

# LZ2-B855E LZ2-B856E

SERVICE MANUAL



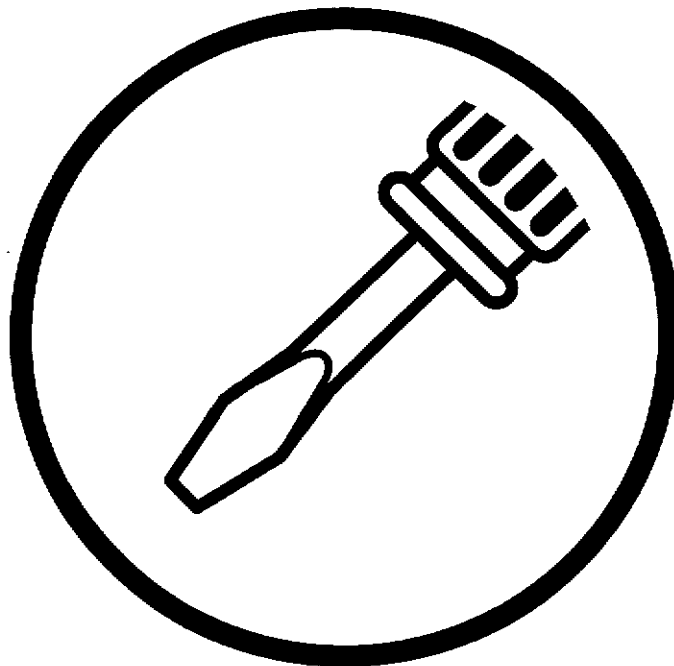
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Please read this manual before making any adjustments.

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ELECTRONIC SINGLE NEEDLE ZIGZAG LOCK STITCHER

ELECTRONIC SINGLE NEEDLE ZIGZAG LOCK STITCHER WITH THREAD TRIMMER



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**brother**<sup>®</sup>

This service manual is intended for B855E, B856E; be sure to read the B855E, B856E instruction manual before this manual.

Carefully read the "SAFETY INSTRUCTIONS" below and the whole of this manual to understand this product before you start maintenance.

As a result of research and improvements regarding this product, some details of this manual may not be the same as those for the product you purchased.



If you have any questions regarding this product, please contact a Brother dealer.

## SAFETY INSTRUCTIONS

### 1 Safety indications and their meanings


This service 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 almost certainly result in death or severe 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 face plate 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 high-frequency welders. 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 electrical consumption. Insufficient power supply capacity 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.



Avoid exposure to direct sunlight during use. Exposure to direct sunlight 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 more than 37 kg. The installation should be carried out by two or more people.



Do not connect the power cord until installation is complete, otherwise the machine may operate if the treadle is pressed by mistake, which could result in injury.



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, otherwise there is the danger that fire or electric shocks could occur.



Install the belt covers to the machine head and motor.



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 no oil gets into your eyes or onto your skin, otherwise inflammation can result.




Furthermore, do not drink the oil under any circumstances, as it can cause vomiting and diarrhea. 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, otherwise the machine may operate if the treadle is pressed by mistake, which could result in injury.
  - When threading the needle
  - When replacing the needle and bobbin
  - When not using the machine and when leaving the machine unattended
-  If the actuator is pressed by mistake when using the correction sewing function, the needle will move in a zigzag motion while the machine is operating, and injury may result.
-  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.
-  For machines with automatic presser lifter, do not touch the solenoid section, otherwise burns may result.
-  If an error occurs in machine, 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 cleaning, otherwise the machine may operate if the treadle is pressed by mistake, which could result in injury.
-  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 no oil gets into your eyes or onto your skin, otherwise inflammation can result. Furthermore, do not drink the oil under any circumstances, as it can cause vomiting and diarrhoea. 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 from the wall outlet at the following times, otherwise the machine may operate if the treadle is pressed by mistake, which could result in injury.
  - When carrying out inspection, adjustment and maintenance
  - When replacing consumable parts such as the rotary hook
-  If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
-  Turn off the power switch before connecting and disconnecting the plugs, otherwise damage to the control box may result.
-  If using a work table which has casters, the casters should be secured in such a way so that they cannot move.
-  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>⚠ DANGER</b>	<b>⚠ GEFAHR</b>	<b>⚠ DANGER</b>	<b>⚠ PELIGRO</b>
	Hazardous voltage will cause injury.	Hochspannung verletzungsgefahr!	Un voltage non adapté provoque des blessures.	Un voltaje inadecuado puede provocar las heridas.
	Turn off main switch and wait 10 minutes before opening this cover.	Bitte schalten sie den hauptschalter aus und warten sie 10 minuten, bevor sie diese abdeckung öffnen.	Eteindre l'interrupteur et attendre 10 minutes avant d' ouvrir le capot	Apagar el interruptor principal y esperar 10 minutos antes de abrir esta cubierta.

2

<b>⚠ CAUTION</b>	
	Moving parts may cause injury.
	Operate with safety devices. Turn off main switch before changing needle, cleaning etc.

#### Safety devices

- ① Finger guard
- ② Thread take-up guard cover
- ③ Belt cover
- ④ Belt casting prevention guide
- ⑤ finger guard, etc.

3

	<b>⚠ 注意</b>	
	高温部 さわるとやけどすることがある。通電中はさわらないこと。	
	<b>⚠ CAUTION</b>	<b>⚠ ACHTUNG</b>
	Heated cover may burn hands. Do not touch when operating.	Verbrennungsgefahr! Deckel bei Bedienung nicht berühren!
<b>⚠ ATTENTION</b>	<b>⚠ ATENCION</b>	
Couvercle chaud risque de brûler les mains. Ne pas toucher pendant le fonctionnement.	La tapa caliente puede quemarle las manos. No tocar estando en marcha.	

4



- If the actuator is pressed by mistake when using the correction sewing function, the needle will move in a zigzag motion while the machine is operating, and injury may result.

5



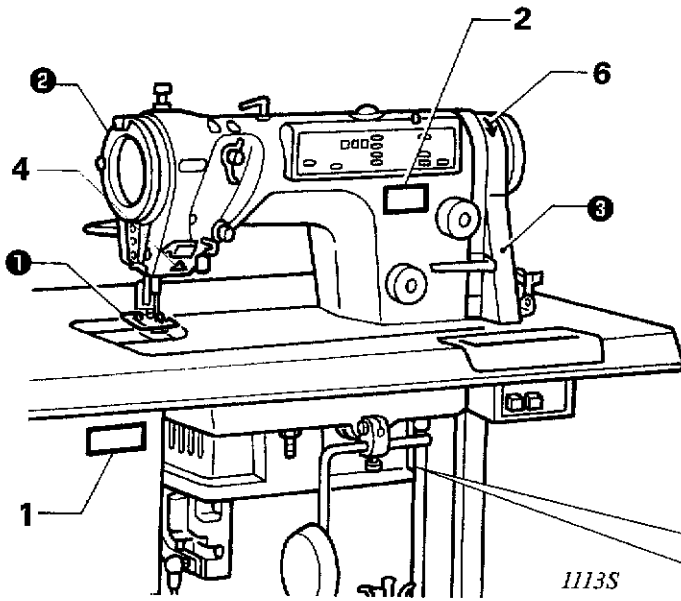
- Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.



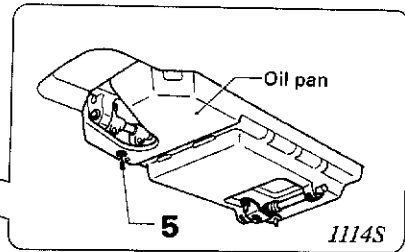
6



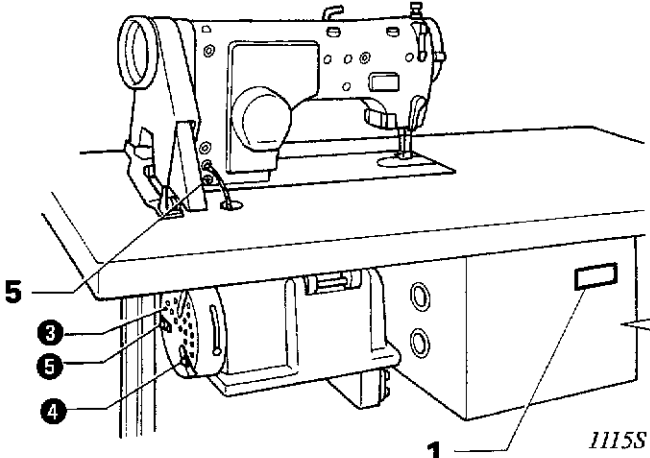
- Direction of operation



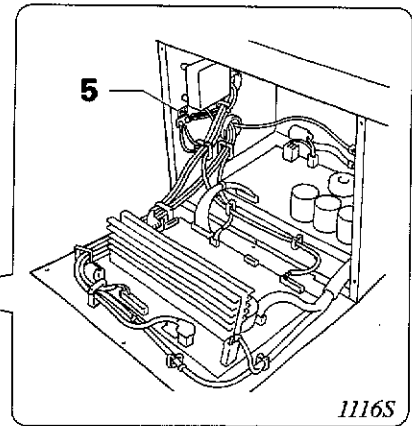
1113S



1114S

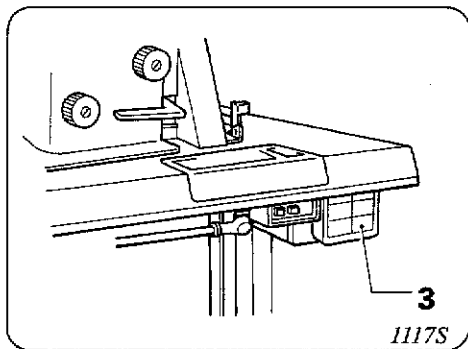


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1116S

- Automatic presser foot lifter (B856E-90  option)



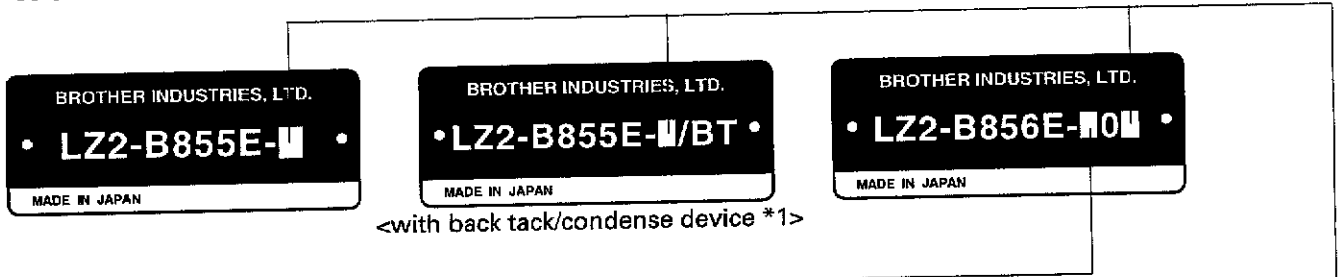
1117S

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# 1. MACHINE SPECIFICATIONS

## 1. MACHINE SPECIFICATIONS



B856E	3	4	9
Thread trimmer	Solenoid		
Upper thread feeding device	Solenoid		
Back tack/condense device *1	Solenoid		
Thread wiper	Solenoid		
Automatic presser foot lifter	Solenoid		

\*1 ... Used for sewing condensed stitches and backtack stitches.

	B855E		B856E	
	General (foundation)	General (long stitch)	General (foundation)	General (long stitch)
	-1	-3	-□01	-□03
Use	For light-weight materials-medium-weight materials			
Maximum stitch length	2.5mm	5mm	2.5mm	5mm
Max. sewing speed	5,000rpm*3			
Sewing pattern	14 patterns of eight types built-in (Up to 99 different types of custom-made patterns can be added*4)			
Max. zigzag width	10mm (Standard factory setting: 8mm)			
Thread take-up lever	Rotary thread take-up			
Needle bar stroke	33.3mm			
Feed dog height	1mm			
Presser foot height	Presser bar lifter	6mm		
	Knee lifter	10mm		
	Automatic	7mm		
Presser foot pressure	20-60N*5	20-60N	20-60N*5	20-60N
Needle	Schmets SY 1965 Nm 70/10			
Motor	Three-phase 400 W induction motor			
Power supply	Single-phase/Eine Phase 110V, 220V, 230V Maximum electric power consumption: 600 VA			

\*2 ... If fine adjustments to the stitch length are needed, use "General (foundation)".

\*3 ... At the time of shipment from the factory, the maximum sewing speed is set to 4,500 rpm. If you would like to sew at speeds higher than this, change the setting of the DIP switch inside the control box. (Refer to instruction manual page 163.)

Furthermore, the maximum sewing speed may be limited by the type of sewing pattern and the zigzag width. (Refer to instruction manual page 84.)





\*4 ... The maximum number of custom-made patterns that can be stored is 99 patterns with a total of 10,000 stitches, at 500 stitches or less per pattern.


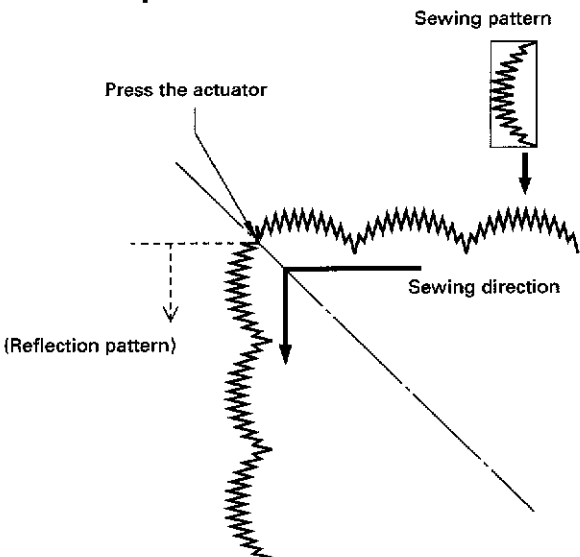









\*5 ... If you would like to reduce the pressure of the presser foot (such as when sewing light-weight materials), replace the compression spring with the accessory spring. (Refer to instruction manual page 134.)



## 2. SEWING PATTERN TABLE

- This sewing machine is equipped with the following built-in sewing patterns. Select the pattern number from the operation panel to use a pattern. (Refer to instruction manual page 71.)
- Different zigzag widths and zigzag lengths can be set for each sewing pattern. (Refer to instruction manual page 53 and 77.)

	Sewing pattern	Pattern no. (LED display)	Notes
Straight stitch		1 - -	
Plain zigzag		2 - -	
2-step zigzag		3 - -	
3-step zigzag		4 - -	

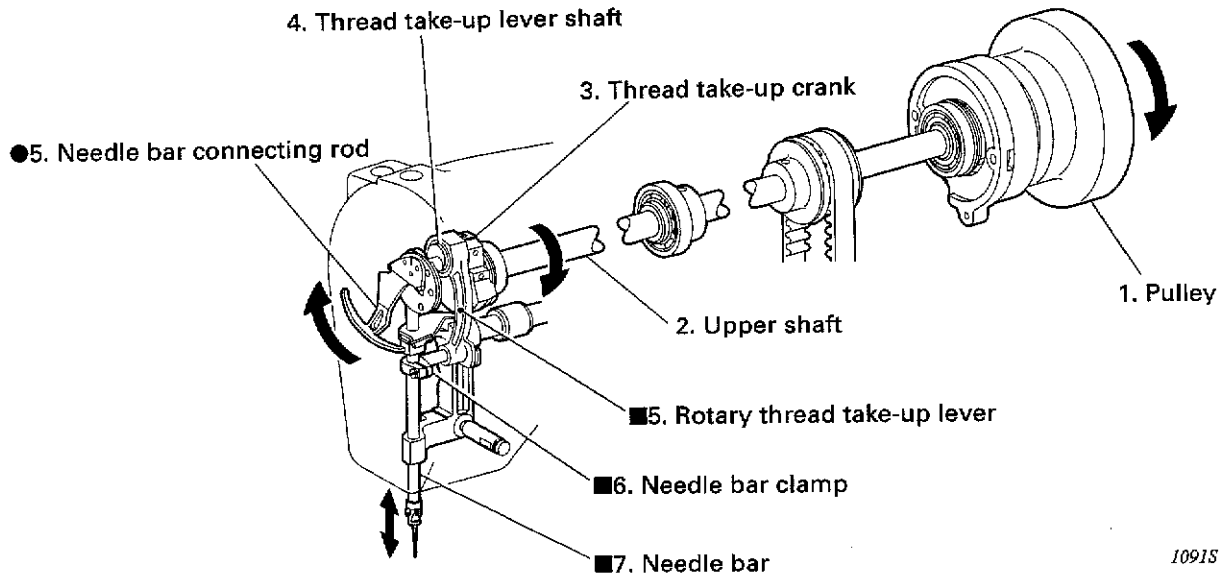
Scallop (left)	Crescent scallop (24sts.) 	5 1 ■ (R)	<p>If (R) is set in the column marked with ■, a reflection pattern can be sewn by stopping the sewing machine and then pressing the actuator. (Refer to instruction manual page 73.)</p> <p><b>&lt;Reflection pattern&gt;</b></p> 
	Even scallop (12sts.) 	5 2 ■ (R)	
	Standard scallop (24sts.) 	5 3 ■ (R)	
	Even scallop (24sts.) 	5 4 ■ (R)	
Scallop (right)	Crescent scallop (24sts.) 	6 1 ■ (R)	
	Even scallop (12sts.) 	6 2 ■ (R)	
	Standard scallop (24sts.) 	6 3 ■ (R)	
	Even scallop (24sts.) 	6 4 ■ (R)	
Blind stitch (left)		7 * *	<p>In the columns marked with ■, the number of stitches sewn in a straight line can be set within the range of 1 to 99 stitches.</p> <p>■ 1-99 (No. of stitches)</p>
Blind stitch (right)		8 * *	
Custom made pattern		9 * *	<p>Sewing patterns created using the BAS-PC/300 (optional device) can be sewn.</p> <p>(The pattern number is set in the columns marked with [*].)</p>

### 3. MECHANICAL DESCRIPTIONS

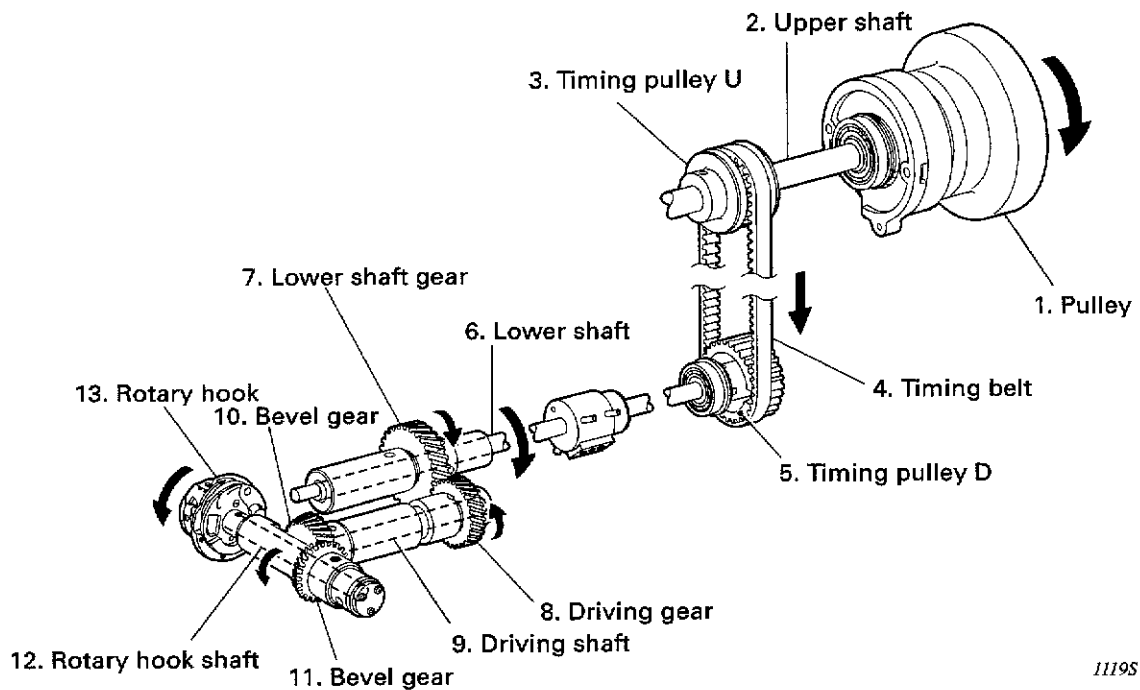
## 3. MECHANICAL DESCRIPTIONS

Operate in the order of the numbers in the illustration.  
The ●, ■ and other symbols with the numbers indicate different sequences of operation which can occur at the same time.

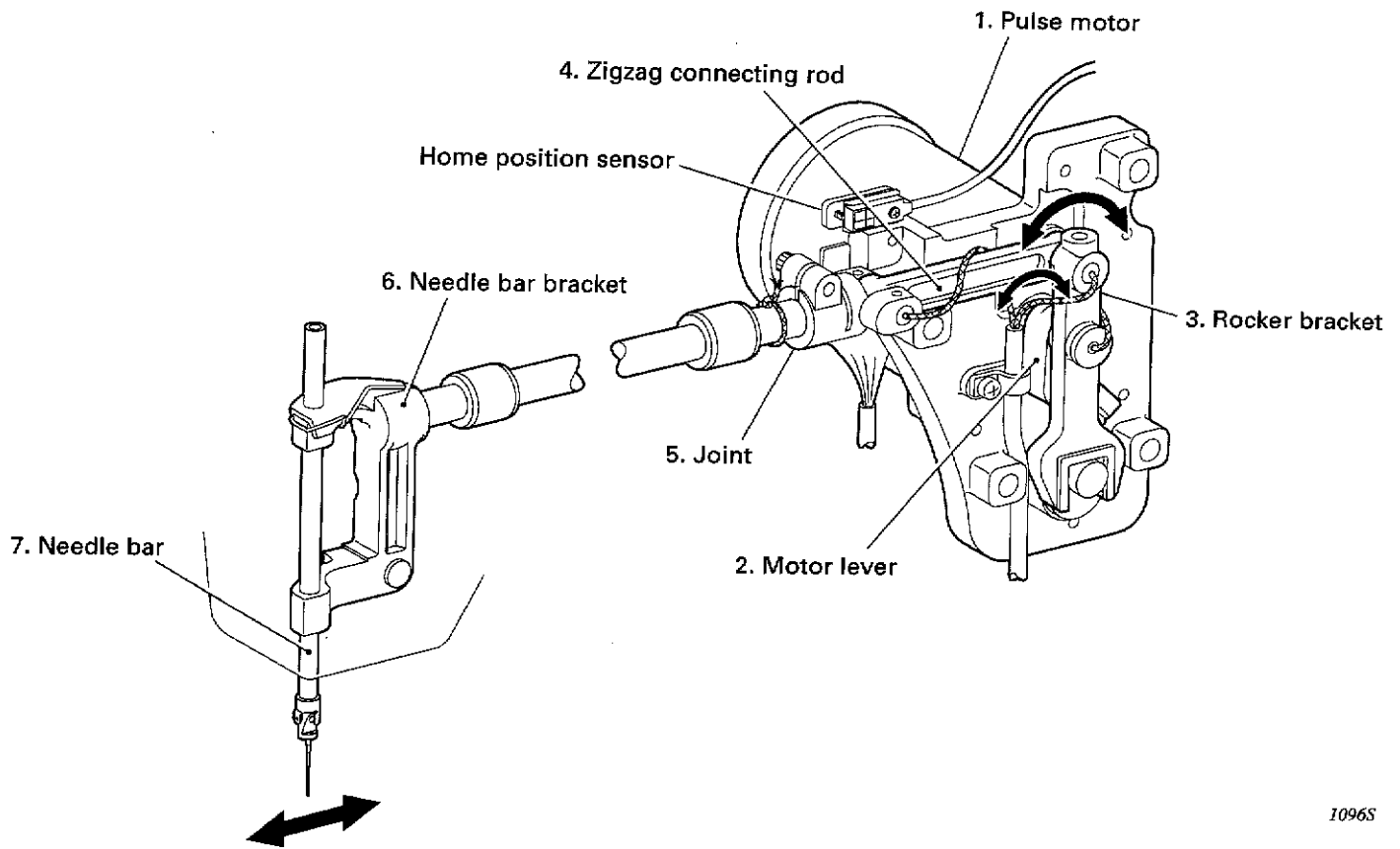
### 3-1. Needle bar and thread take-up mechanism



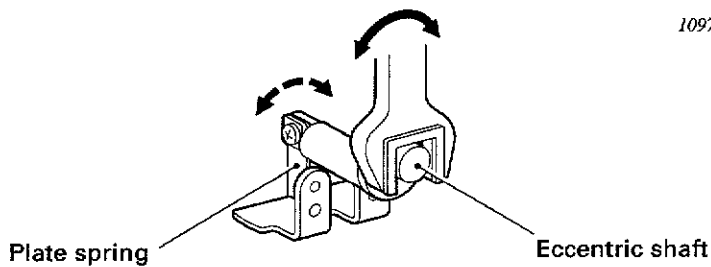
### 3-2. Lower shaft and rotary hook mechanism



3-3. Zigzag mechanism



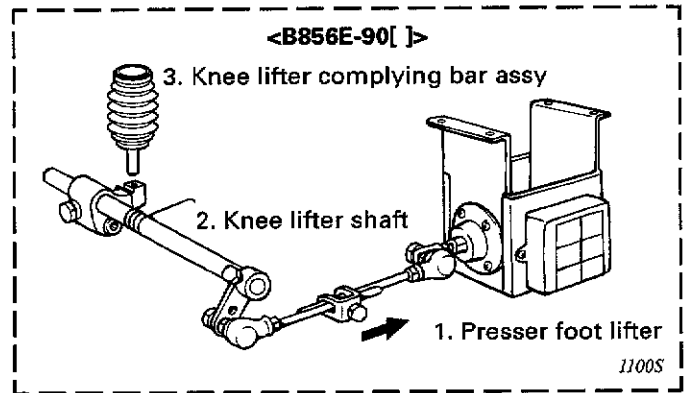
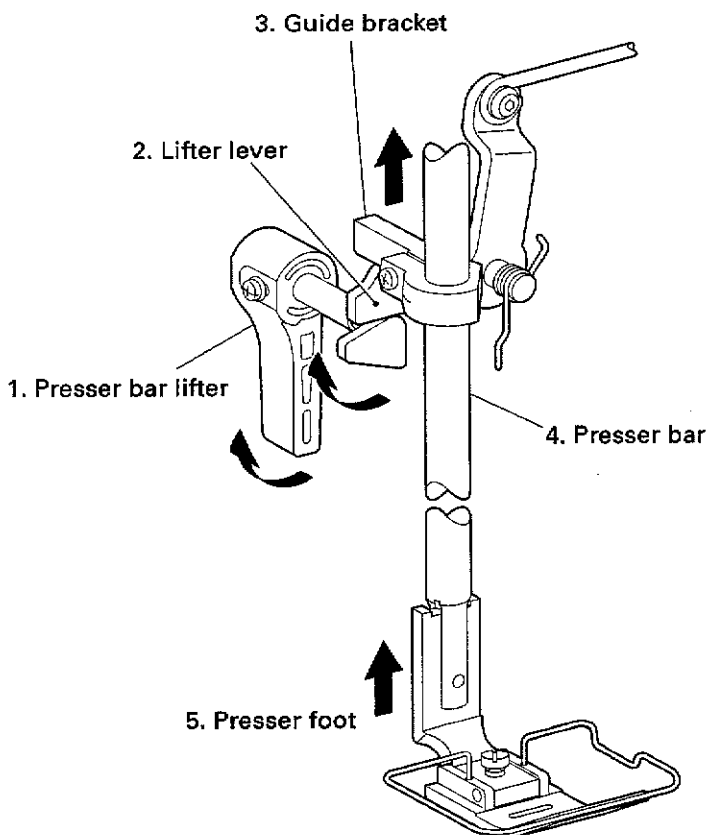
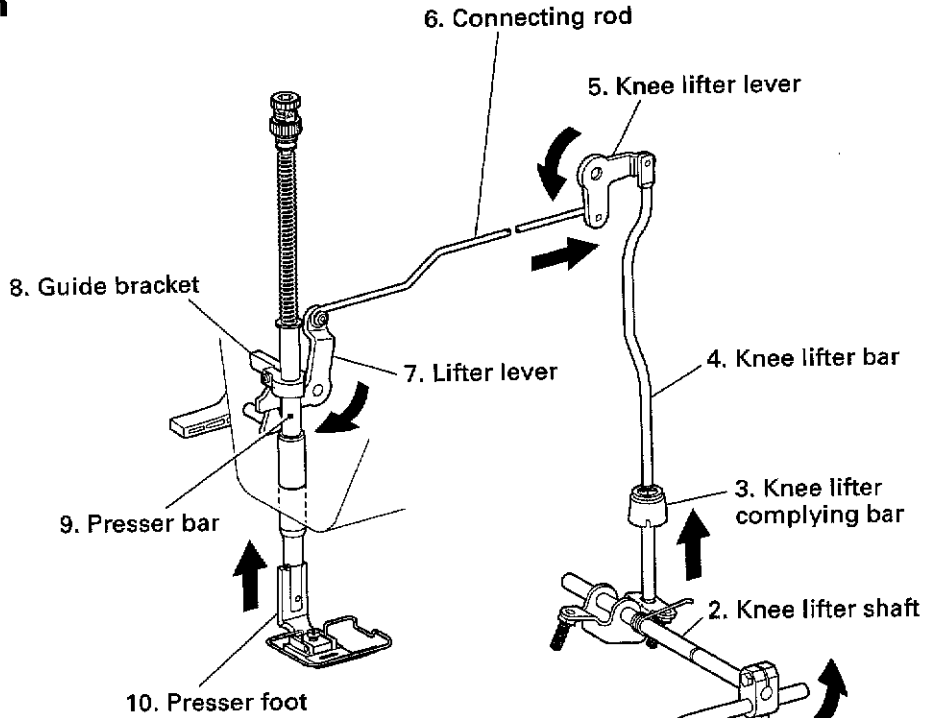
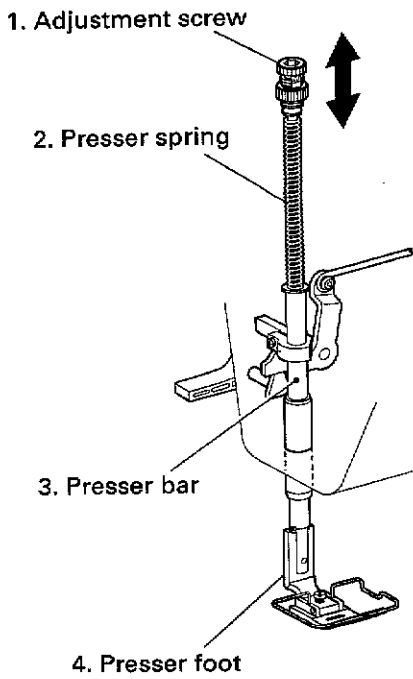
<High-speed damper mechanism>



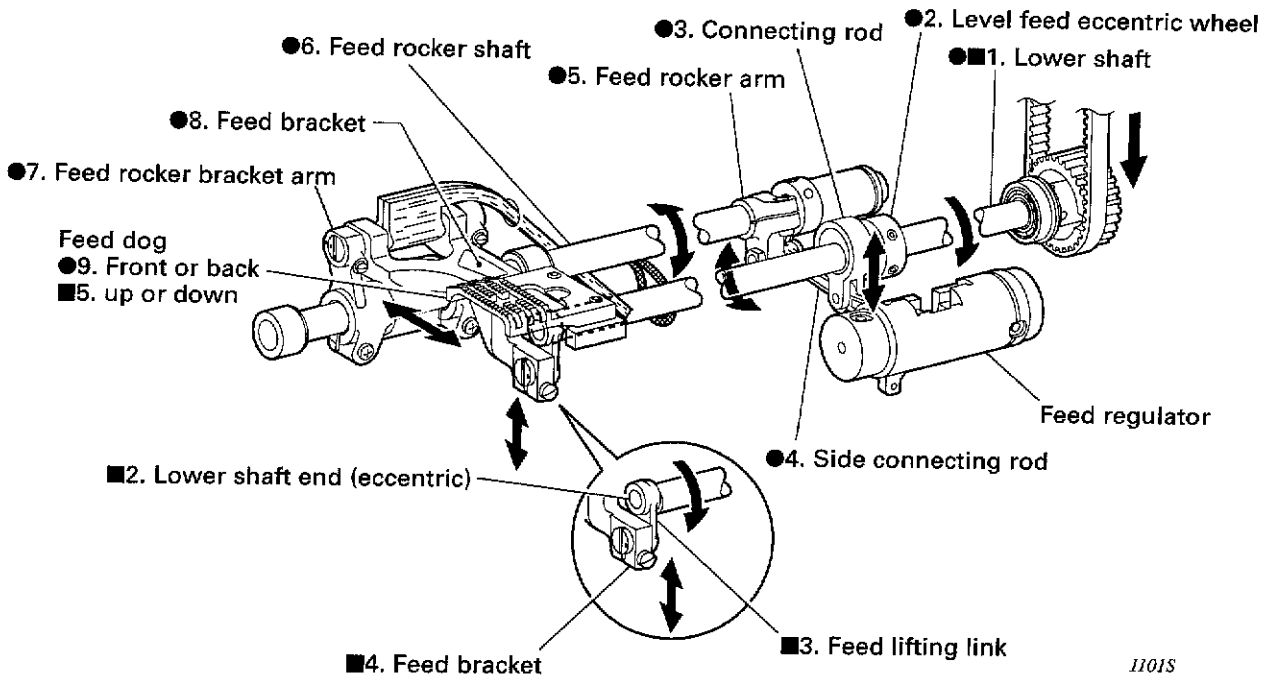
When pulse motors are used for high-speed drive control, vibration inevitably occurs. This new mechanism uses a spring plate to absorb the inertial reaction force generated during high-speed operation quickly and efficiently. The new electronic zigzag mechanism allows sewing at high speed with no pattern distortion.

### 3. MECHANICAL DESCRIPTIONS

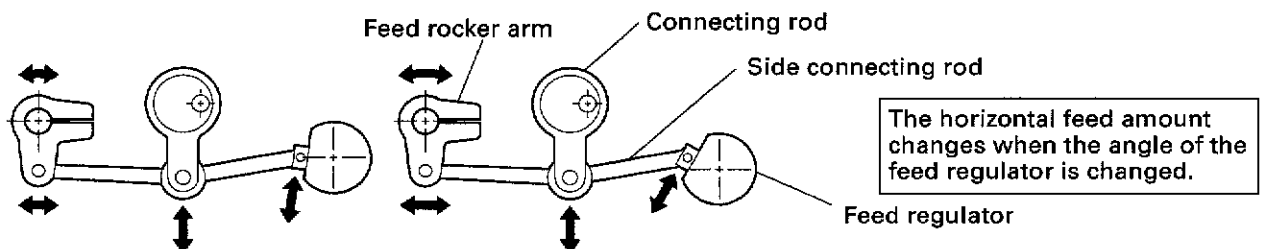
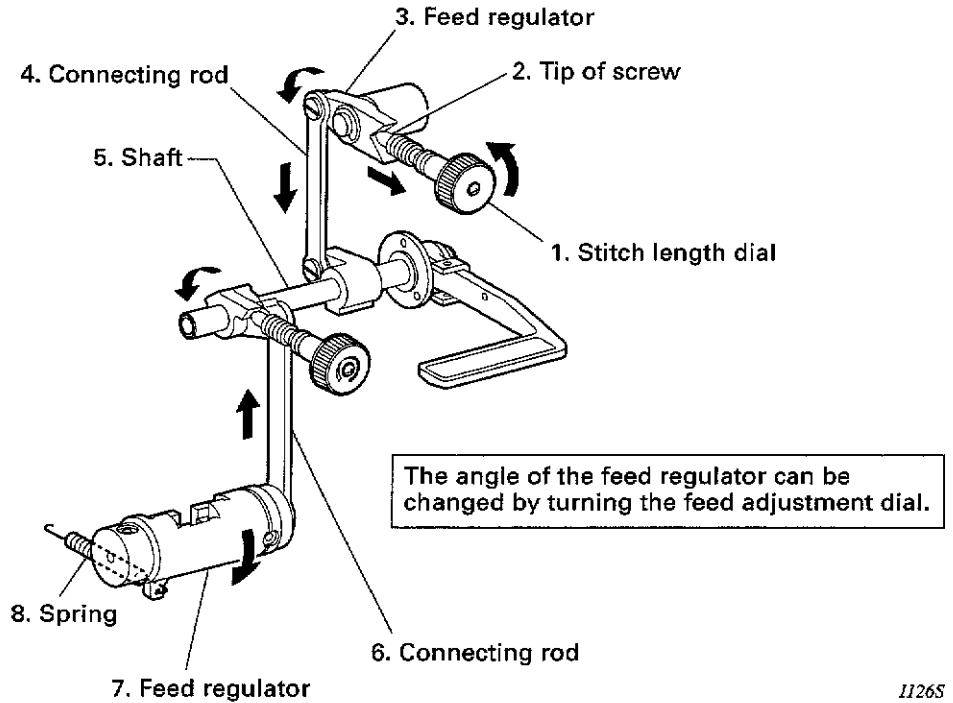
#### 3-4. Presser foot mechanism



3-5. Feed mechanism



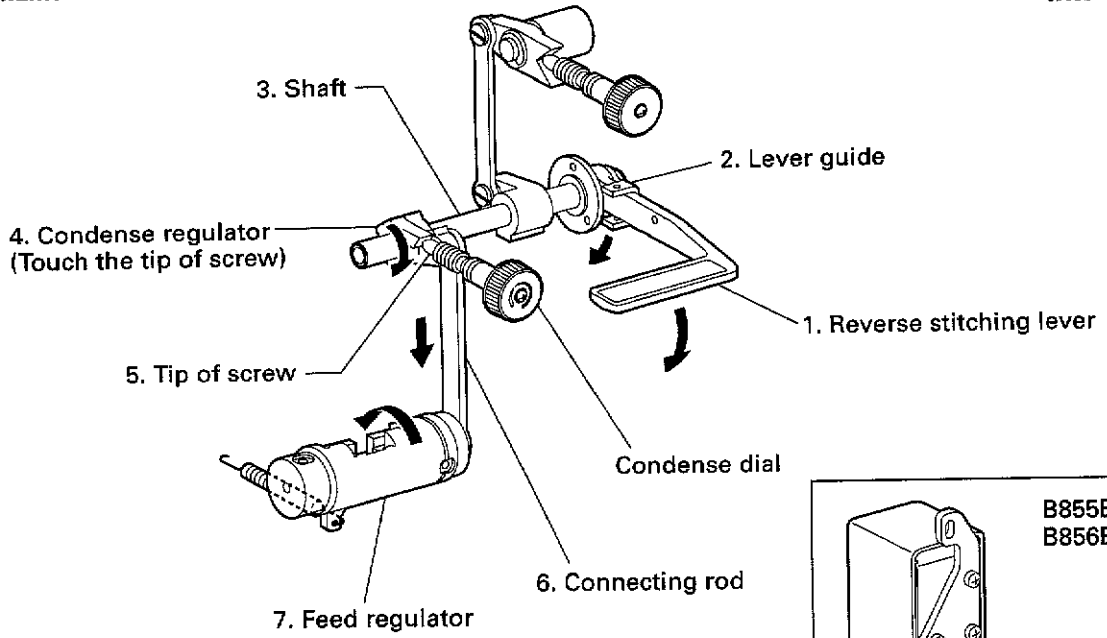
<Dial feed mechanism>



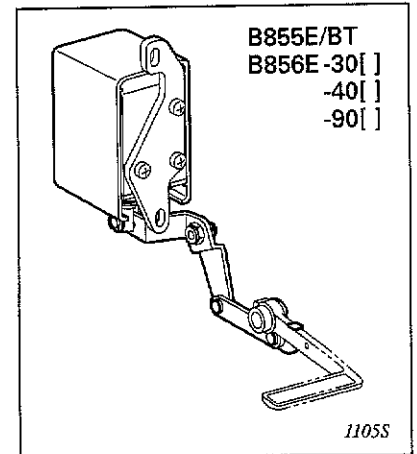
### 3. MECHANICAL DESCRIPTIONS

#### < Back tack mechanism >

11025

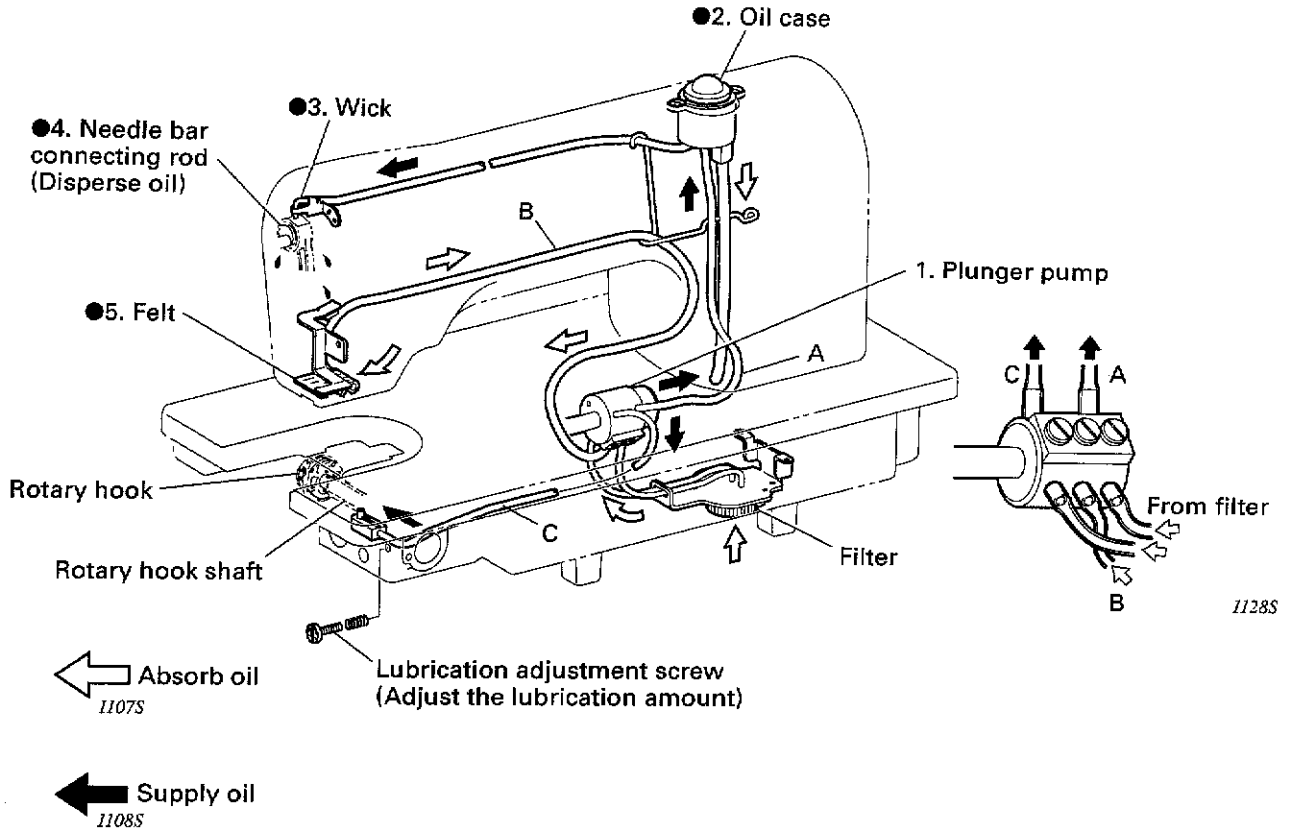


The angle of the feed regulator when the backtack lever is pressed down can be changed by adjusting the condense dial. When the condense dial is turned to the - (minus) side of the scale, the angle of the feed regulator becomes greater and reverse feeding is carried out.

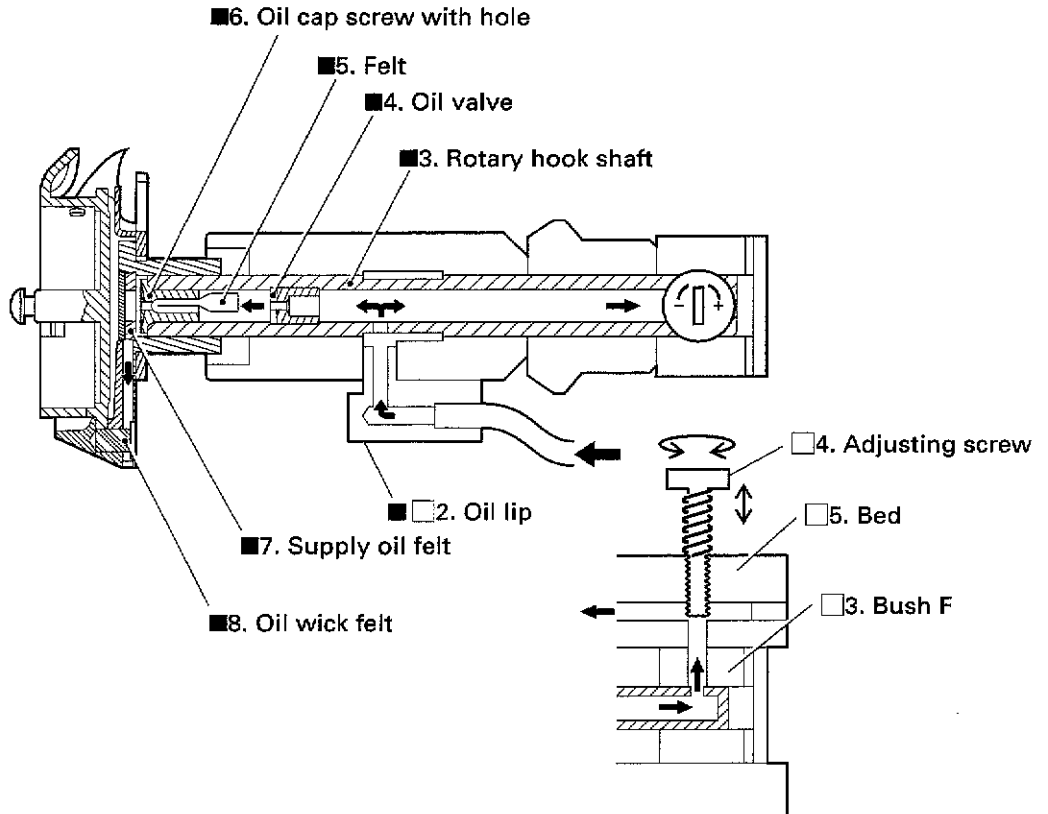


3-6. Lubrication

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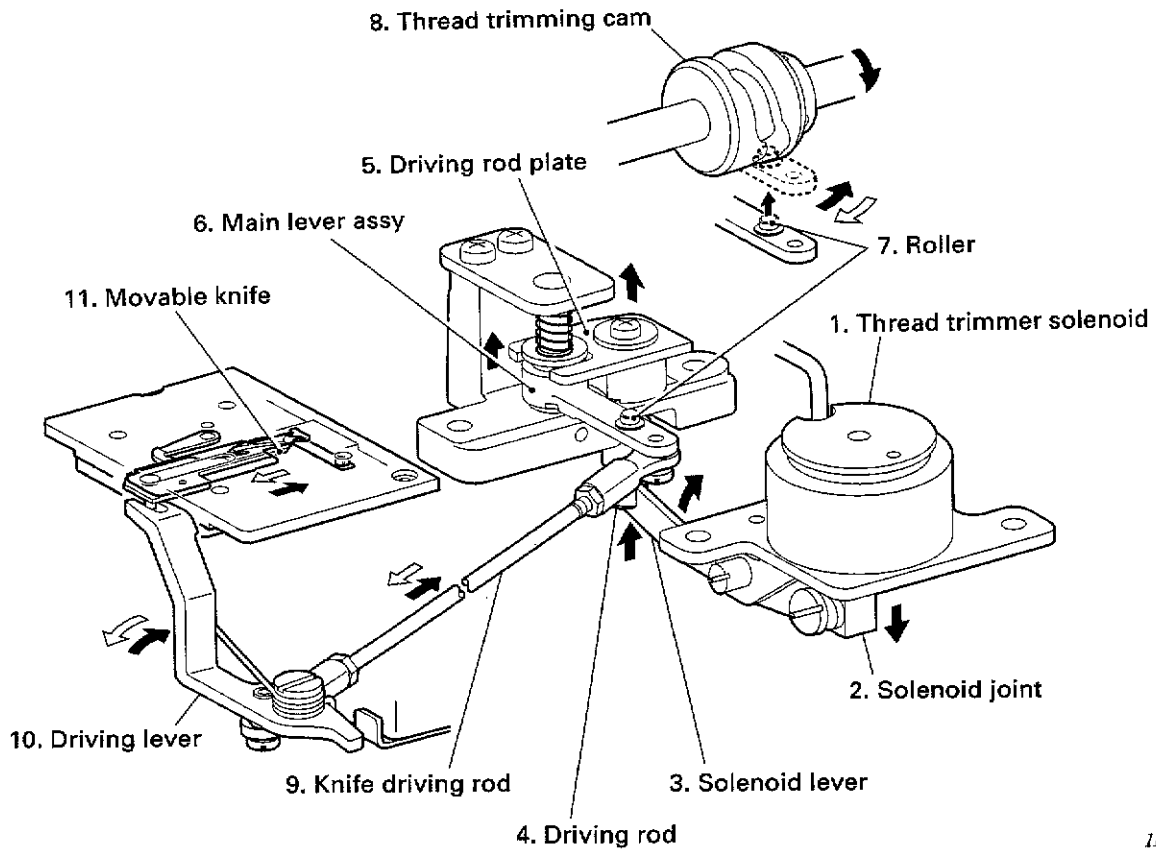
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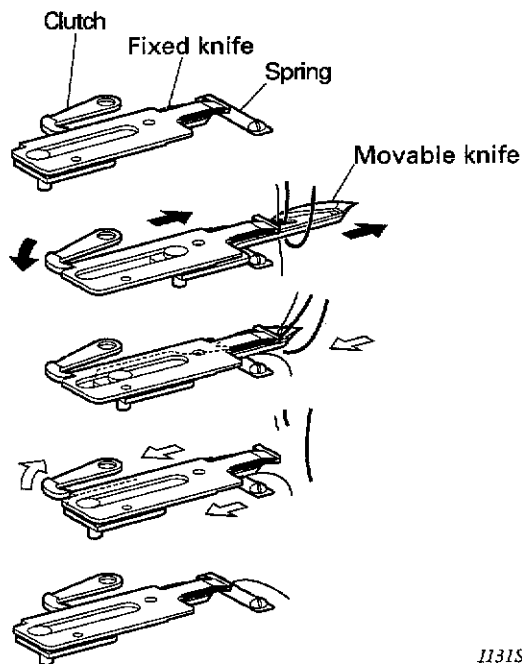
1129S

### 3. MECHANICAL DESCRIPTIONS

#### 3-7. Thread trimmer mechanism (B856E)



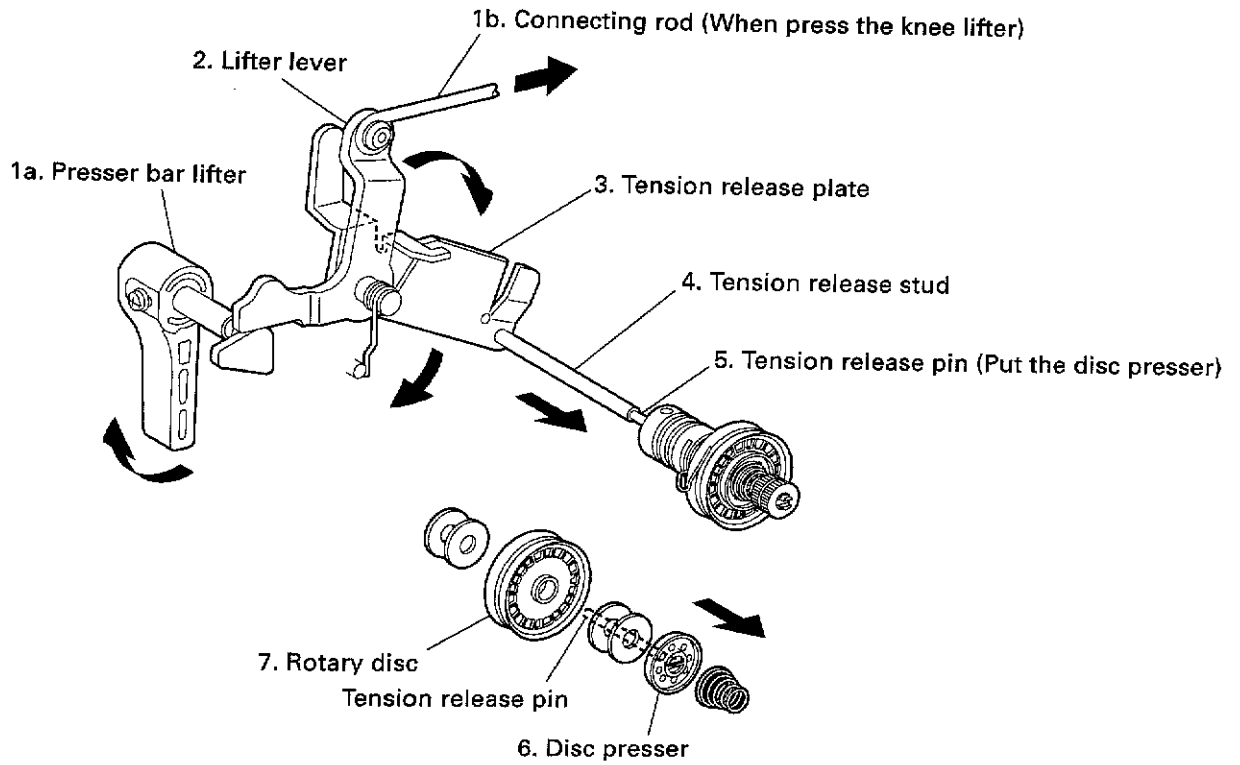
11305



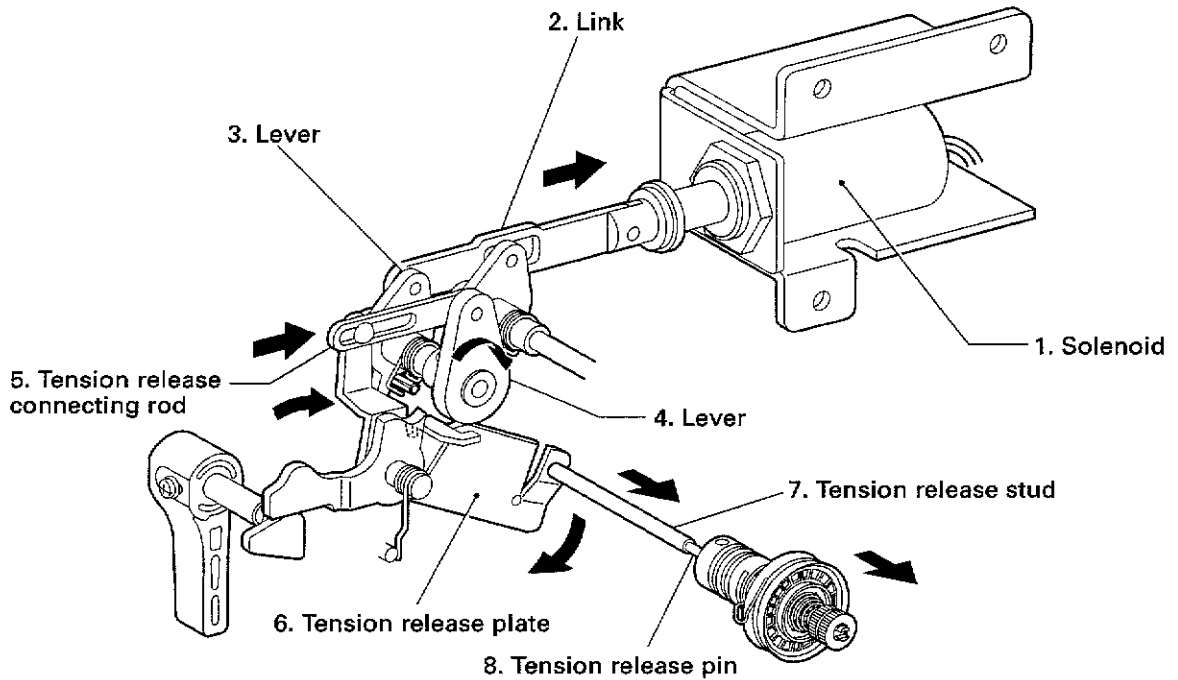
1131S



3-8. Tension release mechanism



<Tension release of thread trimming (B856E)>



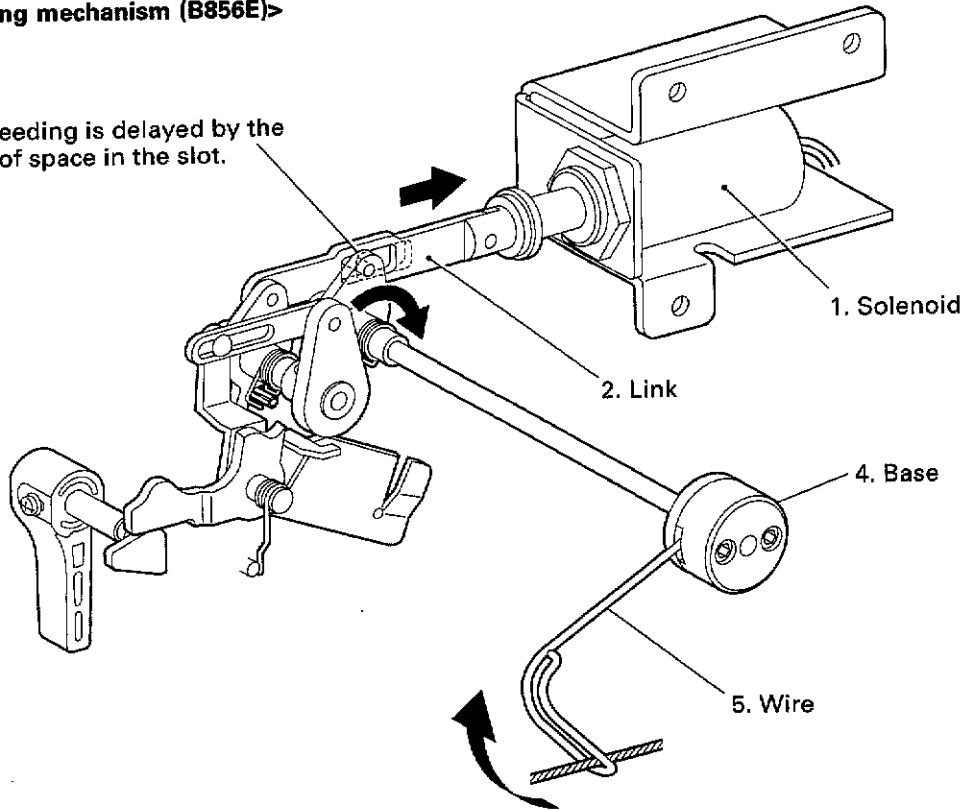
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### 3. MECHANICAL DESCRIPTIONS

#### <Upper thread feeding mechanism (B856E)>

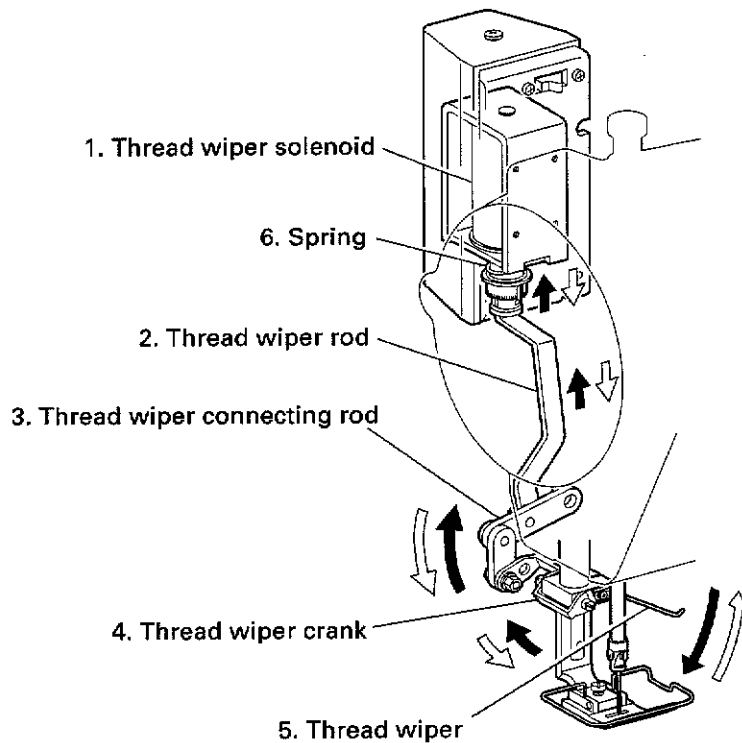
**3. Lever**

Thread feeding is delayed by the amount of space in the slot.



11125

#### 3-9. Thread wiper mechanism (B856E)



11325



4. DISASSEMBLY

4. DISASSEMBLY

**⚠ DANGER**



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

**⚠ CAUTION**



Turn off the power switch before disassembly, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.



Disassembly of the sewing machine should only be carried out by a qualified technician.



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.



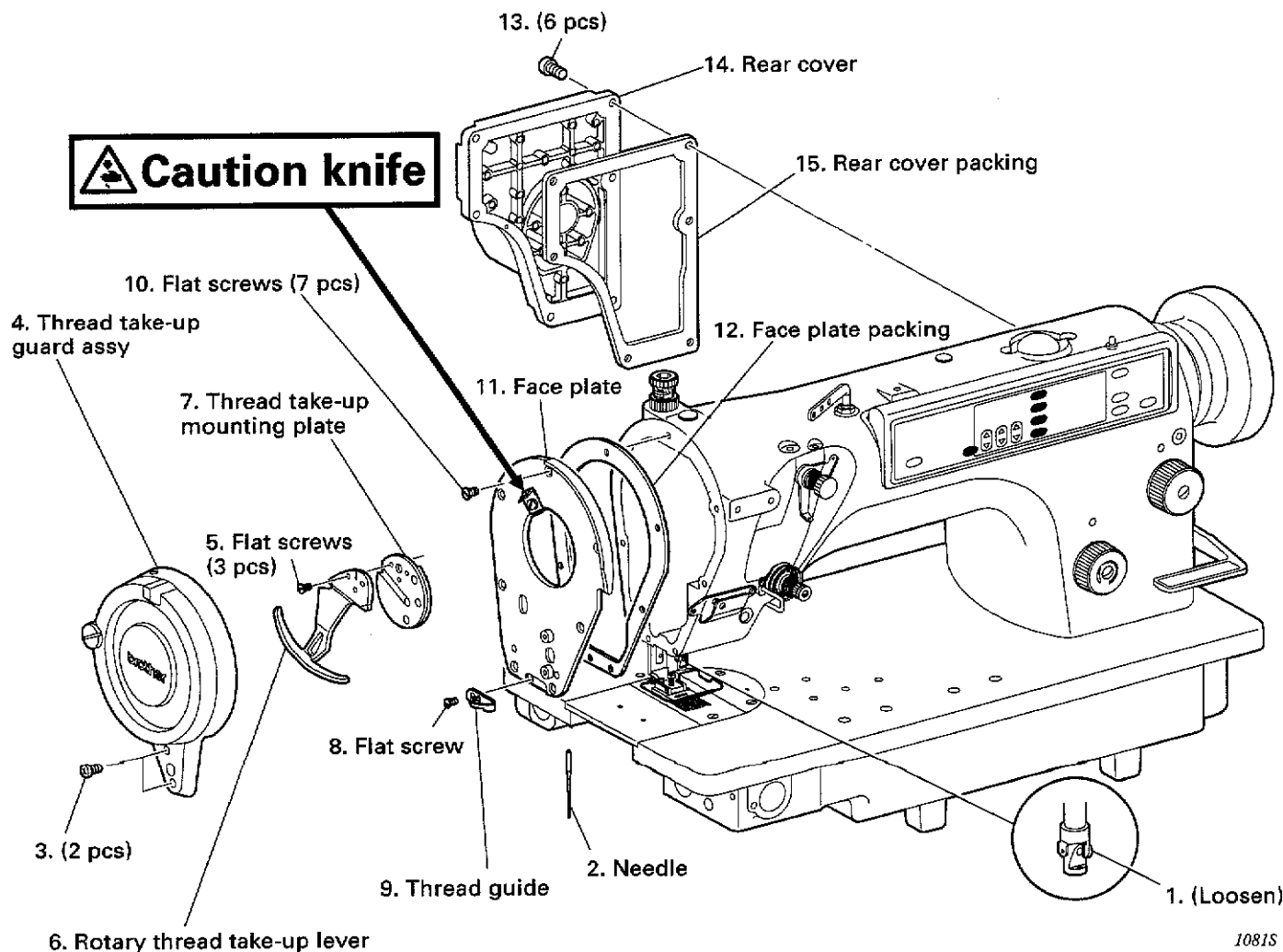
Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation may result. Furthermore, do not drink the oil or eat the grease under any circumstances, as they may cause vomiting and diarrhea.



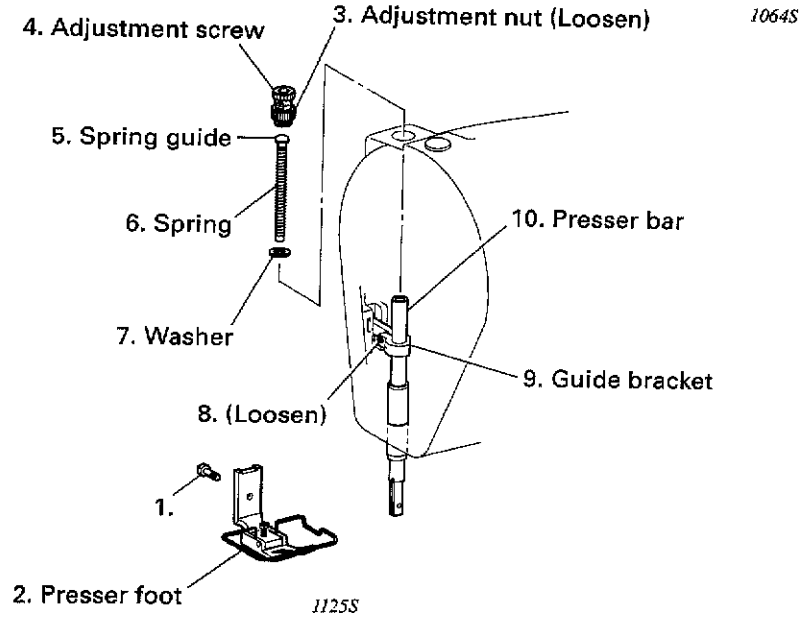
Keep the oil out of the reach of children. Any problems in machine operation which result from unauthorized modifications to the machine will not be covered by the warranty.

Disassemble each part in order of the numbers.

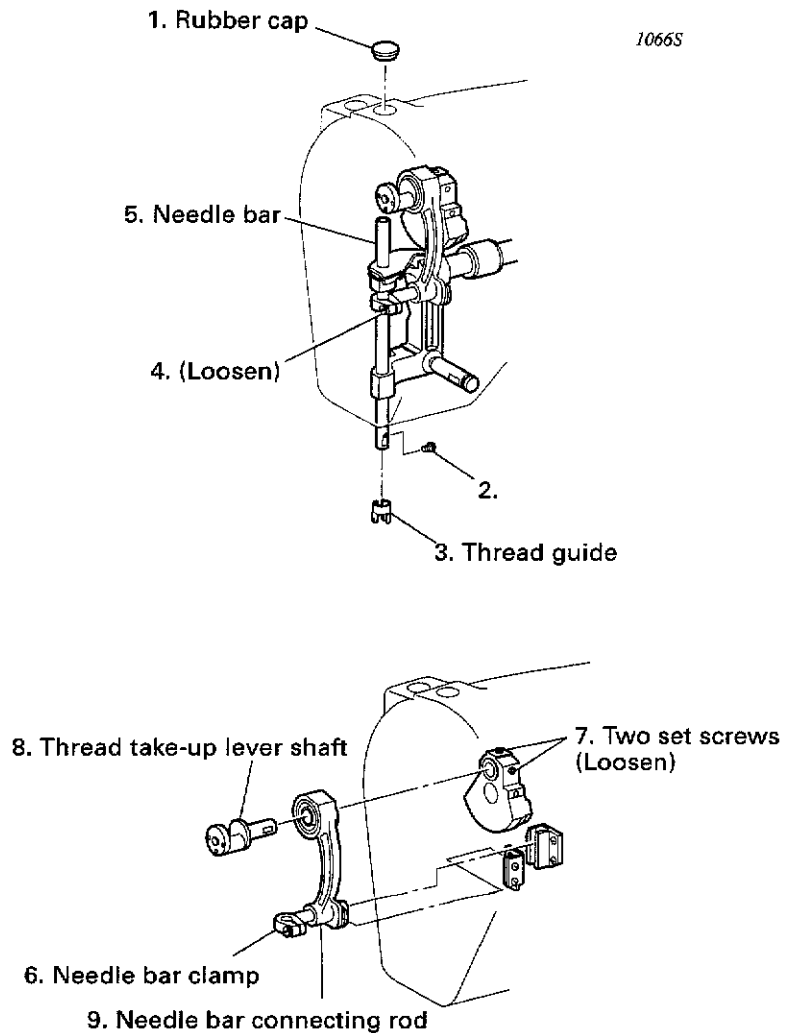
4-1. Cover



4-2. Presser mechanism

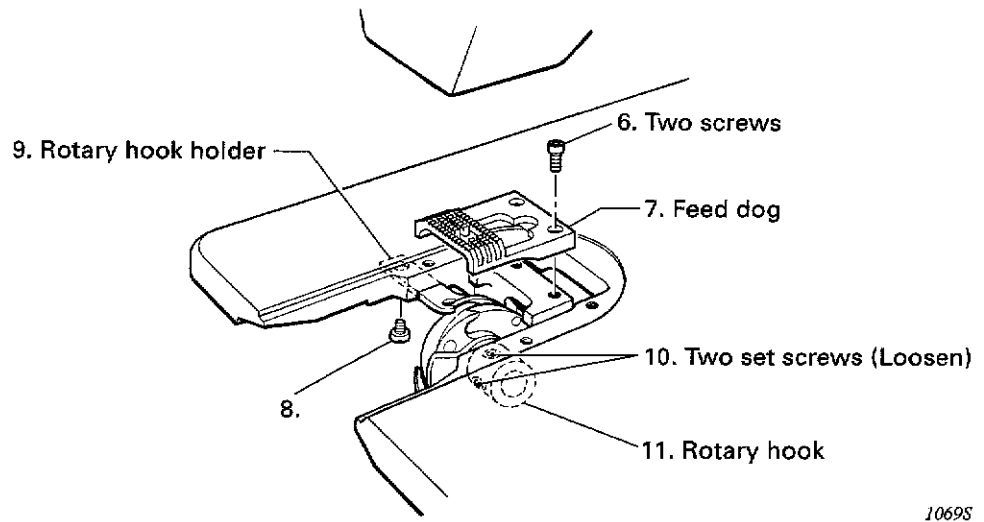
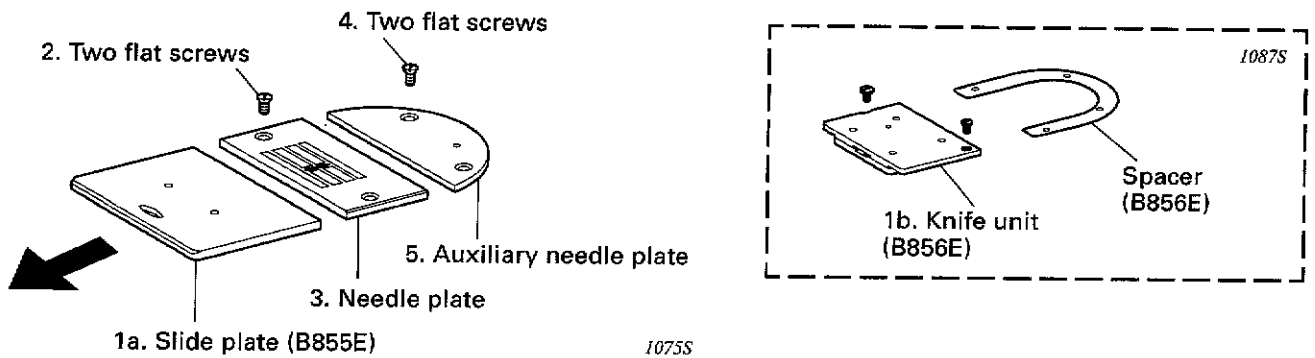


4-3. Needle bar mechanism

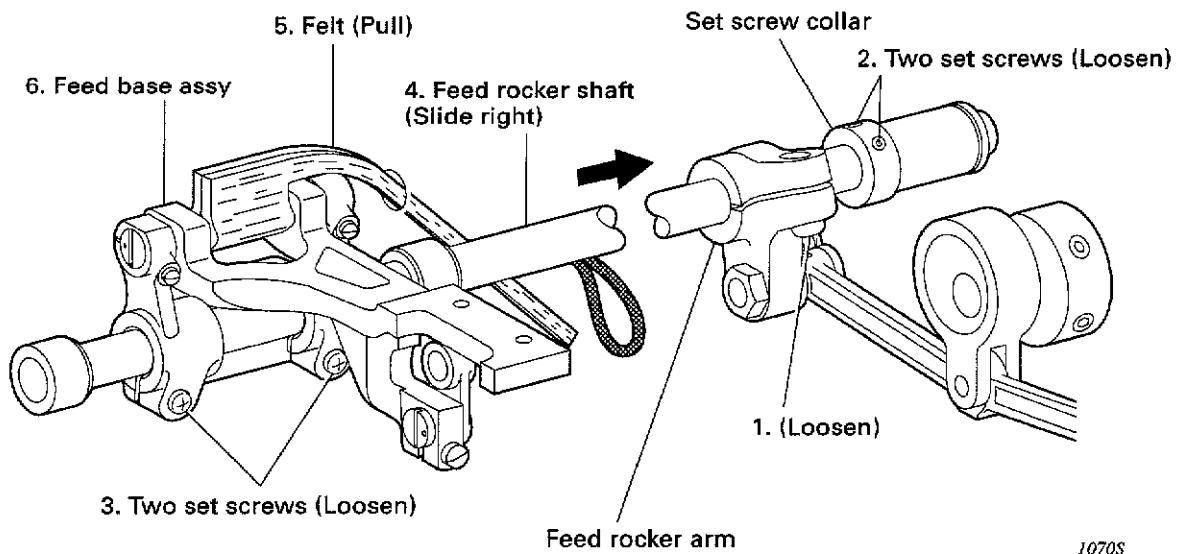




### 4-5. Rotary hook mechanism

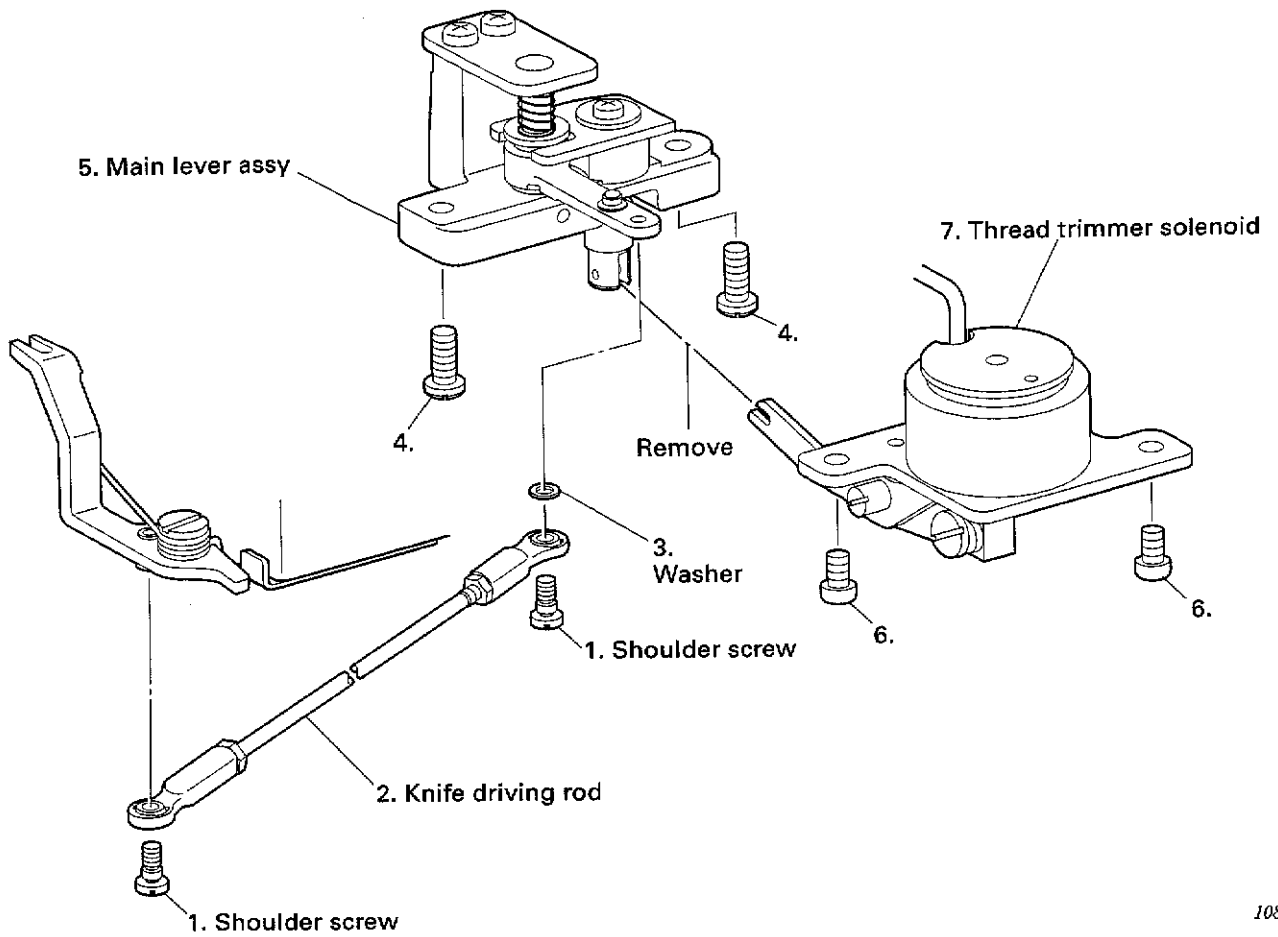


### 4-6. Feed mechanism



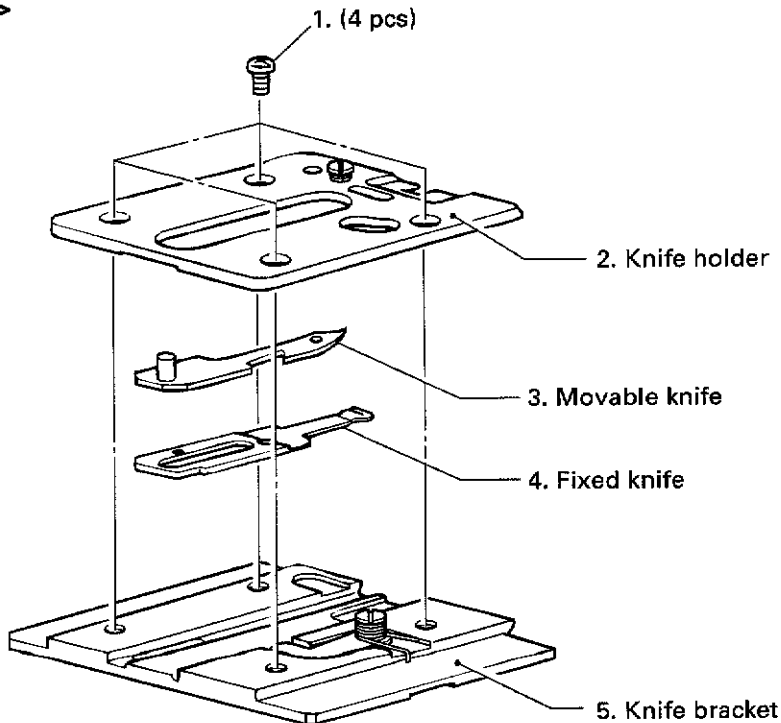
4. DISASSEMBLY

4-7. Thread trimmer mechanism (B856E)



1084S

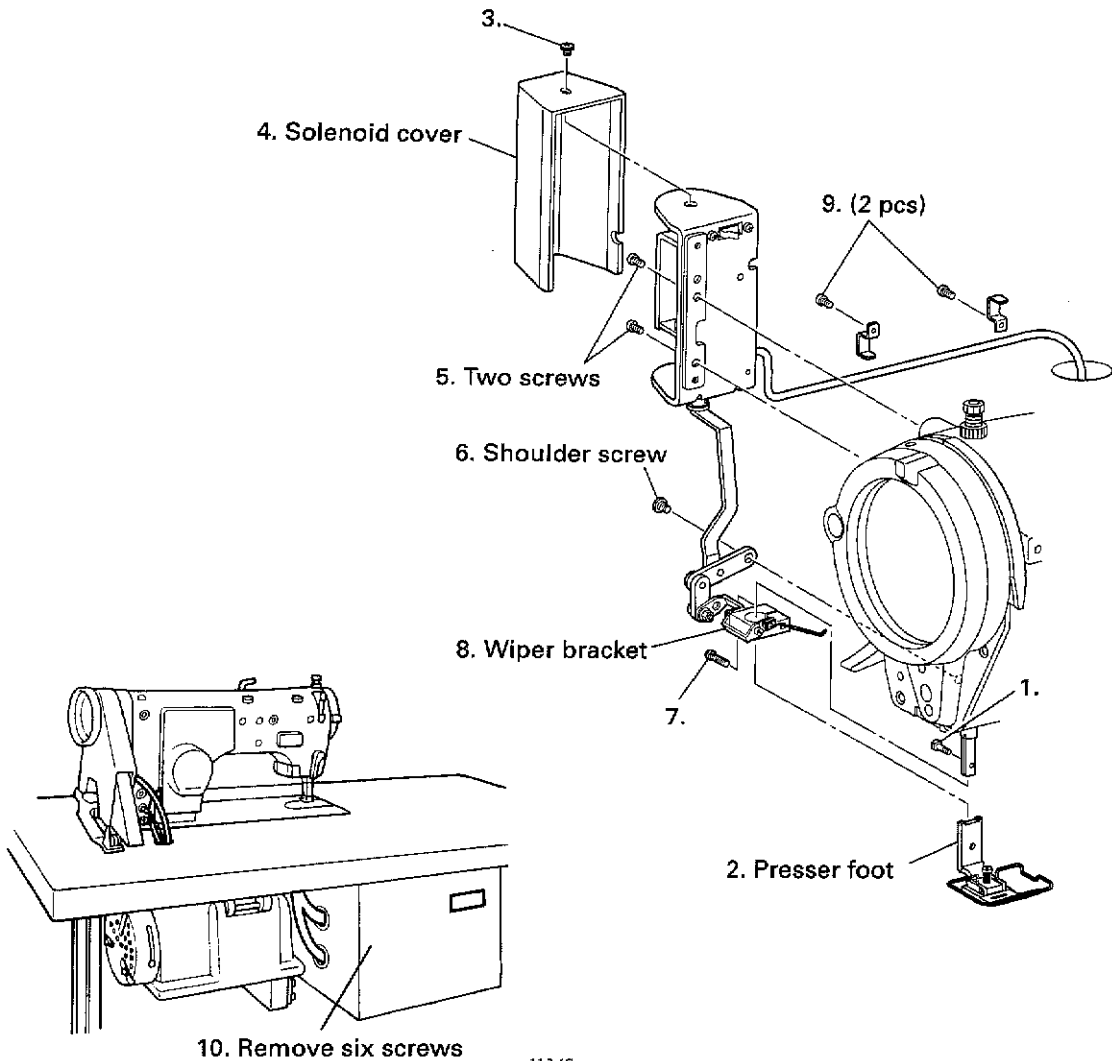
<Knife unit>



1085S

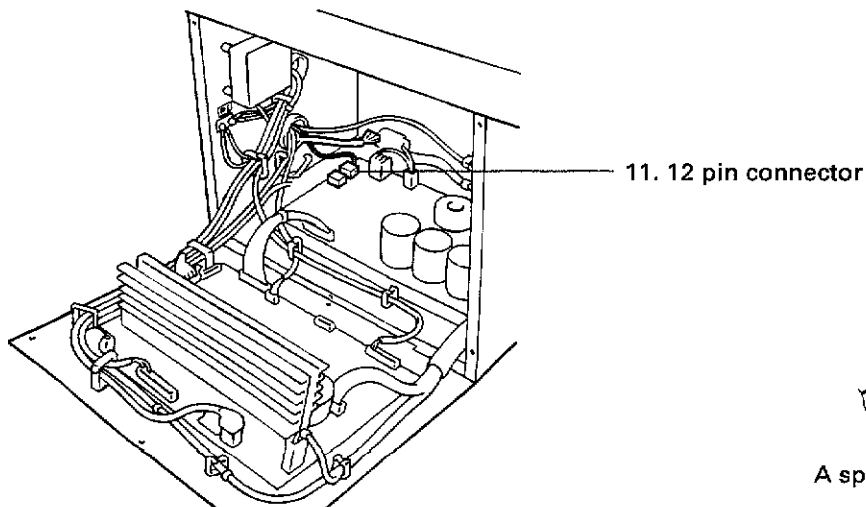


4-8. Thread wiper mechanism (B856E-40[ ], -90[ ])

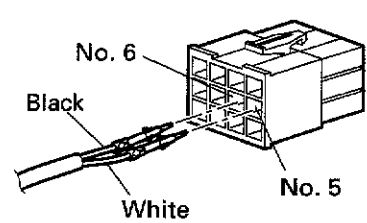


1133S

1134S



1135S

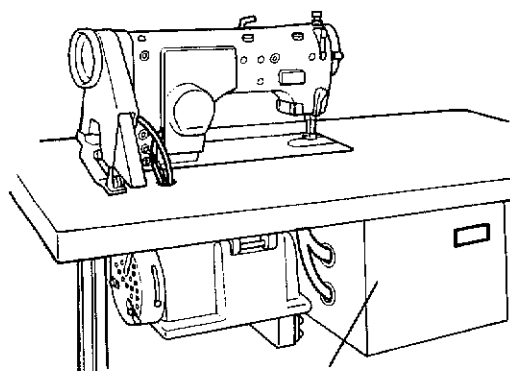


1136S

A special tool is needed to pull out the pins.

## 4. DISASSEMBLY

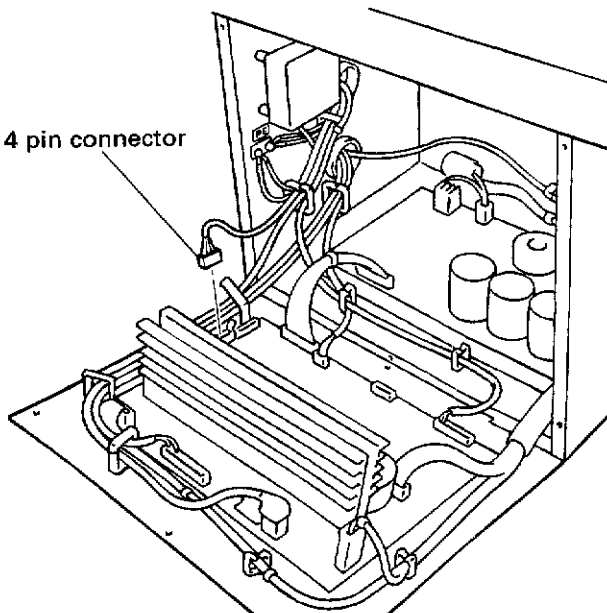
### 4-9. Panel



1. Remove six screws

11345

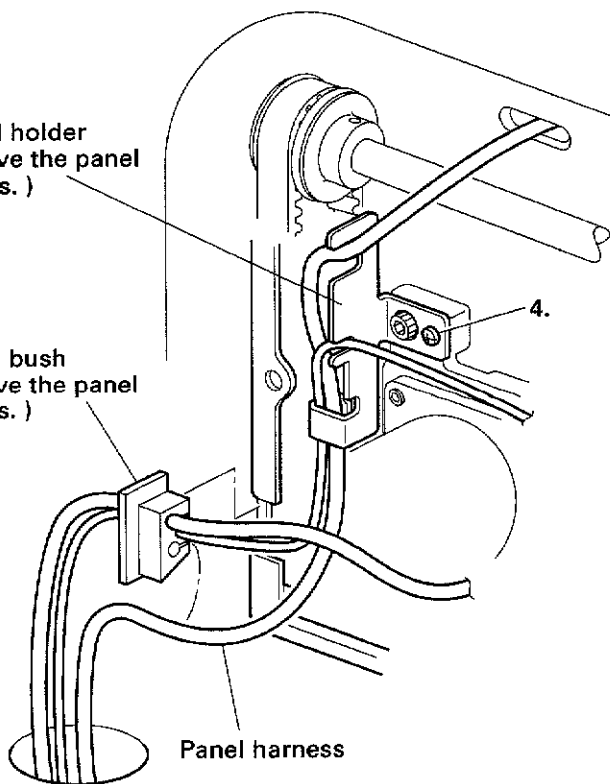
2. 4 pin connector



11375

5. Cord holder  
(Remove the panel harness.)

3. Cord bush  
(Remove the panel harness.)

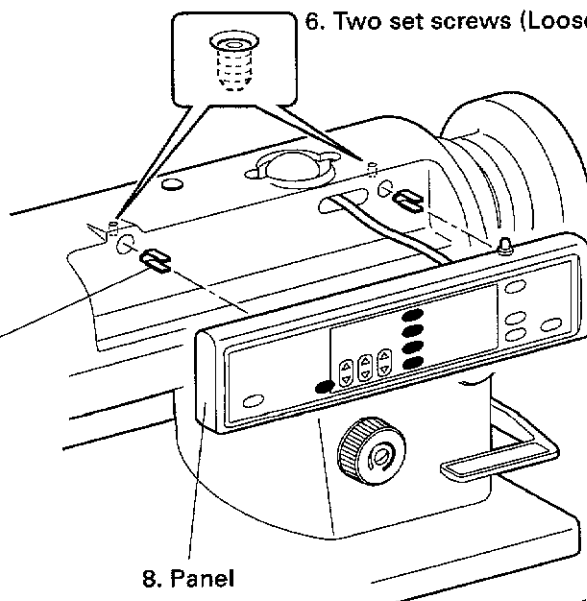


Panel harness

11385

7. Two panel support bracket

6. Two set screws (Loosen)



8. Panel

11395

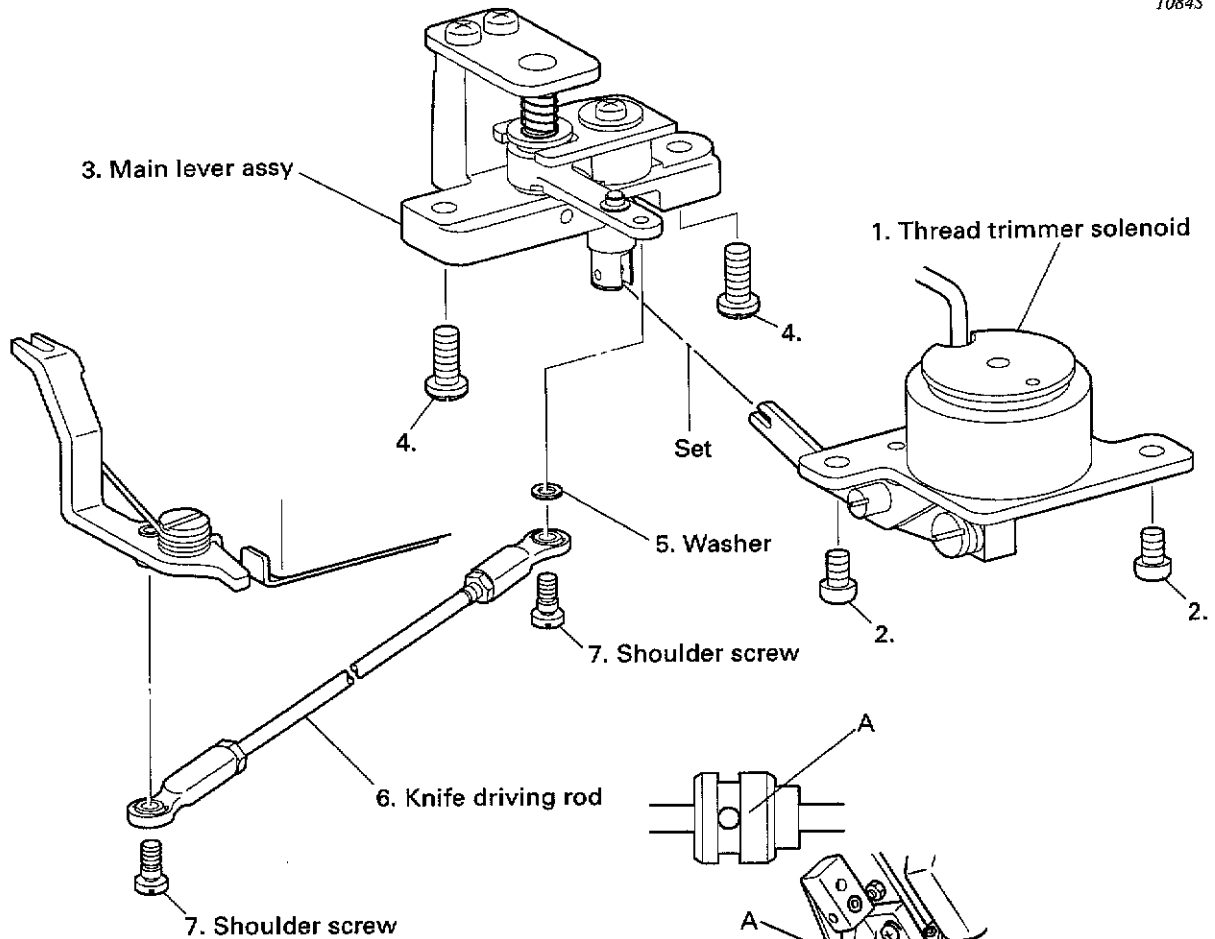
## 5. ASSEMBLY

### 5. ASSEMBLY

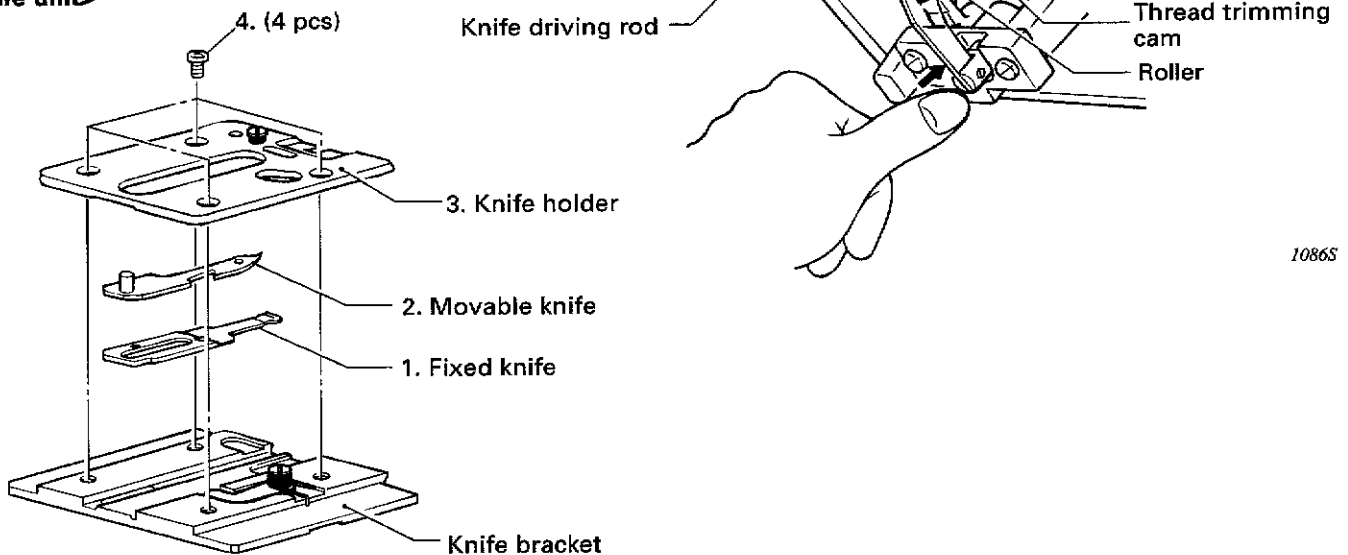
Install each part in order of the numbers.

#### 5-1. Thread trimmer mechanism (856E)

1084S



#### <Knife unit>

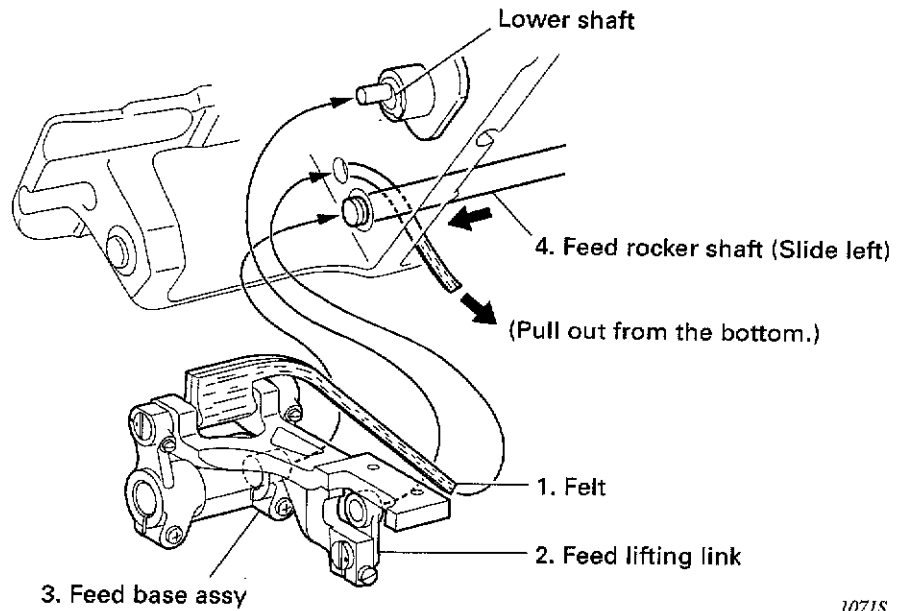


1086S

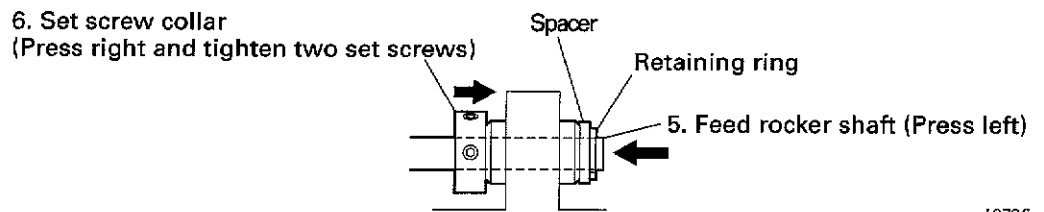
1085S

Adjust the length of the knife driving rod so that the roller of the main lever moves smoothly in and out of the straight section A of the groove in the thread trimming cam. After making this assembly, you should also carry out the adjustment in "6-18. Adjusting the timing of the thread trimming" (page 6-15).

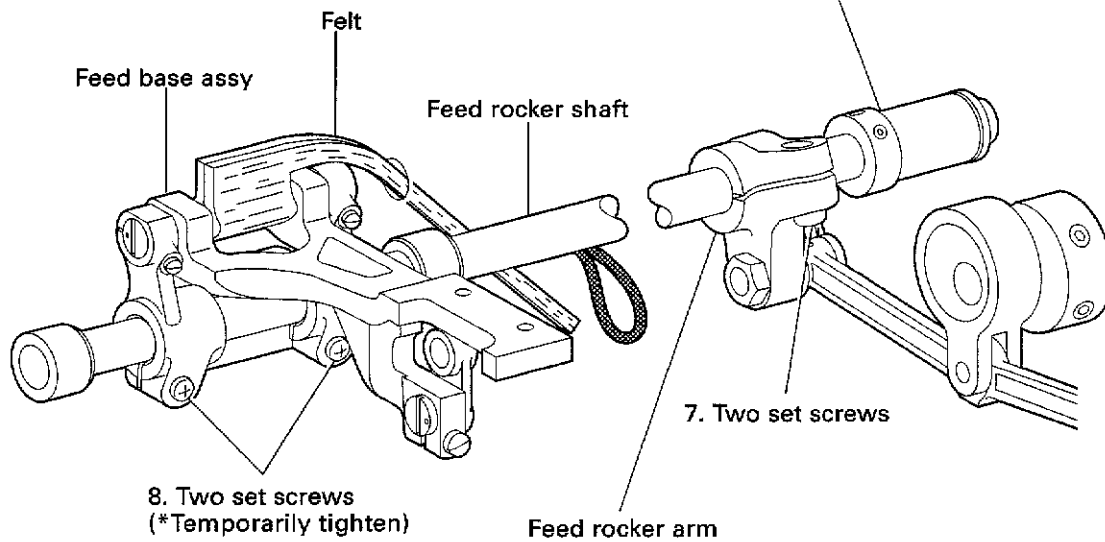
5-2. Feed mechanism



1071S



1072S

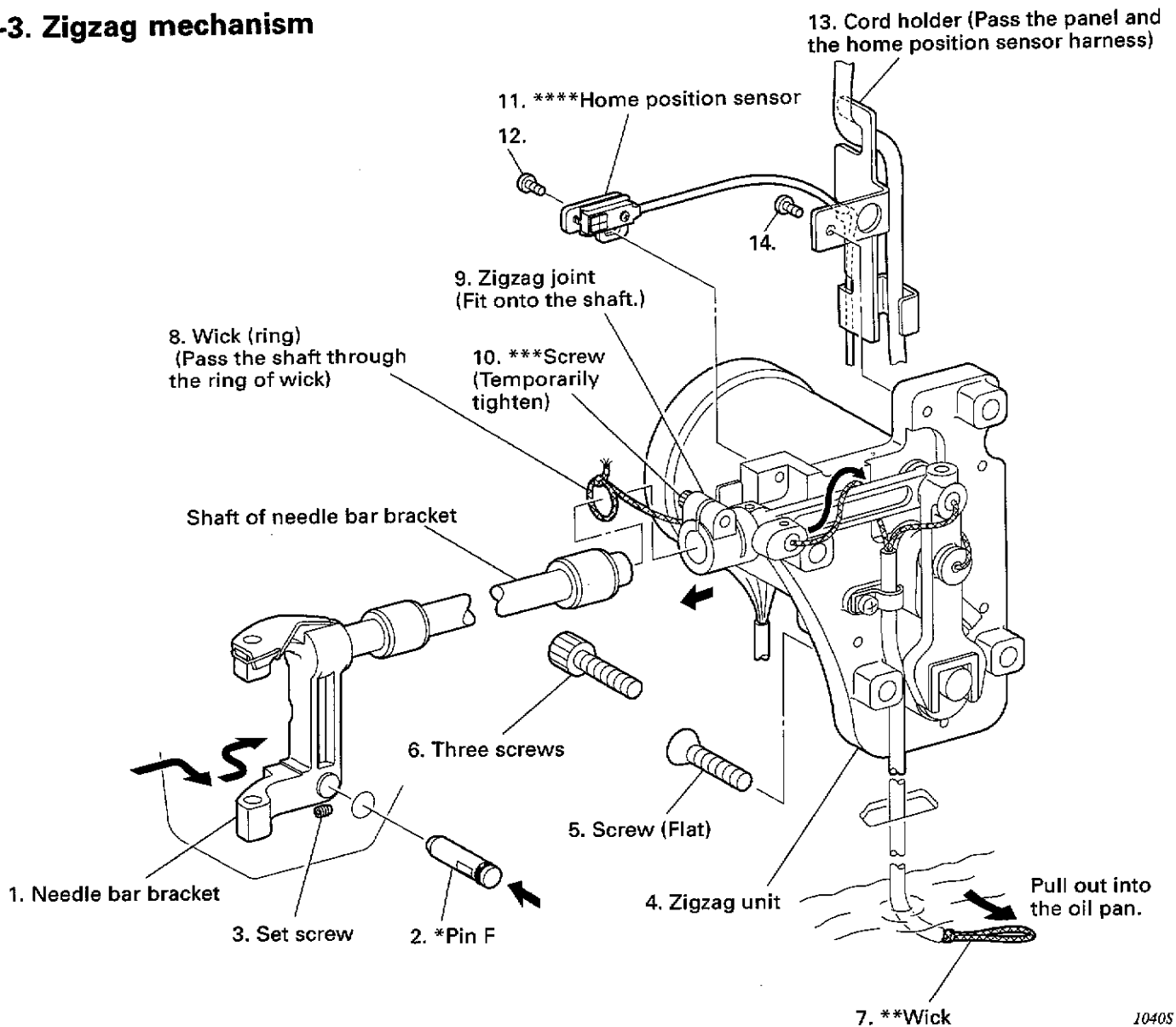


1070S

\* After adjusting the feed dog, tighten the two screws.  
Refer to "6-5. Adjusting the forward/back, right/left position of the feed dog" (page 6-03).

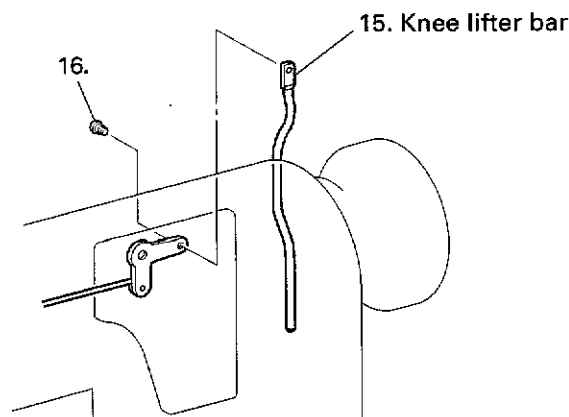
## 5. ASSEMBLY

### 5-3. Zigzag mechanism



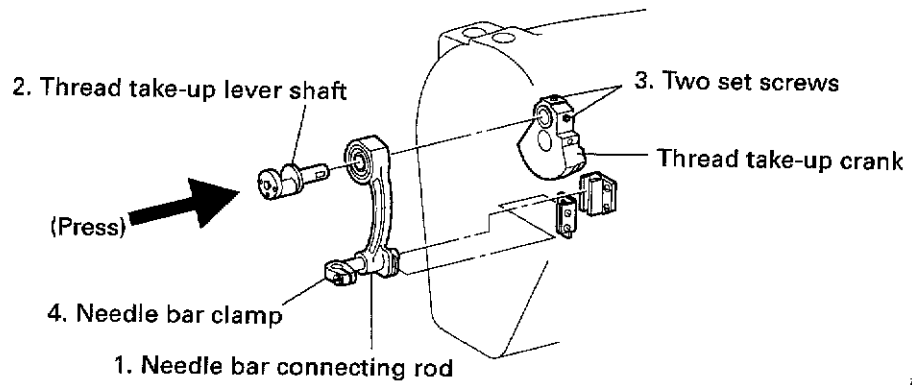
1040S

- \* After install the pin F, make sure that there is no longitudinal play in the needle bar bracket and that it moves smoothly when zigzagging.
- \*\* If the wick (ring) is very loose after installing, adjust by pulling only the wick shown in the illustration through the oil tube.
- \*\*\* After assembly "5-4. Needle bar mechanism" (page 5-04), tighten in "6-9. Adjusting the right/left position of the needle zigzags" (page 6-07).  
And carry out the adjustment in "6-8. Adjusting the forward/back position of the needle bar" (page 6-06).
- \*\*\*\* Adjustment of the home position carry out the adjustment in "6-9. Adjusting the right/left position of the needle bar" (Page 6-07).

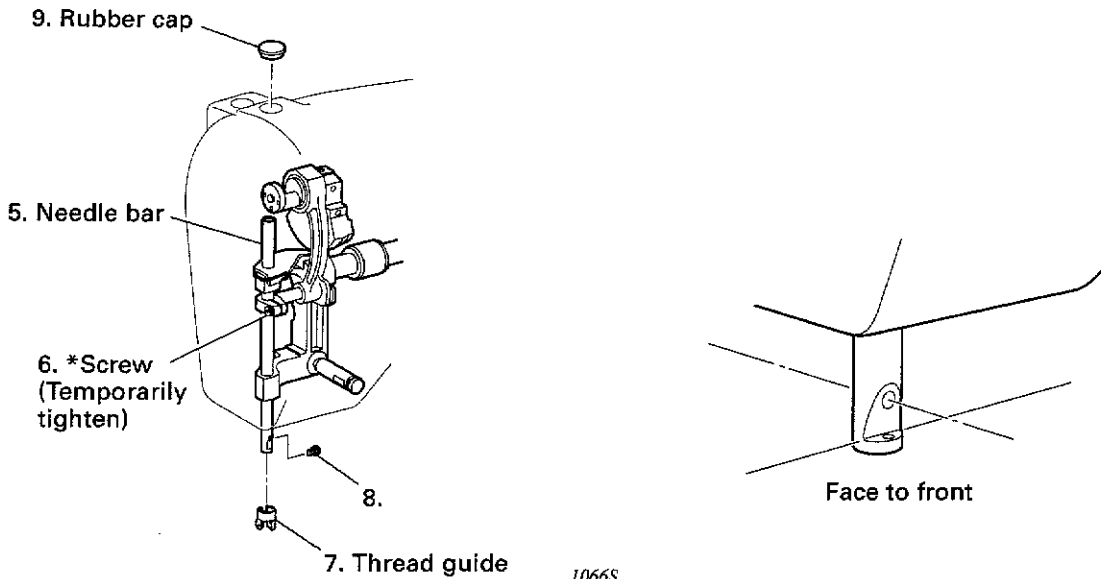


1082S

### 5-4. Needle bar mechanism



1068S



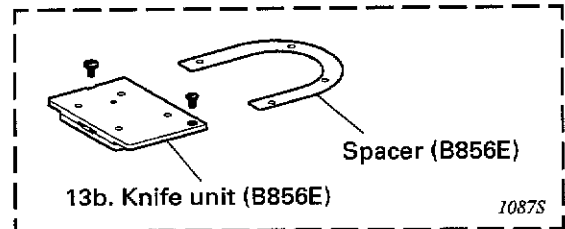
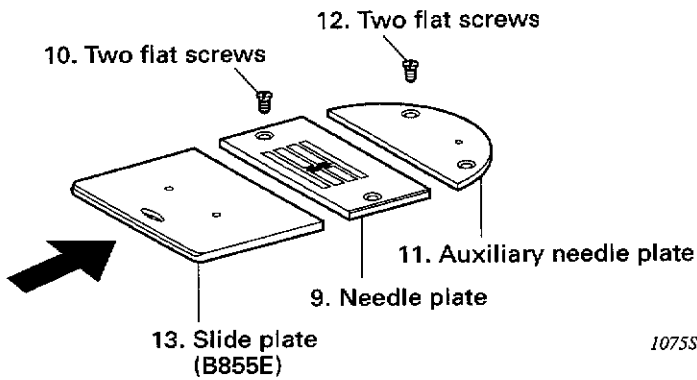
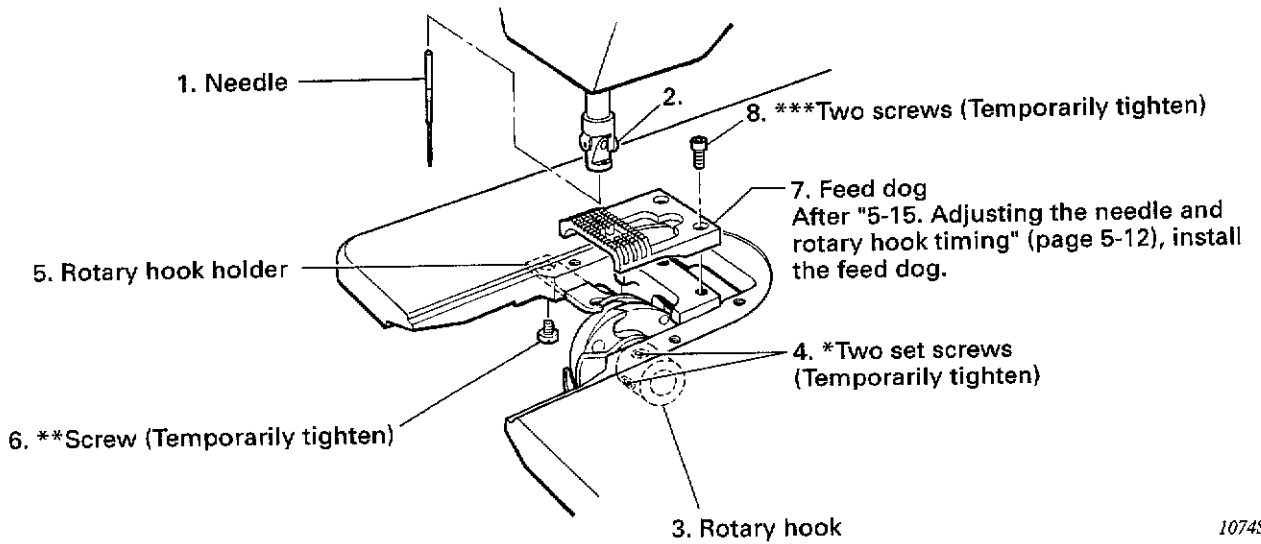
1066S

1073S

\* After adjusting the needle bar height, tighten the screw.  
Refer to "6-10. Adjusting the needle bar height" (page 6-08).

## 5. ASSEMBLY

### 5-5. Rotary hook mechanism

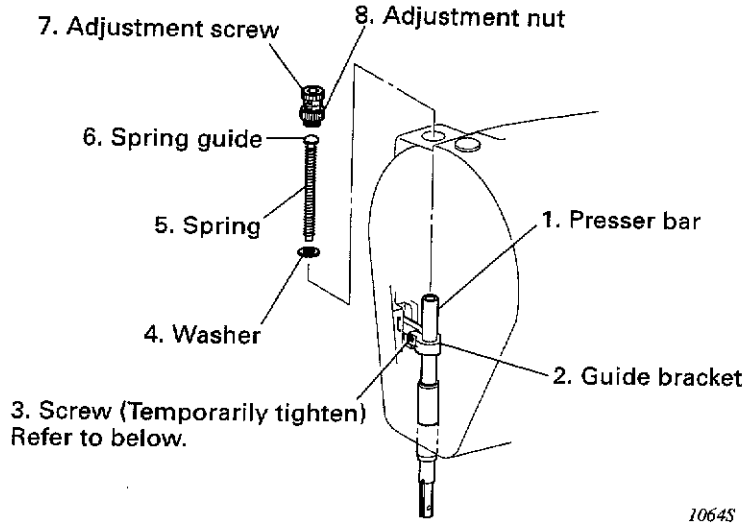


\* After "6-11. Adjusting the needle and rotary hook timing" (page 6-09), tighten the two set screws.

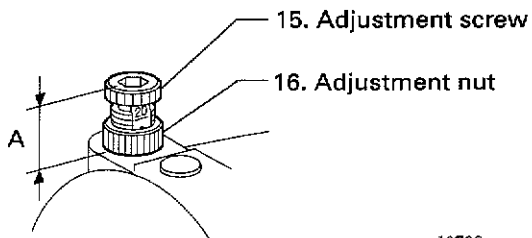
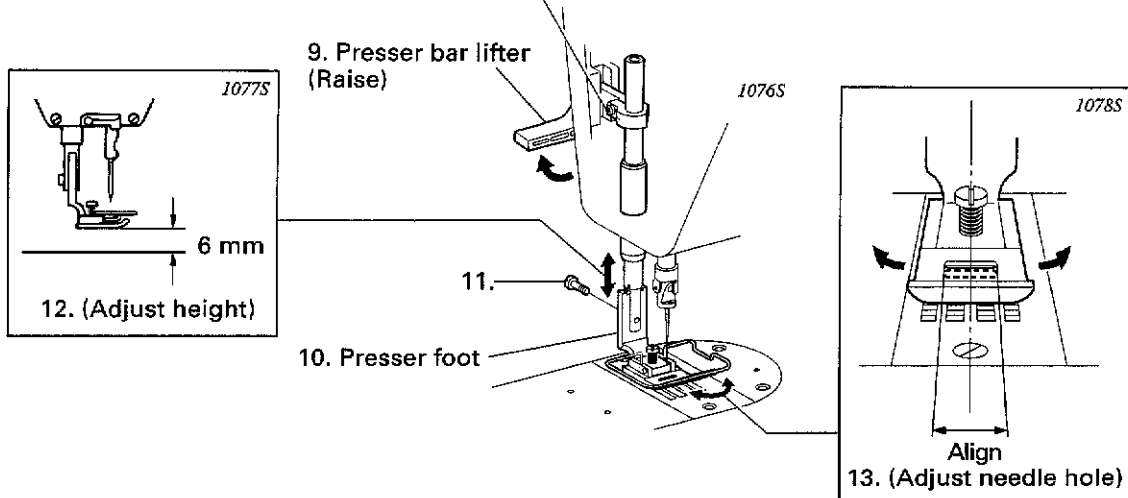
\*\* After "6-12. Adjusting the hook stopper position" (page 6-09), tighten the screw.

\*\*\* After "6-5. Adjusting the forward/back, right/left position of the feed dog" (page 6-03), tighten the two screws.

5-6. Presser mechanism



14. (Loosen, and then tighten again after making the adjustments in 12 and 13.)



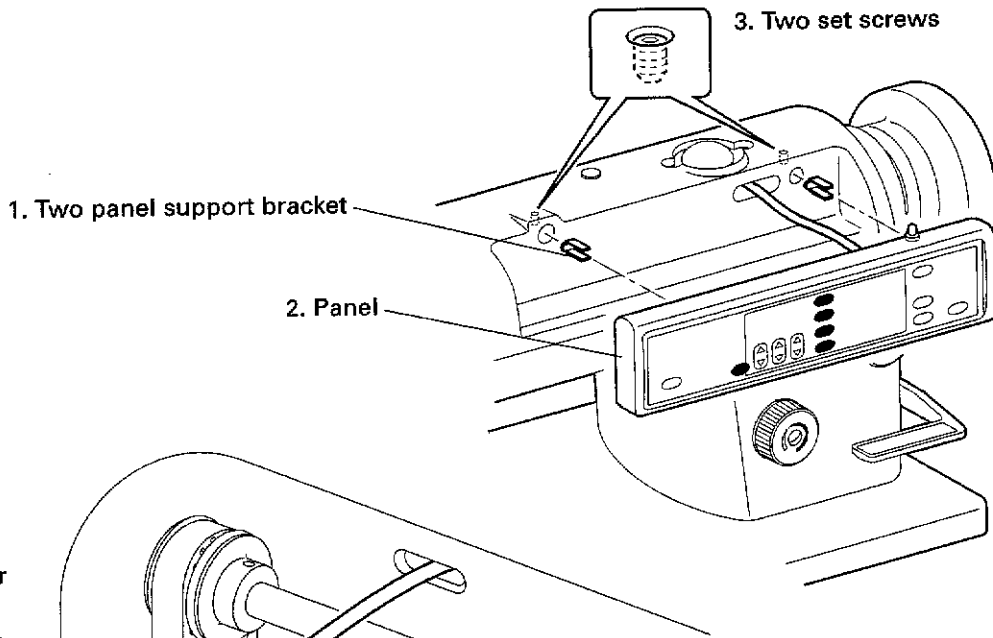
Specification	A
- [ I ] 1	*
- [ I ] 3	31 mm

\* 31 mm for export models (24.5 mm when using at 4,000 rpm or above)  
(Japanese models is 23 mm)



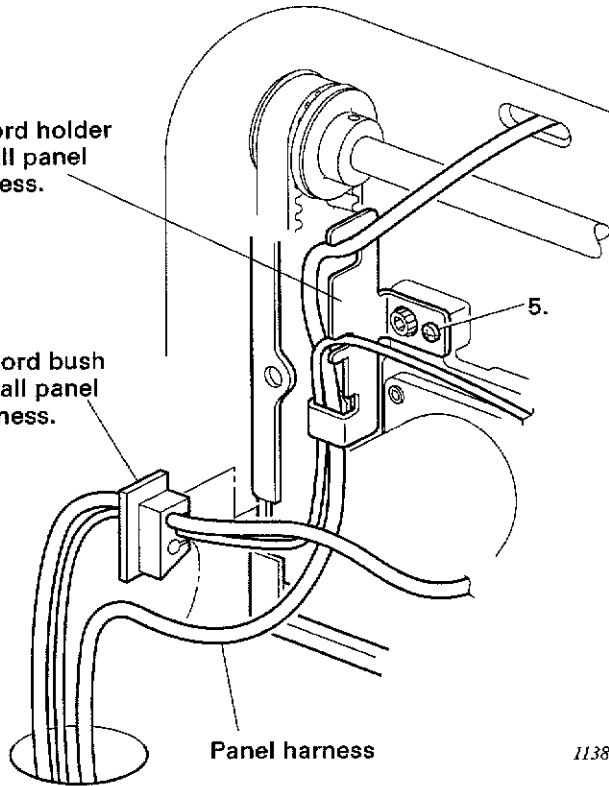
## 5. ASSEMBLY

### 5-7. Panel



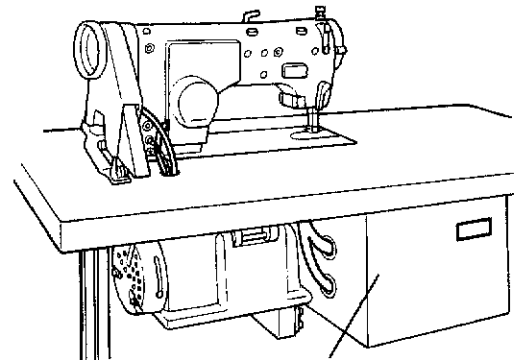
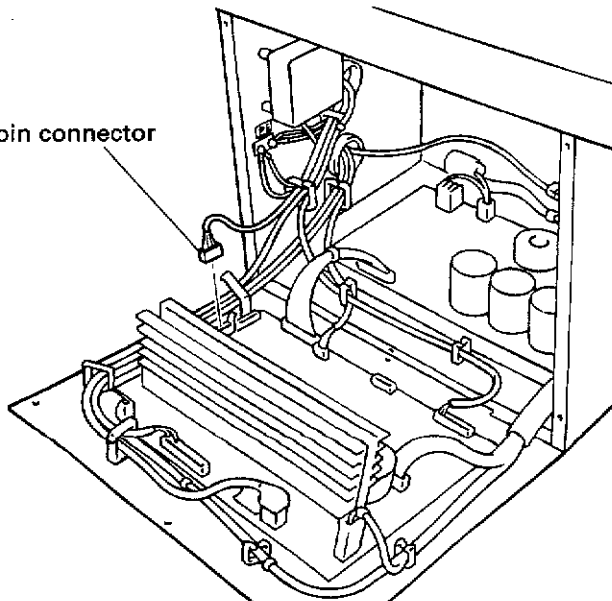
4. Cord holder  
Install panel  
harness.

6. Cord bush  
Install panel  
harness.

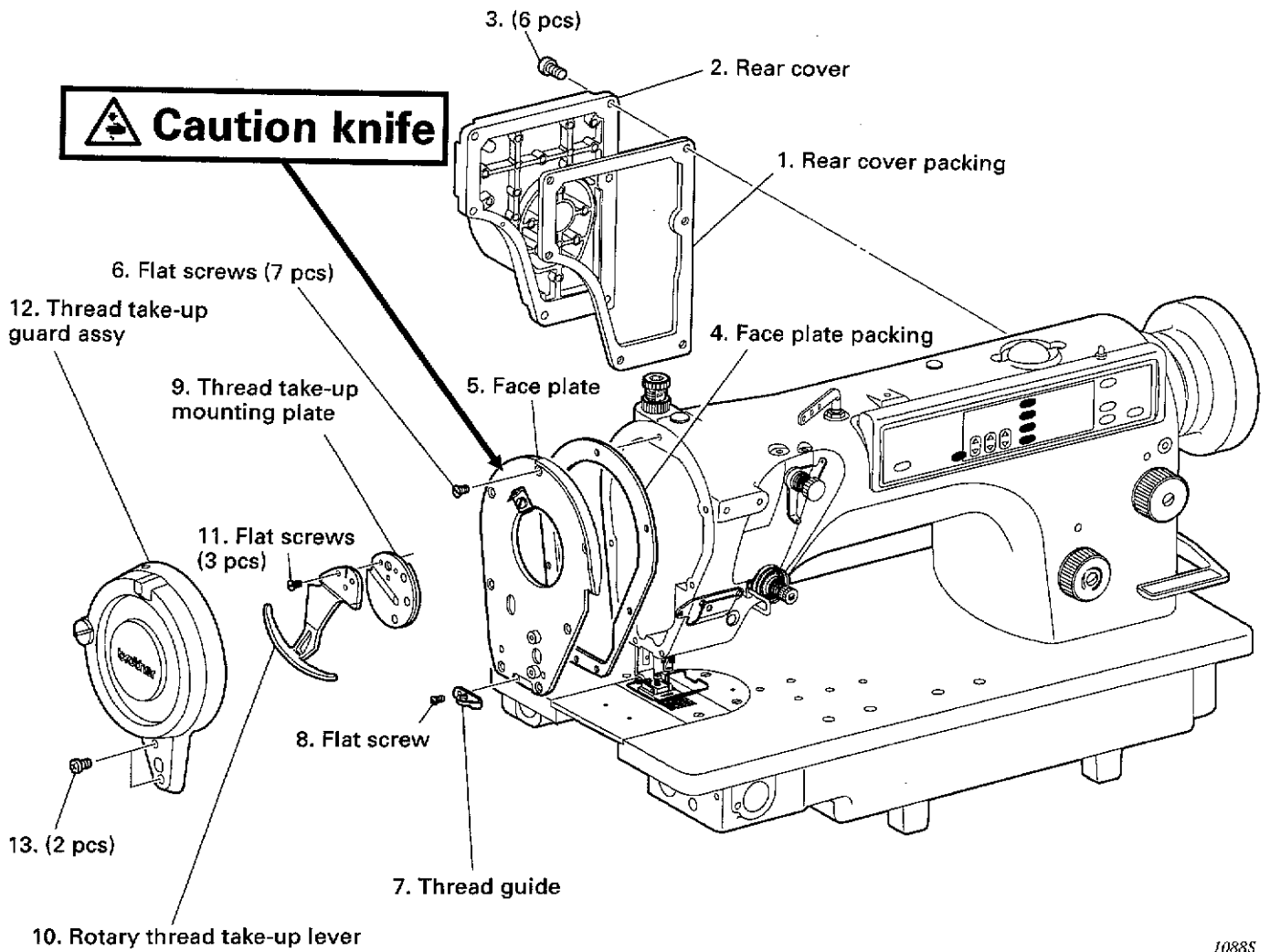


Secure the cord in the cord holder after making sure that it is not excessively loose inside the machine arm. Also make sure that it does not touch any moving parts such as the upper shaft and timing belt.

7. 4 pin connector



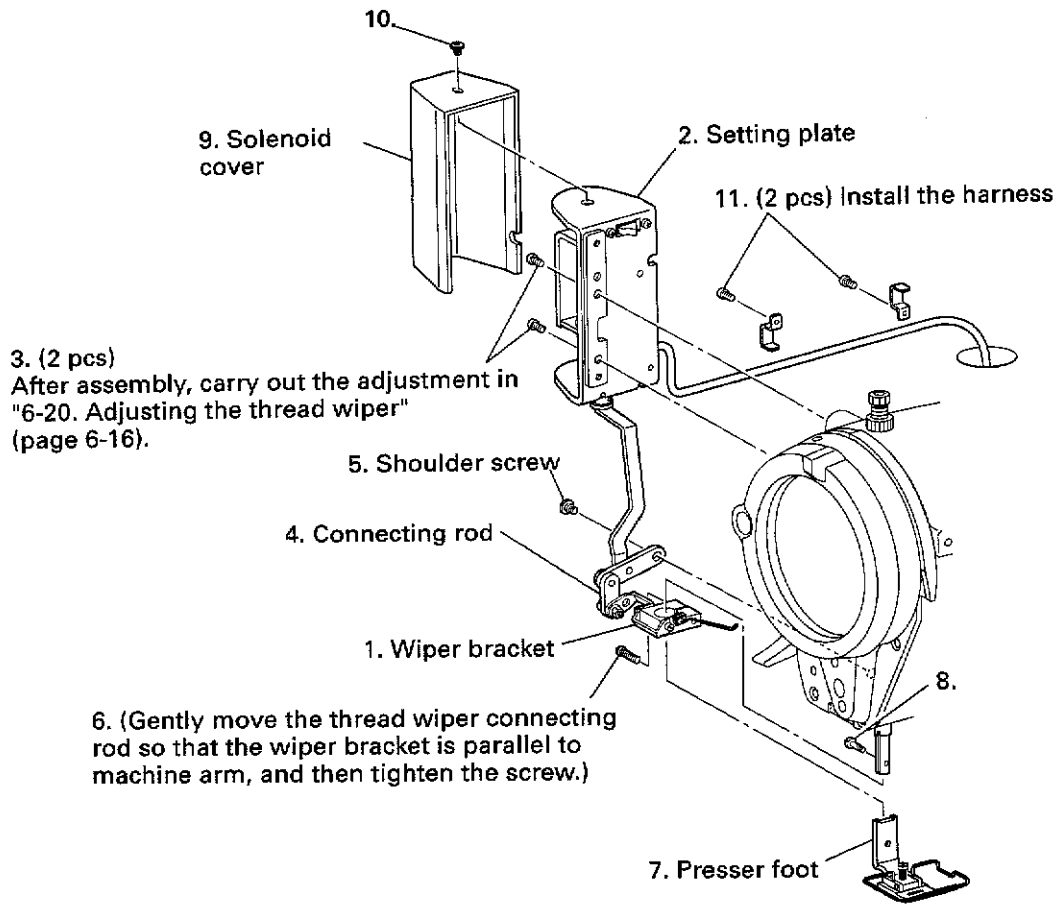
5-8. Cover



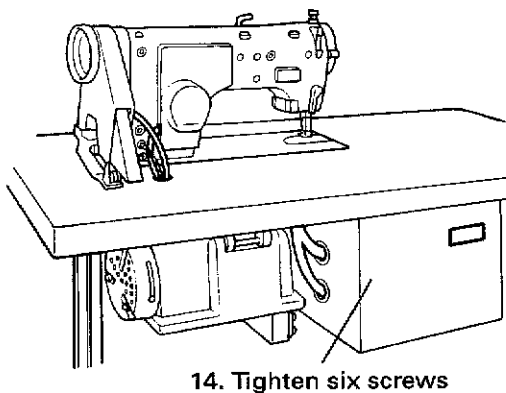
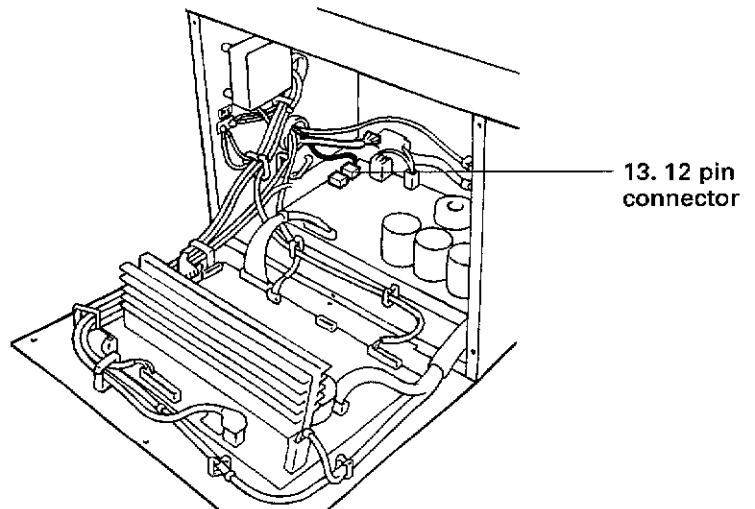
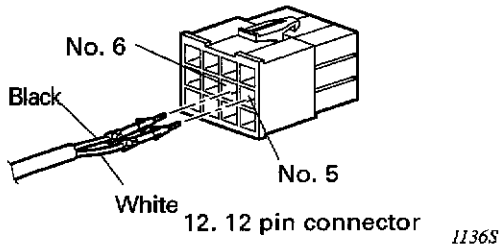
10885

**5. ASSEMBLY**

**5-9. Thread wiper mechanism (B856E-40[ ], -90[ ])**



11335





## 6. ADJUSTMENTS

### 6. ADJUSTMENTS

#### ⚠ CAUTION



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



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



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.



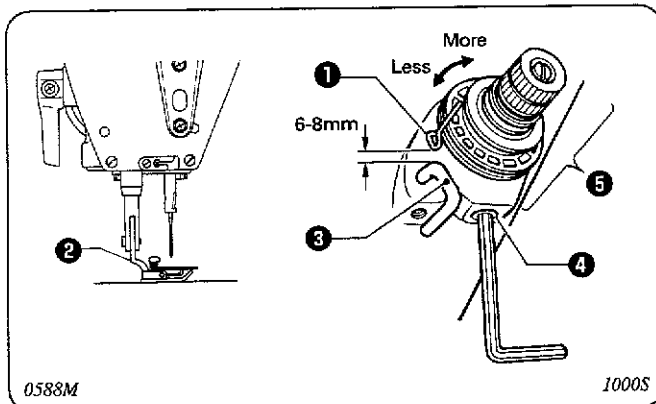
Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.

- When carrying out inspection, adjustment and maintenance
- When replacing consumable parts such as the rotary hook



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

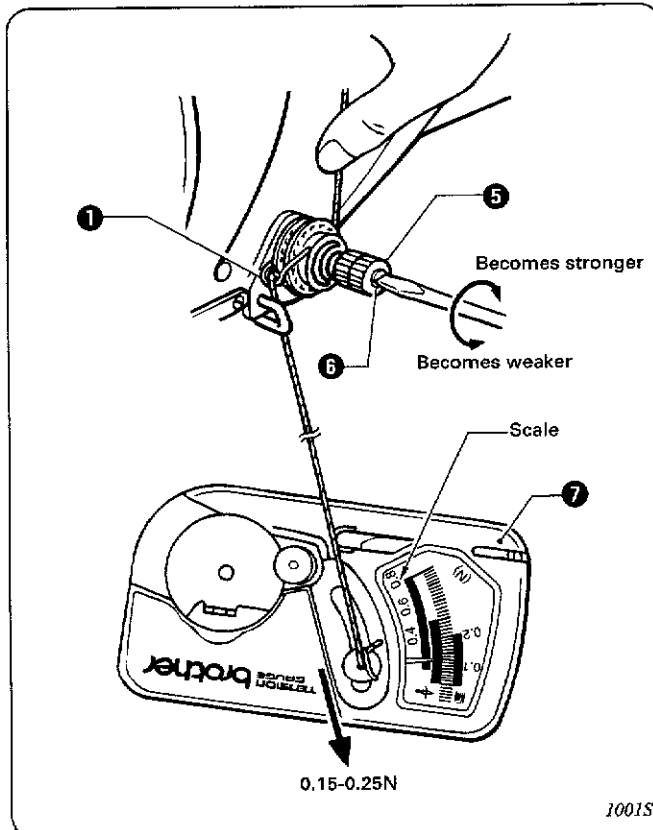
#### 6-1. Adjusting the thread tension spring



##### <Thread tension spring position>

The standard position of the thread tension spring ① is 6 - 8 mm above the surface of the thread guide ③ when the presser foot ② is lowered.

1. Lower the presser foot ②.
2. Loosen the set screw ④.
3. Turn the thread tension bracket ⑤ to adjust the spring position.
4. Securely tighten the set screw ④.



##### <Thread tension spring tension>

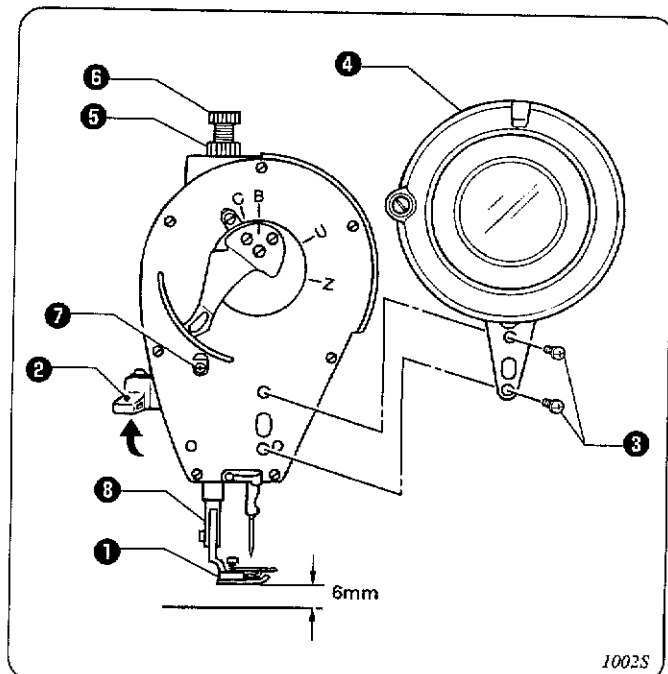
The standard tension of the thread tension spring ① is 0.15 to 0.25 N.

1. Press the upper thread slightly above the thread tension bracket ⑤ with a finger to stop the thread spooling out.
2. Pull the upper thread down until the thread tension spring ① starts to move down, and measure the tension of the thread tension spring ① at this point.
3. Insert the tip of a screwdriver into the groove in the thread tension stud ⑥ and turn it to adjust the tension of the thread tension spring ①.

##### Note:

If using a tension gauge ⑦ (sold separately) to measure the tension, take the reading from the scale on the side of the red line.

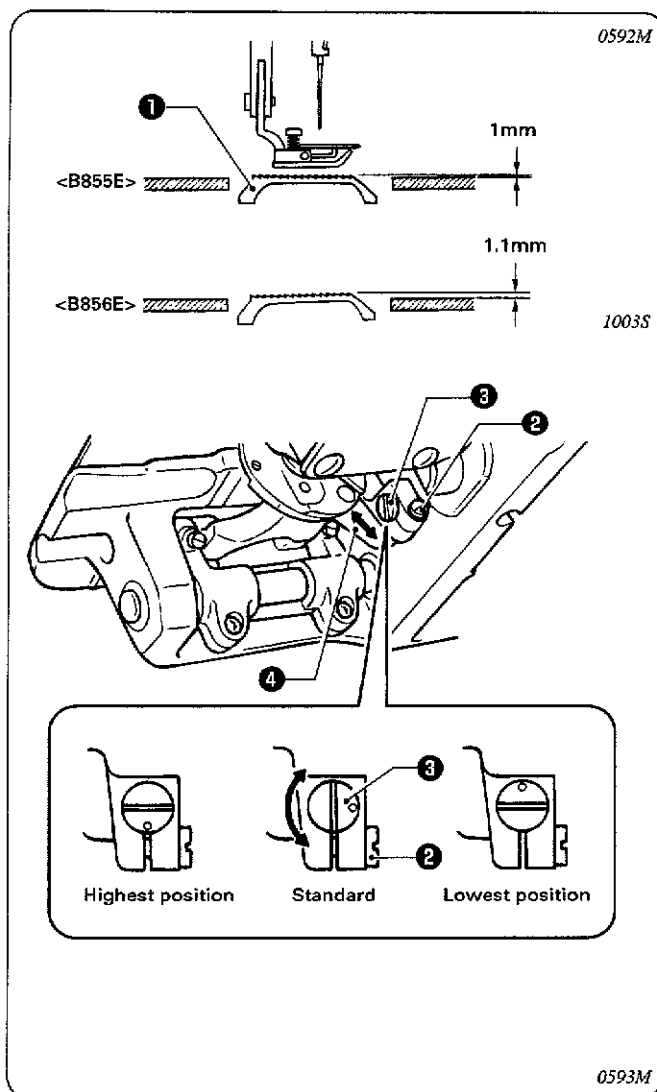
## 6-2. Adjusting the presser foot height



The standard height of the presser foot ① is 6 mm when the presser foot ① is raised by means of the presser bar lifter ②.

1. Remove the two screws ③ and then remove the thread take-up guard ④.
2. Loosen the nut ⑤ of the adjustment screw ⑥, and then turn the adjustment screw ⑥ so that there is no pressure applied to the presser foot.
3. Raise the presser bar lifter lever ②. The presser foot ① will also rise.
4. Loosen the screw ⑦ and move the presser bar ⑧ up and down to adjust the height of the presser foot ① to 6 mm.
5. Tighten the bolt ⑦.
6. Adjust the presser foot pressure using the adjustment screw ⑥, and then tighten the nut ⑤.
7. Install the thread take-up guard ④ with the two screws ③.

## 6-3. Adjusting the feed dog height

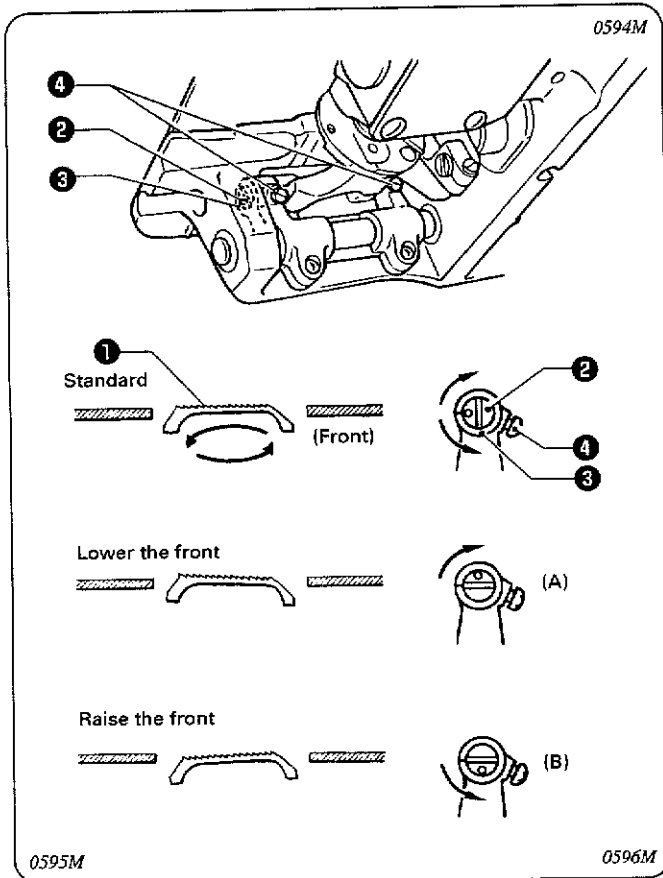


The standard height when the feed dog ① is at its highest position above the needle plate is 1 mm for the B855E, and 1.1 mm (at the side closest to the operator) for the B856E.

1. Turn the machine pulley to move the feed dog to its highest position above the needle plate.
2. Tilt back the machine head.
3. Loosen the screw ②.
4. Turn the pin ③ to move the feed bar ④ up and down in order to adjust the height.
5. Securely tighten the screw ②.

## 6. ADJUSTMENTS

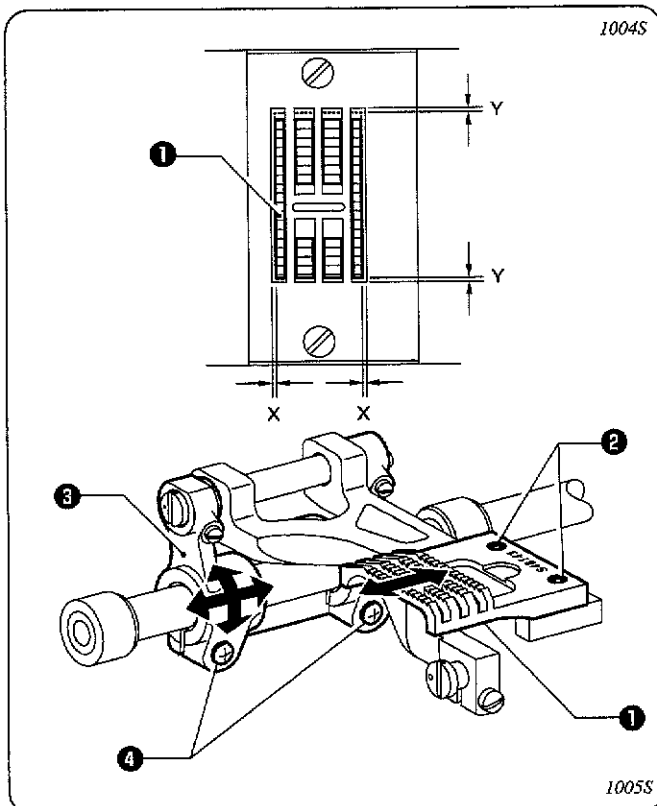
### 6-4. Adjusting the feed dog angle



The standard angle for the feed dog ① is for the top of the needle plate to be parallel with the top of the feed dog ① (for the B855E) or raised slightly at the side closest to the operator (for the B856E) when the feed dog ① is raised to its highest position above the needle plate. (with the O mark on the feed bracket shaft ② aligned with the mark on the feed rocker bracket arm ③).

1. Turn the machine pulley to move the feed dog ① to its highest position above the needle plate.
  2. Loosen the two set screws ④.
  3. Turn the feed bracket shaft ② in the direction of the arrow within a range of 90° with respect to the standard position.
    - Tilting the feed dog ① so that the front is lowered tends to prevent puckering (gathering). (Figure A)
    - Tilting the feed dog ① so that the front is raised tends to prevent material from slipping (uneven material feeding). (Figure B)
  4. Securely tighten the set screws ④.
- \* When the angle of the feed dog ① is adjusted, the height and forward/back position of the feed dog ① will also change and will need to be readjusted.

### 6-5. Adjusting the forward/back, right/left position of the feed dog



Adjust the clearances X at the left and right sides of the feed dog ① and the needle plate so that they are as close as possible to being equal.

Adjust the clearances Y at the front and rear ends of the feed dog ① and the needle plate so that they are as close as possible to being equal when the machine pulley is turned so that the needle plate is at its furthest position forward and furthest position back.

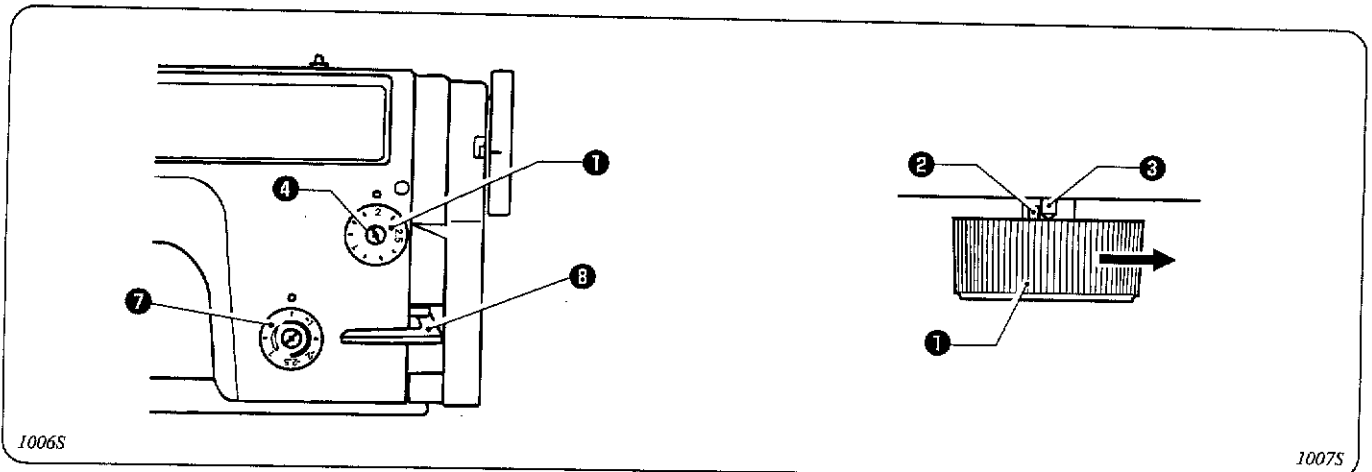
#### <Adjusting the left and right clearances X>

Loosen the two screws ② of the feed dog ① and adjust. If adjustment is not possible, carry out the following adjustment.

#### <Adjusting the front and back clearances Y and the left and right clearances X>

Loosen the two screws ④ of the level feed arm ③ and adjust.

## 6-6. Adjusting the stitch length





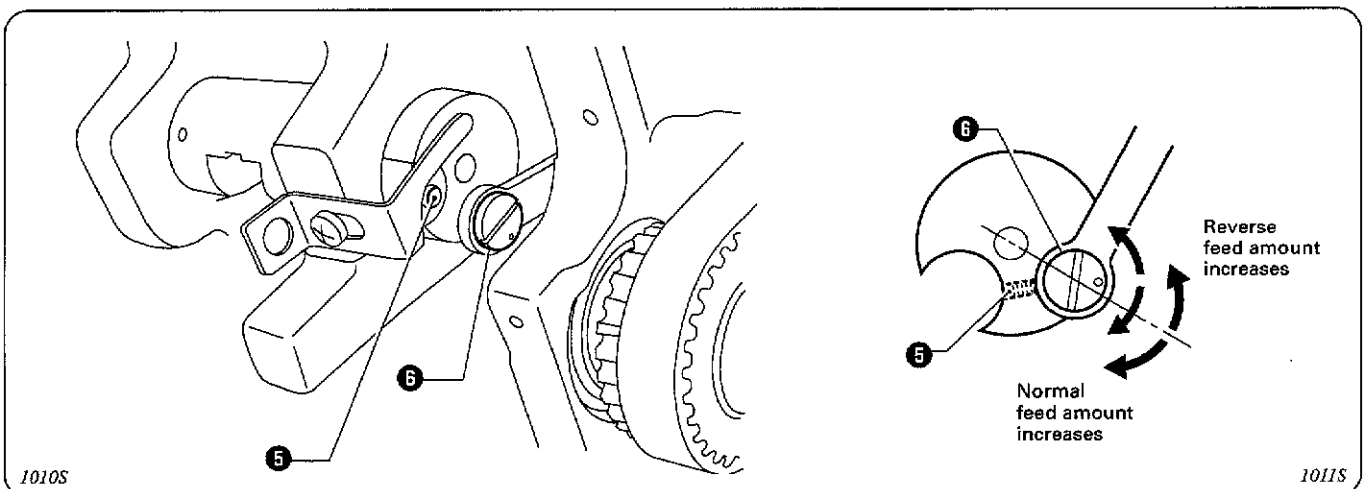
The feed amount is set by means of the feed adjustment dial ①.

The scale is a guide only; if the length of the finished stitches differs greatly from the scale value, make the following adjustment.

1. Turn the feed adjustment dial ① clockwise as far as it will go so that the stopper ② touches the pin ③.
2. Push the pin ③ using a screwdriver or similar tool to separate it from the stopper ②, and check that the feed adjustment dial ① cannot be turned any further clockwise even when this is done. If the feed adjustment dial can be turned further, turn it until it cannot turn any further. Loosen the screw ④, turn only the dial section of the feed adjustment dial ① so that the stopper ② touches the pin ③, and then tighten the screw ④.

<If adjusting the forward feed amount and reverse feed amount so that they are the same>

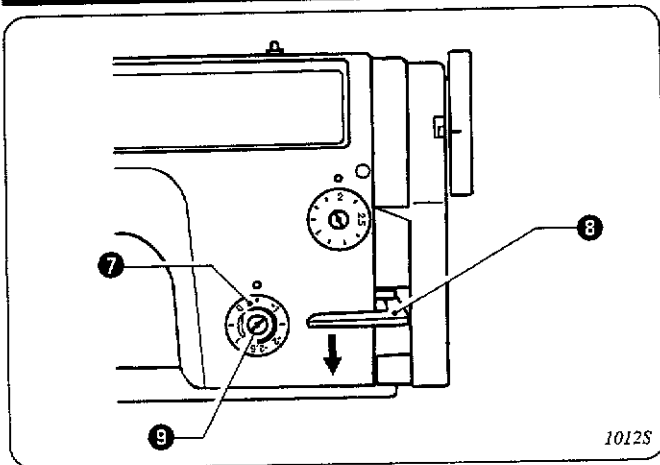
Specification	Scale position	Feed amount per 10 stitches
-1 (Max. stitch length 2.5mm)  1008S	1.5	15mm
-3 (Max. stitch length 5mm)  1009S	3	30mm



3. Set the feed adjustment dial ① as indicated in the table.
  4. Turn the condensed stitch adjustment dial ⑦ counterclockwise as far as it will go.
  5. Adjust the feed amount so that the length of material fed after 10 stitches (after the machine pulley rotates 11 times) and the length of reverse feed when the reverse lever ⑧ is pressed (after the machine pulley rotates 11 times) match the distances given in the table.
  6. Loosen the set screw ⑤ and turn the eccentric pin ⑥ to adjust the feed amount.
- \* After adjusting, carry out the "<Backtacking and condensed stitches>" adjustment in the next section also.



## 6. ADJUSTMENTS



### <Backtacking and condensed stitches>

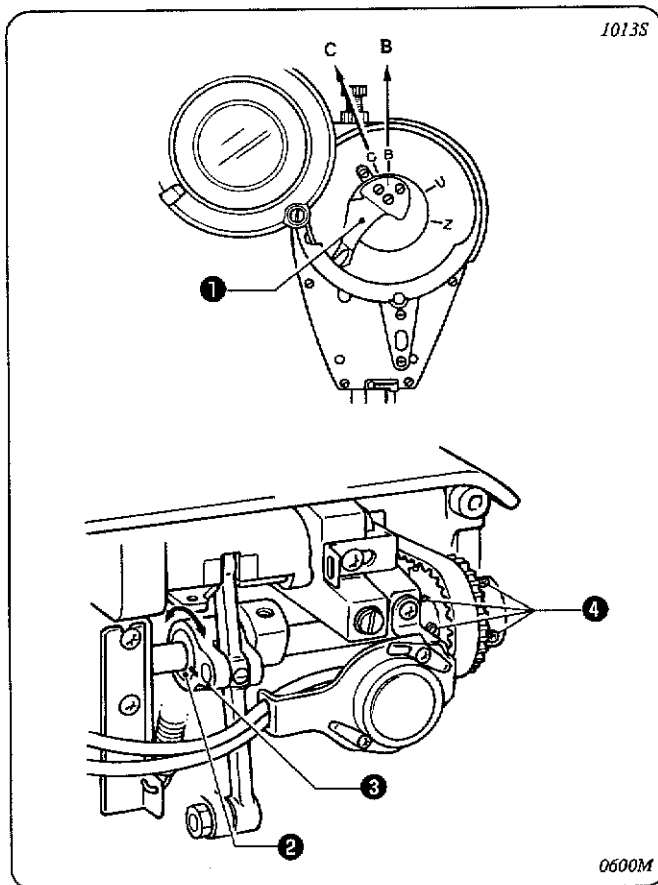
The feed amount for backtacking and condensed stitches is set by means of the condensed stitch adjustment dial ⑦.

The scale is a guide only; if the length of the finished stitches differs greatly from the scale value, make the following adjustment.

In addition, carry out the following adjustment when adjusting the forward feed amount and reverse feed amount so that they are the same.

1. Set the condensed stitch adjustment dial ⑦ to the "0" position.
2. While keeping the backtack lever ⑧ pressed down, turn the machine pulley about 10 times and check that the material feed amount is zero. If the material feed amount is not zero, make the following adjustment.
3. Turn the condensed stitch adjustment dial ⑦ so that it is slightly to the left or the right of the "0" position. Repeat steps 2. and 3. until the zero position for the material feed amount is located.
4. When the zero position for the material feed amount has been located, loosen the screw ⑨, turn only the dial section of the condense stitch adjustment dial ⑦ to the "0" position, and then re-tighten the screw ⑨.

## 6-7. Adjusting the needle and feed mechanism timing



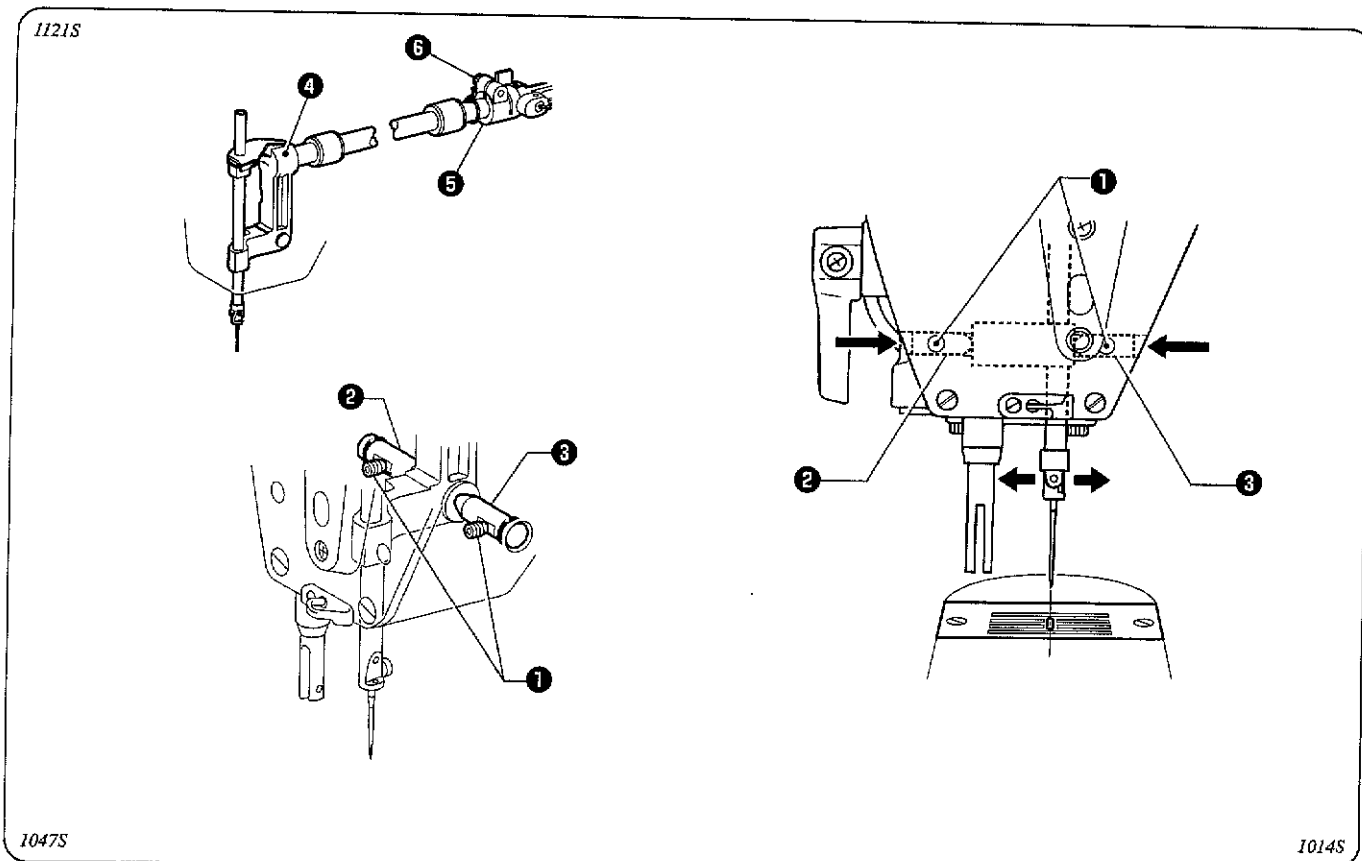
The ○ mark on the level feed eccentric wheel ② should be aligned with the ○ mark on the connecting rod ③ when the reference line on the thread take-up lever ① is aligned with the (the B855E is B, the B856E is C) mark on the face plate.

1. Tilt back the machine head.
2. Align the reference line on the thread take-up lever ① with the B mark (for the B855E) or the C mark (for the B856E) on the face plate.
3. Loosen the four screws ④.
4. Turn the level feed eccentric wheel ② to align the ○ mark with the ○ mark on the connecting rod ③.
5. Securely tighten the four screws ④.

\* If the needle and feed timing has been adjusted, you should also adjust "6-11. Adjusting the needle and rotary hook timing". (Refer to page 6-09.)

For the B856E, "6-18. Adjusting the timing of the thread trimming" should also be adjusted. (Refer to page 6-15.)

## 6-8. Adjusting the forward/back position of the needle bar



\* Make this adjustment if the needle bar bracket assembly ① and joint ⑤ are not fixed securely.

Loosen the screw ⑥ while making this adjustment.

Adjust so that the needle is in the center of the needle plate hole at equal distances from the front and rear edges of the hole.

Furthermore, adjust so that there is no longitudinal play in the needle bar, and so that it moves smoothly to the left and right when the power is turned off and it is pushed by hand. (If the sewing machine is operated when the needle bar does not move smoothly, it may cause the zigzag motor to skip.)

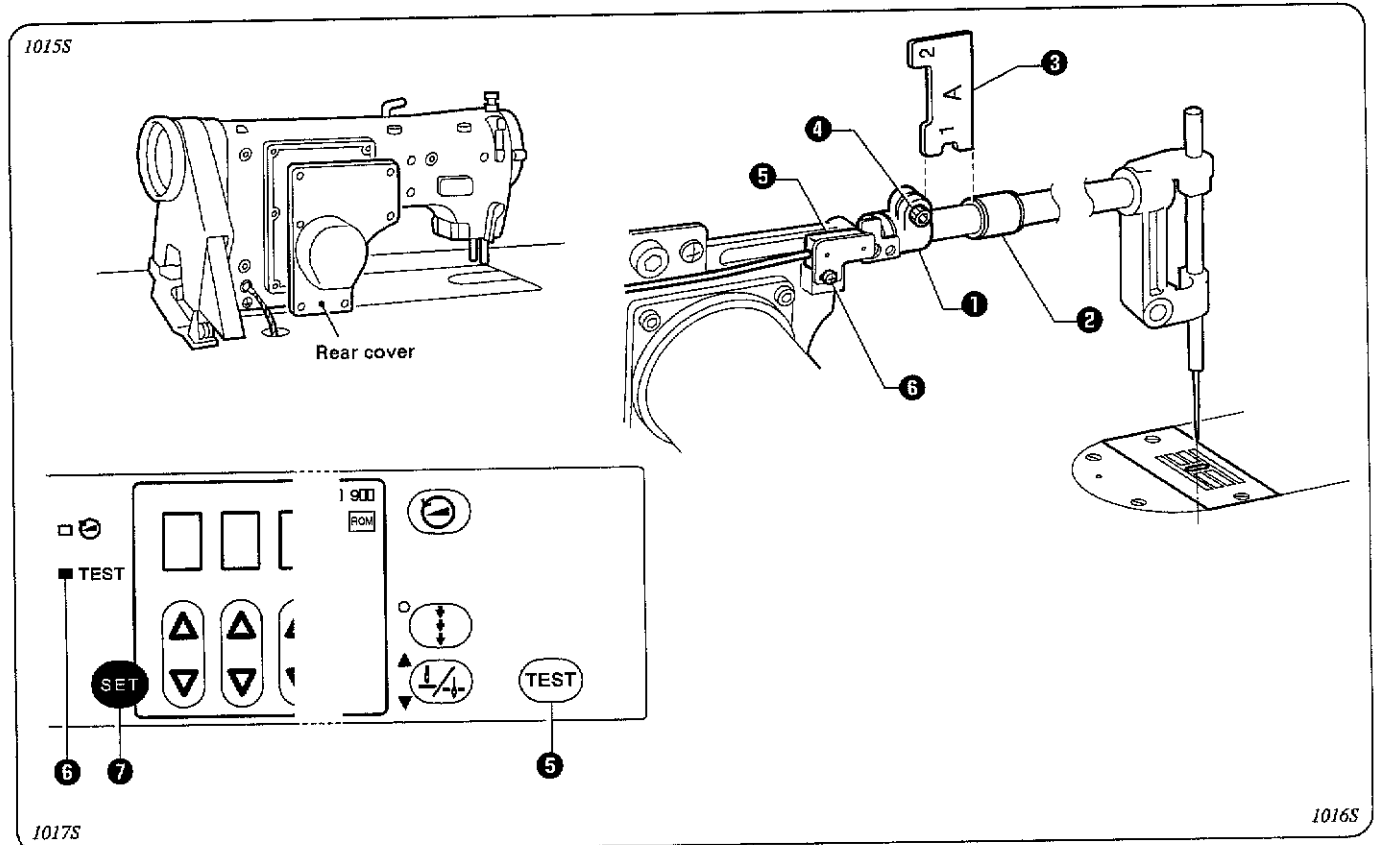
1. Remove the presser foot while making this adjustment.
2. Loosen the two set screws (hexagonal screws 2 mm diagonally opposite each other) ①, and then push pin R ② or pin F ③ to adjust.  
Turn the machine pulley and check that the needle moves down into the center of the needle plate hole.
3. Securely tighten the two screws ①.

\* After adjusting, be sure to check that there is no longitudinal play in the needle bar, and that it moves smoothly to the left and right when the power is turned off and it is pushed by hand.

\* After making this adjustment, you should also carry out the adjustment in "6-9. Adjusting the right/left position of the needle bar" (Page 6-07).

## 6. ADJUSTMENTS

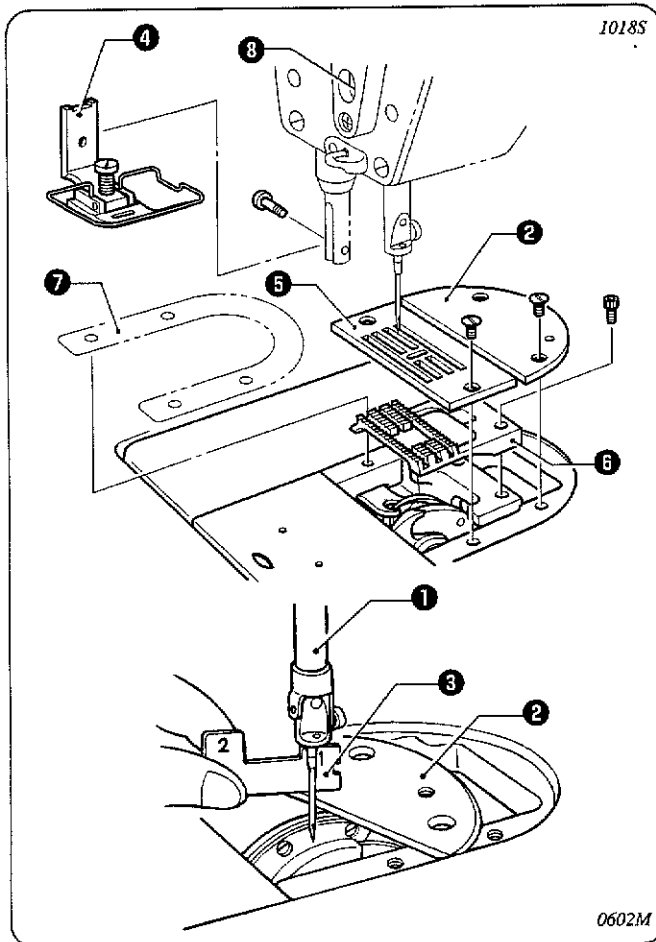
### 6-9. Adjusting the right/left position of the needle bar



Adjust so that the needle is almost exactly in the center of the groove in the needle plate hole when the power is turned on, the zigzag width is set to zero on the operation panel (when the PATTERN key is set to "1" (straight stitch), the zigzag width will become 0.0 mm) and the zigzag reference line position is set to 0 mm.

1. Turn off the power switch.
2. Remove the presser foot and the rear cover while making this adjustment.
3. Adjust so that the clearance between the edge of the zigzag joint ① and the edge of the bushing ② on the machine head is the same as the width 1 on timing gauge "A" ③ when the needle is in the center of the needle plate hole (groove).  
Loosen the screw ④ of the zigzag joint ① to adjust.  
\* After adjusting, securely tighten the screw ④, while being careful not to screw it in too tightly and so that the zigzag joint ① does not get twisted.
4. Turn on the power.
5. Press the TEST key ⑤ on the operation panel and check that the TEST indicator ⑥ illuminates. (Be sure to carry out this step as a safety measure. It will prevent the sewing machine motor from operating even if the treadle is depressed.)
6. Use the operation panel keys to set the zigzag width and the zigzag reference line position to "0". Refer to the instruction manual for details on how to make these settings.  
After making the settings, press the SET key ⑦. The needle bar will then move sideways to determine the home position.  
If the needle home position does not align with the center of the needle plate hole (groove), make the following adjustment.
7. Adjust the home position sensor ⑤ so that the needle home position is aligned with the center of the needle plate hole (groove).  
Loosen the screw ⑥, and then move the home position sensor ⑤ by the same distance that the needle home position is out of alignment.  
After adjusting, press the SET key ⑦ twice so that the needle bar moves to the home position.  
Repeat this step until the needle home position is aligned with the center of the needle plate hole.
8. Press the TEST key ⑤ on the operation panel. The TEST indicator ⑥ will switch off and the sewing machine will return to normal sewing mode. Then press the power switch to turn off the power.

## 6-10. Adjusting the needle bar height



When the needle bar ① is at its lowest position, the distance from the top of the auxiliary needle plate ② to the bottom edge of the needle bar ① should be the same as the height of accessory timing gauge ③ (No.1 side).

1. Remove the presser foot ④, needle plate ⑤, auxiliary needle plate ②, feed dog ⑥ and spacer ⑦ (B856E only).
2. Place the auxiliary needle plate ② on the needle plate installation surface of the machine bed.
3. Turn the machine pulley to move the needle bar ① to its lowest position.
4. Loosen the screw ⑧.
5. Move the needle bar ① up or down to adjust the distance from the top of the auxiliary needle plate ② to the bottom edge of the needle bar ① so that it is the same as the height of accessory timing gauge ③ (No.1 side).

**Note:**

The needle plate ⑤ and the auxiliary needle plate ② are of different thicknesses, so be sure to use the auxiliary needle plate ②.

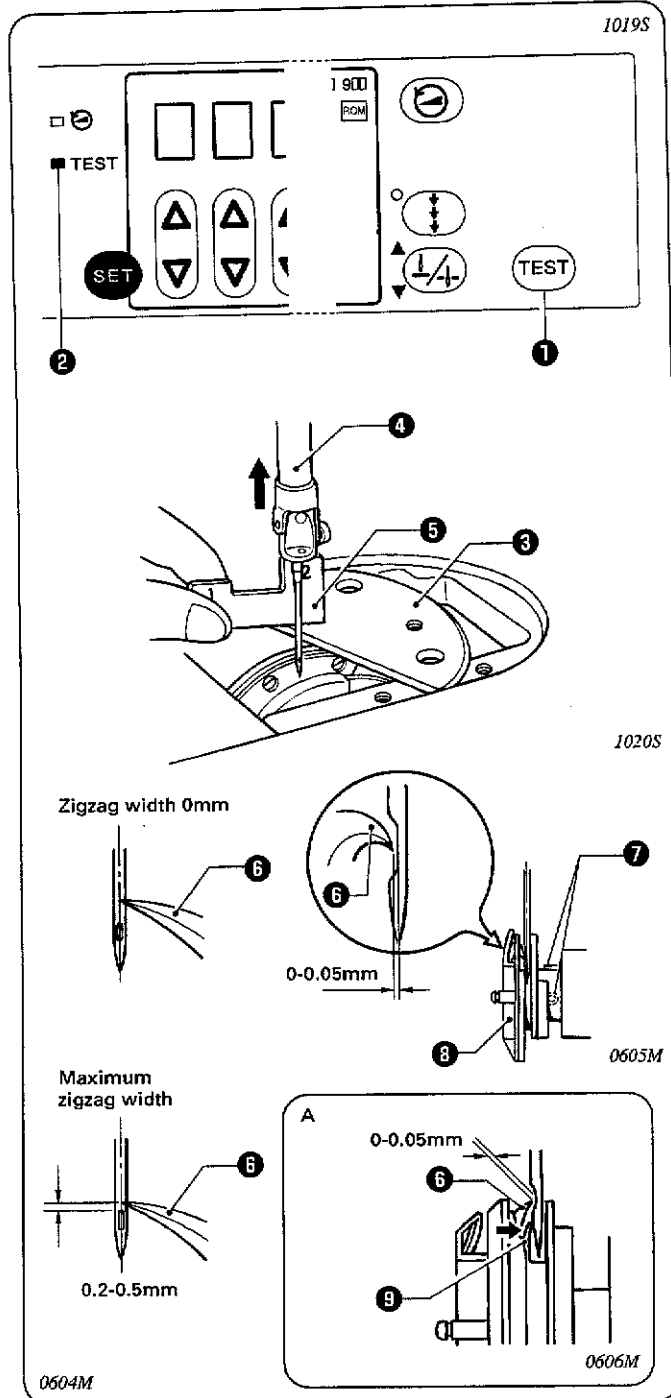
6. Securely tighten the screw ⑧.
  7. Install the presser foot ④, needle plate ⑤, auxiliary needle plate ②, feed dog ⑥ and spacer ⑦ (B856E only).
- \* When adjusting the needle bar height, be sure to adjust "6-11. Adjusting the needle and rotary hook timing" also. (Refer to page 6-09.)
- \* When remove the feed dog, be sure to adjust "6-5. Adjusting the forward/back, right/left position of the feed dog". (Refer to page 6-03.)

**Accessory timing gauge**

Index mark	Max.zigzag width
A	8mm
B	10mm
C	5mm

## 6. ADJUSTMENTS

### 6-11. Adjusting the needle and rotary hook timing



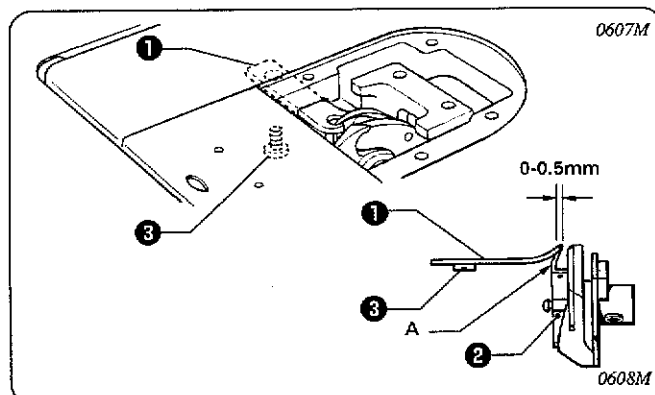
1. Turn on the power switch.
2. Press the TEST key ① and check that the TEST indicator ② is illuminated.  
(For safety purposes, be sure to carry out this step, as it prevents the motor from operating even if the treadle is depressed.)
3. Set both the zigzag width and the zigzag base line position to "0". (Refer to instruction manual pages 77-79.)
4. Remove the presser foot, needle plate, auxiliary needle plate, feed dog and spacer (B856E only). (Refer to 6-10 on page 6-08.)
5. Place the auxiliary needle plate ③ on the needle plate installation surface of the machine bed.
6. Turn the machine pulley to move the needle bar ④ from its lowest position, and check the following when the distance from the top of the auxiliary needle plate ③ to the bottom edge of the needle bar ④ is the same as the height of accessory timing gauge ⑤ (No.2 side).
  - The tip of the rotary hook ⑥ should be aligned with the center of the needle.
  - The distance from the tip of the rotary hook ⑥ to the needle should be 0 to 0.05 mm.

#### Note:

The needle plate and the auxiliary needle plate ③ are of different thicknesses, so be sure to use the auxiliary needle plate ③.

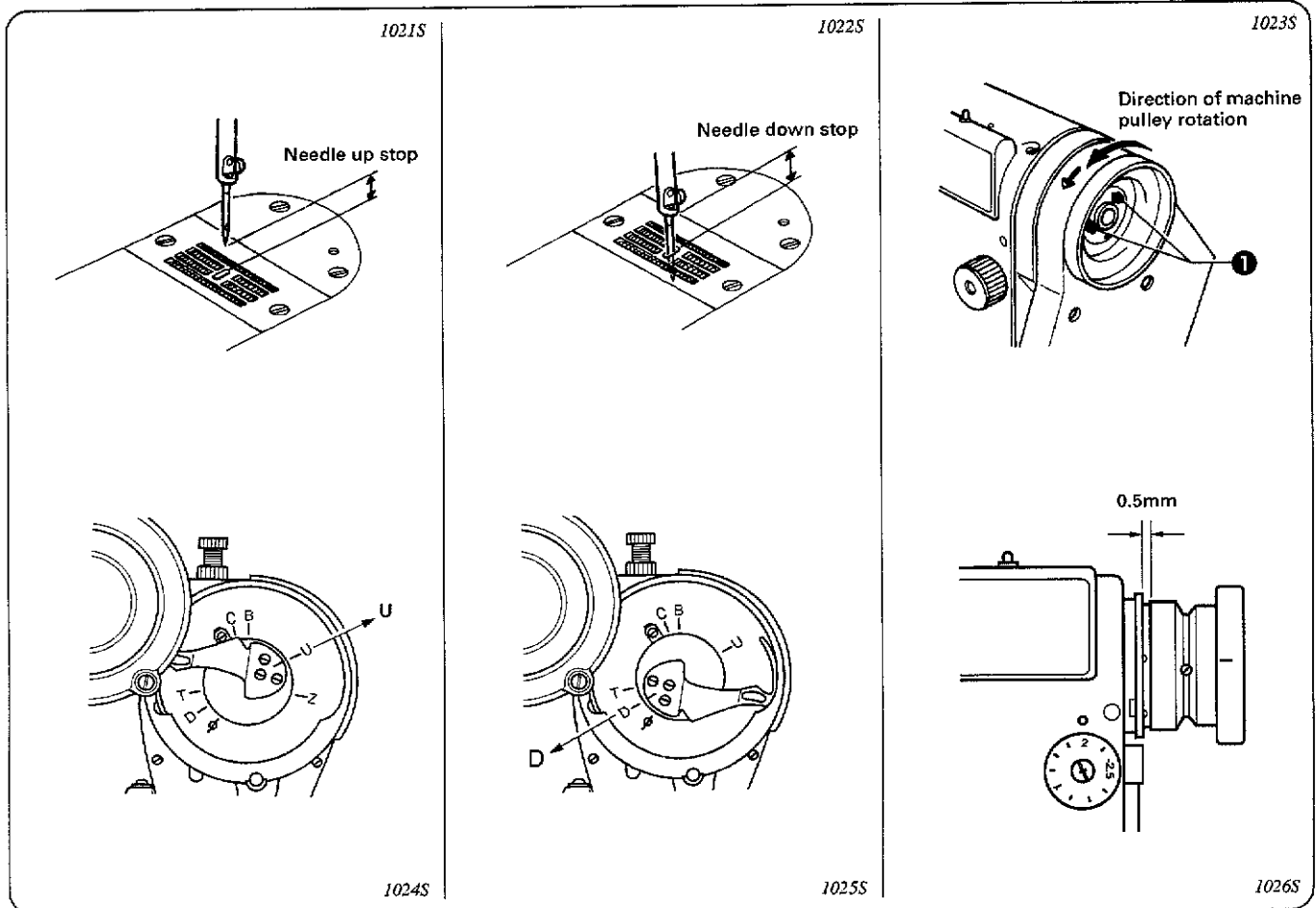
7. If the above are not correct, loosen the two screws ⑦ and adjust the position of the rotary hook ⑧.  
After adjustment, securely tighten the two screws ⑦.
8. Set the zigzag width to the maximum setting (8 mm).
9. Turn the machine pulley to move the needle to its furthest left position so that the tip of the rotary hook ⑥ is aligned with the center of the needle, and check that the distance from the upper edge of the needle hole to the tip of the rotary hook ⑥ is 0.2 to 0.5 mm at this time.
  - \* If the distance is not correct, adjust the height of the needle bar. (Refer to page 6-08.)
10. If needle deflection occurs when sewing material with joints, bend the needle guard ⑨ in the direction of the arrow as shown in the illustration A so that it touches the needle.
  - \* After this, check that the clearance between the tip of the rotary hook ⑥ and the needle is 0 to 0.05 mm.
11. Press the TEST key ① so that the TEST indicator ② switches off.  
Normal sewing will then be possible.  
Turn off the power to continue adjustment.

### 6-12. Adjusting the hook stopper position



- Adjust so that the end of the rotary hook holder ① is 0 to 0.5 mm back from end A of the inner rotary hook ②.
- \* The end of the rotary hook holder ① must never extend to the right of end A of the inner rotary hook ②.
1. Loosen the screw ③ and adjust the position of the rotary hook holder ①.
  2. Securely tighten the screw ③.

## 6-13. Adjusting the synchronizer



- The synchronizer consists of two elements which are used to detect the needle position. One of these elements is used to control the needle down signal and the thread trimmer signal.
- When the power is turned on and the sewing machine stops in the needle up stop position, the reference line on the thread take-up lever should stop near the U mark on the face plate ( $\pm 3$  mm). Furthermore, when the sewing machine stops in the needle down stop position, the reference line on the thread take-up lever should stop near the D mark on the face plate ( $\pm 4$  mm).

## &lt;Needle up stop position adjustment&gt;

1. Turn off the power switch.
2. Loosen the two set screws ❶.
3. Move set screw ❶ in the direction of normal pulley rotation to raise the needle bar. Move the screw ❶ in the opposite direction to lower the needle bar.
4. Tighten the set screws ❶.

## &lt;Needle down and thread trimmer signals&gt;

Do not adjust the needle down stop position.

## \* Note

- The synchronizer is preadjusted at the factory. Do not remove the synchronizer after removing the pulley.
- When mounting the pulley be sure to leave a 0.5 mm gap between the pulley edge and synchronizer. Furthermore, tighten the two machine pulley set screws so that the rear set screw is at the screw stop on the upper shaft when seen from the machine pulley turning direction.

## 6. ADJUSTMENTS

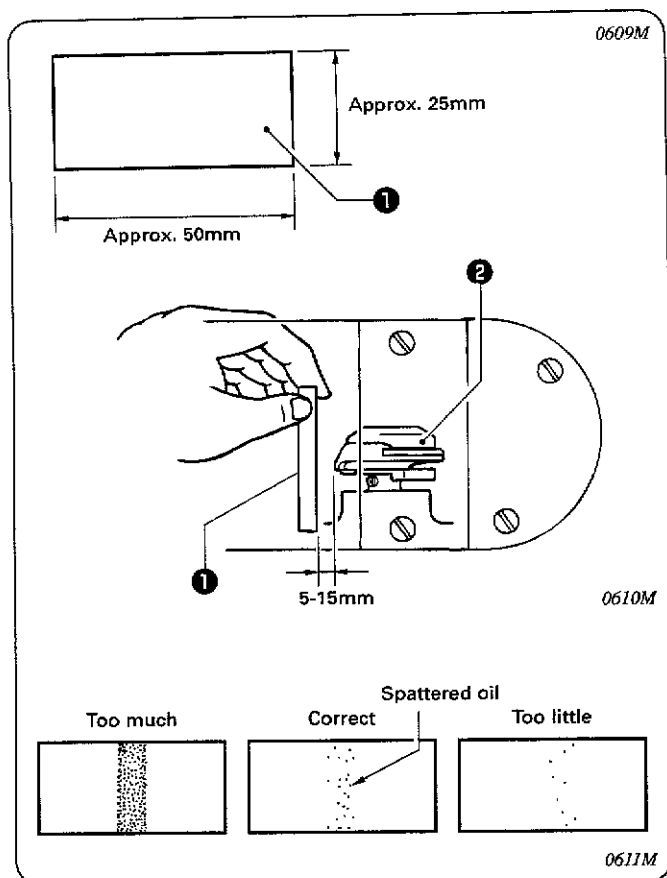
### 6-14. Adjusting the rotary hook lubrication amount

#### ⚠ CAUTION



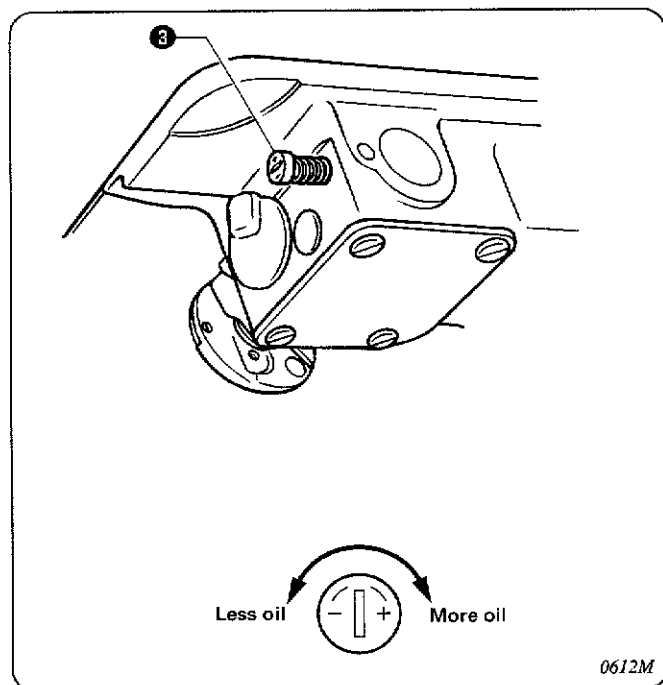
Be careful not to touch your fingers or the lubrication amount check sheet against moving parts such as the rotary hook or the feed mechanism when checking the amount of oil supplied to the rotary hook, otherwise injury may result.

Use the following procedure to check the amount of oil being supplied to the rotary hook when replacing the rotary hook or when changing the sewing speed.



#### <Checking the lubrication amount>

1. Run the machine at the normal sewing speed for approximately 1 minute without sewing any material (following the same start/stop pattern as when actually sewing).
2. Place the lubrication amount check sheet ① to the left of the rotary hook ② and hold it there. Then run the sewing machine at the normal sewing speed for 10 seconds.  
(Any type of paper can be used as the lubrication amount check sheet ①.)
3. Check the amount of oil which has spattered onto the sheet.
  - \* Be sure to repeat this operation three to four times to check average lubrication amounts.

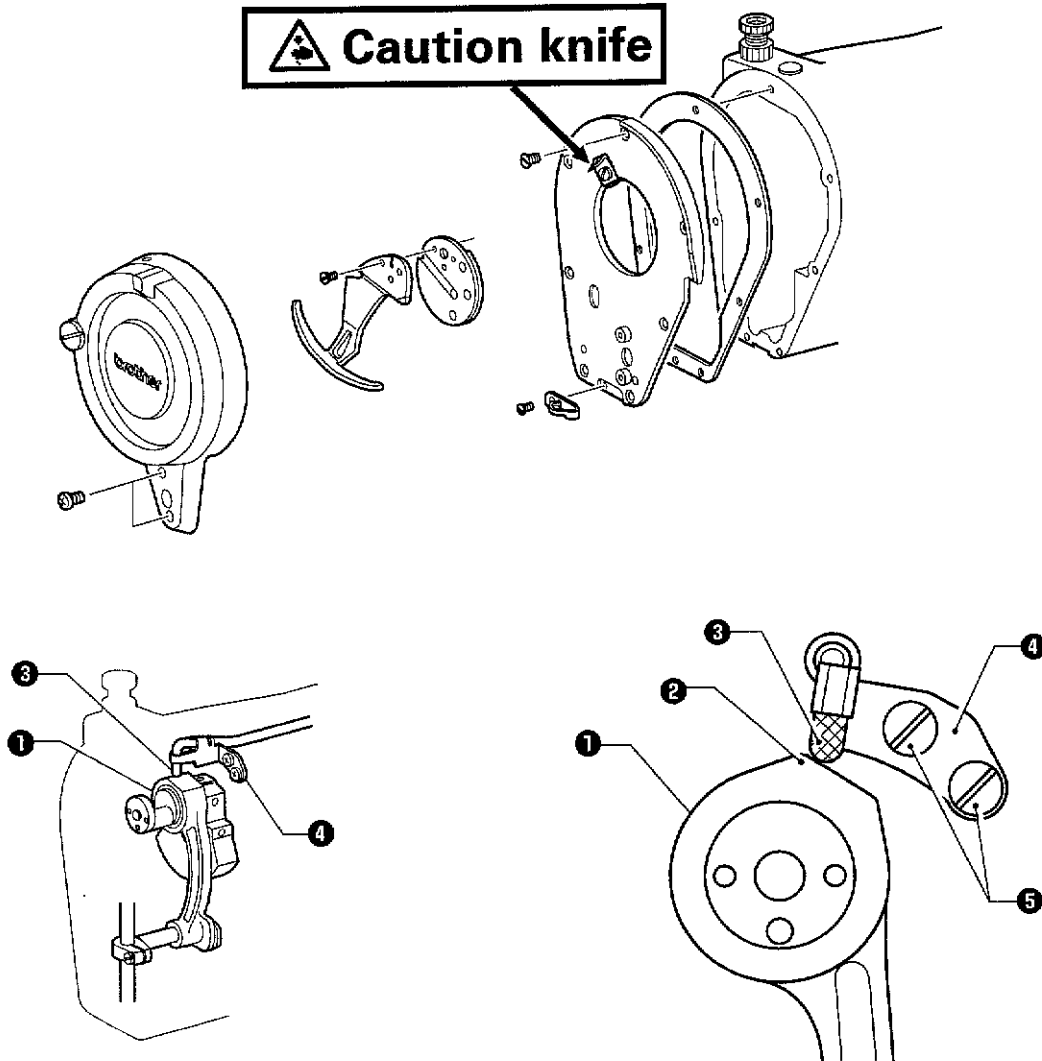


#### <Adjusting the lubrication amount>

1. Tilt back the machine head.
2. Turn the lubrication adjustment screw ③ to adjust the lubrication amount.
3. Return the machine head to the upright position. Check the lubrication amount again according to the procedure given in "Checking the lubrication amount" above.
  - \* Turn the lubrication adjustment screw ③ and check the lubrication amount repeatedly until the lubrication amount is correct.
4. Check the lubrication amount again after the sewing machine has been used for approximately two hours.

## 6-15. Adjusting the lubrication amount of the needle bar

1027S



1028S

1029S

Make this adjustment if there is a large amount of oil leaking from around the needle bar, or if needle zigzagging becomes more and more sluggish and the motor skips as sewing operation continues.

1. Remove the parts shown in the illustration while making this adjustment.
2. Turn the machine pulley and adjust the position of the needle bar lubrication support ④ so that the projection on the needle bar connecting rod ① is slightly touching the wick ③.  
Loosen the two screws ⑤ to adjust.

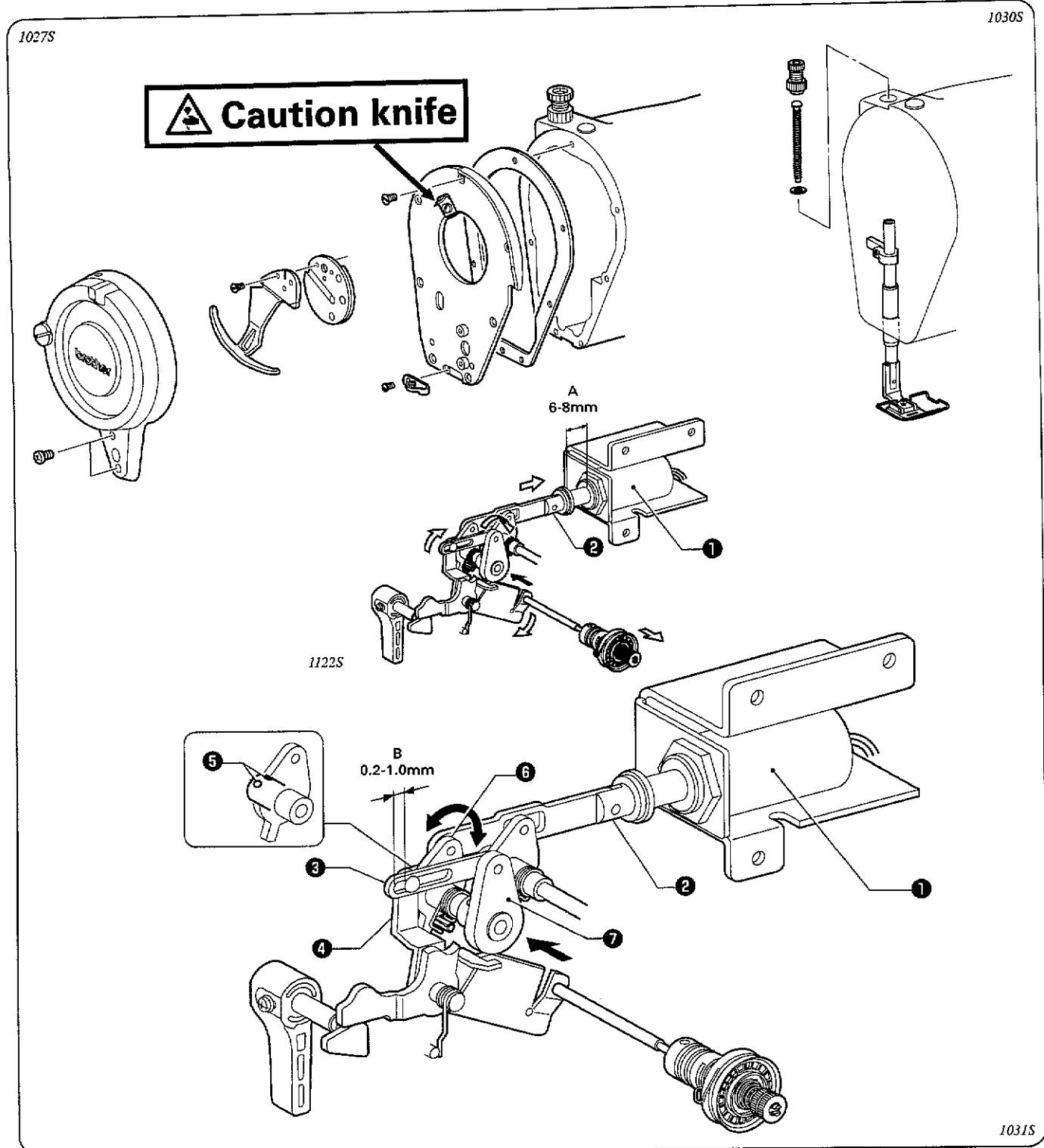
**Note:**

- If the projection on the needle bar connecting rod ① is touching the wick ③ too firmly, the amount of oil leaking around the needle bar will increase.
- In contrast, if they do not touch at all, needle zigzagging will become more and more sluggish as the sewing machine continues running, and motor skipping and seizure will result.



## 6. ADJUSTMENTS

### 6-16. Adjusting the tension release of thread trimming (B856E)

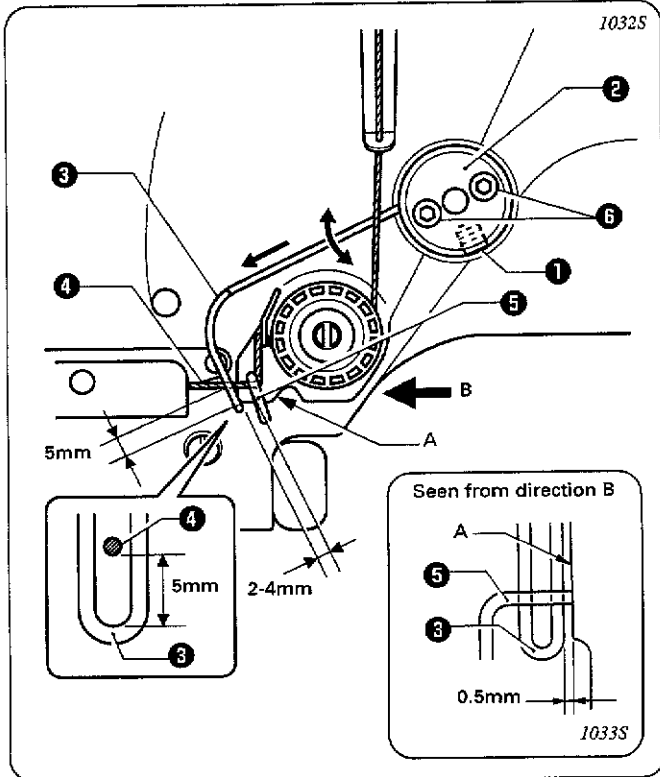


The tension release mechanism operates during thread trimming.

The thread tension will start to become less when the presser bar lifter is lowered and the plunger ② of the thread feeding solenoid ① is at the length A shown in the illustration.

1. Remove the parts shown in the illustration while making this adjustment. Also lower the presser bar lifter.
2. Adjust so that the distance between the tension release connecting rod ③ and the crimped pin of the tension release plate ④ is at the distance B shown in the illustration.  
Loosen the two set screws ⑤ and move the thread feeding lever ⑦ to adjust.  
(First adjust so that the tension release connecting rod and the crimped pin are touching, and then adjust further so that they are at the distance in the illustration.)
3. After adjusting, tighten the two set screws ⑤ while pushing the thread feeding lever ⑦ gently backward.
4. To check the timing for the start of tension release, push the plunger ② of the thread feeding solenoid ① by hand until it reaches the position shown in the illustration.

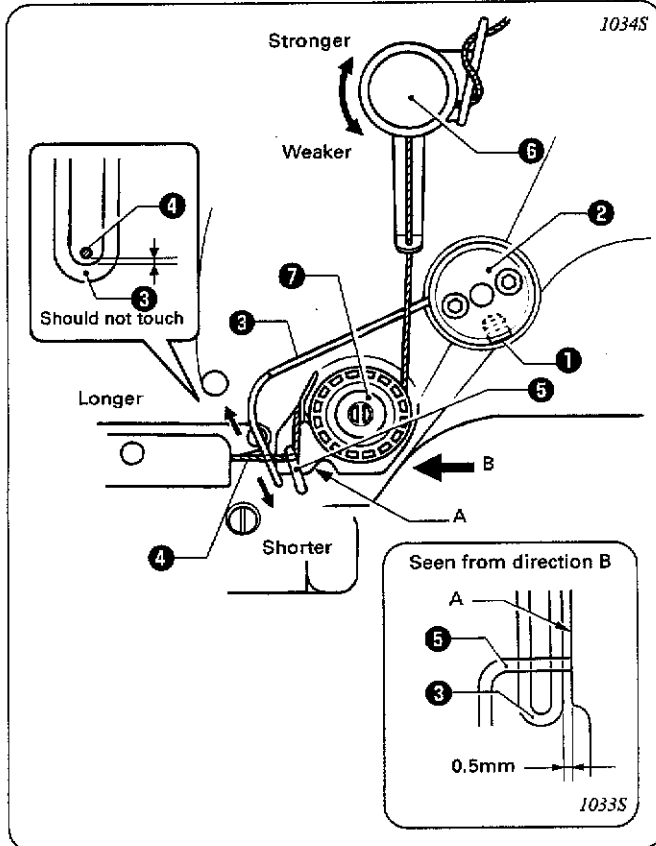
6-17. Adjusting the thread trailing length after thread trimming (B856E)



<Standard position for upper thread feeding device>

The standard position for the upper thread feeding device is as shown in the illustration.

1. Loosen the set screw ①.
2. Turn the base ② so that the end of the wire ③ is at a position 5 mm below the position where the upper thread ④ passes.
3. Tighten the set screw ①.  
\* At this time, keep the end of the wire ③ 0.5 mm away from surface A of the part where the thread guide ⑤ is installed.
4. Loosen the two bolts ⑥.
5. Move the wire ③ to the left or right so that the end of the wire ③ is 2 to 4 mm from the top-left edge of the thread guide ⑤.
6. Tighten the bolts ⑥.



<Adjusting the upper thread trailing amount>

The standard upper thread trailing amount after thread trimming varies as shown below depending on the type of thread used.

Upper thread	Upper thread trailing amount
nylon 100D 1 X 3(Z)	50 - 60mm
#60 spun	40 - 50mm

If adjustment is necessary, adjust the position of the wire ③ as described below.

1. Loosen the set screw ①.
2. Turn the base ② to adjust the vertical position of the end of the wire ③.
  - To increase the upper thread trailing amount, raise the position of the wire ③ without letting it touch the upper thread ④.
  - To decrease the upper thread trailing amount, lower the position of the wire ③ without letting it touch the thread guide ⑤.
3. After adjusting, tighten the set screw ①.  
\* At this time, keep the end of the wire ③ 0.5 mm away from surface A of the part where the thread guide ⑤ is installed.

**Note:**

If the tension of the pre-tension ⑥ is too strong, it will be more difficult to adjust the upper thread trailing amount.

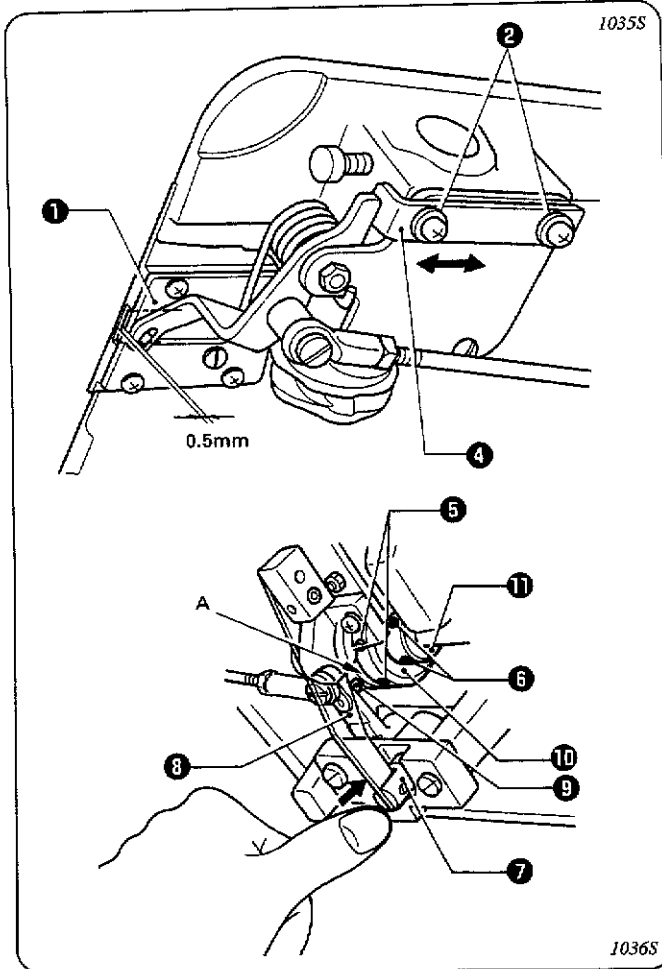
The pre-tension ⑥ should be adjusted to as weak a tension as possible while still allowing the rotary disc ⑦ to rotate smoothly.

\* The thread tension will change at this time, so be sure to re-adjust the upper thread tension. (Refer to instruction manual page 123.)

## 6. ADJUSTMENTS

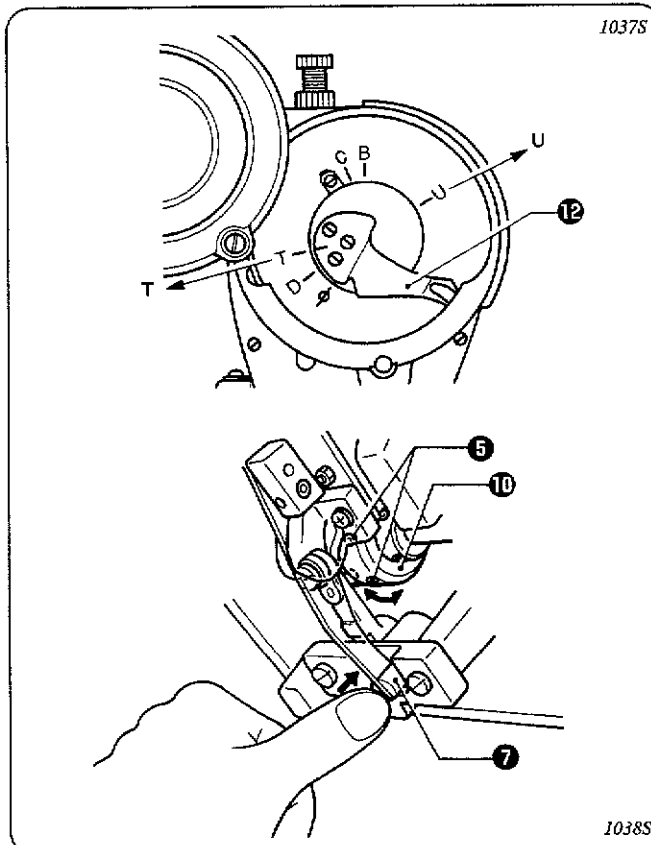
### 6-18. Adjusting the timing of the thread trimming (B856E)

The knife unit ① should already be installed in the correct way when the following adjustments are carried out.



#### <Horizontal position adjustment>

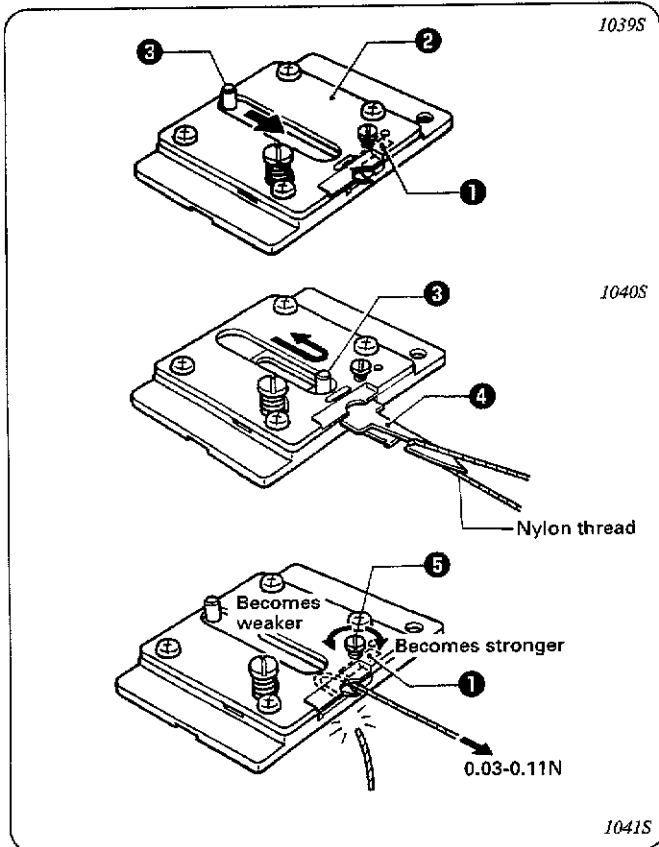
1. Tilt back the machine head.
2. Loosen the two screws ②.
3. Move the stopper ④ to adjust so that the edge of the movable knife ③ is 0.5 mm inside the edge of the knife unit ①.
4. Securely tighten the screws ②.
5. Loosen the two set screws ⑤ and the two set screws ⑥.
6. While pushing the thread trimming driving rod ⑦ by hand, adjust the horizontal position of the thread trimming cam ⑩ so that the roller ⑨ of the main lever ⑧ moves smoothly in and out of the straight section A of the groove in the thread trimming cam ⑩.
7. Provisionally tighten the two set screws ⑤.
8. Place the set screw collar ⑪ firmly against the thread trimming cam ⑩, and then securely tighten the two set screws ⑥.



#### <Rotating direction adjustment>

1. While still pushing thread trimming driving rod ⑦ by hand, turn the machine pulley slowly by hand toward you until the reference line on the thread take-up lever ⑫ is aligned with the T mark on the face plate. Adjust the position of the thread trimming cam ⑩ so that the knife begins to move at this point.  
\* At this time, be careful to turn the machine pulley so that the thread trimmer cam ⑩ does not separate from the set collar ⑪.
2. Securely tighten the two set screws ⑤.
3. While still pushing thread trimming driving rod ⑦ by hand, turn the machine pulley slowly by hand toward you until the reference line on the thread take-up lever is aligned with the T mark on the face plate. Check that the knife begins to move at this point, and that it returns when the reference line is aligned with the U mark.

### 6-19. Adjusting the tension of the lower thread presser spring (B856E)



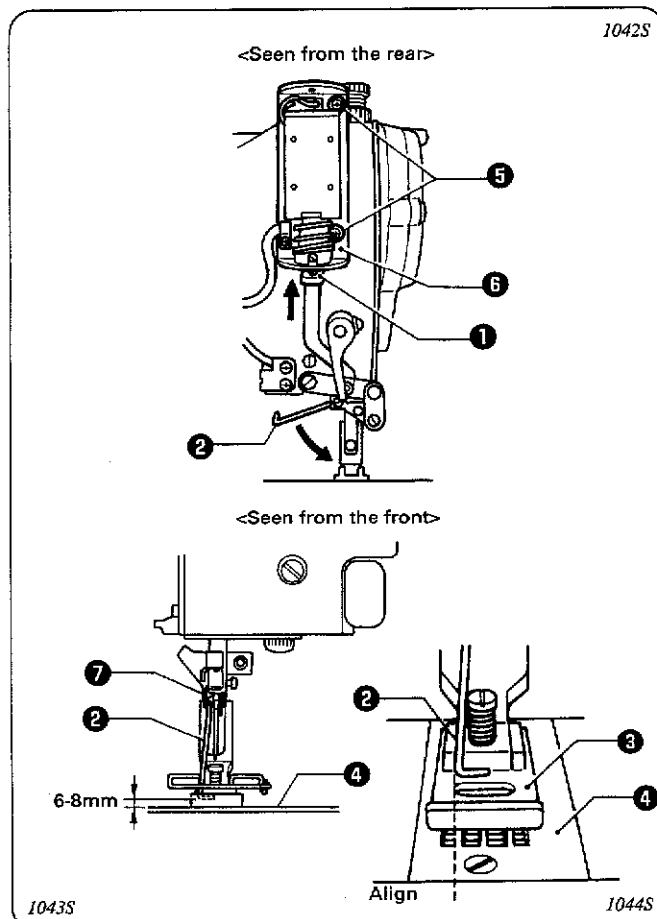
Adjust the tension of the lower thread presser spring ① so that the tension is 0.03 to 0.11 N when the lower thread presser spring ① is pulling the lower thread (nylon thread: 100D 1 X 3 (Z)) after thread trimming.

1. Remove the knife unit ②. (Refer to instruction manual page 130.)
2. Move the knob ③ to slide out the movable knife ④, and then hook the thread as shown in the illustration.
3. Return the movable knife ④ to trim the thread. After this, measure the tension of the lower thread presser spring ① while it is pulling the lower thread.
4. Turn the screw ⑤ to adjust the tension of the lower thread presser spring ① to 0.03 to 0.11 N.

**Note:**

If using a tension gauge (sold separately) to measure the tension, take the reading from the scale on the side of the red line.

### 6-20. Adjusting the thread wiper (B856E)



**<Horizontal position adjustment>**

The front corner of the thread wiper ② and the left edge of the needle hole of the presser foot ③ (or the needle hole of the needle plate ④) should be aligned when the solenoid plunger ① is pushed up as far as it will go. Loosen the two screws ⑤ and move the setting plate ⑥ up or down to adjust.

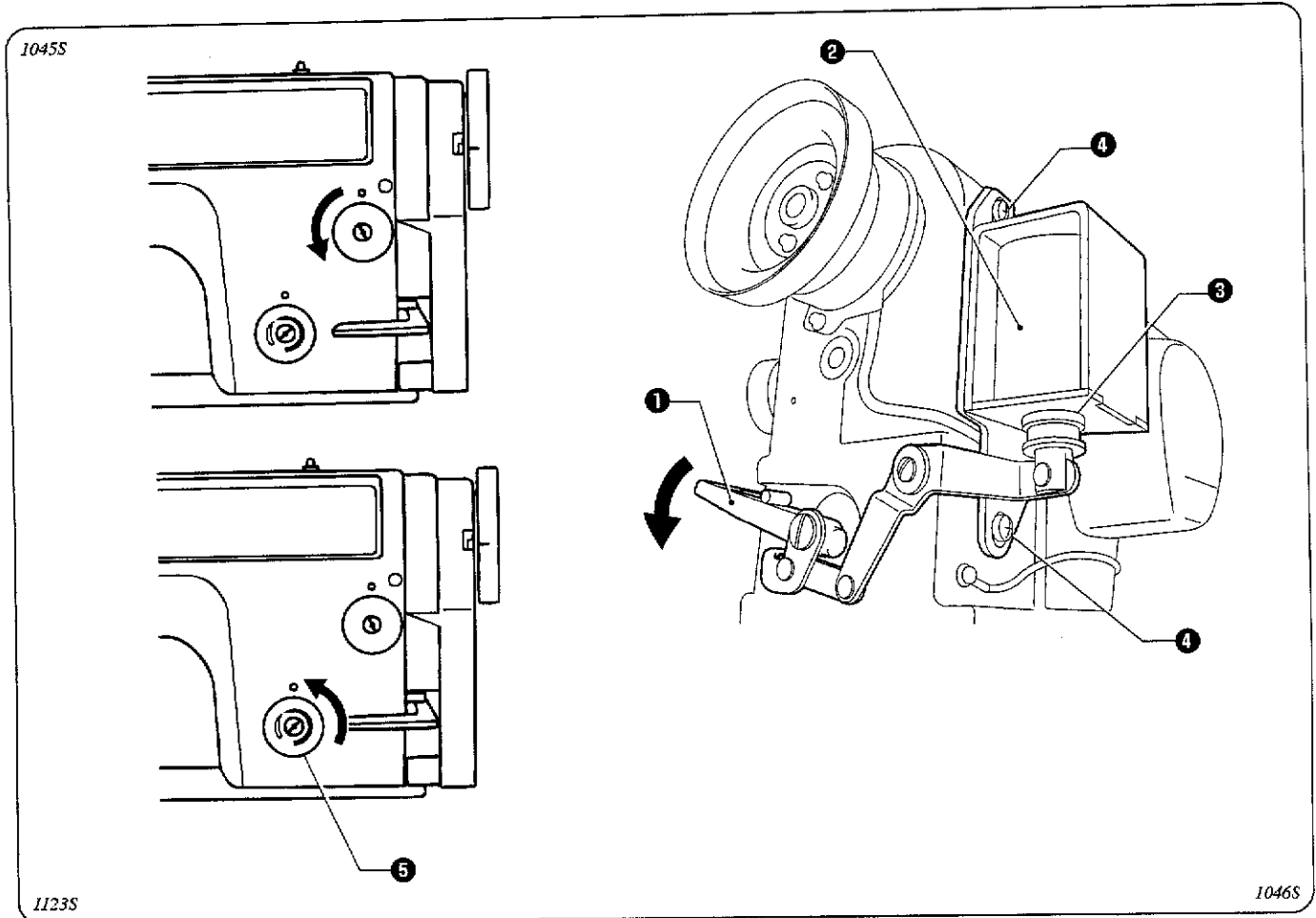
\* If the finger guard of the presser foot and the thread wiper interfere with each other during actual operation, move the thread wiper position to the right (when looking from the front).

**<Height adjustment>**

Check that the distance from the bottom edge of the thread wiper ② to the top of the needle plate ④ is 6 to 8 mm, and that the thread wiper ② catches the thread firmly. Loosen the screw ⑦ and move the thread wiper ② up or down to adjust.

## 6. ADJUSTMENTS

### 6-21. Adjusting the reverse feed assembly (B855E/BT856E)



If the feed amount is at the maximum, press the backtack lever **1** to its lowest position so that the plunger cushion **3** touches the base of the backtack solenoid **2**.  
Set the condense stitch adjustment dial **5** to the maximum reverse setting when adjusting.  
Loosen the two screws **4** and move the backtack solenoid **2** up and down to adjust.



## 7. TROUBLESHOOTING

### 7. TROUBLESHOOTING

- Please check the following points before calling for repairs or service.
- If the following suggestions do not solve the problem, turn off the machine power supply and contact your nearest Brother service center.

## ⚠ DANGER




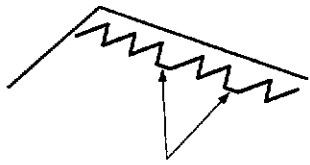



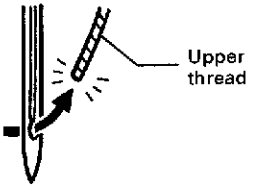

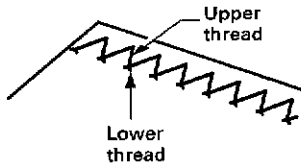
Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the face plate of the control box. Touching areas where high voltages are present can result in severe injury.

## ⚠ CAUTION




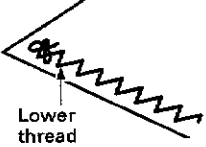
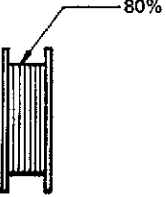
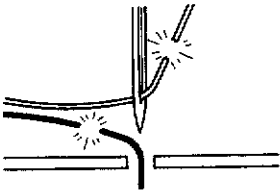
Turn off the power switch and disconnect the power cord before carrying out troubleshooting, otherwise the machine will operate if the treadle is pressed by mistake, which could result in injury.

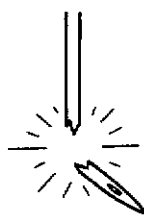
Problem	Possible cause	Page
<p>1. Upper thread is not tight.</p>  <p style="text-align: right;"><i>0573M</i></p>	<ul style="list-style-type: none"> <li>• Is the upper thread tension too weak, or is the lower thread tension too strong? Adjust the upper thread tension or lower thread tension.</li> </ul>	—
<p>2. Lower thread is not tight.</p>  <p style="text-align: right;"><i>0574M</i></p>	<ul style="list-style-type: none"> <li>• Is the lower thread tension too weak, or is the upper thread tension too strong? Adjust the lower thread tension or upper thread tension.</li> </ul>	—
<p>3. Skipped stitches occur while sewing</p>  <p style="text-align: right;"><i>0621M</i></p>	<ul style="list-style-type: none"> <li>• Is the needle tip bent? Is the needle tip blunt? If the needle tip is bent or broken, replace the needle.</li> <li>• Is the needle properly installed? If it is incorrect, install the needle correctly.</li> <li>• Is the machine properly threaded? If it is incorrect, thread the thread correctly.</li> <li>• Is the presser foot pressure too weak? Adjust the presser foot pressure.</li> <li>• Is the needle too thin? Replace the needle with a needle that is one rank thicker.</li> <li>• Is the presser foot too high? Adjust the height of the presser foot.</li> <li>• Is the needle and rotary hook timing incorrect? Adjust the height of the needle bar.</li> <li>• Is the thread tension spring too weak? Adjust the clearance between the needle and the rotary hook.</li> <li>• Is the thread tension spring too weak? Adjust the tension of the thread tension spring.</li> </ul>	<p>—</p> <p>—</p> <p>—</p> <p>—</p> <p>—</p> <p>6-02</p> <p>6-08</p> <p>6-09</p> <p>6-01</p>
<p>4. Flattened zigzags appear in the stitch during intermittent sewing (B855E)</p>  <p style="text-align: right;"><i>1118S</i></p>	<ul style="list-style-type: none"> <li>• Has the treadle been depressed backward? Do not press the treadle backward when the sewing machine is stopped. (When DIP switch 2-4 is set to ON, needle zigzagging also occurs when the treadle is depressed backward, in order to prevent a flattened zigzag from being sewn if the treadle is depressed backward by mistake.)</li> <li>• Does the treadle move too easily when it is depressed backward? Adjust the force required to depress the treadle backward so that it is a bit heavier.</li> </ul>	<p>—</p> <p>Instruction manual 40</p> <p>Instruction manual 44</p>

Problem	Possible cause	Page
<p>5. Skipped stitches at sewing start</p>  <p>0622M</p> <p>Thread unravelling at sewing start</p>  <p>Upper thread</p> <p>0623M</p>	<ul style="list-style-type: none"> <li>• Are the thread take-up spring tensions too strong? Reduce the tension of the thread take-up springs.</li> <li>• Is the thread tension spring operating range too large? Lower the position of the thread tension spring.</li> <li>• Is the needle too wide? Try using a needle with a count that is one lower than the current needle.</li> </ul> <p>&lt;B855E&gt;</p> <ul style="list-style-type: none"> <li>• Is the needle bar at the needle up stop position at the sewing start? Set the needle bar to the needle up stop position at the sewing start.</li> <li>• Is the length of the upper thread trailing from the needle hole too short? Pull about 50 mm of thread through the needle hole at the sewing start.</li> </ul> <p>&lt;B856E&gt;</p> <ul style="list-style-type: none"> <li>• Is the trailing length of the upper thread too short after thread trimming? Adjust the upper thread feeding device.</li> <li>• Are the threads not being trimmed cleanly? Sharpen the fixed knife with a whetstone, or replace the fixed knife. Replace the movable knife.</li> <li>• Is the length of thread trailing out from the bobbin case after thread trimming too short? If the bobbin is spinning loosely, replace the bobbin tension spring in the bobbin case. Adjust the tension of the lower thread presser spring.</li> <li>• Is the needle up stop position too high? Adjust the synchronizer.</li> </ul>	<p>6-01</p> <p>6-01</p> <p>—</p> <p>—</p> <p>—</p> <p>6-14</p> <p>Instruction manual 130</p> <p>Instruction manual 47</p> <p>Instruction manual 161</p> <p>6-10</p>
<p>6. Uneven seam</p>  <p>0625M</p>	<ul style="list-style-type: none"> <li>• Is the presser foot pressure too weak? Adjust the presser foot pressure.</li> <li>• Is the feed dog too low? Adjust the feed dog height.</li> <li>• Is the bobbin scratched? If the bobbin is damaged, smooth it with an oiled grindstone or replace it.</li> </ul>	<p>—</p> <p>6-02</p> <p>—</p>
<p>7. Horizontal thread tightening not balanced</p>  <p>Upper thread</p> <p>Lower thread</p> <p>0626M</p>	<ul style="list-style-type: none"> <li>• Is the upper thread tension or lower thread tension too strong or too weak? Adjust the upper thread tension or lower thread tension.</li> <li>• Does the rotary disc rotate smoothly? Adjust the pre-tension.</li> <li>• Is the tension of the thread take-up spring correct? Adjust the tension of the thread take-up spring.</li> <li>• Is the stroke of the thread take-up spring correct? Adjust the position of the thread take-up spring.</li> <li>• Is the needle and rotary hook timing correct? Adjust the needle and rotary hook timing.</li> <li>• Is the needle and rotary hook timing correct? Adjust the height of the needle bar. Adjust the distance between the needle and the tip of the rotary hook.</li> <li>• Is the thread too thick for the needle? Use the correct needle or the correct thread.</li> <li>• Is the rotary hook, bobbin case, thread take-up lever or some other part in the thread path damaged? Repair the damage, or replace the part with a new one.</li> </ul>	<p>—</p> <p>—</p> <p>6-01</p> <p>6-01</p> <p>6-05</p> <p>6-08</p> <p>6-09</p> <p>—</p> <p>—</p>



## 7. TROUBLESHOOTING

Problem	Possible cause	Page
<p>8. Large degree of puckering (excess tension)</p>  <p style="text-align: right;">0627M</p>	<ul style="list-style-type: none"> <li>• Is the upper thread tension too strong? Make the upper thread tension as weak as possible.</li> <li>• Is the lower thread tension too strong? Make the lower thread tension as weak as possible.</li> <li>• Is the point of the needle broken? If the point of the needle is broken, replace the needle.</li> <li>• Is the needle too thick? Replace with as thin a needle as possible.</li> <li>• Are the thread take-up spring tensions too strong? Make the thread take-up spring tension as weak as possible.</li> <li>• Is the thread tension spring operating range too large? Lower the position of the thread tension spring to as low a position as possible.</li> <li>• Is the presser foot pressure too strong? Adjust the presser foot pressure.</li> <li>• Is the sewing speed too fast? Reduce the sewing speed slightly.</li> <li>• Is the angle of the feed dog incorrect? Tilt the front of the feed dog down slightly.</li> </ul>	<p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">6-01</p> <p style="text-align: center;">6-01</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">6-03</p>
<p>9. Lower thread is tangled at the sewing start.</p>  <p style="text-align: right;">0628M</p> <p>Sprinning of bobbin during thread trimming (B856E)</p>  <p style="text-align: right;">0629M</p>	<ul style="list-style-type: none"> <li>• Is the bobbin spinning direction correct when the lower thread is being pulled? Set the bobbin so that it turns in the opposite direction to the rotary hook.</li> <li>• Is there too much thread wound onto the bobbin? The bobbin winding amount should not be more than 80%.</li> <li>• Is the bobbin tension spring attached? (B856E) Attach the bobbin tension spring.</li> <li>• Is the bobbin turning smoothly? If the bobbin is not turning smoothly, replace the bobbin.</li> <li>• Is a bobbin other than the light-alloy bobbins specified by Brother being used? (B856E) Use only bobbins which are specified by Brother.</li> </ul>	<p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p>
<p>10. Upper and lower threads are breaking.</p>  <p style="text-align: right;">0471M</p>	<ul style="list-style-type: none"> <li>• Is the needle bent or is the needle tip broken? Replace the needle if it is bent or broken.</li> <li>• Is the needle properly installed? If it is incorrect, install the needle correctly.</li> <li>• Is the needle properly threaded? If it is incorrect, thread the needle correctly.</li> <li>• Is the upper or lower thread tension too weak or too strong? Adjust the upper thread or lower thread tension.</li> <li>• Is the upper thread may be loose because the thread tension spring operating range is too small? Adjust the position of the thread tension spring.</li> <li>• Is the needle and rotary hock timing incorrect? Adjust the height of the needle bar. Adjust the clearance between the needle and the rotary hock.</li> <li>• Is the thread too thick for the needle? Use the correct needle or the correct thread.</li> <li>• Is the rotary hook, bobbin case, thread take-up lever or some other part in the thread path damaged? Repair the damage, or replace the part with a new one.</li> </ul>	<p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: center;">6-01</p> <p style="text-align: center;">6-08</p> <p style="text-align: center;">6-09</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p>

Problem	Possible cause	Page
<p>11. Broken needles</p>  <p style="text-align: right; font-size: small;">0469M</p>	<ul style="list-style-type: none"> <li>• Is the material being pushed or pulled with excessive force during sewing?</li> <li>• Is the needle properly installed? If it is incorrect, install the needle correctly.</li> <li>• Is the needle bent, is the needle tip broken, or is the needle hole blocked? Replace the needle.</li> <li>• Is the needle and rotary hook timing incorrect? Adjust the height of the needle bar. Adjust the clearance between the needle and the rotary hook.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Caution</p> <ul style="list-style-type: none"> <li>• It is extremely dangerous to leave any pieces of broken needle sticking in the material. If the needle breaks, search for all pieces until the whole of the needle is found again.</li> <li>• Furthermore, we recommend that through steps be taken to account for such needles to comply with product liability regulations.</li> </ul> </div>	<p style="text-align: center;">—</p> <p style="text-align: center;">—</p> <p style="text-align: center;">—</p> <p style="text-align: center;">6-08 6-09</p>
<p>12. Incorrect thread trimming (upper and lower threads are both not being trimmed). (B856E)</p>	<ul style="list-style-type: none"> <li>• Is the fixed knife or movable knife damaged or worn? Replace the fixed knife or the movable knife.</li> <li>• Is the thread trimming timing correct? Adjust the rotating direction of the thread trimming cam.</li> </ul>	<p style="text-align: center;">—</p> <p style="text-align: center;">6-15</p>
<p>13. Incorrect thread trimming (upper thread or lower thread is not being trimmed). (B856E)</p>	<ul style="list-style-type: none"> <li>• Is the needle properly installed? If it is incorrect, install the needle correctly.</li> <li>• Is the fixed knife or movable knife blunt? Replace the fixed knife or the movable knife.</li> <li>• Do skipped stitches occur during sewing? Refer to "Skipped stitches during sewing".</li> </ul>	<p style="text-align: center;">—</p> <p style="text-align: center;">—</p> <p style="text-align: center;">7-01</p>
<p>14. The thread wiper does not wipe the thread. (B856E-40□, 90□)</p>	<ul style="list-style-type: none"> <li>• Is the length of thread trailing from the needle hole too long after thread trimming? Adjust the upper thread feeding device.</li> </ul>	<p style="text-align: center;">6-14</p>

Problem	Possible cause	Page
<p>15. Operation panel keys do not operate.</p>	<ul style="list-style-type: none"> <li>• Is □□□□ appearing in the LED display? If this display appears, key operation has been locked because of a DIP switch setting, so the keys cannot be operated.</li> </ul>	<p style="text-align: center;">Instruction manual 165</p>

## 8. ELECTRIC COMPONENTS

### 8. ELECTRIC COMPONENTS

**⚠ DANGER**



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

#### 8-1. Precautions at the time of adjustment

Pay attention to the following when opening the control box for maintenance.

##### [ Electric shock ]

Some large capacitors may have a high voltage remaining in them for up to 5 minutes after the power is turned off. To prevent electric shock, wait at least 5 minutes after the power is turned off before doing the following:

- Opening and closing the control box
- Replacing fuses
- Separating and joining connectors
- Measuring resistance
- Doing anything with a possibility of touching something inside the control box

Some adjustments require measuring the voltage while the power is turned on with the control box kept open. In such a case, be careful not to touch any place other than that for the measurement. In addition, always keep in mind that a high voltage remains for 5 minutes after the power is turned off.

##### [ Injury ]

While the power is turned on, the cooling fan of the control box operates; be careful not to get caught in it. When separating or rejoining connectors, and measuring something, be careful not to cut your fingers on metal parts such as heatsinks and covers.

#### 8-2. Components inside the control box

The following are brief explanations of components inside the control box. See control circuit block diagram at the end of this manual for the details of the connections.

##### < Control circuit board >

The main circuit board is fixed to the rear panel of the control box. This PCB serves to control machine operation.

##### < Power supply circuit board >

The power supply circuit board is fixed at the bottom of the control box. Furthermore, the power IC for driving the sewing machine motor is also located here.

##### < DC fan motor 1 >

Discharges air in the control box.  
Clean the inlet filter monthly.

##### < DC fan motor 2 >

Cools the heatsink on the PCB.

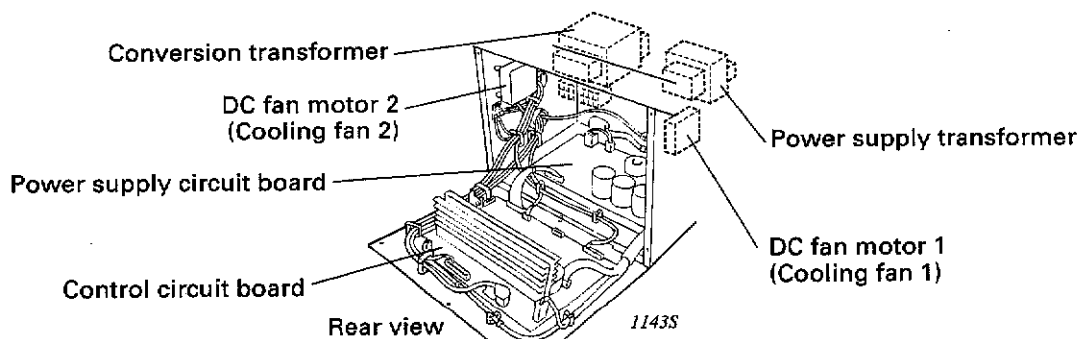
##### < Power supply transformer >

This transformer generates the voltage which is needed to by the solenoid and the needle zigzag motor drive circuit.

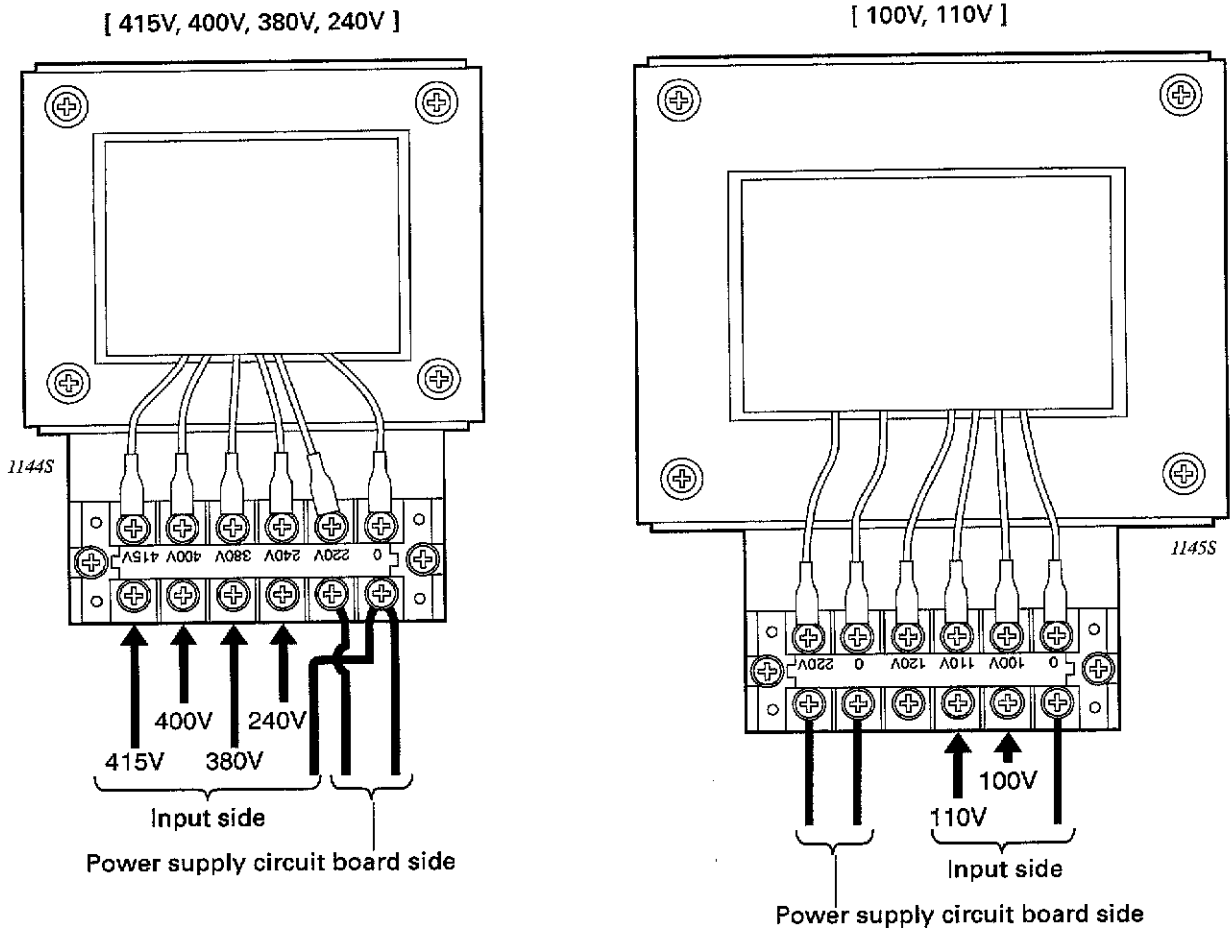
##### < Conversion transformer > (depending on power supply voltage specification)

Adjusts the power voltage so that it is that required for the PCB.

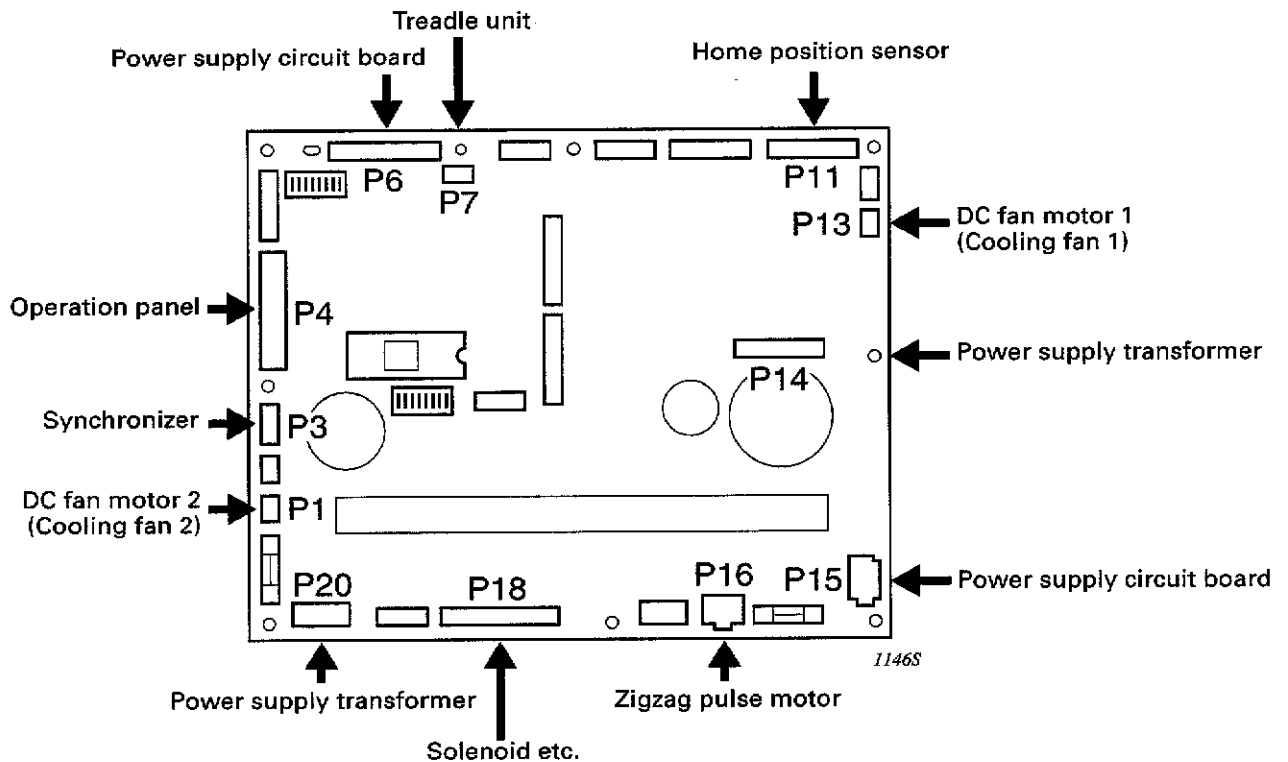
There are two types of transformers : a high voltage transformer is equipped with 240 V, 380 V, 400 V, and 415 V specifications ; a low voltage transformer is equipped with 100 V and 110 V specifications.



< Transformer connections >

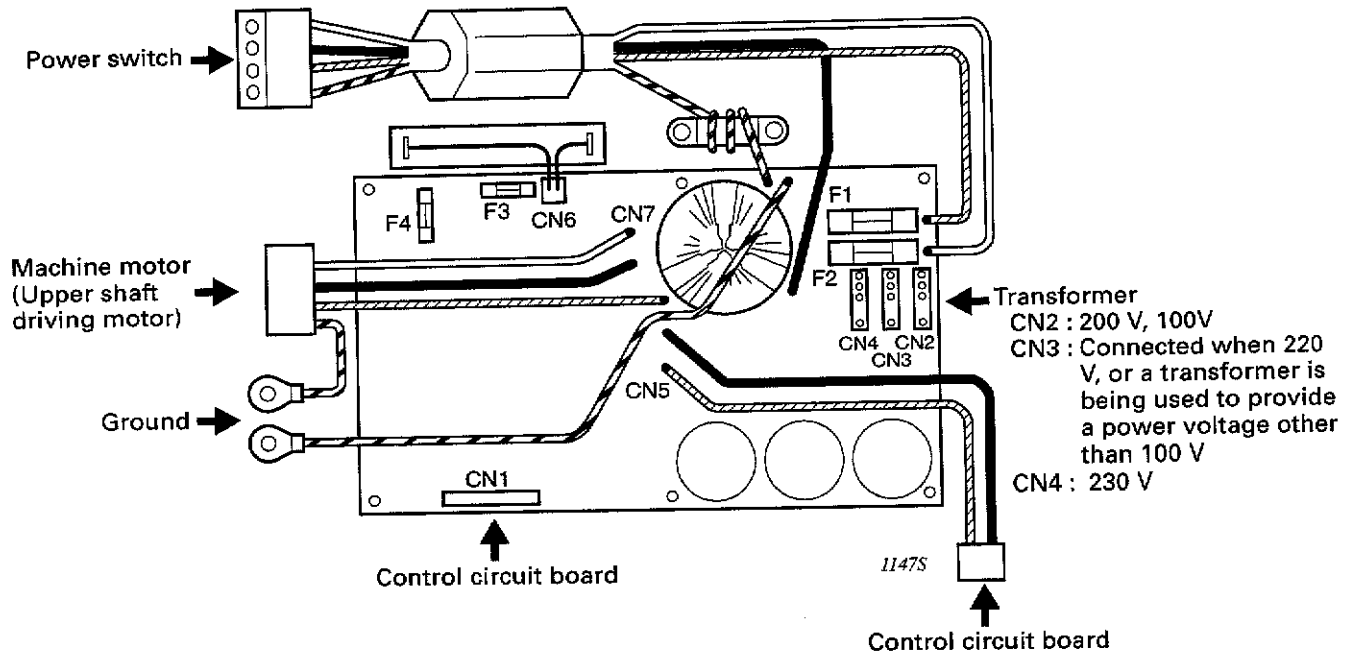


< Control circuit board connections >

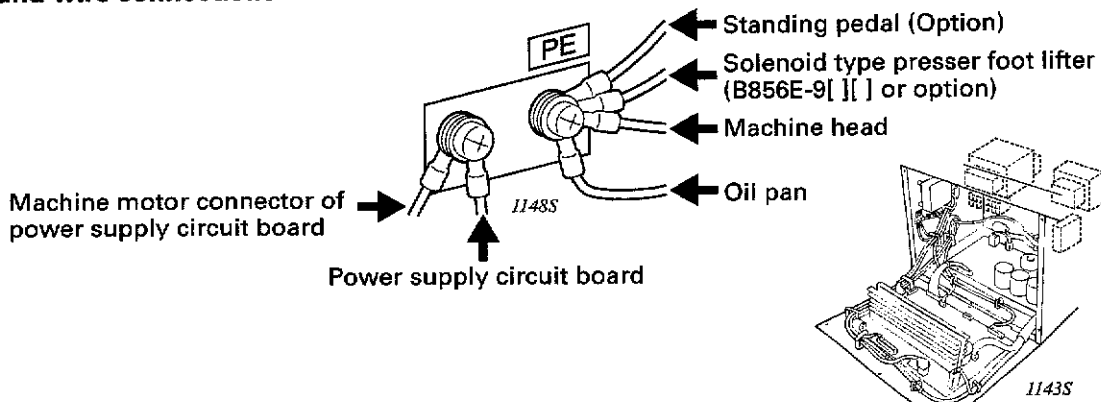


## 8. ELECTRIC COMPONENTS

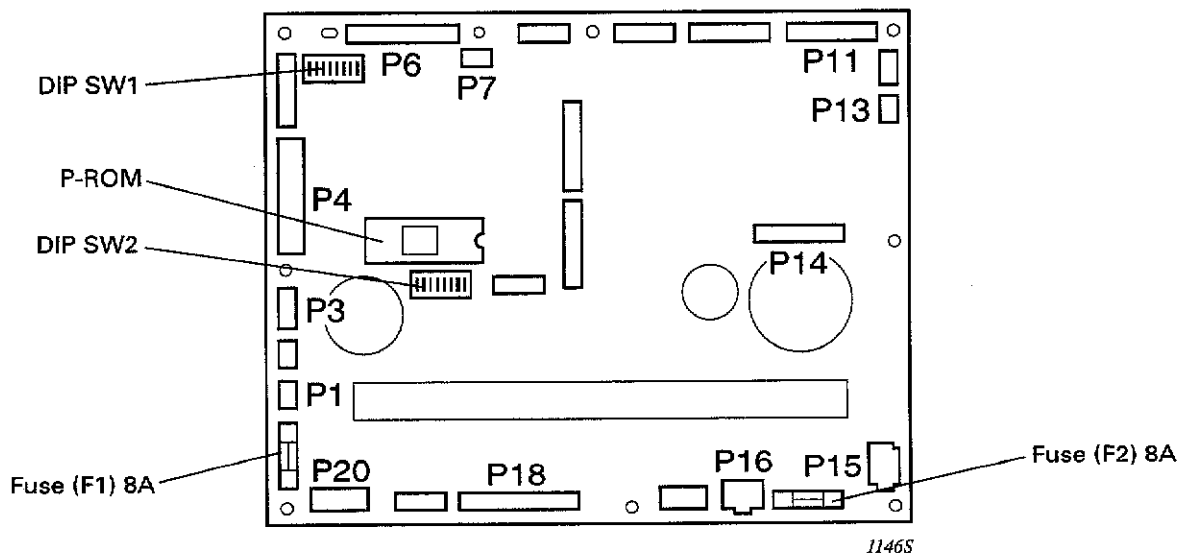
### < Power supply circuit board connections >



### < Ground wire connections >



### < DIP switches, ROM and fuses positions >

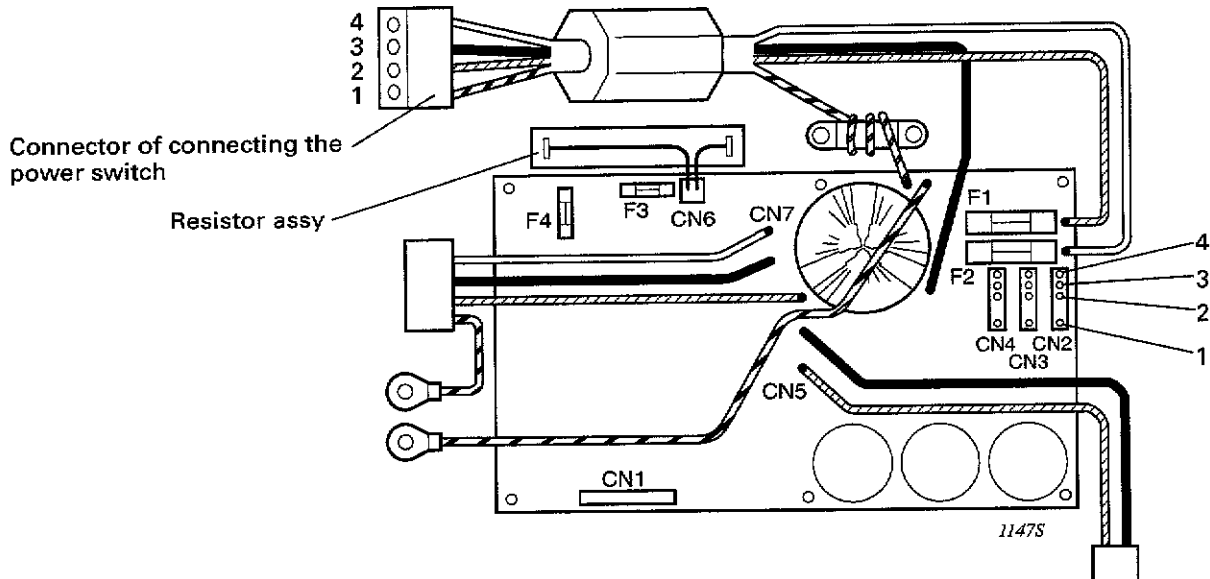


### 8-3. Fuse explanation

#### Note

If a component on a PCB is damaged, a fuse may blow again immediately even when it has been replaced. When replacing a fuse, be sure to use the specified ones listed below.

#### Power supply circuit board



#### < If fuse F1 or fuse F2 is blown >

**Problem :** The 7 segment LED is not indicated, and nothing operates.

Before replacing a fuse, separate connectors (connector of connecting the power switch and CN2 or CN3 or CN4) on the power supply circuit board and measure the resistance as shown in the table.

Connector's pin No. of connecting the power switch	CN2 connector's pin No.	No good resistance
3	1	Short-circuit (a little $\Omega$ )
3	2	
-	1 and 2	
1 and 3	-	Except $\infty$
1	1	
1	2	

If the resistances are good, replace the blown fuses. (Name of parts of the fuse F1 and the fuse F2 - "FUZE, 15A#2" CODE - 218469001)

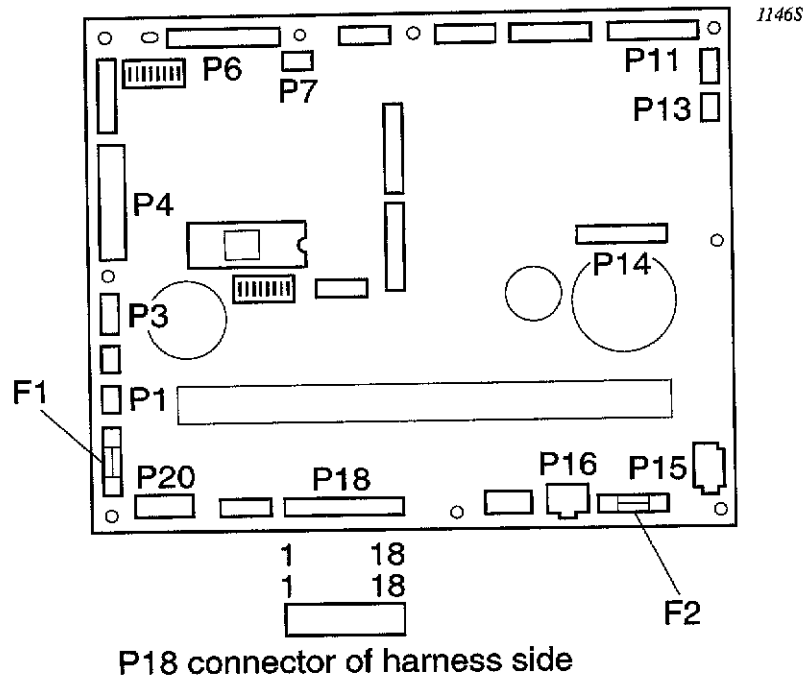
If the resistances are no good, replace the power supply circuit board.

#### < If fuse F3 or fuse F4 is blown >

Replace the power supply circuit board. (There is a possibility that the component on the power supply circuit board is damaged.)

## 8. ELECTRIC COMPONENTS

### Control circuit board



#### < If fuse F1 is blown >

**Problem :** Error **EES** appears.

Before replacing a fuse, separate connector (P18) on the control circuit board and measure the resistance as shown in the table.

Pin No. of P18 connector of harness side	Solenoid	Good resistance
6 and 12	Thread trimming (B856E)	Approx. 7Ω
7 and 14	Thread wiper (B856E)	Approx. 6Ω
8 and 13	Reverse feeding (B855E/BT, B856E)	Approx. 7Ω
9 and 11	Presser foot lifter (B856E)	Approx. 9Ω
10 and 15	Upper thread feeding (B856E)	Approx. 17Ω

If the resistances are no good, replace the blown solenoids.

Pin No. of P18 connector of PCB side	No good resistance
1 and 6	Short-circuit (a little Ω)
1 and 7	
1 and 8	
1 and 9	
1 and 10	
16 and 11	
16 and 13	
16 and 14	

If the resistances are good, replace the blown fuse. (Name of part of the fuse F1 - "GLASS FUSE, 8A" CODE-S47680000)

If the resistances are no good, replace the control circuit board.

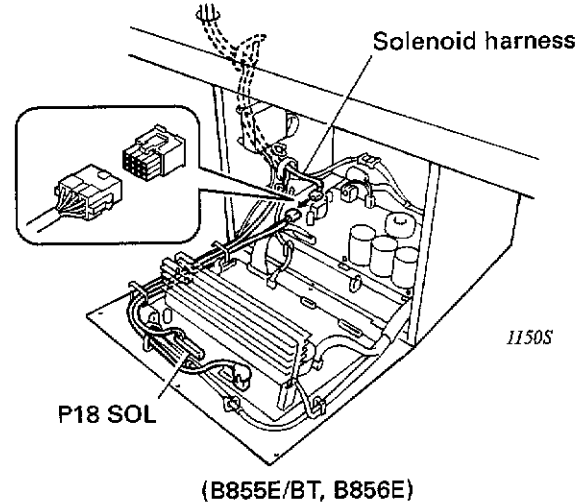
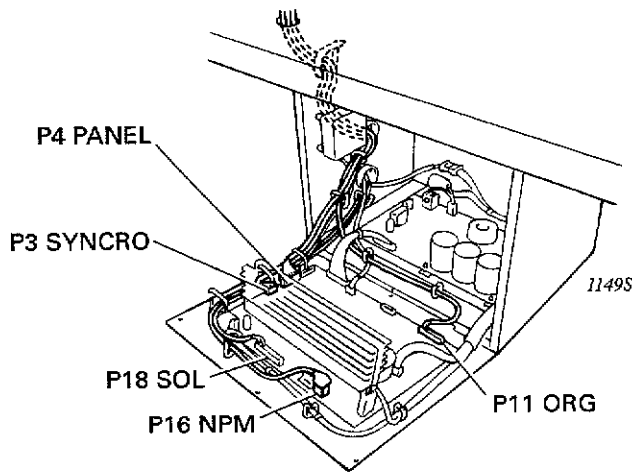
#### < If fuse F2 is blown >

Replace the control circuit board. (There is a possibility that the component on the control circuit board is damaged.)

### 8-4. Connectors

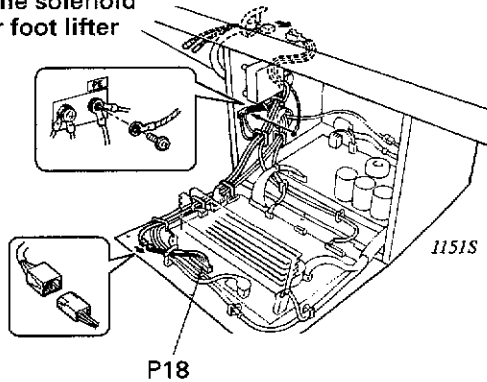
Most of the machine trouble is due to connector problems including improper connection or insufficient contact. Therefore, be sure to check if each connector is correctly inserted and that there is no contact failure between pins and wires before starting troubleshooting procedures.

#### 8-4-1. Connector positions



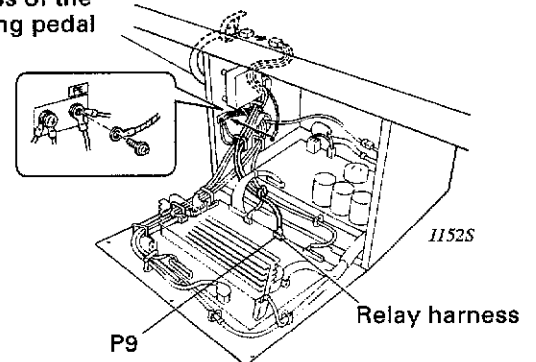
< Solenoid type presser foot lifter (B856E-90[ ], or option) >

Harness of the solenoid type presser foot lifter

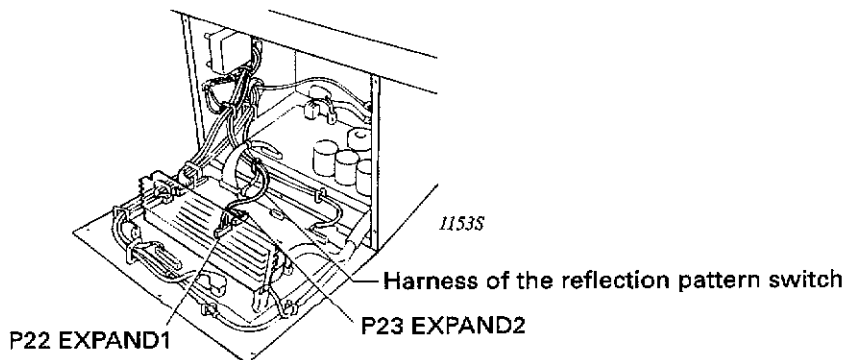


< Standing pedal (option) >

Harness of the standing pedal



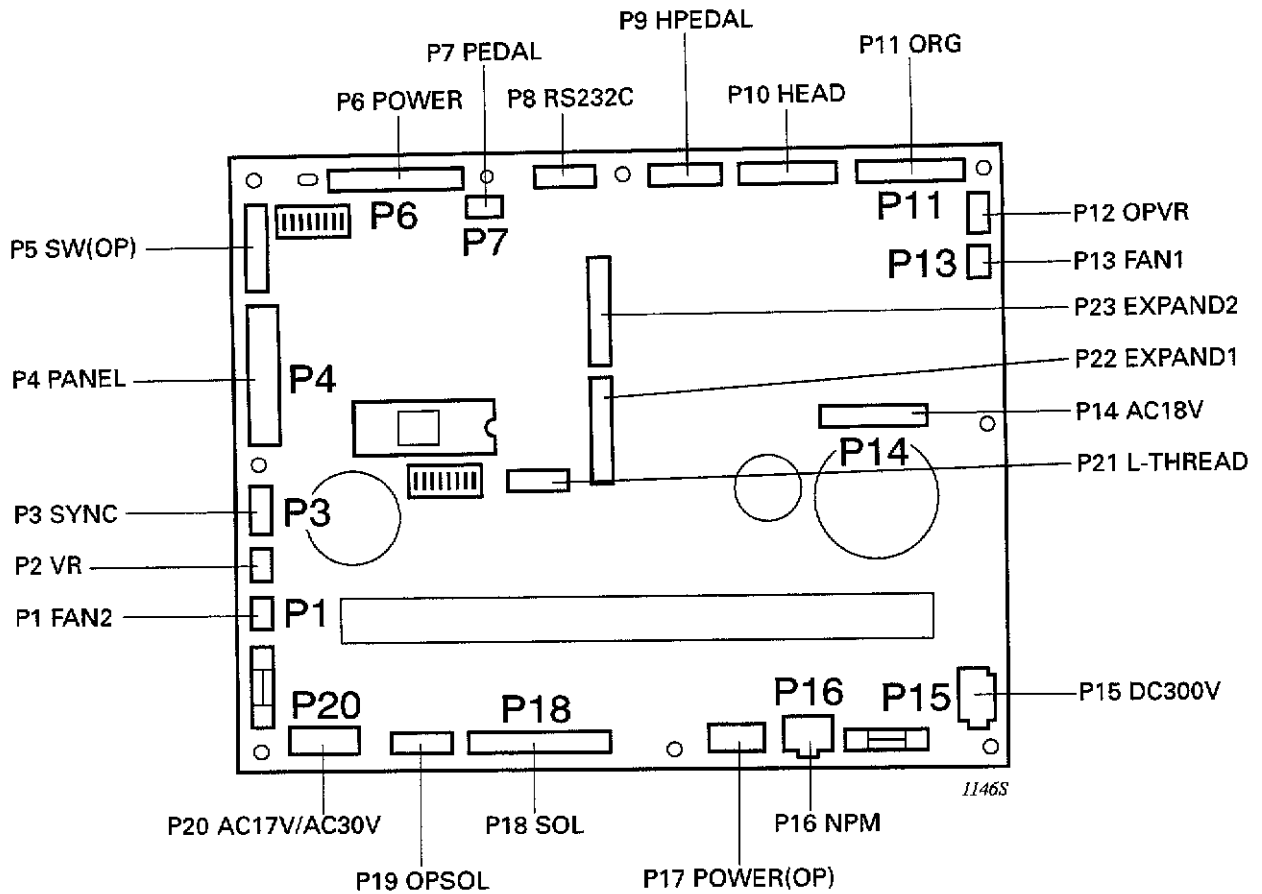
< Reflection pattern switch (option) >



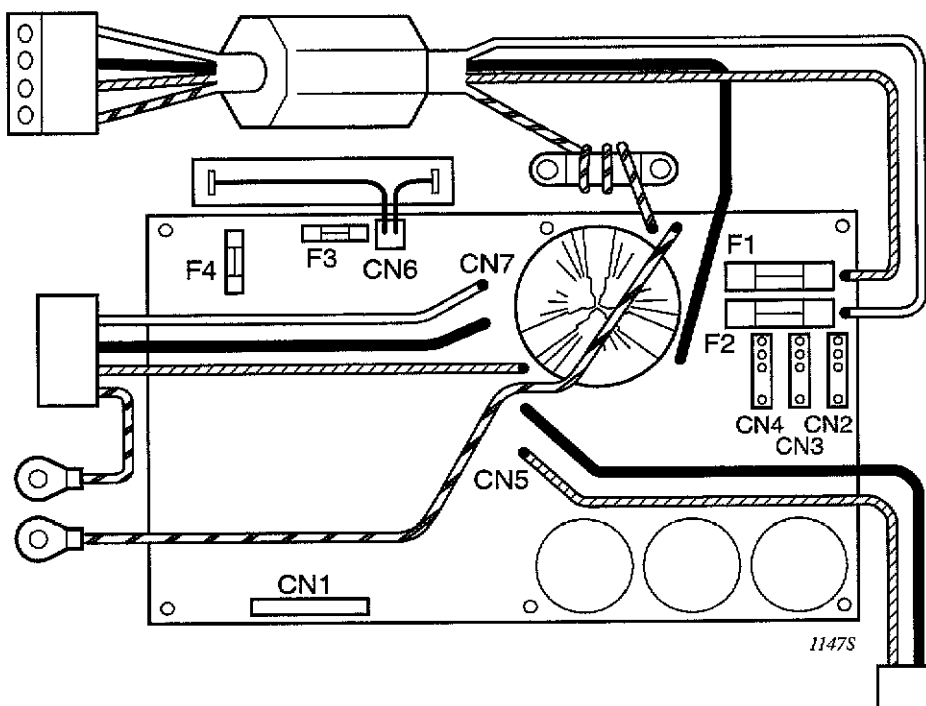


## 8. ELECTRIC COMPONENTS

### Control circuit board



### Power supply circuit board



**8-4-2. Signal names for connectors and probable symptoms due to poor contact**

< Relay connector > Outside control box  
For solenoid type presser foot lifter (MOLEX 1261R, 1261P)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+40V	The presser foot does not operate automatically.
2	0V(P0V)	The knee switch does not have any effect.
3	-	The presser foot operating is not correct.
4	Presser foot lifter SOL	
5	Knee switch input	
6	Ground	

< Relay connector > Inside control box  
For solenoid type presser foot lifter (MOLEX 1261R, 1261P)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+40V	The presser foot does not operate automatically.
2	0V(P0V)	The knee switch does not have any effect.
3	-	The presser foot operating is not correct.
4	Presser foot lifter SOL	
5	Knee switch input	
6	-	

## 8. ELECTRIC COMPONENTS

< Circuit board connector > Control circuit board  
P1 [FAN2] (JAPAN SOLDERLESS TERMINAL PHR-3)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+24V	Rotation of FAN2 is irregular. Error code <b>E25</b> appears.
2	Fan lock error	
3	0V	

P2 [VR] (not attached)

P3 [SYNC] (JAPAN SOLDERLESS TERMINAL XHP-5)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+5V	Rotation of machine motor is not correct. Machine motor stop position is not correct. Error code <b>E24</b> , or <b>E29</b> appears. <b>U2</b> display remains without changing.
2	Encoder timing	
3	Needle up	
4	Needle down	
5	0V	

P4 [PANEL] (HIROSE HIF3BA-20PA-2.54R)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+5V	The panel display is not lit. Panel input does not have any effect. The panel display is flickering. Error code <b>E26</b> , <b>E27</b> , or <b>E28</b> appears.
2	0V	
3	Key scan input 0	
4	Key scan input 1	
5	Key scan input 2	
6	Panel control output (OC)	
7	Panel output (A)	
8	Panel output (B)	
9	Panel output (C)	
10	Panel output (D)	
11	Panel output (E)	
12	Panel output (F)	
13	Panel output (G)	
14	Panel control output (PLED)	
15	+8V	
16	Sensor input	
17	Buzzer output	
18	0V	
19	0V	
20	0V	

P5 [SW(OP)] (not attached)

P6 [POWER] (JAPAN SOLDERLESS TERMINAL XHP-15)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+8V	With the power turned on, no indicate on the operation panel. The machine motor does not run. Rotation of machine motor is not correct. Error code $\square\square\square$ , $\square\square\square$ , $\square\square\square$ , $\square\square\square$ , or $\square\square\square$ appears.
2	0V	
3	-8V	
4	Primary voltage detect	
5	Relay control output	
6	Restore control output	
7	+5V	
8	IPM control output	
9	U phase control output	
10	V phase control output	
11	W phase control output	
12	-U phase control output	
13	-V phase control output	
14	-W phase control output	
15	IPM-FAULT	

P7 [PEDAL](JAPAN SOLDERLESS TERMINAL PHR-4)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+8V	The treadle stroke is not in proportion to the sewing speed. Error code $\square\square\square$ appears.
2	Treadle depress input	
3	0V	
4	-8V	

P8 [RS232C] (not attached)

P9 [HPEDAL] (JAPAN SOLDERLESS TERMINAL XHP-7) (option)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+8V	Pedal input does not have any effect. The machine motor does not high speed run. Error code $\square\square\square$ appears.
2	High speed input	
3	Back tacking input	
4	0V	
5	Low speed input	
6	Presser input	
7	Standing pedal recognition	

P10 [HEAD] (not attached)

P11 [ORG] (JAPAN SOLDERLESS TERMINAL XHP-12)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+24V	Home position can not be found. Error code $\square\square\square$ appears.
2	Home position sensor	
3	0V	
4	-	
5	-	
6	-	
7	-	
8	-	
9	-	
10	-	
11	-	
12	-	

P12 [OPVR] (not attached)

## 8. ELECTRIC COMPONENTS

P13 [FAN1] (JAPAN SOLDERLESS TERMINAL PHR-3)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+24V	Rotation of FAN1 is irregular.
2	Fan lock error	Error code <b>E24</b> appears.
3	0V	

P14 [AC18V] (JAPAN SOLDERLESS TERMINAL PHDR-30VS)

Pin No.	Signal name	Probable symptoms due to poor contact
1	AC18V(D10)	Home position can not be found.
2	AC18V(D10)	The machine does not zigzag.
3	-	The zigzagging is not correct.
4	-	Error code <b>E27</b> appears.
5	AC18V(N)	
6	AC18V(N)	
7	-	
8	-	
9	AC18V(A)	
10	AC18V(A)	
11	-	
12	-	
13	AC18V(B)	
14	AC18V(B)	
15	-	
16	-	
17	AC18V(C)	
18	AC18V(C)	
19	-	
20	-	
21	AC18V(D)	
22	AC18V(D)	
23	-	
24	-	
25	AC18V(E)	
26	AC18V(E)	
27	-	
28	-	
29	AC20V(F)	
30	AC20V(F)	

P15 [DC300V](MOLEX 3191-02R1)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+300V	Home position can not be found.
2	0V(DC300)	The machine does not zigzag. The zigzagging is not correct. Error code <b>E27</b> appears.

## P16 [NPM](MOLEX 5557-06R)

Pin No.	Signal name	Probable symptoms due to poor contact
1	Zigzag PM driving current (NA)	Home position can not be found. The machine does not zigzag. The zigzagging is not correct. Error code $\square\square\square$ appears.
2	Zigzag PM driving current (NB)	
3	Zigzag PM driving current (NC)	
4	Zigzag PM driving current (ND)	
5	Zigzag PM driving current (NE)	
6	-	

## P17 [POWER(OP)] (not attached)

## P18 [SOL] (JAPAN SOLDERLESS TERMINAL XHP-16)

Pin No.	Signal name	Probable symptoms due to poor contact
1	0V (actuator switch)	Thread can not be trimmed. Thread can not be wiped. Upper thread can not be fed. Back tacking can not be sewn. Presser foot does not rise. Actuator switch does not have any effect. Knee switch does not have any effect.
2	0V (knee switch)	
3	Actuator switch input	
4	Knee switch input	
5	-	
6	Thread trimmer SOL driving	
7	Thread wiper SOL driving	
8	Back tacking SOL driving	
9	Presser foot lifter SOL driving	
10	Upper thread feeding SOL driving	
11	TR40V (Presser foot lifter SOL)	
12	+40V (Thread trimmer SOL)	
13	TR40V (Back tacking SOL)	
14	TR40V (Thread wiper SOL)	
15	+40V (Upper thread feeding SOL)	
16	-	

## P19 [OPSOL] (not attached)

## P20 [AC17V/AC30V] (JAPAN SOLDERLESS TERMINAL VHR-5N)

Pin No.	Signal name	Probable symptoms due to poor contact
1	AC30V	Error code $\square\square\square$ appears.
2	AC30V	
3	-	
4	AC17V	
5	AC17V	

## P21 [L-THREAD] (not attached)

## 8. ELECTRIC COMPONENTS

P22 [EXPAND1](JAPAN SOLDERLESS TERMINAL PHD-32)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+5V	The lamp of reflection pattern switch does not light or one is flickering.
2	+5V	
3	+5V	
4	+5V	
5	+24V	
6	+24V	
7	+24V	
8	+24V	
9	TOUT1	
10	TOUT2	
11	TOUT3	
12	TOUT4	
13	PF0	
14	PF1	
15	PF2	
16	PF3	
17	PF4	
18	PF5	
19	PF6	
20	PF7	
21	PE0	
22	PE1	
23	PE2	
24	PE3	
25	PE4	
26	PE5	
27	PE6	
28	PE7	
29	S0V	
30	S0V	
31	S0V	
32	S0V	

\* Only pins 1 and 17 are used by the lamp mirror switch.

P23 [EXPAND2] (JAPAN SOLDERLESS TERMINAL PHD-26)

Pin No.	Signal name	Probable symptoms due to poor contact
1	OPSEN1	The reflection pattern switch does not operate.
2	OPSEN2	
3	OPSEN3	
4	OPSEN4	
5	OPSEN5	
6	OPSEN6	
7	OPSEN7	
8	OPSEN8	
9	OPSEN9	
10	OPSEN10	
11	OPSEN11	
12	OPSEN12	
13	S0V	
14	S0V	
15	S0V	
16	S0V	
17	+24V	
18	+24V	
19	+24V	
20	+24V	
21	PD2	
22	PD3	
23	PD4	
24	PD5	
25	PD6	
26	PD7	

\* Only pins 1 and 17 are used by the lamp mirror switch.



## 8. ELECTRIC COMPONENTS

< Circuit board connector > Power supply circuit board

CN1 (JAPAN SOLDERLESS TERMINAL XHP-15) (The power supply circuit board connector is secured by solder.)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+8V	With the power turned on, no indicate on the operation panel. The machine motor does not run. Rotation of machine motor is not correct. Error code <b>E01</b> , <b>E02</b> , <b>E03</b> , <b>E04</b> , or <b>E09</b> appears.
2	0V	
3	-8V	
4	Primary voltage detect	
5	Relay control output	
6	Restore control output	
7	+5V	
8	IPM control output	
9	U phase control output	
10	V phase control output	
11	W phase control output	
12	-U phase control output	
13	-V phase control output	
14	-W phase control output	
15	IPM-FAULT	

CN2 [AC200V] (JAPAN SOLDERLESS TERMINAL VBR-4) (Connected for 200 V and 100 V specifications)

Pin No.	Signal name	Probable symptoms due to poor contact
1	AC200V	Home position can not be found.
2	AC200V	The machine does not zigzag.
3	-	The zigzagging is not correct.
4	-	Error code <b>E07</b> appears.

CN3 [AC220V] (JAPAN SOLDERLESS TERMINAL VBR-4)

(Connected when 220 V, or a transformer is being used to provide a power voltage other than 100 V)

Pin No.	Signal name	Probable symptoms due to poor contact
1	AC220V	Home position can not be found.
2	-	The machine does not zigzag.
3	AC220V	The zigzagging is not correct.
4	-	Error code <b>E07</b> appears.

CN4 [AC230V/AC240V] (JAPAN SOLDERLESS TERMINAL VBR-4) (Connected for 230 V specification)

Pin No.	Signal name	Probable symptoms due to poor contact
1	AC230V	Home position can not be found.
2	-	The machine does not zigzag.
3	-	The zigzagging is not correct.
4	AC230V	Error code <b>E07</b> appears.

CN5 (MOLEX 3191-02R1) (The power supply circuit board connector is secured by solder.)

Pin No.	Signal name	Probable symptoms due to poor contact
1	+300V	Home position can not be found.
2	0V(DC300)	The machine does not zigzag. The zigzagging is not correct. Error code <b>E07</b> appears.

CN6 (MOLEX 5197-2)

Pin No.	Signal name	Probable symptoms due to poor contact
1	Resistor	Error code <b>E02</b> , or <b>E03</b> appears.
2	Resistor	

CN7 (MOLEX 3191-04P) (The power supply circuit board connector is secured by solder.)

Pin No.	Signal name	Probable symptoms due to poor contact
1	Ground	The machine motor does not run.
2	Machine motor U phase output	Rotation of machine motor is not correct.
3	Machine motor V phase output	Error code E24, or E29 appears.
4	Machine motor W phase output	

CN8 (MOLEX 3191-04P) (The power supply circuit board connector is secured by solder.)

Pin No.	Signal name	Probable symptoms due to poor contact
1	Ground	Power does not come on.
2	AC input R phase	Home position can not be found.
3	AC input S phase	The machine does not zigzag.
4	AC input T phase	The zigzagging is not correct. Error code E21, or E23 appears.

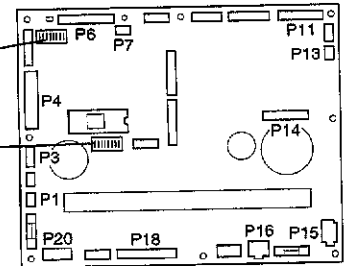
## 8. ELECTRIC COMPONENTS

### 8-5. Summary of DIP switches

Always turn off the power supply before changing any of the DIP switch settings.

DIP SW1

DIP SW2



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#### DIP SW1

\* indicates a factory setting. (Machine motor (Upper shaft driving motor) mechanism)

No.	Function	When OFF	When ON
1	Treadle specifications	Japan	Export
2	-	* Do not set to ON.	Do not set to ON.
3	Automatic presser lifter	* Not used	Used
4	-	* Do not set to ON.	Do not set to ON.
5	Motor operation when <input checked="" type="checkbox"/> <input type="checkbox"/> appears on display.	*No. (turning by hand only)	Yes. (treadle depressed backwards, half stitch key)
6	Maximum sewing speed limit	See Table 1 below.	See Table 1 below.
7	Maximum sewing speed limit	See Table 1 below.	See Table 1 below.
8	Maximum sewing speed limit	See Table 1 below.	See Table 1 below.

#### DIP SW2

\* indicates a factory setting. (Needle zigzagging mechanism)

No.	Function	When OFF	When ON
1	Zigzag width limit	See Table 2 below.	See Table 2 below.
2	Zigzag width limit	See Table 2 below.	See Table 2 below.
3	Sewing start position	See Table 3 below.	See Table 3 below.
4	Needle zigzagging when the treadle is depressed backward.	* No.	Yes.
5	Backtack zigzag width setting	Enabled	* Disabled
6	Voltage specifications (Note. 2)	Medium & high voltage spec. (200V, 400V, and others)	Low voltage spec. (100V, 110V)
7	-	* Do not set to ON.	-
8	Panel key lock	* Not locked	Locked (panel key inputs is ignored)

Table 1 : Maximum sewing speed limit ( \* indicates a factory setting.)

	1000	2000	2500	3000	3500	4000	4500	5000
DIPSW1-6	OFF	ON	OFF	ON	OFF	ON	*OFF	ON
DIPSW1-7	OFF	OFF	ON	ON	OFF	OFF	*ON	ON
DIPSW1-8	OFF	OFF	OFF	OFF	ON	ON	*ON	ON

Table 2 : Zigzag width limit

	10mm	8mm	5mm	3mm
DIPSW2-1	ON	*ON	OFF	OFF
DIPSW2-2	ON	*OFF	ON	OFF

Table 3 : Start position of plain, 2-step, and 3-step zigzag (Note. 1)

	Left stop setting	No setting	Right stop setting
DIPSW2-3 : OFF	Left end	Left end	Right end
DIPSW2-3 : ON	Right end	Right end	Left end

The start position refers to a position of one of the following cases: immediately after the power is turned ON, after the setting by the SET key, after the treadle is depressed backward when the pattern reset function is ON. For the other patterns, the start position is the beginning of the pattern regardless of the DIPSW settings.

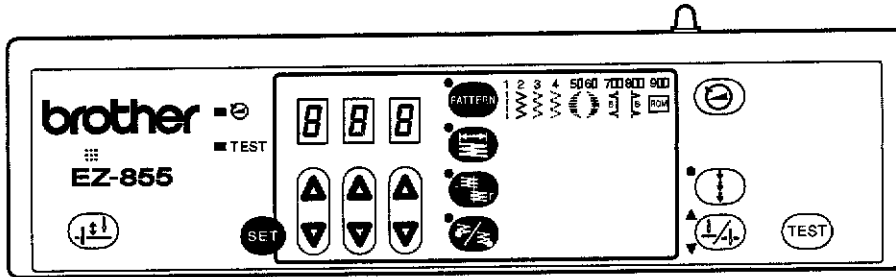
Note 1 : If the part code of the mail PCB ends with -001, the setting is as follows:

	Left stop setting	No setting	Right stop setting
DIPSW2-3 : OFF	Left end	Left end	Right end
DIPSW2-3 : ON	Left end	Right end	Right end

Note 2 : When the DIP SW2-6 was switched, be sure to reset all.

## 8-6. Memory switches

The functions of the switches on the operation panel can be changed to carry out special functions.



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1. Turn on the power, and have the zigzag width displayed.
2. While pressing the TEST key, press the PATTERN key.  
   will appear on the display.
3. Press the TEST key.    or    will appear on the display.  
 The numbers in the hundred's place and ten's place indicate a memory switch number.  
 in the one's place indicates that the memory switch is OFF, and  indicates ON.
4. Display the memory switch number that you would like to change.  
 The numbers are changed with  $\Delta$ / $\nabla$  keys.
5. After the memory switch number that you would like to change has appeared, set the number to ON/OFF with  $\Delta$ / $\nabla$  key in the one's place.
6. Press the SET key to accept a setting.    will appear on the display.
7. Press the  $\Delta$  key in the hundred's place twice.    will appear on the display.
8. Press the SET key.  
 The display returns to the normal display.

### Contents

No.	When ON
01	Parameter setting can be changed. (See Remarks.)
02	The treadle suddenly depressed forward after it has been depressed backward is activated.
03	(Set to OFF)
04	Backtack speed is not limited by the speed setting of high speed-sewing.
05	No torque boosts.
06	No automatic needle through force UP operation
07	(Set to OFF)
08	(Set to OFF)
11	Thread trimming or no thread trimming can be set. (See Remarks.)
12	After thread trimming, the presser foot goes UP (when DSW1-1 is ON). After thread trimming, the presser foot goes DOWN (when DSW1-1 is OFF).
13	After sewing is stopped at treadle neutral position, the presser foot goes UP.
14	The actuator SW is used as a thread trimming SW.
15	No immediate stop function
16	No overtime function. (See Remarks.)
17	Half stitch correction operation (See Remarks.)
18	Reverse correction operation (See Remarks.)
21	(Set to OFF)
22	(Set to OFF)
23	(Set to OFF)
24	(Set to OFF)
25	(Set to OFF)
26	Before end backtack is sewn, speed does not change from high speed to low speed. (When OFF, speed increases to backtack speed after deceleration.)
27	(Set to OFF)
28	(Set to OFF)
31	Sewing can be stopped during start backtack sewing.
32	(Set to OFF)












## 8. ELECTRIC COMPONENTS

No.	When ON
33	Special fixed stitch mode (Note. 1)
34	(Set to OFF)
35	The timer is used for the presser foot soft down operation. (Operation by voltage detection when OFF) (See Remarks.)
36	No presser foot timer OFF operation. (Operation by the parameter F1 when OFF.)
37	Switching chopping duty for the presser foot (See Table 1.)
38	Presser foot fly-wheel operation
41	The presser foot does not go up by depressing the treadle 1-step backward after sewing stops at neutral position.
42	Thread trimming operation by depressing the treadle backward is prohibited.
43	(Set to OFF)
44	The standing operation high-speed pedal is high-speed use only. (When OFF, the speed is adjustable.)
45	No delay start during standing work (See Remarks.)
46	No emergency stop by presser foot pedal during standing work (When automatic sewing)
47	No emergency stop by high-speed pedal during standing work (When automatic sewing)
48	The presser foot does not go up by thread trimming pedal during standing work.
51	Correction sewing after thread trimming
52	The emergency stop SW is used as a thread trimming SW.
53	Slow start for the machine without the panel.
54	Slow start for the standard spec. machine.
55	The presser foot goes down by depressing the treadle 1-stage forward, and the presser foot does not go up when the treadle returns to the neutral position.
56	After thread trimming, no function to prevent malfunction caused by pressing treadle forward due to bound of the treadle.
57	The presser foot does not go down by depressing the treadle 1-stage forward.
58	(Set to OFF)
61	(Set to OFF)
62	Low speed sewing is not carried out when sewing starts at a position other than needle up and needle down.
63	(Set to ON)
64	(Set to OFF)
65	When plain zigzag is selected, 3-step zigzag is sewn for backtack. (Note. 2)
66	Pattern reset when the treadle is depressed backward. (Note. 1) (See Remarks.)
67	Pattern reset (Note 4) (See Remarks.)
68	Blind stitch sewing start from straight stitch. (Note 4) (See Remarks.)
71	N backtacking (Note 4) (See Remarks.)
72	(Set to OFF)
73	(Set to OFF)
74	(Set to OFF)
75	(Set to OFF)
76	(Set to OFF)
77	(Set to OFF)
78	(Set to OFF)
81	(Set to OFF) (Note 3)
82	(Set to OFF) (Note 3)
83	(Set to OFF) (Note 3)
84	(Set to OFF) (Note 3)
85	(Set to OFF) (Note 3)
86	(Set to OFF) (Note 3)
87	(Set to OFF) (Note 3)
88	(Set to OFF) (Note 3)
91	(Set to OFF) (Note 3)
92	(Set to OFF) (Note 3)
93	(Set to OFF) (Note 3)
94	(Set to OFF) (Note 3)
95	(Set to OFF) (Note 3)
96	(Set to OFF) (Note 3)
97	(Set to OFF) (Note 3)
98	(Set to OFF) (Note 3)

Table 1 : Presser foot chopping duty

MEMSW	ON : 1.0 msec OFF : 1.0 msec	ON : 1.0 msec OFF : 1.0 msec	ON : 1.0 msec OFF : 5.0 msec	ON : 2.5 msec OFF : 2.5 msec
37	ON	ON	OFF	OFF
38	ON	OFF	ON	OFF





**Remarks**

- 01 : When OFF,  will appear on the display, and you can not enter the parameter setting mode. When ON,  will appear on the display.
- 11 : When ON, thread trimming or no thread trimming can be set by thread trimmer key on the operation panel.
- 16 : When OFF, if the machine continuously runs for three minutes,  (Overtime error) occurs.
- 17 : When ON, 18 is set to OFF.
- 18 : When ON, 17 is set to OFF.
- 35 : Operated by the setting of the parameter  and  when ON.
- 45 : When ON, the setting of the parameter  is ignored.
- 66 : When ON, the start position after the treadle is depressed backward is at the beginning of the pattern or the position of the DIPSW2-3 setting.
- 67 : When ON, priority returns to the sideways position after the treadle is depressed backwards, but only when sewing pattern , , , , or  is selected. However, if memory switch "66" is ON, the setting for memory switch "66" has priority.
- 68 : When OFF, sewing starts from the zigzag section.



When ON, sewing starts from the plain stitch section.



- 71 : When ON, alternating front and backtack (N-backtack) stitches are sewn with the number of backtack stitches and the backtack stitch width that have been previously entered. In other words, the number of stitches and the stitch width for each N-backtacking operation are the same. The method of entering the number of stitches and the zigzag width using the operation panel is the same as for normal backtacking. Furthermore, the switching timing can be adjusted in detail by means of the following parameters.
  - Switching timing from normal start backtack to reverse sewing. ---- 
  - Switching timing from start backtack to normal zigzag sewing. ----- 
  - Switching timing from normal zigzag sewing to end backtack. ----- 
  - Switching timing from reverse end backtack to normal sewing. ---- 

**Note 1 :**

If the P-ROM label is MN-B or MN-C and the part code of the main PCB ends with -001, this function is not available.

**Note 2 :**

If the P-ROM label is MN-B or MN-C, this function is not available.

**Note 3 :**

If the part code of the main PCB ends with -001, No. 81-98 are not displayed.

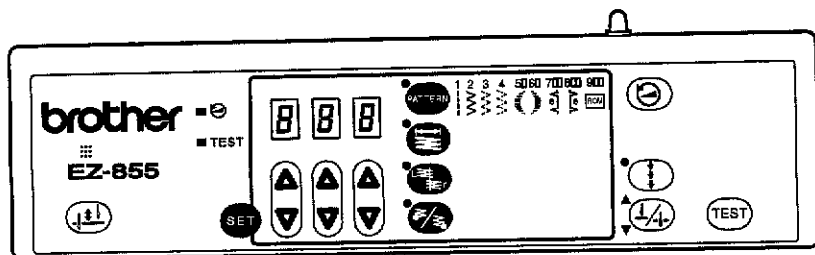
**Note 4 :**

If the P-ROM label is MN-B-D and the part code of the main PCB ends with -001 and -101 this function is not available.

## 8. ELECTRIC COMPONENTS

### 8-7. Parameters

The functions of the switches on the operation panel can be changed to carry out special functions.



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< The procedure 3.- 6. is to set the memory switch "01" to ON and have the condition ready for changing the parameter settings >

1. Turn on the power, and have a zigzag width displayed.
2. While pressing the TEST key, press the PATTERN key.  
000 will appear on the display.
3. Press the TEST key. 010 or 011 will appear on the display.  
The numbers in the hundred's place and ten's place indicate a memory switch number.  
0 in the one's place indicates that the memory switch is OFF, and 1 indicates ON.
4. Press the ∇ key in the hundred's place to display the memory switch number 010.
5. Press the ∆ key in the one's place to have 011 displayed.
6. Press the SET key to accept a setting. 000 will appear on the display.
7. Press the ∆ key in the hundred's place. 010 will appear on the display.
8. Press the TEST key. 010 will appear on the display.
9. Press the ∆ key in the hundred's place several times to display the parameter item that you would like to change.
10. If the parameter item that you would like to change appear on the display, press the TEST key.

<The following is an example of change. In case of the parameter 010>

01\* will appear on the display. (\* is the number that is currently set.)

11. Change the numerical value of the parameter. The number changes with the ∆∇ key.
12. Press the SET key to accept a setting. 011 will appear on the display (in case of the parameter 010).
13. Press the SET key. 010 will appear on the display.

< The procedure 14.- 17. is to set the memory switch "01" to OFF and disable the parameter setting change >

14. Press the ∆ key in the hundred's place twice to have 000 displayed.
15. Carry out the operation of (3) and (4) above.
16. Press the ∇ key in the one's place to have 010 displayed.
17. Press the SET key to accept a setting. 000 will appear on the display.
18. Press the ∆ key in the hundred's place twice to have 000 displayed.
19. Press the SET key.

The display returns to the normal display.

\*if you leave the memory switch "01" ON, there will be no problem in normal operation. To prevent unnecessary change of the parameters however, it is recommended that the memory switch "01" should be normally set to OFF.

#### Contents

Item	Default value	Setting range	Contents
00	06	00 - 99	Time from the needle up signal detection to the wiper ON. (x 10 msec)
01	04	00 - 99	Wiper ON time (x 10msec)
02	05	00 - 99	Time from wiper OFF to presser foot ON (x 10 msec)
03	30	00 - 99	Presser foot full ON time (x 10 msec)
04	36	00 - 60	Time until presser foot timer OFF (x 5 sec) (When 00, the presser foot does not go up automatically.)
05	15	00 - 25	Time from presser foot OFF to motor start (x 10 msec)
06	00	00 - 99	Time from presser foot signal OFF to presser foot signal ON again. (x 2.5 msec) (Soft down operation)
07	00	00 - 20	Operation time of the presser foot signal being ON again (x 10 msec) (Soft down operation)
08	24	00 - 47	Switching timing from start backtack to normal zigzag sewing (See Remarks.)
09	24	00 - 47	Switching timing from normal zigzag sewing to end backtack (See Remarks)

## 8. ELECTRIC COMPONENTS

Item	Default value	Setting range	Contents
C2	05	00 - 10	Switching speed of low speed dumping table
C3	06	00 - 07	Correction value of needle zigzagging timing when low speed dumping is in operation.
C4	04	00 - 04	Time from needle up signal detection to thread trimming OFF. (x 10 msec)
C5	04	00 - 10	Time from needle up signal detection to thread feeding OFF (x 10 msec)
C6	00	00 - 24	Rotation angle from needle down signal OFF detection to thread feeding ON (x 7.5 degrees)
C7	03	00 - 09	No. of slow start stitches
D0	00	00 - 24	Rotation angle from needle down signal detection to thread trimming ON (x 7.5 degrees)
D1	08	00 - 20	Start delay time of the standing operation panel (x 10 msec) (See Remarks)
P0	02	00 - 04	Thread trimming operation point by depressing the treadle backward. (See Remarks.)
P1	02	00 - 04	Presser foot operation point by depressing the treadle backward. (See Remarks.)
P2	02	00 - 04	Neutral point of the treadle. (See Remarks.)
P3	02	00 - 04	Inching start point by depressing the treadle (See Remarks.)
P4	02	00 - 04	Start point of speed adjustable range by depressing the treadle. (See Notes)
P5	02	00 - 04	Max. sewing speed operation point by depressing the treadle (See Remarks.)
S0	02	00 - 04	Start point of speed adjustable range of the standing operation speed-adjustable pedal. (See Remarks.)
S1	02	00 - 04	Max. sewing speed operation point of the standing operation speed-adjustable pedal. (See Remarks.)
R0	*	64 - 99	Detection value of under voltage ( * Low voltage spec. : 66, Medium & high voltage spec. : 71)
R1	00	00 - 50	Home position detection interval when the treadle is depressed backward. (Note 1) (See Remarks.)
R2	00	00 - 05	Operation timing of home position detection when the treadle is depressed backward. (Note 1) (See Remarks.)
R3	24	00 - 47	Switching timing from normal start backtack to reverse sewing. (Note 2)
R4	24	00 - 47	Switching timing from reverse end backtack to normal sewing. (Note 1) (Note 2)
R5	00	00 - 00	Spare (Note 1)
R6	00	00 - 00	Spare (Note 1)
R7	00	00 - 00	Spare (Note 1)
R8	00	00 - 00	Spare (Note 1)
R9	00	00 - 00	Spare (Note 1)
U0	07	00 - 09	No. of pulses for needle down stop position (x 15 degrees) (Note 1)
U1	00	00 - 00	Spare (Note 1)
R0	07	04 - 50	(Note 3)
R1	11	05 - 15	(Note 3)
R2	11	05 - 15	(Note 3)
R3	20	00 - 70	(Note 3)
R4	20	00 - 70	(Note 3)
R5	10	00 - 70	(Note 3)
R6	10	07 - 15	(Note 3)
R7	10	07 - 20	(Note 3)
R8	09	05 - 15	(Note 3)
R9	09	05 - 15	(Note 3)
RA	09	07 - 18	(Note 3)
RB	20	20 - 70	(Note 3)
RC	03	03 - 09	(Note 3)
RD	05	03 - 15	(Note 3)
RE	49	35 - 99	(Note 3)
RF	21	14 - 35	(Note 3)
RG	**	10 - 64	Limit value of frequency command feedback amount when speed is increasing. (** Low voltage spec. : 20, Medium & high voltage spec. : 46)
RH	46	10 - 90	(Note 3)
RI	60	10 - 99	(Note 3)
RJ	40	05 - 70	(Note 3)



## 8. ELECTRIC COMPONENTS

### Remarks

- B1** : The greater the value is, the more the timing delays.
- B3** : The greater the value is, the more the timing delays
- d1** : This is ignored when the memory switch "45" is ON.
- P0** : The greater the value is, the less the treadle depressing amount backward is required to carry out thread trimming.
- P1** : The greater the value is, the less the treadle depressing amount backward is required to raise the presser foot.
- P2** : The smaller the value is, the less the treadle depressing amount forward is required to start.
- P4** : The smaller the value is, the wider the adjustable range section becomes.  
The larger the value is, the wider the inching section becomes.
- P5** : The smaller the value is, the shorter the stroke is required to reach high speed.  
The larger the value is, the wider the adjustable range section becomes.
- S0** : The smaller the value is, the wider the adjustable range section becomes.  
The larger the value is, the wider the inching section becomes.
- S1** : The smaller the value is, the shorter the stroke is required to reach high speed.  
The larger the value is, the longer the adjustable range section becomes.
- H1** : If this is set to 00, the home position is not detected when the treadle is depressed backward.  
The needle bar position after the home position is detected is the same as the needle bar position when the home position is not detected.
- H2** : The larger the value is, the longer the interval of home position detection becomes.
- H3** : The greater the value is, the more the timing delays.
- H4** : The greater the value is, the more the timing delays

If you have changed the setting by mistake, carry out the initialization of the parameters by following the initializing operation. "8-9. Initialization" (Refer to page 8-25)

### Note 1

- If the part code of the main PCB ends with -001, this function is not available.
- If the part code of the main PCB ends with -001, **H4** - **P1** will not appear on the display.

### Note 2

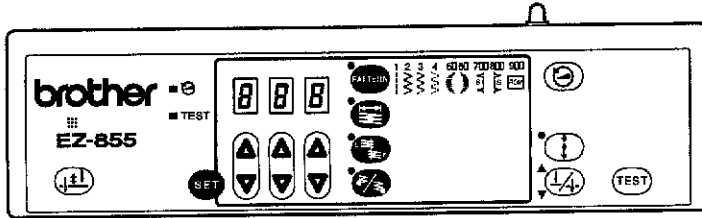
Control circuit boards which have -001 or -101 as the final three digits of their part number do not support this function.

### Note 3

This is related to motor control. It should not normally be changed.

## 8-8. Speed parameter

The functions of the switches on the operation panel can be changed to carry out special functions.



1154S

1. Turn on the power, and have the zigzag width displayed.
2. While pressing the TEST key, press the PATTERN key.  
 will appear on the display.
3. Press the PATTERN key once again.  will appear on the display.
4. Press the TEST key.  will appear on the display.
5. Press the  $\Delta$  key in the hundred's place several times to display the speed parameter item that you would like to change.
6. If the speed parameter item that you would like to change appear on the display, press the TEST key.  
 <The following is an example of changing the max. speed .>  
 will appear on the display. ( is a currently-set numerical value of the parameter.)
7. Change the numerical value of the speed parameter. The number changes with the  $\Delta$ / $\nabla$  key below each number.
8. Press the SET key to accept a setting.  will appear on the display (in case of the speed parameter .
9. Press the SET key.  will appear on the display.
10. Press the  $\Delta$  key in the hundred's place three times to have  displayed.
11. Press the SET key.  will appear on the display.
12. Press the  $\Delta$  key in the hundred's place twice to have  displayed.
13. Press the SET key.

The display returns to the normal display.

### Speed parameter

Item	Default value	Setting range (x 10 rpm)	Change unit (x 10 rpm)	Contents
<input type="text" value="100"/>	22	15 - 28	1	Inching speed (correction sewing speed)
<input type="text" value="500"/>	16	15 - Lo	1	Speed when thread is trimmed.
<input type="text" value="500"/>	03	Lo - 100	10	Slow start speed
<input type="text" value="100"/>	12	Lo - 300	10	Start backtack speed
<input type="text" value="100"/>	12	Lo - 300	10	End backtack speed
<input type="text" value="100"/>	DIP SW	Lo - DIP SW	10	Max. speed
<input type="text" value="100"/>	DIP SW	Lo - Hi	10	Automatic sewing speed
<input type="text" value="100"/>	17	50 - 250	10	Declaration speed when sewing is stopped.

### Note

For the part code of the main PCB ends with -001, if  (Max. speed) of the speed parameter is changed to set the max. speed, have the value of the speed parameter  (automatic sewing speed) displayed after setting the numerical value, and then exit the speed parameter setting mode.

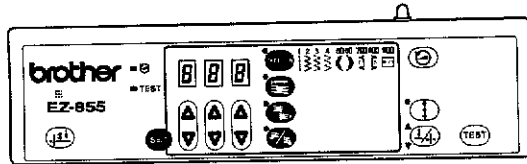
If you do not do so, the buzzer will intermittently sound until you press any of the keys or sewing starts.

(If you exit the setting mode without doing the operation above, the buzzer will stop sounding if you enter the setting mode once again and have  displayed.)

## 8. ELECTRIC COMPONENTS

### 8-9. Initialization

- If the data such as parameter data has been changed by mistake, it is possible to reset the data to the factory setting.
- (1) Initializing the panel setting value --- Initializing the setting values from the panel such as pattern number and zigzag width settings.
  - (2) Initializing the parameters ----- Initializing the parameters and the memory switches.
  - (3) Initializing the speed ----- Initializing the speed parameters.
  - (4) Initializing all ----- Initializing all from (1) to (3) above.



1154S

#### Initializing

1. Turn off the power.
2. While pressing the TEST key, turn on the power.  $\square\square\square$  will appear on the display.  
(If you would like to stop initializing, turn off the power now.)
3. Press the SET key.  $\square\square\square$  will appear on the display.
4. Press the  $\Delta$  key several times to display the type of initializations that you would like.  
( $\square\square\square$  indicates all initialization,  $\square\square\square$  initializing panel setting value,  $\square\square\square$  initializing parameters,  $\square\square\square$  initializing speed parameters. To exit this mode without doing any type of the initializations, select  $\square\square\square$ .)
5. After the type of initialization has been appeared on the display, press the SET key.  
After initializing, the machine will return to the normal condition.

### 8-10. List of 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 face plate of the control box. Touching areas where high voltages are present can result in severe injury.

#### < Zigzag CPU >

Display	Details	Cause
$\square\square\square$	Home position cannot be found.	Broken or short-circuited of home position sensor harness Malfunction of home position sensor Broken or short-circuited of zigzag pulse motor harness Malfunction of zigzag pulse motor
$\square\square\square$	Zigzag pulse motor over current	Zigzag mechanism operation is heavy Malfunction of control circuit board Broken or short-circuited of zigzag pulse motor harness Malfunction of zigzag pulse motor
$\square\square\square$	Overheating of control circuit board heat sink	Malfunction of cooling fan Cooling fan is attached incorrectly (direction) Blocked air inlet in control box filter Malfunction of control circuit board temperature sensor
$\square\square\square$	Cooling fan 1 problem (When looking from the rear, right-side fan (For exhaust fan of control box))	Malfunction of cooling fan 1 Broken or short-circuited of cooling fan 1 harness
$\square\square\square$	Cooling fan 2 problem (When looking from the rear, left-side fan (For Inside air recirculation fan of control box))	Malfunction of cooling fan 2 Broken or short-circuited of cooling fan 2 harness
$\square\square\square$	Needle zigzag data problem	Malfunction of P-ROM or poor connection Malfunction of control circuit board Problem with custom data
$\square\square\square$	Communication problem between CPUs	Malfunction of control circuit board Noise affecting transmission Mismatch between control circuit board and PROM versions

## &lt; Machine motor (Upper shaft driving motor) CPU &gt;

Display	Details	Cause
E E 1	Overheating or over current of machine motor IC	Broken or short-circuited of machine motor harness Malfunction of machine motor Malfunction of power supply circuit board
E E 2	Primary-side voltage is too high	Power supply voltage is too high Terminals connections of conversion transformer are incorrect
E E 3	Primary-side voltage is too low	Power supply voltage is too low Terminals connections of conversion transformer are not correct
E E 4	Machine motor is locked	Timing belt is not fitted Loose pulley Upper shaft operation is heavy Load too great during sewing Broken or short-circuited of synchronizer harness Malfunction of synchronizer
E E 5	Blown solenoid fuse	Malfunction of solenoid Malfunction of control circuit board Incorrect fuse rating
E E 6	Starting input when power turned on (See note)	Power turned on when treadle was depressed forward Power turned on when treadle was depressed backward Power turned on while actuator was being pressed Broken or short-circuited of treadle harness Malfunction of treadle unit
E E 7	Panel input when power is turned on	Power turned on while panel key was being pressed Short-circuited of panel harness Malfunction of panel circuit board
E E 8	Panel input when power is turned on	Power turned on while panel key was being pressed Short-circuited of panel harness Malfunction of panel circuit board
E E 9	Operating problem	Incorrect pulley diameter DIP SW1-2 is not set to OFF Malfunction of synchronizer
E F 1	Continuous operation (See note)	Sewing machine was operated continuously for 3 minutes or more
E F 2	Overload	Upper shaft operation is heavy Load too great during sewing
E F 3	Communication problem between CPUs	Malfunction of control circuit board Noise affecting transmission
E F 4	Communication between CPUs is not started	P-ROM is attached incorrectly Malfunction of P-ROM Malfunction of control circuit board
E F 5	Communication problem between CPUs	Malfunction of control circuit board Noise affecting transmission

**Note**

If an error code appears in the LED display on the operation panel, the error display will not disappear immediately when the power is turned off. After the panel display turns off, remove the cause of the error and then turn the power back on. (Except for error E E 6)

E E 6 : In this case, when the cause of the problem is eliminated (for example, the treadle is returned to neutral), S E E will appear on the LED display. When this happens, normal operation after turning on the power will return when the SET key is pressed.

E E 1 : When set to ON memory switch No. 16, E E 1 (overtime error) not occurs.

## 8. ELECTRIC COMPONENTS

### 8-11. Troubleshooting

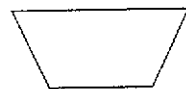
**! DANGER**



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

#### 8-11-1. Troubleshooting flowchart

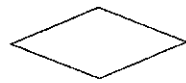
Symbols and their meanings



Switch operation



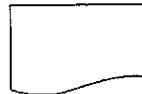
Set-up operation or condition



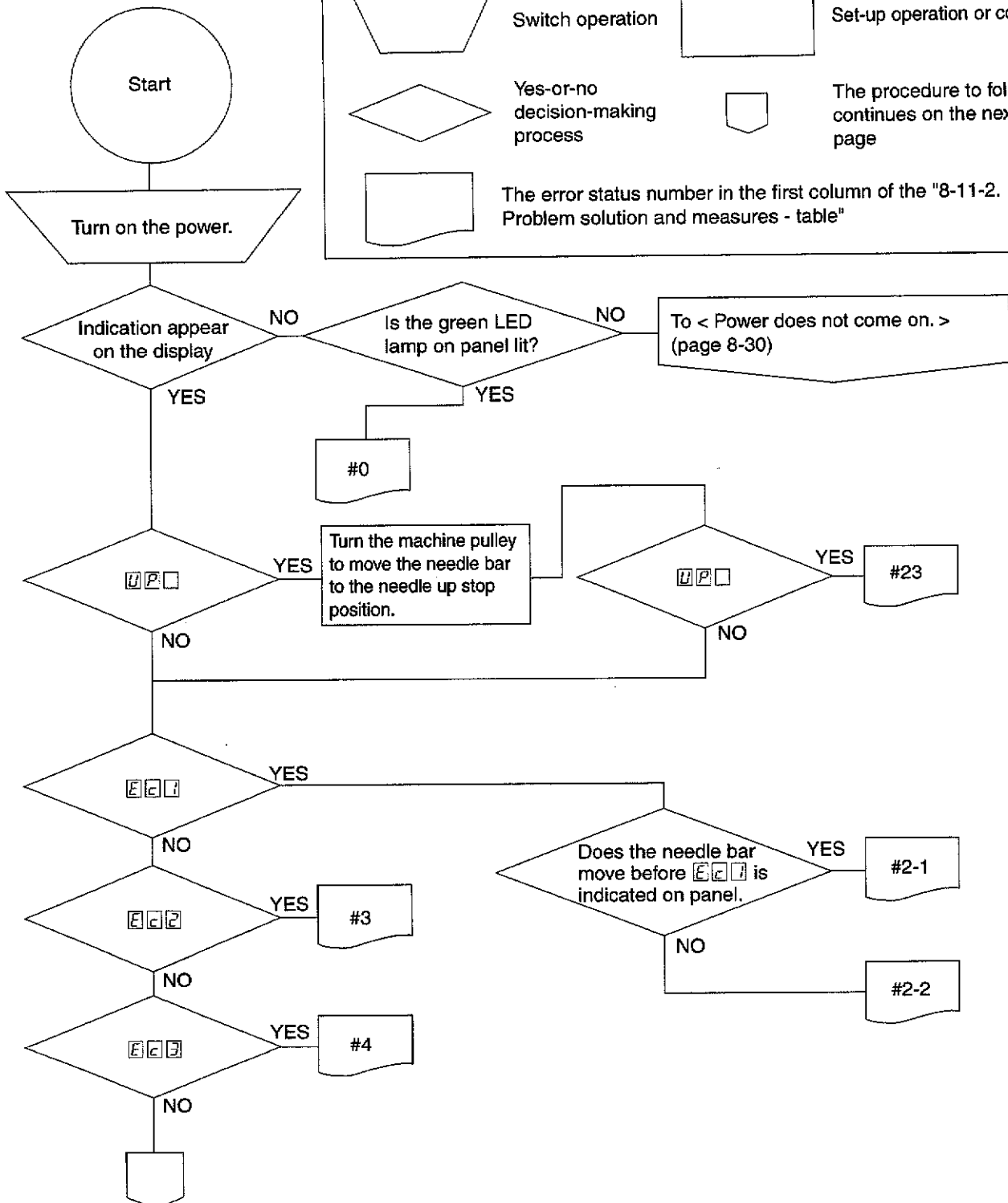
Yes-or-no decision-making process

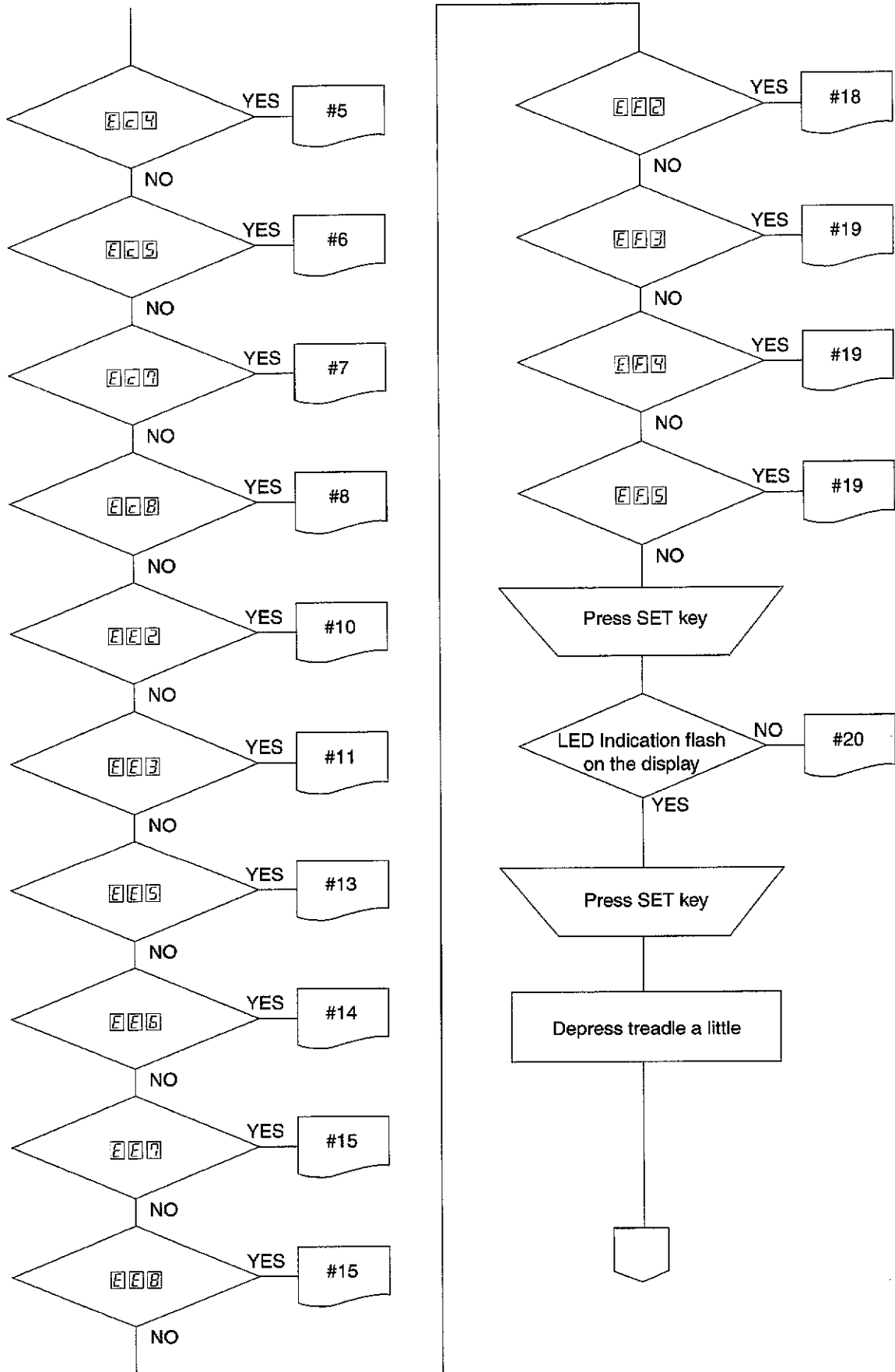


The procedure to follow continues on the next page

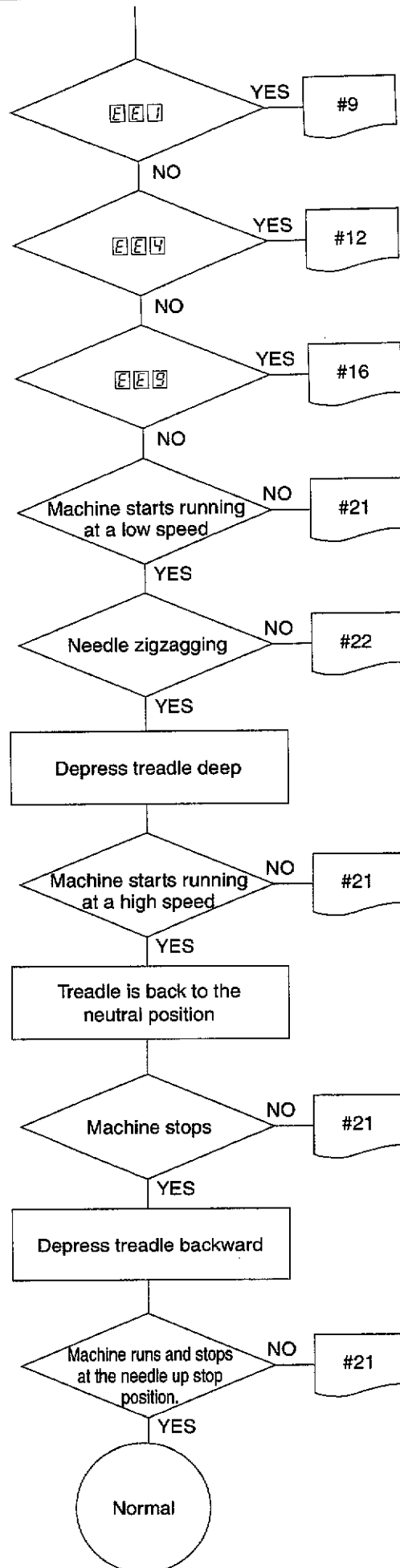


The error status number in the first column of the "8-11-2. Problem solution and measures - table"

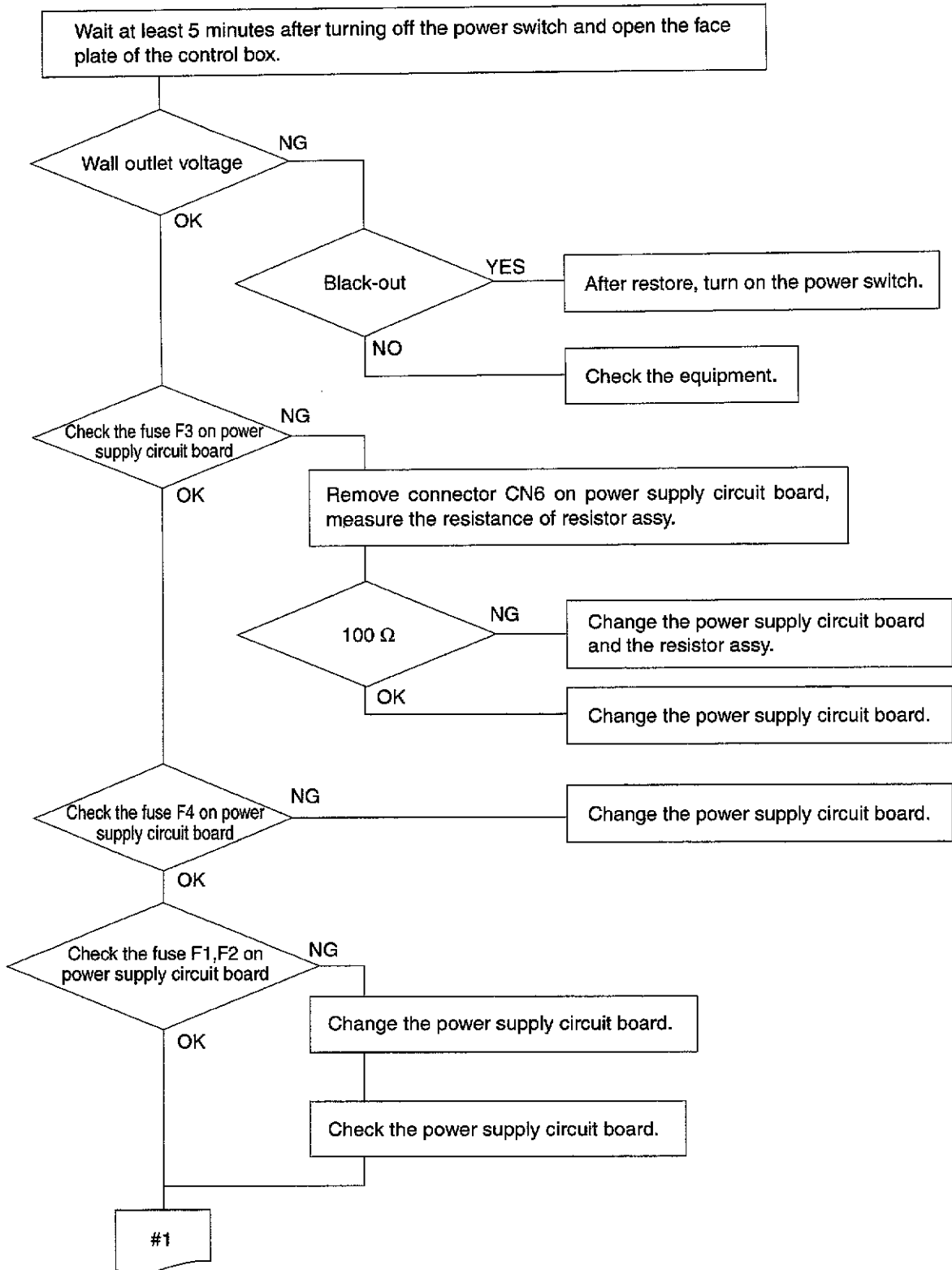




# 8. ELECTRIC COMPONENTS



< Power does not come on. >





## 8. ELECTRIC COMPONENTS

### 8-11-2. Problem solution and measures

1. Pay attention to the following when opening the control box for maintenance.

**[ Electric shock ]**

Some large capacitors may have a high voltage remaining in them for up to 5 minutes after the power is turned off. To prevent electric shock, wait at least 5 minutes after the power is turned off before doing the following:

- Opening and closing the control box
- Replacing fuses
- Separating and joining connectors
- Measuring resistance
- Doing anything with a possibility of touching something inside the control box

Some adjustments require measuring the voltage while the power is turned on with the control box kept open. In such a case, be careful not to touch any place other than that for the measurement. In addition, always keep in mind that a high voltage remains for 5 minutes after the power is turned off.

**[ Injury ]**

While the power is turned on, the cooling fan of the control box operates; be careful not to get caught in it. When separating or rejoining connectors, and measuring something, be careful not to cut your fingers on metal parts such as heatsinks and covers.

2. When replacing a fuse, be sure to use the specified ones listed "8-3. Fuse explanation" (Page 8-04,05).
3. See control circuit block diagram at the end of this manual for the connector No. and the connections.

**Before adjustment**

1. With the power turned off, check that the connector are securely connected by following the procedure in "8-4. Connectors" (page 8-06).
2. Use the flow chart to ascertain the conditions (# x) under which the problem occurred.
3. When checking the reason for a particular problem, carry out the checks in the order given in the "Probable causes" column.

Problem solution and measures table

Error status	Probable causes	Check/repair/adjust	Parts to be replaced
# 0	1. Malfunction of harness	a. Check P4 (PANEL) connector is securely plugged in on the control circuit board. b. Check the panel harness is not damaged.	
	2. P-ROM installed in reverse	Remove the P-ROM which has been installed in reverse, and install the new P-ROM in the correct position. (The P-ROM which has been installed in reverse will be corrupted and cannot be re-used.)	P-ROM
# 1 When turn on the power ON, Indication does not appear on the display	Malfunction of harness	a. Check P4 (PANEL) connector is securely plugged in on the control circuit board. b. Check the panel harness is not damaged.	
# 2-1. E E I	Malfunction of home position sensor etc.	a. Check P11 (ORG) and P20 (AC17V/AC30V) connectors are securely plugged in on the control circuit board. b. Adjusting position of the home position sensor.	
# 2-2. E E I	1. Needle zigzagging circuit problem	a. Check P14 (AC18V), P15 (DC300V) and P16 (NPM) connectors are securely plugged in on the control circuit board. b. Malfunction of control circuit board	Control circuit board
	2. Broken fuse F2 on the control circuit board	When fuse F2 has blown, other parts have blown on control circuit board too.	Control circuit board

## 8. ELECTRIC COMPONENTS

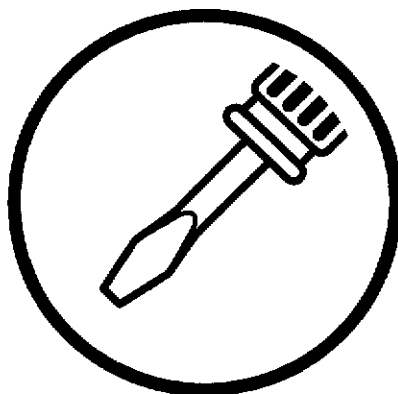
Error status	Probable causes	Check/repair/adjust	Parts to be replaced
# 3. E E 2	1. Malfunction of pulse motor and harness	Separate P16 (NPM) connector on the control circuit board, and measure the resistance on the harness. If the resistance is 1.5 - 2 Ω, there is problem.	Pulse motor
	2. Malfunction of control circuit board	Control circuit board	Control circuit board
# 4. E E 3	1. Malfunction of cooling fan	Check threads are not tangled in the cooling fan.	
	2. Blocked air inlet in control box filter	Clean the ventilation outlet of the control box.	
	3. Malfunction of thermal sensor on control circuit board	Check the thermal sensor on control circuit board is installed correctly and one is not blown.	Control circuit board
# 5. E E 4	Cooling fan 1 or one's harness problem (When looking from the rear, right-side fan)	a. Check P13 (FAN1) connector is securely plugged in on the control circuit board. b. Check threads are not tangled in the cooling fan 1.	DC fan motor 1
# 6. E E 5	Cooling fan 2 or ones harness problem (When looking from the rear, left-side fan)	a. Check P1 (FAN2) connector is securely plugged in on the control circuit board. b. Check threads are not tangled in the cooling fan 2.	DC fan motor 2
# 7. E E 7	1. P-ROM poor connection	Check P-ROM connector is securely plugged in on the control circuit board.	Control circuit board
	2. Custom data problem	Check the custom data is created Check that the custom data is within the allowable sewing area.	P-ROM
# 8. E E 8	1. P-ROM poor connection	Check P-ROM connector is securely plugged in on the control circuit board.	P-ROM
	2. Malfunction of control circuit board	If the display remains even after the power is turned off and back on again, thee is a malfunction in the control circuit board.	Control circuit board
	3. P-ROM version mismatch	Mismatch between control circuit board and PROM versions	P-ROM
# 9. E E 1	Malfunction of power supply circuit board		Power supply circuit board
# 10. E E 2	Abnormal rise in power supply voltage	a. Check that the power supply voltage at the wall outlet is within 10% of the rated voltage. b. If a transformer has been connected, check the transformer wiring. (Refer to the transformer wiring diagram.)	
# 11. E E 3	1. Abnormal drop in power supply voltage	Refer to "# 10. E E 2"	
	2. Malfunction of harness	Check P6 (POWER) connector is securely plugged in on the control circuit board.	Power supply circuit board
# 12. E E 4	1. Timing belt is not fitted	Fit the timing belt.	
	2. Pulley is loosened	Adjust and fix pulley.	
	3. Malfunction of synchronizer or one's harness	Check P3 (SYNC) connector is securely plugged in on the control circuit board.	Synchronizer
	4. Abnormal rise in power supply voltage	Refer to "# 10. E E 2"	
	5. Malfunction of machine motor connector	Check connection of the machine motor connector	
# 13. E E 5	1. Broken fuse on the control circuit board	Check the fuse F1 on the control circuit board is not damaged.	Fuse
	2. Malfunction of harness	Check P20 (AC17V/AC30V) connector is securely plugged in on the control circuit board.	
	3. Malfunction of connection	Check 4P connector from transformer is securely plugged in on the power supply circuit board. ( See below) For 100V,200V === CN2(200V) For 110V,220V,240V,380V,400V,415V === CN3(220V) For 230V === CN4(230V/240V)	

## 8. ELECTRIC COMPONENTS

Error status	Probable causes	Check/repair/adjust	Parts to be replaced
# 14. E E E	1. Power turned on when treadle was depressed forward or backward	Returned to the neutral position, set the display so that E E E appears, and then press the SET key. Operation will return to the normal when the power is turned on.	
	2. Malfunction of adjusting treadle	Adjust so that the treadle is at the neutral position when it is not being depressed.	
	3. Malfunction of harness	Check P7 (PEDAL) connector is securely plugged in on the control circuit board and one's harness is not damaged.	
# 15. E E 7, E E 8	1. Power turned on while panel key was being pressed	Turn off the power and then turn the power back on.	
	2. Malfunction of panel	Check P4 (PANEL) connector is securely plugged in on the control circuit board and one's harness is not damaged.	Panel
# 16. E E 9	1. Malfunction of synchronizer	Check P3 (SYNC) connector is securely plugged in on the control circuit board.	Synchronizer
	2. Incorrect machine motor pulley diameter	Use correct machine motor pulley	
	3. DIPSW1-2 is turned ON	Turn OFF DIPSW1-2 and reset all.	
# 18. E E 2	1. Abnormal rise in power supply voltage	Refer to "# 10. E E 2"	
	2. Upper shaft is locked	Turn the machine pulley to check whether the upper shaft is locked or not.	
# 19. E E 3, E E 4, E E 5	1. Poor connection of P-ROM	Check P-ROM securely plugged in on the control circuit board.	
	2. Problem of P-ROM data		P-ROM, control circuit board
# 20. LED does not flush when SET key is pressed	1. Malfunction of panel circuit board		Panel circuit board
	2. Panel key is locked	Check DSW2-8 is turned OFF. When release key lock turn OFF DSW2-8.	
# 21. Sewing machine does not operate correctly in accordance with the treadle depression amount.	1. Max. sewing speed is limited	Check the setting of Max. sewing speed.	
	2. Treadle is not adjusted correctly	Refer to instruction manual "5-16. Adjusting the treadle" (page 44).	
	3. Malfunction of harness	Check P7 connector is securely plugged in on the control circuit board.	Treadle unit
	4. Malfunction of treadle unit		Treadle unit
# 22. Needle zigzagging does not operate	1. Sewing pattern is straight stitch	Check the sewing pattern	
	2. Refer to "# 2-2"		
# 23. The E P □ display remains without changing even when the machine pulley is turned to the needle up stop position.	1. Malfunction of harness	Check P3 (SYNC) connector is securely plugged in on the control circuit board.	Synchronizer
	2. Malfunction of synchronizer		Synchronizer



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