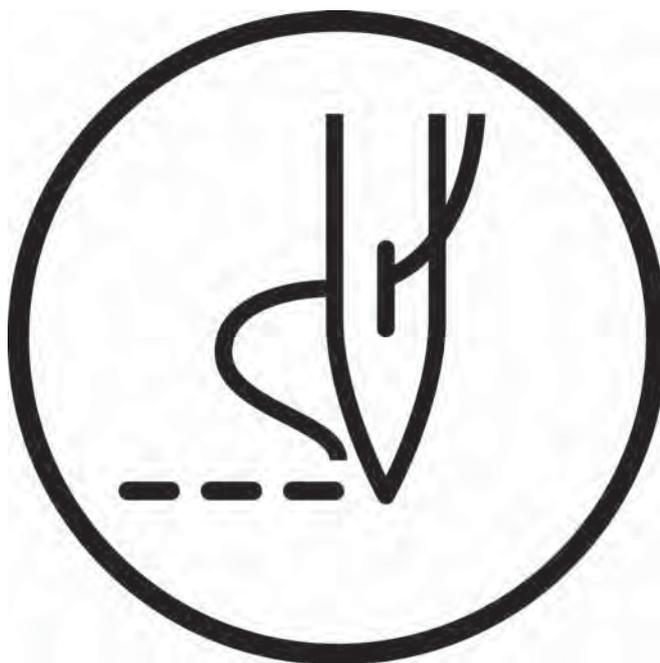


---

Please read this manual before using the machine.  
Please keep this manual within easy reach for quick reference.

---

## ELECTRONIC EYELET BUTTON HOLER



Thank you very much for buying a BROTHER sewing machine. Before using your new machine, please read the safety instructions and the explanations given in the instruction manual.

With industrial sewing machines, it is normal to carry out work while positioned directly in front of moving parts such as the needle and thread take-up lever, and consequently there is always a danger of injury that can be caused by these parts. Follow the instructions from training personnel and instructors regarding safe and correct operation before operating the machine so that you will know how to use it correctly.

# SAFETY INSTRUCTIONS

## [1] Safety indications and their meanings

This instruction manual and the indications and symbols that are used on the machine itself are provided in order to ensure safe operation of this machine and to prevent accidents and injury to yourself or other people.

The meanings of these indications and symbols are given below.

### Indications

 <b>DANGER</b>	The instructions which follow this term indicate situations where failure to follow the instructions will result in death or serious injury.
 <b>CAUTION</b>	The instructions which follow this term indicate situations where failure to follow the instructions could cause injury when using the machine or physical damage to equipment and surroundings.

### Symbols



..... This symbol () indicates something that you should be careful of. The picture inside the triangle indicates the nature of the caution that must be taken.  
(For example, the symbol at left means "beware of injury".)



..... This symbol () indicates something that you must not do.



..... This symbol () indicates something that you must do. The picture inside the circle indicates the nature of the thing that must be done.  
(For example, the symbol at left means "you must make the ground connection".)

## [2] Notes on safety

### DANGER



Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the cover of the control box. Touching areas where high voltages are present can result in severe injury.

### CAUTION

#### Environmental requirements



Use the sewing machine in an area which is free from sources of strong electrical noise such as electrical line noise or static electric noise. Sources of strong electrical noise may cause problems with correct operation.



Any fluctuations in the power supply voltage should be within  $\pm 10\%$  of the rated voltage for the machine. Voltage fluctuations which are greater than this may cause problems with correct operation.



The power supply capacity should be greater than the requirements for the sewing machine's power consumption. Insufficient power supply capacity may cause problems with correct operation.



The pneumatic delivery capability should be greater than the requirements for the sewing machine's total air consumption. Insufficient pneumatic delivery capability may cause problems with correct operation.



The ambient temperature should be within the range of 5°C to 35°C during use. Temperatures which are lower or higher than this may cause problems with correct operation.



The relative humidity should be within the range of 45% to 85% during use, and no dew formation should occur in any devices. Excessively dry or humid environments and dew formation may cause problems with correct operation.



In the event of an electrical storm, turn off the power and disconnect the power cord from the wall outlet. Lightning may cause problems with correct operation.

#### Installation



Machine installation should only be carried out by a qualified technician.



Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.



The sewing machine weighs approximately 120 kg. Installation of the sewing machine and adjustment of the table height should be carried out by four or more people.



Do not connect the power cord until installation is complete. If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.



Hold the machine head with both hands when tilting it back or returning it to its original position. In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head may become unbalanced and fall over (together with the table), and serious injury or damage to the sewing machine may result.



Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.



All cords should be secured at least 25 mm away from any moving parts. Furthermore, do not excessively bend the cords or secure them too firmly with staples. If this is not observed, fire or electric shocks may result.



Install belt covers to the machine head.



Install belt covers to the machine head.



If using a work table which has casters, the casters should be secured in such a way so that they cannot move.



Be sure to wear protective goggles and gloves when handling the lubricating oil, so that it does not get into your eyes or onto your skin. If care is not taken, inflammation can result. Furthermore, do not drink the lubricating oil. Diarrhea or vomiting may result. Keep the oil out of the reach of children.

## CAUTION

### Sewing



This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.



The sewing machine should not be used for any applications other than sewing.



Be sure to wear protective goggles when using the machine.

If goggles are not worn, there is the danger that if a needle breaks, parts of the broken needle may enter your eyes and injury may result.



Turn off the power switch at the following times. If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.

- When threading the needle
- When replacing the needle
- When not using the machine and when leaving the machine unattended



If using a work table which has casters, the casters should be secured in such a way so that they cannot move.



Attach all safety devices before using the sewing machine. If the machine is used without these devices attached, injury may result.



Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.



If an error occurs in machine operation, or if abnormal noises or smells are noticed, immediately turn off the power switch. Then contact your nearest Brother dealer or a qualified technician.



If the machine develops a problem, contact your nearest Brother dealer or a qualified technician.

### Cleaning



Turn off the power switch before carrying out this operation. If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.



Be sure to wear protective goggles and gloves when handling the lubricating oil, so that it does not get into your eyes or onto your skin.

If care is not taken, inflammation can result.

Furthermore, do not drink the lubricating oil. Diarrhea or vomiting may result.

Keep the oil out of the reach of children.

### Maintenance and inspection



Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.



Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.



Turn off the power switch and disconnect the power cord at the following times. If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.

- When carrying out inspection, adjustment and maintenance
- When replacing consumable parts such as the loopers and knife



Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.



Hold the machine head with both hands when tilting it back or returning it to its original position.

In addition, do not subject the machine head to extra force while it is tilted back.

If this is not observed, the machine head may become unbalanced and fall over (together with the table), and serious injury or damage to the sewing machine may result.



If the power switch and air need to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.



Use only the proper replacement parts as specified by Brother.



If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.



Any problems in machine operation which result from unauthorized modifications to the machine will not be covered by the warranty.

### [3] Warning labels

The following warning labels appear on the sewing machine. Please follow the instructions on the labels at all times when using the machine. If the labels have been removed or are difficult to read, please contact your nearest Brother dealer.

**1**

	<b>⚠ 危険</b> 高電圧部分にふれて、大けがをすることがある。電源を切り、5分たつてからカバーをはずすこと。	<b>⚠ 危険</b> 触摸高压电部分, 会导致受伤。在切断电源5分钟后, 再开启盖罩。
	<b>⚠ DANGER</b> Hazardous voltage will cause injury. Turn off main switch and wait 5 minutes before opening this cover.	<b>⚠ GEFAHR</b> Hochspannung verletzungsgefahr! Bitte schalten sie den hauptschalter aus und warten sie 5 minuten, bevor sie diese abdeckung öffnen.
	<b>⚠ PELIGRO</b> Un voltaje inadecuado puede provocar las heridas. Apagar el interruptor principal y esperar 5 minutos antes de abrir esta cubierta.	

**2**

	<b>⚠ 注意</b> 触摸运动部分, 易造成受伤。所以在装上安全保护装置后, 再进行缝纫操作。在切断电源后, 进行穿线, 更换梭芯, 机针和做清扫, 调整工作。
	<b>⚠ CAUTION</b> Moving parts may cause injury. Operate with safety devices. Turn off main switch before threading, changing bobbin and needle, cleaning etc.

**3** Do not touch the knife or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.

**Safety devices**  
Devices such as eye guard, finger guard, needle bar guard, needle guide cover and belt cover

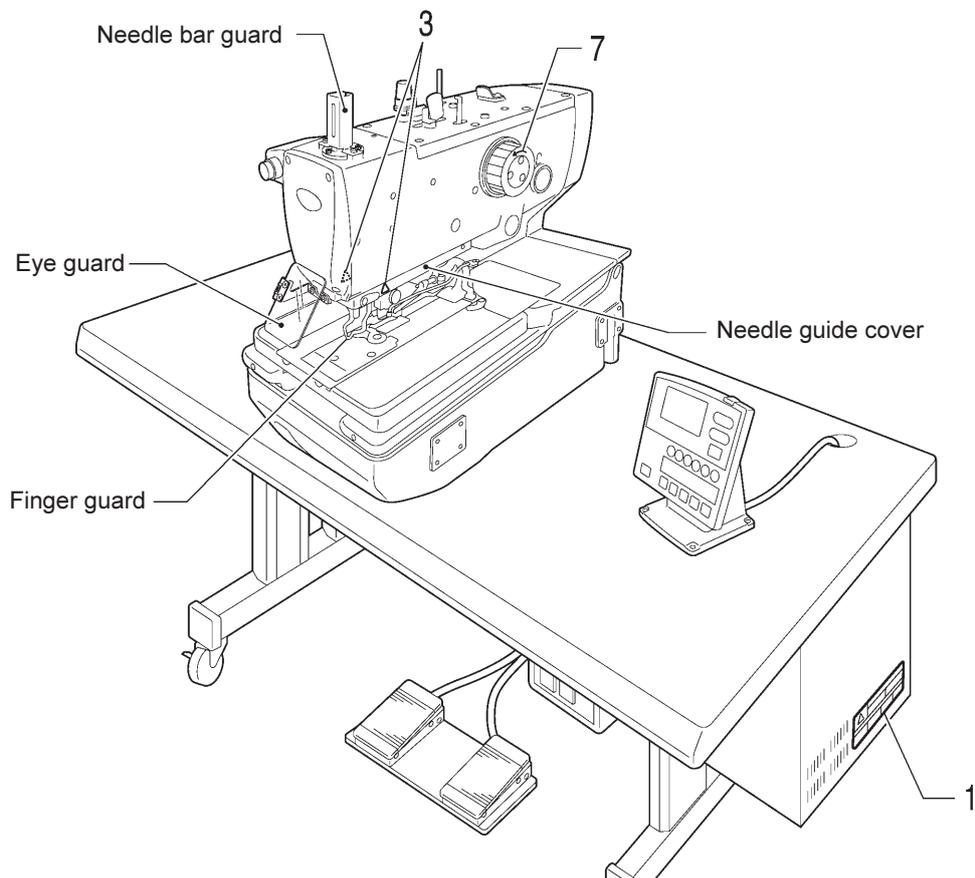
**4** Be careful not to get your hands caught when returning the machine head to its original position after it has been tilted.

**5** Be careful not to get your hands caught when moving the feed base backward.

**6** Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

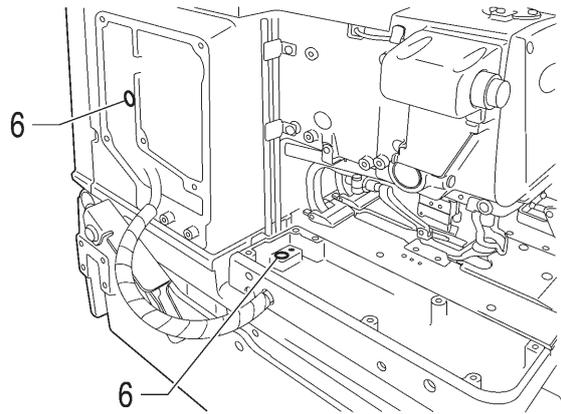
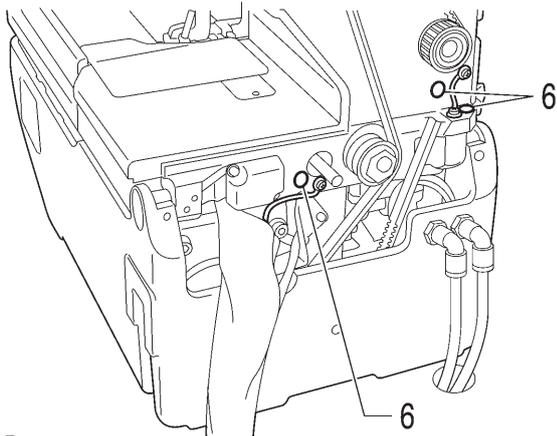
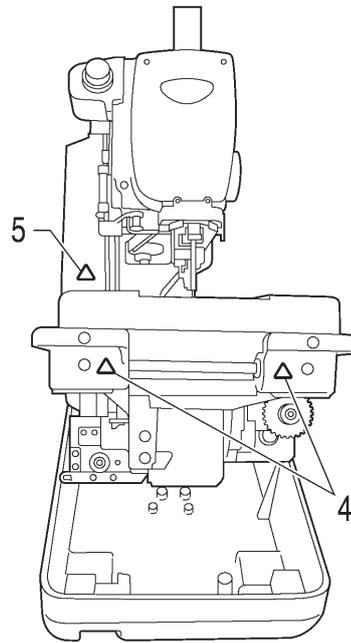
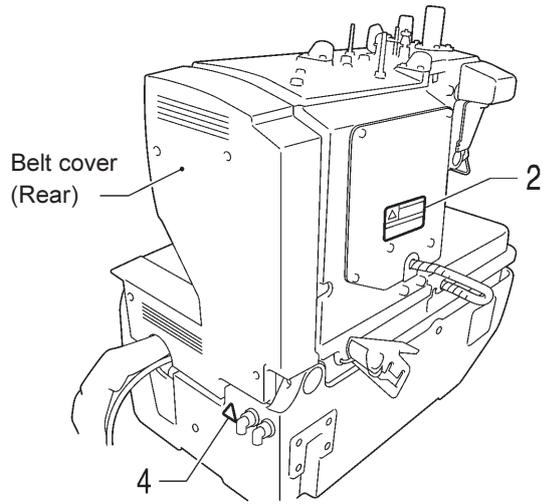
**7** Direction of operation

**8** High temperature warning display



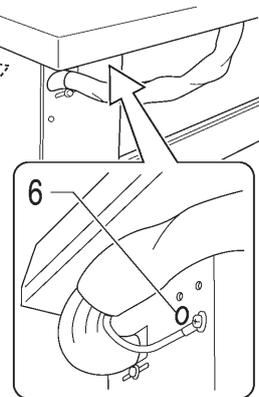
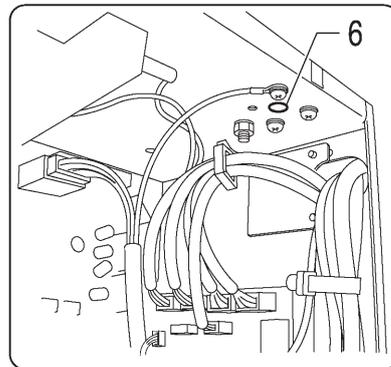
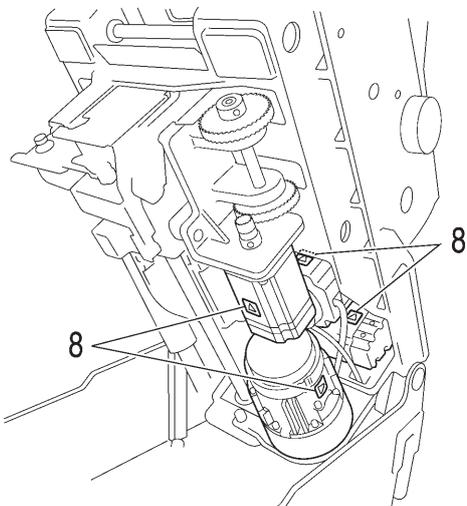
0332B

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0333B

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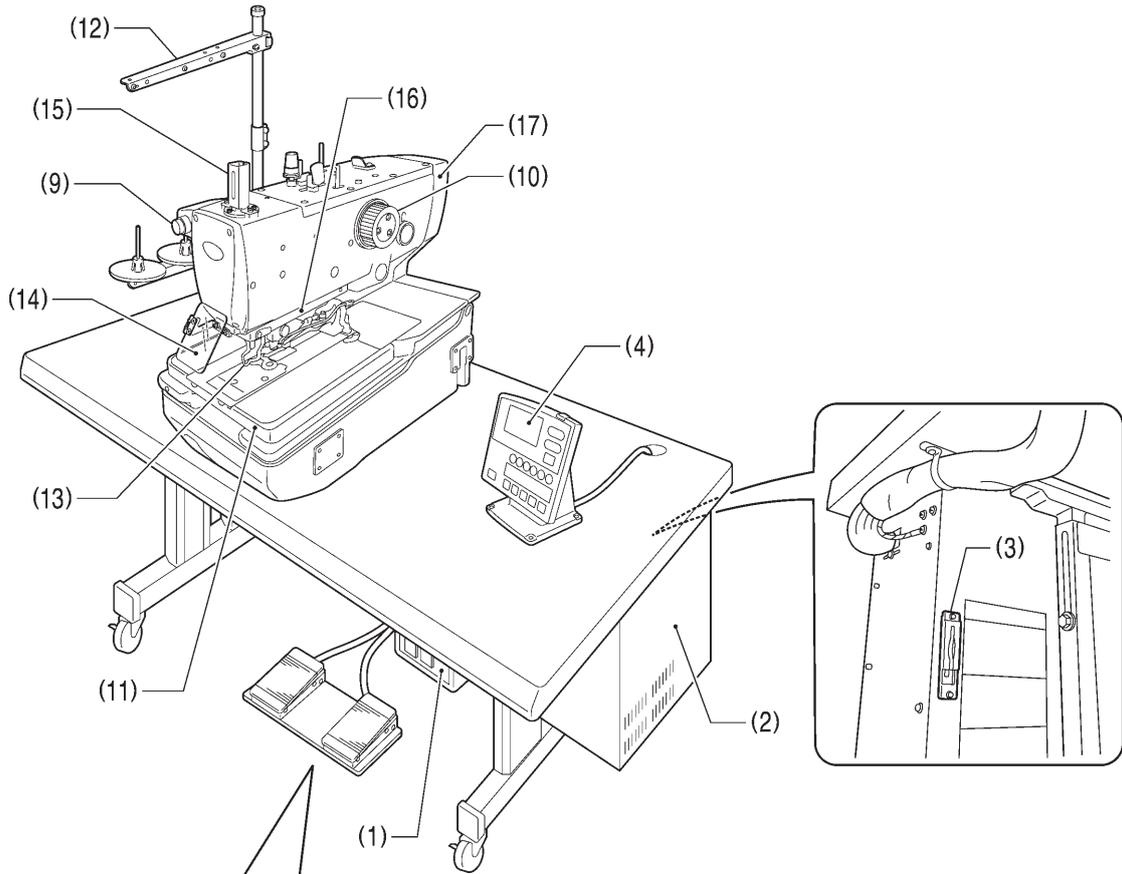
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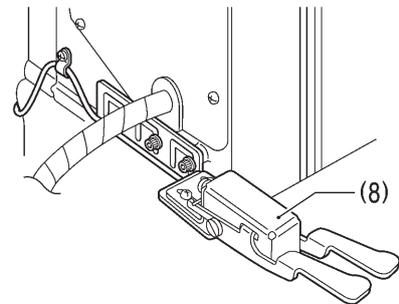
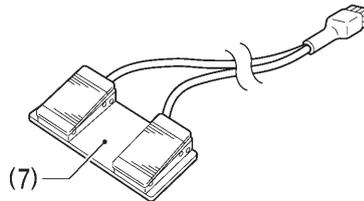
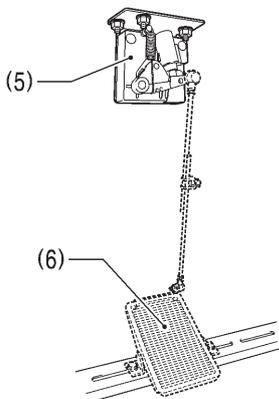
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# 1. NAMES OF MAJOR PARTS

0335B



The accessory switches shown below to use for starting the sewing machine will vary depending on the destination.



- (1) Power switch
- (2) Control box
- (3) CF slot\*
- (4) Operation panel
- (5) Treadle unit
- (6) Treadle (commercially-available)

- (7) 2-pedal foot switch
- (8) Hand start switch
- (9) STOP switch
- (10) Upper shaft pulley
- (11) Feed base
- (12) Cotton stand

**Safety devices:**

- (13) Finger guard
- (14) Eye guard
- (15) Needle bar guard
- (16) Needle guide cover
- (17) Belt cover

\*: CF™ is a trademark of SanDisk Corporation.

## 2. MACHINE SPECIFICATIONS

### 2-1. Specifications



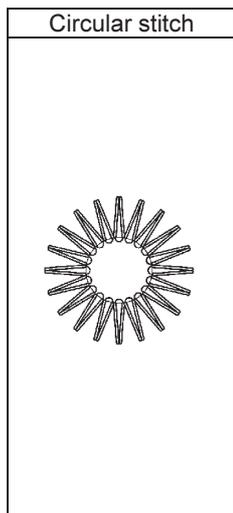
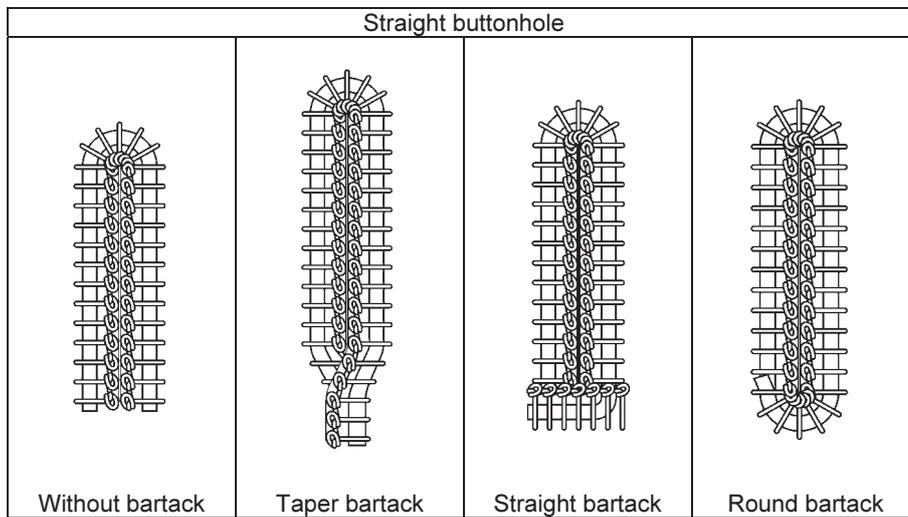
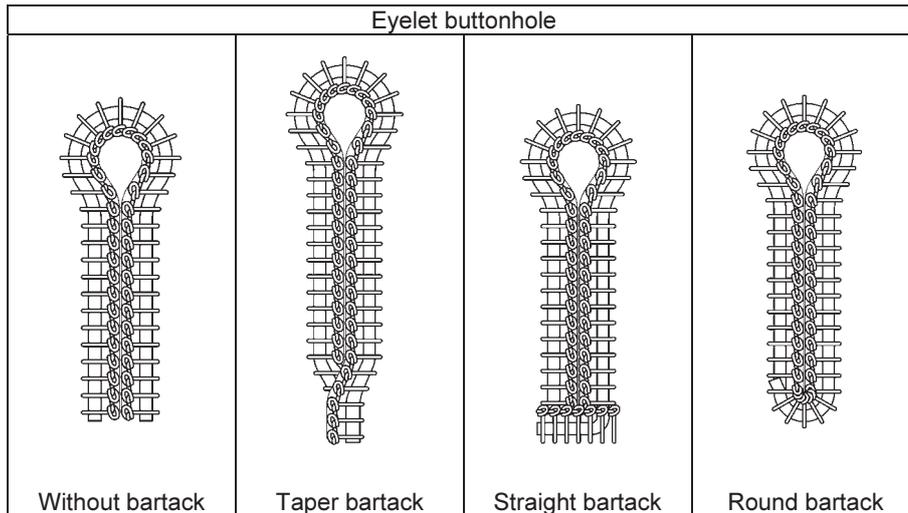
	Thread trimmer	Lower thread trimmer	
		Long type	Short type
-00	○	-	-
-01	○	○	-
-02* <sup>1</sup>	○	-	○

\*1: -02 specifications are divided into L1422 to L3422 specifications depending on the sewing lengths, so please specify the sewing length when ordering.

\*2: This is not covered by specification designations, but compatibility is possible by replacement of gauge parts. (Ask the place of purchase for details.)

SPECIFICATIONS	RH-9820-00	RH-9820-01	RH-9820-02
Use	Men's clothes, ladies' clothes		Jeans and work clothes
Sewing speed	1,000 - 2,500 rpm (Setting possible in units of 100 rpm)		
Sewing shape	Without bartack Taper bartack Straight bartack Round bartack Circular stitch	Without bartack Taper bartack Straight bartack Round bartack Circular stitch	Without bartack Taper bartack Straight bartack Round bartack Circular stitch
Sewing length	Eyelet buttonholes: 8 - 50 mm Straight buttonholes: 5 - 50 mm	Eyelet buttonholes: 8 - 42 mm Straight buttonholes: 5 - 42 mm	L1422: 14 - 22 mm * <sup>2</sup> L1826: 18 - 26 mm L2230: 22 - 30 mm L2634: 26 - 34 mm * <sup>2</sup> L3442: 34 - 42 mm * <sup>2</sup>
Stitch pitch	0.5 - 2.0 mm		
Zigzag width	1.5 - 5.0 mm (Max. 4.0 mm with mechanism, Max. 1.0 mm with software)		
Taper bartack length	0 - 20 mm		
Work clamp height	Standard 12 mm (up to 16 mm possible)		16 mm
Starting method	Foot switch (treadle type, 2-pedal type) or hand start switch		
Feed mechanism	Intermittent feed by three pulse motors (X, Y, θ)		
Needle	DO x 558 80 - 120 Nm (Schmetz 558)		
Safety devices	Built-in emergency stop function and automatic stopping device which stops the machine when the safety circuit is activated		
Upper shaft motor	AC servo motor (4-pole, 550 W)		
Air pressure	Main regulator: 0.5 MPa Hammer pressure regulator: 0.4 MPa		
Air consumption	43.2 l/min (8 cycles/min)		
Power supply	Single-phase 100V/220V, Three-phase 200V/220V/380V/400V 400 VA		
Weight	Machine head: Approx. 120 kg, Operation panel: Approx. 0.6 kg Control box: 14.2 - 16.2 kg (Varies depending on destination)		

## 2-2. Sewing shapes



0536B-0539B  
0540B-0543B  
0544B

## 3. INSTALLATION

### CAUTION

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li> Machine installation should only be carried out by a qualified technician.</li> <li> Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.</li> <li> The sewing machine weighs approximately 120 kg. Installation of the sewing machine and adjustment of the table height should be carried out by four or more people.</li> <li> Do not connect the power cord until installation is complete. If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.</li> <li> Hold the machine head with both hands when tilting it back or returning it to its original position. In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head may lose balance and fall over (together with the table), and injury or damage to the sewing machine may result.</li> </ul> | <ul style="list-style-type: none"> <li> All cords should be secured at least 25 mm away from any moving parts. Furthermore, do not excessively bend the cords or secure them too firmly with staples. If this is not observed, there is the danger that fire or electric shocks could occur.</li> <li> If this is not observed, there is the danger that fire or electric shocks could occur.</li> <li> Be sure to connect the ground.</li> <li> If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.</li> <li> Install the safety covers to the machine head and motor.</li> </ul> |
|---|--|

### 3-1. Table processing diagram

- Use a table with legs which is strong enough to bear the weight of the sewing machine (120 kg) and which can also withstand vibration. Use a table with a top thickness of 49 - 60 mm.

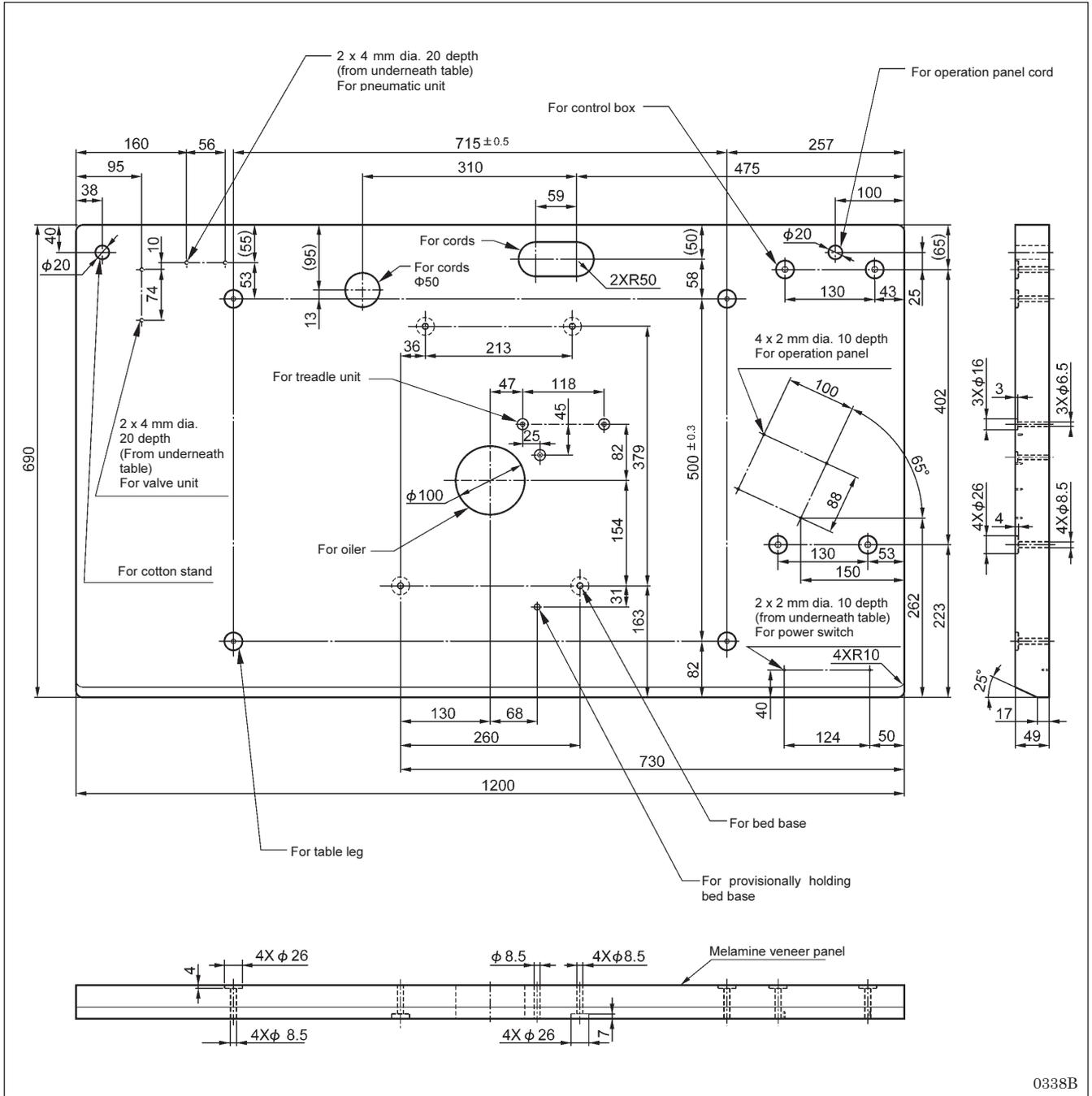
**NOTE:**

If the thickness of the table exceeds 60 mm, the accessory bolts and the cables coming from the machine head may not be long enough.

- If using casters, use ones which can bear the total weight of sewing machine and table.
- Check that the control box is at least 10 mm away from the leg. If the control box and the leg are too close together, it may result in incorrect sewing machine operation.
- The method of processing the table varies depending on whether the machine head is sitting on the table or embedded into the table. Refer to the processing diagrams for each respective setting-up method and drill the holes as appropriate.

### 3. INSTALLATION

#### 3-1-1. When setting up on top of the table

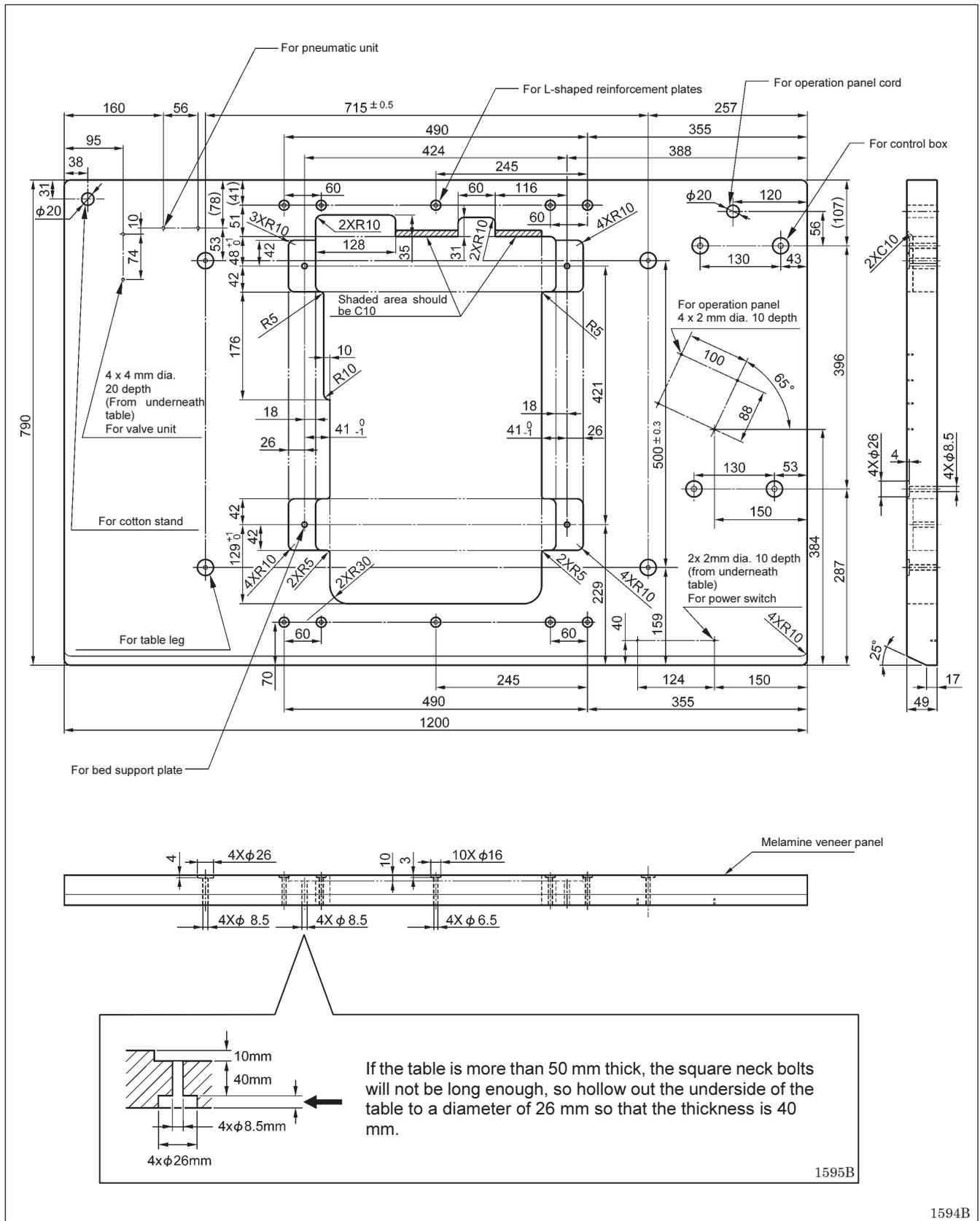


### 3-1-2. When embedding into the table

When embedding the machine head into the table, some extra components will be required, so contact the place of purchase for further details.

**NOTE:**

When embedding the machine head into the table, be sure to install the L-shaped table reinforcement plates. (Refer to “3-3. Installing the table reinforcement plates (embedded installation only)”.)



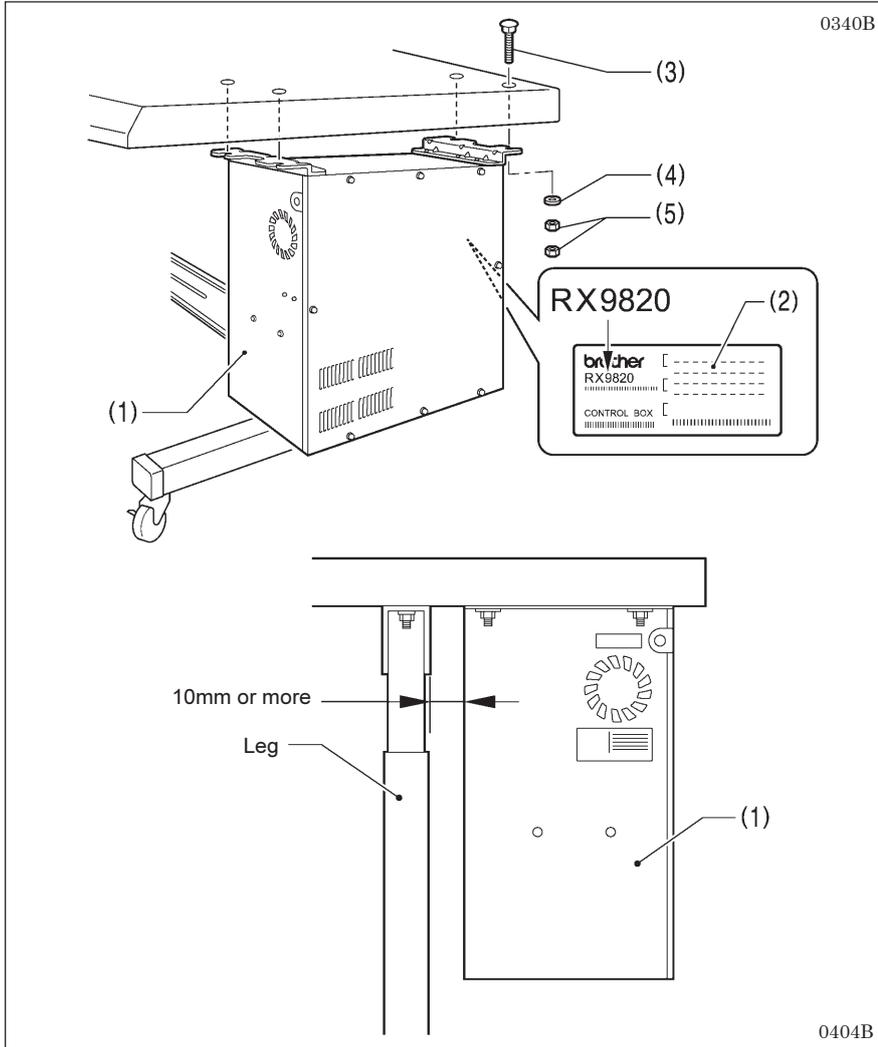
### 3. INSTALLATION

#### 3-2. Installing the control box

## ! CAUTION



Before installing the control box, take steps to make sure that the control box does not fall down. If this is not done, injury to feet or damage to the control box may result.

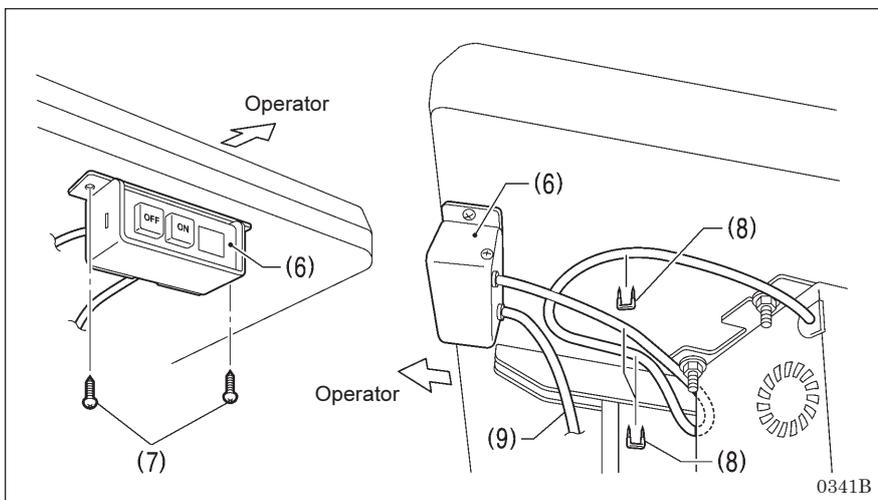


Before installing the control box (1), check that the model plate (2) on the control box (1) is "RX9820" to indicate that it is an RX-control box for RH-9820 sewing machines.

- (1) Control box
- (3) Bolts [4 pcs.]
- (4) Plain washers [4 pcs.]
- (5) Nuts [8 pcs.]

**NOTE:**

Check that the control box (1) is at least 10 mm away from the leg. If the control box (1) and the leg are too close together, it may result in incorrect sewing machine operation.



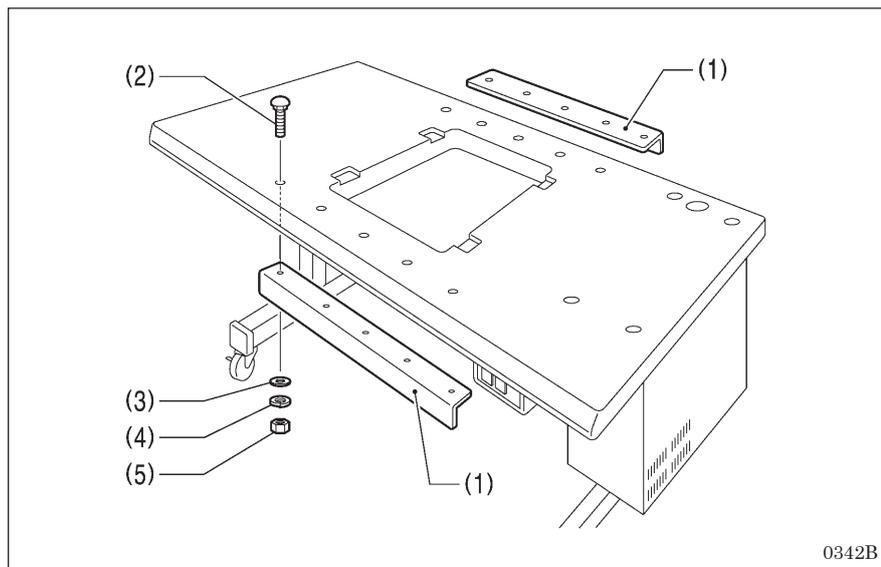
- (6) Power switch
- (7) Screws [2 pcs.]
- (8) Staples [5 pcs.]

\* Use the remaining two staples to secure the power cord (9) in a position that matches the position of the wall outlet.

**NOTE:**

Take care when tapping in the staples (8) to make sure that they do not pierce the power cord (9).

### 3-3. Installing the table reinforcement plates (embedded installation only)

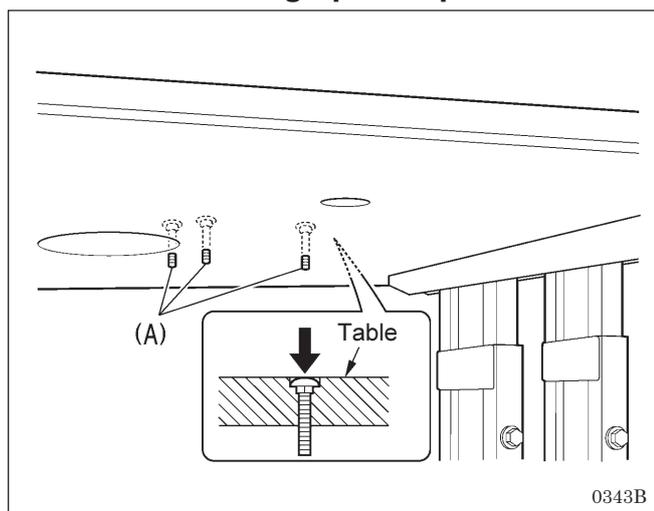


- (1) L-shaped reinforcement plates [2 pcs.]
- (2) Bolts [10 pcs.]
- (3) Plain washers [10 pcs.]
- (4) Spring washers [10 pcs.]
- (5) Nuts [10 pcs.]

0342B

### 3-4. Installing the machine head

#### 3-4-1. When setting up on top of the table



0343B

**<Only when using the treadle>**

Before installing the machine head, install the three treadle mounting bolts (A) to the table.

\* Insert the bolts (A) securely so that their heads do not protrude out from the top of the table.

(Refer to "3-12. Installing the treadle unit (when using the treadle)".)

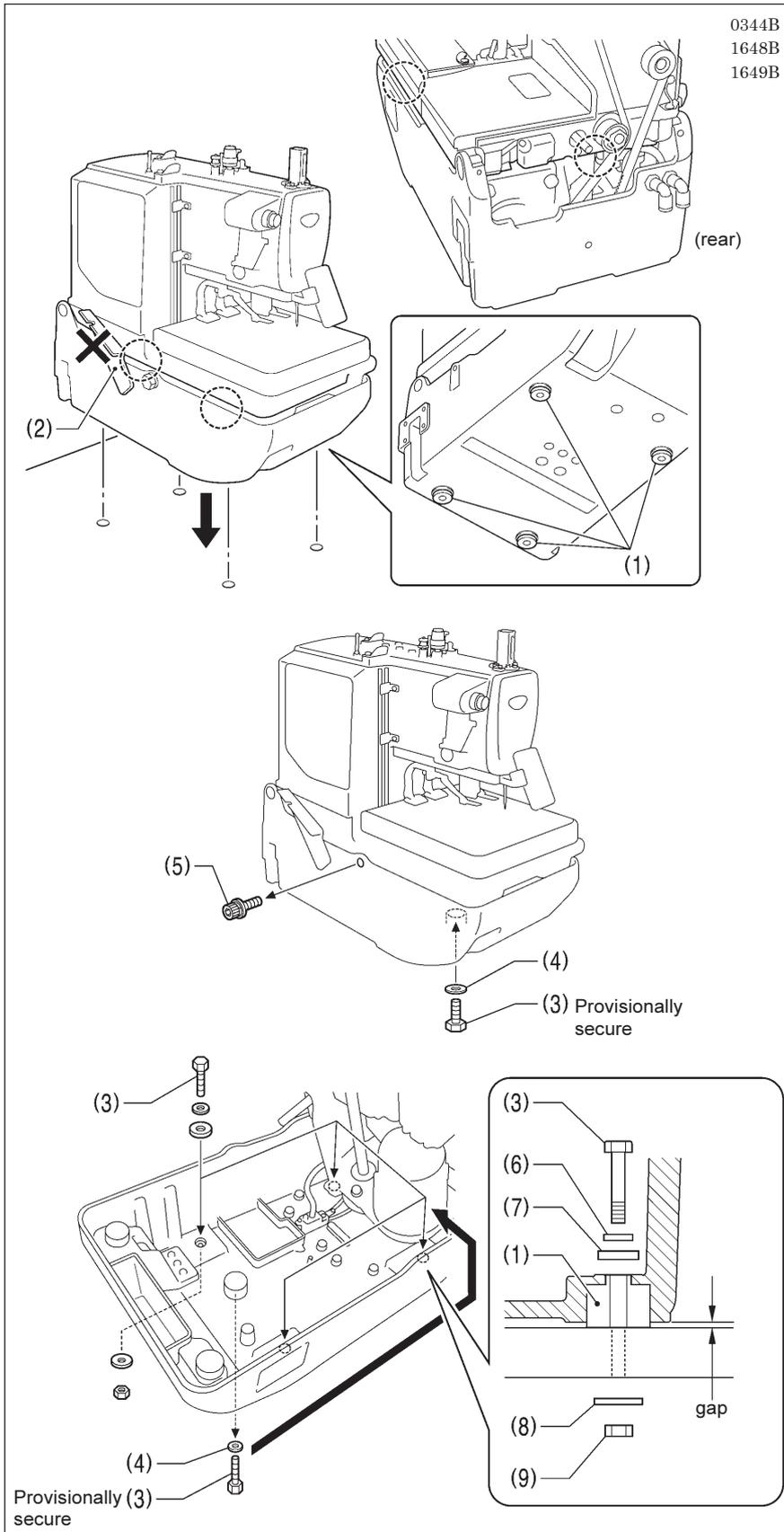
(Continued on next page)

### 3. INSTALLATION

## CAUTION



Always be sure to install the stopper bolt before tilting back the machine head in step 4 below. If this is not done, the machine head will tip over and fall down, and injury or damage to the machine head may result.



1. Check that the four bed base cushions (1) have all been installed to the bottom of the bed base, and then place the machine head onto the table.

#### NOTE:

- When placing the machine head onto the table, have four or more people hold the machine head by the places indicated by the four ○ locations in the illustration.
- Do not hold by the head support lever (2).

2. Use one of the four bolts (3) and a plain washer (4) to provisionally secure the bed base to the table from underneath the table.
3. After provisionally securing the bed base, remove the fixing bolt (5).
4. Tilt back the machine head, and then install the remaining three of the four bolts (3) to the other three places in the bed base. (Refer to "3-5. Tilting back and returning the machine head" for details on tilting back the machine head.)

(6) Washers [4 pcs.]

(7) Rubber sheets [4 pcs.]

(8) Washers (large) [4 pcs.]

(9) Nuts [4 pcs.]

#### NOTE:

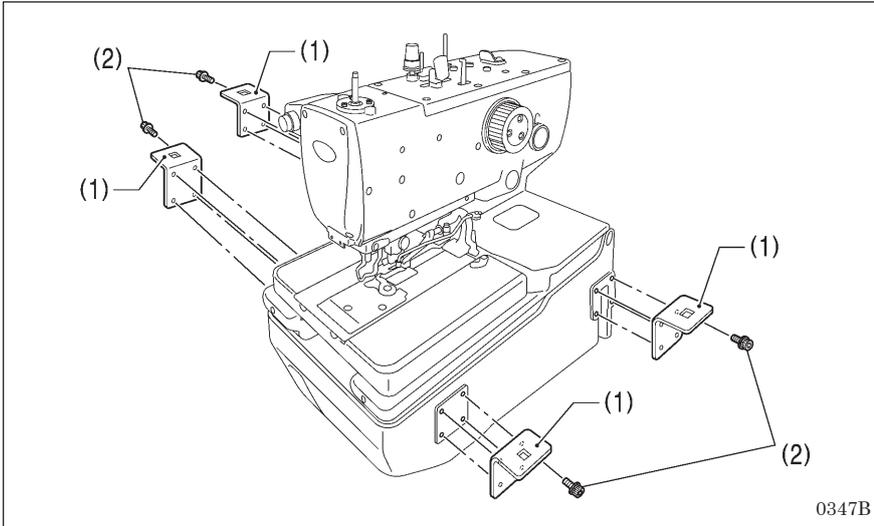
Do not over tighten the bolts (3) so much that a gap is produced between the table and the bed base.

5. Remove the bolt (3) and washer (4) that were used to provisionally secure the bed base, and install them to the one remaining location.

#### NOTE:

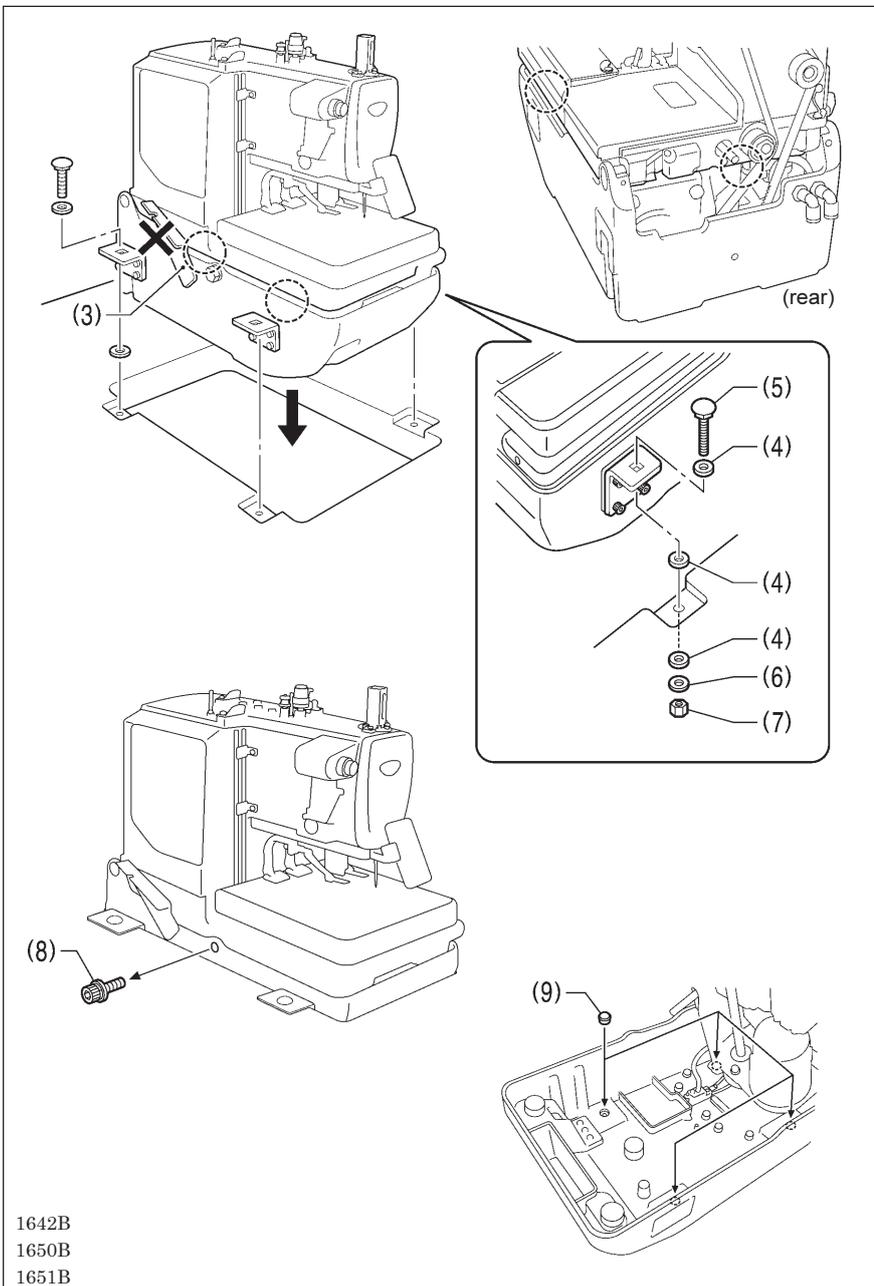
The fixing bolt (5) is needed when moving the machine head, so store it in a safe place.

3-4-2. When embedding into the table



- (1) Bed support plates [4 pcs.]
- (2) Bolts [16 pcs.]

\* Install so that they are horizontal to the bed base.



**NOTE:**

- When placing the machine head onto the table, have four or more people hold the machine head by the places indicated by the ○ locations in the illustration.
- Do not hold by the head support lever (3).

- (4) Rubber sheets [12 pcs.]
- (5) Bolts [4 pcs.]
- (6) Washers (large) [4 pcs.]
- (7) Nuts [4 pcs.]

After installing the machine head, remove the fixing bolt (8).

Tilt back the machine head and install the rubber caps (9) to the four holes in the bed base.

**NOTE:**

- The fixing bolt (8) is needed when moving the machine head, so store it in a safe place.
- Be sure to use the rubber sheets (4). If they are not used, the amount of vibration will be excessive.

### 3-5. Tilting back and returning the machine head

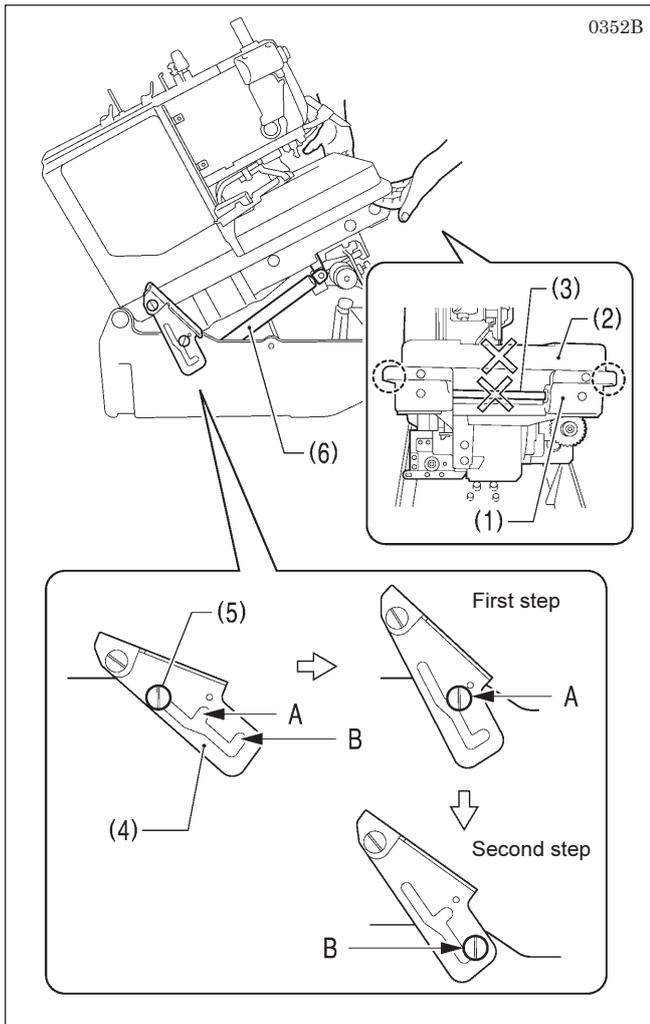
## ! CAUTION

-  Hold the machine head with both hands when tilting it back or returning it to its original position. In addition, do not subject the machine head to extra force while it is tilted back. If this is not observed, the machine head may lose balance and fall over (together with the table), and injury or damage to the sewing machine may result.
-  Do not hold the feed base (2) and the feed guide shaft (3). If this is not observed and the feed base (2) or feed guide shaft (3) come off, the machine head may fall down and injury or damage to the machine head may result.

The machine head can be tilted back and returned to one of two heights.

**NOTE:**

Always be sure to turn off the power switch before tilting back and returning the machine head.



**Tilting back the sewing machine head**

1. Hold the bed (1) at both sides (at the places indicated by ○ in the illustration) with both hands.
2. **To tilt back to the first step:**  
Gently lift up the machine head until the head support lever (4) securely engages section A of the hinge support shaft (5) (until a click is heard).
3. **To tilt back to the second step:**  
Remove the head support lever (4) from section A of the hinge support shaft (5), and then gently lift up the machine head until the head support lever (4) securely engages section B.

**NOTE:**

The machine head will be momentarily stopped by the gas spring (6) immediately before it rises to the second step, but it will not be locked at this point. Lift the machine head until the head support lever (4) securely engages section B of the hinge support shaft (5).

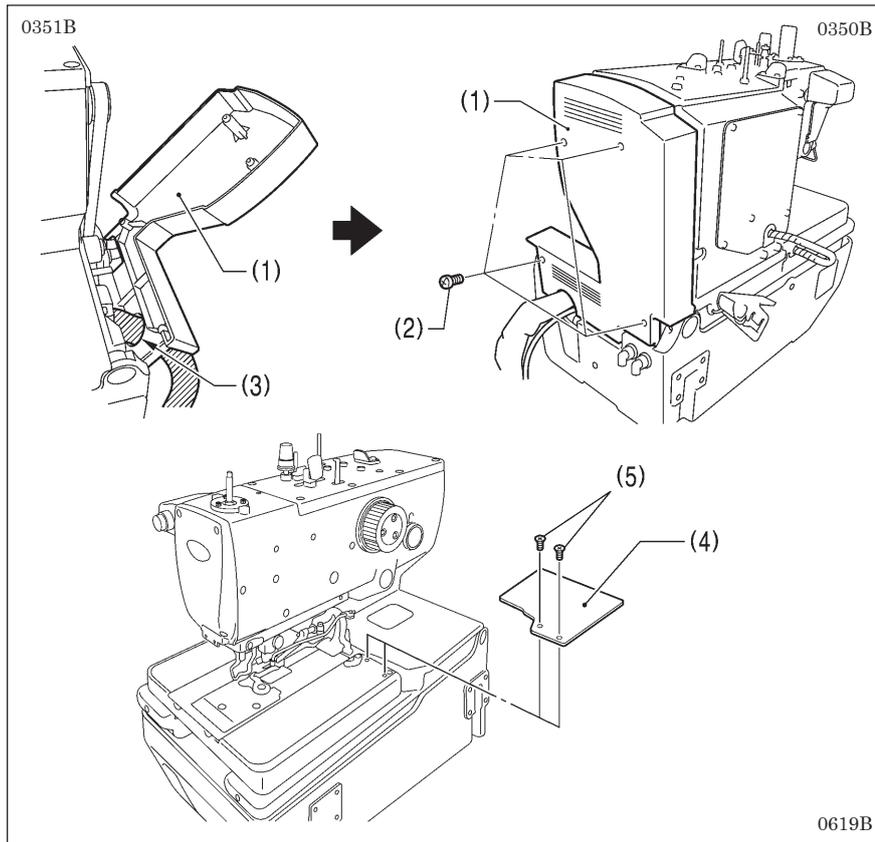
## ! CAUTION

-  Be sure to check that the head support lever (4) and the hinge support shaft (5) are engaged. If they are not engaged, the machine head may suddenly return to its original position and injury may result.

**<Returning the machine head to its original position>**

1. **To return the machine head from the second step:**  
After lifting up the machine head, remove the head support lever (4) from section B of the hinge support shaft (5), and then hold the bed at both sides and gently return it to its original position.
  - \* The machine head will start returning until the gas spring (6) starts to operate, so support the machine head securely with both hands.
  - \* When the machine head is returned to the first step, the head support lever will lock onto section A.
2. **To return the machine head from the first step:**  
After gently lifting up the machine head, remove the head support lever (4) from section A of the hinge support shaft (5), and then hold the bed at both sides and gently return it to its original position.

### 3-6. Installing the belt cover and feed bar cover U



- (1) Belt cover
- (2) Screws [4 pcs.]
- Before installing the belt cover, pass the cords through the belt cover notch (3).

**NOTE:**

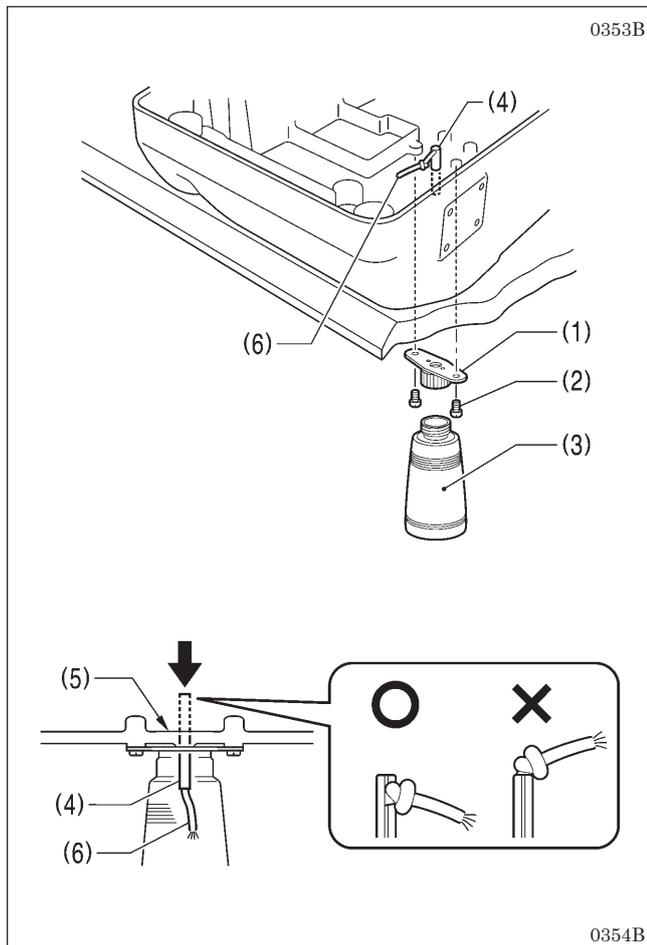
- Be careful not to clamp the cords when installing the belt cover. If care is not taken, the belt cover and cords may become damaged.
- If using the embedded installation method, check that the belt cover (1) does not touch the table when the machine head is tilted back.

- (4) Feed bar cover U
- (5) Screws [2 pcs.]

**NOTE:**

- If the screws (5) are tightened too much, the feed bar cover U (4) may become cracked.

### 3-7. Installing the oiler



The oiler should be installed while the machine head is tilted back.  
(Refer to “3-5. Tilting back and returning the machine head”.)

- (1) Dust oiler support
- (2) Screws [2 pcs.]
- (3) Oiler
- (4) Oiler spring pin

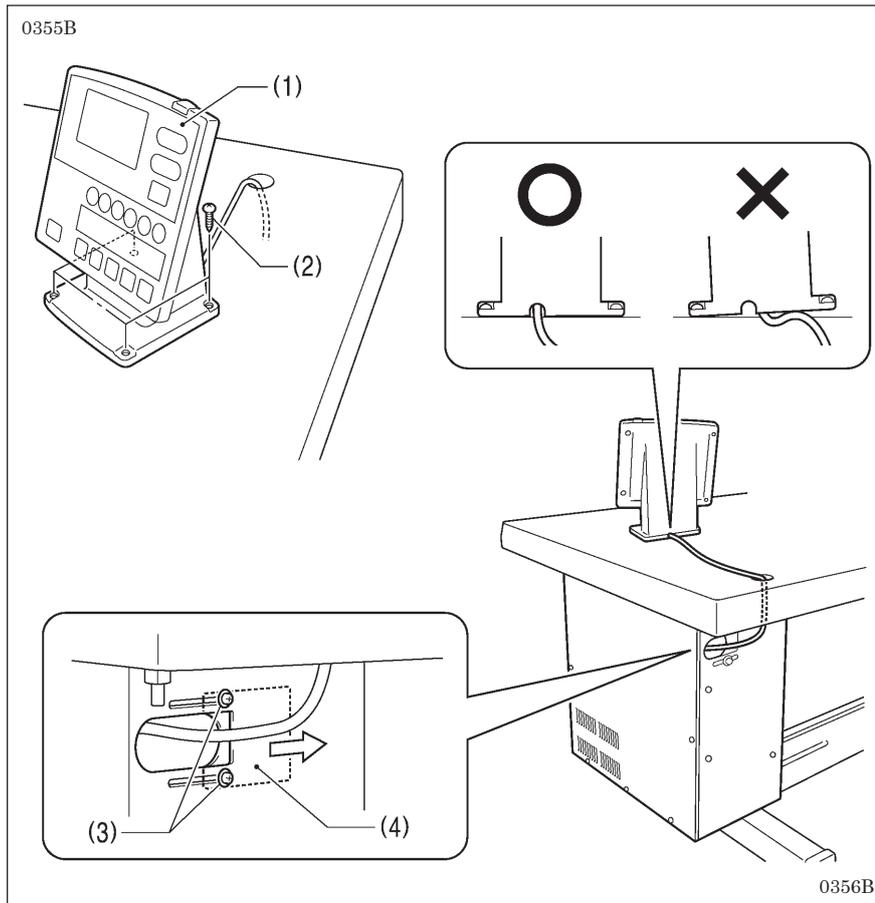
- Use a hammer or similar to tap the pin (4) so that its head is flush with the base of the oil pan (5).

**NOTE:**

When tapping in the pin (4), check that the knot in the wick (6) is below the top of the pin (4) as shown in the illustration at left. If the knot is above the pin (4), it may become hit by the hammer and this may cause the wick (6) to break.

- Once installation is complete, return the machine head to its original position.

### 3-8. Installing the operation panel



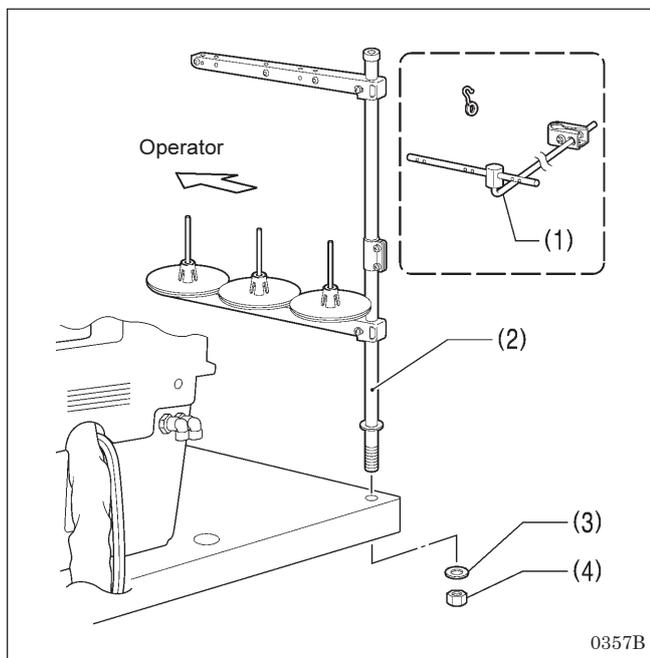
- (1) Operation panel
- (2) Screws [4 pcs.]

1. Pass the cord of the operation panel (1) through the table hole.
2. Loosen the two screws (3) at the rear of the control box, open the cord presser plate (4) in the direction of the arrow, and pass the cord through the hole into the box. (Refer to "3-1. Table processing diagram" for details on the installation position for the operation panel.)

**NOTE:**

Check that the operation panel cord is not being clamped when screwing the operation panel into the table. The cord may become damaged if it is clamped.

### 3-9. Installing the cotton stand



Install the cotton stand so that it is at the far left of the table when looking from the front of the sewing machine.

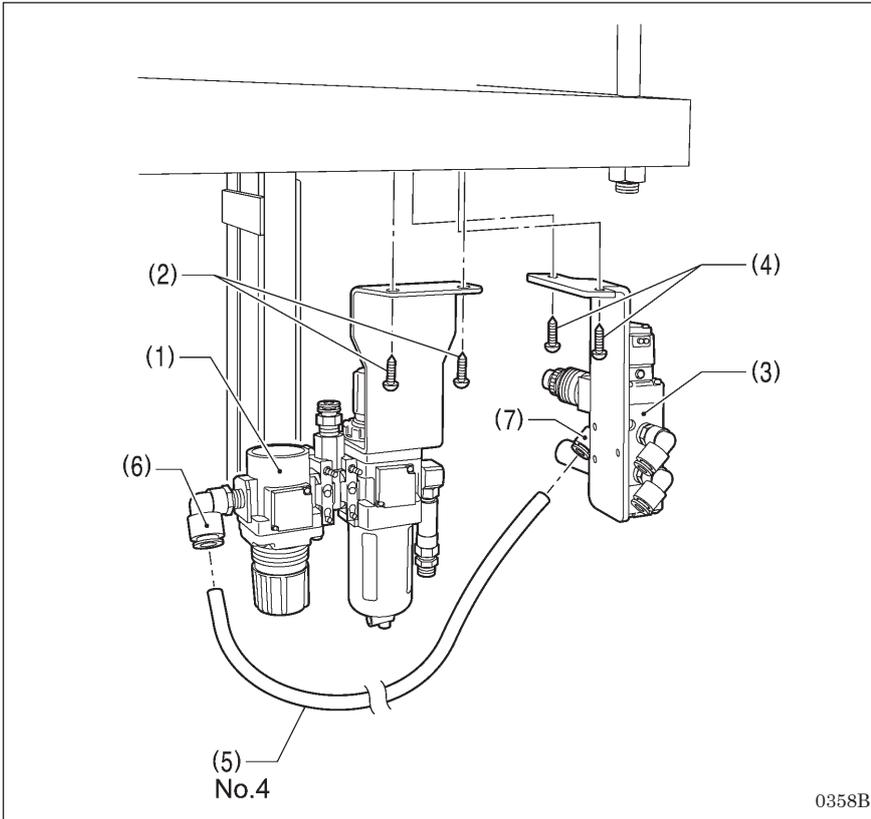
\* Do not use the thread guide (1) which is provided as an accessory with the cotton stand.

- (2) Cotton stand
- (3) Washer
- (4) Nut

**NOTE:**

- Tighten the nut to secure the cotton stand firmly so that it will not move.
- The cotton stand can also be installed on the far right side of the table, but if this is done, the threading method will change. (Refer to "4-5. Threading the thread when the cotton stand is installed on the right side".)

### 3-10. Installing the air unit and valve unit



Install to the underside of the table.  
(Refer to "3-1. Table processing diagram" for the installation positions.)

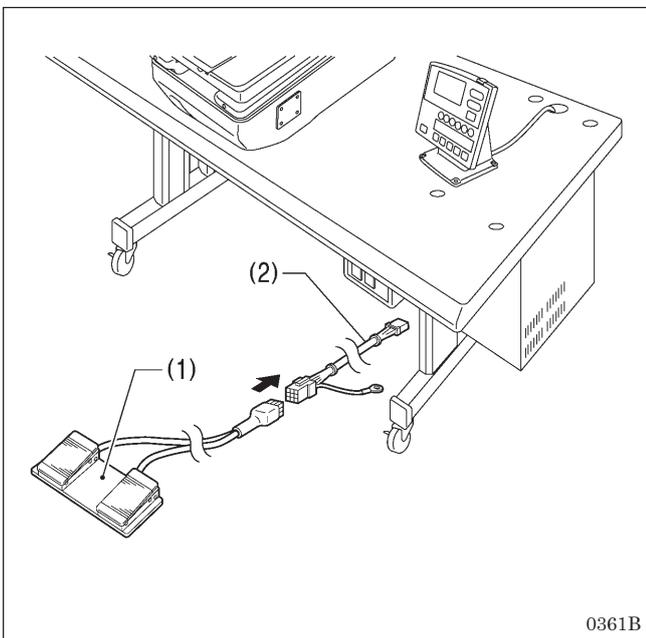
- (1) Air unit
- (2) Screws [2 pcs.]
- (3) Valve unit
- (4) Screws [2 pcs.]
- (5) Air tube No. 4

Insert air tube No. 4 (5) into the joint (6) and the joint (7).

**NOTE:**

- Install the air unit (1) so that it does not touch the table leg.
- Be careful to avoid injury from items such as sewing machine parts and the corners of table drawers during installation.

### 3-11. Installing the 2-pedal foot switch (when using the 2-pedal foot switch)

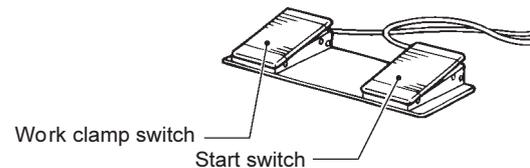


- (1) 2-pedal foot switch
- (2) Foot switch conversion harness

Pass the connector of the foot switch conversion harness (2) into the control box through the hole in the rear of the control box. (Refer to "3-8. Installing the operation panel".)

**<2-pedal foot switch operation method>**

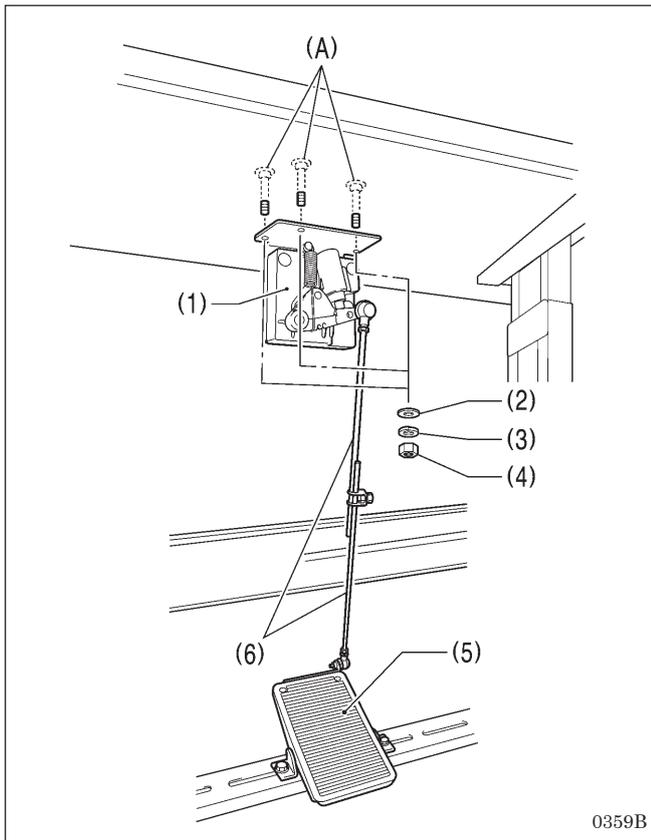
When the work clamp switch (left side) is depressed, the work clamp will be lowered, and when the start switch (right side) is depressed, the sewing machine will start.



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### 3-12. Installing the treadle unit (when using the treadle)

#### 3-12-1. When setting up on top of the table



**NOTE:**

Before installing the machine head, install the three treadle unit mounting bolts (A) to the table. (Refer to “3-4-1. When setting up on top of the table”.)

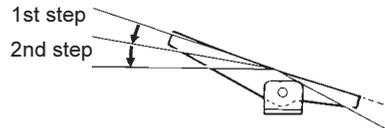
- (1) Treadle unit
- (2) Plain washers [3 pcs.]
- (3) Spring washers [3 pcs.]
- (4) Nuts [3 pcs.]

Pass the connector of the treadle unit (1) into the control box through the hole in the rear of the control box. (Refer to “3-8. Installing the operation panel”.)

\* Use a commercially-available treadle (5) and connecting rod (6).

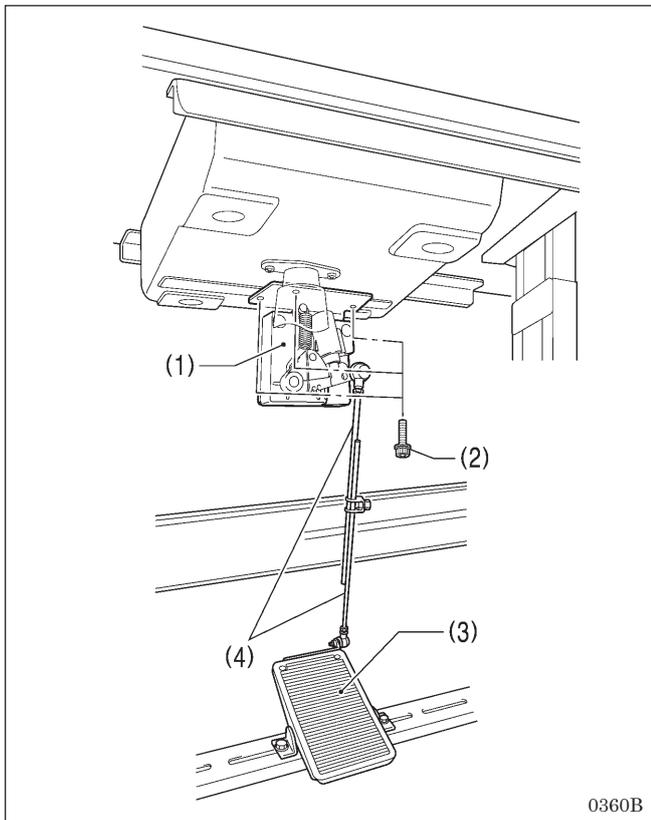
**<Treadle operation method>**

When the treadle (5) is depressed to the 1st step, the work clamp will be lowered, and when it is depressed to the 2nd step, the sewing machine will start.



4441Q

#### 3-12-2. When embedding into the table



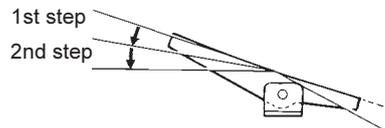
- (1) Treadle unit
- (2) Screws [3 pcs.]

Pass the connector of the treadle unit (1) into the control box through the hole in the rear of the control box. (Refer to “3-8. Installing the operation panel”.)

\* Use a commercially-available treadle (3) and connecting rod (4).

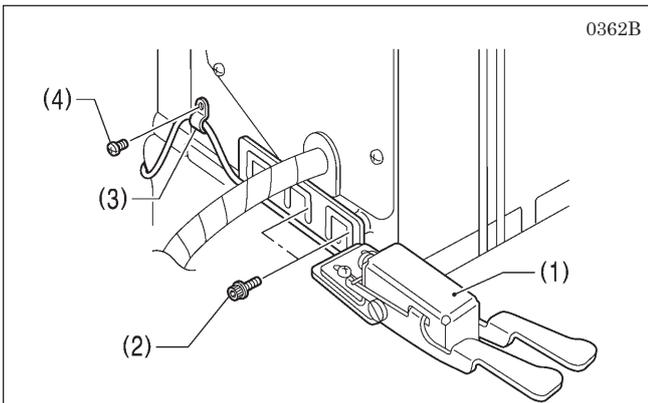
**<Treadle operation method>**

When the treadle (3) is depressed to the 1st step, the work clamp will be lowered, and when it is depressed to the 2nd step, the sewing machine will start.



4441Q

### 3-13. Installing the hand start switch (when using the hand start switch)



- (1) Hand start switch
- (2) Screws [2 pcs.]
- (3) Cord holders [3 pcs.]
- (4) Screws [3 pcs.]

\* When setting up on top of the table, use only two of the cord holders (3) and screws (4).

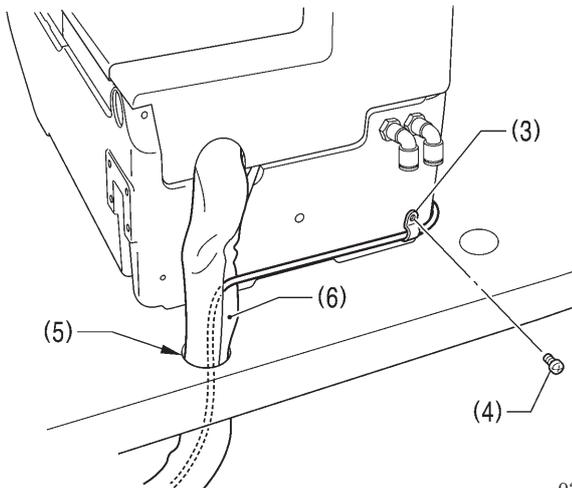
Pass the cord of the hand start switch (1) through the table hole (5), and pass the connector into the control box through the hole in the rear of the control box. (Refer to "3-8. Installing the operation panel".)

**[When setting up on top of the table]**

Insert the cord into the quick tube (6), and then pass it through the table hole (5).

\* This is to prevent damage from the cord rubbing against the table hole (5) when the machine head is tilted back and returned.

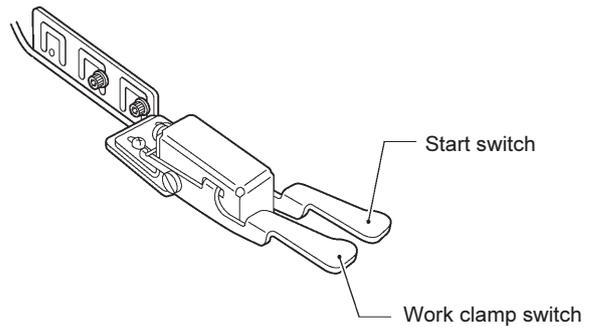
**[When setting up on top of the table]**



0363B

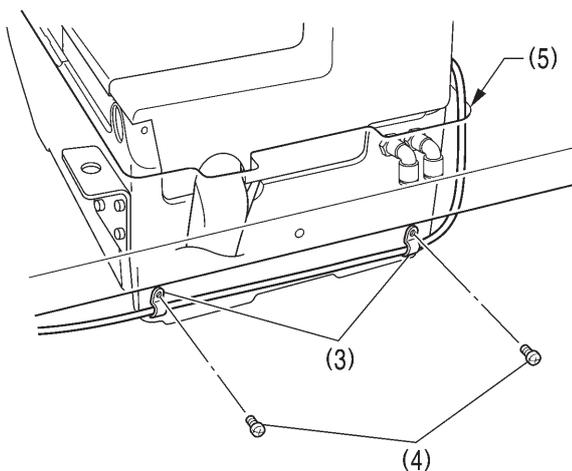
**<Hand start switch operation method>**

When the work clamp switch (left side) is depressed, the work clamp will be lowered, and when the start switch (right side) is depressed, the sewing machine will start.



0364B

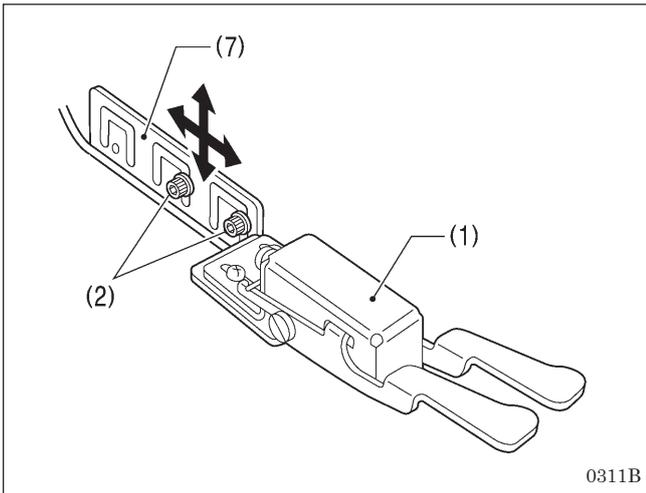
**[When embedding into the table]**



0385B

(Continued on next page)

### 3. INSTALLATION

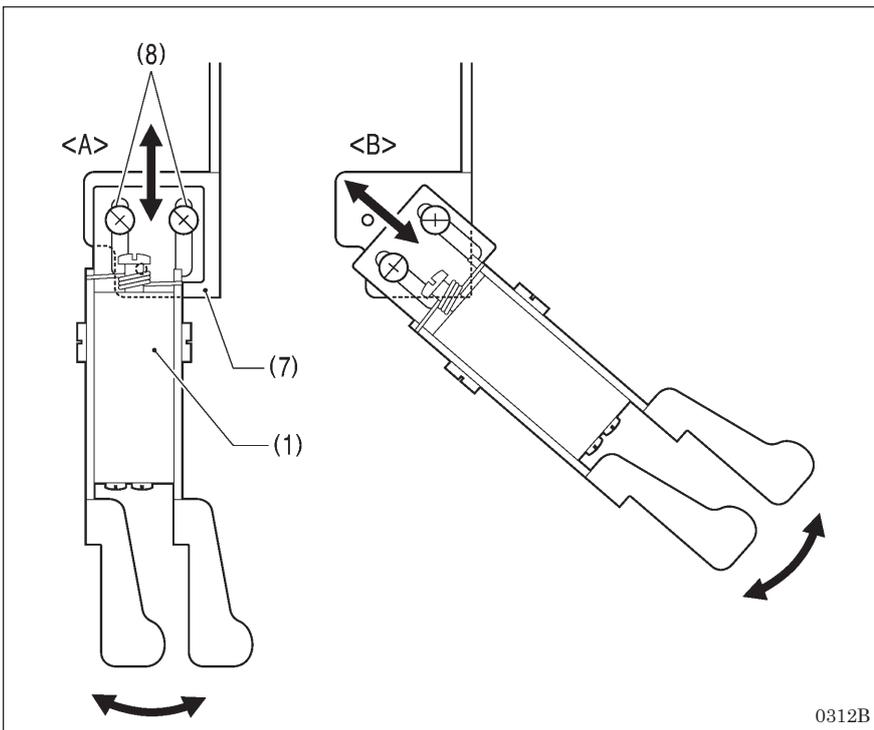


#### <Adjusting the hand start switch position>

Adjust the position of the hand start switch (1) as follows so that it is in an easy-to-use position.

#### [Forward/back and vertical position]

1. Loosen the two screws (2), and then move the hand start switch mounting plate (7) forward, back, up or down to adjust its position.
2. Once adjustment is complete, securely tighten the screws (2).

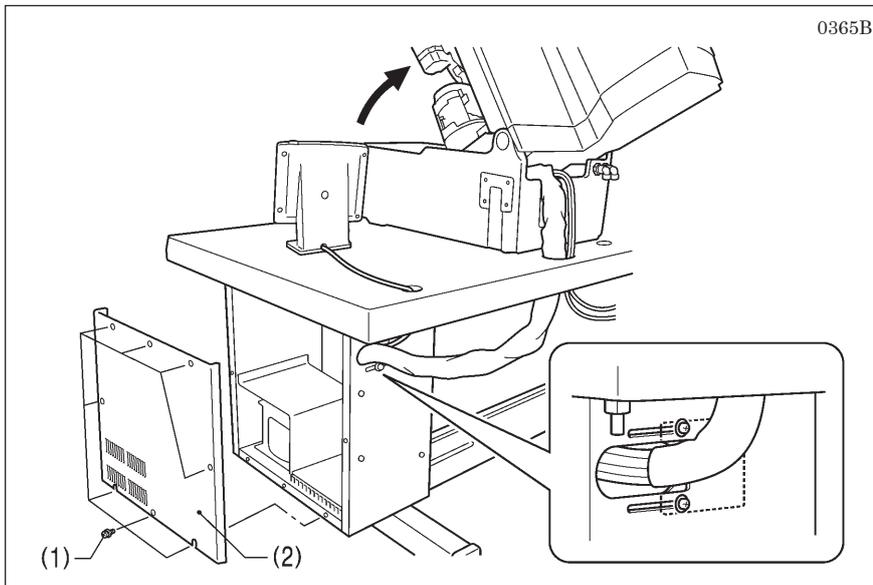


#### [Forward/back and sideways position]

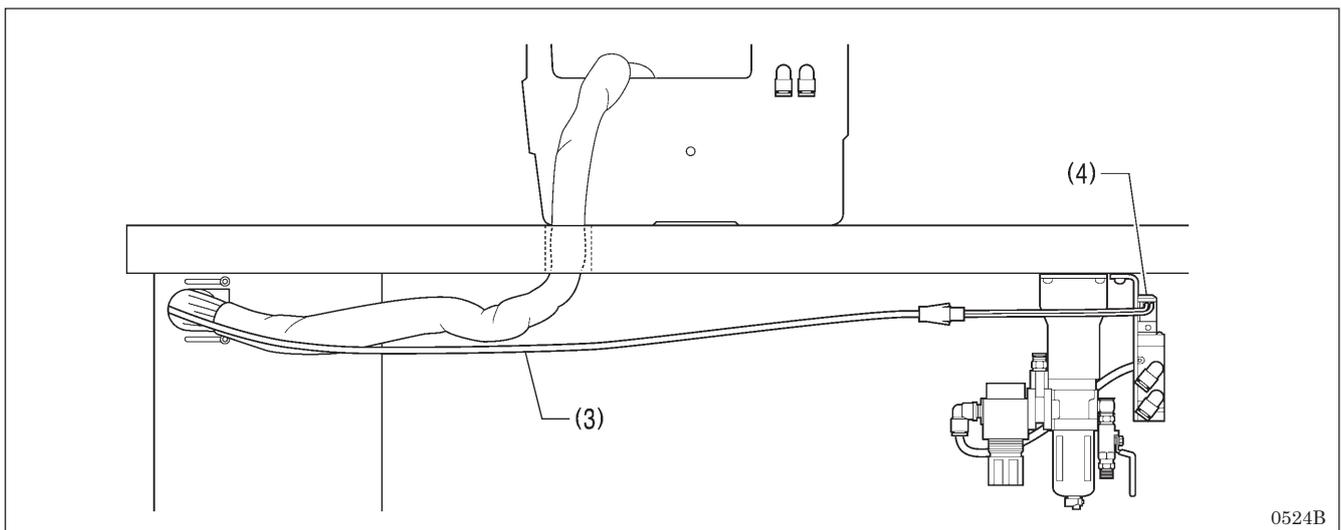
- The hand start switch mounting plate (7) has three screw holes in it. You can select the installation position from either <A> or <B> shown in the illustration by changing the screw holes used by the screws (8).
- In addition, when the screws (8) are loosened, the hand start switch (1) can be moved forward, back and sideways to adjust its position. Once adjustment is complete, securely tighten the screws (8).

## 3-14. Connecting the cords

### 3-14-1. Connecting the connectors inside the control box



1. Remove the eight screws (1), and then remove the control box cover (2).
2. Gently tilt back the machine head.
3. Pass the cord bundle through the table hole, and then pass it into the control box through the hole in the rear of the control box.



4. Pass the hammer valve harness (3) into the control box through the hole in the rear of the control box.

(4) Hammer valve

5. Insert each of the connectors as shown in the illustration and table on pages 19 and 20.

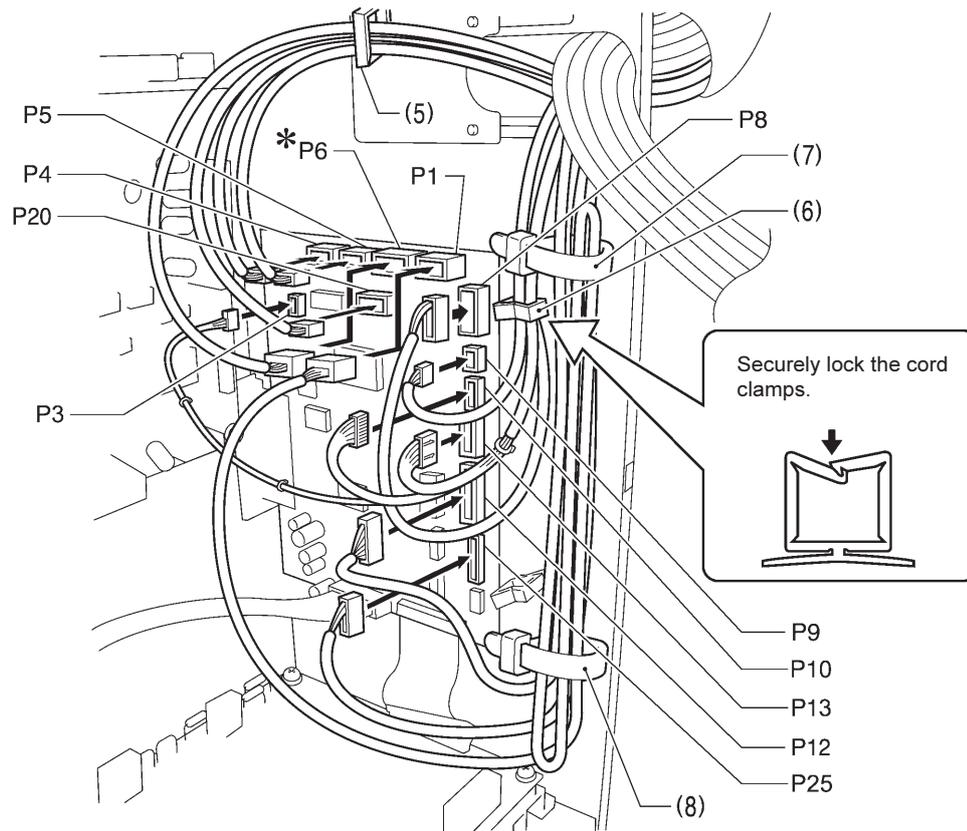
**NOTE:**

- Check that the connectors are facing the correct way, and then insert them firmly until they lock into place.
- Secure the cables with fastening bands and cord clamps, while being careful not to pull on the connectors.

(Continued on next page)

### 3. INSTALLATION

#### <Main P.C. board>



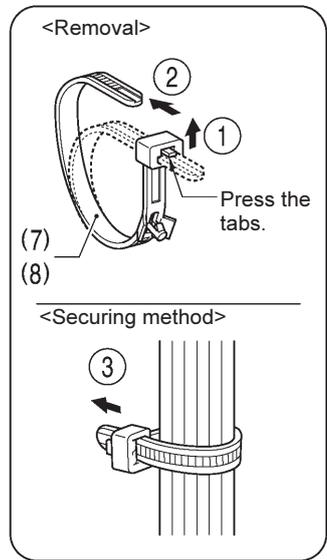
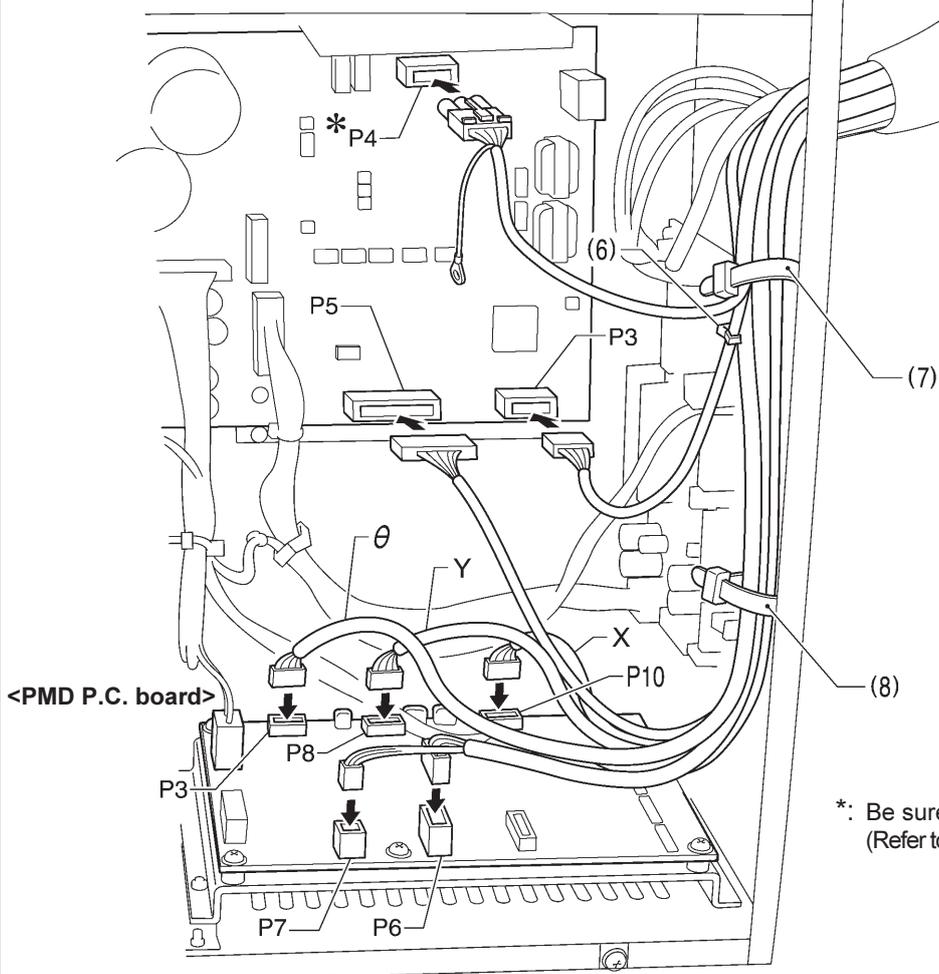
\* <If using the 2-pedal foot switch>

Be sure to make the ground connection. (Refer to "3-14-2. Connecting the ground wire".)

Connectors	At main P.C. board Insertion location	Cord clamp
X pulse motor encoder 5-pin white	P20 (X-ENC)	(5)
Y pulse motor encoder 5-pin blue	P4 (Y-ENC)	(5)
θ-feed motor encoder 5-pin black	P5 (P-ENC)	(5)
Treadle, 2-pedal foot switch, hand start switch 10-pin	P6 (FOOT)	(5)
Operation panel 8-pin	P1 (PANEL)	(7), (8)
Hammer position sensor	P3 (CUTTER)	(6)
Machine head safety switch 3-pin	P9 (HEAD-SW)	(6)
(Y home position, cooling fan) sensor 12-pin	P8 (SENSOR1)	(6)
STOP switch 6-pin	P13 (HEAD)	(6)
(Zigzag check, low thread trimming OFF) sensor 6-pin	P10 (SENSOR2)	(6)
Valve harness 12-pin	P12 (AIR1)	(7), (8)
Hammer valve harness 10-pin	P25 (AIR2)	(7), (8)

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<Power supply motor P.C. board>



\*: Be sure to make the ground connection.  
(Refer to "3-14-2. Connecting the ground wire".)

Connectors	At power supply motor P.C. board Insertion location	Cord clamp
Machine head memory 7-pin	P3 (HEAD-M)	(6)
Upper shaft motor 3-pin	P4 (UVW)	(7)
Synchronizer 14-pin	P5 (SYNC)	(7), (8)
Connectors	At PMD P.C. board Insertion location	Cord clamp
θ-feed motor 4-pin black (Gimp clamp, lower tension release) solenoid 6-pin	P3 (PPM)	(7), (8)
Upper tension release solenoid 4-pin	P6 (SOL1)	(7), (8)
Y-feed motor 4-pin blue	P7 (SOL2)	(7), (8)
X-feed motor 4-pin white	P8 (YPM)	(7), (8)
	P10 (XPM)	(7), (8)

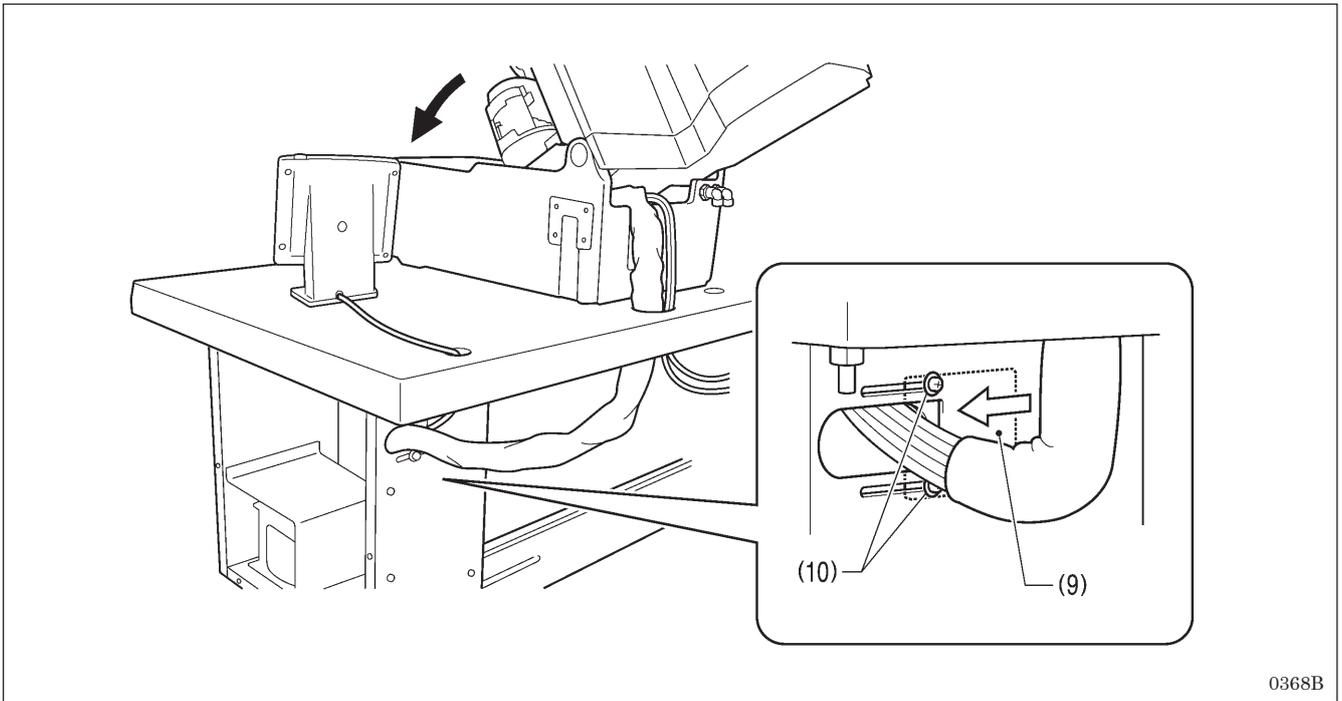
**NOTE:**

Route the X-feed, Y-feed and θ-feed motor harnesses so that they do not touch the PMD P.C. board.

0367B

(Continued on next page)

### 3. INSTALLATION



0368B

6. Close the cord presser plate (9) in the direction of the arrow, and secure it by tightening the two screws (10).

**NOTE:**

- Make some slack in the cords outside the control box so that the cords do not get pulled too tightly inside the control box.
- Securely close the cord presser plate (9). If dust gets inside the control box, it may cause problems with operation.

7. Check that the cords do not get pulled, and then gently return the machine head to its original position.

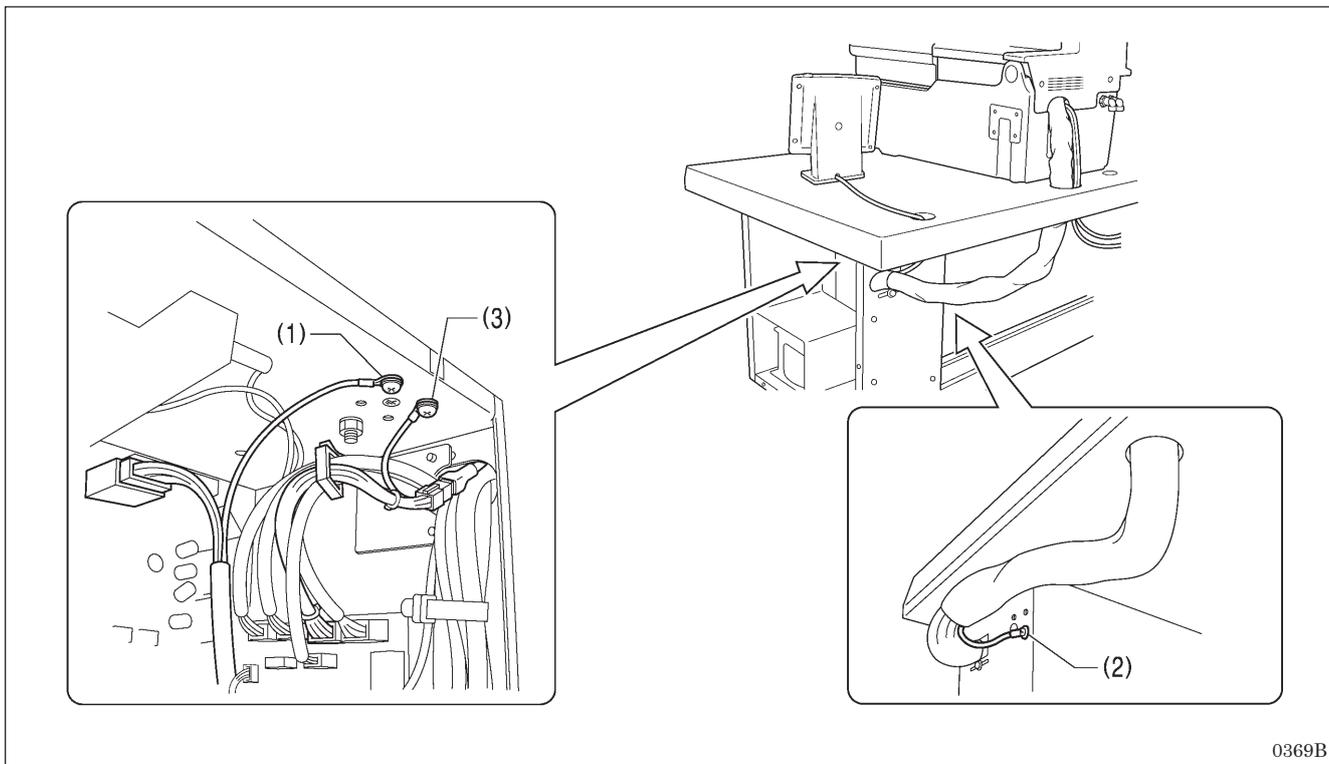
### 3-14-2. Connecting the ground wire

## ⚠ CAUTION



Be sure to connect the ground.

If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

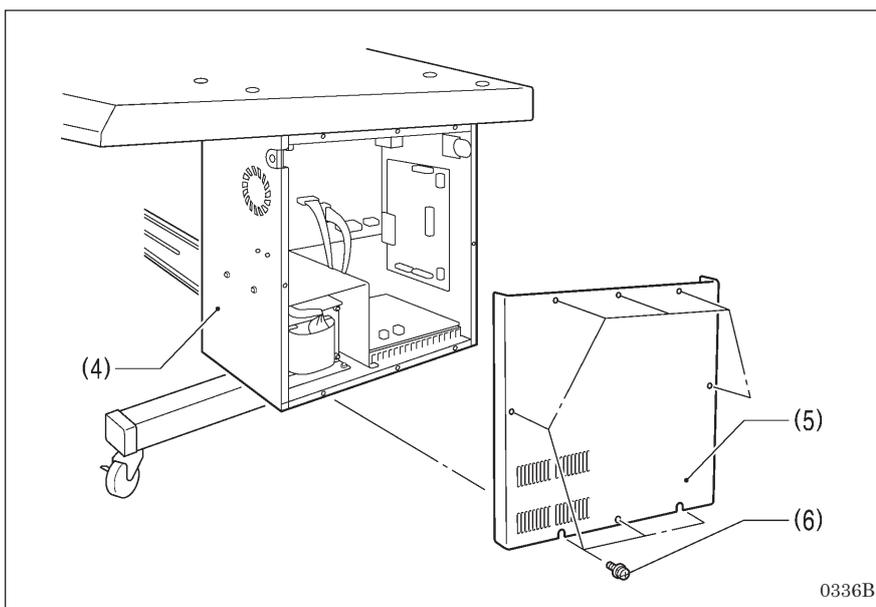


0369B

- (1) Ground wire from upper shaft motor harness
- (2) Ground wire from the machine head
- (3) Ground wire from foot switch conversion harness of 2-pedal foot switch (when using 2-pedal foot switch)

**NOTE:**

Make sure that the ground connections are secure in order to ensure safety.



Secure the cover (5) of the control box (4) by tightening the eight screws (6). Check that the cords are not clamped by the cover at this time.

**<For European destinations>**

For European destinations, there are other ground wire connection locations in addition to those mentioned above. Refer to the CE instruction manual for further details.

0336B

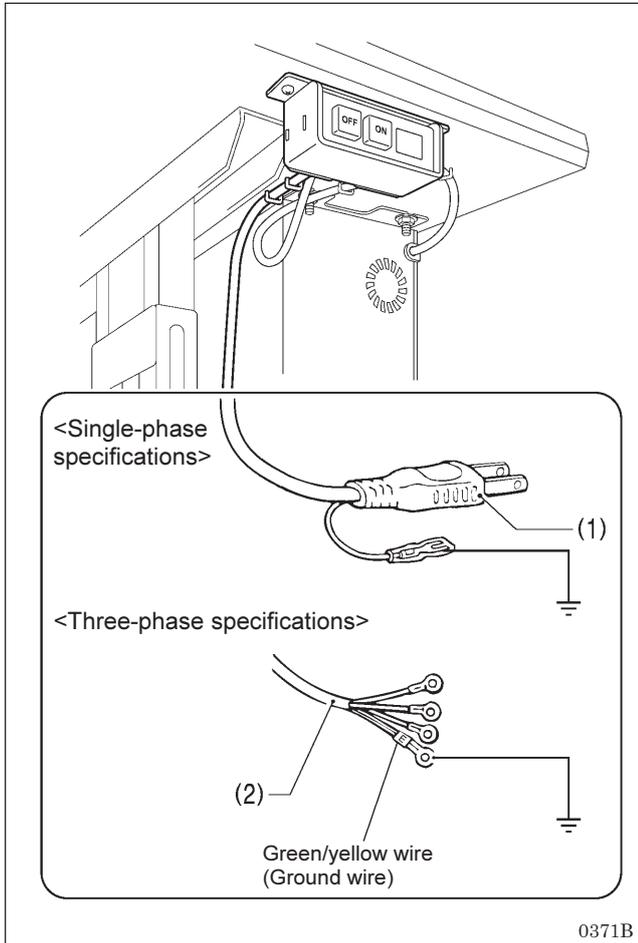
### 3. INSTALLATION

#### 3-14-3. Connecting the power cord

## CAUTION



Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.



#### <For single-phase specifications>

Insert the power cord plug (1) into a wall outlet.

#### <For three-phase specifications>

1. Attach an appropriate plug to the power cord (2). (The green and yellow wire is the ground wire.)
2. Insert the power plug into a properly-grounded AC power supply.

\* The inside of the control box uses single-phase power.

#### NOTE:

Do not use extension cords. They may cause problems with correct operation of the sewing machine.

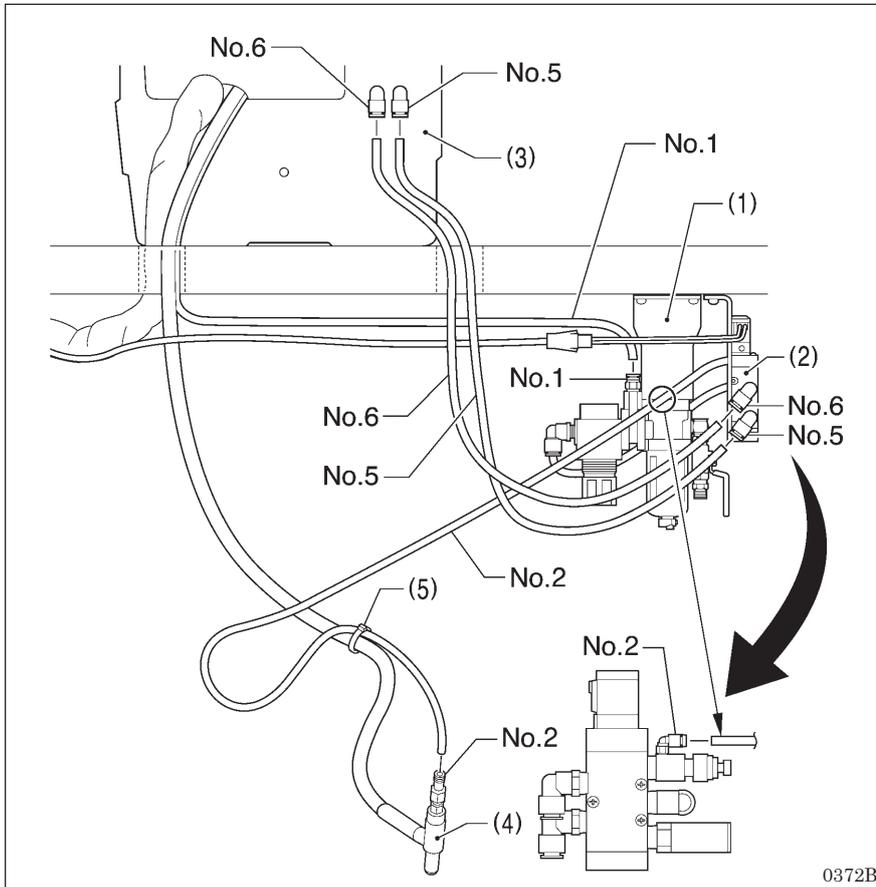
0371B

### 3-14-4. Connecting the air tubes

## ! CAUTION

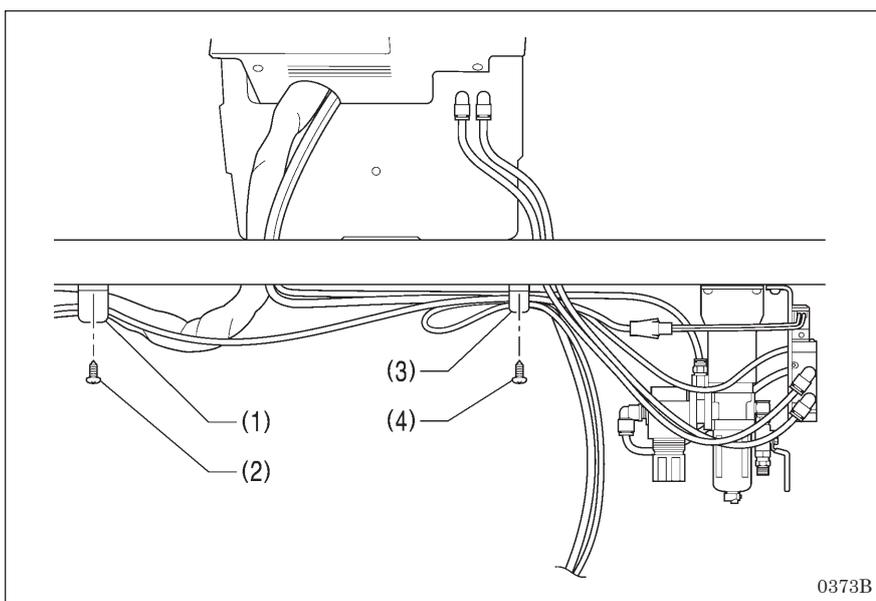


Do not switch the insertion locations for air tube No. 5 and No. 6 by mistake. If they are not connected correctly, the hammer may be lowered when the power is turned on or when the air cock is opened, and serious injury may result.



1. Insert air tube No. 1 coming from the machine head into the nipple for the air unit assembly (1). (The numbers appear on the air tubes coming from the sewing machine.)
2. Insert accessory air tube No. 5 and No. 6 into the nipples of the solenoid valve assembly (2) and bed base (3). (When setting up the machine head on top of the table, pass the air tubes through the table hole.)
3. Insert accessory air tube No. 2 into the nipples of the solenoid valve assembly (2) and venturi tube (4).
4. Bind the air tubes together using fastening bands (5).

### 3-14-5. Securing the cords



**NOTE:**

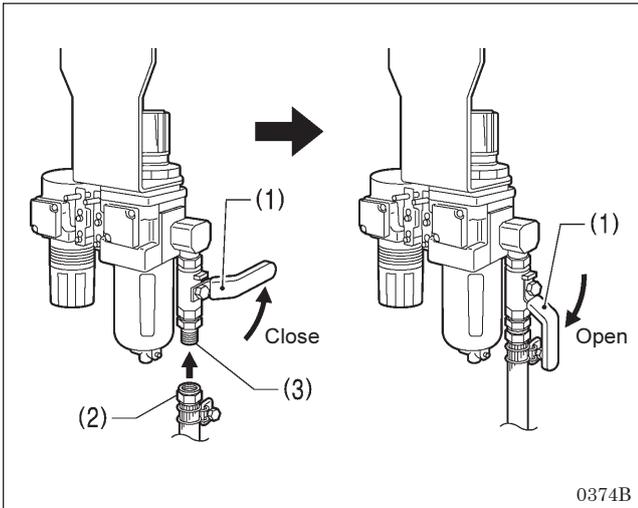
Secure the cords while leaving enough slack in them so that they do not get pulled when the machine head is tilted back.

1. Pass the cord bundle and the hammer valve harness through the accessory cord holder (large) (1), and secure the cord holder (large) (1) to the underside of the table with the screw (2).
2. Pass the air tubes and the valve cords through the accessory cord holder (small) (3), and secure the cord holder (small) (3) to the underside of the table with the screw (4).

### 3. INSTALLATION

#### 3-15. Installing the air hose

Connect the air hose coming from the compressor to the air unit which is installed underneath the table.



1. Close the cock (1).
2. Turn the nut (2) at the end of the air hose and connect it to the valve (3).
3. Open the cock at the compressor.  
\* Check that no air is leaking from the valve connection.
4. Open the cock (1).  
(The meter pointer will turn clockwise.)
5. Adjust the air pressure.

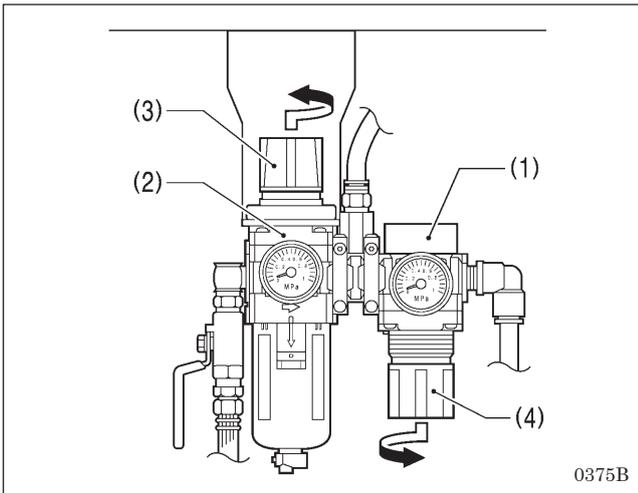
**NOTE:**

Turn the cock (1) gently to open it. If this is not done, the air cylinder may operate too suddenly.

#### 3-16. Adjusting the air pressure

Adjust the hammer pressure adjustment regulator (1) to the minimum pressure setting which will allow cutting of the article being sewn.

To set to the standard pressure, adjust the main regulator (2) to 0.5 MPa.

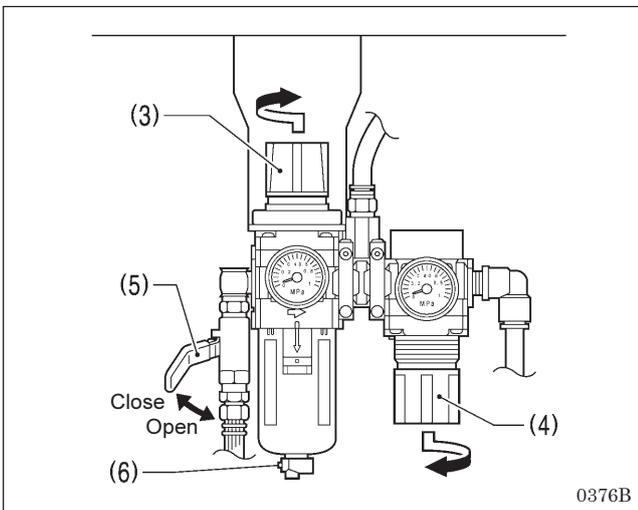


**<Increasing the air pressure>**

1. Lift up the knob (3) of the main regulator (2) and turn it gently to adjust the pressure.  
\* When the knob (3) is turned in the direction of the arrow, the air pressure will increase.
2. Pull down the knob (4) of the hammer pressure adjustment regulator (1) and turn it gently to adjust the pressure.  
\* When the knob (4) is turned in the direction of the arrow, the air pressure will increase.

**NOTE:**

The hammer pressure adjustment regulator (1) is already adjusted to a pressure of 0.4 MPa. Do not increase the pressure if it is not necessary to do so. If the pressure is too high, the sharpness of the knife will deteriorate and the knife may become damaged.



**<Decreasing the air pressure>**

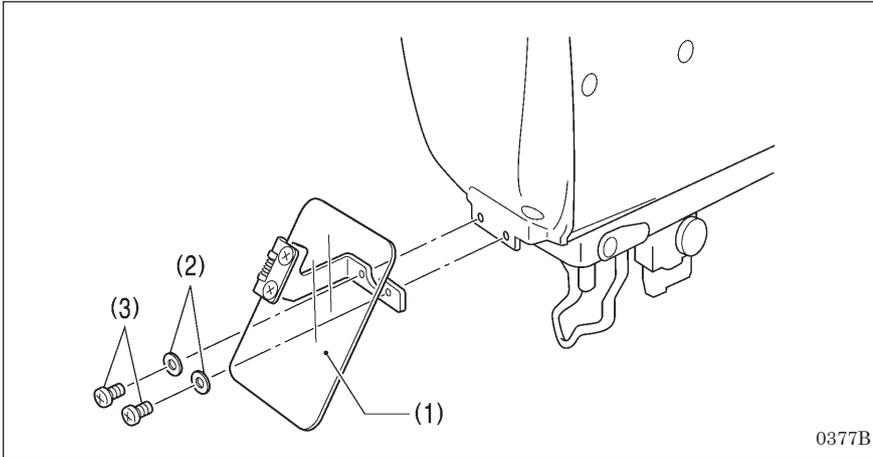
1. Close the air cock (5). (The pointer will stay at the high position on the scale.)
2. Press the button (6).  
The air pressure inside the bowl will be released and the pointer will move down.
3. To decrease the air pressure, lift up the knob (3) or pull down the knob (4) and turn it in the direction of the arrow.
4. Open the cock (5).  
Air will enter the bowl and the pointer will move.
5. Repeat steps 1 to 4 until the desired air pressure is obtained.

### 3-17. Installing the eye guard

## ! CAUTION



Attach all safety devices before using the sewing machine.  
If the machine is used without these devices attached, injury may result.

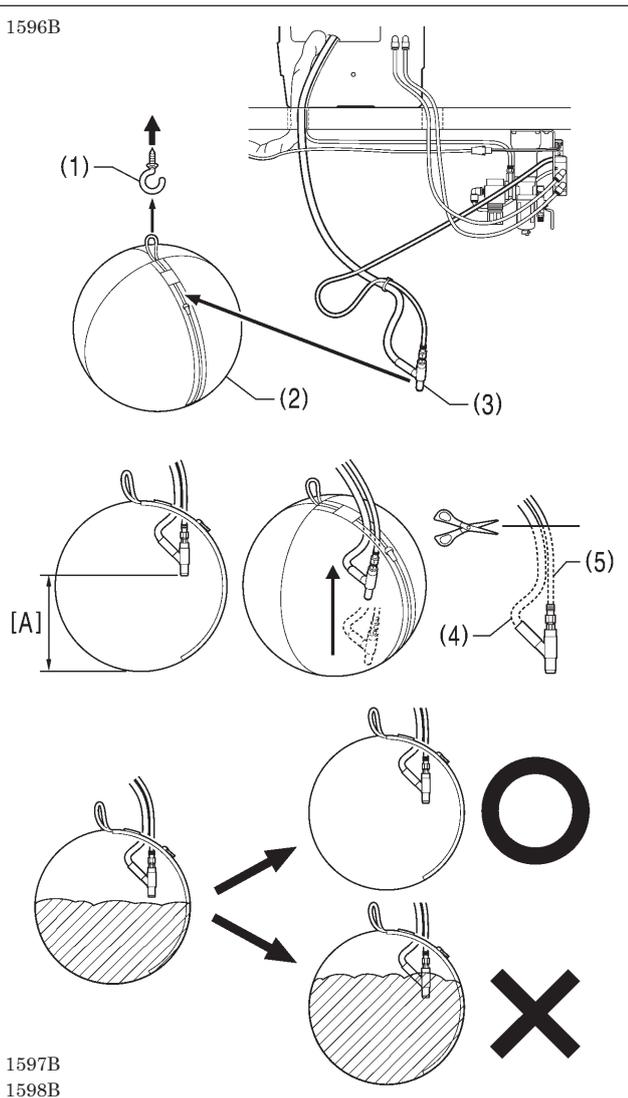


- (1) Eye guard assembly
- (2) Plain washers [2 pcs.]
- (3) Screws [2 pcs.]

0377B

### 3-18. Installing the dust bag

1596B



1597B  
1598B

1. Install the hook (1) underneath the table in a convenient-to-use position.
2. Install the dust bag (2) to the hook (1).
3. Open the chuck of the dust bag (2) and insert the venturi tube (3).
4. Close the chuck.

The longer the distance [A] from the bottom of the dust bag to the venturi tube (3), the greater the amount of cutting scraps that the dust bag can hold. To increase the amount of cutting scraps that can be held, adjust so that the distance [A] becomes longer.

Cut the knife trash tube (4) and air tube (5) shorter if necessary.

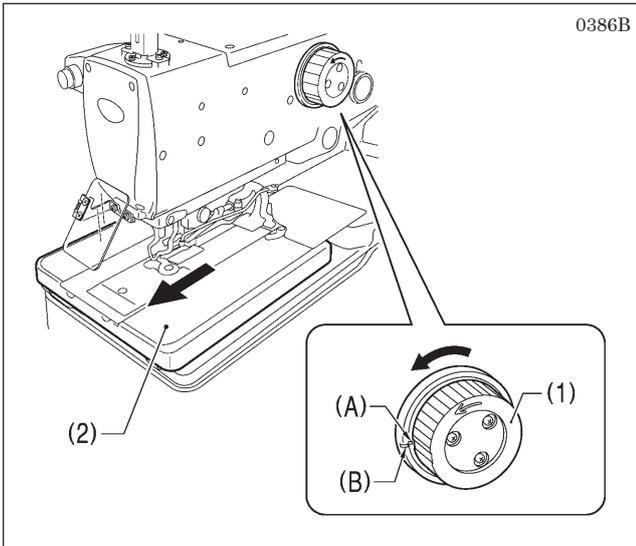
\* The efficiency for sucking in the cutting scraps will increase if the knife trash tube (4) and air tube (5) are made shorter.

**NOTE:**

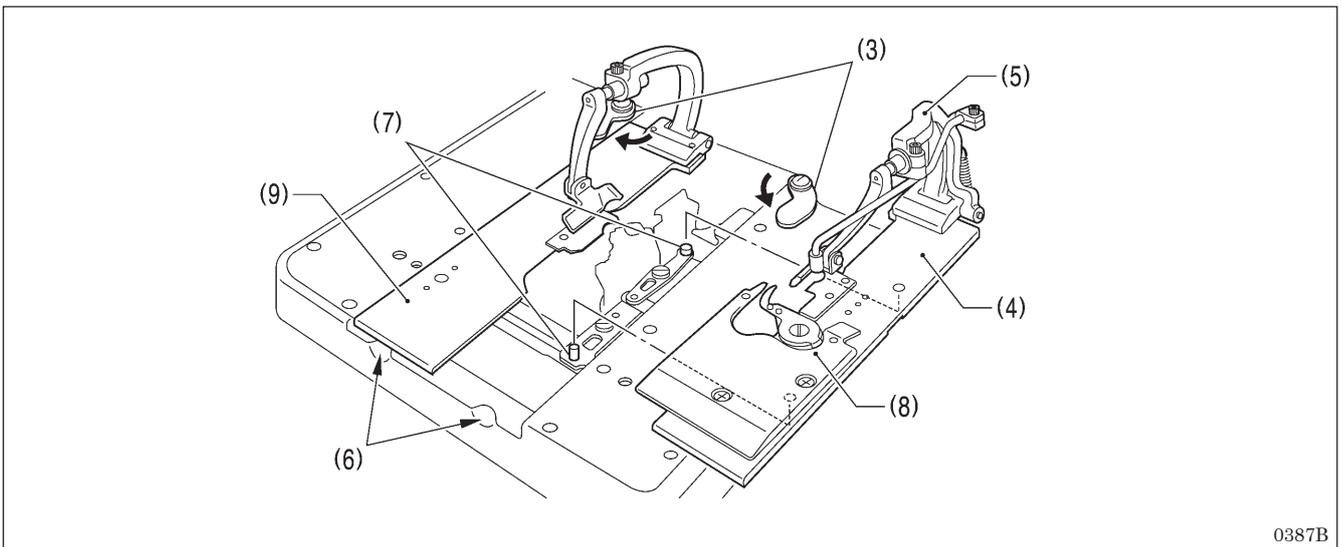
Throw away the cutting scraps before they reach the tip of the venturi tube (3). If they cover the tip of the venturi tube, the inside of the knife trash tube (4) will become blocked.

### 3-19. Installing and removing the work clamp plates

<Removal>



1. Turn the upper shaft pulley (1) forward to align the mating mark (A) on the pulley with the notch (B) in the machine head.  
\* The needle will be set to the needle up stop position.
2. Move the feed base (2) forward.



3. Push the left and right plate pressers (3) in the directions of the arrows (toward the outside).
4. While holding the clamp lever (5), insert a finger into the notch (6) and push up the right work clamp plate (4) to remove it from the pin (7).
5. Pull the right work clamp plate (4) forward to remove it.

**NOTE:**

Move the feed base (2) to a position where the work clamp plate JU (8) can be removed without touching the needle, and then lift up the right work clamp plate (4) and remove it.

6. Remove the left work clamp plate (9) in the same way as for the right work clamp plate (4).

<Installation>

Install by carrying out the "Removal" procedure given above in reverse.

## 3-20. Lubrication

### CAUTION



Turn off the power switch before carrying out this operation.

If this is not done, the machine may operate if the start switch is pressed by mistake, which could result in serious injury.



Be sure to wear protective goggles and gloves when handling the lubricating oil, so that it does not get into your eyes or onto your skin. If care is not taken, inflammation can result.

Furthermore, do not drink the lubricating oil. Diarrhea or vomiting may result.

Keep the oil out of the reach of children.

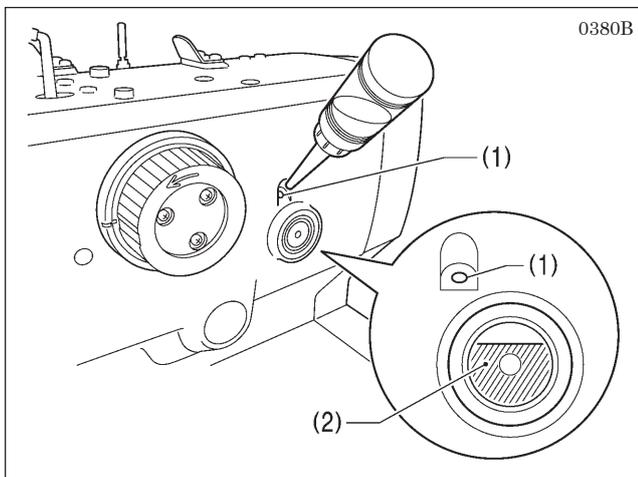
#### NOTE:

Use only the lubricating oil <NIPPON OIL CORPORATION Sewing Lube 10N; VG10> specified by Brother.

\* If this type of lubricating oil is difficult to obtain, the recommended oil to use is Exxon Mobil Essotex SM10, VG10.

### 3-20-1. Adding oil

The sewing machine should always be lubricated and the oil supply replenished before it is used for the first time, and also after long periods of non-use.

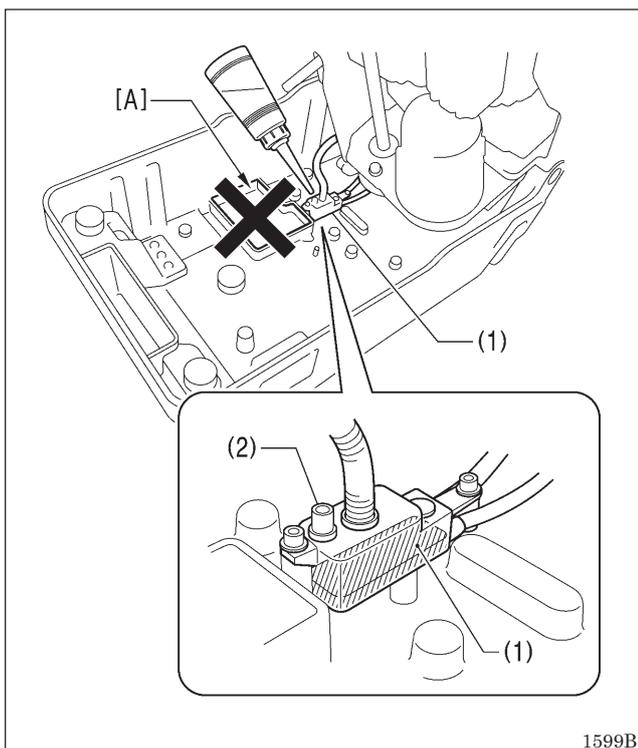


#### <Filling the arm oil tank>

Pour lubricating oil in through the lubricating hole (1) in the arm oil tank. Use the oil gauge window (2) to check the oil amount, and pour in the oil until the oil gauge window (2) is about 8/10ths covered.

#### NOTE:

- If the oil level in the oil gauge window drops to cover about 1/3rd of the window, be sure to add more lubricating oil. If this is not done, problems such as seizing may occur.
- Be careful not to add too much lubricating oil. If too much lubricating oil is added, it may overflow inside the sewing machine.



#### <Adding oil to the bed oil tank (sub tank)>

1. Tilt back the machine head.
2. Pour lubricating oil in through the lubricating hole (2) of the sub tank (1) without letting it overflow.

\* During normal use, oil will be fed automatically from the arm oil tank, so it is not necessary to add oil.

#### NOTE:

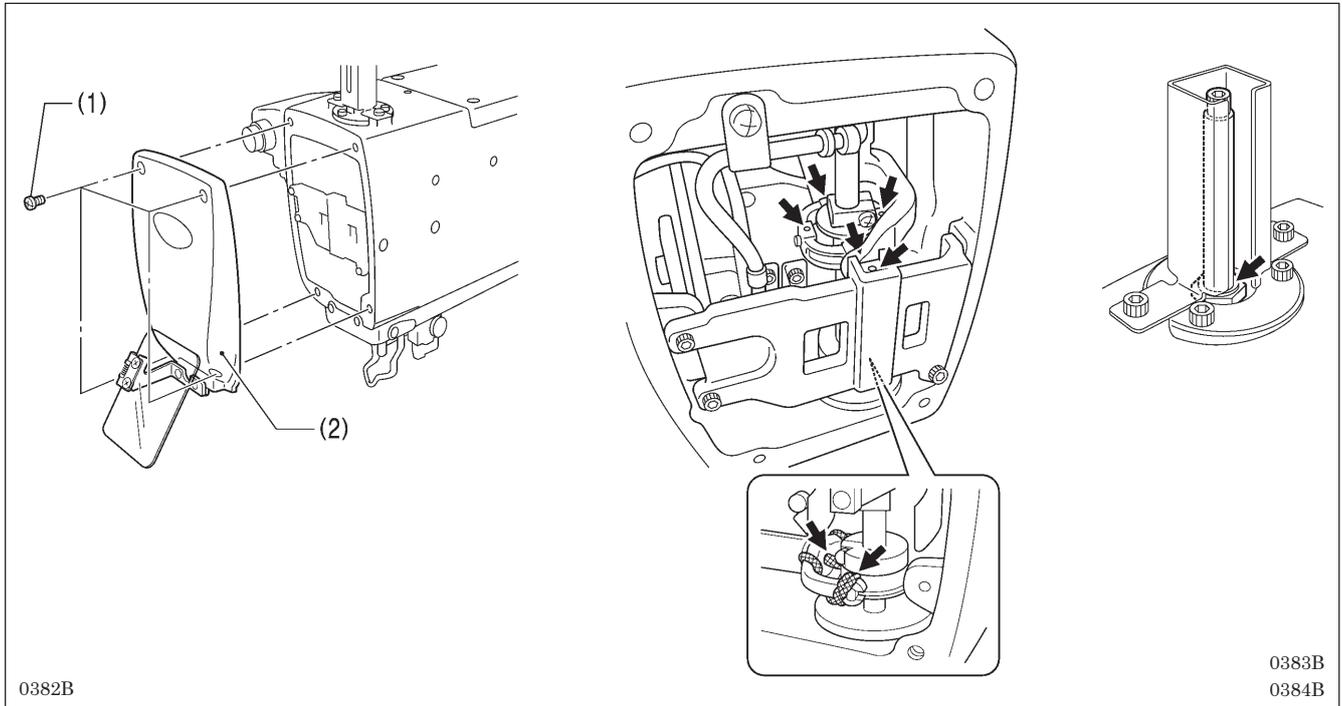
- Do not add any oil to the area marked [A]. This part is a tank for collecting the water that is discharged from the air valve inside the side plate. If any water has collected in this tank, drain it out. (Refer to "8-3-4. Draining water".)

### 3. INSTALLATION

#### 3-20-2. Lubrication

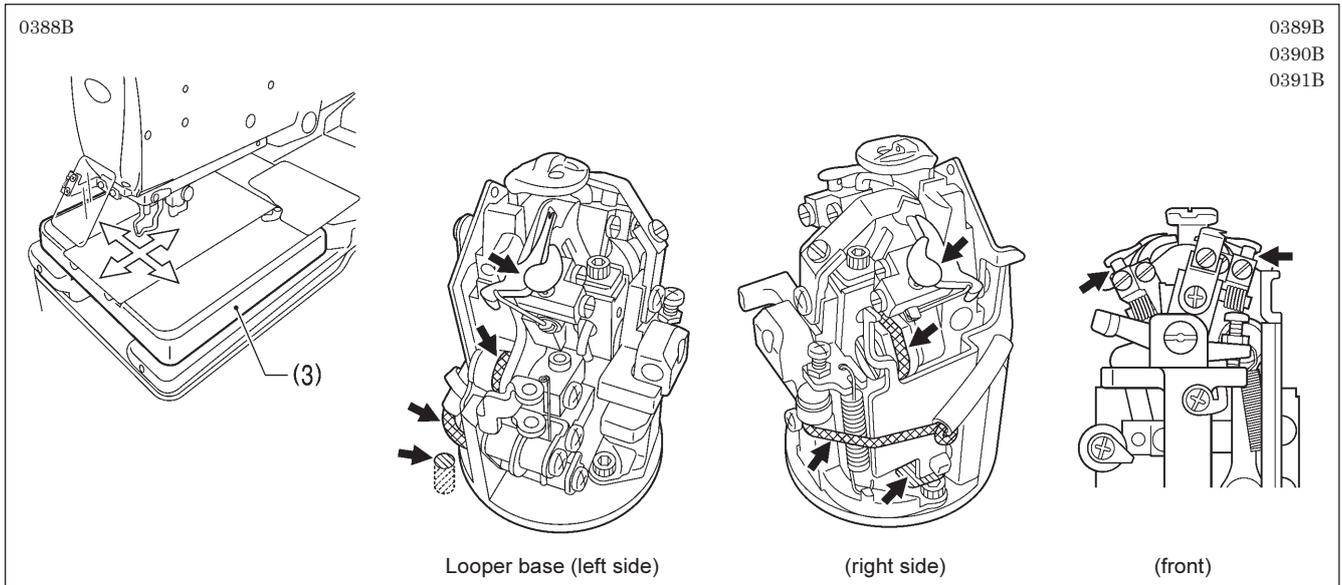
- When using the sewing machine for the first time, and also after long periods of non-use, lubricate the sewing machine in the places indicated by arrows in the illustration below.
- Oil may get onto the thread while lubrication is being carried out. Carry out a test sewing to ensure that your material does not get stained with oil.

##### <Lubricating the needle bar>



1. Loosen the four screws (1) and then remove the face plate (2).
2. Add 2 - 3 drops of oil in the places indicated by the arrows.
3. Once lubrication is complete, install the face plate (2).

##### <Oiling the looper, spreader and looper base>



1. Remove the left and right work clamp plates. (Refer to "3-19. Installing and removing the work clamp plates".)
2. Move the feed base (3) to a position where it will not interfere with lubrication.
3. Turn the looper base and add 2 - 3 drops of oil in the places indicated by the arrows.
4. Once lubrication is complete, install the work clamp plates.

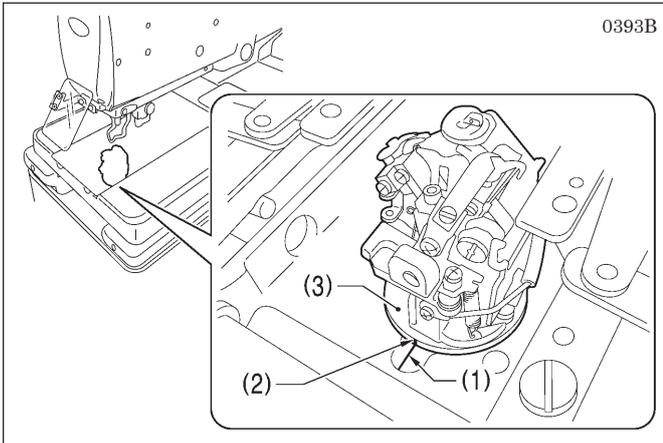
# 4. PREPARATION BEFORE SEWING

## 4-1. Installing the needle

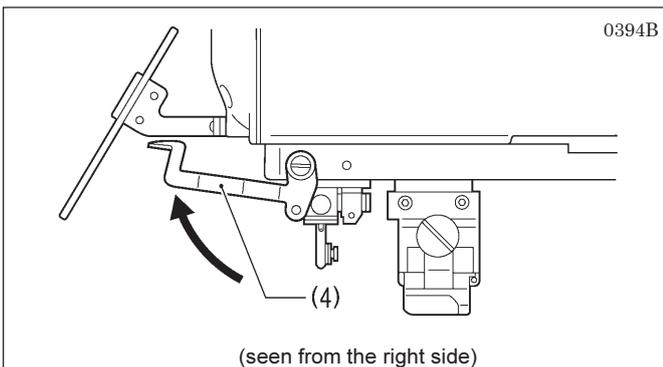
### ⚠ CAUTION



Turn off the power switch before installing the needle.  
Otherwise the machine may operate if the start switch is pressed by mistake, which could result in serious injury.



1. Remove the work clamp plates. (Refer to "3-19. Installing and removing the work clamp plates" for details on removing the plates.)
2. Check that the index mark (1) on the bed is aligned with the index mark (2) on the looper base.
  - \* If they are not aligned, turn the looper base (3) until they are aligned.



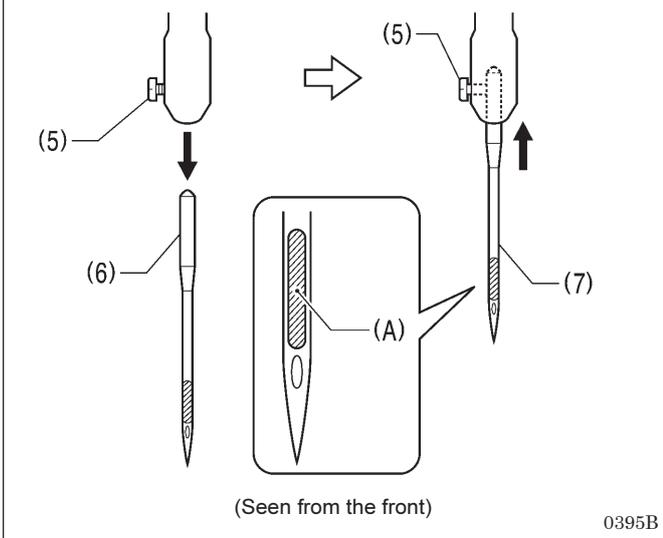
3. Raise the finger guard (4).
4. Loosen the set screw (5), and then remove the needle (6).
5. Insert the new needle (7) as far as it will go, with the hollow (A) facing toward the front.
6. Securely tighten the set screw (5).
7. Lower the finger guard (4).

#### NOTE:

Do not tighten the set screw (5) while the needle has been removed. If the set screw (5) is tightened, it may damage the inside of the needle bar and it may not be possible to insert the needle.

#### <Recommended needle>

DO x 558 80 - 120 Nm (Schmetz 558)





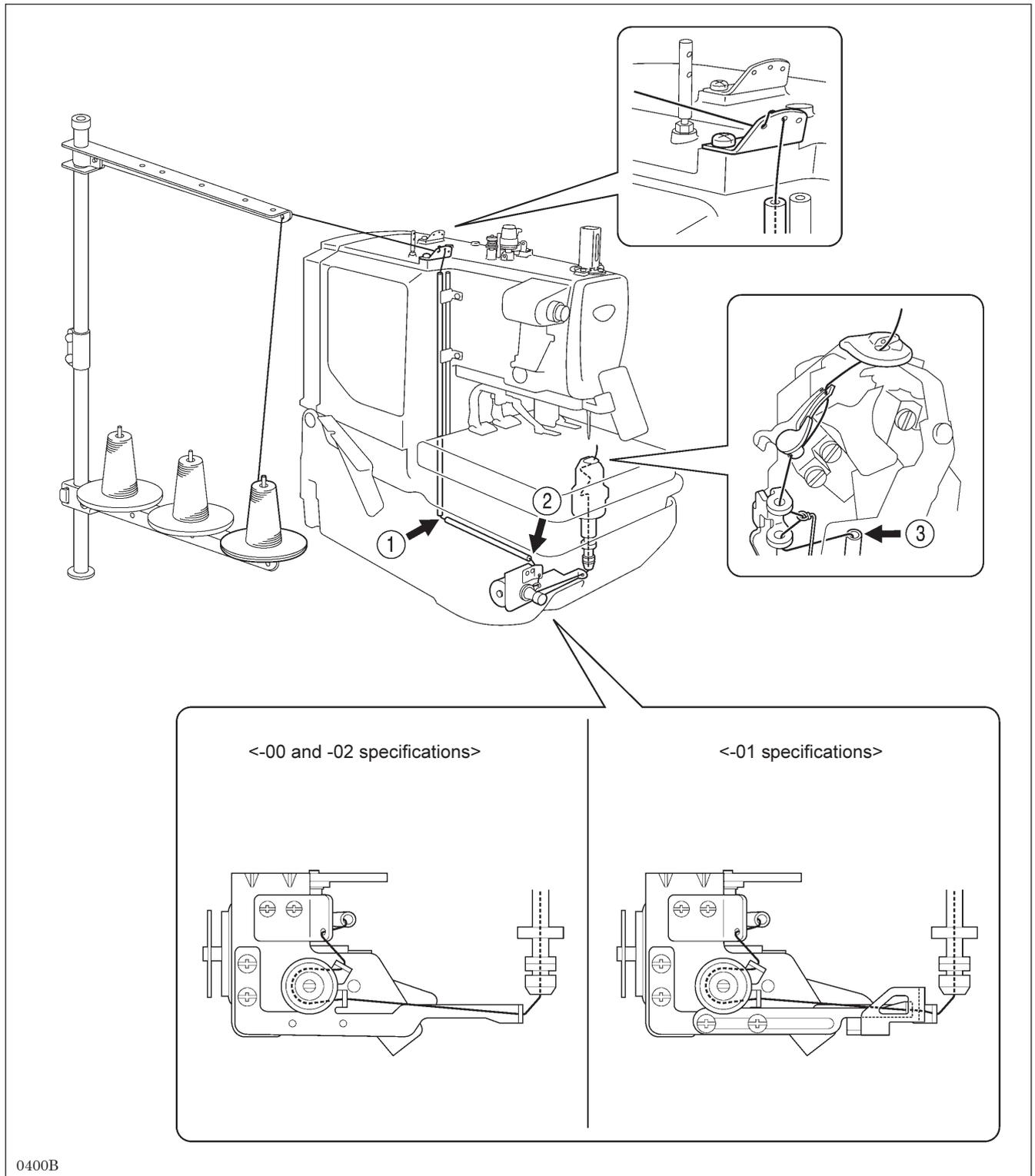
### 4-3. Threading the lower thread

When threading the lower thread, first remove the work clamp plates, and then thread the lower thread correctly as shown in the illustration below.

(Refer to “3-19. Installing and removing the work clamp plates” for details on removing the work clamp plates.)

\* The illustration below shows the method when the cotton stand is installed on the left side. If the cotton stand is installed on the right side, the threading method will be different. Before threading, refer to “4-5. Threading the threads when the cotton stand is installed on the right side”.

\* (① - ③ in the illustration show the positions for inserting the threader.) (Refer to “4-2. Threading the upper thread” for details on using the threader.)



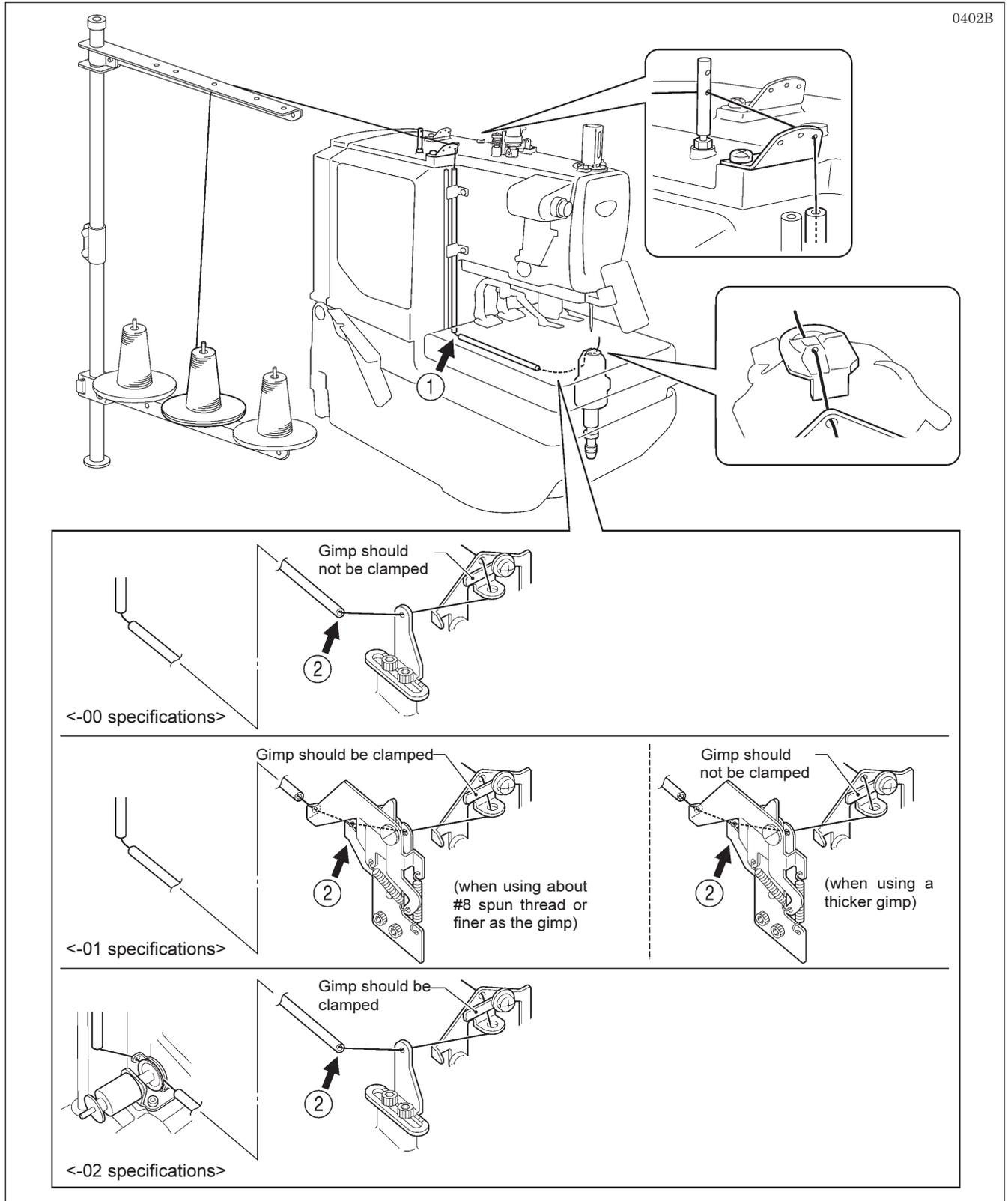
0400B

### 4-4. Threading the gimp

When threading the gimp, first remove the work clamp plates, and then thread the gimp correctly as shown in the illustration below. Once threading has been completed, install the work clamp plates. (Refer to “3-19. Installing and removing the work clamp plates”.)

\* The illustration below shows the method when the cotton stand is installed on the left side. If the cotton stand is installed on the right side, the threading method will be different. Before threading, refer to “4-5. Threading the threads when the cotton stand is installed on the right side”.

\* ①-② in the illustration show the positions for inserting the threader. (Refer to “4-2. Threading the upper thread” for details on using the threader.)

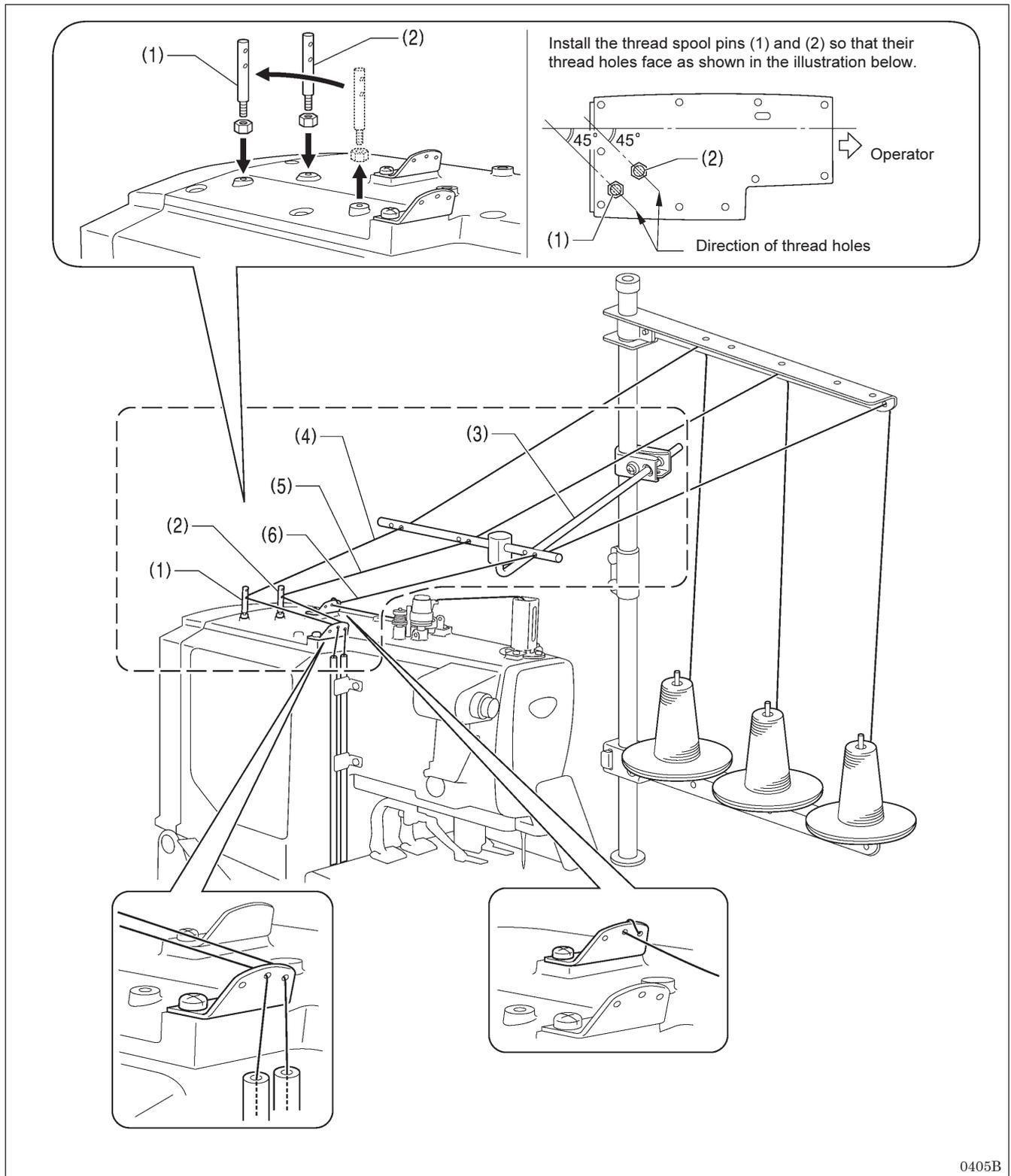


### 4-5. Threading the threads when the cotton stand is installed on the right side

When the cotton stand is installed on the right side, thread the threads through the parts shown inside the dotted lines below. The parts outside the dotted lines should be threaded in the same way as when the cotton stand is installed on the left side. Refer to "4-2" to "4-4" for details on threading each of the threads.

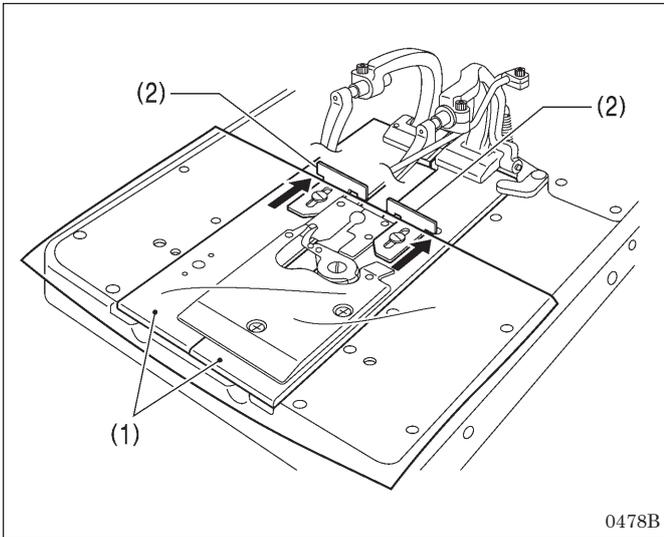
- Before threading any of the threads, move the thread spool pin (1) to the position shown in the illustration, and then install the accessory thread spool pin (2).
- When installing the cotton stand on the right side, it is recommended that you use the accessory thread guide (3).

- (4) Lower thread
- (5) Gimp
- (6) Upper thread



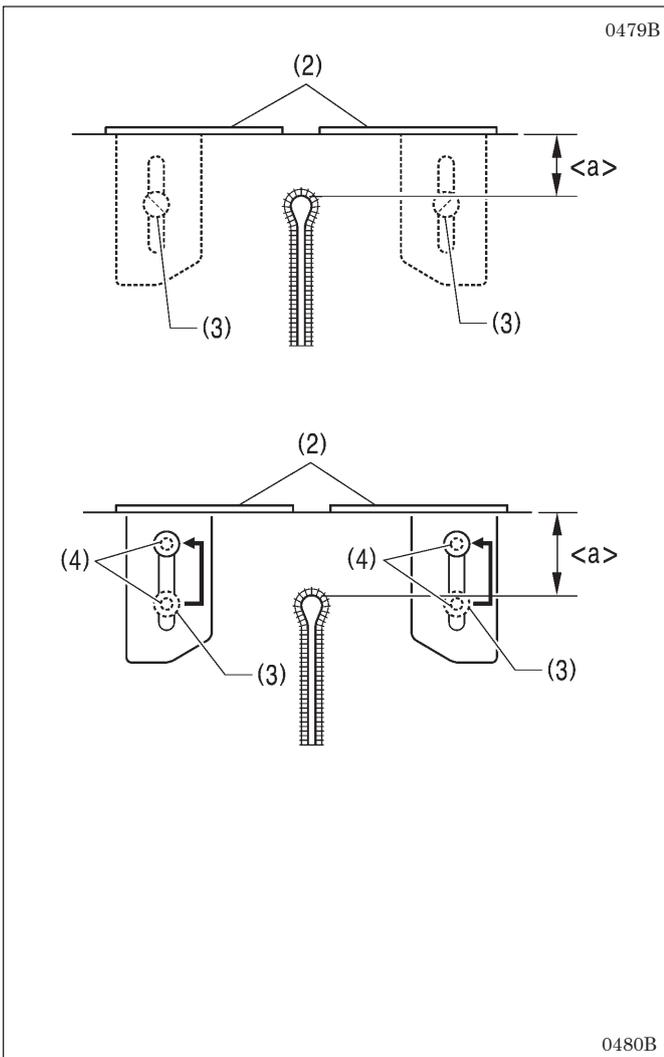
### 4-6. Setting the material

Cloth guides (2) are attached to the left and right work clamp plates (1). The material can be set so that it is vertical and parallel to the sewing machine by aligning the edges of the material with the cloth guides (2). In addition, the width (sewing margin) between the edge (top edge) of the material and the sewing pattern can be adjusted by changing the installation positions of the cloth guides (2).



#### Setting the material

Set the material so that its edges are aligned with the cloth guides (2) as shown in the illustration.



#### Adjusting the sewing margin

<For -00 and -01 specifications>

1. Loosen the screws (3) at the left and right, and then move the cloth guides (2) forward or back to adjust the sewing margin <a>.  
\* <a> can be adjusted to between 10 - 30 mm.
2. Once adjustment is complete, securely tighten the screws (3).

<For -02 specifications>

There are two installation holes (4) for the left and right screws (3), one at the front and one at the back.

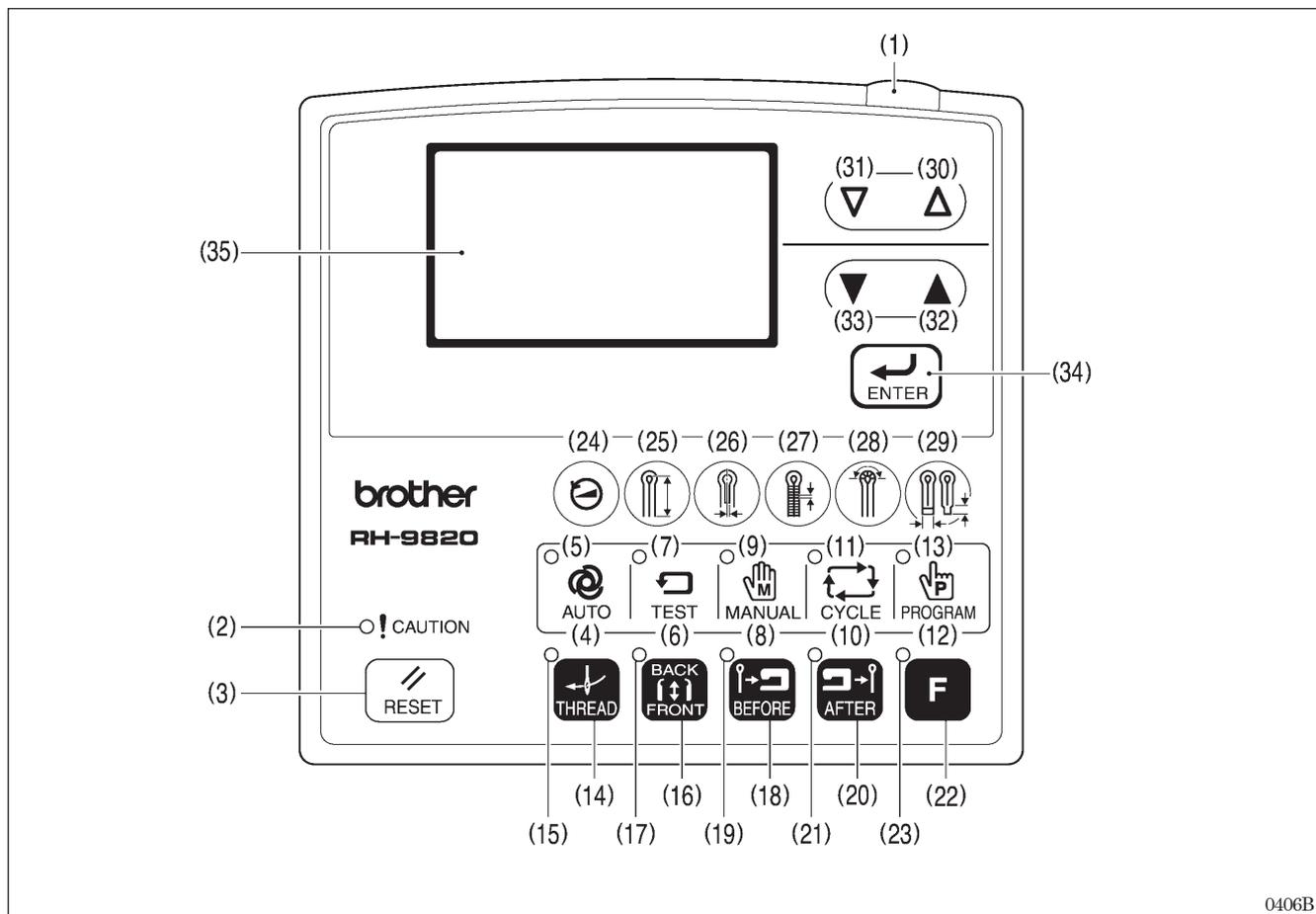
1. Move the screws (3) to whichever installation hole (4) is needed.
2. With the screws (3) loosened, move the cloth guides (2) forward or back to adjust the sewing margin <a>.  
\* Adjustment range for <a>  
The following adjustment ranges can be obtained by changing the installation holes (4).

Specifications	Adjustment range
L1422	10 - 50 mm
L1826	10 - 46 mm
L2230	10 - 42 mm
L2634	10 - 38 mm
L3442	10 - 30 mm

3. Once adjustment is complete, securely tighten the screws (3).

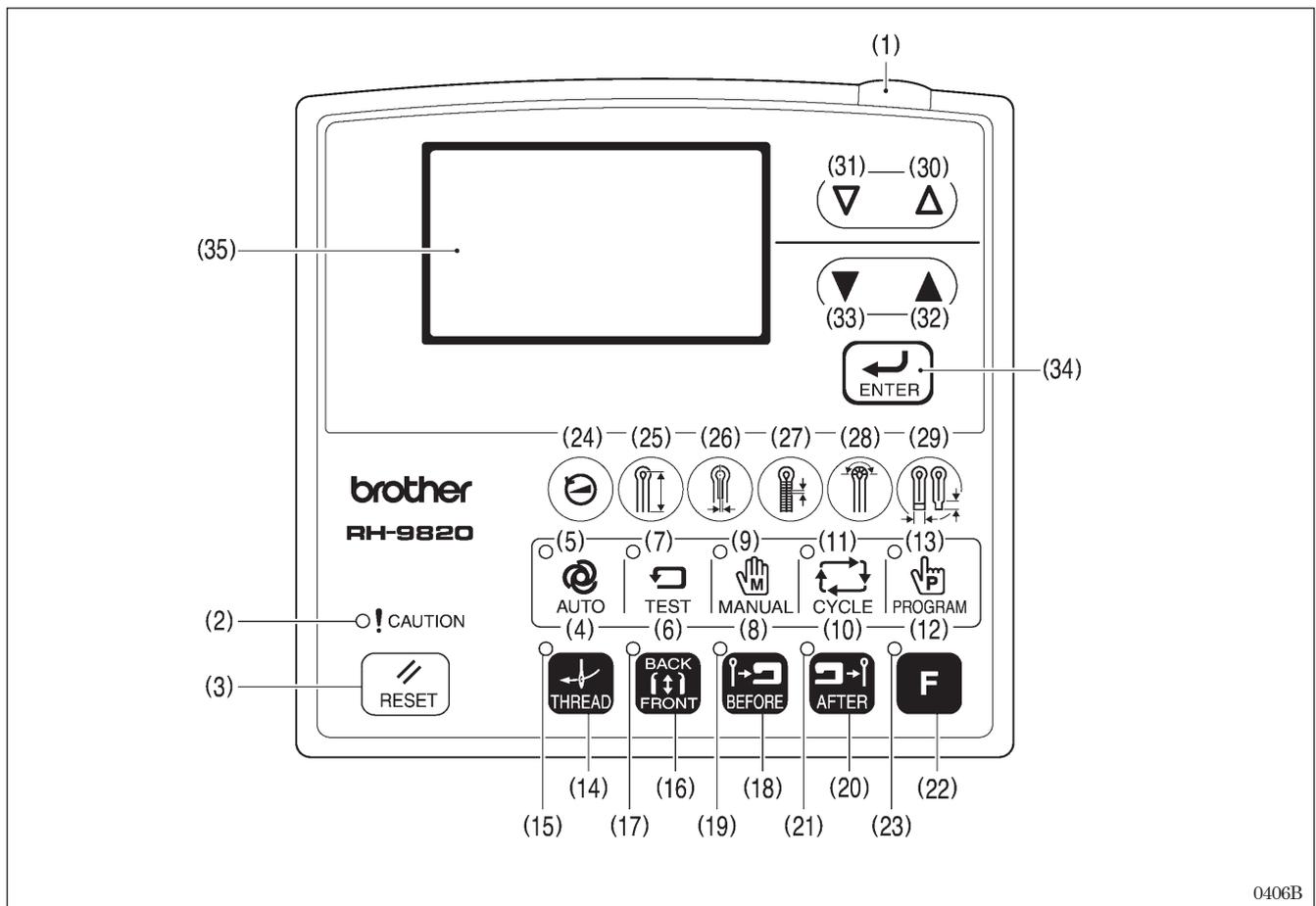
## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

### 5-1. Name and function of each operation panel item



0406B

- |   |   |
|---|---|
| <p>(1) <b>Power indicator</b><br/>Illuminates when the power is turned on.</p> <p>(2) <b>CAUTION indicator</b><br/>Illuminates when an error occurs.</p> <p>(3) <b>RESET key</b><br/>Press to reset errors, and to clear the production counter value.</p> <p>(4) <b>AUTO key</b><br/>This key is used to start automatic mode.</p> <p>(5) <b>AUTO indicator</b><br/>Illuminates during automatic mode.</p> <p>(6) <b>TEST key</b><br/>This key is used to start test mode.</p> <p>(7) <b>TEST indicator</b><br/>Illuminates during test mode.</p> <p>(8) <b>MANUAL key</b><br/>This key is used to start manual mode.</p> <p>(9) <b>MANUAL indicator</b><br/>Illuminates during manual mode.</p> | <p>(10) <b>CYCLE key</b><br/>This key is used to start cycle program mode.</p> <p>(11) <b>CYCLE indicator</b><br/>Illuminates during cycle program mode.</p> <p>(12) <b>PROGRAM key</b><br/>This key is used to start program mode.</p> <p>(13) <b>PROGRAM indicator</b><br/>Illuminates during program mode.</p> <p>(14) <b>THREAD key</b><br/>This key is used when threading the threads.</p> <p>(15) <b>THREAD indicator</b><br/>Illuminates when the THREAD key is pressed (while threading is in progress).</p> <p>(16) <b>FRONT/BACK key</b><br/>This key is used to switch the material setting position to "front" or "back".</p> <p>(17) <b>FRONT indicator</b><br/>Illuminates when the material setting position is set to "front".</p> |
|---|---|



0406B

- (18) **BEFORE key**  
This key is used to set cutting operation to cutting before sewing.
- (19) **BEFORE indicator**  
Illuminates when cutting operation is set to cutting before sewing.
- (20) **AFTER key**  
This key is used to set cutting operation to cutting after sewing.
- (21) **AFTER indicator**  
Illuminates when cutting operation is set to cutting after sewing.
- (22) **F key**  
This key is used to display the help screen.
- (23) **F indicator**  
Illuminates while a CF card is being read from or written to.
- (24) **Shortcut 1 key**  
This key is used to change the sewing speed.
- (25) **Shortcut 2 key**  
This key is used to change the sewing length.
- (26) **Shortcut 3 key**  
This key is used to change the cutting spacing.
- (27) **Shortcut 4 key**  
This key is used to change the stitch pitch.
- (28) **Shortcut 5 key**  
This key is used to change the number of stitches sewn for eyelets.
- (29) **Shortcut 6 key**  
This key is used to change the bartack length.
- (30) **▲ key**  
This key is used to increase the values for program numbers and parameter numbers.
- (31) **▽ key**  
This key is used to decrease the values for program numbers and parameter numbers.
- (32) **▲ key**  
This key is used to increase the values for parameter settings and memory switch settings.
- (33) **▽ key**  
This key is used to decrease the values for parameter settings and memory switch settings.
- (34) **ENTER key**  
This key is used to apply the values for parameter settings and memory switch settings.
- (35) **Display**  
This shows program numbers and messages.

## 5-2. Starting the sewing machine

[The display examples are for a -01 specification sewing machine.]

**1** Push the power switch (1) to the ON side.

The power indicator (2) will illuminate and the contents of the panel display (3) will switch in the order shown below.

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\*1

Displayed for approx. 2 seconds

<For 2-pedal foot switch/hand start switch specifications>

PRESS START SW TO INITIALIZE

<For treadle specifications>

DEPRESS TREADLE TO INITIALIZE

0311B  
0312B

**NOTE:**  
If "E110" is displayed, turn the upper shaft pulley (4) by hand to align the index mark (5) on the pulley with the notch (6).

TURN PULLEY TO STOP POSITION

<E110>

0313B  
0408B

**2** Press the start switch (7).

<For 2-pedal foot switch specifications>

(7)

<For hand start switch specifications>

(7)

[During test mode]

<For treadle specifications>  
Depress the treadle.

- The feed base will move to the material setting position.
- The panel display will switch to the standby condition \*2 for the mode (automatic mode, manual mode, test mode, cycle program mode or program mode) that was active when the sewing machine was last turned off.

0409B  
0506B  
0507B  
0229B

\*1: If settings for an optional device have been made, the icon for the optional device will appear here.

**Indexer   Cut length changeover device   Upper thread nipper device   Upper thread breakage detector   Air pressure detector**



\*2: The "standby condition" is the name for the period from the point after switching to one of these modes until the first operation occurs.

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1644B

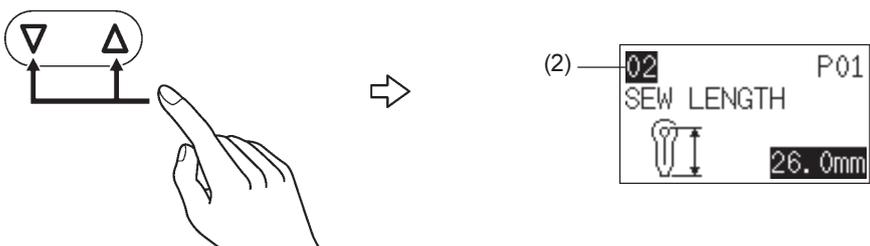
### 5-3. Program setting method

It is recommended that you register patterns that are sewn frequently as programs. After programs have been registered, you can retrieve the desired sewing patterns simply by selecting a program number, which eliminates the need to set the pattern each time.

- Normally up to 20 programs can be registered, and their contents can be changed at any time. The contents can be set by changing the parameters for each item.
- At the time of shipment from the factory, temporary contents are set for programs P01 to P20. (The contents are the same for all programs from P01 to P20.) Follow the method given below to change the contents of a program before using it.

1	<p>Switch the mode to test mode.</p>	0229B
2	<p>Select the program number from P01 to P20 (1) to select the program that you would like to change.</p> <p>The program No. (1) changes in the order shown in the illustration each time the <math>\Delta</math> key is pressed. (The <math>\nabla</math> key changes the order in the opposite direction.)</p> <p><b>NOTE:</b> Program mode is not available if a cycle program has been selected.</p>	0337B 0229B
3	<p>Switch to program mode.</p> <p>The parameter number (2) that was last selected and the setting (3) for that parameter will appear in the display.</p> <p>* You can also start program mode by pressing a shortcut key. In this case, the parameter number that corresponds to the shortcut key will be selected. (Refer to the next page.)</p>	0315B

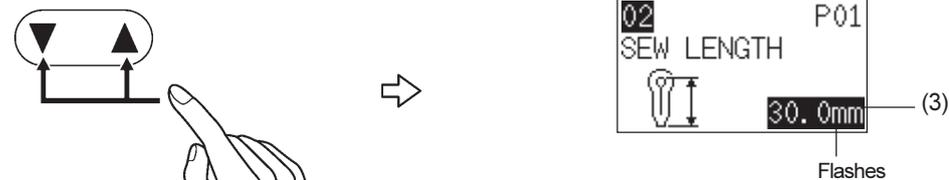
**4** Select the parameter number (2) for the parameter that you would like to change. (Refer to "5-3-1. Parameter list".)



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**5** Change the setting (3) for the parameter.



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\* The flashing display means that the setting has not yet been applied.  
 \* You can make the initial setting appear in the display by pressing the RESET key.

---

**6** Apply the changed setting.



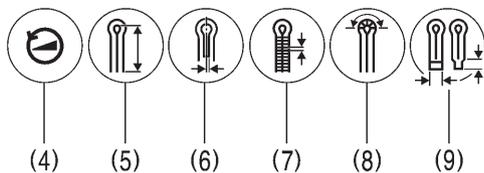
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\* The display will change from flashing to illuminated, and this means that the setting has been applied.  
 \* You can cancel the setting change by pressing the  $\Delta$ ,  $\nabla$ , AUTO, TEST or MANUAL key without pressing the ENTER key.

---

**7** Repeat steps 4 - 6 above to change other parameters.

**Shortcut keys**



The shortcut keys have the following six often-used parameters registered into them.

- You can retrieve a desired parameter simply by pressing the corresponding shortcut key.
- These operations can be carried out from any mode (automatic, manual, test and program mode) except cycle program mode.

- (4) Sewing speed (Parameter No. 01)
- (5) Sewing length (Parameter No. 02)
- (6) Cutting spacing (Parameter No. 03)
- (7) Stitch pitch (Parameter No. 04)
- (8) No. of eyelet stitches (Parameter No. 05)
- (9) Bartack length (Parameter Nos. 06, 08, 10)\*

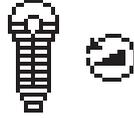
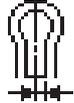
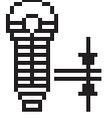
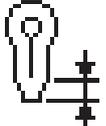
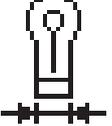
\*: Loads the parameter number corresponding to the bartack shape for parameter No. 40.

## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

### 5-3-1. Parameter list

**NOTE:**

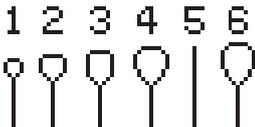
- It may not be possible to change some setting values or some settings may be invalid because of the settings for other parameters.
- If any parameters have been changed, operate the sewing machine in test mode and check that there is no obstruction between the needle and other parts and also between other parts before carrying out actual sewing.

No.	Setting	Setting range	Unit	Initial value
01	Sewing speed 	1,000 - 2,500 rpm	100	1,800 rpm
02	Sewing length (*1) 	<-00 specifications>: Eyelet buttonholes: 8 - 50 mm Straight buttonholes: 5 - 50 mm <-01 specifications>: Eyelet buttonholes: 8 - 42 mm Straight buttonholes: 5 - 42 mm <-02 specifications> (L1422): 14 - 22 mm (L1826): 18 - 26 mm (L2230): 22 - 30 mm (L2634): 26 - 34 mm (L3442): 34 - 42 mm	0.5	<-00 specifications>: 25 mm <-01 specifications>: 25 mm <-02 specifications> (L1422): 18 mm (L1826): 22 mm (L2230): 26 mm (L2634): 30 mm (L3442): 38 mm
03	Cutting space 	-0.3 - 0.5 mm	0.05	0.2 mm
04	Stitch pitch 	0.5 - 2.0 mm	0.1	1.0 mm
05	No. of eyelet stitches 	4 - 20 stitches	1	9 stitches
06	Taper bartack length 	1 - 20 mm	1	6 mm
07	Offset 	0.5 - 2.0 mm	0.1	1.5 mm
08	Straight bartack length 	2.0 - 6.0 mm (up to 3.0 mm on one side)	0.1	5.0 mm

\*1: The sewing length setting range and initial value vary depending on the machine sub-class.

0268B - 0275B

## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

No.	Setting	Setting range	Unit	Initial value
09	No. of straight bartack stitches 	5 - 18 stitches	1	7 stitches
10	No. of round bartack stitches 	5 - 17 stitches	1	7 stitches
11	Eyelet pattern 1 2 3 4 5 6 	1 - 6 (Once the knife has been replaced, check the knife number for the replacement knife and then select an appropriate eyelet pattern.)	1	2
12	Zigzag width adjustment 	-1.0 - 1.0 mm	0.1	0.0 mm
13	Eyelet deceleration speed (*2) 	-600 - 0 rpm	100	0 rpm
14	Straight bartack speed (*3) 	1,000 - 2,500 rpm	100	1,800 rpm
15	Number of slow start stitches 	0 - 3 stitches	1	0 stitches
16	Slow start speed (*4) 	400 - 1,500 rpm	100	700 rpm

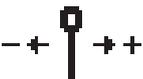
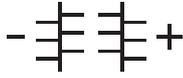
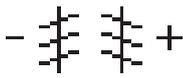
0276B - 0283B

\*2: The standard eyelet deceleration speed is the value that has been set by parameter No. 01 (sewing speed).

\*3: If the sewing speed is set to a speed that is slower than the straight bartack speed, the straight bartack speed used for sewing will be the same as the normal sewing speed.

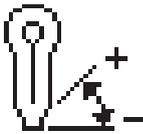
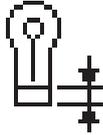
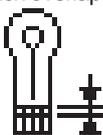
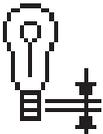
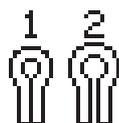
\*4: If the sewing speed is set to a speed that is slower than the slow start speed, the slow start speed used for sewing will be the same as the normal sewing speed.

## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

No.	Setting	Setting range	Unit	Initial value
17	X cutting position correction value 	-0.5 - 0.5 mm	0.05	0.0 mm
18	Y cutting position correction value 	-0.7 - 0.7 mm	0.05	0.0 mm
19	No. of tying stitches at the sewing start 	0 - 4 stitches	1	0 stitches
20	No. of tying stitches at the sewing end 	0 - 4 stitches	1	0 stitches
21	X correction value 	-1 - 6	1	0
22	Y correction value 	-1 - 6	1	0
23	θ 1 correction value 	-3 - 3	1	0
24	θ 2 correction value 	-3 - 3	1	0

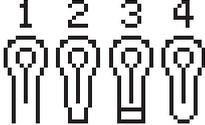
0284B - 0291B

## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

No.	Setting	Setting range	Unit	Initial value
25	Taper bartack angle 	-5 - 5	1	0
26	Straight bartack width correction value 	-1.0 - 0.0 mm	0.1	0.0 mm
27	Straight bartack overlap amount 	0.0 - 2.0 mm	0.1	1.0 mm
28	Straight bartack X position alignment 	-1.0 - 1.0 mm	0.1	0.0 mm
29	Straight bartack angle correction value 	-3 - 1	1	0
30	Spare (For future version upgrades)			
31	Stitch pitch for taper bartack tying stitches at the sewing end 	20% - 100% of stitch pitch	5	100%
32	No. of round bartack overlap stitches 	1 - 4 stitches (within 45 degrees)	1	1 stitch
33	Stitch pattern for no cutting 	1: Same stitch pattern as for cutting before sewing 2: Same stitch pattern as for cutting after sewing	1	1

0292B-0294B 0471B 0295B 1645B 0297B 1646B

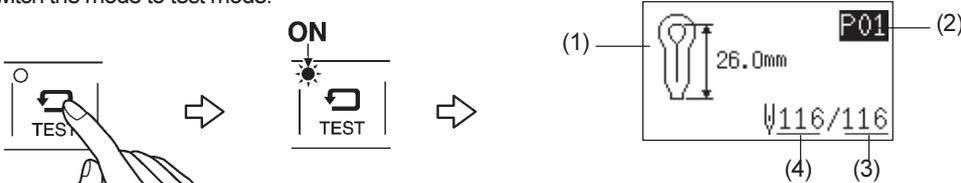
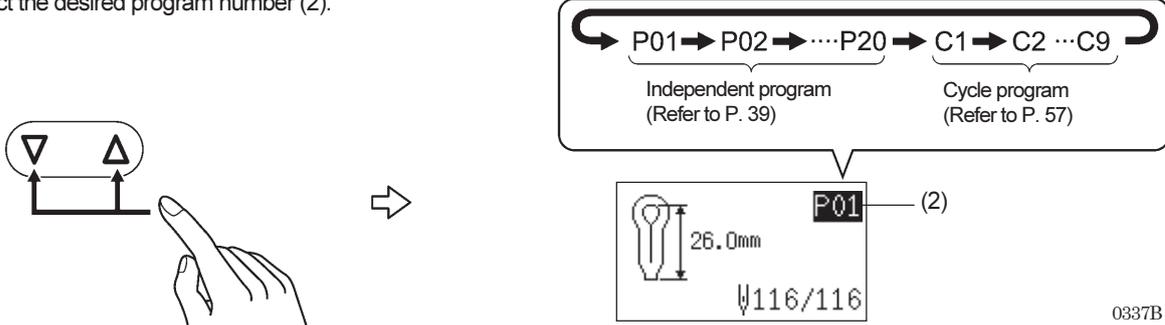
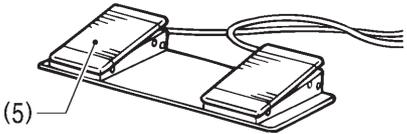
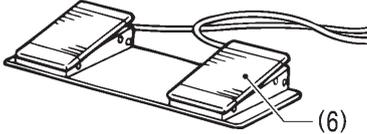
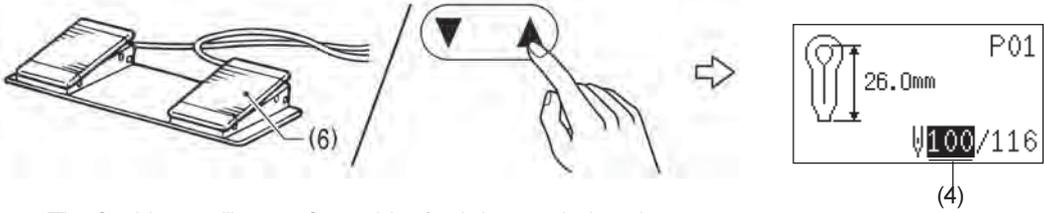
## 5. USING THE SEWING MACHINE (OPERATION PANEL: BASIC OPERATION)

No.	Setting	Setting range	Unit	Initial value
34	Circular stitch knife size 	2 - 5 mm	1	2
35	No. of circular stitch stitches 	8 - 100 stitches	1	20
36	No. of circular stitch overlap stitches 	1 - 5 stitches (within 45 degrees)	1	2
37	Sub hammer   * This is only enabled when the cut length changeover device is being used.	OFF : Hammer ON : Sub hammer	-	OFF
38	Spare (For future version upgrades)			
39	Program copy	OFF, 1 - 20 (Specify the program number for the copy source)	1	OFF
40	Bartack shape 	1: Without bartack 2: Taper bartack 3: Straight bartack 4: Round bartack	1	2

0298B · 0300B 1647B 0301B

### 5-4. Checking the sewing pattern in test mode

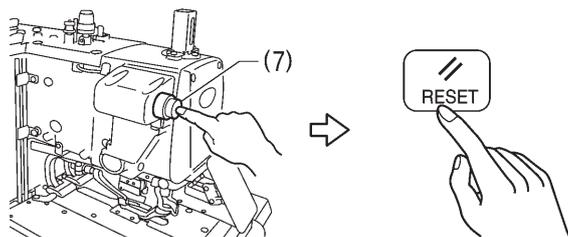
Test mode can be used to make only the feed base move in the same way as during normal sewing, but with the upper shaft stopped. This mode is useful for checking the positions of the needle and other parts and of the other parts relative to each other.

<p><b>1</b></p>	<p>Switch the mode to test mode.</p>  <p>The sewing shape (1), program number (2), total number of stitches (3) and number of remaining stitches (4) will appear in the display.</p> <p>0410B <span style="float: right;">0230B</span></p>
<p><b>2</b></p>	<p>Select the desired program number (2).</p>  <p>The program No. (2) changes in the order shown in the illustration each time the <math>\Delta</math> key is pressed. (The <math>\nabla</math> key changes the order in the opposite direction.)</p> <p>0413B <span style="float: right;">0337B 0230B</span></p>
<p><b>3</b></p>	<p>Press the work clamp switch (5).</p>  <p>The work clamps will be lowered.</p> <p>0419B</p>
<p><b>4</b></p>	<p>Press the start switch (6).</p>  <p>The feed base will move to the sewing start position.</p> <p>0420B</p>
<p><b>5</b></p>	<p>Press the start switch (6) or the <math>\blacktriangle</math> switch to start test feeding.</p>  <p>(The feed base will move forward by 2 stitches each time the switch or key is pressed.) (The feed base will move quicker if you keep the switch or key pressed down.)</p> <ul style="list-style-type: none"> <li>• The number of remaining stitches (4) on the display will decrease by 2 each time.</li> <li>• When the final stitch is reached, the buzzer will sound.</li> <li>• Thread trimming and cutting operation will not be carried out in test mode.</li> </ul> <p>0421B <span style="float: right;">0231B</span></p>

(Continued on next page)

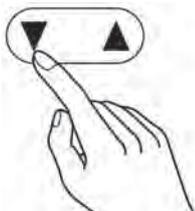
**6** [If you would like to pause test feeding and return the feed base to the material setting position]

Press the STOP switch (7) and then press the RESET key.

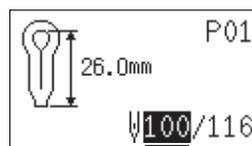


0422B

[If you would like to return the feed base to the previous sewing position during test feeding]



0423B



0231B

(4)

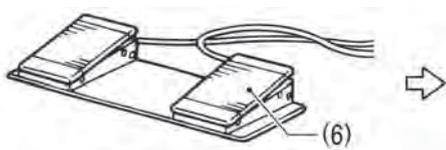
(The feed base will move backward by 2 stitches each time.)

The number of remaining stitches (4) on the display will increase by 2 each time.

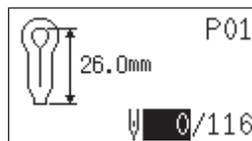
[Once sewing continues to the final stitch and the buzzer sounds]

Press the start switch (6).

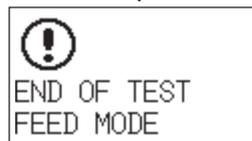
\* Keep pressing until the feed base returns to the material setting position.



0424B



0232B



0318B

### 5-5. Switching cutting operation

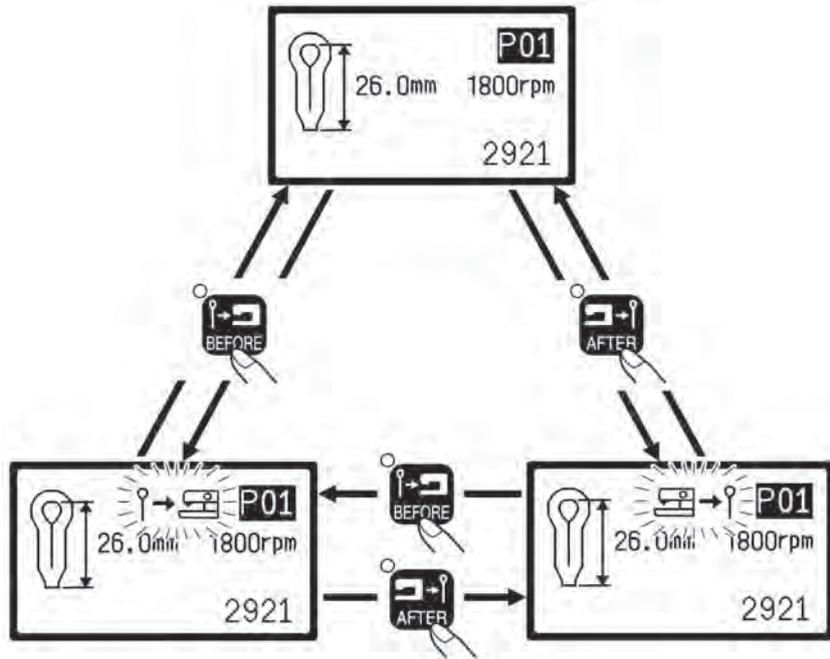
0310B  
0425B

**No cutting**

Cutting operations are not carried out.



When "No cutting" is selected, the cutting before sewing indicator and the cutting after sewing indicator will both switch off.



**Cutting before sewing**

Sewing is carried out after cutting has been carried out.



When cutting before sewing is selected, the cutting before sewing indicator illuminates.

**Cutting after sewing**

Cutting is carried out after sewing has been carried out.



When cutting after sewing is selected, the cutting after sewing indicator illuminates.

0308B  
0309B

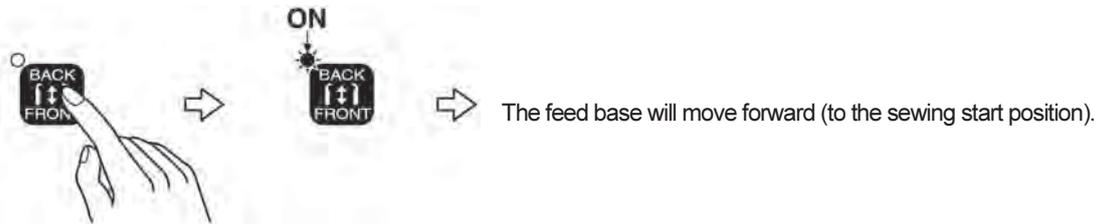
Press the BEFORE or AFTER key during the standby condition in automatic mode, test mode or manual mode. The cutting operation changes as shown in the illustration each time a key is pressed.

### 5-6. Changing the material setting position

The feed base can be moved forward from the standard material setting position. This can make it easier to set the material in place. Cycle time will be reduced with this setting, particularly if cutting after sewing is selected.

**[To move the feed base forward]**

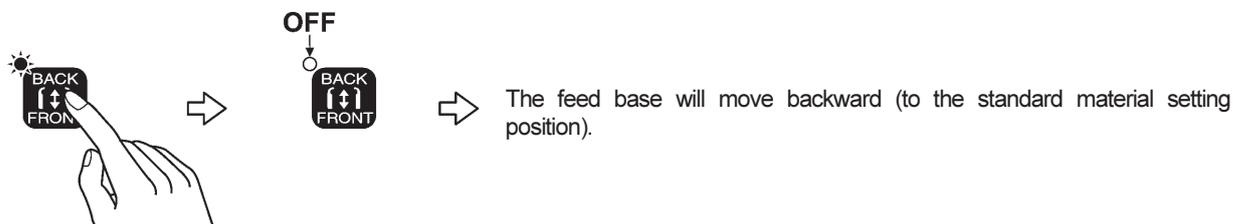
Press the FRONT/BACK key during the standby condition in automatic mode, test mode or manual mode.



0426B

**[To move the feed base backward (standard material setting position)]**

Press the FRONT/BACK key once more.

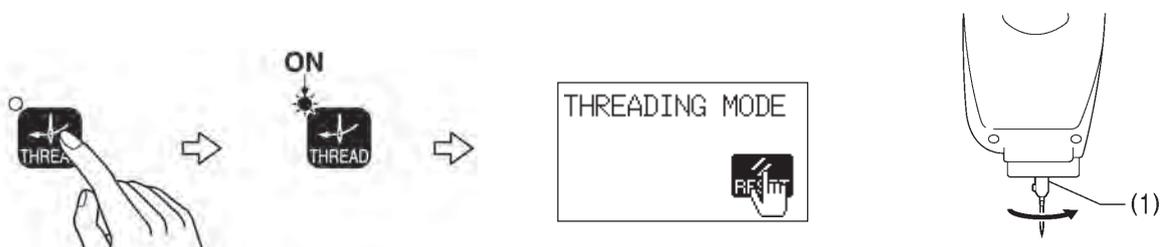
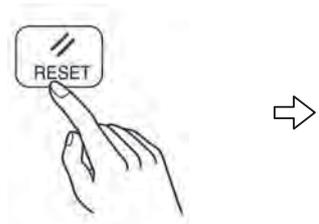


0427B

### 5-7. Using threading mode

This is used to thread the upper thread. (Refer to “4-2. Threading the upper thread” for details on using the threader.)

When the sewing machine switches to threading mode, the needle bar ( $\theta$  feed) turns 180 degrees, and then the energization of the X, Y and  $\theta$  feed motors is stopped. This allows the needle bar and feed base to move freely, in order to make threading of the upper thread easier. In addition, threading mode is safe because the sewing machine will not operate when the start switch is pressed (or the treadle is depressed).

<p><b>1</b></p>	<p>Press the THREAD key during the standby condition in automatic mode, test mode or manual mode.</p>  <ul style="list-style-type: none"> <li>• The tension discs will open.</li> <li>• The buzzer will sound, and then the needle bar (<math>\theta</math> feed) (1) will turn 180 degrees. After this, energization of the X, Y and <math>\theta</math> feed motors will be stopped.</li> </ul> <p>0428B <span style="float: right;">0319B 0529B</span></p>
<p><b>2</b></p>	<p>Thread the thread.</p> <ul style="list-style-type: none"> <li>• After 3 minutes have passed, the tension discs will close.</li> </ul>
<p><b>3</b></p>	<p>Once the upper thread has been threaded, press the RESET key.</p>  <ul style="list-style-type: none"> <li>• After the home positions are detected, the needle bar and feed base will return to the material setting position.</li> <li>• The tension discs will close.</li> </ul> <p>0429B</p>

# 6. USING THE SEWING MACHINE (SEWING OPERATION)

## ! CAUTION



Turn off the power switch before carrying out the following operations.

If this is not done, the machine may operate if the start switch is pressed by mistake, which could result in serious injury.

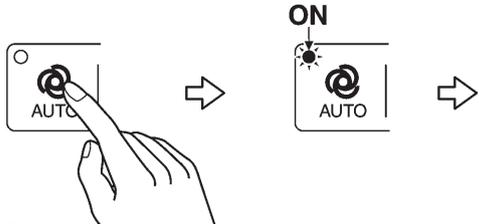
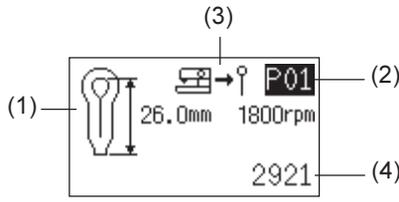
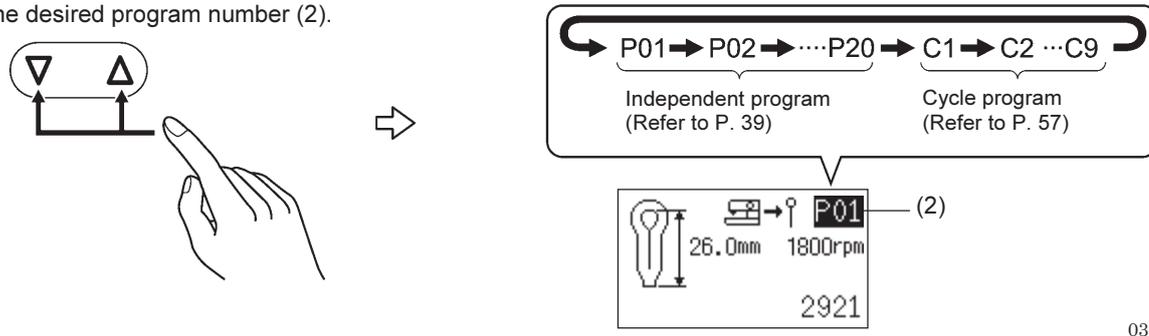
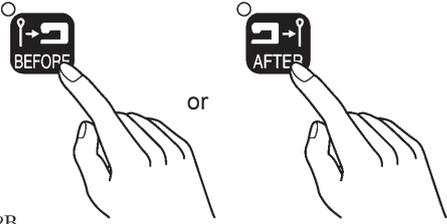
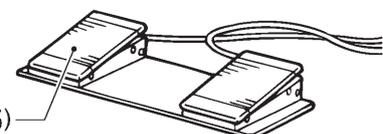
- When replacing the needle
- When not using the sewing machine and when leaving the sewing machine unattended

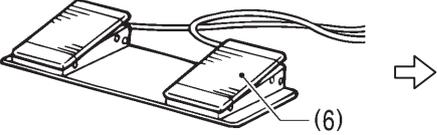


Do not touch any of the moving parts or press any objects against the sewing machine while sewing. If this is not observed, it may result in personal injury or damage to the sewing machine.

### 6-1. Automatic sewing (automatic mode)

- When carrying out automatic sewing for the first time, be sure to carry out a test sewing first.
- In addition, if using the sewing machine when the ambient temperature is cold, carry out several test sewing operations to allow the motor to warm up.

<p><b>1</b></p>	<p>Switch the mode to automatic mode.</p>   <p>The sewing shape (1), program number (2), cutting operation (3) and production counter (4) will appear in the display.</p> <p>0430B <span style="float: right;">0222B</span></p>
<p><b>2</b></p>	<p>Select the desired program number (2).</p>  <p>The program number (2) changes in the order shown in the illustration each time the <math>\Delta</math> key is pressed. (The <math>\nabla</math> key changes the order in the opposite direction.)</p> <p>0413B <span style="float: right;">0337B 0222B</span></p>
<p><b>3</b></p>	<p>Select the desired cutting operation (Cutting before sewing/No cutting/Cutting after sewing).</p>  <p>* Refer to "5-5. Switching cutting operation" for details on switching the cutting operation.</p> <p>0432B</p>
<p><b>4</b></p>	<p>Place the material to be sewn under the work clamps, and then press the work clamp switch (5).</p>  <p>The work clamps will be lowered.</p> <p>0419B</p>

<b>5</b>	<p>Press the start switch (6).</p>  <p style="text-align: right;">Sewing will then start. * When sewing is finished, the work clamps will be raised. In addition, the production counter value appearing in the display will increase by 1.</p>
<b>6</b>	<p>To repeat the sewing operation, repeat steps 4 and 5 above.</p>

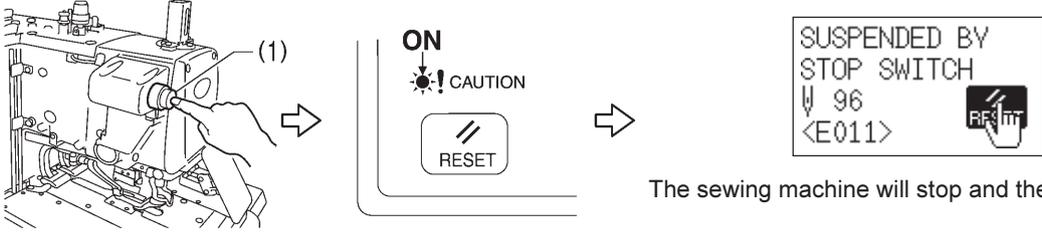
0420B

## 6-2. Using the STOP switch

### 6-2-1. Pausing sewing during automatic sewing

The STOP switch is used to stop the sewing machine if a problem occurs such as a thread breakage.

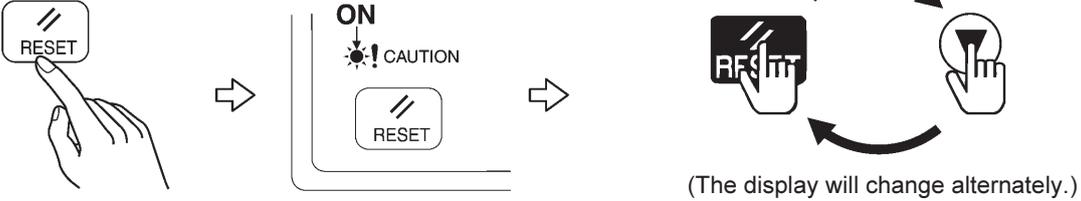
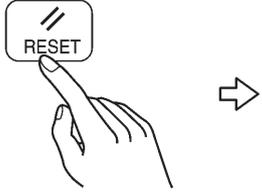
#### <Pausing sewing>

<p>Press the STOP switch (1) while sewing is being carried out.</p>  <p style="text-align: right;">The sewing machine will stop and the buzzer will sound.</p>
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0436B

0320B

#### <Clearing the pause (when not continuing from the point where sewing was paused)>

<b>1</b>	<p>Press the RESET key.</p>  <p style="text-align: right;">The buzzer will stop sounding.</p>
<b>2</b>	<p>Eliminate the cause of the problem.</p>
<b>3</b>	<p>Press the RESET key once more.</p>  <p style="text-align: right;">After the home positions are detected, the needle bar and feed base will move to the material setting position.</p>

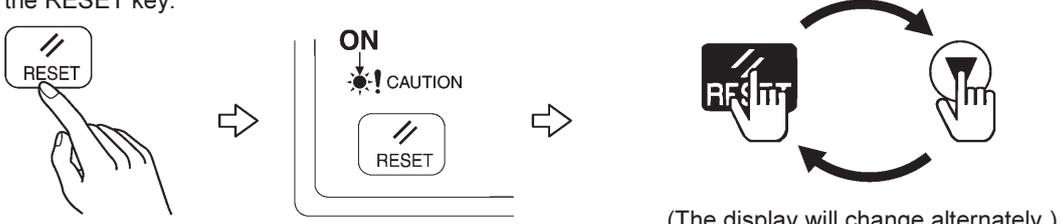
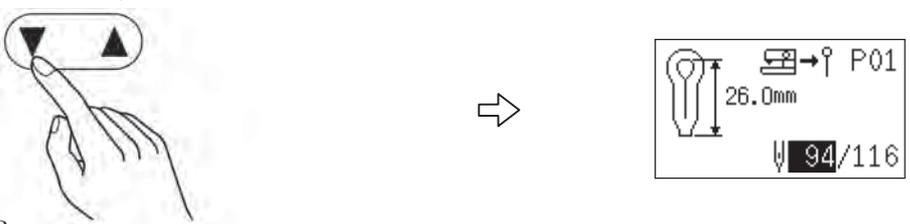
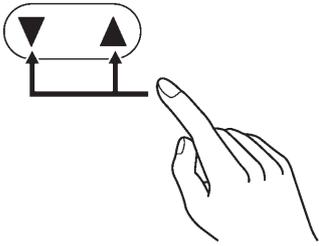
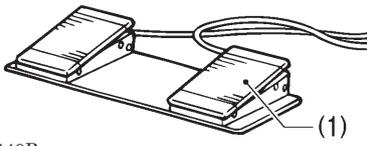
0437B

0438B

0392B

## 6. USING THE SEWING MACHINE (SEWING OPERATION)

### <Clearing the pause (when continuing from the point where sewing was paused)>

<p><b>1</b></p>	<p>Press the RESET key.</p>  <p>The buzzer will stop sounding.</p> <p>(The display will change alternately.)</p> <p>0437B <span style="float: right;">0438B</span></p>
<p><b>2</b></p>	<p>Eliminate the cause of the problem.</p> <p>* If a problem such as an upper thread breakage has occurred, you can press the THREAD key to switch to threading mode.</p>
<p><b>3</b></p>	<p>Press the ▼ key once.</p>  <p>0423B <span style="float: right;">0482B</span></p>
<p><b>4</b></p>	<p>Press the ▲ and ▼ keys to determine the position to resume sewing.</p>  <p>* If a problem such as an upper thread breakage has occurred, you can press the THREAD key to switch to threading mode.</p> <ul style="list-style-type: none"> <li>• The ▲ key moves forward, and the ▼ key moves backward.</li> <li>• (The feed will move quicker if you keep the key pressed down.)</li> </ul> <p>0439B</p>
<p><b>5</b></p>	<p>Press the start switch (1).</p>  <p>Automatic sewing will resume.</p> <p>0440B</p>

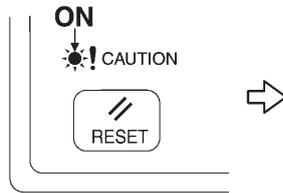
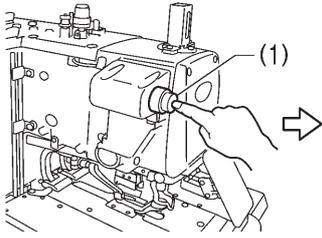
#### NOTE:

If the STOP switch is pressed before the upper shaft motor starts operating or after it has stopped, it will not be possible to continue sewing from the point where sewing was paused.

## 6-2-2. Canceling manual sewing or test feeding

## &lt;Canceling method&gt;

Press the STOP switch (1) while manual sewing or test feeding is being carried out.



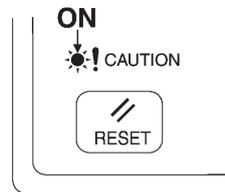
The buzzer will sound.

0436B

0320B

## &lt;Clearing the suspended display&gt;

Press the RESET key.



- The buzzer will stop sounding.
- After the home positions are detected, the needle bar and feed base will move to the material setting position.

0437B

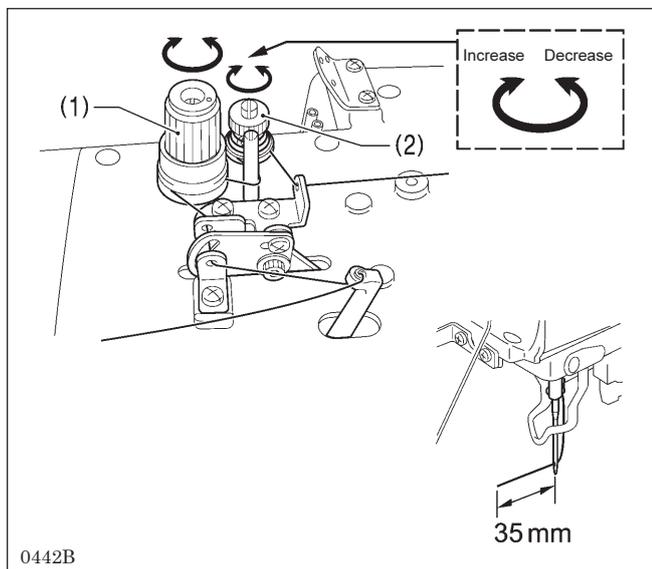
### 6-3. Adjusting the thread tension

The thread tension needs to be adjusted in accordance with the articles being sewn.

**[Reference thread tensions]**

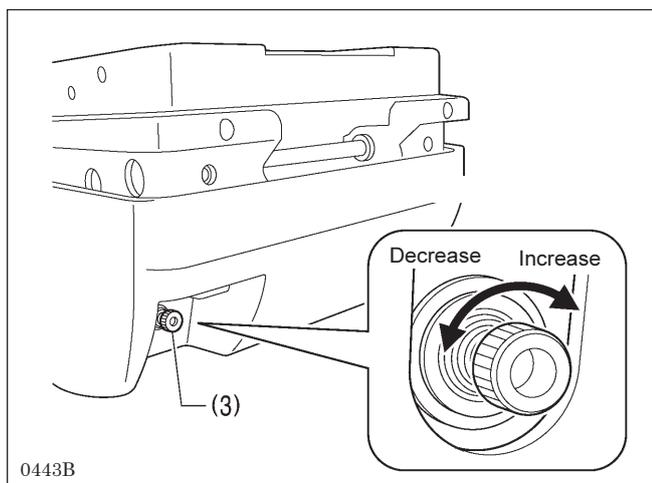
Material	Woollen material (2 layers) + padding	Denim (3 layers)
Thread used	#30 synthetic thread	#50 spun thread
Needle	DO x 558 Nm90	DO x 558 Nm110
Upper thread tension (N)	0.6	1.0
Lower thread tension (N)	0.3	0.3
Thread take-up spring tension (N)	0.05	0.07
Thread take-up spring stroke (mm)	8	8

\* The upper thread tension given above is the tension when the upper thread is pulled out from the thread path hole of the thread take-up lever, and the lower thread tension is when the lower thread is pulled out from the needle hole in the throat plate.



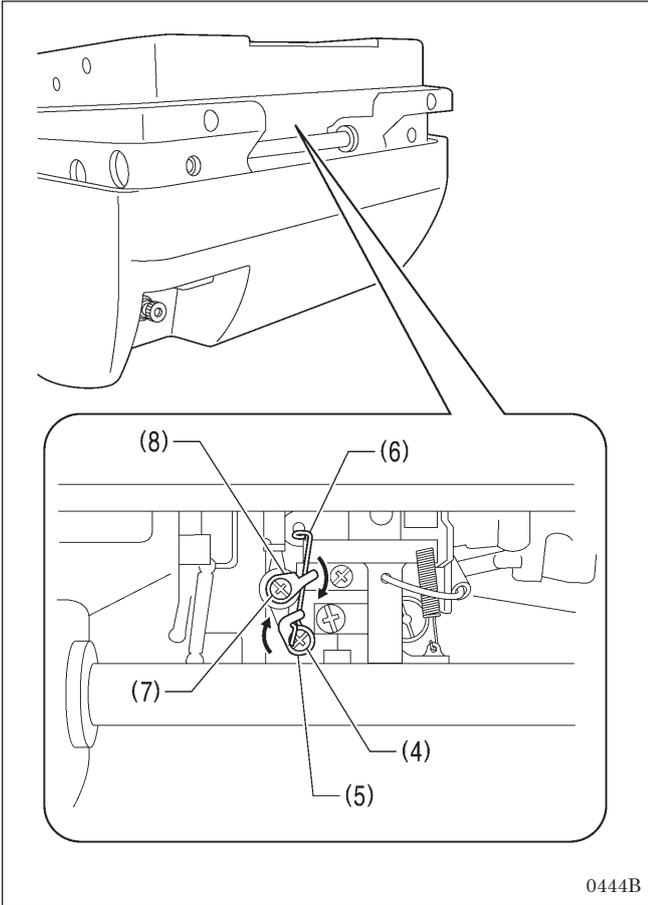
**<Upper thread tension adjustment>**

1. Adjust by turning the tension nut (1).
  2. Turn the tension nut (2) (sub tension) to adjust so that the upper thread trailing length is about 35 mm.
- \* When the tension nut (2) is turned clockwise, the upper thread trailing length will decrease, and when it is turned counterclockwise, the length will increase.



**<Lower thread tension adjustment>**

Adjust by turning the tension nut (3).



**<Lower thread take-up spring tension and stroke adjustment>**

**Tension adjustment**

1. Loosen the screw (4), and then turn the L thread take-up spring support (5) to adjust the tension.
  - \* When turned in the direction of the arrow, the tension of the thread take-up spring (6) will increase.
2. Once adjustment is complete, tighten the screw (4).

**Stroke adjustment**

1. Loosen the screw (7), and then turn the L thread take-up spring guide (8) to adjust the stroke.
  - \* When turned in the direction of the arrow, the stroke of the thread tension spring (6) will increase.
2. Once adjustment is complete, tighten the screw (7).

# 7. USING THE SEWING MACHINE (OPERATION PANEL: ADVANCED OPERATION)

## 7-1. Using cycle programs

The sewing patterns which have been registered in independent programs (P01 - P20) can be combined to register "cycle programs" so that they can be run continuously. When sewing the sewing patterns in a certain order, it can be useful to record them in a cycle program beforehand.

### Cycle programs

Max. no. of recordable programs	9 (C1 - C9)
Max. no. of steps	9 (the same independent program can be selected several times)

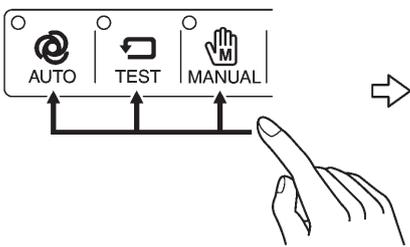
### Program example

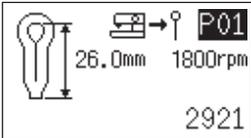
The following shows an example of storing a cycle program into cycle program C1 that consists of three steps of independent program 01 with cutting operation on, and one step of independent program 03 with cutting operation off.

### Example: Setting contents for cycle program C1

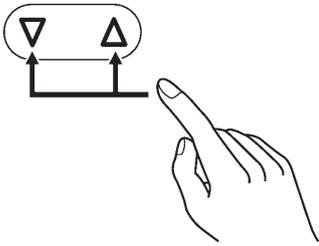
Step number	Step 1	Step 2	Step 3	Step 4
Independent program number	P01	P01	P01	P03
Cutting operation	Yes	Yes	Yes	No

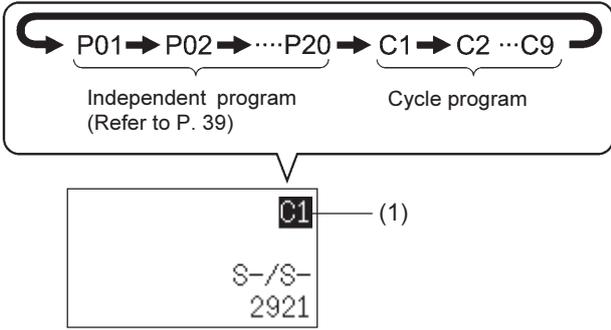
**1** Press one of the following keys to select a sewing mode.  
(In this example, automatic mode is selected.)





**2** Select cycle program number C1 (1).



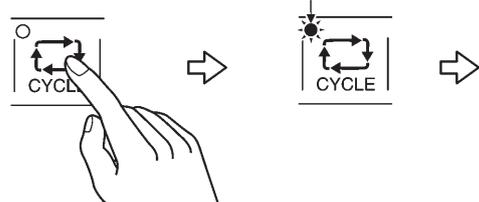
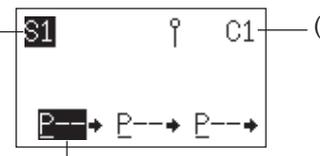
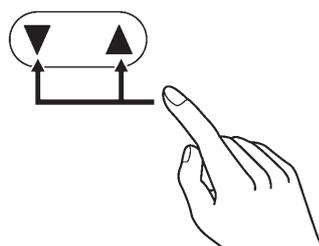
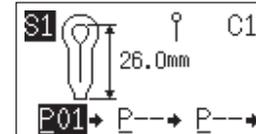
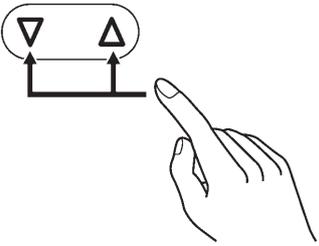
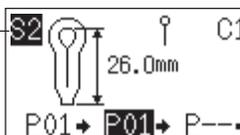
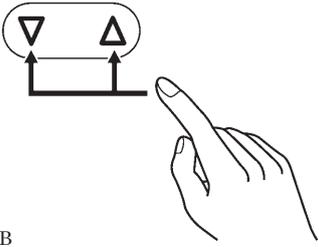
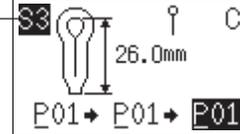


The program number (1) changes in the order shown in the illustration each time the  $\Delta$  key is pressed. The  $\nabla$  key changes the order in the opposite direction.

**NOTE:**  
Cycle program mode is not available if an independent program has been selected.

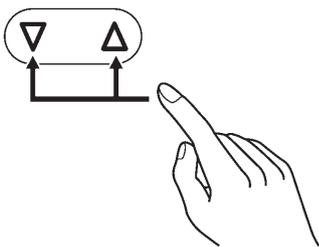
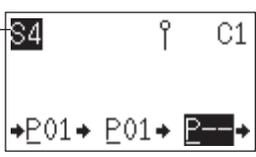
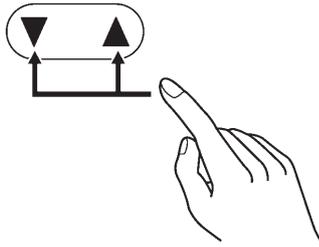
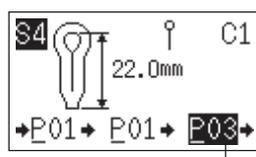
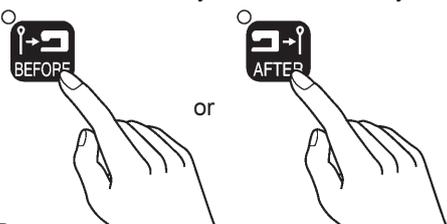
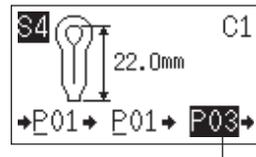
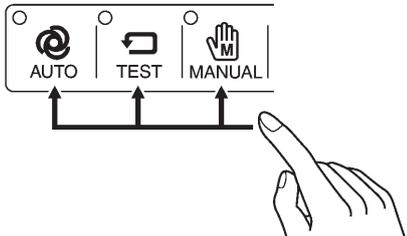
0445B
0222B

0413B
0337B  
0307B

<p><b>3</b></p>	<p>Switch to cycle program mode.</p> 	<p>0263B</p>  <p>(1) Cycle program number          (2) Step number          (3) Contents (program number, cutting operation) set for the selected step number 1</p>
<p><b>4</b></p>	<p>Set the contents (3) for step 1 to "P01".</p> 	<p>0414B</p>  <p>(3)</p> <ul style="list-style-type: none"> <li>* The "-" in "P" means that cutting operation is set to be on.</li> <li>* The "--" in "P--" means that no setting has been made. When "--" is set, the contents for all subsequent steps are cleared.</li> </ul>
<p><b>5</b></p>	<p>Apply the changed contents.</p> 	<p>0415B</p> <p>⇒ The contents (3) for step 1 will change from flashing to steadily illuminated.</p>
<p><b>6</b></p>	<p>Set the step number (2) to "2".</p> 	<p>0413B</p>  <p>(2)</p> <p>0238B</p>
<p><b>7</b></p>	<p>Repeat steps 4 and 5 above to set the contents for step 2 of the cycle program to "P01", the same contents as for step 1.</p>	
<p><b>8</b></p>	<p>Set the step number (2) to "3".</p> 	<p>0413B</p>  <p>(2)</p> <p>0239B</p>
<p><b>9</b></p>	<p>Repeat steps 4 and 5 above to set the contents for step 3 of the cycle program to "P01", the same contents as for step 1.</p>	

(Continued on next page)

## 7. USING THE SEWING MACHINE (OPERATION PANEL: ADVANCED OPERATION)

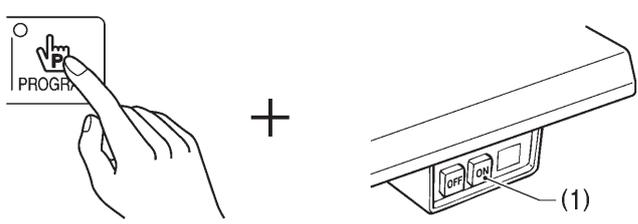
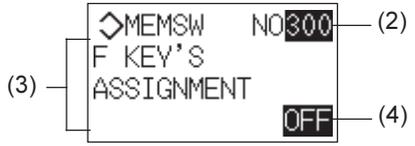
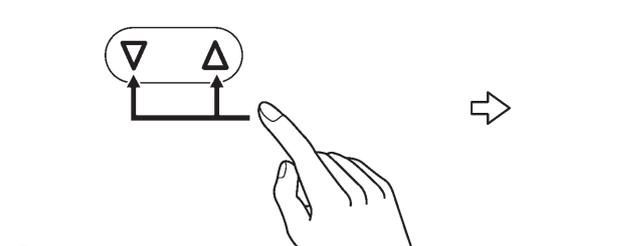
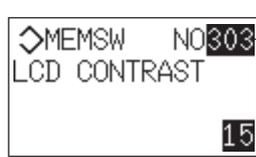
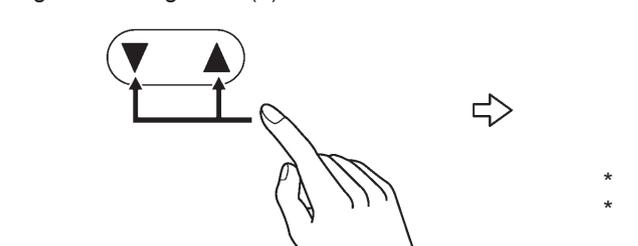
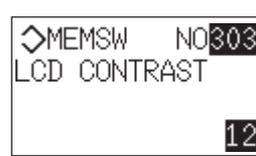
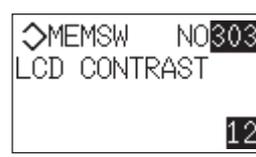
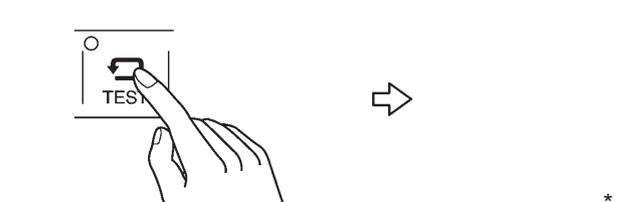
<p><b>10</b></p>	<p>Set the step number (2) to "4".</p> 	
<p><b>11</b></p>	<p>Set the contents (3) for step 4 to "P03".</p> 	
<p><b>12</b></p>	<p>Press the BEFORE key or the AFTER key to change the "P" to "P". (This sets "no cutting operation".)</p> 	
<p><b>13</b></p>	<p>Apply the changed contents.</p> 	
<p><b>14</b></p>	<p>Press one of the following keys to exit cycle program mode.</p> 	

**NOTE:**

When a cycle program is selected for automatic sewing to be carried out, the cutting operation used is the operation that is currently selected (cutting before sewing or cutting after sewing).

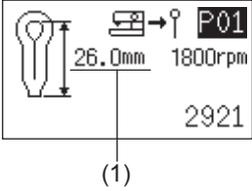
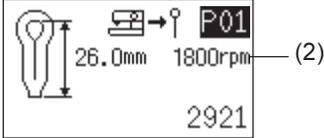
## 7-2. Setting memory switches

The functions of the operation panel include some that are set by memory switches at the time of shipment from the factory. You can change the settings for these memory switches if required. The settings for the memory switches are valid for all programs. Refer to "7-2-1. List of memory switch settings" for details on memory switch Nos. and settings.

<p><b>1</b></p>	<p>While pressing the PROGRAM key, push the POWER switch (1) to the ON side.</p> 	 <p>(2) Memory switch number (3) Setting for selected number (4) Setting range</p>
<p><b>2</b></p>	<p>Select the memory switch (2) that you would like to change the setting for.</p> 	
<p><b>3</b></p>	<p>Change the setting value (4).</p> 	 <p>* When the setting value is changed, (4) will start flashing. * If you would like to return the setting to the default value, press the RESET key.</p>
<p><b>4</b></p>	<p>Apply the changed setting.</p> 	 <p>* The setting for the memory switch will be stored and (4) will stop flashing and illuminate steadily.</p>
<p><b>5</b></p>	<p>To change the settings for other memory switch Nos., repeat the operations in steps 2 - 4 above.</p>	
<p><b>6</b></p>	<p>Exit memory switch mode.</p> 	 <p>* Normal sewing machine operation will then be possible.</p>

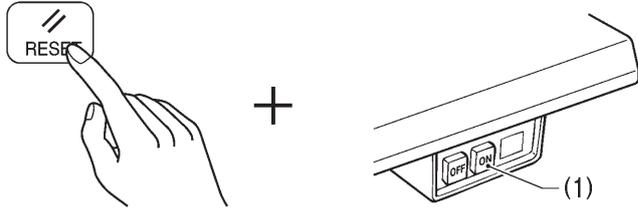
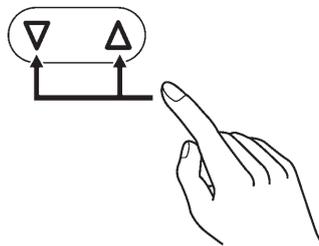
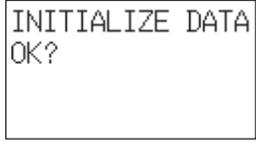
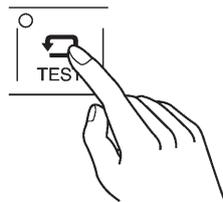
## 7. USING THE SEWING MACHINE (OPERATION PANEL: ADVANCED OPERATION)

### 7-2-1. List of memory switch settings

No.	Setting items	Setting range	Default value
001	Switching between 1-pedal and 2-pedal operation 1: When the start switch is pressed, the work clamps are lowered and the sewing machine starts operating. 2: When the work clamp switch is pressed, the work clamps are lowered. After that, the sewing machine starts operating when the start switch is pressed.	1: 1-pedal operation 2: 2-pedal operation	2
300	Assignment of functions to the F key If the setting is OFF: The help screen will be displayed while the F key is being pressed. If the setting is 1 - 40: The 7th shortcut key will be enabled. When it is pressed, the parameters for the specified setting number (corresponding to the parameter number) will be retrieved.	OFF, 1 - 40	OFF
301	Parameter display during automatic mode Sets the parameter settings that appear in the display (1) during automatic mode.  0222B	1: Sewing length 2: Pitch	1
302	Parameter display during automatic mode Sets the parameter settings that appear in the display (2) during automatic mode.  0222B	3: Sewing speed 4: Number of stitches.	3
303	Display screen contrast The contrast becomes stronger as the value is increased.	0 - 30	15

### 7-3. Resetting the data (initialization)

If the sewing machine stops operating normally, the cause may be that an incorrect memory setting may have been made by means of memory switches, for instance. In such cases, it may be possible to restore normal operation by following the steps given below to initialize the memory setting data.

<p><b>1</b></p> <p>0449B</p>	<p>While pressing the RESET key, push the POWER switch (1) to the ON side.</p> 	<p>0324B</p>  <p>The mode will switch to initialization mode.</p>
<p><b>2</b></p> <p>0413B</p>	<p>Select the initialization level (1) from 1 to 3.</p> 	<p>0324B</p>  <p>Level 1 is selected as the default. * The settings that are reset (initialized) will vary depending on the initialization level selected. (Refer to the table on the next page.)</p>
<p><b>3</b></p> <p>0415B</p>	<p><b>[To proceed with initialization]</b></p> 	<p>0325B</p> 
<p><b>4</b></p> <p>0415B</p>	<p><b>[To carry out initialization]</b></p> 	<p>0415B</p> <p>"INITIALIZING" will be displayed and initialization will start. * If you would like to cancel the initialization procedure, press the RESET key.</p>
<p><b>5</b></p> <p>0448B</p>	<p><b>[To exit initialization mode]</b></p> 	<p>0311B</p>  <p>Normal sewing machine operation will then be possible.</p>

## 7. USING THE SEWING MACHINE (OPERATION PANEL: ADVANCED OPERATION)

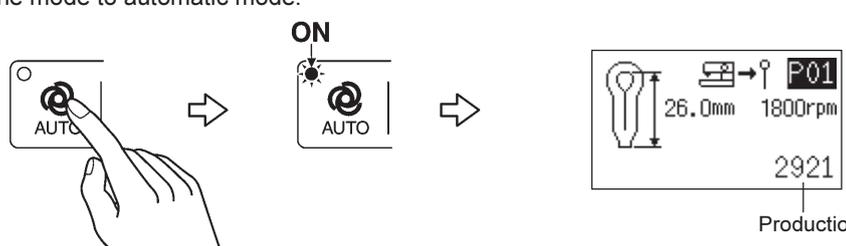
Initialization level and settings that are reset or initialized.

	Level 1	Level 2	Level 3
Program settings (Parameter)	Default value	-	Default value
Cycle programs	Reset	-	Reset
Memory switch	-	Default value	Default value
Program No.	-	-	1
Parameter No.	-	-	1
Production counter	-	-	0
Operating mode	-	-	Program
Material setting position	-	-	Set back
Cutting operation	-	-	OFF

### 7-4. Changing the production counter setting

The production counter is displayed at the bottom-right of the screen during automatic mode. The counter value increases by 1 each time a pattern is sewn.

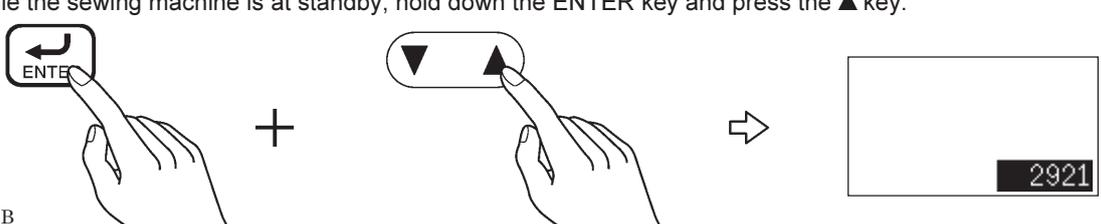
**1** Switch the mode to automatic mode.



Production counter

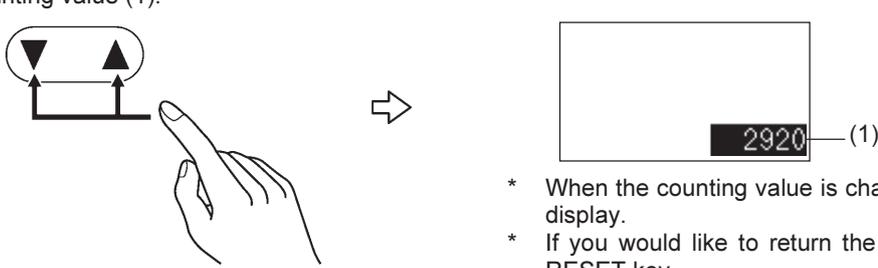
0430B 0222B

**2** While the sewing machine is at standby, hold down the ENTER key and press the ▲ key.



0451B 0262B

**3** Set the counting value (1).



0599B

- \* When the counting value is changed, (1) will flash in the display.
- \* If you would like to return the setting to "0", press the RESET key.

0414B

**4** Apply the changed setting.



The mode will return to automatic mode.

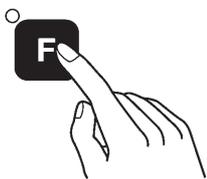
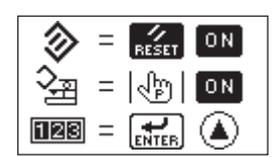
0415B 0600B

**NOTE:**

If you press the AUTO key while the counting value (1) is flashing, the mode will return to automatic mode and the setting will not be changed.

## 7-5. Displaying the help screen

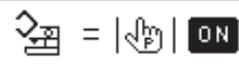
The help screen is a screen which uses graphics to show how to switch the sewing machine to data initialization mode, memory switch setting mode and production counter setting mode. (Refer to the table below for details.)

<b>1</b>	Press the F key while the sewing machine is in standby during automatic mode, test mode, manual mode, program mode or cycle program mode.
	
0452B	* The help screen will be displayed while the F key is being pressed. <span style="float: right;">0303B</span>
<b>2</b>	When the F key is released, the display will return to the normal display.

**NOTE:**

If the F key has been assigned as a shortcut key by changing the memory switch settings, it will not be possible to display the help screen. To display the help screen, change the setting for memory switch No. 300 to OFF. (Refer to “7-2. Setting memory switches”.)

**Meaning of help screen symbols**

Symbol	Meaning	Operation method
	How to switch to data initialization mode	While holding down the RESET key, push the POWER switch to the ON side.
	How to switch to memory switch setting mode	While holding down the PROGRAM key, push the POWER switch to the ON side.
	How to switch to production counter setting mode	While the sewing machine is at standby in automatic mode, hold down the ENTER key and press the ▲ key.

0304B  
0305B  
0306B

## 7-6. Manual sewing (manual mode)

### CAUTION



The hammer may operate during manual mode, so do not put your hands near the hammer at this time. If care is not taken, injury may result.

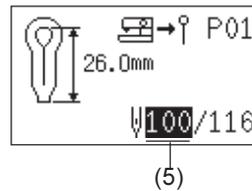
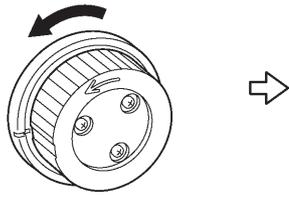
You can turn the upper shaft pulley by hand to move the feed base one stitch at a time. This is useful to do when adjusting the spreader timing. (Refer to “9-10. Adjusting the spreader timing”.)

<p><b>1</b></p>	<p>Switch the mode to manual mode.</p>	<p>0225B</p> <p>The sewing shape (1), program number (2), cutting operation (3), total number of stitches (4) and number of stitches remaining (5) will appear in the display.</p>
<p><b>2</b></p>	<p>Select the desired program number (2).</p>	<p>0413B</p> <p>The program number (2) changes in the order shown in the illustration each time the <math>\Delta</math> key is pressed. (The <math>\nabla</math> key changes the order in the opposite direction.)</p> <p>0337B 0225B</p>
<p><b>3</b></p>	<p>Place the material to be sewn under the work clamps, and then press the work clamp switch (6).</p>	<p>The work clamps will be lowered.</p> <p>0531B</p>
<p><b>4</b></p>	<p>Press the start switch (7).</p>	<p>The feed base will move to the sewing start position.</p> <p><b>NOTE:</b> If cutting operation is set to “Cutting before sewing”, the hammer will operate.</p> <p>0532B</p>

0226B

5

Turn the upper shaft pulley by hand.



- The feed base will move to the next sewing start position in accordance with the rotation of the upper shaft.
- The number of remaining stitches (5) in the display will decrease by 1 each time the upper shaft pulley is rotated half a turn (when the needle bar moves up and down once).

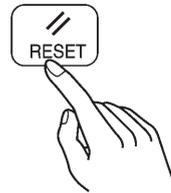
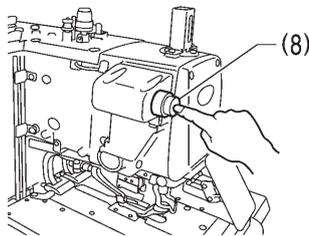
**NOTE:**

If the upper shaft pulley is turned in the reverse direction, no seam will be formed, so do not turn it in the reverse direction.

0435B

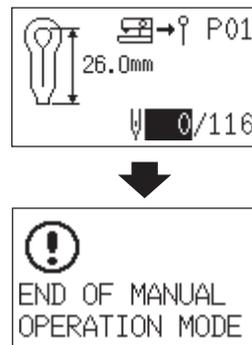
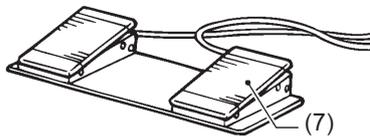
6

**[If you would like to pause manual sewing and return the feed base to the material setting position]**  
Press the STOP switch (8) and then press the RESET key.



0533B

**[Once sewing continues to the final stitch and the buzzer sounds]**  
When the needle bar is at the needle up stop position, press the start switch (7).



0227B  
0326B

(Keep pressing until the feed base returns to the material setting position.)

Thread trimming will be carried out and the feed base will return to the material setting position.)

**NOTE:**

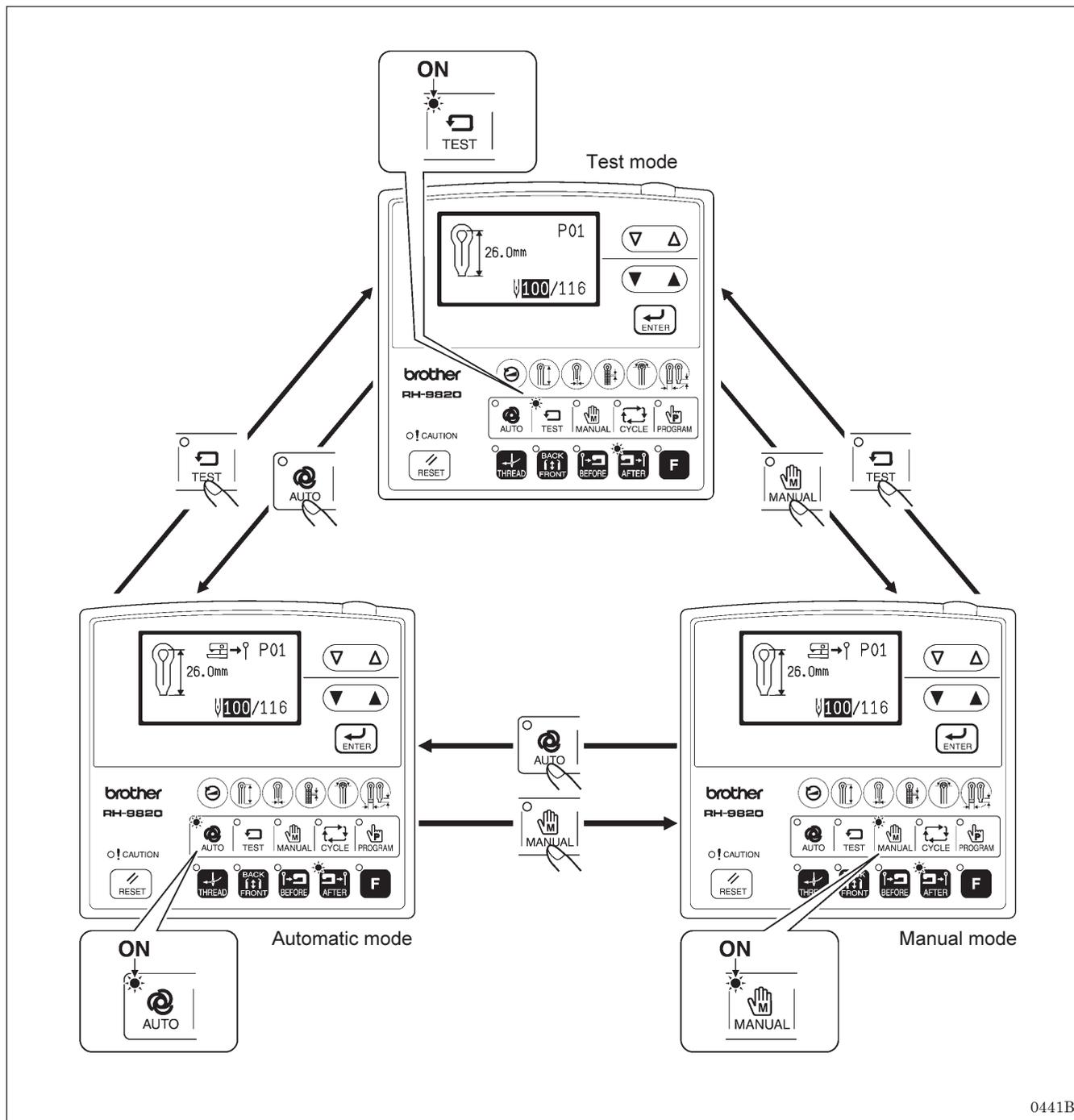
If cutting operation is set to "Cutting after sewing", the hammer will operate.

0532B

### 7-7. Switching the sewing mode while sewing is in progress

If a stop (or interruption) has been cleared during automatic sewing, manual sewing or test mode, you can switch the mode to the desired mode by pressing the corresponding mode key.

The sewing mode changes as shown in the illustration each time a key is pressed.



0441B

## 8. CLEANING AND INSPECTION

### CAUTION



Turn off the power switch before carrying out this operation.

Turn off the power switch before starting any cleaning work, otherwise the machine may operate if the start switch is pressed by mistake, which could result in serious injury.



Be sure to wear protective goggles and gloves when handling the lubricating oil, so that it does not get into your eyes or onto your skin.

If care is not taken, inflammation can result.

Furthermore, do not drink the lubricating oil. Diarrhea or vomiting may result.

Keep the oil out of the reach of children.

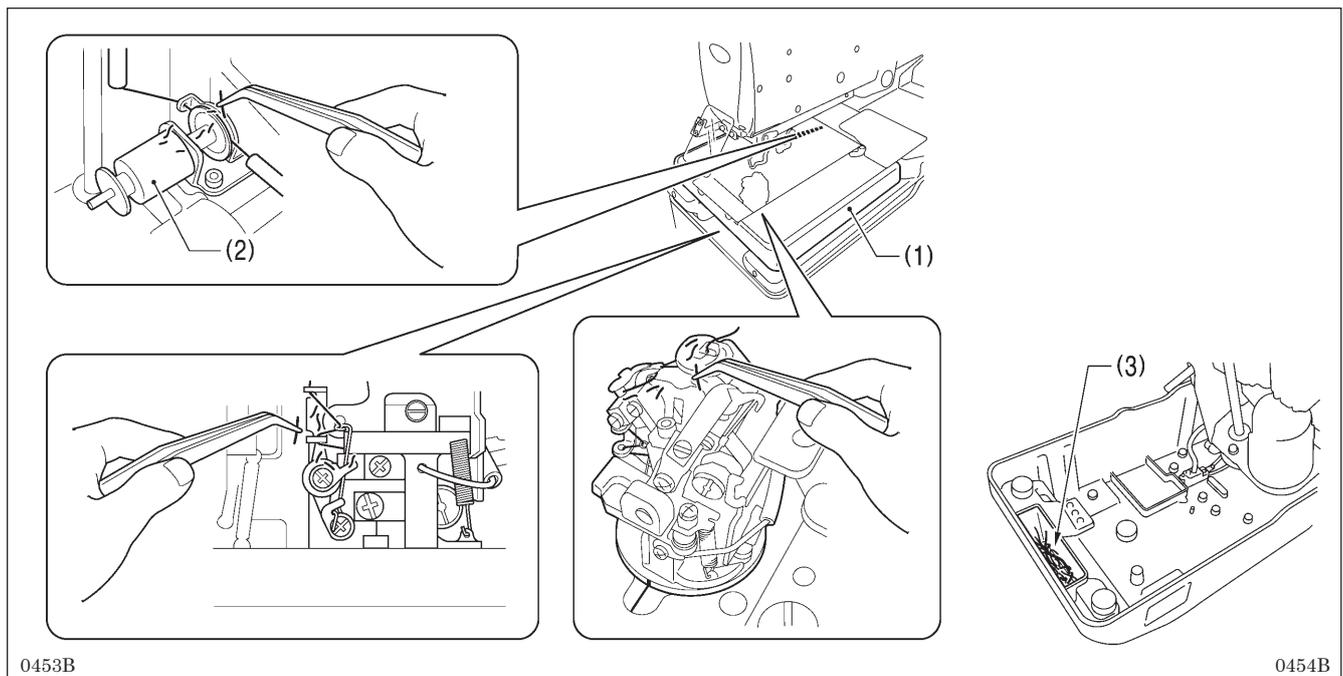
### 8-1. Daily cleaning and inspection

The following cleaning operations should be carried out each day in order to maintain the performance of this machine and to ensure a long service life. Furthermore, if the sewing machine has not been used for a long period of time, carry out the following cleaning procedures before using it again.

#### 8-1-1. Cleaning

##### NOTE:

Do not use the air gun while the machine head is tilted back. Thread scraps may get inside the machine head and cause problems with operation.



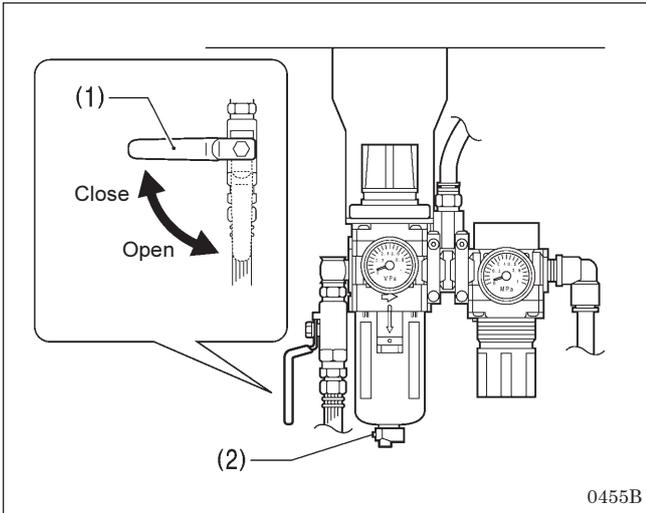
0453B

0454B

1. Turn off the power switch.
2. Turn the air cock to stop the flow of air, and then press the button to release the air. (Refer to "3-16. Adjusting the air pressure".)
3. Remove the work clamp plates. (Refer to "3-19. Installing and removing the work clamp plates".)
4. Remove any thread scraps and dust, etc. from the thread paths for the upper thread, lower thread and gimp.
  - \* In particular, the looper thread path should be cleaned every day to keep it free from thread scraps and dust.
5. Move the feed base (1) by hand and remove any thread scraps and dust from around the gimp solenoid (2). **<For -02 specifications only>**
6. Tilt back the machine head and remove any thread scraps that have collected in the thread scrap collection pocket (3) in the bed base.

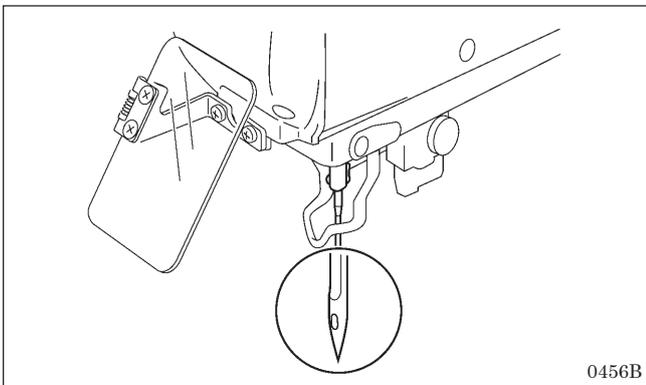
## 8. CLEANING AND INSPECTION

### 8-1-2. Checking the air filter



1. Close the air cock (1).
2. Press the button (2) to release the air and water that have collected inside the drain.
3. Once the air and water have been released, open the air cock (1).

### 8-1-3. Checking the needle

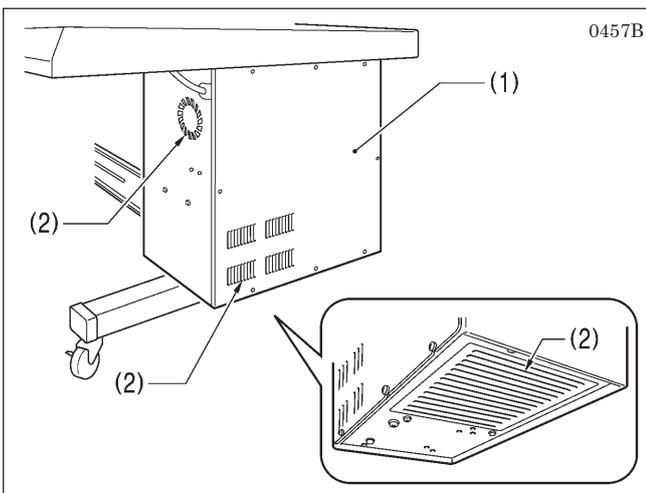


Always check that the tip of the needle is not broken and also the needle is not bent before starting sewing.

## 8-2. Monthly cleaning and inspection

This section describes the cleaning procedures that should be carried out periodically about once a month.

### 8-2-1. Cleaning the control box air inlet port

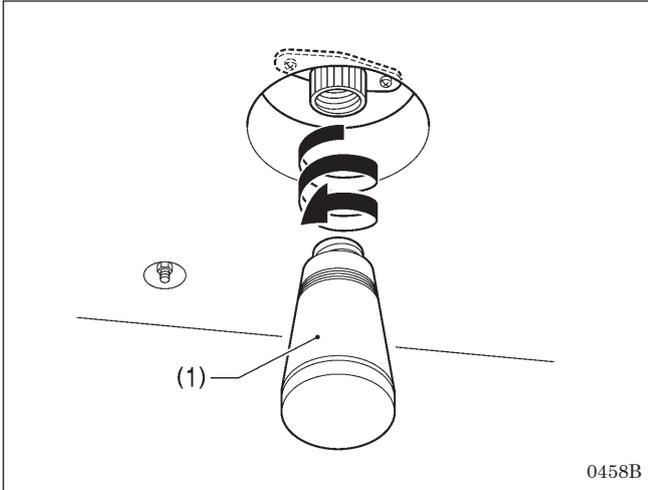


Use a vacuum cleaner to clean the filters in the air inlet ports (2) of the control box (1).

### 8-3. Cleaning and inspection as required

This section describes the cleaning procedures that should be carried out not regularly but when required.

#### 8-3-1. Draining lubricating oil

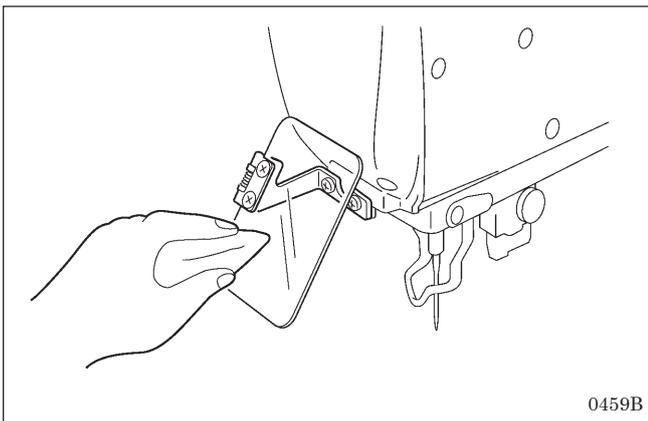


1. When the oiler (1) has filled with oil, turn the oiler (1) to remove it, and drain the oil.
2. After draining the oil, return the oiler (1) to its original position.

**NOTE:**

Dispose of waste oil correctly in accordance with local regulations.  
If any of the oil spills onto the floor by mistake, wipe it all up carefully.

#### 8-3-2. Cleaning the eye guard



Wipe the eye guard clean with a soft cloth.

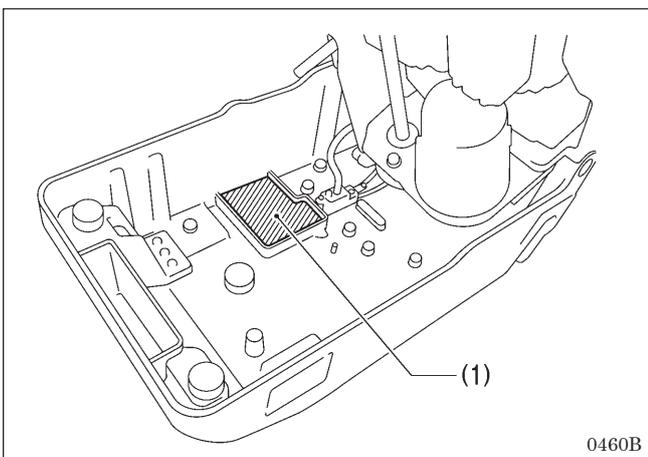
**NOTE:**

Do not use solvents such as kerosene or thinner to clean the eye guard. They may cause discoloration or deterioration of the eye guard.

#### 8-3-3. Lubrication

Lubricate the machine head when required while referring to "3-20. Lubrication".

#### 8-3-4. Draining water



1. Tilt back the machine head.
2. Water may collect in the bed base (1) depending on the condition of the air coming from the compressor, so drain this water if necessary.

**NOTE:**

If water collects in the bed base (1), carry out the inspections in "8-1-2. Checking the air filter". If water still continues to collect, there may be a problem with the air cylinder, so it is recommended that you install an automatic drain (commercially-available).

## 9. STANDARD ADJUSTMENTS

### ⚠ CAUTION



Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.



Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.



Turn off the power switch and disconnect the power cord at the following times.

If this is not done, the sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.

- When carrying out inspection, adjustment and maintenance
- When replacing consumable parts such as the loopers and knife



Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.



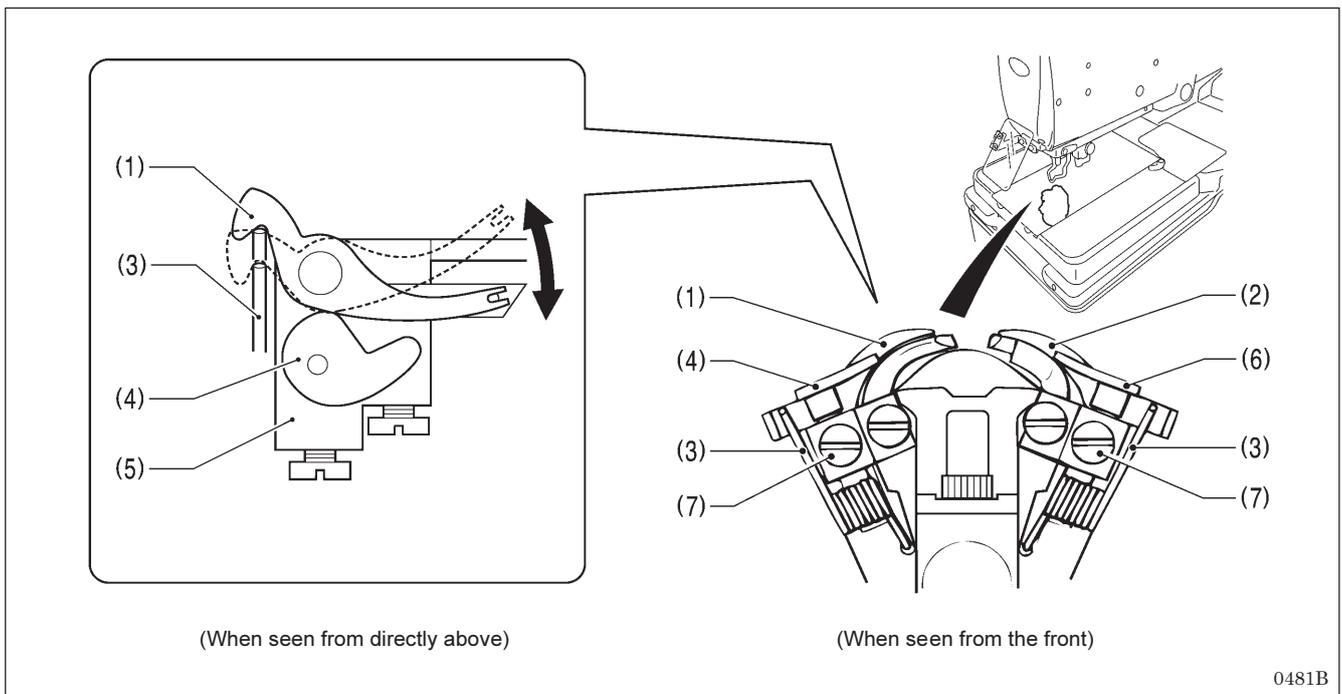
If the power switch and air need to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.



If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

### 9-1. Adjusting the heights of the spreaders and loopers

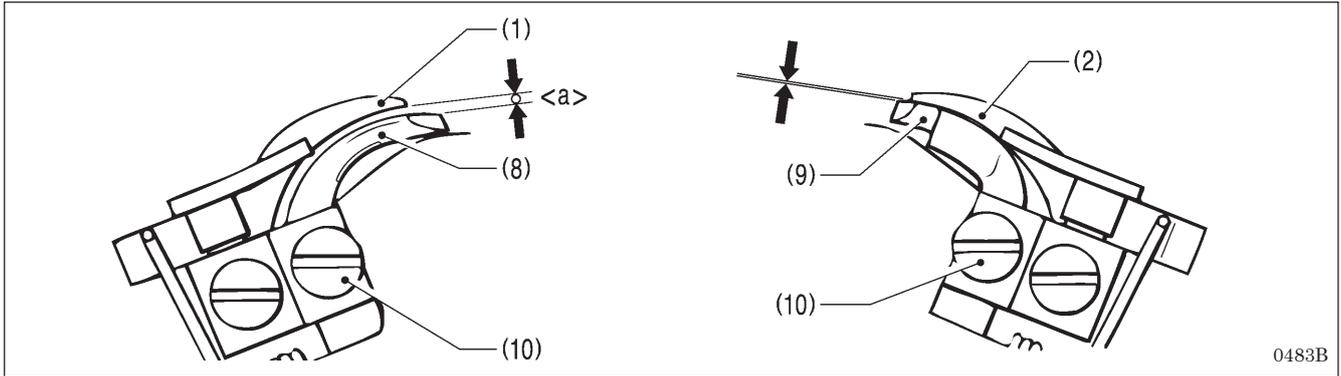
#### Spreader height



0481B

1. Remove the work clamp plates. (Refer to "3-19. Installing and removing the work clamp plates".)
2. Check the following.
  - Check that the spring (3) causes the spreader L (1) to move smoothly without any play between the spreader stopper L (4) and the LS holder base (5).
  - Check that the spring (3) causes the spreader R (2) to move smoothly without any play between the spreader stopper R (6) and the LS holder base (5).
3. If the spreaders do not move smoothly or if there is play in their movement, loosen the set screws (7) and move the spreader stopper L (4) or spreader stopper R (6) up or down to adjust.
4. Once adjustment is complete, securely tighten the set screws (7).

**Looper height**



Adjust so that the positions of the eye looper (8) and the looper R (9) are as follows.

- The clearance <a> between the eye looper (8) and the spreader L (1) should be equal to the thickness of the lower thread (looper thread).
- The clearance between the looper R (9) and the spreader R (2) should be as small as possible (so that the two parts do not touch).

**<Adjustment method>**

1. Loosen the set screws (10), and then move the eye looper (8) or the looper R (9) up or down to adjust.
2. Check that the spreader L (1) and the spreader R (2) move smoothly by the force of the springs (3).
3. Once adjustment is complete, securely tighten the set screws (10).

**9-2. Adjusting the zigzag width (stitch width)**

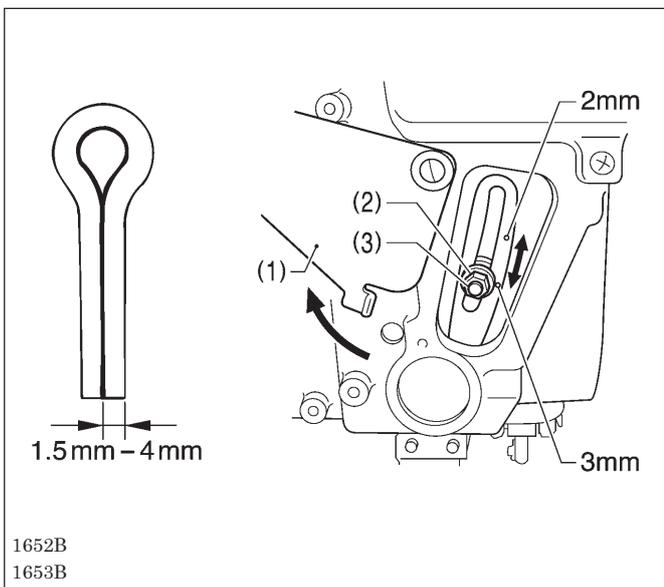
The zigzag width can be adjusted to between 1.5 - 4 mm. It is set to 3 mm at the time of shipment from the factory.

\* If the zigzag width is set to 3.2 mm or more, replace the throat plate (optional part).

**NOTE:**

If the throat plate has been replaced, carry out the following readjustments.

“9-20. Adjusting the positions of the work clamp plates”, “9-21. Adjusting the cloth opening amounts”.



1. Turn the cover (1) to open it.
2. Use the accessory socket wrench to loosen the zigzag width adjustment nut (2).
3. Move the adjustment screw (3) up or down along the slot to adjust.
  - \* The zigzag width becomes smaller as the adjustment screw (3) is moved upward.
  - \* The zigzag width becomes larger as the adjustment screw (3) is moved downward.
  - \* There are index marks at the 2 mm and 3 mm zigzag width positions. Align the middle of the adjustment screw (3) with the index marks.
4. Once adjustment is complete, securely tighten the adjustment nut (2), and then close the cover (1).

**NOTE:**

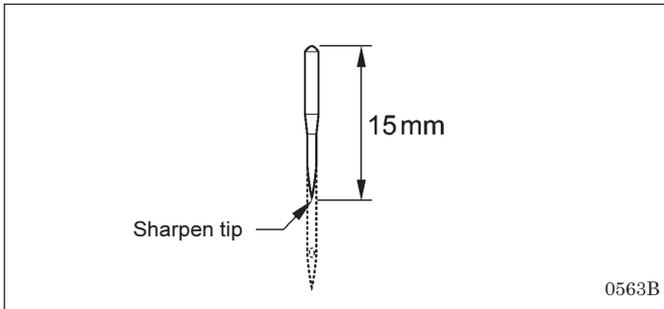
- If the zigzag width has been increased, carry out the following readjustments. “9-4. Adjusting the needle and looper timing”, “9-5. Adjusting the looper stroke”, “9-6. Adjusting the height of the needle bar”, “9-7. Adjusting the clearance between the loopers and needle”, “9-8. Adjusting the needle guard”, “9-9. Adjusting the spreader installation positions”, “9-10. Adjusting the spreader timing”.
- The index marks are a guide to the zigzag width. Lower the needle onto a piece of paper or similar to accurately measure the zigzag width.

1652B  
1653B

### 9-3. Adjusting the zigzag base line position

#### Preparing a short customized needle

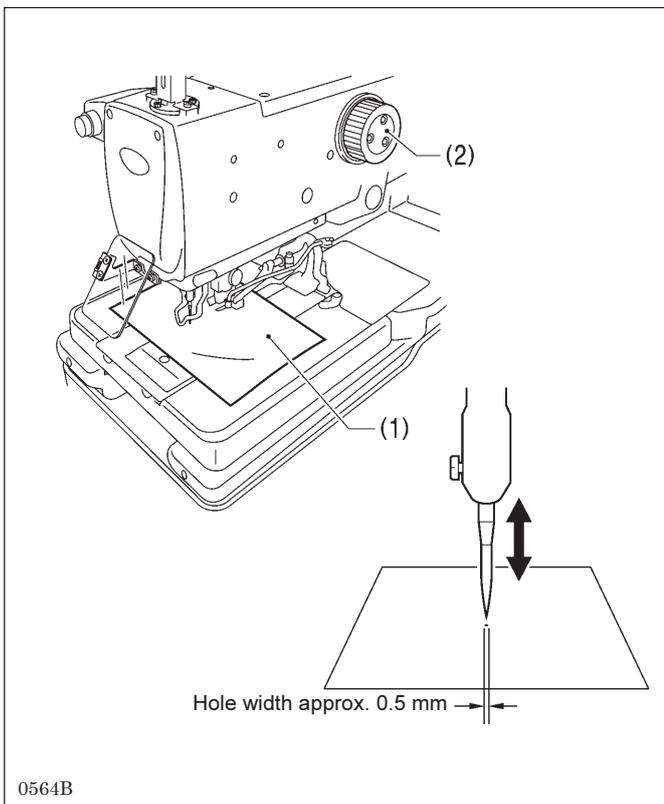
Prepare a short needle as described below in order to make very small holes in a piece of paper while checking the needle drop position.



1. Use a grinder or similar to grind the tip of the currently-used needle until the length of the needle is 15 mm.
2. Sharpen the tip of the needle.

**NOTE:**

Sharpen the needle so that the tip of the needle is in the middle.

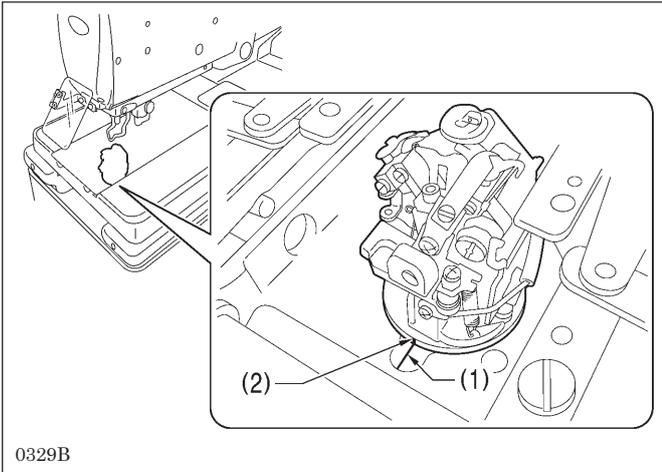


3. Place a piece of paper (1) underneath the work clamps.
4. Turn the upper shaft pulley (2) to set the needle to its lowest position.
5. Move the needle up or down to adjust the installation position of the needle so that the tip of the needle makes a hole with a width of about 0.5 mm in the paper (1) when the needle comes to the needle down position.

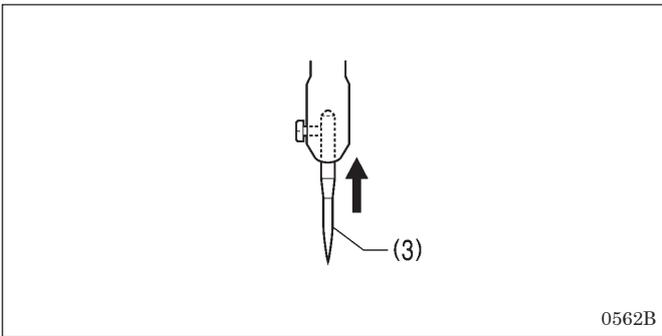
### Adjusting the zigzag base line position

The zigzag base line is on the inside of the zigzag.

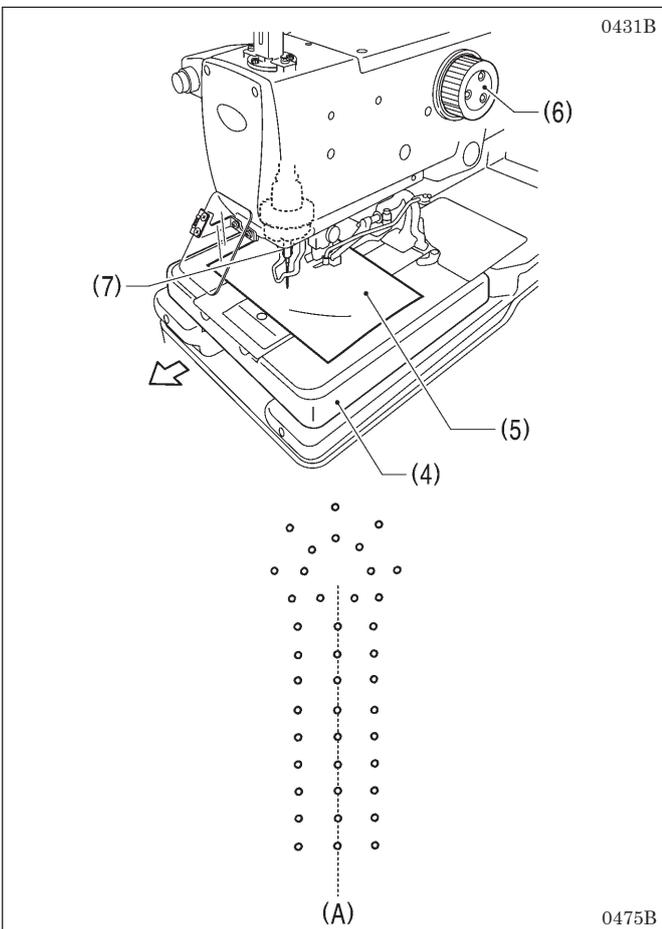
If you change the zigzag width, only the outer needle drop position will change, and the zigzag base line (inner base line) will not change.



1. Move the needle bar guard block (θ) to the home position.
  - \* The home position for the needle bar guard block (θ) is when the bed index mark (1) and the looper base index mark (2) are aligned.



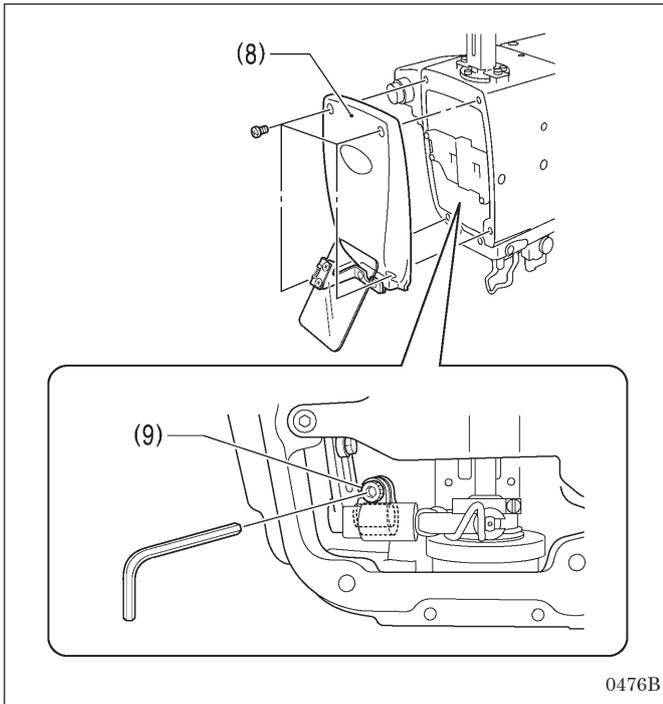
2. Install the short customized needle (3). (Refer to "Preparing a short customized needle" on the previous page.)



3. Move the feed base (4) forward (to near the sewing start position) by hand.
4. Place a piece of paper (5) underneath the work clamps.
  - \* Secure the piece of paper so that it will not move.
5. Turn the upper shaft pulley (6) to lower the needle so that it makes a small hole in the paper (5).
6. Turn the upper shaft pulley (6) in reverse to return the needle to its original position (needle up position).
7. Turn the needle bar guard block (needle bar) (7) by hand 180 degrees.
8. Turn the upper shaft pulley (6) to lower the needle so that it makes a small hole in the paper (5).
  - \* If the inner needle drop positions (A) are not aligned, carry out the adjustments in steps 9 - 12 on the next page.

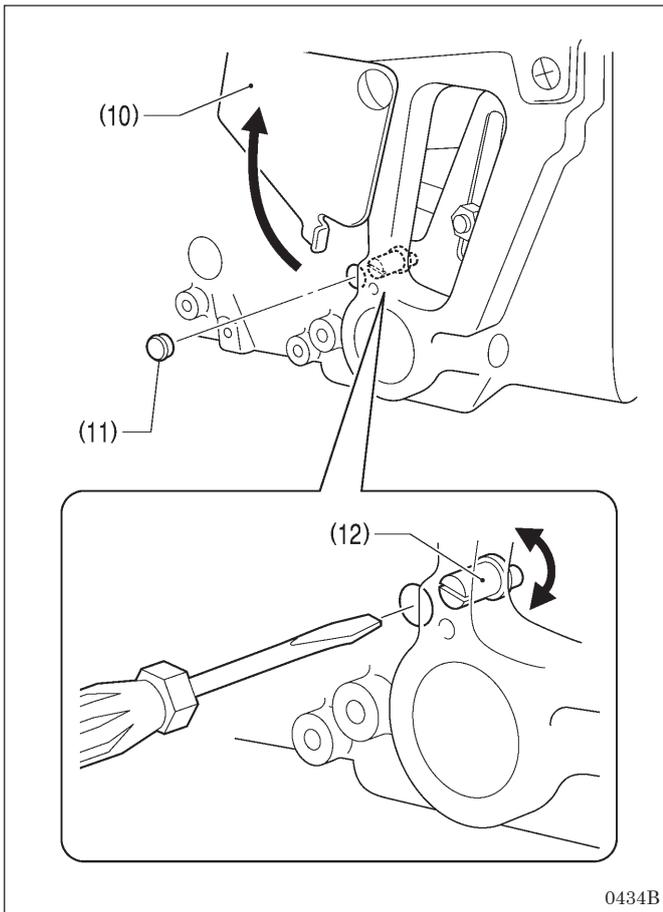
(Continued on next page)

## 9. STANDARD ADJUSTMENTS



### <Zigzag base line position adjustment>

9. Remove the face plate (8), and then loosen the socket bolt (9).



10. Open the cover (10), and then remove the cap (11).
11. Insert a flat-tipped screwdriver into the hole and turn the zigzag eccentric pin (12) to adjust the zigzag base line position.
12. Tighten the socket bolt (9).
13. Repeat steps 4 - 12 until the inner zigzag base line is aligned correctly.
14. Once adjustment is complete, return the cap (11), cover (10) and face plate (8) to their original positions.

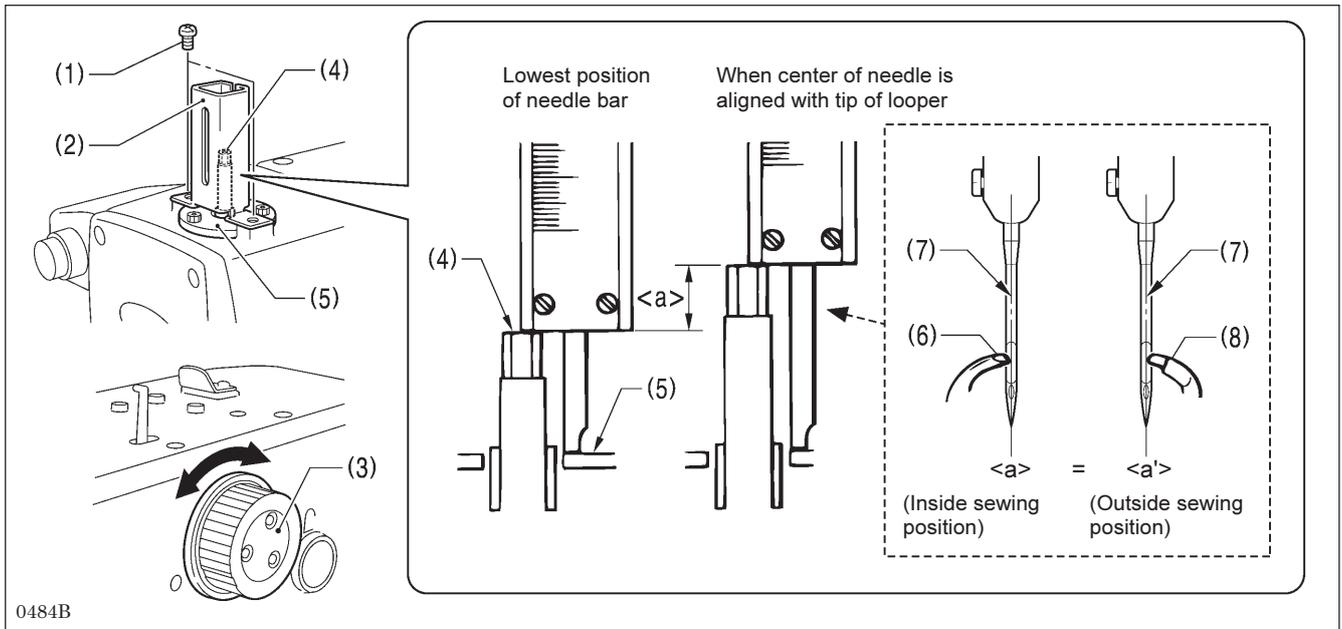
## 9-4. Adjusting the needle and looper timing

**NOTE:**

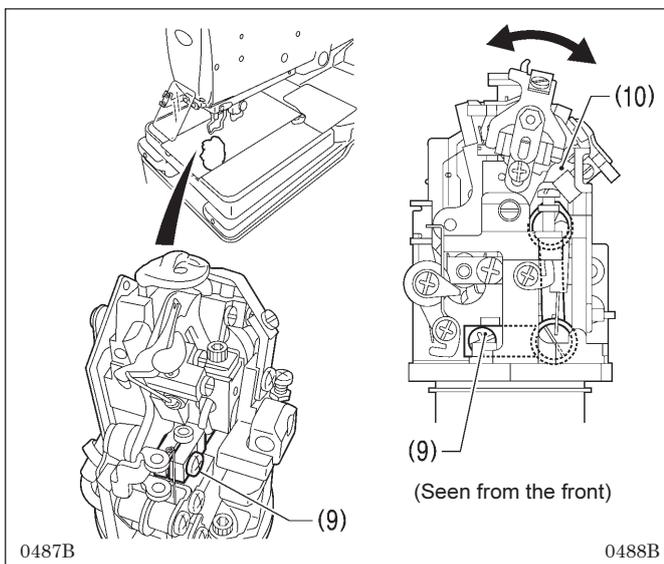
The needle bar moves through two needle drop cycles for each single turn of the upper shaft pulley. The needle drop movement toward the left side (knife cutting side) is called the “**inside sewing position**”, and the needle drop movement toward the right is called the “**outside sewing position**”. In addition, the amount of movement involved when the needle bar rises from its lowest position until the tip of the looper at either the left or right is aligned with the center of the needle is called the “**loop stroke**”.

The left and right loop strokes must be the same as each other. This section describes the adjustments to be carried out so that the left and right loop strokes are the same.

\* Before carrying out these adjustments, set the zigzag width (stitch width). (Refer to “9-2. Adjusting the zigzag width (stitch width)”.)



1. Remove the two screws (1), and then remove the needle bar guard (2).
  2. Turn the upper shaft pulley (3) to set the needle bar to its lowest position at the inside sewing position.
  3. Use calipers to measure the length from the edge of the needle bar (4) to the top of the needle bar bush holder base (5).
  4. Next, turn the upper shaft pulley (3) until the tip of the eye looper (6) is aligned with the needle center (7).
  5. In the same way as in step 3, use calipers to measure the length from the edge of the needle bar (4) to the top of the needle bar bush holder base (5).
  6. Calculate the difference  $\langle a \rangle$  between the value obtained in step 5 and the value obtained in step 3.
  7. Repeat steps 2 - 6 and calculate the difference  $\langle a' \rangle$  for the outside sewing position in the same way as for the inside sewing position.
- \* For the inside sewing position, align the tip of the eye looper (6) with the needle center (7), and for the outside sewing position, align the tip of looper R (8) with the needle center (7).

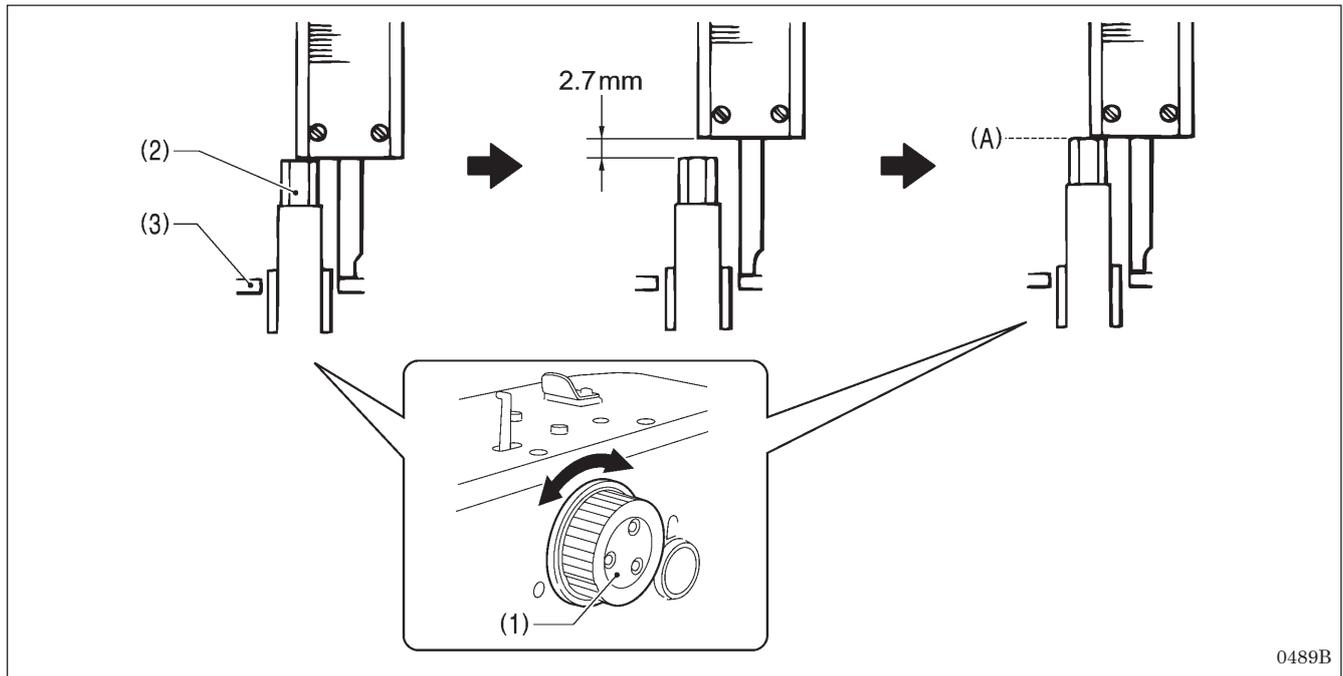


8. Loosen the screw (9).
9. Move the LS holder base (10) to the left or right to adjust so that length  $\langle a \rangle$  and length  $\langle a' \rangle$  are the same.
10. Once adjustment is complete, securely tighten the screw (9).

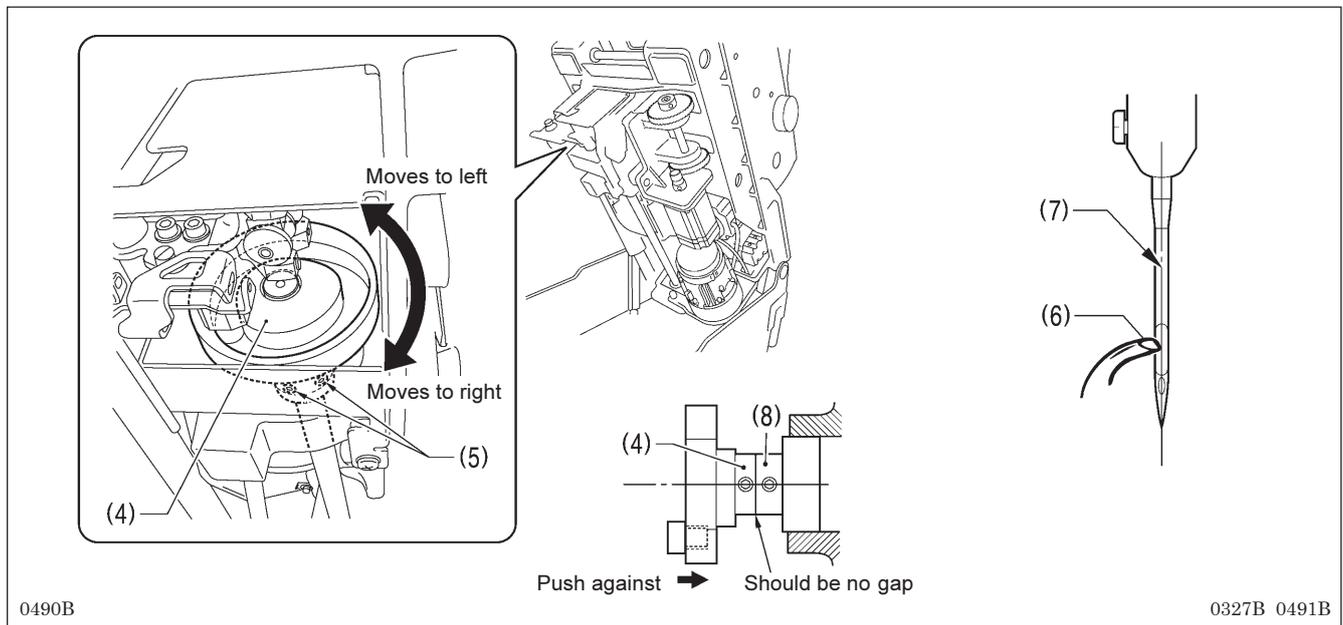
### 9-5. Adjusting the looper stroke

The standard looper stroke is 2.7 mm. (It may be preferable to change this depending on the material and thread.)

\* Carry out the adjustment in "9-4. Adjusting the needle and looper timing" before making this adjustment.



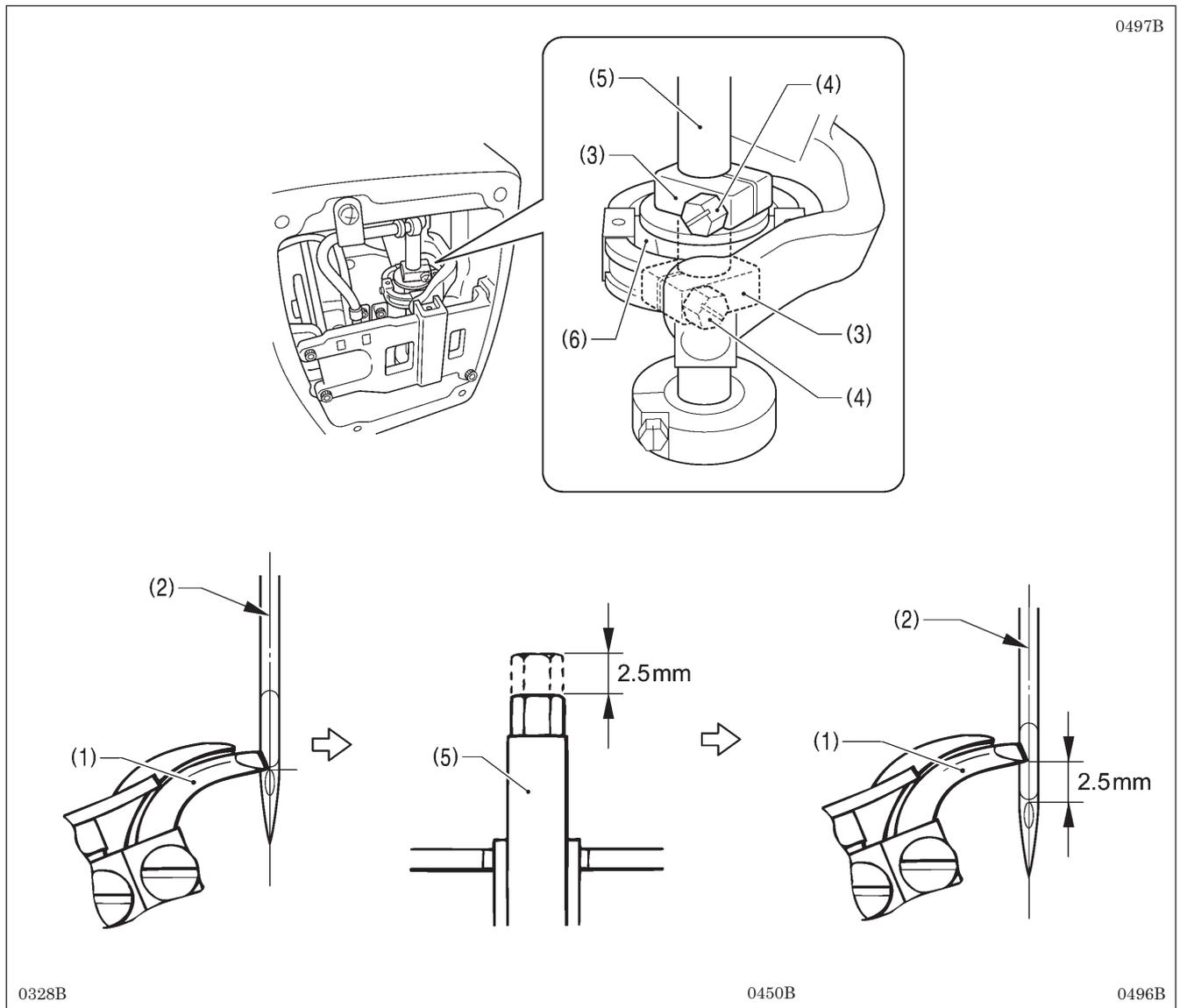
1. Turn the upper shaft pulley (1) to set the needle bar to the needle drop position at the inside sewing position.
2. At this position, use calipers to measure the length from the edge of the needle bar (2) to the top of the needle bar bush holder base (3).
3. Add 2.7 mm to the value obtained in step 2 above, and set the width of the calipers to the resulting value.
4. Turn the upper shaft pulley (1) until the edge of the needle bar (2) touches the edge of the calipers, and stop turning the upper shaft pulley (1) at that point (A).



5. Tilt back the machine head.
6. Loosen the two set screws (5) of the lower shaft cam (4).
7. With the upper shaft pulley (1) stopped, turn the lower shaft cam (4) to adjust so that the tip of the eye looper (6) is aligned with the needle center (7).
8. Once adjustment is complete, push the lower shaft cam (4) against the surface of the bearing collar (8), and then securely tighten the two set screws (5).

## 9-6. Adjusting the height of the needle bar

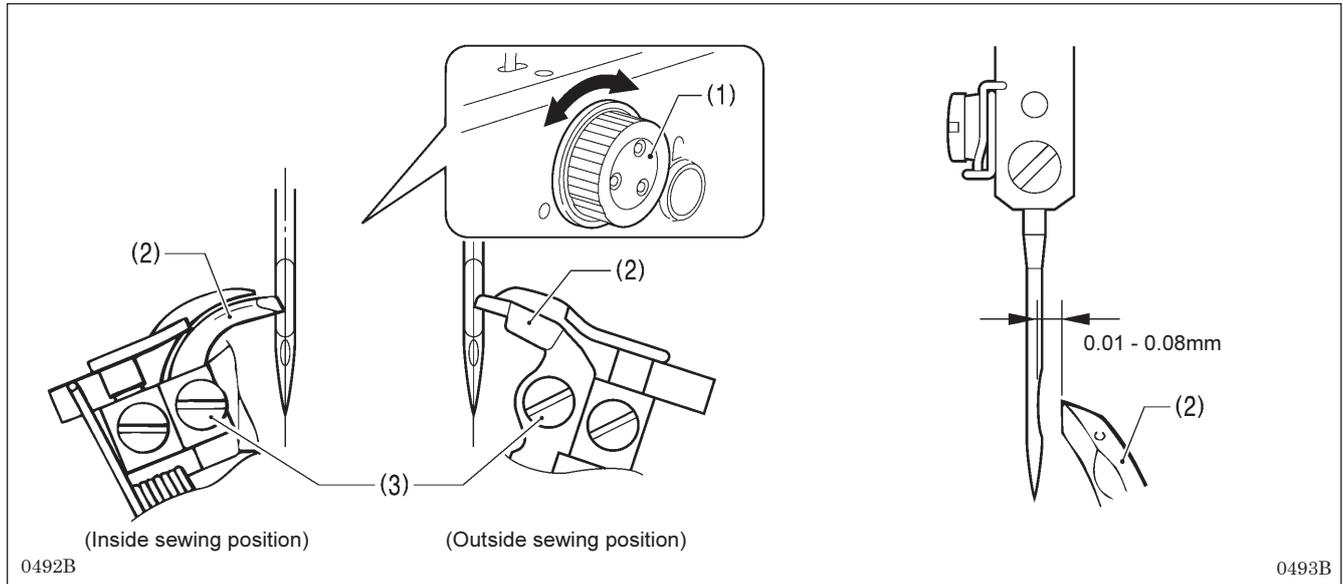
The standard height for the needle bar is 2.5 mm. (It may be preferable to change this depending on the material and thread.)



1. Remove the face plate.
2. Turn the upper shaft pulley until the tip of the eye looper (1) is aligned with the top edge of the needle hole in the needle center (2) when the needle is at the inside sewing position.
3. Loosen the two screws (4) of the top and bottom needle bar clamps (3).
4. Lower the needle bar (5) 2.5 mm from the position where the tip of the eye looper (1) is aligned with the top edge of the needle hole.
5. In order to make the needle bar turn smoothly, adjust so that there is no play in the needle bar, but so that there is enough of a gap between the needle bar clamps (3) and the needle bar feed rock link (6) for oil to get into.
6. Once adjustment is complete, securely tighten the two screws (4) and install the face plate.

### 9-7. Adjusting the clearance between the loopers and needle

If the needle count has been changed, always be sure to check the clearance between the needle and the loopers, and adjust the clearances if necessary. These adjustments should be made for both the inside sewing position and outside sewing position.

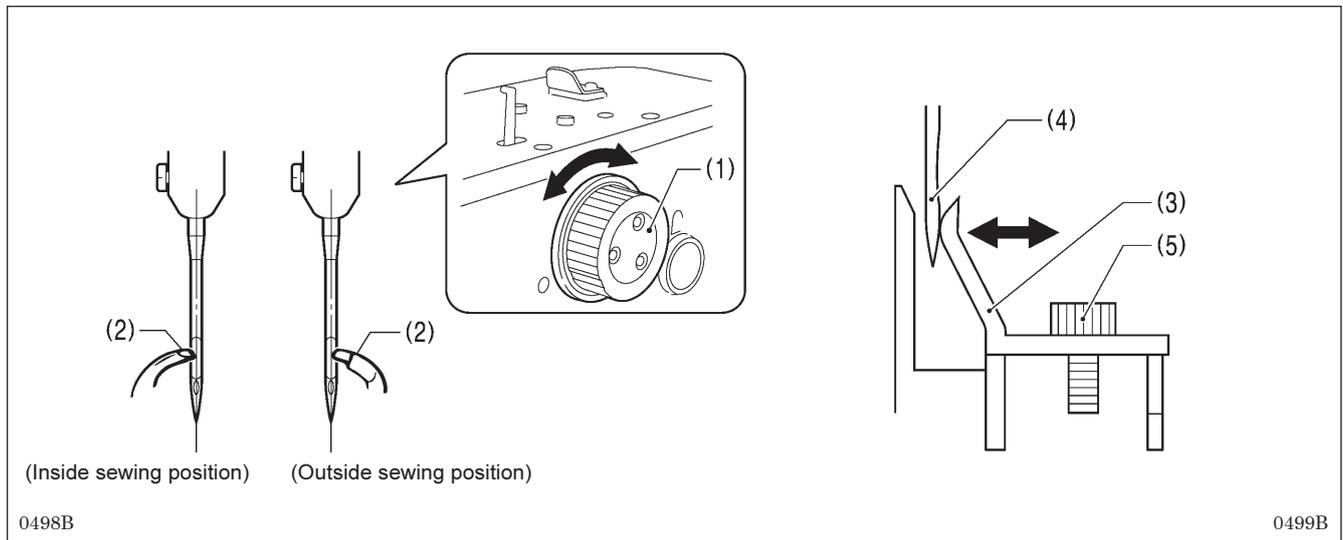


Turn the upper shaft pulley (1) so that the tips of both the left and right loopers (2) are aligned with the needle center, and then loosen the set screws (3) and adjust the clearances between the needle and the tips of the loopers (2) to 0.01 - 0.08 mm.

- \* These clearances must be uniform while the looper base is rotating (through 360 degrees). If they are not uniform, adjust the center of rotation of the needle bar. (The center of rotation is already adjusted at the time of shipment from the factory.)
- \* After making this adjustment, carry out the adjustment procedures given in "9-9. Adjusting the spreader installation positions".

### 9-8. Adjusting the needle guard

If the needle count has been changed, always be sure to check the position of the needle guard, and adjust the position if necessary. This adjustment should be made for both the inside sewing position and outside sewing position.

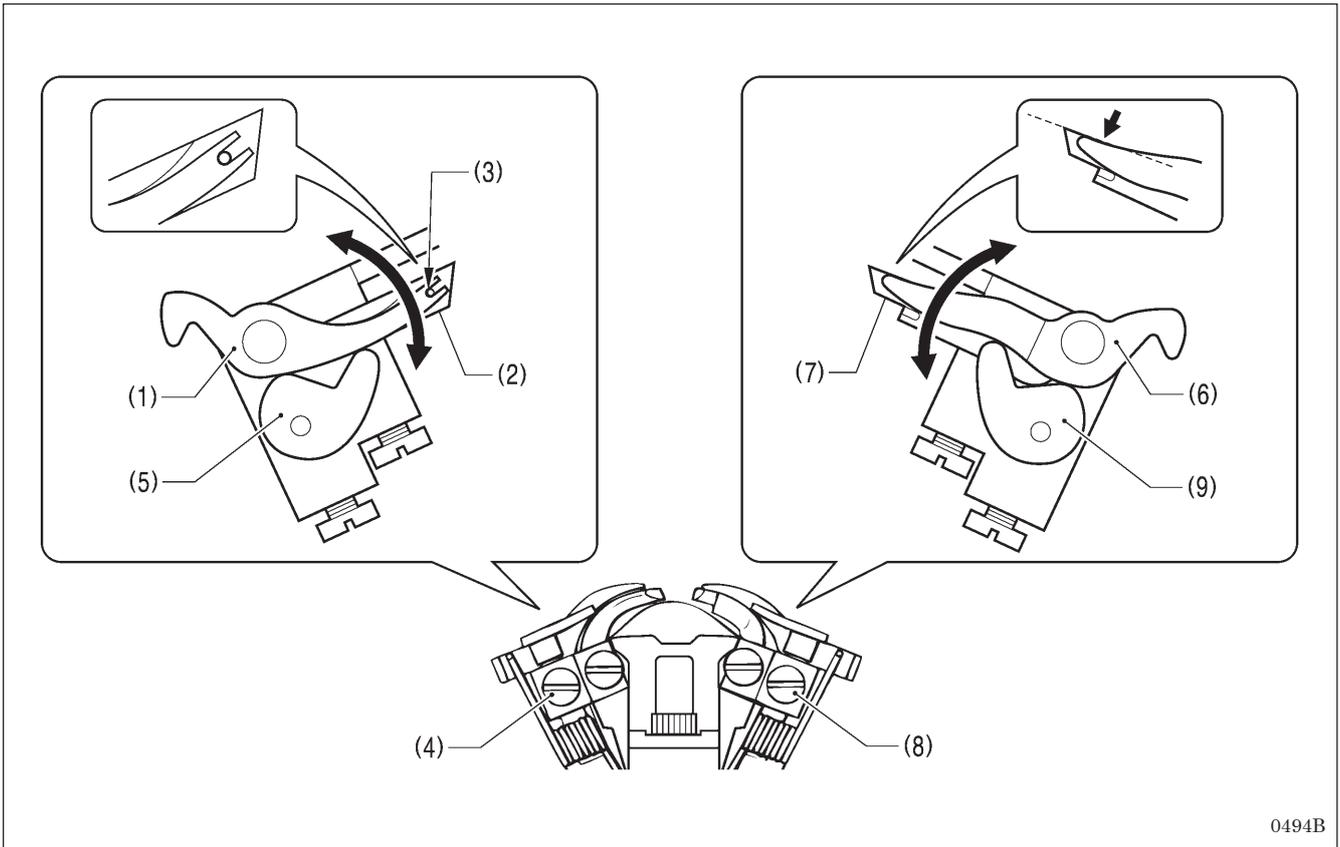


Turn the upper shaft pulley (1) so that the tips of both the left and right loopers (2) are aligned with the needle center, and then loosen the screw (5) and adjust the needle guard (3) so that it touches the needle (4).

**NOTE:**

If it crosses the needle more than necessary, it will place a load on the needle and this may cause the needle to break. Alternatively, if it does not cross the needle at all, the tips of the loopers will interfere with the needle and skipped stitches may occur.

## 9-9. Adjusting the spreader installation positions



0494B

1. Loosen the set screw (4) and adjust spreader stopper L (5) so that the relative positions of the U-shaped part at the tip of spreader L (1) and the lower thread guide hole (3) in the eye looper (2) are as shown in the illustration below.
2. Once adjustment is complete, tighten the set screw (4).
3. Loosen the set screw (8) and adjust the spreader stopper R (9) so that the top edge of the tip of spreader R (6) is aligned with the top edge of the tip of looper R (7).
4. Once adjustment is complete, tighten the set screw (8).

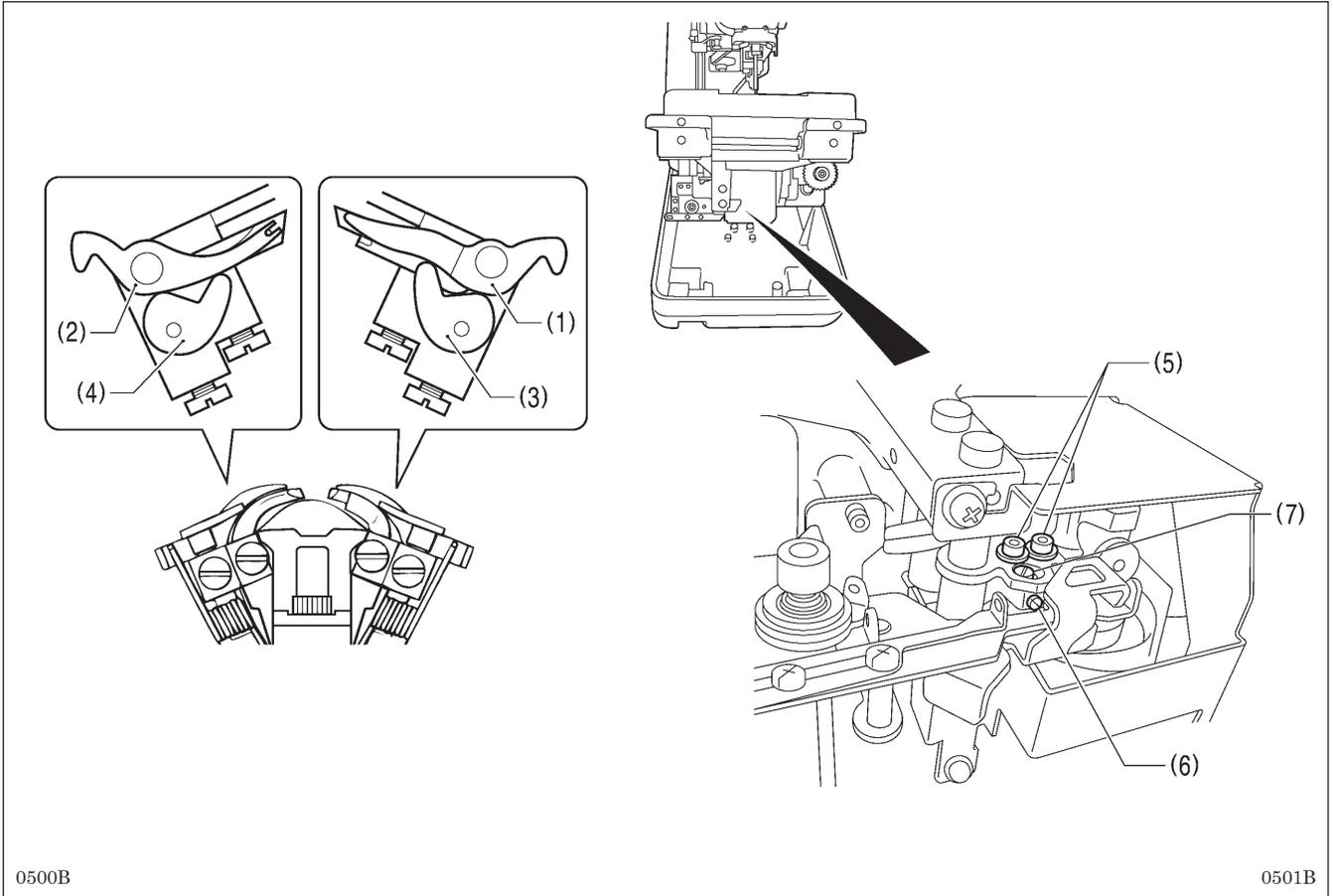
### NOTE:

Spreader L (1) and spreader R (6) should not protrude above the eye looper (2) or looper R (7) respectively. If they do, skipped stitches or needle breakages may occur.

### 9-10. Adjusting the spreader timing

Spreader R (1) (at inside sewing position) and spreader L (at outside sewing position) must touch the spreader stoppers (3) and (4) respectively and stop moving immediately before the needle bar reaches its lowest position.

\* Adjustment can be carried out more easily if it is done in manual mode.

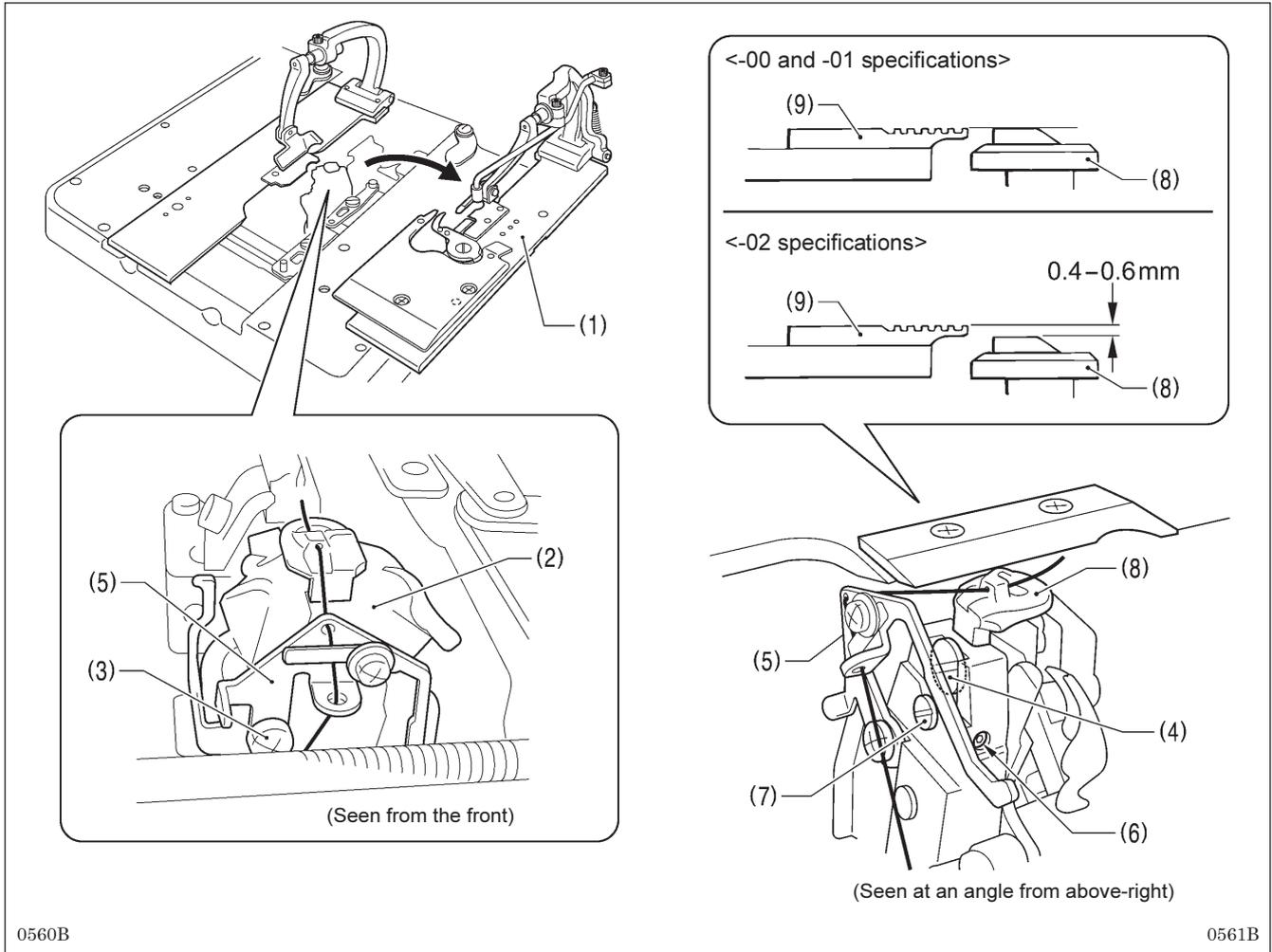


1. Tilt back the machine head.
2. Loosen the two screws (2), and then loose the set screw (6).
3. Turn the eccentric pin (7) to adjust.
4. After adjusting, tighten the set screw (6) and the two screws (5) in that order.

**NOTE:**

Make sure that spreader R (1) and spreader L (2) do not obstruct the needle after adjustment.

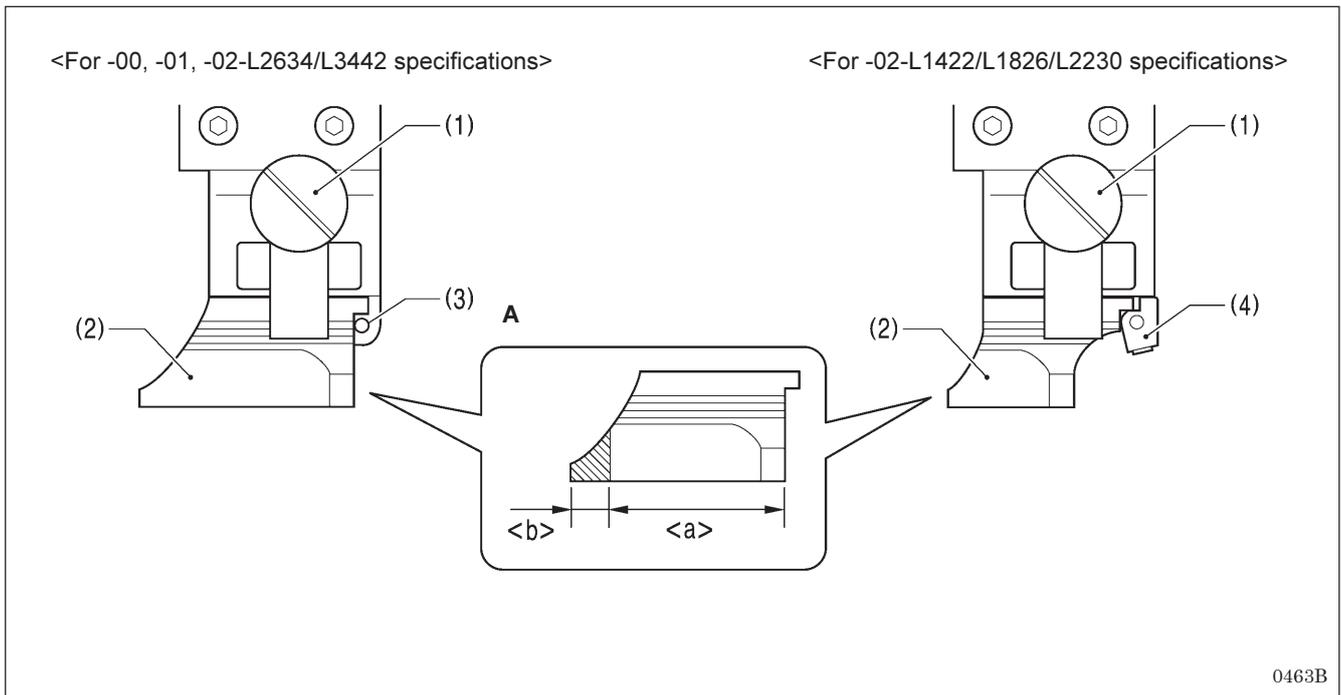
## 9-11. Adjusting the height of the throat plate



1. Remove the right-side work clamp plate (1).
  2. Turn the looper base (2) so that it faces as shown in the illustration.
  3. Loosen the screw (3), and then move gimp thread guide C (5) to a position where it will not obstruct turning of the screw (4).
  4. Loosen the screw (4) by about 10 turns.
  5. Loosen the set screw (6).
  6. Move the vertical pin (7) to adjust the height of the throat plate (8) as follows.
    - <For -00 and -01 specifications>  
Adjust so that the top of the throat plate (8) and the top of the needle plate (9) are at the same height.
    - <For -02 specifications>  
Adjust so that the top of the throat plate (8) is 0.4 - 0.6 mm lower than the top of the needle plate (9).
- NOTE:**
- If the position of the throat plate (8) is too high, it may obstruct the movable knife and damage it.
  - Press down gently on the throat plate (8) from above while adjusting it. If the adjustment is carried out while the throat plate (8) is lifted up, the correct adjustment result will not be obtained.
7. Once adjustment is complete, tighten the screws that were loosened and return all other parts to their original positions.

## 9-12. Changing the cutting length (Replacing the hammer)

The cutting length is determined by the length of the hammer. File or replace the hammer in order to change the cutting length.

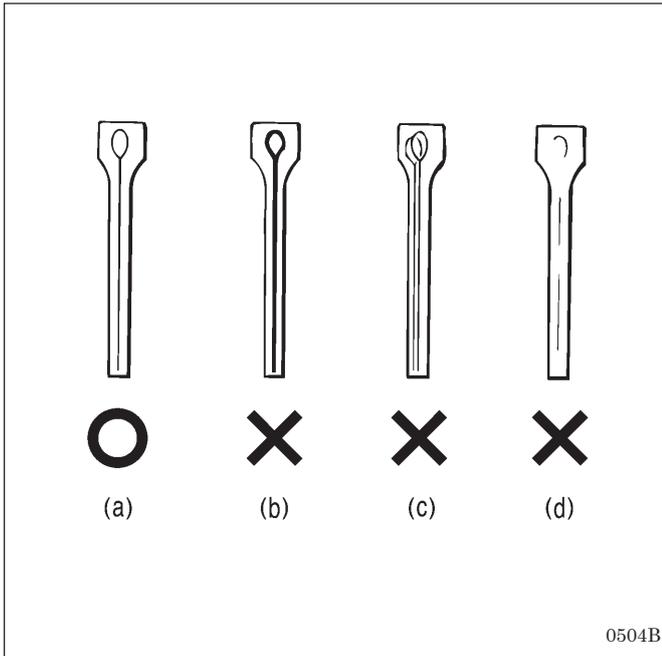


1. Loosen the knob screw (1), and then remove the hammer (2).
2. **[If grinding the hammer (Refer to Figure A)]**  
Use a grinder to grind section  $\langle b \rangle$  of the hammer so that cutting length + 1.5 mm =  $\langle a \rangle$ .
3. **[If installing a new hammer]**  
Push the hammer against the positioning pin (3) (or the hammer spacer (4)), and then tighten the knob screw (1).

**NOTE:**

If the knife that was being used previously is replaced by a knife with a different number, replace the hammer also. If the same hammer is used for two or more different types of knife, different knife incisions will be formed on the hammer, and this may cause problems with the accurate cutting of the material or may damage the knife.

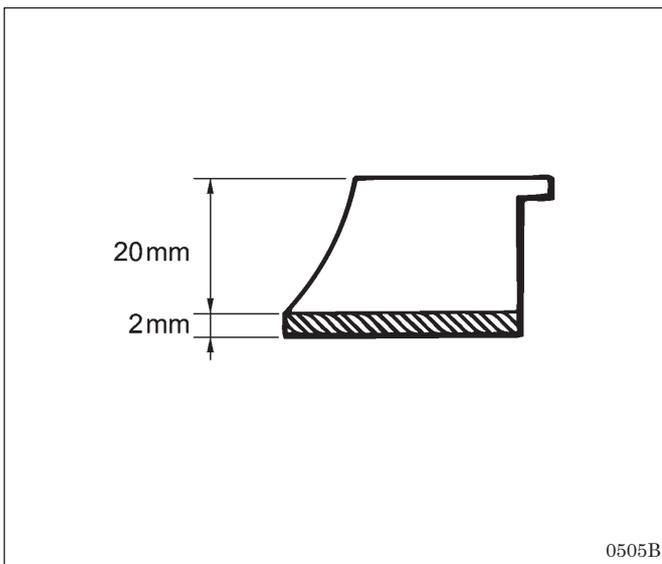
## 9-13. Adjusting the cutting surface of the hammer



### <Adjustment procedure>

1. Remove the hammer. (Refer to the previous page for instructions on removing the hammer.)
2. Check the cutting surface of the hammer. Refer to the illustration at left, and if the cutting surface looks like (b) - (d), file the cutting surface so that the knife incision is made evenly on the cutting surface.
  - (a) Knife incision is correct
  - (b) Knife incision is too deep
  - (c) A different knife was used which produced an overlapping knife incision
  - (d) Partial knife incision which is not being made completely
3. If the material cannot be cut cleanly even though the hammer has been ground correctly, also check whether the tip of the knife is worn.
  - \* If the tip is worn, replace the knife.
  - \* Do not use the old hammer after the knife has been replaced. If the same hammer is used, it may damage the tip of the knife.

### 9-13-1. Filing the cutting surface of the hammer



The cutting pressure over the whole of the hammer should be uniform so that the material will be cut cleanly. File the cutting surface of the hammer so that the knife incision will be uniform over the whole of the hammer.

- \* The hammer can be filed until a height of 20 mm remains.
- \* Use a flat file for filing the hammer.

#### Filing the cutting surface of the hammer on which the knife incision is overlapping or has shifted

1. Grip the hammer in a vise.
2. Use the flat file to file the cutting surface of the hammer until the knife incision disappears.

#### Filing the cutting surface of the hammer in which knife incision is deep

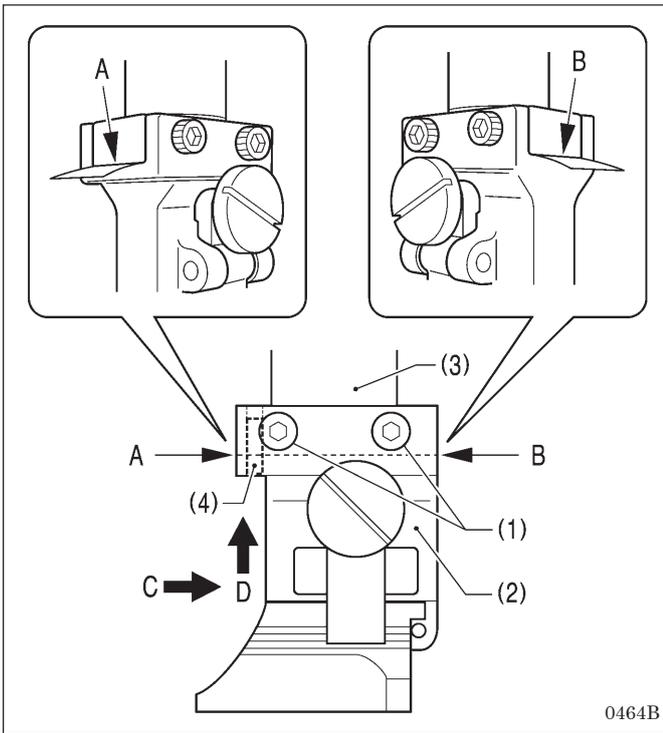
1. Grip the hammer in a vise.
2. Use the flat file to file the cutting surface of the hammer smoothly until a single knife incision can still be seen faintly.

- \* Once filing is complete, install the hammer.

### 9-13-2. Adjusting the contact between the knife and the hammer

The knife incision can be seen more clearly if the cutting surface of the hammer is filled over with a marker pen or similar.

1. Operate the hammer three times with the knife making a mark on it each time.
2. If the knife incision is not uniform, file the hammer. (Refer to the previous page for details on filing the hammer.)
3. Repeat steps 1 and 2 until the knife incisions are uniform.

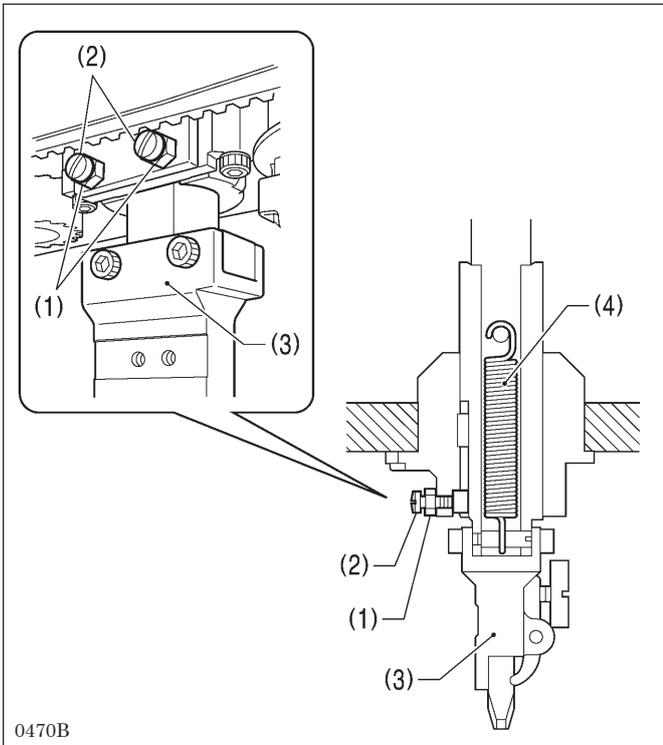


#### <Contact adjustment method using thin paper>

The following method can also be used to adjust the contact.

1. Loosen the four screws (1).
2. Insert some thin paper into either of the gaps A or B between the hammer bracket (2) and the cutter driving shaft (3).
3. Tighten the four screws (1).
  - \* Push the hammer bracket (2) in the direction of arrow C and firmly upward in the direction of D shown in the illustration so that there is no gap between the hammer bracket (2) and the cutter driving shaft (3), and then tighten the screws. (This operation will position the hammer bracket (2)) accurately by pushing the pin (4) of the hammer bracket (2) against the hole side of the cutter driving shaft (3).)

### 9-14. Adjusting the axial play of the hammer

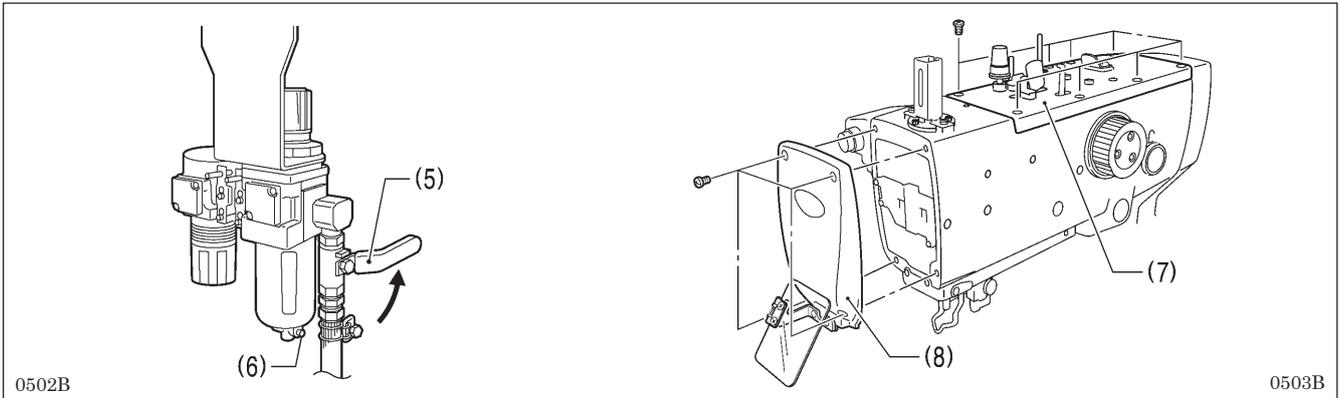


If there is too much axial play in the hammer, carry out the following adjustment.

1. Loosen the two nuts (1).
2. Tighten the two screws (2) slightly to adjust while checking the amount of play.
3. When the hammer bracket (3) is pushed downward by hand, check that the built-in extension spring (4) causes it to return correctly.
  - \* If the hammer bracket (3) does not return correctly, it may obstruct the work clamps and damage may result.
4. Once adjustment is complete, tighten the two nuts (1).

### 9-15. Making the cutter driving shaft and driving shaft presser move together

The cutter driving shaft (2) and driving shaft presser (3) are linked by an extension spring (4) so that the hammer bracket (1) can be positioned by being pushed down by hand when aligning the needle with an eyelet buttonhole that has already been made in the material in order to resume sewing. If this extension spring (4) has been damaged, or if the return speed of the cutter is too slow, the cutter driving shaft (2) and the driving shaft presser (3) can be made to move together as a single unit.

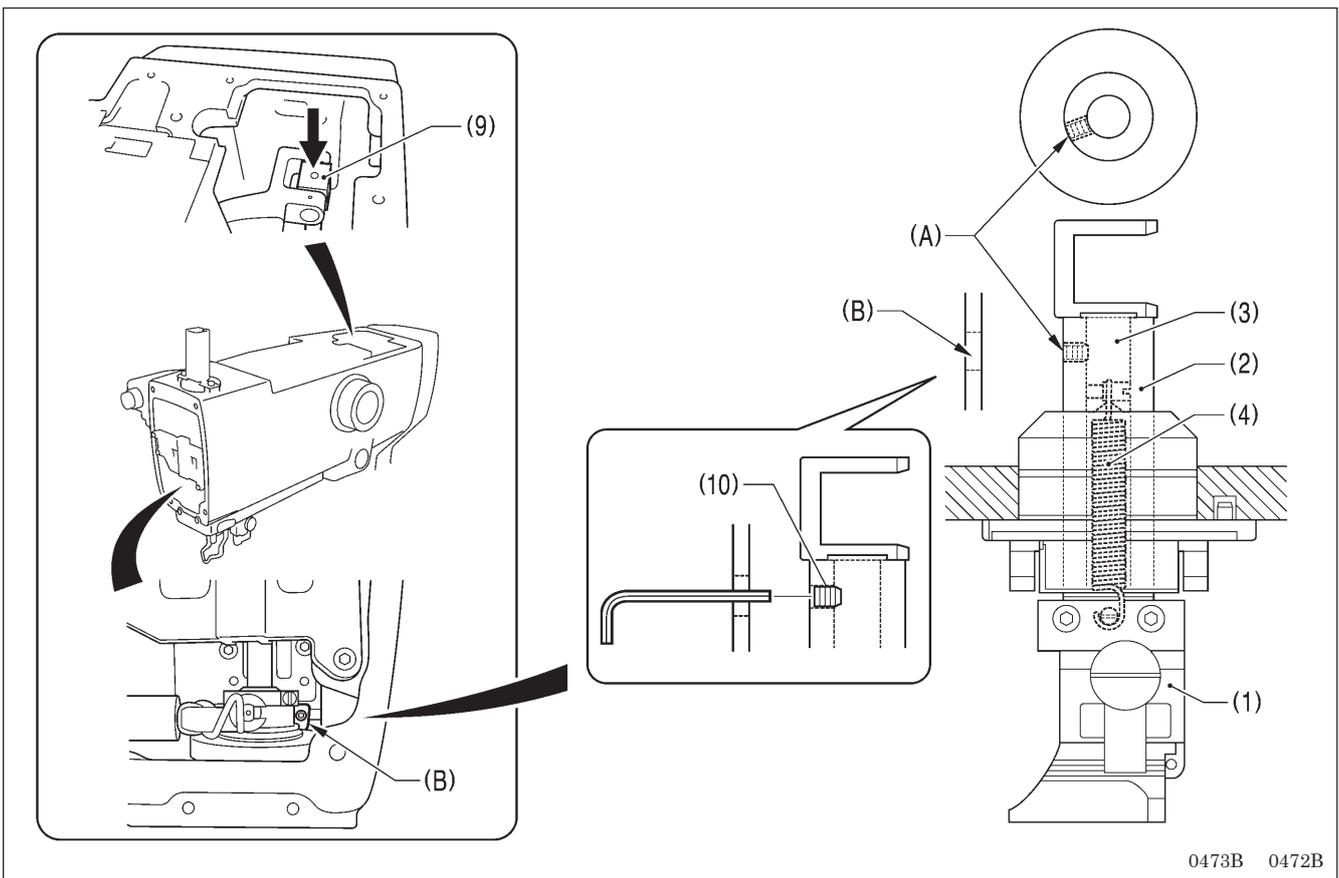


1. Turn the cock (5) in the direction of the arrow to close it and stop the supply of air.
2. Press the button (6) to release the air.

**NOTE:**

When the air is released, the hammer may lower by its own weight.

3. Remove the upper cover (7) and the face plate (8).



4. Lower the cylinder rod (9) to align the screw (A) of the cutter driving shaft (2) with (B) inside the face plate.
5. Use a commercially-available set screw (6) (M6 with a length of 6mm or less) to secure (A) and (B) together.  
\* Tighten the set screw (10) securely. If the set screw (10) is loose and protrudes from the surface of the cutter driving shaft (2), damage may result.
6. Install the face plate (8) and the upper cover (7), and then open the cock (5) to resume the supply of air.

## 9-16. Replacing the knife and adjusting its position

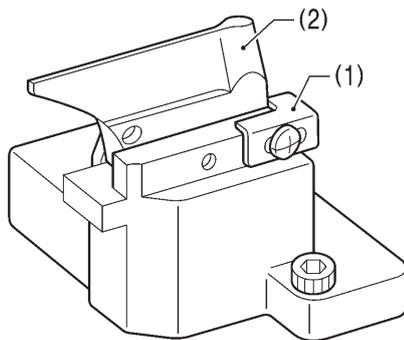
### 9-16-1. Replacing the knife

#### CAUTION

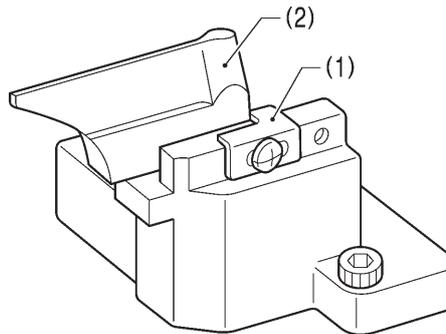


Do not operate the sewing machine while a knife and hammer with numbers that are different from those which have been set in programs.

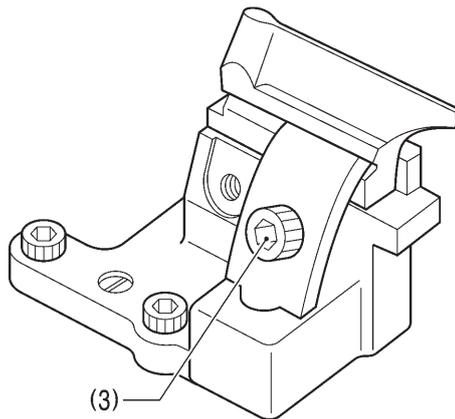
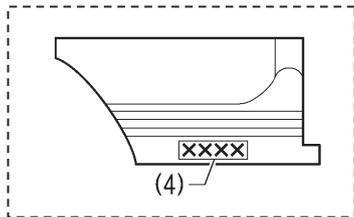
If this is not observed, damage to sewing machine parts or the needle or serious injury may occur.



<For -00, -01, -02-L2634/L3442 specifications>



<For -02-L1422/L1826/L2230 specifications>



0467B

0466B

0468B

1. Check that there is no gap between the block stopper plate (1) and the knife (2), and then loosen the socket bolt (3) and remove the knife (2).
2. Place the new knife to be installed against the block stopper plate (1), and then tighten the socket bolt (3).

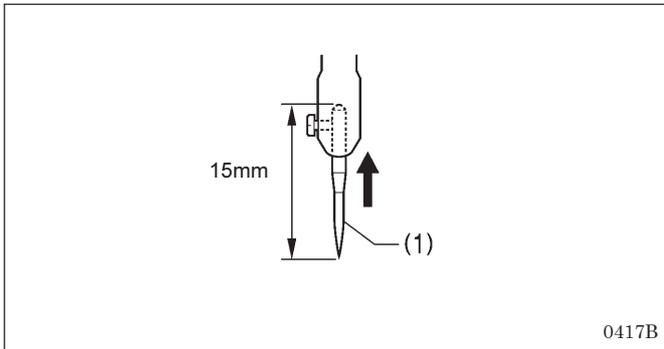
#### NOTE:

- When replacing the knife, use the parameter settings to change the eyelet pattern to the pattern that corresponds to the knife number (4) that is given on one side of the knife. (Refer to "5-3. Program setting method".)
- Replace the knife and hammer as a set. If the same hammer is used for two or more different types of knife, different knife incisions will be formed on the hammer, and this may cause problems with the accurate cutting of the material or may damage the knife.

### 9-16-2. Making fine adjustments to the knife position

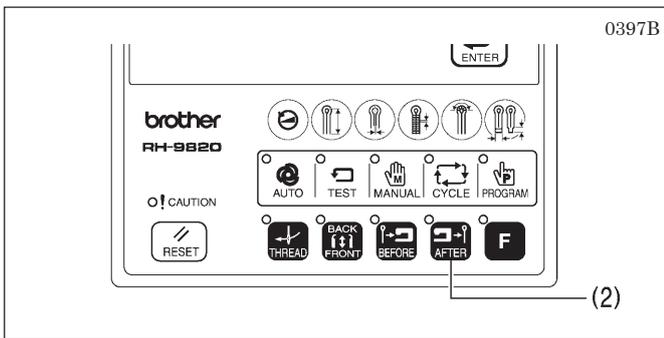
Adjust the knife position so that it cuts the material cleanly at the inside sewing position and around the eyelet.

- \* Before carrying out this adjustment, check that the procedure in “9-3. Adjusting the zigzag base line position” has been completed correctly.
- \* The knife position can be adjusted independently in the forward/back direction and tilt direction.

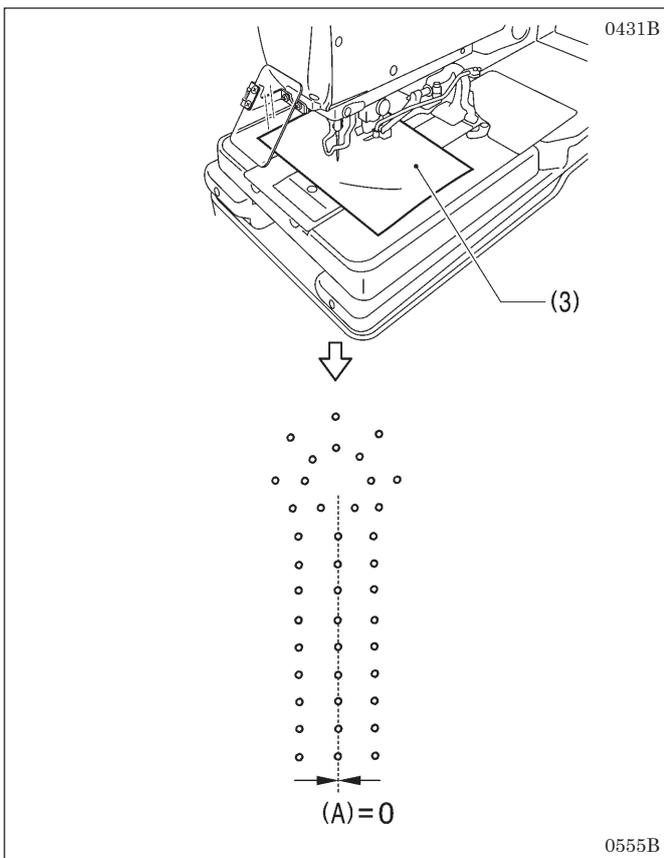


#### <Adjustment procedure>

1. Install the short customized needle (1). (Refer to “9-3. Adjusting the zigzag base line position” for details on the short customized needle (1).)
2. Set the air pressure at the hammer pressure adjustment regulator on the underside of the table to about 0.2 MPa. (Refer to “9-17. Adjusting the cutting pressure”.)
  - \* This is so that the knife will not make several overlapping incisions in the hammer and so that the paper for checking the needle drop does not become pierced while adjusting the knife position.



3. Press the AFTER key (2) on the operation panel to set the cutting method to “cutting after sewing”.

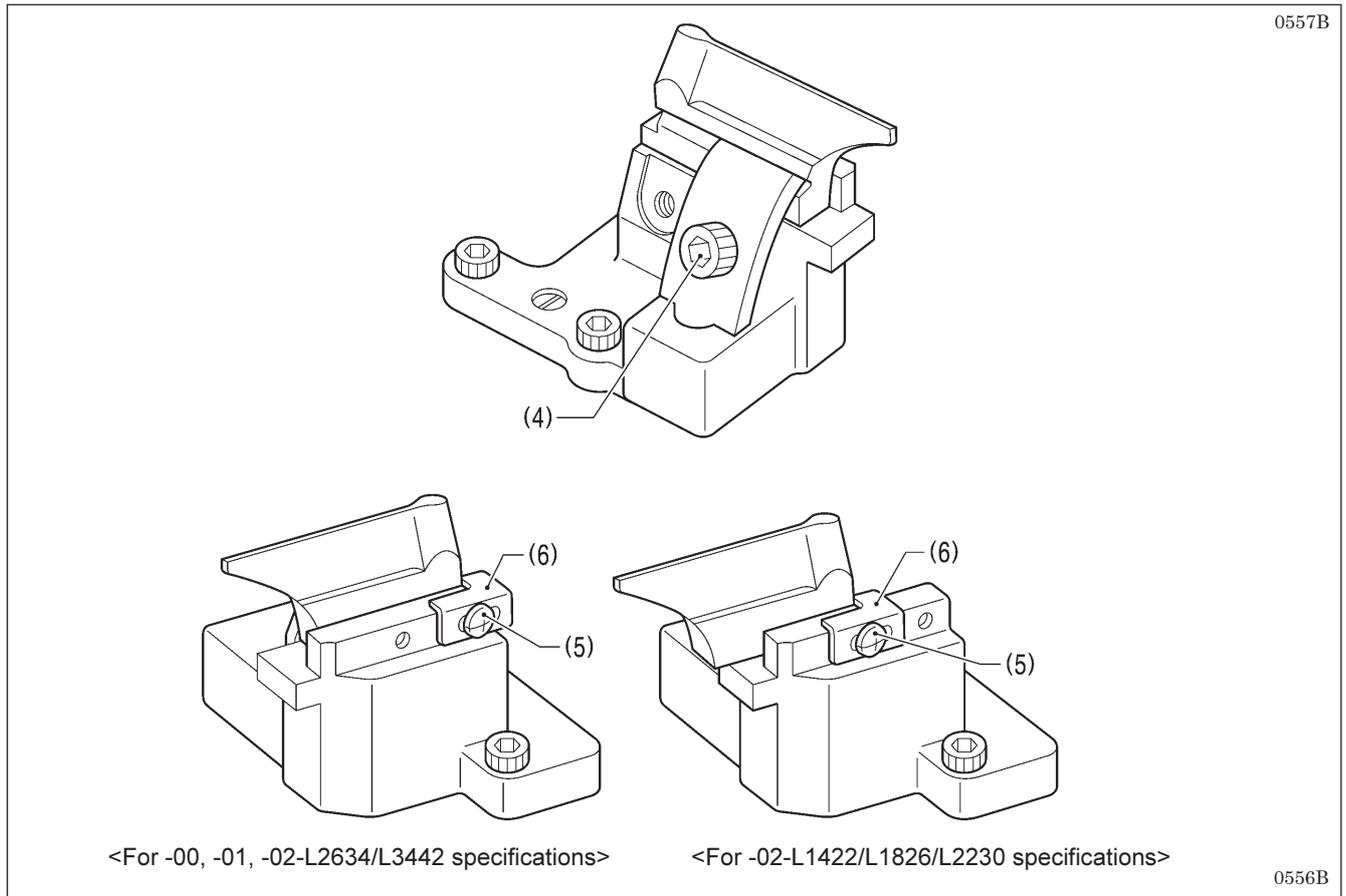


4. Place a piece of paper (3) underneath the work clamps.
5. Start the sewing machine and trace the needle drop position around the eyelet hole.
6. Check that the needle drop positions around the eyelet hole and the knife cutting position overlap uniformly.
  - \* Checking will be easier if the cutting position value (A) in the parameter settings is set to “0”. (Refer to “5-3. Program setting method”.)
7. If they do not overlap uniformly, turn off the power and carry out the adjustment in steps 8 - 13.
  - \* Once adjustment is complete, repeat steps 4 - 6 to check, and if further adjustment is needed, repeat step 7.

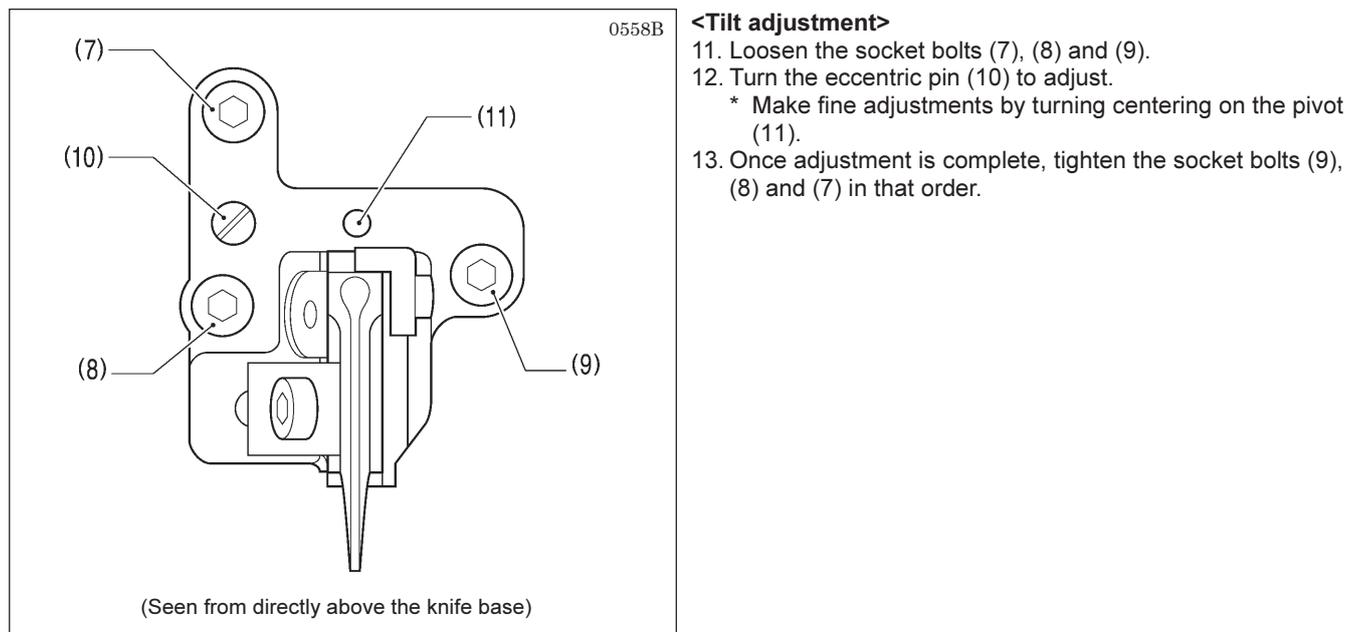
(Continued on next page)

## 9. STANDARD ADJUSTMENTS

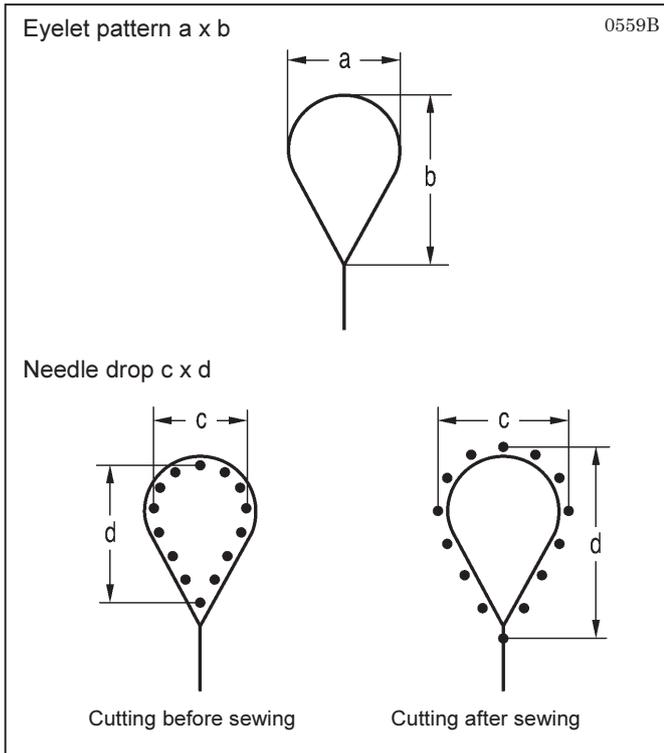
### <Forward/back position adjustment>



8. Loosen the socket bolt (4) and the screw (5), and move the knife position forward or back to adjust.
  9. Once the knife position has been determined, securely tighten the socket bolt (4).
  10. Push the block stopper plate (6) against the knife, and then tighten the screw (5).
- \* The block stopper plate (6) is a guide for showing the current position of the knife, so be sure to move the block stopper plate (6) so that it is touching against the knife.



**NOTE: Relationship between needle drop position and eyelet pattern at the eyelet**

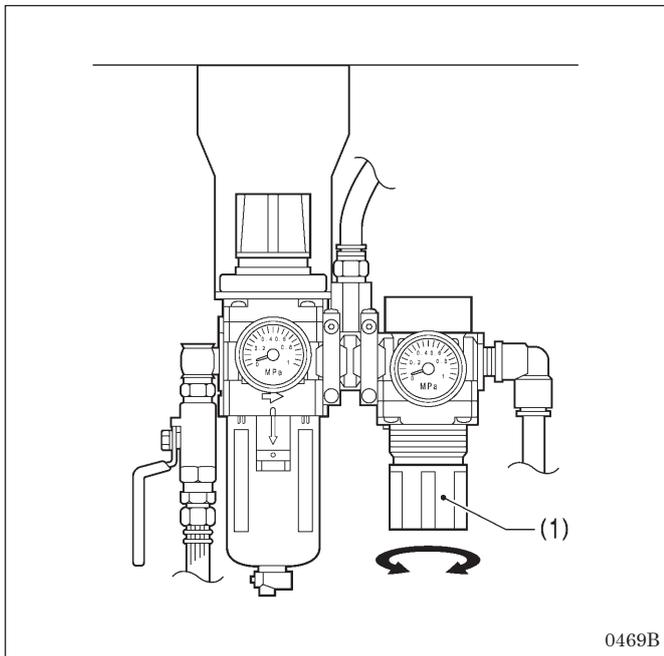


When switching between cutting before sewing and cutting after sewing, the needle drop position at the inside sewing position will change automatically in accordance with the eyelet pattern as shown in the illustration.

Knife No.	Eyelet pattern a x b	Needle drop c x d	
		Cutting before sewing	Cutting after sewing
1	2.1 x 3.2	1.7 x 2.7	2.5 x 3.8
2	2.8 x 4.3	2.4 x 3.9	3.2 x 4.9
3	3.0 x 4.6	2.6 x 4.1	3.4 x 5.2
4	3.2 x 5.4	2.8 x 4.9	3.6 x 6.0
5	Straight	Straight	Straight
6	3.8 x 4.3	3.4 x 3.8	4.2 x 4.9

\* The default setting for the needle drop position for no cutting is the same as for cutting before sewing. You can also change the needle drop position setting to the same position as for cutting after sewing by changing parameter settings. (Refer to No. 33 in "5-3-1. Parameter list".)

**9-17. Adjusting the cutting pressure**



Set the cutting pressure to the minimum pressure that still allows the material to be cut.

\* Set to between 0.1 - 0.6 MPa. (It is set to 0.4 MPa at the time of shipment from the factory.)

**<Adjustment method>**

Turn the knob (1) of the hammer pressure adjustment regulator on the underside of the table to adjust the air pressure.

**NOTE:**

- Do not increase the cutting pressure more than necessary. If the pressure is too high, it will wear out the hammer and damage the knife.
- If the material cannot be cut cleanly, do not increase the cutting pressure to too high a pressure. Check the timing between the knife and the hammer. (Refer to "9-13-2. Adjusting the contact between the knife and the hammer".)

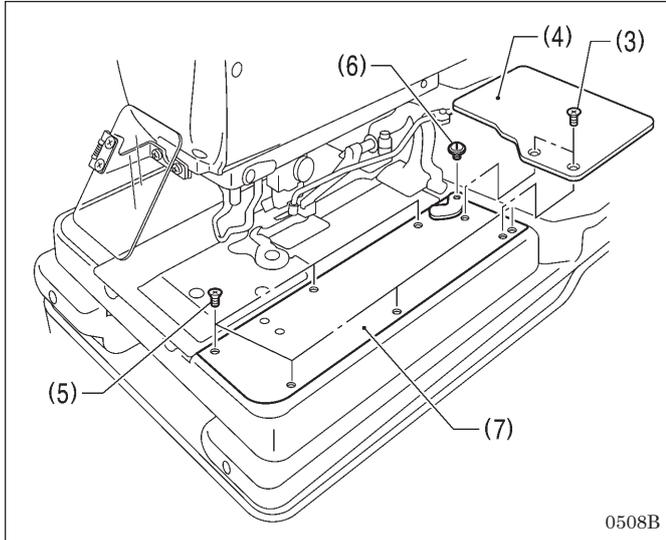
## 9-18. Adjusting the work clamp lift amounts

Adjust the work clamp lift amount <a> to one of the values given below.

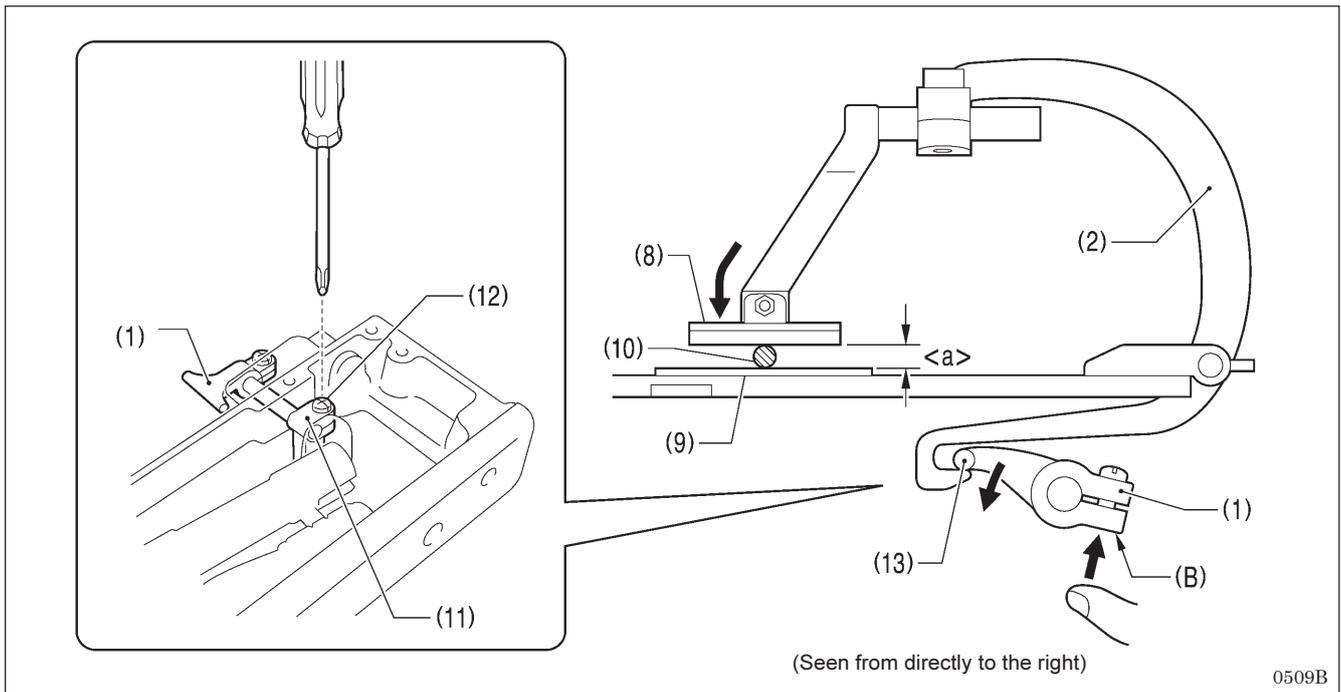
<For -00, -01 specifications>: 12 mm

<For -02 specifications>: 16 mm

- \* The work clamp lift amount <a> is the value which includes the play in crank lever B (1) and the clamp lever (2).
- \* Carry out adjustment for both the left and right work clamps. (The following describes how to adjust the lift amount for the right-side work clamp.)



1. Remove the two screws (3), and then remove feed base cover U (4).
2. Remove the six screws (5) and the shoulder screw (6), and then remove feed base cover R (7) at the right side.



3. Insert a block with a thickness of 12 mm or 16 mm or a gauge (10) in between the support point of work clamp R (8) and the needle plate (9).
4. Loosen the screw (12) of the clamp driving lever (11).
5. Push section (B) of crank lever B (1) upward so that the tip (13) is pressed against the end of clamp lever R (2) as shown in the illustration.
6. While holding the parts in the position in step 5, tighten the screw (12).

**NOTE:**

Check that work clamp R (8) is pressed securely against the block or the gauge (10).

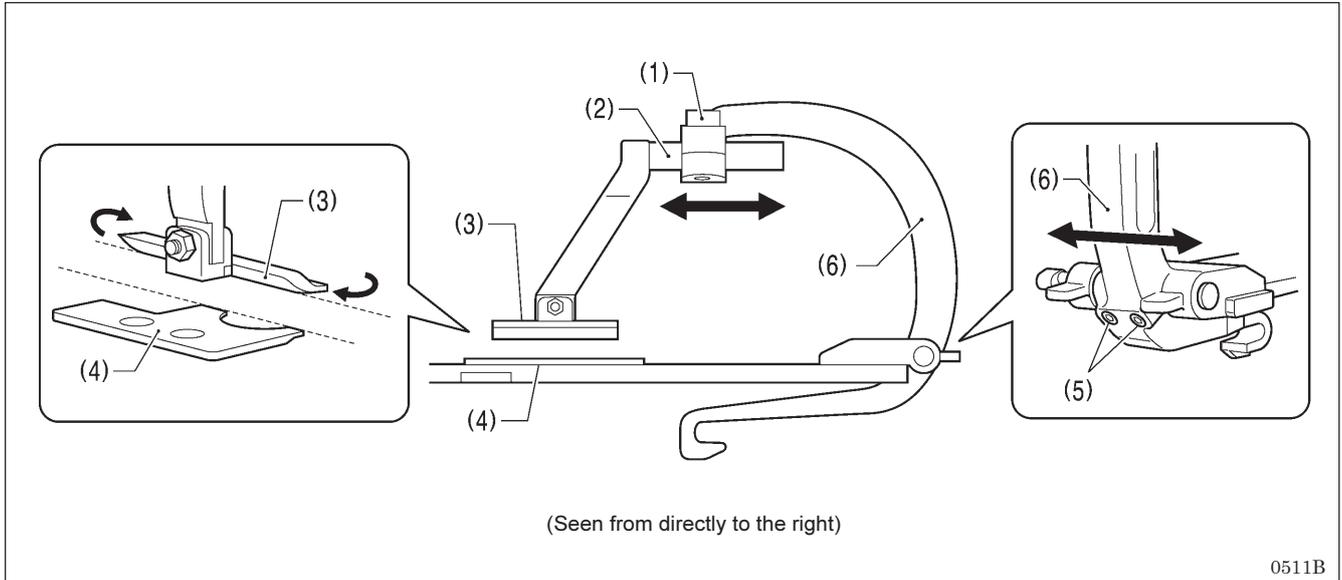
7. Install feed base cover R (7) and feed base cover U (4).

- \* Adjust the lift amount for the left-side work clamp in the same way.

## 9-19. Adjusting the work clamp positions

The positions of the work clamps relative to the needle plate can be adjusted forward, back and sideways.

\* Adjust the left and right work clamps so that they are both positioned at an equal distance from the needle drop position.  
(The following describes how to adjust the position of the right-side work clamp.)



### <Forward/back adjustment>

1. Loosen the socket bolt (1), and then move the position of the clamp arm (2) forward or back to adjust.
2. Next, adjust so that the side of work clamp R (3) is parallel to the side of the needle plate (4).
3. Once adjustment is complete, tighten the socket bolt (1).

### <Sideways adjustment>

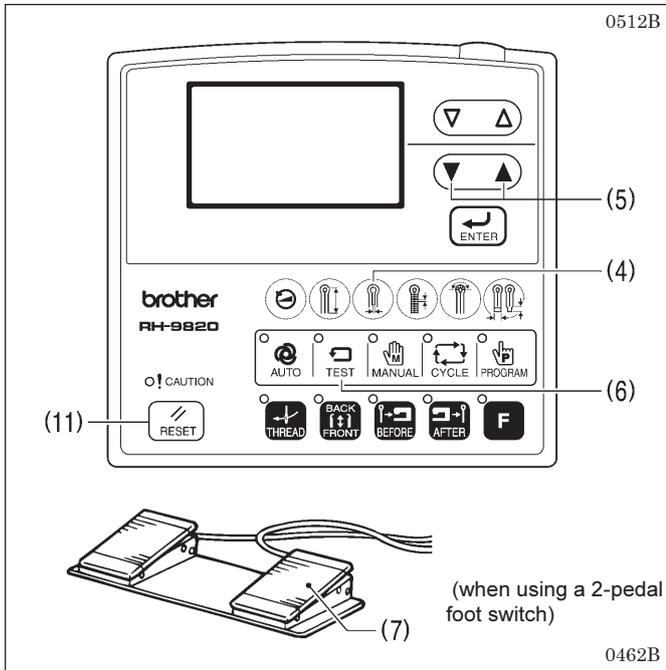
1. Loosen the two set screws (5), and then adjust the sideways position of the clamp lever (6).
2. Once adjustment is complete, tighten the two set screws (5).

\* Adjust the position for the left-side work clamp in the same way.

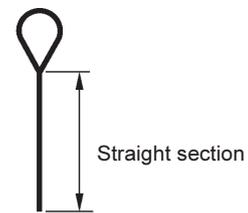
## 9-20. Adjusting the positions of the work clamp plates

Adjust the positions of the work clamp plates (3) so that the throat plate (1) and needle plates (2) do not touch during sewing. The standard adjustment is when there is a gap of 0.8 mm between the throat plate (1) and the needle plates (2) (when the cutting space is set to "0").

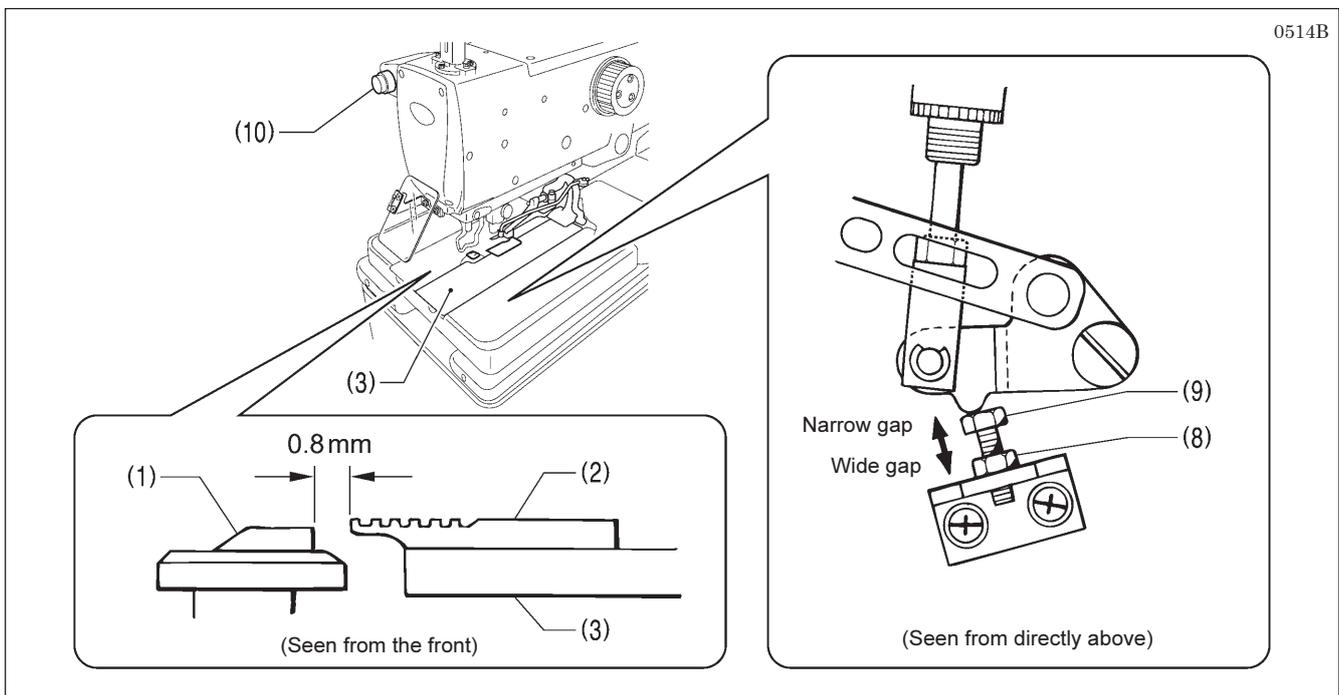
- \* Carry out adjustment for both the left and right work clamps. (The adjustment method described below is for the position of the right-side work clamp plate (3).)
- \* Carry out adjustment with the work clamp plates (3) installed.



1. Use the parameter settings to set the cutting space to "0". (Refer to "5-3. Program setting method".)  
\* If you press shortcut key 3 (4), you can then change the value simply by pressing the ▲/▼ keys (5)
2. Press the TEST key (6) to turn on test mode, and then start test operation. (Refer to "5-4. Checking the sewing pattern in test mode".)
3. Press and hold the start switch (7) until the feed base moves to the position where the straight section of the sewing shape is sewn, and then release the start switch (7).



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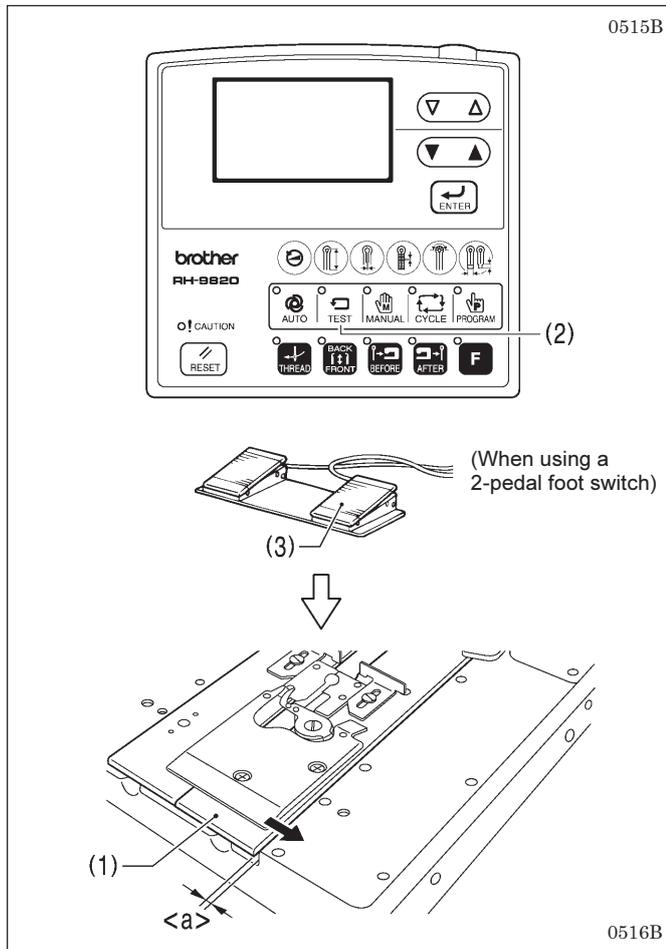


4. Check that there is a gap of 0.8 mm between the throat plate (1) and needle plate R (2).
5. If there is not a gap of 0.8 mm, loosen the nut (8), and then turn the bolt (9) to adjust.
6. Once adjustment is complete, tighten the nut (8).
7. Press the STOP switch (10), and then press the RESET key (11) to end test mode.
- \* Adjust the gap between the throat plate (1) and needle plate L in the same way.

## 9-21. Adjusting the cloth opening amounts

Adjust so that the opening amounts for the left and right work clamp plates (1) are equal.

\* The cloth opening amounts should always be 0.8 mm or more on each side.

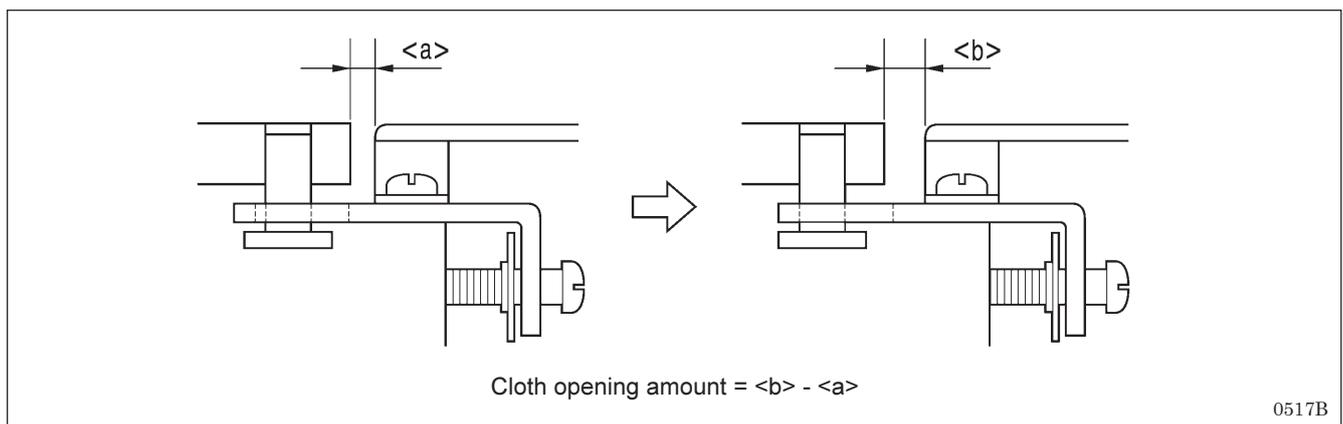


### <Opening amount measurement method>

1. Press the TEST key (2) to turn on test mode, and then start test operation. (Refer to "5-4. Checking the sewing pattern in test mode".)

2. Depress the start switch (3).

\* Check that the feed base moves and that the work clamp plates (1) at left and right both open. This opening amount is <a>.



3. Use calipers to measure <a> (at both left and right).

4. Turn off the power for the sewing machine.

\* The gap <a> will become wider. This opening amount is <b>.

5. Lower the work clamps, and then use calipers to measure <b> (at both left and right).

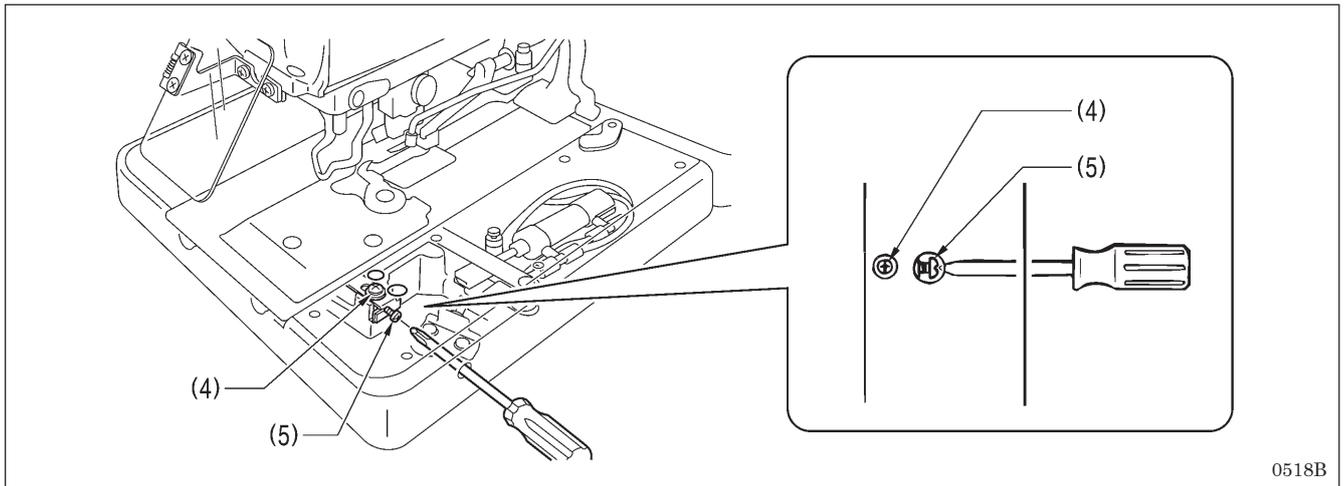
(Cloth opening amount = <b> - <a>)

6. Calculate the cloth opening amounts for both sides.

7. Carry out adjustment if the two cloth opening amounts are not the same, or if the cloth opening amount at either side is lower than 0.8 mm. (Refer to following page.)

## 9. STANDARD ADJUSTMENTS

### <Cloth opening amount adjustment>



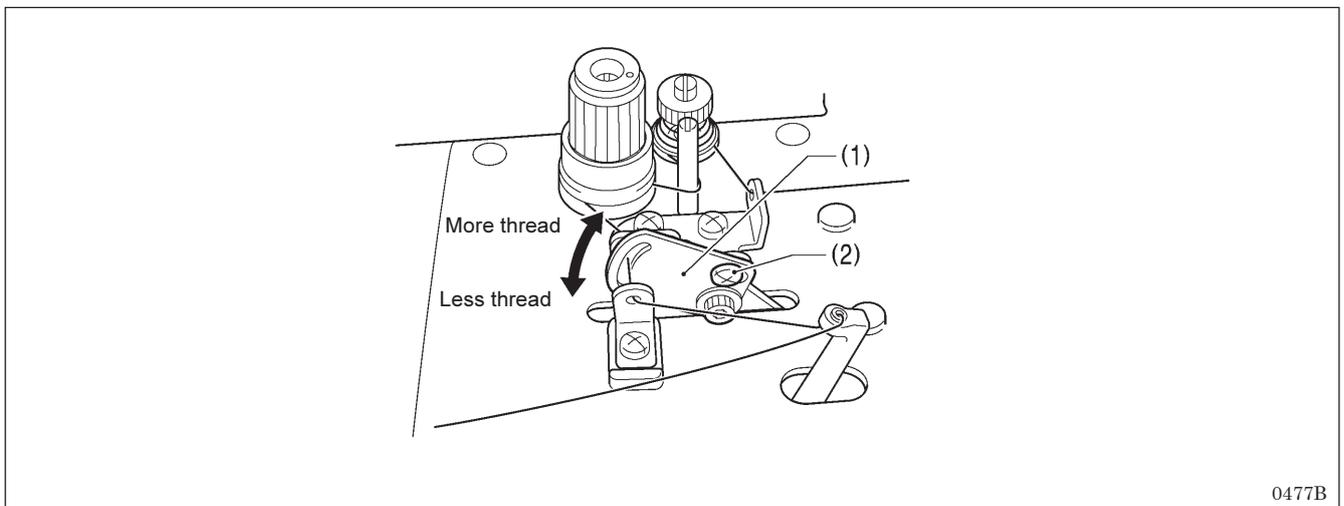
8. Loosen the screw (4).
9. Insert a screwdriver into the notch in the side of the feed base, and turn the adjustment screw (5) to adjust.
10. After tightening the screw (4), measure the opening amounts once more.
11. Repeat steps 2 - 10 until the left and right cloth opening amounts are equal to each other.

### 9-22. Adjusting the upper thread feeding amount

It is necessary for enough of an upper thread feeding amount to be maintained so that the amount of upper thread is sufficient for stitches to be formed accurately at the sewing start.

#### NOTE:

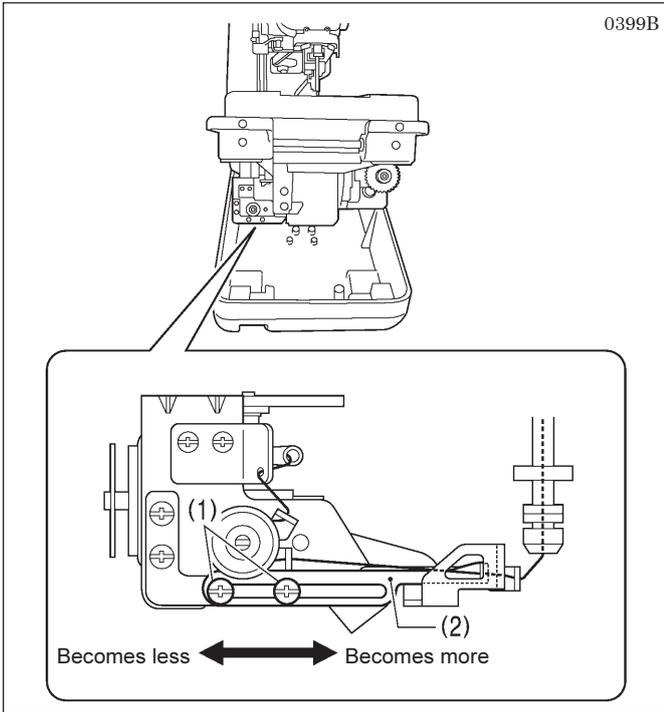
The thread take-up lever (1) operates at the same time as sewing ends, and it stops operating at the same time as the feed base starts moving when the start switch is pressed.



1. Loosen the screw (2).
2. Move the thread take-up lever (1) up or down to adjust the upper thread feeding amount.
3. Once adjustment is complete, securely tighten the screw (2).

### 9-23. Adjusting the lower thread feeding amount <-01 specifications only>

It is necessary for enough tension to be applied to the lower thread during the time from when the upper thread is picked up by the eye looper at the first stitch until spreader L finishes opening, without the lower thread being pulled out by the thread nipper, so that the first stitch can be sewn correctly at the sewing start.



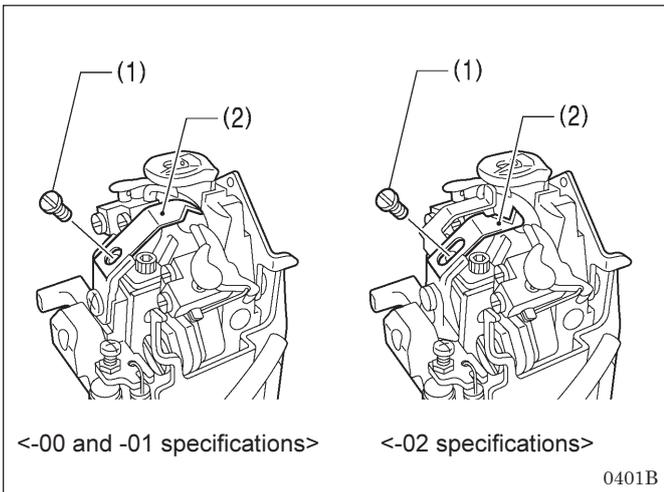
1. After automatic sewing is finished, switch to manual mode and then press the start switch. (Refer to "7-6. Manual sewing (manual mode)".)
2. Turn the upper shaft pulley and check the condition of the lower thread.

**<If adjustment is necessary>**

3. Turn off the power, and then tilt back the machine head.
4. Loosen the two screws (1), and then move lower thread guide C (2) in the direction of the arrow to adjust.
  - \* If it is moved to the right, the lower thread feeding amount will increase, and if it is moved to the left, the amount will decrease.
5. Once adjustment is complete, securely tighten the two screws (1).

### 9-24. Replacing and adjusting the upper movable knife

#### 9-24-1. Replacing the upper movable knife

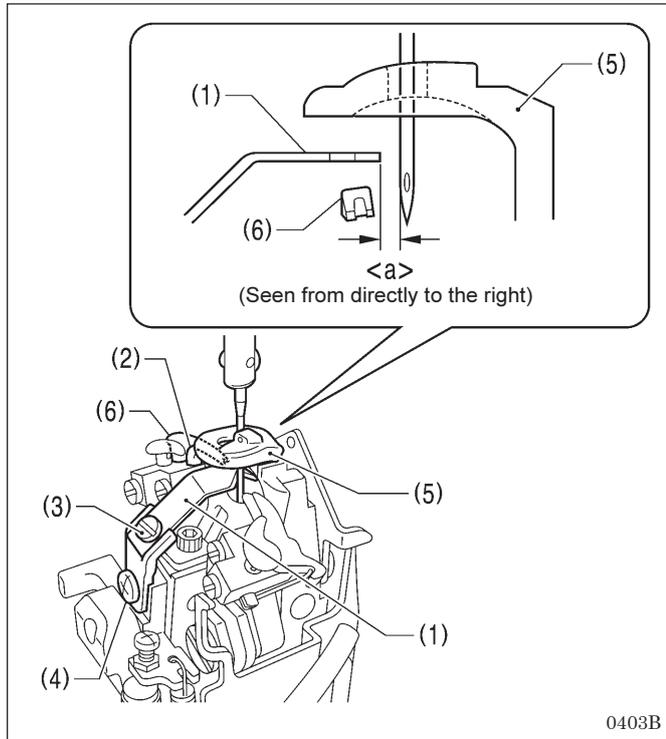


1. Remove the screw (1), and then remove the upper movable knife (2).
2. Install the new upper movable knife with the screw (1).

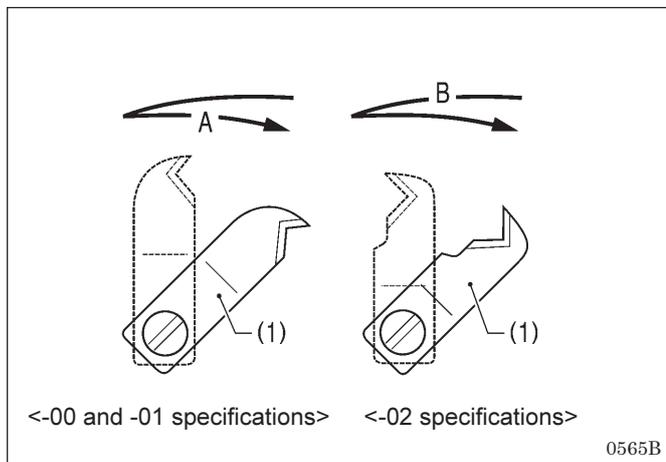
### 9-24-2. Adjusting the upper movable knife

The upper movable knife (1) is adjusted so that only the upper thread that is in front of looper L (2) is cut. If two of the upper thread loops (front and back) are cut, the upper thread trailing length will become too short and skipped stitches may occur at the sewing start.

\* If this adjustment is carried out in manual mode, the upper thread trimming operation can be checked step by step, which will make adjustment easier.



1. Turn the upper shaft pulley to set the needle to the lowest position at the outside sewing position.
2. Loosen the screw (3), and then adjust the gap <a> between the tip of the upper movable knife (1) and the needle to 0.1 - 0.4 mm.
3. Turn the upper shaft pulley to set the needle to its highest position (needle up stop position) at the outside sewing position.
4. Loosen the screw (4), and then adjust the position of the upper movable knife (1) so that it is in between the throat plate (5) and spreader L (6) without touching either of them.
5. Move the upper movable knife (1) sideways by hand and check that it does not touch either the throat plate (5) or spreader L (6).
6. Once adjustment is complete, tighten the screws (4) and (3) in that order.



#### NOTE: Upper thread trimming timing

##### <-00 and -01 specifications>

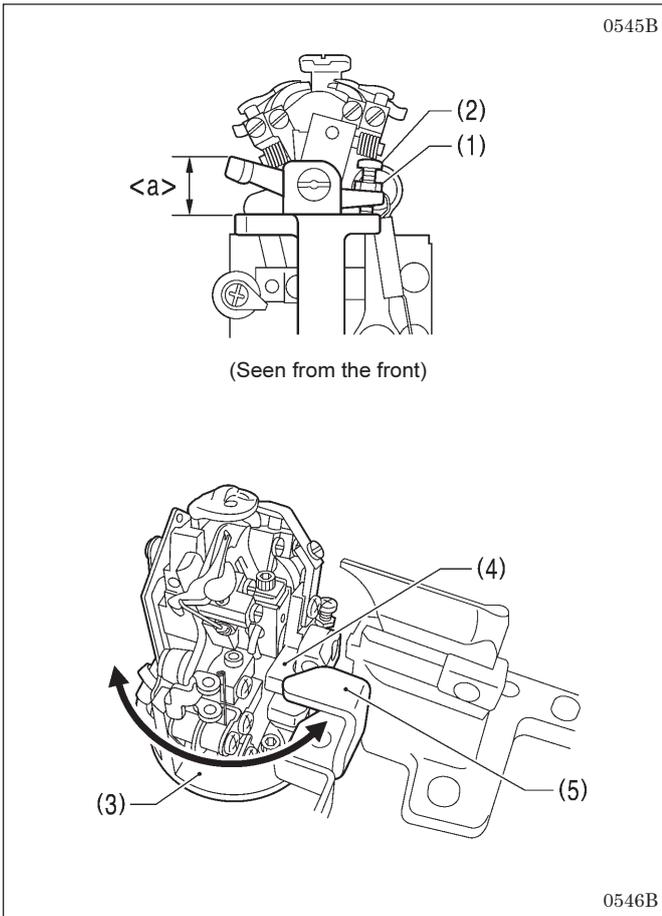
When the upper movable knife (1) has returned to its original position, the upper thread is trimmed at position A.

##### <-02 specifications>

When the upper movable knife (1) starts moving, the upper thread is trimmed at position B.

### 9-24-3. Adjusting the position of the thread trimmer lever bracket

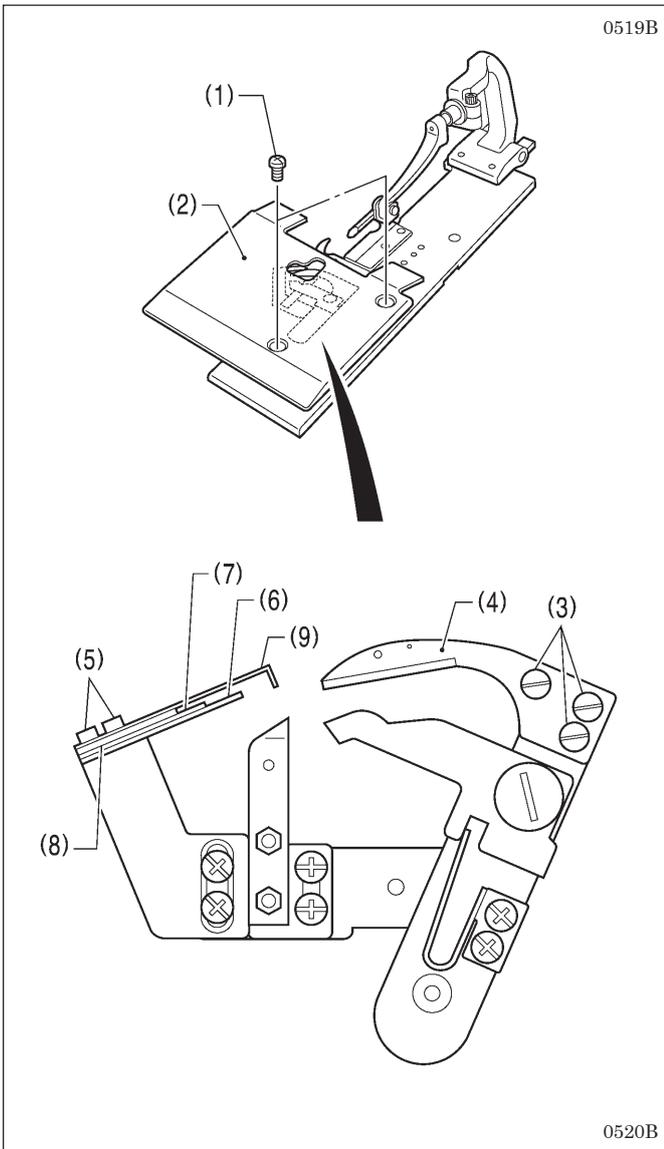
The position of the needle must be adjusted so that it does not obstruct the upper movable knife when it is at the maximum zigzag width for the outside sewing position.



1. Loosen the nut (1).
2. Turn the screw (2) to adjust <a> in the illustration to 12 mm.
3. Turn the looper base (3) and check that the thread trimmer lever bracket (4) moves underneath the thread trimmer hammer (5) without obstructing any other parts.
4. Once adjustment is complete, securely tighten the screw (2).

## 9-25. Replacing and adjusting the movable knife and fixed knife (for the lower thread and gimp) <-01 specifications>

### 9-25-1. Replacing the movable knife and fixed knife



1. Remove the two screws (1), and then remove work clamp plate U (2).

#### <Movable knife replacement>

2. Remove the three screws (3), and then remove the movable knife (4).
3. Install the new movable knife, and then tighten the three screws (3).

#### <Fixed knife replacement>

4. Remove the two screws (5), and then remove the fixed knife (6).
5. Install the new fixed knife (6), fixed knife plate spring (7), fixed knife plate spring U (8) and thread guide plate (9) on top of each other in that order, and then tighten the two screws (5).

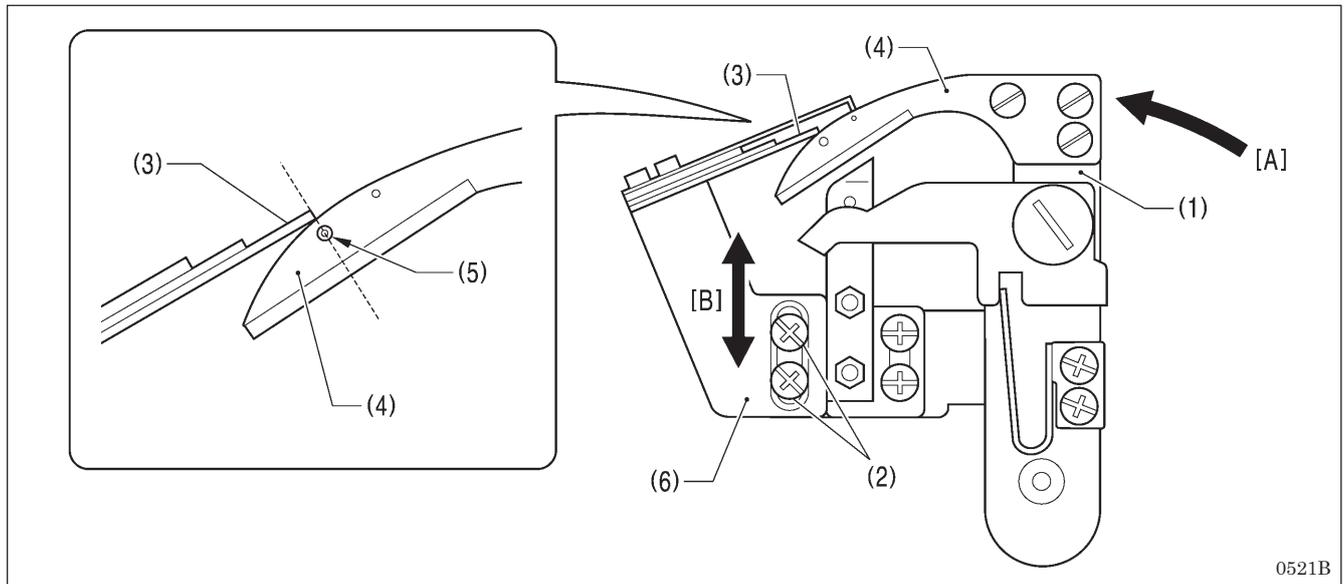
\* After replacing the knives, carry out the adjustments from "9-25-2. Adjusting the cutting pressure" to "9-25-5. Adjusting the thread handler". Once adjustment is complete, install work clamp plate U (2).

### 9-25-2. Adjusting the cutting pressure

Adjust the cutting pressure to a suitable pressure so that the threads are trimmed cleanly.

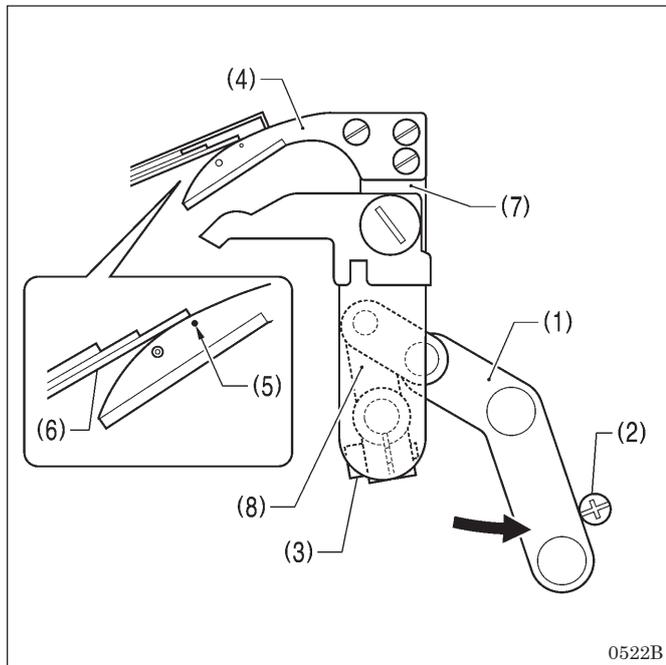
**NOTE:**

Do not apply excessive pressure. Excessive pressure will cause the fixed knife and movable knife to become worn or damaged.



1. Push the thread trimmer arm (1) as far as it will go in the direction of the arrow [A].
2. Loosen the two screws (2).
3. With the thread trimmer arm (1) pushed as far as it will go, move the fixed knife setting bracket (6) along the guide groove in the direction of arrow [B] to adjust so that the position where the tip of the fixed knife (3) and the movable knife (4) first start touching is immediately above the mark (5).
4. Once adjustment is complete, securely tighten the two screws (2).

### 9-25-3. Adjusting the meshing amount



1. Turn the thread trimmer link lever (1) in the direction of the arrow until it touches the screw (2).
2. Loosen the socket bolt (3).
3. Adjust the position of the thread trimmer arm (7) so that the tip of the fixed knife (6) is directly above the index mark (5) on the movable knife (4).
4. Once the adjustment is complete, securely tighten the socket bolt (3).

**NOTE:**

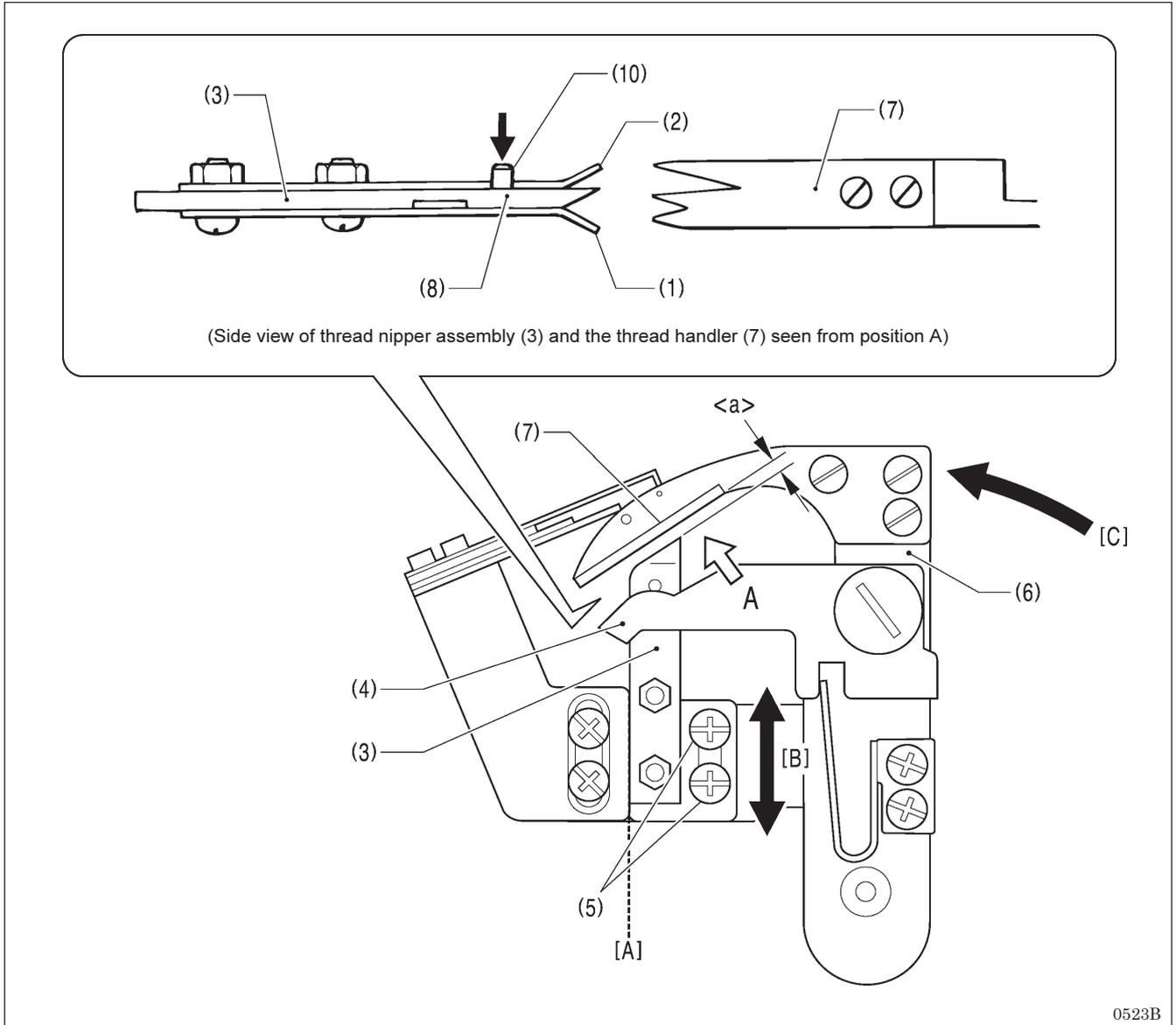
- When tightening the socket bolt (3), check that the thread trimmer lever arm (8) and the thread trimmer arm (7) move smoothly with no play.
- If the meshing amount is too small, problems with the lower thread nipper will occur and the thread will be pulled out at the sewing start.

**9-25-4. Adjusting the thread nipper assembly and opener**

The lower thread must pass through thread nipper D (1) and the gimp thread must pass through thread nipper U (2). Therefore, check that the thread nipper assembly (3) is installed in the correct position and that the thread nipper opener (4) moves correctly.

**NOTE:**

The lower thread must be securely held by thread nipper D (1) at the sewing start.

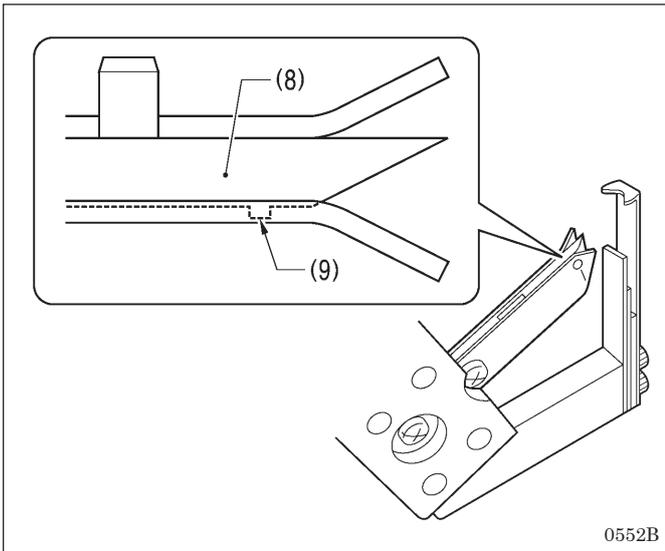


1. Loosen the two screws (5), and then move the thread nipper assembly (3) along the dotted line [A] in the illustration in the direction of the arrow [B] to adjust.

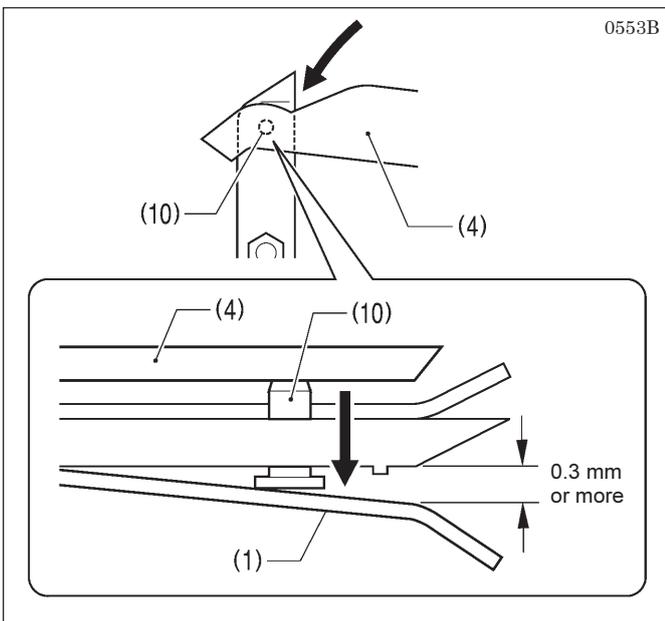
\* Adjust so that the gap  $\langle a \rangle$  between the thread nipper assembly (3) and the thread handler (7) is as narrow as possible without the two parts touching when the thread trimmer arm (6) is turned in the direction of the arrow [C].

**NOTE:**

- If the gap  $\langle a \rangle$  is too wide, problems with the lower thread nipper will occur and the thread will be pulled out at the sewing start.
- If the thread nipper assembly (3) is installed at an angle, thread nipper D (1) may touch the throat plate and fail to open, and problems with the lower thread nipper will occur and the thread will be pulled out at the sewing start.

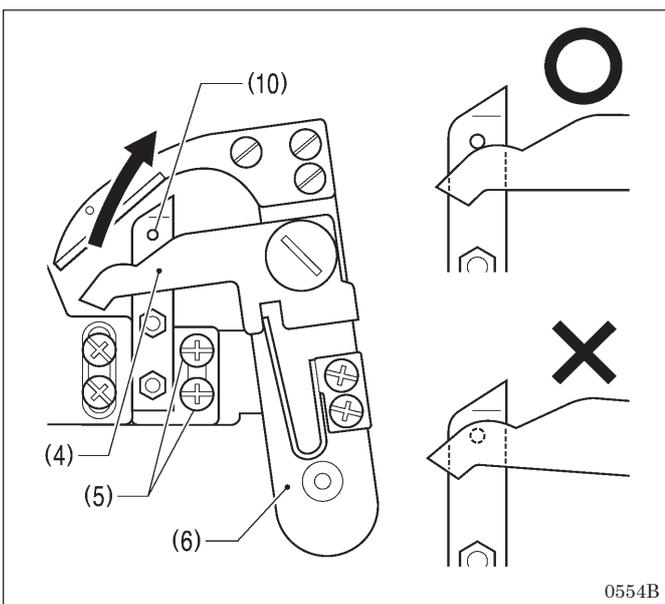


2. The lower thread must go over the projection (9) on thread nipper M (8) and be held securely. To make sure this happens, check that the operations in (a), (b) and (c) below are all correct.



(a) Thread nipper D (1) should open by 0.3 mm or more when the thread nipper opener (4) pushes down on the opener pin (10).

(b) Thread nipper D (1) should close immediately before the thread is trimmed.



(c) Thread nipper D (1) should not open when the thread trimmer arm (6) returns after thread trimming, so that the thread nipper opener (4) returns without going over the opener pin (10).

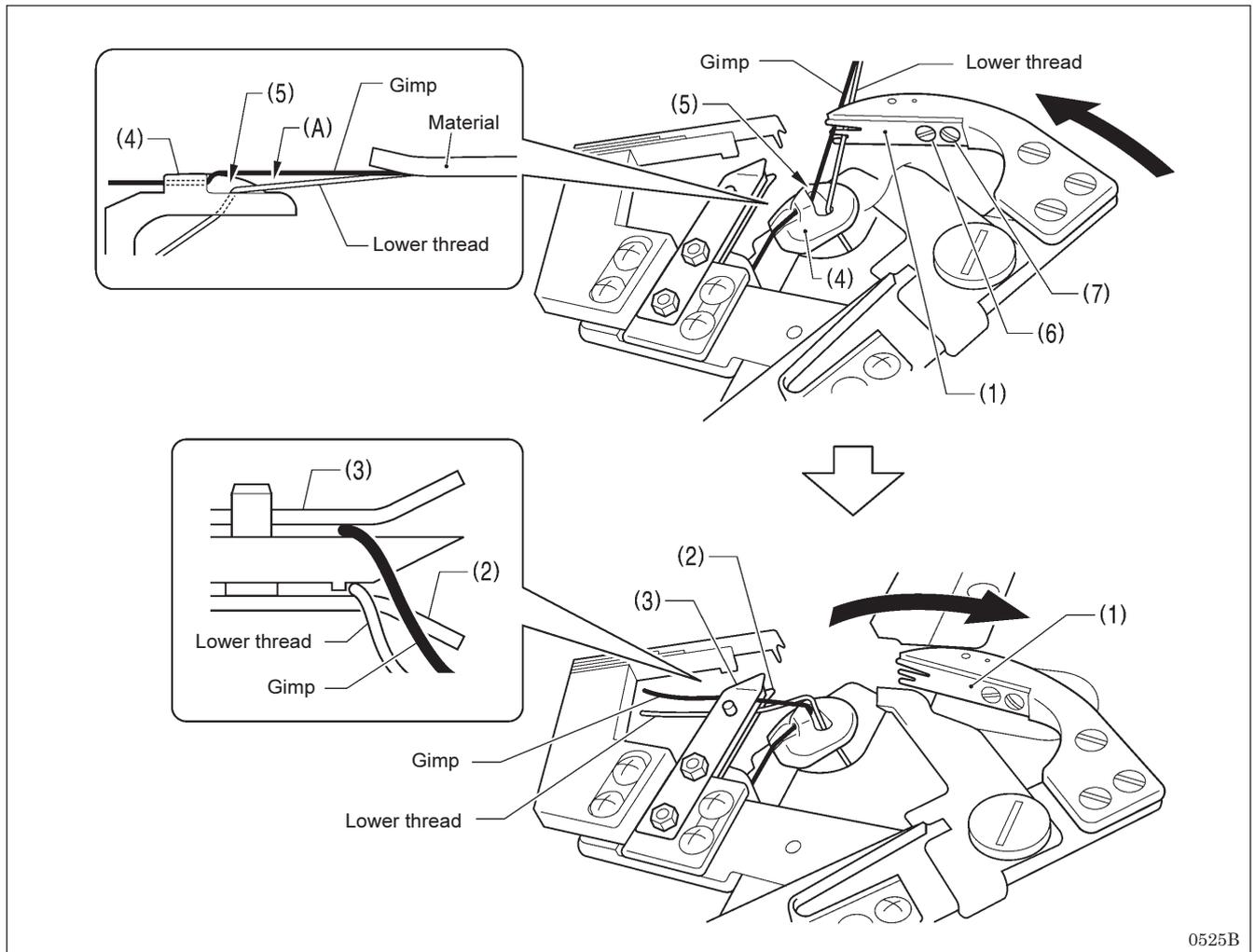
3. Once adjustment is complete, securely tighten the two screws (5).

9-25-5. Adjusting the thread handler

The lower thread and gimp are securely separated and guided by the thread handler (1), after which the lower thread needs to go smoothly into thread nipper D (2), while the gimp needs to go smoothly into thread nipper U (3).

**NOTE: Principle of the thread handler**

When the thread trimmer arm operates, the throat plate (4) turns 45 degrees. This causes the gimp to sit on top of the projection (5) of the throat plate (4) so that a difference in height is created between the lower thread and the gimp, and a triangular shape (A) is formed between the two threads and the final stitch. The thread handler (1) goes into this triangular shape (A) to separate the lower thread and gimp.



0525B

**<Adjustment method>**

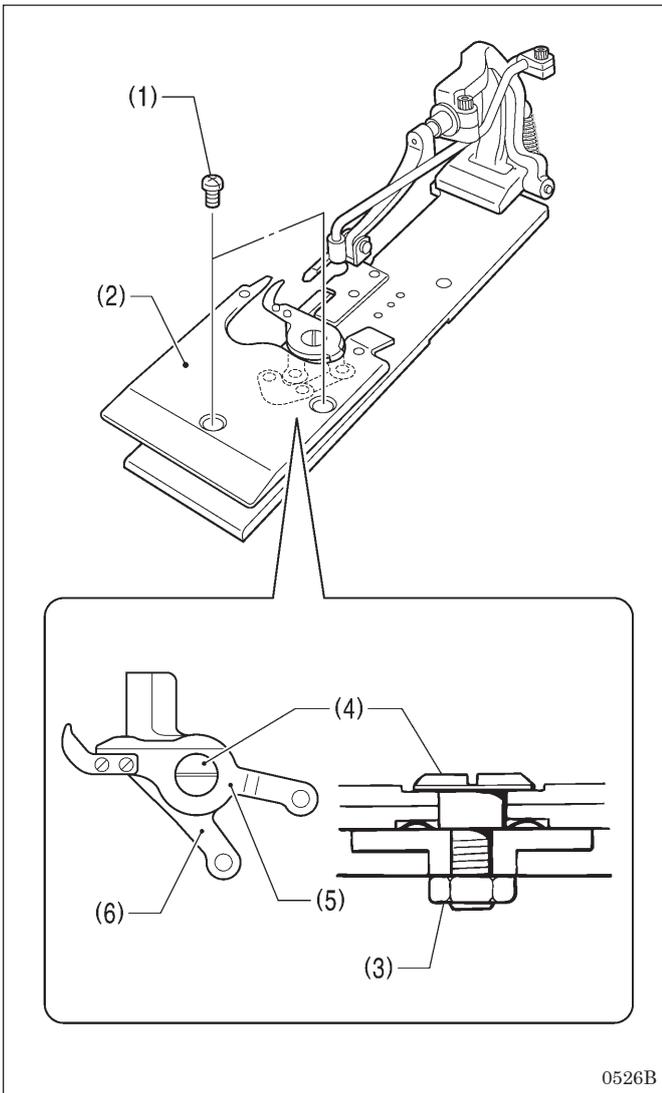
- \* If this adjustment is carried out in manual mode, the lower thread trimming operation can be checked step by step, which will make adjustment easier.
- 1. Use the parameter settings to set the stitch pitch to 2.0 mm and reduce the total number of stitches. (Refer to "5-3. Program setting method".)
- 2. In manual mode, depress the start switch, and then turn the upper shaft pulley to sew manually as far as the final stitch. (Refer to "7-6. Manual sewing (manual mode)".)
- 3. With the needle bar at the needle up stop position, depress the start switch one press at a time.
  - \* The thread trimming operation will be carried out one step at a time.
- 4. Loosen the pan screw (6) and the screw (7), and then use the pan screw (6) as a pivot to turn the thread handler (1) to adjust.
- 5. Once adjustment is complete, securely tighten the pan screw (6) and the screw (7).

**NOTE:**

If the height of the throat plate (4) has been changed, the triangular shape (A) defined by the final stitch, lower thread and gimp will change, and so you should adjust the thread handler (1).

## 9-26. Replacing and adjusting the movable knife and fixed knife (for the lower thread and gimp) <-02 specifications>

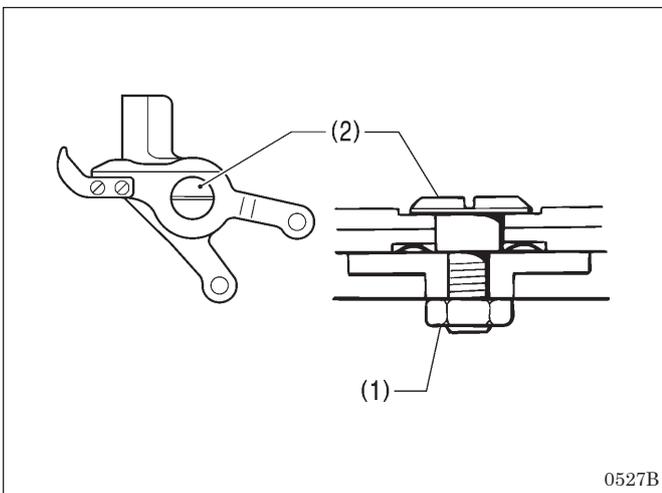
### 9-26-1. Replacing the movable knife and fixed knife



1. Remove the two screws (1), and then remove work clamp plate U (2).

2. Remove the nut (3).
3. Remove the shoulder screw (4), and then remove movable knife L (5) and movable knife R (6).
4. Install the new knives, and then install the shoulder screw (4).
5. Adjust the cutting pressure (see below), and then tighten the nut (3).
6. Install work clamp plate U (2).

### 9-26-2. Adjusting the cutting pressure



Adjust the cutting pressure to the minimum pressure at which thread trimming can be carried out cleanly.

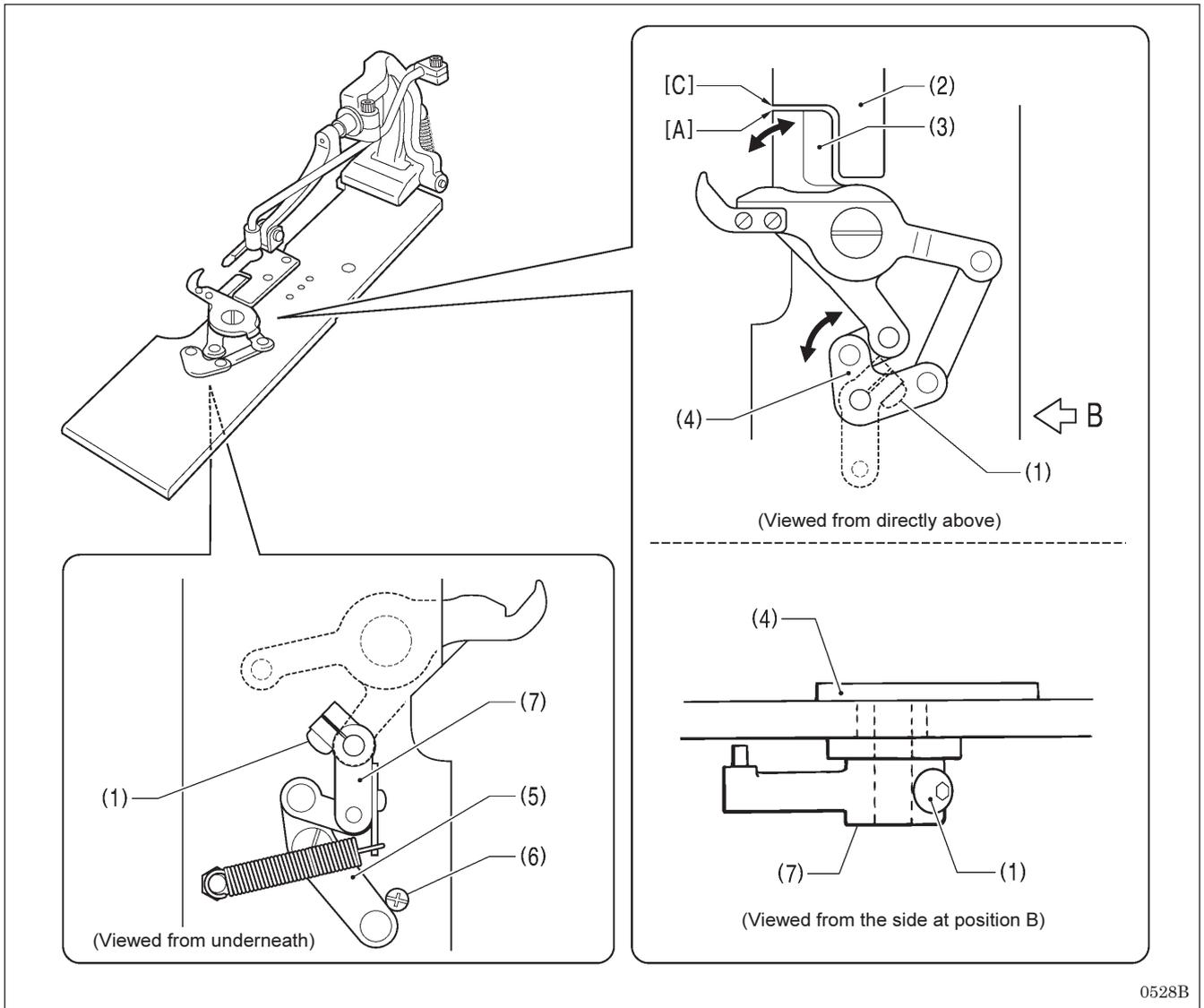
1. Loosen the nut (1).
2. Turn the shoulder screw (2) to adjust the cutting pressure.

**NOTE:**

If the shoulder screw (2) is tightened as far as it will go, the movable knives will no longer operate. Gradually loosen the shoulder screw (2) to a point where the movable knives turn smoothly.

3. Once adjustment is complete, securely tighten the nut (1).

9-26-3. Adjusting the movable knife installation position



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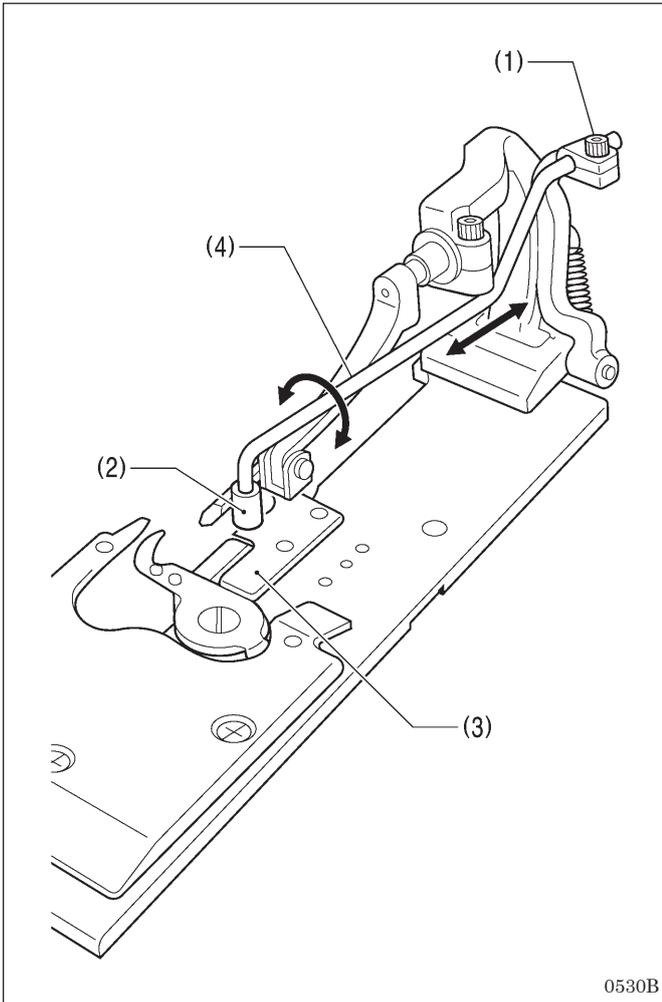
1. Remove work clamp plate U. (Refer to “9-26-1. Replacing the movable knife and fixed knife”.)
2. Loosen the screw (1).
3. Turn the movable knife driving plate (4) so that the tip [A] of movable knife R (3) and the corner [C] of the needle plate (2) are aligned.
4. Turn thread trimmer lever arm B (7) until the thread trimmer link lever J assembly (5) touches against the screw (6), and then tighten the screw (1).
5. Once adjustment is complete, install work clamp plate U.

**NOTE:**

Check that the movable knife driving plate (4) and thread trimmer lever arm B (7) turn smoothly with no play.

#### 9-26-4. Adjusting the position of the auxiliary clamp

Trimming of the lower thread and gimp is carried out when the work clamps rise. The auxiliary clamp ensures that the material does not move during thread trimming, in order to maintain a stable thread length after trimming.



1. Loosen the socket bolt (1).
2. Adjust the installation position of the auxiliary clamp (4) with respect to the article being sewn so that the button clamp (2) moves above the needle plate (3).
3. Once adjustment is complete, securely tighten the socket bolt (1).

0530B

### 9-27. Adjusting the gimp trailing length <-02 specifications only>

The gimp is pressed against the material by means of the twisting of the first 2 - 3 stitches at the sewing start, and is then pulled out continuously. Because of this, if strong tension is applied to the gimp when the feed base is at the sewing position and the gimp trailing length (<a> in the illustration below) becomes extremely short, the gimp may be pulled out of the stitches.

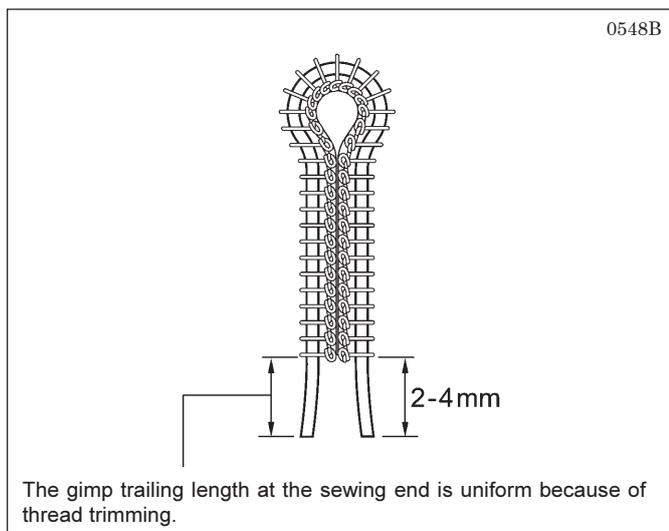
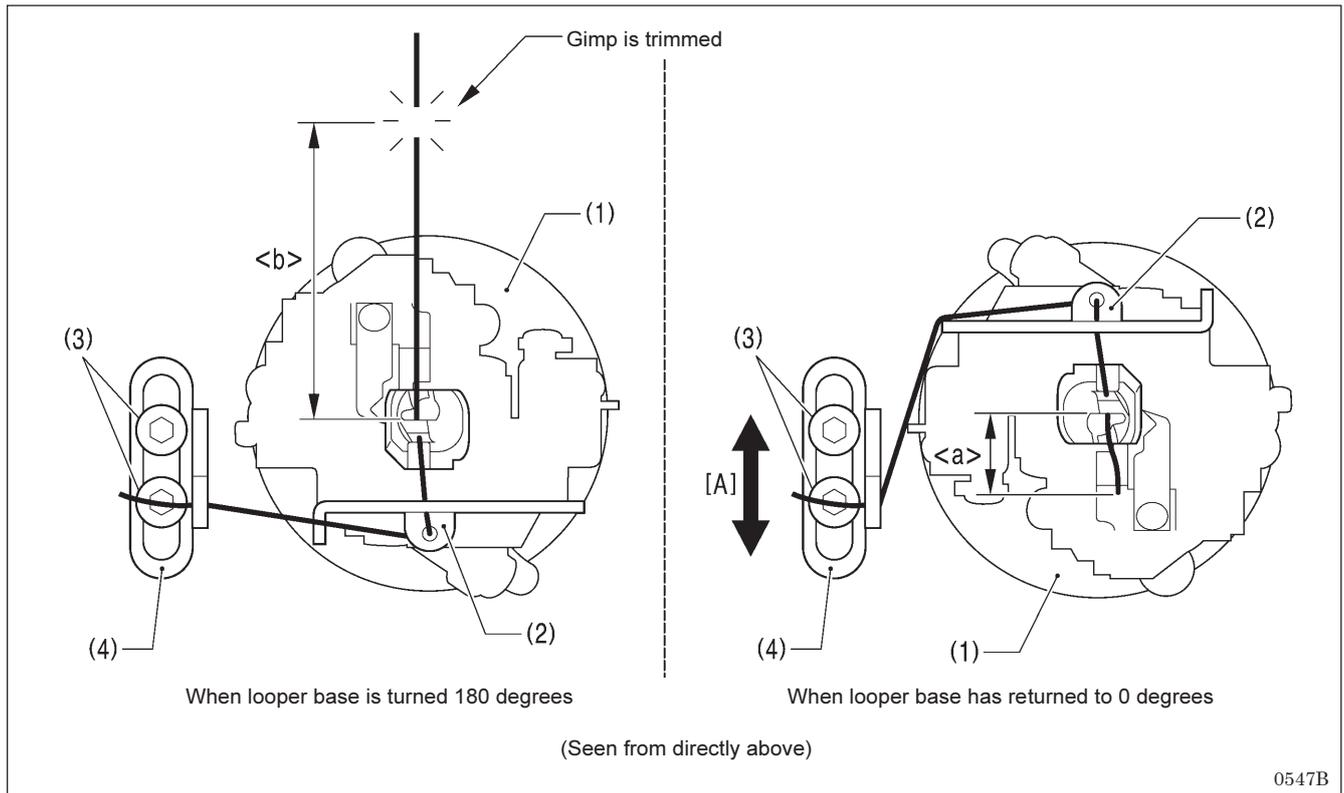
The gimp should be adjusted to as short a length as possible which will still allow the gimp to be securely wound around the stitches at the sewing start and leave a length protruding from above the stitches.

**NOTE: Principle of gimp pulling**

When the looper base (1) turns back from 180 degrees to 0 degrees after the gimp has been trimmed, gimp thread guide C-J (2) pulls the gimp to make it come out.

Adjustment of the gimp trailing length is necessary in the following cases.

- When the sewing length has been changed (the gimp is trimmed at the feed base home position, so the length of <b> will change. As a result, the gimp trailing length <a> will also change.)
- When the type of gimp and the gimp tension have been changed (the gimp trailing length <a> will change.)



The gimp trailing length at the sewing end is uniform because of thread trimming.

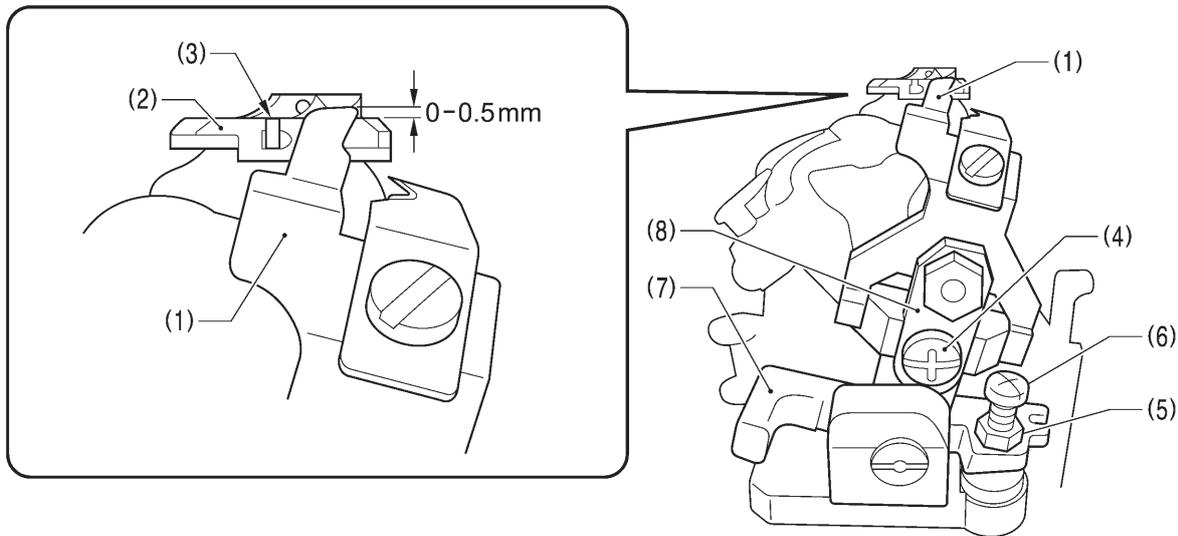
**<Adjustment method>**

1. Loosen the screw (3).
2. Move gimp thread guide J (4) in the direction of the arrow [A] to adjust so that 2 - 4 mm of the gimp protrudes from the seam at the sewing start.
3. Once adjustment is complete, securely tighten the screw (3).

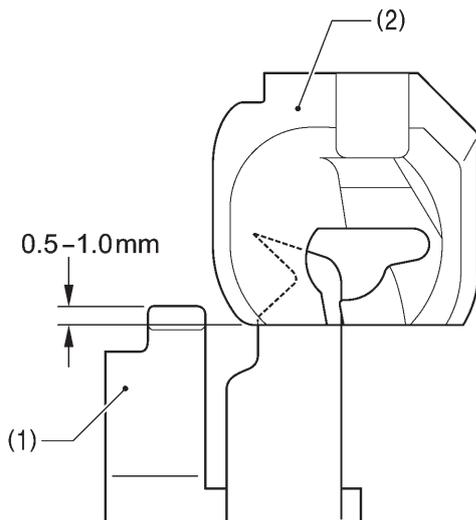
**9-28. Adjusting the position of the lower thread presser <-02 specifications only>**

Adjust the lower thread presser (1) so that it securely holds the lower thread.

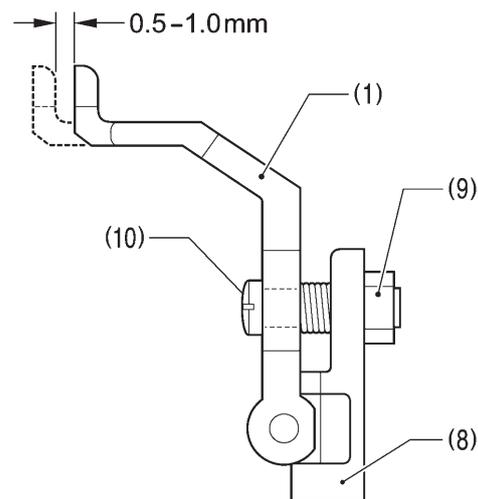
0549B  
0550B  
0551B



(Seen from the front)



(Seen from directly above)

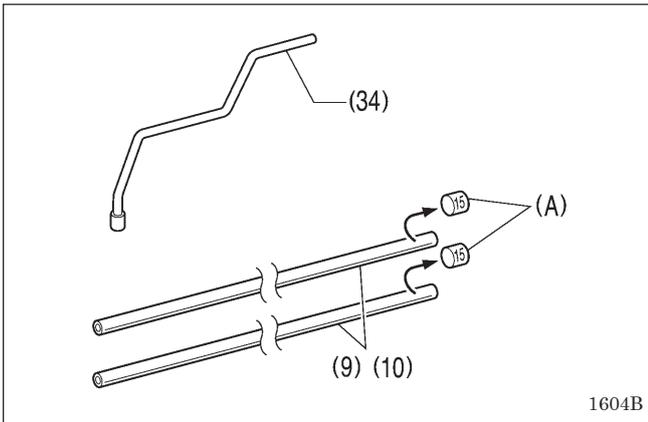


(Seen from directly to the right)

1. Loosen the screw (4) and move the lower thread presser (1) up or down to adjust so that its top projects approximately 0.5 mm from the top of the thread groove (3) in the throat plate (2).
2. Check that the lower thread presser (1) does not cover the groove at the front of the throat plate (2).
  - \* If the groove is covered, loosen the nut (5) and then turn the screw (6) to adjust.
3. Check that the front of the throat plate (2) and the lower thread presser (1) are overlapping by 0.5 - 1.0 mm after thread trimmer lever bracket B (7) has operated.
  - \* If adjustment is required, remove the lower thread presser base (8), loosen the nut (9), and then turn the screw (10) to adjust.
4. Once adjustment is complete, tighten the nuts (5) and (9) that were loosened, and install the lower thread presser base (8).

### 9-29. Installing (replacing) the auxiliary clamp on the left side

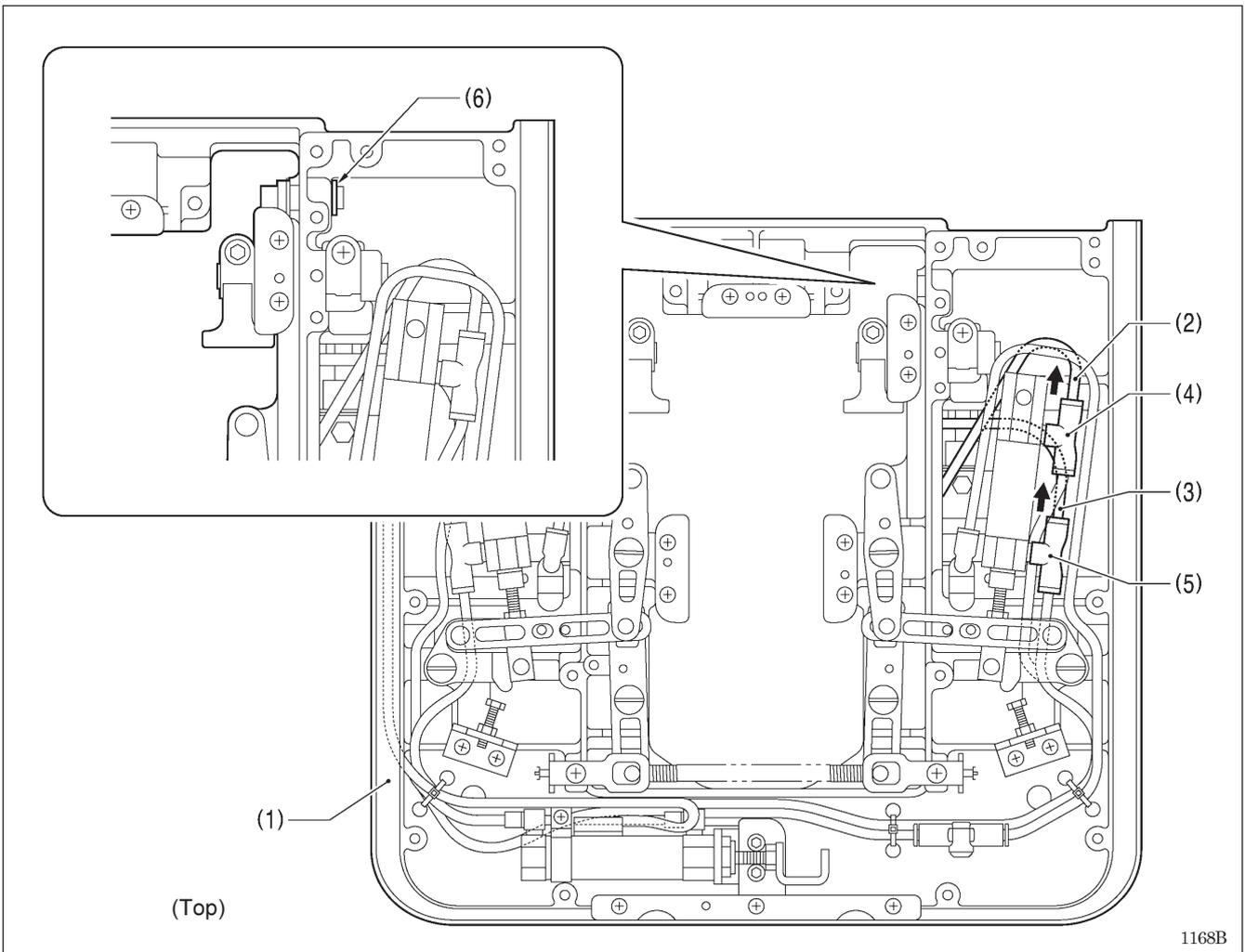
If necessary, the auxiliary clamp can be removed from the right side and can be installed on the left side instead. In this case, the following optional parts are required.



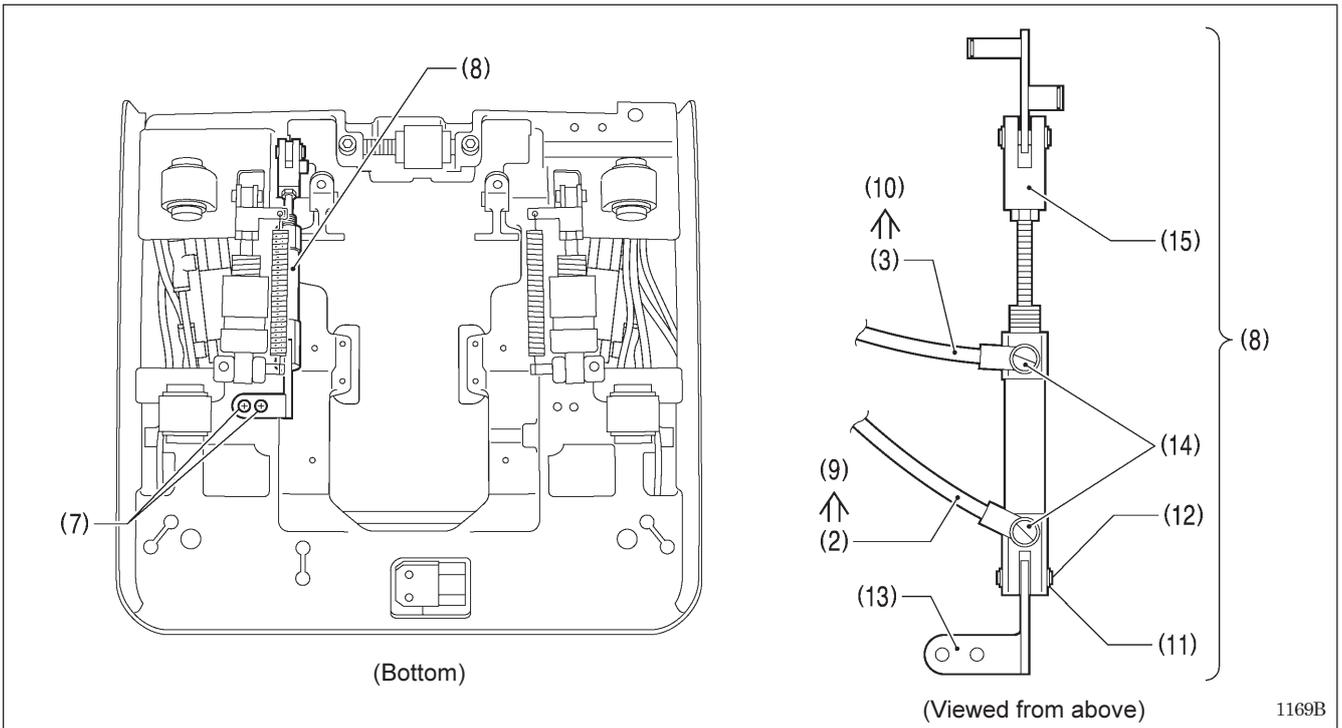
To install the auxiliary clamp on the left side, first have the following option parts ready.

Ref. No.	Code	Qty.	Part name
(34)	SA9132001	1	Auxiliary clamp L assembly
(9) (10)	SA5683001	2	Air hose (outer dia. 4 mm, inner dia. 2.5 mm, length 750 mm)

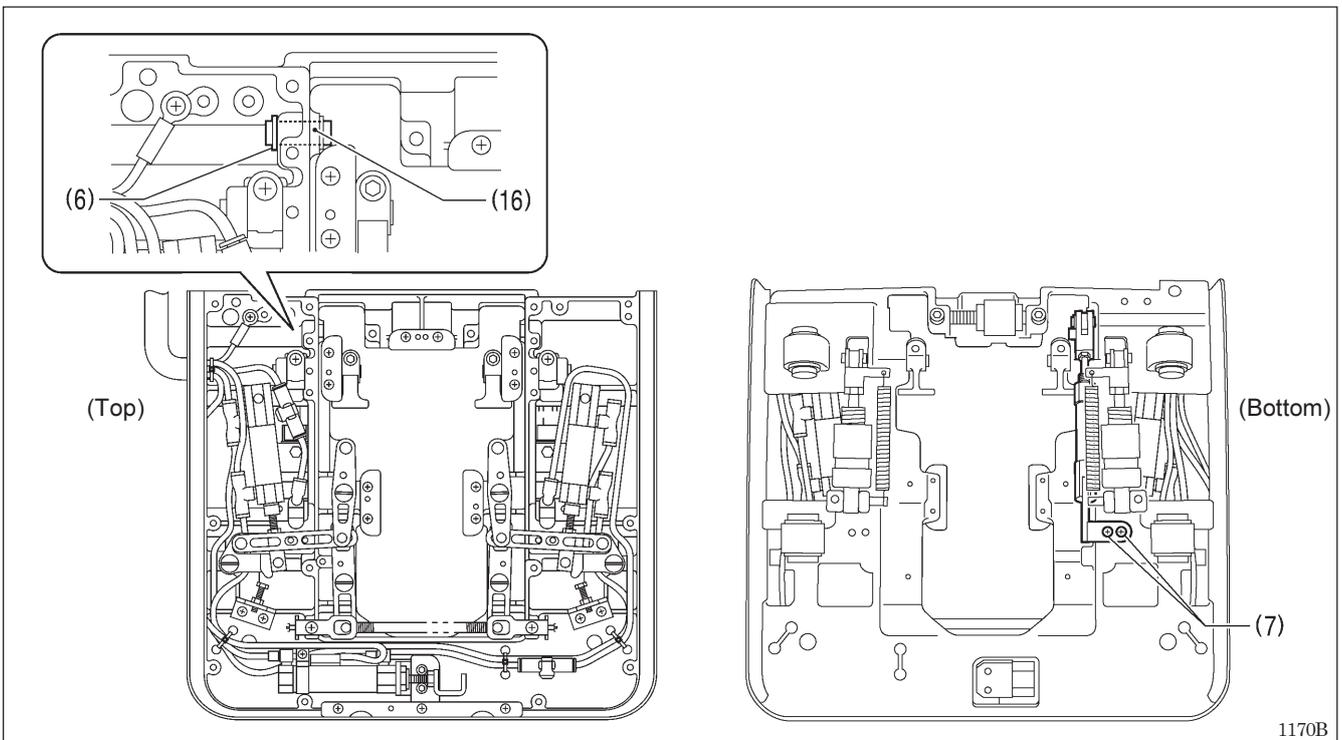
\* Be sure to remove the stickers (A) before using the air hoses (9) and (10).



1. Stop the air and then bleed the air. (Refer to "3-16. Adjusting the air pressure".)
2. Remove the feed base unit (1) from the bed. (Refer to "5-3. Feed mechanism" in the service manual.)
3. Disconnect the air tubes (2) and (3) from the joints (4) and (5).
4. Remove retaining ring C (6).



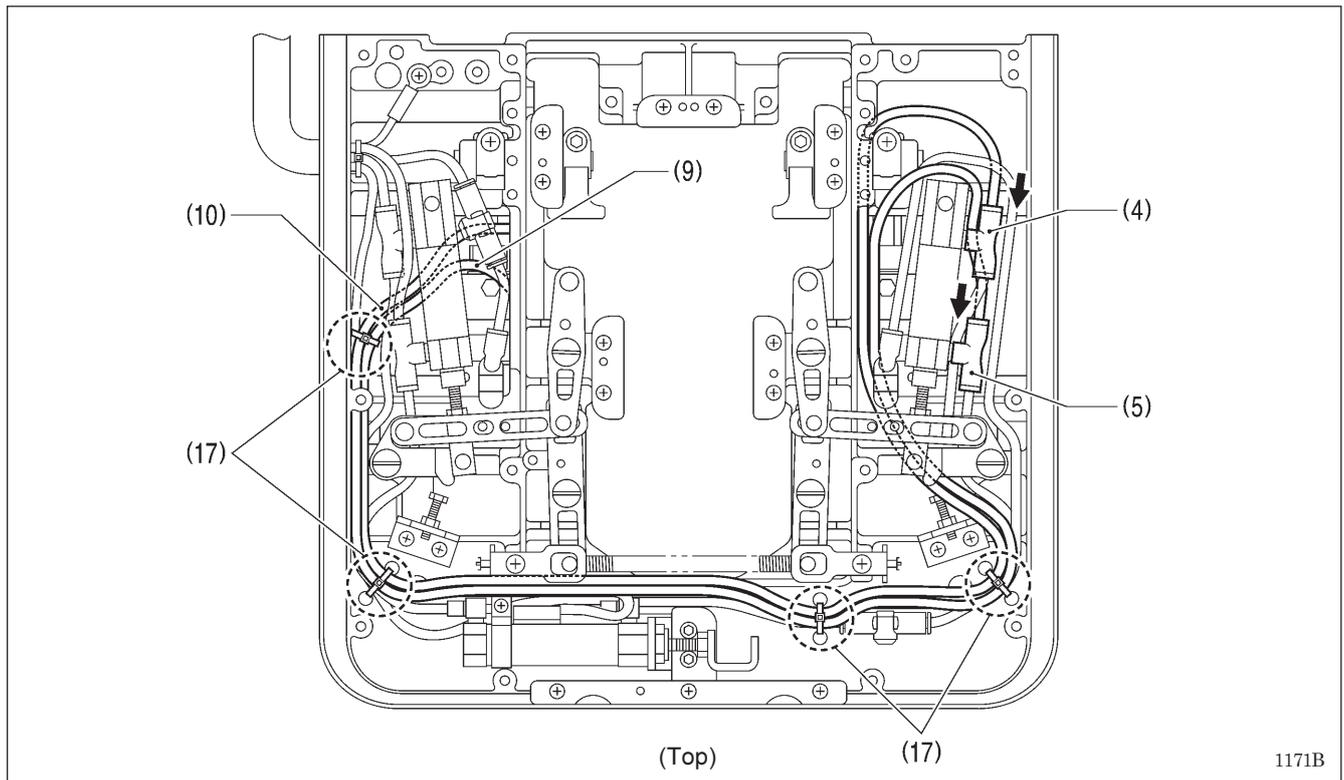
5. Remove the two screws (7), and then remove the auxiliary clamp cylinder assembly (8).
6. Replace the air hoses (2) and (3) with the optional air hoses (9) and (10).
7. Remove retaining ring C (11) and pull out the shaft (12).
8. Insert the shaft (12) into the auxiliary clamp S holder (13) in the direction shown in the illustration, and then install retaining ring C (11).
9. Set the joint (14) and the cylinder rod (15) so that they are facing as shown in the illustration.



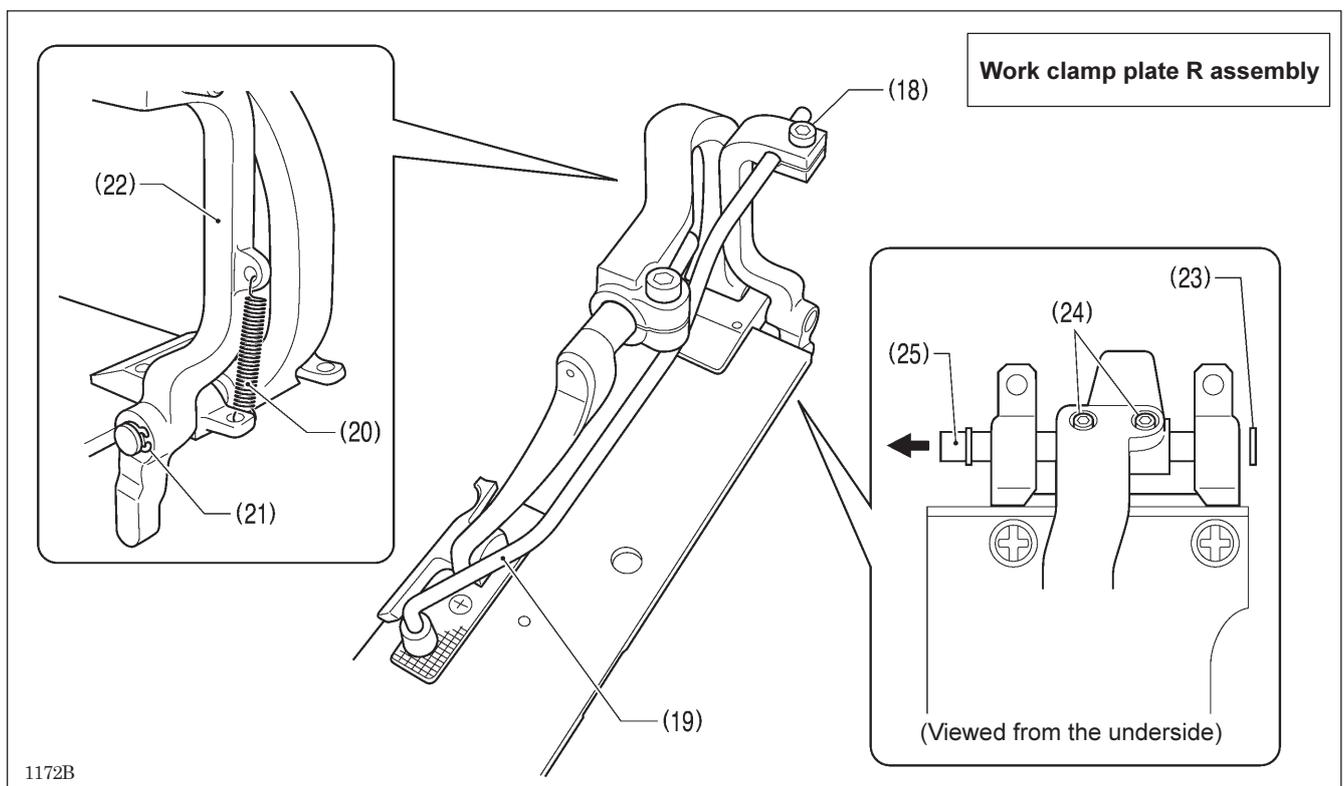
10. Insert the shaft (16) of the auxiliary clamp connecting rod into the hole in the feed base, and then install retaining ring C (6).
11. Tighten the two screws (7).

(Continued on next page)

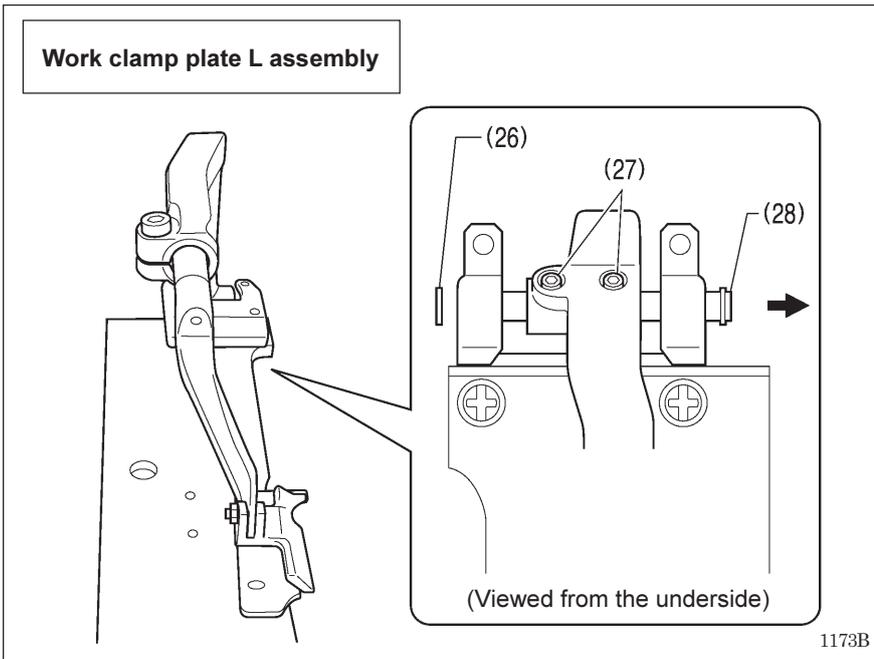
## 9. STANDARD ADJUSTMENTS



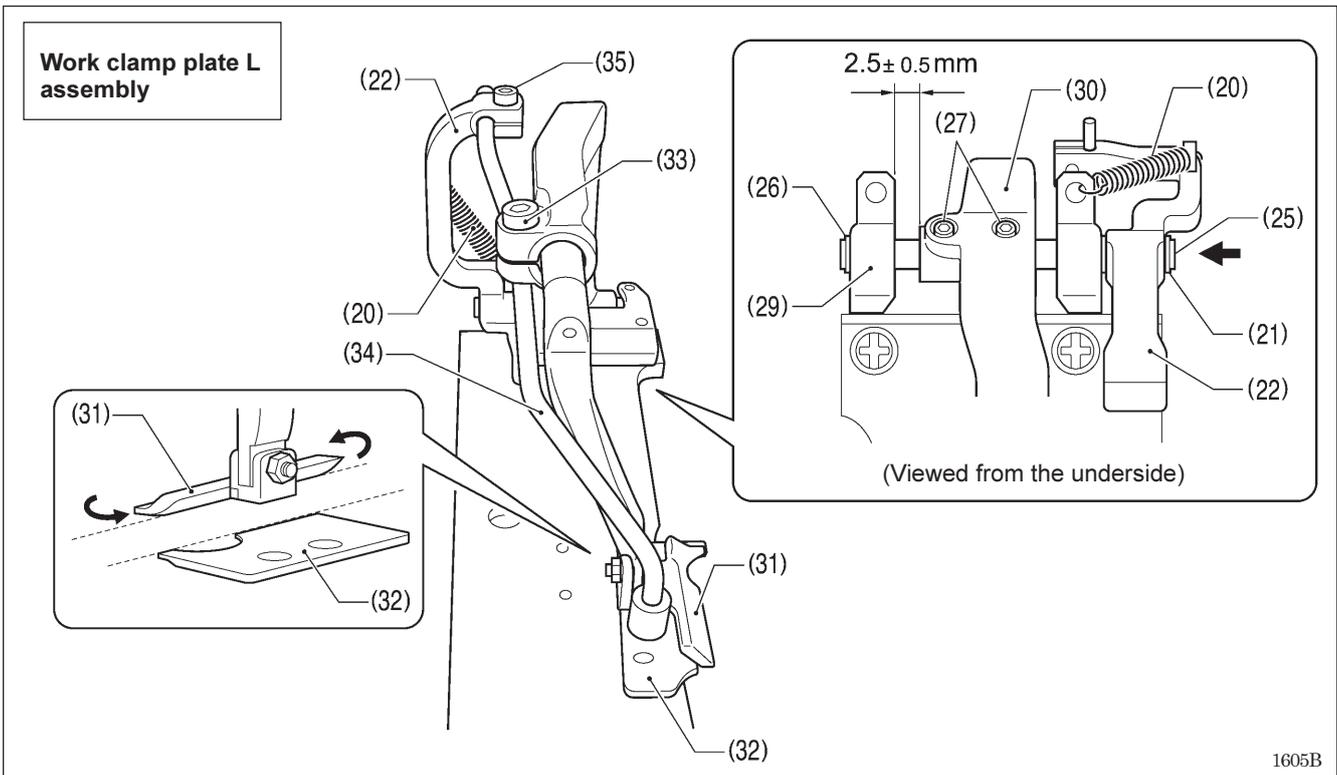
12. Route the tubes as shown in the illustration, and then connect the air hose (9) to the joint (4) and the air hose (10) to the joint (5).
13. Secure the air hoses (9) and (10) in four places using the four bead bands (17) as shown in the illustration.



14. Loosen the socket bolt (18), and then remove the auxiliary clamp assembly (19).
15. Remove the spring (20).
16. Remove retaining ring C (21), and then remove the auxiliary clamp arm (22).
17. Remove retaining ring C (23), loosen the two set screws (24), and then remove clamp fulcrum shaft J (25) in the direction of the arrow.



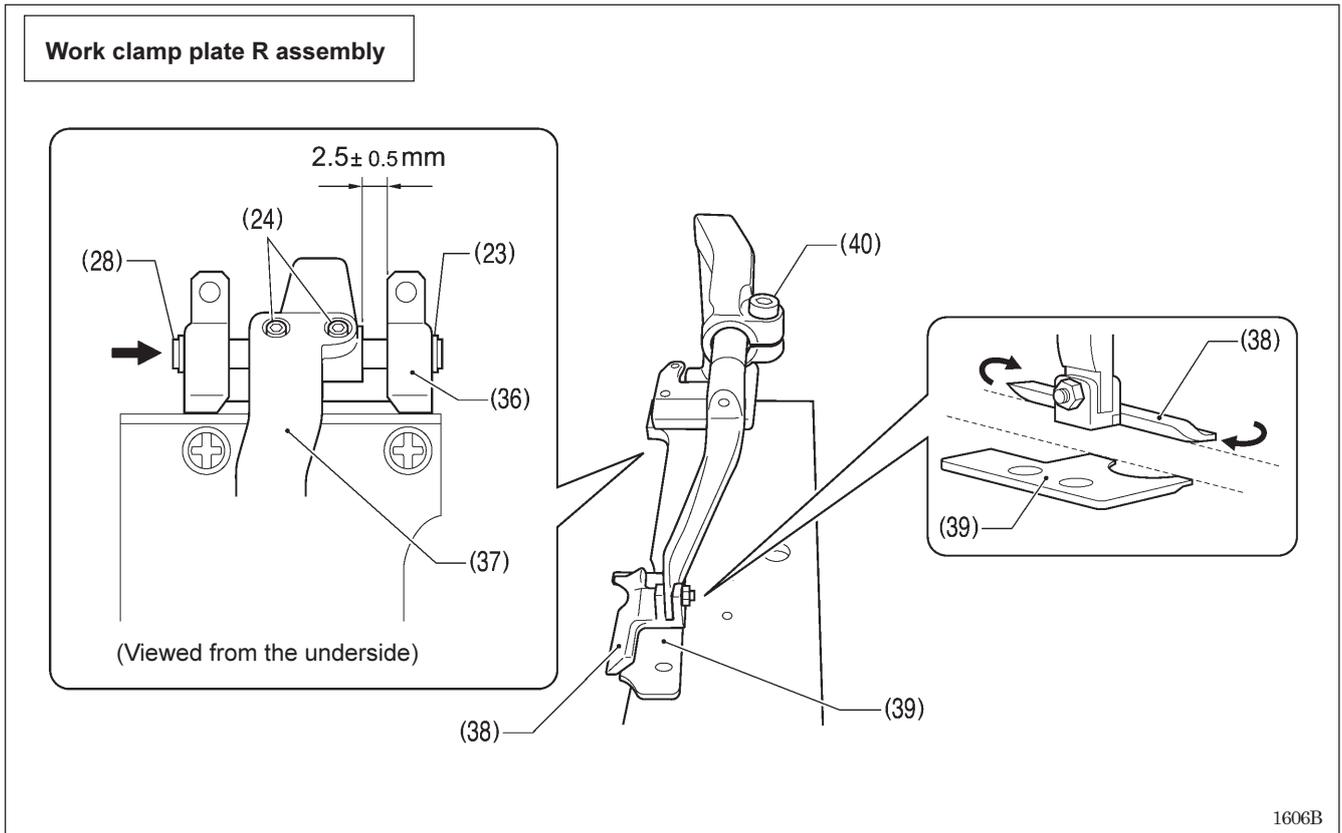
18. Remove retaining ring C (26), loosen the two set screws (27), and then remove the clamp fulcrum shaft (28) in the direction of the arrow.



19. Insert clamp fulcrum shaft J (25) in the direction of the arrow, and then install retaining ring C (26).
20. Place the auxiliary clamp arm (22) onto clamp fulcrum shaft J (25) as shown in the illustration, and then install retaining ring C (21).
21. Tighten the two set screws (27) so that the clearance between the clamp shaft holder (29) and clamp lever L (30) is  $2.5 \pm 0.5$  mm.  
 \* Check that the sides of work clamp L (31) and needle plate L (32) are aligned at this time. If they are not aligned, loosen the socket bolt (33) and adjust.
22. Install the auxiliary clamp L assembly (34) to the auxiliary clamp arm (22), and then secure it by tightening the socket bolt (35).  
 (Refer to "9-26-4. Adjusting the position of the auxiliary clamp".)
23. Install the spring (20) to the auxiliary clamp arm (22) and the clamp shaft holder (29).

(Continued on next page)

## 9. STANDARD ADJUSTMENTS



24. Insert the clamp fulcrum shaft (28) in the direction of the arrow, and then install retaining ring C (23).
25. Tighten the two set screws (24) so that the clearance between the clamp shaft holder (36) and clamp lever R (37) is  $2.5 \pm 0.5$  mm.
  - \* Check that the sides of work clamp R (38) and needle plate R (39) are aligned at this time. If they are not aligned, loosen the socket bolt (40) and adjust.

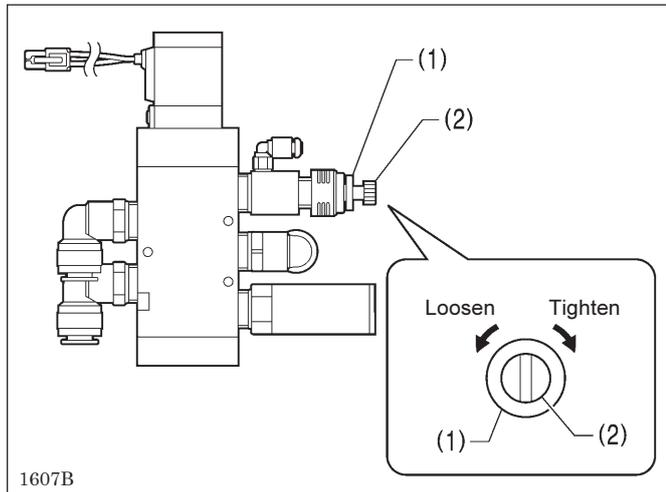
## 9-30. Adjusting the throttle valves

Adjust the throttle valves of each valve as follows.

### 9-30-1. Adjusting the throttle valve of the cutter valve

**NOTE: Function of the throttle valve of the cutter valve**

The air released from the cutter cylinder when the hammer is raised is used as the air which flows to the venturi tube in order to collect the cutting scraps. You can adjust the amount of this air that is released by adjusting the throttle valve of the cutter valve. As a result of this, increasing or decreasing the opening amount of the throttle valve will change the cutting scrap collection performance and also the hammer lifting speed (cycle time). Make the adjustment correctly by following the procedure below.



**<Adjustment method>**

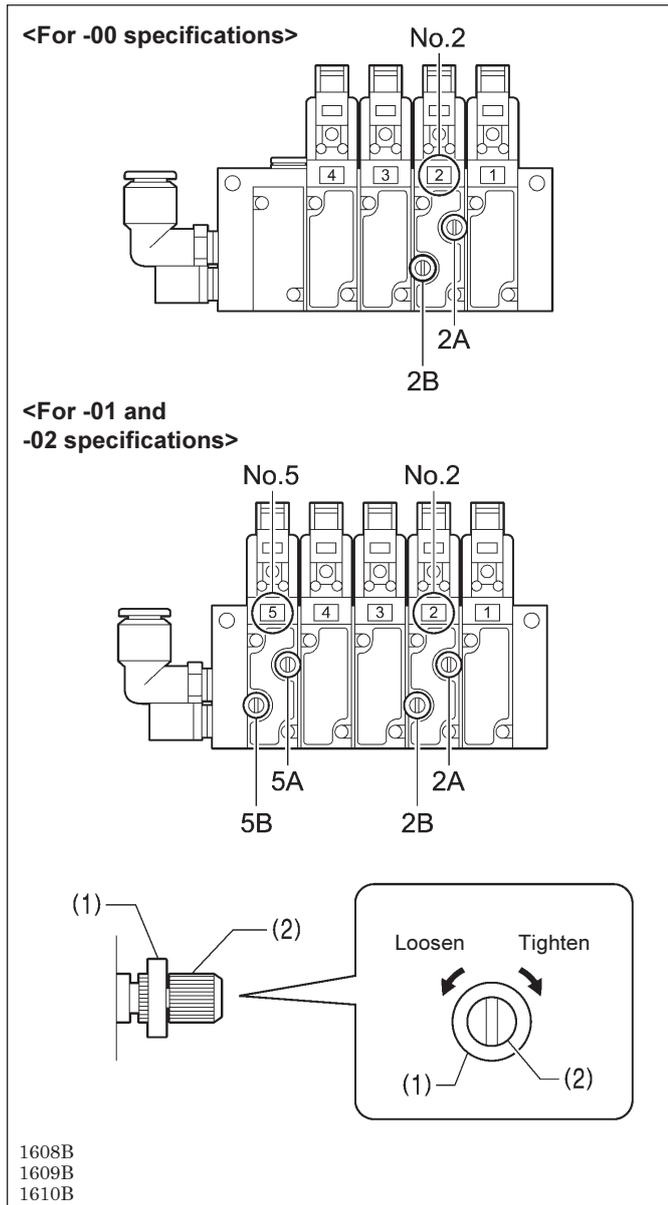
1. Loosen the fixing nut (1).
2. Loosen the throttle valve adjusting screw (2) by eight turns from the fully-tightened position.
3. After adjusting, tighten the fixing nut (1) to secure the throttle valve adjusting screw (2) so that it cannot turn.

1607B

\* If the throttle valve adjusting screw (2) is not adjusted correctly, the following problems will occur.

No. of turns of throttle valve adjusting screw (2)	Problem
If loosened by more than eight turns	The amount of air flowing to the venturi tube will be reduced, and so the cutting scrap collection performance will drop. (If it is loosened too far, cutting scrap blockages will occur. )
If loosened by less than eight turns	The amount of air flowing to the venturi tube will increase, and so the cutting scrap collection performance will increase, but the hammer lifting speed will decrease. (The cycle time will become longer and working efficiency will drop. ) <b>Note:</b> The hammer lifting speed will tend to become too slow after about six turns. If you would like to give the highest priority to cutting scrap collection performance, adjust to within a range of 6 to 8 turns while continually checking hammer operation.

9-30-2. Adjusting the throttle valves of the solenoid valves



NOTE: Applications of each valve

Label No.	Solenoid valve application
1	For upper thread take-up
2	For upper thread trimming
3	For cloth spreading (+ for auxiliary clamp * <sup>1</sup> )
4	For work clamp
5* <sup>2</sup>	For lower thread trimming

\*<sup>1</sup>: Auxiliary clamp is for -02 specifications only.  
\*<sup>2</sup>: The solenoid valve for label No. 5 is not present in -00 specifications.

- Use the throttle valve adjusting screws for valve No. 2 (2A and 2B in the illustration) to adjust the operating speed for the upper thread trimming cylinder.
- Use the throttle valve adjusting screws for valve No. 5 (5A and 5B in the illustration) to adjust the operating speed for the lower thread trimming cylinder.

Make the adjustments correctly by following the procedure below.

<Adjustment method>

1. Loosen the fixing nut (1).
2. With the throttle valve adjusting screw (2) tightened fully, loosen the throttle valve adjusting screw (2) while referring to the "Guide to adjustment" below.
3. After adjusting, tighten the fixing nut (1) to secure the throttle valve adjusting screw (2) so that it cannot turn.

<Guide to adjustment>

Valve	No. of turns of throttle valve adjusting screw	Problem
Valve No. 2 (Throttle valve adjusting screws: 2A and 2B)	If loosened by more than nine turns	Operation will become faster, but if it becomes too fast, shocks will become greater and noise will occur.
	If loosened by less than nine turns	Operation will become slower and cutting performance will drop. For -02 specifications, lower thread clamping errors may occur.
Valve No. 5 (Throttle valve adjusting screws: 5A and 5B)	If loosened by more than seven turns	Operation will become faster, but if it becomes too fast, bunching may occur during thread handling, and thread trimming errors may occur.
	If loosened by less than seven turns	Operation will become slower, and cycle time will increase and an error code may be displayed.

# 10. SEWING CIRCULAR STITCHES

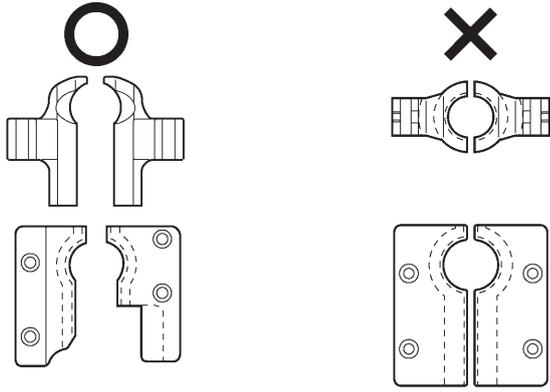
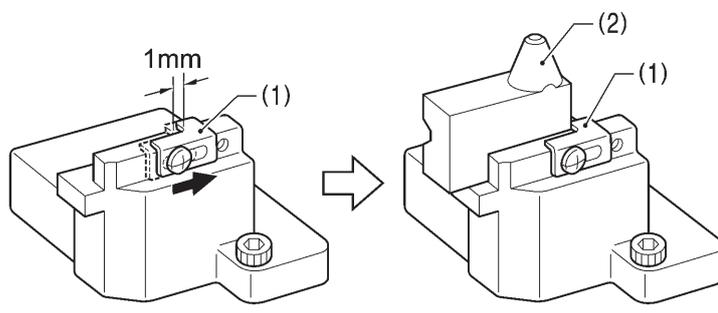
For -00 and -01 specifications, it is recommended that you use the special parts when sewing. (Refer to the Parts Book.)

## <If using a -02 specification sewing machine>

It is recommended that you change to using a -00 or -01 specification sewing machine.

Alternatively, if the version of the main control program (MN) is 1.3.00 or later, simple sewing is possible. However, the following restrictions will apply, so make sure that you understand them before using the sewing machine.

## <Restrictions when using -02 specification sewing machines for sewing circular stitches>

	Restriction	Points to note and understand
1	<p>Use standard -02 specification parts for the needle plate and work clamp.</p>  <p>1611B</p>	<p>Note that the work clamp range will become smaller and the amount of play in the material will increase.</p>
2	<p>The lower thread trimming mechanism will not operate.</p>	<p>Thread trimming will become unstable because of the way the mechanism operates, so the mechanism will be set to be disabled.</p>
3	<p>The only material setting position available is "Front".</p>	<p>The "Back" setting position would result in the lower thread and gimp getting caught on the thread trimming knife when the material is pulled out at the end of sewing, and so this setting cannot be used.</p>
4	<p>Move the position of the block stopper plate (1) used to install the knife back by 1 mm and install the circular stitch knife (2).</p>  <p>1612B</p>	<p>In order to match the seam position to the standard work clamp, the seam position for circular stitches is moved back by 1 mm. As a result, the knife installation position should also be moved back.</p>

## <Knife pressure>

The cutting area will be smaller than for eyelet shapes, so it is recommended that you decrease the knife pressure.

# 11. ERROR CODES

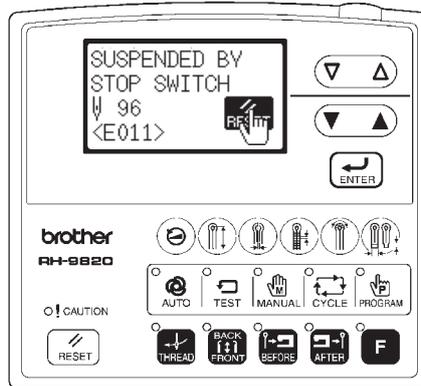
## ⚠ DANGER



Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the cover of the control box. Touching areas where high voltages are present can result in severe injury.

If a problem should occur with the sewing machine, the buzzer will sound and an error code and error message will appear in the display.

Follow the remedy procedure to eliminate the cause of the problem.



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### Switch-related errors

Items with a “\*” in the “Page” column should only be checked by a qualified technician.

Code	Cause	Remedy	Page
E010	Stop switch was pressed during standby.	Remove your finger from the stop switch (so that it is off).	1
E011	Stop switch was pressed during sewing.	Press the RESET key to clear the error. * Press the ▼ key to move the feed mechanism so that you can continue sewing.	36 53
E015	The stop switch was still being pressed, or there is a problem with the stop switch connection.	Turn off the power, and check the stop switch if it was not being pressed at the time.	19*
E016	Problem with the stop switch connection.	Turn off the power and check the connection of the stop switch connector P13 at the main P.C. board.	19*
E024	Start switch is being pressed.	Release the start switch (so that it turns off).	14 - 16
E025	Start switch was depressed after the power was turned on, or connection of start switch is defective.	Turn off the power and check if the start switch is pressed. If the start switch is not being pressed, check the switch connector P6 at the main P.C. board.	14 - 16 19*
E034	Work clamp switch is being pressed.	Release the work clamp switch (so that it turns off).	14 - 16
E035	Work clamp switch was depressed, or connection of work clamp switch is defective.	Turn off the power and check the work clamp switch.	14 - 16
E050	Machine head tilting was detected after the power was turned on.	Turn off the power, and then return the machine head to its original position. Check the connection of the machine head safety switch connector P9 at the main P.C. board.	11 19*
E051	Machine head tilting was detected while the sewing machine was operating.	Turn off the power, and then return the machine head to its original position. Check the connection of the machine head safety switch connector P9 at the main P.C. board.	11 19*
E055	Machine head tilting was detected when the power was turned on.	Turn off the power, and then return the machine head to its original position. Check the connection of the machine head safety switch connector P9 at the main P.C. board.	11 19*
E065	An operation panel key was still being pressed when the power was turned on, or key is faulty.	Turn off the power and check that no keys are being pressed.	36 37

**Upper shaft motor-related errors**

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

Code	Cause	Remedy	Page
E110	Needle up stop position error	Turn the upper shaft pulley until the point where the error display disappears.	38
E111	Needle up stop position error	Turn off the power, and check the connection of synchronizer connector P5 at the power supply motor P.C. board and zigzag sensor connector P10 at the main P.C. board.	19* 20*
E120	Needle drop signal could not be detected.	Turn off the power, and check the connection of the synchronizer connector P5 at the main P.C. board.	20*
E130	Sewing machine motor stopped due to a problem, or synchronizer is faulty.	Turn off the power, and then turn the upper shaft pulley and check if the sewing machine has locked up. Check that the upper shaft motor connector P4 and synchronizer connector P5 are connected at the power supply motor P.C. board.	20*
E131	Synchronizer is faulty.	Turn off the power, and check the connection of the synchronizer connector P5 at the power supply motor P.C. board.	20*
E132	Problem detected with sewing machine motor operation.	Turn off the power, and then turn the upper shaft pulley and check if the sewing machine has locked up. Check that the upper shaft motor connector P4 and synchronizer connector P5 are connected at the power supply motor P.C. board.	20*
E133	Sewing machine motor stopping position is incorrect.	Turn off the power, and then turn the upper shaft pulley and check if the sewing machine has locked up. Check that the upper shaft motor connector P4 and synchronizer connector P5 are connected at the power supply motor P.C. board.	20*
E140	Sewing machine motor operated in reverse during sewing.	Turn off the power, and then turn the upper shaft pulley and check if the sewing machine has locked up. Check that the upper shaft motor connector P4 and synchronizer connector P5 are connected at the power supply motor P.C. board.	20*
E150	Sewing machine motor is overheating, or temperature sensor is faulty.	Turn off the power, and then turn the upper shaft pulley and check if the sewing machine has locked up. Check that the upper shaft motor connector P4 and synchronizer connector P5 are connected at the power supply motor P.C. board.	20*

## 11. ERROR CODES

### Feed mechanism-related errors

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

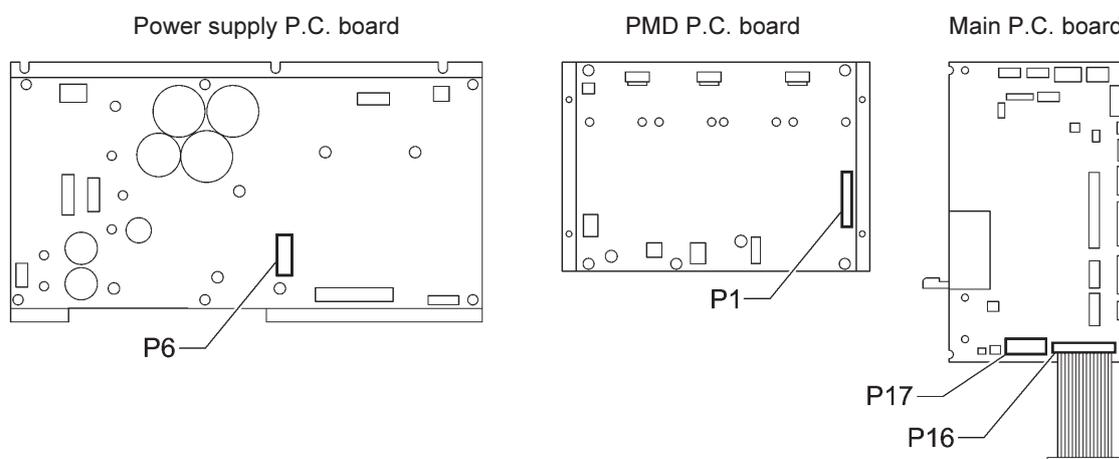
Code	Cause	Remedy	Page
E200	X-feed motor home position cannot be detected. Problem with X-feed motor or poor X home position sensor connection.	Turn off the power, and then check that the X-feed motor connector P10 is connected at the PMD P.C. board and that the X pulse motor encoder connector P20 is connected at the main P.C. board.	19* 20*
E201	X-feed motor stopped due to a problem.	Turn off the power, and then check if there are any problems in the X-feed direction.	*
E210	Y-feed motor home position cannot be detected. Problem with Y-feed motor or poor Y home position sensor connection.	Turn off the power, and then check that the Y-feed motor connector P8 is connected at the PMD P.C. board and that the Y pulse motor encoder connector P4 and sensor connector P8 are connected at the main P.C. board.	19* 20*
E211	Y-feed motor stopped due to a problem.	Turn off the power, and then check if there are any problems in the Y-feed direction.	*
E220	$\theta$ -feed motor home position cannot be detected. Problem with $\theta$ -feed motor or poor $\theta$ home position sensor connection.	Turn off the power, and then check that the $\theta$ -feed motor connector P3 is connected at the PMD P.C. board and that the $\theta$ -feed motor encoder connector P5 is connected at the main P.C. board.	19* 20*
E221	$\theta$ -feed motor stopped due to a problem.	Turn off the power, and then check if there are any problems in the $\theta$ -feed direction.	*

**Communication and memory-related errors**

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

For items with "\*\*" appearing in the "Page" column, ask the place of purchase for advice.

Code	Cause	Remedy	Page
E401	Connection error detected between the main P.C. board and power supply motor P.C. board when the power was turned on.	Turn off the power, and then check that connector P17 on the main P.C. board and connector P6 on the power supply motor P.C. board are properly connected.	19* 20* 120*
E403	Communication error detected between the main P.C. board and PMD P.C. board when the power was turned on.	Turn off the power, and then check that connector P16 on the main P.C. board and connector P1 on the PMD P.C. board are properly connected.	19* 20* 120*
E410	Communication error between main P.C. board and panel P.C. board detected.	Turn off the power, and then check that the operation panel connector P1 is connected at the main P.C. board.	19*
E411	Communication error between main P.C. board and power supply motor P.C. board detected.	Turn off the power, and then check that connector P17 on the main P.C. board and connector P6 on the power supply motor P.C. board are properly connected.	120*
E420	No CF card is inserted. (No messages are displayed.)	Turn off the power, and then insert a CF card into the CF card slot of the control box.	**
E422	Error occurred while reading CF card.	Check the data on the CF card.	**
E424	Insufficient free space on CF card.	Use a different CF card.	**
E425	Error occurred while writing to CF card.	Use the specified type of CF card.	**
E430	Problem with flash memory on main P.C. board.	Turn the power off and then back on again.	38
E440	Problem with EEPROM on main P.C. board.	Turn the power off and then back on again.	38
E450	Model selection cannot be read from the machine head memory.	Turn off the power, and check the connection of the machine head memory connector P3 at the power supply motor P.C. board.	20*
E451	Data cannot be backed up to machine head memory.	Turn the power off and then back on again.	38
E480	Problem with RAM on main P.C. board.	Turn the power off and then back on again.	38

**[P.C. board and connector positions]**

0535B

## 11. ERROR CODES

### Software-related errors

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

Code	Cause	Remedy	Page
E569	Program version error between main and motor detected.	Press the RESET key to clear the error. * This error is displayed when a power supply motor P.C.board for a different model is installed. Replace with the power supply motor P.C.B. for the RH-9820 as soon as possible.	20*
E580	Error in EEPROM version detected.	Turn off the power and carry out level 3 initialization.	62
E581	Error in memory switch version detected.	Turn off the power and carry out level 2 initialization.	62
E582	Error in parameter data version detected.	Turn off the power and carry out level 1 initialization.	62

### Device-related errors

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

Code	Cause	Remedy	Page
E630	Lower thread trimmer does not operate, or lower thread trimming sensor is faulty.	Turn off the power, and then check that the valve harness connector and sensor connector are inserted at the main P.C. board.	19*
E650	Hammer is lowered, or hammer position sensor is faulty.	Turn off the power, and then check that the hammer valve harness connector and hammer position sensor connector are inserted at the main P.C. board.	19*
E651	Hammer is not lowered, or hammer position sensor is faulty.	Turn off the power, and then check that the hammer valve harness connector and hammer position sensor connector are inserted at the main P.C. board.	19*

### P.C. board-related errors

Items with a "\*" in the "Page" column should only be checked by a qualified technician.

Code	Cause	Remedy	Page
E700	Abnormal rise in power supply voltage.	Turn off the power and check the input voltage.	23*
E701	Abnormal rise in sewing machine motor drive voltage.	Turn off the power, and then check the voltage.	20*
E705	Abnormal drop in power supply voltage.	Turn off the power and check the input voltage.	23*
E710	Abnormal current detected in sewing machine motor.	Turn off the power, and then check if there are any problems with the sewing machine.	*
E719	Problem detected with PMD P.C. board.	Turn off the power, and then check the PMD P.C. board.	20*
E740	Cooling fan does not operate.	Turn off the power, and then check that the cooling fan sensor connector is connected at the main P.C. board.	19*

If an error code that is not listed above appears or if carrying out the specified remedy does not solve the problem, contact the place of purchase.

## 12. TROUBLESHOOTING

- If there is a problem with operation, first check that the threads are correctly threaded and that the needle is correctly installed.
- Please check the following points before calling for repairs or service.
- If the following remedies do not fix the problem, turn off the power switch and consult a qualified technician or the place of purchase.

### CAUTION



Turn off the power switch and disconnect the power cord before carrying out troubleshooting. Otherwise the machine may operate if the start switch is pressed by mistake, which could result in serious injury.

Problem	Cause	Remedy	Page
Thread breaks	Thread tension is too strong.	Adjust the thread tension to the correct tension.	55
	Needle is not installed correctly.	Install the needle so that it faces correctly.	30
	Thread is too thick for the needle.	Select a thread which is suitable for the needle.	55
	Needle and looper adjustment is incorrect.	Adjust the clearance between the needle and looper, the needle bar height or the looper and spreader height.	71, 78 79
	Needle, looper, spreader, throat plate or thread path is damaged.	Repair or replace the respective part(s).	
	Thread is not threaded correctly.	Thread the thread correctly.	31 - 34
Skipped stitches occur.	Upper thread tension is too strong or too weak.	Adjust the upper thread tension to the correct tension.	55
	Needle point is broken or bent.	Replace with a new needle.	30
	Clearance between needle and looper tip is incorrect.	Adjust the clearance between the needle and looper tip.	79
	Needle, looper and spreader adjustment is incorrect.	Adjust correctly.	71 76 - 81
	Needle and needle guard adjustment is incorrect.	Adjust the needle guard.	79
	Looper tip is blunt.	Repair with an oilstone or replace the looper with a new one.	
	Needle is not installed correctly.	Install the needle so that it faces correctly.	30
	Needle is too thin.	Select a needle that is suitable for the sewing conditions.	55

## 12. TROUBLESHOOTING

Problem	Cause	Remedy	Page
Broken needle	Needle is bent.	Replace with a new needle.	30
	Needle, looper and spreader adjustment is incorrect.	Adjust correctly.	71 76 - 81
	Needle guard is covering the needle too far.	Adjust the needle guard.	79
	Needle is too thin.	Select a needle that is suitable for the sewing conditions.	55
Upper thread is not cut.	Upper movable knife is blunt.	Replace the upper movable knife with a new one.	96, 97
	Upper movable knife does not move to the full stroke because air pressure is too weak.	Adjust the air pressure.	25
	Upper movable knife is not picking up the upper thread.	Install the upper movable knife so that it cuts only one side of the upper thread loop.	97
	Upper movable knife is not picking up the upper thread because the last stitch is being skipped.	Refer to the remedies given under "Skipped stitches occur" in this troubleshooting chart.	122
	Upper movable knife position is incorrect.	Adjust the position of the upper movable knife.	97
Lower thread is not cut.	Movable knife is blunt.	Replace the movable knife with a new one.	99, 104
	Movable knife does not move to the full stroke because air pressure is too weak.	Adjust the air pressure.	25
	Movable knife position is incorrect.	Adjust the position of the movable knife or the thread handler.	100, 103 105
	Cutting pressure for lower thread trimming is too weak.	Adjust to an appropriate cutting pressure.	100, 104
Thread unravelling at sewing start	Lower thread is not being held.	Adjust the lower thread nipper (-01 specifications) or the lower thread presser (-02 specifications).	101, 103 108
	Upper thread length is too short after trimming.	Adjust the sub tension.	55
	Not enough upper thread is being fed out.	Adjust the amount of upper thread being fed out.	95
	Upper thread loops are uneven.	Set slow start and bar tacking.	42, 43
Material is not being cut cleanly.	Cutting pressure is too weak.	Adjust the cutting pressure so that it is strong enough.	90
	Knife and hammer are not contacting properly.	Grind the hammer surface.	84
	Knife is blunt.	Replace the knife with a new one.	87
Poor thread tightening	Upper thread tension is too strong or too weak.	Adjust the upper thread tension to the correct tension.	55
	Lower thread tension is too strong or too weak.	Adjust the lower thread tension to the correct tension.	55
	Tension or stroke of thread take-up spring is incorrect.	Adjust the tension and stroke of the thread take-up spring.	55



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