

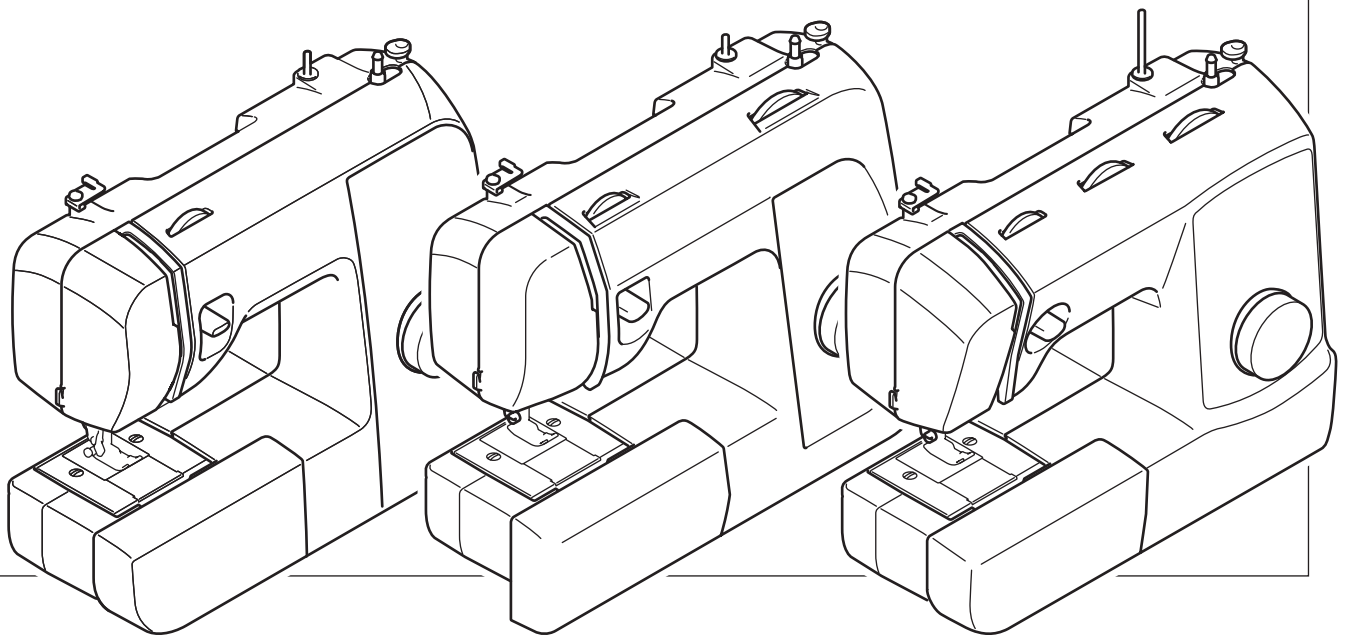
# brother®

Home Sewing Machine

## SERVICE MANUAL

MODEL :

**LX2500/LX17/BQ17/RL417/XN1700  
AE1700/Universal 17/UJ417/JSL-30  
SB170/ModerN 21/artwork 31/STAR17**



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# GENERAL INFORMATION

This service manual has been compiled for explaining repair procedures of this MODEL.

This was produced based on up-to-date product specifications at the time of issue, but there may have been changes of specifications for the purpose of improvements.

Contact manufacturer or local sales company for information concerning such changes.

Brother Industries, Ltd.  
Nagoya, Japan

**CAUTION** <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 form 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.

## LIST of UPDATE RECORD

Date	Added Models	Contents
Jul.,2011	RL417	-
Aug.,2011	LX17/BQ17/XN1700	Changed 2-6 to 9, 14, 15, 32, 33, 36, 40 to 42, 3-1, 6 to 8, 16, 17, 21, 22, 49, 50, 55 to 57, 66, 67 4-2, 6, 19, 24, 5-2, 3, 6-2, 3 Added 4-7, 4-31
Sep.,2011	-	Changed 1-2, 3-8 to 13, 31, 33, 39, 45, 58, 66 to 69 Added 4-31, 32
Sep.,2011	-	Correction of some typographical errors
Oct.,2011	AE1700	-
Oct.,2011	-	Correction of some typographical errors
Dec.,2011	Universal 17	-
Feb.,2012	UJ417	-
Aug.,2012	JSL-30, SB170	-
Oct.,2012	ModerN 21, artwork 31	-
Nov.,2012	STAR17	-

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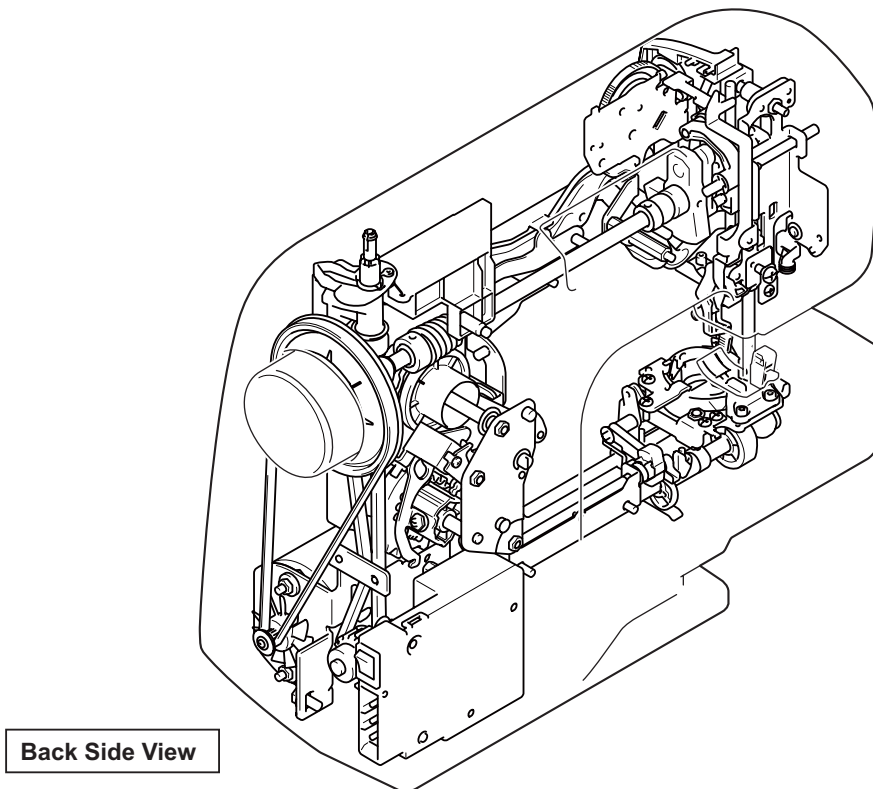
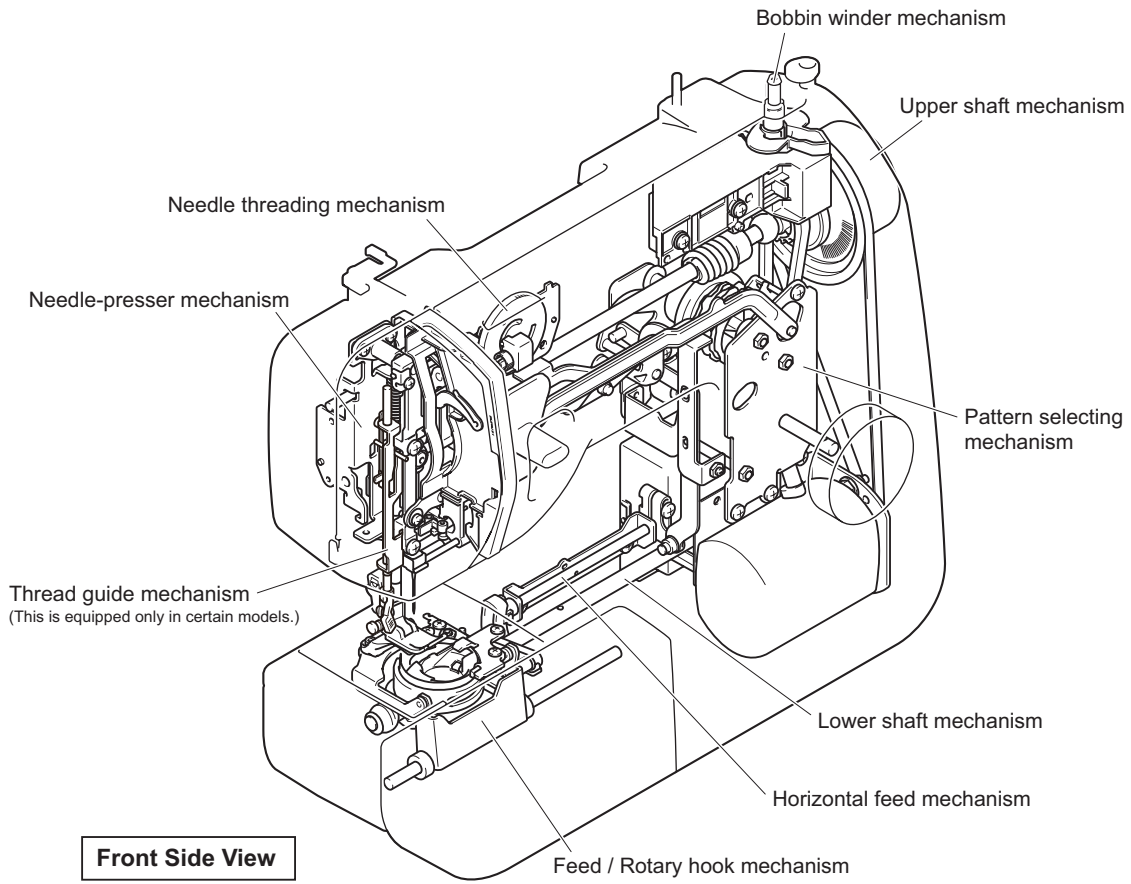
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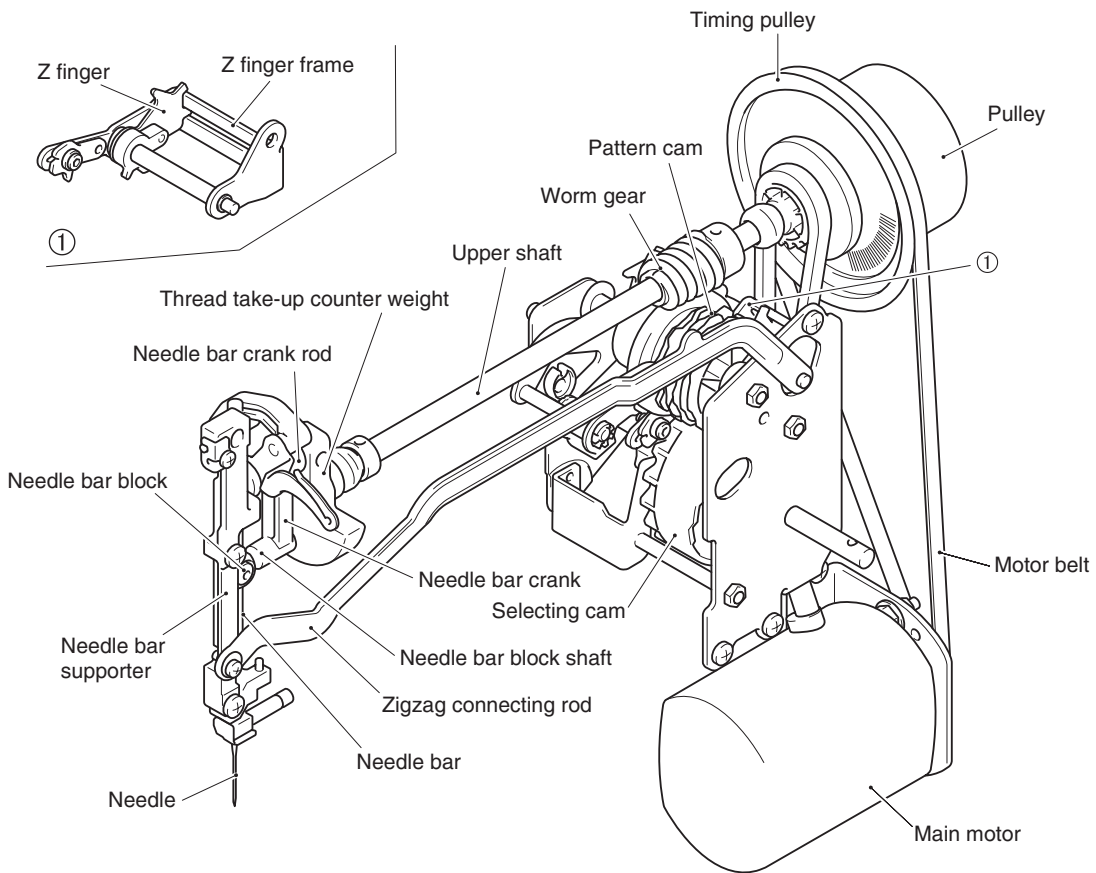
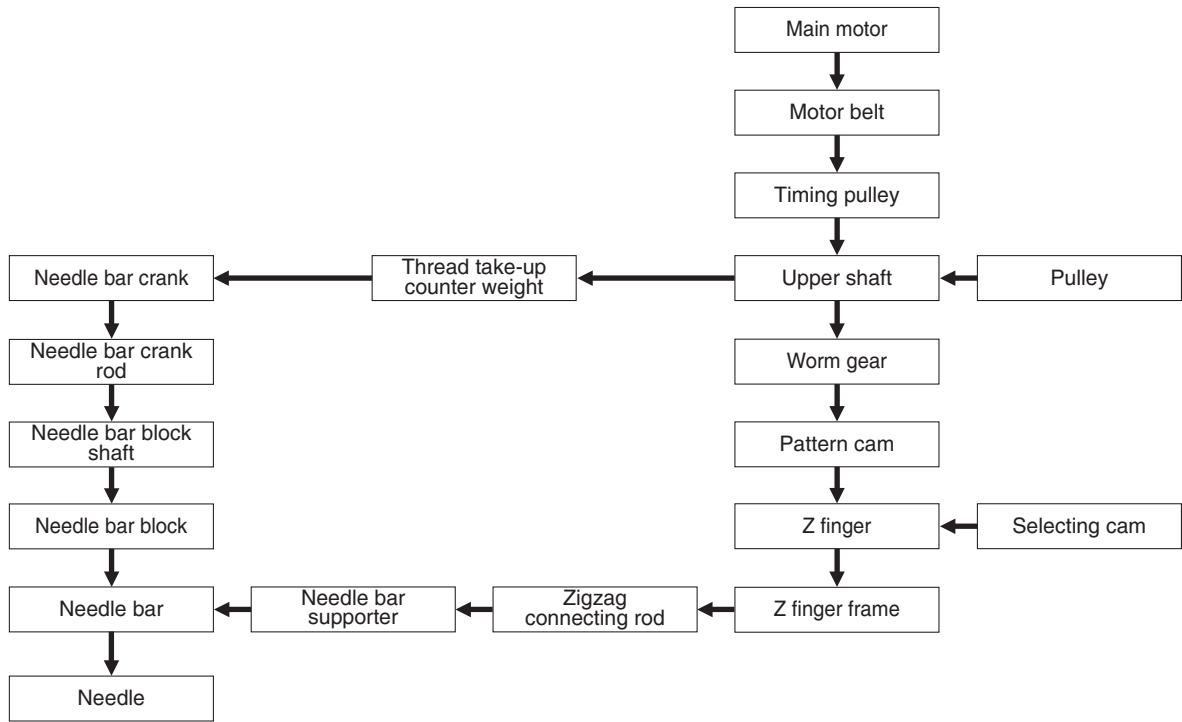
# 1 Outline of Mechanism

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

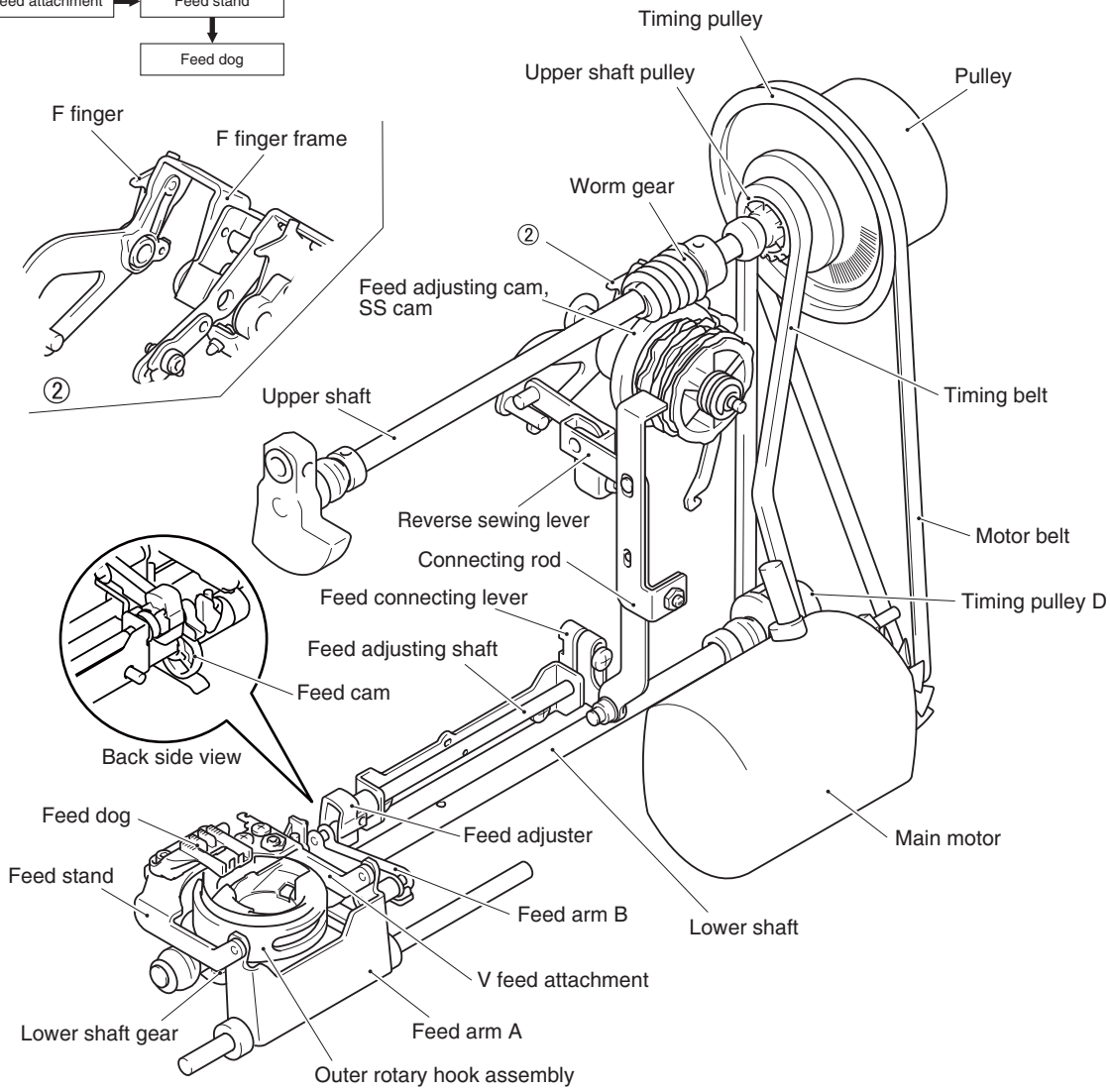
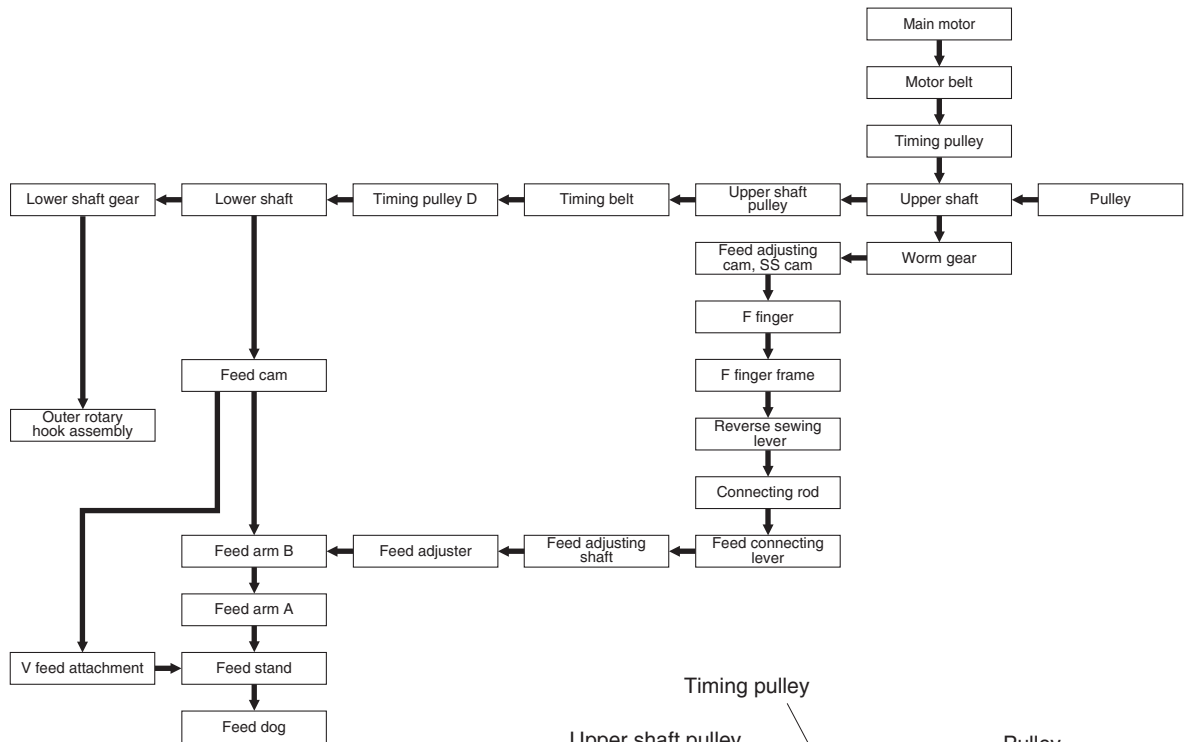


Outline of Mechanism

Outline of Mechanism

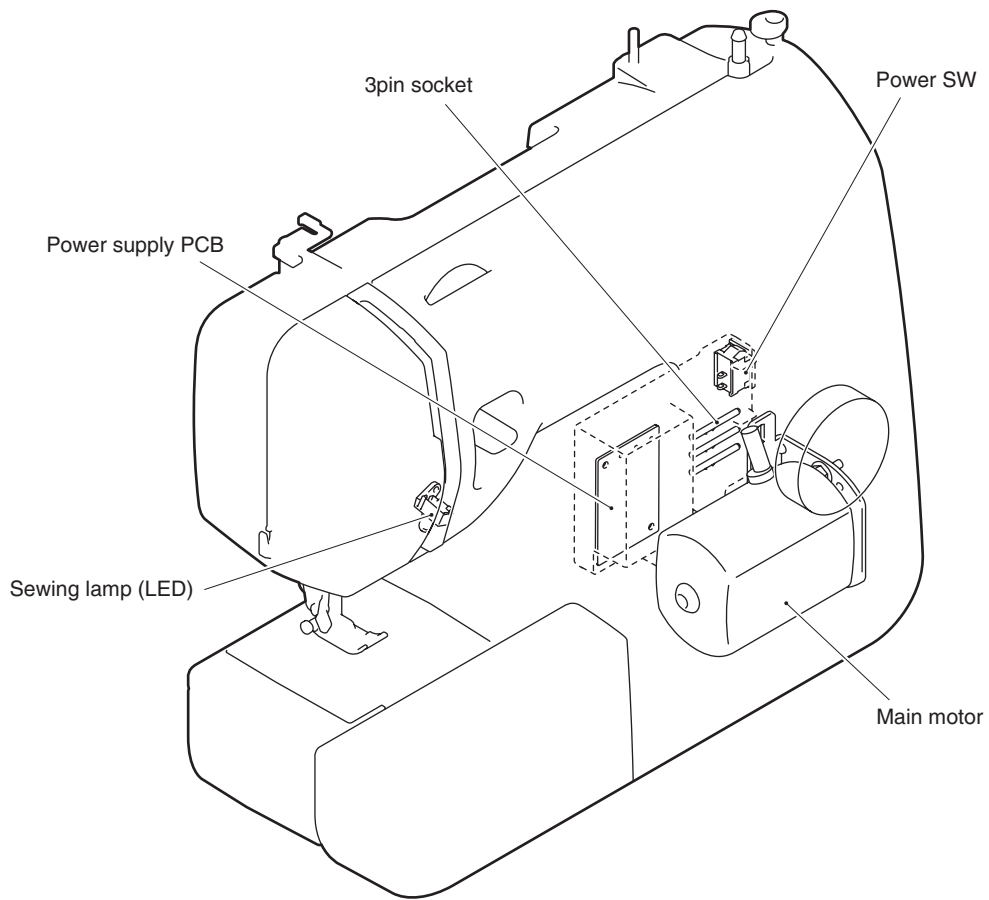


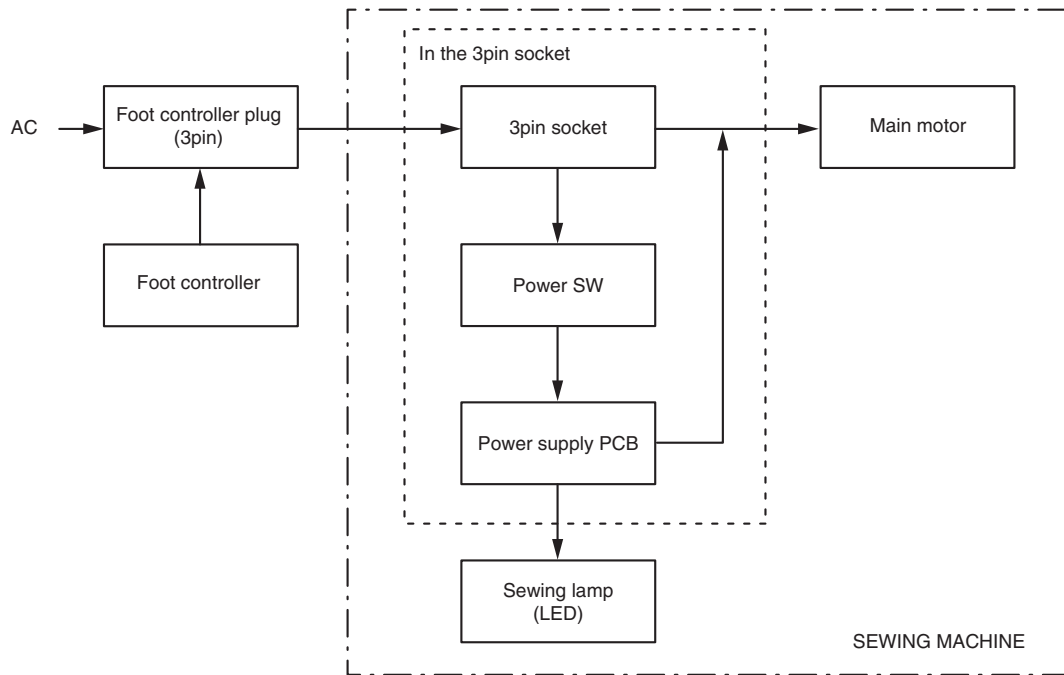
(B) Movement of feed dog and rotary hook



Outline of Mechanism

Outline of Mechanism





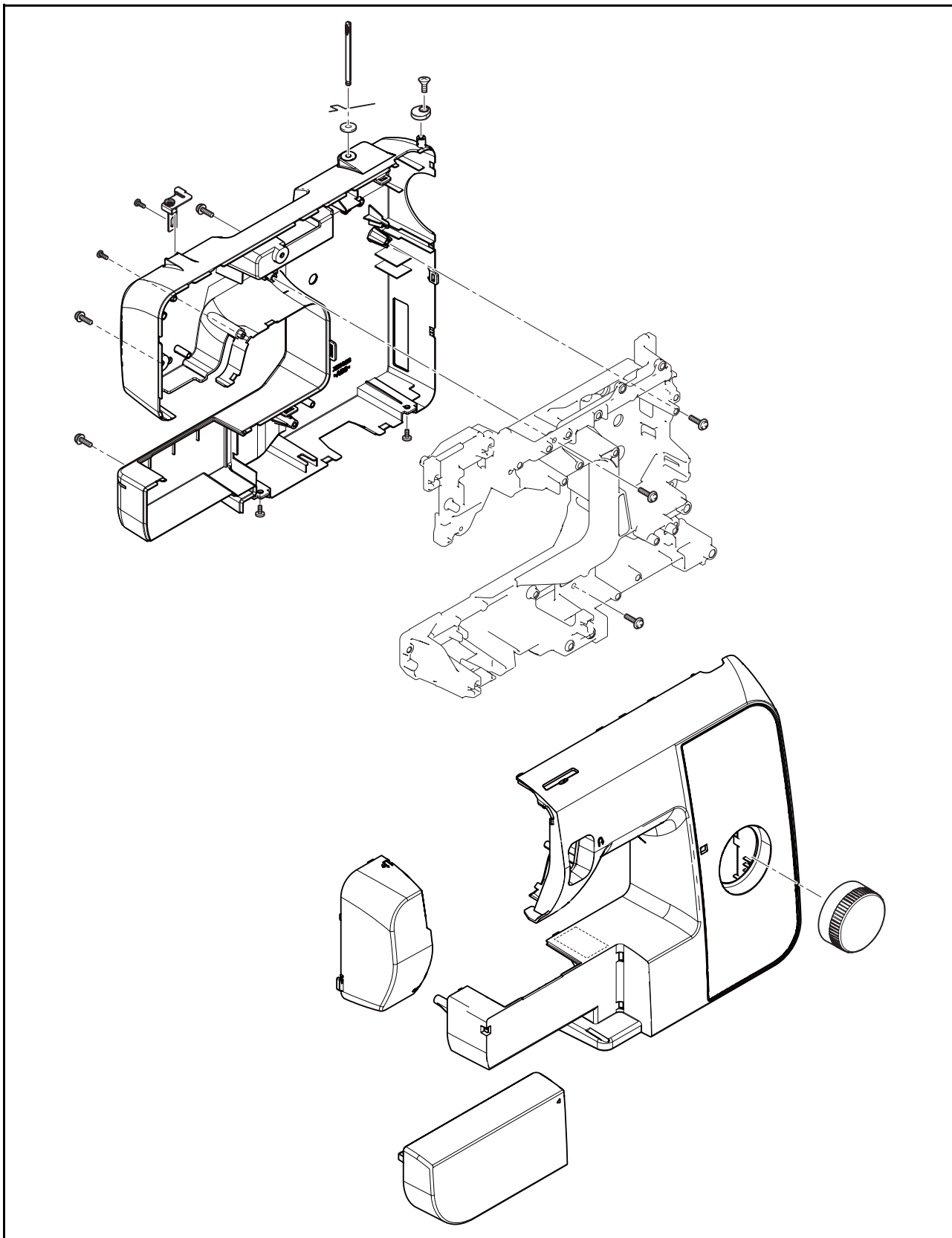
# 2 Basic of Disassembly/Assembly

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When repair and replace the part of the unit, refer to “CHAPTER 3: Application of Disassembly/Assembly”.

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Main frame and Covers location diagram



Basic

Basic

**1** Removal of Accessory table

1. Remove the accessory table ①.

**2** Removal of Face plate assy

1. Remove the screw ①.
2. Pull up the bottom side of the face plate assy ①, and then release the hook to remove the face plate assy ①.

→Refer to 3 - 3 of the Disassembly.

**3** Removal of Pattern selecting dial

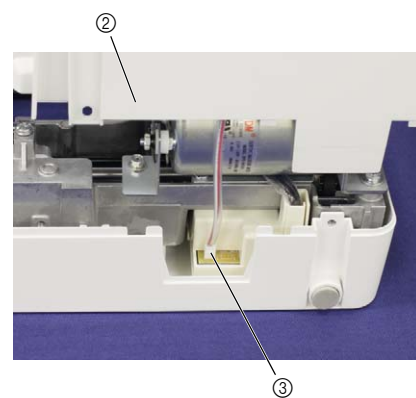
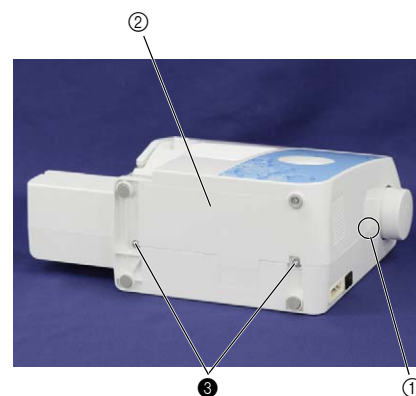
1. Pull out the pattern selecting dial ①.



#### 4 Removal of Front cover assy

1. Remove the 2 screws ①, the screw ② and the 2 screws ③.
2. Release the 4 hooks ① to remove the front cover assy ②, and then disconnect the connector ③.

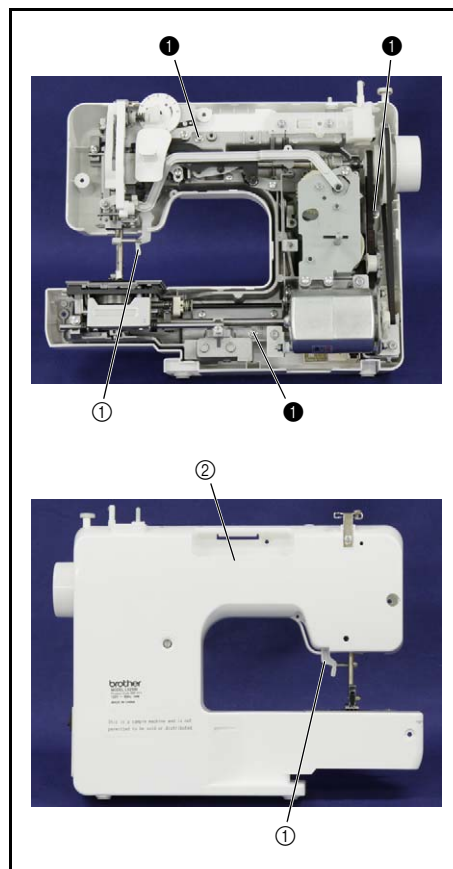
→Refer to 3 - 4 of the Disassembly.



**5** Removal of Rear cover assy

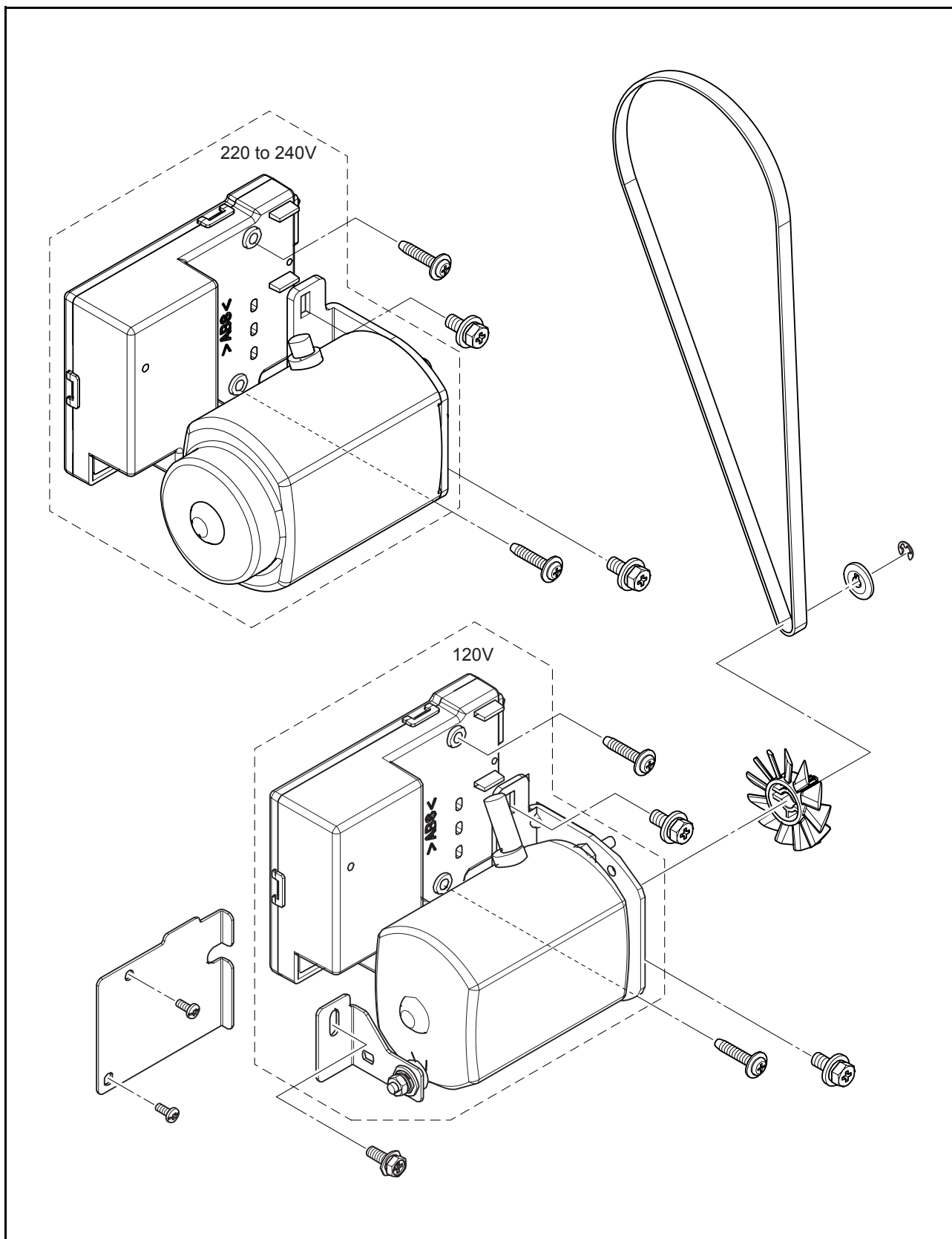
1. Pull down the presser foot lifter ①.
2. Remove the 3 screws ❶, and then remove the rear cover assy ②.

→Refer to 3 - 5 of the Disassembly.





Main motor unit location diagram



Basic

Basic

## 1 Removal of Motor 3P supply assy

### ■ 120V specification

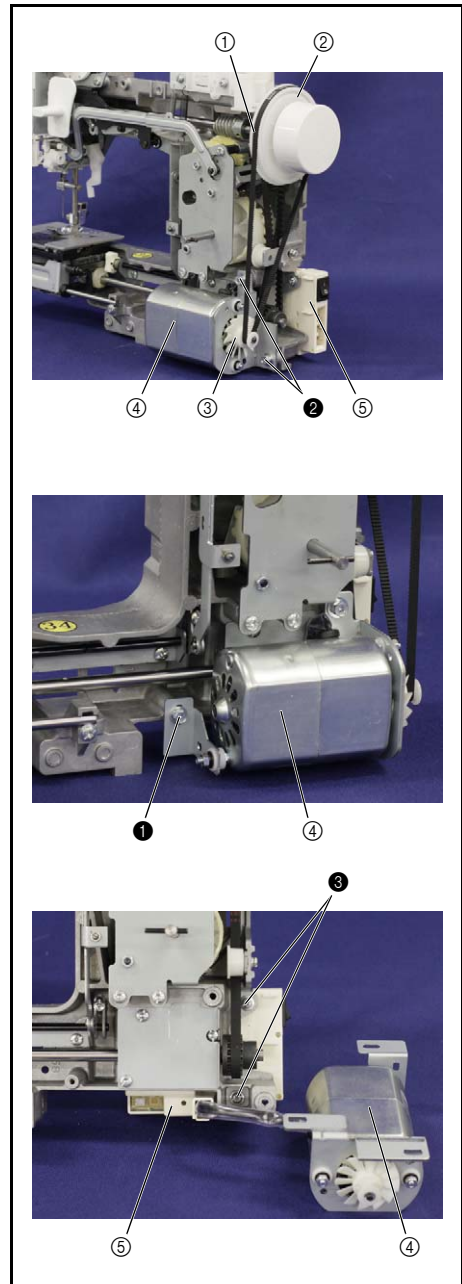
1. Remove the timing belt ① from the T pulley ② and the motor T-pulley ③.
2. Remove the screw ① and the 2 screws ②, and then remove the motor assy ④ of the motor 3P supply assy.

#### \*Key point

- Be careful not to damage the fins of the motor T-pulley ③.
  - Be careful not to pull the harness of the motor assy ④ by force.
3. Remove the 2 screws ③, and then remove the 3P socket unit ⑤ of the motor 3P supply assy.

<In case of 220 to 240V specification, refer to next page.>

→Refer to 3 - 7 of the Disassembly.



### ■ 220 to 240V specification

1. Remove the timing belt ① from the T pulley ② and the motor T-pulley ③.
2. Remove the 2 screws ①, and then remove the motor assy ④ of the motor 3P supply assy.

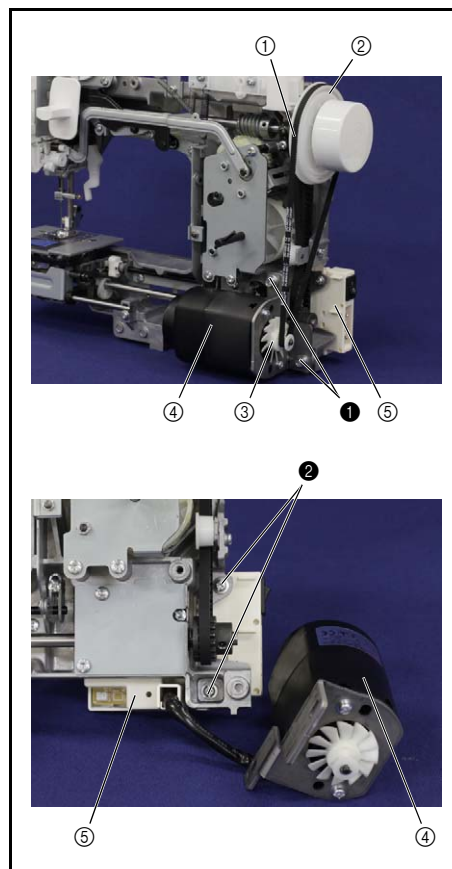
#### \*Key point

- Be careful not to damage the fins of the motor T-pulley ③.
- Be careful not to pull the harness of the motor assy ④ by force.

3. Remove the 2 screws ②, and then remove the 3P socket unit ⑤ of the motor 3P supply assy.

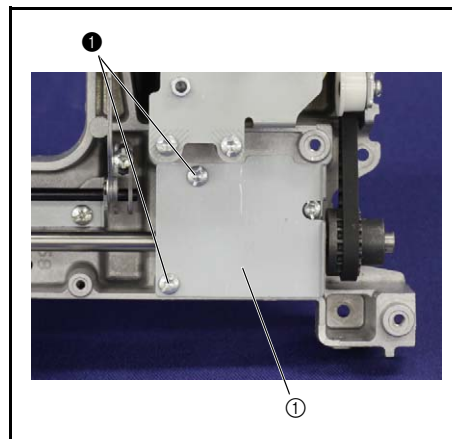
<In case of 120V specification, refer to previous page.>

→Refer to 3 - 7 of the Disassembly.

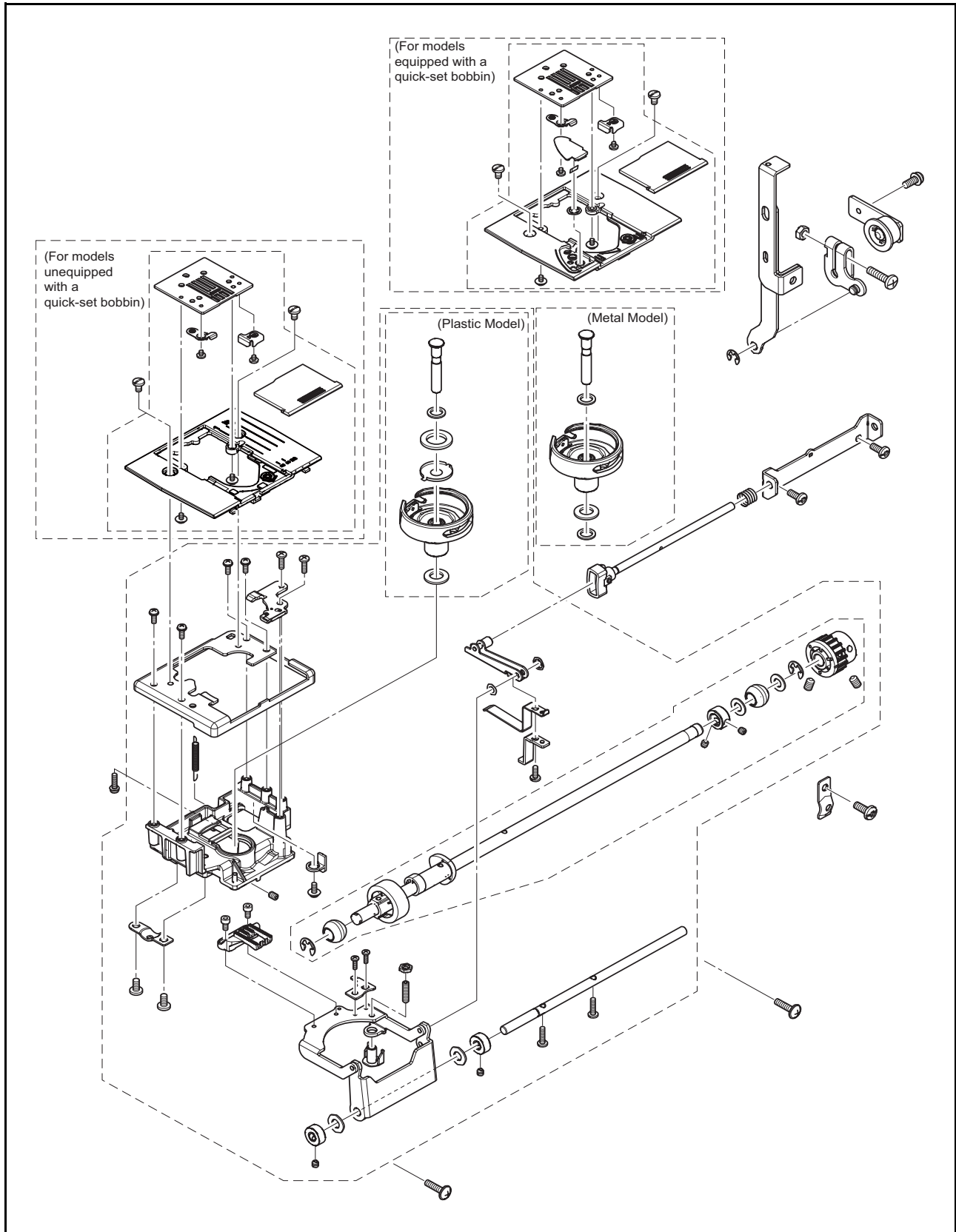


## 2 Removal of Lower shaft plate

1. Remove the 2 screws ①, and then remove the lower shaft plate ①.



Feed unit location diagram

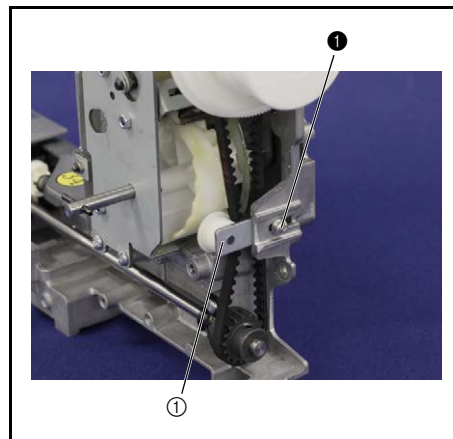


Basic

Basic

## 1 Removal of Tension pulley assy

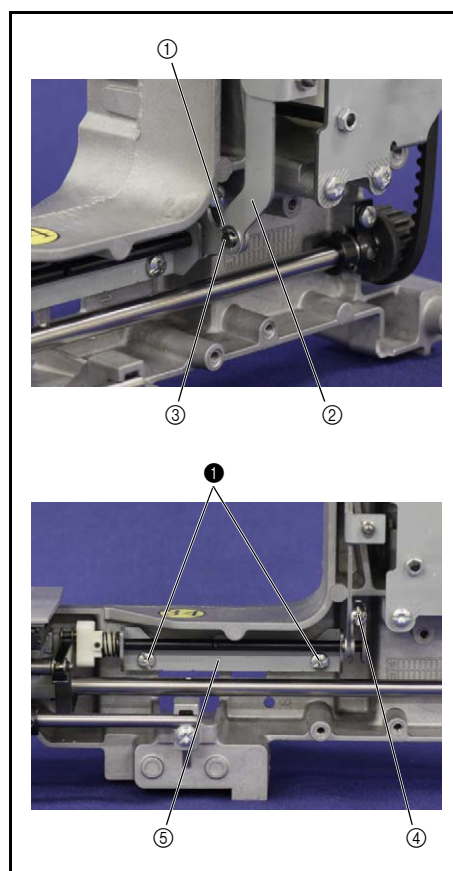
1. Remove the screw ❶, and then remove the tension pulley assy ❶.



## 2 Removal of Feed adjuster assy

1. Remove the retaining ring E4 ❶, and then remove the connecting rod D ❷ from the shaft ❸ of the feed connecting lever assy ❹.
2. Remove the 2 screws ❶, and then remove the feed adjuster assy ❺.

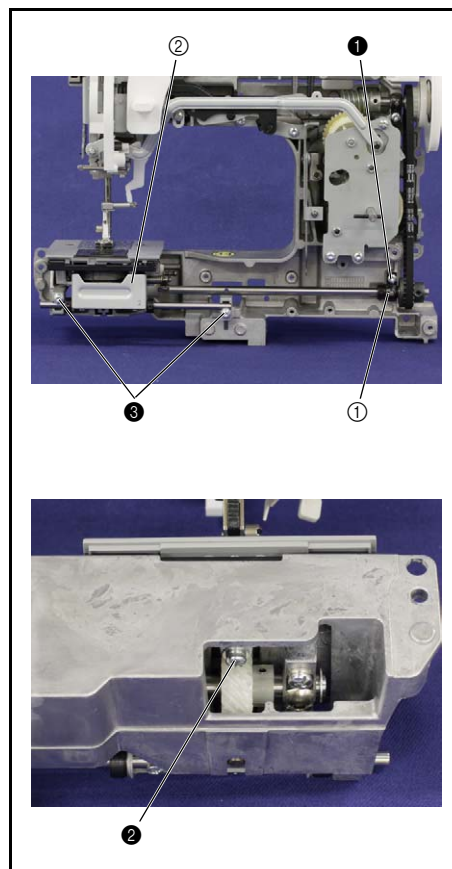
→Refer to 3 - 9 of the Disassembly.



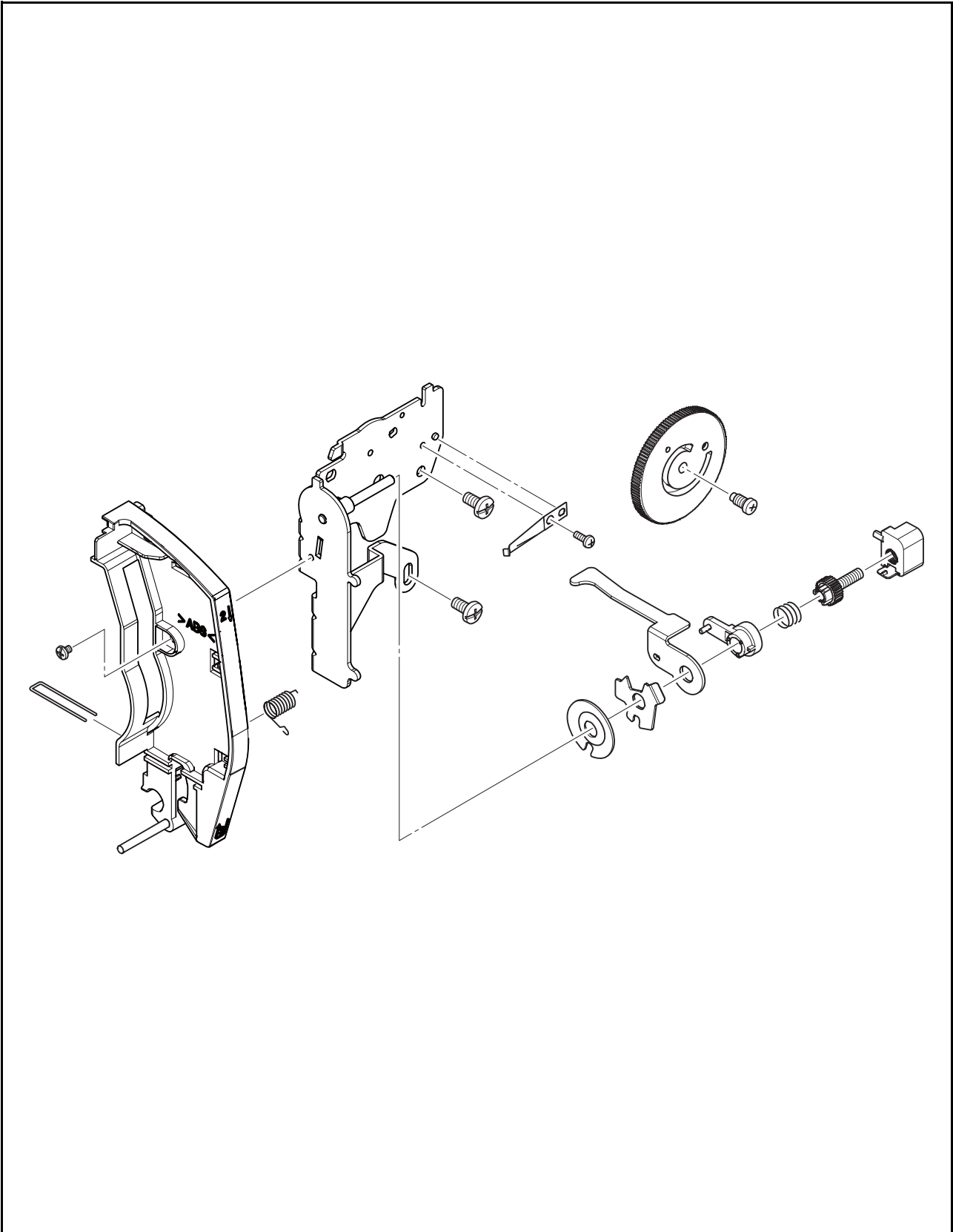
### 3 Removal of Feed module

1. Remove the screw ①, and then remove the bushing presser ①.
2. Remove the screw ② and the 2 screws ③, and then remove the feed module ②.

→Refer to 3 - 9 of the Disassembly.



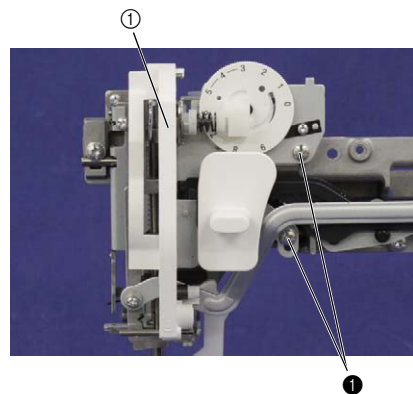
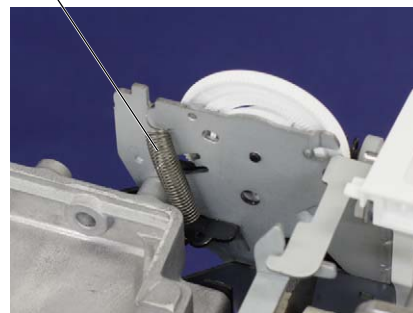
Needle threading mechanism location diagram



**1** Removal of Thread guard assy

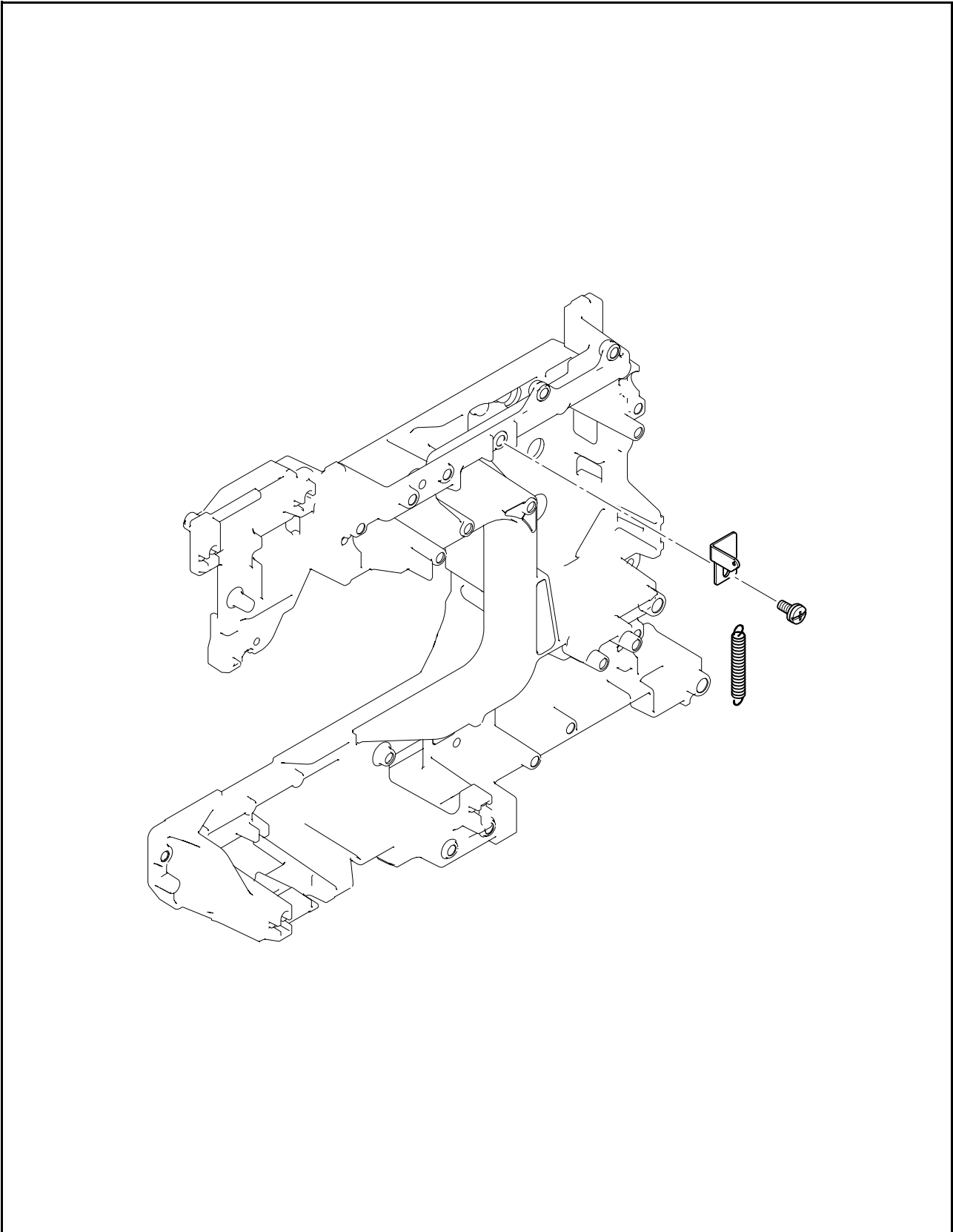
1. Remove the spring **S01**.
2. Remove the 2 screws **1**, and then remove the thread guard assy **1**.

→Refer to 3 - 22 of the Disassembly.

**S01**

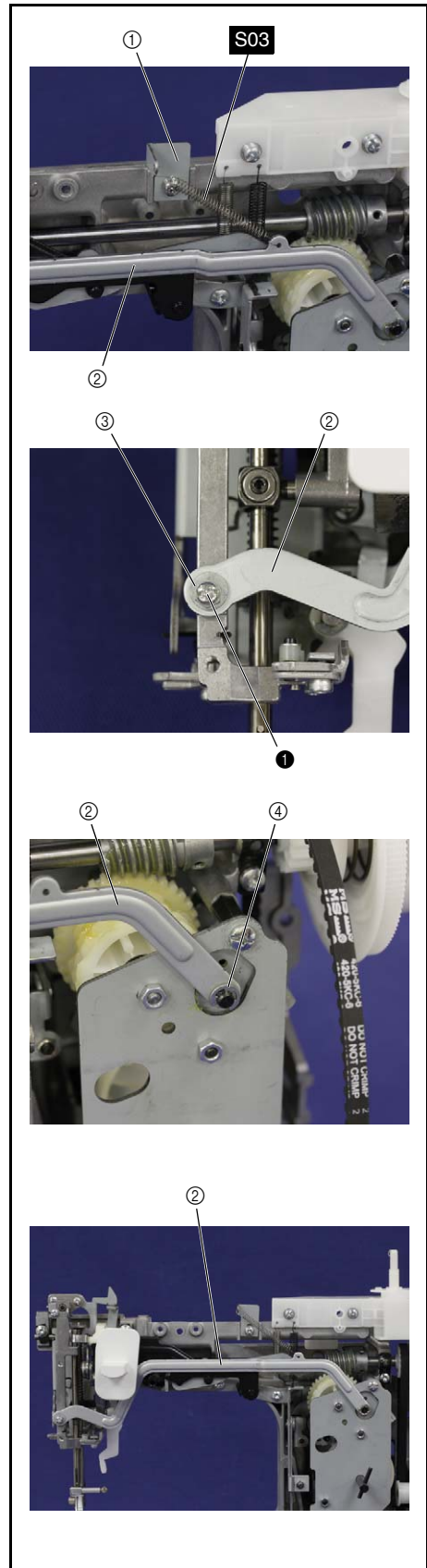


Zigzag mechanism location diagram

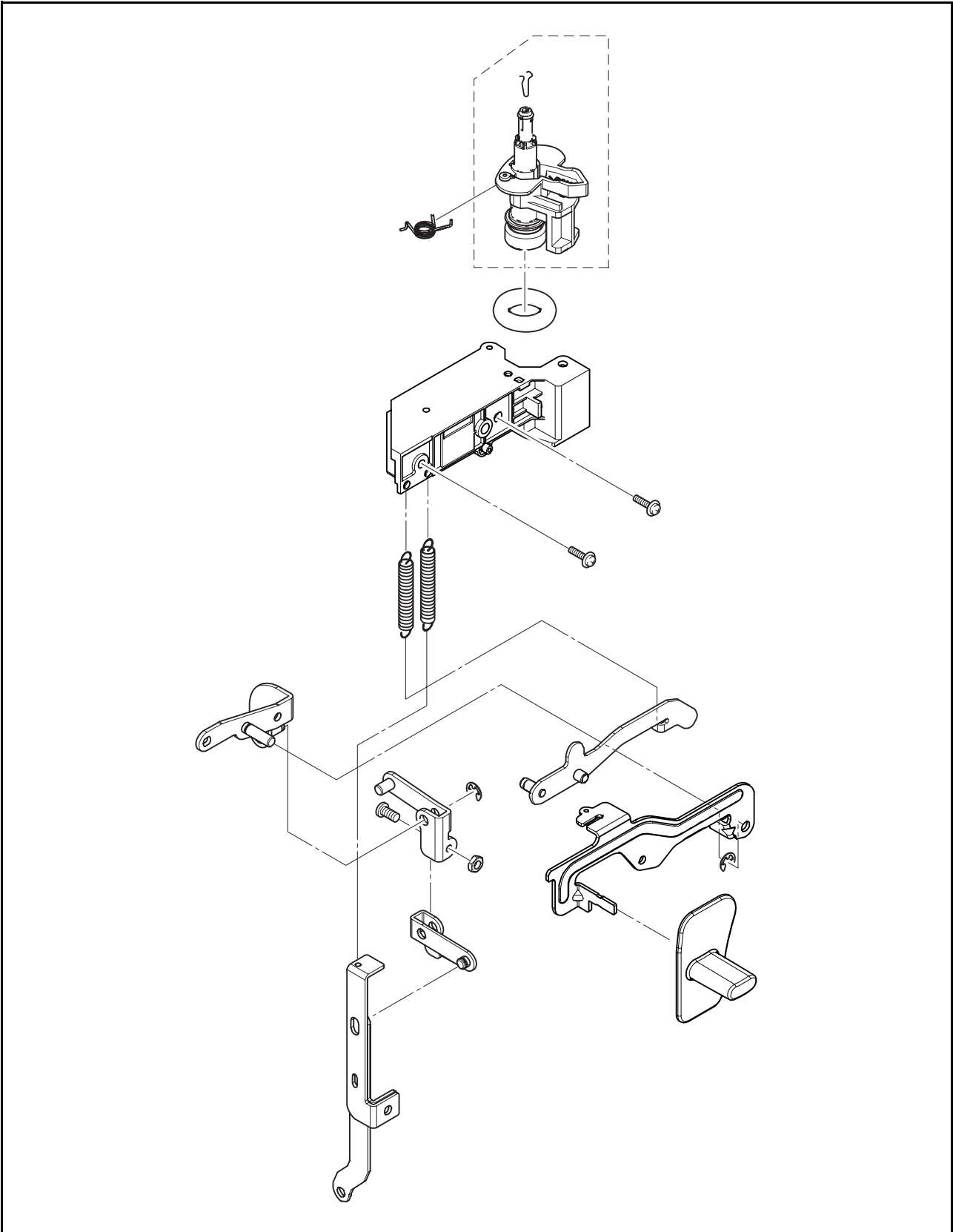


**1** Removal of Zigzag connecting rod assy

1. Remove the spring **S03** from the BH adjusting plate ① and the zigzag connecting rod ②.
2. Remove the screw ①, and then remove the zigzag adjusting nut ③.
3. Remove the retaining ring E4 ④, and then remove the zigzag connecting rod ②.



Feed control mechanism location diagram

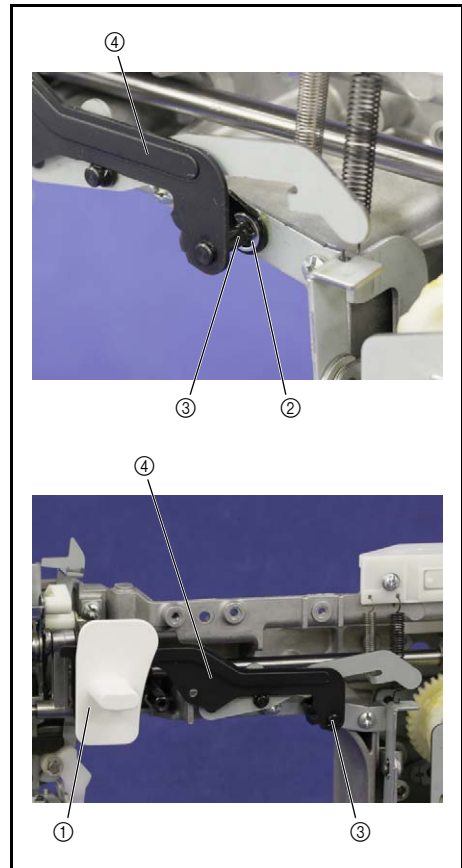


Basic

Basic

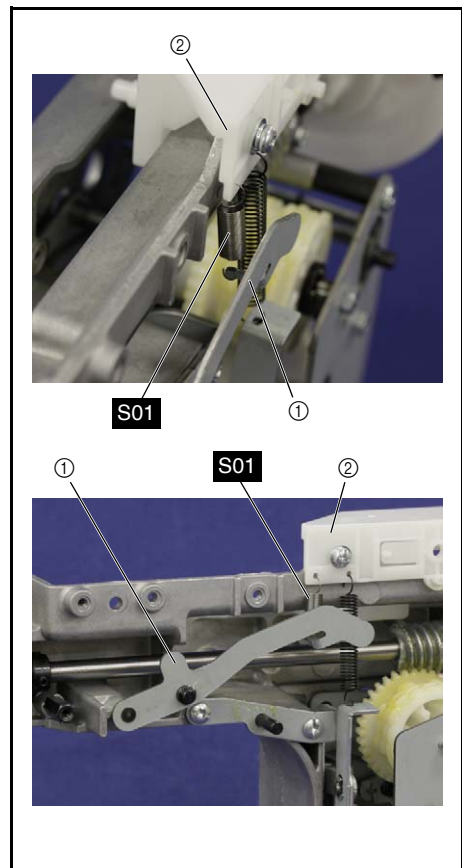
## 1 Removal of Reverse sewing lever A

1. Remove the reverse sewing button ①.
2. Remove the retaining ring E4 ② from the shaft of the lever holder sub assy ③.
3. Remove the reverse sewing lever A ④.



## 2 Removal of Reverse sewing lever B assy

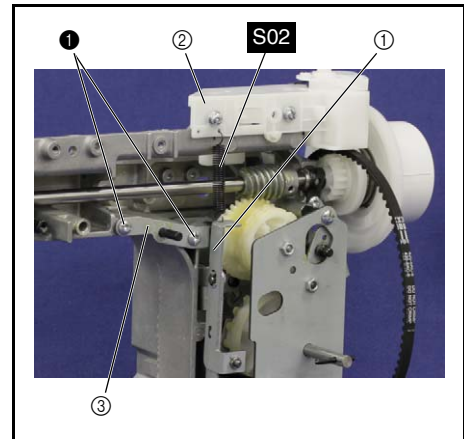
1. Remove the spring **S01** from the reverse sewing lever B assy ① and the feed bracket sub assy ②.
2. Remove the reverse sewing lever B assy ① from the arm bed.



### 3 Removal of Lever holder assy

1. Remove the spring **S02** from the connecting rod U ① and the feed bracket sub assy ②.
2. Remove the 2 screws ①, and then remove the lever holder assy ③.

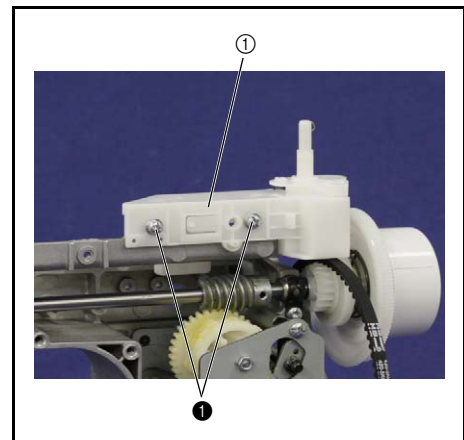
→Refer to 3 - 27 of the Disassembly.



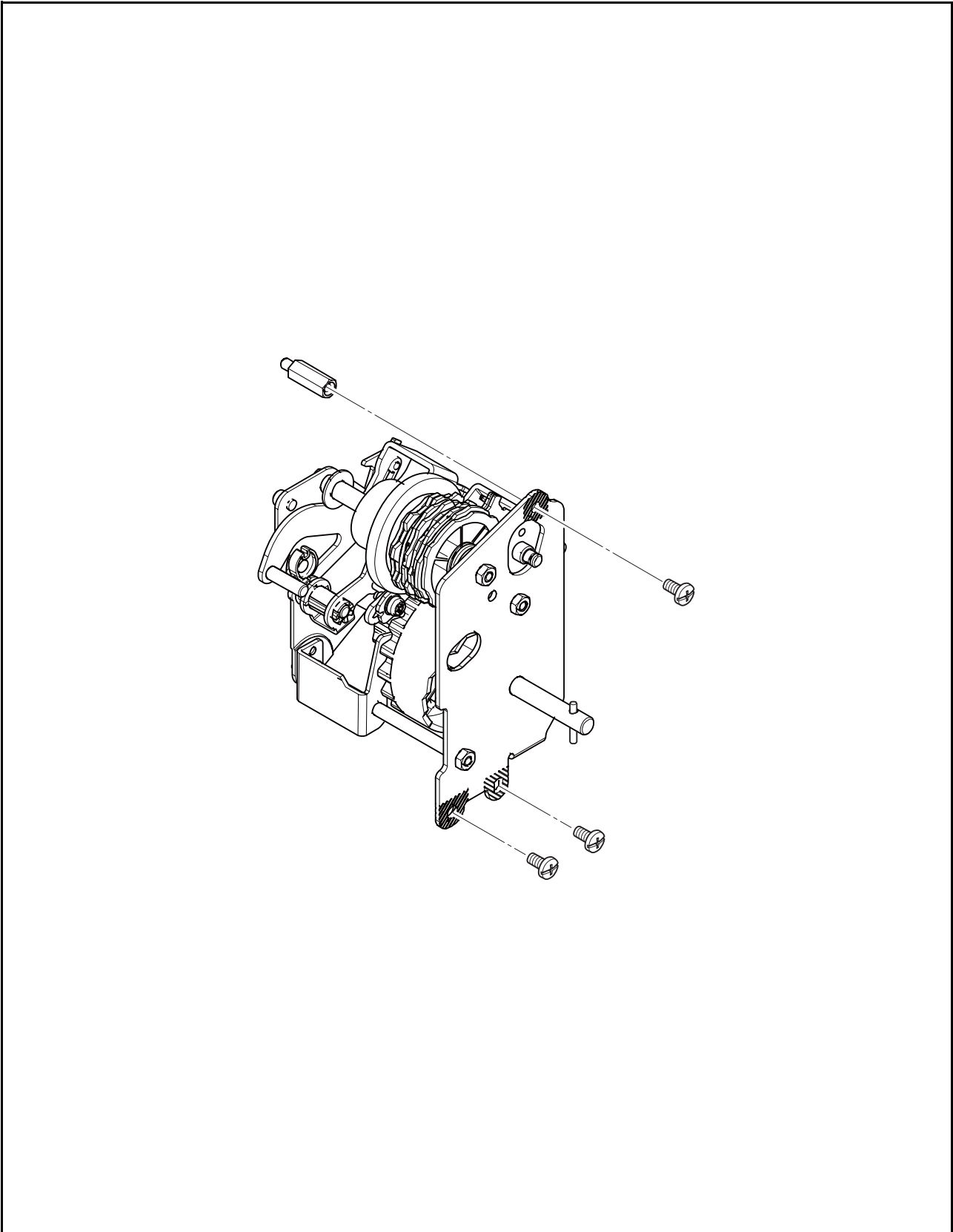
### 4 Removal of Feed bracket assy

1. Remove the 2 screws ①, and then remove the feed bracket assy ①.

→Refer to 3 - 28 of the Disassembly.



Pattern selecting mechanism location diagram

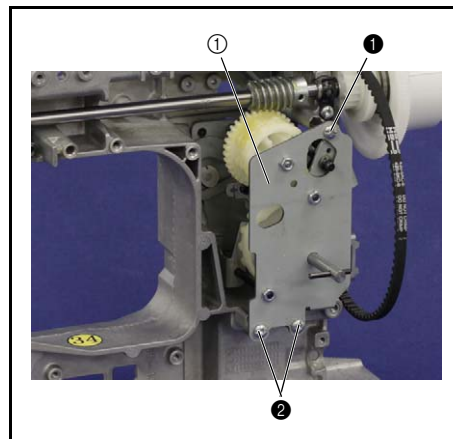


Basic

Basic

**1** Removal of Pattern selecting unit assy

1. Remove the screw ❶ and the 2 screws ❷, and then remove the pattern selecting unit assy ❶.



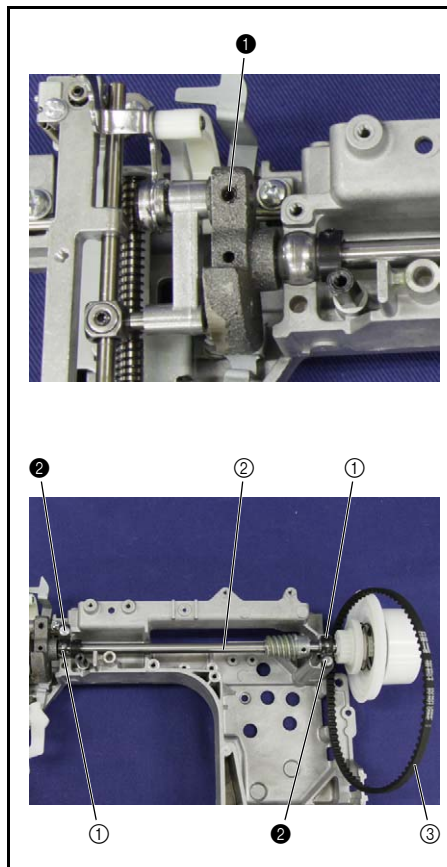




## 1 Removal of Upper shaft assy

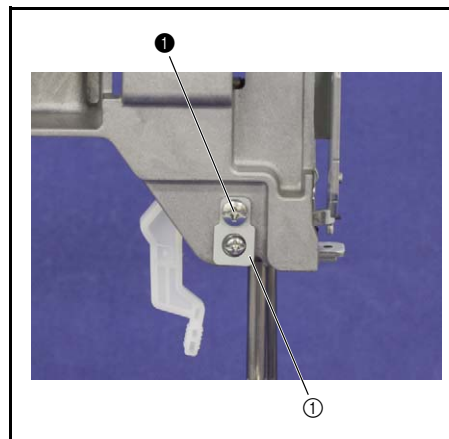
1. Remove the screw ①.
2. Remove the 2 screws ②, and then remove the 2 bushing pressers ①.
3. Remove the upper shaft assy ②.
4. Remove the timing belt ③ from the upper shaft assy ②.

→Refer to 3 - 32 of the Disassembly.



## 2 Removal of Stopper plate

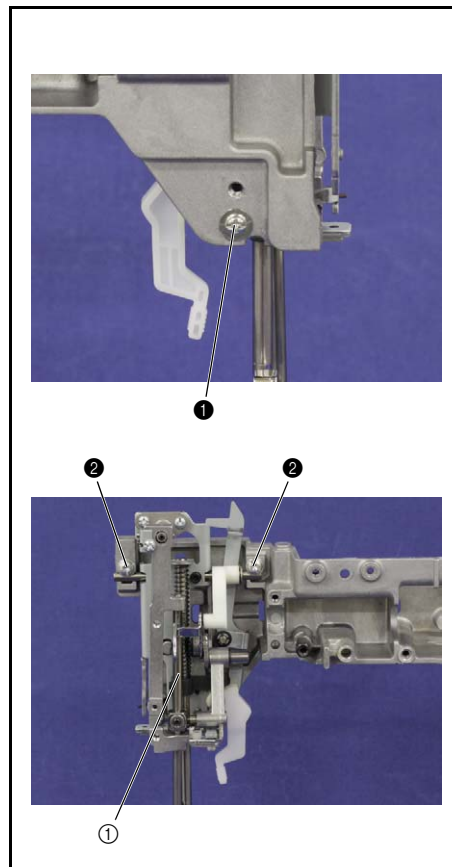
1. Remove the screw ①, and then remove the stopper plate ①.



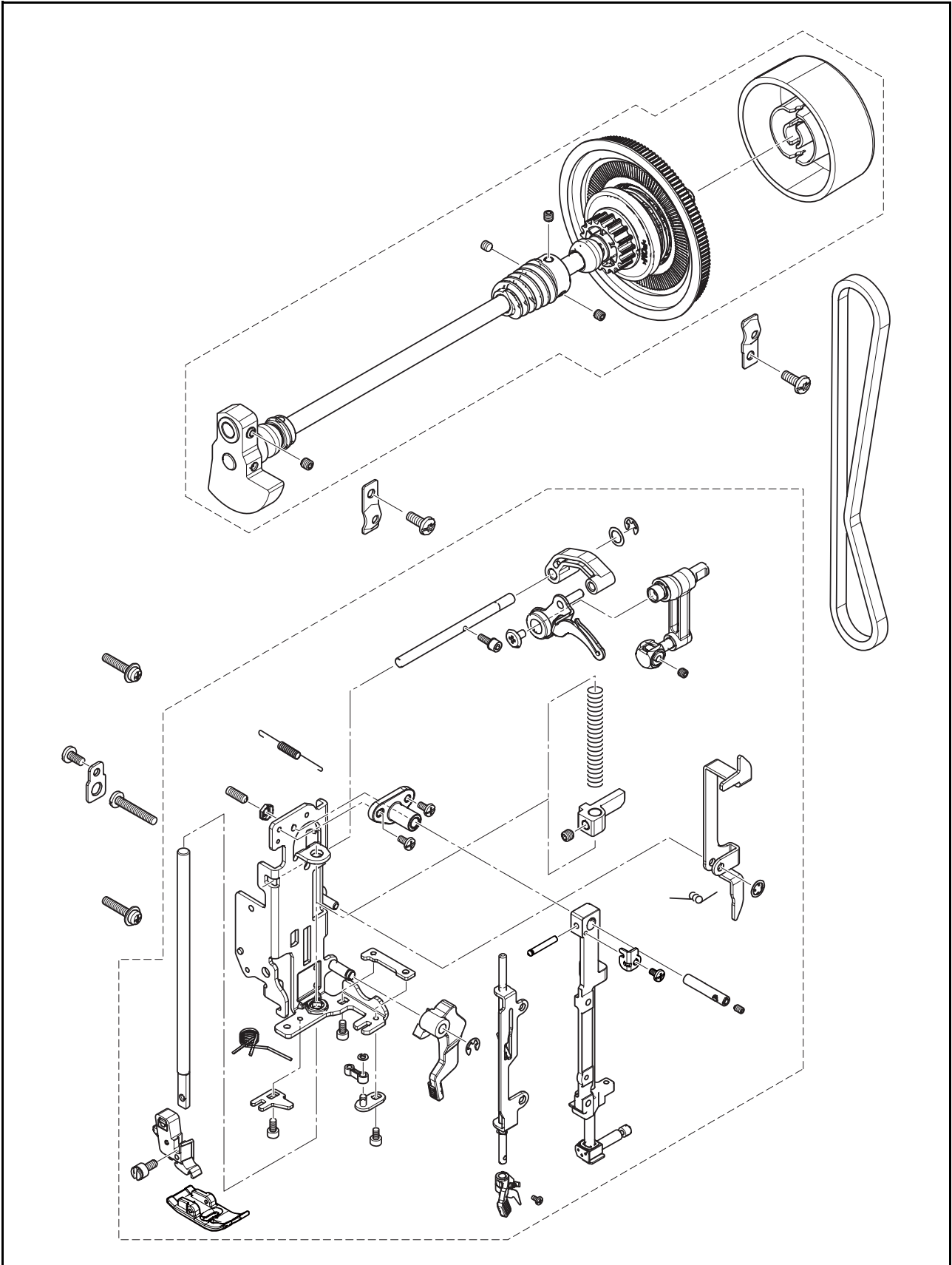
**3** Removal of Needle-presser module

1. Remove the screw ①.
2. Remove the 2 screws ②, and then remove the needle-presser module ①.

→Refer to 3 - 32 of the Disassembly.



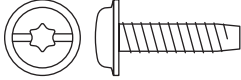
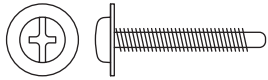
Upper shaft, Needle bar and Presser foot unit location diagram

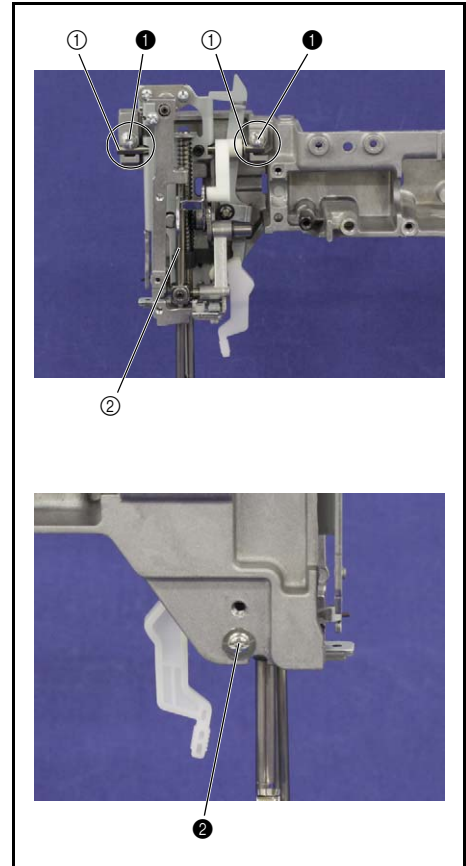


## 1 Attachment of Needle-presser module

1. Set the shaft ① of the needle-presser module ② to the 2 positioning grooves of the arm bed, and secure them with the 2 screws ①.
2. Tighten the screw ② to the back side of the arm bed.


→Refer to 3 - 40 of the Assembly.

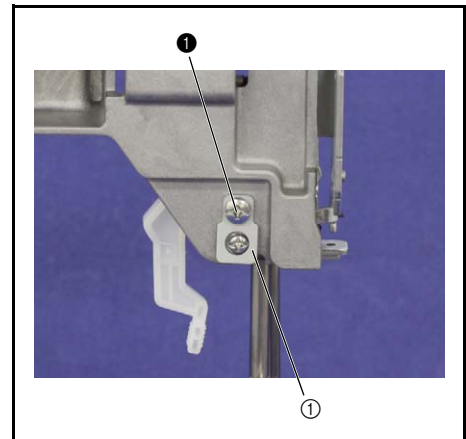
①		Taplite, Cup S M4X16
②		Cup screw M3X20



## 2 Attachment of Stopper plate

1. Set the stopper plate ① to the arm bed, and then secure it with the screw ①.

①		Screw, Bind M4X8
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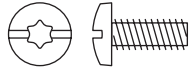


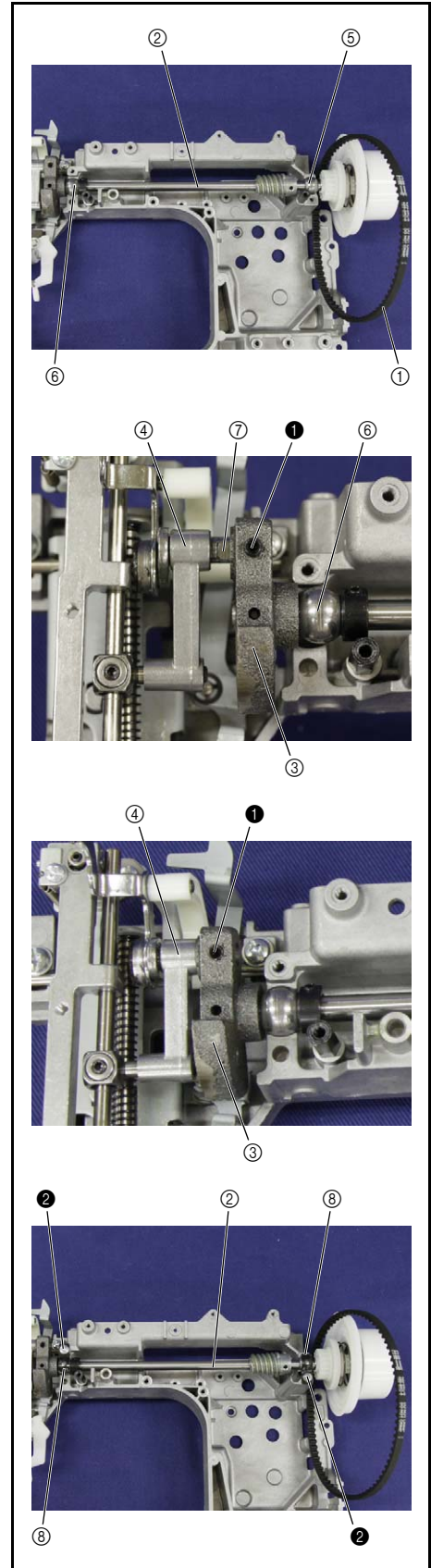
### 3 Attachment of Upper shaft assy

1. Pass the timing belt ① to the upper shaft assy ②.
2. Set the thread take-up counter weight ③ to the needle bar crank rod assy ④.
3. Set the lower shaft bushing ⑤ and the lower shaft bushing ⑥ to the 2 positioning parts of the arm bed.
4. Align the D cut face ⑦ of the needle bar crank rod assy ④ with the screw hole on the thread take-up counter weight ③, and then tighten the screw ①.
5. Set the 2 bushing pressers ⑧ to the arm bed, and then secure them with the 2 screws ②.

Apply FBK OIL RO 100 to the matching section of the upper shaft and the lower shaft bushing ⑤.	2 drops
Apply FBK OIL RO 100 to the left and right end of the lower shaft bushing ⑥.	2 drops
Apply FBK OIL RO 100 to the sliding surface of the needle bar crank rod assy ④ and the thread take-up counter weight ③.	2 drops

→Refer to 3 - 46 of the Assembly.

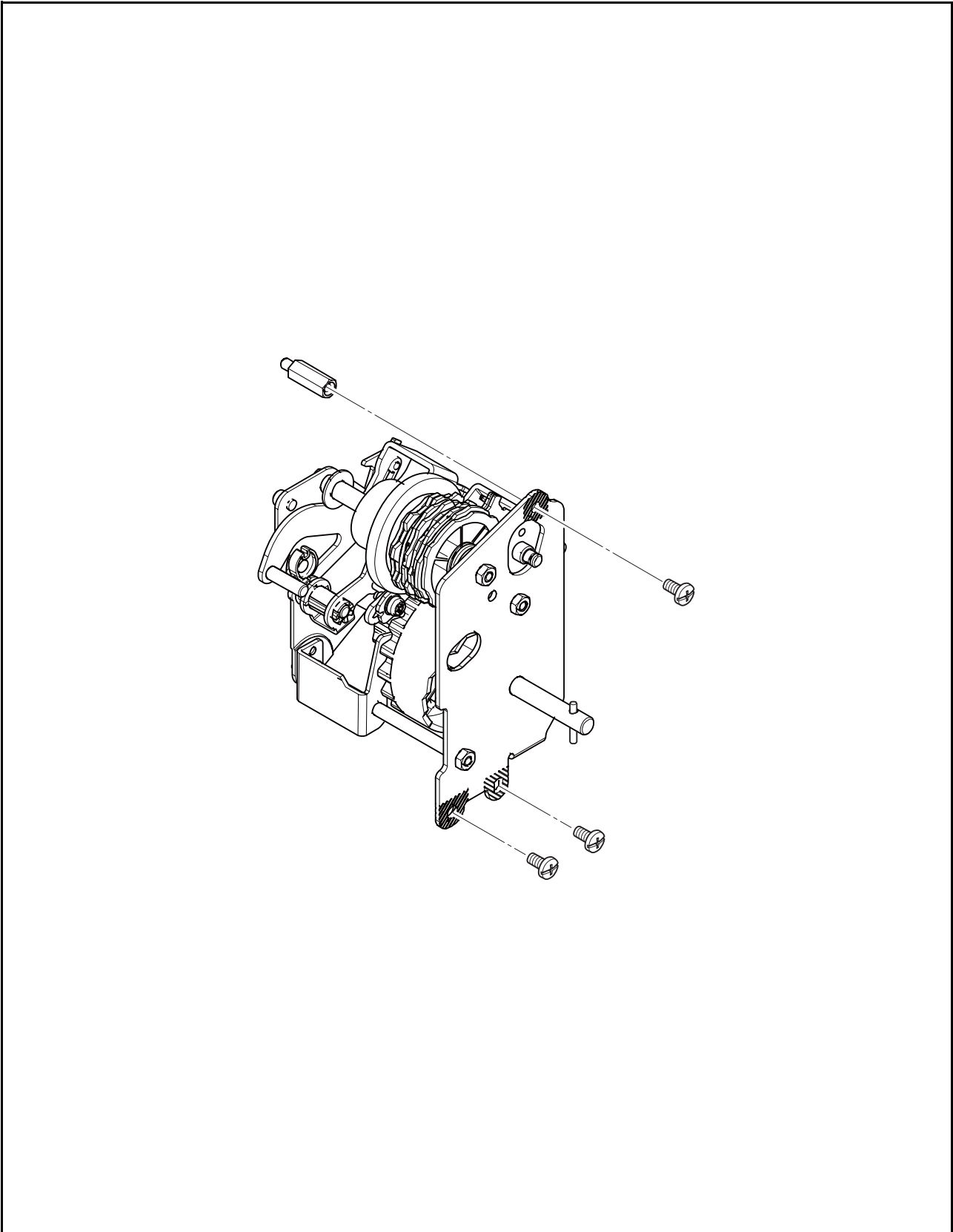
<b>①</b>		Set Screw, Socket (FT) M5X5
Hex wrench 2.5mm		
<b>②</b>		Tapite, Bind S M4X10



Basic

Basic

Pattern selecting mechanism location diagram


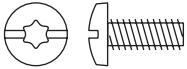


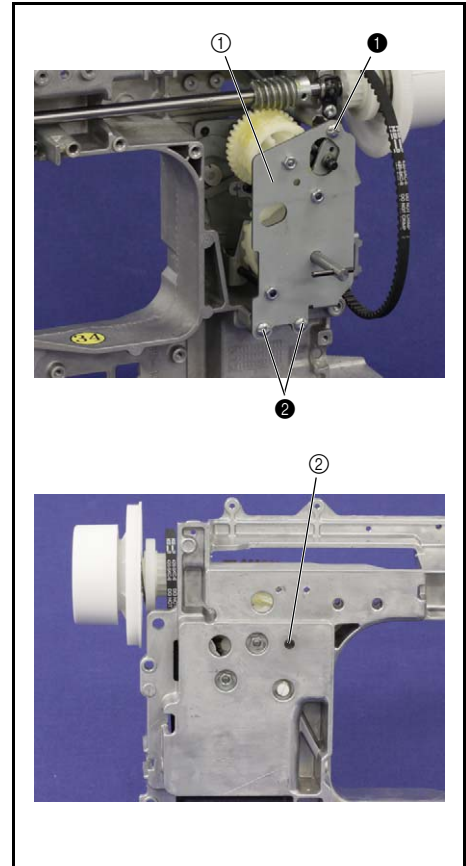
## 1 Attachment of Pattern selecting unit assy

1. Set the pattern selecting unit assy ① to the arm bed, and then secure it with the screw ① and the 2 screws ②.

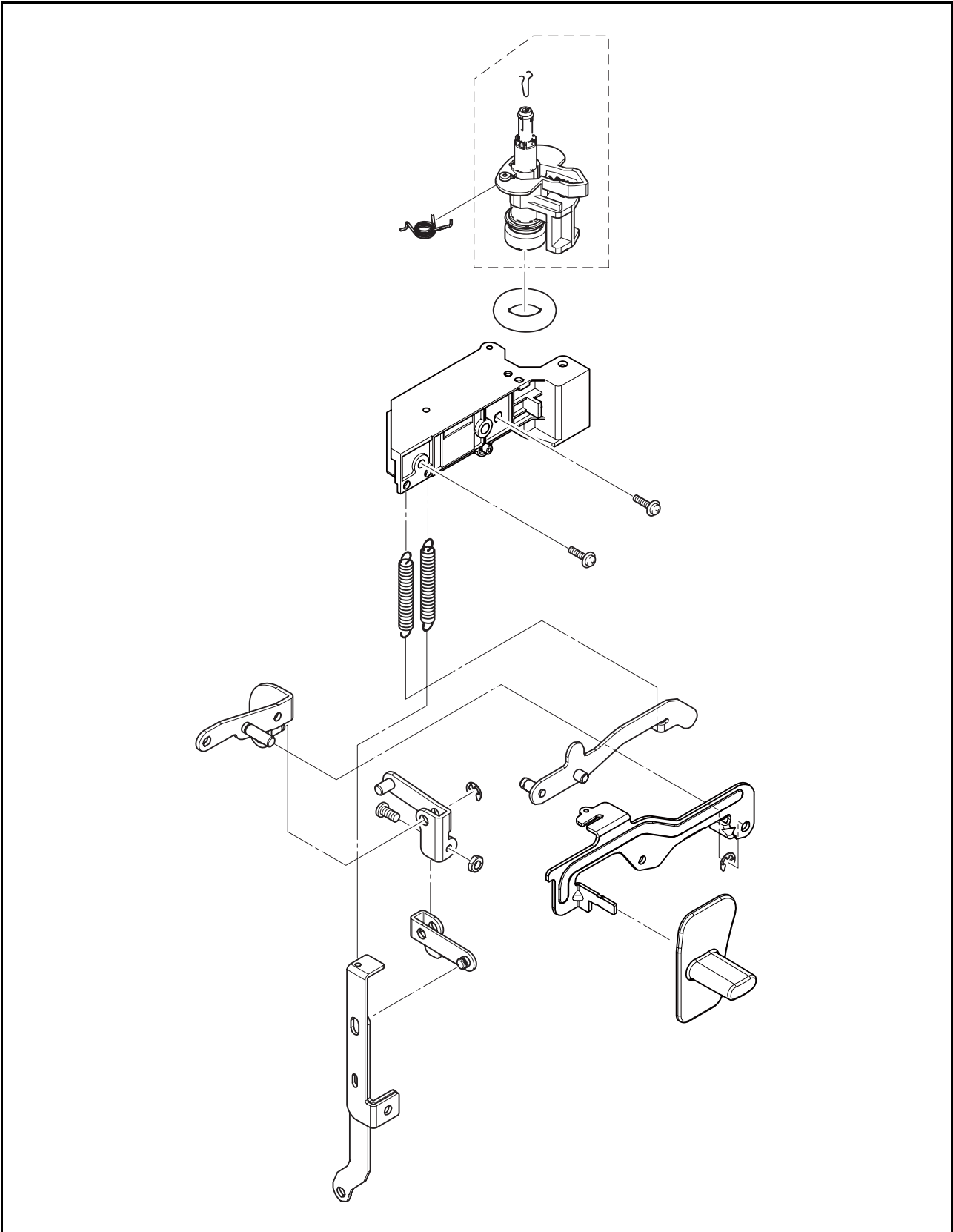
### \*Key point

- Tighten the screw ① temporarily, fully tighten the 2 screws ② and fully tighten the screw ① in this order.
- Check that insert the shaft ② of the pattern selecting unit assy ① into the positioning hole of the back side of the arm bed.

①		Screw, Bind M4X8
②		Tapite, Bind S M4X10



Feed control mechanism location diagram



Basic

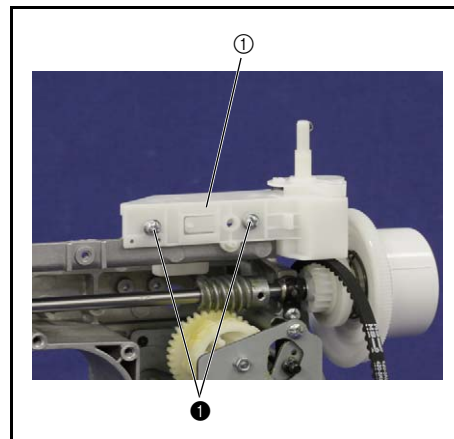
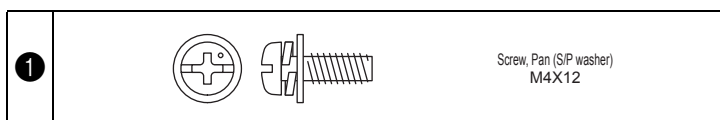
Basic



### 1 Attachment of Feed bracket assy

1. Set the feed bracket assy ① to the arm bed, and then secure it with the 2 screws ①.

→Refer to 3 - 50 of the Assembly.



### 2 Attachment of Lever holder assy

1. Set the lever holder assy ① to the arm bed, and then secure it with the screw ① and the screw ②.

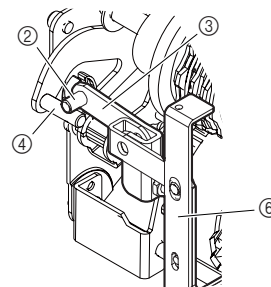
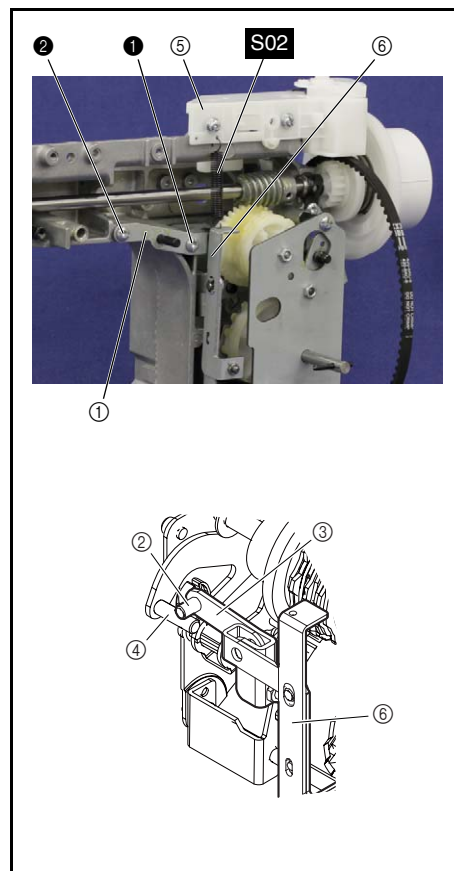
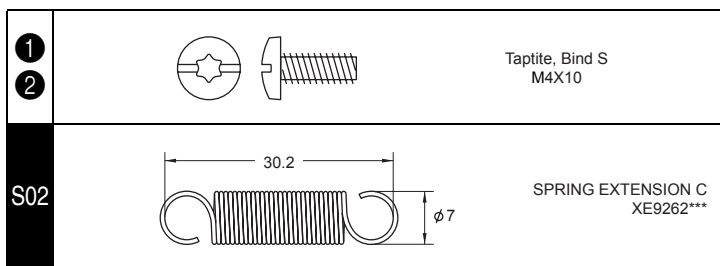
**\*Key point**

- Check that there is the shaft ② of the reverse sewing lever D assy ③ above the shaft ④ of the pattern selecting unit assy.
- Tighten the screw ① temporarily, fully tighten the screw ② and fully tighten the screw ① in this order.

2. Attach the spring S02 to the feed bracket sub assy ⑤ and the connecting rod U ⑥.

Lubricate the EPNOC AP(N) 0 to the shaft of the lever holder assy ①.	3mm dia. ball
--	---------------

→Refer to 3 - 51 of the Assembly.



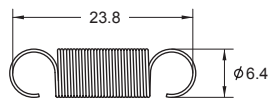
### 3 Attachment of Reverse sewing lever B assy

1. Insert the shaft ① of the reverse sewing lever B assy ② to the positioning hole of the arm bed.
2. Attach the spring S01 to the reverse sewing lever B assy ② and the feed bracket sub assy ③.

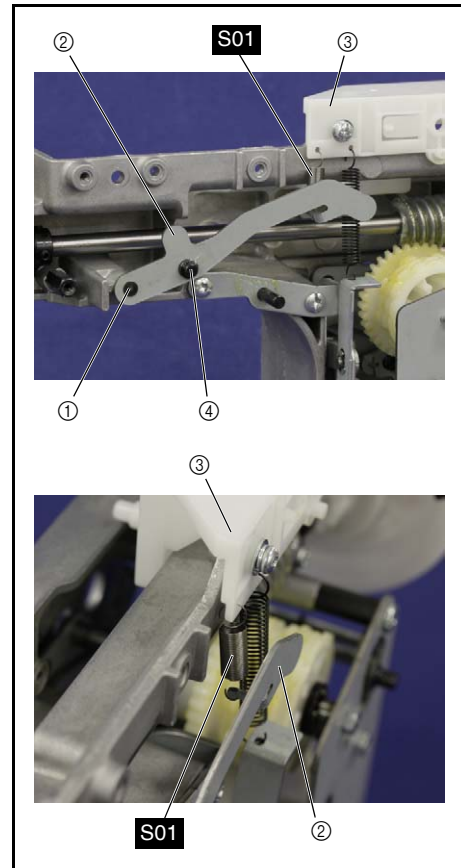
Lubricate the EPNOC AP(N) 0 to the shaft ① of the arm bed side and the shaft ④ of the reverse sewing lever B assy ②.

3mm dia. ball

S01



SPRING  
XA8111\*\*\*\*



### 4 Attachment of Reverse sewing lever A

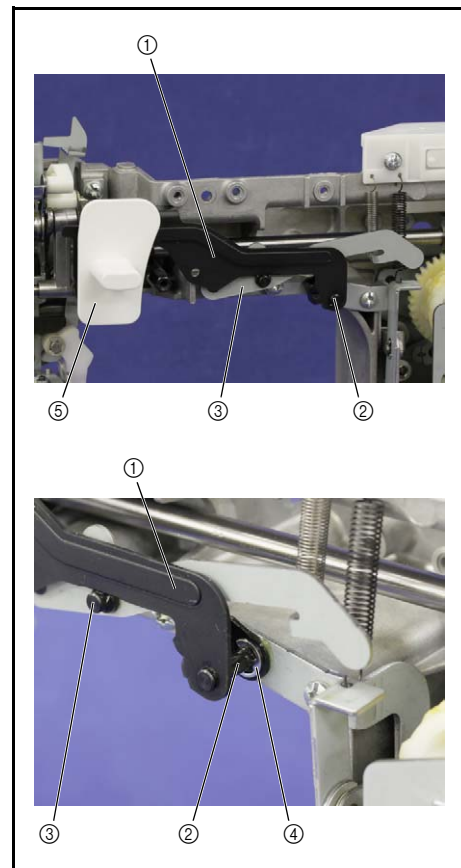
1. Set the reverse sewing lever A ① to the shaft of the lever holder sub assy ② while pushing down the reverse sewing lever B assy ③.

**\*Key point**

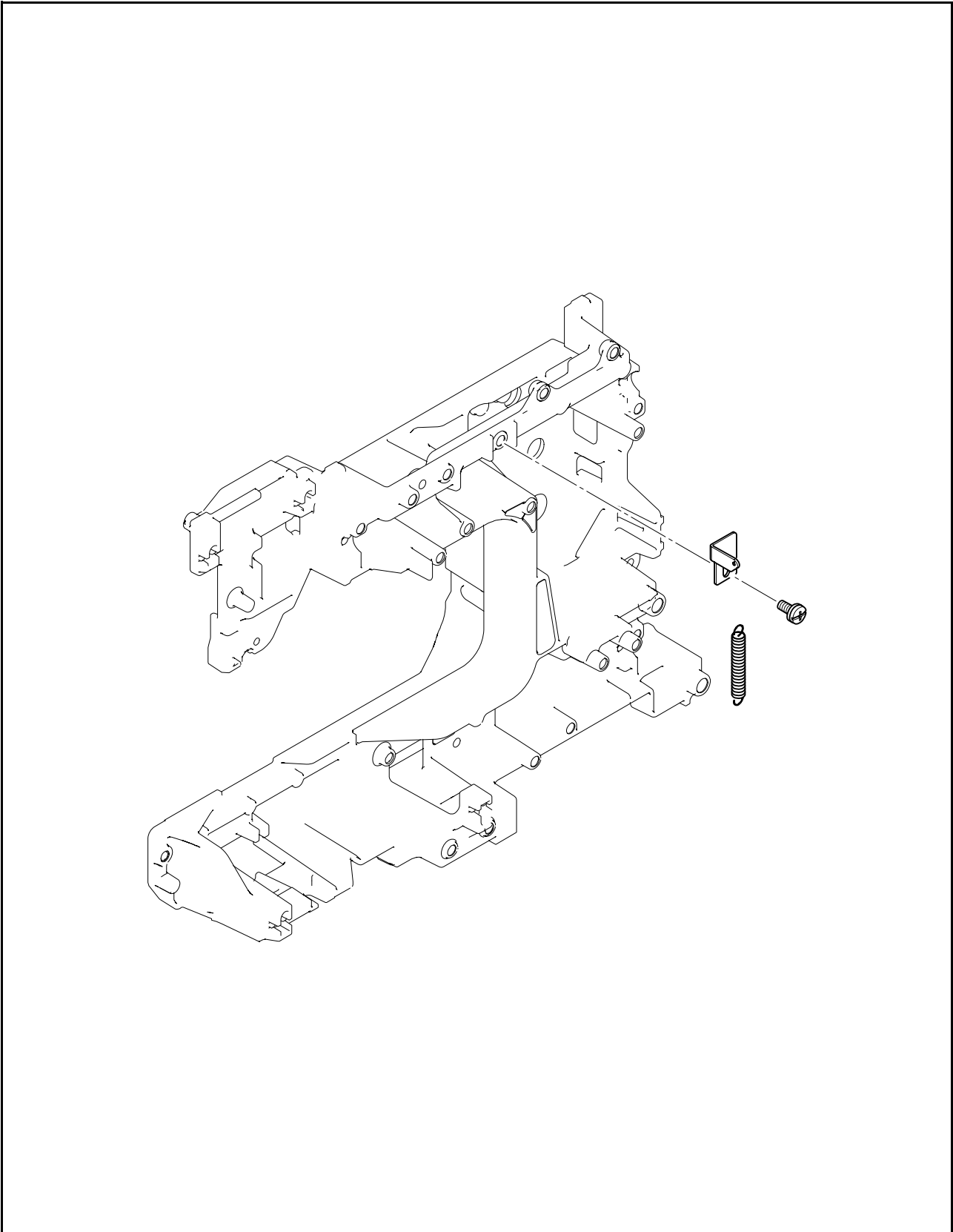
- Check that there is the reverse sewing lever A ① below the shaft of the reverse sewing lever B assy ③.
2. Attach the retaining ring E4 ④ to the shaft of the lever holder sub assy ②.
  3. Attach the reverse sewing button ⑤ to the reverse sewing lever A ①.

Lubricate the EPNOC AP(N) 0 to the shaft of the lever holder sub assy ②.

3mm dia. ball



Zigzag mechanism location diagram



Basic

Basic

## 1 Attachment of Zigzag connecting rod assy

1. Set the zigzag connecting rod ① to the shaft ② of the pattern selecting unit assy, and then secure it with the retaining ring E4 ③.
2. Set the zigzag adjusting nut ④ to the zigzag connecting rod ①, and set them to the needle bar supporter assy ⑤, and then tighten the screw ① temporarily.

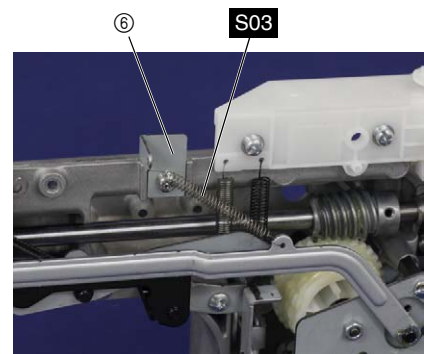
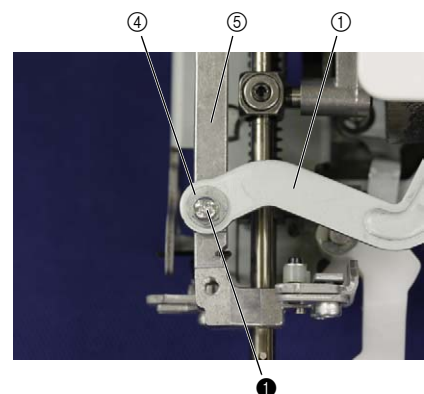
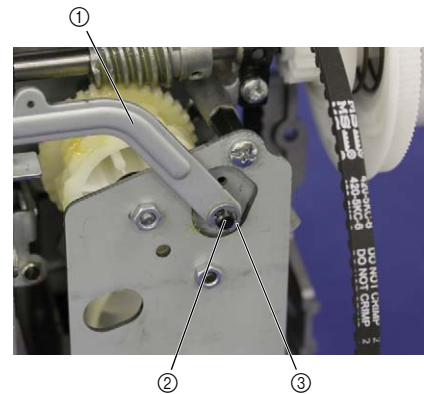
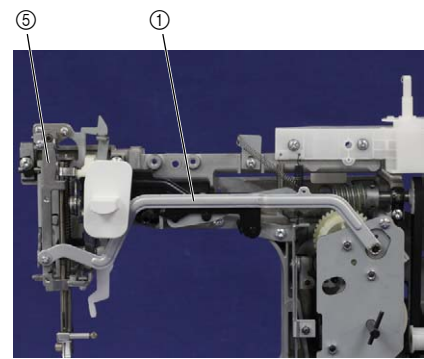
### \*Key point



- Check that place the zigzag adjusting nut ④ with the larger end facing the top side.
- Fully tighten the screw ① after performing "4-13 Adjustment: Three point needle drop".

3. Set the spring S03 to the BH adjusting plate ⑥ and the zigzag connecting rod ①.

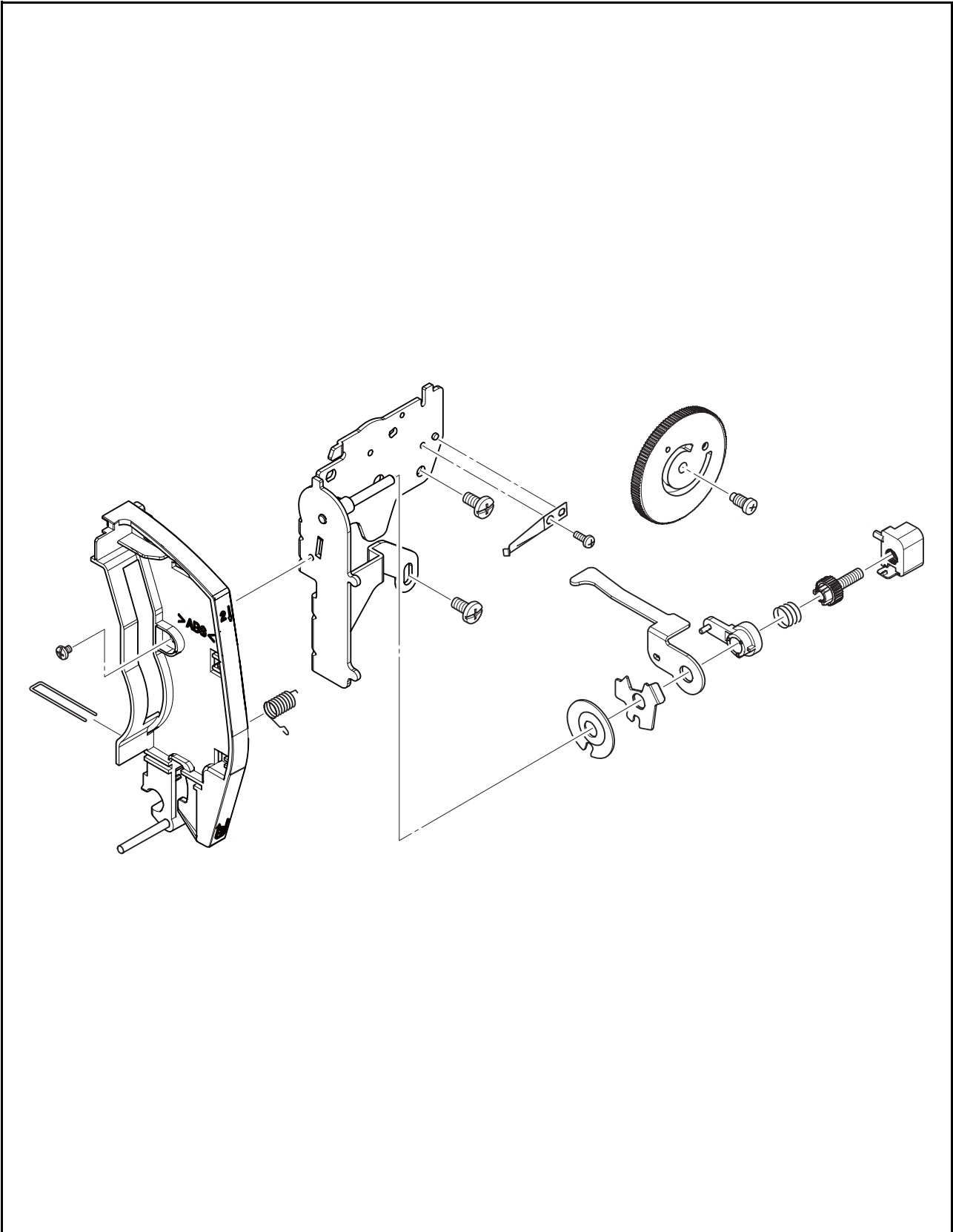
Lubricate the EPNOC AP(N) 0 to the shaft ② of the pattern selecting unit assy.

5mm dia. ball



①		Screw, Pan M3X10
S03		SPRING XC4935***


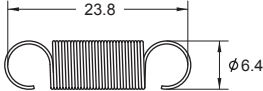
Needle threading mechanism location diagram

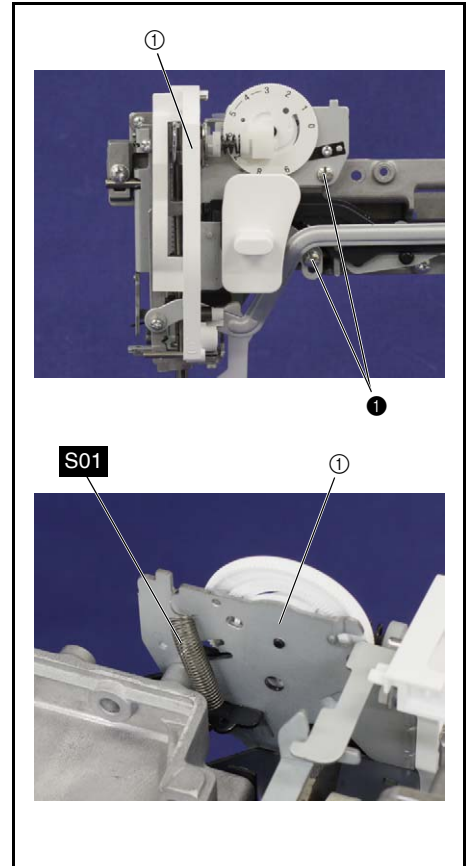


**1** Attachment of Thread guard assy

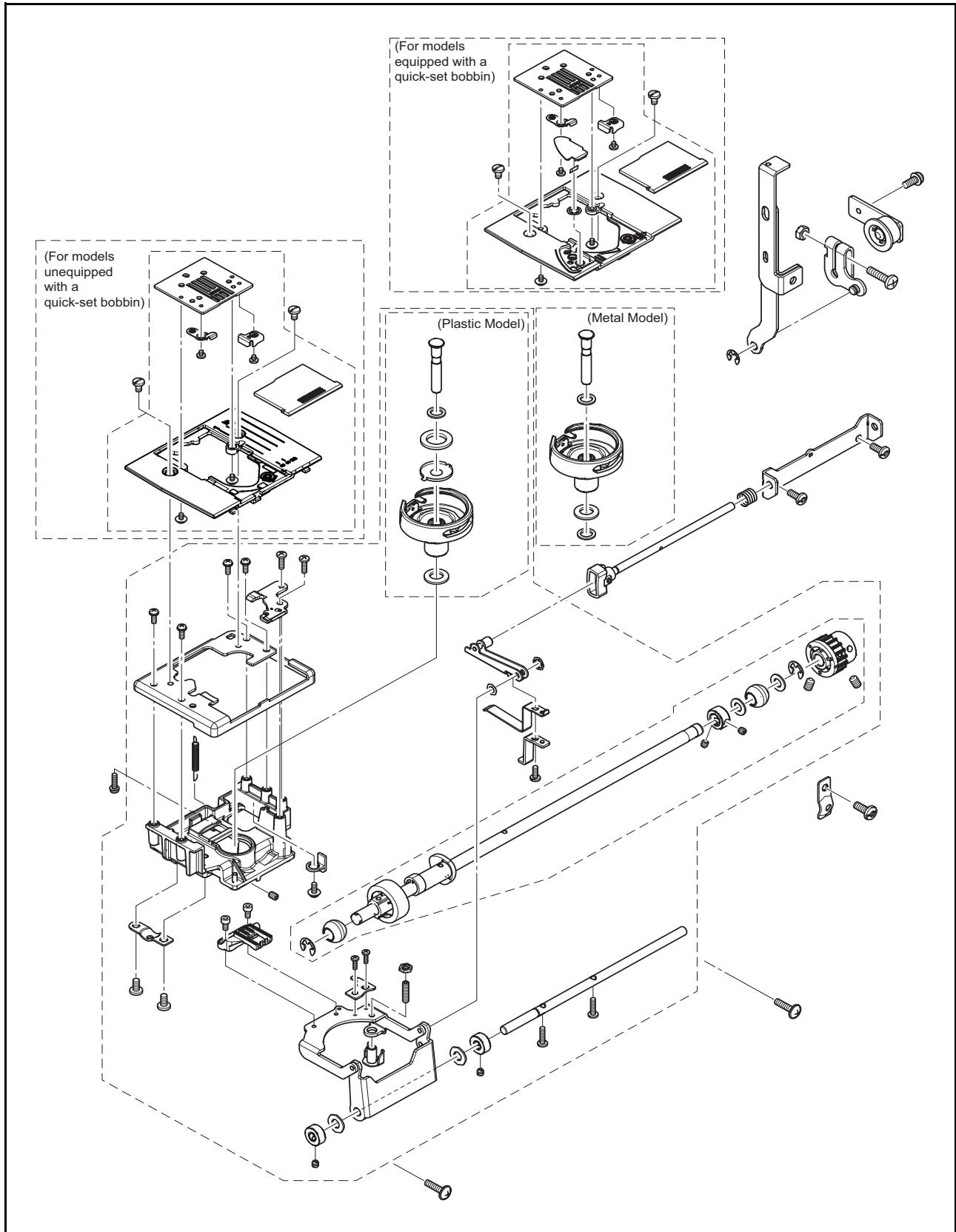
1. Set the thread guard assy ① to the arm bed, and then secure it with the 2 screws ①.
2. Attach the spring S01 to the thread guard assy ① and the arm bed.

→Refer to 3 - 55 of the Assembly.

<b>①</b>		Screw, Bind M4X8
<b>S01</b>		SPRING XA8111****



Feed unit location diagram



Basic

Basic



### 1 Attachment of Feed module

1. Set the feed module ① to the arm bed, and then secure it with the 2 screws ① and the screw ②.

**\*Key point**

- Check that engage the outer rotary shaft ② with the notch part of the arm bed.
- Check that engage the lower shaft bushing ③ with the positioning groove of the arm bed.

2. Set the bushing presser ④ to the arm bed, and then secure it with the screw ③.
3. Slide the feed stand assy ⑤ to the right side, and place the position where the feed arm assy ⑥ contact the feed arm supporter ⑦.

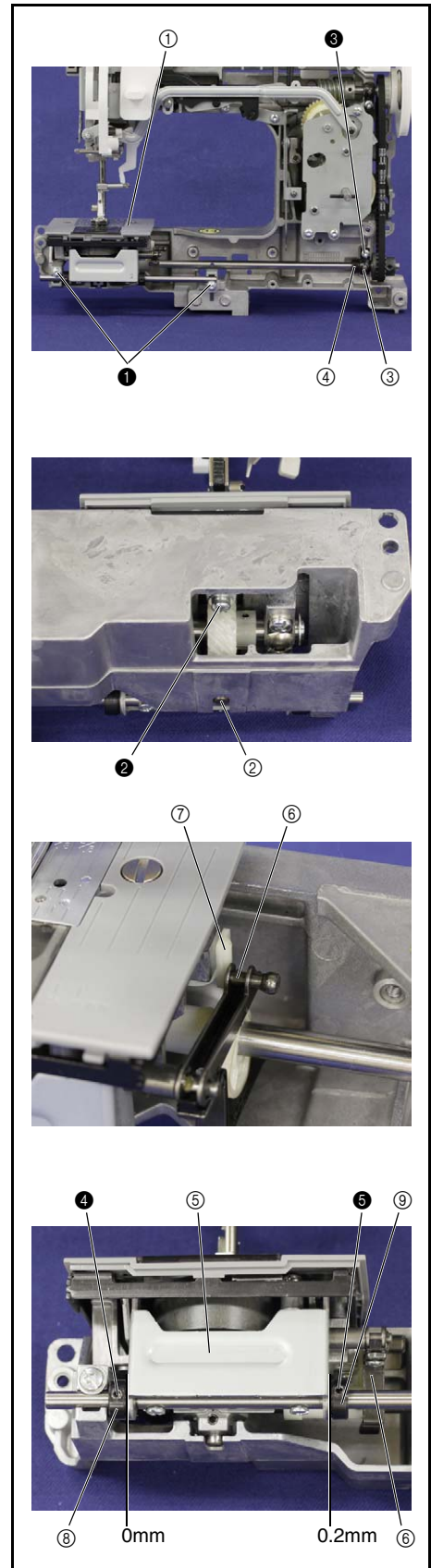
**\*Key point**

- The feed arm assy ⑥ is perpendicular to the lower shaft.

4. Slide the set screw collar ⑧ to the side of the feed stand assy ⑤, and then tighten the screw ④ in the state of that the clearance is 0 mm.
5. Slide the set screw collar ⑨ to the side of the feed stand assy ⑤, and then tighten the screw ⑤ in the state of that the clearance is 0.2 mm.

Apply OILER to the matching section of the lower shaft and the lower shaft bushing ③.	1-2 drops
---	-----------

→Refer to 3 - 59 of the Assembly.

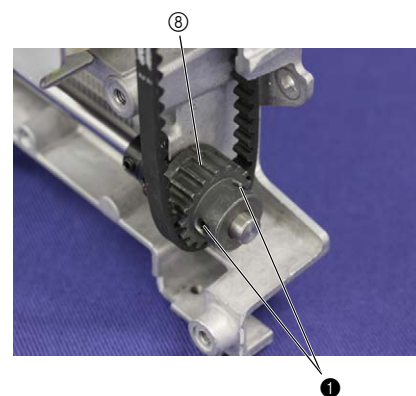
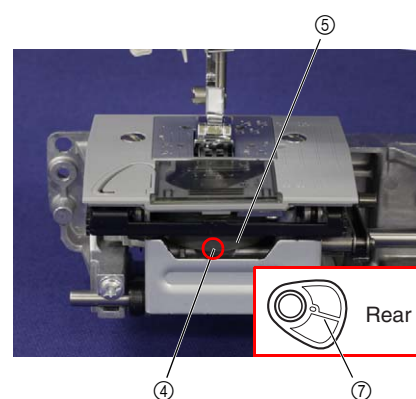
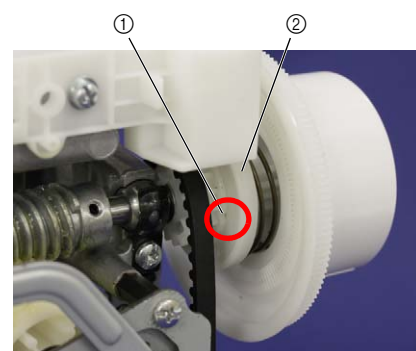
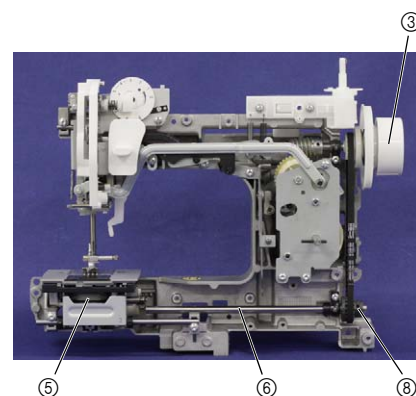




①		Tapite, Cup S M4X16
②		Screw, Pan (S/P washer) M4X12DB
③		Screw, Pan (S/P washer) M4X8DA
④ ⑤		Set Screw, Socket (CP) M4X4
Hex wrench 2.0mm		



## 2 Phase matching of Upper shaft and lower shaft

- When set the groove ① of the upper shaft pulley ② frontward by rotating the pulley of the upper shaft assy ③, set the mark ④ of the outer rotary hook assy ⑤ frontward by rotating the lower shaft assy ⑥ and set the feed cam ⑦ with the larger end facing backward, and then tighten the 2 screws ① of the timing pulley D ⑧.



①	 	Set Screw, Socket (FT) M5X5
Hex wrench 2.5mm		

### 3 Attachment of Feed adjuster assy

1. Insert the groove ① of the feed adjuster sub assy ② to the shaft of the feed arm assy ③, and then set the feed adjusting shaft holder ④ to the arm bed with the screw ① and the screw ②.

**\*Key point**

- Tighten the screw ① temporarily, fully tighten the screw ② and fully tighten the screw ① in this order.

2. Fully tighten the screw ③ of the feed connecting lever assy ⑤.

**\*Key point**

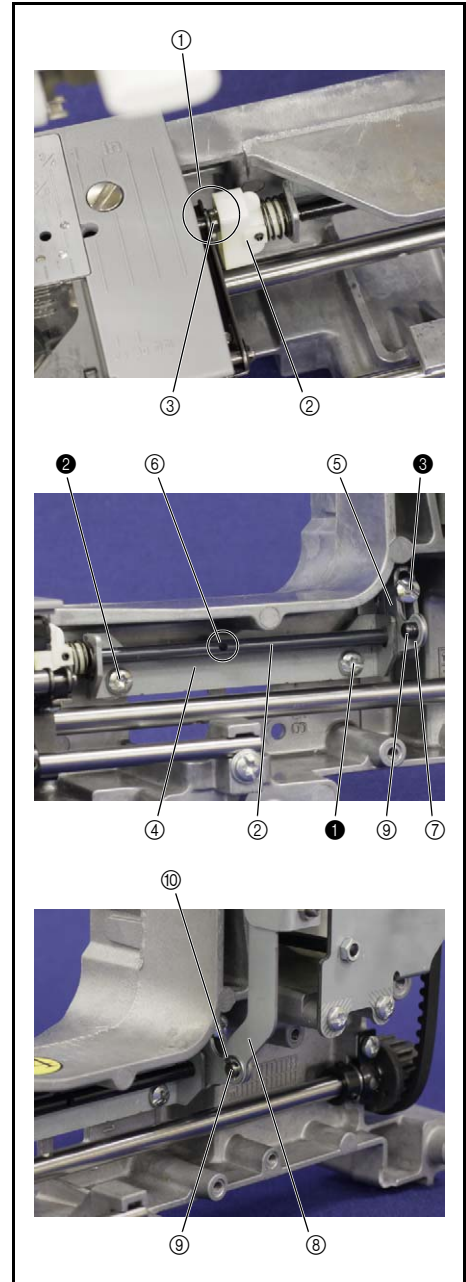
- Set the positioning hole ⑥ of the feed adjuster sub assy ② so that facing directly forward, and set the arm part ⑦ of the feed connecting lever assy ⑤ so that facing directly forward.

3. Set the hole of the connecting rod D ⑧ to the shaft ⑨ of the feed connecting lever assy ⑤, and then attach the retaining ring E4 ⑩.

Lubricate the EPNOC AP(N) 0 to the shaft ⑨ of the feed connecting lever assy ⑤.

3mm dia. ball

→Refer to 3 - 70 of the Assembly.



① ②		Screw, Bind M4X8
③		Screw, Bind M4X16

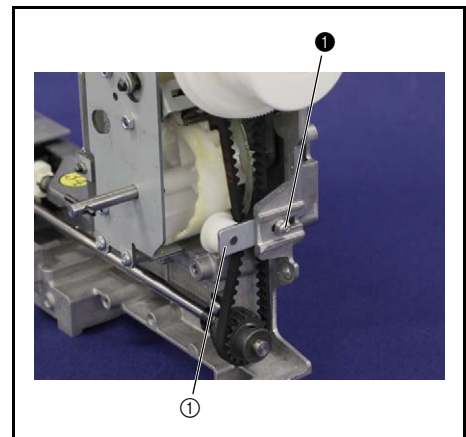
### 4 Attachment of Tension pulley assy

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

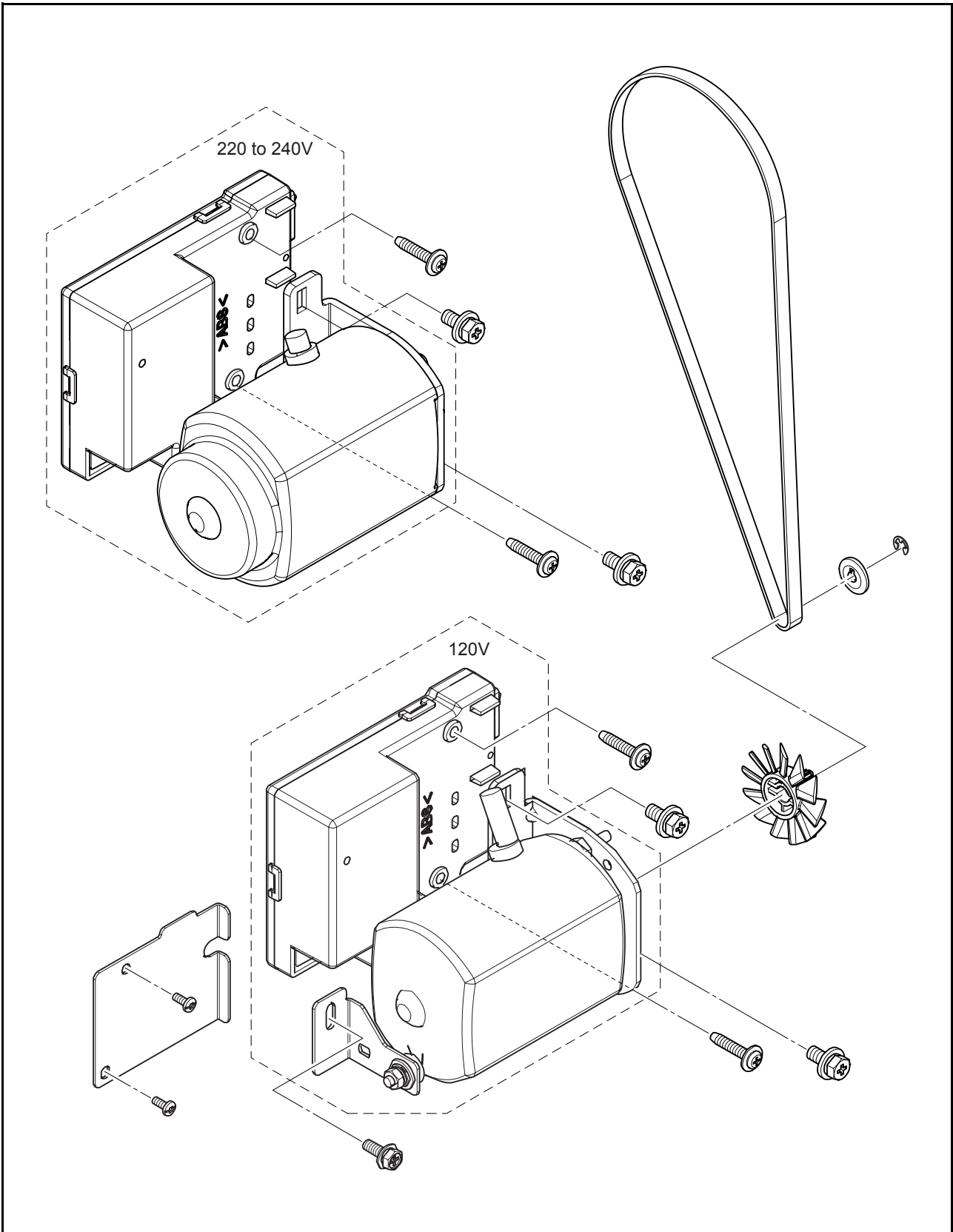
**\*Key point**

- Fully tighten the screw ① after performing "4-5 Adjustment: Timing belt tension".

①		Screw, Pan (S/P washer) M4X8DA
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Main motor unit location diagram

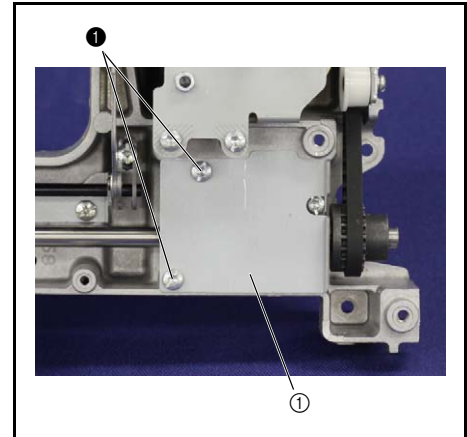
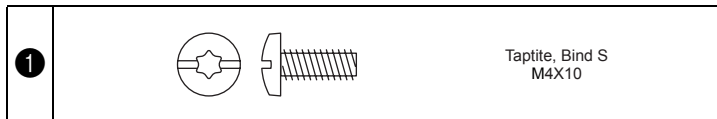


Basic

Basic

### 1 Attachment of Lower shaft plate

1. Set the lower shaft plate ① to the arm bed with the 2 screws ①.



### 2 Attachment of Motor 3P supply assy

#### ■ 120V specification

1. Set the 3P socket unit ① of the motor 3P supply assy to the back side of the arm bed, and then secure it with the 2 screws ①.
2. Set the motor assy ② of the motor 3P supply assy to the front side of the arm bed, and then tighten the 2 screws ② and the screw ③ temporarily.

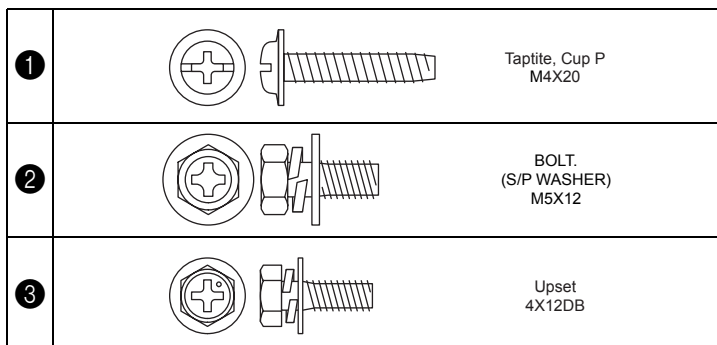
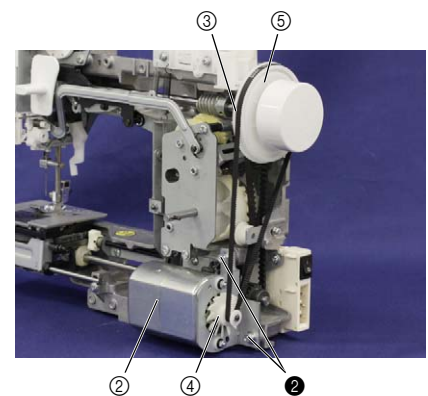
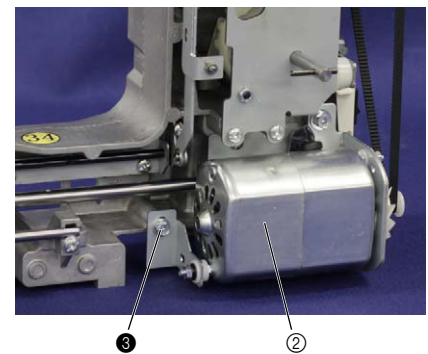
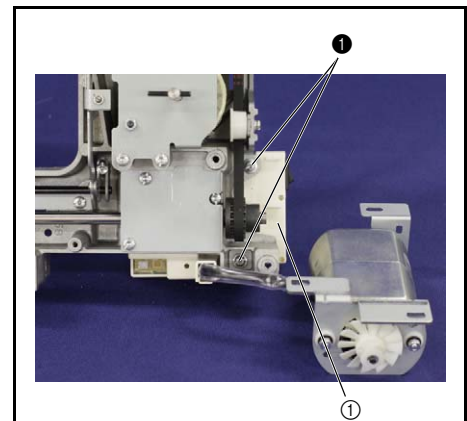
#### \*Key point

- Fully tighten the 2 screws ② and the screw ③ after performing "4-6 Adjustment: Motor belt tension".

3. Hang the timing belt ③ on the motor T-pulley ④ and the T pulley ⑤.

<In case of 220 to 240V specification, refer to next page.>

→Refer to 3 - 72 of the Assembly.



Basic

Basic

### ■ 220 to 240V specification

1. Set the 3P socket unit ① of the motor 3P supply assy to the back side of the arm bed, and then secure it with the 2 screws ②.
2. Set the motor assy ② of the motor 3P supply assy to the front side of the arm bed, and then tighten the 2 screws ② temporarily.

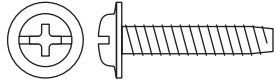

#### \*Key point

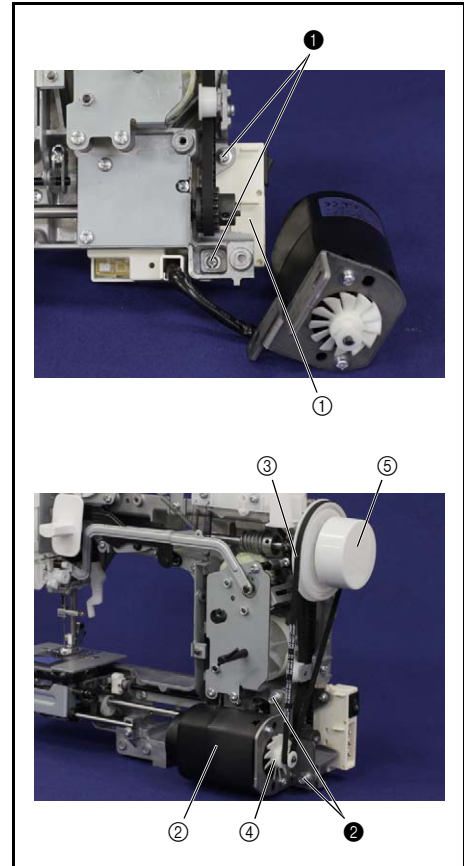
- Fully tighten the 2 screws ② after performing "4-6 Adjustment: Motor belt tension".

3. Hang the timing belt ③ on the motor T-pulley ④ and the T pulley ⑤.

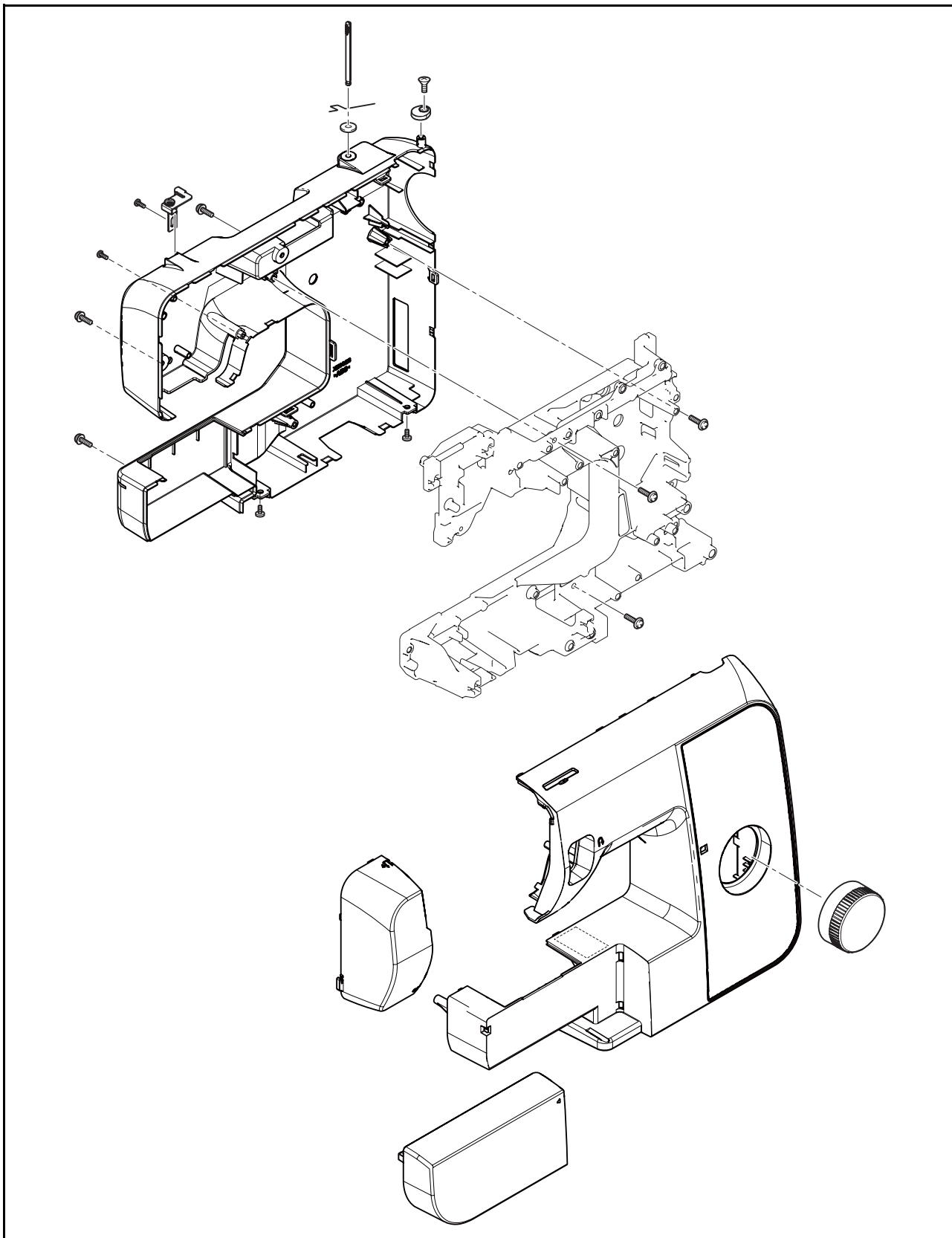
<In case of 120V specification, refer to previous page.>

→Refer to 3 - 72 of the Assembly.

①		Tapite, Cup P M4X20
②		BOLT. (S/P WASHER) M5X12



Main frame and Covers location diagram



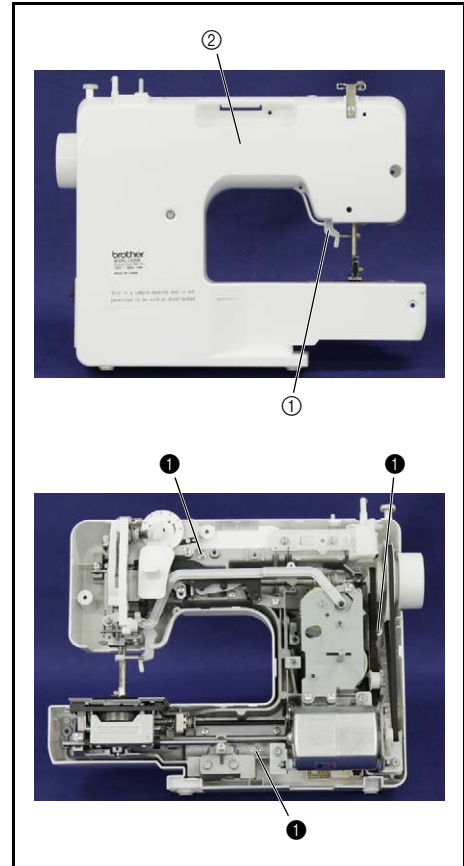
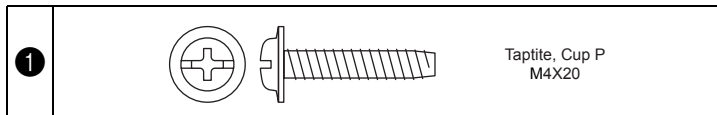
Basic

Basic

**1** Attachment of Rear cover assy

1. Pull down the presser foot lifter ①.
2. Set the rear cover assy ② to the arm bed, and then secure it with the 3 screws ①.

→Refer to 3 - 74 of the Assembly.





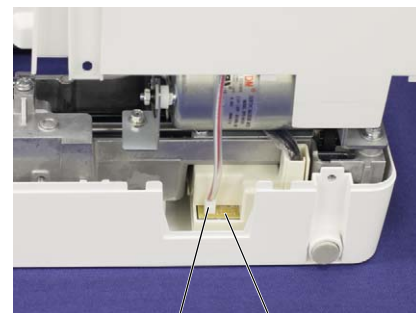
## 2 Attachment of Front cover assy

1. Connect the connector ① of the LED lamp supply assy to the motor 3P supply assy ②.
2. Set the front cover assy to the arm bed, and then secure it with the 2 screws ①, the screw ② and the 2 screws ③.

**\*Key point**

- Attach the front cover assy from the top side.
- Check that hang the 4 hooks ③ of the front cover assy on the rear cover assy.

→Refer to 3 - 75 of the Assembly.



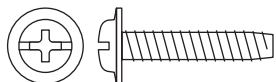


① ②



②



③ ③

①		Tapite, Cup P M4X20
②		Tapite, Bind P M3X16
③		Screw, Pan (S/P washer) M4X10DB



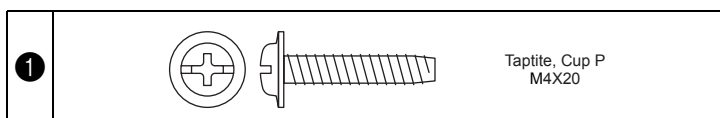
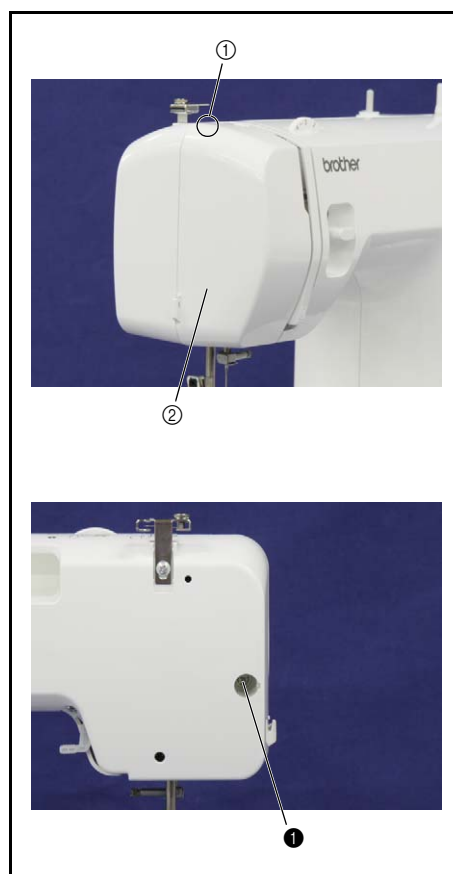
**3** Attachment of Pattern selecting dial

1. Attach the pattern selecting dial ①.

**4** Attachment of Face plate assy

1. Hang the hook ① on the positioning part of the rear cover, and then set the face plate assy ② to the rear cover.
2. Secure the face plate assy ② to the rear cover with the screw ③.

→Refer to 3 - 76 of the Assembly.

**5** Attachment of Accessory table

1. Attach the accessory table ① to the front cover assy.



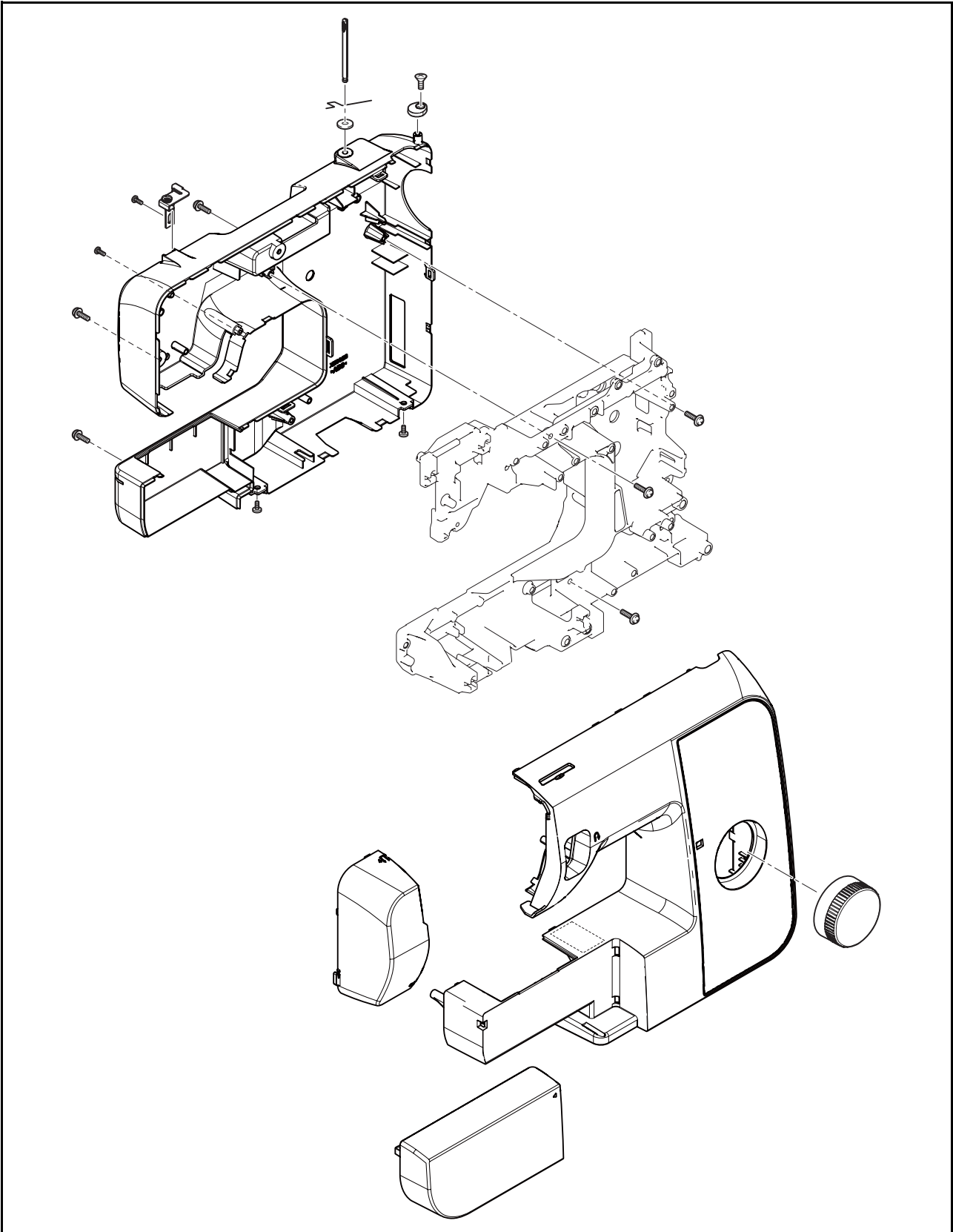
# 3 Application of Disassembly/Assembly

---

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

Disassembly	Main frame and Covers .....	3 - 2
	Main motor unit.....	3 - 6
	Feed unit.....	3 - 8
	Needle threading mechanism .....	3 - 21
	Zigzag mechanism .....	3 - 24
	Feed control mechanism .....	3 - 26
	Pattern selecting mechanism .....	3 - 29
	Upper shaft, Needle bar and Presser foot unit .....	3 - 31
Assembly	Upper shaft, Needle bar and Presser foot unit .....	3 - 39
	Pattern selecting mechanism .....	3 - 47
	Feed control mechanism .....	3 - 49
	Zigzag mechanism .....	3 - 52
	Needle threading mechanism .....	3 - 54
	Feed unit.....	3 - 58
	Main motor unit.....	3 - 71
	Main frame and Covers .....	3 - 73

Main frame and Covers location diagram

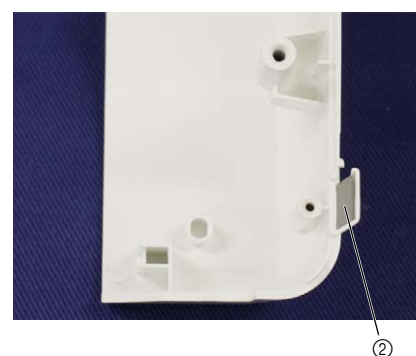


Application

Application

**1** Disassembly of Face plate assy

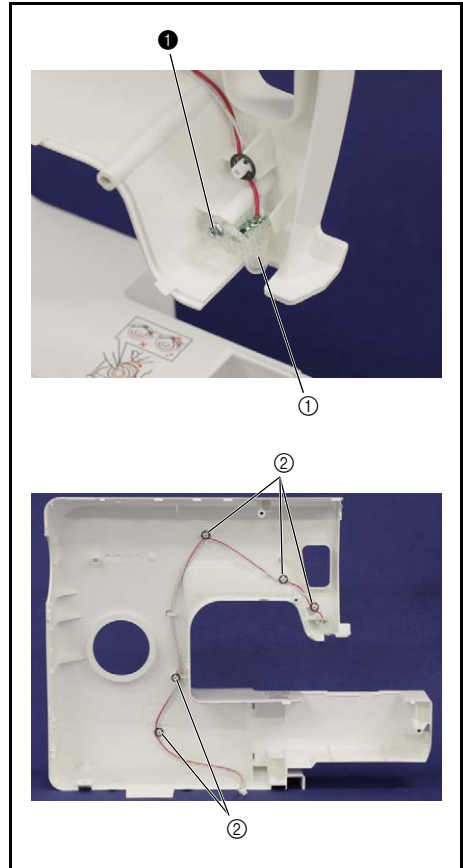
1. Remove the screw ❶, and then remove the face plate cutter holder ❶ from the face plate assy.
2. Remove the NT lower thread cutter ❷ from the face plate assy.



## 2 Disassembly of Front cover assy

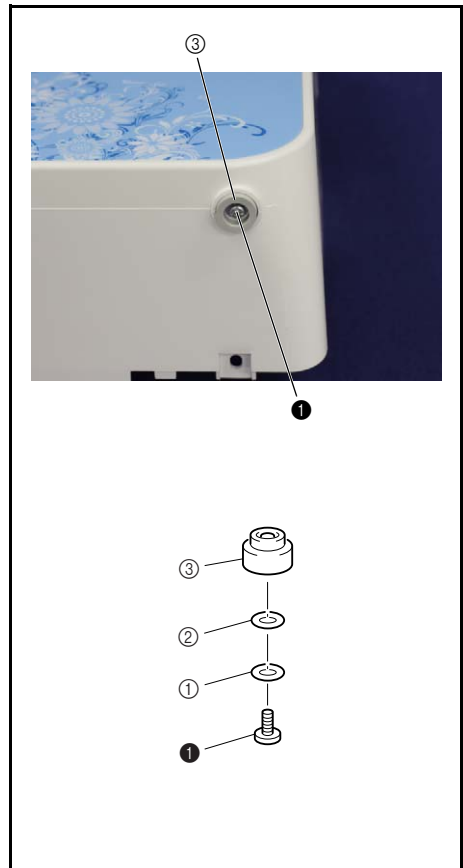
### 2-1 Removal of LED lamp supply assy

1. Remove the screw ❶, and then remove the LED lamp supply assy ❶.
2. Remove the 5 retaining rings, CS4 ❷.



### 2-2 Removal of Rubber cushion A

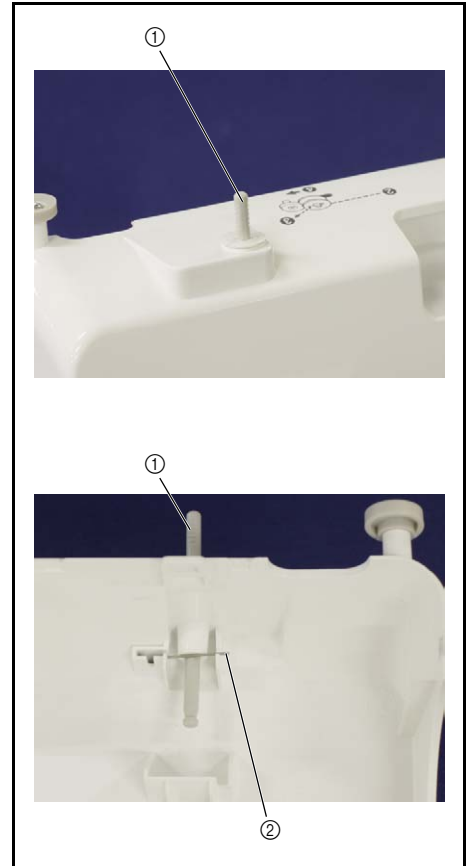
1. Remove the screw ❶, and then remove the washer plain M3.5 ❷, the washer ❸ and the rubber cushion A ❸.



### 3 Disassembly of Rear cover assy

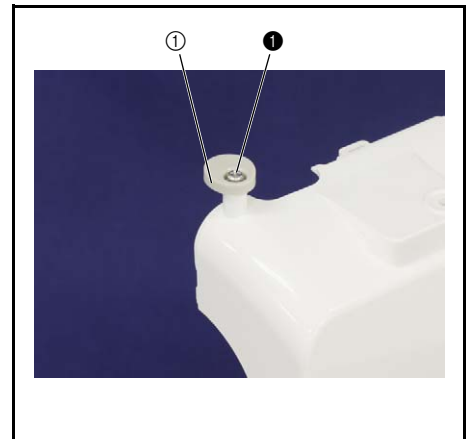
#### 3-1 Removal of Spool pin

1. Remove the spool pin ① while pulling the spool pin spring ②.
2. Remove the spool pin spring ②.



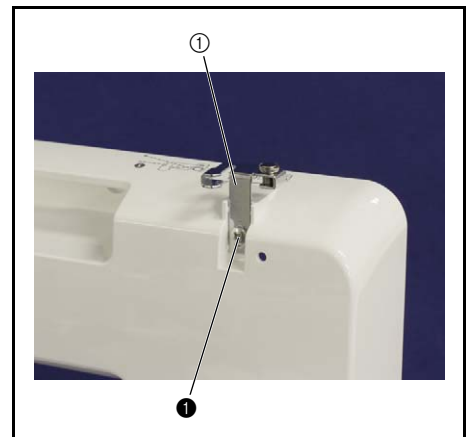
#### 3-2 Removal of Bobbin presser

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

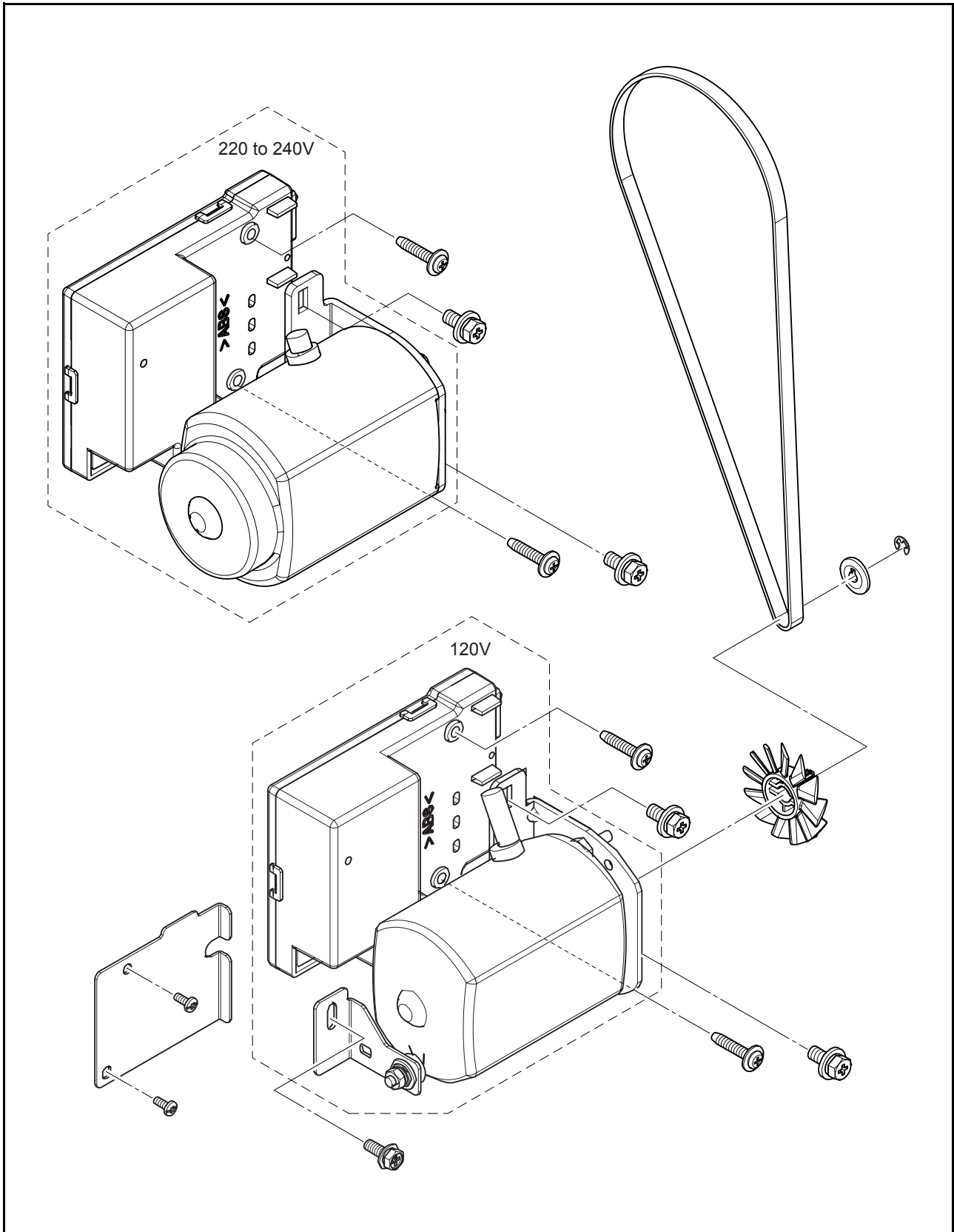


#### 3-3 Removal of Thread guide assy

1. Remove the screw ①, and then remove the thread guide assy ①.



Main motor unit location diagram

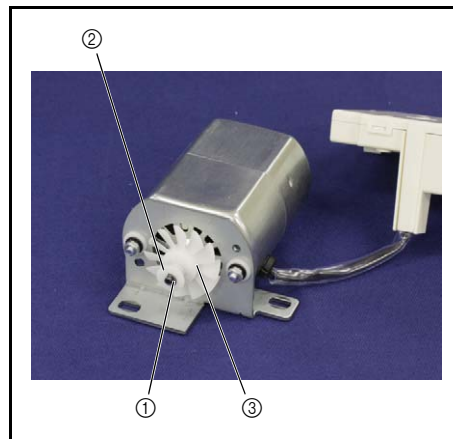


Application

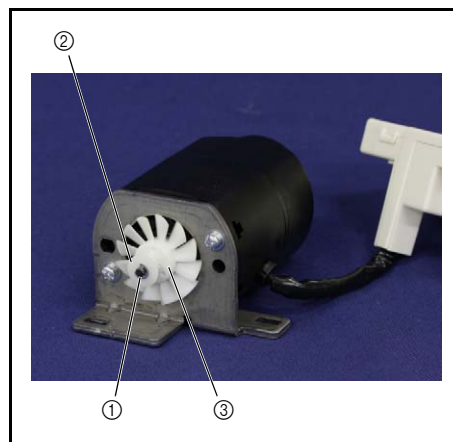
Application

**1** Disassembly of Motor 3P supply assy**■ 120V specification**

1. Remove the retaining ring E3 ①, and then remove the frange ② and the motor T-pulley ③.

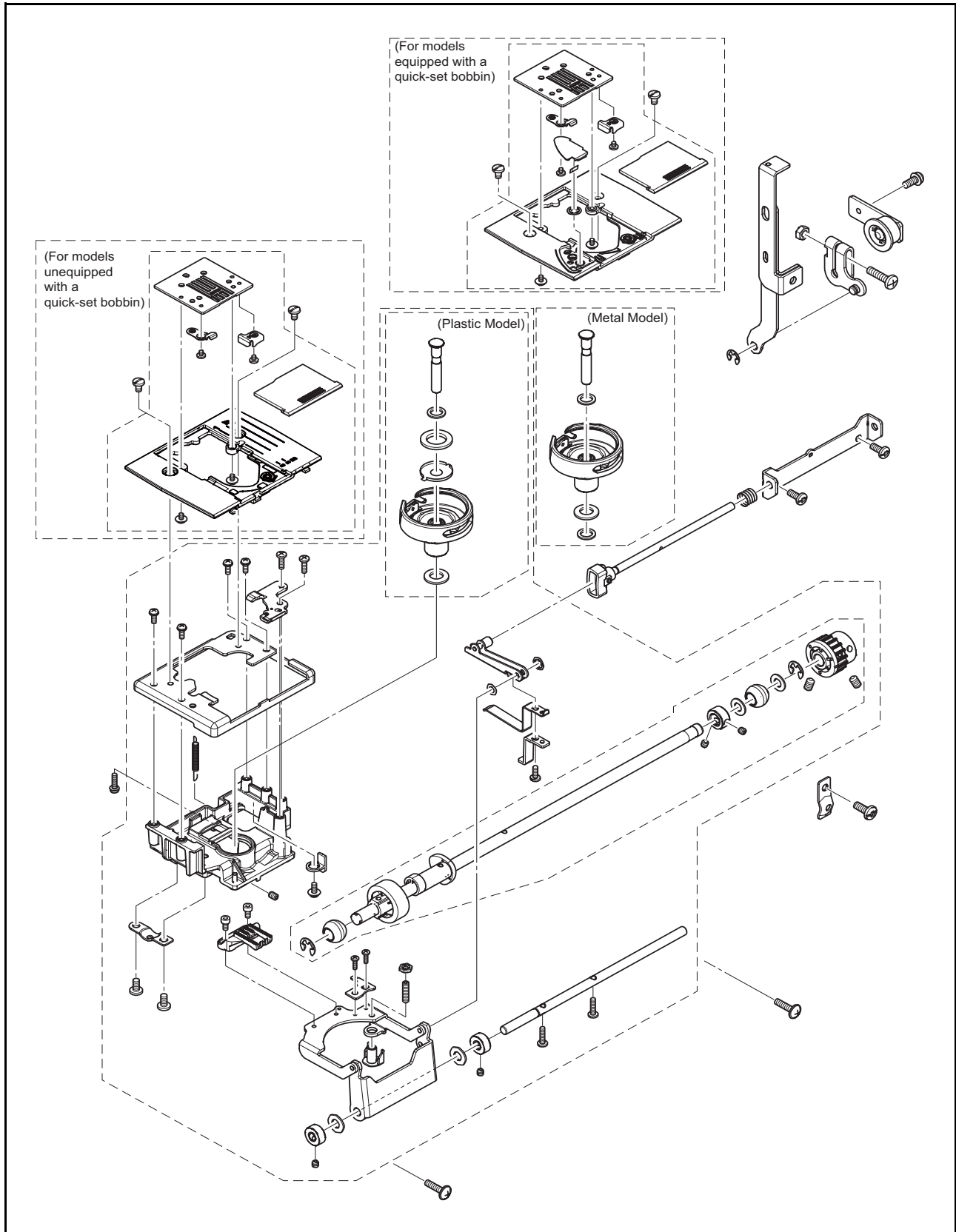
**■ 220 to 240V specification**

1. Remove the retaining ring E3 ①, and then remove the frange ② and the motor T-pulley ③.





Feed unit location diagram

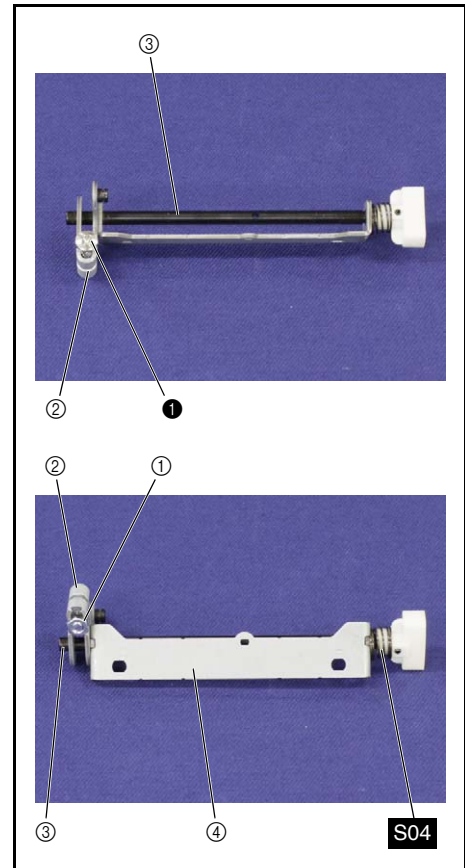


Application

Application

## 1 Disassembly of Feed adjuster assy

1. Remove the screw ❶ and the nut 2 M4 ❷ from the feed connecting lever assy ❸.
2. Pull out the feed connecting lever assy ❸ from the shaft of feed adjuster sub assy ❹.
3. Pull out the feed adjuster sub assy ❹ to remove the spring S04 from the feed adjusting shaft holder ❺.



## 2 Disassembly of Feed module

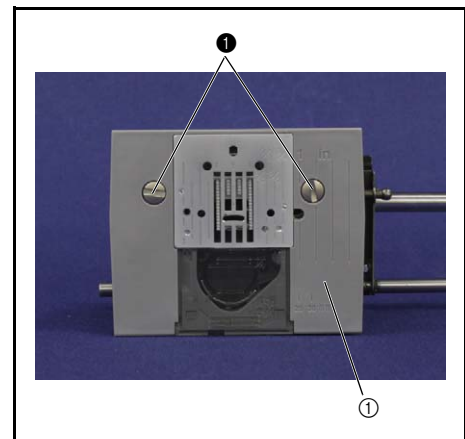
### 2-1 Disassembly of Needle plate assy

#### ■ For models unequipped with a quick-set bobbin

<In case of models equipped with a quick-set bobbin, refer to "3 - 11".>

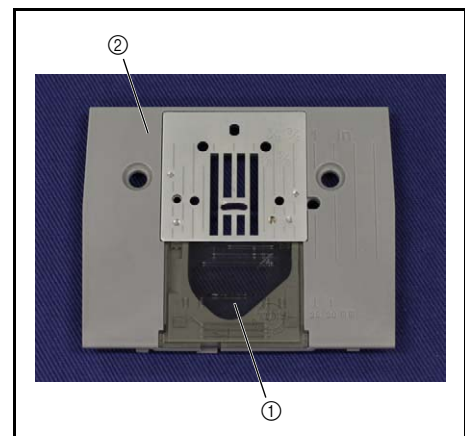
#### 2-1-1 Removal of Needle plate assy

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



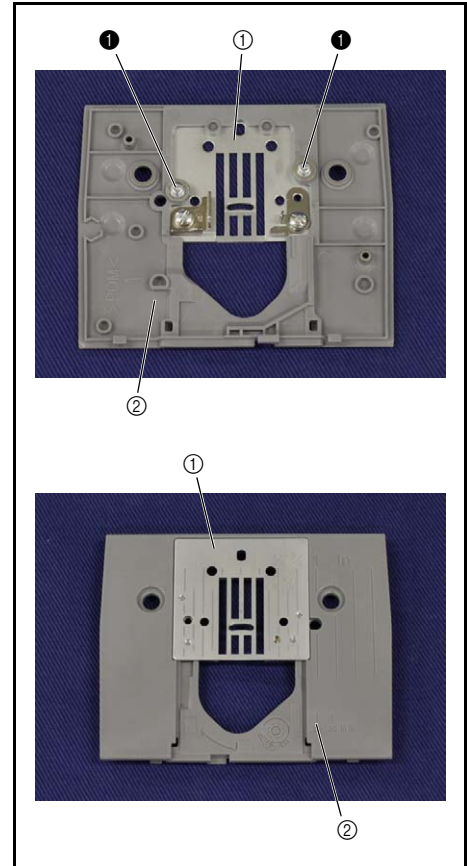
#### 2-1-2 Removal of Slide plate

1. Remove the slide plate ❶ from the needle plate assy ❷.



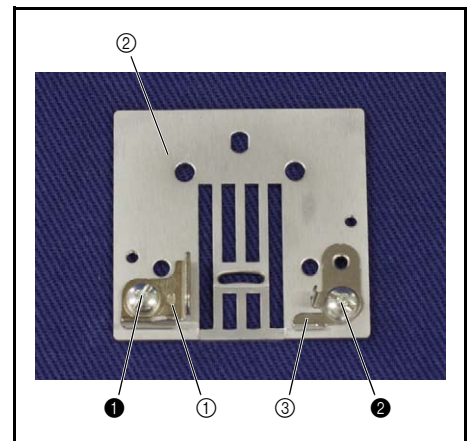
## 2-1-3 Removal of Needle plate A

1. Remove the 2 screws ❶, and then remove the needle plate A ❶ from the needle plate B ❷.



## 2-1-4 Removal of Stopper plate R/M

1. Remove the screw ❶, and then remove the stopper plate R ❶ from the needle plate A ❷.
2. Remove the screw ❷, and then remove the stopper plate M ❸ from the needle plate A ❷.

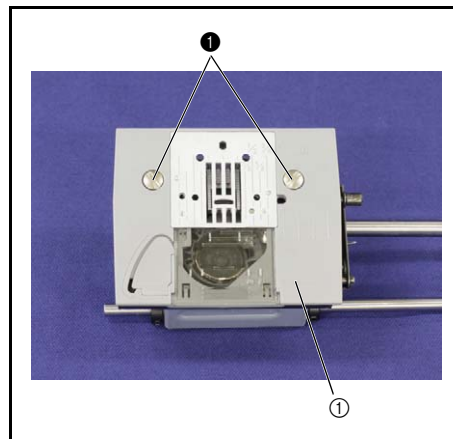


**■ For models equipped with a quick-set bobbin**

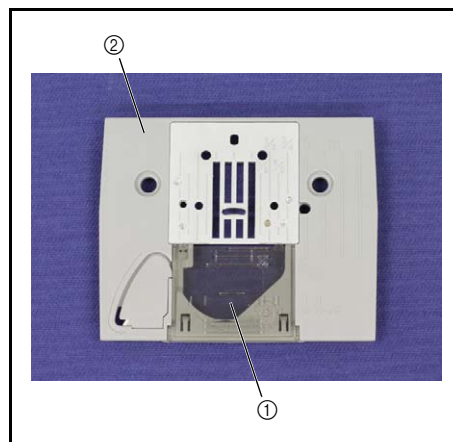
<In case of models unequipped with a quick-set bobbin, refer to “3 - 9”.>

**2-1-1 Removal of Needle plate assy**

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

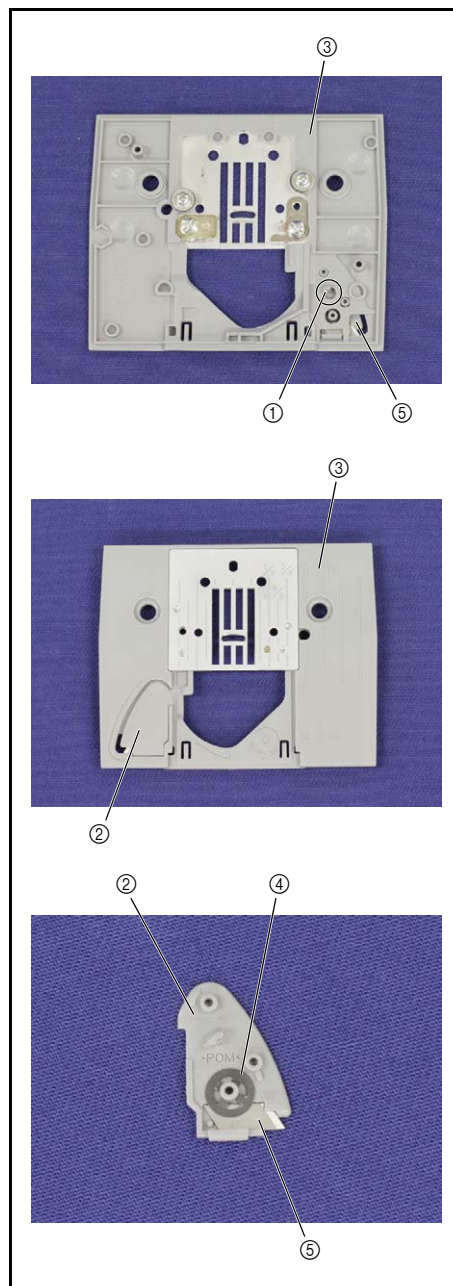
**2-1-2 Removal of Slide plate**

1. Remove the slide plate ❶ from the needle plate assy ❷.



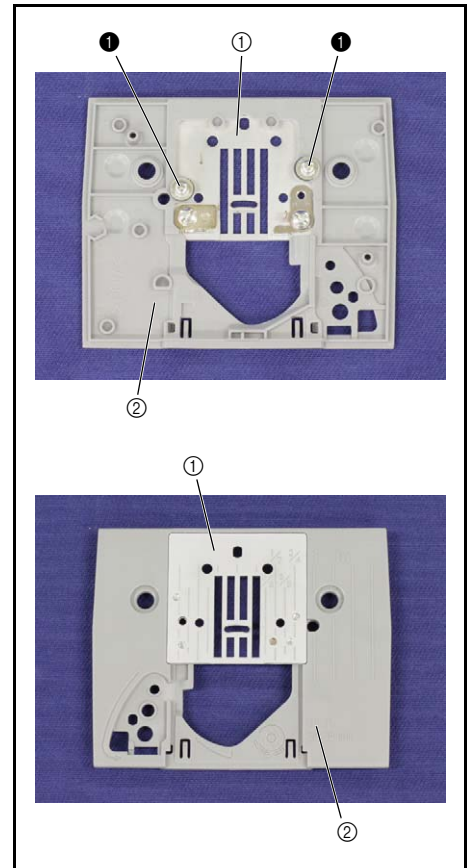
## 2-1-3 Removal of NT lower thread cutter

1. Release the hook ① to remove the cutter cover ② from the needle plate B ③.
2. Remove the retaining ring CS3 ④, and then remove the NT lower thread cutter ⑤ from the cutter cover ②.



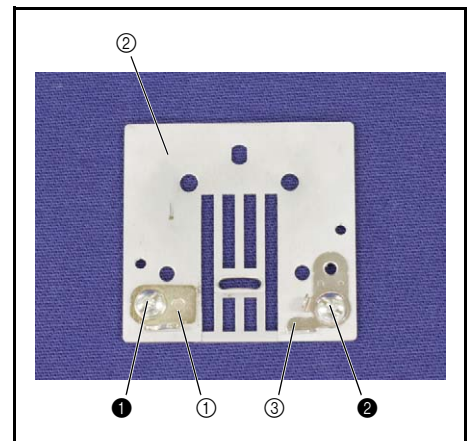
## 2-1-4 Removal of Needle plate A

1. Remove the 2 screws ❶, and then remove the needle plate A ❶ from the needle plate B ❷.



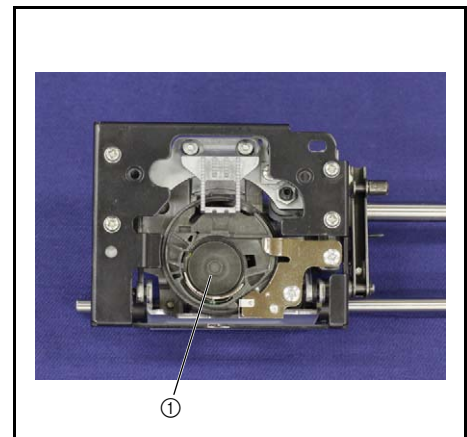
## 2-1-5 Removal of Stopper plate R/M

1. Remove the screw ❶, and then remove the stopper plate R ❶ from the needle plate A ❷.
2. Remove the screw ❷, and then remove the stopper plate M ❸ from the needle plate A ❷.



## 2-2 Removal of Inner rotary hook assy

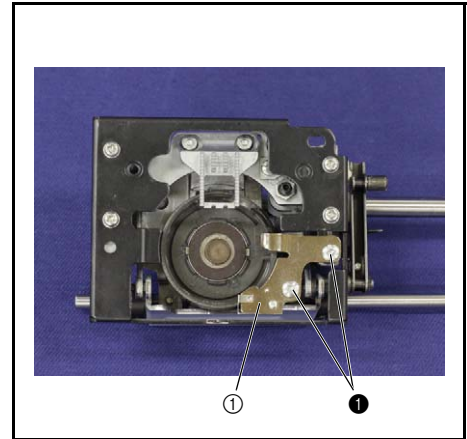
1. Remove the inner rotary hook assy ❶.





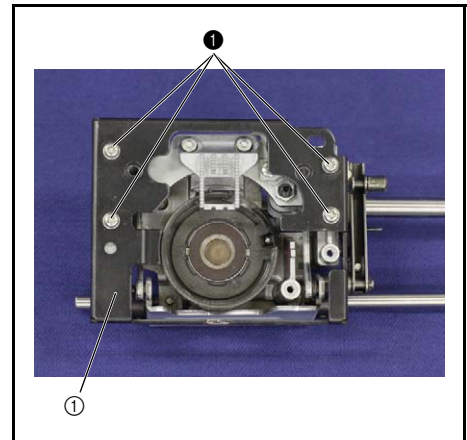
### 2-3 Removal of Inner rotary hook plate assy

1. Remove the 2 screws ❶, and then remove the inner rotary hook plate assy ❶.



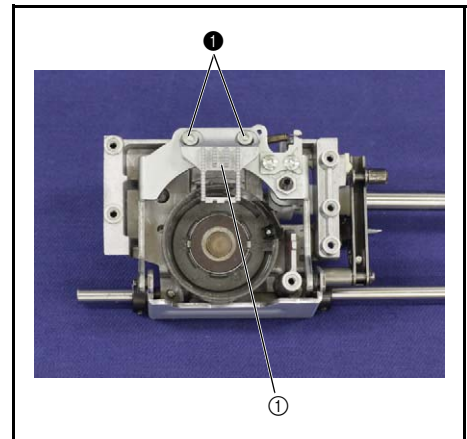
### 2-4 Removal of Base plate

1. Remove the 4 screws ❶, and then remove the base plate ❶.



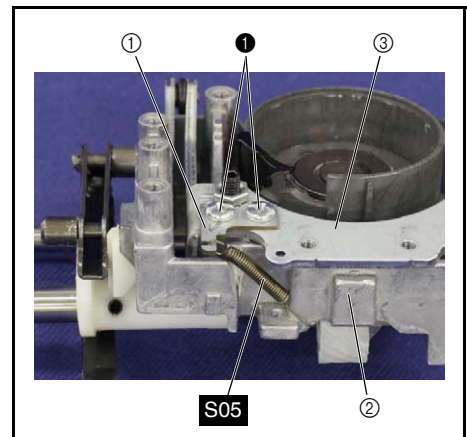
### 2-5 Removal of Feed dog

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



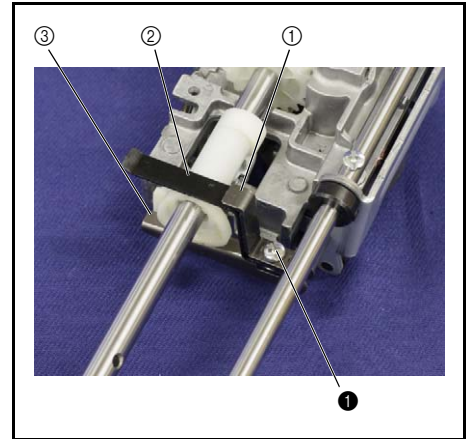
### 2-6 Removal of Feed stand supporter

1. Remove the spring **S05** from the feed stand supporter ❶ and the feed holder ❷.
2. Remove the 2 screws ❶, and then remove the feed stand supporter ❶ from the feed stand sub assy ❸.



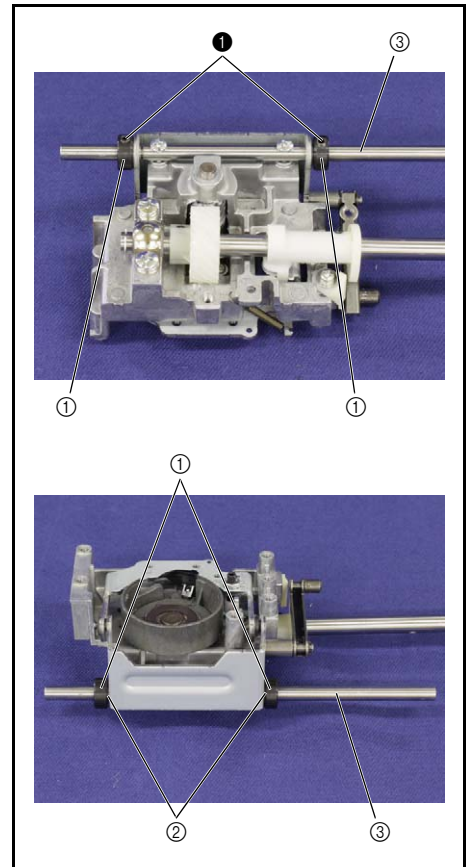
### 2-7 Removal of Feed supporting plate

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



### 2-8 Removal of Set screw collar

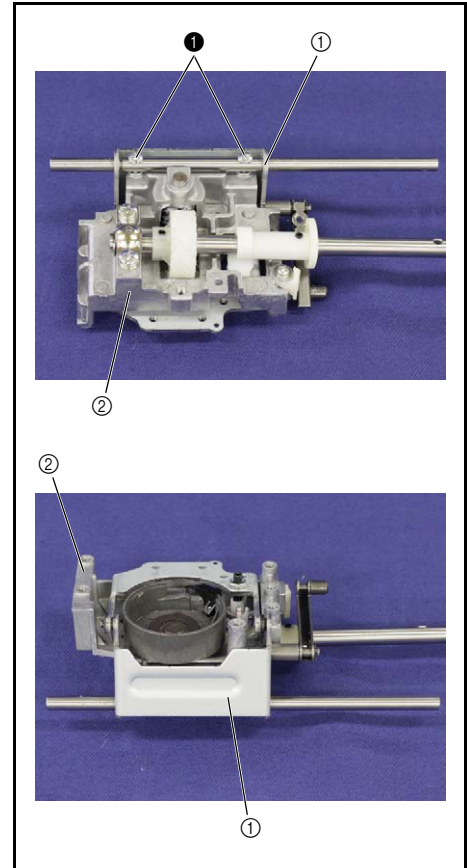
1. Remove the screw ①, and then remove the set screw collar ① and the washer thrust ② from the horizontal feed shaft ③ (2 locations).





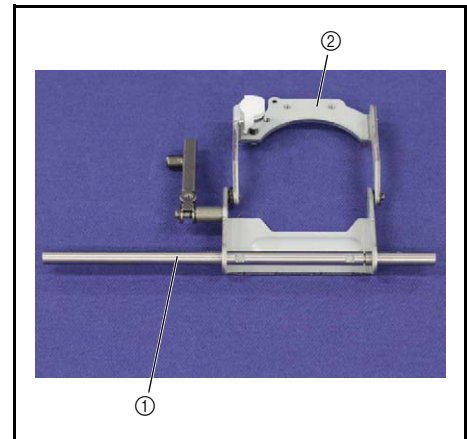
### 2-9 Removal of Feed stand sub assy

1. Remove the 2 screws ❶, and then remove the feed stand sub assy ❶ from the feed holder ❷.



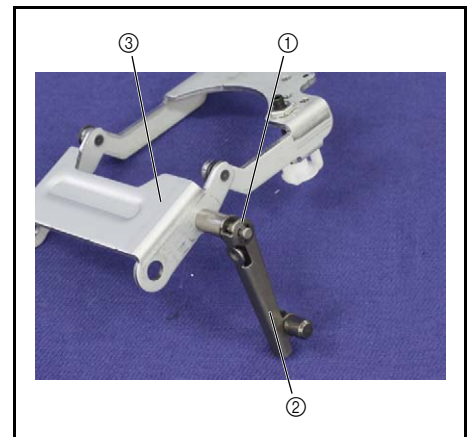
### 2-10 Removal of Horizontal feed shaft

1. Remove the horizontal feed shaft ❶ from the feed stand sub assy ❷.



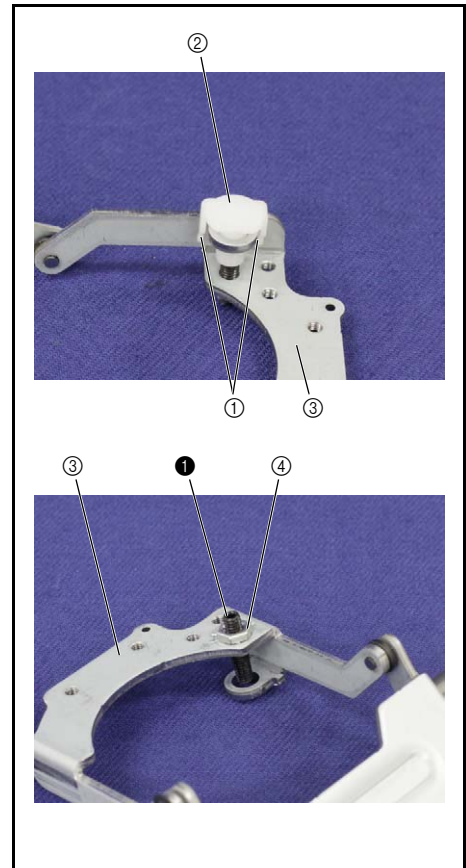
### 2-11 Removal of Feed arm assy

1. Remove the retaining ring CS4 ❶, and then remove the feed arm assy ❷ and the polyester slider from the shaft of the feed stand sub assy ❸.



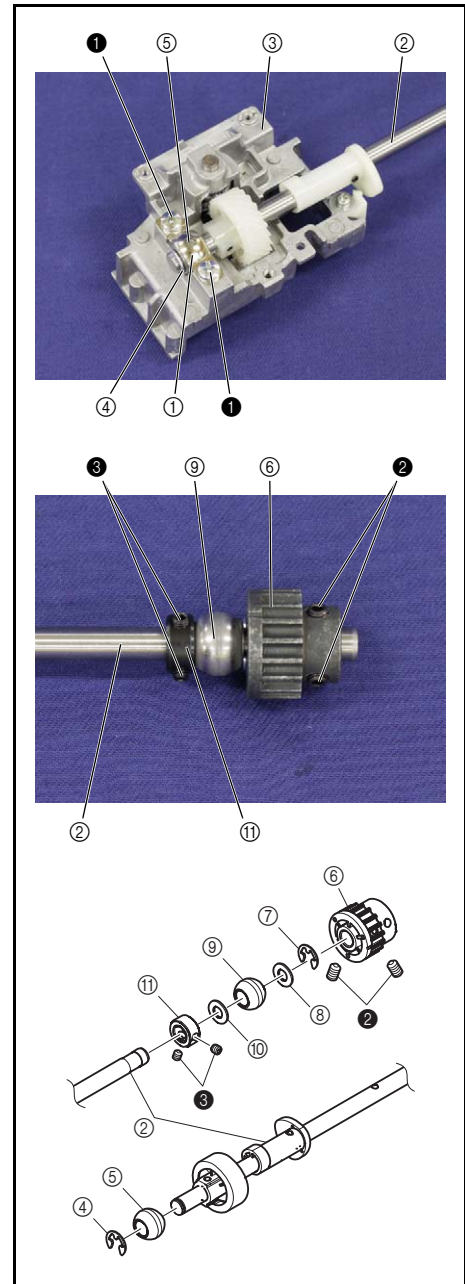
## 2-12 Removal of V feed attachment

1. Release the 2 hooks ① to remove the V feed attachment ② from the feed stand sub assy ③.
2. Remove the lock nut ④, and then remove the screw ① from the feed stand sub assy ③.



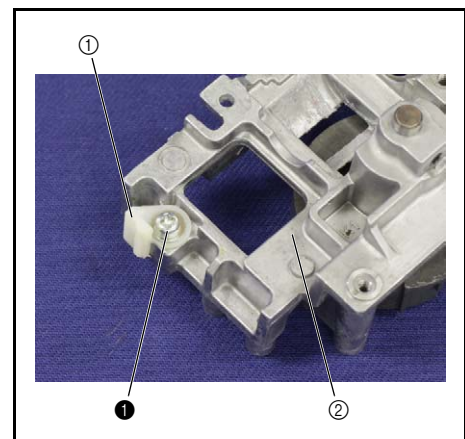
## 2-13 Removal/Disassembly of Lower shaft assy

1. Remove the 2 screws ①, and then remove the bushing presser ① and the lower shaft assy ② from the feed holder ③.
2. Remove the retaining ring E6 ④, and then remove the lower shaft bushing ⑤ from the lower shaft assy ②.
3. Remove the 2 screws ②, and then remove the timing pulley D ⑥ from the lower shaft assy ②.
4. Remove the retaining ring E6 ⑦, and then remove the washer thrust ⑧, the lower shaft bushing ⑨ and the washer thrust ⑩ from the lower shaft assy ②.
5. Remove the 2 screws ③, and then remove the set screw collar ⑪ from the lower shaft assy ②.



## 2-14 Removal of Feed arm supporter

1. Remove the screw ①, and then remove the feed arm supporter ① from the feed holder ②.

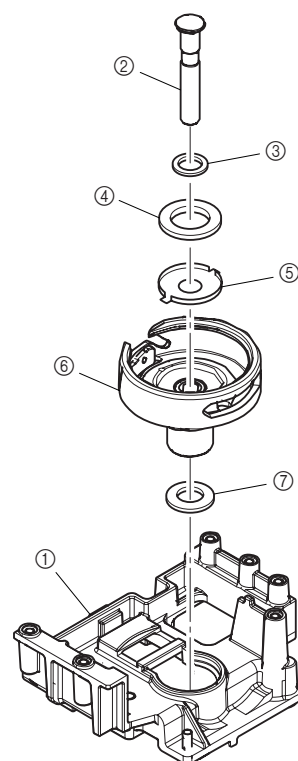
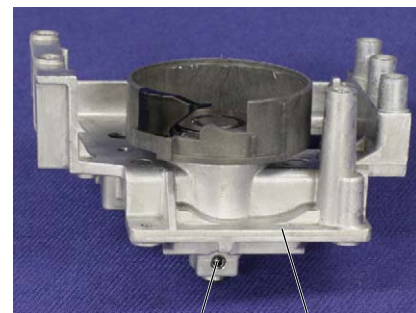


## 2-15 Removal of Outer rotary hook assy

## ■ Plastic model

1. Remove the screw ❶ from the feed holder ❶.
2. Pull out the outer rotary hook shaft ❷ to remove the washer ❸, the magnet ❹, the washer ❺, the outer rotary hook assy ❻ and the washer thrust ❼ from the feed holder ❶.

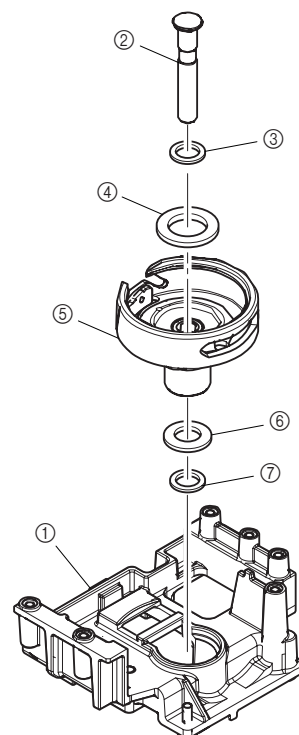
<In case of metal model, refer to next page.>



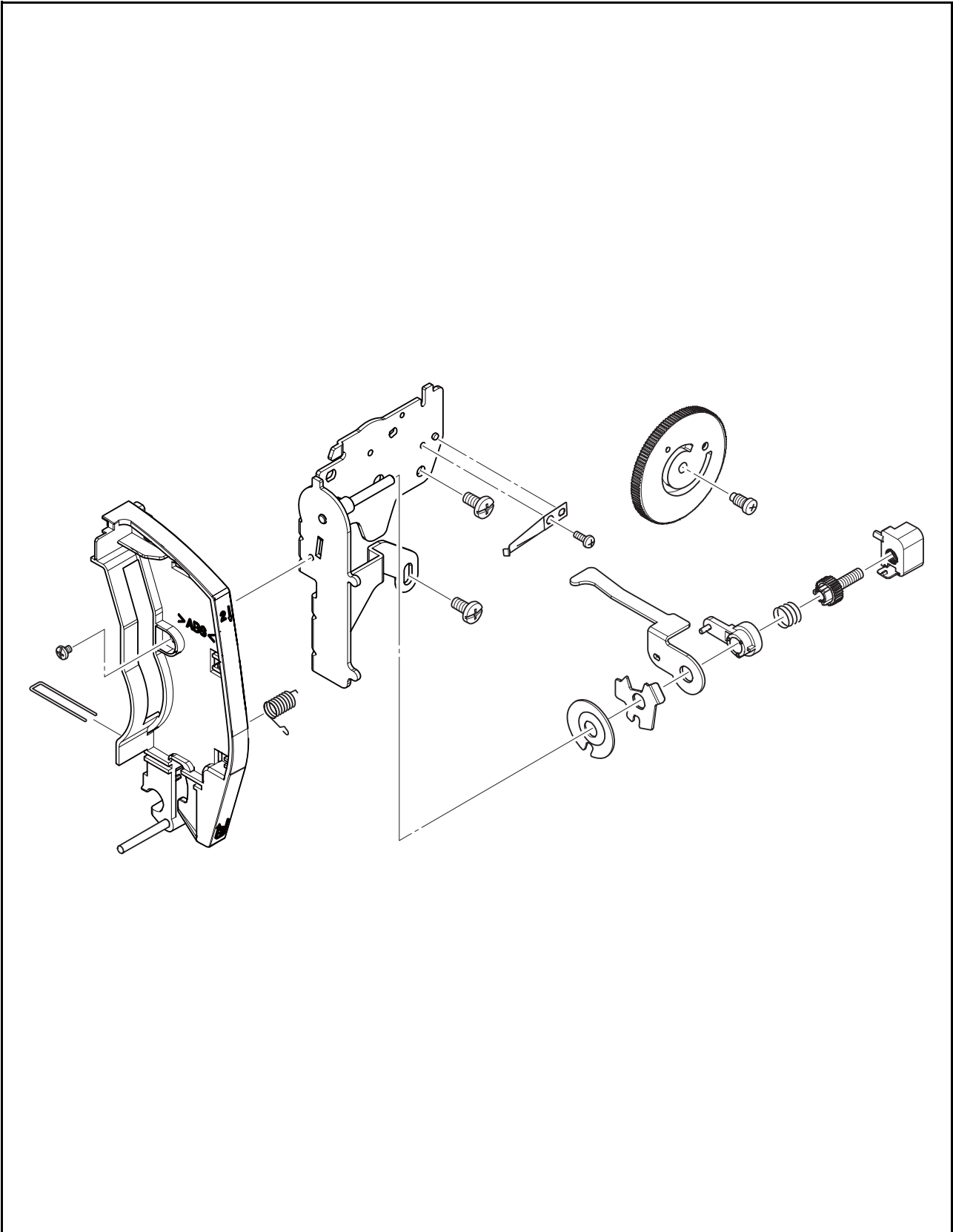
**■ Metal model specification**

1. Remove the screw ❶ from the feed holder ❶.
2. Pull out the outer rotary hook shaft ❷ to remove the spacer ❸, the magnet ❹, the outer rotary hook assy ❺, the washer ❻ and the spacer ❼ from the feed holder ❶.

<In case of plastic model, refer to previous page.>



Needle threading mechanism location diagram



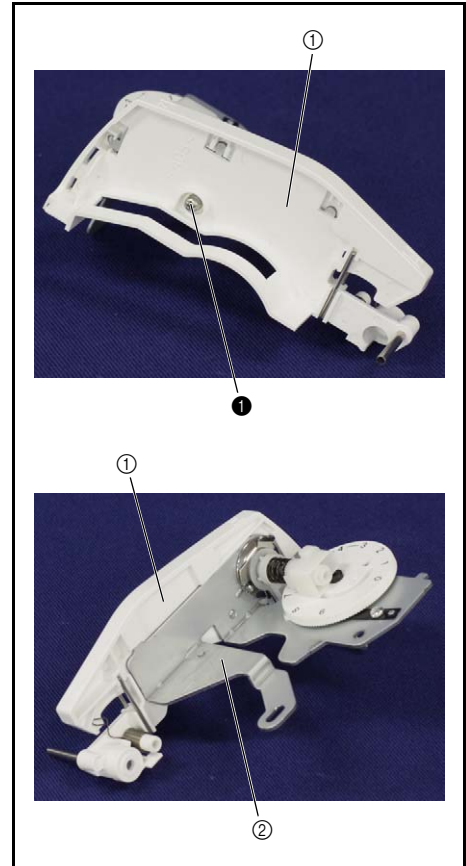
Application

Application

## 1 Disassembly of Needle threading unit

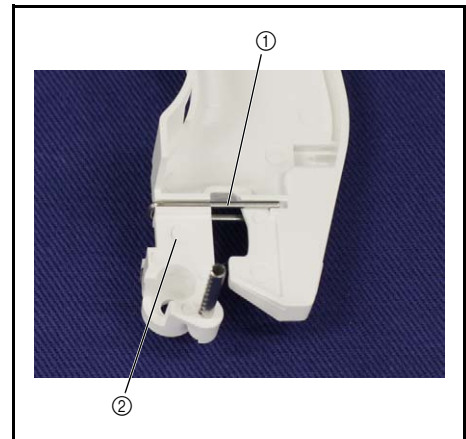
### 1-1 Removal of Thread guard cover assy

1. Remove the screw ①, and then remove the thread guard cover assy ① from the thread guard assy ②.



### 1-2 Removal of Thread guide wire

1. Remove the thread guide wire ① from the thread guard cover assy ②.



### 1-3 Removal of Thread take up spring

1. Remove the spring S06 from the thread guard cover assy ①.





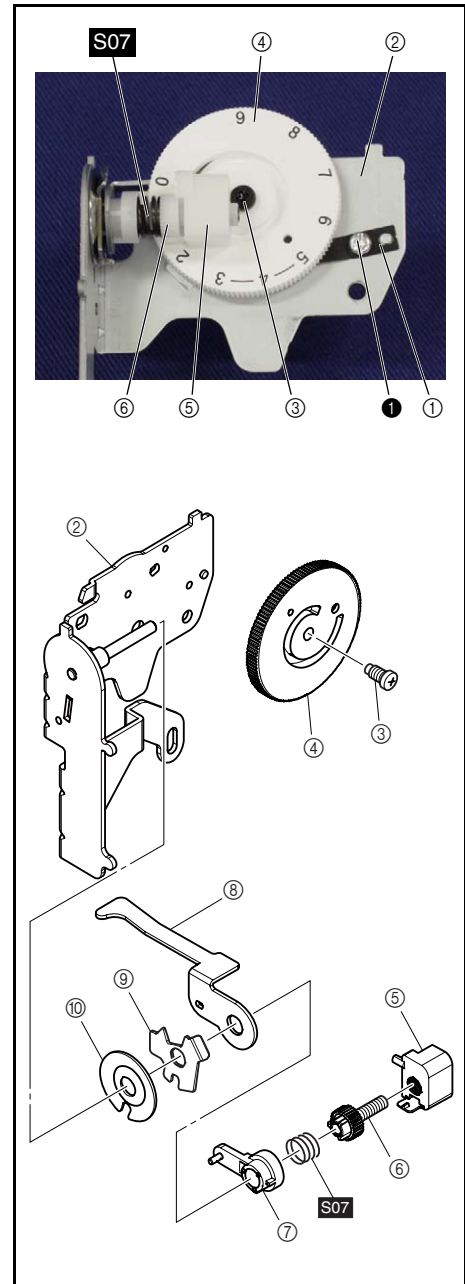
## 1-4 Disassembly of Thread guard assy

1. Remove the screw ❶, and then remove the notched spring ❶ from the thread tension holder assy ❷.
2. Remove the tension dial shaft ❸, and then remove the thread tension dial ❹ and the thread tension nut ❺ from the shaft of the thread tension holder assy ❷.

**\*Key point**

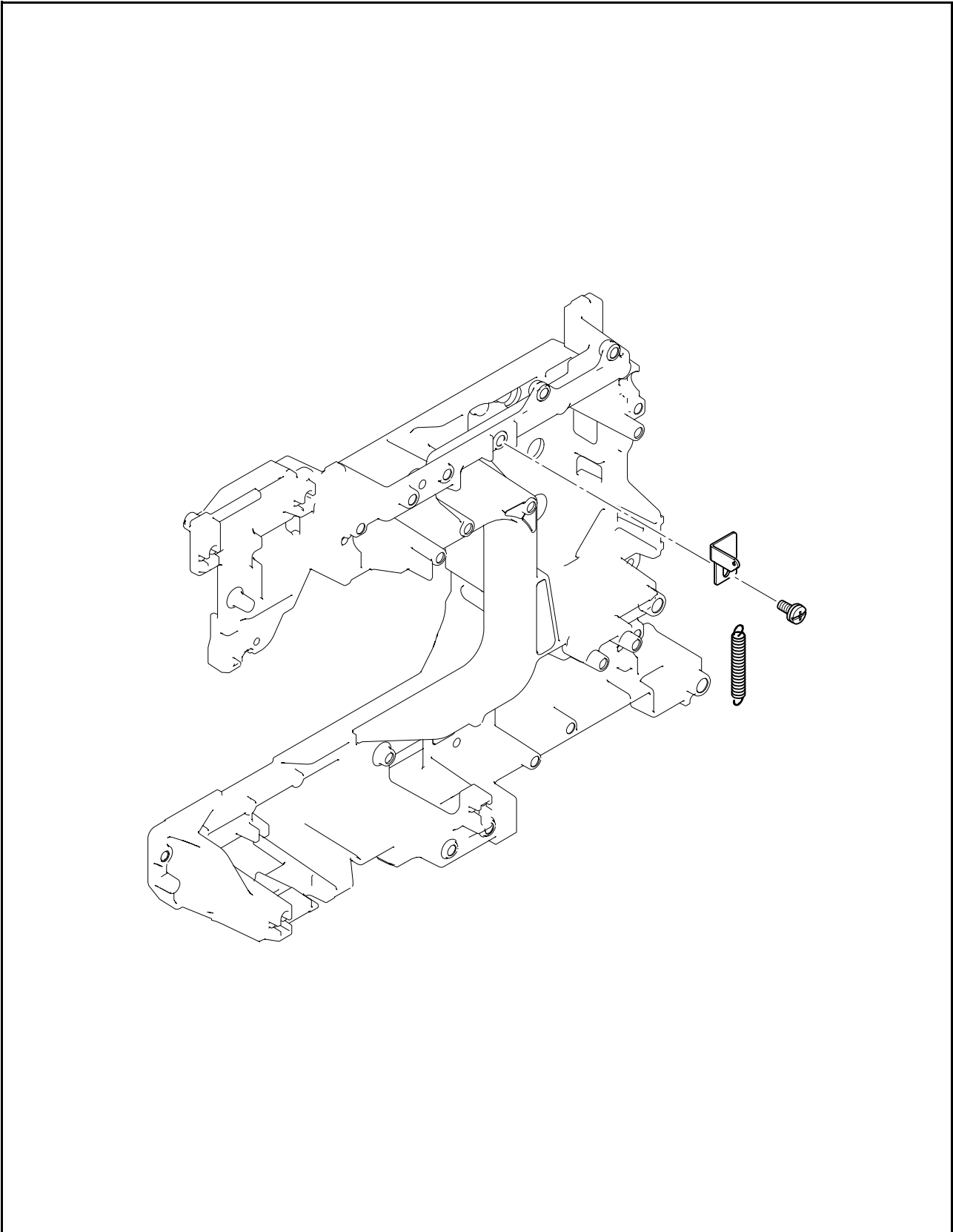
- Turn the thread tension dial ❹ until see the tension dial shaft ❸ by feeding the thread tension nut ❺ to the left side.

3. Remove the thread tension adjusting screw ❻ from the thread tension nut ❺.
4. Remove the spring S07, the spring holder ❼, the tension release plate ❸, the tension plate ❾ and the tension disc A ❿ from the shaft of the thread tension holder assy ❷.





Zigzag mechanism location diagram

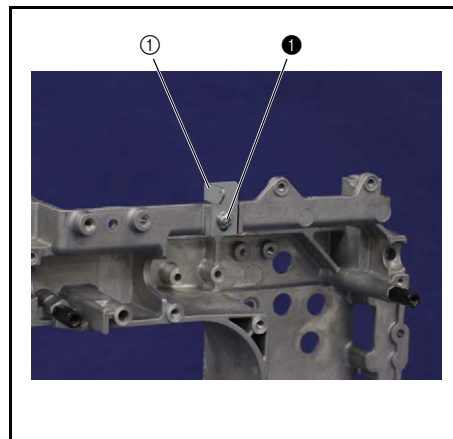


Application

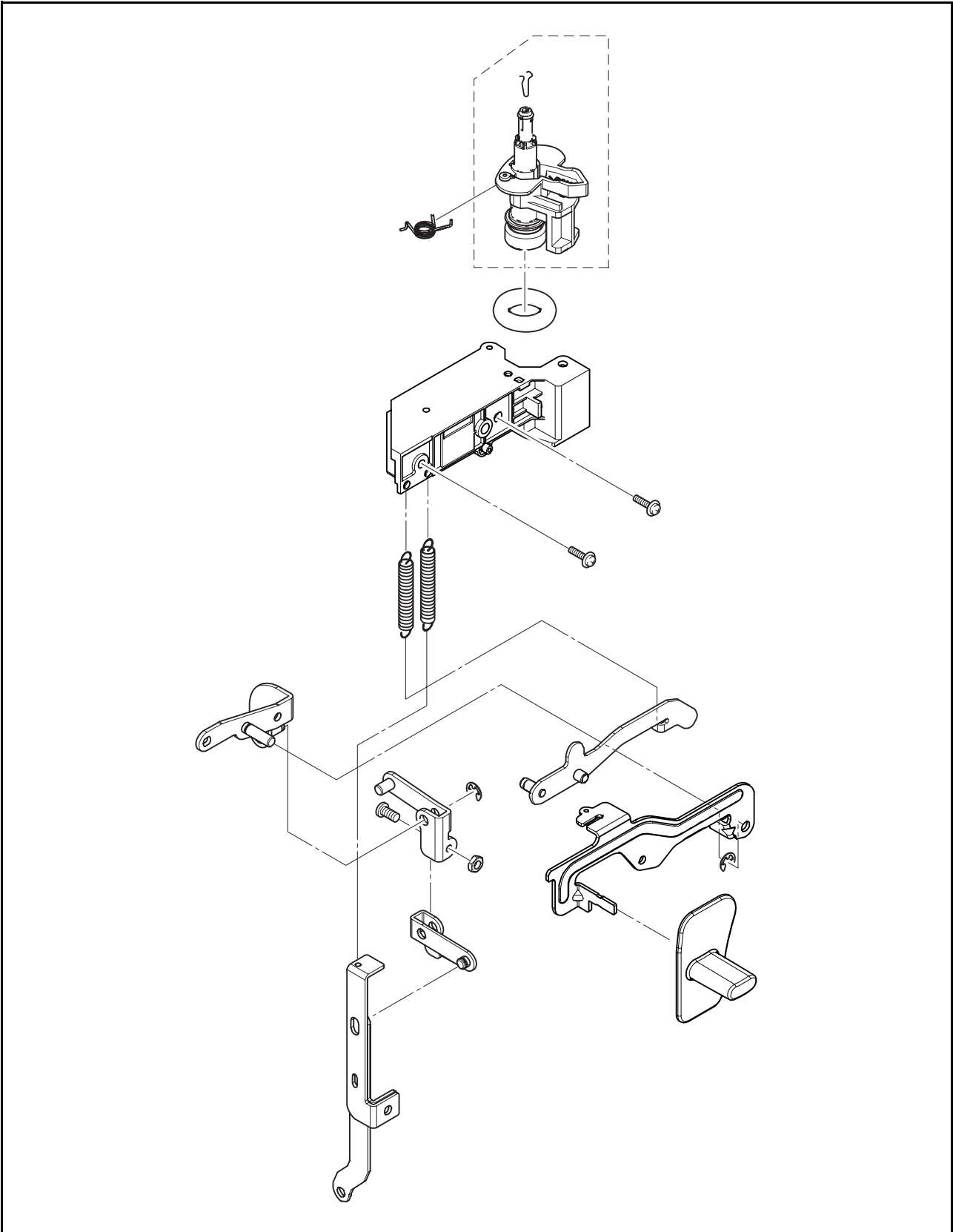
Application

**1** Disassembly of BH adjusting plate

1. Remove the screw ❶, and then remove the BH adjusting plate ❶.



Feed control mechanism location diagram

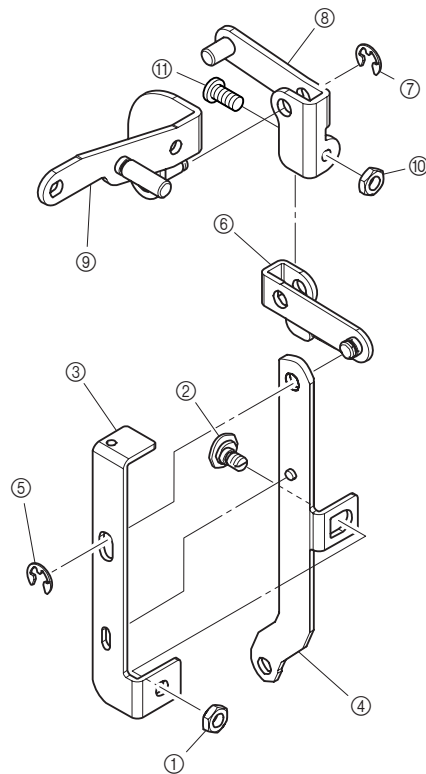
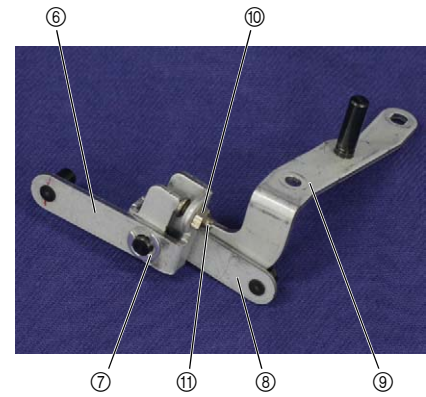
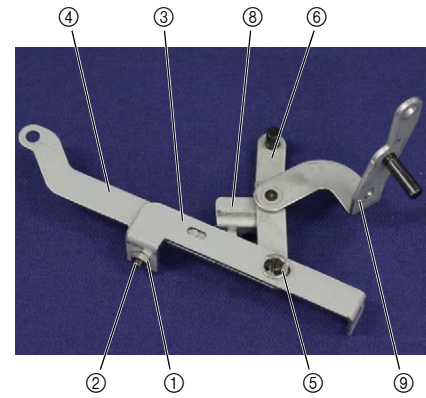


Application

Application

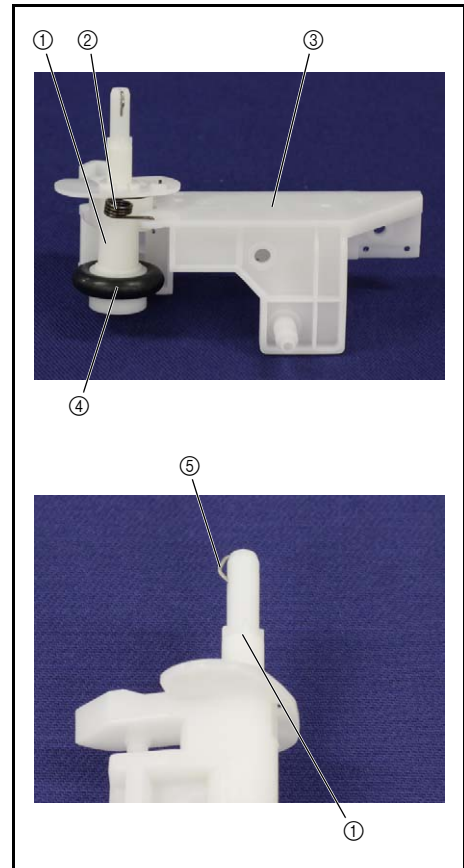
## 1 Disassembly of Lever holder assy

1. Remove the nut 4 ① and the reverse sew adjusting screw ② from the connecting rod U ③ and connecting rod D ④.
2. Remove the retaining ring E4 ⑤, and then remove the connecting rod U ③ and connecting rod D ④ from the reverse sewing lever C assy ⑥.
3. Remove the retaining ring E4 ⑦, and then remove the reverse sewing lever D assy ⑧ and the reverse sewing lever C assy ⑥ from the lever holder sub assy ⑨.
4. Remove the nut 4 ⑩, and then remove the screw ⑪ from the reverse sewing lever D assy ⑧.

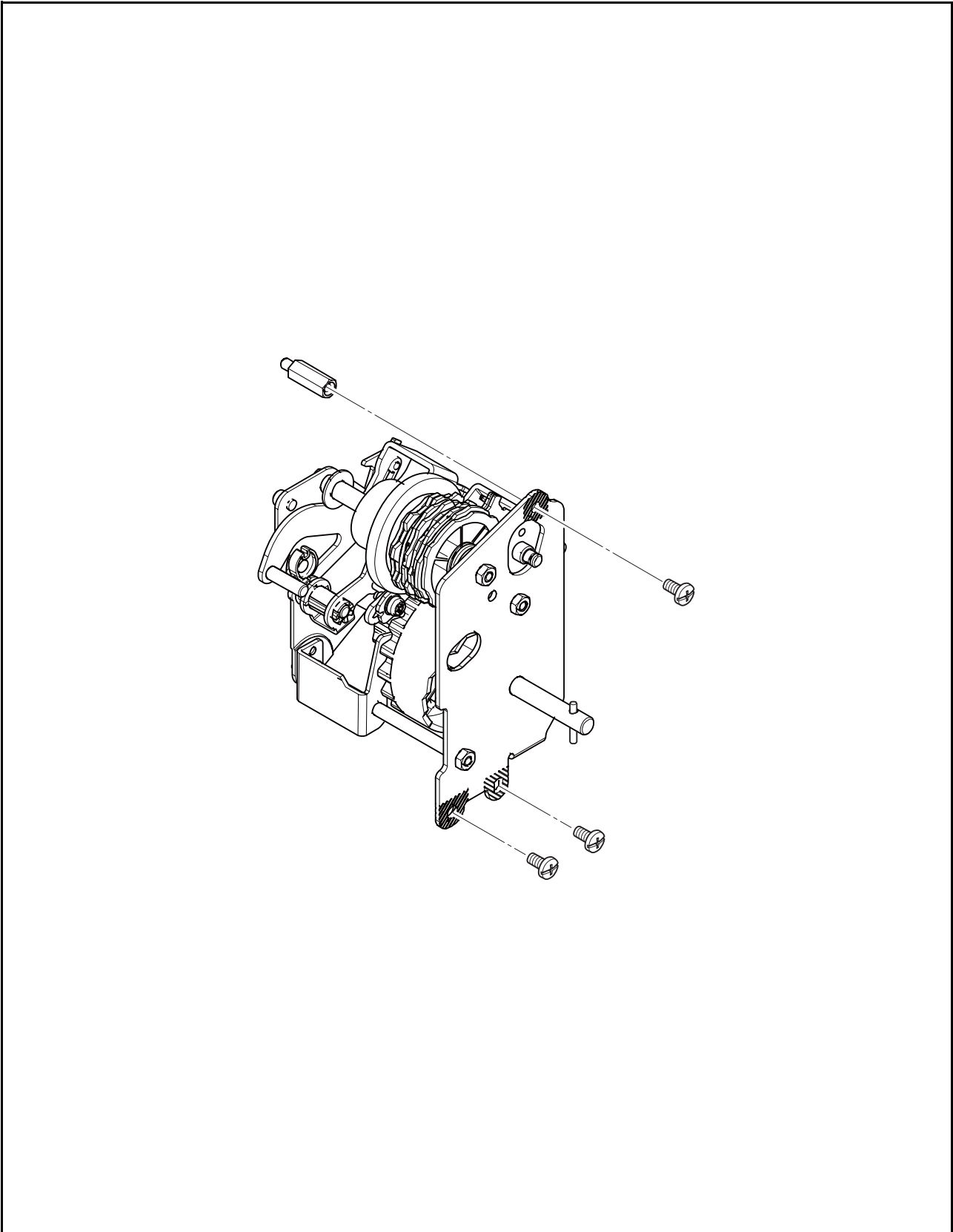


## 2 Disassembly of Feed bracket sub assy

1. Open the bobbin winder assy ①, and then remove the bobbin winder spring ② from the bobbin winder assy ① and the feed bracket sub assy ③.
2. Remove the bobbin winder assy ① from the feed bracket sub assy ③.
3. Remove the bobbin winder rubber band ④ from the bobbin winder assy ①.
4. Remove the bobbin winder shaft spring ⑤ from the bobbin winder assy ①.



Pattern selecting mechanism location diagram

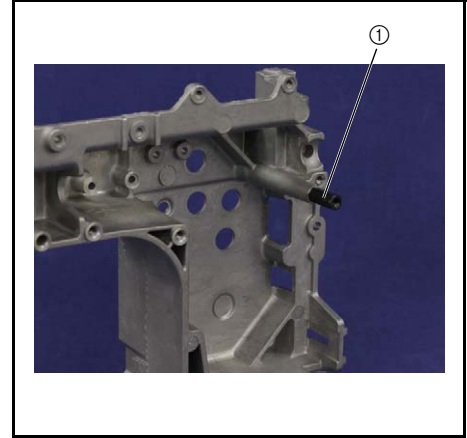


Application

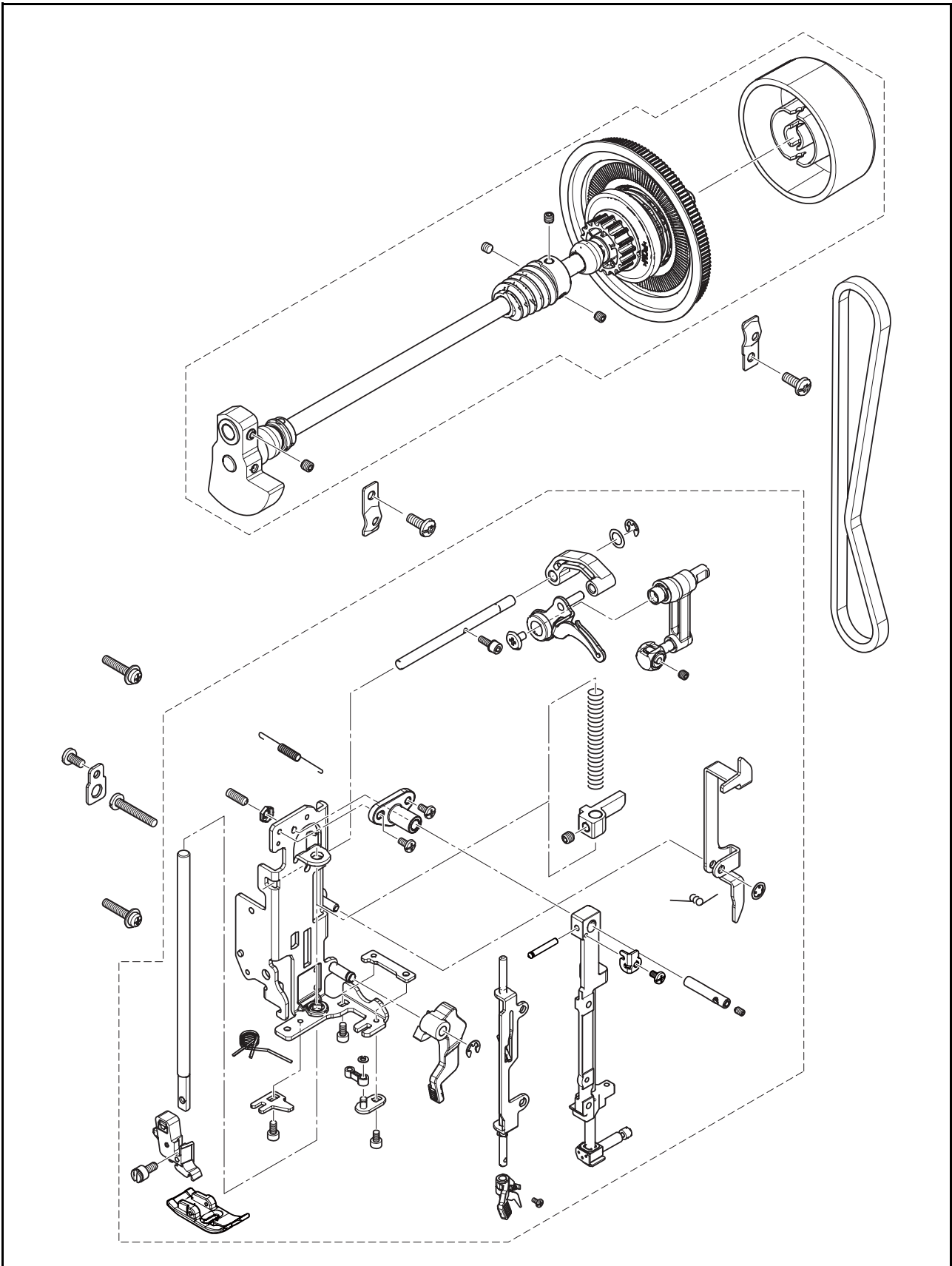
Application

**1** Removal of Hexagon M4x17.5

1. Remove the hexagon M4x17.5 ①.



Upper shaft, Needle bar and Presser foot unit location diagram



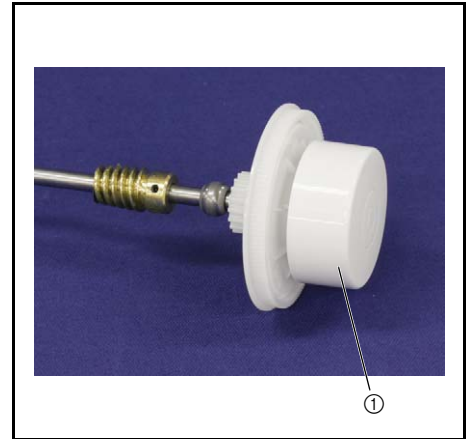
Application

Application

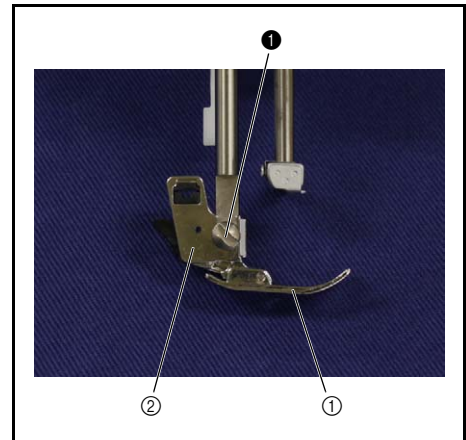


**1** Disassembly of Upper shaft assy

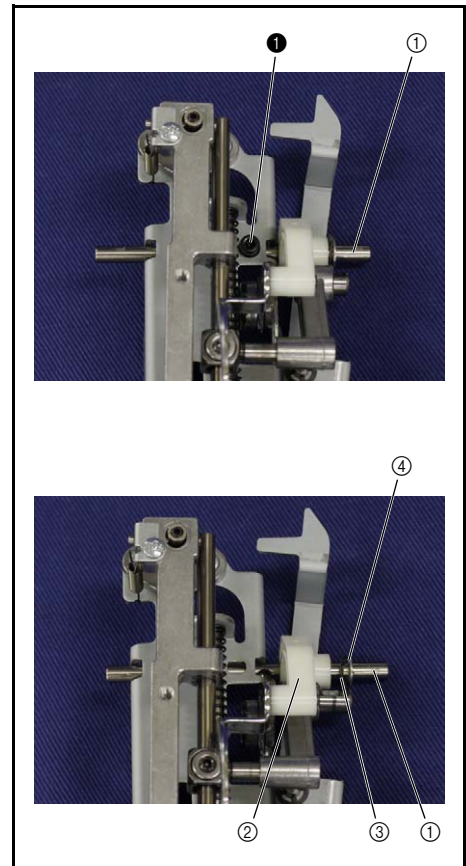
1. Remove the pulley ① from the upper shaft assy.

**2** Disassembly of Needle-presser module**2-1** Removal of Presser foot holder assy

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

**2-2** Removal of Thread take-up lever link

1. Remove the screw ❶, and then pull out the shaft ① to remove the thread take-up lever link ② and the washer, spring ③ from the base holder assy.
2. Remove the retaining ring E4 ④ from the shaft ①.

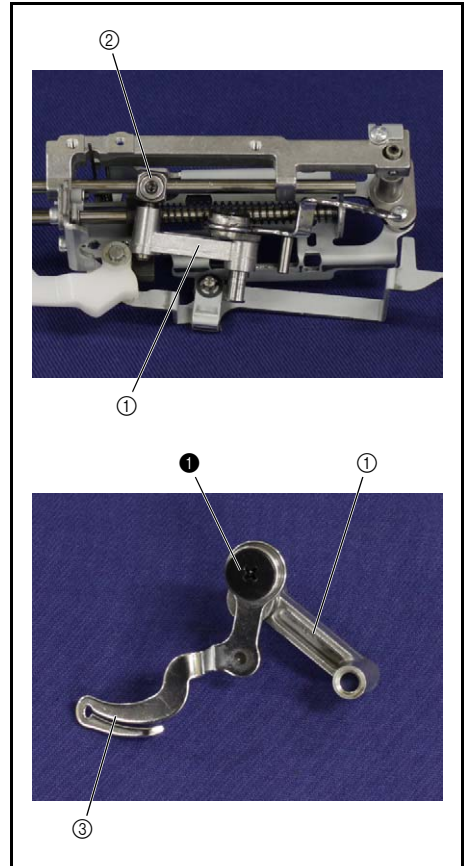


## 2-3 Removal of Needle bar crank rod assy / Thread take-up lever

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

**\*Key point**

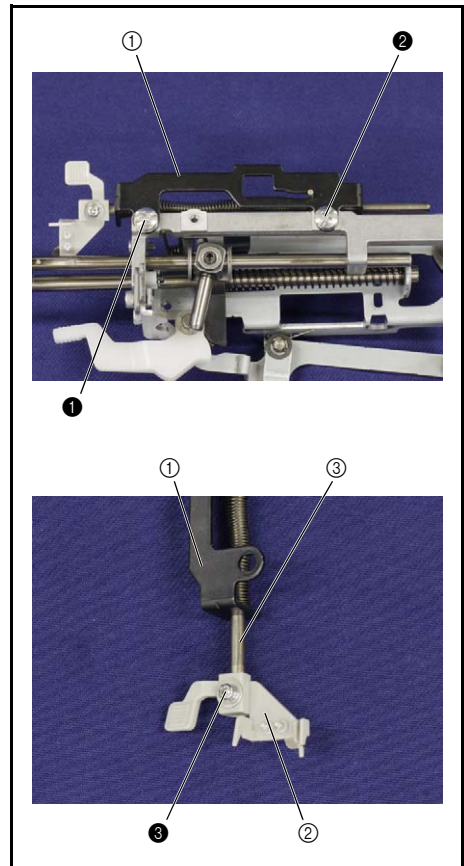
- The screw is reverse threaded.



## 2-4 Removal of Thread guide plate assy

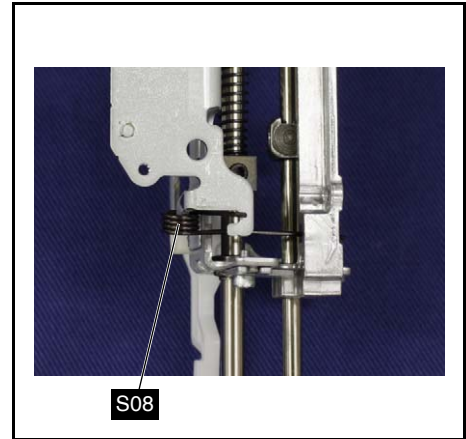
<For models equipped with a needle threader>

1. Remove the screw ❶ and the washer plain.
2. Remove the screw ❷, and then remove the thread guide plate assy ①.
3. Remove the screw ❸, and then remove the needle thread lever assy ② from the thread guide shaft ③ of the thread guide plate assy ①.



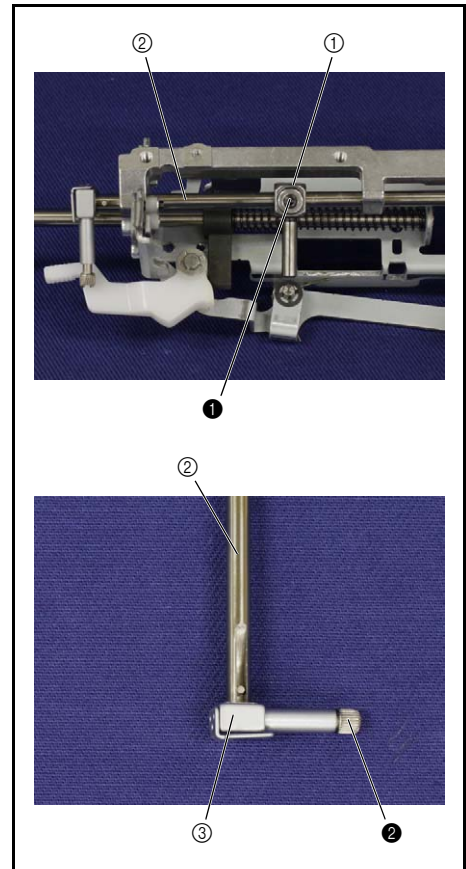
## 2-5 Removal of Spring

1. Remove the spring **S08**.



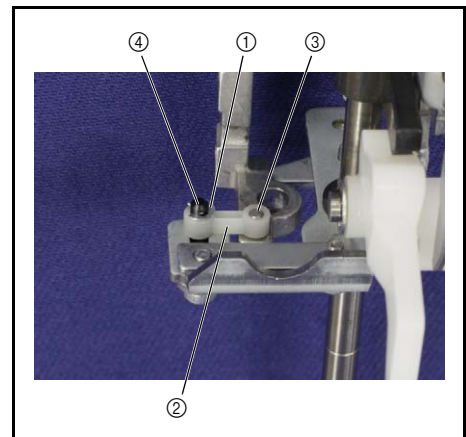
## 2-6 Removal of Needle bar assy N

1. Remove the screw ① from the needle bar block ①.
2. Pull out the needle bar assy N ② to remove the needle bar block ①.
3. Remove the needle clamp screw ② from the needle block ③ of the needle bar assy N ②.



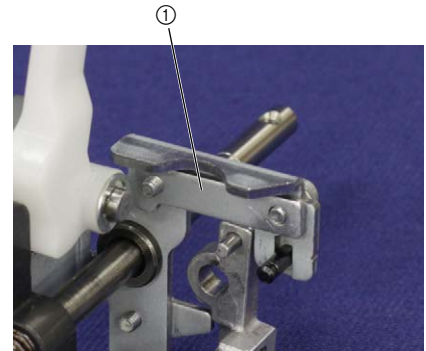
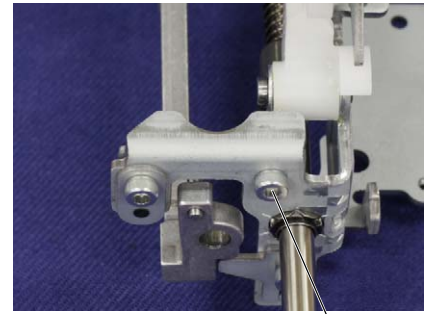
## 2-7 Removal of Needle bar supporter arm

1. Remove the retaining ring E2 ①, and then remove the needle bar supporter arm ② from the shaft of the needle bar supporter assy ③ and the shaft of the needle shaft holder assy ④.



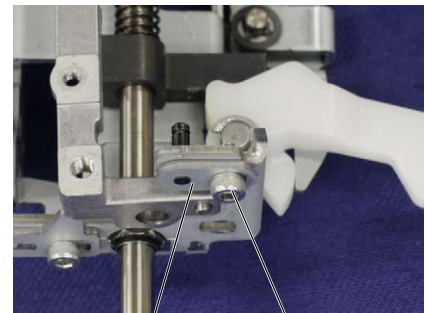
### 2-8 Removal of Stopper plate R

1. Remove the screw ❶, and then remove the stopper plate R ① from the base holder assy.



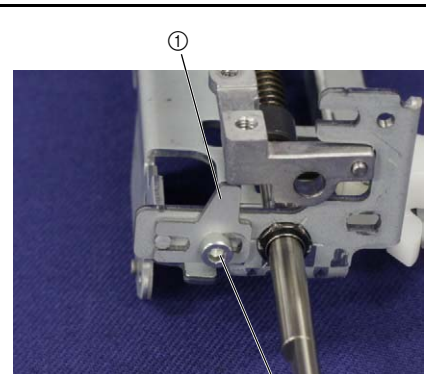
### 2-9 Removal of Needle shaft holder assy

1. Remove the screw ❶, and then remove the needle shaft holder assy ① from the base holder assy.



### 2-10 Removal of Stopper L

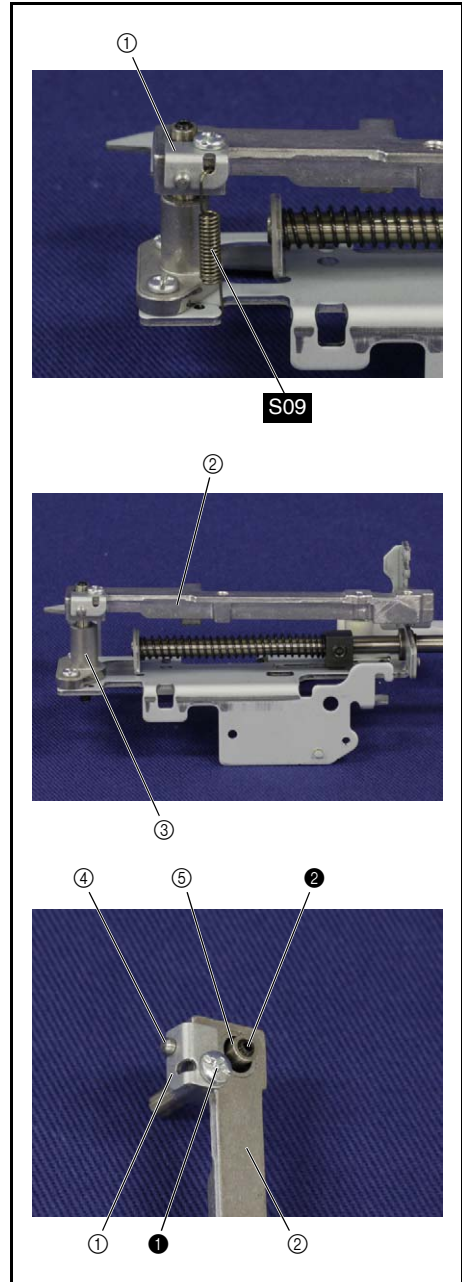
1. Remove the screw ❶, and then remove the stopper L ① from the base holder assy.





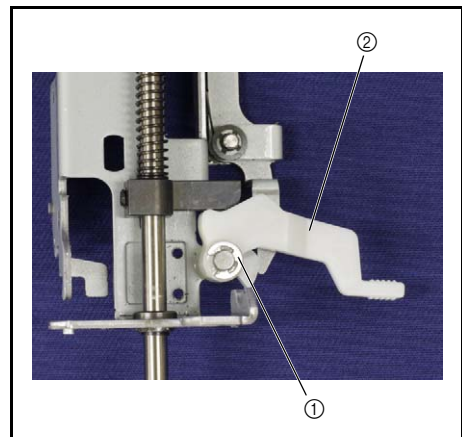
## 2-11 Removal of Needle bar supporter assy

1. Remove the spring **S09** from the plate ① and the base holder assy.
2. Remove the needle bar supporter assy ② from the shaft bushing ③ of the base holder assy.
3. Remove the screw ①, and then remove the plate ① from the needle bar supporter assy ②.
4. Remove the screw ②, and then pull out the shaft ④ to remove the needle bar supporter shaft ⑤ from the needle bar supporter assy ②.



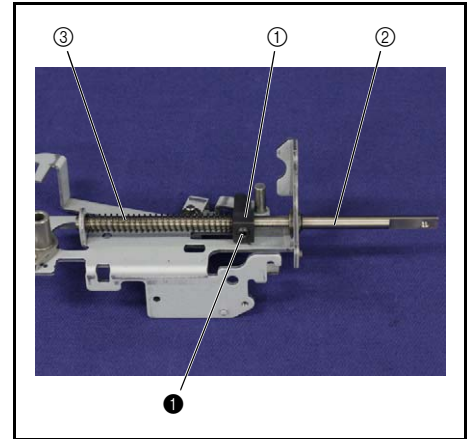
## 2-12 Removal of Presser foot lifter

1. Remove the retaining ring E4 ①, and then remove the presser foot lifter ② from the shaft of base holder assy.



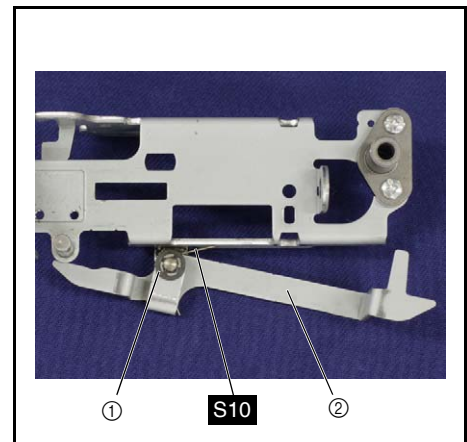
## 2-13 Removal of Presser bar

1. Remove the screw ❶ from the presser bar clamp ❶.
2. Pull out the presser bar ❷ to remove the spring ❸ and the presser bar clamp ❶ from the base holder assy.



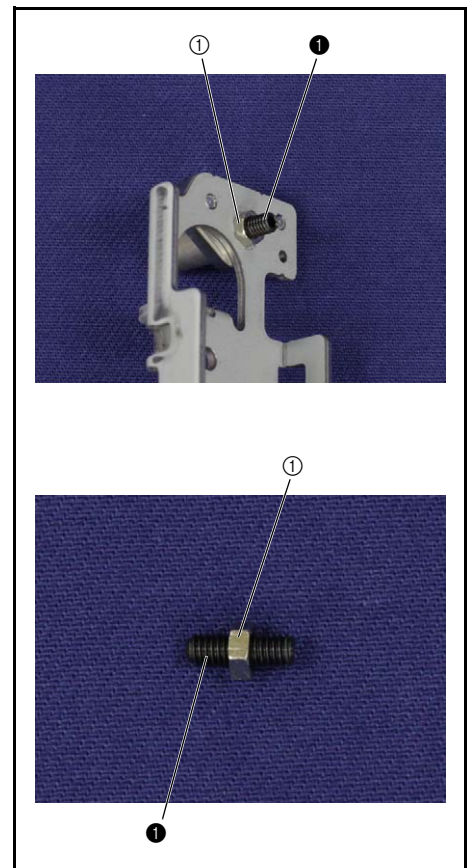
## 2-14 Removal of Thread release lever

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



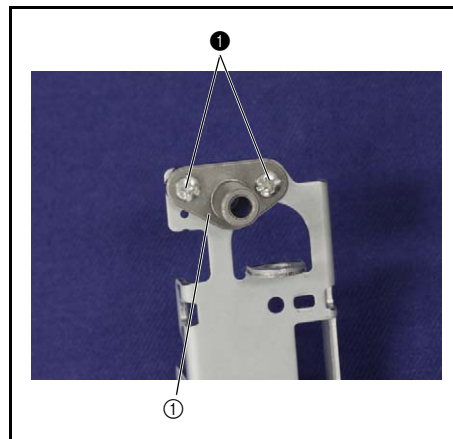
## 2-15 Removal of Lock nut

1. Loosen the lock nut ❶, and then remove the screw ❶ from the base holder assy.
2. Remove the lock nut ❶ from the screw ❶.

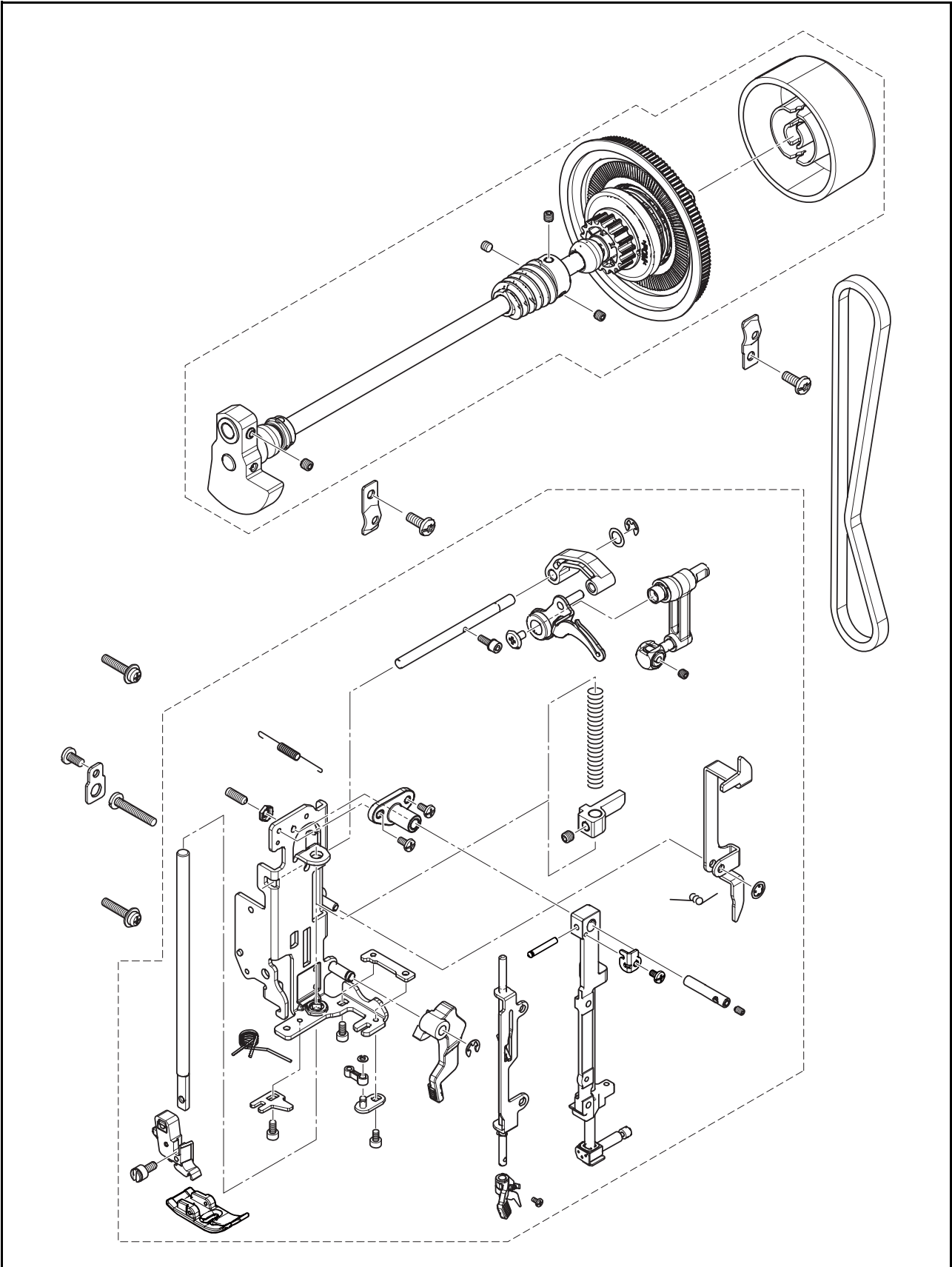


## 2-16 Removal of Shaft bushing

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



Upper shaft, Needle bar and Presser foot unit location diagram



Application

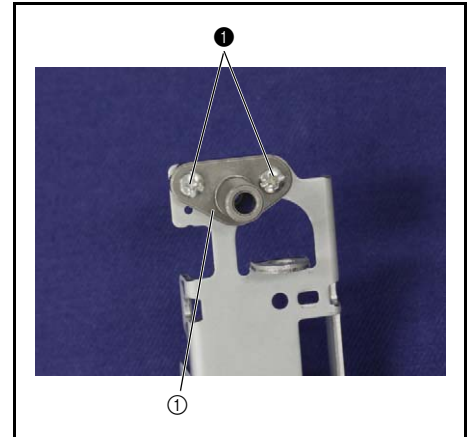
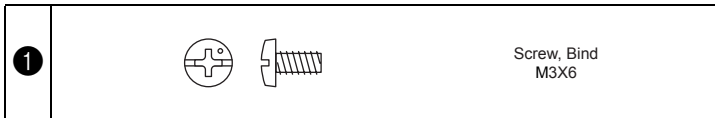
Application



## 1 Assembly of Needle-presser module

### 1-1 Attachment of Shaft bushing

1. Set the shaft bushing ① to the base holder assy, and then secure it with the 2 screws ①.



### 1-2 Attachment of Lock nut

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

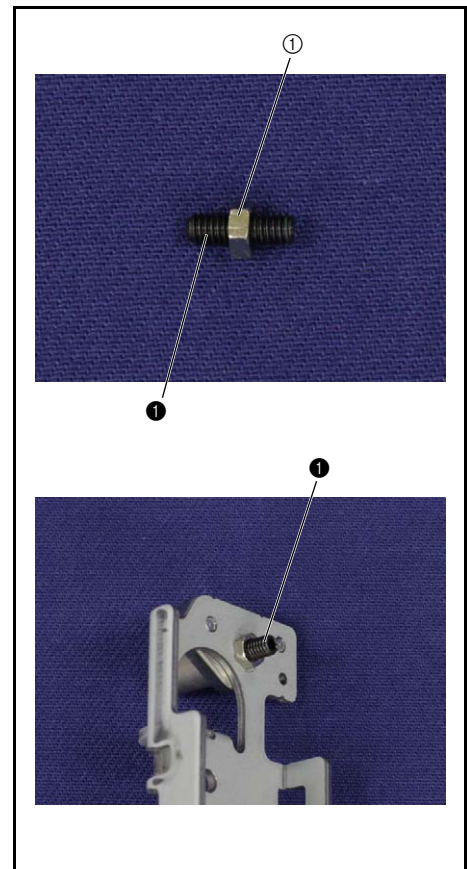
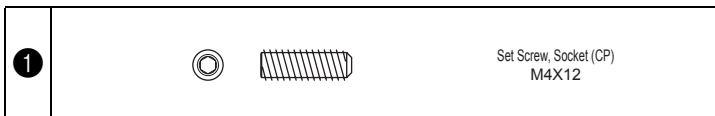
**\*Key point**

- Tighten the lock nut ① to about half of the screw ①.

2. Attach the screw ① to the base holder assy.

**\*Key point**

- Tighten it until the lock nut ① hit the base holder assy.
- Refer to "4-15 Adjustment: Needle drop position to presser foot hole (front/back)".



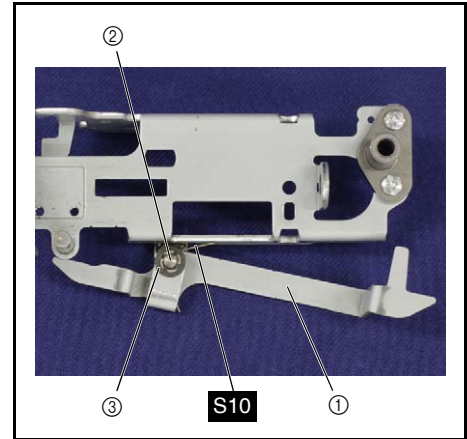
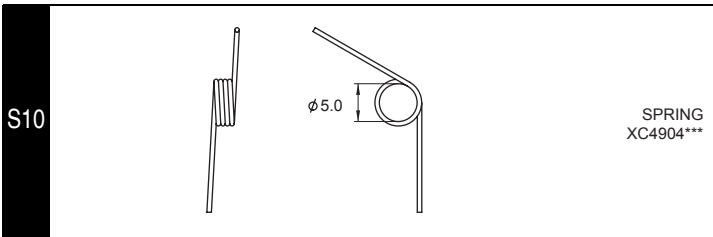
1-3 Attachment of Thread release lever

1. Set the thread release lever ① and the spring S10 to the shaft ② of the base holder assy, and then attach the retaining ring CS4 ③.

**\*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 ② of the base holder assy.	Small amount XC8387***
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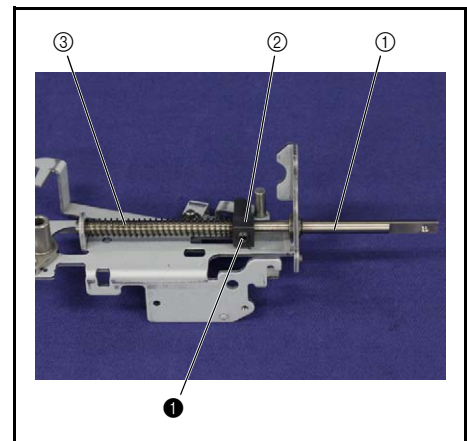


1-4 Attachment of Presser bar

1. Insert the presser bar ① into the bottom side hole of the base holder assy, the presser bar clamp ②, the spring ③ and the upper side hole of the base holder assy.
2. Tighten the screw ① temporarily.

**\*Key point**

- Fully tighten the screw ① after performing "4-23 Adjustment: Presser bar height".



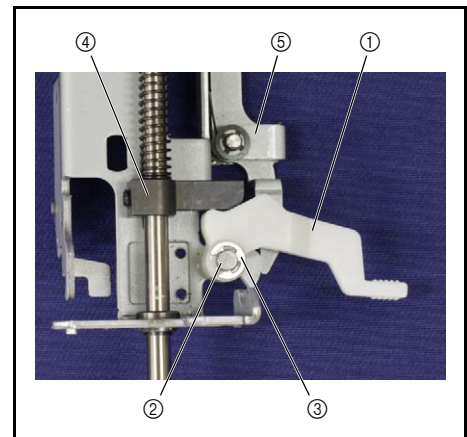
1-5 Attachment of Presser foot lifter

1. Set the presser foot lifter ① to the shaft ② of the base holder assy, and then attach the retaining ring E4 ③.

**\*Key point**

- Push the presser bar clamp ④ to the upper side, and then attach it while pushing the bottom side of the thread release lever ⑤.

Apply EPNOC AP (N) 0 to the shaft ② of the base holder assy.	Small amount XC8387***
Apply EPNOC AP (N) 0 to the operating surface of the presser foot lifter ① and the presser bar clamp ④.	Small amount XC8387***

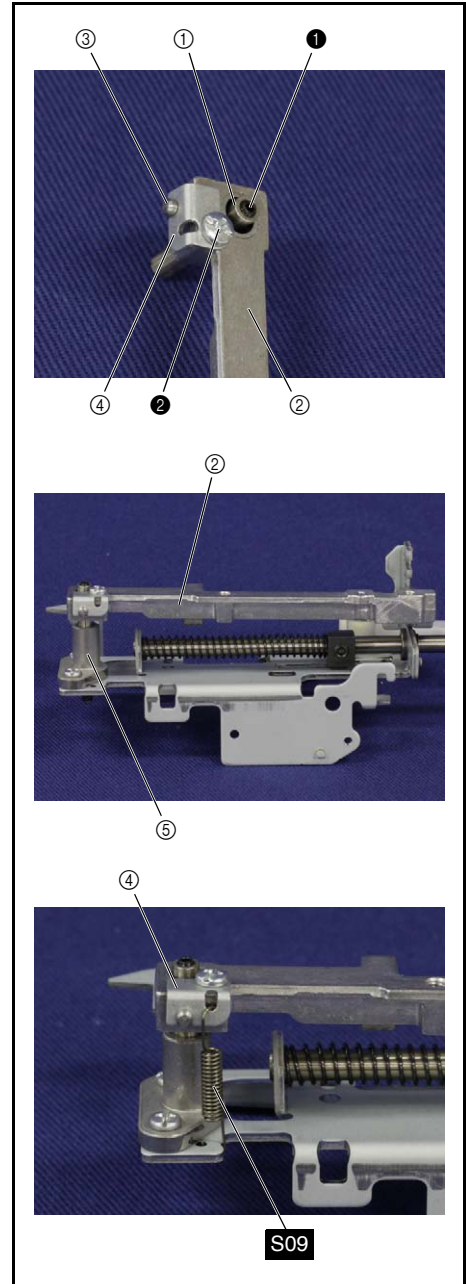




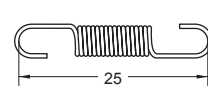
Application

Application

1-6 Attachment of Needle bar supporter assy

1. Insert the needle bar supporter shaft ① into the upper side hole of the needle bar supporter assy ②, and then align the hole of the needle bar supporter assy ② with the hole of the needle bar supporter shaft ①, and then insert the shaft ③ until the position of the right figure.
  2. Tighten the screw ❶ temporarily.
  3. Set the plate ④ to the needle bar supporter assy ②, and then secure it with the screw ❷.
- \*Key point**
- Check that the groove part of the shaft ③ engaged with the notch part of the plate ④.
4. Fully tighten the screw ❶.
  5. Insert the needle bar supporter shaft ① to the shaft bushing ⑤.
  6. Attach the spring S09 to the plate ④ and the base holder assy.

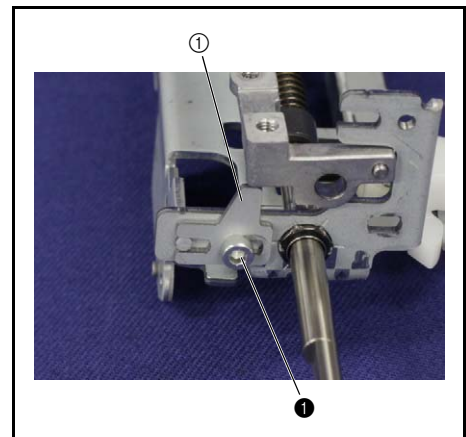


❶		Set Screw, Socket (CP) M3X5
❷		Screw, Bind M3X5
S09		SPRING XE9140***

1-7 Attachment of Stopper L

1. Set the stopper L ① to the bottom side of the base holder assy, and then tighten the screw ❶ temporarily.
- \*Key point**
- Check that align the notch part of the stopper L ① with the boss of the base holder assy.
  - Fully tighten the screw ❶ after performing "4-8 Adjustment: Needle bar supporter stopper L position".

❶		Bolt, Socket M3X6
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Application

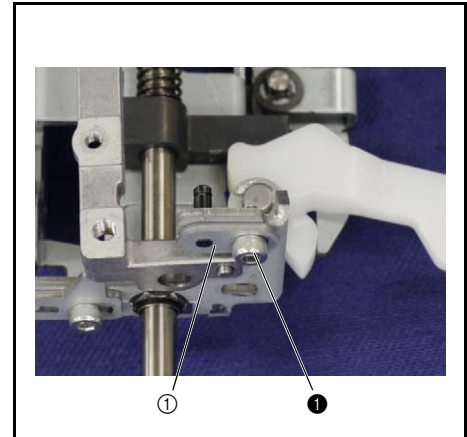
Application

## 1-8 Attachment of Needle shaft holder assy

1. Set the needle shaft holder assy ① to the bottom side of the base holder assy, and then tighten the screw ① temporarily.

**\*Key point**

- Fully tighten the screw ① after performing "4-13 Adjustment: Three point needle drop".

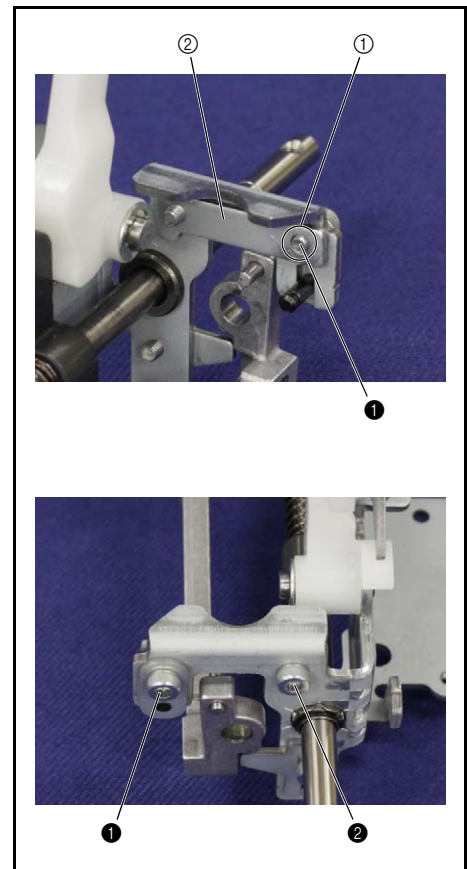
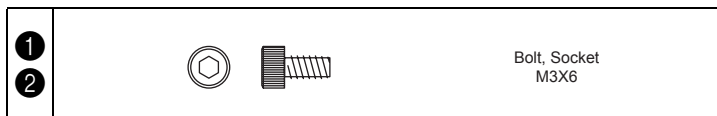


## 1-9 Attachment of Stopper plate R

1. Insert the hole ① of the stopper plate R ② to the screw ①, and then tighten the screw ② temporarily.

**\*Key point**

- Fully tighten the screw ② after performing "4-9 Adjustment: Needle bar supporter stopper R position".

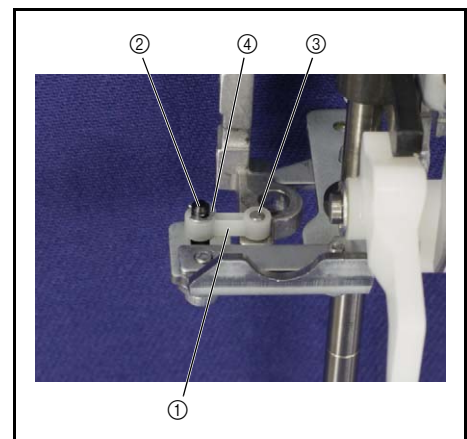


## 1-10 Attachment of Needle bar supporter arm

1. Set the needle bar supporter arm ① to the shaft of the needle shaft holder assy ② and the shaft of the needle bar supporter assy ③, and then attach the retaining ring E2 ④.

**\*Key point**

- Flat surface of the needle bar supporter arm ① is the bottom side.

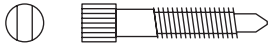



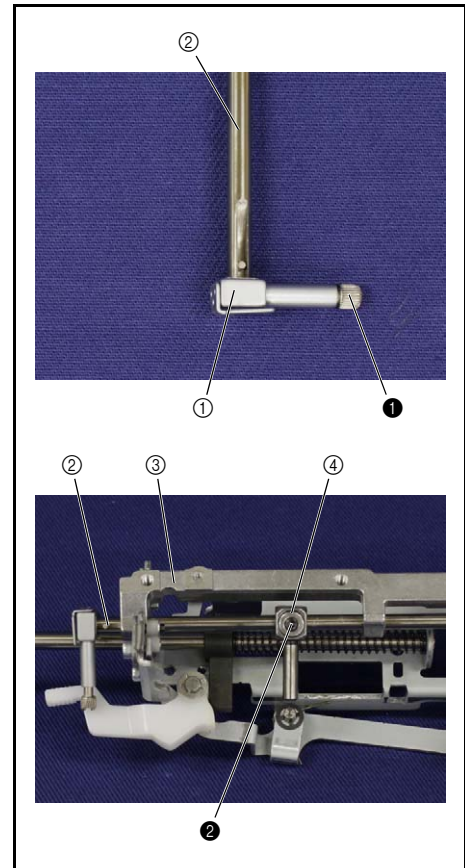
## 1-11 Attachment of Needle bar assy N

1. Tighten the needle clamp screw ① to the needle block ① of the needle bar assy N ②.
2. Inset the needle bar assy N ② into the bottom side hole of the needle bar supporter assy ③, the needle bar block ④ and the upper side hole of the needle bar supporter assy ③, and then tighten the screw ② temporarily.

**\*Key point**

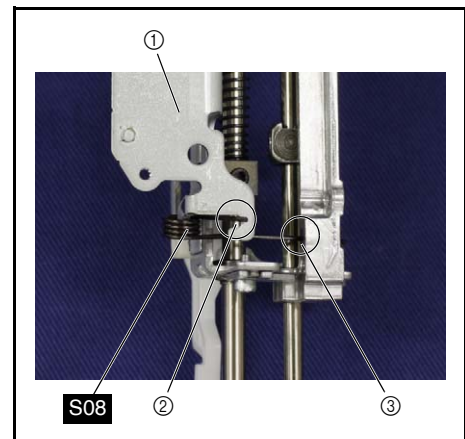
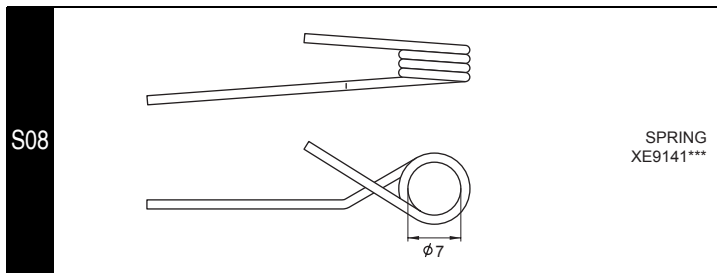
- Fully tighten the screw ② after performing "4-19 Adjustment: Needle bar height".

①		Needle Clamp Screw
②		Set Screw, Socket (FT) M4X4



## 1-12 Attachment of Spring

1. Set the spring S08 to the tab of the base holder assy ①, and then hang the shorter hook side of the spring on the notch part ② of the base holder assy ①, and hang the longer hook side of the spring on the groove part ③ of the needle bar supporter assy.





1-13 Attachment of Thread guide plate assy  
 <For models equipped with a needle threader>

1. Set the needle thread lever assy ① to the thread guide shaft ② of the thread guide plate assy ③, and then tighten the screw ❶ temporarily.



**\*Key point**

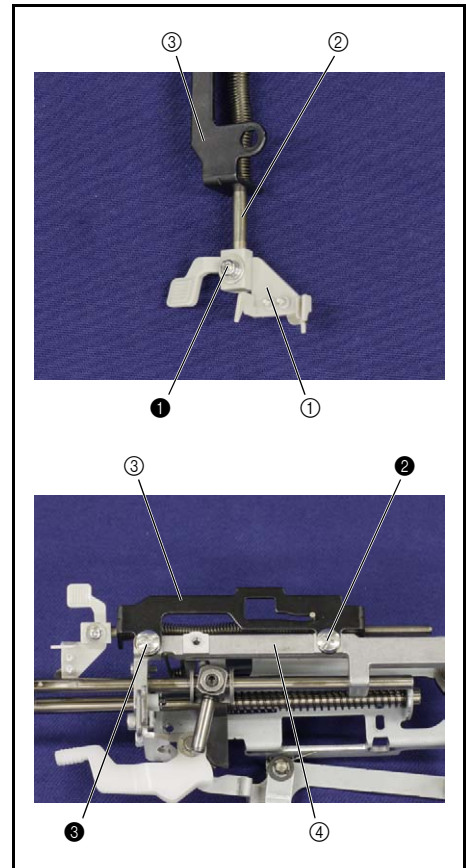
- Fully tighten the screw ❶ after performing "4-31 Adjustment: Needle threader".

2. Set the thread guide plate assy ③ to the needle bar supporter assy ④, and then tighten the screw ❷ temporarily.
3. Tighten the washer plain S4.37 and the screw ❸ temporarily.

**\*Key point**

- Fully tighten the screw ❷ and ❸ after performing "4-31 Adjustment: Needle threader".

❶		Screw, Pan (S/P washer) M2.6X6DB
❷ ❸		Screw, Bind M4X6



Application

1-14 Attachment of Needle bar crank rod assy / Thread take-up lever


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

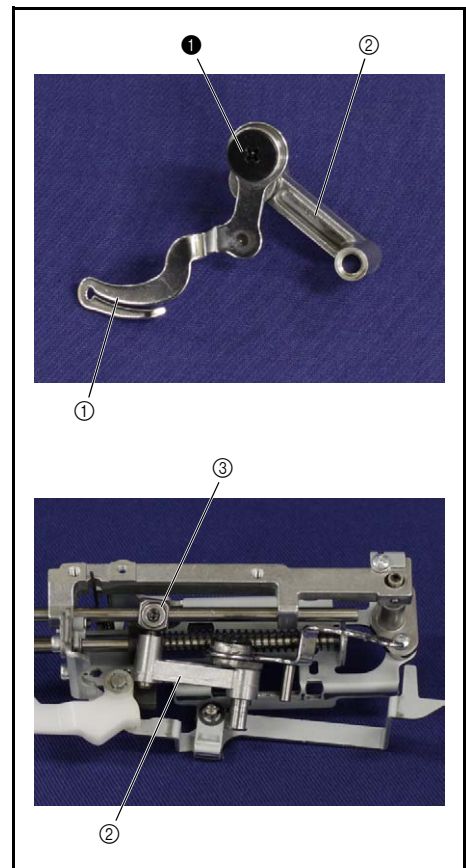
**\*Key point**

- The screw ❶ is reverse threaded.

2. Set 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 SM3.57L
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Application

Application

## 1-15 Attachment of Thread take-up lever link

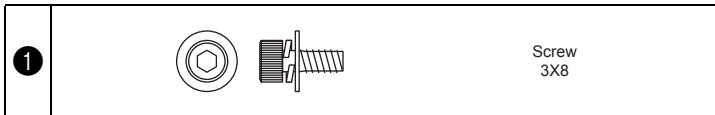
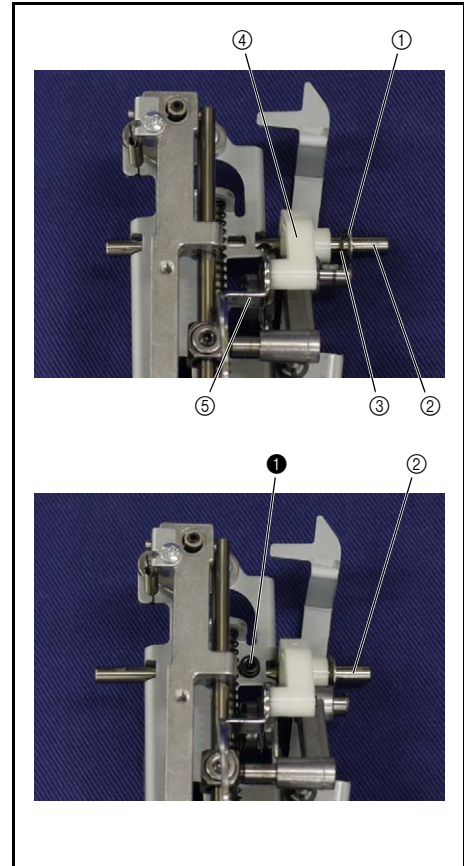
1. Attach the retaining ring E4 ① to the shaft ②.
2. Set the base holder assy as shown in the right figure, and then insert the shaft ② into the washer, spring ③, the thread take-up lever link ④ and the base holder assy from the right side, and then secure them with the screw ①.

**\*Key point**

- Insert the shaft of the thread take-up lever ⑤ into the thread take-up lever link ④.

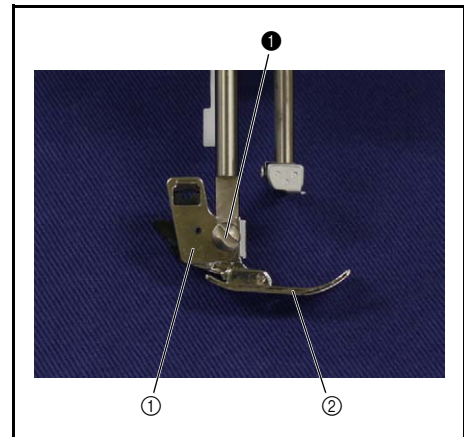
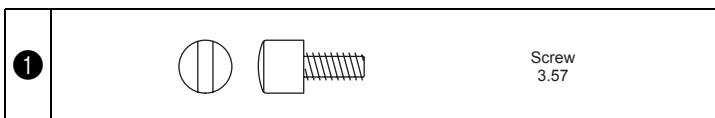
Apply EPNOC AP (N) 0 to the all around the take-up support shaft hole.

Small amount  
XC8387\*\*\*



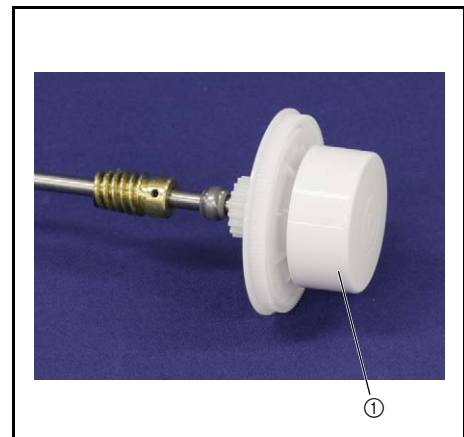
## 1-16 Attachment of Presser foot holder assy

1. Set the presser foot holder assy ① to the presser bar with the screw ①.
2. Set the zigzag presser foot ② to the presser foot holder assy ①.

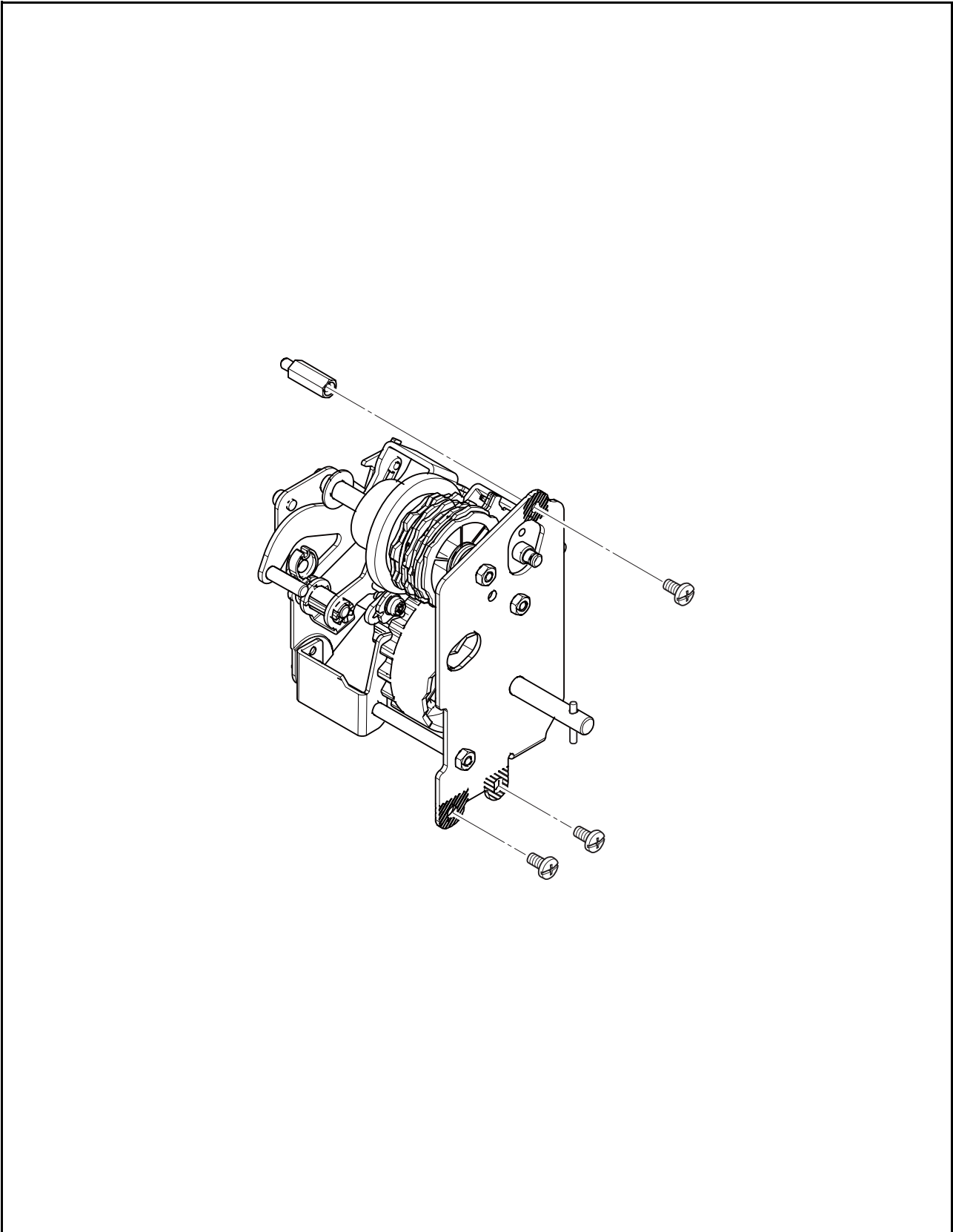


## 2 Assembly of Upper shaft assy

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



Pattern selecting mechanism location diagram



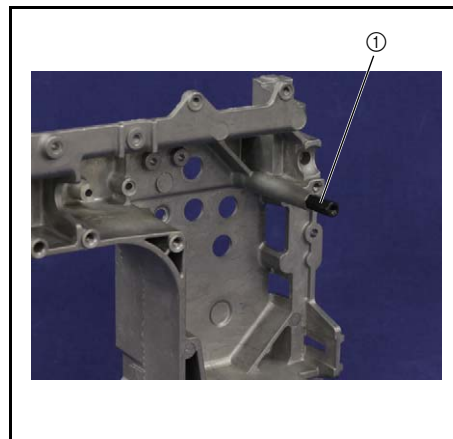
Application

Application

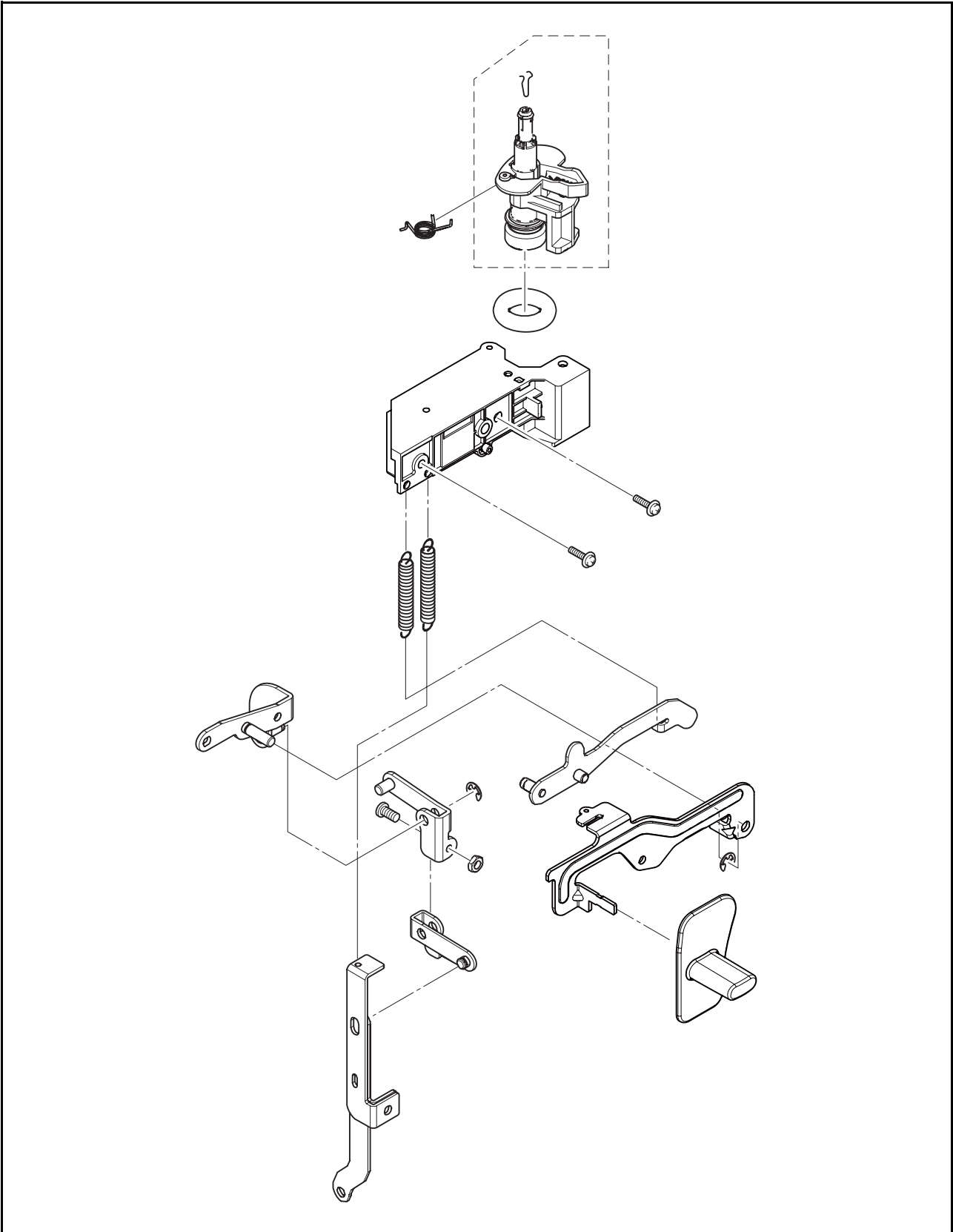


**1** Attachment of Hexagon M4x17.5

1. Attach the hexagon M4x17.5 ① to the arm bed.



Feed control mechanism location diagram

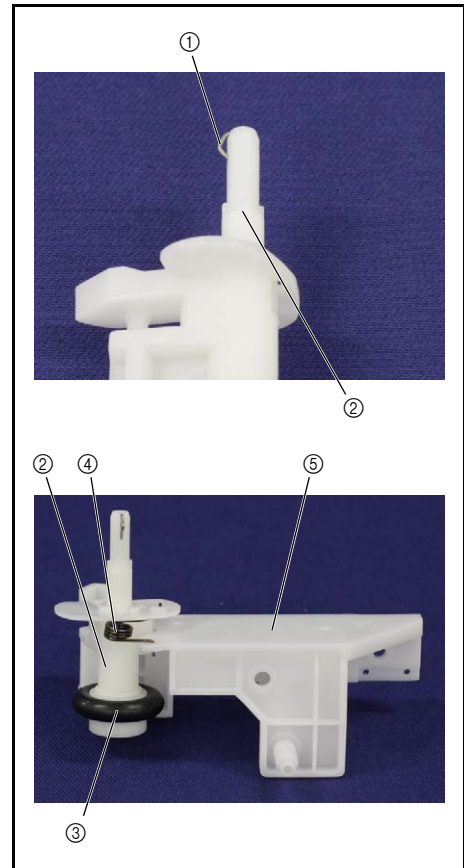


Application

Application

**1** Assembly of Feed bracket sub assy

1. Set the bobbin winder shaft spring ① to the bobbin winder assy ②.
2. Set the bobbin winder rubber band ③ to the bobbin winder assy ②.
3. Assemble the bobbin winder assy ② and the feed bracket sub assy ⑤, and then set the bobbin winder spring ④ to the bobbin winder assy ② and the feed bracket sub assy ⑤.
4. Close the bobbin winder assy ②.



## 2 Assembly of Lever holder assy

1. Tighten the screw ① to the reverse sewing lever D assy ②, and then tighten the nut 4 ③ to the screw ①.
2. Assemble the reverse sewing lever C assy ④ and the reverse sewing lever D assy ② to the shaft ⑤ of the lever holder sub assy ⑥ as shown in the right figure, and then attach the retaining ring E4 ⑦.
3. Set the connecting rod D ⑧ and the connecting rod U ⑨ to the shaft ⑩ of the reverse sewing lever C assy ④, and then attach the retaining ring E4 ⑪.

### \*Key point

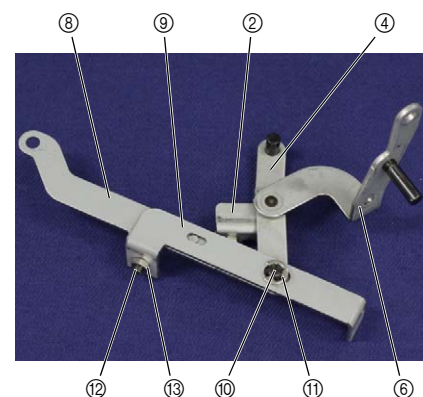
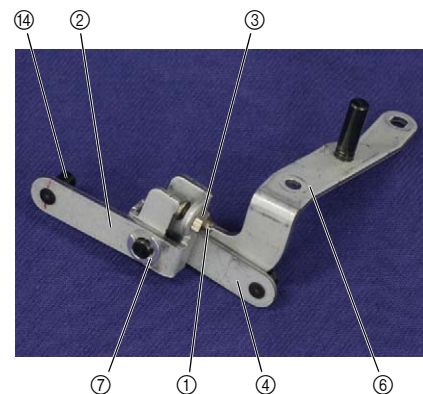
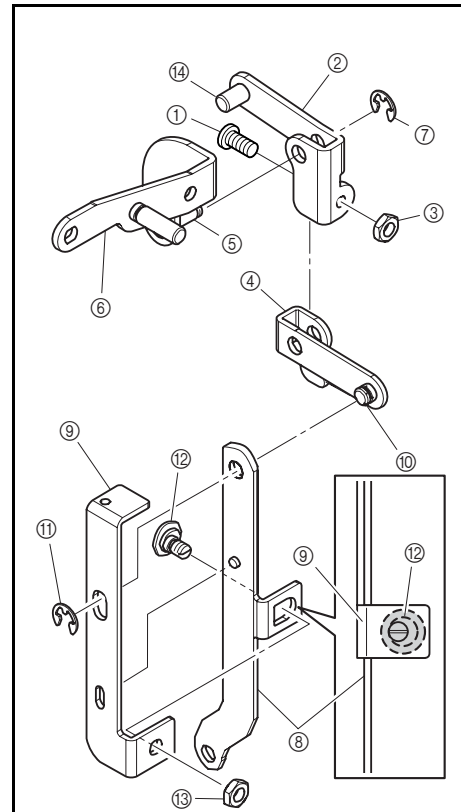
- Check that align the boss of the connecting rod D ⑧ with the positioning hole of the connecting rod U ⑨.

4. Set the reverse sew adjusting screw ⑫ to the connecting rod D ⑧ and the connecting rod U ⑨, and tighten the nut 4 ⑬ temporarily.

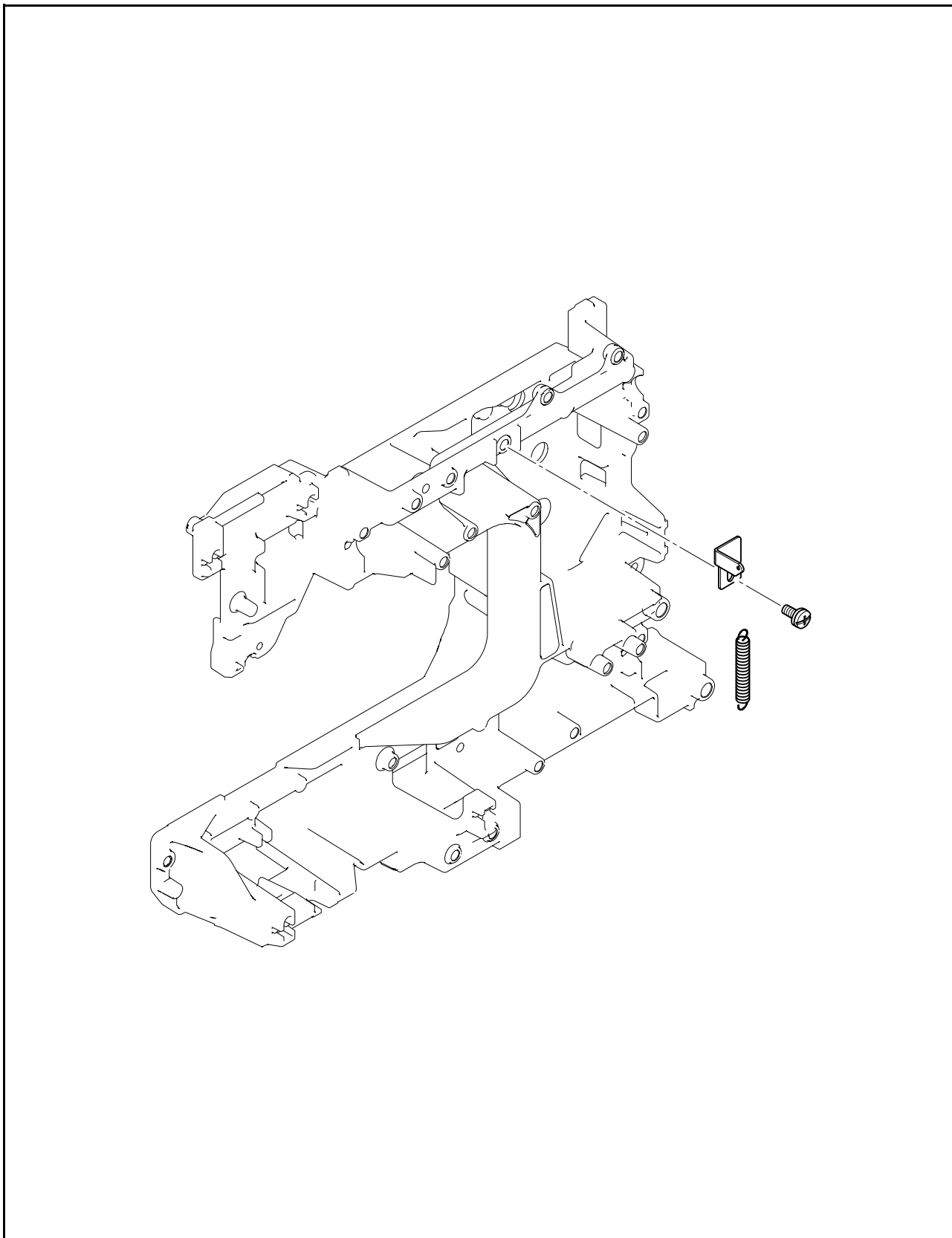
### \*Key point

- Check that place the reverse sew adjusting screw ⑫ with the larger end facing rightward.
- Fully tighten the nut 4 ⑬ after performing "4-28 Adjustment: Straight forward/Straight reverse stitch length".

Lubricate the EPNOC AP(N) 0 to the shaft ⑤ of the lever holder sub assy ⑥.	3mm dia. ball
Lubricate the EPNOC AP(N) 0 to the shaft ⑩ of the reverse sewing lever C assy ④.	3mm dia. ball
Lubricate the EPNOC AP(N) 0 to the shaft ⑭ of the reverse sewing lever D assy ②.	3mm dia. ball



Zigzag mechanism location diagram

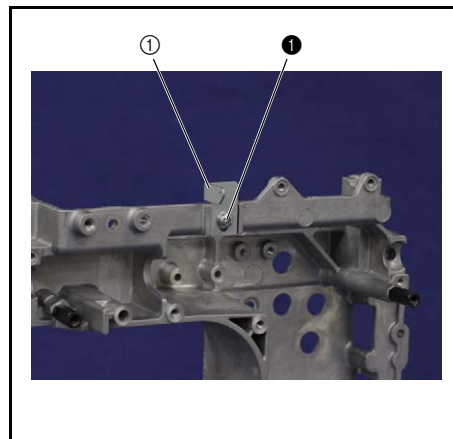
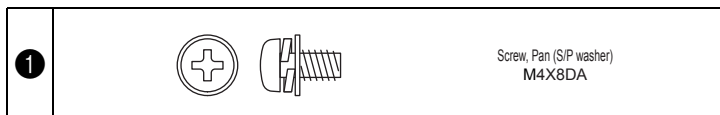


Application

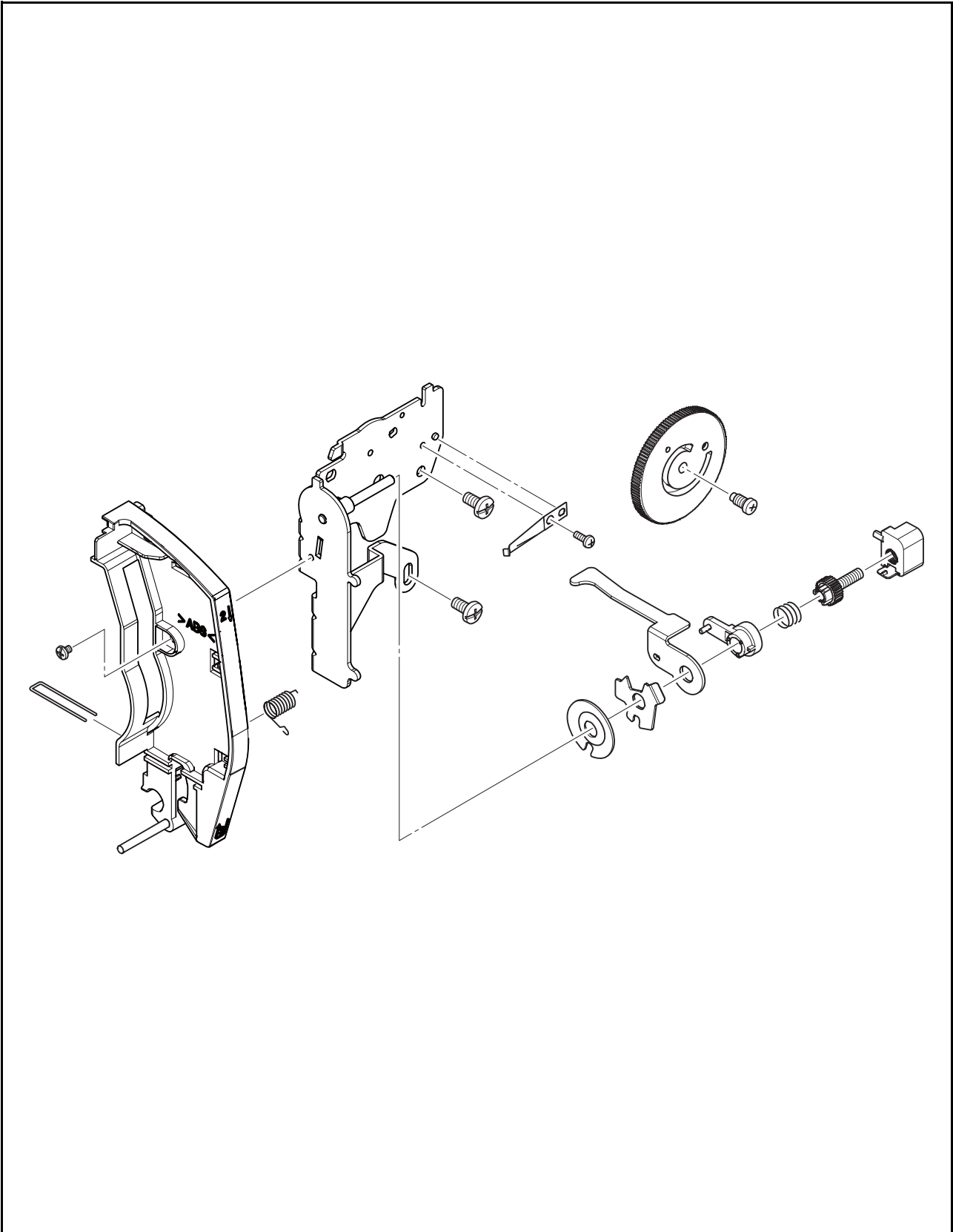
Application

**1** Assembly of BH adjusting plate

1. Set the BH adjusting plate ① to the arm bed with the screw ❶.



Needle threading mechanism location diagram



Application

Application

## 1 Assembly of Needle threading unit

### 1-1 Assembly of Thread guard assy

1. Set the thread tension adjusting screw ① to the thread tension nut ②.
2. Insert the tension disc A ③, the tension plate ④, the tension release plate ⑤, the spring holder ⑥ and the spring S07 in this order into the shaft ⑦ of the thread tension holder assy ⑧.

#### \*Key point

- Check that align the notch part ⑨ of the tension disc A ③ and the tension plate ④ with the protrusion of the thread tension holder assy ⑧.

3. Engage the groove part ⑩ of the thread tension dial ⑪ with the protrusion of the thread tension nut ②, and insert the thread tension adjusting screw ① into the shaft ⑦ of the thread tension holder assy ⑧, and then set the thread tension dial ⑪ to the thread tension holder assy ⑧ with the tension dial shaft ⑫.

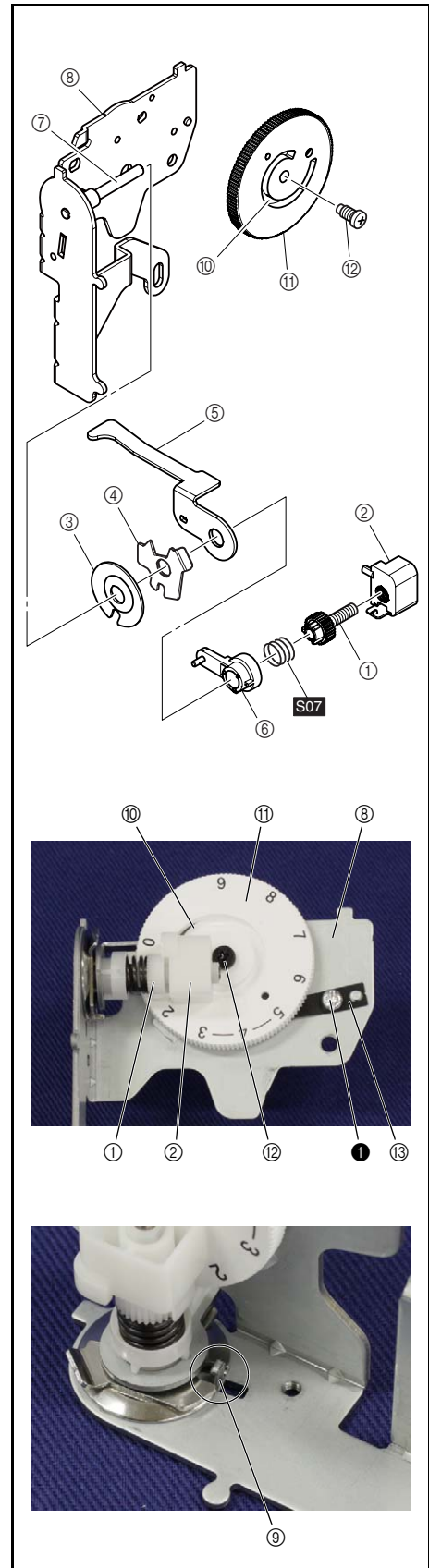
#### \*Key point


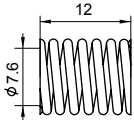
- Set the tension dial shaft ⑫ to the thread tension dial ⑪ in the state that the (9) of the thread tension dial ⑪ is the topmost position.

4. Set the notched spring ⑬ to the thread tension holder assy ⑧ with the screw ①.

#### \*Key point

- Attach the end of the notched spring ⑬ to the lower side of the thread tension dial ⑪.
- Check that engage the boss part of the thread tension holder assy ⑧ with the positioning hole of the notched spring ⑬.

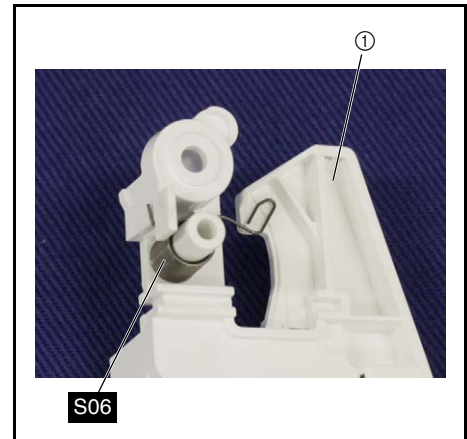
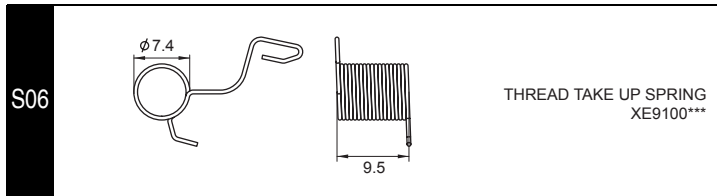


①		Screw, Pan M3X4
S07		SPRING X55842***



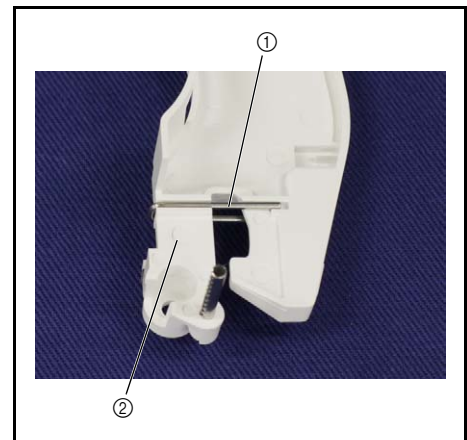
1-2 Attachment of Thread take up spring

1. Set the spring **S06** to the thread guard cover assy ① as shown in the right figure.



1-3 Attachment of Thread guide wire

1. Set the thread guide wire ① to the groove of the thread guard cover assy ②.

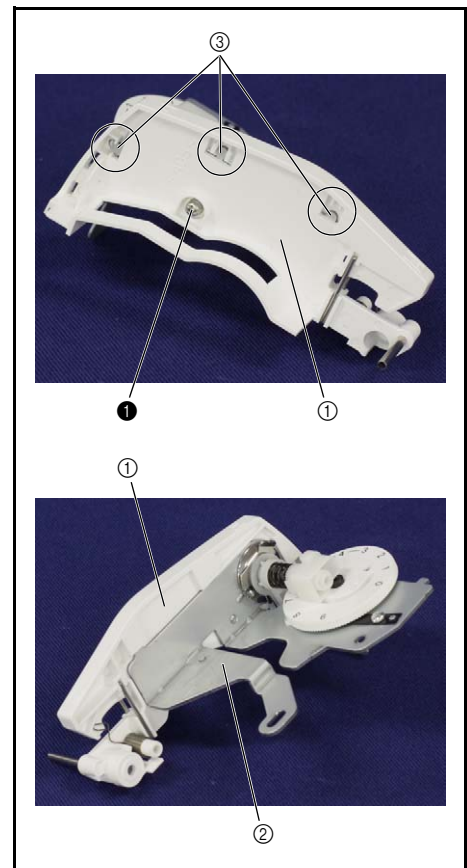


1-4 Attachment of Thread guard cover assy

1. Set the thread guard cover assy ① to the thread tension holder assy ② as shown in the right figure, and then secure it with the screw ①.

**\*Key point**

- Check that engage the 3 protrusions ③ of the thread tension holder assy ② with the 3 gullets of the thread guard cover assy ①.

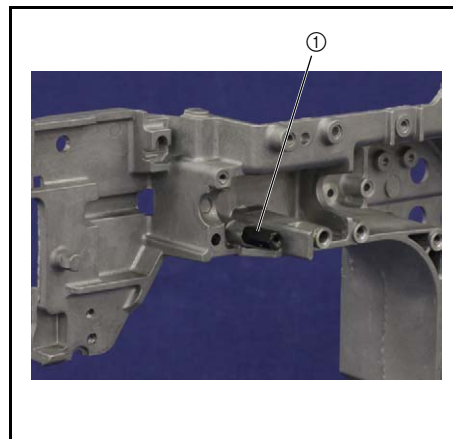


Application

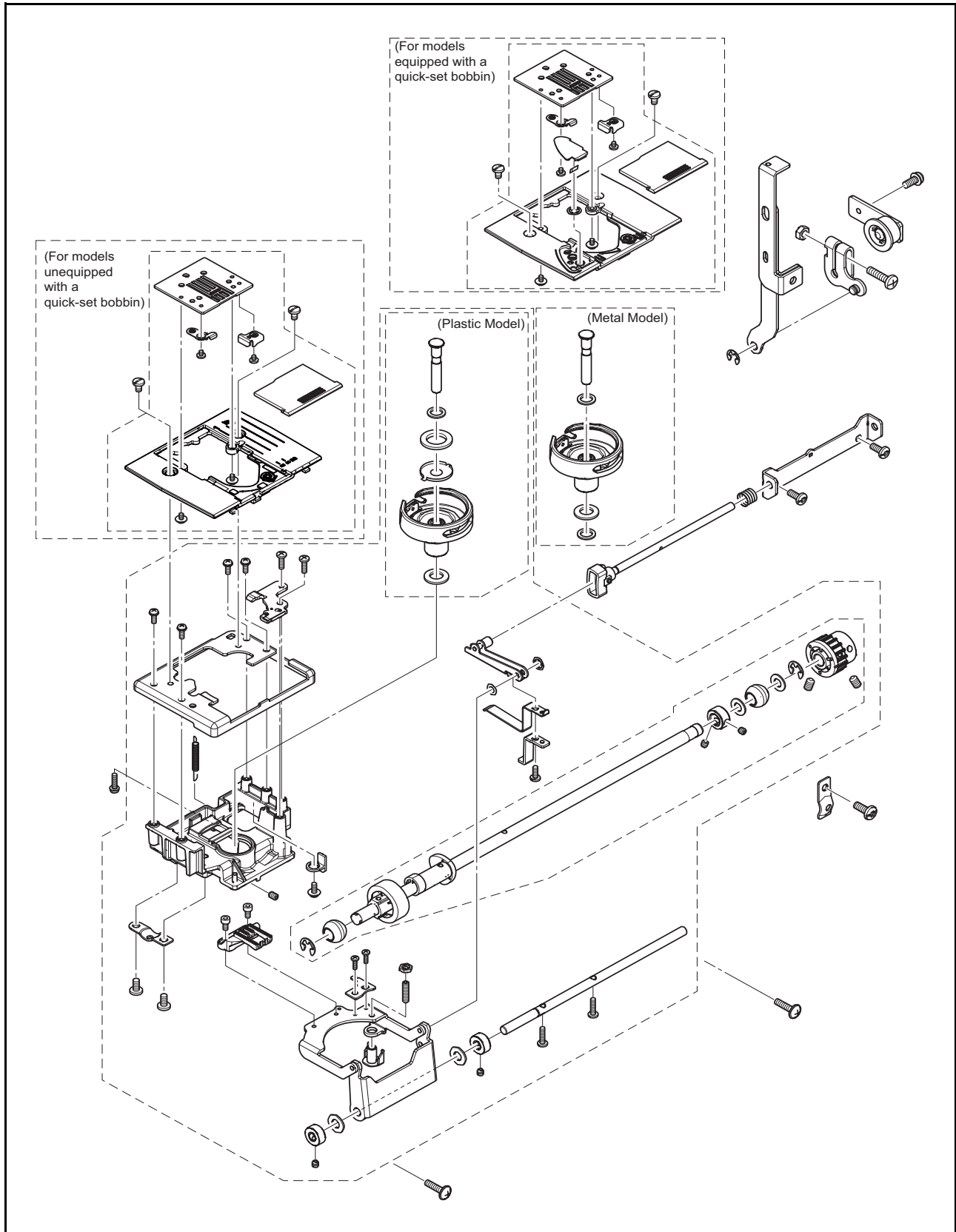
Application

**2** Attachment of Hexagon M4x17.5

1. Attach the hexagon M4x17.5 ① to the arm bed.



Feed unit location diagram



Application

Application

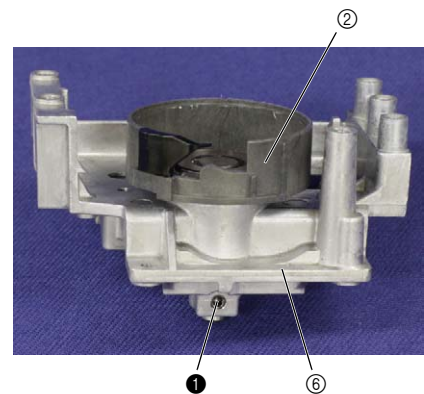
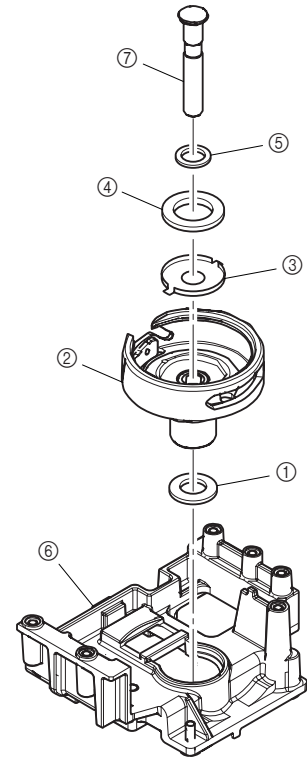
## 1 Assembly of Feed module

### 1-1 Attachment of Outer rotary hook assy

#### ■ Plastic model

1. Set the washer thrust ①, the outer rotary hook assy ②, the washer ③, the magnet ④ and the washer ⑤ in this order to the feed holder ⑥, and then insert the outer rotary hook shaft ⑦ to them.
2. Tighten the screw ❶ to the feed holder ⑥.

<In case of metal model, refer to next page.>

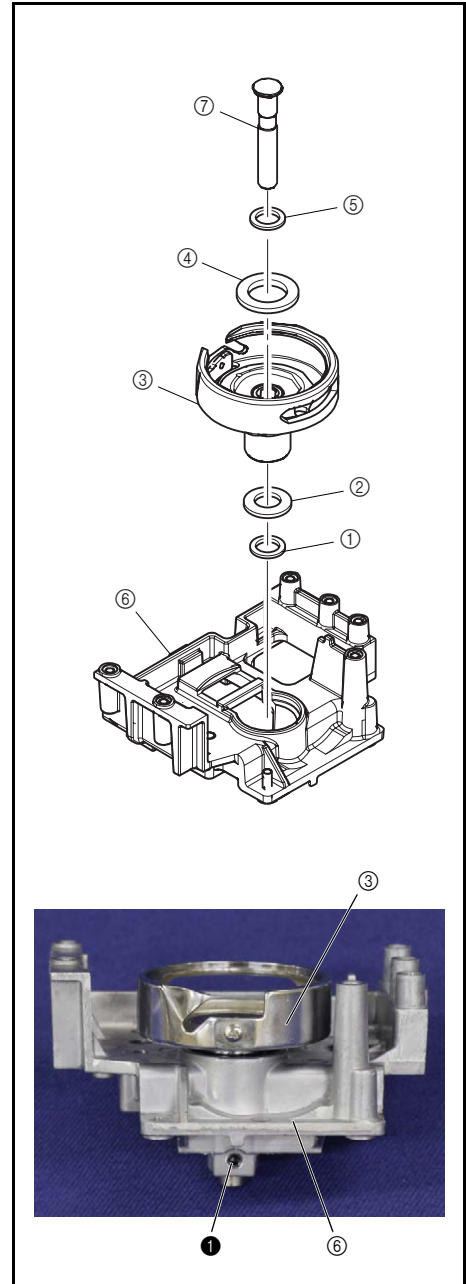


❶	 	Set Screw, Socket (CP) M4X6
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■ Metal model

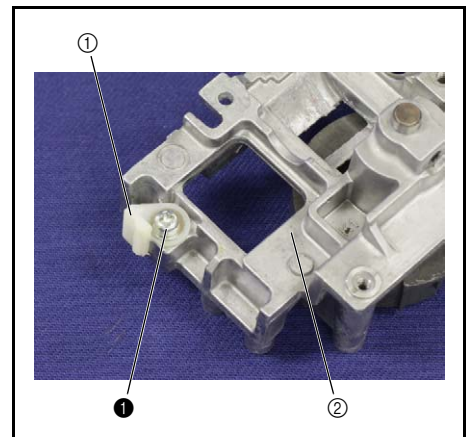
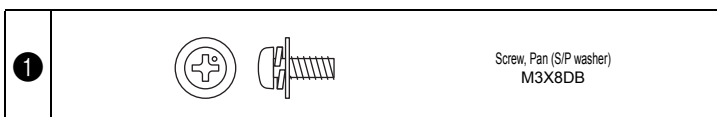
1. Set the spacer ①, the washer ②, the outer rotary hook assy ③, the magnet ④ and the spacer ⑤ in this order to the feed holder ⑥, and then insert the outer rotary hook shaft ⑦ to them.
2. Tighten the screw ① to the feed holder ⑥.

<In case of plastic model, refer to previous page.>



1-2 Attachment of Feed arm supporter

1. Set the feed arm supporter ① to the back side of the feed holder ② with the screw ①.



Application

Application

1-3 Assembly/Attachment of Lower shaft assy

1. Set the set screw collar ①, the washer thrust ②, the lower shaft bushing ③ and the washer thrust ④ to the lower shaft assy ⑤, and then attach the retaining ring E6 ⑥.
2. Tighten the 2 screws ① while pushing the set screw collar ① to the direction of the arrow ⑦.

**\*Key point**

- Check that it is not a wobble, and it moves smoothly.

3. Set the timing pulley D ⑧ to the lower shaft assy ⑤, and slide it to the direction of the arrow ⑨, and then tighten the 2 screws ② temporarily.

**\*Key point**

- Set the groove ⑩ of the timing pulley D ⑧ facing forward so that the larger end of the feed cam ⑪ facing backward in the state that the positioning hole ⑫ with the vertical.
- Fully tighten the 2 screws ② after performing "4-17 Adjustment: Needle bar rising".




4. Set the lower shaft bushing ⑬ to the lower shaft assy ⑤, and then attach the retaining ring E6 ⑭.
5. Set the lower shaft assy ⑤ to the bottom side of the feed holder ⑮.

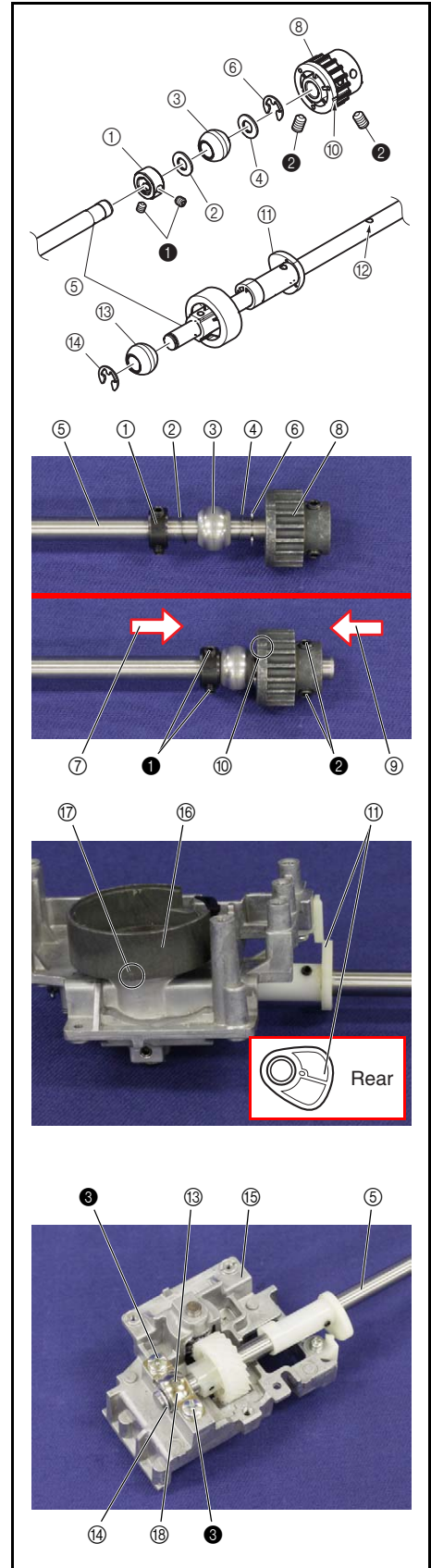
**\*Key point**

- Check that the lower shaft bushing ⑬ is set the positioning part of the back side of the feed holder ⑮.
- When attaching the lower shaft assy ⑤, set the outer rotary hook ⑯ with the mark ⑰ facing forward, and set the lower shaft assy ⑤ so that the larger end of the feed cam ⑪ facing backward in the state that the positioning hole ⑫ with the vertical.

6. Set the bushing presser ⑱ to the back side of the feed holder ⑮, and then secure it with the 2 screws ③.

Apply FBK OIL RO 100 to the left and right end of the lower shaft bushing ③.	2 drops
Apply FBK OIL RO 100 to the left and right end of the lower shaft bushing ⑬.	2 drops

①		Set Screw, Socket (FT) M4X4
②		Set Screw, Socket (CP) M5X5
③		Screw, Bind M4X8



Application

Application



## 1-4 Attachment of V feed attachment

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

**\*Key point**

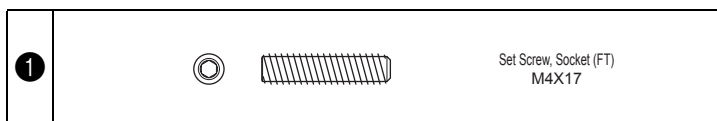
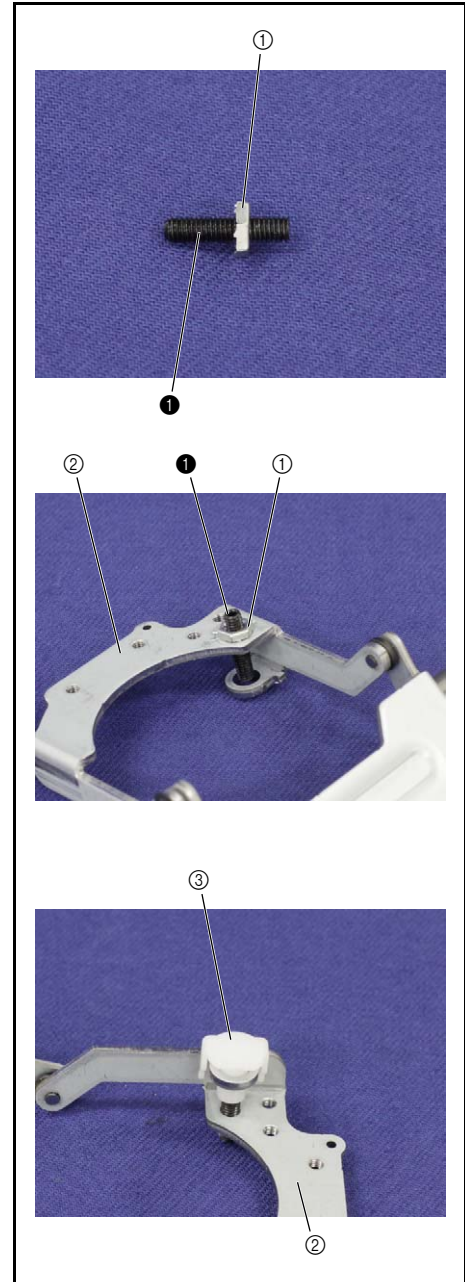
- Tighten the lock nut ① to about a quarter of the screw ①.

2. Attach the screw ① to the feed stand sub assy ②.

**\*Key point**

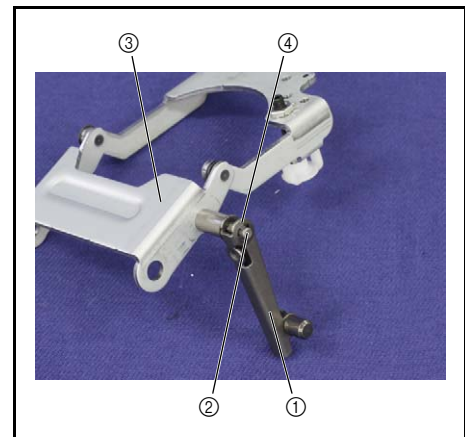
- Tighten it until the lock nut ① hit the feed stand sub assy ②.
- Refer to "4-22 Adjustment: Feed dog height".

3. Set the V feed attachment ③ to the back side of the feed stand sub assy ②.



## 1-5 Attachment of Feed arm assy

1. Set the polyester slider and the feed arm assy ① to the shaft ② of the feed stand sub assy ③, and then attach the retaining ring CS4 ④.

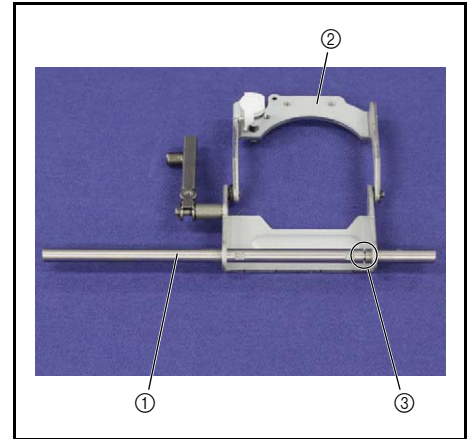


## 1-6 Attachment of Horizontal feed shaft

1. Insert the horizontal feed shaft ① into the feed stand sub assy ②.

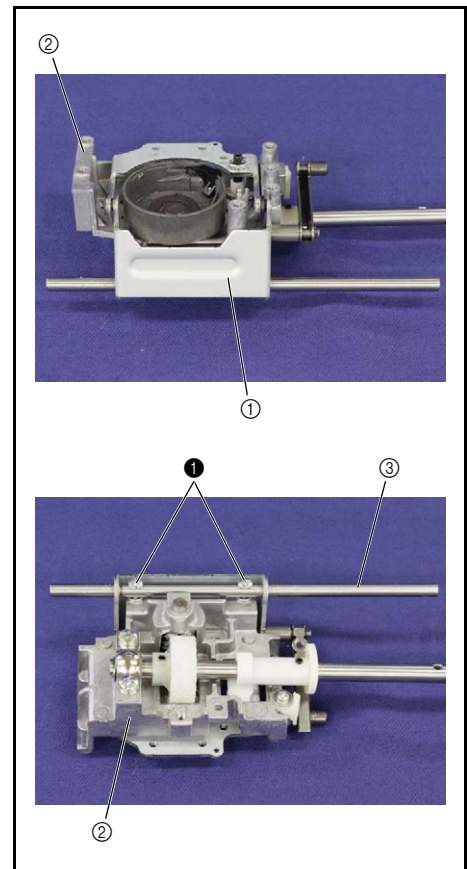
**\*Key point**

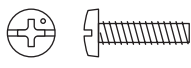
- Check that there is the groove ③ of the horizontal feed shaft ① as shown in the right figure position.



## 1-7 Attachment of Feed stand sub assy

1. Set the feed stand sub assy ① to the feed holder ②, and then secure the horizontal feed shaft ③ with the 2 screws ①.



①		Screw, Bind M3X12
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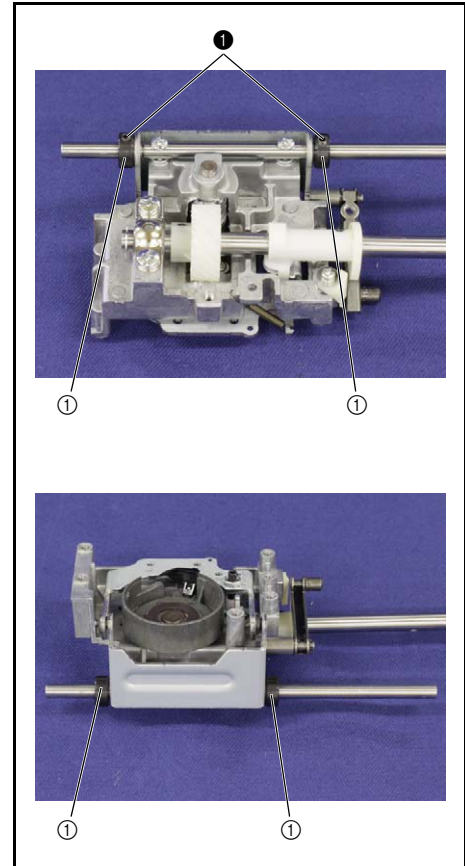


## 1-8 Attachment of Set screw collar

1. Set the washer thrust and the set screw collar ① to the horizontal feed shaft, and then tighten the screw ❶ temporarily (2 locations).

**\*Key point**

- Fully tighten the screw after performing "2-37 Attachment of Feed module".



## 1-9 Attachment of Feed supporting plate

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

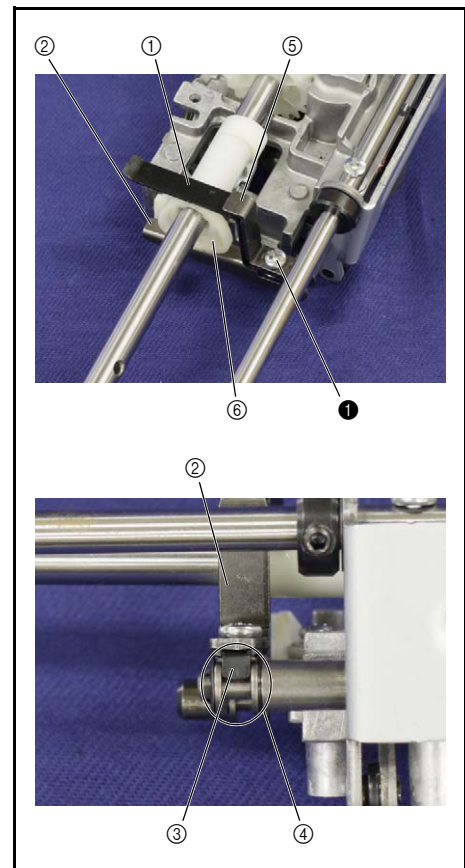
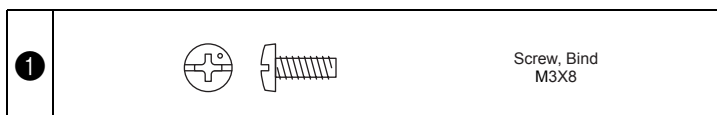
**\*Key point**

- Check that engage the protrusion ③ of the feed supporting plate ① with the groove ④ of the feed arm assy ②.

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

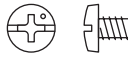

**\*Key point**

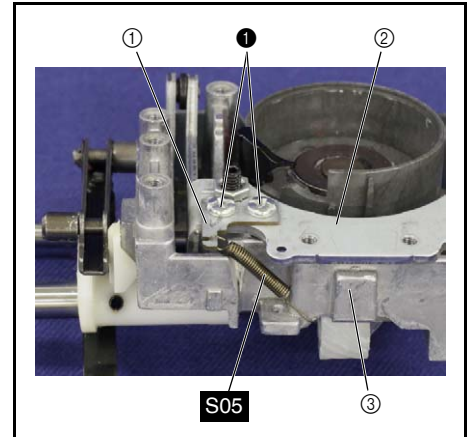
- Check that engage the boss of the feed supporting plate B ⑤ with the positioning hole of the feed supporting plate ①.
- Check that sandwich the feed cam ⑥ with the feed supporting plate ① and the feed arm assy ②.



1-10 Attachment of Feed stand supporter

1. Set the feed stand supporter ① to the feed stand sub assy ② with the 2 screws ①.
2. Hang the spring S05 on the feed stand supporter ① and the feed holder ③ as shown in the right figure.

<b>①</b>		Screw, Bind M3X4
<b>S05</b>		SPRING XE9836***



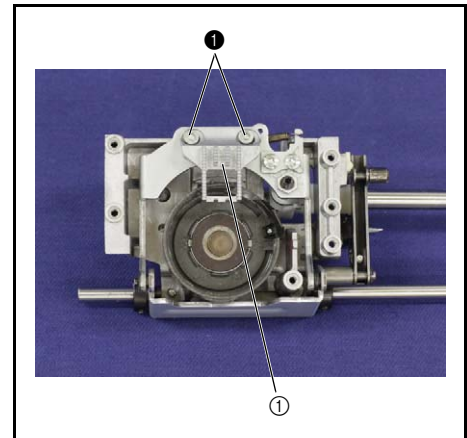
1-11 Attachment of Feed dog

1. Set the feed dog ① to the feed stand sub assy, and then tighten the 2 screws ① temporarily.

**\*Key point**

- Fully tighten the 2 screws ① after performing "4-21 Adjustment: Feed dog position (front/back and left/right)".

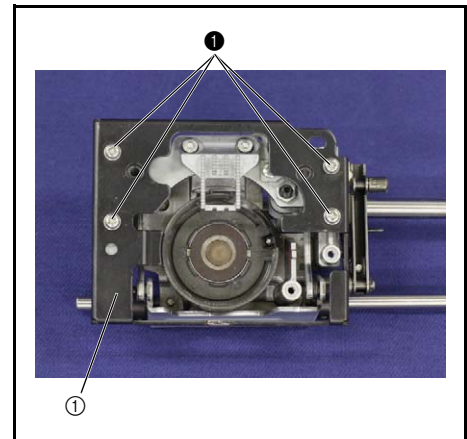
<b>①</b>		Bolt, Socket M3X5
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1-12 Attachment of Base plate

1. Set the base plate ① to the feed holder, and then secure it with the 4 screws ①.

<b>①</b>		Screw, Pan (SP washer) M3X8A
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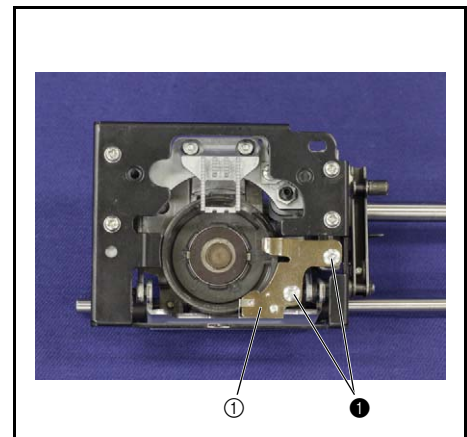
1-13 Attachment of Inner rotary hook plate assy

1. Set the inner rotary hook plate assy ① to the feed holder, and then tighten the 2 screws ① temporarily.

**\*Key point**

- Fully tighten the 2 screws ① after performing "4-16 Adjustment: Inner rotary hook plate position".

<b>①</b>		Screw, Bind M3X6
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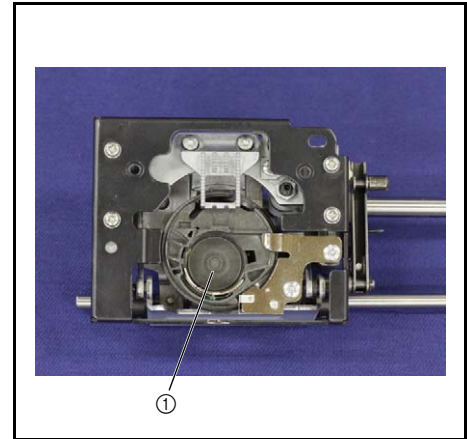


Application

Application

## 1-14 Attachment of Inner rotary hook assy

1. Set the inner rotary hook assy ① to the outer rotary hook assy.



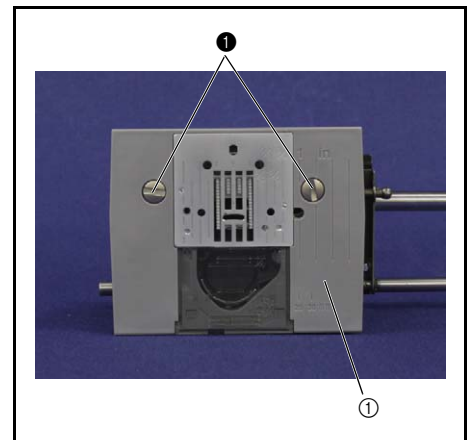
## 1-15 Assembly of Needle plate assy

■ For models unequipped with a quick-set bobbin

<In case of models equipped with a quick-set bobbin, refer to "3 - 68">

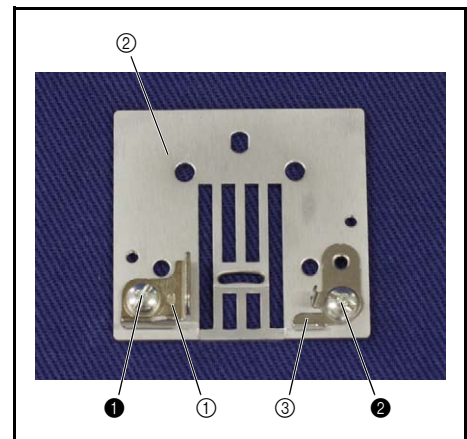
## 1-15-1 Attachment of Needle plate assy

1. Set the needle plate assy ① to the base plate, and then secure it with the 2 screws ①.



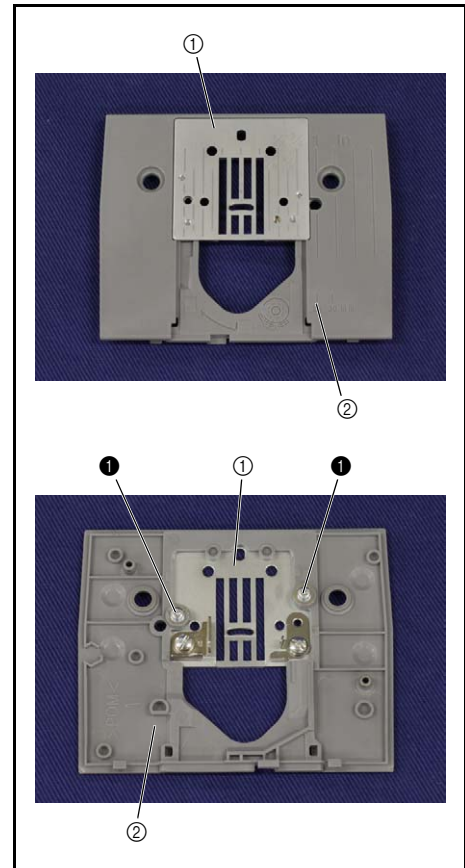
## 1-15-2 Attachment of Stopper plate R/M

1. Set the stopper plate R ① to the back side of the needle plate A ②, and secure it with the screw ①.
2. Set the stopper plate M ③ to the back side of the needle plate A ②, and secure it with the screw ②.



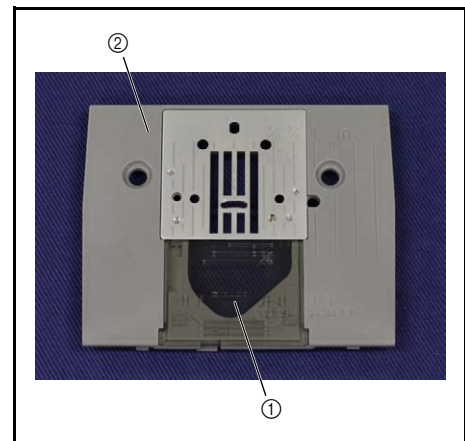
## 1-15-3 Attachment of Needle plate A

1. Set the needle plate A ① to the needle plate B ②, and then secure it with the 2 screws ①.



## 1-15-4 Attachment of Slide plate

1. Set the slide plate ① to the needle plate B ②.

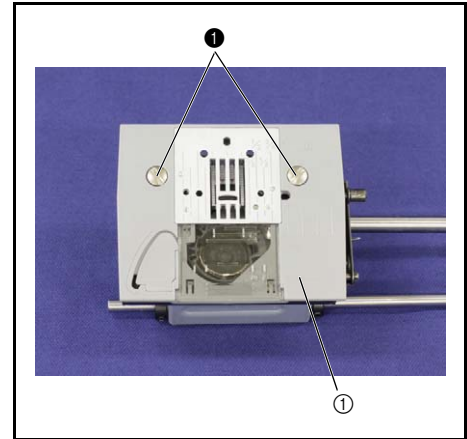


■ For models equipped with a quick-set bobbin

<In case of models unequipped with a quick-set bobbin, refer to “3 - 66”.>

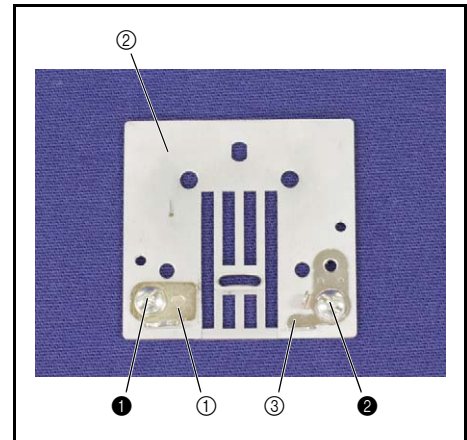
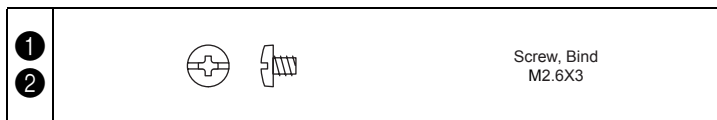
1-15-1 Attachment of Needle plate assy

1. Set the needle plate assy ① to the base plate, and then secure it with the 2 screws ①.



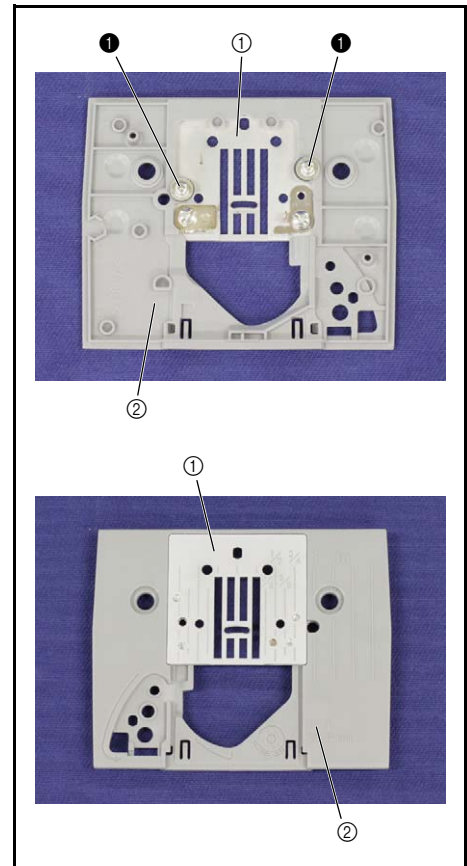
1-15-2 Attachment of Stopper plate R/M

1. Set the stopper plate R ① to the back side of the needle plate A ②, and secure it with the screw ①.
2. Set the stopper plate M ③ to the back side of the needle plate A ②, and secure it with the screw ②.



1-15-3 Attachment of Needle plate A

1. Set the needle plate A ① to the needle plate B ②, and then secure it with the 2 screws ①.



Application

Application

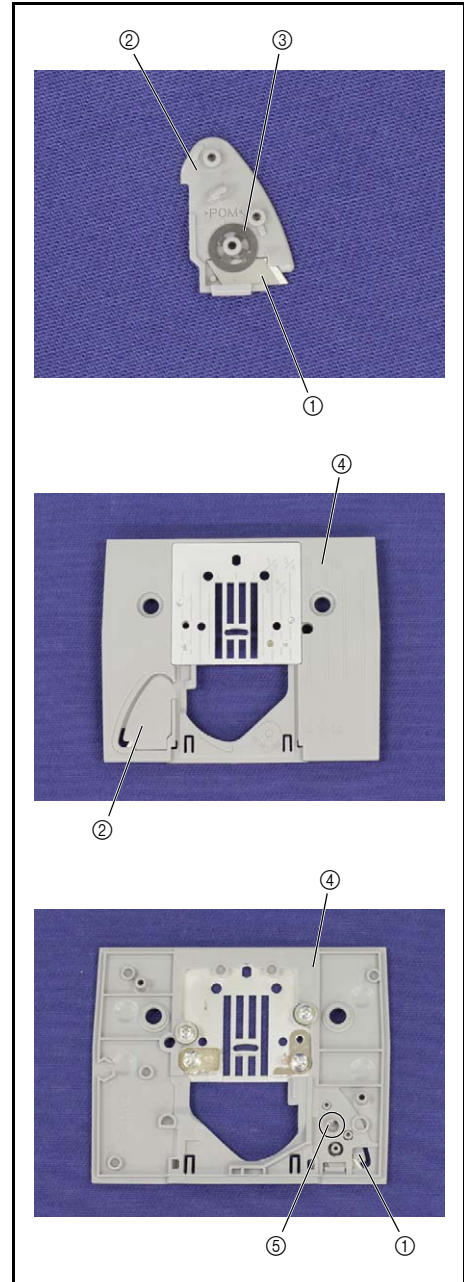


## 1-15-4 Attachment of NT lower thread cutter

1. Set the NT lower thread cutter ① to the back side of the cutter cover ②, and then attach the retaining ring CS3 ③.
2. Set the cutter cover ② to the needle plate B ④.

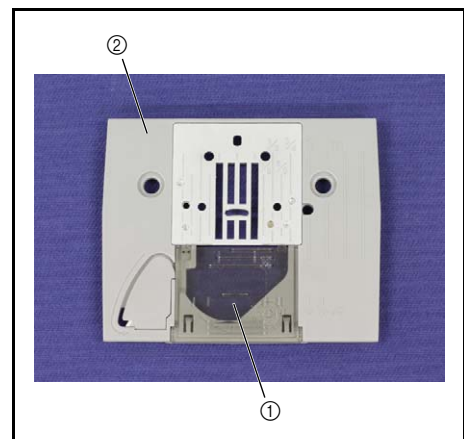
**\*Key point**

- Check that hang the hook ⑤ of the cutter cover ② on the back side of the needle plate B ④.



## 1-15-5 Attachment of Slide plate

1. Set the slide plate ① to the needle plate B ②.



## 2 Assembly of Feed adjuster assy

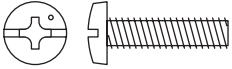
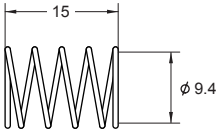
1. Insert the feed adjuster sub assy ① into the spring S04, the feed adjusting shaft holder ② and the feed connecting lever assy ③.
2. Set the screw ① to the feed connecting lever assy ③, and then tighten the nut 2 M4 ④ temporarily.

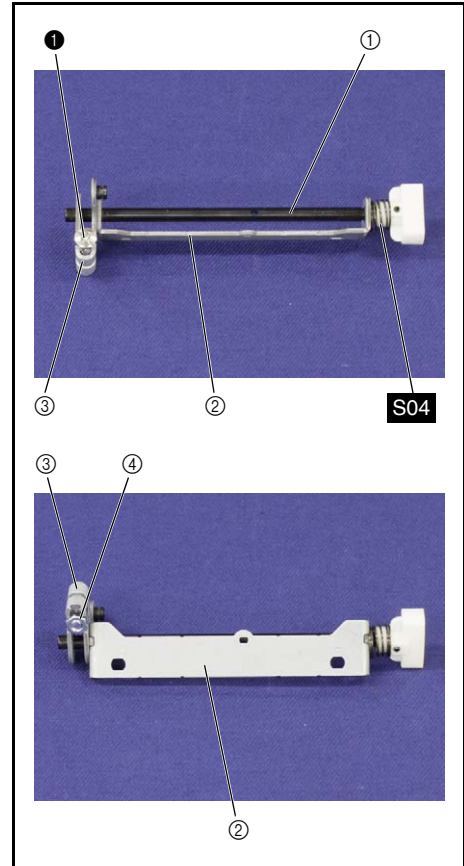
### \*Key point

- Fully tighten the screw ① after performing "2-39 Attachment of Feed adjuster assy".

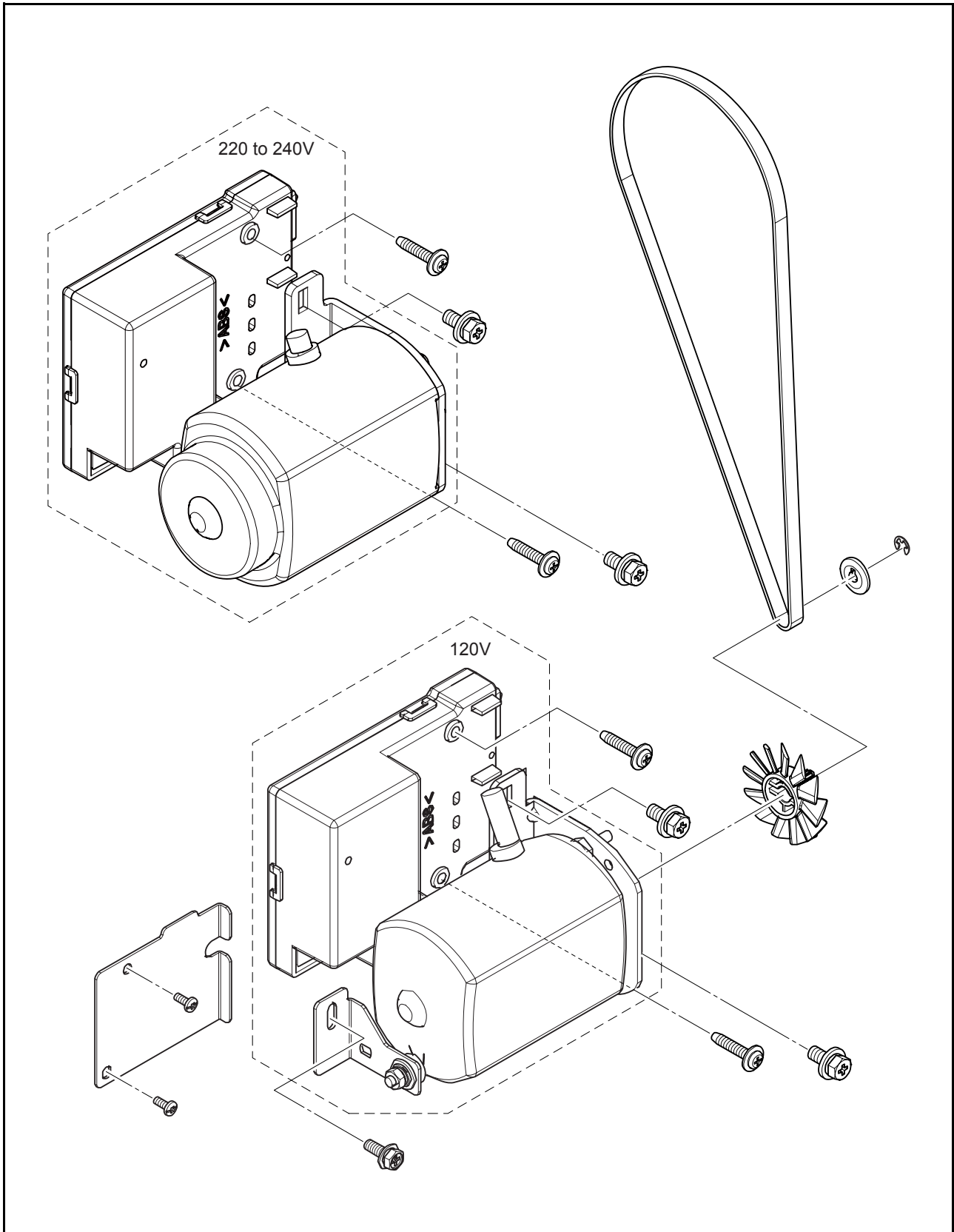
Lubricate the EPNOC AP(N) 0 to the 2 sliding surfaces of the feed connecting lever assy ③ and the feed adjuster sub assy ①.

3mm dia. ball

①		Screw, Bind M4X16
S04		SPRING XE9731***



Main motor unit location diagram



Application

Application

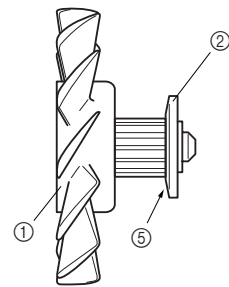
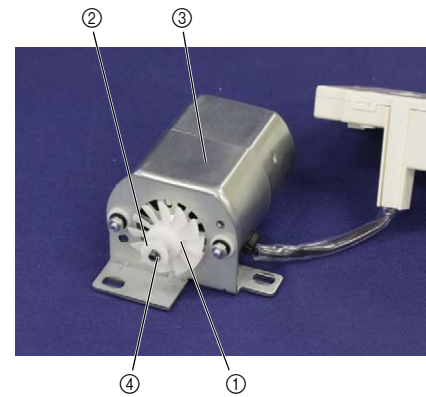


**1** Assembly of Motor 3P supply assy■ **120V specification**

1. Set the motor T-pulley ① and the frange ② to the shaft of the motor assy ③, and then attach the retaining ring E3 ④.

## \*Key point

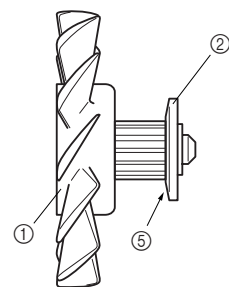
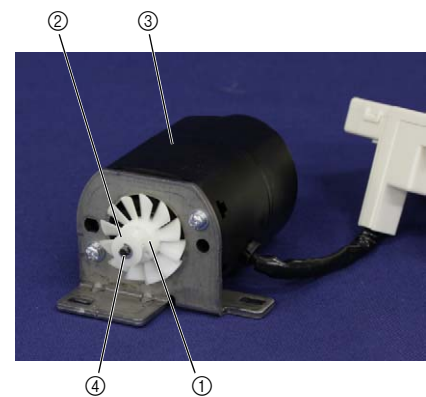
- Attach the taper surface ⑤ of the frange ② to the side of the motor T-pulley ①.

■ **220 to 240V specification**

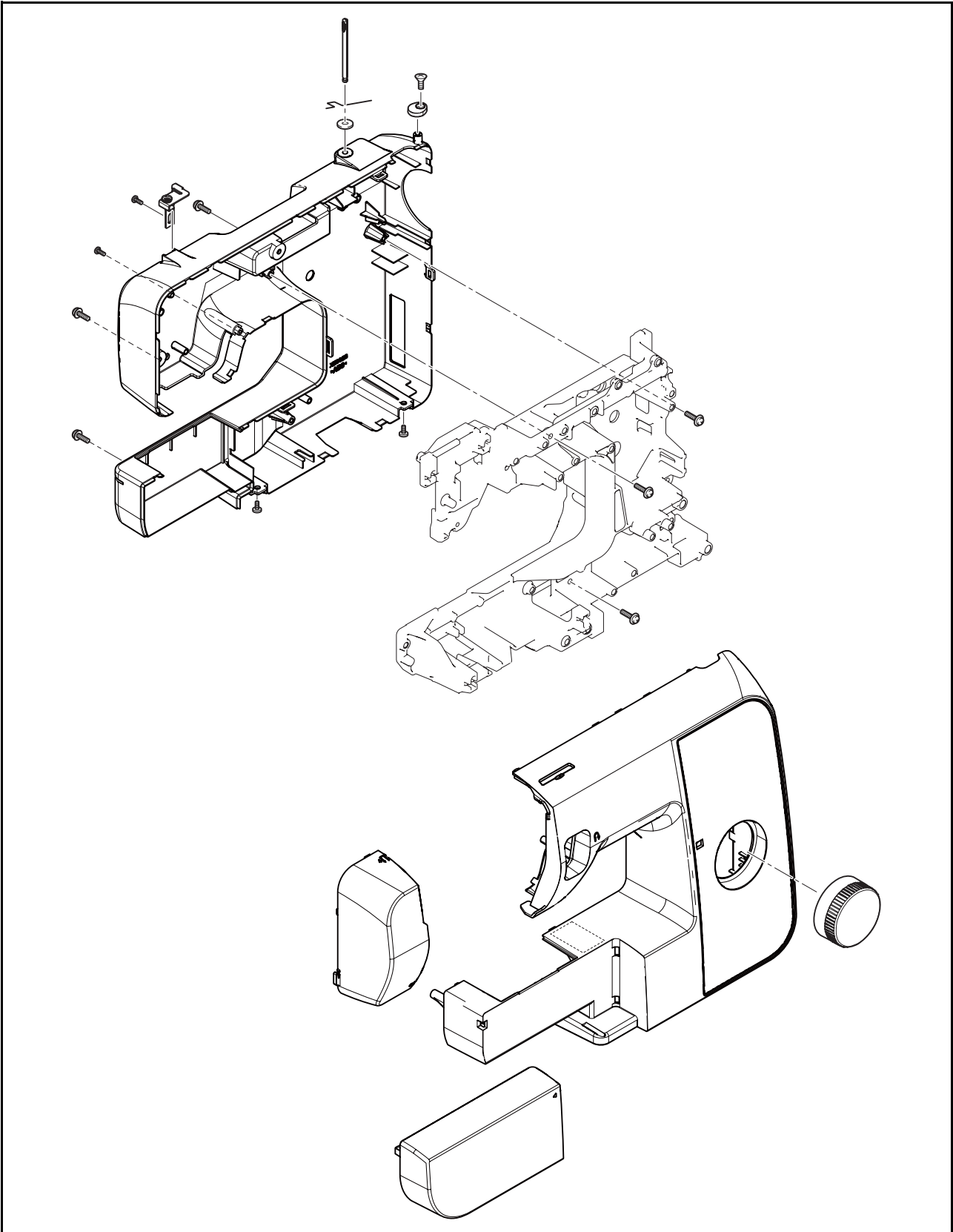
1. Set the motor T-pulley ① and the frange ② to the shaft of the motor assy ③, and then attach the retaining ring E3 ④.

## \*Key point

- Attach the taper surface ⑤ of the frange ② to the side of the motor T-pulley ①.



Main frame and Covers location diagram



Application

Application

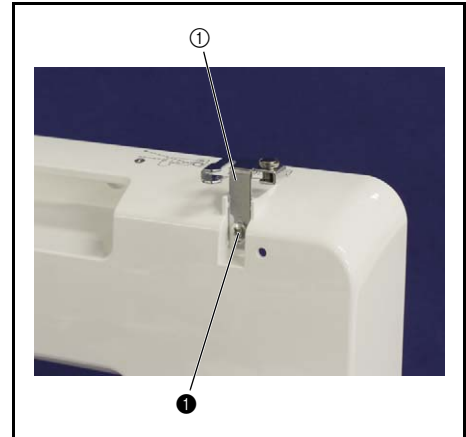
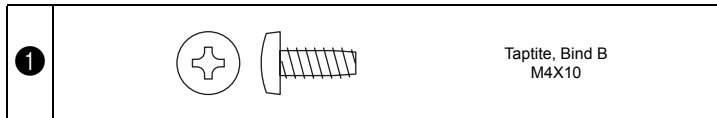
## 1 Assembly of Rear cover assy

### 1-1 Attachment of Thread guide assy

1. Set the thread guide assy ① to the rear cover assy, and then tighten the screw ❶ temporarily.

**\*Key point**

- Fully tighten the screw ❶ after performing "4-30 Adjustment: Bobbin winder".

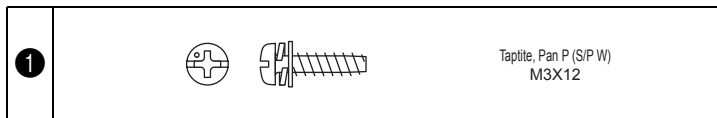


### 1-2 Attachment of Bobbin presser

1. Set the bobbin presser ① to the rear cover assy, and then tighten the screw ❶ temporarily.

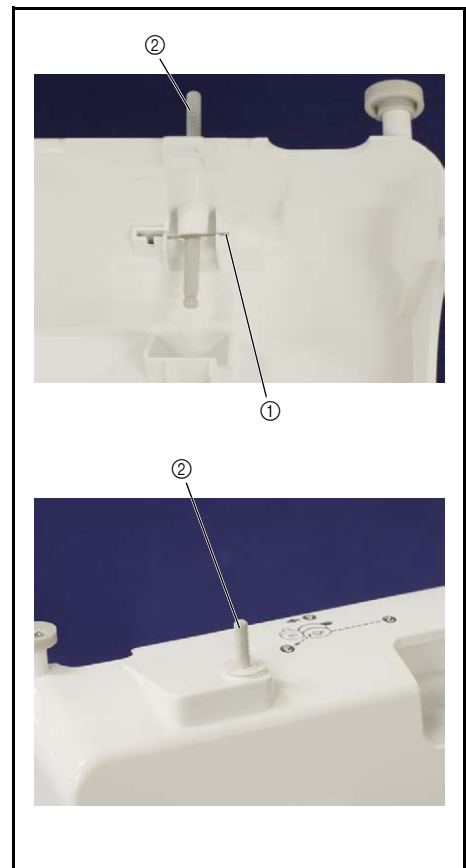
**\*Key point**

- Place the bobbin presser ① with the smaller end facing the rear.
- Fully tighten the screw ❶ after performing "4-30 Adjustment: Bobbin winder".



### 1-3 Attachment of Spool pin

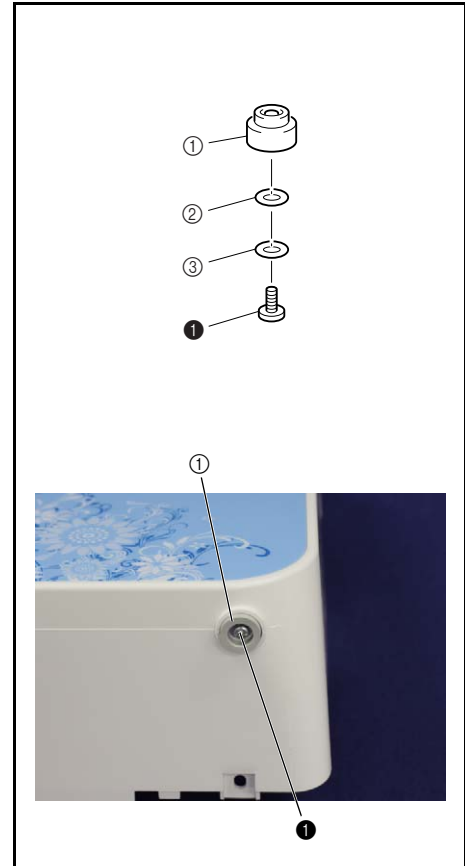
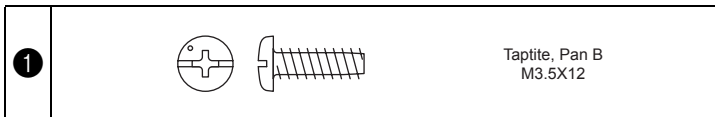
1. Set the spool pin spring ① to the positioning groove of the rear cover assy.
2. Insert the spool pin ② into the positioning hole of the rear cover assy while pulling the spool pin spring ①.



## 2 Assembly of Front cover assy

### 2-1 Attachment of Rubber cushion A

1. Set the rubber cushion A ①, the washer ② and the washer plain M3.5 ③ to the bottom side of the front cover assy, and then secure them with screw ④.

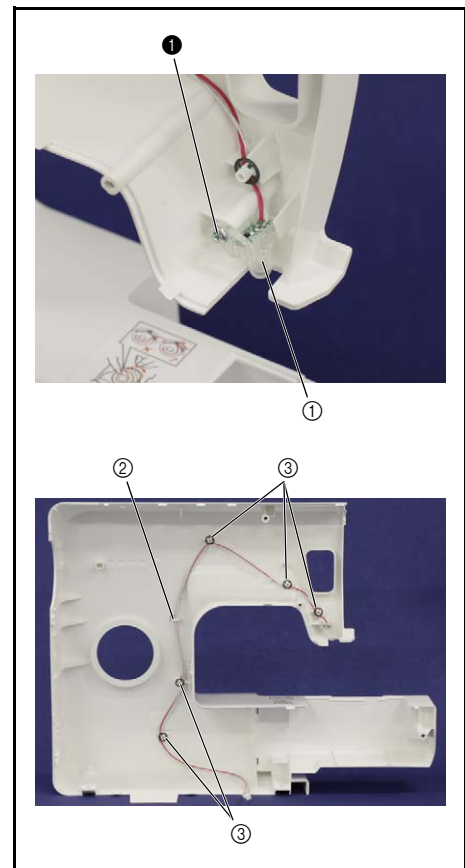
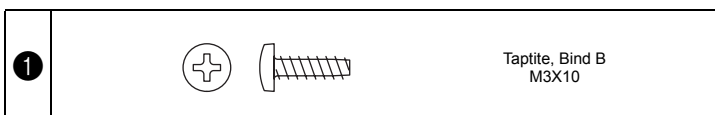


### 2-2 Attachment of LED lamp supply assy

1. Set the LED lamp supply assy ① to the inside of the front cover assy, and then secure it with the screw ④.
2. Pass the lead wire through the 5 guide parts and the hook part ② as shown in the right figure, and then attach the 5 retaining rings CS4 ③ to the 5 bosses of the 5 guide parts.

**\*Key point**

- Refer to "Special Instructions of Wiring".

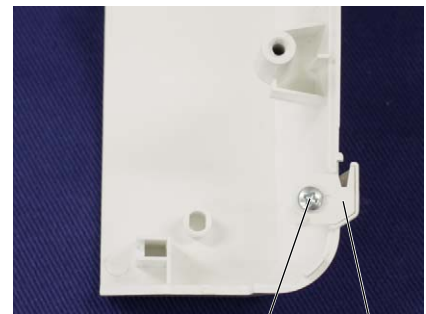


**3** Assembly of Face plate assy

1. Set the NT lower thread cutter ① to the face plate assy.
2. Set the face plate cutter holder ② to the face plate assy, and then secure it with the screw ①.

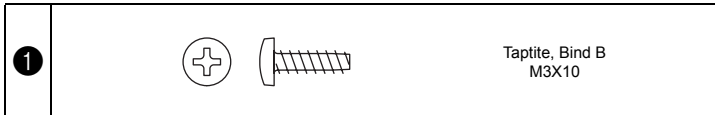


①



①

②



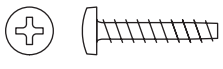

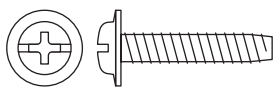
# 4 Adjustment

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Preparation	Removal of covers .....	4 - 2
Inspection	Needle point damage.....	4 - 4
Adjustment	Timing belt tension .....	4 - 5
	Motor belt tension.....	4 - 6
	Needle bar supporter stopper L position ....	4 - 8
	Needle bar supporter stopper R position ....	4 - 9
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	Three point needle drop .....	4 - 13
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	Needle drop position to presser foot hole (front/back).	4 - 15
	Inner rotary hook plate position .....	4 - 16
	Needle bar rising .....	4 - 17
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	Lower thread tension.....	4 - 33

This sewing machine stands up for oneself in the state that the front cover and rear cover are removed. There are feasible adjustments without covers, but recommend that adjust after removing the front cover and rear cover basically.

1. Turn off the power switch, and then disconnect the plug of the foot controller from the electrical outlet.
2. Disconnect the 3-pin connector of the foot controller from the 3P socket of the machine.
3. Remove the accessory table.
4. Remove the screw on the rear side of the machine, and then remove the face plate.
5. Remove the pattern selection dial.
6. Remove the screw ❶ and the 2 screws ❷ on the rear side of the machine.
7. Remove the 2 screws ❸ on the bottom side of the machine.

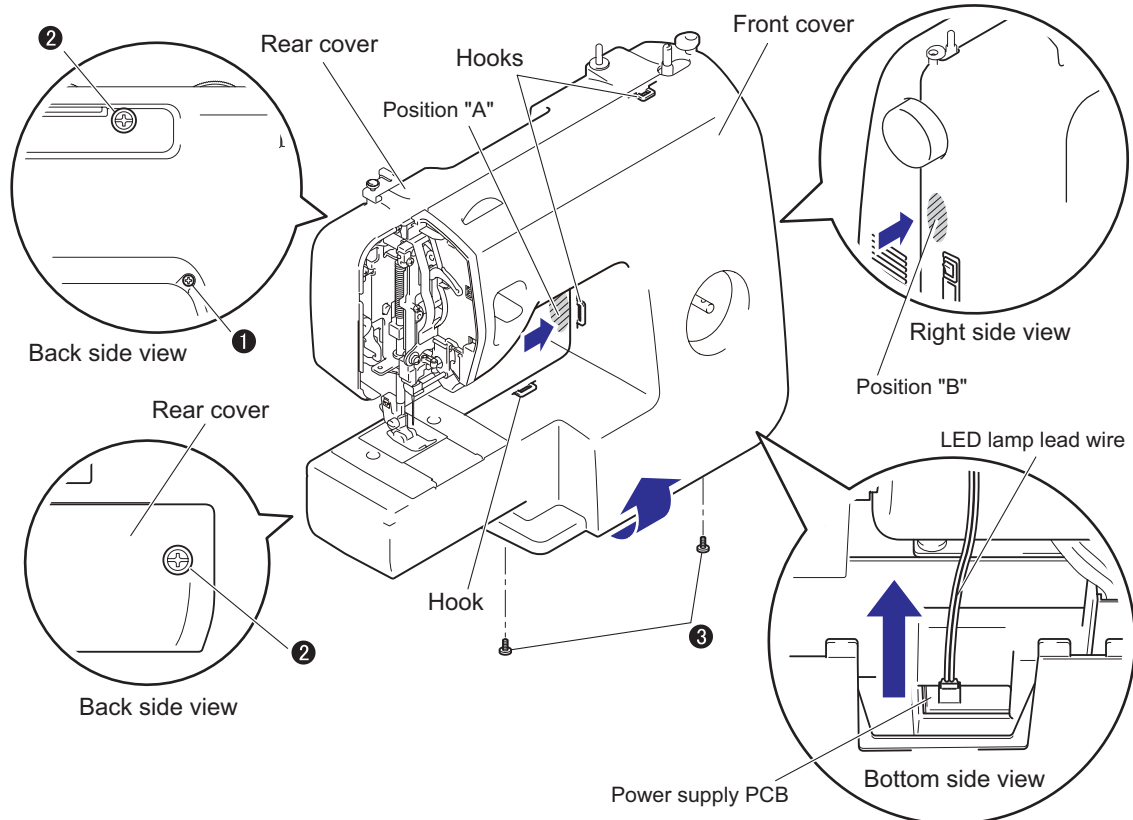
❶		Tapite, Bind P M3X16	❸		Screw, Pan (S/P washer) M4X10DB
❷		Tapite, Cup P M4X20			

8. Release the 3 hooks of the front cover from the rear cover by pushing the position "A" and the position "B" on the rear cover.

**\*Key point**

- There are 3 hooks on the front cover. (Refer to the following figure.)

9. Disconnect the connector of the LED lamp lead wire on the bottom side of the front cover from the power supply PCB.
10. Remove the front cover.

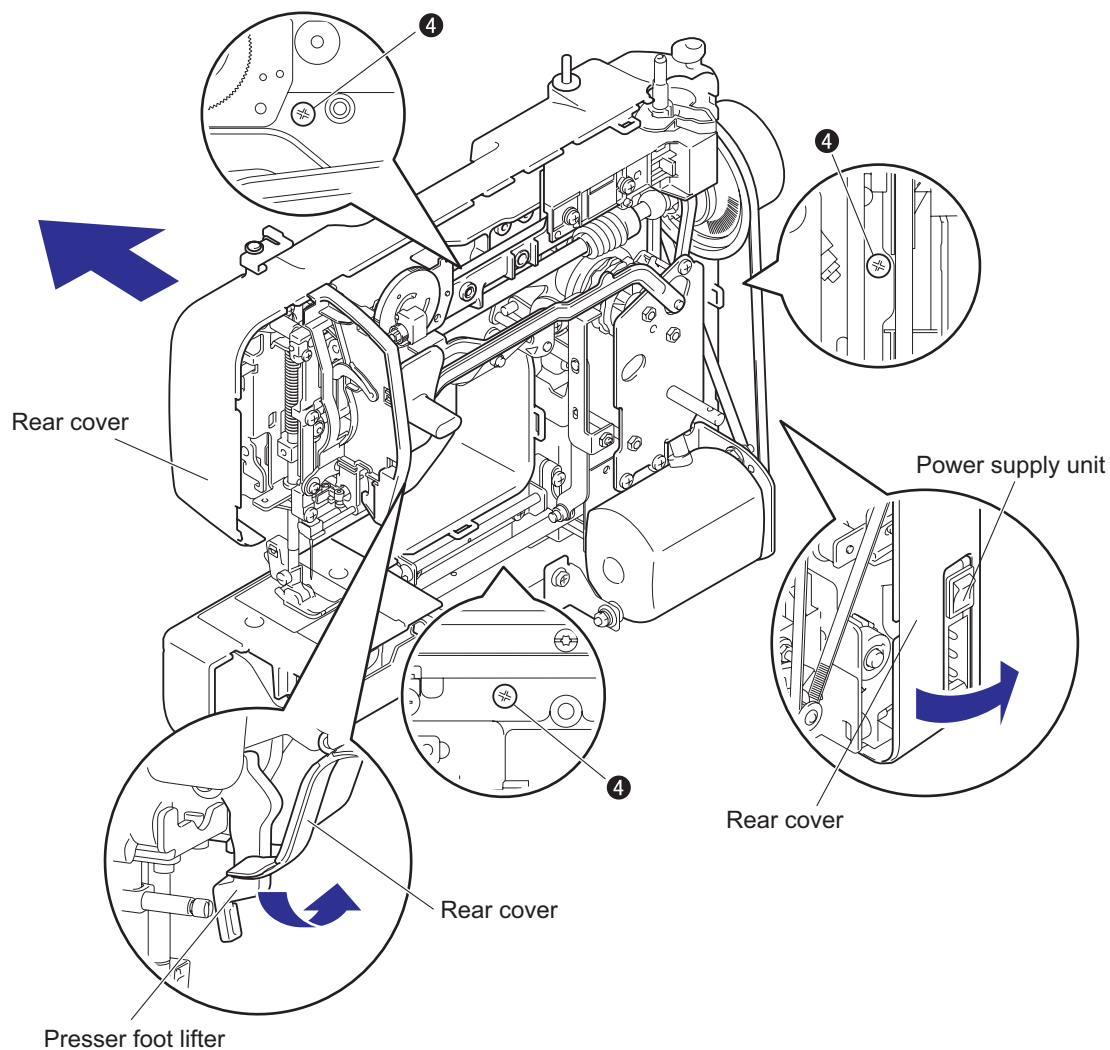
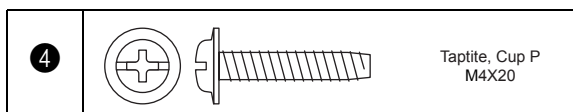


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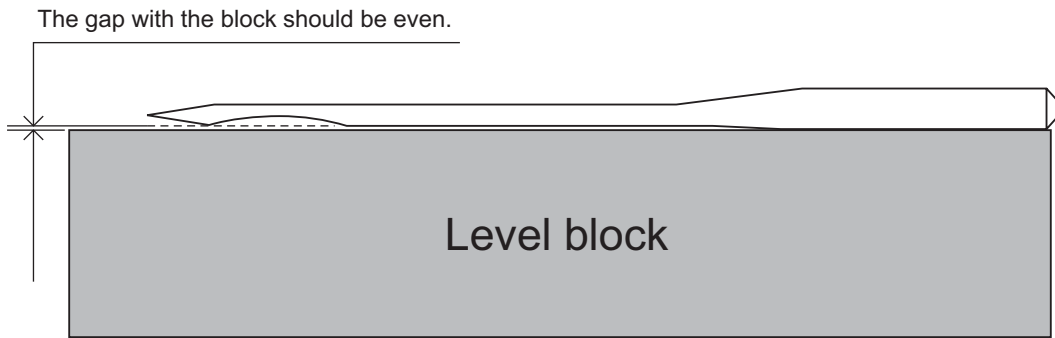
11. Lower the presser foot lifter.

12. Remove the 3 screws ④ on the front side of the arm bed, and then remove the rear cover.

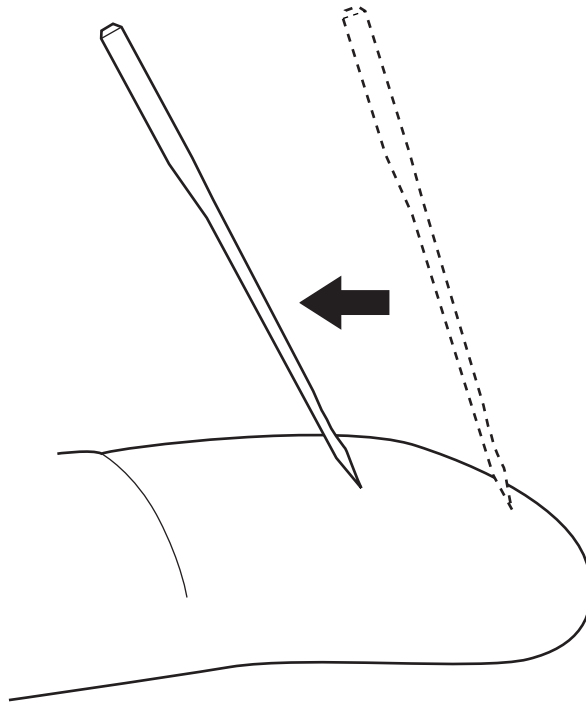




1. Put needle on a level block, and check a needle is not bent.



2. Slide a needle on your finger and check if moves smoothly (no damage on needle point).

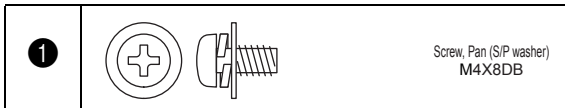
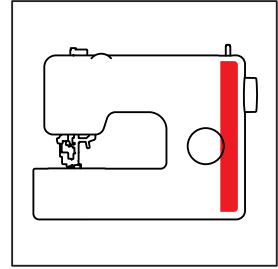


## [Standard]

The belt slack should be 2.5 to 3 mm when pushing the center of the timing belt between the upper shaft pulley and the tension pulley with a force of 1.96 N (200g).

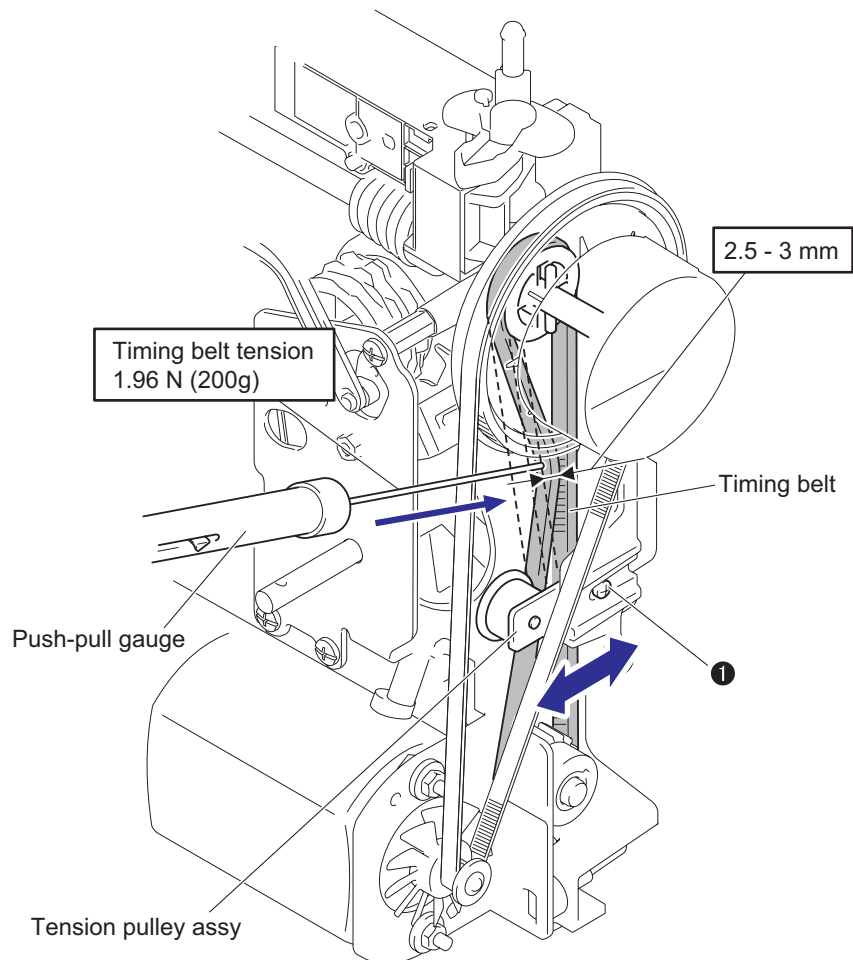
## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Loosen the screw ❶ of the tension pulley assy.
4. Move the tension pulley assy back and forth to adjust the tension of the timing belt.
5. Tighten the screw ❶ of the tension pulley assy to secure the tension pulley assy to the arm bed.



XC2277001

Push-pull gauge (5N)



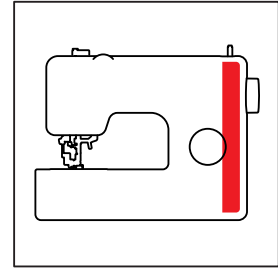
### ■ 120V specification

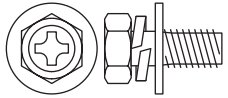
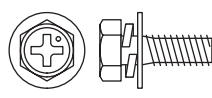
#### [Standard]

The belt slack should be 3.5 to 4.5 mm when pushing the center of the motor belt between the T pulley of the upper shaft and the T pulley of the motor with a force of 0.98 N (100g).

#### [Adjustment]

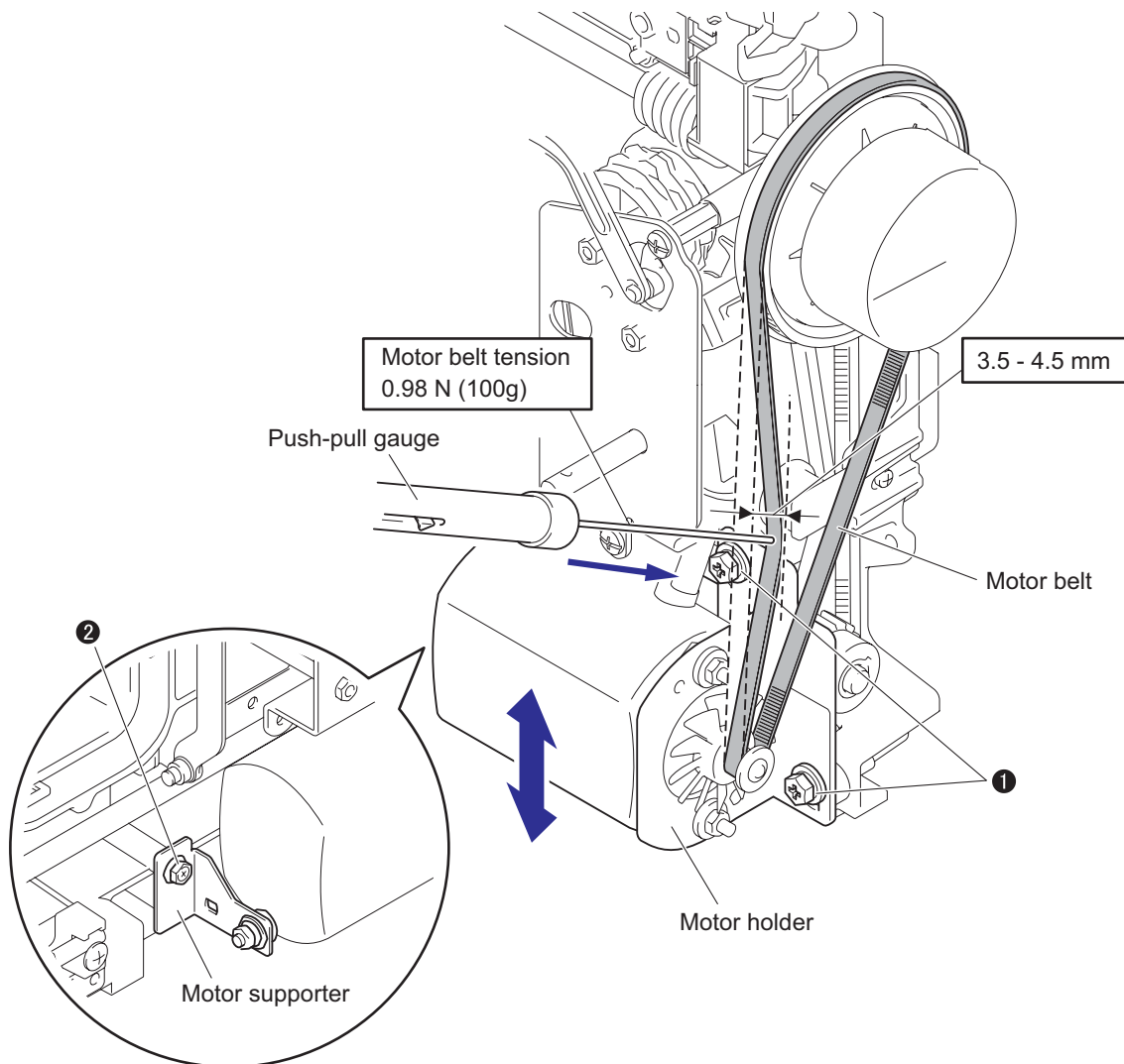
1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Loosen the 2 screws ❶ of the motor holder.
4. Loosen the screw ❷ of the motor supporter.
5. Move the motor holder up and down to adjust the tension of the motor belt.
6. Tighten the 2 screws ❶ of the motor holder to secure the motor holder to the arm bed.
7. Tighten the screw ❷ of the motor supporter to secure the motor holder to the arm bed.



❶		❷	
BOLT. (S/P WASHER) M5X12		Upset 4X12DB	

XC2277001

Push-pull gauge (5N)



<In case of 220 to 240V specification, refer to next page.>

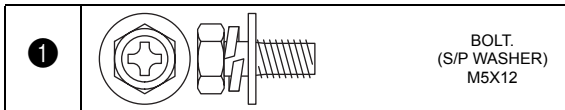
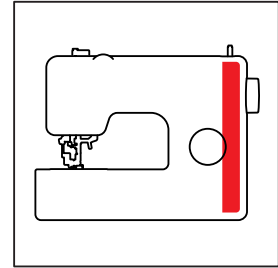
### ■ 220 to 240V specification

#### [Standard]

The belt slack should be 4.6 to 6 mm when pushing the center of the motor belt between the T pulley of the upper shaft and the T pulley of the motor with a force of 0.98 N (100g).

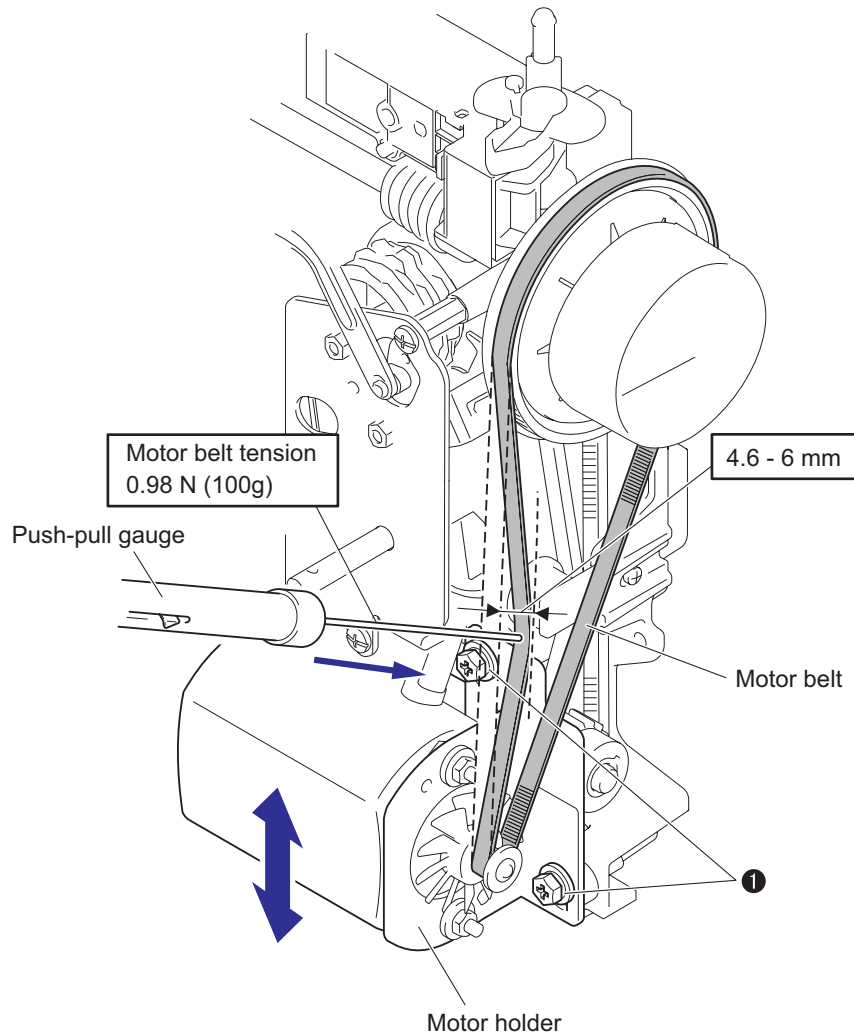
#### [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Loosen the 2 screws ❶ of the motor holder.
4. Move the motor holder up and down to adjust the tension of the motor belt.
5. Tighten the 2 screws ❶ of the motor holder to secure the motor holder to the arm bed.



XC2277001

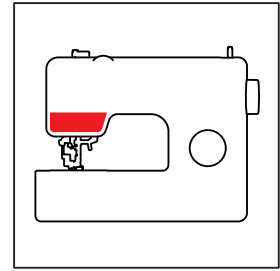
Push-pull gauge (5N)



<In case of 120V specification, refer to previous page.>

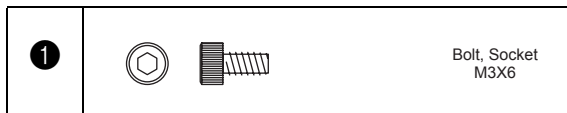
## [Standard]

At pattern selection dial [10] (zigzag stitch/stitch width: maximum), when the needle is dropped to the left side, the clearance between the needle bar supporter and the stopper L should be 0.3 to 0.6 mm.



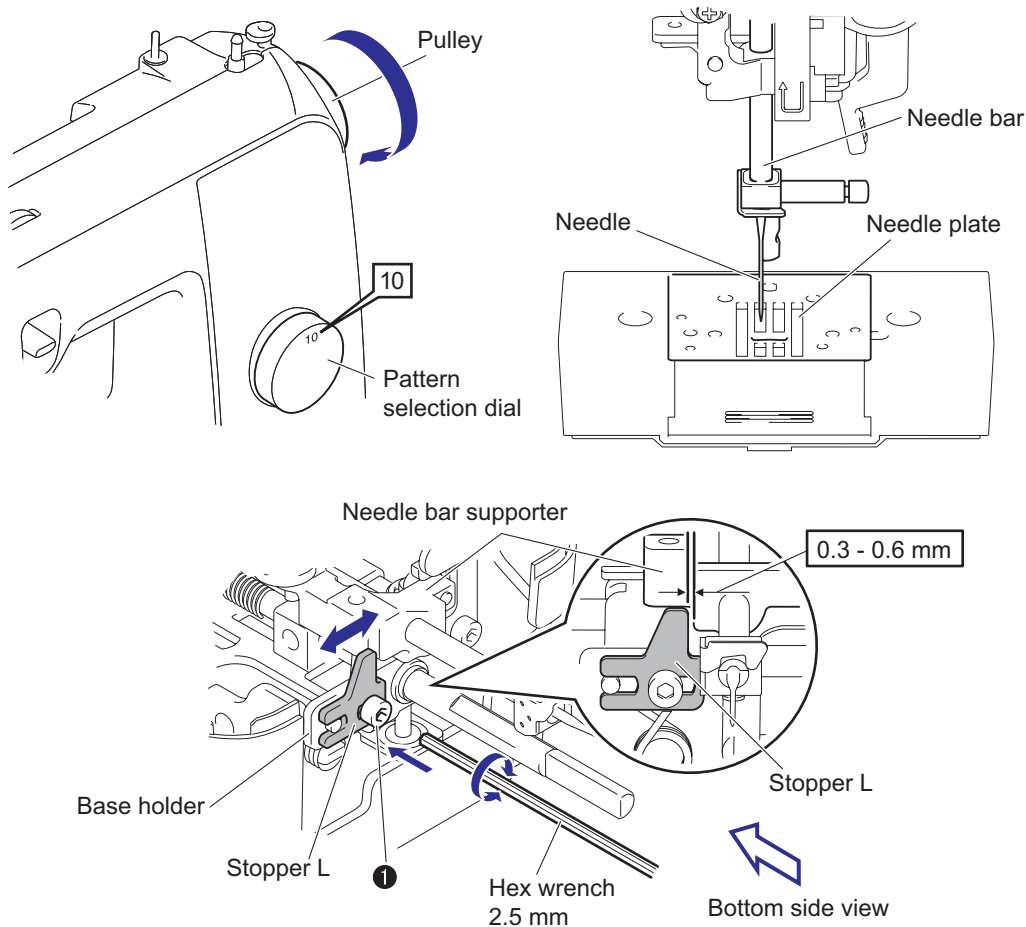
## [Adjustment]

1. Remove the face plate and the accessory table.
2. Remove the presser foot.
3. Attach the size 90/14 needle.
4. Turn the pattern selection dial until the [10] is the topmost position.
5. Turn the pulley by hand until the needle top comes to the needle plate surface. (Needle bar is left side.)
6. Loosen the screw ❶ of the stopper L.
7. Move the position of the stopper L left and right, and adjust the clearance between the needle bar supporter and the stopper L.
8. Tighten the screw ❶ of the stopper L to secure the stopper L to the base holder.



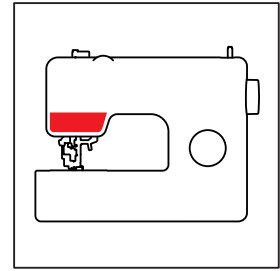
## [Confirmation]

Turn the pulley by hand until the needle top comes into the needle hole of the needle plate. (Needle bar is left side.) And then check that the needle top does not contact the needle plate when the needle bar supporter contacts the stopper L by pushing the needle bar to the left side.



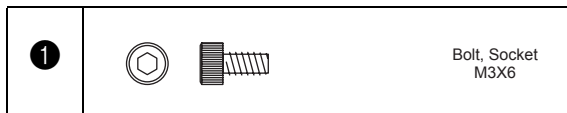
## [Standard]

At pattern selection dial [10] (zigzag stitch/stitch width: maximum), when the needle is dropped to the right side and the pattern selection dial is turned, the minimum clearance between the needle bar supporter and the stopper R should be 0 to 0.2 mm.



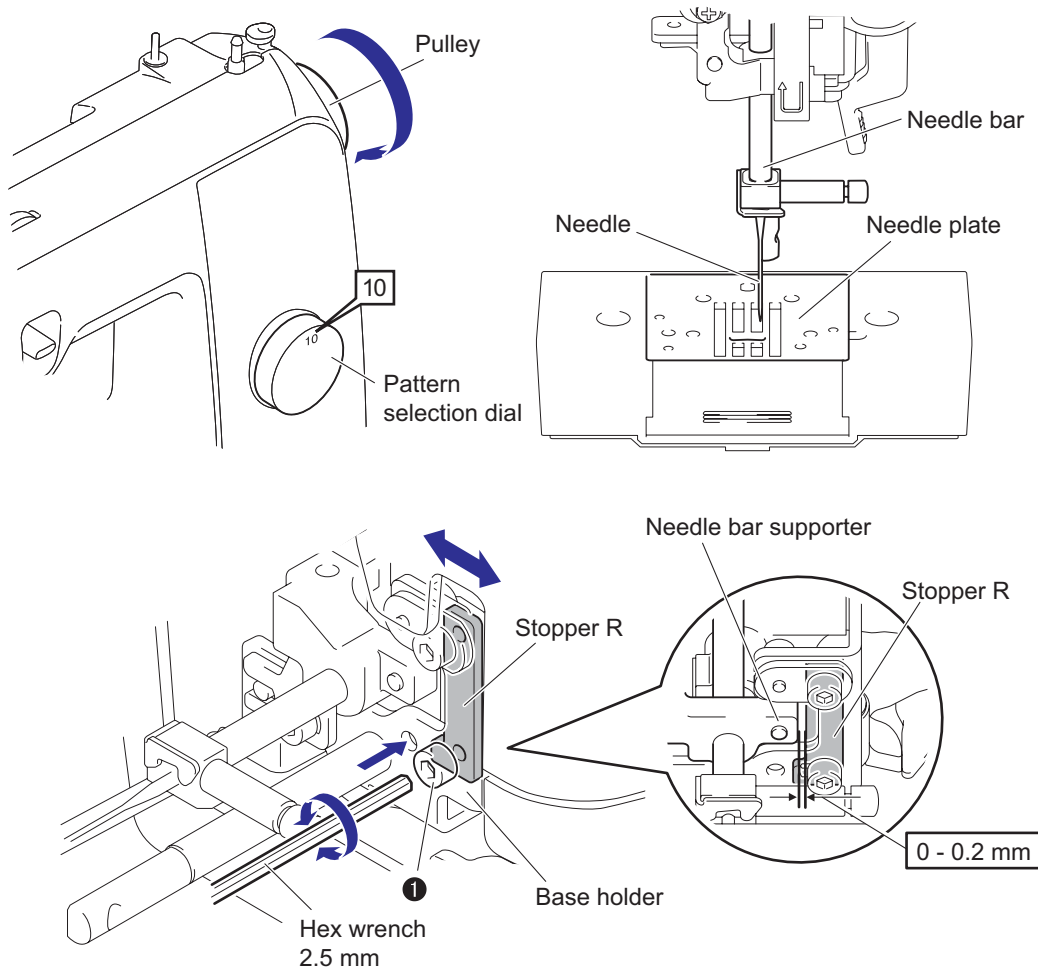
## [Adjustment]

1. Remove the face plate and the accessory table.
2. Remove the presser foot.
3. Attach the size 90/14 needle.
4. Turn the pattern selection dial until the [10] is the topmost position.
5. Turn the pulley by hand until the needle top comes to the needle plate surface. (Needle bar is right side.)
6. Loosen the screw ❶ of the stopper R.
7. Move the position of the stopper R (screw ❶) left and right, and adjust the minimum clearance between the needle bar supporter and the stopper R when the pattern selection dial is turned.
8. Tighten the screw ❶ of the stopper R to secure the stopper R to the base holder.



## [Confirmation]

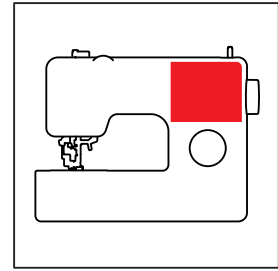
Turn the pulley by hand until the needle top comes into the needle hole of the needle plate. (Needle bar is right side.) And then check that the needle top does not contact the needle plate when the needle bar supporter contacts the stopper R by pushing the needle bar to the right side.



## [Standard]

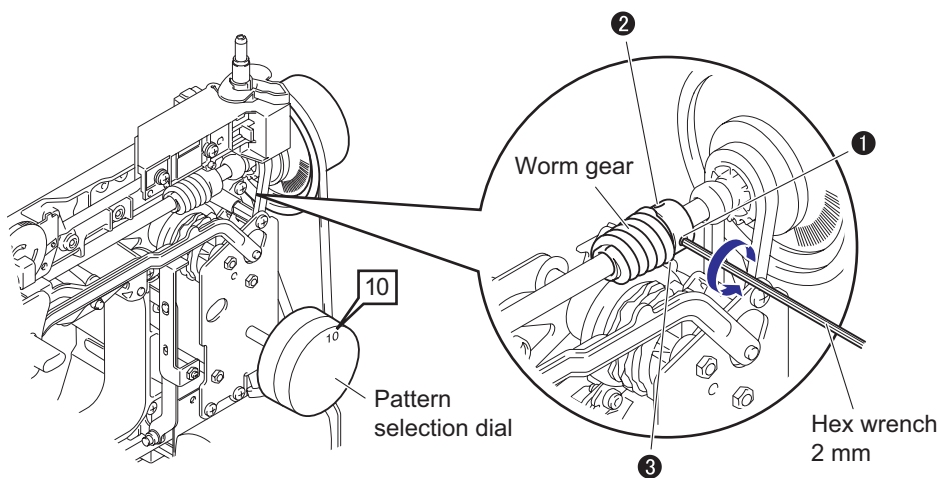
At pattern selection dial [10] (zigzag stitch/stitch width: maximum), when the needle bar starts oscillating movement from left to right, the distance from the needle plate top surface to the needle top should be  $5 \pm 0.4$  mm (4.6 to 5.4 mm).

\* When the needle bar stops oscillating movement from left to right, the distance from the needle plate top surface to the needle top should be  $7 \pm 0.4$  mm (6.6 to 7.4 mm).



## [Adjustment]

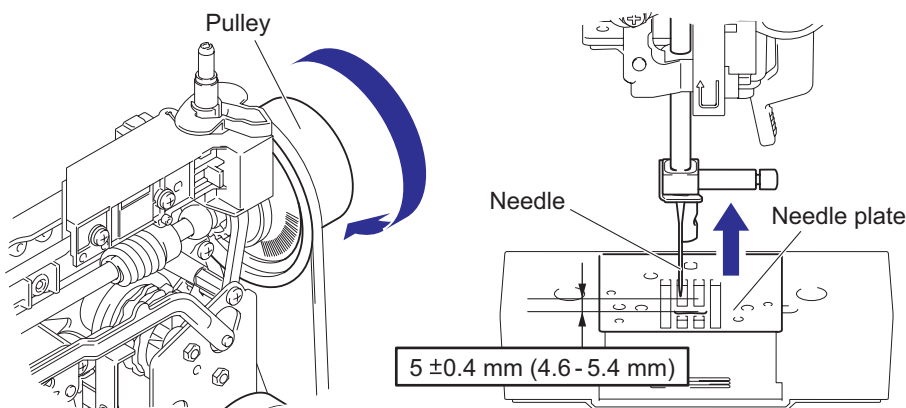
1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Remove the presser foot.
4. Attach the size 90/14 needle.
5. Attach the pattern selection dial.
6. Turn the pattern selection dial until the [10] is the topmost position.



7. Loosen the screws ①, ② and ③ of the worm gear.



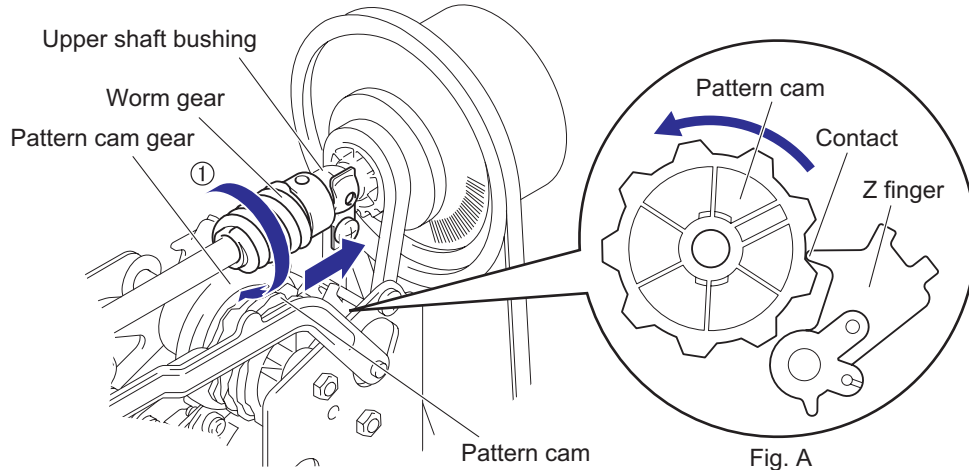
8. Turn the pulley by hand to the direction of the arrow and lower the needle bar to the lowest position, and then raise the needle bar until the distance from the needle plate top surface to the needle top is 5 mm.



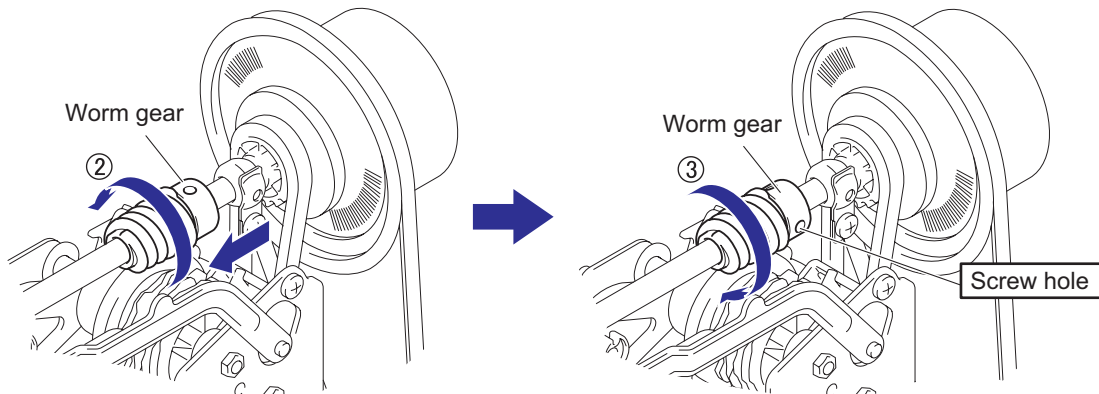
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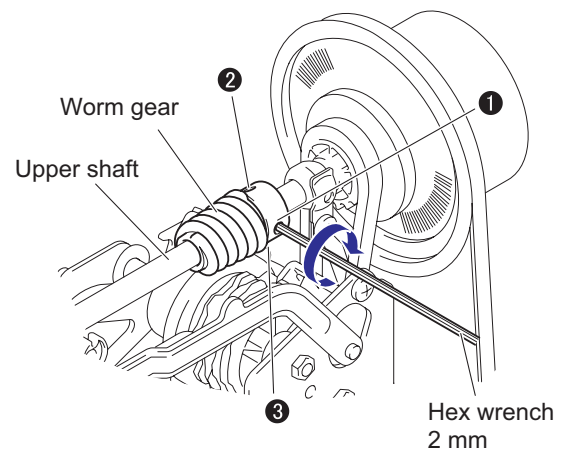
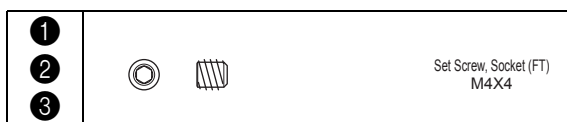
9. Move the worm gear to the right side until the right side surface of the worm gear contacts to the upper shaft bushing by turning the worm gear by hand to the direction of the arrow ①.
10. Turn the worm gear by hand to the direction of the arrow ① to turn the pattern cam gear until the Z finger and the pattern cam in the state shown in Fig. A. (Starting position of oscillating from left to right)



11. Move the worm gear to the left side until feels a response by turning the worm gear by hand to the direction of the arrow ②.
12. Move the screw hole of the worm gear to the position in which facing directly frontward by turning the worm gear by hand to the direction of the arrow ③ (10 to 60 degrees).



13. Tighten the screw ① of the worm gear to secure the worm gear to the upper shaft.
14. Turn the pulley by hand and tighten the screws ②, ③ of the worm gear, and then retighten the screw ①.



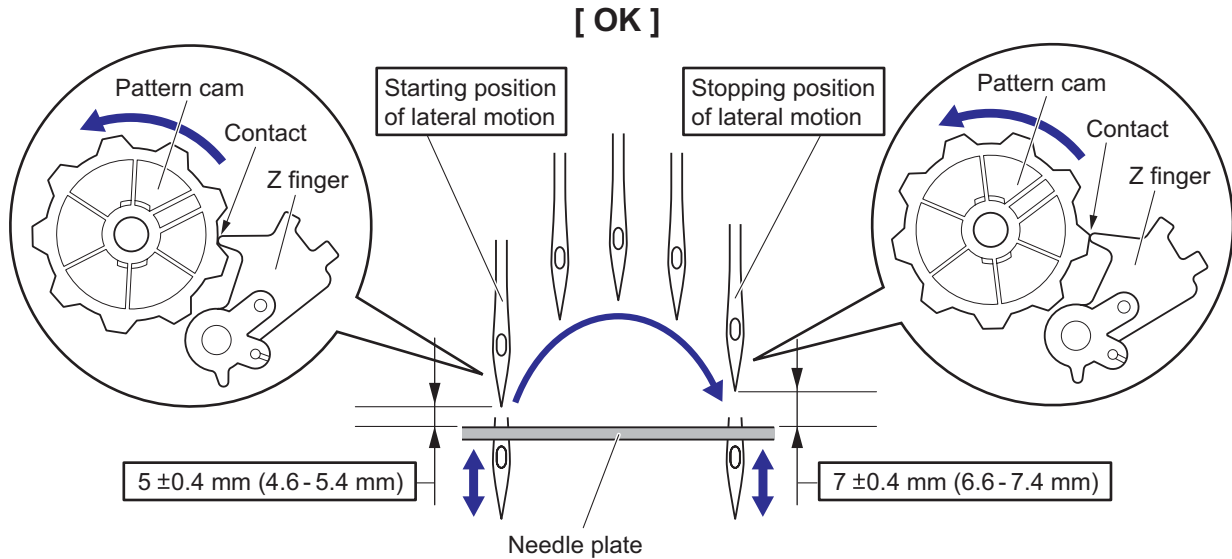
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[Confirmation]

When the pulley is turned by hand from the rear to the front, check that the needle flow from left to right is normal. And check that the upper shaft rotation is not too heavy.



\* The needle does not move to left/right direction under the needle plate.

**[ NG ]**

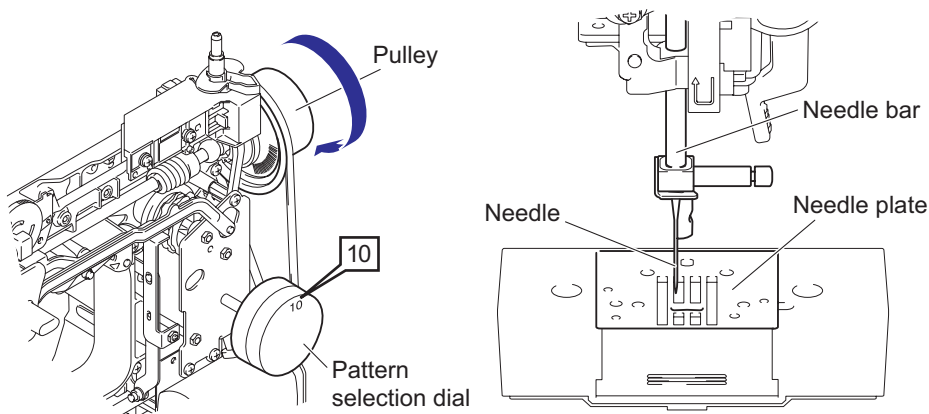
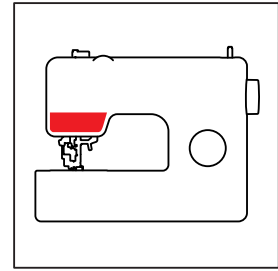
\* The needle moves to left/right direction under the needle plate.

## [Standard]

At pattern selection dial [10] (zigzag stitch/stitch width: maximum), the left and right needle drop position should be the same to the center of the needle hole.

## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Remove the presser foot.
4. Attach the size 90/14 needle.
5. Attach the pattern selection dial.
6. Turn the pattern selection dial until the [10] is the topmost position.
7. Turn the pulley by hand until the needle top comes to the needle plate surface. (Needle bar is left side.)



8. Loosen the screw ❶ of the zigzag adjusting nut.
9. Adjust the left/right needle drop position so that the same to the center of the needle hole by turning the zigzag adjusting nut with a spanner.

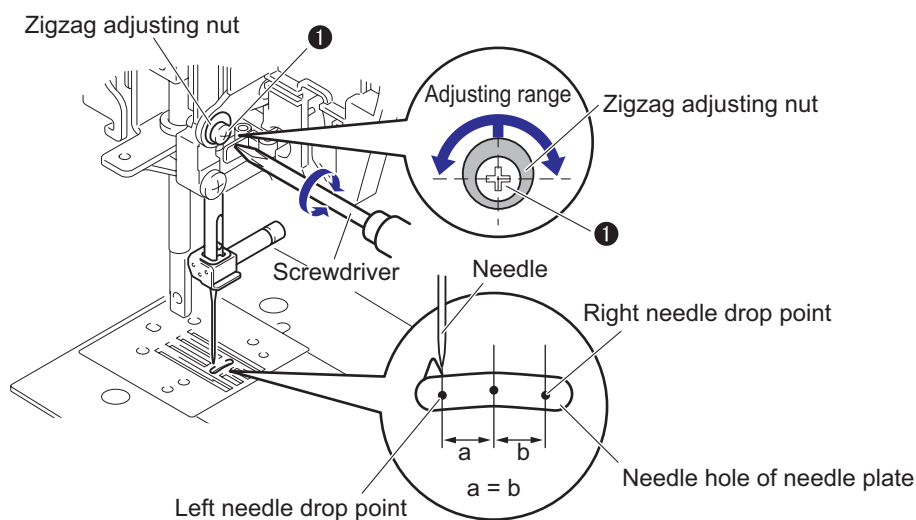
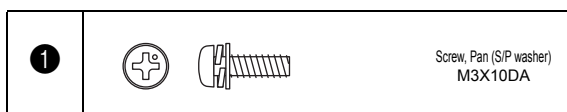
**\*Key point**

- Adjust it within the range where the large side of the eccentric amount of the zigzag adjusting nut is upper side.

10. Tighten the screw ❶ of the zigzag adjusting nut to secure the zigzag adjusting nut.

**\*Key point**

- When tightening the screw ❶ of the zigzag adjusting nut, keep the zigzag adjusting nut from moving.

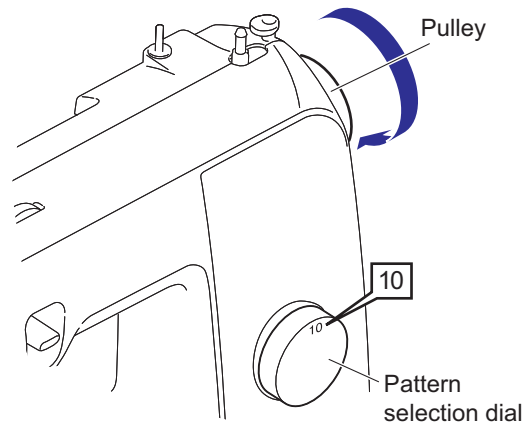
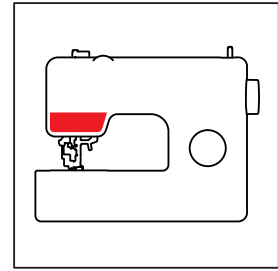


## [Standard]

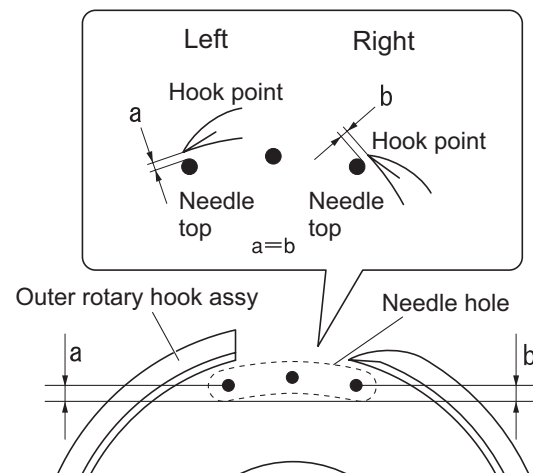
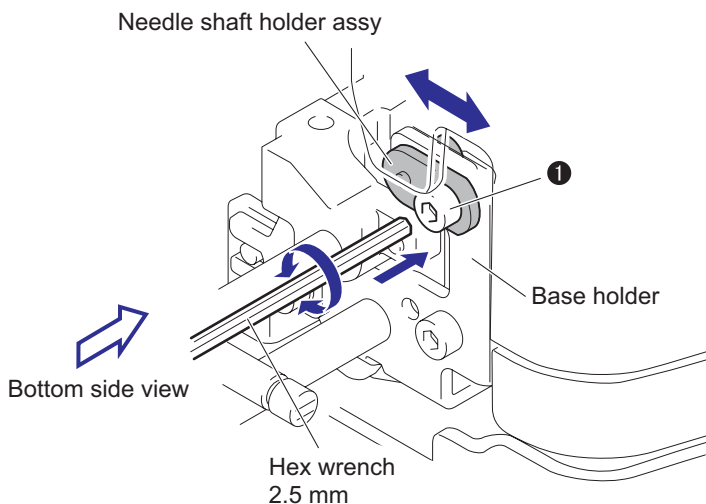
At pattern selection dial [10] (zigzag stitch/stitch width: maximum), the left and right needle drop position should be the same to the center of the needle hole.

## [Adjustment]

1. Remove the face plate and the accessory table.
2. Remove the presser foot.
3. Attach the size 90/14 needle.
4. Turn the pattern selection dial until the [10] is the topmost position.

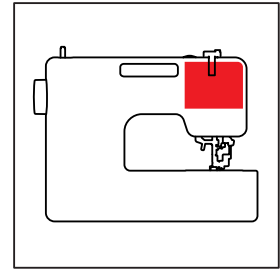


5. Loosen the screw ❶ of the needle shaft holder assy.
6. Adjust the left/right needle drop position so that the same to the center of the needle hole by moving the position of the needle shaft holder assy to the left and right.
7. Tighten the screw ❶ of the needle shaft holder assy to secure the needle shaft holder assy to the base holder.



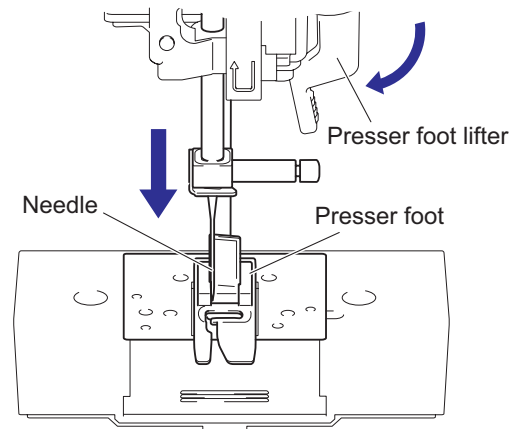
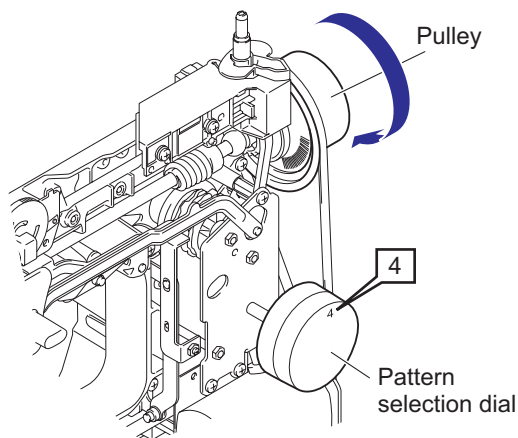
## [Standard]

At pattern selection dial [4] (straight stitch/center base line), when the needle top is dropped into the needle hole of the presser foot, the clearance between the needle hole of the presser foot and the needle top should be the same in the front/back direction.



## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Attach the size 90/14 needle.
4. Attach the pattern selection dial.
5. Turn the pattern selection dial until the [4] is the topmost position.
6. Lower the presser foot lifter and lower the presser foot.
7. Turn the pulley by hand, and drop the needle top into the needle hole of the presser foot.

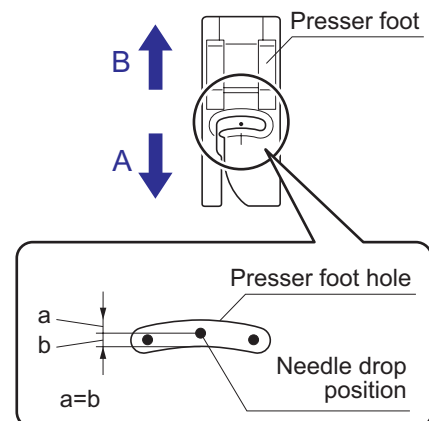
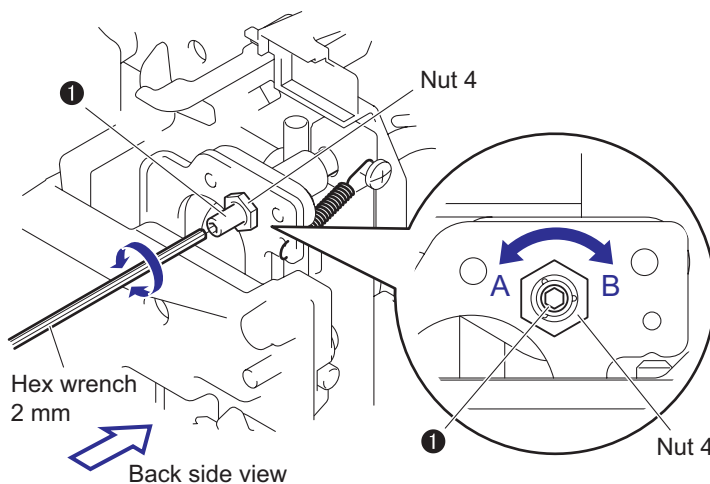
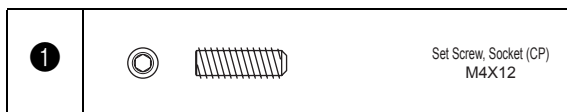


8. Loosen the nut 4 of the screw ❶ on the upper side of the needle-presser module.
9. Turn the screw ❶, and adjust the clearance between the needle hole of the presser foot and the needle top in the front/back direction.

## \*Key point

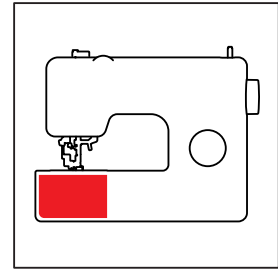
- Loosen the screw ❶. (turn to the direction of "A") → Move the needle to the front side. (A)
- Tighten the screw ❶. (turn to the direction of "B") → Move the needle to the rear side. (B)

10. Tighten the nut 4 of the screw ❶ to secure the screw ❶.



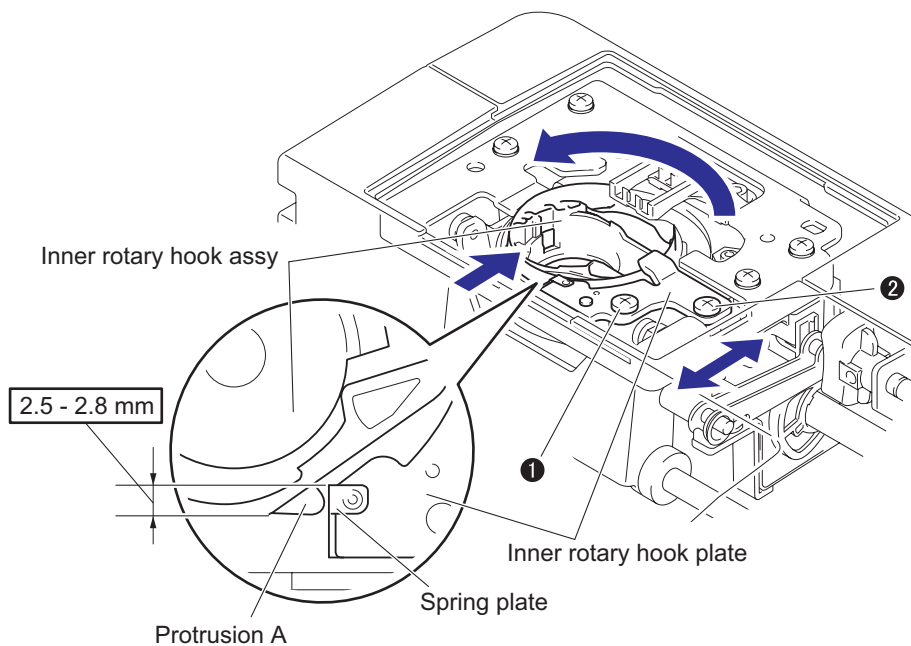
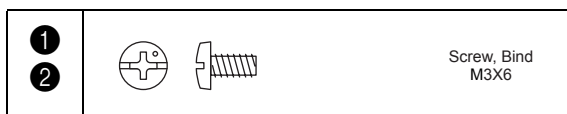
## [Standard]

When the inner rotary hook assy is pushed to the needle side (from front to rear), the overlap between the spring plate of the inner rotary hook plate and the protrusion A of the inner rotary hook assy in the front/back direction should be 2.5 to 2.8 mm.



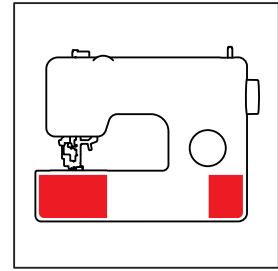
## [Adjustment]

1. Remove the needle plate assy.
2. Turn the inner rotary hook assy counterclockwise to contact the protrusion A of the inner rotary hook assy to the spring plate of the inner rotary hook plate, and then push the inner rotary hook assy to the needle side (from front to rear).
3. Loosen the screws ① and ② of the inner rotary hook plate.
4. Move the inner rotary hook plate to front/back around on the screw ②, and adjust the overlap between the spring plate of the inner rotary hook plate and the protrusion A of the inner rotary hook assy.
5. Tighten the screws ① and ② of the inner rotary hook plate in this order, to secure the inner rotary hook plate to the feed holder.



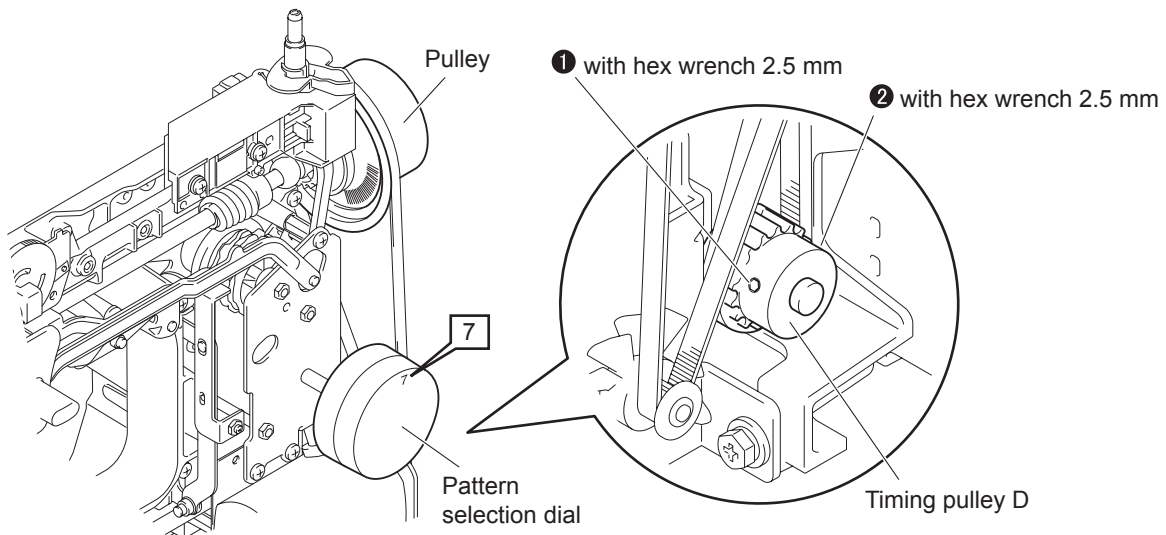
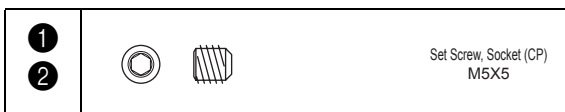
## [Standard]

At pattern selection dial [7] (straight stitch/left base line), the right edge of the needle matches up with the outer rotary hook point when the needle bar is raised 3.1 ±0.2 mm (2.9 to 3.3 mm) from its lowest point.

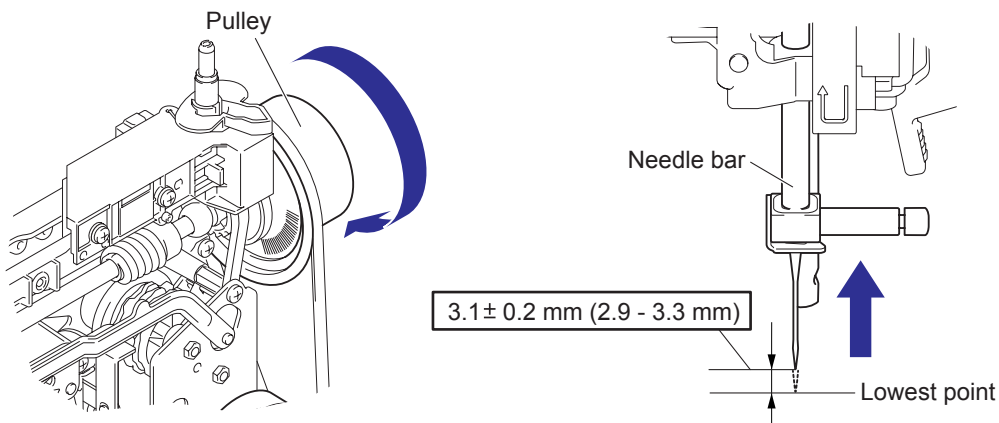


## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Remove the needle plate assy, the presser foot and the inner rotary hook assy.
4. Attach the size 90/14 needle.
5. Attach the pattern selection dial.
6. Turn the pattern selection dial until the [7] is the topmost position.
7. Loosen the screws ① and ② of the timing pulley D.



8. Raise the needle bar up 3.1 mm from its lowest point by turning the pulley by hand from the rear to the front.



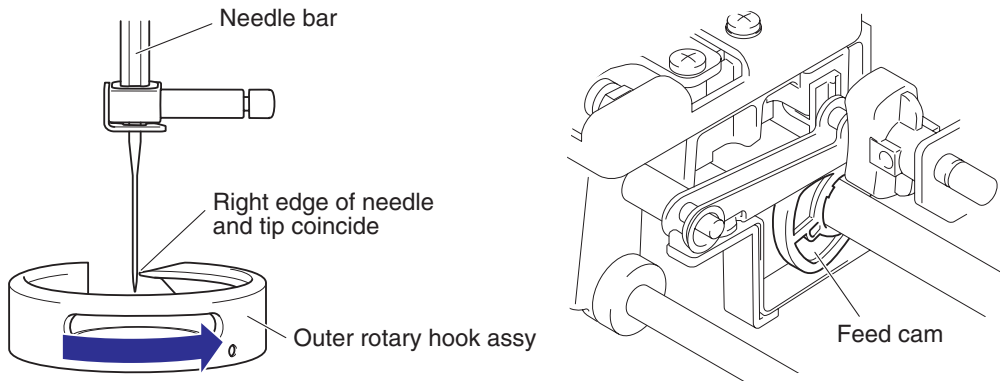
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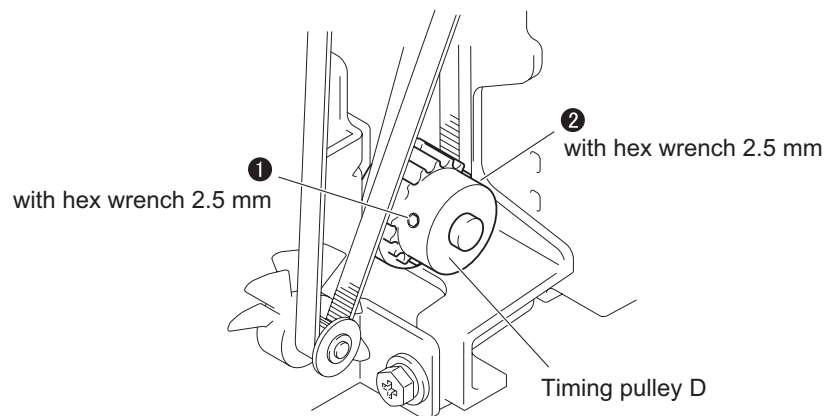
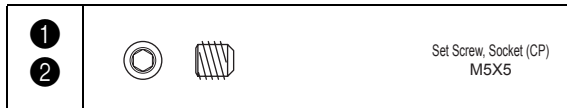
9. Match up the right edge of the needle with the outer rotary hook point by turning the outer rotary hook assy counterclockwise by hand.

**\*Key point**

- When the right edge of the needle matches up with the outer rotary hook point, the large side of the eccentric amount of the feed cam of the lower shaft should be facing directly forward.



10. Tighten the screws ① and ② of the timing pulley D to secure the timing pulley D to the lower shaft.

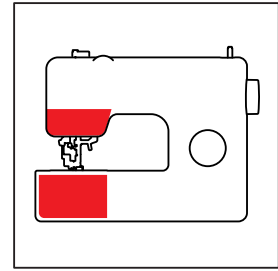


[Confirmation]

When the needle is lowered to the lowest point by turning the pulley by hand, check that the feed dog is lowered.

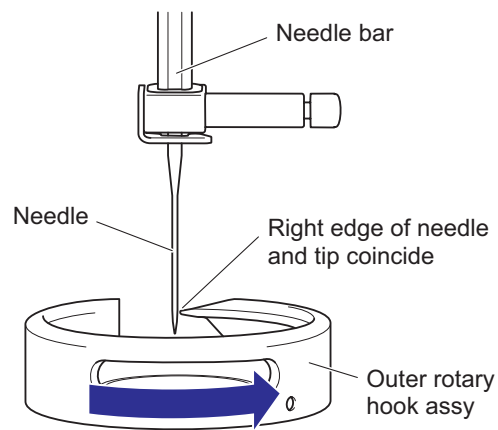
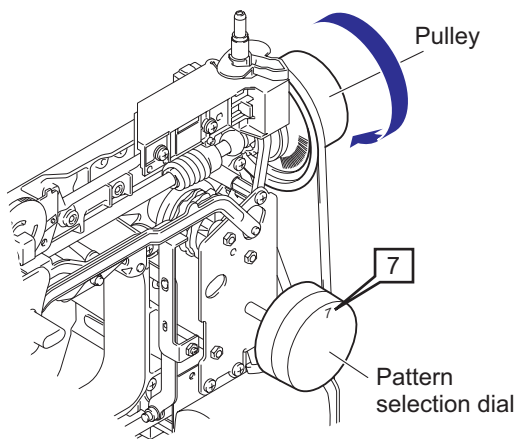
## [Standard]

At pattern selection dial [7] (straight stitch/left base line), the gap between the top of needle eye and the lower end of the outer rotary hook point in the up/down direction should be  $1.2 \pm 0.2$  mm (1 to 1.4 mm) when the right edge of the needle matches up with the outer rotary hook point.



## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Remove the needle plate assy, the presser foot and the inner rotary hook assy.
4. Attach the size 90/14 needle.
5. Attach the pattern selection dial.
6. Turn the pattern selection dial until the [7] is the topmost position.
7. Match up the right edge of the needle with the outer rotary hook point by turning the pulley by hand from the rear to the front.

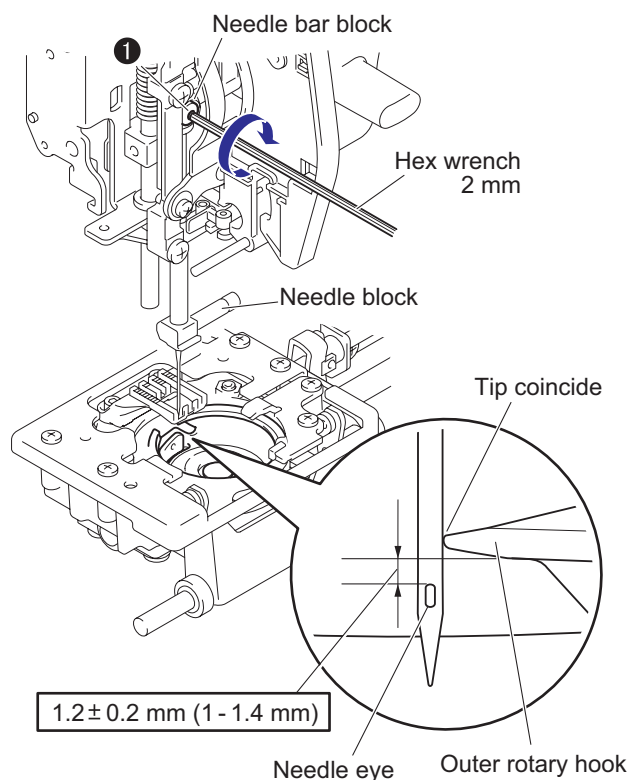


8. Loosen the screw ❶ of the needle bar block.
9. Move the needle bar up and down, and adjust the gap between the top of needle eye and the lower end of the outer rotary hook point.

**\*Key point**

- When moving the needle bar up and down, the needle bar block do not be diagonal for the machine.

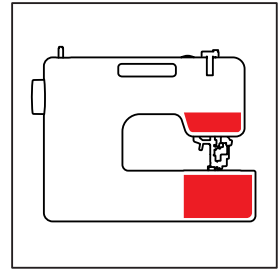
10. Tighten the screw ❶ of the needle bar block to secure the needle bar.





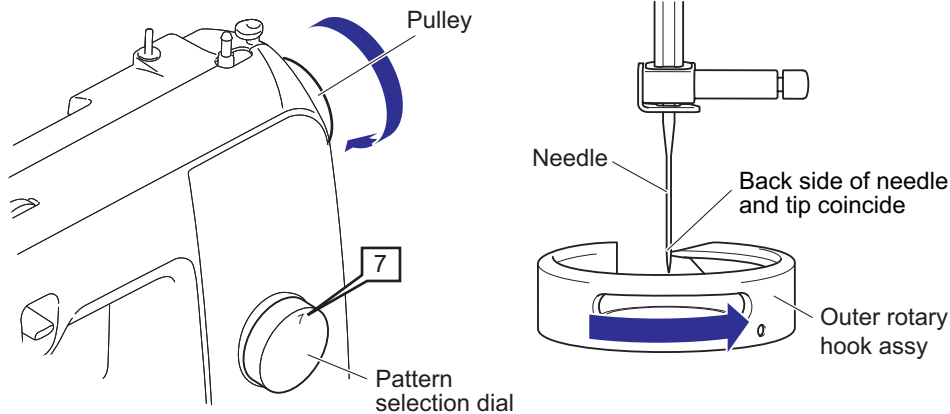
## [Standard]

At pattern selection dial [7] (straight stitch/left base line), the clearance between the scarf of the needle and the outer rotary hook point should be 0.15 to 0.3 mm when the rear side of the needle aligns with the outer rotary hook point.



## [Adjustment]

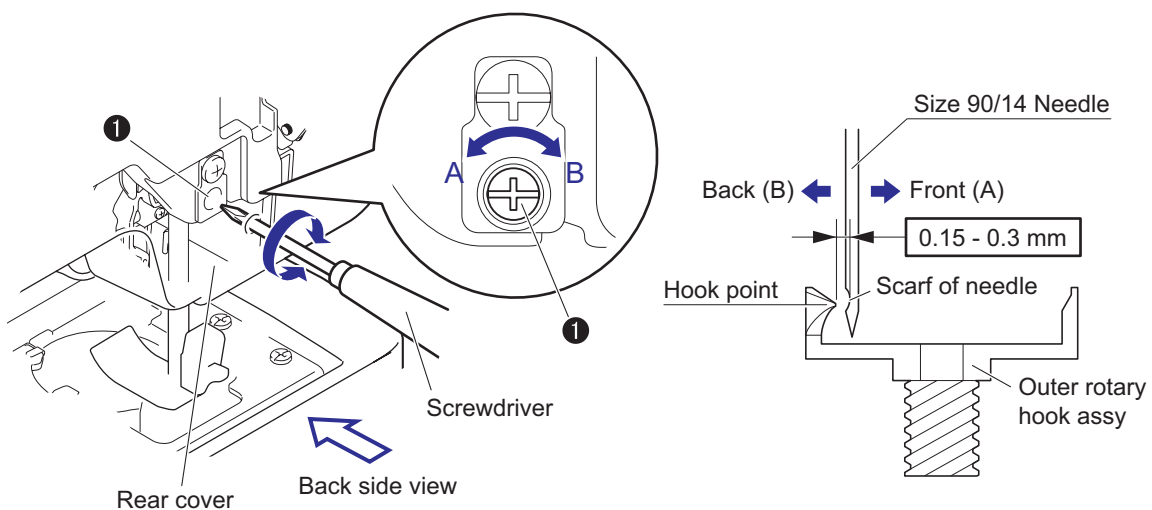
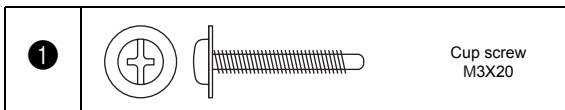
1. Remove the needle plate assy, the presser foot and the inner rotary hook assy.
2. Attach the size 90/14 needle.
3. Turn the pattern selection dial until the [7] is the topmost position.
4. Turn the pulley by hand until the outer rotary hook point aligns with the back side of the needle.



5. Insert a screwdriver into the hole of the rear cover, adjust the clearance between the scarf of the needle and the outer rotary hook point by turning the screw ①.

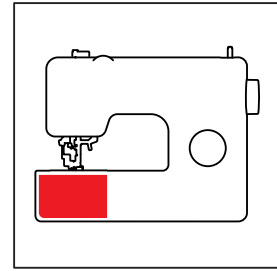
## \*Key point

- Loosen the screw ①. (turn to the direction of "A") → Move the needle to front side. (needle clearance is larger)
- Tighten the screw ①. (turn to the direction of "B") → Move the needle to rear side. (needle clearance is smaller)



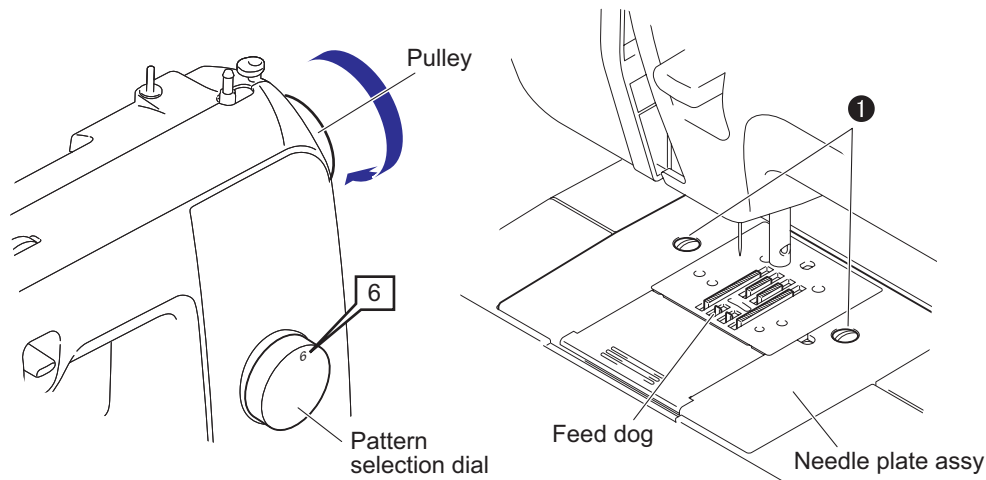
## [Standard]

- ① At pattern selection dial [6] (straight stitch/center base line/feed length: maximum), the minimum clearance between the front of the feed dog and the needle plate should be 0.6 to 1.3 mm.
- ② The left and right clearance between the feed dog and the needle plate should be the same.



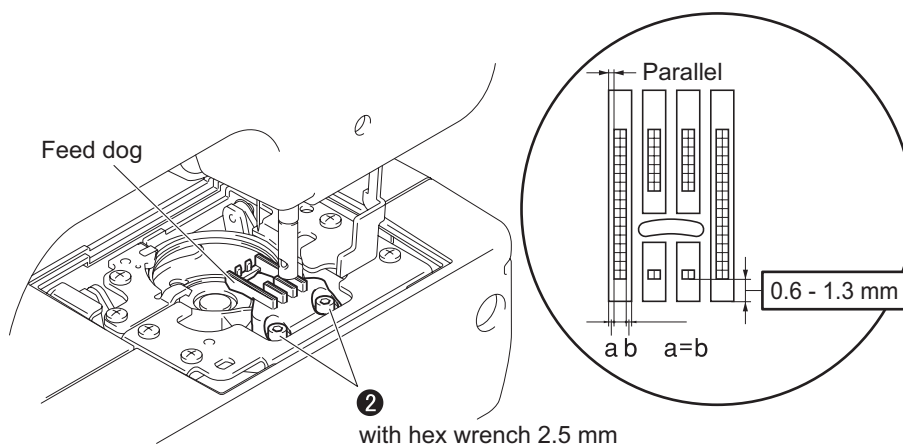
## [Adjustment]

1. Remove the presser foot.
2. Turn the pattern selection dial until the [6] is the topmost position.
3. Turn the pulley by hand and move the feed dog to the front position.
4. Remove the 2 screws ① of the needle plate assy, and remove the needle plate assy.



5. Loosen the 2 screws ② of the feed dog. Set the needle plate assy temporarily, and adjust the position of the feed dog.
6. Tighten the 2 screws ② of the feed dog to secure the feed dog to the feed stand assy.
7. Tighten the 2 screws ① of the needle plate assy to secure the needle plate assy to the feed module.

①		Screw needle plate	②		Bolt, Socket M3X5
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## [Standard]

When the feed dog is its highest position, the feed dog height from the surface of the needle plate should be  $1 \pm 0.1$  mm (0.9 to 1.1 mm).

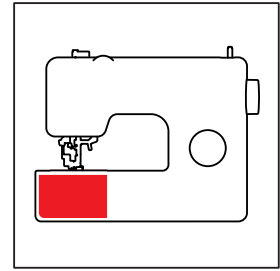
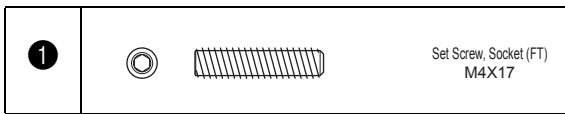
When the feed dog is its lowest position, the feed dog is 0.3 mm or more lower than the surface of the needle plate.

## [Adjustment]

1. Remove the presser foot.
2. When the needle plate assy is removed, attach the needle plate assy.
3. Turn the pulley by hand and move the feed dog to its highest position.
4. Insert the hex wrench into the hole of the needle plate, and adjust the feed dog height from the surface of the needle plate by turning the screw ①.

**\*Key point**

- Loosen the screw ①. (turn to the direction of "a") → The feed dog is lowered.
- Tighten the screw ①. (turn to the direction of "b") → The feed dog is raised.

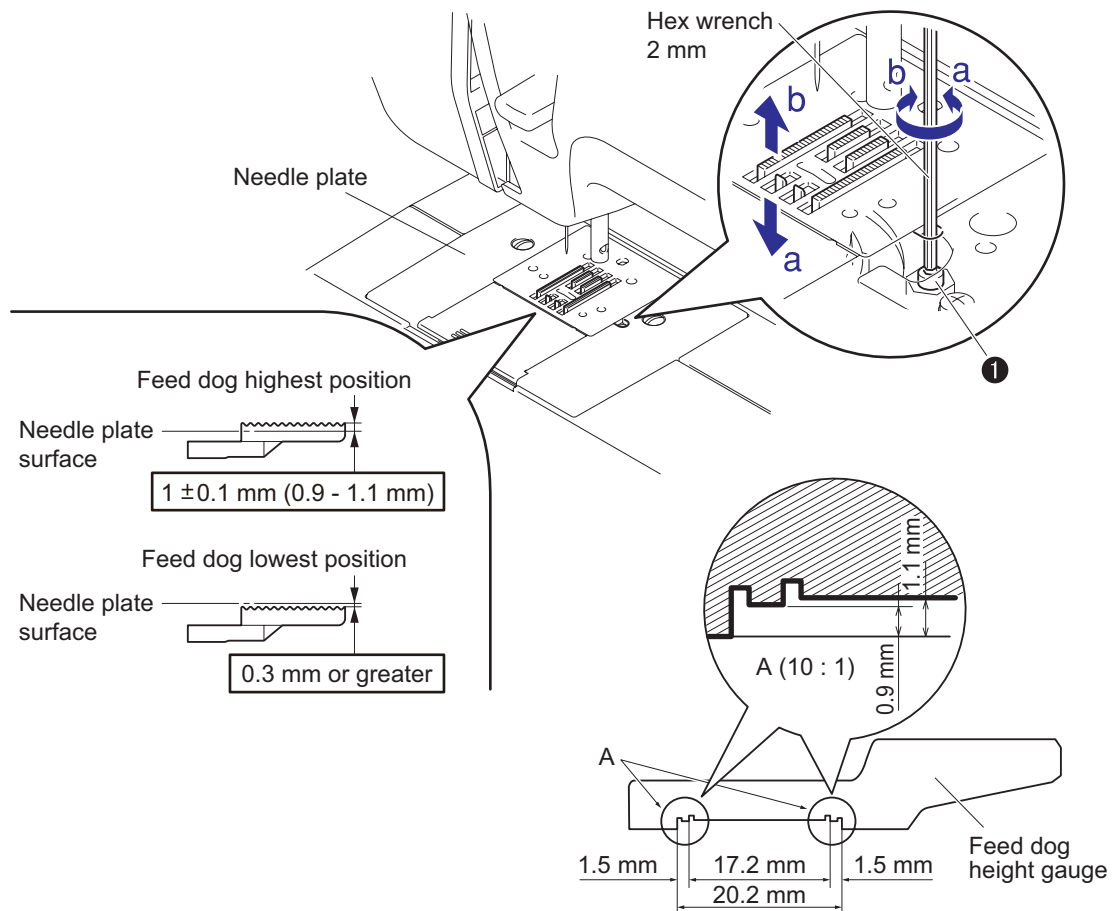


## [Confirmation]

When lower the feed dog by turning the pulley by hand, check that the feed dog is lower than the surface of the needle plate.

XC2278001

Feed dog height gauge



## [Standard]

When the presser foot is raised, the clearance between the bottom surface of the presser foot and the surface of the needle plate should be  $6.4 \pm 0.25$  mm (6.15 to 6.65 mm).

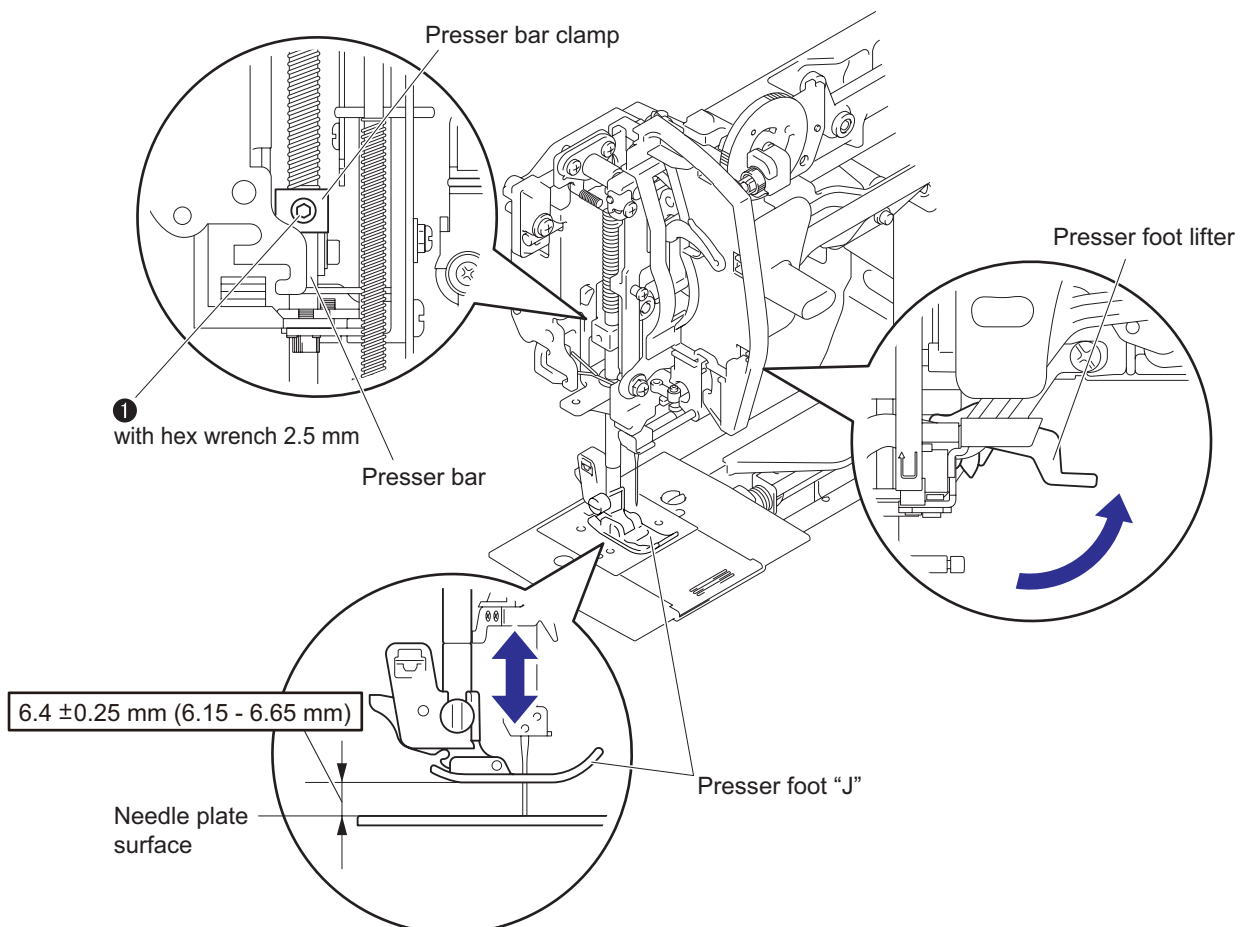
## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Attach the presser foot "J".
4. Raise the presser foot lifter to raise the presser foot "J".
5. Remove the screw ❶ of the presser bar clamp.
6. Move the presser bar (presser foot) up and down, and adjust the clearance between the bottom surface of the presser foot and the surface of the needle plate.

**\*Key point**

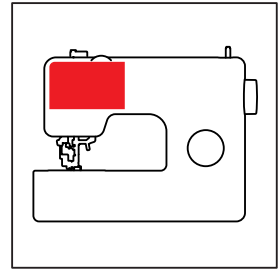
- When measuring the height of the presser foot "J", perform in the state that lower the feed dog than the surface of the needle plate.

7. Tighten the screw ❶ of the presser bar clamp to secure the presser bar.



## [Standard]

At upper tension-control dial [4], when the schappe spun thread #60 is passed through the tension disc and the presser foot lifter is lowered and the thread is pulled down slowly with the tension gauge, the thread tension should be 0.37 to 0.42 N (38 to 43 gf).



## [Adjustment]

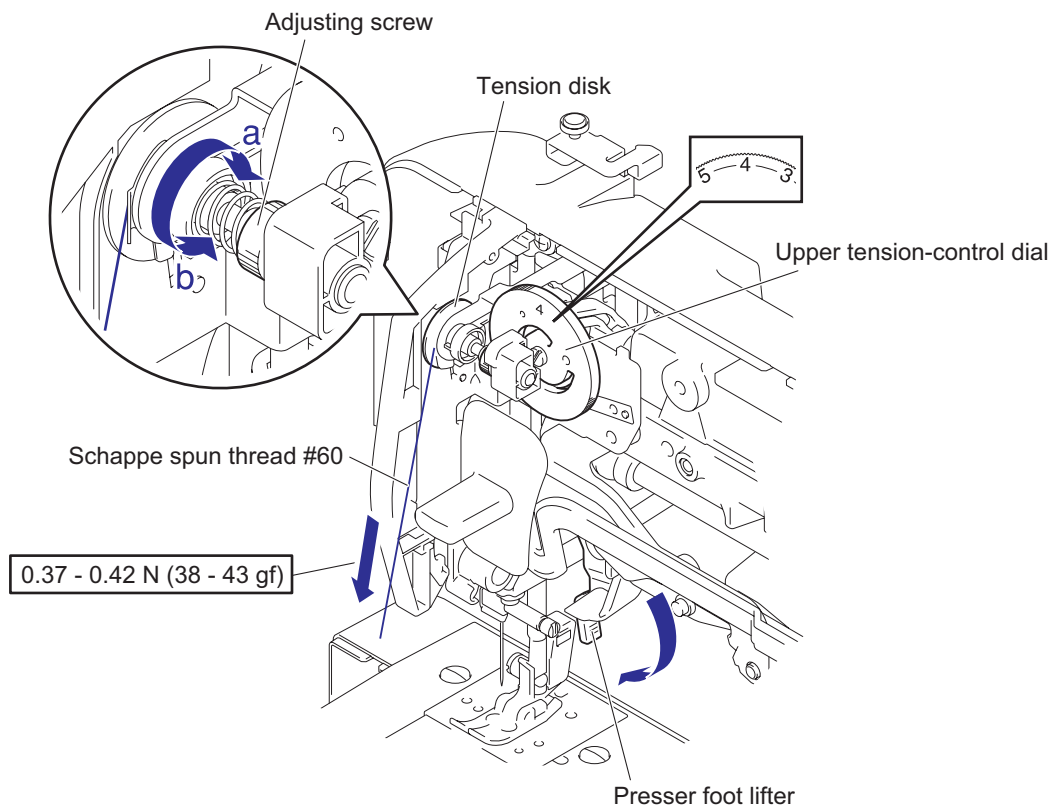
1. Remove the face plate, the pattern selection dial and the front cover.
2. Turn the upper tension-control dial until the [4] is the topmost position.
3. Pass the schappe spun thread #60 through the tension disc, and lower the presser foot lifter. (Close the tension disc.)
4. Pull the thread down slowly with the tension gauge, and measure the thread tension.
5. Adjust the thread tension by turning the adjusting screw of the thread tension unit.

**\*Key point**

- Turn the adjusting screw to the direction of "a" → The thread tension is smaller.
- Turn the adjusting screw to the direction of "b" → The thread tension is larger.

XA9154001

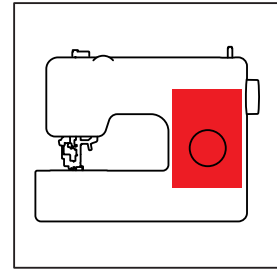
Tension gauge 50 (~ 0.5 N)



## [Standard]

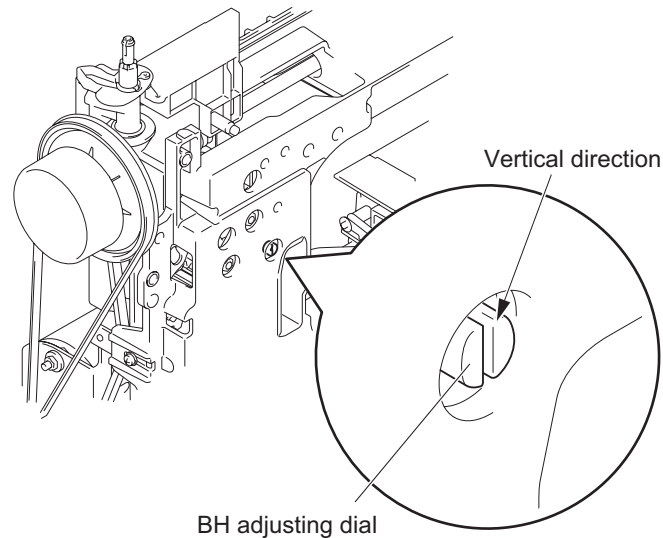
Set the BH presser, when the bar tack sewing is executed to the double broadcloth with a schappe spun thread #60, the standard is as follows.

- The number of left reverse/right forward stitches should be 35 to 50 per 20 mm.
- The stitch difference should be within  $\pm 10$ .

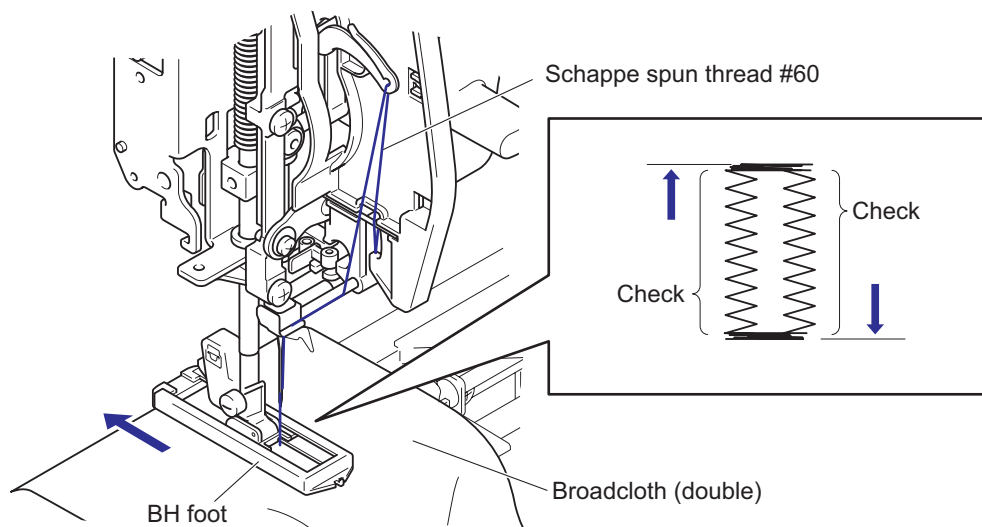


## [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Attach the size 90/14 needle.
4. Attach the pattern selection dial.
5. Set the slot of the BH adjusting dial in the vertical direction.



6. Set the BH foot.
7. Attach the foot controller, and turn on the power.
8. Execute the bar tack sewing 20 mm or more to the double broadcloth with a schappe spun thread #60, and check the number of stitches of the left reverse stitch and right forward stitch per 20 mm.



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### ■ Adjustment of the stitch length of “b” (left reverse stitch)

9. Loosen the nut 4 of the adjusting screw of the reverse sewing lever C/D assy.

10. Adjust the stitch length of the left reverse stitch by turning the adjusting screw of the reverse sewing lever C/D assy.

#### \*Key point

- The number of left reverse stitches should be 35 to 50 per 20 mm.

#### \*Key point

- Loosen the adjusting screw. (Turn to the direction “A”)  
→ Left reverse stitch length is shorter. (The number of stitches increases) (Fig. 1 “A”)
- Tighten the adjusting screw. (Turn to the direction “B”)  
→ Left reverse stitch length is longer. (The number of stitches decreases) (Fig. 1 “B”)

11. Tighten the nut 4 of the adjusting screw of the reverse sewing lever C/D assy to secure the adjusting screw.

#### \*Key point

- When tightening the nut 4 of the adjusting screw, keep the adjusting screw from moving.

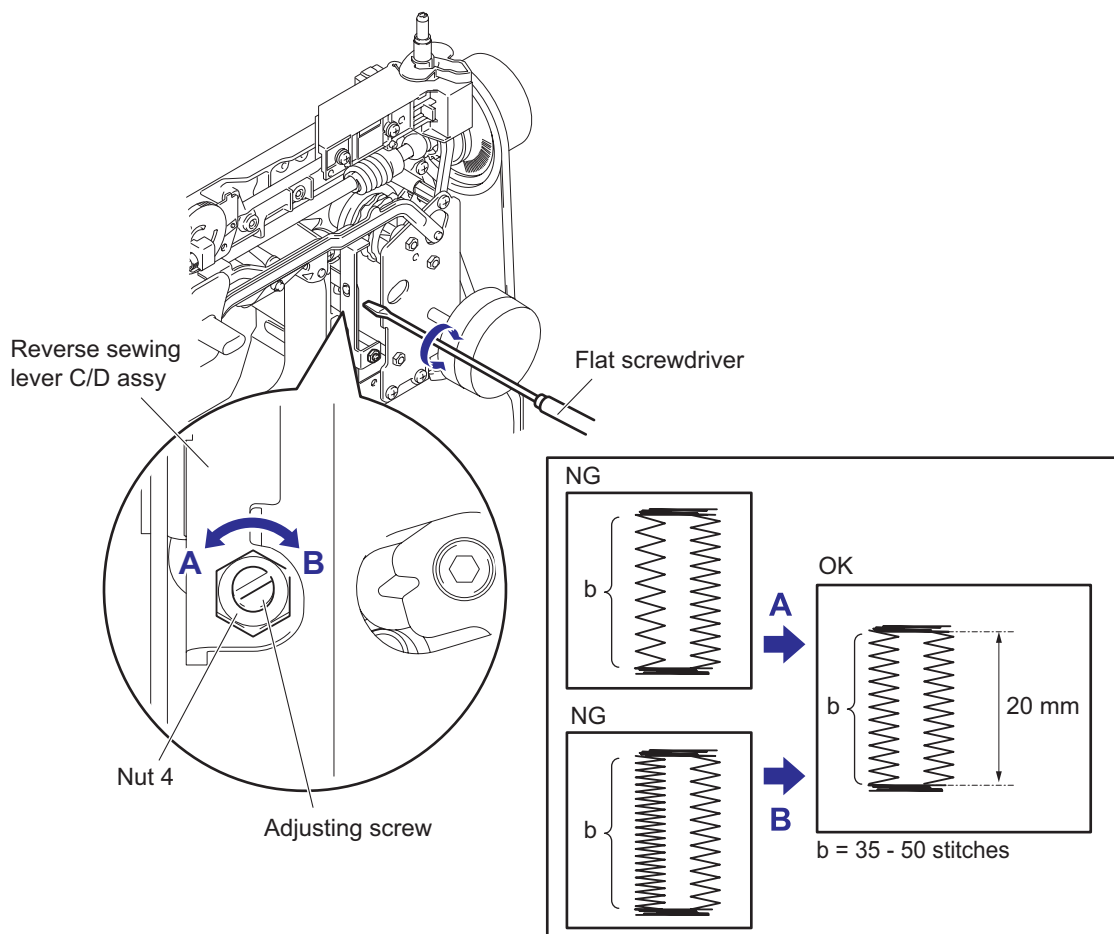


Fig. 1

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### ■ Adjustment of the stitch length of “d” (right forward stitch)

12. Loosen the nut 4 of the adjusting screw of the BHB lever.

13. Adjust the stitch length of the right forward stitch by turning the adjusting screw of the BHB lever.

#### \*Key point

- The number of right forward stitches should be 35 to 50 per 20 mm.  
And stitch difference should be within  $\pm 10$ .

#### \*Key point

- Loosen the adjusting screw. (Turn to the direction “A”)  
→ Right forward stitch length is shorter. (The number of stitches increases) (Fig. 2 “A”)
- Tighten the adjusting screw. (Turn to the direction “B”)  
→ Right forward stitch length is longer. (The number of stitches decreases) (Fig. 2 “B”)

14. Tighten the nut 4 of the adjusting screw of the BHB lever to secure the adjusting screw.

#### \*Key point

- When tightening the nut 4 of the adjusting screw, keep the adjusting screw from moving.

\*Do not turn this screw.  
Do not use this adjustment.

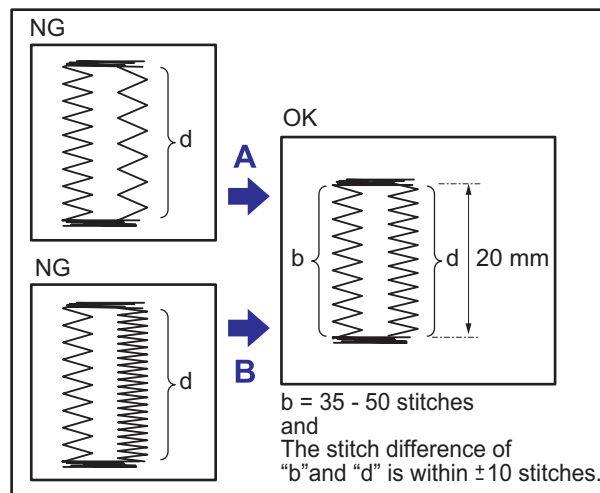
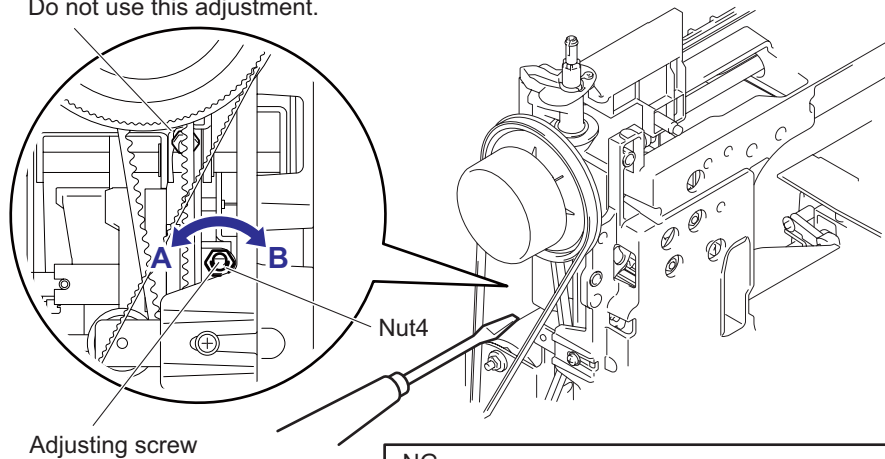


Fig. 2



Need to adjust "4-25 Left and right stitch of buttonhole stitch length" before this adjustment.

## [Standard]

At pattern selection dial [4] (straight stitch/center base line/feed length : 2mm), the difference between the forward stitch length (10 pitches) and the reverse stitch length (10 pitches) should be within  $\pm 4$  mm.

## [Adjustment]

1. Remove the face plate, the pattern selection dial and the front cover.
2. Attach the size 90/14 needle.
3. Attach the pattern selection dial.
4. Turn the pattern selection dial until the [4] is the topmost position.
5. Lay a paper on the needle plate, and lower the presser foot lifter to lower the presser foot.
6. Turn the pulley by hand, and drop 11 stitches on a paper. (Fig. 1)

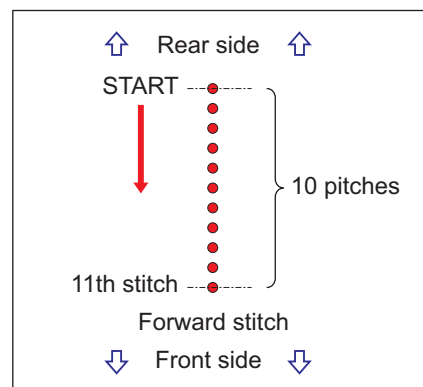
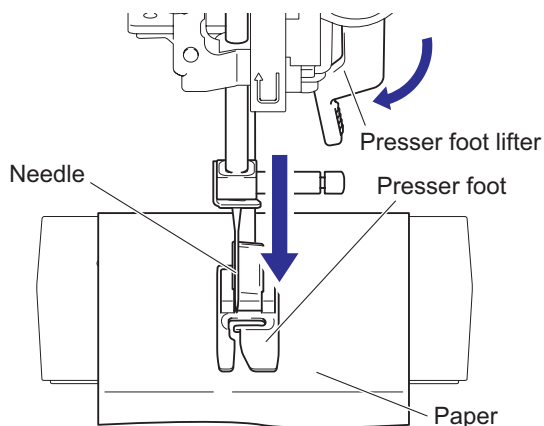
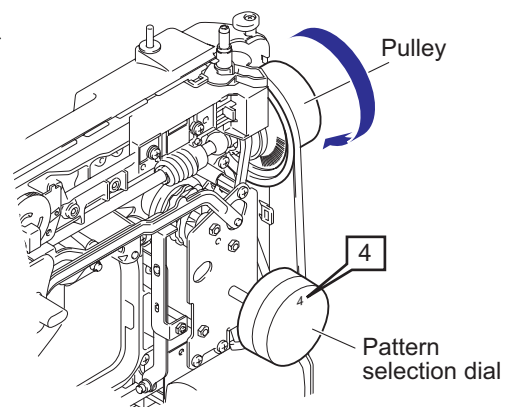
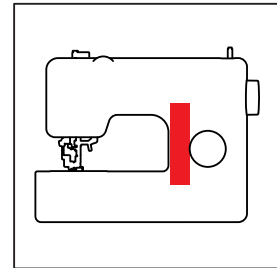


Fig. 1

7. Raise the presser foot lifter and slide a paper, and drop 11 needles on a paper while pushing down the reverse sewing button. (Fig. 2)

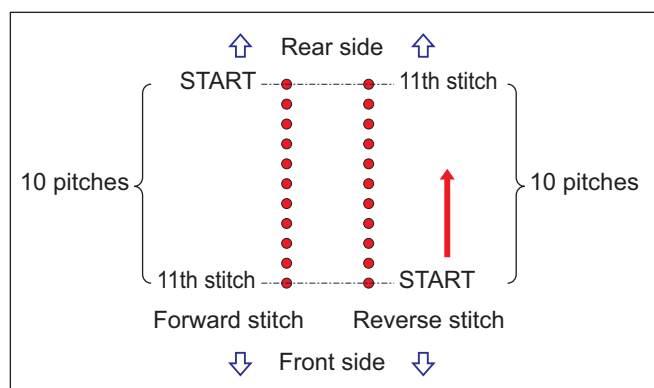
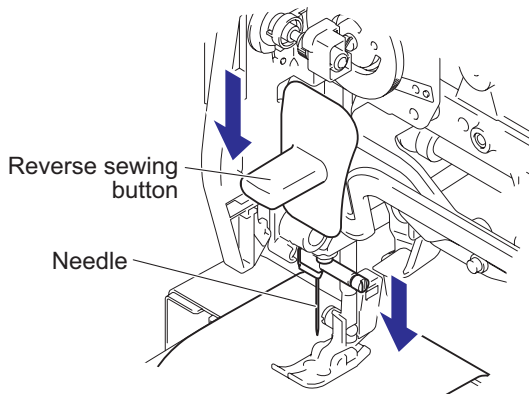


Fig. 2

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8. Loosen the nut 4 on the adjusting screw of the connecting rod assy.

**\*Key point**

- Do not loosen the nut 4 too much. (When the nut 4 is loosened too much, the adjusting screw is removed.)

9. Adjust the stitch length so that the forward stitch length (10 pitches) and the reverse stitch length (10 pitches) are the same by turning the adjusting screw of the connecting rod assy.

**\*Key point**

- Turn the adjusting screw counterclockwise (Turn to the direction "a"). (Connecting rod assy is shorter.)  
→ Reverse stitch length "f" is shorter. (Fig. 3 "a")
- Turn the adjusting screw clockwise (Turn to the direction "b"). (Connecting rod assy is longer.)  
→ Reverse stitch length "f" is longer. (Fig. 3 "b")

10. Tighten the nut 4 on the adjusting screw of the connecting rod assy to secure the adjusting screw.

**\*Key point**

- When tightening the nut 4 of the adjusting screw, keep the adjusting screw from moving.

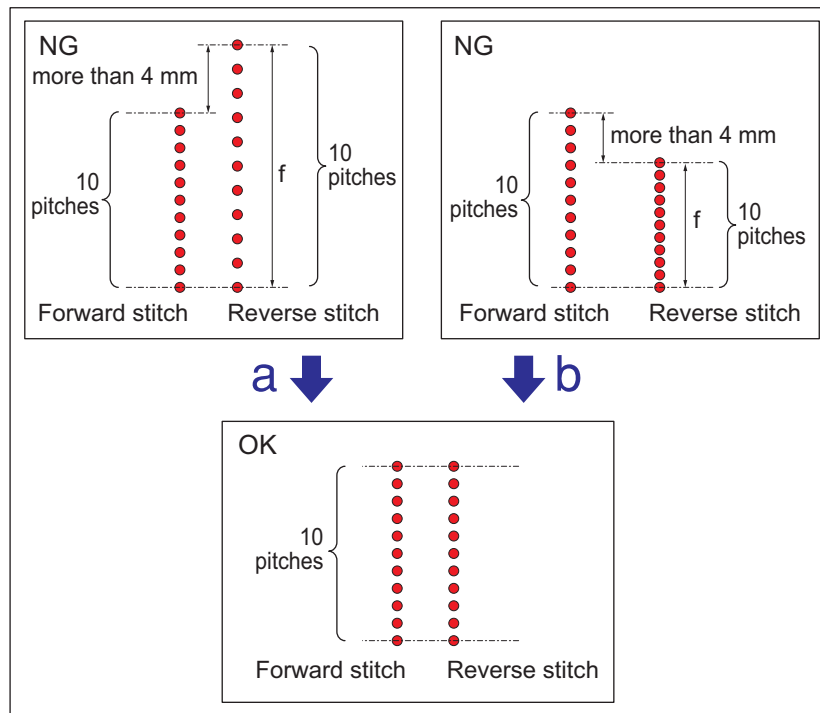
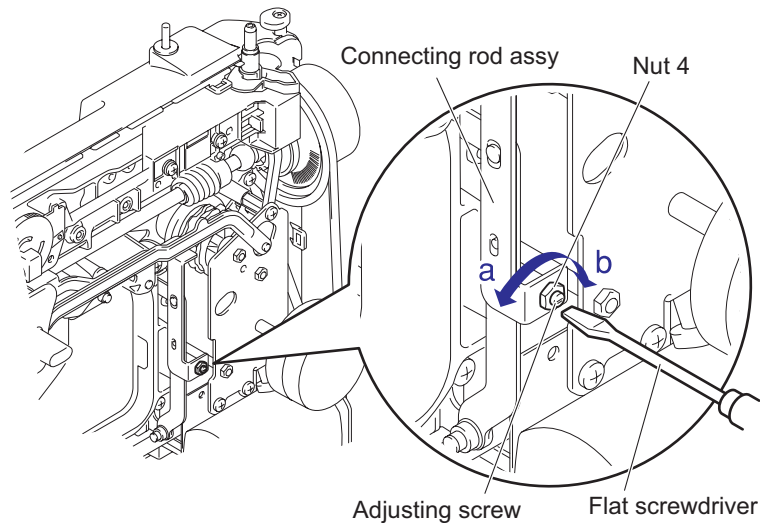
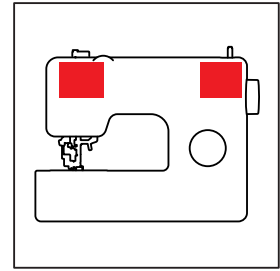


Fig. 3

## [Standard]

- The thread should be wound parallel to the bobbin.
- The bobbin winding quantity should be filling 80 to 90% of the diameter.



## [Adjustment]

1. When the front cover and the rear cover are removed, attach them.
2. Set the empty bobbin to the machine, and perform the bobbin winding. And check the condition of the bobbin winding.
3. Loosen the screw ❶ of the thread guide assy.
4. Move the thread guide assy up and down to adjust the bobbin winding so that the thread is wound parallel to the bobbin.

**\*Key point**

- When uneven bobbin winding is the upper side, move the thread guide assy downward. (Fig. 1 "a")
  - When uneven bobbin winding is the lower side, move the thread guide assy upward. (Fig. 1 "b")
5. Tighten the screw ❶ of the thread guide assy to secure the thread guide assy.

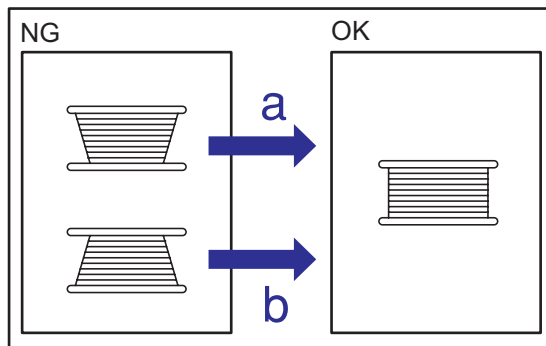
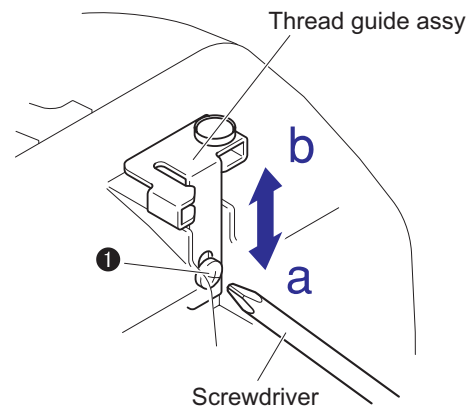


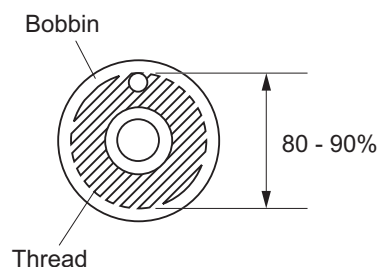
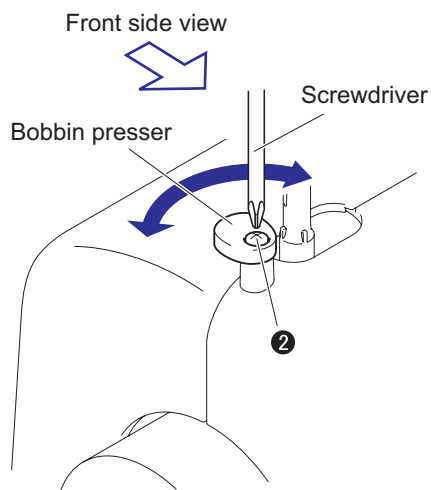
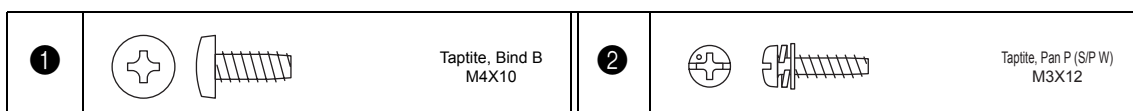
Fig. 1



6. Loosen the screw ❷ of the bobbin presser.
7. Turn the bobbin presser left and right to adjust the bobbin winding quantity.
8. Tighten the screw ❷ of the bobbin presser to secure the bobbin presser.

**\*Key point**

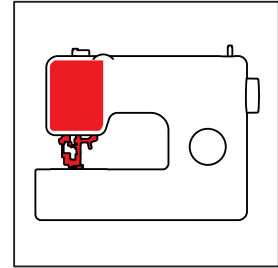
- Place the bobbin presser with the larger end facing the front.



### ■ For models equipped with a needle threader

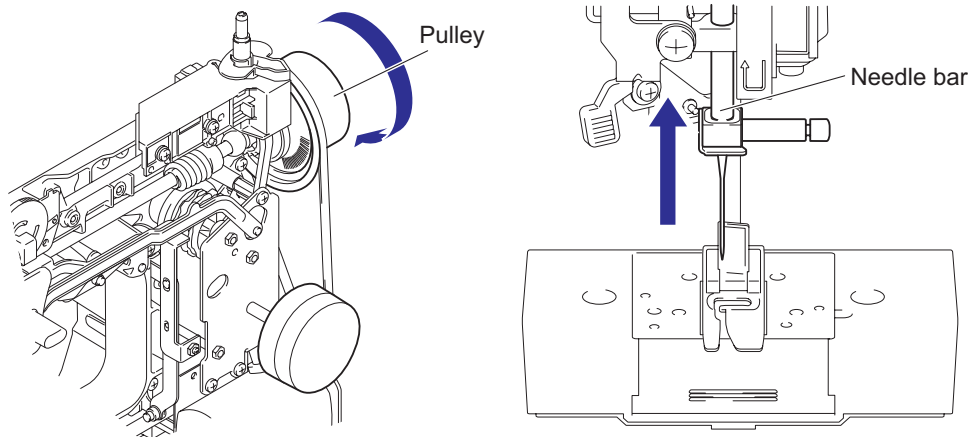
#### [Standard]

- The hook of the needle thread lever should be passed into the needle eye.
- The clearance between the upside of the hook and the top of the needle eye should be 0.03 to 0.13 mm.



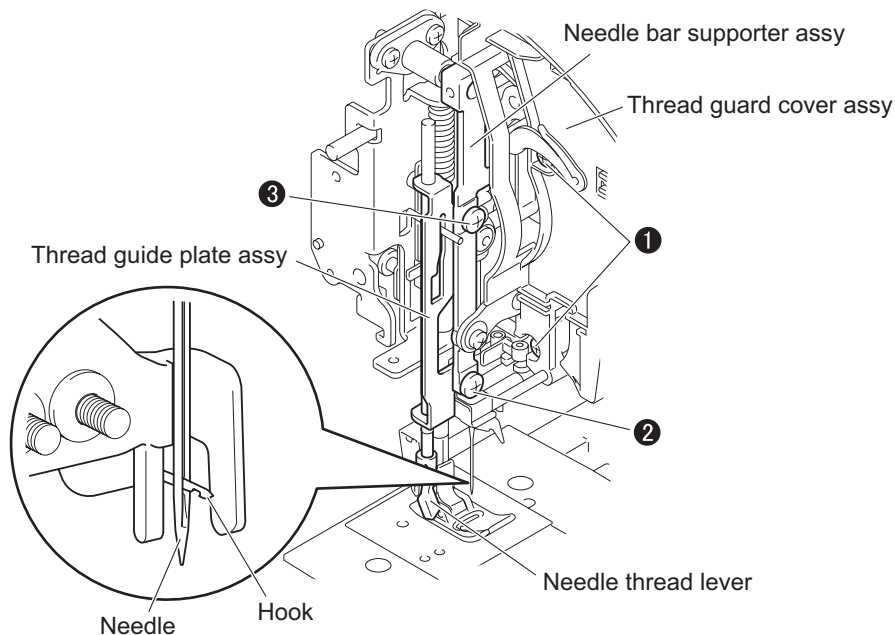
#### [Adjustment]

1. Turn off the power, and then remove the foot controller.
2. Remove the face plate and the pattern selection dial, and remove the front cover and the rear cover.
3. Attach the size 90/14 needle.
4. Turn the pulley by hand and move the needle bar to its highest position.



5. Loosen the 2 screws ❶ of the thread guard cover assy to remove the thread guard cover.
6. Loosen the screws ❷ and ❸ of the thread guide plate assy.
7. Move the thread guide plate assy left and right to adjust it so that the hook is passed into the needle eye.
8. Tighten the screws ❷ and ❸ of the thread guide plate assy in this order to secure the thread guide plate assy to the needle bar supporter assy.

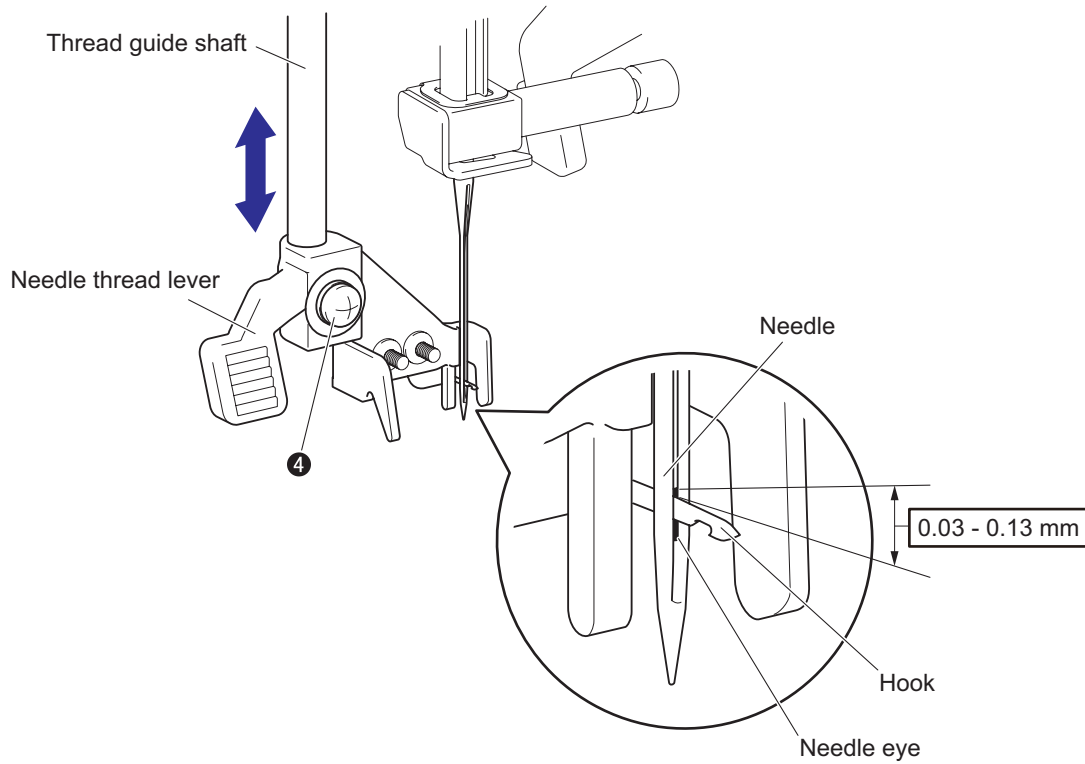
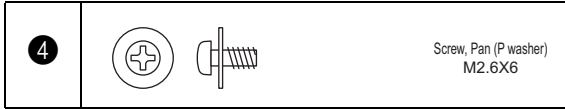
❶		❷ ❸	
	Screw, Pan (SIP washer) M3X6DB		Screw, Bind M4X6



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9. Loosen the screw ④ of the needle thread lever.
10. Move the needle thread lever up and down to adjust the clearance between the upside of the hook and the top of the needle eye.
11. Tighten the screw ④ of the needle thread lever to secure the needle thread lever to the thread guide shaft.

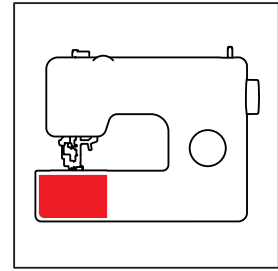


## [Standard]

When the schappe spun thread #60 is pulled from the inner rotary hook assy slowly with the tension gauge, the thread tension should be 0.1 to 0.12 N (10 to 12 gf).

## [Adjustment]

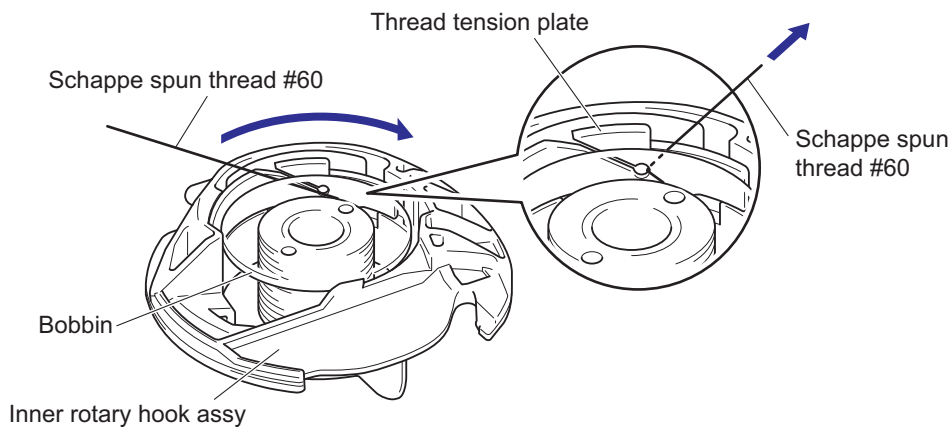
1. Remove the 2 screws ❶ of the needle plate assy, and remove the needle plate assy.



2. Remove the inner rotary hook assy from the machine.
3. Set the bobbin (the schappe spun thread #60) in the inner rotary hook assy, and pass the thread through the groove of the thread tension plate.

**\*Key point**

- Pass the thread through into the back of the groove of the thread tension plate.

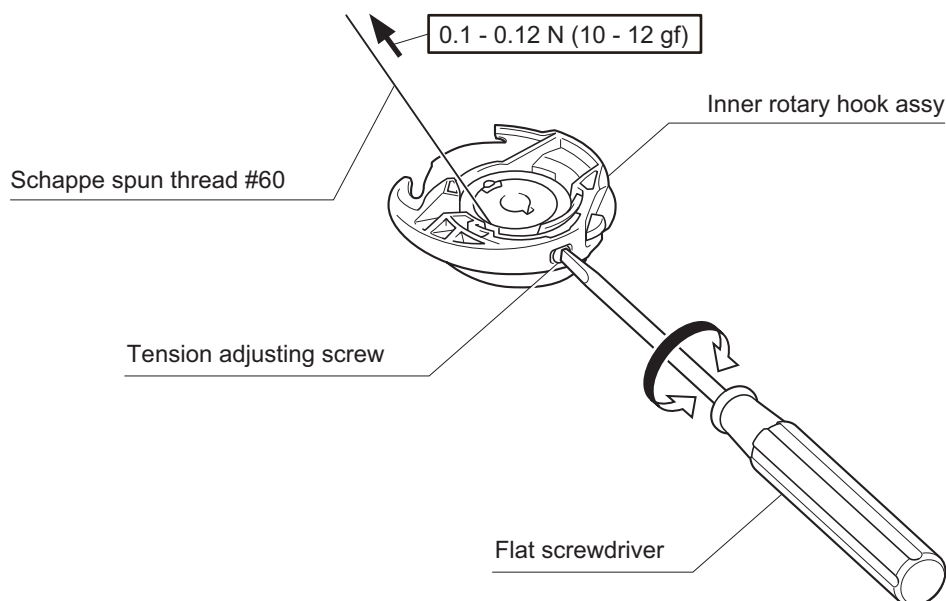


4. Pull the thread slowly from the inner rotary hook assy with the tension gauge, and measure the thread tension.
5. Adjust the thread tension by turning the tension adjusting screw of the inner rotary hook assy.

**\*Key point**

- The tension adjusting screw is secured with the thread locker.

6. Secure the tension adjusting screw to the inner rotary hook assy by applying a small amount of the thread locker to the tension adjusting screw.



# 5 Failure Investigation for Electronic Parts

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Sewing lamp does not light .....	5 - 2
Main motor does not turn or Rotation speed is slow .....	5 - 3

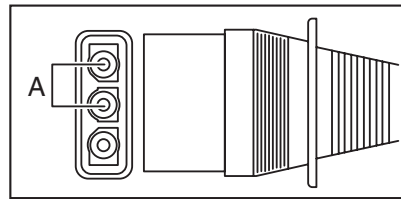
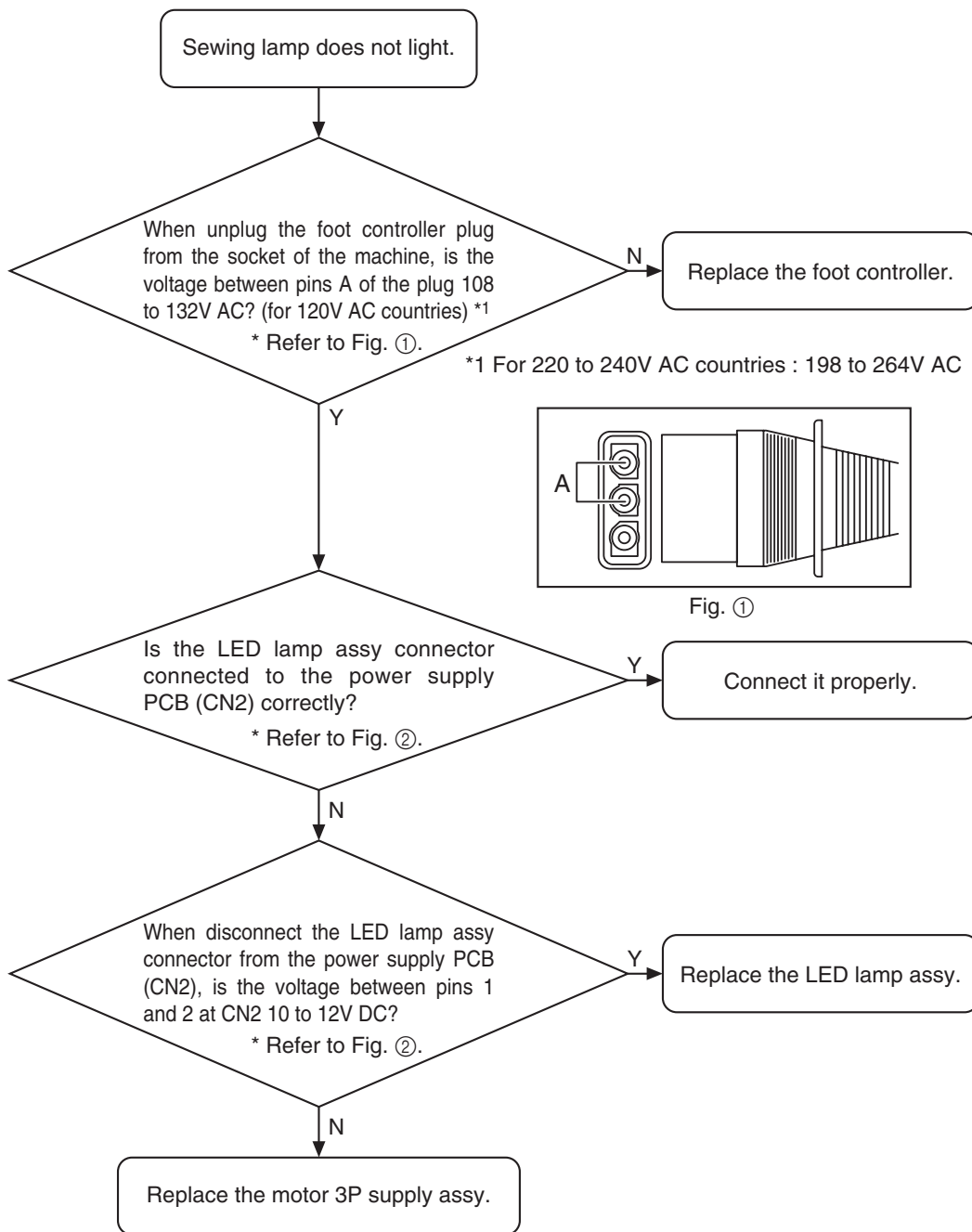


Fig. ①

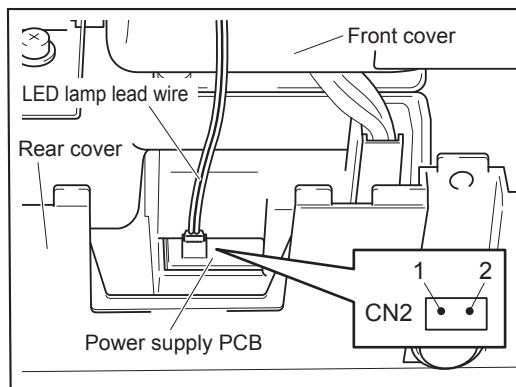
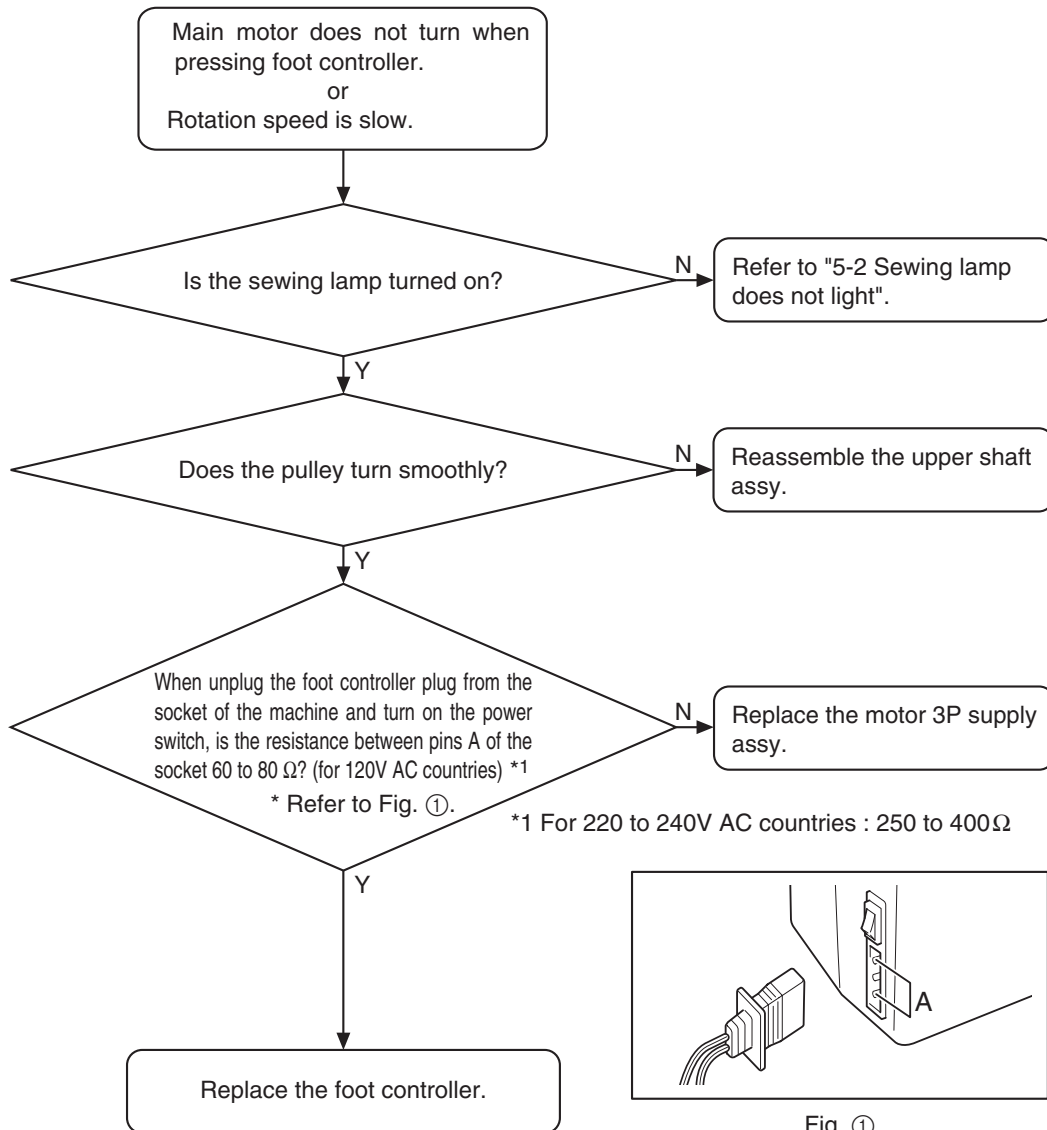


Fig. ②





Failure Investigation for Electronic Parts

Failure Investigation for Electronic Parts

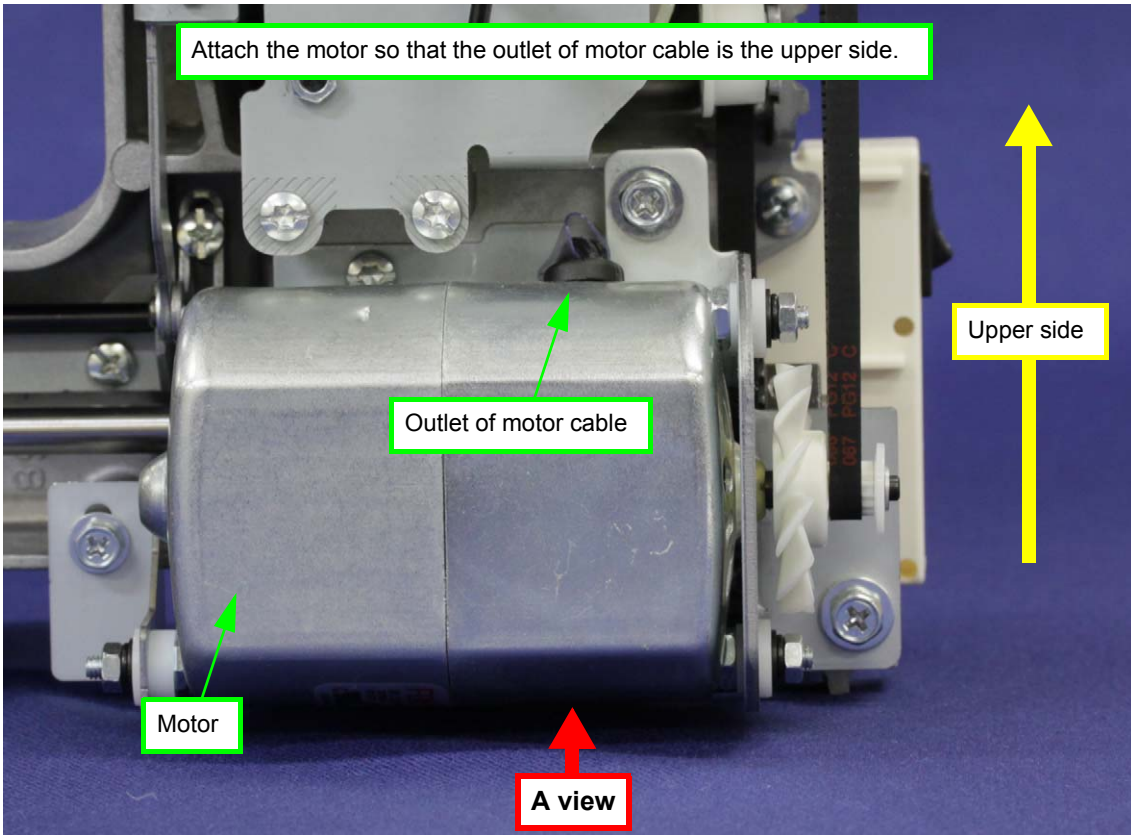
# 6 Special Instructions of Wiring

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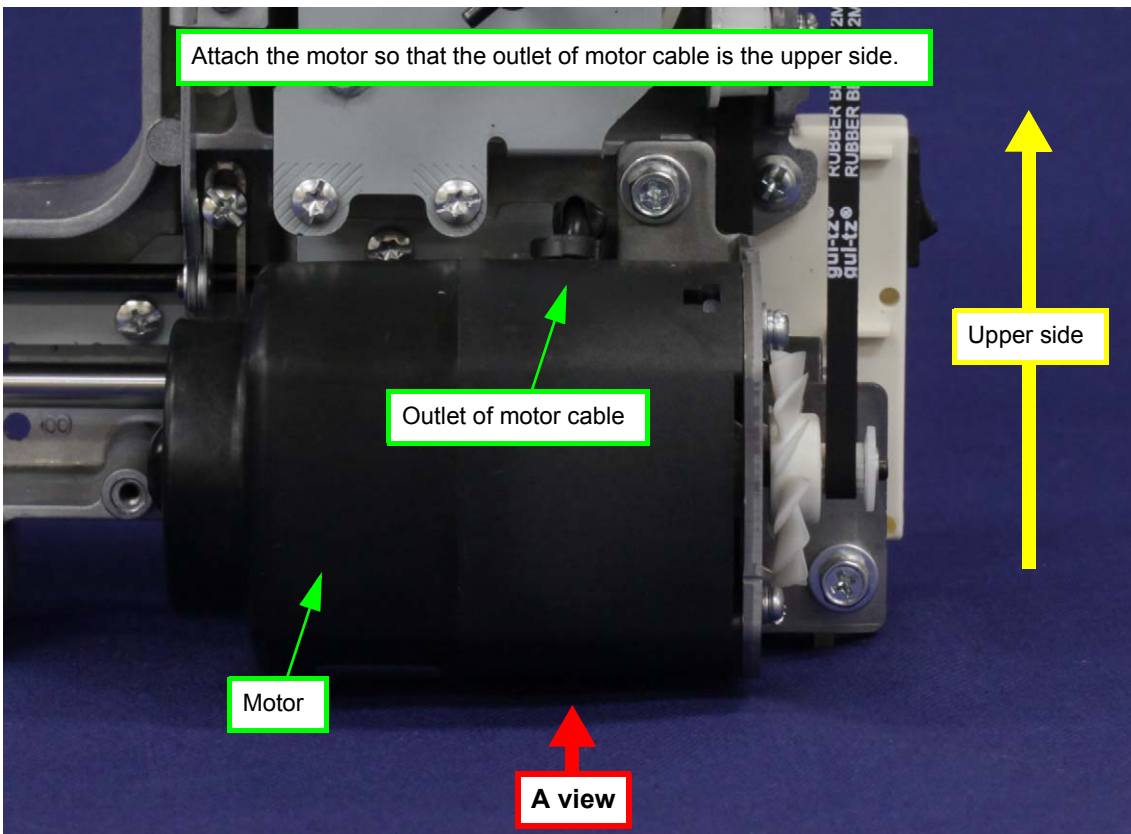
Motor 3P supply assy .....	6 - 2
LED lamp .....	6 - 4

1. Attachment of motor

■ 120V specification



■ 220 to 240V specification

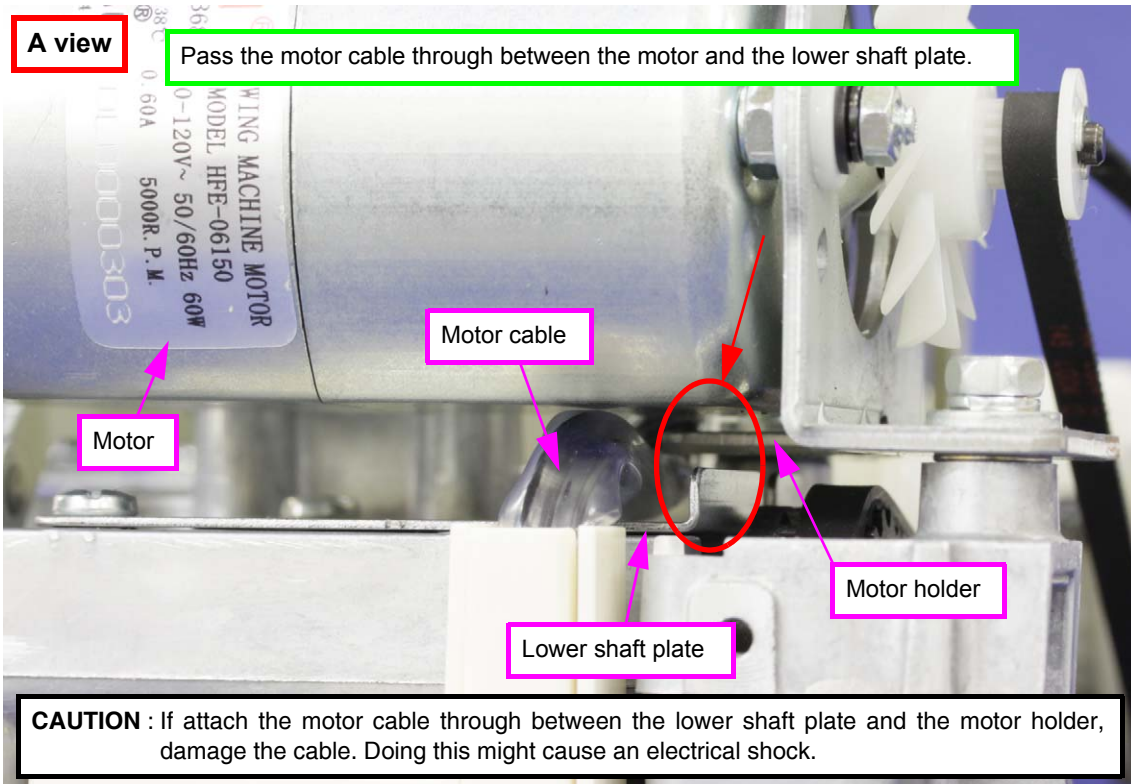


Special Instructions of Wiring

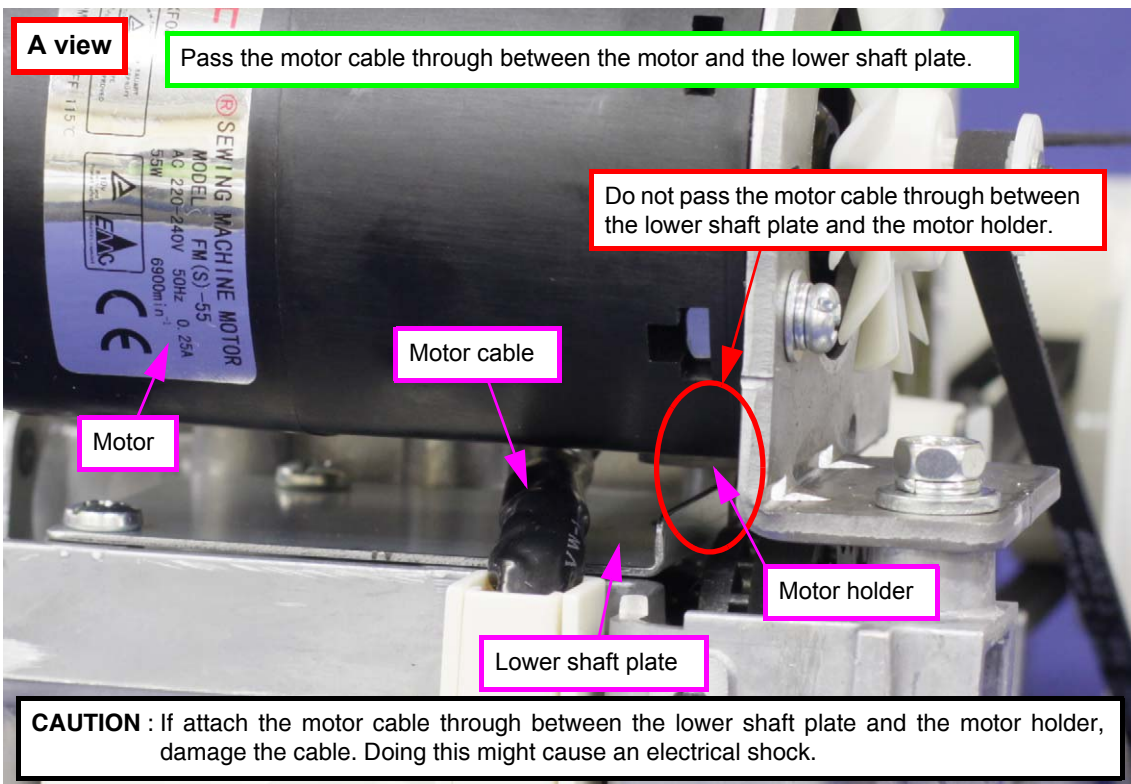
Special Instructions of Wiring

2. Wiring of motor cable

■ 120V specification



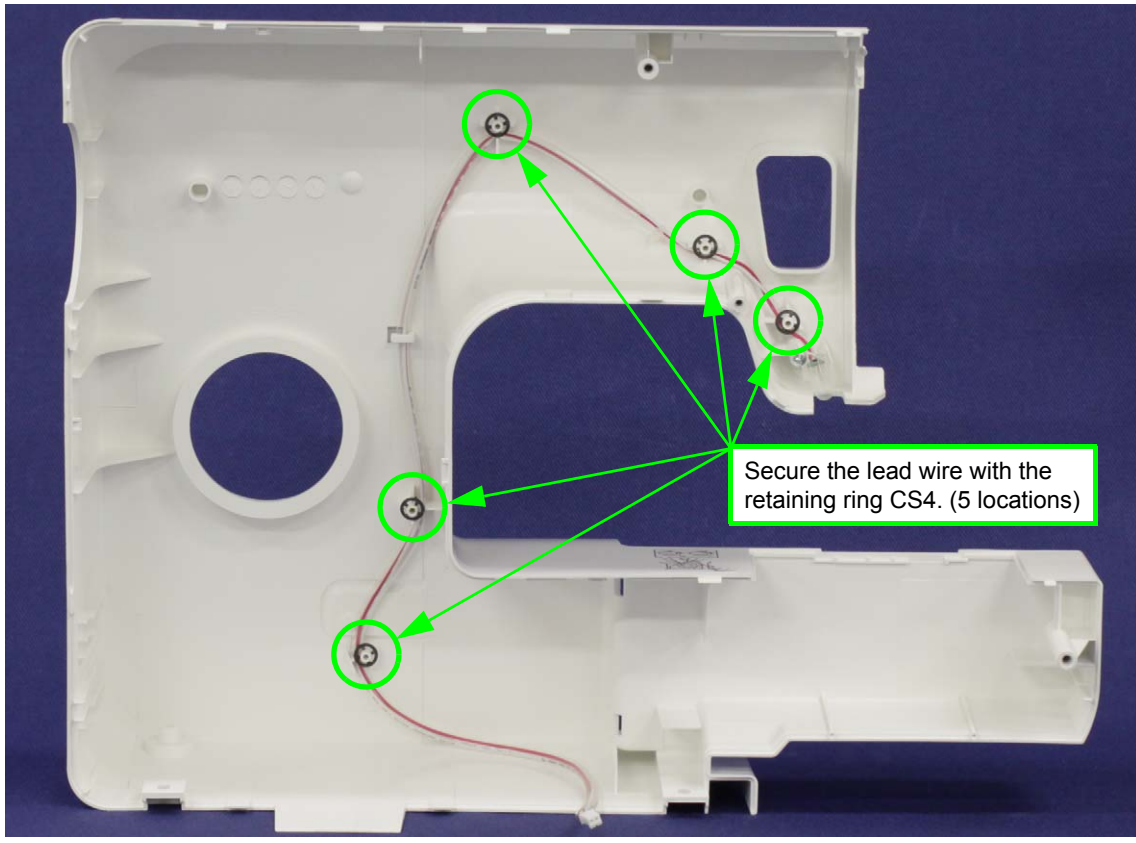
■ 220 to 240V specification



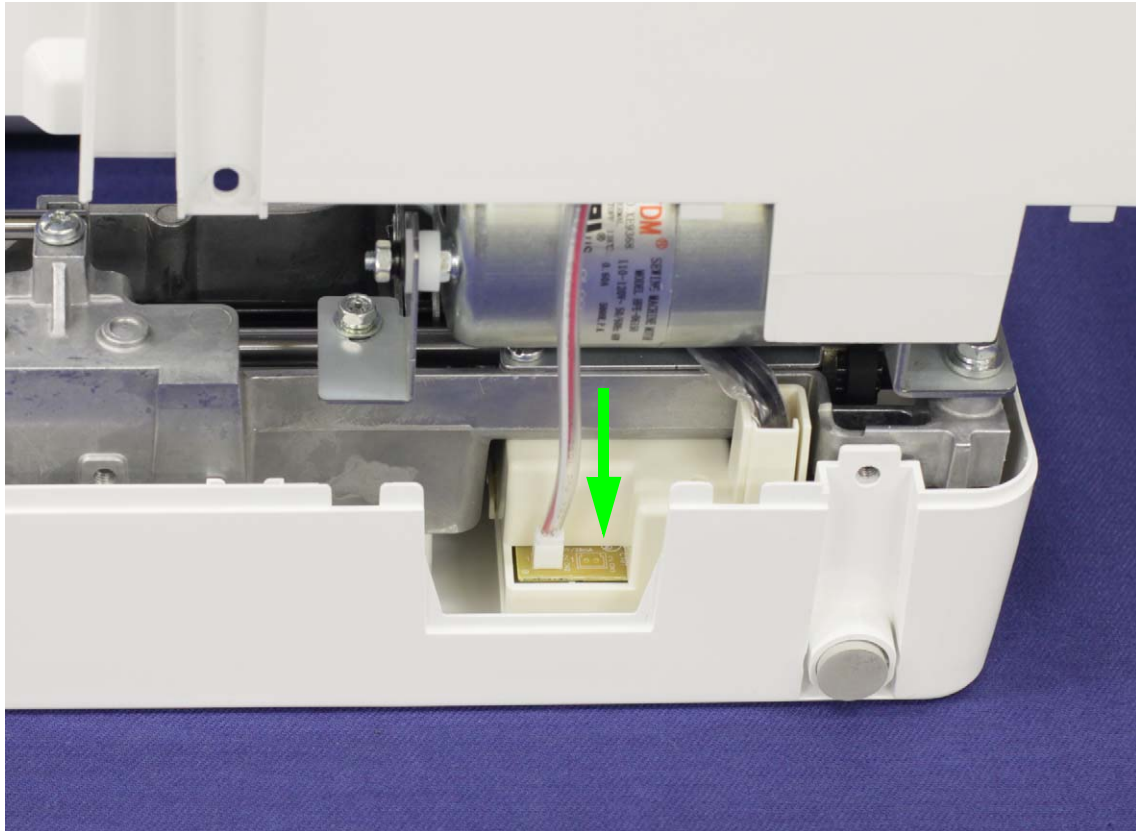
Special Instructions of Wiring

Special Instructions of Wiring

1. Wiring on inside of front cover.



2. Wiring on lower side of arm bed.



Special Instructions of Wiring

Special Instructions of Wiring



**brother**<sup>®</sup>