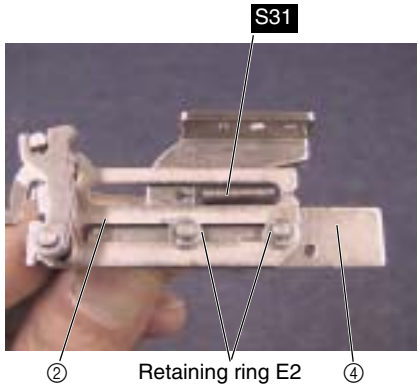
1. Attach the thread hook link B assy. ① and plain S3 washer to the slide plate assy. ②, and attach retaining ring E2.
2. Attach thread hook link A ③, a plain S3 washer and spring S30 to the slide plate assy. ②, and attach retaining ring E2.
3. Attach plain 3.5 washers (two), the slide plate assy. ② and plain S3 washers (two) to the supporting plate assy. ④, and attach retaining rings E2 (two).
4. Attach spring S31 to the slide plate assy. and supporting plate assy.

Start movie clip (CD-ROM version only)

S30		SPRING XC3642***
S31		SPRING XC3646***







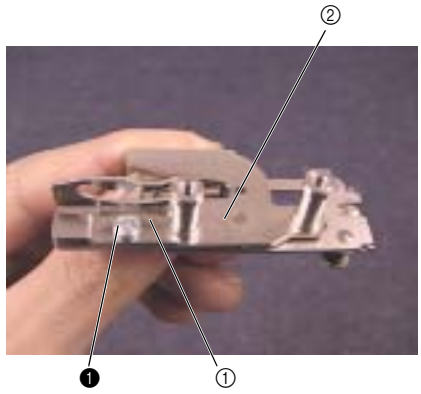
9 Thread hook assy. assembly 2

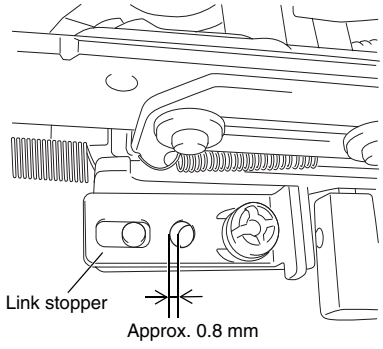
1. Attach the link D guide ① to the supporting plate assy. ② using screw ❶.
2. Attach the link stopper ③ to the supporting plate assy. ② using screw ❷.

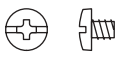
***Key point**

- Offset the positioning hole in the link stopper approximately 0.8 mm to the right from the positioning hole in the link A assy.

Start movie clip (CD-ROM version only)





❶		Screw, Bind M2.6X3 Color; Silver	Torque 0.57 - 0.78 N-m
❷		Screw, Pan (S/P washer) M3X5DA Color; Gold	Torque 0.57 - 0.78 N-m

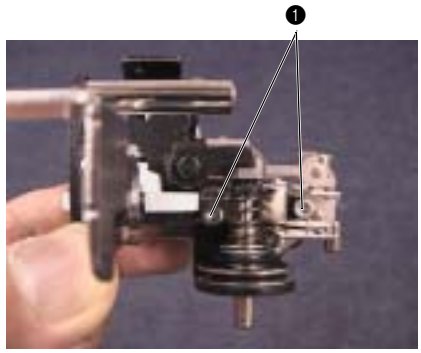
10 Thread hook assy. attachment

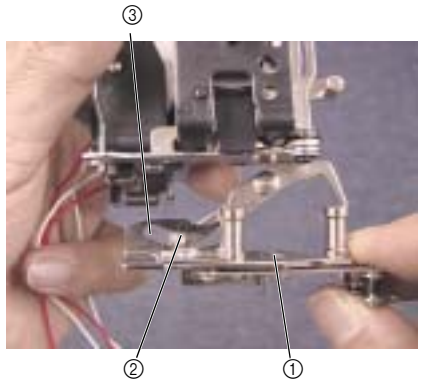
1. Attach the thread hook assy. ① to the thread tension holder assy. using screws ❶ (bolt, socket M3X6).

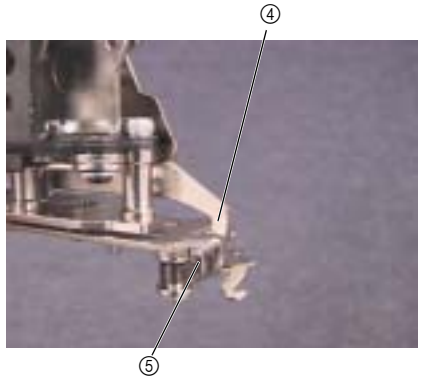
***Key point**

- Align the shaft ② of the thread hook link C assy. with the groove ③ in the link D guide.
- The end ④ of the thread hook link C assy. is on the outside of thread hook link A ⑤.

Start movie clip (CD-ROM version only)





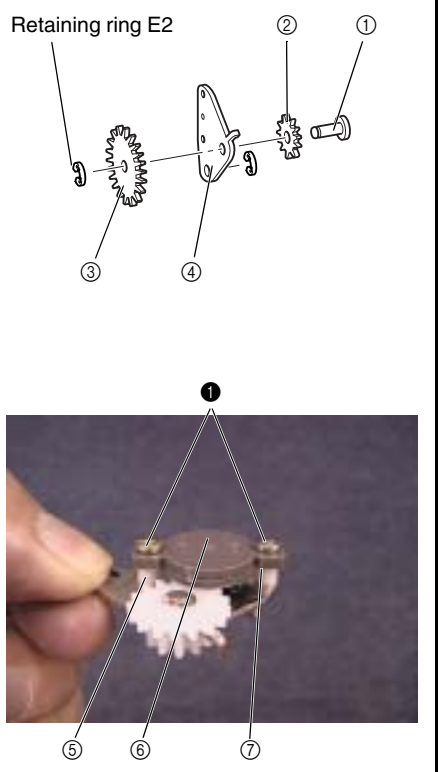


❶		Bolt, Socket M3X6 Color; Black	Torque 0.78 - 1.18 N-m

11 Damper holder assy. assembly

1. Attach the damper gear shaft ①, gear A ② and gear B ③ to the damper holder assy. ④, and attach retaining ring E2.
2. Attach spacers ⑤ (two) and the oil damper ⑥ to the damper holder assy. ④ using screws ❶ (two).

Start movie clip (CD-ROM version only)

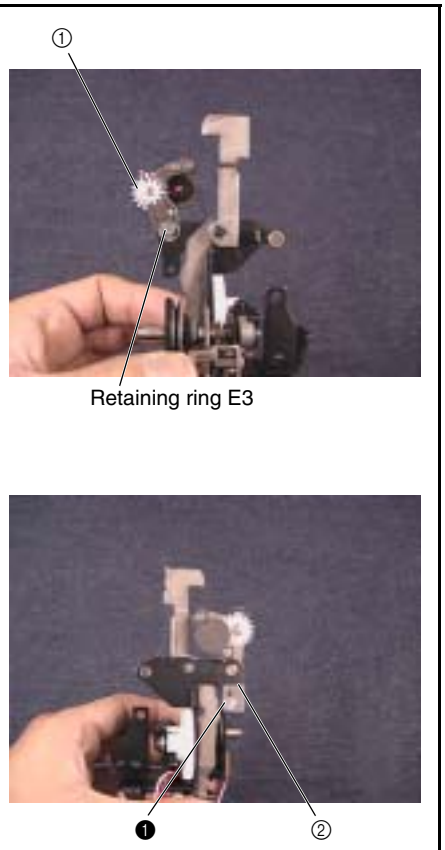


❶		Screw, Bind M2X7 Color; Silver	Torque 0.29 - 0.49 N-m

12 Damper holder assy. attachment

1. Attach the damper holder assy. ① to the thread tension holder assy., and attach retaining ring E3.
2. Attach the damper holder spring ② to the thread tension holder assy. using screw ❶.

Start movie clip (CD-ROM version only)



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

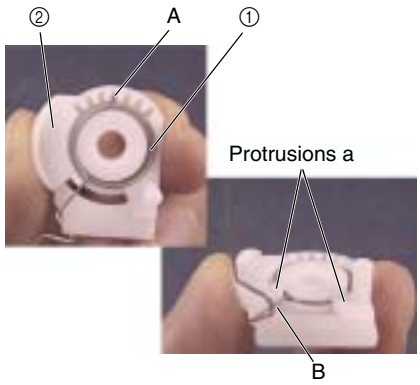
13 Thread take-up spring attachment

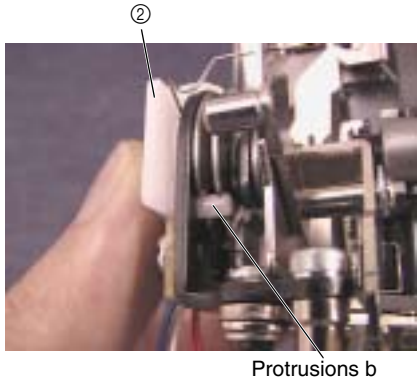
1. Attach the thread take-up spring ① to the thread take-up spring cover ②.

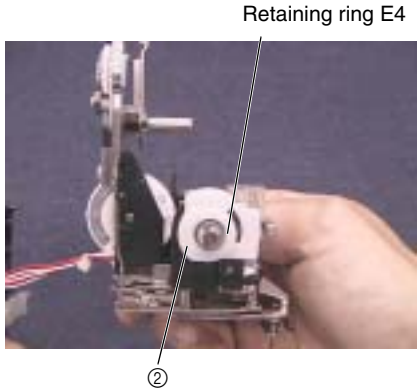
   ***Key point**
   - Align end A of the thread take-up spring with the center of the thread take-up spring cover groove.
   - Insert end B of the thread take-up spring between protrusions a (two) of the thread take-up spring cover.

2. Attach the thread take-up spring cover assy. ② to the thread tension holder assy., and attach retaining ring E4.

   ***Key point**
   - Align tension disc A and tension disc B with protrusion b on the thread take-up spring cover assy.

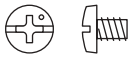


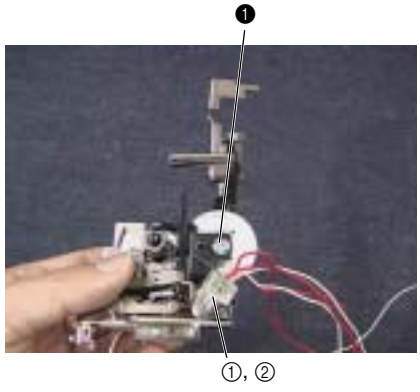




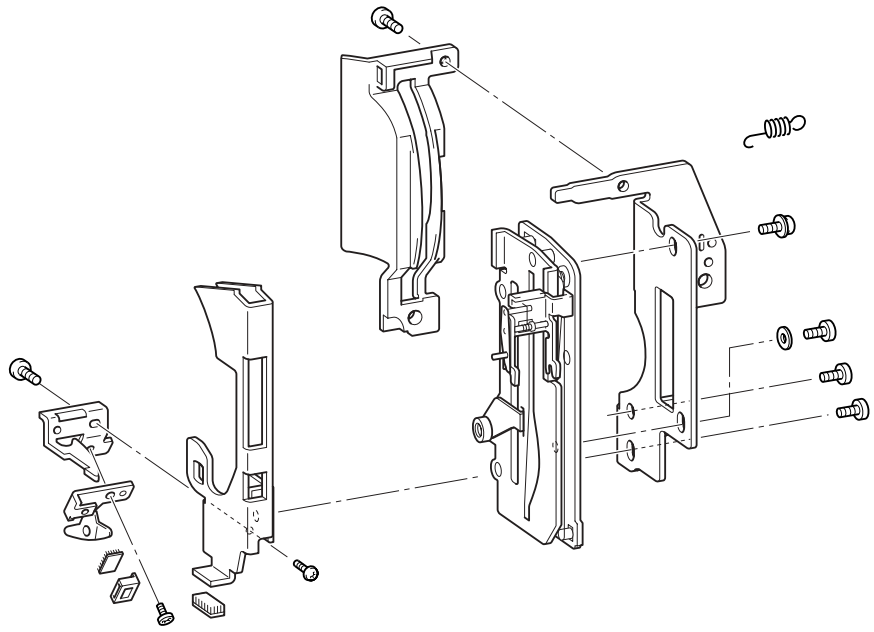
14 LED lamp L assy. attachment

1. Attach LED lamp holder L ① and the LED lamp L assy. ② to the thread tension holder assy. using screw ❶.

❶		Screw, Bind M3X4 Color; Silver	Torque 0.57 - 0.78 N-m



Thread hook mechanism location diagram



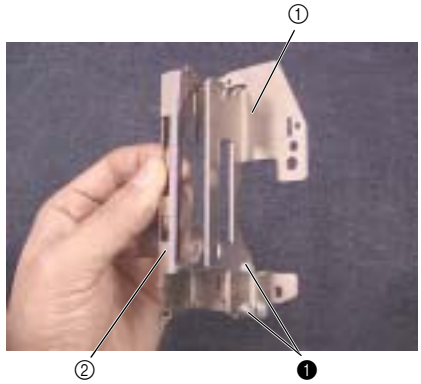
1 Thread guide base assy. attachment

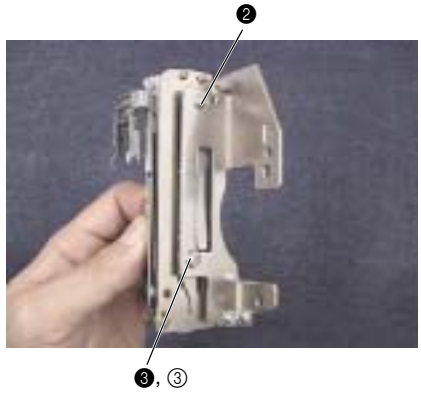
1. Attach Thread take-up lever guide A ② to the thread guide base supporter ① using screws ❶ (two).
2. Attach the thread guide base assy. ④ using screw ❷, screw ❸ and a plain M3 washer ③.

***Key point**

- Hand start screws ❷ and ❸, and perform 4 - 11 "Cassette threading height adjustment" after attaching the thread hook assy. and thread unit to the needle-presser module.

Start movie clip (CD-ROM version only)



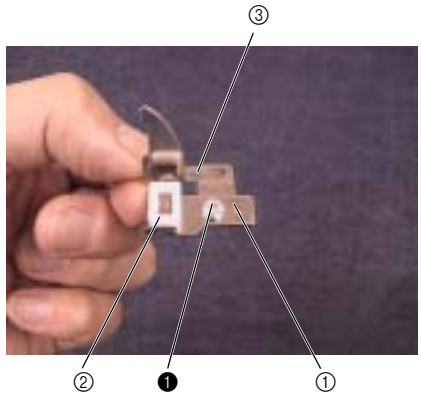


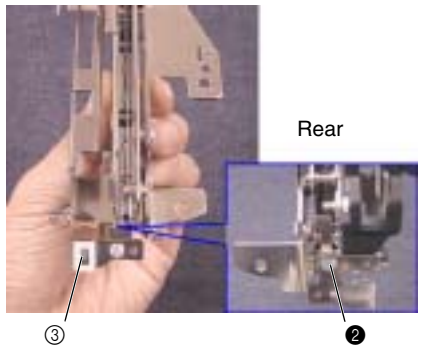
❶ ❸	Screw, Bind M3X4 Color; Silver	Torque 0.57 - 0.79 N-m
❷	Screw, Pan (S/P washer) M3X6 Color; Silver	Torque 0.57 - 0.79 N-m

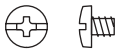
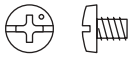
2 Thread take-up lever guide C attachment

1. Attach the pile cap ② to the pile holder ①.
2. Attach the pile holder to thread take-up lever guide C ③ using screw ❶.
3. Attach thread take-up lever guide C ③ using screw ❷.

Start movie clip (CD-ROM version only)





❶		Screw, Bind M2.6X3 Color; Silver	Torque 0.29 - 0.57 N-m
❷		Screw, Bind M3X4 Color; Silver	Torque 0.79 - 1.18 N-m

3 Thread take-up lever guide B attachment

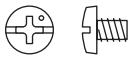
1. Attach thread take-up lever guide B ① using screw ❶.

***Key point**

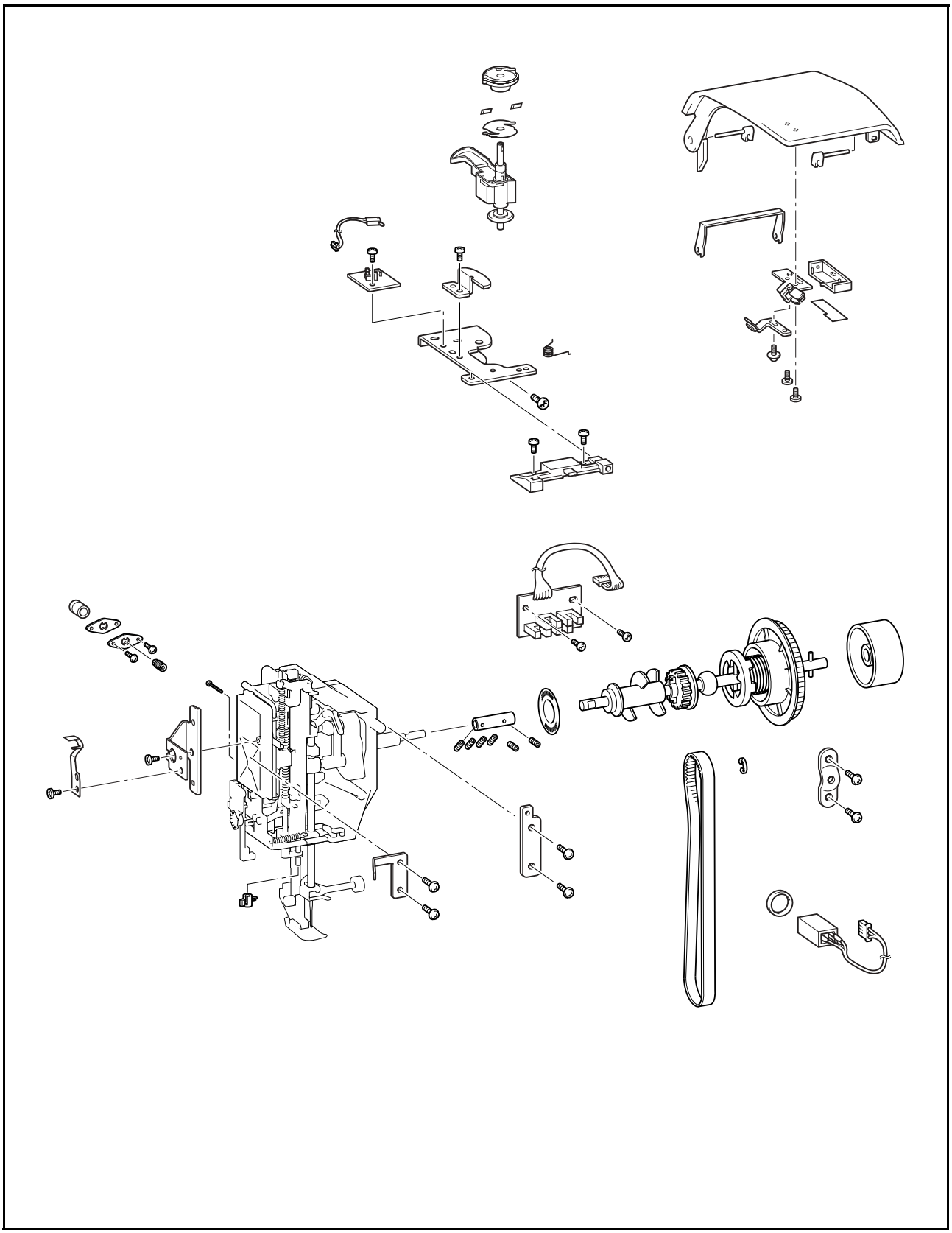
- Insert the hook on the lower part of thread take-up lever guide B ① into the hole in thread take-up lever guide C.

Start movie clip (CD-ROM version only)

Insert the hook in the hole.

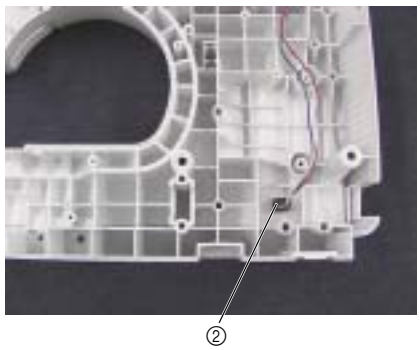
❶		Screw, Bind M3X4 Color; Silver	Torque 0.57 - 0.79 N-m

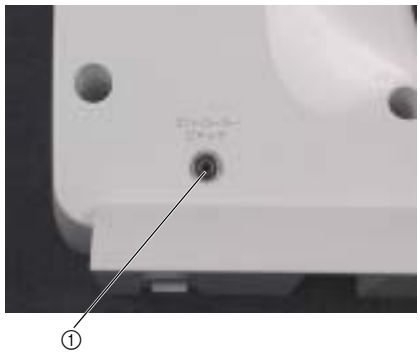
Upper shaft mechanism location diagram



1 Foot controller jack assy. attachment

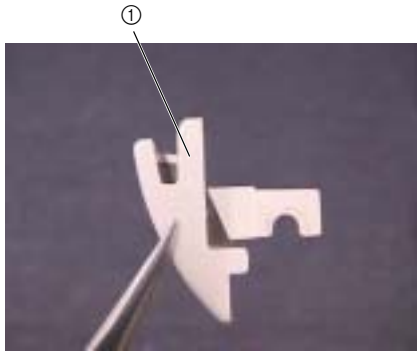
1. Attach the foot controller jack assy. ② to the arm bed using nut ①.

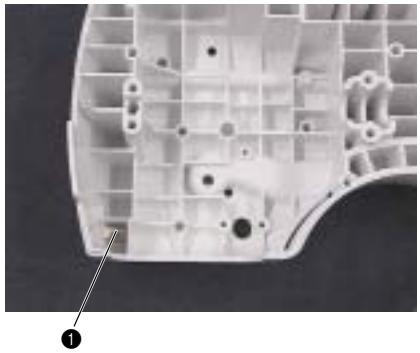


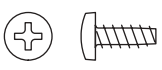


2 NT lower thread cutter attachment

1. Attach the NT lower thread cutter ① to the cutter cover.
2. Attach the cutter cover ① to the arm bed using screw ❶.





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

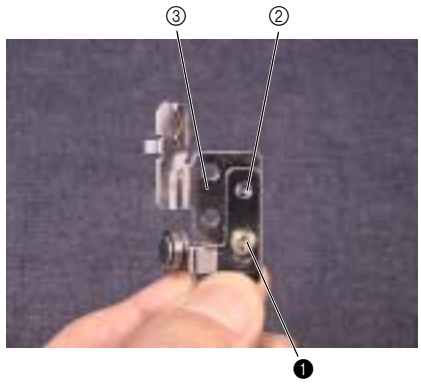
3 Bobbin winder cover assy. assembly

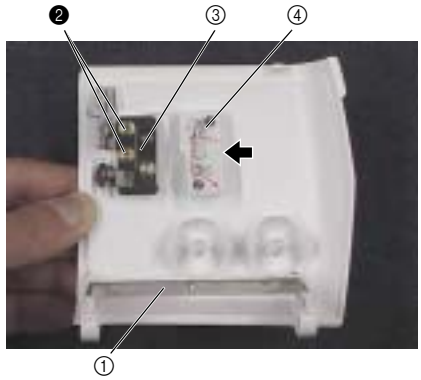
1. Attach the bobbin winder cover supporter ① to the bobbin winder cover.
2. Attach the thread tension assy. ② to the thread tension plate ③ using screw ❶.

***Key point**

- Hand start screw ❶, and fully tighten after 4 - 18 "Bobbin winder (uneven bobbin winding and bobbin winding amounts) adjustment."

3. Attach the thread tension plate ③ to the bobbin winder cover using screws ❷ (two).
4. ④Attach the thread tension cover.



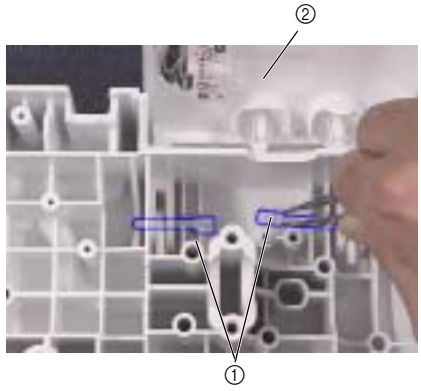


❶		Screw, Pan (S/P washer) M3X6DA Color; Gold	Torque Hand start
❷		Screw, Bind M3X8 Color; Silver	Torque Hand start

4 Bobbin winder cover assy. attachment

1. Attach the bobbin winder cover assy. ② to the arm bed using the shafts ① for the bobbin winder cover (two).

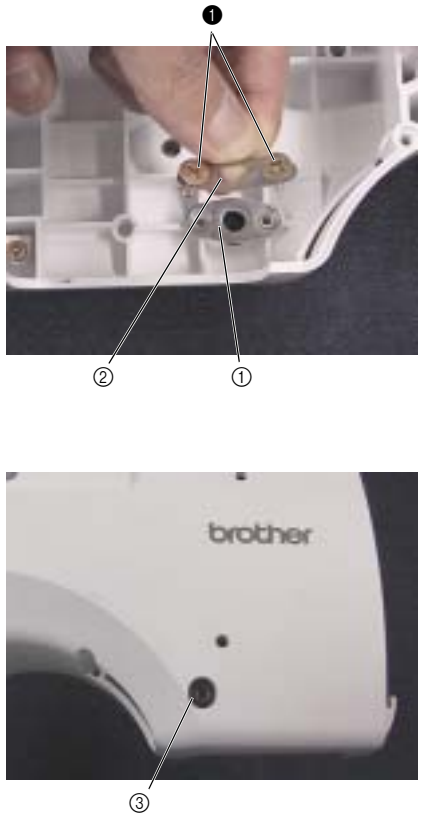
Start movie clip (CD-ROM version only)

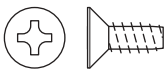


5 Adjusting plate attachment

1. Attach the adjusting plate ① and the plate spring ② to the arm bed using screws ❶ (two).
2. Attach the adjusting screw ③.

   ***Key point**
   - Hand start the adjusting screw ③ (fully tightening in 3 - 28 "Needle interference provisional adjustment (needle bar, presser back-front position adjustment)" and 4 - 16 "Clearance between the needle and the rotary hook point adjustmen").
3. Attach the arm cap.



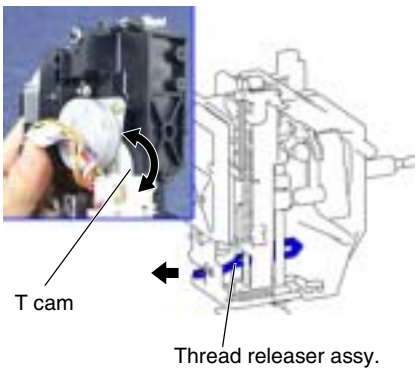
❶		Giza Tite 4X10 Color; Gold	Torque 0.78 - 1.18 N-m

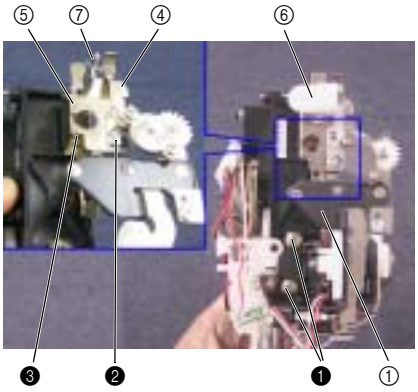
6 Thread unit attachment

1. Lower the presser foot lifter.
2. Turn the T cam, and move the thread releaser assy. to the left side.
3. Attach the thread unit ① to the needle-presser module using screws ❶ (two).

   ***Key point**
   - Align the hole ② in the thread releaser assy. and thread release plate D ③.
4. Attach the presser plate spring ④ to the cassette guide plate ⑤ using screw ❷.
5. Attach the cassette guide plate ⑤ to the needle-presser module using screw ❸.
6. Attach the cassette release button ⑥ to the cassette hold plate ⑦.
7. Move the presser foot lifter up and down, and check the opening and closing of the tension discs.
8. To the shafts and link arm assy. attach spring S39 .

Start movie clip (CD-ROM version only)





❶	Taptite, Bind B M4X10 Color; Gold	Torque 1.18 – 0.78 N-m
❷	Screw, Bind M3X4 Color; Silver	Torque 0.57 – 0.78 N-m
❸	Taptite, Bind B M3X6 Color; Gold	Torque 0.57 – 0.78 N-m
S39	16, ϕ3, ϕ3.5	GROUND SPRING XC5348***

7 Thread hook assy. attachment

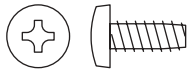
***Key point**

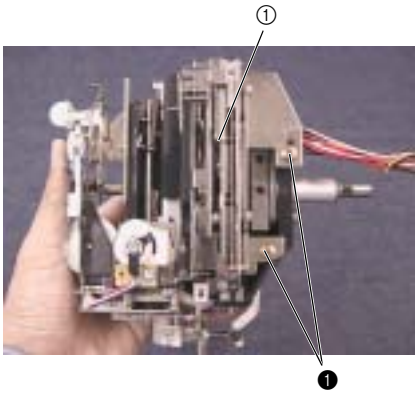
- Attach after 4 - 23"Adjust the needle thread block."

1. Attach the thread hook assy. ① to the needle-presser module using screws ❶ (two).

***Key point**

- Perform 4 - 11"Cassette threading height adjustment."
- Perform 4 - 12"Shuttle return timing adjustment."

❶		Taptite, Bind B M4X10 Color; Gold	Torque Hand start



8 Needle-presser module attachment

1. Attach the needle-presser module to the arm bed.

***Key point**

- Gather the lead wires (two locations) at the back of the needle-presser module.
- Raise the presser foot lifter.

2. Attach the presser plate ① and upper shaft bushing presser ② using screws ❶ (four).

***Key point**

- Hand start the screws ❶ (four), and fully tighten after 3 - 23 "Upper shaft assy. attachment."

3. Install screw ❷.

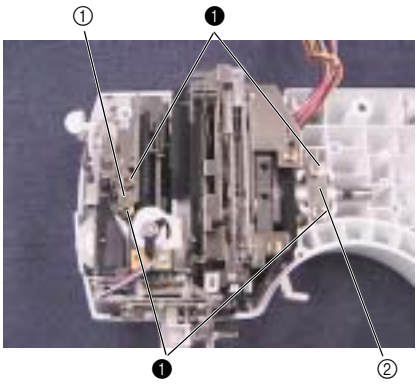
***Key point**

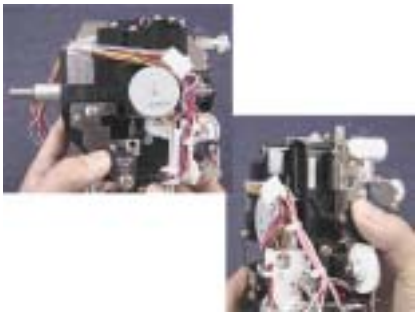
- Hand start screw ❷, and fully tighten after 4 - 16 "Clearance between the needle and the rotary hook point adjustmen."

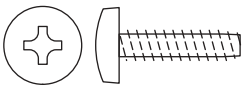
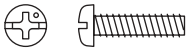
4. Apply 1 – 2 drops of Sewing Lube to the unit shaft ③.

Sewing Lube	1 – 2 drops

Start movie clip (CD-ROM version only)

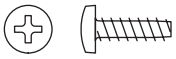


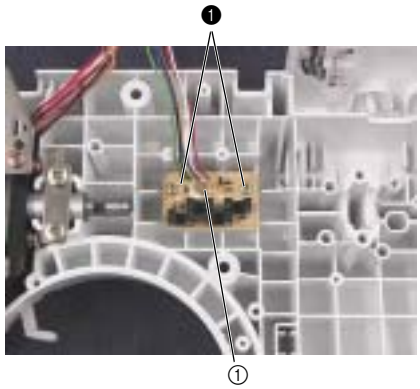


❶		Giza Tite 5X16 Color; Gold	Torque Hand start
❷		Screw, Pan M3X12 Color; Silver	Torque Hand start

9 NP PCB assy. attachment

1. Attach the NP PCB assy. ① to the arm bed using screws ❶ (two).

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



10 Upper shaft assy. assembly

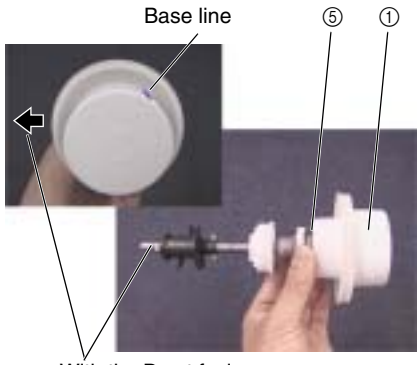
1. Attach the pulley ① to the upper shaft assy.

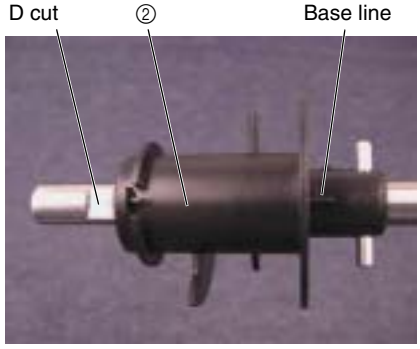
   ***Key point**
   - Be careful of the orientation for attaching the pulley.
2. Attach the timing shutter ② to the upper shaft assy.

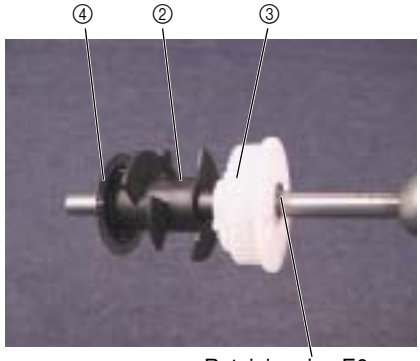
   ***Key point**
   - Align the timing shutter base line and the upper shaft assy. D cut.
3. Move the upper shaft pulley ③ to the timing shutter ② side and attach retaining ring E6.
4. Attach the speed shutter ④ to the timing shutter ②.

   ***Key point**
   - Face the side of the speed shutter ④ that is not shiny toward the timing shutter.
5. Apply Molykote EM30L to the operating part of the T pulley clutch plate ⑤.

Molykote EM30L	Apply a thin coat to the entire operating groove







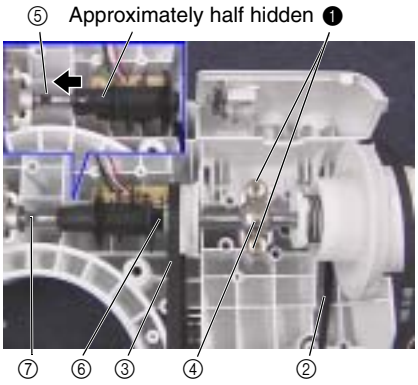
11 Upper shaft assy. attachment

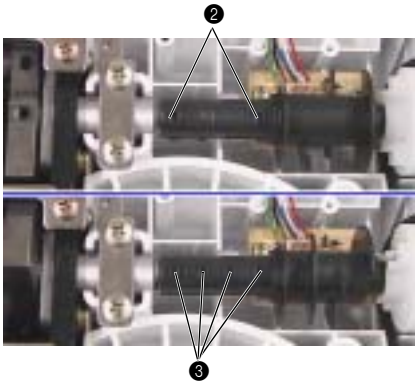
1. Attach the fixed joint ① to the upper shaft assy., and move it toward the timing shutter side.

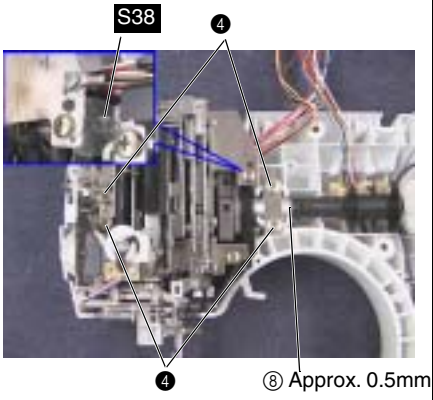
   ***Key point**
   - Approximately half of the fixed joint ① is hidden by the timing shutter.
   - The screw holes in the fixed joint ① are offset to the left.
2. Attach the upper shaft assy., timing belt (motor) ② and timing belt (rotary hook drive) ③ to the arm bed.
3. Attach the upper shaft bearing presser ④ to the arm bed using screws ❶ (two).
4. Slide the fixed joint ① onto the unit shaft ⑤ (needle-presser module), and attach it using screws ❷ (set screw, socket (FT) M5X5) (two) and screws ❸ (set screw, socket (CP) M4X4) (four).

   ***Key point**
   - Align the timing shutter base line ⑥ and the unit shaft D cut ⑦.
   - The gap (8) between the fixed joint and the needle presser module is approximately 0.5 mm.
5. Fully tighten screws ❹ (four), which were hand started in 3 - 21" 8 Needle-presser module attachment."
6. Attach spring S38 to the thread hook assy. and the upper shaft bushing presser.

Start movie clip (CD-ROM version only)





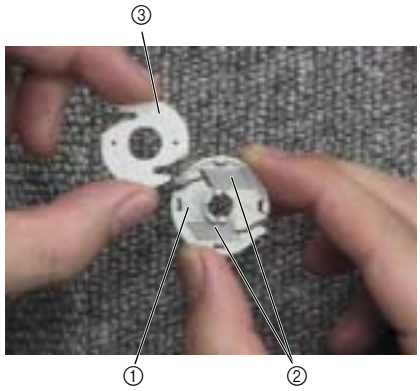


❶ ❷	Giza Tite 5X16 Color; Gold	Torque 1.18 - 1.57 N-m
❷	Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.18 - 1.57 N-m
❸	Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 - 1.18 N-m
S38	ϕ5, 15.3	SPRING XA5246***

12 Bobbin base assembly

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

Start movie clip (CD-ROM version only)

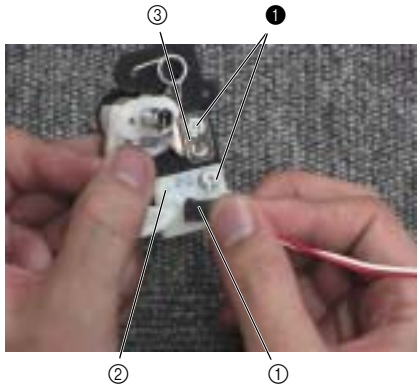


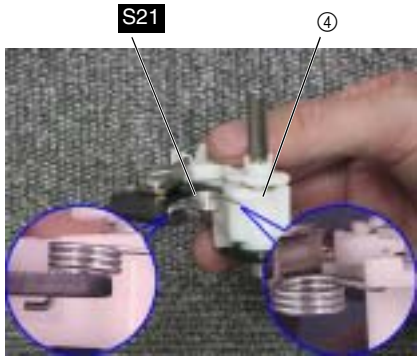
13 Bobbin winder assy. assembly

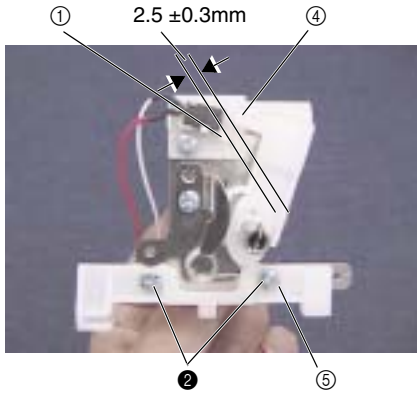
1. Attach the BWSW-S assy. ① to the SW adjust plate ②.
2. Attach the SW adjust plate ② and the bobbin winder shaft stopper ③ to the bobbin winder assy. holder using screws ❶ (two).
3. Attach the BW shaft holder assy. to the bobbin winder assembly holder.
4. Attach spring S21 to the BW shaft holder assy. ④ and bobbin winder assy. holder.
5. Attach the Board presser ⑤ using screws ❷ (two).

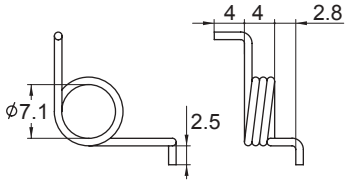
***Key point**

- With bobbin winding OFF, adjust the position of ② so that the gap between the ① BWSW-S assy. and the BW shaft holder assy. ④ is 2.5 ± 0.3 mm.



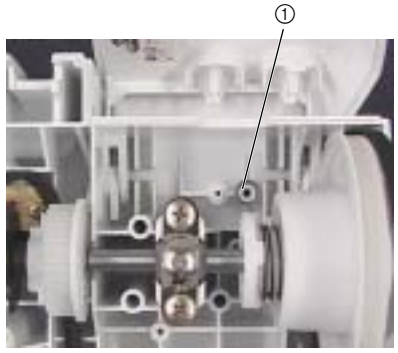


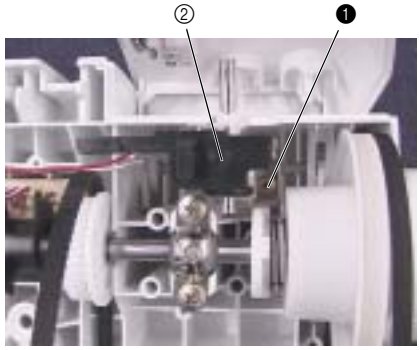


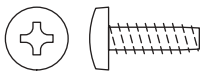
❶ ❷	Screw, Bind M3X6 Color; Silver	Torque 0.57 – 0.78 N-m
S21		BOBBIN WINDER SPRING XZ0070***

14 Bobbin winder assy. attachment

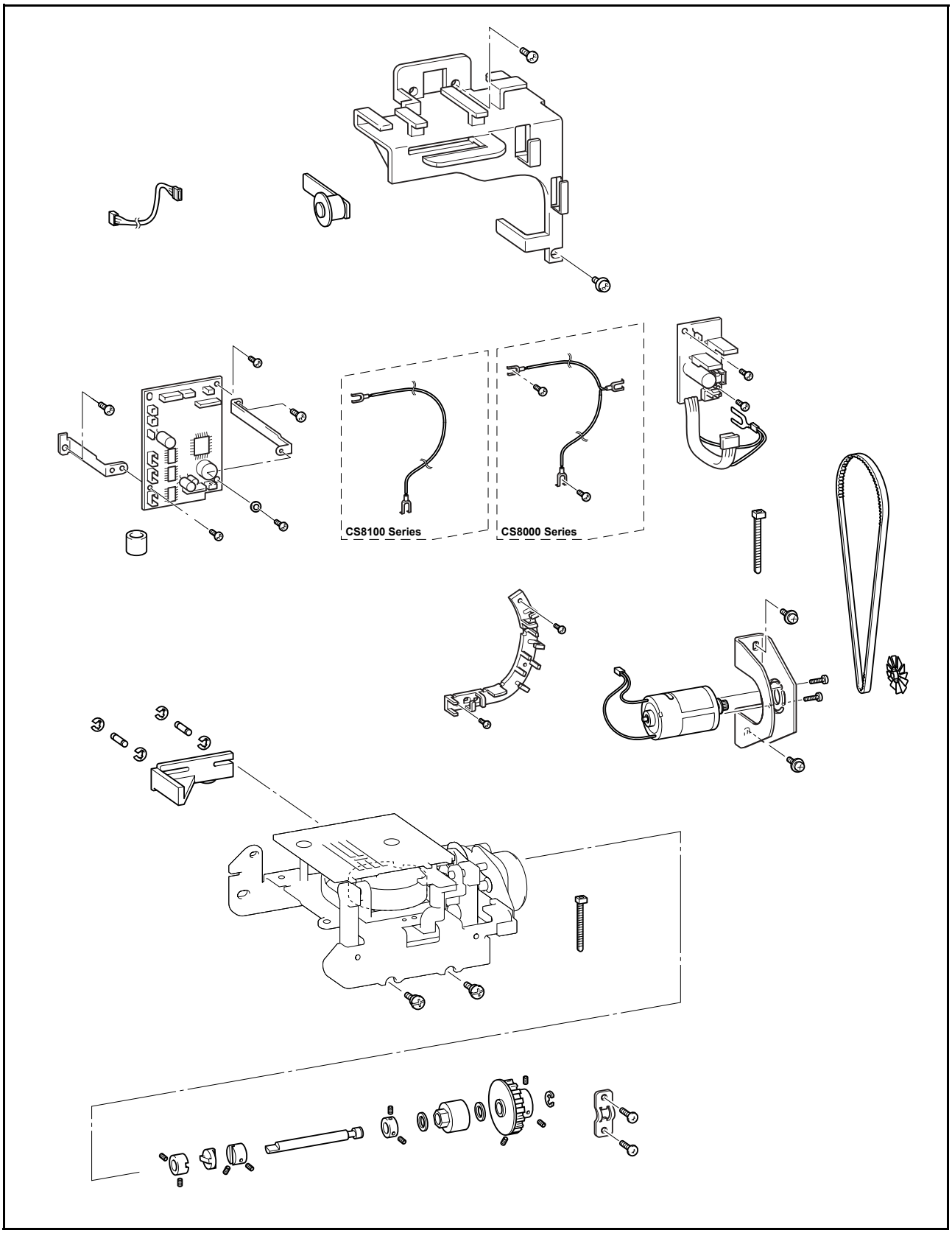
1. Attach a washer ① and the bobbin winder assy. ② to the arm bed using screw ❶.





❶		Giza Tite 4X12 Color; Gold	Torque 0.57 - 0.78 N-m

Rotary hook drive mechanism location diagram



1 Tension pulley assy. attachment

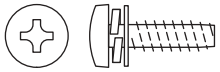
1. Attach the tension pulley assy. ① to the arm bed.

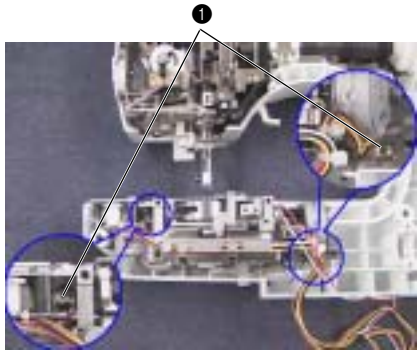
2 Feed **module** attachment

1. Attach the feed module to the arm bed using screws ❶ (two).

***Key point**

- Hand start screw ❶, and fully tighten after 4 - 6 "Needle-presser module and feed module left-right position alignment."
- After attaching the feed module/thread cutter module, always perform 3 - 28 "3 Needle interference provisional adjustment (needle bar, presser back-front position adjustment)Needle interference adjustment.

❶		Giza Tite 4X14 Color; Gold	Torque Hand start



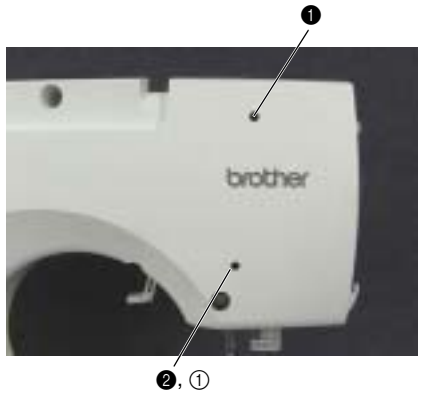
3 Needle interference provisional adjustment (needle bar, presser back-front position adjustment)

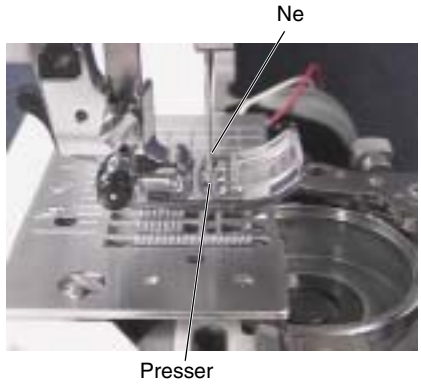
1. Attach the needle and presser foot.
2. Adjust the position of the needle to the front-back center of the presser foot needle hole using screw ❶.
3. Loosen screw ❷, and align the needle to the back-front center position of the needle hole in needle plate A. using the adjusting screw ①.
4. Hand start screw ❷.

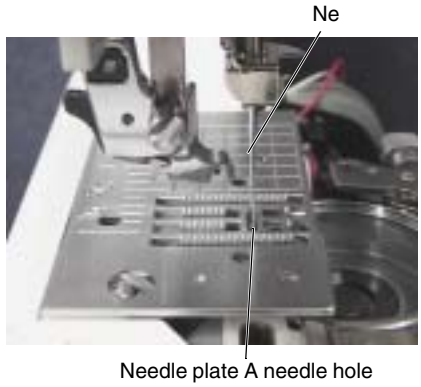
***Key point**

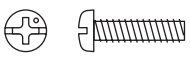
- Fully tighten after 4 - 16 "Clearance between the needle and the rotary hook point adjustmen."

Start movie clip (CD-ROM version only)







❶		Set Screw, Socket (CP) M4X12 Color; Black	Since the adjustment is by the amount the screw is tightened, there is no specified torque.
❷		Screw, Pan M3X12 Color; Silver	Hand start

4 Lower shaft A assy. assembly

1. Attach retaining ring E6 to lower shaft A.
2. Attach timing pulley D ① to lower shaft A using screws ❶ (set screw, socket (CP) M5X5) (three)

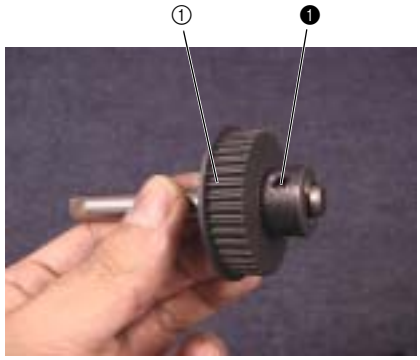
   ***Key point**
   - Hand start screw ❶, and fully tighten after 4 - 8 "Needle bar rise adjustment."
   - Align one of the three screw holes ③ in timing pulley D with the D cut ② in lower shaft A.
3. Attach the thrust washer ④, eccentric shaft bushing ⑤, thrust washer ④, set screw collar ⑥ to lower shaft A, and secure the set screw collar ⑥ with screws ❷ (set screw, socket (CP) M4X4) (two).

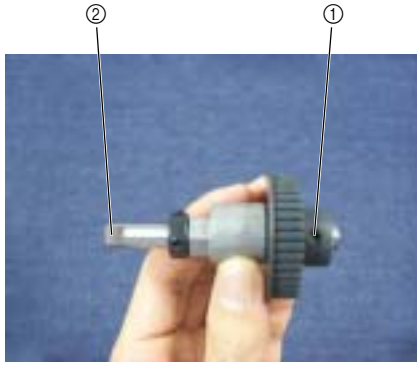
   ***Key point**
   - Ground surface of the set screw collar toward the eccentric shaft bushing.
4. Apply 1 – 2 drops of Sewing Lube to the eccentric shaft bushing ⑤.
5. Attach the joint ⑦ to lower shaft A using screws ❸ (set screw, socket (FT) M5X5) (two).

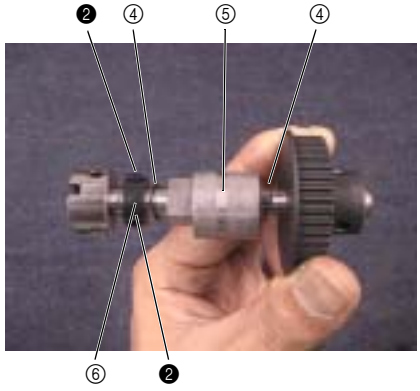
   ***Key point**
   - Joint groove parallel to D cut in lower shaft A

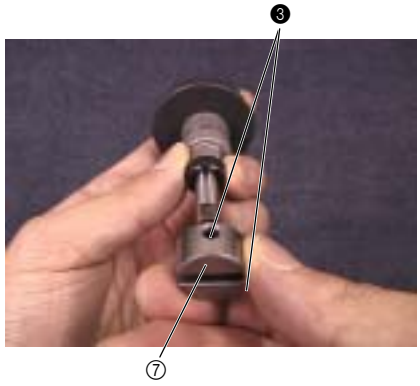
Sewing Lube	1 – 2 drops

Start movie clip (CD-ROM version only)









❶		Set Screw, Socket (CP) M5X5 Color; Black	Torque Hand start
❷		Set Screw, Socket (CP) M4X4 Color; Black	Torque 0.78 - 1.18 N-m
❸		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.18 - 1.57 N-m

5 Lower shaft A attachment

1. Rotate the upper shaft by hand, and bring the needle bar to its highest point (timing shutter base line forward).
2. Rotate the feed module lower shaft B, and bring the solid dot ① on the outer rotary hook to the front and the D cut on lower shaft B to face straight up.
3. Apply a small amount of Epnoc Grease AP to lower shaft A and the (feed module) lower shaft B joint.
4. Place the timing belt (rotary hook drive) on the lower shaft A assy. timing pulley, and attach the lower shaft A assy. ② and the disk ③.

***Key point**

- The needle bar should be at the highest point.
- The solid circle mark on the outer rotary hook should be forward.
- The lower shaft B socket set screw (feed module) should be straight up.
- The lower shaft A side joint socket set screw should face forward.

5. Attach the lower shaft bushing presser (4) to the arm bed and hand start screws ❶ (two).

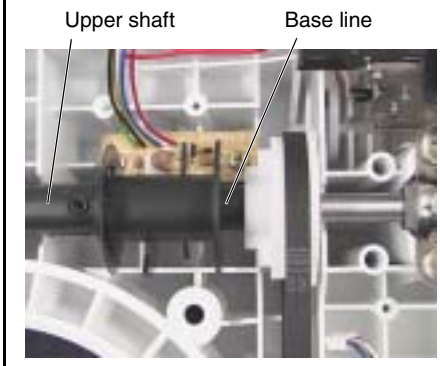
***Key point**

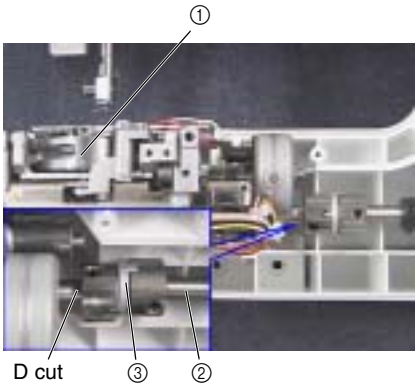
- Fully tighten after 4 - 7 "Timing belt tension adjustment."

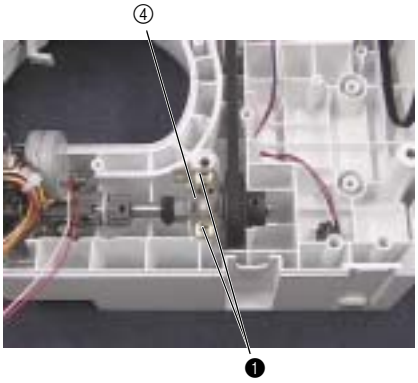
6. Apply 1 – 2 drops of Sewing Lube to the lower shaft assy. eccentric shaft bushing shaft hole.

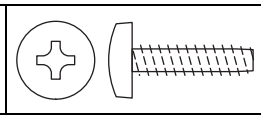
Epnoc Grease AP	Small amount
Sewing Lube	1 – 2 drops

Start movie clip (CD-ROM version only)



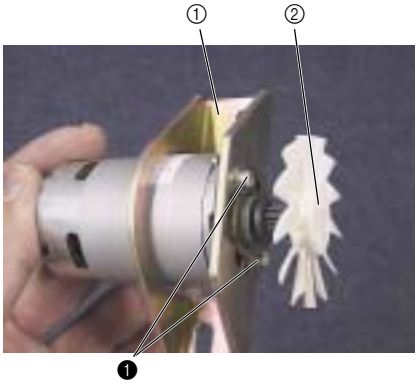


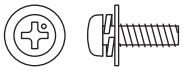


❶ 	Giza Tite 5X16 Color; Gold	Torque 1.18 - 1.57 N-m

6 Main motor assy. assembly

1. Attach the main motor to the motor holder ① using screws ❶ (two).
2. ②Attach the motor fan to the main motor.



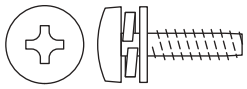
❶ 	Screw, Pan (S/P washer) M3X10DB Color; Silver	Torque 0.78 - 1.18 N-m

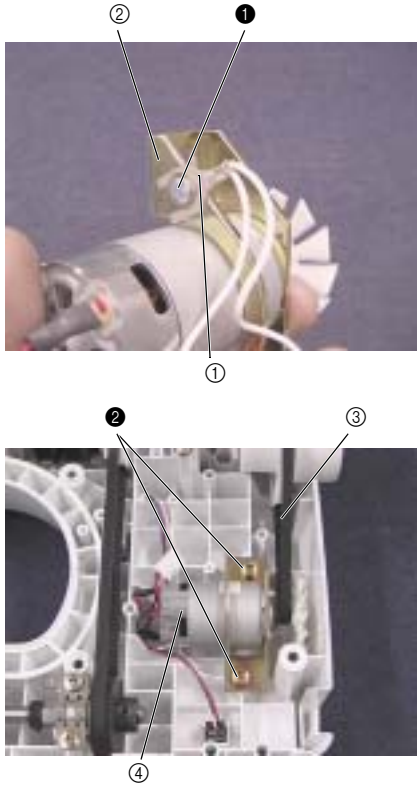
7 Main motor assy. attachment

1. Attach the motor PCB assy. ground wire ① to the motor holder ② using screw ❶.
2. Place the timing belt (motor) ③ on the main motor upper shaft pulley, align the main motor assy. ④ with the arm bed, and hand start screws ❷ (two).

***Key point**

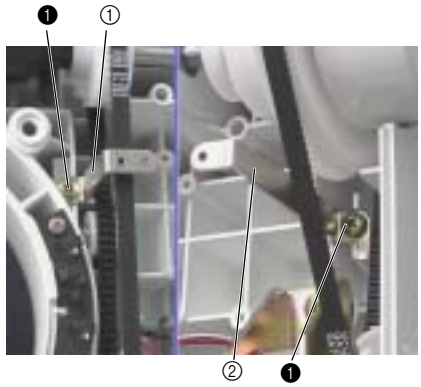
- Perform 4 - 5 "Motor belt tension adjustment."
- Bring the FC jack lead wires out to the top, passing under the motor.

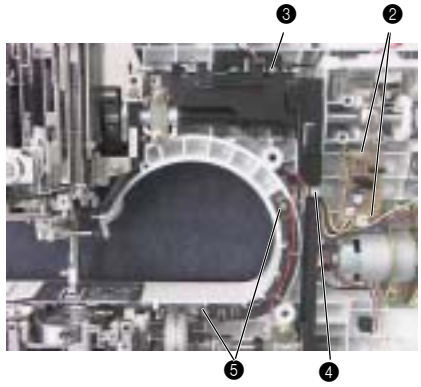
❶		Screw, Bind M3X6 Color; Silver	Torque 0.57 - 0.78 N-m
❷		Giza Tite 5X16 Color; Gold	Torque Hand start

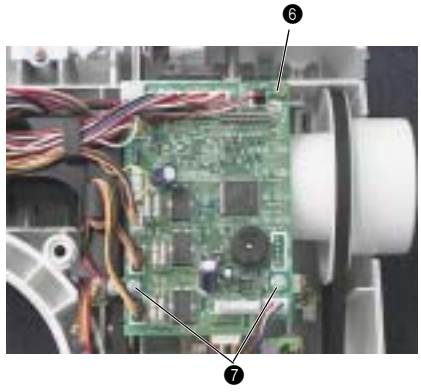


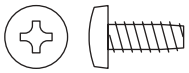
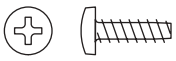
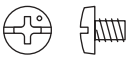
8 Main PCB assy./motor PCB assy. attachment

1. Attach Set plate L ① and Set plate R ② to the arm bed using screws ❶ (two).
2. Attach the motor PCB assy. to the arm bed using screws ❷ (two).
3. Attach the shutter cover to the arm bed using screw ❸ and screw ❹.
4. Attach the lead wire guide to the arm bed using screws ❺ (two).
5. Attach the main PCB assy. using screw ❻, screws ❼ (two) and a plain M3 washer.



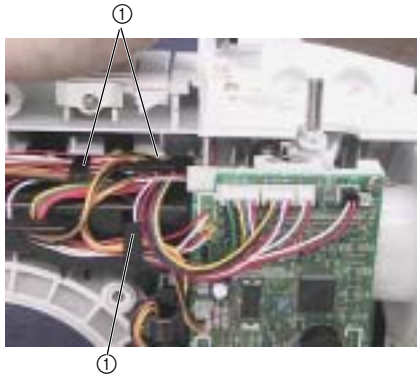


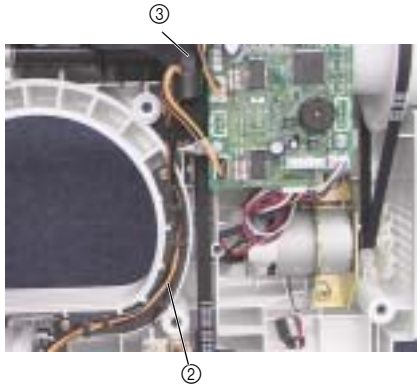


❶		Taptite, Bind B M4X10 Color; Gold	Torque 1.18 - 1.57 N-m
❷ ❸ ❺ ❻		Taptite, Bind B M3X10 Color; Gold	Torque 0.59 - 0.78 N-m
❹		Screw, Bind M3X4 Color; Silver	Torque Hand start
❼		Screw, Bind M3X6 Color; Silver	Torque 0.57 - 0.78 N-m

9 Lead assy. processing

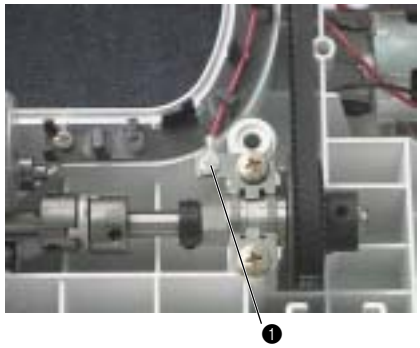
1. Bring the various lead wires for the needle-presser module to the shutter cover hook ①, and attach to the main PCB assy.
2. Bring the various lead wires from the feed module to the lead wire guide ② and shutter cover hook ③, and attach them to the main PCB assy.
3. Connect the foot controller jack lead wires and motor PCB lead wires to the main PCB assy.
4. Connect the main motor assembly lead wires to the motor PCB assy.

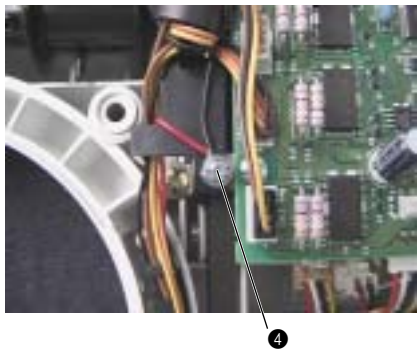


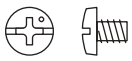
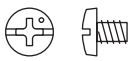


10 Ground lead wire assy. attachment

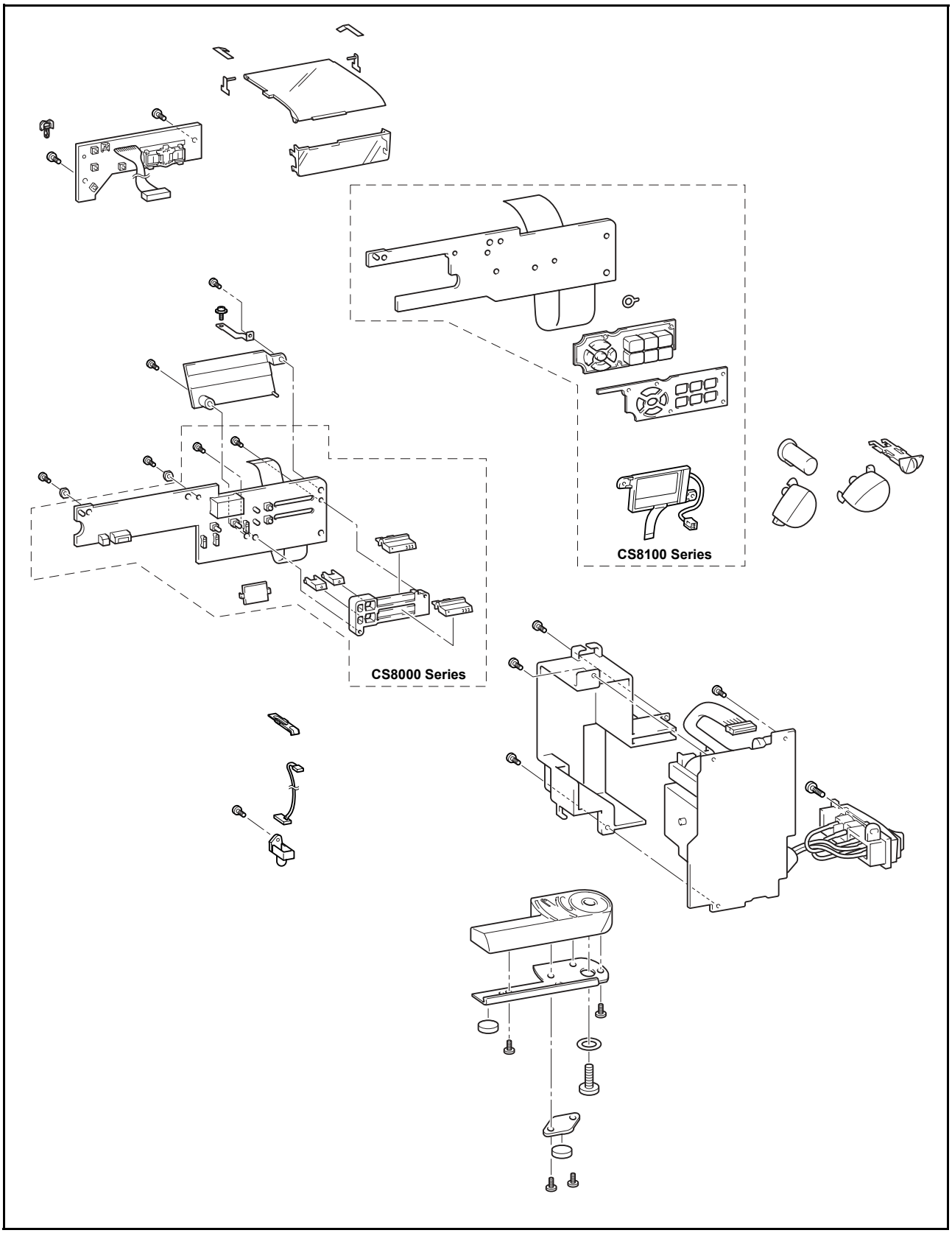
1. Attach the ground lead wire assy. using screws ❶ (two).
2. Tighten the ground lead wire assy. to both the shutter cover and Set plate L using the screw ❹ attached in "3." of 3 - 32 "8 Main PCB assy./motor PCB assy. attachment."





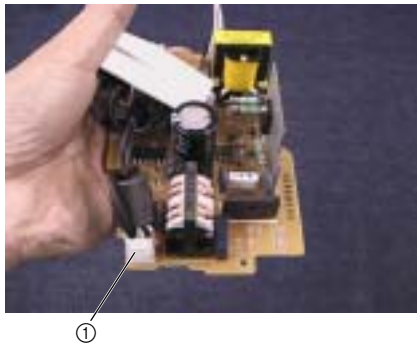
❶		Screw, Bind M3X4 Color; Silver	Torque 0.29 - 0.59 N-m
❹		Screw, Bind M3X4 Color; Silver	Torque 0.78 - 1.18 N-m

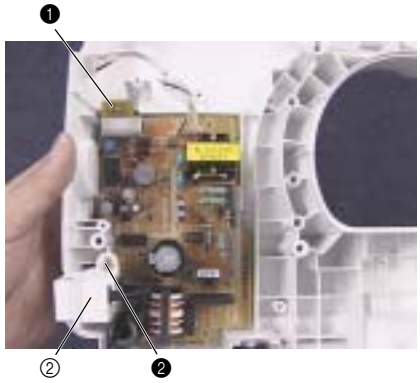
Front cover location diagram

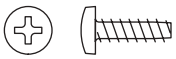
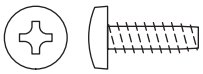


1 Power PCB assy. attachment

1. Attach the inlet assy. connector ① to the power PCB assy.
2. Attach the power PCB assy. to the front cover using screw ❶.
3. Attach the inlet assy. ② to the front cover using screw ❷.

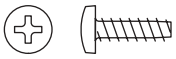




❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m
❷		Giza Tite 4X12 Color; Gold	Torque 0.78 - 1.18 N-m

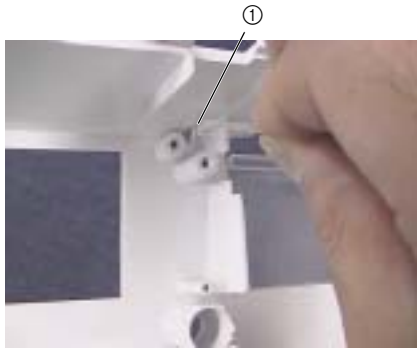
2 Break cover attachment

1. Attach the break cover ① using screws ❶ (two).

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

3 LED cover attachment

1. Attach the LED cover ① to the front cover.

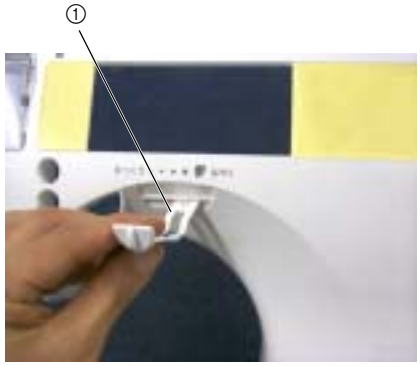


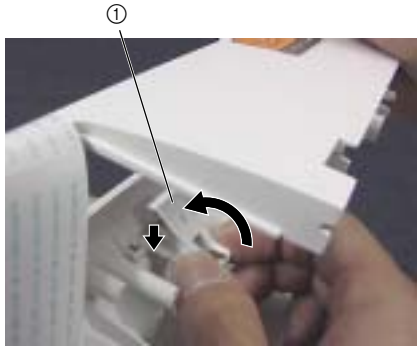
4 SV key top attachment

1. Attach the SV key top ① to the front cover.

***Key point**

- Insert the SV key top from the back of the front cover, fold it in two behind the front cover, and lock the hook.



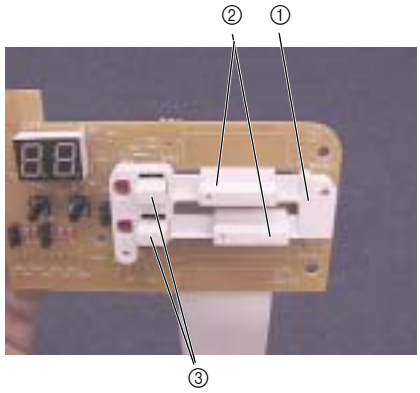


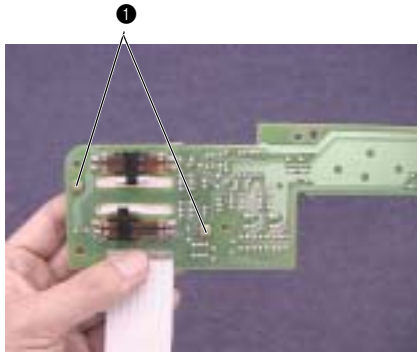
5 PCB assy : operation S2. assembly (S2 only)

1. Attach the VR holder ①, SV key tops ② (two) and SW buttons ③ (two) to the PCB assy : operation S2. using screws ❶ (two).

***Key point**

- Align the position of the SV key tops with VR1 and VR2 on the PCB assy : operation S2.

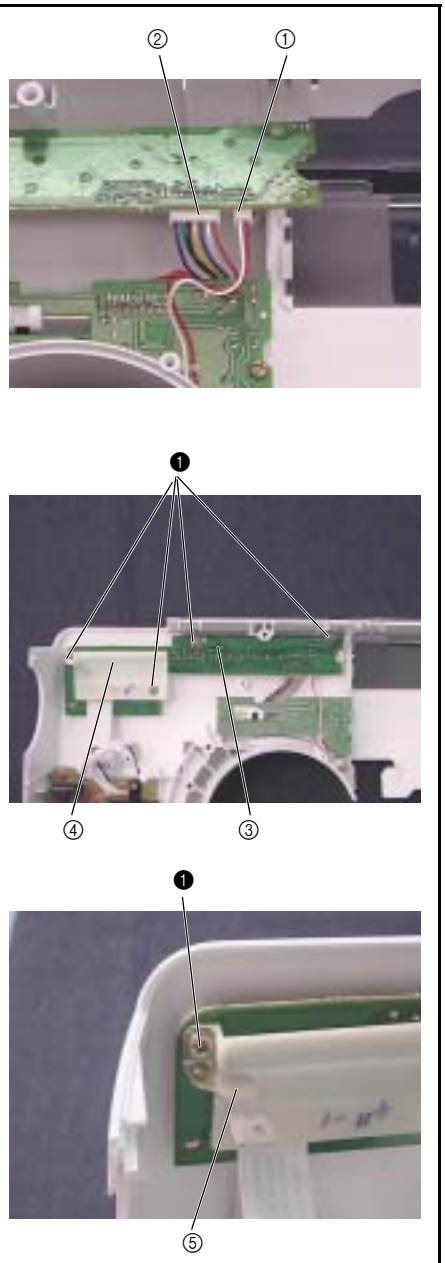


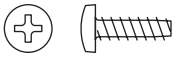


❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 - 0.78 N-m

6 PCB assy : operation S2. attachment (S2 only)

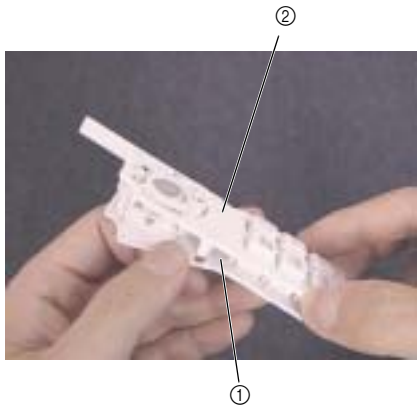
1. Connect the LED PCB-SR assy. connector ① and the SSVR PCB assy. connector ② to the PCB assy : operation S2.
2. Attach the PCB assy : operation S2. ③, Board pressers (two), the PCB cover ④ and front cover fixed plate ⑤ to the front cover using screws ❶ (four).

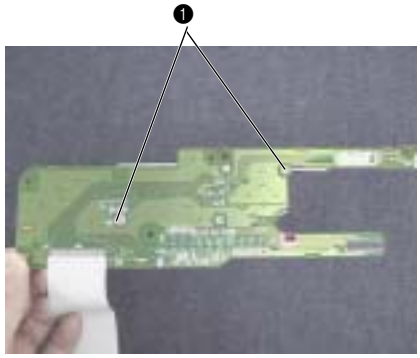


❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m

7 Rubber key attachment (S3 only)

1. Attach the rubber keys ① to the rubber key holder ②.
2. Attach the rubber key holder ② to the PCB assy : operation S3 using screws ❶ (two).

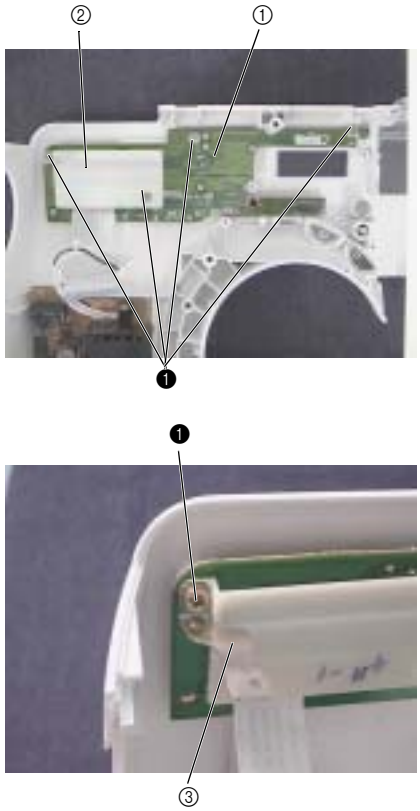


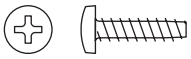


❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.59 - 0.78 N-m

8 PCB assy : operation S3. attachment (S3 only)

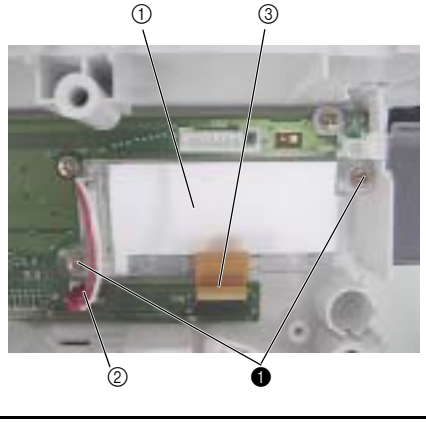
1. Attach the PCB assy : operation S3. ①, Board pressers (two), the PCB cover ② and front cover fixed plate ③ to the front cover using screws ❶ (four).

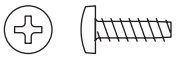


❶		Taptite, Bind B M3X12 Color; Gold	Torque 0.59 - 0.78 N-m

9 Single light guide assy S3. attachment (S3 only)

1. Attach the Single light guide assy S3. ①, and PCB hold plate to the front cover using screws ❶ (two).
2. Connect the back light lead wire connector ② and Single light guide assy S3. connector ③ to the PCB assy : operation S3.



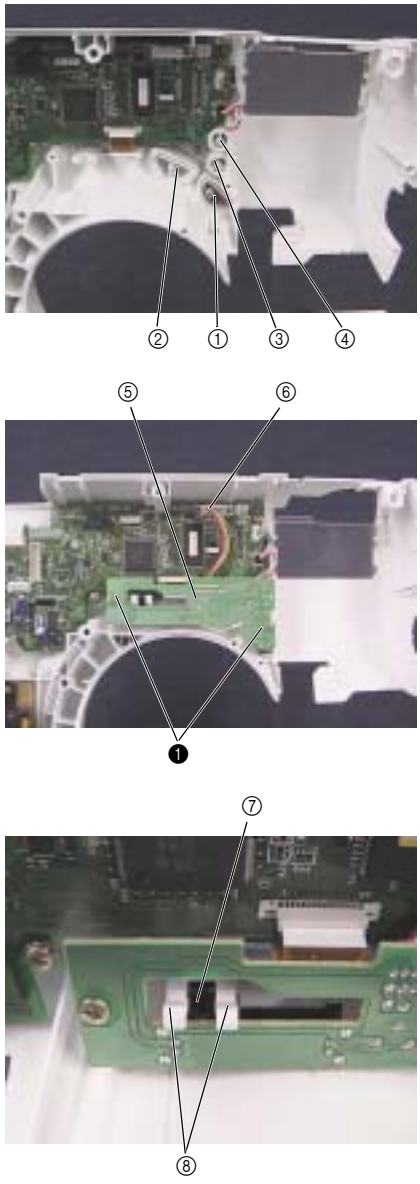
❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.59 - 0.78 N-m

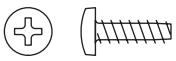
10 SSVR PCB assy. attachment

1. Attach the SS button ①, backstitching button ②, NP button ③ and thread cutting button ④ to the front cover.
2. Attach the SSVR PCB assy. ⑤ to the front cover using screws ❶ (two).
3. Attach the SSVR PCB assy. connector ⑥ to the main PCB assy.

***Key point**

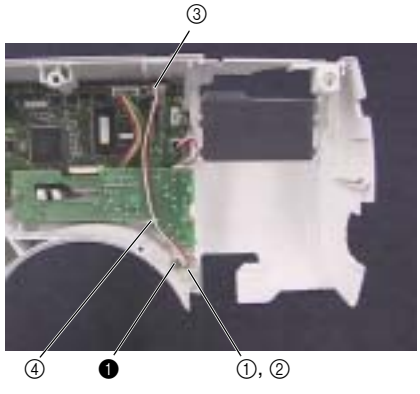
- Align SSVR PCB assy. VR1 ⑦ with the SV key top ⑧.

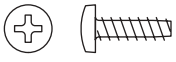


❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m

11 LED PCB-SR assy. attachment

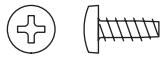
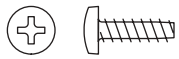
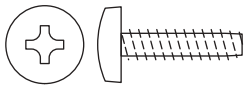
1. Attach the LED PCB-SR assy. ① and lamp holder R ② to the front cover using screw ❶.
2. Attach the LED PCB-SR assy. connector ③ to the main PCB assy.
3. Run the LED PCB-SR assy. lead wire through the cord clip ④.

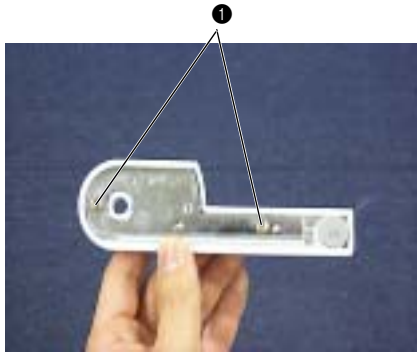


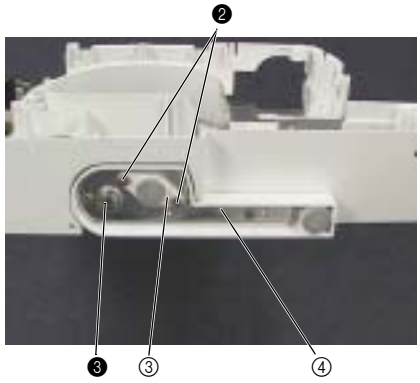
❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m

12 Base cover A attachment

1. Attach base plate A ② to the base cover ① using screws ❶ (two).
2. Attach the rubber cushion plinth ③ to base plate A ② using screws ❷ (two).
3. Attach base plate rubbers A (two) to base plate A ②.
4. Attach the base cover washer and base cover A assy. ④ to the front cover using screws ❸.

❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 - 0.78 N-m
❷		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m
❸		Giza Tite 5X16 Color; Gold	Torque 1.18 - 1.57 N-m

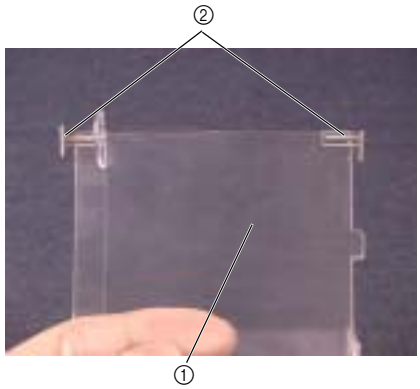


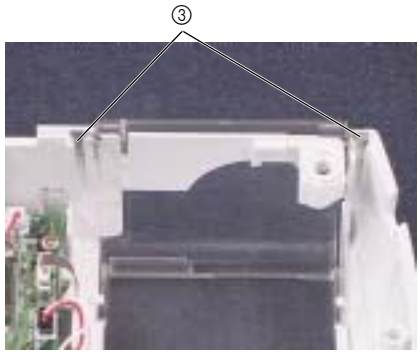


13 Cassette cover attachment

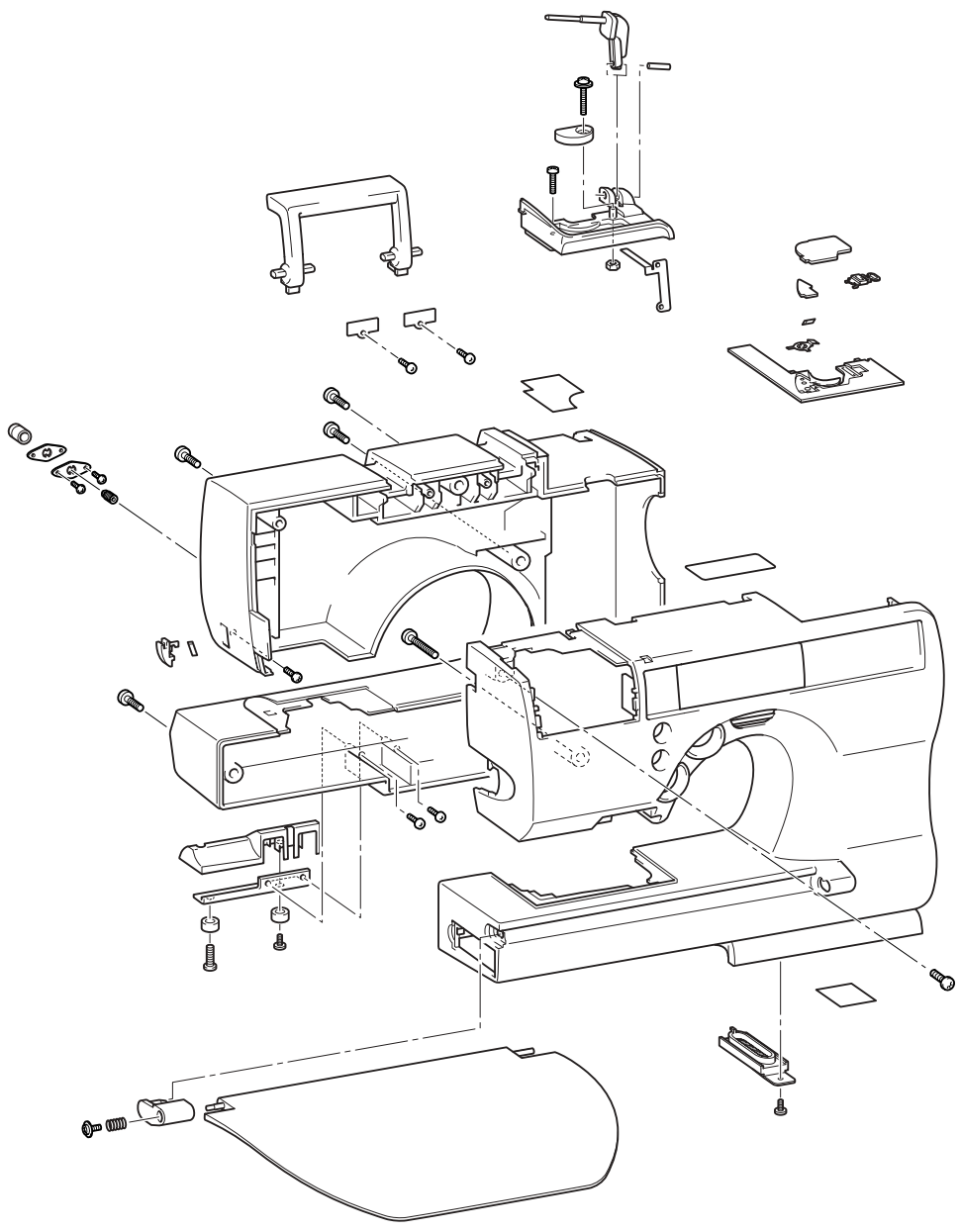
1. Attach the cover link plate assys. ② (two) to the cassette cover ①.
2. Attach the cassette cover to the front cover using the link hold plates ③ (two).
3. Attach the front cover for the cassette to the front cover.

Start movie clip (CD-ROM version only)





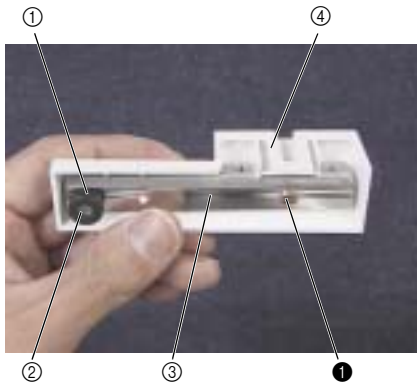
Main parts location diagram



1 Base cover B assy. assembly

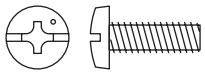
1. Attach the base plate rubber ① and adjusting screw ② to base plate B ③.
2. Attach base plate B ③ to base cover B ④ using screw ❶.

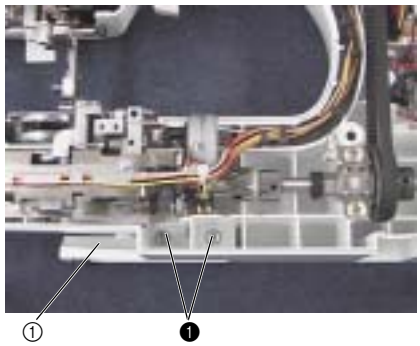
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.57 - 0.78 N-m



2 Base cover B assy. attachment

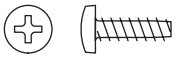
1. Attach the base cover B assy. ① to the arm bed using screws ❶ (two).

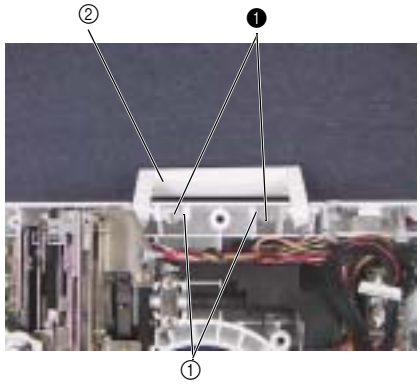
❶		Screw, Bind M4X12 Color; Silver	Torque 0.78 – 1.18 N-m



3 Handle attachment

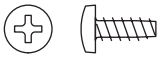
1. Attach the handle fixed plates ① (two) and handle ② to the arm bed using screws ❶ (two).

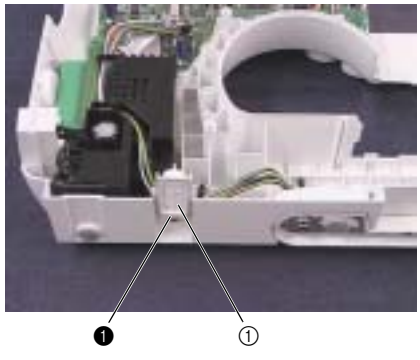
❶		Taptite, Bind B M3X10 Color; Gold	Torque 0.57 - 0.78 N-m



4 Base cover attachment

1. Attach the base cover ① to the front cover using screw ❶.

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

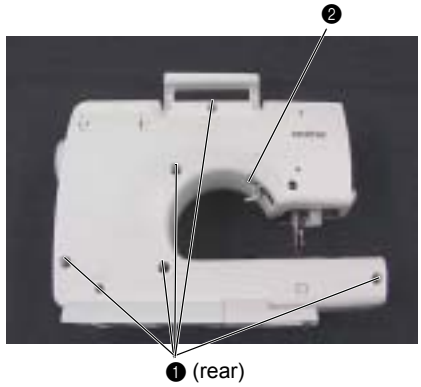


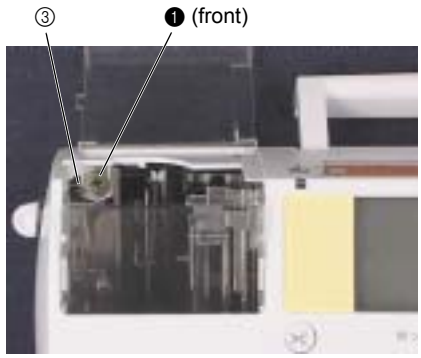
5 Front cover assy. attachment

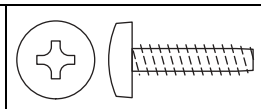
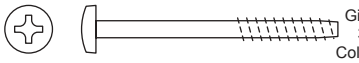
1. Connect the operation S2 (or S3) flat cable ① and the power PCB assy. lead wire connector ② to the main PCB assy. on the arm bed side.
2. Attach the front cover assy. to the arm bed using screws ❶ (one on the front side, five on the rear side) and screw ❷ (one on rear side).

***Key point**

- Be careful to push the thread tension mechanism spring ③ to the left side, and not damage it when attaching the front cover.



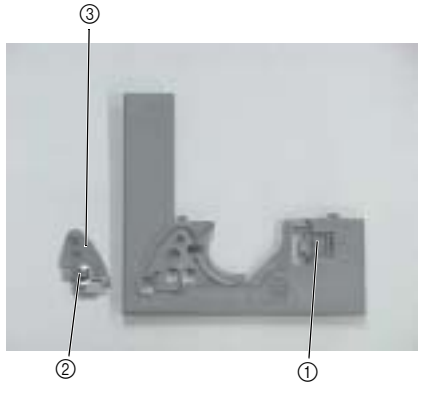


❶	 Giza Tite 5X16 Color; Gold	Torque 1.18 - 1.57 N-m
❷	 Giza Tite 3X32 Color; Gold	Torque 0.78 - 1.18 N-m

6 Needle plate B assy. assembly

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

Start movie clip (CD-ROM version only)



7 Needle plate B assy. attachment

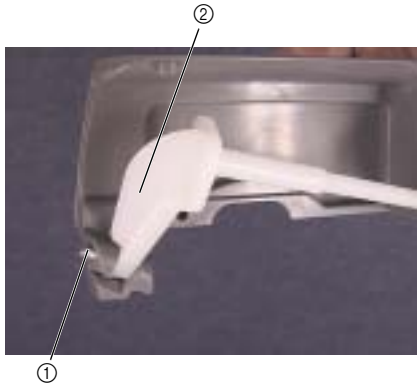
1. Attach the needle plate B assy. ① to the main unit.
2. Attach the needle plate cover to the needle plate B assy. ①.

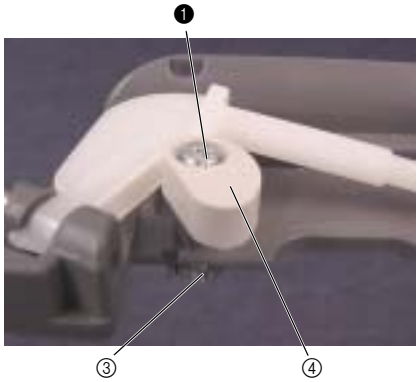
8 Bobbin winder plate assy. assembly

1. Attach the lower thread pin ② to the bobbin winder plate using a spring roll BW3X12 pin ①.
2. Attach the bobbin presser ④ to the bobbin winder plate using screw ❶ and a 2 M3 nut ③.

***Key point**

- Hand start screw ❶, and perform 4 - 18 "Bobbin winder (uneven bobbin winding and bobbin winding amounts) adjustment.

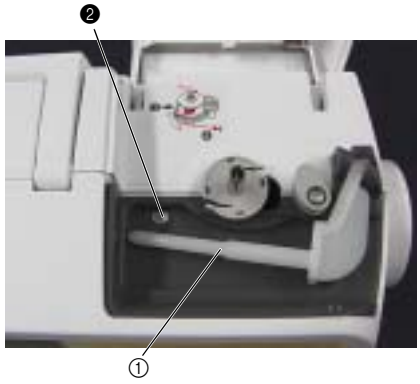


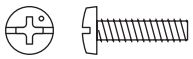


❶		Screw, Pan (S/P washer) M3X20DA Color; Silver	Torque Hand start

9 BW plate assy. attachment

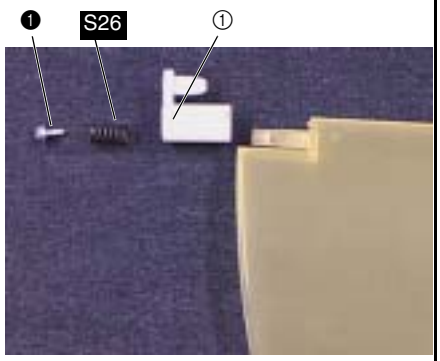
1. Install screw ❶.
2. Attach the bobbin winder plate assy. ① to the main unit using screw ❷.
3. Attach the bobbin base.

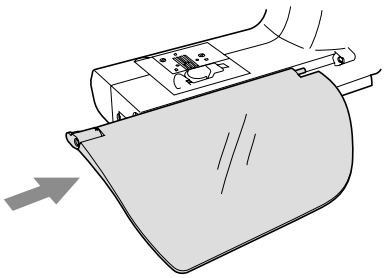


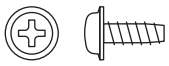
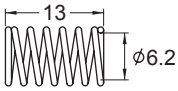
❶		Screw, Pan (S/P washer) M3X6DA Color; Gold	Torque 0.59 - 0.78 N-m
❷		Screw, Bind M3X12 Color; Silver	Torque 0.57 - 0.78 N-m

10 Flap table assembly

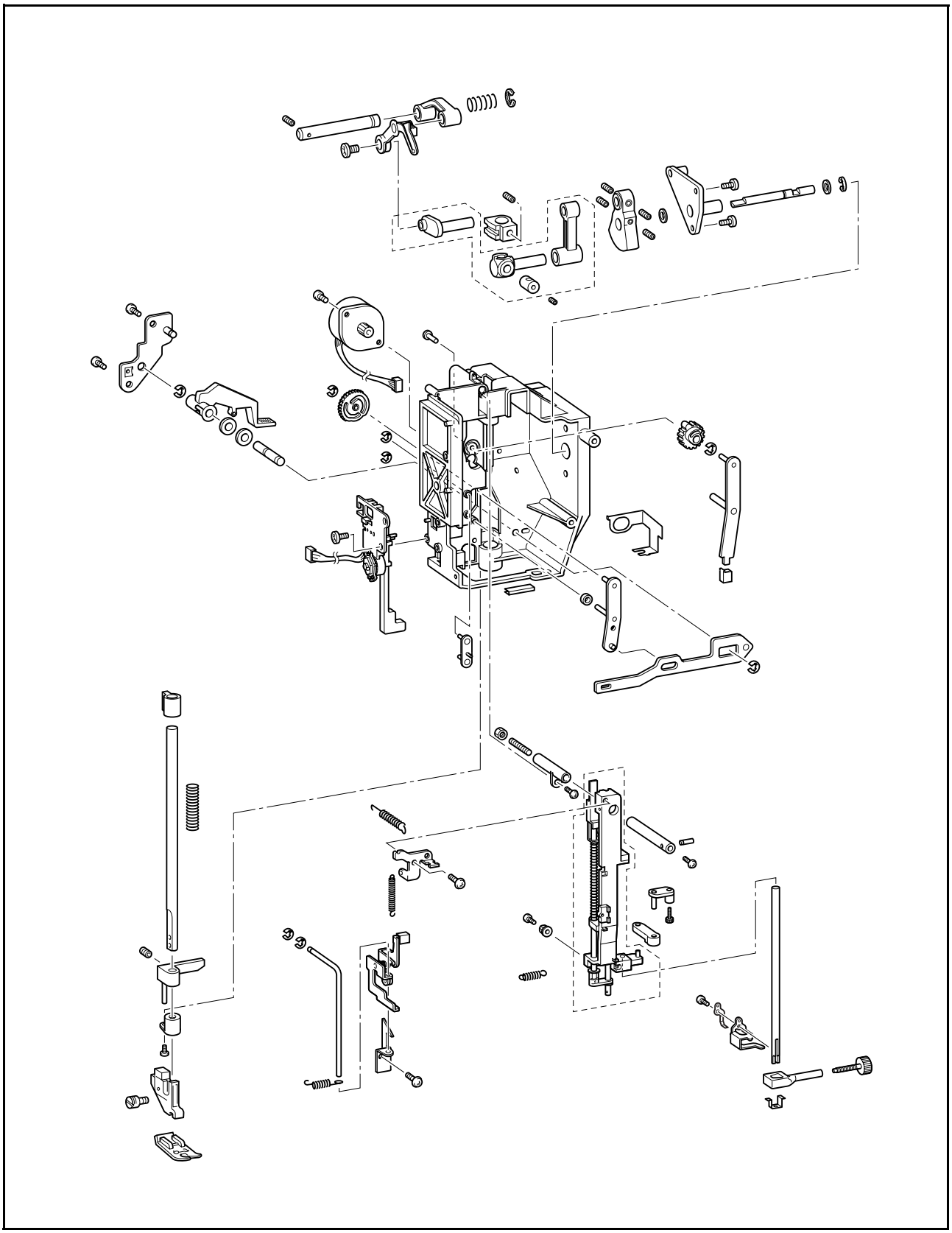
1. Using screw ❶, attach spring S26 and the table bearing ① to the flap table.
2. Attach the flap table to the main unit.





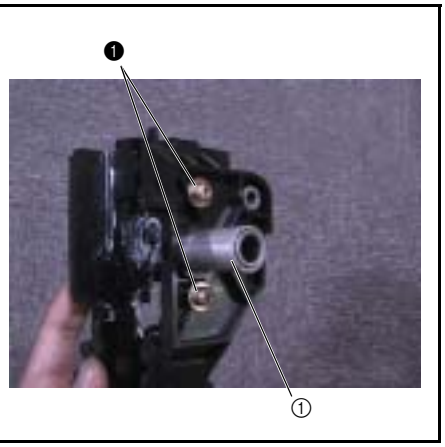
❶		Taptite, Cup B M3X8 Color; Gold	Torque 0.39 - 0.78 N-m
S26			SPRING, COMPRESSION XC3519***

Needle-presser modulebreakout diagram



1 Shaft bushing assembly attachment

1. Attach the shaft bushing assy. ① to the upper unit holder using screws ❶ (two).

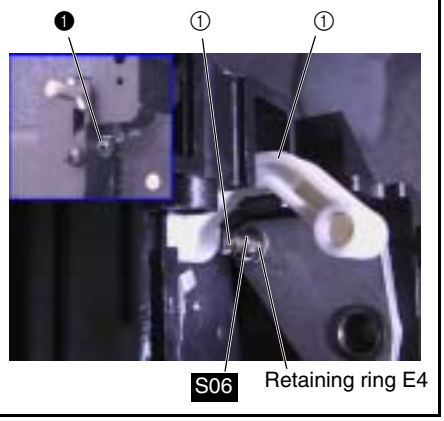


Start movie clip (CD-ROM version only)

❶		Set Screw, Socke M3X5 Color; Bla	Torque 1.18 – 1.57 N–m

2 Thread take-up lever link assembly

1. Attach the shaft ①, spring S06 Aand thread take-up lever link ② to the upper unit holder, and attach retaining ring E4.
2. Install 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)

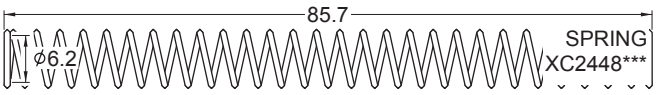
❶		Set Screw, Socket (CP) M3X5 Color; Black	Torque 0.49 N–m
S06	20.7 ϕ5.2		SPRING XC2441***

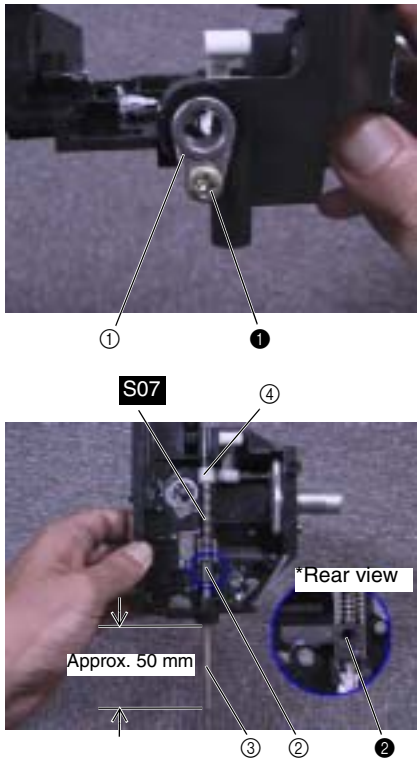
3 Presser bar attachment

1. Attach the presser bar bushing ① and plate spring to the upper unit holder using 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, spring S07 Aand presser spring supporter ④ to the upper unit holder.
5. Hand start screw ❷ in the presser bar clamp ②.
   (Fully tighten after 4 - 15 "Presser bar height and parallel adjustment.")
   ***Key point**
   - Face the D cut in the presser bar ③ to the left, and adjust the length from the upper unit holder base 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 start
S07		85.7 ϕ6.2 SPRING XC2448***	

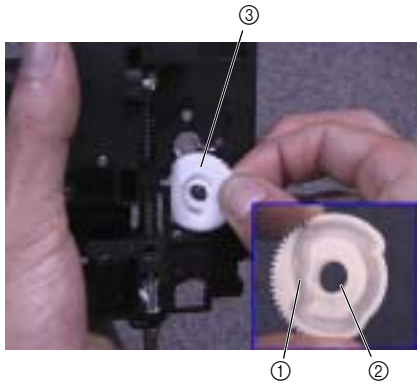


4 T cam attachment

1. Apply a small amount of Molykote Em30L to the cam groove ① and shaft hole② 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

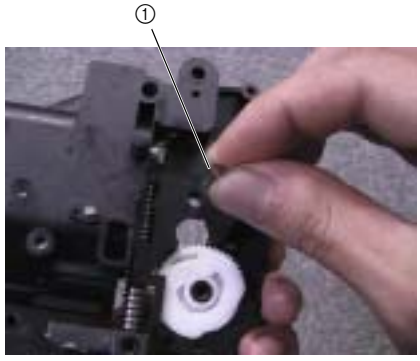
Start movie clip (CD-ROM version only)



5 Shaft attachment

1. Attach the shaft ①.

Start movie clip (CD-ROM version only)



6 Thread release lever assy. attachment

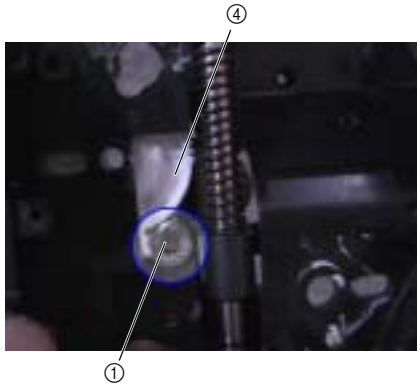
1. Apply a small amount of Molykote EM30L to the thread release lever assy. hole ① hole in the upper unit holder.
2. Attach the thread release lever assy. ② and polyester slider to the upper unit holder, and attach retaining ring E3.

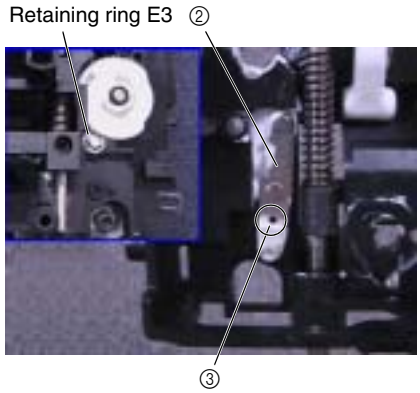
***Key point**

- 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)





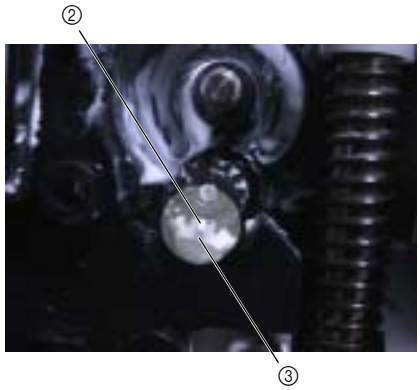
7 Z pulse motor attachment.

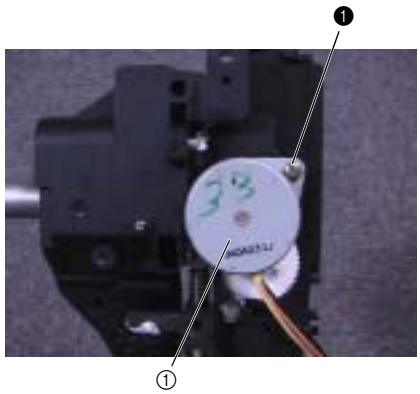
1. Attach the Z pulse motor (ZPMSMJ-35-4840-A) ① to the upper unit holder using screw❶.

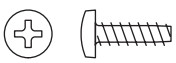
***Key point**

- 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.

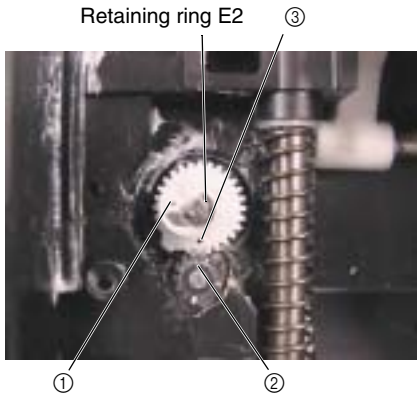
***Key point**

- Align the match mark ② on the Z pulse motor gear and the match mark ③ 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

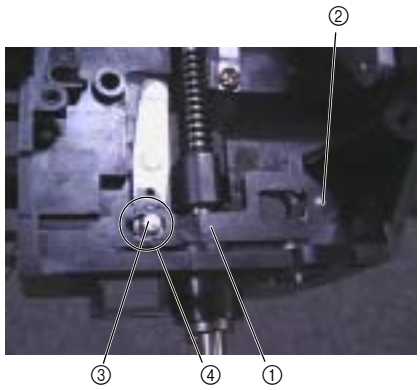
1. Apply Molykote EM30L to the thread releaser assy. ①.
2. Attach the thread releaser assy. ① to the upper unit holder.

***Key point**

- Align the thread releaser assy. ① pin ② and upper unit holder hole and 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 parts of the thread releaser assy. (1).	Small amount

Start movie clip (CD-ROM version only)



10 Z zigzag lever assy. attachment

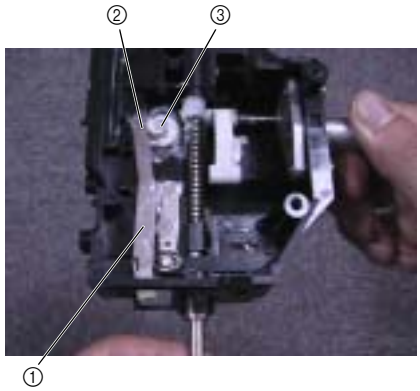
1. Attach the cap to the Z zigzag lever assy. ①.
2. Apply a small amount of Molykote EM30L to the Z zigzag lever assy. ① pins (two).
3. Attach the Z zigzag lever assy. ① to the upper unit holder, and attach retaining ring E3.

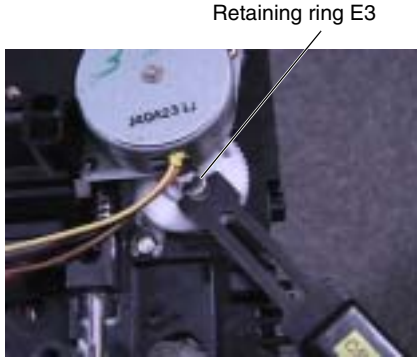
***Key point**

- The end ② of the Z zigzag lever ① goes on 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)





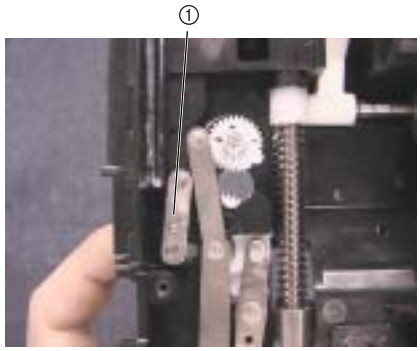
11 Lever release plate assy. attachment

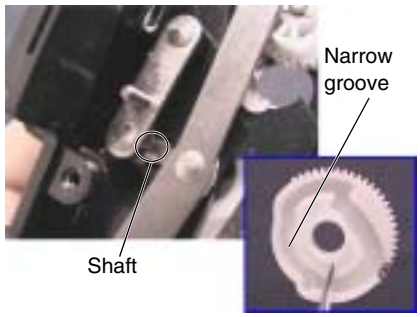
1. Attach the lever release plate assy. ① to the upper unit holder, and attach retaining ring E3.

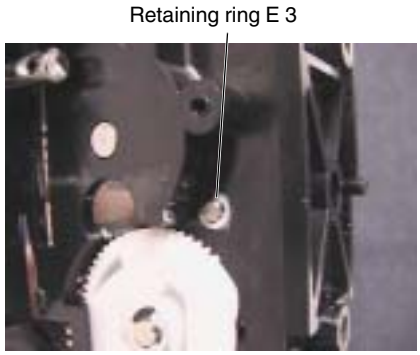
***Key point**

- Align the shaft of the lever release plate assy. with the narrow groove in the T cam.

Start movie clip (CD-ROM version only)







12 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 and thrust washer ② to the shaft bushing assembly ③.
3. Attach the thread take-up counter weight ④ using screws ❶ (two).

***Key point**

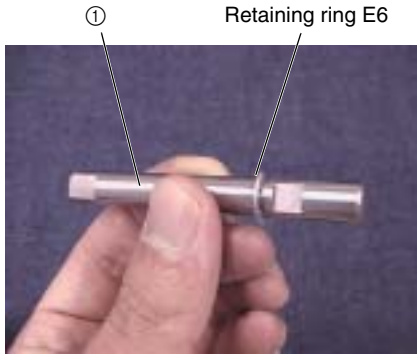
- Align the screw hole ⑤ in the thread take-up counter weight and the unit shaft D cut ⑥.

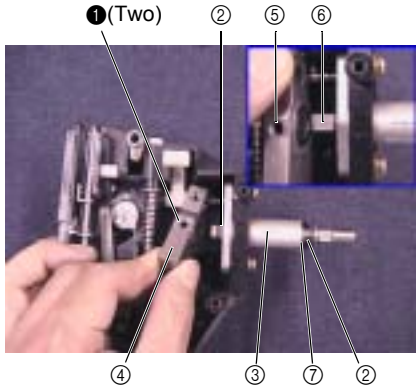
4. Lubricate part ⑦ of the shaft bushing assembly ③ with 1 - 2 drops of Sewing Lube.

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





13 Thread take-up lever assy. attachment

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

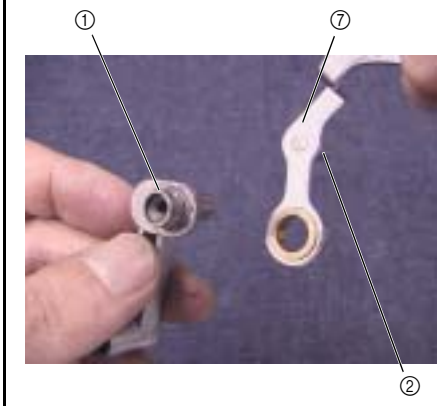
***Key point**
- Align the needle bar crank D cut ⑤ with the thread take-up counter weight screw hole ⑥.

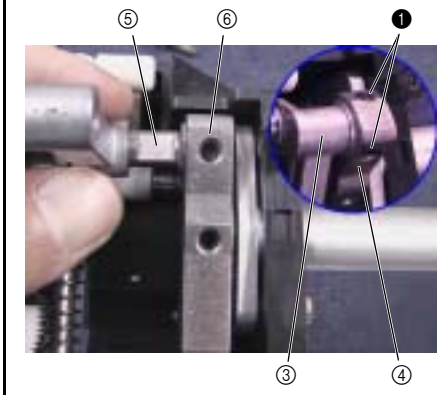
3. Attach the thread take-up lever assy. ⑦ to the needle bar crank rod assy. ③ and thread take-up lever link ⑧ using screw ❷.

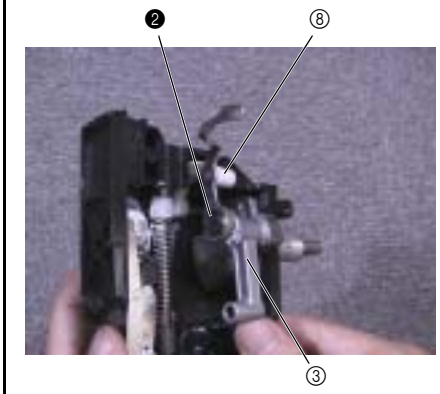
***Key point**
- Screw ❷ is reverse threaded.

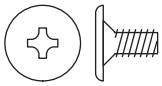
Apply Molykote EM30L grease to the needle bar crank shaft	Small amount
Apply Molykote EM30L grease to the thread take-up lever shaft	Small amount
Apply Molykote EM30L grease to the to the needle bar crank thread take-up attachment (left screw attachment) surface	Small amount

Start movie clip (CD-ROM version only)







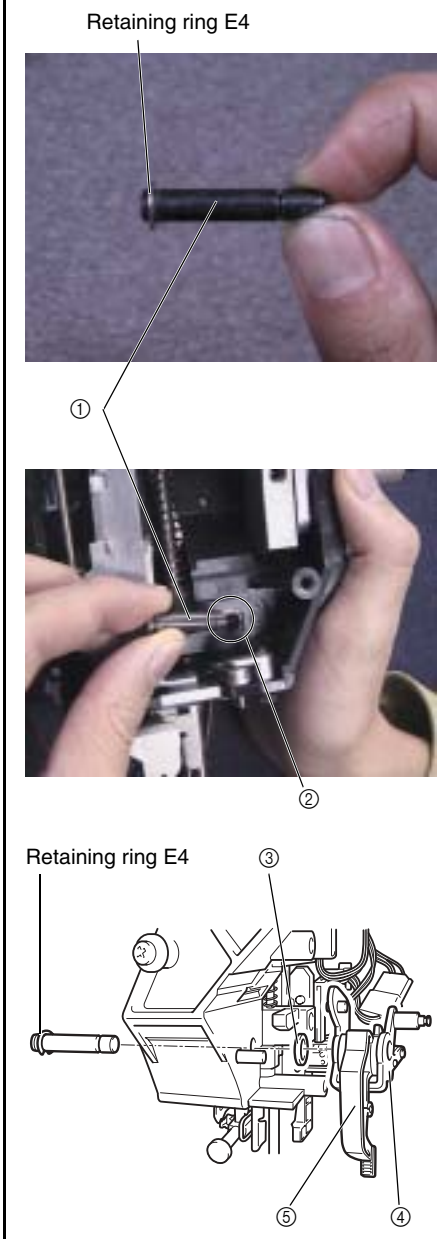
❶		Set Screw, Socket (FT) M5X5 Color; Black	Torque 1.37 – 1.77 N–m
❷		Screw, Flat SM3.57-40X7 L Color; Black	Torque 1.18 – 1.57 N–m

14 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 square hole ② in the thread releaser assy., and attach the washers ③ (two) and presser foot lifter ④.
4. Attach retaining ring E4 to the presser lift shaft ①.

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

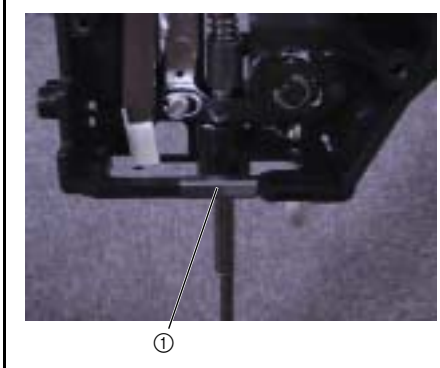
Start movie clip (CD-ROM version only)



15 Thread guide plate attachment

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

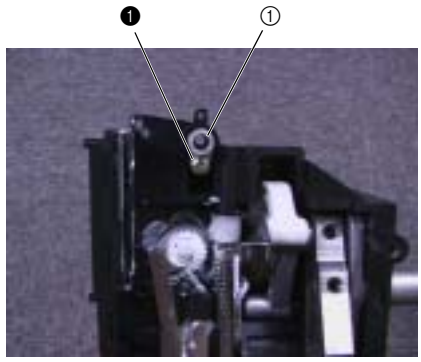
Start movie clip (CD-ROM version only)



16 Shaft bushing A attachment

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

Start movie clip (CD-ROM version only)



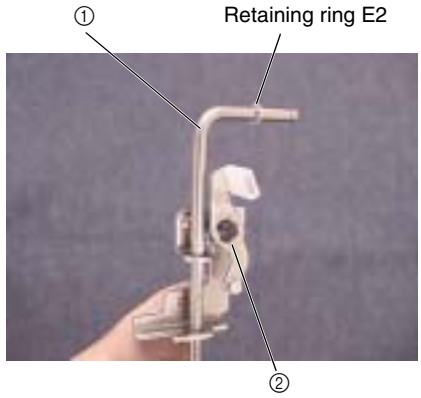
❶		Taptite, Bind B M3X8 Color; Gold	Torque 0.78 – 1.18 N–m

17 Lever AB assy. attachment

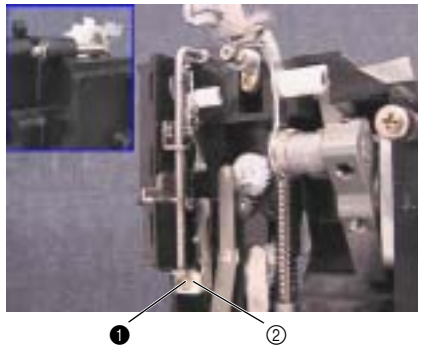
1. Attach retaining ring E2 to the lever guide shaft ①.
2. Apply a small amount of Epnoc Grease AP to the lever guide shaft.
3. Attach the Lever AB assy. ② and spring S39 to the lever guide shaft.
4. Apply a small amount of Molykote EM30L to the upper unit holder slide groove.
5. Attach the lever guide shaft to the upper unit holder, and attach the lever supporter plate ② using screw ❶.
6. Attach retaining ring E2 to the lever guide shaft.
7. Apply a small amount of Molykote EM30L to the lever AB assy.

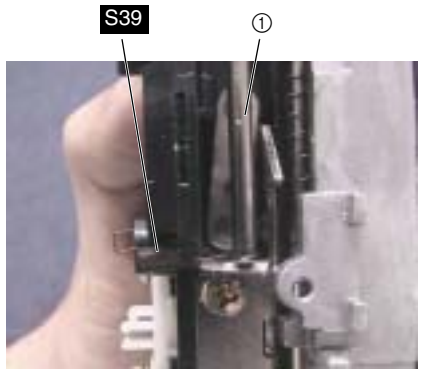
Epnoc Grease AP	Small amount
Molykote EM30L	Small amount

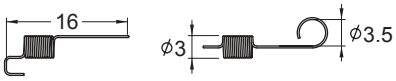
Start movie clip (CD-ROM version only)



Retaining ring E2





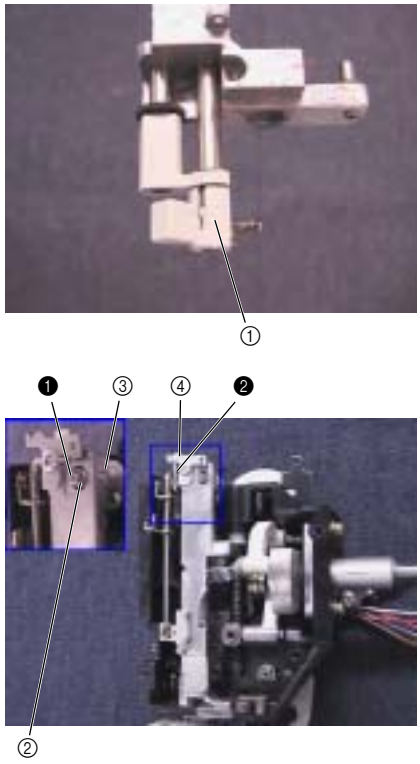
❶		Screw, Bind M3X6 Color; Silver	Torque 0.58 - 0.78 N–m
S39			GROUND SPRING XC5348***

18 Needle bar supporter assy. attachment.

1. Attach the thread hook assy. ① to the needle bar supporter assy. ①.
2. Attach the needle bar supporter assy. to the upper unit holder.
3. Attach shaft ② and shaft ③, and install screw ❶.
4. Lubricate the shaft with 1 – 2 drops of turbine oil #100.
5. Attach the plate ④ using screw ❷.

Turbine oil # 100	1 – 2 drops

Start movie clip (CD-ROM version only)

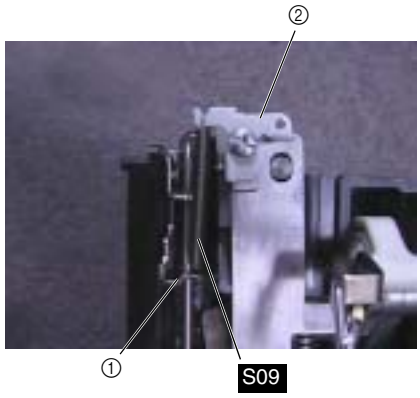


❶		Screw, Bind M2X4 Color; Silver	Torque 0.37 - 0.78 N–m
❷		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N–m

19 Lever A spring attachment

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

Start movie clip (CD-ROM version only)



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

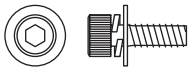
20 Shaft assy. attachment

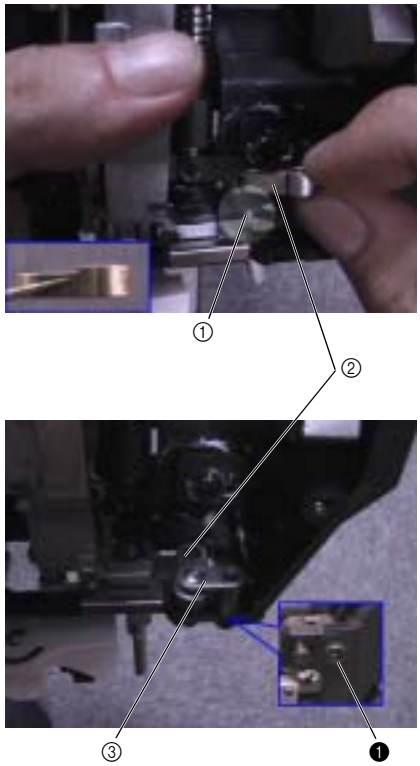
1. Apply a small amount of Epnoc Grease AP to the needle bar supporter assy. needle roller ①.
2. Attach the needle holder block ② to the needle bar supporter assy. needle roller ①.

   ***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 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)

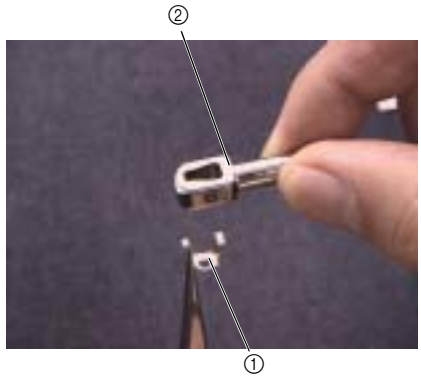
❶		Screw 3X10 Color; Black	Torque Hand start

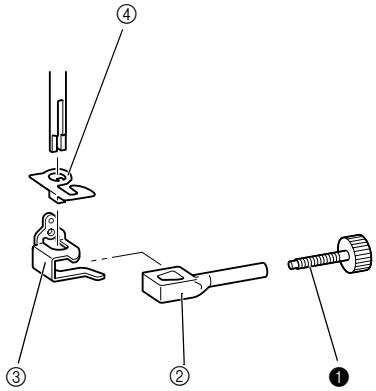


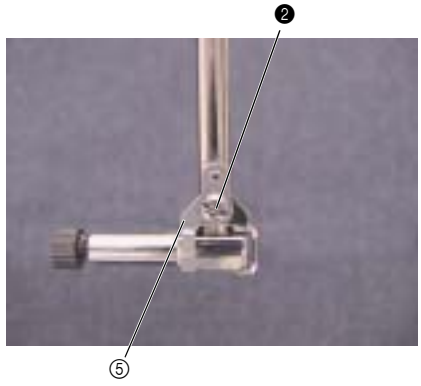
21 Needle bar assy. assembly

1. Attach the needle thread plate ① to the needle block ②.
2. Attach the needle block ②, needle bar thread guide ③ and support spring ④ using screw ❶.
3. Attach the needle block supporter ⑤ using screw ❷.

Start movie clip (CD-ROM version only)







❶	Needle Clamp Screw Color; Black	
❷	Screw SM2.38 Color; Silver	Torque 0.39 – 0.718 N–m

22 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 ❶ (two).
   (Fully tighten after 4 - 9 "Needle bar height adjustment," and 4 - 23"Adjust the needle thread block.")

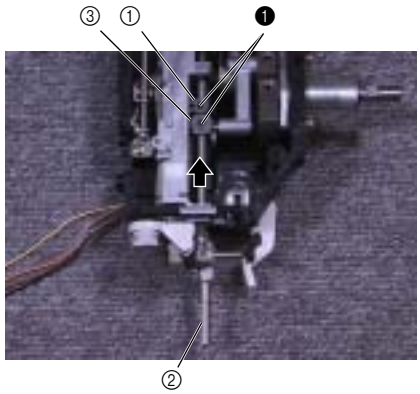
***Key point**

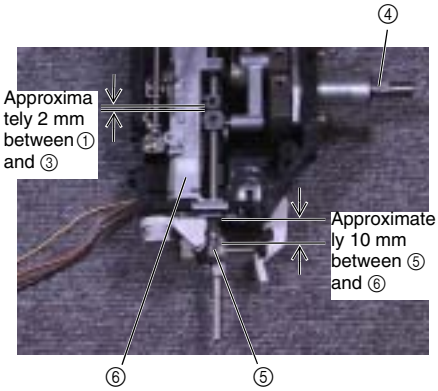
- With the unit shaft D cut ④ facing forward, the upper surface of the needle block ⑤ and the base of the needle bar supporter assy. ⑥ should be adjusted to an approximately 10 mm separation.
- Adjust the space between the needle thread block ① and the needle bar block ③ to approximately 2 mm.
- When the needle thread block ① is viewed from the front, it is secured in a position turned slightly counterclockwise (see 4 - 23 "Adjust the needle thread block").

Lubricate the needle bar block needle bar crank joint area on the needle bar block with Molykote (Sewing Lube 90% + Molykote dispersion)	1 – 2 drops
Apply Epnoc Grease AP to the pin sliding 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 start





23 Lock nut attachment

1. Install screw ❶ in the locknut ①.

***Key point**

- Screw the screw ❶ in approximately half its length.

2. Install ❶ in the upper unit holder.

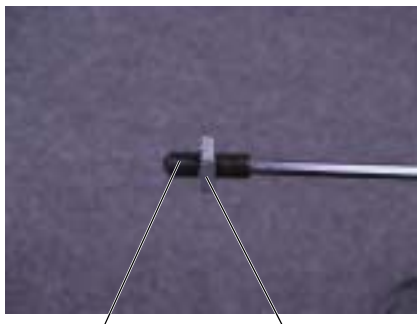
***Key point**

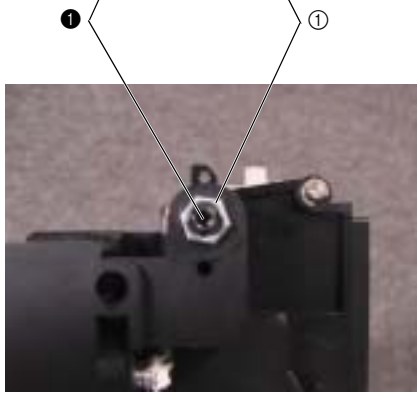
- Tighten until the lock nut ① hits the upper unit holder.

3. Tighten the lock nut ①.

Start movie clip (CD-ROM version only)

❶		Set Screw, Socket (CP) M4X12 Color; Black	Torque 0.39 - 0.49 N–m





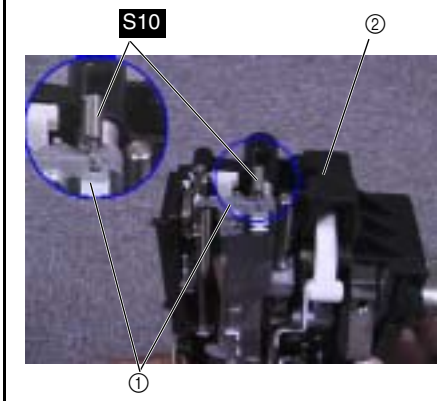
24 Spring (for needle bar supporter assy.) attachment

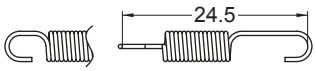
1. Attach plate ① and the upper unit ② holder spring S10 to the needle bar supporter assy.

***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		SPRING XC2429***

25 Zigzag adjusting nut attachment

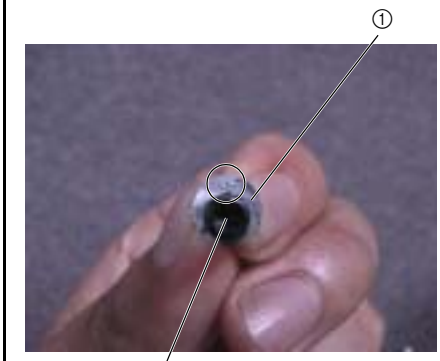
1. Apply a small amount of Epnoc Grease AP to the zigzag adjusting nut ①.
2. Hand tighten the zigzag adjusting nut (1) on the needle bar supporter assy. using screw ❶.

***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)



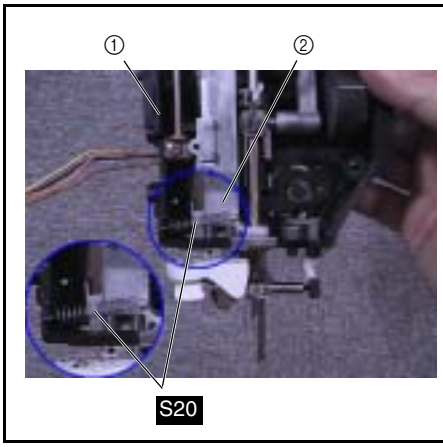
*Rear view

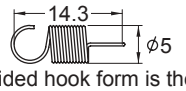
❶		Bolt, Socket M4X25 Color; Black	Torque 0.98 - 1.37 N–m

26 Spring-Z attachment

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

Start movie clip (CD-ROM version only)



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

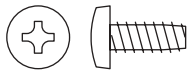
27 Adjusting plate assy. attachment

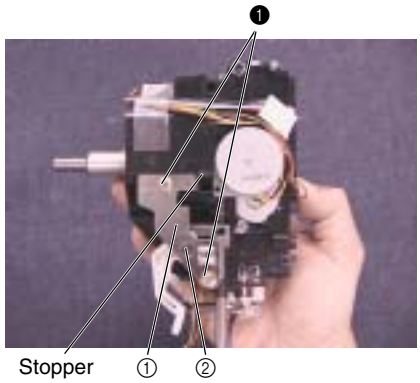
1. Attach the adjusting plate assy. ① to the upper unit holder using screws ❶ (two).

***Key point**

- Hold the adjusting plate assy. ① against the right stopper and attach.
- Align the presser lift shaft and the adjusting plate assy. hole ②.
- Tighten both the adjusting plate assy. ① and the plate spring using the lower screw ❶.

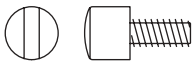
Start movie clip (CD-ROM version only)

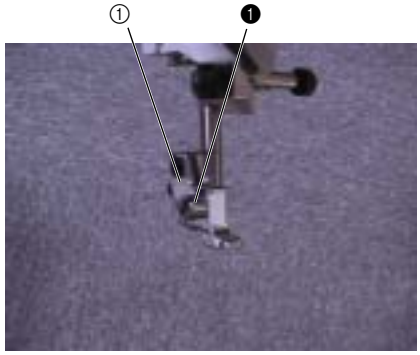
❶		Taptite, Bind B M4X10 Color; Gold	Torque 1.18 – 1.57 N–m



28 Presser feed holder assy. attachment.

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

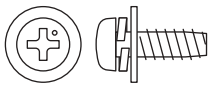
❶		Screw 3.57 Color; Silver	Torque 1.18 – 1.57 N–m

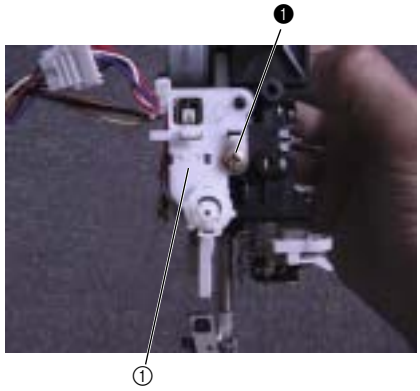


29 BH switch assy. attachment

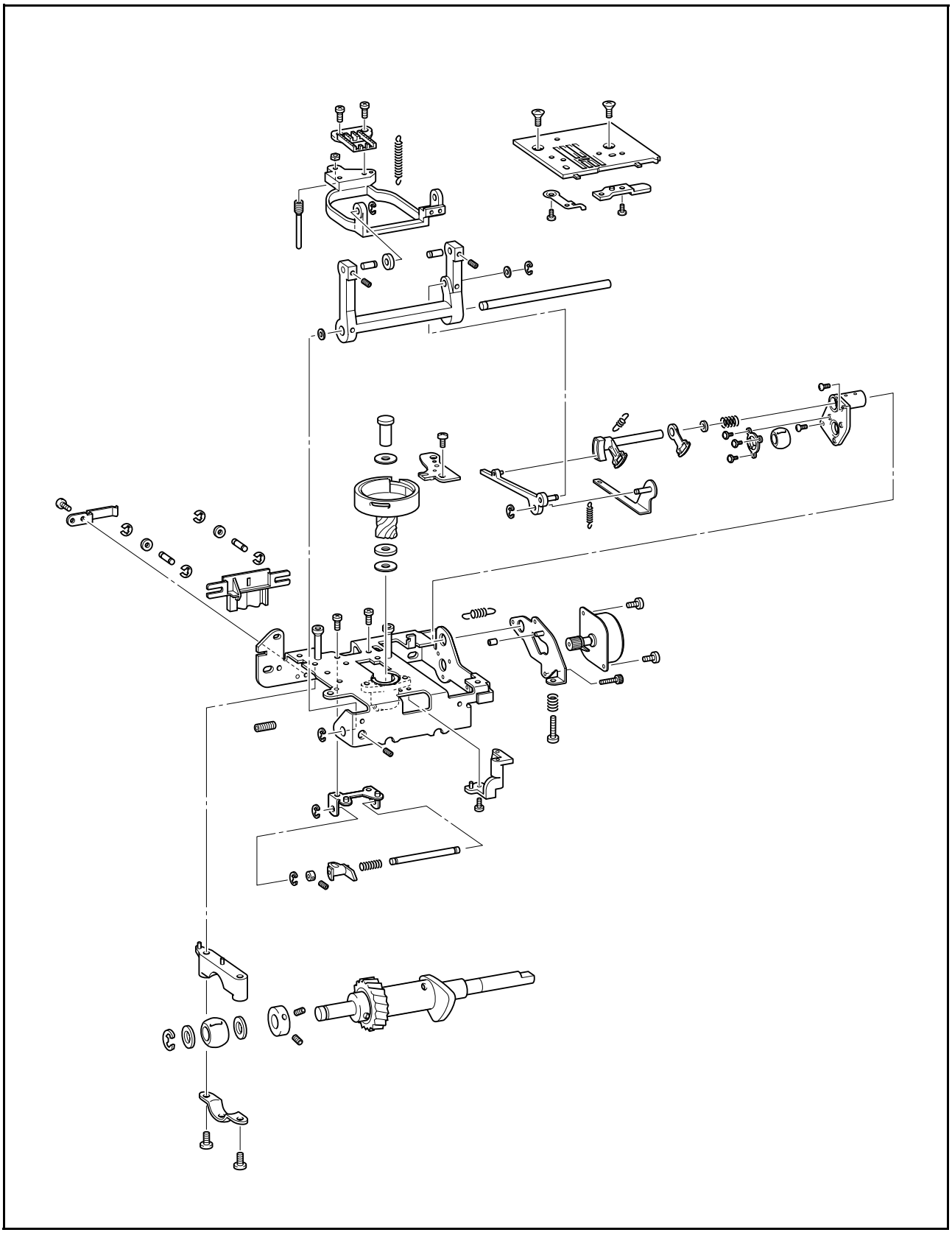
1. Attach the BH switch assy. ① to the upper unit holder using screw ❶.

Start movie clip (CD-ROM version only)

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



Feed module breakout diagram

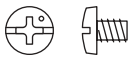


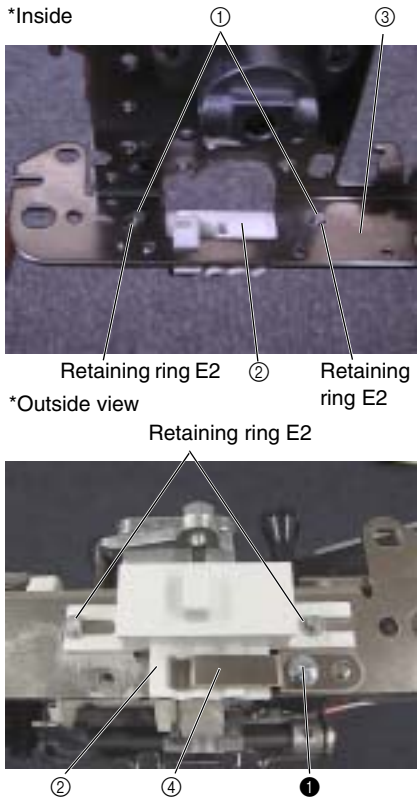
1 Drop knob attachment

1. Attach retaining rings E2 (two) to slide shafts B ①.
2. Attach the drop knob ② and to the slide shaft B assemblies 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 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

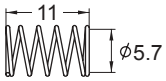


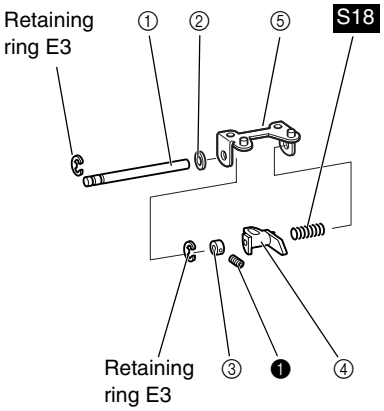
2 Drop assy. assembly

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 ③, vertical lever ④ and spring S18 to the vertical supporting plate ⑤, and attach retaining ring E3.
3. Hand start screw ❶ in the set screw collar ③.
   (Fully tighten after 3 - 71 "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)

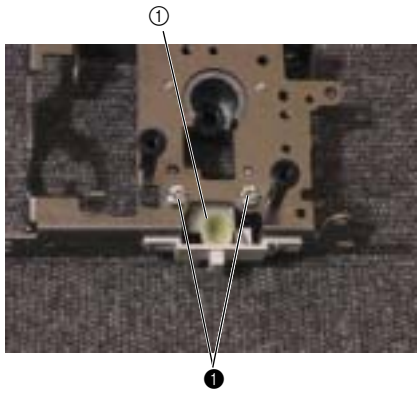
❶		Set Screw, Socket (CP) M4X4 Color; Black	Torque Hand start
S18			SPRING XC2550***

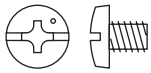


3 Drop assy. attachment

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

Start movie clip (CD-ROM version only)



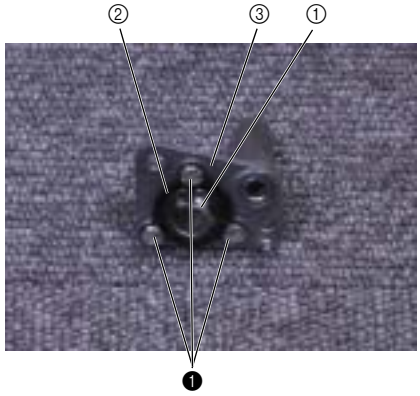
❶		Screw, Bind M4X5 Color; Silver	Torque 1.18 – 1.57 N–m

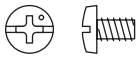
4 Bushing supporter assy. assembly

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

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

Start movie clip (CD-ROM version only)



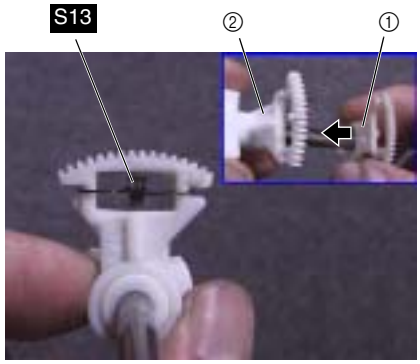
❶		Screw, Bind M3X5 Color; Silver	Torque 0.78 – 1.18 N–m

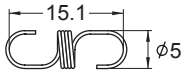
5 Feed adjuster assembly

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 spring 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***

6 Feed adjuster assy. attachment

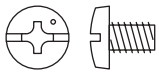
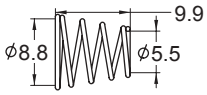
1. Attach the feed adjuster assy. ①, polyester slider ② and spring S14 to the bushing supporter assy. ③.

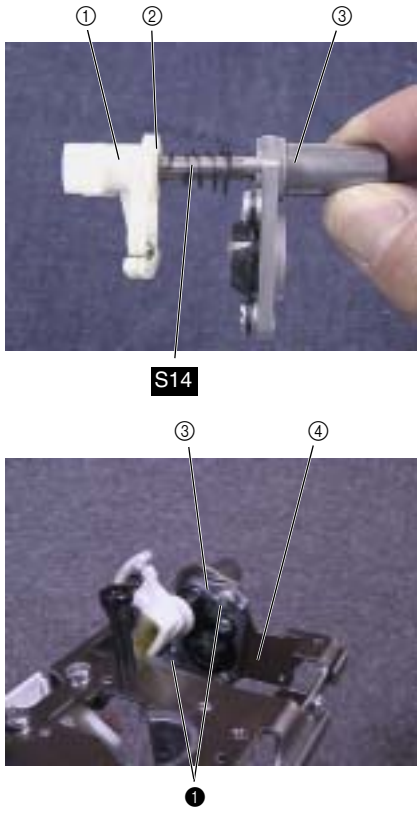
   ***Key point**
   - Attach spring S14 to the feed adjuster assy. ② starting with the side having the smaller spring diameter.

2. Attach the bushing supporter assy. ③ and feed adjuster assy. ② to the feed base ④ using 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 assy. feed regulator.	Small amount

Start movie clip (CD-ROM version only)

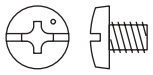
❶		Screw, Bind M4X6 Color; Silver	Torque 1.18 – 1.57 N–m
S14			SPRING XC2531***

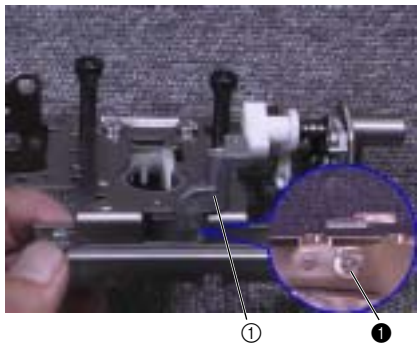


7 Stopper plate block assy. attachment

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

Start movie clip (CD-ROM version only)

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

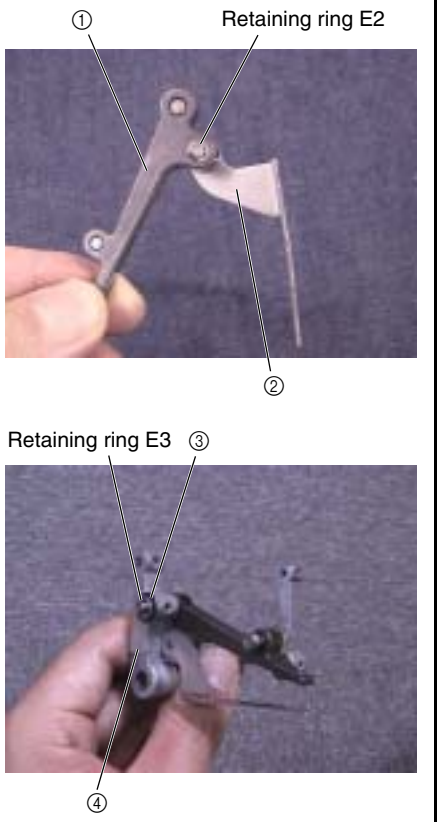


8 Feed arm assy. assembly

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)

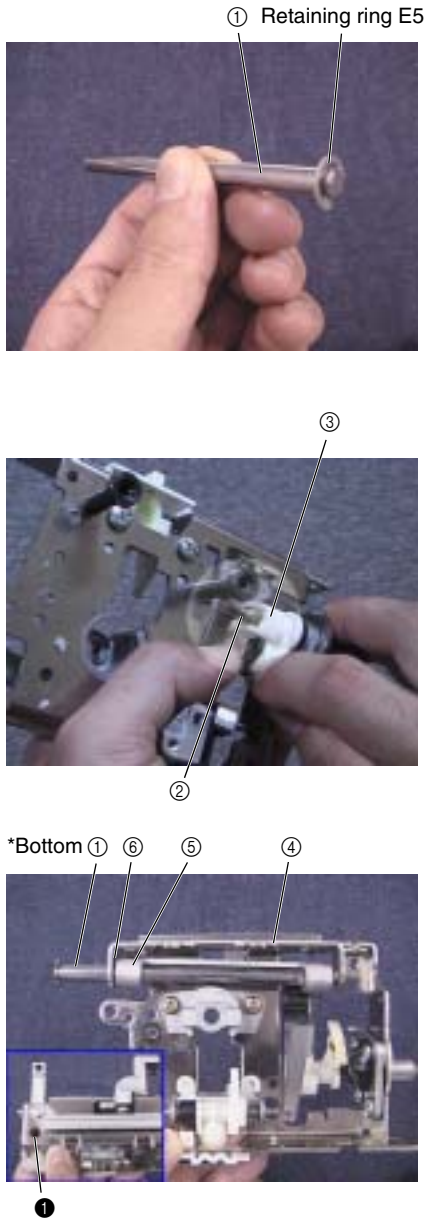


9 Feed arm assembly attachment

1. Attach retaining ring E5 to the horizontal feed shaft ①.
2. Align the feed arm B assy. feed regulator slide shaft ② with the square hole ③ in the feed adjuster assy.
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 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

10 Lower shaft B assy. assembly

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.

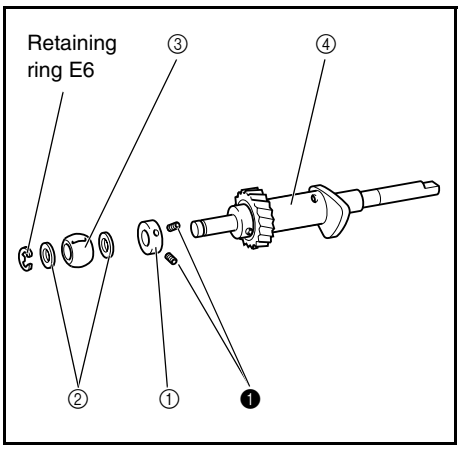
   ***Key point**
   - Attach the set screw collar ① with the ground surface facing the lower shaft bushing ③.

2. In stall screws ❶ (two) in the set screw collar ①.

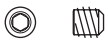
   ***Key point**
   - Attach the set screw collar ① in a position that allows the lower shaft bushing ③ to turn smoothly.

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

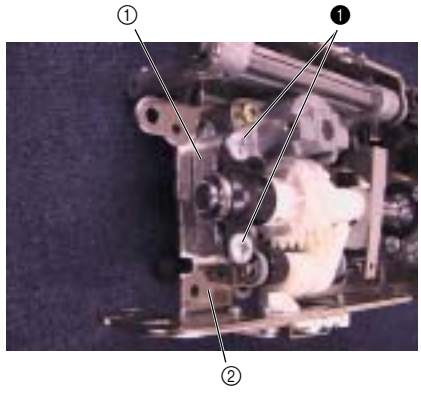
11 Lower shaft B assy. attachment

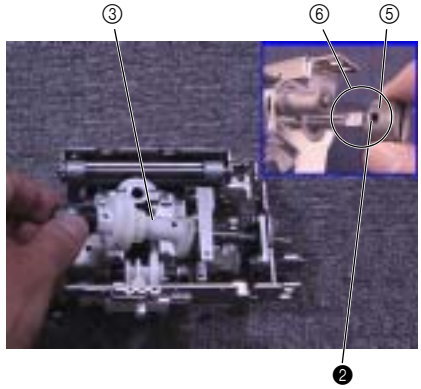
1. Attach the bushing supporter A ① to the feed base ②.
2. Attach the lower shaft B assy. ③.
3. Attach bushing presser A ④ using screws ❶ (two).
4. Attach the joint ⑤ using screws ❷ (two).

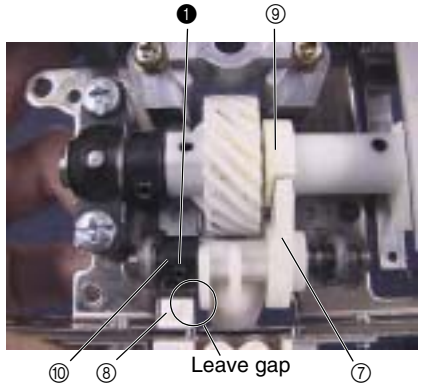
   ***Key point**
   - Align the screw hole ⑥ in the joint ⑤ and the D cut ⑥ in the lower shaft B.
5. Adjust the right-left position of the set screw collar ⑩ so that there is a gap between the vertical lever ⑦ and the drop knob ⑧ and so that the vertical feed cam contact area of the vertical lever ⑦ does not come off of the vertical feed cam ⑨, and fully tighten *screw S15.

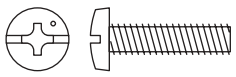
Lubricate the lower shaft (inserted side of bushing supporter assy.) with Sewing Lube.	1 – 2 drops

Start movie clip (CD-ROM version only)





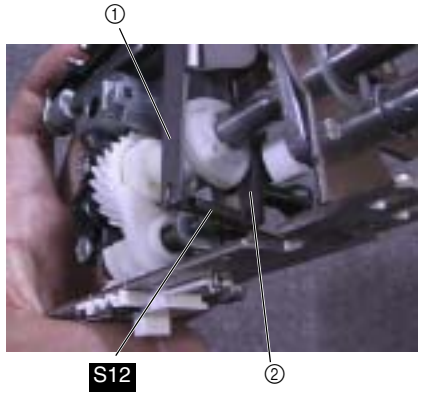


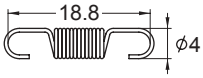
❶		Screw, Bind M4X16 Color; Silver	Torque 1.18 – 1.57 N–m
❷		Set Screw, Socket (CP) M5X5 Color; Black	Torque 1.18 – 1.57 N–m

12 Support spring attachment

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

Start movie clip (CD-ROM version only)

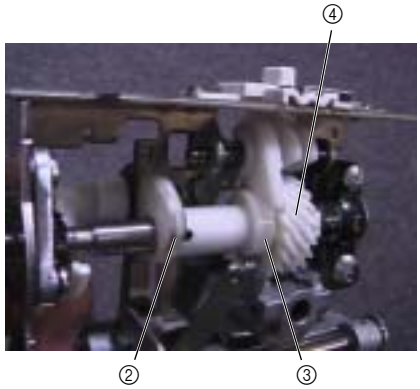


S37		SPRING XZ0174***

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



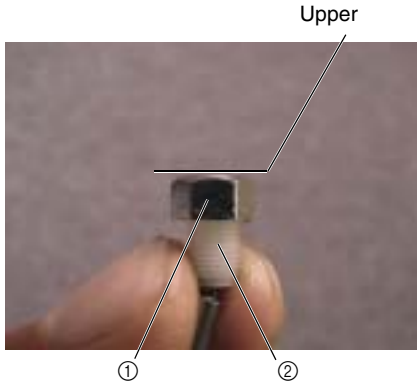
14 Vertical adjusting screw attachment

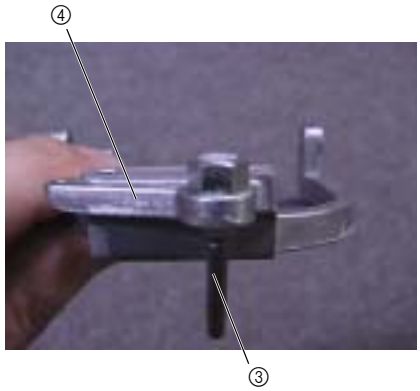
1. Attach the M5 nut ① to the vertical adjusting screw ②.

   ***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 assy. 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)





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 screws ❶ (two).

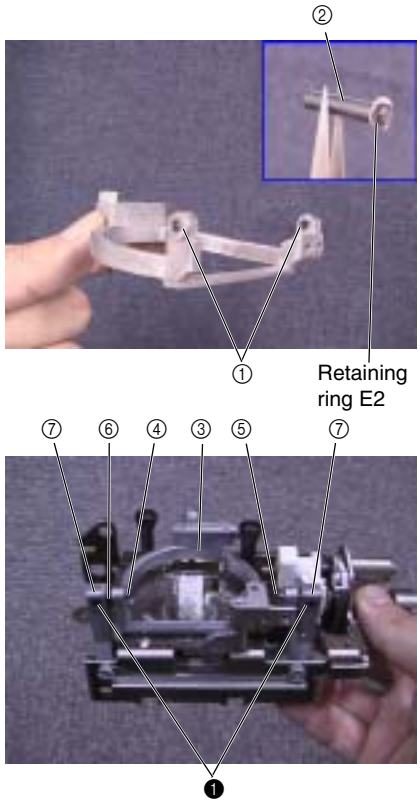
***Key point**

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

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



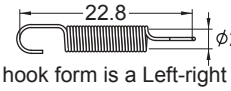
16 Feed bar spring attachment

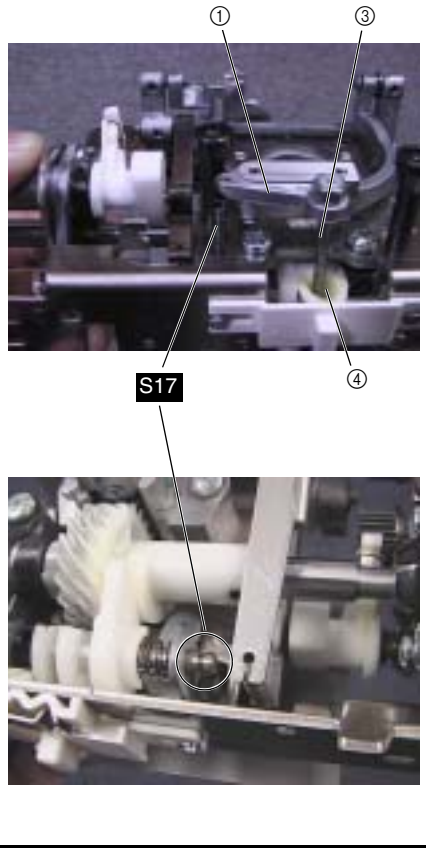
1. Attach spring S17 to the feed bar ① and vertical feed shaft ②.

***Key point**

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

Start movie clip (CD-ROM version only)

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



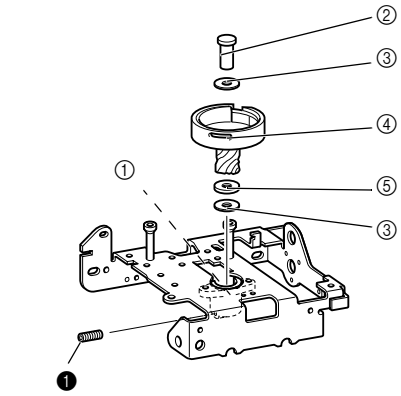
17 Outer rotary hook assy. attachment

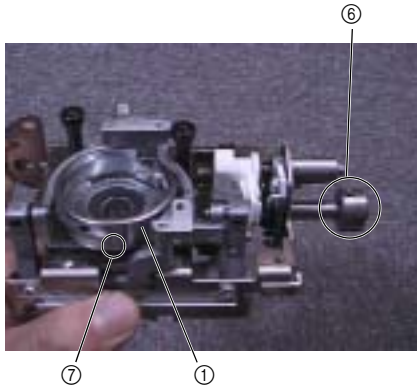
1. Apply a small amount of Molykote EM30L to the shaft supporter ①.
2. Install the outer rotary hook shaft ②, spacer (thin) ③, outer rotary hook assy. ④, washer 6 (thick) ⑤ and spacer (thin) ③.

   ***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 screw ❶ in the shaft supporter.

Apply Molykote EM30L grease to the shaft supporter attachment 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. Attach the inner rotary hook bracket assy. using screw ❶.

Start movie clip (CD-ROM version only)

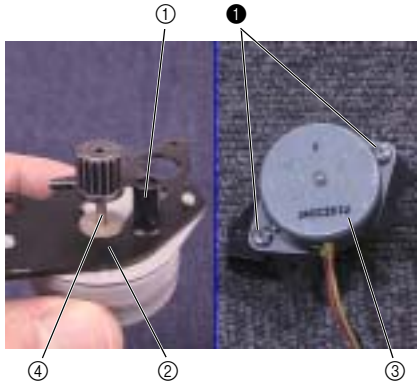
❶		Screw, Bind M3X6 Color; Silver	Torque 0.78 – 1.18 N–m

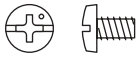
19 F pulse motor assy. assembly

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 screws ❶ (two).
3. Lubricate the F pulse motor (FPM35SP-9N) ② bearing ④ with 1 – 2 drops of 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

20 FPM holder assy. attachment

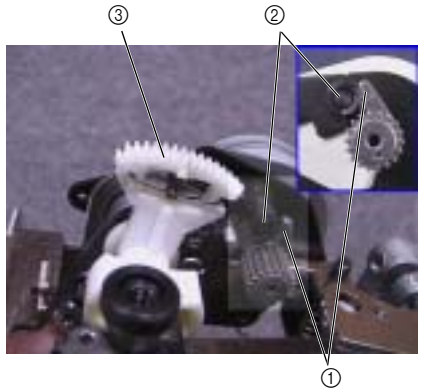
1. Turn the F pulse motor gear counterclockwise until the stopper ① on it touches the FPM holder assy. shaft. ②.
2. Set the feed adjuster assy. ③ to the position in the figure to the right.
3. Attach the F pulse motor assy. ④.
4. Attach spring S15 and screw ❶.

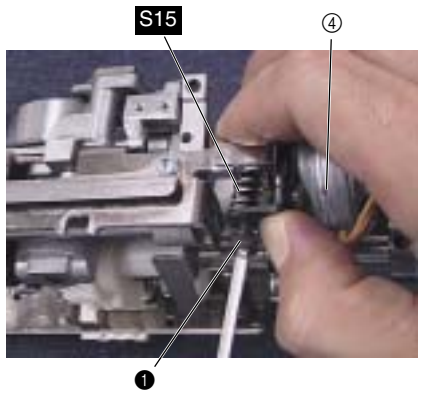
***Key point**

- To prevent screw ❶ from being tightened into the spacer at an angle, compress *spring S15 and tighten screw ❶.
- Tighten 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 *screw ❷.
   (Fully tighten after 4 - 14 "Feed adjustment.")

Start movie clip (CD-ROM version only)





❶	Bolt, Socket M4X25 Color; Black	Since the adjustment is by the amount the screw is tightened, there is no specified torque.
❷	Screw M3X8 Color; Black	Torque Hand start
S15	21, ø5	SPRING XC2537***

21 F gear teeth alignment

1. Apply a small amount of Epnoc Grease AP to the feed adjuster 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.

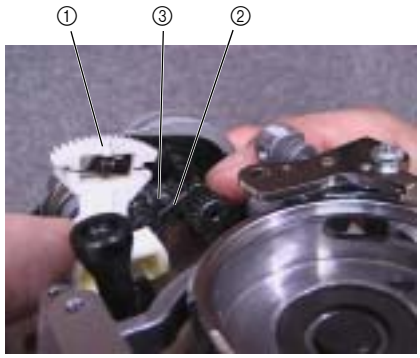
4. Push the feed adjuster ④ until the feed adjuster ④ and the F gear ⑦ have their gears aligned ⑧.
5. With the gears ⑧ aligned, push them down, and mesh the feed adjuster assy. ④ and F pulse motor gears.

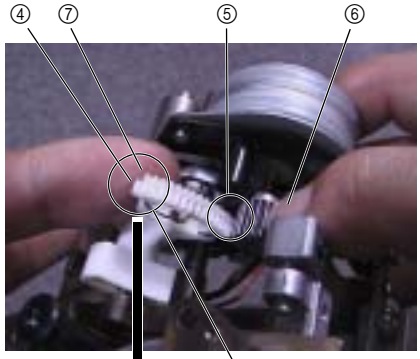
***Key point**

- Check that the feed adjuster assy. ④ gear match mark ⑨ and the F pulse motor gear match mark ⑩) are aligned.

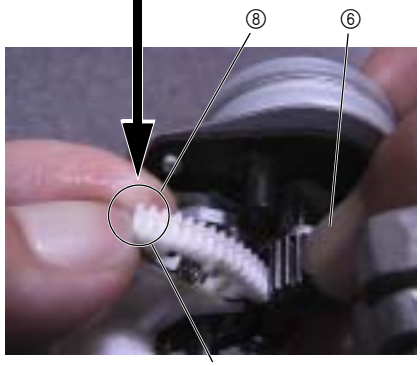
Apply Epnoc Grease AP to the all of the teeth on the feed adjuster F gear	Small amount

Start movie clip (CD-ROM version only)





Gear is offset

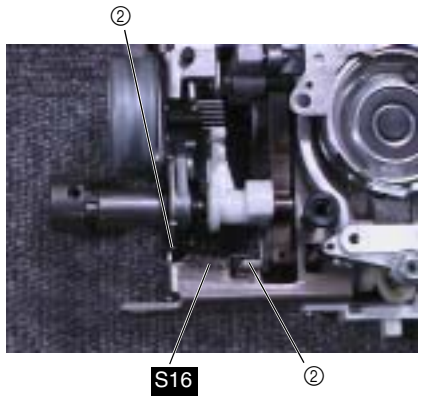


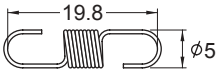
Gear aligned

22 Spring attachment (for FPM holder assy.)

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

Start movie clip (CD-ROM version only)

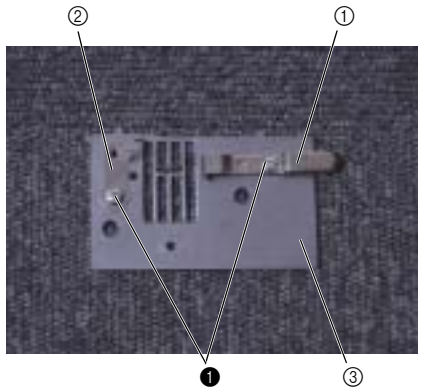


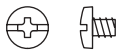
S16		SPRING XC2538***

23 Needle plate A assy. assembly

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

Start movie clip (CD-ROM version only)

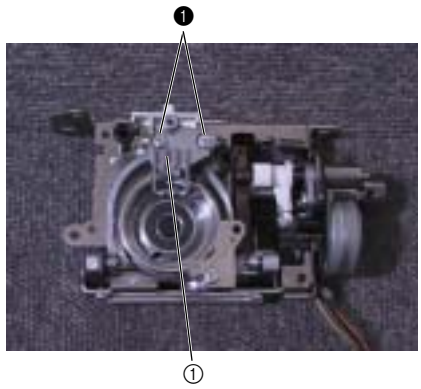


❶		Screw, Bind M2.6X3 Color; Silver	Torque 0.57 – 0.78 N–m

24 Feed dog attachment

1. Attach the feed dog ① and hand start screws ❶ (two).
(Fully tighten after 4 - 19 "Front/back, left/right position of feed dog adjustment.")

Start movie clip (CD-ROM version only)

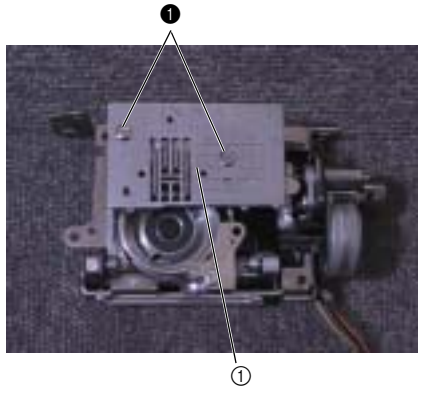


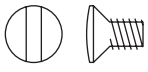
❶		Screw, Bind M3X8 Color; Silver	Torque Hand start

25 Needle plate A assy. attachment

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

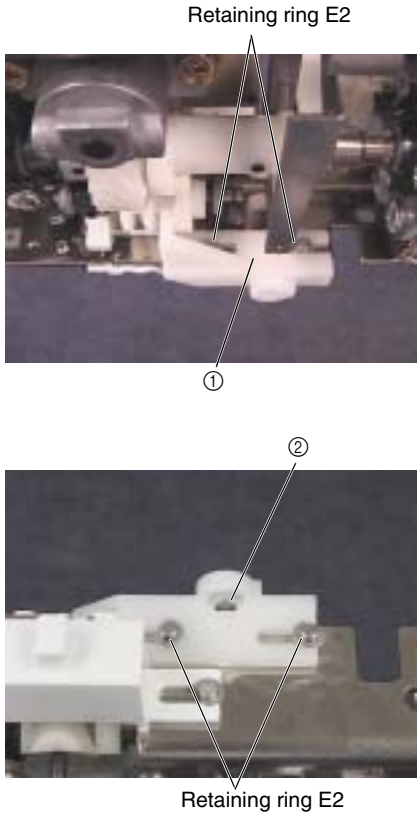
Start movie clip (CD-ROM version only)



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

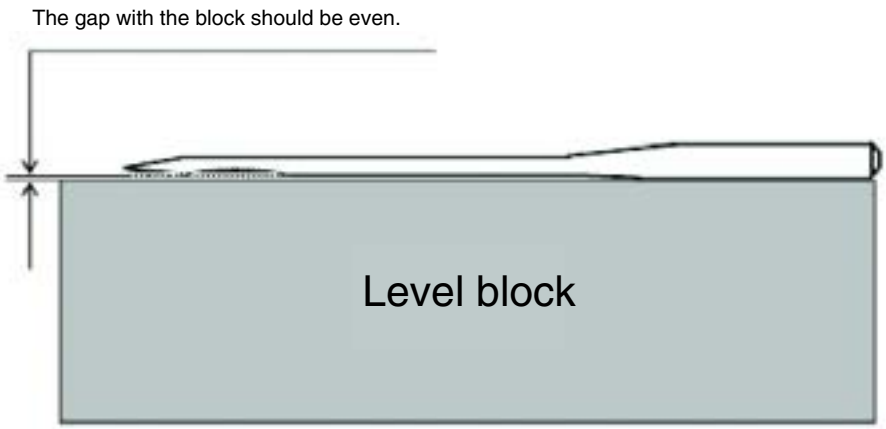
26 Drop lever SE attachment

1. Attach retaining rings E2 (two) to slide shafts A (two).
2. Attach the slide shaft A assemblies (two) and the drop lever SE ① to the feed base, and attach retaining rings E2 (two).



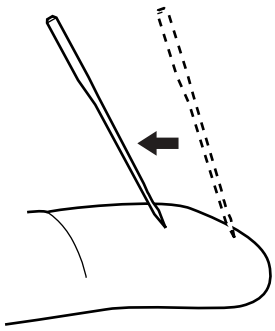
4 Adjustment

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



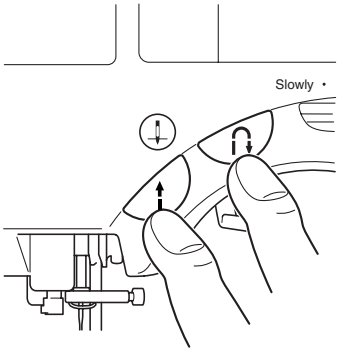
Inspection	Tip damage to needle

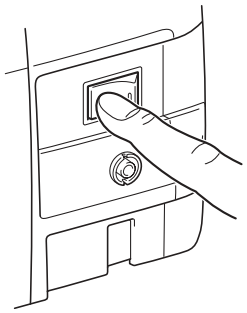
1. Touch the tip of the needle to your finger, and check to be sure it does not catch.



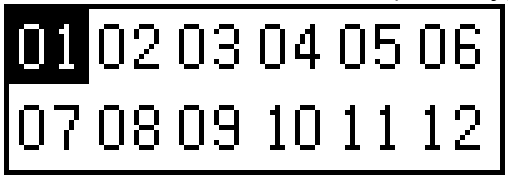
1.Starting in test mode

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





Test mode selection screen (S3 only)



2. Mode selection

<S2>

Press , and select pattern number (mode).

<S3>

Select the pattern number (mode) using or , and press .

3. Starting and stopping test mode

Press

4. Returning to the test mode selection screen

When test mode is stopped, press

5. Test modes (used for adjustments)

Mode	Mode selection Screen number		Z (zigzag) operations	F (feed) operations	Operating speed
3 point needle drop	S2	02	Switches left base line / center base line / right base line with each stitch *Pressing stops the base line from changing.s	0 mm (none)	Any speed may be selected using the speed control key
	S3	03			
Feed adjustment	S2	05	100 stitches forward on the left base line 100 stitches reverse on the right baseline		Switches low / middle / high speed with each push of .
	S3	06			

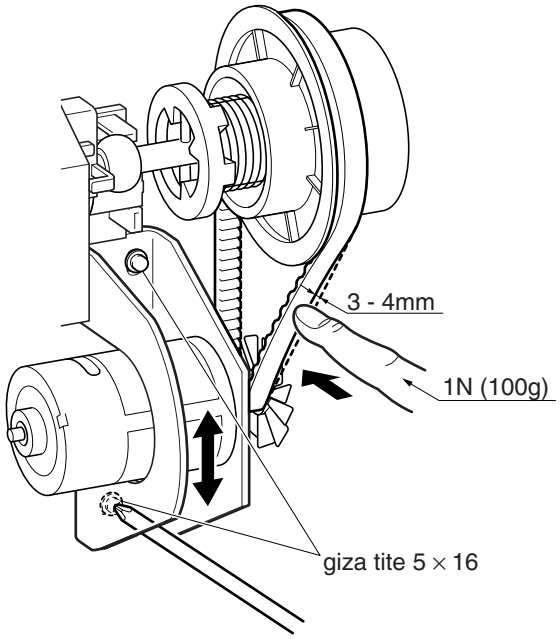
1. Loosen giza tite 5X16 (two locations: securing motor holder).
2. Move the motor holder up and down and adjust the motor belt tension.

Motor belt deflection when a force of approximately 1 N (100 g) is applied to the middle of the motor belt:	3 - 4 mm

XC2277001	Push-pull gauge (3 N)

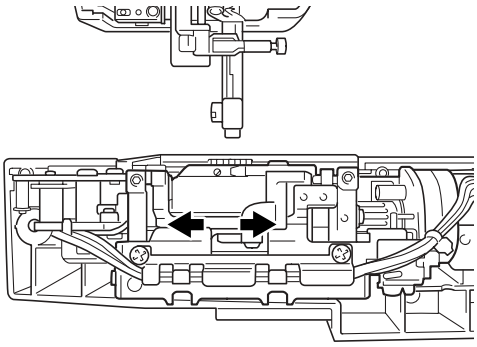
3. Fully tighten the giza tites 5X16 (two locations).

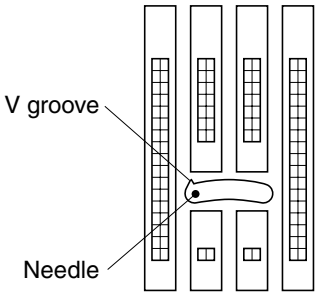
Giza tite 5X16 torque:	1.18 - 1.57 N-m



1. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed.
2. Press and while turning the power on (the buzzer will sound four times, and test mode will start).
3. <S2>
   Select 02 using , press once, and set the needle bar to the left base line position.
   <S3>
   Select 03 using or , and after pressing OK press once, and set the needle bar to the left base line position.
4. Turn the power off, disconnect lead wires A and B and remove the front cover.
5. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
6. Loosen giza tites4X14 (two: feed module attachment) and giza tites 5X16 (two: lower shaft bearing presser attachment).
7. Adjust the feed module left and right so that the tip of the needle and the needle hole V-groove come together.
8. Fully tighten the giza tites 4X14 (two: feed module attachment).

Giza tite 4X14 torque:	0.78 - 1.18 N-m





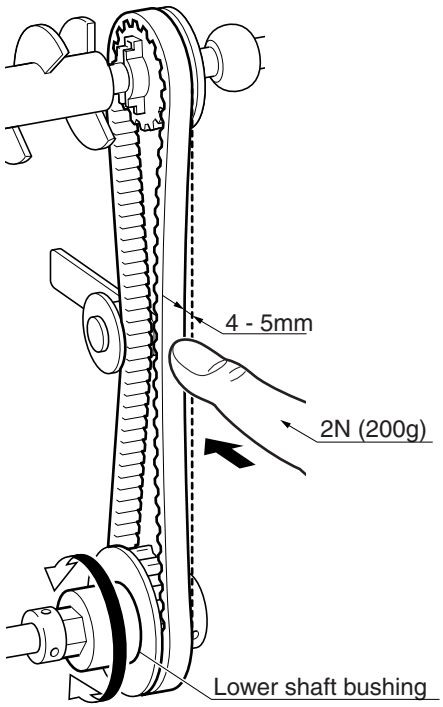
1. Remove giza tites (two), and remove the lower shaft bushing presser.
2. Turn the lower shaft bushing, and adjust the timing belt tension.

Timing belt deflection when a force of 2 N (200 g) is applied to the center of the timing belt	4 – 5 mm

XC2277001	Push-pull gauge (3 N)

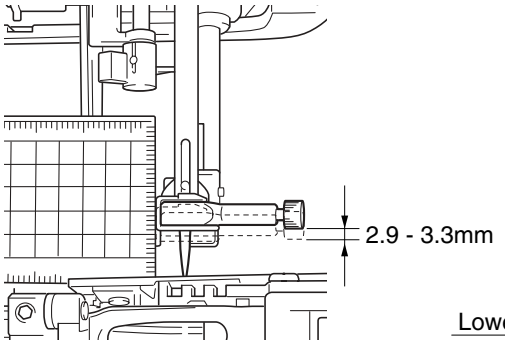
3. While holding lower shaft A to the left, attach the lower shaft bushing presser using giza tites 5X16 (two).

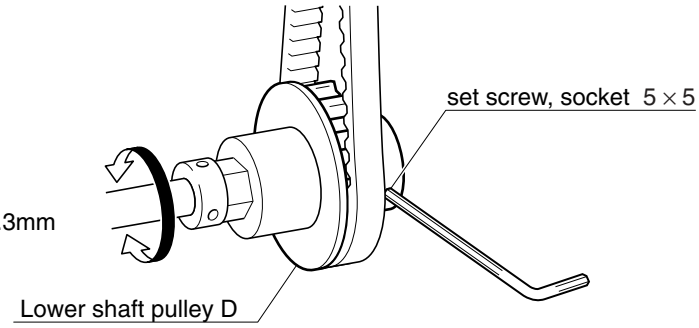
Giza tite 5X16 torque:	1.18 - 1.57 N-m

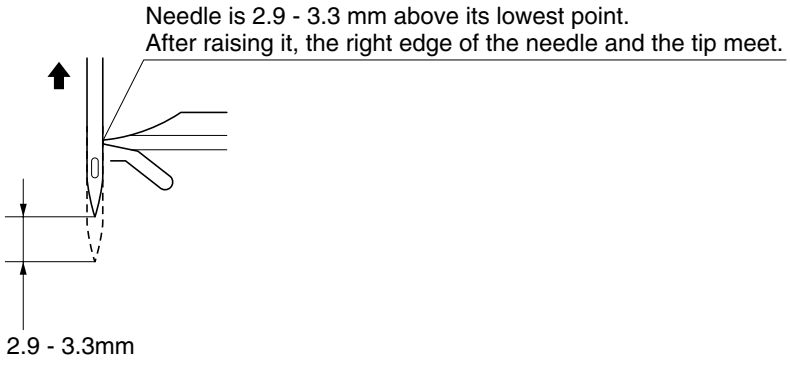


1. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed.
2. Press and while turning the power on (the buzzer will sound four times, and test mode will start).
3. <S2>
   Select 02 using , press once, and set the needle bar to the left base line position.
   <S3>
   Select 03 using or , and after pressing OK press once, and set the needle bar to the left base line position.
4. Turn off the power and remove the front cover.
5. Attach the presser foot (J).
6. Lower the presser foot lifter.
7. Loosen the set screws (socket (FT) M5X5) (three) on lower shaft pulley D.
8. Turn the pulley by hand, moving the needle bar to its lowest point (pulley turned counterclockwise).
9. When the needle bar is raised 2.9 – 3.3 mm above its lowest point (use a ruler on the left side to measure), rotate the outer rotary hook and adjust it so that the right edge of the needle and the outer rotary hook tip meet (outer rotary hook turned counterclockwise).
10. Fully tighten the set screws (socket (CP) M5X5) (three) on lower shaft pulley D.

Set screw, socket (CP) M5X5 torque	1.18 - 1.57 N-m





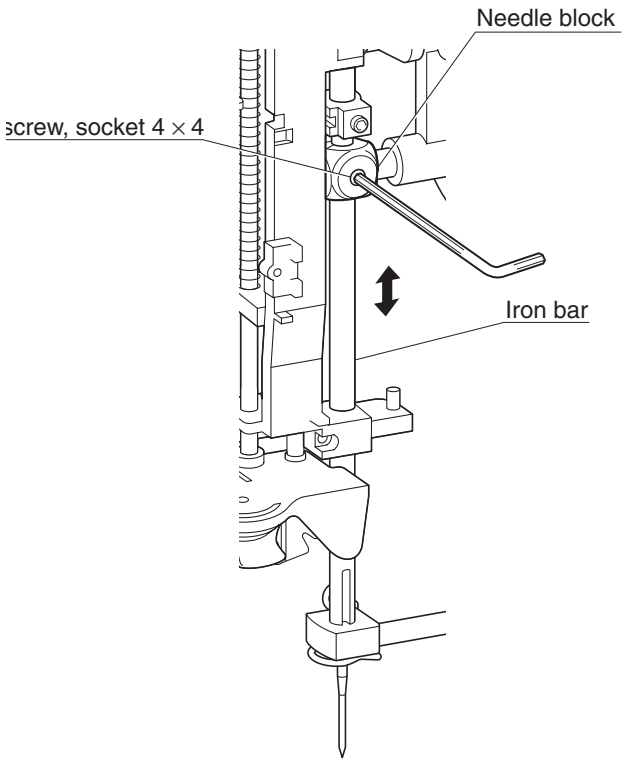


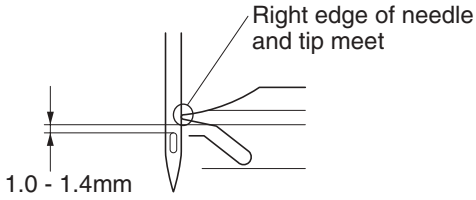
1. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed.
2. Press and while turning the power on (the buzzer will sound four times, and test mode will start).
3. <S2>
   Select 02 using , press once, and set the needle bar to the left base line position.
   <S3>
   Select 03 using or , and after pressing OK press once, and set the needle bar to the left base line position.
4. Turn off the power.
5. Lower the presser foot lifter.
6. Turn the pulley by hand until the right edge of the needle and the tip of the outer rotary hook meet (pulley turned counterclockwise).
7. Loosen the set screw (socket (CP) M4X4) in the needle bar block
8. Adjust the height of the needle bar for 1.0 – 1.4 mm between the top of the needle hole and lower edge of the outer rotary hook tip.

NOTE •Needle hole turned forward

9. Fully tighten set screw (socket (CP) M4X4.
10. Perform 4 - 23 "Adjust the needle thread block."

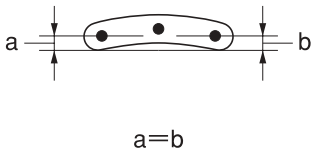
Set screw, socket (CP) M4X4 torque	0.78 – 1.18 N-m



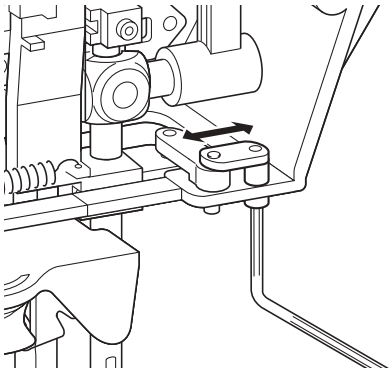


1. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
2. Loosen the screw (3X10).
3. Adjust the needle holder shaft block to the left or right so that the left base line / right base line needle drop is uniform forward and back with respect to the needle plate A hole.
4.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

Screw 3X10 torque	0.78 - 1.18 N-m



a=b



1. Perform 4 - 23 "Adjust the needle thread block."
2. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed. (without screwing it on).
3. Turn the power on.
4. Turn the pulley counterclockwise by hand, and stop just before the LED lamp changes from green to red (green light/needle up stop position).
5. Turn off the power.
6. Remove the front cover.

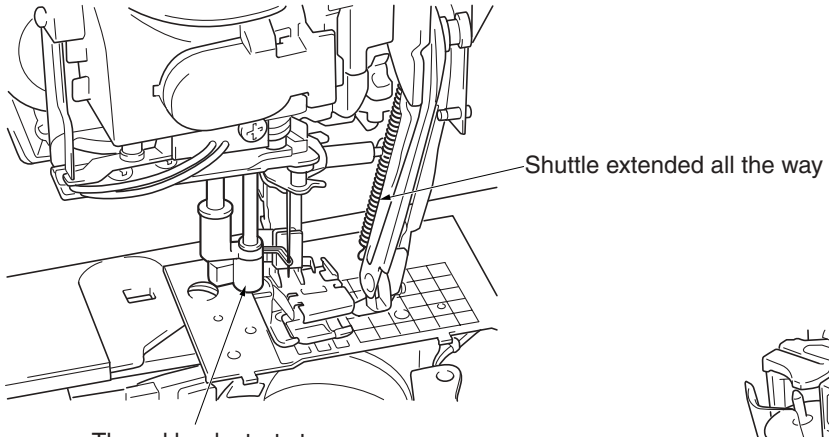
NOTE •Be careful that the pulley position does not shift at this time.

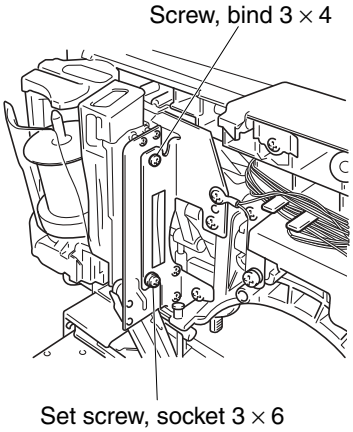
7. Prepare a cassette (set up the thread)
8. Insert the cassette, and lower the shuttle to the lowest point (Position where the shuttle is extended to the lowest point and the threading hook starts to move).
9. Loosen the screw, bind M3X4, and screw, pan (S/P washer) M3X6, and adjust the position of the thread guide base assy.

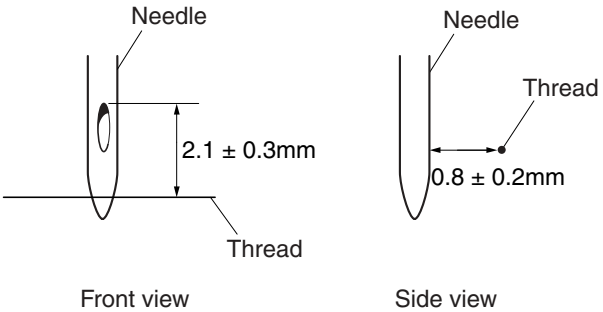
Distance from the upper edge of the needle hole to the thread	2.1 +/-0.3 mm
Distance from the front of the needle to the thread	0.8 +/-0.2 mm

10. Fully tighten screw, bind M3X4, and screw, pan (S/P washer) M3X6.

Screw, bind 3x4, torque	0.57 - 0.79 N-m
Screw, pan (S/P washer) M3X6 torque	0.57 - 0.79 N-m





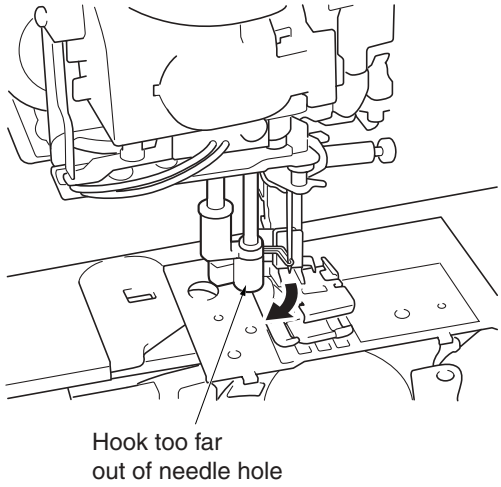


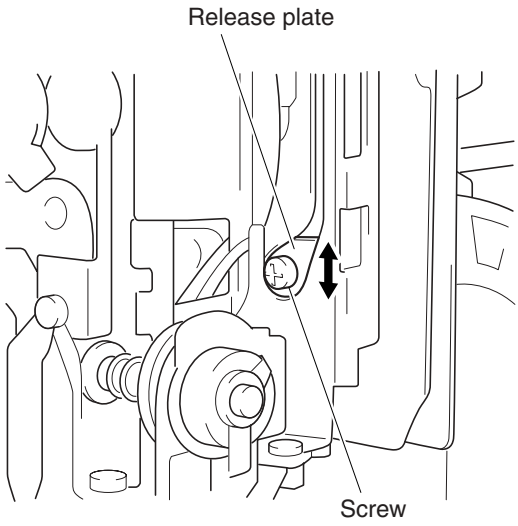
1. Perform 4 - 23 "Adjust the needle thread block."
2. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed. (without screwing it on).
3. Turn the power on.
4. Turn the pulley counterclockwise by hand, and stop just before the LED lamp changes from green to red (green light/needle up stop position).
5. Turn off the power.
6. Loosen bolt, socket M3X6, and adjust the release plate vertically.

***Key point**

- Insert the cassette, and with the hook moved to fully extend from the needle hole, adjust it so the shuttle is released.

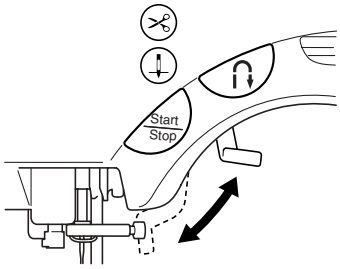
Bolt, socket M3X6, torque	0.78 – 1.18 N-m

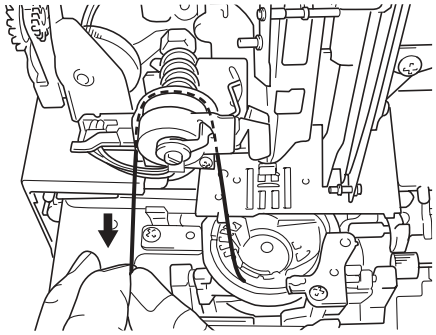




1. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed. (without screwing it on).
2. Press and while turning the power on (the buzzer will sound four times, and test mode will start).
3. <S2>
   Select 02 using , press twice, and set the needle bar to the middle base line position.
   <S3>
   Select 03 using or , and after pressing OK, press twice, and set the needle bar to the middle base line position.
4. Raise the presser foot lifter.
5. Turn the thread tension dial to the "standard" position.
6. Pass a Schappe Spun Sewing Thread #60 through the tension disc.
7. Lower the presser foot lifter.
8. Pull the thread with a tension gauge, and adjust the thread tension adjusting screw so that it is 0.436 - 0.466N (44.5 - 47.5 g).
9. 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)





●Check (front cover attachment operation)

1. Press and while turning the power on (the buzzer will sound four times, and test mode will start).
2. <S2>
   Select 05 (feed forward and reverse mode) using .
   <S3>
   Select 06 (feed adjustment mode) using or , and press .
3. Press and run "Feed adjustment mode," checking the forward and reverse feed amounts.

***Key point**

- When a material of two layers of broadcloth with paper in between is given 100 stitches forward and reverse ("Feed adjustment" mode), the forward side should be 0 – 10 mm longer than the reverse side.

●Adjustment (work with front cover removed)

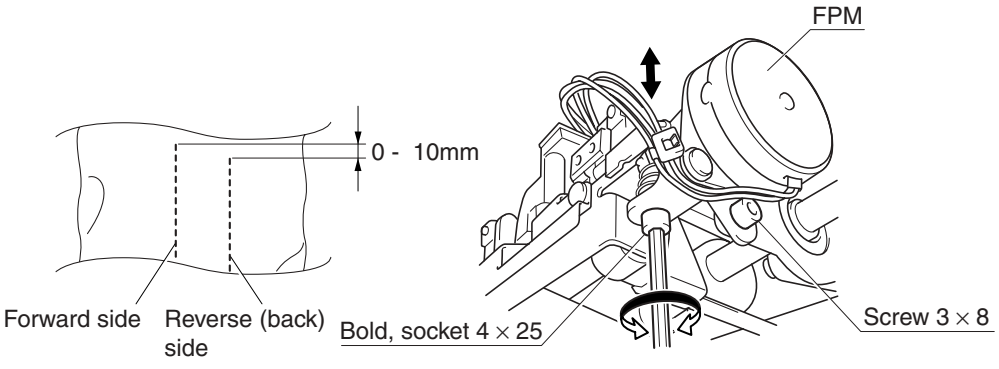
4. Loosen the FPM holder assy. screw (3 x 8).
5. Adjust the forward and reverse feed using the FPM holder assy. screw (4 x 25).

***Key point**

- Tightening the screw (4 x 25) --) shortens the reverse side.
- Loosening the screw (4 x 25) --) lengthens the reverse side.

6. Fully tighten the screw (3X8).
7. Apply a small amount of screw locking compound to the M4X25 socket bolt.

Screw 3X8 torque	0.27 - 0.48 N-m



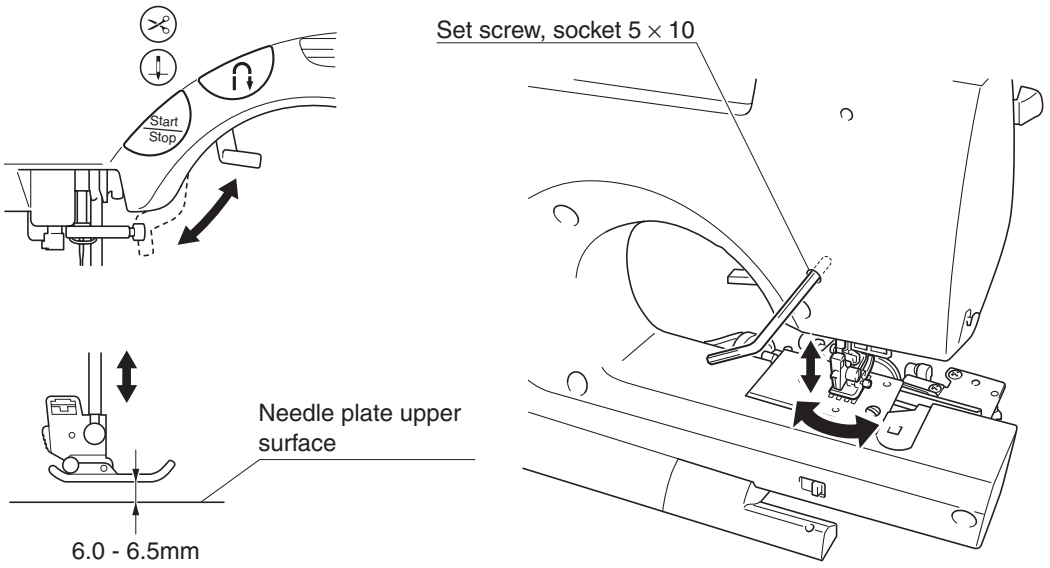
Lower right of feed module

1. Attach the presser foot (J).
2. Raise the presser foot lifter.
3. Turn the pulley by hand, and lower the feed dog below needle plate A.
4. Loosen the screw (5X10) in the presser bar clamp assy.
5. Adjust the height of the presser bar so that there is 6.0 – 6.5 mm between the top of needle plate A and the bottom of the presser foot.

NOTE • Set the feed dog (needle plate) and presser foot parallel (to prevent damage to the needle from slanting during serging).

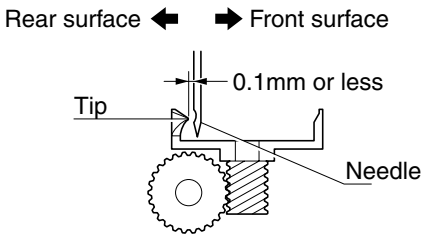
6. Fully tighten screw (5X10).

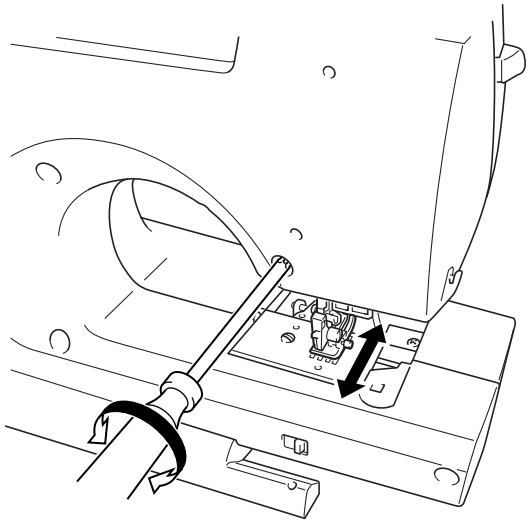
Screw (5X10) torque	1.37 – 1.77 N-m



1. Attach the operation PCB assy. flat cable and power PCB assy. lead wire connector to the main PCB assy., and attach the front cover to the arm bed.
2. Press  and  while turning the power on (the buzzer will sound four times, and test mode will start).
3. <S2>
   Select  using  , press  three times, and set the needle bar to the right base line position.
   <S3>
   Select  using  or  , and after pressing  , press  three times, and set the needle bar to the right base line position.
4. Turn off the power.
5. Remove screws M4 (two), and remove needle plate A (1).
6. Loosen screw, pan M3X12 (or remove it)
7. Hand turn the pulley until the right edge of the needle and the outer rotary hook tip meet.
8. Adjust the gap between the needle and the outer rotary hook tip (front and back) to 0.1 mm or less using the tightening depth of the adjusting screw.
9. Install and fully tighten screw, pan M3X12.
10. Attach needle plate A using screws M4 (two).

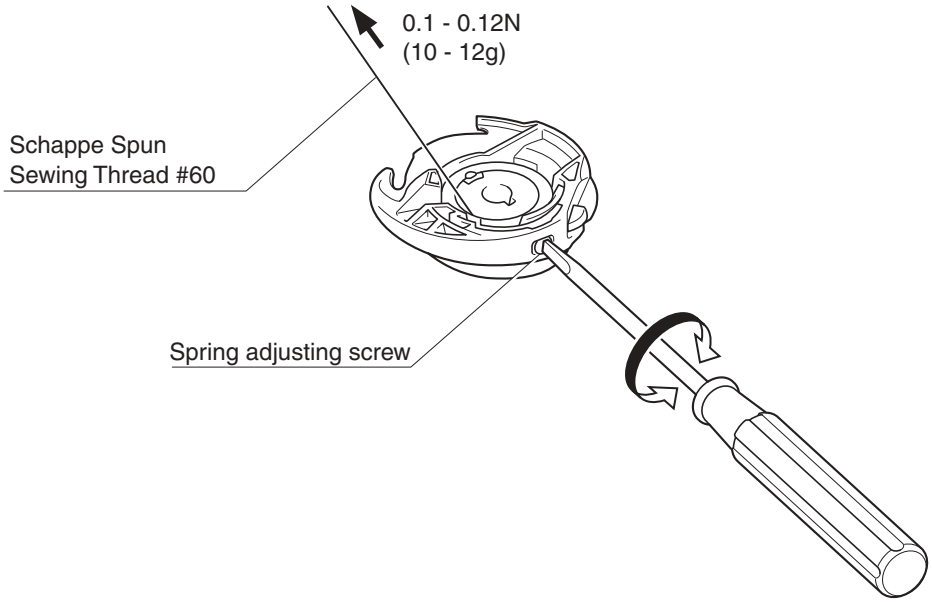
Screw, pan M3X12, torque	0.78 – 1.18 N-m





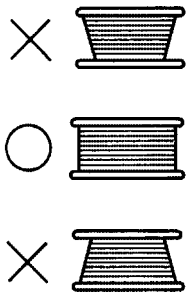
1. Set a bobbin (wound with Schappe Spun Sewing Thread #60) in the inner rotary hook and thread.
2. Pull the thread with a tension gauge, and adjust the tension adjusting screw so that it is 0.1 – 0.12 N (10 – 12 g).
3. Apply a small amount of screw locking compound to the spring adjusting screw.

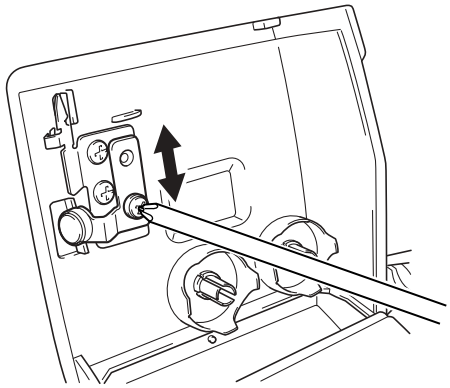
XA9153001	Tension gauge 30 (0.3 N)



1. Move the bobbin winder tension assy. up and down to adjust uneven bobbin winding.
2. Fully tighten the screw, pan (S/P washer) M3X6.

Screw, pan (S/P washer) M3X6 torque	0.39 - 0.78 N-m





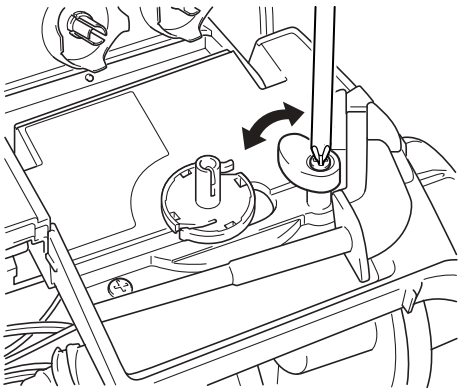
3. Turn the bobbin presser left and right, and adjust the winding quantity.

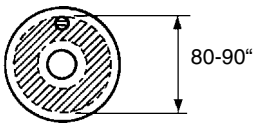
***Key point**

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

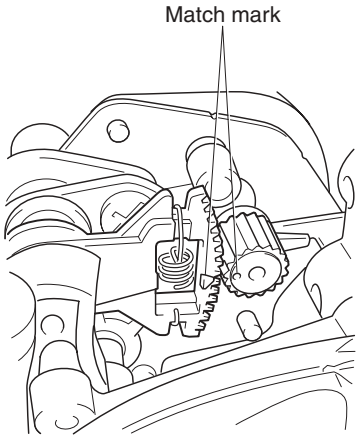
4. Fully tighten the screw.

Screw torque	0.39 - 0.78 N-m





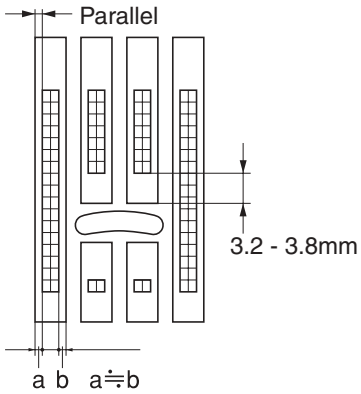
1. Remove screws M4 (two), and remove needle plate A (1).
2. Align the feed adjuster assy. gear and F pulse motor gear match marks (feed in 0 mm position).



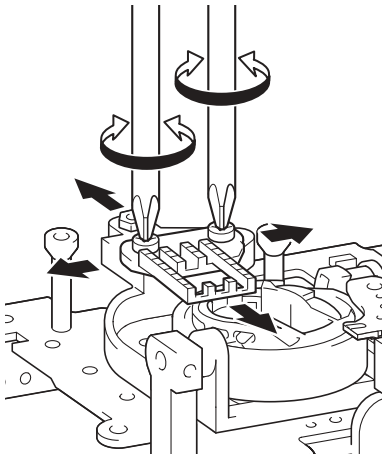
3. Loosen the screw (bind 3 x 8), temporarily install needle plate A, and adjust the forward/reverse and left/right positions of the feed dog.

***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.

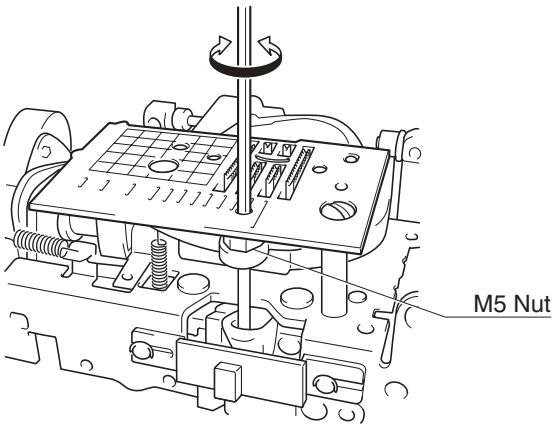


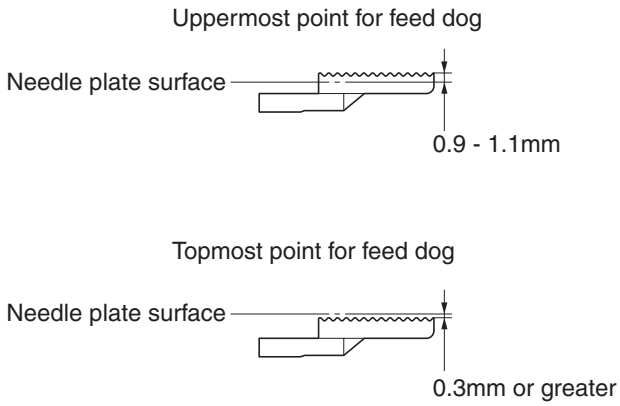
4. Tighten screw (bind 3X8) [torque: 0.78 – 1.18 n-m]
5. Tighten screw M4 [torque: 1.18 – 1.57 n-m]



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 feed adjuster assembly is screwed in.
4. Tighten the M5 nut being careful that the vertical feed adjuster assembly does not turn.
5. With the feed dog in the lowest position, check that the feed dog is 0.3 mm or more below the upper surface of needle plate.

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

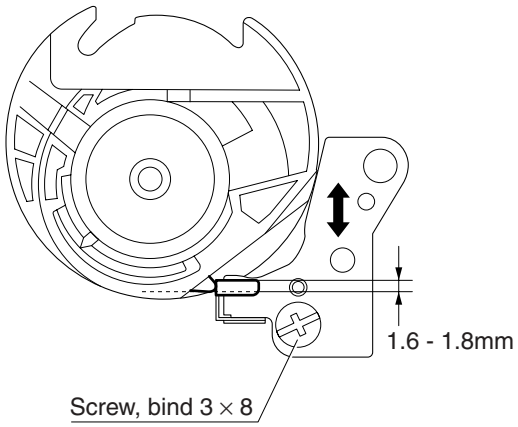




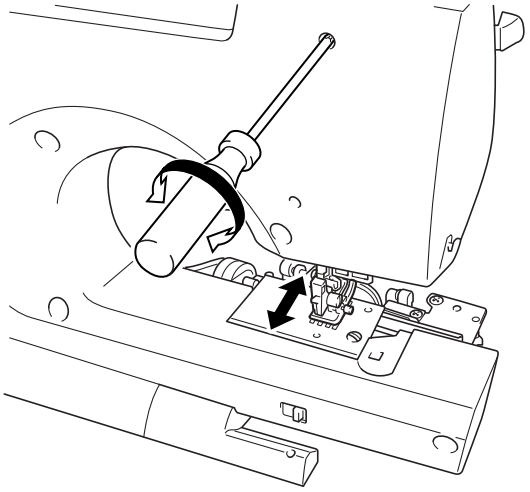
Inner rotary hook bracket position adjustment

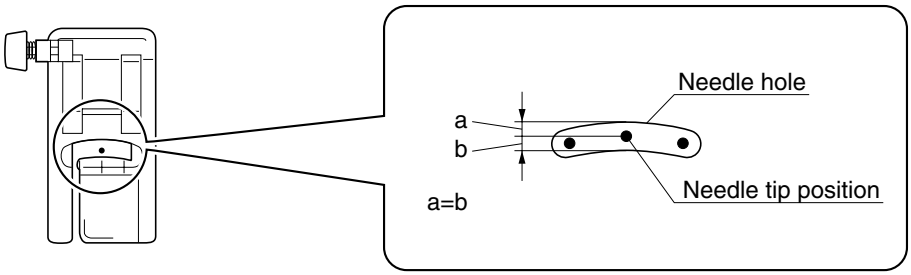
1. Set the inner rotary hook in the outer rotary hook.
2. Loosen screw (bind 3X8).
3. Adjust the inner rotary hook bracket assy. attachment position so that contact between the inner rotary bracket assy. and inner rotary hook is 1.6 – 1.8 mm, and fully tighten screw (bind 3X8).

Giza tite 5X16 torque:	1.18 - 1.57 N-m



1. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
2. Adjust the amount set screw, socket (FT) M4X12 is tightened so that the tip of the needle is centered in the presser foot needle hole back to front.
3. Further tighten the lock nut.





Adjust the needle thread block

1. Remove taptite, bind B M4X10 (two), and remove the thread hook assy.
2. Set the needle bar to the left base line.
3. Attach a needle.
4. Turn the pulley by hand, and set the needle bar at the highest point (position where the timing shutter base line faces forward)
5. Loosen the set screw (socket FT 4 x 4).
6. Adjust the height of the needle thread block so that the threading hook passes through the needle hole, and fully tighten set screw (socket FT 4 x 4).

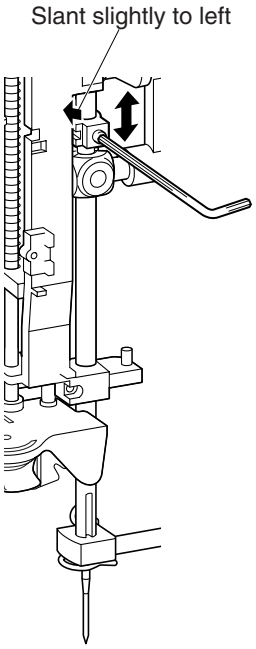
   ***Key point**
   - Slant the needle thread block slightly to the left (approximately 1 degree) and attach it.
   - Adjust so that the upper edge of the threading hook and the upper edge of the needle hole are at the same height.

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

7. Attach the thread hook assy. using taptites, bind B M4X10 (two).

set screw, socket (FT) M4X4 torque	0.78 – 1.18 N-m
Taptite, bind B M4X10 torque	0.78 – 1.18 N-m

Refer to threading usage conditions "1. Outline of Mechanism".



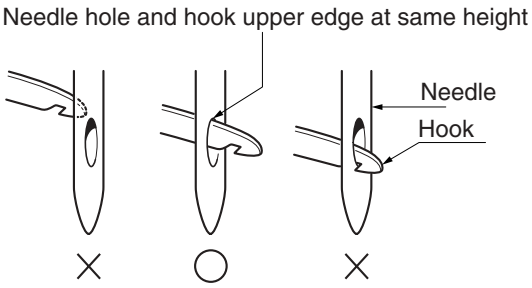
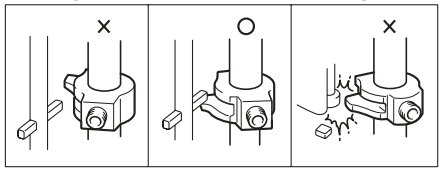


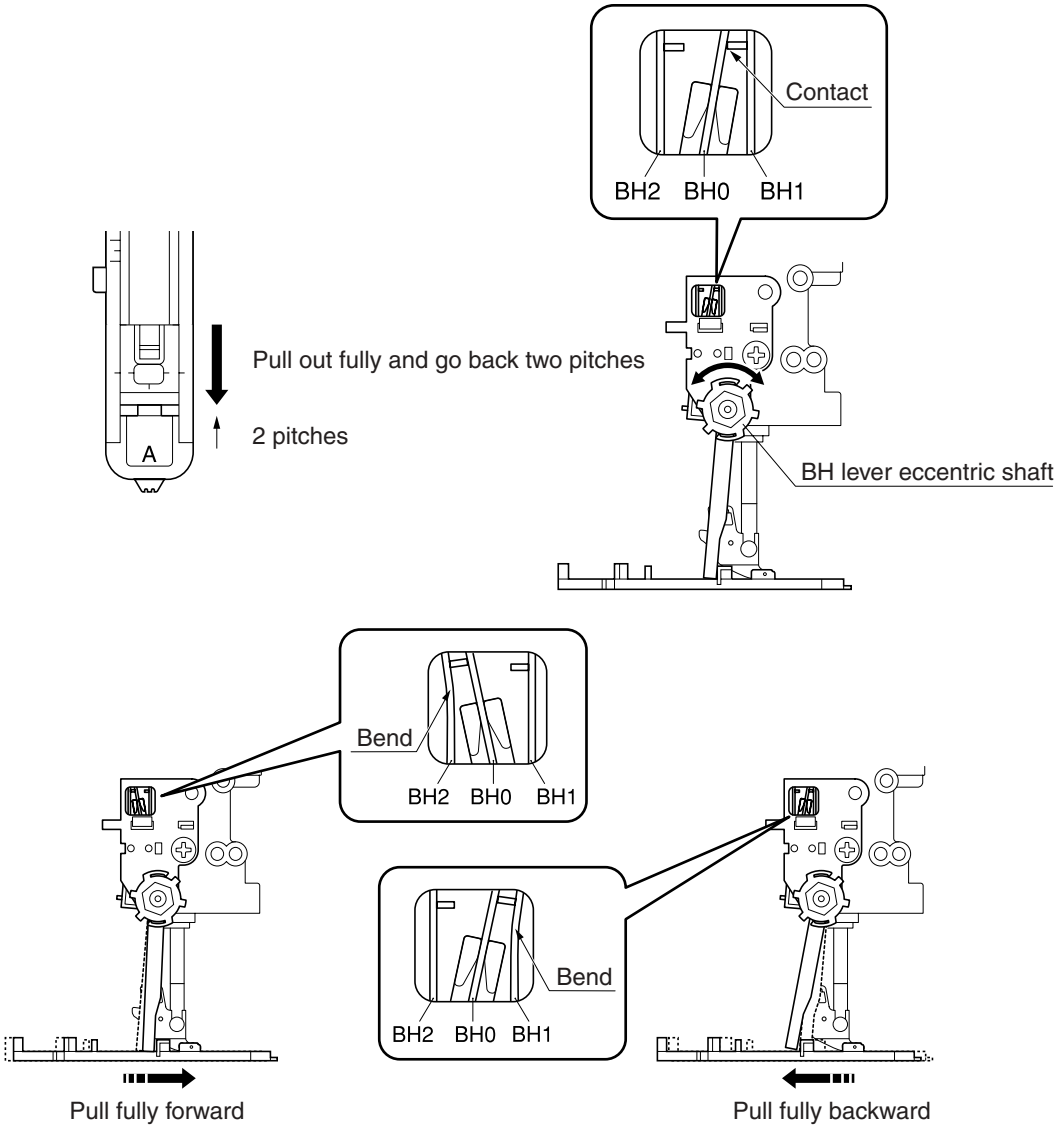
Fig.1 Fig.2



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

***Key point**

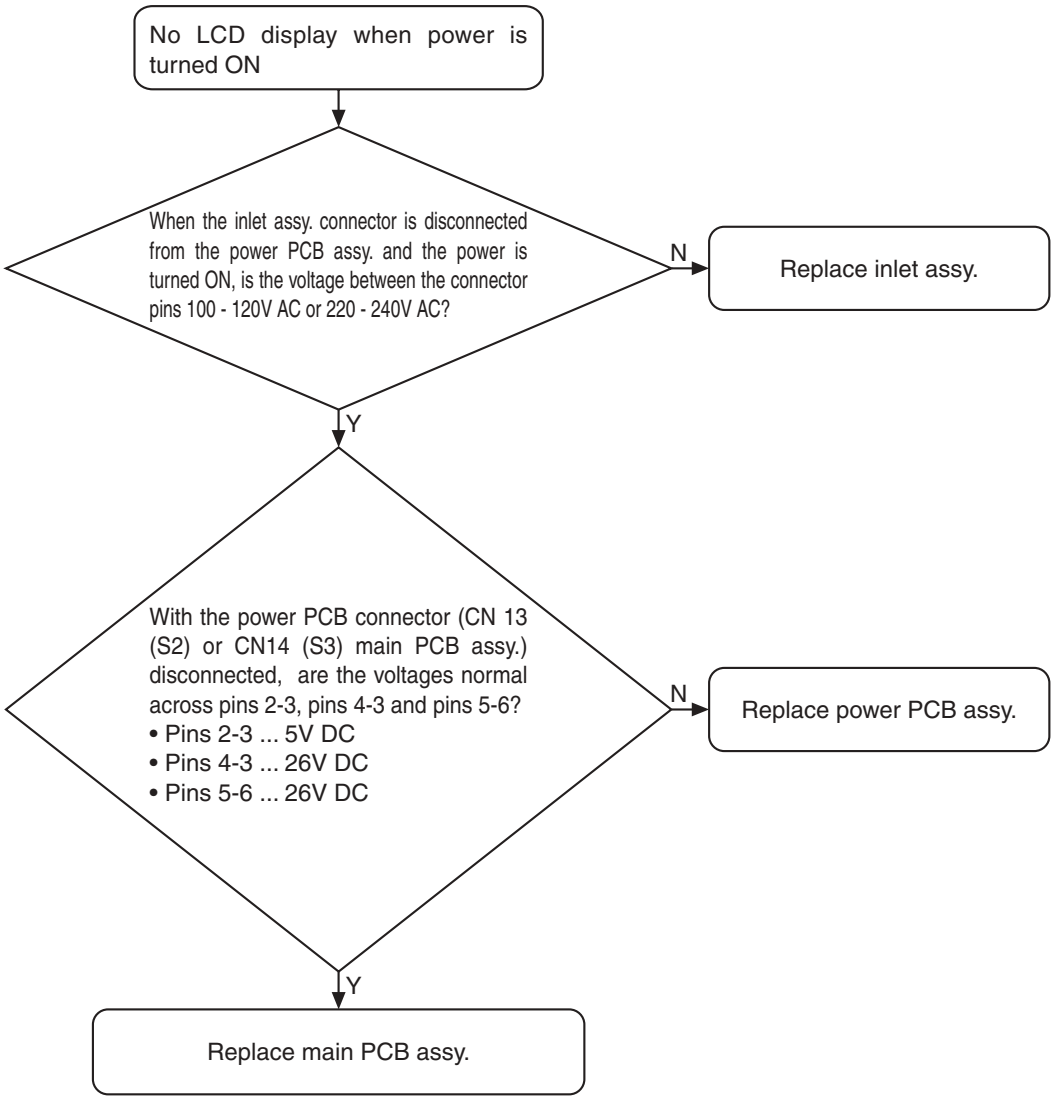
- With the presser foot lifter raised, pull the BH presser foot forward as much as possible, and check that BH0 comes into contact with BH2 and that BH2 has some slack.
- With the presser foot lifter raised, push the BH presser foot back as much as possible, and check that BH0 comes into contact with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



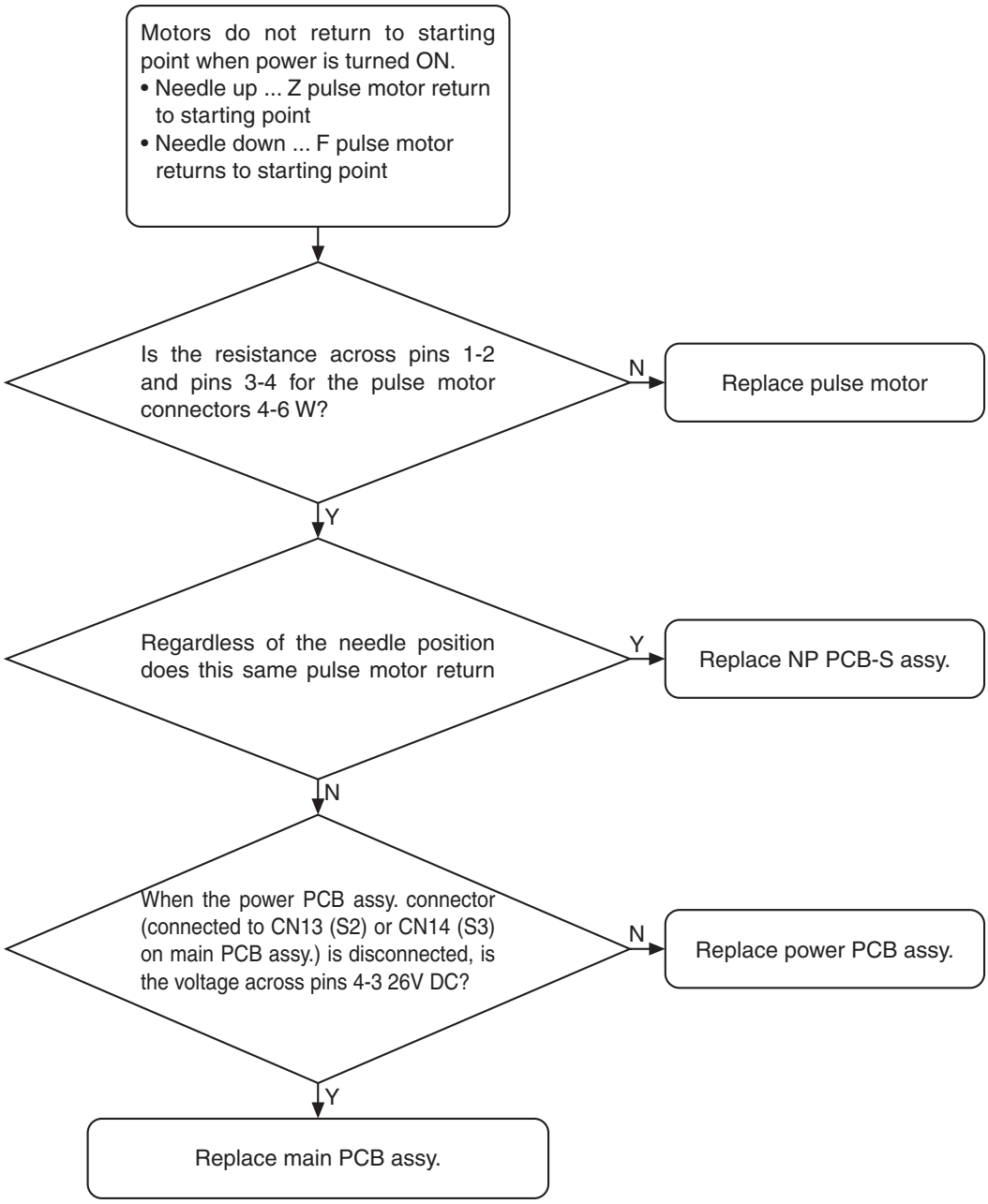
5 Failure Investigation for Electronic Parts

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

Error code			Cause
S2 (CS8000 Series)	S3 (CS8100 Series)	See page	
F1	F01	5-20	1. Rotation irregularity judgment
F2	F02	5-21	2. Key pressed continually with power ON (motion system SW)
F3	F03	5-22	3. Key pressed continually with power ON (operation system SW)
F4	F04	5-23	4. FC disconnect
F5	F05	5-24	5. Dirty speed sensor
F6	F06	5-25	6. NP sensor disconnect
F7	F07	5-26	7. Speed VR disconnect



S2 : CS8000 Series
S3 : CS8100 Series



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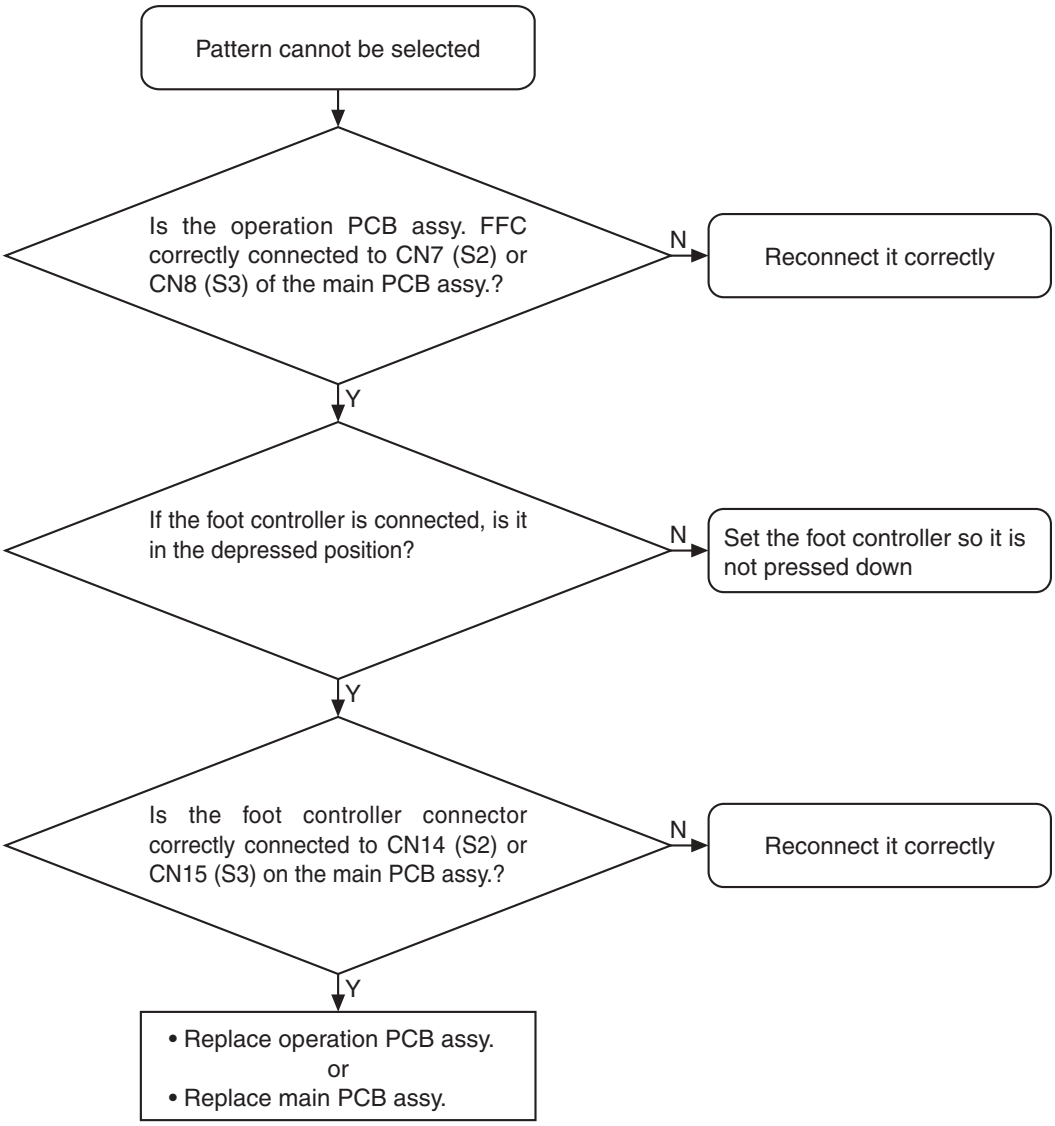
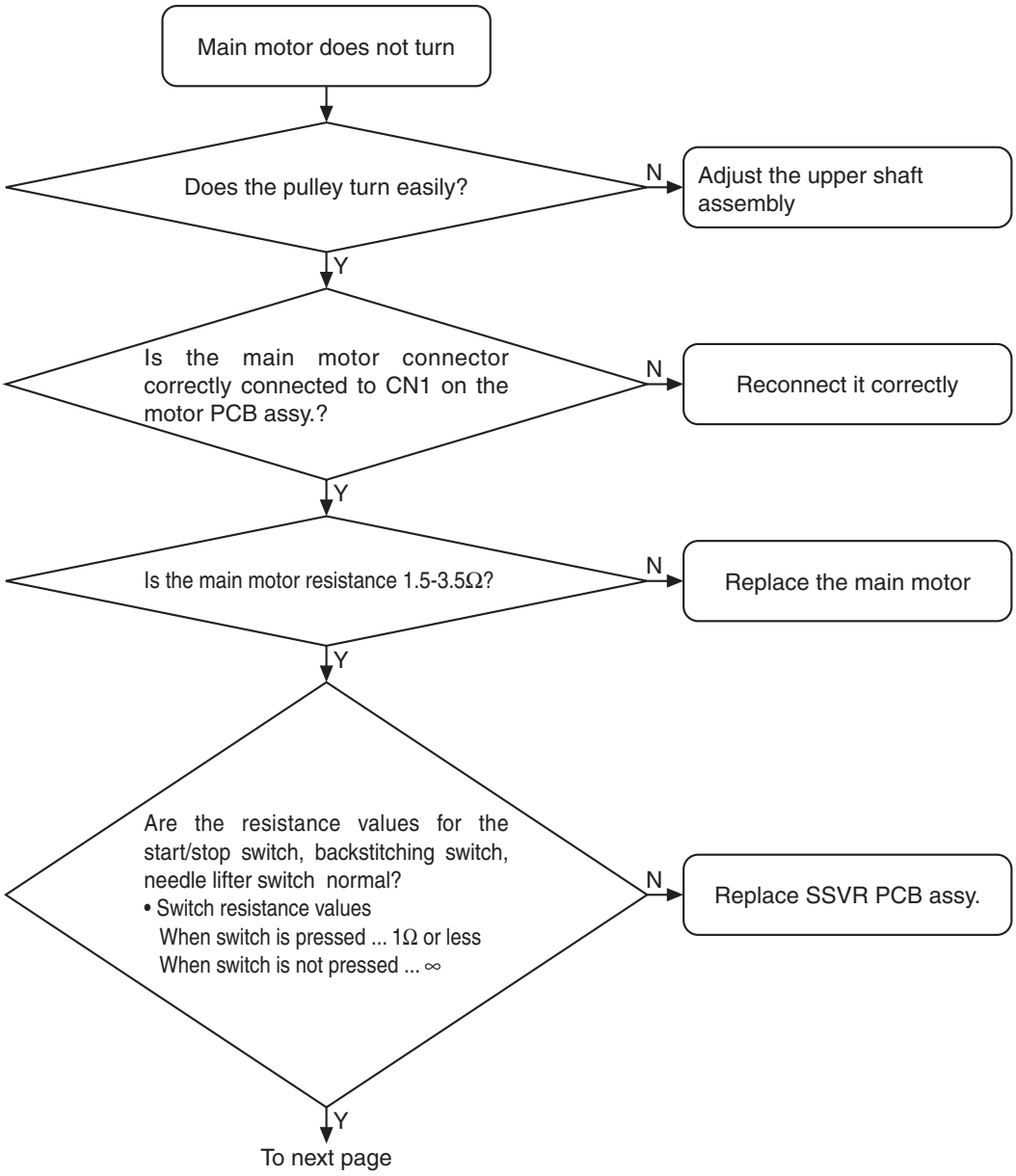
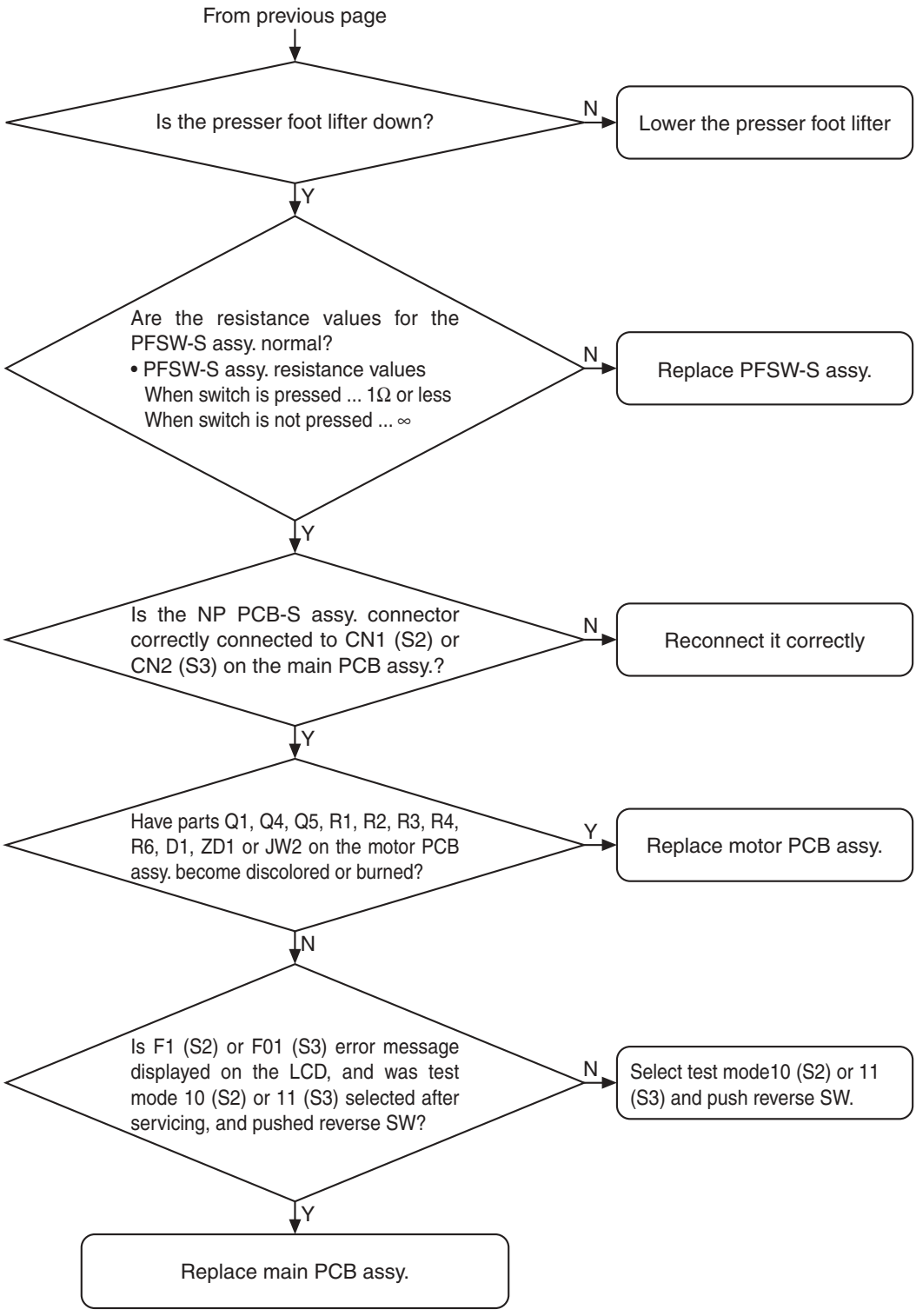
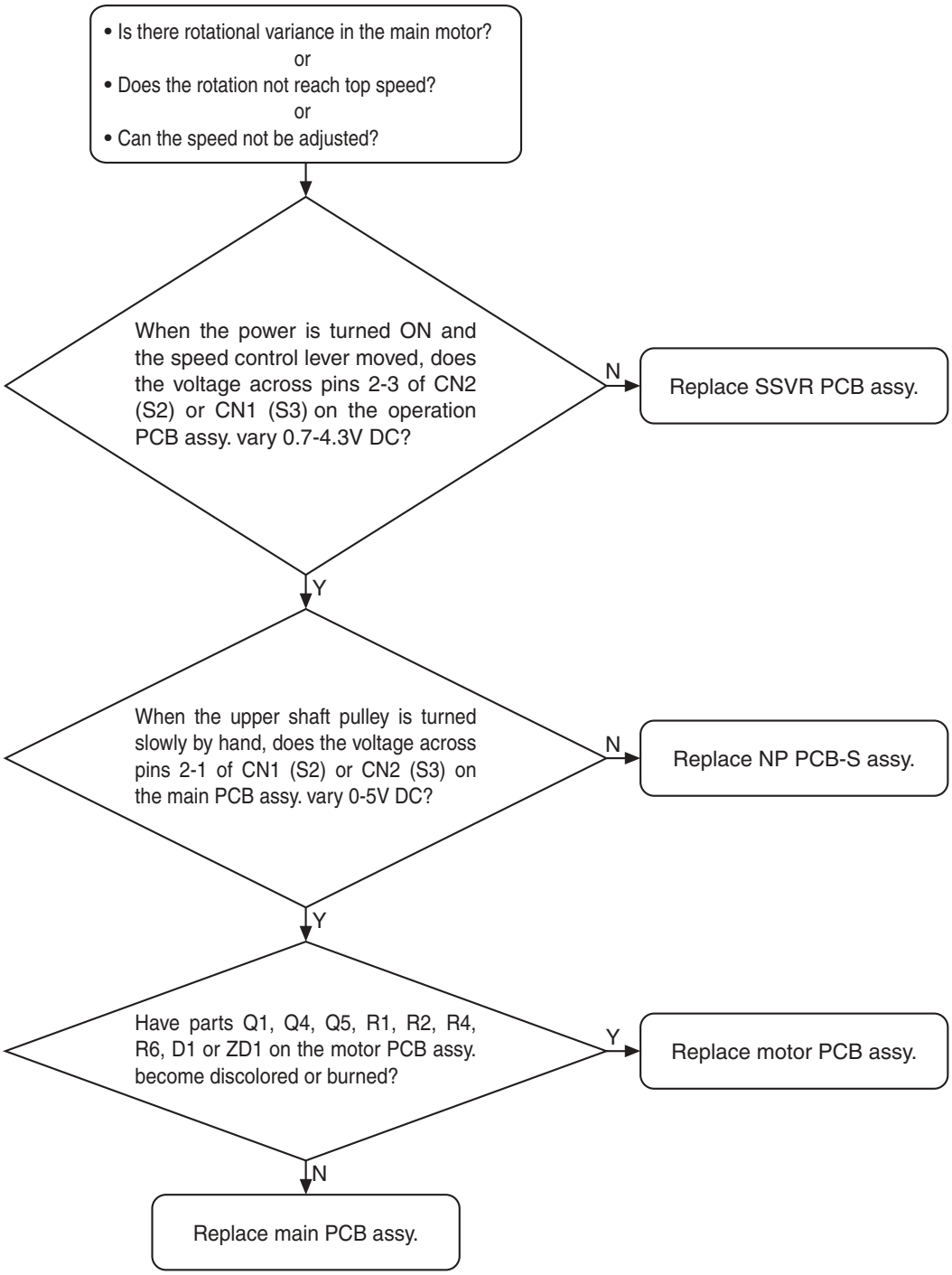


S2 : CS8000 Series
S3 : CS8100 Series

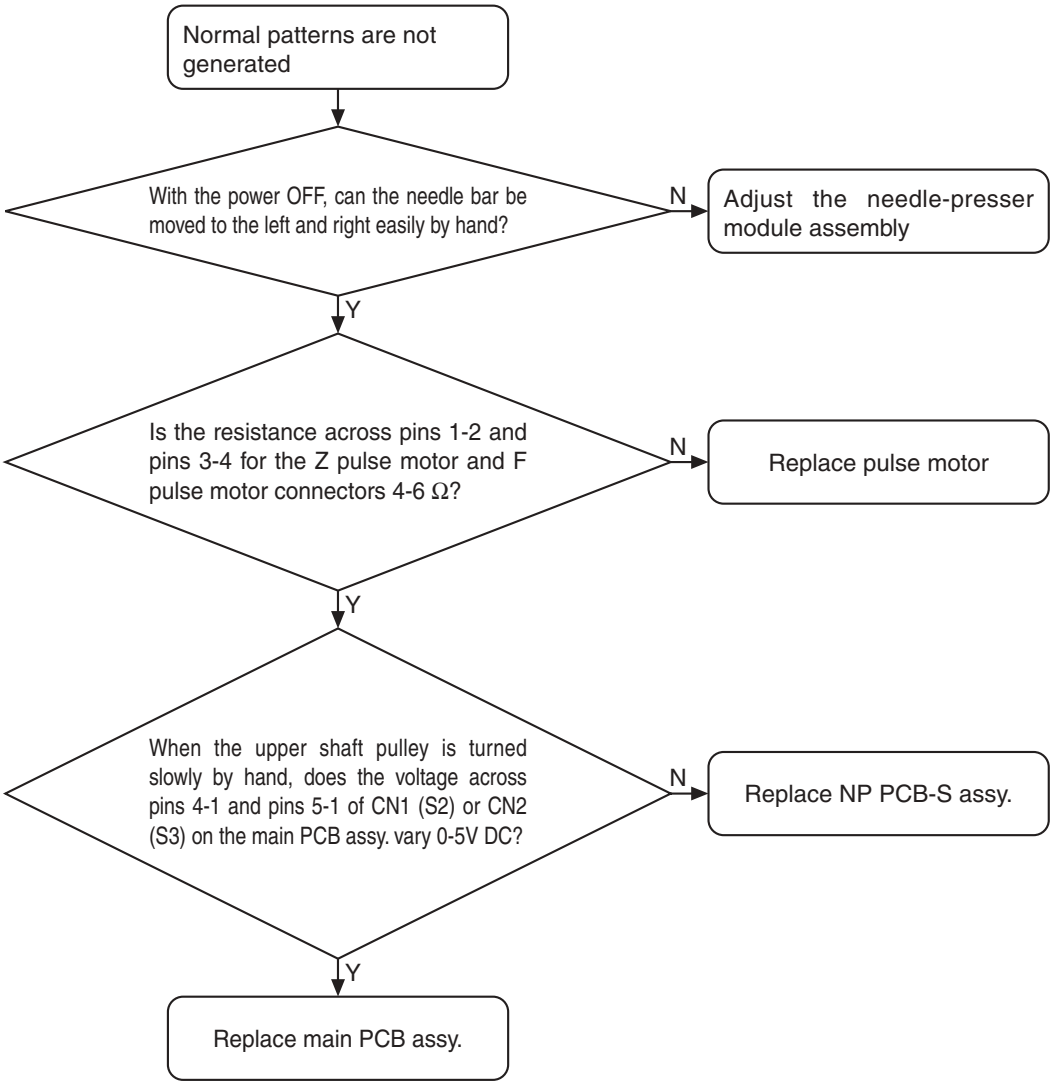

Main motor does not turn
Does the pulley turn easily?
N
Adjust the upper shaft assembly
Y
Is the main motor connector correctly connected to CN1 on the motor PCB assy.?
N
Reconnect it correctly
Y
Is the main motor resistance 1.5-3.5Ω?
N
Replace the main motor
Y
Are the resistance values for the start/stop switch, backstitching switch, needle lifter switch normal?
• Switch resistance values
When switch is pressed ... 1Ω or less
When switch is not pressed ... ∞
N
Replace SSVR PCB assy.
Y
To next page



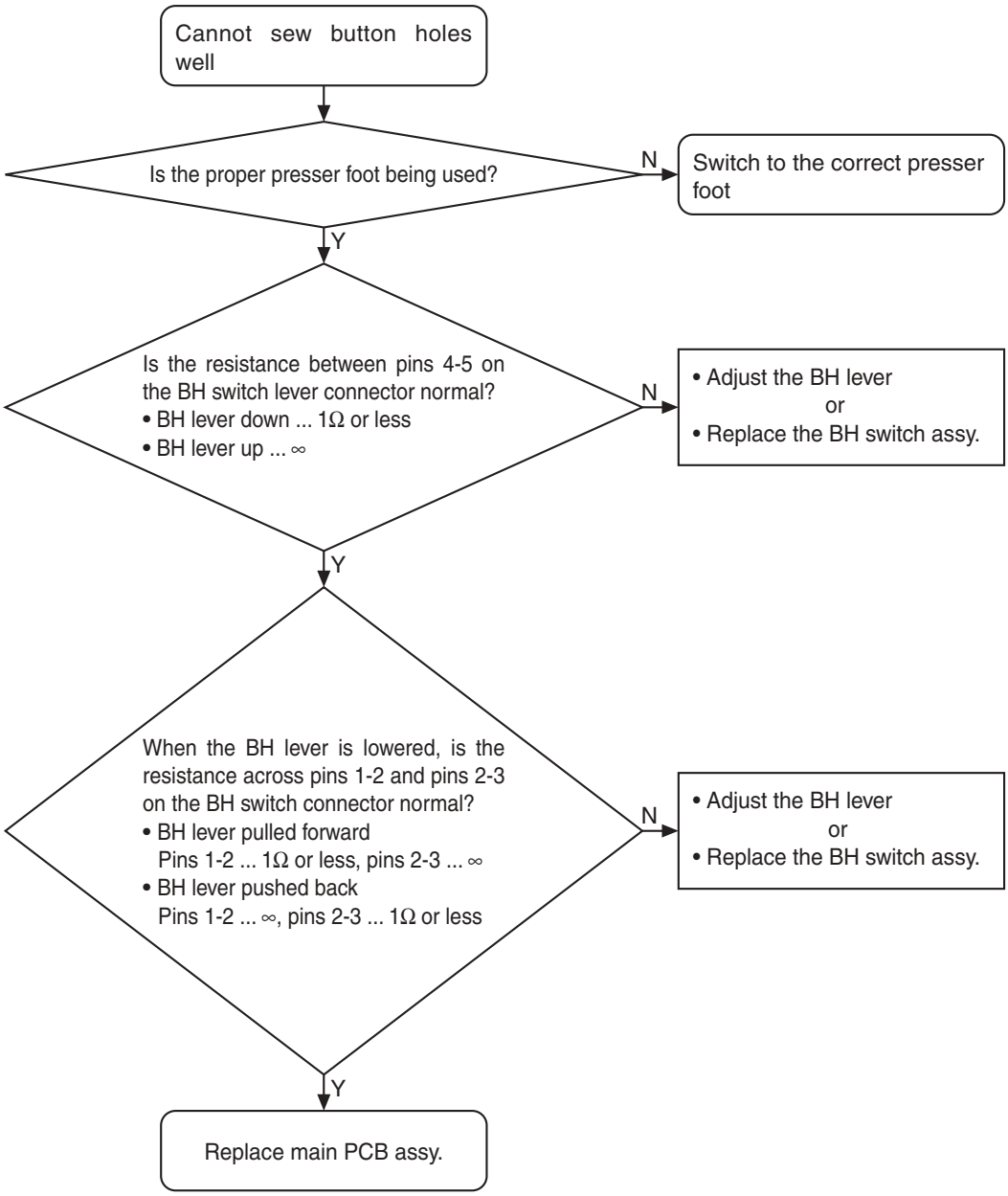
S2 : CS8000 Series
S3 : CS8100 Series

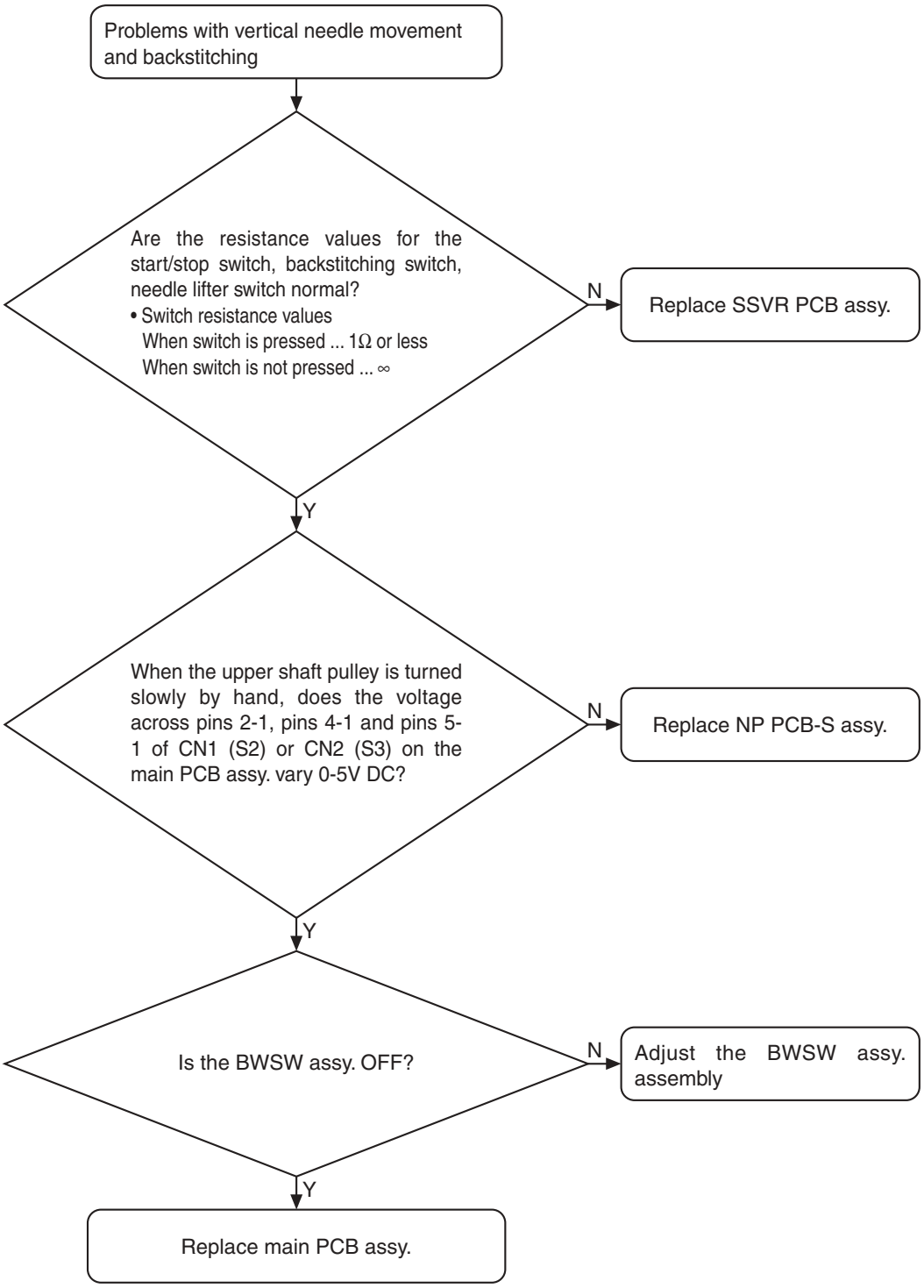


S2 : CS8000 Series
S3 : CS8100 Series

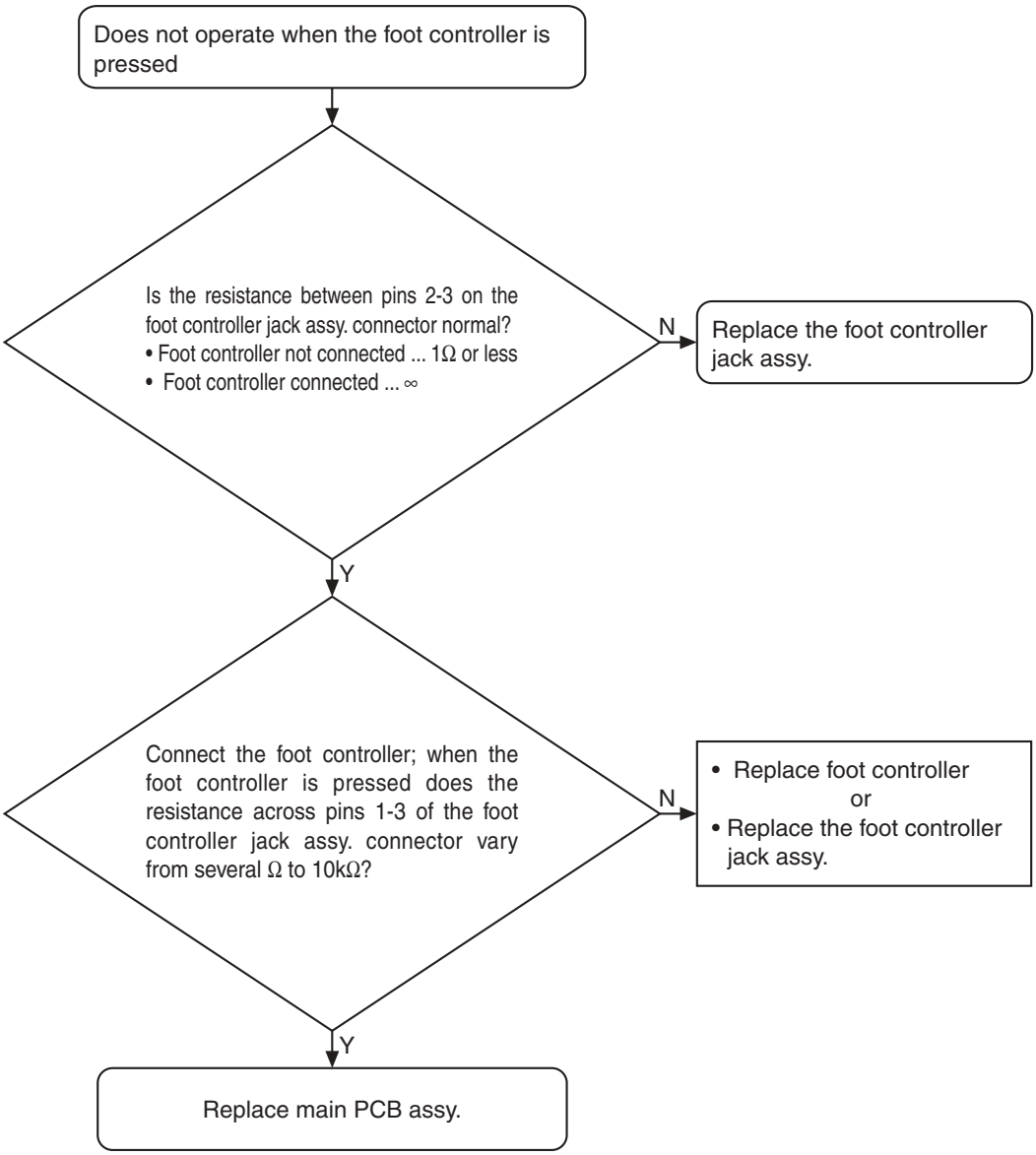


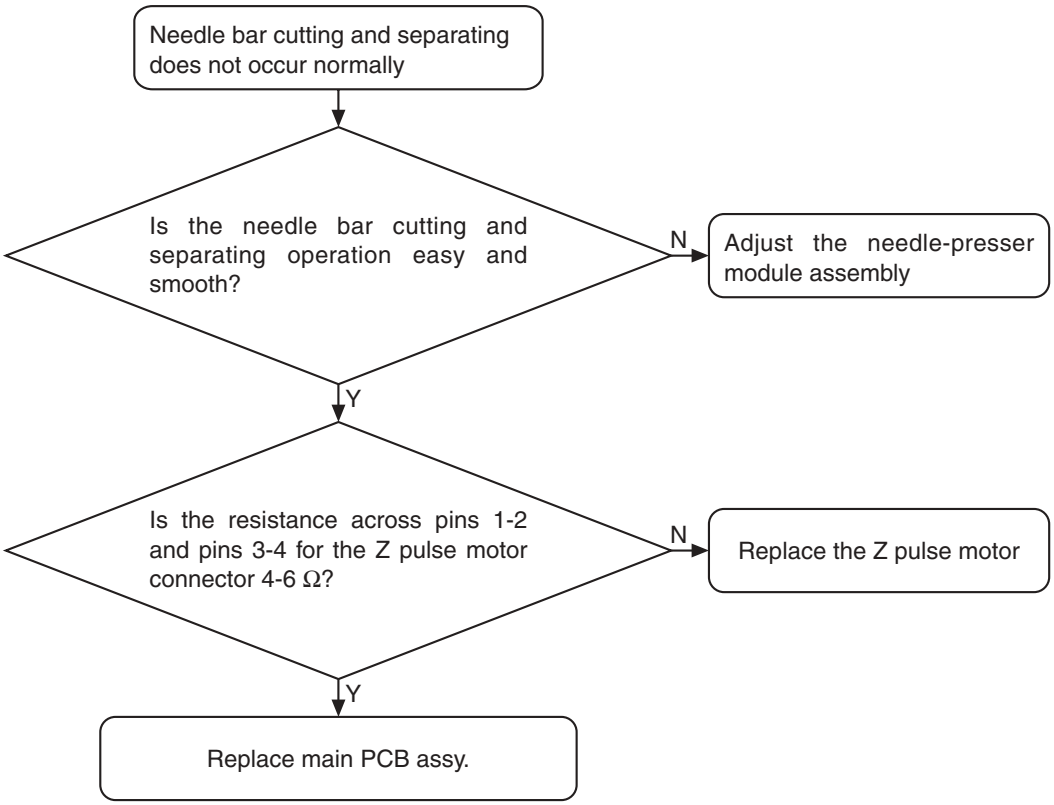
S2 : CS8000 Series
S3 : CS8100 Series

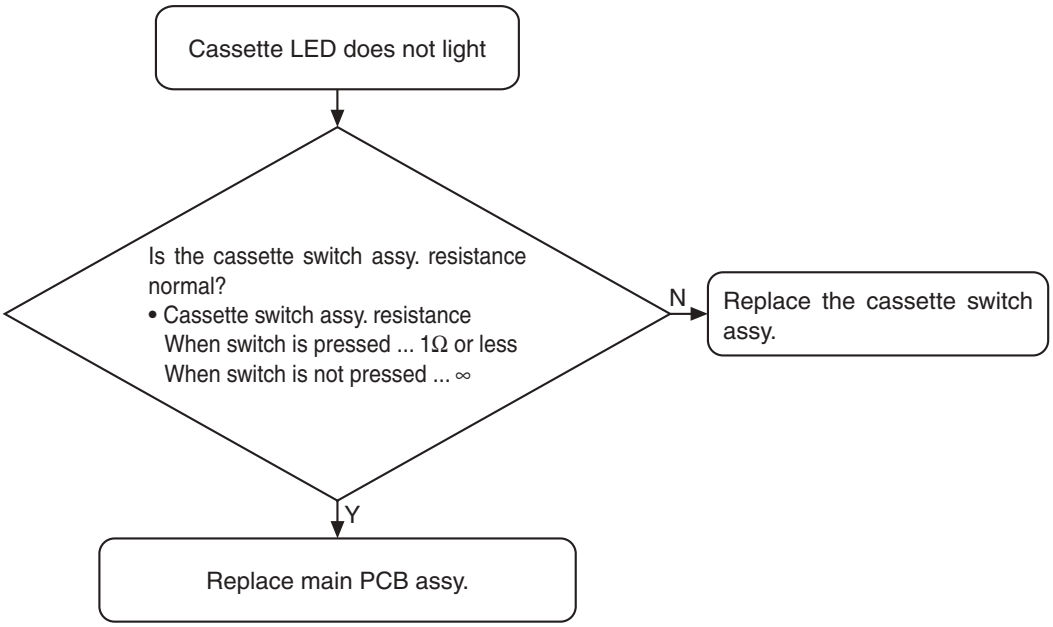

Cannot sew button holes well
Is the proper presser foot being used?
N
Switch to the correct presser foot
Y
Is the resistance between pins 4-5 on the BH switch lever connector normal?
• BH lever down ... 1Ω or less
• BH lever up ... ∞
N
• Adjust the BH lever
or
• Replace the BH switch assy.
Y
When the BH lever is lowered, is the resistance across pins 1-2 and pins 2-3 on the BH switch connector normal?
• BH lever pulled forward
Pins 1-2 ... 1Ω or less, pins 2-3 ... ∞
• BH lever pushed back
Pins 1-2 ... ∞, pins 2-3 ... 1Ω or less
N
• Adjust the BH lever
or
• Replace the BH switch assy.
Y
Replace main PCB assy.

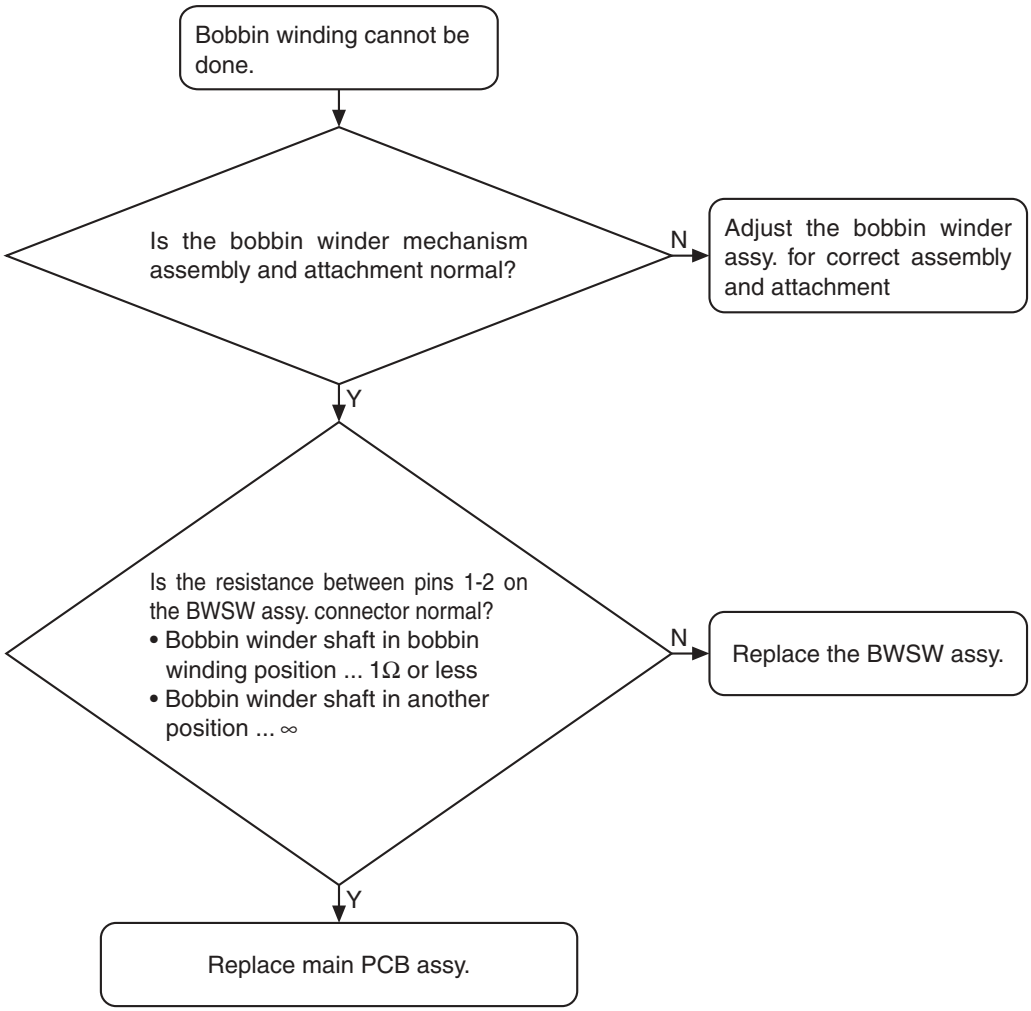


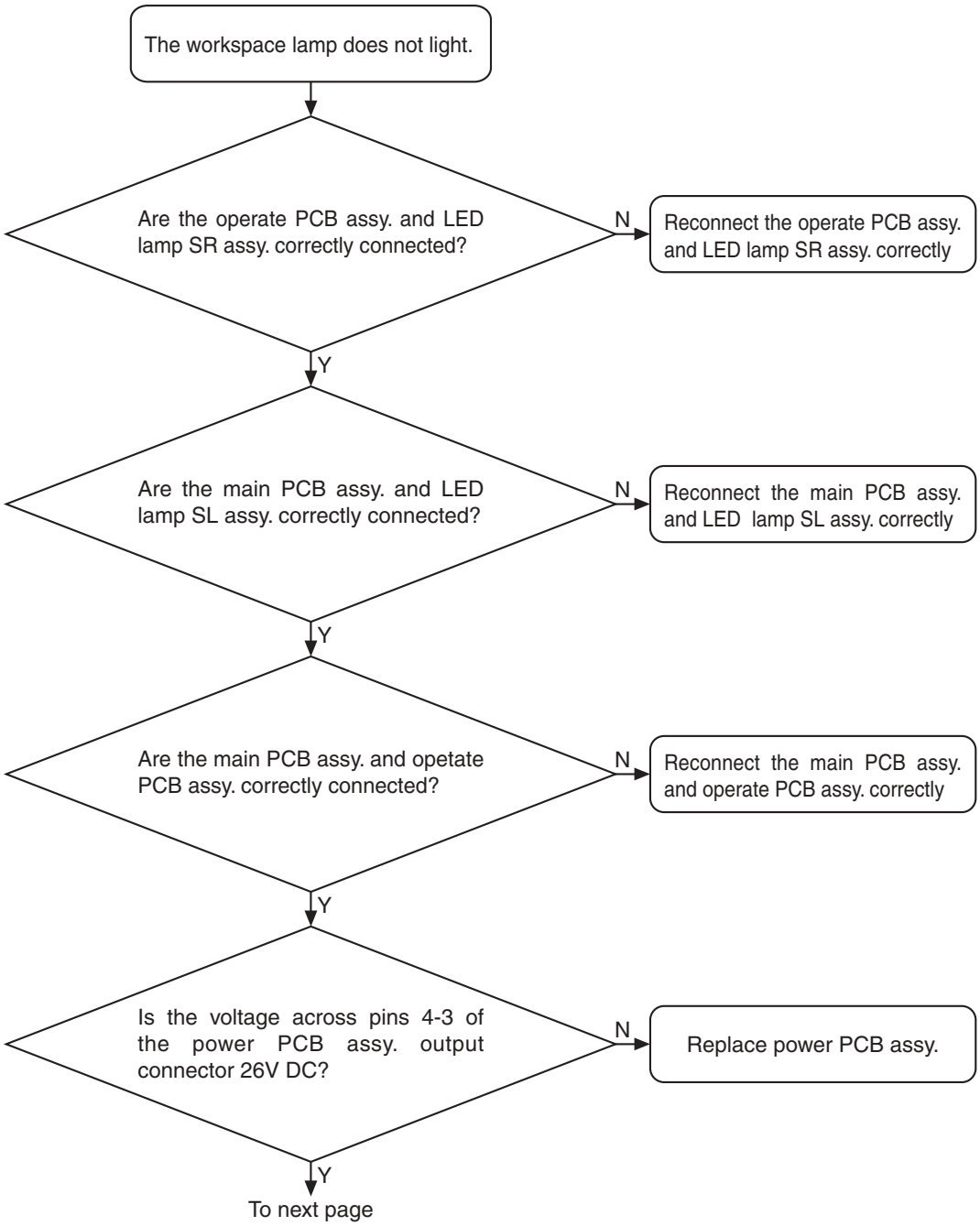
S2 : CS8000 Series
S3 : CS8100 Series

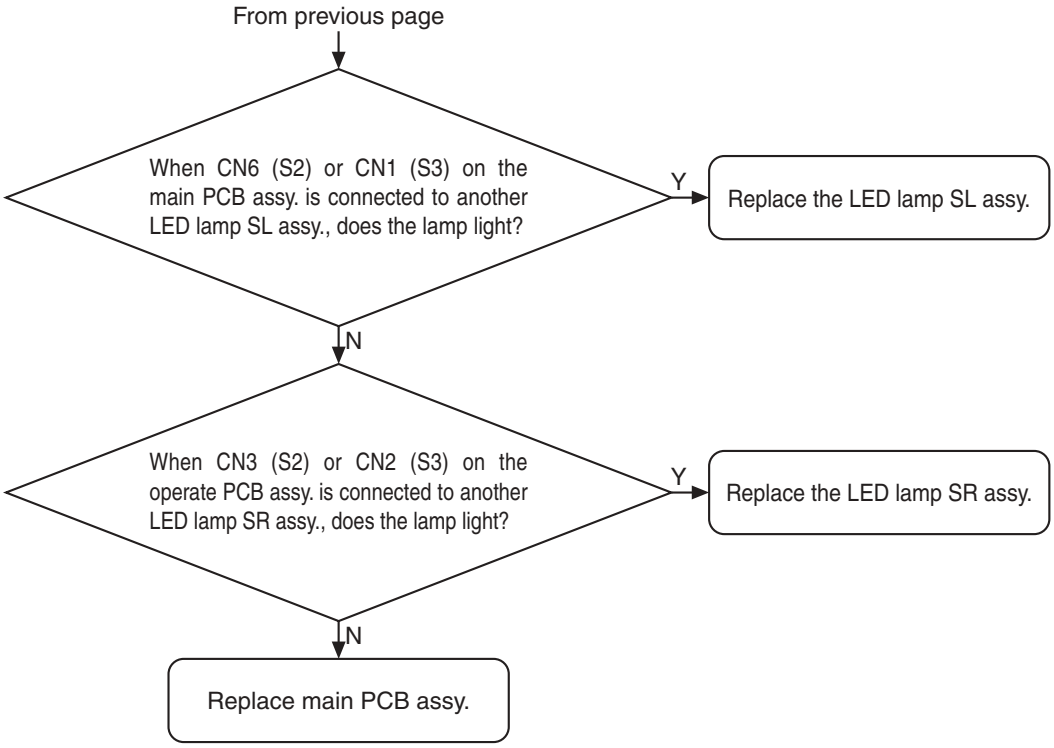

Does not operate when the foot controller is pressed
Is the resistance between pins 2-3 on the foot controller jack assy. connector normal?
• Foot controller not connected ... 1Ω or less
• Foot controller connected ... ∞
N
Replace the foot controller jack assy.
Y
Connect the foot controller; when the foot controller is pressed does the resistance across pins 1-3 of the foot controller jack assy. connector vary from several Ω to 10kΩ?
N
• Replace foot controller
or
• Replace the foot controller jack assy.
Y
Replace main PCB assy.


Needle bar cutting and separating does not occur normally
Is the needle bar cutting and separating operation easy and smooth?
N
Adjust the needle-presser module assembly
Y
Is the resistance across pins 1-2 and pins 3-4 for the Z pulse motor connector 4-6 Ω?
N
Replace the Z pulse motor
Y
Replace main PCB assy.

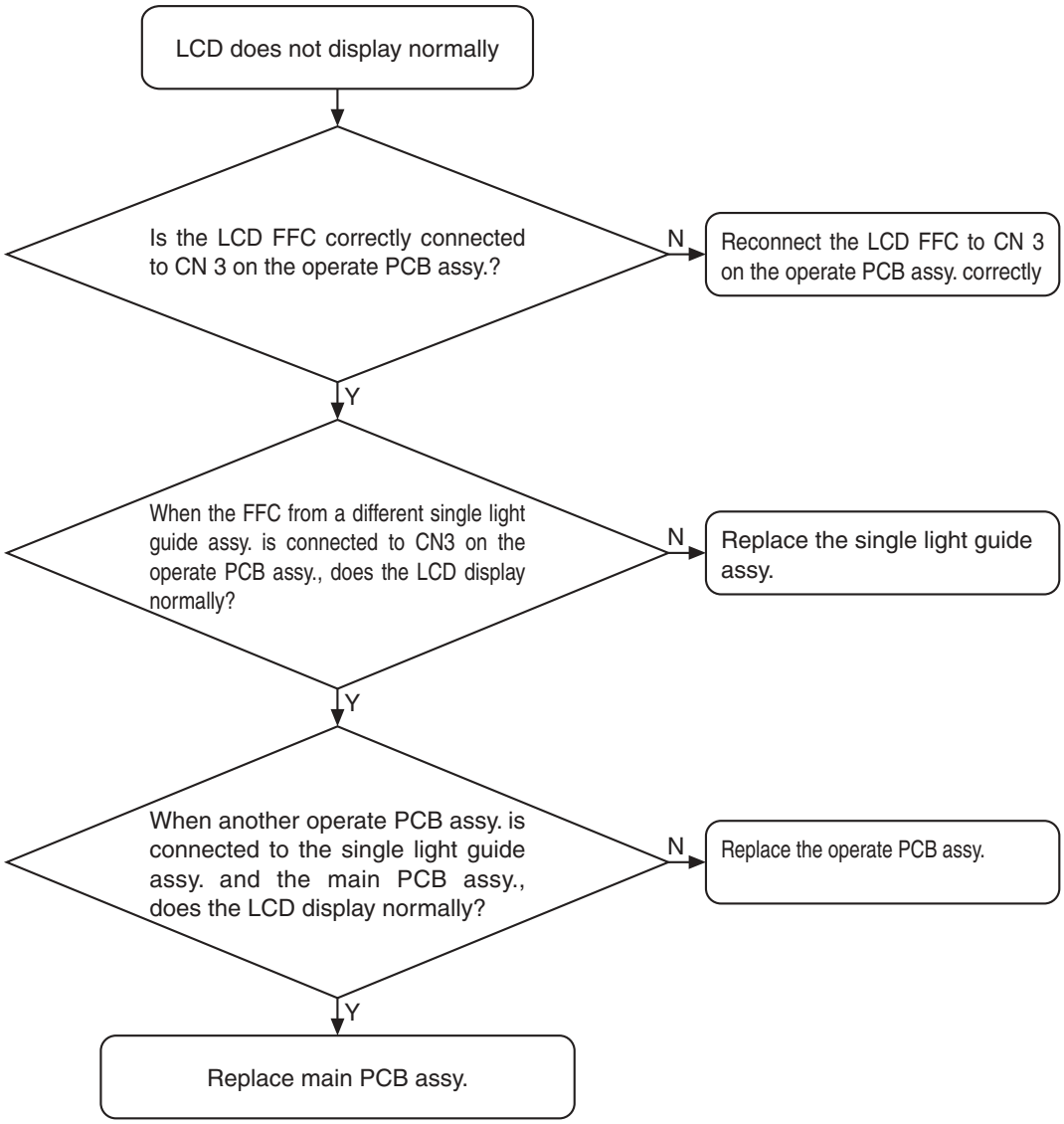

Cassette LED does not light
Is the cassette switch assy. resistance normal?
• Cassette switch assy. resistance
When switch is pressed ... 1Ω or less
When switch is not pressed ... ∞
N
Replace the cassette switch assy.
Y
Replace main PCB assy.

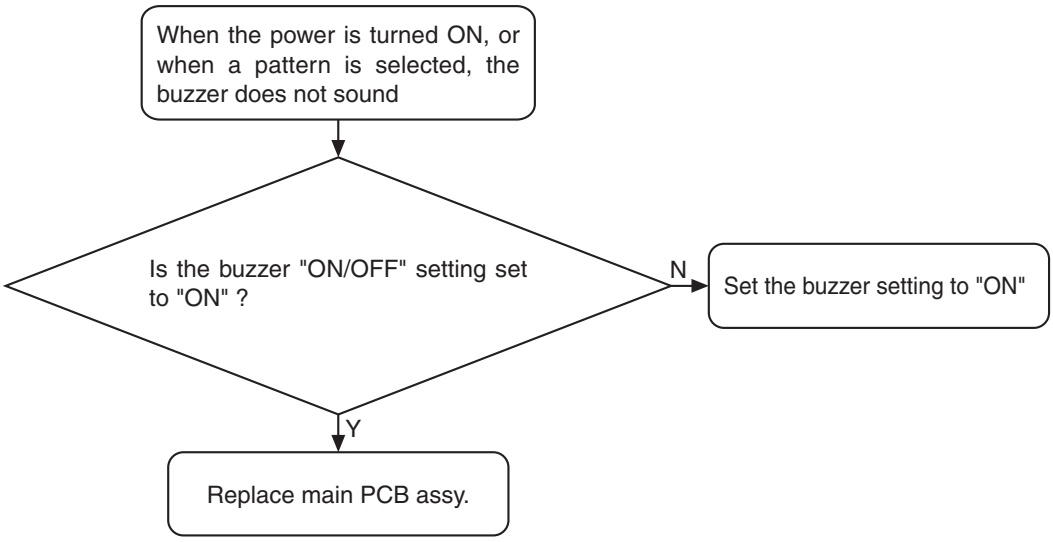

Bobbin winding cannot be done.
Is the bobbin winder mechanism assembly and attachment normal?
N
Adjust the bobbin winder assy. for correct assembly and attachment
Y
Is the resistance between pins 1-2 on the BWSW assy. connector normal?
• Bobbin winder shaft in bobbin winding position ... 1Ω or less
• Bobbin winder shaft in another position ... ∞
N
Replace the BWSW assy.
Y
Replace main PCB assy.

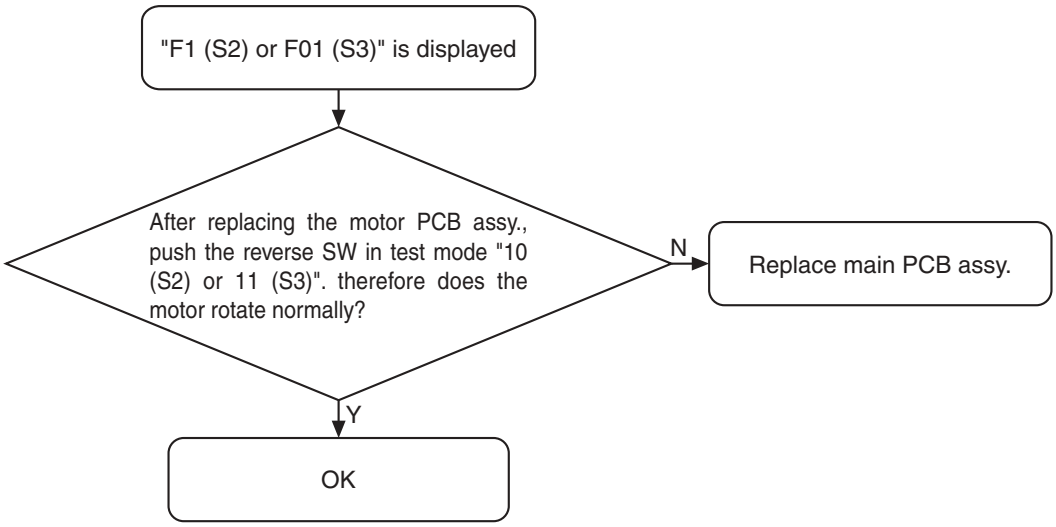

The workspace lamp does not light.
Are the operate PCB assy. and LED lamp SR assy. correctly connected?
N
Reconnect the operate PCB assy. and LED lamp SR assy. correctly
Y
Are the main PCB assy. and LED lamp SL assy. correctly connected?
N
Reconnect the main PCB assy. and LED lamp SL assy. correctly
Y
Are the main PCB assy. and opetate PCB assy. correctly connected?
N
Reconnect the main PCB assy. and operate PCB assy. correctly
Y
Is the voltage across pins 4-3 of the power PCB assy. output connector 26V DC?
N
Replace power PCB assy.
Y
To next page



S2 : CS8000 Series
S3 : CS8100 Series


LCD does not display normally
Is the LCD FFC correctly connected to CN 3 on the operate PCB assy.?
N
Reconnect the LCD FFC to CN 3 on the operate PCB assy. correctly
Y
When the FFC from a different single light guide assy. is connected to CN3 on the operate PCB assy., does the LCD display normally?
N
Replace the single light guide assy.
Y
When another operate PCB assy. is connected to the single light guide assy. and the main PCB assy., does the LCD display normally?
N
Replace the operate PCB assy.
Y
Replace main PCB assy.


When the power is turned ON, or when a pattern is selected, the buzzer does not sound
Is the buzzer "ON/OFF" setting set to "ON" ?
N
Set the buzzer setting to "ON"
Y
Replace main PCB assy.



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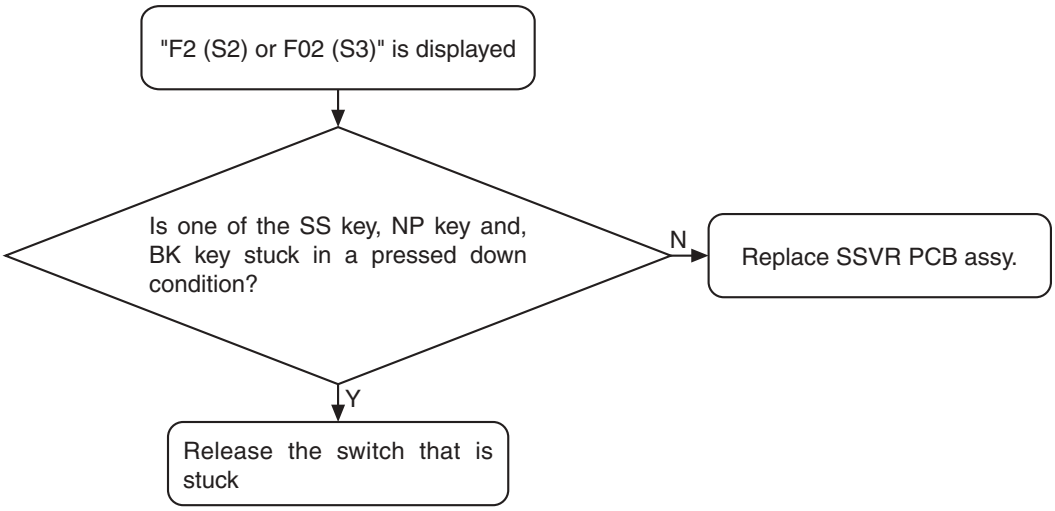

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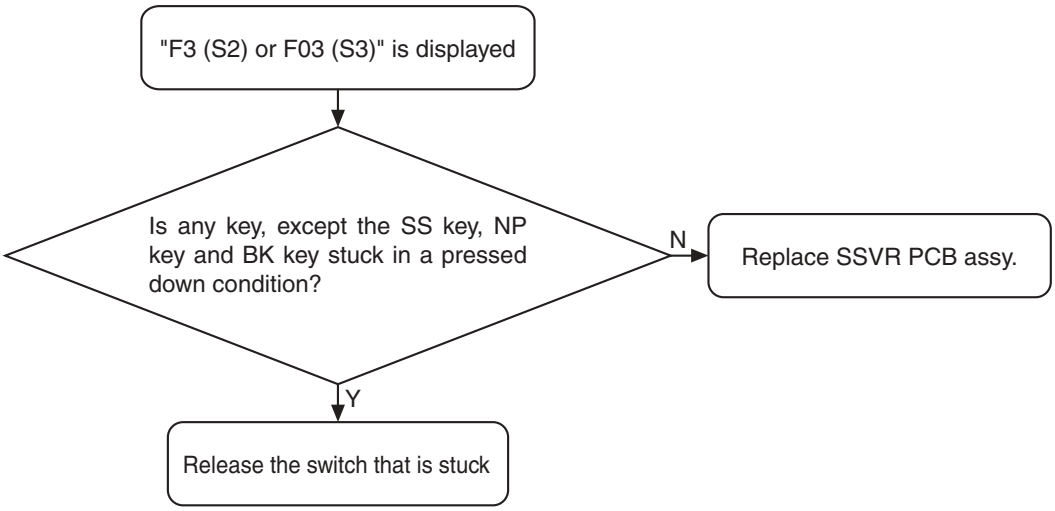

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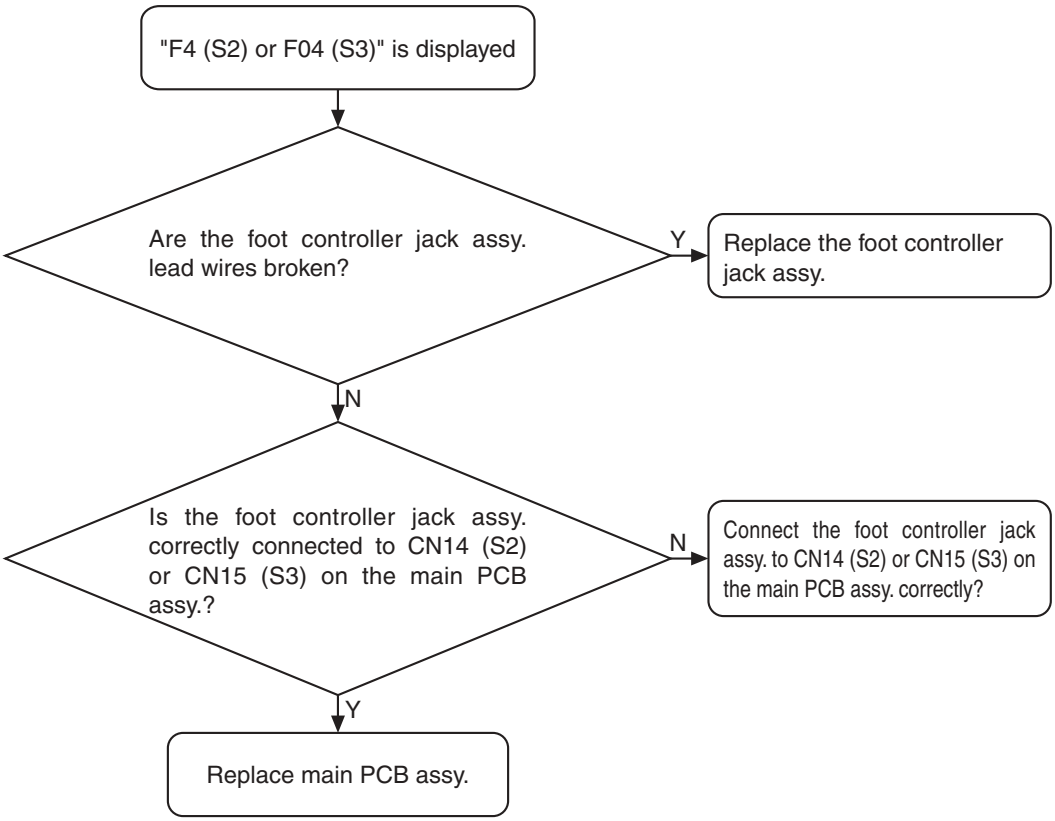

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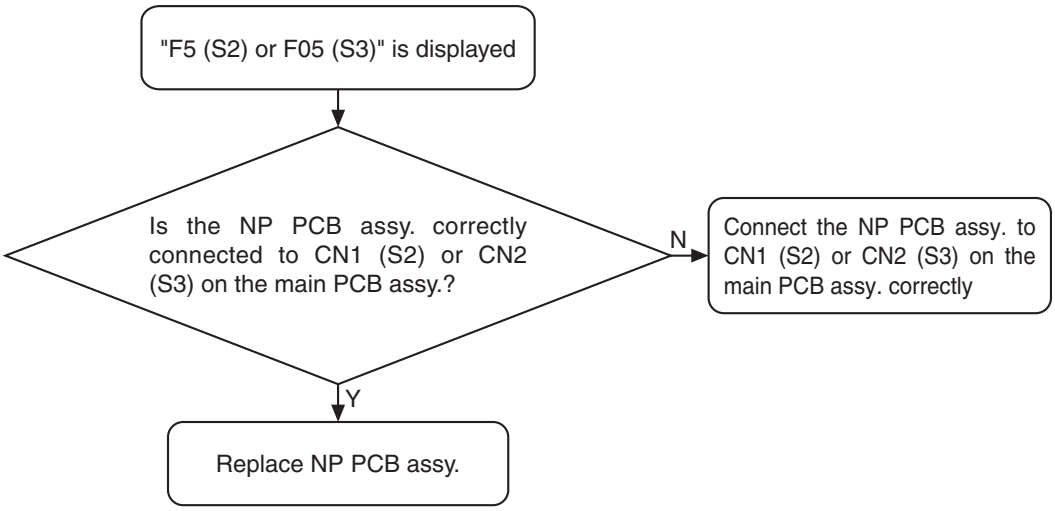

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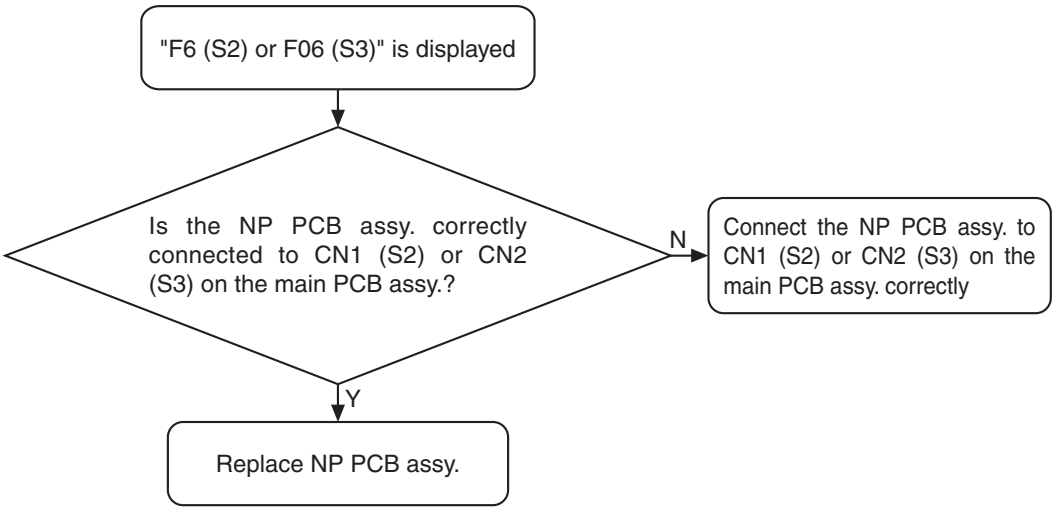

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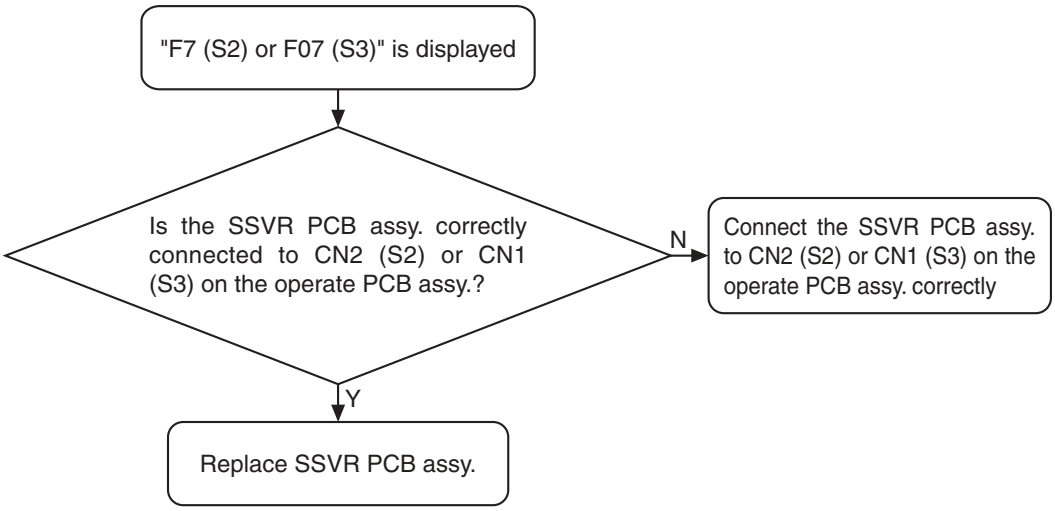


S2 : CS8000 Series
S3 : CS8100 Series

6 Repair Manual

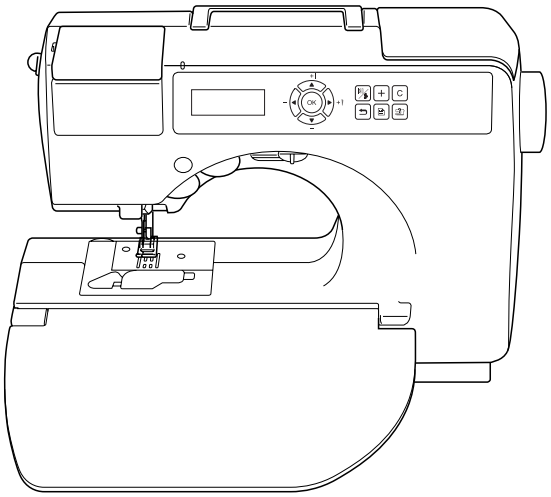
	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
1	Stitch skipping Thread fraying Thread breakage Seam unevenness Needle breaks	Needle tip smashed during sewing Needle catches and bends before or after sewing.	Needle replacement	Needle curvature	Remove the needle, place on level block (horizontal block) and be sure there is no curvature. (4-2)
				Needle smashed	Touch the needle tip with your finger, be sure that it is not smashed. (4-3)
2	Nothing displays on LCD with power ON or 7-SEG LED	Inlet connector disconnection Bad power supply unit S Fuse in power supply unit S is burned out Connector between power supply unit S and main PCB disconnected Bad main PCB Connector between main PCB and SS-VR PCB disconnected Bad contrast adjustment	Plug connector in Replace power supply unit S (3-36) Replace power supply unit S fuse Plug connector in (3-45) Replace main PCB assy. (3-32) Plug connector in (3-41) Adjust contrast	Sewing machine runs when switched on	When the power is turned on there is a beep and the LCD or 7-SEG LED is displayed
	Main lamp (LED lamp) does not light (machine operation normal)	Bad LED lamp SR LED lamp SR lead wire disconnect Bad LED lamp SL LED lamp SL lead wire disconnect LED lamp SR connector disconnect LED lamp SL connector disconnect Bad main PCB Bad operation PCB Bad SS-VR F PCB Selection switch always on ¦ Since two LED lamps are connected in series, two go out with one broken wire	Replace LED lamp SR assy. (3-41) Replace LED lamp SL assy. (3-12) Plug connector in (3-41) Plug connector in (3-12) Replace main PCB assy. (3-32) Replace operation PCB assy. (3-38),(3-40) Replace SS-VR F PCB (3-41) Reassemble bad switch		
3	Cassette display lamp (green, red) does not light	Bad cassette switch Cassette switch connector disconnection Bad main PCB	Replace cassette switch (3-6) Plug cassette switch connector in (3-33) Replace main PCB assy. (3-32)		Display lamp lights with no cassette inserted
4	Even when the presser is raised with a straight line pattern, the sewing machine will not run.	Bad presser switch adjustment Bad presser switch	Adjust presser switch position (3-5) Replace presser switch (3-5)	Presser switch function	
5	Straight line left base line sewing unevenness (pitch)	Bad left-right needle drop adjustment Loose drop adjustment eccentric screw	Bad left-right needle drop adjustment (3-62) Bad left-right needle drop adjustment (3-62)	Three point drop (divide left and right)	Needle should be in the average right-left position with respect to the needle plate needle hole (4-6)
6	Stitch skipping, thread abrasion Thread breakage	Bad needle interference adjustment Loose needle interference adjustment screw	Adjust needle interference (4-16) Adjust needle interference (4-16)	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.
		Bad front-back needle drop adjustment Bad needle plate attachment position	Readjust front-back needle drop (4-16) Reattach the needle plate (3-77)	Front-back needle drop position	Turn the pulley by hand, and confirm that there is a gap with the needle before and after the needle plate groove. (3-28)
		Bad needle bar rise adjustment Loose timing adjustment screws	Adjust needle bar rise (4-8) Readjust needle and rotary hook meeting (4-8)	Needle bar rise amount for needle and rotary hook meeting	With a 2.9 – 3.3 mm rise from the lowest point for the needle, the tip of the bobbin should come to the left side of the needle. (4-8)(measure with gauge)
		Bad needle bar height adjustment Loose timing adjustment screws	Adjust needle bar height (4-9) Adjust needle bar height (4-9)	Needle bar height	When the needle and outside of the bobbin tip meet when turning the pulley on the left base line, the distance from the top of the needle hole to the bottom of the bobbin tip should be 1.0 –1.4 mm. (4-9)

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
7	Does not turn (electronic sound when starting)	Bad main motor Main motor connector disconnection Bad power supply unit Bad SS-VR PCB Connector between SS-VR PCB and operation PCB disconnected	Replace main motor (3-31) Plug connector in (3-33) Replace power supply unit (3-36) Replace SS-VR PCB (3-41) Plug connector in (3-41)	Sewing machine runs at stop/start	Confirm that the sewing machine starts/stops with the SS button
	Does not turn (no electronic sound when starting)	Bad NP PCB assy. NP PCB and main PCB connector disconnect Bad FC jack	Replace NP PCB assy. (3-22) Plug connector in (3-33) Replace FC jack (3-17)		
8	Irregular rotation (rotation slow / fast / unstable)	Grease or dust adhering to speed shutter Grease or dust adhering to NP-F PCB Bad NP PCB assy. Interference between speed shutter and NP-F PCB • Damaged speed shutter • NP PCB slippage damage Bad main PCB	Remove grease or dust Remove grease or dust Replace NP PCB assy. (3-22) Eliminate cause of interference Replace speed shutter (3-22) Replace NP PCB assy. (3-22) Replace main PCB assy. (3-32)	Machine operation while rotating	Should switch speeds fast, medium and slow when the speed control lever is operated and should have no rotational variation at high speed
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 lever Bad vertical drop shaft Disconnected vertical drop shaft	Replace drop knob (3-65) Readjust vertical lever operation (3-65) Replace vertical drop shaft (3-65) Readjust vertical drop shaft (3-65)	Drop function	When the drop lever is moved to the right at the needle bar highest point, the feed dog should move down, and the feed dog should return when it is moved to the left and the pulley turned one turn by hand.
10	Bad pattern shape Blocked by satin stitch 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 Forked spring dissconnect Rattle in feed adjuster assy.	Readjust feed dog attachment screw (3-77) Reattach the feed bar (3-73) Replace lower shaft B assy. (3-71) Assemble forked spring assy. (3-71) Reattach the feed adjuster assy. (3-67)	Back/front rattle in feed dog	There should be no rattle in the feed dog when grabbed front and back and lightly moved back and forth
		Horizontal rattle in feed dog • Loose feed dog attachment screw • Horizontal rattle in feed bar	Readjust feed dog attachment screw (3-77) Reattach the feed bar (3-73)	Rattle in feed dog	There should be no rattle in the feed dog when grabbed on the sides and lightly moved left and right
		Bad feed dog height adjustment	Readjust feed dog height (4-20)	Feed dog height	The height the feed dog protrudes from the needle plate surface at the center of the needle plate hole should be 0.9 – 1.1 mm when the feed dog is at its uppermost point (4-20)
		Bad feed dog front-back position adjustment	Adjust feed dog front-back position (4-21)	Feed dog front-back position	When the pulley is turned by hand and the feed dog is at the needle plate upper surface at a 0 mm feed position (test mode), the gap between the feed dog and the needle plate should be 3.3 – 3.8 mm (4-21)
		Bad feed dog left-right position adjustment	Adjust feed dog left-right position (4-21)	Feed dog left-right position	With the feed dog parallel to the needle plate the right-left gap should be 0.5 - 0.7 mm (4-21)
		Bad feed adjustment	Readjust the feed (4-14)	Feed	The front-back difference in test mode should be 0 - 0 mm for reverse versus forward (4-15)

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
11	Sewing sounds Inappropriate sounds			Operating noise	There should be 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 (3-49)		
	• Outer rotary hook vertical rattle noise	Outer rotary hook noise			
		• Outer rotary hook vertical rattle	Reattach outer rotary hook (3-74)		
	• Upper shaft noise	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 (3-54)		
	• Motor noise	Motor noise			
		• Belt too tight	Readjust the motor belt (4-5)		
		• Motor fan noise	Replace main motor (3-31)		
	• Lower shaft noise	Lower shaft noise			
		• Lower shaft axial rattle	Reassemble the lower shaft (3-71)		
	• Joint noise	Joint noise			
		• Lower shaft joint rattle	Reassemble the lower shaft joint (3-71)		
	• Vertical feed cam noise	Vertical feed cam noise			
		• Vertical feed cam out of oil	Lubricate vertical feed cam		
	• Horizontal feed arm noise	Horizontal feed arm noise			
		• Bad horizontal feed arm	Replace horizontal feed arm (3-69)		
	• Noise from contact between needle plate and feed dog	Noise from contact between needle plate and feed dog			
		• Back/front and left/right rattle in feed dog	Reattach the feed dog assy.(3-77)		
		• Bad feed dog front-back position adjustment	Adjust feed dog front and back (4-19)		
		• Bad feed dog left-right adjustment	Readjust feed dog left and right (4-19)		
		• Slippage in needle plate attachment	Reattach needle plate (3-77)		
	• Needle contact noise	Noise of contact between needle and outer rotary hook			
		• Bad needle interference adjustment	Adjust needle interference (4-16)		
		• Loose needle interference adjustment screw	Readjust needle interference (4-16)		
12	Threading not possible. (threader hook)	Thread pushed out at the hook end.		Threading function	When threading is carried out with Schappe Spun Sewing Thread #60 / #11 needle and Schappe Spun Sewing Thread #30 / #16 needle, the threading lever should move smoothly and threading through the needle hole should be possible. (4-23)
		• Vertical slippage in needle thread block	Readjust the needle thread block (4-23)		
		Hook extends beside the hook.			
		• Large gap between right side of needle and hook guide	Replace hook assy. (3-58)		
		• Needle curvature	Needle replacement		
		• Needle slant (hole slant with slanted attachment of needle block)	Replace needle bar (3-61)		
		• Hook assy. disconnection	Replace hook assy. (3-58)		
		• Vertical slippage in needle thread block	Readjust the needle thread block (4-23)		
		Does not go into needle hole because of hook tip curvature.	Replace hook assy. (3-58)		
		Threading impossible even though hook goes into needle hole.			
	When the threading lever returns, it stops part way through.	Needle thread shaft tangling	Replace needle bar supporter assy. (3-58)		
		Bad thread guide shape	Replace hook assy. (3-58)		
		Hook guide and hook release plate touch	Replace hook assy. (3-58)		
		Bad lever guide shaft shape	Replace lever guide shaft (3-57)		
		Needle thread shaft and top gap too small	Replace needle bar supporter assy. (3-58)		

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
12	Thread cassette operation catches part way through.	Bad needle stop position • NP sensor damage • Grease or dirt adhering to NP sensor • Timing shutter damage Bad needle thread block rotational position	 Replace NP PCB assy. (3-22) Remove grease and dirt Replace upper shaft assy. (3-23) Adjust the needle thread block (4-23)	Threading function	When threading is carried out with Schappe Spun Sewing Thread #60 / #11 needle and Schappe Spun Sewing Thread #30 / #16 needle, the threading lever should move smoothly and threading through the needle hole should be possible. (4-23)
	No thread cassette inserted	Bad presser plate (pretension plate) release plate spring position Deformed presser plate (pretension plate) release plate spring	Adjust presser plate position Replace presser plate (3-20)		
13	Threading impossible (shuttle)	Bad cassette threading height	Readjust cassette threading height (4-11)	Cassette threading function	Distance from the upper edge of the needle hole to the thread 2.1 +/- 0.3 mm Distance from front of the needle to the thread 0.8 +/- 0.2 mm The shuttle should be released when the hook is deep in the needle hole
		Shuttle does not hold the thread (claw does not grasp thread)	Replace thread guide base assy. (3-14)	Cassette threading function	Shuttle claw should securely hold thread
		Thread cassette K thread guide disk does not hold thread	Replace thread cassette	Cassette threading function	Thread cassette should hold thread
	Shuttle returns part way through	• Bad cassette tension plate operation • Thread cassette side surface wear	Replace thread guide base assy. (3-14) Replace thread cassette	Cassette threading function	
	Shuttle does not operate	Thread cassette side surface wear	Replace thread guide base assy. (3-14)	Cassette threading function	
	Shuttle gets stuck part way through	Shuttle shaft complication	Replace thread guide base assy. (3-14)	Cassette threading function	
14	Thread does not catch on needle block	Bad thread guide link B operation	Replace thread guide link (3-8)	Cassette threading function	Thread should catch on needle block
15	Either upper thread tension or bobbin thread tension	Upper thread tension is too strong / weak (Check the screw lock on the tension disk tension adjustment screw) Bobbin thread tension is too strong / weak (Check inner rotary hook screw lock) Upper thread or bobbin thread unsuitable	Upper thread tension with Schappe Spun Sewing Thread #60 is 0.436 – 0.446 N (44.5 – 47.5 g) (4-13) Bobbin thread tension with Schappe Spun Sewing Thread #60 is 0.1 – 0.12 N (10 – 12 g) (4-17) Replace upper thread or bobbin thread	Upper thread tension Bobbin thread tension	Thread tension is good in actual sewing.
16	Utility 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 up/down overlap is too small • Thread catches on spool (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 position (4-21) Adjust inner rotary hook bracket position (4-21) Rethread Replace spool presser Needle replacement	Utility sewing (straight line / zigzag)	Needle does not break in utility sewing. No abnormal sound in utility sewing.
	Thread breakage Thread fraying	Thread breakage. • Thread catches on spool (thread falls down to the right because the spool pressure is insufficient) • Thread catches on spool presser (scratches) • Outer rotary hook scratches	 Rethread Replace spool presser Replace outer rotary hook (3-74)		Thread does not break in utility sewing.

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
16	Seam unevenness	Seam unevenness.			No seam unevenness in utility sewing.
		• Bad presser position	Readjust presser bar height (4-15)		
		• Cloth presser foot is high and does not hold material completely	Readjust presser bar height (4-15)		
		• Inner rotary hook scratches	Replace inner rotary hook		
		• Outer rotary hook scratches	Replace outer rotary hook (3-74)		
		• Scratches around needle plate needle hole	Replace needle plate (3-77)		
		• Scratches around presser foot needle hole	Replace presser foot		
		• Burrs and scratches in thread guide path	Replace parts with burrs and scratches		
		• Bobbin thread tension spring disconnection	Reset bobbin thread		
		• Needle plate scratches	Replace needle plate (3-77)		
	Stops during sewing	Stops during sewing.			Should not stop during utility sewing.
		• No gap for bobbin winder switch	Readjust bobbin winder switch position (3-24)		
		• No gap for BH lever switch	Readjust BH lever switch position (4-24)		
		• No play in SS button, reverse button and vertical stop button	Reassemble SS-VR PCB assy. (3-41)		
17	Cannot sew BH • BH is blocked • BH cannot switch • BH switches part way through Becomes straight line	BH sewing impossible		Batik sewing Eyelet sewing	There should be no stitch skipping or clogging in 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. (4-24)
		• Bad contact point adjustment	Readjust BH switch (4-24)		
		• BH lever detached	Replace BH lever (3-63)		
		• Connector disconnected	Plug connector in (3-33)		
		• Operation sluggish	Replace BH holder (3-63)		
		• BH presser button attachment holder is pulled out fully.	Reset the range for the BH presser button attachment (Move pitch back from the maximum permissible range)		
		Bad feed (forward/reverse pitch) adjustment (100 stitches forward/ reverse)	Re adjust feed (forward/reverse pitch) (4-14)		
18	Cannot select pattern	SW is being pressed continually. Foot controller is tangled and being pressed continually	Adjust or replace SSVR PCB (3-41)		
		Other	Replace main PCB assy. (3-32)		
19	Bobbin winder shaft not turning	Bad BW switch	Replace BW switch assy.(3-24)	Bobbin winder function	Wind bobbin with Schappe Spun Sewing Thread #60, and there should be no uneven winding or abnormal sounds. The amount wound on the bobbin should be approximately 85% or the outside diameter. (4-18)
		BW switch connector disconnect	Plug connector in (3-33)		
		Unsuitable BW switch attachment position	Adjust BW switch position (3-24)		
		Bad main PCB	Replace main PCB assy. (3-32)		
	Bobbin winding amount unsuitable	Bad bobbin presser adjustment	Adjust bobbin presser position (4-18)		
		Loose bobbin presser attachment screw	Reassemble bobbin presser (3-46)		
	Bobbin winder winds unevenly	Bad bobbin winder guide height adjustment	Adjust the bobbin winder guide height (4-18)		
		Loose bobbin winder guide screw	Adjust the bobbin winder guide height (4-18)		
	Abnormal sound when the bobbin winder rotates	The bobbin is coming into contact with the bobbin presser	Remove the front cover, and adjust the position using the bobbin winder holder attachment screw (3-25)		
		Timing pulley scratches	Repair scratches or replace timing pulley (3-22)		
20	Thread is not cut when it is loaded into the thread cassette	Bad cutting edge on thread guide disk blade in thread cassette	Replace thread cassette		Thread should be cut
21	Foot controller not effective	Bad foot controller	Replace foot controller	Foot controller function	Run the sewing machine using the foot controller, and the sewing machine speed should change according to the amount it is pressed down.
		Bad FC jack contact	Replace FC jack assy. (3-17)		
		Bad main PCB	Replace main PCB assy. (3-32)		



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CS8100 Series

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