RH-981A

ENGLISH

ELECTRONIC EYELET BUTTON HOLER

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

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

SAFETY INSTRUCTIONS

1. Safety indications and their meanings

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

Indications

⚠ **DANGER**	The instructions which follow this term indicate situations where failure to follow the instructions will almost certainly result in death or severe injury.
⚠ **CAUTION**	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 ± 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 pneumatic delivery capability should be greater than the requirements for the sewing machine's total air consumption.
Insufficient pneumatic delivery capability may cause problems with correct operation.

The ambient temperature should be within the range of 5 ℃ to 35 ℃ 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 87 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 start switch 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 and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhoea.
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 start switch is pressed by mistake, which could result in injury.
- When threading the needle
- When replacing the needle
- When not using the machine and when leaving the machine unattended

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

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

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

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

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

Cleaning

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

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 can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they 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 start switch is pressed by mistake, which could result in injury.
- When carrying out inspection, adjustment and maintenance
- When replacing consumable parts such as the loopers and knife

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

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

Use only the proper replacement parts as specified by Brother.

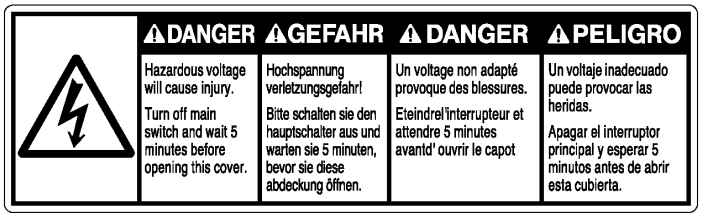
If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

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



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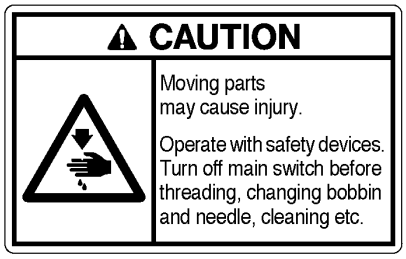


Safety devices
- Eye guard
- Finger guard
- Needle bar guard
- Belt cover, etc.

3

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

4

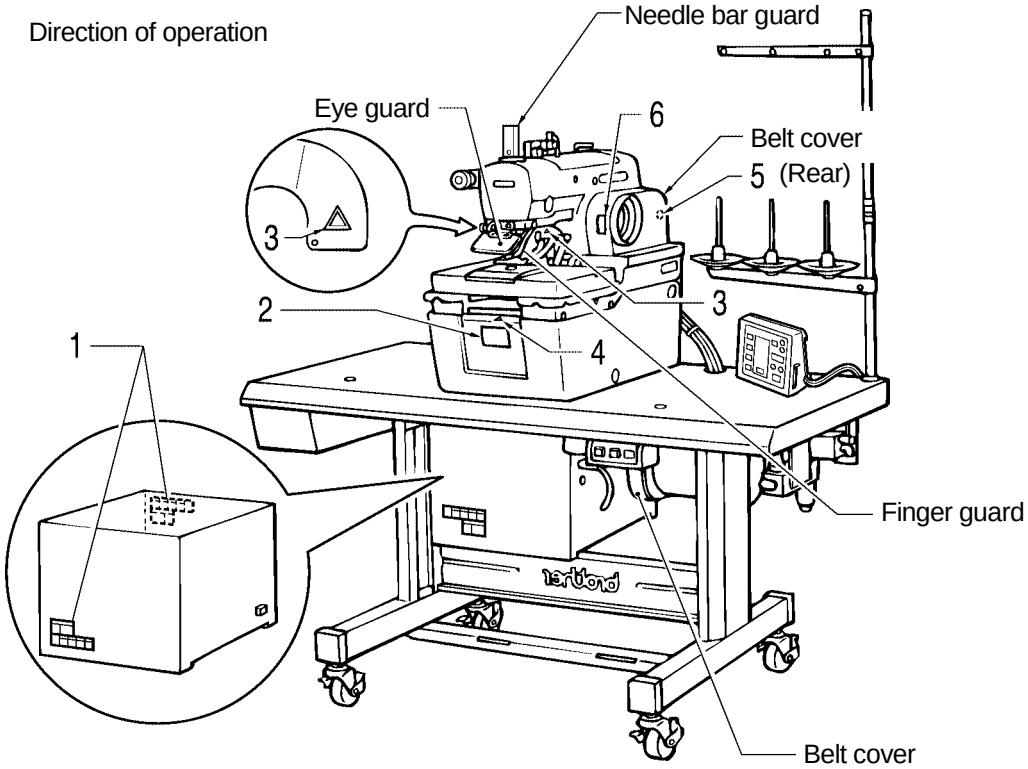
Be careful not to clamp your fingers when closing the front cover.

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



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1. NAMES OF EACH PART

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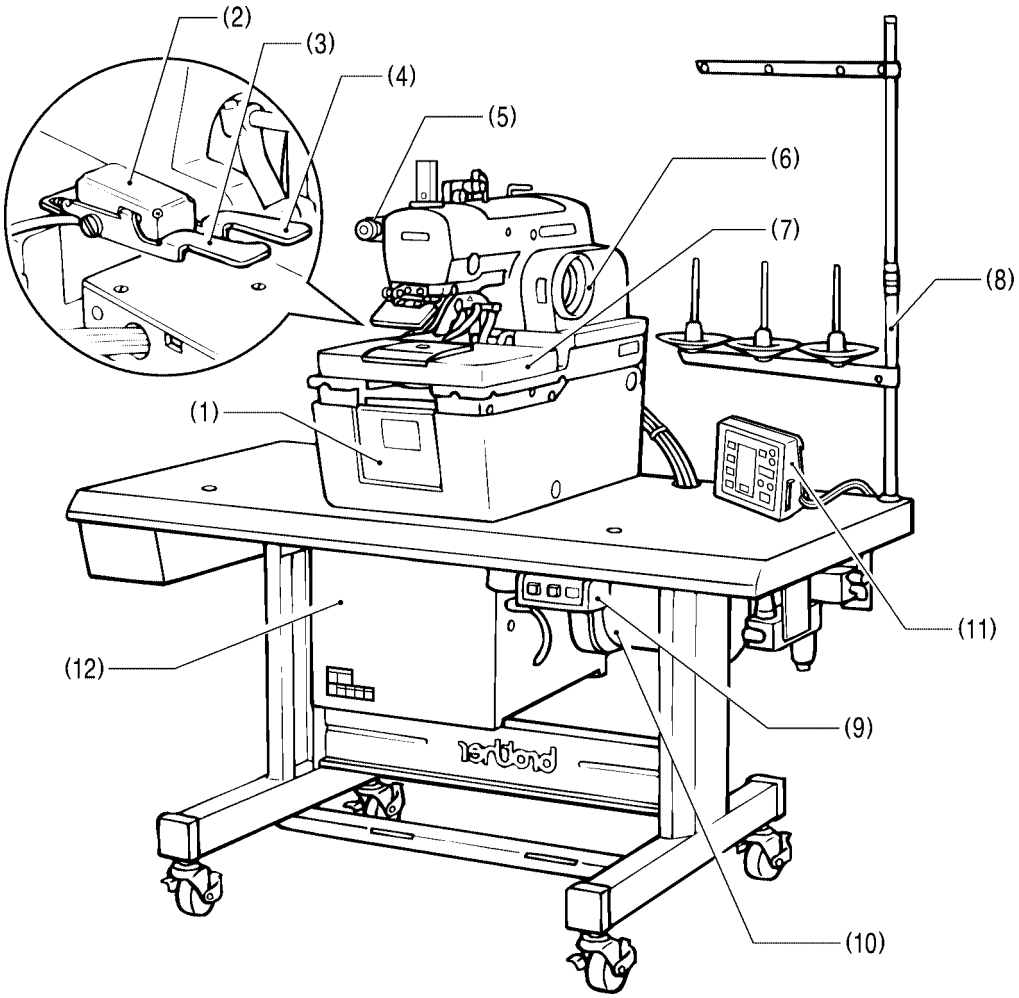
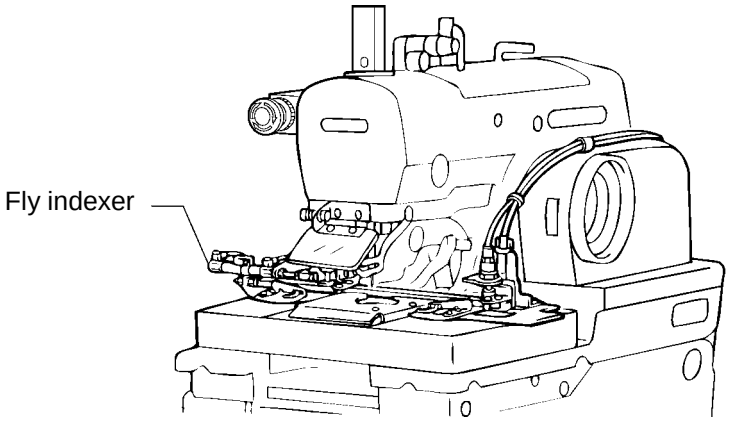


(1) Front cover	(2) Hand switch	(3) Cloth presser switch	(4) Start switch
(5) EMERGENCY STOP switch	(6) Upper shaft pulley	(7) Feed bracket	(8) Spool stand
(9) Power switch	(10) Motor	(11) Operation panel	(12) Control box

Fly indexer (-52 specifications)



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2. SPECIFICATIONS

2-1. Specifications

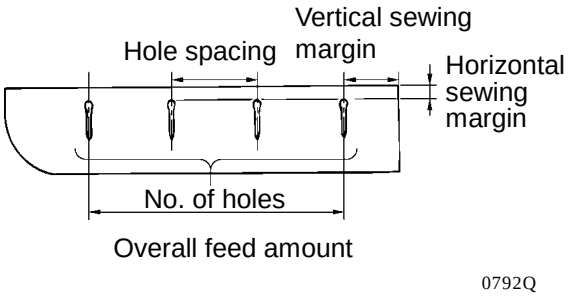
	Upper thread trimmer	Lower thread trimmer		Fly indexer
		Long type	Short type	
-00	◯	-	-	-
-01	◯	◯	-	-
-02	◯	-	◯	-
-52	◯	-	◯	◯

* -02 and -52 specifications are further divided into L1 - L7 specifications in accordance with the stitch length. Please be sure to specify the stitch length when ordering.

Specification	RH-981A-00	RH-981A-01	RH-981A-02, RH-981A-52
Application	Men's clothes and ladies' clothes		Jeans and work clothes
Sewing speed	1,000 - 2,200rpm (100-rpm steps)		
Stitch length	5 - 50 mm	5 - 38 mm	L1 14 - 18 mm L5 28 - 32 mm L2 18 - 22 mm L6 32 - 36 mm L3 22 - 26 mm L7 36 - 40 mm L4 26 - 30 mm
Stitch pitch	0.5 - 2.0 mm		
Stitch width	1.5 - 3.2 mm		
Tacking length	0 - 20 mm		
Work clamp height	12 mm		16 mm
Starting method	Dual switch (cloth presser switch and start switch) or single switch		
Feed method	Intermittent feed by three pulse motors (X, Y, θ)		
Needle	DO X 558 Nm 80 - Nm 120 (Schmetz 558)		
Safety equipment	Built-in emergency stop function and automatic stopping device which stops the machine when the safety circuit is activated		
Motor	Inverter-type induction motor		
Air pressure	Main regulator: 0.5MPa Knife pressure regulator: 0.3MPa		
Air consumption	43.2 l/ min. (8 cycles/min.)		
Noise level	85dB at max. speed of 2,200r pm, measured according to ISO 10821		
Dimensions	1,200 mm (W) X 590 mm(D) X 1,120 mm (H)		
Work table legs	T-shape height-adjustable type		
Power supply	Single-phase 220 V 3-phase 220 V, 380 V, 400 V Maximum electric power consumption: 1kvA		
Weight	163.5 kg		

Fly indexer specifications (-52 specifications)

	Standard	Large size
Max. hole spacing	50.8 mm (2 inch)	57.15 mm (2 1/4 inch)
Max. overall feed amount	152.4 mm (2 inch X 3)	285.75 mm (2 1/4 inch X 5)
No. of holes	3 - 4*1	3 - 6*1
Horizontal sewing margin	9 - 21 mm (9 - 11 mm*2)	
Vertical sewing margin	30 - 40 mm	



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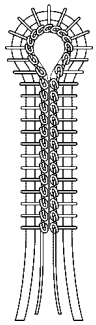
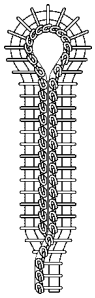
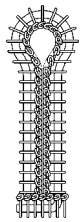
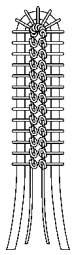
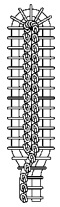
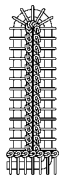
*1 The cloth feed bar F assembly (sold separately) can be processed and used so that 1 to 9 buttonholes can be sewn.

*2 L5 - L7 specifications

2-2. Sewing shape

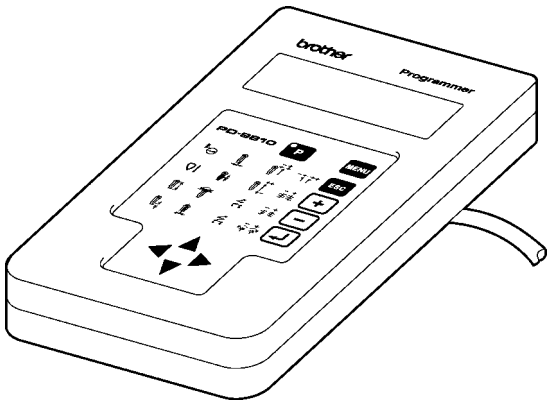
Eyelet buttonhole			Straight buttonhole		
					
Without bar tacking	With taper	With straight bar tacking (*)	Without bar tacking	With taper	With straight bar tacking (*)

* The DIP switch settings must be changed. (Refer to page 74.)

2-3. Optional parts

Parts name	Parts code	
Two-pedal foot switch	S42838-101	This allows the work clamp to raised and lowered and the sewing machine to be started by pedal operation.
Waist belt presser		When sewing eyelet buttonholes into waist belts with which have differences in thickness, this presser provides secure clamping for the different thickness. It prevents any slippage of the material during sewing.
Cloth presser (L3W) set Cloth presser (L4W) set	S43701-001 S43704-001	
Upper thread nipper	S43406-301	This device prevents the thread from pulling out at the sewing start, thus contributing to a more accurate and higher-quality seam finish.
Fly indexer		This is an indexer which is specially for use when sewing flys. It allows from one to nine buttonholes to be set, and automatically feeds the material. Using this device makes the sewing of buttonholes for flys much quicker.
Fly indexer assembly for L1, L2 and L5 specifications Fly indexer assembly for L3, L4, L6 and L7 specifications	S44279-101 S44281-101	
Special lapel cutting device	S53906-201	Eyelet buttonhole and straight buttonhole can be sewn automatically without replacing hammer and knife. It is effective for men's jacket cycle sewing (eyelet buttonhole-flower hole).

2-4. PD-9810, Programmer



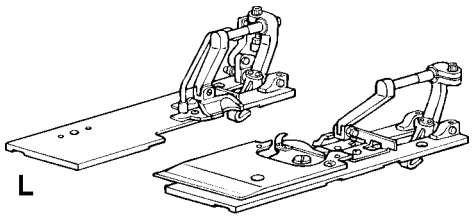
You can use the icon keys to retrieve parameters at a single touch, and to display them as icons on the LED screen so that the settings can be changed easily. It allows you to easily transfer data between different sewing machines.

2-5. Replacement parts list for specification changes

The sewing machine can be changed to any one of L1 - L7 for -02 and -52 specifications by replacing the specified parts with the appropriate parts given below.

-02 specifications

Specifications (buttonhole length)	Replacement parts set	Plate R assembly / Plate L assembly	Hammer	Specification harness
L1 (14 - 18 mm)	S44238-001	S38576-301 / S38577-201	S37702-001 (S12) / S37704-001 (S16)	S43337-000
L2 (18 - 22 mm)	S44239-001	S38578-301 / S38579-201	S37704-001 (S16) / S37706-001 (S20)	S43338-000
L3 (22 - 26 mm)	S44240-001	S38580-301 / S38581-201	S37706-001 (S20) / S37708-001 (S24)	S43339-000
L4 (26 - 30 mm)	S44271-001	S38582-301 / S38583-201	S37708-001 (S24) / S42053-001 (S28)	S43340-000
L5 (28 - 32 mm)	S44272-001	S41470-101 / S41471-101	S37197-001 (26) / S37199-001 (30)	S43341-000
L6 (32 - 36 mm)	S44273-001	S41472-101 / S41473-101	S37199-001 (30) / S37201-001 (34)	S43342-000
L7 (36 - 40 mm)	S44274-001	S41474-101 / S41475-101	S37201-001 (34) / S35093-001 (38)	S43343-000



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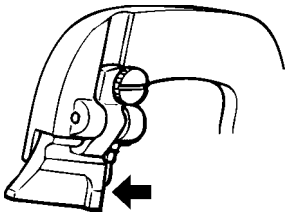

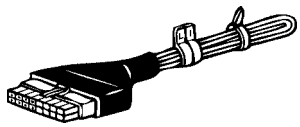
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Note: There is 10 mm of difference in the knife cutting position between L1 - L4 and L5 - L7 specifications. (Refer to page 63.)

-52 specifications

Specifications (buttonhole length)	Plate R assembly / Plate L assembly	Hammer	Specification harness	Cloth feed plate R
L1 (14 - 18 mm)	S38576-301 / S38577-201	S37702-001 (S12) / S37704-001 (S16)	S43360-000	S43809-001
L2 (18 - 22 mm)	S38578-301 / S38579-201	S37704-001 (S16) / S37706-001 (S20)	S43361-000	S43809-001
L3 (22 - 26 mm)	S38580-301 / S38581-201	S37706-001 (S20) / S37708-001 (S24)	S43362-000	S42139-101
L4 (26 - 30 mm)	S38582-301 / S38583-201	S37708-001 (S24) / S42053-001 (S28)	S43363-000	S42139-101
L5 (28 - 32 mm)	S41470-101 / S41471-101	S37197-001 (26) / S37199-001 (30)	S43364-000	S43809-001
L6 (32 - 36 mm)	S41472-101 / S41473-101	S37199-001 (30) / S37201-001 (34)	S43365-000	S42139-101
L7 (36 - 40 mm)	S41474-101 / S41475-101	S37201-001 (34) / S35093-001 (38)	S43366-000	S42139-101

Note: There is 10 mm of difference in the knife cutting position between L1 - L4 and L5 - L7 specifications. (Refer to page 63.)

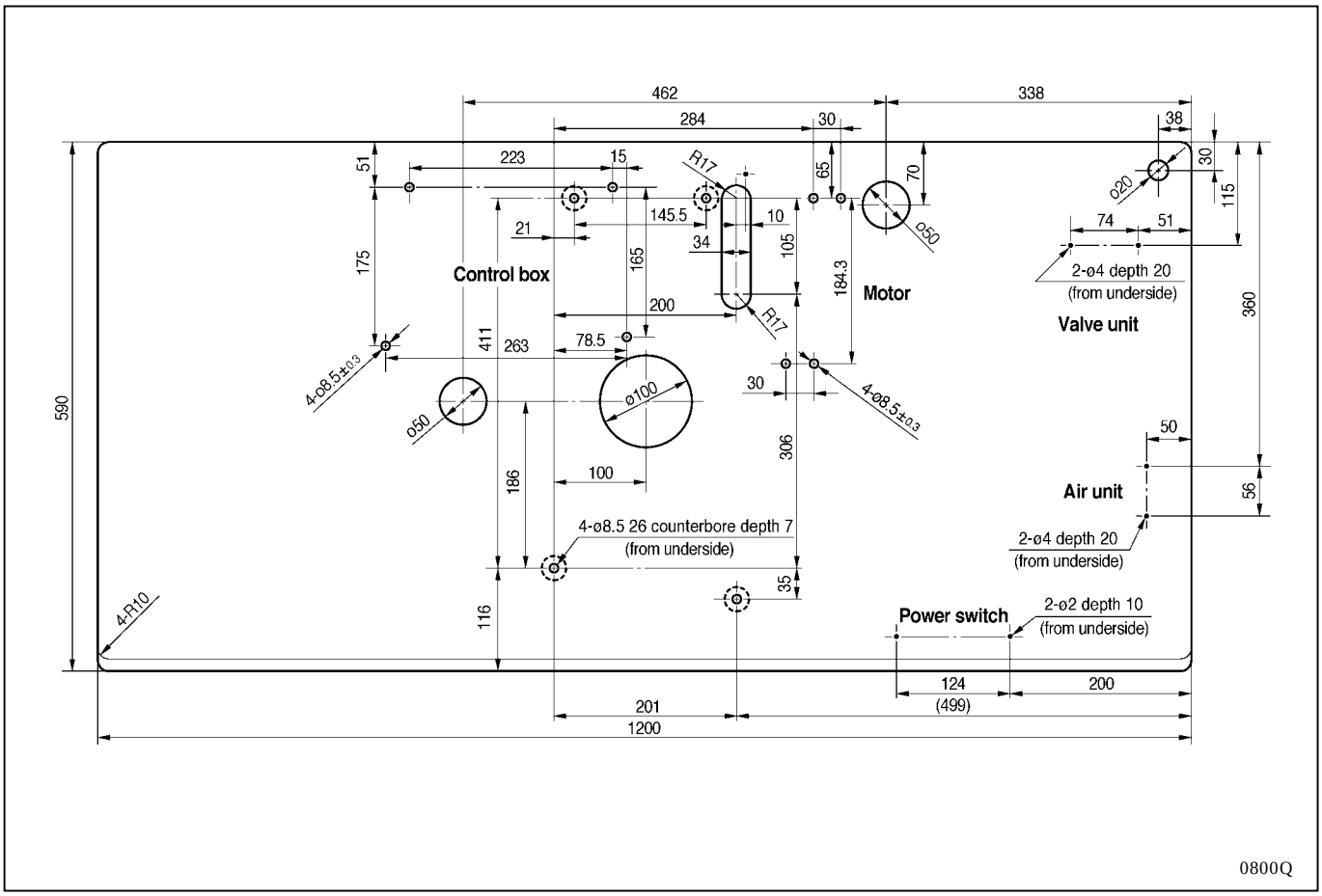
3. INSTALLATION

⚠ CAUTION

- 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 87 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 start switch is pressed by mistake, which could result in injury.
- 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 staples, otherwise there is the danger that fire or electric shocks could occur.
- 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.
- Install the belt covers to the machine head and motor.

3-1. Table processing diagram

The top of the table should be 50 mm in thickness and should be strong enough to hold the weight and withstand the vibration of the sewing machine. Drill holes in the table as shown in the diagram below.

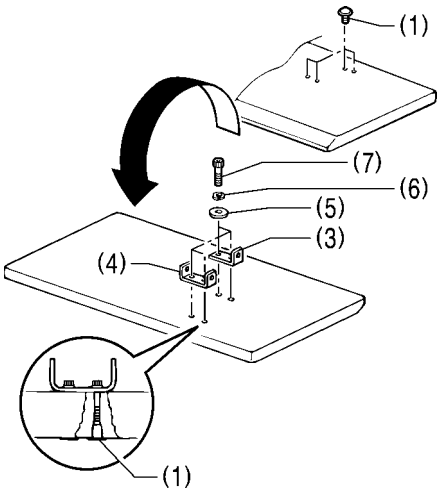


* There is the special table indicated below.

	Model code
Table/legs assembly	127-981-04902

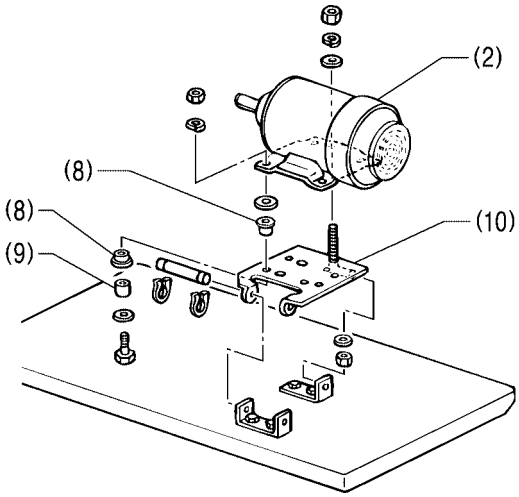
3-2. Installing the motor

3124Q



1. Insert the four nuts (1) into the work table.
2. Turn the work table upside down to make it easier to install the motor (2).

3. Align the holder plate (3) and the motor plate (4) with the nuts (1), and then install them with the four washers (5), the four spring washers (6) and the four bolts (7).

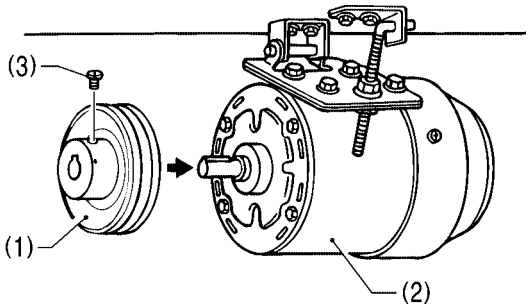


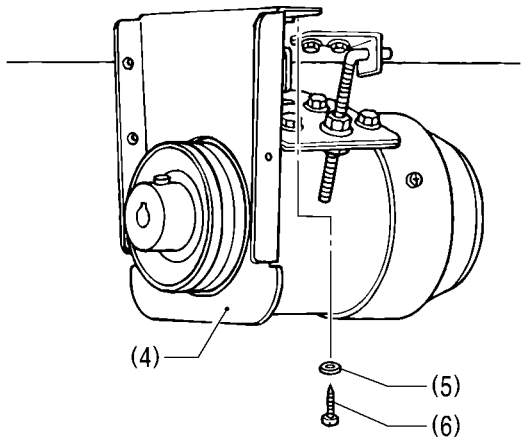
3125Q

4. Place the eight accessory cushions (7) and the four accessory cushion collars (8) onto the motor base plate (9), and then install the motor as shown in the illustration.

Note: The vibration of the motor may cause the bolts to come loose. Make sure that the bolts are securely tightened.

3-3. Installing the motor pulley

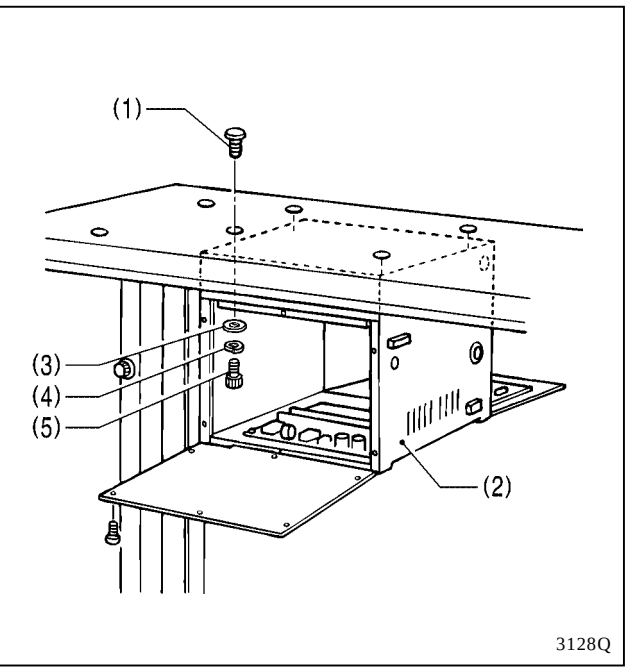




1. Place the motor pulley (1) onto the shaft of the motor (2) so that the key grooves are aligned, and then tighten the set screws (3) so that the center of the V groove in the motor pulley (1) is aligned as closely as possible with the center of the belt hole in the power table.

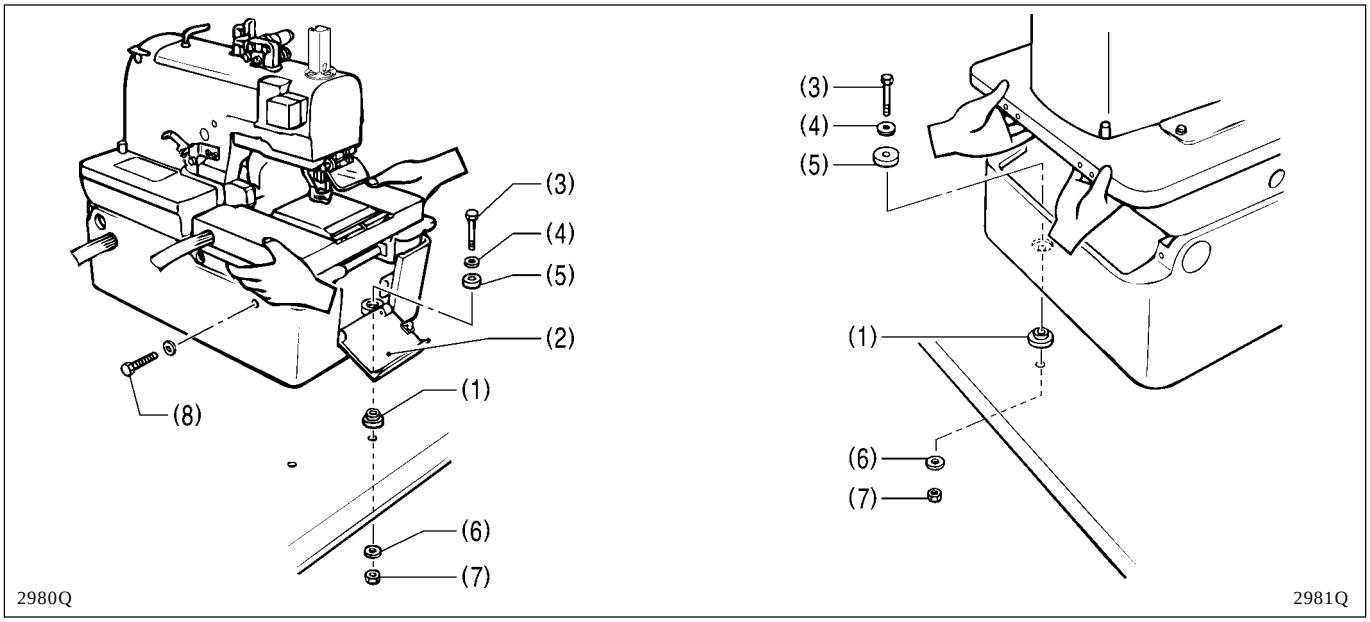
2. Install the motor rear cover support (4) with the two flat washers (5) and the two screws (6).
   Note: Check that the motor rear cover support (4) does not touch the motor pulley (1) or the edge of the motor.

3-4. Installing the control box

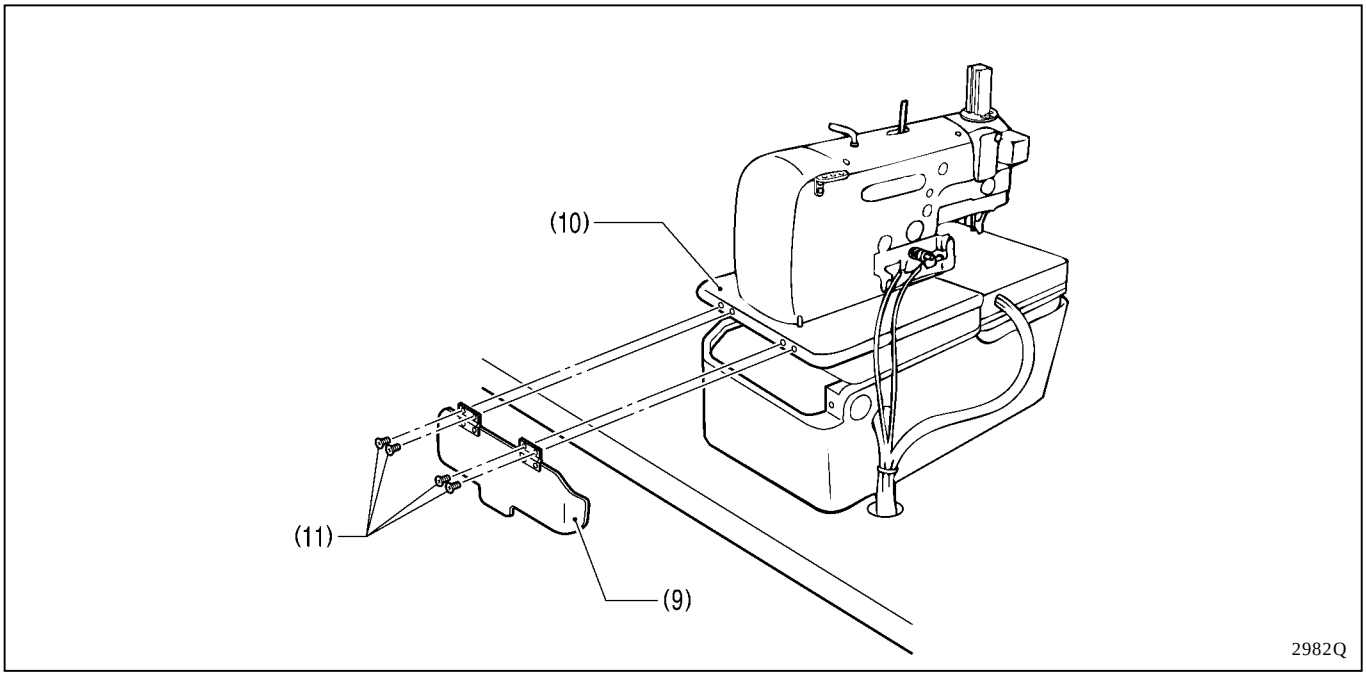


1. Insert the four nuts (1) into the work table.
2. Open the front and rear covers of the control box (2).
3. Align the control box (2) with the nuts (1), and then install it with the four flat washers (3), spring washers (4) and bolts (5).
   Note: Be careful not to drop any small parts such as washers onto the circuit board when installing the bolts.

3-5. Installing the machine head

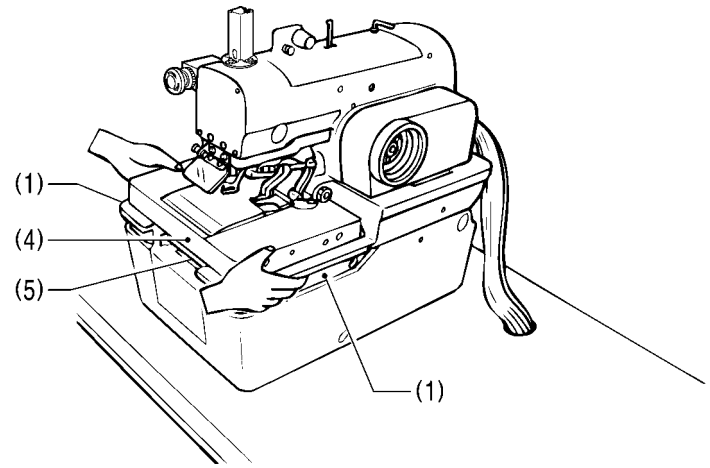


1. Insert the accessory bed base cushions A (1) into the bed base, and then place the machine head on top of the work table.
   Note: When placing the machine head on top of the work table, have two or more people there to hold the handles and rear of the head as indicated in the illustration.
2. Open the front cover (2), and then use the bolt (3), washer (4), rubber sheet (5), bed stand cushion A (1), large washer (6) and nut (7) to attach the front right corner of the bed base to the work table.
3. Attach the bed base to the work table in two places inside the base in the same way as in step 2. above.
4. Remove the bolt (8) and the washer.
   Note: The bolt (8) and washer should be kept, as they will be needed again if the machine head is moved.
5. Raise the machine head, and then attach the front left corner of the bed base to the work table in the same way as in the steps above.
   Note: Make sure that steps 2. to 4. above have been completed before raising the machine head.

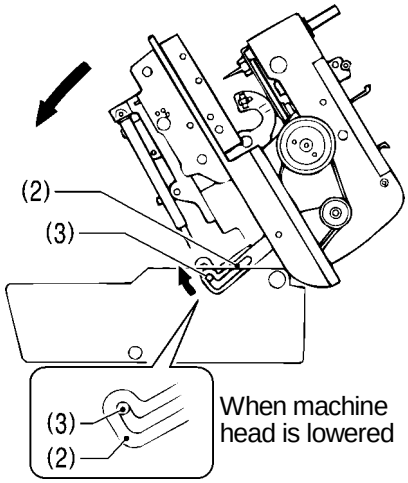


6. Install the bed base cover (9) to the rear of the bed (10) with the four screws (11).
   Note: Be careful not to injure yourself on the spring hinge.

Raising the machine head



2983Q



When machine head is raised

2984Q

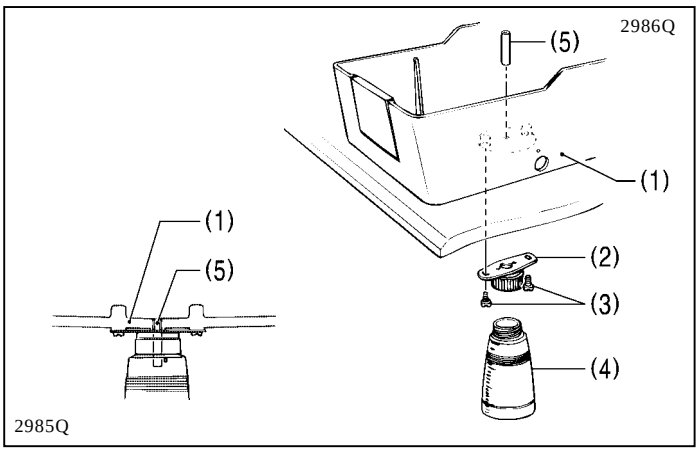
1. While holding the handles of the machine head (1) with both hands, gently raise the machine head.
   Note: Be sure to turn the power supply off before raising the machine head.
2. If you wish to keep the machine head in the raised position, insert the head support lever (2) securely into the hinge lever support shaft (3).
   Note: Always check that the head support lever (2) and the hinge lever support shaft (3) are meshed.

Lowering the machine head

Pull the machine head down toward you gently, remove the head support lever (2) from the hinge lever support shaft (3), and then gently lower the machine head.

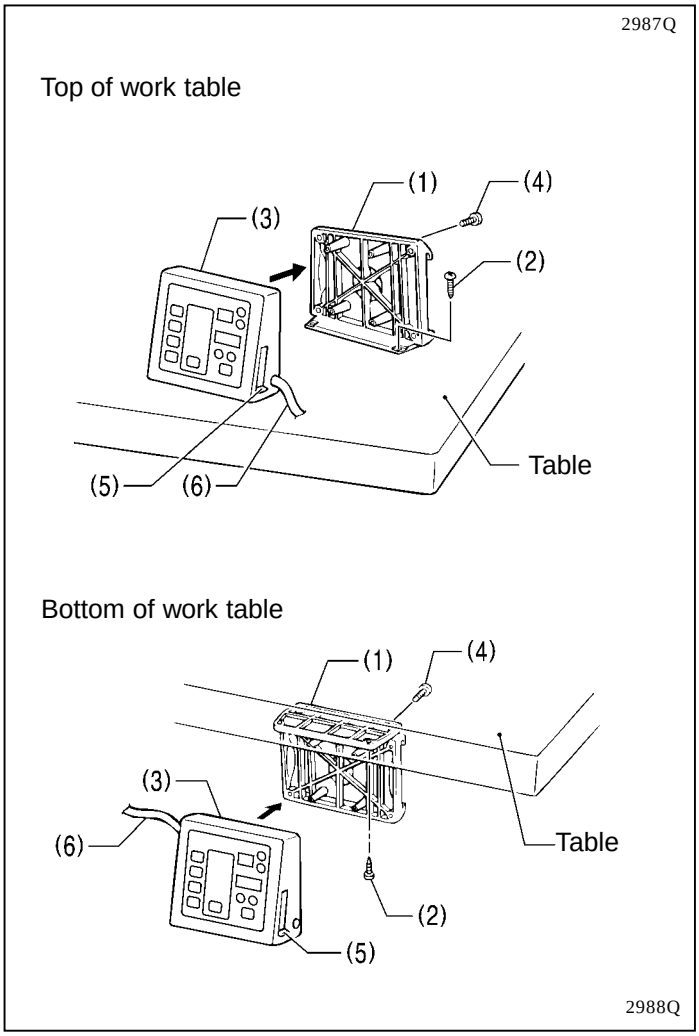
Note: Do not hold the machine head by the feed bracket (4) or X feed shaft A (5) when it is being raised and lowered.

3-6. Installing the oil container



1. Install the oil draining cap support (2) to the base of the bed base (1) with the two screws (3).
2. Screw the oil container (4) into the oil draining cap support (2).
3. Push the oil draining spring pin (5) into the bed base (1) until the pin is flush with the surface of the base.
4. Lower the machine head. (Refer to "Lowering the machine head" on previous page.)

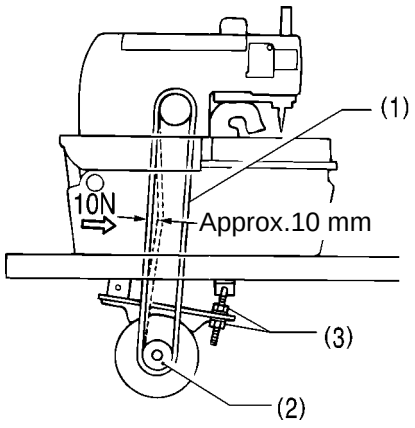
3-7. Installing the operation panel



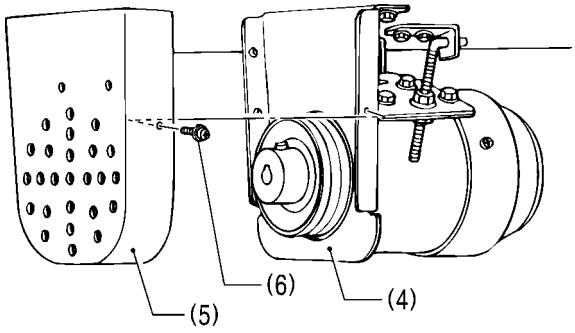
The operation panel can be installed to either the top or bottom of the work table.

1. Install the rear frame (1) to the work table (top or bottom) with the four wood screws (2).
2. Install the front frame assembly (3) to the rear frame (1) with the four screws (4).
   * The vertical orientation of the front frame assembly (3) is the same whether it is installed to the top or the bottom of the work table.
   * Pull the harnesses such as the ground harness out of the way so that the operation panel side cover (5) can be opened and closed.
3. Insert the connector cord (6) into the control box through the hole at the side of the box.

3-8. Tightening the V-belt



2990Q



2991Q

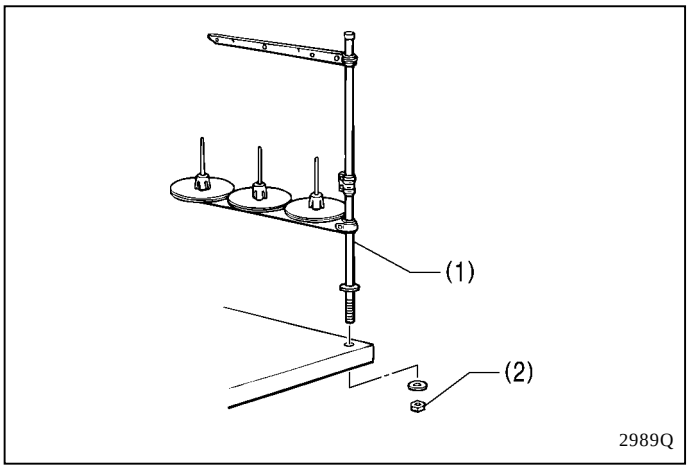
1. Open the rear cover.
2. Pass the V-belt (1) through the base of the bed base and through the hole in the work table.
3. Place the V-belt (1) onto the motor pulley (2).
4. Check that there is approximately 10 mm of deflection in the V-belt (1) when it is pushed in the middle with a load of 10 N.

   If the tightness needs adjusting, loosen the two nuts (3) and move the motor up or down. After adjusting, tighten the nuts (3).

   Note: Check that the motor rear cover support (4) does not touch the motor pulley (1) or the edge of the motor.
5. Install the motor cover (5) with the three screws (6).

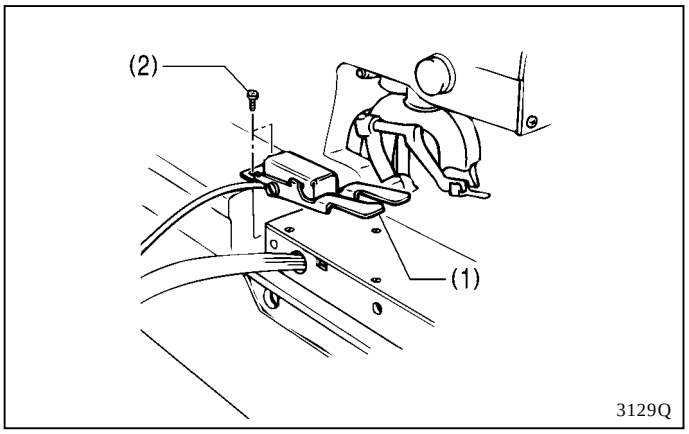
   Note: After a long period of use, the V-belt will become run in and will loosen around the motor pulley. When this happens, turn off the power and adjust by the procedure given in step 4. above.

3-9. Installing the spool stand



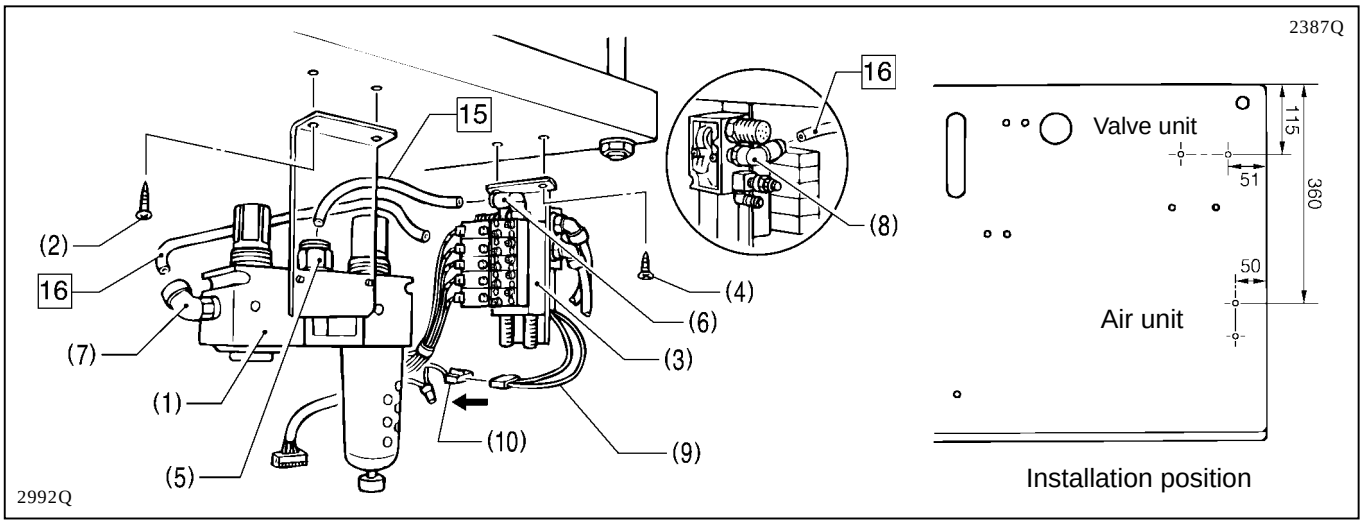
1. To assemble the spool stand (1), follow the instructions in the manual that came with the spool stand (1).
2. Secure the spool stand (1) to the rear right corner of the work table with the washer and nut (2).

3-10. Installing the hand switch



Install the hand switch (1) with the two screws (2).

3-11. Installing the air unit and the valve unit



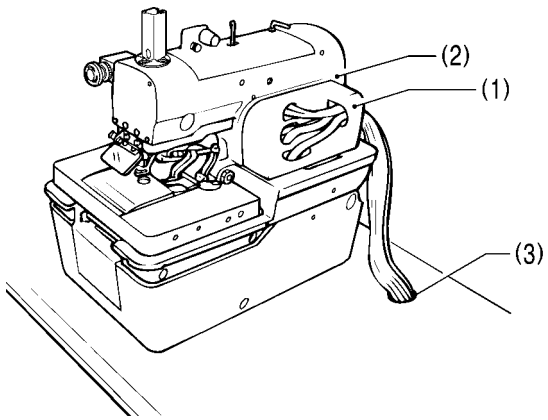
1. Install the air unit (1) to the underside of the work table with the two screws (2).
2. Install the valve unit (3) with the two screws (4).
3. Connect air tube No. 15 to the intermediate joint (5) of the air unit (1) and to the joint (6) of the valve unit (3), and connect air tube No. 16 to joints (7) and (8).

Connecting the valve cables

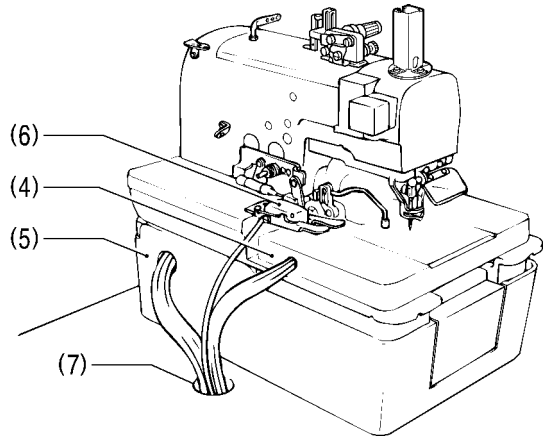
Insert the cable (9) which is coming out of the valve unit to the 2-pin connector (10) of the valve cable assembly.

3-12. Connecting the wiring

2994Q

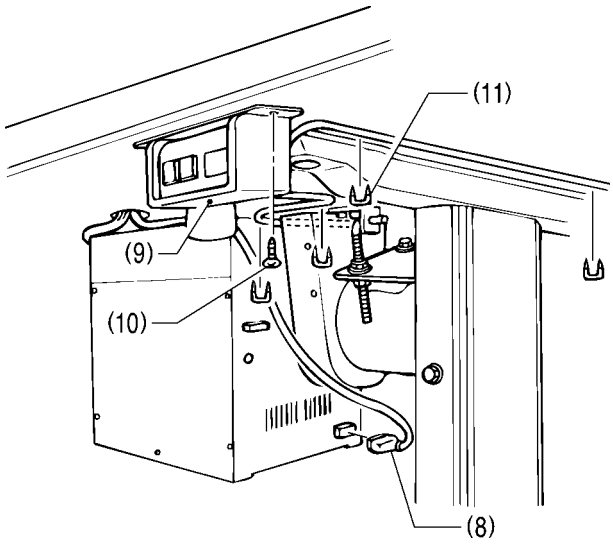


1. Pass the cable and air tube which are coming out of the belt cover (1) and the machine head (2) through the cable hole (3) in the work table.



3130Q

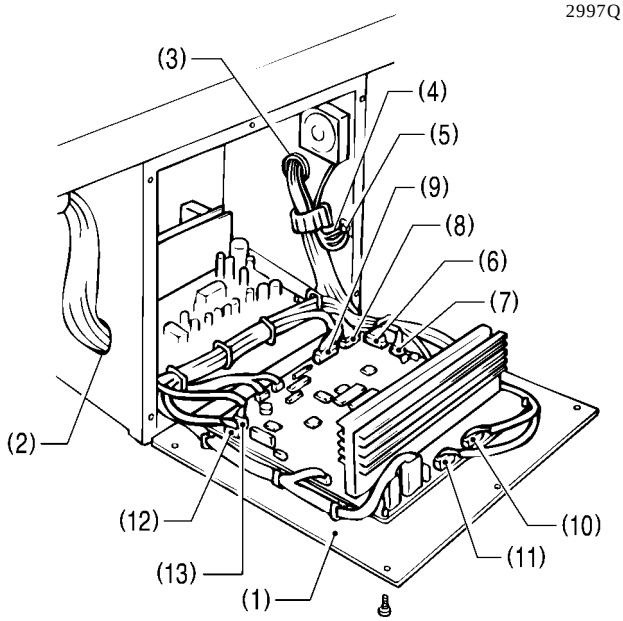
2. Pass the cables and air tube which are coming out of the feed bracket (4) and the left side of the bed base (5) and the cable for the hand switch (6) through the cable hole (7) in the work table.
   Note: Leave enough looseness in the cables so that they will not be pulled when the machine head is tilted back.
   Adjust the looseness after all connections to the control box are complete.

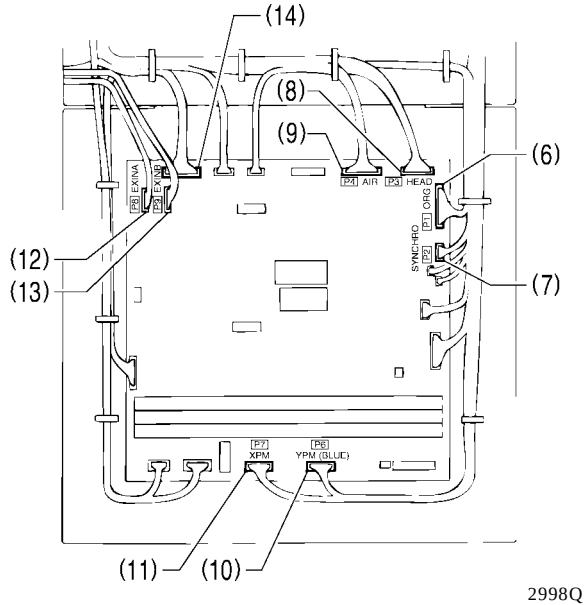


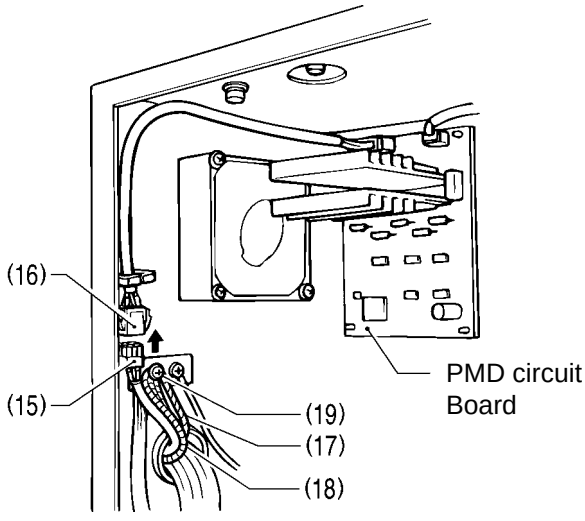
3131Q

3. Connect the hand switch connector (8) to the control box connector.
4. Install the power switch (9) to the underside of the work table with the two screws (10).
5. Secure the cables using staples (11) (in four locations).

3-12-1. Connections inside the control box







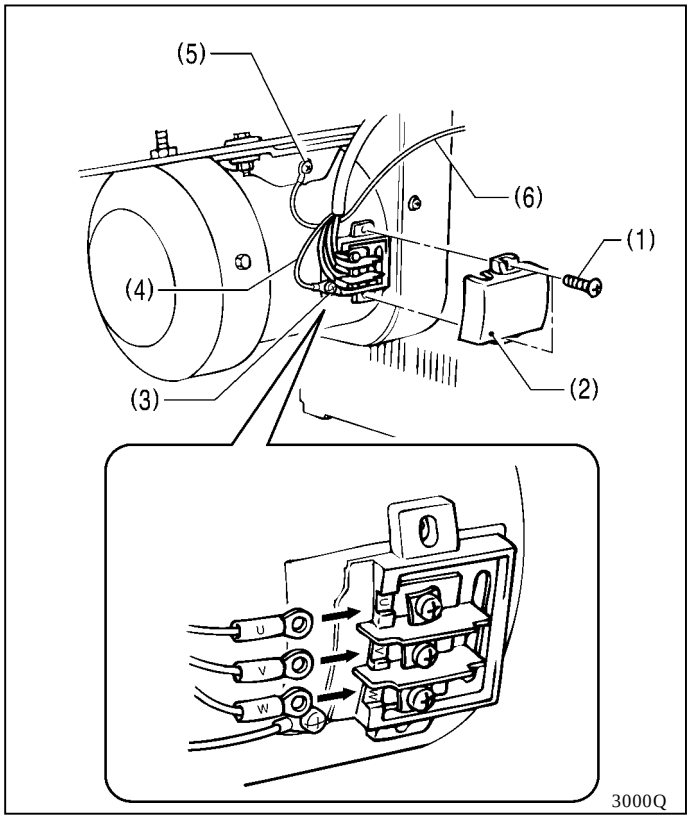
1. Open the rear cover (1) of the control box.
2. Pass the cables through the holes (2) and (3) in the side of the control box.
3. Loosen the screw (5), and then connect the three ground cables (4) that are coming from the machine head.
4. Securely insert each of the connectors (6) - (14) as indicated below.

Machine head connectors	(Connection indications) * This is indicated on the P.C. board.
Connector (6) (12-pin with [1] mark)	P1 (ORG)
Connector (7) (5-pin with [2] mark)	P2 (SYNCHRO)
Connector (8) (9-pin with [3] mark)	P3 (HEAD)
Connector (9) (12-pin with [4] mark)	P4 (AIR)
Connector (10) (5-pin with [6] mark)	P6 (YPM) (BLUE)
Connector (11) (5-pin with [7] mark)	P7 (XPM)
Connector (12) (16-pin with [8] mark)	P8 (EXINA)
Connector (13) (18-pin with [9] mark)	P9 (EXINB)
Connector (14) (10-pin)	P18 (PANEL)

5. Insert the connector (15) (6-pin with [1][R] mark) to the connector (16).
6. Loosen the middle screw (19) and then install the ground cable (17) and the three ground cables (18) from the operation panel.
7. Secure the cables with the cable clamp as shown in the illustration.

   Note: When securing the cables, do not let any of the cables touch the components on the circuit board or the heat sink. Furthermore, adjust the lengths of the cables from outside the control box so that there is no looseness in the cables inside the control box.

3-12-2. Connecting the motor cables



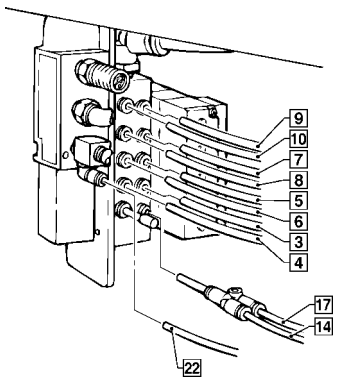
1. Remove the screws (1), and then open the terminal block cover (2) of the motor.
2. Loosen the screw (3) and connect the ground cable (4) for the motor.
3. Loosen the screw (5) and connect the ground cable (6) from the control box.

4. Connect the cables so that the cable marks (U, V, W) match the symbols on the screw terminals.
5. Close the cover (2).
   Note: Be careful not to clamp the cables when closing the cover.

3-12-3. Connecting the air tubes

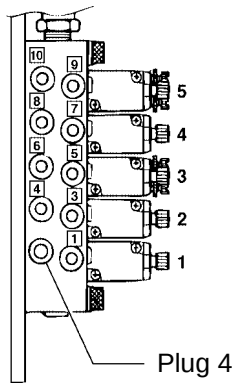
Connect the air tubes to the joints of the solenoid valve assembly, using the illustration below as a reference. Numbers are marked on each of the air hoses which come out of the sewing machine.

< -00, -01 >



0826Q

0827Q

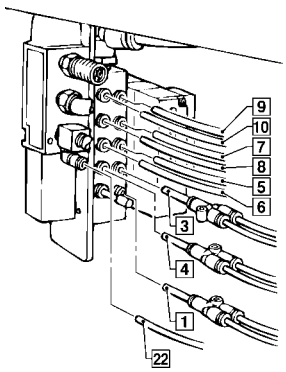


Label No.	Solenoid valve
5	Upper thread trimming
4	Upper thread tightening
3	Lower thread trimming *1
2	Cloth spreading (Auxiliary clamp arm *2)
1	Work clamp

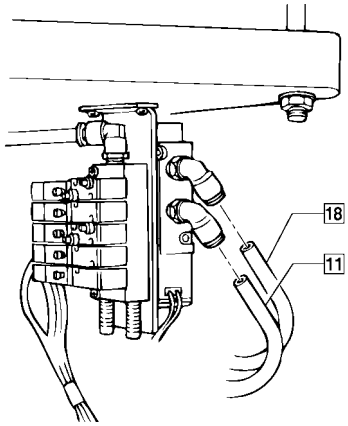
*1 If the lower thread trimmer is not installed, solenoid valve [3] is not used.

*2 The auxiliary clamp arm can only be used for machines with -02 specification.

< -02 >

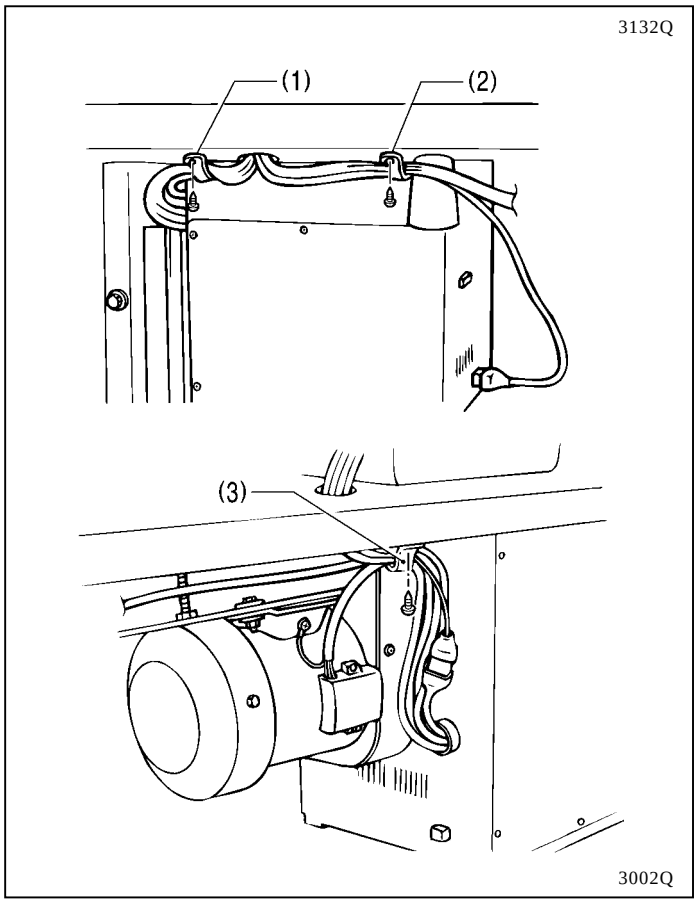


0828Q



0829Q

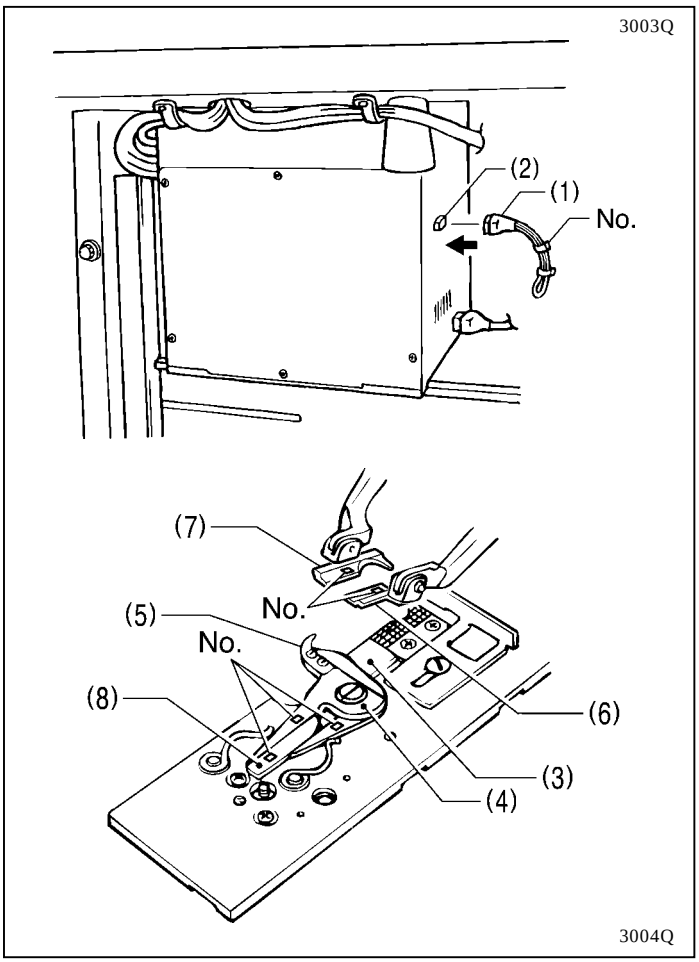
3-12-4. Securing the cables



Note: Leave enough looseness in the cables so that they will not be pulled when the machine head is tilted back.

1. Pass the cable through the cable holder (1), and then secure the cable holder (1) to the underside of the work table with the screw.
2. Pass the air tube and the hand switch cable through the cable holder (2), and then secure the cable holder (2) to the underside of the work table with the screw.

3. Place the machine head cable together with the valve cable assembly and motor cable, pass them all through the cable holder (3), and then secure the cable holder (3) to the underside of the work table with the screw.



Insert the specification harness (1) into the control box connector (2).

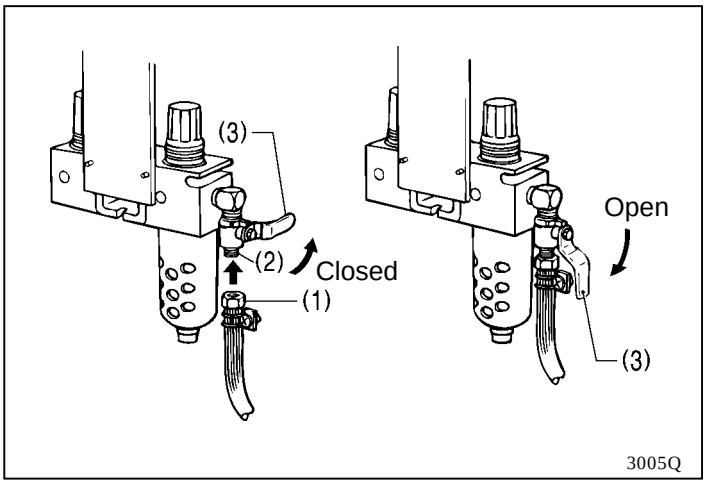
Note: Check that the label number on the specification harness (1) matches the movable knife (R) (3), movable knife (L) (4), thread handler (5), work clamp (R) (6), work clamp (L) (7) and movable knife driving cam (8) numbers before inserting the specification harness (1). (If a connector with an incorrect label number is connected, it may cause problems such as damage to the sewing machine or thread trimming errors.)

Specification		Label No. of harness	Right/left work clamp No. Right/left movable knife No. Thread handler No.
-00, -01		0	
-02	L1	1	1
	L2	2	2
	L3	3	3
	L4	4	4
	L5	5	5
	L6	6	6
	L7	7	7

* There is 10 mm of difference in the knife installation positions between L1 - L4 and L5 - L7.

3-13. Installing the air tubes

Connect the air tube from the compressor to the air unit underneath the work table.

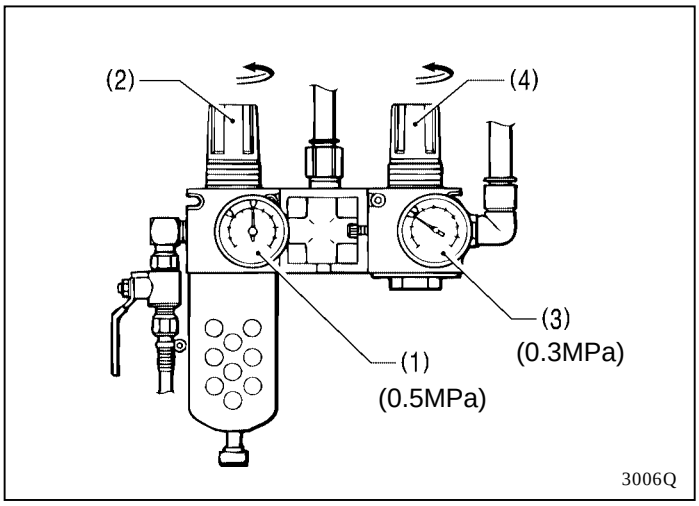


1. Turn the nut (1) at the end of the air tube, and then connect the tube to the valve (2).
2. Open the air cock (3) on the compressor.
   Check that there is no air leaking from the valve connection.
3. Open the cock (3) by turning it in the direction of the arrow.
   The meter needle will move clockwise.
4. Adjust the air pressure.

3-13-1. Adjusting the air pressure

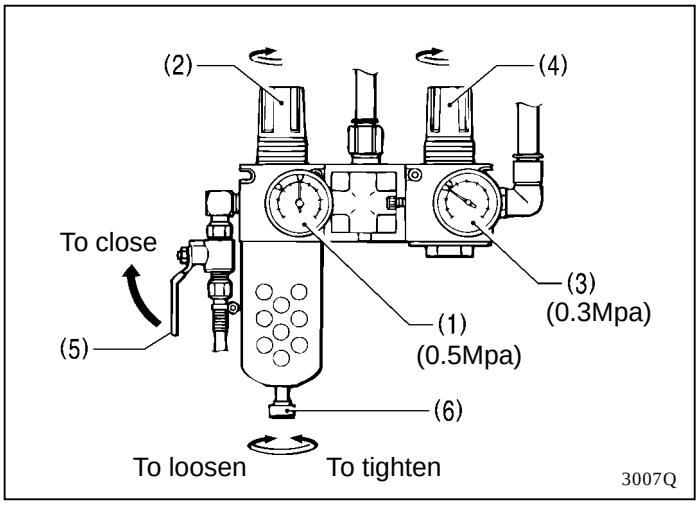
Set the air pressure for the knife pressure adjustment regulator (3) to the lowest pressure at which the knife can still cut the material. Set the standard air pressure for the main regulator (1) to 0.5 MPa.

To increase the air pressure



1. Gently lift the knob (2) of the main regulator (1) and turn it in the direction of the arrow in the illustration.
   The pressure will increase when the knob (2) is turned clockwise.
2. Gently lift the knob (4) of the knife pressure adjustment regulator (3) and turn it in the direction of the arrow in the illustration.
   The pressure will increase when the knob (4) is turned clockwise.
   * The pressure for the knife pressure adjustment regulator (3) is adjusted to 0.3 MPa. Be careful not to increase this pressure needlessly, otherwise poor cutting performance or damage to the knife may result.

To decrease the air pressure



1. Close the cock (5). (The needle will remain at the high pressure position.)
2. Turn the knob screw (6) in the direction of the arrow in the illustration to loosen it. Make sure that you turn it in the correct direction.
   The air will escape from the reservoir and the needle will drop.
3. Tighten the knob screw (6).
4. To reduce the air pressure, gently lift knob (2) or knob (4) and turn it counterclockwise.
5. Open the cock (5). Air will enter the reservoir and the needle will move

3-14. Connecting the power cord

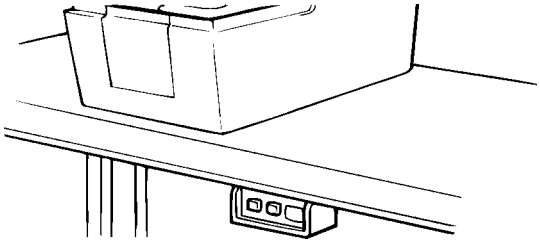
⚠ CAUTION

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

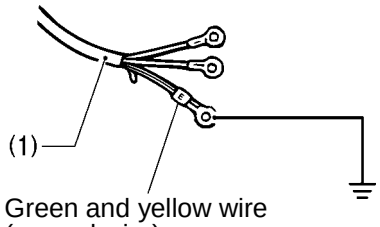
Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

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

0838Q

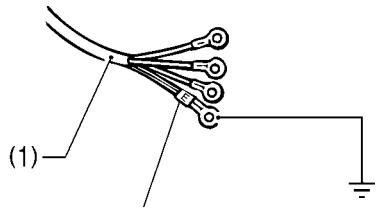


Single phase



3133Q

Three phase



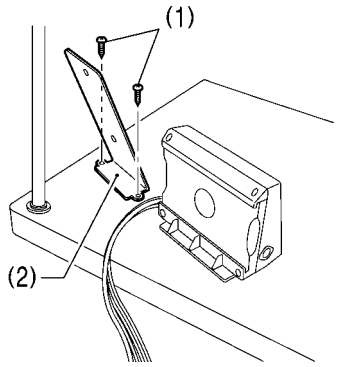
3134Q

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

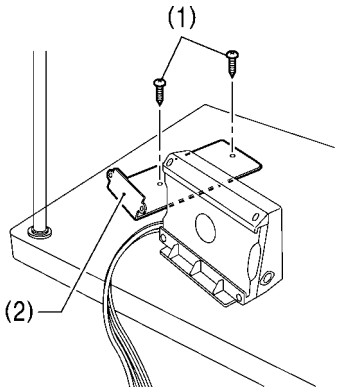
Note: Do not use extension cords, otherwise machine operation problems may result.

3-15. Installing the programmer (sold separately)

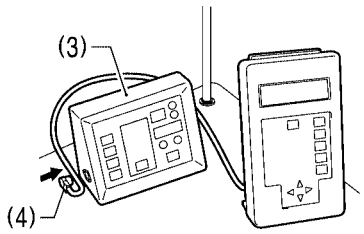
[Vertical] [Flat]



3010Q



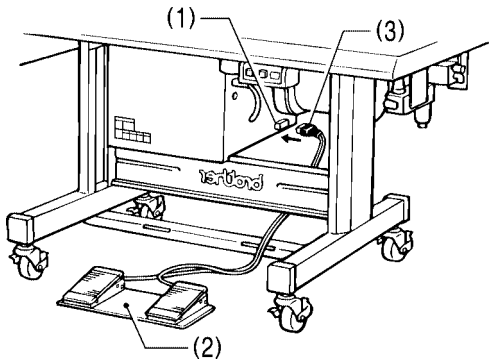
3011Q



3012Q

1. Install the programmer support (2) to the work table with the two screws (1).
2. Insert the programmer connector (4) securely into the left side of the operation panel (3).

3-16. Installing the foot switch (option)



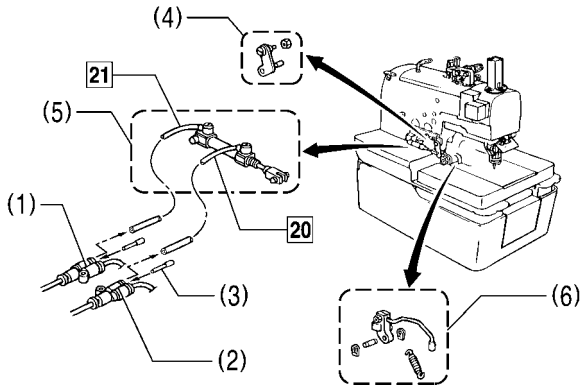
3135Q

Insert the connector (3) of the foot switch (2) into the control box connector (1).

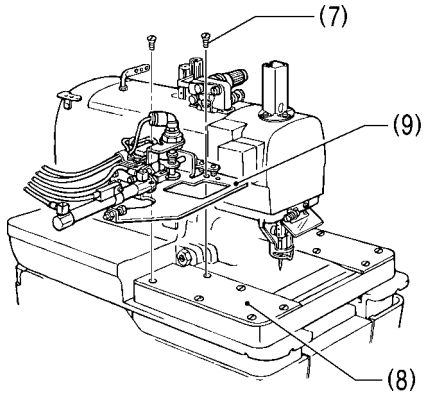
3-17. Installing the indexer (option)

3-17-1. Installing the indexer main unit

3015Q

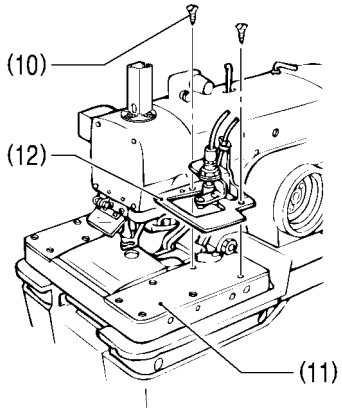


1. After disconnecting air tubes [20] and [21], insert the two plugs (3) into joints (1) and (2). In addition, remove parts (4), (5) and (6) indicated in the illustration.



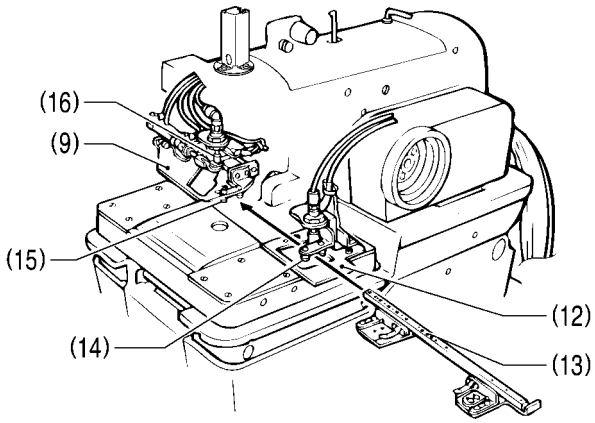
3016Q

2. Remove the screws (7) from feed bracket cover (L) (8), and then install feed base (L) (9).



3017Q

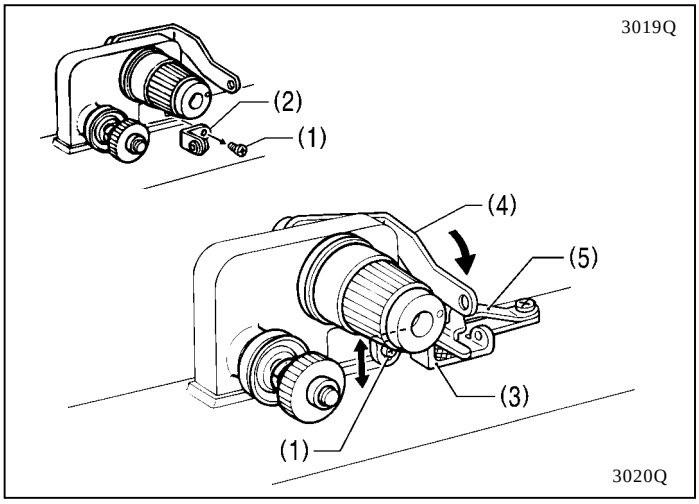
3. Remove the screws (10) from feed bracket cover (R) (11), and then install feed base (R) (12).



3018Q

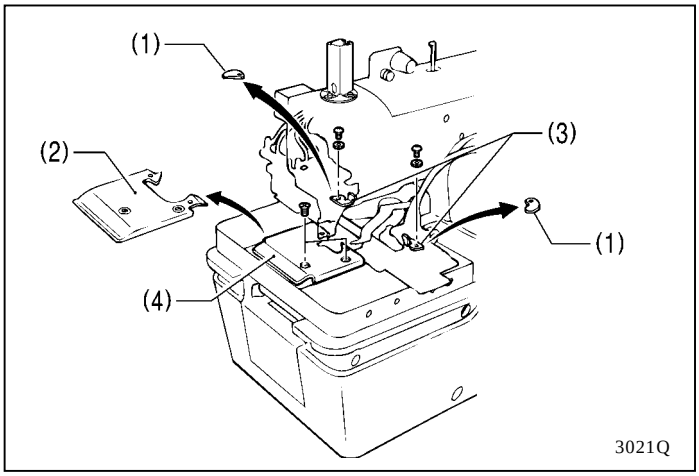
4. Pass the cloth feed bar (13) between the rollers of feed bar guide (R) (14) and feed bar guide (L) (15), and place it on top of feed base (L) (9) and feed base (R) (12).
   * Push down the chuck pin (16) and check that it goes smoothly into all of the holes in the cloth feed bar (13).
     If it does not go in smoothly, re-adjust the installation positions of feed base (L) (9) and feed base (R) (12).

3-17-2. Installing the upper thread presser



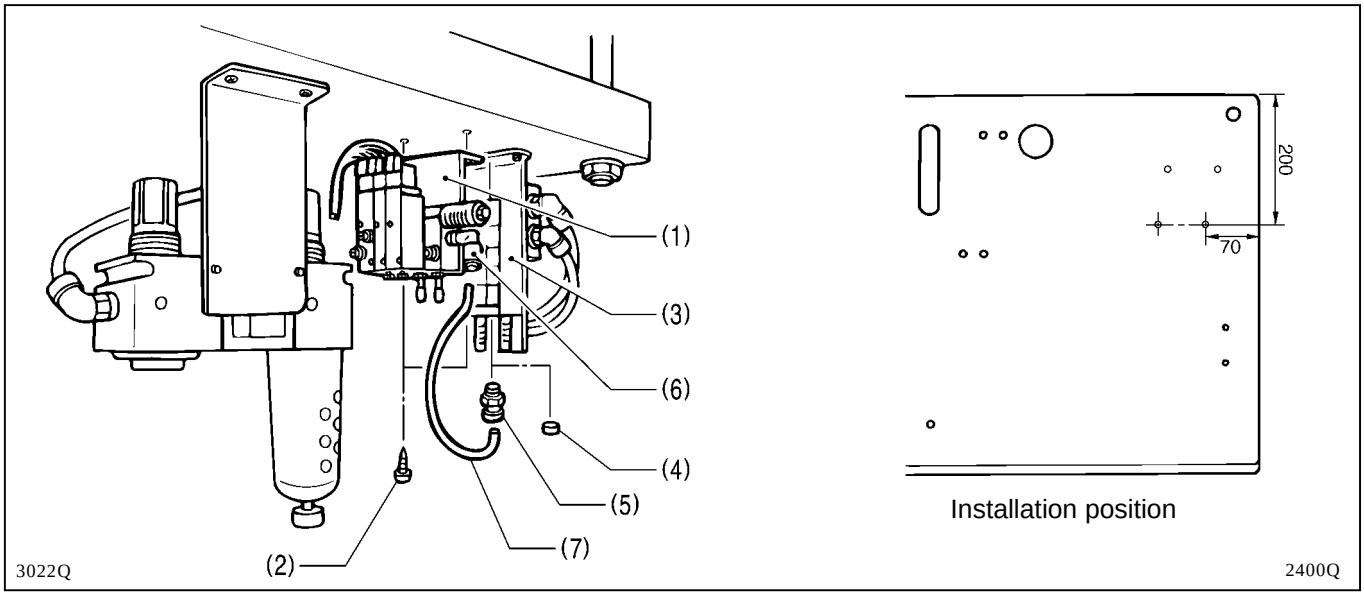
1. Loosen the screw (1), and then remove the thread guide (2).
2. Install the upper thread presser support (3) with the screw (1).
   * Adjust the height of the upper thread presser support (3) so that it presses against the upper thread presser plate (5) when the upper thread take-up lever (4) is lowered.

3-17-3. Replacing the plate presser and presser plate



Remove the plate presser (1) and presser plate (U) (2), and replace them with plate presser (I) (3) and presser plate (I) (4).

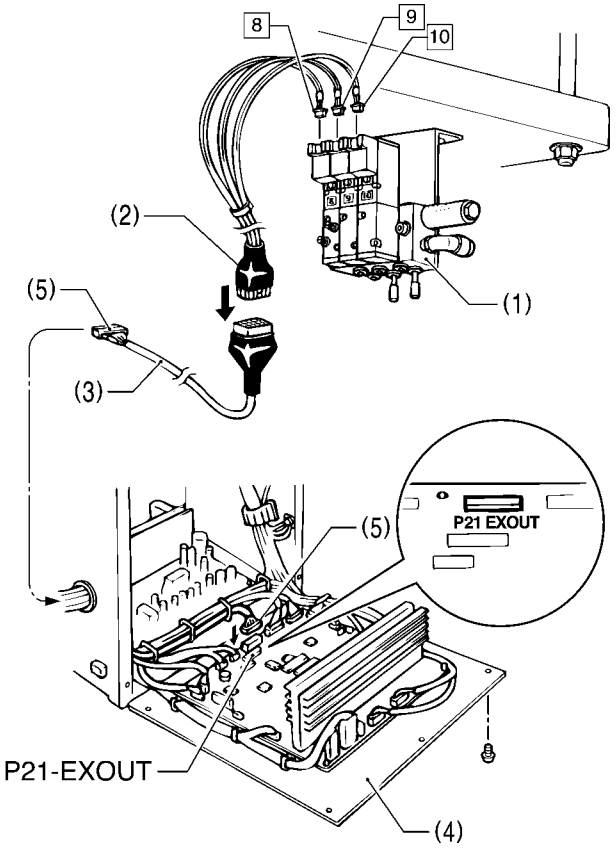
3-17-4. Installing the valve unit

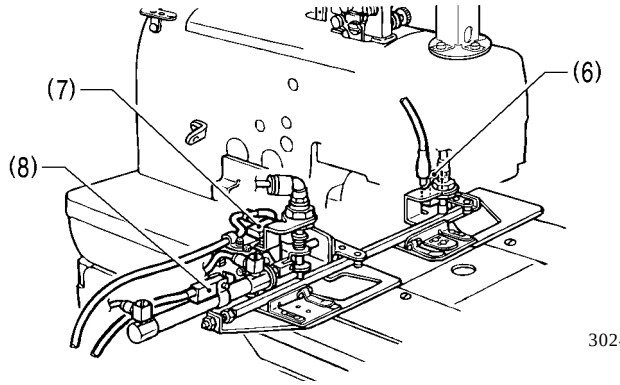


1. Install the valve unit (1) with the screw (2).
2. Remove the stopper plug (with the P mark) (4) from the valve unit (3), and then install the joint (5).
3. Connect the 6mm-diameter air tube (7) to joints (5) and (6).

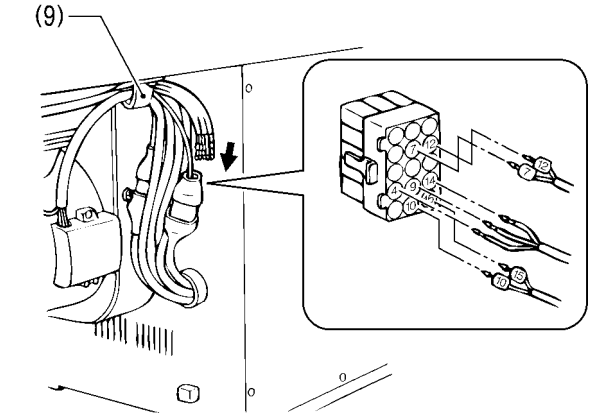
3-17-5. Connecting the connectors

3023Q





3024Q



3025Q

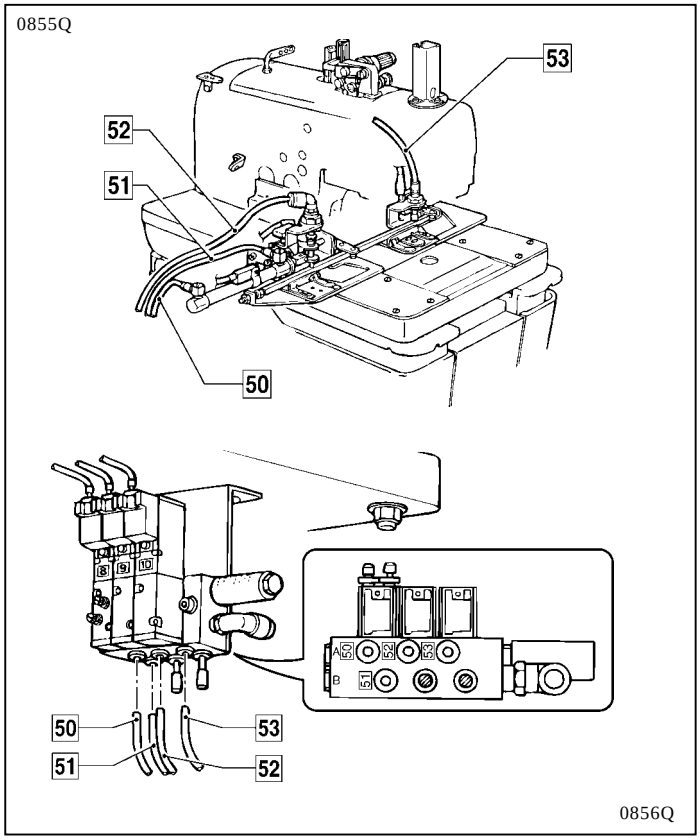
1. Insert the 3-pin connectors [8], [9] and [10] of the valve harness into the solenoid valves of the valve unit (1) so that the label numbers match.
2. Insert the 15-pin connector (2) into the connector of the indexer cord (3).
3. Open the rear cover (4) of the control box.
4. Insert the connector (5) of the indexer cord (3) in the position shown in the illustration.
5. Secure the cord with the cord clamp.
6. Insert the two pins of limit switch (R) (6) and the two pins of limit switch (L) (7) into the 15-pin connector terminals with matching numbers.
7. Connect the three pins of the cylinder sensor (8) into the 15-pin connector so that the cable colors match the connector numbers as given in the table below.
   * If the cable colors are red, white and black, refer to the colors in brackets.

Note: First disconnect the connector before inserting the pins, and then after inserting the pins, re-connect the connector.

	Switch pin No.	Cable color	15-pin Connector
Limit switch (R) (6)	7	White	7
	12	Black	12
Limit switch (L) (7)	10	White	10
	15	Black	15
Cylinder sensor (8)		Brown (Red)	4
		Black (White)	9
		Blue (Black)	14

8. Secure the cable with the cable clamp (9).

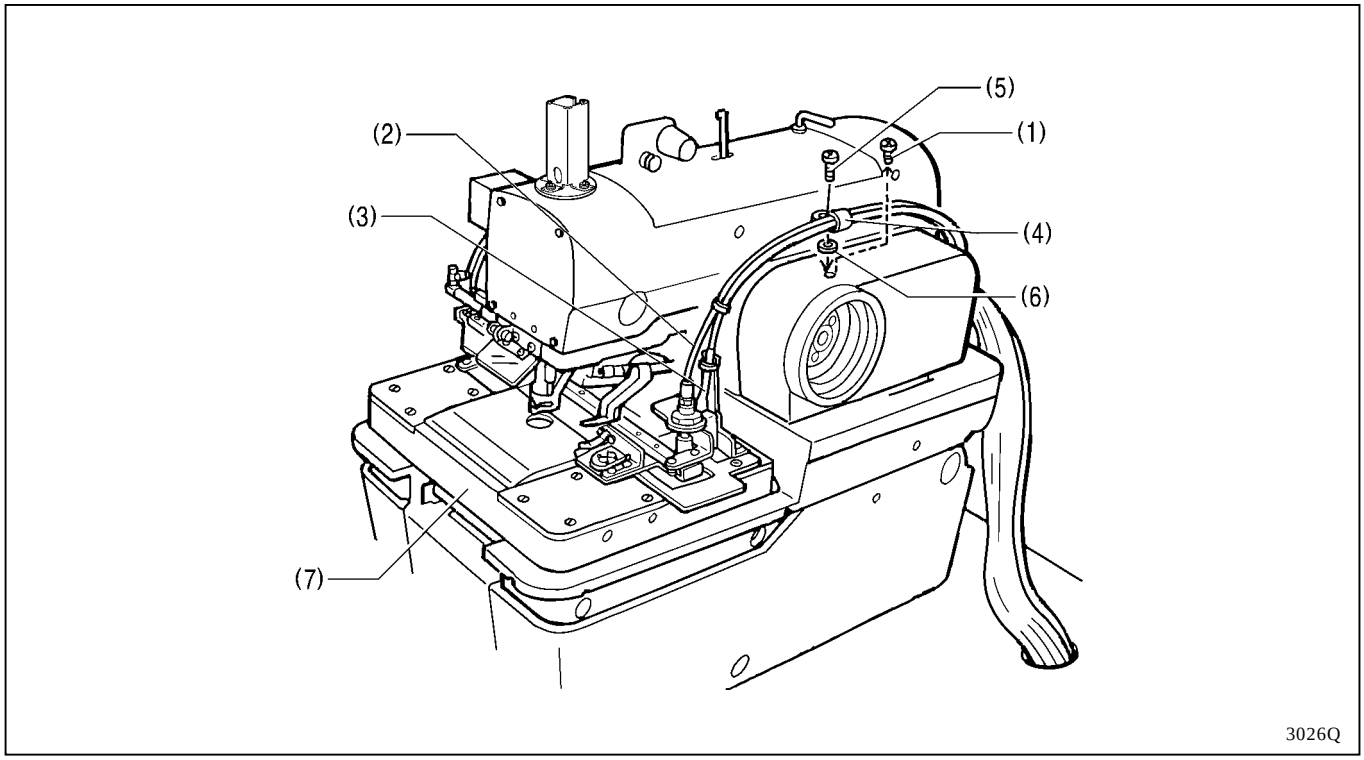
3-17-6. Connecting the air tubes



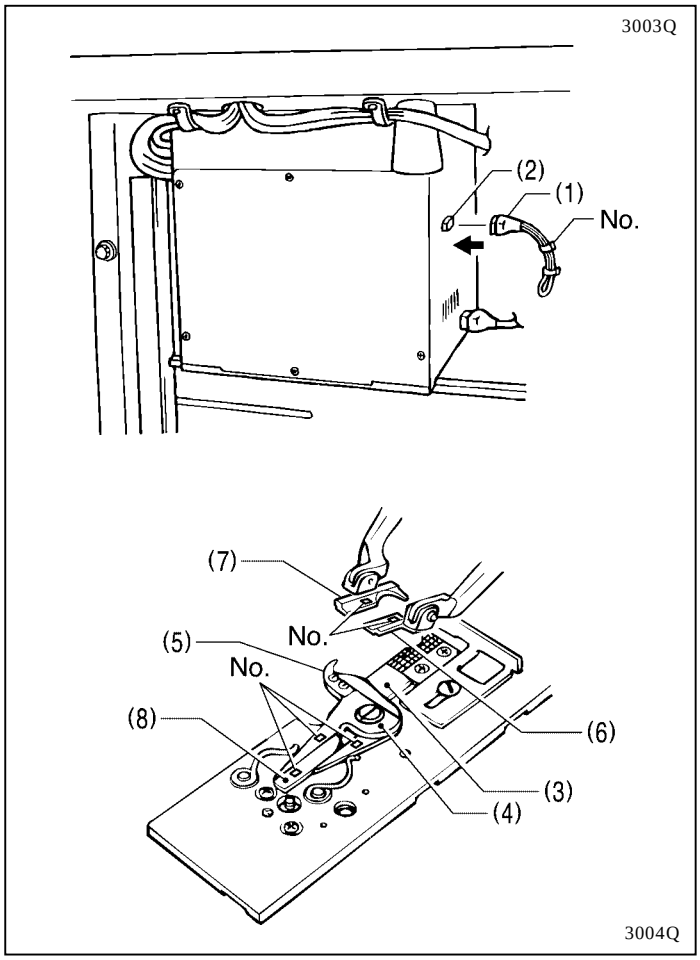
Connect air tubes [50], [51], [52] and [53] to the places with the corresponding numbers on the valve unit.

Label No.	Solenoid valve type
[50], [51]	For cloth feed drive cylinder
[52]	For chucking cylinder
[53]	For holding cylinder

3-17-7. Securing the air tubes and cables



1. Remove the screw (length 8 mm) (1).
2. Secure the air tube (2) and cable (3) with the cord holder (4), screw (length 16 mm) (5) and washer (6).
   * Leave enough slack in the air tube (2) and cable (3) at this time to allow for the movement of the feed bracket (7).



Insert the indexer specification harness (1) into the control box connector (2).

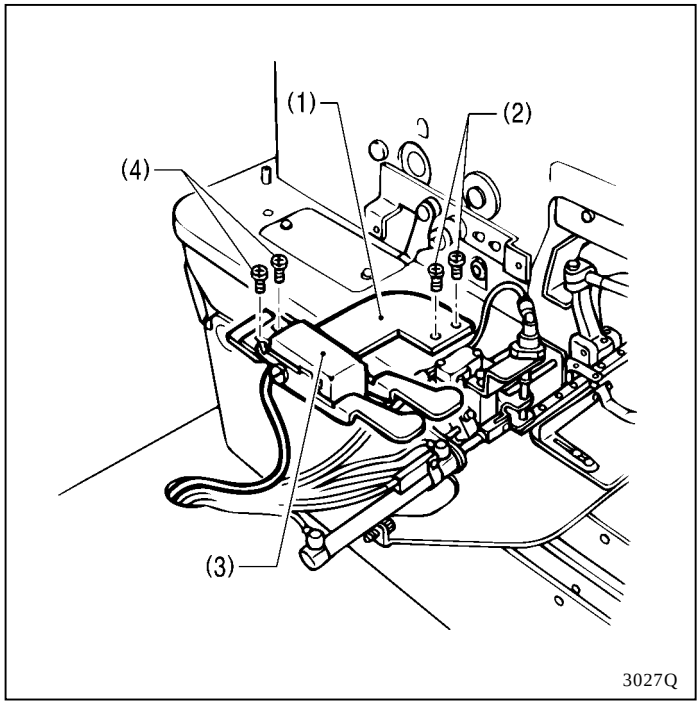
* If another specification harness has been inserted into this connector, first disconnect this harness and then insert the indexer specification harness (1).

Note: Check that the label number on the indexer specification harness (1) matches the movable knife (R) (3), movable knife (L) (4), thread handler (5), work clamp (R) (6), work clamp (L) (7) and movable knife driving cam (8) numbers before inserting the specification harness (1). (If a connector with an incorrect label number is connected, it may cause problems such as damage to the sewing machine or thread trimming errors.)

Specification		Label No. of harness	Right/left work clamp No. Right/left movable knife No. Thread handler No.
-52	L1	1	1
	L2	2	2
	L3	3	3
	L4	4	4
	L5	5	5
	L6	6	6
	L7	7	7

* There is 10 mm of difference in the knife installation positions between L1 - L4 and L5 - L7.
* If using both an upper thread clamping device and a fly indexer, L5 to L7 cannot be used.

3-17-8. Installing the hand switch



1. Install the hand switch support plate (1) with the two screws (2) in the position shown in the illustration.
2. Install the hand switch (3) to the hand switch support plate (1) with the two screws (4).

4. LUBRICATION

⚠ CAUTION

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

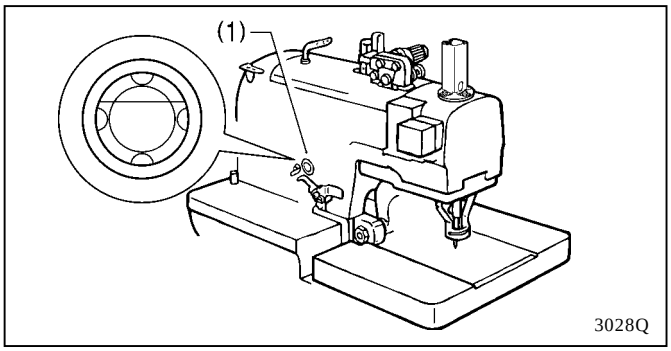
Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhoea.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

Use only specified Brother oil (Nisseki Mitsubishi Sewing Lube 10 N; VG 10) for the machine oil.

4-1. Adding oil

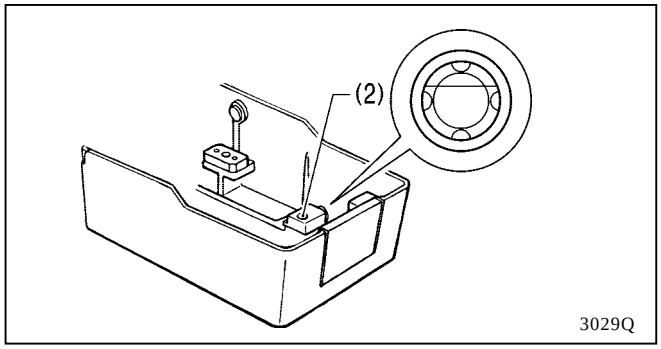
Check the oil level by looking at the sight glass. If the oil level is low, replenish the oil supply.

Filling the arm oil tank



Pour approximately 10 cc of machine oil into the arm oil tank (1) (until it is about four-fifths full).

Filling the bed base oil tank

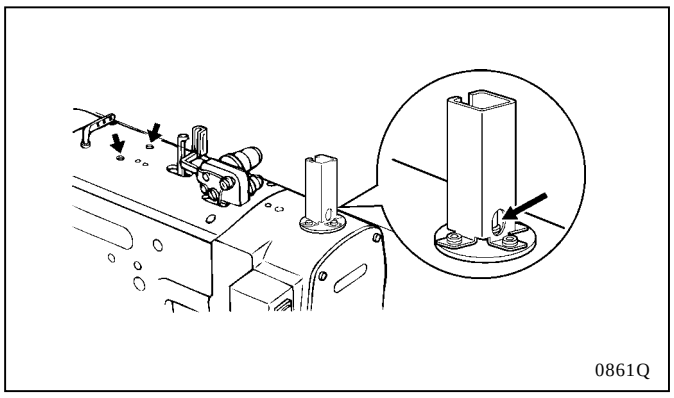


1. Raise the machine head.
2. Pour approximately 20 cc of machine oil into the bed base oil tank (2) (until it is about four-fifths full).
3. Lower the machine head.

4-2. Lubrication

Oil these parts once a day.
Oil the moving parts of the needle bar, looper and spreader mechanisms and also the cam groove, roller, the felt at the base of the wick and the wick before using the sewing machine for the first time, and also after long periods of non-use.
When oiling, some oil will get onto the thread. Carry out a test sewing to ensure that your material does not get stained with oil.

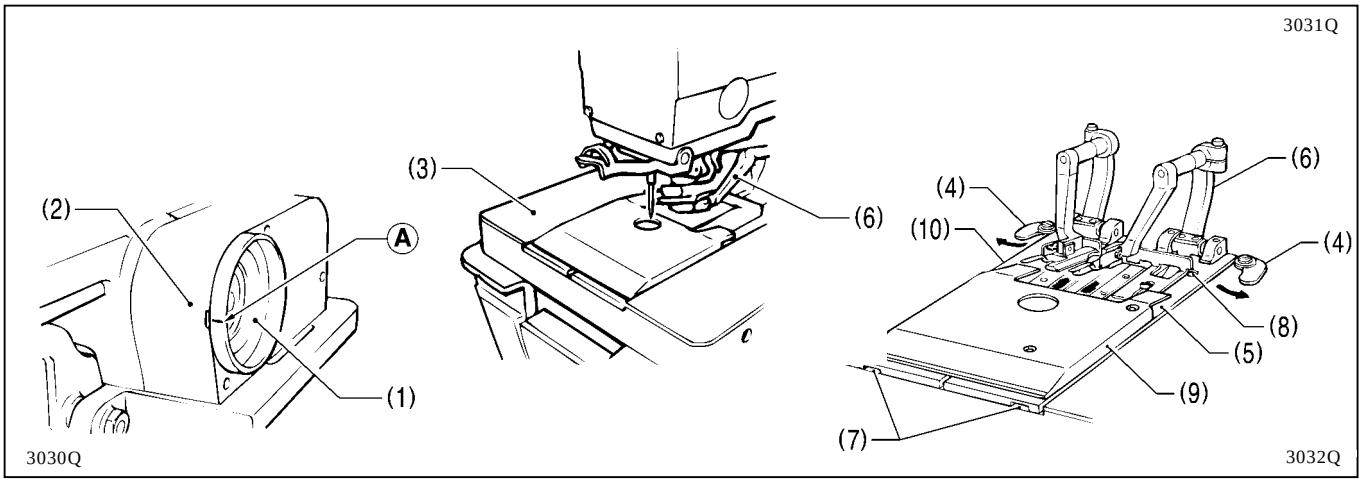
Oiling the needle bar and cam



Add 2-3 drops of oil in the places indicated by the arrows.

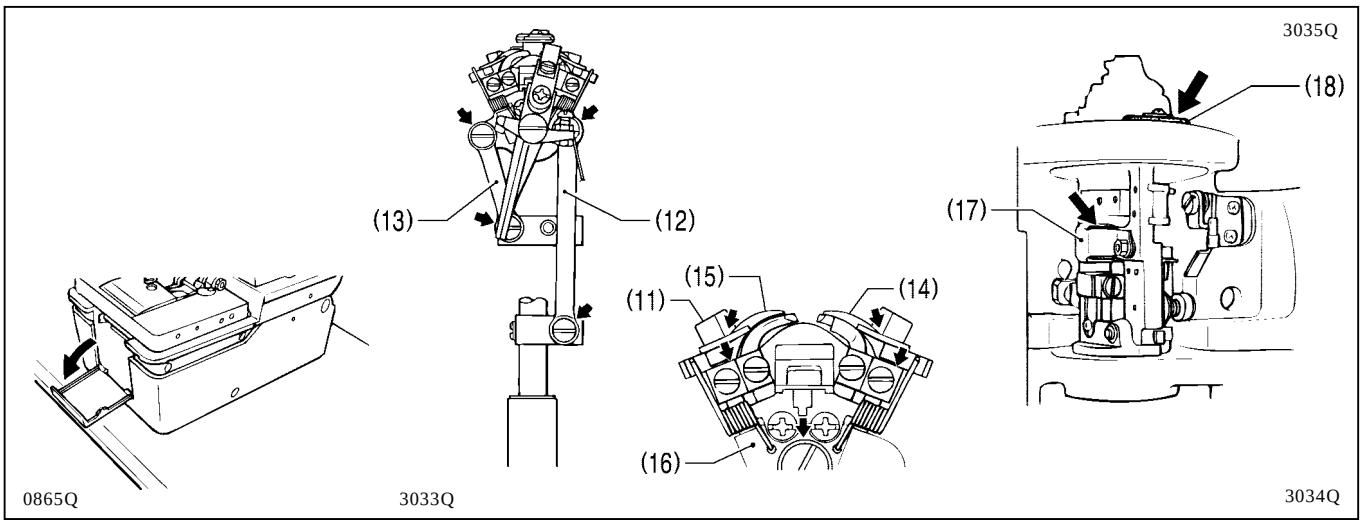
Oiling the looper, spreader and looper base

<Removing the work clamp plates>



1. Turn the upper shaft pulley (1) toward you until the mark on the pulley (A) is aligned with the notch in the pulley cover (2).
2. Move the feed bracket (3) toward you.
3. Turn the left and right plate pressers (4) in the directions indicated by the arrows.
4. Lift up the clamp lever (6) and the notched section (7) of the right work clamp plate (5), remove the right work clamp plate (5) from the pin (8), and then pull the right work clamp plate (5) toward you to remove it.

   Note: If the lower thread trimmer has been installed, move presser plate U (9) to a position where it can be removed without its touching the needle.
   Raise presser plate U (9), pass the needle through the hole, and then remove presser plate U (9) from the pin (8).
5. Remove the left work clamp plate (10) in the same way as the right work clamp plate (5) was removed.

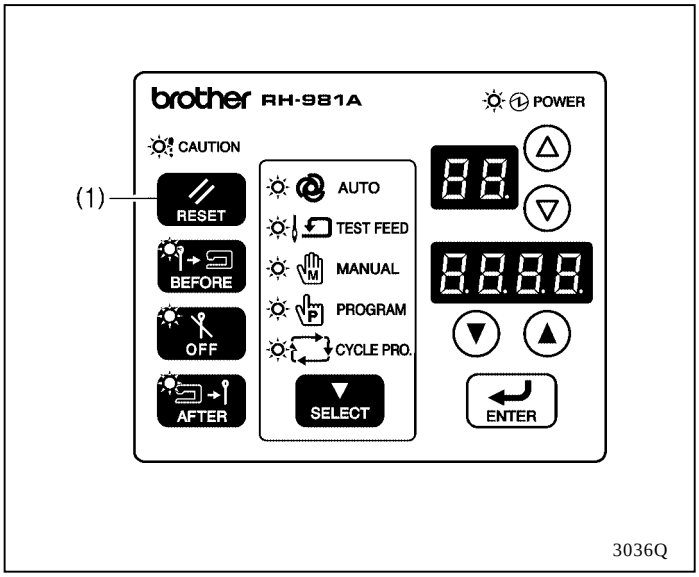


6. Open the front cover.
7. Turn the looper base and add a few drops of oil to the spreader driving cam (11), and to the supports for the looper link (12) and spreader link (13).
8. Add a few drops of oil to the shafts of the right spreader (14), left spreader (15) and LS-holder bracket (16).
9. Fill the felt tank (17) on the looper base with oil also.
10. Add 5 - 6 drops of oil to the felt (18) which is attached to the sliding surfaces of the looper base and the bed.
11. Close the front cover.
12. Install the work clamp plates by carrying out the steps 5., 4. and 3. in that order.

5. CORRECT USE

5-1. Data initialization

When using the sewing machine for the first time, initialize the data by following the procedure below.



1. While pressing the RESET key (1), turn on the power switch.
   * While the data is being initialized, all LEDs will illuminate and the buzzer will sound a series of short beeps.
   * All parameters, memory switches, cycle programs and the production counter will be initialized.
2. When the data writing is complete, the buzzer will stop and the machine will go to the normal starting-up condition.

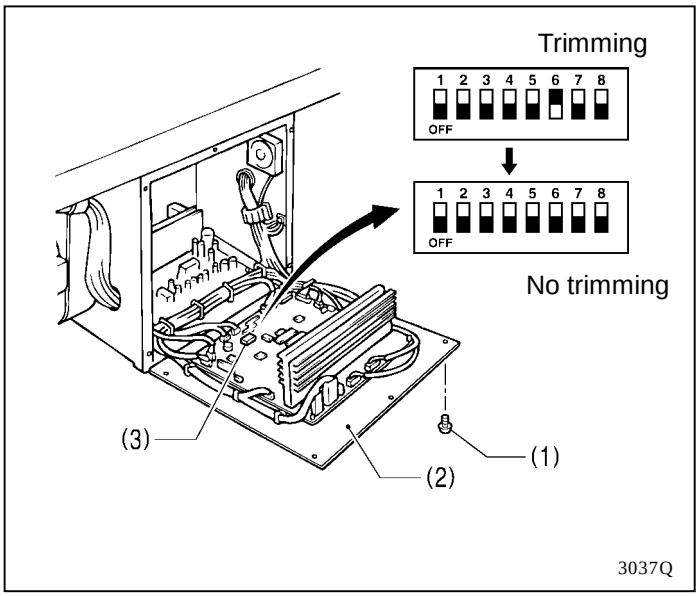
Note: The data is retained for approximately one month after the power supply is turned off. If more than one month passes since the power supply was last turned on, "E-59" may be displayed the next time the power is turned on. If this happens, you will need to re-initialize the data.

5-2. Changing the lower thread and gimp trimming

The sewing machine is set to lower thread and gimp trimming when it is shipped from the factory. (DIP switch C (3) No. 6 is set to ON.)

For setting the lower thread and gimp thread trimming to OFF, carry out the following procedure.

Note: For -00 specification, be sure to set the lower thread and gimp thread trimming to OFF**.**

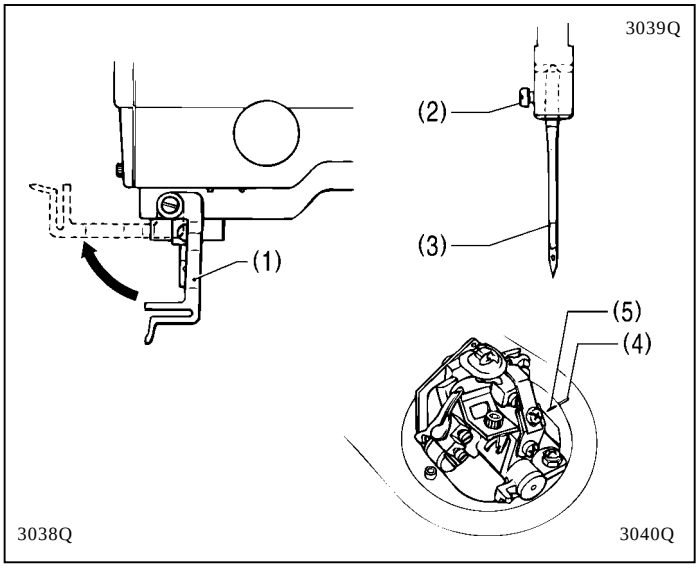


1. Turn off the power.
2. Remove the six screws (1).
3. Open the rear plate (2) of the control box.
4. Set DIP switch C (3) No. 6 on the circuit board to OFF.
5. Close the rear plate (2) and tighten the six screws (1).

5-3. Installing the needle

⚠ CAUTION

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



Use only Schmetz DO x 558 Nm80 - Nm120 needles.

1. Raise the finger guard (1).
2. Loosen the screw (2), and then remove the needle (3).
3. Insert the new needle (3) as far as it will go so that the groove is facing toward you.
4. Securely tighten the screw (2).
5. Remove the work clamp plates. (Refer to page 26.)

Note: After removing the work clamp plates, check that the index mark (4) on the machine head is aligned with the index mark (5) on the looper base before inserting the needle (3) (when the looper base is turned fully to the right).

6. Lower the finger guard (1).

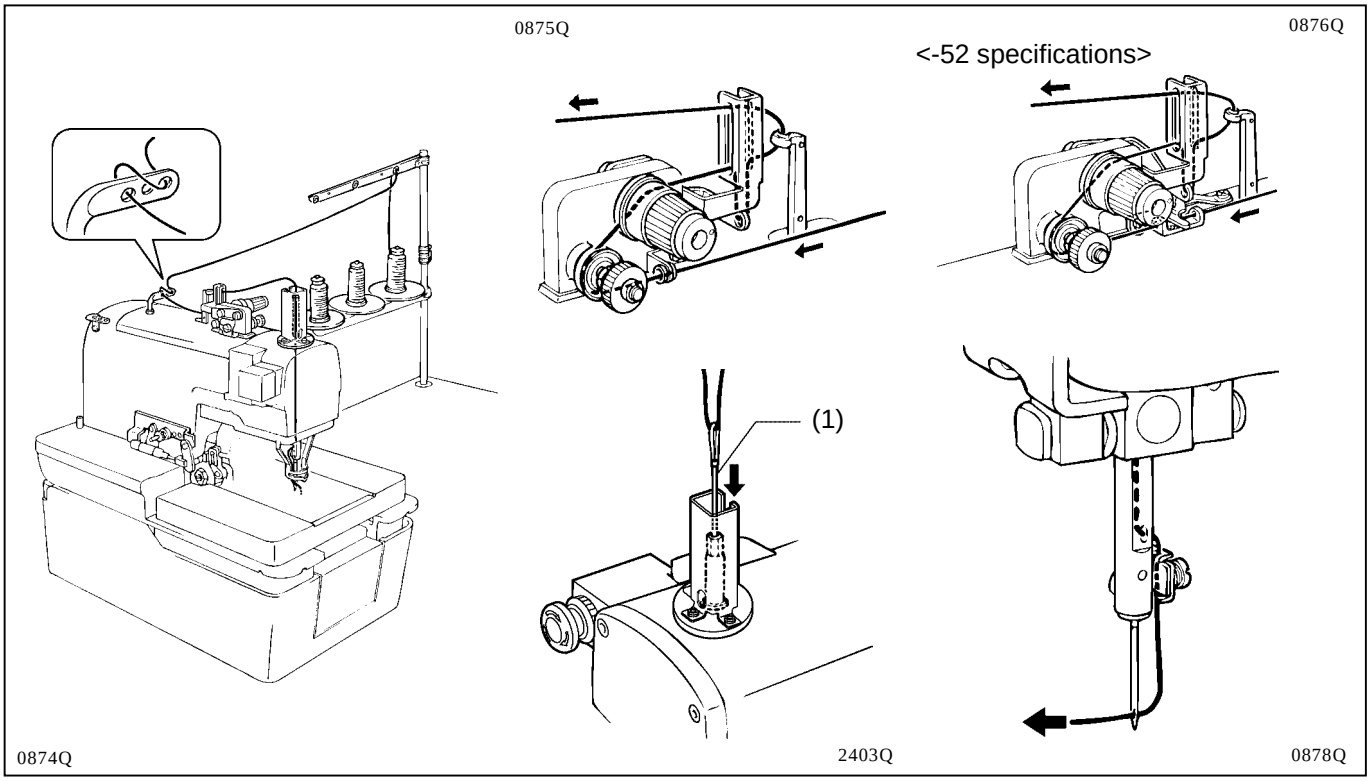
5-4. Threading the upper thread

⚠ CAUTION

Turn off the power switch before threading the thread, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.

Thread the upper thread as shown in the illustration below.

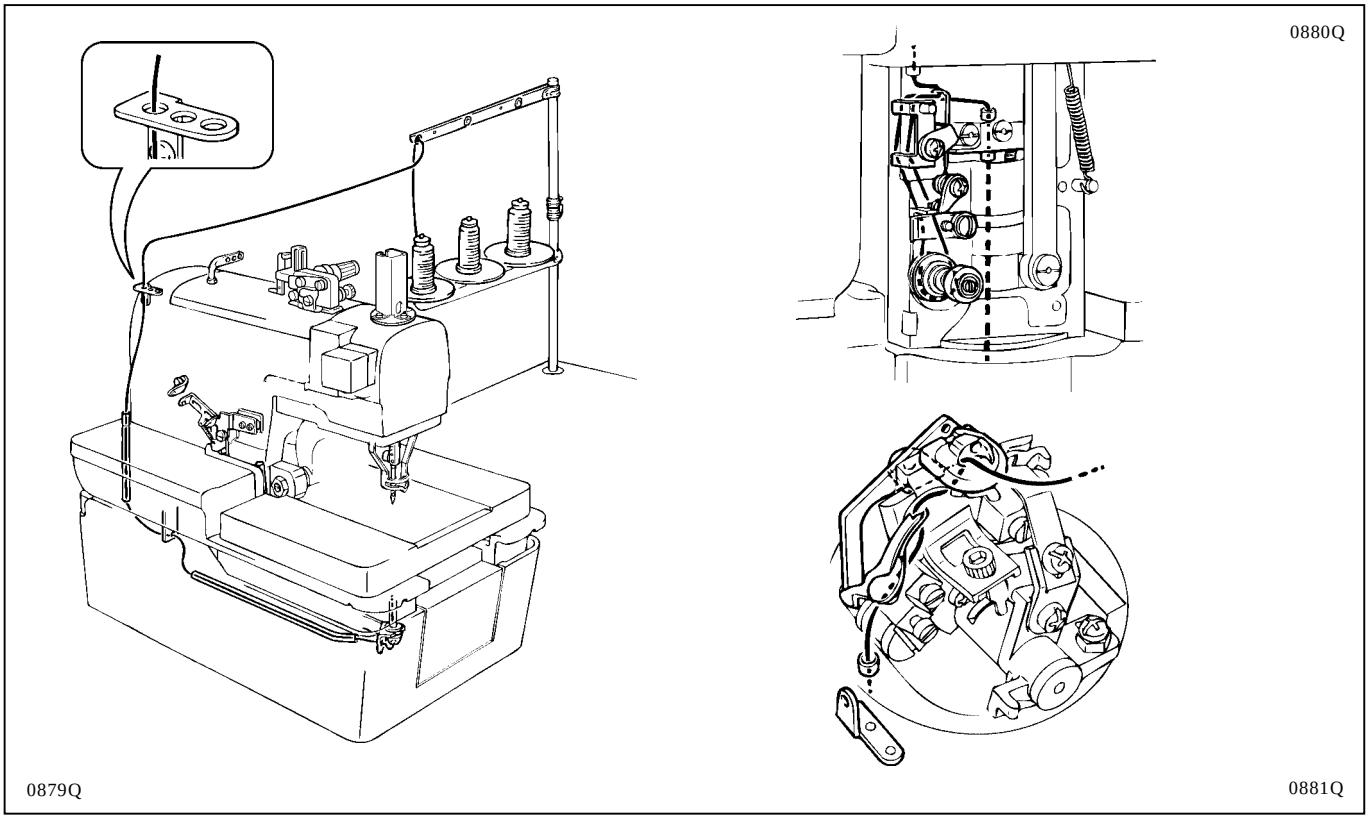
* Use the accessory needle threader (1).



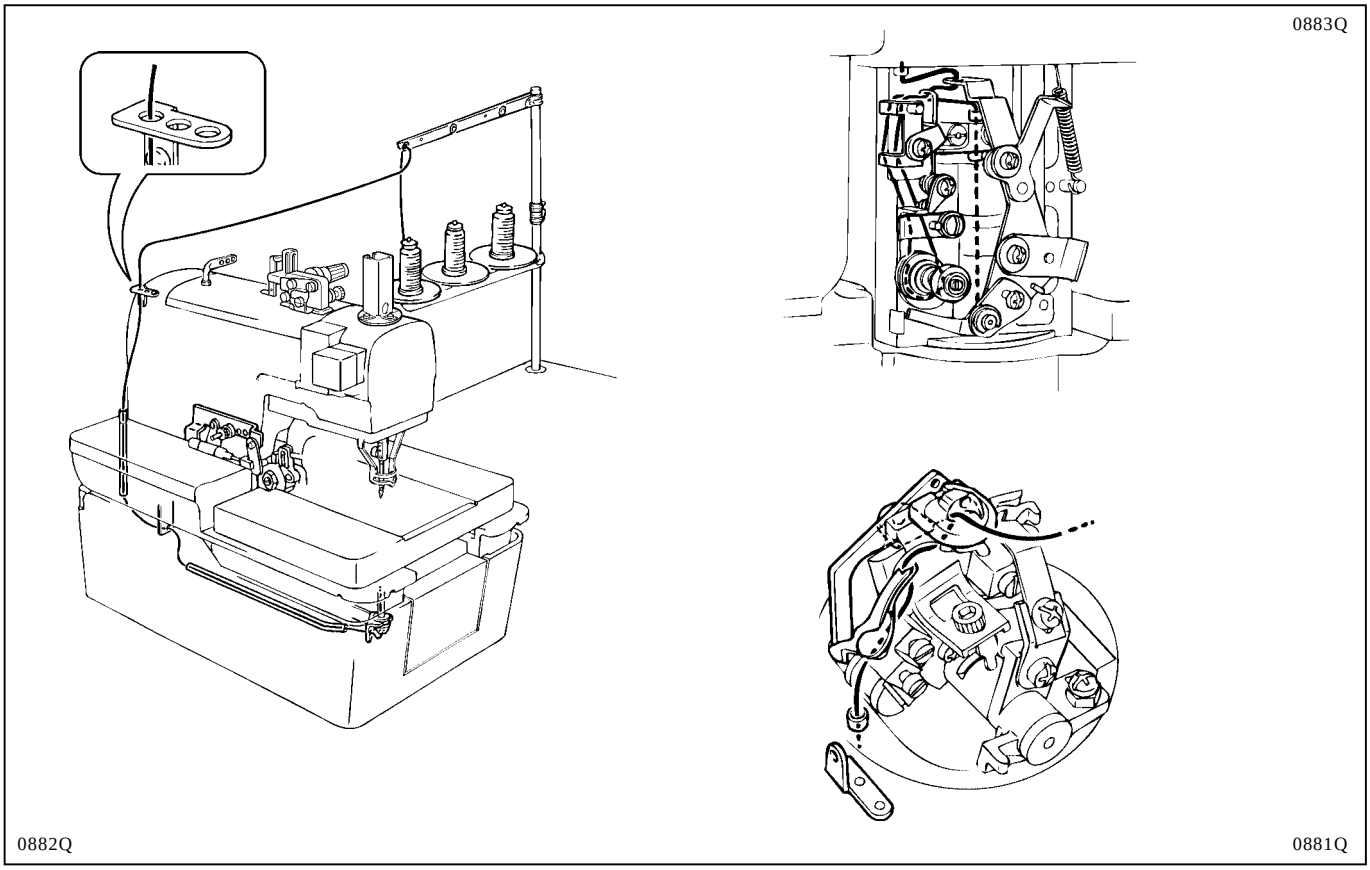
5-5. Threading the lower thread

Remove the work clamp plates (refer to page 26), and then thread the lower thread as shown in the illustration below.

For upper thread trimming specifications (-00)



For upper and lower thread trimming specifications (-01, -02 and -52)

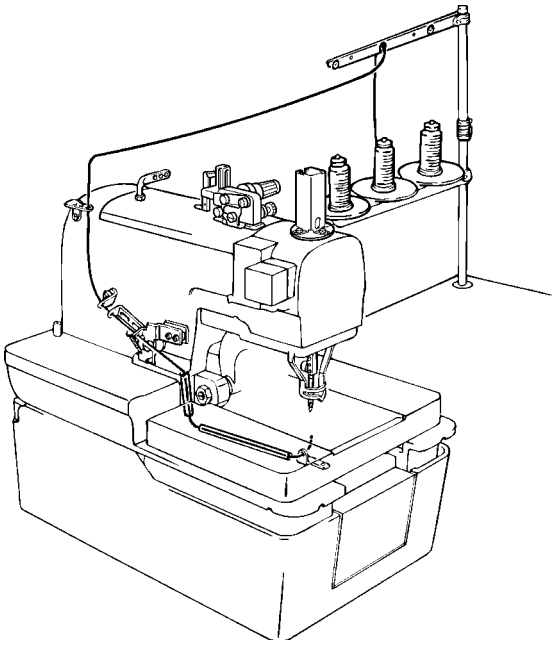


5-6. Threading the gimp

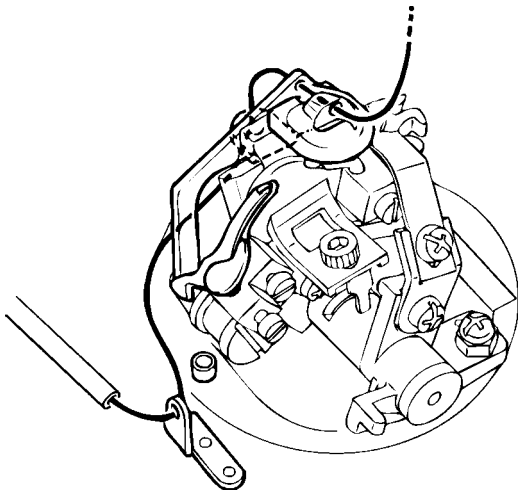
Remove the work clamp plates (refer to page 26), and then thread the gimp as shown in the illustration below. Once threading is complete, replace the work clamp plates.

<-00,-01>

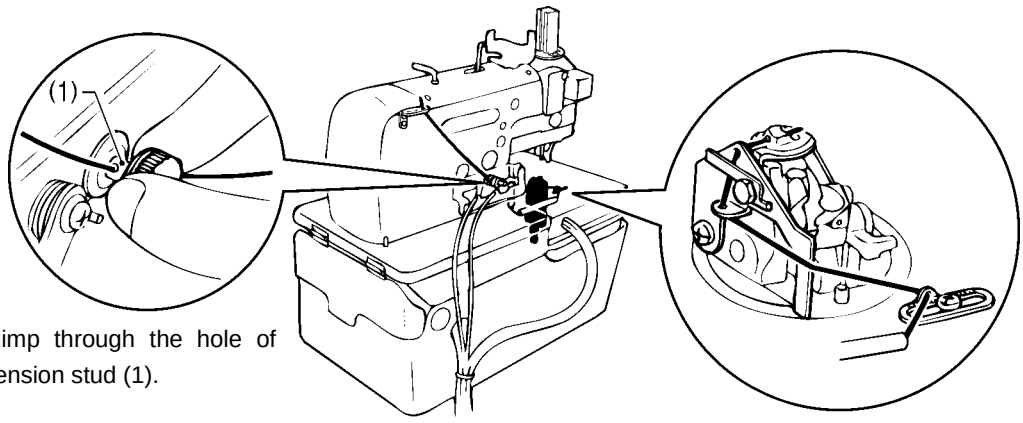
0884Q



0885Q



<-02,-52>



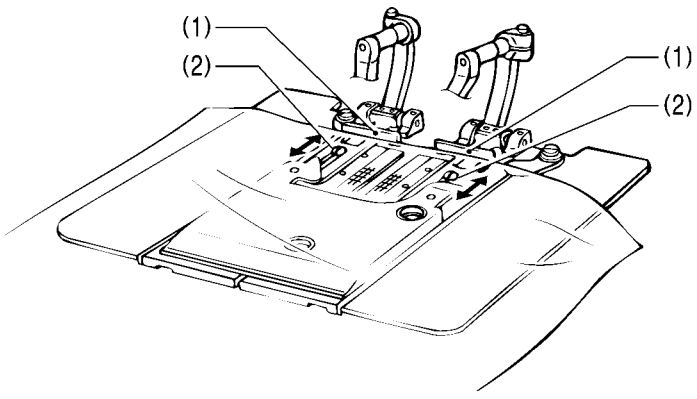
Pass the gimp through the hole of the thread tension stud (1).

Refer to “9-18. Adjusting the gimp length after trimming” (Page 67).

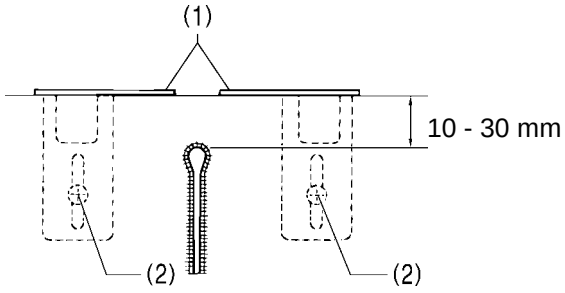
3041Q

5-7. Setting the material

<-00, -01, -02 specifications>



3042Q

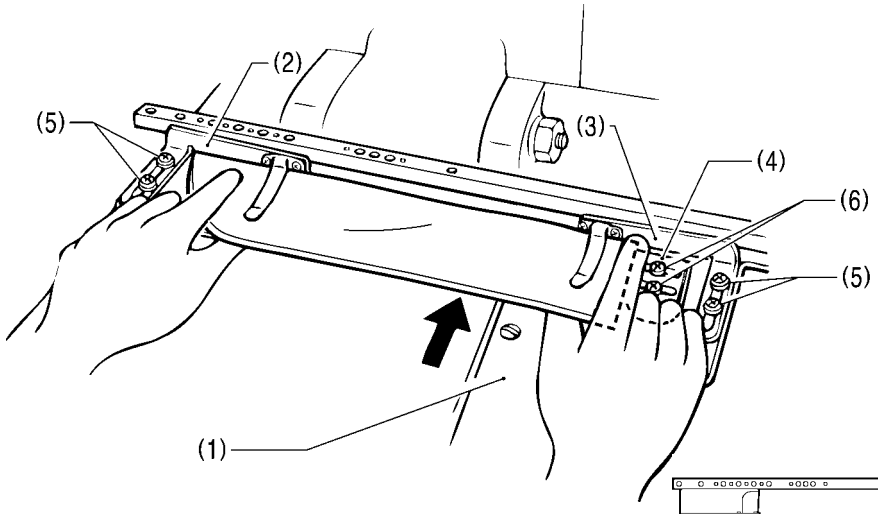


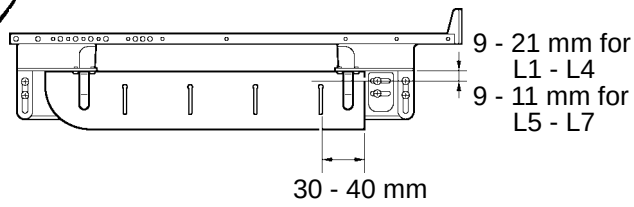
3043Q

1. Insert the material so that it touches the right and left cloth guides (1).
2. The sewing margin can be adjusted to within 10 - 30 mm.
3. Loosen the screws (2) at left and right and move the cloth guides (1) back and forth to adjust the sewing margin.

<-52 specifications>

0892Q

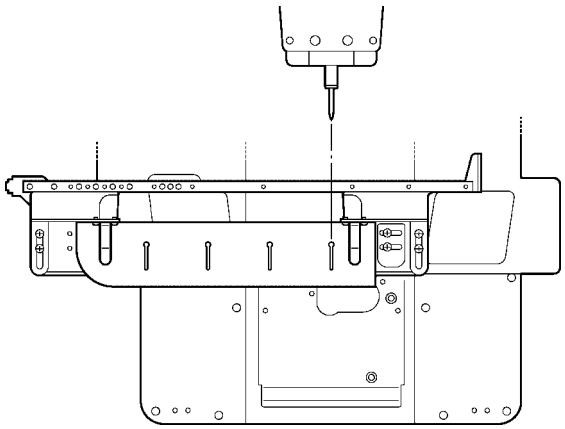




3044Q

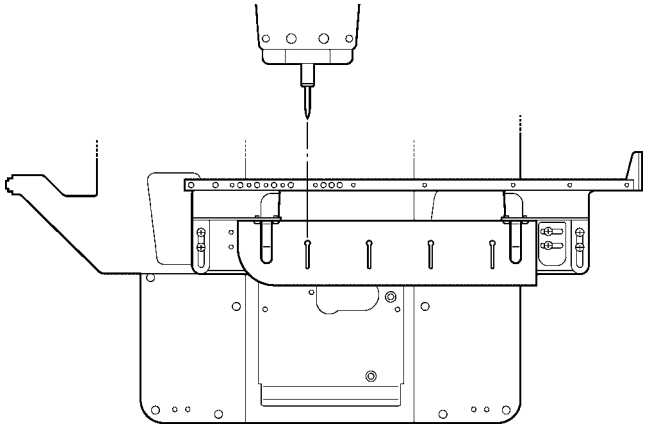
1. Place the material (fly) on top of the feed bracket (1), and then feed the material (fly) in until it reaches horizontal cloth set guide (L) (2) and horizontal cloth set guide (R) (3).
   * Check that the right edge of the material (fly) is straight against the left edge of the vertical cloth set guide (4) at this time.
2. The vertical sewing margin can be adjusted between 9 - 21 mm for L1 - L4 and 9 - 11 mm for L5 - L7.
   Loosen the four screws (5), and then move horizontal cloth set guide (L) (2) and horizontal cloth set guide (R) (3) forward or back to adjust.
3. The horizontal sewing margin can be adjusted between 30 - 40 mm.
   Loosen the two screws (6), and move the vertical cloth set guide (4) to the left or right to adjust.

Cloth setting position



Left setting position

0893Q



Right setting position

0894Q

The sewing start position can be set to either the left setting position or the horizontal setting position. (Refer to page 73.)

When set to the left setting position

This is the normal setting position for the cloth.

* After the last buttonhole is sewn, the cloth feed bar returns to the left setting position.

Horizontal setting position

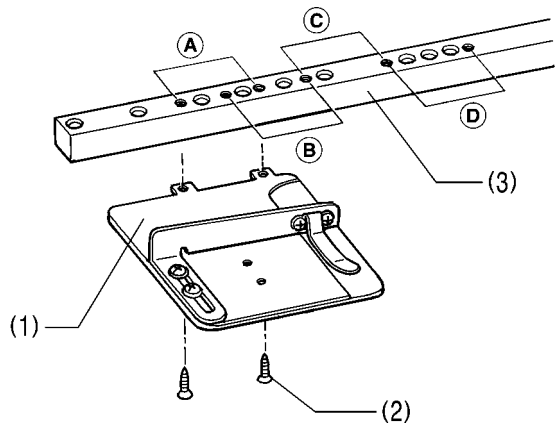
The cloth is set to both the left setting position and right setting position.

* The next piece of cloth is set at the position that the last buttonhole was sewn.

5-8. Setting the installation position for cloth feed plate (L) (-52 specifications)

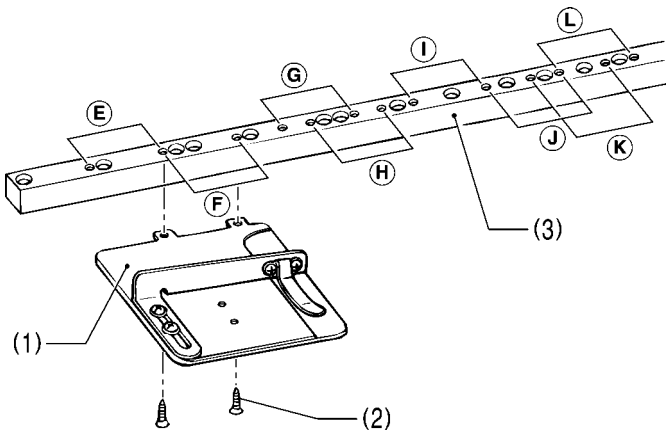
The installation position for cloth feed plate (L) can be set to one of four positions depending on the spacing between buttonholes and the number of buttonholes to be sewn. When the spacing between buttonholes and the number of buttonholes sewn have been changed, the installation position for cloth feed plate (L) should also be changed. Refer to the illustration and table below at this time.

Standard



3045Q

Large size



3046Q

Install the cloth feed plate (L) (1) to the cloth feed bar (3) with the screws (2).

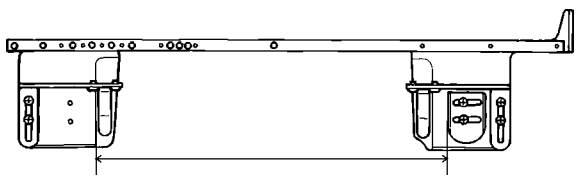
Installation position

<Standard specification>

Hole spacing / No. of holes	38.1 mm	44.45 mm	50.8 mm
3	(D)	(D)	(C)
4	(C)	(B)	(A)

<Large size specification>

Hole spacing / No. of holes	38.1 mm	44.45 mm	50.8 mm	57.15 mm
3	(L)	(K)	(L)	(L)
4	(L)	(K)	(J)	(I)
5	(J)	(I)	(H)	(F)
6		(G)	(F)	(E)



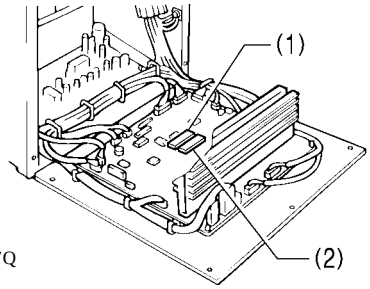
0897Q

(A) 207- 217 mm
(B) 192.5 - 202.5 mm
(C) 167.5 - 177.5 mm
(D) 142.5 - 152.5 mm
(E) 346.5 - 356.5 mm
(F) 321.5 - 331.5 mm
(G) 279.5 - 289.5 mm
(H) 270.5 - 280.5 mm
(I) 234.5 - 244.5 mm
(J) 209.5 - 219.5 mm
(K) 195 - 205 mm
(L) 184.5 - 194.5 mm

5-9. Replacing the PROMs

Refer to the following when replacing the PROMs (for example, when upgrading the version number). At this time, be particularly careful not to make a mistake with the direction of the PROM.

<Control circuit board>



3047Q

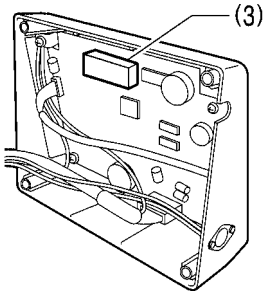
RH981A
MN-□

The PROM which is marked “MN” is the main PROM.
This PROM is mounted in position (1).

RH981A
MT-□

The PROM which is marked “MT” is the machine motor PROM.
This PROM is mounted in position (2).

<Panel circuit board>



3048Q

RH981A
PL-□

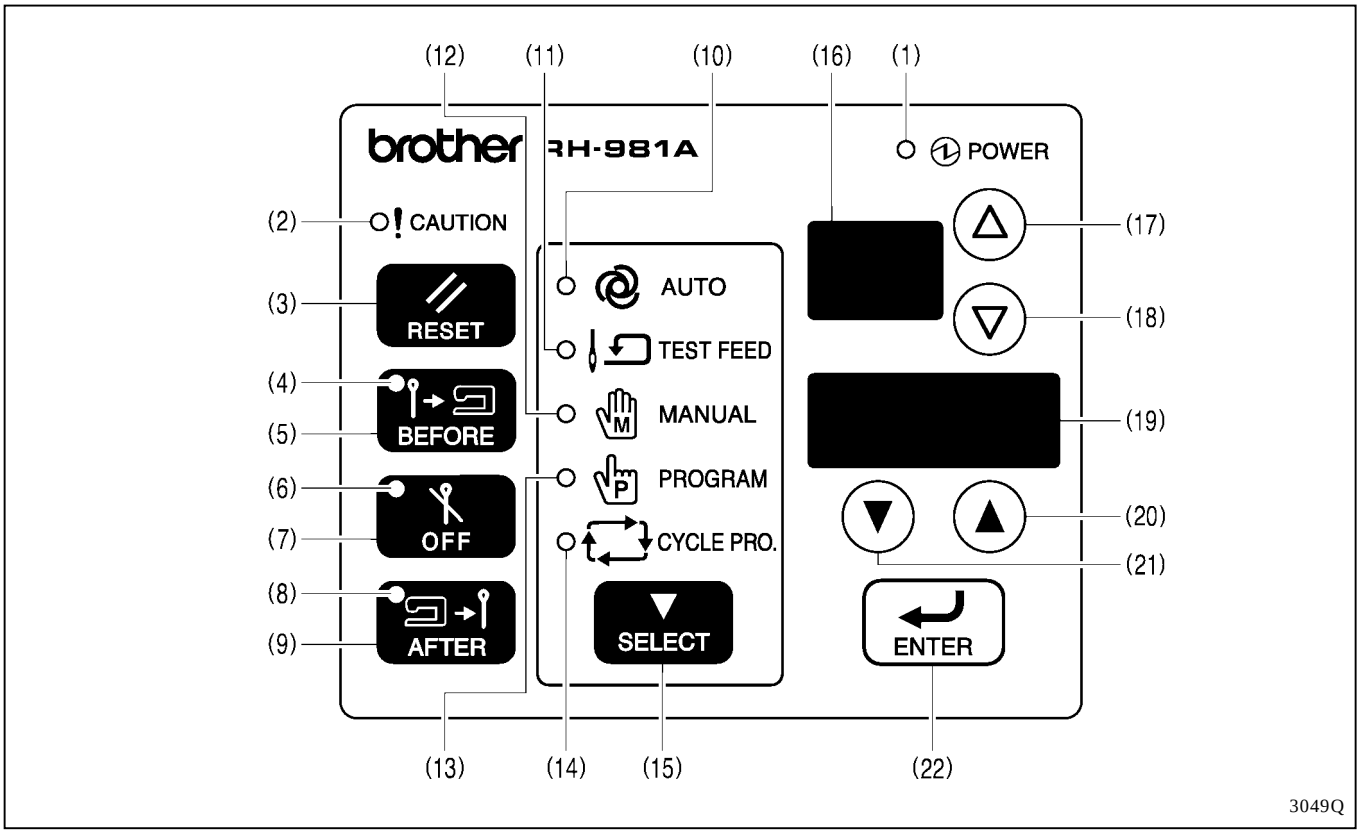
The PROM which is marked “PL” is the panel PROM.
This PROM is mounted in position (3).

* The figure inside the box indicates the version number.

2430Q

6. OPERATION

6-1. Name and function of each operation panel item



(1) Power indicator
Illuminates when the power is turned on.

(2) Warning indicator
Illuminates when an error occurs.

(3) RESET key
Press to reset errors, and to clear the production counter.

(4) BEFORE indicator
Illuminates when cutting before sewing has been set.

(5) BEFORE key
Press to set cutting before sewing.

(6) OFF indicator
Illuminates when no cutting has been set.

(7) OFF key
Press to set no cutting.

(8) AFTER indicator
Illuminates when cutting after sewing has been set.

(9) AFTER key
Press to set cutting after sewing.

(10) Automatic mode indicator
Illuminates during automatic mode.

(11) Test feed mode indicator
Illuminates during test feed mode.

(12) Manual mode indicator
Illuminates during manual mode.

(13) Program mode indicator
Illuminates during program mode.

(14) Cycle program mode indicator
Illuminates during cycle program mode.

(15) SELECT key
Press to change the mode.
- When an independent program (1 - 9) is selected, the mode changes in the following order.
  Automatic mode → Test feed mode → Manual mode → Program mode → Automatic mode
- When a cycle program (A - D) is selected, the mode changes in the following order.
  Automatic mode → Test feed mode → Manual mode → Cycle program mode → Automatic mode

(16) Program number display
Displays the program number and the parameter number.

(17) Program No. UP key (△ key)
Press to increase the value in the program number display.

(18) Program No. DOWN key (▽ key)
Press to decrease the value in the program number display.

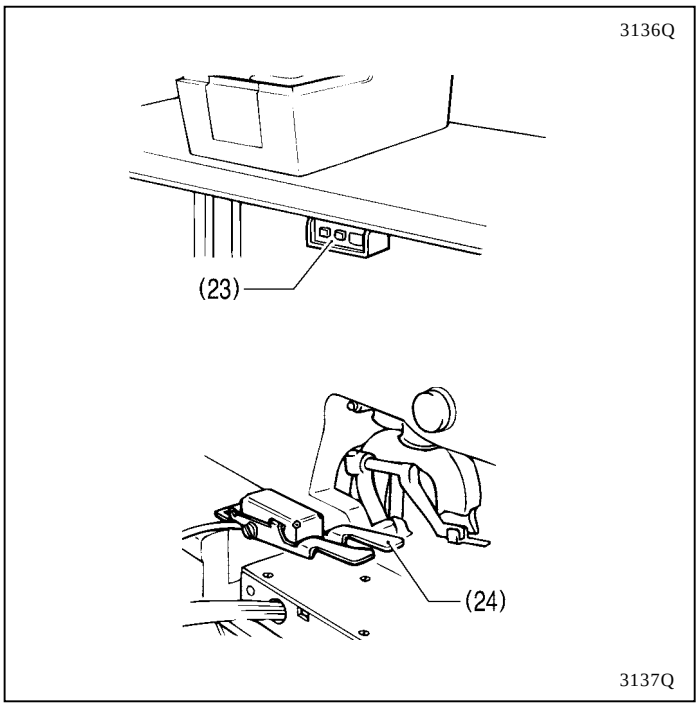
(19) Detail display
- In automatic mode, this display shows the production counter or the stitch length.
  However, if a cycle program is selected, the cycle program step number and setting details are displayed.
- In test feed mode and manual mode, the number of stitches remaining is displayed.
- In program mode, the parameter details are shown.
- In cycle program mode, the cycle program details are shown.

(20) Detail UP key (▲ key)
Press to increase the value in the detail display.

(21) Detail DOWN key (▼ key)
Press to decrease the value in the detail display.

(22) ENTER key
Press to accept the values appearing in the program number display and detail display.

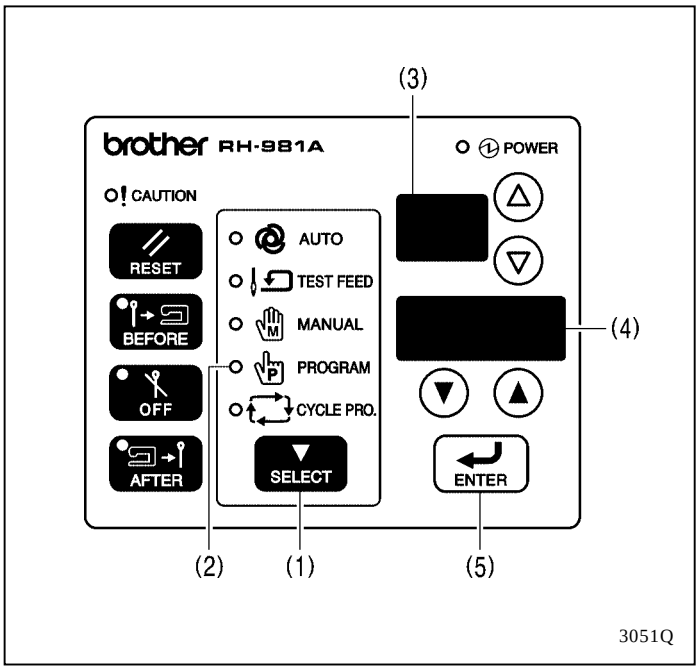
6-2. Starting up



1. Press the power switch (23) to turn on the power.
   * The power indicator (1) will illuminate, and "--" and "----" will appear in the program number display (16) and detail display (19) respectively.
   Note: If "E-10" appears in the detail display, turn the upper shaft pulley by hand to set the upper shaft to the needle up stop position.

2. Press the start switch (24).
   * The feed bracket will move to the cloth setting position.
   * The panel displays will return to the same displays as when sewing last finished.

6-3. Program setting method



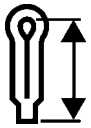
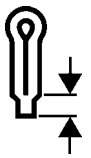
1. Press the SELECT key (1) to change the mode to automatic, manual or test feed mode.
2. Press the △ and ▽ keys to select the program number (1 - 9) for the independent program to be changed.

Note: Program mode is not available if a cycle program has been selected.

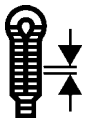
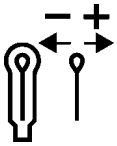
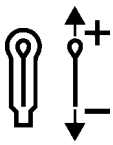
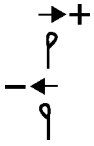
3. Press the SELECT key (1). The program mode indicator (2) will illuminate.
   * The parameter number "00" will appear in the program number display (3), and the parameter details will appear in the detail display (4).
4. Press the △ and ▽ keys to select the number of the parameter to be changed.
5. Press the ▲ and ▼ keys to change the parameter setting. (Refer to "Parameter table".)
   * The flashing display indicates that the value has not yet been accepted.
6. Press the ENTER key (5) to accept the changed setting. (The display will then illuminate steadily.)
7. Repeat steps 4 to 6 to change other parameter settings.
8. Press the SELECT key (1) to change the mode to automatic mode.
   * The program settings will be memorized.

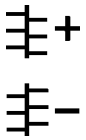
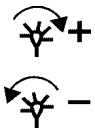
6-3-1. Parameter table (Taper bar)

The allowable setting range for some parameters may vary from the range specified, depending on the settings of other parameters.

No.	Setting items	Setting range	Unit	Default
00	Sewing speed	1,000 - 2,200 rpm	100	1,800
01	Eyelet pattern 	1 - 6	1	2
02	Button hole length (*1) 	-00: 5 - 50 mm -01: 5 - 38 mm -02 (L1): 14 - 18 mm (L2): 18 - 22 mm (L3): 22 - 26 mm (L4): 26 - 30 mm (L5): 28 - 32 mm (L6): 32 - 36 mm (L7): 36 - 40 mm	1	-00: 25 mm -01: 25 mm -02 (L1): 16 mm (L2): 20 mm (L3): 24 mm (L4): 28 mm (L5): 30 mm (L6): 34 mm (L7): 38 mm
03	Tacking length 	0 - 20 mm	1	6

*1 The Button hole length setting value and the default value vary depending on the machine sub-class.

No.	Setting items	Setting range	Unit	Default
04	Offset 	0.5 - 2.0 mm	0.1	1.5
05	Stitch pitch 	0.5 - 2.0 mm	0.1	1.0
06	Number of eyelet stitches 	4 - 20 stitches	1	9
07	Cutting space 	-0.3 - 0.5 mm	0.1	0
08	Knife X position compensation 	-0.5 - 0.5 mm	0.1	0
09	Knife Y position compensation 	-0.7 - 0.7 mm	0.1	0
10	Start tying stitches 	0 - 2	1	0
11	End tying stitches 	0 - 2	1	0
12	X alignment 	-1 - 6	1	0

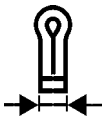
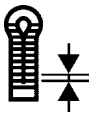
No.	Setting items	Setting range	Unit	Default
13	Y alignment 	-1 - 6	1	0
14	θ1 alignment 	-3 - 3	1	0
15	θ2 alignment 	-3 - 3	1	0
16	Eyelet machine speed (*2)	-600 - 0 rpm	100	0
17	Eyelet radius 	OFF, 1 - 5	1	OFF
18	Taper tact radius 	OFF, 1 - 5	1	OFF
19	Taper tact angle 	-5 - 5	1	0
20	Slow start stitches	0 - 3 stitches	1	0
21	Slow start speed (*3)	400 - 1,500 rpm	100	1,000
22	Stitch width correction 	-1.0 - 1.0 mm	0.1	0
29	Program copy	OFF, 1 - 9 (Specify copy source)	1	OFF

*2 The standard eyelet machine speed is the value that has been set by parameter 00 (sewing speed).

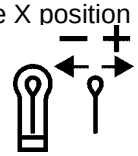
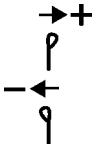
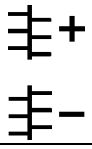
*3 If the sewing speed is set to a speed that is slower than the slow start speed, the slow start speed used for sewing will be the same as the normal sewing speed.

6-3-2. Parameter table (Straight bar tacking)

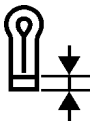
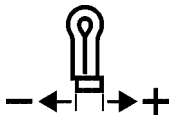
The allowable setting range for some parameters may vary from the range specified, depending on the settings of other parameters.

No.	Setting items	Setting range	Unit	Default
00	Sewing speed	1,000 - 2,200 rpm	100	1,800
01	Eyelet pattern 	1 - 6	1	2
02	Button hole length (*1) 	L1: 14 - 18 mm L2: 18 - 22 mm L3: 22 - 26 mm L4: 26 - 30 mm L5: 28 - 32 mm L6: 32 - 36 mm L7: 36 - 40 mm	1	L1: 16 mm L2: 20 mm L3: 24 mm L4: 28 mm L5: 30 mm L6: 34 mm L7: 38 mm
03	Tacking length 	2.0 - 6.0 mm (Up to 3.0 mm on one side)	0.1	4.0
04	Tacking stitches 	5 - 18 stitches	1	7
05	Stitch pitch 	0.5 - 2.0 mm	0.1	1.0
06	Number of eyelet stitches 	4 - 20 stitches	1	9
07	Cutting space 	-0.3 - 0.5 mm	0.1	0

*1 The Button hole length setting value and the default value vary depending on the machine sub-class.

No.	Setting items	Setting range	Unit	Default
08	Knife X position compensation 	-0.5 - 0.5 mm	0.1	0
09	Knife Y position compensation 	-0.7 - 0.7 mm	0.1	0
10	Start tying stitches 	0 - 2 stitches	1	0
11	End tying stitches 	0 - 2 stitches	1	0
12	X alignment 	-1 - 6	1	0
13	Y alignment 	-1 - 6	1	0
14	θ1 alignment 	-3 - 3	1	0
15	θ2 alignment 	-3 - 3	1	0
16	Eyelet machine speed (*2)	-600 - 0 rpm	100	0

*2 The standard eyelet machine speed is the value that has been set by parameter 00 (sewing speed).

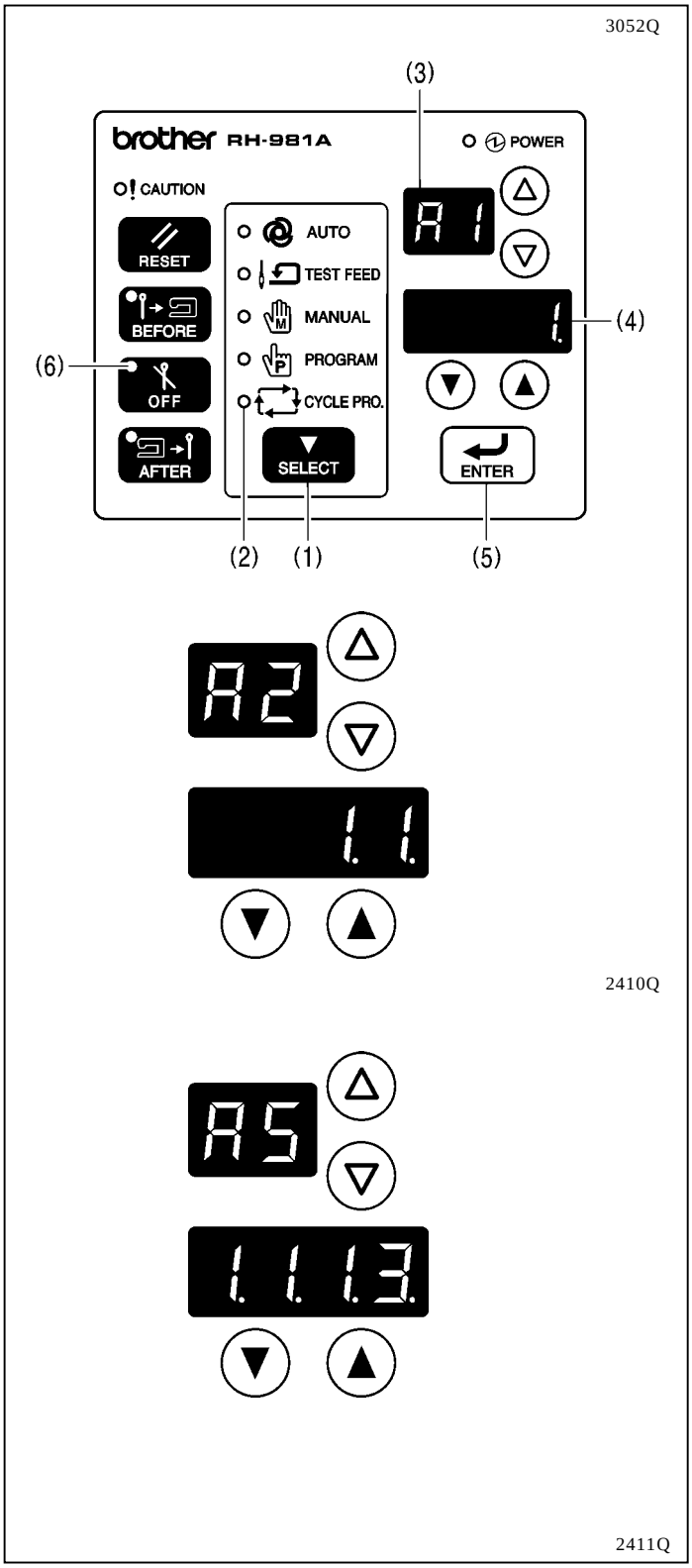
No.	Setting items	Setting range	Unit	Default
17	Eyelet radius 	OFF, 1 - 5	1	OFF
18	Width correction value 	-1.0 - 0 mm	0.1	0
19	Tacking overlap amount 	0 - 2.0 mm	0.1	1.0
20	Slow start stitches	0 - 3 stitches	1	0
21	Slow start speed (*3)	400 - 1,500 rpm	100	1,000
22	Stitch width correction 	-1.0 - 1.0 mm	0.1	0
23	Tacking X alignment 	-1.0 - 1.0 mm	0.1	0
24	Tacking angle compensation 	-3 - 1	1	0
29	Program copy	OFF, 1 - 9 (Specify copy source)	1	OFF

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

6-4. Cycle program

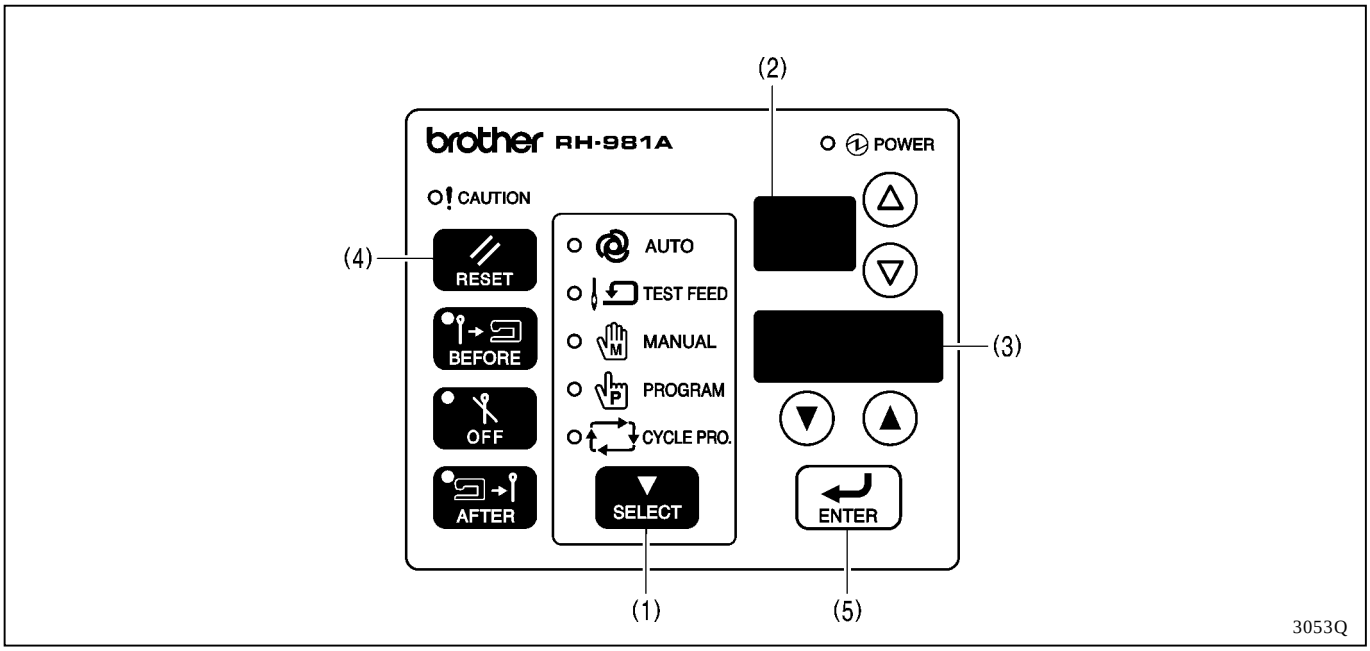
Cycle programs can consist of up to a maximum of four independent programs (A to D).
A single cycle program can contain up to a maximum of eight steps.
The following shows an example of storing a cycle program into cycle program A that consists of four steps of program 1 with knife operation on, and one step of program 3 with knife operation off.

	Step 1	Step 2	Step 3	Step 4	Step 5
Program No.	1	1	1	1	3
Knife operation	ON	ON	ON	ON	OFF



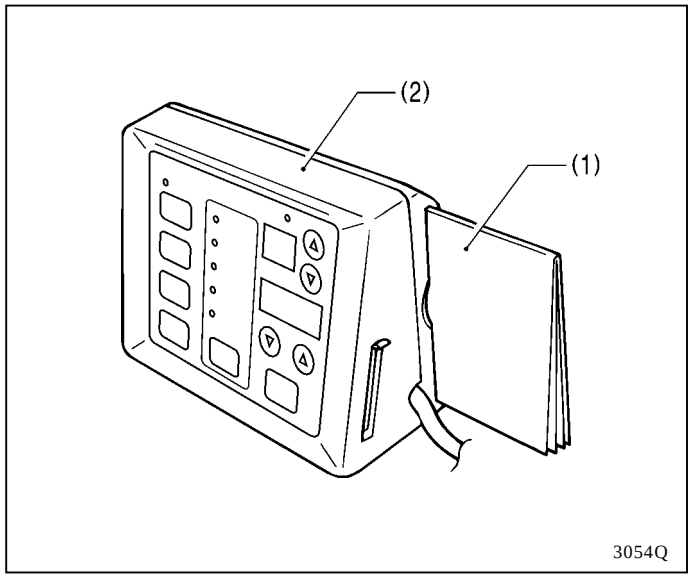
1. Press the SELECT key (1) to change the mode to automatic, manual or test feed mode.
2. Press the △ and ▽ keys to select cycle program "A".
   Note: Cycle program mode is not available if an independent program has been selected.
3. Press the SELECT key (1). The cycle program mode indicator (2) will illuminate.
   * The cycle program number "A" and the step number "1" will appear in the program number display (3), and the cycle program details will appear in the detail display (4).
4. Press the ▲ and ▼ keys to change the setting for step 1 to "1.", and then press the ENTER key (5) to accept the "1." setting.
   * "." signifies that knife operation is on.
   * "-" signifies a clear status. If "-" is set, the setting details for all subsequent steps will be cleared.
5. Press the △ and ▽ keys to change the step number to "2", and then repeat step 4 above.
6. Press the △ and ▽ keys to change the step number to "3", and then repeat step 4 above.
7. Press the △ and ▽ keys to change the step number to "4", and then repeat step 4 above.
8. Press the △ and ▽ keys to change the step number to "5".
9. Press the ▲ and ▼ keys to change the setting for step "5" to "3.".
10. Press the OFF key (6) so that the "." disappears, and then press the ENTER key (5) to accept the "3" setting.
11. Press the SELECT key (1). Cycle program mode will end and the mode will change to automatic mode.

6-5. Production counter



1. Press the SELECT key (1) to change the mode to automatic mode.
2. Press the ▲ key and ▼ key simultaneously.
   * "PC" will flash in the program number display (2), and the production counter value will appear in the detail display (3).
3. Press the ▲▼ keys to change the production counter setting.
   * The production counter setting will flash while the setting is being changed.
   * If you would like to set the production counter to "0", press the RESET key (4).
4. Press the ENTER key (5). The production counter value will be accepted and the mode will return to automatic mode.
   * If you press the SELECT key (1) while the production counter value is still flashing, the mode will return to automatic mode without the production counter value being changed.

6-6. Using the program memos



Insert the program memos (1) into the rear of the operation box (2) for safekeeping.

Program memo contents

1. Easy reference guide
2. Error code table
3. Parameter table
4. Program notes

Use a lead pencil to make any additions to the parameter table and for writing anything into the program notes. If you do so, additions can be removed using an eraser and the space can be re-used. The program notes are useful for recording what patterns have been entered into which programs.

7. SEWING

⚠ CAUTION

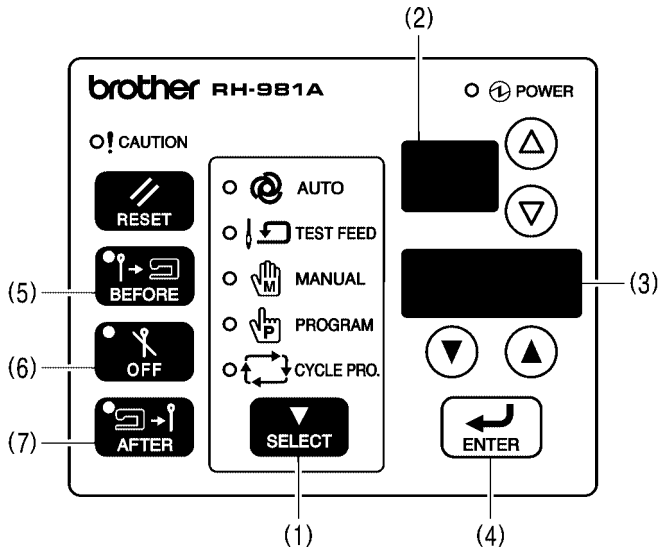
Turn off the power switch at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.

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

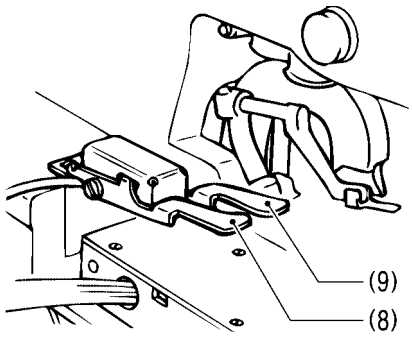
Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.

7-1. Automatic sewing

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



3055Q

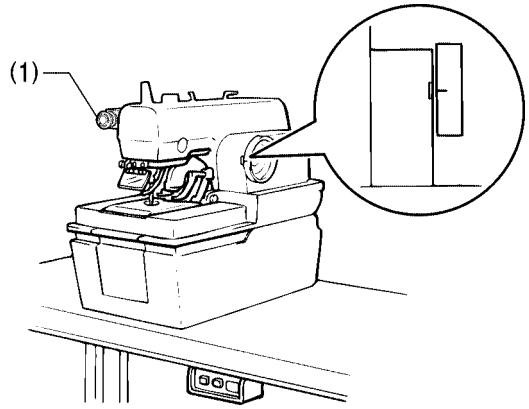


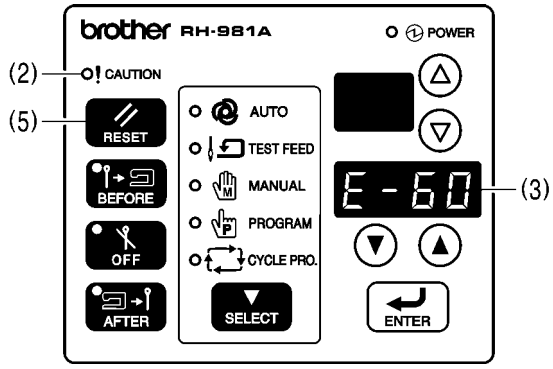
3138Q

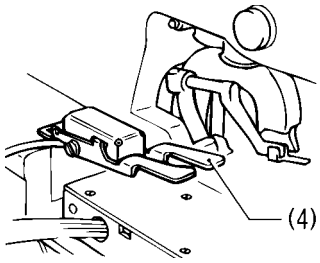
1. Press the SELECT key (1) to change the mode to automatic mode.
   * The program number will appear in the program number display (2), and the production counter value will appear in the detail display (3).
2. Use the △ and ▽ keys to select the desired program number.
   * The program number changes in the order 1 → 2 → ... → 9 → A → B → C → D → 1 each time a key is pressed. A to D are cycle programs.
3. Press the ENTER key (4) to accept the program number selection.
   * The program number display will stop flashing and illuminate steadily.
4. If changing the knife operation (before/off/after), press the corresponding knife key ((5)/(6)/(7)).
   * The corresponding knife indicator (BEFORE/OFF/AFTER) will illuminate.
5. Place the material to be sewn under the work clamp, and then press the cloth presser switch (8). The work clamp will be lowered.
6. Press the start switch (9). Sewing will then start.
7. When sewing is finished, the work clamp will be raised.
   * The production counter value in the detail display (3) will increase by 1.
8. To repeat this operation, repeat steps 5 and 6 above.

7-2. Using the EMERGENCY STOP switch

3058Q







3139Q

3140Q

1. Press the EMERGENCY STOP switch (1).
   * All sewing operations will stop and the buzzer will sound. At this time, the warning indicator (2) will flash and "E-60" will flash in the detail display (3).
   * If the upper shaft could not stop in the needle up stop position, "E-10" will flash in the detail display (3). In this case, turn the upper shaft pulley by hand to set the upper shaft to the needle up stop position. (Align the marks.)
2. Eliminate the cause of the problem.
3. Release the EMERGENCY STOP switch (1).
4. In automatic mode:
   - If continuing on with sewing, press the ▲ and ▼ keys to determine the position to resume sewing from. Then press the start switch (4). (Sewing will then restart.)
     Note: The start switch (4) will not work unless you not press the ▼ key at least once.
   - To stop sewing, press the RESET key (5). (The feed bracket will return to the cloth setting position.)

   In test feed mode or in manual mode:
   - Press the RESET key (5). (The feed bracket will return to the cloth setting position.)

7-3. Adjusting the thread tension

Turn off the power.

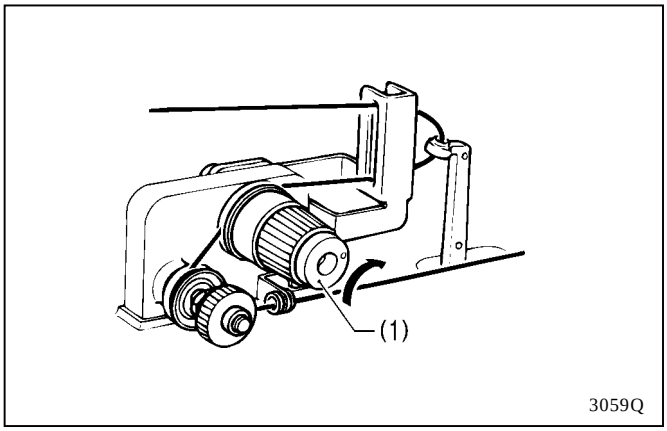
Never adjust the thread tension while sewing.

<Reference values>

	Woolen materials + wool gimps	Denim (3 layers)
Upper thread tension	0.9 N	1.0 N
Lower thread tension	0.3 N	0.8 N
Thread take-up spring tension	0.05 N	0.07N
Thread take-up spring stroke	8 mm	8 mm
Upper and lower thread	# 30 polyester	# 30 cotton

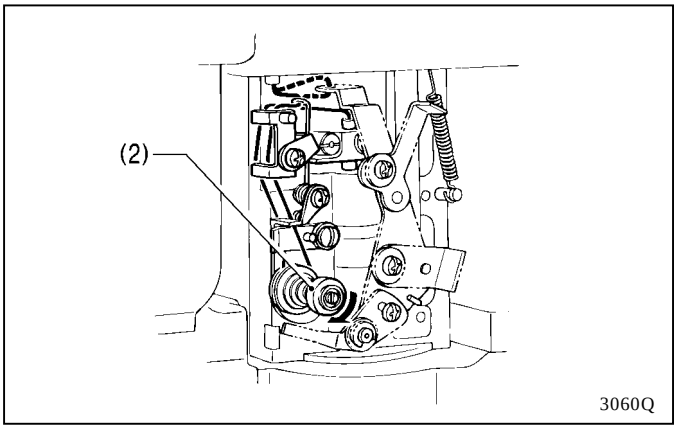
* If you change the type of material being used, it may be necessary to change the thread tension.
  The upper thread tension given above is the tension when the upper thread is pulled out from the thread path hole of the thread take-up lever, and the lower thread tension is when the lower thread is pulled out from the needle hole in the throat plate.

Upper thread tension



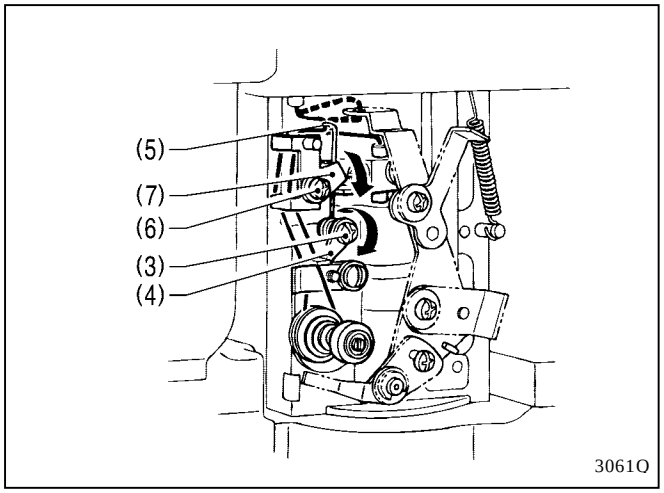
Turn the upper thread tension adjustment knob (1) in the direction indicated by the arrow to increase the upper thread tension.

Lower thread tension



Turn the lower thread tension adjustment knob (2) in the direction indicated by the arrow to increase the lower thread tension.

Adjusting the lower thread take-up spring tension and stroke



Tension adjustment

Loosen the screw (3) and turn the thread take-up spring support (4) in the direction indicated by the arrow to increase the tension of the spring (5).

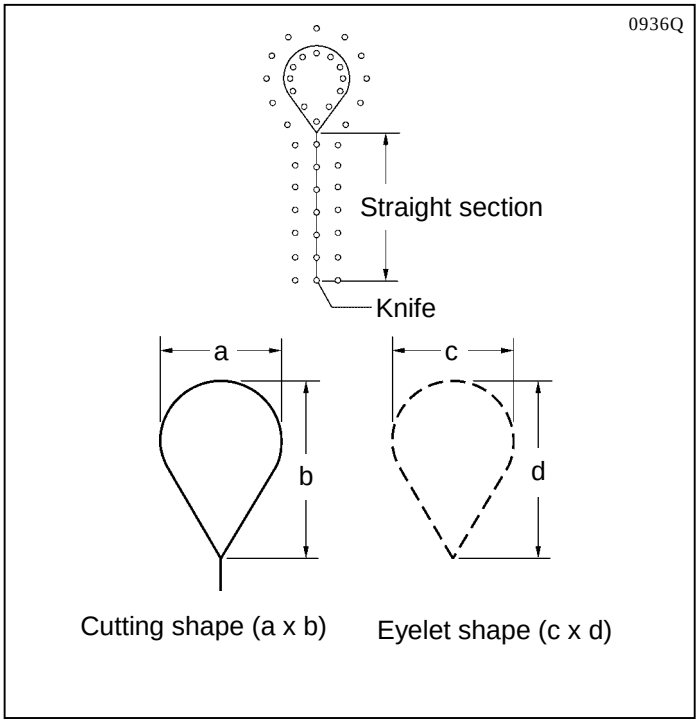
Stroke adjustment

Loosen the screw (6) and turn the thread take-up spring guide (7) in the direction indicated by the arrow to increase the stroke of the spring (5).

7-4. Needle and knife position

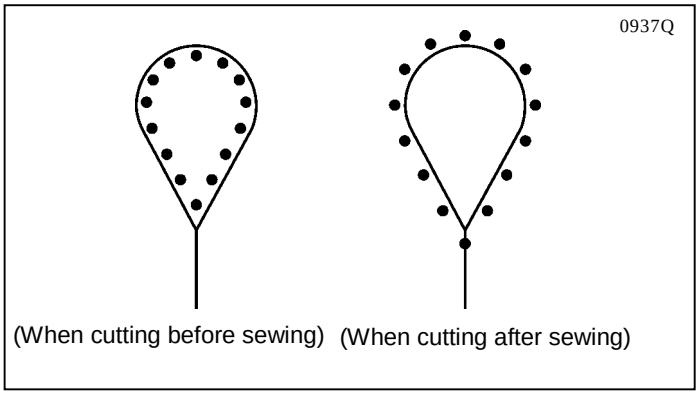
The feed bracket is electronically controlled by means of pulse motors.
It is not necessary to change the position of the knife when switching between cutting before sewing and cutting after sewing.
It is not necessary to change the needle down position in order to keep enough space for cutting when cutting after sewing has been selected.

Relationship between knife position and eyelet shape



1. When cutting before sewing, the inside needle down position must be aligned accurately with the straight line section of the eyelet (when the cutting space is 0).
   This is set correctly at the time of shipment from the factory.
2. The shape of the eyelet is automatically changed according to the shape of the knife for cutting before and after sewing and for no cutting.

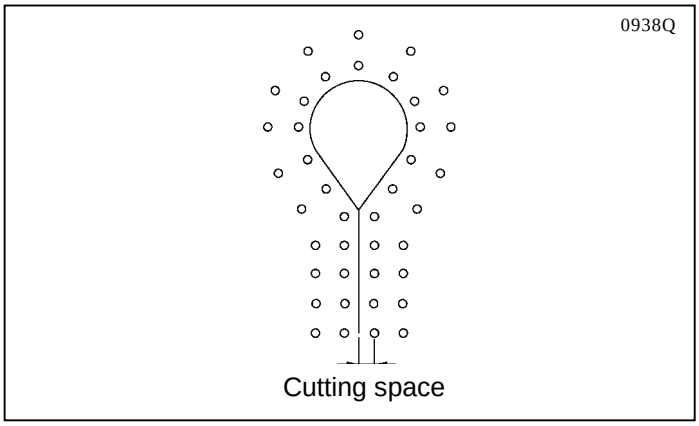
Knife No.	Cutting shape (a X b)	Eyelet shape (c X d)	
		Cutting before sewing or no cutting	Cutting after sewing
1	2.1 X 3.2	1.7 X 2.7	2.5 X 3.8
2	2.8 X 4.3	2.4 X 3.8	3.2 X 4.9
3	3.0 X 4.6	2.6 X 4.1	3.4 X 5.2
4	3.2 X 5.4	2.8 X 4.9	3.6 X 6.0
5	Straight	Straight	Straight
6	3.8 X 4.3	3.4 X 3.8	4.2 X 4.9



3. At the time of shipment, the installation position for the knife is adjusted to the position shown in the illustration at left (when the cutting space value is "0").

Explanation of the cutting space function

When cutting after sewing, this function moves the outer needle down positions in accordance with the knife shape so that the seam is not cut by the knife.

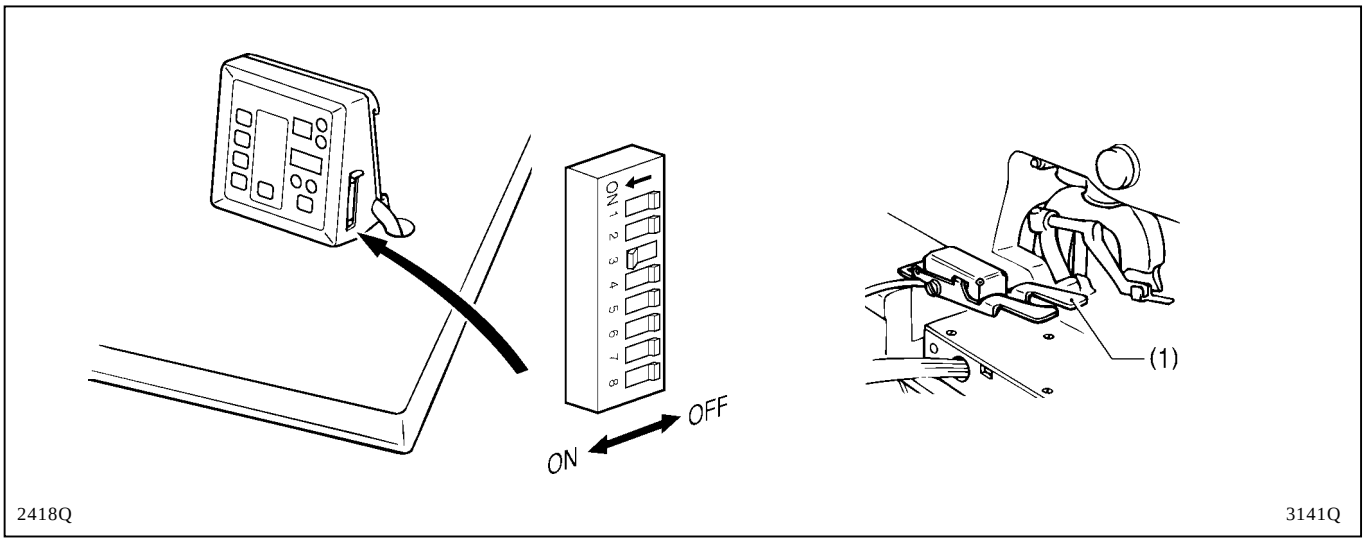


When cutting after sewing, set the cutting space to an appropriate value so that the seam is not cut by the knife.

* The cutting space should generally be set to around 0.2. (Refer to “6-3 Program setting method.”)

7-5. Setting the feed bracket to the front position

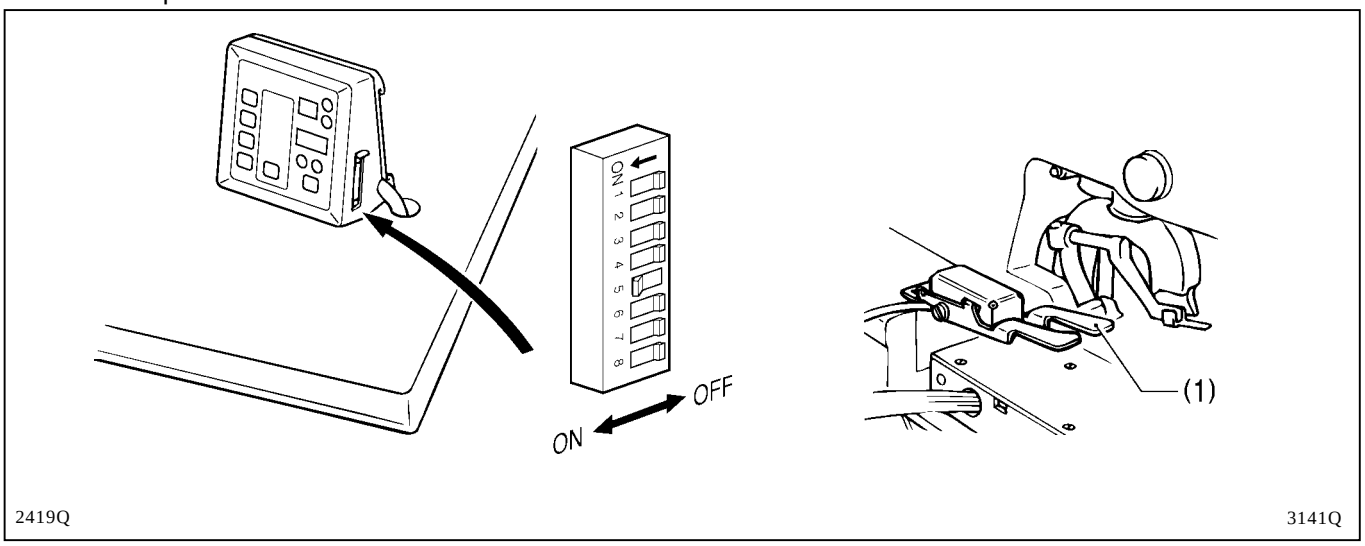
Setting the material will be easier if the feed bracket is moved forward from the standard cloth setting position. Cycle time will be reduced with this setting, particularly if cutting after sewing is selected.



1. Turn off the power.
2. Set panel DIP switch No. 3 to ON.
3. Turn on the power and press the start switch (1).
   * The feed bracket will move to the home position and then to the front position.
4. Sewing can then be carried out as normal. (Refer to “7-1. Automatic sewing”.)

7-6. Switching between single-pedal and dual-pedal operation

The work clamp can be lowered and the machine can start sewing just by pressing the start switch, without having to use the cloth presser switch.



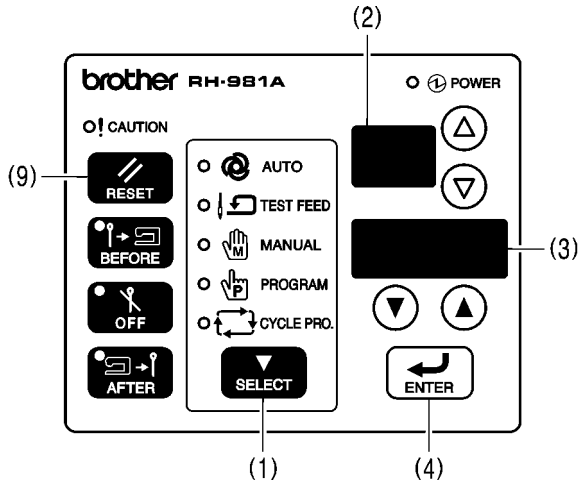
1. Turn off the power.
2. Change the setting of panel DIP switch No. 5.
   OFF: To use both pedals (cloth presser switch and start switch)
   ON: To use only one pedal (start switch)
3. Turn on the power and press the start switch (1).
   * The feed bracket will move to the cloth setting position.
4. Sewing can then be carried out as normal. (Refer to “7-1. Automatic sewing”.)

Note:

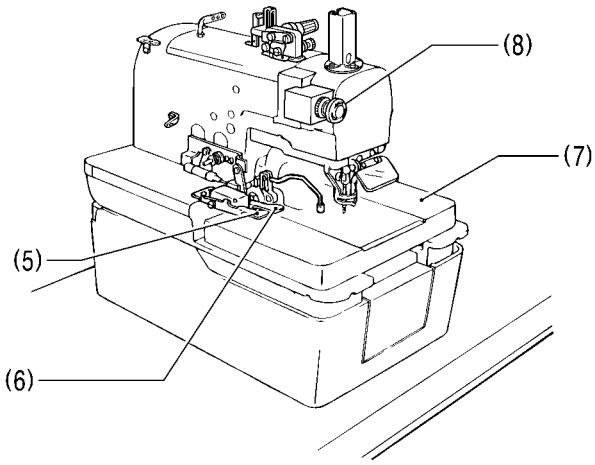
During single pedal operation, when the start switch is pressed, the work clamp is lowered and sewing starts straight away. If you would like to reset the material, set to dual-pedal operation.

7-7. Using test feed mode

In this mode, the feed bracket can be moved while the needle stopped.
It is useful for checking the relative positions of the needle and the work clamp.



3063Q

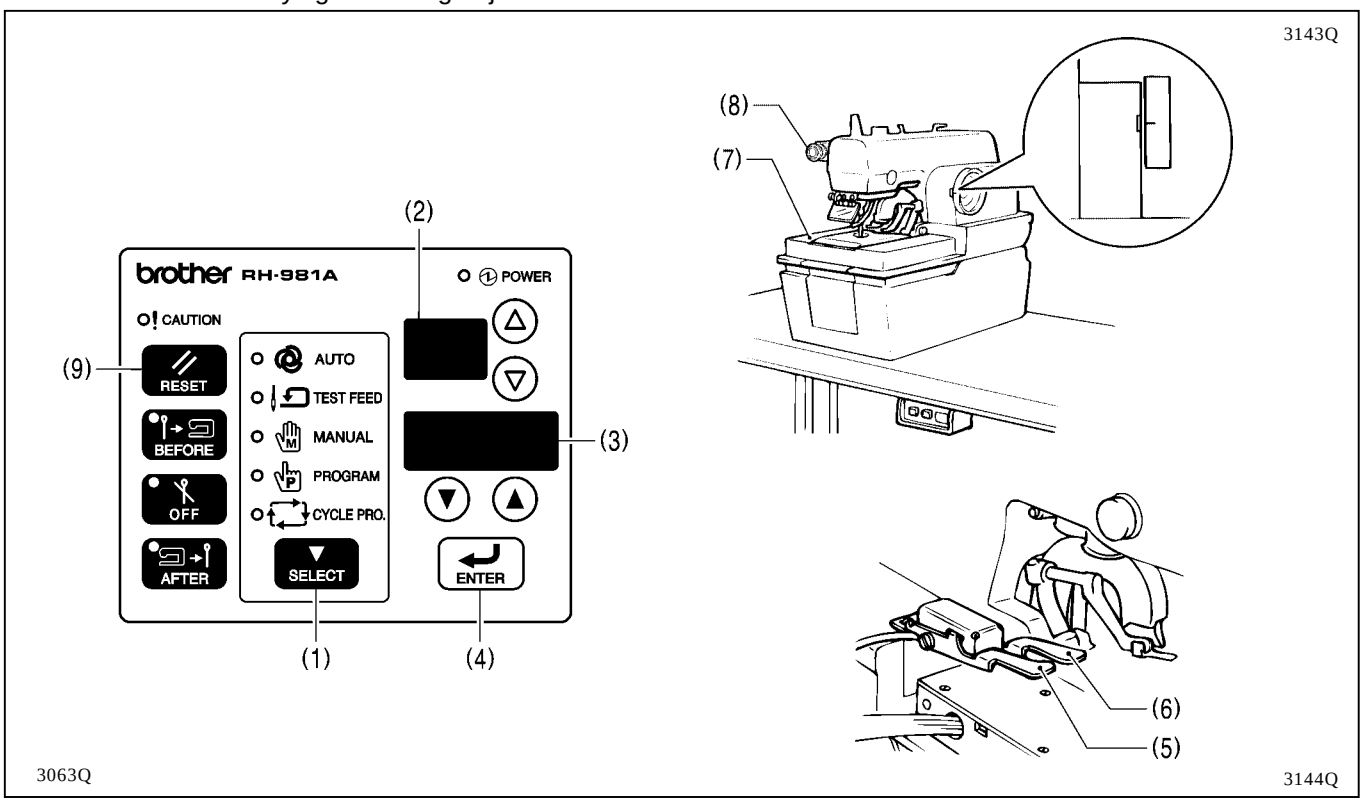


3142Q

1. Press the SELECT key (1) to change the mode to test feed mode.
   * The program number will appear in the program number display (2), and the number of stitches will appear in the detail display (3).
2. Use the△ and▽keys to select the desired program number.
   * If an independent program has been selected, the program number changes in the order 1 → 2 → ... → 9 → 1.
   * If a cycle program has been selected, the program number changes in the order A1 → A2 → ... → A8 → A1. However, steps that have not been programmed will be skipped.
3. Press the ENTER key (4) to accept the program number selection.
   * The program number display will stop flashing and illuminate steadily.
4. Press the cloth presser switch (5) to lower the work clamp.
5. Press the start switch (6).
   * The feed bracket (7) will move to the sewing start position.
6. After releasing the start switch (6), press it once more (or press the▲key).
   * The feed bracket (7) will move to the next sewing start position.
   * The number of stitches in the detail display (3) will decrease by 2.
   * To return the feed bracket to the cloth setting position while sewing:
     1) Press the EMERGENCY STOP switch (8) and then release it.
     2) Press the RESET key (9).
7. If you would like to return the feed bracket (7) to the previous sewing position during test feeding, press the▼key.
   * The number of stitches in the detail display (3) will increase by 2.
8. When the final stitch is reached, the buzzer will sound.
9. After releasing the start switch (6), press it once more.
   * The feed bracket (7) will return to the cloth setting position.

7-8. Using manual mode

In this mode, the feed bracket can be moved one stitch at a time by turning the upper shaft pulley by hand.
This is useful when carrying out timing adjustment.



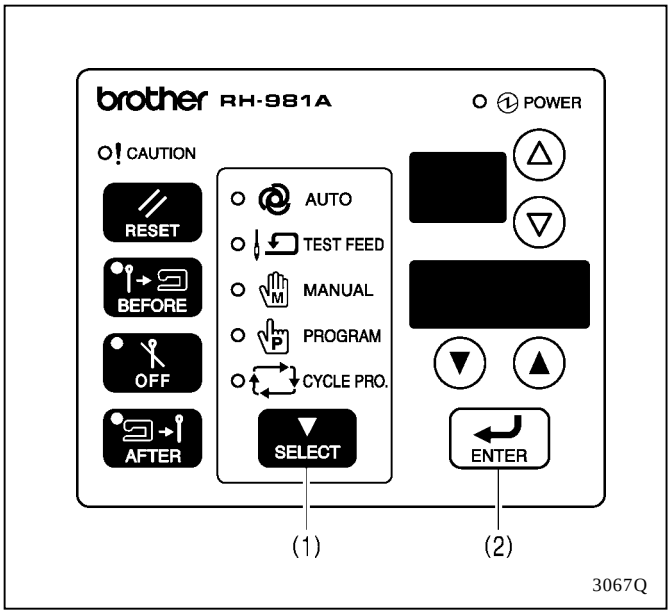
1. Press the SELECT key (1) to change the mode to manual mode.
   * The program number will appear in the program number display (2), and the number of stitches will appear in the detail display (3).
2. Use the △ and ▽ keys to select the desired program number.
   * If an independent program has been selected, the program number changes in the order 1 → 2 → ... → 9 → 1.
   * If a cycle program has been selected, the program number changes in the order A1 → A2 → ... → A8 → A1. However, steps that have not been programmed will be skipped.
3. Press the ENTER key (4) to accept the program number selection.
   * The program number display will stop flashing and illuminate steadily.
4. Place the material to be sewn under the work clamp, and then press the cloth presser switch (5). The work clamp will be lowered.
5. Press the start switch (6).
   * The feed bracket (7) will move to the sewing start position.

   Note: If cutting before sewing has been selected, the hammer will operate.
6. Turn the upper shaft pulley toward you.
   * The feed bracket (7) will move to the next sewing start position in accordance with the rotation of the upper shaft.

   Note: If the upper shaft pulley is turned in the wrong direction, the feed bracket timing may become disrupted.
   * The number of stitches in the detail display (3) will decrease by 1.
   * To return the feed bracket to the cloth setting position while sewing:
     1) Press the EMERGENCY STOP switch (8) and then release it.
     2) Press the RESET key (9).
7. When the final stitch is reached, the buzzer will sound.
8. When the needle up position is reached, press the start switch (6).
   * Thread trimming will be carried out, and then the machine will return to the cloth setting position.

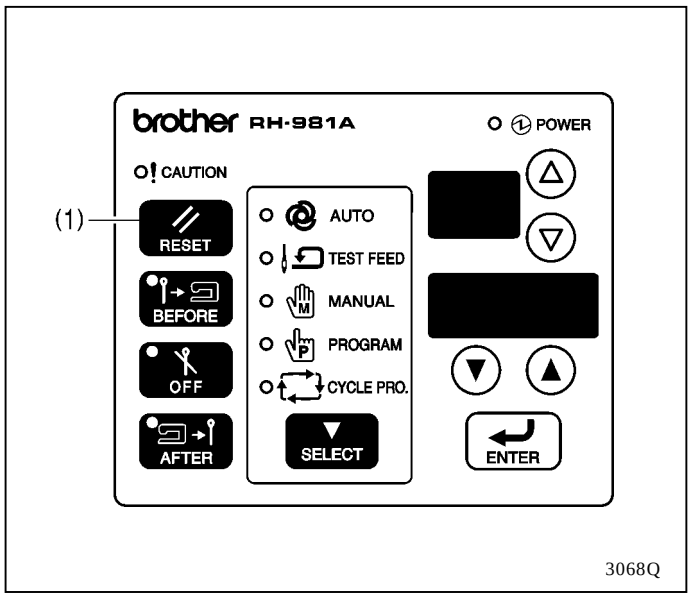
   Note: If cutting after sewing has been selected, the hammer will operate.

7-9. Changing the mode during an operation



- If you press the SELECT key (1) during test feeding, you can change the mode to manual sewing in manual sewing mode.
- If you press the SELECT key (1) while pressing and holding the ENTER key (2) during test feeding, you can change the mode to resewing enabled in automatic sewing mode.
- If you press the SELECT key (1) during manual sewing mode, you can change the mode to test feeding in test feeding mode.
- If you press the SELECT key (1) while pressing and holding the ENTER key (2) during manual sewing, you can change the mode to resewing enabled in automatic sewing mode.

7-10. Moving the cloth feed bar (-52 specifications)



While pressing the RESET key (1), press the ▲ key or the ▼ key.
The cloth feed bar will then move in the right direction or the left direction.

* This operation is only possible when the cloth feed plate is in the left setting position (home condition).

8. CLEANING AND MAINTENANCE

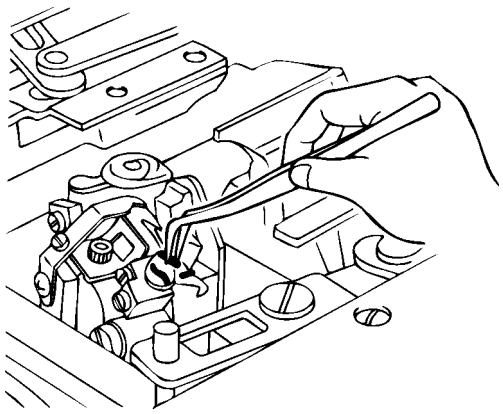
⚠ CAUTION

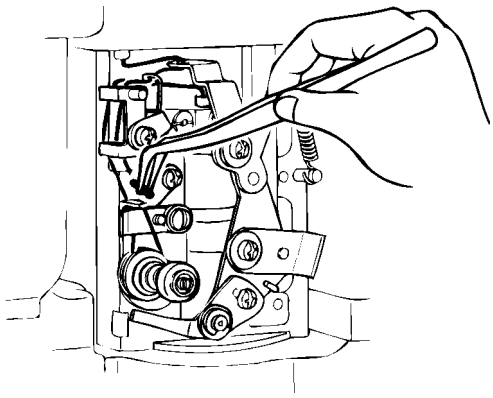
Turn off the power switch before starting any cleaning work, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.

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 can result.
Furthermore, do not drink the oil or eat the grease under any circumstances, as they can cause vomiting and diarrhoea.
Keep the oil out of the reach of children.

8-1. Cleaning

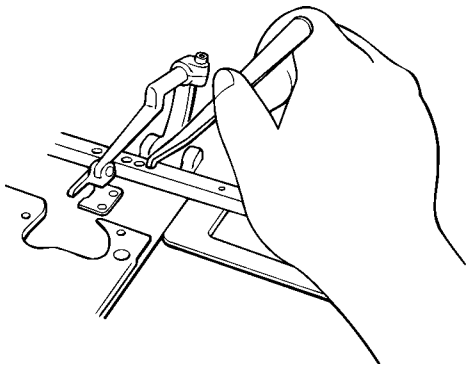
If using an air gun, do not use it while the machine head is tilted back, otherwise oil and thread scraps may adhere to the cutter sensor and timing belt, resulting in operating problems.

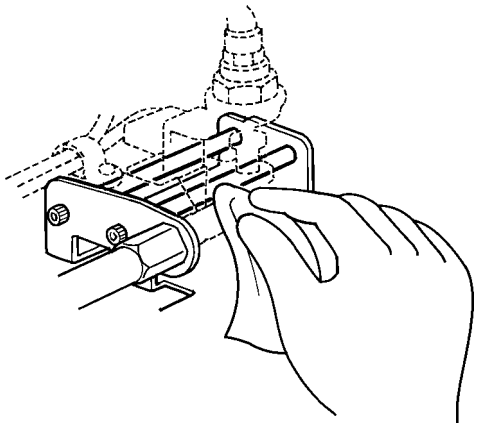

0848Q


0849Q

1. Turn off the power.
2. Turn the air cock to stop the air.
   * Turn the knob to release the air.
3. Remove any thread scraps and dust, etc. from the thread paths for the needle thread, looper thread and gimp.
   In particular, the looper thread path should be cleaned every day to keep it free from thread scraps and dust.
4. Check the oil level by looking at the sight glass. If the oil level is low, replenish the oil supply.

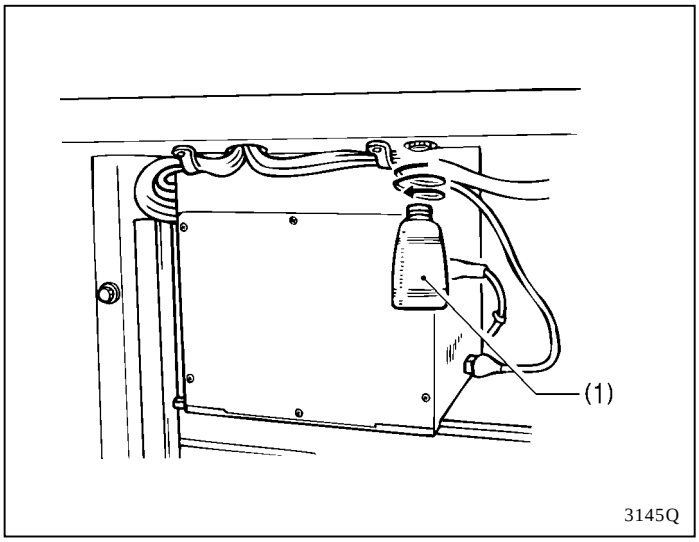
<-52 specifications>


0931Q


0940Q

5. Remove any thread scraps and dust which have collected in the holes of the cloth feed bar.
6. Wipe away any thread scraps and dust which are adhering to the feed guide shaft.

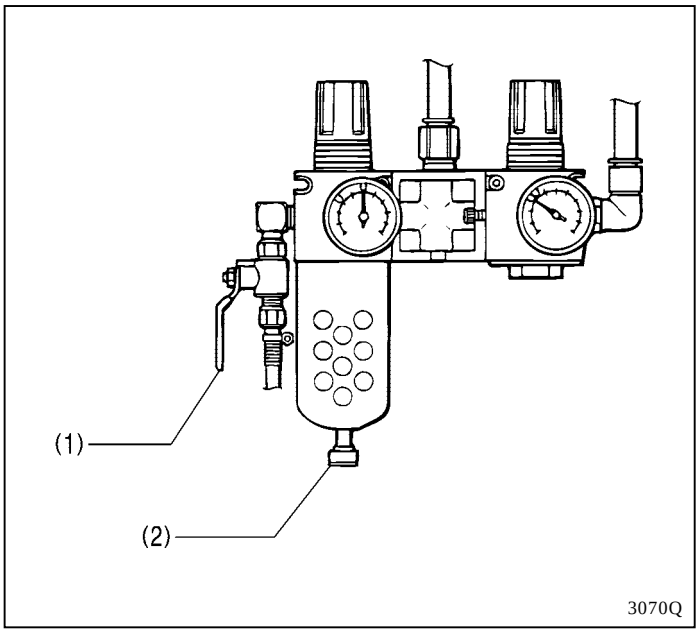
8-2. Draining the oil



When the oil container (1) is full of oil, remove the oil container (1) and let the oil drain out.

Note: Clean up any oil that may have been spilt onto the floor.

8-3. Checking the air filter



1. Close the air cock (1).
2. Turn the screw (2) to release any air and water in the drain.

9. STANDARD ADJUSTMENTS

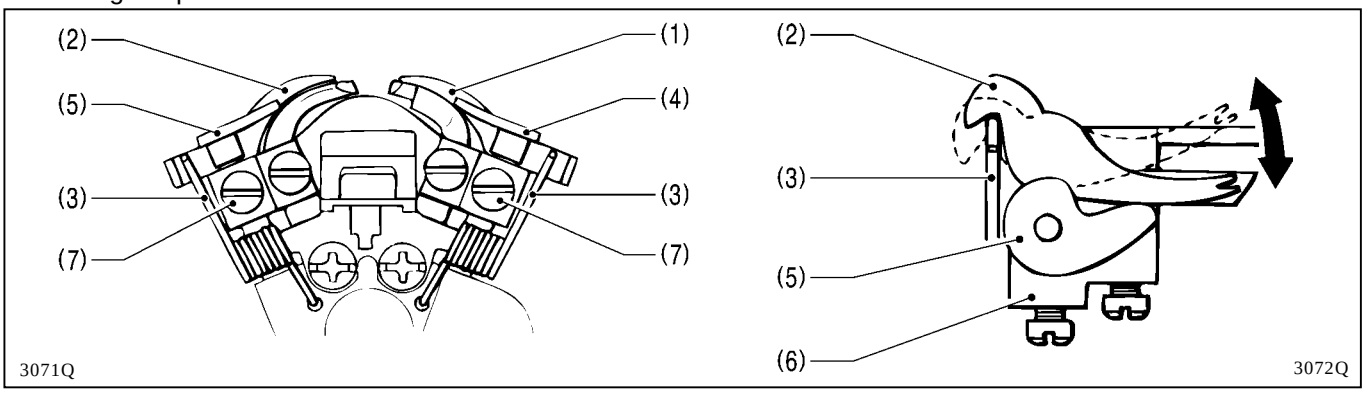
⚠ CAUTION

- Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.
- Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.
- Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.
  - When carrying out inspection, adjustment and maintenance.
  - When replacing consumable parts such as the loopers and knife.
- Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.
- If the power switch and air need to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
- If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

9-1. Adjusting the height of the spreader and looper

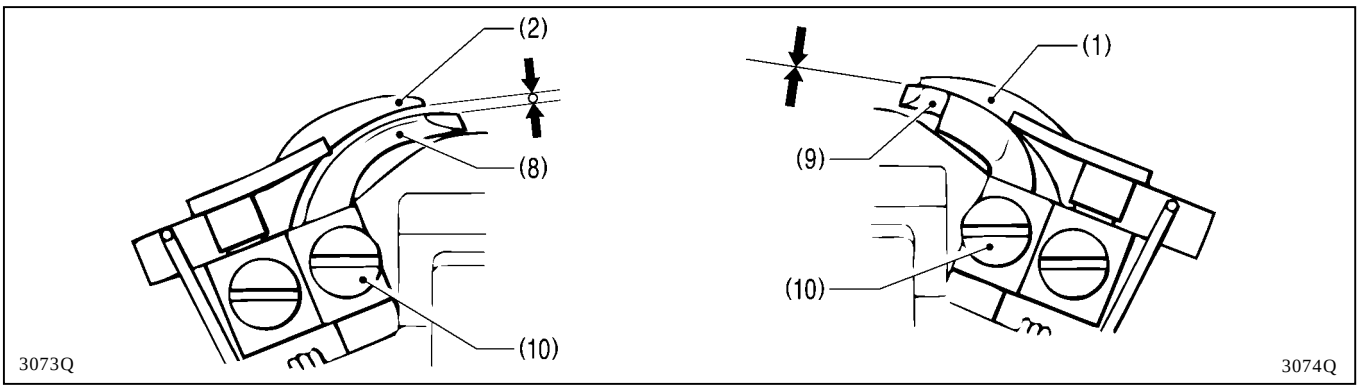
Spreader height

The clearance between the left spreader (forked spreader) and the eye looper must be set to match the thickness of the lower thread. The clearance between the right spreader and the right looper should be as small as possible while still letting the parts slide.



1. The right spreader (1) and left spreader (2) move by means of springs (3). Adjust so that the spreaders move smoothly between the right spreader stopper (4), the left spreader stopper (5) and the LS-holder bracket (6), with no looseness.
2. If adjustment is necessary, loosen the screw (7) and then move the right spreader stopper (4) or left spreader stopper (5) up or down.

Looper height

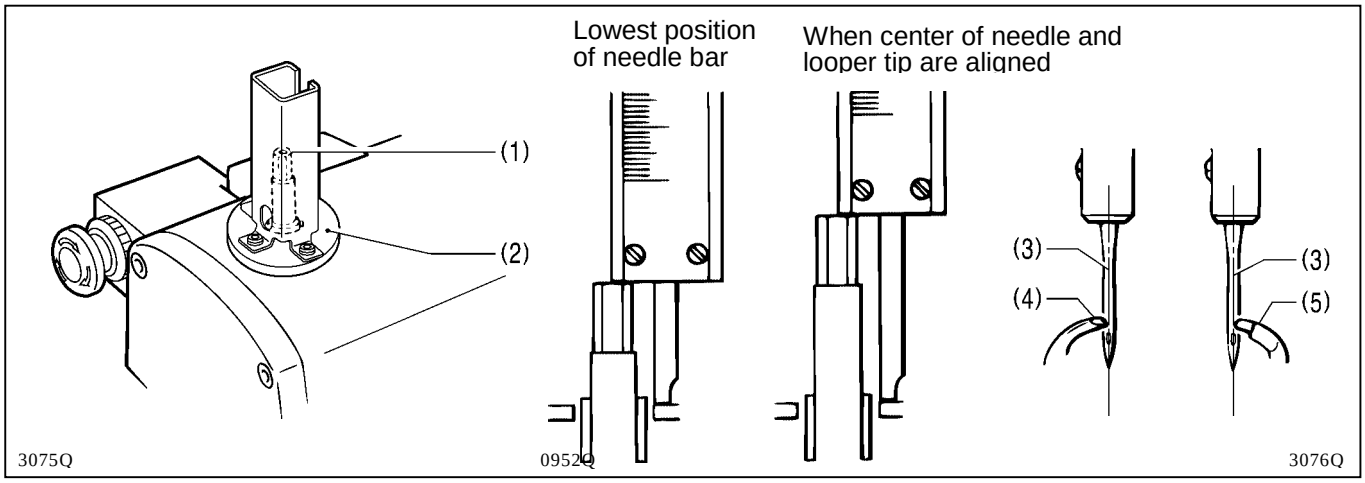


1. Set the clearance between the eye looper (8) and the left spreader (2) to the same distance as the thickness of the lower (looper) thread.
2. The clearance between the right looper (9) and the right spreader (1) should be as small as possible.
3. If adjustment is necessary, loosen the screw (10) and then move the eye looper (8) and right looper (9) up or down.

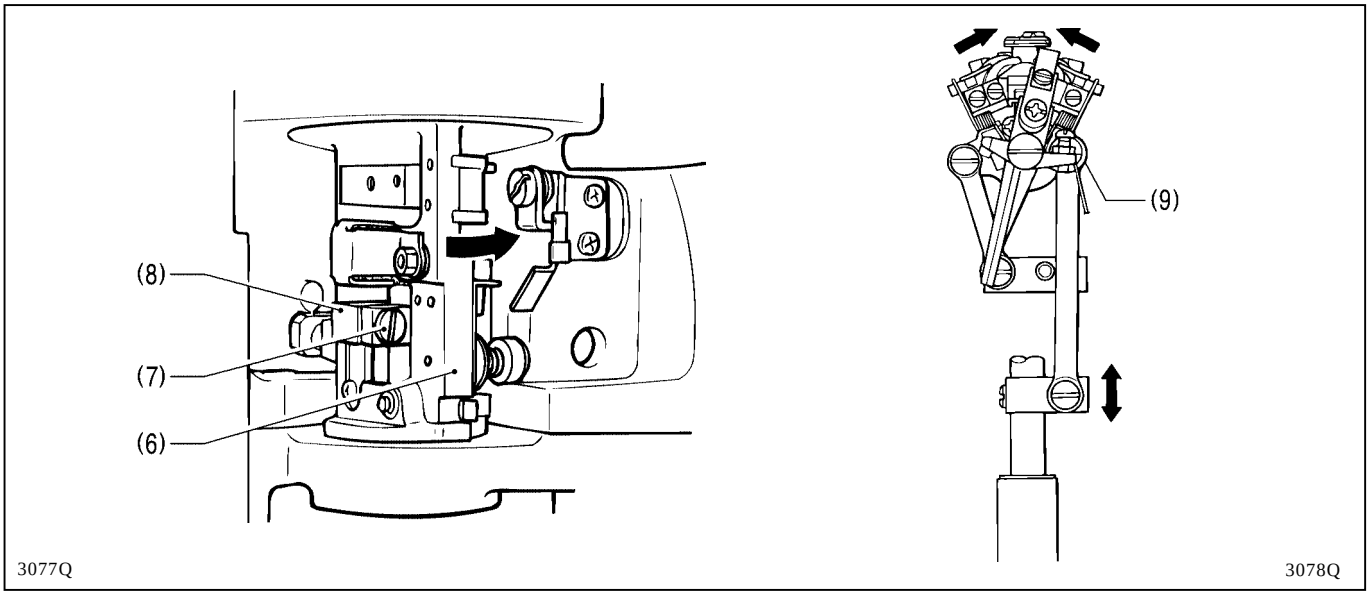
9-2. Adjusting the needle and looper timing

The distance by which the needle bar rises from its lowest position to the position where the tip of the eye looper and the center of the needle are aligned should be the same as the distance from its lowest position to the position where the tip of the right looper and the center of the needle are aligned.
Before adjusting the looper timing, first adjust the stitch width (needle racking width).

* Refer to "Adjusting the needle racking width (stitch width)" on page 60. The standard width is 3 mm.



1. Move the needle bar to its lowest position.
2. Use calipers to measure the distance between the end of the needle bar (1) and the top of the holder base (2) when the needle bar is at its lowest position.
3. Turn the upper shaft pulley until the tip of the eye looper (4) and the center of the needle (3) are aligned when the needle (3) is at the inside sewing position, and then use the calipers to take the same measurement as taken in step 2. Find the difference between the measurements taken in this step and in step 2.
4. Follow the same procedure as in step 3. above to find the difference between the two measurements when the needle (3) is at the outside sewing position.
   * When the needle (3) is at the inside sewing position, the tip of the eye looper (4) should be aligned with the center of the needle (3), and when the needle (3) is at the outside sewing position, the tip of the right looper (5) should be aligned with the center of the needle (3).
   * The distance from the end of the needle bar (1) and the top of the holder base (2) should be the same when the needle (3) is at both the inside sewing position and the outside sewing position.

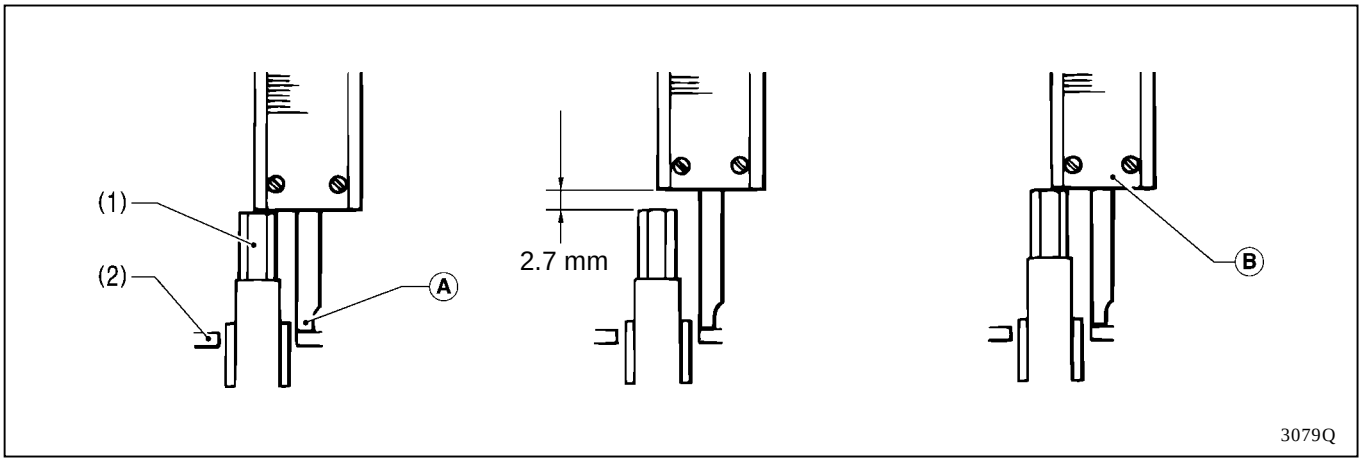


5. If adjustment is necessary, turn the looper base (6) in the direction indicated by the arrow in the illustration, loosen the screw (7), and then move the looper link clamp (8) up or down to tilt the LS-holder bracket (9) to the left or right (in the direction of the arrow).

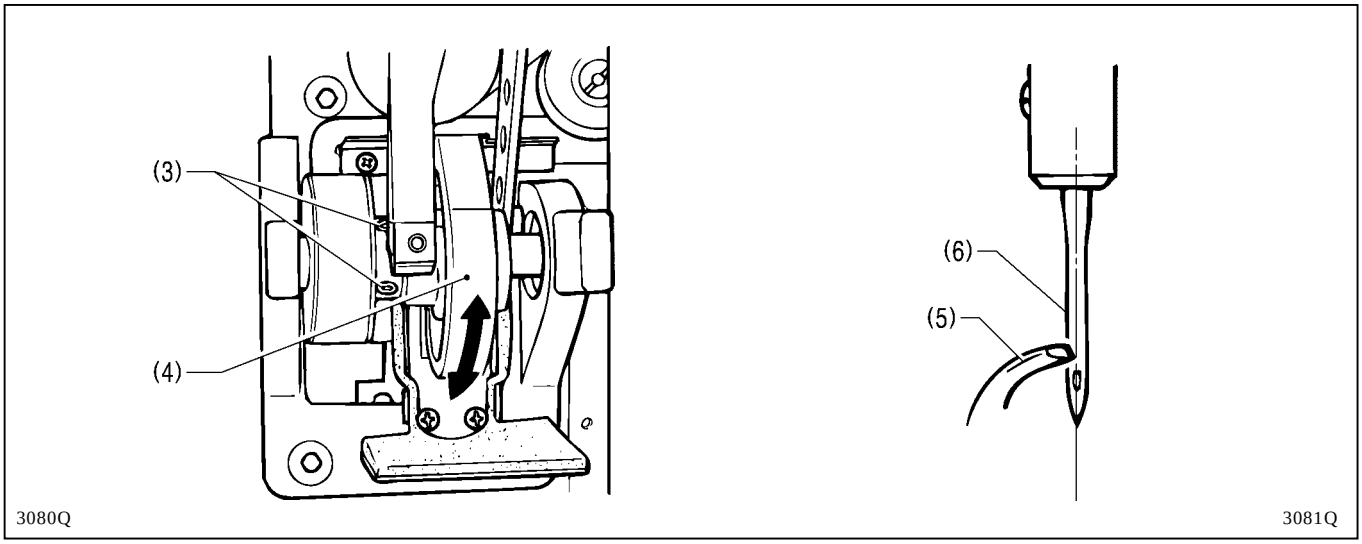
9-3. Adjusting the loop stroke

The loop stroke is the distance the needle bar rises from its lowest position to the position where the tips of the eye looper and right looper are aligned with the center of the needle. The standard loop stroke is 2.7 mm. (The loop stroke may need changing depending on the material and thread being used.)

* Carry out the adjustment in "9-2. Adjusting the needle and looper timing" before making this adjustment.



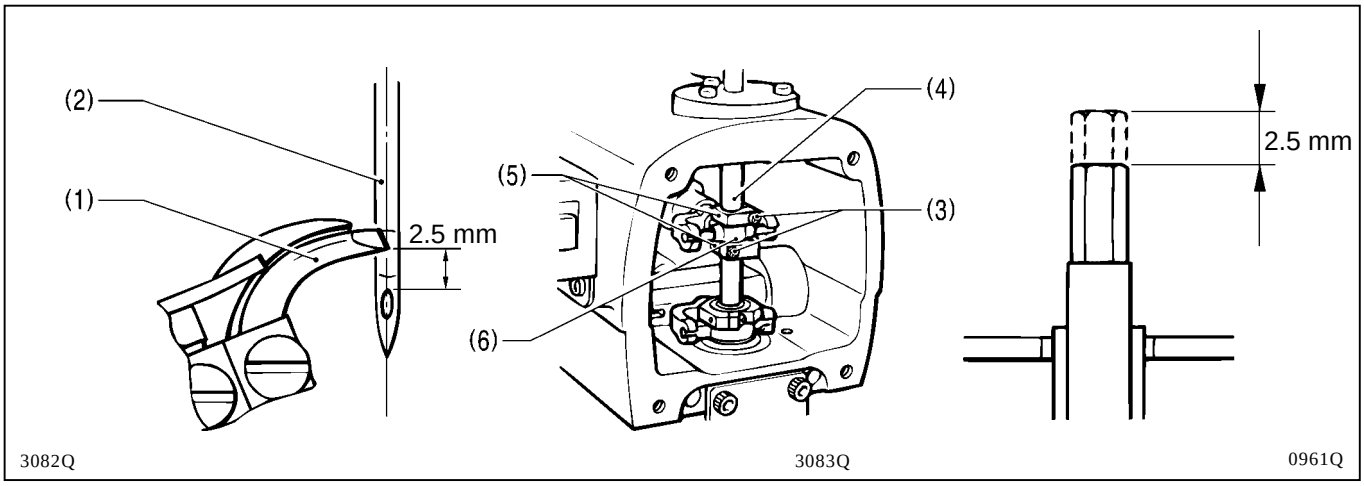
1. In the same way as in "9-2. Adjusting the needle and looper timing", move the needle bar to its lowest position with the needle at the inside sewing position, and then use calipers to measure the distance between the end of the needle bar (1) and the top of the holder base (2).
2. Add 2.7 mm to the value obtained in step 1. above.
3. Touch the end of the calipers (A) against the top of holder base (2), and then turn the upper shaft pulley until the end of the needle bar (1) touches the edge of the calipers (B). Check that the tip of the eye looper is aligned with the center of the needle at this time.
4. In the same way, check that the tip of the right looper is aligned with the center of the needle when the needle is at the outside sewing position.



5. If the tips of the loopers are not aligned with the center of the needle, carry out the adjustment below.
   Raise the machine head.
   Loosen the two screws (3) of the lower shaft timing pulley, hold the upper shaft pulley so that it doesn't move, and then turn the lower shaft cam (4) in the direction indicated by the arrow until the tip of the eye looper (5) is aligned with the center of the needle (6). Once they are aligned, tighten the two screws (3).
   After adjusting, check that the screws have been adequately tightened.
   Once this adjustment has been carried out, repeat the procedure given in "9-2. Adjusting the needle and looper timing".

9-4. Adjusting the height of the needle bar

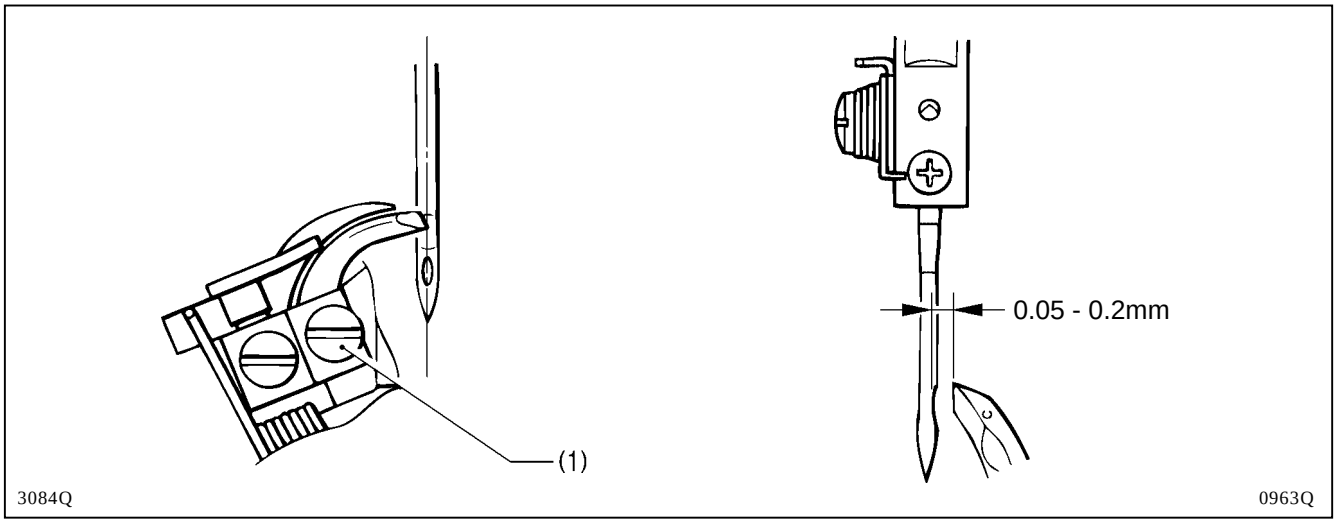
The standard height for the needle bar is 2.5 mm. (The needle bar height may need changing depending on the material and thread being used.)



1. Align the tip of the eye looper (1) with the center of the needle (2) when the needle (2) is at the inside sewing position.
2. Remove the face plate.
3. Loosen the screw (3) of the needle bar clamp (5) and adjust the height of the needle bar (4).
   * After aligning the tip of the eye looper (1) with the top edge of the needle hole, lower the needle bar (4) 2.5 mm.
4. Adjust so that there is as little play as possible, and so that the needle bar clamp (5) and the needle bar level feed link (6) can maintain their oil films. This will help to ensure that the needle bar turns smoothly.

9-5. Adjusting the clearance between the looper and needle

Be sure to carry out this adjustment after changing the size of the needle.
The clearance between the tip of the looper and the needle should be 0.05 - 0.2 mm.

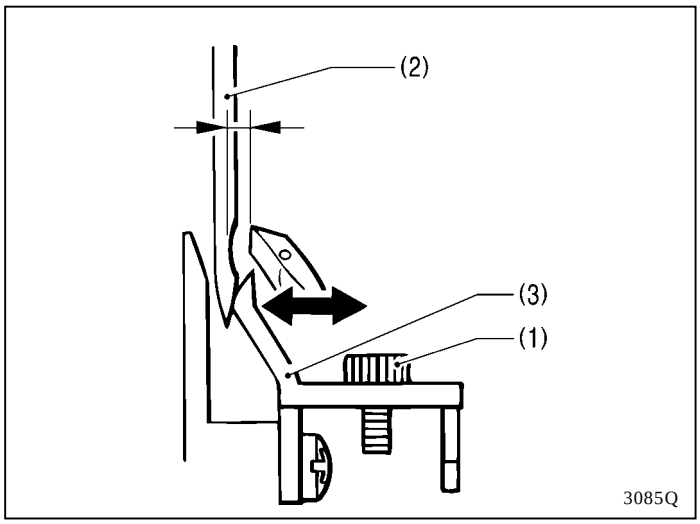


Loosen the looper screw (1) and then adjust the clearance.

* This clearance must be uniform while the looper base is rotating (through 360^{o}).
  If the clearance is not uniform, adjust the turning center for the needle bar. (This adjustment is made at the time of shipment from the factory.)
* After making the adjustment in step 1. above, carry out the adjustment procedure given in "9-7. Adjusting the spreader mounting positions".

9-6. Adjusting the needle guard

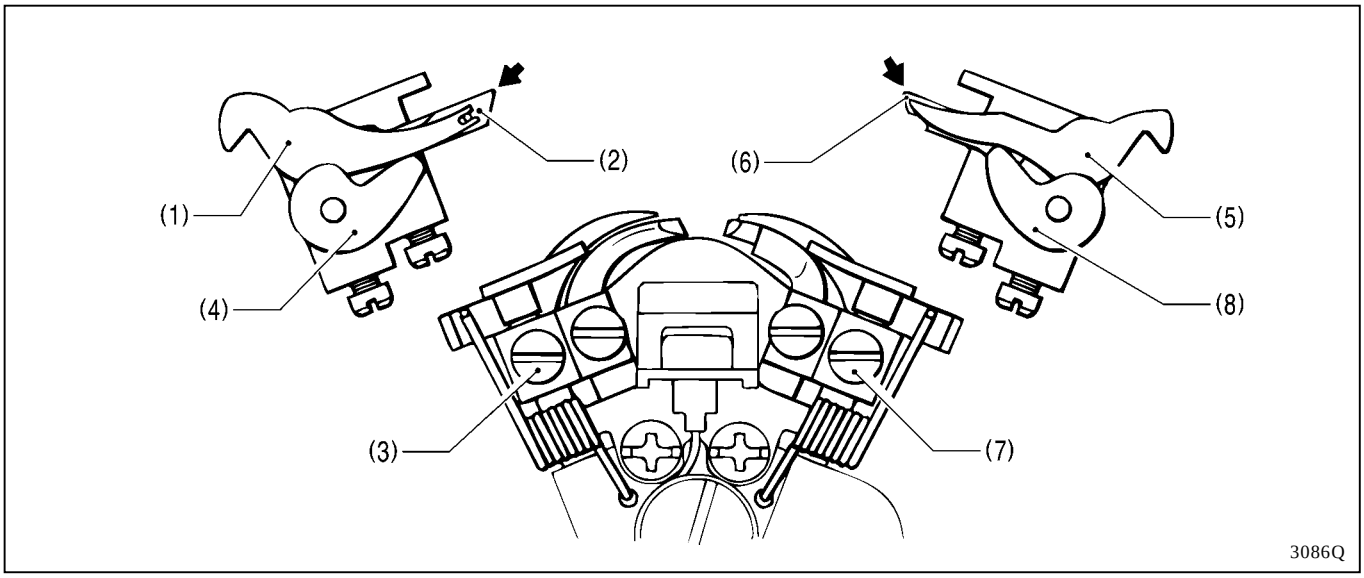
Be sure to carry out this adjustment after changing the size of the needle.
The needle must remain stationary with respect to the needle guard until the tip of the looper reaches the needle.



Loosen the screw (1) and then move the needle guard (3) in the directions indicated by the arrows by an appropriate amount in accordance with the thickness of the needle (2).

Note: Adjust so that the looper clasps the upper thread securely.

9-7. Adjusting the spreader mounting positions

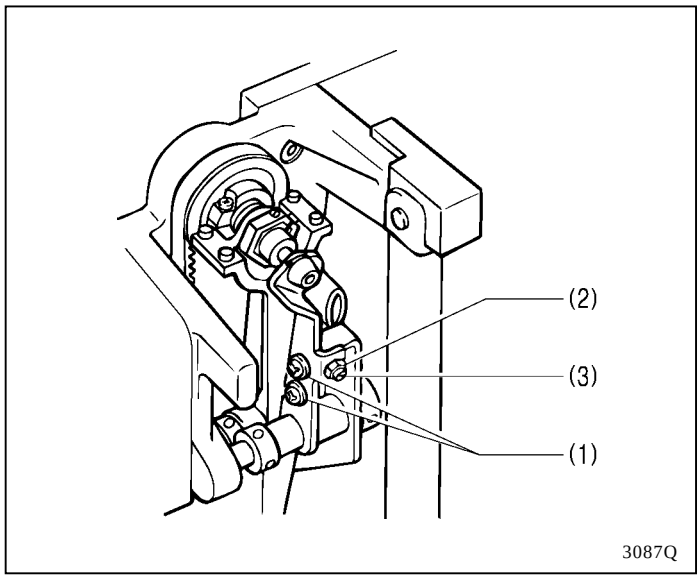


1. Loosen the screw (3) and adjust the position of the left spreader stopper (4) so that the fork of the left spreader (1) is aligned with the lower thread guide hole of the eye looper (2).
2. Loosen the screw (7) and adjust the position of the right spreader stopper (8) so that the tip of the right spreader (5) is aligned with the tip of the right looper (6).

   Note: Both the left spreader (1) and right spreader (5) should be installed so that they do not project past the tips of the eye looper (2) and right looper (6) respectively.

9-8. Adjusting the spreader timing

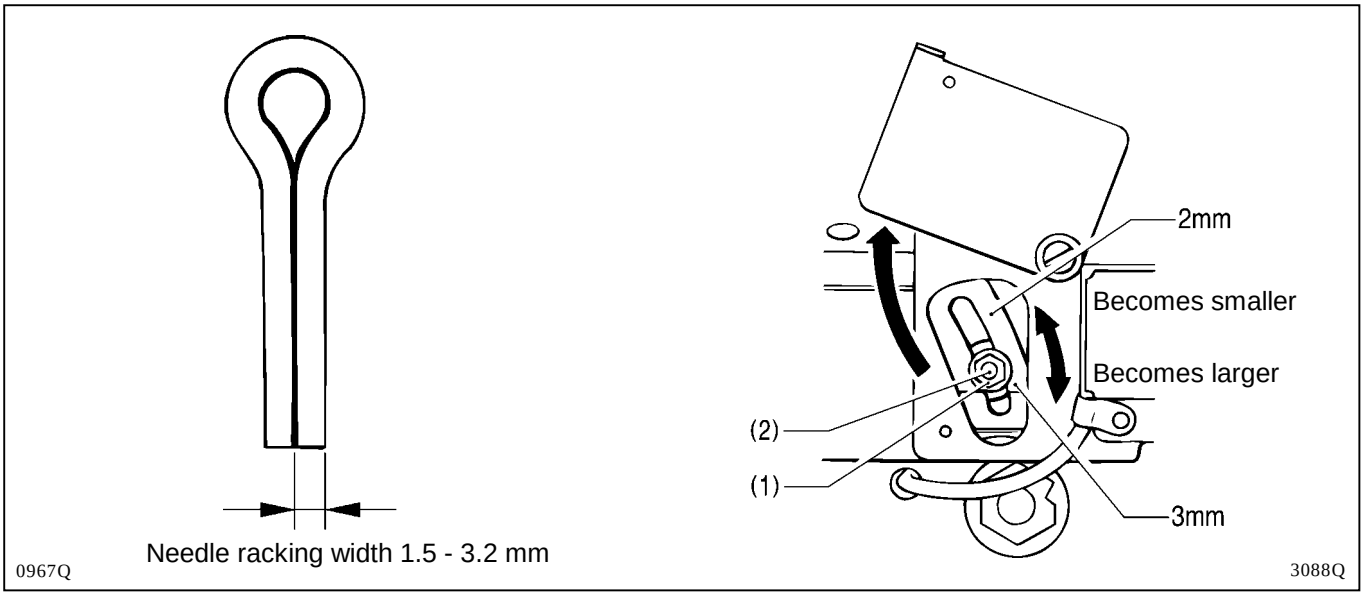
When the needle is at the inside sewing position, the left spreader should touch the left spreader stopper and stop immediately before the needle bar reaches its lowest position.
When the needle is at the outside sewing position, the right stopper should touch the right spreader stopper and stop immediately before the needle bar reaches its lowest position.



1. Raise the machine head.
2. Loosen the screw (1) and the nut (2), and then turn the adjusting screw (3) to adjust the spreader timing.
3. After adjusting, tighten the nut (2) and the screw (1).

9-9. Adjusting the needle racking width (stitch width)

The needle racking width is set to 3 mm at the time of shipment from the factory.



Loosen the needle racking adjustment nut (1) and then adjust the needle racking width by sliding the adjustment screw (2) vertically along the oval slot.
The stitch width becomes smaller as the adjustment screw (2) is moved upward.

Note: If the needle racking width is changed greatly, you should re-adjust the timing between the needle and the loopers.
(Refer to "9-2. Adjusting the needle and looper timing".)

9-10. Changing the knife cutting length (Replacing the hammer)

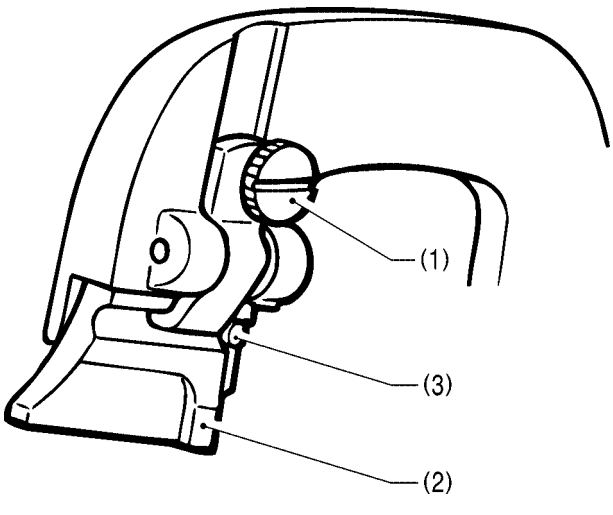
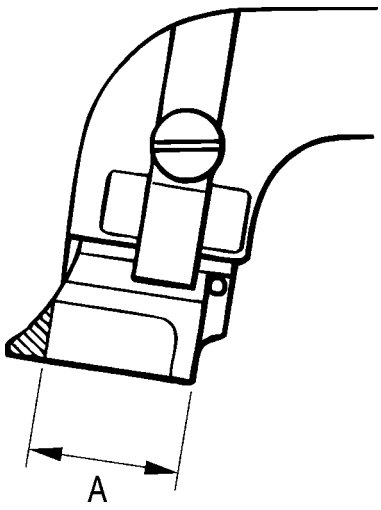
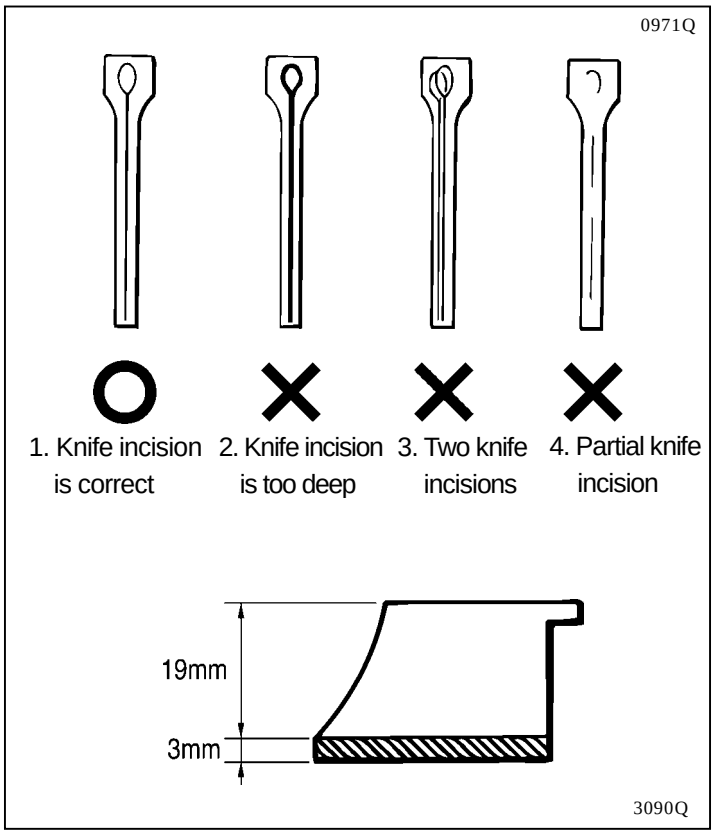


Illustration (A)



1. Grind or replace the hammer after changing the knife cutting length.
2. Loosen the screw (1), and then remove the hammer (2).
   Because the knife cutting length is set in accordance with the length of the hammer, grind the hammer as shown in (A) in the above illustration.
   Hammer length A = Knife cutting length + 1.5 mm
3. When installing the hammer, push in the pin (3) and then tighten the screw (1).
   * Do not use knives with different numbers on the same hammer. If knives with different numbers are used, accurate cutting will not be possible and the knife will be damaged.

9-11. Adjusting the contact between the knife and the hammer



1. Remove the hammer. (Refer to the previous page.)
2. If the knife incision on the surface of the hammer is very deep, if there are two or more incisions on the hammer because different knives were used, or if only part of the incision has been made, grind the surface of the hammer smoothly until a single knife incision can still be seen faintly.
3. The cutting pressure over the whole of the hammer should be uniform so that the material will be cut cleanly.
   Grind the surface of the hammer so that the knife incision will be uniform over the whole of the hammer.
   * The hammer can be filed until its height is 19 mm.
4. If the material cannot be cut cleanly even though the hammer has been ground correctly, check whether the tip of the knife is worn.
   * If the tip is worn, replace the knife.
     Do not use the old hammer after the knife has been replaced, otherwise it may damage the tip of the knife.

Adjusting the contact between the knife and the hammer

To see the knife incision more easily, color the cutting surface of the hammer with a marker pen.

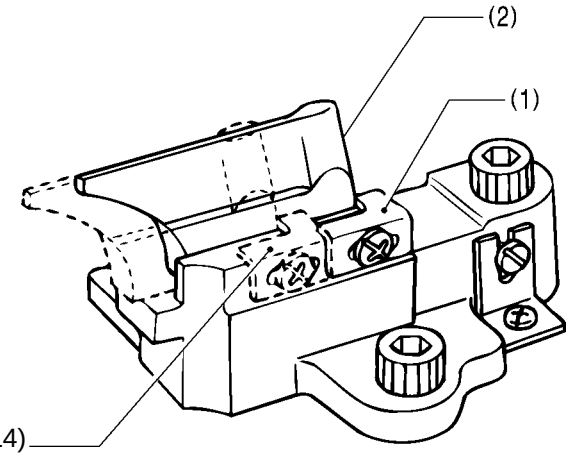
1. Operate the hammer three times with the knife making a mark on it each time.
2. Adjust the position of the hammer or contact between the knife and the hammer until the knife consistently makes a mark in the same place.

Filing the cutting surface of the hammer

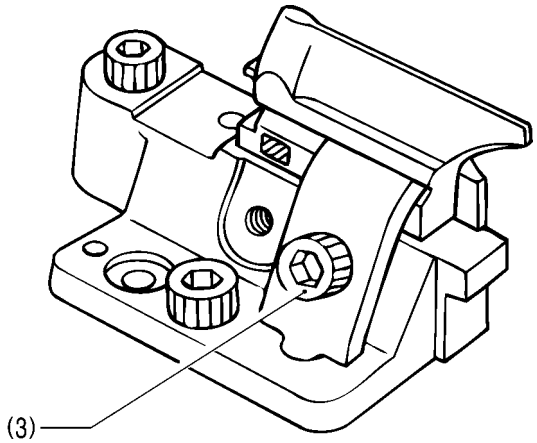
Use a flat file for filing.

1. Filing the cutting surface of the hammer on which the knife incision breaks off or is shifted
   1-1. Grip the hammer in a vise.
   1-2. File the surface of the hammer smoothly until the knife incision is erased away.
2. Filing the cutting surface of the hammer in which knife incision is deep
   2-1. Grip the hammer in a vise.
   2-2. File the surface of the hammer smoothly until a single knife incision can still be seen faintly.

9-12. Replacing the knife



3091Q



3092Q

1. After checking that there is no clearance between the stopper plate (1) and the knife (2), loosen the bolt (3) and then remove the knife (2).
2. Insert the new knife (2) into the stopper plate (1), and then tighten it with the bolt (3).

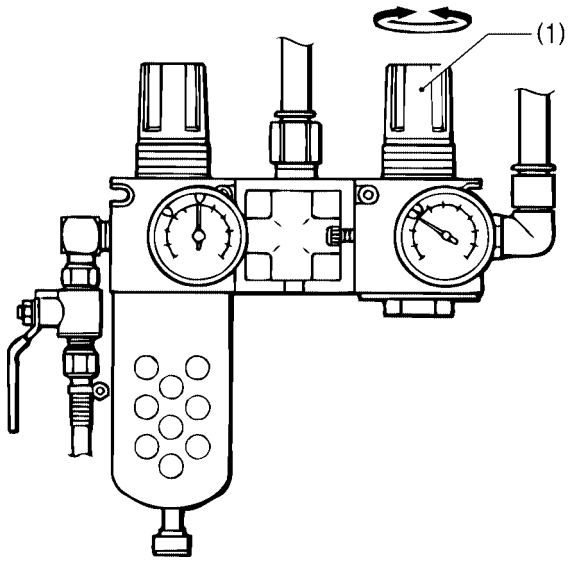
   Note: For L1 - L4 specifications, secure the stopper plate (1) in the position closest to you (the position indicated by the dotted lines).

* When replacing the knife (2), make sure that the knife number matches the number for the eyelet shape.
Replace the knife and hammer as a set.
If knives with different numbers are used on the same hammer, accurate cutting will not be possible, and damage to the knife may result.

9-13. Adjusting the cutting pressure

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

* If the knife cutting length is 20 mm, sufficient cutting performance can be obtained with an air pressure of 0.2 MPa. To adjust the cutting pressure, adjust the air pressure of the knife pressure adjustment regulator (1) which is mounted underneath the work table.



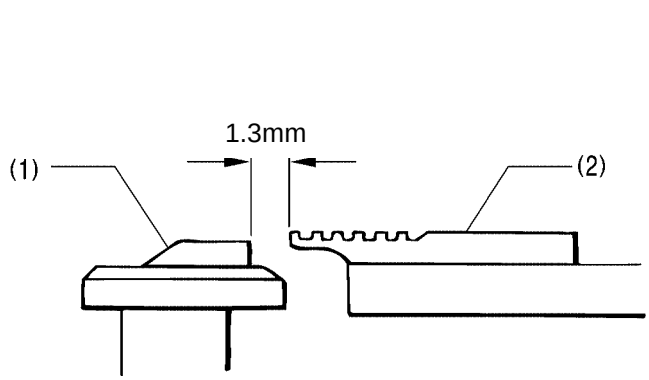
3093Q

* If the cutting pressure is increased to more than is necessary, it will cause the hammer to become worn or the knife to become damaged.

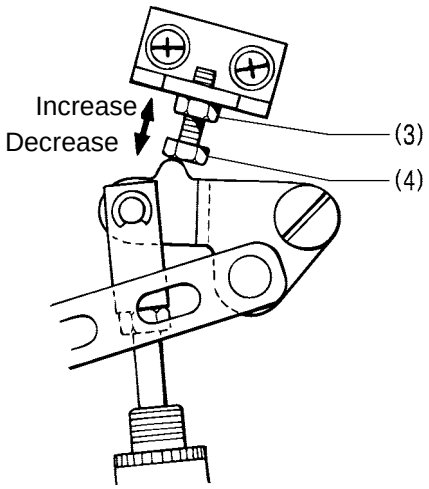
* If the material cannot be cut cleanly, do not increase the cutting pressure over the maximum limit. Check the contact between the knife and the hammer, while referring to "9-11. Adjusting the contact between the knife and the hammer".

9-14. Adjusting the position of the work clamp plate

Adjust so that the throat plate (1) and the needle plate R (2) do not make contact during sewing.
The standard clearance between the throat plate (1) and the needle plate R (2) is 1.3 mm (when the cutting space is set to 0).



3094Q



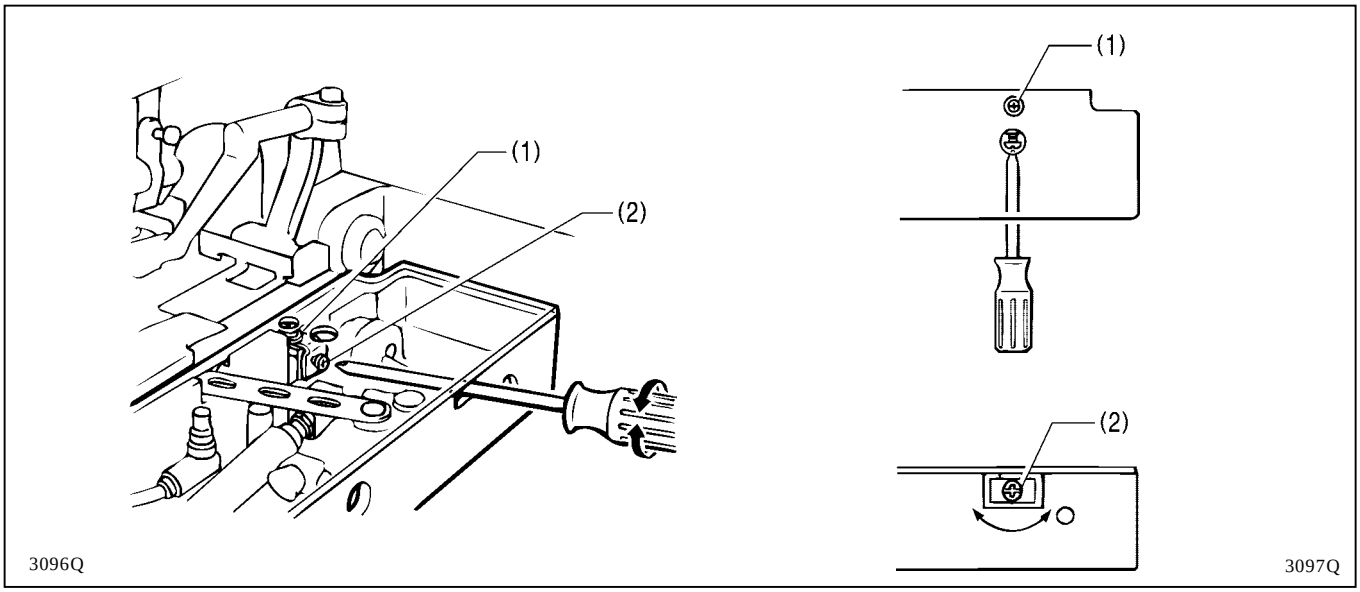
3095Q

1. Use the parameter settings to set the cutting space to "0".
2. Select the test feed mode, and press the start switch.
3. Keep pressing the start switch, and make sure that the clearance between the throat plate (1) and the needle plate R (2) is 1.3 mm.
4. If the clearance is not 1.3 mm, loosen the nut (3), and turn the bolt (4) to adjust the clearance.

Note: Adjust the clearance between the throat plate (1) and the needle plate L in the same manner.

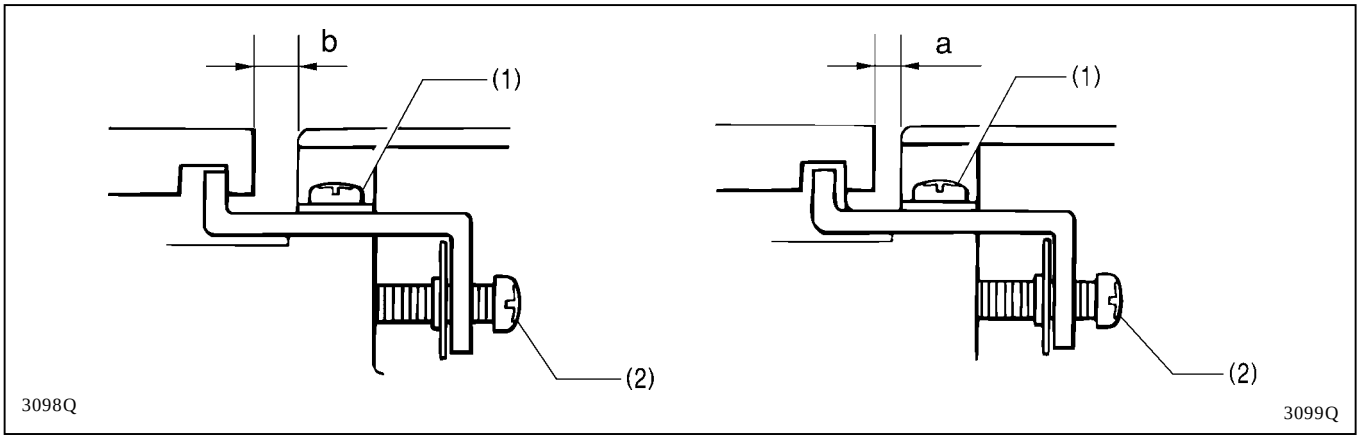
* If the maximum stitch width correction amount is set to 2.0 mm, adjust the distance between the throat plate and the needle plate to more than 2.0 mm.

9-15. Adjusting the cloth opening amount



1. Loosen the screw (1), and then insert a screwdriver into the notch in the side of the feed bracket and turn the adjusting screw (2) to adjust the opening amount.
2. After tightening the screw (1), measure the opening amount.
   Note: Adjust so that the opening amounts for the left and right work clamp plates are equal.
   * It is usually sufficient for one work clamp plate to open by 0.8 mm.

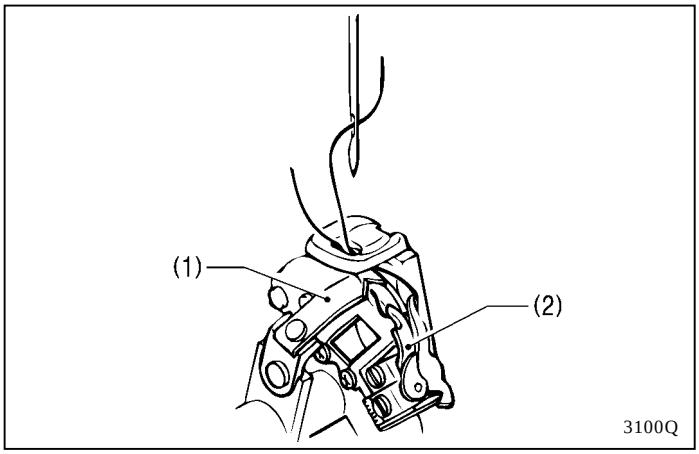
Measuring the opening amount



1. Switch the mode to test feed mode. (Refer to page 50.)
2. Lower the work clamp and then use calipers to measure the distance a.
3. Press the start switch. The feed bracket will move and then the left and right work clamp plates will open.
4. Use calipers to measure the distance b.
5. The difference between a and b is the opening amount. (Opening amount = a - b)

9-16. Adjusting the trimming of the upper thread

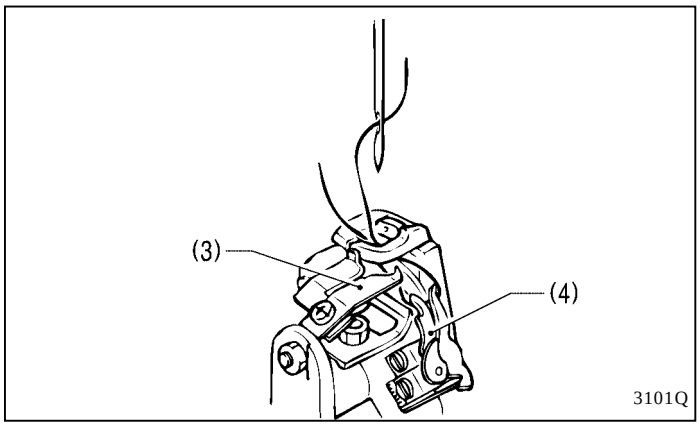
The upper thread should be trimmed at the correct time after sewing is completed.



<-00, -01>

Adjust so that the upper movable knife (1) cuts only one of the threads in front of the right looper (2).

Note: If both strands of the thread loop are cut, the thread remaining in the needle may become too short and skipped stitches may result.



<-02,-52>

Adjust so that the upper movable knife (3) cuts only one of the threads in front of the right looper (4).

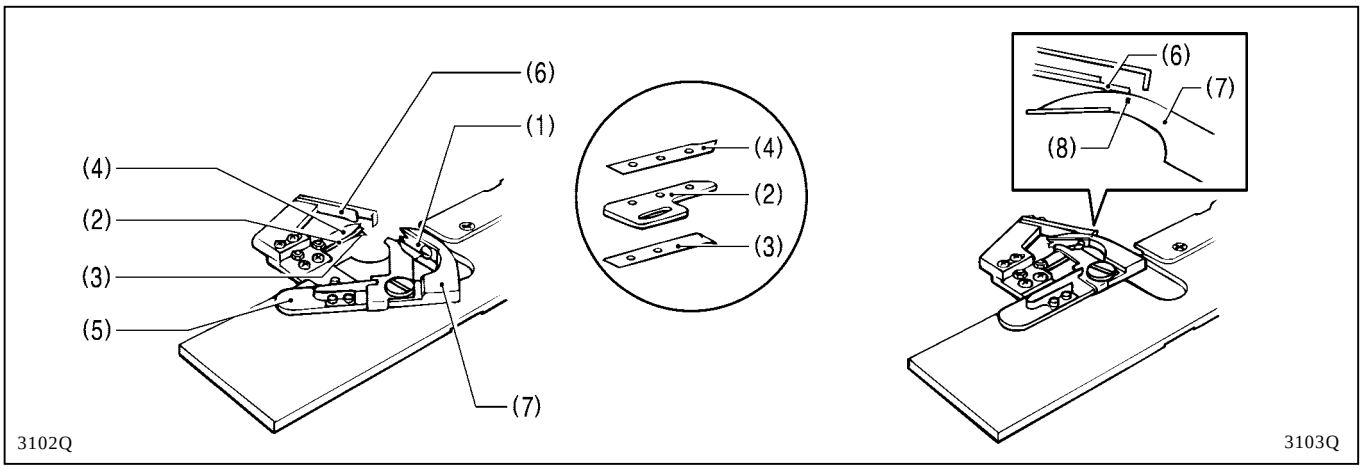
Note: If both strands of the thread loop (forward and back) are cut, the thread remaining in the needle may become too short and skipped stitches may result.

9-17. Adjusting the trimming of the lower thread and gimp

<-00, -01>

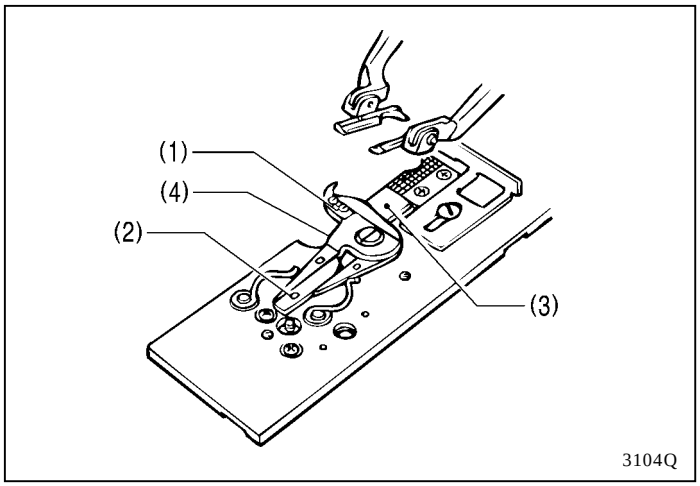
The lower thread and gimp should be trimmed at the correct time after the feed bracket has returned to the home position.

Thread trimming operation can be checked in steps while manual mode is active. (Refer to “7-8. Using manual mode”.)



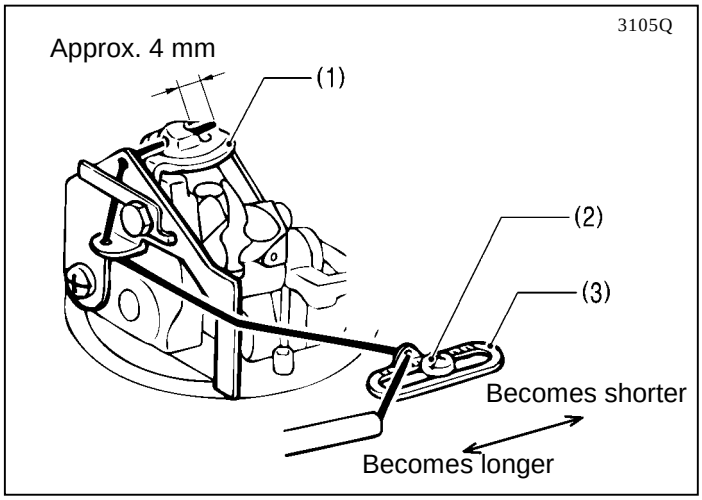
1. The mechanism is adjusted so that the lower thread and gimp are separated from each other and spread by the thread handler (1).
2. The lower thread is held between thread nipper M (2) and thread nipper D (3) on the plate spring.
   The gimp is held between thread nipper M (2) and thread nipper U (4) on the plate spring.
3. Adjust so that the edge of the fixed knife (6) and the index mark (8) on the movable knife (7) are aligned when the thread trimmer arm (5) is at the maximum stroke.

<-02,-52>
The lower thread and gimp should be trimmed at the correct time after the work clamps rise at the feed home position.
Thread trimming operation can be checked in steps while manual mode is active. (Refer to “7-8. Using manual mode”.)



1. The mechanism is adjusted so that the lower thread and gimp are spread by the thread handler (1).
2. The movable knife driving cam (2) operates, and the right movable knife (3) and left movable knife (4) mesh and the thread is cut.

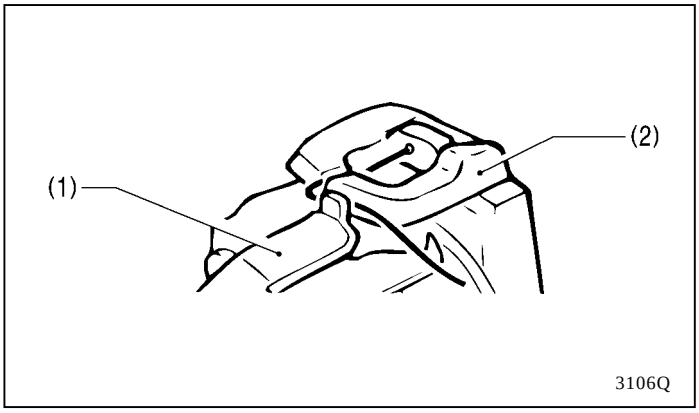
9-18. Adjusting the gimp length after trimming (-02, -52 specifications)



Adjust so that approximately 4 mm of the gimp thread is coming out from the throat plate (1).

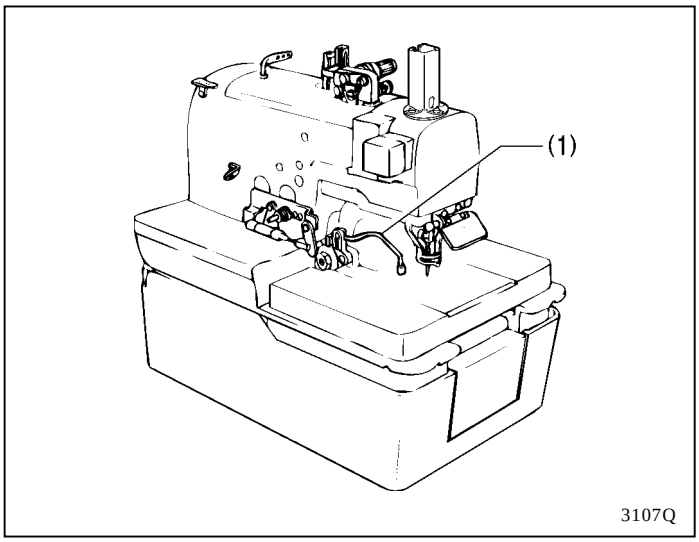
1. Loosen the screw (2) and move the gimp thread guide J (3) in the direction of the arrow to adjust the length.

9-19. Lower thread presser (-02, -52 specifications)



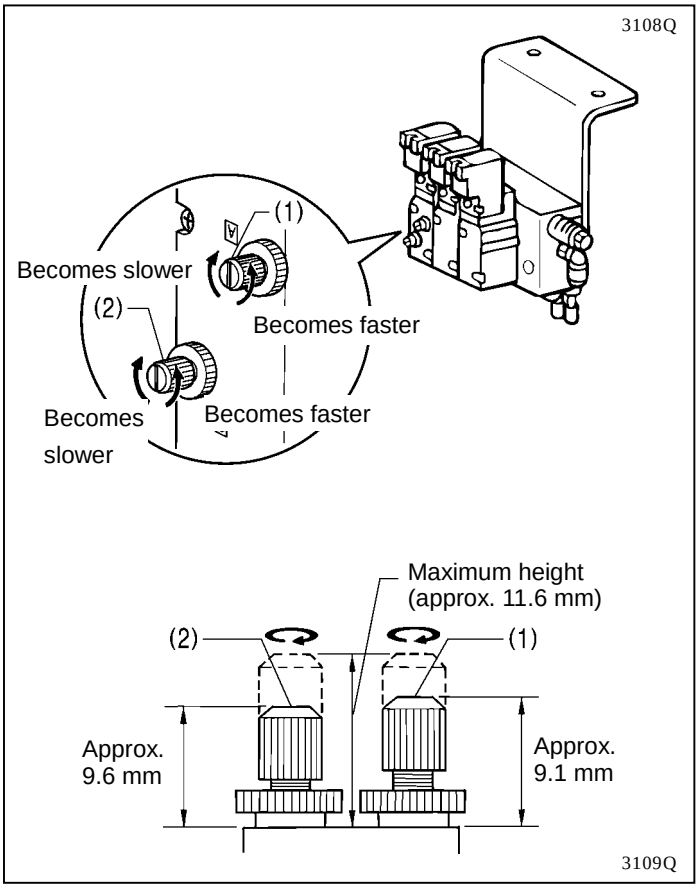
The lower thread presser (1) operates at the same time as upper thread trimming is carried out.
The end of the lower thread is securely held between the lower thread presser (1) and the throat plate (2).

9-20. Auxiliary clamp arm (-02, -52 specifications)



Trimming of the lower thread and gimp is carried out when the work clamps rise. The auxiliary clamp arm (1) endures that the material does not move during thread trimming, in order to maintain a stable thread length after trimming.

9-21. Adjusting the cloth feeding speed (-52 specifications)



Turn the A-side needle valve (1) or B-side needle valve (2) to adjust the cloth feeding speed.

Note: The cloth feeding speed is adjusted to an appropriate speed at the time of shipment from the factory, and should not be changed unnecessarily.

At the time of shipment

A- side needle valve

At a height of approximately 9.6 mm from the surface of the valve body (turned 6 full rotations from the maximum height)

B- side needle valve

At a height of approximately 9.1 mm from the surface of the valve body (turned 7 full rotations from the maximum height)

9-22. Adjusting the cloth feed bar home position (-52 specifications)

The cloth feed bar home position is adjusted by means of the bolt which is installed to feed base L.
After carrying out this adjustment, adjust the installation position for limit switch (R). (Refer to page 71.)

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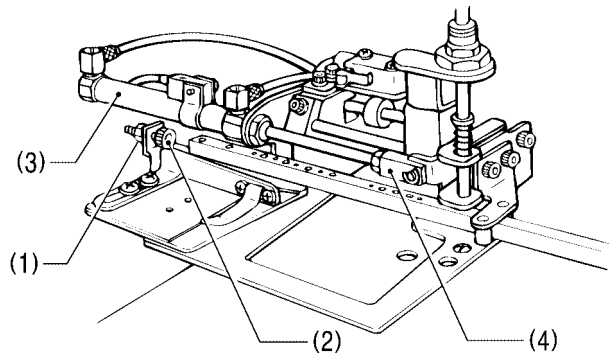
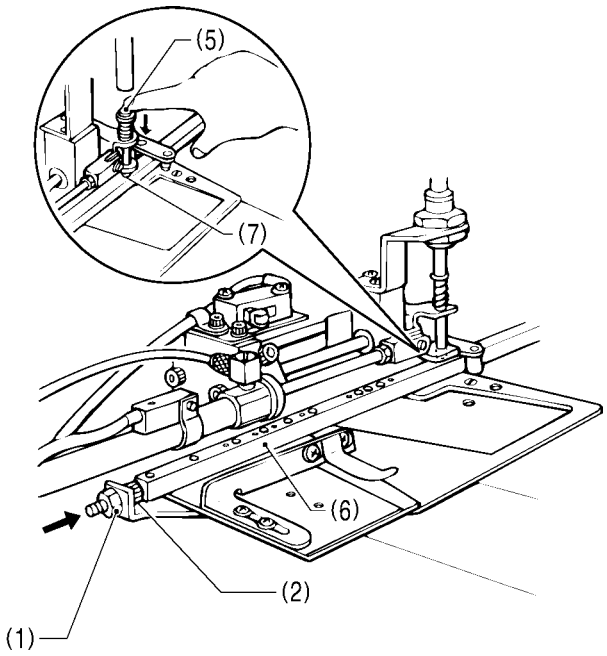


1. Loosen the nut (1) and then turn the bolt (2) so that it moves to the left.
2. Pull the cylinder rod (4) of the cylinder (3) as far to the right as it will go.



3. Insert the pin (5) into the home position hole (7) (refer to page 70) in the cloth feed bar (6).
4. Turn the bolt (2) to move it to the right until it gently touches the cloth feed bar (6)
5. Tighten the nut (1) to secure the bolt (2) in position.
6. Check that the pin (5) fits smoothly into the home position hole (7) when the cloth feed bar (6) is touching the bolt (2).
   * If the pin (5) is not fitting smoothly, repeat the procedure in steps 1. to 5.

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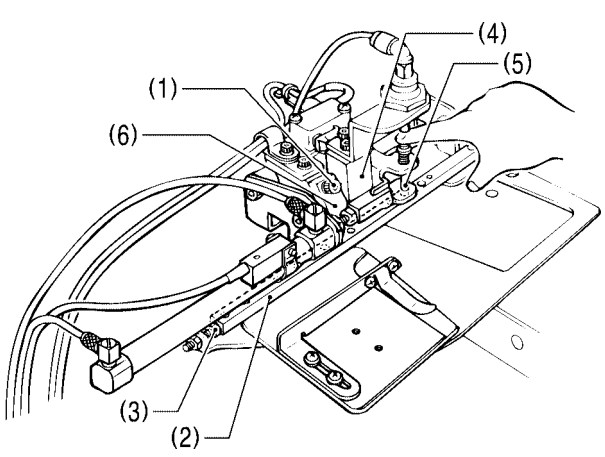
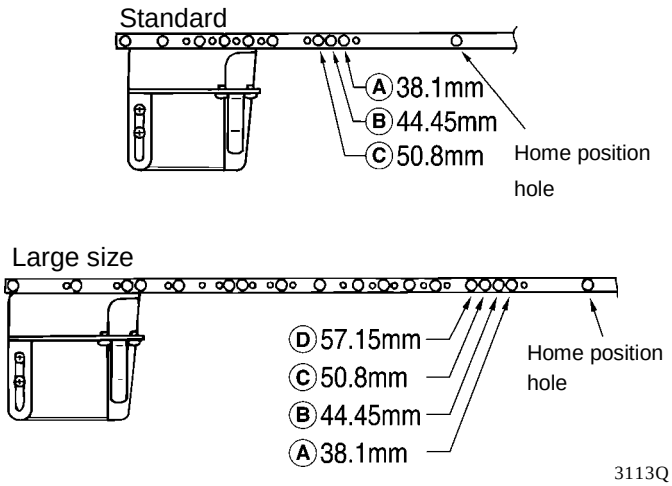
9-23. Adjusting the indexer hole spacing (-52 specifications)

Before carrying out this adjustment, check that the home position adjustment for the cloth feed bar has been carried out correctly. (Refer to page 69.)

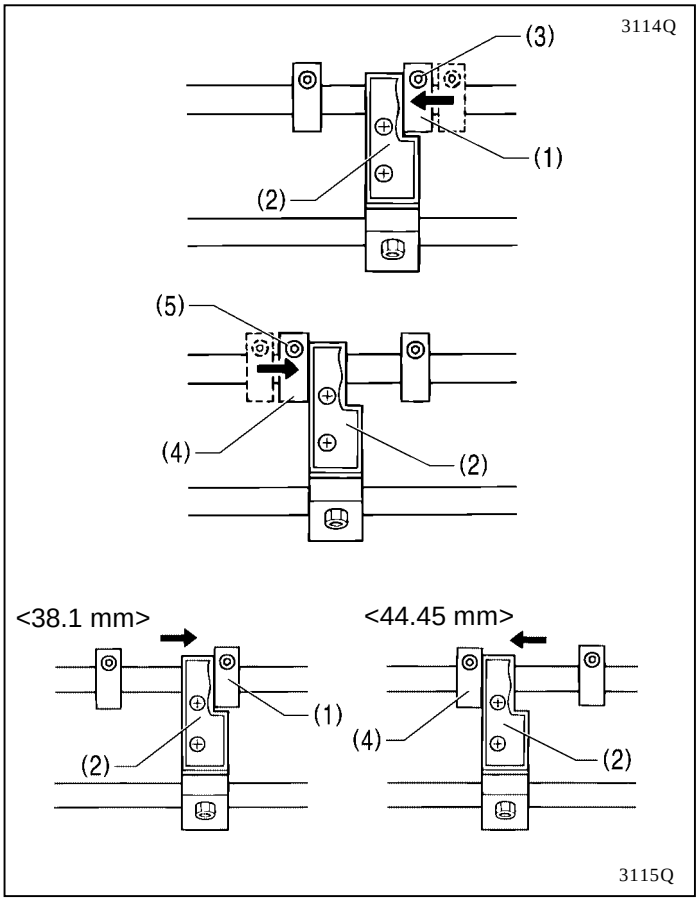




1. Loosen the bolt (1).
2. Push the cloth feed bar (2) against the bolt (3).
3. Move the feed movable block (4) so that the pin (5) goes smoothly into the indexer holes (38.1 mm - (A), 44.45 mm - (B), 50.8 mm - (C), 57.15 mm - (D)).
4. Place the stopper block (6) firmly against the feed movable block (4), and then tighten the bolt (1) to secure it in place.

Using the set screw collar

Using the set screw collar makes it easy to change between two different hole spacing settings. The right-hand set screw collar can be used to set the smaller hole spacing, and the left-hand screw collar can be used to set the larger hole spacing.



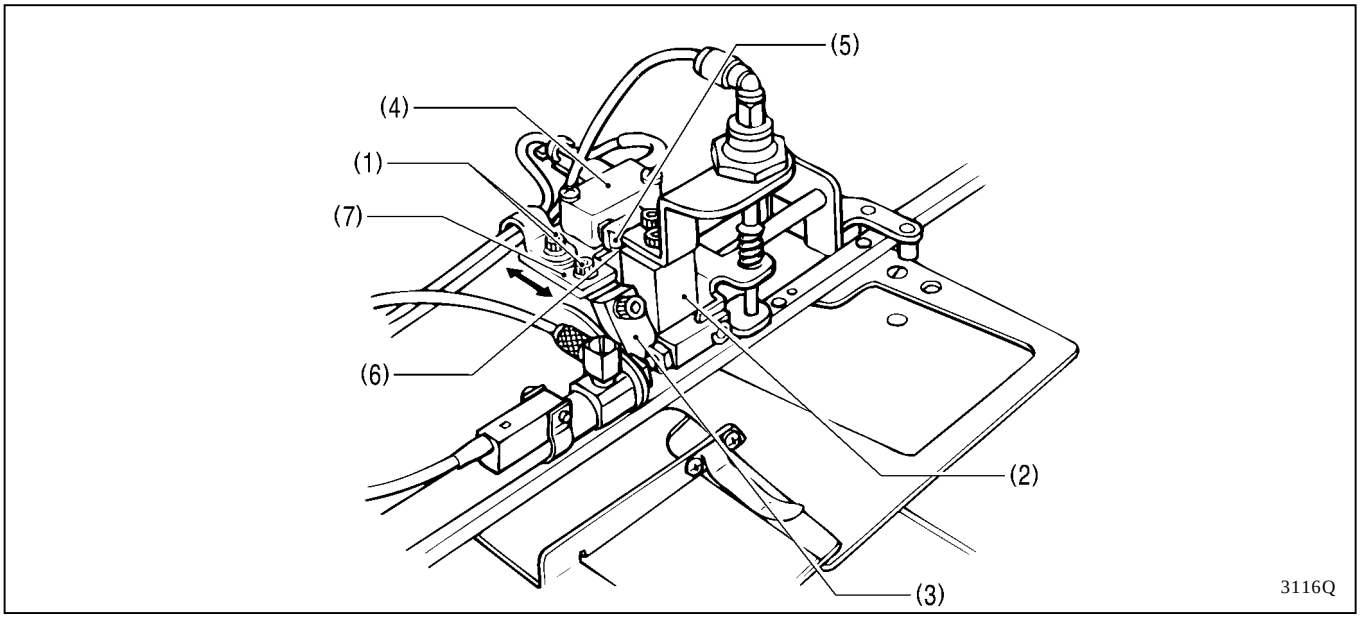
Example: For spacing of 38.1 mm (1-1/2”) and 44.45 mm (1-3/4”)

1. set the hole spacing to 38.1 mm (1-1/2”).
2. Place the right-hand set screw collar (1) against the stopper block (2), and then secure it by tightening the screw (3).
3. Set the hole spacing to 44.45 mm (1-3/4”).
4. Place the left-hand set screw collar (4) against the stopper block (2), and then secure it by tightening the screw (5).
5. From now on, if you want to have hole intervals of 38.1 mm (1-1/2”), move the stopper block (2) so that it is against the right-hand set screw collar (1) and secure it in this position, and if you want to have hole intervals of 44.45 mm (1-3/4”), move the stopper block (2) so that it is against the left-hand set screw collar (4) and secure it in this position.

   Use the same setting method if using other combinations of different hole intervals.

9-24. Adjusting the position of limit switch L (-52 specifications)

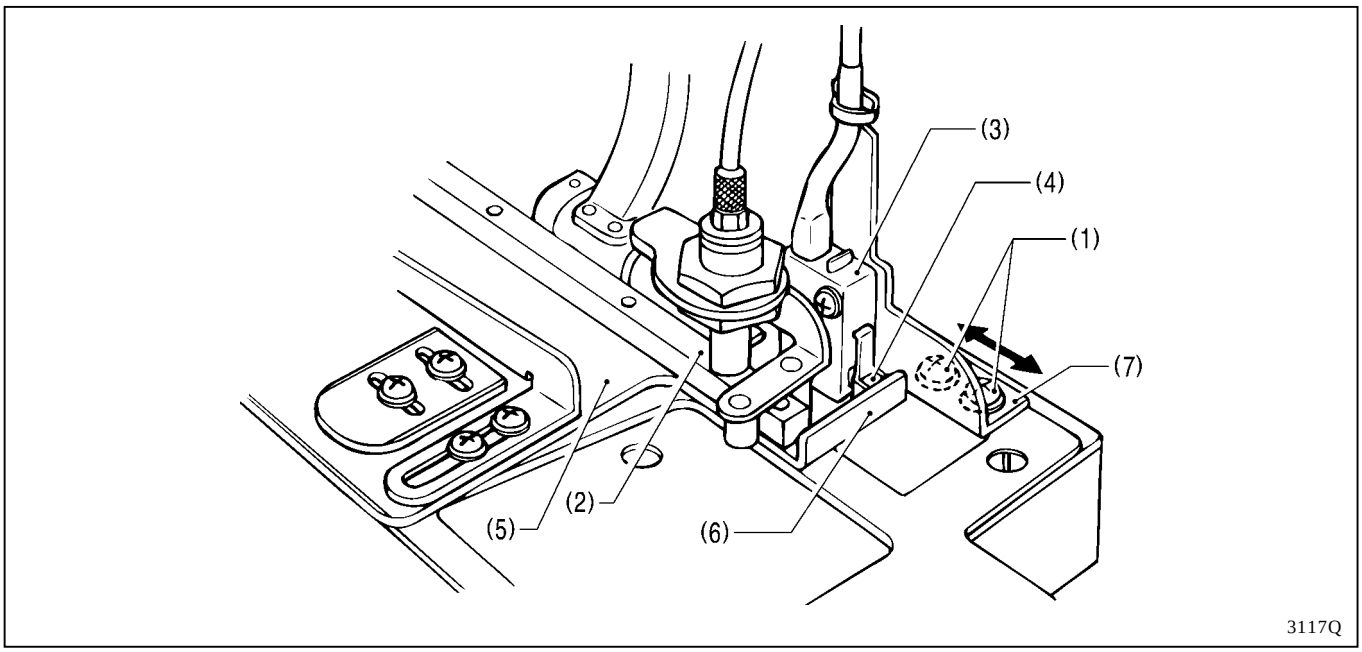
Limit switch L must turn on when the feed movable block is touching the stopper block.



1. Loosen the two bolts (1).
2. Place the feed movable block (2) and the stop block (3) firmly against each other.
3. Adjust the position of the switch setting plate (7) so that limit switch L (4) turns on when the roller (5) is pressed by the dog (6) of the feed movable block (2).
4. Tighten the two bolts (1).

9-25. Adjusting the position of limit switch R (-52 specifications)

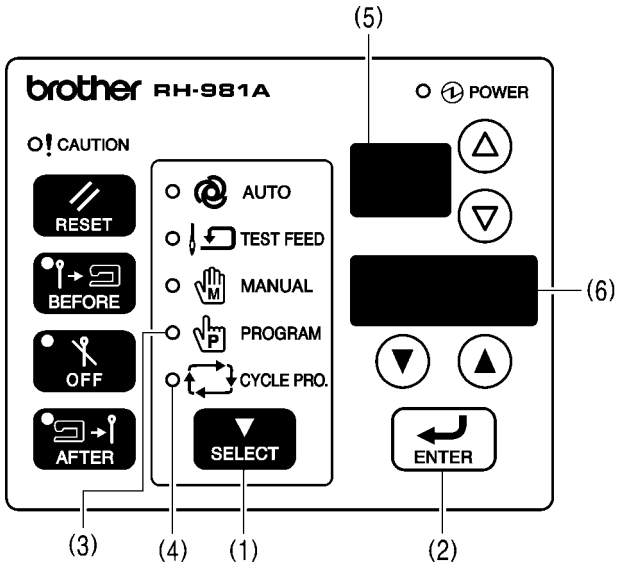
Limit switch R must turn on when the cloth feed bar is at the left setting position.



1. Loosen the two screws (1).
2. Move the cloth feed bar (2) to the left setting position.
3. Adjust the position of feed bar guide R (7) so that limit switch R (3) turns on when the roller (4) is pressed by the dog (6) of cloth feed plate R (5).
4. Tighten the two screws (1).

10. CHANGING FUNCTIONS USING THE MEMORY SWITCHES

The memory switches are valid for all programs.



3118Q

1. Press the SELECT key (1) to change the mode to program or cycle program mode.
2. While pressing the ENTER key (2), press the △ key.
   * The program mode indicator (3) and the cycle program mode indicator (4) will illuminate.
   * The memory switch number "00" will appear in the program number display (5), and the memory switch setting will appear in the detail display (6).
3. Press the △▽ keys to select the number for the memory switch to be changed.
4. Press the ▲▼ keys to change the memory switch setting.
   * The memory switch setting will flash while it is being changed.
5. Press the ENTER key (2) to accept the new setting.
   * The memory switch setting will stop flashing.
6. Repeat steps 3 to 5 to change other memory switch settings.
7. Press the SELECT key (1) to change the mode to automatic mode.
   * The memory switch settings will be memorized.

10-1. Memory switch table

The memory switch settings are applied immediately to all programs once the settings have been changed. However, memory switches marked with * are only applied after the power is turned on.

No.	Setting items	Setting range	Unit	Default
00.	Cloth presser down operation when feed bracket is forward	OFF, ON	-	OFF
01.	Cloth presser stays down after sewing	OFF, ON	-	OFF
02.	Number of home position start cycles (Note 1)	OFF, 1 - 9	1	1
03.	Cutting block ON time	25 - 200 ms	25 ms	25 ms
04.	Timer for checking raising of hammer (Timer for determining if the cutting block has been raised to a position where it will not touch the next feed bracket to operate)	OFF (Determined from number of slit signals), 200 - 500 ms	50 ms	OFF
05.	Feed operation timing correction after hammer is raised (After checking that the hammer is raised, the timer interval is added so that the hammer and feed bracket do not touch.)	0 - 150 ms	25 ms	0
06.	Test feeding deceleration speed	OFF, 1 - 4	1	OFF
07.	Increased amount of upper thread remaining	OFF, 1 - 3	1	OFF
08.	Stitch length display in automatic mode	OFF, ON	-	OFF
09.*	Max. stitch length of L7	40 mm, 42 mm	2 mm	40 mm
10.	Feed timing correction	-10 - 10	1	0
11.*	Number of eyelet buttonholes when fly indexer is used	OFF (Fly indexer is not used),1 - 9	1	1
12.*	Cloth setting position when fly indexer is used	1: Left setting position 2: Horizontal setting position	1	1
13.	Program number selected when buttonhole sensor is ON when using the special lapel cutting device	OFF, 1 - 9	1	OFF
14.	Program number for operating the straight buttonhole hammer regardless of eyelet shape setting (parameter No. 01) and whether the buttonhole sensor is ON or OFF (Note 2)	OFF, 1 - 9	1	OFF

(Note 1) If home position starting is not carried out for each piece of material, there is the danger that the feed bracket may become overloaded for some reason and come off, which will affect the next piece to be sewn. Accordingly it is recommended that you set home position starting to be carried out each time (setting "1").

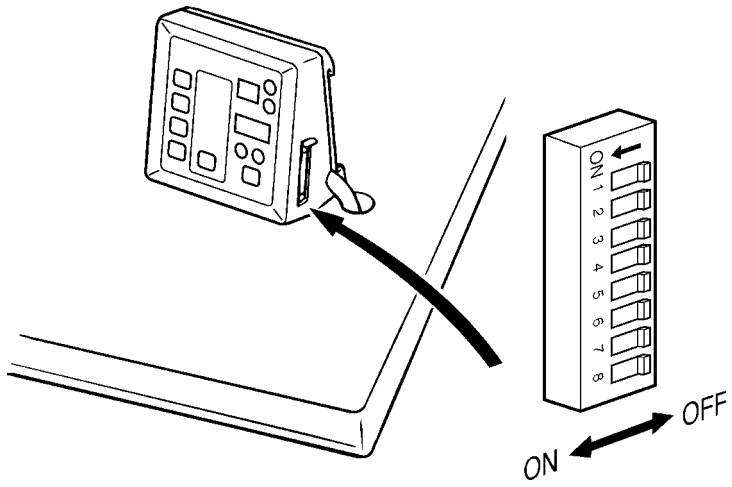
(Note 2) If a program number has been set for memory switch No. 13, it will be ignored if a program number has been set for memory switch No. 14.

11. CHANGING FUNCTIONS USING THE DIP SWITCHES

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

11-1. Panel DIP switches

The ON/OFF positions of the DIP switches inside the operation panel are checked only once when the power is turned on.
Any changes to the DIP switch positions will not be effective until the power is switched off and back on again.



2425Q

No.	ON/OFF	Setting items	Default
1*	ON	Program mode disabled	OFF
	OFF	Program mode enabled	
2	ON	Switches between taper bar ←→ straight bar tacking	OFF
	OFF	Normal	
3	ON	Set the feed bracket to the front position	OFF
	OFF	Set the feed bracket to the back position	
4	ON	-	OFF
	OFF	-	
5	ON	Single-pedal operation	OFF
	OFF	Dual-pedal operation	
6	ON	-	OFF
	OFF	-	
7	ON	-	OFF
	OFF	-	
8**	ON	Maximum stitch width correction amount = 2.0 mm	OFF
	OFF	Maximum stitch width correction amount = 1.0 mm	

* If program mode is disabled, operation becomes as follows.
- Program numbers, knife operations and the production counter cannot be changed.
- The modes change in the order Automatic → Test feed → Manual → Automatic.

** If the maximum stitch width correction amount is set to 2.0 mm, carry out the adjustment in "9-14. Adjusting the position of the work clamp plate". If this adjustment is not carried out, the throat plate and needle plate may interfere with each other.
If the stitch width correction amount is set to more than 1.0 mm, the sewing speed will be limited in accordance with the value set.

11-2. Circuit board DIP switches

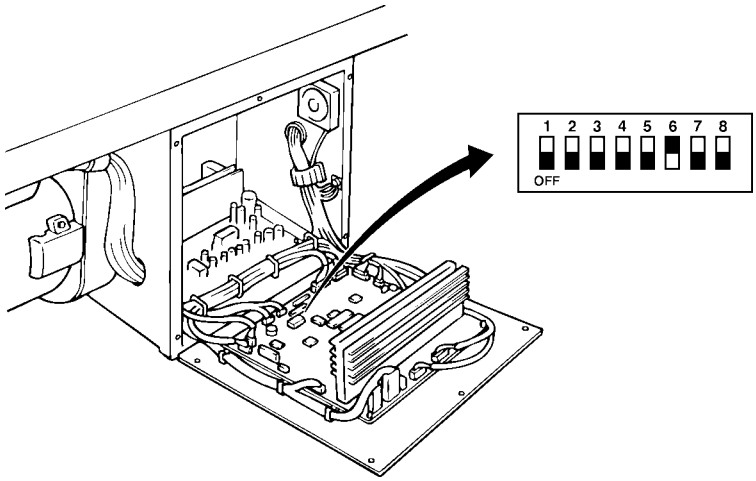
⚠ DANGER

⚠ 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.

The ON/OFF positions of the DIP switches inside the control box are checked only once when the power is turned on.

Any changes to the DIP switch positions will not be effective until the power is switched off and back on again.

Circuit board DIP switch C

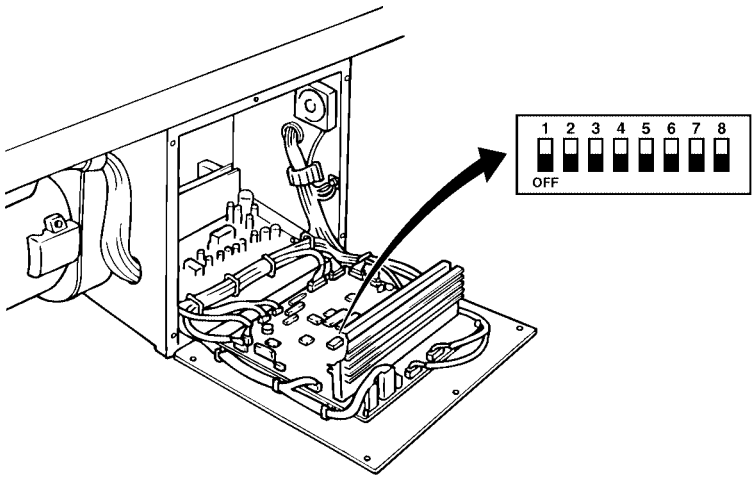


2426Q

No.	ON/OFF	Setting items	Default
1	ON	Special lapel cutting device enabled	OFF
	OFF	Special lapel cutting device disabled	
2	ON	Button hole sensor of special lapel cutting device enabled	OFF
	OFF	Button hole sensor of special lapel cutting device disabled	
3	ON	With pressure sensor	OFF
	OFF	Without pressure sensor	
4	ON	-	OFF
	OFF	-	
5	ON	Upper thread nipper enabled	OFF
	OFF	Upper thread nipper disabled	
6	ON	Lower thread trimming enabled	ON
	OFF	Lower thread trimming disabled	
7	ON	-	OFF
	OFF	-	
8*	ON	Maximum straight bar tacking length = 9.0 mm	OFF
	OFF	Maximum straight bar tacking length = 6.0 mm	

* If the maximum straight bar tacking length is set to 9.0 mm, it will be necessary to process the work clamp plate. Consult with your local Brother sales office for further details. If the work clamp plate is not processed, the throat plate may interfere with the needle plate and work clamp plate.

Circuit board DIP switch D



1001Q

No.	ON/OFF	Setting items	Default
1	ON	-	OFF
	OFF	-	
2	ON	-	OFF
	OFF	-	
3	ON	-	OFF
	OFF	-	
4	ON	-	OFF
	OFF	-	
5	ON	-	OFF
	OFF	-	
6	ON	-	OFF
	OFF	-	
7	ON	-	OFF
	OFF	-	
8	ON	-	OFF
	OFF	-	

12. 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.

When an error occurs, the warning indicator and the error code display flash and the buzzer sounds.

Errors after power is turned on		
Code	Explanation	Resetting method
E-00	EMERGENCY STOP switch was pressed.	1. Release the EMERGENCY STOP switch. 2. If an error still occurs after 1. is carried out, check that connector P3 on the control circuit board is properly connected.
E-02	Machine head is tilted back.	1. Turn off the power. 2. Return the machine head to its original position. 3. If an error still occurs after 1. is carried out, check that connector P8 on the control circuit board is properly connected.
E-03	Cloth presser switch was pressed.	1. Release the cloth presser switch. 2. If an error still occurs after 1. is carried out, check that connector P19 on the control circuit board is properly connected.
E-04	Start switch was pressed.	1. Release the start switch. 2. If an error still occurs after 1. is carried out, check that connector P19 on the control circuit board is properly connected.
E-05	Air pressure is insufficient.	1. Turn off the power. 2. Check the air pressure. 3. Check that connector P1 on the control circuit board is properly connected.
E-06	Feed plate home position sensor is OFF.	1. Move the cloth feed bar to the left so that the feed plate home position sensor turns ON. 2. If an error still occurs after 1. is carried out, check that connector P9 on the control circuit board is properly connected.
E-07	Feed plate left range sensor is OFF.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
E-09	Specification that machine does not support is set.	1. Turn off the power. 2. Check the specification harness and PROM. 3. Check that connector P26 on the control circuit board is properly connected.
E-10	Needle bar is not at the highest position.	1. Turn the pulley by hand to raise the needle bar to its highest position. 2. If an error still occurs after 1. is carried out, check that connector P2 on the control circuit board is properly connected.
E-12	Cutter sensor is ON.	Turn off the power and check that connector P3 on the control circuit board is properly connected.
E-15	Lower thread trimming OFF sensor is OFF.	Turn off the power and check that connector P8 on the control circuit board is properly connected.
E-26	PER terminal connection error	1. Turn off the power. 2. Check that connector P20 on the control circuit board is properly connected. 3. Check that connector P2 on the power supply circuit board is properly connected.
E-27	External RAM error	Turn off the power.
E-28	Panel communication start error	1. Turn off the power. 2. Check that connector P18 on the control circuit board is properly connected. 3. Check that connector P1 on the panel circuit board is properly connected.
E-29	Machine motor communication start error	Turn off the power.

Errors before operation and after the EMERGENCY STOP switch is pressed		
Code	Explanation	Resetting method
E-30	EMERGENCY STOP switch was pressed.	Release the EMERGENCY STOP switch and then press the RESET key.
E-32	Machine head is tilted back.	Turn off the power and return the machine head to its original position.
E-35	Air pressure is insufficient.	Turn off the power and check the air pressure.
E-36	Feed plate home position sensor is OFF when it should be ON.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
E-37	Feed plate left range sensor is OFF when it should be ON.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
E-38	Feed plate right range sensor is OFF when it should be ON.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
E-40	Needle up sensor is OFF when it should be ON.	Turn the pulley by hand to raise the needle bar to its highest position, and then press the RESET key.
E-42	Cutter sensor is ON.	Turn off the power and check that connector P3 on the control circuit board is properly connected.
E-45	Lower thread trimming OFF sensor is OFF.	Turn off the power and check that connector P8 on the control circuit board is properly connected.
E-50	X home position sensor is OFF when it should be ON.	Turn off the power and check that connector P1 on the control circuit board is properly connected.
E-51	Y home position sensor is OFF when it should be ON.	Turn off the power and check that connector P1 on the control circuit board is properly connected.
E-52	θ home position sensor is OFF when it should be ON.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
Data errors		
Code	Explanation	Resetting method
E-59	Sewing data error	Turn off the power and initialize the data.
Errors during operation		
Code	Explanation	Resetting method
E-60	EMERGENCY STOP switch was pressed.	Release the EMERGENCY STOP switch and then press the RESET key.
E-62	Machine head is tilted back. (Head sensor is OFF.)	Turn off the power and return the machine head to its original position.
E-66	Feed plate home position sensor is not activated within a specified time.	Turn off the power and check that connector P9 on the control circuit board is properly connected.
E-67	Feed plate left range sensor is not activated within a specified time.	1. Turn off the power. 2. Check that air is reaching the valve. 3. Check that connector P9 on the control circuit board is properly connected.
E-68	Feed plate right range sensor is not activated within a specified time.	1. Turn off the power. 2. Check that air is reaching the valve. 3. Check that connectors P9 and P21 on the control circuit board are properly connected.
E-70	Needle up sensor is not activated within a specified time.	Turn off the power and check that connector P2 on the control circuit board is properly connected.

12. LIST OF ERROR CODES

Errors during operation		
Code	Explanation	Resetting method
E-71	Needle down sensor is not activated within a specified time.	Turn off the power and check that connector P2 on the control circuit board is properly connected.
E-72	Cutter sensor is not activated within a specified time.	1. Turn off the power. 2. Check that air is reaching the valve. 3. Check that connectors P3 and P4 on the control circuit board are properly connected.
E-75	Lower thread trimming OFF sensor is not activated within a specified time.	1. Turn off the power. 2. Check that air is reaching the valve. 3. Check that connector P8 on the control circuit board is properly connected.
E-76	Needle up sensor is OFF during test feeding.	Turn off the power and turn the pulley by hand to raise the needle bar to its highest position.
E-77	Synch signal is not activated within a specified time.	Turn off the power and check that connector P2 on the control circuit board is properly connected.
E-80	X home position sensor is not set to ON within a specified time of searching home position.	Turn off the power and check that connector P7 on the control circuit board is properly connected.
E-81	Y home position sensor is not set to ON within a specified time of searching home position.	Turn off the power and check that connector P6 on the control circuit board is properly connected.
E-82	θ home position sensor is not set to ON within a specified time of searching home position.	1. Turn off the power. 2. Check that connectors P11 and P13 on the control circuit board are properly connected. 3. Check that connectors P1, P2 and P3 on the θ axis PMD circuit board are properly connected.
E-89	Machine motor reverse operation error	Turn off the power and check that the motor cord is properly connected.
Hardware errors		
Code	Explanation	Resetting method
E-90	Communication error (against machine motor CPU)	1. Turn off the power. 2. Check that connector P18 on the control circuit board is properly connected. 3. Check that connector P1 on the panel circuit board is properly connected.
E-91	Machine motor running error	Turn off the power and check that connector P2 on the control circuit board is properly connected.
E-92	Abnormal voltage error	1. Turn off the power. 2. Check that the power supply voltage matches the rated voltage. 3. Check that connector P20 on the control circuit board is properly connected.
E-93	Fan (large) lock error	Turn off the power and check that connector P10 on the control circuit board is properly connected.
E-94	Fan (small) lock error	Turn off the power and check that connector P25 on the control circuit board is properly connected.
E-95	X motor overcurrent error	Turn off the power and check that connector P7 on the control circuit board is properly connected.
E-96	Y motor overcurrent error	Turn off the power and check that connector P6 on the control circuit board is properly connected.
E-97	Control circuit board temperature rise error	Turn off the power and check that the inside of the control box is being properly ventilated.
E-98	Power supply relay error	Turn off the power and check that connector P20 on the control circuit board is properly connected.
E-99	Power supply circuit board overcurrent error	Turn off the power and check that connectors P12 and P13 on the control circuit board are properly connected.

13. TROUBLESHOOTING

If there is a problem with operation, first check that the threads are correctly threaded and that the needle is correctly installed.

⚠ CAUTION

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

MACHINE HEAD

Problem	Cause	Remedy	Page
Thread breaks.	Thread tension control nut pressure is too strong.	Adjust to an appropriate pressure.	47
	Thread is of poor quality.	Use a better-quality thread.	
	Thread is too thick for the needle.	Use a differently-size needle.	
	Needle groove or needle hole are not smooth.	Replace with a new needle.	28
	Needle and looper adjustment is incorrect.	Adjust the needle bar height or the looper and spreader height.	55
	Needle, looper, throat plate or thread path is damaged.	Repair the damage with an oilstone or buffer, or replace the damaged part.	
Skipped stitches occur.	Thread tension control nut pressure is too strong or too weak.	Adjust to an appropriate pressure.	47
	Needle point is broken or bent.	Replace with a new needle.	28
	Needle and looper adjustment is incorrect, or clearance is incorrect.	Adjust correctly.	56
	Needle and needle guard adjustment is incorrect.	Adjust correctly.	59
	Looper tip is blunt.	Repair with an oilstone or replace the looper with a new one.	
Needle breaks.	Needle is bent.	Replace with a new needle.	28
	Needle and looper adjustment is incorrect.	Adjust the needle bar height or the looper and spreader height.	55
	Needle and needle guard adjustment is incorrect.	Adjust correctly.	59

Problem	Cause	Remedy	Page
Upper thread is not cut.	Knife is blunt.	Replace with a new knife.	63
	Knife does not move to the full stroke because air pressure is too weak.	Adjust the air pressure.	63
	Upper thread trimmer knife is not picking up the upper thread.	Install the upper thread trimmer knife so that it cuts only one side of the upper thread loop.	66
	Movable knife is not picking up the needle thread because the last stitch is being skipped.	Refer to the remedies given under “Skipped stitches occur” in this troubleshooting chart.	80
	Movable knife position is incorrect.	Adjust the position of the movable knife or the loop spreader.	66, 67
Lower thread is not cut.	Knife is blunt.	Replace with a new knife.	63
	Knife does not move to the full stroke because air pressure is too weak.	Adjust the air pressure.	63
	Movable knife position is incorrect.	Adjust the position of the movable knife or the loop spreader.	66, 67
Thread slips out of the needle at the sewing start.	Thread nipper spring force is too weak.	Adjust the force of the thread nipper spring.	66, 67
	Upper thread length is too short after trimming.	Install the upper thread trimmer knife so that it cuts only one side of the upper thread loop.	66
	Needle and looper adjustment is incorrect.	Adjust the needle bar height or the looper and spreader height.	55
	Not enough upper thread is being fed out.	Adjust the amount of upper thread being fed out.	57
Material is not being cut cleanly.	Cutting pressure is too weak.	Adjust the cutting pressure so that it is strong enough.	63
	Knife and hammer are not contacting properly.	Grind the hammer surface.	62
	Knife is blunt.	Replace with a new knife.	63

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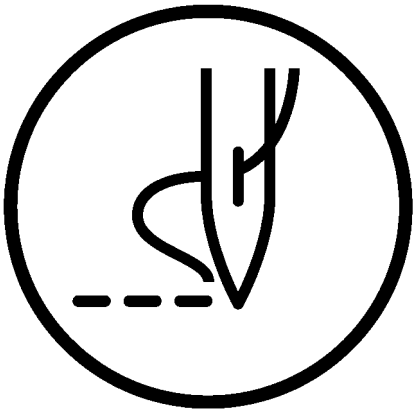

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