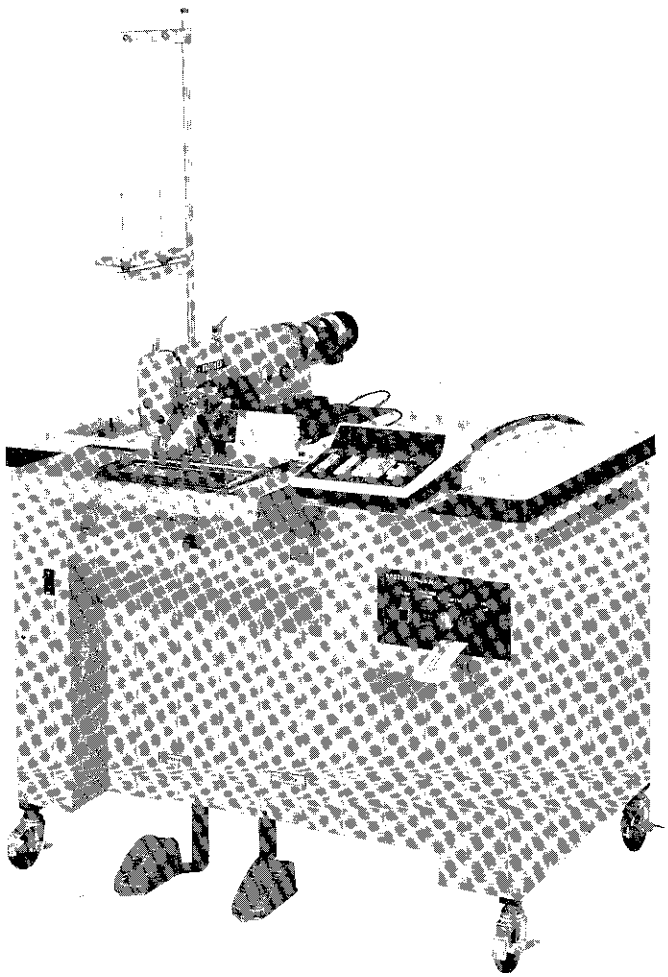
SERVICE MANUAL

FOR

BROTHER BAS-301



Electronically Programmable Lock Stitch Sewing Machine

BROTHER INDUSTRIES, LTD.
NAGOYA, JAPAN

AN OUTLINE OF THIS MACHINE

★ The production of the BAS-301 model automatic sewing machine is an event that has been long awaited by the sewing industry.
It is a masterpiece of BROTHER electronic technology, a general-use labor-saving sewing machine suited to a wide range of applications.
One of the greatest features of this machine is that it has a small easy-to-use programmer so that memory cards can be quickly and accurately produced at the sewing factory.

★ Once a stitch pattern has been recorded on the memory card, the card can be used indefinitely. The same card can also be used repeatedly for recording other, new stitch patterns. The operator merely needs to hold the sewing material between the foot-presser mechanism and depress the foot pedal. The control of the stitching and even the thread cutting will be automatically performed.

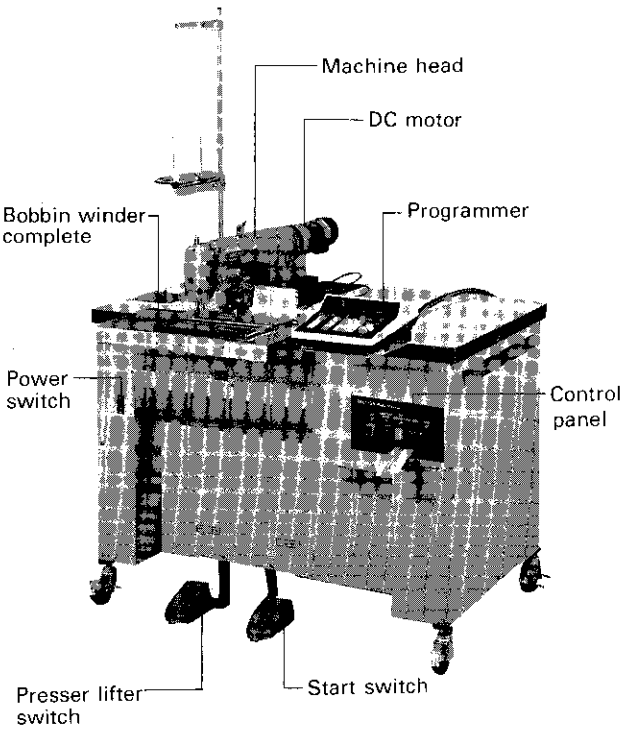
★ Alterations of the pattern are accomplished simply by inserting the memory card into the card reader. The introduction of this machine into the sewing industry will bring about the advantages of automation: improved quality and productivity, rationalization of the manufacturing process because unskilled machinists can be employed, and immediate product modification by pattern alteration.

FEATURES OF THIS UNIT

1. Operation requires no special skill or effort because all functions are electronically controlled and sewing of the programmed pattern proceeds automatically.
2. Alterations of the pattern can be accomplished very quickly and simply by replacing the memory card.
3. The memory card is produced by the programmer as it traces the position of the stitches of a full-scale reproduction of the pattern.
   The programmer immediately memorizes the design.
   Compared with conventional pattern sewing machines, this one produces memory cards much faser and more easily.
4. This model has a pulse motor for intermittent feed, thus accurate patterns can be stitched on any kind of cloth, from thin to thick materials.
5. This model has a maximum stitch size of 250 mm × 105 mm so that large-scale patterns can be sewn. Intricate and complicated designs are beautiflly formed and uniformly finished.
6. An inner clamping device has been developed to facilitate and speed up the previously time-consuming operation of sewing such as rectangular name tags, magic tape, reinforcing cloth, etc.
7. This is a high performance general-use machine with functions suited to a diverse range of sewing applications.

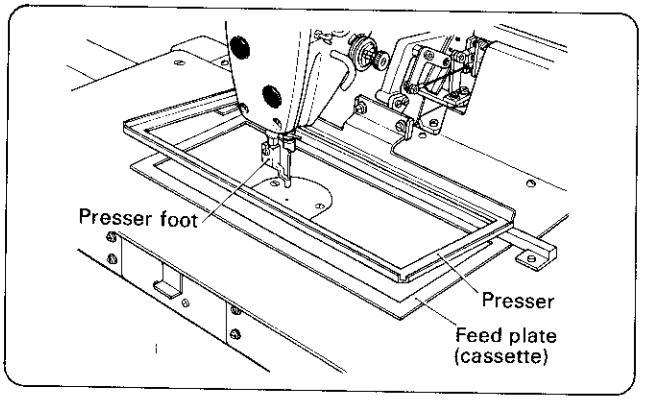
CONTENTS

NAME OF MAJOR PARTS

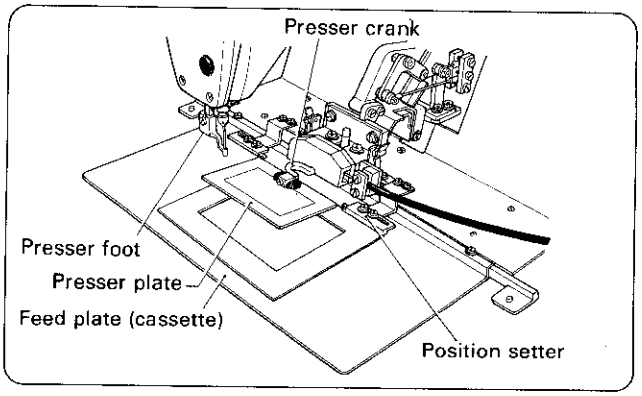


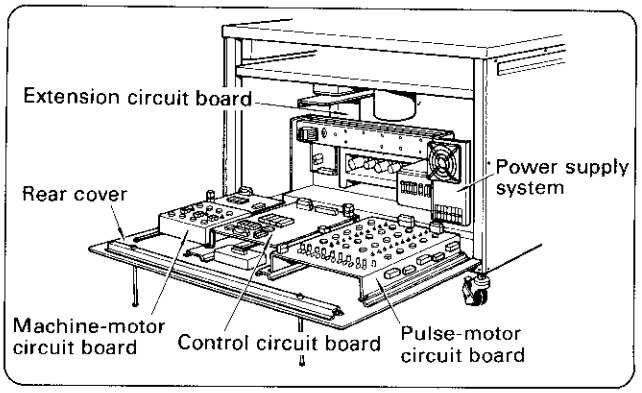
(Note) Be sure to ground the power cord.

≪Clamp parts≫



≪Clamp parts≫ Inner clamping device





Stitch type	Single needle lock stitch sewing
Machine type	Single needle automatic thread trimming sewing machine
Sewing speed	2,000 spm (Intermittent feed) Sewing start and stop: high/low speed automatic changeover
Pattern size	X course (crosswise) 250 mm Y course (lengthwise) 105 mm (When using inner clamping device) X course (crosswise) 250 mm Y course (lengthwise) 80 mm
Number of stitches	1,000 max.
Stitch length	0.2 mm ~ 3 mm, Sewing speed 2,000 spm / 3.2 mm ~ 6.2 mm, Sewing speed 1,000 spm * For a seam pitch larger than 3.2 mm, refer to the accompanying "Programmer Instruction Manual."

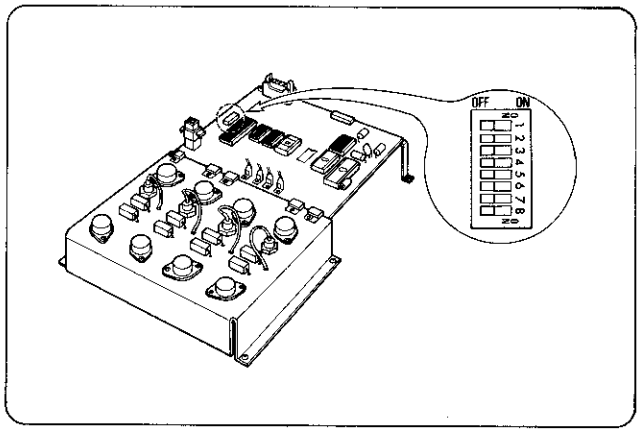
Test device	Built-in test function at low speed drive
Safety device	Built-in temporary stop function and automatic built-in emergency stop device using safety circuitry (both with thread trimmer drive) Equipped with lower thread counter
Power	3P, 200V, 600W, motor
Drive motor	DC motor, and pulse motor
Dimensions	1,100 (W), 850 (D), 1,060 (H) mm
Standard accessories	Cleaning card, memory cards (301 models: — 3 type only)

EXPLANATION OF CIRCUIT BOARD DIP SWITCHES

1. DIP SWITCHES OF THE MACHINE-MOTOR CIRCUIT BOARD

* The switches should ordinarily be set to the OFF position.

	ON	
1	High-speed rotation	Self-Test Switch Order of priority 1 · 2 · 3 · 4
2	Low-speed rotation (200 spm)	
3	Extreme low-speed rotation (100 spm)	
4	Thread trimmer	
5	The maximum speed (even for programs with stitch length longer than 3.2 mm) is 2,000 spm.	
6		
7 8	Speed Selector Switch	



The speed control adjustment on the operating panel can be used to produce the following sewing speed.

	Low speed (L)			High speed (H)
Pitch of 3 mm or less	1,250 spm	1,500 spm	1,750 spm	2,000 spm
Pitch of 3.2 mm or more	500 spm	600 spm	750 spm	1,000 spm

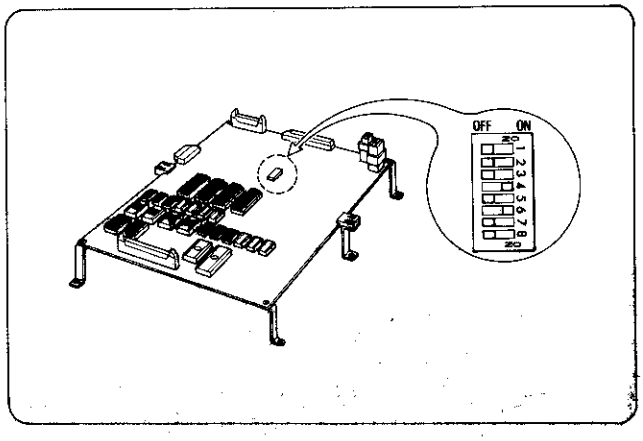
* However, the speed cannot be changed to be less than that which has been set with the Speed Selector Switch unless dip switches 7 and 8 are both set to the OFF position.

Speed selection by using dip switches 7 and 8

	1,250 spm (500)	1,500 spm (600)	1,750 spm (750)	2,000 spm (1,000)
7	OFF	OFF	ON	ON
8	OFF	ON	OFF	ON

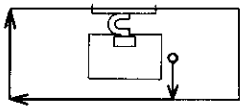
2. CONTROL CIRCUIT BOARD DIP SWITCHES

	ON	OFF
1	The presser is in the lower position when sewing is completed.	The presser is raised when sewing is completed.
2 3		
4	Stitching pitch of 0.2 mm — 6.2 mm	Stitching pitch of 0.2 mm — 3 mm
5	Inner clamping test	
6	Inner clamping device retrun	Fast return
7 8		



* Switch No. 5 should normally be set to the "OFF" position, except when the inner clamping device is to be tested.
* Be sure to set switch No. 6 to the "ON" position when the inner clamping device is to be used.
(Switch No. 6 is set to the "ON" position when the unit is delivered.)

[Inner clamping device return]

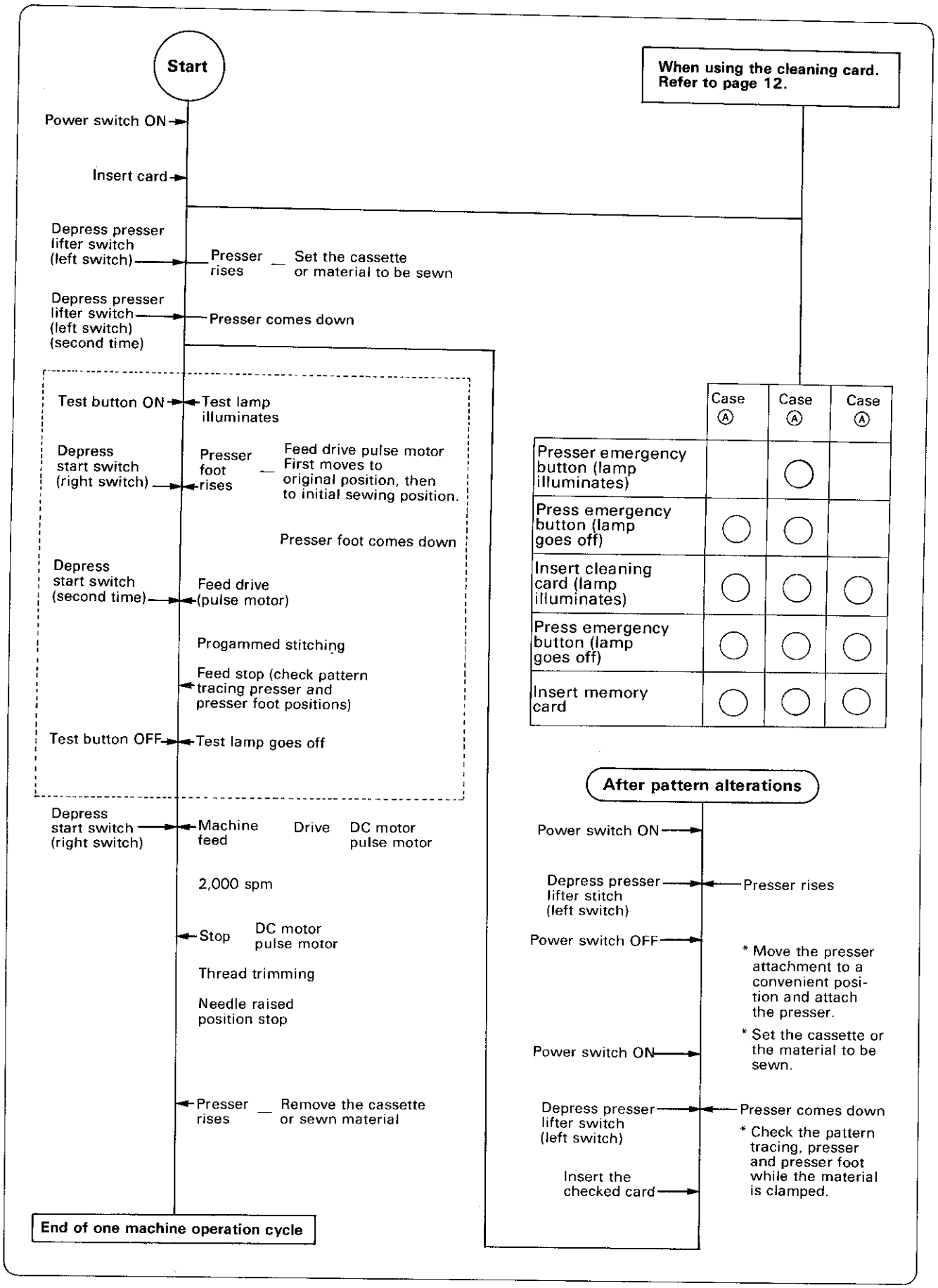


The needle will return to the starting point, avoiding contact with the inner clamping device.

[Fast return]

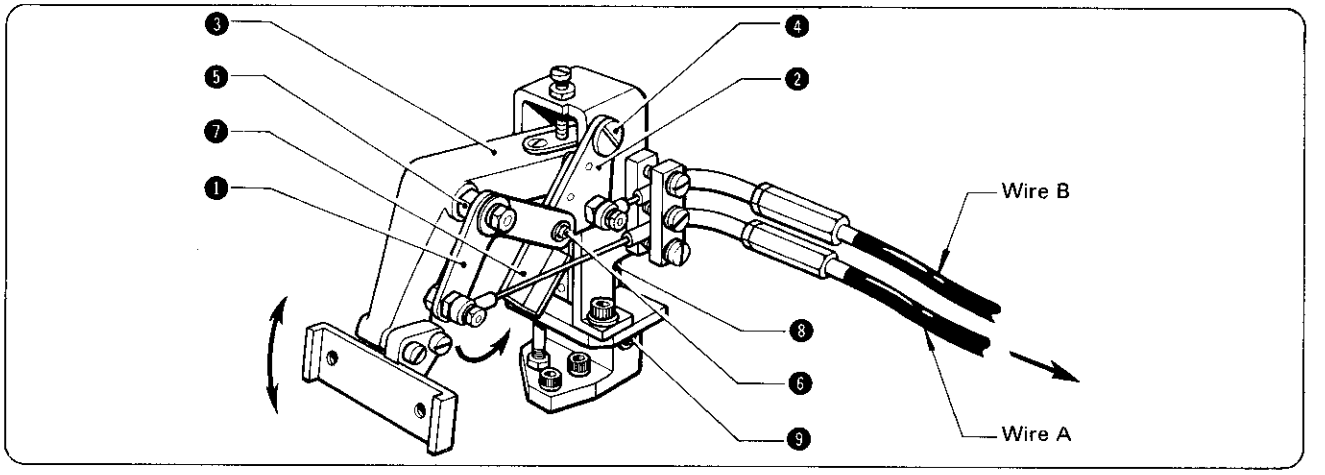
The needle will return diagonally to the starting point. (Do not use this when the inner clamping device is mounted because the needle will strike the device.)

OPERATION FLOW CHART



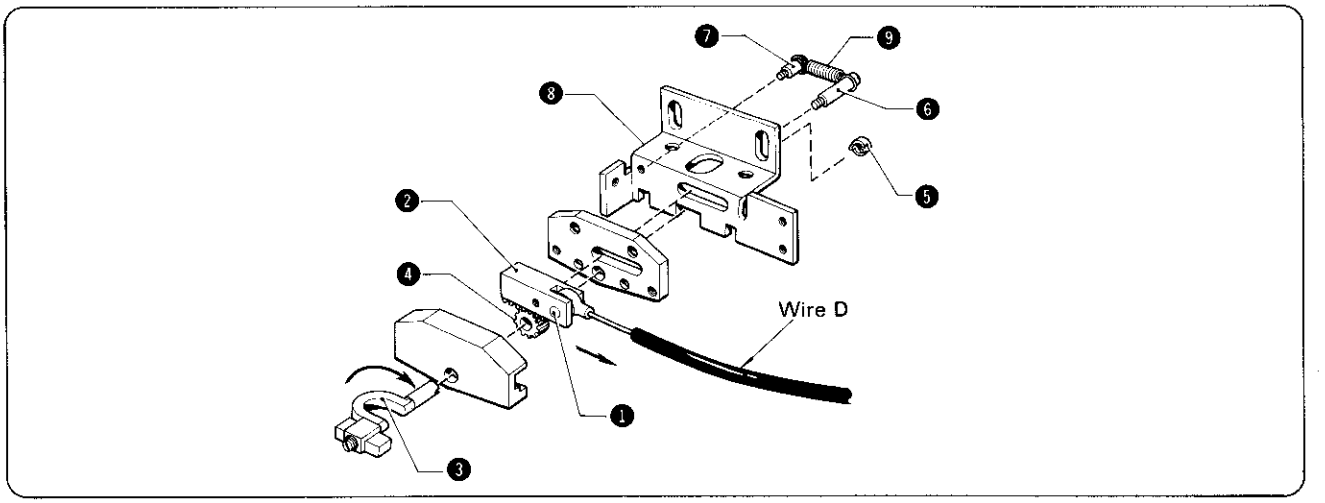
MECHANISM DESCRIPTION

1. PRESSER MECHANISM



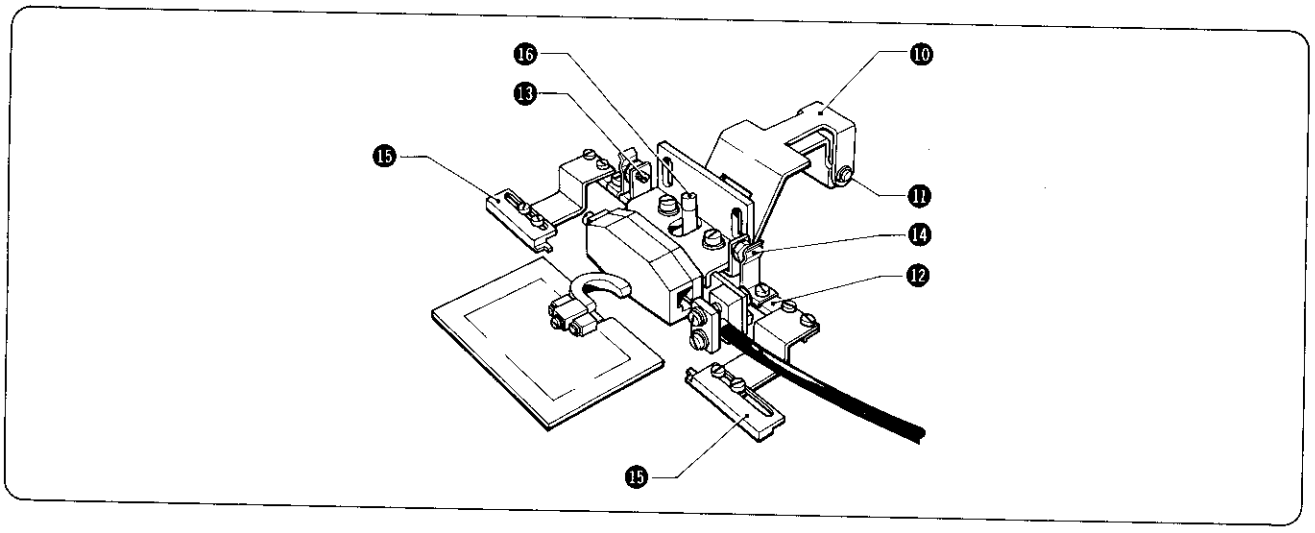
1. When wire A is pulled in the direction indicated by the arrow, the motion is transmitted to lever B ❶, lever A ❷ is then pushed up, and the presser arm ❸ is lowered. At this time, the step screw ❹ of lever A, lever axle A ❺ and lever axle B ❻ will be positioned in a straight line. this assembly will then contact the stopper ❼. The pressure of the presser will then be at its maximum point.
2. The presser arm ❸ moves vertically. The presser arm hinge axle ❾ acts as the fulcrum of its movement through the presser arm hinge ❽.
3. Lever A ❷ and lever B ❶ are connected by lever axle B ❻.
   The step screw ❹ of lever A is the fulcrum of the movement of lever A ❷, and lever axle A ❺ is the fulcrum of the arc movement of lever B ❶.
4. When wire B is pulled, lever A ❷ is pulled back and the presser arm ❸ is raised.

[Inner clamping device]



1. When wire D is pulled, it acts on the wire clamp pin ❶ and the reverse motion rack ❷ then moves in the direction indicated by the arrow.
2. The presser crank is connected to the reverse gear ❹ by means of the reverse gear washer ❺. The presser crank ❸ turns by the movement of the reverse motion rack ❷.
3. Reverse-return-spring hanger A ❻ is attached to the reverse-motion rack ❷, and reverse-return-spring hanger B ❼ is attached to the presser for the device ❽. When wire D is slackened, the reverse-motion rack ❷ is moved back by the action of the reverse return spring ❾, and the presser crank ❸ returns to its original position.

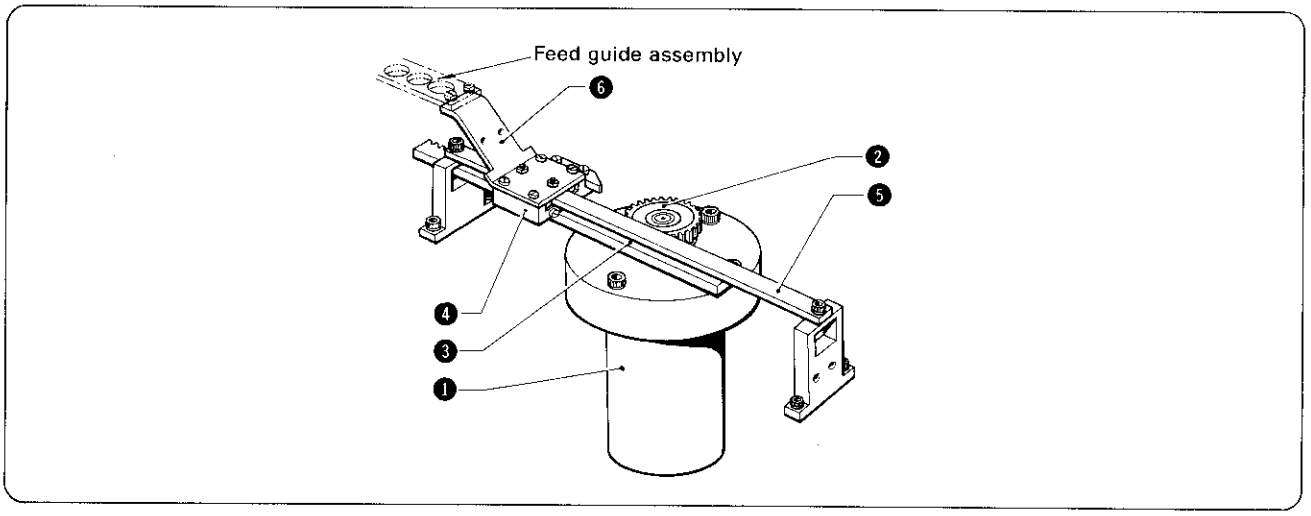
◎ Positioner



4. The body of the positioner ⑩ is attached to the presser of the inner clamping device ⑧. the positioning lever ⑫ moves in an arc by means of the positioning lever axle ⑪.
5. The stop screw ⑬ is attached to the body of the positioners ⑩, and the positioning plate spring is attached to the positioning lever ⑫. The positioner and the positioning lever join together when the presser is lowered. As a result, when the presser is raised, the positioner ⑮ is also raised.
6. When the setting shaft ⑯, which is attached to the positioning lever ⑫, is pressed, the positioner ⑮ will lower while the inner clamping device remains suspended.

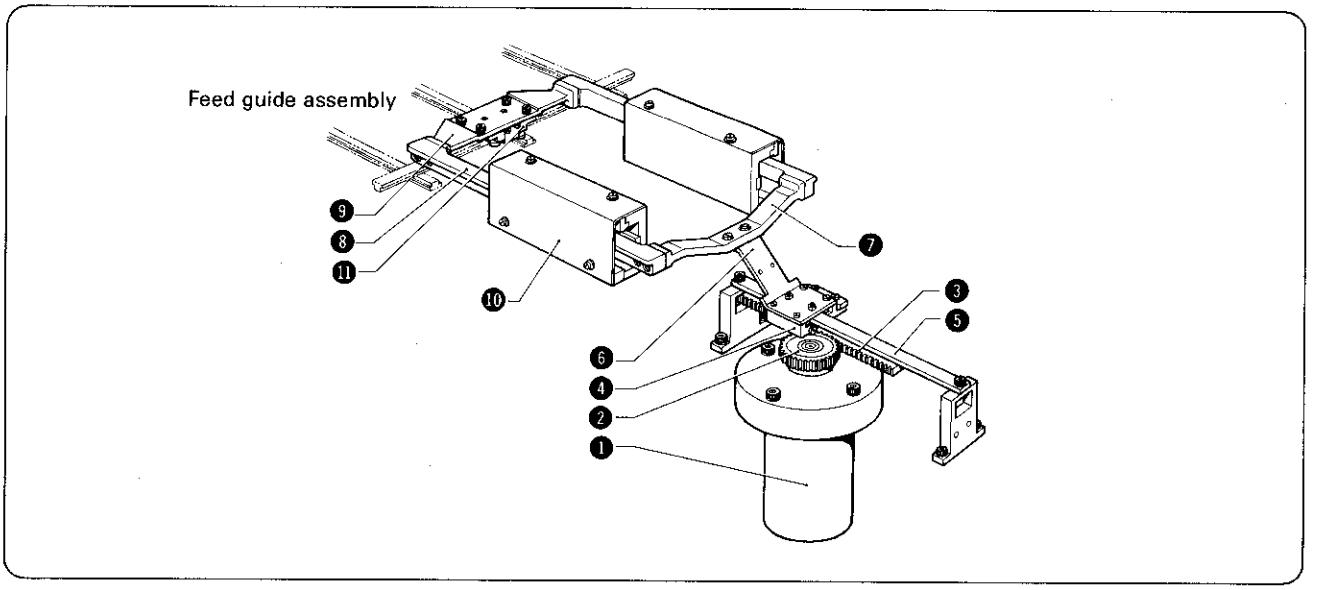
2. FEED MECHANISM (DRIVE SIDE)

[X Direction]



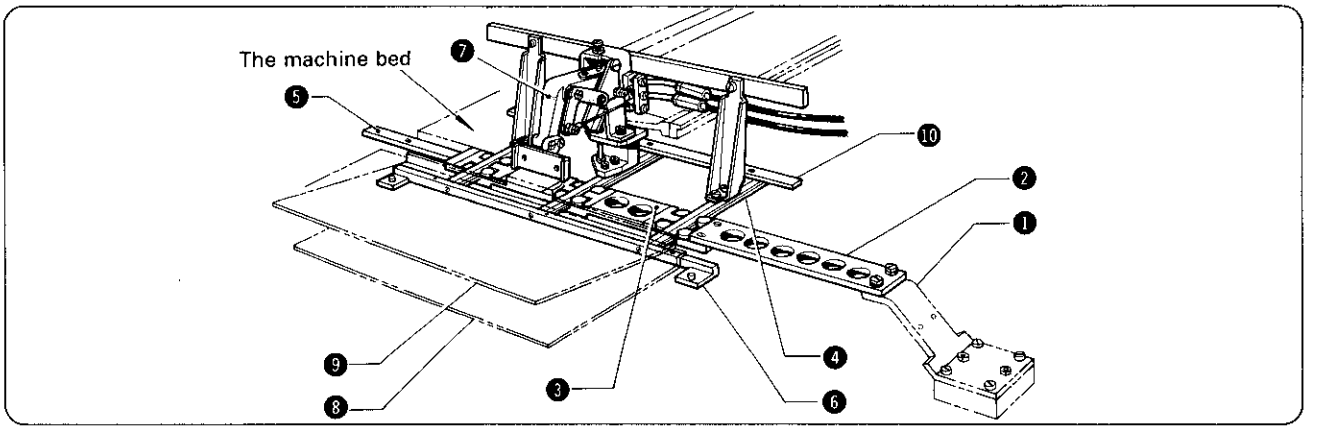
1. When the pulse motor ① begins to rotate, the motion is transmitted to the bracket ④ via the rack ③ which is acted upon by the gear ②.
2. The bracket is guided by the bracket guide ⑤.
3. The drive is transmitted to the feed guide through the bracket connecting plate ⑥, which is attached to the bracket ④.

[Y Direction]



1. When the pulse motor ❶ begins to rotate, the motion is transmitted to the bracket ❹ via the rack ❸ which is acted upon by the gear ❷.
2. The bracket ❹ is guided by the bracket guide ❺.
3. The straight motion of the bracket connecting plate ❻ which is attached to the backet ❹ is transmitted from the rear guide-stand holder ❼ via the feed connecting plate ❽ to the front guide-stand holder ❾.
3. The feed connecting plate ❽ is guided by the roller guide ❿.
5. Motion is transmitted to the feed guide assembly by means of the feed-guide stand ⓫ attached to the front guide-stand holder ❾.

3. FEED GUIDE MECHANISM



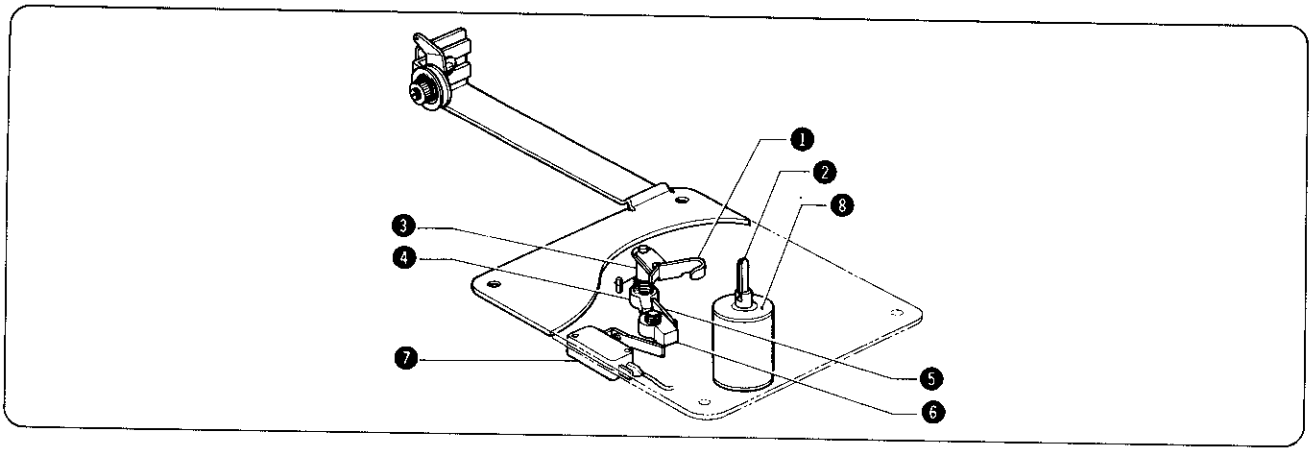
[X direction]

1. The straight and the back and forth motions of the bracket-connecting plate ❶ are transmitted by the slider connecting plate ❷ [attached to the bracket-connecting plate ❶] via the slider ❸ to guide Y ❹.
2. The slider ❸ is guided by the feed-guide standard plate ❺.
3. Motion is transmitted to either the feed plate or the cassette ❽ and cassette presser ❾ by means of the presser mechanism ❼ and the feed-guide front plate ❻ which is attached to feed guide Y ❹.

[Y direction]

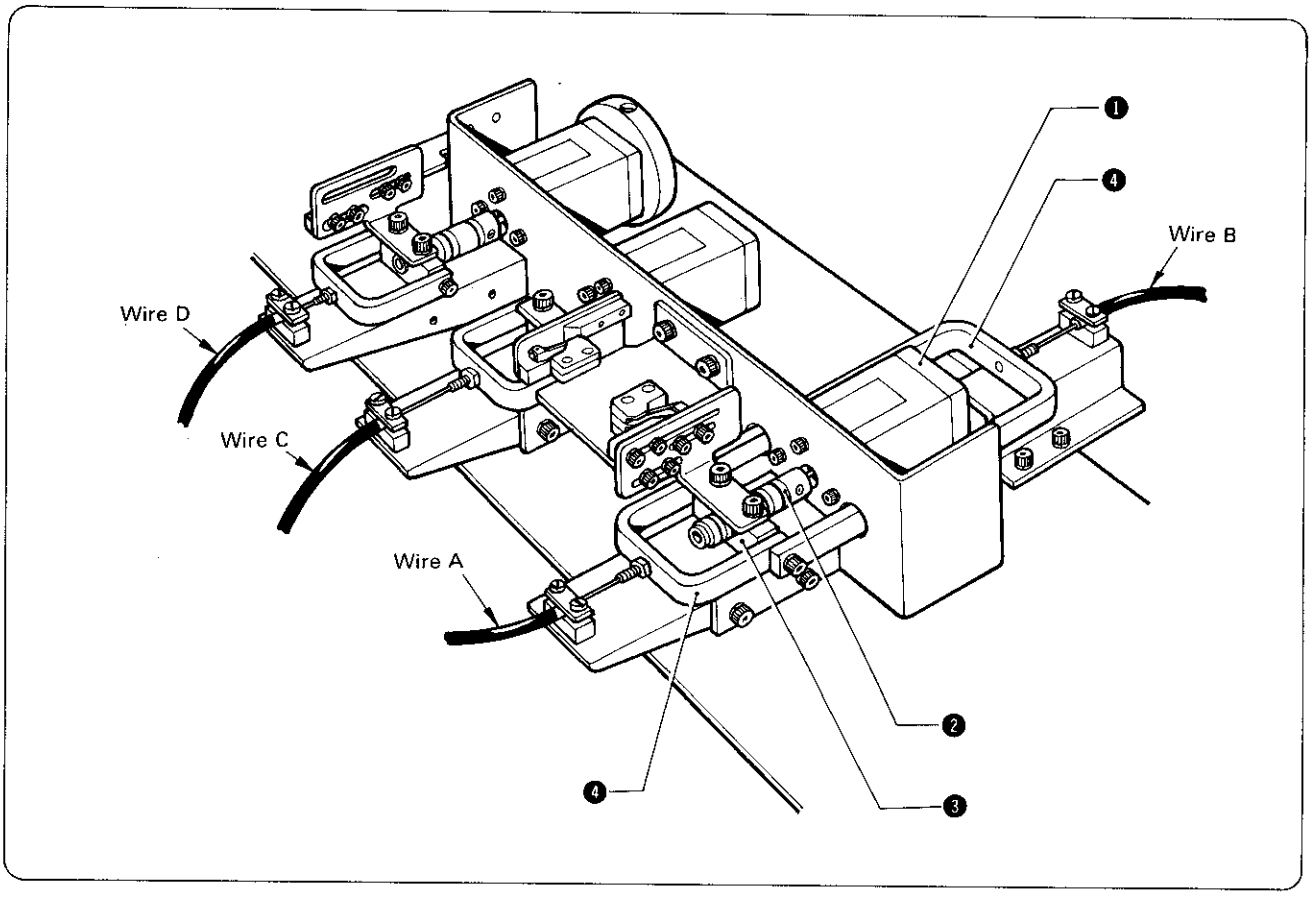
1. When the feed-guide stand moves forward and backward in a straight line, the motion is transmitted to feed guide Y ❹ which is attached to feed guide X ❿.
2. Feed guide Y ❹ is guided by the slider ❸.
3. Motion is transmitted to either the feed plate or the cassette ❽ and the cassette presser ❾ by means of the presser mechanism and the feed-guide front plate ❻ which is attached to feed guide Y ❹.

4. BOBBIN WINDING MECHANISM



1. When the bobbin winder stop latch plate ❶ is moved toward the bobbin winder spindle ❷, the bobbin winder stop latch ❸ connected to the bobbin winder stop latch plate ❶ will begin to rotate.
   The movement of the bobbin winder stop latch tripping arm ❹ and the leaf spring ❺ causes the bobbin winder lever ❻ to activate the limit switch ❼.
   The motor ❽, then, begins to rotate.
2. When the thread is wound and the bobbin winder stop latch plate ❶ has moved back to its original positin, the limit switch ❼ will be turned off and the motor ❽ will then stop.

5. PRESSER ACTUATOR MECHANISM

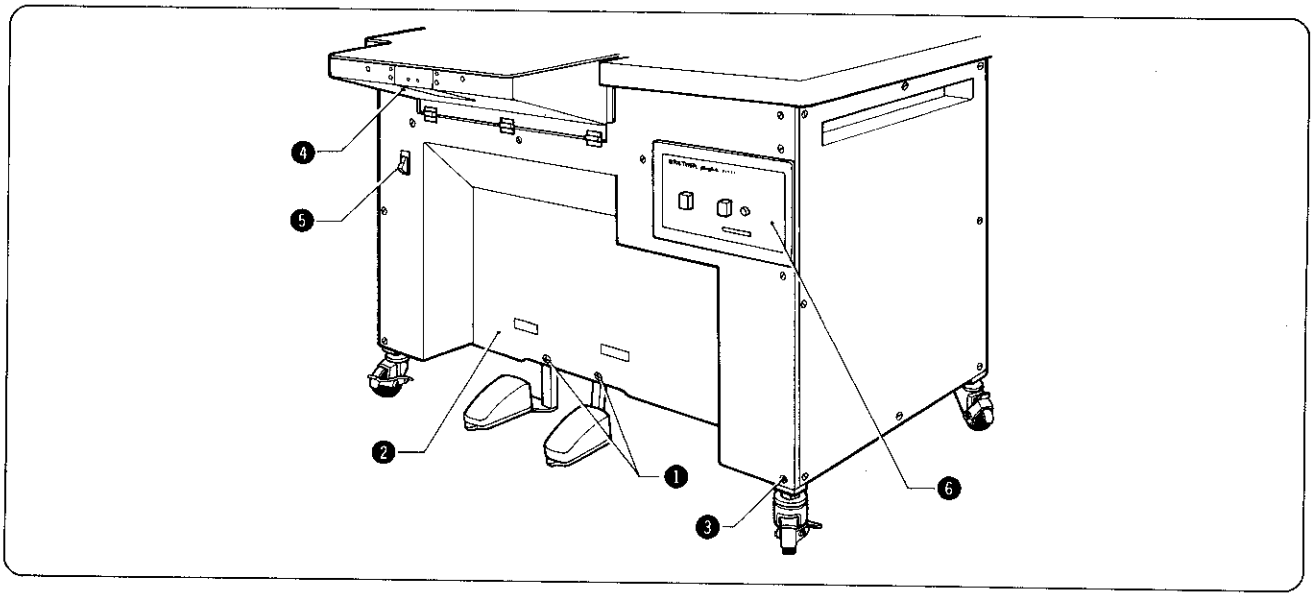


1. When the motor ❶ rotates, the wire-operation screw ❷ connected to it also rotates. This moves the wire-operation block ❸ forward and backward.
2. Wires ❶, ❷, ❸ and ❹ attached to the wire-operation block ❸.

PANEL REMOVAL AND INSTALLATION

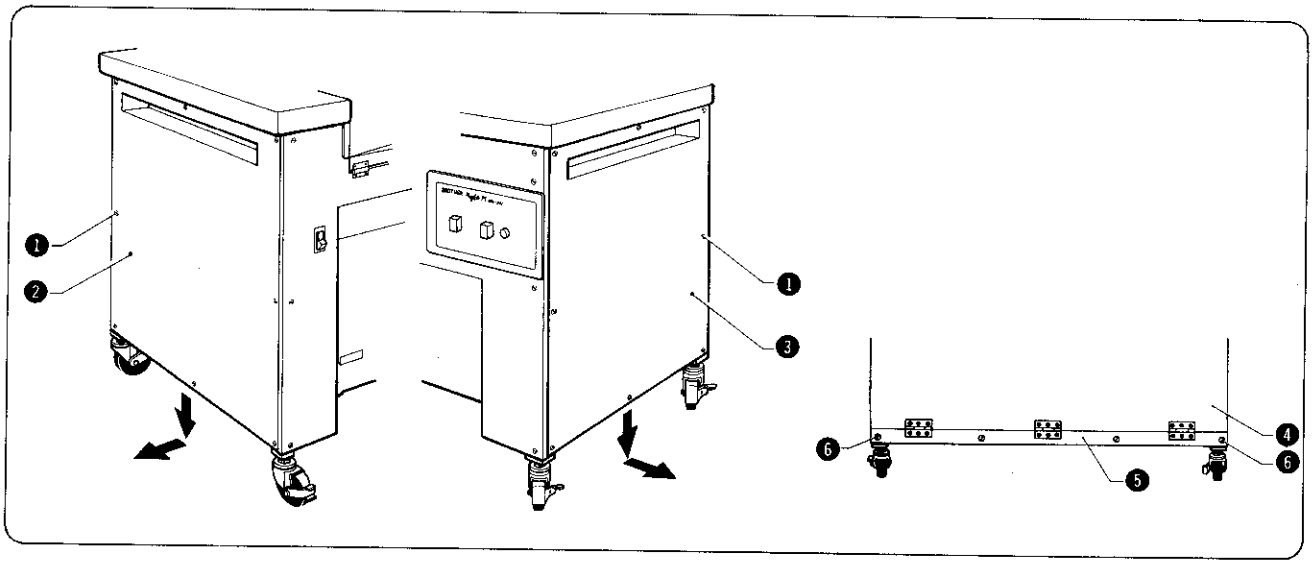
* Be sure to turn the power switch off before removing or installing the panels.

1. FRONT PANEL REMOVAL AND INSTALLATION



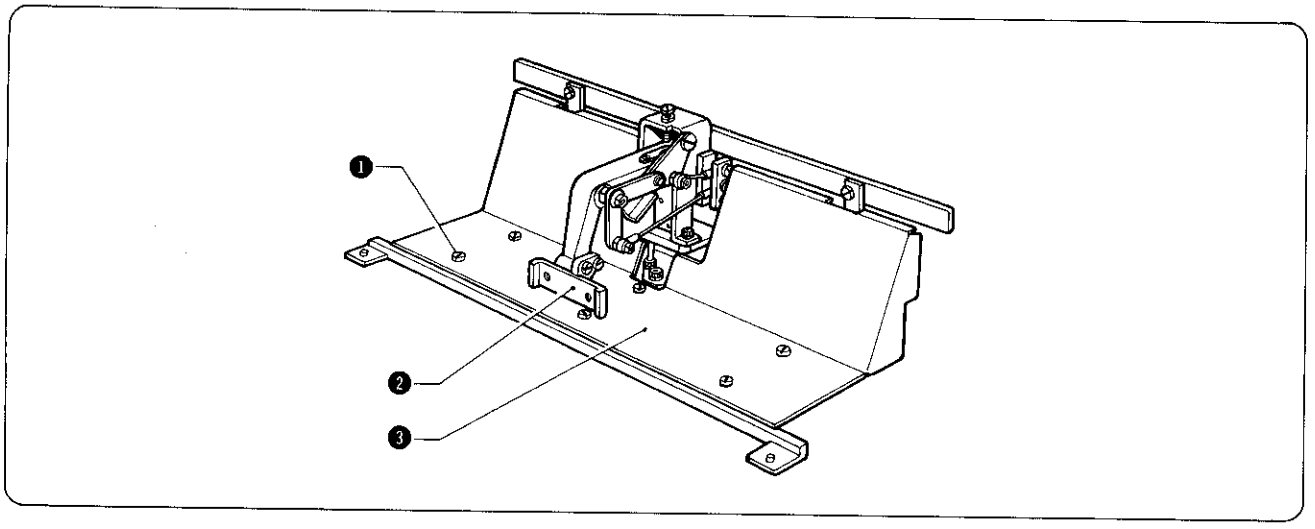
1. Remove the screws ❶ by which the foot pedals ❷ are attached.
2. Remove the ten screws ❸ which attach the front cover.
3. Pull the front panel ❷ downward in order to remove it.
   * When removing the front panel ❷, be careful not to damage the rotary hook cover ❹, power switch ❺ or the operation panel ❻.
4. Installation is performed in the opposite manner to which the parts are removed.

2. SIDE PANEL REMOVAL AND INSTALLATION



1. Remove the eight screws ❶ from each side panel.
2. Remove the side panels ❷, ❸ by pulling them down while moving them to the right and left.
   * The side panel can't be removed unless the screws of the back panel ❹ and the screws ❻ of the back panel bottom plate ❺ are first loosened.
3. Installation is performed in the opposite manner to which the parts are removed. (Be sure to tighten the screws that has been loosened.)

3. FEED-GUIDE PANEL REMOVAL AND INSTALLATION



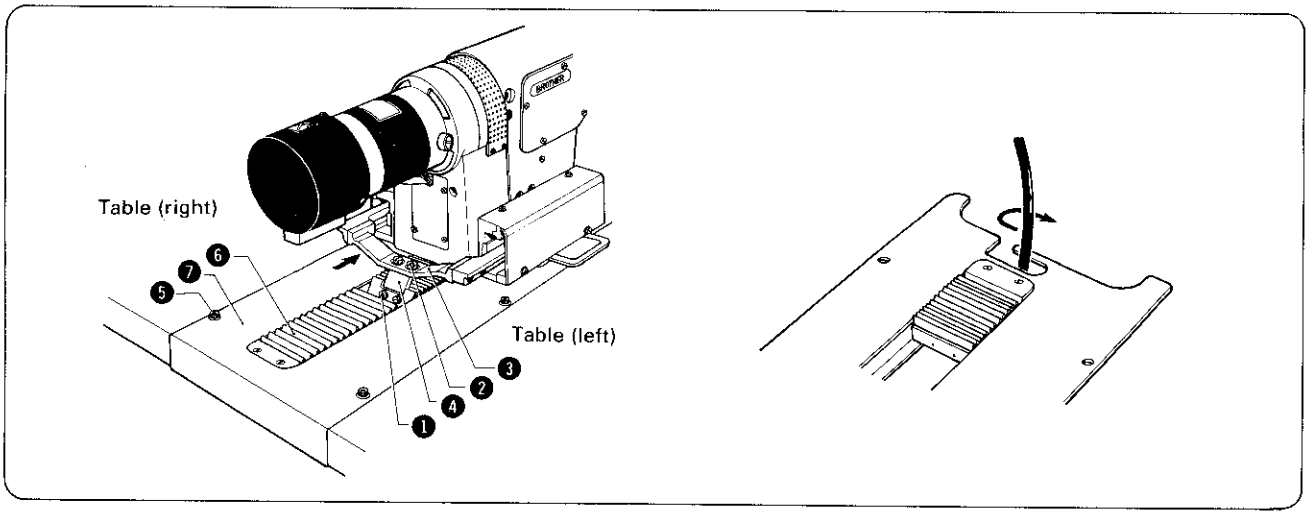
1. Raise the presser, and then turn the power of the machine off. If the presser is atached, remove it.
2. remove the six screws ❶.
3. Remove the guide panel ❸. Be careful so that the panel does not strike the feed guide ❷.
4. Installation is performed in the opposite manner to which the parts are removed.

◆ Refer to page 4 of the operating manual of this unit for instructions on how to open the back panel.
◆ Refer to page 3 of the operating manual of this unit for instructions on how to open the rotary-hook panel.

TABLE REMOVAL AND INSTALLATION

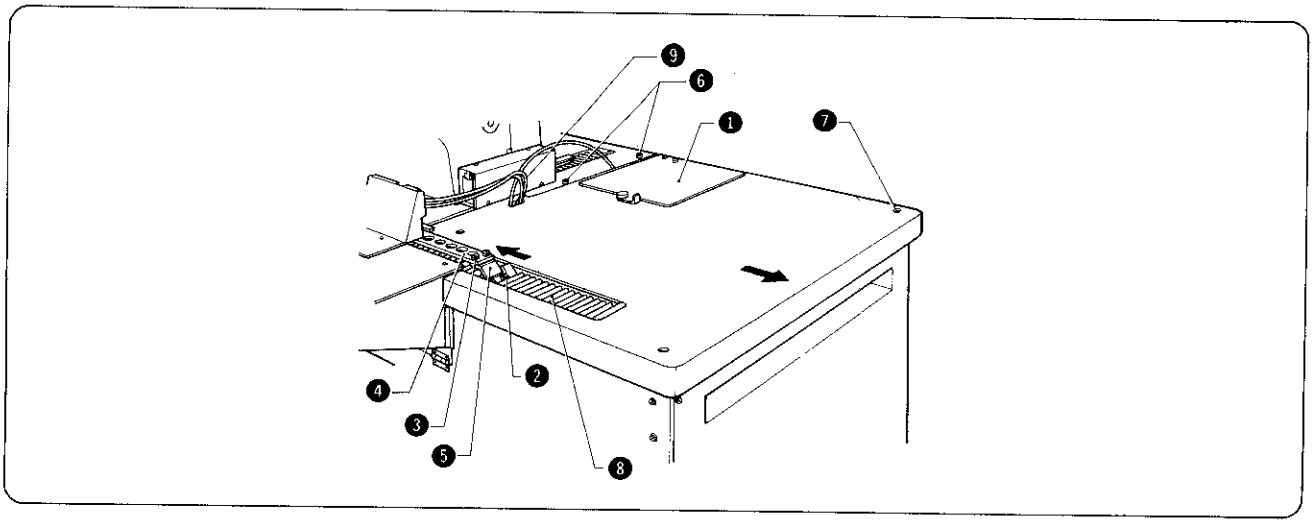
* Be certain to turn the power of the machine off before removing or installing the table.

1. REMOVAL AND INSTALLATION OF THE CENTER SECTION OF THE TABLE



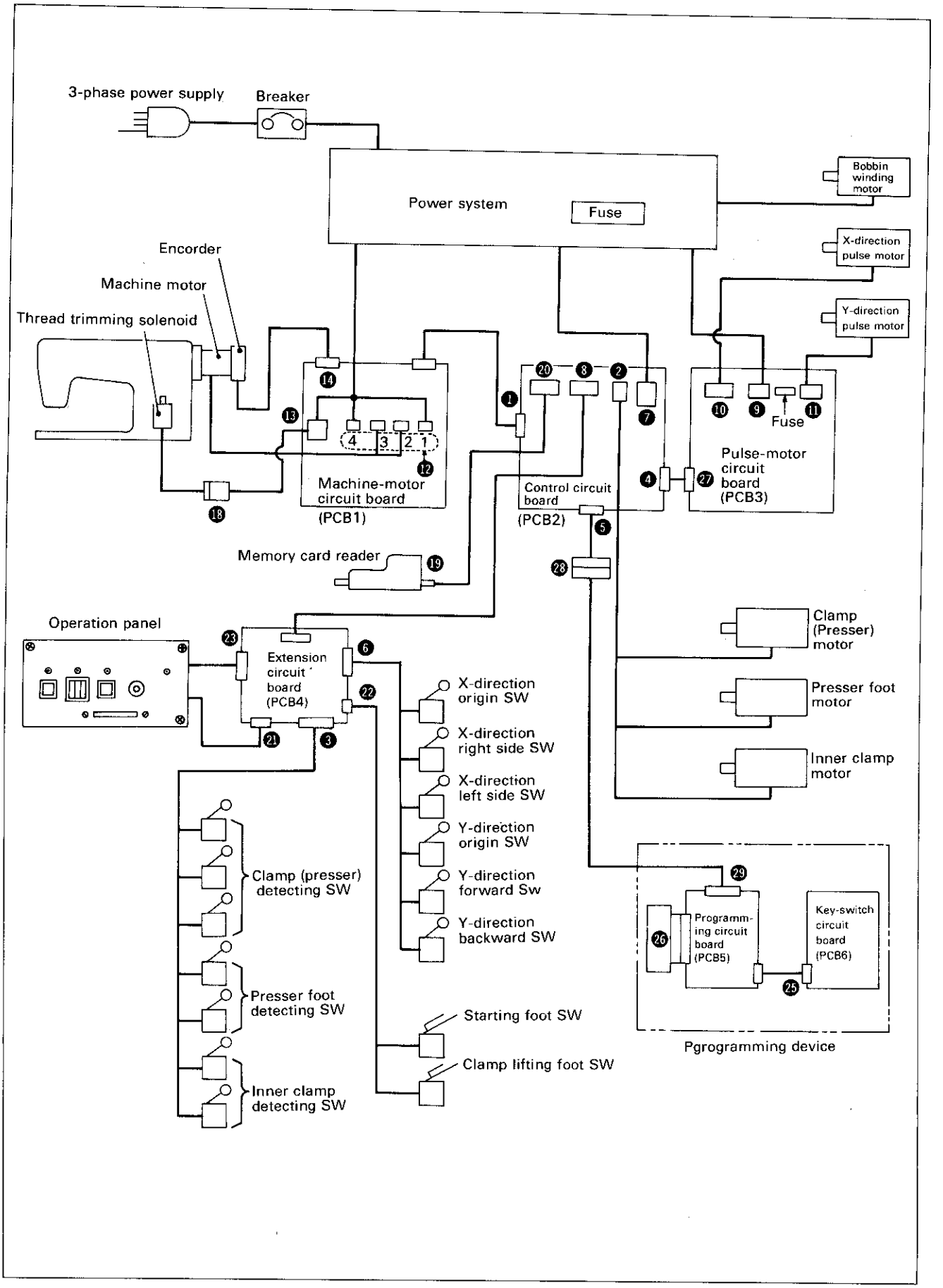
1. Remove the two screws ❶ which attach the bellows.
2. Remove the two Y-direction connecting step screws ❷.
3. Move the rear guide-stand holder ❸ in the direction indicated by the arrow, and move the bracket connecting plate ❹ in the direction opposite to that indicated by the arrow.
4. Remove the four screws ❺.
5. Move the bellows to each end, and then remove the center section of the table ❼.
   * Be careful of the cord which is in the table channel.
6. Install the table in the opposite manner to which it was removed. (Replace the cord in its original position in the table channel.)

2. REMOVAL AND INSTALLATION OF THE RIGHT SECTION OF THE TABLE



1. Open the cover ❶ of the storage box, and then remove the inner clamping device and place it on the left side of the table.
2. Remove the two screws ❷ which attach the bellows.
3. Remove the two x-direction connecting step screws ❸.
4. Move the slider connecting plate ❹ in the direction indicatd by the arrow. Move the bracket connecting plate ❺ in the direction opposite to that indicated by the arrow.
5. Remove the two bolts ❻ which attach the center portion of the table, and then remove the four bolts ❼.
6. Move the bellows to each end, and then, while moving the wires from the opening in the right side of the table, remove the right side of the table by moving it in the direction indicated by the arrow.
7. Install the right side of the table in the opposite manner to which it was removed. (Replace the wires in their original positions in the opening of the table.)

ELECTRIC-CIRCUIT



PARTS REPLACEMENT AND ADJUSTMENT

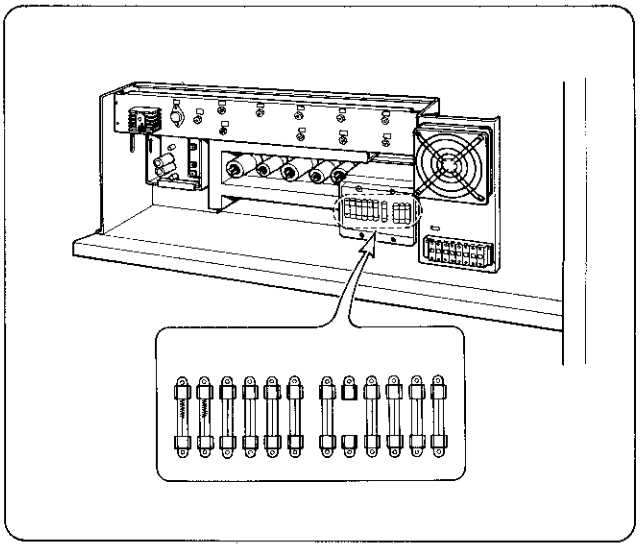
* Be sure to turn the power off before replacing or adjusting parts.

1. FUSE REPLACEMENT

1. Power system

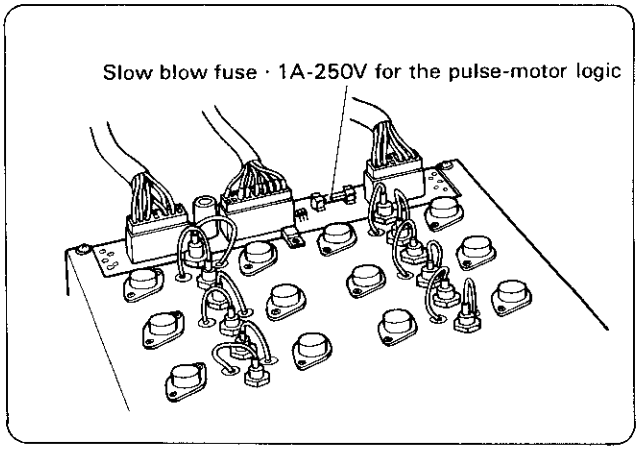
(1) Remove the rear cover of the unit.
(2) If a fuse is to be replaced, be certain to replace it with one of the exact same type.
Refer to the table below.

No.	Kind of fuse	Remarks
1	Slow blow fuse 5A—25V	For pulse-motor
2	Slow blow fuse 5A—250V	For pulse-motor
3	Fuse 10A—125V	For machine-motor
4	Fuse 2A—125V	For bobbin winding motor
5	Fuse 5A—125V	For thread trimming solenoid
6	Fuse 5A—125V	For presser (clamp), presser foot motor
7	Fuse 1A—125V	For memory card reader motor
9	Fuse 5A—125V	For pulse-motor (high voltage)
10	Fuse 5A—125V	+ 5V
11	Fuse 1A—125V	+ 12V
12	Fuse 1A—125V	− 5V



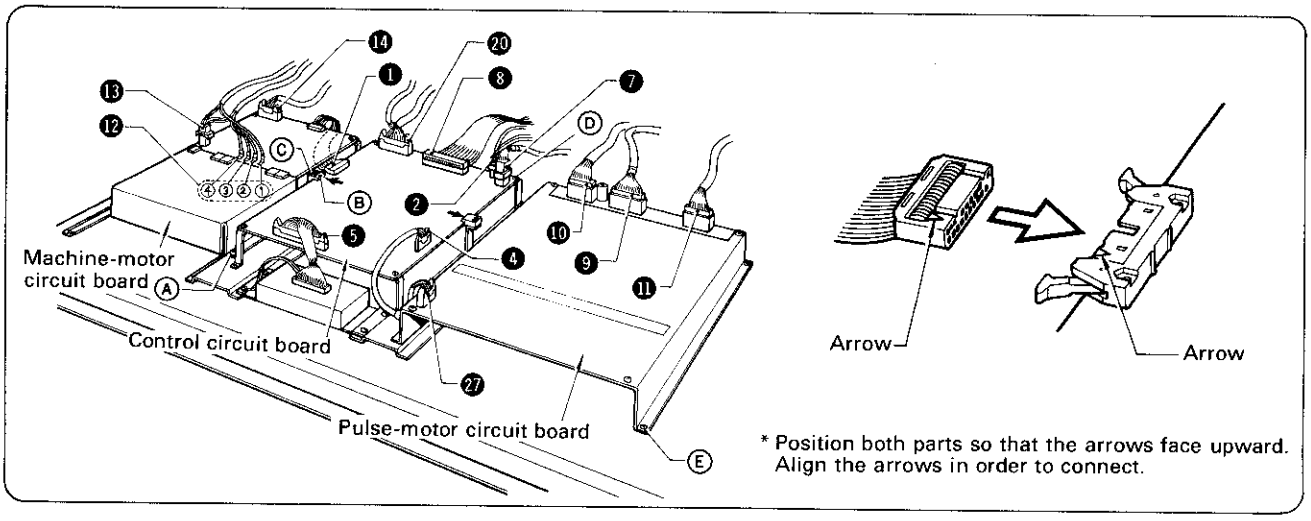
3. Pulse motor circuit board

(1) Replace the fuse (slow blow fuse 1A-250V) located on the pulse motor circuit board.



2. CIRCUIT BOARD REPLACEMENT

* Be sure to turn the power off before opening the rear panel to replace the circuit board.



★ When the rear panel is opened, the machine circuit board, control circuit board, and pulse-motor circuit board can be seen in the positions shown above.

1. Replacement of the machine-motor

(1) Remove the connectors ⓭, ⓮, flat cable ❶, and tab terminals ①, ②, ③ and ④.
(2) Remove the six screws Ⓐ, and then remove the machine-motor circuit board.
(3) Replace the machine-motor circuit board, and then tighten by using the screws Ⓐ.
(4) Install the connectors ⓭, ⓮, flat cable ❶, and tab terminals ①, ②, ③ and ④.

2. Replacement of the control circuit board

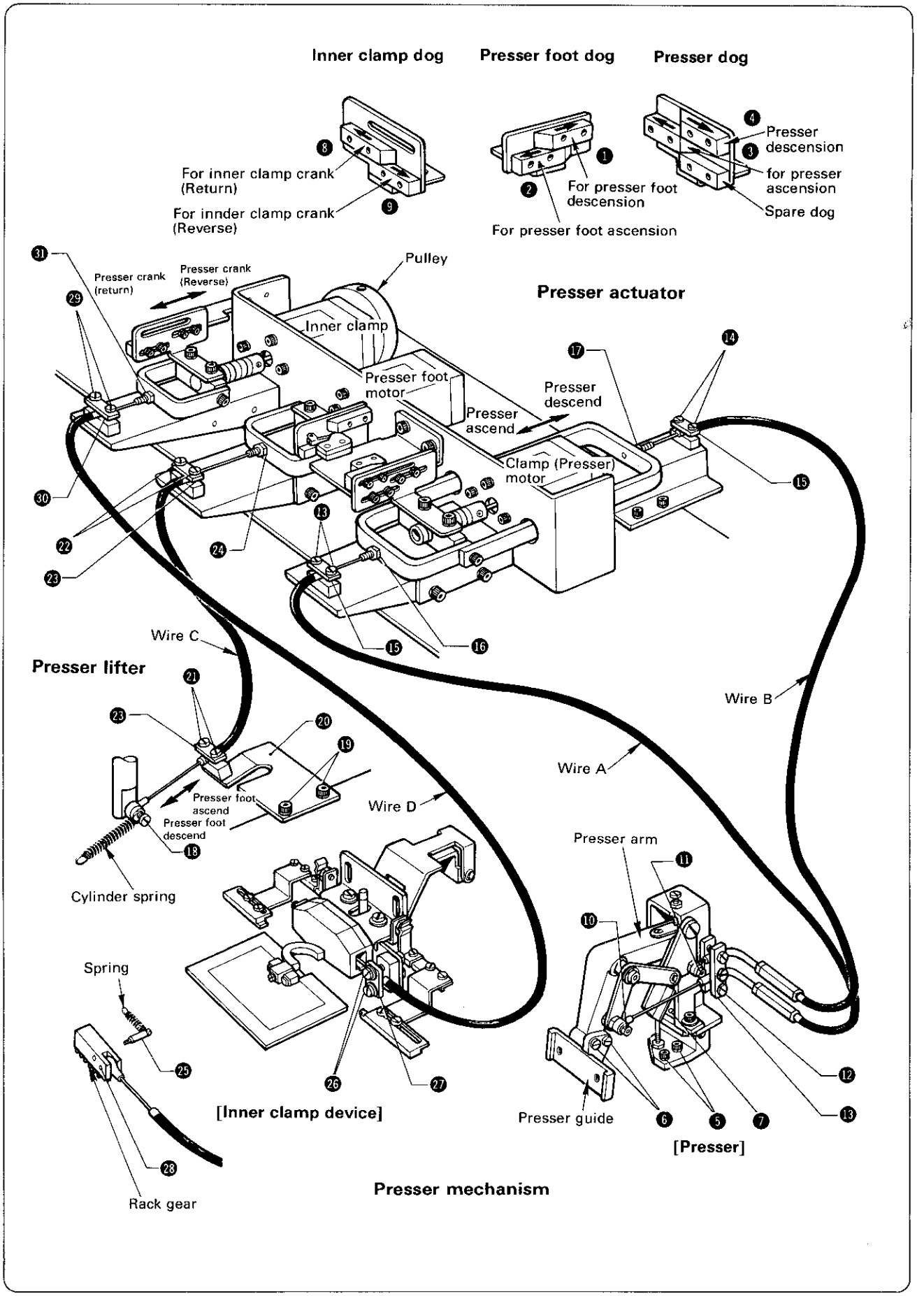
(1) Remove the connectors ❷, ❹, ❺, ❼ and ⓴, and flat cables ❶ and ❽.
(2) Loosen the screws Ⓒ of the lock plates Ⓑ which are located on the right and left sides of the circuit board, and then move the circuit board lock plates Ⓒ in the directions indicated by the arrows.
(3) Remove the four screws Ⓓ, and then remove the control circuit board.
(4) Replace the control circuit board, and then secure it by using the screws Ⓓ.
(5) Move the circuit board lock plates in the directions opposite to those indicated by the arrows, and then use the screws Ⓒ to tighten the circuit board in position.
(6) Install the connectors ❷, ❹, ❺, ❼ and ⓴, and flat cables ❶ and ❽.

3. Replacement of the pulse-motor circuit board

(1) Remove the connectors ❾, ❿, ⓫ and ㉗.
(2) Remove the four screws Ⓔ, and then remove the pulse-motor circuit board.
(3) Replace the pulse-motor circuit board, and then secure it by using the screws Ⓔ.
(4) Install the connectors ❾, ❿, ⓫ and ㉗.

Notes * When removing and installing the connectors, be certain to handle them by holding the body of the connectors, not the wire.
Be sure to connect the connectors after the circuit board are replaced.
Make sure that the flat cables ❶ and ❽ are facing the correct direction (indicated by the arrows) when connected.

3. WIRE REPLACEMENT AND PRESSER MECHANISM ADJUSTMENT



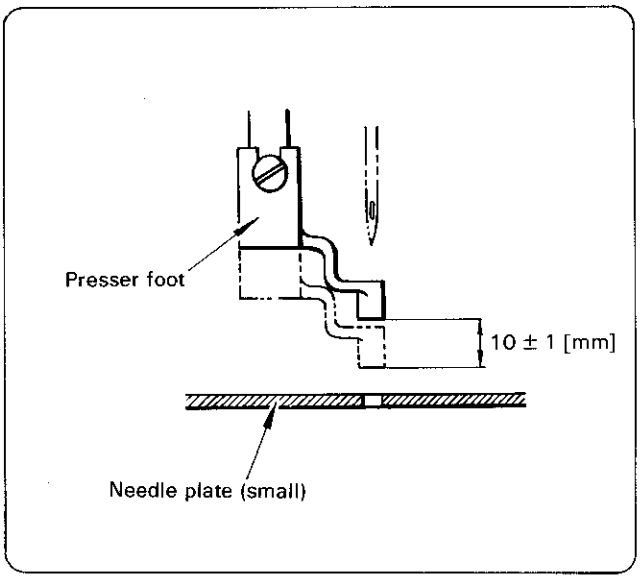
1. Adjustment for the amount of presser foot ascension

(1) Remove the right section of the table.

(2) Loosen the screws of the dog ❶ which is used for the adjustment of the amount of presser-foot descent in accordance with the presser actuator.
Adjust the dog so that the limiter mechanism detect the point when the presser foot reaches its lowest position.
* When the dog is moved in the direction indicated by the arrow, the lowest limit of the presser foot becomes lower. When the dog is moved in the opposite direction, the lowest limit becmoes higher.

(3) In the same manner, loosen the screws of the dog ❷ used for the adjustment of the amount of presser-foot ascension, and then adjust the dog so that the limiter mechanism detects when the presser-foot is raised 10 ± 1 [mm].
* When the dog is moved in the direction indicated by the arrow, the amount that the presser-foot is raised increases. When the dog is moved in the opposite direction, the limit is detected at a lower position, thereby decreasing the amount the presser-foot is raised.

(4) Be sure to retighten the screws of the dogs, and then replace the right section of the table.



2. Adjustment of the amount which the presser (clamp) opens

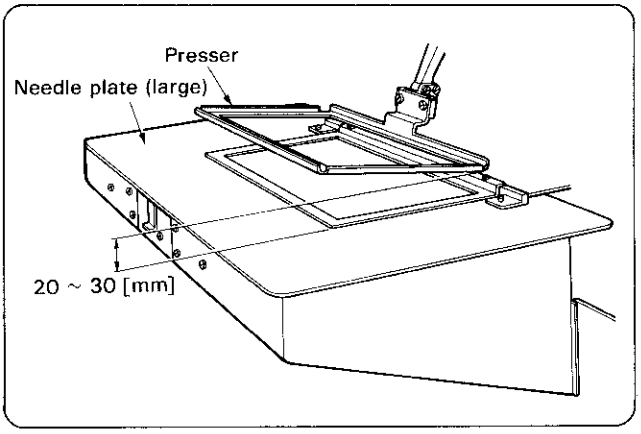
(1) Remove the right section of the table.

(2) Loosen the screws of the dog ❸ which is used for the adjustment of the amount of prsser ascension (unclamping) in accordance with the presser actuator, and then adjust the amount which the presser opens.
* Attach the standard presser, and then adjust the clearance between the bottom rear of the presser and the surface of the needle plate to be 20 — 30 mm.
* When the dog is moved in the direction indicated by the arrow, the amount which the presser opens will increase. When the dog is moved in the opposite direction, the amount which it opens will be detected sooner and will thereby decrease.

(3) In the same manner, loosen the screws of the dog ❹ which is used for the adjustment of the amount of presser descension, and then adjust it so that the presser will press the material firmly.
* When the dog is moved in the directin indicated by the arrow, the amount the presser is lowered will increase and the material will be pressed more firmly. When the dog is moved in the opposite direction, the presser will not press the material as firmly.
(If the presser is set too lightly, it may be difficult to hold the material in position.)

(4) Be certain to retighten the screws of the dogs, and then replace the right section of the table.

(5) Check the amount of presser opening once again after completion of the adjustment.
* The amount of opening may become smaller after the right section of the table is replaced.



4. REPLACEMENT AND ADJUSTMENT OF BEARINGS

1. Replacement and adjustment of bracket bearings

(1) Remove the right section of the table in order to replace or adjust the bearings for the X direction, and remove the center sectiom of the table for the bearings of the Y direction.

(2) Remove the four screws ❶, and when removing the bracket connecting plate ❷ and the bracket spacer ❸.
* The slide plate ❹ may come out of the bracket connecting plate ❷. If it comes out, be cetain to replace it when reassembling the braket parts.

(3) Loosen the roller axle screw ❺ of the bearing to be replaced, and then remove the bearing assembly ❻ from the bracket ❼.

(4) Remove the retaining ring ❿ from the roller axle ❽ [or the eccentric roller axle ❾], and then replace the bearing assembly.

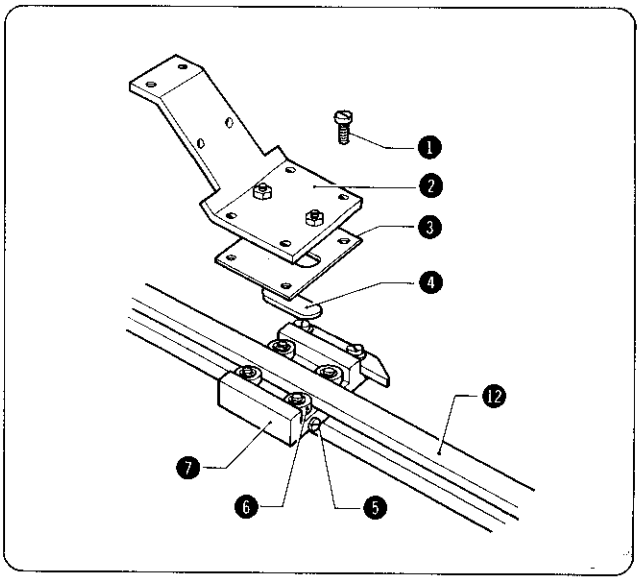
(5) After replacing the bearing assembly, attach the retaining ring ❿ to its original position.
* There are two kinds of beraing assemblies ❻. One is for fixed axles and the other if for eccentric axles. If the bearing assemblies are installed in the wrong places,adjustment may not be possible. In order to avoid this, be certain to replace them in their original locations.

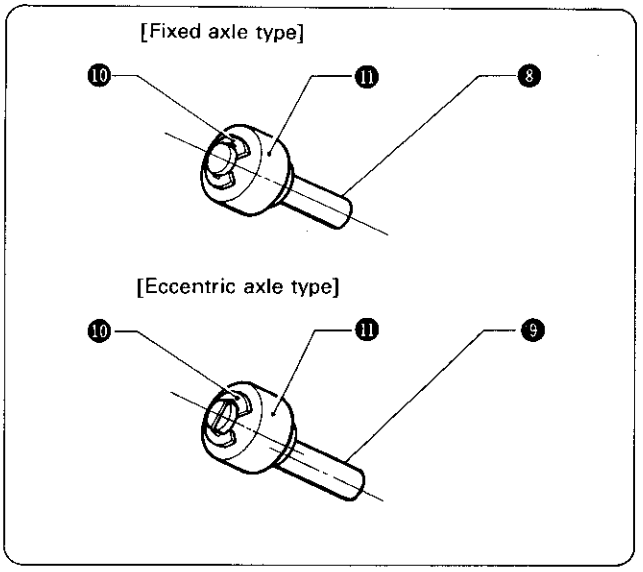
(6) Adjust the eccentric roller axle ❾ so that the bearing ⓫ will move inside the bracket guide ⓬ smoothly with no play, and then tighten it into position by using the screw ❺.
(A) Adjustment is not necessary when only the bearing of the fixed axle is repalced.
(B) If only the bearing of the eccentric axle is replaced, adjust the bearing while turning the eccentric roller axle ❾ and then tighten it into position by using the screw ❺.
(C) If both fixed and eccentric axle bearings are replaced, tighten the fixed axle by using the screw ❺ first, and then adjust the eccentric axle bearing while turning the eccentric roller axle ❾.
* If the bearing is to be merely adjusted, not replaced, loosen the screw ❺ which secures the eccentric axle, and then turn the eccentric roller axle ❾ and make the necessary adjustment.

(7) Attach the slide plate ❹ to the bracket connecting plate ❷, and then install the bracket connecting plate ❷ together with the bracket spacer ❷ to the bracket ❼ by using the four screws ❶.

(8) Perform a check of the position of origin of the needle.

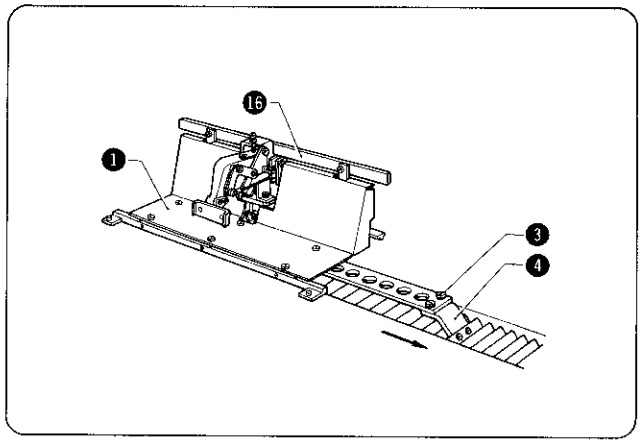
(9) Replace the right (and/or center) section of the table.

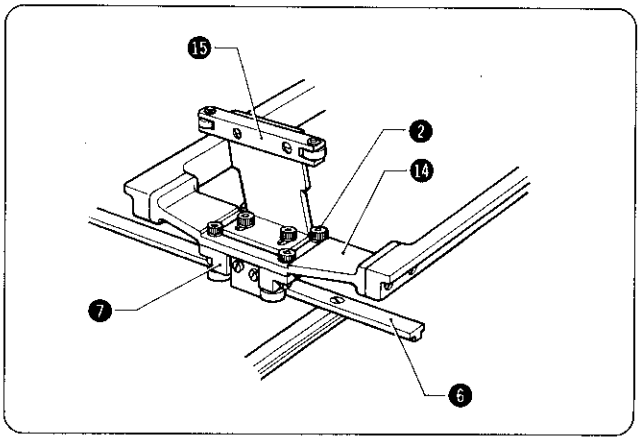


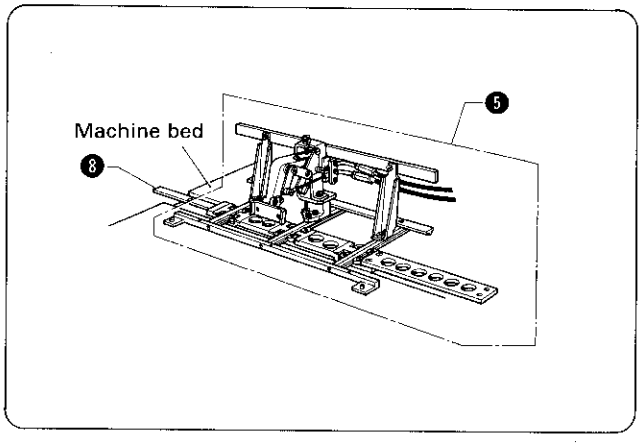


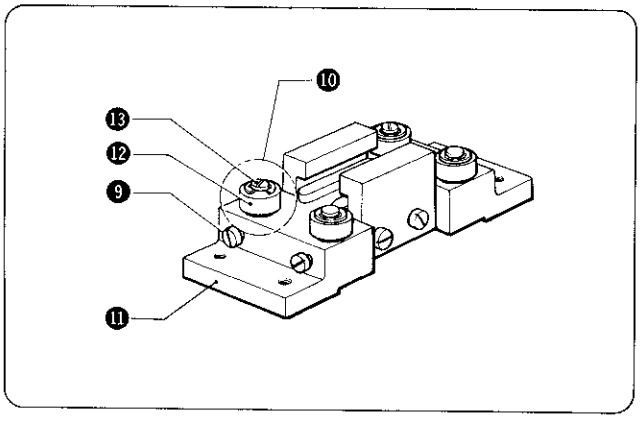
2. Replacement and adjustment of the bearings of the feed-guide base

(1) Remove the feed-guide cover ❶.
(2) Remove the four screws ❷.
(3) Remove the two X-direction conneting step screws ❸ and then move the bracket connecting plate ❹ to the right (the direction indicated by the arrow).
(4) Move the feed guide assembly ❺ to the right and, with the feed-guide base assembly ❼ still attached to feed guide X ❻, remove it from the feed guide standard plate ❽.
(5) Loosen the roller axle screw ❾ at the place where replacement is desired, and then remove the bearing unit ❿ from the feed guide base ⓫.
(6) Replace bearings in the same way as described for the replacement of the bracket bearings. Turn and adjust the eccentric roller axle ⓭ so that the bearing ⓬ will move along feed guide X ❻ smoothly with no play, and then tighten it into position by using the screw ❾.
(7) Insert the feed guide assembly ❺ into the feed guide standard plate ❽, and then install the feed guide base assembly ❼ to the feed base front holder ⓮ by using the four screws ❷.
* Install the feed guide assembly ❺ to the bracket connecting plate ❹ by using the two connecting step screws ❸.
(Be sure that the feed guide base assembly ❻ is parallel to feed guide X ❻.)
(8) Perform a check of the position of origin of the needle.
(9) Install the feed guide cover ❶.
* Check to be sure that the bearings of roller holder B are correctly rotating so that there will be no play betwen roller hodler B ⓯ and the feed auxiliary guide ⓰.









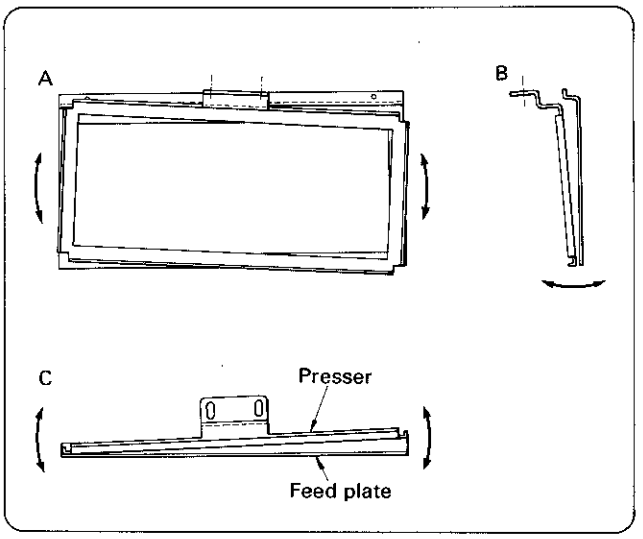
3. Adjustment of the presser

★ Adjust the presser so that it presses the material evenly.

(1) Adjustment in the A direction
Loosen the two screws ❺, and then move the presser to a position where it is parallel with the feed plate.

(2) Adjustment in the B direction
Loosen the two screws ❻, and then adjust the angle of the presser guide so that the front and rear portions of the presser press the material.

(3) Adjustment in the C direction
Loosen the two screws ❼, and then adjust the presser arm angle so that the left and right portions of the presser press the material evenly.



4. Adjustment of the reversing angle of the presser crank

(1) Remove the right section of the table.

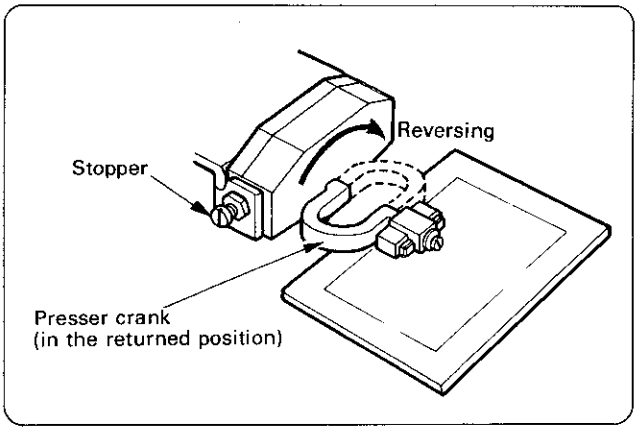
(2) Loosen the screws of the dog ❽ which is used to adjust the returning of the presser crank in accordance with the presser actuator, and then adjust the dog so that the limiter mechanism detects the the point when the presser crank returns to its normal position.
* When the dog is moved in the direction indicated by the arrow, the angle of return increases.
When the dog is moved in the opposite direction, the limit is detected earlier and the crank is not allowed to return to its normal position.

(3) Loosen the screws of the dog ❾ which is used to adjust the initial reversing of the presser crank, and then adjust the reversing angle in the same manner as previously described for the return of the presser crank.
* When the dog is moved in the direction indicated by the arrow, the reversing angle becomes greater. When the dog is moved in the opposite diretion, the limit is detected eralier and the reversing angle is decreased.

(4) Be sure to retighten the screws of the dog firmly, and check to be certain that the angle is appropriate for the sewing conditions.

(5) Replace the right section of the table.

(6) Check the reversing angle once again.
* The reversing angle may change when the right section of the table is replaced.



5. Wire replacement

[Replacement of wires A and B]

(1) Remove the right section of the table.

(2) Remove the nut ❿ from the screw which holds wire A. Remove the end of wire A from the lever of the presser arm. For wire B, remove nut ⓫, and then follow the above procedure.

(3) Remove the three screws ⓬, and then remove wire A and/or B from the wire holder ⓭.

(4) Remove the screw ⓭[or ⓮], and then remove wire a (or B) from the wire holder ⓯.
[Loosen the bottom nuts before removing screws ⓭ or ⓮.]

(5) Loosen the nut ⓰ [or ⓱], and then remove wire A (or B).

(6) Replace the wire (A or B), and then install by following the opposite procedure to that in which it was removed.

[Replacement of wire C]

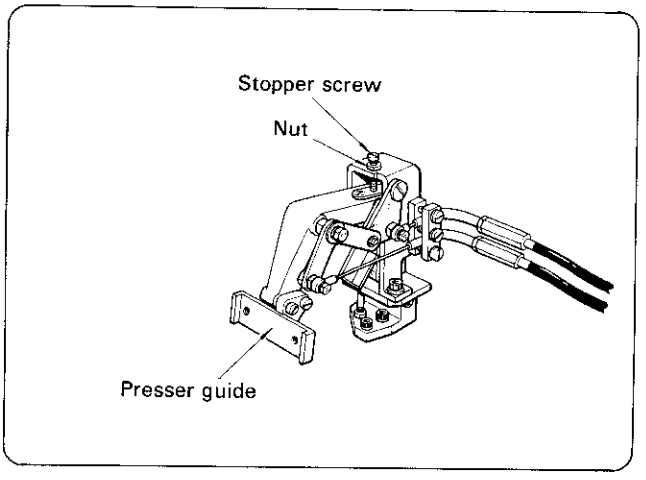
(1) Remove the right section of the table and then open the cover of the rotary hook.
(2) Remove the cylinder spring and then remove the screw ⑱ on which the spring is hooked.
(3) Remove the two screws ⑲, and then remove the wire-holder plate ⑳.
(4) Remove the two screws ㉑, ㉒, and then remove wire C from the wire holder ㉓.
(Loosen the bottom nuts before removing screws ㉑ and ㉓.)
(5) Loosen the nut ㉔, and then remove wire C.
(6) Replace wire C, and then install it in the opposite manner to that in which it was removed.

[Replacement of wire D]

(1) Remove the right section of the table.
(2) Remove the reversing-return spring from the backside of the inner clamping device, and then remove spring hook A ㉕ (movable side).
(3) Remove the two screws ㉖, and then remove wire D from the wire holder ㉚ together with the rack to which the wire is connected.
[Loosen the attached nuts before removing the screws ㉖.]
(4) Pull out the wire installation pin ㉘, and then remove wire D from the rack.
(5) Remove the two screws ㉙, and then remove wire D from the wire holder ㉚.
[Loosen the bottom nuts before removing the screws ㉙.]
(6) Loosen the nut ㉛ and then remove wire D.
(7) Replace wire D, installing it in the opposite manner to that in which it was removed.
(When replacing the rack, be certain that it is set in a position which ensures correct operation of the presser crank.)

6. Adjustment of the presser stopper

(1) If the prsser guide is raised when the presser is not attached, the presser arm may rise to an excessive height. The presser will then not lower even if the presser lifter pedal is depressed.
(2) Loosen the nut and adjust the stopper screws so that the presser guide will move up and down smoothly even when the presser-lifter pedal is depressed.
* If the stopper screws is lowered too much, it will contact the stopper when the presser is attached, and the amount that the presser is raised will decrease.
* If the stopper screw is raised too much, the top of the screw will contact the body of the machine. Therefore, check to be certain that they do not contact each other after the adjustment is completed.



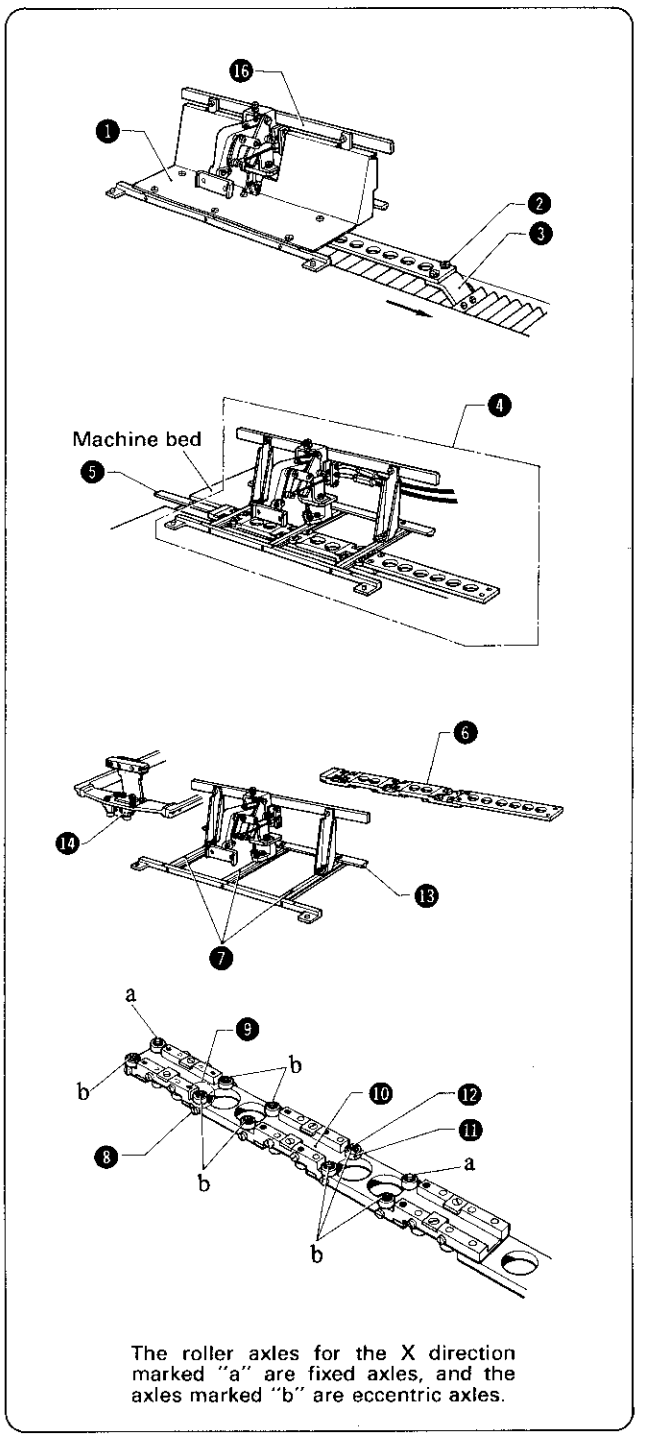
3. Replacement and adjustment of slider bearings

[X direction]

(1) Remove the feed-guide cover ❶.
(2) Remove the two X-direction connecting step screws ❷, and then move the bracket connecting plate ❸ to the extreme right edge (in the direction indicated by the arrow).
(3) Move the feed guide assembly ❹ to the right, and then remove it from the feed-guide standard plate ❺.
(4) Pull out the slider unit ❻ from feed guide Y ❼.
(5) Loosen the roller axle screw ❽ at the place where replacement is desired, and then remove the bearing assembly ❾ from the slider ❿.
(6) Replae the bearing in the same manner as described for the replacement of bearings in the bracket section. Turn the eccentric roller axle ⓬ and adjust the bearing so that it moves inside the guide-standard plate ❺ smoothly, with no play. After adjustment, secure it by using the screw ❽.
(7) Insert the slider unit ❻ into feed guide Y ❼.
(8) Insert the slider unit ❻ of the feed guide assembly ❹ into the feed-guide standard plate ❺ and attach feed guide X ⓭ to the feed guide base assembly ⓮.
(9) Install the feed guide assembly ❹ to the bracket-connecting plate ❸ by using the two connecting step screws ❷.
(10) aInstall the feed guide cover ❶.

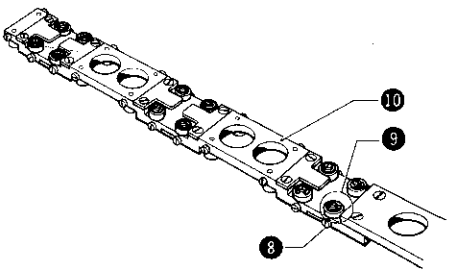
[Y direction]

* Follow steps ❶ through ❸ of the instructions described above (for the X direction).
(4) Loosen the roller axle screw ❽ at the place where replacement is desired, and then remove the bearing assembly ❾ from the slider ❿.
(5) Replace the bearing in the same manner as described for the replacement of bearings in the backet section, and then adjust the bearing so that it moves along feed guide Y ❼ smoothly with no play. After adjustment secure by using the screw ❽.
* Because all roller axles of the Y direction are eccentric axles, if many bearings are replaced at one time, the X direction and Y direction may not intersect at right angles as they should.
In order to avoid this, check to be certain that the Y dirction moves smoothly after the assembly is completed.
(6) Attach the slider unit ❻ of the feed guide assembly ❹ to the feed guide standard plate ❺, and attach feed guide X ⓭ to the feed guide base assembly ⓮.
(7) Install the feed guide assembly ❹ to the bracket connecting plate ❸ by using the two connecting step screws ❷.
(8) Install the feed-guide cover ❶.
* If many bearings for the Y direction have been replaced and/or adjustd,perform a check of the position of origin of the needle.

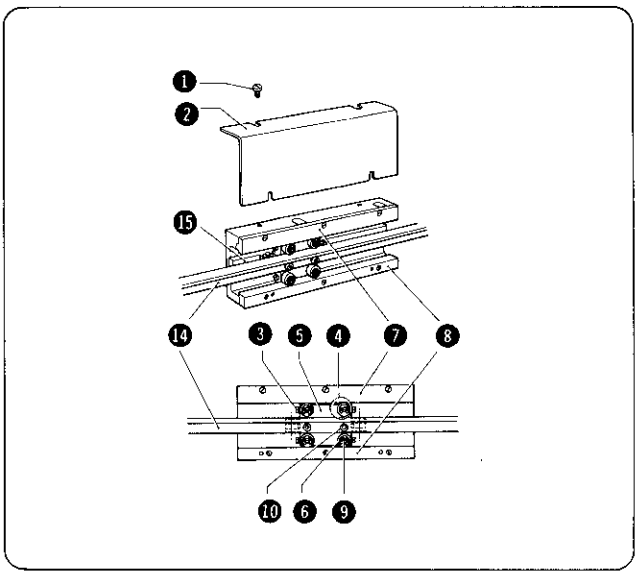


The roller axles for the X direction marked "a" are fixed axles, and the axles marked "b" are eccentric axles.

All roller axles for the Y direction are eccentric axles.



4. Replacement and adjustment of roller bearings of roller axle holder A



[Vertical direction]

(1) Loosen the four screws ❶, and then remove the roller-guide-base cover ❷.

(2) Loosen the roller axle screw ❸ of the bearing to be replaced, and then remove the roller bearing assembly ❹ from roller axle holder A ❺.

(3) Replace the roller bearing in the same manner as described for the replacement of bearings in the bracket sectoin. And then turn the eccentric roller axle ❾ and adjust the bearing so that the roller bearing ❻ moves under the upper roller guide ❼ and on the lower roller guide ❽ smoothly with no play. After adjustment is completed, secure by using the screw ❸.

* All roller axles for the vertical direction are eccentric axles.

(4) Reinstall the roller-guide-base cover ❷ with the four screws ❶.

[Horizontal direction]

(1) Loosen the four screws ❶, and then remove the roller-guide-base cover ❷.

(2) Remove the two screws ❿, and then remove the roller axle holder A assembly ⓫.

(3) Remove the retaining ring from the roller bearing to be replaced. Pull out the roller axle ⓭ from roller axle holder A ❺, and then replace the roller bearing ⓲. Install, and then secure the roller bearing by replacing the retaining ring ⓬.

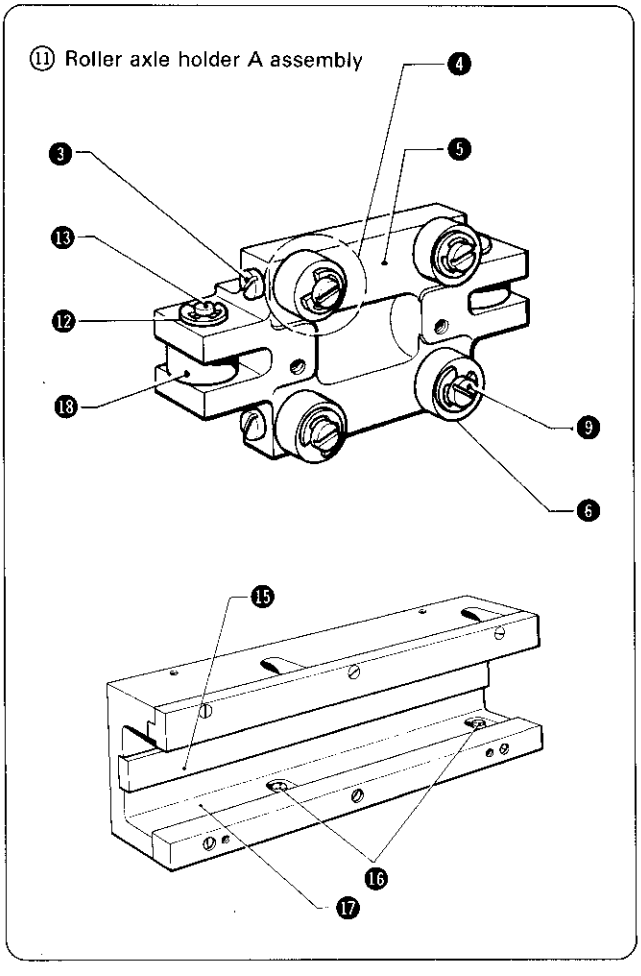
(4) Install the rollr axle holder A assembly ⓫ to the feed connecting plate ⓮ by using the two screws ❿.

* At this point, be sure that the beaing roller moves in the vertical direction smoothly with no play.

(5) Also check to be sure that the rollr bearing ⓲ move along the side roller guide ⓯ smoothly with no play.

* If play is found, loosen the two screws ⓰, and then adjust the roller guide base ⓱.

(6) Install the roller-guide-base cover ❷ by using the four screws ❶.



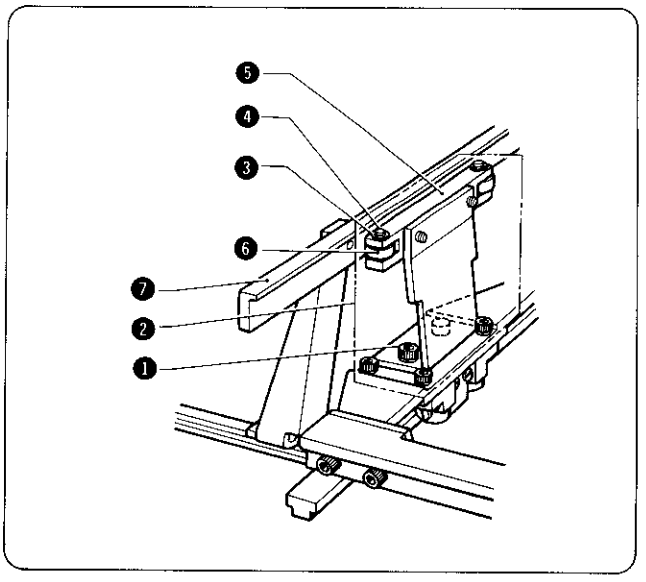
5. Replacement and adjustment of the bearings of roller axle holder B

(1) Take out the two screws ❶, and then remove roller axle holder B assembly ❷.

(2) Remove the retaining ring ❸ from the bearing to be replaced. Pull out the roller axle ❹ from roller axle holder B ❺, and then replace the bearing ❻. Install the bearing, and then secure it by attaching the retaining ring ❸.

(3) With the presser feed plate attached, operate the machine to lower the clamp. Then, adjust the assembly so that the bearing ❻ moves along the feed auxiliary guide ❼ smoothly with no play, and so that the feed plate does not rise at any point in the Z-direction movement. Secure the roller axle holder B-assembly ❷ by using the two screws ❶.

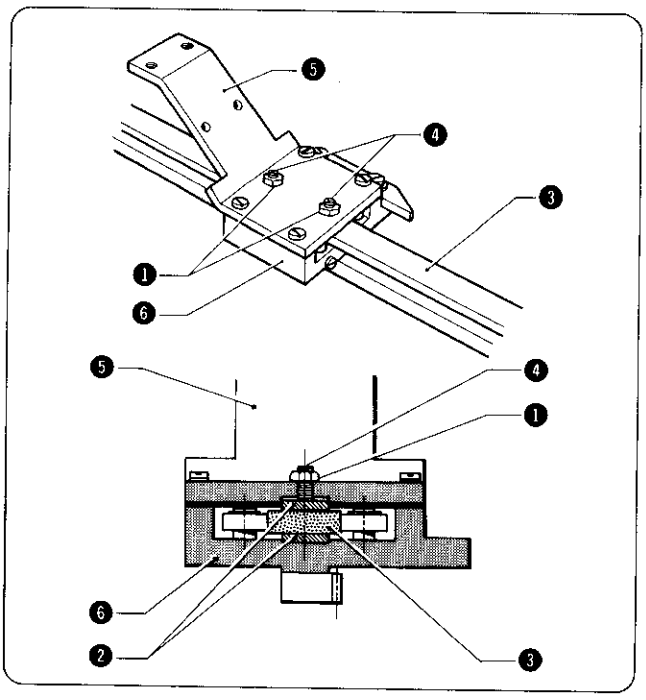
* This assembly is used to prevent the rising of the rear side of the feed plate. Therefore, if the bearings are merely making contact with the feed auxiliary guide ❻, the rear side of the feed plate will rise and favorable sewing conditions cannot be obtained.



5. ADJUSTMENT OF THE SLIDE PLATE ASSEMBLY

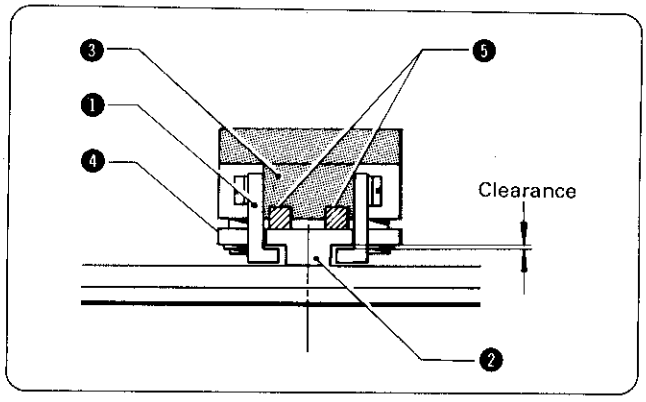
1. Adjustment of the bracket section slide plates

(1) Remove either the right or center section of the table.
(2) Loosen the two nuts ❶.
(3) Adjust the screws ❹ so that the slide plates move along the top and bottom guides of the bracket guide ❸ smoothly with no play, and then tighten by using the nuts ❶.
* The slide plates ❷ are attached to the bracket connecting plate ❺ and the bracket ❻ as shown in the right figure. Adjust the upper slide plate by the using adjusting screw ❹.
(4) Confirm the position of origin of the needle.
* If the amount of play prior to adjustment was only slight, confirmation of the position of origin is not necessary.
(5) Reinstall the right or center section of the table.



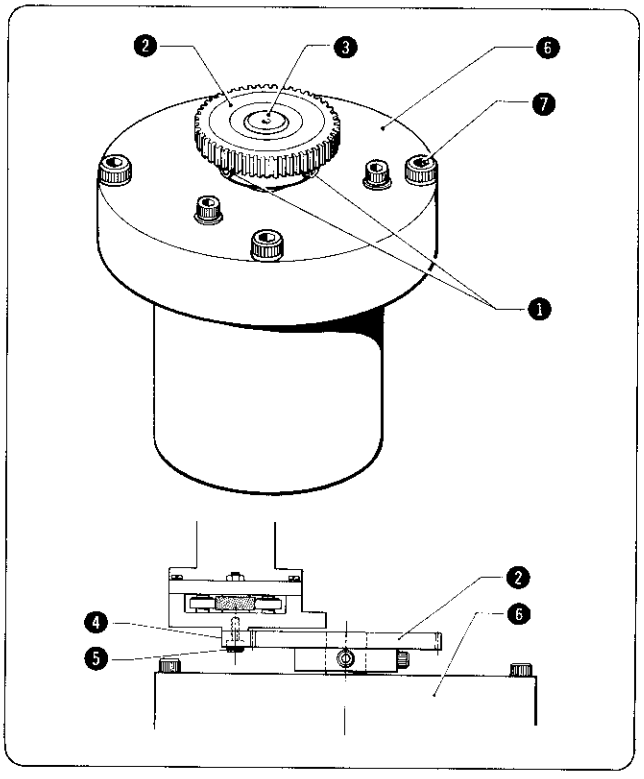
2. Adjustment of the feed-guide-base slide plates and the feed-guide-base presser

★ The feed-guide-base presser ❶ prevents the bearing ❹ of the feed guide base ❸ from coming out of feed guide X ❷.
★ When feed guide X ❷ is held between the botton surface of the slide plates ❺ and the feed-guide-base presser ❶, adjust the assembly so that there is a clearance of 0,1 — 0,2 mm between the feed-guide-base presser ❶ and feed guide X ❷.



6. REPLACEMENT OF THE GEAR AND ADJUSTMENT OF PALY

(1) Remove the table.
(2) Loosen the two screws ❶.
(3) Replace the gear ❷.
(4) Attach the gear ❷ to the pulse motor axle ❸ so that the top surface of the gear is flush with the top of the axle, and then tighten by using the screws ❶.
* Be sure to securely tighten the set screws of the pulse motor axle ❸.
(5) Turn the gear ❷ by hand. If the gear does not mesh with the rack ❹, loosen the two screws ❺ of the rack ❹ or the four scres ❼ of the motor bracket ❻ and adjust the gear and/or rack between them.
(6) Reinstall the table.

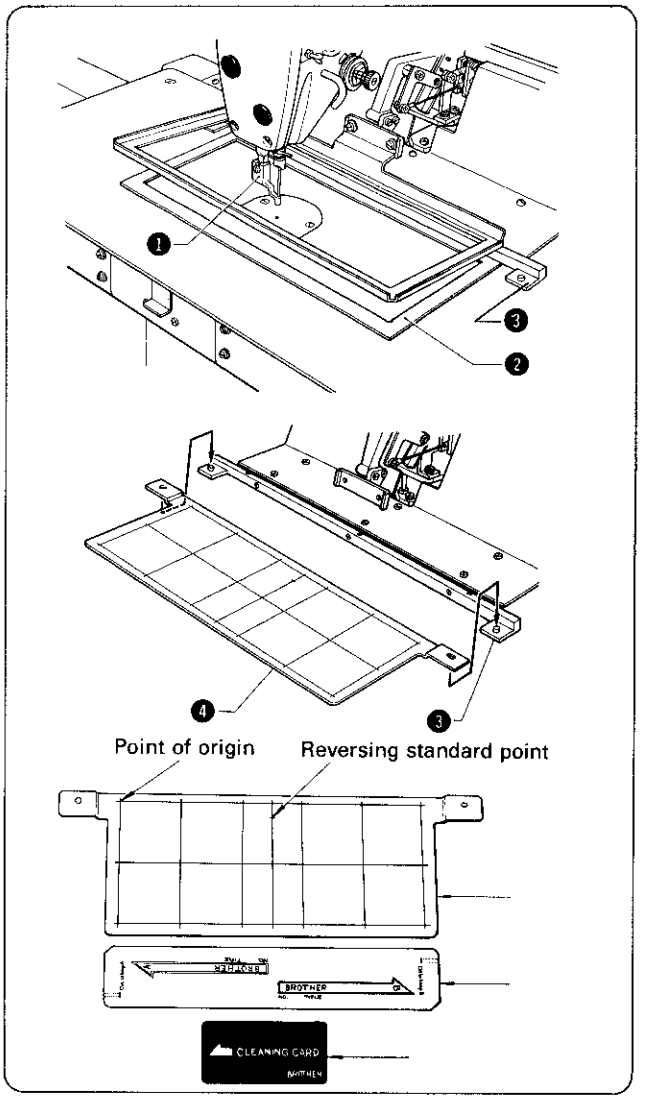


7. CONFIRMATION AND ADJUSTMENT OF THE NEEDLE POSITION OF ORIGIN

* If after replacement of bearings, etc., the initial position of the needle is different from its original positin, the needle may contact the presser due to a discrepancy between the position of the presser and the program of the memory card.

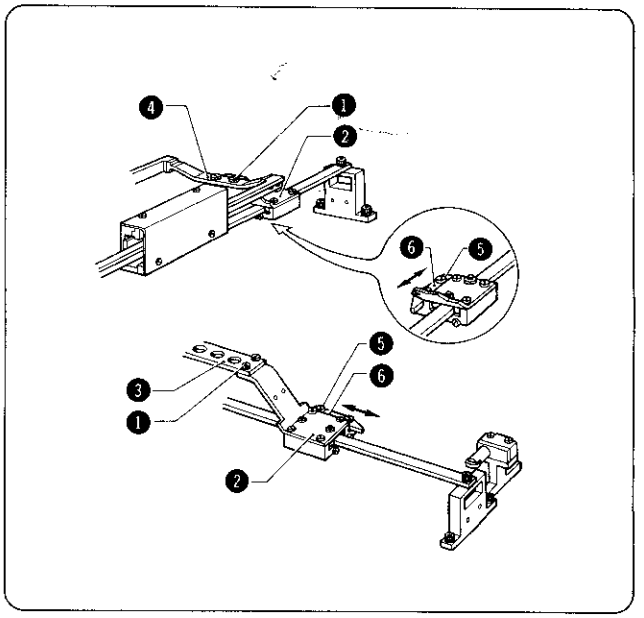
1. Confirmation of the position of origin

(1) Remove the presser ❶ and the feed plate ❷.
(2) Install the program standard plate ❹ to the feed guide front plate ❸.
(3) Move the feed guide section to a point near the center by hand.
(4) Set the power switch to the ON position.
(5) Depress the presser lifter pedal so that the presser is moved to the clamped position. Then, depress the start pedal.
  * When there is no memory card inserted and start pedal is depressed, the feed guide section will move to the position of origin and the emergency stop lamp will illuminate.
(6) Lower the needle by rotating the pulley of the machine, and check to be sure that the position of the needle matches the position of origin on the program standard plate ❹.
  (The operation can be done after connecting the programmer by pressing the P key, because when this key is pressed during programming, the needle moves to the point of origin.)



2. Adjustment of the point of origin

(1) Remove the table.
(2) With the table removed, use the connecting step screws ❶ to firmly attach the bracket connecting plate ❷ to the slider connecting plate ❸ and the guide base rear holder ❹.
(3) Loosen the two screws ❺ and adjust the origin dag ❻.
(4) Confirm the position of the point of origin.
(5) Remove the connecting screws ❶, and then reinstall the table.



8. ADJUSTMENT OF THE OVER-LIMIT SWITCH

(1) Remove the table.

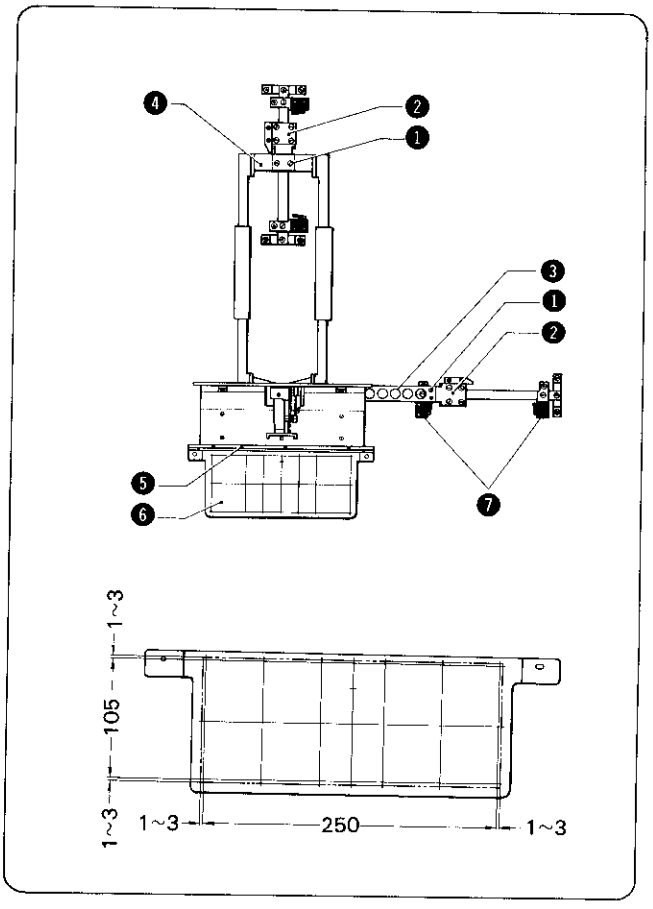
(2) With the table removed, use the connecting step screws ❶ to firmly attach the bracket connecting plate ❷ to the slider connecting plate ❸ and the guide base rear holder ❹.

(3) Install the program standard plate ❻ to the feed guide front plate ❺ in the same manner as described for the confirmation of the position of the origin.

(4) Loosen the screw ❽, and then make the necessary adjustment so that the over-limit switch ❼ turns on when the feed guide section is moved 1 — 3 mm outside the sewing area (250 × 105).

* On the origin-limit side, check to be sure that the origin-limit switches on before the over-limit switch does.

(5) Remove the connecting step screws ❶, and then reinstall the table.



[9]. ADJUSTMENT OF THE ENCODER (POSITION DETECTING DEVICE)

* Remove the encoder which is attached to the rear side of the machine motor.

1. Position adjustment of the synchronizing signal

Loosen the screw ❶ and then move the position of the slot ❷ in order to adjust the synchronizing signal so that when the pulley is rorated by hand, the number two LED of the machine motor substrate ceases to illuminate at the point where the clearance between the upper surface of the needle plate and the tip of the needle is 0 — 0.5 mm, as the needle bar ascends from its lowest position.

2. Position adjustment of the thread cutting signal

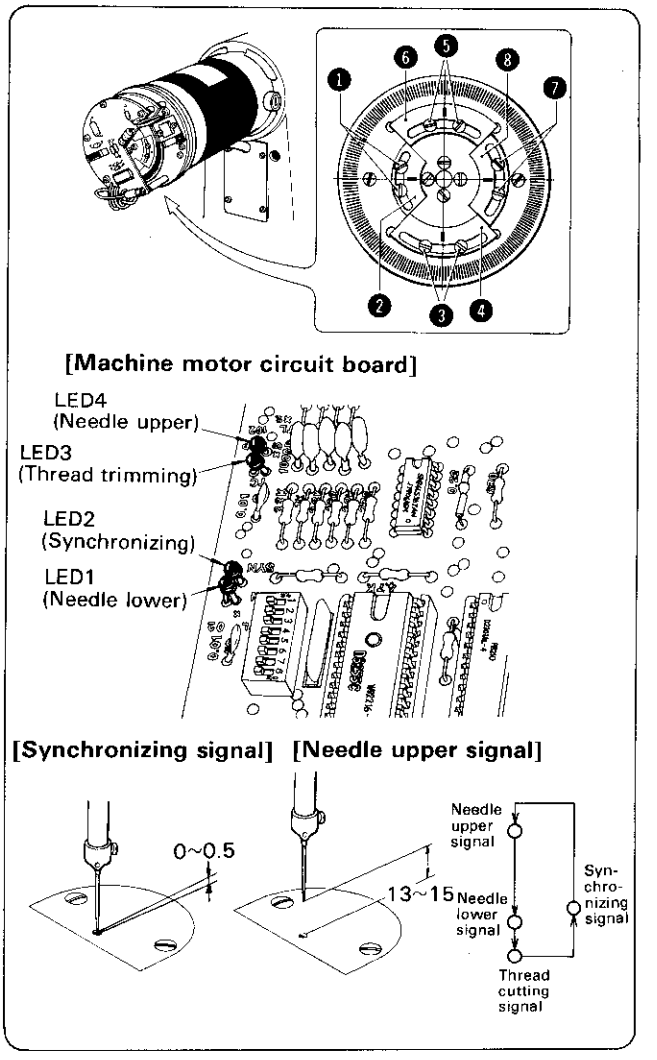
Loosen the screw ❸ and move the positin of the slot ❹ for the adjustmetn of the thread cutting signal so that the number three LED of the machine motor substrate will cease to illuminate when the needle bar is at its lowest position.

3. Position adjustment of the needle upper signal

Loosen the screw ❺ and then move the position of the slot ❻ in order to adjust the needle lower signal so that when the pulley is rotated by hand, the number four LED of the machine motor substrate ceases to illuminate at the point where the clearance between the upper surface of the needle plate and the tip of the needle is 13 — 15 mm, as the needle bar lowers from its highest position.

4. Position adjustment of the needle lower signal

Loosen the screw ❼ and then move the position of the slot ❽ in order to adjust the needle lower position so that when the pulley is rotated by hand, the number one LED of the machine motor substrate ceases to illuminate during the descending movement of the needle bar. It should illuminate only when the needle bar has reached its lowest position.



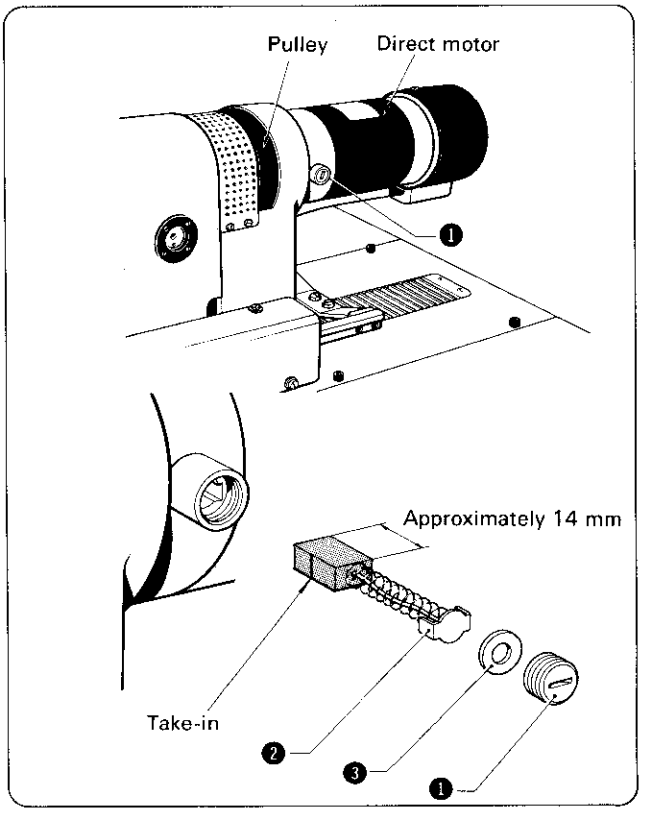
[10]. MAINTENANCE INSPECTION OF THE DIRECT MOTOR (MACHINE MOTOR)

Caution
* Do not strike or allow any great shocks to occur to the motor.
* Be careful so that dust does not enter the inside of the motor during replacement of the brush.
* The length of new brushes is approximately 14 mm. Replace the brush when it wears out to the take-in line.
* After the brush is replaced, operate the motor at maximum speed for more than one hour.

Inspection and replacement of the brush

(1) Remove the screw ❶ that secures the brush.
(2) Remove the brush ❷ and the washer ❸.
(3) After inspection or replacement of the brush ❷, replace it exactly as before, and then tighten by using the screw ❶.

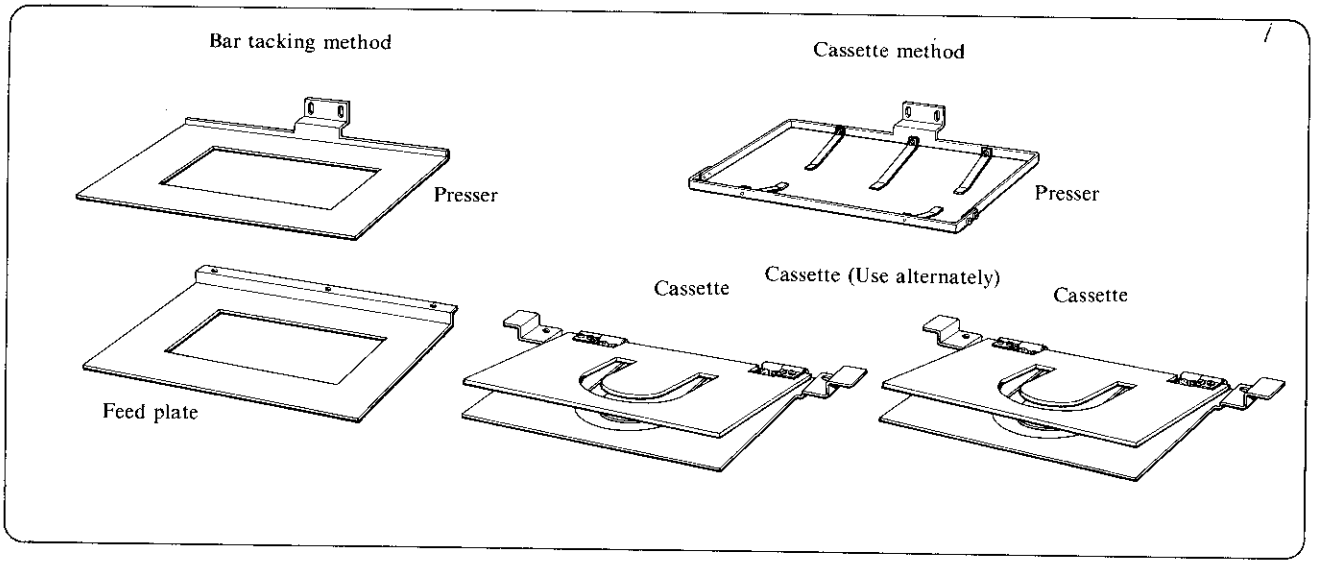
* If the brush is not to be replaced, be certain to reinstall it in the exact same position (taking note that the brush is not inserted upside down) as it was when removed.



ASSEMBLY OF THE PRESSER

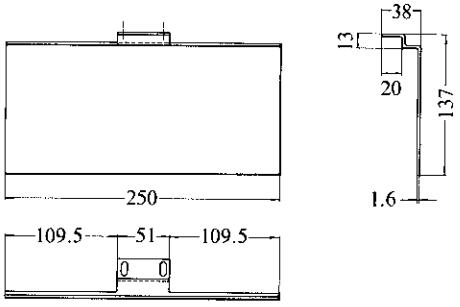
1. Presser methods

★ There are two presser methods: bar tacking and cassette.



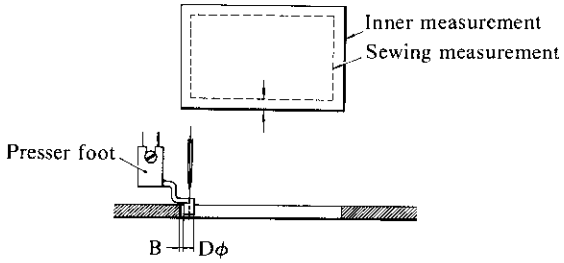
	Sewing conditions	Time required for setting	Sewing time
Bar tacking method	Sewing on level surface	Easy to set	Relatively short time
Cassette method	Sewing parts onto material. Sewing more than two parts simultaneously.	Setting requires a long time	Relatively long time

2. Preparing the bar-tacking presser

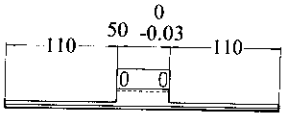


Dimensions of the standard bar-tacking presser (152630001) are shown in the figure above.

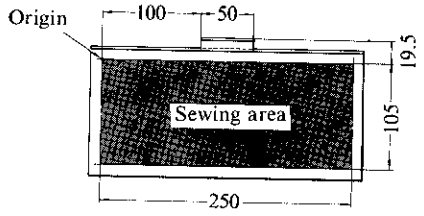
A = D/2 + B
D : Diameter of the presser foot
B : Clearance between the presser foot and the presser



(1) File each end of the center parts (51 mm) by 0.5 mm as shown in the figure below.

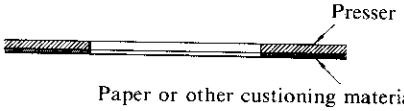


(2) Determine the position in which the material to be sewn will be placed, and then cut out and remove the center part in accordance with the sewing measurement.

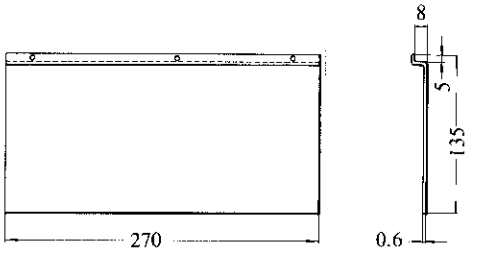


The position of the needle's origin is as shown in the figure above.
Refer to the figure on the left for the inner measurement. The inner measurement is greater than the sewing measurement by the measurement "A" only.

(3) Use glue to attach paper or some other cushioning material around the presser so that the material to be sewn will be firmly pressed.

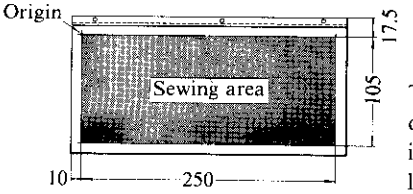


3. Preparing the feed plate



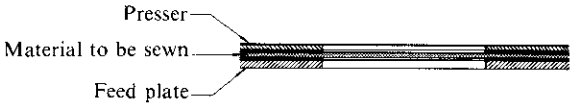
The dimensions of the standard feed plate (152631001) are shown in the figure above.

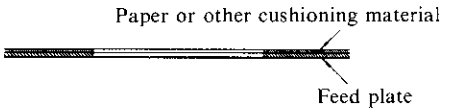
(1) Prepare the feed plate by removing the center portion in accordance with the inner measurement of the presser.



The position of the origin is as shown in the figure on the left.

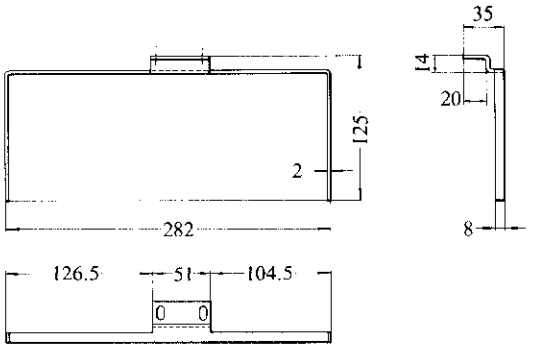
Cut out and remove the center portion of the feed plate (according to the same measurement as that of the presser).





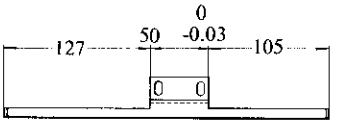
(2) Attach paper or some other cushioning material around the feed plate by using adjustment material so that the material to be sewn is firmly pressed.

4. Preparing the cassette presser

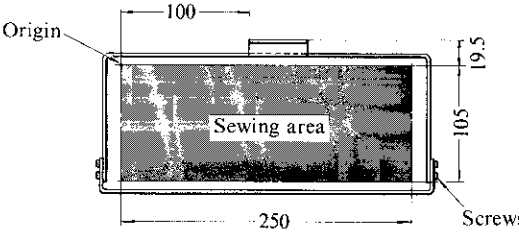


Rear standard-presser (152623001)

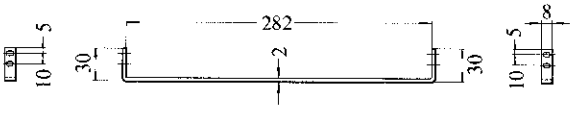
(1) File 0.5 mm from both sides of the center part (51 mm) of the rear standard presser as shown in the figure below.



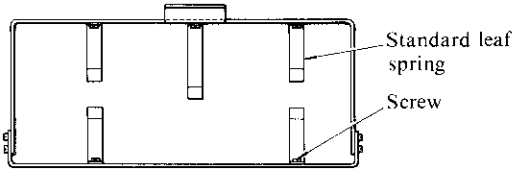
(2) Make screw holes so that the front standard-presser can be attached to the rear standard-presser.



Attach as shown in the figure above by using the four 4 mm screws.
Position the screw holes so that a sufficient sewing area can be obtained.



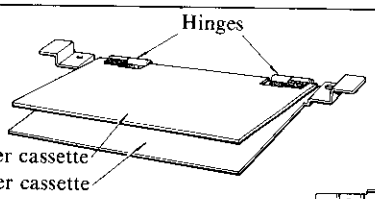
(3) Position the screw holes so that the standard leaf springs will press the cassette.



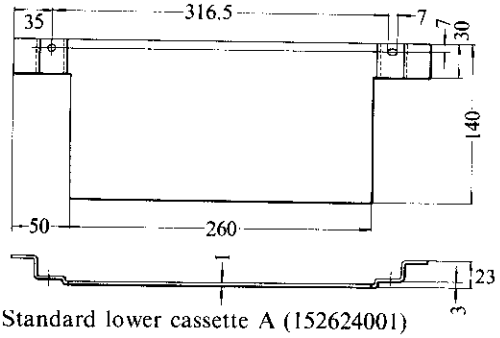
Install the leaf springs in positions where they will not obstruct sewing. Install by using 3 mm screws.

5. Preparing the cassette

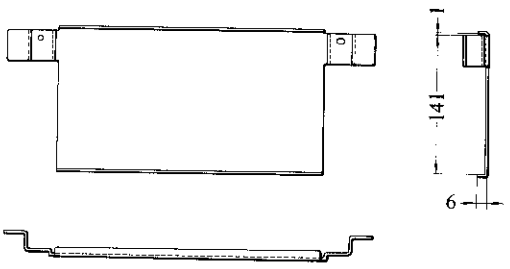
★ The cassette consists of the lower cassette, upper cassette and the hinges.



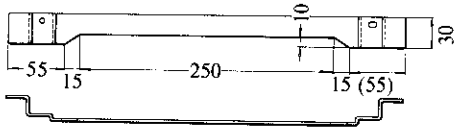
The following types of lower cassettes are available:



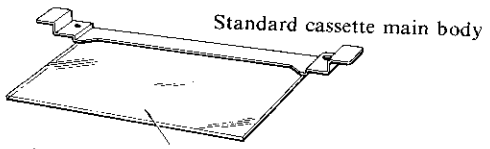
Standard lower cassette A (152624001)



Standard lower cassette B (154091001)

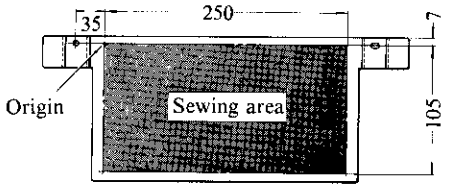


Standard cassette main body (154071001)



Secure a plastic plate under the standard casette main body and then use in the same manner as cassette A or cassette B.

(1) Determine the position of the material to be sewn, and then cut out and remove the center part of the cassette to correspond with the sewing measurement.



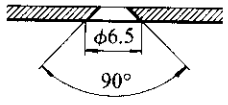
The position of the origin is as shown in the figure on the left.

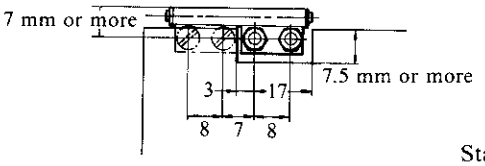
Cut out and remove the center part of the upper and lower cassettes. Refer to the section on the bar tacking-type presser and feed plate for the measurement of the sections to be removed. If two cassettes are used alternately, use the same measurements to cut out and remove the center sections.

(2) Install the hinges.

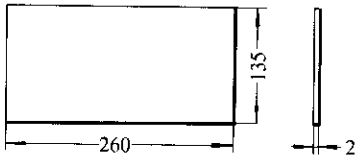
Make beveled holes in the lower cassette and a 3.5ϕ hole in the upper cassette.

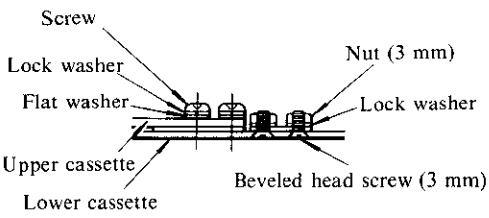
Size of beveled hole for lower cassette

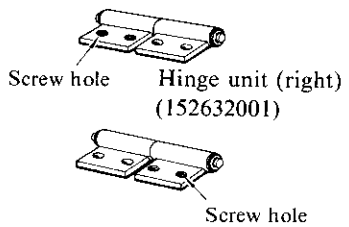




Standard upper cassette (152625000)







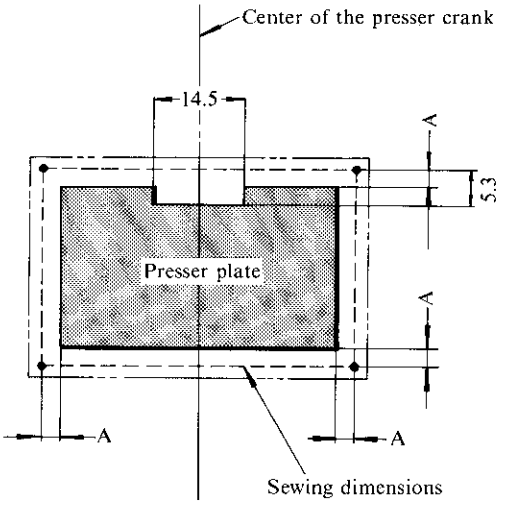
(3) Attach paper or other cushioning material around the opening of the cassette so that the material to be sewn will be firmly pressed.

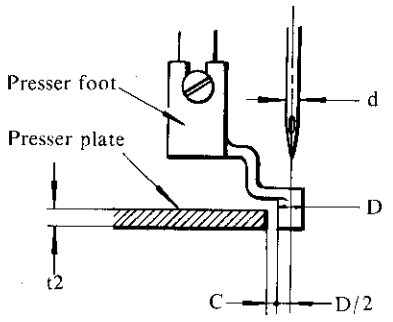
PREPARATION AND ADJUSTMENT OF THE PRESER FOR CENTER-PRESSER REVERSE STITCHING

1. Dimensions of presser plate and feed palte

(1) Dimensions for processing presser plate

★ Alter the presser plate in accordance with the dimensions shown in the figure below.





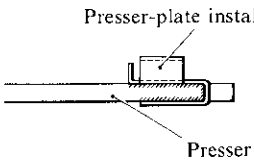
A	
When presser foot is used	When presser foot is not used
D/2+C	d/2+C

C : Clearance between the presser plate and the presser foot, or between the presser plate and the needle.
D : Diameter of presser foot
d : Diameter of needle

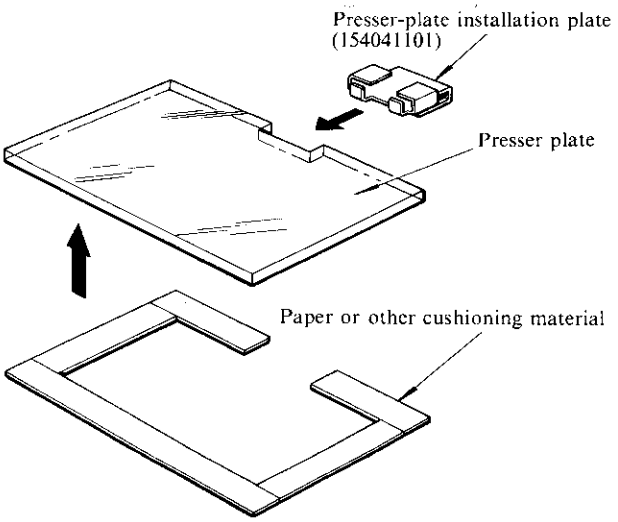
* When the presser foot is used, the clearance "C" must be at least 1 mm. If it is less than this, the presser foot may strike the presser plate during sewing because of deviations between the presser plate and it installation plate, or deviations in the adjustment of the reversing device.

(2) Preparation of the presser plate (assembly)

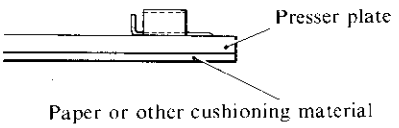
(1) Attach the presser-plate installation plate to the presser plate made in step (1).



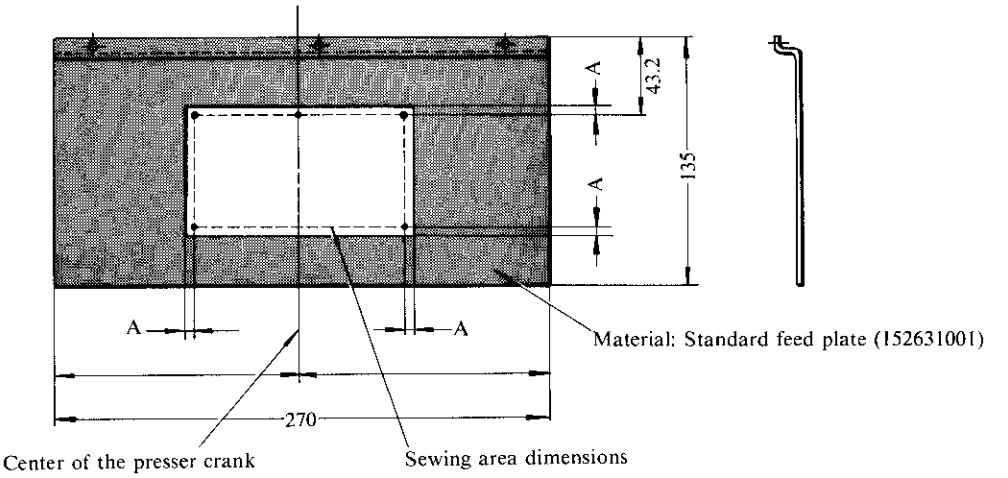
Apply adhesive to the area marked by diagonal lines



Use adhesive to attach paper or other cushioning material to the bottom surface of the presser plate so that the material to be sewn will be firmly pressed.

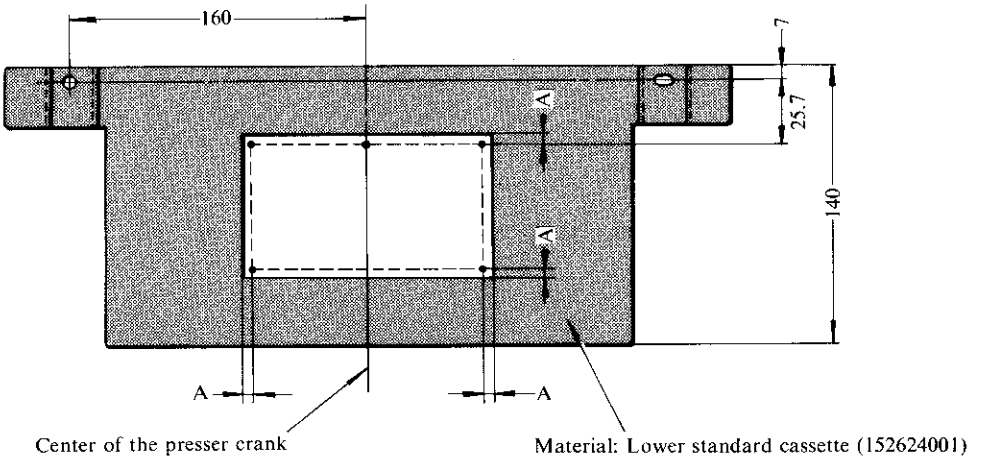


(3) Measurement for the cutting and removal of the center part of the feed plate
Cut out and remove the center part of the feed plate in accordance with the measurements shown in the figure below.

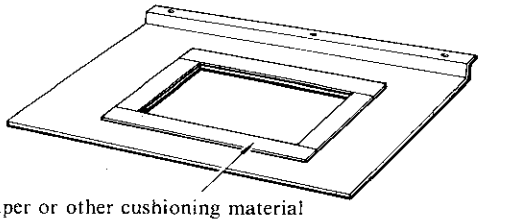


The measurement "A" should be greater than the measurement made for the needle clearance. This measurement should normally contain the same margin as that allowed for sewing. (The measurement for the cutting and removal of the center portion should be the same as the measurement of the material to be sewn.)

Cut out and remove the center part of the cassette as shown in the figure below.

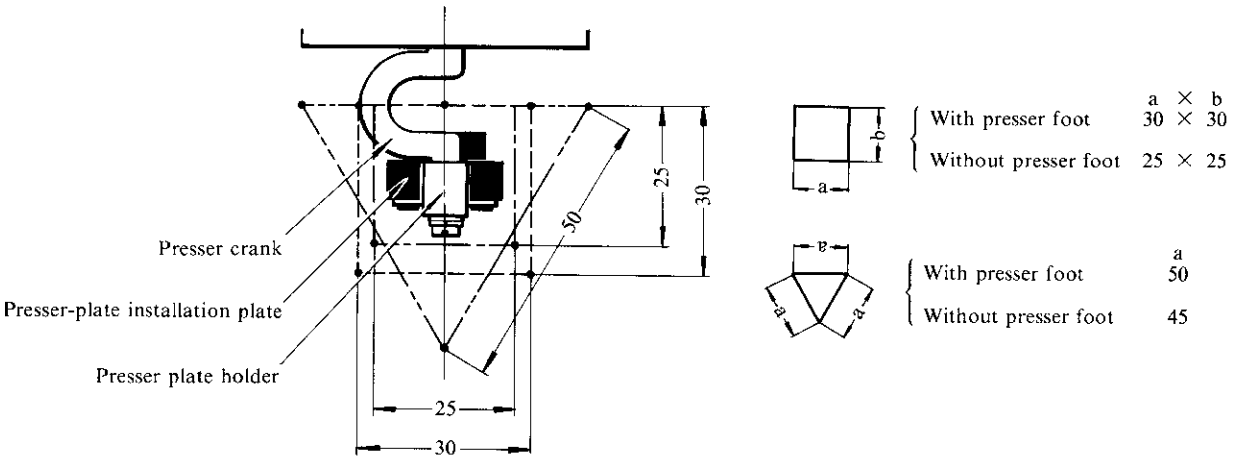


Attach paper or other cushioning material to the feed plate (or cassette).
Use adhesive to attach paper or other cushioning material to the upper surface of the feed plate (or cassette).



2. Minimum sewing dimensions

Refer to the figure below for the minimum sewing dimensions possible when the inner clamping device is used.



(Presser plate holders and presser cranks are available by special order which make it possible to sew materials that are smaller than the dimensions given above.)

3. Programming method when the inner clamping device is used

Refer to the following sections of the Programmer Instructional Manual:
Reversing type program on p. 14
Program Example 3 on p. 19

* If programming is performed by using the stitch pattern directly with the inner clamping device and not using the program standard plate, the presser crank will not reverse.
(If the 111 E button is pressed when the needle of the last stitch is in the lowered position, the needle will strike the presser crank.)

4. Reversing test for the presser crank

It is possible to reverse the presser crank by using the dip switch on the control circuit board.

1. Set the No. 5 dip switch of the control circuit board to the ON position.
2. Install the inner clamping device.
3. Turn on the power switch of the unit.
4. Depress the presser lifter pedal and clamp the presser assembly. The crank will reverse when the clamp signal illuminates.
5. Raise the presser by depresing the presser lifter pedal once again. The presser crank will return to its original position at the same time the presser rises.

* Raise and lower the presser repeatedly in order to find the position where the presser crank reverses and then returns smoothly. Install the reversing device at that position.
* Set the No. 5 dip switch of the control circuit board to the OFF position when the test is completed.
* Check to be sure that the No. 6 dip switch of the control circuit board is in the ON position (for reversing). Be sure to set the No. 6 dip switch to the ON position when the inner clamping device is to be used.

5. Reversing test for the presser crank during trial operation

Insert the card which is used for the reversing operation, and then, during a trial operation, check the reversing position of the presser crank.

Refer to pages 7 — 9 of the Instruction Manual for this unit.

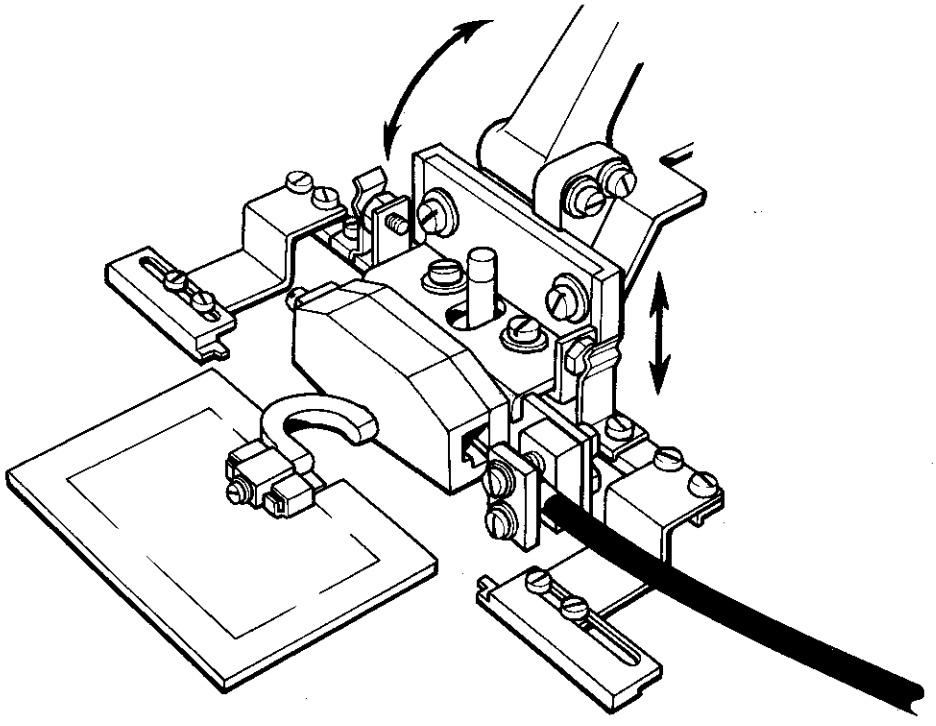
* If this test is to be repeated, move the presser up and down once before beginning. If this is not done, the presser crank will remain in the reversed condition. In this condition, the presser crank will not move even if the starter pedal is depressed.
* While performing the test operation, adjust the presser crank so that it will reverse and then return smoothly.
* Check to be sure that the presser crank is in a position where it will not strike the presser foot or the needle when it begins to reverse.

6. Sewing

Refer to page 10 of the Instruction Manual for this unit.

* Check to be sure that the presser crank reverses smoothly in actual sewing conditions.

* If the pressure of the presser is increased, the presser crank may be affected so that it won't reverse correctly. On the other hand, if the presser crank is adjusted so that it reverses correctly, there may not be sufficient pressure on the material to keep it in place. Final adjustments should therefore be made at the time of actual sewing.

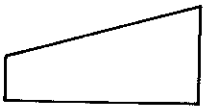


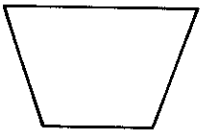
TROUBLESHOOTING CHART

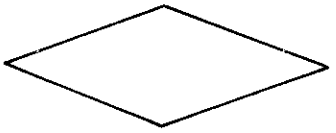
Problem	Cause	Inspection method	Corrective measure	Reference page
Needle breaks	Feed timing is incorrect.	Check to see if feed mechanism moves while needle is piercing material.	Adjust feed timing (synchronizing signal).	26
	Needle strikes presser foot or presser.	Check the presser foot and presser for marks where the needle has strck.	Adjust needle, presser foot, and presser.	
	Upper stopping position of needle is inconsistent.	Check for deviation in pulley.	Adjust upper stopping position of needle.	26
Upper thread breaks	Needle hole of presser foot and center of needle are not aligned.		Adjust alignment of presser foot and needle.	
	Needle hole of presser foot is scratched or damaged.		Use emery cloth, etc., to smooth.	
Stitches are skipped	Presses rises excessively.	Check to see if clearance between material and bottom surface of presser foot is too great.	Adjust height of presser foot.	
	Pressing method is incorrect.	Check to see if the place where the needle descends is sufficiently pressed.	Use different pressing method. Adjust presser.	27
	Height of presser foot is not securely set.	Check for vertical vibration of presser foot.	Strengthen presser spring.	
Deviates from the pattern.	Gap between guide plate and bearing.	Check to see if bearing is rotating correctly.	Adjust bearing.	18
	Play between rack and gear.		Adjust rack and gear in order to eliminate play.	23
	Material is slipping.	Check to see if material is securely pressed.	Adjust presser	15
		Check to see if pressure of presser is insufficient.	Adjust presser	15
		Check to see if feed timing is correct.	Adjust feed timing	26
		Check to see if presser foot descends too low.	Adjust presser foot to obtain correct height.	

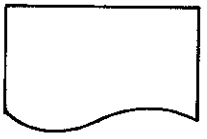
TROUBLESHOOTING FLOW CHART

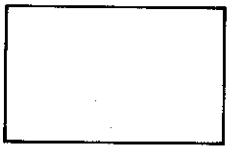
[EXPLANATION ON MARKINGS]

1.  means "manual operation"

2.  means "switch operation"

3.  means "decision"

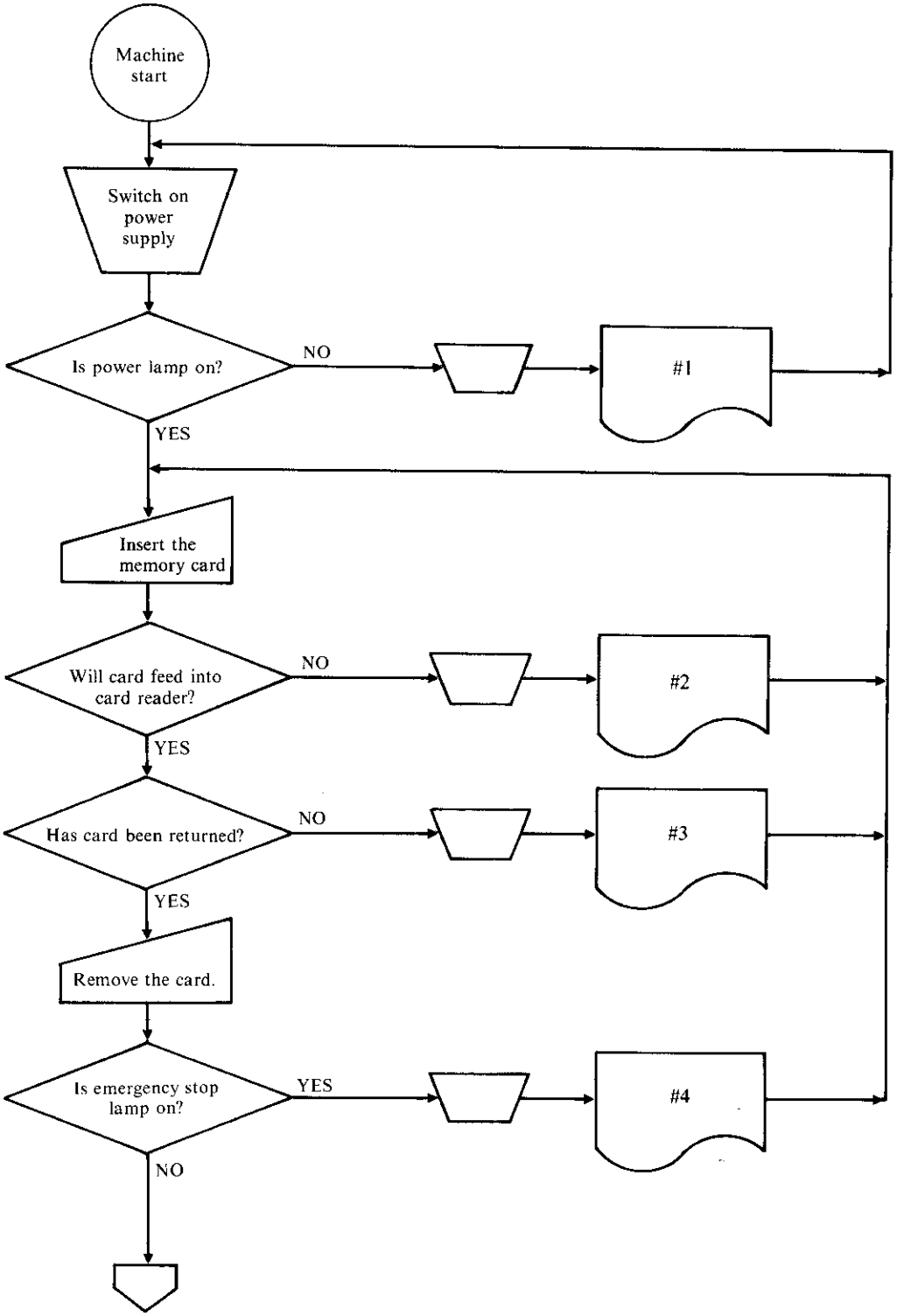
4.  means "refer to Item Number"

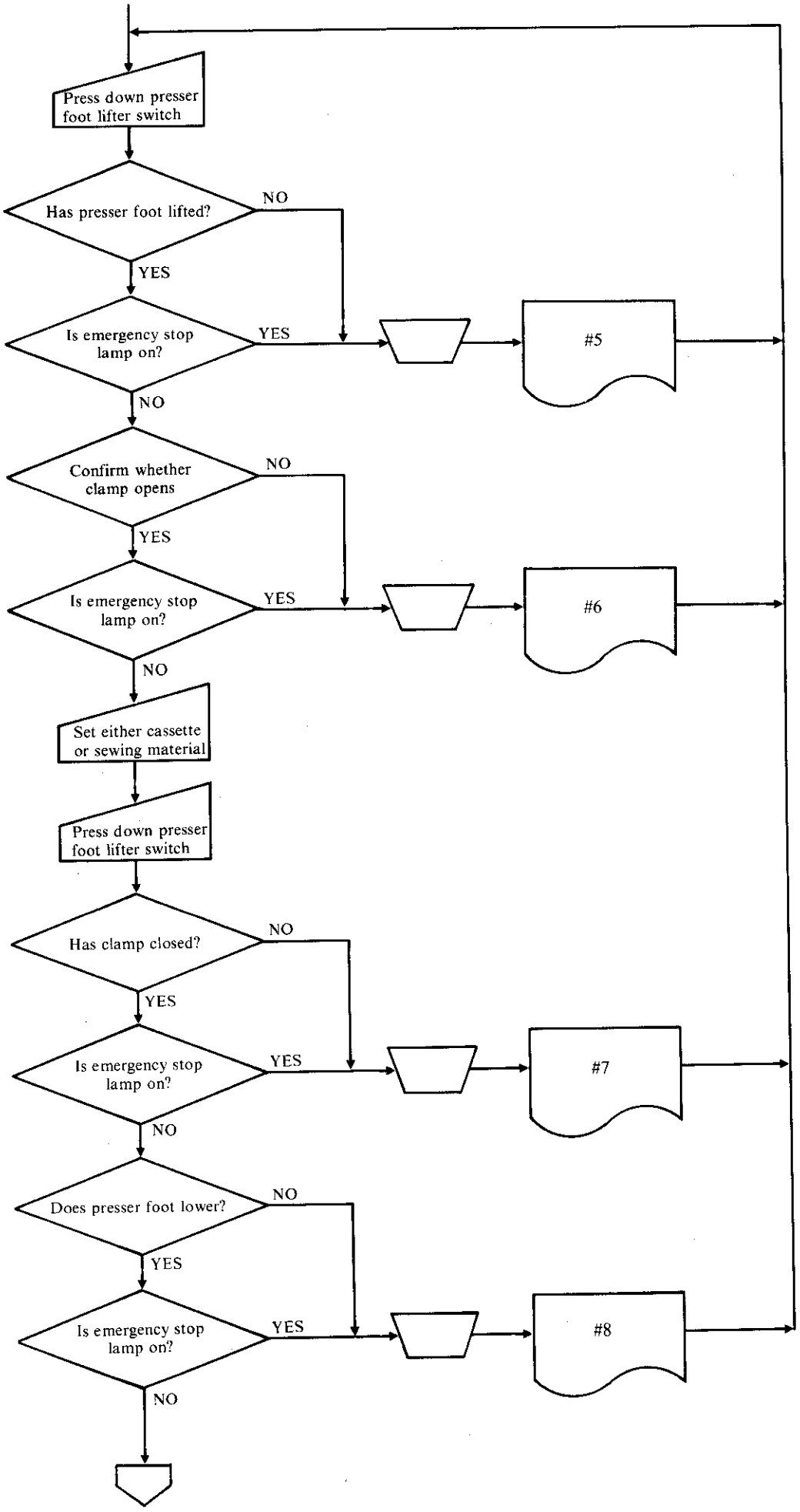
5.  means "set-up of conditions or situation"

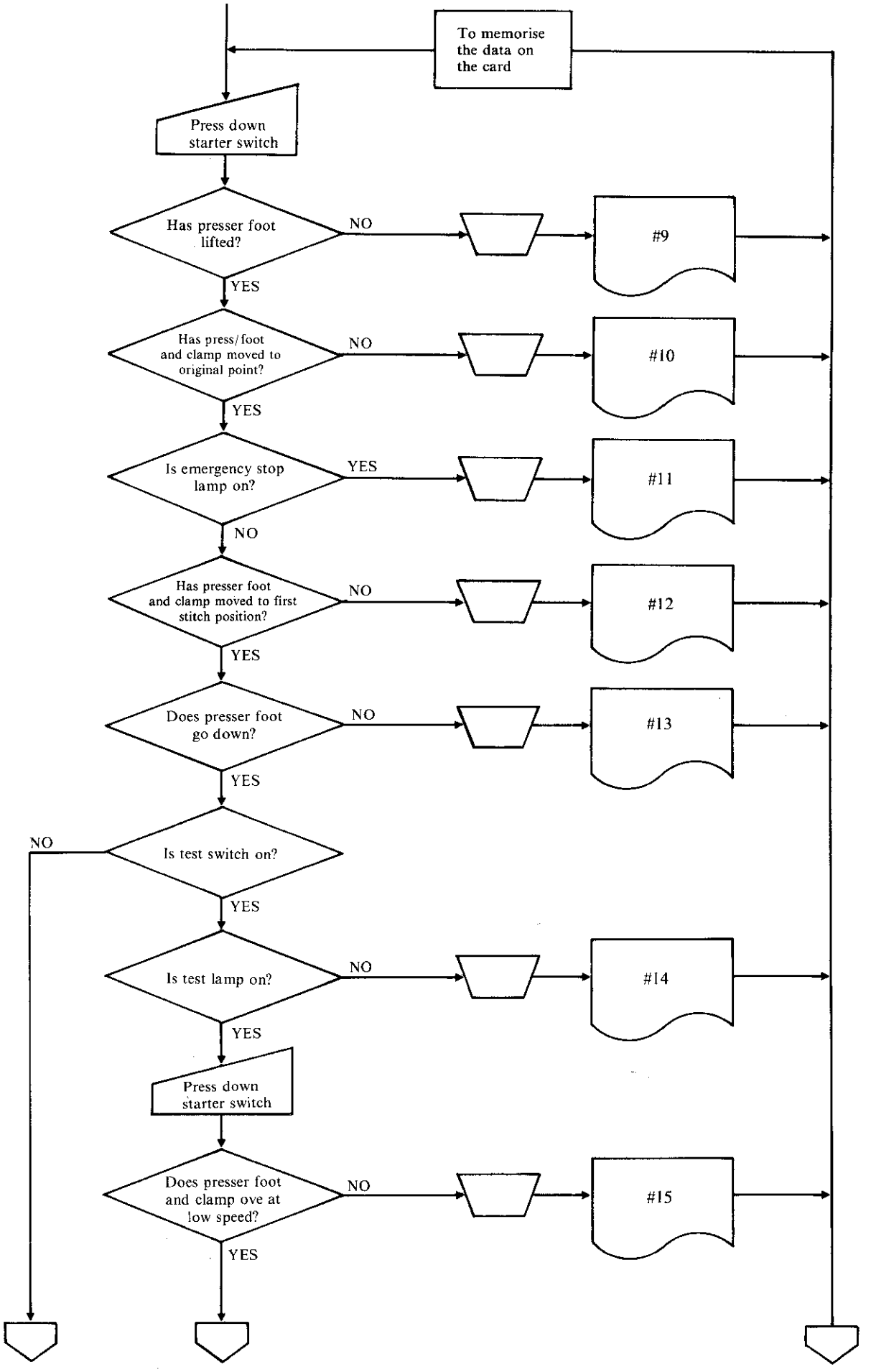
6.  means "continue to next page"

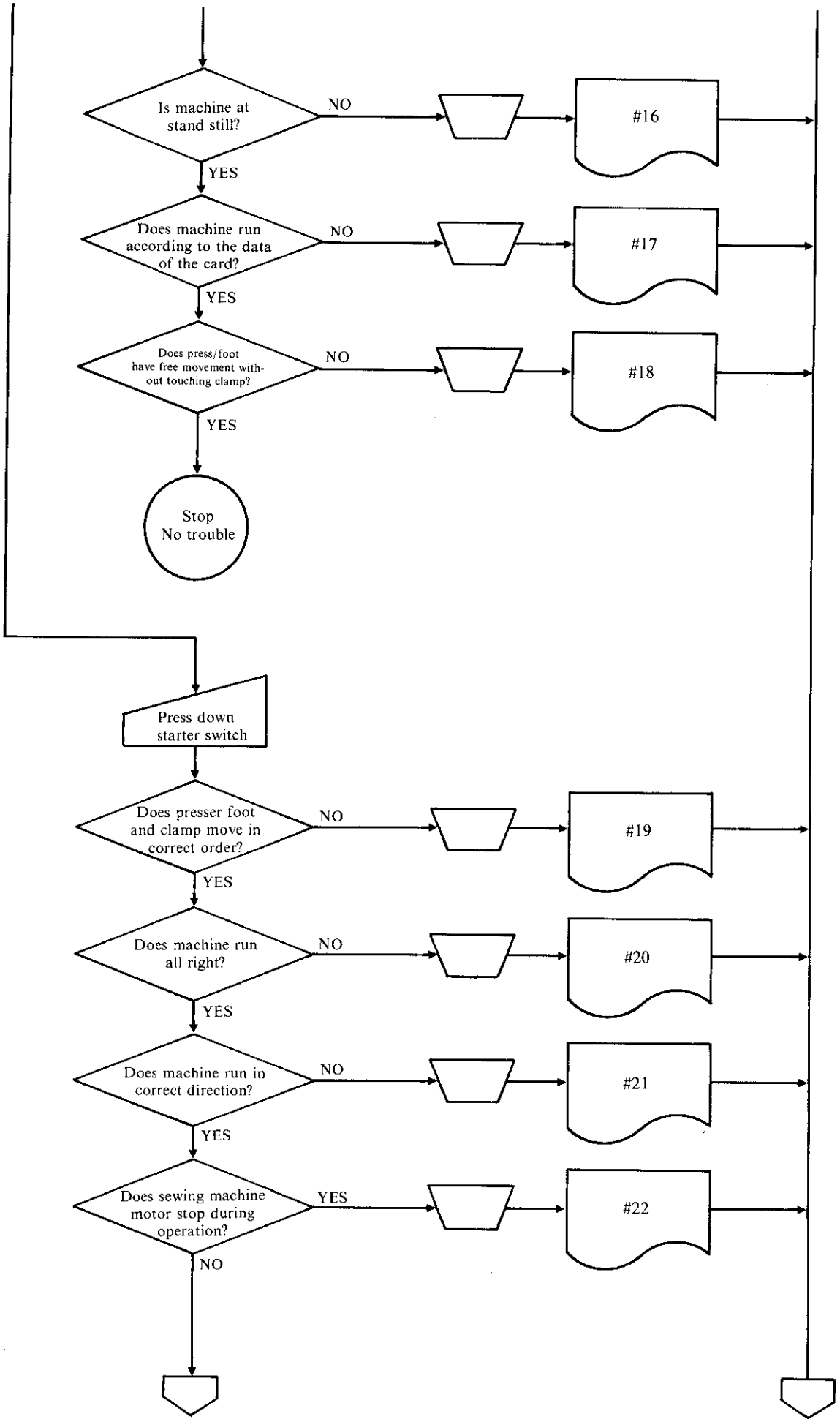
7.  means "switch-off of power supply"

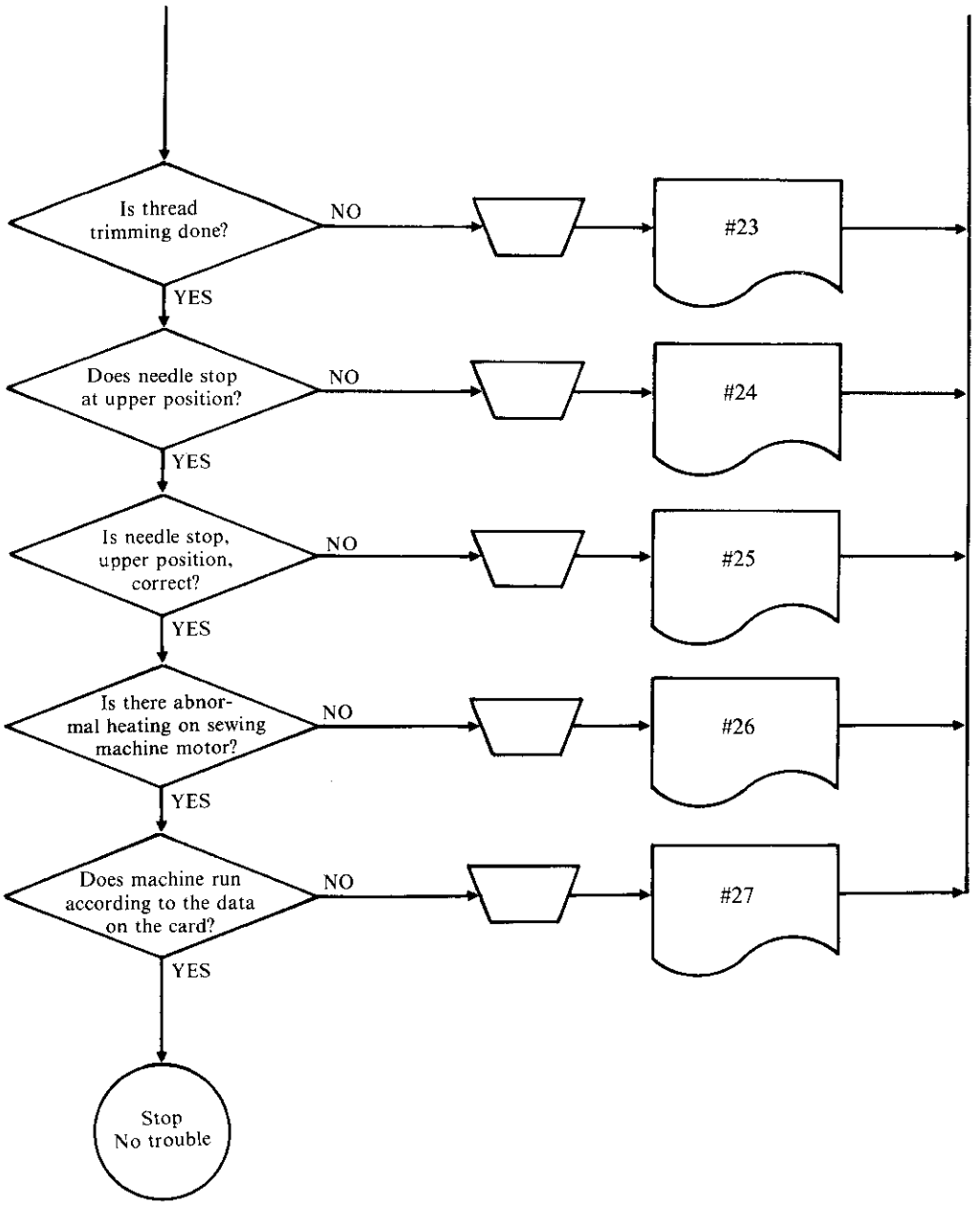
1. TROUBLESHOOTING FLOW CHART FOR MACHINE CONTROL DEVICE



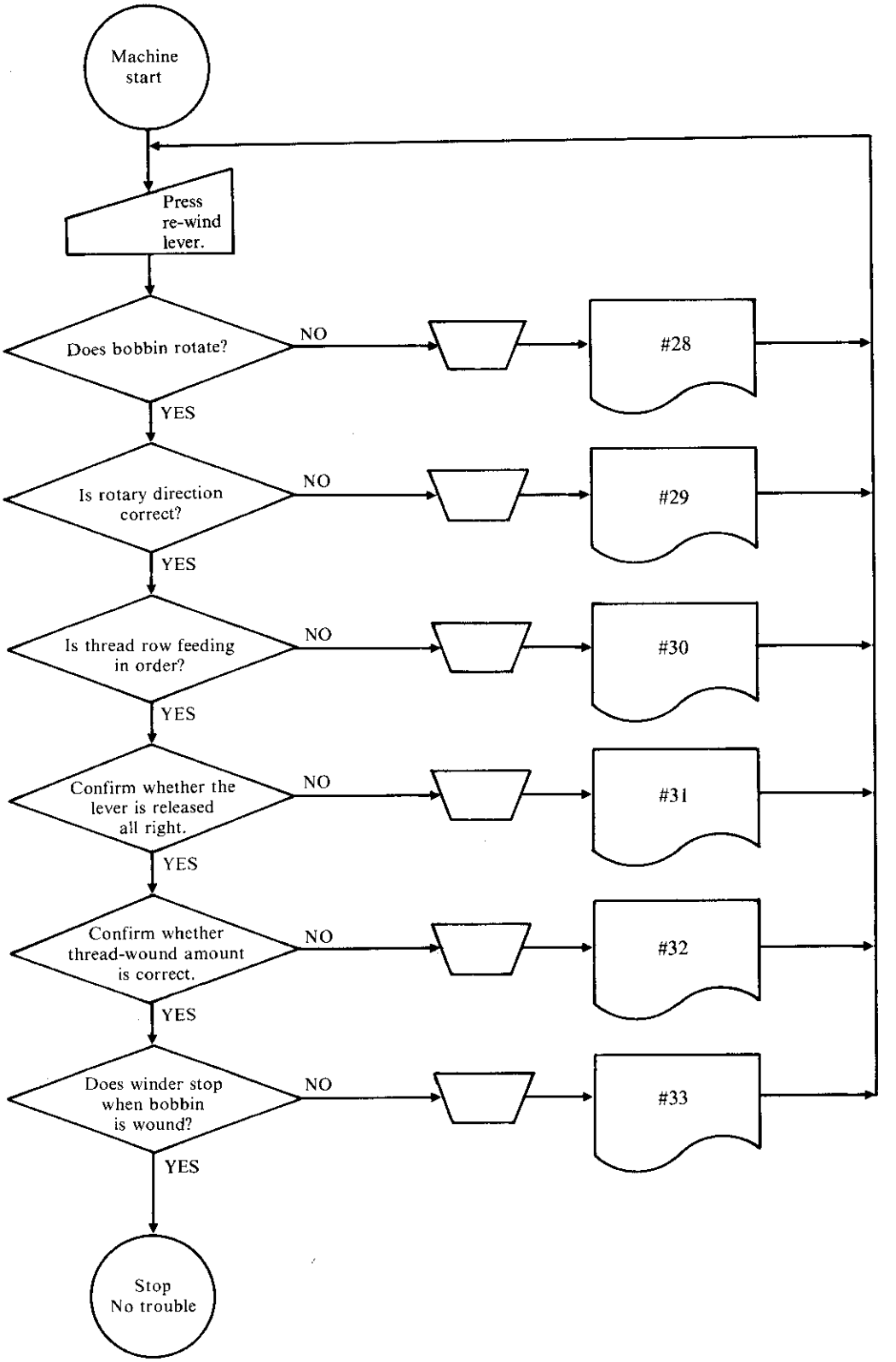

Press down presser foot lifter switch
Has presser foot lifted?
NO
YES
Is emergency stop lamp on?
YES
#5
NO
Confirm whether clamp opens
NO
YES
Is emergency stop lamp on?
YES
#6
NO
Set either cassette or sewing material
Press down presser foot lifter switch
Has clamp closed?
NO
YES
Is emergency stop lamp on?
YES
#7
NO
Does presser foot lower?
NO
YES
Is emergency stop lamp on?
YES
#8
NO


To memorise the data on the card
Press down starter switch
Has presser foot lifted?
NO
#9
YES
Has press/foot and clamp moved to original point?
NO
#10
YES
Is emergency stop lamp on?
YES
#11
NO
Has presser foot and clamp moved to first stitch position?
NO
#12
YES
Does presser foot go down?
NO
#13
YES
NO
Is test switch on?
YES
Is test lamp on?
NO
#14
YES
Press down starter switch
Does presser foot and clamp ove at low speed?
NO
#15
YES

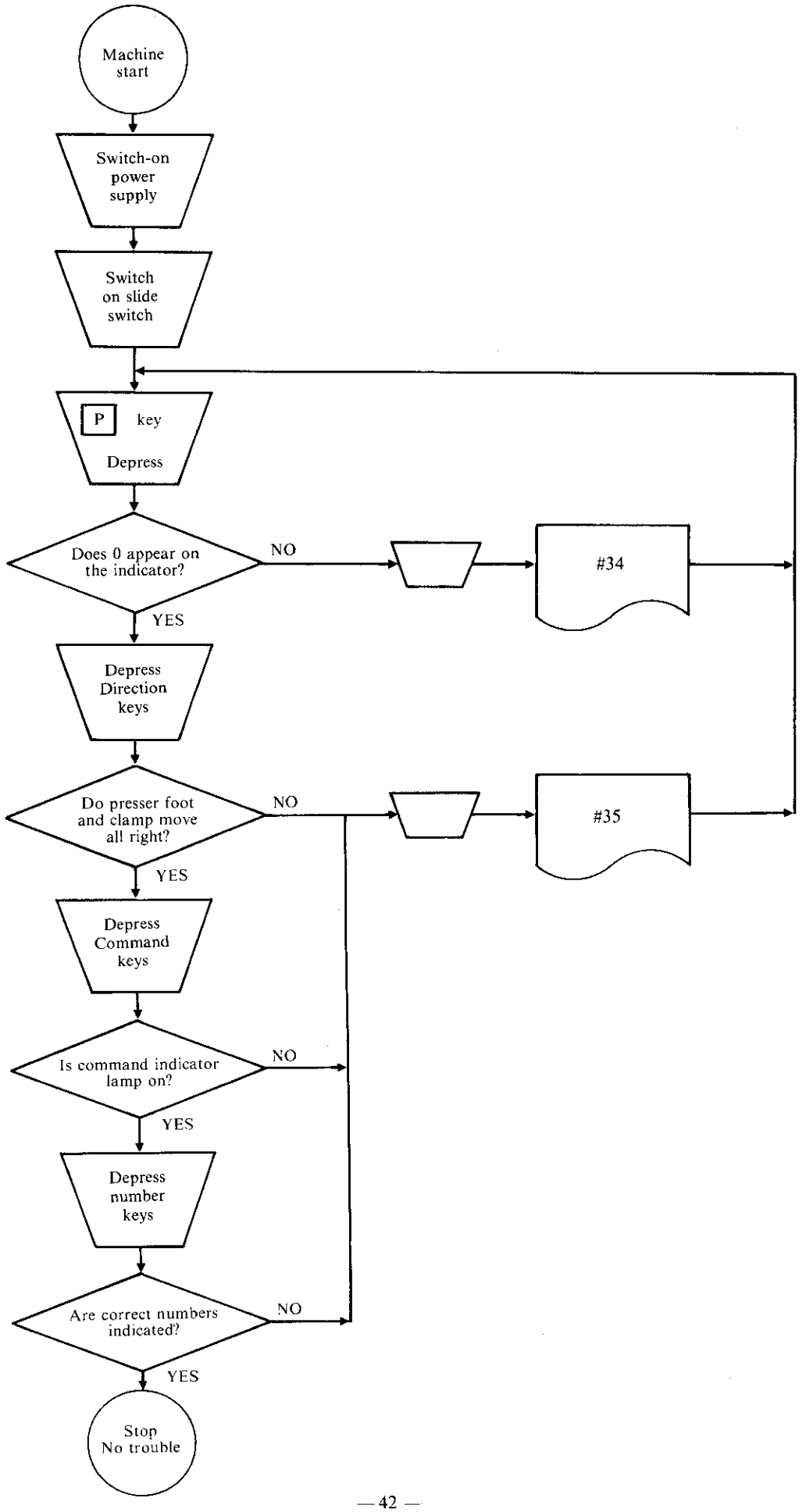

Is machine at stand still?
NO
#16
YES
Does machine run according to the data of the card?
NO
#17
YES
Does press/foot have free movement without touching clamp?
NO
#18
YES
Stop
No trouble
Press down starter switch
Does presser foot and clamp move in correct order?
NO
#19
YES
Does machine run all right?
NO
#20
YES
Does machine run in correct direction?
NO
#21
YES
Does sewing machine motor stop during operation?
YES
#22
NO


Is thread trimming done?
NO
#23
YES
Does needle stop at upper position?
NO
#24
YES
Is needle stop, upper position, correct?
NO
#25
YES
Is there abnormal heating on sewing machine motor?
NO
#26
YES
Does machine run according to the data on the card?
NO
#27
YES
Stop
No trouble

[2]. TROUBLESHOOTING FLOW CHART FOR THREAD WINDER



3. TROUBLESHOOTING FLOW CHART FOR PROGRAMMING DEVICE



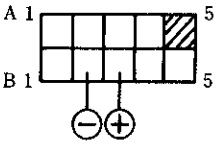
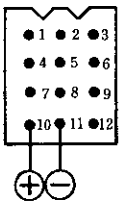
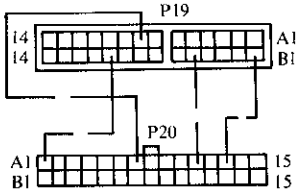
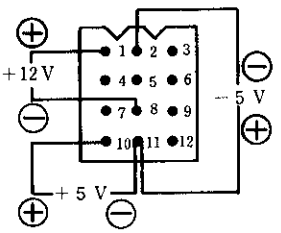
ACTION COUNTERMEASURE

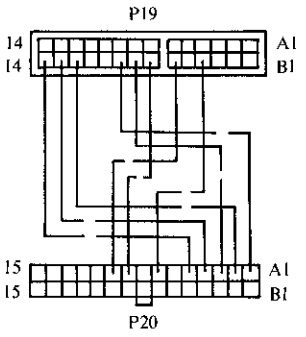
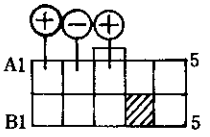
WARNINGS WHEN CARRYING CUT TROUBLESHOOTING:

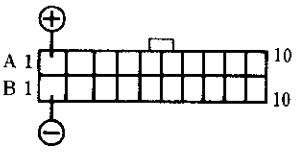
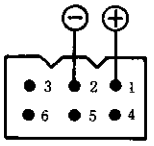
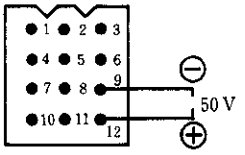
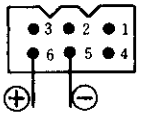
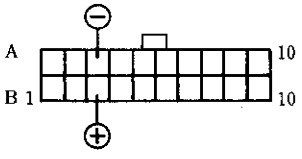
1. Make sure to remove or replace the plug after switching off the power supply.
2. Switch off the power supply when taking off the covers or tables from the machine.
3. When replacing fuse, always make sure to use exactly the same quality and capacity of fuse.
4. □ ..... Turn the switch on, and check the voltage.
   ○ ..... Turn the switch off, and check the resistance.

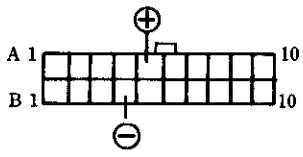
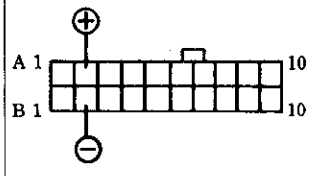
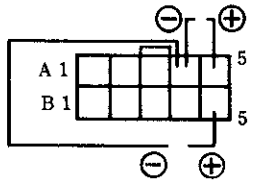
≪BEFORE MAKING ADJUSTMENTS≫

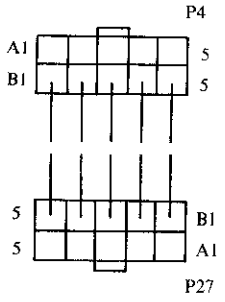
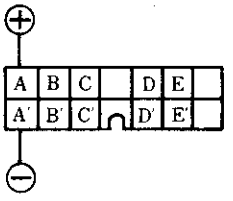
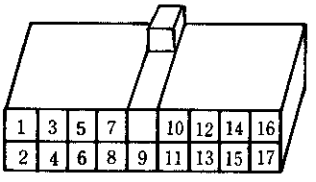
1. Check whether fuse is not blown.
2. Confirm whether all plugs are properly connected.
3. Find out with flow chart under what condition it's symptoms occurs.

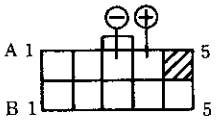
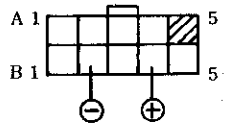
No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#1 Electric power supply lamp does not light	1. No power supply	[A] Measure the voltage of 3 ph. power transformer. Each phase should be approx (200 VAC) at output terminals.		
	2. Fault on power supply switch or cord	Ⓐ Power switch on. Test for continuity between power transformer output terminals and terminals of power supply.	Power switch Power supply cord	
	3. Fuse failure	Ⓐ Switch off. Remove fuse No. 10 and check continuity.	Fuse No. 10 (5A)	12
	4. Fault on lamp (LED) or cord 	Ⓐ Switch off. Remove plug P21 from connector board, set test meter to highest resistance range. Connect test leads as shown. If LED is O.K. Meter will show low resistance. B2 · · · ⊖ B3 · · · ⊕	Switch panel assembly (LED)	
	5. Fault on power supply equipment 	[A] Remove pulg P7 from control circuit board and measure the voltage as drawing. If it is approx 5 VDC it is O.K. No. 10 · · · ⊕ No. 11 · · · ⊖	Power supply equipment	
#2 Card is not fed into the slat	1. Fuse failure	Ⓐ Switch off. Remove plug No. 7 and check continuity.	Fuse No. 7 (1A)	12
	2. Fault on cord for card reader 	Ⓐ Switch off. Remove plug P20 from control circuit board and remove plug P19 from card reader. the check for continuity as follows. P20 A13—B1 P19 A11—B5 A1 —B10 A7 —A8	Reader harness assembly	
	3. Fault on power supply equipment 	[A] Remove plug P7 from control circuit board and measure the DC Voltage as shown below. No. 1 · · · ⊕ No. 10 · · · ⊕ No. 11 · · · ⊕ ↑ +12V ↓ ↑ +5V ↓ ↑ −5V ↓ No. 8 · · · ⊖ No. 11 · · · ⊖ No. 2 · · · ⊖	Power supply equipment	
	4. Fault on card reader	If above mentioned item 1 ~ 3 are good, card reader is fault.	Card reader	

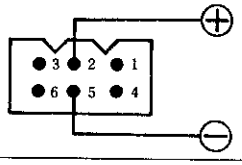
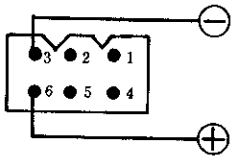
No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#3 Card reader does not return card	1. Fault on card reader	A Replace the card reader	Card reader	
#4 When card is returned emergency stop lamp is on.	1. Incorrect reading by card reader	A Insert cleaning card to clean magnetic head.		
	2. Fault on memory card	A Try another card of known quality.	Memory card	
	3. Fault on card reader cord 	Ⓐ Switch off. Remove plug P20 from control circuit board and remove plug P19 from card reader. Then check for continuity as follows: P20 B5 —B14 P19 B4 —B13 B1 —B9 B3 —B8 B2 —B12 B7 —B4 B10—B6 B9 —B7	Reader harness assembly	
	4. Fault on card reader	A Switch off. Replace card reader.	Card reader	
	5. Fault on control circuit board	A Switch off. Replace the control circuit board.	Control circuit board	13
#5 Presser foot does not lift when presser foot switch is operated.	1. Fuse failure	Ⓐ Switch off. Remove fuse No. 6 and check continuity.	Fuse No. 6 (5A)	12
	2. Excessive load on presser foot motor	A Check presser foot mechanism. (Bowman cable, oprating screw stopper, etc.)		
	3. Incorrect adjustment of presser foot	A Adjust to correct movement.		
	4. Fault on presser foot micro switch. 	Ⓐ Switch off. Remove plug P22 from connector board and check switch operation contacts. normally closed normally open A1 ·····A2 ·····A3 common When switching on, the electricity is on.	Foot switch assembly	15

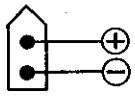
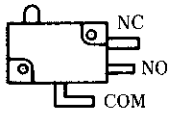
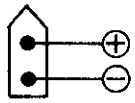
No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#5 Presser foot does not lift when presser foot switch is operated	5. Fault on lamp micro switch 	Ⓐ Switch off. Remove plug P3 from connector board and check switch operation. Contacts normally open A1 ⊕ · · · ⊖ B1	Position sensing switch assembly	
	6. Fault on presser foot motor cord 	Ⓐ Switch off. Remove plug P2 from control circuit board and check continuity and resistance of motor. 20 ohms approx No. 1 ⊖ · · · ⊕ No.2	Presser foot motor assembly	
	7. Fault on power supply equipment 	Ⓐ Remove plug P7 from circuit board and measure voltage as diagram. No. 9 ⊖ · · · ⊕ No. 12 50 V approx	Power supply equipment	
	8. Fault on control circuit board	If all above tests do not reveal fault, replace control circuit board.	Control circuit board	13
#6 Clamp does not open when presser foot is lifted.	1. Excessive load on clamp motor.	A Check clamp mechanism. (Bowman cable, operating screw stopper etc.)		
	2. Incorrect adjustment of clamp.	A Adjust to correct movement.		15
	3. Fault on presser foot motor cord 	Ⓐ Switch off. Remove plug P2 from control circuit board and check continuity and resistance of motor. 20 ohms approx No. 5 ⊖ · · · ⊕ No. 6	Presser foot motor assembly	
	4. Fault on micro switch 	Ⓐ Switch off. Remove plug P3 from connector board and check micro switch operation. CONTACTS NORMALLY CLOSED A3 ⊕ · · · ⊖ B3	Position sensing switch assembly	
	5. Fault on control board.	If all above tests do not reveal fault, replace control circuit board.	Control circuit board	13

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#7 Clamp does not close when presser foot switch is depressed.	1. Overload on presser foot motor	Refer to #6.1		
	2. Incorrect adjustment on presser foot	Refer to #6.2		15
	3. Fault on clamp micro switch 	Ⓐ Switch off. Remove plug P3 from connector board and check micro SW. A5 ⊕ · · · ⊖ B4	Position sensing switch	
	4. Fault on control circuit board	If all above tests do not reveal fault, replace control circuit board.	Control circuit board.	13
#8 Presser foot does not go down when clamp is closed.	1. Overload on clamp motor.	Refer to #5.2		
	2. Incorrect adjustment of clamp.	Refer to #5.3		15
	3. Fault on presser foot micro switch 	Ⓐ Switch off. Remove plug P3 from connector board and test micro switch operation. Contacts normally closed A2 ⊕ · · · ⊖ B2	Posisiton sensing switch assembly	
	4. Fault on control circuit board	If all above tests do not reveal fault, replace control circuit board.	Control circuit board	13
#9 Presser foot does not lift when starter switch is pressed.	1. Fault on start switch 	Ⓐ Switch off. Remove plug P22 from connector circuit board and test switch operation. normally closed normally open A5 ·····A4 ·····B5 common When switching on, the electricity is on.	Foot switch assy	
	2.	Refer to #5		

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#10 Presser parts does not move back to original point	1. Fuse failure	Ⓐ Switch off. Remove fuse numbers: 1, 2, 9, 13 and check continuity.	Fuse No. 1 5 amp slo blo No. 2 5 amp slo blo No. 9 5 amp No. 13 1A slo blo	12
	2. Fault on cord  	Ⓐ Switch off. Remove plug P4 from control circuit board and plug P27 from pulse motor, check continuity. P4 B1 — B5 P27 B2 — B4 B3 — B3 B4 — B2 B5 — B1	Clock harness assembly	
	3. Fault on pulse motor connector  	Ⓐ Switch off. Remove plug P10, P11 from pulse motor ciucuit board and check resistance of pulse motor windings. A ⊕ · · · ⊖ A′ B ⊕ · · · ⊖ B′ C ⊕ · · · ⊖ C′ D ⊕ · · · ⊖ D′ E ⊕ · · · ⊖ E′ All windings approx. 2 ohms.	Pulse motor assembly	
	4. Fault on power supply  	[A] Remove plug P9 and measure the voltage as diagram. Approx valure 16 ⊕ · · · ⊖ 5 120VDC 9, 10, 11, 13 ⊕ · · · ⊖ 3, 5, 6, 8, 6 VDC 1, 2, 4 ⊕ · · · ⊖ 5, 15 VAC	Power supply equipment	
	5. Fault on circuit boards	Replace control circit board and pulse motor circuit board.	Control circuit board or pulse motor circuit board	13

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#11	1. No pattern data in memory	Insert memory card.		
	2. Incorrect setting of over limit switch	A Switch off. Adjust so that over limit switch is operated after original point switch is operated.		25
#12	Dirty oil on the head of card reader	A Insert cleaning card several times.	Memory card	
	2. Fault on memory card	A Try another card of known memory card quality.	Card reader or control circuit board	
	3. Fault on card reader control circuit board	If all above tests do not reveal fault, replace card reader. If fault persists, replace control circuit board.		13
#13		Refer to #8.		
#14	1. Fault on test switch 	Ⓐ Switch off. Remove plug P21 and check switch operation. A4 ⊕ · · · ⊖ A3	Switch panel assembly	
	2. Fault on test lamp 	Ⓐ Switch off. Remove plug P21 from connector board. Set test meter to highest resistance range connect test lends as shown. If LED is ok, meter will show low resistance. B4 ⊕ · · · ⊖ B2	Switch panel assembly (LED)	
	3. Fault on control circuit board	If all above tests do not reveal fault, replace control circuit board.	Control circuit board	13
#15		Refer to #10.		
#16	1. Fault on control circuit board	A Replace control circuit board	Control circuit board	13
#17		Refer to #12.		
#18	1. Presser foot and clamp are not compatible for this programme.	Modify clamp Use suitable presser foot Modify programme	Presser foot	
#19		Refer to #15.		

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#20	1. Fuse failure	Ⓐ Switch off. Remove fuse No. 3 and check continuity.	Fuse No. 3 (10A)	12
	2. Fault on cord.	Ⓐ Switch off. Remove connections from terminals 2 and 3 motor etc. board and measure motor reistance which should be approx 2 ohms.		
	3. Fault on power supply equipment	[A] Remove connections 1 and 4 from terminals on power supply equipment. Measure output voltage 80 VDC.	Power supply equipment	
	4. Fault on sewing machine motor cirucit board	A Switch off. Replace circuit board.	Sewing machine motor circuit board	13
#21	1. Sewing machine motor connections reversed.	A Switch off. Exchange connections of wires at terminals 2, 3.		
#22	1. Overloading into sewing machine motor	A Make necessary adjustment on sewing machine.		
	2. Fault on sewing machine motor circuit board	A Switch off. Replace machine motor circuit board.	Sewing machine motor circuit board	13
#23 No thread trimming	1. Fuse failure	Ⓐ Switch off. Remove fuse No. 5 and check continuity.	Fuse No. 5 (5A)	12
	5. Fault on either solenoid or cord. 	Ⓐ Switch off. Remove plug No. P13 from sewing motor control board. Measure resistance of solenoid. No. 2 ⊕ · · · ⊖ No. 5 5 ohms	Solenoid or cord	
	3. Fault on power supply equipment 	[A] Remove plug P13 and measure its voltage as shown in diagram. No.3 ⊖ · · · ⊕ No. 6 38 VDC	Power supply equipment	
	4. Incorrect adjustment of synchronizer	A If LED No. 3 on sewing motor is off when needle bar is at the lowest point, synchro timing is OK.		26
	5. Falt on sewing machine motor circuit board	A Replace sewing machine motor circuit board.	Sewing machine motor circuit board	13
	6. Incorrect adjustment of thread trimming	A Make necessary adjustment. See machine hand manual.		

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#24	1. Fault on synchronizer	A If LED No. 4 of sewing machine motor circuit board extinguishes at needle-up position, it is O.K.	Encoder assembly	
	2. Fault on sewing machine motor circuit board	A Replace circuit board.	Sewing machine motor circuit board	13
#25	1. Incorrect adjustment of synchronizer	A Adjust needle up slit position.		26
	2. Fault on sewing machine motor circuit board	A Replace sewing machine motor circuit board.	Sewing machine motor circuit board	13
#26		Refer to #22.		
#27	1. Incorrect adjustment of table move signal	Adjust slit of table move signal.		26
	2.	Refer to #12.		
#28	1. Incorrect adjustment on bobbin winder	A Bobbin winder operating lever should fully depress micro switch when winding bobbin.		
	2. Fuse failure	Ⓐ Switch off. Remove fuse No. 4 and check continuity.	Fuse No. 4 (2A)	12
	3. Falt on either bobbin winder motor or harness 	Check for continuity. Pin connection as drawing.	Bobbin winder motor assembly	
	4. Fault on micro switch 	Ⓐ Switch off. Check micro switch function. Normally closed contact used. With power on.	Bobbin winder motor assembly	
	5. Fault on power supply equipment 	[A] Remove the connector from bobbin winder motor assembly and measure supply voltage which should be approx. 16 VDC.	Power supply equipment	

Bobbin winder motor does not rotate

No.	Cause	Check, Repair, Adjustment	Replacement parts	Page
#29	1. Reversed polarity of supply to bobbin winder motor	A Exchange ⊕ ⊖ terminals on bobbin winder motor.		
#30	1. Incorrect adjustment on bobbin winder gurde plate	A Adjust position of bobbin winder guide plate.		
	2. Incorrect adjustment of lever	A Adjust so that lever easily returns when wound thread touches.		
#31	1. Incorrect adjustment of bobbin winder	A Adjust so that lever will return.		
#32	1. Incorrect adjustment on thread winding	A Adjust.		
#33		Refer to #28.		
#34	1. Poor connection of programmes harness	Ensure connector is fitted correctly.		
	2. Poor connections of connector on programmer cct. board	Same as above.		
	3. Poor connection of key switch	Same as above.		
	4. Poor connection of indicator circuit board	Same as above.		
#35	4. Poor connection of indicator circuit board	Refer to #1, 1, 2, 3.		

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