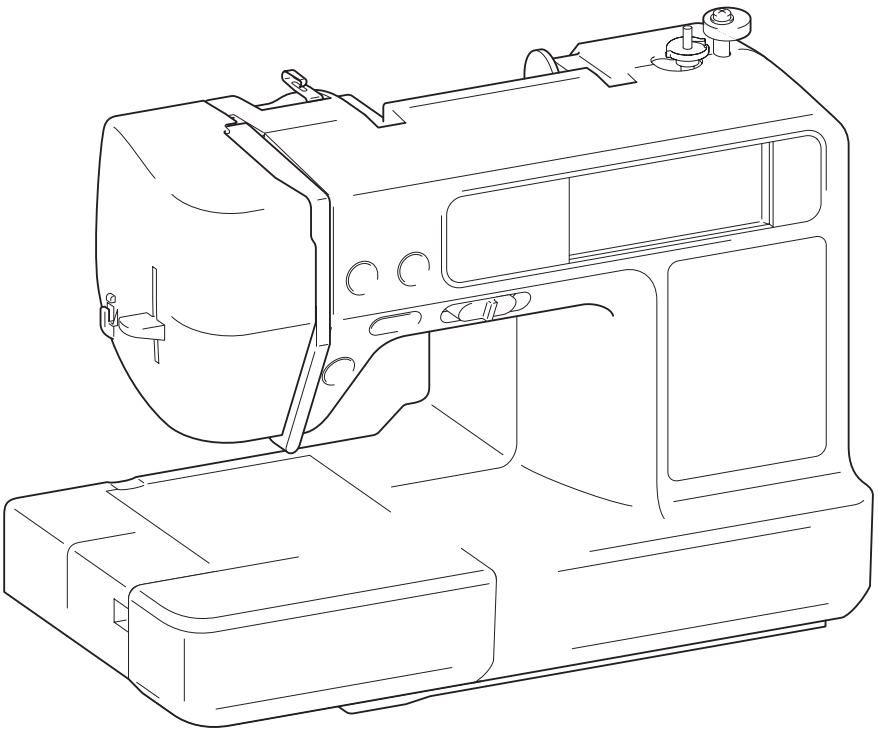
SERVICE MANUAL FOR COMPUTERIZED SEWING MACHINE



BL137A

11.2008.

GENERAL INFORMATION

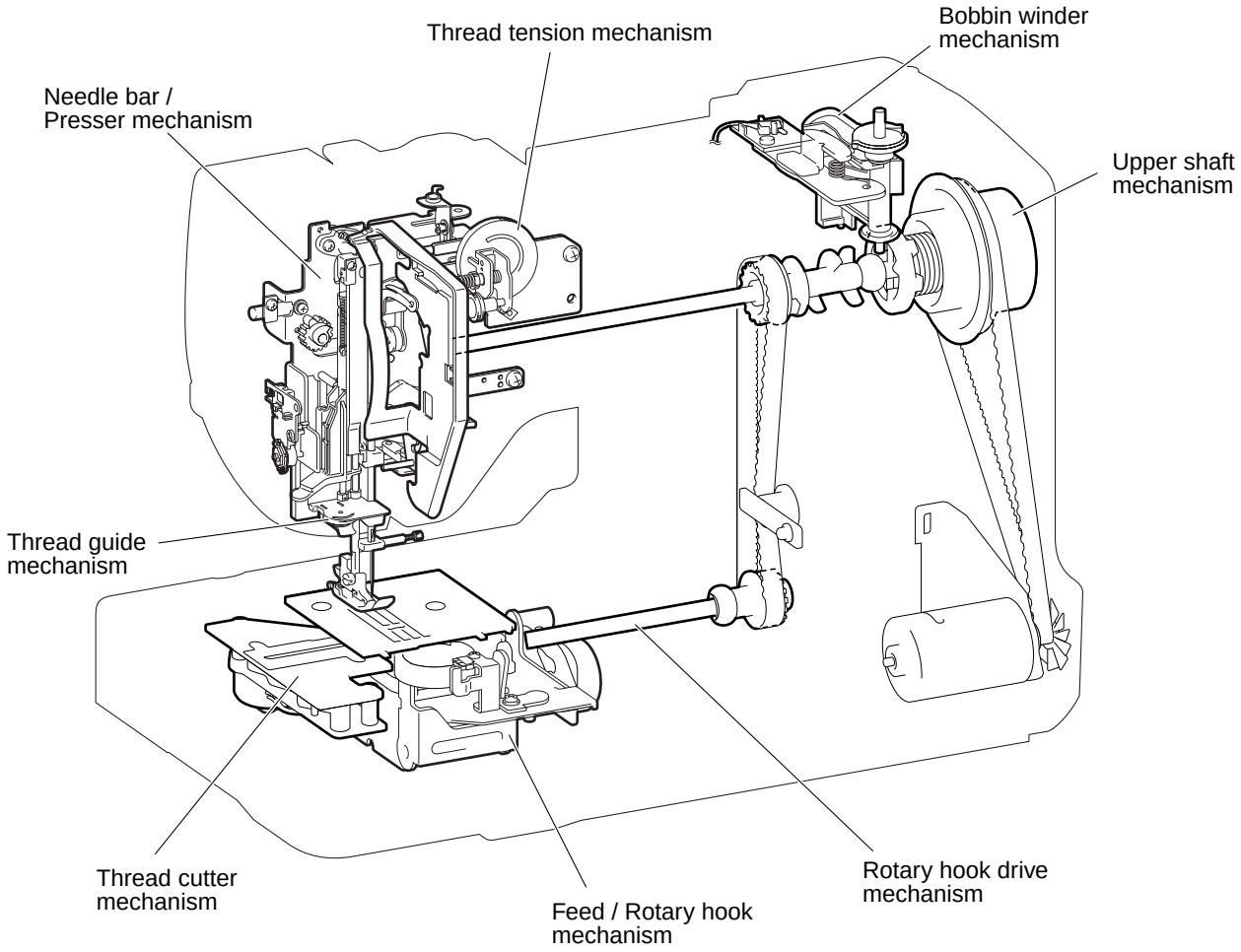
This service manual has been compiled for explaining repair procedures of this MODEL.
This was produced based on up-to-date product specifications at the time of issue, but there may have been changes of specifications for the purpose of improvements.
Contact manufacturer or local sales company for information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

CAUTION <To do the adjustment and the repair safely and surely, follow the instructions below. >

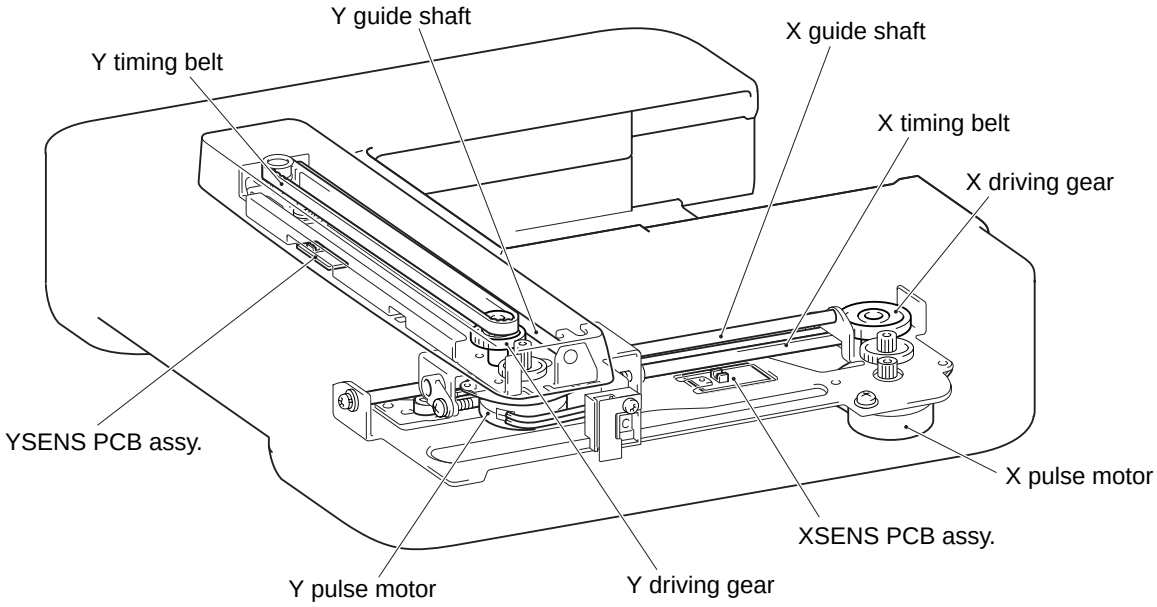
1. Do the adjustment and the repair according to operation procedure of this service manual.
2. When you attach or remove parts, turn off a power switch and then pull out a power supply plug from outlet.
3. When you replace parts, use regular parts.
4. Do not remodel a sewing machine.
5. Always use earth band when handling printed circuit boards to exclude damage of printed circuit boards by static electricity.
6. Pack printed circuit boards in antistatic packaging and avoid subjecting them to any from of impact during storage or transportation.
7. 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.
8. Insert removed connectors into the proper position according to special instructions of wiring for this service manual at the repair, the adjustment and replace printed circuit boards.
9. When you remove a connector from printed circuit boards, remove it while having a connector part. (When you pull out a connector while having a lead wire part, there is a risk that a lead wire get broken.)
10. Do not damage lead wires, when you cut a band that bind up lead wires.

1 Outline of Mechanism

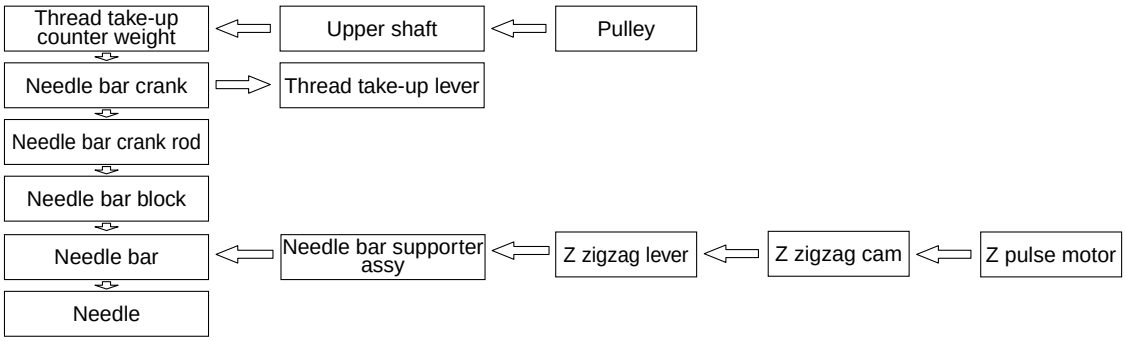
Main body

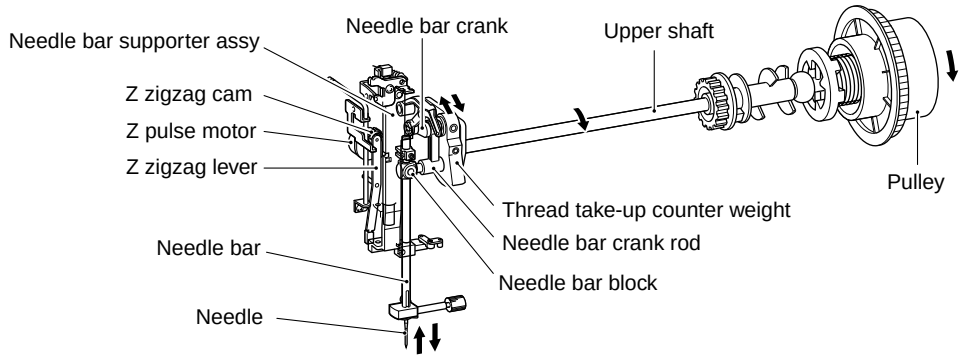


Embroidery unit

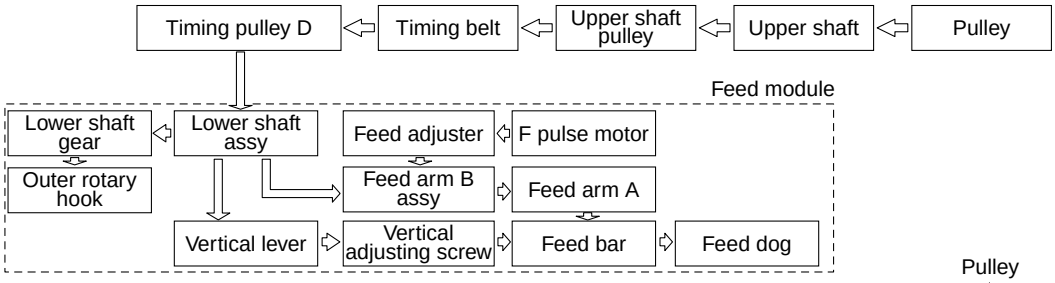


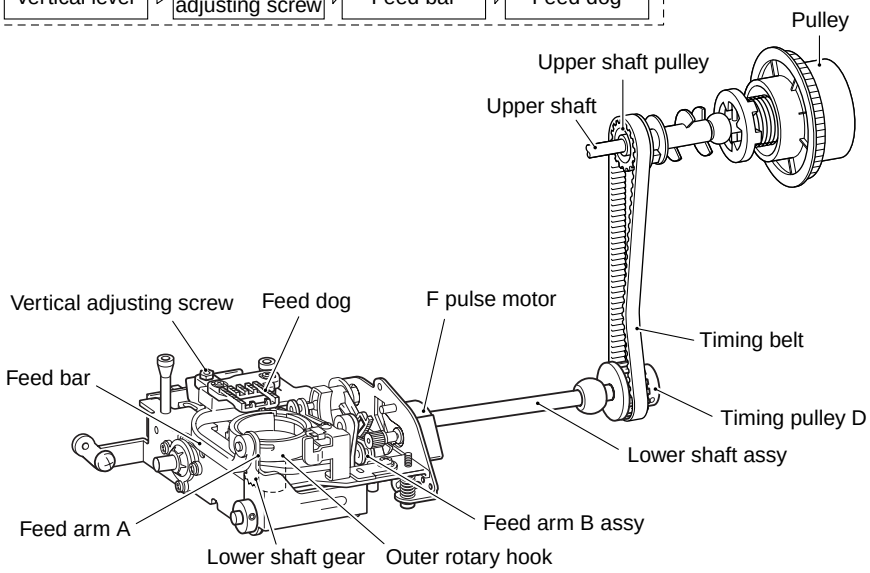
A) Up and down movement of needle bar, movement of thread take-up lever and zigzag mechanism

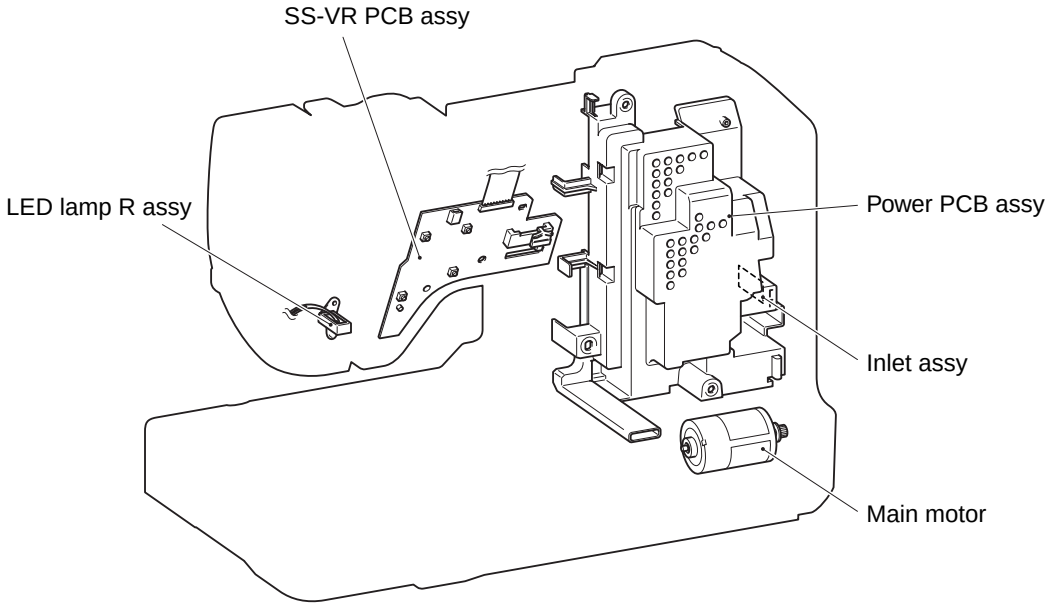


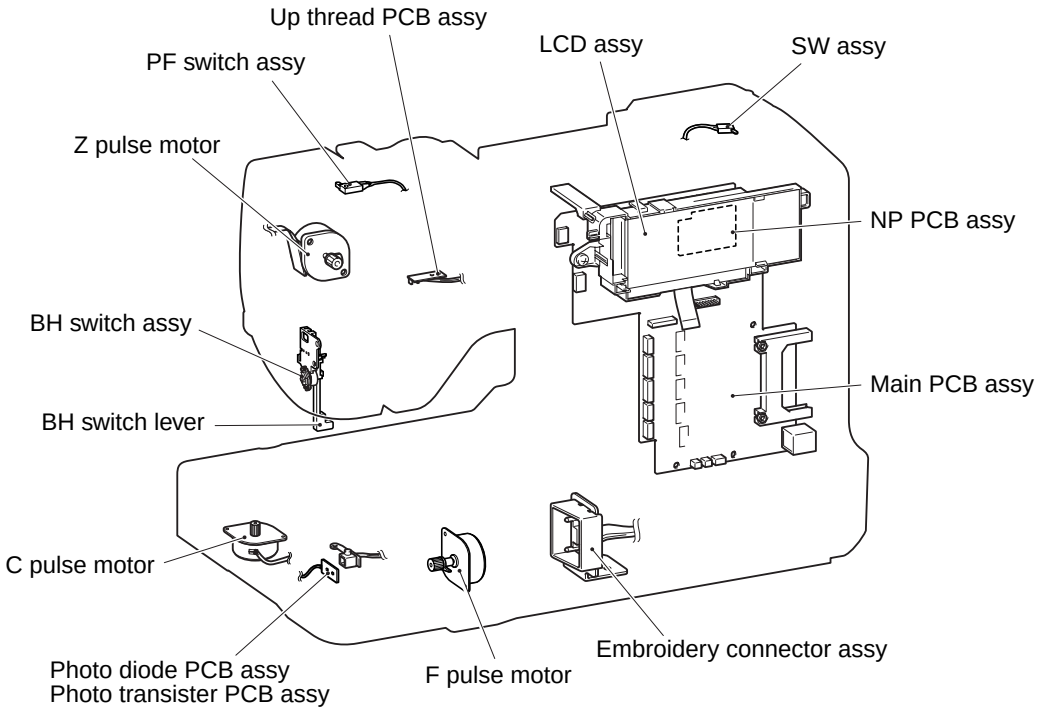


B) Movement of feed dog and bobbin

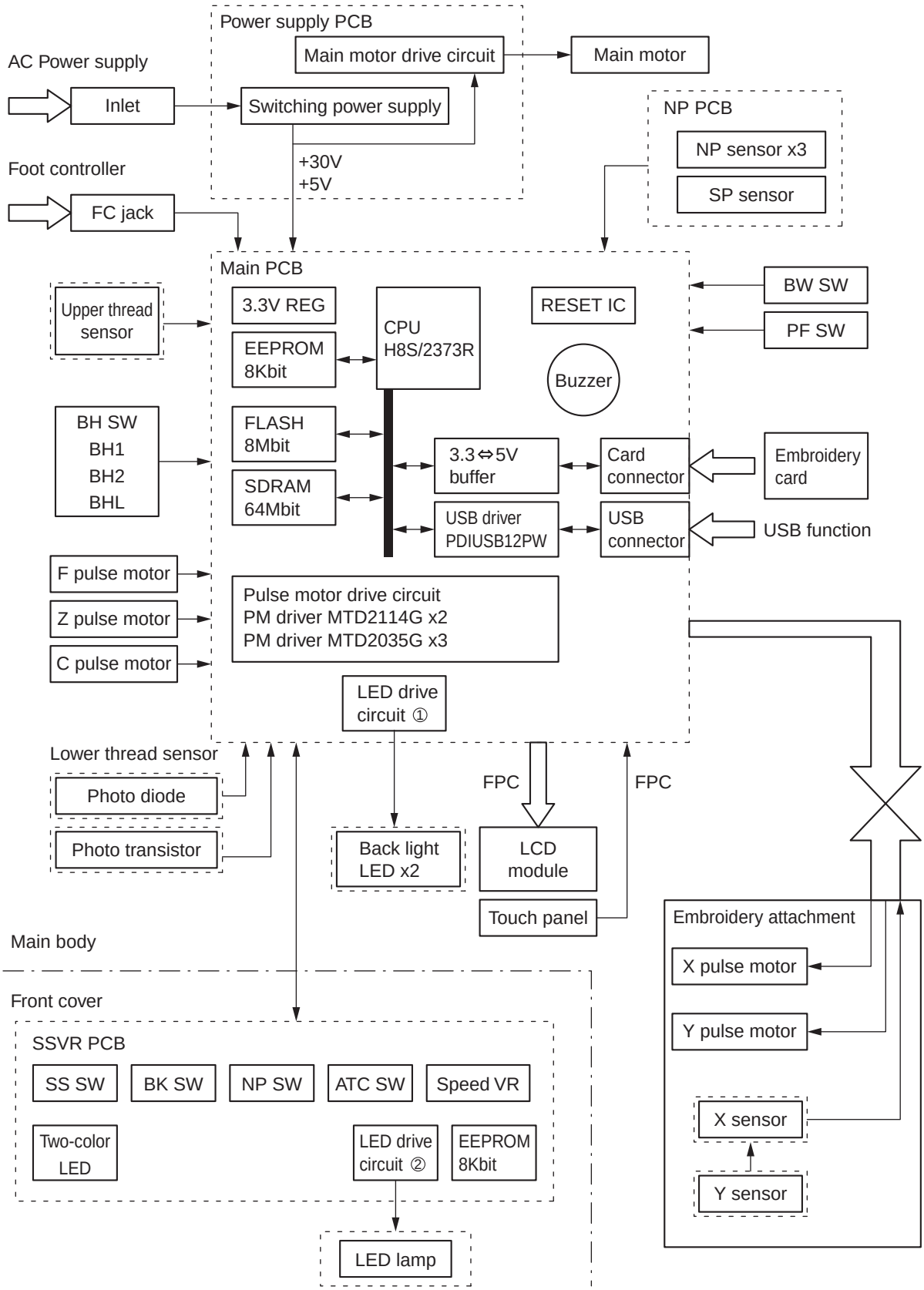





SS-VR PCB assy
LED lamp R assy
Power PCB assy
Inlet assy
Main motor


Up thread PCB assy
PF switch assy
LCD assy
SW assy
Z pulse motor
NP PCB assy
BH switch assy
Main PCB assy
BH switch lever
C pulse motor
Embroidery connector assy
Photo diode PCB assy
Photo transister PCB assy
F pulse motor

Control system block diagram



Start/Stop (SS) Switch, LED	Switch for starting and stopping the sewing machine. The machine operates at a slow speed while the switch is being held down.
Revers stitch 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.
Needle position switch	This switch toggles the needle between the up and down positions.
Thread cutter switch	This switch is for cutting the thread. If the switch is pressed, the thread is cut regardless of the position of the needle, and the machine stops with the needle up.
Touch Panel	Used to select pattern and input test mode number required for sewing by simply touching the display on the panel. This simplifies the oparation for selecting the desired pattern and number.
Speed Control Lever.	This lever detects for the speed of sewing.
BH (buttonhole) switch	This switch is for detecting the forward and rear ends of the button hole according to the BH presser and lever.
BH (button hole) lever switch	This switch detects whether the BH lever is up or down.
NP sensor	This sensor detects the drive timing for the pulse motor for the vertical stop position for the needle. It detects the upper shaft angle of rotation using a shutter attached to the upper shaft and an opitical 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.
PF 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	White LED lamp for illuminating the work space.
Up thread PCB	Detects the presence or absence of the upper thread and whether it is cut or not.
Photo diode PCB assy, photo transistor PCB assy.	When the bobbin thread is low, this detects it.

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

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

<Cautions>

1. The threader cannot be used with sewing machine thread and needle combinations that are not in the table or those marked with an x.

2. Since combinations marked with an asterisk have a greater possibility of damaging the threader or not working properly, do your best to encourage users to avoid them.

3. When using the threader, lower the presser.

4. Do not turn the pulley while using the threader.

5. 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.

6. When a #9 sewing machine needle is used, threading may be difficult. (This is caused by variations in needle precision.)

7. If the needle tip is less than 8 mm from the upper surface of needle plate A, threading may not be possible.

8. When a side cutter is being used, the threader cannot be used. Perform the threading operation before attaching the side cutter.

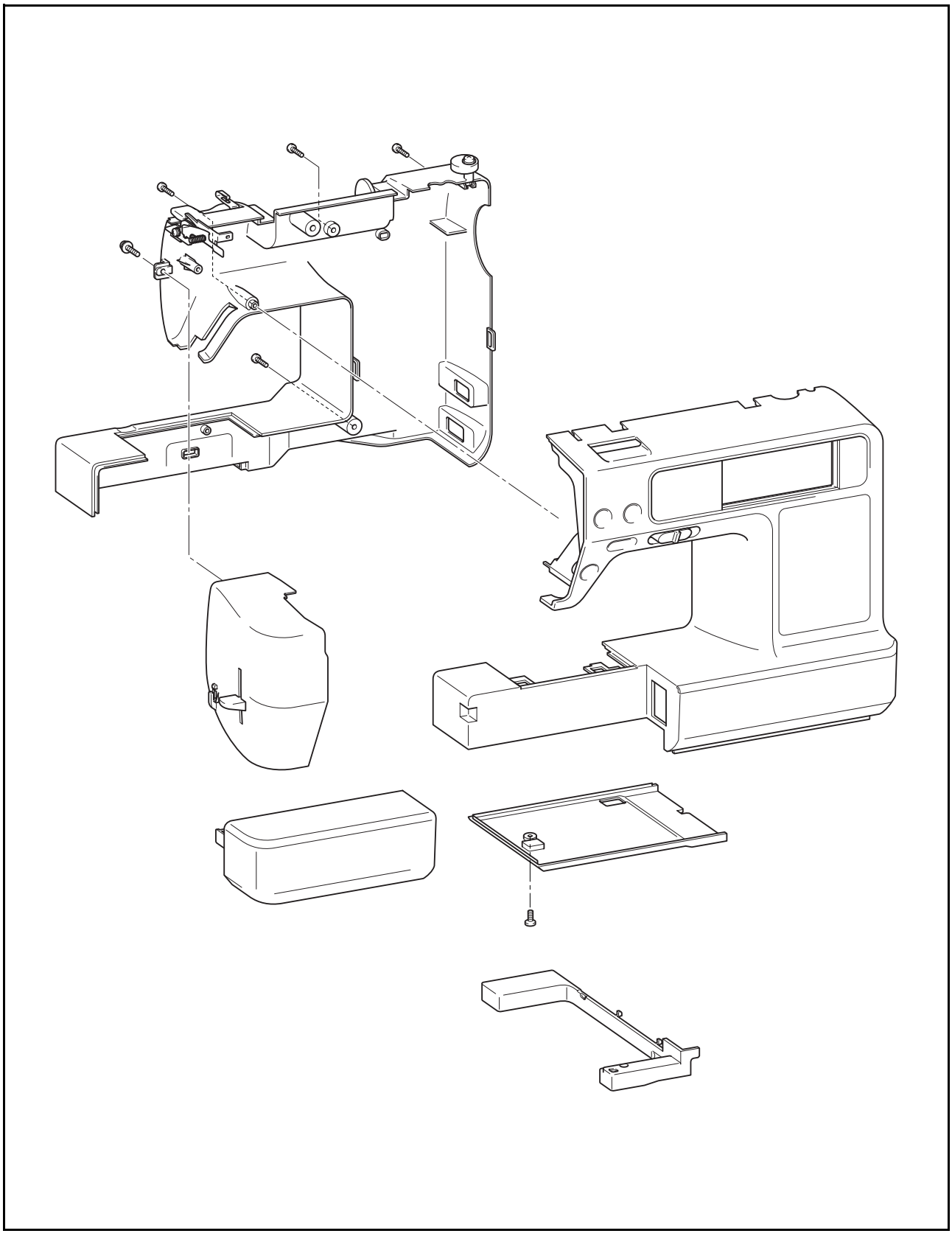
Thread size / Needle size	#30	#50	#60	#80	#100	#120
#9	×	×	×	○	○	○
#11	×	○	○	○	○	※
#14	×	○	○	○	※	※
#16	※	○	○	※	※	※
#18	※	※	※	※	※	※

2 Basics of Disassembly/Assembly

In this chapter, explains the disassembly and assembly of the each module. When fix by a unity of the module, use this chapter.

* When fix and replace the part of the module, refer to “CHAPTER 3 Applications of Disassembly/assembly.

Main parts location diagram



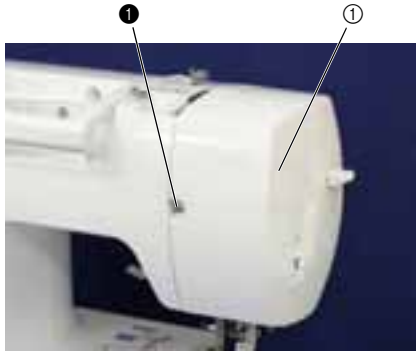
1 Removal of Accessory table assy.

1. Remove the accessory table assy ①.

2 Removal of Face plate assy.

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

→**Refer to 3 - 3 of the Disassembly.**



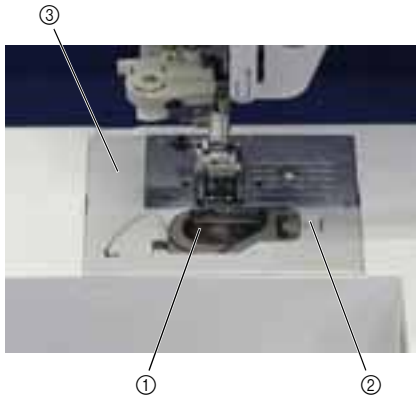
3 Removal of Needle plate B assy.

1. Remove the needle plate cover ①.

   ***Key point**
   - Slide the slide button ②, and then remove it.

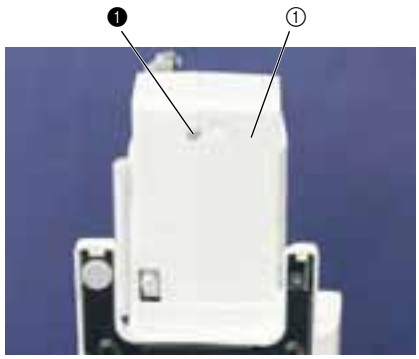
2. Remove the needle plate B assy. ③.

→**Refer to 3 - 4 of the Disassembly.**



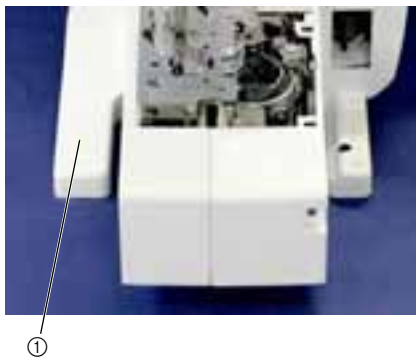
4 Removal of Bottom cover

1. Remove the screw ❶, and then remove the bottom cover ① from the arm bed.



5 Removal of Base foot cover

1. Remove the base foot cover ① from the base plate.

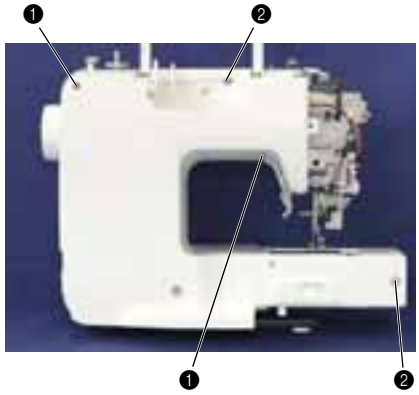


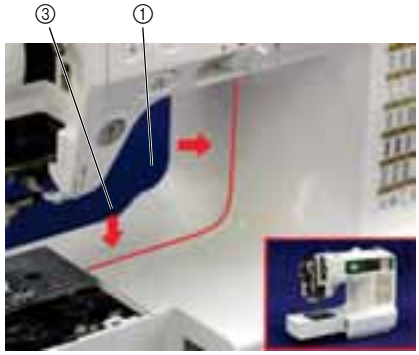
6 Removal of Front cover assy.

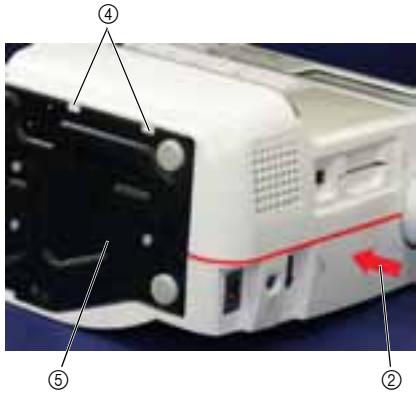
1. Remove the 2 screws ❶ and the 2 screws ❷.
2. Remove the hooks (2 locations) of the front cover assy. while pushing the part which showed with the arrows of the ①, ② of the side of the rear cover. And then remove the hook of the front cover assy. while pushing the part which showed with arrow of the ③ of the side of the rear cover.

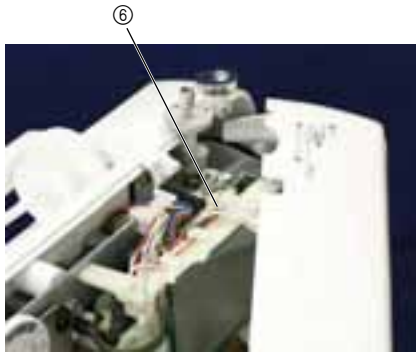
   ***Key point**
   - Be careful not to damage the hooks.
3. Remove the hooks ④ (2 locations) of the bottom side of the front cover assy. from the base plate ⑤.
4. Remove the 2 connectors ⑥ from the main PCB assy., and then remove the front cover assy..

→Refer to 3 - 5 of the Disassembly.









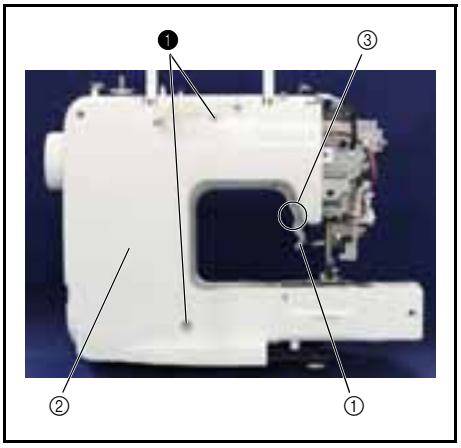
7 Removal of Rear cover

1. Remove the 2 screws ❶.
2. Lower the presser lever ①.
3. Remove the rear cover ② from the arm bed.

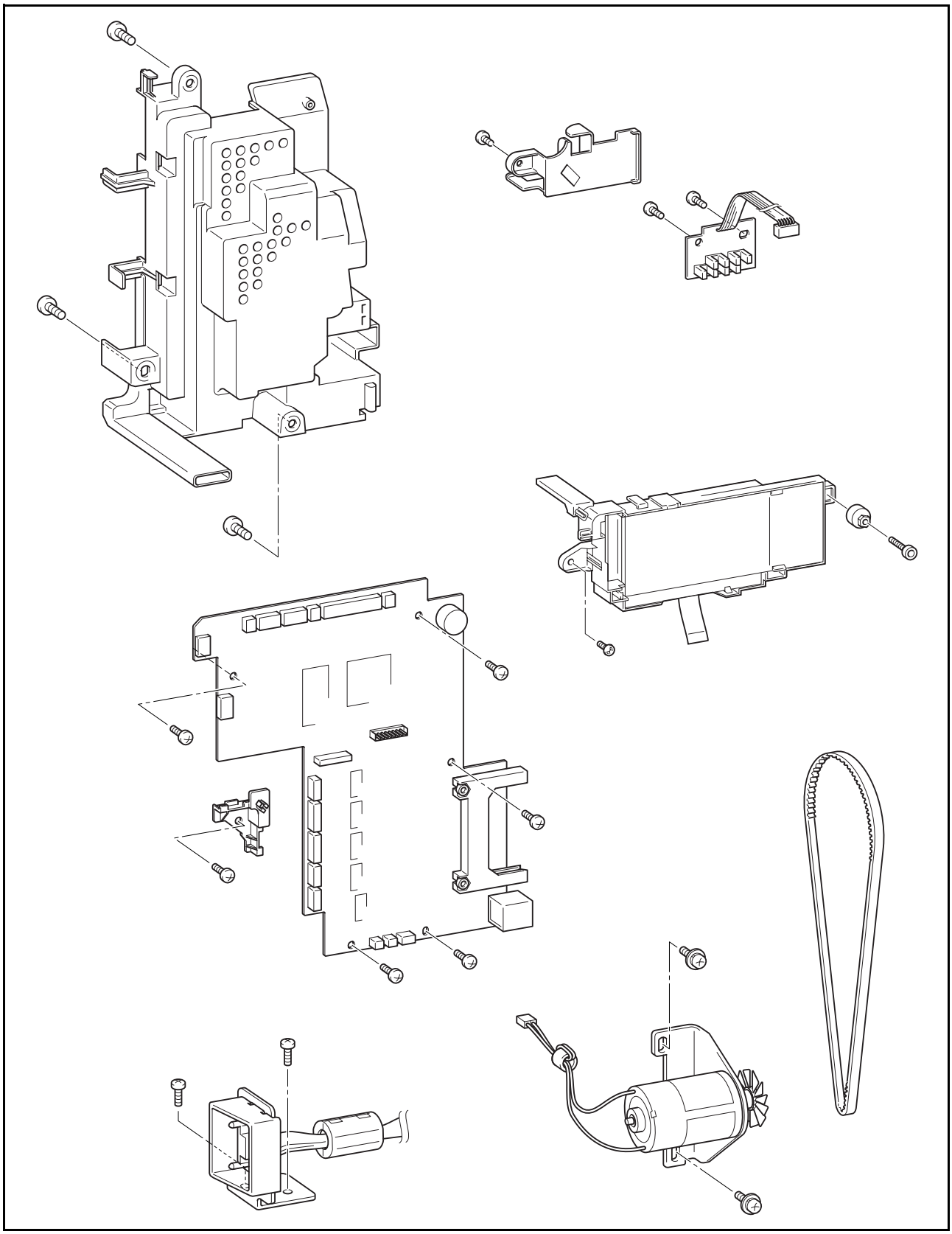
***Key point**

- Check that the section ③ get over the presser lever ①.

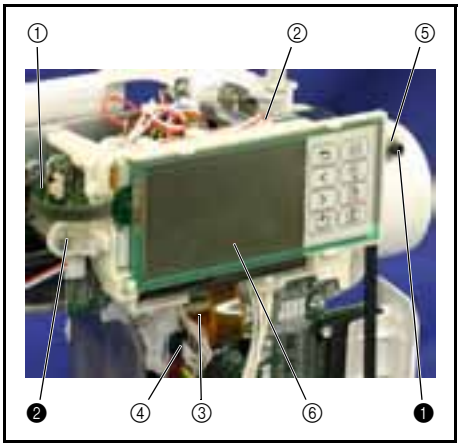
→**Refer to 3 - 7 of the Disassembly.**



Electrical parts and motors location diagram



1 Removal of LCD unit



1. Remove the FFC of the touch panel assy. ① from the main PCB assy..

   ***Key point**
   - Release the lock of the main PCB assy..

2. Remove the connector ② of the back light PCB assy. from the main PCB assy..

   ***Key point**
   - Remove the lead wire of the back light PCB assy. from the guide part of the light plate assy..

3. Remove the connector ④ of the ZPM lead wire and the FFC ③ of the LCD supply assy. from the main PCB assy..

   ***Key point**
   - Remove the ZPM lead wire from the guide part of the LCD supporter and LCD supply assy..

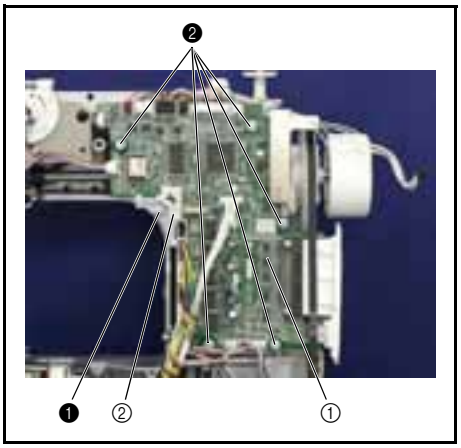
4. Remove the screw ❶, and then remove the zigzag adjusting nut ⑤.

   ***Key point**
   - The adjustment of the position of the LCD unit ⑥ is easy when add the mach mark to the zigzag adjusting nut ⑤ and the light plate assy. with the pencils when re-assembly it before remove the screw ❶.

5. Remove the screw ❷, and then remove the LCD unit ⑥ from the arm bed.

→**Refer to 3 - 13 of the Disassembly.**

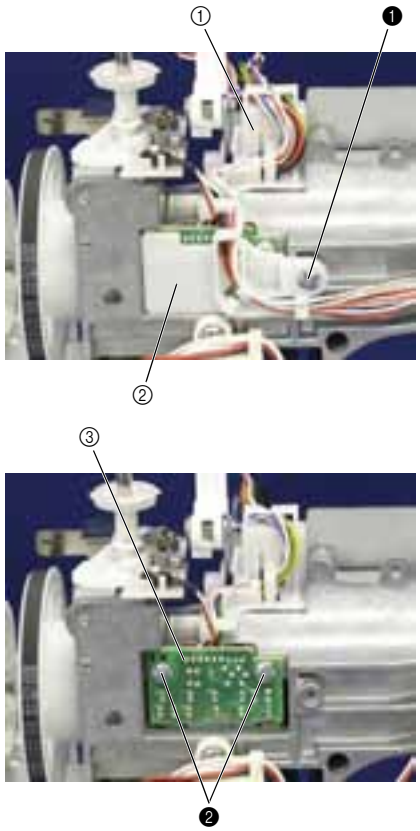
2 Removal of Main PCB assy.



1. Remove the all connectors from the main PCB assy. ①.
2. Remove the screw ❶, and then remove the LCD supporter ② from the arm bed.
3. Remove the 5 screws ❷, and then remove the main PCB assy. ① from the arm bed.

3 Removal of NP PCB assy.

1. Remove the all lead wires from the cord guide ① and the cord guide A ②.
2. Remove the screw ❶, and then remove the cord guide A ② from the arm bed.
3. Remove the 2 screws ❷, and then remove the NP PCB assy. ③ from the arm bed.



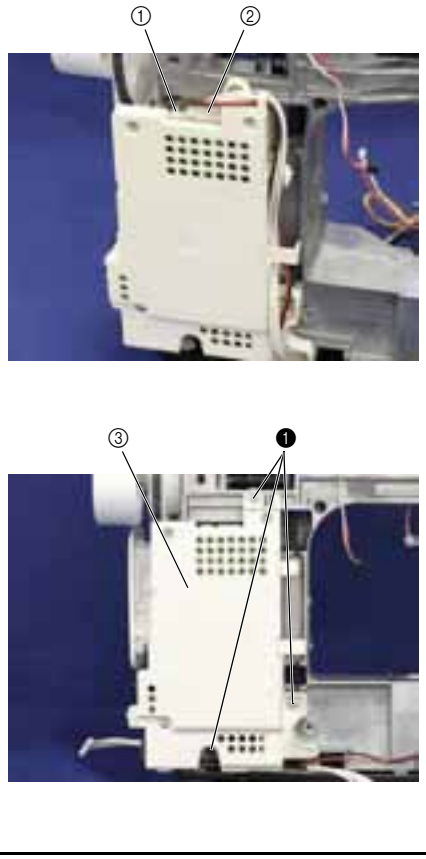
4 Removal of Power supply unit

1. Remove the main motor sub assy. lead wire connector ① and the power lead wire assy. connector ② from the power PCB supply assy..

   ***Key point**
   - Remove the each lead wire from the guide part of the insulation cover.

2. Remove the 3 screws ❶, and then remove the power supply unit ③ from the arm bed.

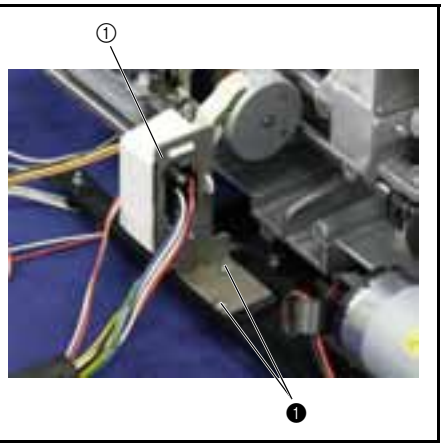
→Refer to 3 - 14 of the Disassembly.



5 Removal of Embroidery connector assy.

1. Remove the 2 screws ❶, and then remove the embroidery connector assy. ① from the base plate.

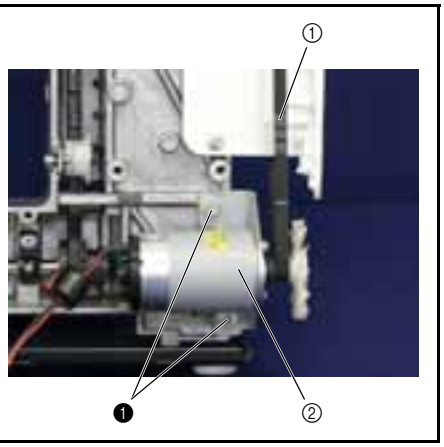
→**Refer to 3 - 16 of the Disassembly.**



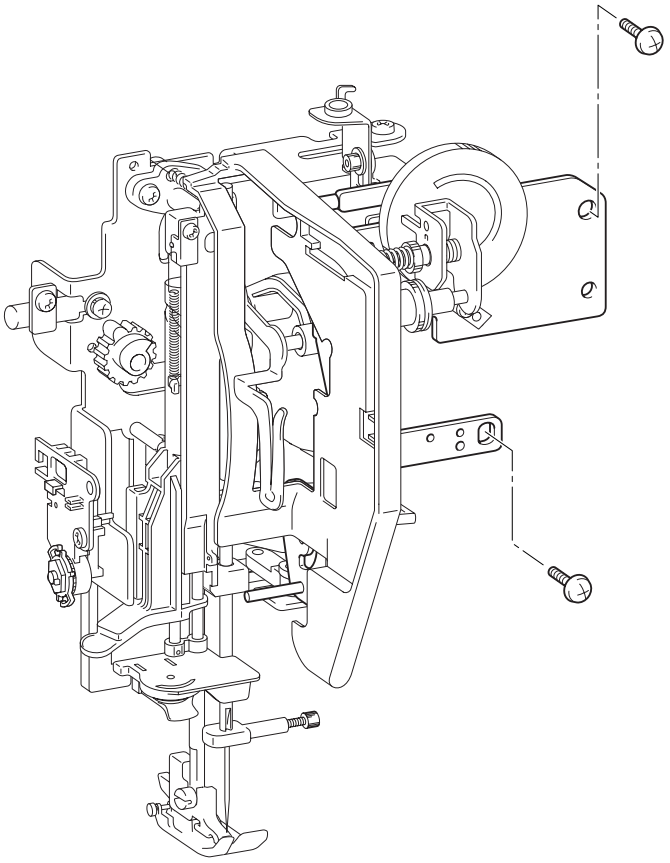
6 Removal of Main motor sub assy.

1. Remove the T belt ①.
2. Remove the 2 screws ❶, and then remove the main motor sub assy. ② from the arm bed.

→**Refer to 3 - 16 of the Disassembly.**



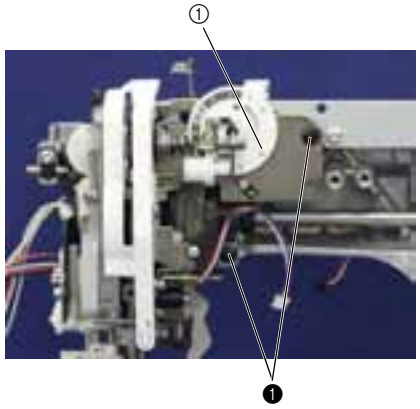
Thread tension mechanism location diagram



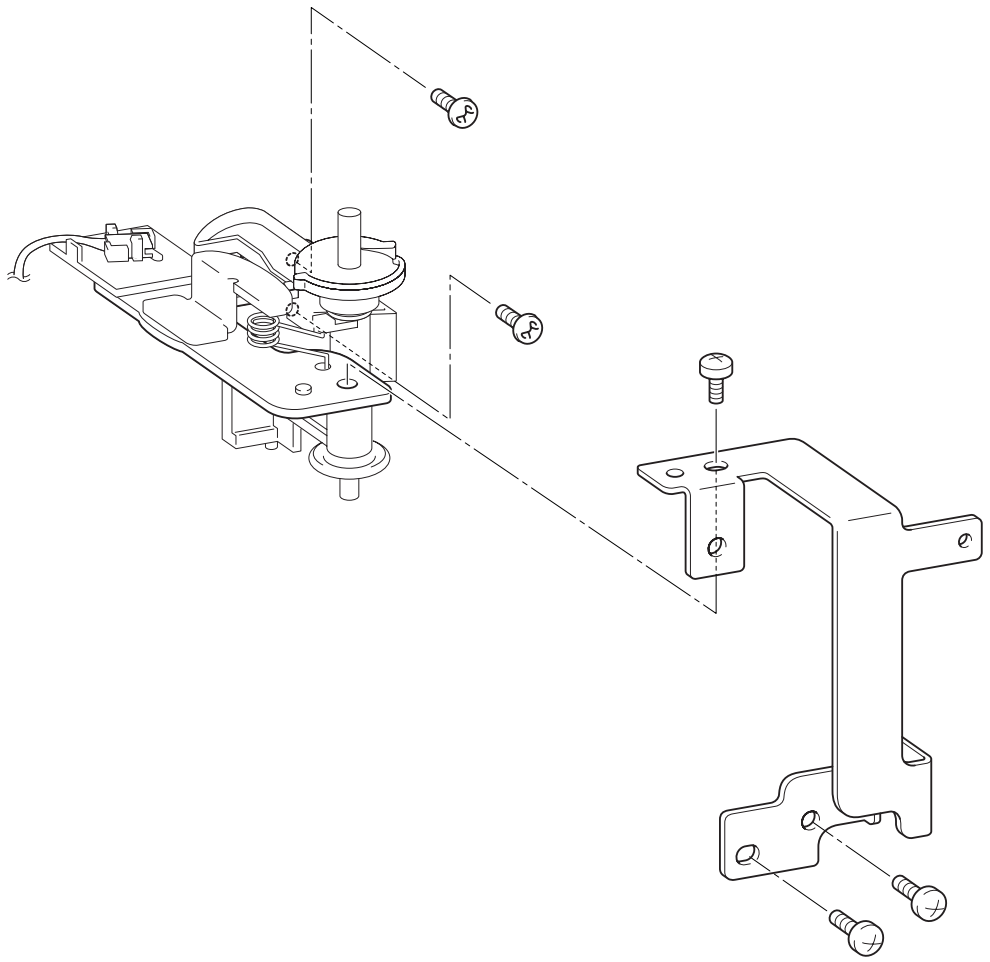
1 Removal of Thread unit

1. Remove the 2 screws ❶, and then remove the thread unit ① from the arm bed.

→**Refer to 3 - 17 of the Disassembly.**



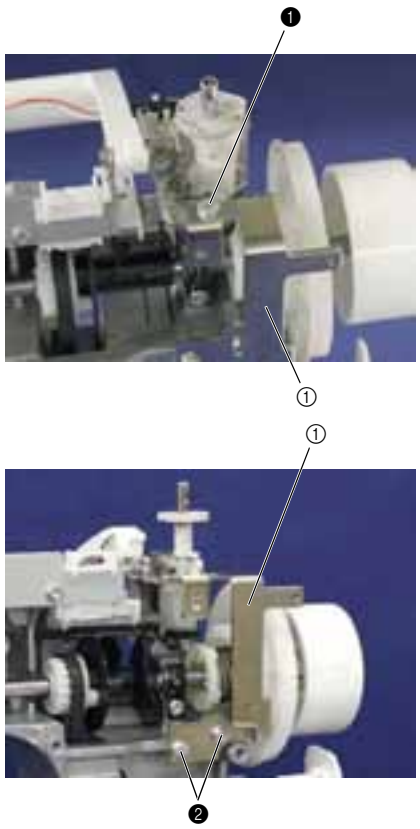
Bobbin winder mechanism location diagram



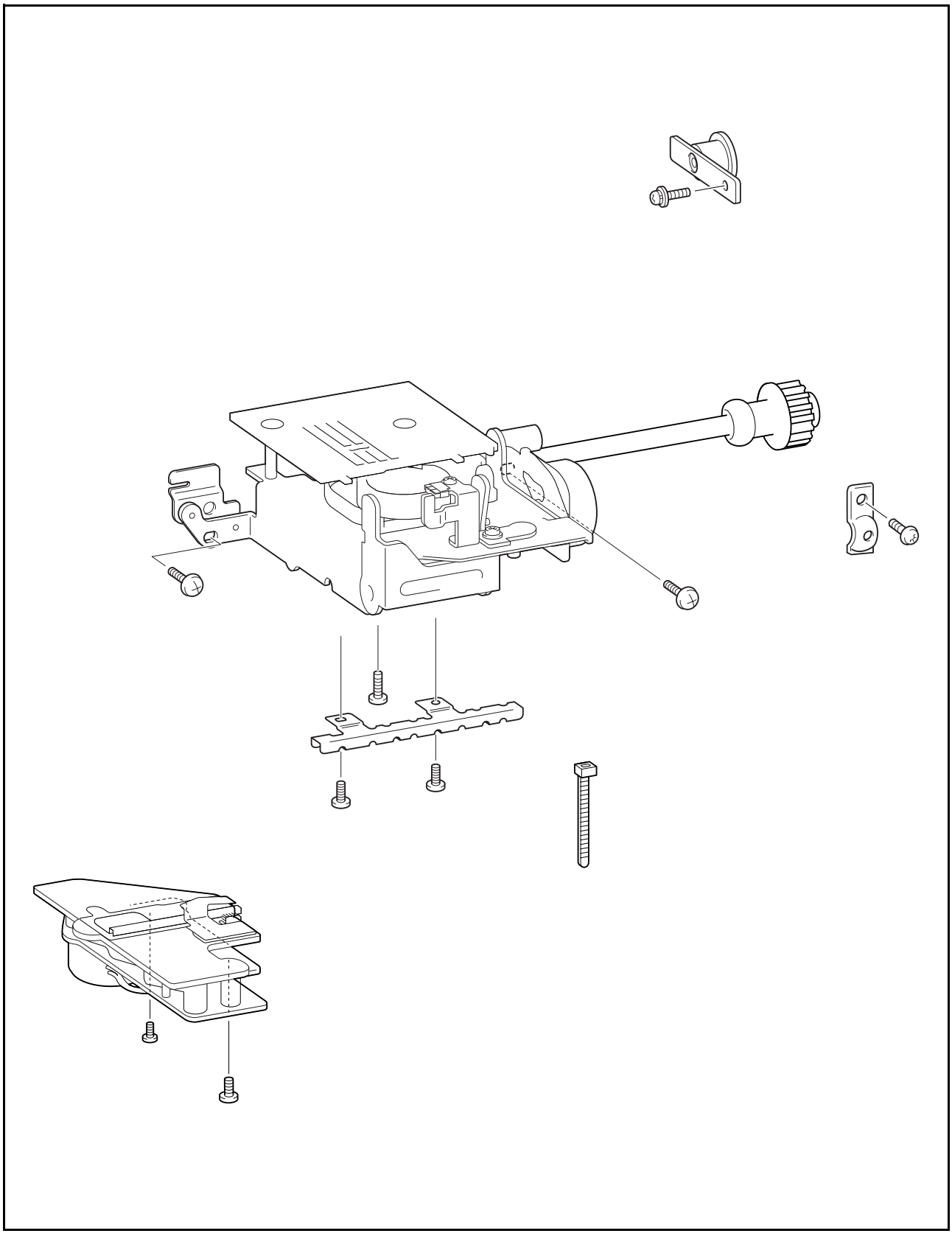
1 Removal of Bobbin winder assy.

1. Remove the screw ❶ and the 2 screws ❷, and then remove the LCD supporter ① from the arm bed.
2. Remove the 2 screws ❸, and then remove the bobbin winder assy. ② from the arm bed.

→**Refer to 3 - 22 of the Disassembly.**

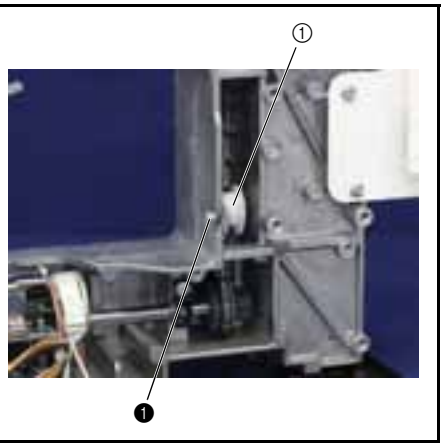


Feed/rotary hook and thread cutter mechanism location diagram



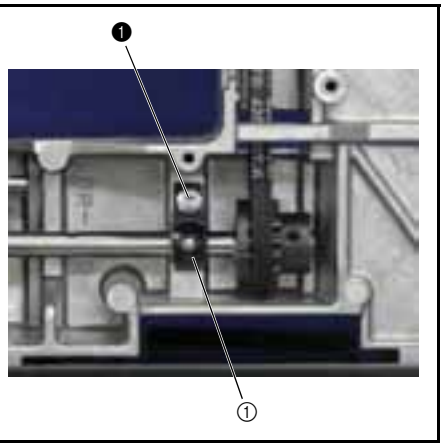
1 Removal of Tension pulley assy.

1. Remove the screw ❶, and then remove the tension pulley assy. ① from the arm bed.



2 Removal of Bushing presser (for lower shaft)

1. Remove the screw ❶, and then remove the bushing presser ① from the arm bed.



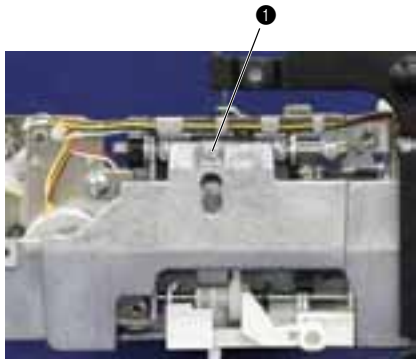
3 Removal of Feed/rotary hook module

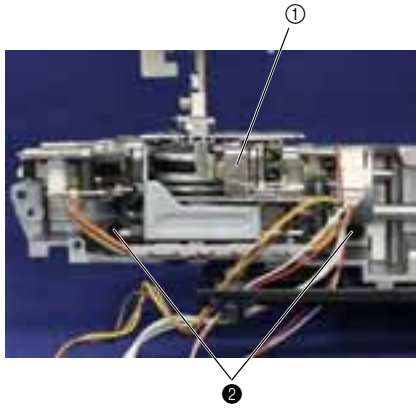
1. Removew the screw ❶ and the 2 screws ❷, and then remove the feed/rotary hook module ① from the arm bed.

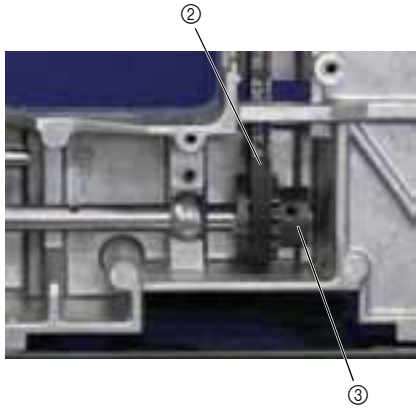
***Key point**

- Remove the T belt ② from the timing pulley D ③.

→Refer to 3 - 35 of the Disassembly.



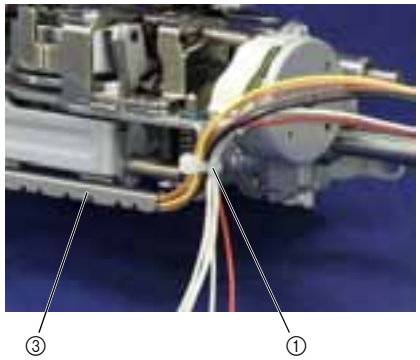


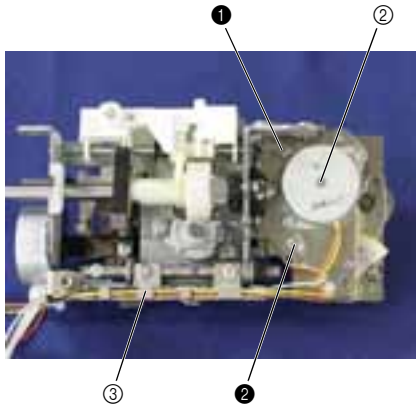


4 Removal of Thread cutter module

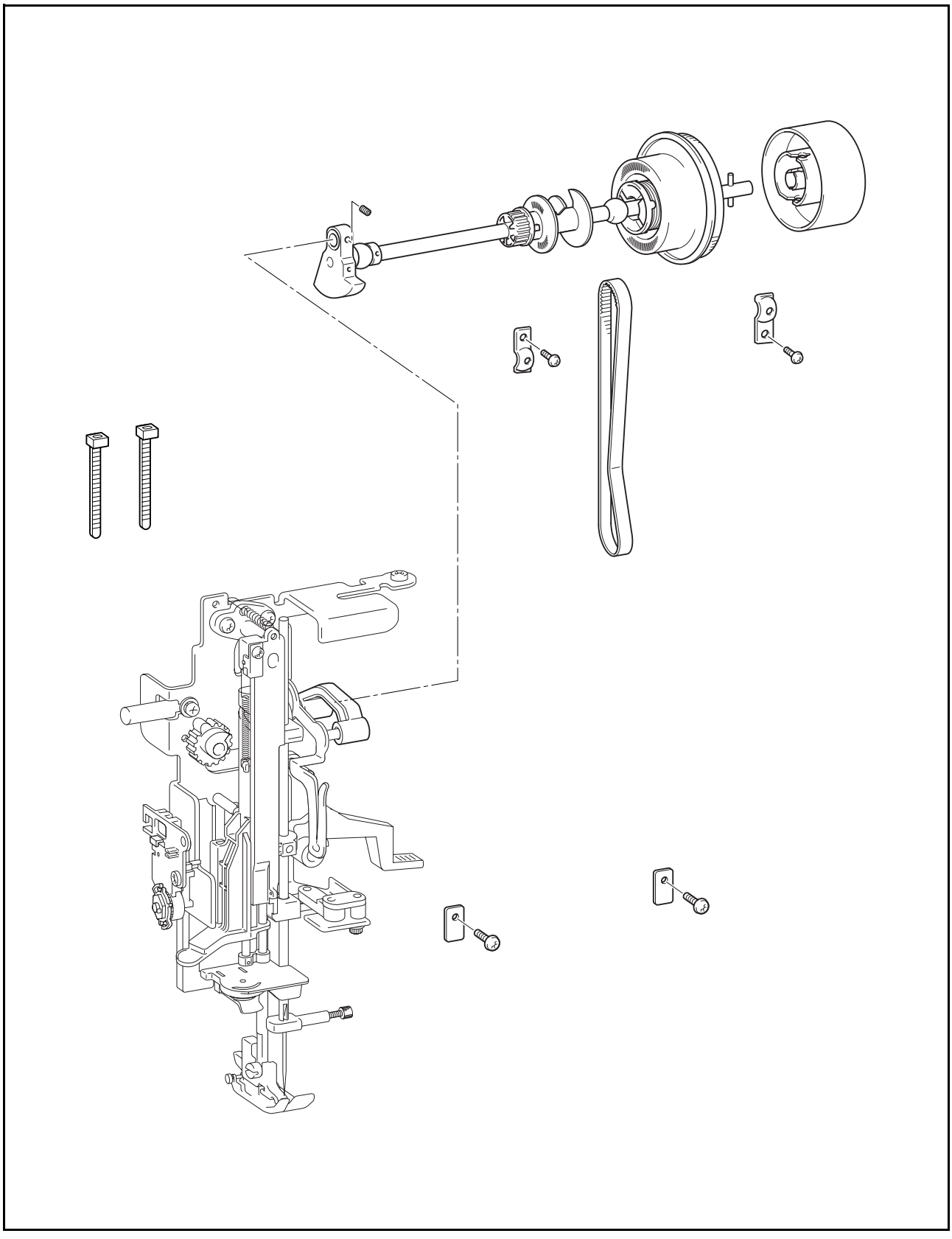
1. Cut the band ①.
2. Remove the lead wire of the thread cutter module ② from the lead wire guide holder ③.
3. Remove the screw ❶ and ❷, and then remove the thread cutter module ② from the feed/rotary hook module.

→**Refer to 3 - 47 of the Disassembly.**



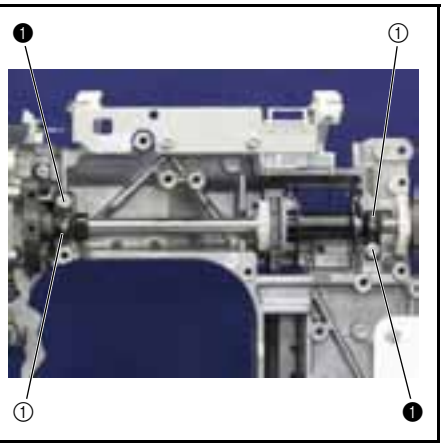


Needle bar, presser / upper shaft mechanism location diagram



1 Removal of Bushing presser (for upper shaft)

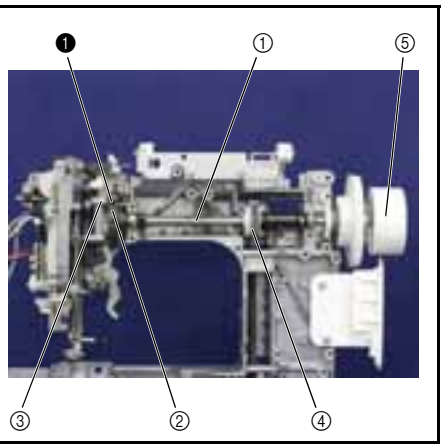
1. Remove the 2 screws ❶, and then remove the 2 bushing pressers ① from the arm bed.



2 Removal of Upper shaft assy.

1. Remove the screw ❶, and then remove the upper shaft assy. ① from the arm bed.

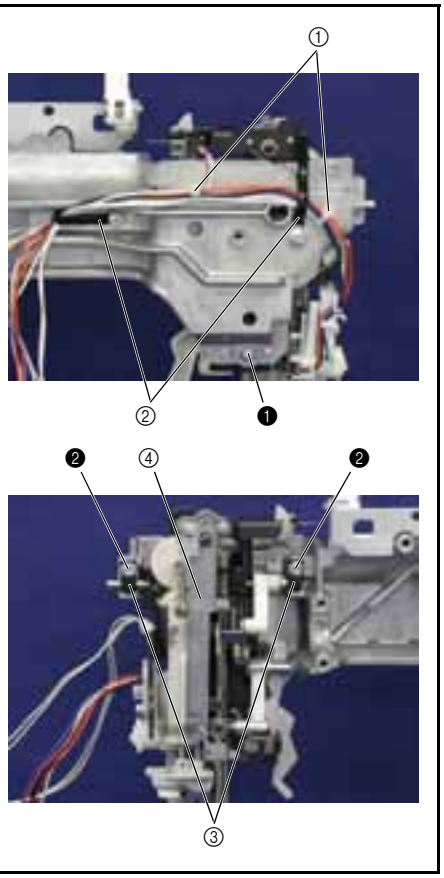
   ***Key point**
   - Remove the thread take-up counter weight ② from the needle bar crank rod assy. ③.
2. Remove the T belt ④ from the upper shaft assy. ①.
3. Remove the pulley ⑤ from the upper shaft assy. ①.



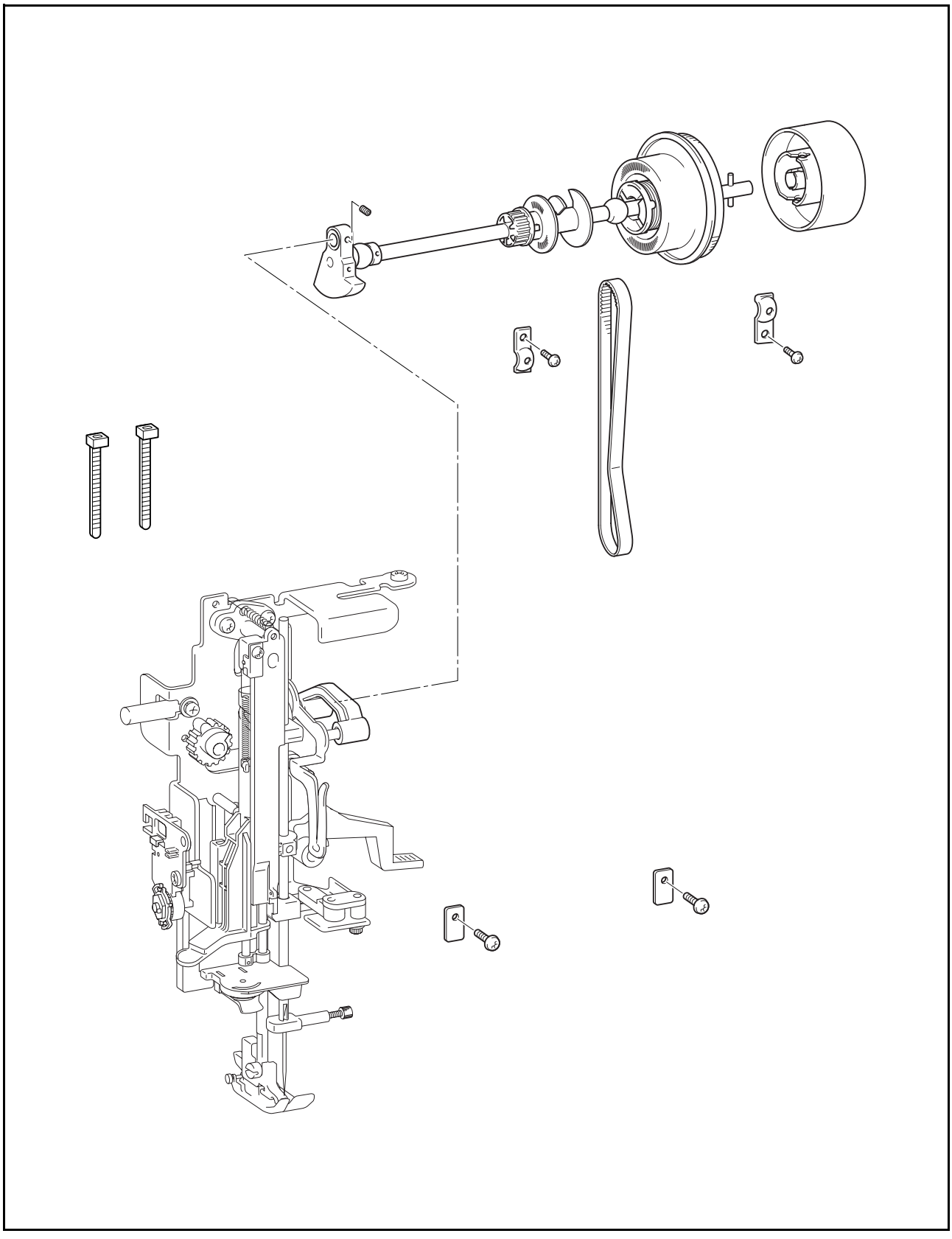
3 Removal of Needle bar, presser module

1. Cut the 2 bands ①.
2. Remove the lead wire from the coaching clip ② (2 locations) of the back side of the arm bed.
3. Remove the screw ❶.
4. Remove the 2 screws ❷, and then remove the 2 presser plates ③ from the arm bed.
5. Remove the needle bar, presser module ④ from the arm bed.

→Refer to 3 - 25 of the Disassembly.



Needle bar, presser / upper shaft mechanism location diagram



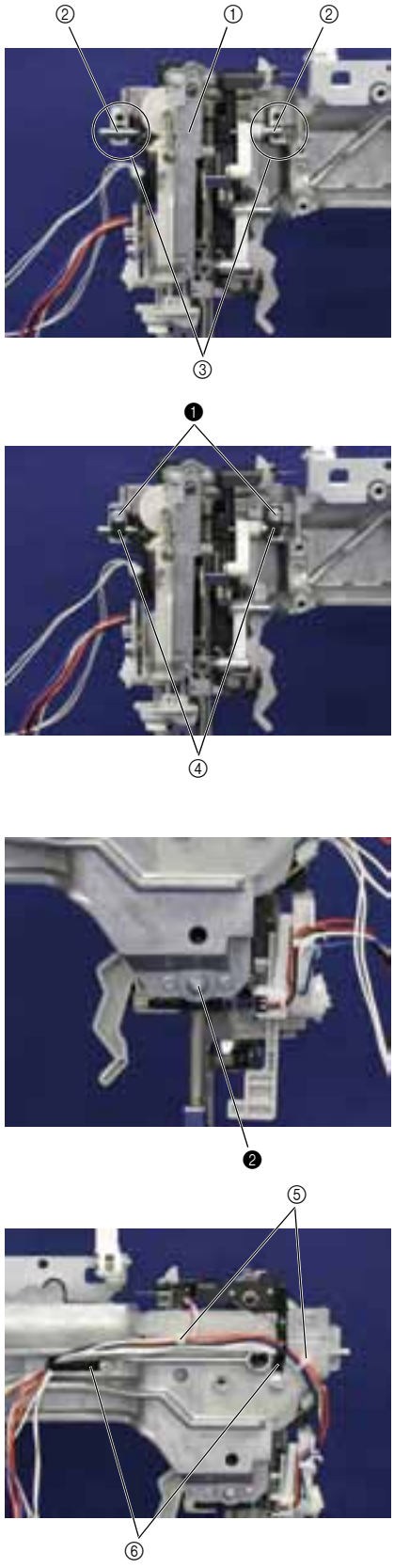
1 Attachment of Needle bar, presser module

1. Attach the needle bar, presser module ① from the arm bed.

   ***Key point**
   - Set in the take-up support shaft ② to the groove ③ (2 locations) of the arm bed.
2. Attach the 2 presser plates ④ with the 2 screws ❶.
3. Tighten the screw ❷ temporarily.

   ***Key point**
   - Fully tighten the screw after performing "4-12 Adjustment of clearance between the needle and the rotary hook point"
4. Bind up the lead wires with the 2 bands ⑤.
5. Attach lead wires with the 2 coaching clips ⑥

→Refer to 3 - 88 of the Assembly.



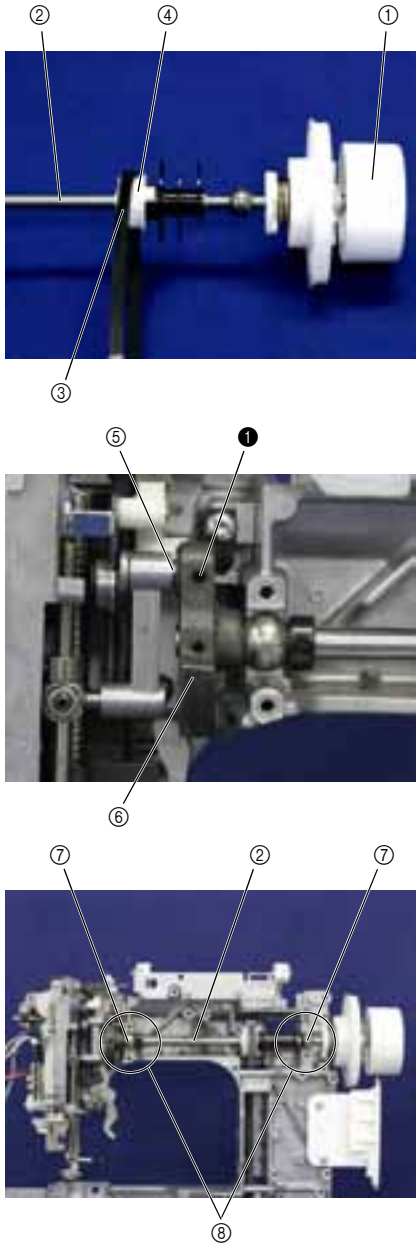
❶	Taptite, Bind S M4X10	Torque 1.47 – 1.96 N·m
❷	Screw, Pan (S/P washer) M3X18A	Torque Free tighten

2 Attachment of Upper shaft assy.

1. Attach the pulley ① to the upper shaft assy. ②.
2. Hang the T belt ③ on the upper shaft pulley ④.
3. Insert the shaft of the needle bar crank ⑤ into the thread take-up counter weight ⑥, and then attach the upper shaft assy. ② to the arm bed.

   ***Key point**
   - Check that the 2 lower shaft bushings ⑦ engaged with the attaching part ⑧ of the arm bed.
4. Attach the scrrew ❶.

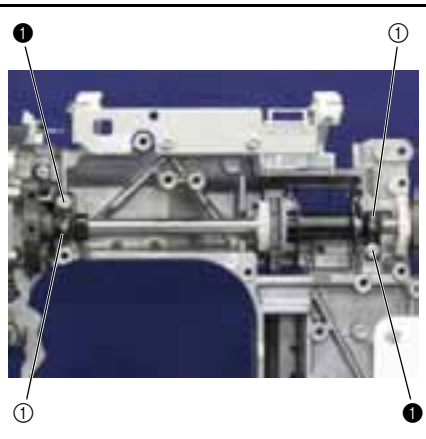
   ***Key point**
   - Check that the screw ❶ with the D cut surface of the needle bar crank rod assy. ⑤.



❶	Set Screw, Socket (FT) M5X5	Torque 1.18 – 1.57 N·m

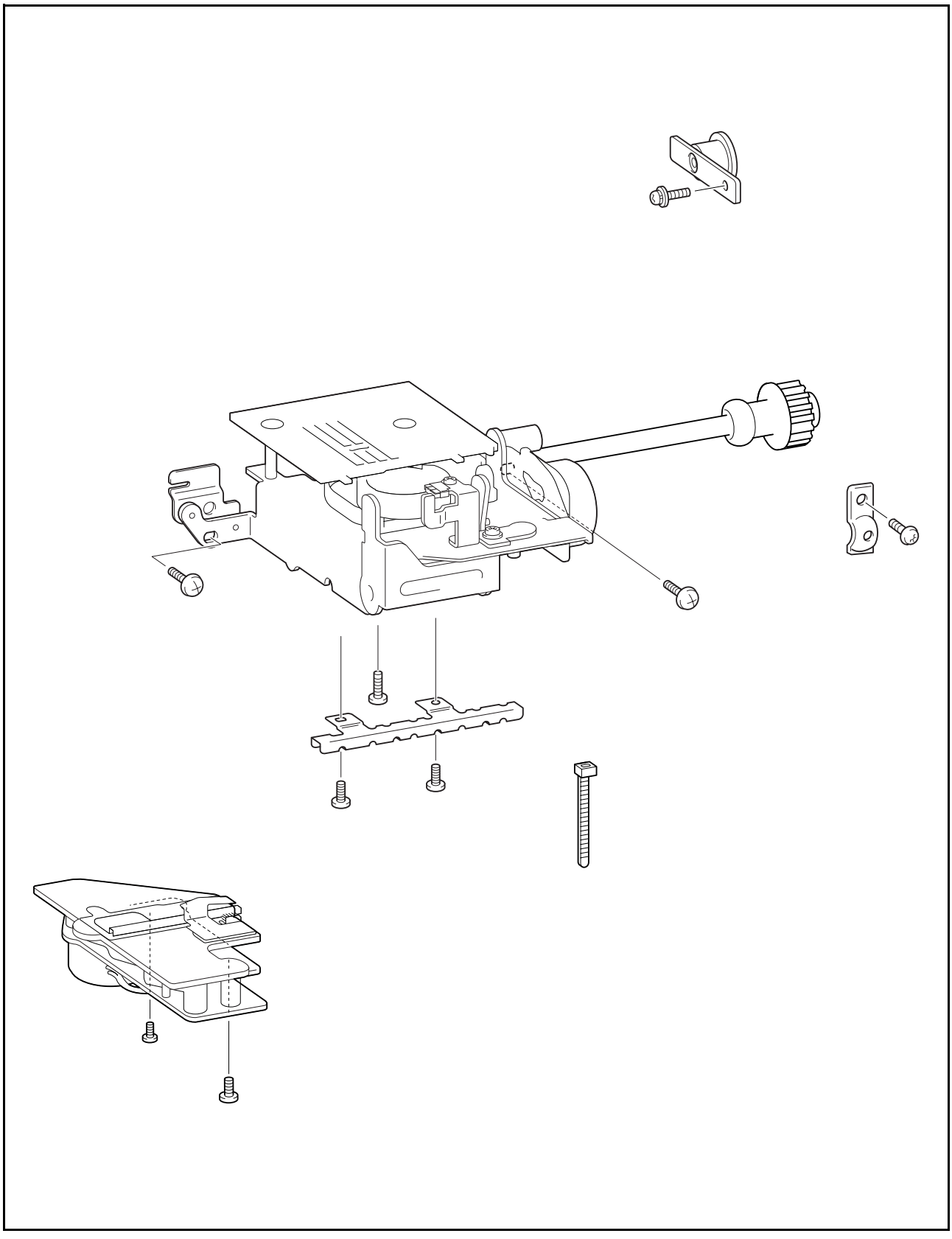
3 Attachment of Bushing presser (for upper shaft)

1. Attach the 2 bushing pressers ① to the arm bed with the 2 screws ❶.



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

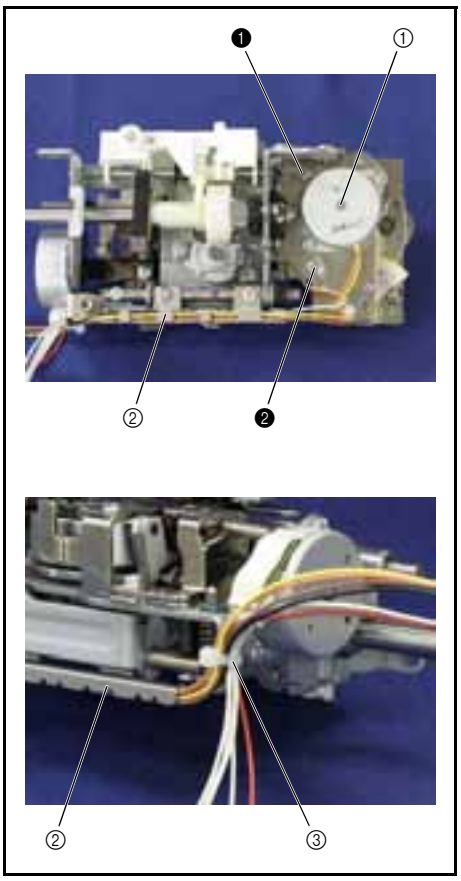
Feed/rotary hook and thread cutter mechanism location diagram



1 Attachment of Thread cutter module

1. Attach the thread cutter module ① to the feed/rotary hook module with the screw ❶ and ❷.
2. Insert the lead wire of the thread cutter module ① into the lead wire guide holder thread ②.
3. Bind up the lead wires with the band ③.

→Refer to 3 - 117 of the Assembly.



❶	Screw, Bind M3X5	Torque 1.18 – 1.57 N·m
❷	Screw, Bind M4X5	Torque 1.18 – 1.57 N·m

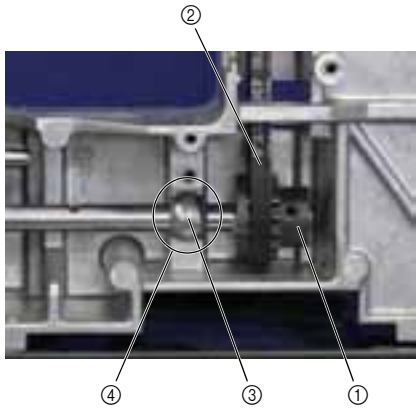
2 Attachment of Feed/rotary hook module

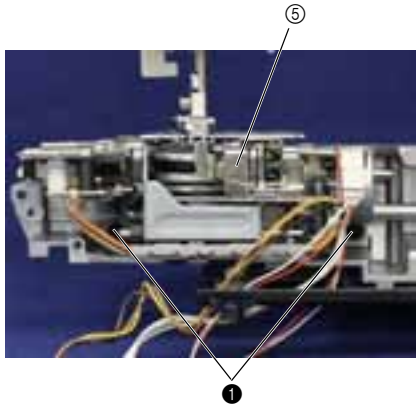
1. Hang the timing pulley D ① on the T belt ②.
2. Set in the lower shaft bushing ③ to the attaching part ④ of the arm bed.
3. Attach the feed module ⑤ to the arm bed with the 2 screws ❶ and ❷.

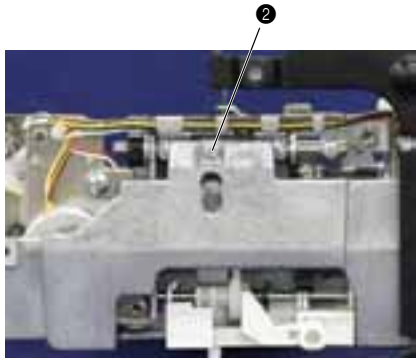
***Key point**

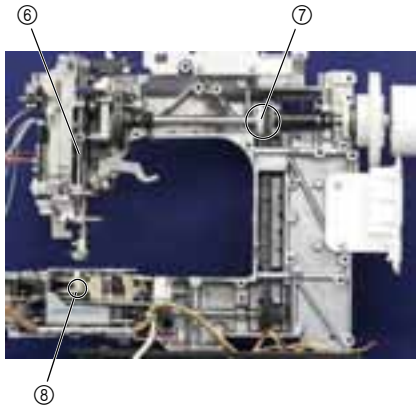
- Check that there is the gullet ⑦ of the upper shaft pulley and the reference point ⑧ of the outer rotary hook assy. in the front side, when the needle bar ⑥ is the highest point.

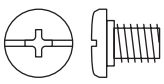
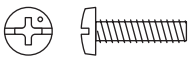
→**Refer to 3 - 102 of the Assembly.**





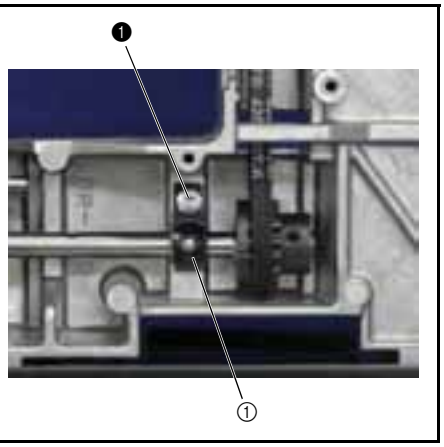


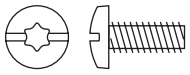


❶		Stud screw M4	Torque 1.18 – 1.57 N·m
❷		Screw, Bind M3X12	Torque 0.59 – 0.78 N·m

3 Attachment of Bushing presser (for lower shaft)

1. Attach the lower shaft bushing ① to the arm bed with the screw ❶.



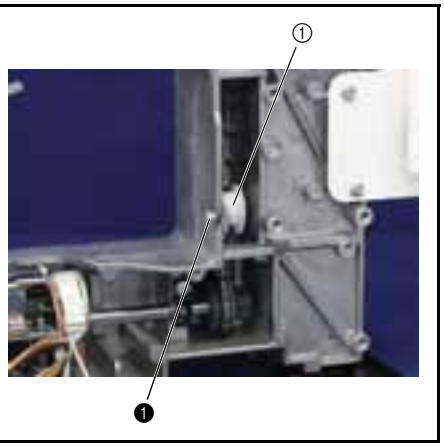
❶		Taptite, Bind S M4X10	Torque 1.47 – 1.96 N·m

4 Attachment of Tension pulley assy.

1. Set the tension pulley assy. ① to the arm bed, and then tighten the scerw ❶ temporarily.

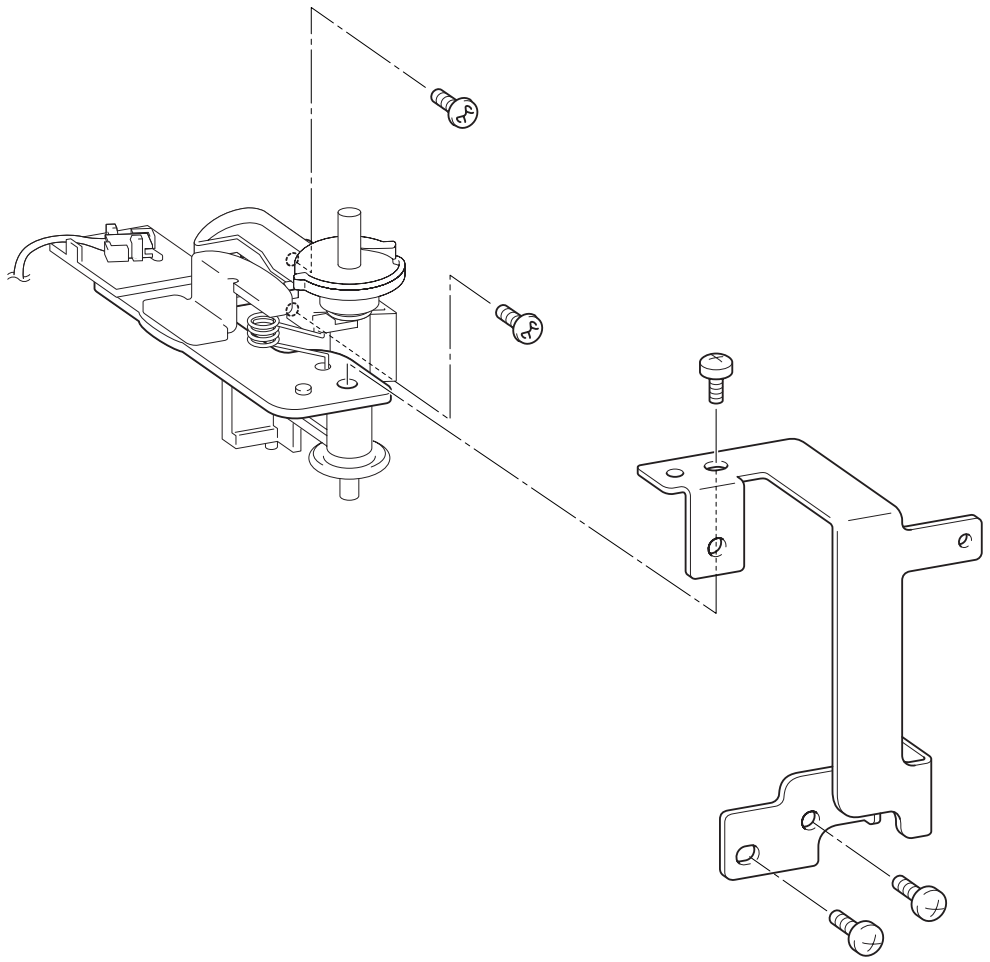
***Key point**

- Fully tighten the screw after performing "4-5 Adjustment of timing belt tension".



❶		Screw, Pan (S/P washer) M4X10	Torque Free tighten

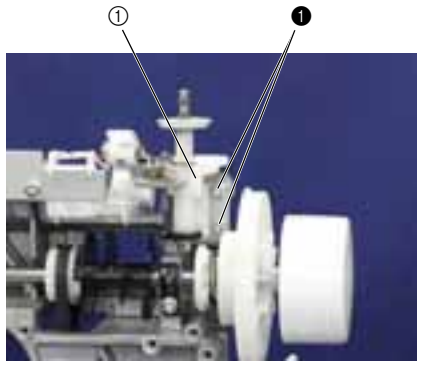
Bobbin winder mechanism location diagram

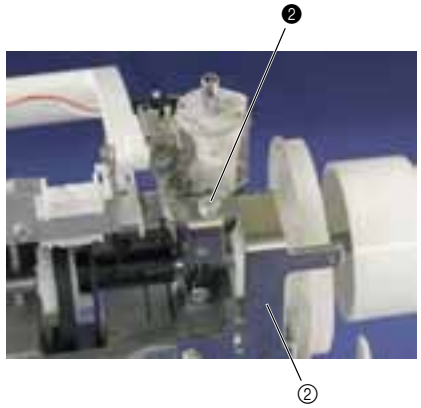


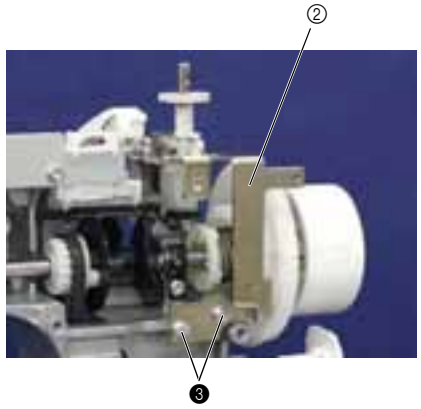
1 Attachment of Bobbin winder assy.

1. Attach the bobbin winder assy. ① to the arm bed with the 2 screws ❶.
2. Attach the LCD supporter ② to the arm bed with the screw ❷ and the 2 screws ❸.

→**Refer to 3 - 85 of the Assembly.**

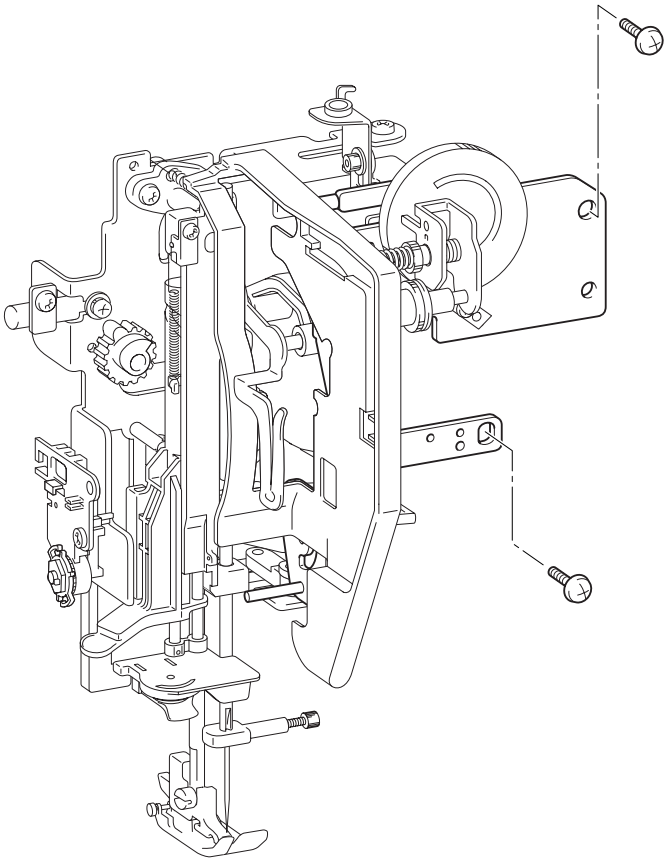






❶	Taptite, Bind S M4X10	Torque 1.47 – 1.96 N·m
❷	Screw, Bind M4X5	Torque 1.18 – 1.57 N·m
❸	Screw, Bind M4X8	Torque 1.18 – 1.57 N·m

Thread tension mechanism location diagram



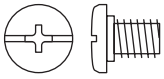
1 Attachment of Thread unit

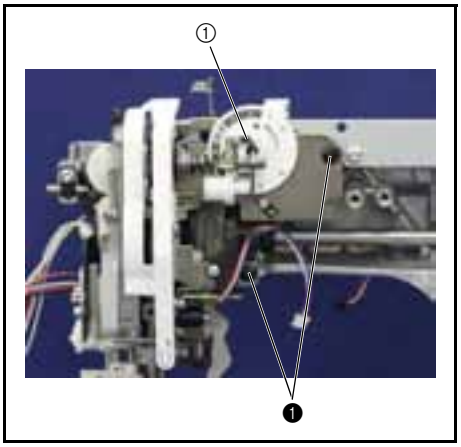
1. Attach the thread unit ① to the arm bed with the 2 screws ❶.

***Key point**

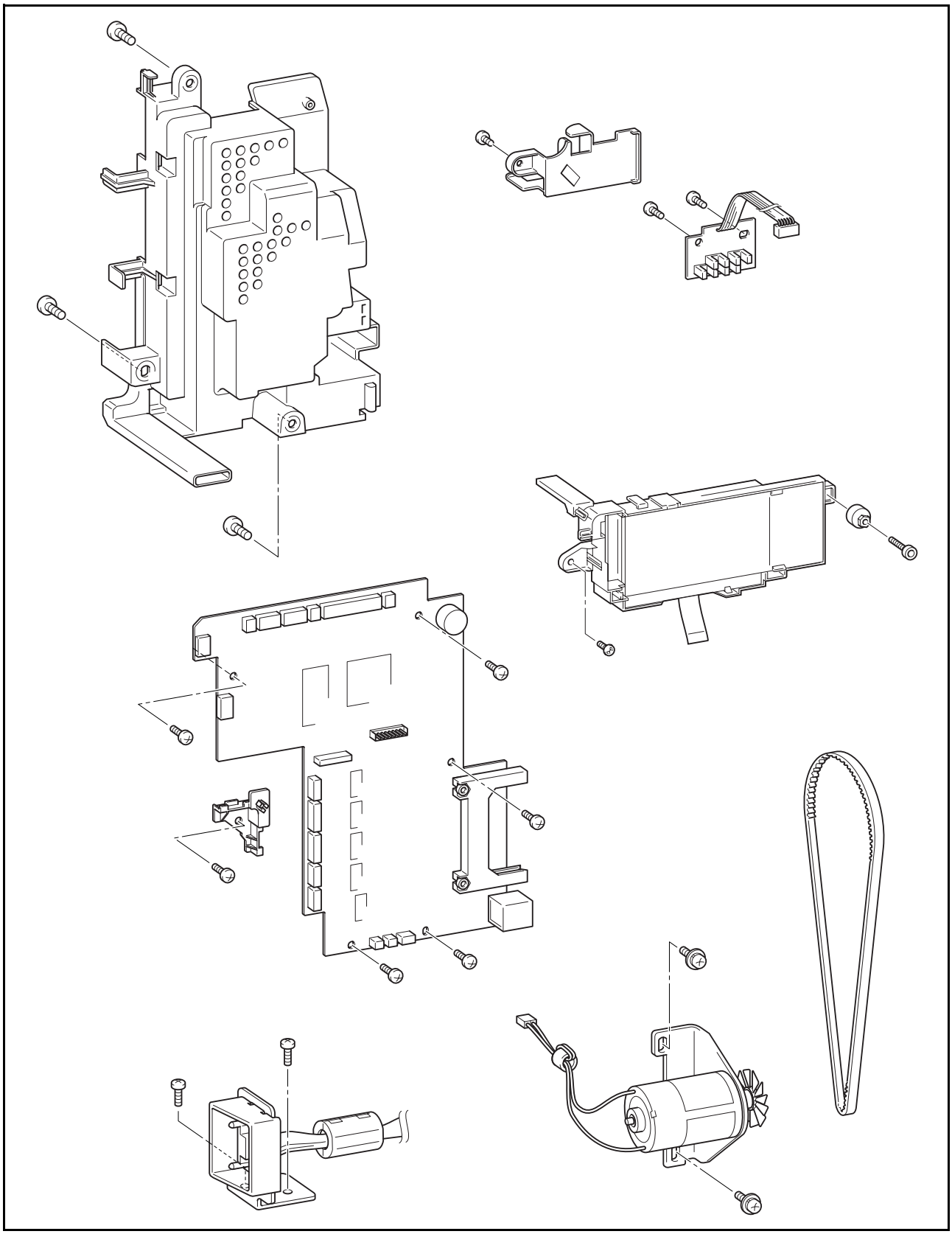
- Refer to "4-7 Adjustment of upper thread tension".

→**Refer to 3 - 79 of the Assembly.**

❶		Stud screw M4	Torque 1.18 – 1.57 N·m



Electrical parts and motors location diagram

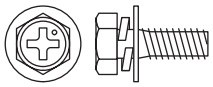


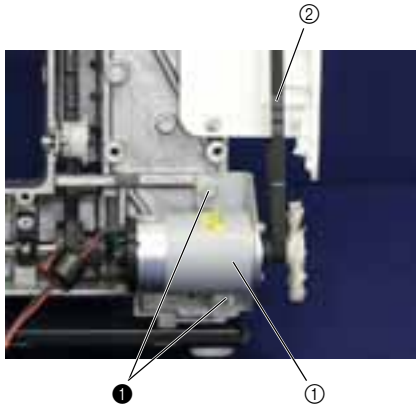
1 Attachment of Main motor sub assy.

1. Set the main motor sub assy. ① to the arm bed, and then tighten the 2 screws ❶ temporarily.

   ***Key point**
   - Fully tighten the screw after performing "4-6 Adjustment of motor belt tension".
2. Hand the T belt ② on the T pulley and the gear for the main motor sub assy. ①.

→Refer to 3 - 75 of the Assembly.

❶		Upset 4X12DB	Torque Free tighten

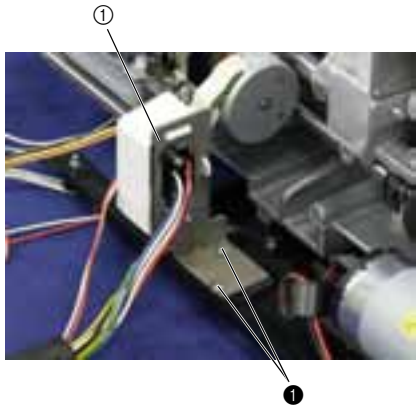


2 Attachment of Embroidery connector assy.

1. Attach the embroidery connector assy. ① to the base plate with the 2 screws ❶.

→Refer to 3 - 75 of the Assembly.

❶		Screw, Bind M3X5	Torque 1.18 – 1.57 N·m

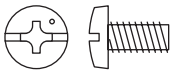


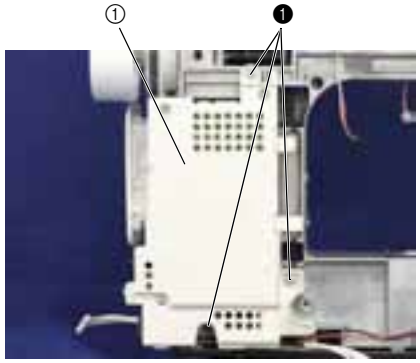
3 Attachment of Power supply unit

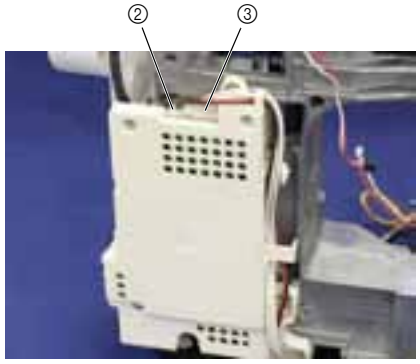
1. Attach the power supply unit ① to the arm bed with the 3 screws ❶.
2. Attach the main motor sub assy. lead wire connector ② and the power lead wire assy. connector ③ to the power PCB supply assy..

   ***Key point**
   - Insert the lead wire of the main motor sub assy. and the power lead wire assy. into the guide part of the insulation cover.
   - Refer to "Special Instructions of Wiring".

→Refer to 3 - 76 of the Assembly.

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



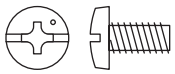


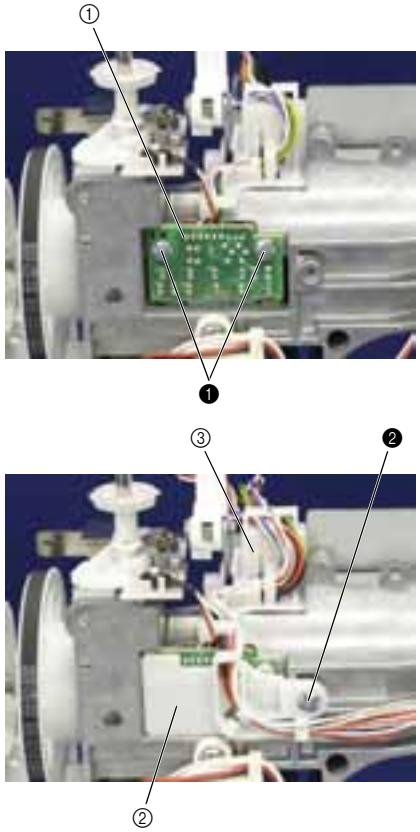
4 Attachment of NP PCB assy.

1. Attach the NP PCB assy. ① to the arm bed with the 2 screws ❶.
2. Attach the cord guide A ② to the arm bed with the screw ❷.
3. Insert the lead wire into the cord guide A ② and the cord guide ③.

***Key point**

- Refer to "Special Instructions of Wiring".

❶ ❷		Screw, Bind M4X8	Torque 0.78 – 1.18 N·m

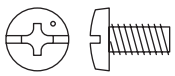


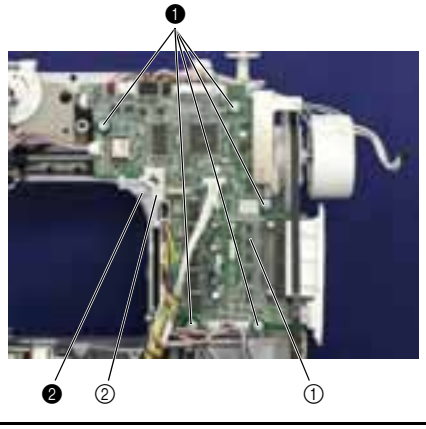
5 Attachment of Main PCB assy.

1. Attach the main PCB assy. ① to the arm bed with the 5 screws ❶.
2. Attach the remove the LCD supporter ② to the arm bed with the screw ❷.
3. Attach the connector to the main PCB assy. ①.

***Key point**

- Refer to "Special Instructions of Wiring".

❶ ❷		Screw, Bind M4X8	Torque 0.78 – 1.18 N·m



6 Attachment of LCD unit

1. Attach the LCD unit ① to the arm bed with the screw ❶.
2. Attach the zigzag adjusting nut ② with the screw ❷.

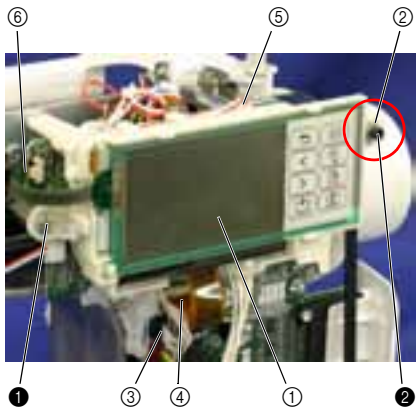
   ***Key point**
   - Attach the zigzag adjusting nut as shown the photograph. (When add the mach mark to the zigzag adjusting nut and the light plate assy., matches it.)
   - When the LCD is not parallel for the sash of the front cover before attach the front cover, refer to "4-27 Fine adjustment of LCD position". And then adjust the tilt of the LCD unit.
3. Insert the ZPM lead wire into the guide part of the light plate assy. and the LCD supporter assy., attach the main PCB to the connector ③ of the ZPM lead wire.

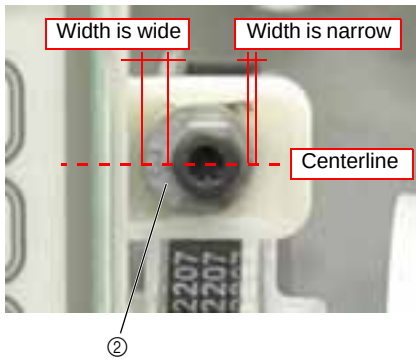
   ***Key point**
   - Refer to "Special Instructions of Wiring".
4. Attach the FFC ④ of the LCD supply assy. to the main PCB.
5. Insert the lead wire of the back light PCB assy. into the guide part of the light plate assy., attach the connector ⑤ of the back light PCB assy..

   ***Key point**
   - Refer to "Special Instructions of Wiring".
6. Attach the FFC ⑥ of the touch panel assy. to the main PCB assy..

   ***Key point**
   - Check that the connector is locked.

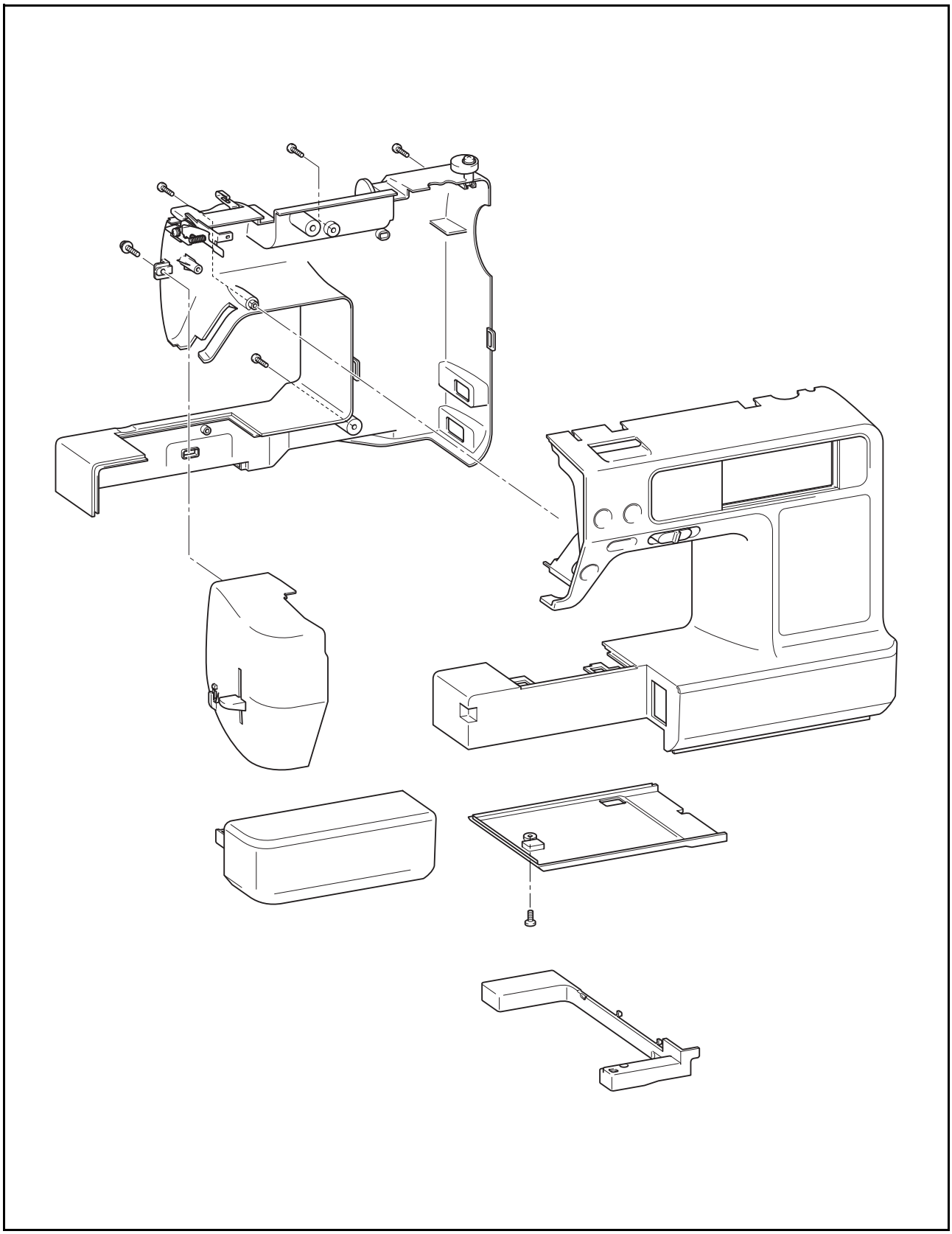
→Refer to 3 - 78 of the Assembly.





❶	Screw, Bind M4X5	Torque 0.78 – 1.18 N·m
❷	Bolt, Socket M3X12	Torque 0.78 – 1.18 N·m

Main parts location diagram

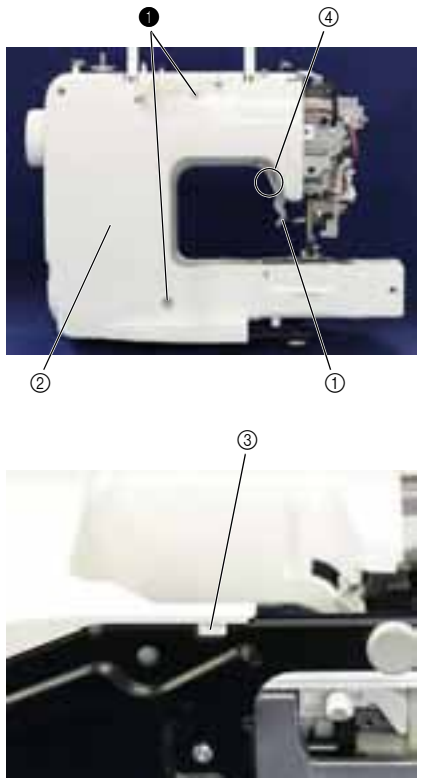


1 Attachment of Rear cover

1. Lower the presser lever ①.
2. Attach the rear cover assy. ② to the arm bed, and then hang the hook ③ on the base plate.

   ***Key point**
   - Check that the section ④ get over the presser lever ①.
   - Check that the 2 bosses of the rear cover assy. ② engaged with the 2 positioning holes of the arm bed.
3. Attach the rear cover assy. ② with the 2 screws ❶.

→Refer to 3 - 68 of the Assembly.



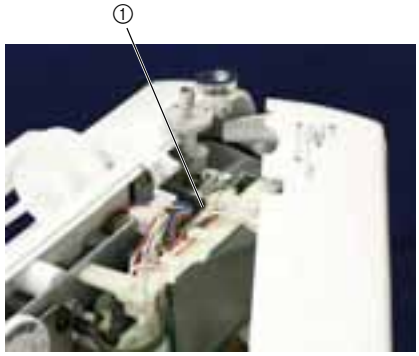
❶	Screw, Bind M4X8	Torque 1.18 – 1.57 N·m

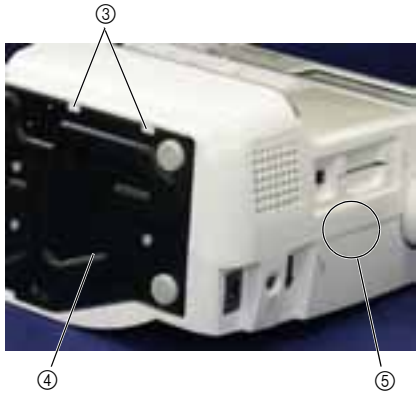
2 Attachment of Front cover assy.

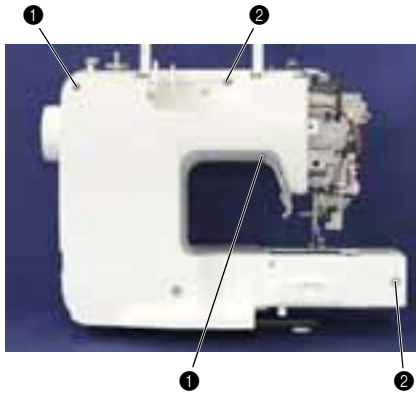
1. Attach the connector ① of the SSVR PCB assy. to the main PCB assy..
2. Attach the front cover assy. ②.

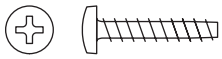
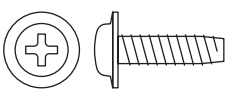
   ***Key point**
   - Check that the hooks ③ (2 locations) hang on the base plate ④ and the hooks ⑤ (3 locations) hang on the attaching part of the hook.
3. Attach the front cover assy. ② with the 2 screws ❶ and the 2 screws ❷.

→Refer to 3 - 70 of the Assembly.



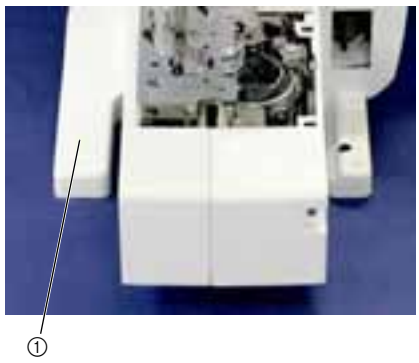




❶		Taptite, Bind P M3X16	Torque 0.59 – 0.78 N·m
❷		Taptite, Cup B M4X14	Torque 0.78 – 1.18 N·m

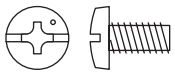
3 Attachment of Base foot cover

1. Attach the base foot cover ①.



4 Attachment of Bottom cover

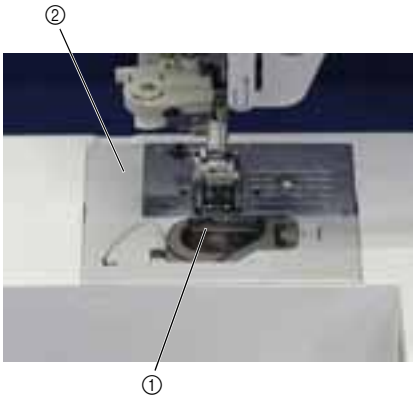
1. Set the bottom cover ① to the arm bed with the screw ❶.

❶		Screw, Bind M4X8	Torque 0.59 – 0.78 N·m

5 Attachment of Needle plate B assy.

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

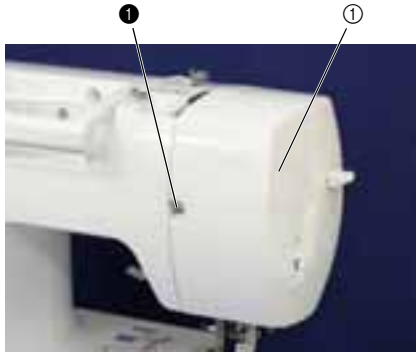
→Refer to 3 - 72 of the Assembly.



6 Attachment of Face plate assy.

1. Attach the face plate assy. ① with the screw ❶.

→Refer to 3 - 73 of the Assembly.



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

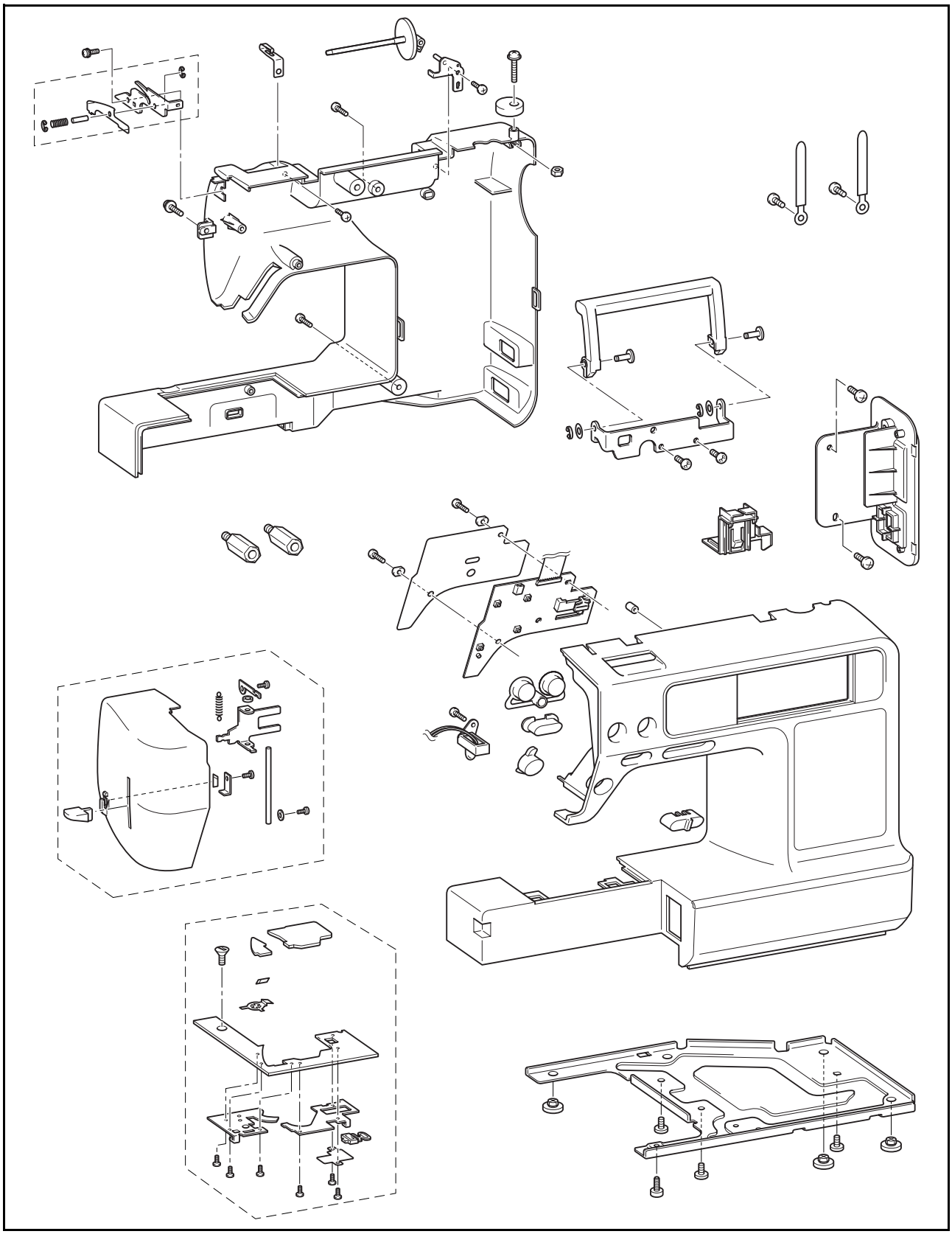
7 Attachment of Accessory table assy.

1. Attach the accessory table assy. ①.

3 Application of Disassembly/Assembly

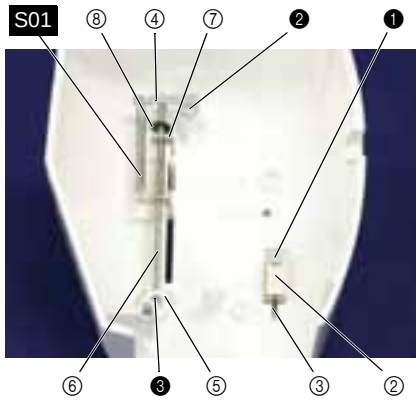
In this chapter, explains the disassembly and assembly of the each module. When fix and replace the each module, use this chapter.

Main parts location diagram



1 Disassembly of Face plate

1. Remove the needle thread lever knob ①.
2. Remove the screw ❶, and then remove the face plate cutter holder ② and the NT lower thread cutter ③.
3. Remove the screws ❷ and ❸, and then remove the shaft presser plate ④ and the plain washer ⑤.
4. Remove the spring S01.
5. Remove the needle thread lever shaft ⑥.
6. Remove the needle thread lever ⑦ and the rubber washer ⑧ from the needle thread lever shaft ⑥.

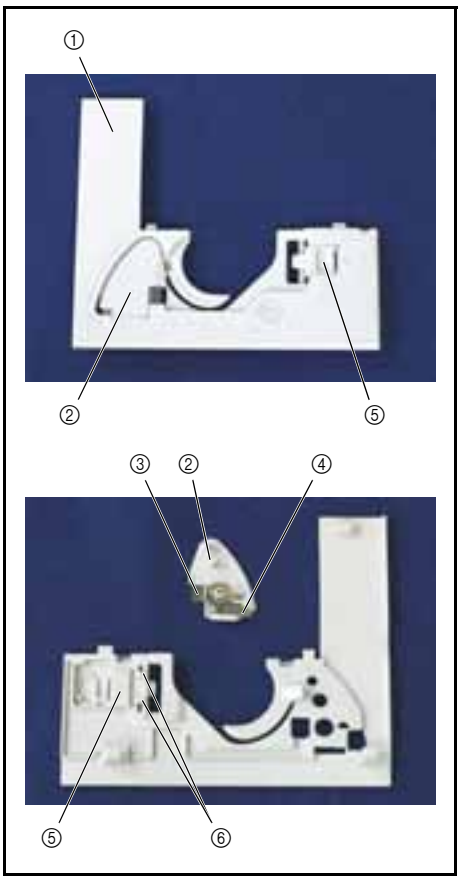


2 Disassembly of Needle plate B assy.

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

***Key point**

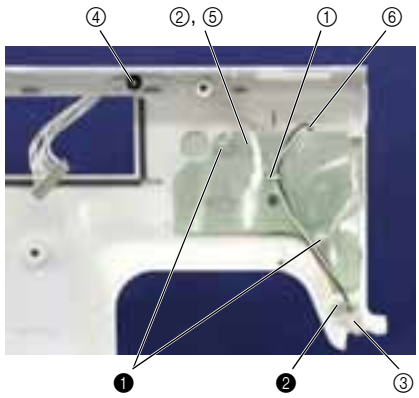
- Disengage the hooks ⑥ (2 locations) from the backside of the needle plate B assy. ①.



3-1 Disassembly of Front cover assy. (Removal of SSVR PCB assy.)

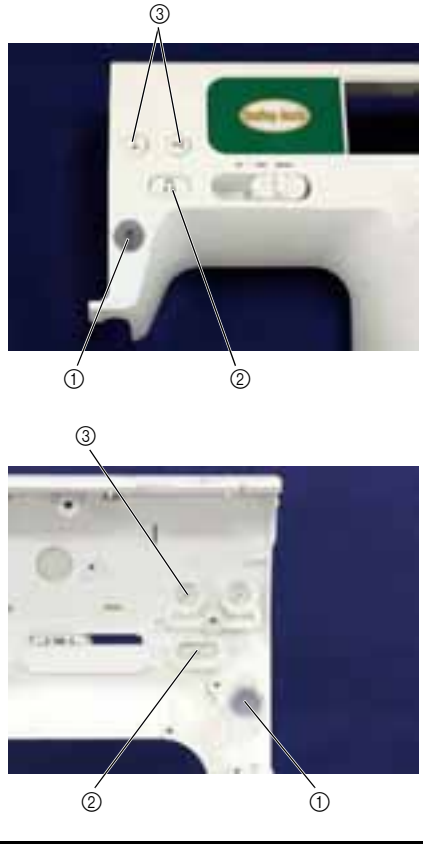
1. Remove the mini clamp ① from the SSVR PCB assy. ②.

   ***Key point**
   - Remove the lead wire of the LED lamp right assy. ③ from the mini clamp ①.
2. Remove the rubber ④.
3. Remove the 2 screws ❶, and then remove the 2 board pressers, the insulator sheet ⑤ and the SSVR PCB assy. ②.
4. Remove the connector ⑥ of the LED lamp right assy. ③ from the SSVR PCB assy. ②.
5. Remove the 2 screws ❷, and then remove the LED lamp right assy. ③.



3-2 Disassembly of Front cover assy. (Removal of Buttons)

1. Remove the SS button ①, the reverse button ② and the NP button ③.

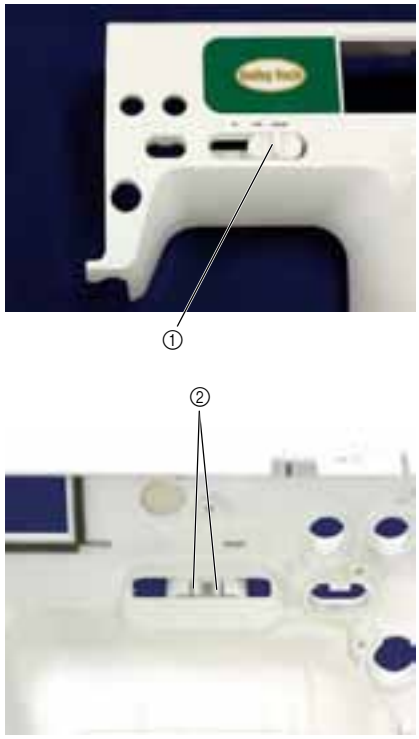


3-3 Disassembly of Front cover assy. (Removal of SV key top)

1. Remove the SV key top ①.

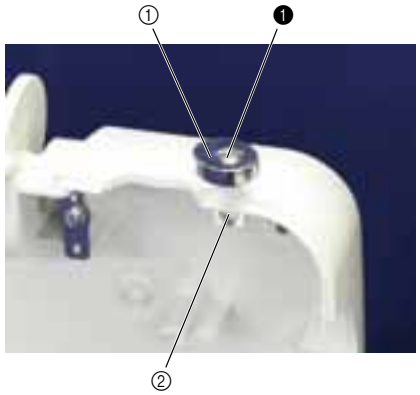
***Key point**

- Disengage the hooks ② (2 locations) from the backside of the front cover assy.



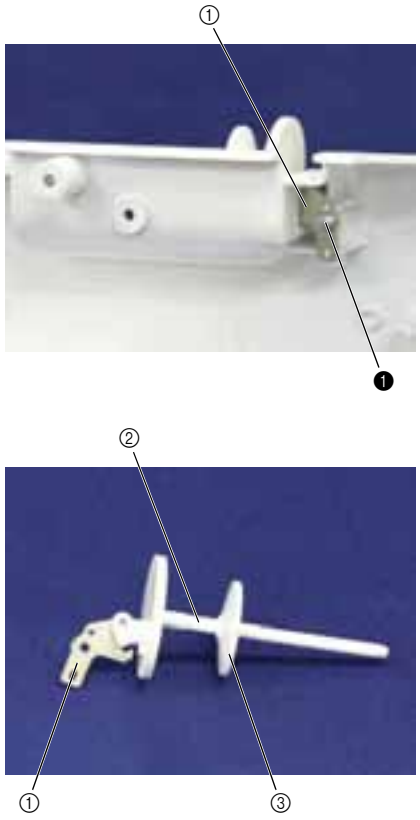
4-1 Disassembly of Rear cover assy. (Removal of bobbin presser)

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



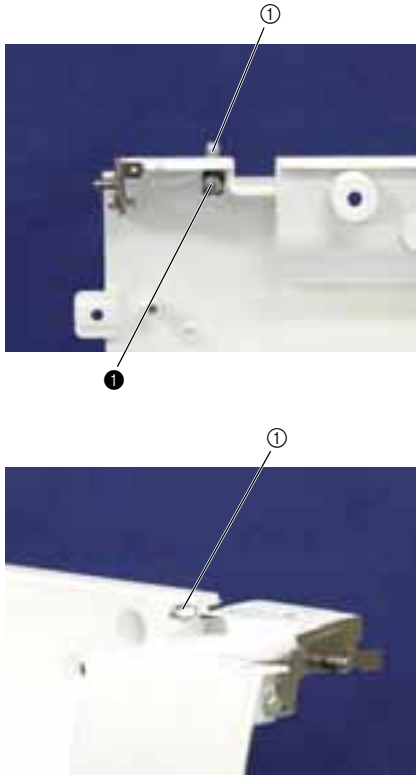
4-2 Disassembly of Rear cover assy. (Removal of Spool pin)

1. Remove the screw ❶, and then remove the spool pin holder assy. ① from the rear cover assy.
2. Remove the spool pin ② from the shaft of the spool pin holder assy.①.
3. Remove the spool presser ③ from the spool pin ②.



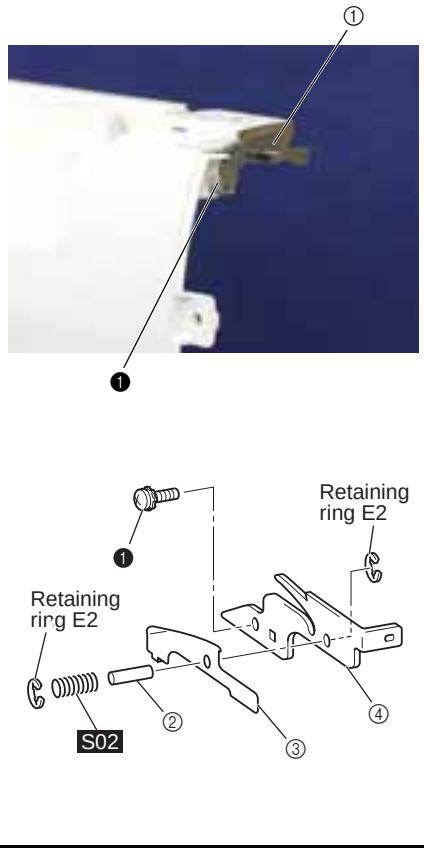
4-3 Disassembly of Rear cover assy. (Removal of Thread guide supporting plate)

1. Remove the screw ❶, and then remove the thread guide supporting plate ① from the rear cover assy.



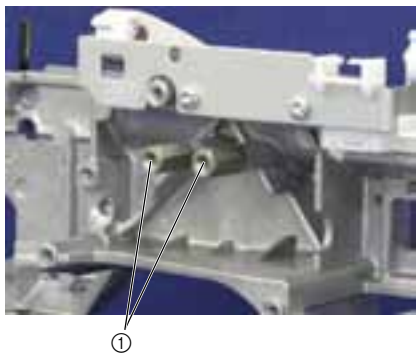
4-4 Disassembly of Rear cover assy. (Removal of thread guide plate assy.)

1. Remove the screw ❶, and then remove the thread guide plate assy. ① from the rear cover assy..
2. Remove the retaining ring E2.
3. Pull out the shaft ②, and then remove spring S02 and the thread guide spring ③ from the thread guide plate ④.
4. Remove the retaining ring E2 from the shaft ②.



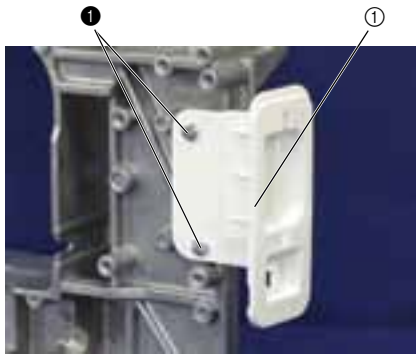
5 Removal of Stud

1. Remove the 2 studs ① from the arm bed.



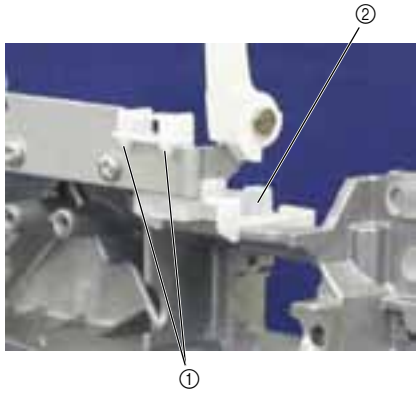
6 Removal of Card connect cover

1. Remove the 2 screws ❶, and then remove the card connect cover ① from the arm bed.



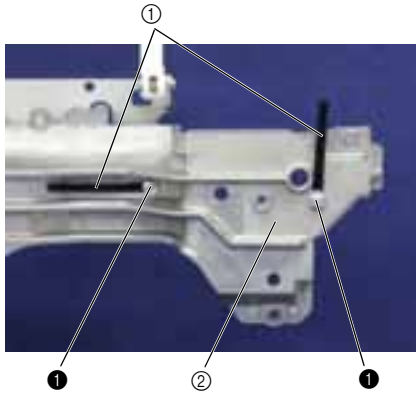
7 Removal of Cord guide

1. Disengage the hook ①, and then remove the cord guide ② from the handle holder.



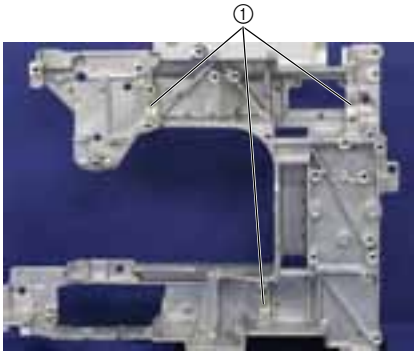
8 Removal of Wire clip

1. Remove the 2 screws ❶, and then remove the 2 coaching clips ① and the insulate sheet back ② from the arm bed.



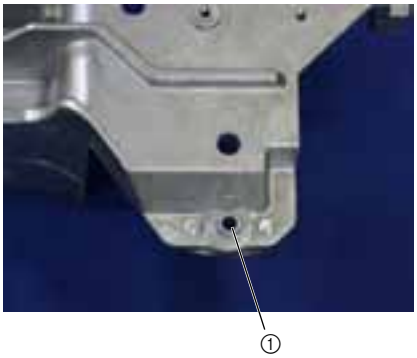
9 Removal of Felt

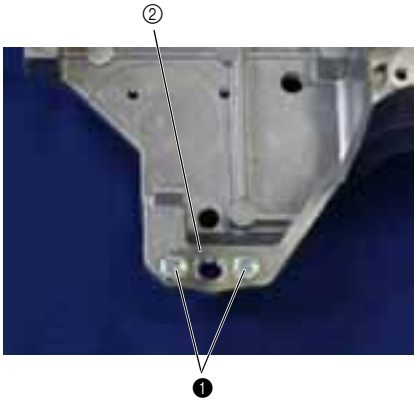
1. Remove the 3 felts ① from the arm bed.



10 Removal of Plate spring

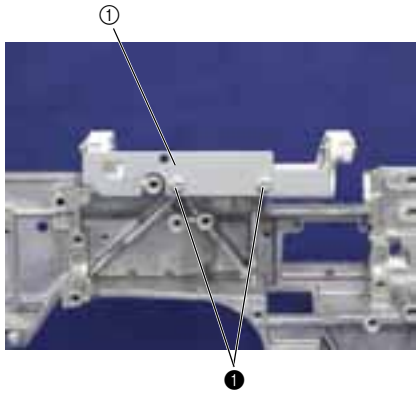
1. Remove the adjusting screw ①.
2. Remove the 2 screws ❶, and then remove the plate spring ②.

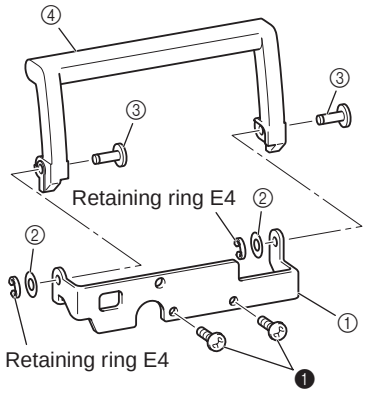




11 Removal of Handle

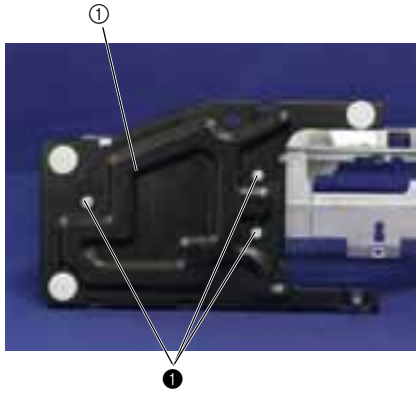
1. Remove the 2 screws ❶, and then remove the handle holder ① from the arm bed.
2. Remove the 2 retaining rings E4, and then remove the 2 polyester sliders ②.
3. Remove the 2 handle shafts ③, and then remove the handle ④ from the handle holder ①.





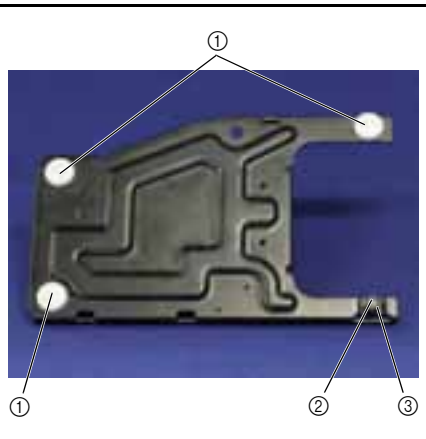
12 Removal of Base plate assy.

1. Remove the 3 screws ❶, and then remove the base plate assy. ① from the arm bed.

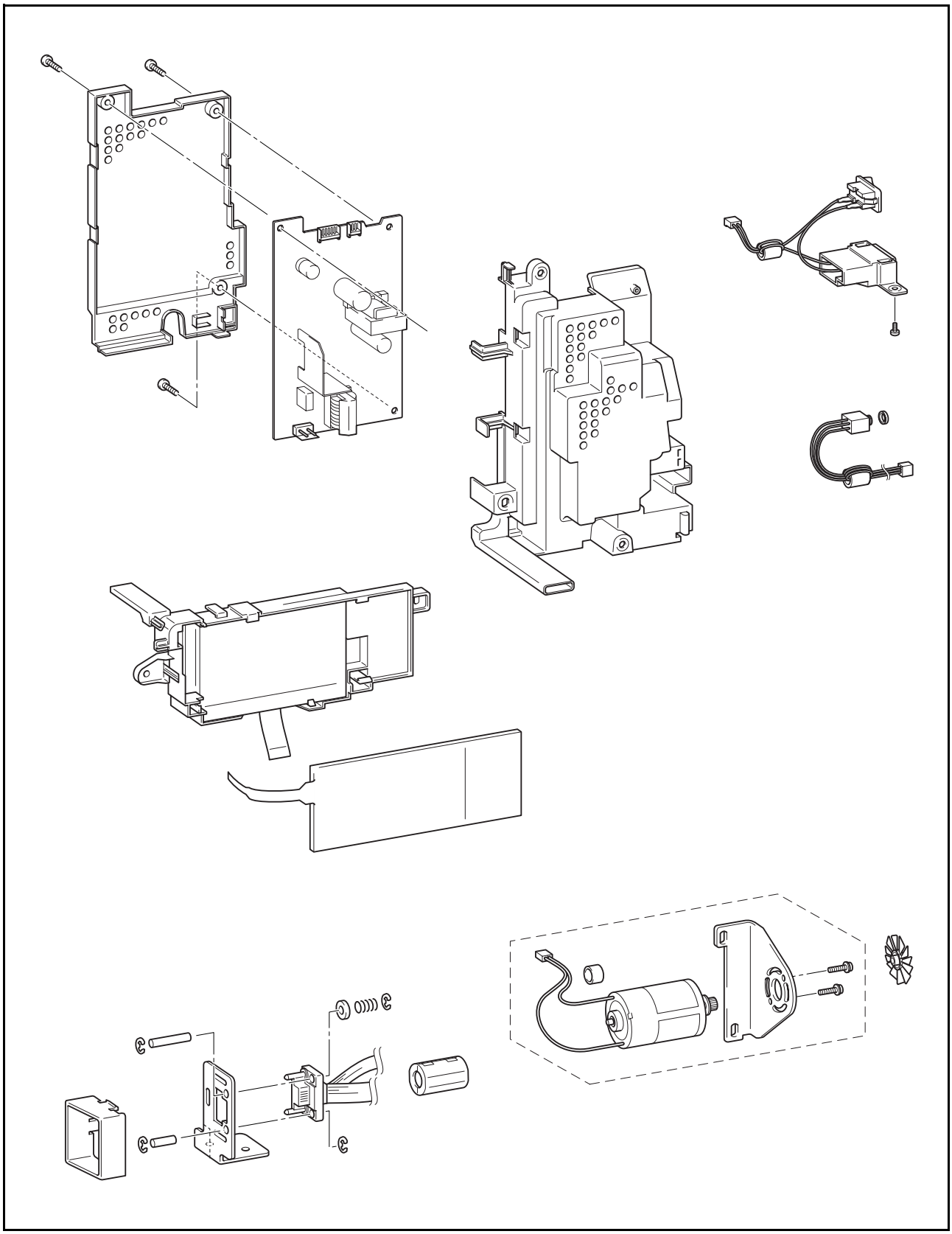


12-1 Disassembly of Base plate assy.

1. Remove the 3 base rubbers A ① from the base plate.
2. Remove the adjusting screw ② from the base plate.
3. Remove the base plate rubber ③ from the adjusting screw ①.

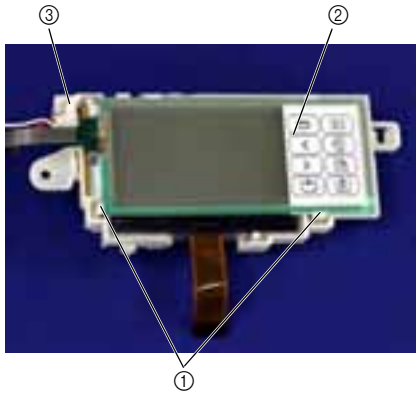


Electrical parts and motors location diagram



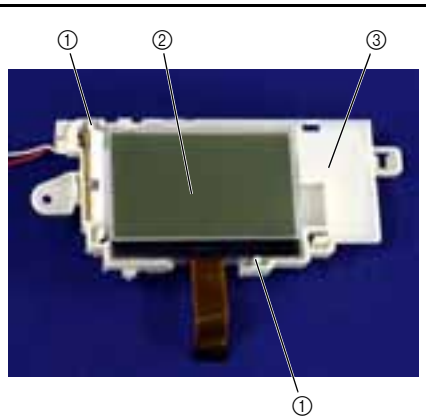
1-1 Disassembly of LCD unit (Removal of Touch panel assy.)

1. Disengage the 2 hooks ①, and then remove the touch panel assy. ② from the light plate assy. ③.



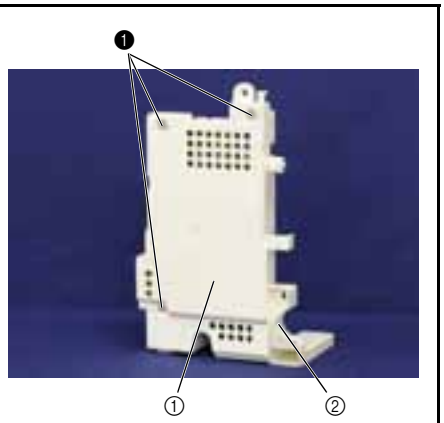
1-2 Disassembly of LCD unit (Removal of LCD supply assy.)

1. Disengage the 2 hooks ①, and then remove the LCD supply assy. ② from the light plate assy. ③.



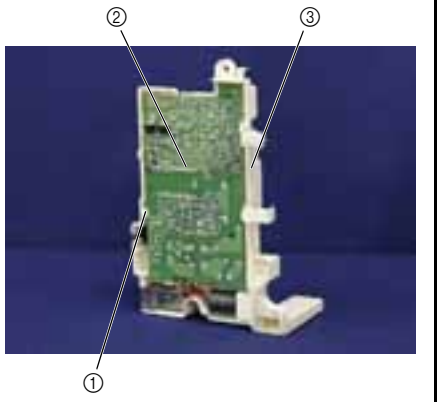
2-1 Disassembly of Power supply unit (Removal of Insulation plate)

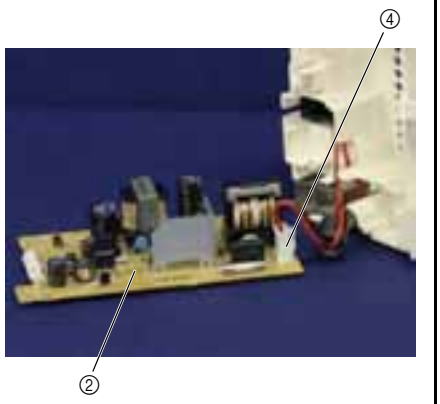
1. Remove the 3 screws ❶, and then remove the insulation plate ① from the insulation cover ②.



2-2 Disassembly of Power supply unit (Removal of Power PCB supply assy.)

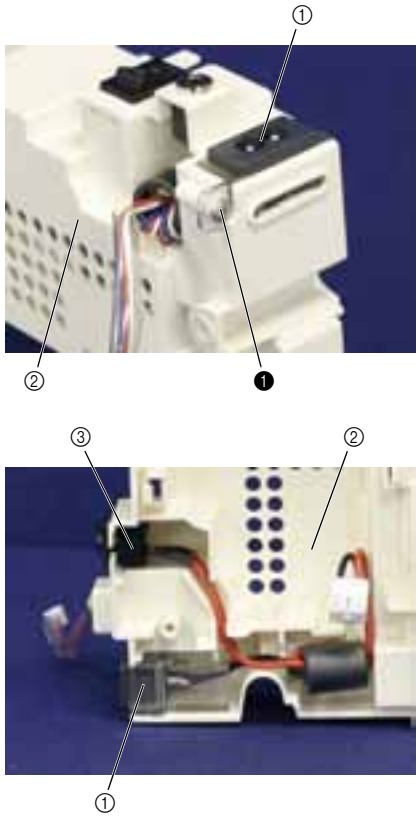
1. Disengage the hook ①, and then remove the power PCB supply assy. ② from the insulation cover ③.
2. Remove the connector ④ of the inlet assy. from the power PCB supply assy. ②.





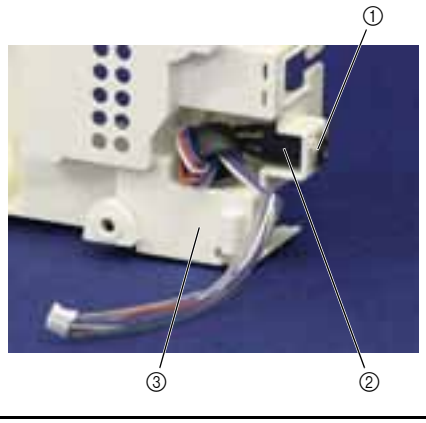
2-3 Disassembly of Power supply unit (Removal of Inlet assy.)

1. Remove the screw ❶, and then remove the inlet holder ① of the inlet assy. from the insulation cover ②.
2. Remove the power SW ③ of the inlet assy. from the insulation cover ②.



2-4 Disassembly of Power supply unit (Removal of FC jack supply assy.)

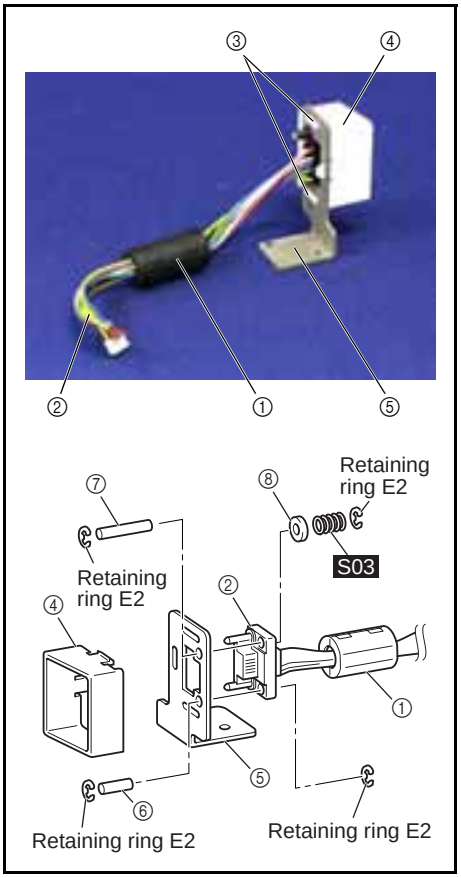
1. Remove the nut F ① from the FC jack supply assy. ②.
2. Remove the FC jack supply assy. ② from the insulation cover ③.



3 Disassembly of Embroidery connector assy.

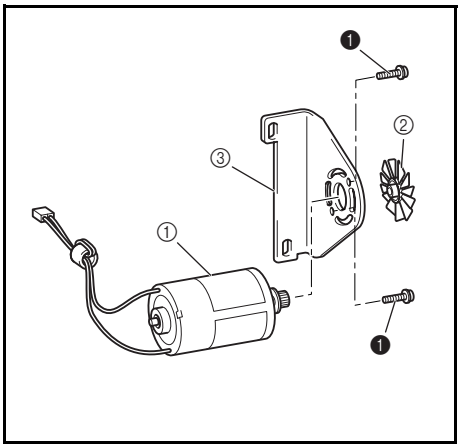
1. Remove the ferrite core ① from the lead wire assy. main body ②.

   ***Key point**
   - Remove the 2 locks of the ferrite core ①.
2. Disengage the 2 hooks ③, and then remove the connector holder cover ④ from the connector holder ⑤.
3. Remove the 2 retaining rings E2, and then remove the lead wire assy. main body ② from the connector holder ⑤.
4. Pull out the ES pin F-A ⑥ from the connector holder ⑤.
5. Remove the retaining ring E2 from the ES pin F-A ⑥.
6. Pull out the ES pin F-B ⑦ from the connector holder ⑤, and then remove the spring S03 and the feed bar spacer ⑧.
7. Remove the retaining ring E2 from the ES pin F-B ⑦.

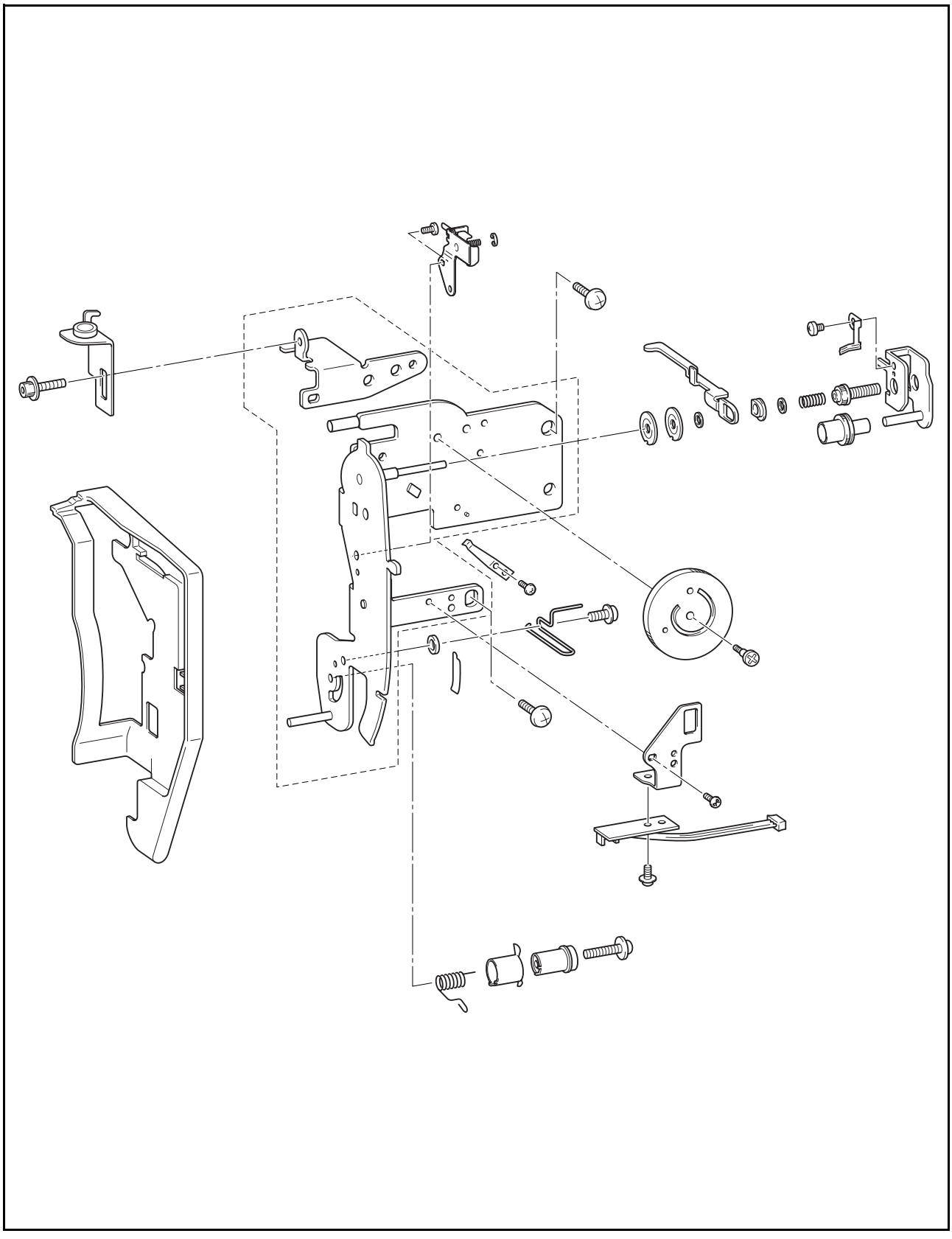


4 Disassembly of Main motor sub assy.

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



Thread tension mechanism location diagram

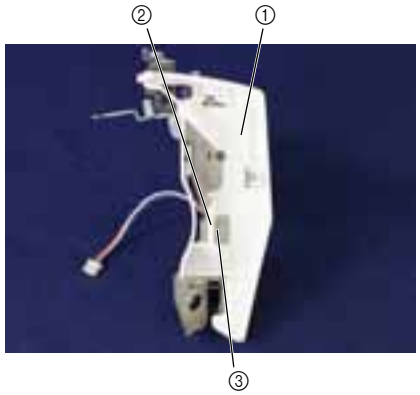


1 Removal of Thread guard cover

1. Remove the thread guard cover ① from the thread unit .

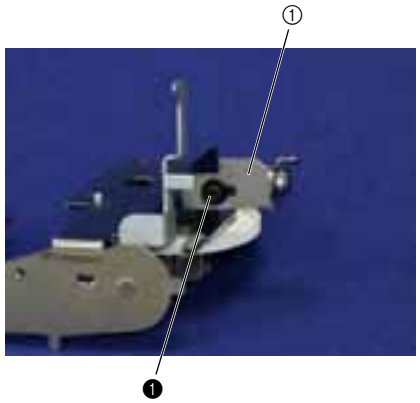
***Key point**

- Remove it while lifting the section ② of the thread guard cover ① to get over the boss ③ of the thread unit .



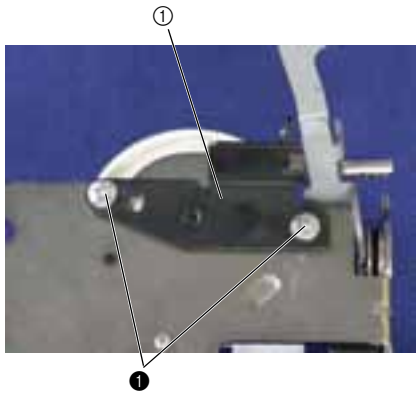
2 Removal of Bobbin winder guide assy.

1. Remove the screw ❶, and then remove the bobbin winder guide assy. ① from the thread unit.



3 Removal of Thread guard holder S

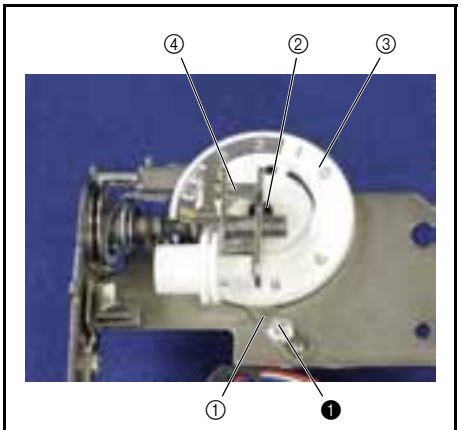
1. Remove the 2 screws ❶, and then remove the thread guard holder S ① from the thread unit.

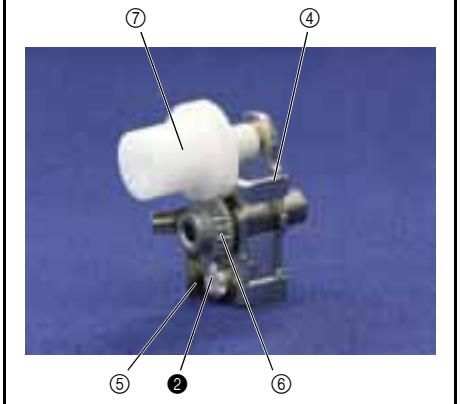


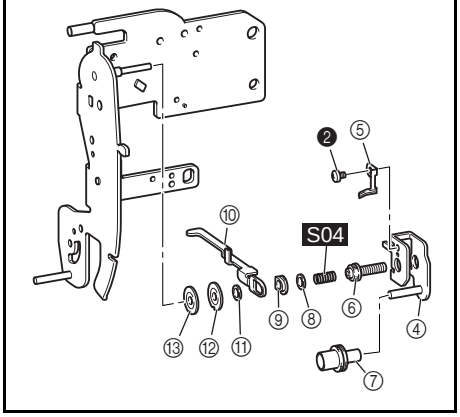
4 Removal of Thread tension dial

1. Remove the screw ❶, and then remove the notched spring ① from the thread unit.
2. Remove the tension dial shaft ②, and then remove the thread tension dial ③ and the thread tension plate assy. ④ from the thread unit.

   ***Key point**
   - Turn the thread tension dial ③ to the right, and slide the thread tension plate assy. ④ to the left to see the tension dial shaft ②.
3. Remove the screw ❷, and then remove the adjusting screw spring plate ⑤ from the thread tension plate assy. ④.
4. Remove the thread tension adjusting screw ⑥, and then remove the thread tehnsion adjusting gear ⑦ from the thread tension plate assy. ④.
5. Remove in order of the spring S04, the washer ⑧, the tension disc washer ⑨, the thread release plate ⑩, the washer ⑪, the tension disc B ⑫ and the tension disc B ⑬ from the shaft of the thread unit.

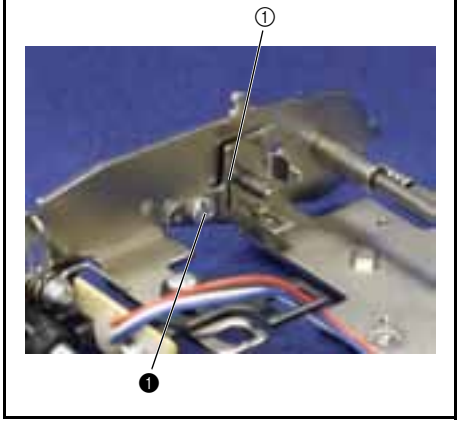






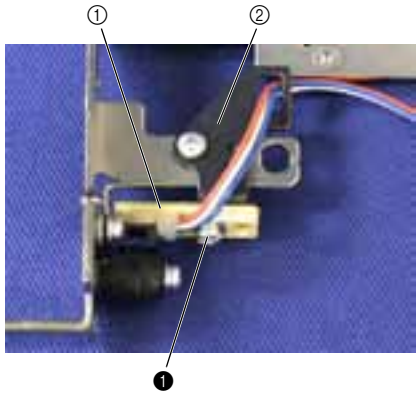
5 Removal of Plate assy.

1. Remove the screw ❶, and then remove the plate assy. ① from the thread unit.



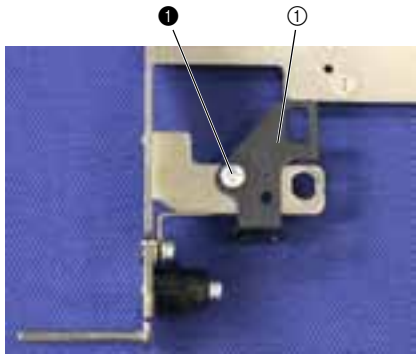
6 Removal of Up thread PCB assy.

1. Remove the screw ❶, and then remove the up thread PCB assy. ① from the thread sensor holder ②.



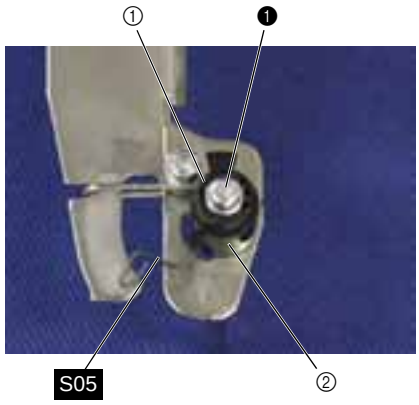
7 Removal of Thread sensor holder

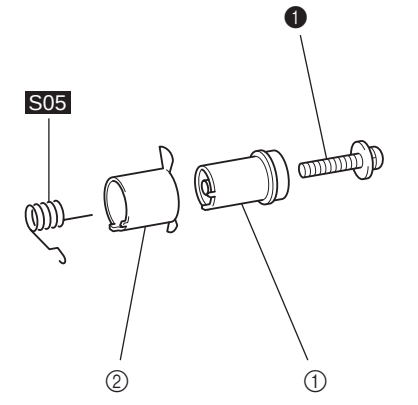
1. Remove the screw ❶, and then remove the thread sensor holder ① from the thread unit.



8 Removal of Thread catching spring case

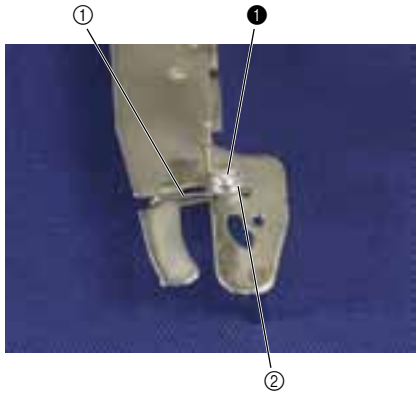
1. Remove the screw ❶, and then remove the thread catching spring case ①, thread cutting shutter ② and the spring S05 from the thread unit.





9 Removal of Thread guide wire

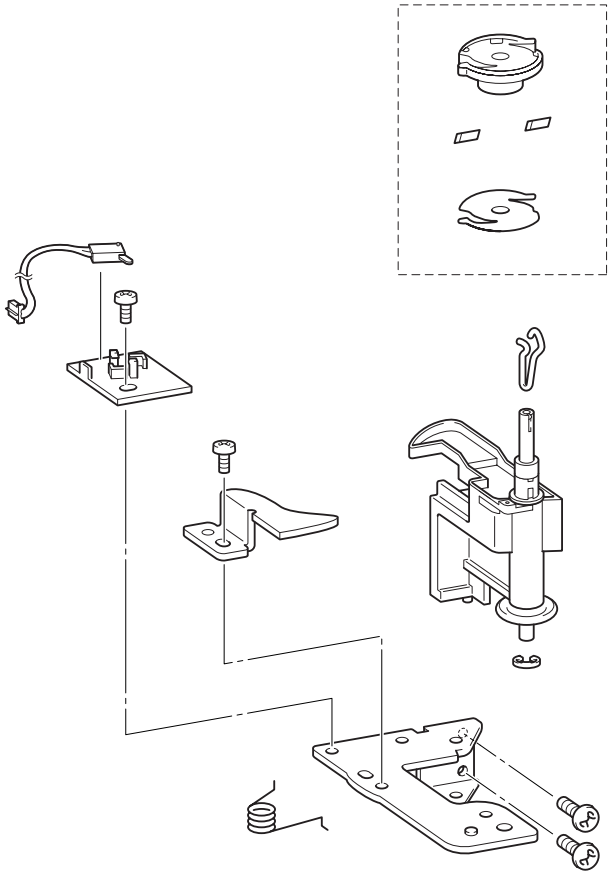
1. Remove the screw ❶, and then remove the thread guide wire ① and the washer, plain ② from the thread unit.



10 Removal of Spring tape

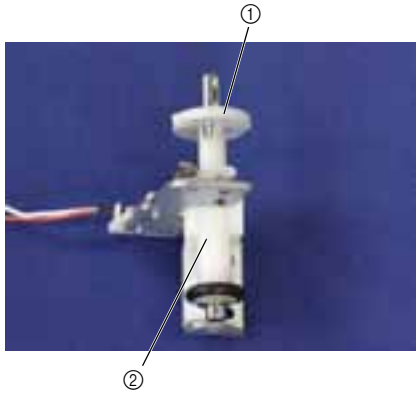
1. Remove the spring tape ① from the thread unit.

Bobbin winder mechanism location diagram



1 Removal of Bobbin base assy.

1. Remove the bobbin base assy. ① from the bobbin winder assy. ②.

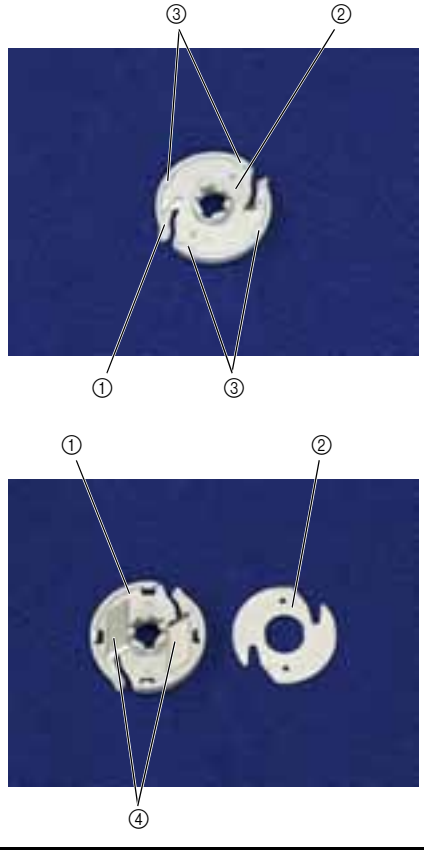


1-1 Disassembly of Bobbin base assy.

1. Remove the bobbin thread cutter holder ② from the bobbin base assy. ①.

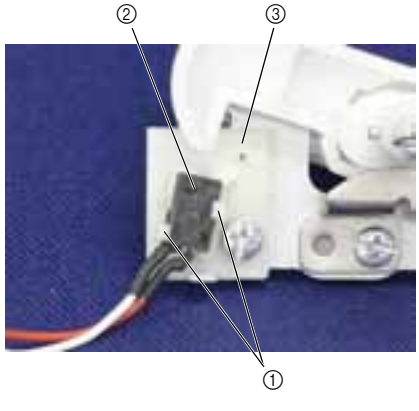
   ***Key point**
   - Be careful not to damage the hooks ③ (4 locations).

2. Remove the NT lower thread cutter ④ from the bobbin base assy. ①.



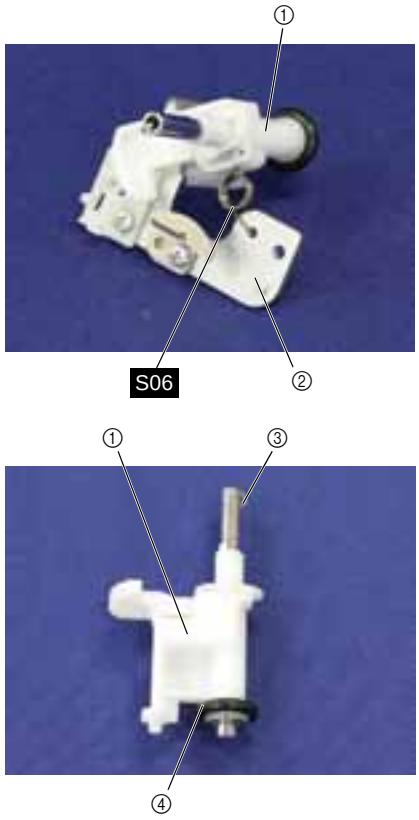
2 Removal of SW assy: BW-F

1. Disengage the hooks ① (2 locations), and then remove SW assy: BW-F ② from the bobbin winder assy. ③.



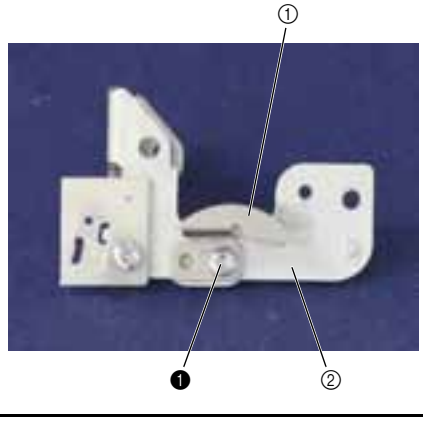
3 Removal of BW shaft holder assy.

1. Open the bobbin winder assy.
2. Remove the spring S06.
3. Remove the BW shaft holder assy. ① from the bobbin winder assy. holder ②.
4. Remove the bobbin winder shaft spring ③ from the BW shaft holder assy. ①.
1. Remove the rubber ring ④ from the BW shaft holder assy. ①.



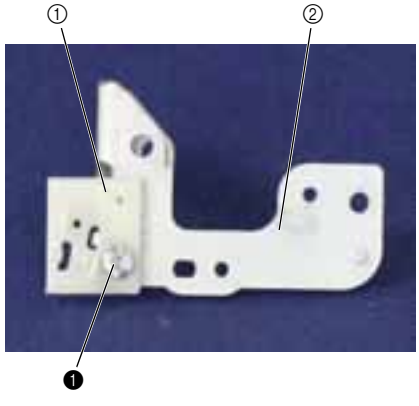
4 Removal of Bobbin winder shaft stopper

1. Remove the screw ❶, and then remove the bobbin winder shaft stopper ① from the bobbin winder assy. holder ②.

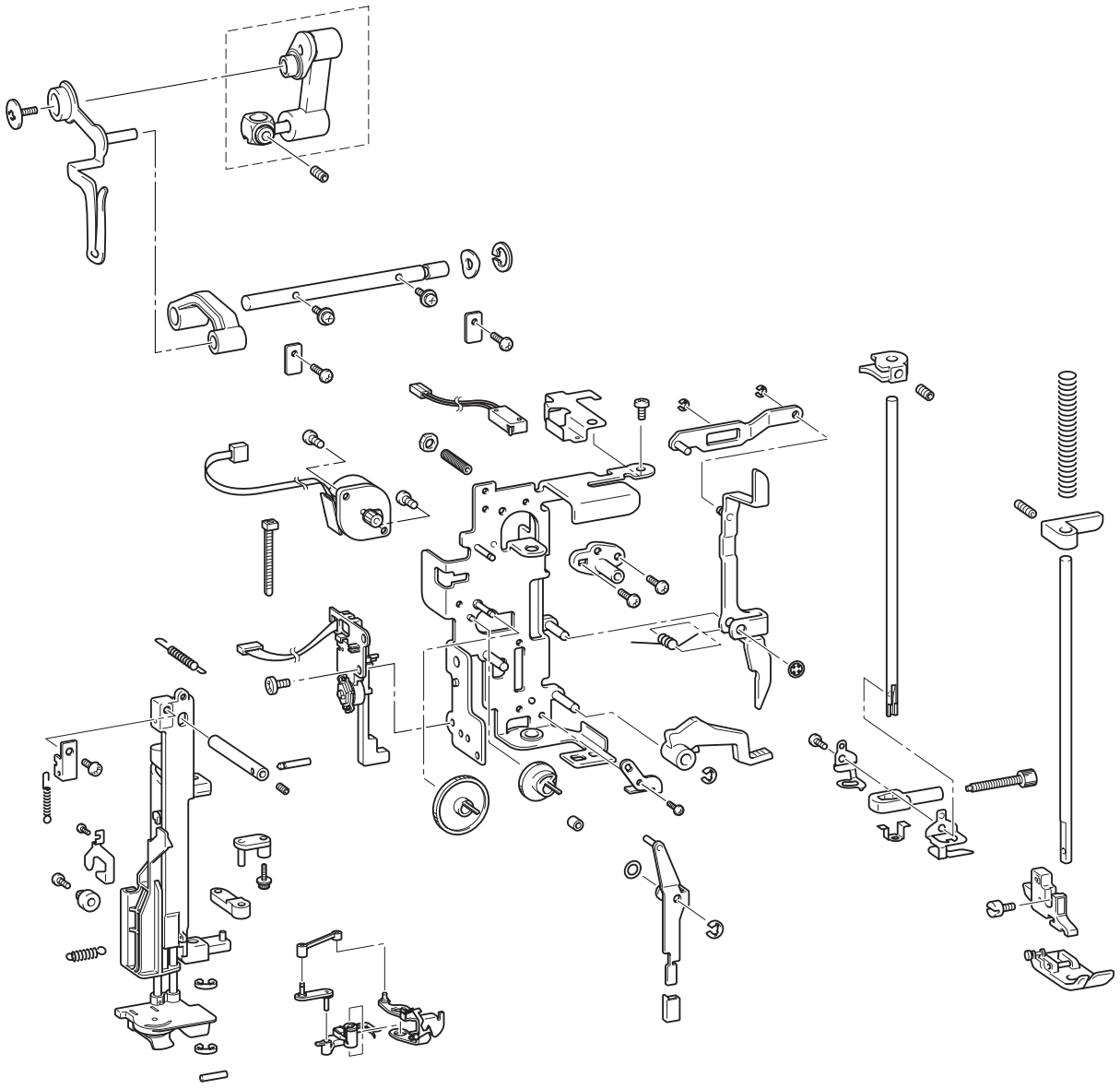


5 Removal of SW adjust plate

1. Remove the screw ❶, and then remove the SW adjust plate ① from the bobbin winder assy. holder ②.

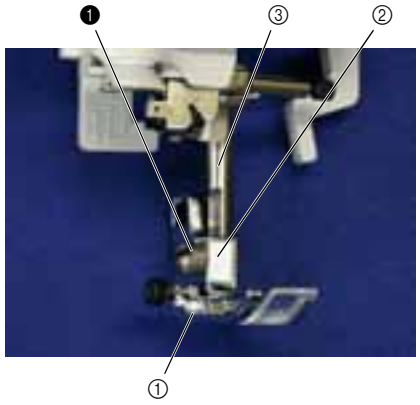


Needle-presser module location diagram



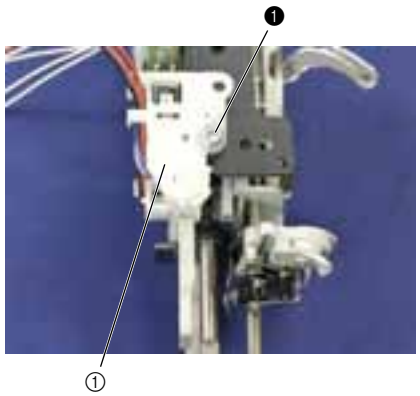
1 Removal of Presser feed holder assy.

1. Remove the Z foot ①.
2. Remove the screw ❶, and then remove the presser feed holder assy. ② from the presser bar ③.



2 Removal of BH switch assy.

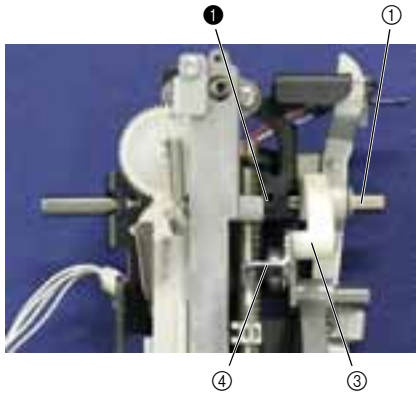
1. Remove the screw ❶, and then remove the BH switch assy. ①.

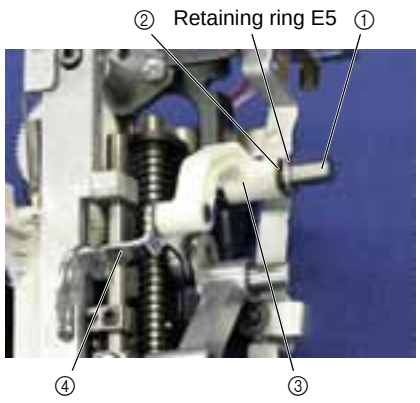


3 Removal of Thread take-up lever link

1. Remove the screw ❶, and then pull the take-up support shaft ①, and then remove the washer, spring ② and the thread take-up lever link ③.

   ***Key point**
   - Pull the thread take-up lever link ③ from the shaft of the thread take-up lever ④.
2. Remove the retaining ring E5 from the take-up support shaft ①.



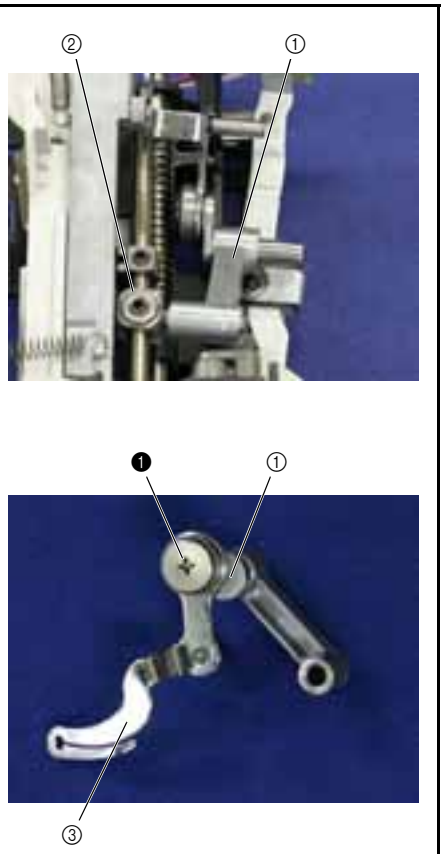


4 Removal of Needle bar crank rod assy.

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

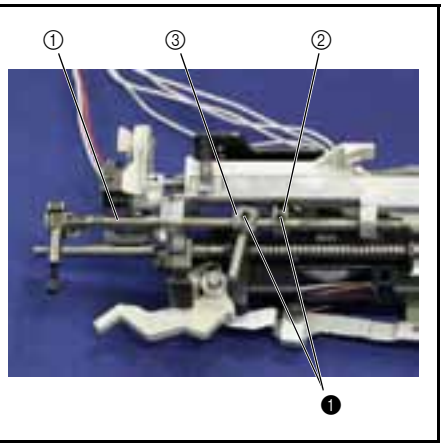
***Key point**

- The screw is reverse threaded.



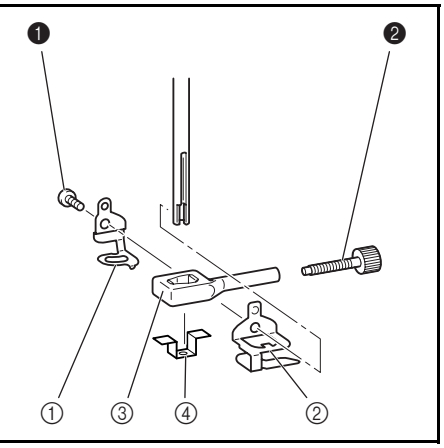
5 Removal of Needle bar assy.

1. Remove the 2 screws ❶, and then pull the needle bar assy. ① from the needle bar supporter assy., and then remove the needle thread block ② and the needle bar block ③.



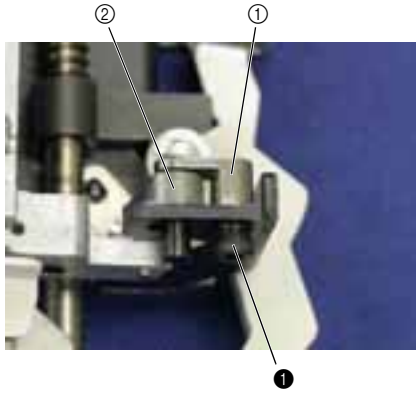
5-1 Disassembly of Needle bar assy.

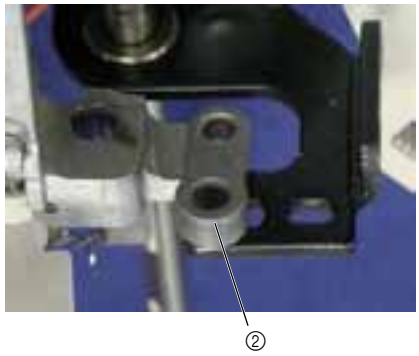
1. Remove the screw ❶, and then remove the needle thread guide spring ① from the needle bar assy..
2. Remove the screw ❷, and then remove the needle bar thread guide ② and the needle block ③ from the needle bar assy..
3. Remove the needle thread plate ④ from the needle block ③.



6 Removal of Shaft assy.

1. Remove the screw ❶, and then remove the shaft assy. ① from the base holder assy..
2. Remove the needle holder block ② from the shaft of the needle bar supporter assy..



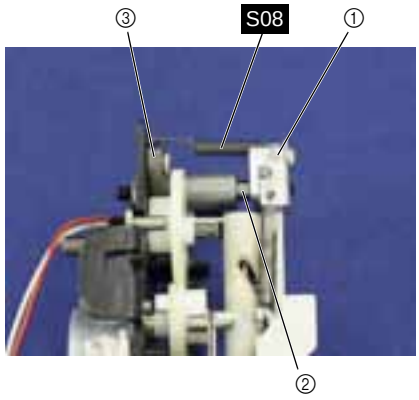


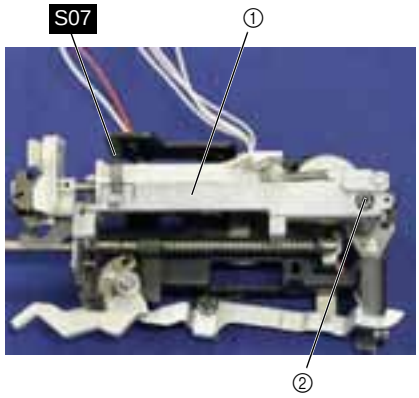
7 Removal of Needle bar supporter assy.

1. Remove the spring S07 and the spring S08, and then remove the needle bar supporter assy. ① from the base holder assy..

***Key point**

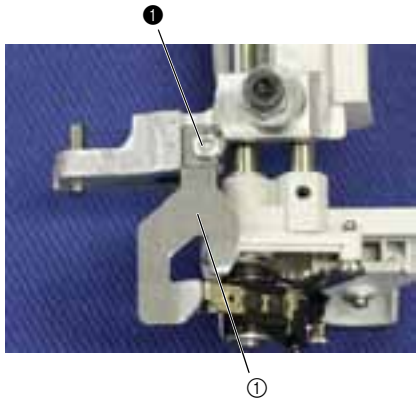
- Pull the shaft ② of the needle bar supporter assy. ① from the shaft bushing ③, and then remove it from the upper side.





8 Removal of Hook release plate

1. Remove the screw ❶, and then remove the hook release plate ① from the needle bar supporter assy..

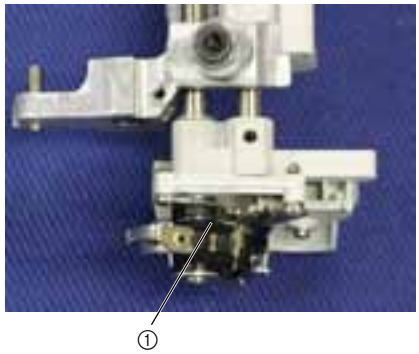


9 Removal of Threader hook assy.

1. Remove the threader hook assy. ① from the needle bar supporter assy..

   ***Key point**
   - Pull the threader hook assy. ① to the lower side.

2. Disassemble the threader hook assy. ①, the link A assy. ②, the link B ③ and the thread guide assy. ④.

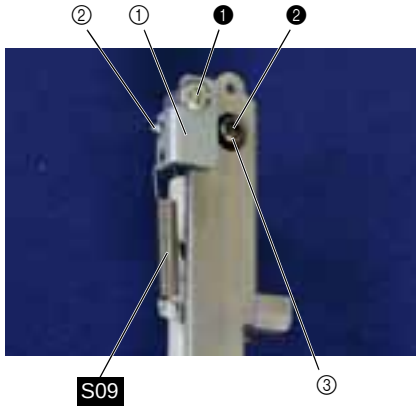


10 Removal of Zigzag adjusting nut

1. Remove the screw ❶, and then remove the zigzag adjusting nut ① from the needle bar supporter assy..

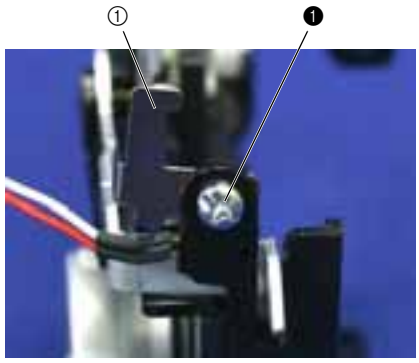
11 Removal of Needle holder shaft A

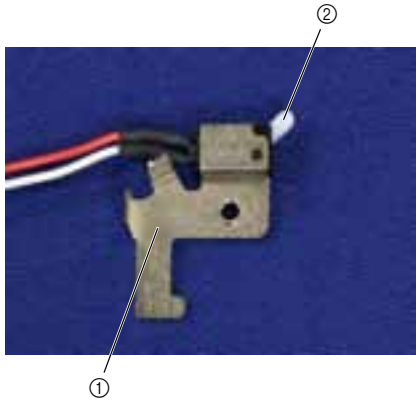
1. Remove the spring S09.
2. Remove the screw ❶, and then remove the plate ① from the needle bar supporter assy.
3. Remove the screw ❷, and then pull the shaft ②, and then remove the needle holder shaft A ③ from the needle bar supporter assy.



12 Removal of PF switch assy.

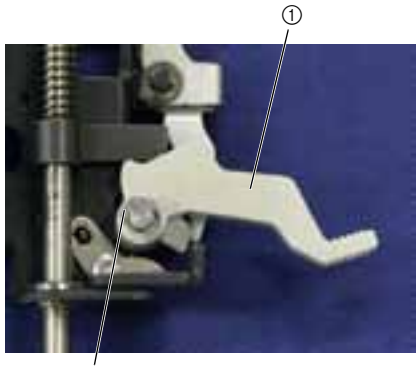
1. Remove the screw ❶, and then remove the presser switch holder ① from the base holder assy.
2. Remove the PF switch assy. ② from the presser switch holder ①.





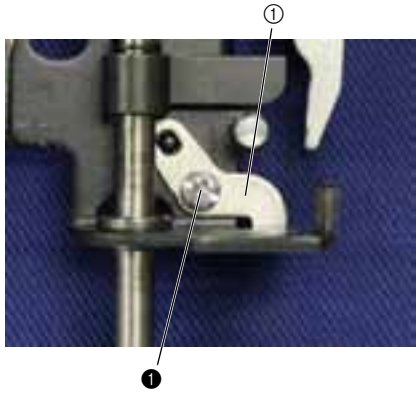
13 Removal of Presser foot lifter

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



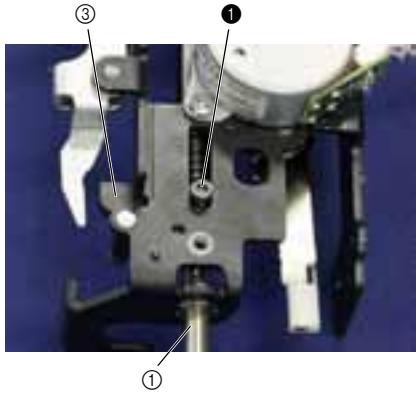
14 Removal of Embroidery presser stopper

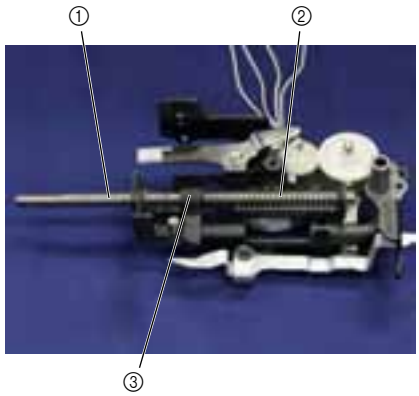
1. Remove the screw ❶, and then remove the embroidry presser stopper ① from the base holder assy..



15 Removal of Presser bar

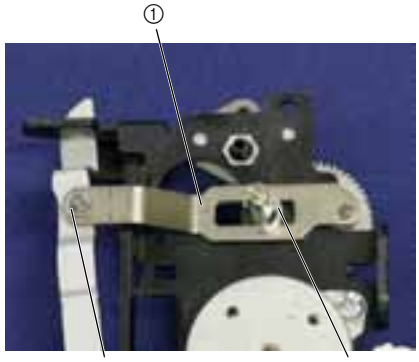
1. Remove the screw ❶, and then pull the presser bar ① from the base holder assy., and then remove the spring ② and the presser bar clamp ③.





16 Removal of Thread releaser assy.

1. Remove the retaining ring E2 and retaining ring E4.
2. Remove the thread releaser assy. ① and the polyester slider from the base holder assy..

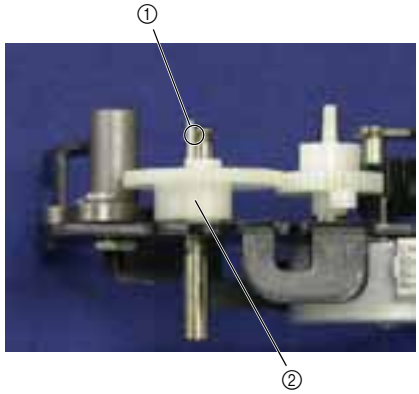


17 Removal of Thread release lever

1. Remove the retaining ring CS4, and then remove the thread release lever ① and the spring S10 from the base holder assy..

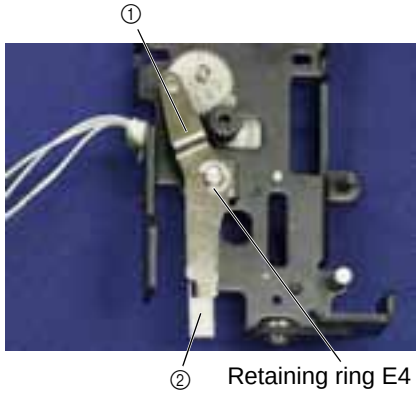
18 Removal of T cam

1. Disengage the hook ①, and then remove the T cam ② from the base holder assy..



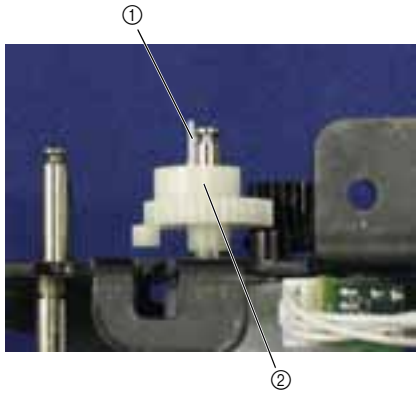
19 Removal of Z zigzag lever assy.

1. Remove the Z lever cap ② from the Z zigzag lever assy. ①.
2. Remove the retaining ring E4, and then remove the Z zigzag lever assy. ① and the polyester slider from the base holder assy..



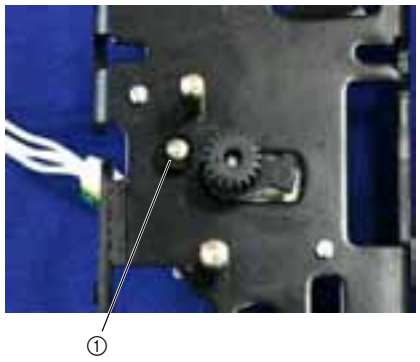
20 Removal of Z zigzag cam

1. Disengage the hook ①, and then remove the Z zigzag cam ② from the base holder assy..



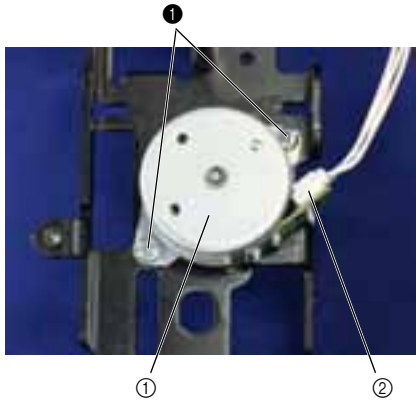
21 Removal of Rubber

1. Remove the rubber ①.



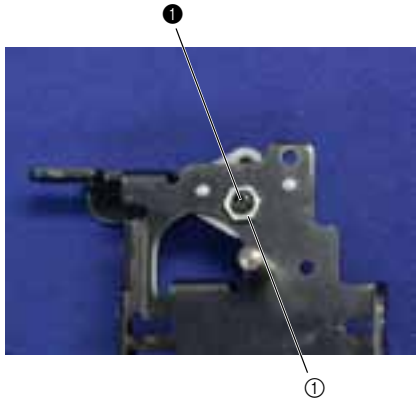
22 Removal of Z pulse motor

1. Remove the 2 screws ❶, and then remove the Z pulse motor ① from the base holder assy.
2. Remove the lead wire assy. ② from the Z pulse motor ①.



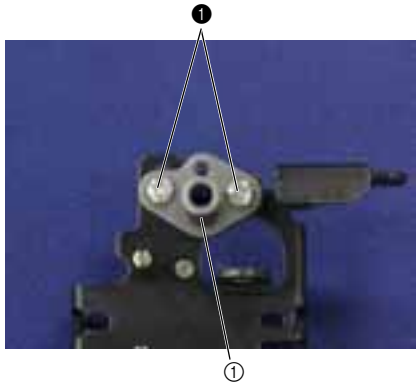
23 Removal of Lock nut

1. Remove the lock nut ① from the base holder assy.
2. Remove the screw ❶.

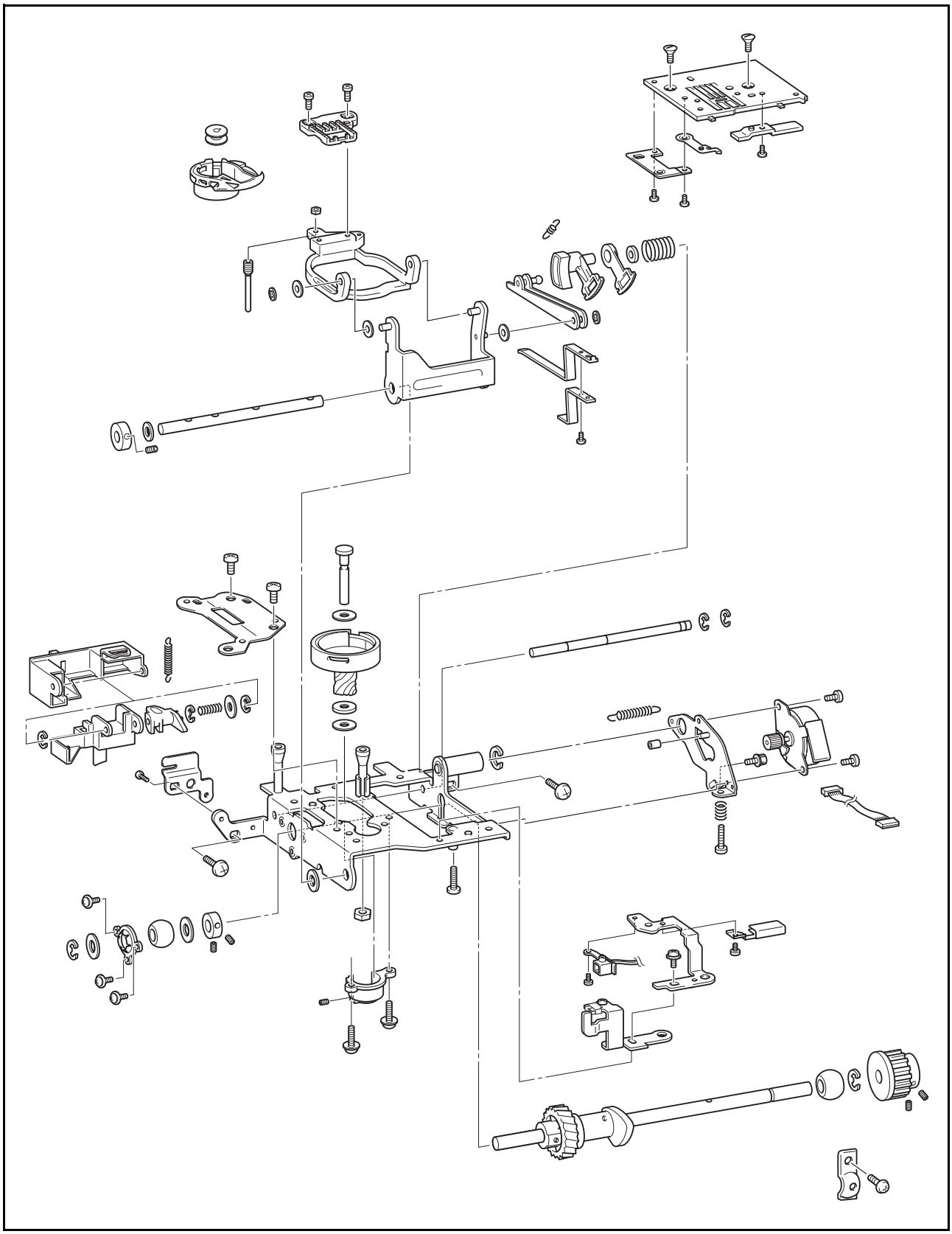


24 Removal of Shaft bushing

1. Remove the 2 screws ❶, and then remove the shaft bushing ① from the base holder assy..

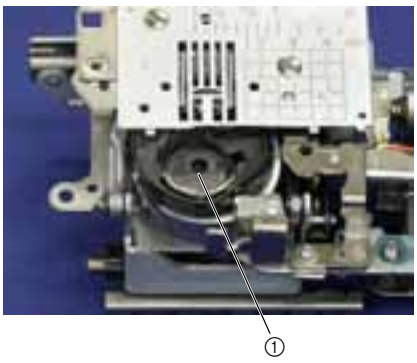


Feed / rotary hook module location diagram



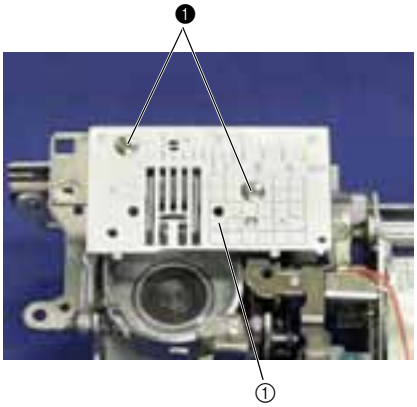
1 Removal of Inner rotary hook assy.

1. Remove the inner rotary hook assy. ①.



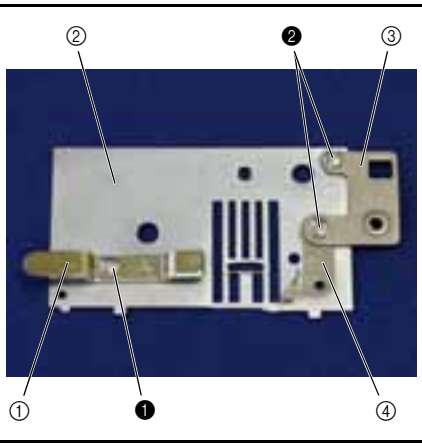
2 Removal of Removal of Needle plate A assy.

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



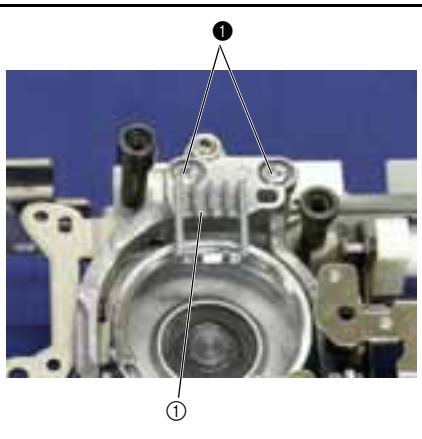
2-1 Disassembly of Needle plate A assy.

1. Remove the screw ❶, and then remove the F gear stopper plate ① from the needle plate A ②.
2. Remove the 2 screws ❷, and then remove the needle plate B support plate ③ and the stopper plate ④ from the needle plate A ②.



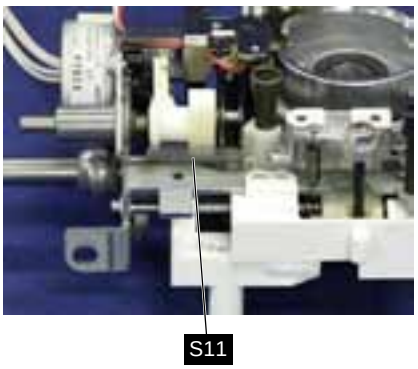
3 Removal of Feed dog

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



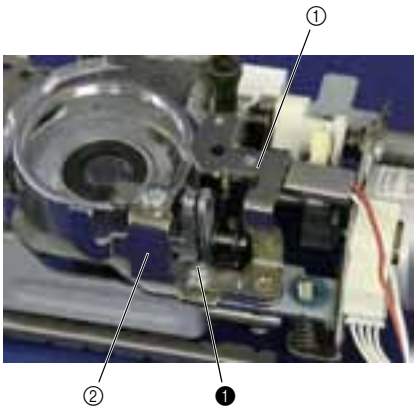
4 Removal of Spring

1. Remove the spring S11.



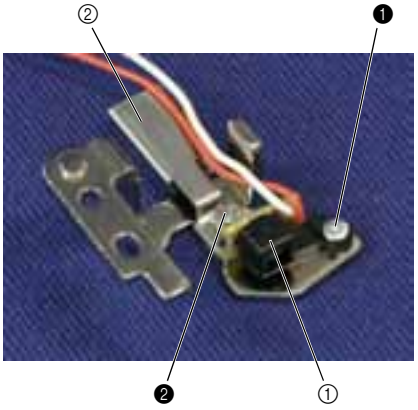
5 Removal of Photo diode holder assy./Inner rotary hook bracket assy.

1. Remove the screw ❶, and then remove the photo diode supporter ① and the inner rotary hook bracket assy. ② from the base plate assy..



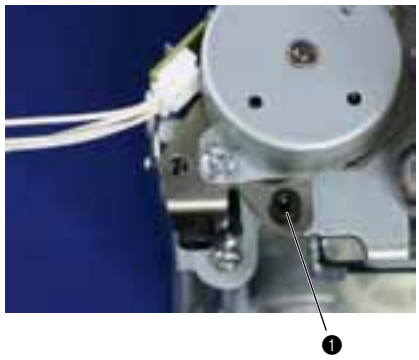
5-1 Disassembly of Photo diode holder assy.

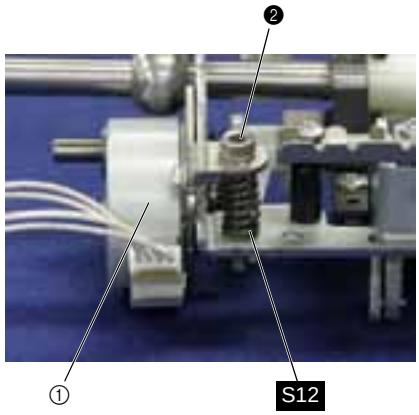
1. Remove the screw ❶, and then remove the photo diode holder assy. ①.
2. Remove the screw ❷, and then remove the cord holder ②.

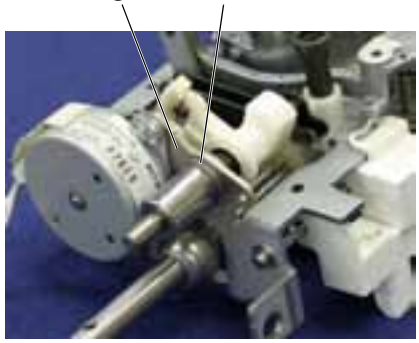


6 Removal of FPM holder sub assy.

1. Remove the screw ❶.
2. Remove the screw ❷, and then remove the spring S12.
3. Remove the retaining ring CRS-10, and then remove the FPM holder sub assy. ① from the base plate assy.

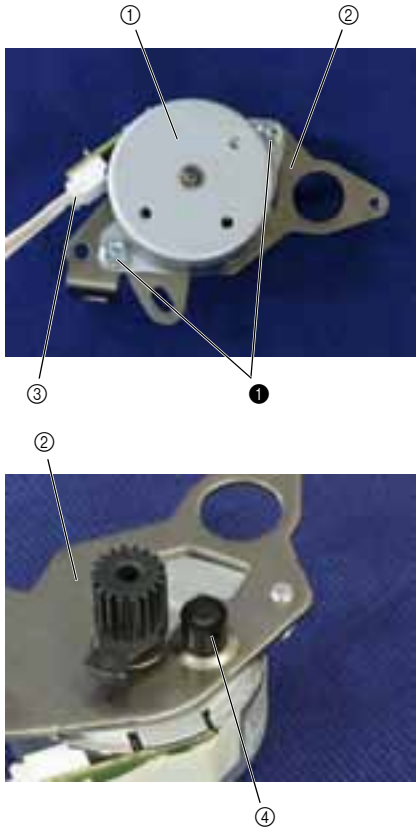






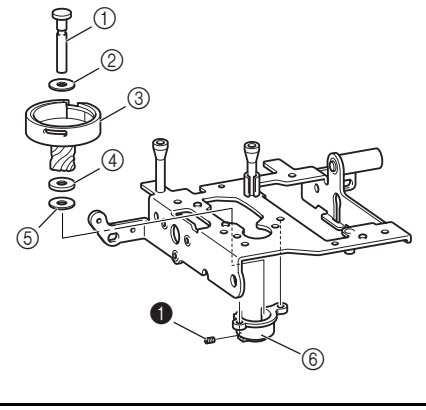
7 Removal of F pulse motor

1. Remove the 2 screws ❶, and then remove the F pulse motor ① from the FPM holder sub assy. ②.
2. Remove the lead wire assy. FPM-LE ③ from the F pulse motor ①.
3. Remove the rubber ④ from the FPM holder sub assy. ②.



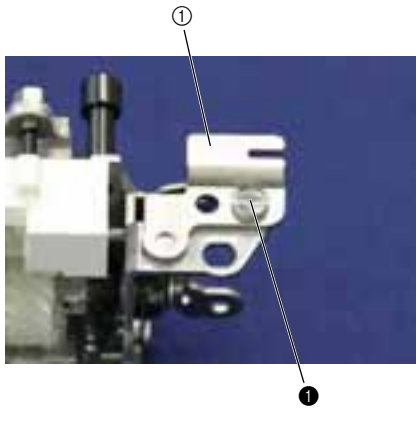
8 Removal of Outer rotary hook assy.

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



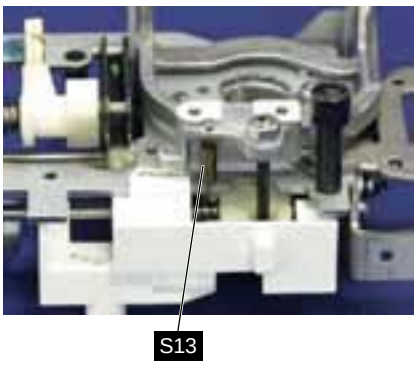
9 Removal of Thread cutter module supporter

1. Remove the screw ❶, and then remove the thread cutter module supporter ①.



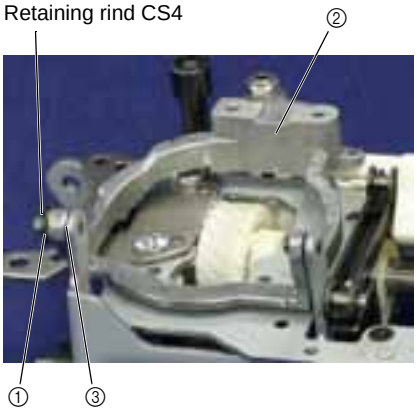
10 Removal of Spring

1. Remove the spring S13.



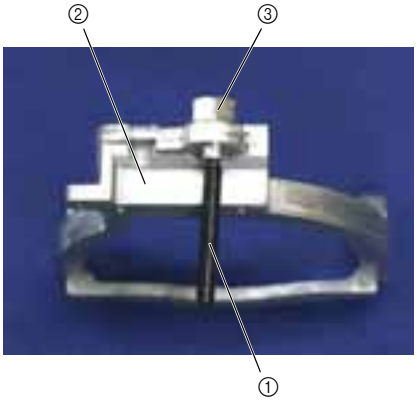
11 Removal of Feed bar

1. Remove the retaining rind CS4, and then remove the polyester slider ①, the feed bar ② and the polyester slider ③ from the feed arm A assy.



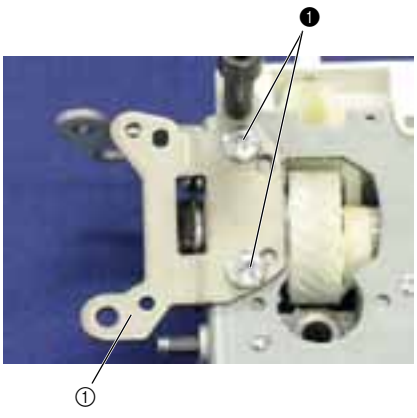
12 Removal of Vertical adjuster screw assy.

1. Remove the vertical adjuster screw assy. ① from the feed bar ②.
2. Remove the M5 nut ③ from the vertical adjuster screw assy. ①.



13 Removal of Thread cutter module supporter

1. Remove the 2 screws ❶, and then remove the thread cutter module supporter ①.

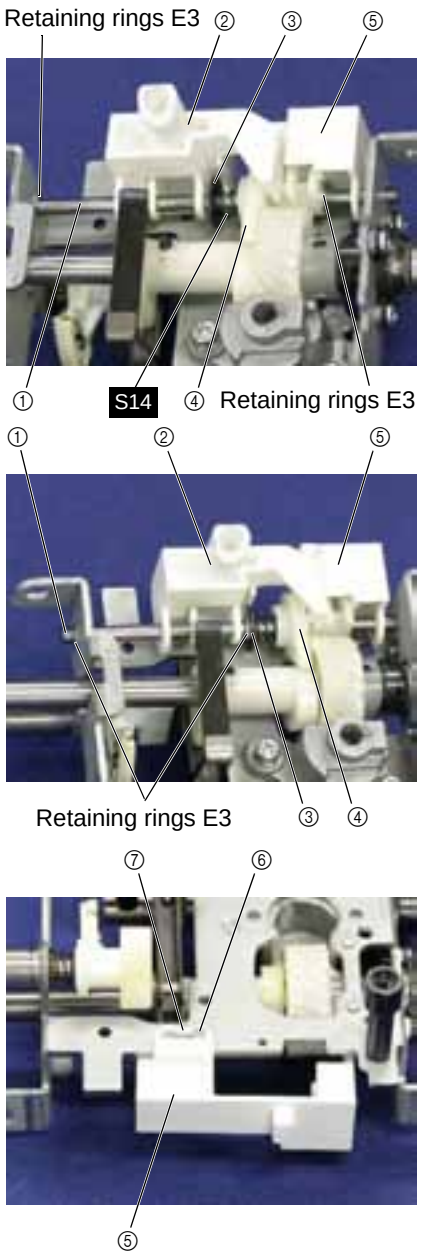


14 Removal of Drop knob / drop lever

1. Remove the 3 retaining rings E3.
2. Remove the vertical feed shaft ①, and then remove the drop lever ②, the washer plain L4 ③, the spring S14 and the vertical lever ④.
3. Remove the retaining ring E3 from the vertical feed shft ①.
4. Remove the drop knob ⑤ from the base plate assy..

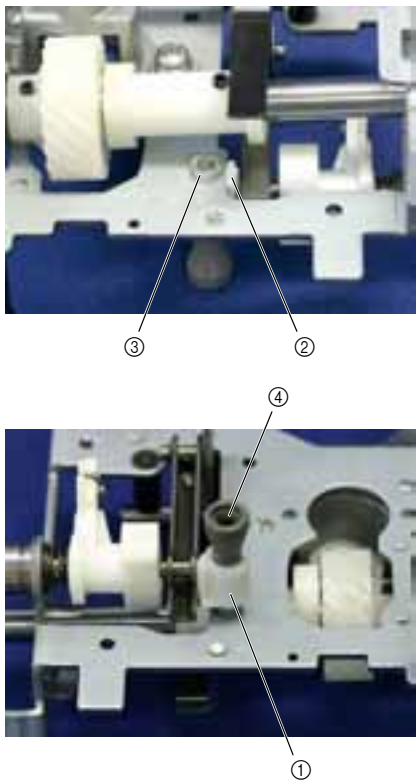
***Key point**

- Remove it while lifting the section ⑦ of the drop knob ⑤ to get over the boss part ⑤ of the base plate assy.



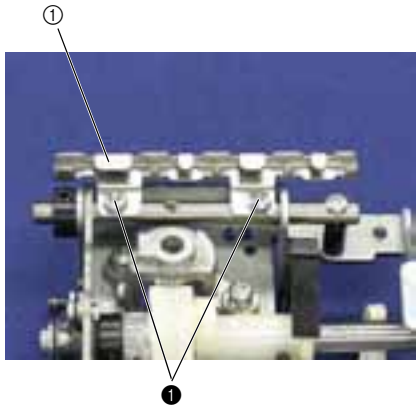
15 Removal of Needle plate supporter shaft B

1. Disengage the hook ② of the feed arm supporter ①.
2. Remove the nut 1 M3 ③.
3. Remove the needle plate supporter shaft B ④ from the base plate assy.
4. Remove the feed arm supporter ① from the needle plate supporter shaft B ④.



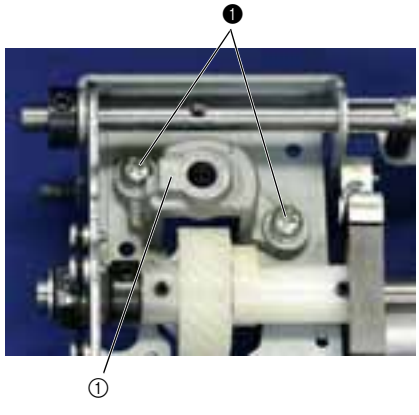
16 Removal of Lead wire guide holder

1. Remove the 2 screws ❶, and then remove the lead wire guide holder ① from the base plate assy..



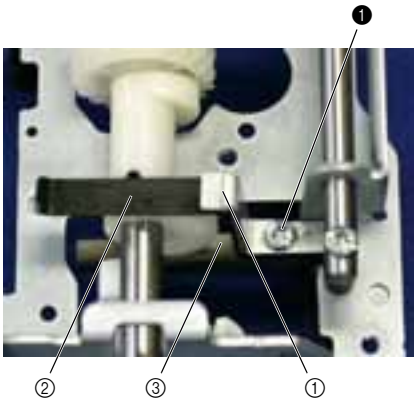
17 Removal of Shaft supporter

1. Remove the 2 screws ❶, and then remove the shaft supporter ① from the base plate assy.



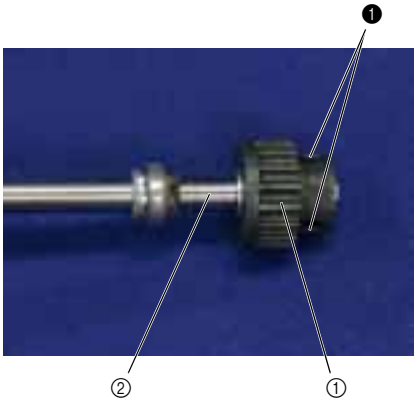
18 Removal of Feed supporting plate

1. Remove the screw ❶, and then remove the feed supporting plate B ① and the feed supporting plate ② from the feed arm assy. ③.



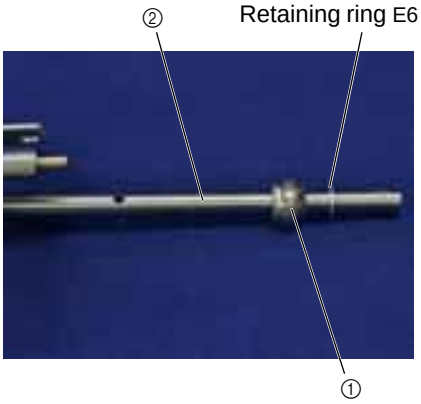
19 Removal of Timing pulley D

1. Remove the 2 screws ❶, and then remove the timing pulley D ① from the lower shaft assy. ②.



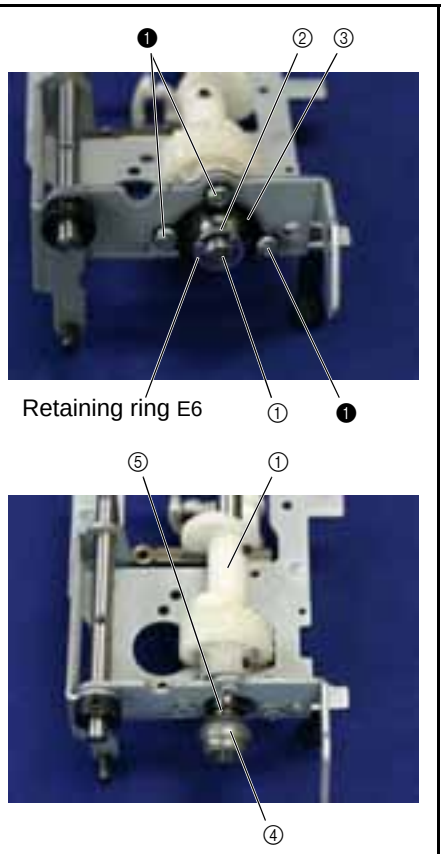
20 Removal of Lower shaft bushing

1. Remove the retaining ring E6, and then lower shaft bushing ① from the lower shaft assy. ②.



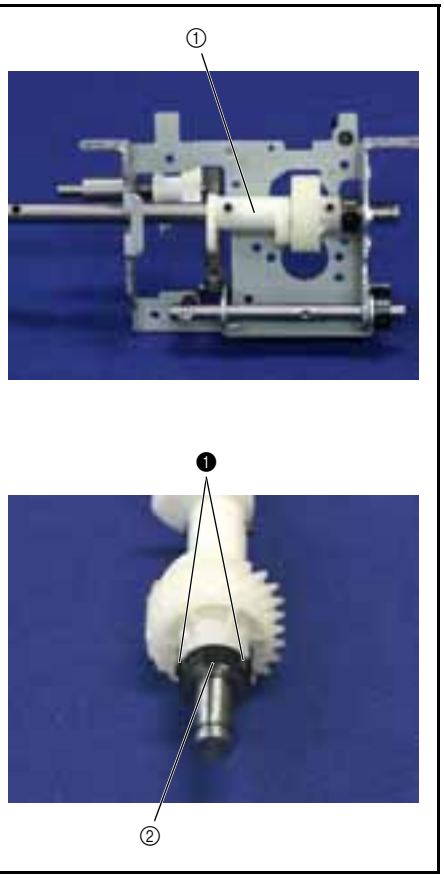
21 Removal of Bushing presser B

1. Remove the retaining ring E6, and then remove the “washer, thrust ②” from the lower shaft assy. ①.
2. Remove the 3 screws ❶, and then remove the bushing presser B ③ from the base plate assy.
3. Remove the lower shaft bushing ④ and the “washer, thrust ⑤” from the lower shaft assy. ①.



22 Removal of Lower shaft assy.

1. Remove the lower shaft assy. ① from the base plate assy.
2. Remove the 2 screws ❶, and then remove the set collar ②.

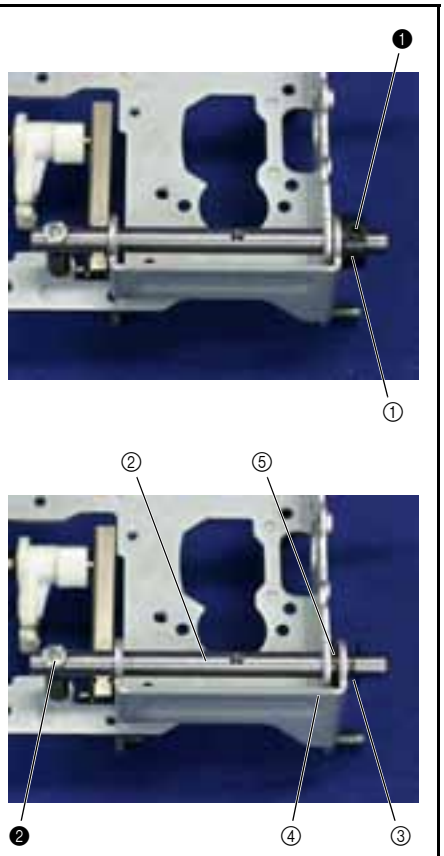


23 Removal of Feed arm A assy.

1. Remove the screw ❶, and then remove the set collar ①.
2. Remove the screws ❷, and then pull the horizontal feed shaft ②, and then remove the "washer, thrust ③", the feed arm A assy. ④ and the "washer, thrust ⑤".

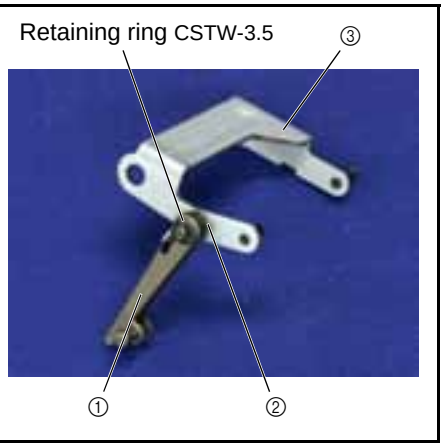
***Key point**

- Remove the feed regulator slide shaft of the feed arm B assy. from the feed adjuster.



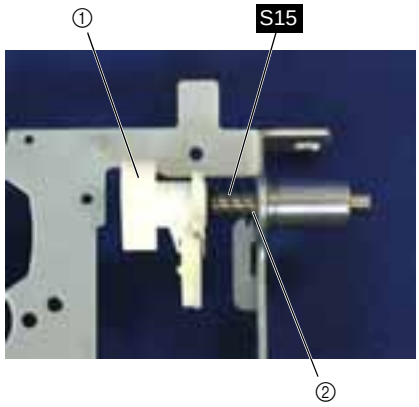
24 Removal of Feed arm B assy.

1. Remove the retaining ring CSTW-3.5, and then remove the feed arm B assy. ① and the polyester slider ② from the feed arm A assy. ③.



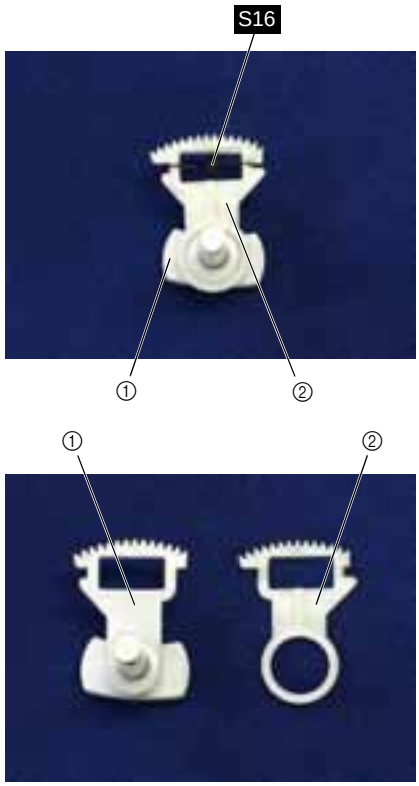
25 Removal of Feed adjuster assy.

1. Pull the feed adjuster ① from the base plate assy. and then remove the spring S15 and the polyester slider ②.

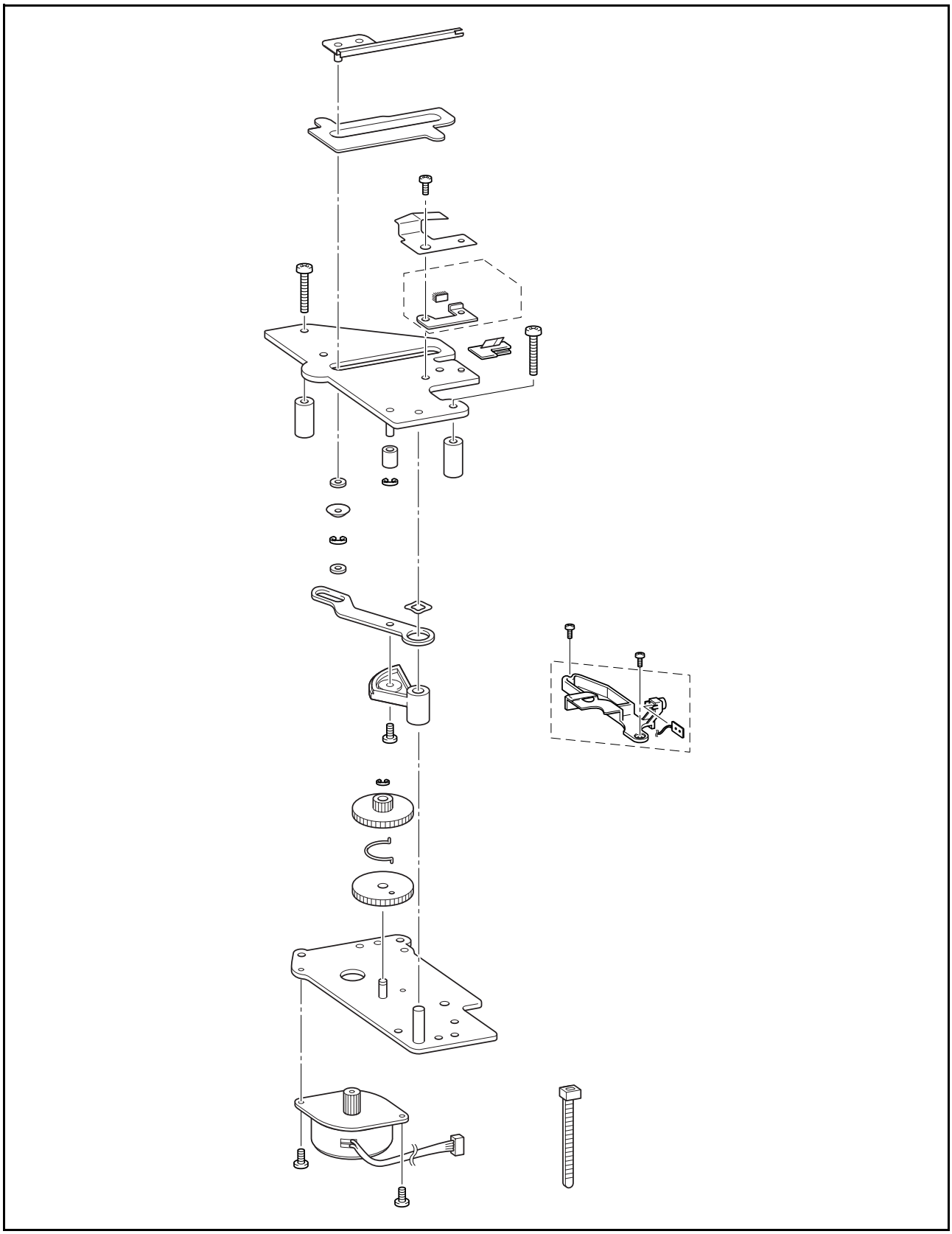


26 Disassembly of Feed adjuster assy.

1. Remove the spring S16, and then remove the F gear ② from the feed adjuster ①.

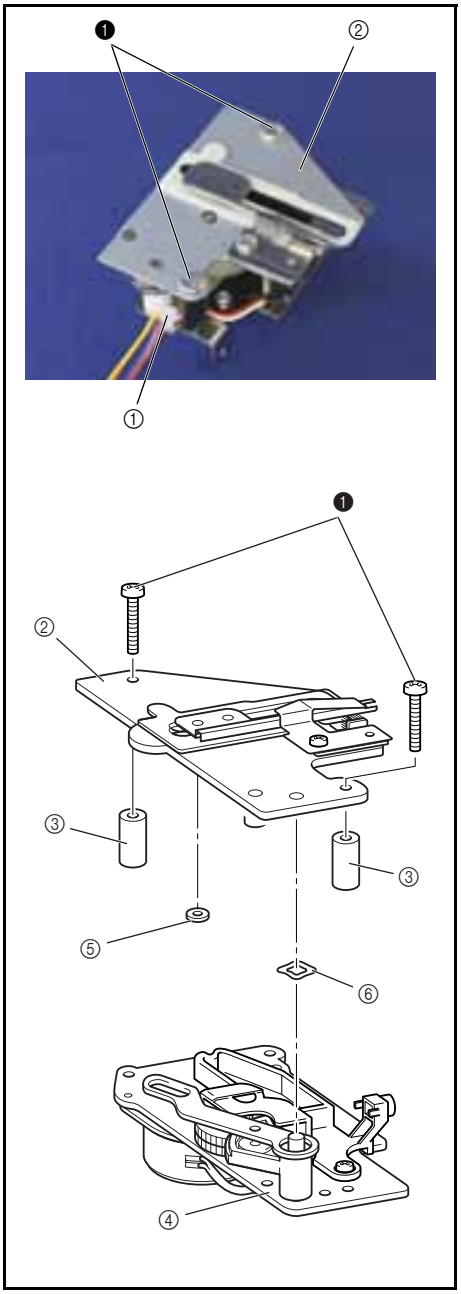


Thread cutter module location diagram



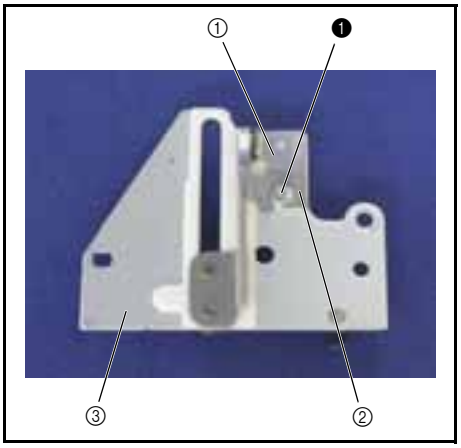
1 Removal of Thread cutter frame assy.

1. Cut the band ①.
2. Remove the 2 screws ❶, and then remove the thread cutter frame assy. ② and the 2 collars ③ from the motor holder assy. ④.
3. Remove the polyester slider ⑤ from the thread cutter frame assy. ②.
4. Remove the wave-shape spring washer ⑥ from the motor holder assy. ④.



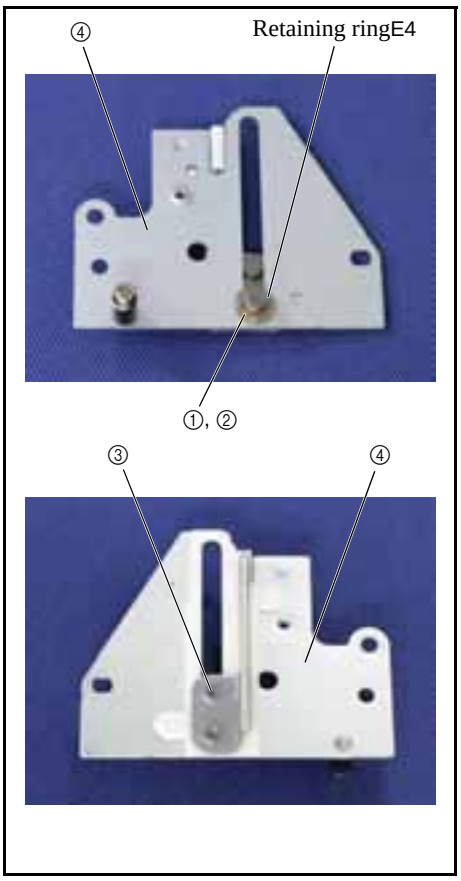
2 Removal of Presser plate assy.

1. Remove the screw ❶, and then remove the spring plate ① and the presser plate assy. ② from the thread cutter frame assy. ③.



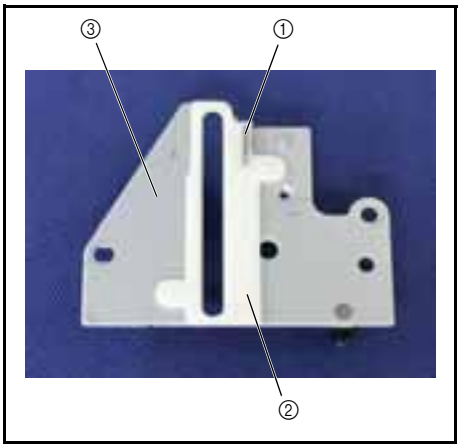
3 Removal of Thread hook assy.

1. Remove the retaining ring E4, and then remove the washer ① and the polyester slider ②.
2. Remove the thread hook assy. ③ from the thread cutter frame assy. ④.



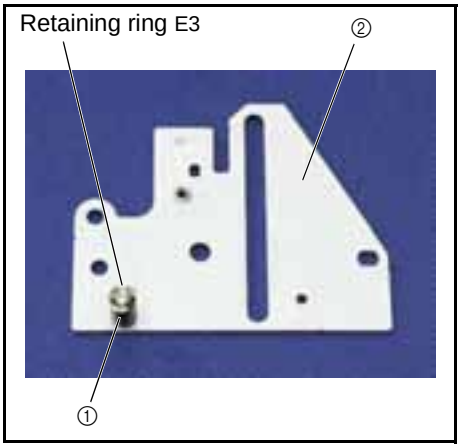
4 Removal of Spacer

1. Remove the NT lower thread cutter ① from the spacer ②.
2. Remove the spacer ② from the thread cutter frame assy. ③.



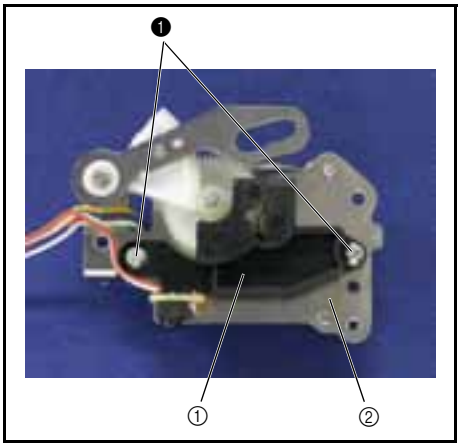
5 Removal of Rubber

1. Remove the retaining ring E3, and then remove the rubber ① from the thread cutter frame assy. ②.



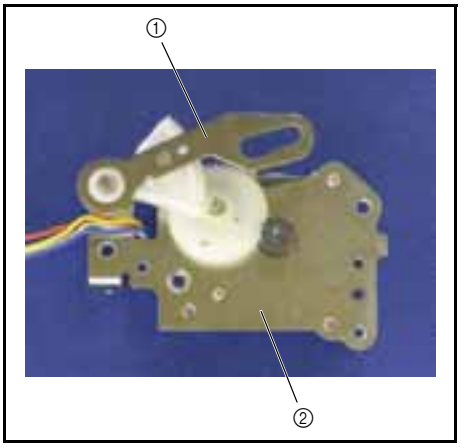
6 Removal of Photo transistor assy.

1. Remove the 2 screws ❶, and then remove the photo transistor ① from the motor holder assy. ②.



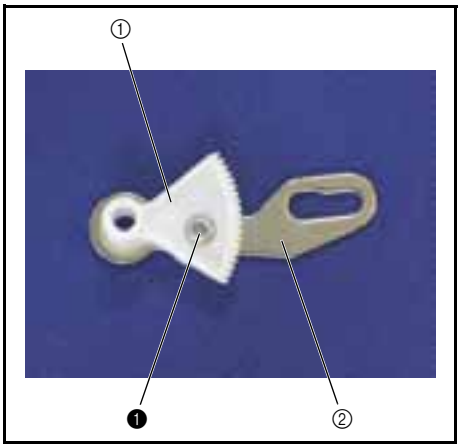
7 Removal of Thread cutter lever assy.

1. Remove the thread cutter lever assy. ① from the motor holder assy. ②.



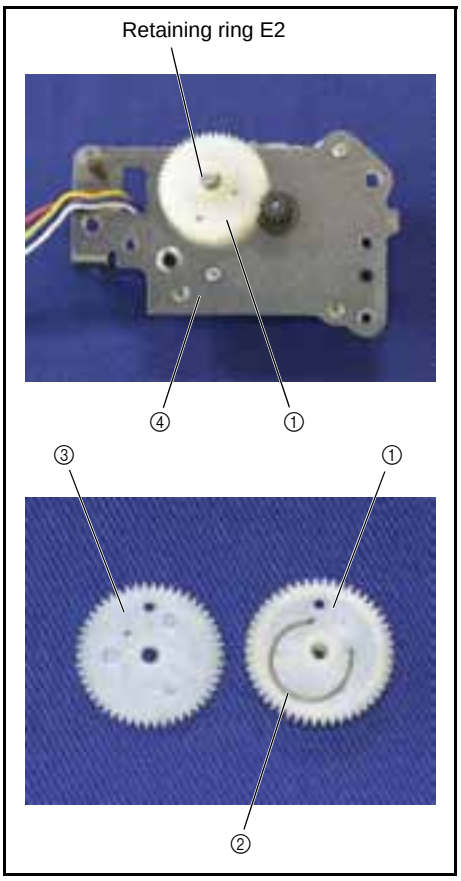
7-1 Disassembly of Thread cutter lever assy.

1. Remove the screw ❶, and then remove the thread cutter lever gear ① from the thread cutter lever ②.



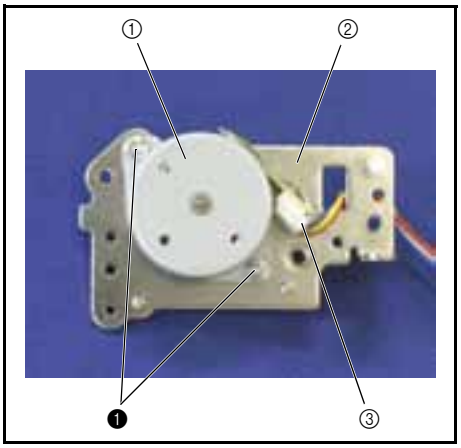
8 Removal of Idle gear A/B

1. Remove the retaining ring E2, and then remove the idle gear A ①, the spring ② and the idle gear B ③ from the motor holder assy. ④.

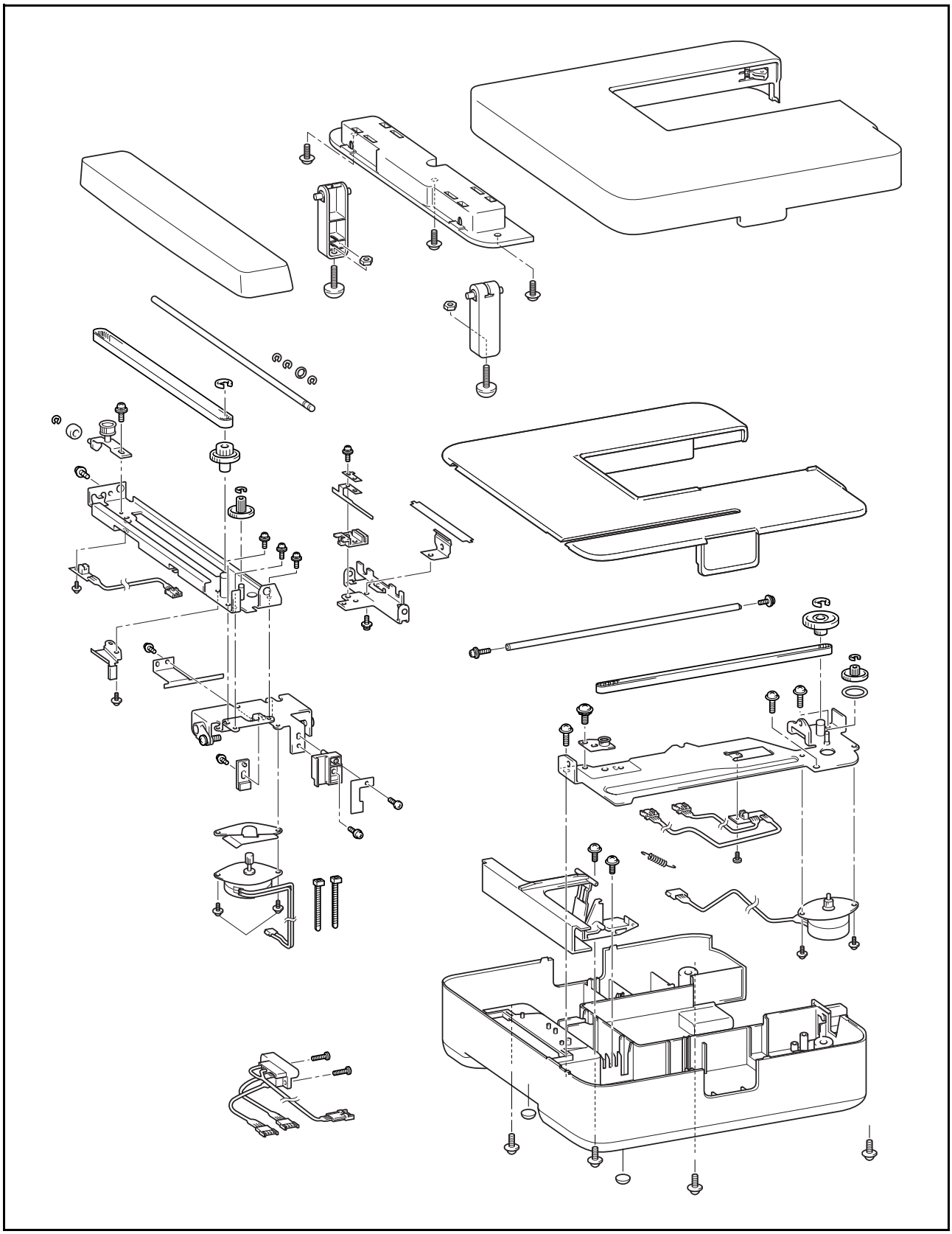


9 Removal of Motor pulse

1. Remove the 2 screws ❶, and then remove the motor pulse ① from the motor holder assy. ②.
2. Remove the CPM lead wire assy. ③ from the motor pulse ①.



Embroidery unit location diagram



1 Removal of ES top cover

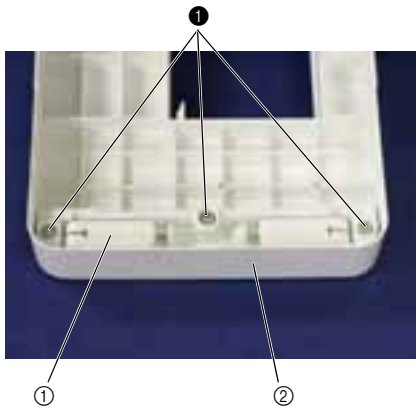
1. Remove the ES top cover ① from the embroidery.

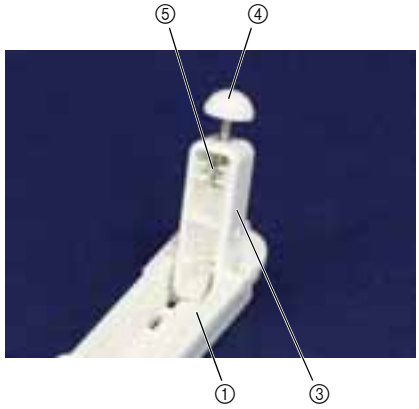
***Key point**

- Remove the hooks (2 locations), and then remove the ES top cover.

2 Removal of ES foot cover

1. Remove the 3 screws ❶, and then remove the ES foot cover ① from the ES top cover ②.
2. Remove the 2 ES feet ③ from the ES foot cover ①.
3. Remove the 2 adjusting feet ④ from the 2 ES foot ③.
4. Remove the 2 nut 2 M4 ⑤ from the 2 ES foot ③.





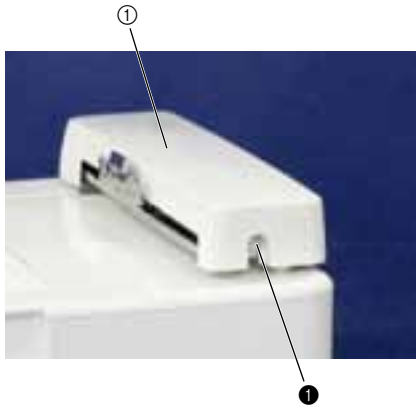
3 Removal of Carriage cover

1. Move the X carriage assy. to the right side.

***Key point**

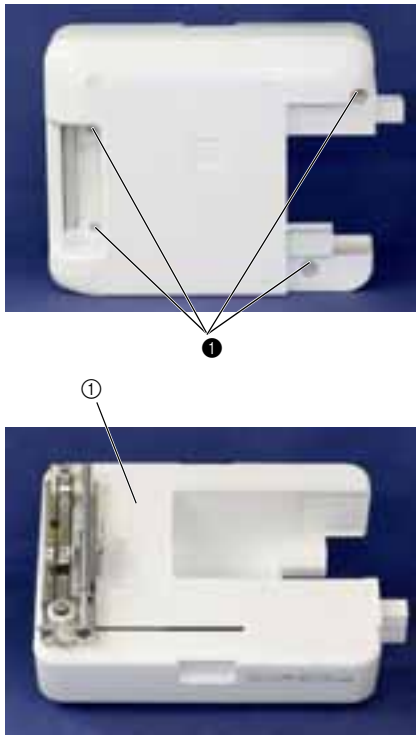
- Set the embroidery unit as shown in the right figure.

2. Remove the screw ❶, and then remove the carriage cover ① from the X carriage assy..



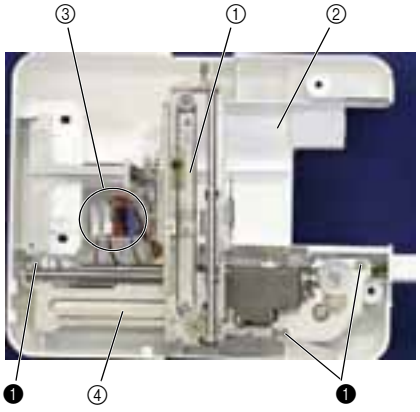
4 Removal of ES cover U

1. Remove the 4 screws ❶, and then remove the ES cover U ①.
2. Set the embroidery unit as shown in the right figure, and then slide the ES cover U ① to the right side. And remove it.



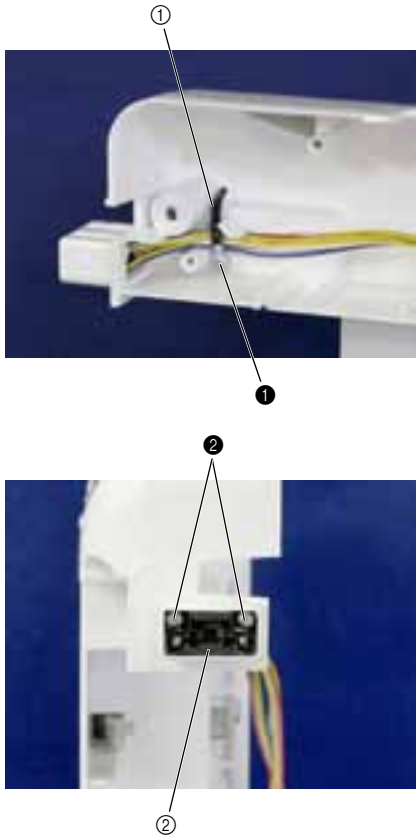
5 Removal of Main frame assy.

1. Move the X carriage assy. ① to the position where the screw is seen.
2. Remove the 4 lead wires assy. from the guide part ③ of the ES cover D, and then remove the 4 connectors.
3. Remove the 3 screws ❶, and then remove the ES cover D ② from the main frame assy. ④.



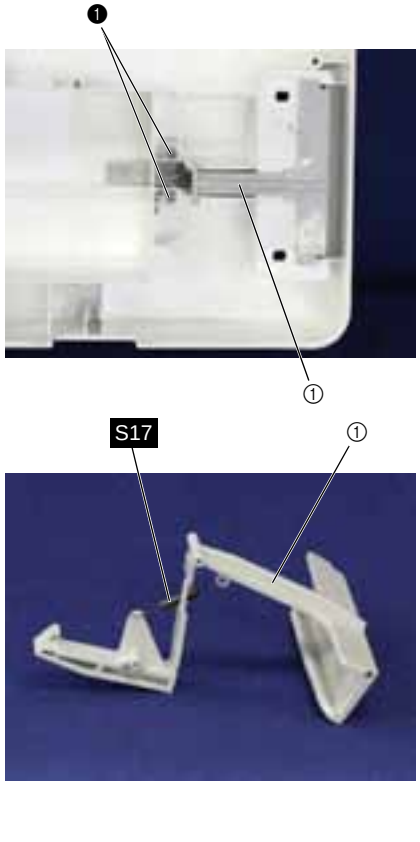
6 Removal of lead wire assy: EMB unit

1. Remove the screw ❶, and then remove the coaching clip ①.
2. Remove the 2 screws ❷, and then remove the lead wire assy: EMB unit ② from the ES cover D.



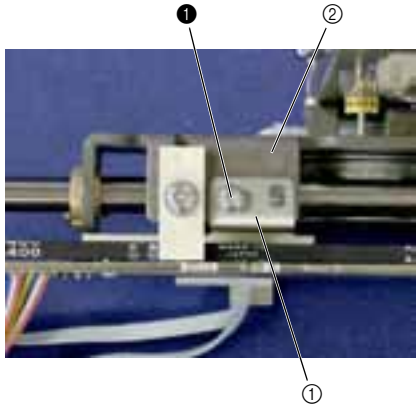
7 Removal of Handle

1. Remove the 2 screws ❶, and then remove the handle ① from the ES cover D.
2. Remove the spring S17 from the handle ①.



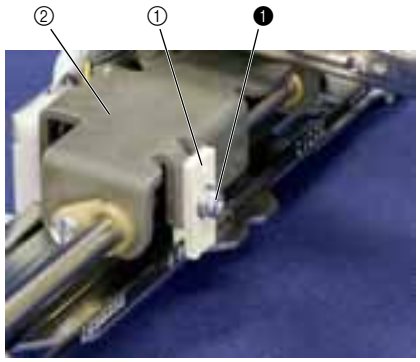
8 Removal of X shutter

1. Remove the screw ❶, and then remove the X shutter ① from the X carriage guide plate assy. ②.



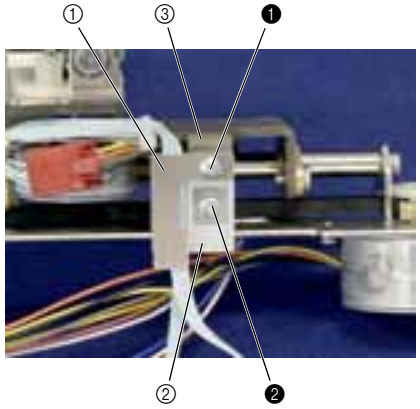
9 Removal of X belt presser

1. Remove the screw ❶, and then remove the X belt presser ① from the X carriage guide plate assy. ②.



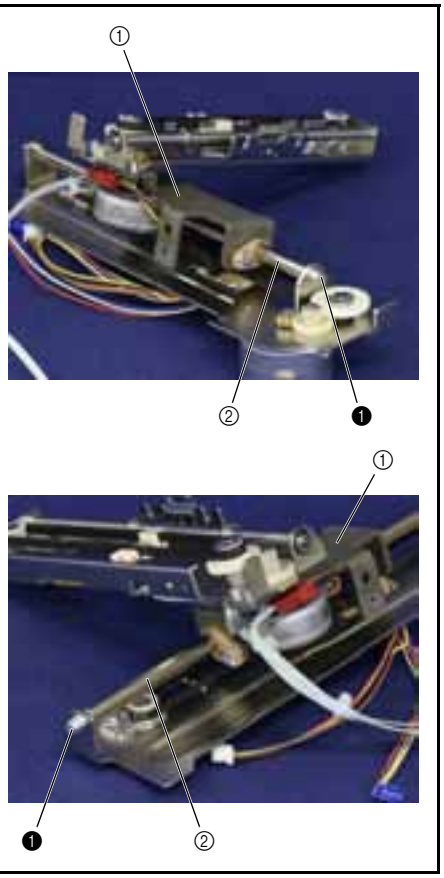
10 Removal of X slider

1. Remove the screw ❶, and then remove the cord presser ① from the X slider ②.
2. Remove the screw ❷, and then remove the X slider ② from the X carriage guide plate assy. ③.



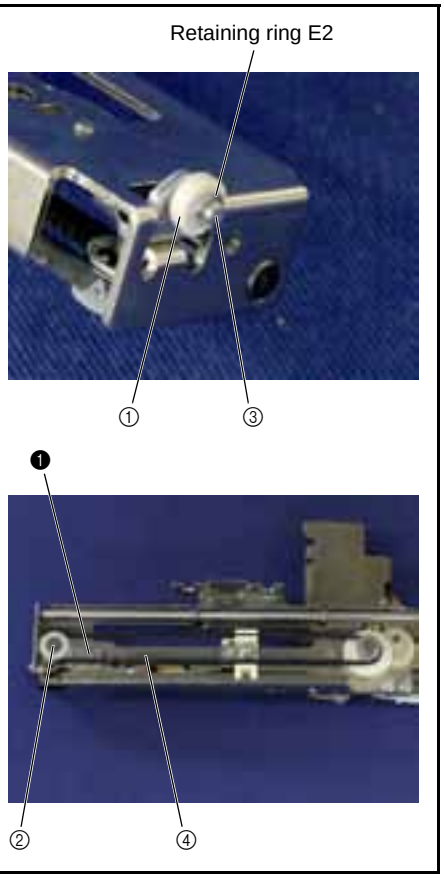
11 Removal of X carriage guide plate assy. / X guide shaft

1. Remove the 2 screws ❶, and then remove the X carriage guide plate assy. ① and the X guide shaft ② from the main frame assy..
2. Remove the X guide shaft ② from the X carriage guide plate assy. ①.



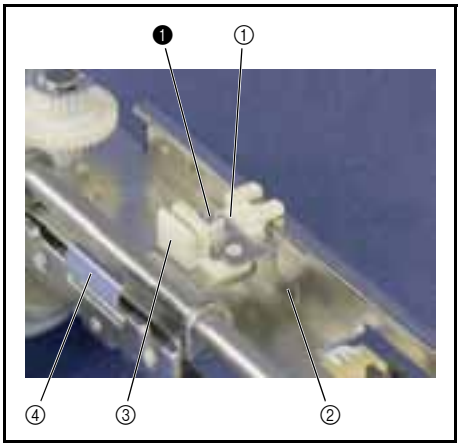
12 Removal of Y tension pulley assy.

1. Remove the retaining ring E2, and then remove the roller assy. ① from the shaft ③ of the Y tension pulley assy. ②.
2. Remove the screw ❶, and then remove the Y tension pulley assy. ② from the X carriage assy..
3. Remove the T belt 40S2M316. ④.



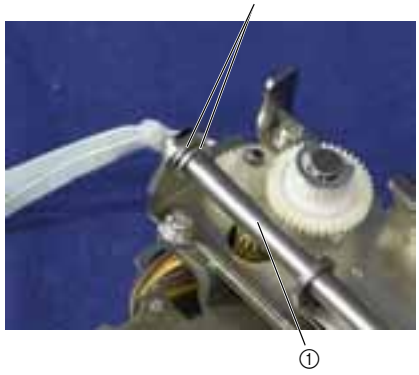
13 Removal of Y slider

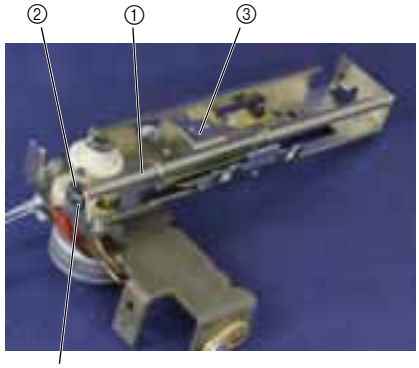
1. Remove the screw ❶, and remove the shutter presser plate ①, the Y shutter ② and the Y slider ③ from the Y carriage ④.

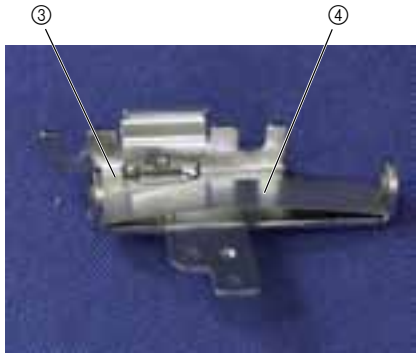


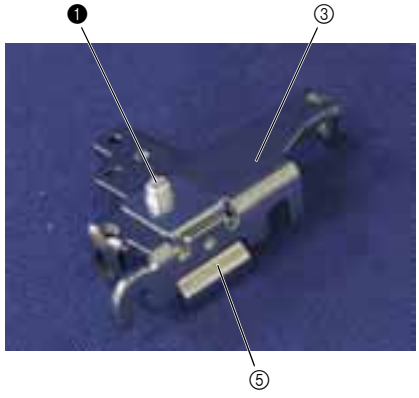
14 Removal of Y carriage

1. Remove the 2 retaining rings E4, and then remove the Y guide shaft ① and remove the “washer, wave spring ②” and the Y carriage ③ from the X carriage assy..
2. Remove the retaining ring E4 from the Y guide shaft ①.
3. Remove the Y presser plate ④ from the Y carriage ③.
4. Remove the screw ❶, and then remove the notched spring ⑤ from the Y carriage ③.



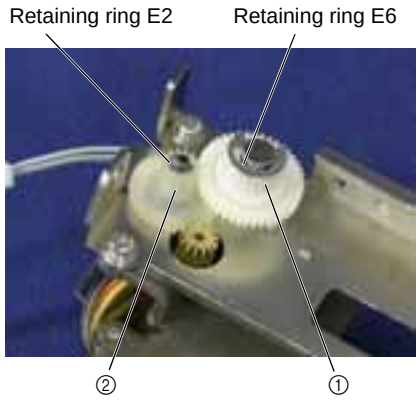






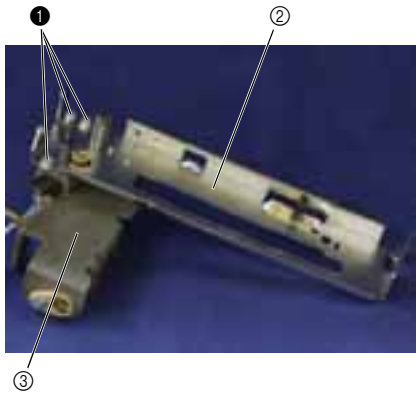
15 Removal of Y driving gear / Y gear

1. Remove the retaining ring E6, and then remove the Y driving gear ① from the X carriage assy..
2. Remove the retaining ring E2, and then remove the Y gear ② from the X carriage assy..



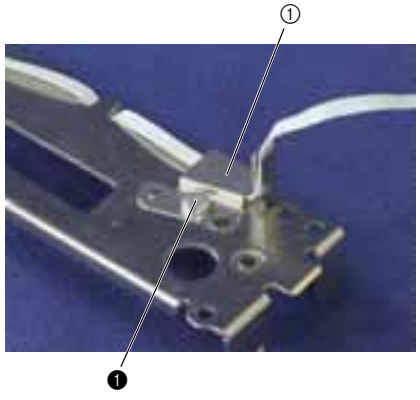
16 Removal of X carriage assy.

1. Cut the 2 bands ①.
2. Remove the 3 screws ❶, and then remove the X carriage assy. ② from the X carriage guide plate assy. ③.



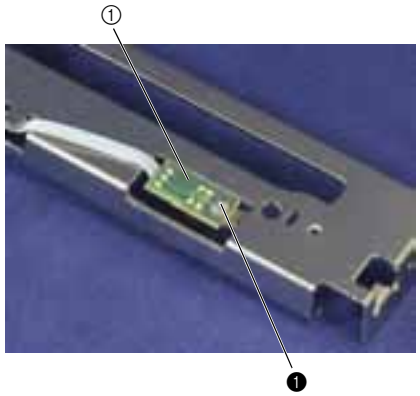
17 Removal of Cord holder

1. Remove the screw ❶, and then remove the cord holder ① from the X carriage assy..



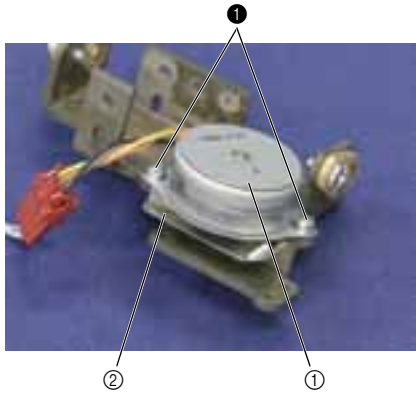
18 Removal of YSENS PCB assy.

1. Remove the screw ❶, and then remove the YSENS PCB assy, ① from the X carriage.



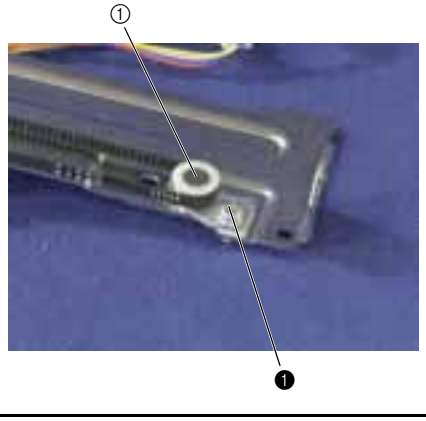
19 Removal of YPM

1. Remove the 2 screws ❶, and then remove the YPM ① and the cord guide ② from the X carriage guide plate assy..



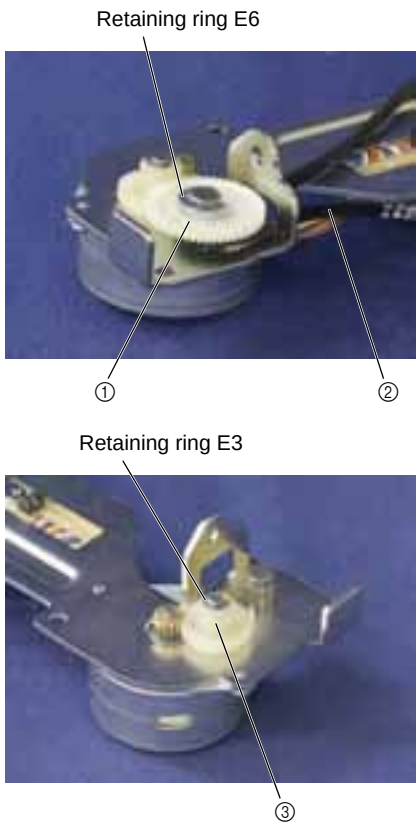
20 Removal of X tension pulley assy.

1. Remove the screw ❶, and then remove the X tension pulley assy. ① from the main frame assy..



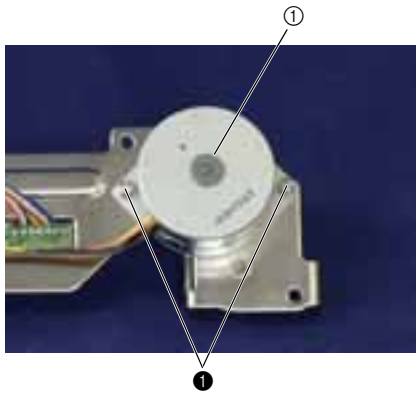
21 Removal of X gear / X driving gear

1. Remove the retaining ring E6, and then remove the X driving gear ①, the T belt 40S2M400 ② and the washer from the main frame assy..
2. Remove the retaining ring E3, and then remove the X gear ③ from the main frame assy..



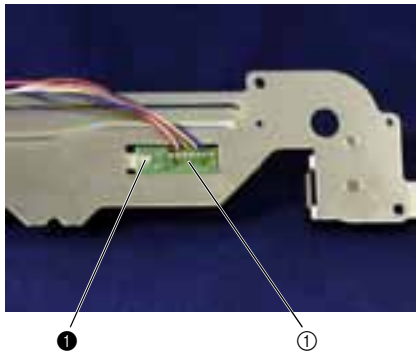
22 Removal of XPM

1. Remove the 2 screws ❶, and then remove the XPM ① from the main frame assy..

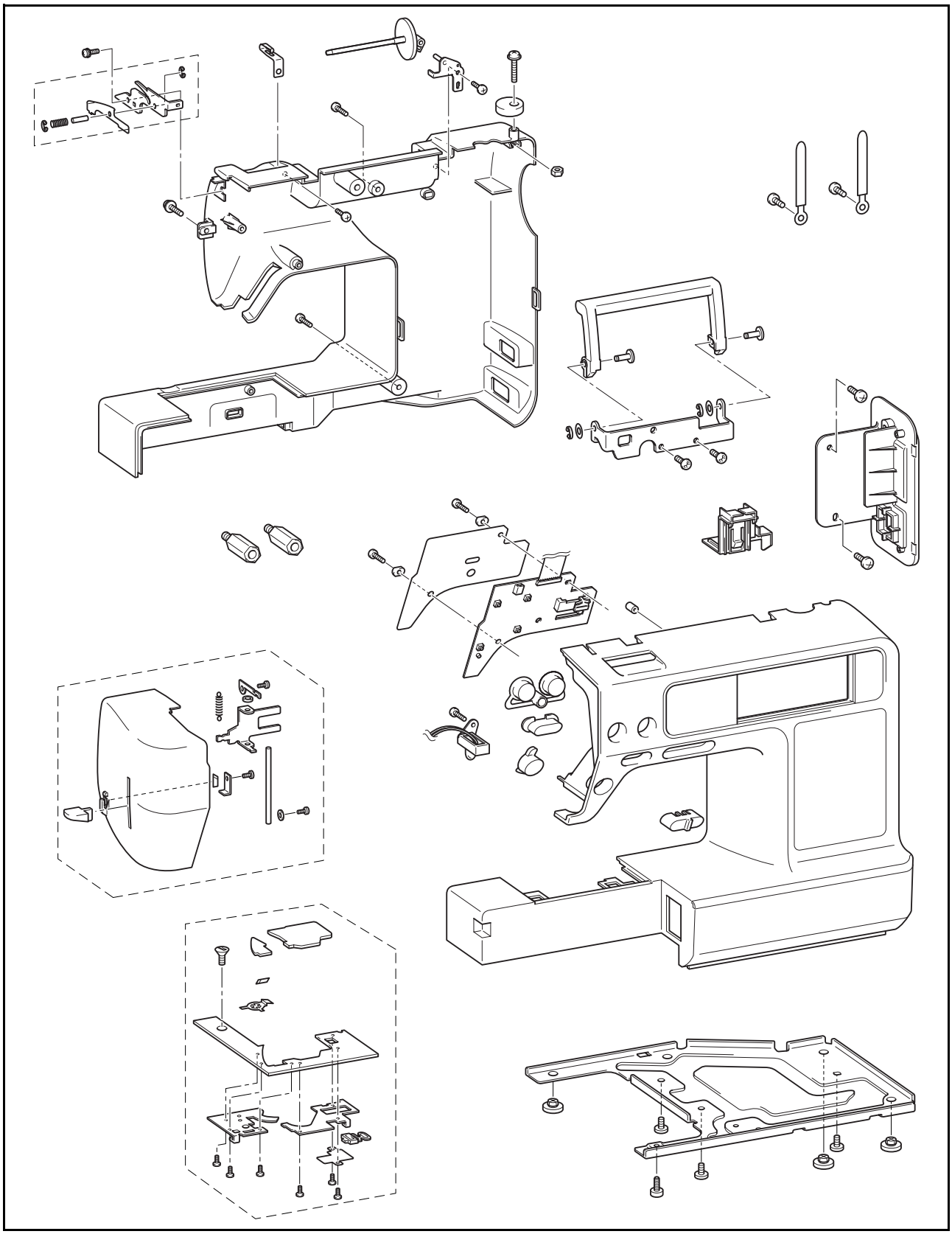


23 Removal of XSENS PCB assy.

1. Remove the screw ❶, and then remove the XSENS PCB assy. ① from the main frame assy..

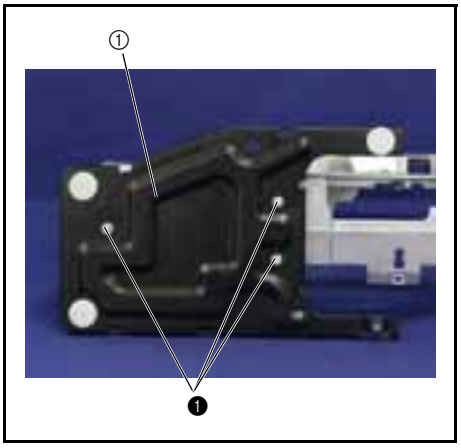


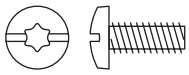
Main parts location diagram



1 Attachment of Base plate assy.

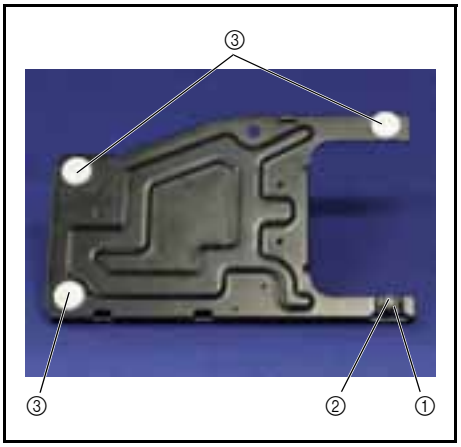
1. Attach the base plate assy. ① to the arm bed with the 3 screws ❶.



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

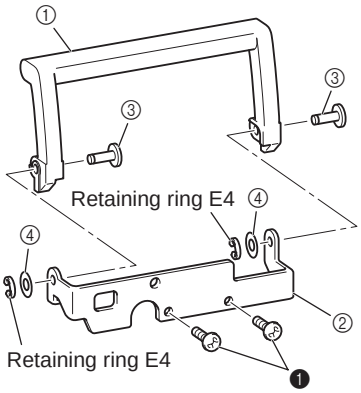
1-1 Attachment of Base plate

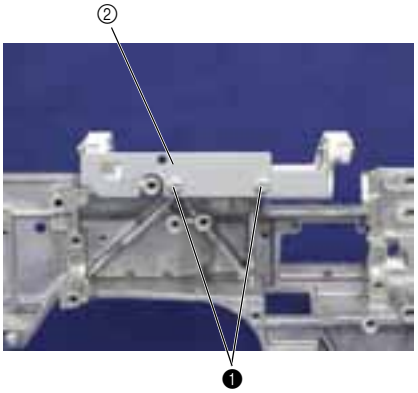
1. Attach the base plate rubber ① to the adjusting screw ②.
2. Attach the adjusting screw ② to the base plate.
3. Attach 3 base rubbers A ③ to the base plate.

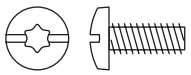


2 Attachment of Handle

1. Set the handle ① to the handle holder ②, and then insert the 2 handle shafts ③.
2. Insert the 2 polyester sliders ④ into the handle shaft ③, and then attach the retaining ring E4.
3. Attach the handle holder ② to the arm bed with the 2 screws ❶.





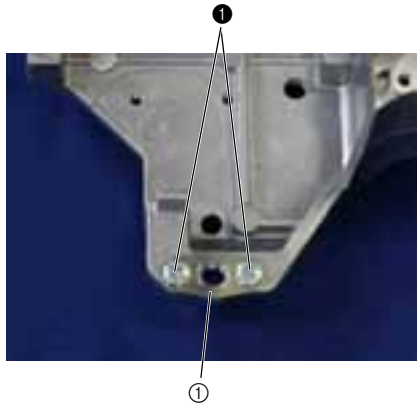
❶		Taptite, Bind S M4X10	Torque 1.47 – 1.96 N·m

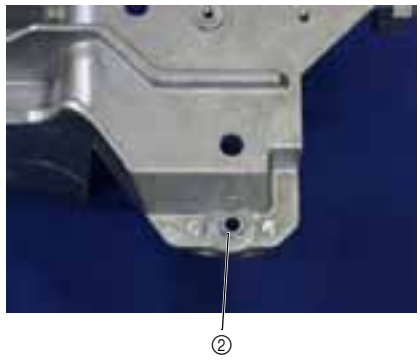
3 Attachment of Plate spring

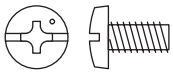
1. Attach the plate spring ① to the front of the arm bed with the 2 screws ❶.
2. Attach the adjusting screw ② to the back of the arm bed.

***Key point**

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

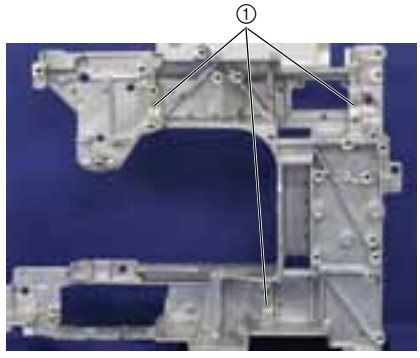




❶		Screw, Bind M4X8	Torque 1.18 – 1.57 N·m

4 Attachment of Felt

1. Attach the 3 felts ① to the arm bed.



5 Attachment of Wire clip

1. Attach the the insulate sheet back ① and the coaching clip ② to the arm bed with the screw ❶.

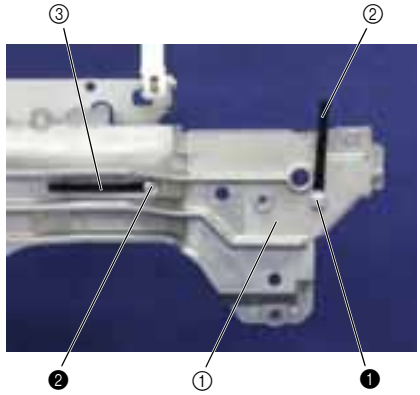
***Key point**

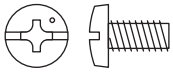
- Set the tip of the coaching clip upward.

2. Attach the coaching clip ③ to the arm bed with the screw ❷.

***Key point**

- Set the tip of the coaching clip to the left.



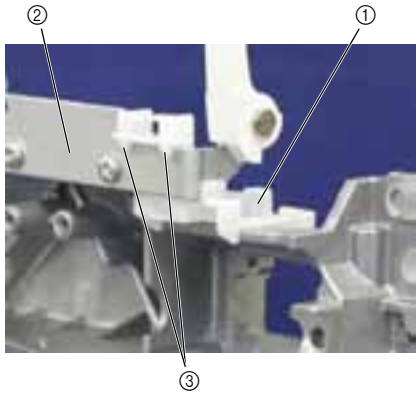
❶ ❷		Screw, Bind M4X8	Torque 1.18 – 1.57 N·m

6 Attachment of Cord guide

1. Attach the cord guide ① to the handle holder ②.

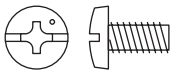
***Key point**

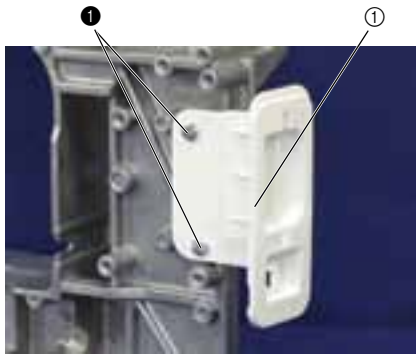
- Check that the groove of the cord guide ① engaged with the handle holder ② and hang on the hook ③.



7 Attachment of Card connect cover

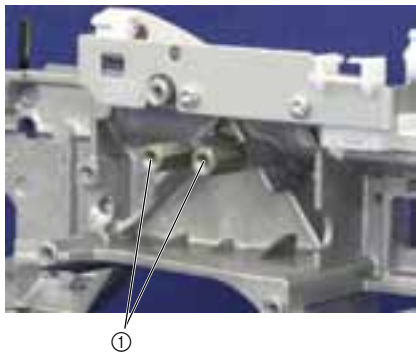
1. Attach the card connect cover ① to the arm bed with the 2 scerws ❶.

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



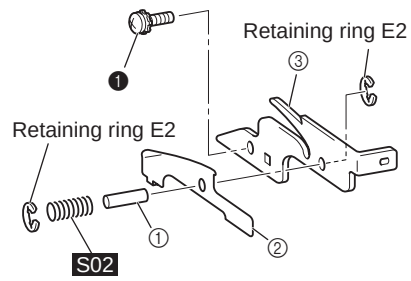
8 Attachment of Stud

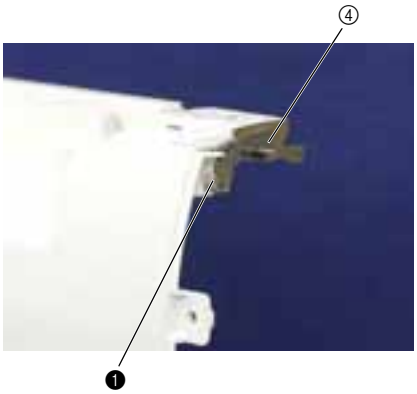
1. Attach the 2 studs ① to the arm bed.



9-1 Assembly of Rear cover assy. (Attachment of Thread guide plate assy.)

1. Attach the retaining ring E2 to the shaft ①.
2. Insert the shaft ① into the spring S02, the thread guide spring ② and the thread guide plate ③, and then attach the retaining ring E2.
3. Set the thread guide plate assy. ④ to the rear cover assy., and then tighten the screw ❶.

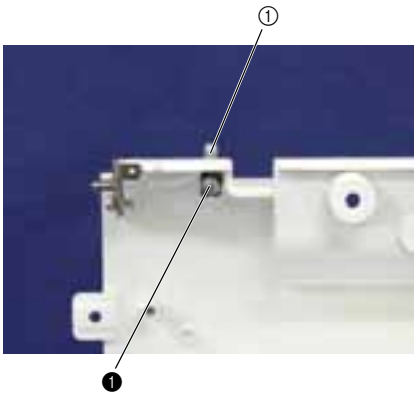


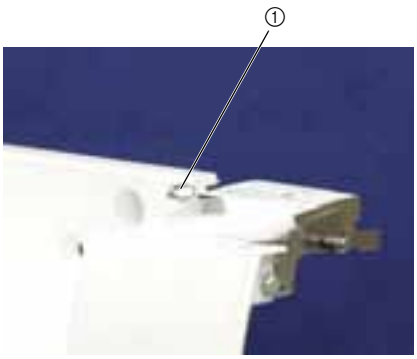


❶	Screw M3X8	Torque 0.59 – 0.78 N·m
S02	9.0, ϕ3.7	Spring X57605***

9-2 Assembly of Rear cover assy. (Attachment of Thread guide supporting plate)

1. Attach the thread guide supporting plate ① to the rear cover assy. with the screw ❶.





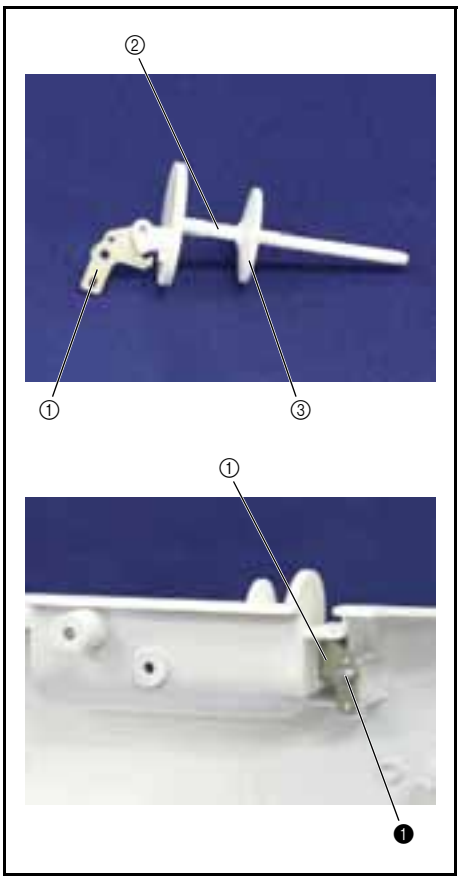
❶	Taptite, Bind B M3X12	Torque 0.59 – 0.78 N·m

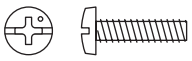
9-3 Assembly of Rear cover assy. (Attachment of Spool pin)

1. Attach the spool pin ② to the shaft of the spool pin holder assy. ①.
2. Attach the spool presser ③ to the spool pin ②.
3. Set the spool pin holder assy. ① to the rear cover, and then attach it with the screw ❶.

***Key point**

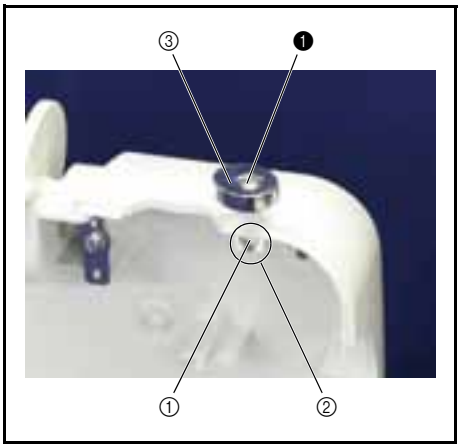
- Check that the 2 bosses of the rear cover engaged with the 2 positioning holes of the spool pin holder assy. ①.



❶		Screw, Bind M3X12	Torque 0.59 – 0.78 N·m

9-4 Assembly of Rear cover assy. (Attachment of Bobbin presser)

1. Set the nut 1 M3 ① to the attaching part ② of the rear cover assy.
2. Attach the bobbin presser ③ with the screw ❶.



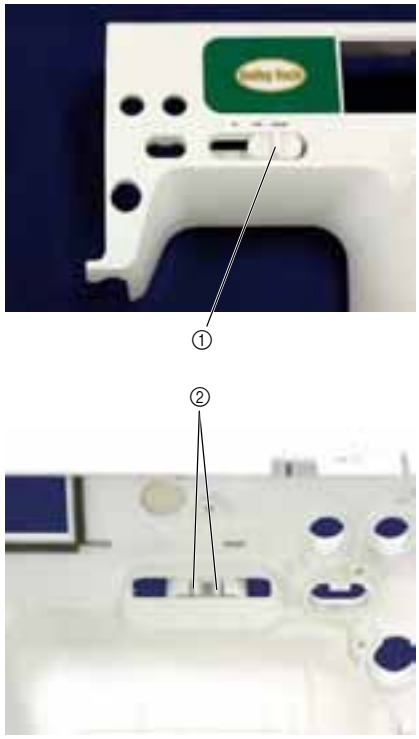
❶		Screw, Pan (S/P washer) M3X20	Torque 0.59 – 0.78 N·m

10-1 Assembly of Front cover assy. (Attachment of SV key top)

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

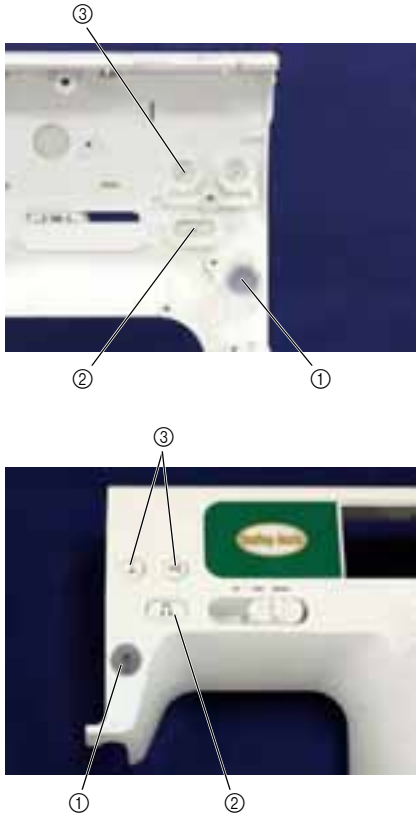
***Key point**

- Check that the hooks ② (2 locations) of the SV key top ① is the upper side and it hang on the front cover assy.

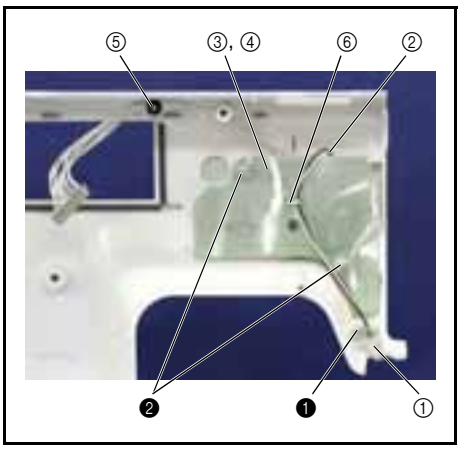


10-2 Assembly of Front cover assy. (Attachment of Buttons)

1. Attach the SS button ①, the reverse button ② and the NP button ③ to the font cover assy.



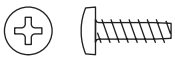
10-3 Assembly of Front cover assy. (Attachment of SSVR PCB assy.)



1. Attach the LED lamp right assy. ① to the front cover assy. with the screw ❶.
2. Attach the connector ② of the LED lamp right assy. ① to the SSVR PCB assy. ③.
3. Attach the SSVR PCB assy. ③, the insulator sheet ④ and the 2 board pressers to the front cover assy. with the 2 screws ❷.

   ***Key point**
   - Check that the slide volume lever of the SSVR PCB assy. ③ engaged with the groove of SV key top.
   - Check that the switch parts (3 locations) of the SSVR PCB assy. ③ with the each button (3 locations).
4. Attach the rubber ⑤.

   ***Key point**
   - Secure the lead wire of the SSVR PCB assy. ③ with the rubber ⑤ and front cover assy..
5. Attach the mini clamp ⑥ to the SSVR PCB assy. ③.
6. Hang the lead wire of the LED lamp right assy. ① on the mini clamp ⑥.

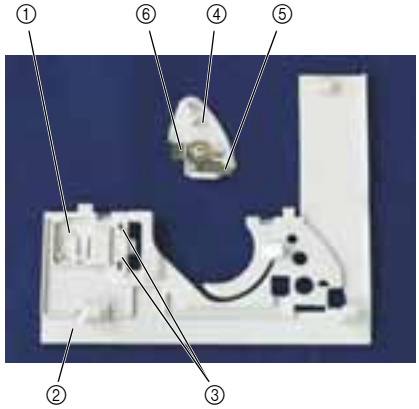
❶ ❷		Taptite, Bind B M3X10	Torque 0.59 – 0.78 N·m

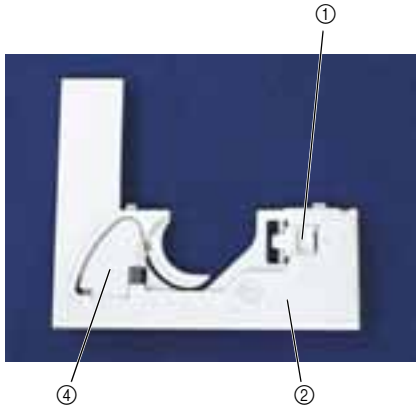
11 Assembly of Needle plate B assy.

1. Attach the slide button ① to the needle plate B assy. ②.

   ***Key point**
   - Check that the hooks ③ (2 locations) hang on the needle plate B assy. ②.
2. Attach the NT lower thread cutter ⑤ and the spring plate ⑥ to the cutter cover ④.
3. Attach the cutter cover ④ to the needle plate B assy. ②.

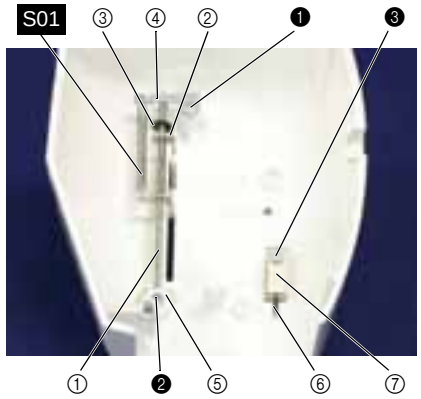
   ***Key point**
   - Check that the hook ⑦ hang on the needle plate B assy. ②.





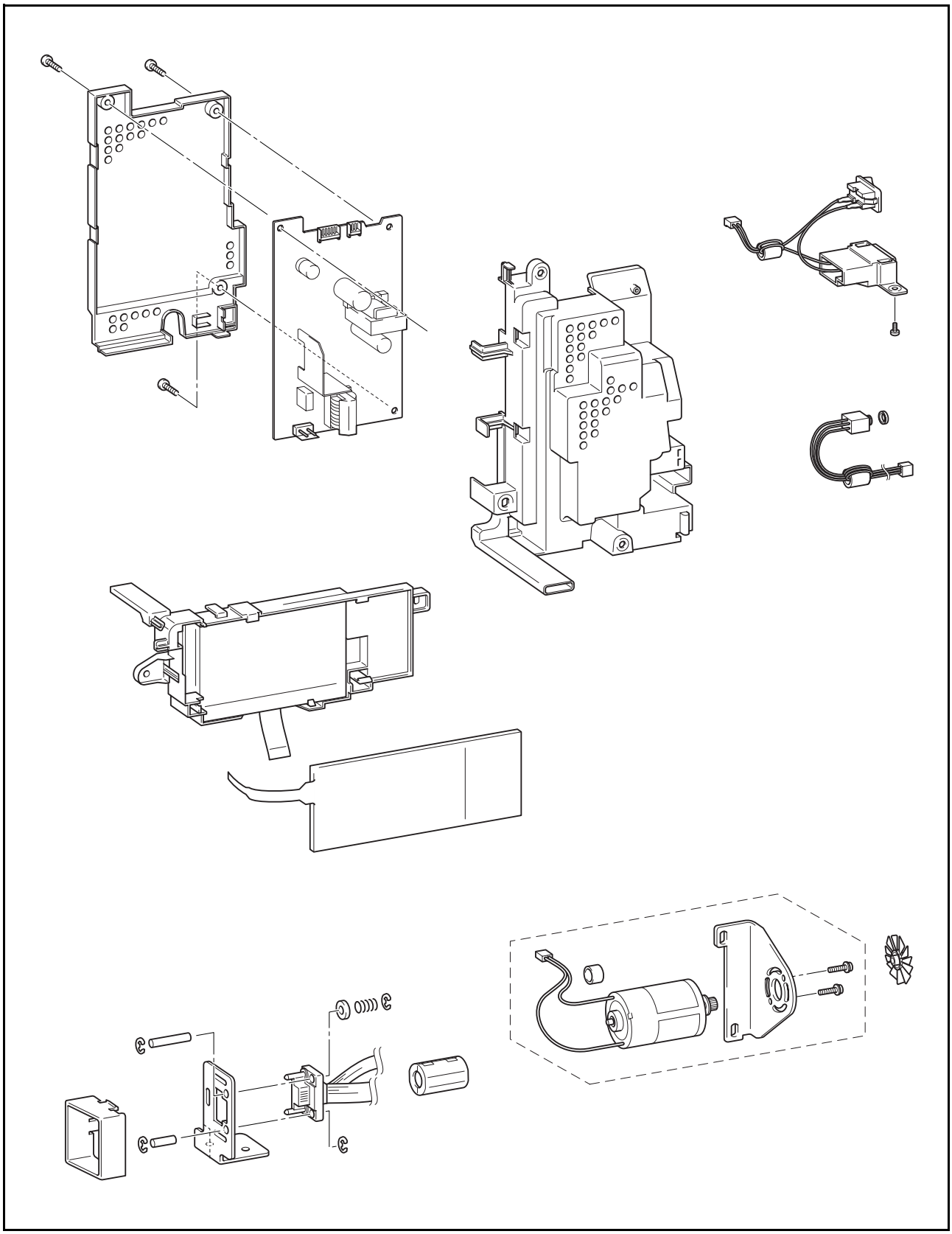
12 Assembly of Face plate

1. Attach the needle thread lever shaft ①, needle thread lever ②, and rubber washer ③ to the face plate.
1. Attach the shaft presser plate ④ to the face plate with the screw ❶.
2. Attach the screw ❷ and the washer ⑤.
3. Attach the spring S01 to the needle thread lever ② and the shaft presser plate ④.
4. Attach the NT lower thread cutter ⑥ to the face plate, and then attach the face plate cutter holder ⑦ with the screw ❸.
5. Attach the needle thread lever knob ⑧.



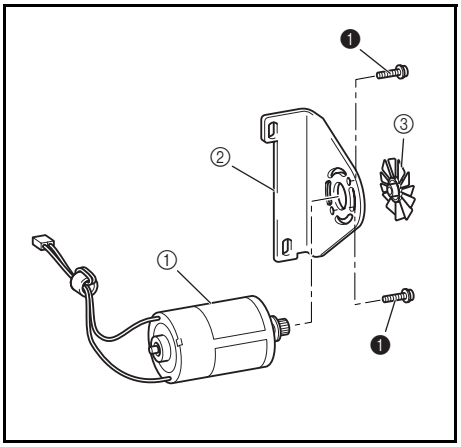
❶ ❷	Taptite, Bind B M3X10	Torque 0.29 – 0.34 N·m
❸	Taptite, Pan B M3X6	Torque 0.29 – 0.34 N·m
S01	23, ϕ4	THREAD THROUGH LEVER SPRING 138260***

Electrical parts and motors location diagram



1 Assembly of Main motor sub assy.

1. Attach the main motor sub assy. ① to the motor holder ② with the 2 screws ❶.
2. Attach the motor fan ③ to the gear for main motor sub assy. ①.

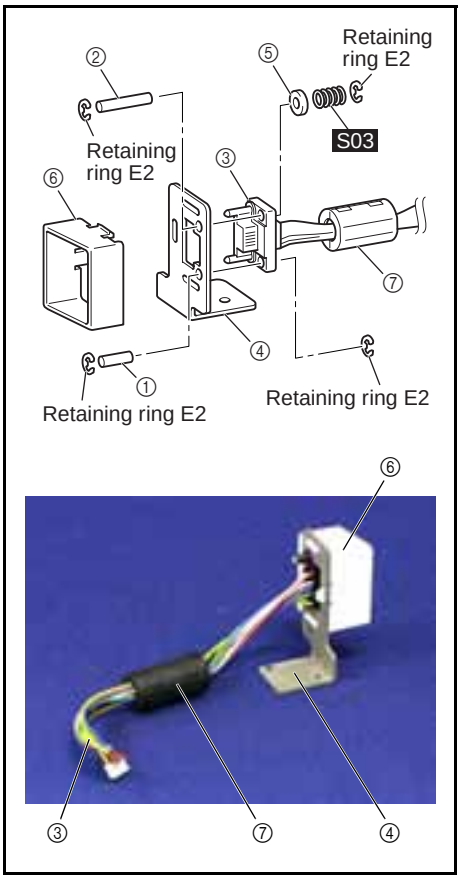


❶		Screw, Pan (S/P washer) M3X8DB	Torque 0.59 – 0.78 N·m

2 Assembly of Embroidery connector assy.

1. Attach the retaining ring E2 to the ES pin F-A ① and the ES pin F-B ②.
2. Insert the ES pin F-A ① and the ES pin F-B ② into the lead wire assy. main body ③ and connector holder ④.

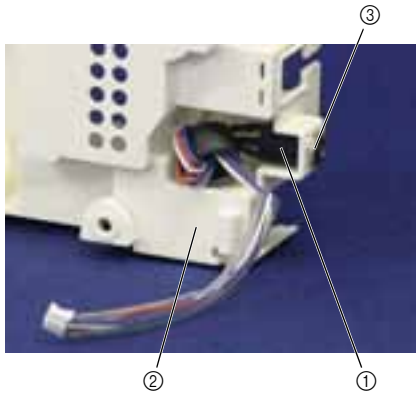
   ***Key point**
   - Check that there is the ES pin F-A ① in the lower side and there is the ES pin F-B ② in the upper side.
3. Attach the 2 retaining rings E2 to the ES pin F-A ①.
4. Insert the feed bar spacer ⑤ and the spring S03 into the ES pin F-B ②, and then attach the retaining ring E2.
5. Attach the connector holder cover ⑥ to the connector holder ④.
6. Attach the ferrite core ⑦ to the lead wire assy. main body ③.



S03		Spring, compression XD0967***	

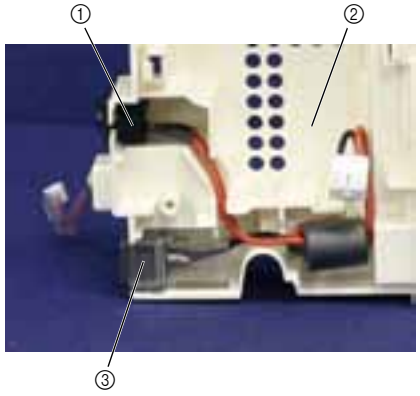
3-1 Assembly of Power supply unit (Attachment of FC jack supply assy.)

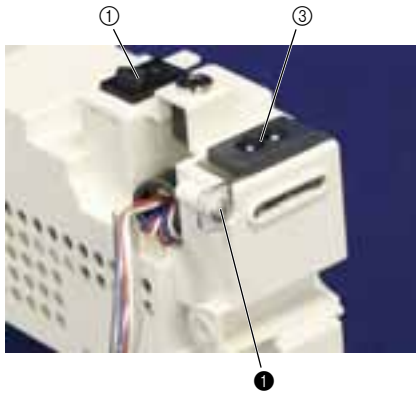
1. Insert the FC jack supply assy. ① to the insulation cover, ② and then attach the nut F ③.

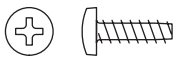


3-2 Disassembly of Power supply unit (Removal of Inlet assy.)

1. Attach the power SW ① of the inlet assy. to the insulation cover ②.
2. Set the inlet holder ③ of the inlet assy. to the insulation cover ②, and then tighten the screw ❶.





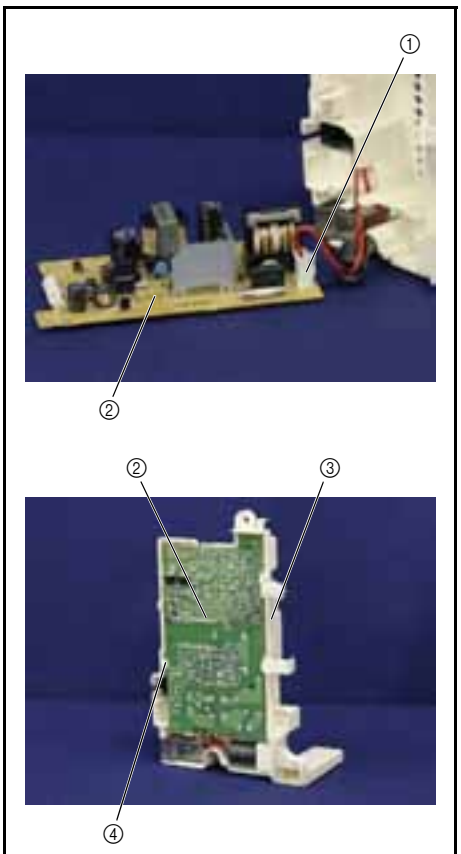
❶		Taptite, Bind B M3X10	Torque 0.59 – 0.78 N·m

3-3 Disassembly of Power supply unit (Removal of Power PCB supply assy.)

1. Attach the connector of the inlet assy. ① to the power PCB supply assy. ②.
2. Attach the power PCB supply assy. ② to the insulation cover ③.

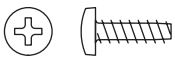
***Key point**

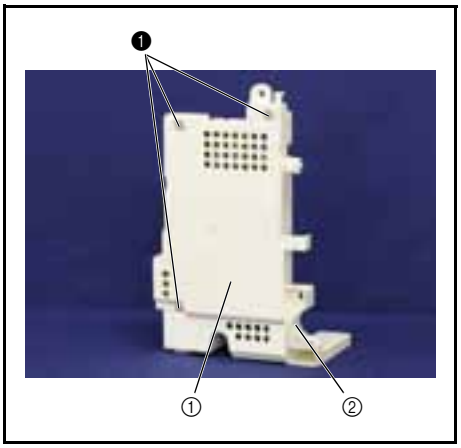
- Check that the hook ④ hang on the power PCB supply assy. ②.



3-4 Disassembly of Power supply unit (Removal of Insulation plate)

1. Attach the insulation plate ① to the insulation cover ② with the 3 screws ❶.

❶		Taptite, Bind B M3X10	Torque 0.59 – 0.78 N·m

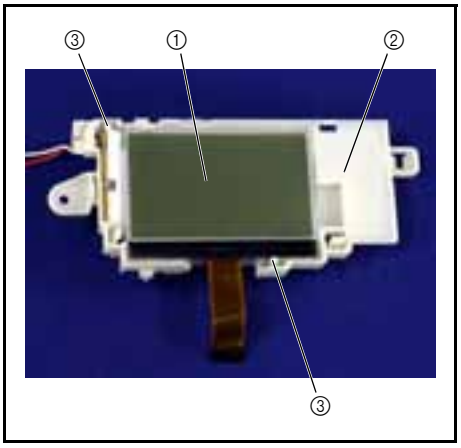


4-1 Assembly of LCD unit (Attachment of LCD supply assy.)

1. Attach the LCD supply assy. ① to the light plate assy. ②.

***Key point**

- Check that the hooks ③ (2 locations) hang on the LCD supply assy. ①.

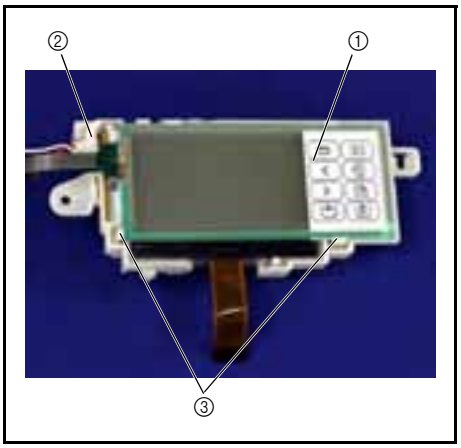


4-2 Assembly of LCD unit (Attachment of Touch panel assy.)

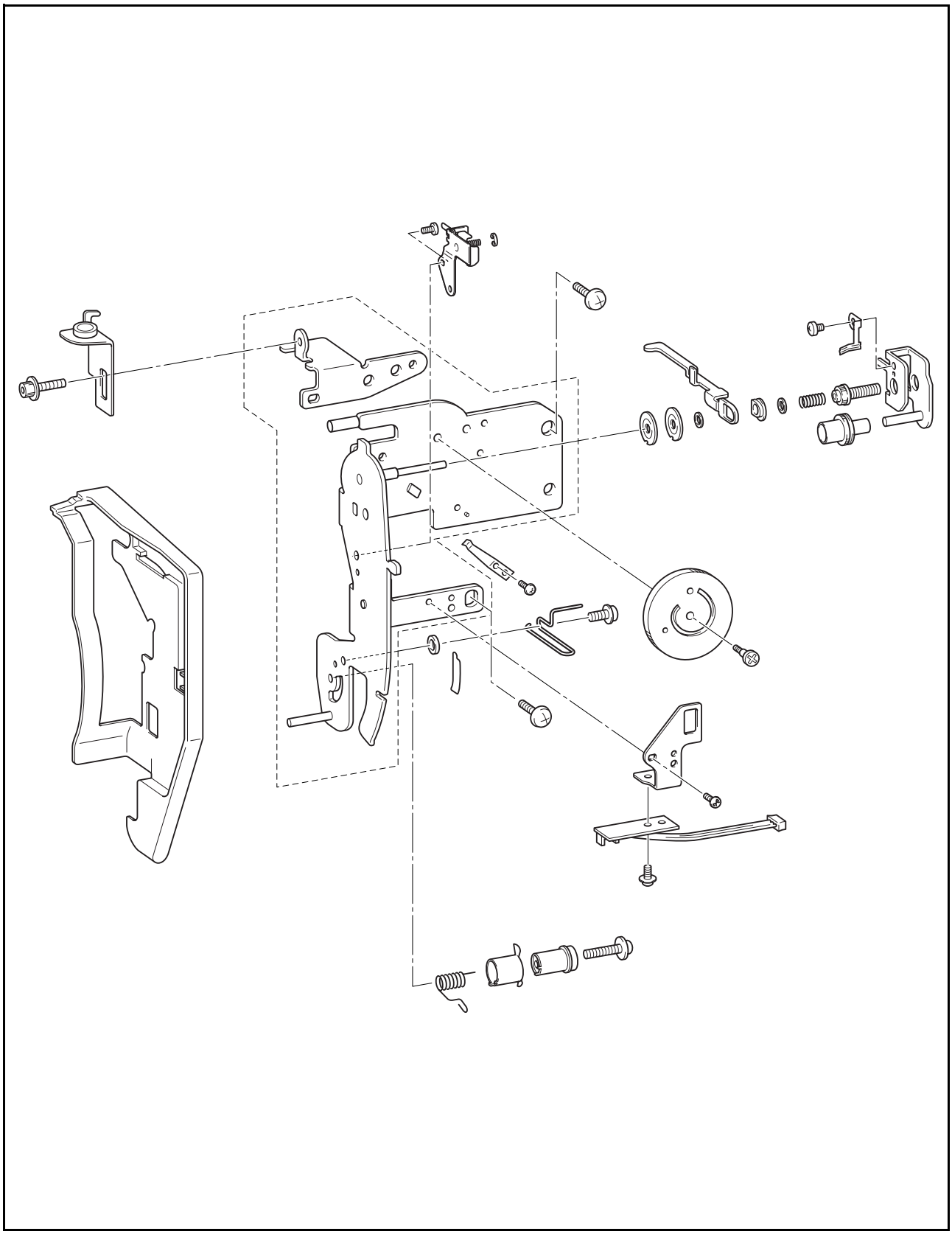
1. Attach the touch panel assy. ① to the light plate assy. ②.

***Key point**

- Check that the hooks ③ (2 locations) hang on the touch panel assy. ①.



Thread tension mechanism location diagram

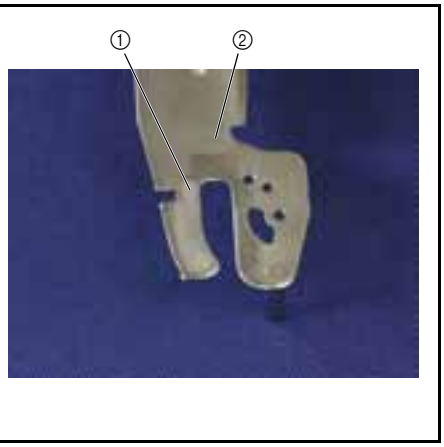


1 Attachment of Spring tape

1. Attach the spring tape ① to the thread unit ②.

***Key point**

- Attach it on the position of the right figure.

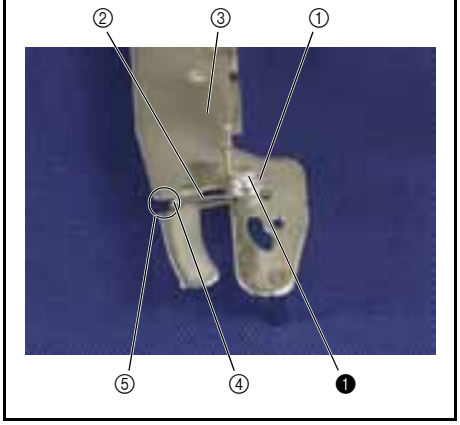


2 Attachment of Thread guide wire

1. Attach the "washer, plain ①" and the thread guide wire ② to the thread unit ③ with the screw ❶.

***Key point**

- Check that the section ④ of the thread guide wire ② engaged with the notch part ⑤ of the thread unit ③.



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

3 Attachment of Thread catching spring case

1. Attach the thread cutting shutter ② to the thread catching spring case ①.
2. Attach the spring S05 to the thread catching spring case ①.

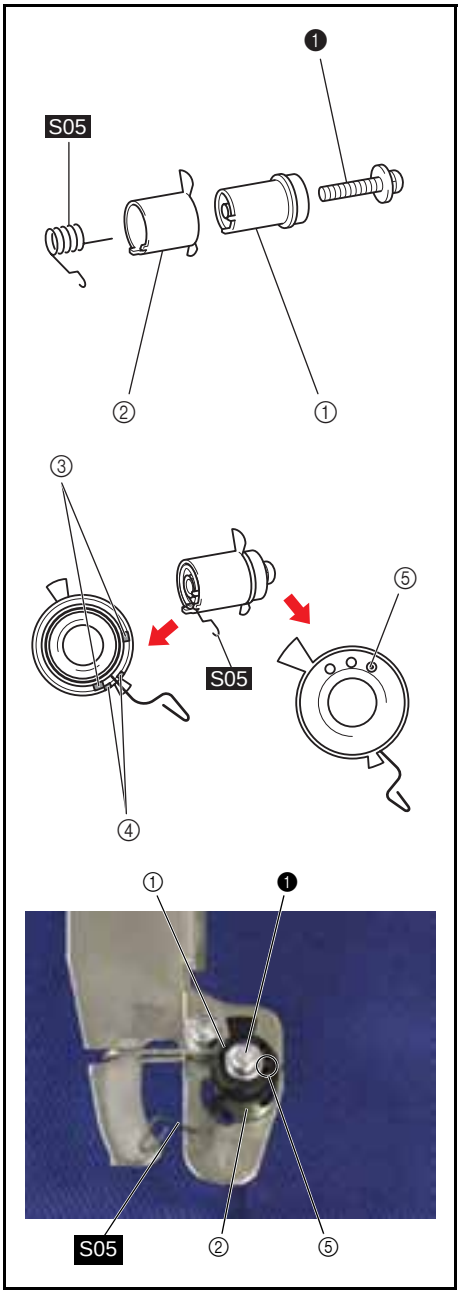
***Key point**

- Check that there is the groove ④ of the thread cutting shutter ② between the tabs ③ (2 locations) of the thread catching spring case ①. and then hang on the spring.
- Insert the spring into the right-most hole ⑤ of the upper side of the thread catching spring case ①.

3. Attach the thread catching spring case ① to the thread unit with the screw ❶.

***Key point**

- Check that the tabs (2 locations) of the thread catching spring case ① engaged with the groove of the thread unit.



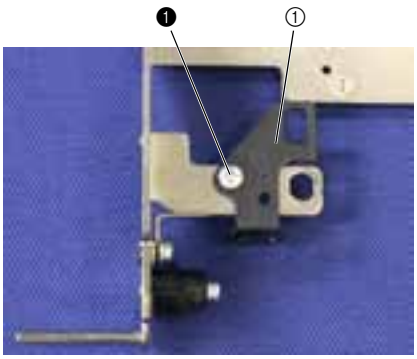
❶	Screw, Pan (S/P washer) M3X18	Torque 0.29 – 0.49 N·m
S05	ϕ7.4, 15.6	Tread take up spring XC6957***

4 Attachment of Thread sensor holder

1. Attach the thread sensor holder ① to the thread unit with the screw ❶.

***Key point**

- Check that the boss of the thread sensor holder ① engaged with the positioning hole of the thread unit.



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

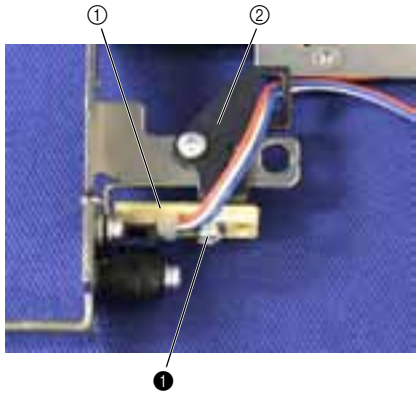
5 Attachment of Up thread PCB assy.

1. Attach the up thread PCB assy. ① to the thread sensor holder ② with the screw ❶.

***Key point**

- Check that the positioning hole of the up thread PCB assy. ① engaged with the boss of the thread sensor holder ②.

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

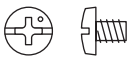


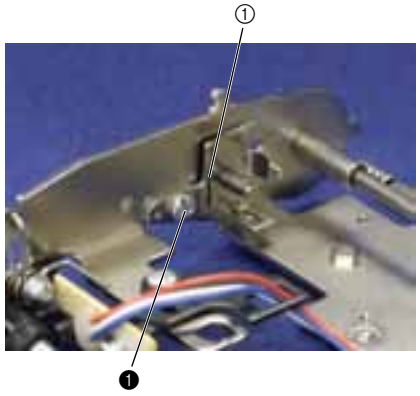
6 Attachment of Plate assy.

1. Attach the plate assy. ① to the thread unit with the screw ❶.

***Key point**

- Check that the positioning hole of the plate assy. ① engaged with the boss of the thread unit.

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



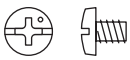
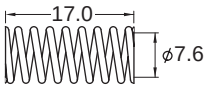
7 Attachment of Thread tension dial

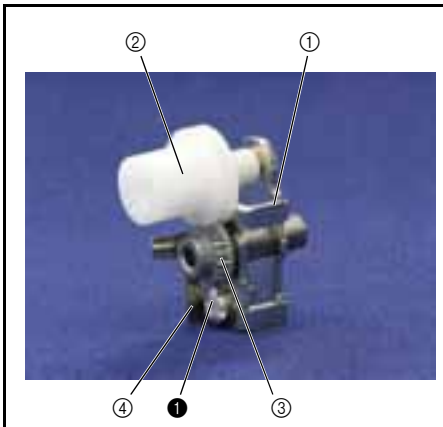
1. Insert the thread tehnsion adjusting gear ② into the shaft of the thread tension plate assy. ①, and then attach the thread tension adjusting screw ③.
2. Attach the adjusting screw spring plate ④ to the thread tension plate assy. ① with the screw ❶.
3. Insert in order of the tension disc A ⑥, the tension disc B ⑦, the washer ⑧, the thread release plate ⑨, the tension disc washer ⑩, the washer ⑪, and the spring S04 into the shaft of the thread unit.

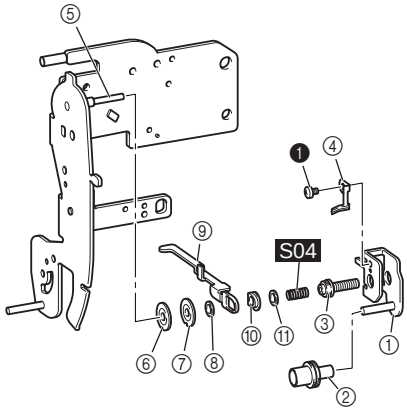
   ***Key point**
   - Check that the notch part of the tension disc A ⑥ and the tension disc B ⑦ align with the protrusion ⑫ of the thread unit.
4. Attach the protrusion of the thread tension plate assy. ① to the groove ⑭ of the thread tension dial ⑬, and then insert the thread tension adjusting screw ③ into the shaft of the thread unit, and then attach the thread tension dial ⑬ to the thread unit with the tension dial shaft ⑮.

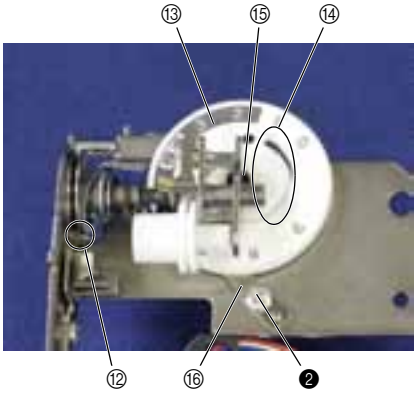
   ***Key point**
   - Attach the tension dial shaft ⑮ to the thread tension dial ⑬ in the state that "9" of the scale of the thread tension dial ⑬ is the top.
5. Attach the notched spring ⑯ to the thread unit with the screw ❷.

   ***Key point**
   - Insert the tip of notched spring ⑯ into the bottom of the thread tension dial ⑬.
   - Check that the boss part of the thread unit engaged with the positioning hole of the notched spring ⑯.

❶		Screw, Bind M3X4	Torque 0.78 – 1.18 N·m
❷		Screw, Pan M3X4	Torque 0.78 – 1.18 N·m
S04			Spring XE3014***

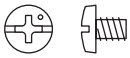


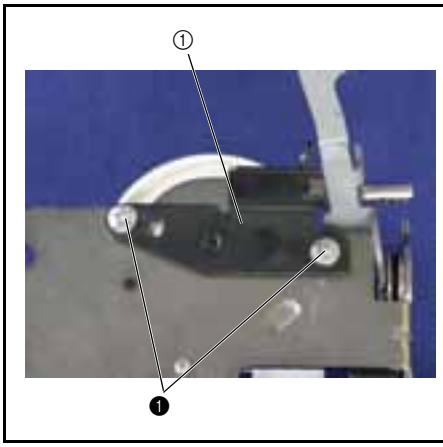




8 Attachment of Thread guard holder S

1. Attach the thread guard holder S ① to the thread unit with the 2 screws ❶.

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

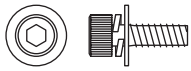


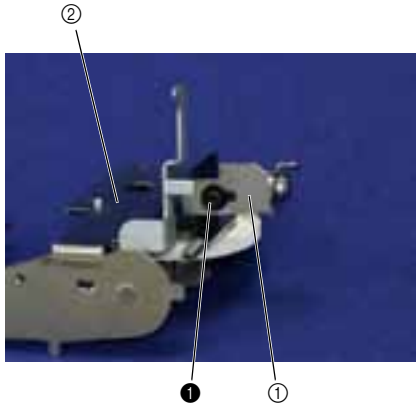
9 Attachment of Bobbin winder guide assy.

1. Attach the bobbin winder guide assy. ① to the thread unit ② with the screw ❶.

***Key point**

- Fully tighten the screw after performing "4-16 Adjustment of bobbin winder (uneven bobbin winding and bobbin winding amounts)".

❶		Screw 3X10	Torque Free tighten

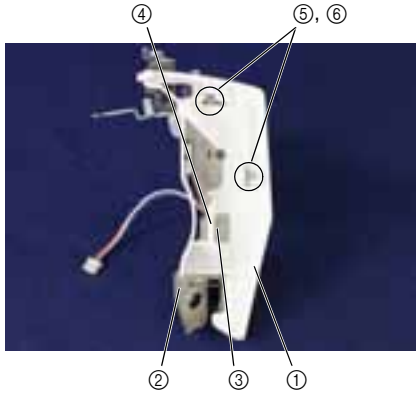


10 Attachment of Thread guard cover

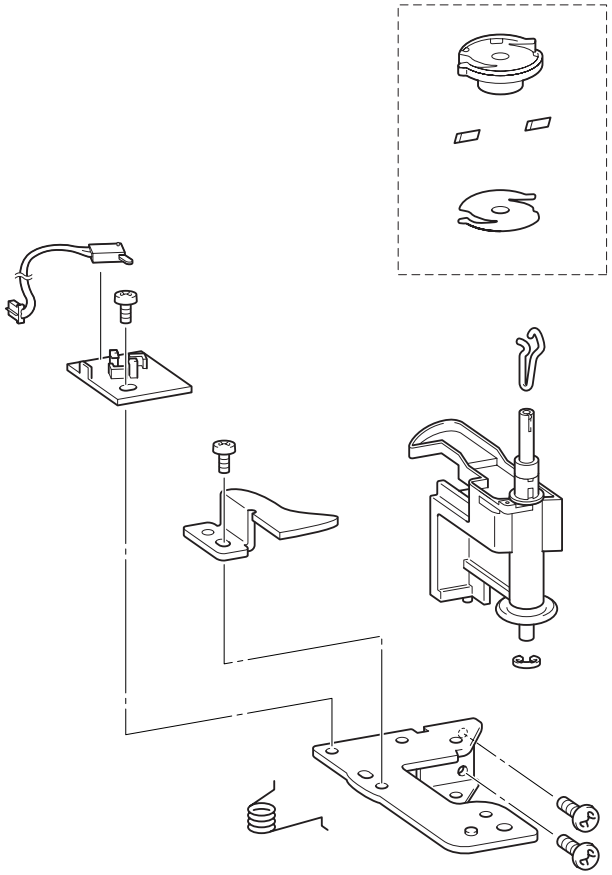
1. Attach the thread guard cover ① to the thread unit ②.

***Key point**

- Attach it while lifting the section ④ of the thread guard cover ① to get over the boss ③ of the thread unit ②.
- Check that the protrusions ⑤ (2 locations) of the thread unit ② engaged with the gullets ⑥ (2 locations) of the thread guard cover ①.



Bobbin winder mechanism location diagram



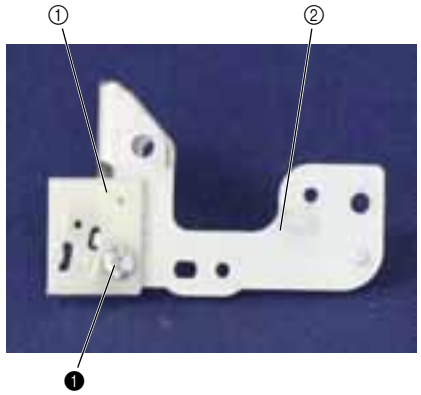
1 Attachment of SW adjust plate

1. Align the boss part of the SW adjust plate ① with the positioning hole of the bobbin winder assy. holder ②, and then tighten the screw ❶ temporarily.

***Key point**

- Fully tighten the screw after performing "4-17 Adjustment of BW switch position"

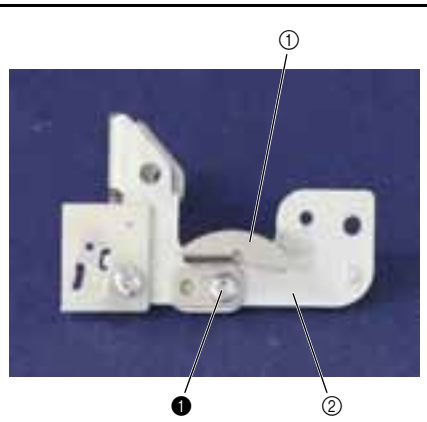
❶		Screw, Bind M3X6	Torque Free tighten



2 Attachment of Bobbin winder shaft stopper

1. Align the boss part of the bobbin winder shaft stopper ① with the positioning hole of the bobbin winder assy. holder ② with the screw ❶.

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



3 Attachment of BW shaft holder assy.

1. Attach the rubber ring ② to the BW shaft holder assy. ①.
2. Attach the bobbin winder shaft spring ③ to the top position of the BW shaft holder assy. ①.
3. Attach the BW shaft holder assy. ① to the bobbin winder assy. holder ④.

***Key point**

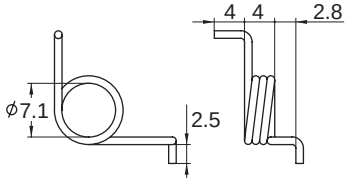
- Check that the 2 boss parts of the BW shaft holder assy. ① engaged with the 2 positioning holes of the bobbin winder assy. holder ④.

4. Attach the spring S06 to the BW shaft holder assy. ① and the bobbin winder assy. holder ④.

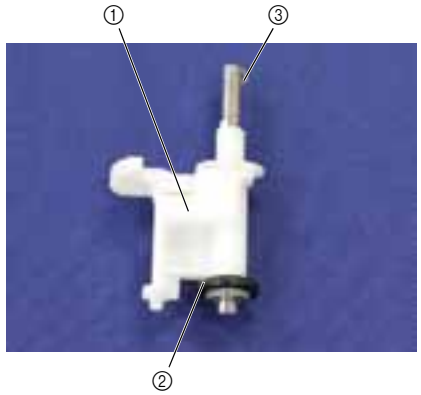
***Key point**

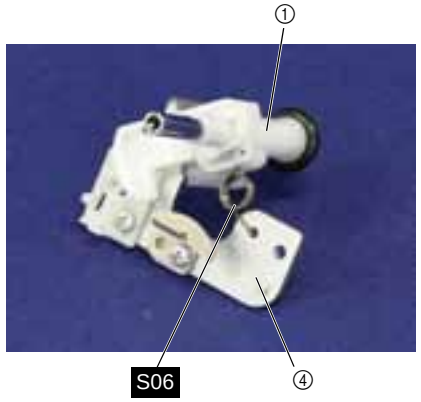
- Attach the side where the hook part of the spring is twisted in the right angle to the BW shaft holder assy. ①.

S06



BOBBIN WINDER SPRING
XZ0070***



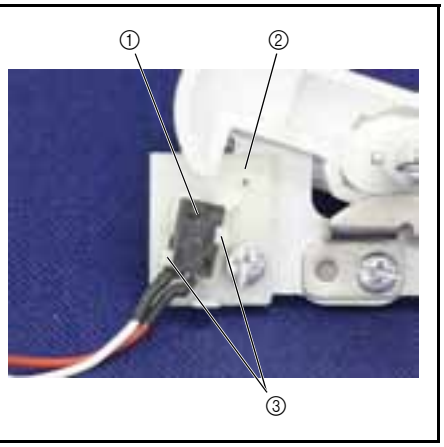


4 Attachment of SW assy: BW-F

1. Attach the SW assy: BW-F ① to the SW adjust plate ②.

***Key point**

- Check that the hooks ③ (2 locations) of the SW adjust plate ② hang on the SW assy : BW-F ①.

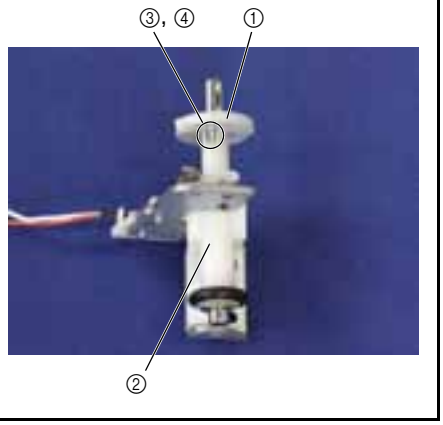


5 Attachment of Bobbin base assy.

1. Attach the bobbin base assy. ① to the bobbin winder assy. ②.

***Key point**

- Check that the 2 gullets ③ of the bobbin base assy. ① engage with the 2 protrusions ④ of the bobbin winder.

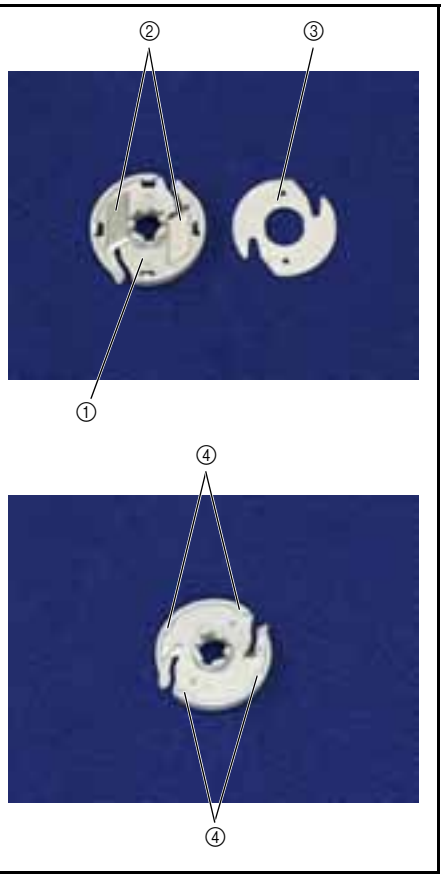


5-1 Assembly of Bobbin base assy.

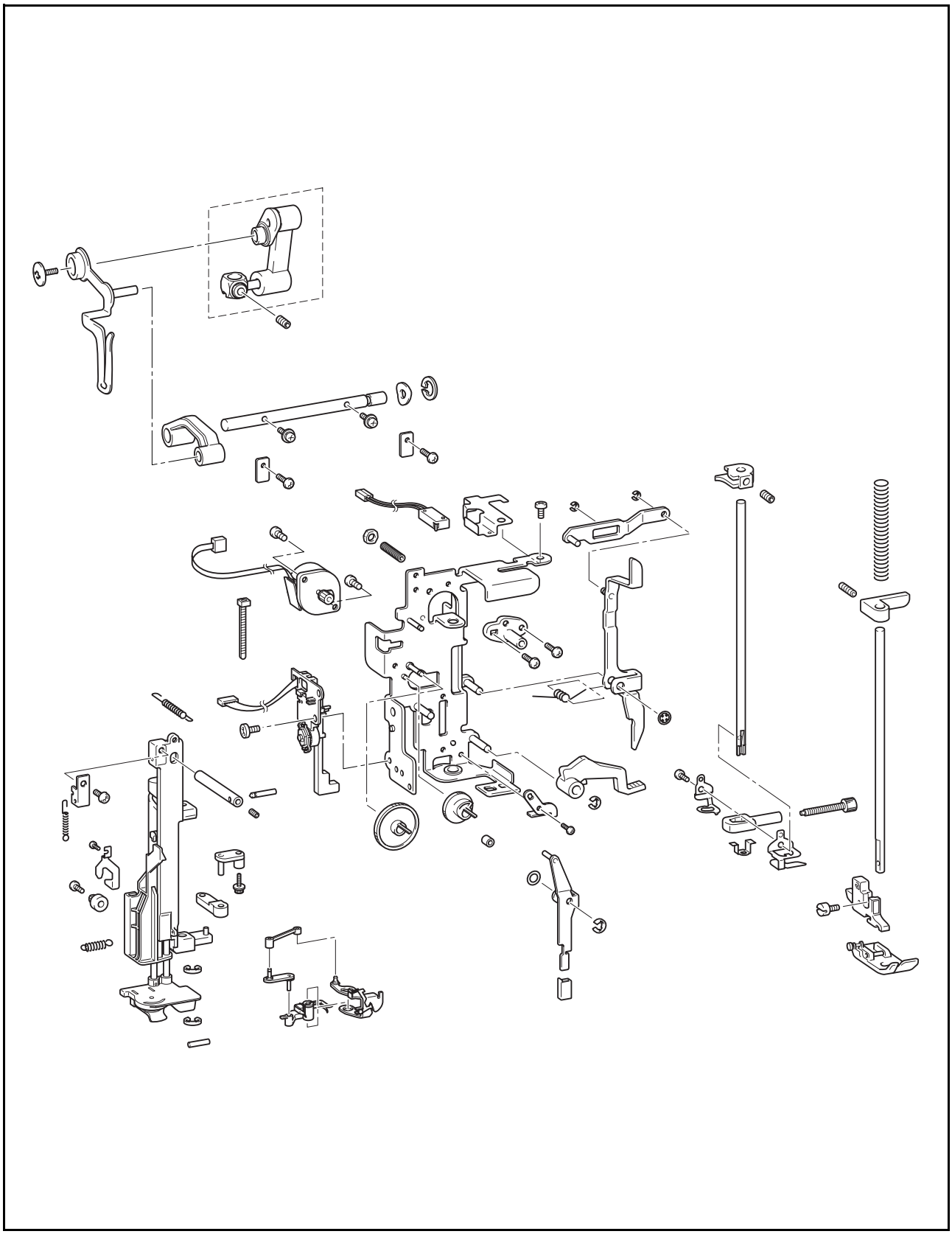
1. Attach the NT lower thread cutter ② to the bobbin base assy. ①.
2. Attach the bobbin thread cutter holder ③ to the bobbin base assy. ①.

***Key point**

- Be careful not to damage the hooks ④ (4 locations).



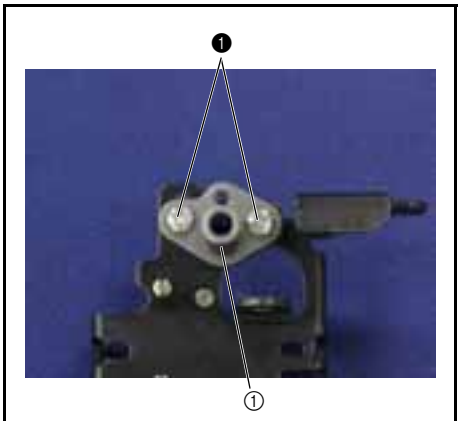
Needle-presser module location diagram



1 Attachment of Shaft bushing

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

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



2 Attachment of Lock nut

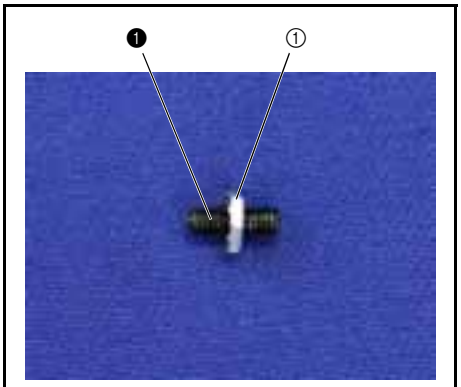
1. Attach the lock nut ① with the screw ❶.

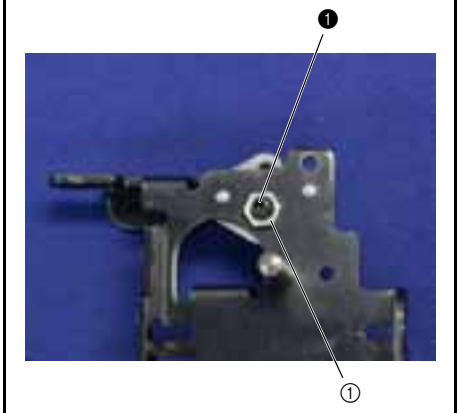
   ***Key point**
   - Tighten the lock nut ① to about half of the screw ❶.

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

   ***Key point**
   - Tighten it until the lock nut ① hit the base holder assy.
   - Refer to "4-19 Forward and back adjustment of needle and presser."

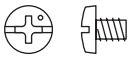
❶		Set Screw, Socket (CP) M4X12	Torque —

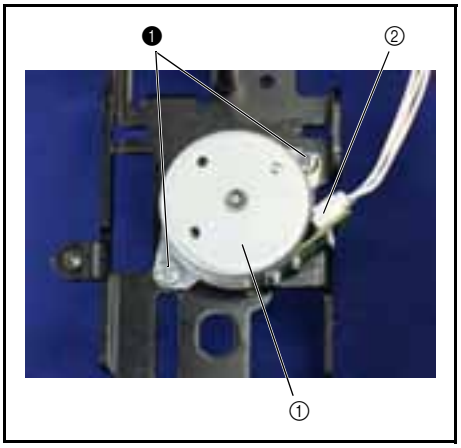




3 Attachment of Z pulse motor

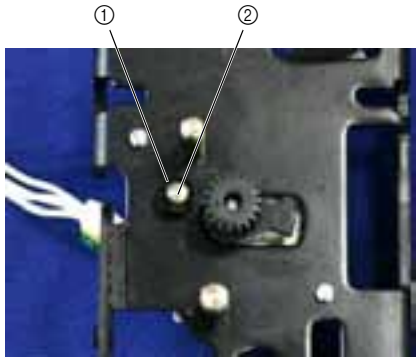
1. Attach the Z pulse motor ① to the base holder assy. with the 2 screws ❶.
2. Attach the lead wire sub assy. ② to the Z pulse motor ①.

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



4 Attachment of Rubber

1. Attach the rubber ① to the shaft ② of the base holder assy.



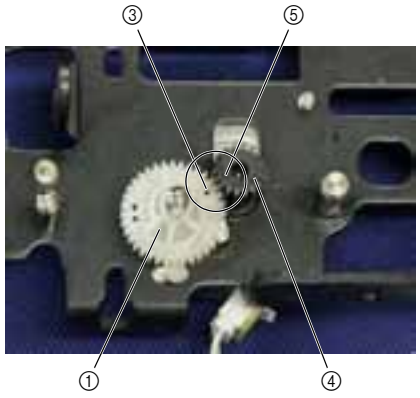
5 Attachment of Z zigzag cam

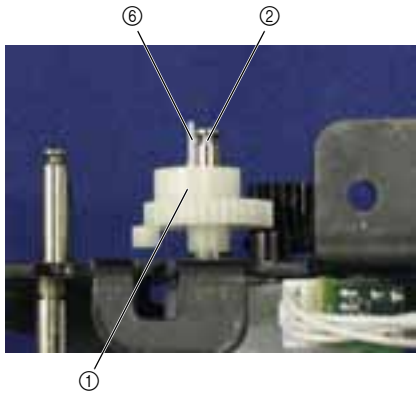
1. Attach the Z zigzag cam ① to the shaft ② of the base holder assy.

***Key point**

- Check that the match mark ③ on the Z zigzag cam ① align with the match mark ⑤ on the Z pulse motor gear ④.
- Check that the hook ⑥ of the Z zigzag cam ① align with the groove the shaft ②.

Apply EPNOC AP (N) 0 to all of the sliding part of the Z zigzag cam pin.	Bead XC8387***
Apply EPNOC AP (N) 0 to all of the Z zigzag cam.	Bead XC8387***
Apply EPNOC AP (N) 0 to the teeth around the Z zigzag cam gear.	Bead XC8387***





6 Attachment of Z zigzag lever assy.

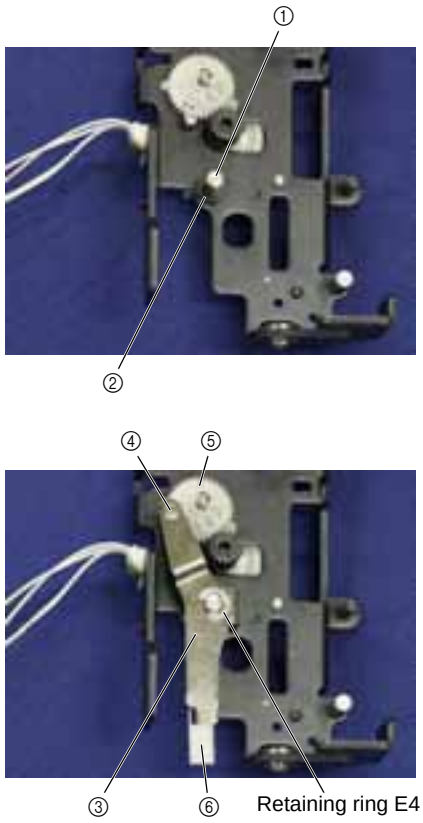
1. Attach the polyester slider ② and the Z zigzag lever assy. ③ to the shaft ① of the base holder assy., and then attach the retaining ring E4.

***Key point**

- Check that the shaft ④ of the Z zigzag lever assy. ③ is at the left of the Z zigzag cam ⑤.

2. Attach the Z lever cap ⑥ to the Z zigzag lever assy. ③.

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

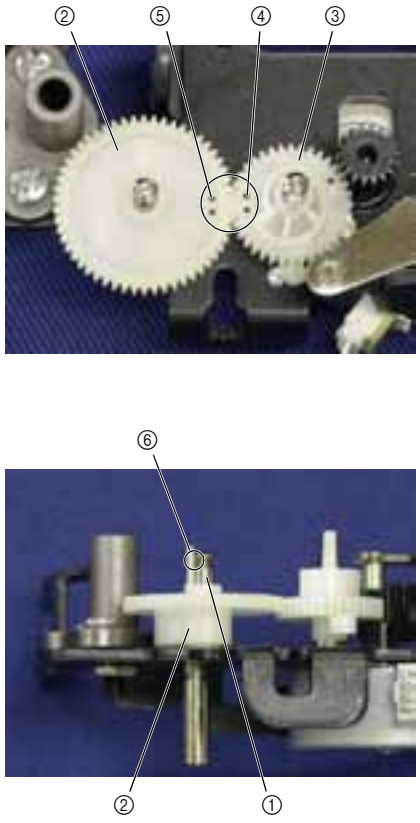


7 Attachment of T cam

1. Attach the T cam ② to the shaft ① of the base holder assy..

***Key point**

- Check that the match mark ④ on the Z zigzag cam ③ align with the match mark ⑤ on the T cam ②.
- Check that the hook ⑥ of the T cam ② align with the groove the shaft ①.



8 Attachment of Thread release lever

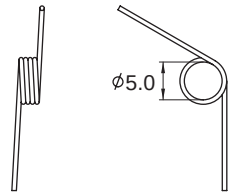
1. Attach the thread release lever ② and the spring S10 to the shaft ① of the base holder assy., and then attach the retaining ring CS4.

***Key point**

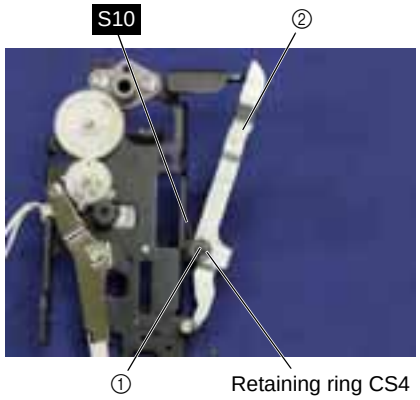
- Check that the hook of the spring is the upper side, when set it as shown in the right figure.

Apply EPNOC AP (N) 0 to the shaft of the base holder assy.	Small amount XC8387***

S10

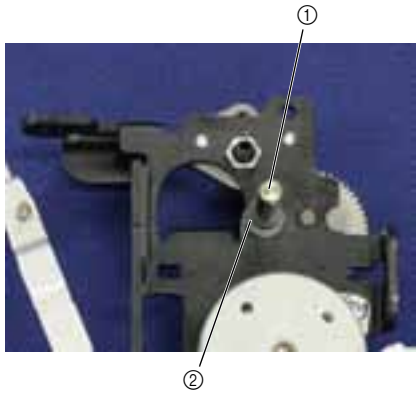


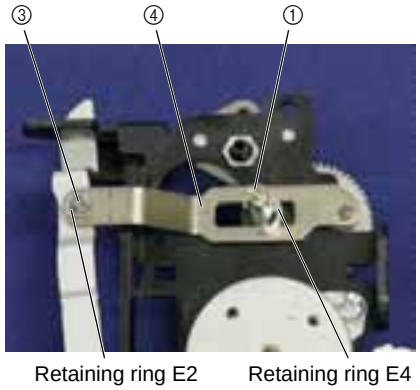
SPRING
XC4904***



9 Attachment of Thread releaser assy.

1. Attach the polyester slider ② to the shaft ① of the base holder assy..
2. Attach the thread releaser assy. ④ to the shaft ① of the base holder assy. and the shaft ③ of the thread release lever assy..
3. Attach the Retaining ring E4 to the shaft ①.
4. Attach the Retaining ring E2 to the shaft ③.





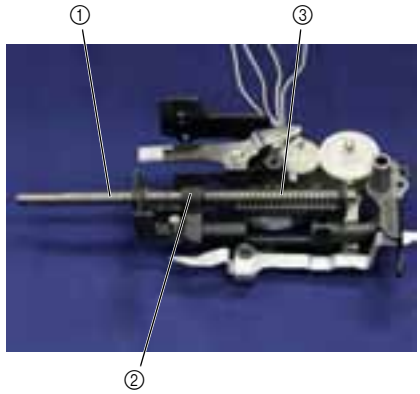
10 Attachment of Presser bar

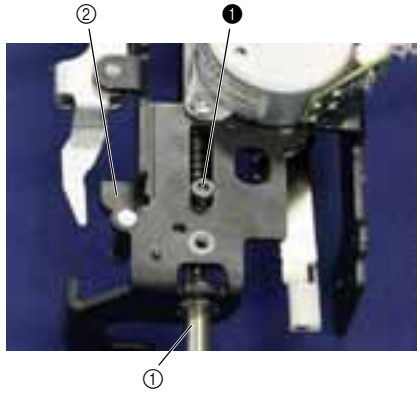
1. Insert the presser bar ① into the base holder assy., the presser bar clamp ②, the spring ③ and the base holder assy., and then tighten the screw ❶ temporarily.

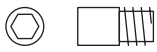
***Key point**

- Fully tighten the screw after performing "4-14 Adjustment of presser bar height and parallel".

Apply FBK OIL RO 100 to the tip of the presser bar.	Apply liberally XC8388***





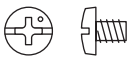
❶		Screw stud M5	Torque Free tighten

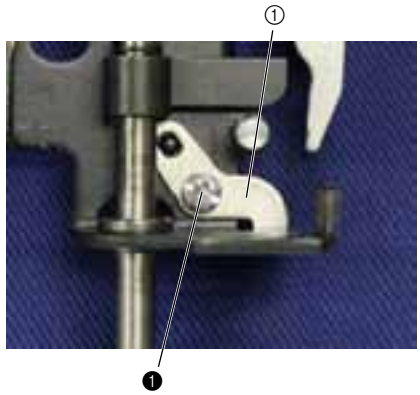
11 Attachment of Embroidery presser stopper

1. Attach the embroidery presser stopper ① to the base holder assy. with the screw ❶.

***Key point**

- Check that the positioning hole of the embroidery presser stopper ① align with the boss of the base holder assy..

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



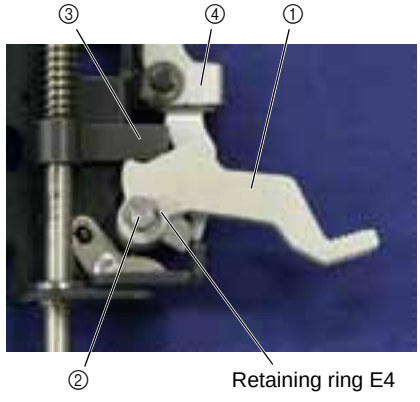
12 Attachment of Presser foot lifter

1. Attach the presser foot lifter ① to the shaft ② of the base holder assy., and then attach the retaining ring E4.

***Key point**

- Push the presser bar clamp ③ to the upper side, and then attach it while pushing the bottom side of the thread release lever ④.

Apply EPNOC AP (N) 0 to the shaft of the base holder assy.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the operating surface of the presser bar lifter presser bar clamp.	Small amount XC8387***



13 Attachment of PF switch assy.

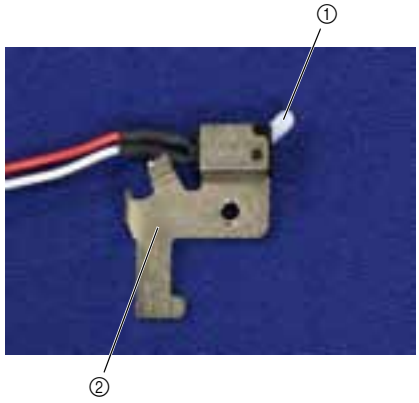
1. Attach the PF switch assy. ① to the presser switch holder ②.

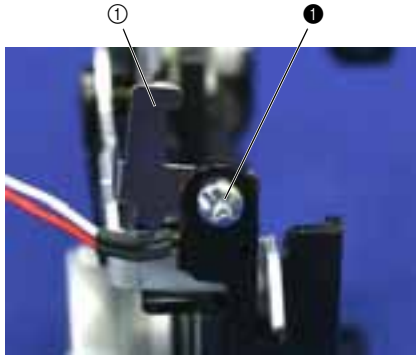
   ***Key point**
   - Check that the boss part of the PF switch assy. ① align with the positioning hole of the presser switch holder ②.

2. Attach the presser switch holder ② to the base holder assy. with the screw ❶.

   ***Key point**
   - Check that the boss part of the PF switch assy. ① align with the notch part of the base holder assy.

❶		Screw, Bind M3X6	Torque 0.59 – 0.78 N·m





14 Attachment of Needle holder shaft A

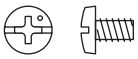
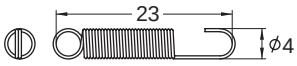
1. Insert the needle holder shaft A ① to the upper side hole of the needle bar supporter assy., and then insert the shaft ② into the needle bar supporter assy., the needle holder shaft A ① and the needle bar supporter assy.

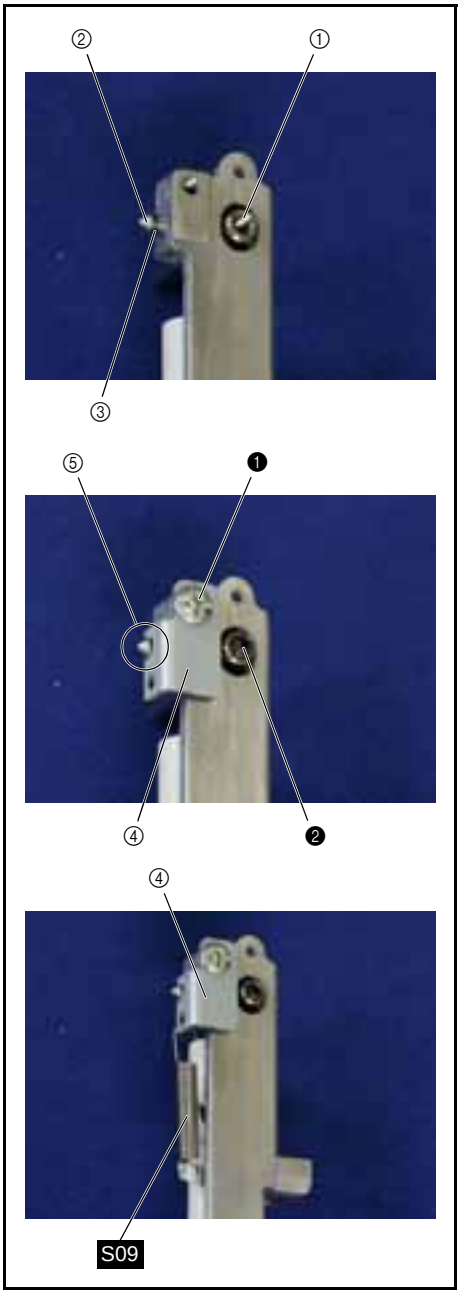
   ***Key point**
   - Check that the groove ③ of the shaft ② is the left side, when set the needle bar supporter assy. as shown in the right figure.
2. Attach the plate ④ to the needle bar supporter assy. with the screw ❶.

   ***Key point**
   - Check that the groove ③ of the shaft ② engaged with the notch part ⑤ of the plate ④.
3. Attach the screw ❷ to the needle holder shaft A ①.
4. Attach the spring S09 to the plate ④ and the needle bar supporter assy.

   ***Key point**
   - Attach the hook side of the spring to the plate ④.

Apply FBK OIL RO 100 to the needle holder shaft A.	1-2 drops XC8388***

❶		Screw, Bind M3X5	Torque 0.59 – 0.78 N·m
❷		Set Screw, Socket (CP) M3X5	Torque 0.59 – 0.78 N·m
S09			SPRING X50476***



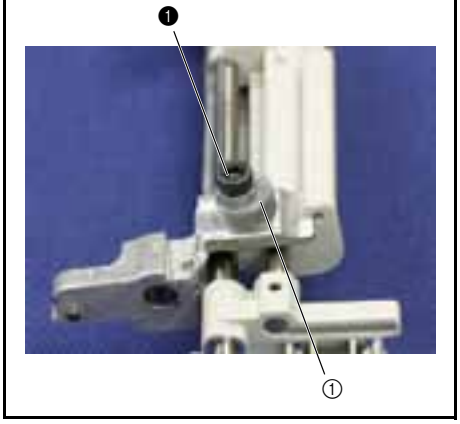
15 Attachment of Z zigzag adjusting nut

1. Set the Z zigzag adjusting nut ① to the needle bar supporter assy., and then tighten the screw ❶ temporarily.

   ***Key point**
   - Check that the side of the zigzag adjusting nut ① with the greatest eccentricity toward the top (see figure at the right).
   - Fully tighten the screw after performing "4-8 Adjustment of three point needle drop".

Apply EPNOC AP (N) 0 to the zigzag adjusting nut Z zigzag lever contact surface.	Bead XC8387***

❶		Bolt, Socket M3X10	Torque Free tighten

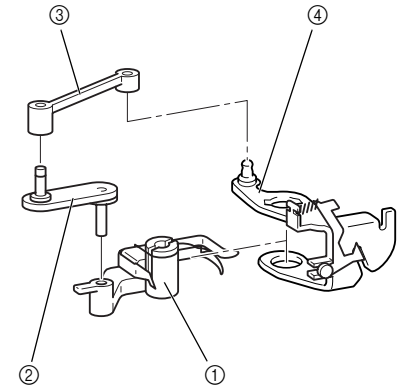


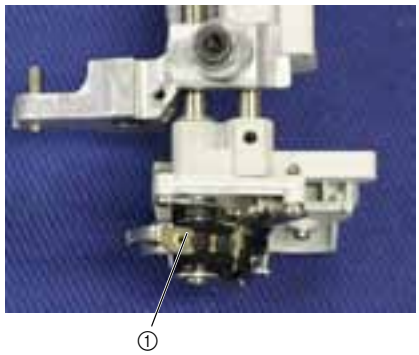
16 Attachment of Threader hook assy.

1. Assemble the threader hook assy. ①, the link A assy. ②, the link B ③ and the thread guide assy. ④.

   ***Key point**
   - Assemble the link A assy. ②, the link B ③ and the thread guide assy. ④ so that a triangle is formed.

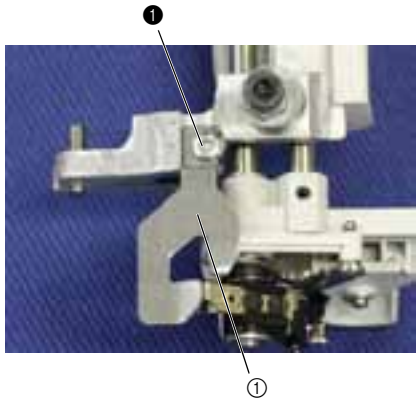
2. Align the shaft hole of the thread hook assy. ① with the pin on the shaft of the needle bar supporter assy., and then attach the threader hook assy. ① to the shaft of the needle bar supporter assy..





17 Attachment of Hook release plate

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



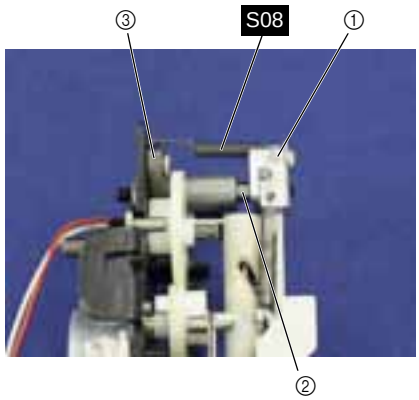
❶		Screw, Pan (S/P washer) M2X6	Torque 0.39 – 0.59 N·m

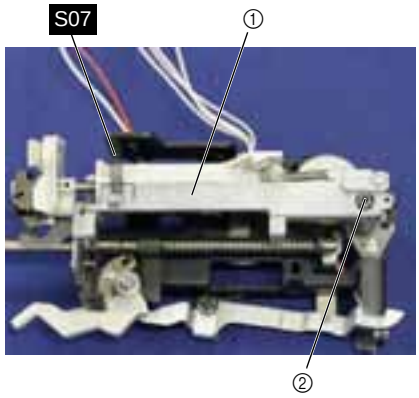
18 Attachment of Needle bar supporter assy.

1. Insert the needle holder shaft A ② of the needle bar supporter assy. ① into the shaft bushing ③ of the base holder assy., and then attach the needle bar supporter assy. ① to the base holder assy.
2. Attach the spring S08 to the needle bar supporter assy. ① and the base holder assy.

***Key point**
- Attach the long side of the hook of the spring to the shaft bushing ③.

3. Attach the spring S07 to the needle bar supporter assy. ① and the base holder assy.





S07	14.3, ϕ5 A decided hook form is same	SPRING-Z XC2748***
S08	24.5, ϕ4	SPRING XC2429***

19 Attachment of Shaft assy.

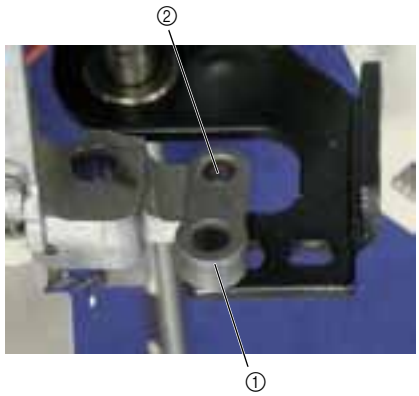
1. Attach the needle holder block ① to the needle roller ② of the needle bar supporter assy.

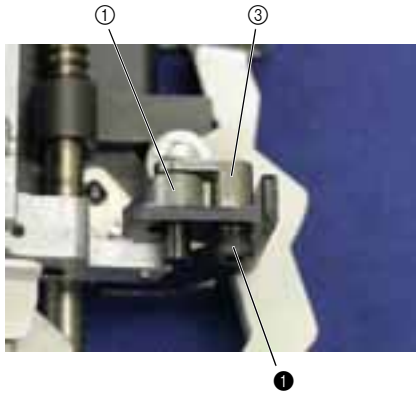
***Key point**
- Flat surface of the needle holder block ① is the lower side.

2. Attach the shaft assy. ③ to the needle holder block ① and the base holder assy., and then tighten the screw ❶ temporarily.

***Key point**
- Fully tighten the screw after performing "4-9 Adjustment of needle interference left / right".

Apply EPNOC AP (N) 0 to the needle roller.	Bead XC8387***
Apply EPNOC AP (N) 0 to the shaft of the shaft assy.	Bead XC8387***





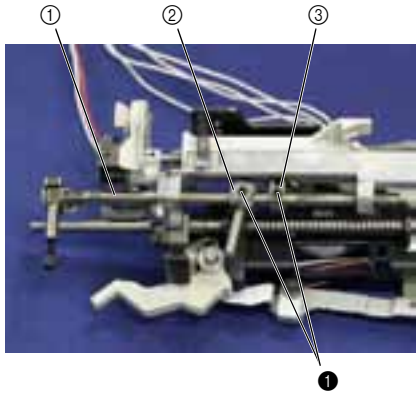
❶		Screw M3X10	Torque Free tighten

20 Attachment of Needle bar assy.

1. Insert the needle bar assy. ① into the needle bar supporter assy., the needle bar block ②, the needle thread block ③ and the needle bar supporter assy., and then tighten the 2 screws ❶ temporarily.

***Key point**

- When the needle thread block ③ is viewed from the front, it is secured in a position turned slightly counterclockwise.
- Fully tighten the screw after performing "4-11 Adjustment of needle bar height"and "4-13 Adjustment of needle thread block".



Lubricate the needle bar crank joint area with MOLYKOTE (OILER 90% + MOLYKOTE M DISPERSION 10%).	1-2 drops XZ0206*** XC8386***
Apply EPNOC AP (N) 0 to the sliding pin part of the needle thread block.	Bead XC8387***
Lubricate the needle bar supporter assy. needle operating area with OILER.	1-2 drops XZ0206***

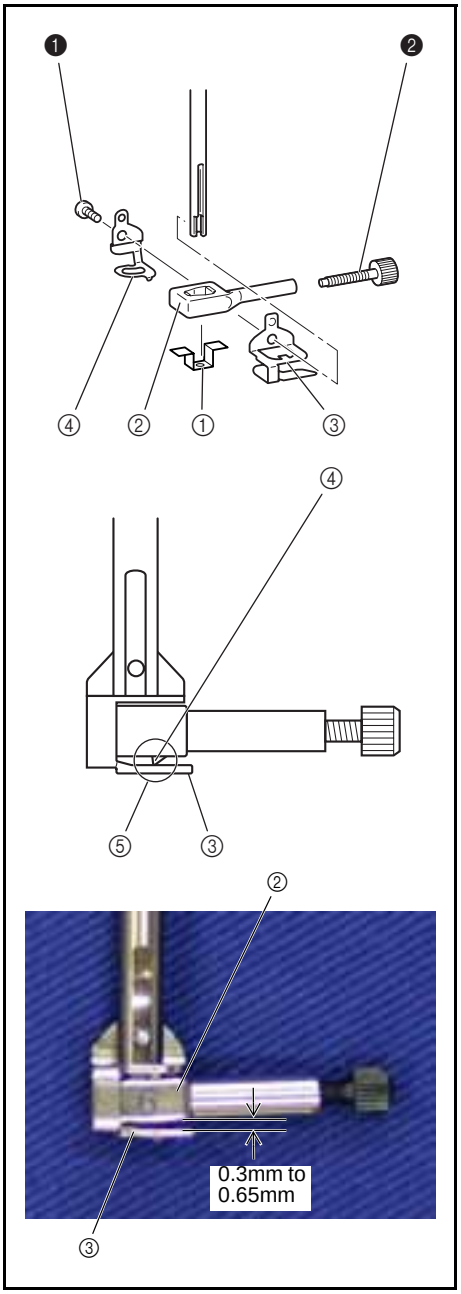
❶		Set Screw, Socket (FT) M4X4	Torque 0.78 – 1.18 N·m

20-1 Assembly of Needle bar assy.

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

***Key point**

- Check that there should no gap ⑤ between the needle bar thread guide ③ and the tip of the needle thread guide spring ④.
- Check that there should be a 0.3 mm – 0.65 mm gap between the needle block ② and the right side of the needle bar thread guide ③.



❶	Screw SM2.38	Torque 0.29 – 0.49 N·m
❷	Needle Clamp Screw	—

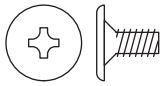
21 Attachment of Needle bar crank rod assy.

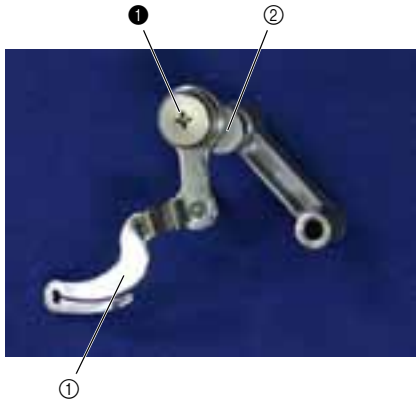
1. Attach the thread take-up lever ① to the needle bar crank rod assy. ② with the screw ❶.

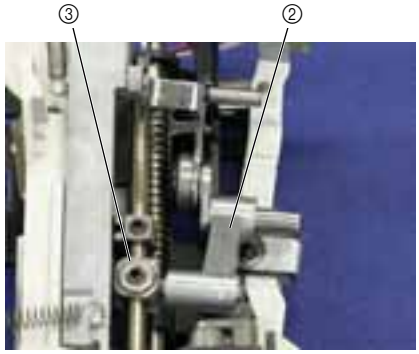
***Key point**
- The screw is reverse threaded.

2. Attach the needle bar crank rod assy. ② to the needle bar block ③.

Apply EPNOC AP (N) 0 to the shaft of the needle bar crank.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the shaft of the thread take-up lever.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the thread take-up lever attachment face (left screw attachment face) of the needle bar crank.	Small amount XC8387***

❶		Screw, Flat SM3.57 - 40X7L	Torque 1.18 – 1.57 N·m



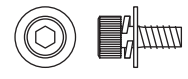


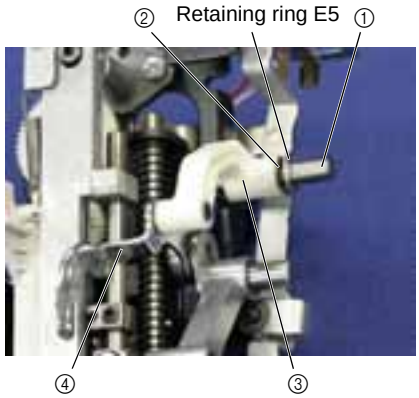
22 Attachment of Thread take-up lever link

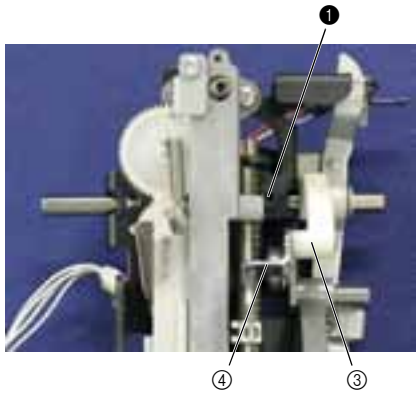
1. Attach the retaining ring E5 to the take-up support shaft ①.
2. Set the base holder assy. as shown in the right figure, and then insert the take-up support shaft ① into the "washer, spring ②", the thread take-up lever link ③ and the base holder assy. from the right side, and then attach it with the screw ❶.

***Key point**
- Insert the shaft of the thread take-up lever ④ into the thread take-up lever link ③.

Apply EPNOC AP (N) 0 to the all around the take-up support shaft hole.	Small amount XC8385***

❶		Screw 3X8	Torque 1.18 – 1.57 N·m





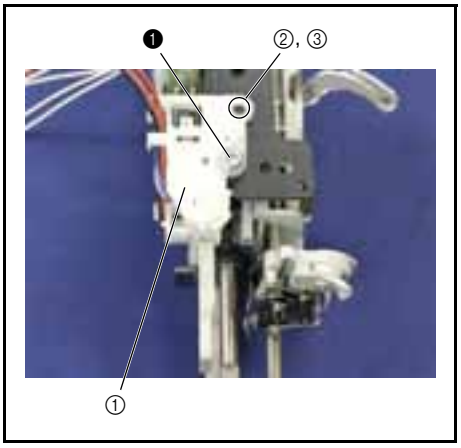
23 Attachment of BH switch assy.

1. Attach the BH switch assy. ① to the base holder assy. with the screw ❶.

***Key point**

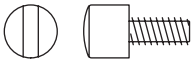
- Check that the boss part ③ of the BH switch holder assy. engaged with the positioning hole ② of the BH switch assy. ①.
- Refer to "4-18 Adjustment of BH lever switch position".

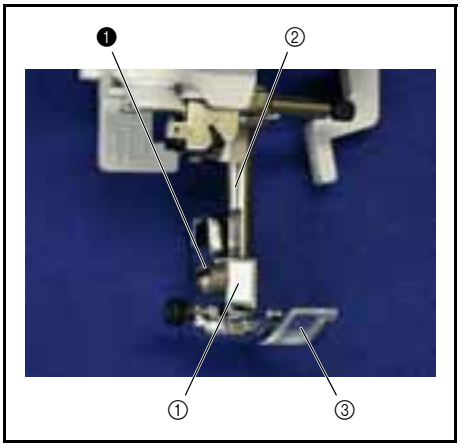
❶		Screw, Pan (S/P washer) M4X8	Torque 0.78 – 1.18 N·m



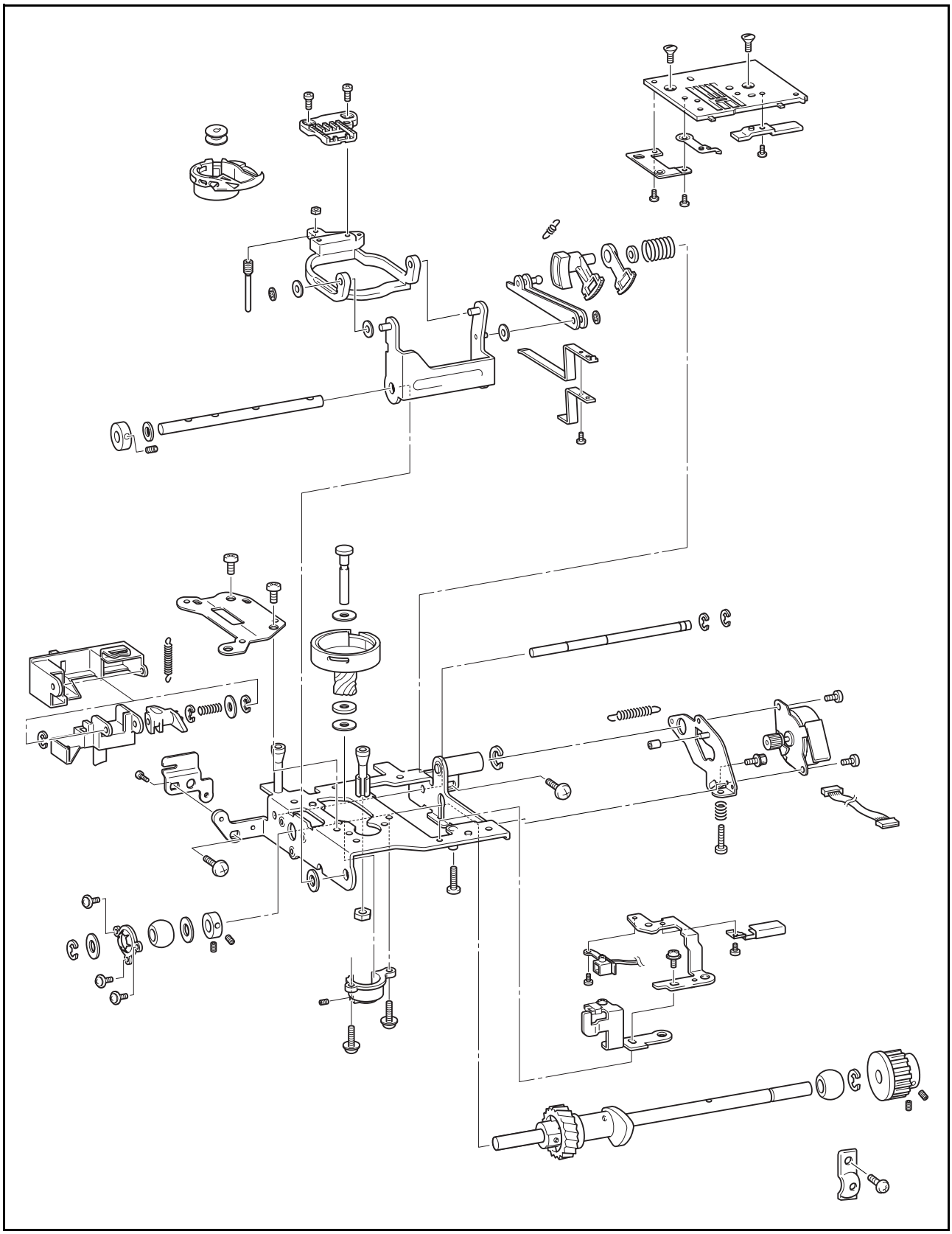
24 Attachment of Presser feed holder assy.

1. Attach the presser feed holder assy. ① to the presser bar ② with the screw ❶.
2. Attach the Z foot ③ to the presser feed holder assy. ①.

❶		Screw 3.57	Torque 0.78 – 1.18 N·m



Feed / rotary hook module location diagram



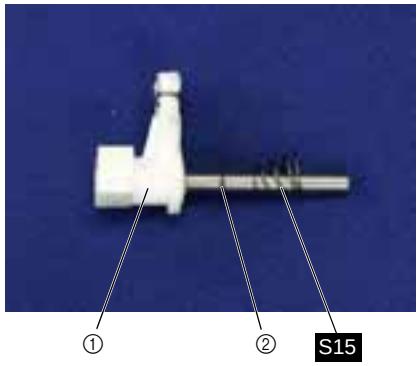
1 Attachment of Feed adjuster assy.

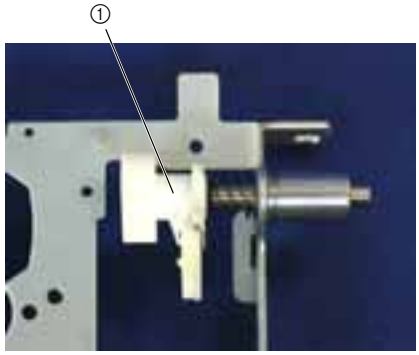
1. Insert the polyester slider ② and the spring S15 into the shaft of the feed adjuster assy. ①.

   ***Key point**
   - Insert the spring starting with the side having the smaller spring diameter.

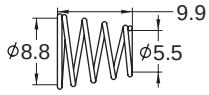
2. Attach the feed adjuster assy. ① to the base plate assy.

Lubricate the feed adjuster shaft with FBK OIL RO 100.	1-2 drops XC8388***
Apply EPNOC AP (N) 0 to the entire operating part of the feed adjuster feed regulator slide block.	Small amount XC8387***





S15



SPRING
XC2531***

1-1 Assembly of Feed adjuster assy.

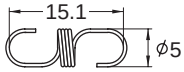
1. Attach the F gear ② to the feed adjuster ①.

   ***Key point**
   - When set it as shown in the right figure, check that the protrusion ③ of the F gear ② is the upper side.

2. Attach the spring S16.

Apply EPNOC AP (N) 0 to the entire operating surface of the feed adjuster and F gear.	Small amount XC8387***

S16

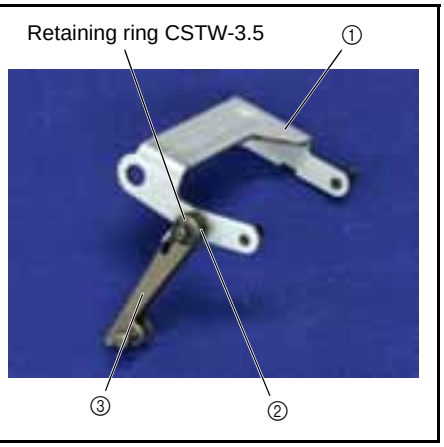


SPRING
XC2530***

2 Attachment of Feed arm B assy.

1. Attach the polyester slider ② and the feed arm B assy. ③ to the shaft of the feed arm A assy. ①, and then attach the retaining ring CSTW-3.5.

Apply EPNOC AP (N) 0 to the feed arm A assy. shaft.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the feed arm B assy. shaft.	Small amount XC8387***



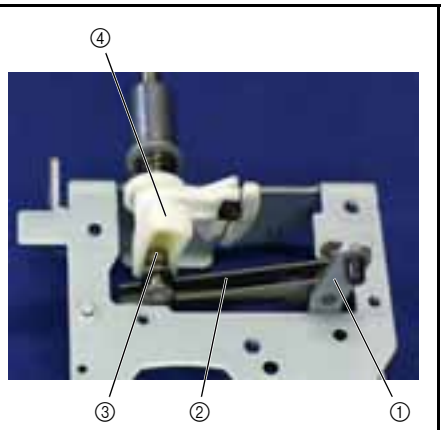
3 Attachment of Feed arm A assy.

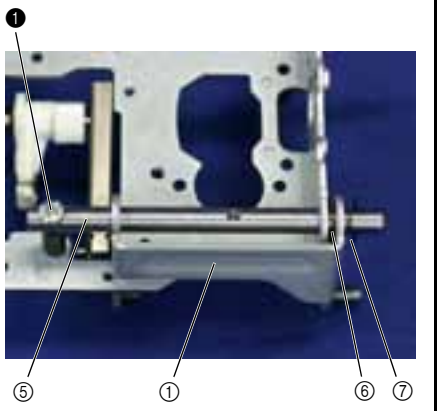
1. Insert the feed arm A assy. ① from the back side of the base plate assy., and then attach the feed regulator slide shaft ③ of the feed arm B assy. ② to the groove of the feed adjuster ④.
2. Insert the horizontal feed shaft ⑤ into the feed arm A assy. ①, the "washer, thrust ⑥" and the base plate assy. from the right side, and then align the positioning hole on the feed arm supporter shaft, and then attach it with the screw ❶.
3. Insert the "washer, thrust ⑦" and the set collar ⑧ into the horizontal feed shaft ⑤, and then attach it with the screw ❷.

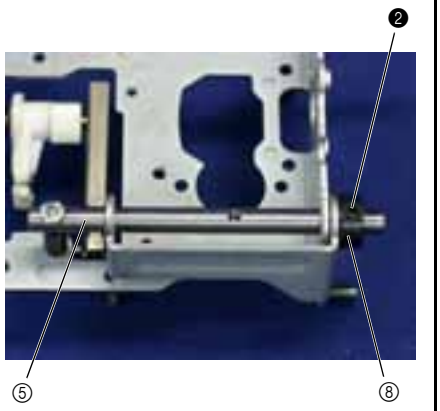
***Key point**

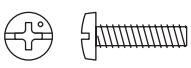
- Attach the feed arm A assy. ①, the "washer, thrust ⑥" and the "washer, thrust ⑦" so that it can sandwich with the base plate assy. and the set collar ⑧.
- Check that it is not a wobble, and it moves smoothly.

Apply OILER to the 2 sections where the horizontal feed shaft is inserted in feed arm A.	Each 1-2 drops XZ0206***





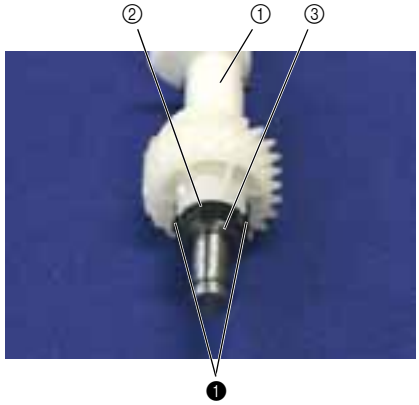


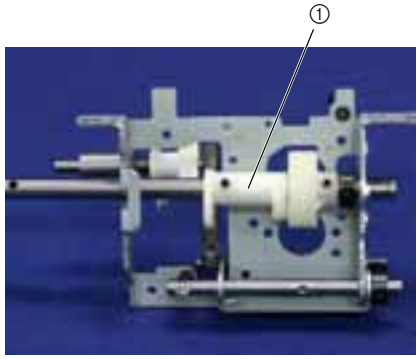
❶		Screw, Bind M3X12	Torque 0.78 – 1.18 N·m
❷		Set Screw, Socket (CP) M4X4	Torque 0.78 – 1.18 N·m

4 Attachment of Lower shaft assy.

1. Insert the set collar ② to the lower shaft assy. ①, and then tighten the 2 screws ❶ temporarily.

   ***Key point**
   - Check that the cut surface ③ of the set collar ② is the out side.
   - Fully tighten the screw after performing "3-106 Attachment of Bushing presser B".
2. Set the lower shaft assy. ① to the base plate assy.





❶		Set Screw, Socket (CP) M4X4	Torque Free tighten

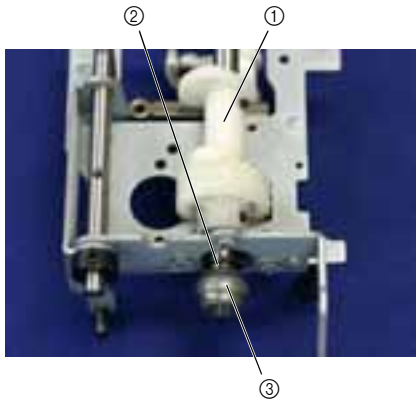
5 Attachment of Bushing presser B

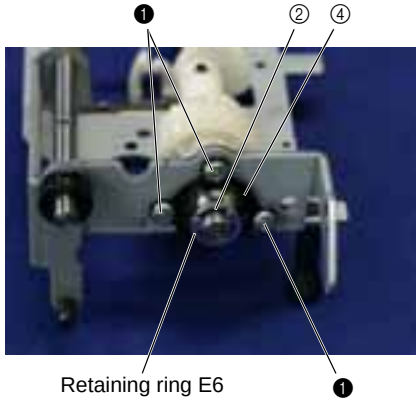
1. Insert the washer, thrust ② and the lower shaft bushing ③ into the lower shaft assy. ①.
2. Attach the bushing presser B ④ to the base plate assy. with the 3 screws ❶.
3. Insert the washer, thrust ② into the lower shaft assy. ①, and then attach the retaining ring E6.
4. Sandwich the lower shaft bushing ③ with the retaining ring E6 and the set collar ⑤ and then tighten the 2 screws ❷.

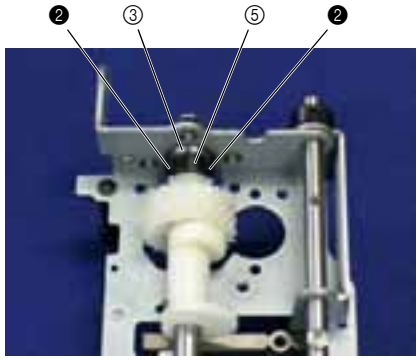
***Key point**

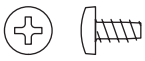
- Check that the lower shaft assy. ① is not a wobble, and it moves smoothly.

Lubricate the lower shaft bushing round surface with FBK OIL RO 100.	1-2 drops XC8388***
Apply MOLYKOTE EM30L to all of the teeth around the lower shaft gear.	Small amount XC8385***





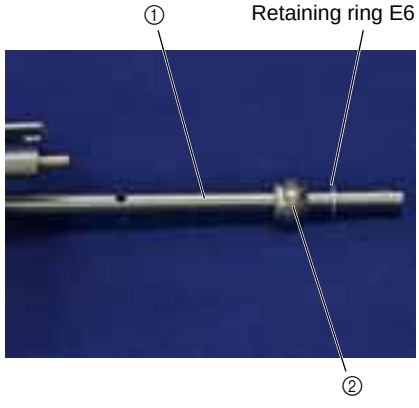


❶		Taptite, Bind B M3X6	Torque 0.39 – 0.78 N·m
❷		Set Screw, Socket (CP) M4X4	Torque 0.78 – 1.18 N·m

6 Attachment of Lower shaft bushing

1. Insert the lower shaft bushing ② into the lower shaft assy. ①, and then attach the retaining ring E6.

Lubricate the lower shaft bushing with FBK OIL RO 100.	1-2 drops XC8388***

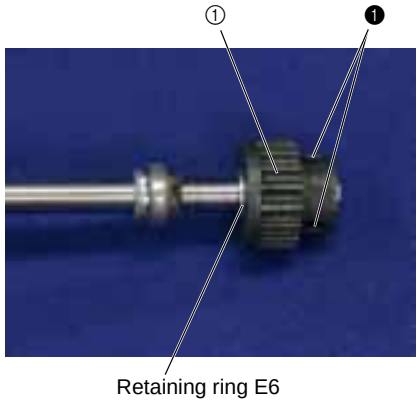


7 Attachment of Timing pulley D

1. Insert the timing pulley D ① into the lower shaft assy. and then tighten the 2 screws ❶ temporarily.

***Key point**
- Insert it until the timing pulley D ① hits the retaining ring E6.
- Fully tighten the screw after performing "4-10 Adjustment of needle bar rise".

❶		Set Screw, Socket (CP) M5X5	Torque Free tighten



Retaining ring E6

8 Attachment of Feed supporting plate

1. Set the feed supporting plate ① to the feed arm B assy. ②.

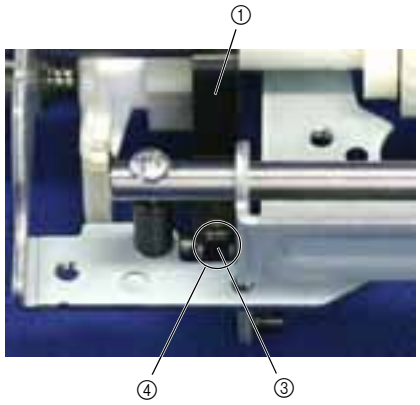
***Key point**
- Check that the protrusion ③ of the feed supporting plate ① engaged with the groove ④ of the feed arm B assy. ②.

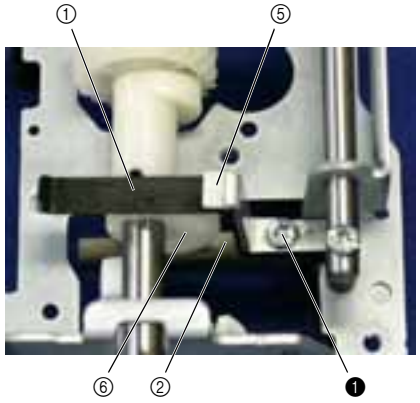
2. Set the feed supporting plate B ⑤ to the feed supporting plate ①, attach the feed arm B assy. ② with the screw ❶.

***Key point**
- Check that the boss of the feed supporting plate B ⑤ engaged with the positioning hole of the feed supporting plate ①.
- Check that sandwich the feed cam ⑥ with the feed supporting plate ① and the feed arm B assy. ②.

Apply EPNOC AP (N) 0 to the horizontal feed cam surface.	Small amount XC8387***

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

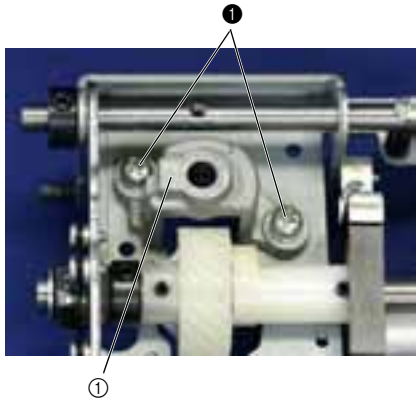




9 Attachment of Shaft supporter

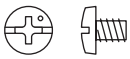
1. Attach the shaft supporter ① to the base plate assy. with the 2 screws ❶.

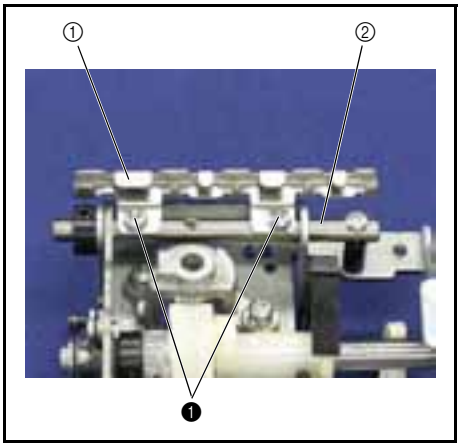
❶		Screw, Pan (S/P washer) M4X10DA	Torque 1.18 – 1.57 N·m



10 Attachment of Lead wire guide holder

1. Attach the lead wire guide holder ① to the horizontal feed shaft ② with the 2 screws ❶.

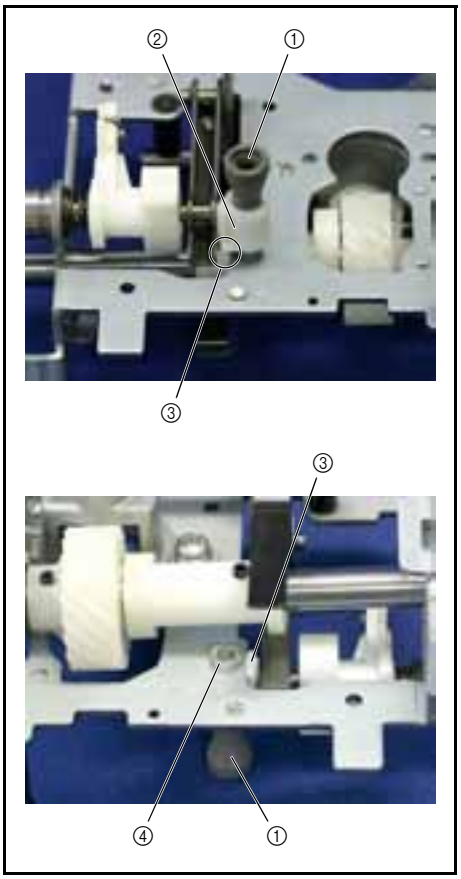
❶		Screw, Bind M3X4	Torque 0.78 – 1.18 N·m



11 Attachment of Needle plate supporter shaft B

1. Attach the feed arm supporter ② to the needle plate supporter shaft B ①.

   ***Key point**
   - Check that the hook part ③ of the feed arm supporter ② is the lower side.
2. Attach the needle plate supporter shaft B ① to the base plate assy.
3. Attach the nut 1 M3 ④ to the needle plate supporter shaft B ①.
4. Hang the hook part ③ of the feed arm supporter ② on the base plate assy.



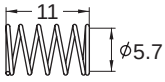
12 Attachment of Drop knob

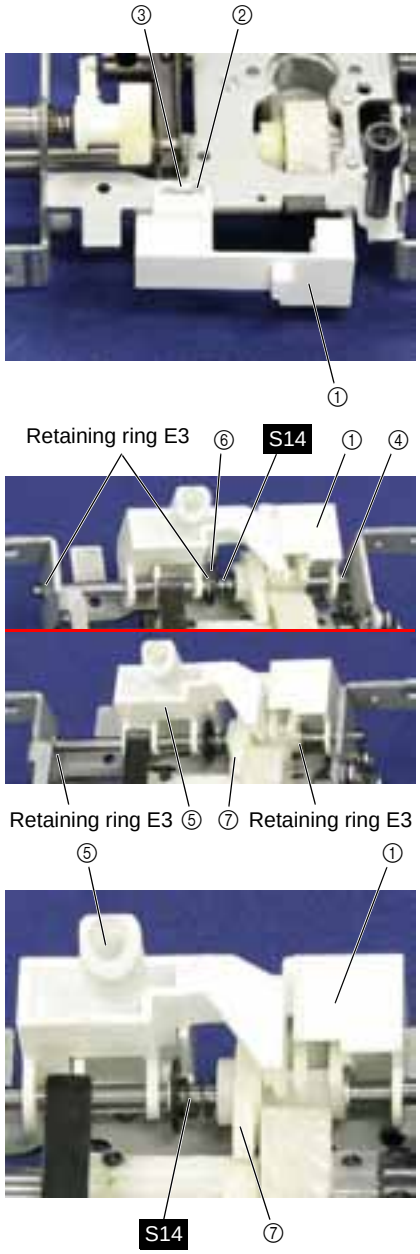
1. Attach the drop knob ① to the base plate assy.

   ***Key point**
   - Attach it while lifting the section ③ to get over the boss part ② of the base plate assy.
2. Attach the retaining ring E3 to the vertical feed shaft ④.
3. Set the base plate assy. as shown in the right figure, and then insert the vertical feed shaft ④ into the base plate assy., the drop lever ⑤, the drop knob ①, the washer plain ⑥, the spring S14, the vertical lever ⑦, the drop knob ① and the base plate from the left side.

   ***Key point**
   - Insert it until the retaining ring hit the base plate assy.
4. Attach the 3 retaining rings E3 to the grooves (3 locations) of the vertical feed shaft ④.

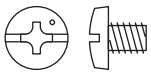
Apply EPNOC AP (N) 0 to the sliding parts of the drop knob and the base plate assy.	Bead XC8387***
Apply EPNOC AP (N) 0 to the vertical feed shaft.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the vertical feed cam surface Ⓐ.	Small amount XC8387***

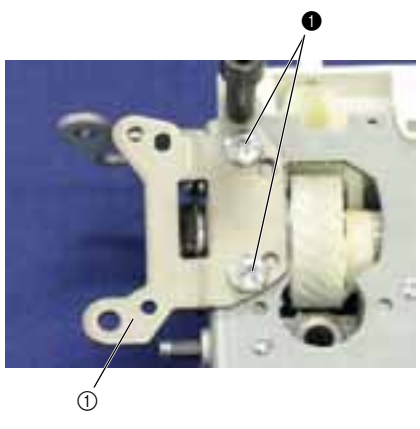
S14		SPRING XC2550***



13 Attachment of Thread cutter module supporter

1. Attach the thread cutter module supporter ① to the base holder assy. with the 2 screws ❶.

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

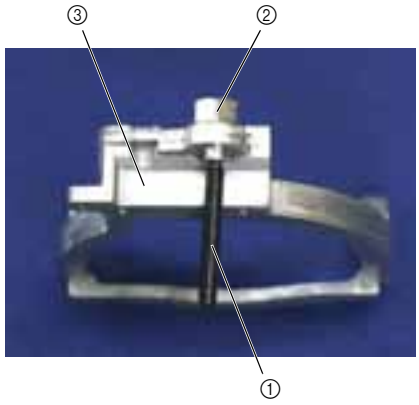


14 Attachment of Vertical adjuster screw assy.

1. Attach the M5 nut ② to the vertical adjuster screw assy. ①.
2. Attach the vertical adjuster screw assy. ① to the feed bar ③.

***Key point**

- Refer to "4-21 Adjustment of feed dog height".



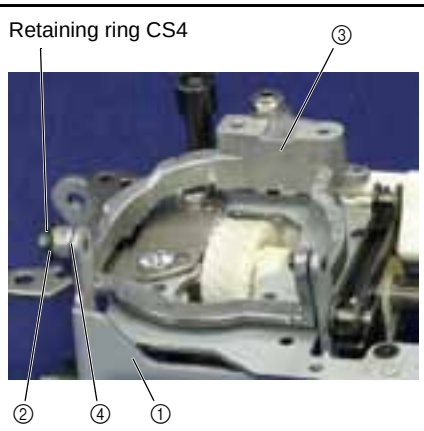
15 Attachment of Feed bar

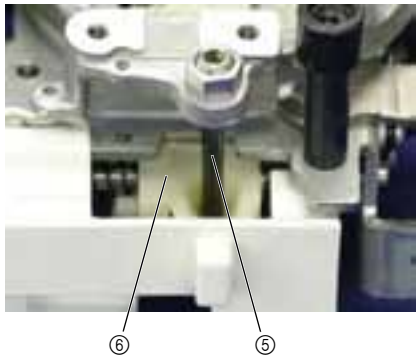
1. Insert the polyester slider ②, the feed bar ③ and the polyester slider ④ into the feed arm A assy. ①, and then attach the retaining ring CS4.

***Key point**

- Check that the vertical adjusting screw ⑤ engaged with the groove of the vertical lever ⑥.
- Check that there should no gap between the retaining ring CS4 and the feed bar ③.

Apply EPNOC AP (N) 0 to the feed shaft hole in the feed bar.	Bead XC8387***
Apply EPNOC AP (N) 0 to the feed arm A assy.	Bead XC8387***
Apply EPNOC AP (N) 0 to the groove of the vertical lever.	Small amount XC8387***

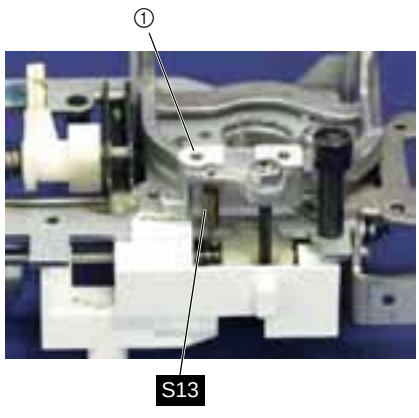




16 Attachment of Spring

1. Attach the spring S13 to the feed bar ① and the base plate assy..

S13	15.2	SPRING XC1940***

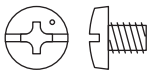


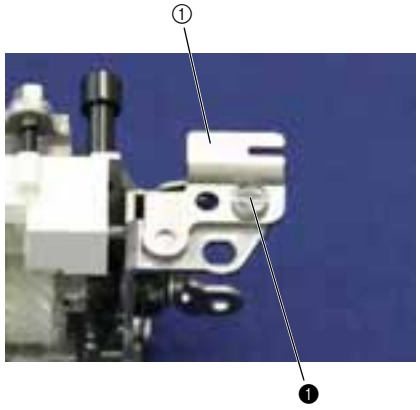
17 Attachment of Thread cutter module supporter

1. Attach the thread cutter module supporter ① to the base holder assy. with the screw ❶.

***Key point**

- Check that the boss of the thread cutter module supporter ① align with the positioning hole of the base holder assy..

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



18 Attachment of Outer rotary hook assy.

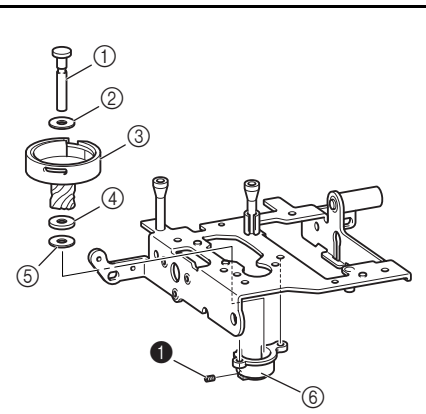
1. Insert the outer rotary hook shaft ① into the spacer ②, the outer rotary hook assy. ③, the washer 6 ④, the spacer ⑤ and the shaft supporter ⑥, and then attach it with the screw ❶.

***Key point**

- Turn the lower shaft so that the large one of the feed cam is depth and the hole of the lower shaft is the upper side, and then attach so that the match mark on the rotary hook faces forward.

Apply MOLYKOTE EM30L to the shaft supporter surface.	Small amount XC8385***
Lubricate the outer rotary hook shaft with the OILER.	Apply liberally XZ0206***

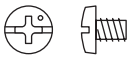
❶		Set Screw, Socket (CP) M4X6	Torque 0.78 – 1.18 N·m

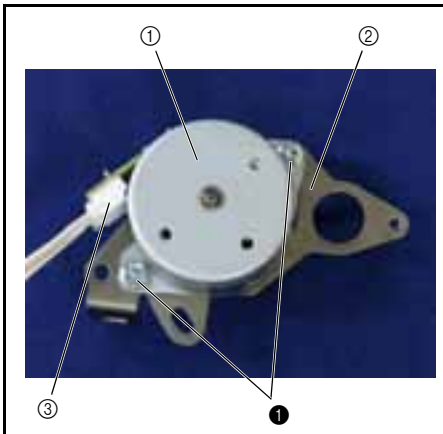


19 Attachment of F pulse motor

1. Attach the F pulse motor ① to the FPM holder sub assy. ② with the 2 screws ❶.
2. Attach the lead wire assy, FPM-LE ③ to the F pulse motor ①.
3. Attach the rubber ④ to the shaft of the FPM holder sub assy. ②.

Lubricate the FPM bearing with FBK OIL RO 100.	1-2 drops XC8388***

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



20 Attachment of FPM holder sub assy.

1. Attach the FPM holder sub assy. ① to the shaft ② of the base plate assy., and then attach the retaining ring CRS-10.

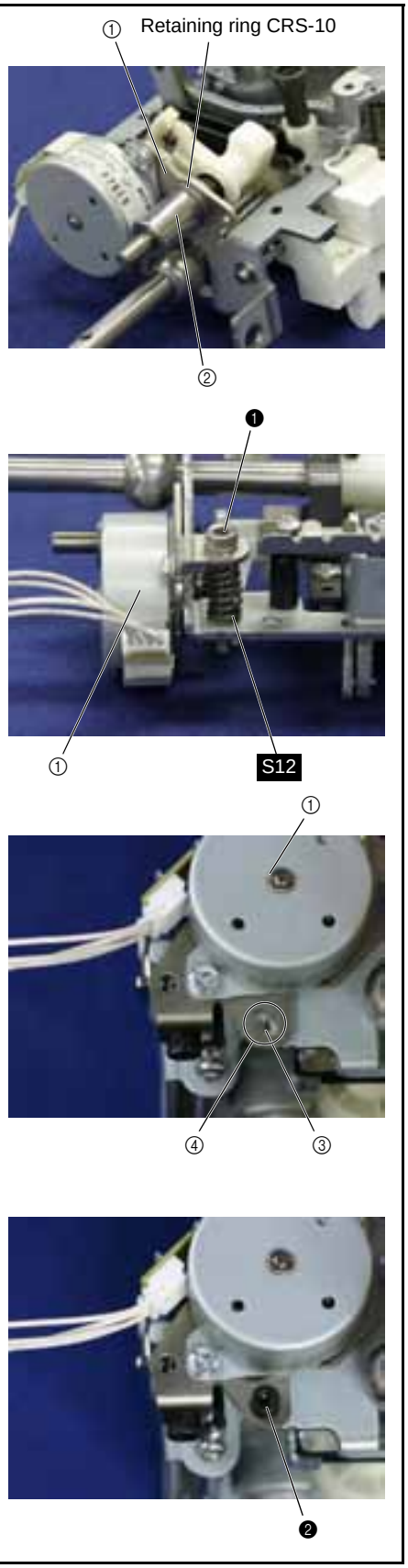
   ***Key point**
   - Check that the feed adjusting is the upper side of the FPM gear.

2. Sandwich the spring S12 between the FPM holder sub assy. ① and the base plate assy., and then attach the screw ❶.

   ***Key point**
   - Tighten the screw ❶ until the screw hole ③ in the base plate assy. comes approximately to the center of the positioning hole ④ in the FPM holder sub assy. ①.

3. Tighten the screw ❷ temporarily.

   ***Key point**
   - Fully tighten the screw after performing "4-15 Adjustment of feed".



❶	Bolt, Socket M4X25	—
❷	Screw 3X8	Torque Free tighten
S12	21, ϕ5	SPRING XC2537***

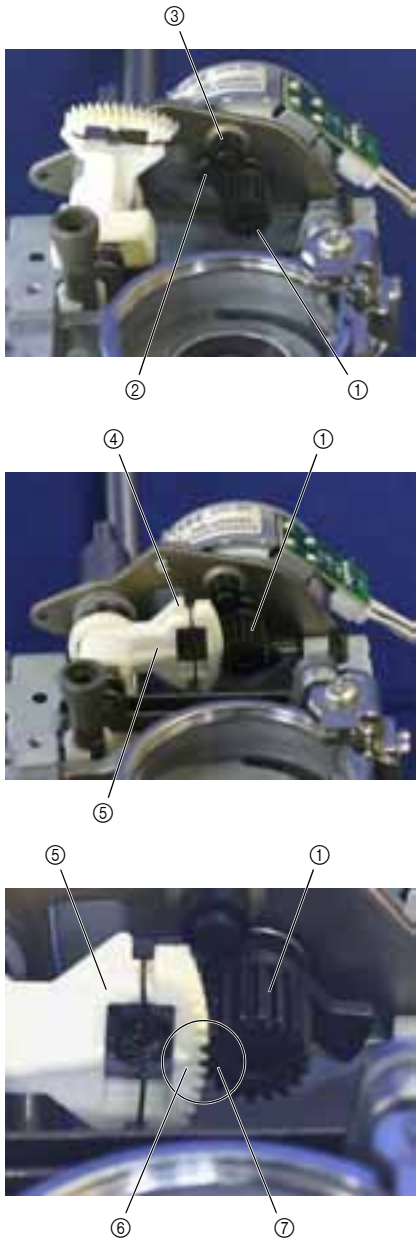
21 Attachment of F gear teeth alignment

1. Turn the F pulse motor gear ① clockwise until the stopper ② of the F pulse motor gear ① on it touches the rubber ③.
2. Align the teeth of the feed adjusting assy. ④ with the teeth of the F gear ⑤, and then mesh it and the F pulse motor gear ①.

***Key point**

- Check that the match mark ⑥ of the F gear ⑤ and the match mark ⑦ of the F pulse motor gear ① are together.

Apply EPNOC AP (N) 0 to the all of the teeth on the feed adjusting assy. F gear.	Bead XC8387***

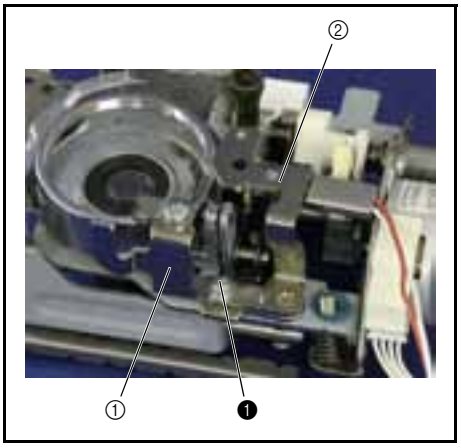


22 Attachment of Photo diode holder assy./Inner rotary hook bracket assy.

1. Attach the inner rotary hook bracket assy. ① and the photo diode holder assy. ② to the base holder assy. with the screw ❶.

***Key point**

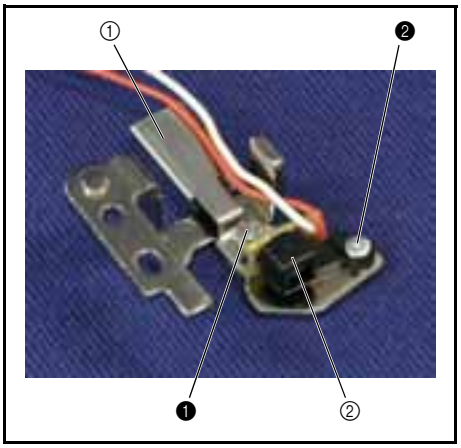
- Check that the positioning hole of the inner rotary hook bracket assy. ① align with the boss of the base holder assy..
- Check that the boss of the photo diode holder assy. ② align with the positioning hole of the inner rotary hook bracket assy. ①.
- Refer to "4-22 Adjustment of inner rotary hook bracket position".

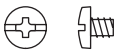


❶		Screw, Pan (S/P washer) M3X8DB	Torque Free tighten

22-1 Assembly of Photo diode holder assy.

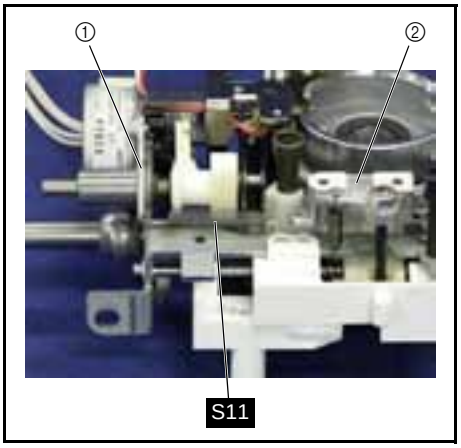
1. Attach the cord holder ① to the photo diode supporter with the screw ❶.
2. Attach the photo diode holder assy. ② to the photo diode supporter with the screw ❷.

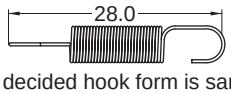


❶		Screw, Bind M2.6X3	Torque 0.58 – 0.78 N·m
❷		Screw, Bind M2X4	Torque 0.29 – 0.49 N·m

23 Attachment of Spring

1. Attach the spring S11 to the FPM holder assy. ① and the feed bar ②.



S11	 28.0 A decided hook form is same		SPRING XE1478***

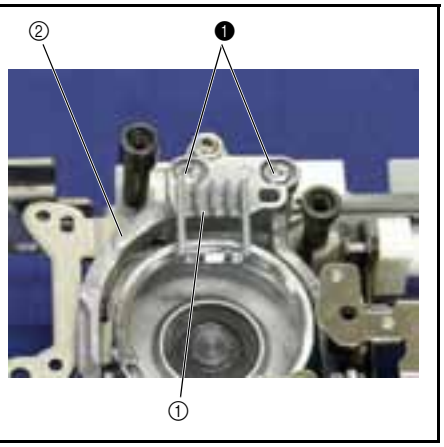
24 Attachment of Feed dog

1. Set the feed dog ① to the feed bar ②, and then tighten the 2 screws ❶ temporarily.

***Key point**

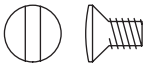
- Fully tighten the screw after performing "4-20 Adjustment of front/back, left/right position of feed dog".

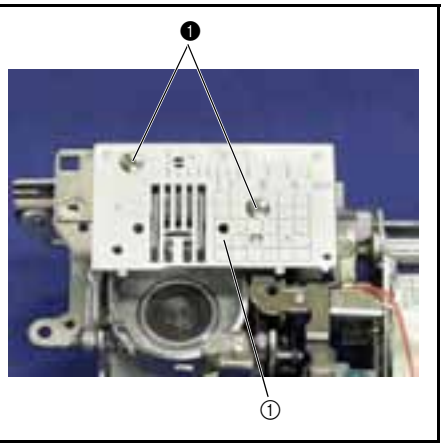
❶		Screw, Bind M3X6	Torque Free tighten



25 Attachment of Needle plate A assy.

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

❶		Screw M4	Torque 0.78 – 1.18 N·m



25-1 Assembly of Needle plate A assy.

1. Attach the F gear stopper plate ① to the needle plate A ② with the screw ❶.

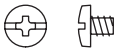
***Key point**

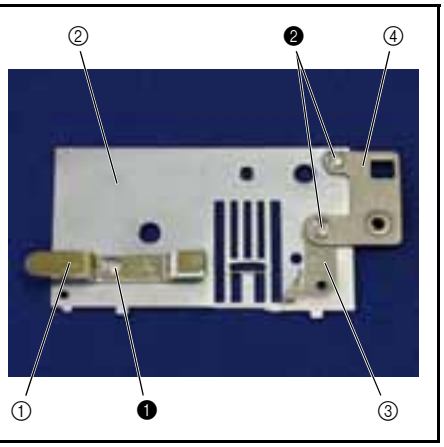
- Check that the boss part of the F gear stopper plate ① engaged with the positioning hole of the needle plate A ②.

2. Attach the stopper plate ③ and the needle plate B support plate ④ to the needle plate A assy. ② with the 2 screws ❷.

***Key point**

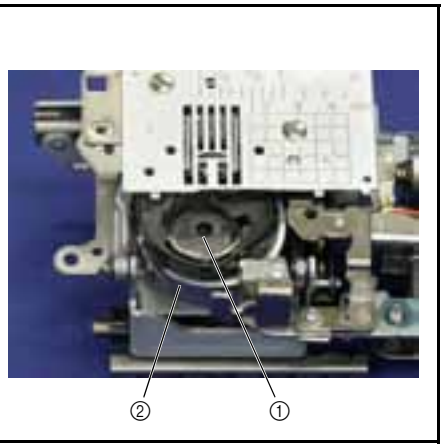
- Check that the boss of the stopper plate ③ engaged with the positioning hole of the needle plate A ②.

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

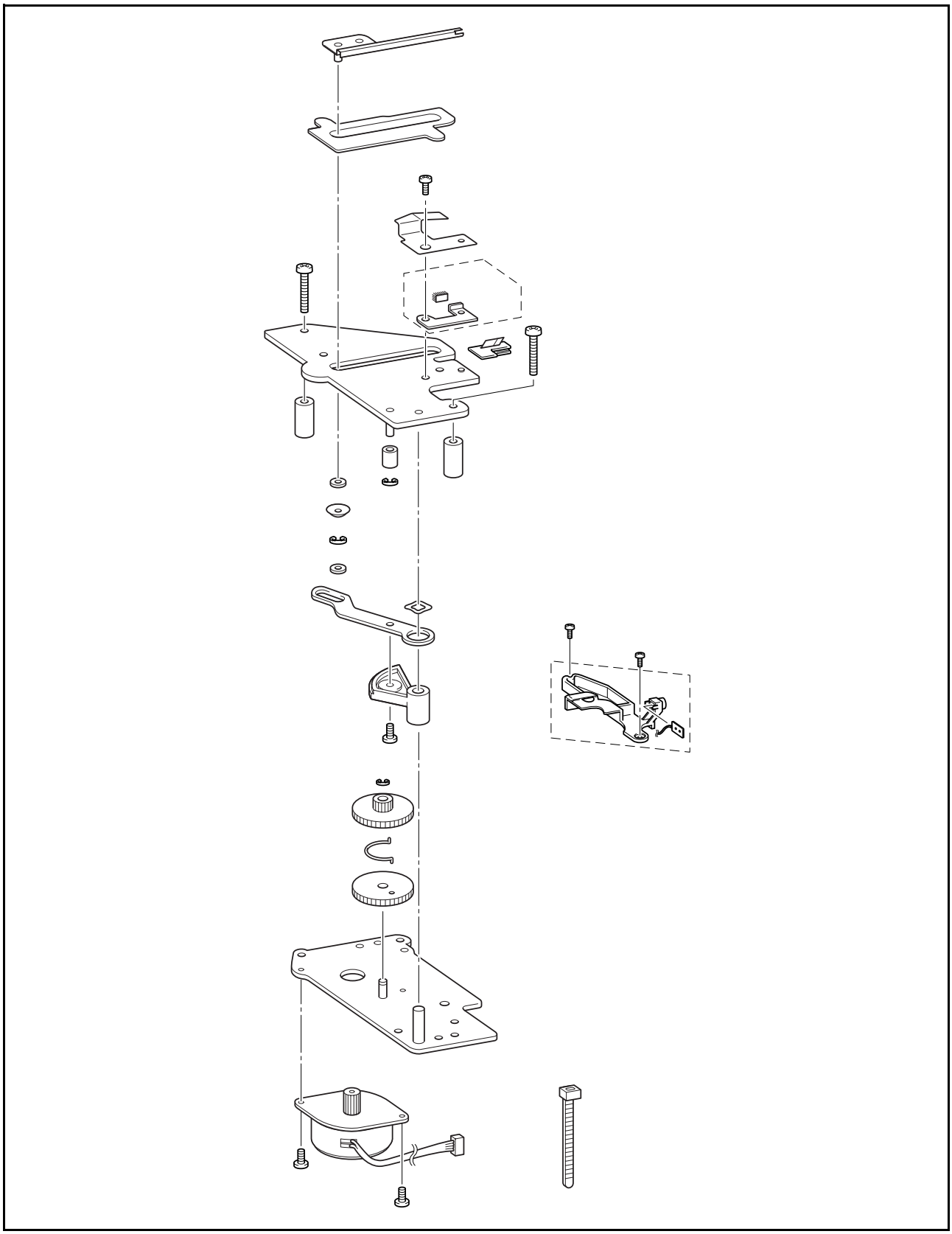


26 Attachment of Inner rotary hook assy.

1. Attach the inner rotary hook assy. ① to the outer rotary hook assy. ②.



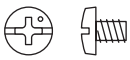
Thread cutter module location diagram

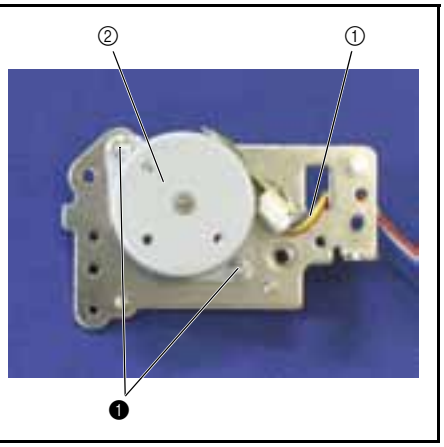


1 Attachment of Motor pulse

1. Attach the CPM lead wire assy. ① to the motor pulse ②.
2. Attach the motor pulse ② to the motor holder assy. with the screw ❶.

Lubricate the ZPM bearing with FBK OIL RO 100.	1-2 drops XC8388***

❶		Screw, Bind M3X4	Torque 0.59 – 0.78 N·m



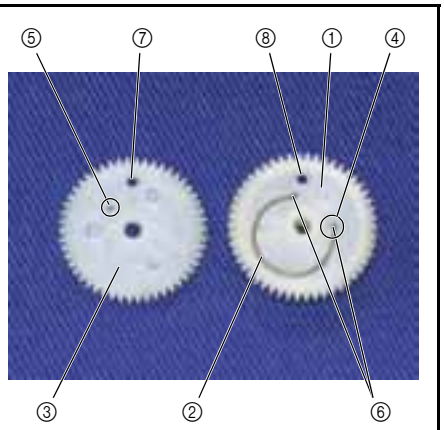
2 Attachment of Idle gear A/B

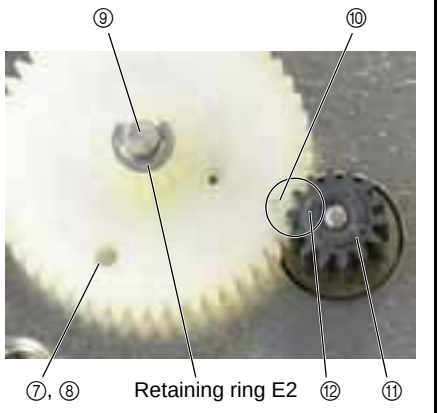
1. Assemble the idle gear A ①, the spring ② and the idle gear B ③.

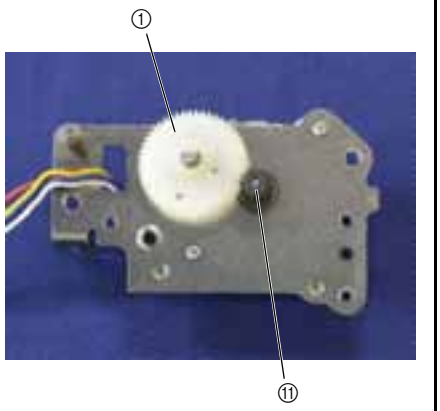
   ***Key point**
   - Insert the hooks (2 locations) of the spring ② into the attaching hole ④ of the idle gear A ① and the attaching hole ⑤ of the idle gear B ③.
   - Check that the positioning hole ⑧ of the idle gear A ① align with the positioning hole ⑦ of the idle gear B ③.
2. Attach the idle gear B ③, the spring ② and the idle gear A ① to the idle gear shaft ⑨, and then attach the retaining ring E2.

   ***Key point**
   - Check that the match mark ⑩ of the idle gear A ① align with the match mark ⑫ of the ZPM gear ⑪.

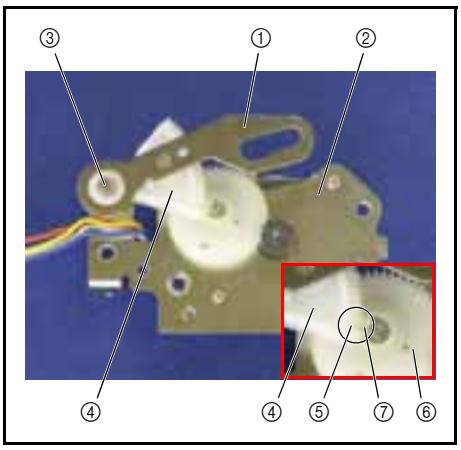
Apply a small amount of EPNOC AP(N)0 to the idle gear shaft.	Small amount XC8387***
Apply a small amount of EPNOC AP(N)0 to all of the teeth around the idle gear shaft A·B	Small amount XC8387***
Apply a small amount of EPNOC AP(N)0 to all of the teeth around the ZPM gear.	Small amount XC8387***







3 Attachment of Thread cutter lever assy.



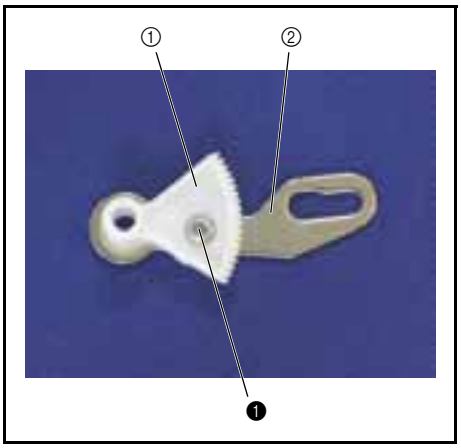
1. Attach the thread cutter lever assy. ① to the thread cutter lever shaft ③ of the motor holder assy. ②.

***Key point**

- Check that the match mark ⑤ of the thread cutter gear ④ align with the match mark ⑦ of the gear A ⑥.

Apply a small amount of EPNOC AP(N)0 to the thread cutter lever shaft.	Small amount XC8387***

3-1 Assembly of Thread cutter lever assy.



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

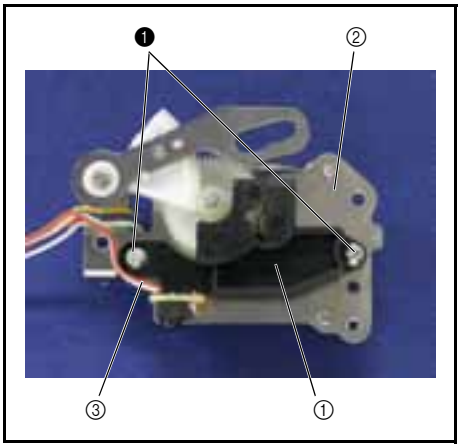
***Key point**

- Check that the boss part of the thread cutter lever gear ① align with the notch part of the thread cutter lever ②.

Apply a small amount of EPNOC AP(N)0 to the gear part of the thread cutter lever gear	Small amount XC8387***
Apply a small amount of EPNOC AP(N)0 to the long hole of the thread cutter lever.	Small amount XC8387***

❶		Screw, Pan (S/P washer) M3X6DA	Torque 0.59 – 0.78 N·m

4 Attachment of Photo transistor assy.



1. Attach the photo transistor assy. ① to the motor holder assy. ② with the 2 screws ❶.

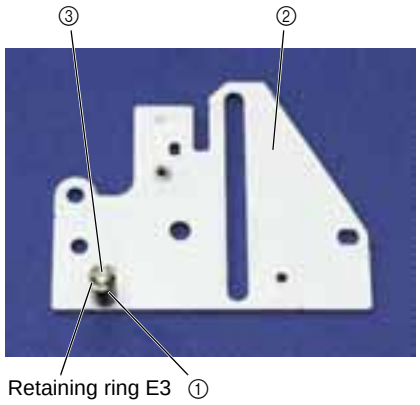
***Key point**

- Check that the CPM lead wire assy. ③ through the lower side of the photo transistor assy. ①.

❶		Screw, Pan (S/P washer) M3X6DA	Torque 0.59 – 0.78 N·m

5 Attachment of Rubber

1. Attach the rubber ① to the shaft ③ of the thread cutter frame assy. ②, and then attach the retaining ring E3.



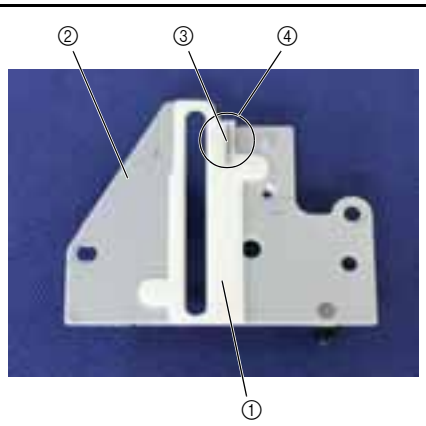
6 Attachment of Spacer

1. Attach the spacer ① to the thread cutter frame assy. ②.

   ***Key point**
   - Check that the boss (2 locations) of the spacer ① align with the positioning hole of the thread cutter frame assy. ②.

2. Set the NT lower thread cutter ③ to the attaching groove of the thread cutter frame assy. ②.

   ***Key point**
   - Check that the cutting part of the NT lower thread cutter ③ is the outside.

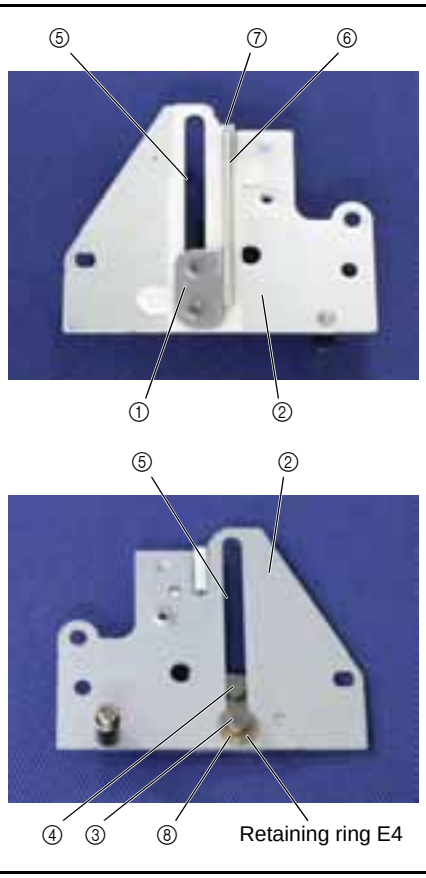


7 Attachment of Tread hook assy.

1. Attach the thread hook assy. ① to the thread cutter frame assy. ②.

   ***Key point**
   - Insert the shaft ③ and the shaft ④ of the thread hook assy. ① into the groove ⑤ of the thread cutter frame assy. ②.
   - Put the thread hook part ⑥ of the thread hook assy. ① on NT lower thread cutter ⑦.

2. Attach the washer ⑧ to the shaft ③ of the thread hook assy. ①, and then attach the retaining ring E4.

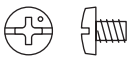


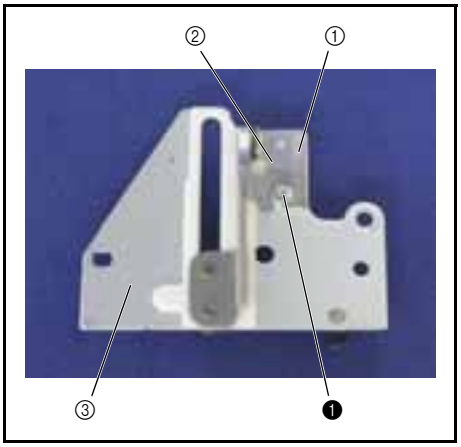
8 Attachment of Presser plate assy.

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

***Key point**

- Check that the boss part of the thread cutter frame assy. ③ align with the positioning hole of the presser plate assy. ① and the spring plate ②.

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



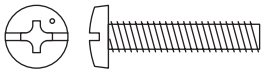
9 Attachment of Thread cutter frame assy.

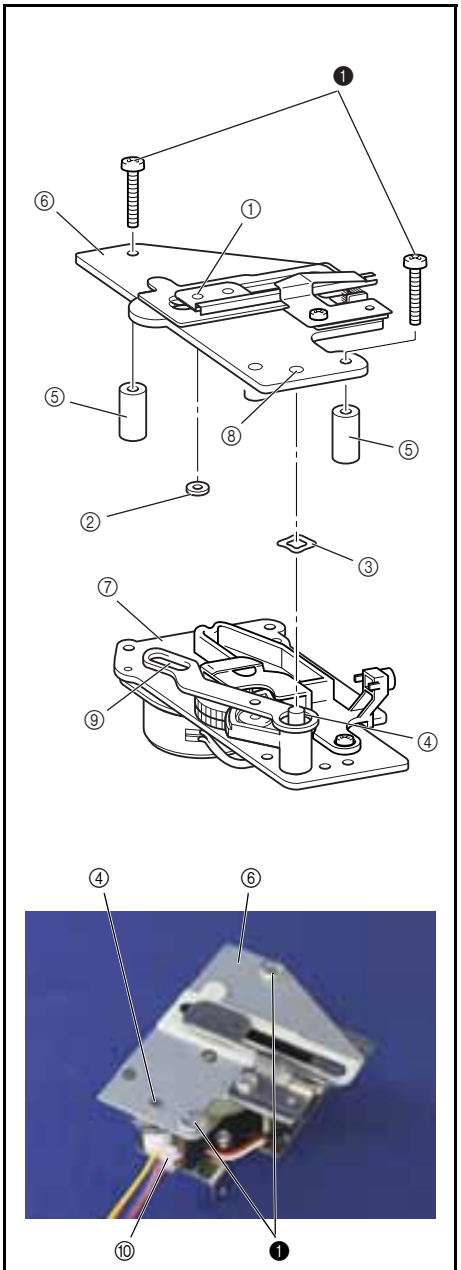
1. Attach the polyester slider ② to the shaft of the thread hook assy. ①.
2. Attach the wave-shape spring washer ③ to the thread cutter lever shaft ④.
3. Attach the 2 collars ⑤ and the thread cutter frame assy. ⑥ to the motor holder assy. ⑦ with the 2 screws ❶.

***Key point**

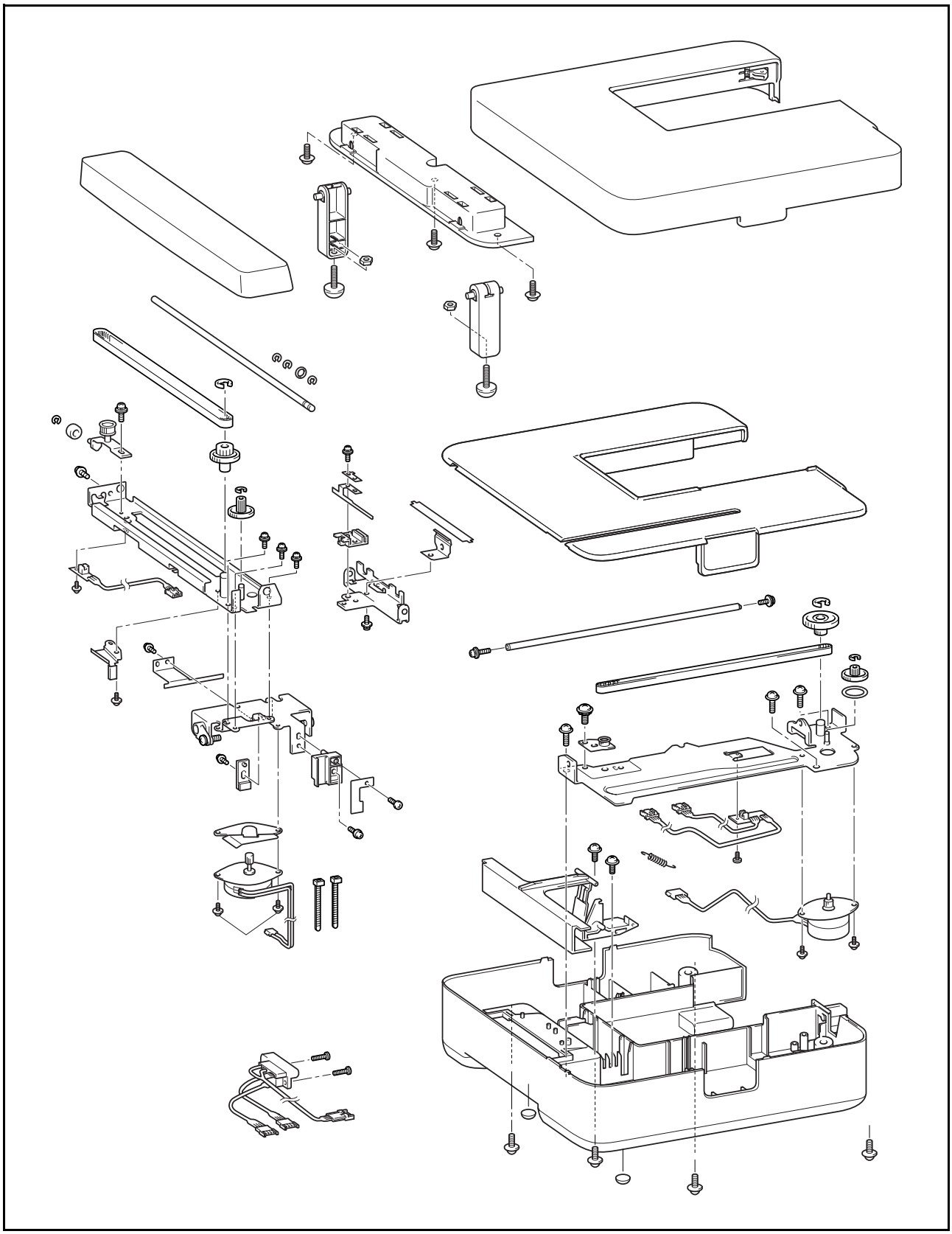
- Check that insert the thread cutter lever shaft ④ into the positioning hole ⑧ of the thread cutter frame assy. ⑥.
- Check that insert the shaft of the thread hook assy. ① into the positioning hole of the thread cutter lever assy. ⑨.

4. Attach the lead wire to the motor holder assy. ⑦ with the band ⑩.

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



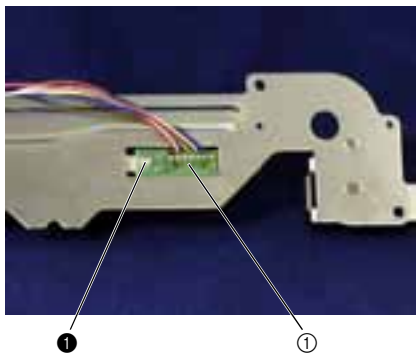
Embroidery unit location diagram



1 Attachment of XSENS PCB assy,

1. Attach the XSENS PCB assy. ① to the main frame assy. with the screw ❶.

❶		Screw, Bind M2X4	Torque 0.29 – 0.49 N·m

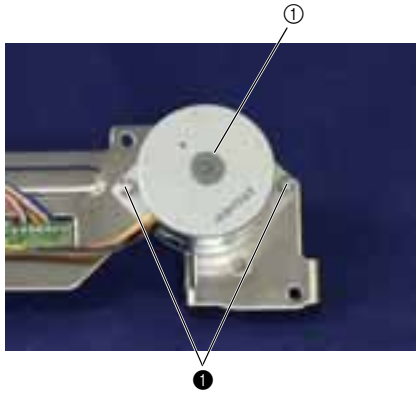


2 Attachment of XPM

1. Attach the XPM ① to the main frame assy. with 2 screws ❶.

Lubricate the XPM bearing with FBK OIL RO 100	1-2 drops XC8388***

❶		Screw, Pan (S/P washer) M3X5DA	Torque 0.79 – 1.18 N·m



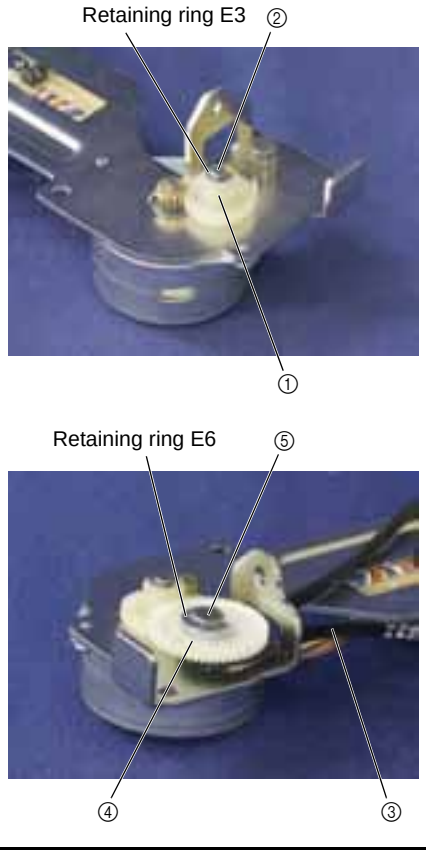
3 Attachment of X gear / X driving gear

1. Attach the X gear ① to the shaft ② of the main frame assy., and then attach the retaining ring E3.
2. Attach the washer, the T belt 40S2M400 ③ and the X driving gear ④ to the shaft of the main frame assy., and then attach the retaining ring E6.

***Key point**

- Check the T belt 40S2M400 ③ hang on the gear of the bottom side of the X driving gear ④.

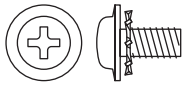
Apply EPNOC AP(N)O to the shaft of the ② and ⑤.	Bead XC8387***
Apply EPNOC AP(N)O to the gear part of the X driving gear, the X gear and the XPM gear.	Thinly all surface XC8387***

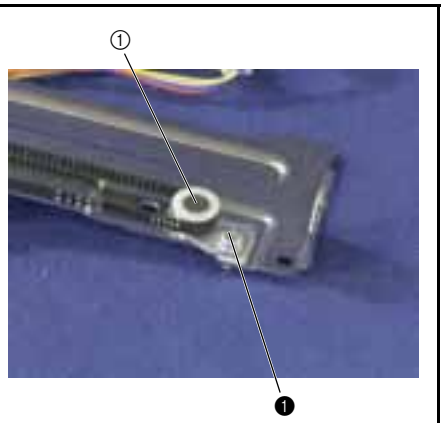


4 Attachment of X tension pulley assy.

1. Set the X tension pulley assy. ① to the main frame assy., and then tighten the screw ❶ temporarily.

***Key point**
- Check that the positioning hole of the X tension pulley assy. ① engaged with the boss part of the main frame assy..
- Fully tighten the screw after performing "4-25 Adjustment of timing belt tension (embroidery unit)".

❶		Screw 4X8F	Torque Free tighten

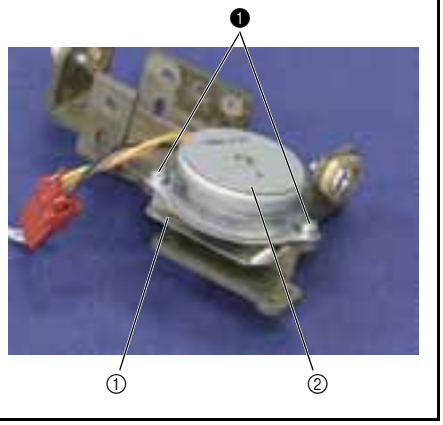


5 Attachment of YPM

1. Attach the cord guide ① and the YPM ② to the X carriage guide plate assy. with the 2 screws ❶.

Lubricate the YPM bearing with FBK OIL RO 100.	1-2 drops XC8387***

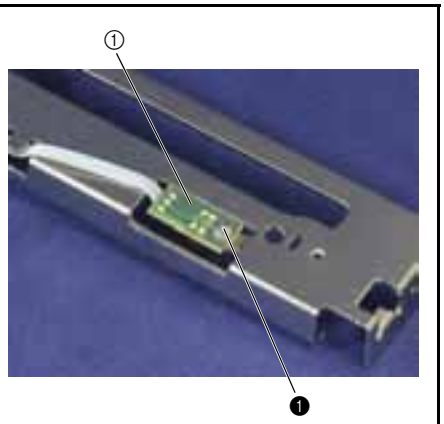
❶		Screw, Pan (S/P washer) M3X6	Torque 0.78 – 1.18 N·m



6 Attachment of YSENS PCB assy.

1. Attach the YSENS PCB assy. ① to the X carriage with the screw ❶.

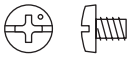
❶		Screw, Bind M2X4	Torque 0.29 – 0.49 N·m

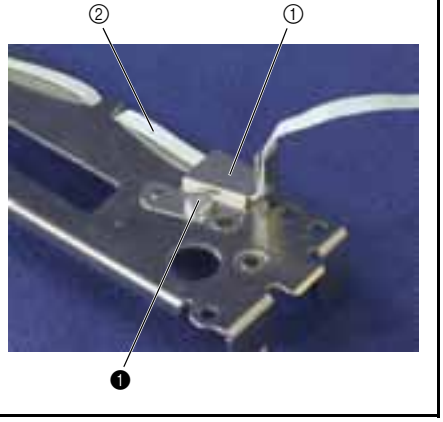


7 Attachment of Cord holder

1. Attach the cord holder ① to the X carriage assy. with the screw ❶.

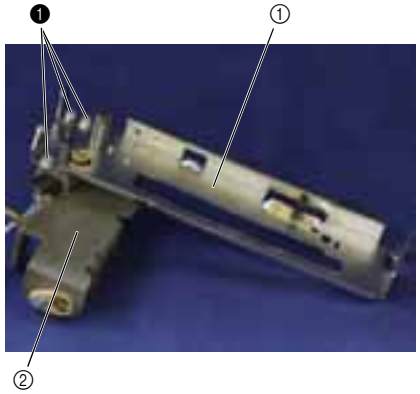
***Key point**
- Check that the positioning hole of the cord holder ① engaged with the boss part of the X carriage assy..
- Check that the lead wire of the YSENS PCB assy. ② go through the bottom side of the cord holder ①.

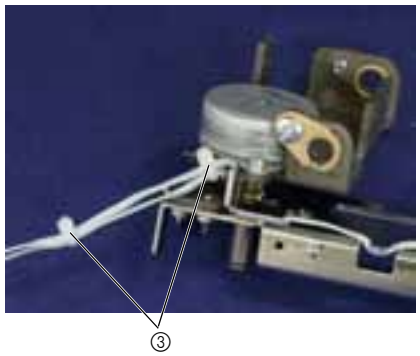
❶		Screw, Bind M3X4	Torque 0.78 – 1.18 N·m



8 Attachment of X carriage assy.

1. Attach the X carriage assy. ① to the X carriage guide plate assy. ② with the 3 screws ❶.
2. Bind up the 2 lead wires with the 2 bands ③.



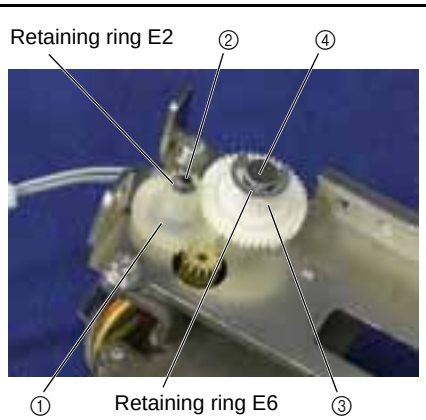


❶		Screw, Pan (S/P washer) M3X6	Torque 0.78 – 1.18 N·m

9 Attachment of Y driving gear / Y gear

1. Attach the Y gear ① to the shaft ② of the X carriage assy., and then attach the retaining ring E2.
2. Attach the Y driving gear ③ to the shaft ④ of the X carriage assy., and then attach the retaining ring E6.

Apply EPNOC AP(N)O to the shaft of the ② and ④.	Bead XC8387***
Apply EPNOC AP(N)O to the gear part of the Y driving gear, the Y gear and the YPM gear.	Thinly all surface XC8387***



10 Attachment of Y carriage

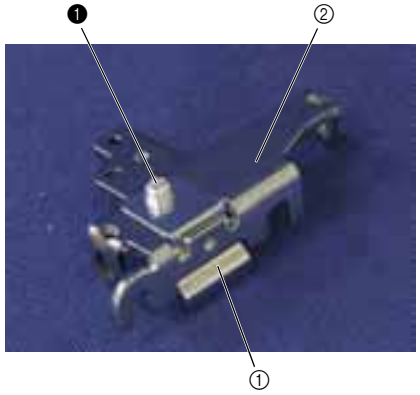
1. Attach the notched spring ① to the Y carriage with the screw ❶.

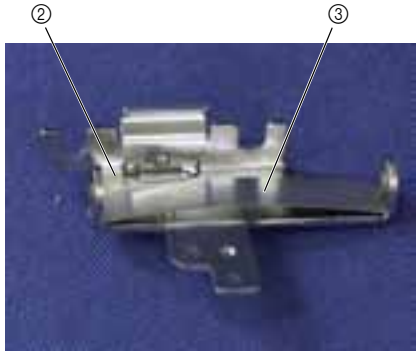
   ***Key point**
   - Check that the positioning hole of the notched spring ① engaged with the boss part of the Y carriage ②.
2. Attach the Y presser plate ③ to the Y carriage ②.
3. Attach the retaining ring E4 to the groove of the outside of the Y guide shaft ④.
4. Insert the Y guide shaft ④ in order of the washer, wave spring ⑤, the X carriage assy., the Y carriage ②, X carriage assy., and then attach the 2 retaining ring E4.

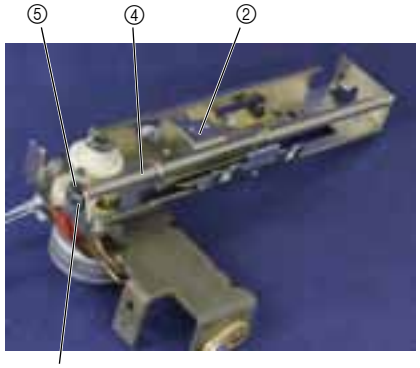
   ***Key point**
   - Set the X carriage assy. as shown in the right figure, and then Insert the Y guide shaft ④ from the left side.

Apply EPNOC AP(N)O to the Y guide shaft.	Small amount XC8387***
Apply EPNOC AP(N)O to the sliding part of the Y slider.	Small amount XC8387***

❶		Screw, Pan (S/P washer) M3X5DA	Torque 1.18 – 1.57 N·m

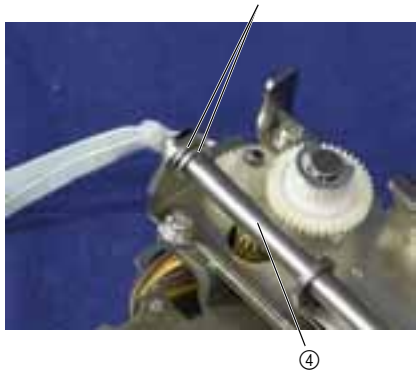






Retaining ring E4

Retaining ring E4



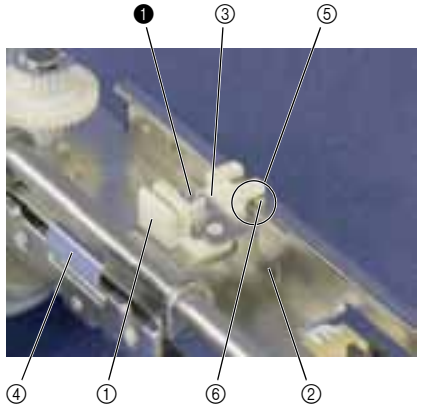
11 Attachment of Y slider

1. Attach the Y slider ①, the Y shutter ② and the shutter presser plate ③ to the Y carriage ④ with the screw ❶.

***Key point**

- Check that the groove ⑤ of the Y slider ① engaged with the rib ⑥ of the X carriage assy..
- Check that the boss part of the Y slider ① engaged with the positioning hole of the Y shutter ② and the shutter presser plate ③.

❶		Screw, Pan (S/P washer) M3X7	Torque 0.78 – 1.18 N·m



12 Attachment of Y tension pulley assy.

1. Set the Y tension pulley assy. ① to the X carriage assy., and then tighten the screw ❶ temporarily.

***Key point**

- Fully tighten the screw after performing "4-25 Adjustment of timing belt tension (embroidery unit)".

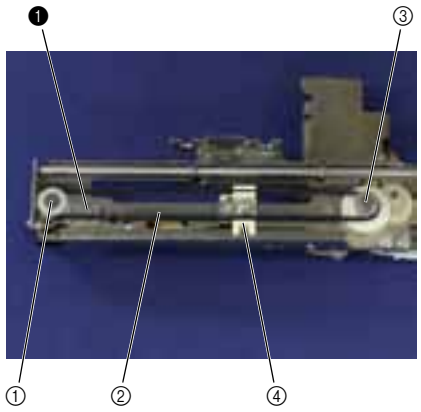
2. Hang the T belt ② on the Y tension pulley assy. ① and the Y driving gear ③.

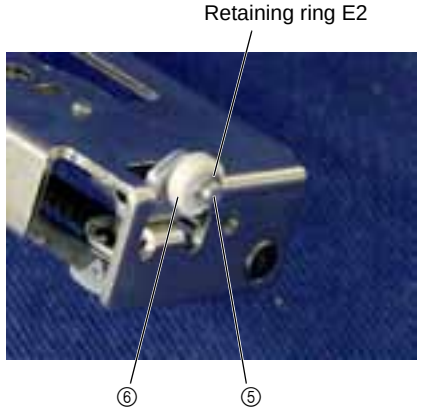
***Key point**

- Check that the tooth engaged, when attach the T belt to the Y slider ④.

3. Insert the roller assy. ⑥ into the shaft ⑤ of the Y tension pulley assy. ①, and then attach the retaining ring E2.

❶		Screw, Pan (S/P washer) M3X6	Torque Free tighten



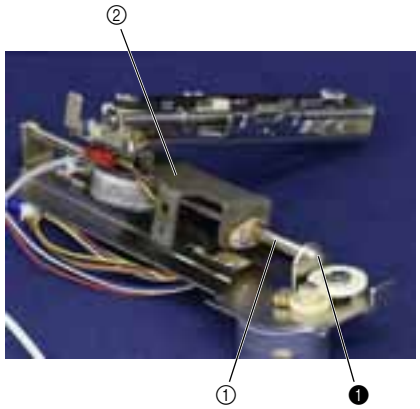


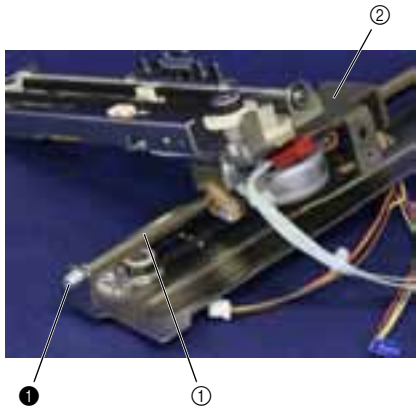
13 Attachment of X carriage guide plate assy. / X guide shaft

1. Insert the X guide shaft ① into the X carriage guide plate assy. ②.
2. Attach the X guide shaft ① to the main frame assy. with the 2 screws ❶.

Apply EPNOC AP(N)O to the X guide shaft.	Small amount XC8387***

❶		Screw, Pan (S/P washer) M4X8	Torque 1.18 – 1.57 N·m





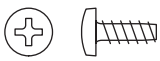
14 Attachment of X slider

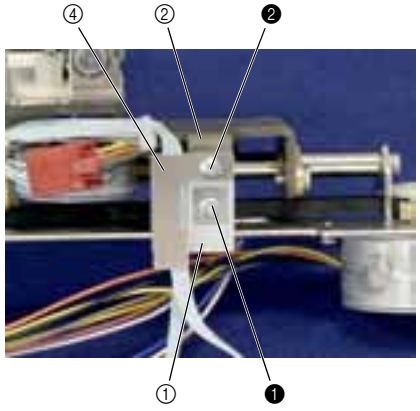
1. Attach the X slider ① to the X carriage guide plate assy. ② with the screw ❶.

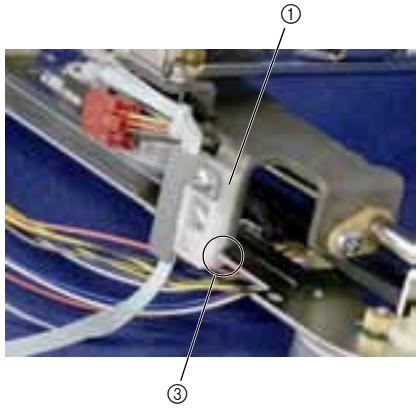
   ***Key point**
   - Check that the boss part of the X slider ① engaged with the positioning hole of the X carriage guide plate assy. ②.
   - Check that the groove ③ of the X slider ① engaged with the rib of the main frame assy..
2. Attach the cord presser ④ to the X slider ① with the screw ❷.

   ***Key point**
   - Check that the 2 cords is between the X slider and the cord presser ④.

Apply EPNOC AP(N)O to the sliding part of the X slider.	Small amount XC8387***

❶		Screw, Pan (S/P washer) M4X8	Torque 0.78 – 1.18 N·m
❷		Taptite, Bind P M3X8	Torque 0.59 – 0.78 N·m





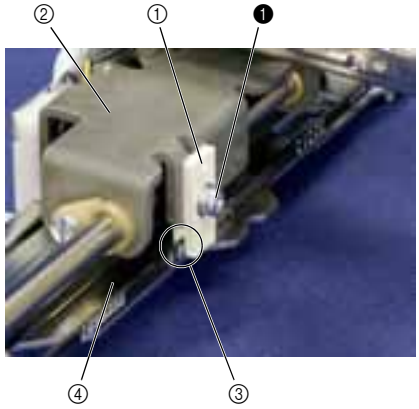
15 Attachment of X belt presser

1. Attach the X belt presser ① to the X carriage guide plate assy. ② with the screw ❶.

***Key point**

- Check that the tooth engaged, when Insert the T belt 40S2M400 ④ into the groove ③ of the X belt presser ①.

❶		Screw, Pan (S/P washer) M4X8	Torque 0.78 – 1.18 N·m



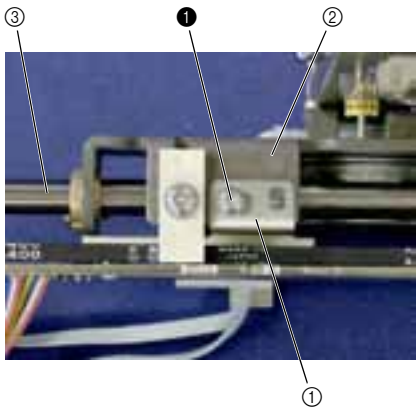
16 Attachment of X shutter

1. Attach the X shutter ① to the X carriage guide plate assy. ② with the screw ❶.

***Key point**

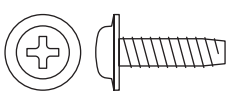
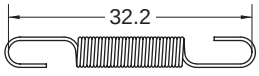
- Check that the positioning hole of the X shutter ① engaged with the boss part of the X carriage guide plate assy. ②.
- Check that the X shutter ① is parallel to the X guide shaft ③.

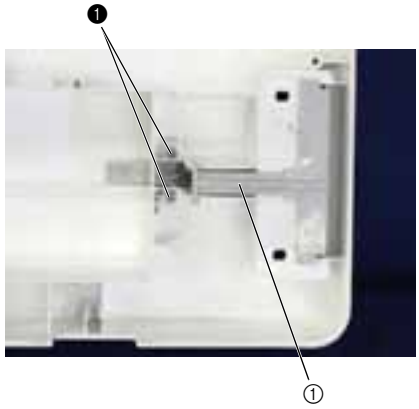
❶		Screw, Pan (S/P washer) M3X5DA	Torque 0.78 – 1.18 N·m



17 Attachment of Handle

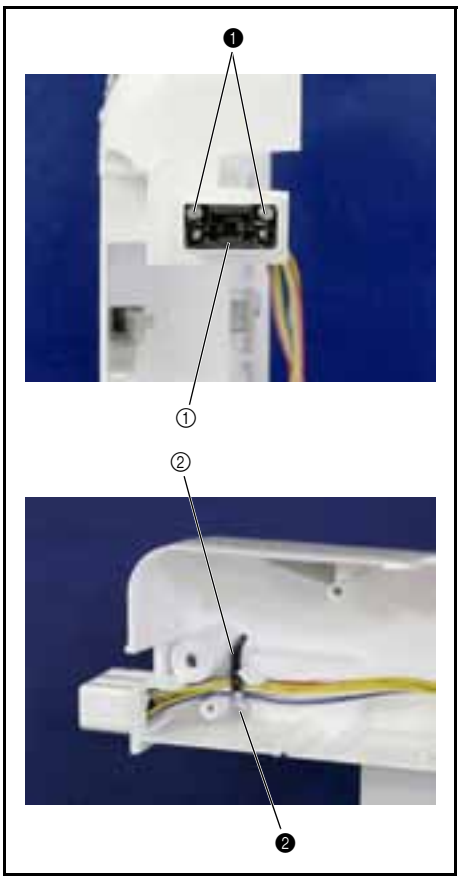
1. Attach the spring S17 to the handle ①.
2. Attach the handle ① to the ES cover D with the 2 screws ❶.

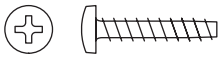
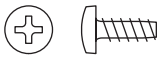
❶		Taptite, Cup B M4X14	Torque 0.59 – 0.78 N·m
S17		32.2	Spring XA1988***



18 Attachment of lead wire assy,: EMB unit

1. Attach the lead wire assy.: EMB unit ① to the ES cover D with the 2 screws ❶.
2. Attach the coaching clip ② to the ES cover D with the screw ❷.
3. Hold on the lead wire with the coaching clip ②.



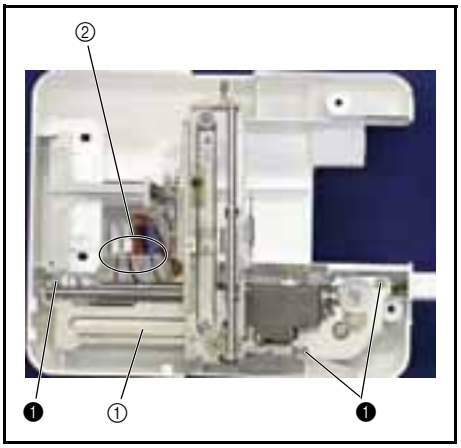
❶		Taptite, Bind P M3X16	Torque 0.59 – 0.78 N·m
❷		Taptite, Bind P M3X8	Torque 0.78 – 1.18 N·m

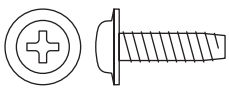
19 Attachment of Main frame assy.

1. Attach the main frame assy. ① to the ES cover D with the 3 screws ❶.

   ***Key point**
   - Set the embroidery as shown in the right figure, and then move the X carriage assy. to the right side.
2. Connect the 4 connectors, and then hang the 4 lead wires on the guide part ② of the ES cover D.

   ***Key point**
   - Refer to "Special Instructions of Wiring".

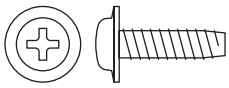


❶		Taptite, Cup B M4X14	Torque 0.78 – 1.18 N·m

20 Attachment of ES cover U

1. Set the ES cover U ① to the ES cover D.

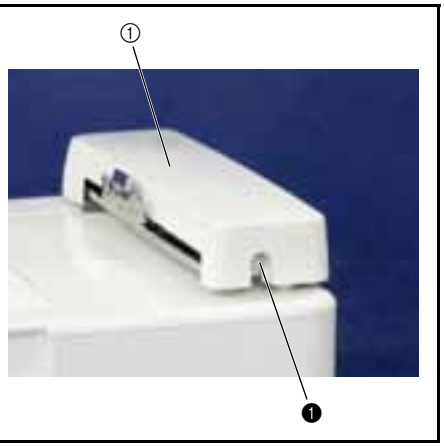
   ***Key point**
   - Set the embroidery as shown in the right figure, and then move the X carriage assy. to the left side.
2. Attach the ES cover U with the 4 screws ❶.

❶		Taptite, Cup B M4X14	Torque 0.78 – 1.18 N·m

21 Attachment of Carriage cover

1. Set the carriage cover ① to the X carriage assy. with the screw ❶.

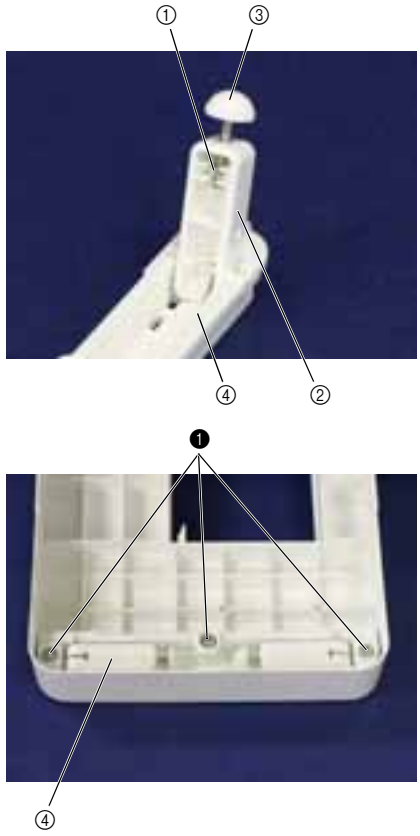
   ***Key point**
   - Check that the attaching groove of the carriage cover ① engaged with the rib of the X carriage assy..

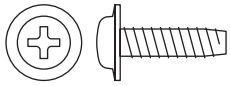


❶		Screw, Pan (S/P washer) M3X6	Torque 0.78 – 1.18 N·m

22 Attachment of ES foot cover

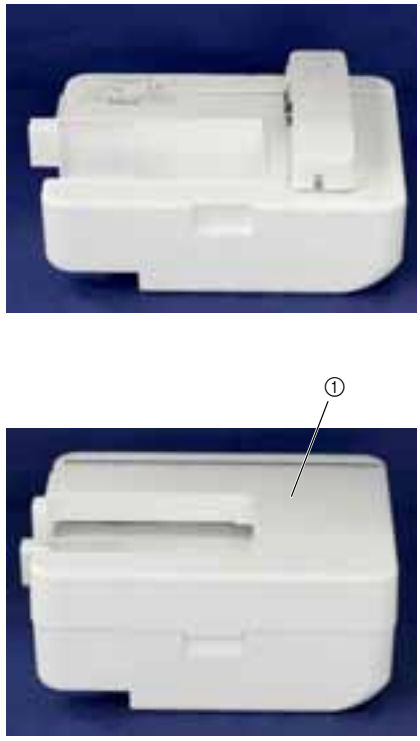
1. Attach the 2 nut 2 M4 ① to the 2 ES foot ②.
2. Attach the 2 adjusting foot ③ to the 2 ES foot ②.
3. Attach the 2 ES foot ② to the ES foot cover ④.
4. Attach the ES foot cover ④ to the ES top cover with the 3 screws ❶.



❶		Taptite, Cup B M4X14	Torque 0.78 – 1.18 N·m

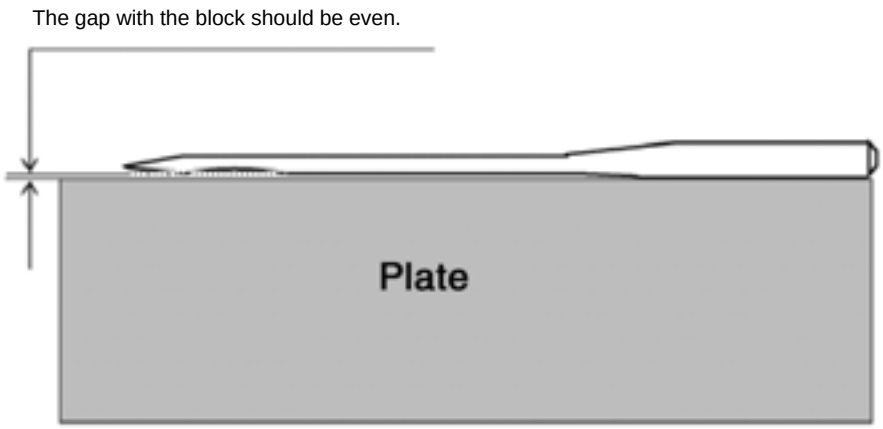
23 Attachment of ES top cover

1. Set the embroidery as shown in the right figure, and then set the Y carriage assy. from the left side at the position of around 40mm.
2. Attachment the ES top cover ① to the embroidery.

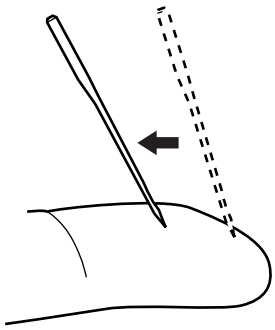


4 Adjustment

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

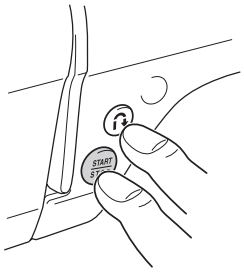


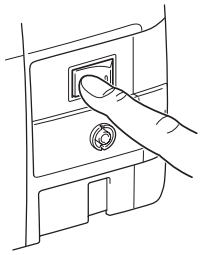
2. Touch the tip of the needle to your finger, and check to be sure it does not catch.



1. Starting test mode

   Press the (START / STOP) (Start / Stop button) and the (Reverse stitch button) while turning the power on; the buzzer will sound four times, and test mode will start.





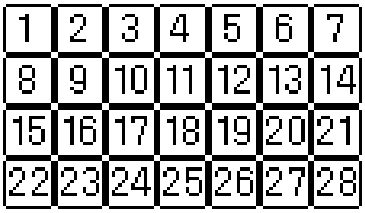
2. Starting and stopping operation

   Press the (START / STOP) (Start / Stop button) .

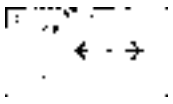
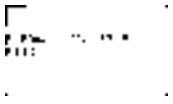
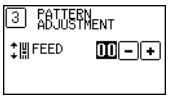
3. Return to test mode selection screen.

   When the test mode stops, press the button on the touch panel. (Back key).

Test mode selection screen



4. List of the Test Mode

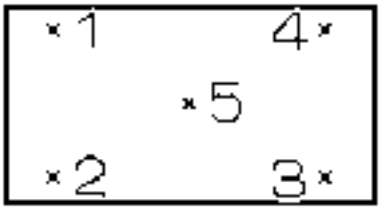
Mode	Test mode No.	Z (zigzag) operations	F (feed) operations	Operation speed	Adjustment used	Reference page
3 point needle drop 	4	The selecting of the base line operate with the arrow on the screen.	None	It is freely changed with the Sewing speed controller	Adjustment of three point needle drop	4 - 8
					Adjustment of needle interference left / right	4 - 9
					Adjustment of needle bar rise	4 - 10
					Adjustment of needle bar height	4 - 11
					Adjustment of clearance between the needle and the rotary hook point	4 - 12
Forward and reverse feed 	13	100 stitches forward on the left base line 100 stitches reverse on the right base line			Adjustment of feed	4 - 15
Pattern adjustment 	3	Produce the one point pattern.		Adjustment is impossible	Adjustment of pattern	4 - 24

1. Hold the (START / STOP) (Start / Stop button), the (Reverse stitch button) and the (Needle position button) , and turn on the power.
2. Press the [x] parts of [x1], [x2], [x3], [x4] and [x5] displayed on the screen in order

   ***Key point**
   - When press [x5], the adjustment is completion when the displayed the [SUCCESS].
   - When press [x5], the adjustment is not completion when the displayed the [ERROR]. Push again from the position of [x1].

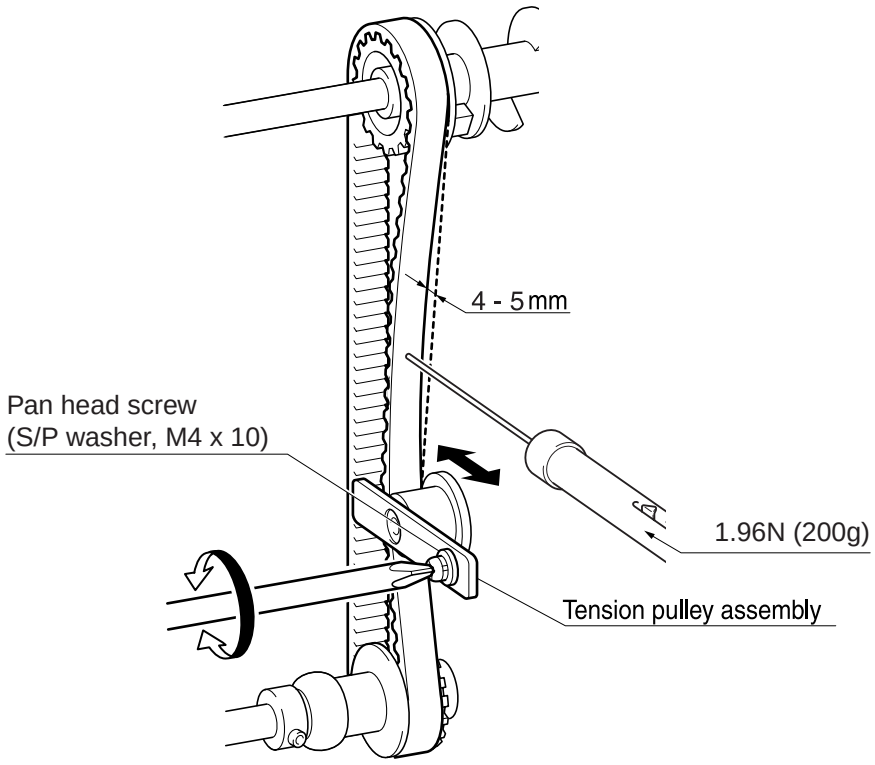
   ***NOTE**
   - When press the screen, use the attached the touch pen. Be absolutely sure not to use things with sharp tips or hard tips.
3. Turn the power on again, and check to see that the screen display and the touch panel positions match.

Touch panel position adjustment screen



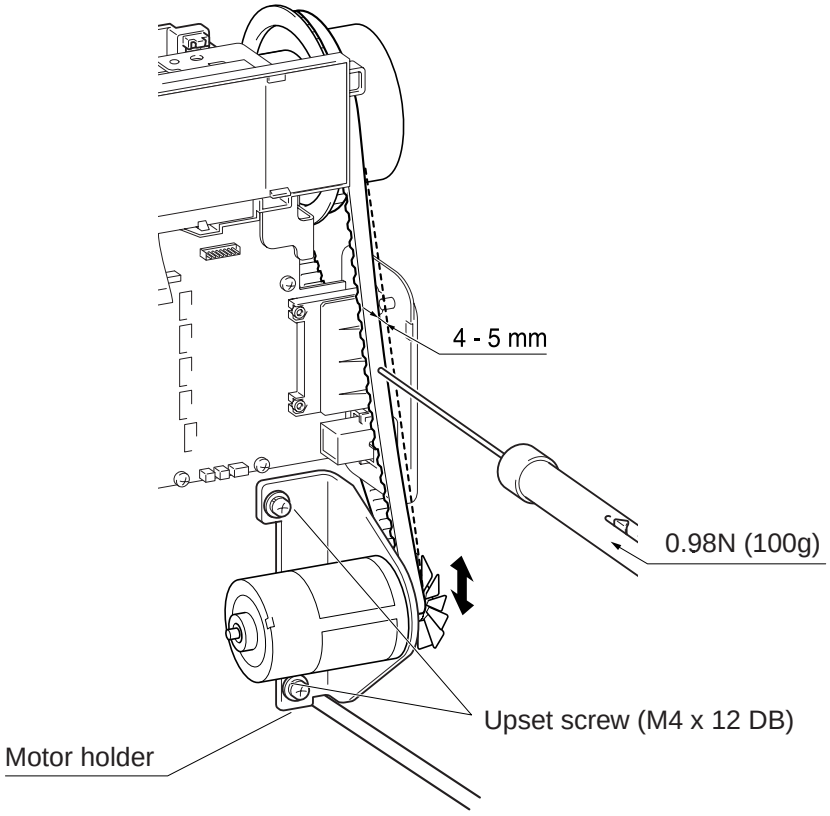
1. Remove the front cover.
2. Loose the pan head screw (S/P washer, M4 x 10) on the tension pulley assembly.
3. **With a force of 1.96 N (200 g) pushing on the center of the belt, adjust the tension pulley assembly position for a deflection of 4 - 5 mm.**
4. Tighten the pan head screw (S/P washer, M4 x 10) on the tension pulley assembly. (torque : 1.18 - 1.57N · m)

XC2277001	Push-pull gauge



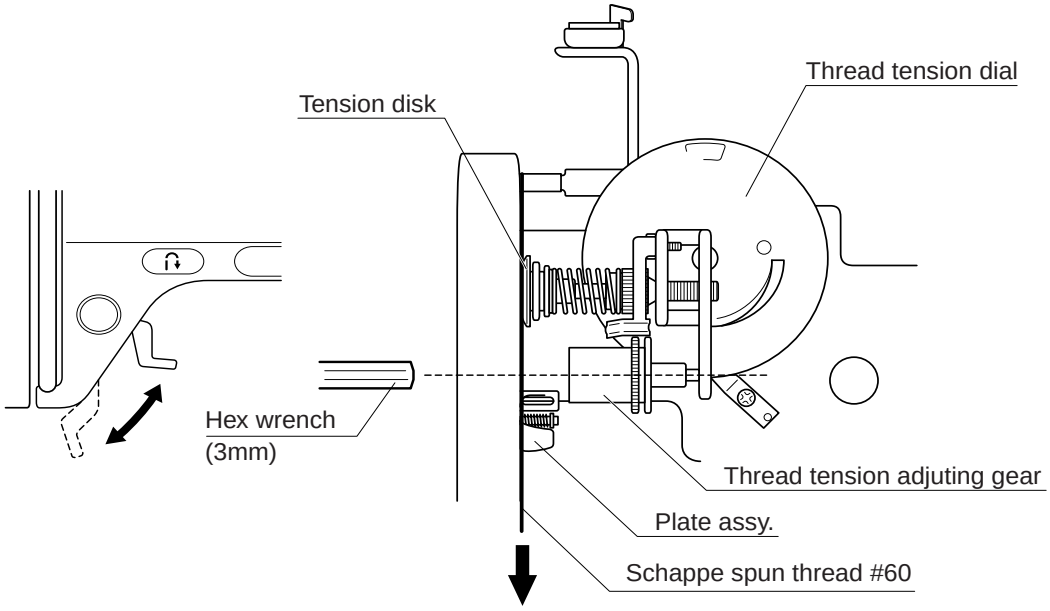
1. Remove the front cover.
2. Loose the 2 upset screw (M4 x 12 DB) in the motor holder.
3. **With a force of 0.98 N (100 g) pushing on the center of the belt, adjust the motor pulley position for a deflection of 4 - 5 mm.**
4. Tighten the 2 upset screw (M4 x 12 DB) in the motor holder. (torque : 1.18 - 1.57N · m)

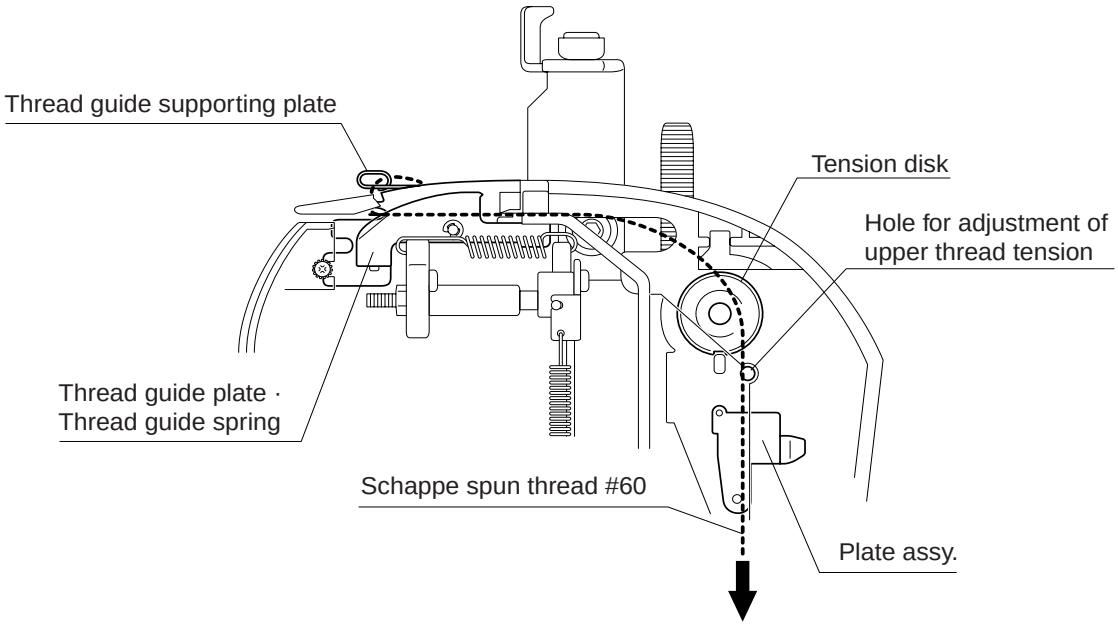
XC2277001	Push-pull gauge



1. Remove the face plate assy..
2. Turn the thread tension dial to the " 4 ".
3. Raise the presser foot lever.
4. Pass the Schappe spun thread #60 through the thread guide supporting plate => thread guide plate · thread guide spring => tension disk => plate assy.
5. Lower the presser foot lever.
6. **Pull thread by tension gauge, and turn the thread tension adjusting gear, and adjust the tension to 0.32 to 0.42N (33 to 43g).**

XA9154001	Tension gauge 50 (0.5 N)

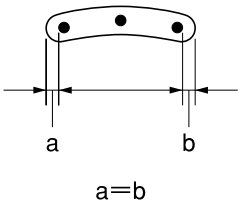


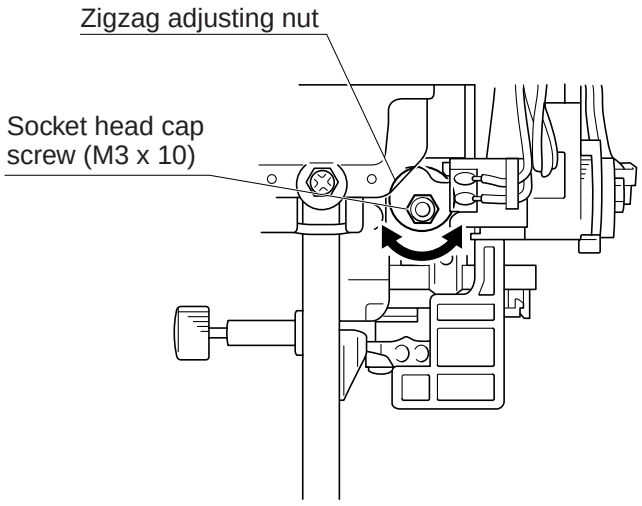


1. Remove the face plate assy., and the presser foot.
2. Attach the #11 needle.
3. Start the test mode, and then select the test mode number [4].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"
4. Press the [←], and then adjust the needle bar so that the left base line.
5. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
6. Loose the socket head cap screw (M3 x 10) of the zigzag adjusting nut.
7. **Turn the zigzag adjusting nut, and adjust clearance between the needle top and the edge of the needle hole must be same at the base line of left and right.**
8. Tighten the head cap screw (M3 x 10). (torque : 0.78 - 1.18N · m)

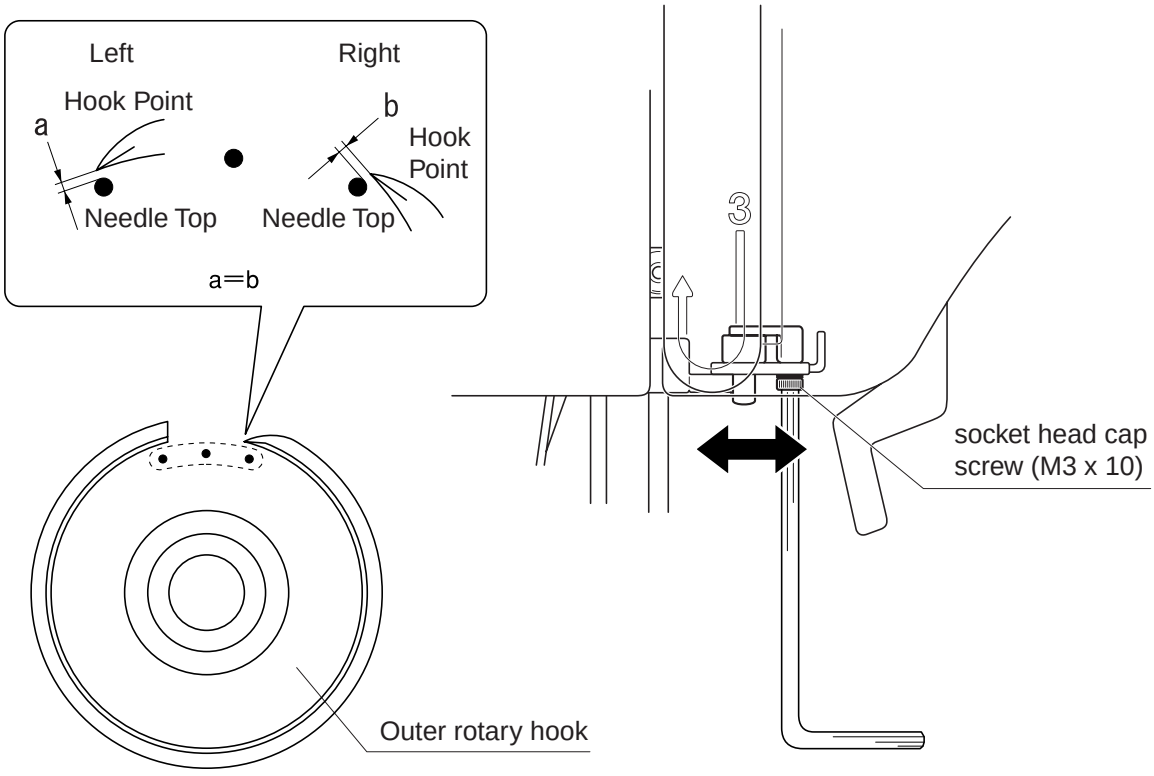
XE2395001	Box screw driver 6





1. Remove the presser foot, the needle plate A and the needle plate B, and then remove the inner rotary hook.
2. Attach the #11 needle.
3. Start the test mode, and then select the test mode number [4].

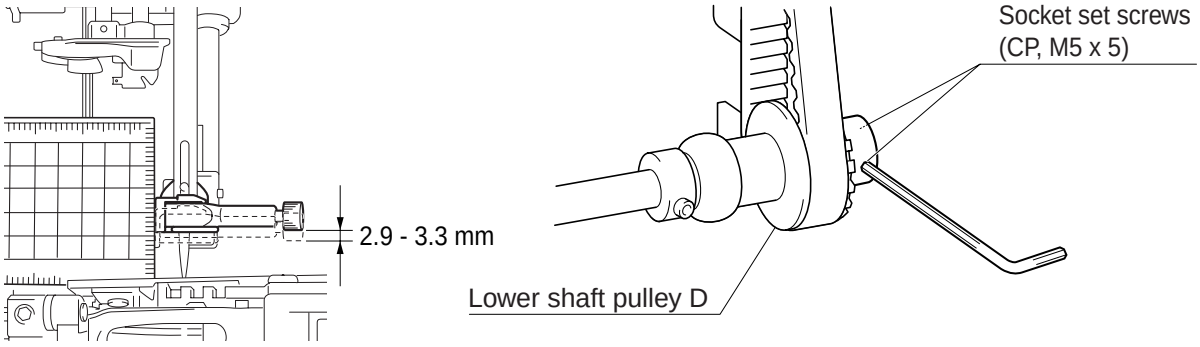
   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"
4. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
5. Loose the socket head cap screw (M3 x 10) of the needle holder block.
6. **Move the needle holder shaft block to the left and right, and adjust clearance between needle top and outer rotary hook point must be same at the base line of left and right.**
7. Tighten the socket head cap screw (M3 x 10) of the needle holder block. (torque : 0.78 - 1.18N · m)

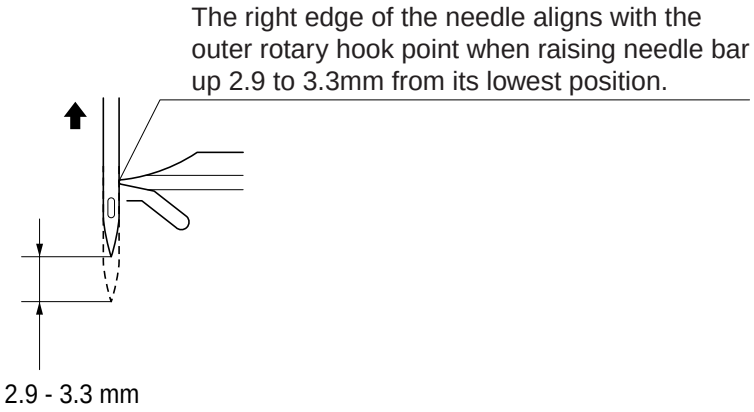


1. Start the test mode, and then select the test mode number [4].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"

2. Press the [←], then needle moves to the left, and then turn the power off.
3. Remove the face plate assy., and the front cover assy..
4. Remove the presser foot, the needle plate A and the needle plate B, and then remove the inner rotary hook.
5. Attach the #11 needle.
6. Turn the pulley by hand, and move the needle to its lowest position.
7. Loosen the 2 socket set screws (CP, M5 x 5) on lower shaft pulley D.
8. **Turn the outer rotary hook by hand, and adjust that the right edge of the needle is aligns with the outer rotary hook point when raising needle bar up 2.9 to 3.3mm from its lowest position.**
9. Secure the 2 socket set screws (CP, M5 x 5) on lower shaft pulley D. (torque : 1.18 - 1.57N · m)





1. Start the test mode, and then select the test mode number [4].

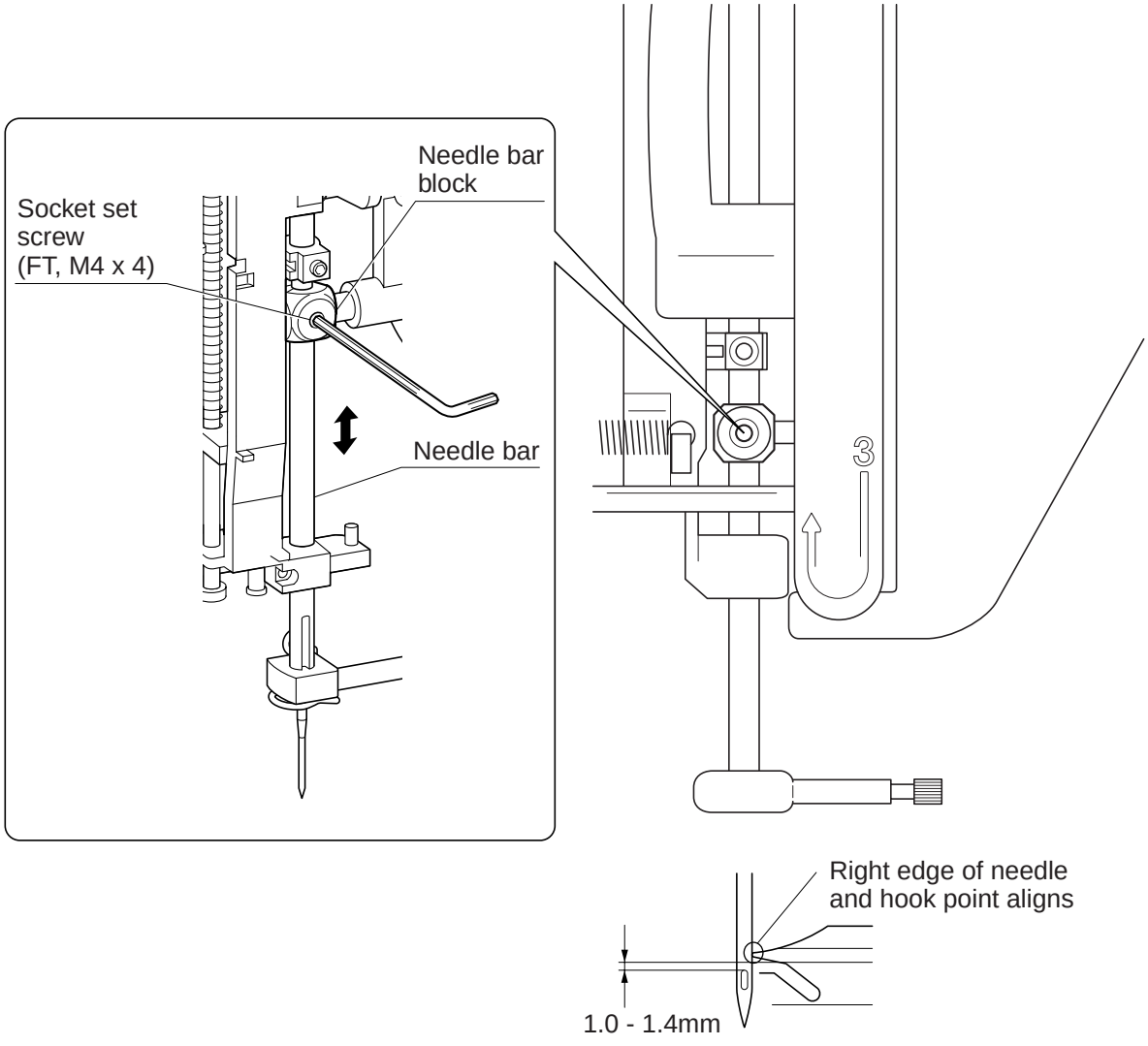
   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"

2. Press the [←], then needle moves to the left, and then turn the power off.
3. Remove the face plate assy., and the front cover assy..
4. Remove the presser foot, the needle plate A and the needle plate B, and then remove the inner rotary hook.
5. Attach the #11 needle.
6. Turn the pulley by hand until the right edge of the needle aligns with the outer rotary hook point.
7. Loose the socket set screw (FT, M4 x 4) of the needle bar block.
8. **Move the needle bar up and down, and adjust clearance between the top of the needle hole and the outer rotary hook point is 1.0 to 1.4mm.**

   ***NOTE**
   - Check the socket set screw (FT, M4 x 4) faces front.

9. Tighten the socket set screw (FT, M4 x 4) of the needle bar block. (torque : 0.78 - 1.18N · m)
10. Adjust the “Needle threader”.

    ***Key point**
    - Need to adjust "4-13 Adjustment of needle thread block" after this adjustment.

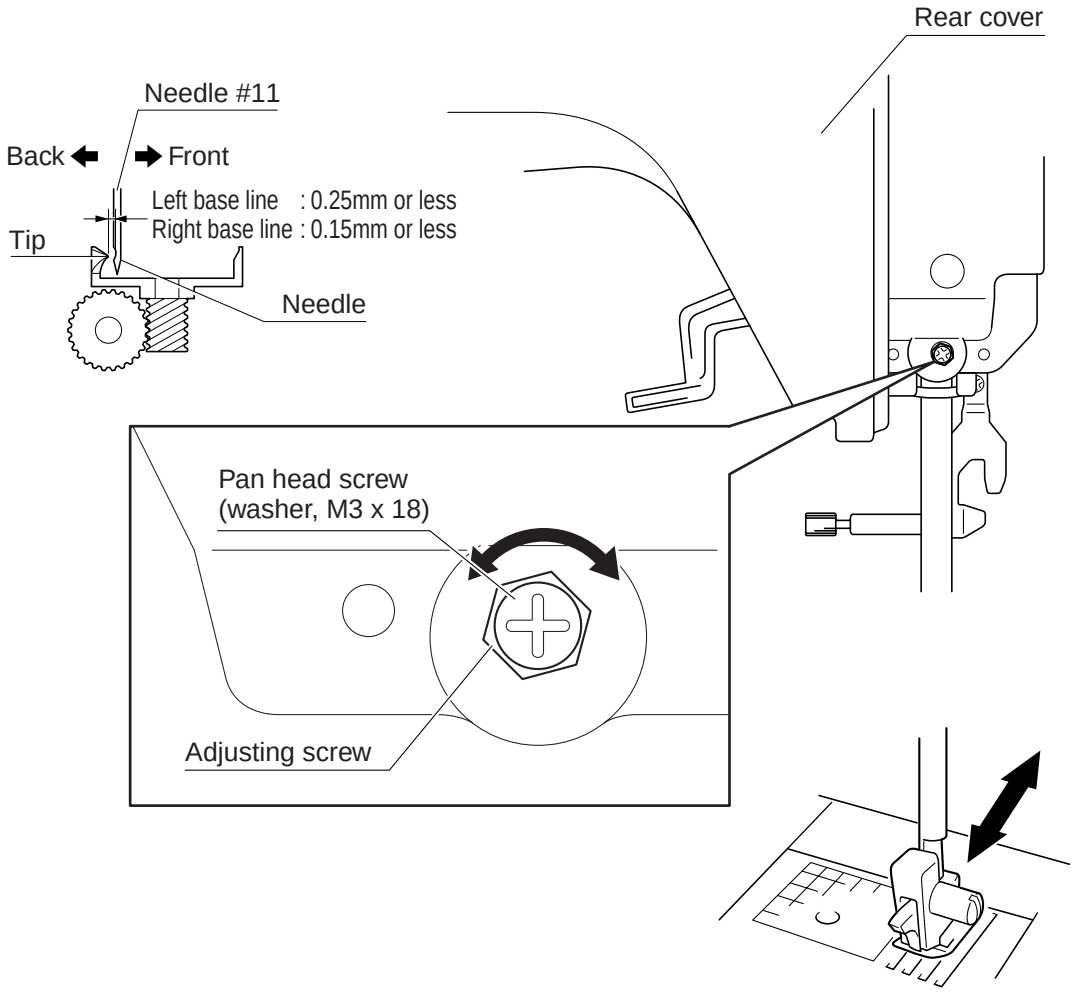


1. Start the test mode, and then select the test mode number [4].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"

2. Press the [←], then needle moves to the left.
3. Remove the face plate assy..
4. Remove the presser foot, the needle plate A and the needle plate B, and then remove the inner rotary hook.
5. Attach the needle #11.
6. Loose the pan head screw (washer, M3 x 18).
7. Turn the pulley by hand until the right edge of the needle aligns with the outer rotary hook point.
8. **Turn the adjusting screw, and adjust clearance between the needle and the outer rotary hook point (front and back) to 0.25mm or less on the left base line (0.15mm or less on the right base line).**
9. Tighten the pan head screw (washer, M3 x 18). (torque : 0.59 - 0.78N · m)

XE2395001	Box screw driver 6



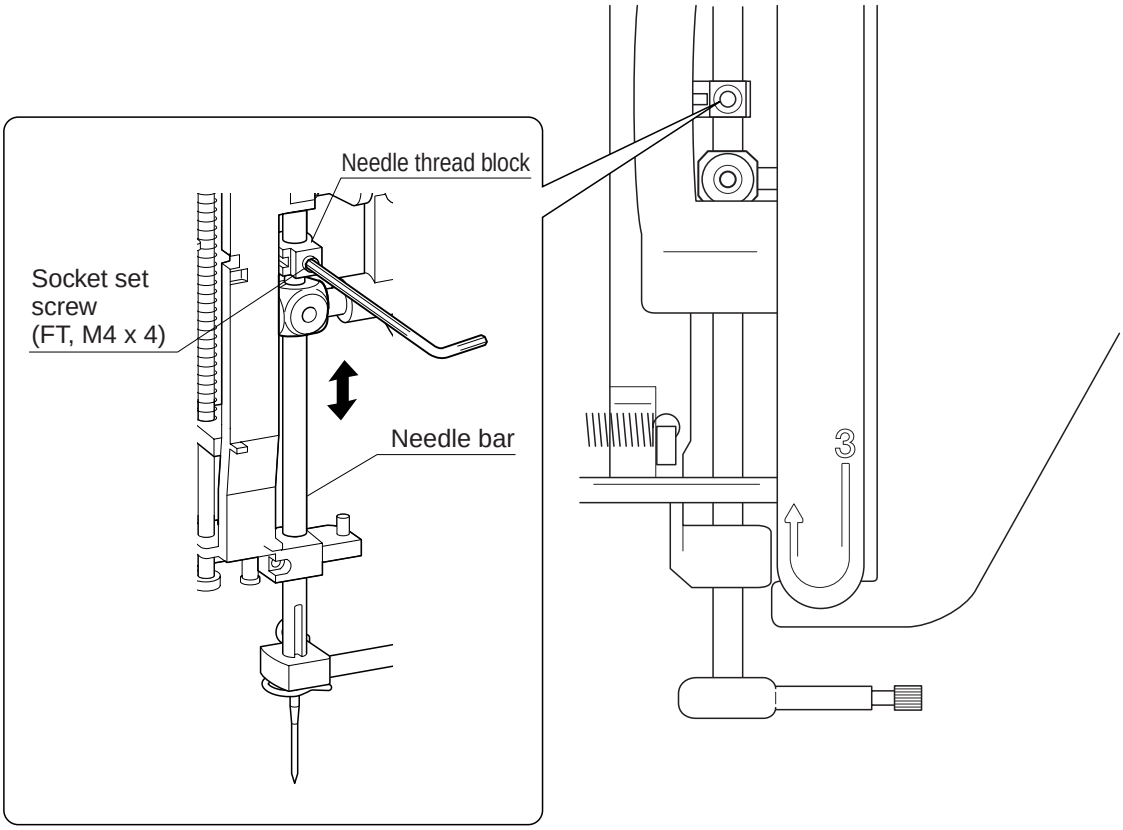
1. Remove the face plate assy..
2. Attach the #11 needle.
3. Turn the pulley by hand, and set the needle bar at its highest point.
4. Loose the socket set screw (FT, M4 x 4).
5. **Adjust the needle thread block, pass the hook of needle threader through the needle hole.**
6. **Tighten the socket set screw (FT, M4 x 4) of the needle thread block. (tightening torque: 0.78 to 1.18N·m)**

***Key point**

- Tighten the socket set screw (FT, M4 x 4) at the position slightly to the left when viewed from the front of the machine.
- Adjust so that the upper edge of the threading hook and the upper edge of the needle hole are at the same height.

***NOTE**

- In case the position of the socket set screw (FT, M4 x 4) is too left, the hook doesn't turn. (Fig.1)
- In case the position of the socket set screw (FT, M4 x 4) is too right, the needle thread block contacts the needle bar supporter assy., and get damaged. (Fig.2)



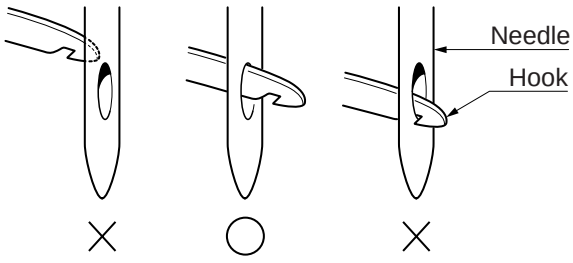


Fig. 1

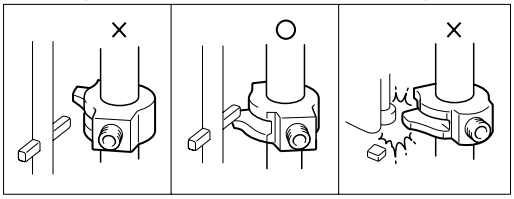
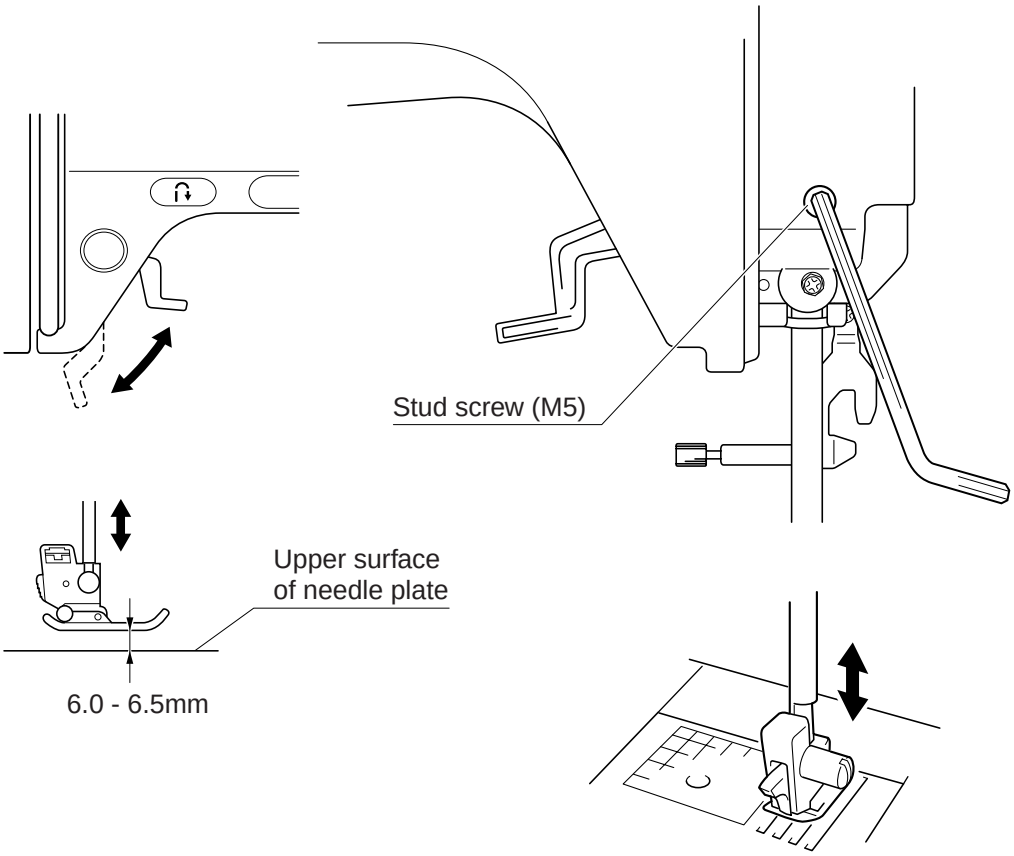


Fig. 2

1. Remove the face plate assy..
2. Attach the J presser foot.
3. Raise the presser foot lever.
4. Turn the pulley by hand and down the feed dog lower than needle plate A.
5. Loose the stud screw (M5) in the presser bar clamp assy.
6. **Adjust the needle presser bar height, clearance between the needle plate A and the bottom surface of the presser foot is 6.0 to 6.5mm.**
7. Tighten the stud screw (M5) in the presser bar clamp assy. (torque : 1.18 - 1.57N · m)

***NOTE**

- Check presser foot parallel with feed dog hole after adjusting presser bar height.



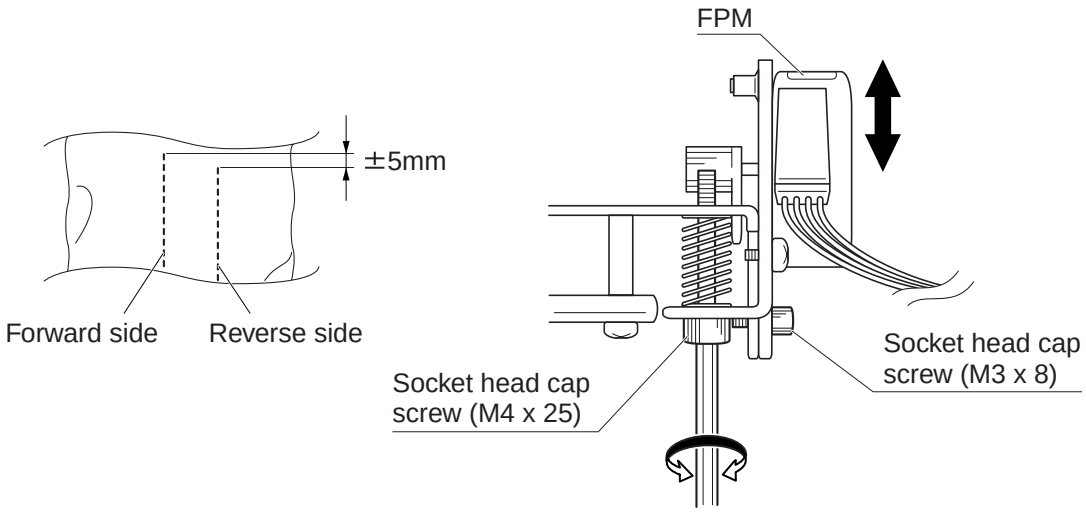
1. Attach the J presser foot.
2. Start the test mode, and then select the test mode number [13].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"

3. Insert a paper between folded broadcloth, and press the (START/STOP) (Start/Stop button), then 100 forward stitches and 100 reverse stitches starts without thread.
4. Check the forward and backward feed length.
5. Loosen the socket head cap screw (M3 x 8) of the FPM holder assy..
6. **Turn the socket head cap screw (M4 x 25), and adjust the forward and backward feed length.**

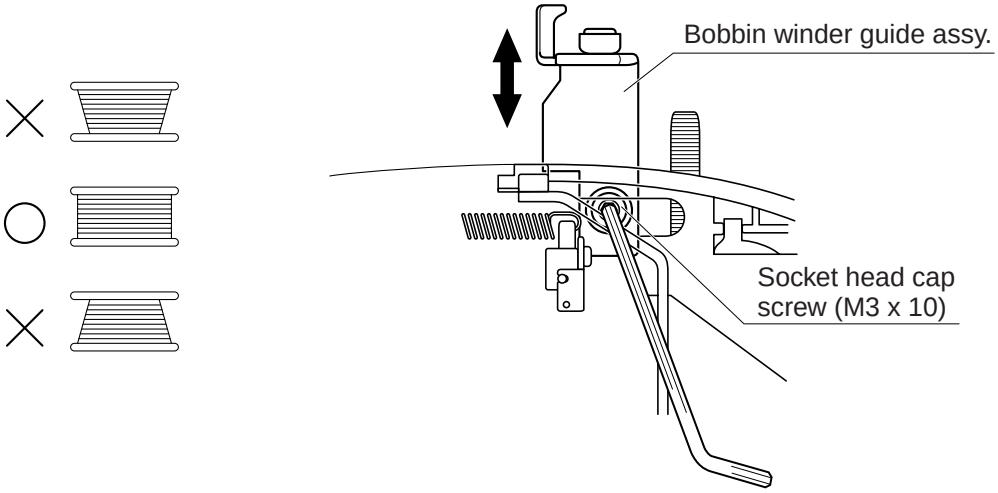
   ***Key point**
   - Adjust the distance of the forward and backward feed is less than 5mm.
   - Tightening the the socket head cap screw (M4 x 25) the backward feed shorter.
   - Loosening the socket head cap screw (M4 x 25) the backward feed longer.

7. Apply a small amount of thread locker to the socket head cap screw (M4 x 25).
8. Tighten the socket head cap screw (M3 x 8) of the FPM holder assy.. (torque : 0.59 - 0.78N · m)



Feed module lower right

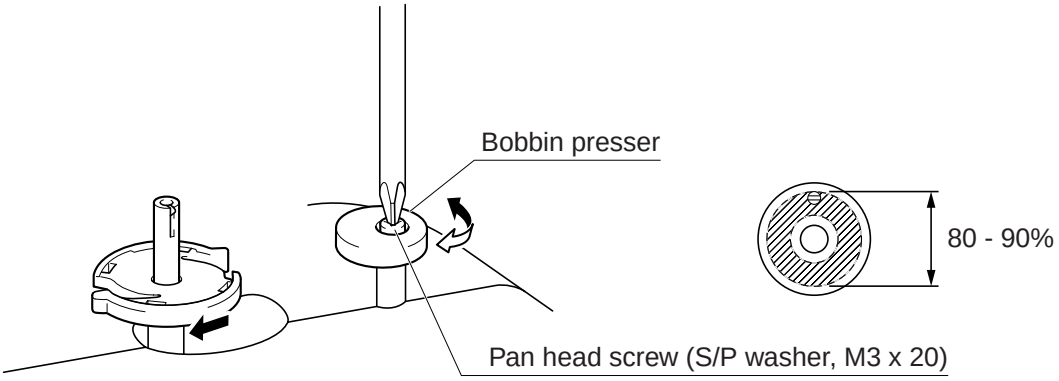
1. Remove the face plate assy..
2. Loose the socket head cap screw (M3 x 10) of the bobbin winder guide assy.
3. **Move the bobbin winder guide assy. up and down, and adjust uneven bobbin winding.**
4. Tighten the socket head cap screw (M3 x 10) of the bobbin winder guide assy. (torque : 0.59 - 0.78N · m)



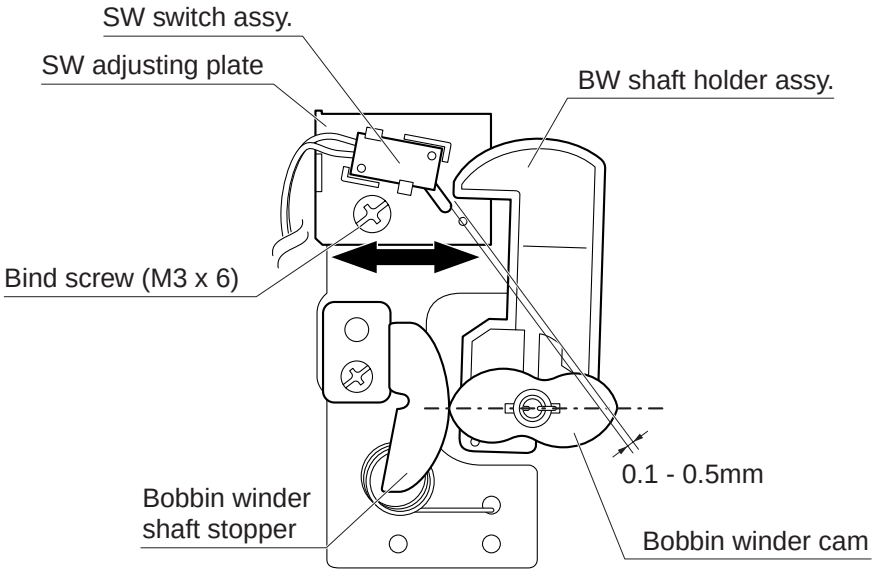
5. Loose the pan head screw (S/P washer, M3 x 20).
6. **Turn the bobbin presser left and right, and adjust the winding quantity.**
7. Tighten the pan head screw (S/P washer, M3 x 20) of the bobbin winder guide assy. (torque : 0.59 - 0.78N · m)

***Key point**

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



1. Loose the bind screw (M3 x 6) of the SW adjusting plate.
2. Set the bobbin winder cam as shown in the figure below.
3. **Move the adjusting plate left and right, and adjust clearance between the SW switch assy. and the BW shaft holder assy. is 0.1 to 0.5mm.**



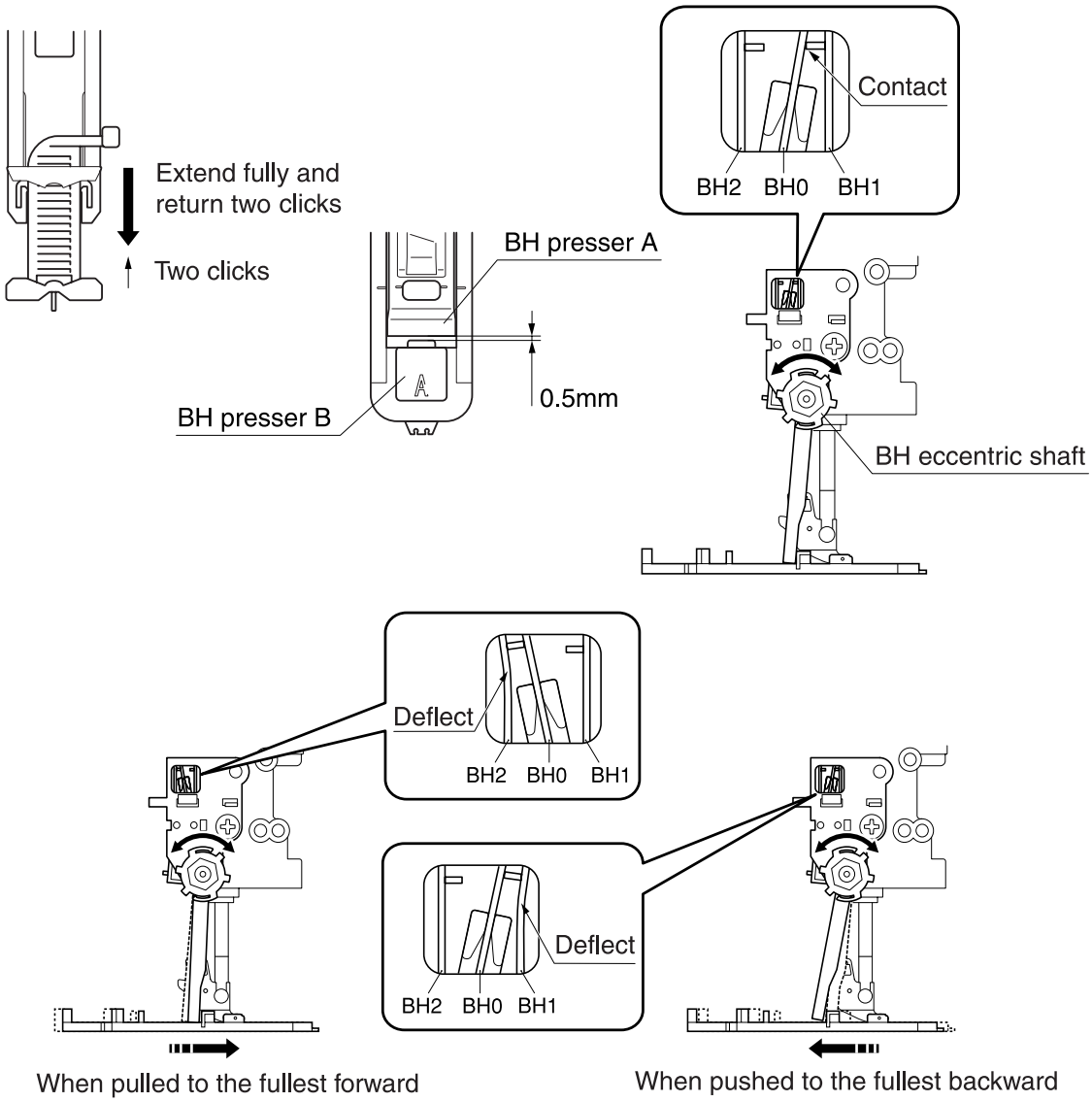
4. Tighten the bind screw (M3 x 6) of the SW adjusting plate. (torque : 0.59 - 0.78N · m)

1. Remove the face plate assy..
2. Raise the presser foot lever.
3. Extend BH presser foot maximum, back it 2 clicks.
4. Attach the BH presser foot.
5. Turn the pulley by hand, and down the feed dog lower than the needle plate.
6. Lower the presser foot lever after checking clearance between the BH presser A and the BH presser B is 0.5mm.
7. Lower the BH lever, and set it to the BH presser foot.
8. Rotate the BH eccentric shaft and adjust the BH 0 touches the BH 1.

***Key point**

Raise the presser foot lever, and the extend BH presser foot maximum, back it 2 clicks.

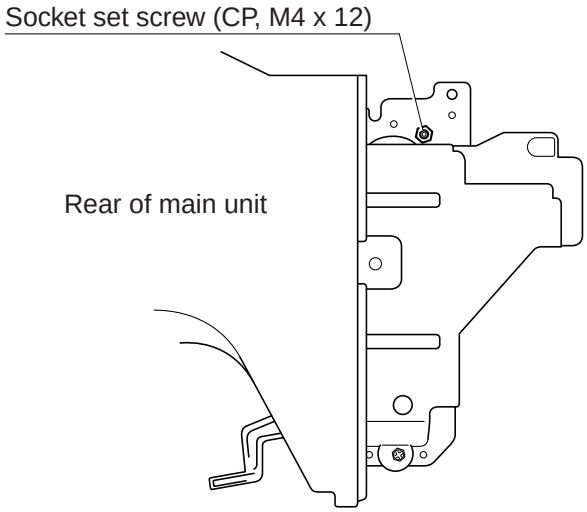
- Pull the BH presser foot forward as much as possible, and the BH 0 touches the BH 2 and the BH 2 bows a little bit.
- Push the BH presser foot back as much as possible, and the BH 0 touches the BH 1 and that BH 1 bows a little bit.

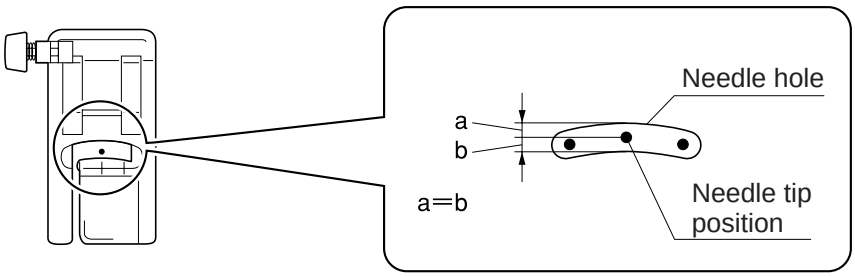


1. Remove the face plate assy..
2. Attach the #11 needle,and the J presser foot.
3. Lower the presser foot lever.
4. Turn the pulley by hand, and insert the tip of the needle into the needle hole.
5. Loose the lock nut.
6. **Turn the socket set screw (CP, M4 x 12), and adjust the clearance (front/back) between the needle tip and the needle hole must be equal.**
7. Tighten the lock nut. (torque : 0.39 - 0.49N · m)

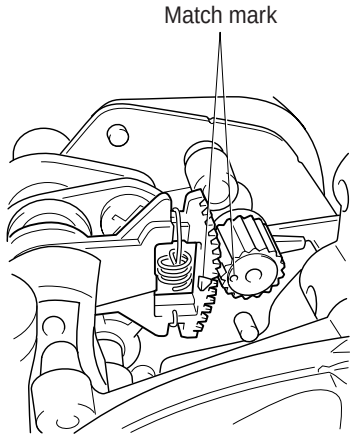
***Key point**

- Need to adjust “4 - 12 Adjustment of clearance between the needle and the rotary hook point” after this adjustment.





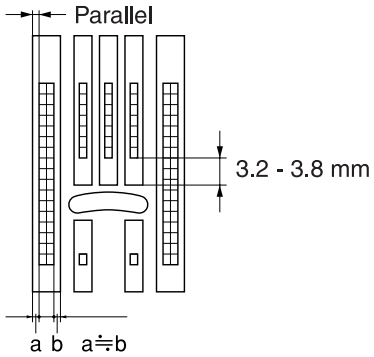
1. Remove the needle plate B, the presser foot and the needle.
2. Remove the 2 flat screws (M4), and remove the needle plate A from the feed base.
3. Align the match mark of the feed adjuster assy. gear with the match mark of the F pulse motor gear (feed in 0 mm position).



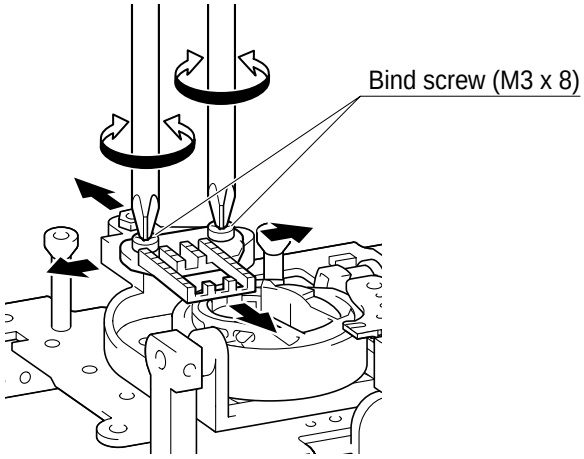
4. **Loose the 2 bind screws (M3 x 8) of the feed dog, temporarily attach the needle plate A, and adjust the front/back and left/right position of the feed dog.**

***Key point**

- Adjust the clearance (front/back) between the forward edge of the feed dog middle tooth and the needle plate A is to 3.2 to 3.8mm.
- Adjust the clearance (left/right) between the feed dog and the needle plate A must be equal.
- Do not assemble feed dog to diagonally to the needle plate A.



5. Secure the feed dog with the 2 bind screw (M3 x 8). (torque : 0.78 - 1.18N · m)
6. Fully tighten the 2 flat screws (M4), and secure the needle plate A.

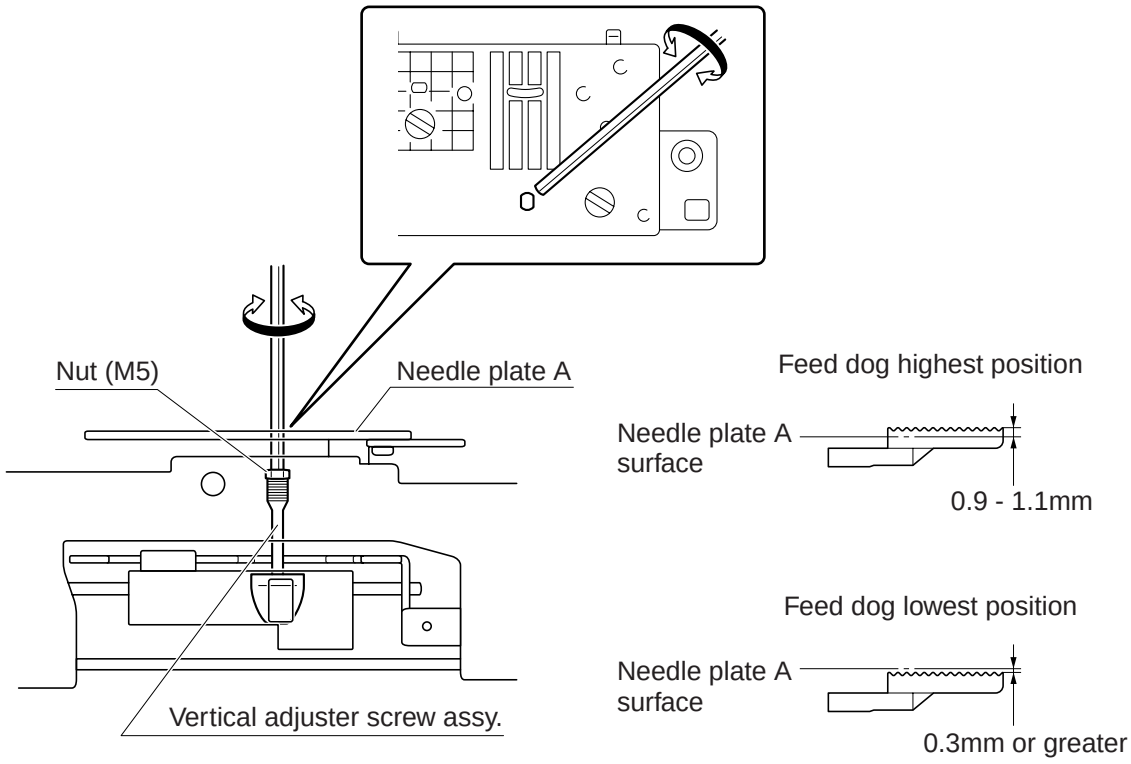


1. Remove the presser foot and needle.
2. Turn the pulley by hand to raise the feed dog to its highest position.
3. Loose the nut (M5).
4. **Turn the vertical adjuster screw assy., and adjust the the feed dog is 0.9 to 1.1mm from needle plate A surface.**
5. Tighten the nut (M5) being careful that the vertical adjuster screw assy. does not turn.
6. With the feed dog in the lowest position, check that the feed dog is 0.3 mm or more below the upper surface of the needle plate A.

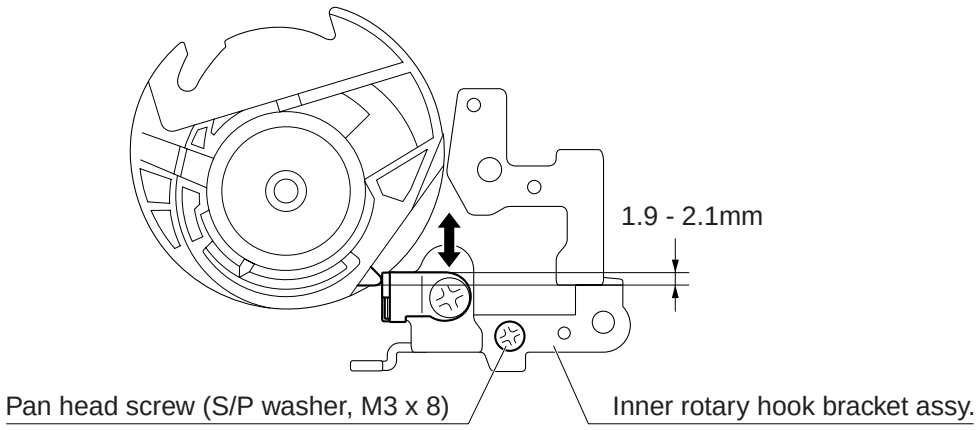
***NOTE**

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

XC2278001	Feed dog height gauge

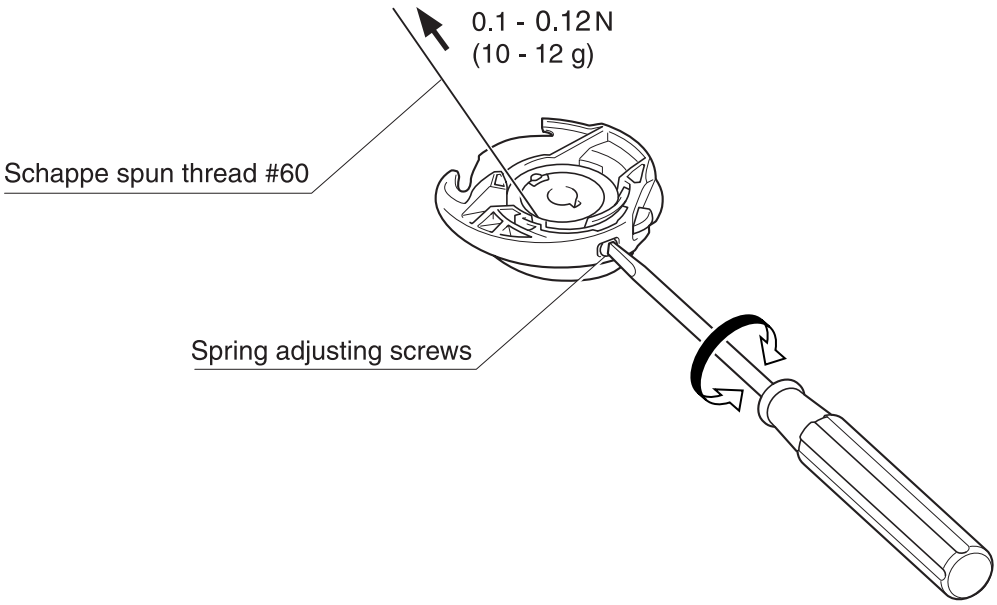


1. Remove the needle plate B.
2. Set the inner rotary hook in the outer rotary hook assy..
3. Loose the pan head screw (S/P washer, M3 x 8) securing the inner rotary hook bracket assy.
4. **Move the position of the inner rotary hook bracket assy. (forward and back), and adjust the clearance is in standard (1.9 to 2.1mm).**
5. Tighten the pan head screw (S/P washer, M3 x 8) of the inner rotary hook bracket assy. (torque : 0.59 - 0.78N · m)



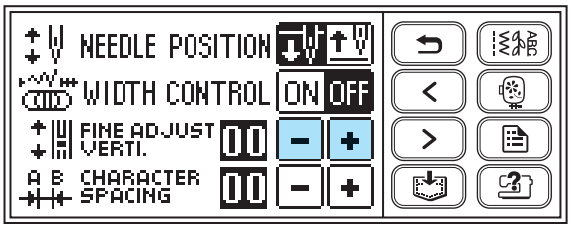
1. Set a bobbin (wound with Schappe spun thread #60) in the inner rotary hook.
2. **Pull the thread with a tension gauge, and turn spring adjusting screw, adjust the tension to 0.10 to 0.12N (10 to 12g).**
3. Apply a small amout of thread locker to the spring adjusting screw.

XA9153001	Tension gauge 30 (0.3 N)



1. Turn on the power, and press the (setting key) of the operation panel. AND set the numerical value of the adjustment of the pattern in “00” by pushing [–] and [+].

   ***Key point**
   - This operation is for NV900/NV900D series only.



2. Ready the sewing machine.

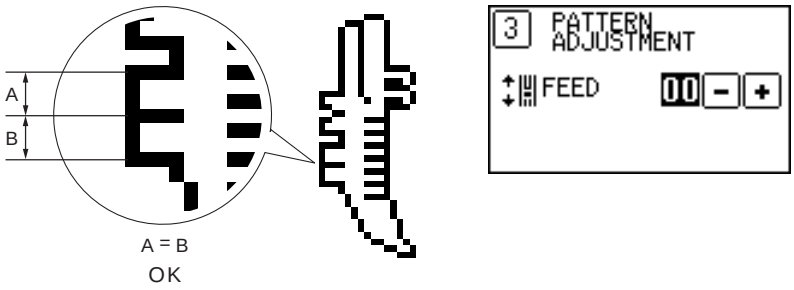
Presser foot	N presser foot
Upper thread / Lower thread	Schappe Spun thread #60
Cloth	Two-ply broadcloth
Thread tension dial position	4

3. Start the test mode, and then select the test mode number [3].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"

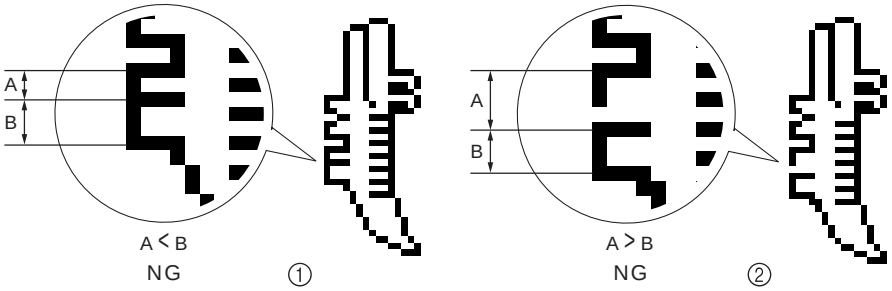
4. Lower the presser foot lever, and press the (START / STOP) (Start / Stop button).

5. **Change the correction value so that length of the A and B of the sewed pattern become the same.**



***Key point**

①Push the [+] at the time of A < B, and the correction value is enlarge.
②Push the [–] at the time of A > B, and the correction value is reduced.



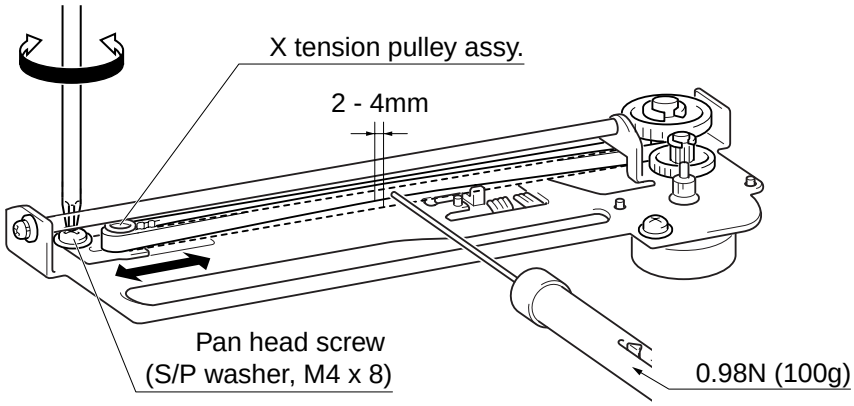
X tension belt

1. Loose the pan head screw (S/P washer, M4 x 8) of the X tension pulley assy.
2. Adjust the position of the X tension pulley assy.

Timing belt deflection with a force of approximately 1 N (100 g) applied to the middle:	2 – 4 mm

3. Tighten the pan head screw (S/P washer, M4 x 8) of the X tension pulley assy. (torque : 1.18 - 1.57N · m)

XC2277001	Push-pull gauge (3 N)



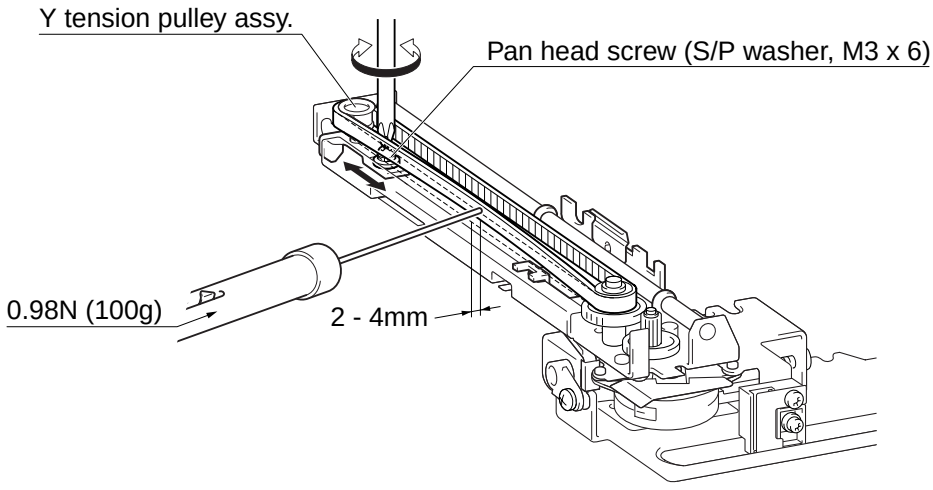
Y tension belt

1. Loose the pan head screw (S/P washer, M3 x 6) of the Y tension pulley assy.
2. Adjust the position of the Y tension pulley assy.

Timing belt deflection with a force of approximately 1 N (100 g) applied to the middle:	2 – 4 mm

3. Tighten the pan head screw (S/P washer, M3 x 6) of the Y tension pulley assy. (torque : 0.79 - 1.18N · m)

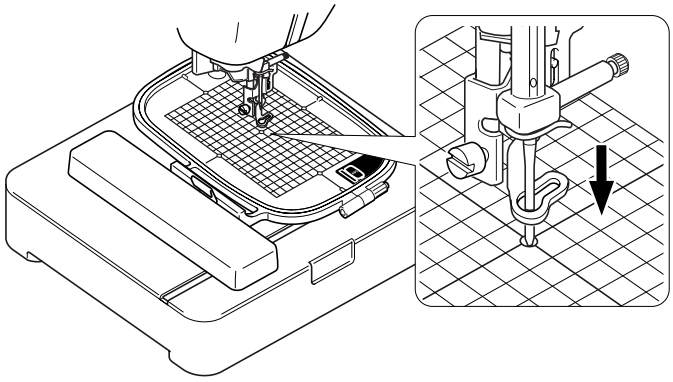
XC2277001	Push-pull gauge (3 N)



If the embroidery unit replace, or the PCB replace, check the central position of the embroidery.

A point to be checked the central position of the embroidery.

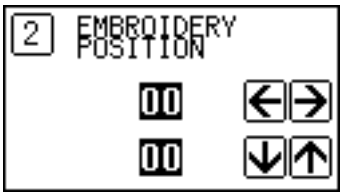
1. Attach the embroidery unit to the machine. (Remove embroidery frame.)
2. Turn on the power, and press [OK], and move the embroidery carriage.
3. Put the embroidery sheet L on the embroidery frame L.
4. Attach the embroidery frame on the embroidery unit.
5. **Turn the pulley by hand and check needle drops in the center of embroidery sheet hole.**



A point to be adjustmented, when the needle don't put into the central hole of the embroidery.

1. Turn off the power of the machene.
2. Start the test mode, and then select the test mode number [2].

   ***Key point**
   - Refer to "4-3 Starting test mode / Starting and stopping operation"
3. **Adjust the needle position by pressing the ← → ↓ ↑ button on the screen for needle to drop in the center of embroidery sheet hole**.

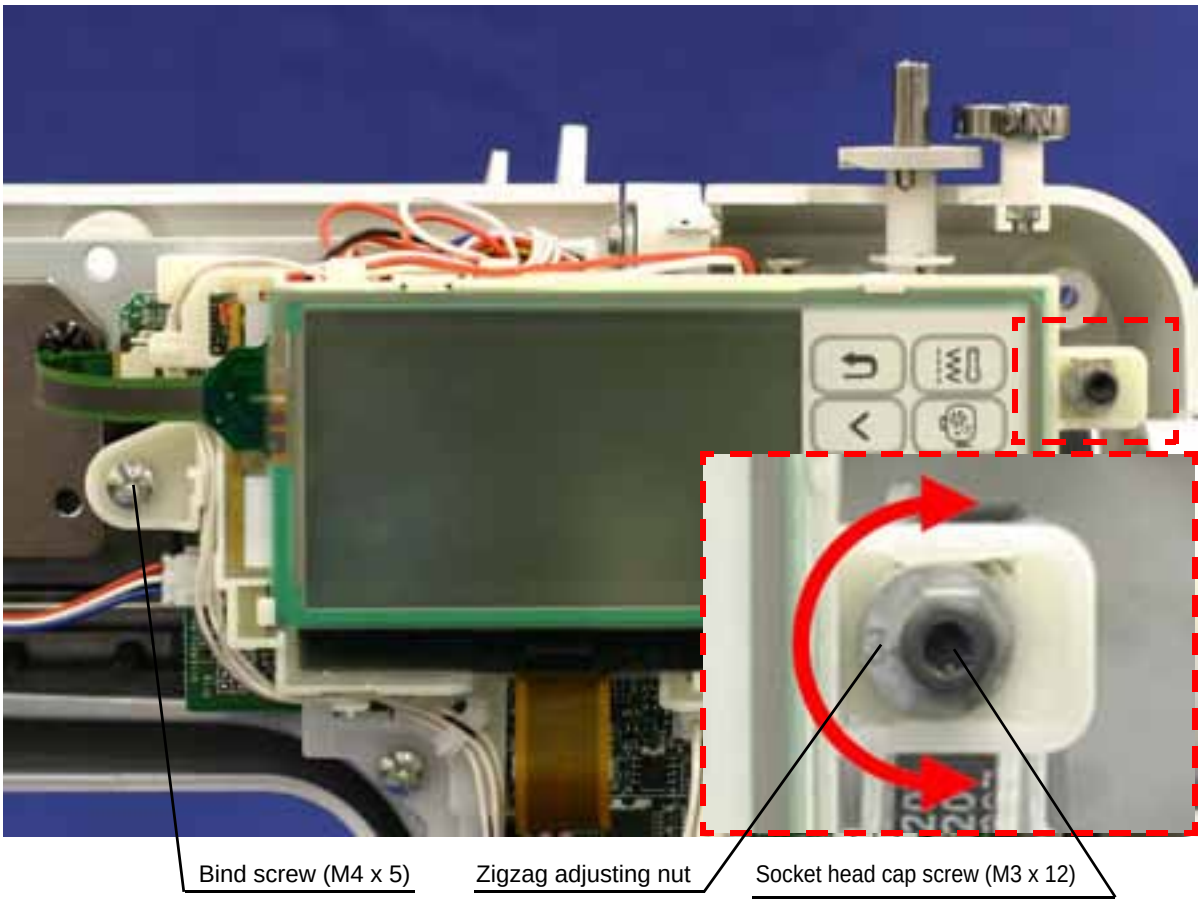


4. After adjustment, turn the power off (adjusting value is memorised automatically).

In case the position of the LCD inclines for the sash of the front cover, turn the Zigzag adjusting nut of the right side of the LCD and fine adjust the position of the LCD.

1. Remove the front cover
2. Loose the bind screw (M4 x 5) of the left side of the LCD.
3. Loose the socket head cap screw (M3 x 12) of the right side of the LCD.
4. **Turn the zigzag adjusting nut, and fine adjust the tilt of the LCD.**
5. Tighten the socket head cap screw (M3 x 12) of the right side of the LCD.
6. Tighten the bind screw (M4 x 5) of the left side of the LCD.
7. Attach the front cover
8. Turn on the power of the machine, and check whether the image displayed in the LCD does not incline for the sash.

If incline it, return to the Procedure 1 and readjust it.

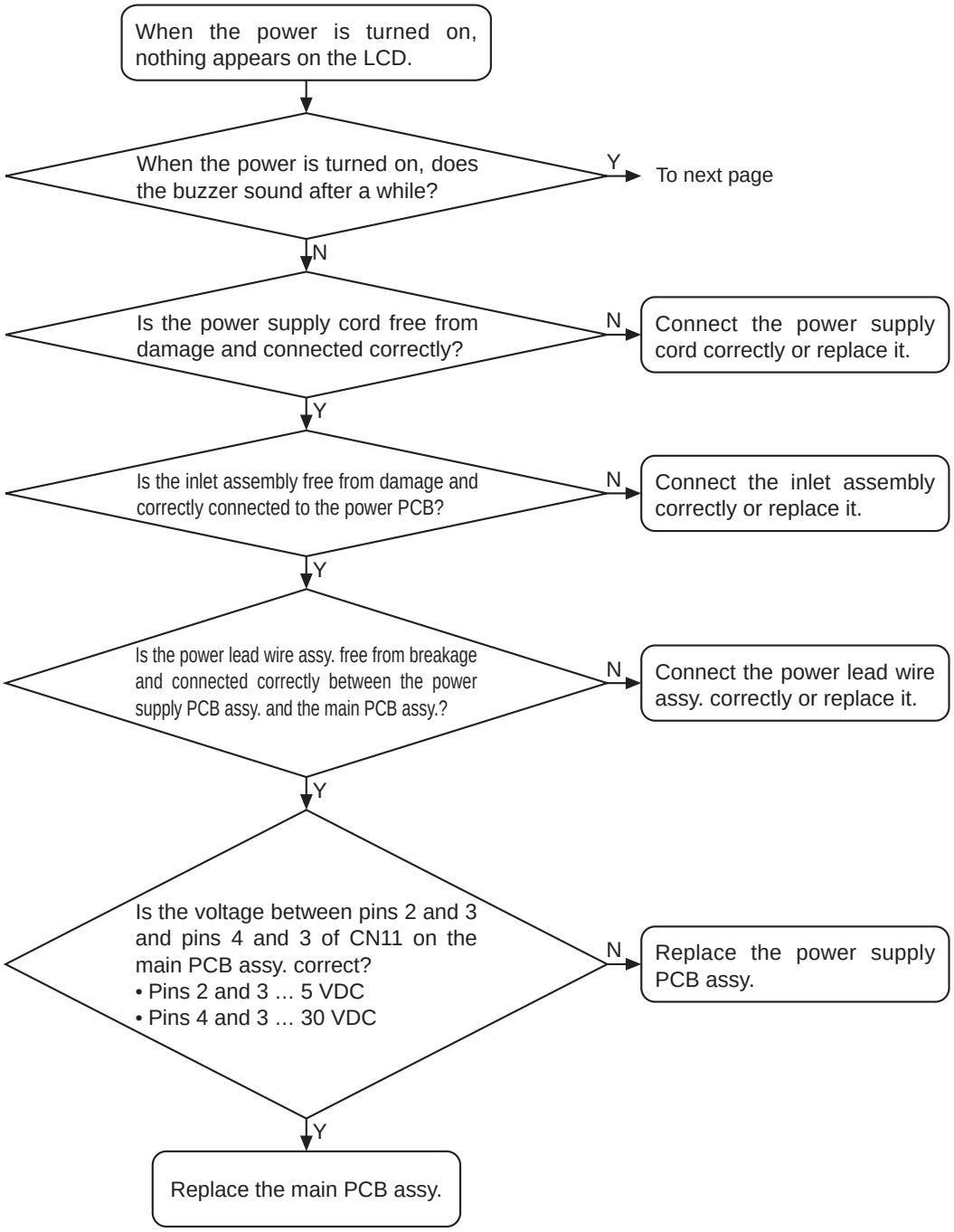


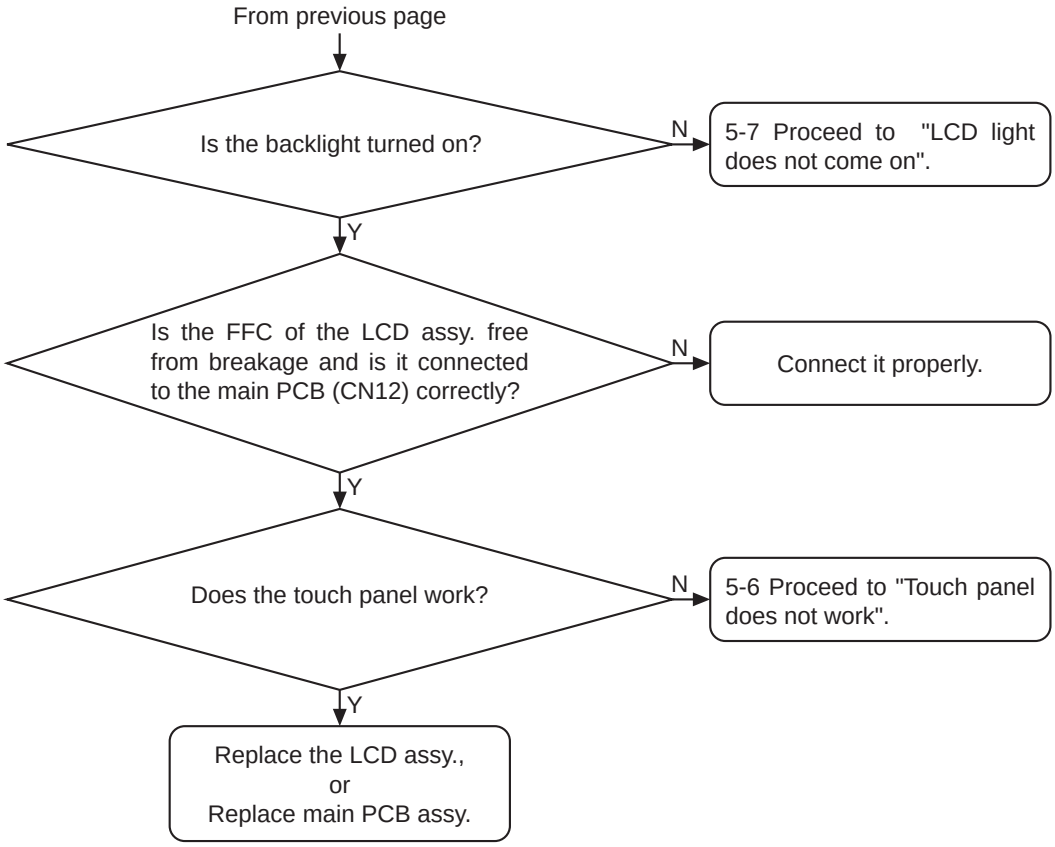
5 Failure Investigation for Electronic Parts

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

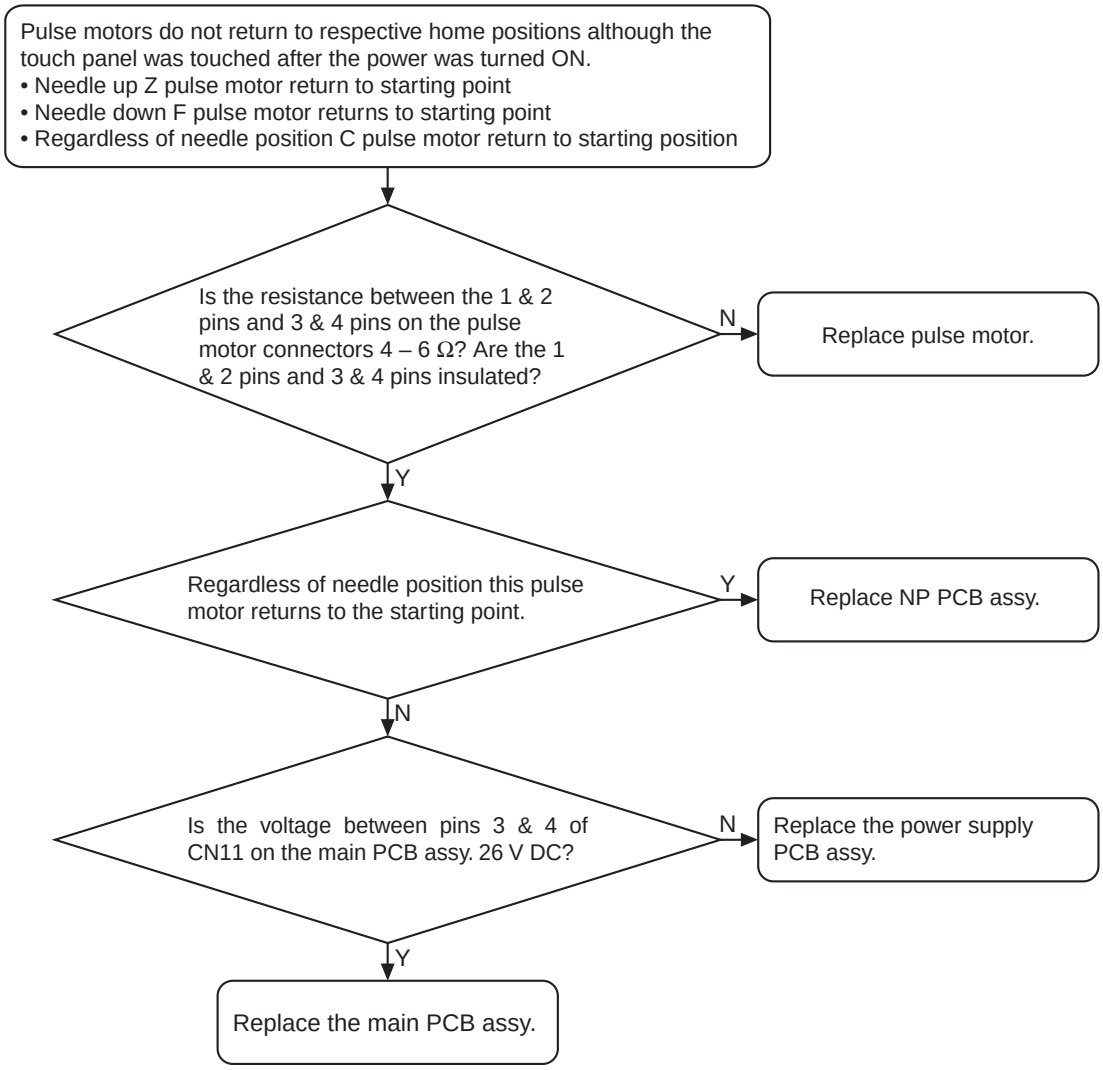
Error display	Cause
F01 (5 - 25)	Abnormal rotation in main motor.
F02 (5 - 26)	Key pressed continually with power ON (operation system SW).
F04 (5 - 27)	FC disconnect
F05 (5 - 28)	Dirty speed sensor
F06 (5 - 28)	NP sensor disconnect
F07 (5 - 29)	Speed VR disconnect
The safety device has been activated.	No rotation in main motor.
A malfunction occurred. Turn the machine off, the on again *-PM	Each pulse motor has not returned to its original position.

The power does not come on

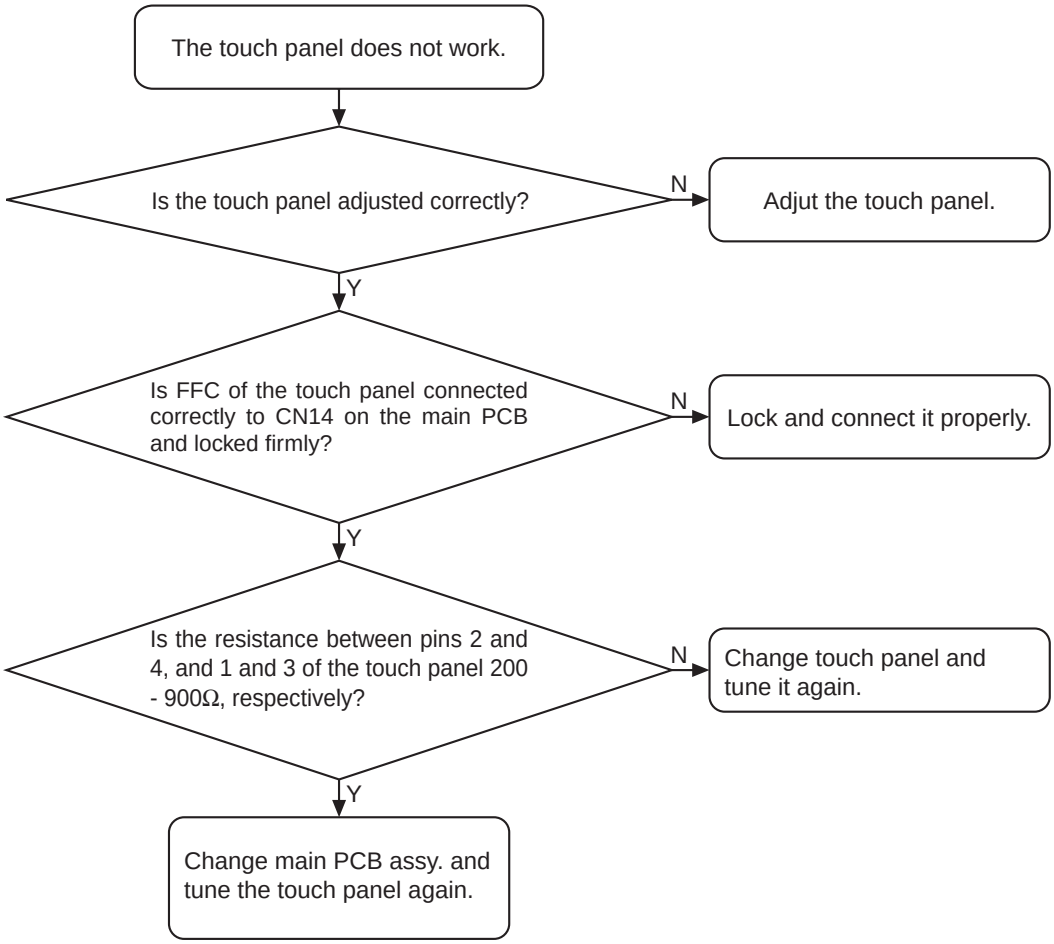



From previous page
Is the backlight turned on?
N
5-7 Proceed to "LCD light does not come on".
Y
Is the FFC of the LCD assy. free from breakage and is it connected to the main PCB (CN12) correctly?
N
Connect it properly.
Y
Does the touch panel work?
N
5-6 Proceed to "Touch panel does not work".
Y
Replace the LCD assy.,
or
Replace main PCB assy.

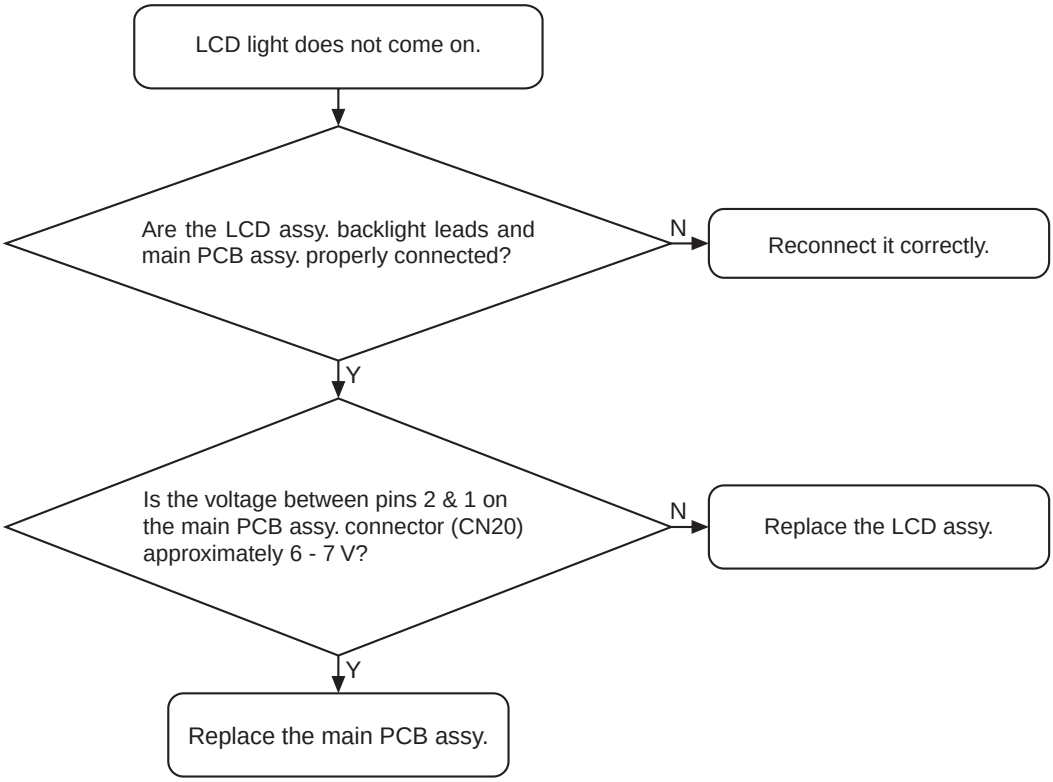
Pulse motors do not return to starting point



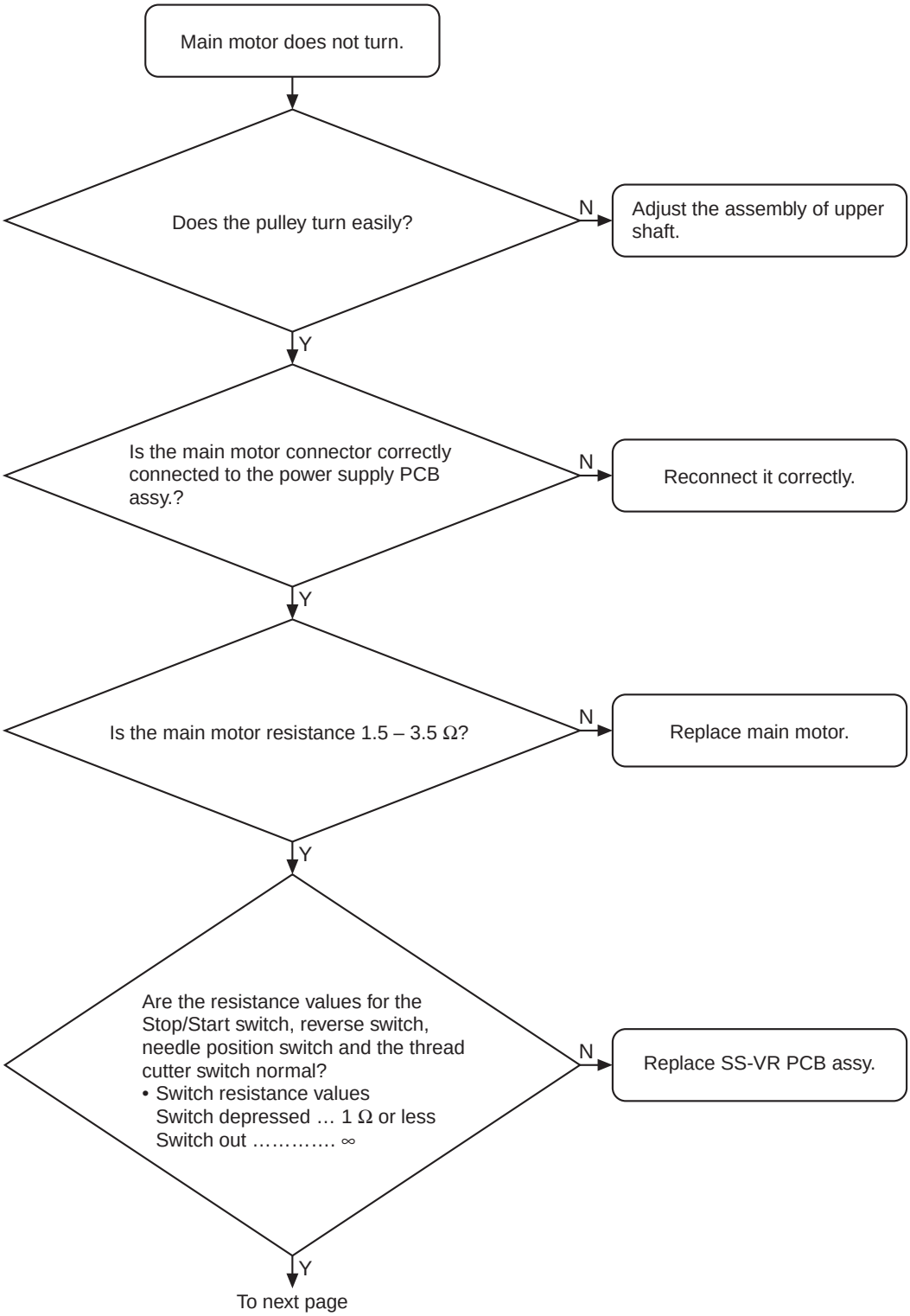
The touch panel does not work



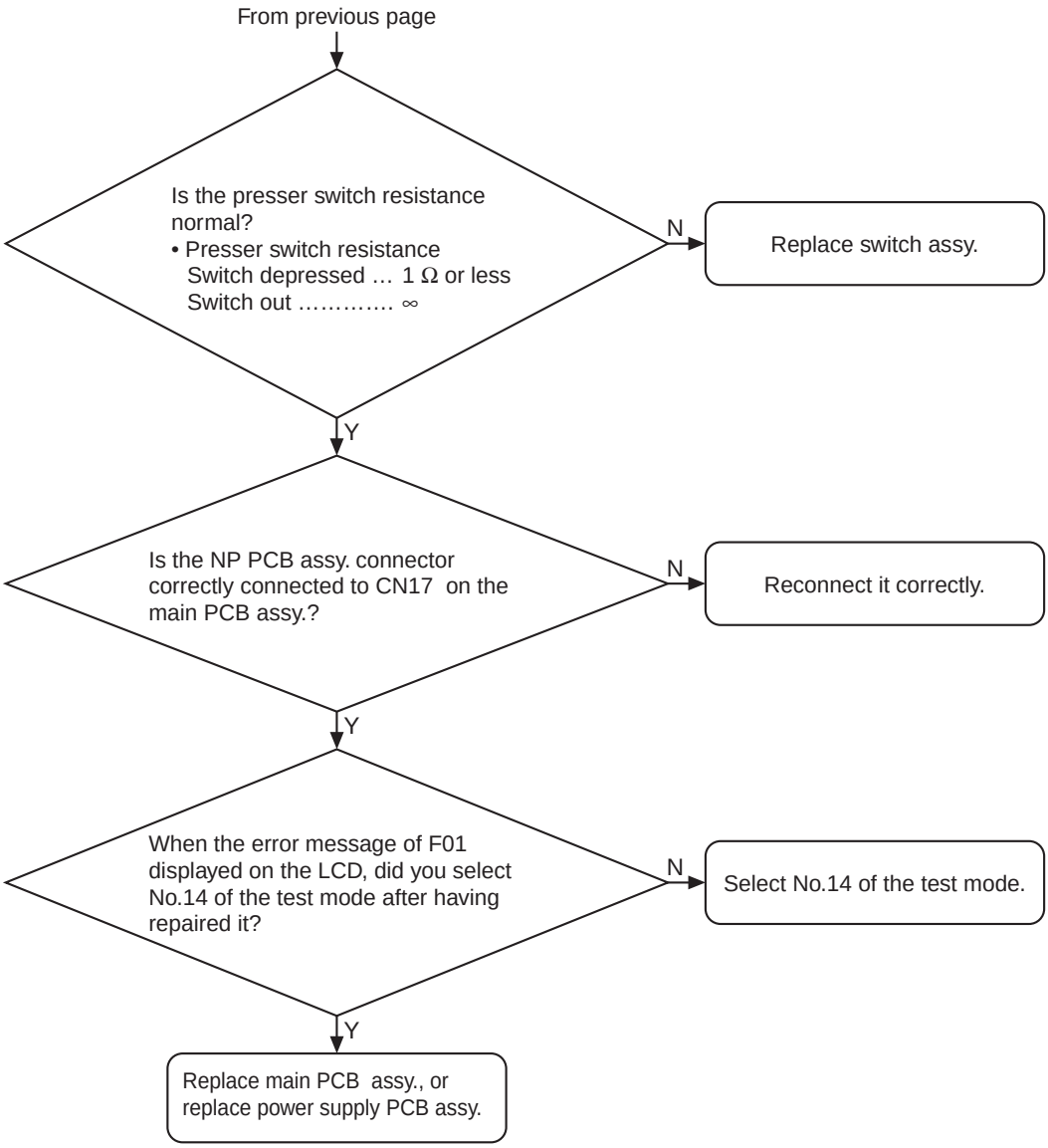
LCD light does not come on

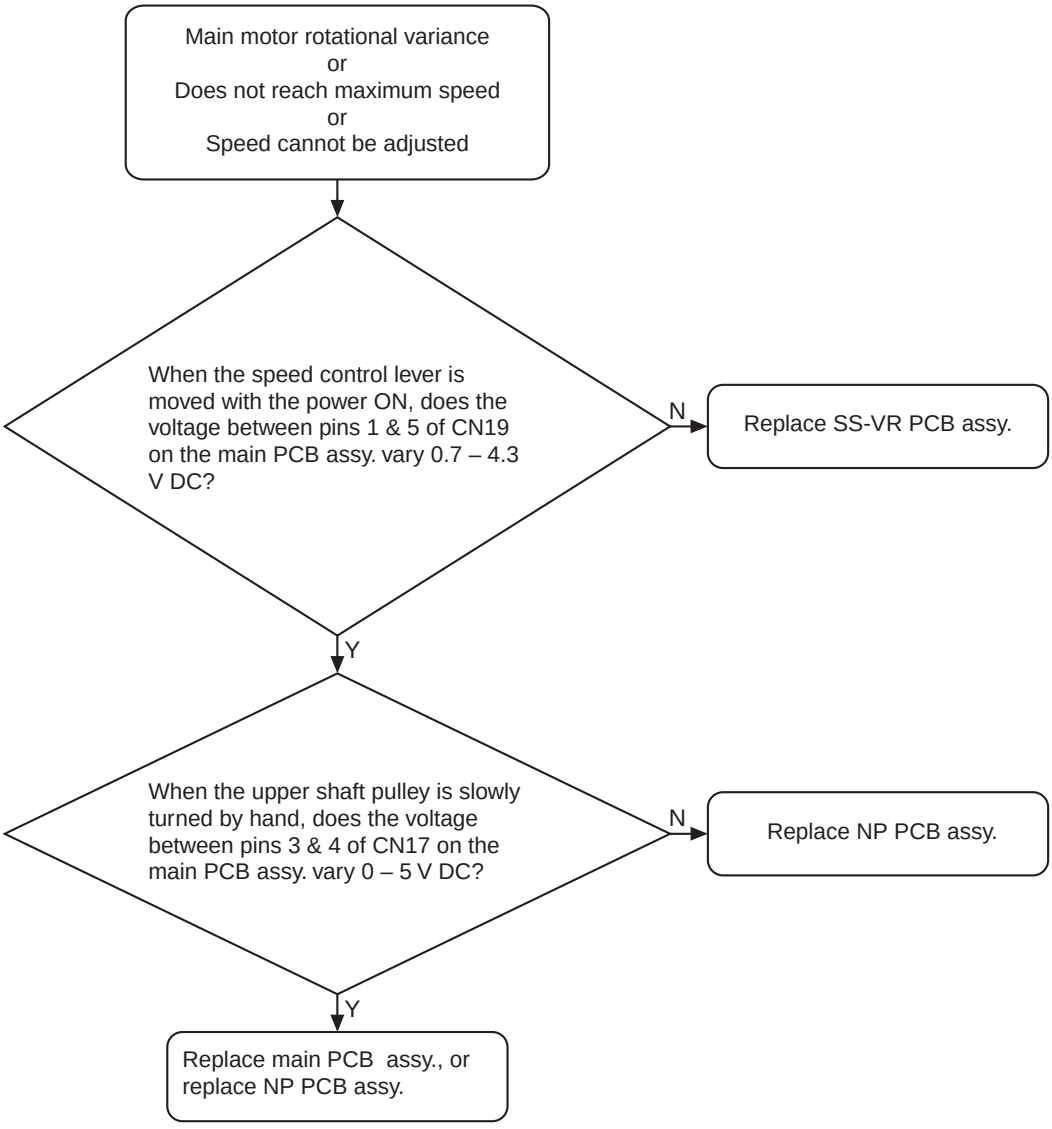


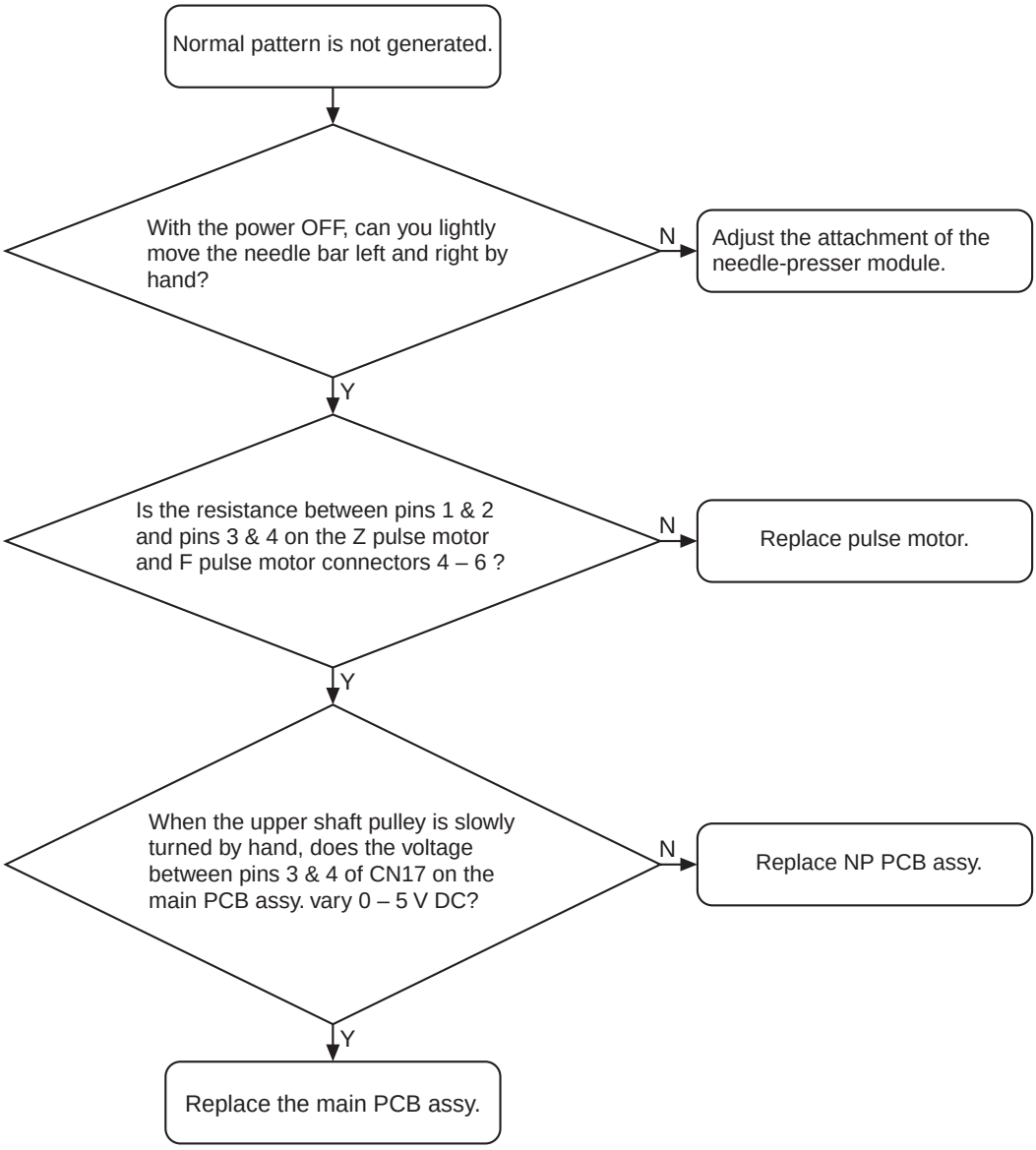
Main motor does not turn

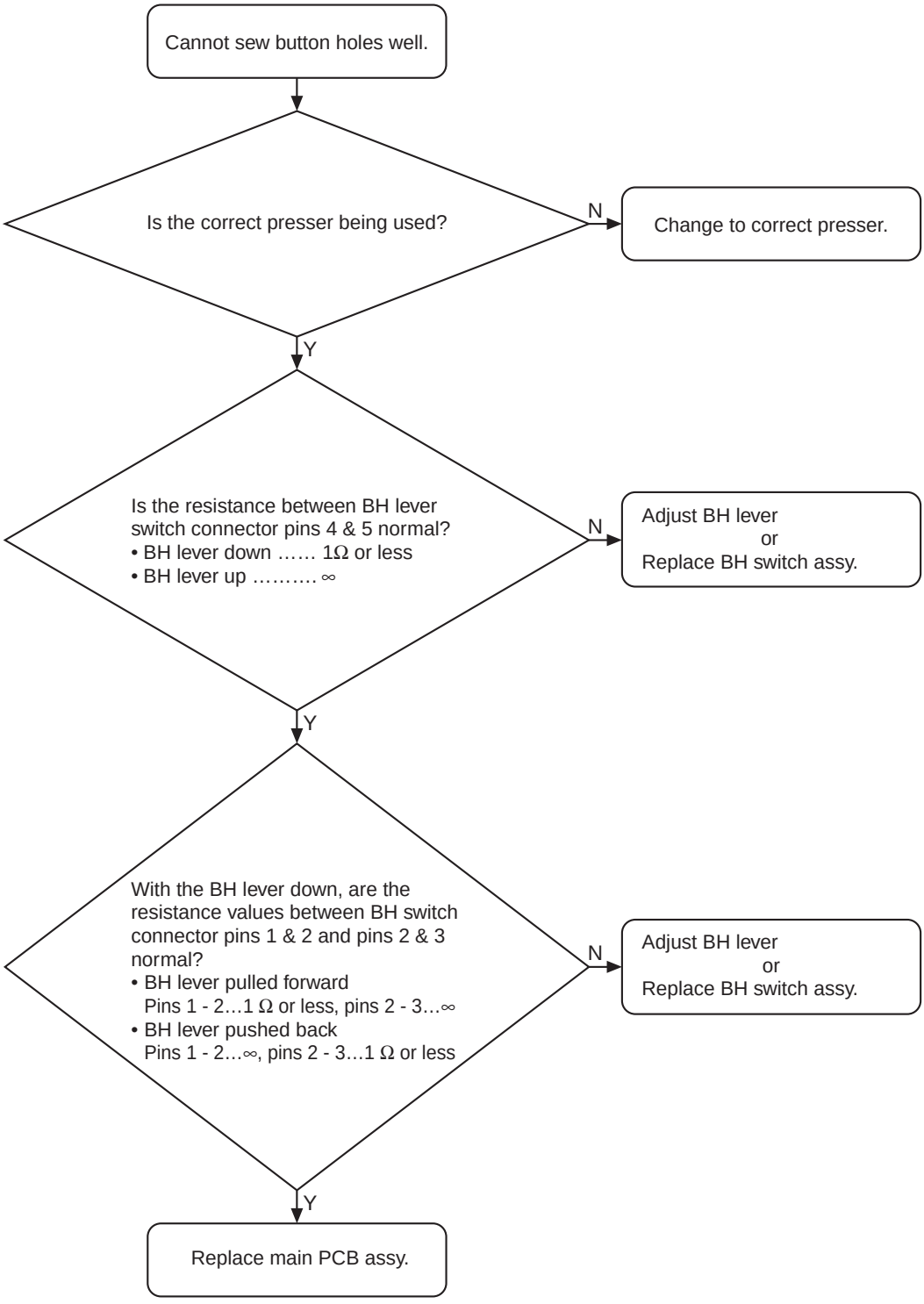


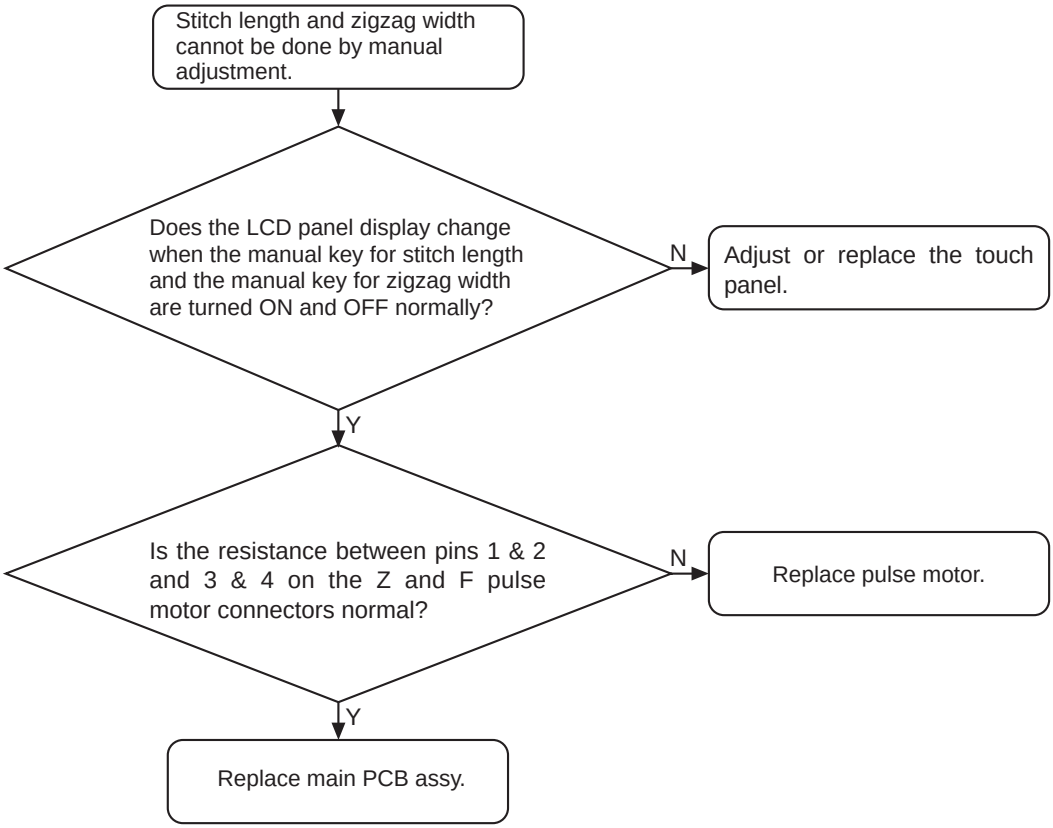
Main motor does not turn

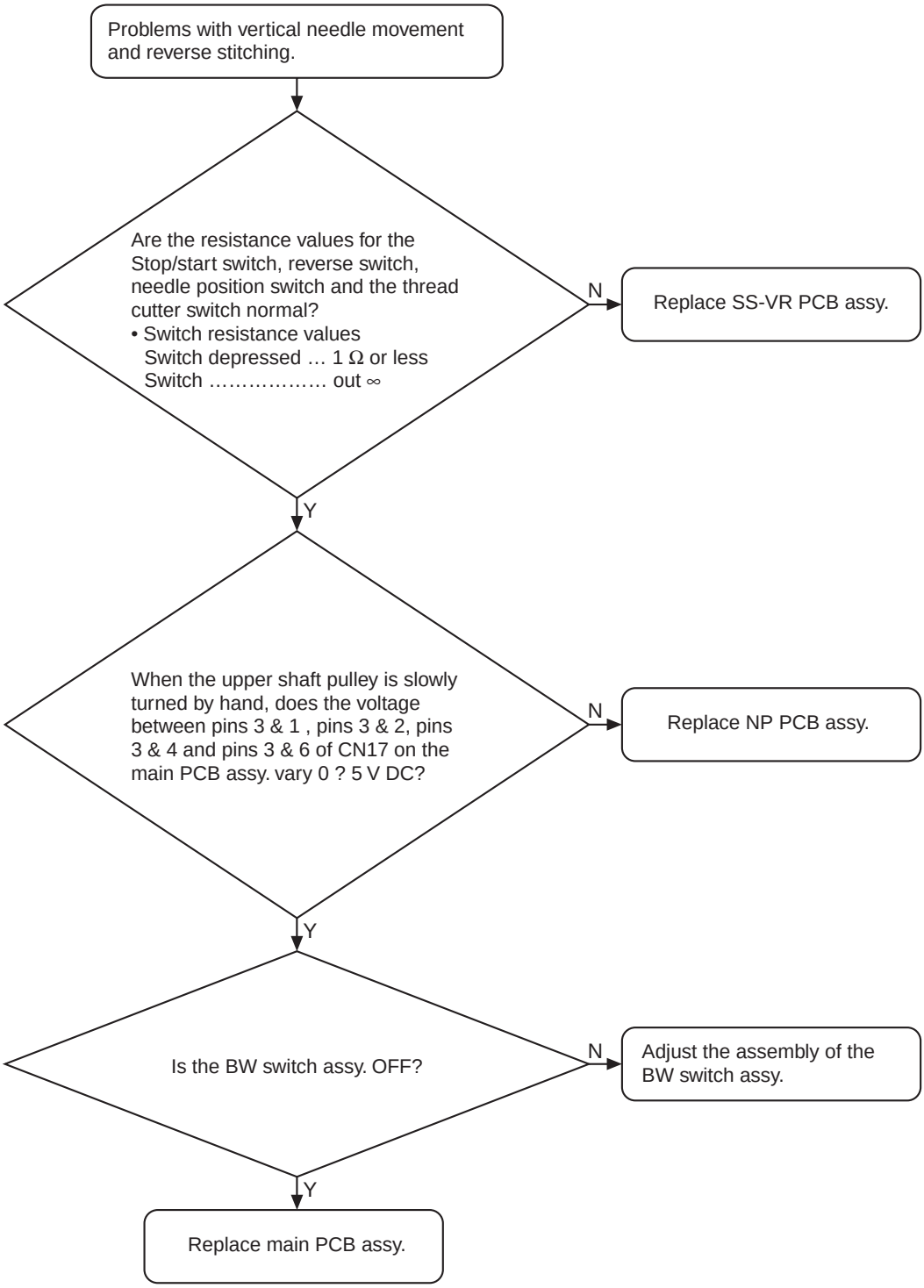


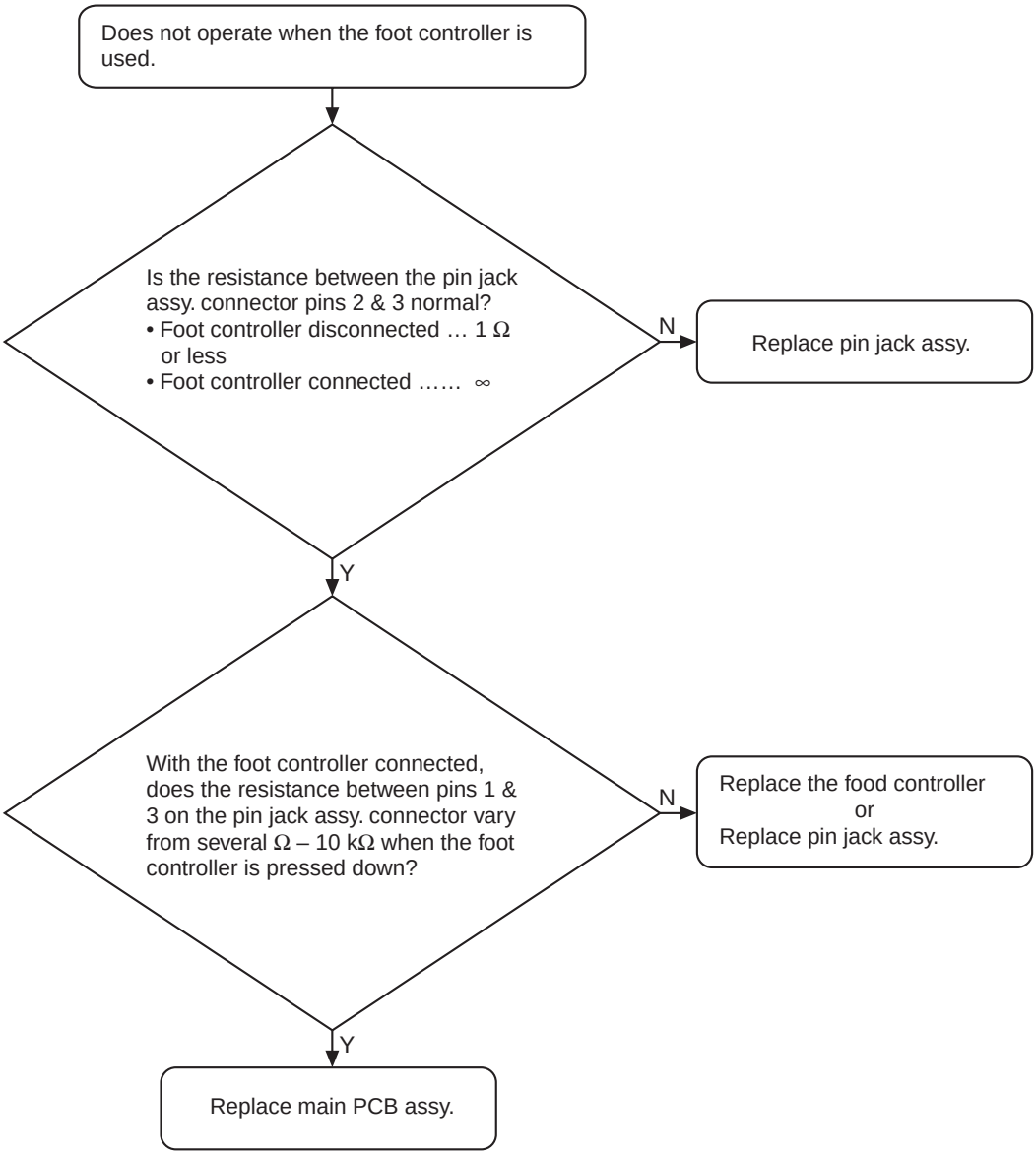

Main motor rotational variance
or
Does not reach maximum speed
or
Speed cannot be adjusted
When the speed control lever is moved with the power ON, does the voltage between pins 1 & 5 of CN19 on the main PCB assy. vary 0.7 – 4.3 V DC?
N
Replace SS-VR PCB assy.
Y
When the upper shaft pulley is slowly turned by hand, does the voltage between pins 3 & 4 of CN17 on the main PCB assy. vary 0 – 5 V DC?
N
Replace NP PCB assy.
Y
Replace main PCB assy., or replace NP PCB assy.

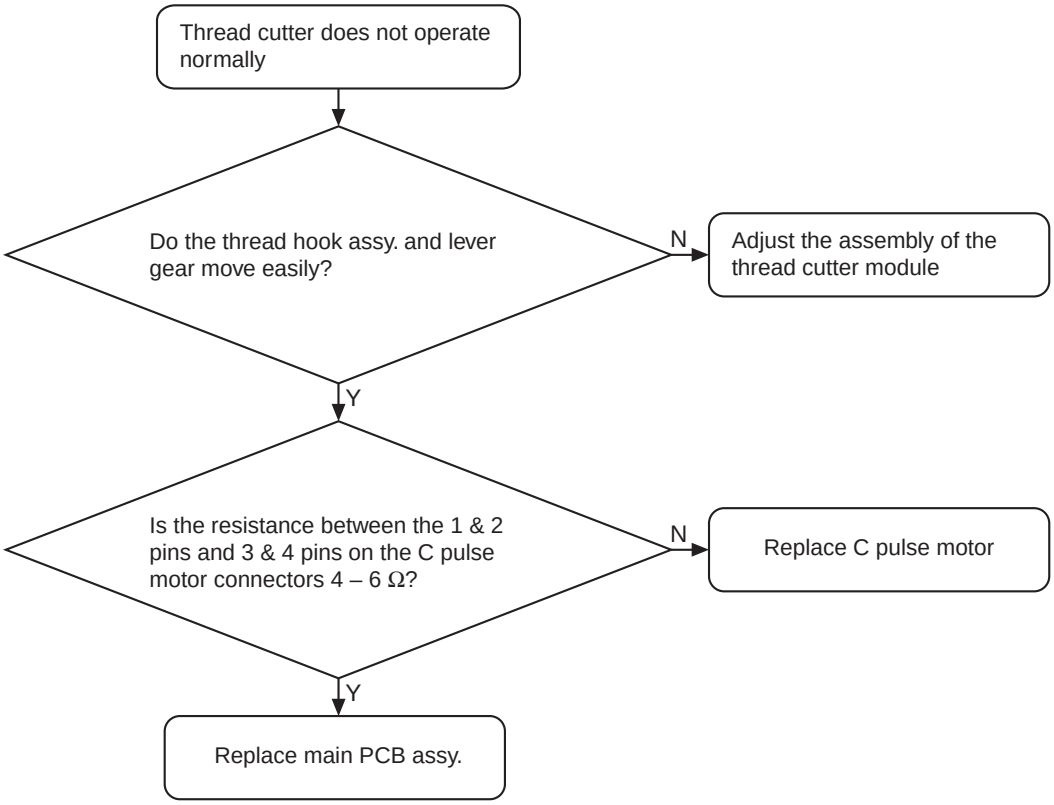

Normal pattern is not generated.
With the power OFF, can you lightly move the needle bar left and right by hand?
N
Adjust the attachment of the needle-presser module.
Y
Is the resistance between pins 1 & 2 and pins 3 & 4 on the Z pulse motor and F pulse motor connectors 4 – 6 ?
N
Replace pulse motor.
Y
When the upper shaft pulley is slowly turned by hand, does the voltage between pins 3 & 4 of CN17 on the main PCB assy. vary 0 – 5 V DC?
N
Replace NP PCB assy.
Y
Replace the main PCB assy.


Cannot sew button holes well.
Is the correct presser being used?
N
Change to correct presser.
Y
Is the resistance between BH lever switch connector pins 4 & 5 normal?
• BH lever down …… 1Ω or less
• BH lever up ……. ∞
N
Adjust BH lever
or
Replace BH switch assy.
Y
With the BH lever down, are the resistance values between BH switch connector pins 1 & 2 and pins 2 & 3 normal?
• BH lever pulled forward
Pins 1 - 2…1 Ω or less, pins 2 - 3…∞
• BH lever pushed back
Pins 1 - 2…∞, pins 2 - 3…1 Ω or less
N
Adjust BH lever
or
Replace BH switch assy.
Y
Replace main PCB assy.

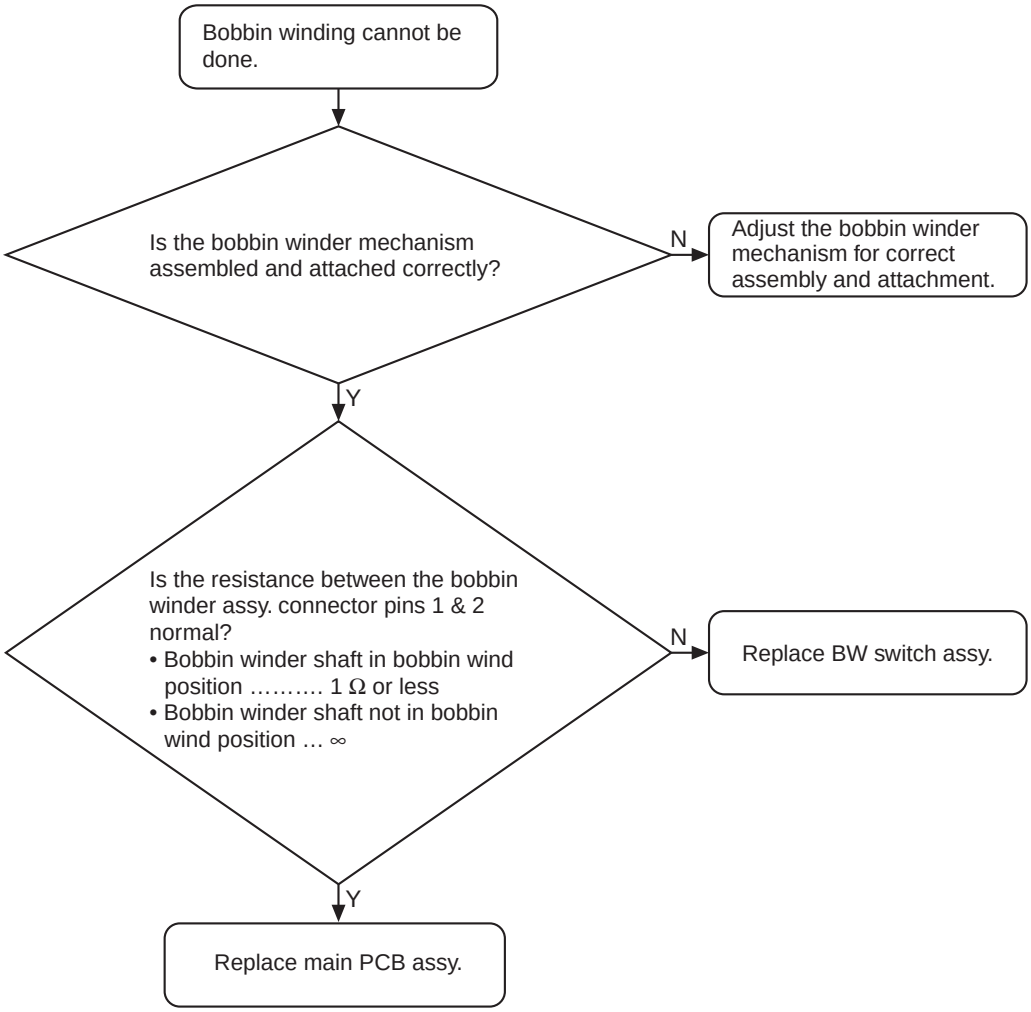

Stitch length and zigzag width cannot be done by manual adjustment.
Does the LCD panel display change when the manual key for stitch length and the manual key for zigzag width are turned ON and OFF normally?
N
Adjust or replace the touch panel.
Y
Is the resistance between pins 1 & 2 and 3 & 4 on the Z and F pulse motor connectors normal?
N
Replace pulse motor.
Y
Replace main PCB assy.

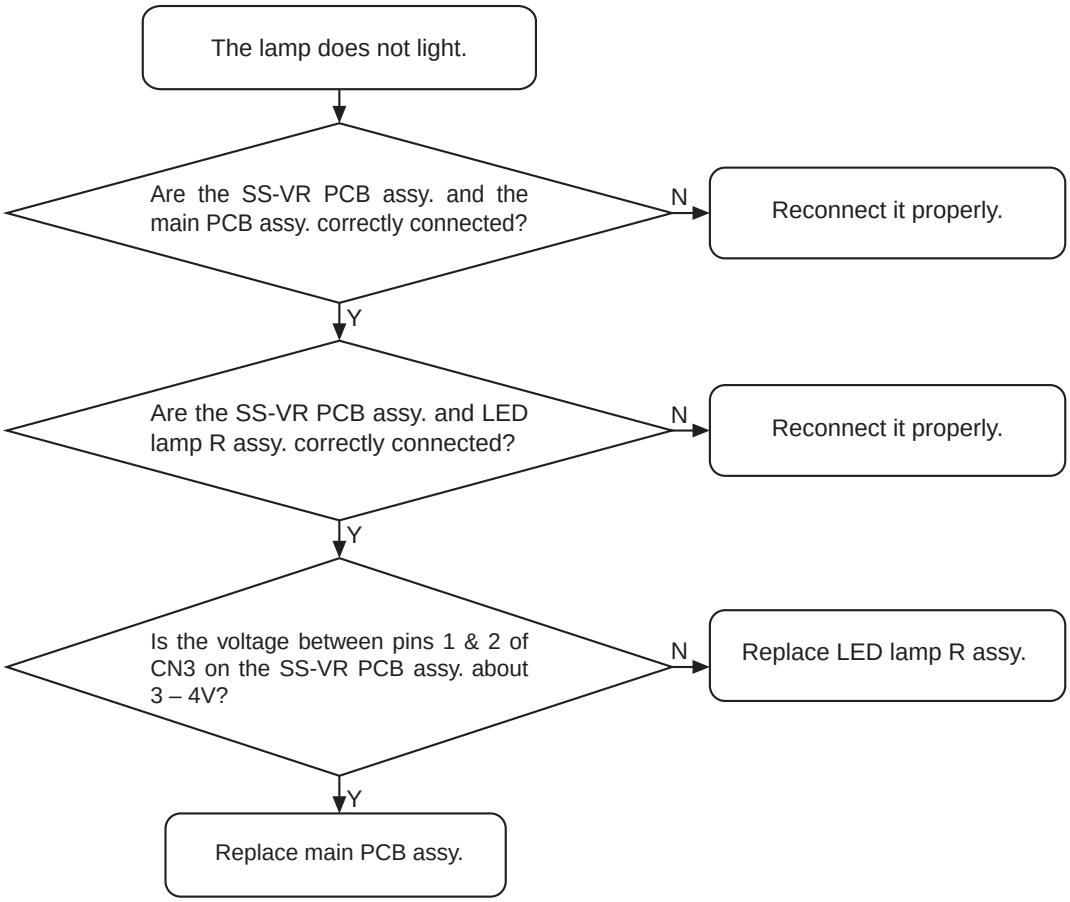

Problems with vertical needle movement and reverse stitching.
Are the resistance values for the Stop/start switch, reverse switch, needle position switch and the thread cutter switch normal?
• Switch resistance values
Switch depressed … 1 Ω or less
Switch …… out ∞
N
Replace SS-VR PCB assy.
Y
When the upper shaft pulley is slowly turned by hand, does the voltage between pins 3 & 1 , pins 3 & 2, pins 3 & 4 and pins 3 & 6 of CN17 on the main PCB assy. vary 0 ? 5 V DC?
N
Replace NP PCB assy.
Y
Is the BW switch assy. OFF?
N
Adjust the assembly of the BW switch assy.
Y
Replace main PCB assy.

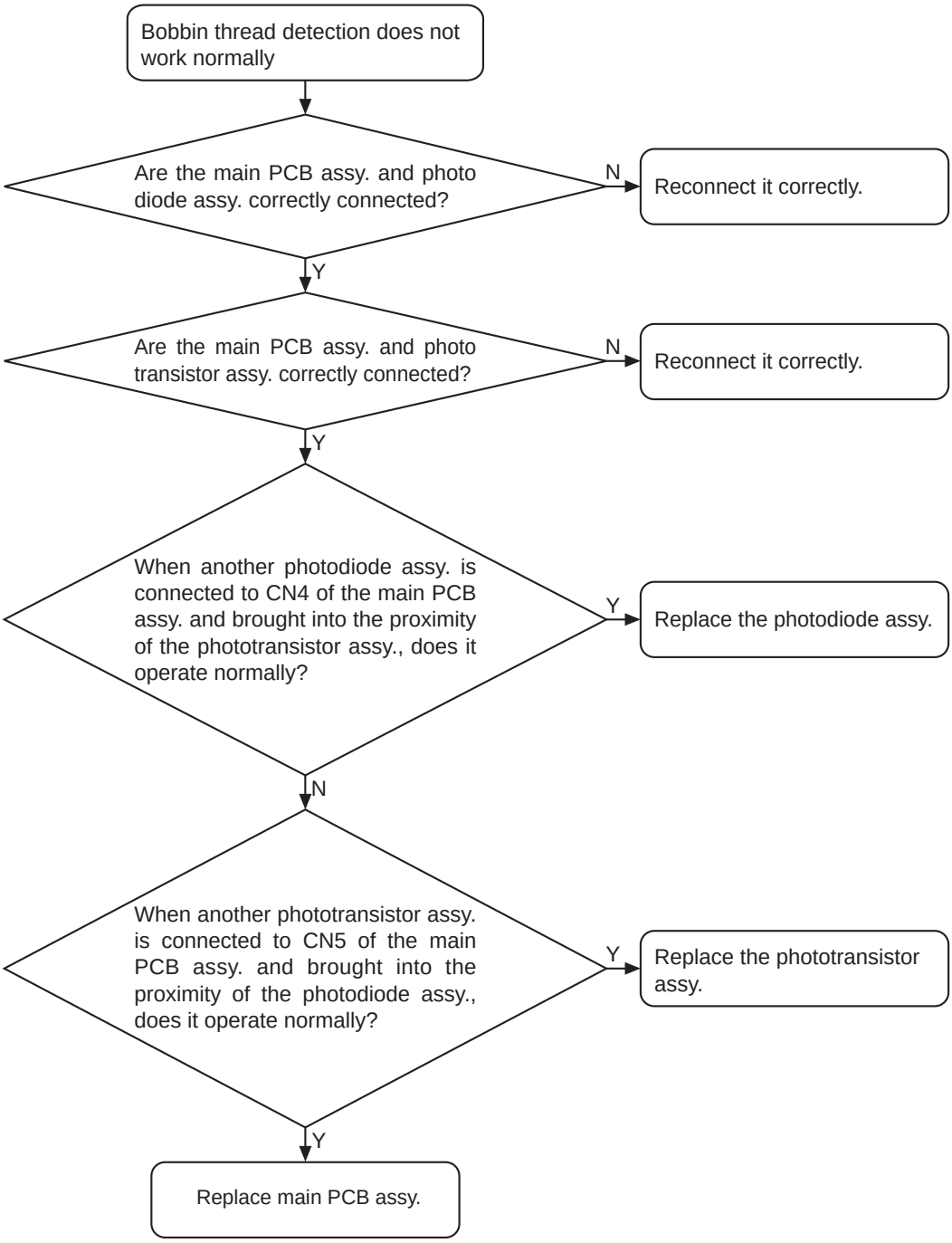

Does not operate when the foot controller is used.
Is the resistance between the pin jack assy. connector pins 2 & 3 normal?
• Foot controller disconnected … 1 Ω or less
• Foot controller connected …… ∞
N
Replace pin jack assy.
Y
With the foot controller connected, does the resistance between pins 1 & 3 on the pin jack assy. connector vary from several Ω – 10 kΩ when the foot controller is pressed down?
N
Replace the food controller
or
Replace pin jack assy.
Y
Replace main PCB assy.

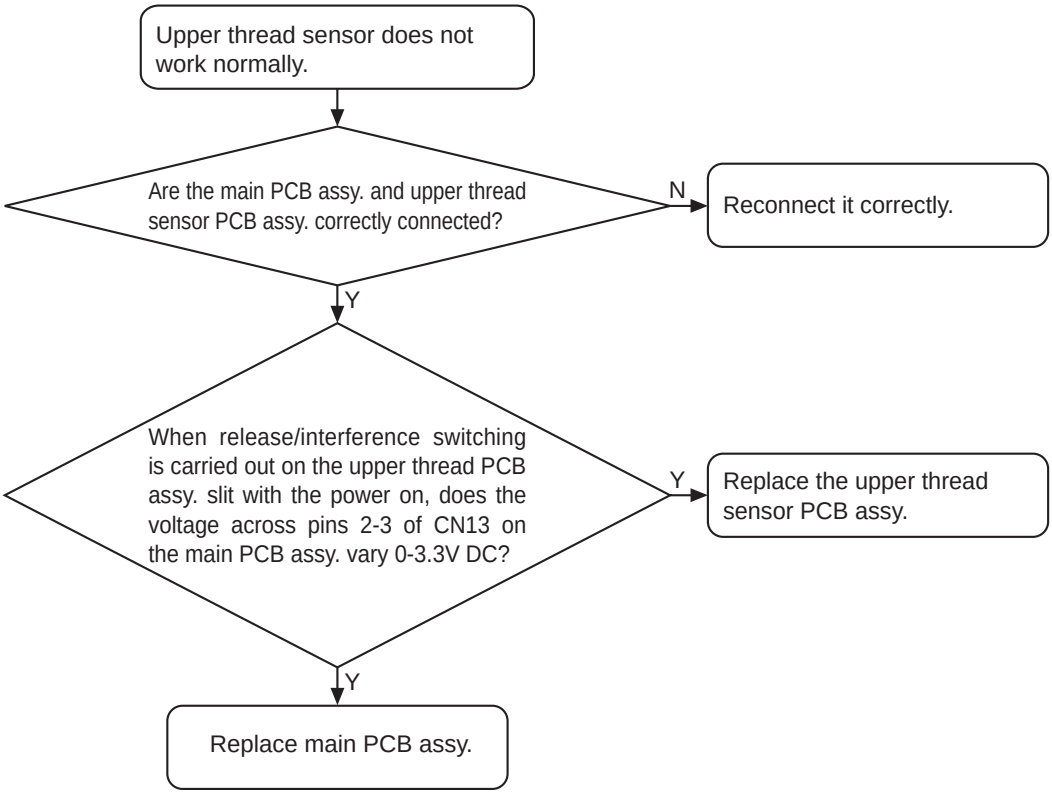

Thread cutter does not operate normally
Do the thread hook assy. and lever gear move easily?
N
Adjust the assembly of the thread cutter module
Y
Is the resistance between the 1 & 2 pins and 3 & 4 pins on the C pulse motor connectors 4 – 6 Ω?
N
Replace C pulse motor
Y
Replace main PCB assy.

Bobbin winding cannot be done

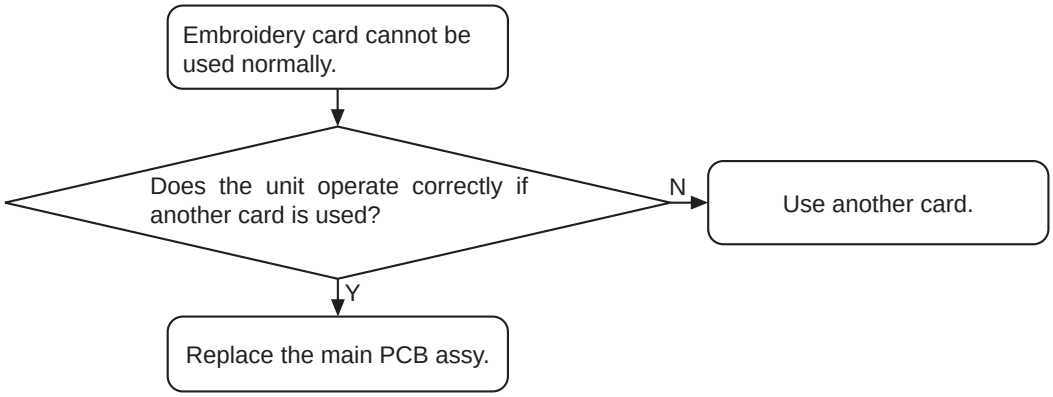


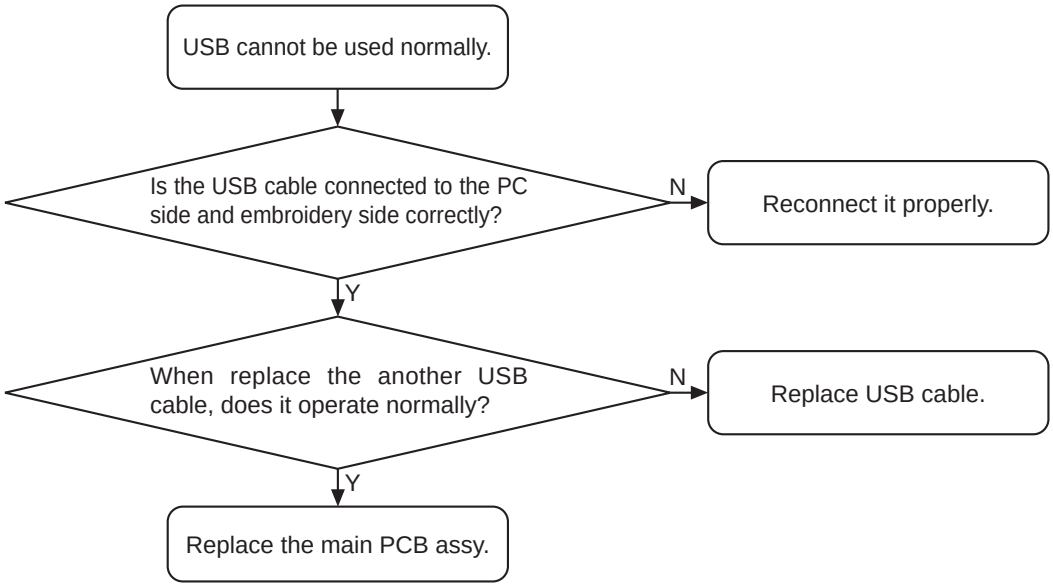

The lamp does not light.
Are the SS-VR PCB assy. and the main PCB assy. correctly connected?
N
Reconnect it properly.
Y
Are the SS-VR PCB assy. and LED lamp R assy. correctly connected?
N
Reconnect it properly.
Y
Is the voltage between pins 1 & 2 of CN3 on the SS-VR PCB assy. about 3 – 4V?
N
Replace LED lamp R assy.
Y
Replace main PCB assy.


Bobbin thread detection does not work normally
Are the main PCB assy. and photo diode assy. correctly connected?
N
Reconnect it correctly.
Y
Are the main PCB assy. and photo transistor assy. correctly connected?
N
Reconnect it correctly.
Y
When another photodiode assy. is connected to CN4 of the main PCB assy. and brought into the proximity of the phototransistor assy., does it operate normally?
Y
Replace the photodiode assy.
N
When another phototransistor assy. is connected to CN5 of the main PCB assy. and brought into the proximity of the photodiode assy., does it operate normally?
Y
Replace the phototransistor assy.
Y
Replace main PCB assy.

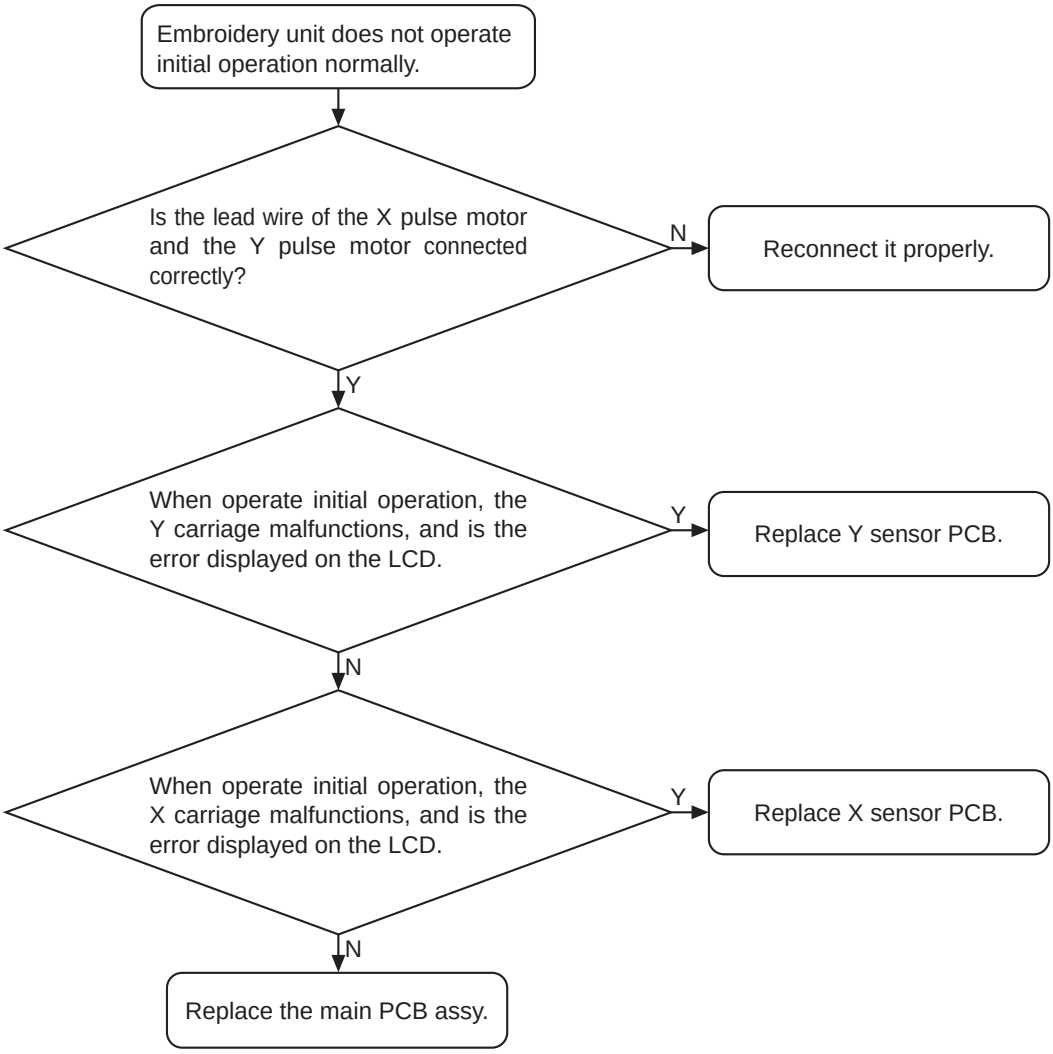

Upper thread sensor does not work normally.
Are the main PCB assy. and upper thread sensor PCB assy. correctly connected?
N
Reconnect it correctly.
Y
When release/interference switching is carried out on the upper thread PCB assy. slit with the power on, does the voltage across pins 2-3 of CN13 on the main PCB assy. vary 0-3.3V DC?
Y
Replace the upper thread sensor PCB assy.
Y
Replace main PCB assy.

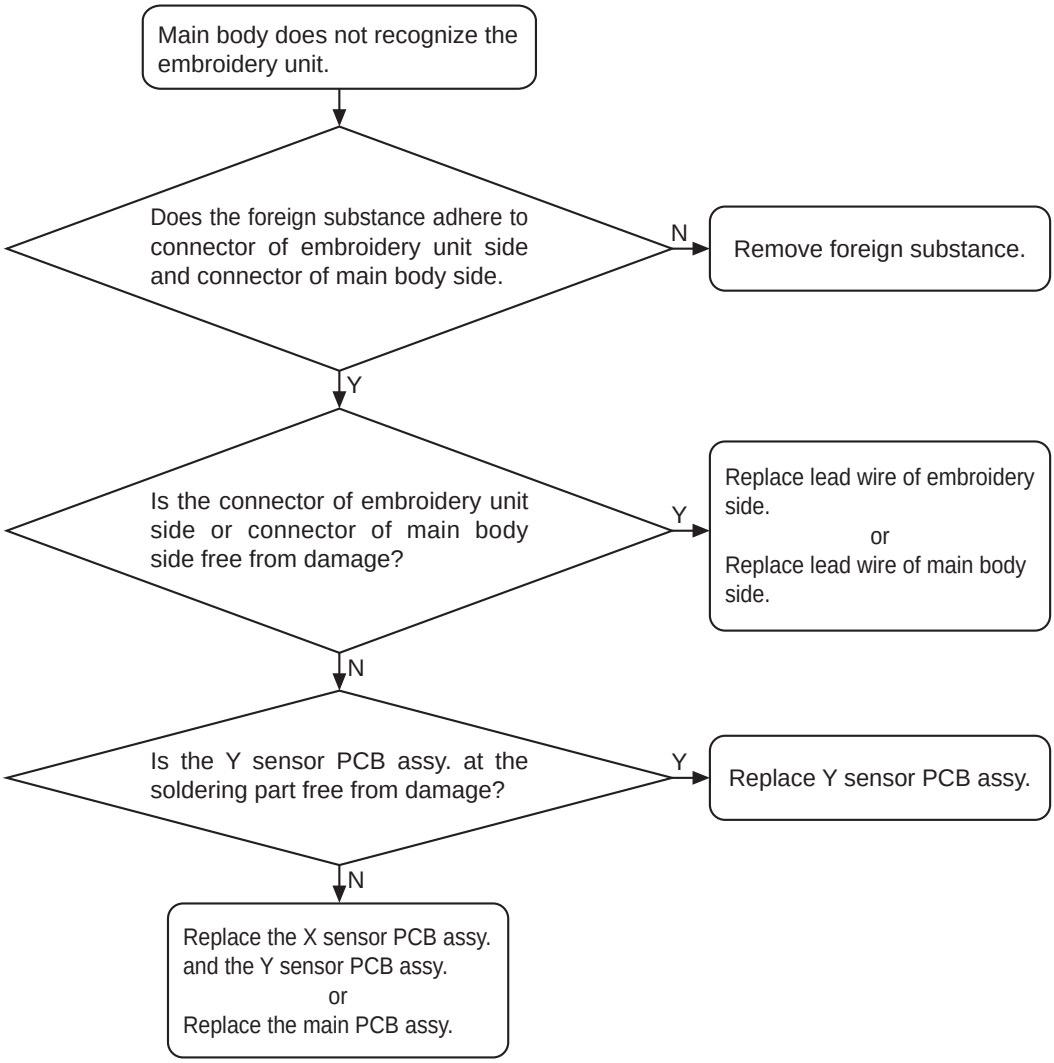
Embroidery card cannot be used normally

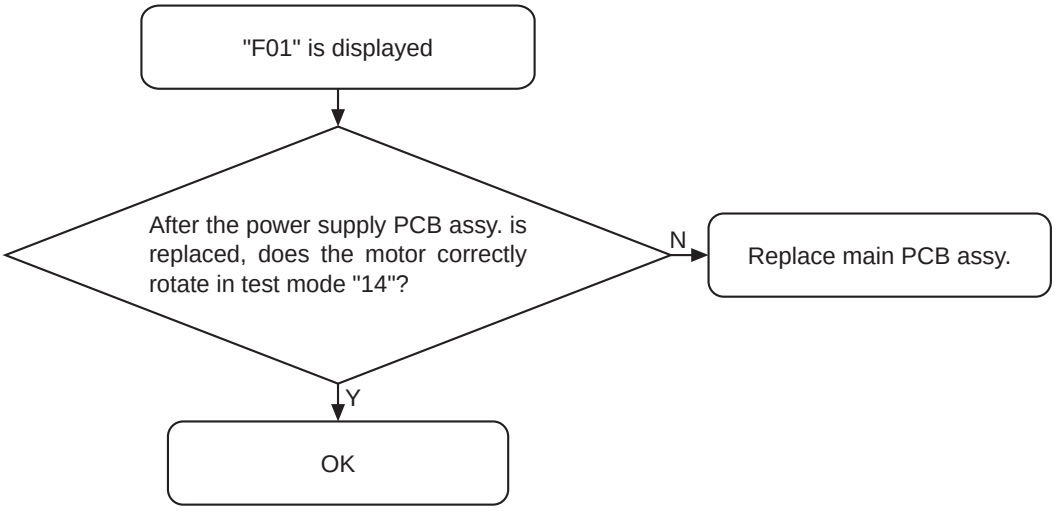


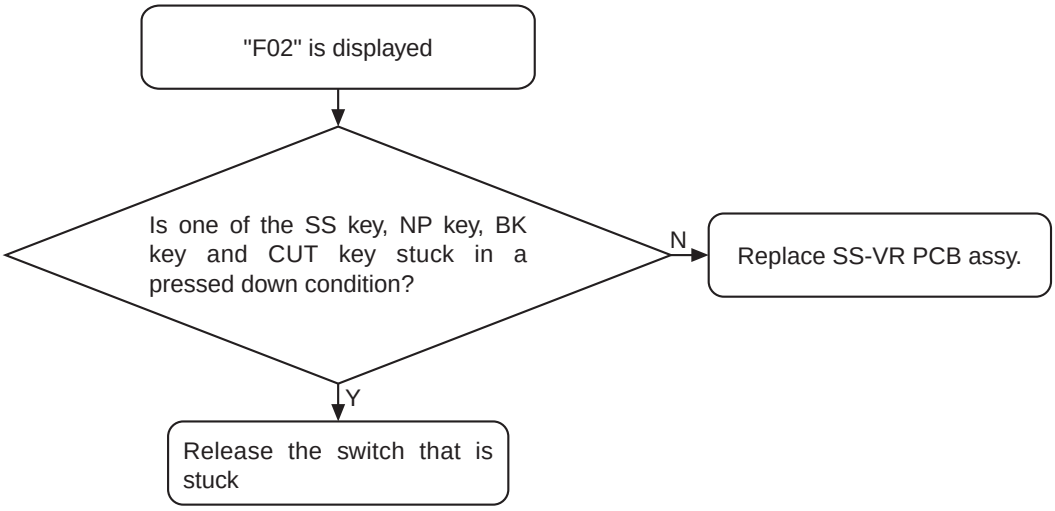

USB cannot be used normally.
Is the USB cable connected to the PC side and embroidery side correctly?
N
Reconnect it properly.
Y
When replace the another USB cable, does it operate normally?
N
Replace USB cable.
Y
Replace the main PCB assy.

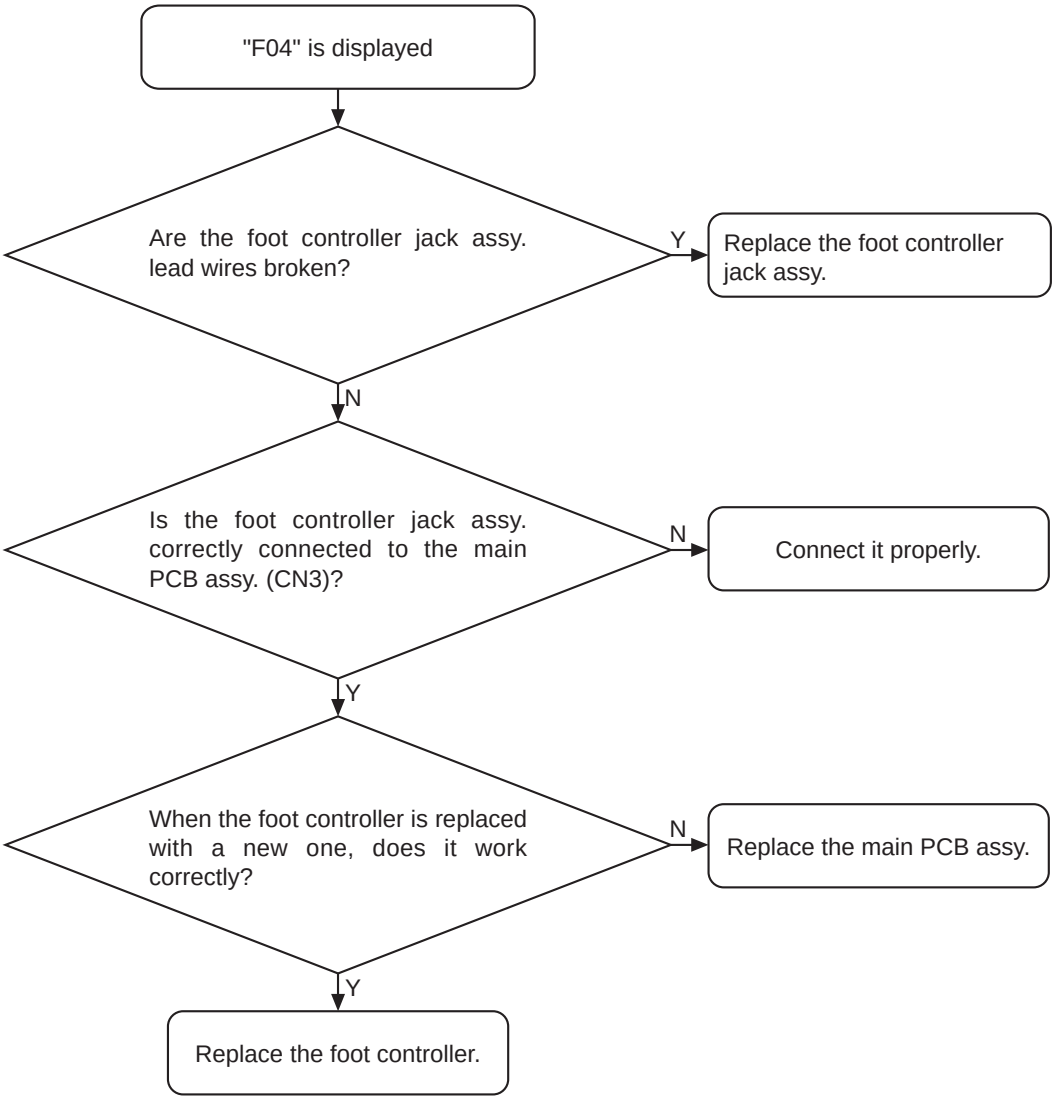
Embroidery unit does not operate initial operation normally

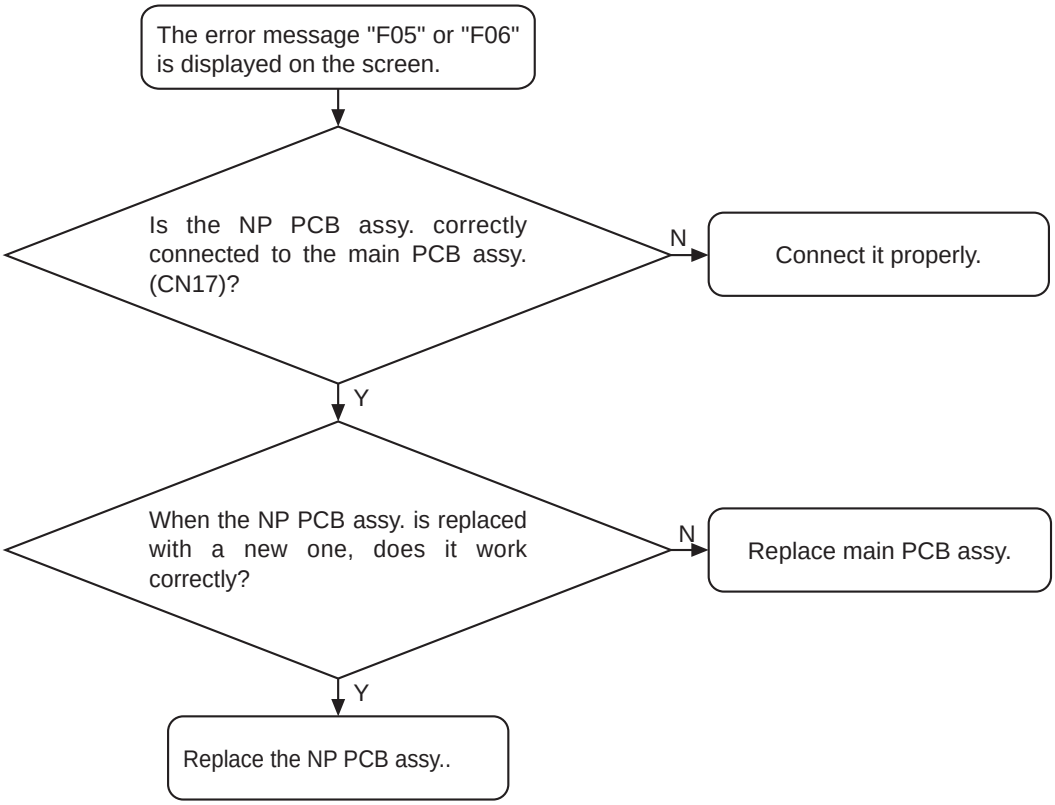


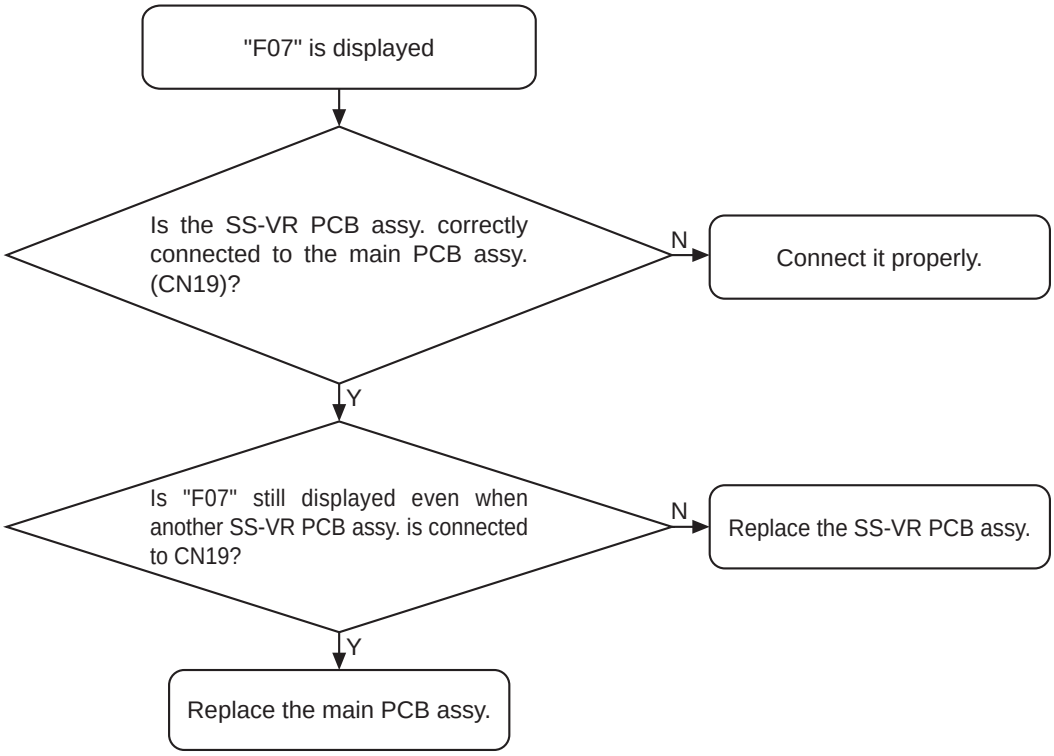

Main body does not recognize the embroidery unit.
Does the foreign substance adhere to connector of embroidery unit side and connector of main body side.
N
Remove foreign substance.
Y
Is the connector of embroidery unit side or connector of main body side free from damage?
Y
Replace lead wire of embroidery side.
or
Replace lead wire of main body side.
N
Is the Y sensor PCB assy. at the soldering part free from damage?
Y
Replace Y sensor PCB assy.
N
Replace the X sensor PCB assy. and the Y sensor PCB assy.
or
Replace the main PCB assy.


"F01" is displayed
After the power supply PCB assy. is replaced, does the motor correctly rotate in test mode "14"?
N
Replace main PCB assy.
Y
OK


"F02" is displayed
Is one of the SS key, NP key, BK key and CUT key stuck in a pressed down condition?
N
Replace SS-VR PCB assy.
Y
Release the switch that is stuck


"F04" is displayed
Are the foot controller jack assy. lead wires broken?
Y
Replace the foot controller jack assy.
N
Is the foot controller jack assy. correctly connected to the main PCB assy. (CN3)?
N
Connect it properly.
Y
When the foot controller is replaced with a new one, does it work correctly?
N
Replace the main PCB assy.
Y
Replace the foot controller.


The error message "F05" or "F06" is displayed on the screen.
Is the NP PCB assy. correctly connected to the main PCB assy. (CN17)?
N
Connect it properly.
Y
When the NP PCB assy. is replaced with a new one, does it work correctly?
N
Replace main PCB assy.
Y
Replace the NP PCB assy..


"F07" is displayed
Is the SS-VR PCB assy. correctly connected to the main PCB assy. (CN19)?
N
Connect it properly.
Y
Is "F07" still displayed even when another SS-VR PCB assy. is connected to CN19?
N
Replace the SS-VR PCB assy.
Y
Replace the main PCB assy.

6 Repair Manual

In this chapter, projects the cause from contents of the malfunction of the products, and explains the method of the fix and the maintenance. When do not understand the cause of the malfunction and the method of the fix and the maintenance, use this chapter.

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
1	Stitch skipping Thread abrasion Thread breakage Seam unevenness Needle breaks	Needle tip damaged while sewing Needle catches and bends before or after sewing	Needle replacement	Needle curvature	Remove the needle, place on level block (horizontal block) and be sure there is no curvature. (4 - 2)
				Tip damage to needle	Touch the needle tip with your finger, be sure that it is not damaged. (4 - 2)
2	Nothing displays on LCD with power ON. Or buzzer does not sound when touch panel is pressed	Inlet assy. and power supply PCB assy. connector disconnected	Plug connector in (3 - 77)	Sewing machine runs when switched on	When power is switched ON Confirm that there is a beep, that the indication lamps and that the sewing machine lamp turns on.
		Bad power supply cord	Replace power supply cord		
		Bad power supply PCB assy.	Replace power supply PCB assy. (3 - 14) (3 - 77)		
		Power supply PCB assy. and main PCB assy. connector disconnected	Plug connector in (2 - 34)		
		Bad main PCB assy.	Replace main PCB assy. (2 - 8)(2 - 34)		
		Main PCB assy. and SSVR PCB assy. connector disconnected	Plug connector in (2 - 38)		
		Bad SSVR PCB assy.	Replace SSVR PCB assy. (3 - 5) (3 - 71)		
		Bad LCD contrast adjustment	Adjust contrast		
		Bad touch panel assy.	Replace touch panel assy. (3 - 13) (3 - 78)		
	Sewing machine lamp (LED lamp) does not light (machine operation normal)	Bad LED lamp R assy.	Replace LED lamp R assy. (3 - 5)(3 - 71)		
		LED lamp R assy. and SSVR PCB assy. connector disconnected	Plug connector in (3 - 71)		
		Bad SSVR PCB assy.	Replace SSVR PCB assy. (3 - 5)(3 - 71)		
		Bad main PCB assy.	Replace main PCB assy. (2 - 8)(2 - 34)		
3	Even when the presser is lowered with a straight line pattern, the sewing machine will not turn	Bad PF switch assy. attachment position	Adjust PF switch assy. position (3 - 30)(3 - 94)	Presser foot switch function	When let the presser foot lift up and down, SS lamp color changes. When raise : RED When lower : GREEN
		Bad PF switch assy.	Replace PF switch assy. (3 - 30)(3 - 94)		
4	Straight left base line stitch unevenness (pitch)	Bad left-right needle drop adjustment Loose zigzag adjusting nut	Adjust 3 point needle drop (4 - 8)	3 point needle drop (divide left and right)	Check that the needle positions are uniform to the left and right of the needle plate A needle hole.

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
5	Stitch skipping, Thread abrasion Thread breakage	Bad needle interference adjustment Loose needle interference adjustment screw	Adjust needle interference (4 - 12)	Needle and tip gap	Refer to Adjustment of clearance between the needle and the rotary hook point. (4 - 12)
		Bad front-back needle drop adjustment Bad needle plate A attachment position	Adjust back-front needle drop (4 - 19) Reattach needle plate A (3 - 36) (3 - 116)	Back-front needle drop position	Refer to Forward and back adjustment of needle and presser. (4 - 19)
		Bad needle bar rise adjustment Loose timing adjustment screws	Adjust needle bar rise (4 - 10)	Needle bar rise Needle interference	Refer to Adjustment of needle bar rise (4 - 10)
		Bad needle bar height adjustment Loose timing adjustment screws	Adjust needle bar height (4 - 11)	Needle bar height	Refer to Adjustment of needle bar height (4 - 11)
6	Does not turn (Electronic sounds and operating display lamps normal at startup)	Bad main motor Main motor connector disconnection Bad power supply PCB assy. Bad SSVR PCB assy. SSVR PCB assy. and main PCB assy. connector disconnection	Replace main motor (3 - 16) (3 - 75) Plug connector in (2 - 34) Replace power supply PCB assy. (3 - 14) (3 - 77) Replace SSVR PCB assy. (3 - 5) (3 - 71) Plug connector in (2 - 38)	Sewing machine runs when S/S button is pushed	Check that the sewing machine starts and stops when the S/S button is pushed.
	Does not turn (No electronic sounds / operating display lamps normal at startup)	Bad NP PCB assy. NP PCB assy. and main PCB assy. connector disconnection Bad pin jack assy.	Replace NP PCB assy. (2 - 9)(2 - 34) Plug connector in (2 - 34) Replace pin jack assy. (3 - 15) (3 - 76)		
7	Irregular rotation (rotation slow / fast / unstable)	Grease or dust adhering to speed shutter Grease or dust adhering to NP PCB assy. Bad NP PCB assy. Interference between NP PCB assy. and speed shutter • Damage to speed shutter • Damage to NP PCB assy. Bad main PCB assy.	Remove grease or dust Remove grease or dust Replace NP PCB assy. (2 - 9)(2 - 34) Eliminate cause of interference Replace upper shaft assy. (2 - 20)(2 - 23) Replace NP PCB assy. (2 - 9)(2 - 34) Replace main PCB assy. (2 - 8)(2 - 34)	Machine operation while rotating	Check that it switches to fast, middle and slow speed when the speed control lever is operated and that at high speed there is no rotational variation.
8	Even if the drop knob is returned to the left, the feed dog stays down and does not return (no material feed)	Drop knob damage Operation trouble of virtical lever Bad vertical feed shaft Vertical feed shaft misalignment Vertical feed cam surface out of grease	Replace drop knob (3 - 41) (3 - 109) Adjust vertical lever operation (3 - 41) (3 - 109) Replace vertical feed shaft (3 - 41) (3 - 109) Adjust vertical feed shaft (3 - 41) (3 - 109) Apply grease (3 - 109)	Drop function	With the needle bar in the top position and the drop lever to the right, check that the feed dog is down, and moving the drop lever to the left and turning the pulley one turn by hand, that the feed dog returns to the original height.

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
9	Bad pattern shape Blocked by satin pattern Fine BH stitches Straight line feed too small Stitches uneven	Vertical rattle in feed dog • Loose feed dog attachment screw • Vertical rattle in feed bar Damage to horizontal feed cam Rattle in feed adjuster assy.	 Adjust feed dog attachment screw (4 - 20) Reattach feed bar (3 - 40) (3 - 110) Replace lower shaft assy. (3 - 44) (3 - 105) Reattach feed adjuster assy. (3 - 46) (3 - 103)	Back/front rattle in feed dog	With the feed dog up, check that there is no rattle when the feed dog is lightly moved back and forth.
		Horizontal rattle in feed dog • Loose feed dog attachment screw • Horizontal rattle in feed bar	 Adjust feed dog attachment screw (4 - 20) Reattach feed bar (3 - 40) (3 - 110)	Left-right rattle in feed dog	With the feed dog up, check that there is no rattle when the feed dog is lightly moved left and right.
		Bad feed dog height adjustment	Adjust feed dog height (4 - 21)	Feed dog height	Refer to Adjustment of feed dog height (4 - 21)
		Bad feed dog front-back position adjustment	Adjust feed dog front-back position (4 - 20)	Feed dog front-back position	Refer to Adjustment of front/back, left/right position of feed dog (4 - 20)
		Bad feed dog left-right position adjustment	Adjust feed dog left-right position (4 - 20)	Feed dog left-right position	Refer to Adjustment of front/back, left/right position of feed dog (4 - 20)
		Bad feed adjustment	Adjust feed (4 - 15)	Feed	Refer to Adjustment of feed (4 - 15)
		Bad presser height and parallel adjustment	Adjust presser height and parallel (4 - 14)	Presser height and parallel	Refer to Adjustment of presser bar height and parallel (4 - 14)

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
10	Sewing sounds Inappropriate sounds			Operating noise	Check that there is no abnormal noise at fast, middle and slow speed in 3 point drop (test mode 3). (4 - 8)
	• Thread take-up noise	Take-up support shaft • Loose screws	Retighten take-up support shaft (3 - 100)		
	• Outer rotary hook vertical rattle noise	Outer rotary hook noise • Outer rotary hook vertical rattle	Reattach outer rotary hook (3 - 39) (3 - 111)		
	• Upper shaft noise	Upper shaft bushing out of oil	Lubricate sliding surfaces of bushing and thread take-up counter weight		
		Rattle along the thread take-up counter weight shaft	Reattach thread take-up counter weight (2 - 20) (2 - 23)		
	• Motor noise	Belt too tight	Adjust motor belt (4 - 6)		
		Motor brush noise	Replace main motor sub assy. (3 - 16) (3 - 75)		
	• Lower shaft noise	Lower shaft axial rattle	Reassemble lower shaft assy. (3 - 44) (3 - 105)		
	• Vertical feed cam noise	Vertical feed cam out of grease	Lubricate vertical feed cam (3 - 107) (3 - 109)		
	• Horizontal feed arm noise	Bad horizontal feed arm	Replace feed arm A (3 - 45) (3 - 104)		
	• Noise from contact between needle plate A and feed dog	Back/front and left/right rattle in feed dog	Reattach feed dog (3 - 36) (3 - 116)		
		Bad feed dog front-back position adjustment	Adjust feed dog front and back position (4 - 20)		
		Bad feed dog left-right adjustment	Adjust feed dog left and right position (4 - 20)		
		Needle plate A attachment position slippage	Reattach needle plate A (3 - 36) (3 - 116)		
	• Needle contact noise	Noise of contact between needle and outer rotary hook • Bad needle interference adjustment • Loose needle interference adjustment screw	Adjust needle interference (4 - 12) Adjust needle interference (4 - 12)		

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
11	Threading not possible.	Thread pushed out at the hook end.		Threading function	Confirm that when threading is carried out with Schappe Spun Sewing Thread #60 / #11 needle and Schappe Spun Sewing Thread #30 / #16 needle, that the threading lever moves smoothly and that threading through the needle hole is possible.
		• Vertical slippage in needle thread block	Adjust needle thread block (4 - 13)		
		Hook extends right of the needle hole			
		• Wide gab between right side of needle and hook guide	Replace hook assy. (3 - 29) (3 - 96)		
		• Needle curvature	Replace needle		
		• Needle slant (hole slant with slanted attachment of needle block)	Replace needle bar (3 - 27) (3 - 98)		
		• Threader hook assy. slippage	Replace hook assy. (3 - 29) (3 - 96)		
		Does not go into needle hole because of hook tip curvature.	Replace hook assy. (3 - 29) (3 - 96)		
	When the threader lever returns, it stops part way through.	Threader shaft tangling	Replace needle bar supporter assy. (3 - 28) (3 - 97)		
		Bad thread guide shape	Replace hook assy. (3 - 29) (3 - 96)		
		Needle thread shaft and top gap too small	Replace needle bar supporter assy. (3 - 28) (3 - 97)		
	Needle thread lever operation catches part way through.	Bad needle stop position			
		• NP sensor damage	Replace NP PCB assy. (2 - 9) (2 - 34)		
		• Grease or dirt adhering to NP sensor	Remove grease and dirt		
		• Rotation shutter damage	Replace upper shaft assy. (2 - 20) (2 - 23)		
		• Bad needle thread block rotational position	Adjust needle thread block (4 - 13)		
12	Either upper thread tension or lower thread tension	Upper thread tension is tight/loose	Adjust upper thread tension (4 - 7)	Upper thread tension	Check that the thread tension is good during actual sewing.
		Lower thread tension is too tight/loose	Adjust lower thread tension (4 - 23)	Lower thread tension	
		Upper thread or lower thread unsuitable	Replace upper thread or lower thread		

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
13	Actual sewing • Needle breakage	Needle breaks. • Inner rotary hook slips because the inner rotary hook and inner rotary hook bracket back/front overlap is too small • Inner rotary hook slips because the inner rotary hook and inner rotary hook bracket vertical overlap is too small • Thread catches on thread bobbin (thread falls down to the right of thread bobbin because the spool pressure is insufficient) • Thread catches on spool presser (scratches on spool presser) Needle catches and bends before or after sewing.	 Adjust inner rotary hook bracket assy. position (4 - 22) Confirm the presence of washer and spacer under outer rotary hook (3 - 39) (3 - 111) Rethread Replace spool presser Replace needle	Actual sewing (straight line / zigzag)	Check that the needle does not break during actual sewing. Check that there are no abnormal sounds during actual sewing.
	• Thread breakage stitch skipping	Thread breakage. • Thread catches on thread bobbin (thread falls down to the right of thread bobbin because the spool pressure is insufficient) • Thread catches on spool presser (scratches on spool presser) • Scratches on outer rotary hook • Wrong thread guide path	 Rethread Replace spool presser Replace outer rotary hook assy. (3 - 39) (3 - 111) Rethread	Actual sewing (straight line / zigzag)	Check that the thread does not break during actual sewing.

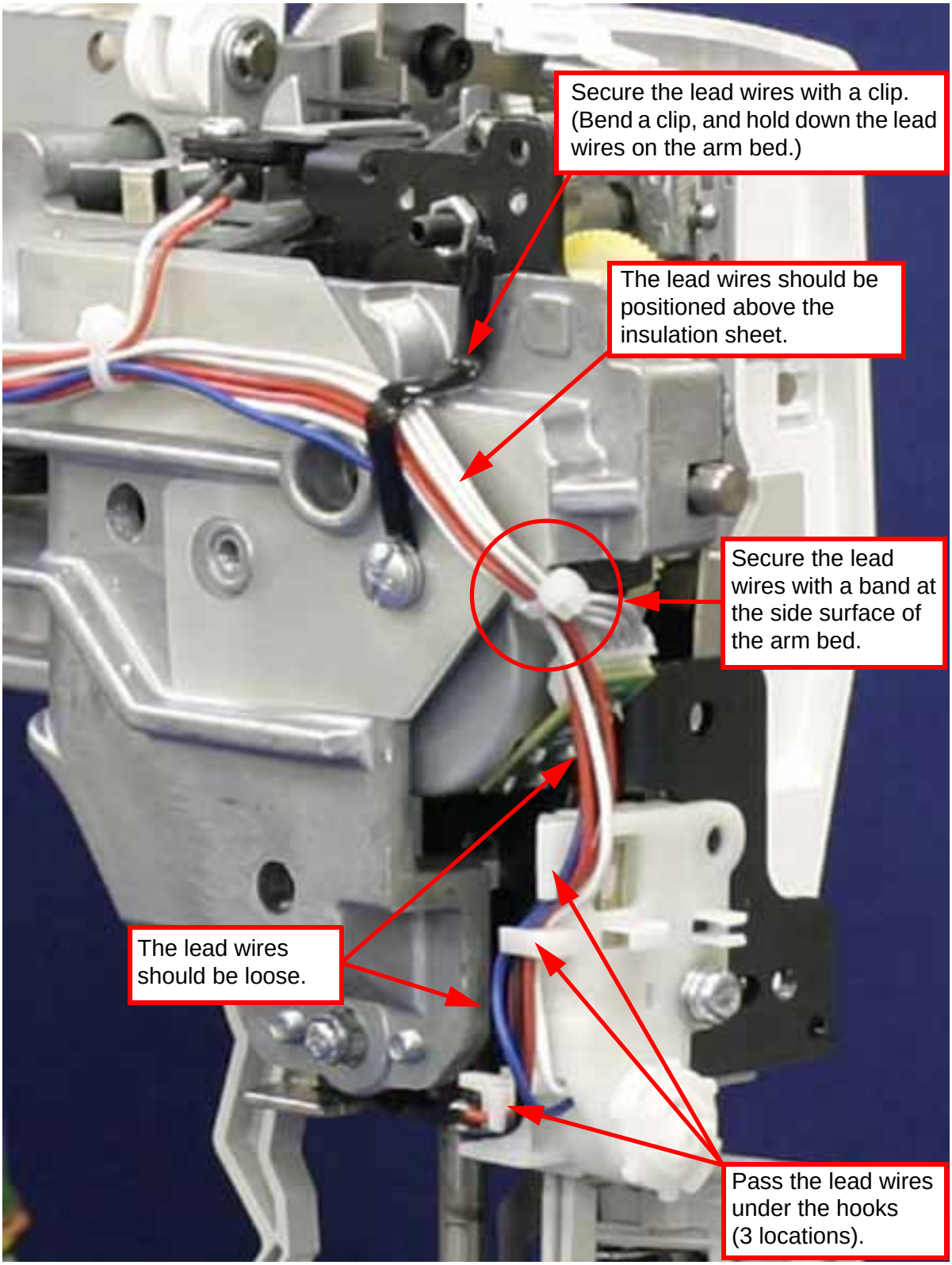
	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
13	• Seam unevenness	Seam unevenness.		Actual sewing (straight line / zigzag)	Check that stitches are not uneven during actual sewing.
		• Bad presser position	Adjust presser bar height (4 - 14)		
		• Cloth presser is high and does not hold material completely	Adjust presser bar height (4 - 14)		
		• Scratches on inner rotary hook	Replace inner rotary hook		
		• Scratches on outer rotary hook	Replace outer rotary hook (3 - 39) (3 - 111)		
		• Scratches around needle plate needle hole	Replace needle plate A (3 - 36) (3 - 116)		
		• Scratches around presser foot needle hole	Replace presser foot (3 - 26) (3 - 101)		
		• Burrs and scratches in thread guide path	Replace parts with burrs and scratches		
		• Slippage from lower thread tension spring	Reset lower thread		
		• Tension loosened by thread scraps and dirt adhering to the thread guide plate	Remove thread and dust on stuck to thread guide plate		
		• Distortion of thread guide plate	Replace thread guide plate (3 - 8) (3 - 68)		
		• Scratches on needle plate	Replace needle plate A (3 - 36) (3 - 116)		
	• Stops during sewing	Stops during sewing.		Actual sewing (straight line / zigzag)	Check that it does not stop during actual sewing.
		• No gap for BH lever switch	Adjust BH lever switch position (4 - 18)		
		• No play in S/S button, reverse button or vertical stop button	Reassemble SSVR PCB assy. (3 - 5) (3 - 71)		
14	Cannot sew BH • BH is blocked • BH cannot switch • BH switches part way through	BH sewing impossible		Bar-tack Eyelet sewing	Check that there is no stitch skipping or clogging with BH pattern sewing. With the BH presser moved the extent of its range by hand, confirm that there is slack on the BH side and the other side.
		• Bad BH connecting point	Adjust BH switch (4 - 18)		
		• BH lever detached	Replace BH switch assy. (3 - 26) (3 - 101)		
		• Connector disconnected	Plug connector in (2 - 34)		
		• Operation drags	Replace BH switch assy. (3 - 26) (3 - 101)		
		• BH presser button attachment holder is pulled out fully.	Reset range for BH presser button attachment (Move back two notches from maximum permissible range) (4 - 18)		
	Becomes straight line	Bad feed forward/reverse adjustment (100 stitches forward and reverse)	Adjust feed forward/reverse (4 - 15)		
15	Detect upper thread operation abnormal	Bad upper thread sensor	Replace upper thread sensor (3 - 20) (3 - 82)	Upper thread detecting function	When hang the thread on the thread catching spring and move it up and down in the state that select the test mode #11, the buzzer sounds ON/OFF.
		Upper thread sensor connector disconnection	Plug connector in (2 - 34)		
		Bad main PCB	Replace main PCB (2 - 8) (2 - 34)		
	Detect lower thread operation abnormal	Bad lower thread sensor	Replace lower thread sensor (3 - 50) (3 - 119)	Lower thread detecting function	When put the bobbin which would up the thread in the state that select the test mode #11, the buzzer sound is lost.
		Upper thread sensor connector disconnection	Plug connector in (2 - 34)		
		Bad main PCB	Replace main PCB (2 - 8) (2 - 34)		

	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
16	Touch panel does not respond	Touch panel position slippage	Adjust touch panel position (4 - 4)	Pattern selecting function	Check that can select the pattern from the touch panel
		Bad Touch panel assy.	Replace touch panel assy. (3 - 13) (3 - 78)		
		Bad main PCB assy.	Replace main PCB (2 - 8) (2 - 34)		
17	Thread cutter does not operate even if push the thread cutter switch	Bad thread cutter pulse motor	Replace thread cutter pulse motor (3 - 51) (3 - 118)	Thread cutter function	Carry out thread cutting on the left base line and the right base line, and the Thread #60 should actually be cut.
		Thread cutter pulse motor connector disconnection	Plug connector in (2 - 34)		
		Related part of the thread cutter lever gear operation drags	Reattach part of that operation drags		
		Bad main PCB assy.	Replace main PCB assy. (2 - 8) (2 - 34)		
		Bad SS-VR PCB assy.	Replace thread cutter pulse motor (3 - 5) (3 - 71)		
		Bad power supply PCB assy.	Replace power supply PCB assy. (3 - 14) (3 - 77)		
	Thread cutter operate, but the thread does not cut	Lint or dust adhering to thread guide assy.	Remove lint or dust		
		Bad timing that dashes out of thread guide assy.			
		• Grease or dust adhering to NP PCB assy.	Remove grease or dust		
		• Bad NP PCB assy.	Replace NP PCB assy. (2 - 9) (2 - 34)		
		• NP PCB assy. connector disconnection	Plug connector in (2 - 34)		
		• Interference between NP sensor and NP PCB assy.	Eliminate cause of interference Replace NP PCB assy. (2 - 9) (2 - 34)		
		Thread hook assy. does not scoop the thread			
		• Bad shape of thread hook assy.	Replace thread hook assy. (3 - 49) (3 - 120)		
		• Floaty plate spring of thread hook assy.	Replace plate spring (3 - 48) (3 - 121)		
		NT lower thread cutter is blunt	Replace NT lower thread cutter (3 - 49) (3 - 120)		
18	Bobbin winder shaft not turning	Bad BW switch	Replace BW switch (3 - 23) (3 - 87)	Bobbin winder function	Operate the bobbin winder with Schappe Spun Sewing Thread #60, and confirm that there is no uneven bobbin winding or abnormal noises. Check that the amount of thread wound onto the bobbin is 80 – 90% of the bobbin diameter.
		BW switch connector disconnected	Plug connector in (2 - 34)		
		BW switch attachment position unsuitable	Adjust BW switch position (4 - 17)		
		Bad main PCB assy.	Replace main PCB assy. (2 - 8) (2 - 34)		
	Bobbin winding amount unsuitable	Bad bobbin presser adjustment Loose bobbin presser attachment screw	Adjust bobbin presser position (4 - 16)		
	Bobbin winder winds unevenly	Bad bobbin winder guide assy. height adjustment Loose bobbin winder guide assembly screw	Adjust bobbin winder guide assy. (4 - 16)		

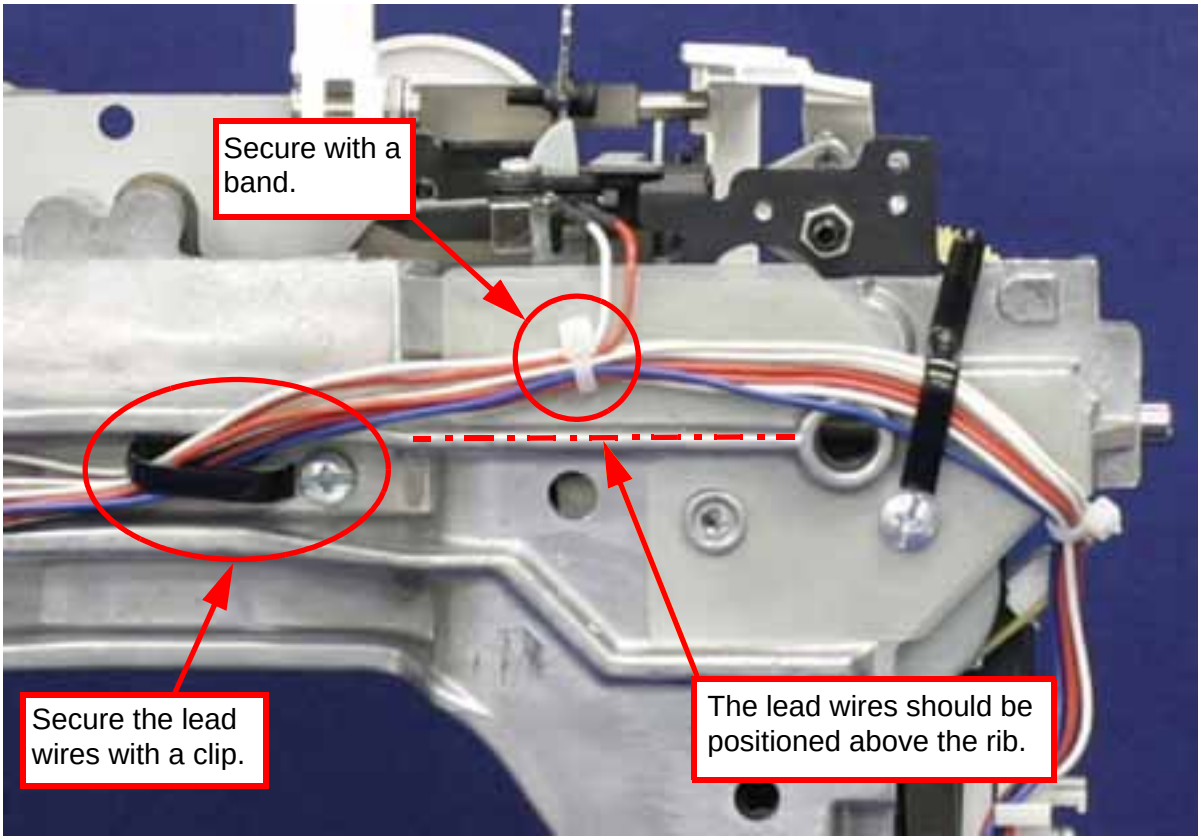
	Problem	Primary factors and causes	Repair method	Items for Inspection	Inspection method and standards
19	Foot controller not effective	Bad foot controller	Replace foot controller	Foot controller function	Run the sewing machine using the foot controller, and check that the sewing machine speed changes according to the amount it is pressed down.
		Bad pin jack assy. contact point	Replace pin jack assy. (3 - 15) (3 - 76)		
		Bad main PCB assy.	Replace main PCB assy. (2 - 8) (2 - 34)		
20	Embroidery machine does not operate normally	X pulse motor lead wire disconnect	Plug connector in	Embroidery function	The carriage moves surely.
		Bad X pulse motor	Replace X pulse motor (3 - 62) (3 - 123)		
		X pulse motor connector disconnect	Plug connector in		
		Y pulse motor lead wire disconnect	Plug connector in		
		Bad Y pulse motor	Replace Y pulse motor (3 - 61) (3 - 124)		
		Y pulse motor connector disconnect	Plug connector in		
		Abnormal initial operation with power is turned ON	Replace initial sensor assy. (3 - 123) (3 - 124)		
		Embroidery side lead wire assy. disconnect	Replace embroidery side lead wire assy. (3 - 55) (3 - 130)		
		Main body side lead wire assy. disconnect	Replace main body side lead wire assy. (3 - 16) (3 - 75)		
		Other	Replace main PCB assy. (2 - 8) (2 - 34)		

7 Special Instructions of Wiring

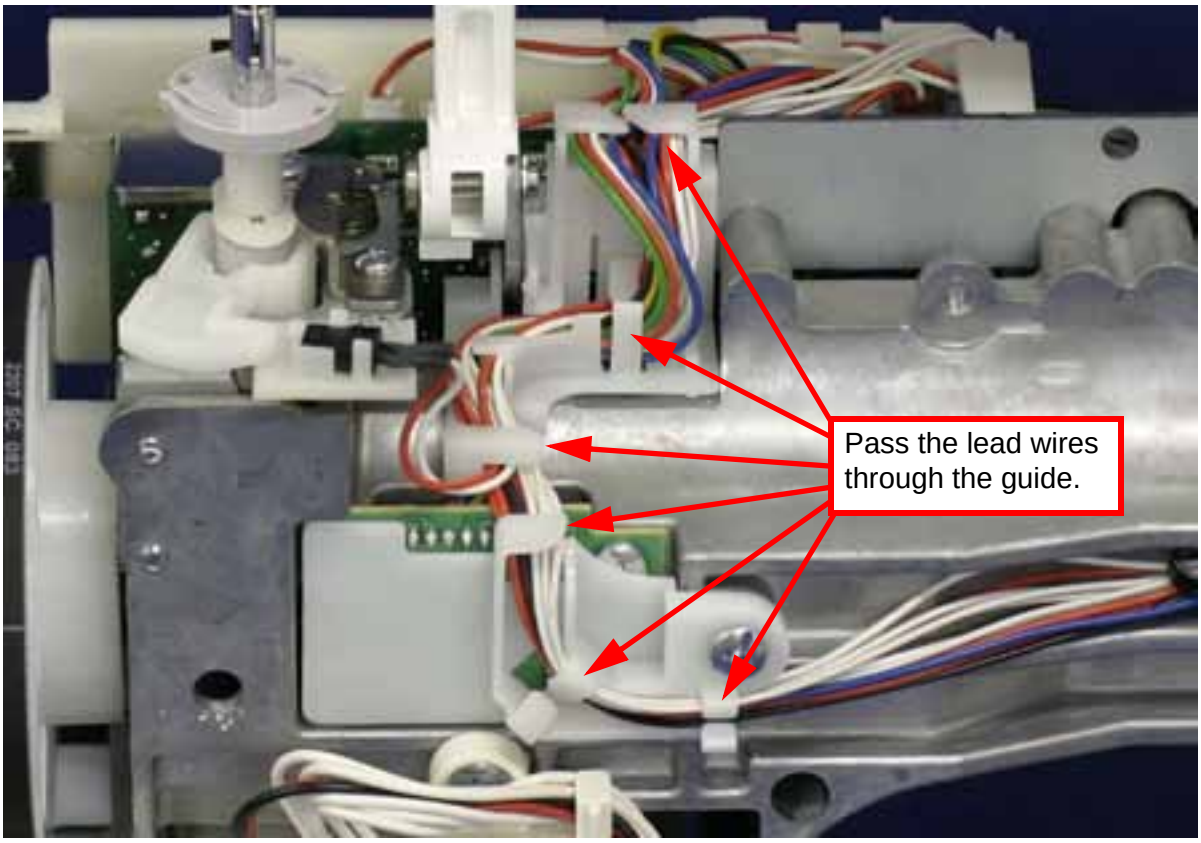
1. Wiring on left side of needle-presser module



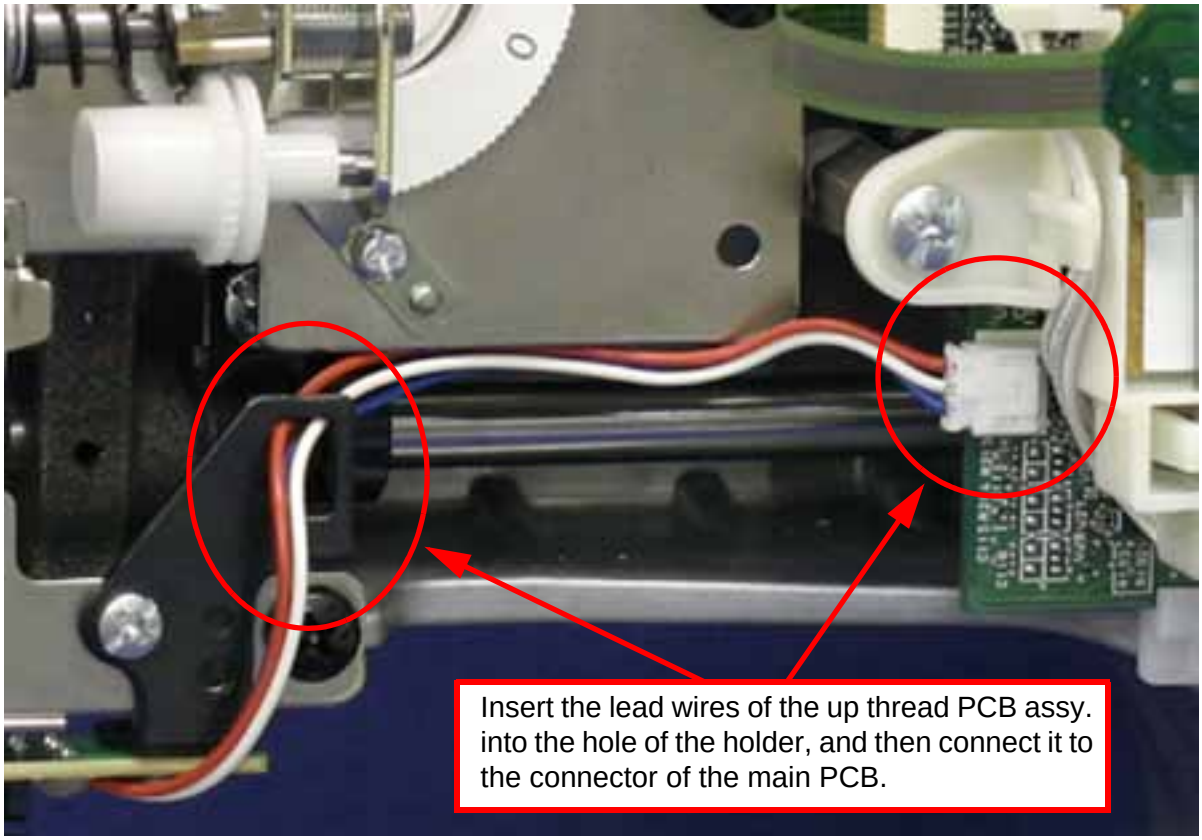
2. Wiring on back side of needle-presser module



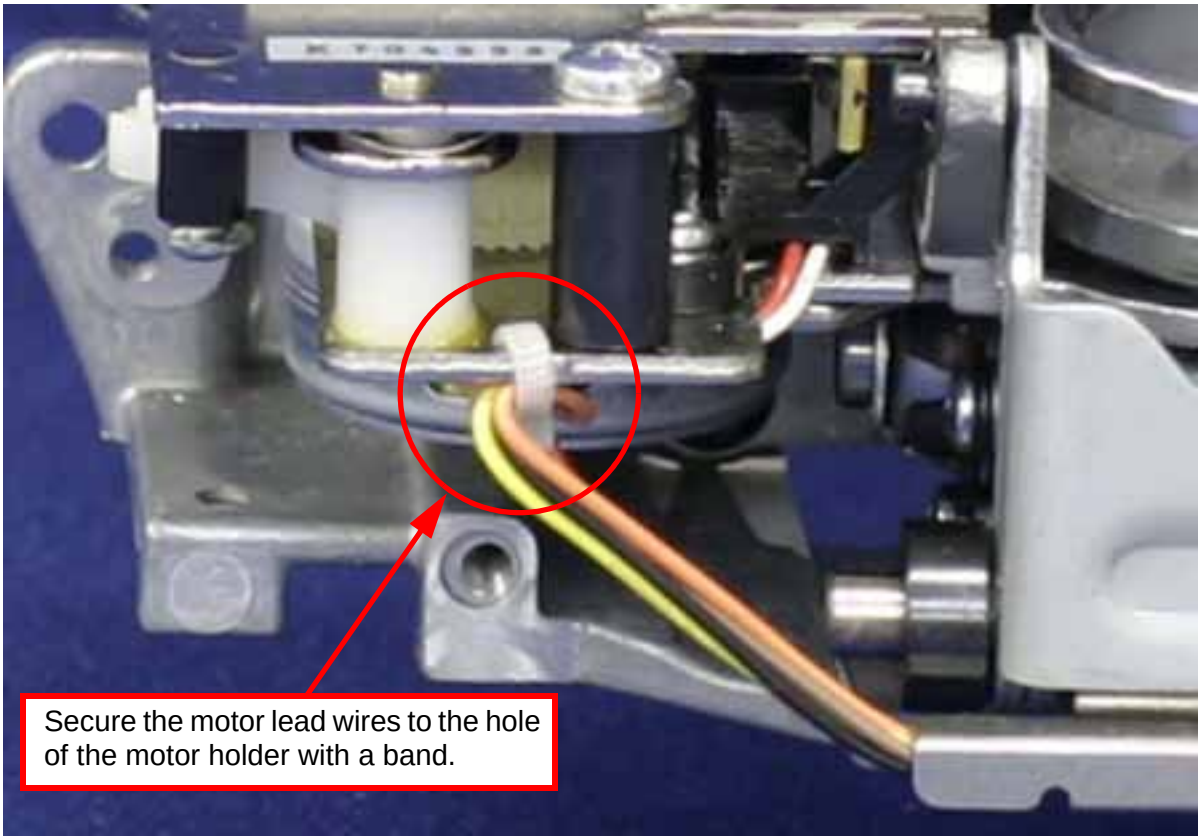
3. Wiring on back side of arm bed



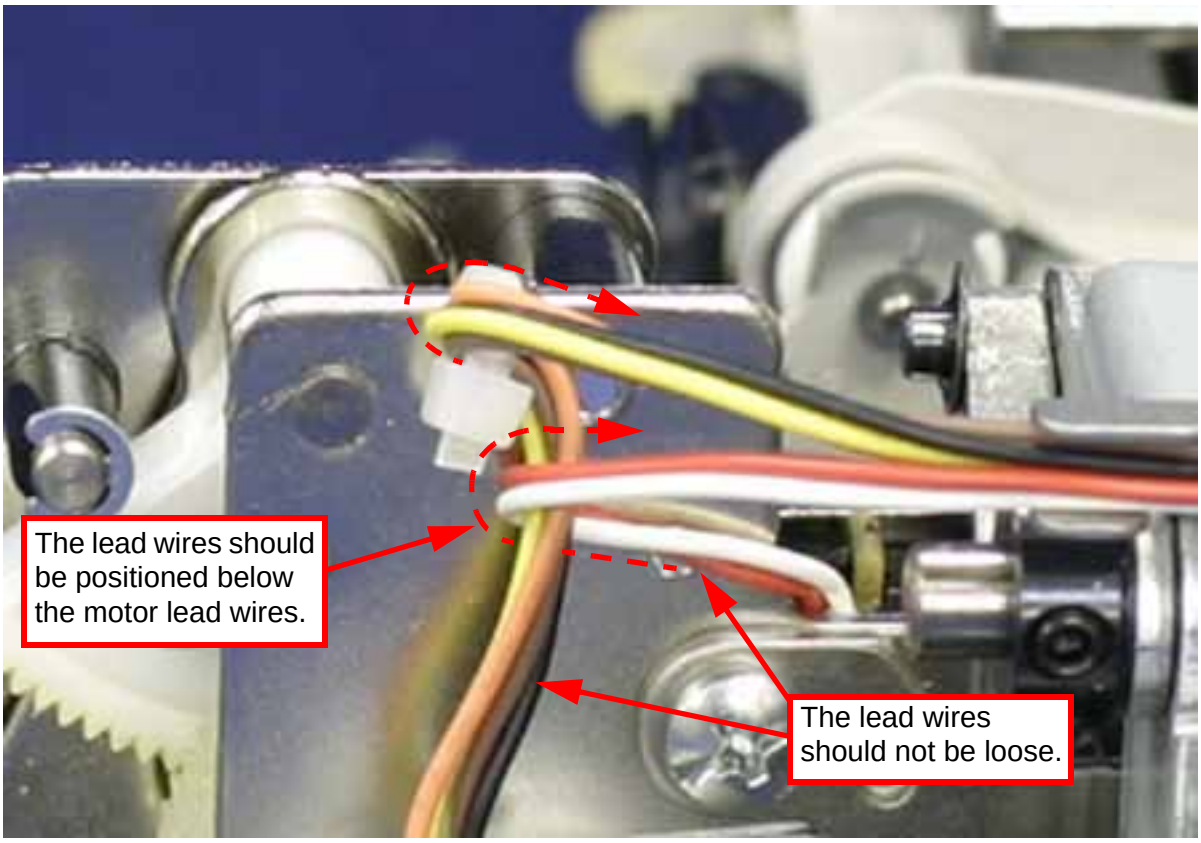
4. Wiring of right side of needle-presser module



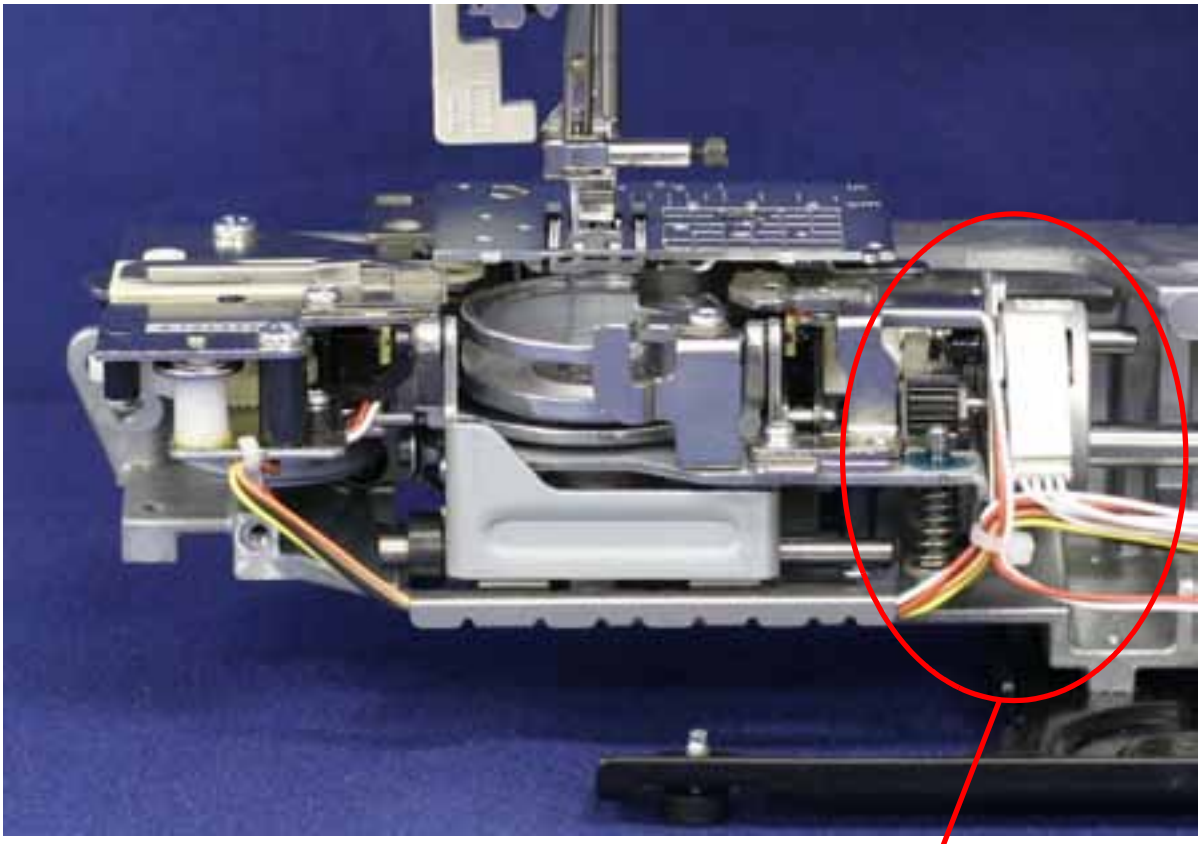
1. Wiring on front side of thread cutter module



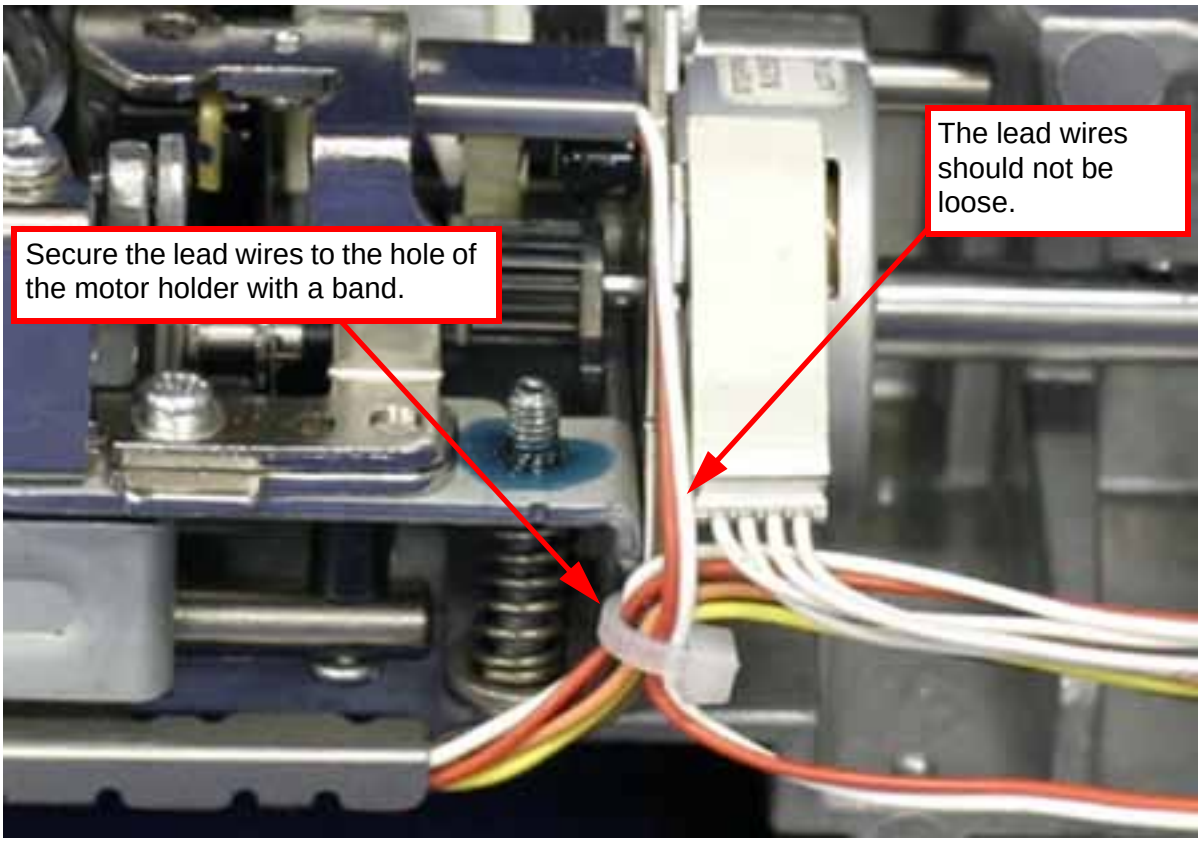
2. Wiring on back side of thread cutter module



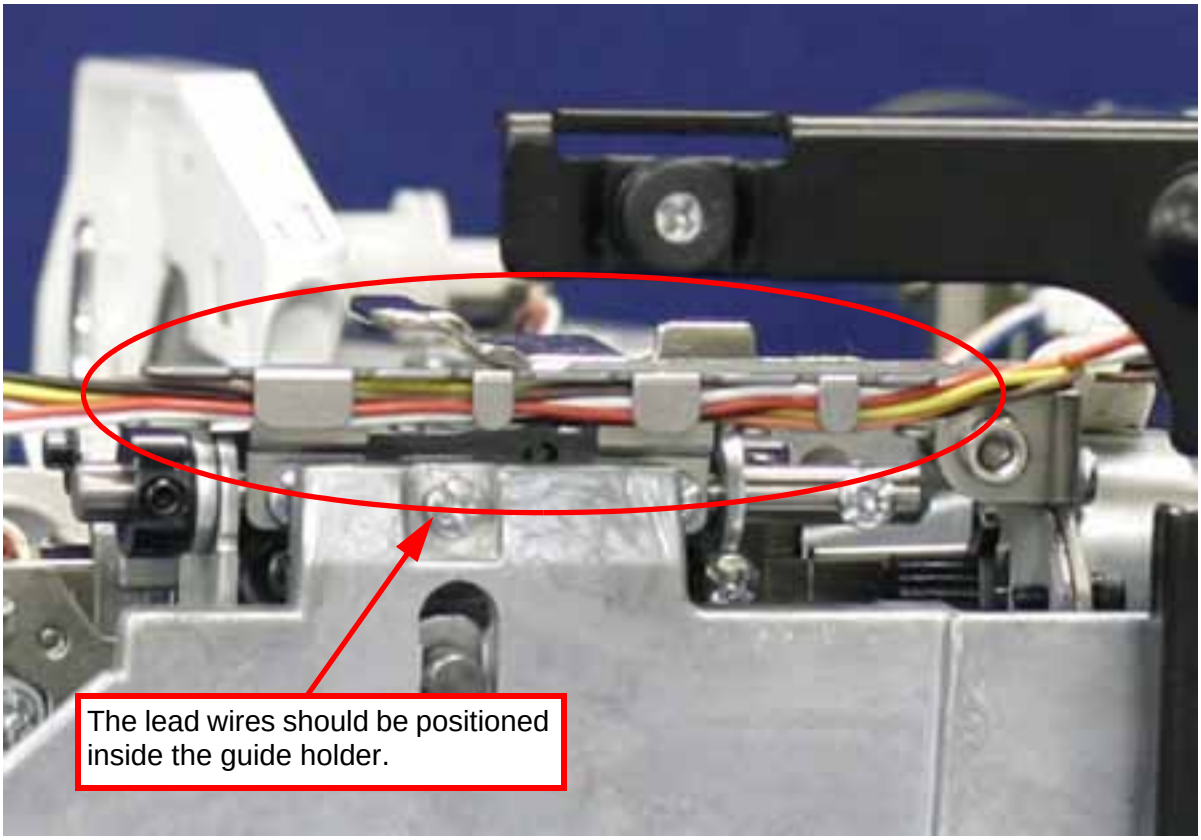
1. Wiring on front side of rotary hook module



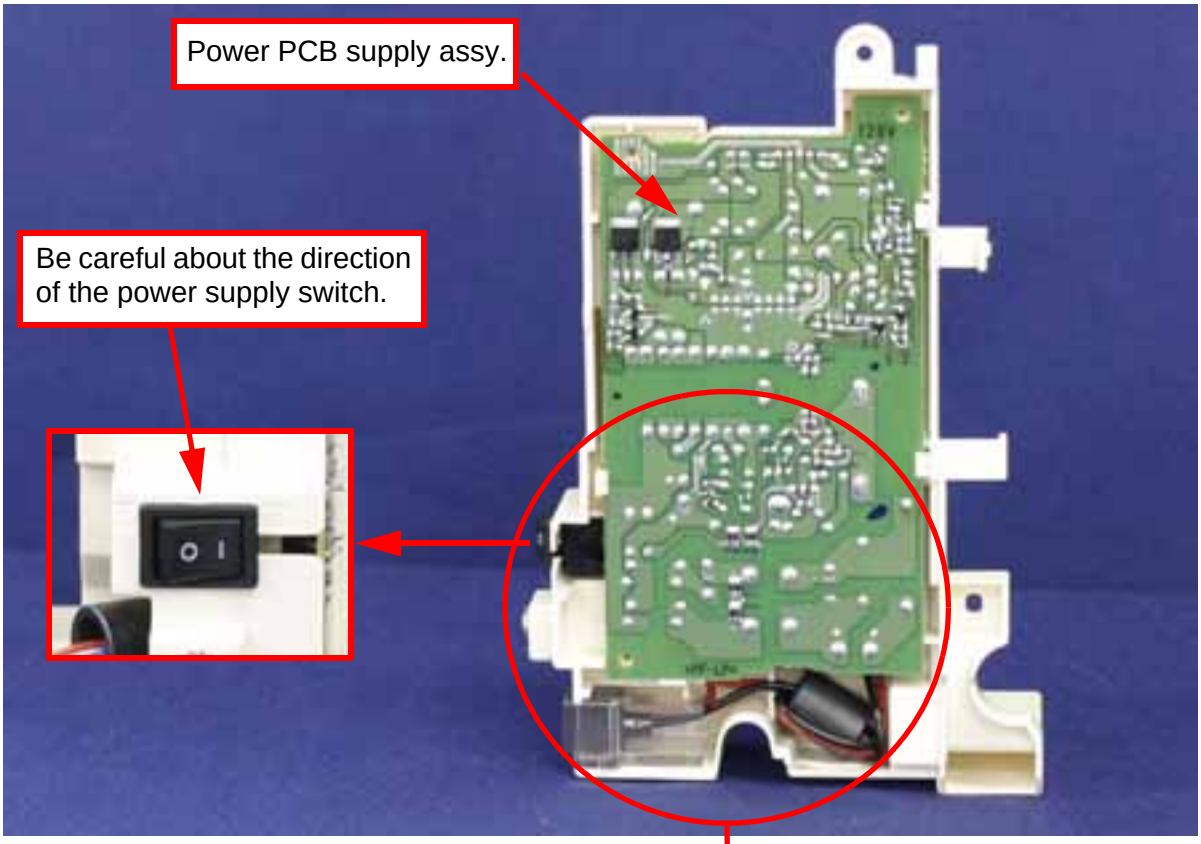
2. Wiring on right side of rotary hook module

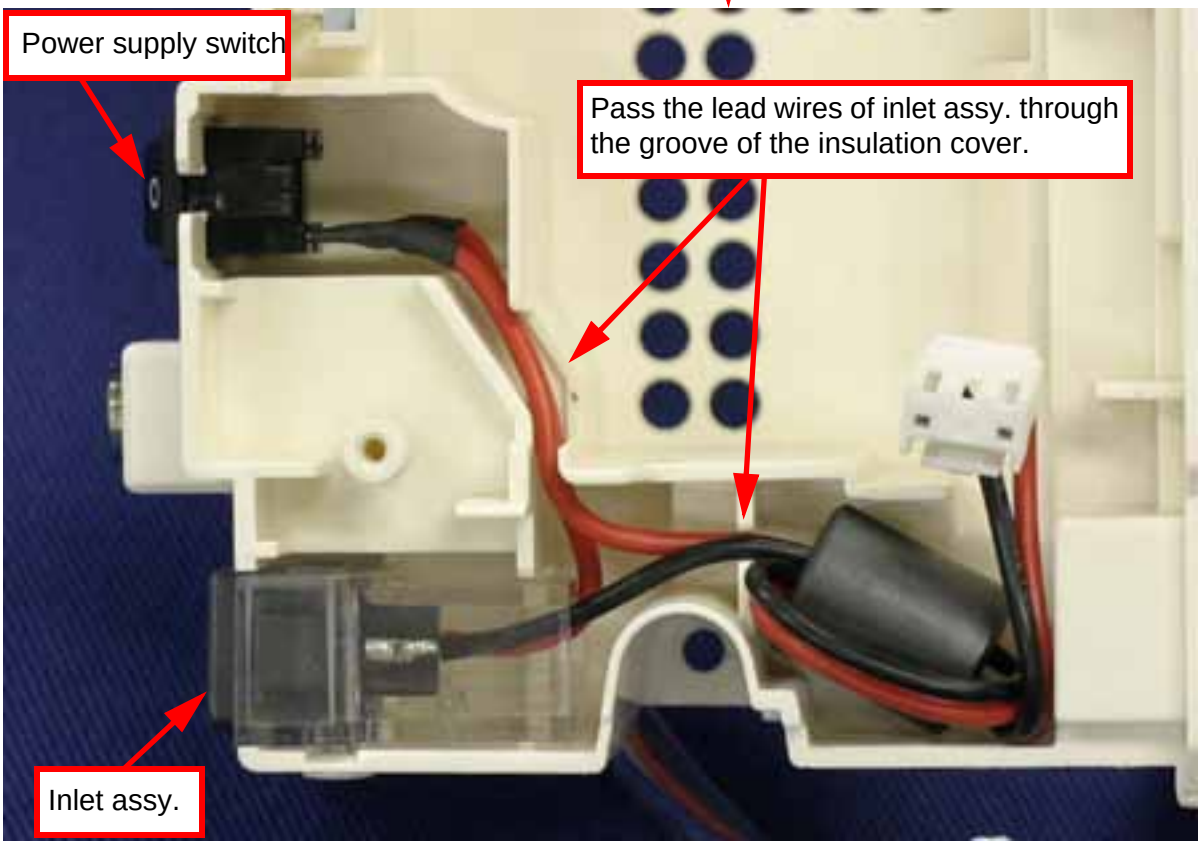


3. Wiring on back side of rotary hook module

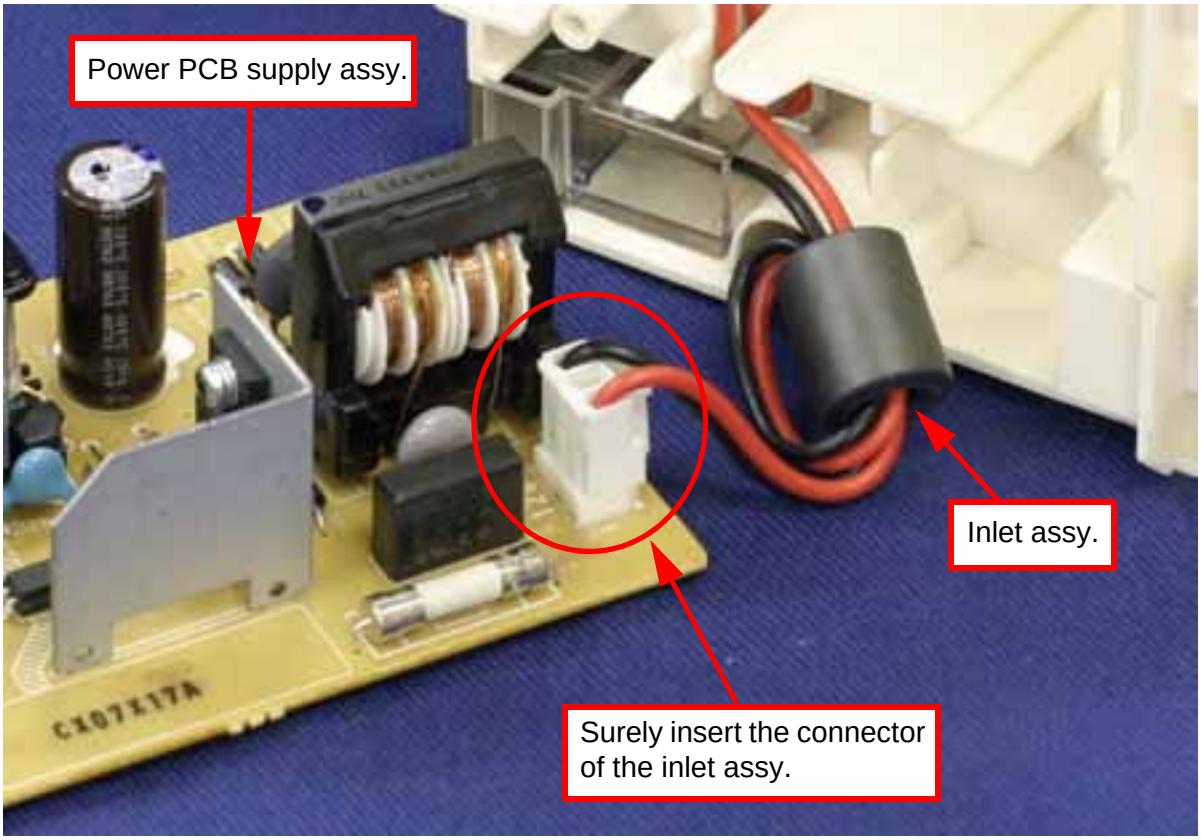


1. Wiring of inlet assy. lead wires

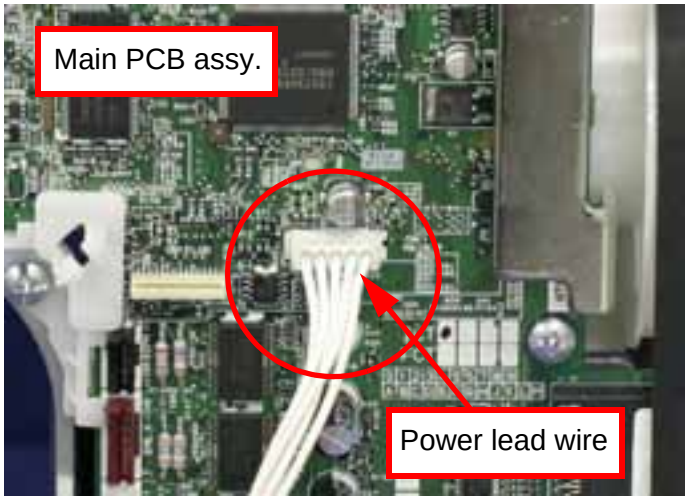
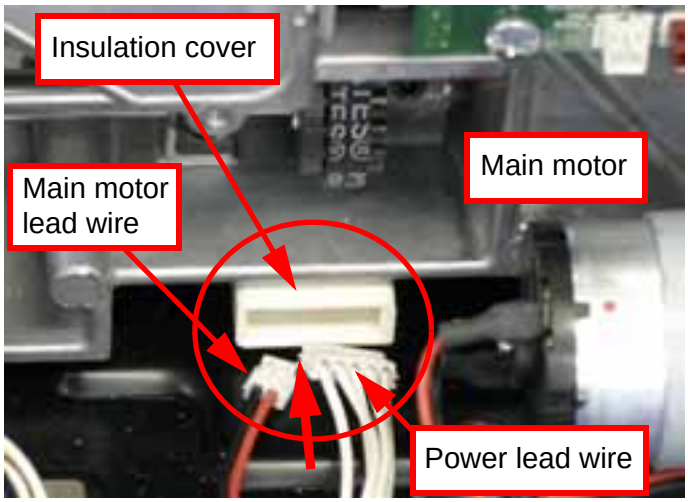
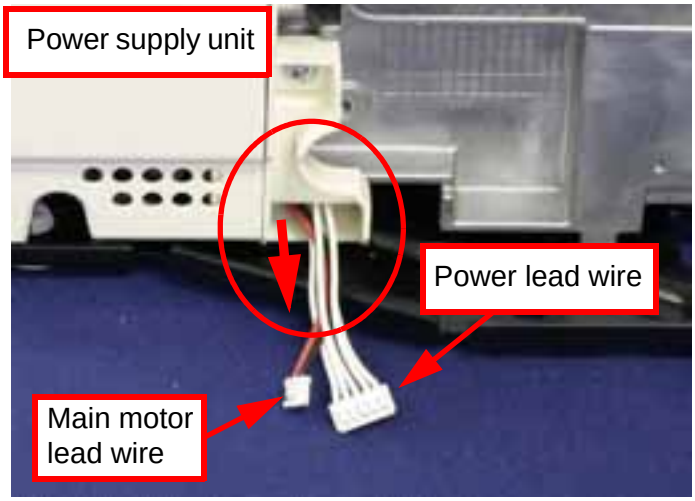




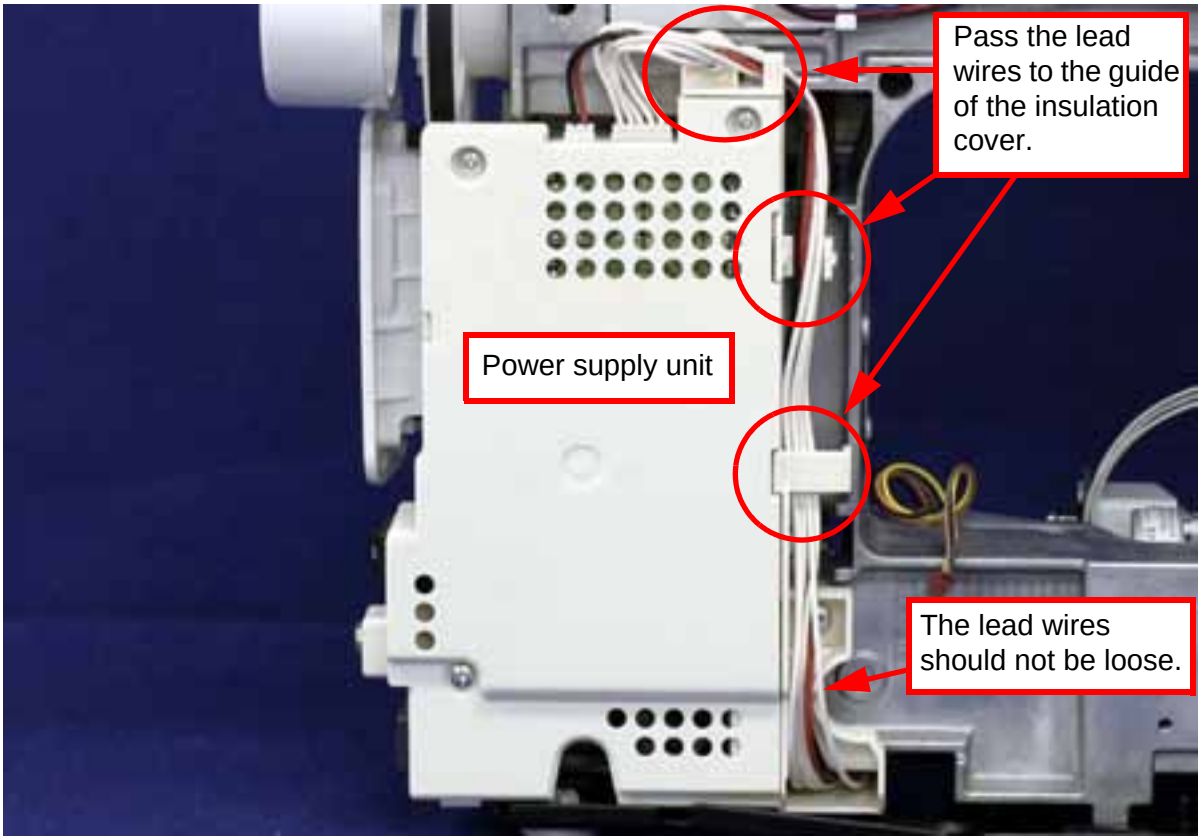
2. Wiring of power PCB supply assy. and inlet assy. lead wires.



3. Wiring of power lead wire and main motor lead wire

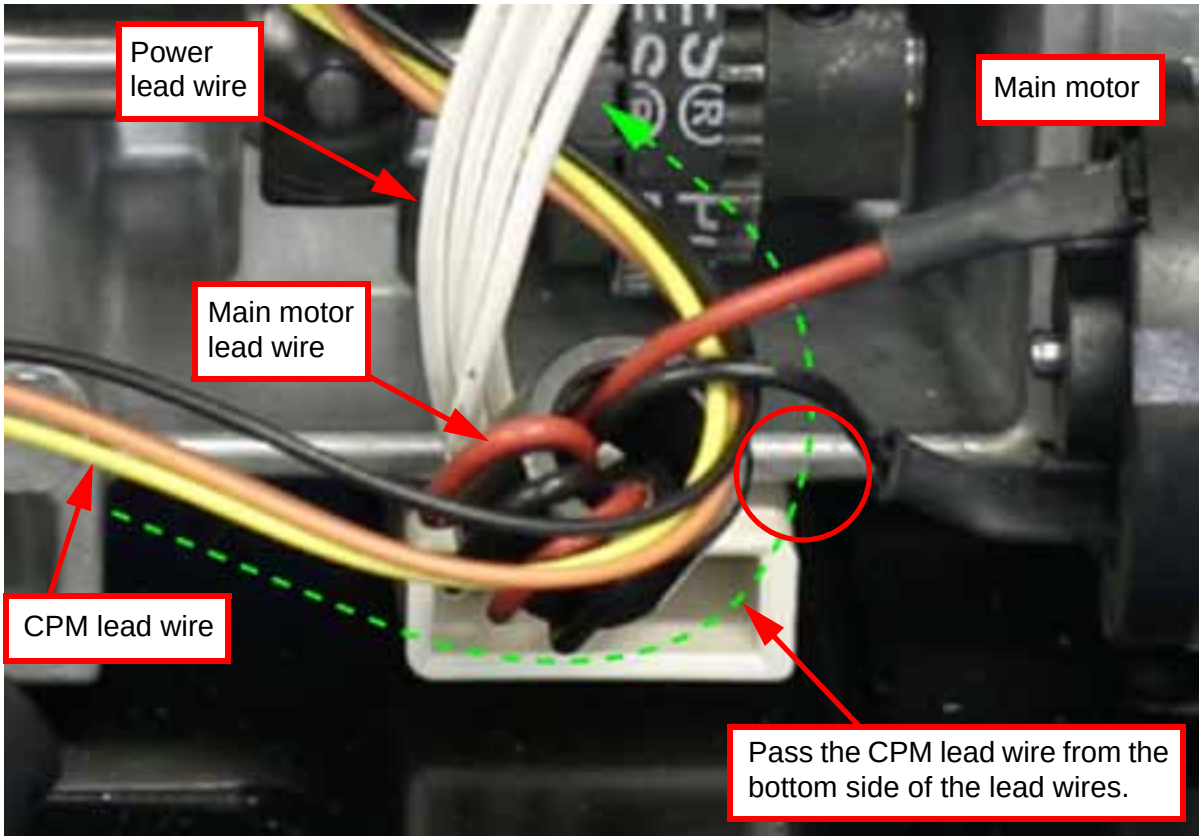
	1. Insert the connector of the power lead wire into the connector of the main PCB assy.
	2. Pass the power lead wire and the main motor lead wire to the hole of the insulation cover.
	3. Pull out the power lead wire and the main motor lead wire from the hole of the insulation cover.

4. Wiring of the main motor lead wire and power lead wire

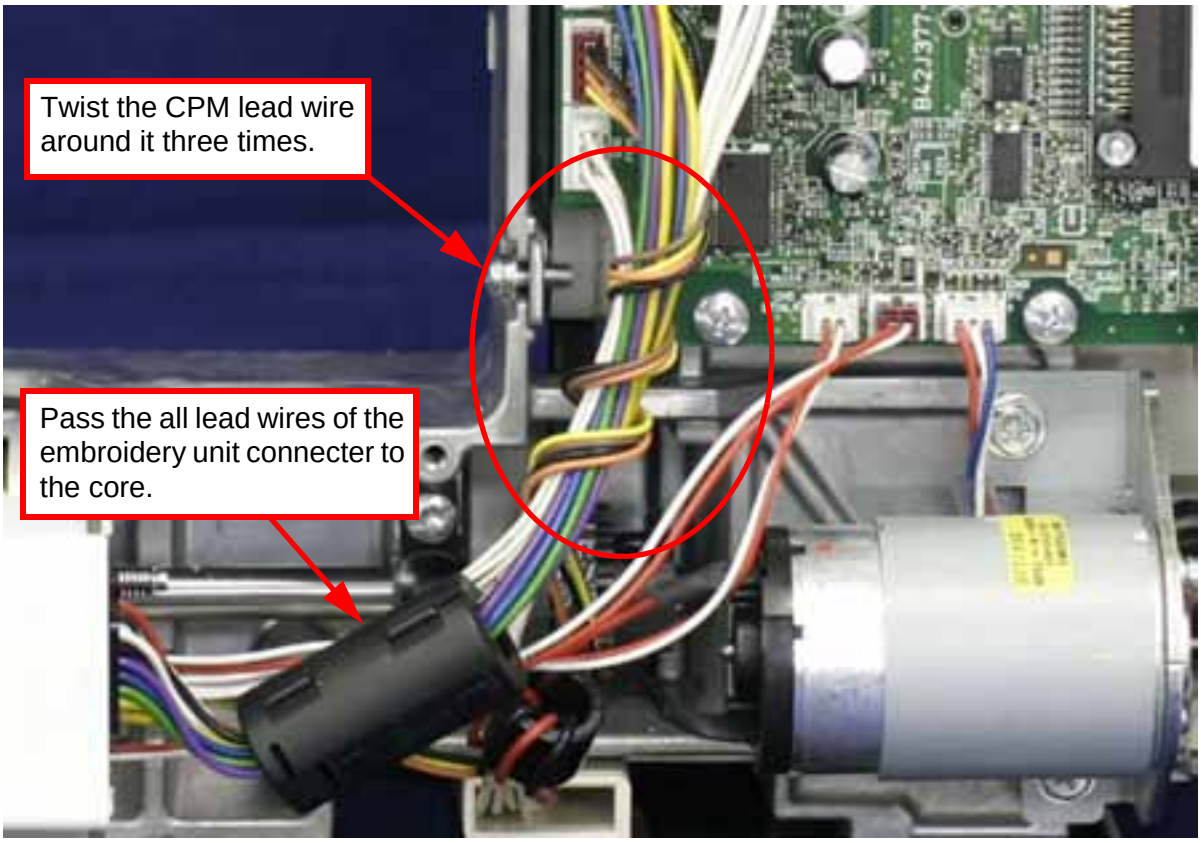


1. Front side of main PCB assy.

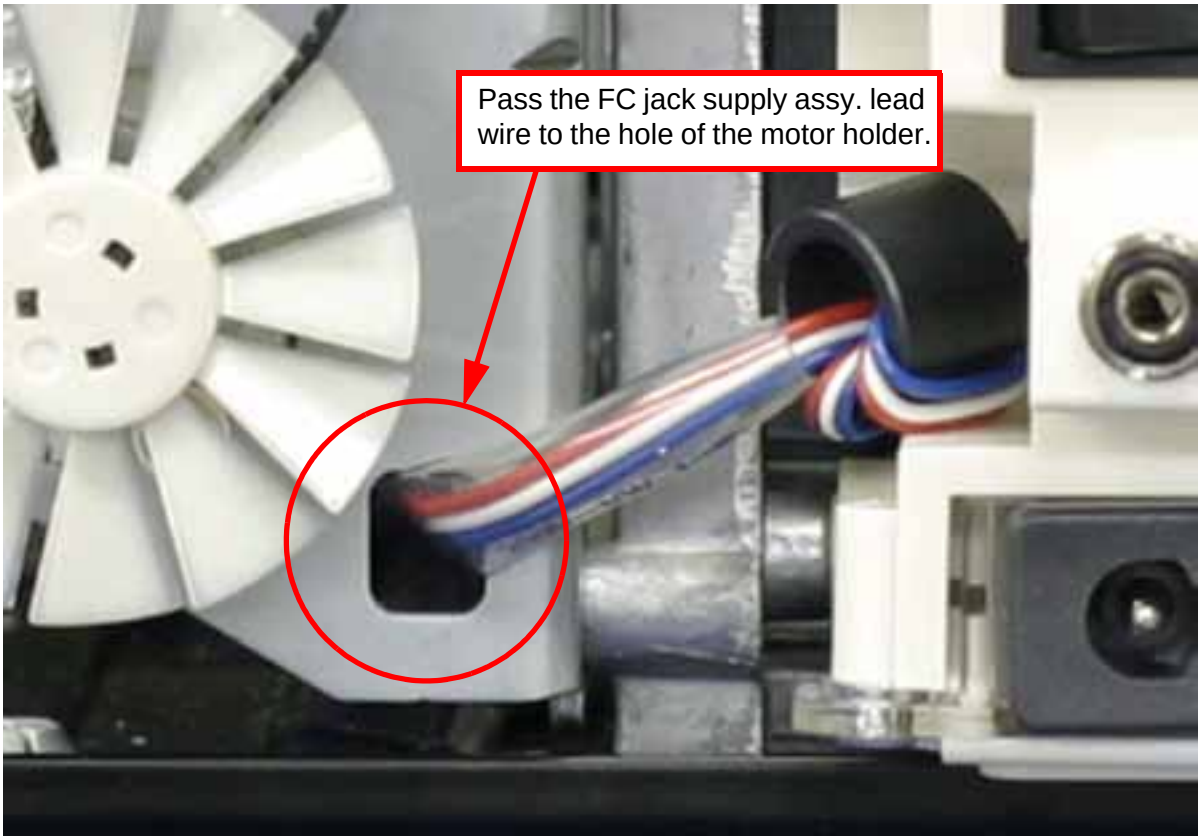
2. Wiring of main motor lead wire and CPM lead wire



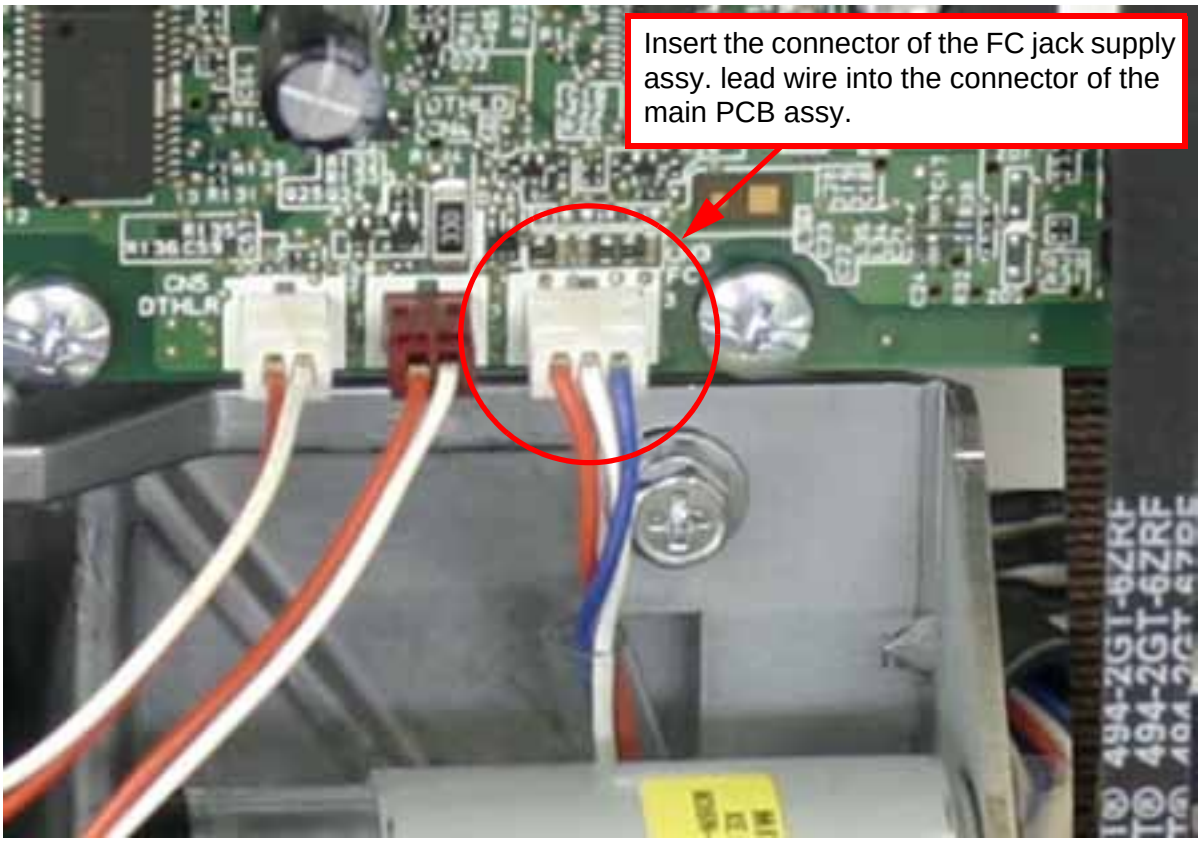
3. Lower side of main PCB assy.



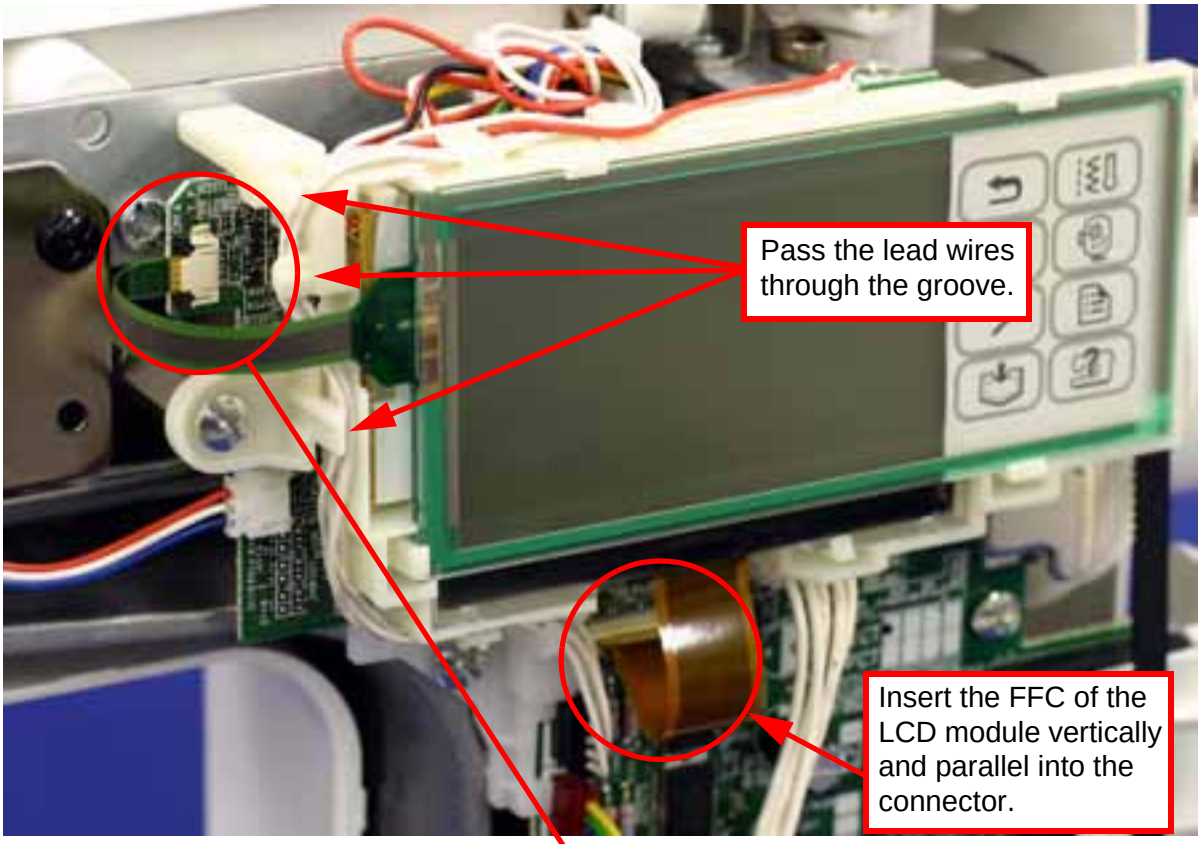
4. Right side of main motor (Wiring of FC jack supply assy. lead wire)



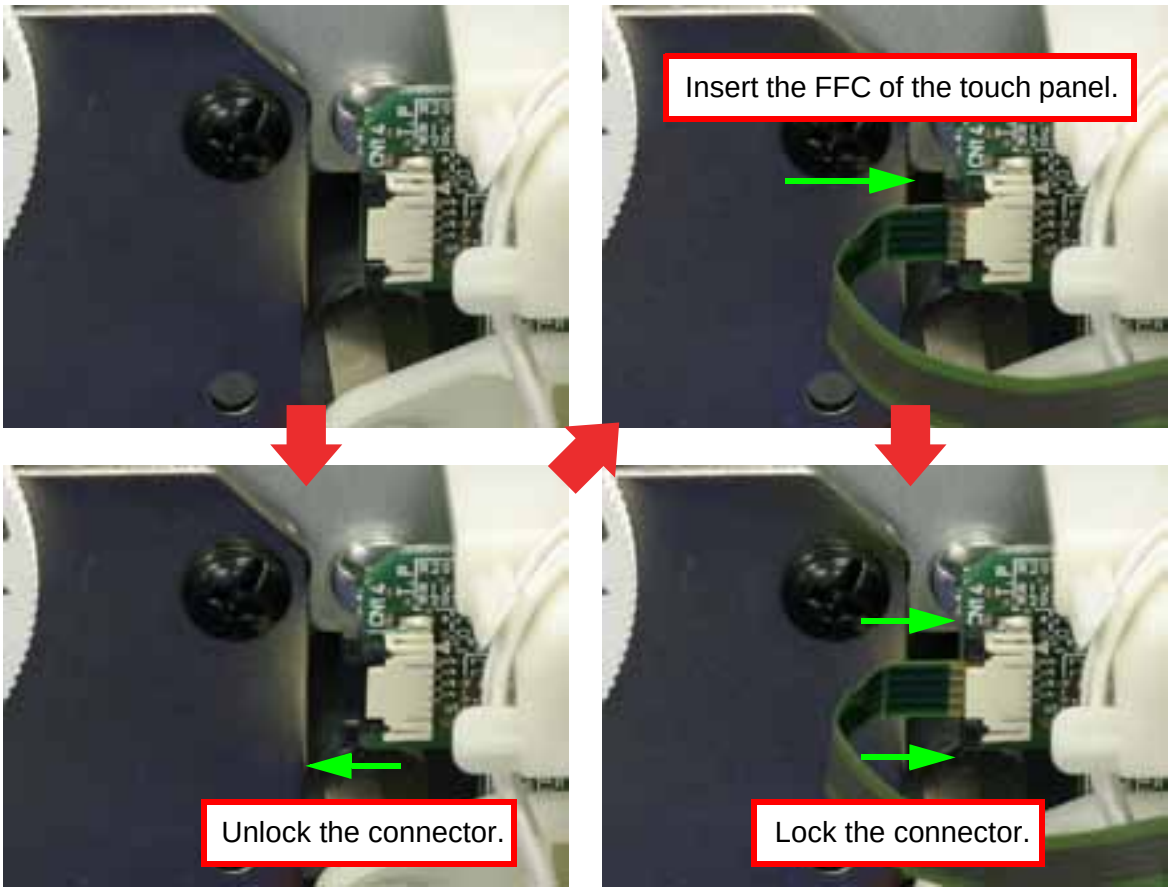
5. Lower side of main motor (Wiring of FC jack supply assy. lead wire)



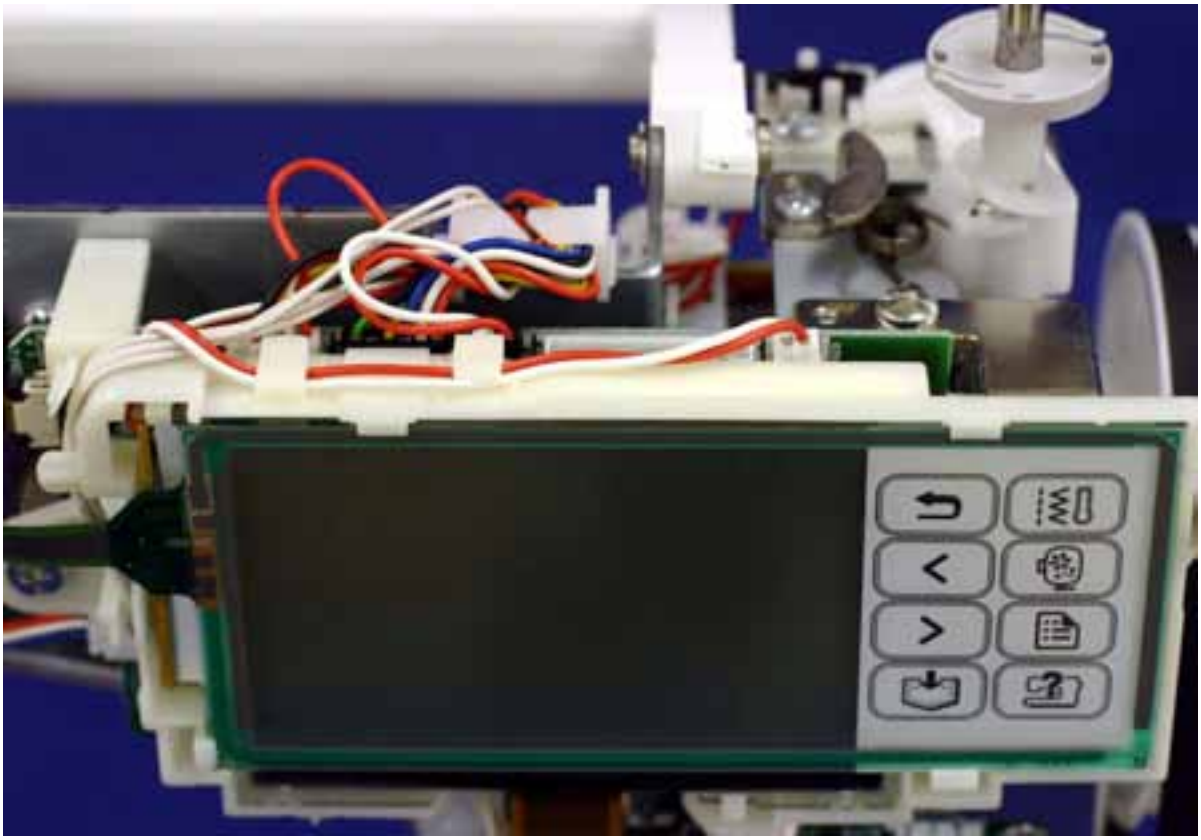
6. Upper side of main PCB assy. (Right side of LCD unit)



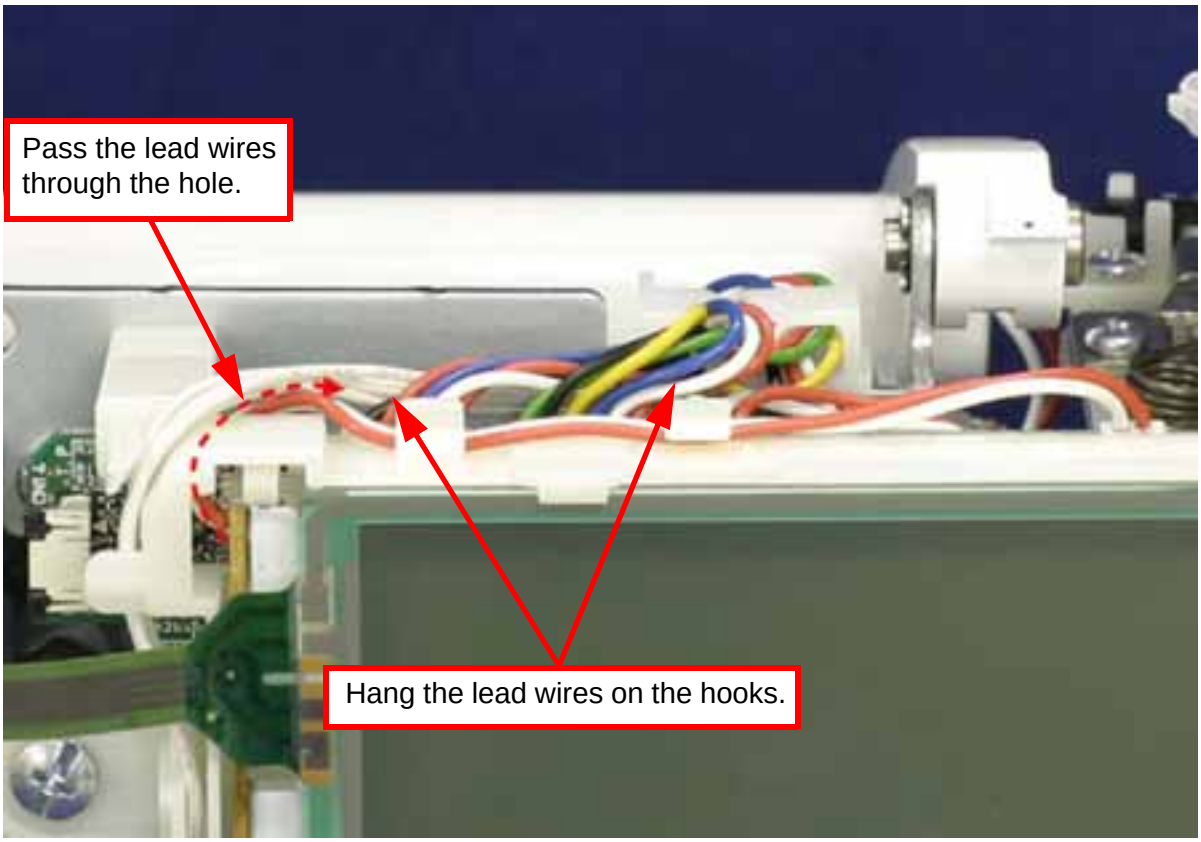
7. Wiring of FPC of touch panel



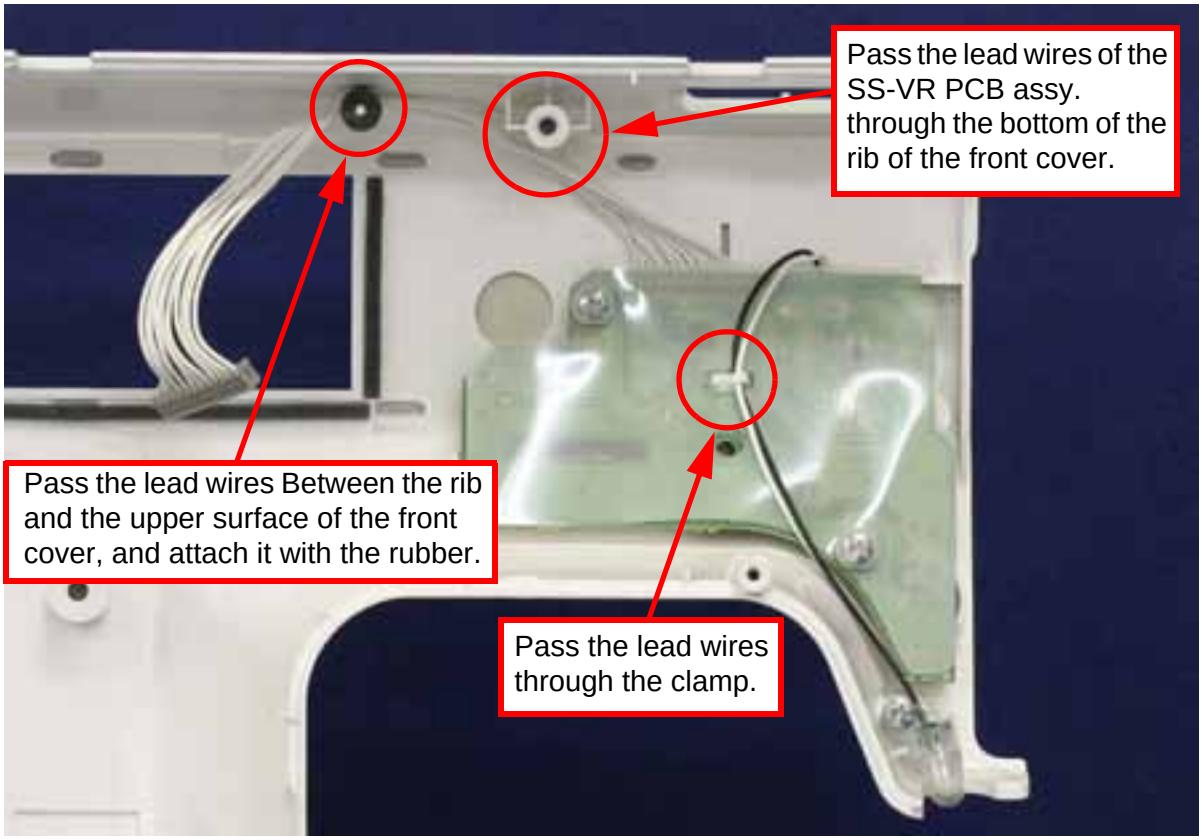
8. Upper side of main PCB (Upper side of LCD unit)



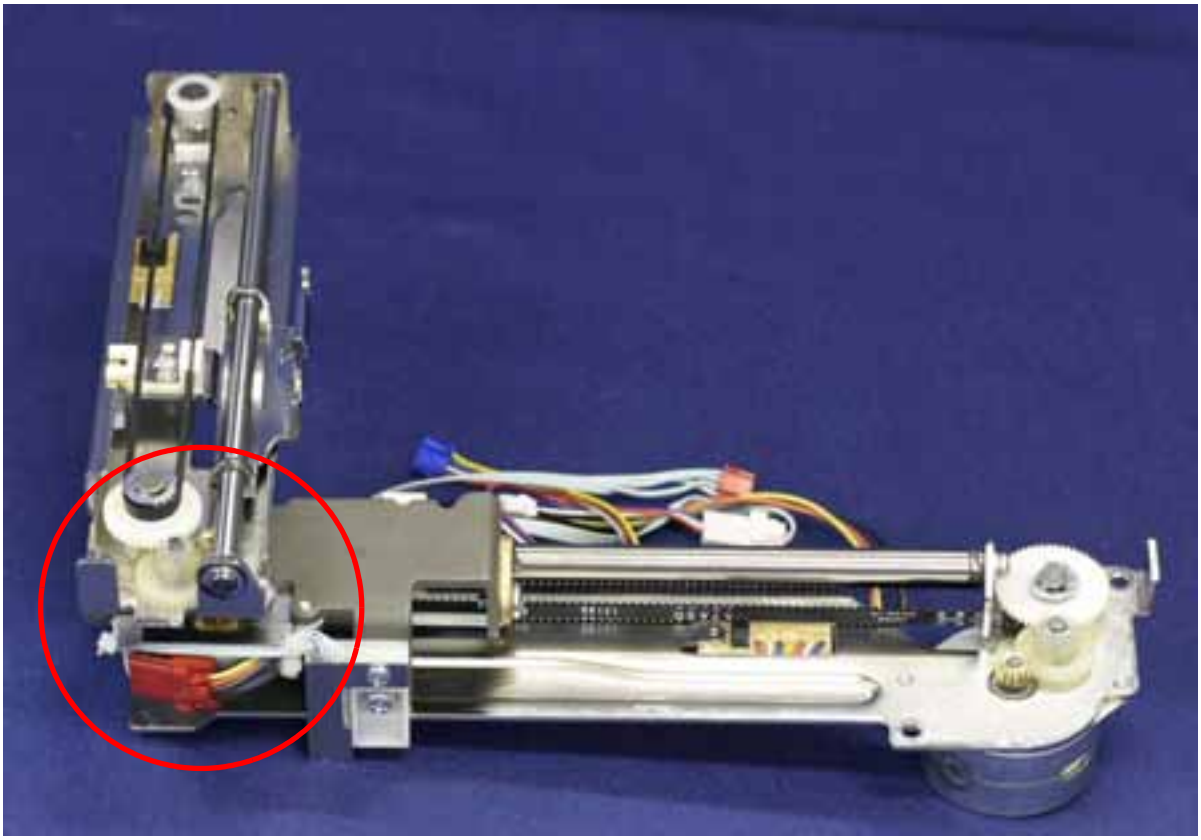
9. Wiring of LCD module lead wire



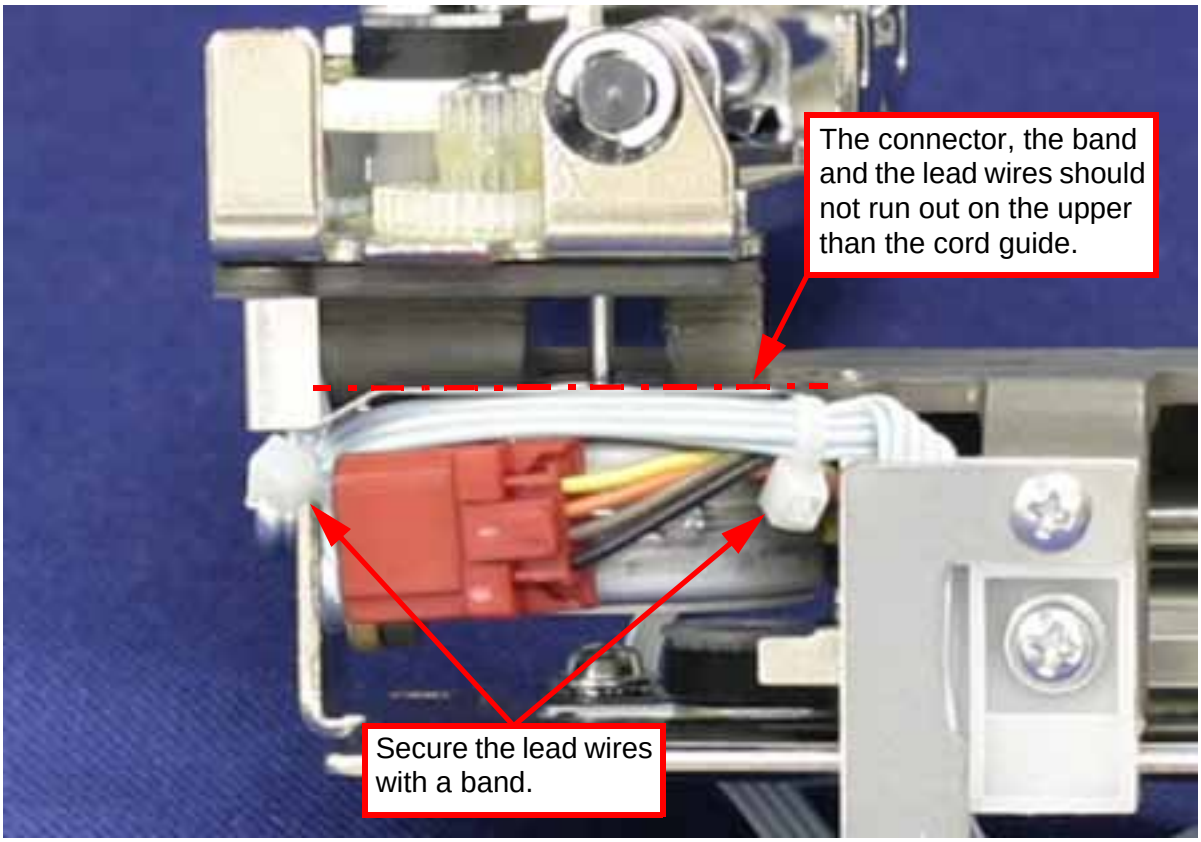
1. Inside of front cover



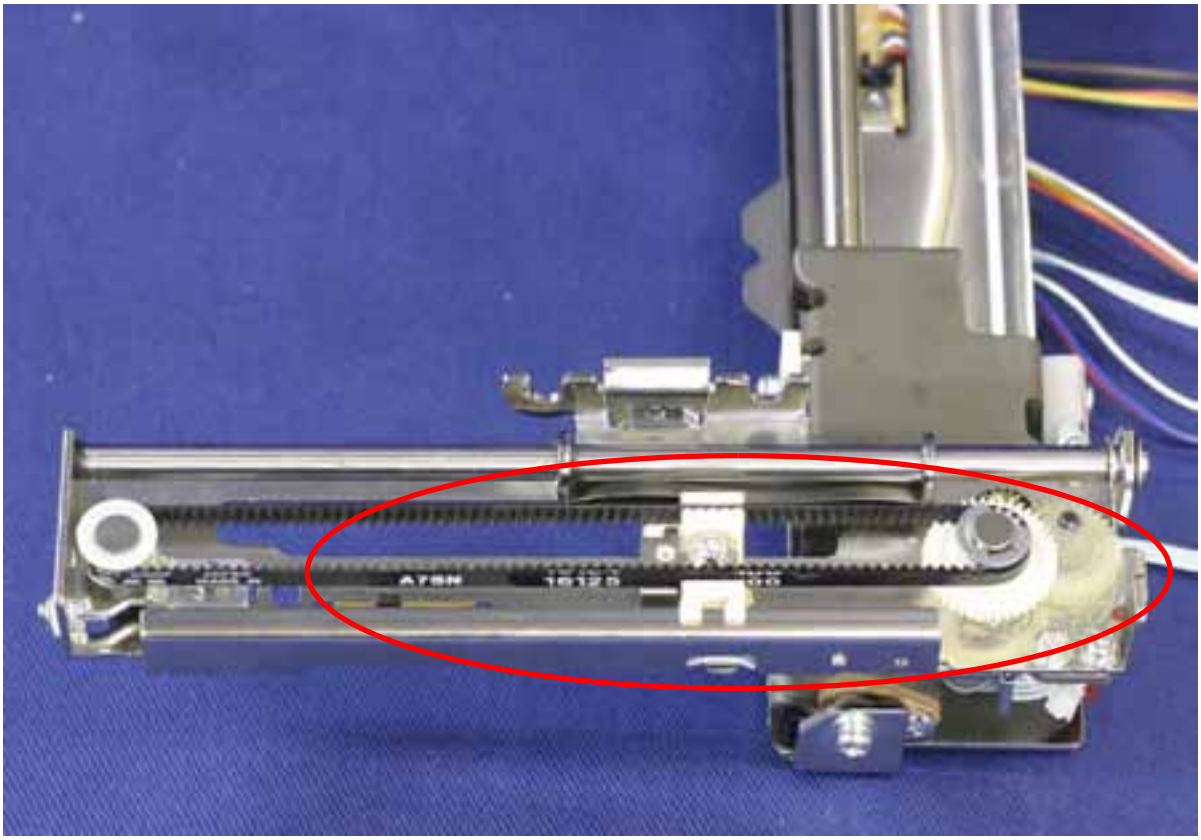
1. Upper surface of carriage



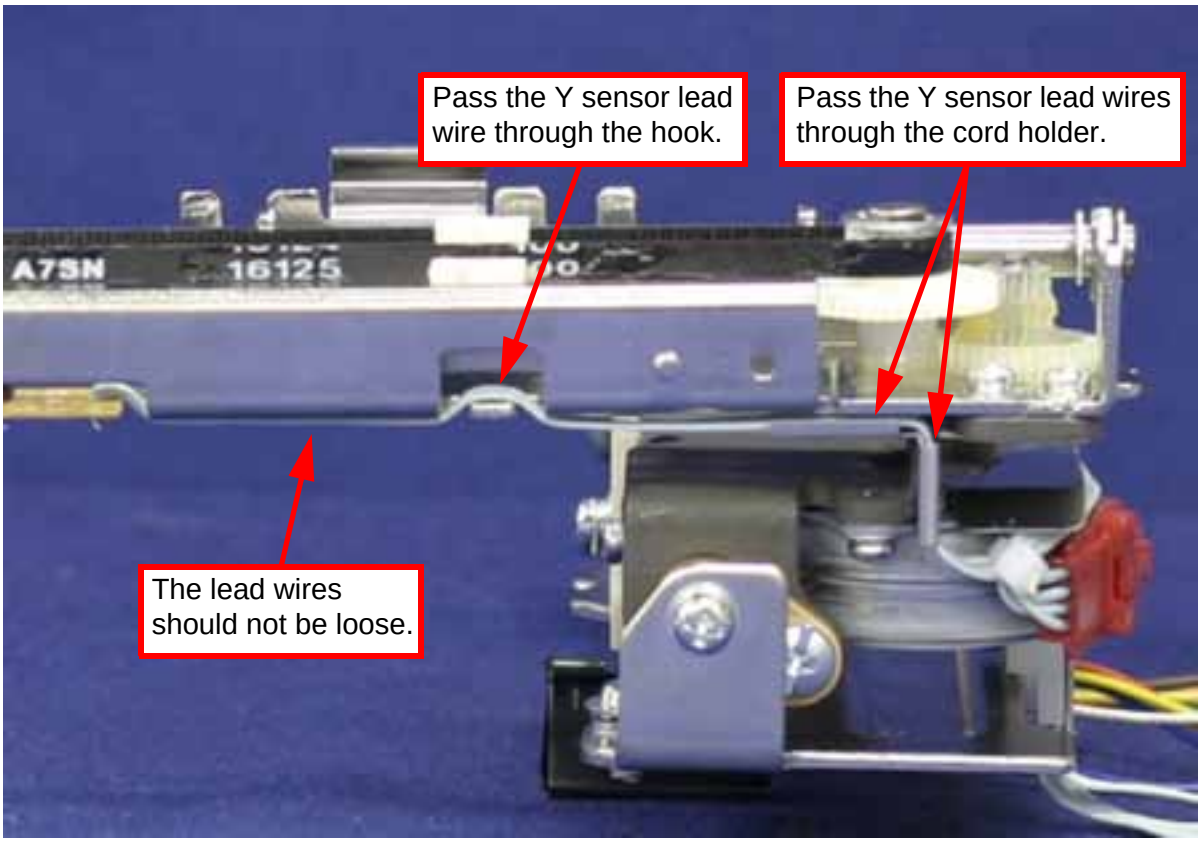
2. Around the Y pulse motor



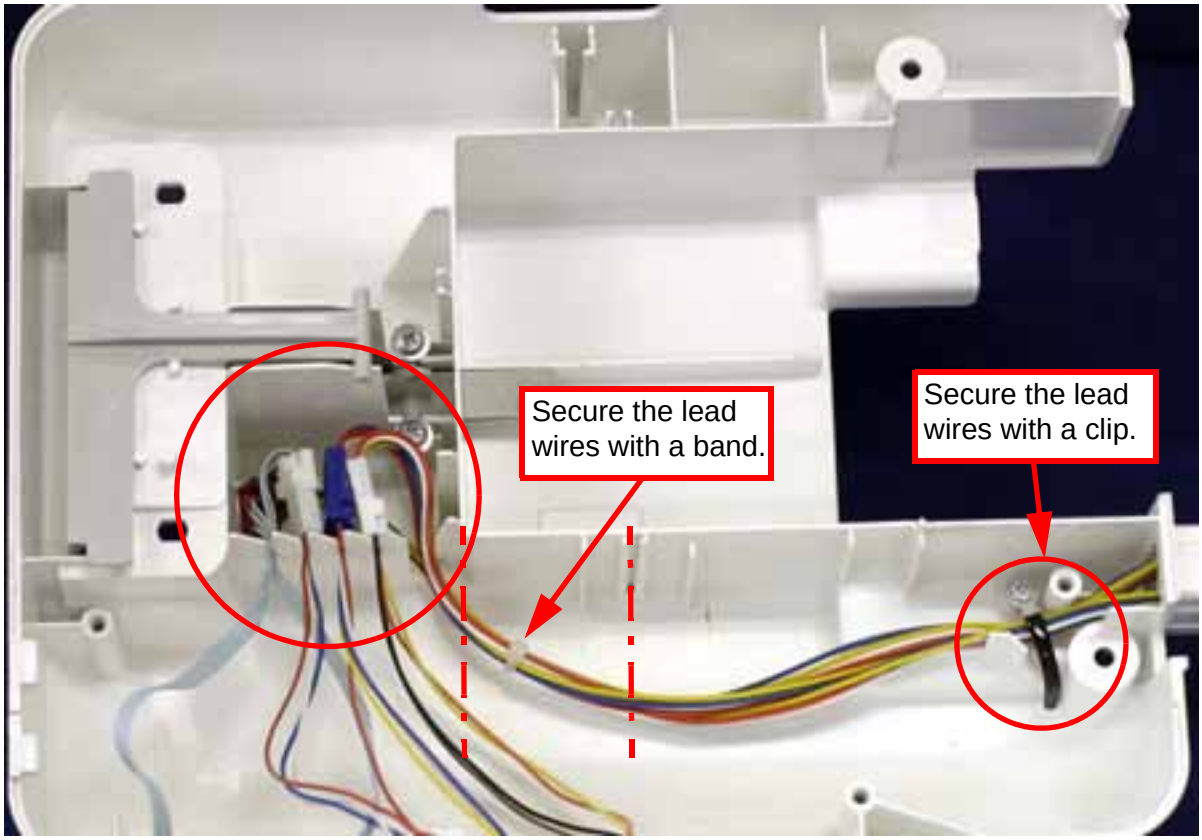
3. Upper surface of carriage



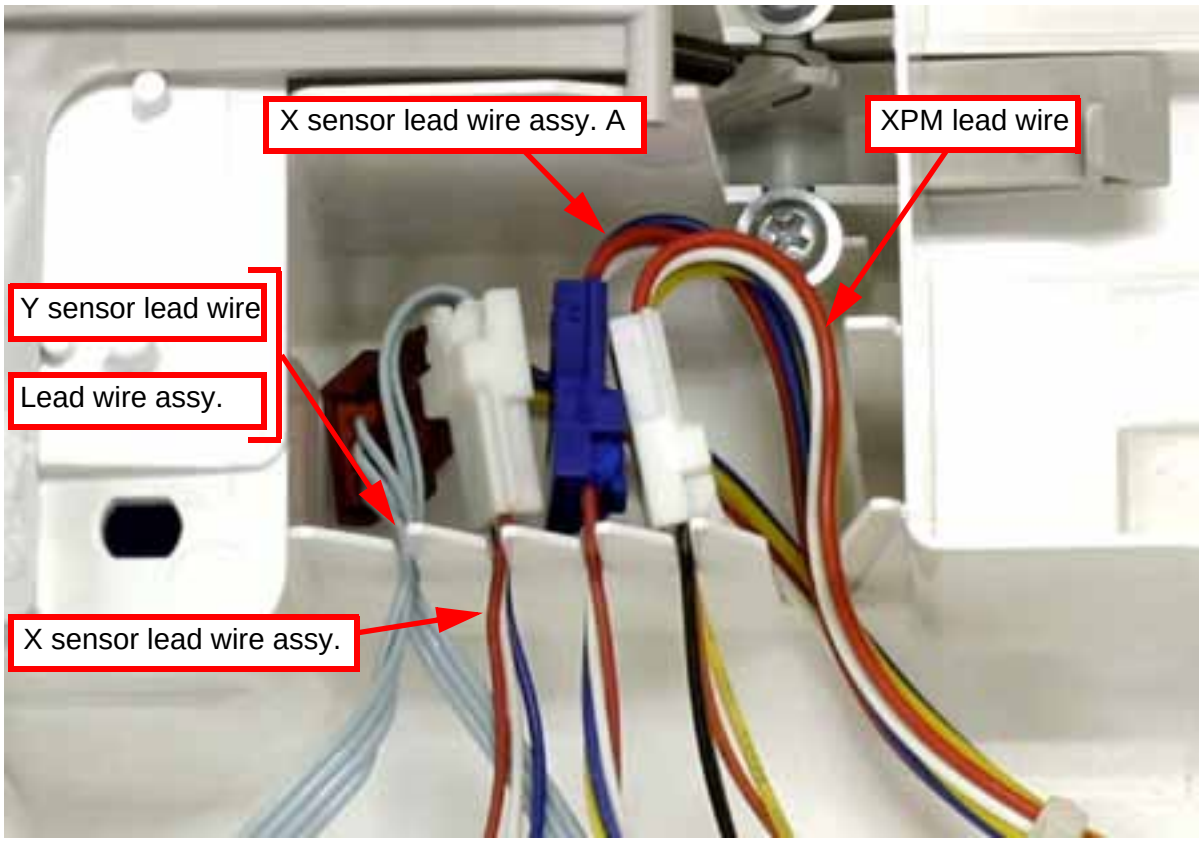
4. Wiring of Y sensor lead wire



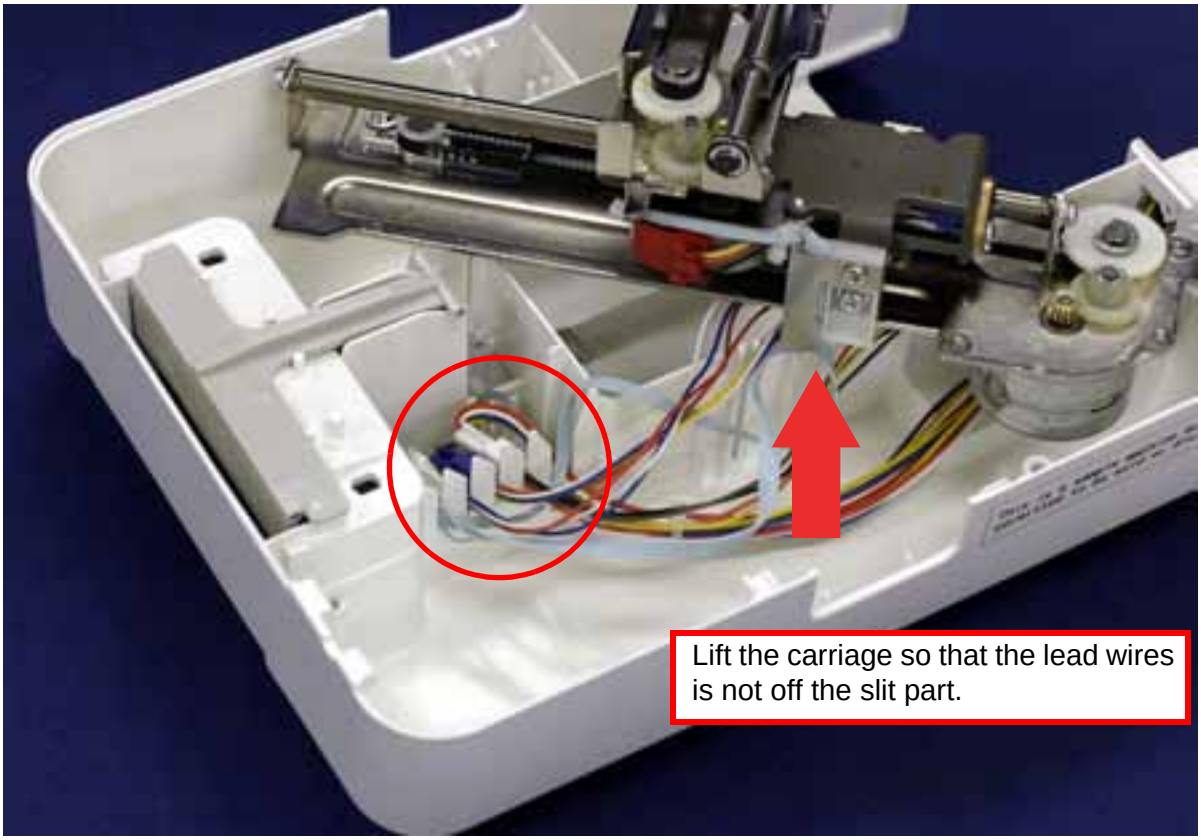
5. Inside of ES cover D



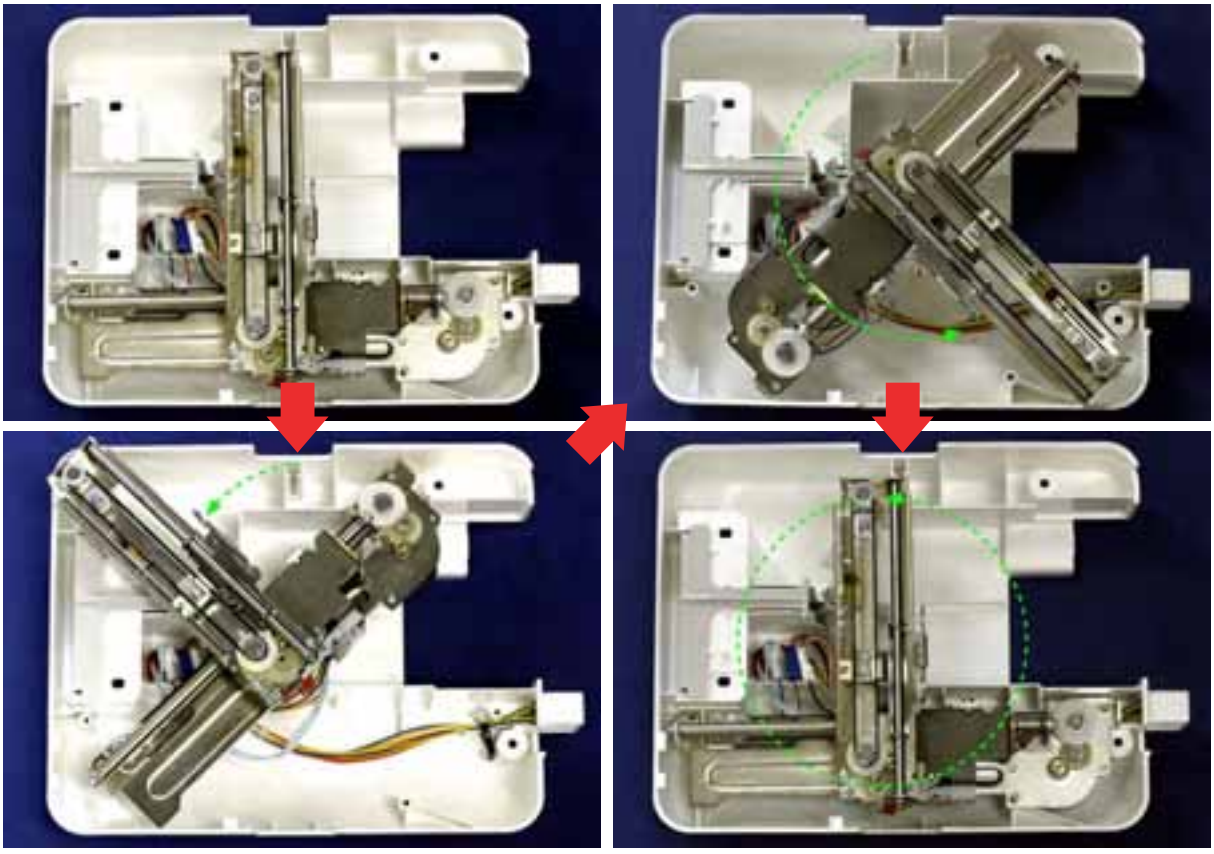
6. Slit part of ES cover D

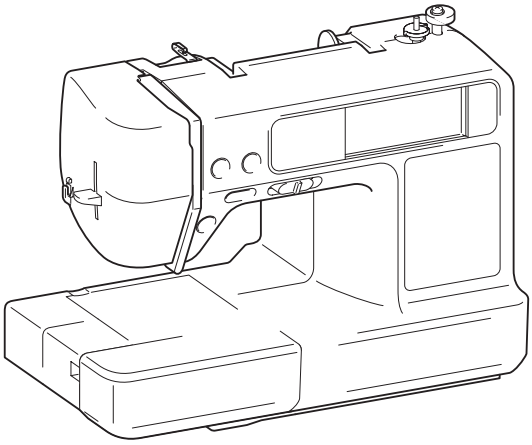


7. Wiring of carriage



Turn the carriage 360 degrees counterclockwise. (Stop the harness spread.)





BL137A

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