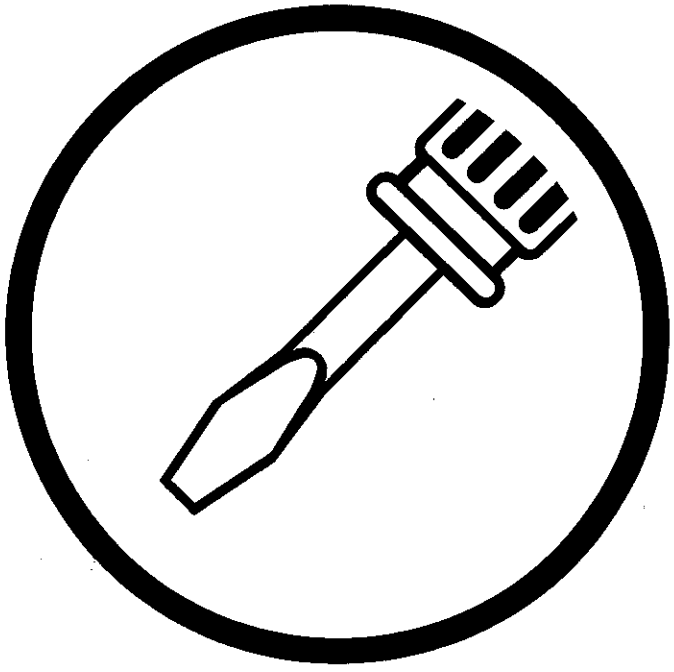
BAS-401,412,416

SERVICE MANUAL

Please read this manual before making any adjustments.

SINGLE HEAD ELECTRONIC EMBROIDERY MACHINE



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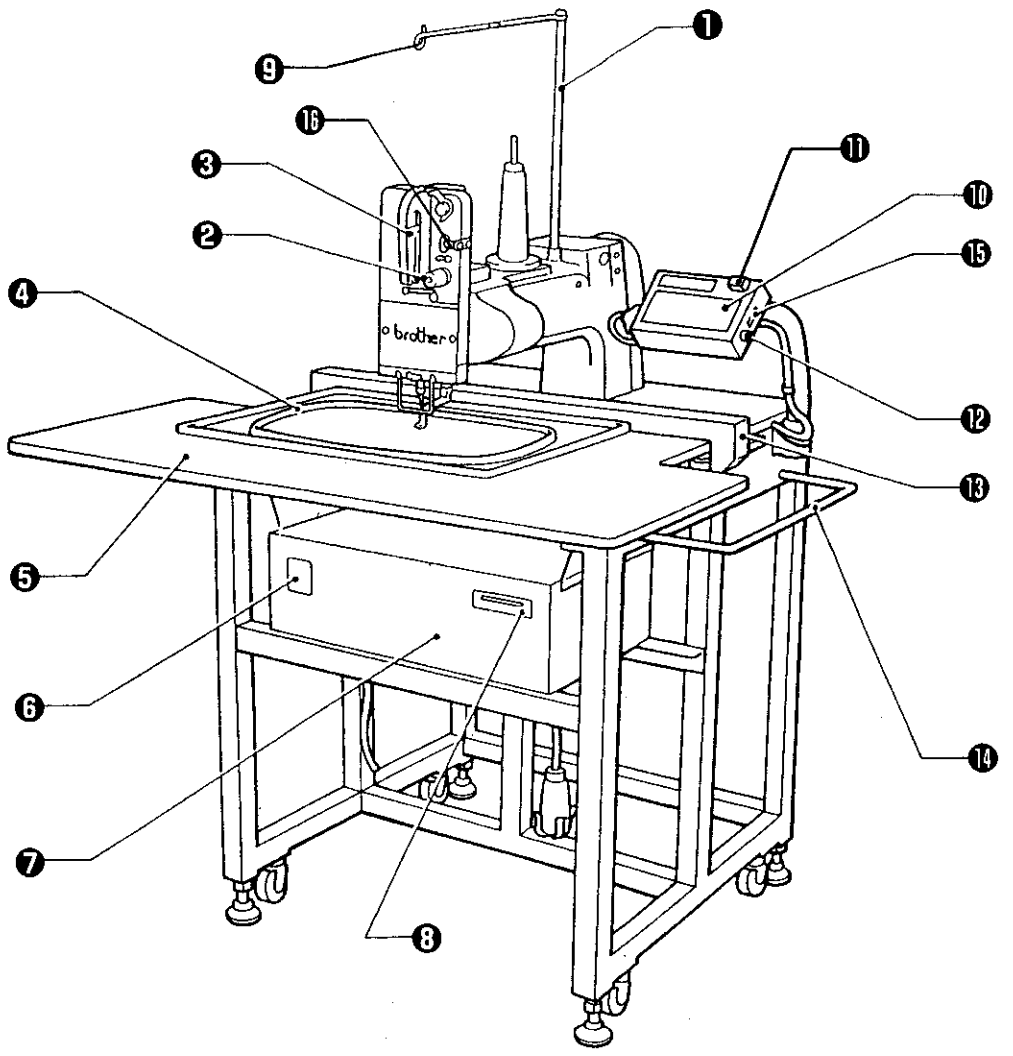
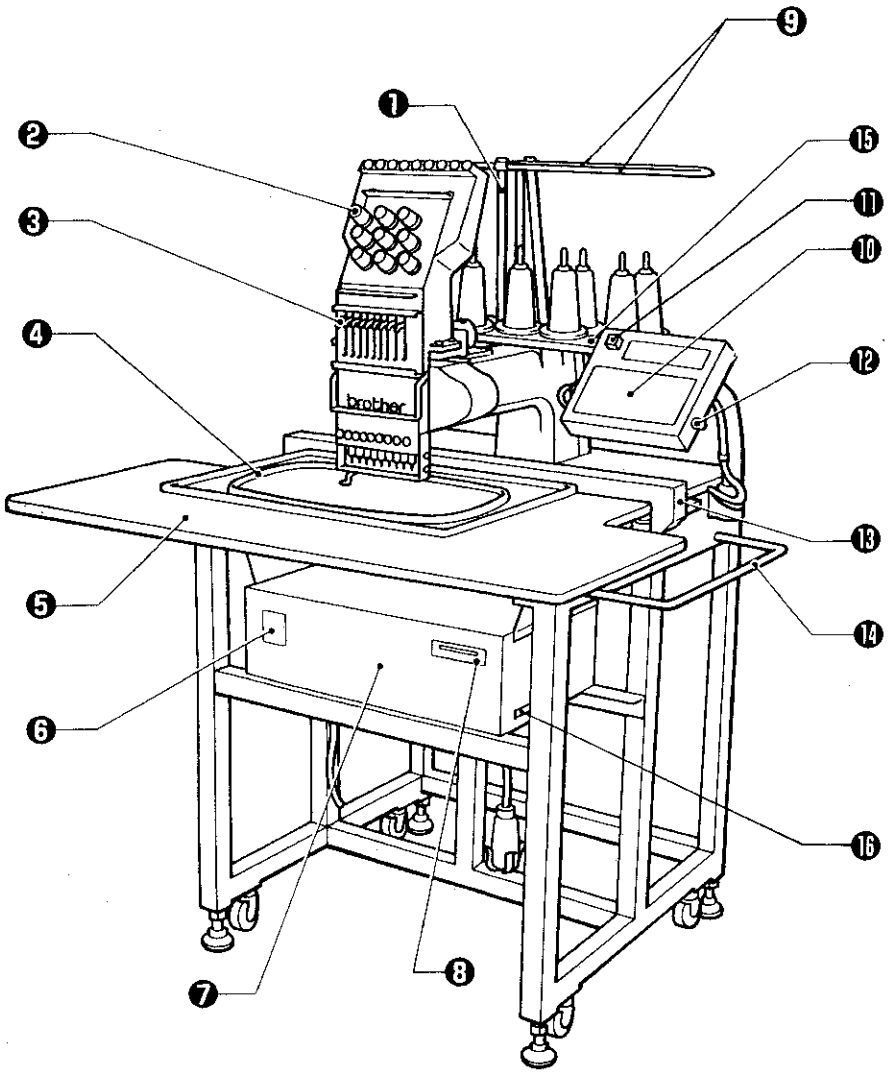
1. PART NAMES

• BAS-401



❶ thread guide spool shaft
❷ thread tension dial
❸ thread take up
❹ embroidery hoop
❺ table
❻ power switch
❼ control box
❽ disk drive
❾ thread guide
❿ keyboard
⓫ emergency switch
⓬ speed dial
⓭ carriages
⓮ guard bar
⓯ DIP switch
⓰ thread breakage sensor
⓱ DIP switch

• BAS-412



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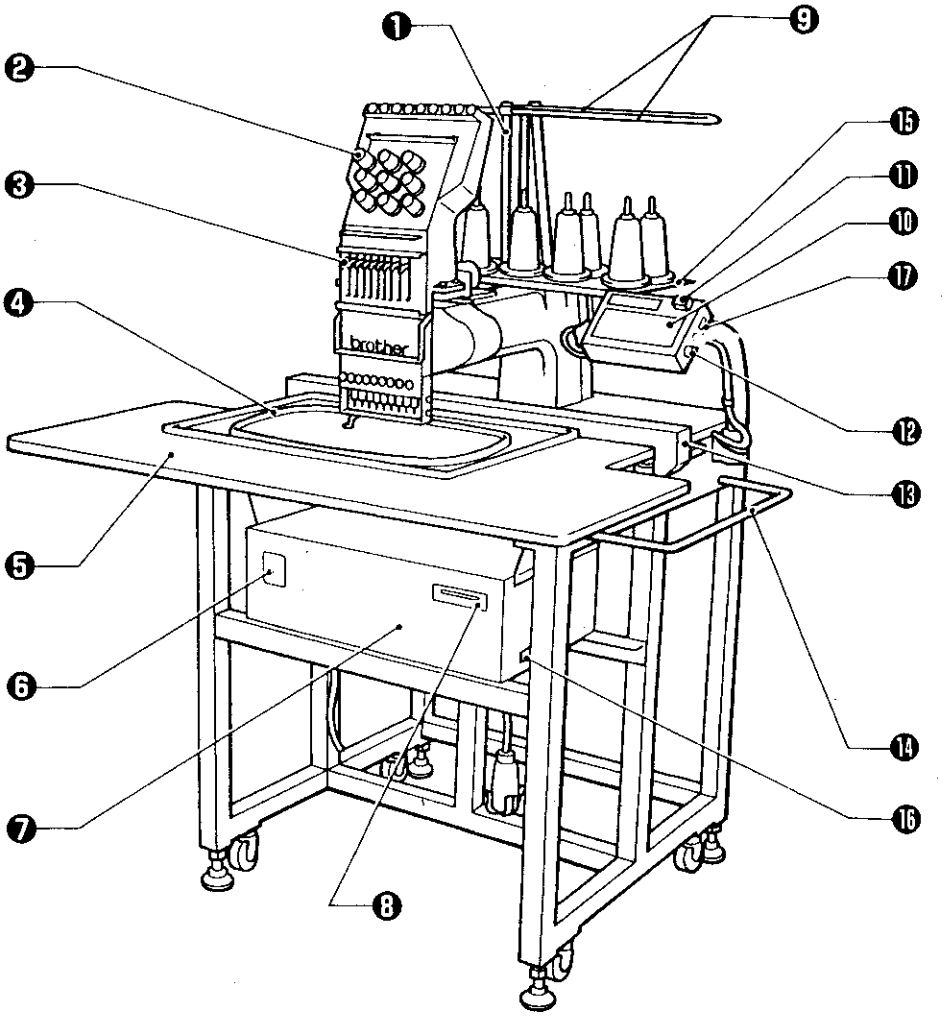
❷ thread tension dial
❸ thread take up
❹ embroidery hoop
❺ table
❻ power switch
❼ control box
❽ disk drive
❾ thread guide A · B
❿ keyboard
⓫ emergency switch
⓬ speed dial
⓭ carriage
⓮ guard bar
⓯ spool stand (9)
⓰ DIP switch

• BAS-416



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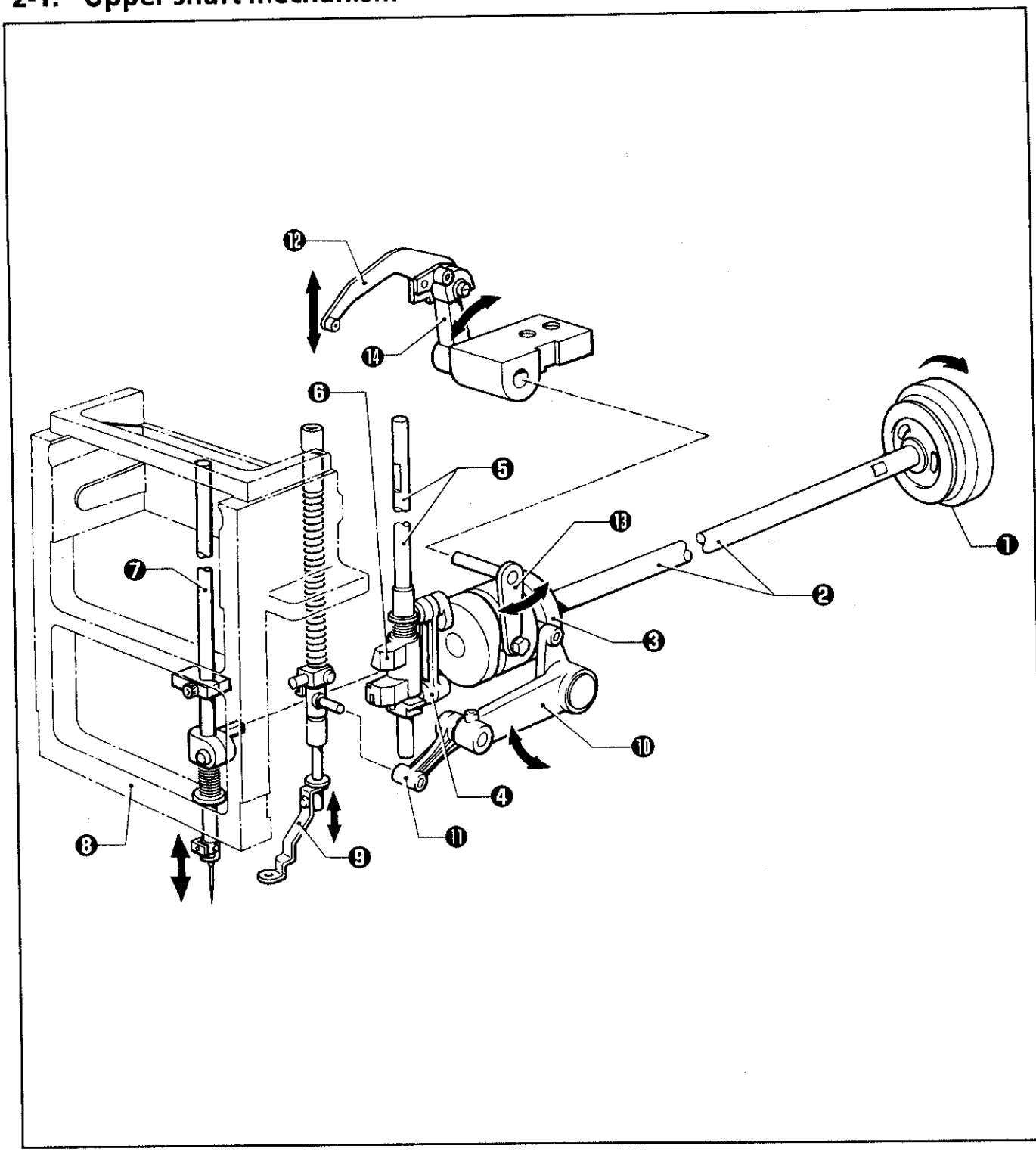
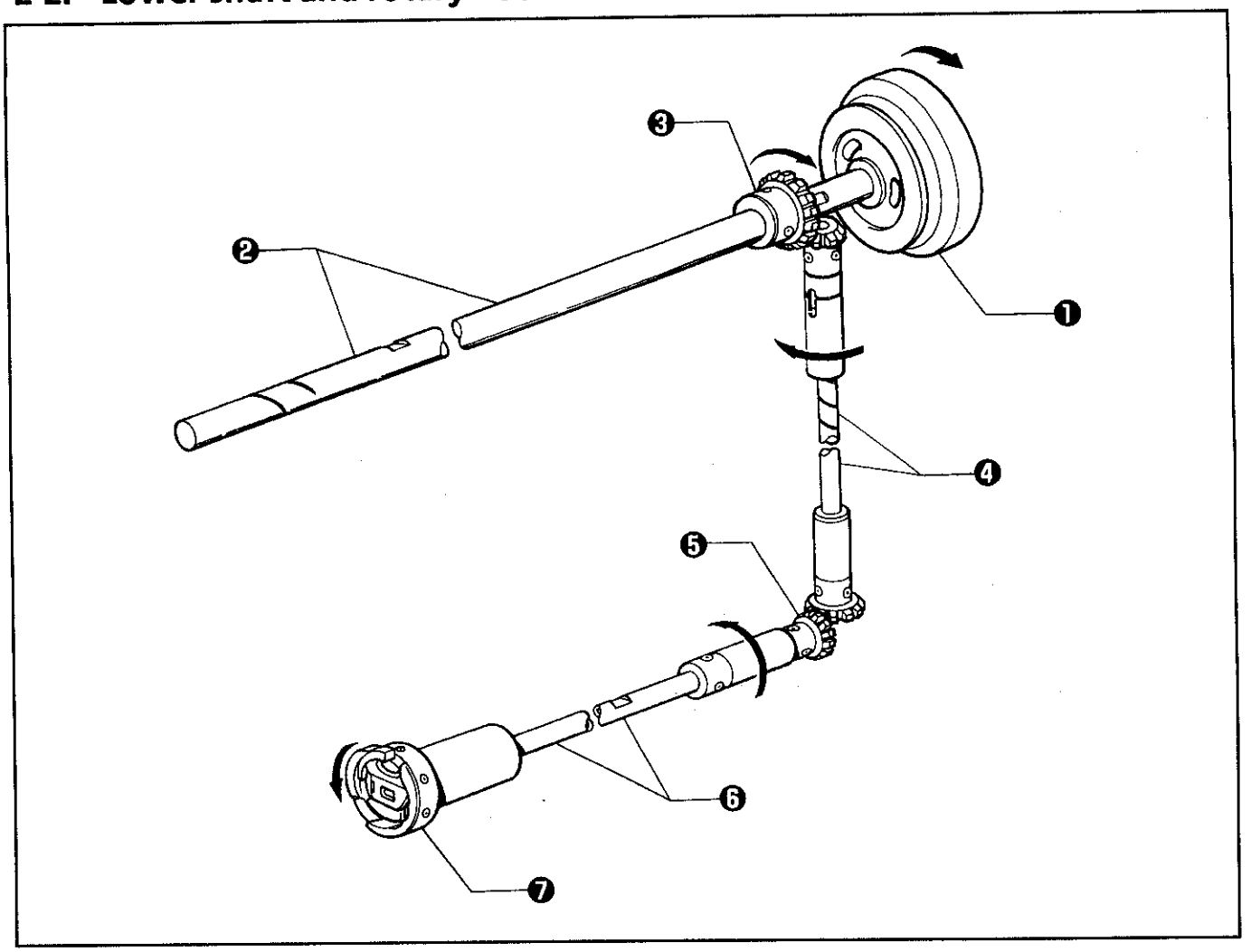
2. MECHANICAL DESCRIPTIONS

2-1. Upper shaft mechanism



1. When the upper shaft pully ❶ is turned in the direction of the arrow, the motion is transmitted to the upper shaft ❷, and the thread take-up cam ❸ rotates.
2. The motion is transmitted to the needle bar crank rod ❹ connected to the thread take-up cam ❸.
3. The jump bracket ❺ connected to the needle bar crank rod ❹ moves the needle bar ❼ via the base needle bar ❻.
4. The needle bar ❼ is guided by the needle bar case ❽.
5. When the thread take-up cam ❸ is turned, the presser driving lever ❿ is moved back and forth, and the presser foot ❾ is moved up and down via the presser operating link ⓫.
6. When the thread take-up cam ❸ is turned, the thread take-up lever ⓬ is rocked via the thread take-up driving lever ⓭ and the thread take-up coupled driving lever ⓮.

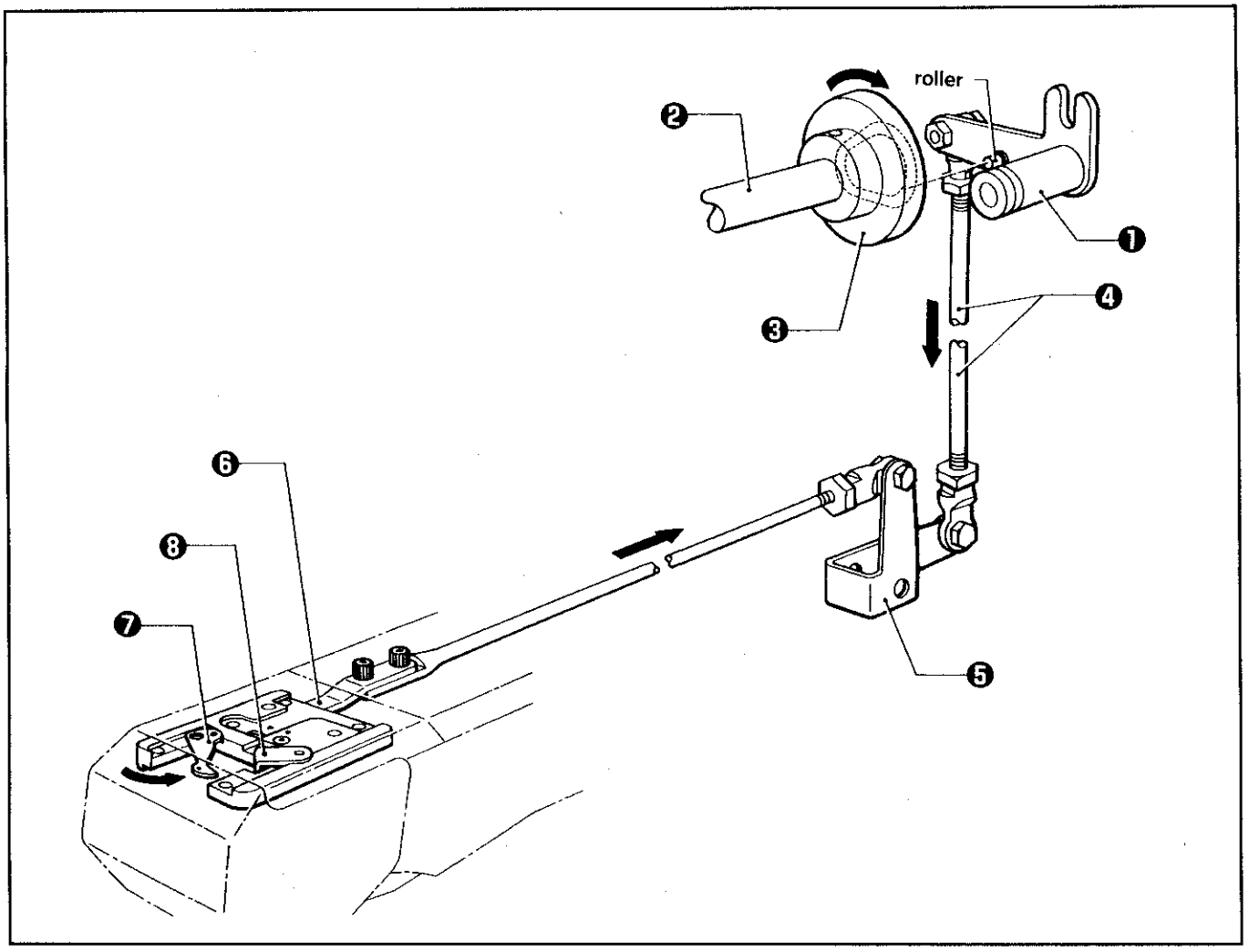
2-2. Lower shaft and rotary hook mechanism



1. When the upper shaft pully ❶ rotates in the direction of the arrow, the motion is transmitted to bevel gear U ❸ through the upper shaft ❷.
2. Bevel gear U ❸ transmits the motion to bevel gear D ❺ through the vertical shaft ❹.
3. Bevel gear D ❺ transmits the motion to the attached lower shaft ❻. Then the rotary hook ❼, attached to the lower shaft ❻, rotates in the direction of the arrow.

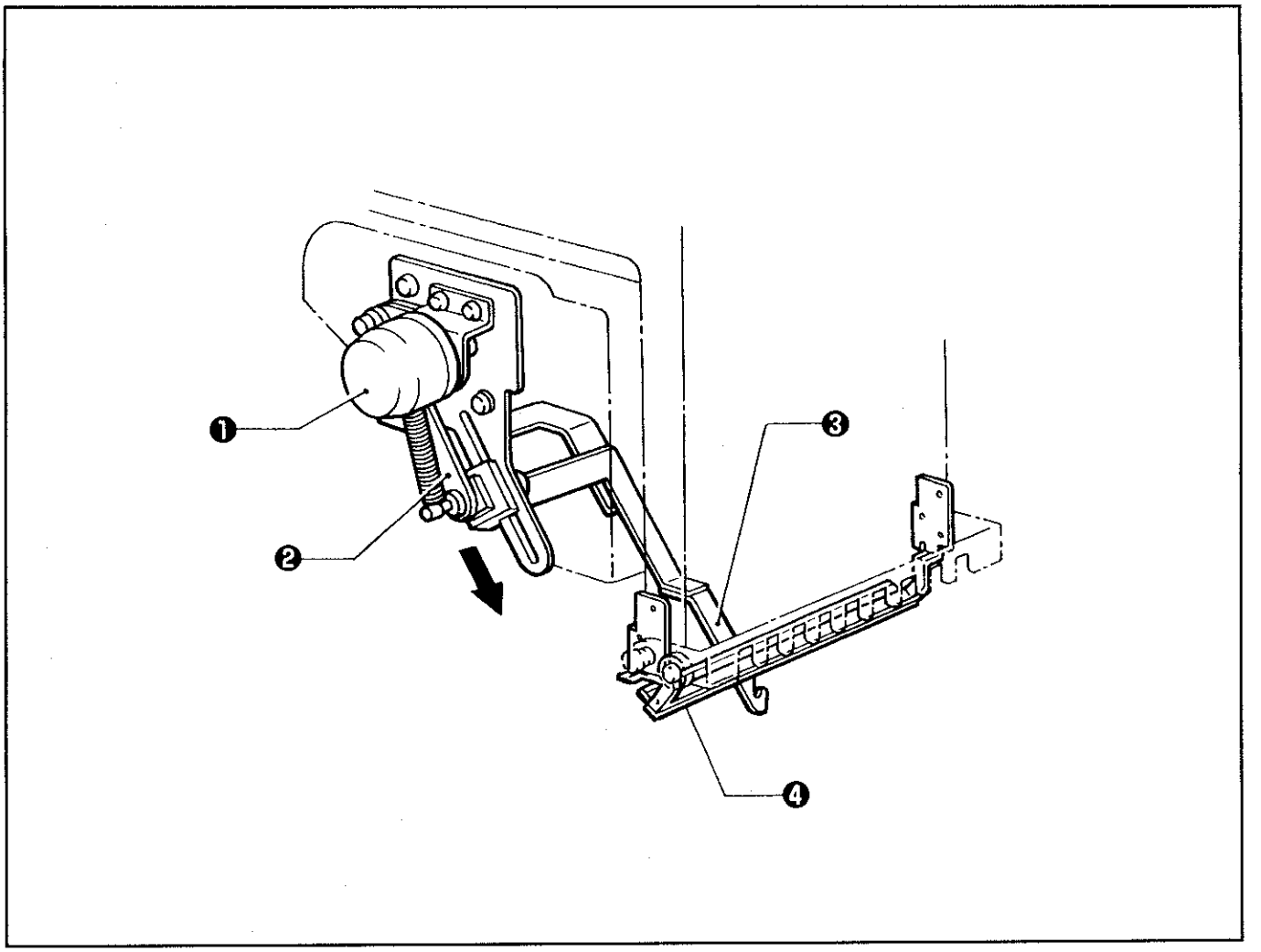
NOTE: In the BAS-401, 412, and 416 the rotary hook makes two revolutions for each revolution made by the pulley.

2-3. Thread trimmer mechanism



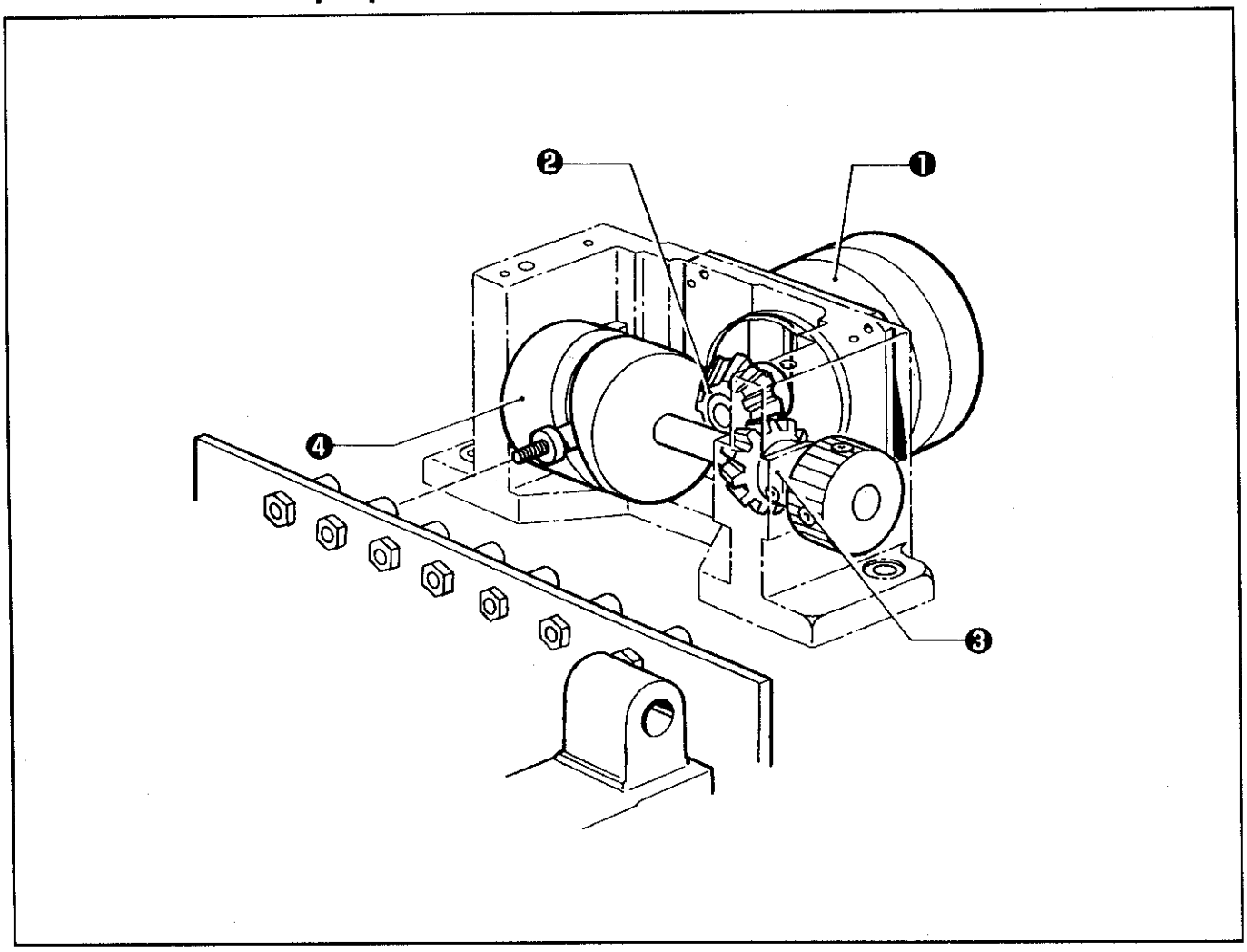
Upon making the final stitch, the roller of the thread trimmer driving lever ❶ moves into the groove of the thread trimmer cam ❸ attached to the upper shaft ❷. When the thread trimmer cam ❸ rotates, the motion is transmitted to the thread trimmer connecting rod ❻ via the thread trimmer rod ❹ and the thread trimmer lever ❺, and the movable knife ❼ and the fixed knife ❽ engage with each other to trim the thread.

2-4. Thread wiper mechanism



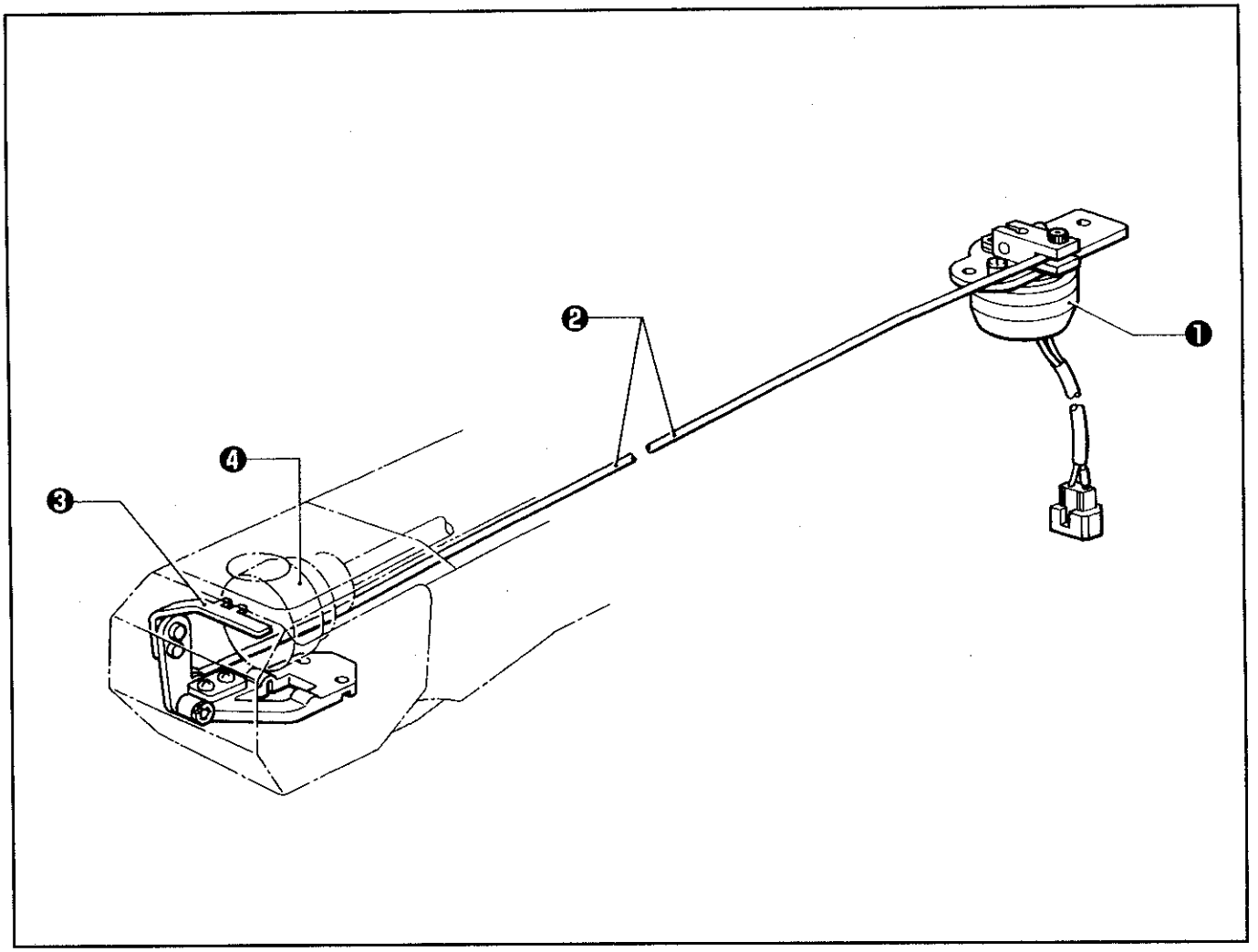
After sewing is finished, the wiper solenoid ❶ moves the plate ❷ in the direction of the arrow, and the upper thread guard hook ❸ attached to the plate ❷ brings the trimmed thread to the thread presser base ❹. The thread presser base ❹ secures the trimmed thread.

2-5. Needle bar flip-up mechanism (BAS-412 · 416 only)



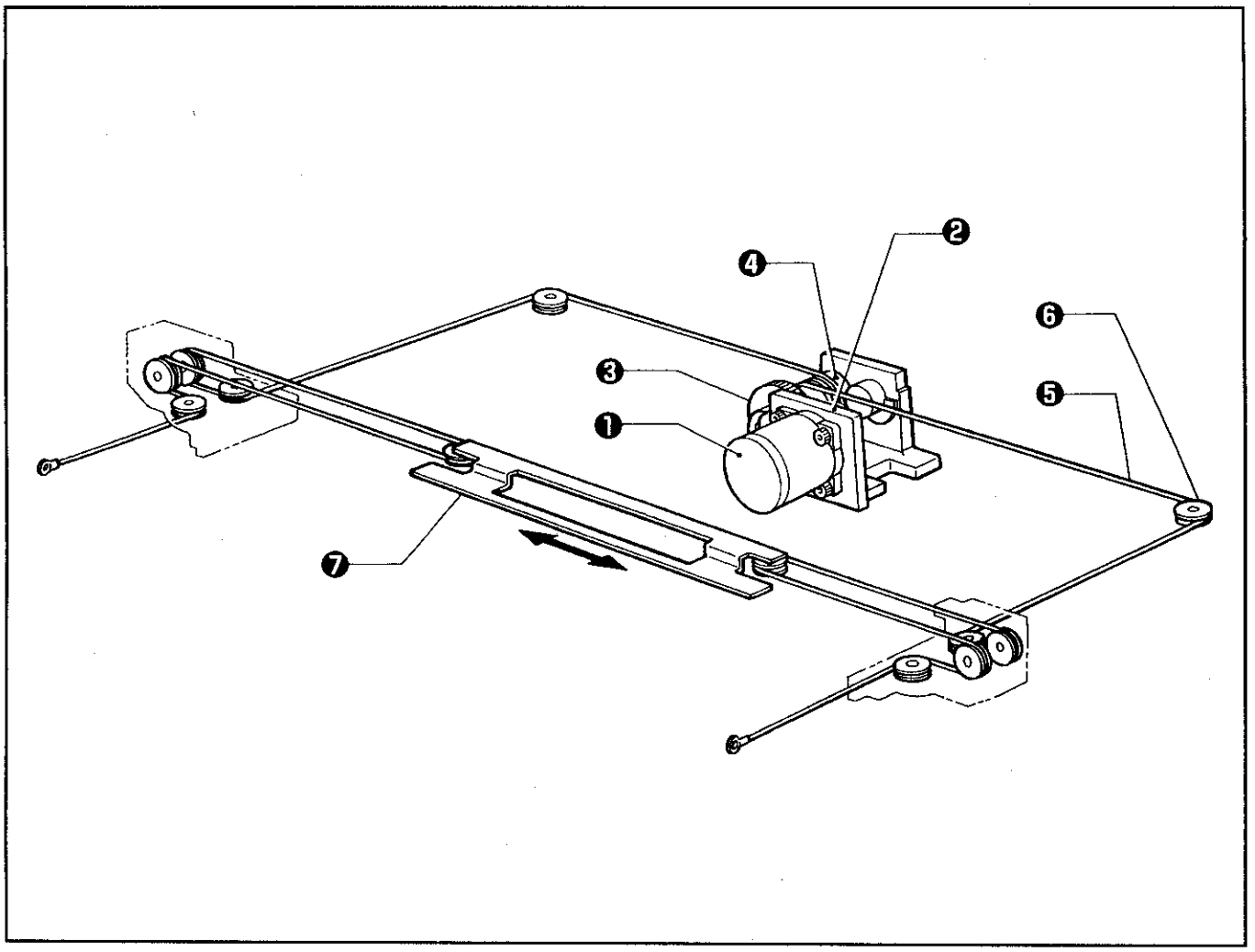
After receiving the set needle flip-up signal, cam gears A ❷ and B ❸ attached to the pulse motor ❶ are activated. The needle bar flip-up is performed by the change cam ❹.
For the main head (center), needle flip-up is performed by the pulse motor which is only on the main head.

2-6. Picker mechanism



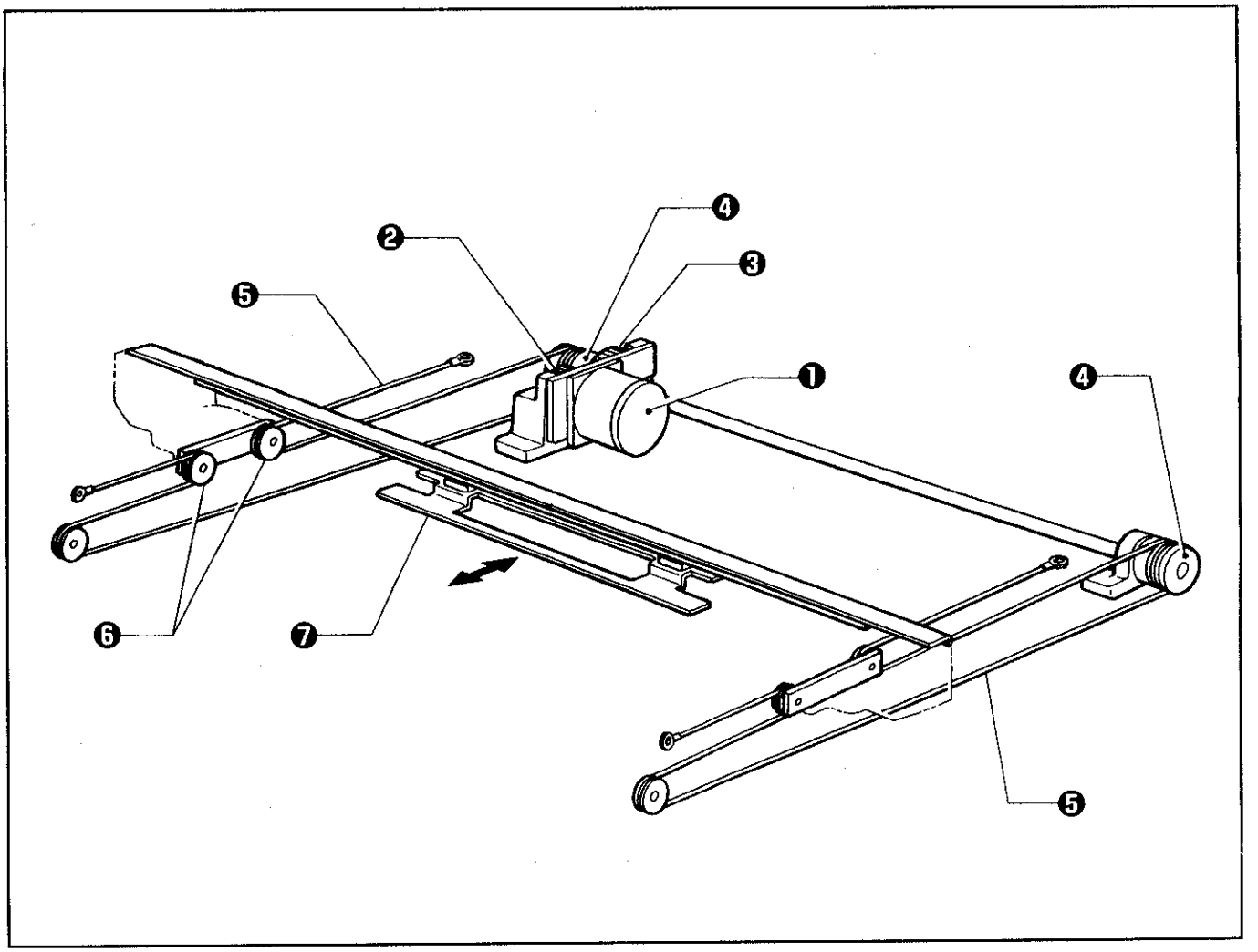
The picker solenoid ❶ functions at the beginning of sewing to hold the needle and bobbin threads. The picker ❸ attached to the connecting wire ❷ moves in the direction of the bobbin case ❹, then pulls the needle thread under the material.
During thread trimming, the picker ❸ operates to keep the needle thread length constant.

2-7. Drive, (X) feed mechanism



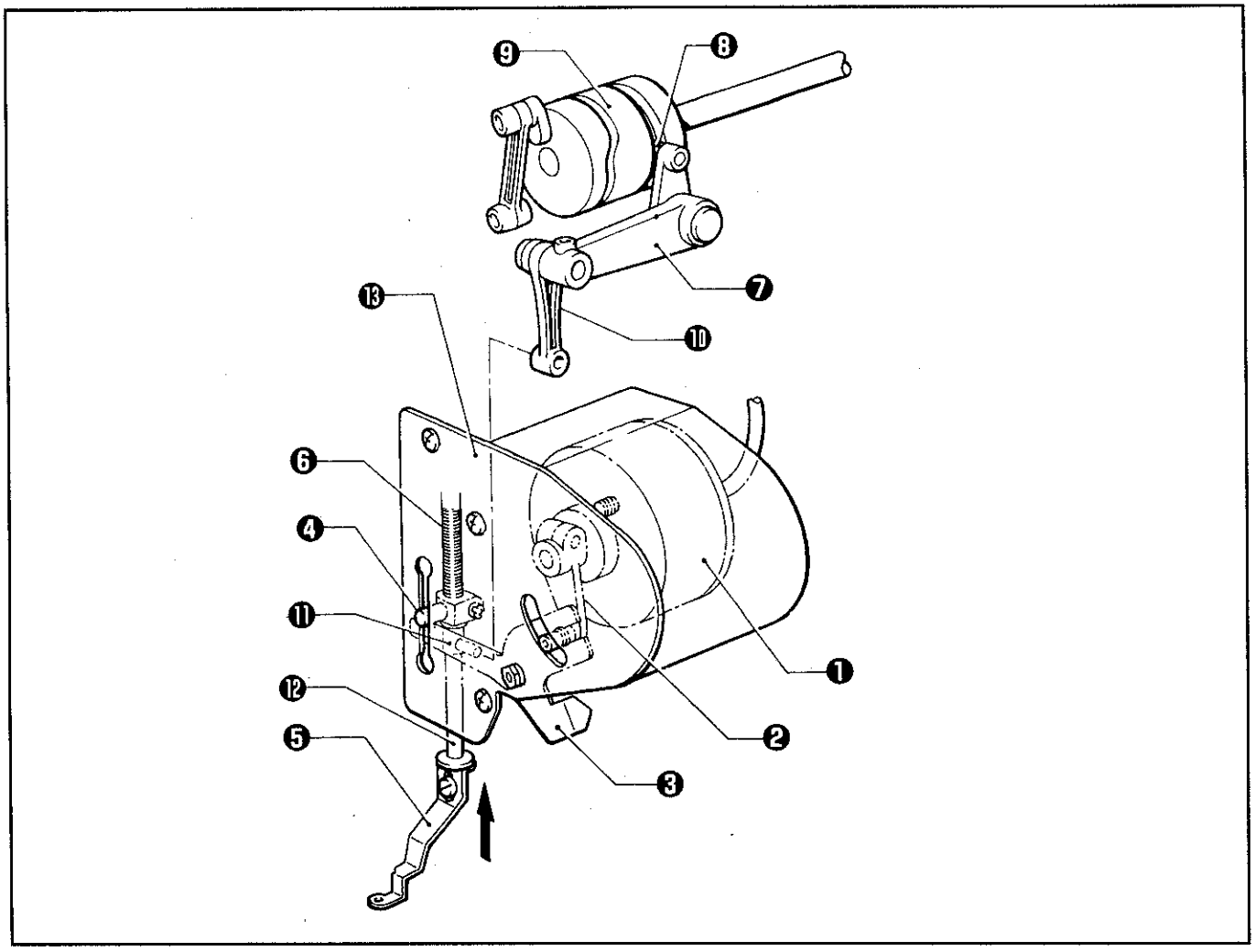
1. Pinion gear (B) ❷ attached to the X-pulse motor ❶ rotates, then transmits the rotation to idle gear (A) ❸.
2. When idle gear (A) ❸ rotates, the (X) wire ❺ reeled in the wire drum (X) ❹ moves the carriage ❼ in the direction of the X-axis (left↔right) via the pulley ❺.

2-8. Drive, (Y) feed mechanism



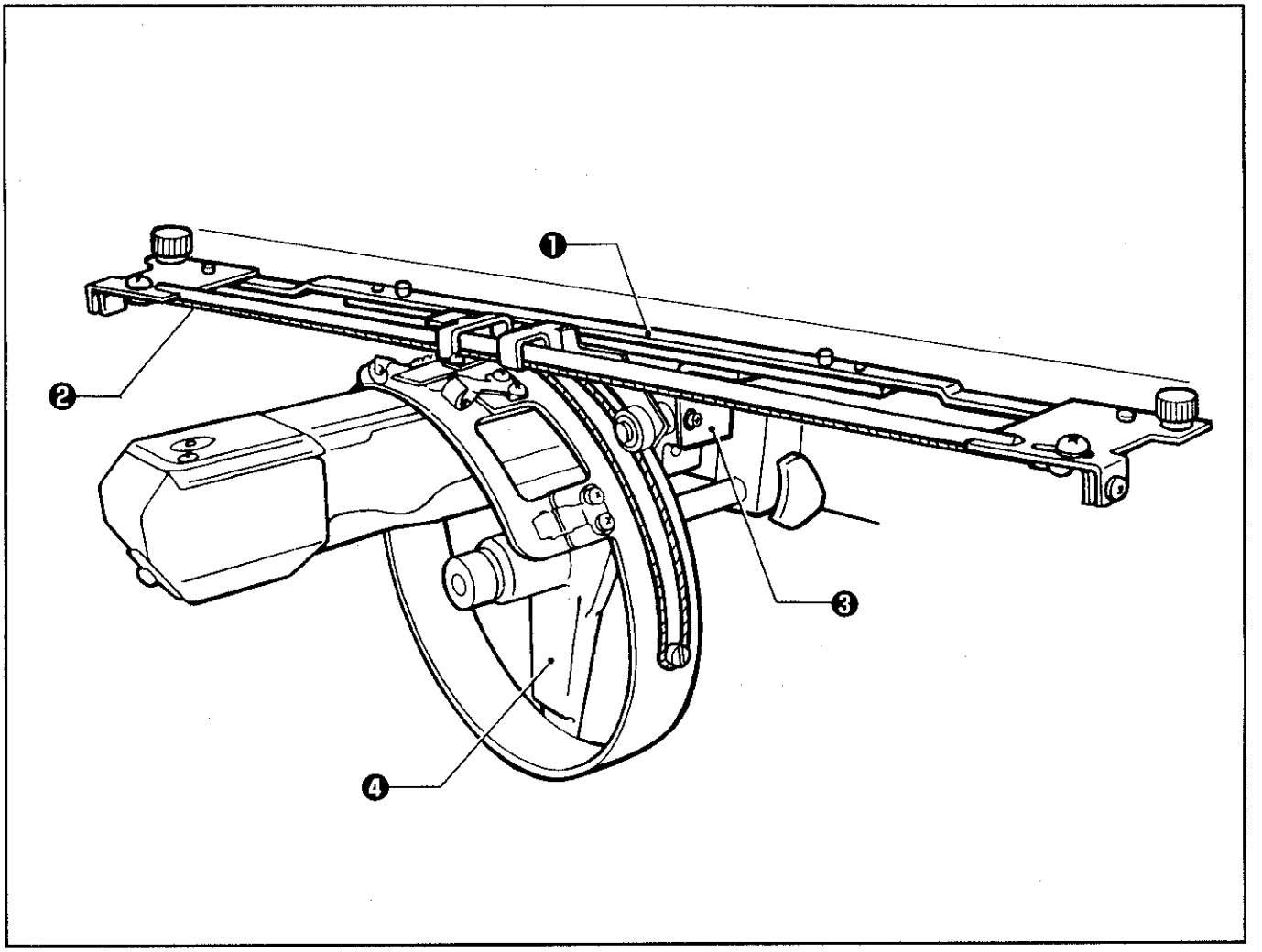
1. Pinion gear (B) ❷ of the Y-pulse motor ❶ rotates, then transmits the rotation to idle gear (A) ❸.
2. When idle gear (A) ❸ rotates, the (Y) wires ❺ (left) and (right) reeled in the wire drums (Y) ❹ on the right and the left move the carriage ❼ in the direction of the Y-axis (backwards↔forwards) via the pulley ❻.

2-9. Presser foot mechanism



1. When the power is turned on, the presser retracting solenoid ❶ operates the retracting solenoid lever ❷, the presser retracting lever ❸ moves the presser shaft crank ❹ upward, and the presser foot ❺ is raised.
2. When sewing is started, the presser retracting solenoid ❶ turns off, the presser foot ❺ is lowered according to the retracting spring ❻, and the pulley rotates.
3. The roller ❽ of the presser driving lever ❼ transmits the motion of the thread take-up cam ❾ to the presser operating link ❿ via the presser driving lever ❼.
4. The presser operating base ⓫ set in the presser operating link ❿ and the presser shaft crank ❹ secured to the presser shaft ⓬ are combined via the retracting spring ❻. They move the presser foot ❺ up and down along the groove of the presser guide plate ⓭.
5. When sewing is finished, the presser retracting solenoid ❶ raises the presser foot ❺.
6. While the power is turned off, the presser foot ❺ can be raised manually by pressing the presser retracting lever ❸.

2-10. Cap frame device (optional)



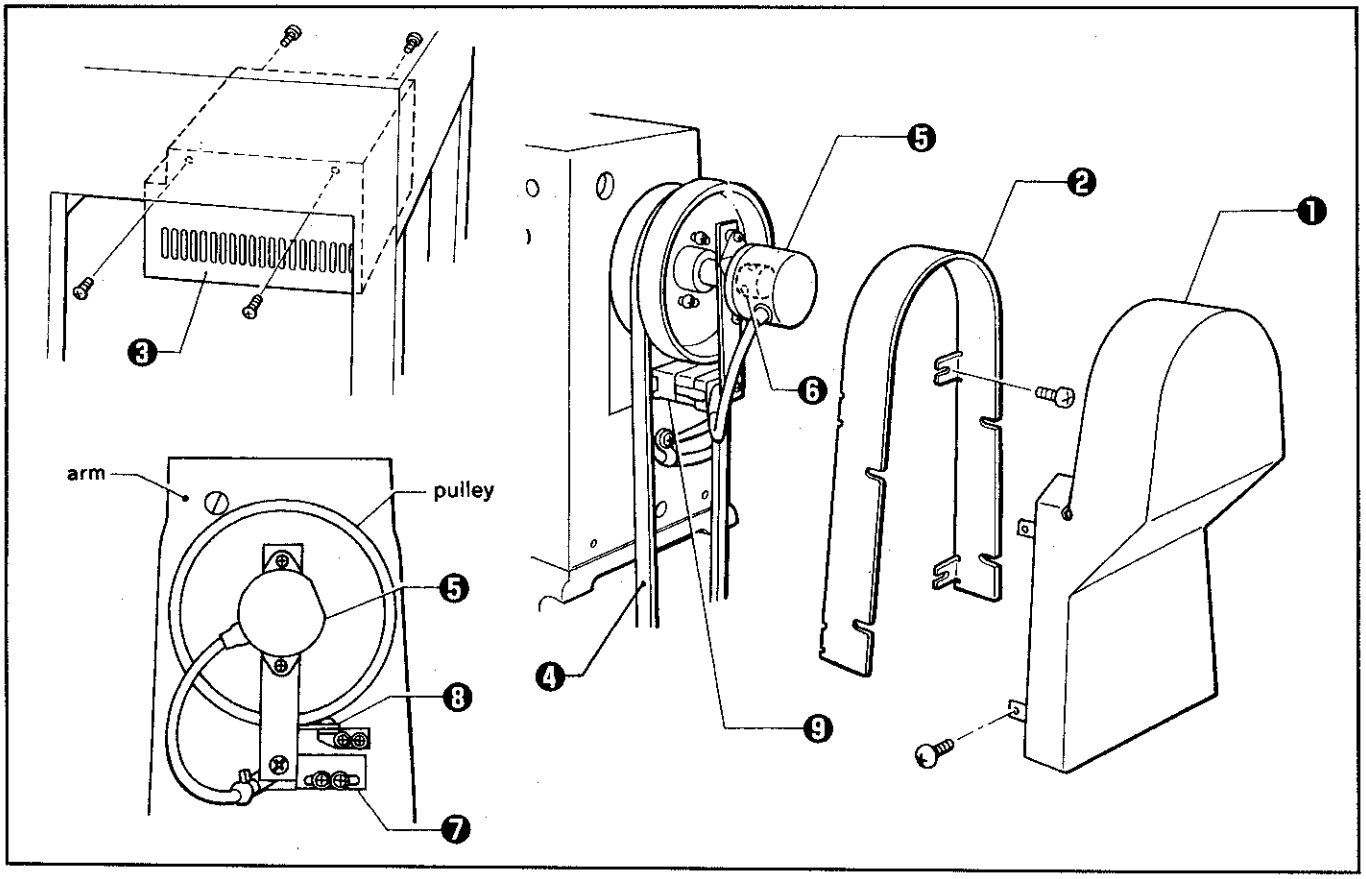
1. When the X-carrige ❶ operates in the X direction, the cap frame device is moved via the wire ❷.
2. Motion in the Y direction is transmitted to the driving arm ❹ secured to the Y-shaft driving rail ❸.

3. PARTS REPLACEMENT AND ADJUSTMENT

⚠ CAUTION

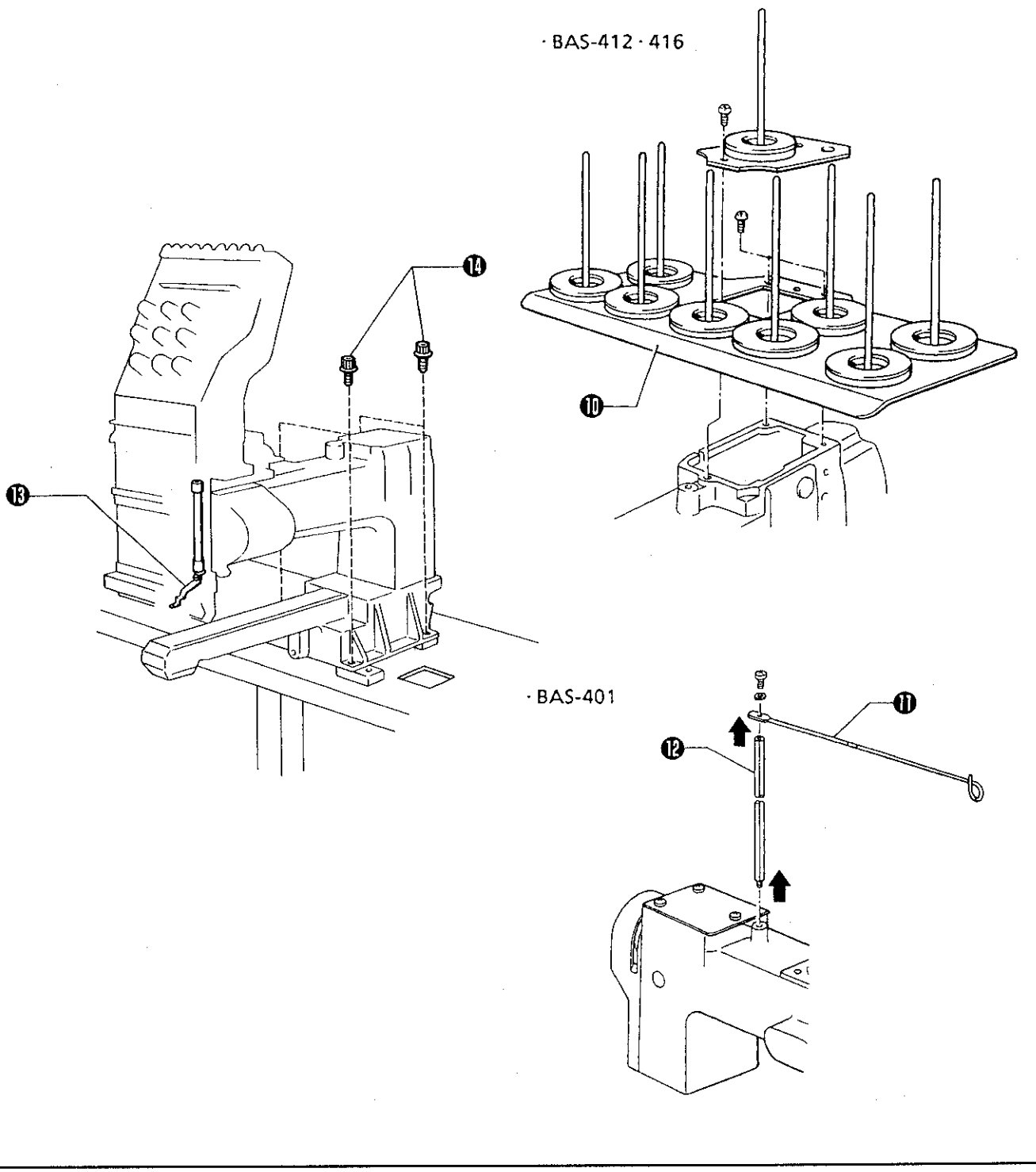
- This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.
- The sewing machine weighs more than 620 kg. The installation should be carried out by two or more people.
- Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.
  - When carrying out inspection, adjustment and maintenace
  - When replacing consumable parts such as the rotary hook and knife
- If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
- Use only the proper replacement parts as specified by Brother.
- If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.
- Any problems in machine operation which result from unauthorized modifications to the machine will not be covered by the warranty.

3-1. Replacing and adjusting the machine head



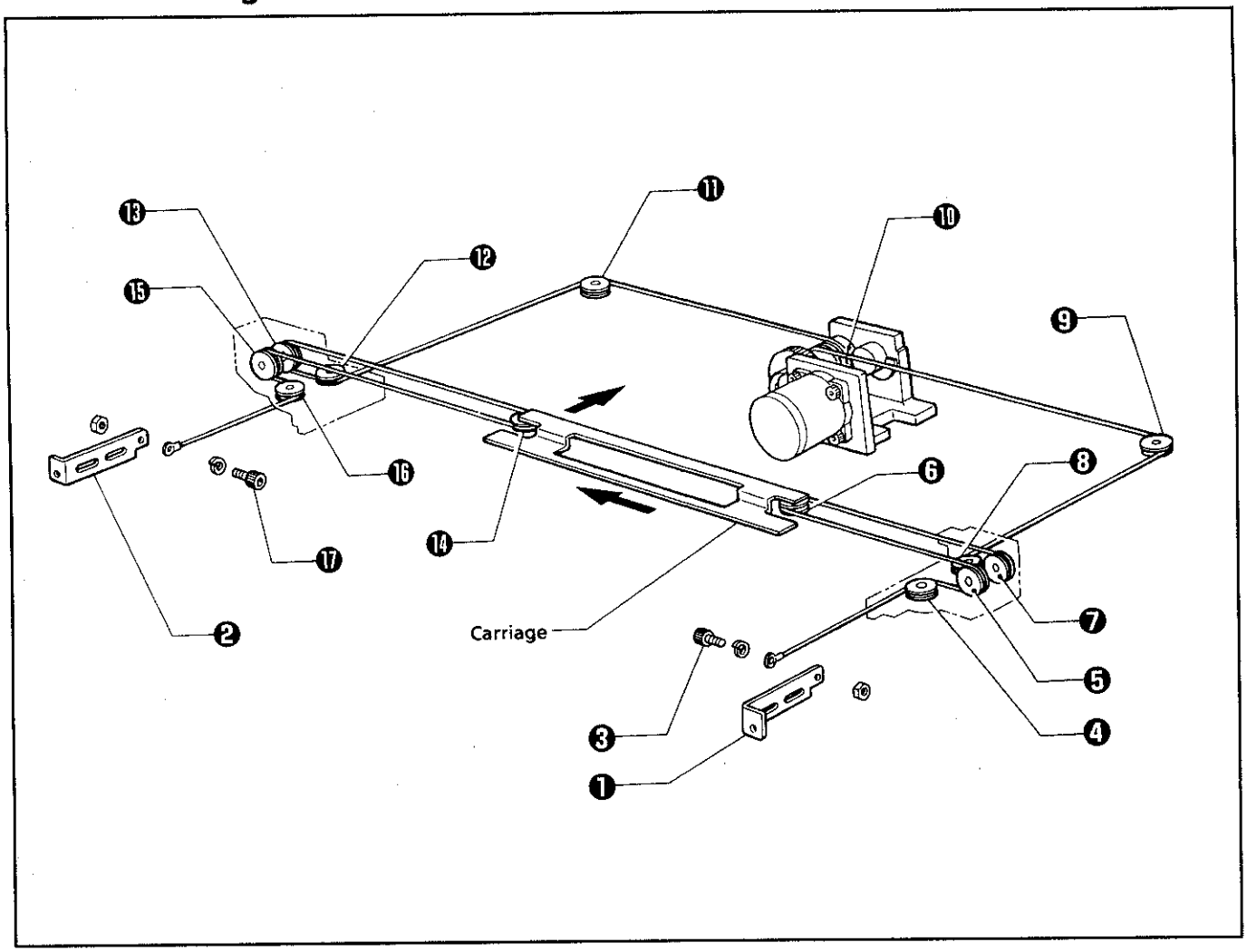
NOTE: Be sure to remove all connectors attached to the machine head except for those for the feed mechanism.

1. Remove the screws, and belt covers B ❶ and A ❷.
2. Remove the screw, and the motor cover ❸ attached to the bottom of the table leg.
3. Remove the V belt ❹.
4. Loosen the two screws of the rotary shaft ❻ of the rotary encoder ❺, and remove the screws and the encoder, including the encoder set plate ❼, from the arm.
5. Remove the screws from the arm. Remove the sensor circuit board ❽ and the cord holder ❾.



6. Remove the screw, and the cotton stand ⑩ from the machine head.
7. Remove the screw and the thread guide ⑪. Turn the thread guid bar ⑫ to remove it from the machine head. (BAS-401)
8. Remove the presser foot ⑬. (Leave the feed mechanism pulled all the way to the front.)
9. Remove the four bolts ⑭ from the machine head. (Mark the position of the machine head on the steel frame so that it can be easily put back afterward.)
10. Remove the machine head from the rear of the steel frame. (Two or more persons are required to remove machine head because it weighs 50 kg.)
11. After replacing the machine head with a new one, reverse the above procedure for assembly.

3-2. Attaching X wire

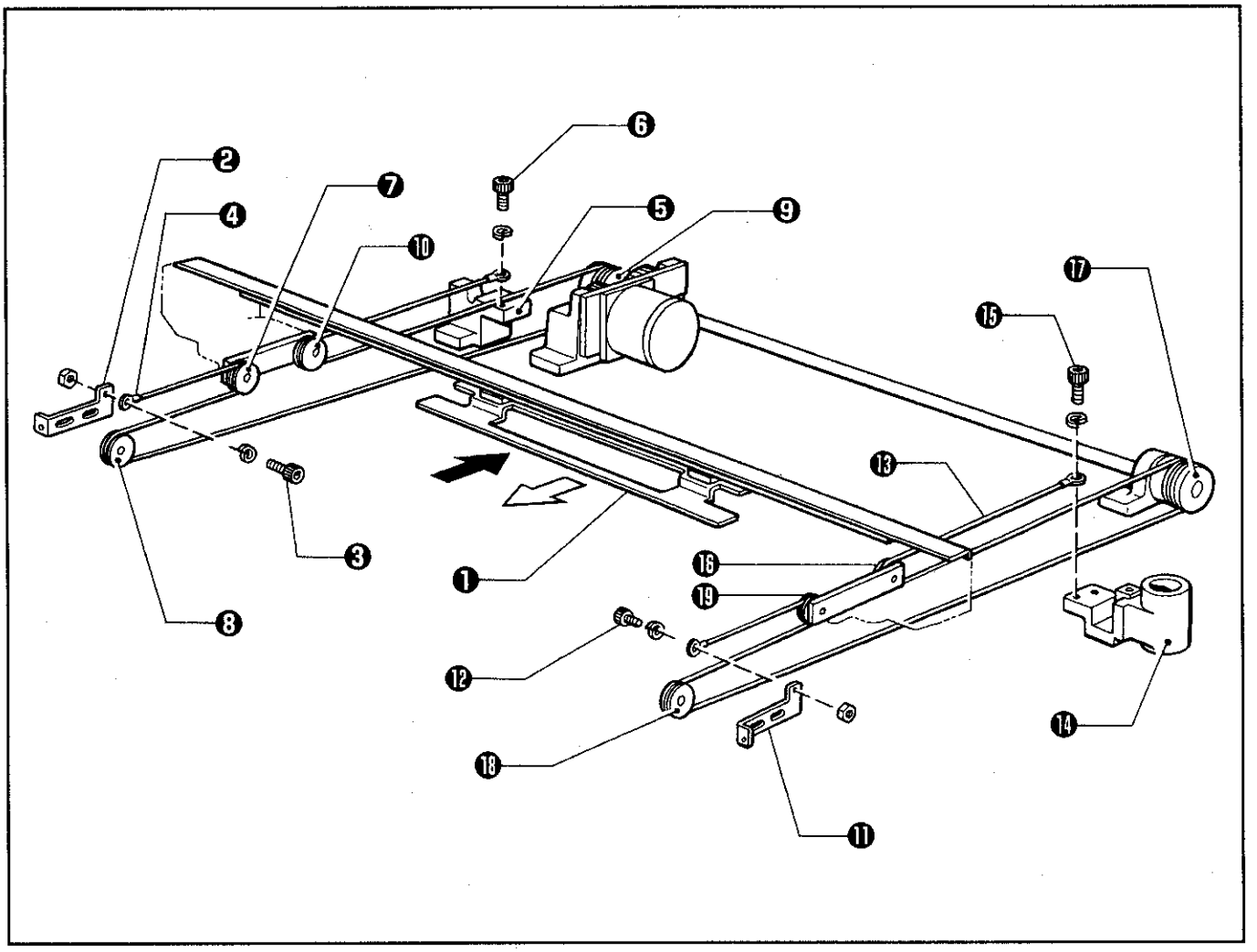


[Removal]
Remove the bolts of hook (RX) ❶ and (LX) ❷, and remove the wire from the pulleys.

[Attachment]
1. Position the carriage in the back, toward the left of the machine, making sure it does not move.
2. Attach the wire end (the end closer to the ball) to hook (RX) ❶ with bolt ❸.
3. Feed the wire around pulley ❹ from the left side, then under pulley ❺. Then feed it behind pulley ❻ from the left side, and over pulley ❼. Then, feed the wire around pulley ❽ from the left, and finally wind it around pulley ❾ from the right.
4. After winding the wire around pulley ❾, feed some slack into the wire.
   Then, put the ball on the wire into the hole of wire drum (X) ❿.
   Fit the wire completely into the groove, then wind the wire seven times around the wire drum.
   NOTE: The wire should be fed from the inner side and wound around wire drum (X) ❿.
5. Feed the wire around the back of pulley ⓫, then around pulley ⓬ from the left.
6. Wind the wire onto pulley ⓭ from below, then around pulley ⓮ from the left.
7. Wind the wire over pulley ⓯ from above, then around pulley ⓰ from the left.
   Attach the wire to hook (LX) ❷ with bolt ⓱.

NOTE: · Be careful not to scratch the wire. The wire is coated with resin and a scratch may decrease its durability.
· Refer to page 42 for adjusting the wire tension.

3-3. Attaching Y wire



Y wire (L)

[Removal]

1. Push the carriage ❶ all the way to the back, and secure it.
2. Remove the bolt ❸ of hook (LY) ❷. Remove Y wire (L) ❹ from both pulleys. Remove the bolt ❻ of stand (RL) ❺.

[Attachment]

1. Attach Y wire (L) ❹ end (the end furthest from the ball) to hook (LY) ❷ using the bolt ❸.
2. Put Y wire (L) ❹ on pulleys ❼ and ❽, and place the wire ball into the hole of wire drum (Y) ❾. Then wind the wire four times, put it around the pulley ❿, and secure it to stand (RL) ❺ using the bolt ❻.

Y wire (R)

[Removal]

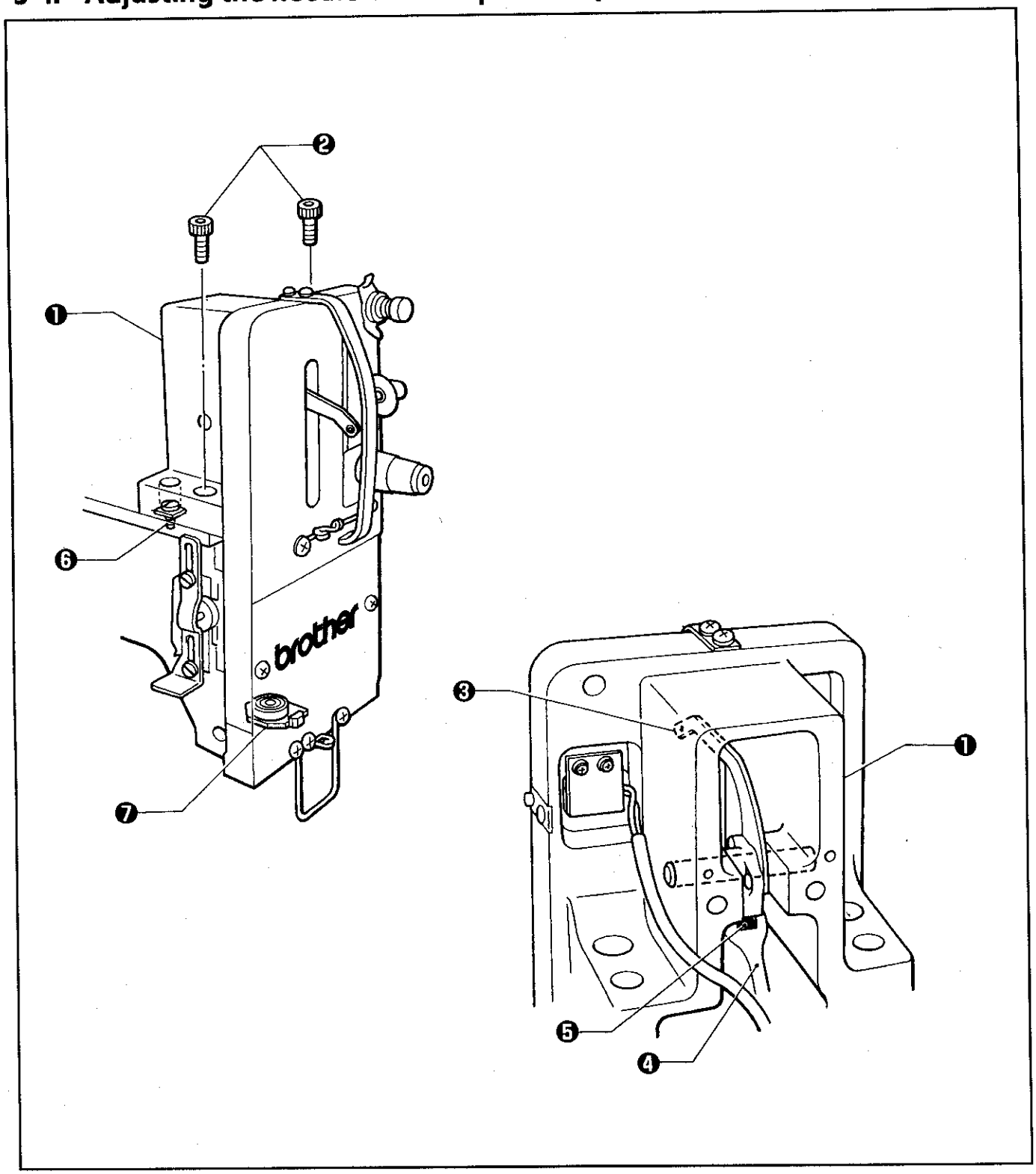
1. Pull the carriage ❶ forward and secure it.
2. Remove the bolt ⓬ from hook (RY) ⓫. Remove Y wire (R) ⓭ from both pulleys. Remove the bolt ⓯ of stand (RR) ⓮, and Y wire (R) ⓭.

[Attachment]

1. Attach Y wire (R) ⓭ end (the end closest to the ball) to stand (RR) ⓮ using the bolt ⓯.
2. Put Y wire (R) ⓭ around the pulley ⓰, and place the wire ball into the hole of wire drum (Y) ⓱. Then wind the wire around the drum four times, feed it around the pulleys ⓲ and ⓳, and finally secure it to hook (RY) ⓫ using the bolt ⓬.

NOTE: Y wires (L) and (R) are the same.

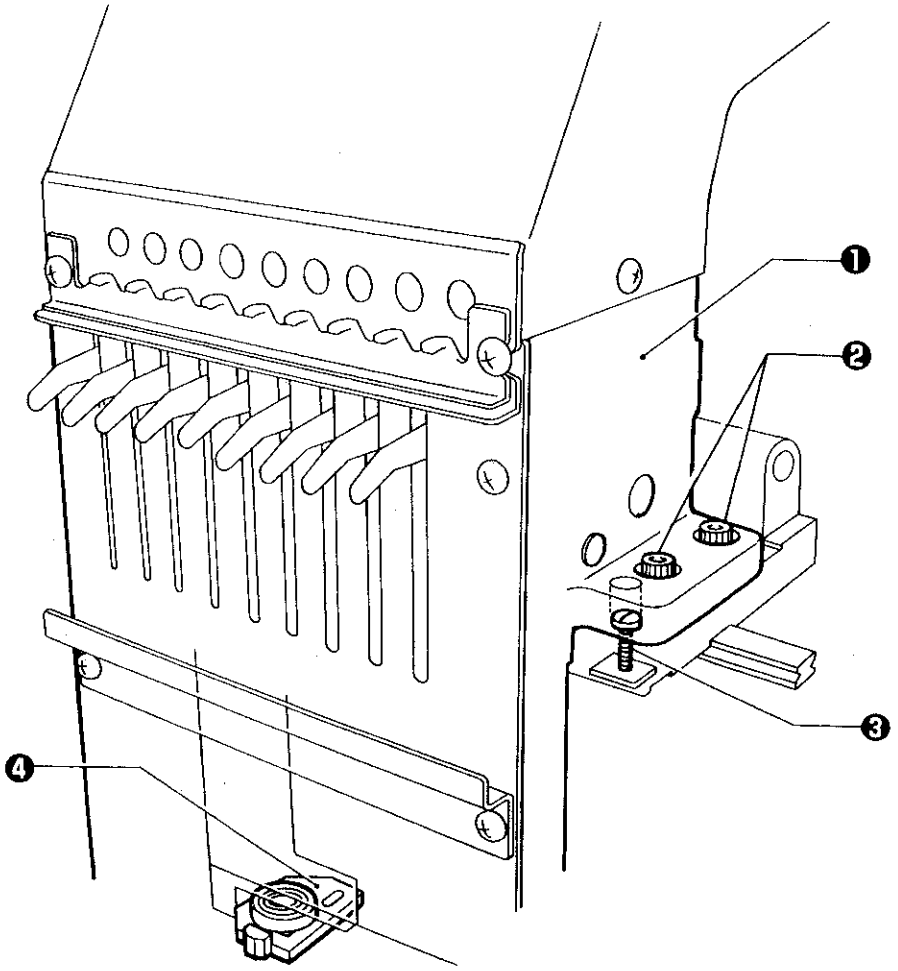
3-4. Adjusting the needle bar case position (for the BAS-401)



1. Remove the two bolts ❷, and the needle bar case ❶.
2. Reattach the needle bar case ❶, and make sure that it easily moves right and left and that the needle point is always aligned with the hole of the needle plate when the needle is raised and lowered 5 times. The thread take-up lever assembly ❸ should be inserted into the roller ❺ of the thread take-up coupled driving lever ❹.
3. Loosen the two bolts ❷ and two set screws ❻ to adjust the needle bar case ❶ movement or the needle movement.
4. Loosen the three bolts 8 of the positioning plate ❼ to adjust the inclination of the needle bar case ❶.

NOTE: Do not loosen the screws ❻ unless it is especially necessary.

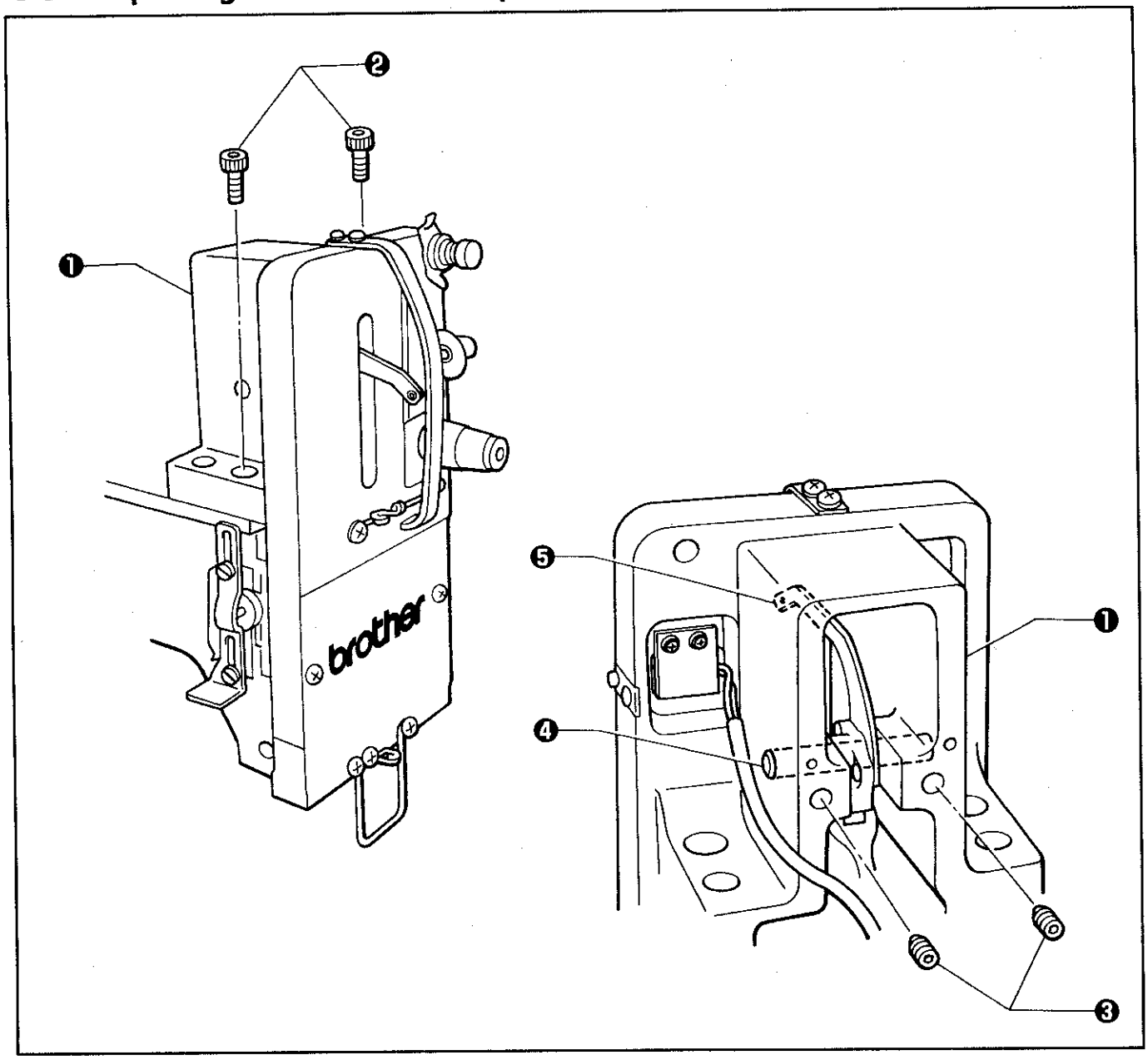
3-4. Adjusting the needle bar case position (common part for the BAS-412 and 416)



1. Remove the four bolts ❷, and the needle bar case ❶.
2. Reattach the needle bar case ❶, and make sure that it easily moves right and left and that the needle point is aligned with the hole of the needle plate.
3. Loosen the two positioning pins ❸ to adjust the needle bar case ❶ movement or the needle movement; use the positioning plate ❹ to adjust the inclination of the needle bar case ❶.

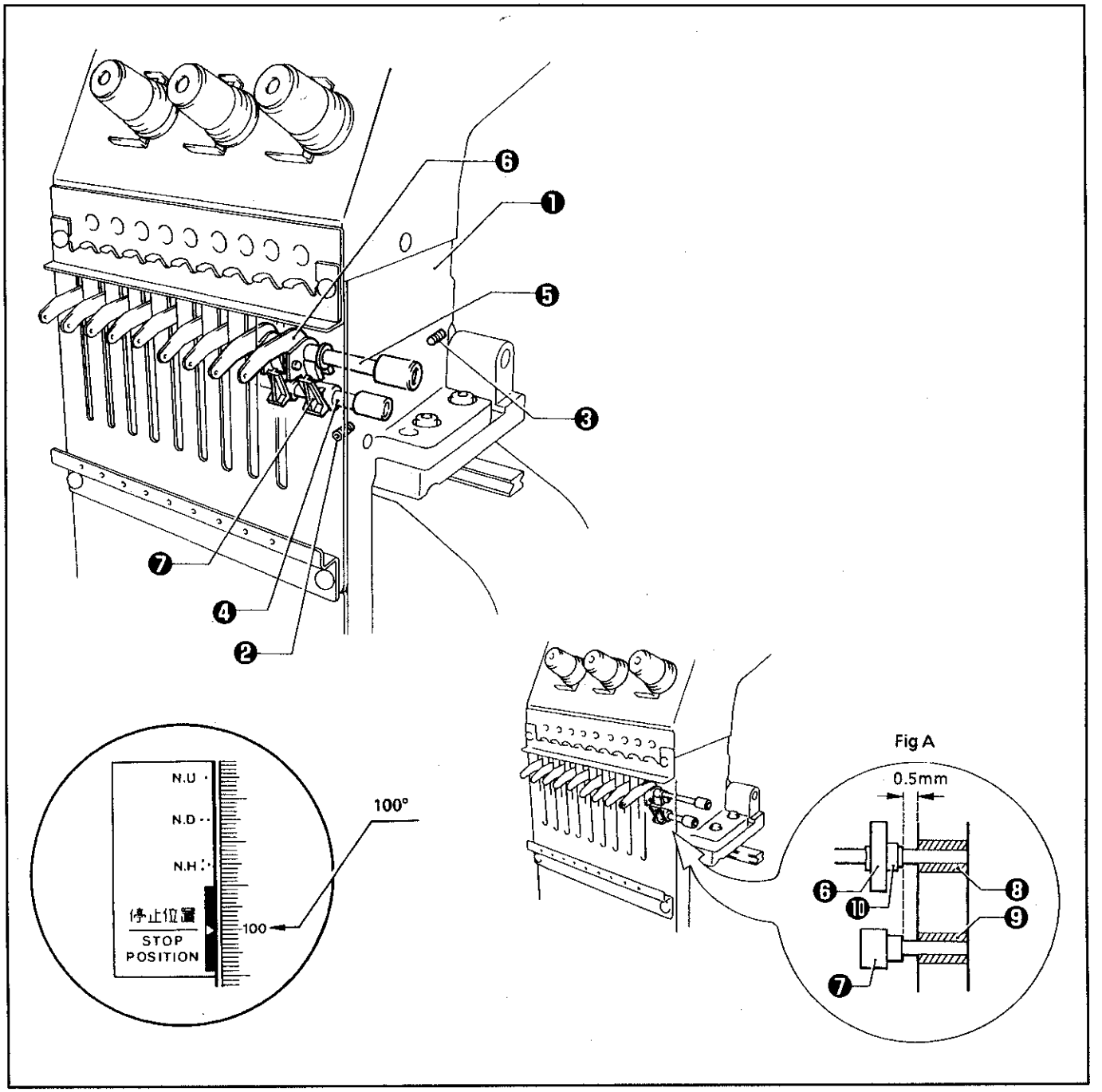
NOTE: Do not loosen the positioning pins ❸ unless it is especially necessary.

3-5. Replacing the thread take-up lever (for the BAS-401)



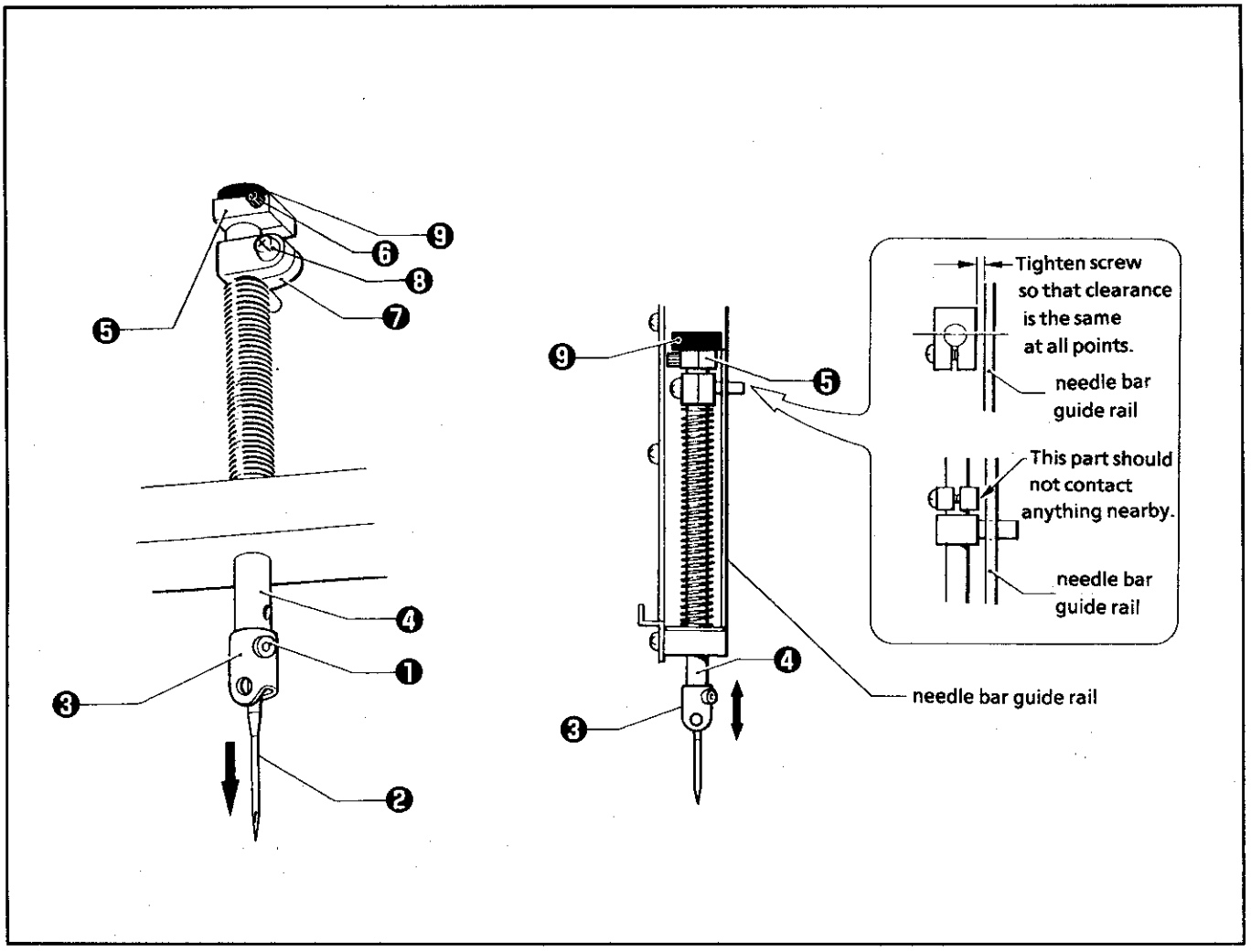
1. Remove the two bolts ❷ and the needle bar case ❶.
2. Set screws ❸ on both sides at the rear of the needle bar case.
3. Pull out the foot switch lever shaft ❹, and remove the thread take-up lever ❺.
4. Reverse the above procedure for assembly.

(BAS-412 · 416)



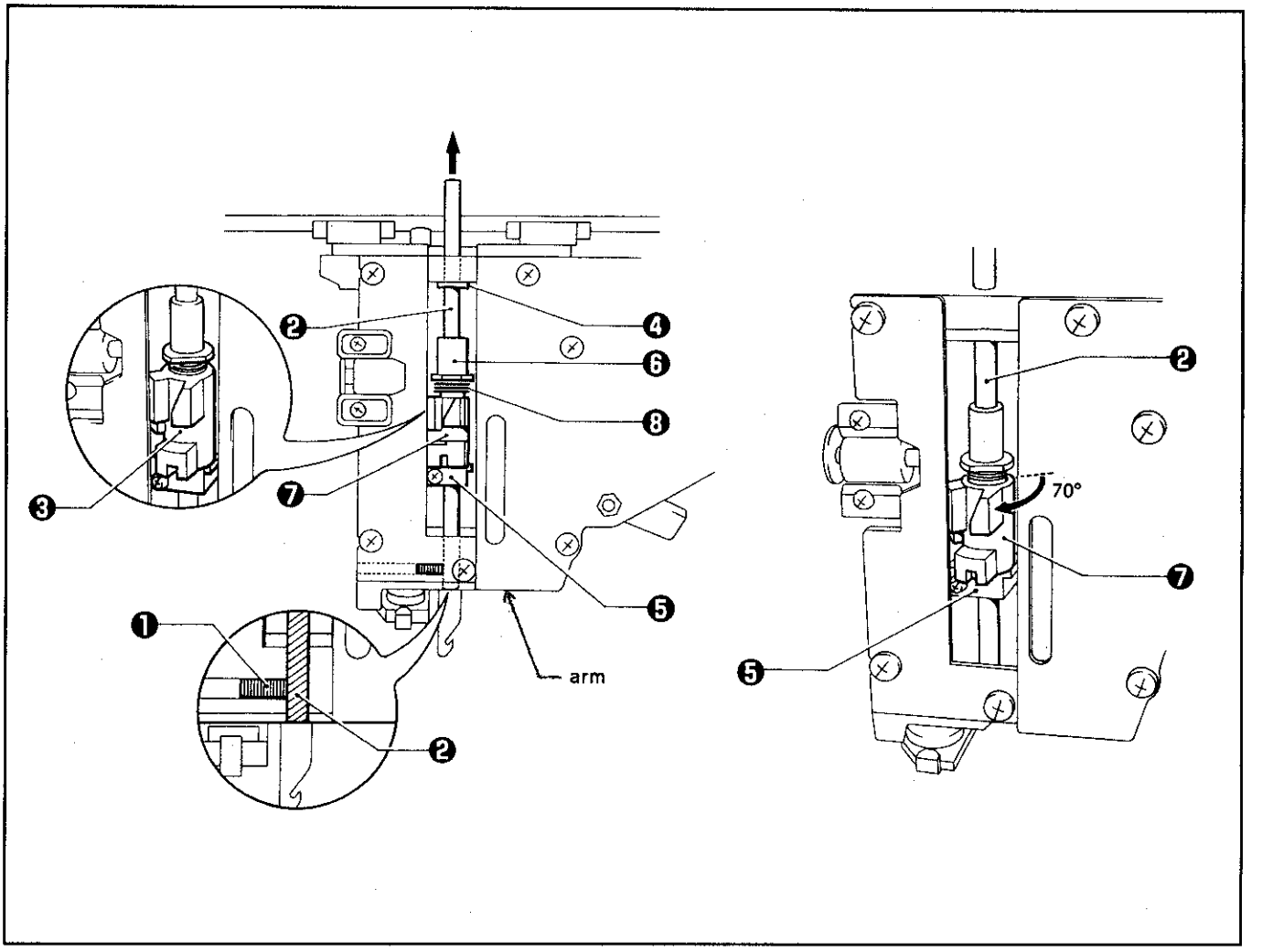
1. Loosen the set screw ❷ on the right of the needle bar case ❶ viewed from the front, and the set screws ❸ on both sides of the rear of the needle bar case ❶.
2. Shift the thread take-up shaft ❹ and the thread take-up bar shaft ❺ 30 - 40 mm in one direction, and remove the thread take-up lever ❻ and 1 - 2 thread take-up holding(s) ❼.
3. Reverse the above procedure for assembly.
   Notes on assembly
   ⓐ When attaching the thread take-up lever ❻ and the thread take-up holding ❼, set the clearance between the end of the thread take-up holding ❼ and the thread take-up shaft bush ❽ and the clearance between the end of the thread take-up holding ❼ and the thread take-up holding bush ❾ to 0.5 mm, respectively. The positions of the thread take-up holding ❼ and the thread take-up lever ❻ should be as shown in figure A; the thread take-up holding ❼ should be inserted into the thread take-up boss ❿ without getting on the thread take-up lever ❻.
   ⓑ When mark on the pulley is aligned with the one on the belt cover, all take-up levers should be aligned at their highest positions.

3-6. Replacing the needle bar (commom part for the BAS-401 · 412 and 416)



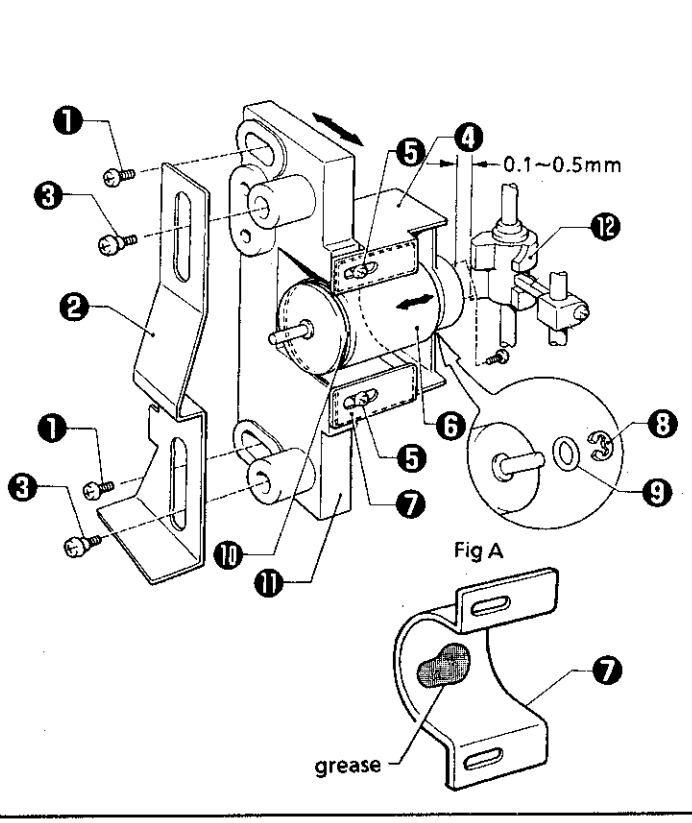
1. Remove the set screw ❶, and the needle ❷.
2. Remove the needle bar thread guide ❸ from the needle bar ❹.
3. Loosen the screw ❻ of the top dead center stopper ❺ and the screw ❽ of the needle bar clamp ❼.
4. Remove the needle bar ❹ by pulling it downward. (The felt, the needle bar clamp, the spring, and the top dead center stopper, and the cushion rubber will come off.)
5. Reverse the above procedure for assembly.
   Notes on assembly:
   ⓐ The needle bar thread guide ❸ should be attached with its hole facing the front.
   ⓑ The top dead center stopper ❺ should be positioned so that it makes slight contact with the cushion rubber ❾ when ▮ mark on the pulley is aligned with the one on the belt cover, and that the needle bar ❹ moves up and down smoothly.
   Make sure that the top dead center stopper ❺ does not make contact with the needle bar guide rail.
   ⓒ Adjust the top dead center stopper when the jump bracket and the needle bar clamp are securely positioned.
   ⓓ Refer to page 35 for adjusting the needle bar neight.

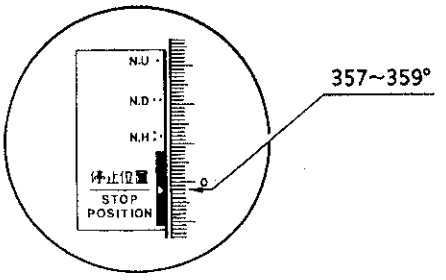
3-7. Replacing the jump bracket

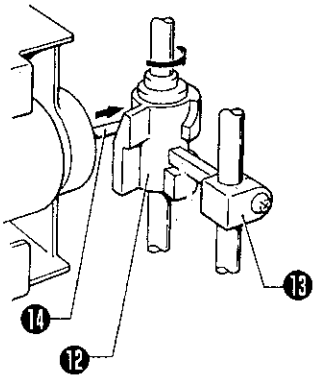


1. Loosen the screw ❶ on the left of the machine head.
2. Pull out the base needle vertical-set bar ❷ by lifting it from above.
   (The needle bar verticalset ❸ and the base needle bar felt ❹ will come off.)
3. Loosen the screw of the jump clamp ❺, and remove the jump clamp ❺ and the jump bracket ❼ from the base needle bar bush ❻.
   (The spring ❽ will come off.)
4. Reverse the above procedure for assembly.
   Notes on assembly:
   ⓐ When loosening the screw of the jump clamp ❺, pay attention to the position of the base needle bar bush ❻ (the spring strength). The screw should be tightened so that the jump clamp can be moved easily without looseness (it can be moved vertically only 0.03 - 0.05 mm) when the jump bracket is turned 70° (where the flat surface of the base needle bar bush ❻ faces the front).
   ⓑ When attaching the base needle bar ❷, align its bottom with the bottom of the arm.

3-8. Replacing and adjusting the jump solenoid







1. Remove the two screws ❶ and the jump solenoid.
2. Remove the two shoulder screws ❸ and the cam plate ❷.
3. Remove the two screws ❺ and the jump solenoid ❻ from the jump solenoid bracket ❹.
   The jump solenoid heat slinger ❼ will come off. (The jump solenoid and the jump solenoid heat slinger are coated with silicon grease.)
4. Remove the retaining ring ❽ of the jump solenoid ❻, and the O ring ❾.
5. Remove the solenoid cushion ❿ from the shaft of the jump solenoid ❻.
6. Replace the jump solenoid ❻ with a new one, and attach the solenoid cushion ❿, the O ring, and the retaining ring ❽.
   NOTE: Do not forget to put the attached spring back.
7. Attach the replaced jump solenoid ❻ to the jump solenoid heat slinger ❼ after coating with silicon grease (equivalent to silicon grease G746 made by Shin-etsu Chemical Co., Ltd.).
   NOTE: Apply silicon grease to the contact surfaces of both the jump solenoid heat slinger ❼ and the jump solenoid base ⓫.
8. Attach the jump solenoid and the jump solenoid heat slinger to the jump solenoid bracket ❹ using the two screws.
   NOTE: Make sure that the jump solenoid works correctly by pressing it with a finger after tightening the screws.
9. Attach the cam plate ❷ to the side of the machine head using the shoulder screw. Attach the jump solenoid to the side of the machine head using the two screws ❶.
   * Secure the jump solenoid at the position where the jump bracket ⓬ is separated from the protrusion of the needle bar clamp ⓭ (when the pulley is turned 357° - 359°) when the pin ⓮ of the jump solenoid protrudes the most.
   If it is hard to turn the pulley manually, slide up the cam plate (set the solenoid to jump condition), operate the machine at its lowest speed, and make sure that the needle is kept at its highest position without moving.
   If the needle moves, move the jump solenoid toward you (toward the needle bar case) slightly.
10. Loosen the two screws of the jump solenoid bracket ❹, move it in parallel with the jump bracket ⓬ to adjust the clearance between them to 0.1 - 0.5 mm.

3-9. Replacing the synchronizer and the sensor circuit board

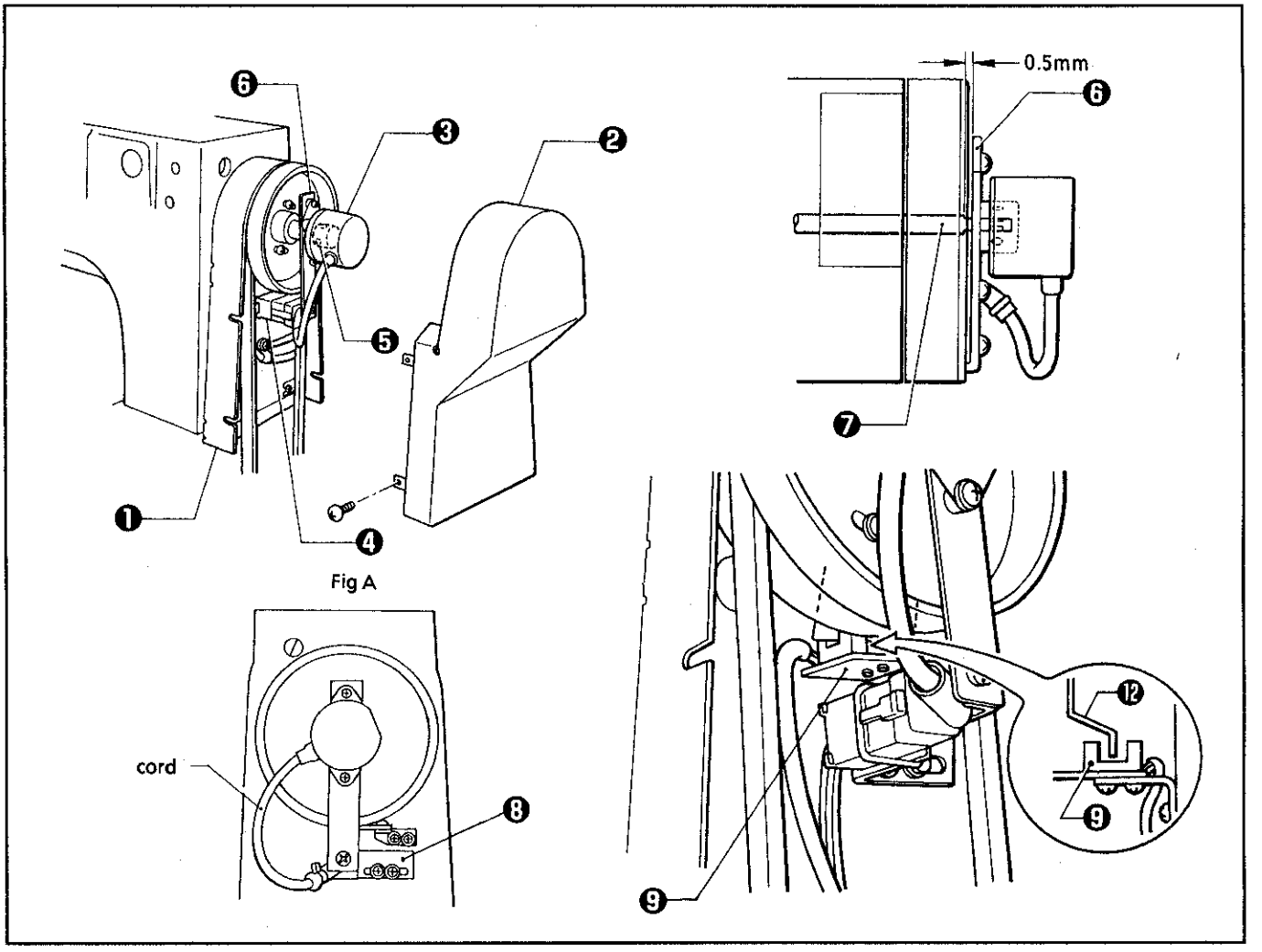


Fig A

[Synchronizer]

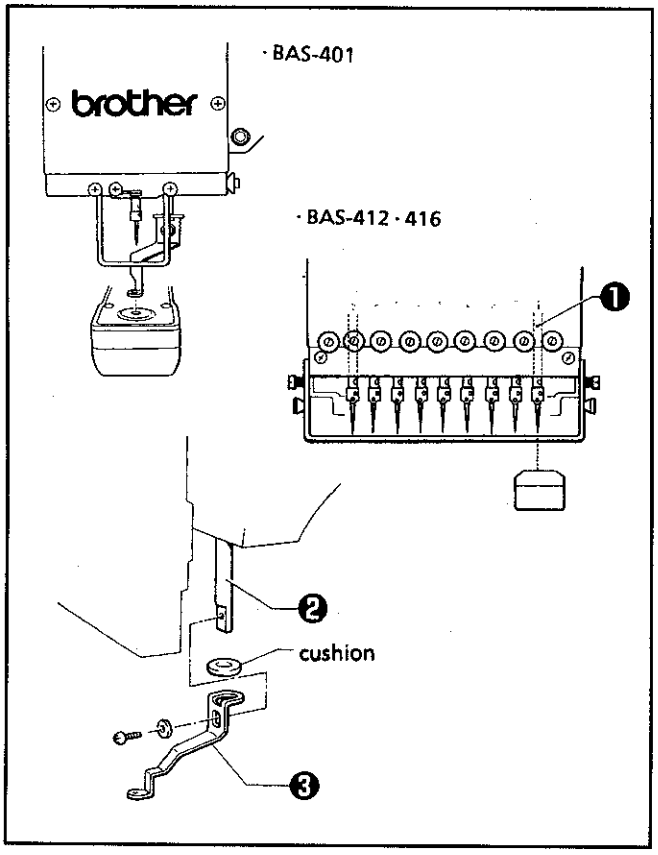
1. Remove the four screws, and belt cover B ❶ · A❷.
2. Remove the connector ❹ of the rotary encoder ❸ from the machine head.
3. Loosen the two set screws of the rotary shaft ❺ attached to the rotary encoder ❸.
4. Remove the two screws, and the rotary encoder ❸ from the encoder bracket ❻.
5. Reverse the above procedure for assembly.
   Notes on assembly
   ⓐ When attaching the rotary encoder, tighten the set screw of the rotary shaft so that the one which first comes in the rotation direction is aligned with the screw flat of the driving shaft.
   ⓑ Ensure the clearance between the edge of the encoder bracket ❻ and the edge of the driving shaft ❼ is 0.5 mm, and attach the rotary encoder so that it is perpendicular to the encoder set plate ❽.
   ⓒ The rotary encoder should be attached so that its cord is positioned to the left (when viewed from the rear) as shown in figure A.

[Sensor circuit board]

1. Remove the connector of the sensor circuit board ❾.
2. Remove the two screws, and the sensor circuit board ❾ from the needle position sensor set plate.
3. When replacing the sensor circuit board, reverse the above procedure.
   Note on assembly:
   ⓐ Make sure that the zero bight needle locating dog ❿ should be positioned in the center of the sensor circuit board.
   ⓑ One end of the sensor cirduit board ❾ wire should be positioned at the arm.

3-10. Replacing and adjusting the parts related to the presser foot (common part for the BAS-401, 412 and 416)

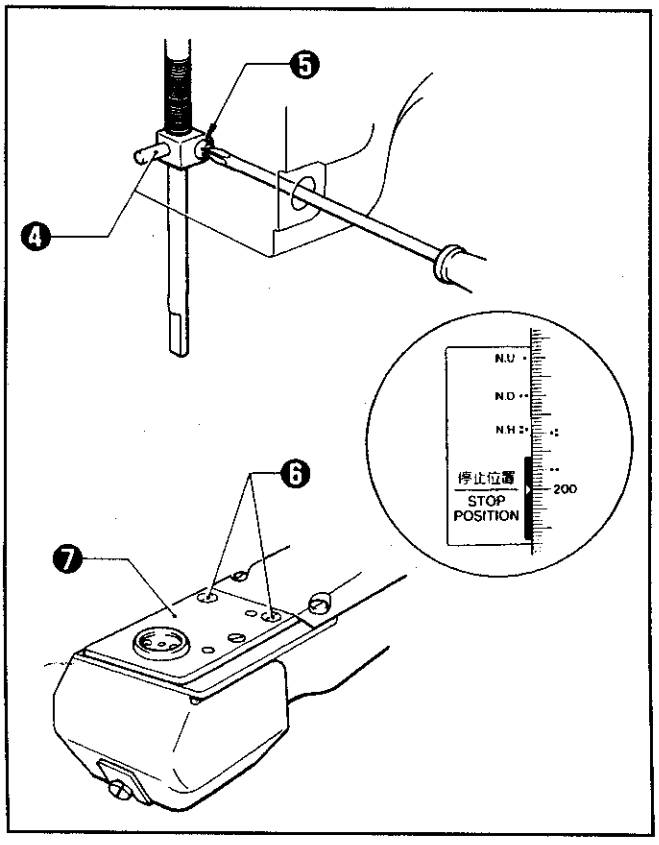
3-10-1. Replacing the presser foot



1. Select the first needle bar ❶ for the BAS-412 and 416.
2. Remove the screw, the washer, and the presser foot ❷ from the presser shaft ❸.
   NOTE: When removing the presser foot, the presser cushion will come off.
3. Reverse the above procedure for assembly.

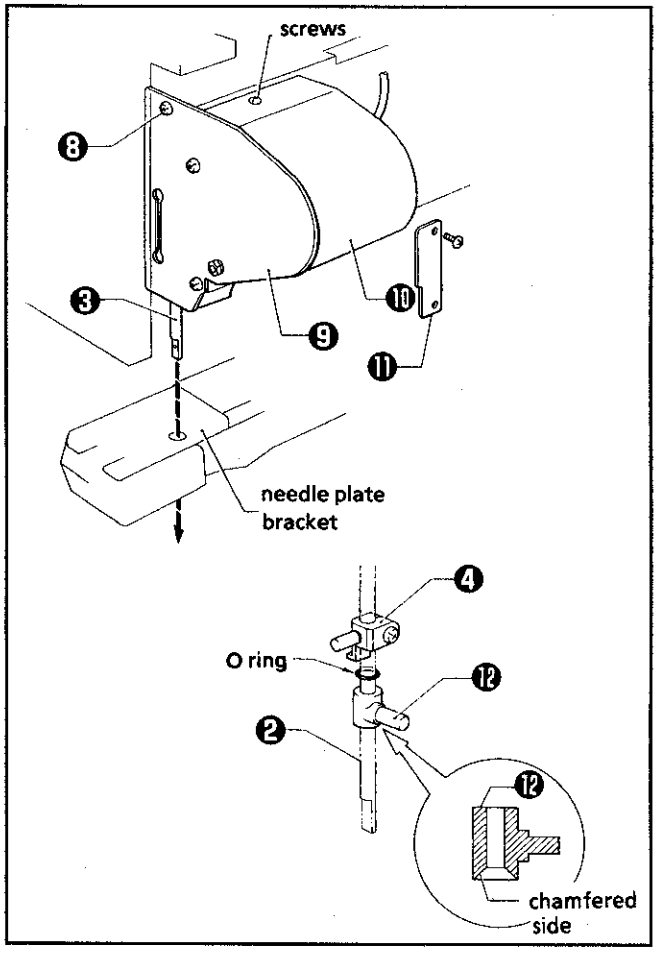
3-10-2. Replacing and adjusting the presser shaft

* When the needle bar case is attached

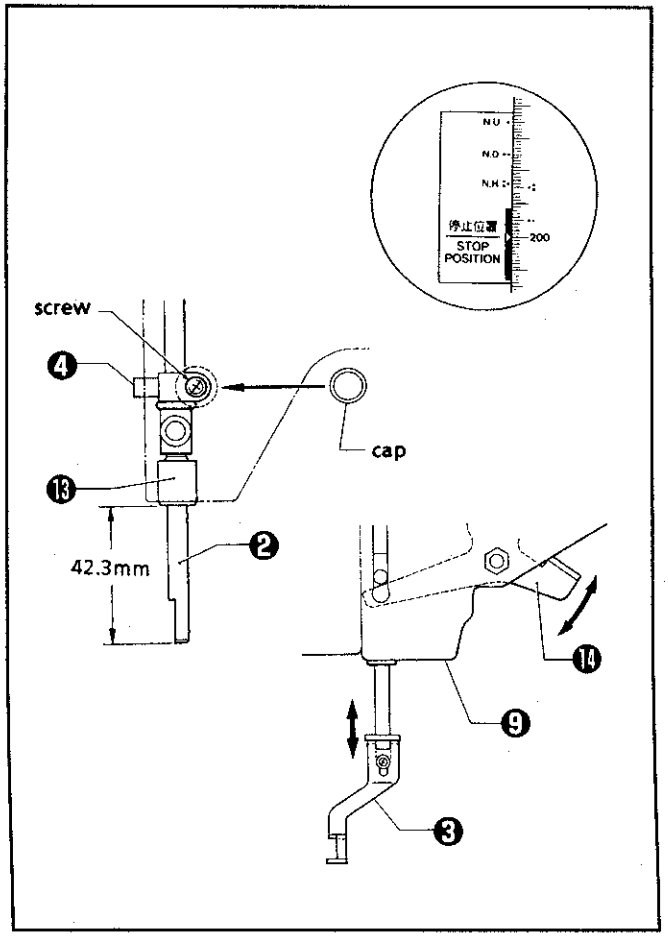


[Replacement]

1. Select the first needle bar ❶ for the BAS-412 and 416.
2. Remove the presser foot ❷ from the presser shaft ❸.
3. Remove the oil cap on the side of the machine head, insert a screwdriver into the hole, and loosen the screw ❺ of the presser shaft clamp ❹ (when the presser foot is set to its lowest position).
4. Remove the screw ❻, and the needle plate ❼.



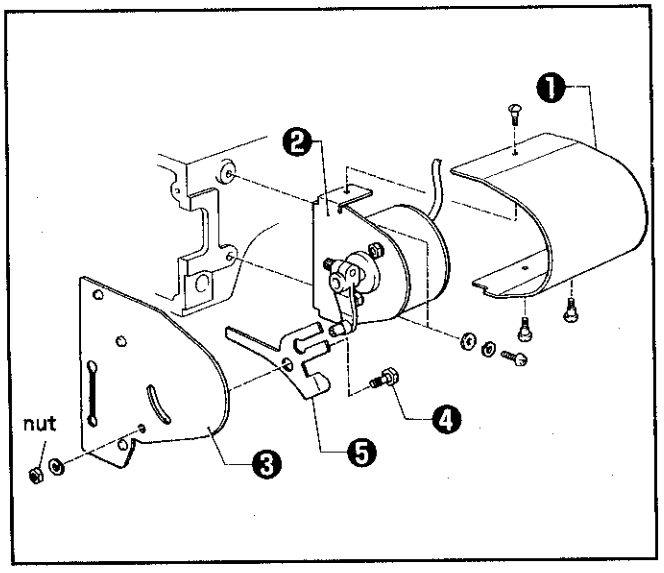
5. Remove the three screws ❽, and the presser guide plate ❾.
6. Remove the three screws, and the solenoid cover ❿. Remove the two screws, and the presser cover ⓫.
7. Remove the presser shaft ❷ by pulling it downward, and pass it through the hole of the needle plate bracket.
   NOTE: The presser shaft can also be removed from the above if it cannot be removed downward because of being bent. (When removing the presser shaft from above, remove the needle bar case.)
   NOTE: When removing the presser shaft, the spring may pop out. Be careful.
8. Reverse the above procedure for assembly.
   Notes on assembly
   ⓐ The screw of the presser shaft clamp ❹ should be kept loose.
   ⓑ Be sure to insert the O ring between the presser shaft clamp ❹ and the presser operating base ⓬ before attaching the presser shaft ❷.
   ⓒ When attaching the presser guide plate, apply adhesive to the portion which touches the machine head.
   ⓓ Attach the presser operating base ⓬ with the chamfered side facing down.



[Adjusting the presser shaft]

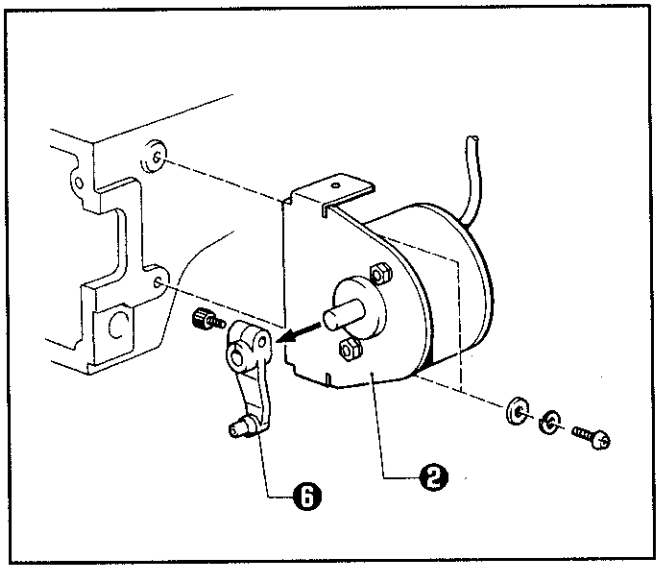
1. Turn the pulley to set the presser foot to its lowest position.
2. Move the presser shaft ❷ up or down to adjust it so that the distance from the end of the bush ⓭ to the presser shaft ❷ is 42.3 mm.
3. Securely tighten the screw of the presser shaft clamp ❹.
4. Cover the hole in the side of the machine head with the oil cap.
5. Make sure that the presser foot ❸ rises and lowers smoothly by moving it manually (using the presser retracting lever ⓮).
   NOTE: If the presser foot has stopped halfway while being raised, the presser guide plate ❾ may be attached on an angle.
   NOTE: When tightening the screw of the presser shaft clamp, attach the presser foot to the end of the presser shaft, and position the hole in the needle plate in the center of the hole of the presser foot.

3-10-3. Replacing and adjusting the presser retracting lever and the retracting solenoid lever



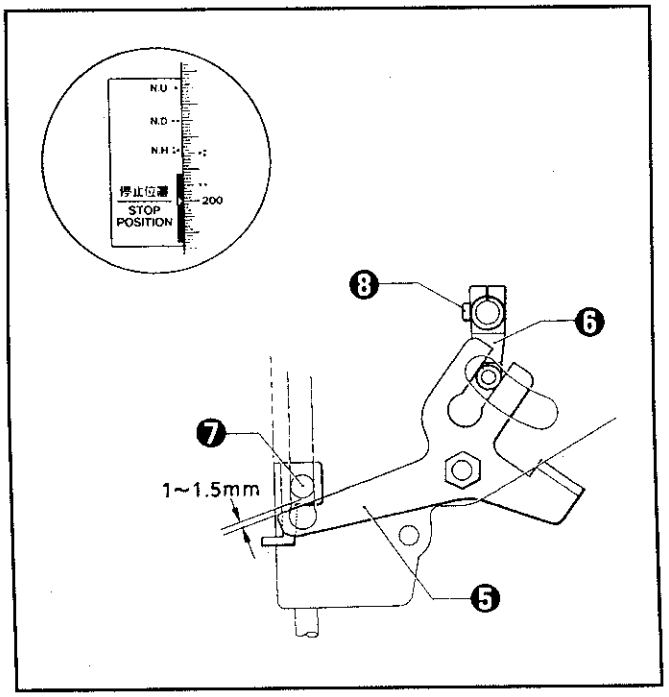
[Presser retracting lever]

1. Remove the three screws, and the solenoid cover ❶.
2. Remove the two screws, and the presser solenoid set plate ❷ from the arm.
3. Remove the nut of the retracting lever shaft ❹ from the presser guide plate ❸, then the presser retracting lever ❺.
4. Reverse the above procedure for assembly.



[Retracting solenoid lever]

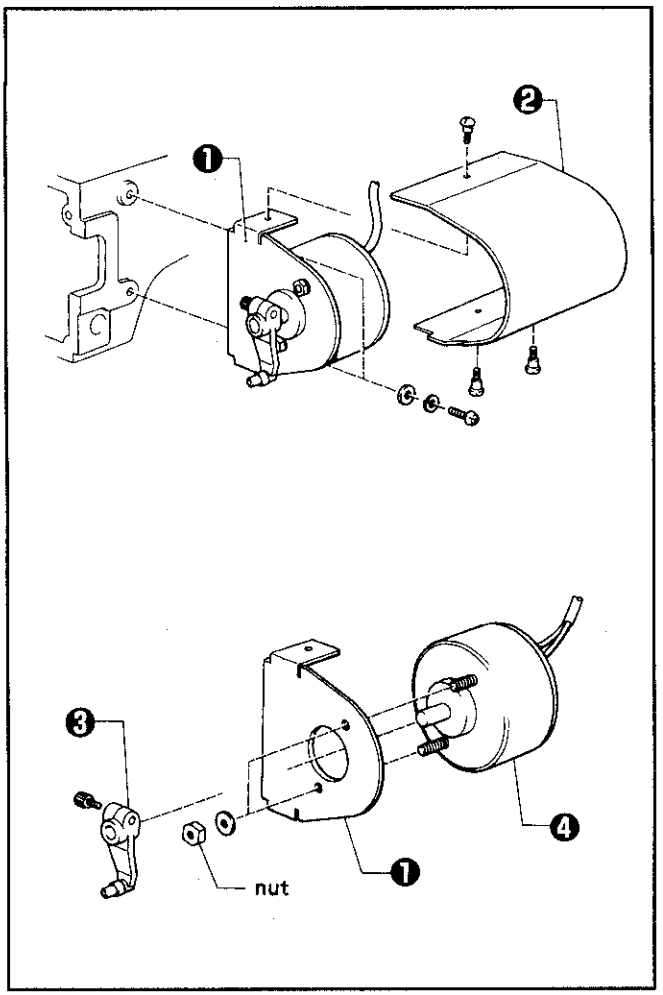
1. Remove the three screws, and the solenoid cover ❶.
2. Remove the two screws, the presser solenoid set plate ❷ along with the solenoid from the arm.
3. Loosen the screw, and remove the retracting solenoid lever ❻ from the solenoid.
4. Reverse the above procedure for assembly.



[Adjustment]

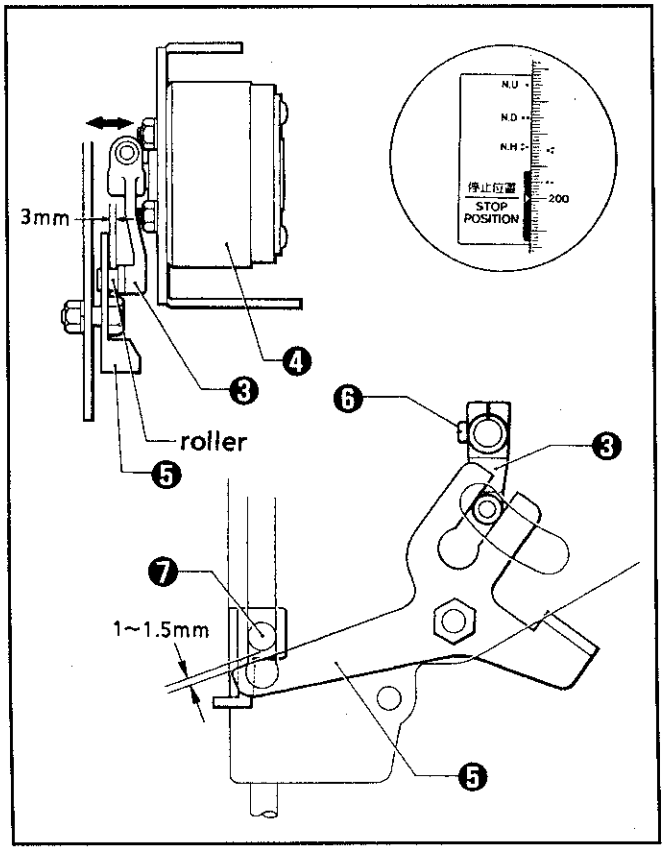
NOTE: Before making this adjustment, turn off the solenoid.
When the presser foot is set to its lowest position by turning the pulley, there should be a 1 - 1.5 mm clearance between the presser retracting lever ❺ and the shaft of the presser shaft clamp ❼. Loosen the screw ❽ of the retracting solenoid lever ❻ to adjust it.

3-10-4. Replacing and adjusting the presser retracting solenoid



[Replacement]

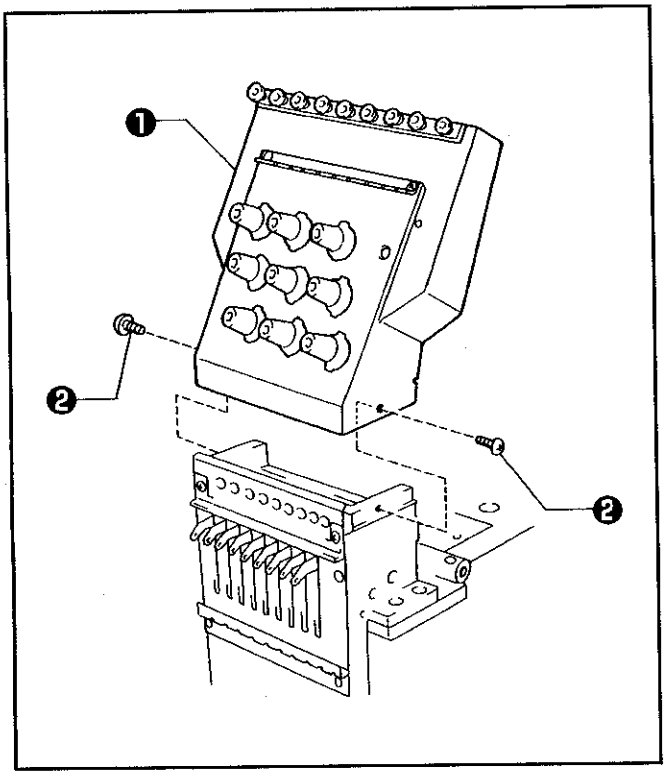
1. Remove the three screws, and the solenoid cover ❷ from the presser solenoid set plate ❶.
2. Remove the two screws, and the solenoid set plate ❶ from the arm.
3. Loosen the bolt of the retracting solenoid lever ❸, and remove it from the presser retracting solenoid ❹.
4. Remove the two nuts, and the presser retracting solenoid ❹ from the presser solenoid set plate ❶. (Remove the connector along with it.)
5. Reverse the above procedure for assembly.



[Adjustment]

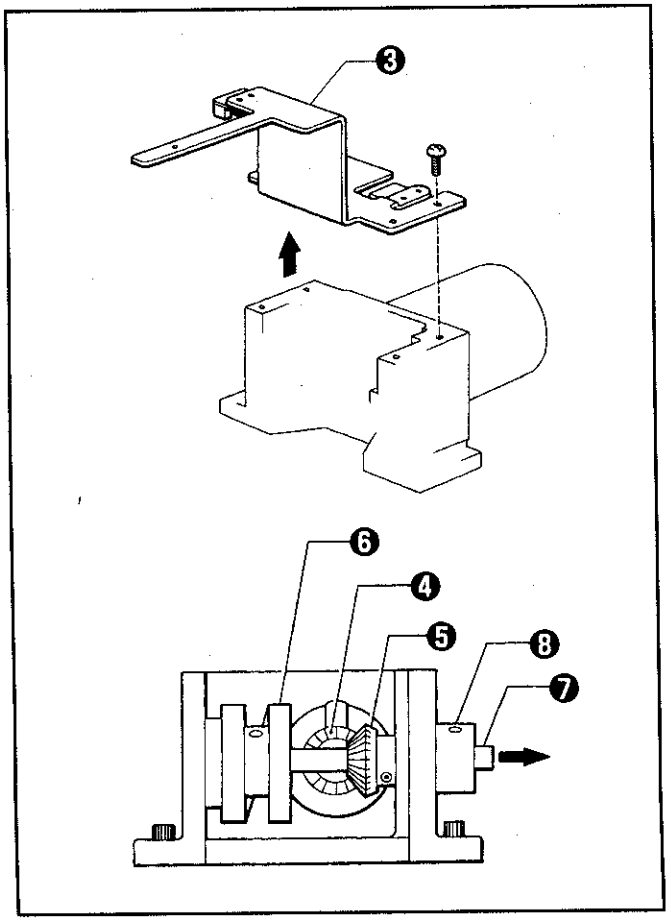
1. Move the retracting solenoid lever ❸ back and forth to set the clearance between the roller of the retracting solenoid lever ❸ and the presser retracting lever ❺ to 3 mm (when presser retracting solenoid is off) after replacing the presser retracting solenoid ❹.
2. Turn the pulley to set the presser foot in its lowest position. (Turn the pulley until ▪▪ mark on the pulley is aligned with the one on the belt cover.) Loosen the screw ❻ of the retracting solenoid lever ❸, and adjust the clearance between the presser retracting lever ❺ and the shaft of the presser shaft clamp ❼ to 1 - 1.5 mm.

3-11. Replacing and adjusting the parts related to the needle bar flip-up mechanism



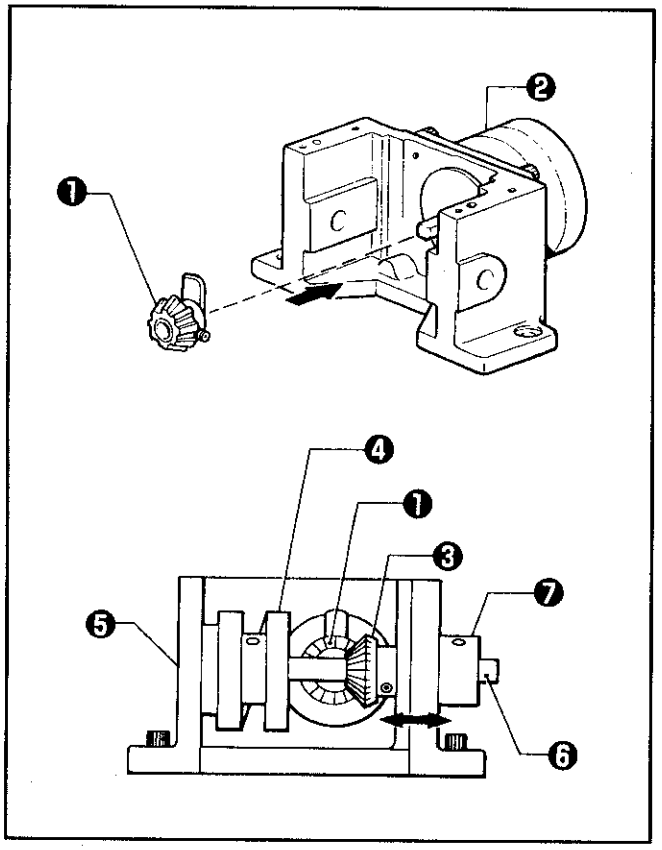
[Replacing the cam gear]

1. Remove the two screws ❷, and the adjustment base ❶.
   NOTE: Be sure to check the needle location before removing the adjustment base.



2. Remove the four screws, and the circuit board base ❸.

3. Loosen each set screw of cam gears A ❹ and B ❺, and the change cam ❻. Remove the cam shaft ❼.
   NOTE: Do not remove the change collar ❽.

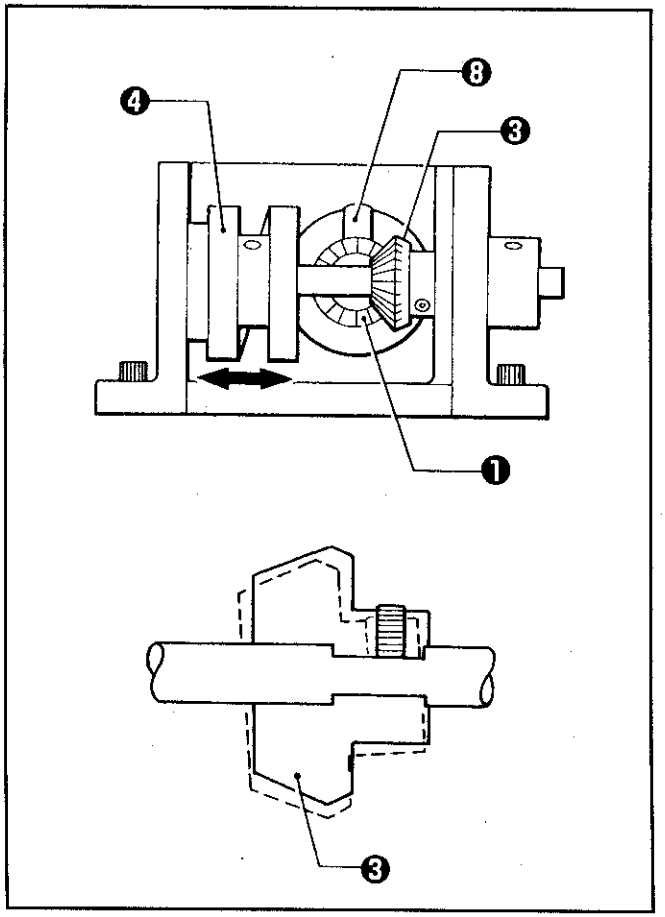


[Assembly]

* When the cam shaft has two screw flats

1. Temporarily attach cam gear A ❶ to the shaft of the pulse motor ❷.

2. Insert the cam shaft ❻ into cam gear B ❸ and the change cam ❹ inside of the change box ❺, and temporarily attach the change cam ❹ and cam gear B ❸ using the set screws.
   Attach the change collar ❼ and cam gear B ❸ so that they are either side of the change box ❺.
   Adjust the end play so that micrometer indicates from 0.02 to 0.05.



3. Turn the change cam ❹ until it comes to the stop position (where the needle bar does not move) to check the needle location. If it has shifted, loosen the set screw of the change cam ❹, and adjust its position by moving it in the direction of the shaft.

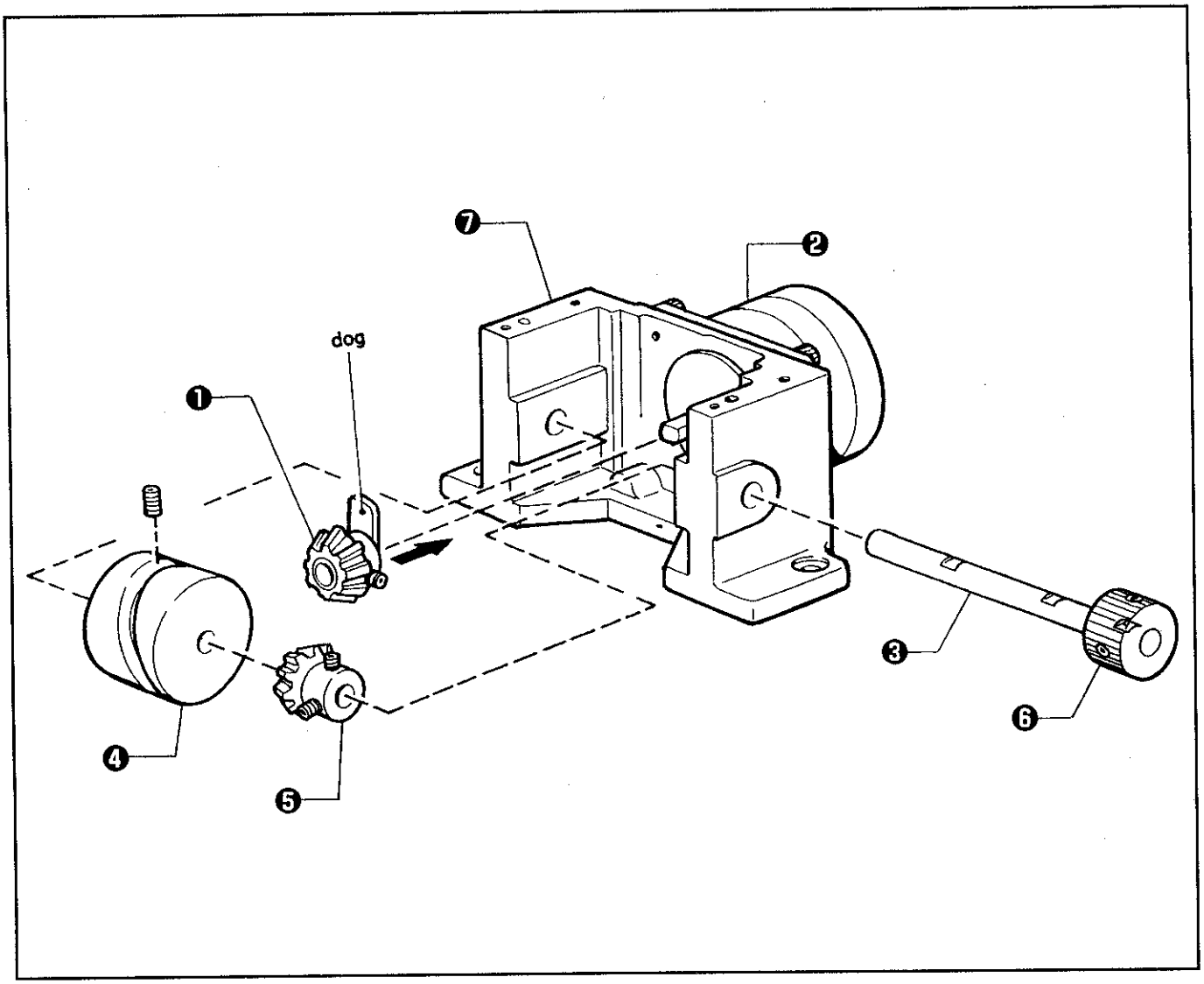
4. Put cam gear A ❶ to cam gear B ❸, and tighten the set screw of cam gear A ❶.

5. Loosen the set screw of cam gear B ❸, and retighten it until the dog ❽ of cam gear A ❶ comes to the top.

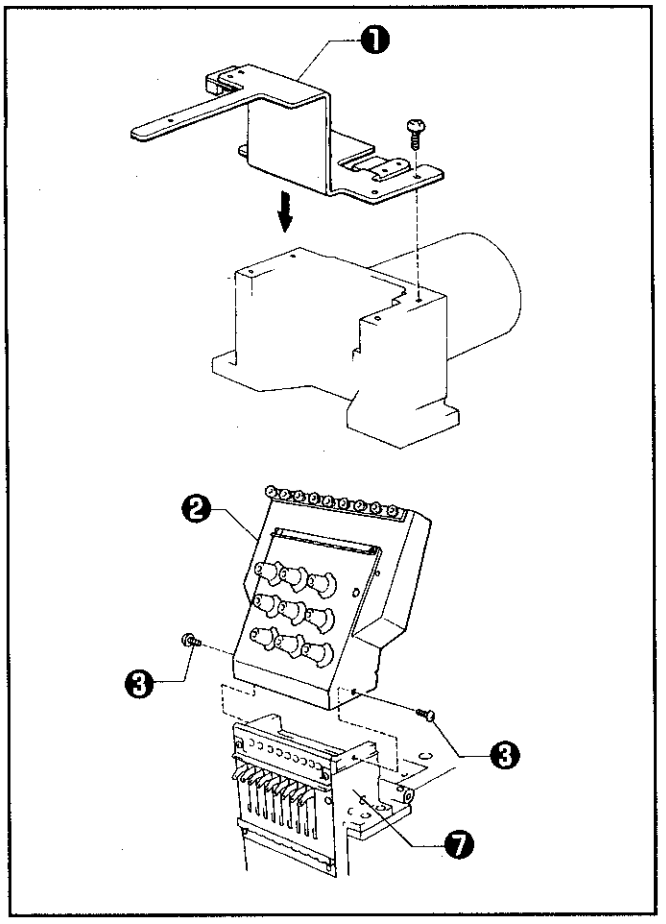
NOTE 1: Make sure that cam gear B ❸ is not inclined by its edge getting into the screw flat notch of the cam shaft. If it does, it cannot work smoothly.

NOTE 2: Make sure that all set screws are tightened.

* When the cam shaft has three screw flats



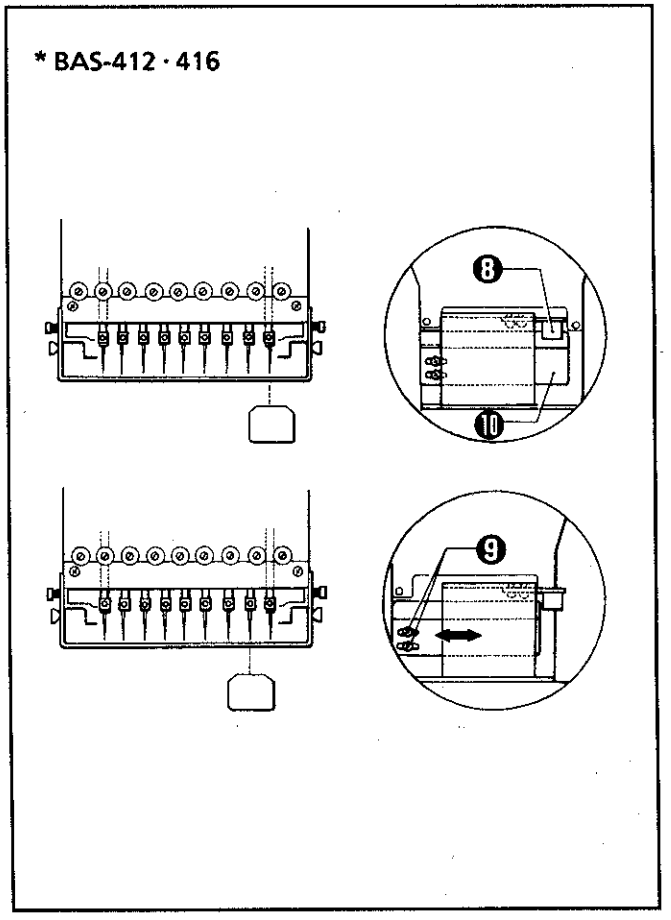
1. Insert cam gear A ❶ into the shaft of the pulse motor ❷.
2. Set screw flats on the cam shaft ❸ facing them upward. Attach the change cam ❹ so that its straight groove (stop position) faces the needle bar case.
3. Attach the change box ❼ between cam gear B ❺ and the change collar ❻.
   NOTE: When securing cam gear B ❺ and the change collar ❻, align any screw hole with the screw flat.
4. Position the change cam ❹ so that each needle can enter the center of the hole. Tighten the set screw of the change cam ❹ when the dog of cam gear A ❶ comes to the top.
5. Securely tighten all set screws.



6. Attach the circuit board base ❶ using the four screws.

7. Attach the adjustment base ❷ using the two screws ❸.

3-11-1. Adjusting the zero bight needle location plate



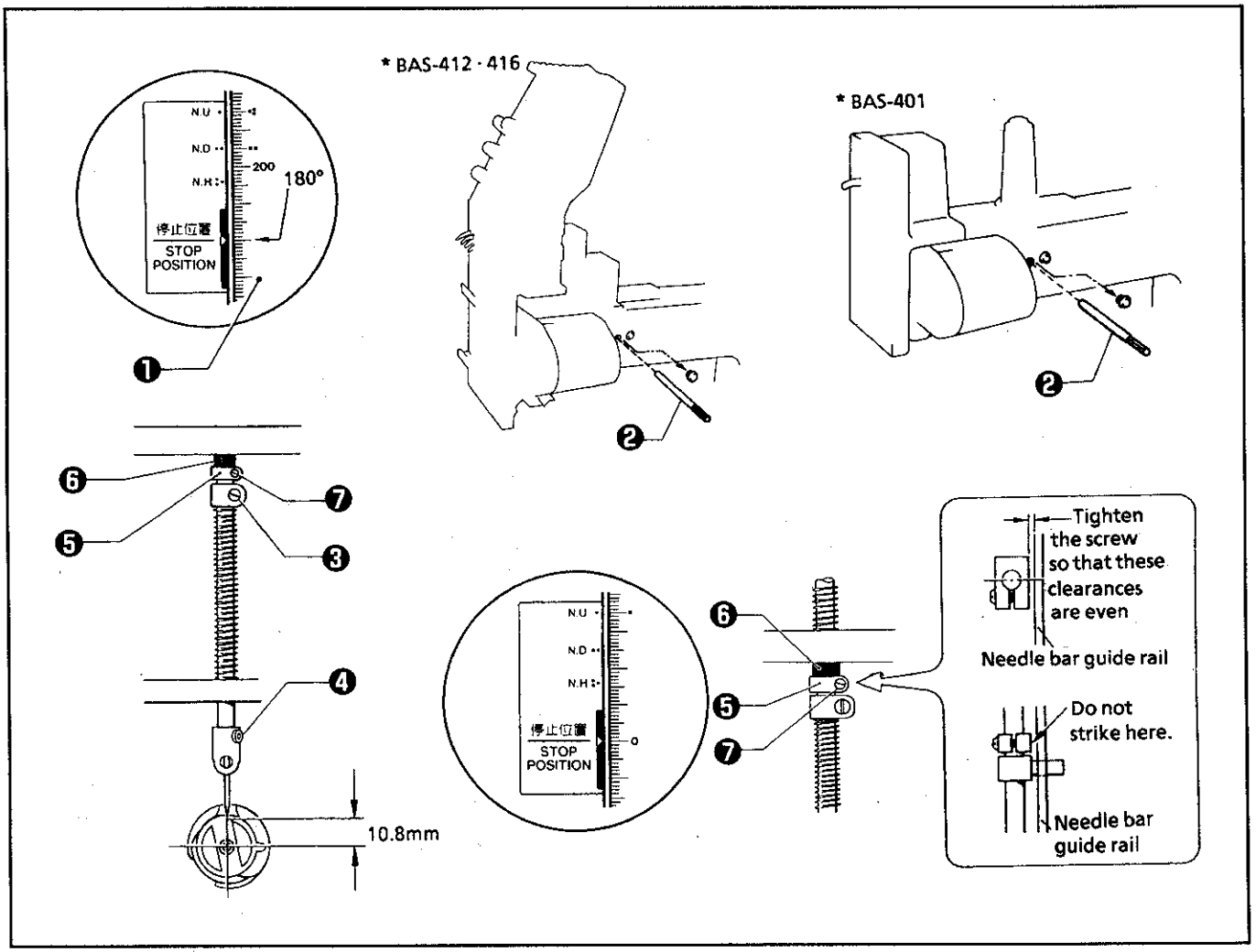
Loosen the two screws ❾, and adjust the position of the zero bight needle location plate by moving it to the left and right so that:
When the needle bar No.1 is aligned with the hole in the needle plate ❿, it should shield the sensor circuit board ❽.
When the needle bar No.2 is aligned with the hole in the needle plate, it should not shield the sensor circuit board.

4. STANDARD ADJUSTMENT

⚠ CAUTION

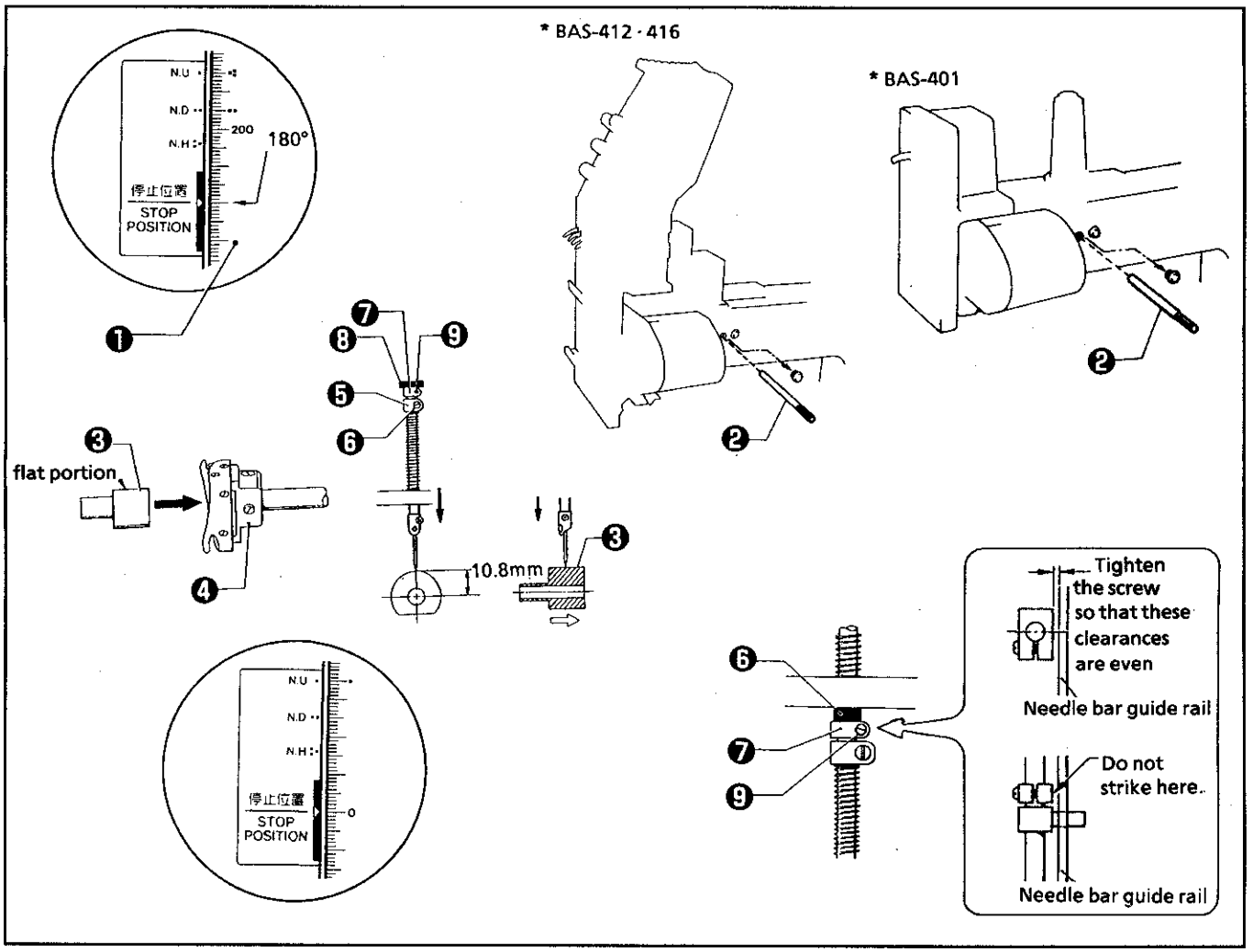
- Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.
  - When carrying out inspection, adjustment and maintenance
- If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.
- Maintenance and inspection of the sewing machine should only be carried out by a qualified technican.

4-1. Adjusting the needle bar height (when the needle bar is raised 2 mm)



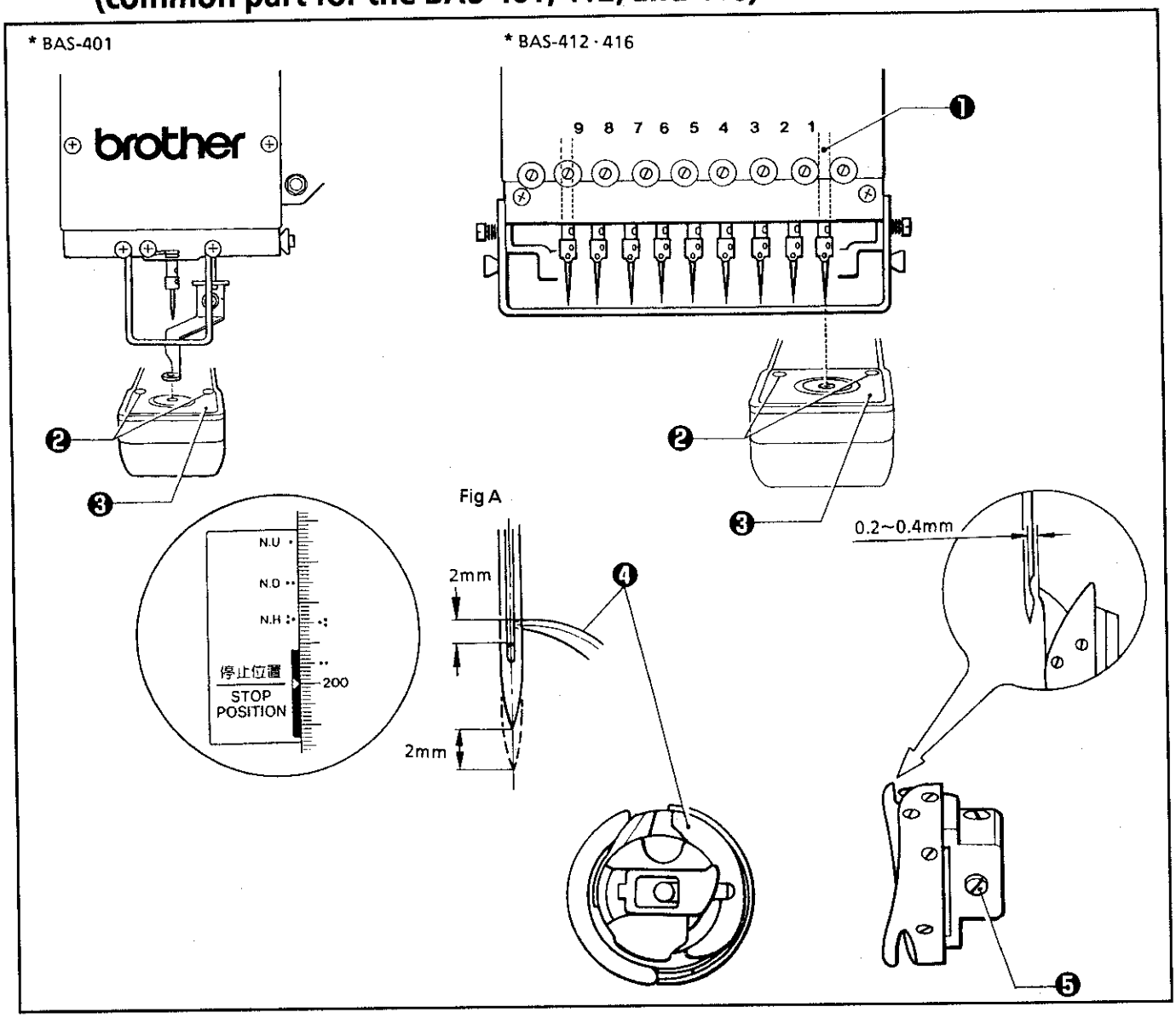
1. Turn the pulley ❶ to set the needle bar to its lowest point. (Turn the pulley until ▮▮ mark on the pulley is aligned with the one on the belt cover.)
2. Insert the positioning bar ❷ into the hole in the side of the machine head, and secure the upper shaft.
3. Loosen the screw of the needle bar clamp ❸ when the needle tip is positioned 10.8 mm above the center of the rotary shaft. Adjust the position of the needle bar thread guide so that the set screw ❹ on it is turned 25° - 30° to the right when viewed from the front. Tighten the screw of the needle bar clamp ❸.
   NOTE: When tightening the screw of the needle bar clamp, the hole in the needle bar thread guide should face the front.
4. Set the needle bar to its highest point. Lightly press the top dead center stopper ❺ toward the cushion rubber ❻, and tighten the screw ❼ so that it faces the front.
   NOTE: Make sure that the stopper does not strike the needle bar guide rail.
5. Remove the positioning bar ❷ from the machine head.

* When using the bottom dead center gauge



1. Turn the pulley ❶ to set the needle bar to its lowest point. (Turn the pulley until ▮▮ mark on the pulley is aligned with the one on the belt cover.)
2. Insert the positioning bar ❷ into the hole in the side of the machine head to secure the upper shaft. (Turn the pulley in the rotation direction.)
3. Insert the bottom dead center gauge ❸ into the rotary hook ❹.
4. Loosen the screw ❻ of the needle bar clamp ❺, move the needle bar up and down so that the needle tip lightly touches the bottom dead center gauge ❸.
   NOTE 1: The needle tip should make contact with the bottom dead center gauge except for the flat portion.
   NOTE 2: When setting the bottom dead center gauge in the rotary hook or removing the former, face the flat portion up.
5. Securely tighten the screw ❻ of the needle bar clamp ❺.
6. Set the needle bar to its highest point. Lightly press the top dead center stopper ❼ toward the cushion rubber ❽, and tighten the screw ❾ so that it faces the front. (Before tightening the screw, insert the positioning bar ❷ to secure the upper shaft.)
   NOTE: Make sure that the top dead center stopper ❼ does not strike the needle bar guide rail ❿.

4-2. Adjusting the timing between the needle and the rotary hook (when the needle bar is raised 2 mm) (common part for the BAS-401, 412, and 416)

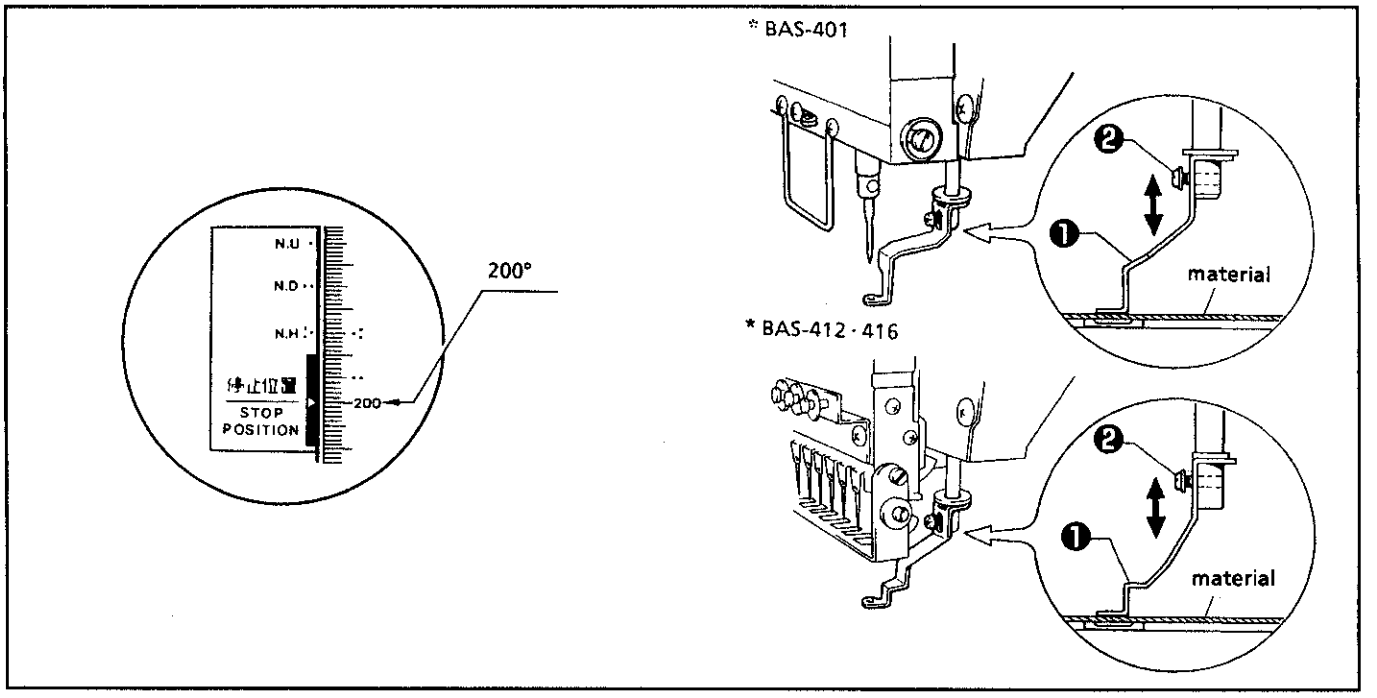


1. Select the first needle bar ❶ (for the BAS-412 and 416).
2. Remove the two screws ❷, and the needle plate ❸.
3. Loosen the set screw ❺ of the rotary hook, and adjust the rotary hook ❹ position so that there is a 0.2 - 0.4 mm clearance between the needle and the rotary hook point. Then tighten the two set screws. At this time, the needle bar will be raised 2 mm above its lowest position (as shown in figure A), and the ▪▪ mark on the pulley will be aligned with the one on the belt cover.
4. Make sure that the clearance between the needle and the rotary hook is 0.2 - 0.4 mm. Then tighten the three set screws ❺ of the rotary hook.

For the BAS-412 and 416

If the clearance between the needle and the rotary hook is not 0.2 - 0.4 mm, repeat step 3, and make sure that there is a 0.2 - 0.4 mm clearance between the needle and the rotary hook at both the first and ninth needle bars

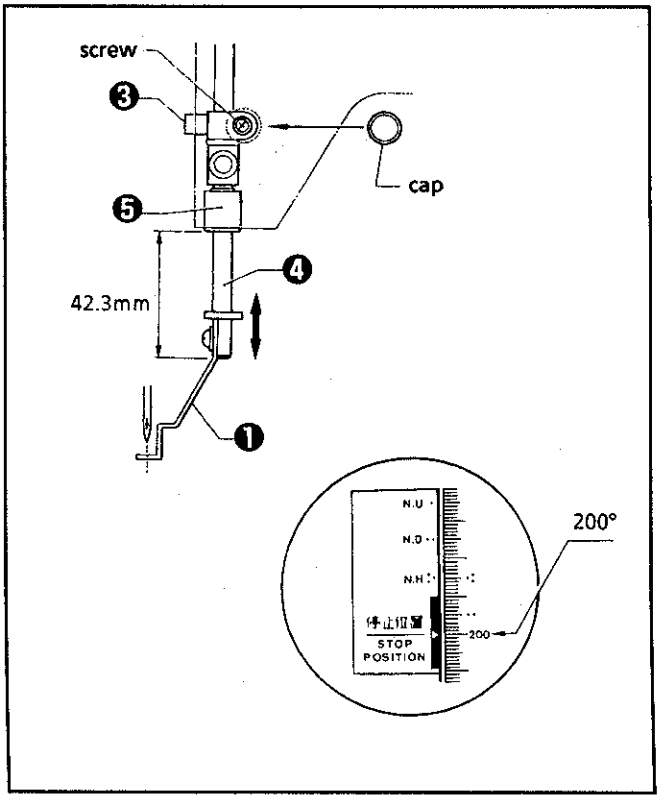
4-3. Adjusting the presser foot height



Adjust the presser foot ❶ height by loosening the screw ❷ so that the presser foot is above the material when the former is in its lowest position (when ▪▪ mark on the pulley is aligned with the one on the belt cover).

NOTE: Select the first needle bar, and loosen the screw of the presser foot. (BAS-412 · 416)
While the power is turned on, lower the presser foot using the presser retracting lever.

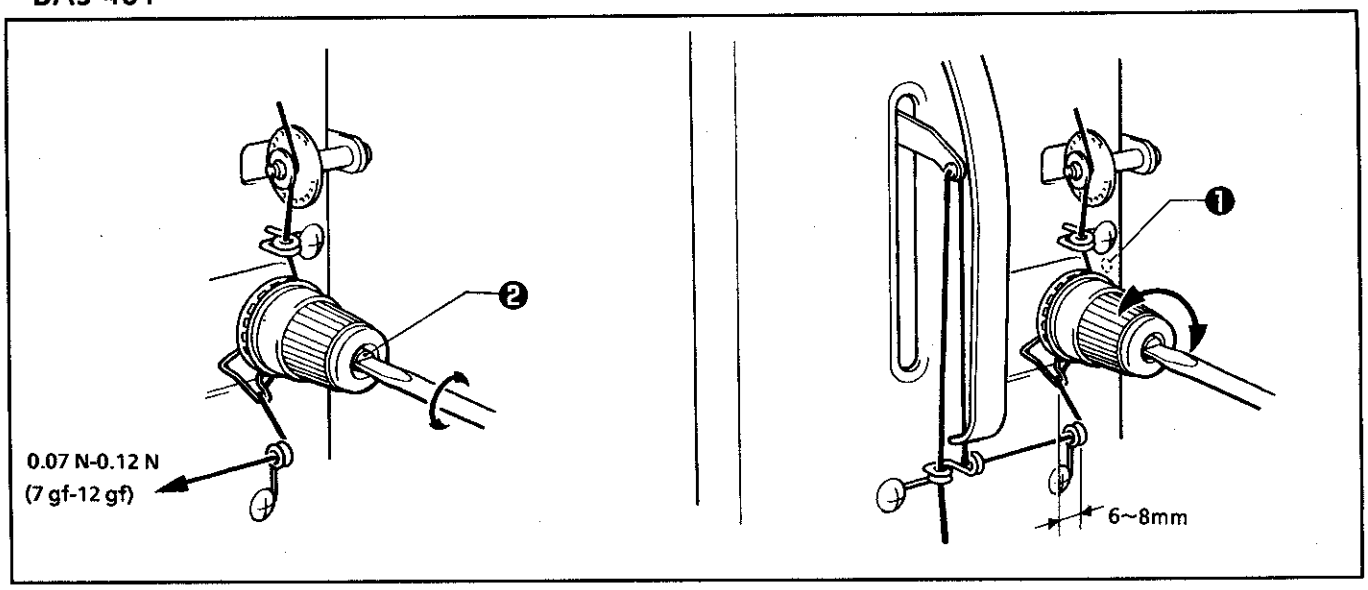
4-3-1. Adjusting the position of the presser shaft



1) Turn the pulley to set the presser foot to its lowest position. (Turn the pulley until ▪▪ mark on the pulley is aligned with the one on the belt cover.)
2) Loosen the screw of the presser shaft clamp ❸ using a screwdriver inserted through the hole in the side of the machine head. Adjust the position of the presser shaft ❹ so that the distance from the end of the bush ❺ to the end of the presser shaft ❹ is 42.3 mm.
3) Securely tighten the screw of the presser shaft clamp ❸.
4) Make sure that the needle is inserted into the center of the hole in the presser foot ❶ when it is lowered.

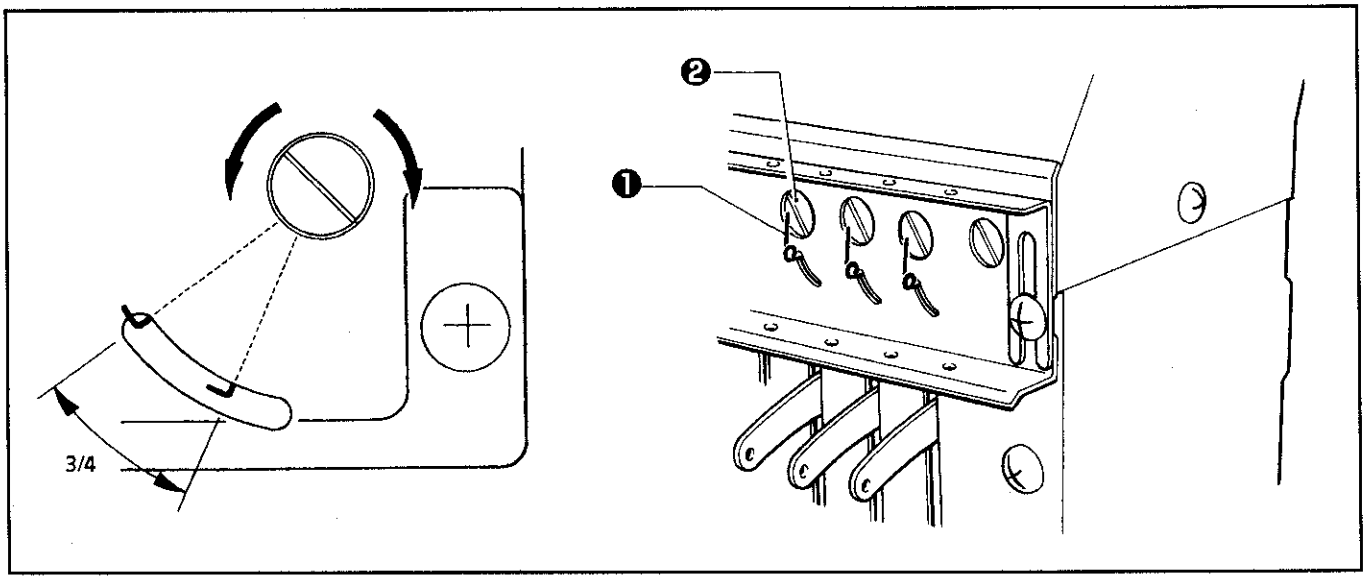
4-4. Adjusting the spring

· BAS-401



* The standard operation range of the thread take-up spring is about 6-8 mm. The standard tension at this time is about 0.07 N-0.12 N (7 gf-12 gf).
* To adjust the operation range of the thread take-up spring, loosen the screw ❶, and turn the upper thread trension assembly.
* To adjust the tension of the thread take-up spring, fit a screwdriver into the slot, and turn the tension stud ❷ as appropriate.

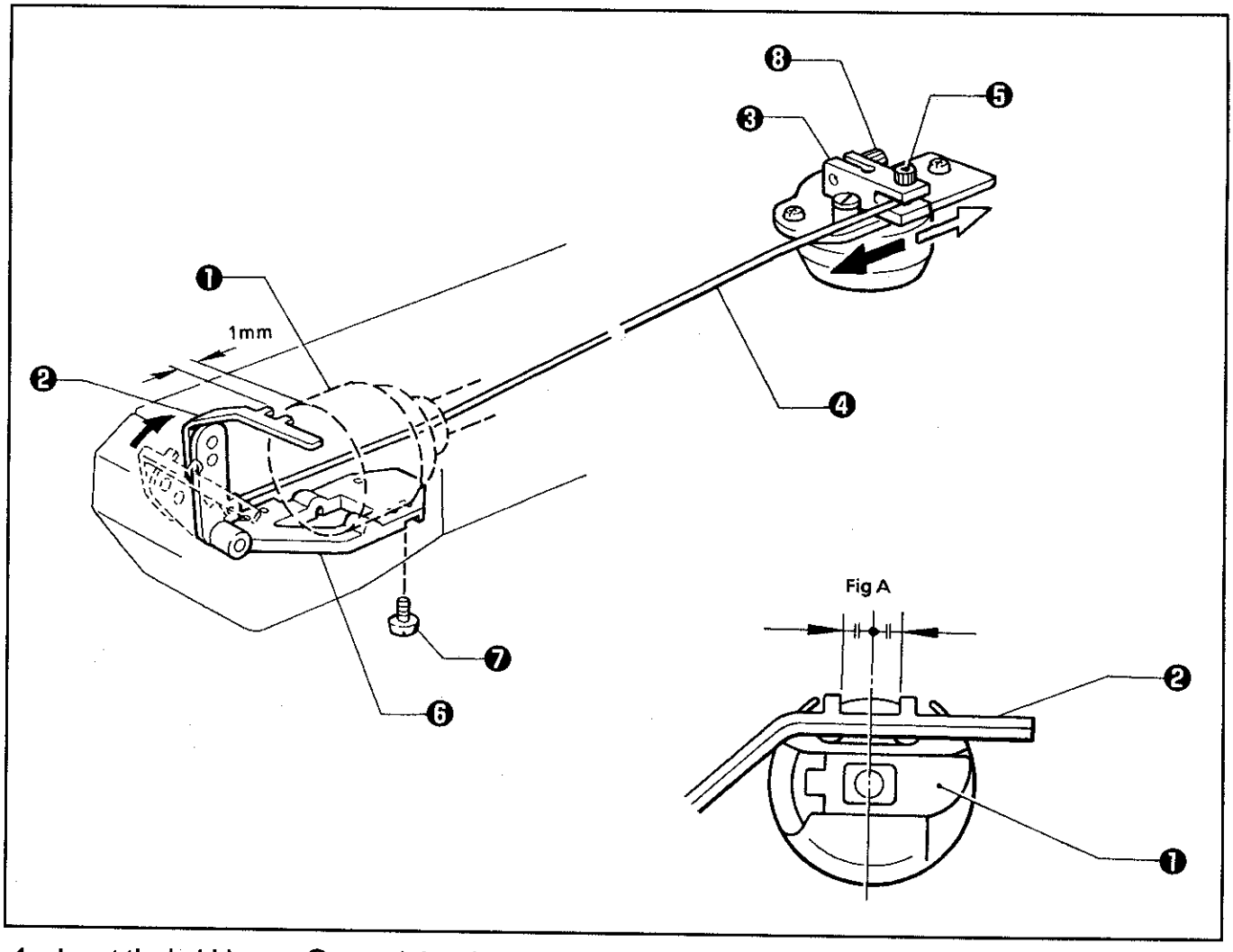
· BAS-412 · 416



When you pull the needle downthrough the needle hole, the spring ❶ should be moved 3/4 of its total possible movement and the needle thread should be pulled out. Turn the tension stud ❷ to adjust the strength of the spring ❶.

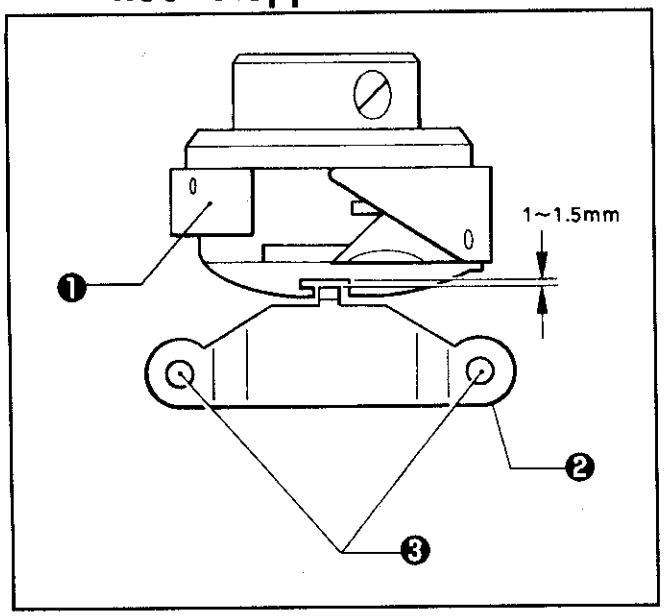
[NOTE1] The standard needle thread tension is 0.69 N-1.27 N (70-130 gf) (When #120 thread is used).
[NOTE2] It is necessary to adjust the needle thread tension according to the material thickness.
Adjust the spring applied force as well as the needle thread tension.
(The needle thread tension is appropriate when taut tatami (fill) stitching is formed.)
[NOTE3] The tension stud ❷ position is preadjusted so that its slit is positioned as shown in the figure below.

4-5. Adjusting the picker



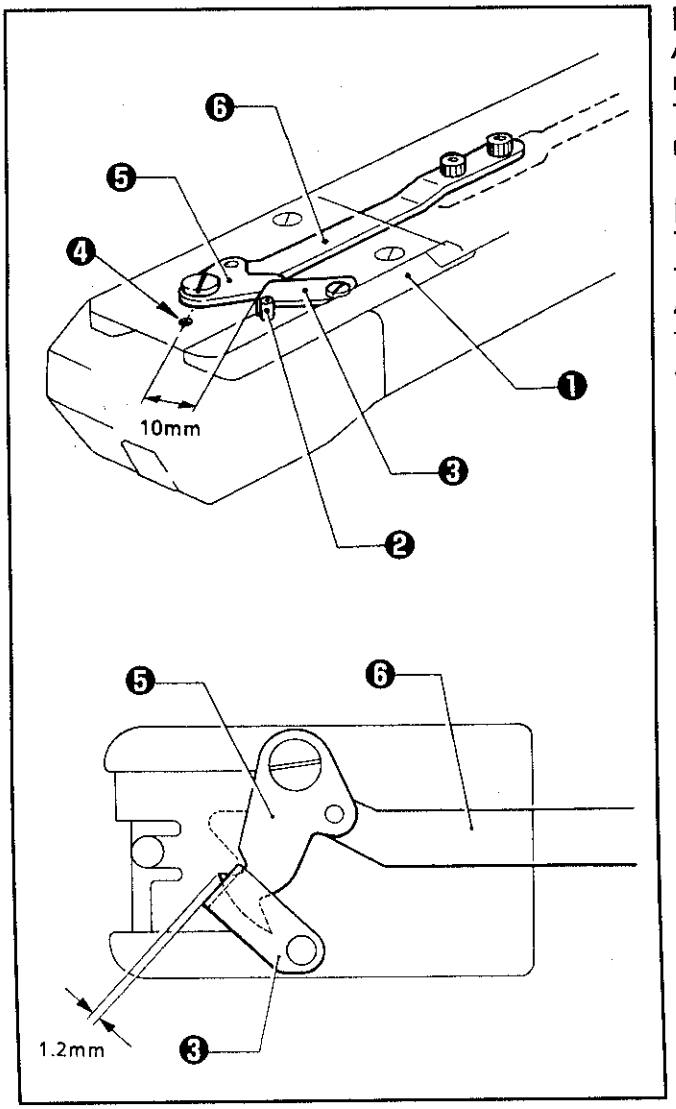
1. Insert the bobbin case ❶ containing the bobbin into the rotary hook, and set the picker ❷ position.
2. Leave the solenoid arm ❸ pushed to the needle bar side, and secure the connecting wire ❹ using the screw ❺.
3. Secure the picker bracket ❻ using the screw ❼ so that the picker ❷ moves easily without any play.
4. Set the clearance between the end of the picker ❷ and the bobbin to 1 mm, leave the solenoid arm ❸ pushed to the pulley side (leave the solenoid operated), and tighten the screw ❽.
5. Adjust the position of the picker ❷ so that it is centered in the bobbin case ❶.
   NOTE: When the picker is retracted (the solenoid is turned off), there should be a 17 mm clearance between the bobbin and the tip of the picker.

4-6. Adjusting the clearance between the rotary hook and the inner rotary hook stopper



1. The clearance between the rotary hook ❶ and the inner rotary hook stopper ❷ should be enough to pass the thread through the clearance easily.
2. Loosen the two screws ❸ to adjust the clearance between the rotary hook and the inner rotary hook stopper to 1 - 1.5 mm.
3. Lower the needle. Make sure that the inner rotary hook stopper ❷ is inserted into the center of the groove of the rotary hook ❶.

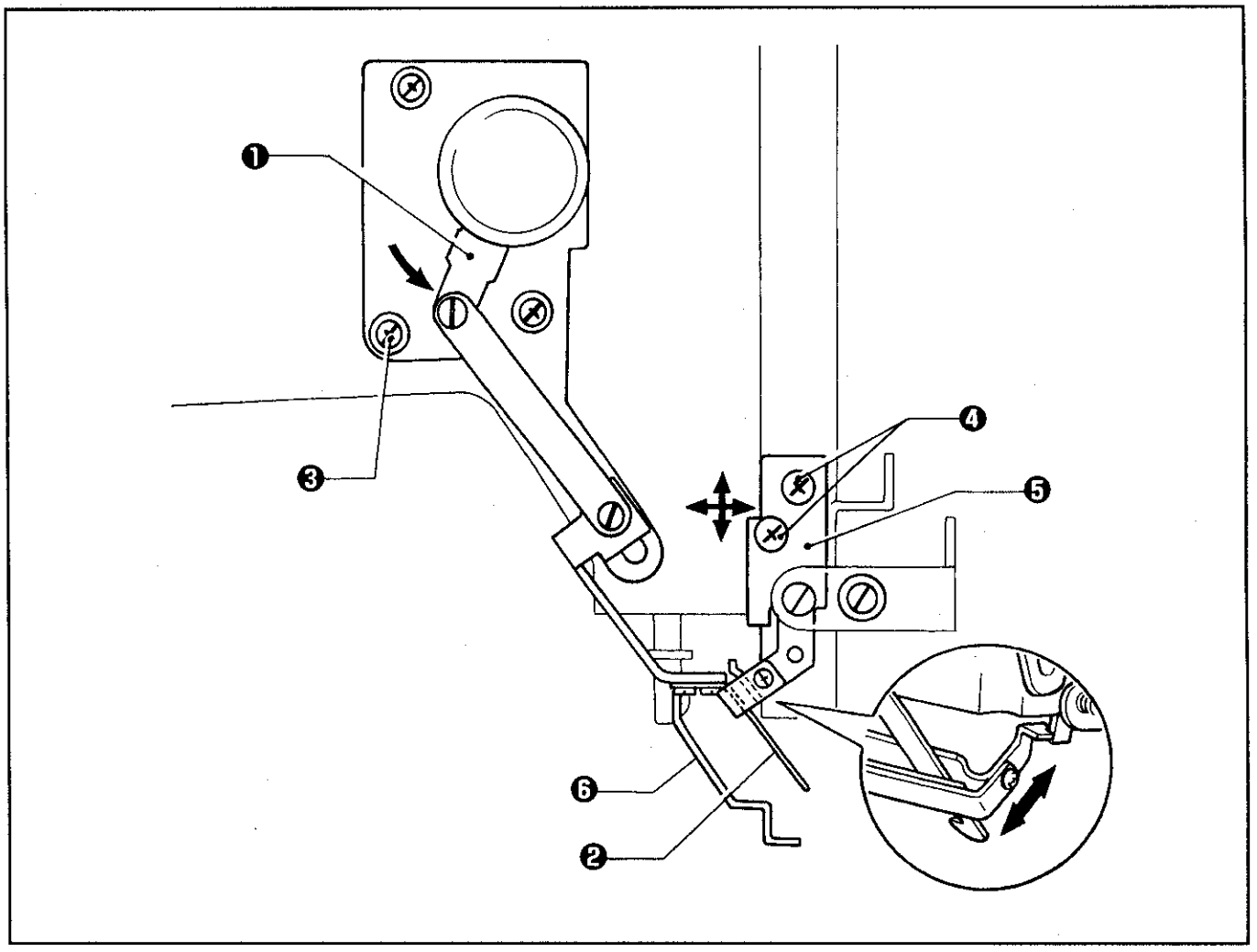
4-7. Adjusting the movable knife and the fixed knife



[Attaching the fixed knife]
Attach the fixed knife ❸ to the spring roll pin ❷ of the needle plate bracket ❶ using the screw.
The fixed knife ❸ should be positioned so that it is 10 mm from the hole ❹ in the needle plate.

[Movable knife position]
The movable knife ❺ always should be positioned so that it is projected 1.2 mm from the fixed knife ❸. Adjust the position of the movable knife ❺ using the thread trimmer connecting rod ❻ so that it is the same as after thread trimming.

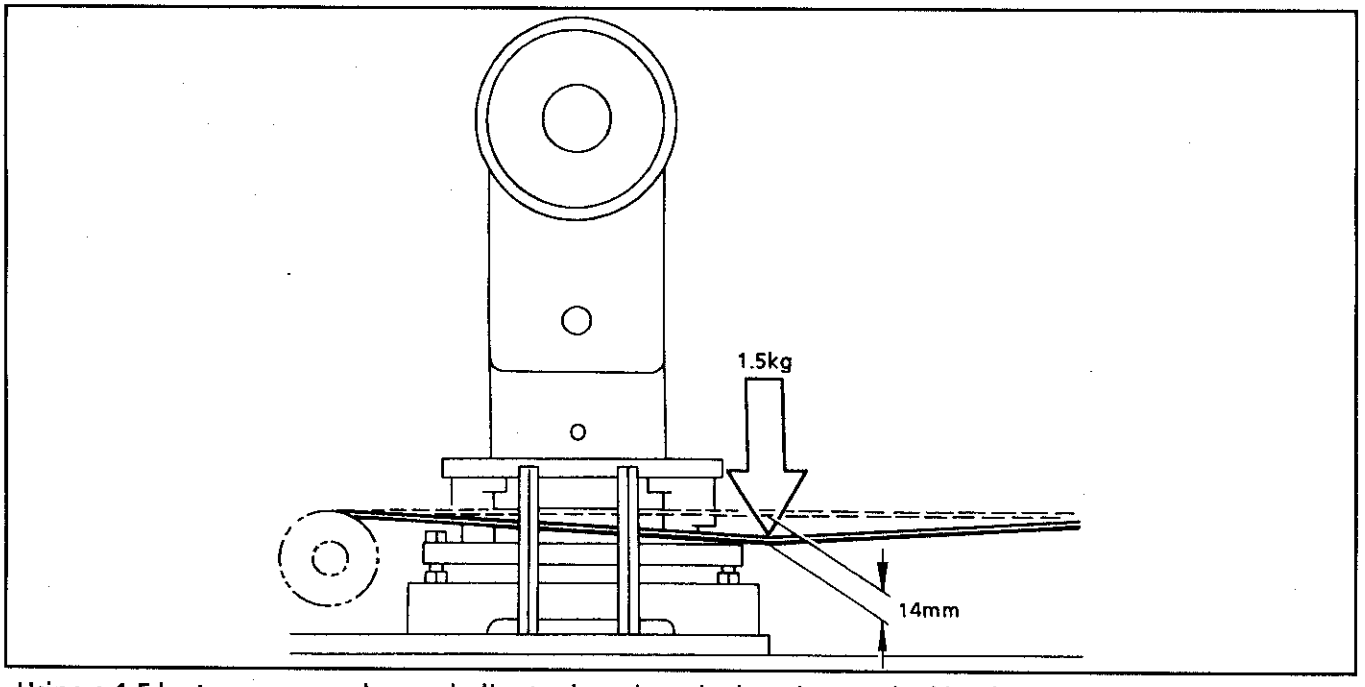
4-8. Adjusting the thread wiper



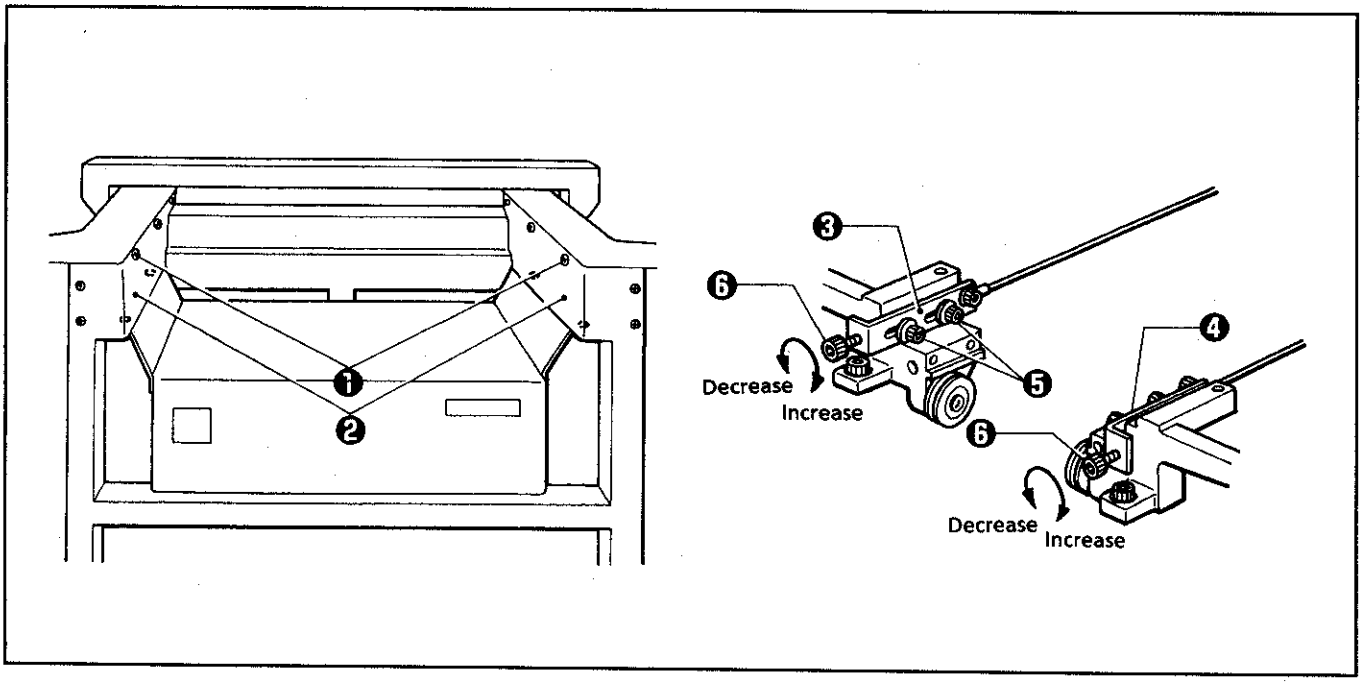
1. Move the solenoid arm ❶ in the direction of the arrow with your finger. Loosen the three screws ❸, and adjust the upper thread guard hook ❷ so that it moves easily.
2. If the first and ninth needles operate differently, loosen the four screws ❹, move the thread presser base ❺ in the direction of either axis (as indicated), and adjust their positions, provided that the presser foot ❻ does not hit the needle when raised by the solenoid.

4-9. Adjusting wire tension (BAS-401 · 412 · 416)

4-9-1. Y-feed wire



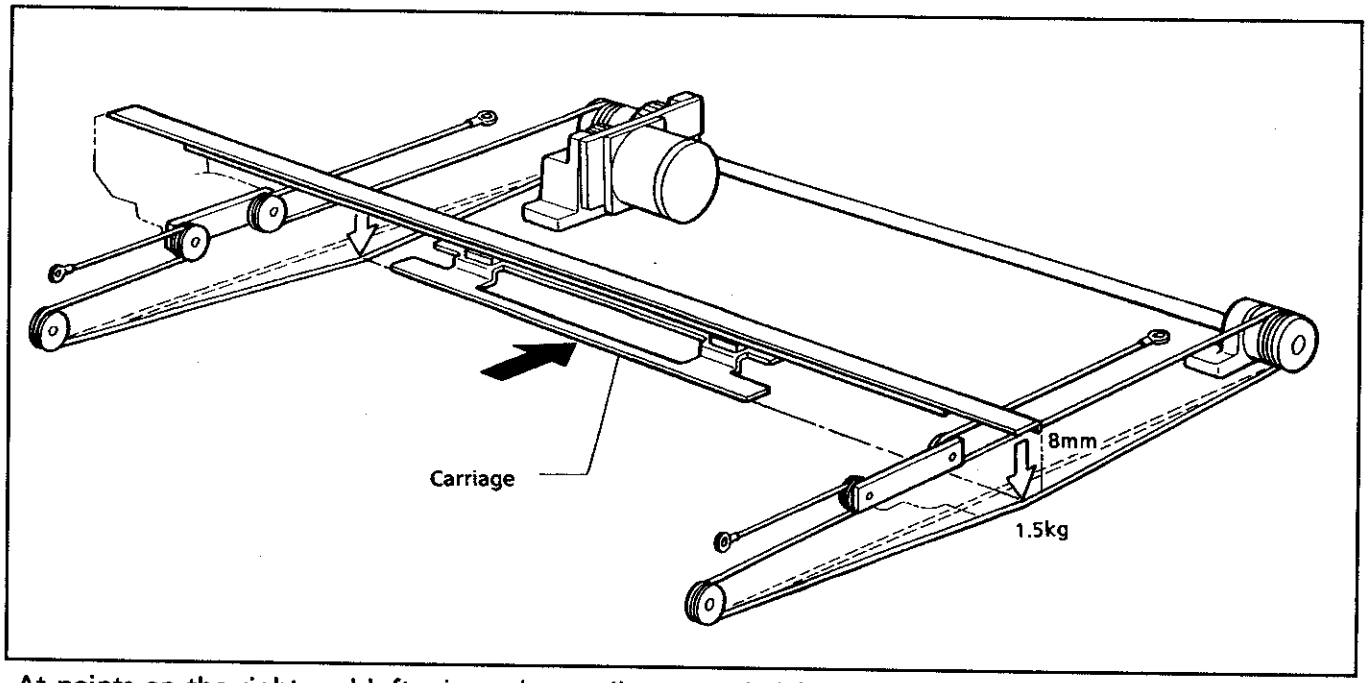
Using a 1.5 kg torque wrench or a similar tool, push at the location marked by the arrow and adjust so there is a deflection of approximately 14 mm.



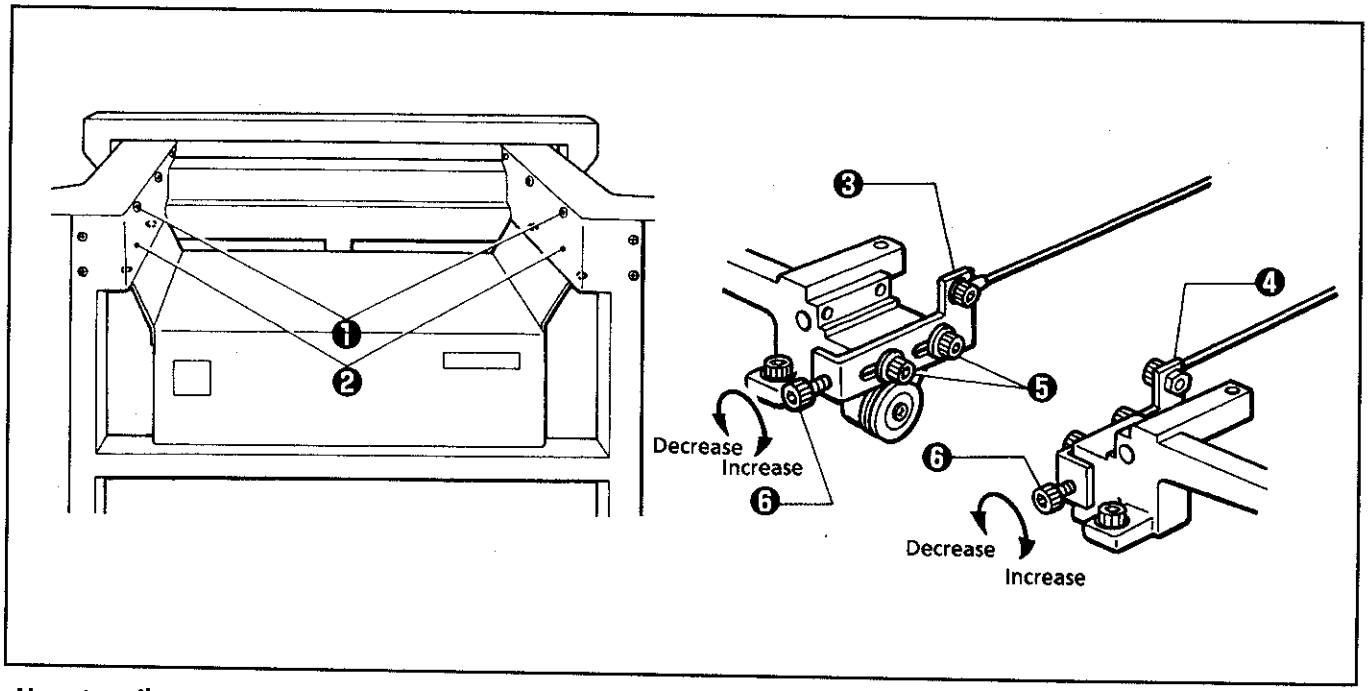
How to adjust

1. Remove the seven screws ❶ and the two covers (LR, LL) ❷.
2. Loosen the two bolts ❺ of both hook (LX) ❸ and hook (RX) ❹.
3. There are two bolts ❻ on the right and the left sides. Turning them clockwise will increase the tension and turning them counterclockwise will decrease the tension.
4. When the tension is proper, tighten bolts ❺.
5. Firmly retighten bolt ❺ so there is no looseness.

4-9-2. Y-feed wire



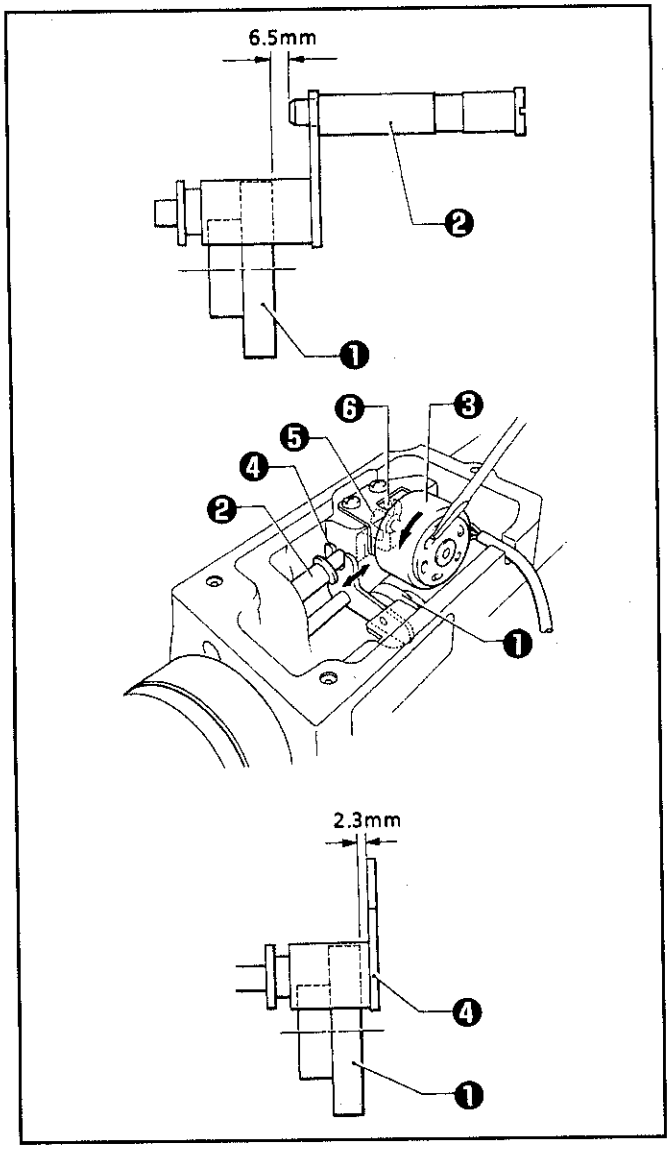
At points on the right and left wires where a line extended from the carriage intersects (see the arrow-marked points in diagram), adjust the deflection to approximately 8 mm, using a 1.5 kg torque wrench or a similar tool.



How to adjust

1. Remove the seven screws ❶ and the two covers (LR, LL) ❷.
2. Loosen the two bolts ❺ of both hook (LY) ❸ and hook (RY) ❹.
3. There are two bolts ❻ on the right and the left sides. Turning them clockwise will increase the tension and turning them counterclockwise will decrease the tension.
4. When the tension is proper, tighten bolts ❺.
5. Firmly retighten bolt ❺ so there is no looseness.

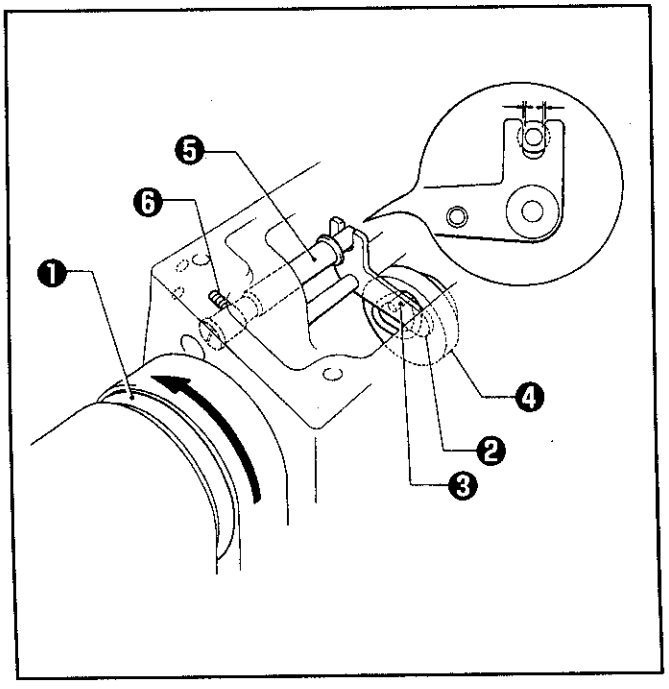
4-10. Adjusting the thread trimmer cam



1. The clearance between the edge of the thread trimmer cam ❶ and the edge of the positioning shaft ❷ is 6.5 mm.

2. While pressing the rotating part of the thread trimmer solenoid ❸ toward the solenoid using a screwdriver, turn the former to set it at the end of the stroke. Loosen the screw ❻ of the solenoid lever ❺, and move the thread trimmer driving lever ❹ back and forth to adjust the clearance from the end of the thread trimmer cam ❶ to the end of the thread trimmer driving lever ❹ to 2.3 mm.

3. Securely tighten the screw ❻ of the solenoid lever ❺.

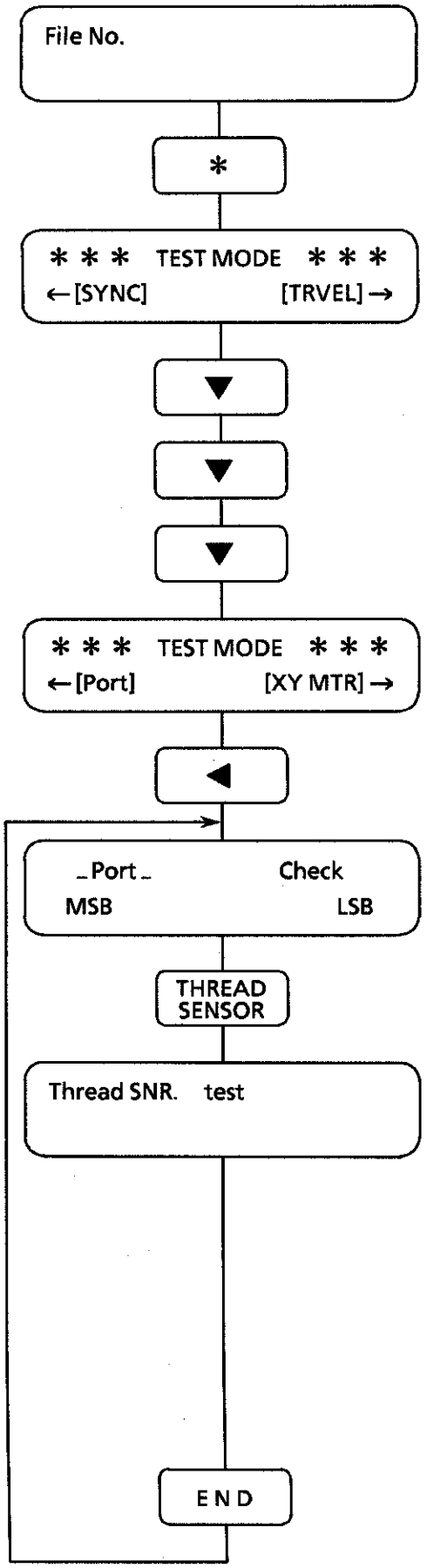


4-10-1. Adjusting the positioning shaft

Turn the pulley ❶ manually until the roller ❸ of the thread trimmer driving lever ❷ is inserted into the groove of the thread trimmer cam ❹ to trim the thread. Loosen the set screw ❻ in the side of the machine head, adjust the positioning shaft ❺ by turning it using a screwdriver so that the groove of the thread trimmer driving lever ❷ is easily inserted into the positioning shaft ❺.

NOTE: The positioning shaft is eccentric. Adjust the positioning shaft so that it is positioned above the groove of the thread trimmer driving lever.

4-11. Adjusting the thread sensor (BAS-401)



1. Turn on the power.
   The main menu will appear.

2. Press the <*> key.

   · The test mode screen will appear.

3. Press the <▼> key three times.

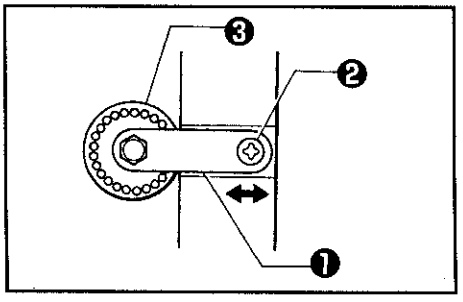
   · The test mode menu [Port] [XY MTR] will appear.

4. Press the <◀> key.

   · The test mode menu Port check will appear.

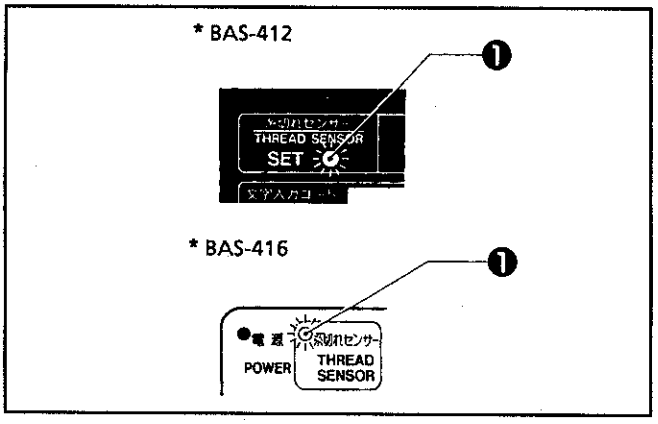
5. Press the <THREAD SENSOR> key.

6. Loosen the screw ❷ of the thread breakage sensor plate ❶. Turn pulley A ❸ manually, and move the thread breakage sensor plate ❶ in the direction of the arrow to adjust its position so that the buzzer will beep.

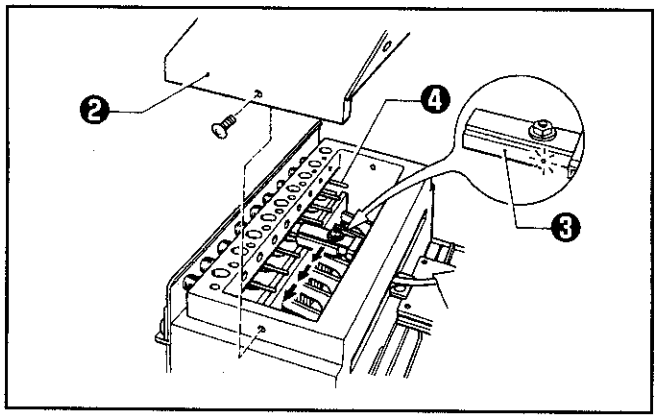


7. Press the <END> key to return to the port selection menu.

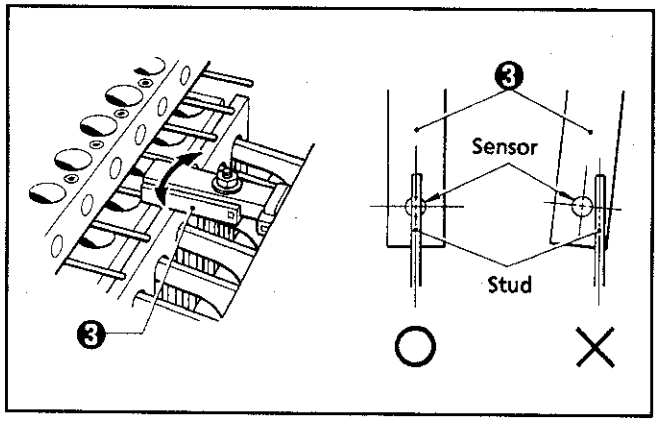
(BAS-412 · 416)



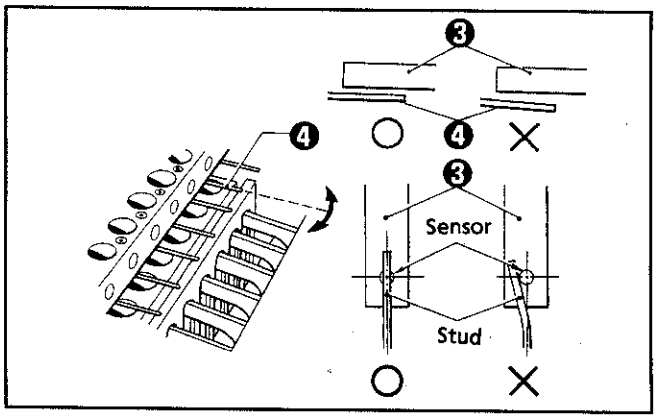
1. Make sure that the thread sensor LED ❶ is lit.



2. Remove the adjustment base ❷, and make sure that the proximity sensor ❸ LED lights at each needle bar position.
The LED will be lit when the spring is returned to its position, and it will be turned off when the spring moves.

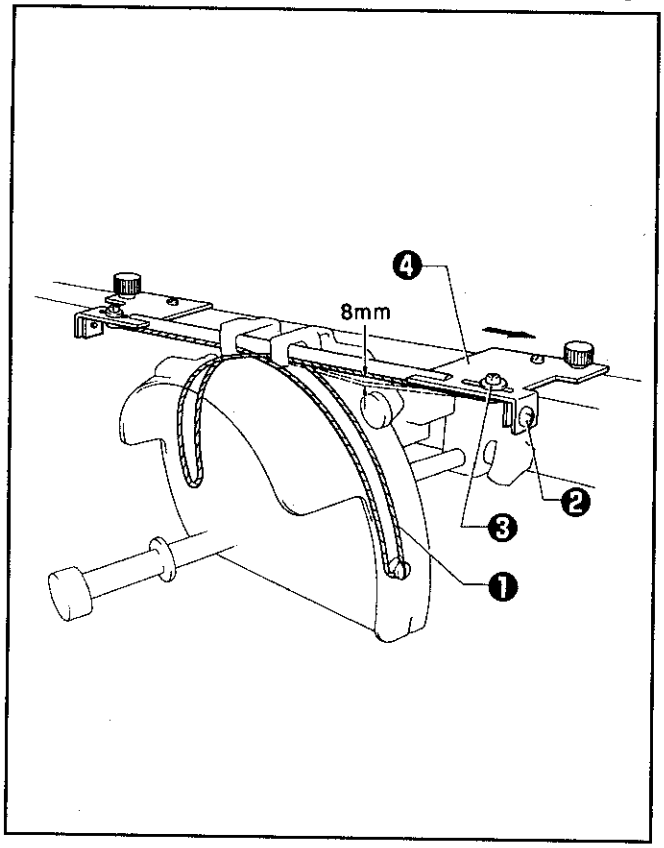


3. If the LED of the proximity sensor ❸ is not lit at each needle bar position, adjust the position of the proximity sensor ❸.



4. If the LED of the sensor ❸ does not light at a specific needle bar, adjust the spring ❹ by gently bending it using a pair of pliers.
NOTE: Do not bend too far; the spring ❹ may break.

4-12. Adjusting the wire of the cap frame device

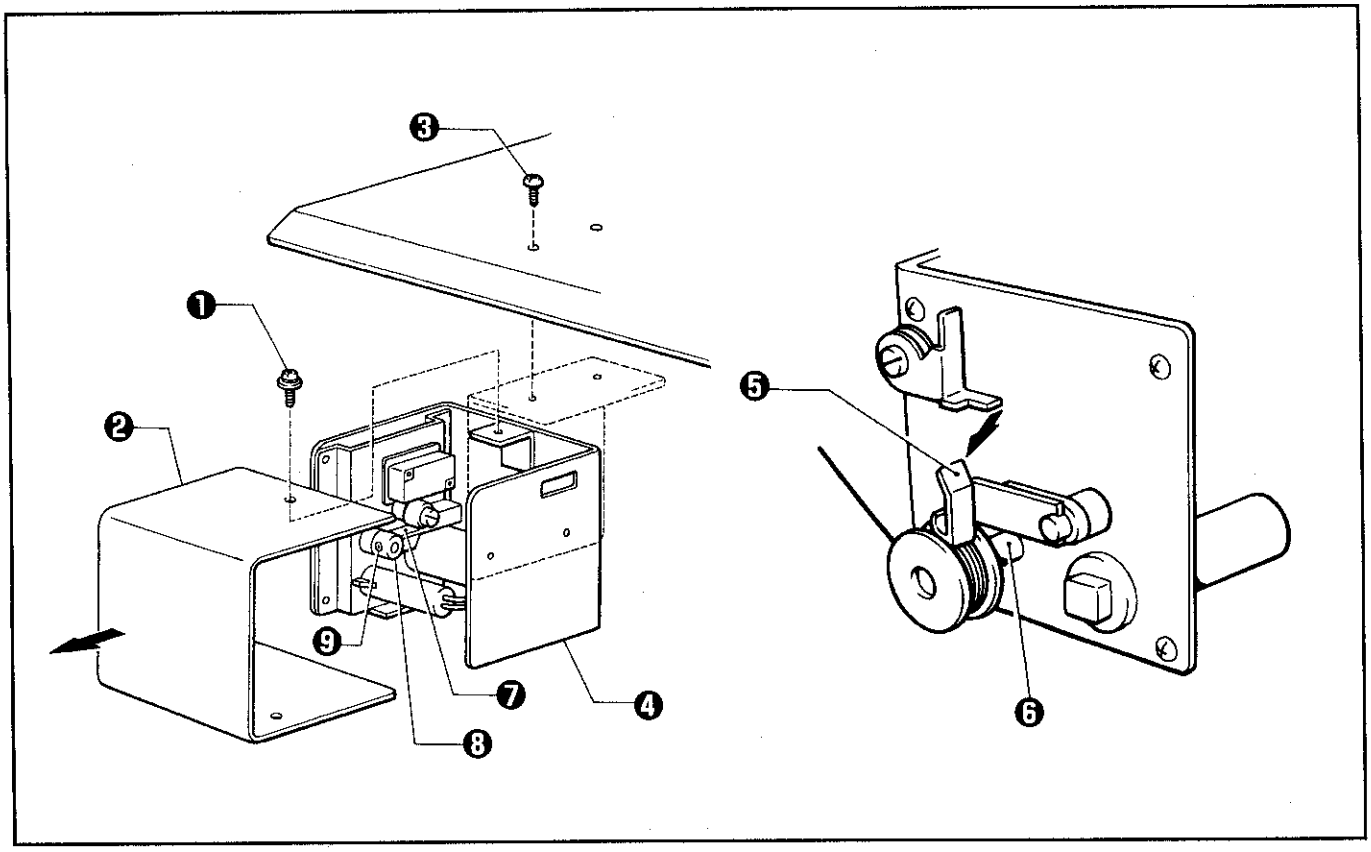


1. Loosen the screw ❸, and adjust the wire tension by tightening the screws ❷ so that the wire is equally pulled at each end. After adjustment, tighten the screw ❸.

2. Shift the wire base ❹ to one side. Adjust the wire tension by tightening the screws so that the slack will be 8 mm with a load of 1.5 - 2.5 kgf applied to the middle of the wire ❶.

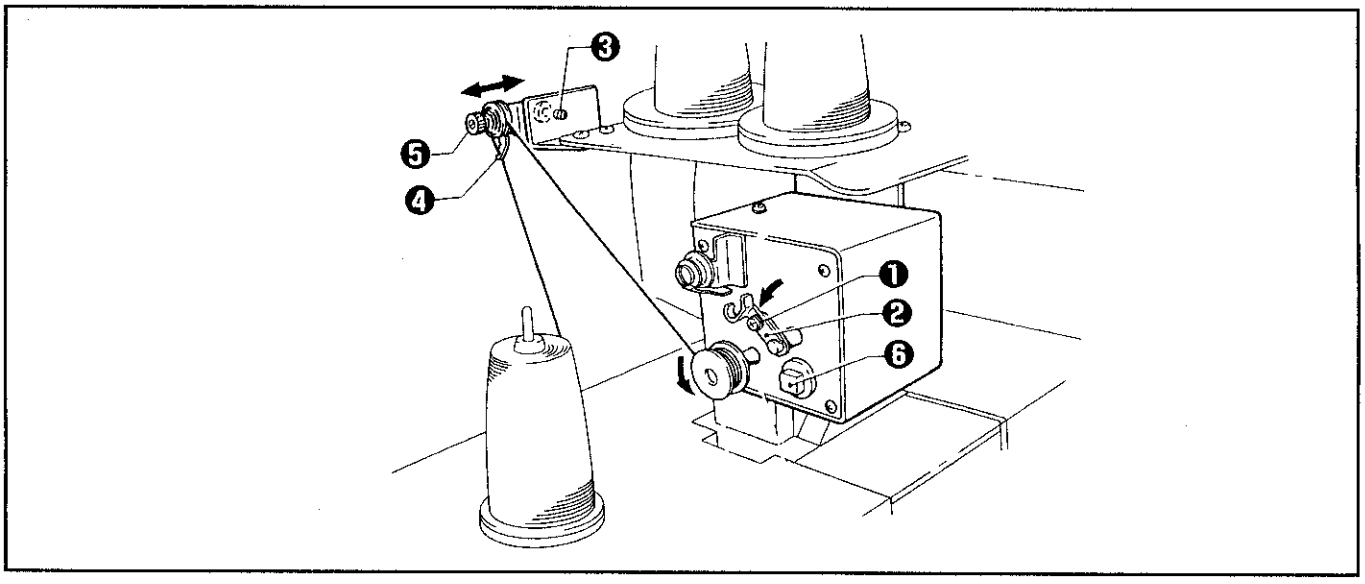
4-13. Adjusting the bobbin winder

4-13-1. Positioning the bobbin winder claw



1. Remove the three screws ❶, and the bobbin winder cover ❷.
   Remove the two screws ❸, and the bobbin winder assembly ❹.
2. Move the bobbin presser ❺ toward the bobbin winder shaft ❻ just before it reaches the position where thread winding ends.
3. Tighten the two screws ❾ so that the plate spring ❼ is at the stepped section of the bobbin winder claw ❽.

4-13-2. Positioning the bobbin presser



Loosen the screw ❶, and adjust the bobbin presser ❷ by moving it so that the proper amount of thread can be wound on the bobbin.

NOTE 1: If the thread is not wound evenly on the bobbin, loosen the screw ❸ and move the thread guide ❹ right and left. When winding more thread on the bobbin, loosen the screw ❶, then move the bobbin presser ❷.

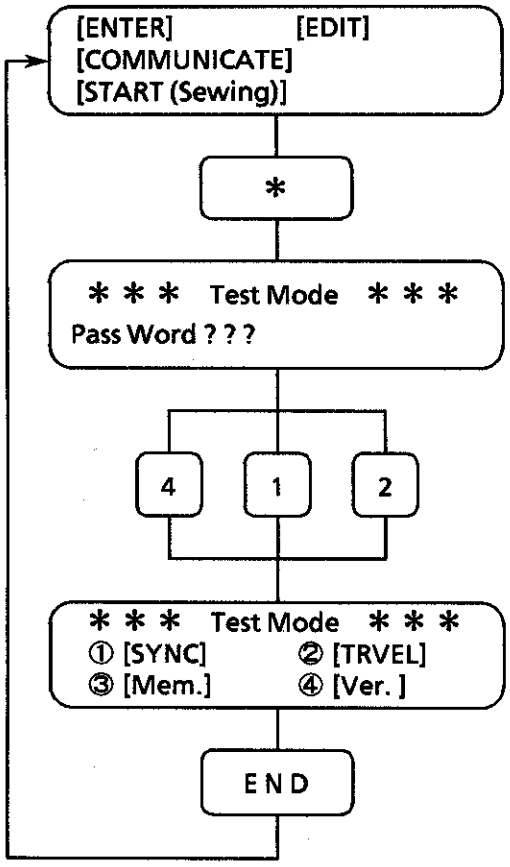
NOTE 2: If the thread comes out from the thread guide ❹, loosen the knob ❺. If the thread is wound too loose, tighten the knob ❺.

NOTE 3: The thread winder motor does not operate if the circuit protector activated.
In that case, leave the protector until it's cooled off. Then, press the protector switch ❻.
If the protector is not cooled off, the switch does not work.

5. TEST MODE

[BAS-412]

5-1. Starting the test mode



1. Turn on the power.
   The main menu will appear.

2. Press the <*> key in the main menu.

   The test mode screen will appear.

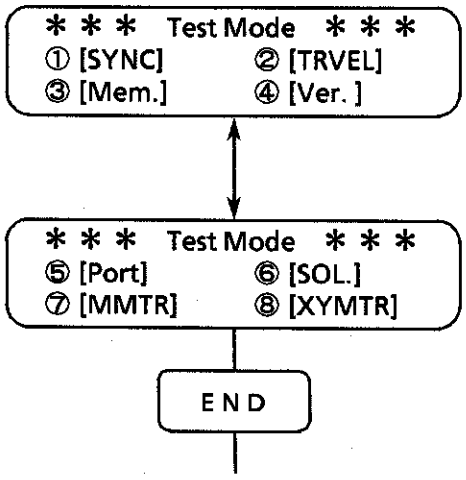
3. Press the <4>, <1>, and <2> keys.

   The first test mode menu will appear.

4. Press the <END> key to return to the main menu.

NOTE: If you press an incorrect key, the machine will beep to inform you.

5-2. Selecting the test mode menu



The first test mode menu will appear.

The test mode menu will change each time the < ⬇ > < ⬆ > key is pressed.

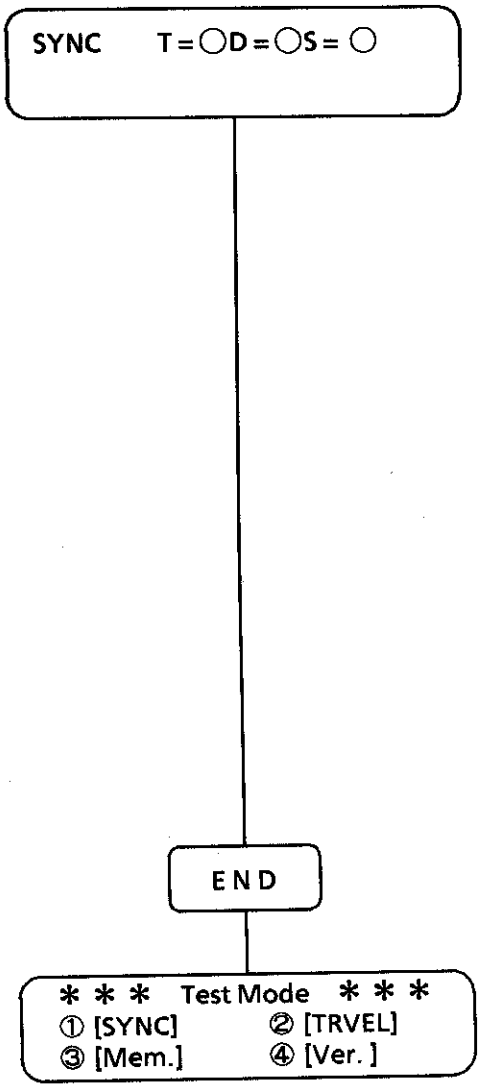
The second test mode menu will appear.

NOTE: You cannot select ⑧ [XYMTR].
Press the <END> key to return to the main menu.
Press a number key (from 1 to 7) to enter each test mode.

5-3. Explanations of test mode functions

5-3-1. Sync. (synchronize) function

This is used to adjust the angles of rotary encoder and stop position sensor which are set for the machine pulley.



- Turn the pulley.
  ON/OFF indications for rotary encoder and stop position sensor will appear on the display. Angles of encoder and sensor can be adjusted while checking signal conditions on the display.
  (You learn of the signal condition from the buzzer sound and mending LED.)

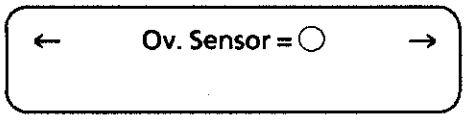
Symbol	Signal	Mark	
		○	●
T=	Timing pulse	OFF	ON
D=	Synchronize signal	OFF	ON
S=	Stop position signal	OFF	ON

- The buzzer will beep while the stop position signal is set to ON (the dog shields the sensor). Also, it will continue while the synchronize signal is set to ON.

Press the <END> key to return to the test mode menu.

5-3-2. Travel function

· This is used to adjust the positions of the overtravel sensors which are set on the XY drive, and the positions of the flat hoop stoppers.



· Press the <⬅> or <➡> key.
The hoop will be moved for the predetermined amount from the home position in order to shield the cap frame overtravel sensor.

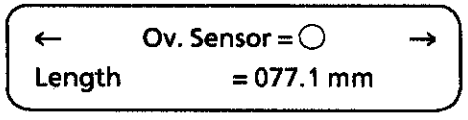
Sensors allocated to the following keys

Key	Cap frame overtravel sensor	Standard cap frame travel distance	Wide cap frame travel distance
⬅	+X limit	77.1 mm	182.1 mm
➡	-X limit	77.1 mm	182.1 mm

· Press the <⬆> or <⬇> key.
The hoop will be moved for the predetermined amount from the home position in order to hit the flat hoop stopers. This function is only available in flat mode. The sensor signal does not change. (○ always appears.)

Flat hoop stoppers allocated to the following keys

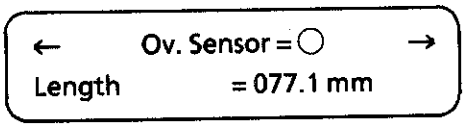
Key	Flat hoop stopper	Predetermined travel distace	
⬆	+Y limit	197.5 mm	Where the carriage hits right and left stoppers on the rear
⬇	-Y limit	105.5 mm	Where there is an approx. 1 mm clearance between the carriage and stoppers at the front



· Press the <⬅> or <➡> key.
The hoop will be moved, and the display on the left will appear (in the standard cap mode).

· If the sensor is shielded after the hoop is moved, the white circle indicating the position of the sensor which is selected to be adjusted will change to a black circle.

· When either the <⬅>, <➡>, <⬆> or <⬇> key is pressed, the hoop will be moved in the direction of the pressed key in 0.1 mm increments, and the value for length on the display will change.



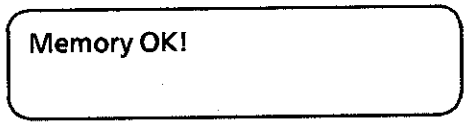
- Adjust the positions of sensor and dog so that the white circle is changed to a black circle at the specified position.
- Press the <END> key.
  The hoop will be moved to the home position, and the initial menu will appear.
  When the <END> key is pressed again, the hoop will be moved to the home position, and the test mode menu will appear.

5-3-3. Memory function

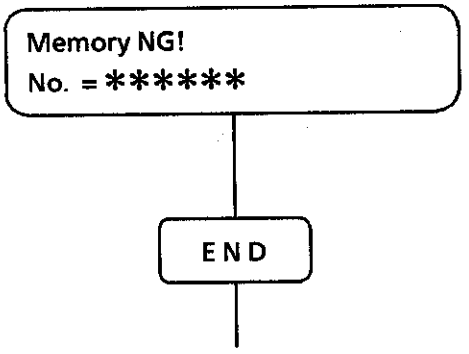
- This is used to check static RAM chips (No. 1-6) on the memory expansion board.
  The sewing data registered in the memory will be deleted.

As soon as this function is selected, checking will start, and the display on the left will appear.

Checking results



[When all static RAM chips (No. 1-6) are normal]

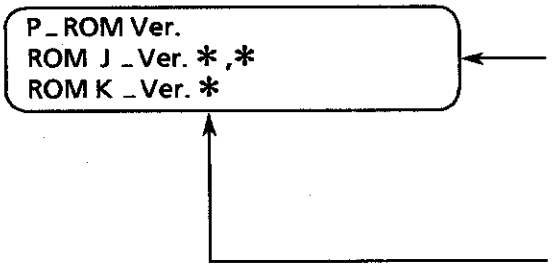


[When no chip is not normal]
Number for static RAM for which something is wrong will be indicated at the *** position.
If the memory expansion board is not mounted, "Memory NG!" will appear during checking but this is not error.

Press the <END> key to return to the test mode menu.

5-3-4. Ver. (version) function

- This is used to display versions for PROM on the main circuit board and the CPU of the keyboard circuit board.



ROM_MN1 version on main circuit board
ROM_MN2 version on main circuit board
J stands for P-ROM for domestic use (Japanese)
E stands for P-ROM for use overseas (English)

ROM version on keyboard circuit board

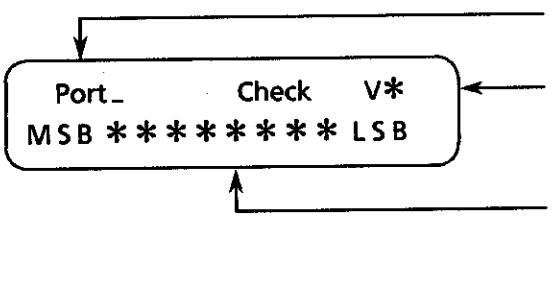
Press the <END> key to return to the test mode menu.

5-3-5. Port function

- Settings of switch and sensor signals are indicated with respect to the level of input port terminal on the IO circuit board.
  This is used to display settings of DIP switches on main circuit board and keyboard circuit board, and speed level.
- Results of checking RS232C interface on the main circuit board will appear.

Checking switches and sensors
Press the key allocated the port you want to check.

Key	Port name	Details
1	S_PORTA	Input signal level for port 1A on IO circuit board
2	S_PORTB	Input signal level for port 1B on IO circuit board
3	S_PORTC	Input signal level for port 1G on IO circuit board
4	M_PORTS	Input signal level for port 2A on IO circuit board
Thread sensor		Setting of DIP switch on keyboard circuit board, speed level
COMMUNICATION		RS232C port check



Each time the sensor or switch setting is changed (shield or release sensor, or turn switch on or off), the corresponding bit number will alternate between 1 and 0 along with a beep.

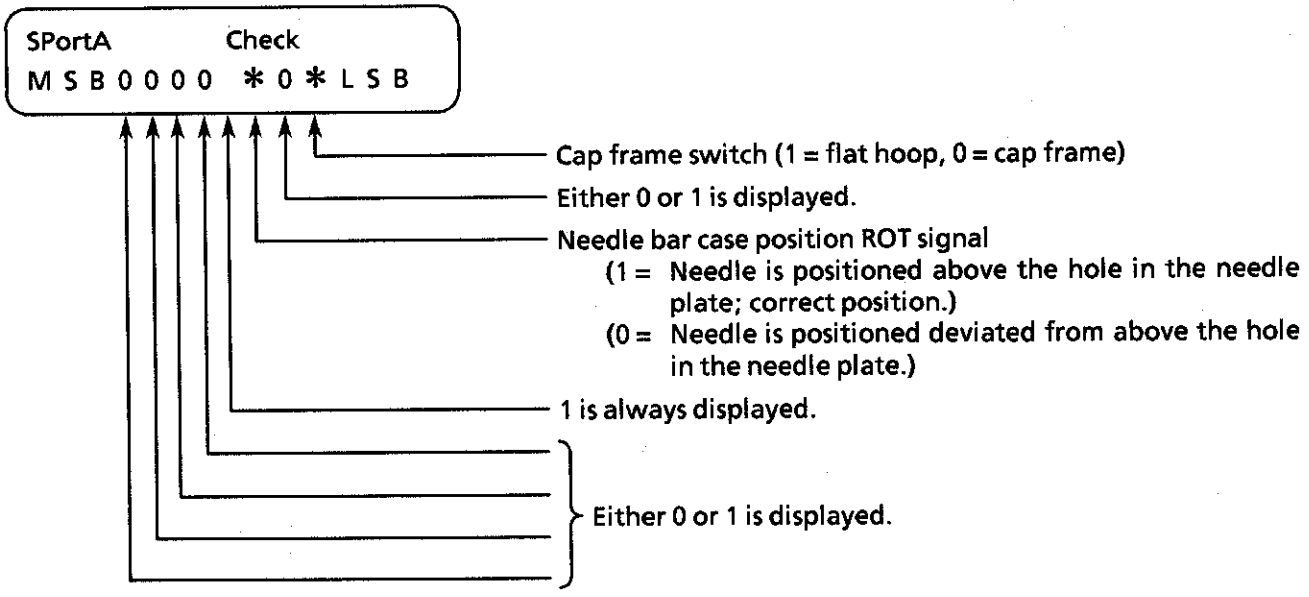
Press the <END> key to return to the port selection menu.

Press the <END> key to return to the test mode menu.

① Checking SPORTA

This is used to check the following:

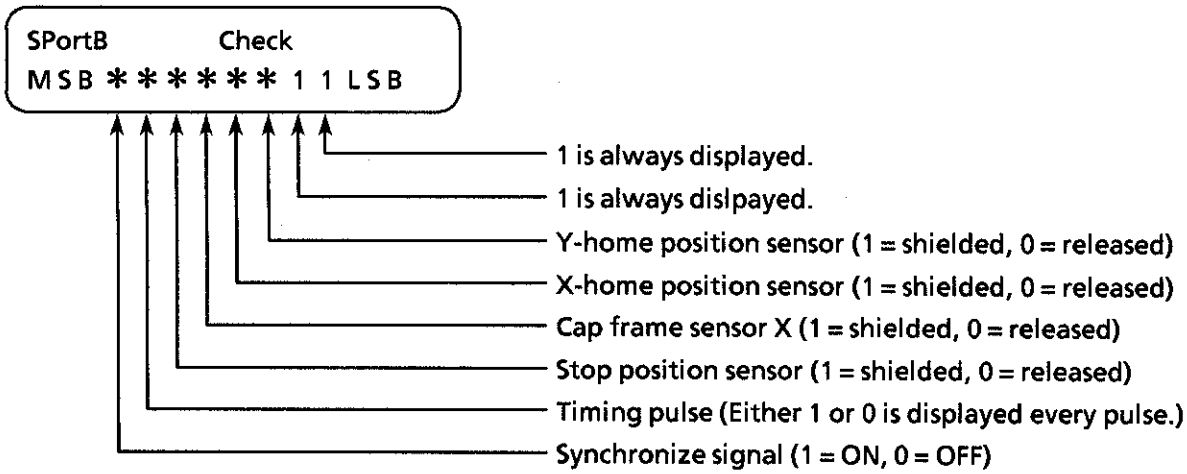
- Needle bar case position signal ROT
- Cap frame switch



② Checking SPORTB

This is used to check the following:

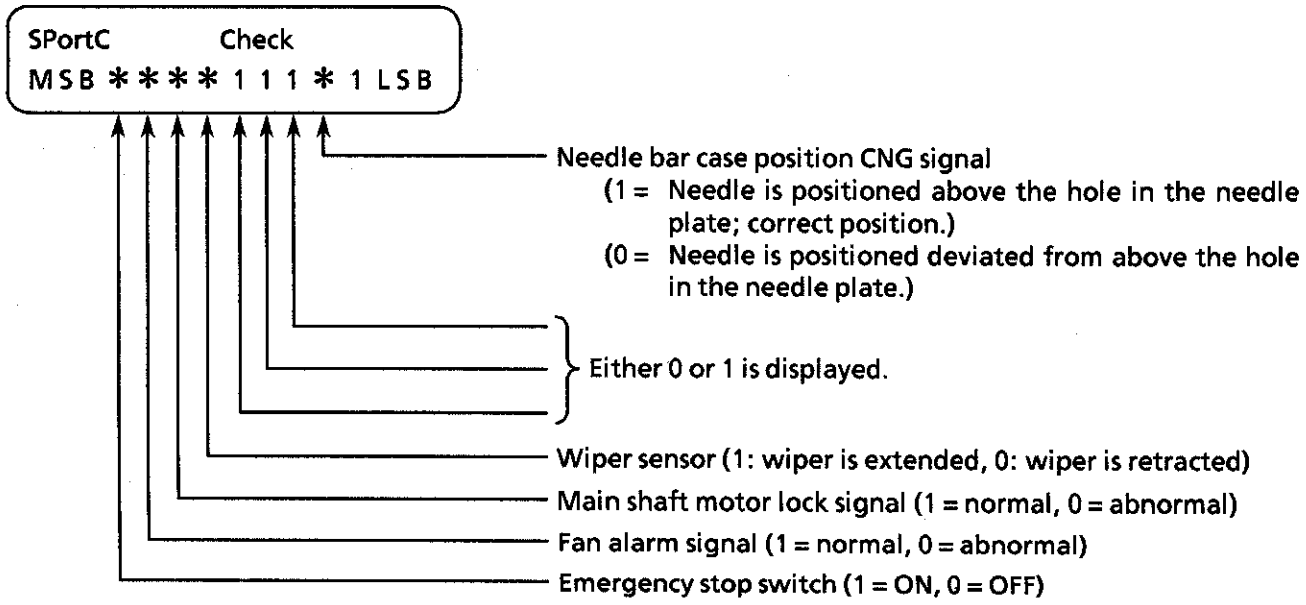
- X- and Y-home position sensors
- Overtravel sensors for cap frame
- Rotary encoder and stop position sensor



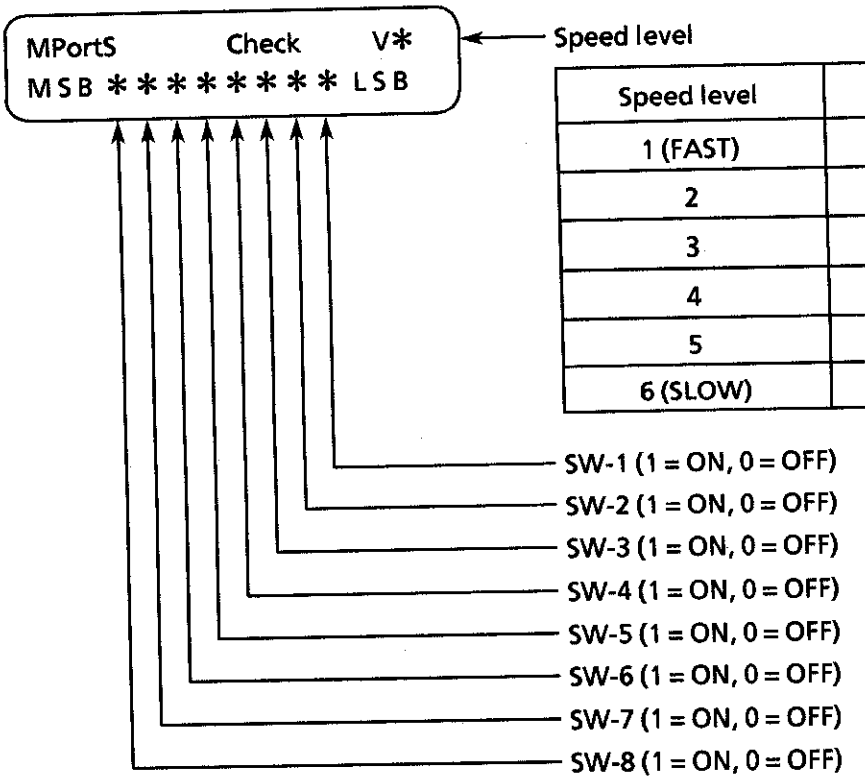
③ Checking SPORTC

This is used to check the following:

- Needle bar case position CNG signal
- Fan alarm signal
- Wiper sensor
- Motor lock signal on machine motor circuit board
- Emergency stop switch

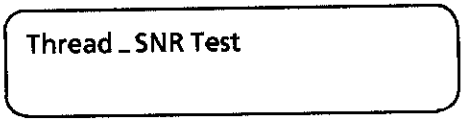


④ Checking MPORTS
This is used to check the DIP switch on the main circuit board and the speed level.



Speed level	Number to be displayed
1 (FAST)	0
2	1
3	2
4	3
5	4
6 (SLOW)	5

⑤ Checking the needle thread sensor signal
This is used to check the needle thread sensor signal.

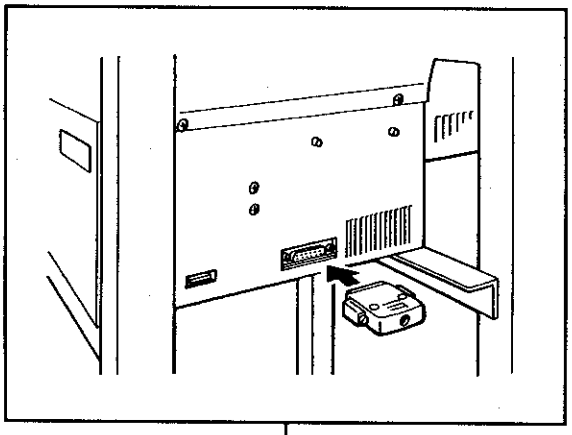


Move the spring up and down to confirm that the buzzer beeps twice.

Press the <END> key to return to the port selection menu.

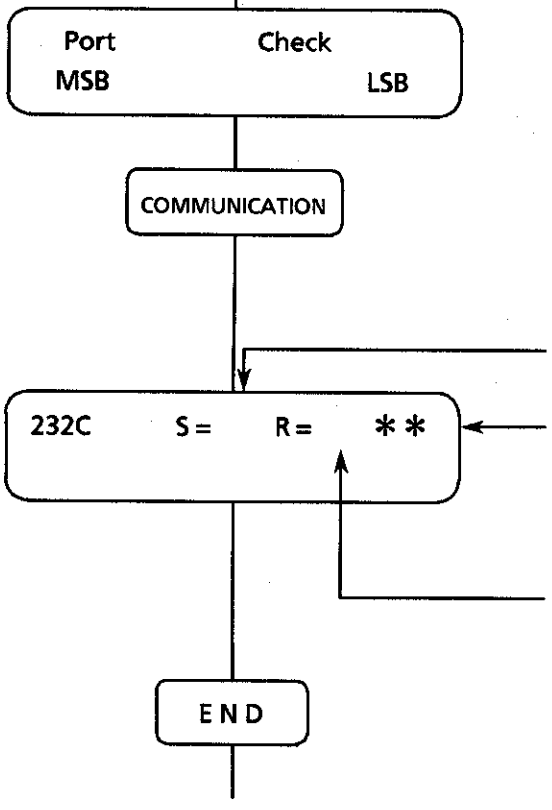
⑥ Checking the RS232C port

· Numbers 1, 2, 4, and 8 of the ASCII are sent from the sending port of the RS232C and received at the receiving port of the RS232C to check that all of them match at both ports. (Loopback check)



1. Attach the connector for checking to the main circuit board.

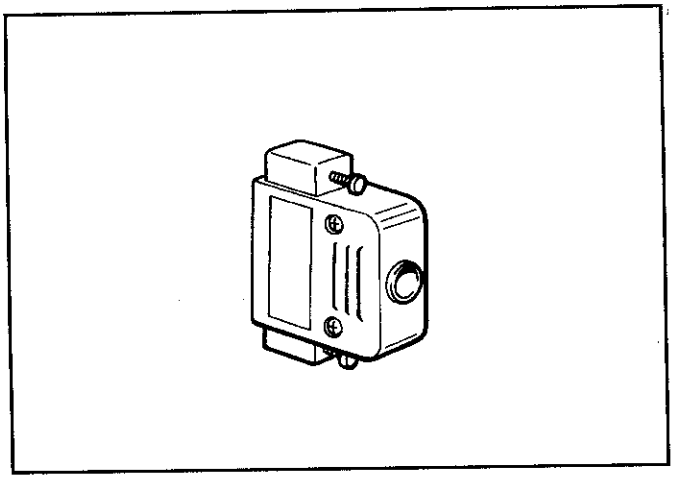
NOTE: If the connector for checking is not attached, the check program may not work correctly.



2. Press the <COMMUNICATION> key.
Checking will start and the display below will appear.

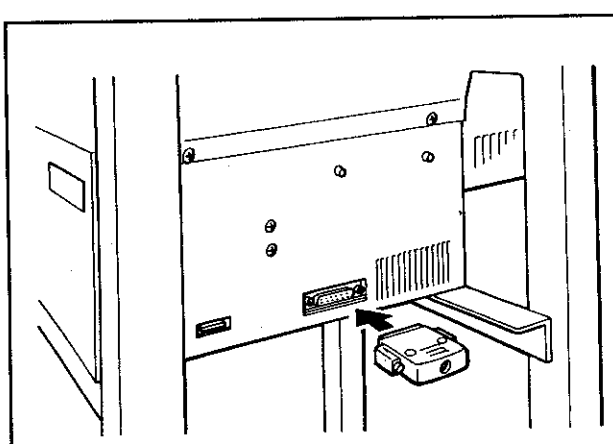
3. Press the <END> key to return to the port selection menu.

⑦ Connectors for checking RS232C port



1. As for RS232C connector (serial), use the left type;

   D-sub 25 pin connector (male)
   Any maker's product is applicable.



Connector for RS232C check
Pins No.2 and 3
Pins No.4, 5, and 6

2. Connection (Attach pins whose number are specified only. Leave others unattached.)

5-3-6. SOL. (solenoid) function

・This is used to check each solenoid operation.

① F_UP	② F_DOWN
③ Trim	④ Wiper
⑤ Ricker	⑥ Jump

Operation

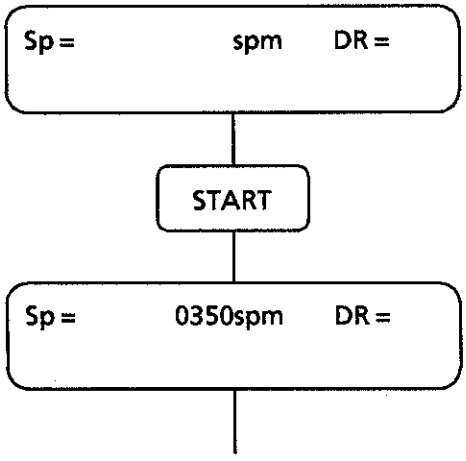
Press appropriate numerical key (from 1 to 6) to check desired solenoid.

Key	Function
1	Raises presser foot. (If it is already raised, this function is not activated.)
2	Lowers presser foot. (If it is already lowered, this function is not activated.)
3	Sets thread trimmer solenoid to ON for 2 seconds, then turns off.
4	Sets wiper solenoid to ON for 2 seconds, then turns off.
5	Sets picker solenoid to ON for 2 seconds, then turns off.
6	Sets jump solenoid to ON for 2 seconds, then turns off.

Press the <END> key to return to the test mode menu.

5-3-7. M mot. (motor) function

· This is used to specify the rotation speed of machine motor.



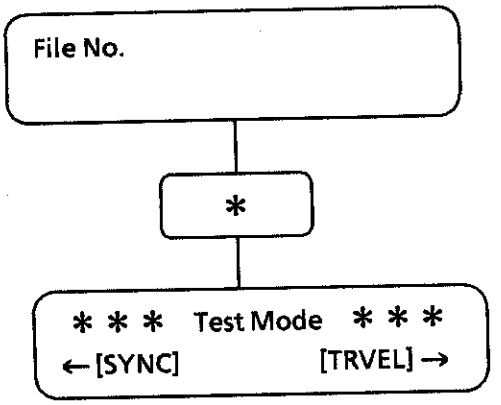
Press the <START> key.
The main shaft will rotate at 350 spm.

Press either of the following keys to change the rotation speed.

Key	Function
⬆	Increases rotation speed to the next preset one
⬇	Decreases rotation speed to the next preset one
AC	Stops rotation of machine motor.
C	Stops rotation of machine motor.

Press the <END> key after the machine motor is completely stopped.
The test mode menu will appear.

5-4. Starting the test mode

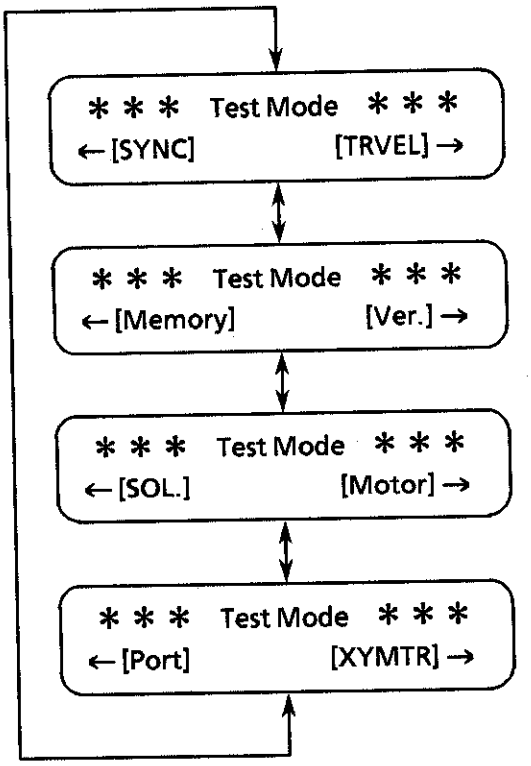


1. Turn on the power.
   The main menu will appear.

2. Press <*> key.

   The test mode screen will appear.

5-5. Selecting the test mode menu



3. The test mode menu will change by pressing the < ⬇ > or < ⬆ > key.

   The first test mode menu will appear.

   The second test mode memu will appear.

   The third test mode menu will appear.

   The fourth test mode menu will appear.

4. Press a <⬅> < ➡> key to enter each test mode.

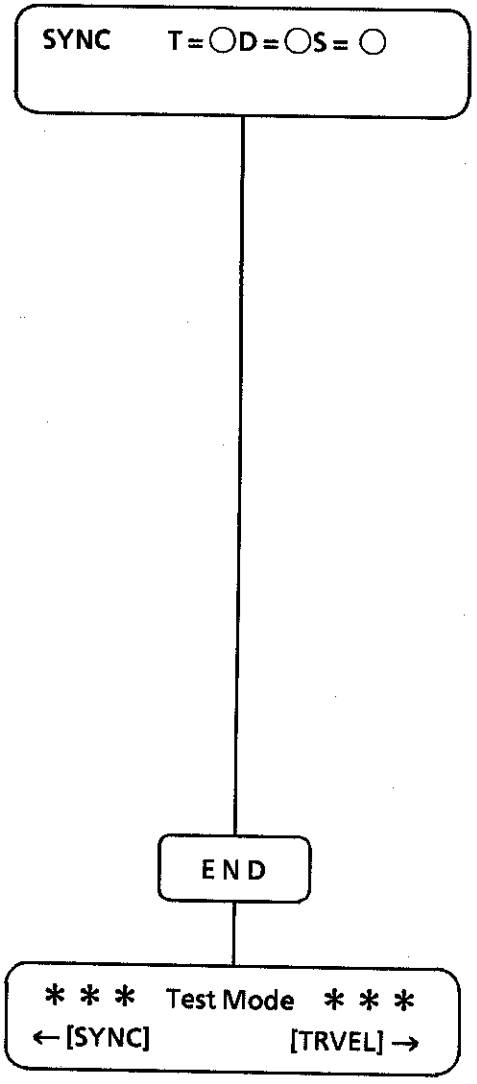
5. Press the <END> key to return to the main menu.

NOTE: You cannot use the fourth test mode [XY mot.].

5-6. Explanations of test mode functions

5-6-1. Sync. (synchronize) function

This is used to adjust the angles of rotary encoder and stop position sensor which are set for the machine pulley.



- Turn the pulley.
  ON/OFF indications for rotary encoder and stop position sensor will appear on the display. Angles of encoder and sensor can be adjusted while checking signal conditions on the display.
  (You learn of the signal condition from the buzzer sound and mending LED.)

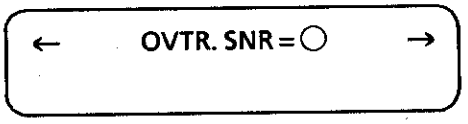
Symbol	Signal	Mark	
		○	●
T=	Timing pulse	OFF	ON
D=	Synchronize signal	OFF	ON
S=	Stop position signal	OFF	ON

- The buzzer will beep while the stop position signal is set to ON (the dog shields the sensor). Also, it will continue while the synchronize signal is set to ON.

Press the <END> key to return to the test mode menu.

5-6-2. Travel function

- This is used to adjust the positions of the overtravel sensors which are set on the XY drive, and the positions of the flat hoop stoppers.



- Press the <◀> or <▶> key.
  The hoop will be moved for the predetermined amount from the home position in order to shield the cap frame overtravel sensor.

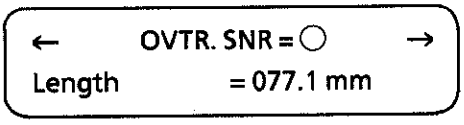
Selection keys and adjusted sensors

Selection key	Cap frame over-travel sensor	Standard cap frame fixed movement amount	Wide cap frame fixed movement amount
◀	+ X limit	77.1 mm	182.1 mm
▶	- X limit	77.1 mm	182.1 mm

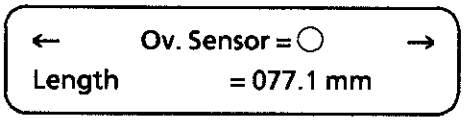
- Press the <▲> or <▼> key.
  The hoop will be moved for the predetermined amount from the home position in order to hit the flat hoop stopers. This function is only available in flat mode. The sensor signal does not change. (○ always appears.)

* Flat hoop stoppers allocated to the following keys

Selection key	Stopper	Fixed movement amount	
▲	+ Y limit	197.5 mm	Where the carriage hits right and left stoppers on the rear
▼	- Y limit	105.5 mm	Where there is an approx. 1 mm clearance between the carriage and stoppers at the front



- Press the <◀> or <▶> key.
  The hoop will be moved, and the display on the left will appear (in the standard cap mode).
- If the sensor is shielded after the hoop is moved, the white circle indicating the position of the sensor which is selected to be adjusted will change to a black circle.
- When either the <◀>, <▶>, <▲> or <▼> key is pressed, the hoop will be moved in the direction of the pressed key in 0.1 mm increments, and the value for length on the display will change.



Adjust the positions of sensor and dog so that the white circle is changed to a black circle at the specified position.

Press the <END> key.
The hoop will be moved to the home position, and the initial menu will appear.

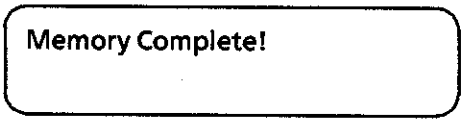
When the <END> key is pressed again, the hoop will be moved to the home position, and the test mode menu will appear.

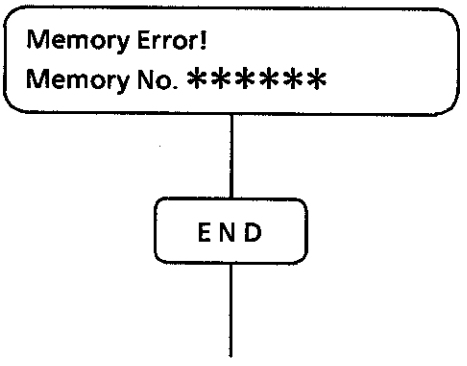
5-6-3. Memory function

- This is used to check static RAM chips (No. 1-6) on the memory expansion board. The sewing data registered in the memory will be deleted.

As soon as this function is selected, checking will start, and the display on the left will appear.

Checking results
[When all static RAM chips (No. 1-6) are normal]



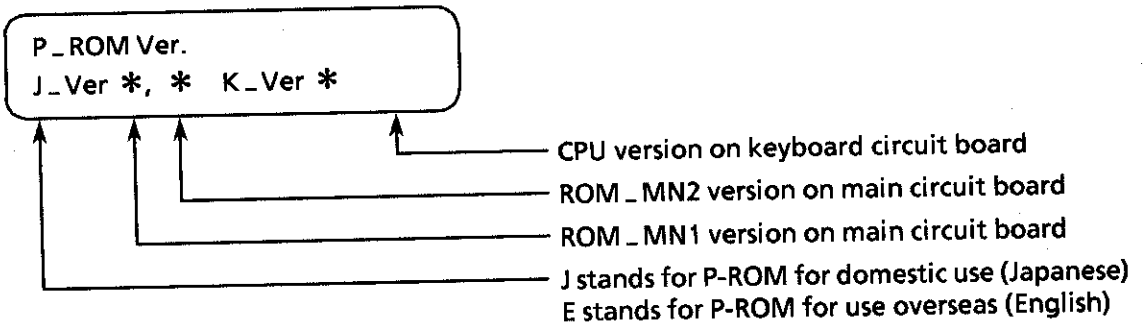


[When no chip is not normal]
Number for static RAM for which something is wrong will be indicated at the *** position.

Press the <END> key to return to the test mode menu.

5-6-4. Ver. (version) function

- This is used to display versions for PROM on the main circuit board and the CPU of the keyboard circuit board.



Press the <END> key to return to the test mode menu.

5-6-5. SOL. (solenoid) function

- This is used to check each solenoid operation.

Operation

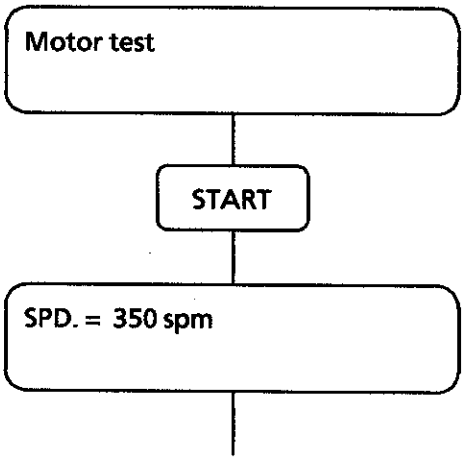
Press appropriate numerical key (from 1 to 6) to check desired solenoid.

Key	Function
Thread trimming	Sets thread trimmer solenoid on each to ON for 2 seconds, then turns off.
Hoop feed	Sets wiper solenoid on each to ON for 2 seconds, then turns off.
Needle set	Sets picker solenoid on each to ON for 2 seconds, then turns off.
Needle select	Sets jump solenoid on each to ON for 2 seconds, then turns off.
↑	Lifts presser foot on each. (Invalid when it is already raised.)
↓	Lowers presser foot on each machine head. (Invalid when it is already lowered.)

Press the <END> key to return to the test mode menu.

5-6-6. M mot. (motor) function

· This is used to specify the rotation speed of machine motor.



Press the <START> key.
The main shaft will rotate at 350 spm.

When changing rotation speed.
Press either of the following keys to change the rotation speed.

Key	Function
▲	Increases rotation speed to the next preset one
▼	Decreases rotation speed to the next preset one
AC	Stops rotation of machine motor.
C	Stops rotation of machine motor.

Press the <END> key after the machine motor is completely stopped.
The test mode menu will appear.

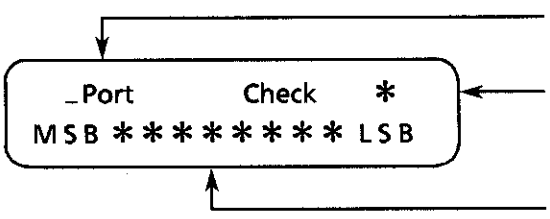
5-6-7. Port function

- Settings of switch and sensor signals are indicated with respect to the level of input port terminal on the IO circuit board.
- This is used to display settings of DIP switches on main circuit board and keyboard circuit board, and speed level.
- Results of checking RS232C interface on the main circuit board will appear.

Checking switches and sensors

- Press the key allocated the port you want to check.

Selection key	Port name	Details
Thread trimming	S_PORTA	Input signal level for portA on IO circuit board
Hoop feed	S_PORTB	Input signal level for portB on IO circuit board
Needle set	S_PORTC	Input signal level for portC on IO circuit board
Needle select	M_PORTSW	Setting of DIP switch on main circuit board
#	K_PORTSV	Setting of DIP switch on keyboard circuit board, speed level
Thread sensor		Thread sensor signal check
EDIT		RS232C port check



Port name

Speed level will appear when the <#> key is pressed.

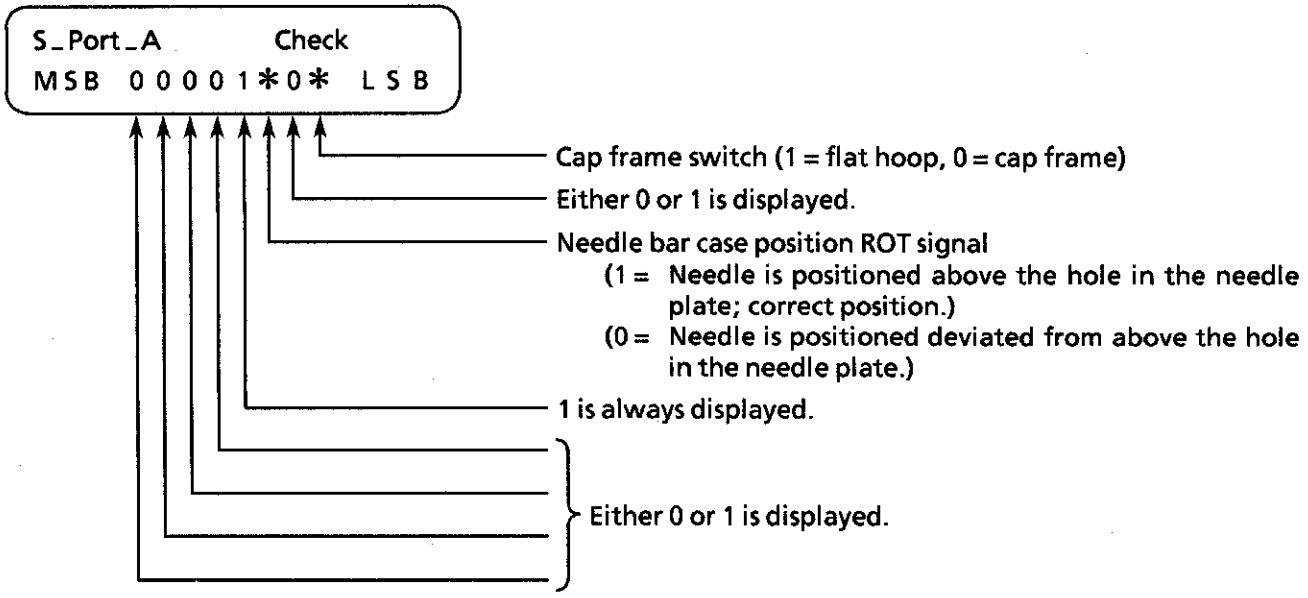
Input port level
1 = H level
0 = L level

Each time the sensor or switch setting is changed (shield or release sensor, or turn switch on or off), the corresponding bit number will alternate between 1 and 0 along with a beep.

Press the <END> key to return to the port selection menu.

Press the <END> key to return to the test mode menu.

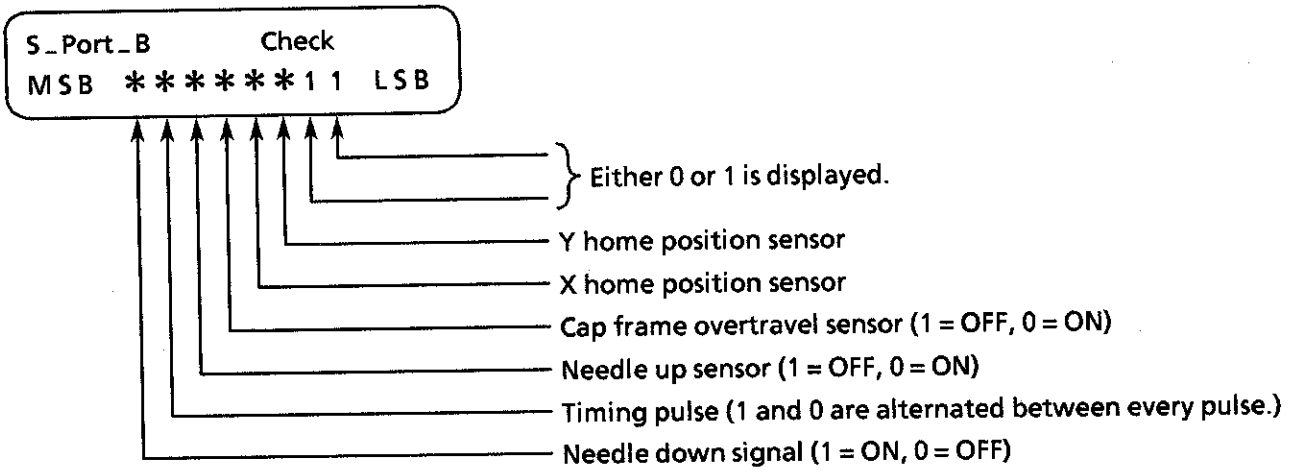
① Checking S_PORT_A
This is used to check the following:
- Needle bar case position signal ROT
- Cap frame switch.



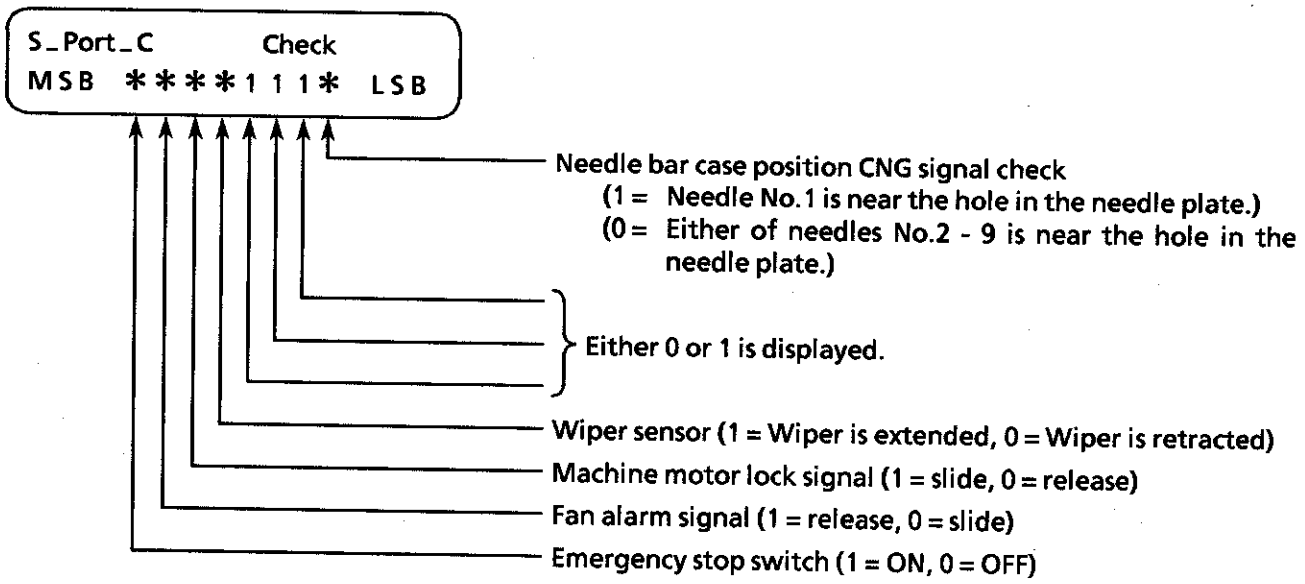
② Checking S_PORT_B

This is used to check the following:

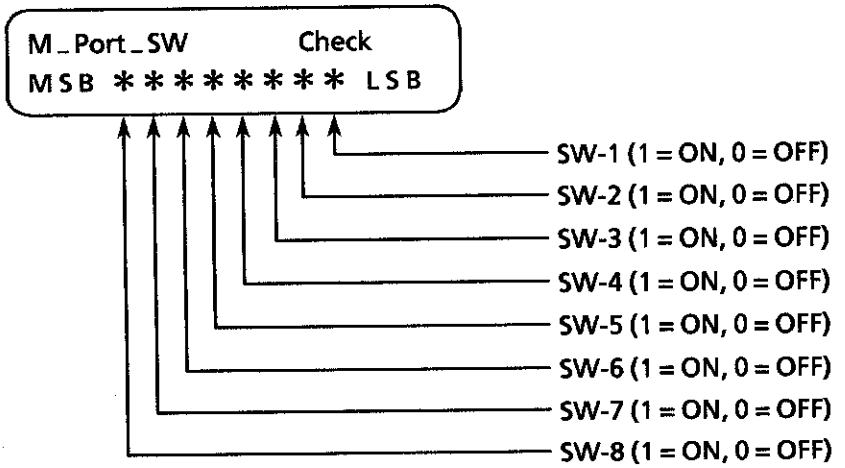
- X- and Y-home position sensors
- This is used to check overtravel sensors for cap frame
- Rotary encoder and stop position sensor



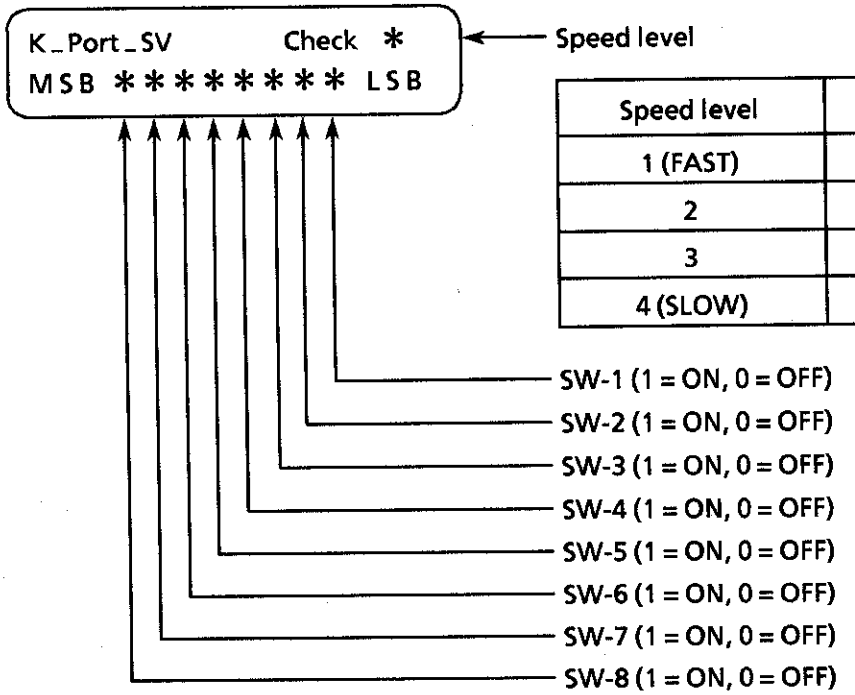
③ Checking S_PORT_C
This is used to check the following:
- Needle bar case position CNG signal
- Fan alarm signal
- Wiper sensor
- Motor lock signal on machine motor circuit board
- Emergency stop switch



④ Checking M_PORT_SW
Dip switches check on main circuit board.



⑤ Checking K_PORT_SV
This is used to display settings of DIP switches on keyboard circuit board and speed level.



Speed level	Number to be displayed
1 (FAST)	0
2	1
3	2
4 (SLOW)	3

⑥ Checking the needle thread sensor signal
This is used to check the needle thread sensor signal.

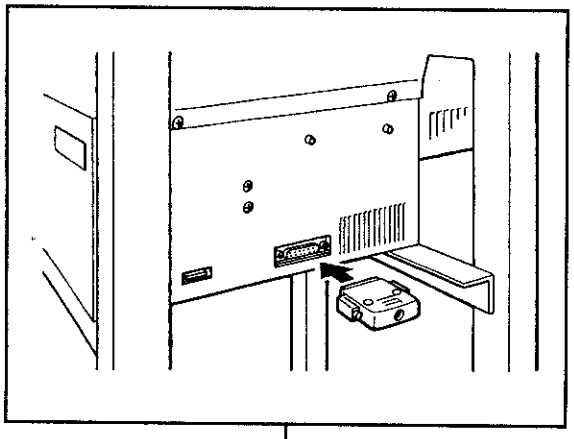
Thread SNR Test

* For the BAS-416
Move the spring up and down to confirm that the buzzer beeps twice.

* For the BAS-401
The buzzer will beep when the sensor pully rotates.

Press the <END> key to return to the port selection menu.

⑦ Checking RS232C port
· Numbers 1, 2, 4, and 8 of the ASCII are sent from the sending port of the RS232C and received at the receiving port of the RS232C to check that all of them match at both ports. (Loopback check)



1. Attach the connector for checking to the main circuit board.

NOTE: If the connector for checking is not attached, the check program may not work correctly.

_Port Check
MSB LSB

EDIT

2. Press the <EDI>›key.
Checking will start and the screen on the left will appear.

Send data will appear one after another.

RS232C S= R= **

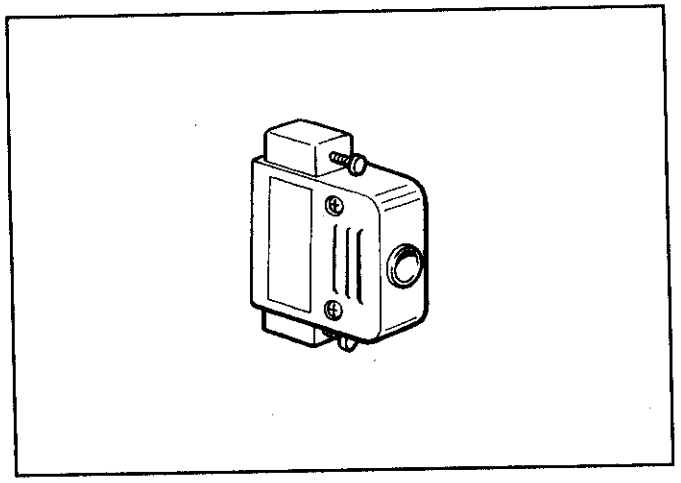
Checking result
OK: normal
NG: abnormal

Received data will appear sequentially.

END

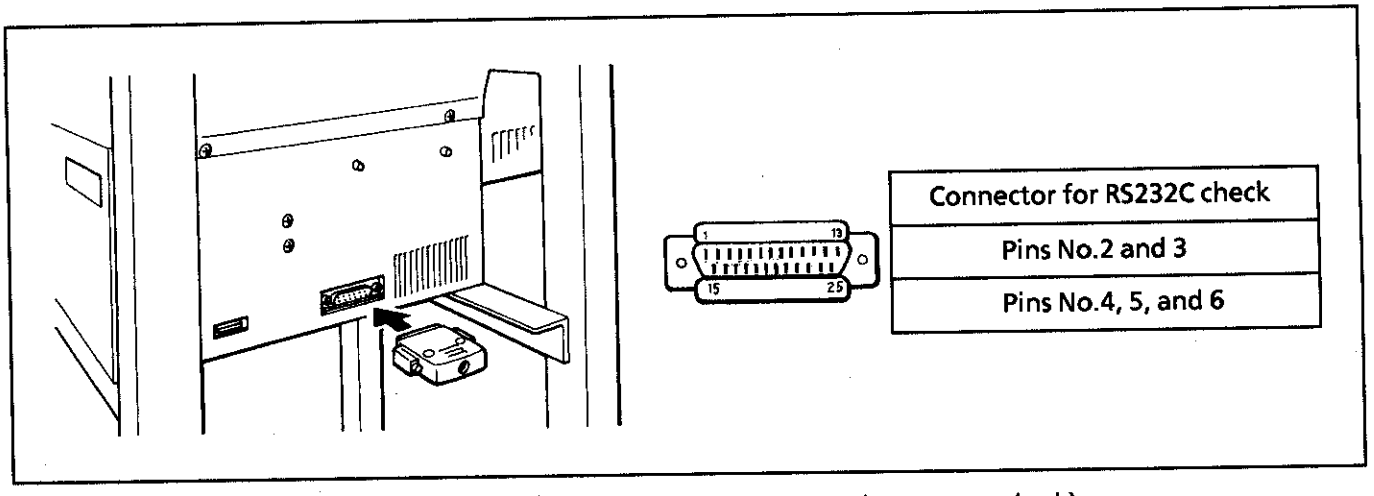
3. Press the <END> key to return to the port selection menu.

Connectors for checking RS232C port



As for RS232C connector (serial), use the left type;

D-sub 25 pin connector (male)
Any maker's product is applicable.



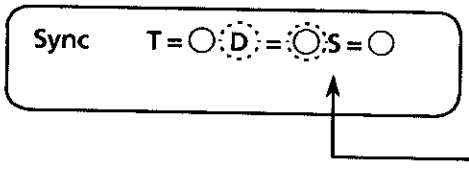
Connector for RS232C check
Pins No.2 and 3
Pins No.4, 5, and 6

Connection (Attach pins whose number are specified only. Leave others unattached.)

5-7. Adjusting the synchronizer (the rotary encoder and the stop position sensor)

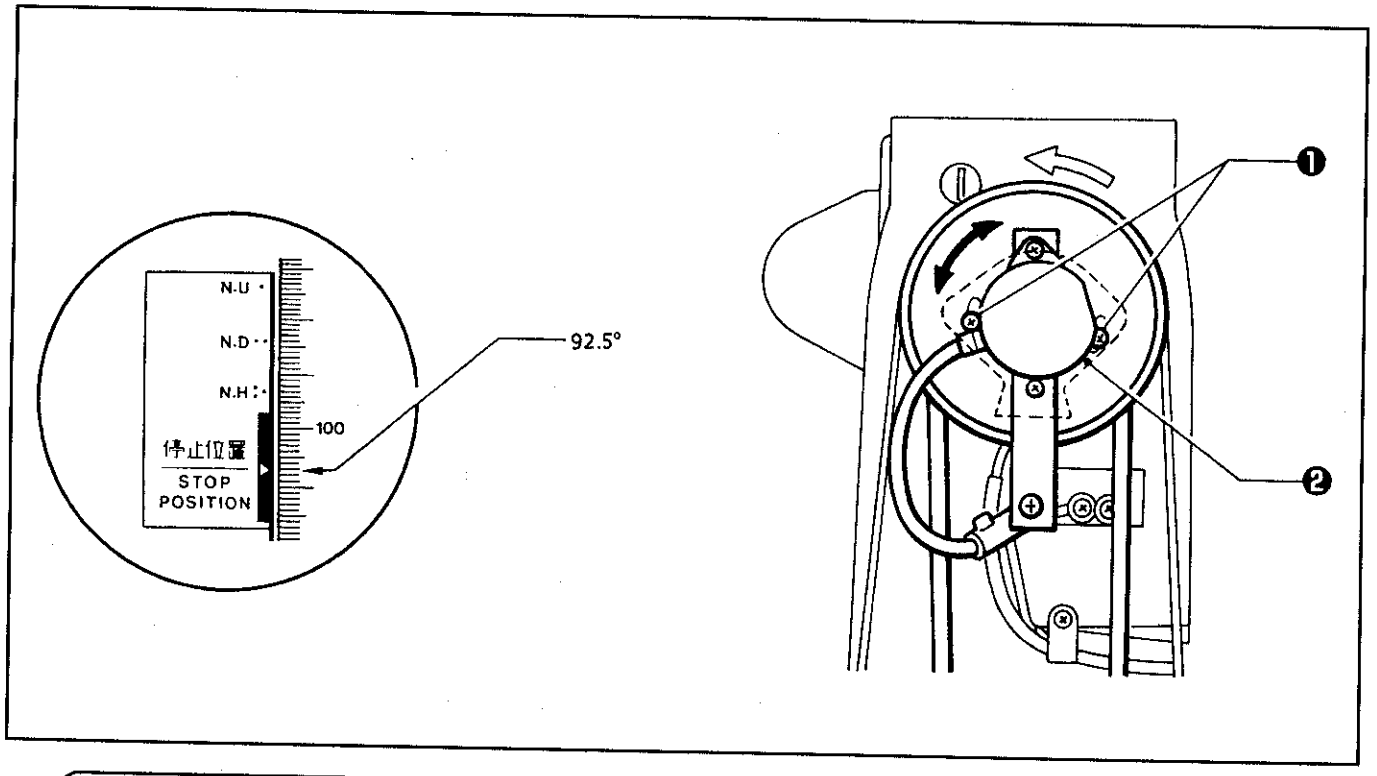
The rotary encoder and the stop position sensor detect the needle stop position, and synchronize hoop motion.
When the machine is emergency stopped during sewing or it stops after thread trimming, the needle bar is in the jump condition (stopped raised) and its thread take-up stops at the same position as the remaining eight ones (for BAS-412 · 416).

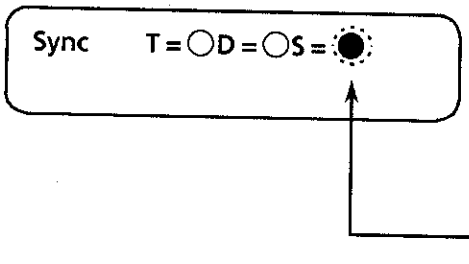
5-7-1. Adjusting the stop position signal (Use the Sync function in the test mode.)



1. Turn on the power, and select the Sync (synchronize) function in the test mode (referring to page 62).

T: timing pulse D: Synchronize signal S: Stop position signal



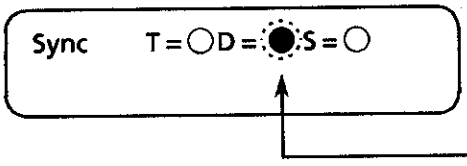


2. Turn the pulley in the rotation direction to set the stop mark on the belt cover to 92.5°. At this time, the stop signal circle should change from white to black.
Loosen the two screws ❶, and adjust the zero bight needle locating dog ❷ by moving it.

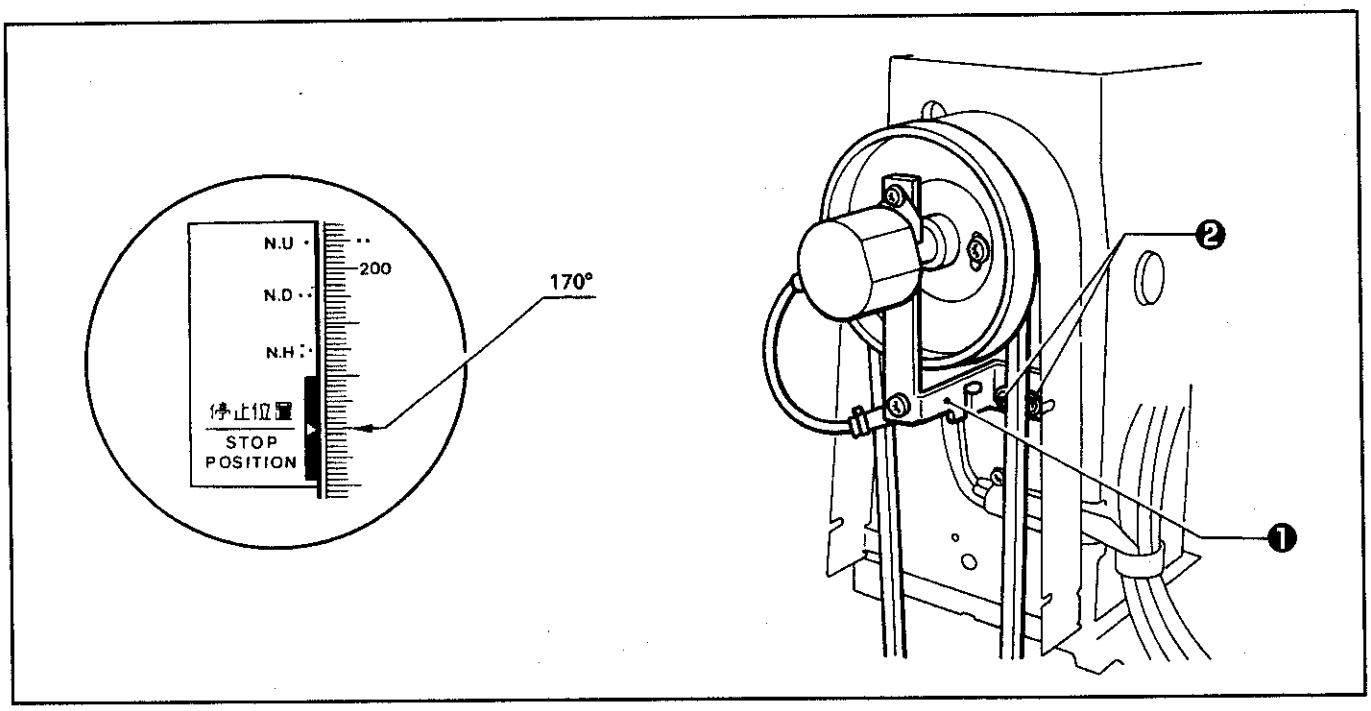
When the pulley is turned 92.5° - 112.5°, a correctly adjusted stop position sensor should output the following:

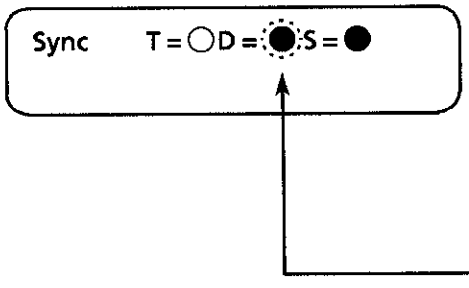
(1) Stop position signal (S) mark will change to black.
(2) The buzzer will beep.

5-7-2. Adjusting the synchronize signal (Use Sync function in the test mode.)



1. Turn on the power, and select the Sync (synchronize) function in the test mode.





2. Turn the pulley in the rotation direction to set the stop mark on the belt cover to 170°. At this time, the synchronize signal circle should change from black to white.
   Loosen the two screws ❷ in the lower portion of the encoder set plate ❶, and adjust the encoder angle.

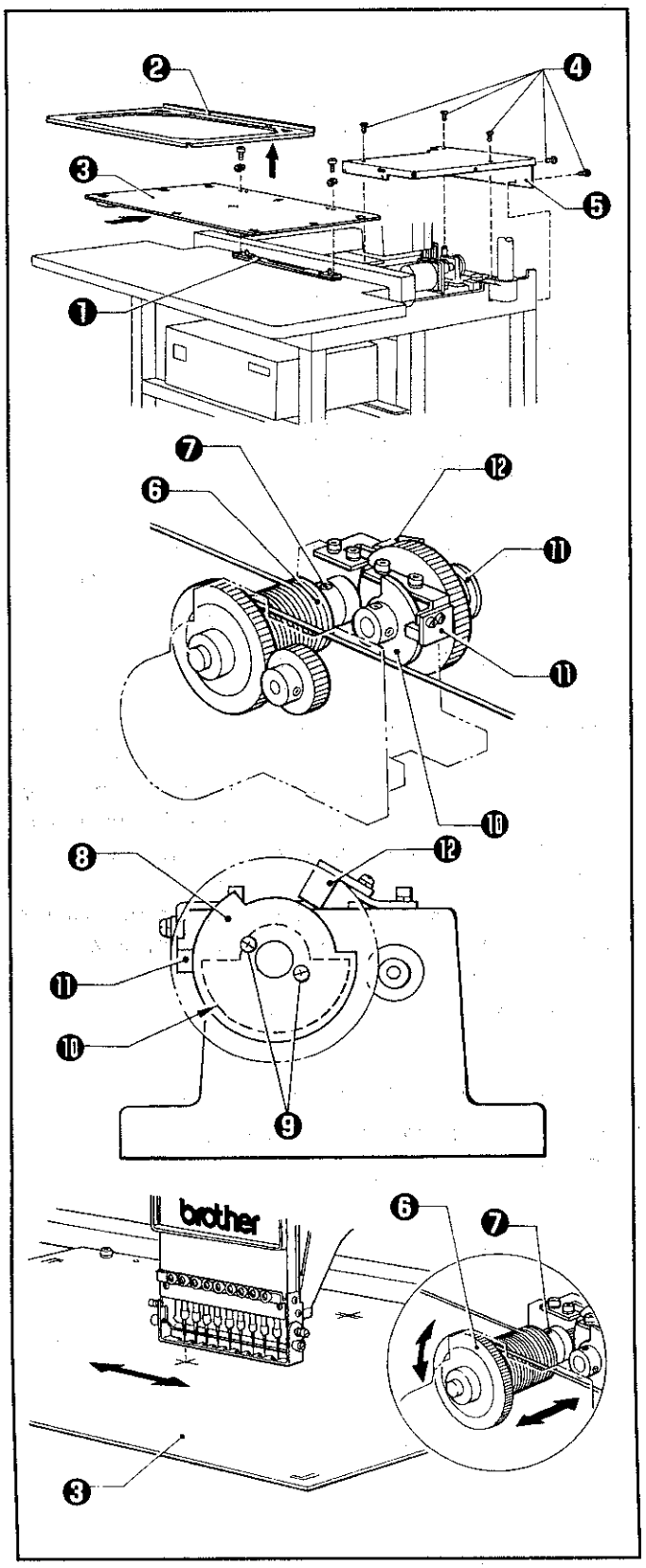
When the pulley is turned 165° - 170°, a correctly adjusted encoder should output the following:

(1) Synchronize (D) mark will change to black.
(2) The buzzer will beep.

5-8. Adjusting home position using home position plate

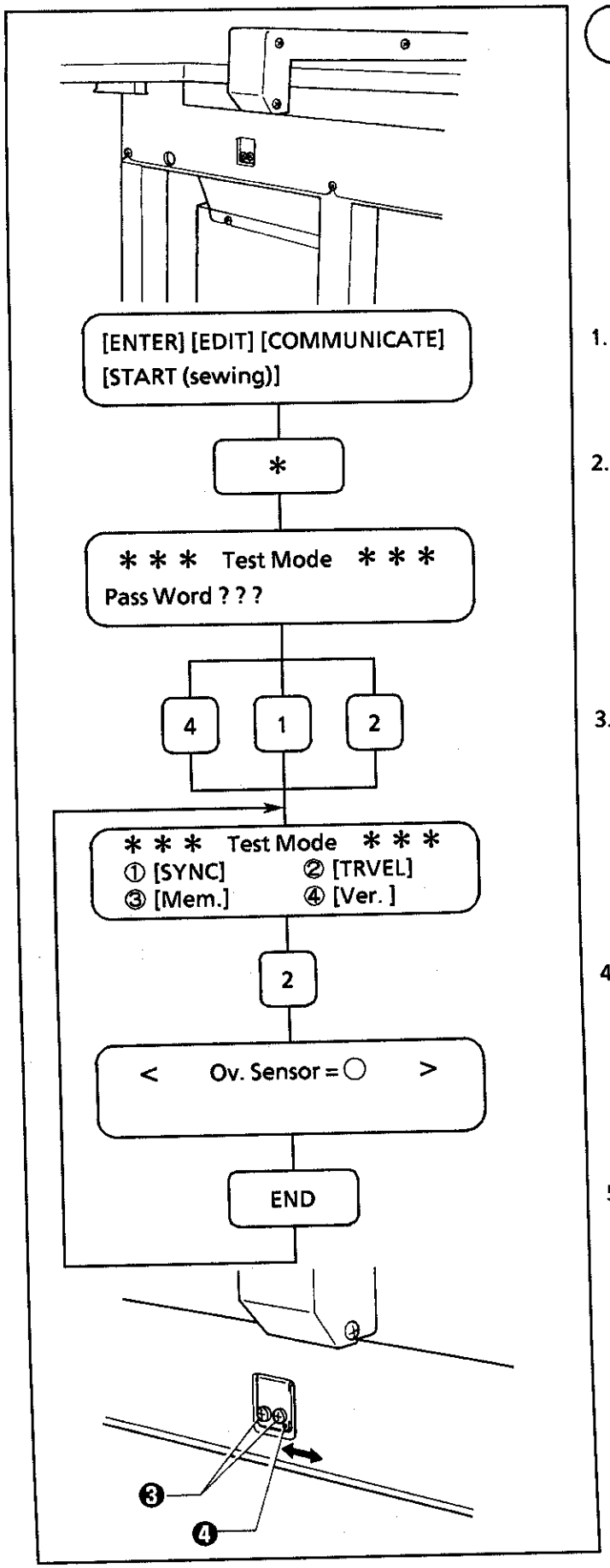
NOTE1: Use the XY-axis home position plate assembly (S36461-001 optional).
NOTE2: Before making this adjustment, turn the power switch off.
NOTE3: Be sure to remove the presser foot.

<X-direction>



1. Remove the holder base ❷ from the X-carriage ❶, and then attach the XY-axis home position plate assembly ❸.
2. Remove the eight screws ❹ and table R ❺.
3. Loosen set screw ❼ of wire drum X ❻ so that wire drum X ❻ can turn idly.
4. Temporarily tighten the screw ❾ so that the X-limit dog cap ❽ is centered in its hole.
5. Attach the X-limit dog cap ❽ so that its notch faces toward the sensor ⓬ when the X-axis home position dog ⓾ interrupts the sensor ⓫ light.
6. While pressing the < ⬇ > key for the BAS-412 or the <▼> key for the BAS-401 and 416, turn on the power.
7. The machine detects the X-home position and the XY-axis home position plate ❸ stops.
8. Turn XY-home position plate assembly ❸ manually and adjust the needle tip position so that it is in the center of the cross of the XY-axis home position plate ❸. Then, tighten screw ❼ firmly so that there is no end play of the shaft.

<Y-direction>



BAS-412

1. Turn on the power.

2. Press the <*> key in the main menu.

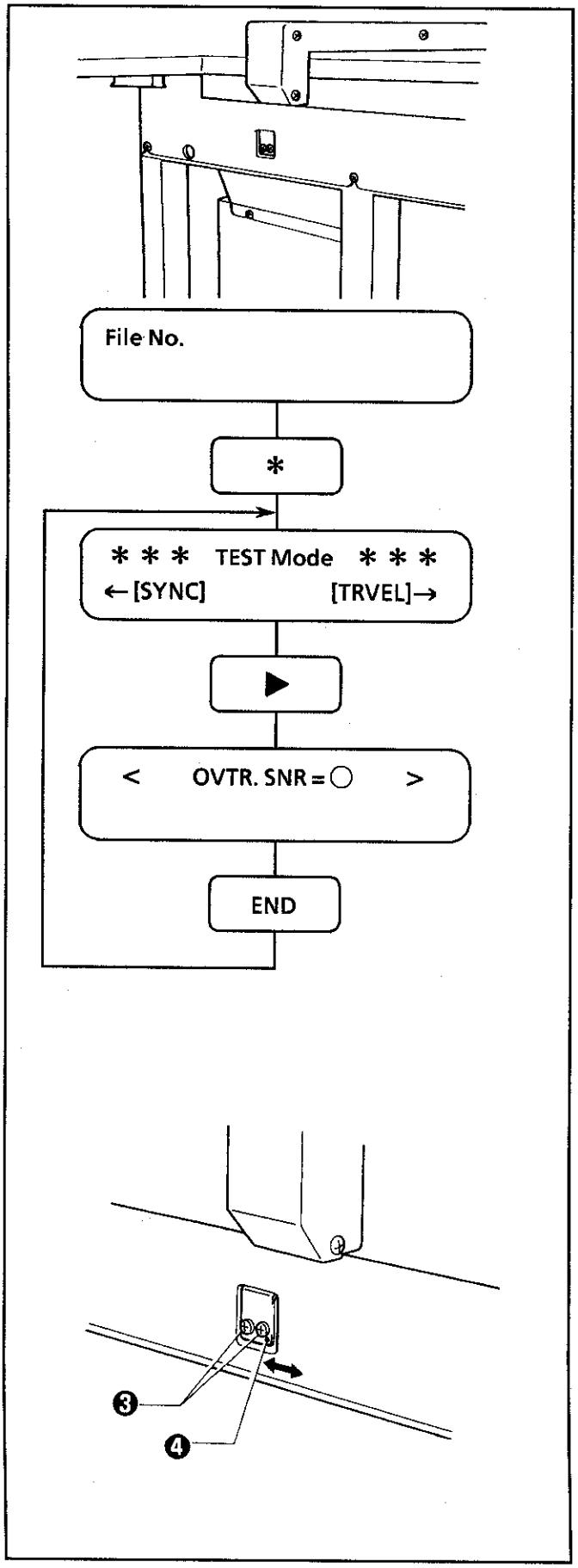
   The test mode menu will appear.

3. Type 412 for password.

4. Press the <2> key to select [Sync].

5. Loosen the bolt ❸. While pressing the <2> key and <END> key alternately, adjust the sensor bracket ❹ by moving it in the Y direction (forward and backward).

<Y-direction>



BAS-401 · 416

1. Turn on the power.

2. Press the <✻> key in the main menu.

   The test mode menu will appear.

3. Press the <▶> key to select [Travel].

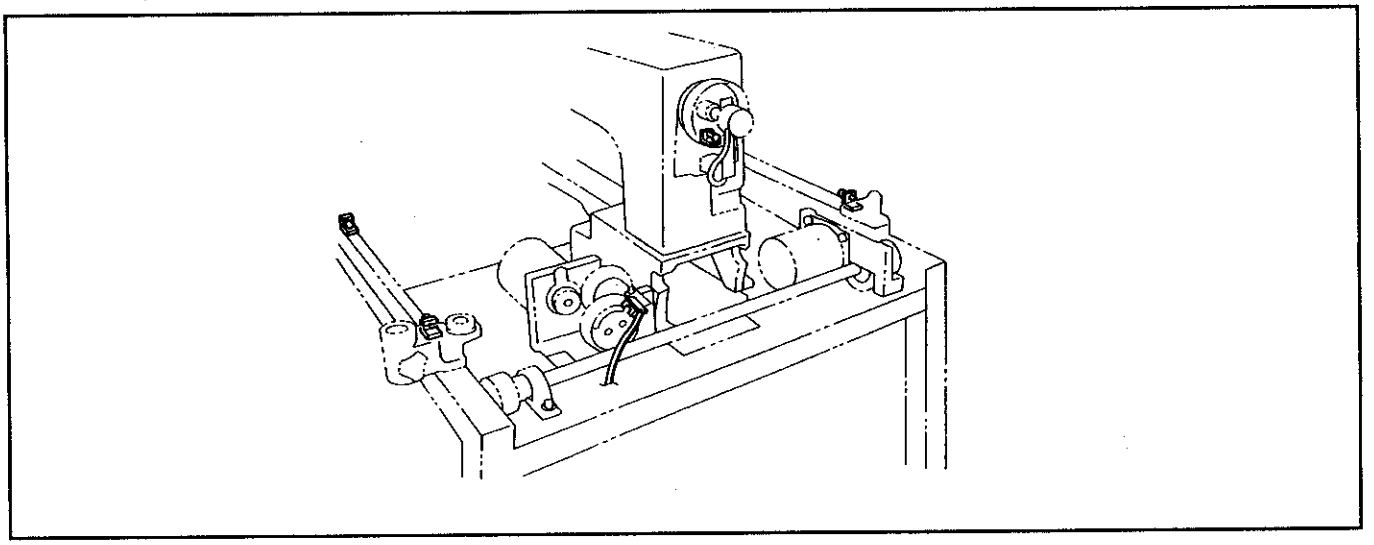
4. Loosen the screws ❸. While pressing the <▶> key and <END> key alternately, adjust the sensor bracket ❹ by moving it in the Y direction (forward and backward).

NOTE: Move the sensor bracket toward the center if the needle is not in the center of the cross.

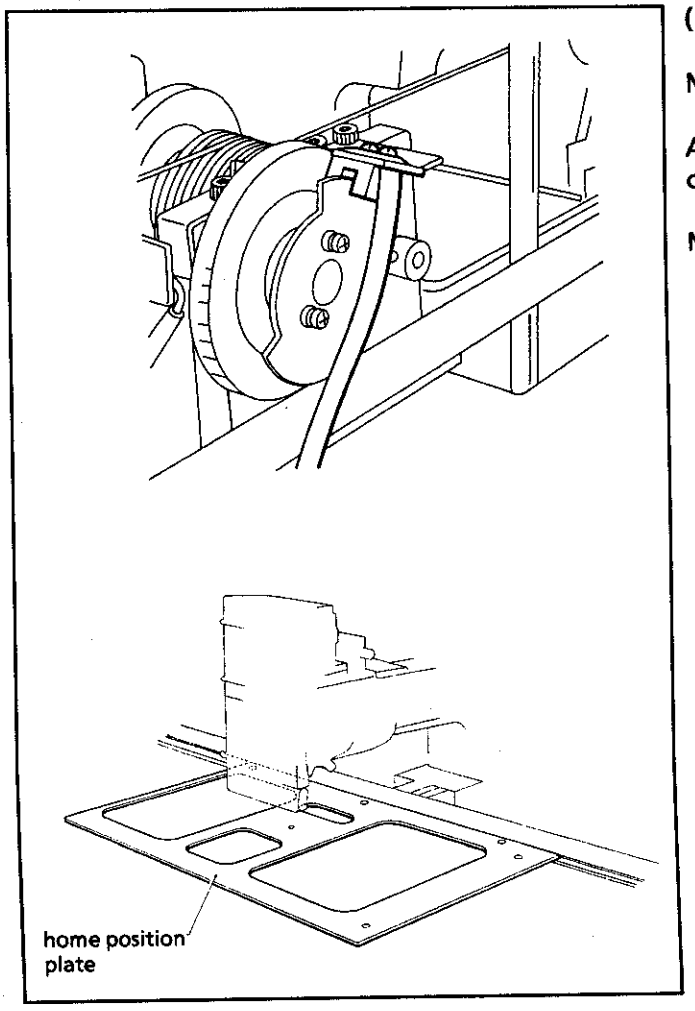
5-9. Adjusting the overtravel sensor and flat hoop stopper using the home position plate

- The sensor and stoppers are used for checking sewing area during sewing and for mechanism protection.

5-9-1. Cap frame overtravel sensor and flat hoop stopper positions.



5-9-2. Adjusting cap frame overtravel sensor (X direction)



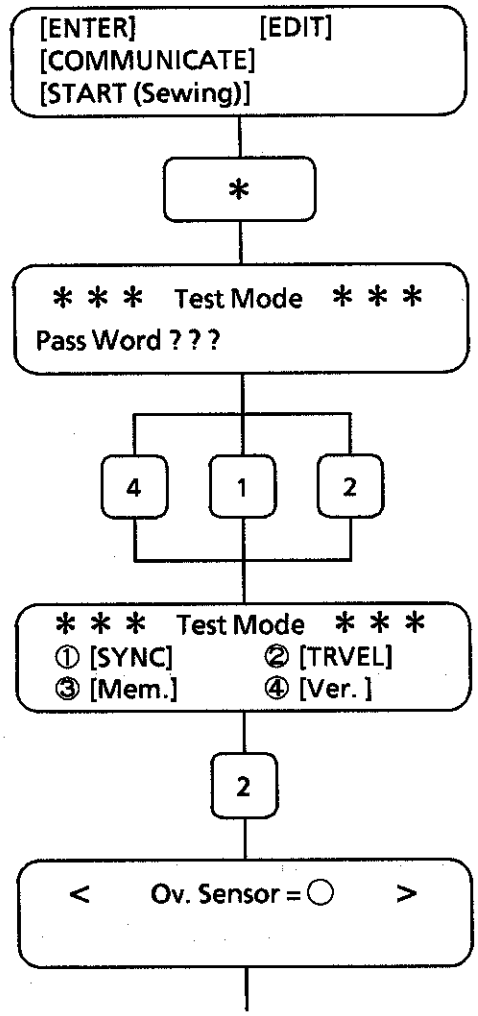
(Use Travel in the test mode).

NOTE: Be sure to remove the presser foot.

Attach the home position plate (S36461-001) to the carriage.

NOTE: The home position plate is an optional part. Consult with your dealer.

[BAS-412]



1. Turn on the power.
   The main menu will appear.

2. Press the <*> key in the main menu.

   The test mode screen will appear.

3. Press the <4>, <1>, and <2> keys.

4. Press the <2> key to select [Sync].

   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

Selection keys and adjusted sensors

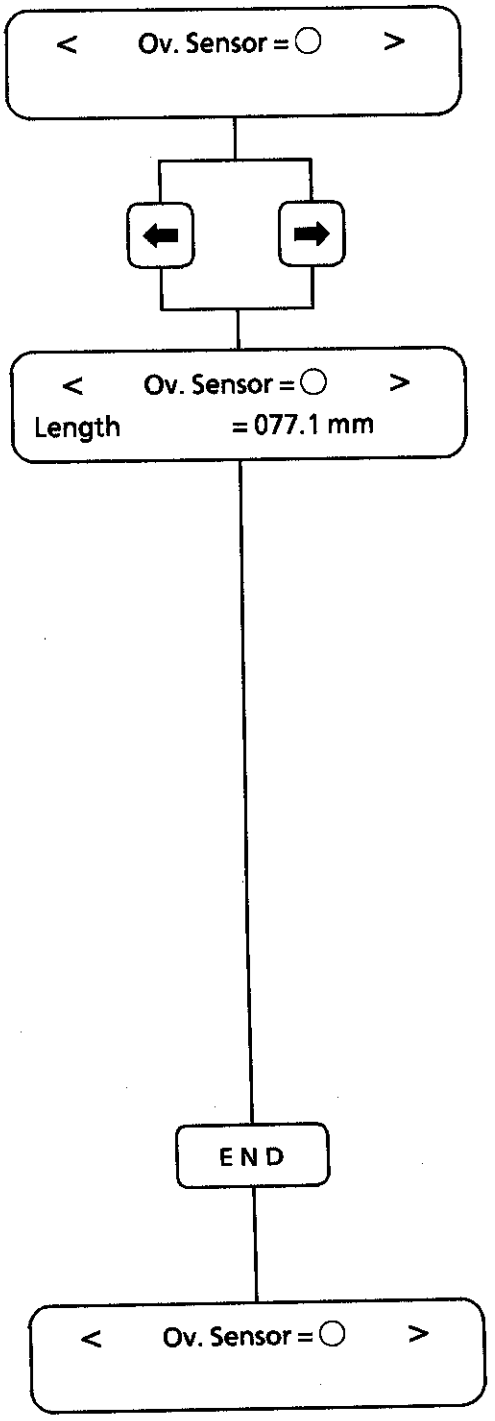
Selection key	Cap frame over-travel sensor	Fixed movement amount	
		Standard cap frame	Wide cap frame
←	+X limit	77.1 mm	182.1 mm
→	−X limit	77.1 mm	182.1 mm

NOTE:

- Switching between the standard cap frame and the wide cap frame is done bymeans of a DIP switch.
  DIP switch No.8 on operation panel
  ..... OFF = Standard cap frame
  ..... ON = Wide cap frame

- The power of the machine should be turned off before changing switch settings. If the power is not turned off, functions do not change.

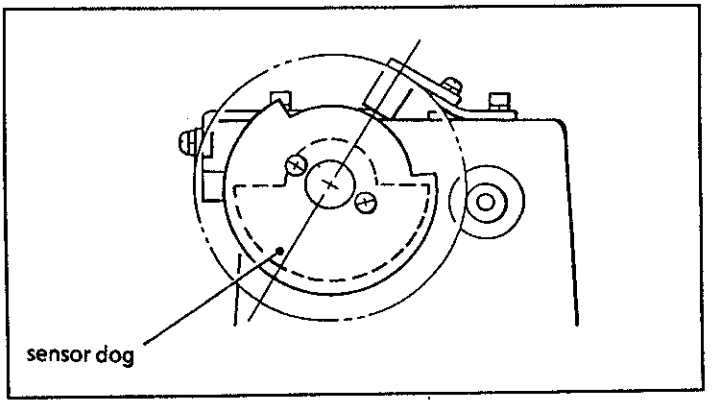
5-9-3. Adjusting the cap frame overtravel sensor



1. Press the <⬅> <➡> jog key.

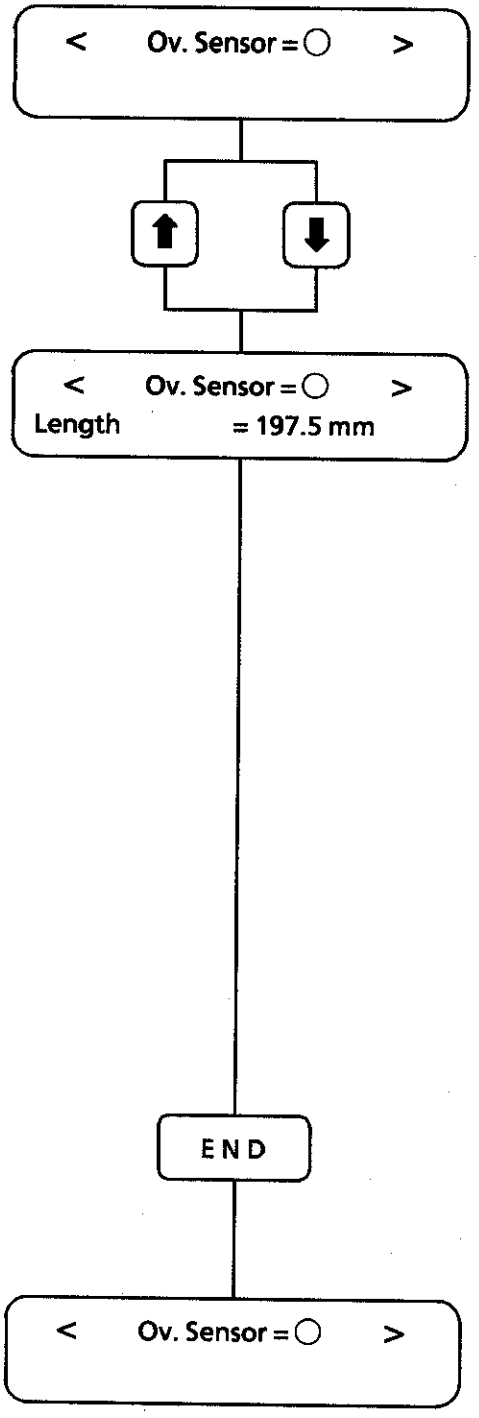
   The presser shaft will be raised, the home position plate will be moved 77.1 mm, and the presser shaft will be lowered.
   (for wide cap fram 182.1 mm)

2. Make sure that the circle changes from white to black when the length is made 76.8 - 77.4 mm by pressing the <⬅> <➡> key.
   If it does not change, adjust the sensor dog position.
   (for wide cap fram 181.5 - 182.5 mm)



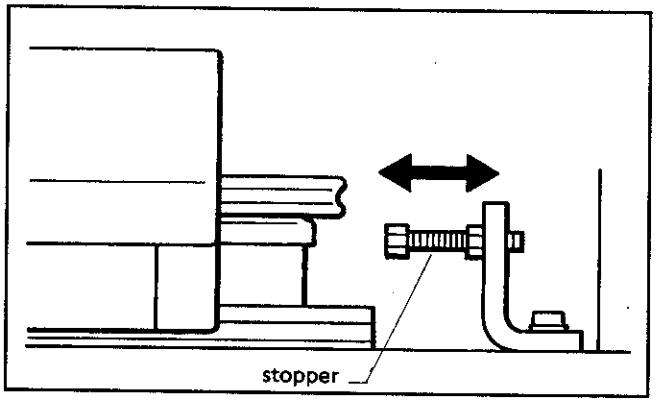
3. Press the <END> key.
   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

5-9-4. Adjusting the flat hoop stoppers (only possible in flat mode)



1. Press the <⬆> key.
   The presser shaft will be raised, the home position plate will be moved 197.5 mm to the rear, and the presser shaft will be lowered.

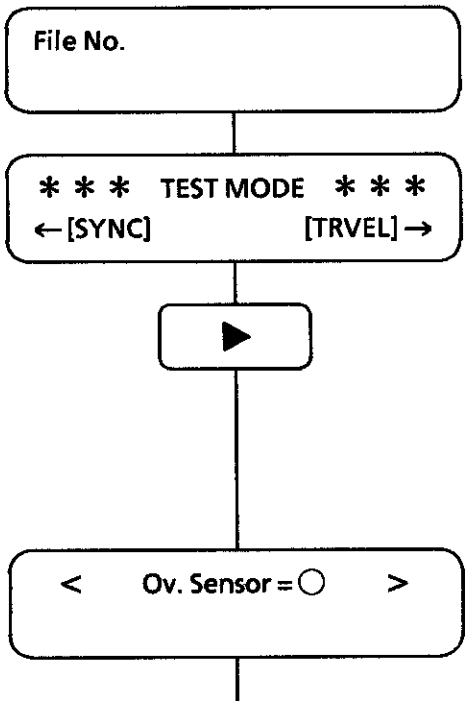
2. Adjust the right and left stoppers so that they can make contact with the carriage.



3. Press the <END> key.
   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

NOTE: After pressing the <⬇> key, the carriage will move 105.5 mm forward. The machine is set at shipping so that there is a 1 mm or more clearance between the stoppers at the front and the carriage. This is a reference point for the X- and Y- carriages. Do not change this clearance.

[BAS-401 · 416]



1. Turn on the power.
   The main menu will appear.

   The test mode screen will appear.

2. Press the < ▶> jog key to select [TRVEL].

   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

Selection keys and adjusted sensors

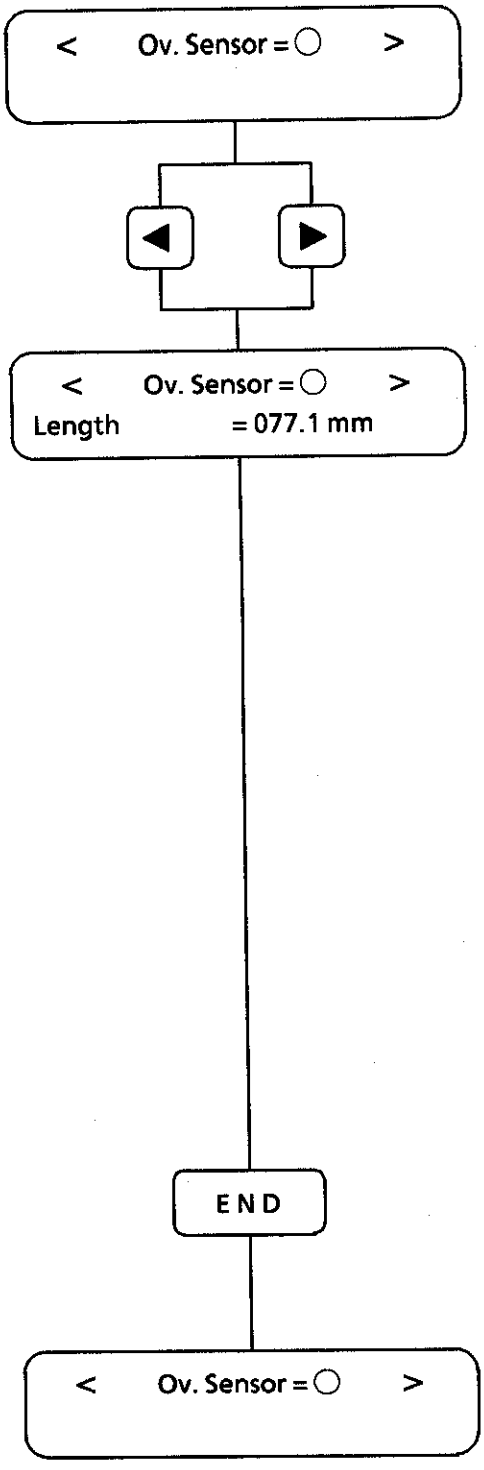
Selection key	Cap frame over-travel sensor	Fixed movement amount	
		Standard cap frame	Wide cap frame
◀	+X limit	77.1 mm	182.1 mm
▶	−X limit	77.1 mm	182.1 mm

NOTE:

- Switching between the standard cap frame and the wide cap frame is done bymeans of a DIP switch.
  DIP switch No.8 on operation panel
  ..... OFF = Standard cap frame
  ..... ON = Wide cap frame

- The power of the machine should be turned off before changing switch settings. If the power is not turned off, functions do not change.

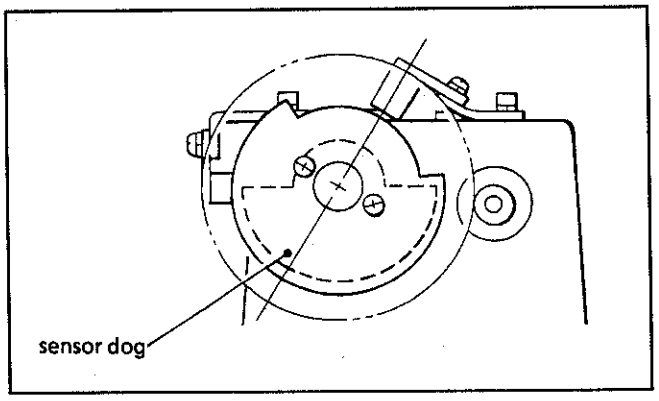
5-9-5. Adjusting the cap frame overtravel sensor



1. Press the <◀> <▶> jog key.

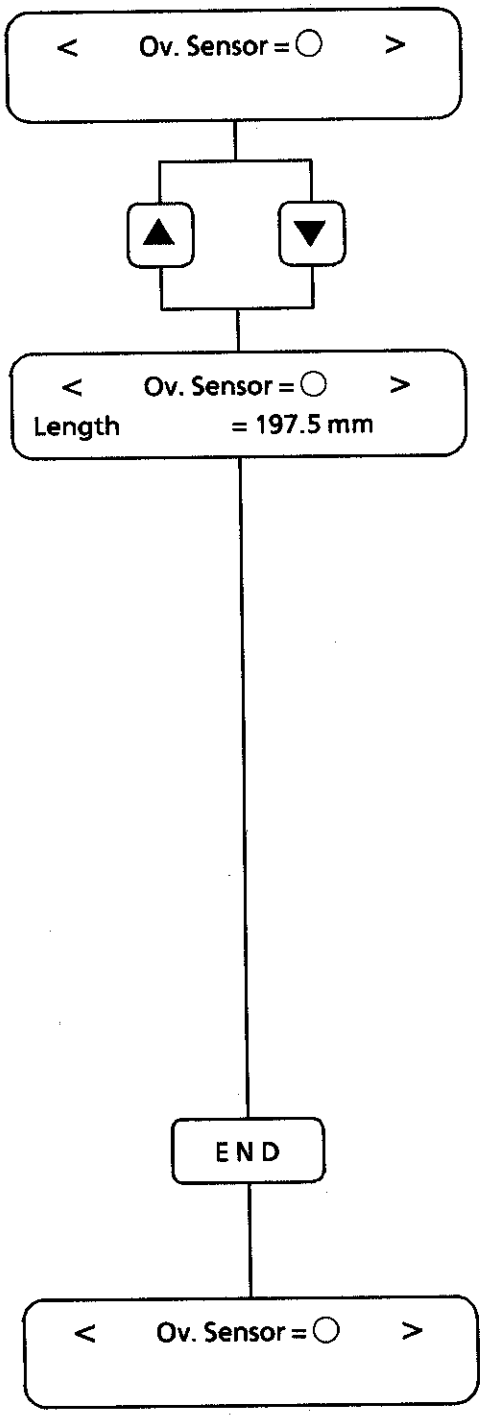
   The presser shaft will be raised, the home position plate will be moved 77.1 mm and the presser shaft will be lowered.
   (for wide cap fram 182.1 mm)

2. Make sure that the circle changes from white to black when the length is made 76.8 - 77.4 mm by pressing the <◀> <▶> key.
   If it does not change, adjust the sensor dog position.
   (for wide cap fram 181.5 - 182.5 mm)



3. Press the <END> key.
   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

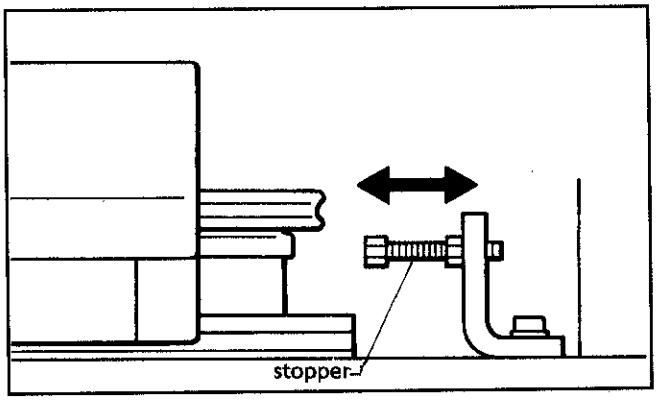
5-9-6. Adjusting the flat hoop stoppers (only possible in flat mode)



1. Press the <▲> key.

   The presser shaft will be raised, the home position plate will be moved 197.5 mm to the rear, and the presser shaft will be lowered.

2. Adjust the right and left stoppers so that they can make contact with the carriage.



3. Press the <END> key.
   The presser shaft will be raised, the home position plate will be moved until the hole in it is almost aligned with the needle tip, and the presser shaft will be lowered.

NOTE:
- After pressing the <▼> key, the carriage will move 105.5 mm forward. The machine is set at shipping so that there is a 1 mm or more clearance between the stoppers at the front and the carriage. This is a reference point for the X- and Y- carriages. Do not change this clearance.

6. LUBRICATION

⚠ CAUTION

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

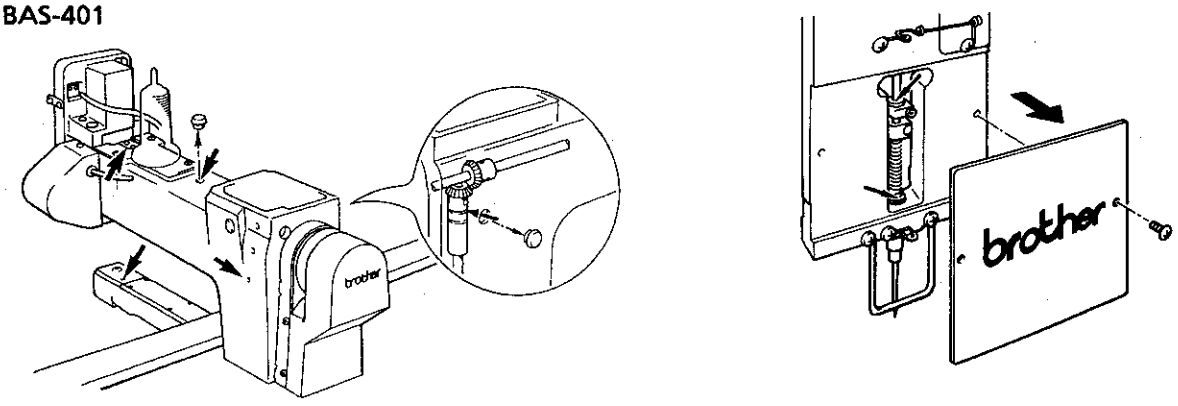
- Turn off the power switch at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.

6-1. Machine head

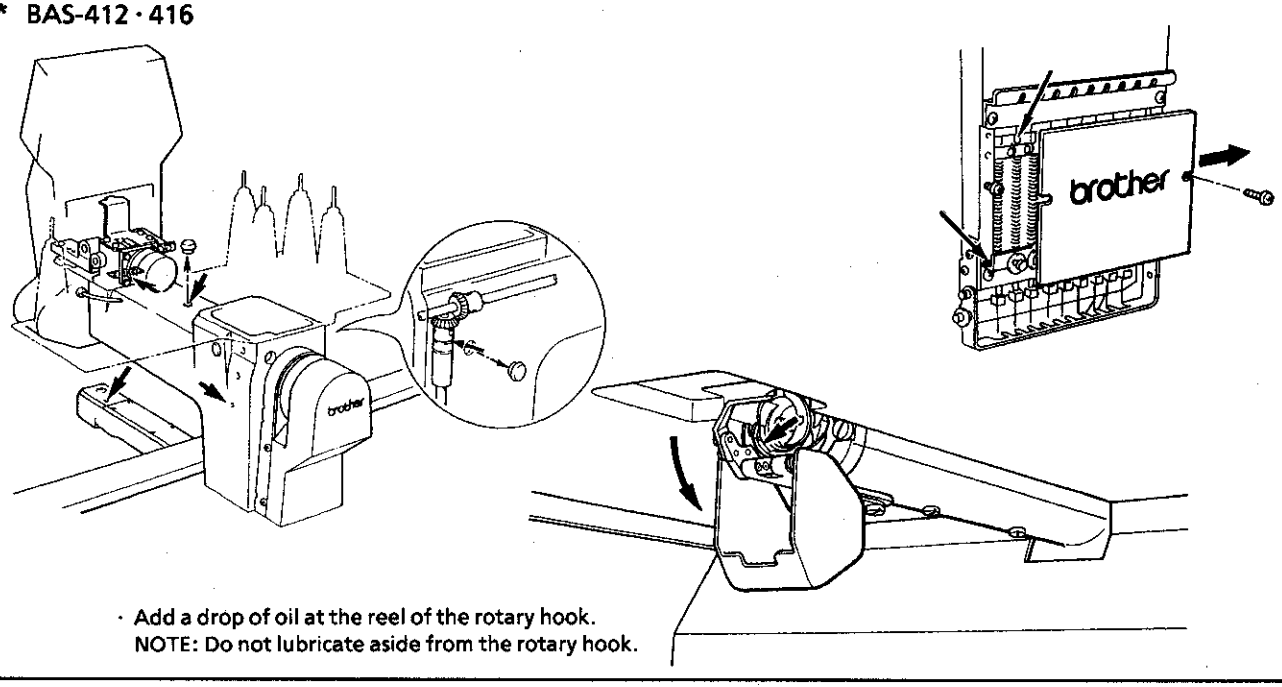
Lubrication is necessary for keeping the machine in good condition.
BAS-401, 412 and 416 has the lubrication system using wicks and an oil tank. Everyday before using the machine, refill the oil tank with new oil if the oil level falls viewing through the oil window.
[NOTE] ① Be sure to use the Brother-specified sewing machine oil for lubrication.
② Supplying too much oil may cause it to drip onto the material.

1. Lubricate each point indicated with the arrow when the machine is used for the first time after unpacking or if left machine unused for along period of time.

* BAS-401



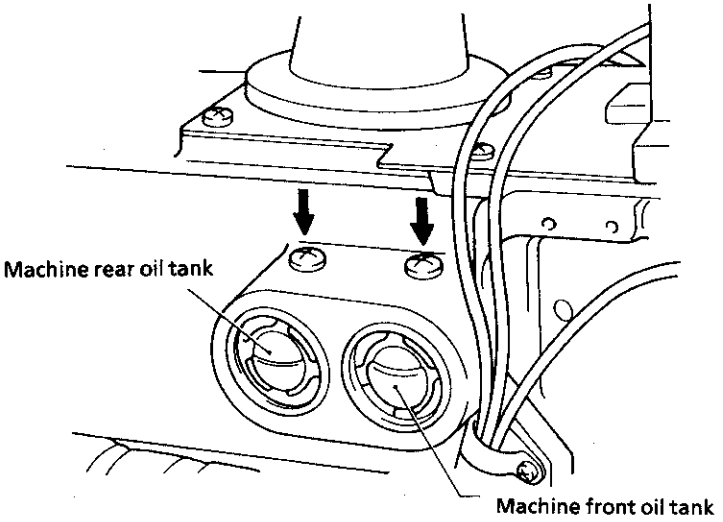
* BAS-412 · 416

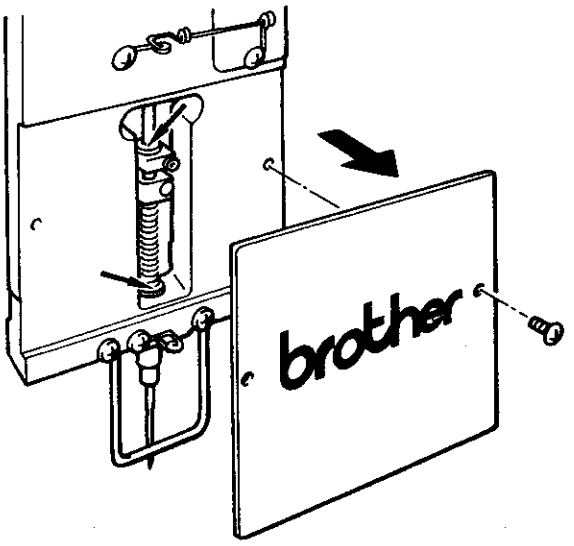


· Add a drop of oil at the reel of the rotary hook.
NOTE: Do not lubricate aside from the rotary hook.

2. Refill with new oil from the holes indicated with arrows if necessary.
Replenish oil in the machine front oil tank once a week.

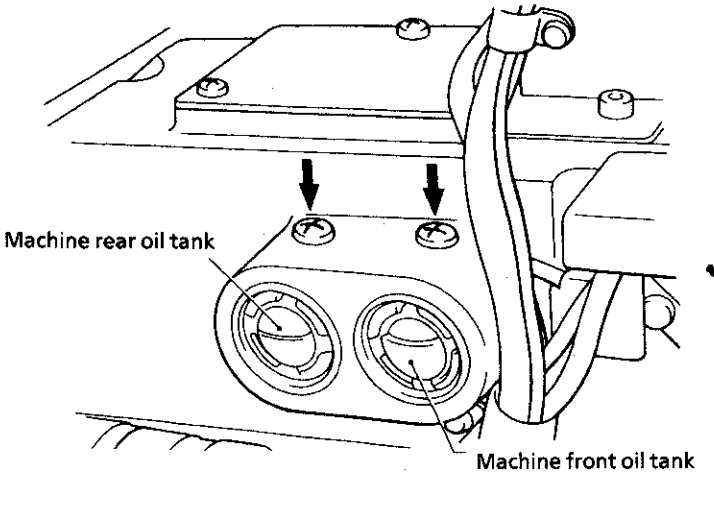
* BAS-401
· Oil may run out in the tank after one or two nours of operation, but a part that can keep extra oil is incorporated into the machine front oil tank, so that even with no oil tank, oil can be supplied from this part little by little.

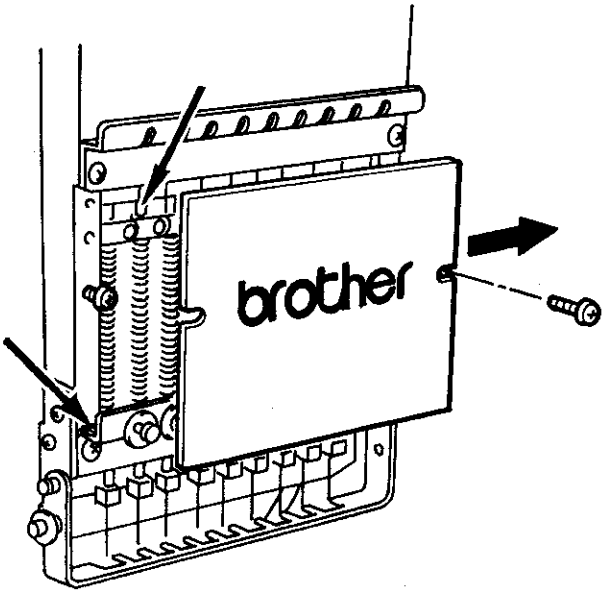




· Lubricate two portion on needle bar.
NOTE: Needle bars are not lubricated automatically.

* BAS-412 · 416

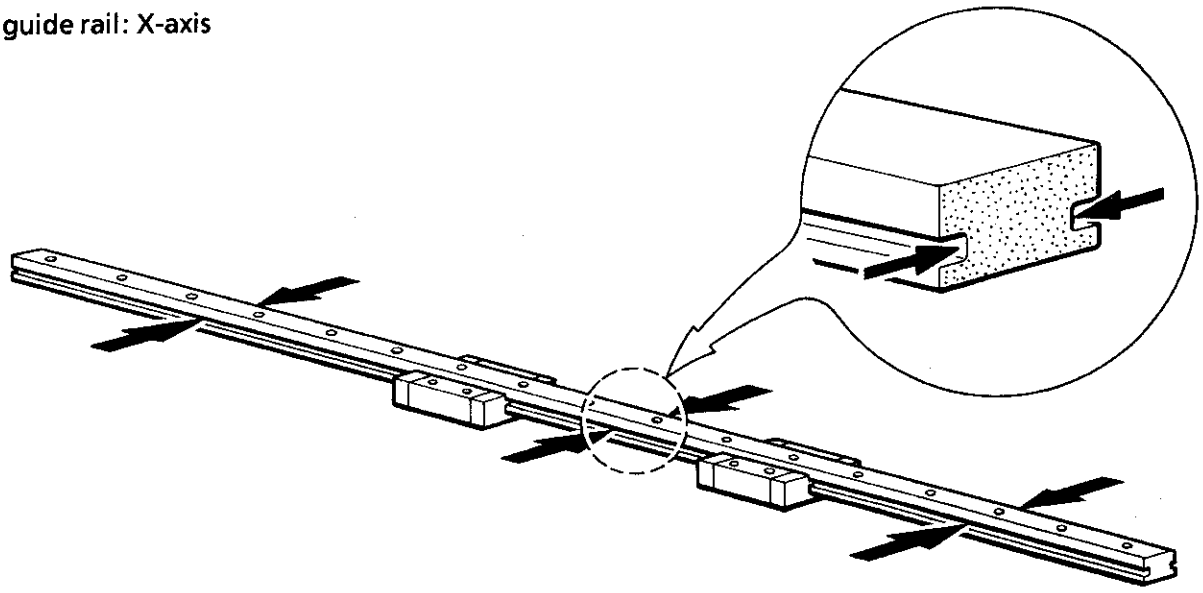




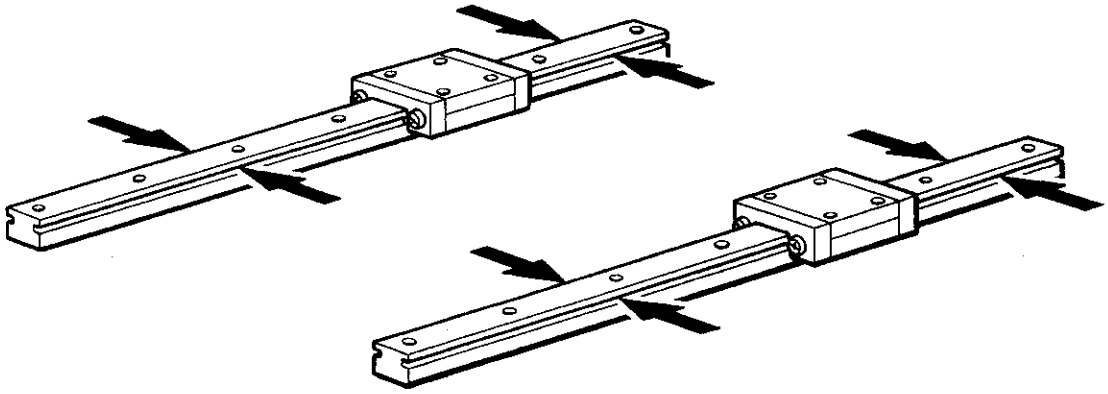
· Lubricate two portion on all (9) needle bar.
NOTE: Needle bars are not lubricated automatically.

6-2. Feed guide mechanism

Linear guide rail: X-axis

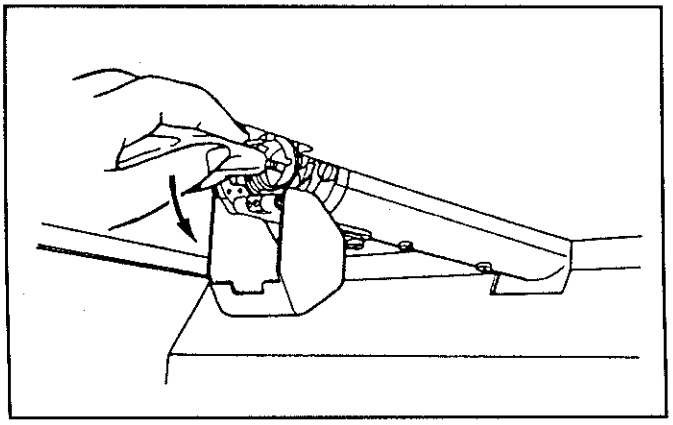


Linear guide rail: Y-axis



NOTE 1: For lubrication, use Brother-specified grease tank 30.
NOTE 2: Be sure to lubricate every 6 months.
NOTE 3: After applying grease to the X · Y guide rail, move the X carriage right and left 2-3 times.
NOTE 4: Before applying grease, remove covers to make the work easier.

6-3. Cleaning



Keep the machine clean:

Remove dirt with a soft, dry cloth. If necessary, clean with a cloth soaked in detergent, then wipe off the detergent with a cloth dampened with (hot) water.

Caution:

Do not clean with benzene, thinner, or other volatile solvents.

7. ELECTRIC COMPONENTS

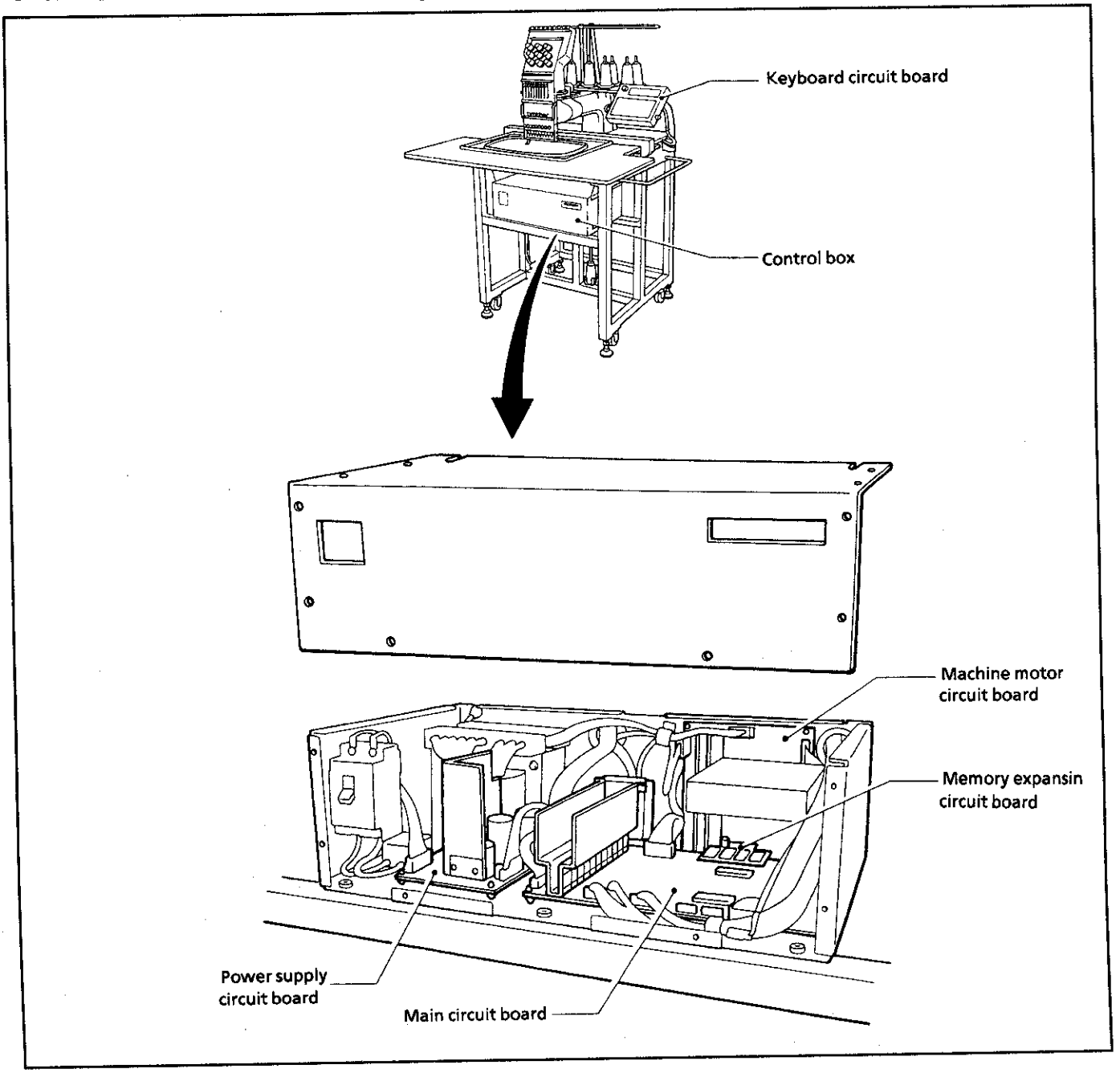
⚠ DANGER

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

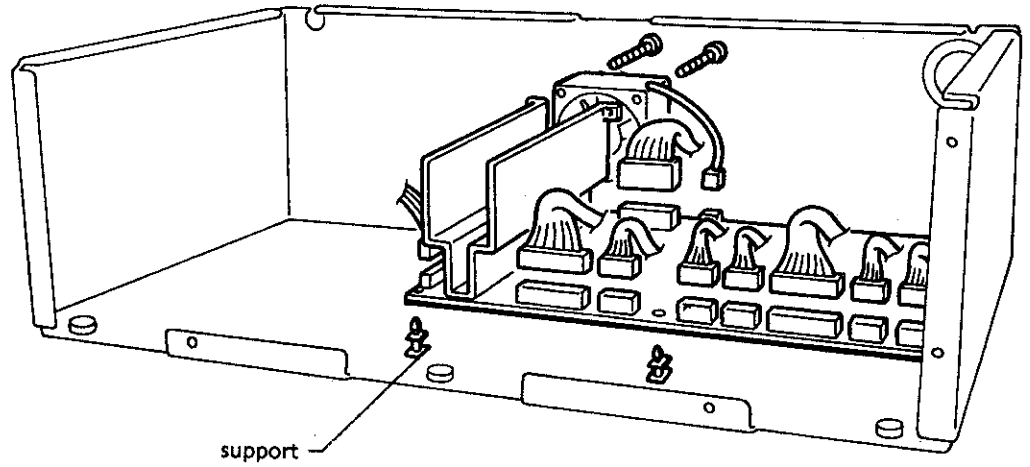
⚠ CAUTION

- Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.
- Be sure to connect the ground. If the ground connection is not secure, you run the risk of receiving a serious electric shock.

7-1. Circuit board locations (BAS-401 · 412 · 416)



7-2. Replacing circuit boards



Main circuit board

Be sure to turn off the power and open the cover before replacement.

1. Disconnect all connectors.
2. Press the six circuit board support clamps inward and remove the main circuit board from the supports. Replace the main circuit board.
3. Place new main circuit board on the supports. Secure the circuit board by pushing down near each of the support clamps until it snaps into position.
4. Connect the connectors while supporting the circuit board from the back side. Be sure not to treat the circuit board forcefully.

NOTE1: When replacing connectors, treat them carefully. Do not pull on the wires when detaching the connectors.

NOTE2: The cooling fan is not attached to a new main circuit board. When replacing the main circuit board with a new one, be sure to remove the cooling fan from the one replaced.

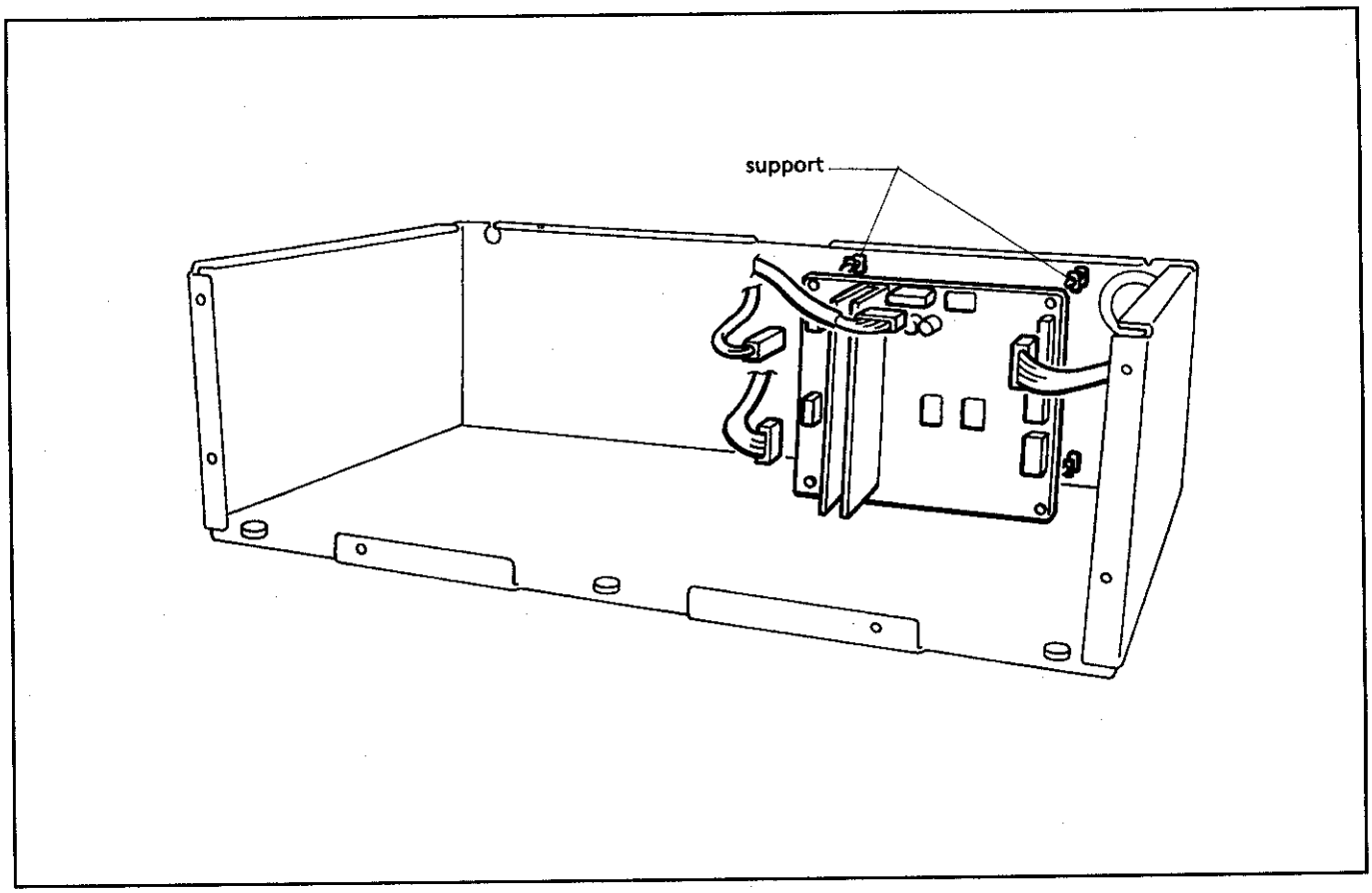
NOTE3: Treat the circuit boards carefully. MOS-IC in the circuit boards is easily damaged by static electricity. Also, do not touch IC pins.

NOTE4: Do not bend circuit boards. The circuit pattern or IC may be broken by external force due to the large size of the circuit board.

NOTE5: The part code for the main circuit board is different for the BAS-412 and the BAS-401 and 416.

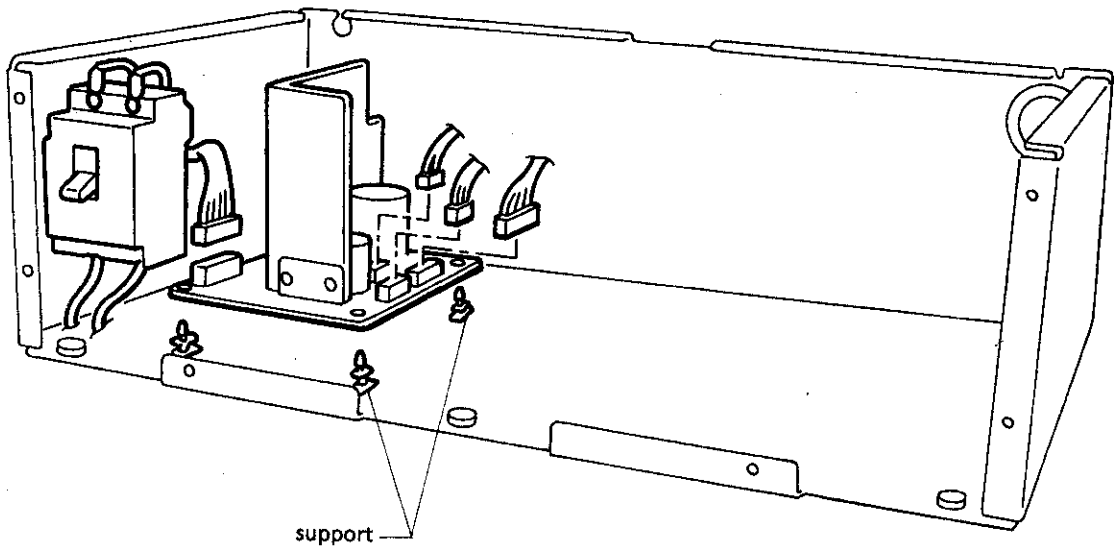
NOTE6: When turning the power on for the first time after replacing the main circuit board, be sure to do it while holding down the < ⬇ >key for the BAS-412 or the <▼> key for the BAS-401 and 416. This clears the internal memory.

7-3. Machine motor circuit board



1. Disconnect the four connectors.
2. Push the four circuit board supports towards the inside and remove the machine motor circuit board. Replace the machine motor circuit board.
3. Place new machine motor circuit board on the supports. Secure the circuit board by pushing down near each of the supports. The support tips will snap into position, securing the circuit board.

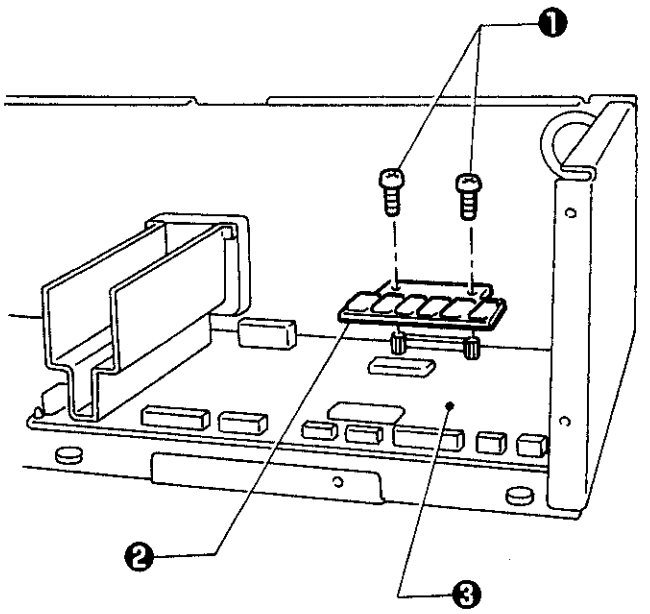
7-4. Replacing the power supply circuit board



1. Remove all connectors of the power supply circuit board .
2. Remove the power supply circuit board while pressing the clamps of four circuit board supports inward.
3. Match the holes in the power supply circuit board with the circuit board supports, and connect the power supply circuit board to the base by pressing it next to each support.

NOTE 1: When removing and reattaching connectors, be careful with them; do not pull on the wires.
NOTE 2: Before removing and reattaching the circuit board, turn off the power, leave it as is for at least 5 minutes, and make sure that electrical charge of the capacitor on the circuit board has been released. Measurement should be taken across the terminals of connector P1; the voltage should be 1 V or less.
NOTE 3: Since an electrical charge may remain in the removed power supply circuit board, do not touch the bottom (soldered surface) of the circuit board and anything lead in part. As well, pay attention not to cause a short by putting the circuit board on anything metal.

7-5. Memory expansion circuit board (option)

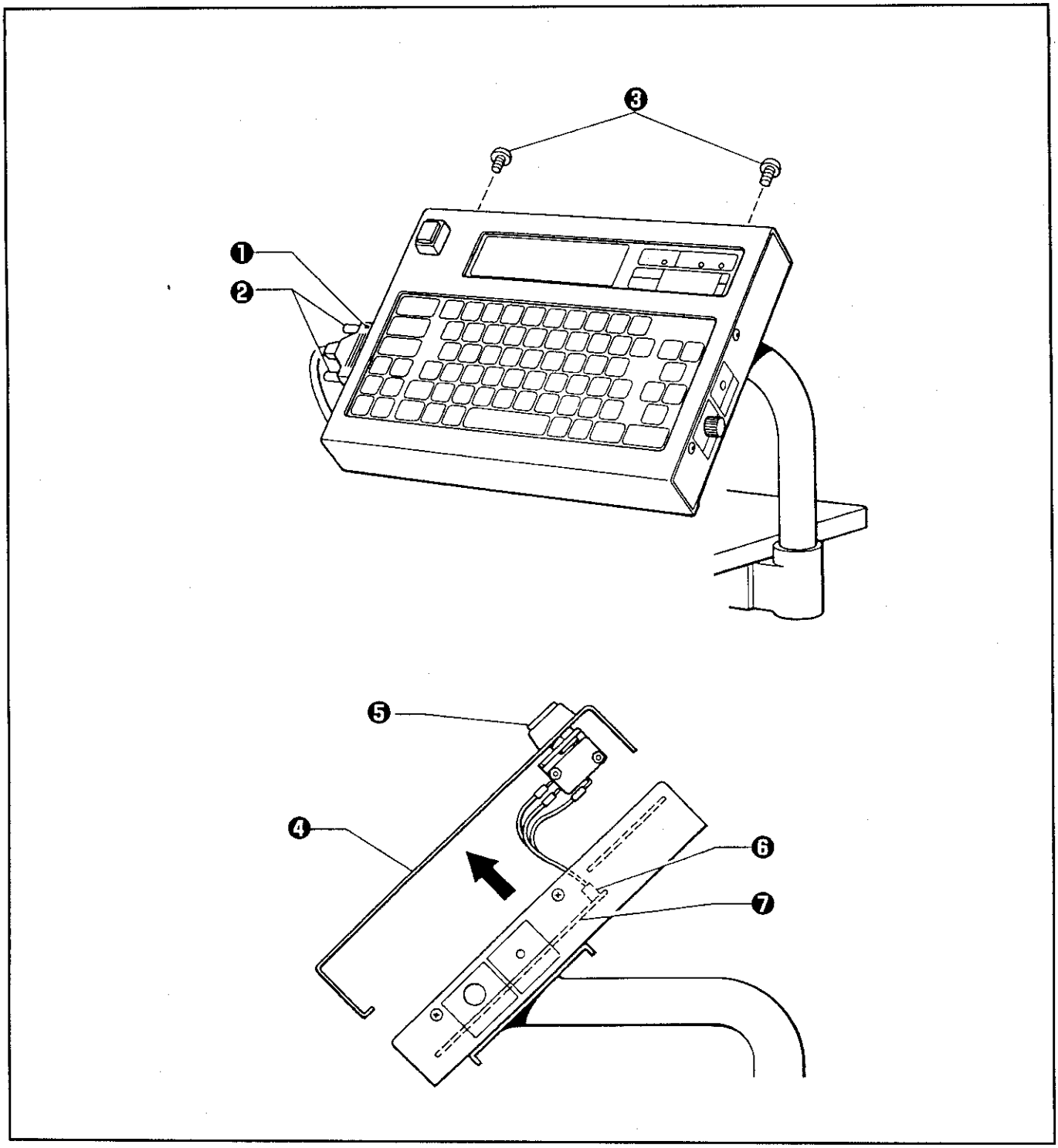


1. Remove two screws ❶ and then remove the memory expansion circuit board ❷ from the main circuit board ❸.

NOTE: When turning on power of BAS-411 · 415 for the first time after replacing the memory expansion circuit board ❷, be sure to do so while holding down the <▼> key for the BAS-401 and 416 or the <⬇> key for the BAS-412. The internal memory will be cleared.

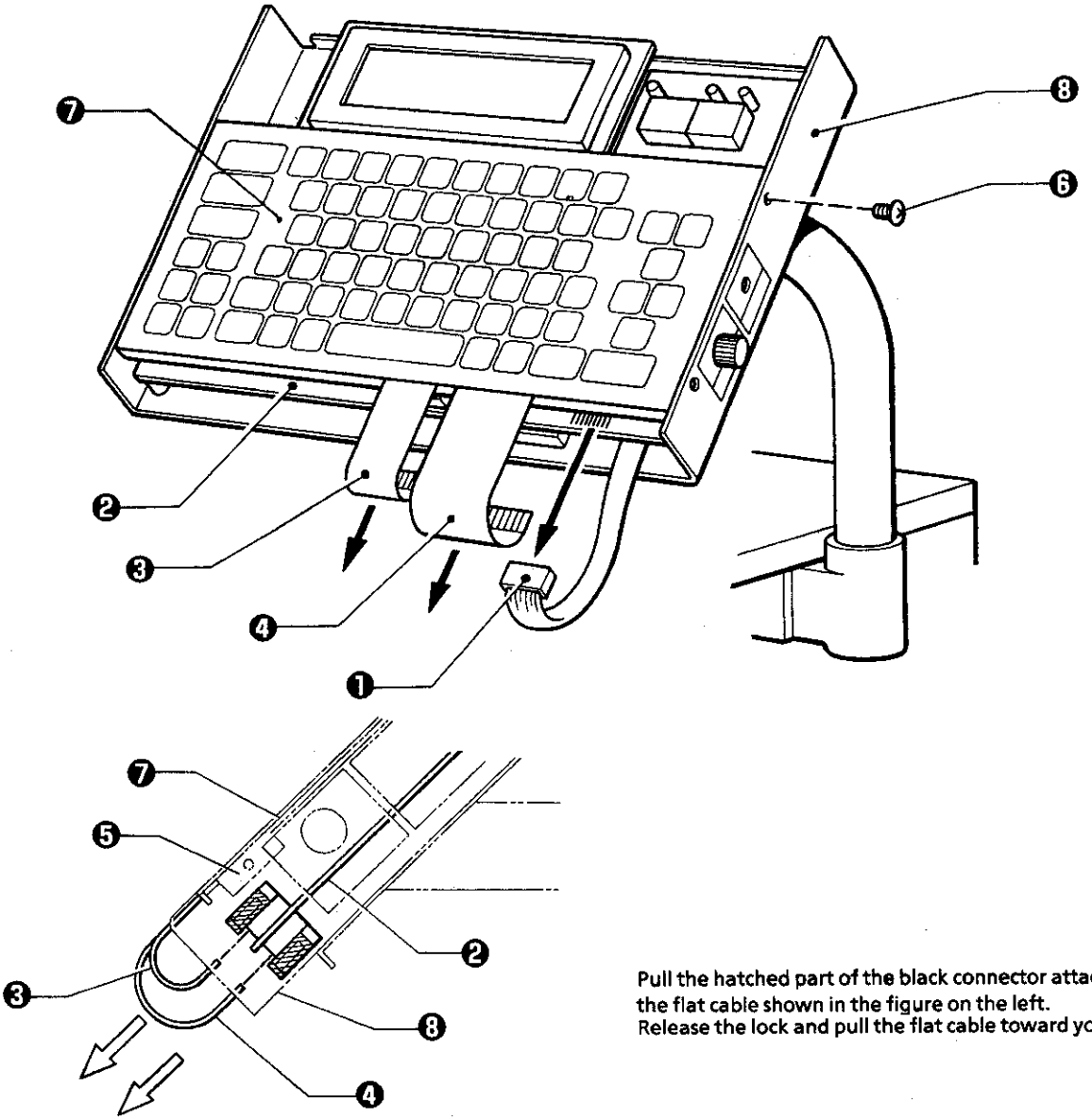
[BAS-412]

7-6. Keyboard circuit board (1)



1. Manually loosen the two screws ❷ in the keyboard cable ❶ and remove it.
2. Loosen the two screws ❸. Pull the upper part of the panel ❹ toward yourself and detach it. At this time, do not pull strongly on the EMERGENCY stop switch ❺ cable.
3. Disconnect the EMERGENCY switch ❺ connector ❻ from the keyboard circuit board ❼.

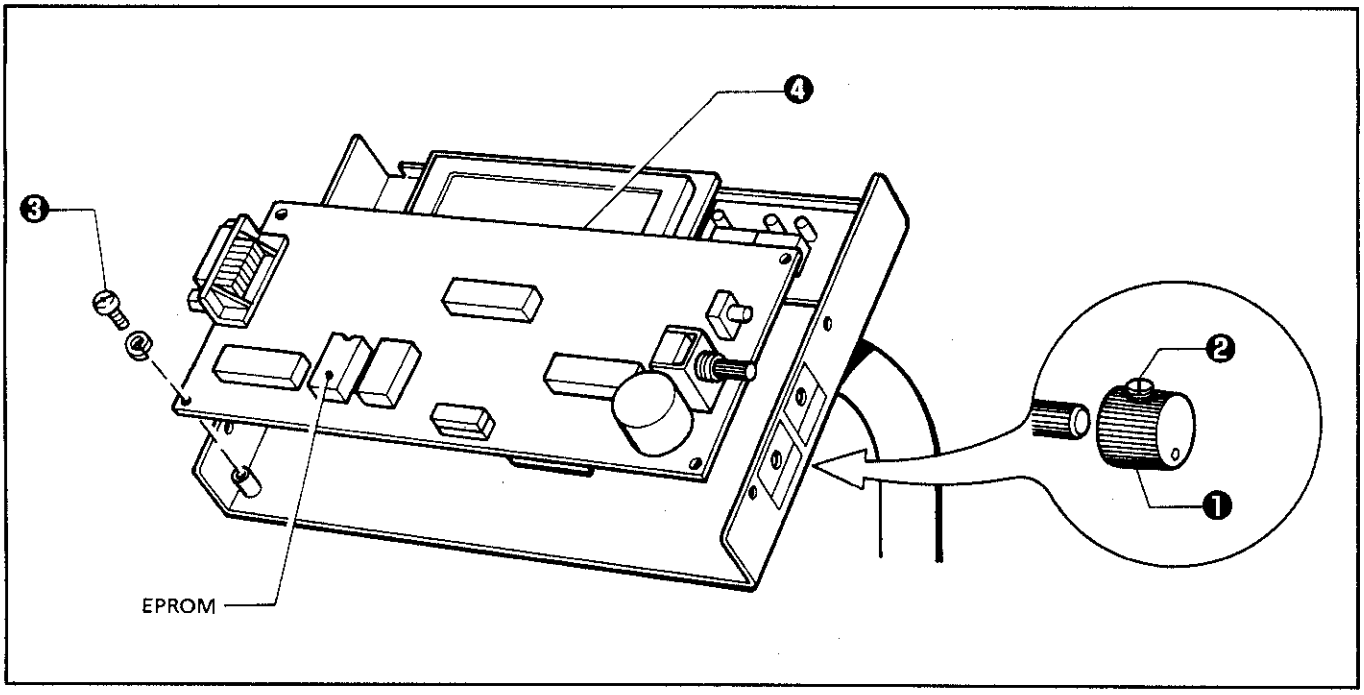
7-6. Keyboard circuit board (2)



Pull the hatched part of the black connector attached to the flat cable shown in the figure on the left.
Release the lock and pull the flat cable toward yourself.

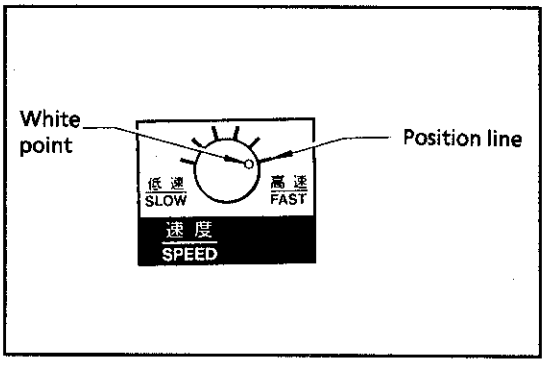
4. Disconnect the connector ❶ from the keyboard circuit board ❷.
5. Disconnect the flat cables ❸ and ❹ from the keyboard circuit board ❷.
6. Loosen the four screws ❻ on the right and left sides of the supporter ❺. Remove the key sheet ❼ from the panel base ❽.

7-6. Keyboard circuit board (3)

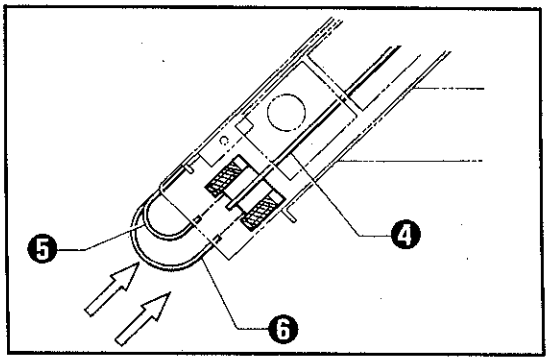


7. Loosen the screw ❷ so that the knob ❶ can be removed easily. Then, remove the knob ❶.
8. Remove the four screws ❸ and the keyboard circuit board ❹.
9. When assembling, reverse the above procedure. For assembling, note the following points.

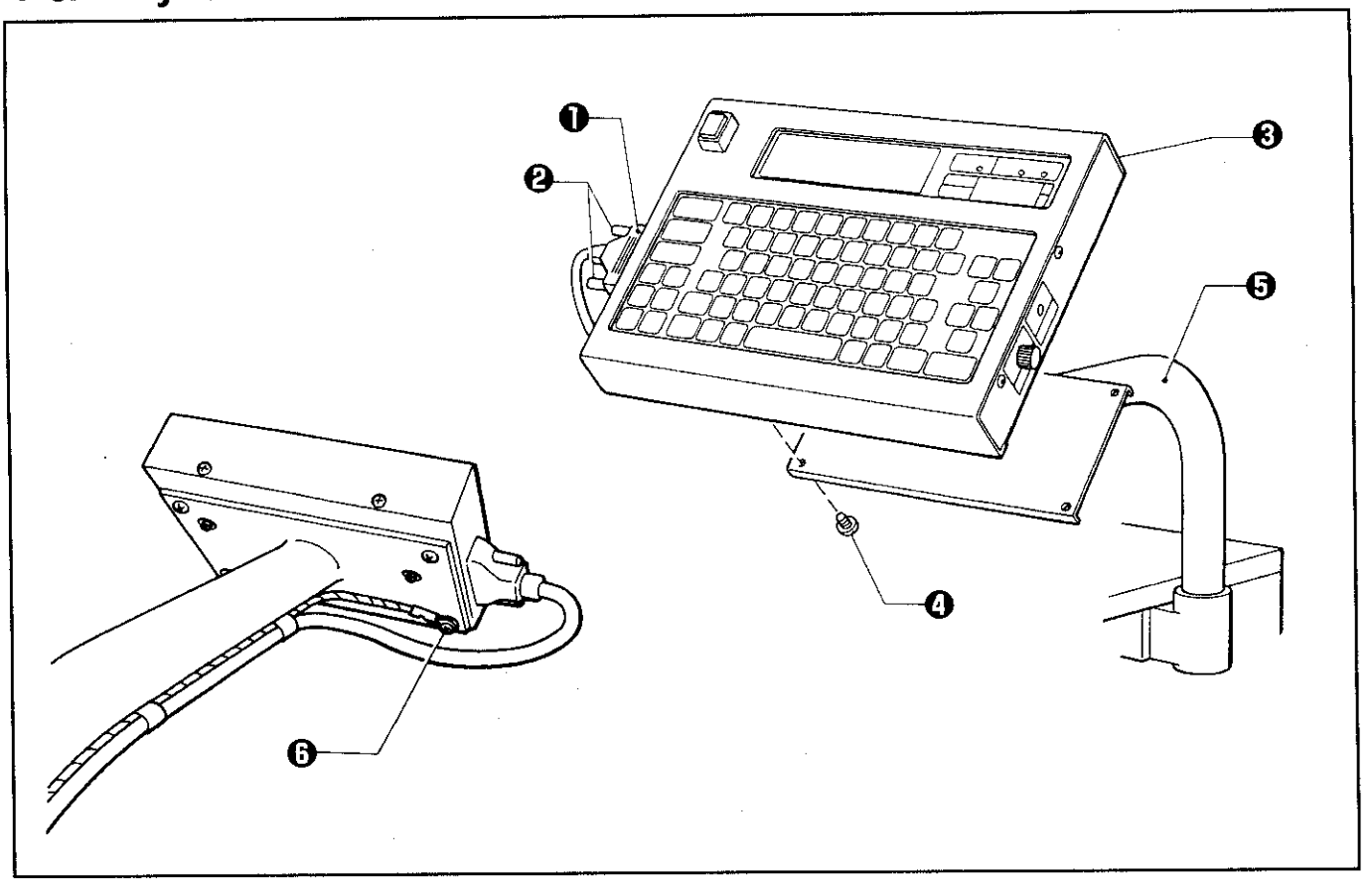
NOTE1: Attach the contrast knob ❶ as follows:
Align the white point of the knob ❶ with the position line. Tighten the screw ❷.



NOTE2: Insert the connectors of the flat cables ❺ and ❻ while the black connector lock is released. Insert the hatched part of the connector to lock it in place.
Pull the flat cables ❺ and ❻ lightly to check if they are locked properly.
If flat cable is loose, the cables may have been improperly inserted into the slots. Release the lock and insert into the slots correctly.



7-6. Keyboard unit

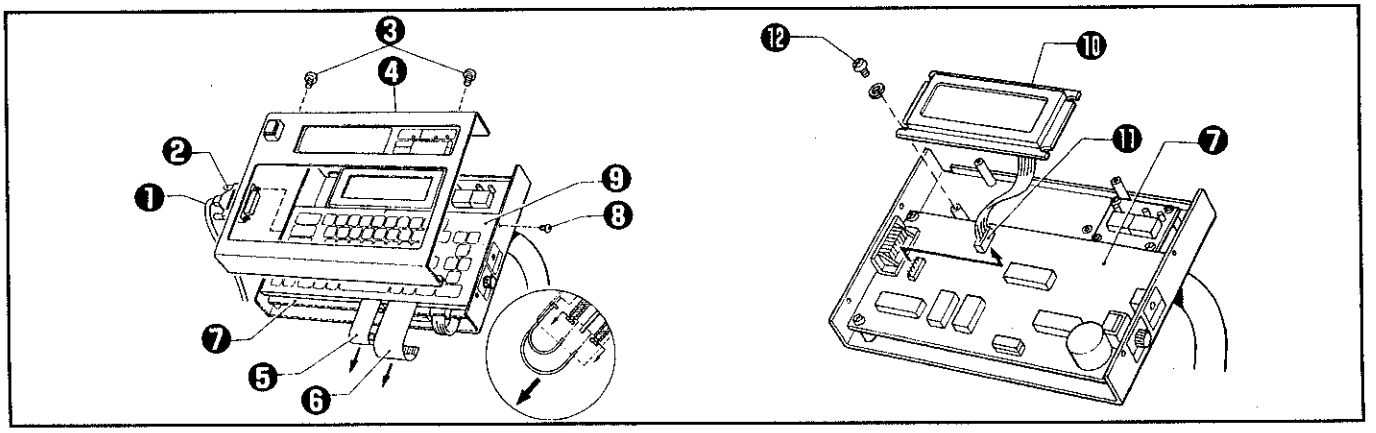


When replacing the whole keyboard unit, follow the procedures below.

1. Manually loosen the two screws ❷ in the board cable ❶ and remove it.
2. Remove the four screws ❹ on the back side of the keyboard unit ❸. Then remove it from the keyboard stand ❺.
   At this time, be careful not to drop the keyboard unit ❸.
3. When assembling, reverse the above procedure.

NOTE: Be sure to connect the ground wire ❻.

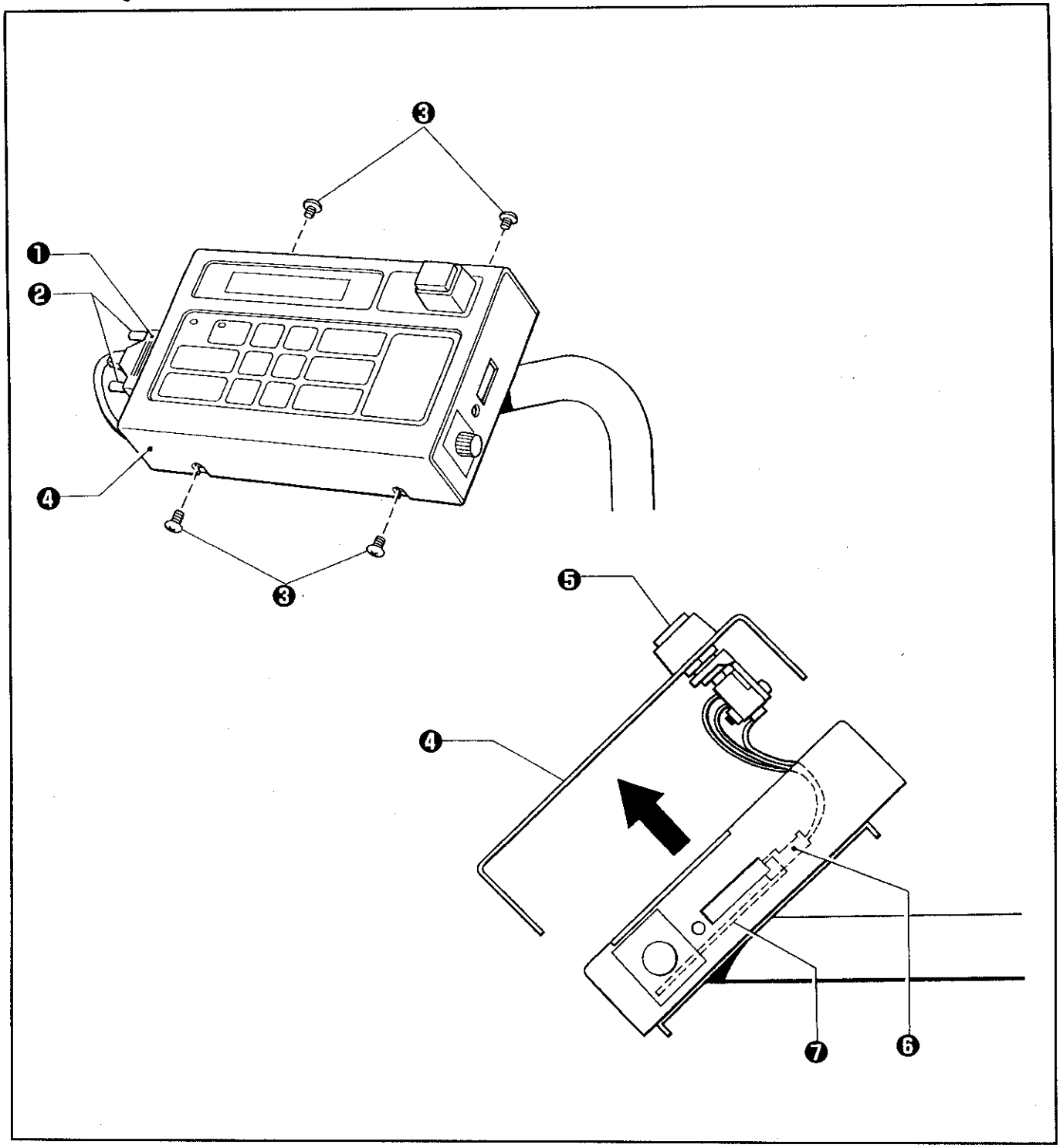
7-7. LCD module assembly



1. Loosen two screws ❷ of the keyboard cable ❶ and remove the cable from the keyboard unit.
2. Remove two screws ❸ and the panel ❹.
3. Remove the flat cables ❺ and ❻ from the keyboard circuit board ❼.
4. Remove four screws ❽ and the support ❾.
5. Remove the LCD module assembly ❿ connector ⓫ from the keyboard circuit board ❼.
6. Remove four screws ⓬ and the LCD module assembly ❿.

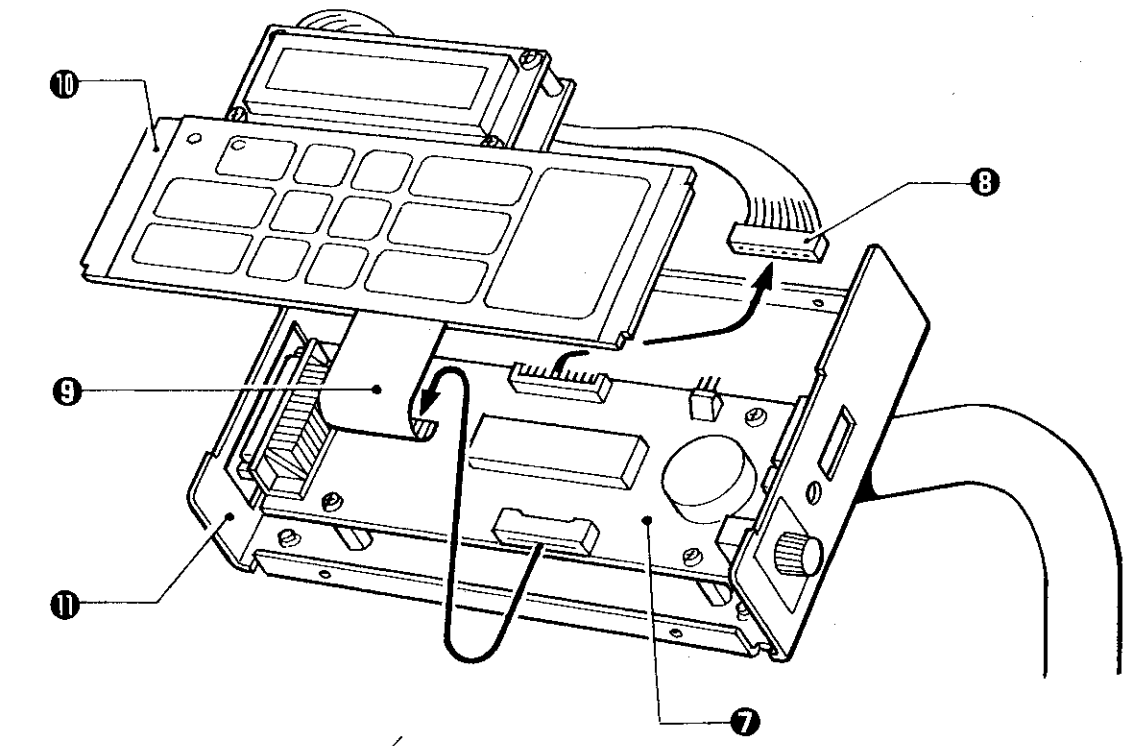
[BAS-401 · 416]

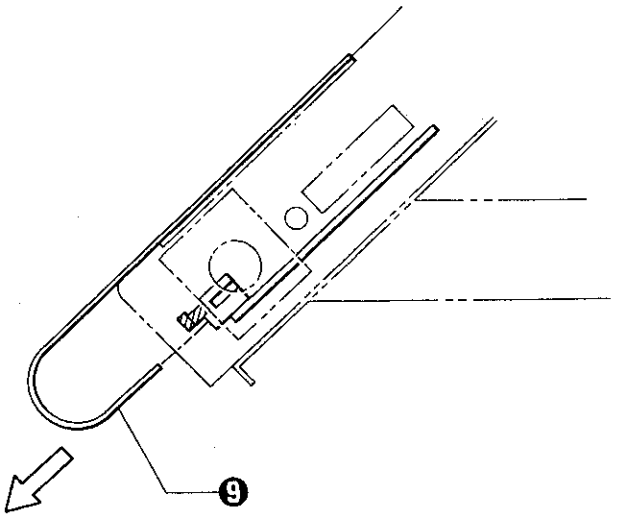
7-8. Keyboard circuit board (1)



1. Manually loosen the two screws ❷ in the keyboard cable ❶ and remove it.
2. Loosen the four screws ❸. Pull the upper part of the panel ❹ toward yourself and detach it.
   NOTE: At this time, do not pull strongly on the EMERGENCY stop switch ❺ cable.
3. Disconnect the EMERGENCY switch ❺ connector ❻ from the keyboard circuit board ❼.

7-8. Keyboard circuit board (2)

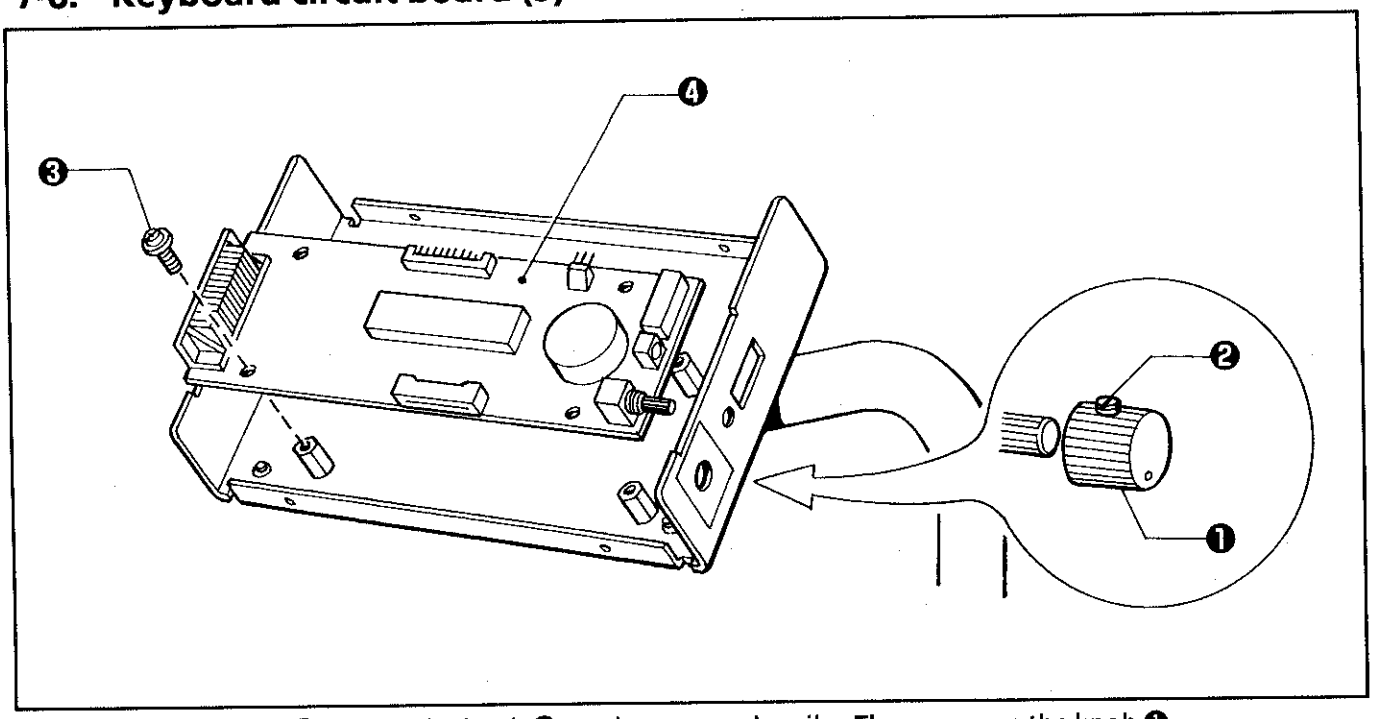




Pull the hatched part of the black connector attached to the flat cable shown in the figure on the left.
Release the lock and pull the flat cable toward yourself.

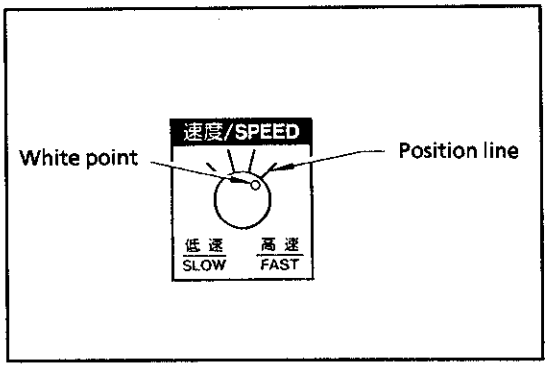
4. Disconnect the connector ⑧ from the keyboard circuit board ⑦.
5. Disconnect the flat cable ⑨ from the keyboard circuit board ⑦.
6. Lift the sheet key support ⑩ and remove it from the panel base ⑪.

7-8. Keyboard circuit board (3)

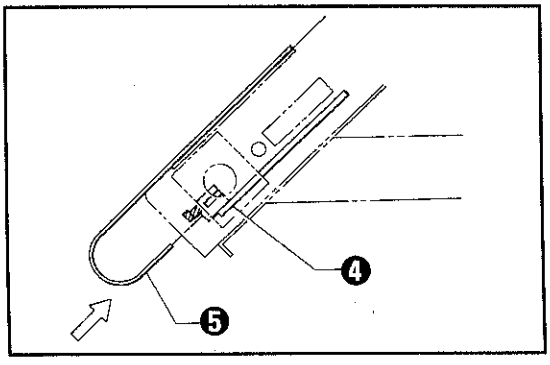


7. Loosen the screw ❷ so that the knob ❶ can be removed easily. Then, remove the knob ❶.
8. Remove the four screws ❸ and the keyboard circuit board ❹.
9. When assembling, reverse the above procedure. For assembling, note the following points.

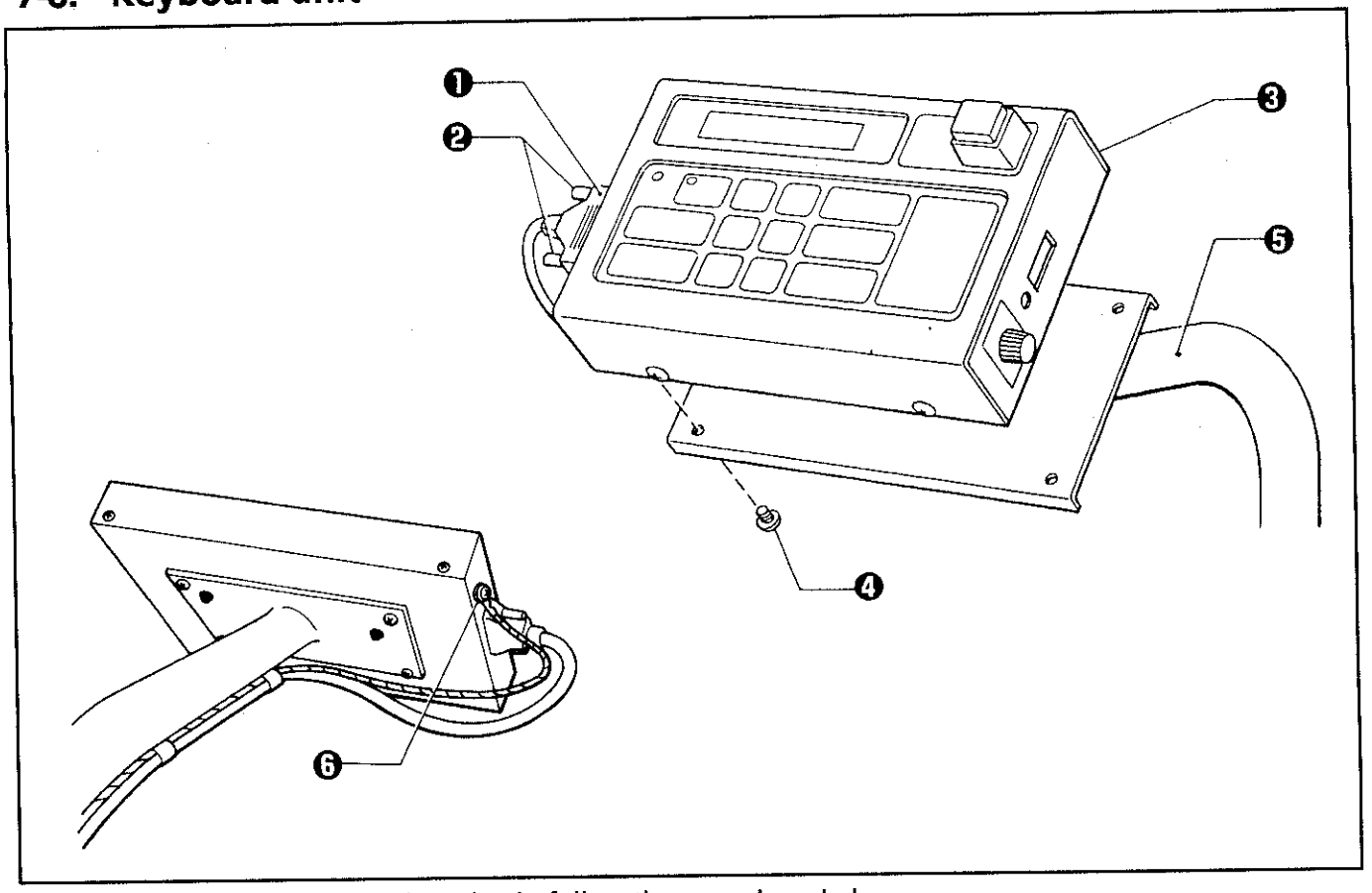
NOTE1: Attach the contrast knob ❶ as follows:
Align the white point of the knob ❶ with the position line. Tighten the screw ❷.



NOTE2: Insert the flat cable ❺ connector while the black connector lock is released. Insert the hatched part of the connector to lock it in place.
Pull the flat cable ❺ lightly to check if it is locked properly.
If flat cable is loose, the cables may have been improperly inserted into the slots. Release the lock and insert into the slots correctly.



7-8. Keyboard unit

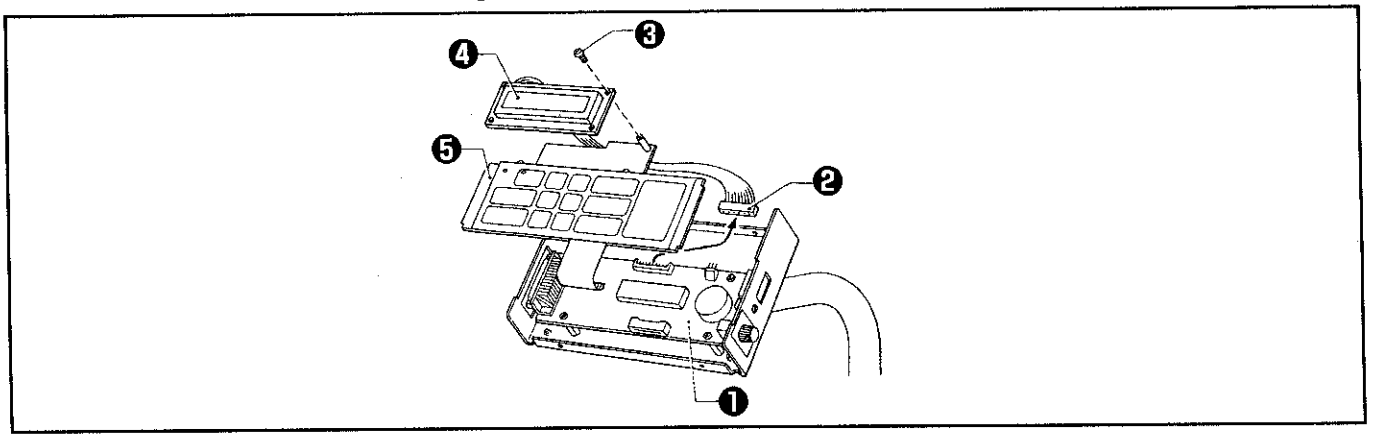


When replacing the whole keyboard unit, follow the procedures below.

1. Manually loosen the two screws ❷ in the board cable ❶ and remove it.
2. Remove the four screws ❹ on the back side of the keyboard unit ❸. Then remove it from the keyboard stand ❺.
   At this time, be careful not to drop the keyboard unit ❸.
3. When assembling, reverse the above procedure.

NOTE: Be sure to connect the ground wire ❻.

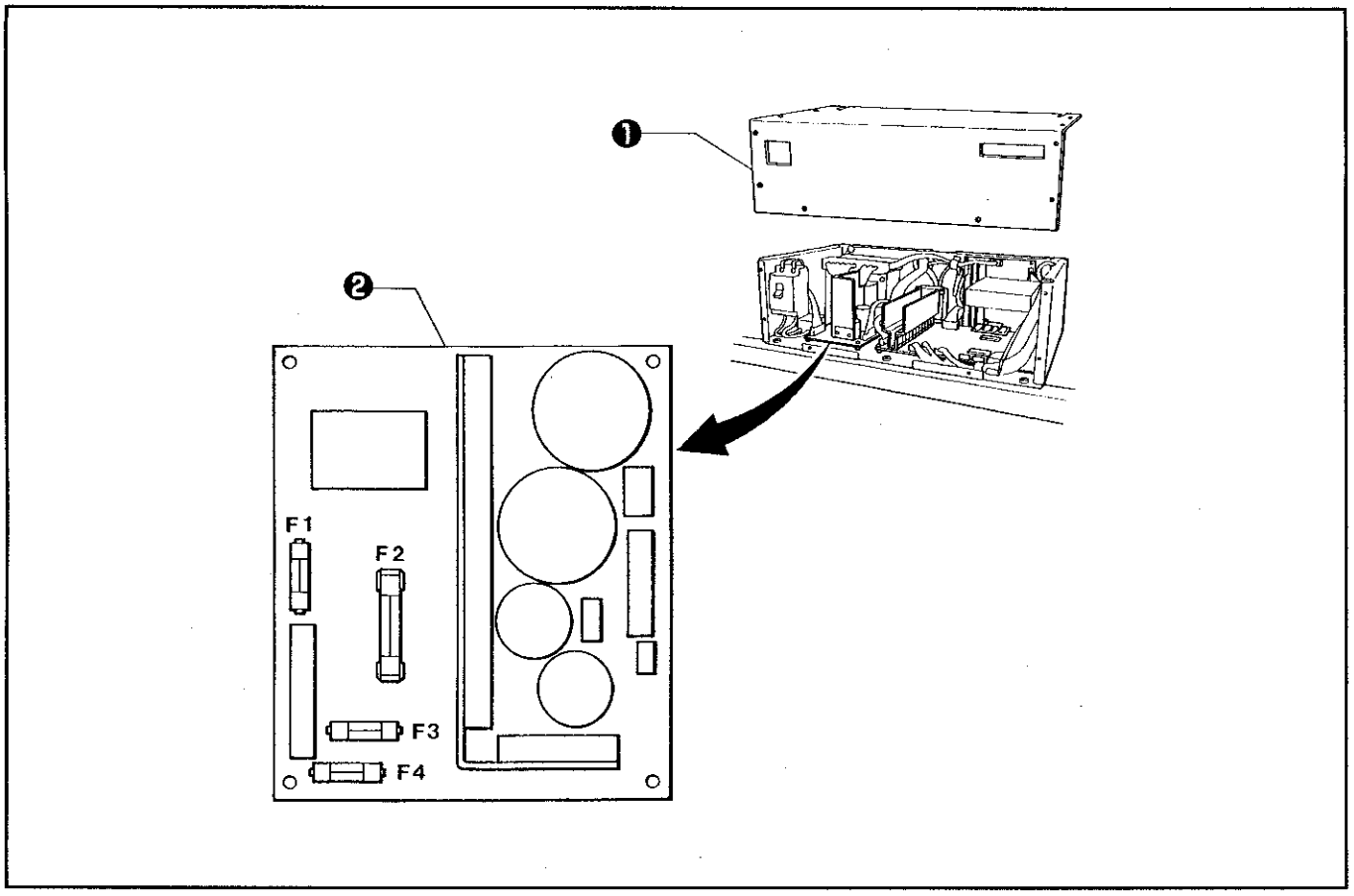
7-9. LCD module assembly



1. Remove the connector ❷ from the keyboard circuit board ❶.
2. Remove three screws ❸ and the LCD module assembly ❹.

7-10. Fuses

7-10-1. Position of fuses



1. Remove cover ❶.
2. There is a fuse holder in front of the transformer in the power supply unit ❷. For fuses are fixed in the fuse holder.

Fuse type and capacity

No.	Fuse type & capacity	Part code	Reference
F1	Fuse 5A Slow blow fuse	415814-001	For totally enclosed 3-phase motor
F2	Fuse 15A Glass tube fuse	S02887-000	For XY-pulse motor For solenoid
F3	Fuse 5A Slow blow fuse	415814-001	For pulse motor For bobbin winder motor
F4	Fuse 5A Slow blow fuse	415814-001	For main circuit board

NOTE: Be sure to use only fuses of authorized types and capacities.
NOTE: While the circuit protector is activated, the thread winding motor will not rotate. Let the protector cool for a while before pushing it back. Otherwise, it may trip again.

7-10-2. Replacing fuse

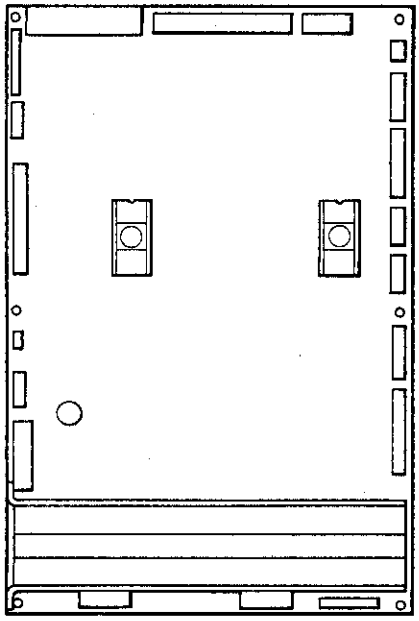
The following problems occur if the fuse is blown.
When replacing fuse, be sure to use a new one having the same quality and capacity as the old one.

NOTE: Be sure to turn off the power before replacement.
NOTE: During replacement, tightly attach each fuse into its socket.

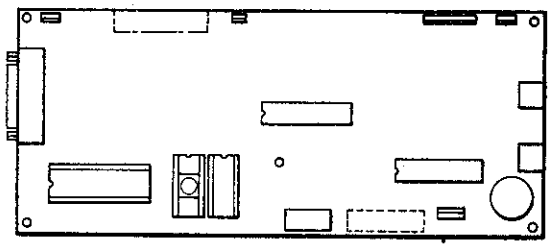
Fuse No.	Problem
F1	Sewing machine motor does not run at all. Overload
F2	· X and Y carriages do not move at all. Home position detection error occurs. · Solenoid does not operate. (Thread trimmer does not function)
F3	Needle bar case locking. Bobbin winder motor does not operate.
F4	Operation panel display is blank and the sewing machine does not operate.

7-11. P-ROMs

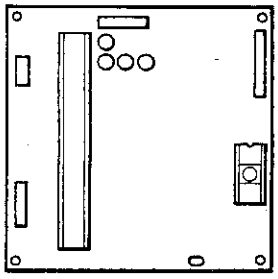
[BAS-412]



Main circuit board

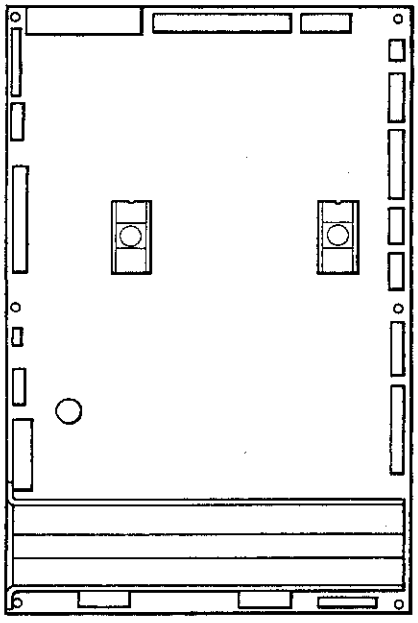


Keyboard circuit board

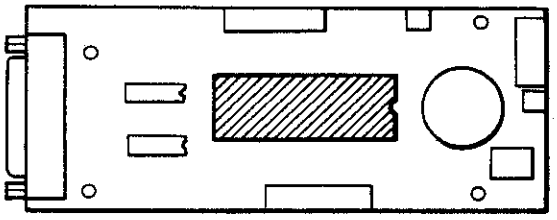


Sewing machine motor circuit board
(common for all models)

[BAS-401 · 416]



Main circuit board

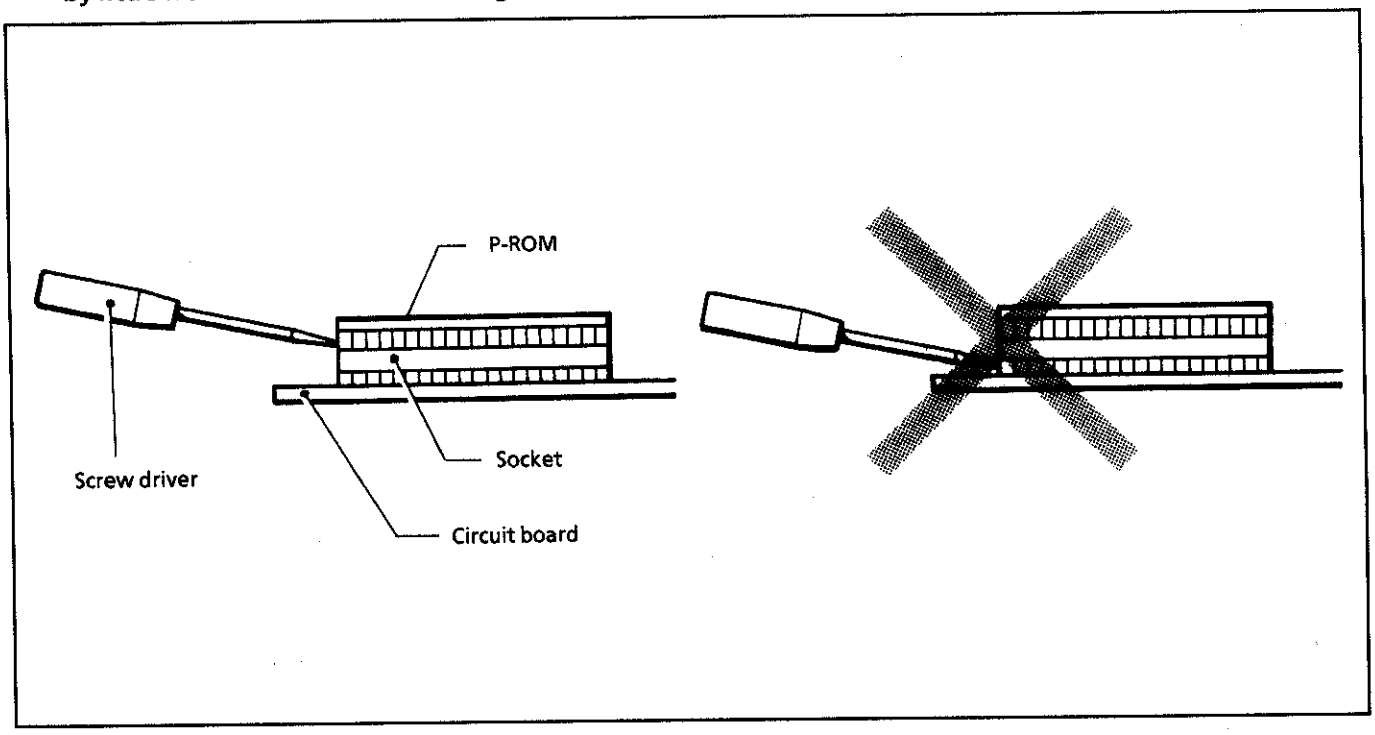


Keyboard circuit board

Be sure to turn off the power before replacement.

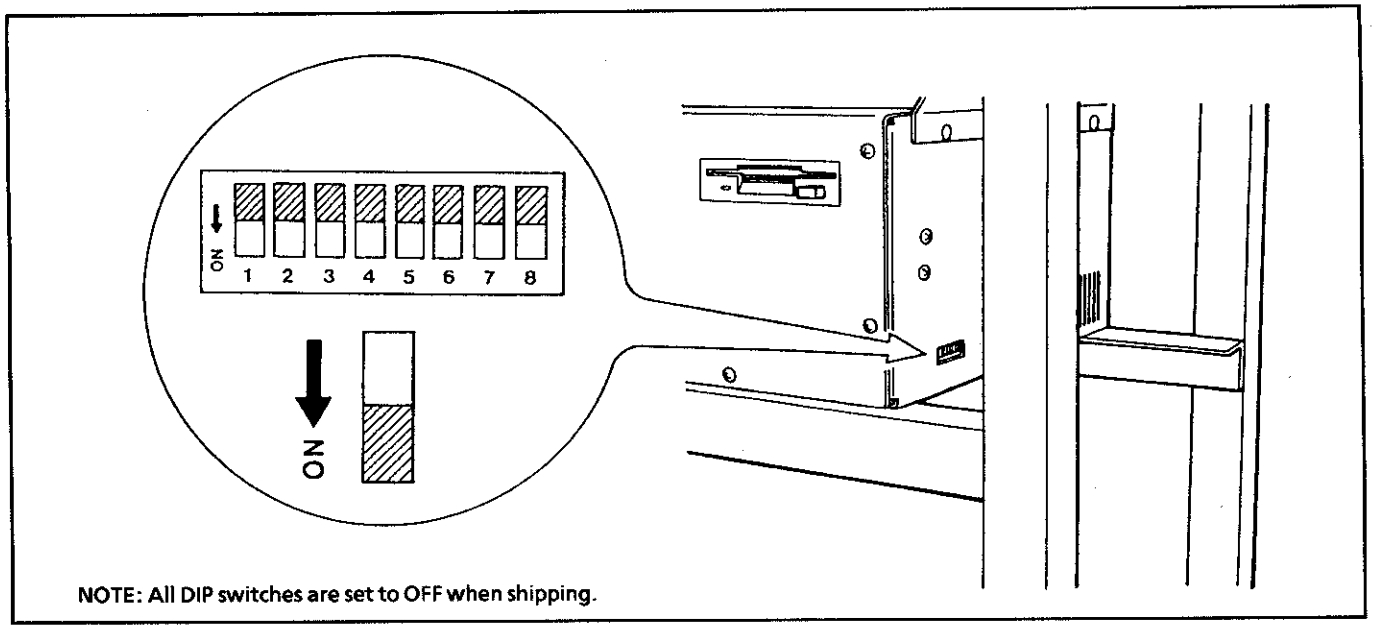
NOTES:

1. Use care when handling the PROMs. Make sure the pins are properly inserted in the sockets.
2. Do not apply excessive force when mounting the PROM on the circuit board.
3. Confirm that the PROMs are in the correct position and direction.
4. Use of the special PROM removal tool is recommended when removing the PROM. If a screwdriver must be used, be careful not to damage the PROM socket and the circuit board. Carefully lift the PROM little by little from both sides. See the figure.



7-12. DIP switch functions

[BAS-412]



NOTE: All DIP switches are set to OFF when shipping.

1. SW1 .... Use this key to choose between mm and inch unit system.

By switching the DIP switch on, the total length of a pattern or the set sewing area can be specified in inches.

Display in inches

Example 1 Area

ARA : V 10.10 " H 15.30 "

This indicates that the vertical length is 10.10 inches (= 257mm) and the horizontal length is 15.30 inches (= 389mm).

Example 2 Total length

LG:V □□.□□" H □□.□□"

When setting the total length :
the data is in 4 digits, the minimum unit being 0.01 inches.

Example 3 To set and confirm hoop feed point

HOP: X 10.00 " Y 15.00 "

Example entry

When setting the vertical length for 3.5 inches and the horizontal length for 10 inches:

Vertical | 0 | 3 | 5 | 0 | Press numeric keys | 0 | 3 F3 | 5 F5 | 0 |

Horizontal | 1 | 0 | 0 | 0 | Press numeric keys | 1 F1 | 0 | 0 | 0 |

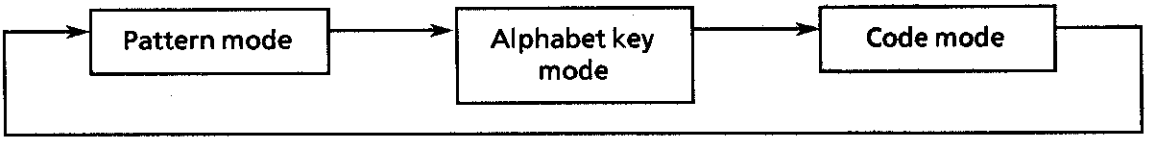
Enter degits in order from left to right.

[NOTE] In using inches, errors within 0.254mm should be tolerated, for the minimum unit is 0.01 inches.
In using millimeters, errors within1mm should be tolerated, for the minimum unit is 1mm.

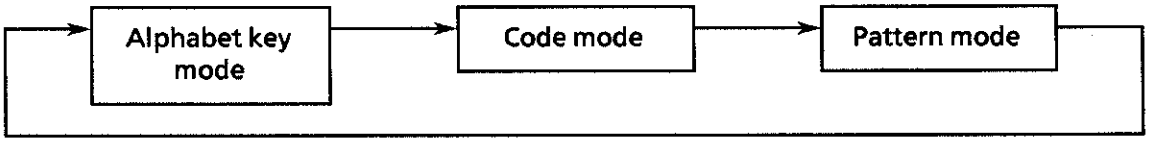
2. SW2 .... The mode display order in the entry mode can be set differently with DIP switch 2.

(When actually in the entry mode, switching to the next mode is done by pressing the PATTERN key.)

° SW2 = ON
Pattern mode is displayed first.



° SW2 = OFF
Alphabet key mode is displayed first.



3. SW3 .... The sewing start point of the embroidery can be changed by switching DIP switch 3.

° SW3 = ON
When the entered data is one pattern, the needle location will be the sewing start point (the first stitch).
In this case, the area check and the test feed function are not available.
In entry mode or when the entered data is two patterns or more, the sewing start point will be the same as when the SW3 is OFF.

° SW3 = OFF
The sewing start point is selected by the centering function.

4. SW4 .... Use this key to set the thread trimming between characters (Brother format) to ON/OFF.

° SW4 = ON
Thread trimming will not be done between characters. (Cross-over stitch is possible.)

° SW4 = OFF
Thread trimming will be automatically done between characters. (Cross-over stitch is not possible.)

5. SW5 .... Data reading or sewing can be completed even if another floppy disk is inserted half way.

° SW5 = ON
Even if another floppy disk is inserted during data reading or sewing of a character (pattern), machine will continue reading or sewing until it is done.

° SW5 = OFF
If another floppy disk is inserted during data reading or sewing of a pattern (character), machine will stop operation at that point.

[NOTE] Do not take out the floppy disk from the disk drive during data reading or sewing. It may cause errors or hinder correct sewing.

6. SW6 .... This switch is used to turn inching on or off after thread trimming.

° SW6 = ON
Inching operation after thread trimming will not occur.

° SW6 = OFF
Inching operation after thread trimming can be carried out.

7. SW7 .... This switch is used to set the power mode for embroidery hoop feed.

° SW7 = ON
This sets the power mode for hoop feed to Power Up mode during embroidering.

° SW7 = OFF
This sets the power mode for hoop feed to Power Save mode during embroidering.

8. SW8 .... This switch is used to set the size for the cap frame.

° SW8 = ON
The cap frame area will be set to wide area size (360 x 85 mm).

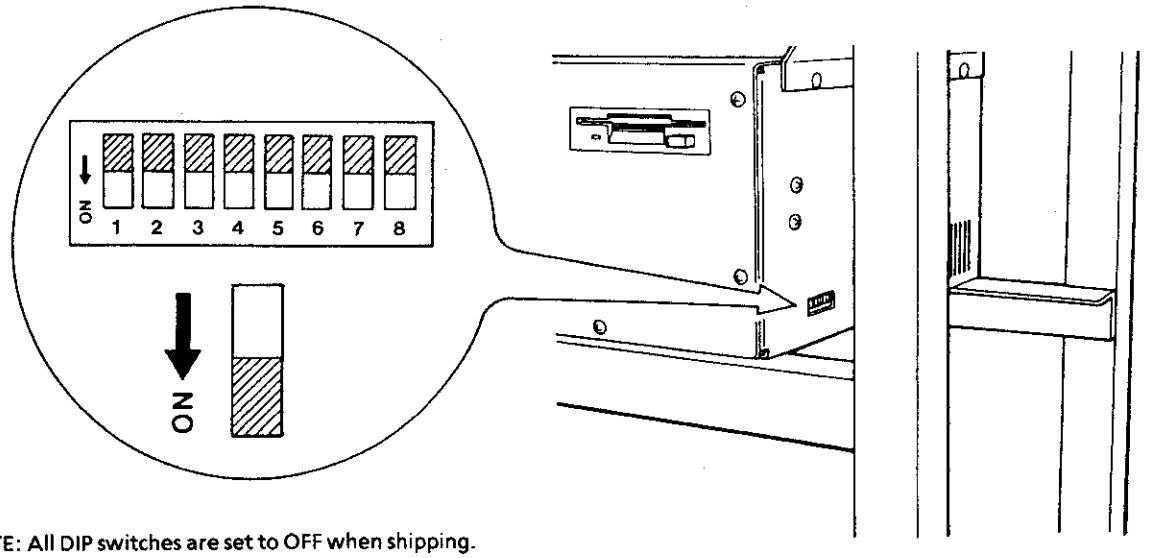
° SW8 = OFF
The cap frame area will be set to standard size (150 x 85 mm).

[NOTE] When switching the cap frame area, replace the cap frame overtravel dog according to the area size.

[BAS-401 · BAS-416]

7-12-1. DIP switch functions on main printed circuit board

NOTE: The power of the machine should be turned off before changing switch.
If the power is not turned off, functions do not change.
Do not take out the floppy disk from the floppy disk drive during data reading and sewing. It may occur errors or hinder correct sewing.

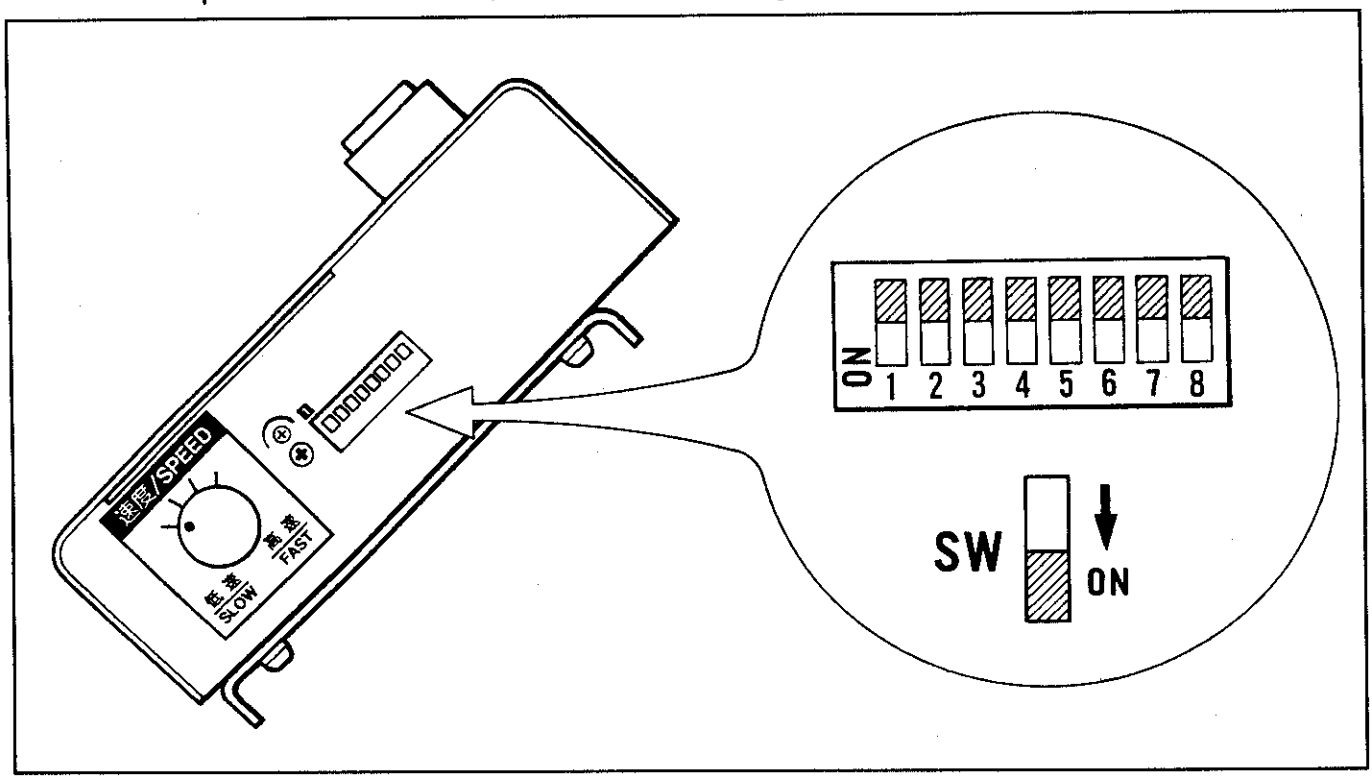


NOTE: All DIP switches are set to OFF when shipping.

switch number	state	function
SW1	OFF	To set the communication speed for the tape reader or editing system to 9600 bps (The speed can be set to 38400 bps when SW7 is ON)
	ON	To set the communication speed for the tape reader or editing system to 4800 bps (The speed can be set to 19600 bps when SW7 is ON)
SW2	OFF	To store data of floppy disk in the memory
	ON	To read and sew data of floppy disk (Data cannot be stored in the memory.)
SW3	OFF	Even if another floppy disk is inserted during data reading or sewing of a character (pattern), machine will continue reading or sewing until it is done.
	ON	If another floppy disk is inserted during data reading or sewing of a pattern (character), machine will stop operation at that point.
SW4	OFF	To display the hoop name for the embroidery data while embroidering
	ON	To display the embroidering speed while embroidering
SW5	OFF	To set normal power mode
	ON	To set Power Up hoop feed mode
SW6	OFF	To set inching after thread trimming
	ON	To cancel inching after thread trimming
SW7	OFF	Use in conjunction with SW1
	ON	
SW8	OFF	To display Japanese
	ON	To display English

7-12-2. DIP switch functions on operation panel

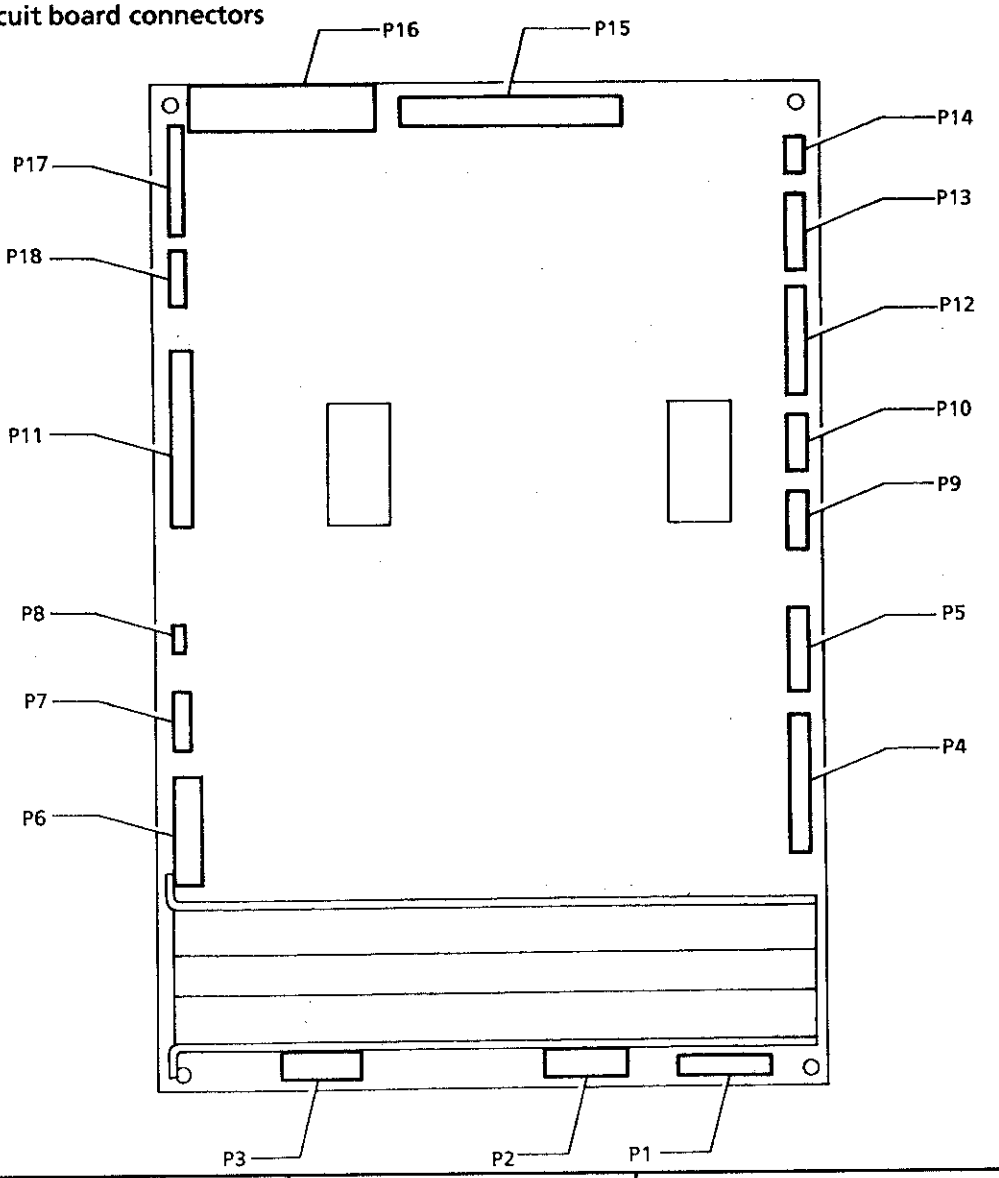
NOTE: The power of the machine should be turned off before changing switch.
If the power is not turned off, functions do not change.



switch number	state	function			
SW1		To jump stitch after thread trimming		SW1	SW2
SW2			more than 8 stitches	OFF	OFF
			more than 5 stitches	ON	OFF
			more than 3 stitches	OFF	ON
			without thread trimming	ON	ON
SW3	OFF	To set boring mode to OFF			
	ON	To set boring mode to ON			
SW4	OFF	To set boring shift to OFF			
	ON	To set boring shift to ON			
SW5	OFF	To return to sewing start point after sewing			
	ON	Not to return to sewing start point after sewing			
SW6	OFF	To adjust timing of hoop movement and needle rise for thin material (The maximum sewing speed is 1200 spm)			
	ON	To adjust timing of hoop movement and needle rise for thick material (The maximum sewing speed is 1000 spm)			
SW7	OFF	To set sewing start point of editing system data to first stitch			
	ON	To set sewing start point of editing system data to center of mask			
SW8	OFF	Standard cap frame mode (150×85) ··· Enabled when cap frame switch is ON			
	ON	Wide cap frame mode (360×85) ··· Enabled when cap frame switch is ON			

7-13. Connectors

7-13-1. Main circuit board connectors

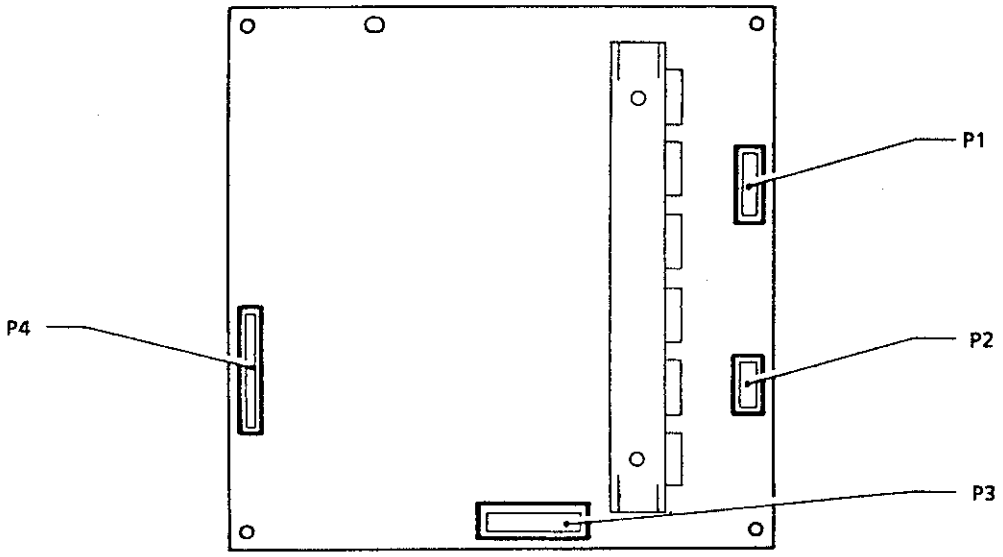


Connector No.	Connecting point	Drive signals	Symptoms resulting from bad connection
P1	Main circuit board - Solenoid	Solenoid drive output	Solenoid does not operate.
P2	Main circuit board - Y-pulse motor	Y-pulse motor driving power supply	· Y home position cannot be detected when power is turned on. · Unbalanced pattern
P3	Main circuit board - X-pulse motor	X-pulse motor driving power supply	· X home position cannot be detected when power is turned on. · Unbalanced pattern
P4	Main circuit board - Machine motor circuit board	Totally enclosed 3-phase motor control signal	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.

Connector No.	Connecting point	Drive signals	Symptoms resulting from bad connection
P5	Main circuit board - X home position sensor Main circuit board - Y home position sensor Main circuit board - Cap frame overtravel sensor	X-axis center detection Y-axis center detection Mechanical area over signal	· When power is turned on, "area over" is displayed. · When power is turned on, "area over" is displayed. · When power is turned on, "area over" is displayed although the needle is in the sewing area. (Cap frame mode) · During sewing, "area over" is displayed although the needle is in the sewing area. (Cap frame mode)
P6	Main circuit board - Power supply circuit board	+ 5V (whole main circuit board) + 24V (Pulse motor for needle bar replacement) + 60V (X-Y pulse motor) + 60V (Solenoid)	· Control function does not operate well, or does not operate at all. · Pulse motor for needle bar replacing does not run. (Needle bar does not move.) · X-axis pulse motor does not run. · Y-axis pulse motor does not run. · Solenoid does not operate.
P7	Main circuit board - Pulse motor for needle bar replacement (Unused for the BAS-401.)	Pulse motor driving output for needle bar replacement	· Needle bar case locking · Improper needle bar case position
P8	Main circuit board - DC Fan motor		
P9	Not available	———	———
P10	Main circuit board - Cap frame switch	Cap frame mode signal	· Machine cannot enter cap frame mode.
P11	Main circuit board - Memory expansion board	Memory expansion control signal	· Control function is faulty. · Data with too many stitches cannot be loaded.
P12	Main circuit board - Needle bar case motor sensors Wiper sensor	· Needle bar case position signall · Wiper sensor signal	· Needle bar case does not move correctly. · Wiper does not retract.
P13	Main circuit board - Rotary encoder Stop position sensor	· Timing pulse motor signal · Synchronize signal · Stop position signal	· Hoop does not move during sewing. · Thread trimmer does not function correctly. · Pulley does not stop at correct position when machine motor is stopped.

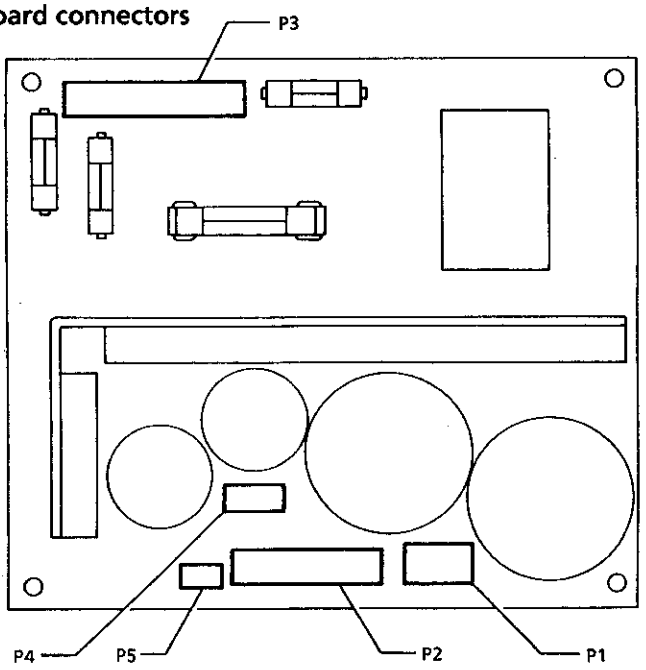
Connector No.	Connecting point	Drive signals	Symptoms resulting from bad connection
P14	Main circuit board - Thread sensor (Thread breakage detector)	Needle thread breakage signal	· Thread breakage detector always activates.
P15	Main circuit board - 3.5 in. floppy disk drive	Input/Output signal of FDD	· FDD does not function. · Data in floppy disk cannot be read.
P16	Main circuit board - Editing system or paper tape reader	Serial comminucation control signal	· Comminucation with editing system cannot be done. (Data cannot be received.) · Data in the tape cannot be read through paper tape reader.
P17	Main circuit board - Operation keyboard	Operation keyboard control signal	· Nothing happens after power is turned on. · Display is blank.
P18	Unused	———	———

7-13-2. Machine motor circuit board connectors



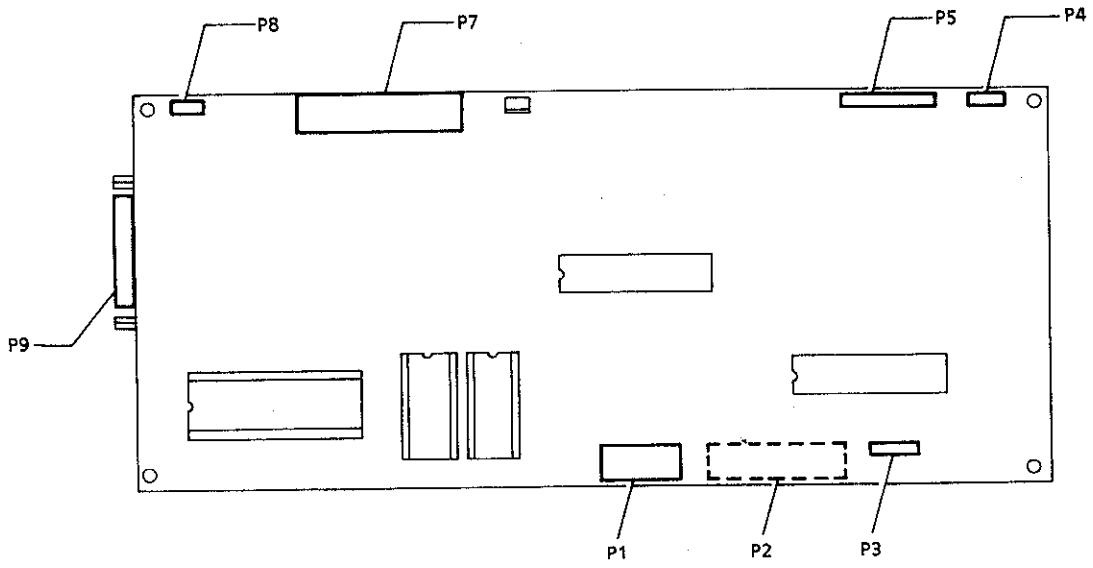
Connector No.	Connecting point	Drive signals	Symptoms resulting from improper connection or breakage
P1	Machine motor circuit board – Totally enclosed 3-phase Motor	Motor output (UVW)	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.
P2	Machine motor circuit board – Power supply circuit board (P9)	Totally enclosed 3-phase motor DC power supply	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.
P3	Machine motor circuit board – Transformer	AC10V	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.
P4	Machine motor circuit board – IO circuit board (P7)	Totally enclosed 3-phase motor control signal	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.

7-13-3. Power supply circuit board connectors



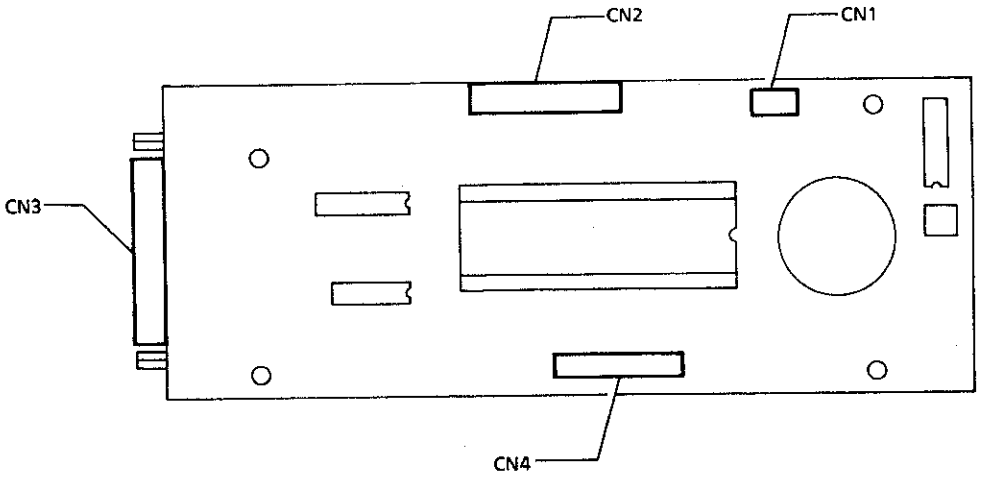
Connector No.	Connecting point	Drive signals	Symptoms resulting from improper connection or breakage
P1	Power supply circuit board – Machine motor circuit board (P2)	Totally enclosed 3-phase motor DC power supply	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked.
P2	Power supply circuit board – Main circuit board (P6)	· XY-pulse motor driving power supply · Solenoid driving power supply · Pulse motor driving power supply · Main circuit board power supply	· X and Y home position cannot be detected when power is turned on. · Solenoid does not work. · Needle bar case is locked. · Control function does not operate well, or does not operate at all.
P3	Power supply circuit board – Transformer	· Totally enclosed 3-phase motor AC power supply · X-pulse motor AC power supply Y-pulse motor AC power supply · Solenoid AC power supply · Main circuit board AC power supply · Pulse motor driving power supply	· Totally enclosed 3-phase motor does not rotate. · Thread trimmer does not function. · Motor is locked. · X and Y home position cannot be detected when power is turned on. · Solenoid does not work. · Control function does not work. · Needle bar case is locked.
P4	Power supply circuit board – Bobbin winder (optional)	Bobbin winder motor driving power supply	· Bobbin winder motor does not rotate.
P5	Power supply circuit board – 3.5 FDD	FDD power supply	· FDD does not work at all.

7-13-4. Keyboard circuit board connectors (BAS-412)



Connector No.	Connecting point	Drive signals	Symptoms resulting from improper connection or breakage
P1 P2	Keyboard circuit board – Sheet key switch	Key input signal	· Key input cannot be made.
P3	Keyboard circuit board – Shift lamp circuit board	Shift lamp control signal	· Shift lamp do not light.
P4	Keyboard circuit board – 7-segment lamp circuit board	· Thread sensor lamp control signal · Centering lamp control signal	· Thread sensor lamp does not light. · Centering lamp does not light.
P5	Keyboard circuit board – 7-segment lamp circuit board	Numeric lamp control signal	· Noting appears on LCD.
P7	Keyboard circuit board – LCD	LCD control signal	· Nothing appears on LCD.
P8	Keyboard circuit board – Emergency stop switch	Emergency stop signal	· Emergency stop cannot be cancelled.
P9	Keyboard circuit board – Main circuit board (P6)	Keyboard control signal	· Nothing functions. · Key input cannot be made.
P6 P10	Unused		

(BAS-401 · 416)



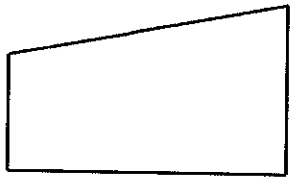
Connector No.	Connecting point	Drive signals	Symptoms resulting from improper connection or breakage
CN1	Keyboard circuit board – Emergency stop switch	Emergency stop signal	· Emergency stop cannot be cancelled.
CN2	Keyboard circuit board – LCD	LCD control signal	· Nothing appears on LCD.
CN3	Keyboard circuit board – Main circuit board (P6)	Keyboard control signal	· Nothing functions. · Key input cannot be made.
CN4	Keyboard circuit board – Sheet key switch	Key input signal	· Key input cannot be made.

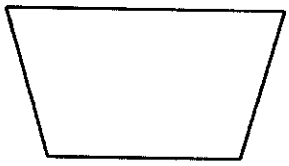
8. TROUBLESHOOTING

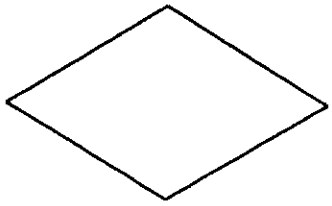
[BAS-412]

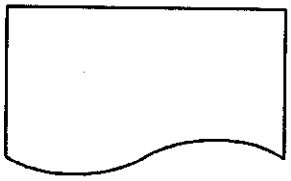
8-1. Trouble shooting flow chart

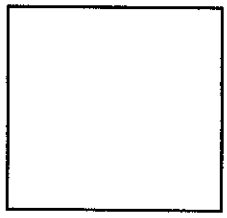
8-1-1. Symbols

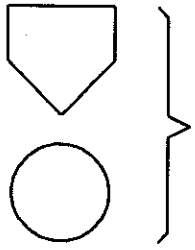
1.  indicates manual operation.

2.  indicates switch operation.

3.  selects the course of action to follow, using a yes-or-no decision-making process.

4.  indicates that the procedure to follow appears in the first column of "problem determination and solution table."

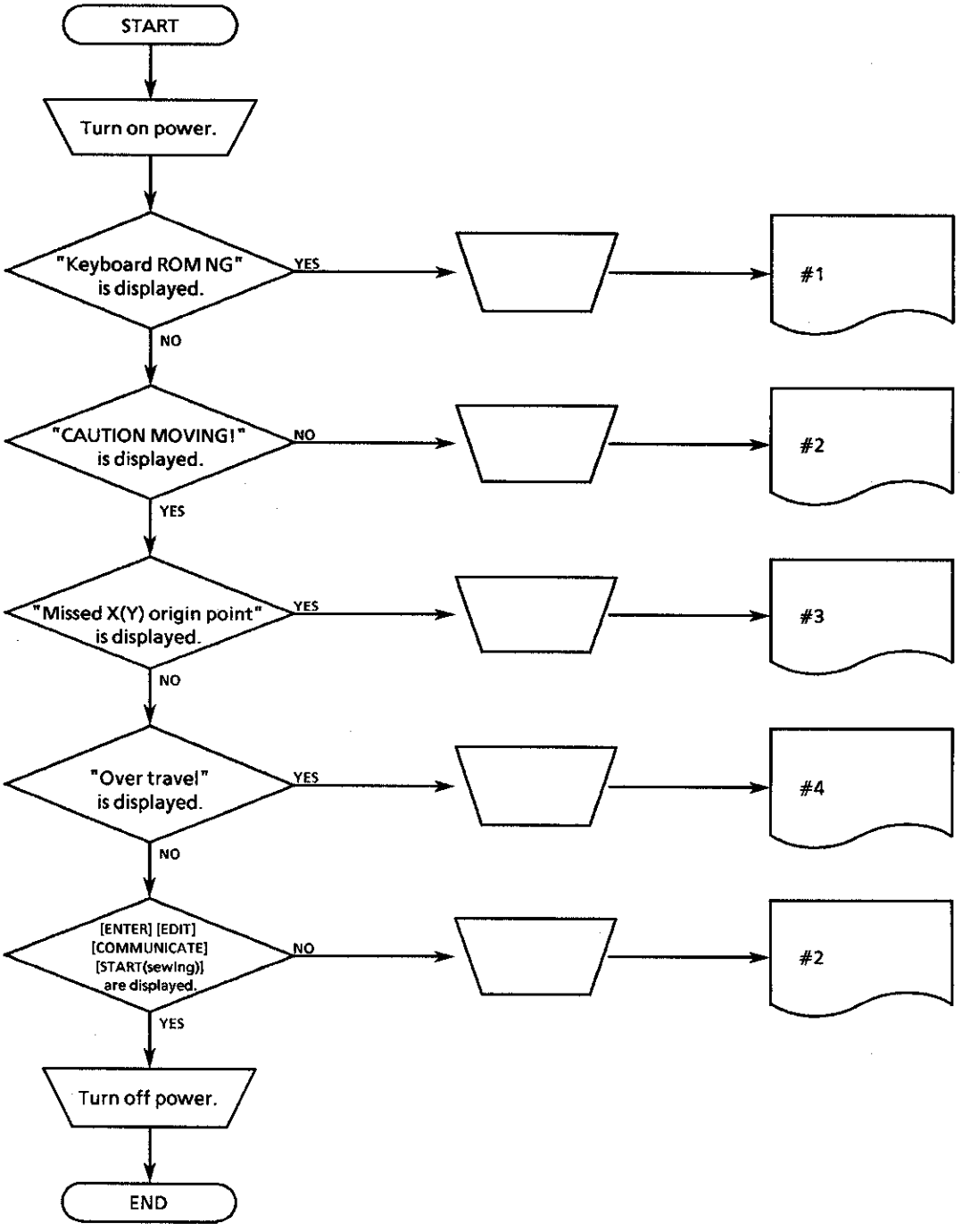
5.  indicates setting-up operation.

6.  indicates that the procedure to follow appears on the next page.

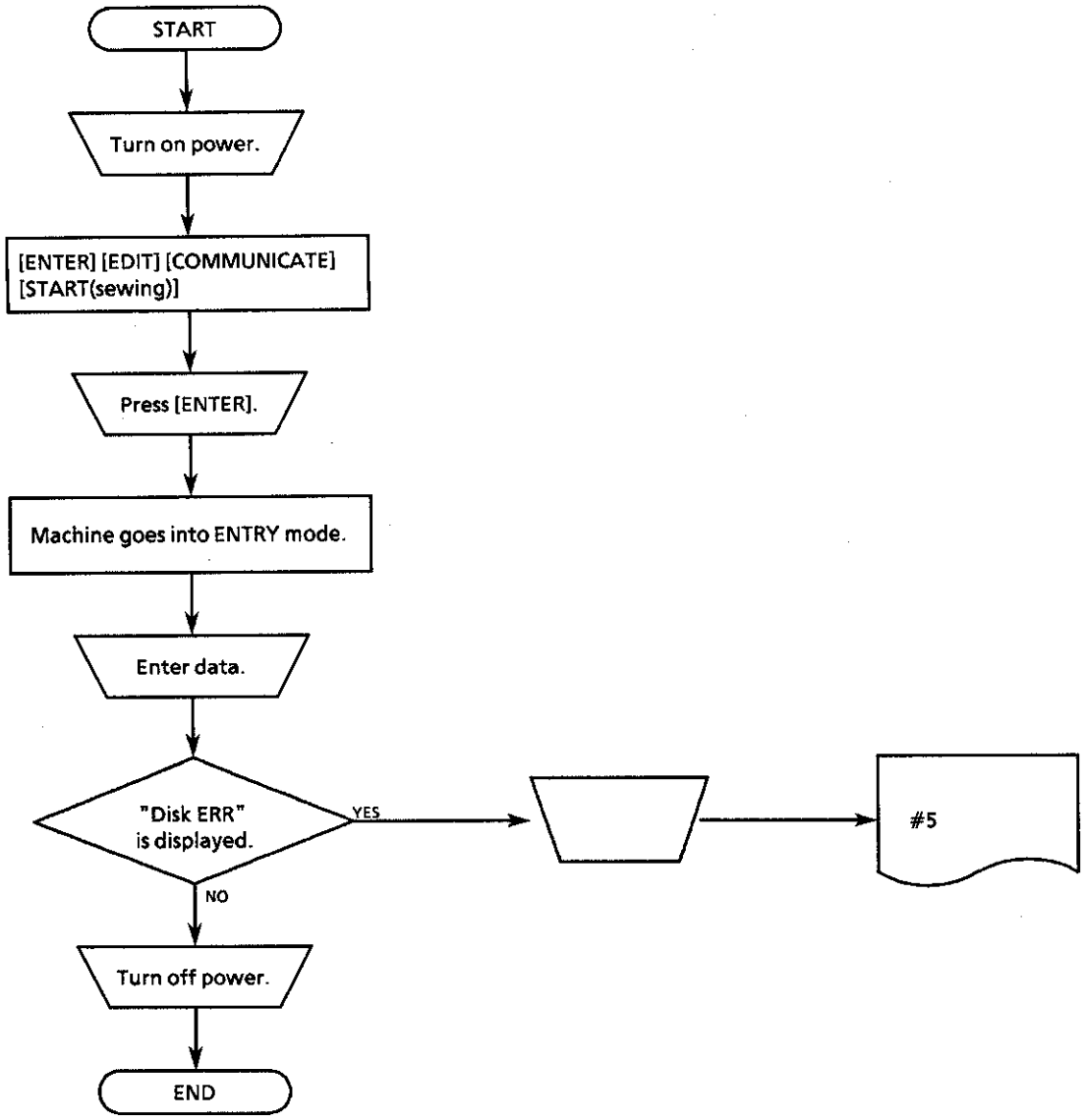
7.  indicates turning-off the power switch.

8-1-2. Troubleshooting flow chart

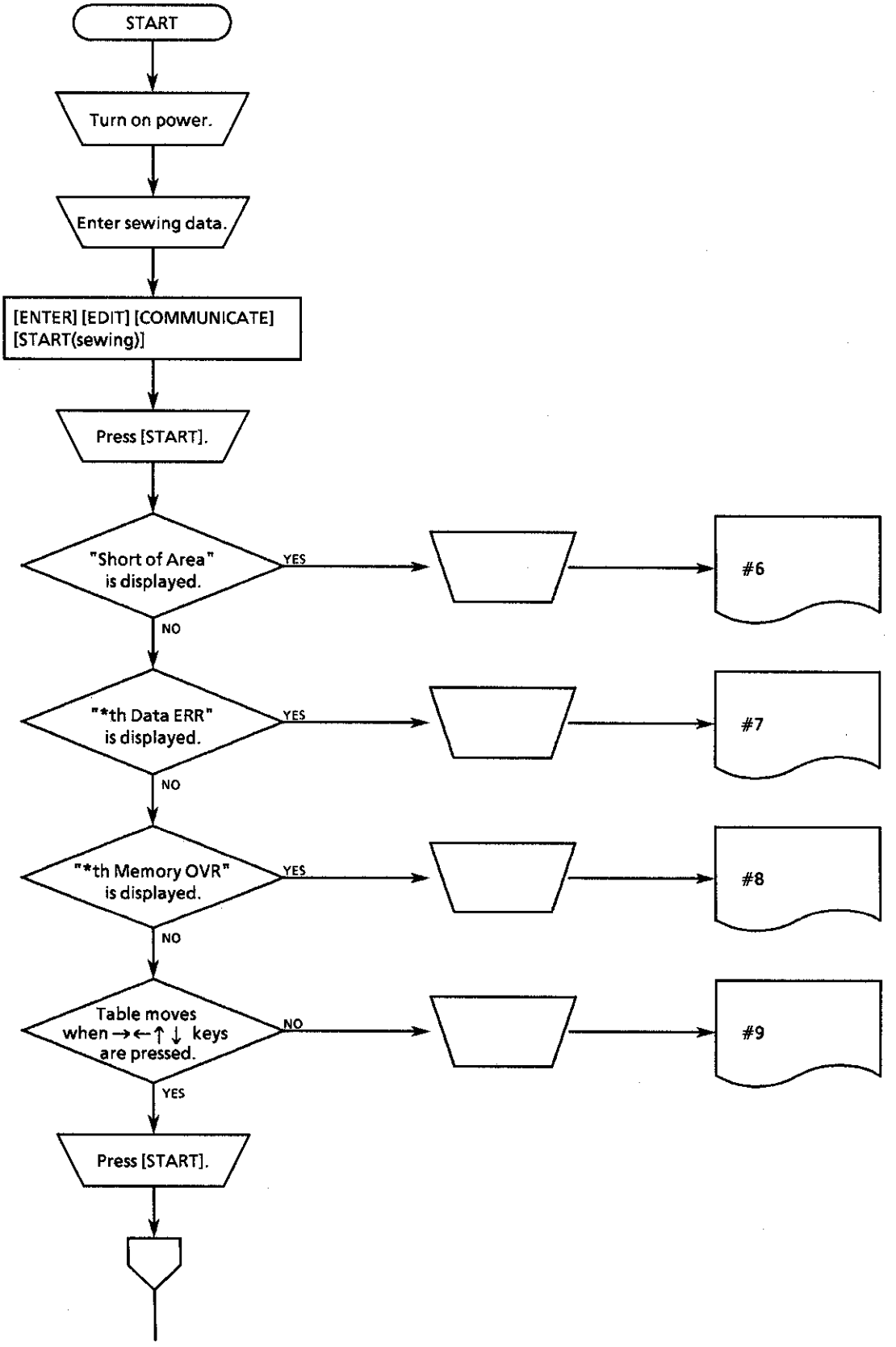
1. When power is turned ON:

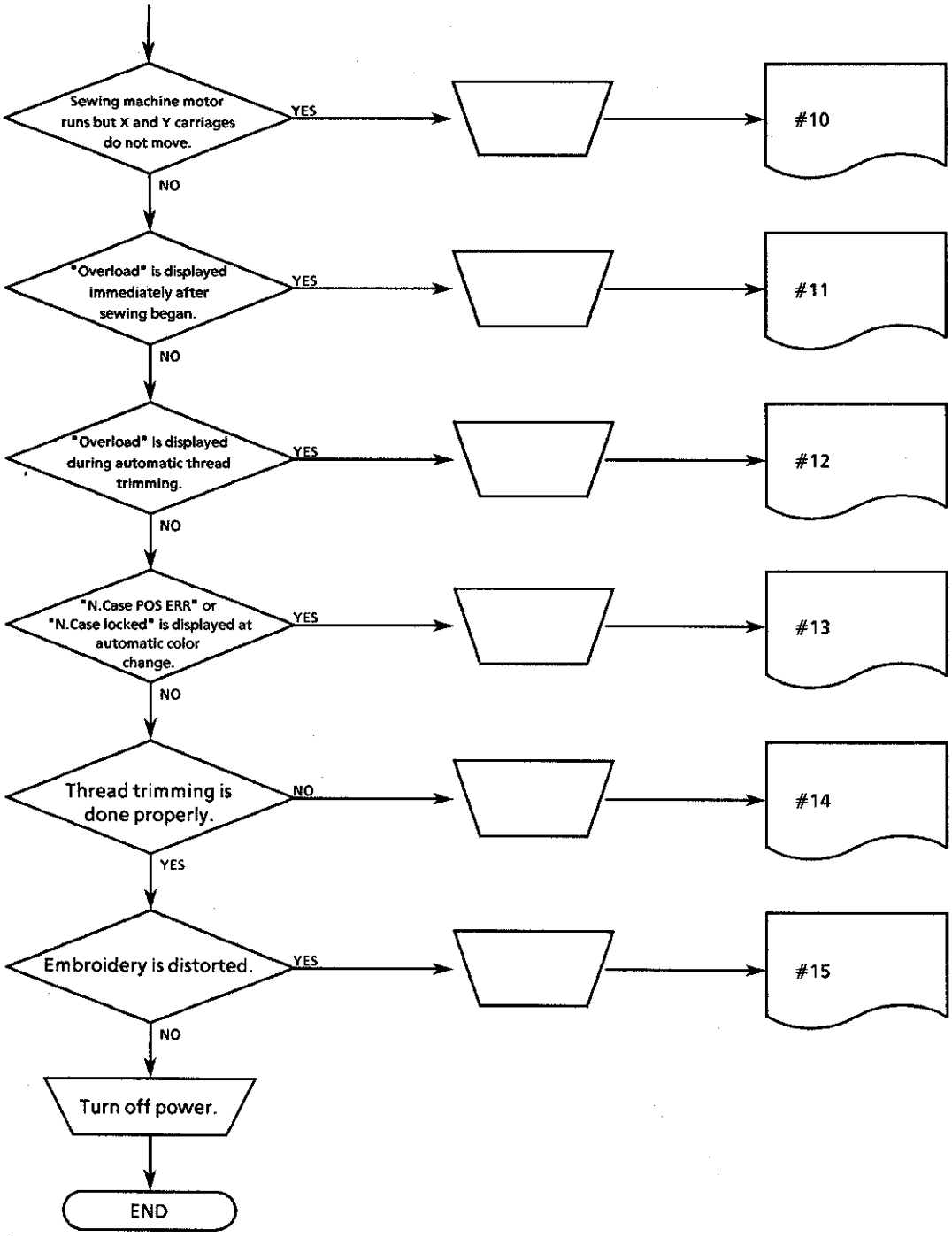


2. In data entry mode

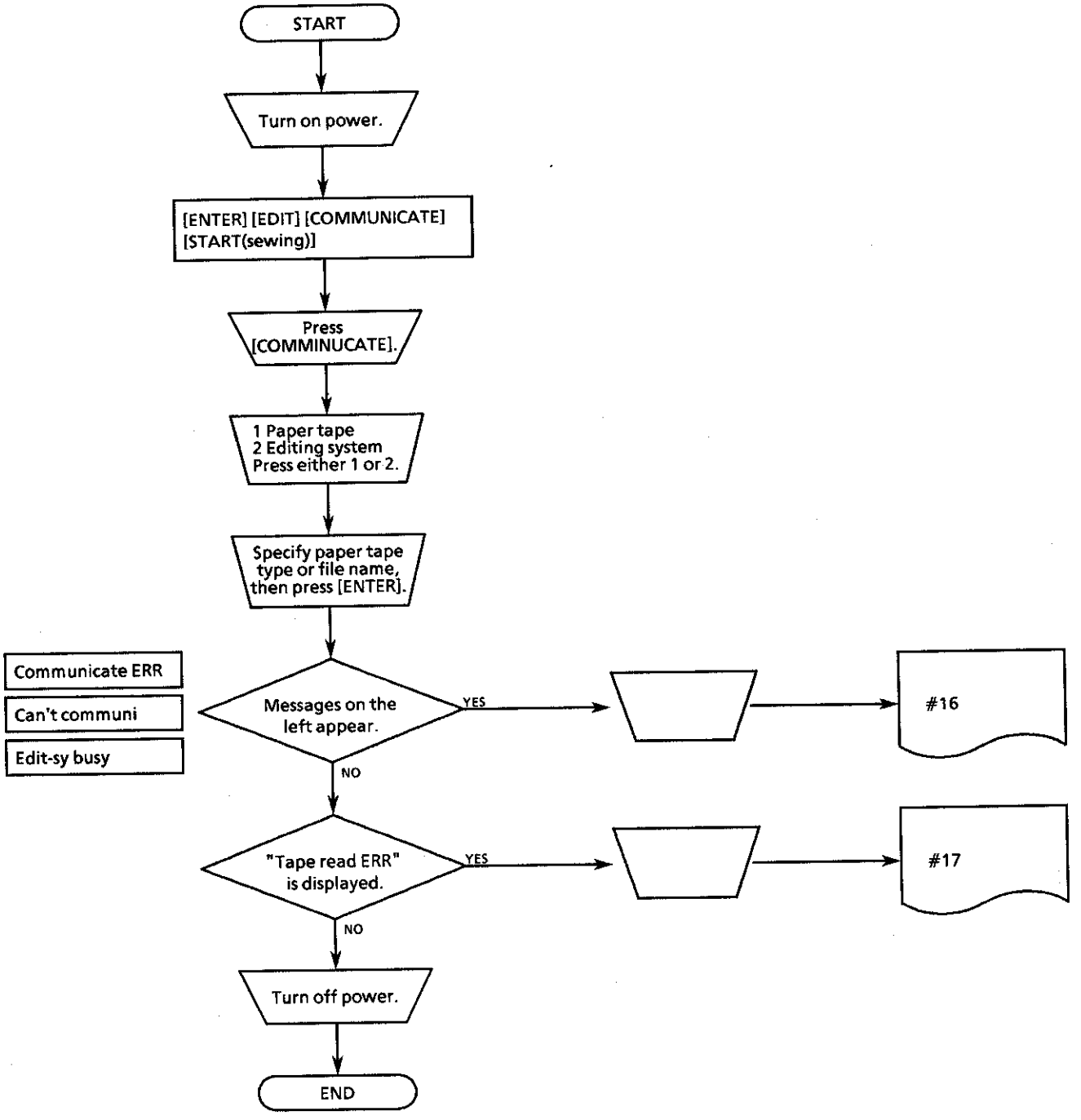


3. In sewing mode

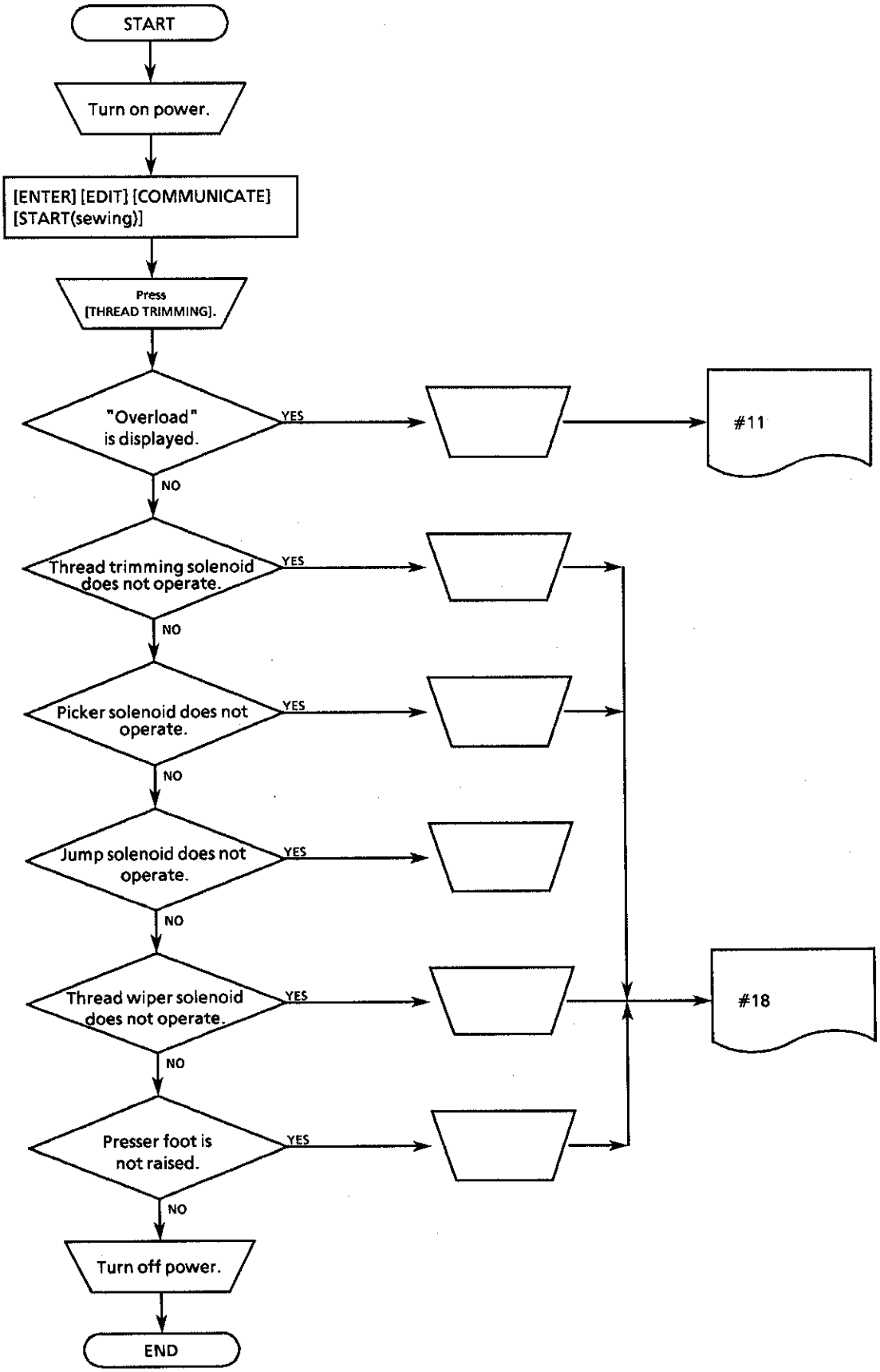



Sewing machine motor runs but X and Y carriages do not move.
YES
#10
NO
"Overload" is displayed immediately after sewing began.
YES
#11
NO
"Overload" is displayed during automatic thread trimming.
YES
#12
NO
"N.Case POS ERR" or "N.Case locked" is displayed at automatic color change.
YES
#13
NO
Thread trimming is done properly.
NO
#14
YES
Embroidery is distorted.
YES
#15
NO
Turn off power.
END

4. In communication mode



5. Electric solenoid



8-2. Problem determination and solution

Precautions

1. Be sure to turn off the power before plugging/unplugging the power cord.
2. Be sure to turn off the power before opening the machine cover or disconnecting cables.
3. In the CHECK/ADJUSTMENT/REPAIR column of the following tables:
   Measure resistance after power is turned off for letters enclosed in circles (ex. ⓐ).
   Measure voltage while the power is applied for letters indicated in squares (ex. [a]).
4. When replacing a fuse, be sure to use a new one of the same quality and capacity as the old one.
5. Check that all harnesses and connectors are correctly connected.

<Before making adjustment>

1. Check that no fuse has blown and each plug is correctly inserted.
2. Locate the where the problem is situated while referring to the flow chart.
3. From the applicable part of the flow chart, take the reference number to find the correspondingly numbered details of the problem in the following table.

<Before replacing parts>

Be sure to check harness connected to the part before replacing it.
Refer to the circuit block diagram and description of connectors, test continuity of the harness. If the harness has no abnormality, replace the part with a new one.

NO. IN FLOW CHART AND ERROR STATUS	CAUSE	CHECK/ADJUSTMENT/REPAIR	PARTS TO BE REPLACED	REF. PAGE
#1 Keyboard ROM NG is displayed.	1. Keyboard P-ROM version is improper.	Replace the keyboard P-ROM with the one matching main circuit board P-ROM.	P-ROM of keyboard	
#2 "CAUTION MOVING!" is not displayed.	1. Power is not supplied.	[a] Measure voltage of single phase power supply. If the voltage is not 100V AC (120V, 220V, 230V, 240V depending on where it is used.), it is defective.		
	2. Power switch or its cord defective	ⓐ Remove face cover on the left, turn on the power with power plug unconnected, then measure transformer input terminals of the power supply plug and power supply unit. If there is no continuity, the power switch is defective.	Power supply cord Breaker	
	3. Power supply circuit board defective	[a] With connector P6 of main circuit board unplugged, check the voltage of pins No.7 (+) and No.6 (-). If it is +5V, it is normal.	Power supply circuit board	
	4. Power harness defective	[a] While connector P6 of main circuit board is plugged, check +5V terminal on the main circuit board. If it is +5V, it is normal.	Power supply harness A Main circuit board	
	5. Keyboard cable defective	ⓐ Check that there is continuity between same numbers in double end connector of keyboard assembly. If there is no continuity, it is defective.	Keyboard cable	
	6. Operation panel defective	Replace operation panel.	Operation panel	
	7. Main circuit board defective	Replace main circuit board.	Main circuit board	
	8. Fuse F4 blown	Replace fuse.	Fuse	
#3 "Missed X-ORG. PT" or "Missed Y-ORG. PT" is displayed.	1. Power supply circuit board defective	[a] With connector P6 on main circuit board unplugged, check the voltage of pins No.1 (+) and No.5 (-). If it is not 60V, it is defective.	Power supply unit	
	2. Pulse motor defective	Replace pulse motor.	Pulse motor	
	3. Main circuit board	Replace main circuit board.	Main circuit board	
	4. Fuse F2 blown	Replace fuse.	Fuse	
#4 "Over travel" is displayed.	1. Home position sensor defective	ⓐ Check that connector P5 is correctly connected and proper continuity tested for.	Home position sensor	
	2. Over travel sensor defective	ⓐ Check that connector P5 is correctly connected and proper continuity tested for.	Over travel sensor	
	3. Main circuit board defective	Replace main circuit board.	Main circuit board	

NO. IN FLOW CHART AND ERROR STATUS	CAUSE	CHECK/ADJUSTMENT/REPAIR	PARTS TO BE REPLACED	REF. PAGE
#5 "Disk ERR." is displayed.	1. Floppy harness defective	ⓐ Check that connector P15 is correctly connected and proper continuity tested for.	Floppy harness	
	2. FDD power supply harness defective	Check that connector P5 of power supply circuit board is correctly connected or proper continuity tested for. With connector P5 of power supply circuit board removed, measure voltage between pin 1 (+) and pin 3 (-). If it is not +5V, it is defective.	FDD power supply harness	
	3. Floppy disk drive defective	Replace floppy disk drive.	Floppy disk drive	
	4. Improper media	a. Check that it is correct for machine. b. Check that media type is correct. 2DD cannot be replaced by 2HD, and vice versa.	Media Media type	
	5. Main circuit board defective	Replace main circuit board.	Main circuit board	
#6 "Short of Area" is displayed.	Mis-operation	Check area and ratio in editing mode.	----------	
#7 "*th data ERR." is displayed.	Improper media	Check media.	Replace media.	
#8 "*th Memory OVR" is displayed.	1. Mis-operation	Entered data exceeds the inside memory capacity and cannot be managed.	----------	
	2. Memory expansion board defective	Replace memory expansion board.	Memory expansion board	
	3. Main circuit board defective	Replace main circuit board.	Main circuit board	
#9 Hoop does not move.	Mis-operation	Area is set too small. Re-edit in editing mode.	----------	
	Refer to item #3.	Refer to item #3.	Refer to item #3.	Refer to item #3.
#10 Sewing machine runs but hoop does not move.	1. Encoder harness defective	ⓐ Check that connector P13 is correctly connected and proper continuity tested for.	Encoder harness	
	2. Rotary encoder defective	Replace rotary encoder.	Rotary encoder	
	3. Synchronizer defective	Replace synchronizer.	Synchronizer	
#11 Overload occurs immediately after sewing began.	1. Sewing machine motor circuit board harness defective	ⓐ Check that connector P4 is correctly connected and proper continuity tested for.	Sewing machine motor circuit board harness	
	2. Sewing machine motor circuit board	Replace sewing machine motor circuit board.	Sewing machine motor circuit board	
	3. Fuse F1 blown	Replace fuse.	Fuse	
#12 Overload occurs during automatic thread trimming.	Machinery defective Refer to item #11.	Repair and adjust machinery. Refer to item #11.	Refer to item #11.	
#13 Errors relative to needle bar case appear.	1. Head sensor harness defective	ⓐ Check that connector P12 is correctly connected and proper continuity tested for.	Index circuit board harness	
	2. Needle change pulse motor defective	Replace pulse motor.	Pulse motor	
	3. Circuit board defective	Replace PMD circuit board.	Main circuit board	
	4. Fuse F2 blown	Replace fuse.	Fuse	

<table>
<tr><th>NO. IN FLOW CHART AND ERROR STATUS</th><th>CAUSE</th><th>CHECK/ADJUSTMENT/REPAIR</th><th>PARTS TO BE REPLACED</th><th>REF. PAGE</th></tr>
<tr><td>#14
Thread trimming is not normal.</td><td colspan="3">Refer to "(5) electric solenoid" in troubleshooting.</td><td></td></tr>
<tr><td>#15
Embroidery is distorted.</td><td>1. Improperly adjusted machinery
2. Main circuit board defective
3. Mis-operation</td><td>Re-adjust machinery.
Replace main circuit board.
Check if machine is operated in hoop mode with cap frame.</td><td>----------
Main circuit board
----------</td><td></td></tr>
<tr><td>#16
Errors relative to communication appear.</td><td>1. Improper RS cable

2. Paper tape reader defective

3. Editing system defective

4. Main circuit board defective</td><td>Check that RS cable is correctly connected and proper continuity tested for.
a. Check that power is turned on.
b. Check that paper tape is set.
c. Replace paper tape reader.
a. Check that power is turned on.
b. Check that machine enters communication mode.
c. Replace editing system.
Replace main circuit board.</td><td>RS cable

Paper tape reader

Editing system
Main circuit board</td><td></td></tr>
<tr><td>#17
"Tape read Error" is displayed.</td><td>1. Mis-operation
2. Improper tape

3. Tape reader defective</td><td>Select correct tape type.
a. Poor punch of paper tape
b. Paper tape runs short.
a. Dirty head of paper tape reader
b. Replace tape reader.</td><td>----------
Re-punch tape.

Clean head.
Tape reader</td><td></td></tr>
<tr><td>#18
Solenoid does not operate.</td><td>1. Solenoid harness defective

2. Solenoid power defective

3. Solenoid defective

4. Main circuit board defective
5. Improper machinery
6. Fuse F2 blown
7. Refer to item #10.</td><td>ⓐ Check connector P1 is correctly connected and proper continuity tested for.
[a] With connector P6 of main circuit board unplugged, check voltage between pins 1 (+) and 3 (-). If it is +60V, it is normal.
ⓐ With connector P1 unplugged, measure resistance values of pins below.
<table><tr><td>No.1
No.2</td><td>thread trimming solenoid</td><td>19Ω</td></tr><tr><td>No.3
No.4</td><td>thread wiper solenoid</td><td>23Ω</td></tr><tr><td>No.5
No.6</td><td>jump solenoid</td><td>185Ω</td></tr><tr><td>No.7
No.8</td><td>picker solenoid</td><td>426Ω</td></tr><tr><td>No.9
No.10</td><td>presser foot solenoid</td><td>81Ω
or
121Ω</td></tr></table>Each voltage should have above specified values.
Replace main circuit board.
Readjust machinery.
Replace fuse.
Refer to item #10.</td><td>

Power supply unit

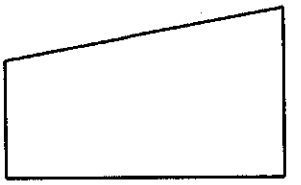
Thread trimming solenoid
Thread wiper solenoid
Jump solenoid
Picker solenoid
Presser foot solenoid

Main circuit board

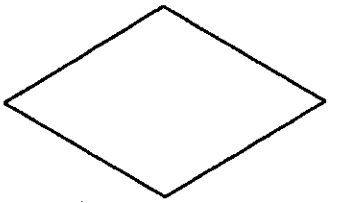
Fuse
Refer to item #10.</td><td></td></tr>
</table>

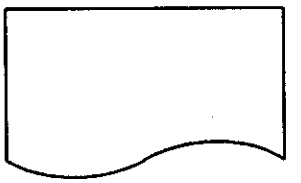
8-3. Trouble shooting flow chart

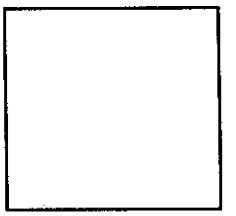
8-3-1. Symbols

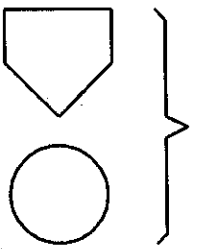
1.  indicates manual operation.

2.  indicates switch operation.

3.  selects the course of action to follow, using a yes-or-no decision-making process.

4.  indicates that the procedure to follow appears in the first column of "problem determination and solution table."

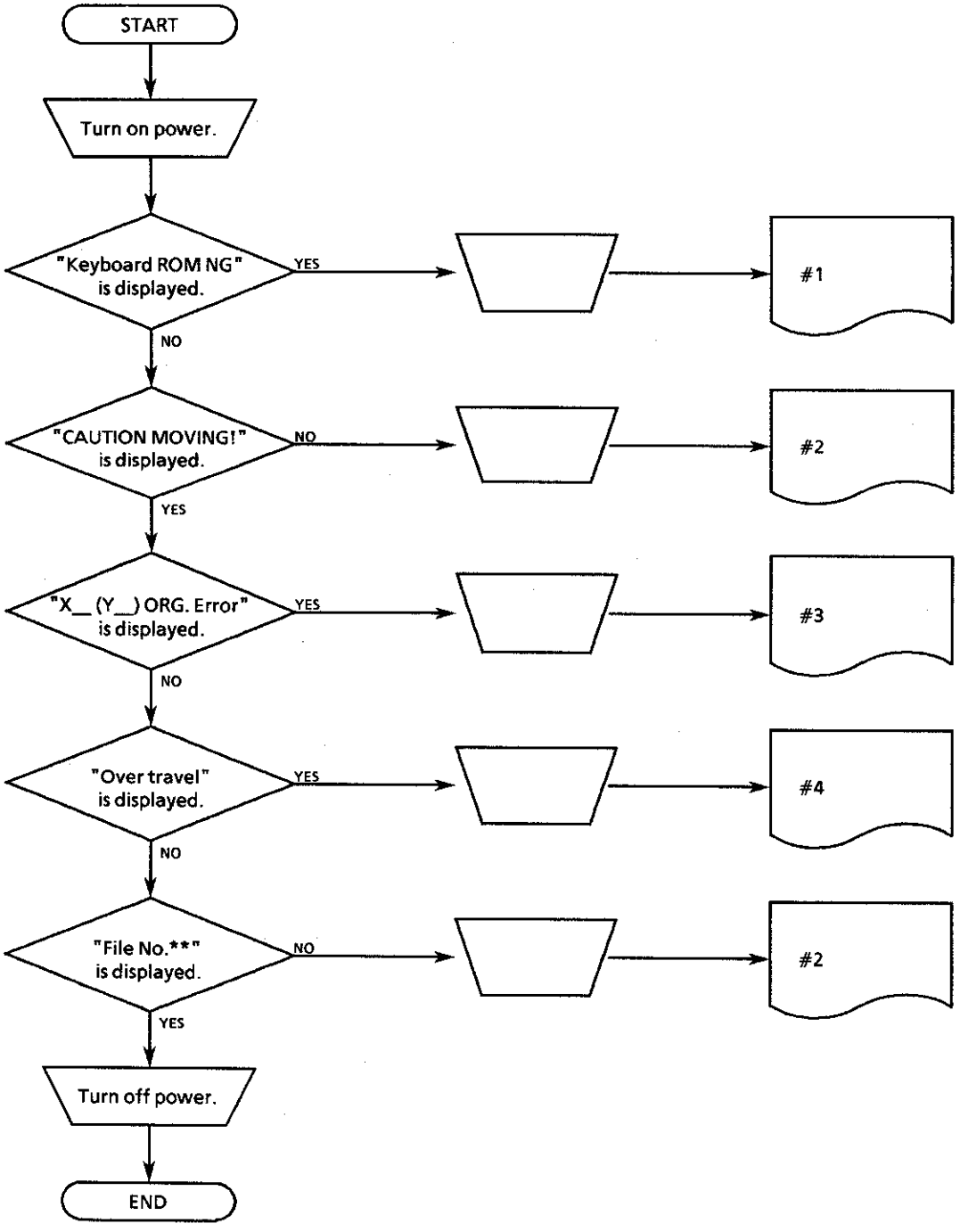
5.  indicates setting-up operation.

6.  indicates that the procedure to follow appears on the next page.

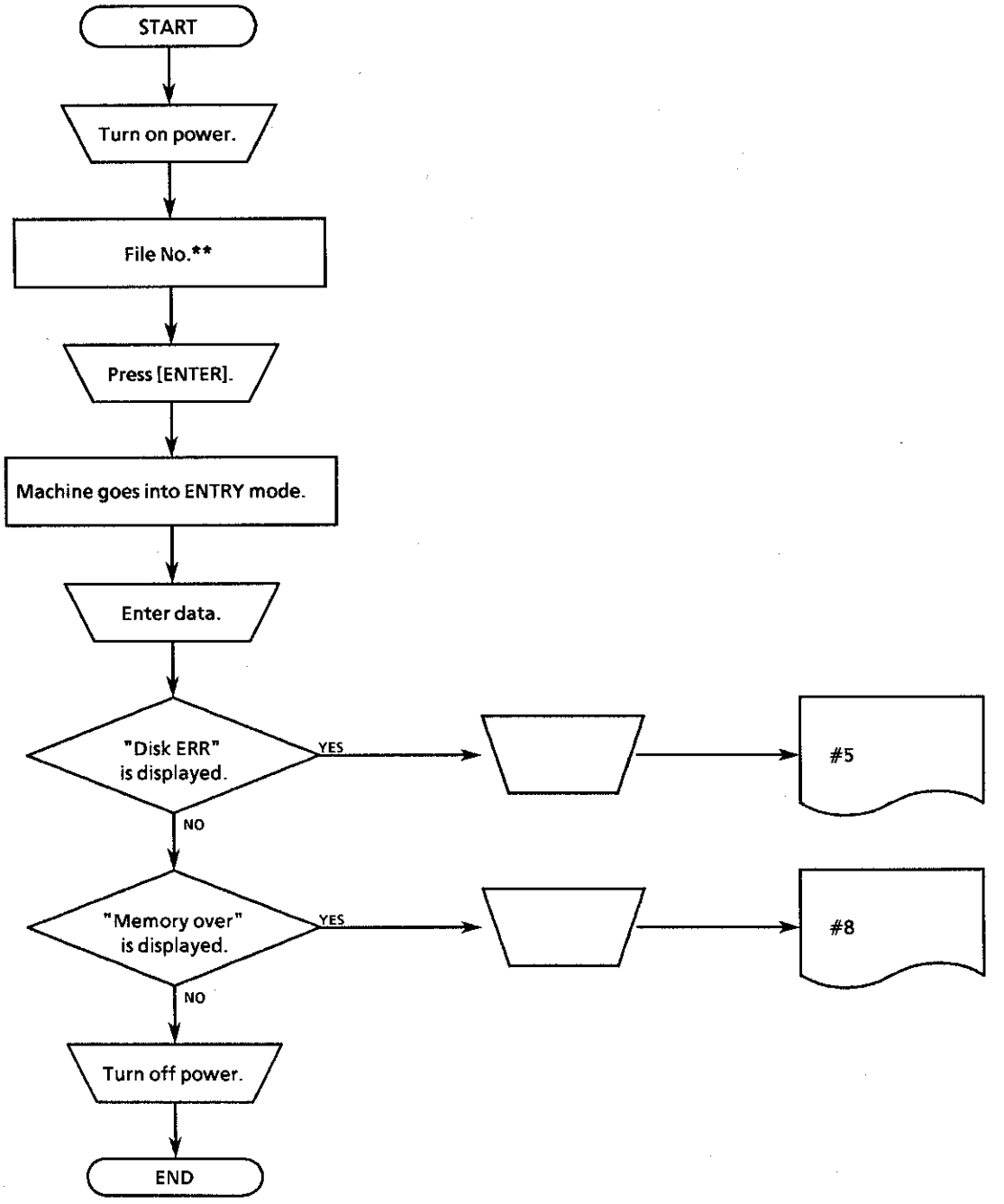
7.  indicates turning-off the power switch.

8-3-2. Troubleshooting flow chart

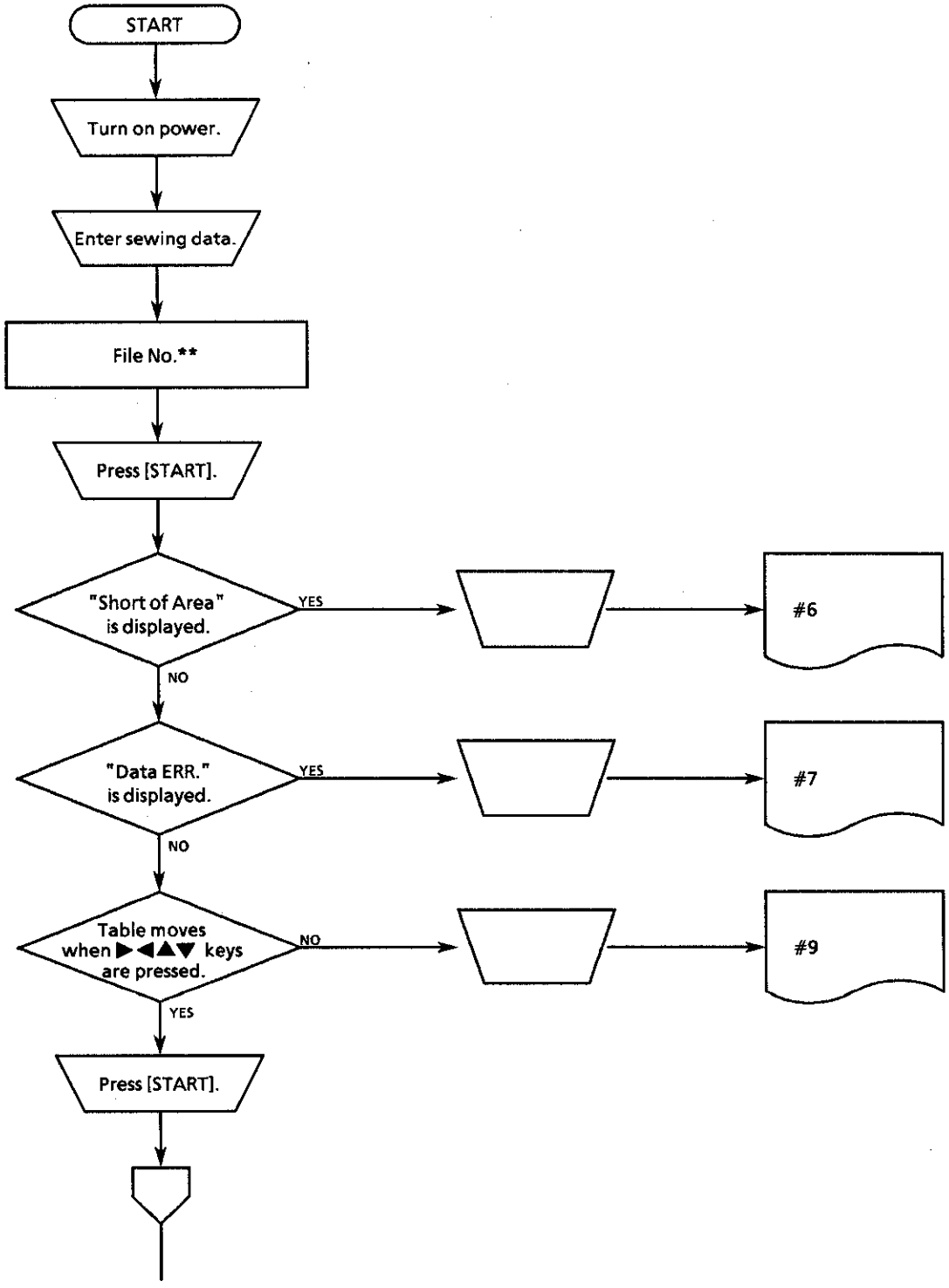
1. When power is turned ON:

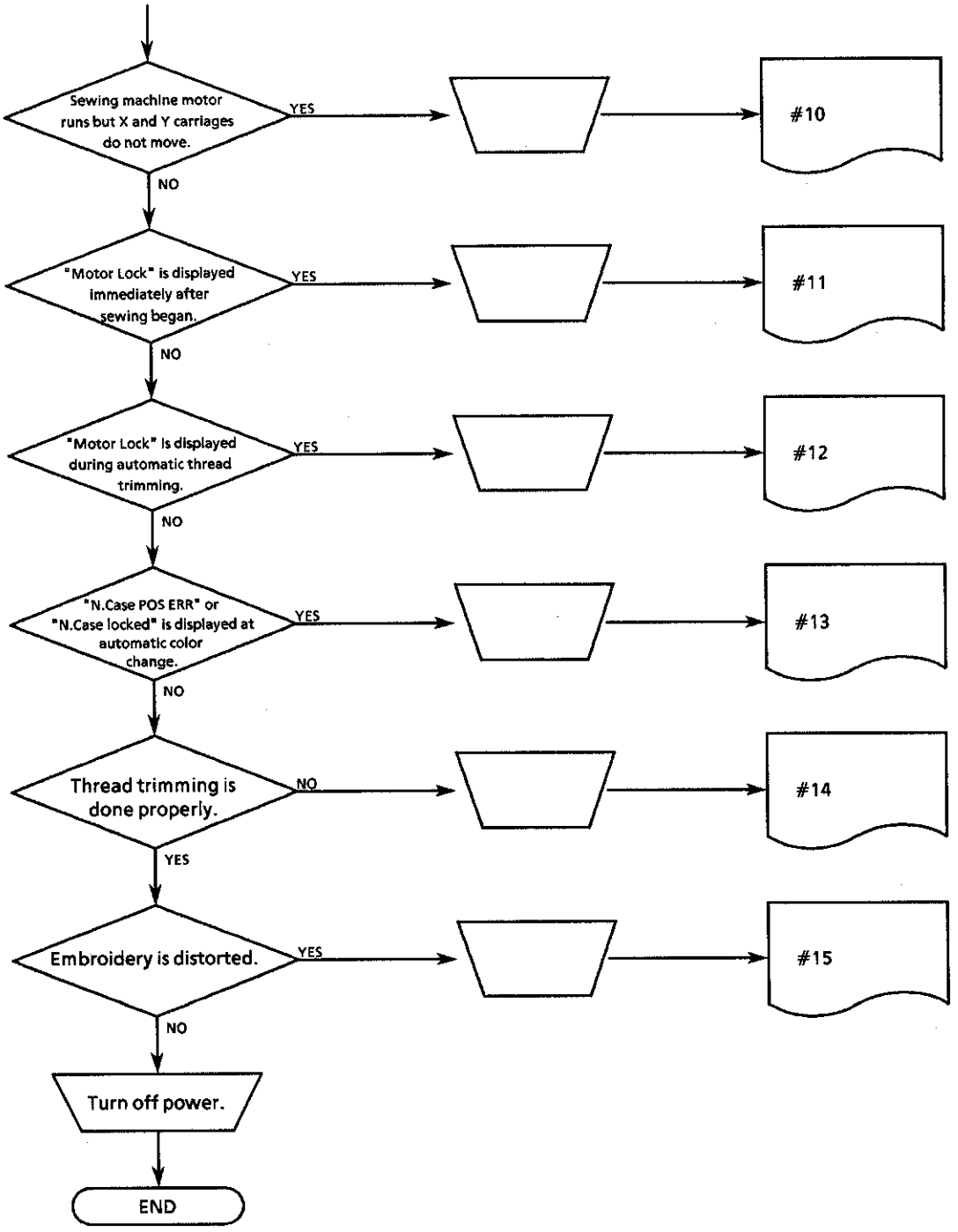


2. In data entry mode

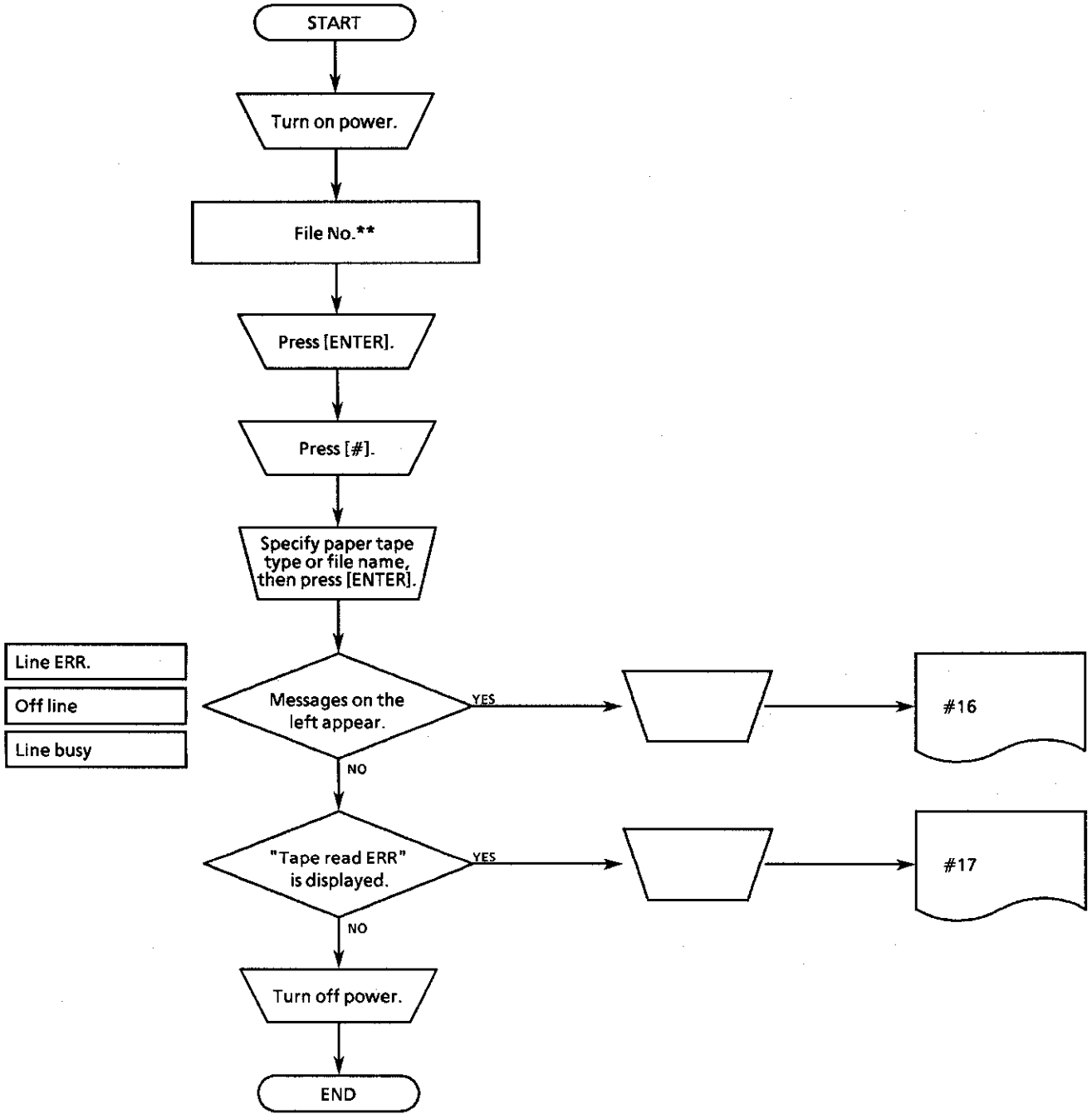


3. In sewing mode

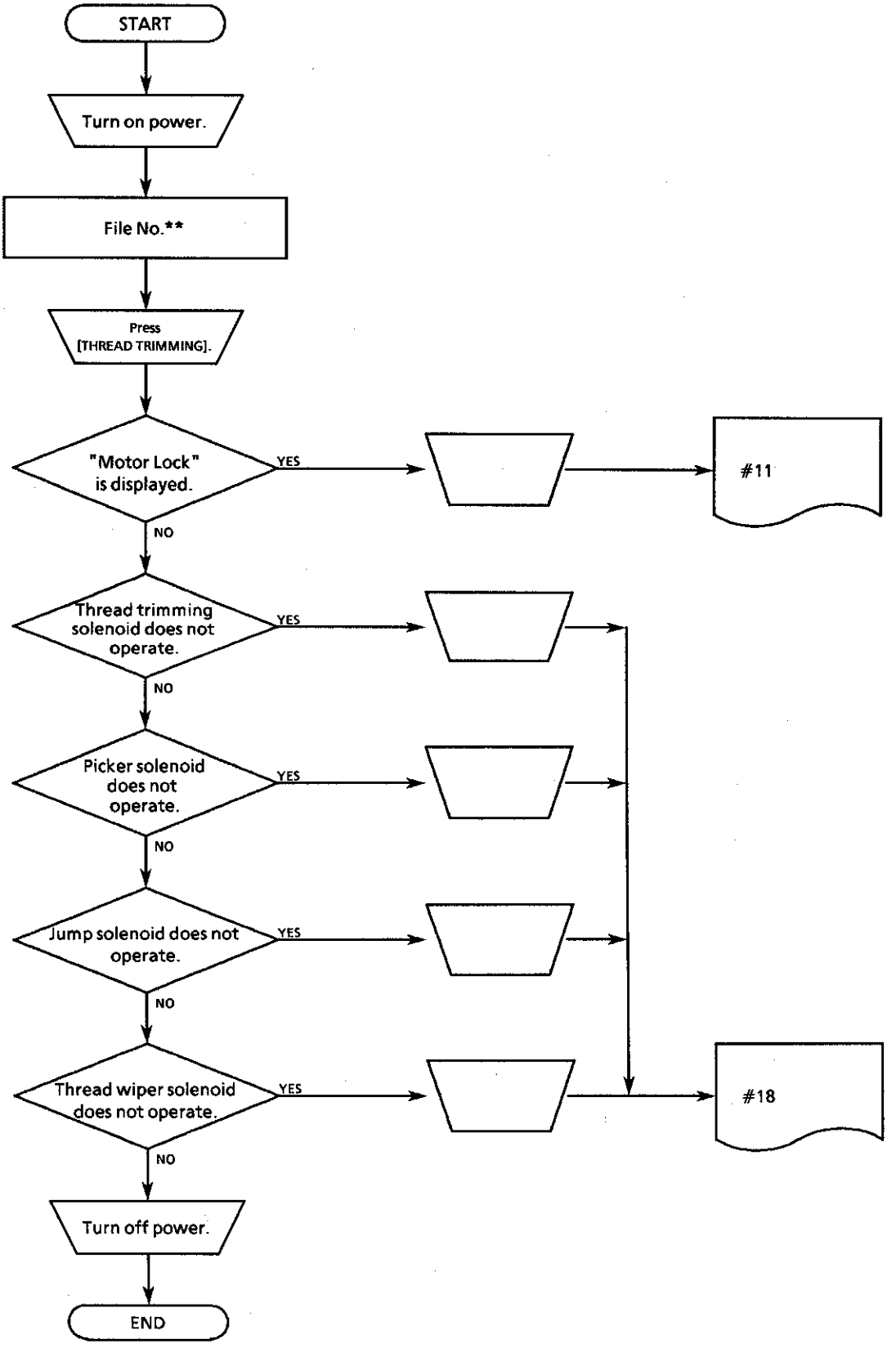



Sewing machine motor runs but X and Y carriages do not move.
YES
#10
NO
"Motor Lock" is displayed immediately after sewing began.
YES
#11
NO
"Motor Lock" is displayed during automatic thread trimming.
YES
#12
NO
"N.Case POS ERR" or "N.Case locked" is displayed at automatic color change.
YES
#13
NO
Thread trimming is done properly.
NO
#14
YES
Embroidery is distorted.
YES
#15
NO
Turn off power.
END

4. In communication mode



5. Electric solenoid



8-4. Problem determination and solution

Precautions

1. Be sure to turn off the power before plugging/unplugging the power cord.
2. Be sure to turn off the power before opening the machine cover or disconnecting cables.
3. In the CHECK/ADJUSTMENT/REPAIR column of the following tables:
   Measure resistance after power is turned off for letters enclosed in circles (ex.ⓐ).
   Measure voltage while the power is applied for letters indicated in squares (ex.[a]).
4. When replacing a fuse, be sure to use a new one of the same quality and capacity as the old one.
5. Check that all harnesses and connectors are correctly connected.

<Before making adjustment>

1. Check that no fuse has blown and each plug is correctly inserted.
2. Locate the where the problem is situated while referring to the flow chart.
3. From the applicable part of the flow chart, take the reference number to find the correspondingly numbered details of the problem in the following table.

<Before replacing parts>

Be sure to check harness connected to the part before replacing it.
Refer to the circuit block diagram and description of connectors, test continuity of the harness. If the harness has no abnormality, replace the part with a new one.

NO. IN FLOW CHART AND ERROR STATUS	CAUSE	CHECK/ADJUSTMENT/REPAIR	PARTS TO BE REPLACED	REF. PAGE
#1 Keyboard ROM NG is displayed.	1. CPU version of keyboard is incorrect.	Change CPU version of keyboard to proper version matching PROM of PCB.	CPU of keyboard	
#2 "CAUTION MOVING!" is not displayed.	1. Power is not supplied.	[a] Measure voltage of single phase power supply. If the voltage is not 100V AC (120V, 220V, 230V, 240V depending on where it is used.), it is defective.		
	2. Power switch or its cord defective	ⓐ Remove face cover on the left, turn on the power with power plug unconnected, then measure transformer input terminals of the power supply plug and power supply unit. If there is no continuity, the power switch is defective.	Power supply cord Breaker	
	3. Power supply circuit board defective	[a] With connector P6 on main circuit board unplugged, check the voltage of pins No.7 (+) and No.6 (-). If it is +5V, it is normal.	Power supply circuit board	
	4. Power harness defective	[a] While connector P6 on main circuit board is plugged, check +5V terminal on the main circuit board. If it is +5V, it is normal.	Power supply harness A Main circuit board	
	5. Keyboard cable defective	ⓐ Check that there is continuity between same numbers in double end connector of keyboard assembly. If there is no continuity, it is defective.	Keyboard cable	
	6. Operation panel defective	Replace operation panel.	Operation panel	
	7. Main circuit board defective	Replace main circuit board.	Main circuit board	
	8. Fuse F4 blown	Replace fuse.	Fuse	
#3 "X__ORG. Error" or "Y__ORG. Error" is displayed.	1. Power supply circuit board defective	[a] With connector P6 on main circuit board unplugged, check the voltage of pins No.1 (+) and No.3 (-). If it is not 37V, it is defective.	Power supply unit	
	2. Pulse motor defective	Replace pulse motor.	Pulse motor	
	3. Main circuit board	Replace main circuit board.	Main circuit board	
	4. Fuse F1 blown	Replace fuse.	Fuse	
#4 "Over travel" is displayed.	1. Home position sensor defective	ⓐ Check that connector P5 is correctly connected and proper continuity tested for.	Home position sensor	
	2. Over travel sensor defective	ⓐ Check that connector P5 is correctly connected and proper continuity tested for.	Over travel sensor	
	3. Main circuit board defective	Replace main circuit board.	Main circuit board	

NO. IN FLOW CHART AND ERROR STATUS	CAUSE	CHECK/ADJUSTMENT/REPAIR	PARTS TO BE REPLACED	REF. PAGE
#5 "Disk ERR." is displayed.	1. Floppy harness defective 2. FDD power supply harness defective 3. Floppy disk drive defective 4. Improper media 5. Main circuit board defective	ⓐ Check that connector P15 is correctly connected and proper continuity tested for. ⓐ Check that connector P5 of power supply circuit board is correctly connected or proper continuity tested for. [b] With connector P5 of power supply circuit board removed, measure voltage between pin 1 (+) and pin 3 (-). If it is not +5V, it is defective. Replace floppy disk drive. a. Check that it is correct for machine. b. Check that media type is correct. 2DD cannot be replaced by 2HD, and vice versa. Replace main circuit board.	Floppy harness FDD power supply harness Floppy disk drive Media Media type Main circuit board	
#6 "Short of Area" is displayed.	Improper sewing data	Pattern size of data exceeds sewing area.	This pattern data cannot be sewn	
#7 "Data ERR." is displayed.	Improper media	Check media.	Replace media.	
#8 "Memory over" is displayed.	1. Mis-operation 2. Memory expansion board defective 3. Main circuit board defective	Entered data exceeds the inside memory capacity and cannot be managed. Replace memory expansion board. Replace main circuit board.	---------- Memory expansion board Main circuit board	
#9 Hoop does not move.	Refer to item #3.	Refer to item #3.	Refer to item #3.	Refer to item #3.
#10 Sewing machine runs but hoop does not move.	1. Encoder harness defective 2. Rotary encoder defective	ⓐ Check that connector P13 is correctly connected and proper continuity tested for. Replace rotary encoder.	Encoder harness Rotary encoder	
#11 Motor is locked immediately after sewing began.	1. Sewing machine motor circuit board harness defective 2. Sewing machine motor circuit board 3. Fuse F1 blown	ⓐ Check that connector P4 is correctly connected and proper continuity tested for. Replace sewing machine motor circuit board. Replace fuse.	Sewing machine motor circuit board harness Sewing machine motor circuit board Fuse	
#12 Motor is locked during automatic thread trimming.	Machinery defective Refer to item #11.	Repair and adjust machinery. Refer to item #11.	Refer to item #11.	
#13 Errors relative to needle bar case appear. NOTE: This message does not appear on the BAS-401.	1. Index circuit board harness defective 2. Needle change pulse motor defective 3. Main circuit board defective 4. Fuse F2 blown	Check that connector P7 is correctly connected and proper continuity tested for. Replace pulse motor. Replace PMD circuit board. Replace fuse.	Index circuit board harness Pulse motor Main circuit board Fuse	

<table>
<tr><th>NO. IN FLOW CHART AND ERROR STATUS</th><th>CAUSE</th><th>CHECK/ADJUSTMENT/REPAIR</th><th>PARTS TO BE REPLACED</th><th>REF. PAGE</th></tr>
<tr><td>#14
Thread trimming is not normal.</td><td colspan="3">Refer to "(5) electric solenoid" in troubleshooting.</td><td></td></tr>
<tr><td>#15
Embroidery is distorted.</td><td>1. Improperly adjusted machinery
2. Main circuit board defective
3. Mis-operation</td><td>Re-adjust machinery.
Replace main circuit board.
a. Check if machine is operated in hoop mode with cap frame.</td><td>----------
Main circuit board
----------</td><td></td></tr>
<tr><td>#16
Errors relative to communication appear.</td><td>1. Improper RS cable

2. Paper tape reader defective

3. Editing system defective

4. Main circuit board defective</td><td>ⓐ Check that RS cable is correctly connected and proper continuity tested for.
a. Check that power is turned on.
b. Check that paper tape is set.
c. Replace paper tape reader.
a. Check that power is turned on.
b. Check that machine enters communication mode.
c. Replace editing system.
Replace main circuit board.</td><td>RS cable

Paper tape reader

Editing system
Main circuit board</td><td></td></tr>
<tr><td>#17
"Tape read Error" is displayed.</td><td>1. Mis-operation
2. Improper tape

3. Tape reader defective</td><td>Select correct tape type.
Poor punch of paper tape
Paper tape runs short.
a. Dirty head of paper tape reader
b. Replace tape reader.</td><td>----------
Re-punch tape.

Clean head.
Tape reader</td><td></td></tr>
<tr><td>#18
Solenoid does not operate.</td><td>1. Solenoid harness defective

2. Solenoid power defective

3. Solenoid defective

4. Main circuit board defective
5. Improper machinery
6. Fuse F2 blown
7. Refer to item #10.</td><td>ⓐ Check connector P1 is correctly connected and proper continuity tested for.
[a] With connector P6 of main circuit board unplugged, check voltage between pins 1 (+) and 3 (-). If it is +60V, it is normal.
ⓐ With connector P1 unplugged, measure resistance values of pins below.
<table><tr><td>No.1
No.2</td><td>thread trimming solenoid</td><td>19Ω</td></tr><tr><td>No.3
No.4</td><td>thread wiper solenoid</td><td>23Ω</td></tr><tr><td>No.5
No.6</td><td>jump solenoid</td><td>185Ω</td></tr><tr><td>No.7
No.8</td><td>picker solenoid</td><td>426Ω</td></tr><tr><td>No.9
No.10</td><td>presser foot solenoid</td><td>81Ω or 121Ω</td></tr></table>Each voltage should have above specified values.
Replace main circuit board.
Readjust machinery.
Replace fuse.
Refer to item #10.</td><td>Power supply unit

Thread trimming solenoid
Thread wiper solenoid
Jump solenoid
Picker solenoid
Presser foot solenoid

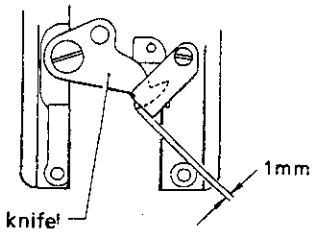
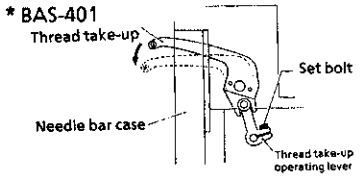
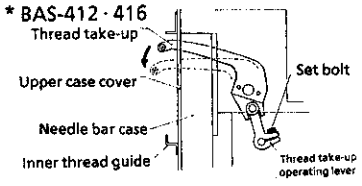
Main circuit board

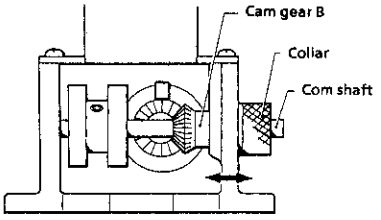
Fuse
Refer to item #10.</td><td></td></tr>
</table>

9. FINDING CAUSE OF PROBLEN

9-1. Mechanical problem

In case of a malfunction, diagnose the problem referring to the table below.
If the problem persists, turn off the power and contact your dealer.

Problem	Check point
1. Machine operates incorrectly.	1. Is set screw of rotary encoder loosened? 2. Is set screw of machine pulley loosened? 3. Is set screw of N65 pulley loosened? 4. Is stop position sensor faulty? 5. Are wires of carriages X and Y off? 6. Are set screws of wire drums X and Y loosened? 7. Are set screws of pinion gears in pulse motors X and Y loosened? 8. Is sewing data in floppy disk normal?
2. Upper shaft is locked at some point of a cycle.	1. Is movable knife for thread trimming stopped in middle of operation? [How to adjust] · Remove thread or other interruption for good thread trimming operation. · Remove needle plate and reset it in proper position manually as in the figure below.  [NOTE] When movable knife is in middle of operation, the safety system works so that the upper shaft cannot rotate. 2. Is thread take-up stopped with striking upper case cover? [How to adjust] Remove adjustment base.   Loosen the bolt of the thread take-up operating lever to adjust movable range of thread take-up, then re-tighten it. 3. Is position of needle bar clamp or stopper correct?

Problem	Check point
3. Upper shaft does not turn.	1. Is thread tangled in rotary hook? [How to adjust] Remove rotary hook and see whether upper shaft rotates or not. If thread is tangled, turn upper shaft by force to trim thread or remove rotary hook and thread.
4. Stitch cannot be made.	1. Is needle attached properly? 2. Is timing of needle and rotary hook correct?
5. Needle breaks.	1. Is needle direction and height properly adjusted? 2. Is needle bent? 3. Is needle tip blunted? 4. Is timing of needle and rotary hook correct? 5. Is there looseness or play in the needle bar case? <Only for the BAS-412 or the BAS-416> When there is play in the needle bar case  Adjust collar when there is looseness of cam shaft in needle bar flip-up mechanism. 6. Is rotary hook holder properly attached so that rotary hook does not rotate?

9-2. Electrical problem

In case of a malfunction, diagnose the problem referring to the table below.
If the problem persists, turn off the power and contact your dealer.

Problem	Check point
1. The display is blank, though power is on.	Is contrast dial properly adjusted?
2. The indicator does not light, though a floppy disk is in disk drive.	1. Is floppy disk damaged? 2. Is disk drive functioning properly?
3. When the power is turned on, the hoop moves till the hoop is over the sewing area.	Turn off the power, then turn on the power again while pressing the <▼> key. When there is a problem even if this is done, contact your dealer. · For the BAS-401 and 416, turn on the power while pressing the <▼> key.
4. When sewing is resumed in restart mode, the hoop moves till the hoop is over the area.	
5. Thread breakage detector functions and machine stops although thread breakage does not occur.	<BAS-412 and 416> Is thread breakage detect stud operation normal? (Is spring tension proper?) <BAS-401> Does pulley rotate normally?

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2. Main circuit board defective
3. Mis-operation</td><td>Re-adjust machinery.
Replace main circuit board.
a. Check if machine is operated in hoop mode with cap frame.</td><td>----------
Main circuit board
----------</td><td></td></tr>
<tr><td>#16
Errors relative to communication appear.</td><td>1. Improper RS cable

2. Paper tape reader defective

3. Editing system defective

4. Main circuit board defective</td><td>ⓐ Check that RS cable is correctly connected and proper continuity tested for.
a. Check that power is turned on.
b. Check that paper tape is set.
c. Replace paper tape reader.
a. Check that power is turned on.
b. Check that machine enters communication mode.
c. Replace editing system.
Replace main circuit board.</td><td>RS cable

Paper tape reader

Editing system
Main circuit board</td><td></td></tr>
<tr><td>#17
"Tape read Error" is displayed.</td><td>1. Mis-operation
2. Improper tape

3. Tape reader defective</td><td>Select correct tape type.
Poor punch of paper tape
Paper tape runs short.
a. Dirty head of paper tape reader
b. Replace tape reader.</td><td>----------
Re-punch tape.

Clean head.
Tape reader</td><td></td></tr>
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Solenoid does not operate.</td><td>1. Solenoid harness defective

2. Solenoid power defective

3. Solenoid defective

4. Main circuit board defective
5. Improper machinery
6. Fuse F2 blown
7. Refer to item #10.</td><td>ⓐ Check connector P1 is correctly connected and proper continuity tested for.
[a] With connector P6 of main circuit board unplugged, check voltage between pins 1 (+) and 3 (-). If it is +60V, it is normal.
ⓐ With connector P1 unplugged, measure resistance values of pins below.
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Replace main circuit board.
Readjust machinery.
Replace fuse.
Refer to item #10.</td><td>Power supply unit

Thread trimming solenoid
Thread wiper solenoid
Jump solenoid
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Presser foot solenoid

Main circuit board

Fuse
Refer to item #10.</td><td></td></tr>
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9. FINDING CAUSE OF PROBLEN

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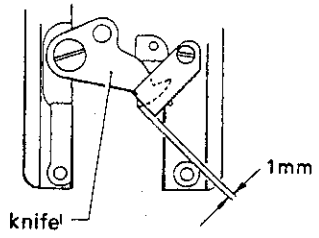
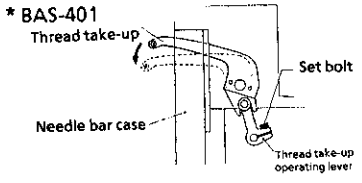
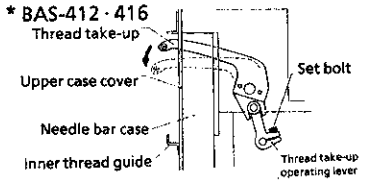
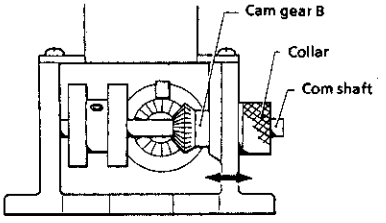
2. Upper shaft is locked at some point of a cycle.	1. Is movable knife for thread trimming stopped in middle of operation? [How to adjust] · Remove thread or other interruption for good thread trimming operation. · Remove needle plate and reset it in proper position manually as in the figure below.  [NOTE] When movable knife is in middle of operation, the safety system works so that the upper shaft cannot rotate. 2. Is thread take-up stopped with striking upper case cover? [How to adjust] Remove adjustment base.   Loosen the bolt of the thread take-up operating lever to adjust movable range of thread take-up, then re-tighten it. 3. Is position of needle bar clamp or stopper correct?

Problem	Check point
3. Upper shaft does not turn.	1. Is thread tangled in rotary hook? [How to adjust] Remove rotary hook and see whether upper shaft rotates or not. If thread is tangled, turn upper shaft by force to trim thread or remove rotary hook and thread.
4. Stitch cannot be made.	1. Is needle attached properly? 2. Is timing of needle and rotary hook correct?
5. Needle breaks.	1. Is needle direction and height properly adjusted? 2. Is needle bent? 3. Is needle tip blunted? 4. Is timing of needle and rotary hook correct? 5. Is there looseness or play in the needle bar case? <Only for the BAS-412 or the BAS-416> When there is play in the needle bar case  Adjust collar when there is looseness of cam shaft in needle bar flip-up mechanism. 6. Is rotary hook holder properly attached so that rotary hook does not rotate?

9-2. Electrical problem

In case of a malfunction, diagnose the problem referring to the table below.
If the problem persists, turn off the power and contact your dealer.

Problem	Check point
1. The display is blank, though power is on.	Is contrast dial properly adjusted?
2. The indicator does not light, though a floppy disk is in disk drive.	1. Is floppy disk damaged? 2. Is disk drive functioning properly?
3. When the power is turned on, the hoop moves till the hoop is over the sewing area.	Turn off the power, then turn on the power again while pressing the <⬇> key. When there is a problem even if this is done, contact your dealer. · For the BAS-401 and 416, turn on the power while pressing the <▼> key.
4. When sewing is resumed in restart mode, the hoop moves till the hoop is over the area.	
5. Thread breakage detector functions and machine stops although thread breakage does not occur.	<BAS-412 and 416> Is thread breakage detect stud operation normal? (Is spring tension proper?) <BAS-401> Does pulley rotate normally?

[BAS-401 · 412 · 416]

Following is displayed when trying to read sewing data from a floppy disk while the floppy disk is inserted into the floppy disk drive.

① "Disk ERR." is displayed.
② "Data ERR." is displayed.
③ "Reading" is displayed and remains .

When another floppy disk is inserted, reading and sewing can be performed normally. The floppy disk drive may not be defective, but it is not clear what is wrong.

[Cause and solution]

(1) Floppy disk has not been previously defective.
If it occurs on the floppy disk which was able to use normally before, the floppy disk may be defective. (Repairing is impossible.)
Carefully deal with floppy disk. And for security, back up data on other storage medium, like personal computer, punching machine and so on.

(2) The floppy disk was originally defective.
If it occurs at a first-time use, the floppy disk may be originally defective.
Consult with shop you bought it or its maker.

(3) Following floppy disk cannot be used in BAS-401 and 412 · 416 even though it can be used in other embroidery machine.
When 3.5" 2HD floppy disk was made in 2DD format.
When 3.5" 2DD floppy disk was made in 2HD format.

If your problem does not come under case (1), (2) or (3), please consult with Brother's shop.

10. ERROR MESSAGES

[BAS-412]

Refer to the table below if an error message is displayed.
By pressing the <END>key, the message will disappear and the display will return to the previous menu.

Message when power is turned on	Cause	Solution
Keyboard ROM NG.	PROM version of key board does not match PROM version of PCB.	Change PROM version of key board to matching PROM version of PCB. Contact your dealer.
N Bar stop ERR	Pulley is not in proper position.	Turn pulley till needle bar is in proper position.
Missed X_ORG. PT Missed Y_ORG. PT	Damaged circuit board, sensor defective, cable defective, pulse motor defective, blown fuse.	Contact your dealer.
Over travel	1. X carriages movement exceeds maximum area.	Turn power off. Move carriages X to center of area manually, then turn power on again. If same error message is displayed again, turn power off, then on again while pressing <⬇> key. (Clearing backup memory.)
	2. Overtravel sensor is in incorrect position or defective. 3. X home position sensor is in incorrect position or defective. 4. Damaged circuit board.	Contact your dealer.
Memory Clear	Back-up data in the memory disappears.	Press key according to message.

Message in entry mode	Cause	Solution
No File	Inputted data has something wrong.	Check file name of data and re-enter.
Data ERR.		Check where data was made, then contact your dealer.
Disk ERR.	1. Data is input without inserting floppy disk. 2. While reading data, floppy disk is removed when machine runs in sewing mode.	Insert floppy disk in proper position and re-enter. Do not remove floppy disk from FDD during sewing in this mode.
	3. Damaged circuit board, defective cable, defective FDD.	Contact your dealer.

Message in editing mode	Cause	Solution
Can-'t edit Data	1. Some of data entered in communication mode has items that cannot edit. 2. Some of data entered in sewing mode while reading data has items that cannot edit. 3. According to editing item, there is item that cannot be set.	Refer to page 57.
T. Length larger	Entered value exceeds maximum area (450 mm × 300 mm).	Re-edit data.
Area Over	Improper area setting	Re-set area or re-edit data.
Arrangement Err	Value set in arrangement mode by [Each] is incorrect (ex. spaces →←↑↓ are inputted) or not all values are inputted. (ex. base line, base point.)	Refer to page 108-116 "Arranging."

Message in sewing mode	Cause	Solution
No inptted Data	Without sewing data entered, you try to set machine to sewing mode.	First, input sewing data, then start sewing.
Short of Area	Improper area setting	Re-set area or re-edit data.
**th Data ERR	Entered data has something wrong.	Check where data was made, then contact your dealer.
**th Memory OVR	Too much data, or number of inputted stitches is over inside memory capacity and cannot manage it.	If memory expansion board (optional) is not set, set memory expansion board or decrease input data.
Area over	When sewing starts from current needle position, sewing pattern is over the area.	Press the <CLEAR> key. Area over checking mode will be disabled and the machine will switch to needle bar selection mode. Then press the <START> key to start embroidering.
B. Thread empty	Set sewing times in bobbin thread counter is completed.	Re-set sewing times in bobbin thread counter.
Thread breakage	1. Needle thread breakage 2. Needle thread is not passed through the thread sensor spring. 3. Bobbin thread breakage 4. Bobbin thread runs out.	Pass thread.
Over load	1. Pulley is too tight. 2. Electrical failure	Remove load. Contact your dealer.

Message in communication mode	Cause	Solution
Can't communi	1. Paper tape reader or editing system does not connect with machine by cable.	Link with exclusive cable.
	2. Power of paper tape reader or editing system is not turned on.	Turn on power.
	3. Editing system does not enter communication mode.	Set editing system to communication mode.
	4. Editing system is communicating with another machine.	Wait till communication ends.
Communicate ERR.	1. Data error occurs during communicating with editing system.	Re-communicate.
	2. Editing system exits from communication mode while machine is communicating with editing system.	Set editing system to communication mode, then communicate again.
	3. Power of editing system is turned off during communicating with editing system.	Turn on power of editing system again, enter communication mode.
Edit-Sy. busy	Editing system is defective, or breakdown.	Turn on power of editing system again, enter communication mode. Contact your dealer.
Tape read ERR	1. Poor punch of paper tape	Remake paper tape.
	2. Paper tape runs short.	
	3. Dirty head of paper tape reader	Clean head.
	4. Power of paper tape reader is not turned on.	Turn on power.
	5. Paper tape type is wrongly selected.	Select proper type to read paper tape.
	6. Improper communication baud rate	Adjust baud rate.

Message in replacing needle bar	Cause	Solution
N. Case POS. ERR	1. Needle bar is not set properly.	Position needle bar case properly.
	2. Damaged circuit board	Contact your dealer.
N. Case locked	1. Needle bar case is too tight mechanically, or locked and cannot move.	Remove load.
	2. Electrical failure	Contact your dealer.

[BAS-401 · 416]

Refer to the table below if an error message is displayed.
By pressing the <CLEAR>key, the message will disappear and the display will return to the previous menu.

Message when power is turned on	Cause	Solution
Keyboard ROM NG.	CPU version of key board does not match PROM version of PCB.	Change CPU version of key board, to proper version matching PROM. Contact your dealer.
Needle POS. Error	Pulley is not in proper position.	Turn pulley till needle bar is in proper position.
X__ORG. Error Y__ORG. Error	Damaged circuit board, sensor defective, cable defective, pulse motor defective, blown fuse.	Contact your dealer.
Over travel (In cap frame mode only)	1. X carriages movement exceeds maximum area. 2. Overtravel sensor is in incorrect position or defective. 3. X home position sensor is in incorrect position or defective. 4. Damaged circuit board.	Turn power off. Move carriages X to center of area manually, then turn power on again. If the same error message is displayed again, turn the power off, and then while pressing the <▽> key, turn it on again. Then press the <CLEAR> key.
Memory CLear	Back-up data in the memory disappears.	Press key according to message.

Message in entry mode	Cause	Solution
No File	Data not registered in the floppy disk is entered.	Check file name of data and re-enter.
Data ERR.	Input data has something wrong.	Check where data was made, then contact your dealer.
Disk ERR.	1. Data is input without inserting floppy disk. 2. While reading data, floppy disk is removed when machine runs in sewing mode. 3. Damaged circuit board, defective cable, defective FDD.	Insert floppy disk in proper position and re-enter. Do not remove floppy disk from FDD during sewing in this mode. Contact your dealer.
Memory over	Too much data, or too many stitches of a data is over inside memory capacity and cannot manage it.	If memory expansion board (optional) is not set, set memory expansion board or decrease input data.

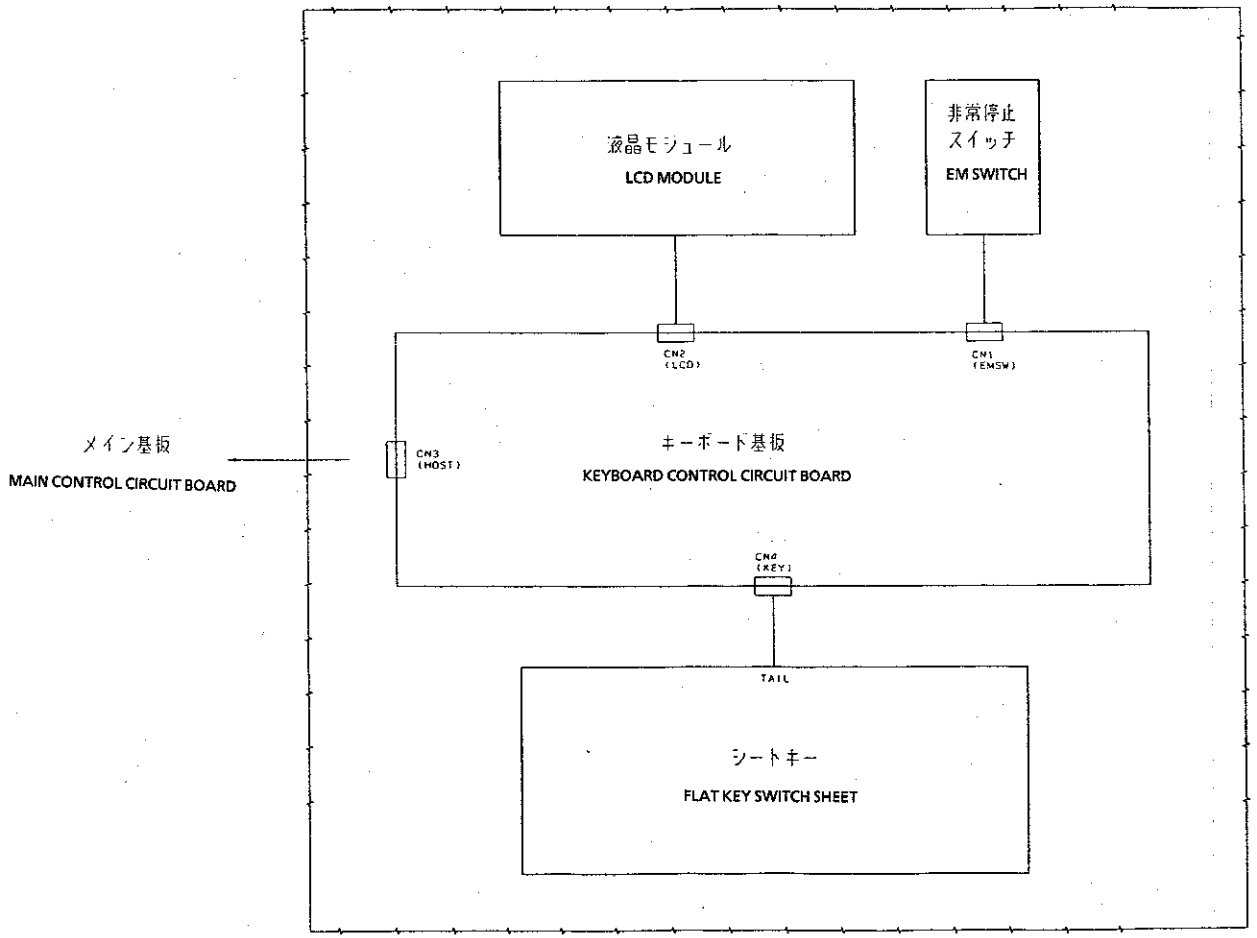
Message in editing mode	Cause	Solution
Can-'t edit Data	1. Some of data entered in communication mode has items that cannot edit. 2. Some of data entered in sewing mode while reading data has items that cannot edit. 3. According to editing item, there is item that cannot be set.	Refer to page 78.

Message in sewing mode	Cause	Solution
No inptted Data	Without sewing data entered, you try to set machine to sewing mode.	First, input sewing data, then start sewing.
Short of Area	Entered value exceeds maximum area (450 mm ×300 mm).	This data cannot be sewn.
Data ERR.	Entered data has something wrong.	Check where data was made, then contact your dealer.
Area Over	When sewing starts from current needle position, sewing pattern is over area.	Move the hoop to position where message disappears, or spread area.
B.Thread empty	The set sewing times in bobbin thread counter is completed.	Reset sewing times in bobbin thread counter.
Thread breakage	1. Upper thread breakage. 2. Thread is not wound on thread breakage detector. 3. Bobbin thread breakage 4. Bobbin thread has run out.	Set thread.
Motor Lock	1. Pulley is too tight. 2. Electrical failure	Remove load. Contact your dealer.

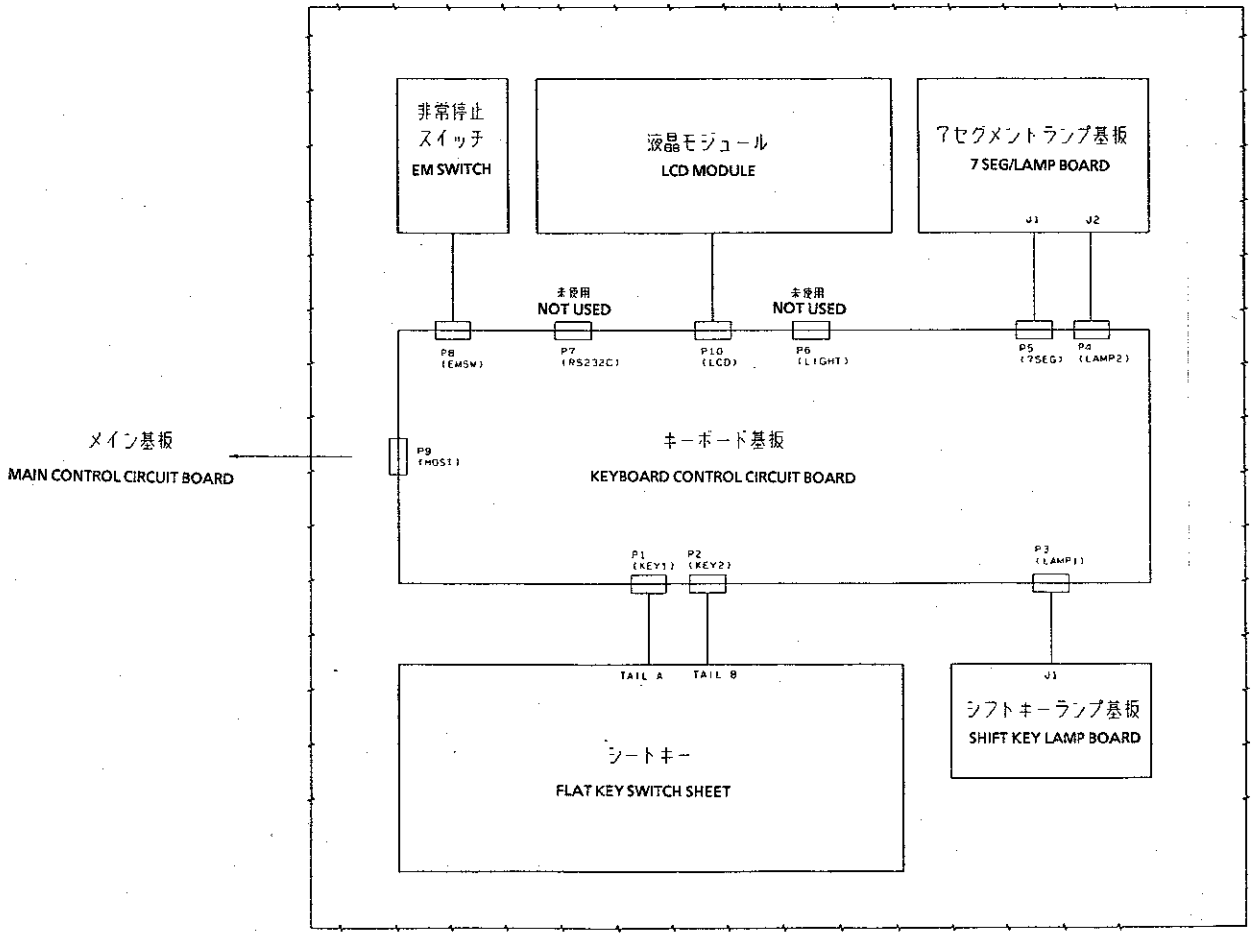
Message in communication mode	Cause	Solution
Off line	1. Paper tape reader or editing system does not connect with machine by cable. 2. Power of paper tape reader or editing system is not turned on. 3. Editing system does not enter communication mode. 4. Editing system is communicating with an other machine.	Link with dedicated cable. Turn on power. Set editing system to communication mode. Wait till communication ends.

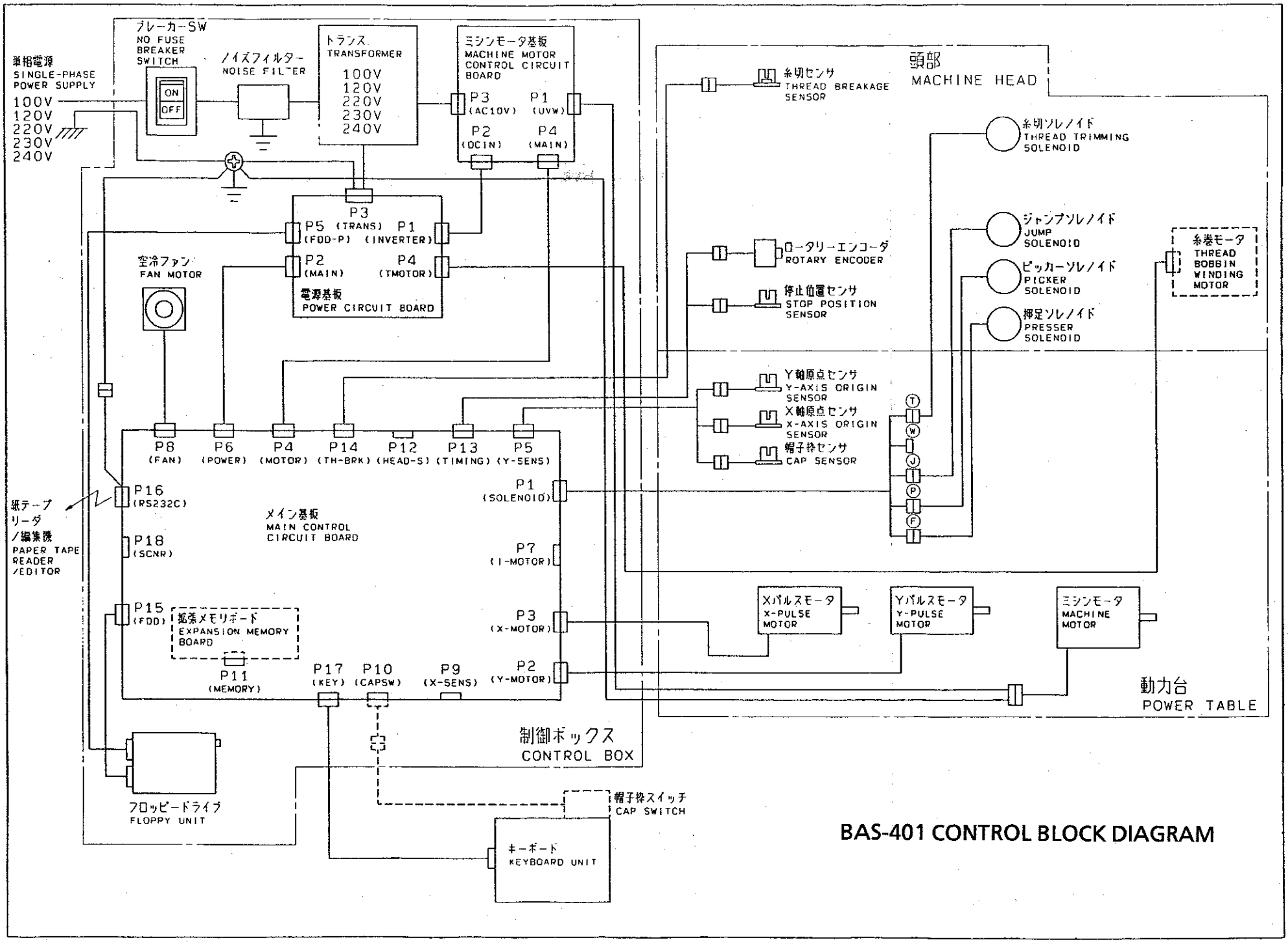
Message in communication mode	Cause	Solution
Line ERR.	1. Data error occurs during communicating with editing system. 2. Editing system exits from communication mode while machine is communicating with editing system. 3. Power of editing system is turned off during communicating.	Re-communicate. Set editing system to communication mode, then communicate again. Turn on power of editing system again, enter communication mode.
Line Busy	Editing system is defective, or breakdown.	Turn on power of editing system again, enter communication mode. Contact your dealer.
Tape read Error	1. Poor punch of paper tape. 2. Paper tape runs short. 3. Dirty head of paper tape reader. 4. Power of paper tape reader is not turned on. 5. Paper tape type is wrongly selected. 6. Improper communication baud rate.	Remake paper tape. Clean head. Turn on the power. Select proper type to read paper tape. Adjust baud rate.
N__Case POS. ERR	1. Needle bar is not set properly. 2. Damaged circuit board	Position needle bar case properly. (Refer to page 27.) Contact your dealer.
N__Case locked NOTE: This message does not appear on the BAS-401.	1. Needle bar case is too tight mechanically, or locked and cannot move. 2. Electrical failure	Remove load. Contact your dealer.

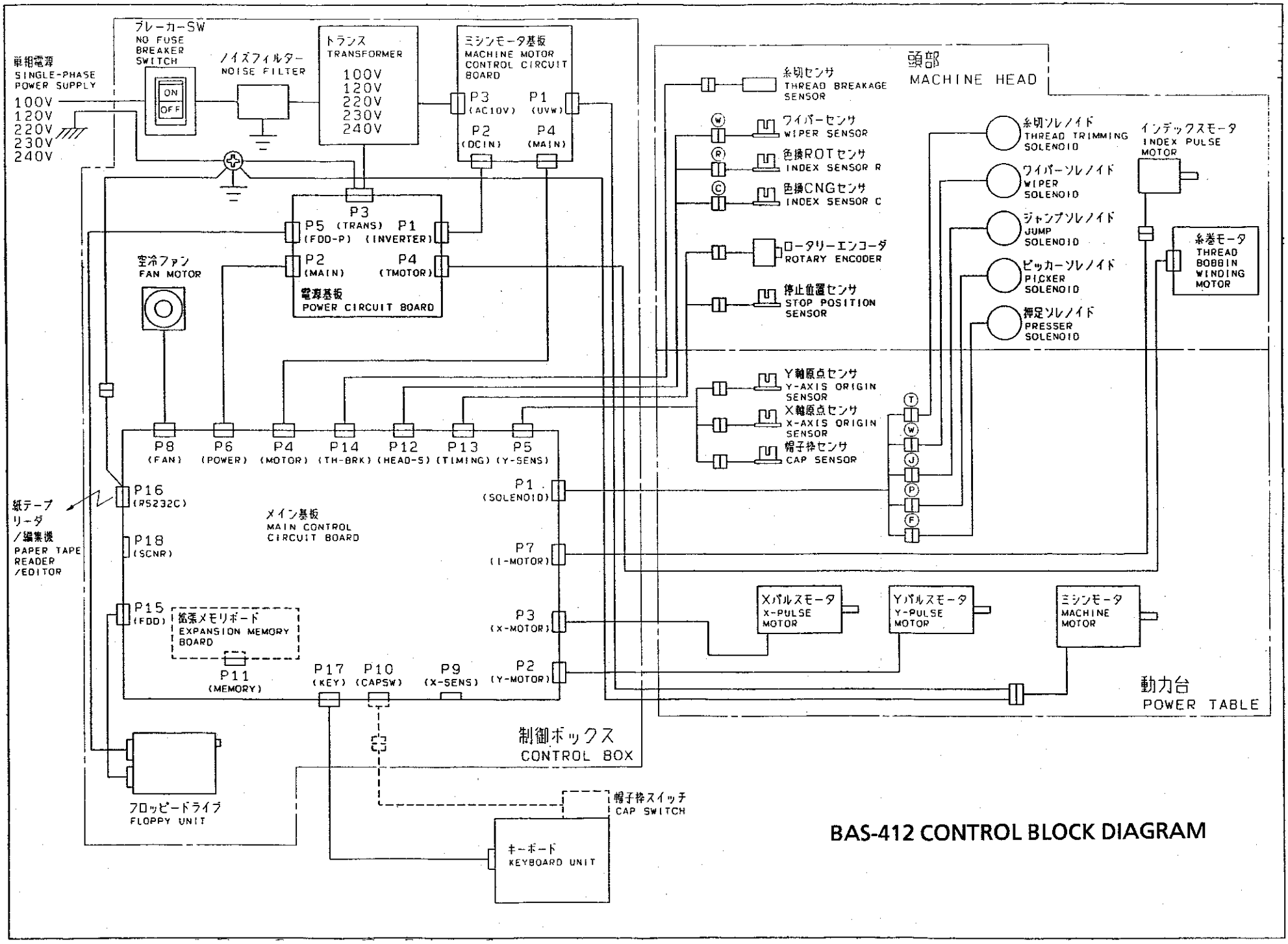
BAS-401 · 416 KEYBOARD UNIT CONTROL BLOCK DIAGRAM



BAS-412 KEYBOARD UNIT CONTROL BLOCK DIAGRAM




単相電源
SINGLE-PHASE
POWER SUPPLY
100V
120V
220V
230V
240V
ブレーカーSW
NO FUSE
BREAKER
SWITCH
ON
OFF
ノイズフィルター
NOISE FILTER
トランス
TRANSFORMER
100V
120V
220V
230V
240V
ミシンモータ基板
MACHINE MOTOR
CONTROL CIRCUIT
BOARD
P3 (AC10V)
P1 (UVW)
P2 (DCIN)
P4 (MAIN)
P3
P5 (TRANS)
P1 (INVERTER)
P2 (MAIN)
P4 (TMOTOR)
電源基板
POWER CIRCUIT BOARD
空冷ファン
FAN MOTOR
P8 (FAN)
P6 (POWER)
P4 (MOTOR)
P14 (TH-BRK)
P12 (HEAD-S)
P13 (TIMING)
P5 (Y-SENS)
P16 (RS232C)
P18 (SCNR)
P15 (FDD)
P11 (MEMORY)
P17 (KEY)
P10 (CAPSW)
P9 (X-SENS)
P1 (SOLENOID)
P7 (I-MOTOR)
P3 (X-MOTOR)
P2 (Y-MOTOR)
メイン基板
MAIN CONTROL
CIRCUIT BOARD
紙テープ
リーダ
/編集機
PAPER TAPE
READER
/EDITOR
拡張メモリボード
EXPANSION MEMORY
BOARD
制御ボックス
CONTROL BOX
フロッピードライブ
FLOPPY UNIT
キーボード
KEYBOARD UNIT
帽子枠スイッチ
CAP SWITCH
頭部
MACHINE HEAD
糸切センサ
THREAD BREAKAGE
SENSOR
ロータリーエンコーダ
ROTARY ENCODER
停止位置センサ
STOP POSITION
SENSOR
Y軸原点センサ
Y-AXIS ORIGIN
SENSOR
X軸原点センサ
X-AXIS ORIGIN
SENSOR
帽子枠センサ
CAP SENSOR
糸切ソレノイド
THREAD TRIMMING
SOLENOID
ジャンプソレノイド
JUMP
SOLENOID
ピッカーソレノイド
PICKER
SOLENOID
押足ソレノイド
PRESSER
SOLENOID
糸巻モータ
THREAD
BOBBIN
WINDING
MOTOR
T
W
J
P
F
Xパルスモータ
X-PULSE
MOTOR
Yパルスモータ
Y-PULSE
MOTOR
ミシンモータ
MACHINE
MOTOR
動力台
POWER TABLE
BAS-401 CONTROL BLOCK DIAGRAM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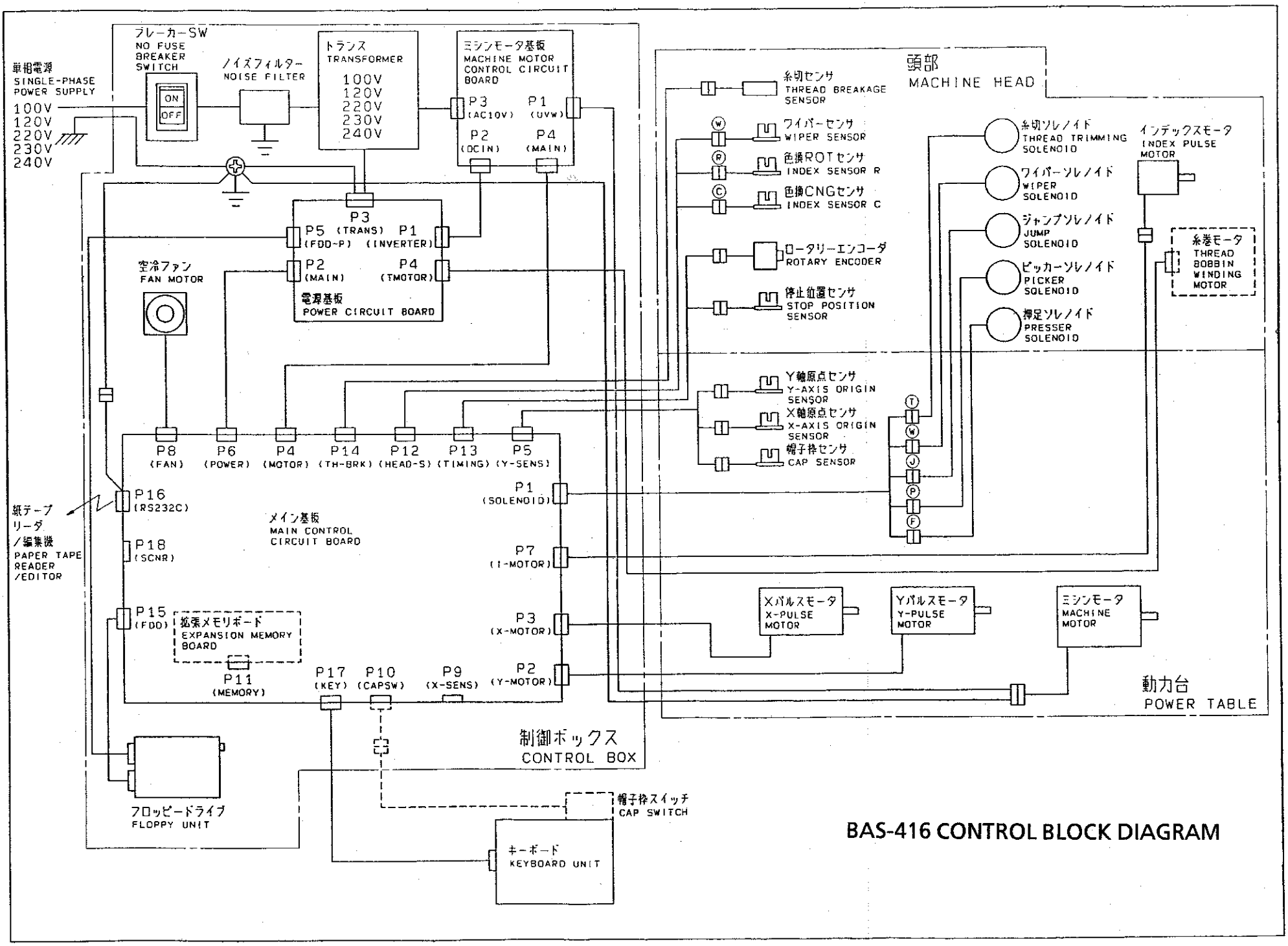
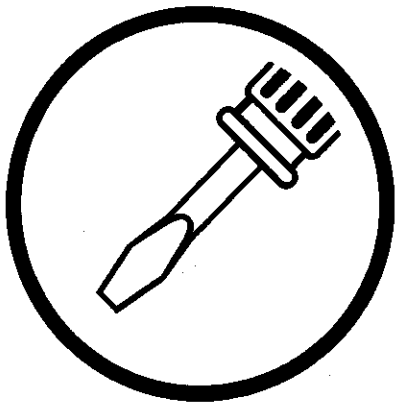
BAS-412 CONTROL BLOCK DIAGRAM



BAS-416 CONTROL BLOCK DIAGRAM

brother



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