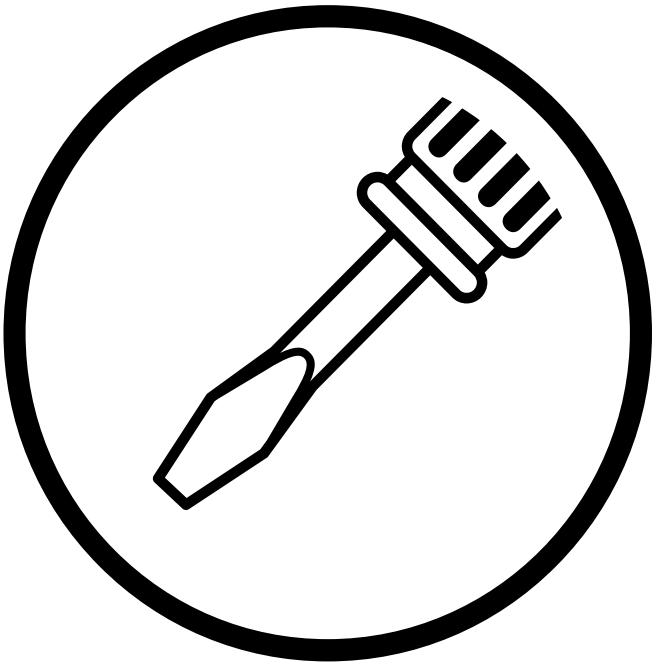
BES-961BC
BES-1261BC

BROTHER
EMBROIDERY
SYSTEMS

SERVICE MANUAL

Please read this manual before making any adjustments.

9 NEEDLE 6 HEAD EMBROIDERY MACHINE (SA TYPE)
12 NEEDLE 6 HEAD EMBROIDERY MACHINE (SA TYPE)



brother

Precautions

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- This manual may be subsequently modified without prior notice.
- Brother Industries, Ltd. shall assume no responsibility for any consequences of using this manual.

This service manual is intended for BES-961BC, 1261BC; be sure to read the BES-961BC, 1261BC instruction manual before this manual.
Carefully read the "SAFETY INSTRUCTIONS" below and the whole of this manual to understand this product before you start maintenance.
As a result of research and improvements regarding this product, some details of this manual may not be the same as those for the product you purchased.

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

SAFETY INSTRUCTIONS

1 Safety indications and their meanings

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

Indications

⚠ **DANGER**	**The instructions which follow this term indicate situations where failure to follow the instructions will almost certainly result in death or severe injury.**
⚠ **CAUTION**	**The instructions which follow this term indicate situations where failure to follow the instructions could cause injury when using the machine or physical damage to equipment and surroundings.**

Symbols

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

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

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

⚠ DANGER

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

⚠ CAUTION

Environmental requirements

Use the sewing machine in an area which is free from sources of strong electrical noise such as high-frequency welders.
Sources of strong electrical noise may cause problems with correct operation.

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

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

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

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

Avoid exposure to direct sunlight during use.
Exposure to direct sunlight may cause problems with correct operation.

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

Installation

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

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

The sewing machine weighs more than 720 kg. The installation should be carried out by a lift or a crane.

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

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

When securing the cords, do not bend the cords excessively or fasten them too hard with staples, otherwise there is the danger that fire or electric shocks could occur.

Be sure to wear protective goggles and gloves when handling the lubricating oil or grease, so that no oil or grease gets into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or grease under any circumstances, as they can cause vomiting and diarrhoea.
Keep the oil out of the reach of children.

Avoid setting up the sewing machine near sources of strong electrical noise such as high-frequency welding equipment.
If this precaution is not taken, incorrect machine operation may result.

Secure the machine with the casters when installing it so that it will not move by placing the leveling seat on the sound floor.

⚠ CAUTION

Sewing

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

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

Be sure to wear protective goggles when using the machine.
If goggles are not worn, there is the danger that if a needle breaks, parts of the broken needle may enter your eyes and injury may result.

Turn off the power switch at the following times, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.
- **When threading the needle**
- **When replacing the bobbin and needle**
- **When not using the machine and when leaving the machine unattended**

Do not get on the table.
Table may be damaged.

Secure the machine with the casters when installing it so that it will not move by placing the leveling seat on the sound floor.

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

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

Do not touch the pulse motor and sewing machine bed section during operation or for 30 minutes after operation. Otherwise burns may result.

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

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

Cleaning

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

Be sure to wear protective goggles and gloves when handling the lubricating oil or grease, so that no oil or grease gets into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or grease under any circumstances, as they can cause vomiting and diarrhoea.
Keep the oil out of the reach of children.

Maintenance and inspection

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

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

Turn off the power switch and disconnect the power cord from the wall outlet at the following times, otherwise the machine may operate if the treadle is depressed by mistake, which could result in injury.
- **When carrying out inspection, adjustment and maintenance**
- **When replacing consumable parts such as the rotary hook 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.

This service manual gives explanations for the following two models:

- **BES-961BC (9 needle)**
- **BES-1261BC (12 needle)**

Description limited to either model is given with the appropriate model name. Before reading this manual, check your machine's model name.

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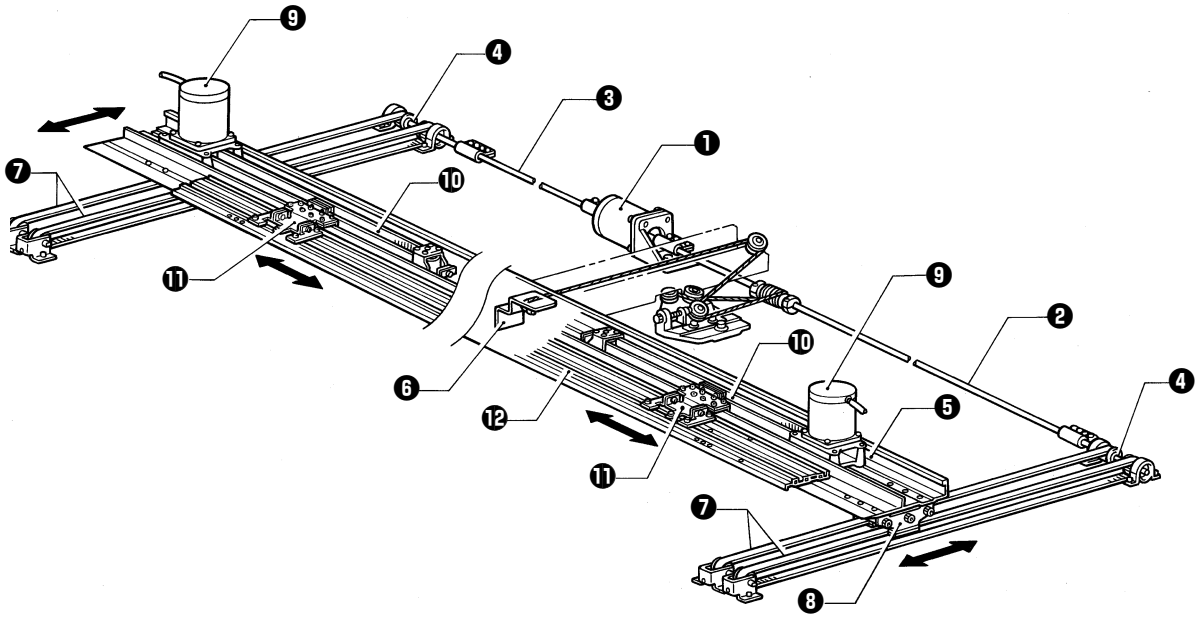
Chapter 1 Mechanical Descriptions

1. Feed guide mechanism



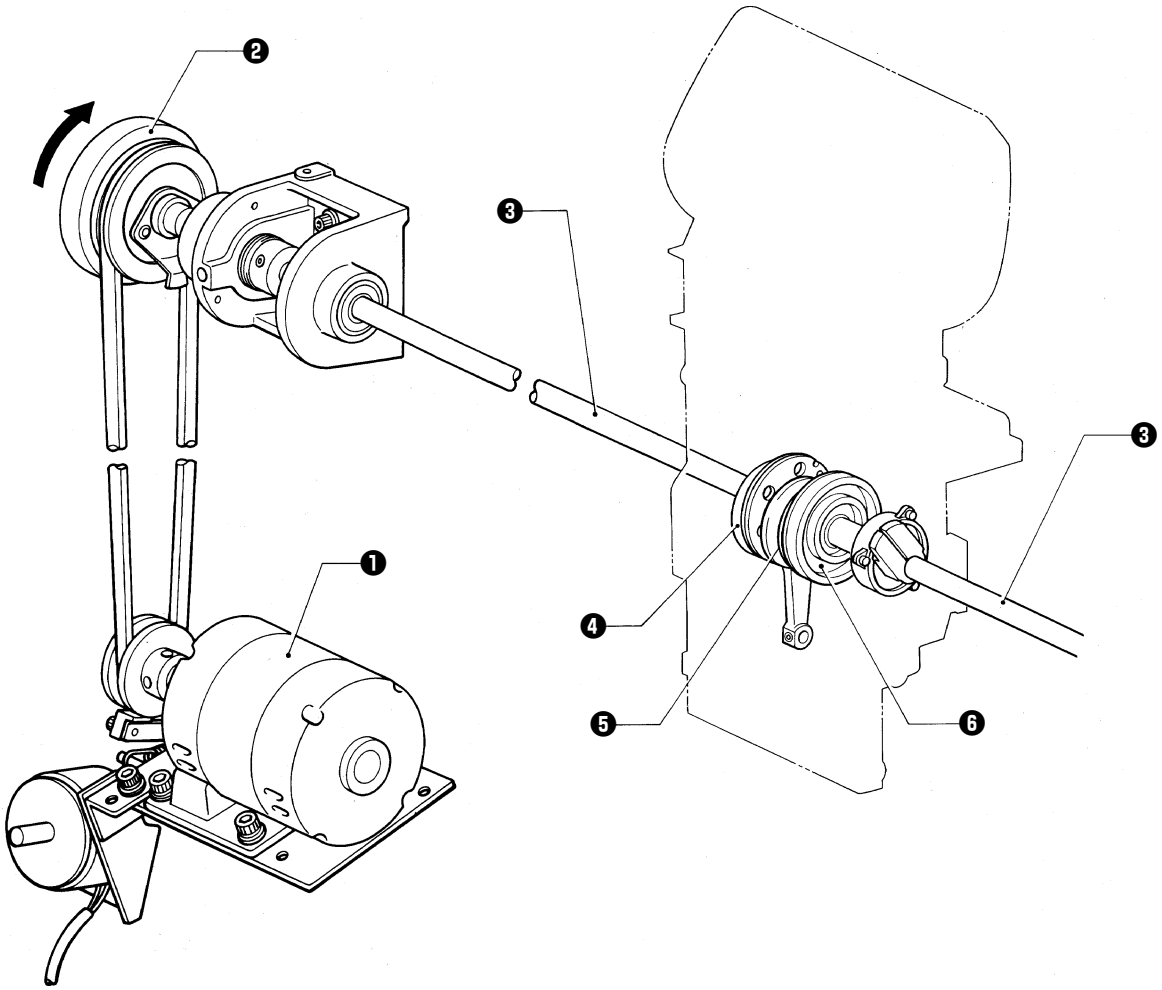
[Y direction]

- When the Y-pulse motor ❶starts, its motion is transmitted to connecting shafts A ❷ and B ❸, and the Y-driving shaft ❹.
- The rail connecting plate ❻ secured to the Y-feed frame ❺ moves the wire, and the Y-carriage ❽ attached to the Y-timing belts ❼ moves the Y-feed frame ❺ in the Y-direction.

[X direction]

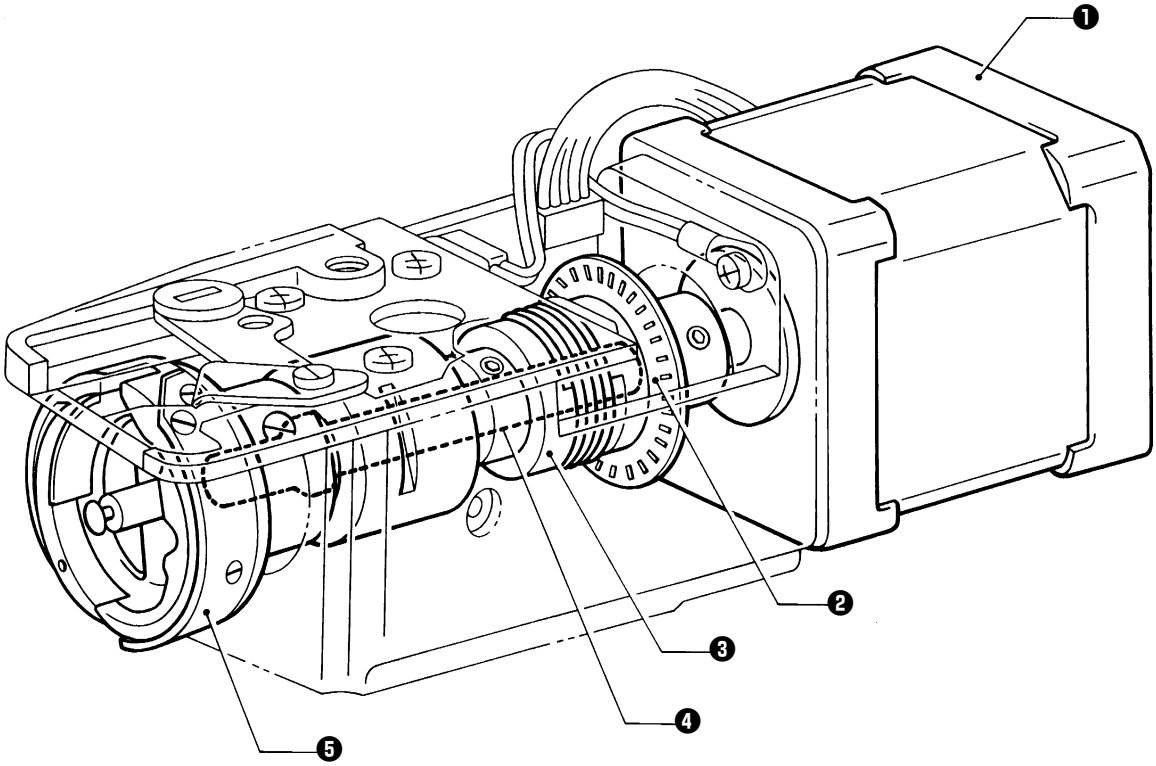
- When the X-pulse motor ❾ starts, its motion is transmitted to the X-timing belt ❿, and the X-feed bracket ⓫, resulting in causing the X-feed frame ⓬ to move in the X-direction.

2. Crank shaft mechanism



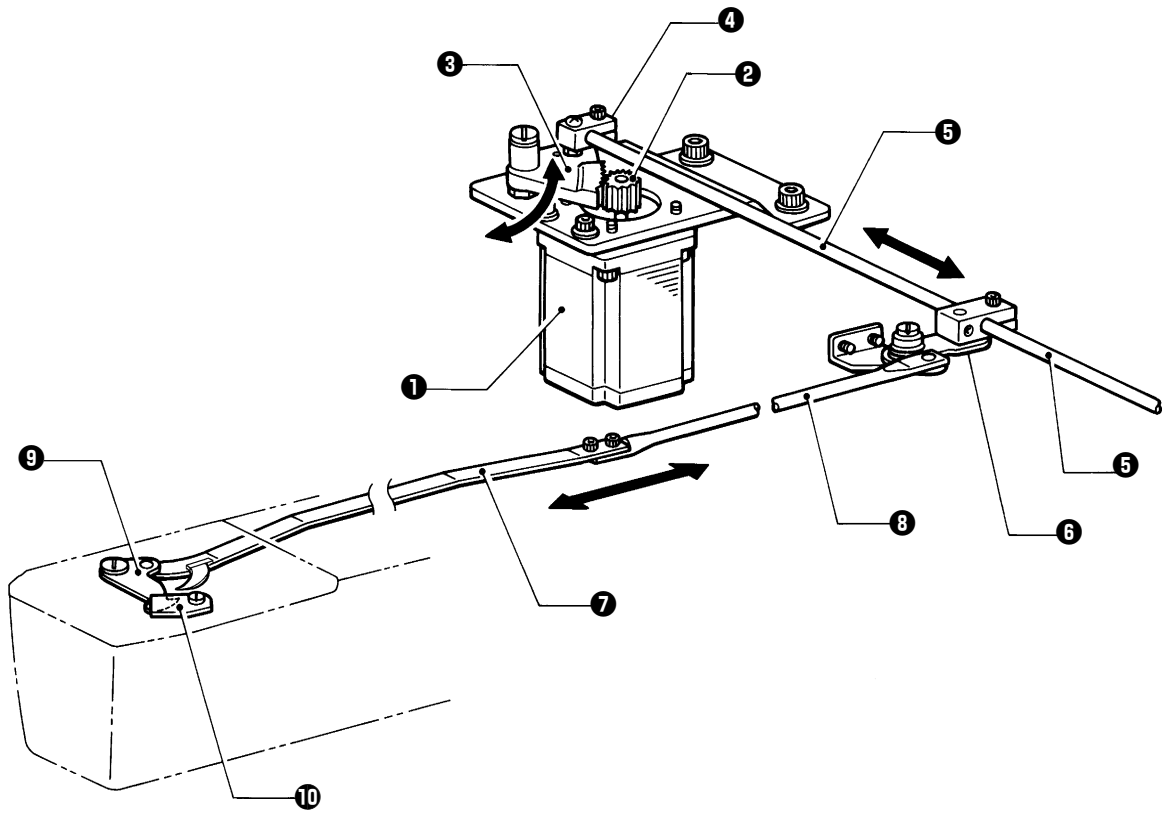
When the motor ❶ starts, pulley B ❷ is rotated via the V-belt, resulting in causing the driving shaft ❸ to rotate the thread take-up cam ❹, the needle bar driving cam ❺, and the work clamp cam ❻.

3. Lower shaft and rotary hook mechanisms



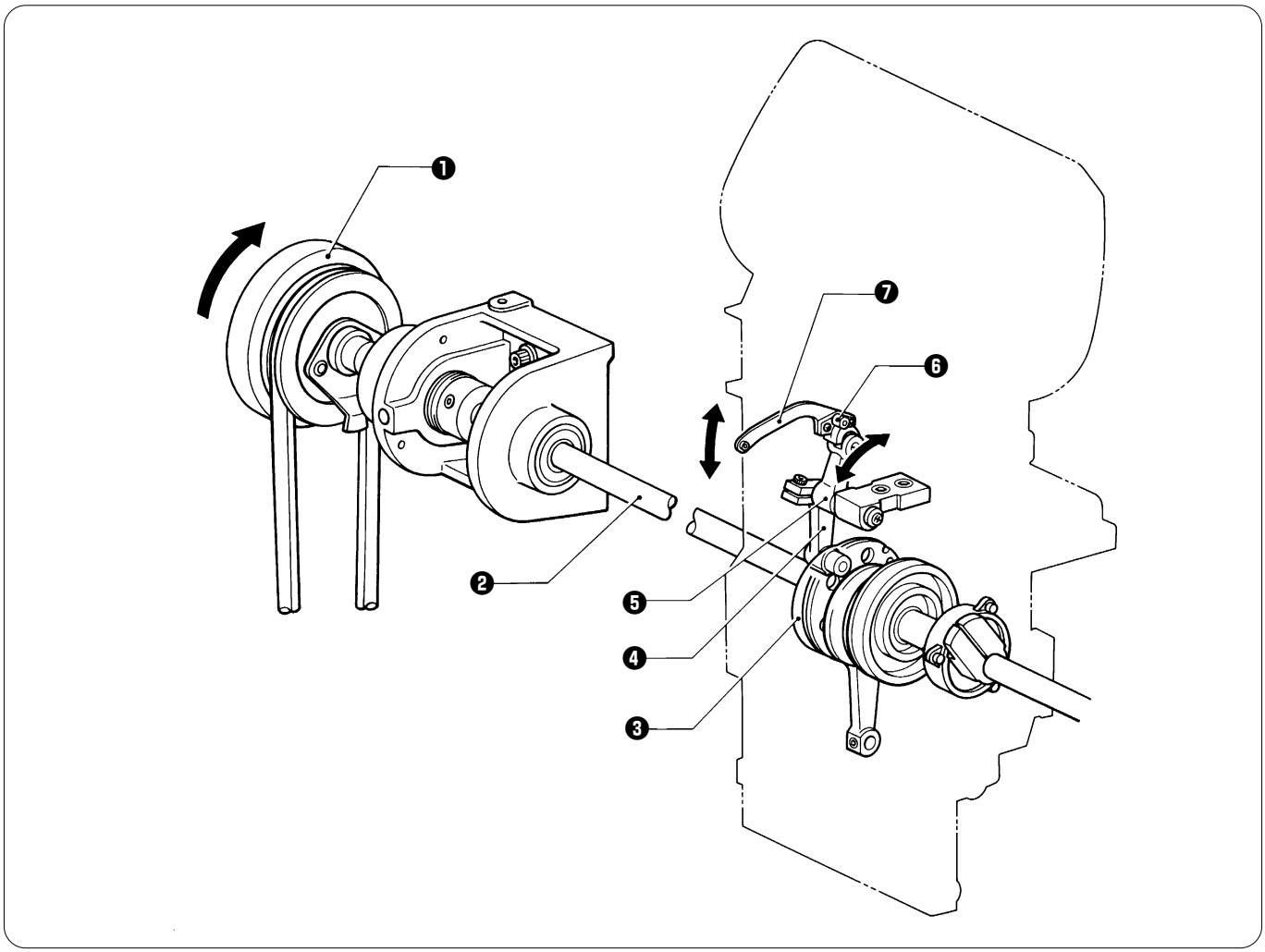
When pulley B and the crank shaft rotate, the pulse motor ❶ of the lower shaft module is synchronized with the upper shaft by the coupling hub assembly R ❷, and rotates the coupling hub ❸, the lower shaft ❹, and the rotary hook ❺.

4. Thread trimmer mechanism



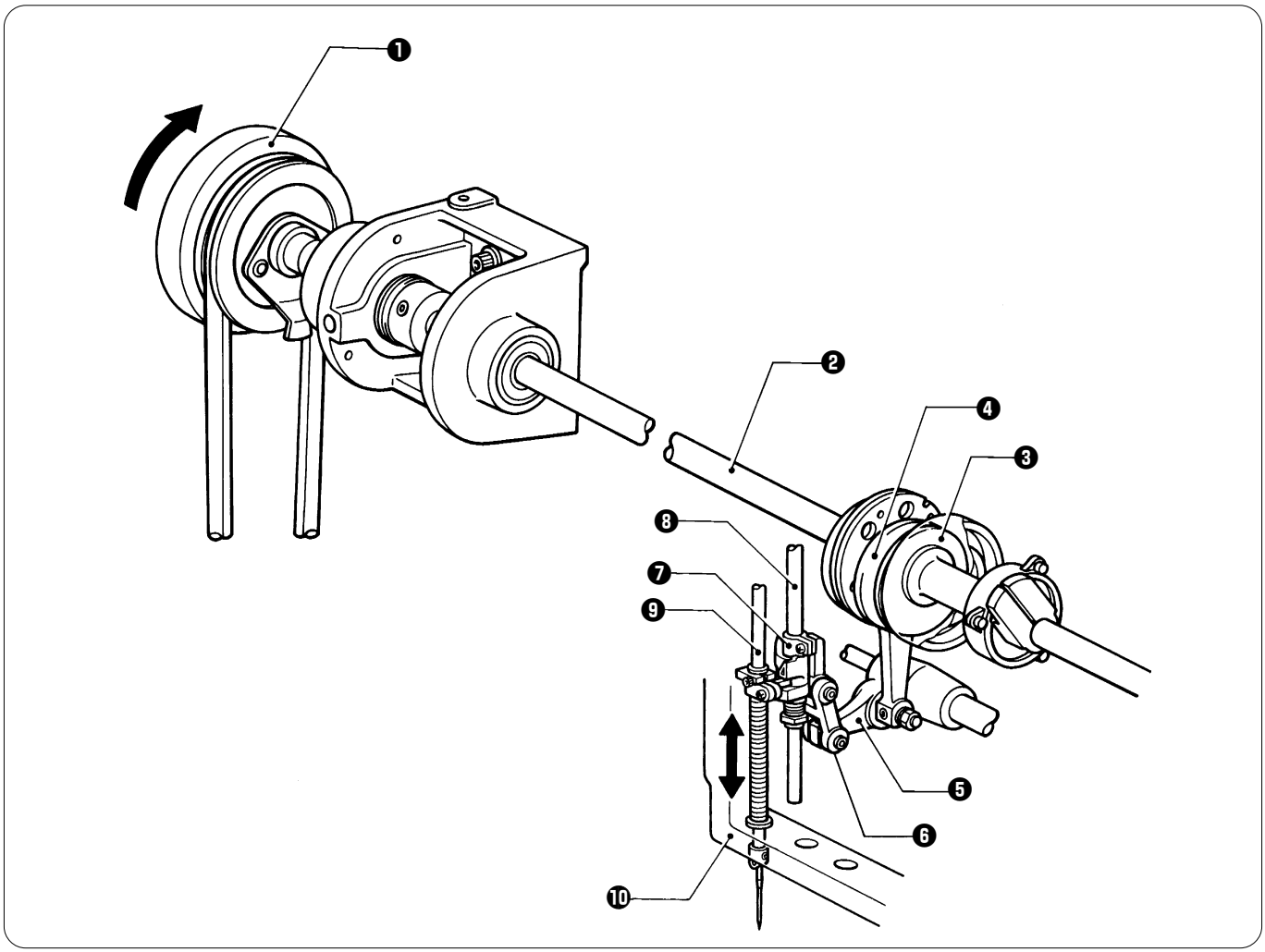
- When the pulse motor ❶ receives the signal for the final stitch, C TR gear ❷ rotates, and A TR gear ❸ rocks.
- The motion of TR gear A ❸ is transmitted to connecting block TR ❹, resulting in causing the two TR connecting rods ❺ to move to the right and left.
- The motion of TR connecting rods ❺ is transmitted to the thread trimmer lever ❻, resulting in causing TR connecting rod assys B ❼ and C ❽ to move back and forth.
- When TR connecting rod assys B ❼ and C ❽ move back and forth, the movable knife ❾ and the fixed knife ❿ engage with each other to trim the thread.

5. Thread take-up mechanism



- When pulley B ❶ rotates in the direction of the arrow, the motion is transmitted to the crank shaft ❷, and the thread take-up driving cam ❸ rotates.
- The thread take-up driving cam ❸ rocks the lever ❺ via the roller of the TR take-up driving lever assembly ❹.
- The lever ❺ moves the thread take-up lever ❼ via the thread take-up boss ❻.

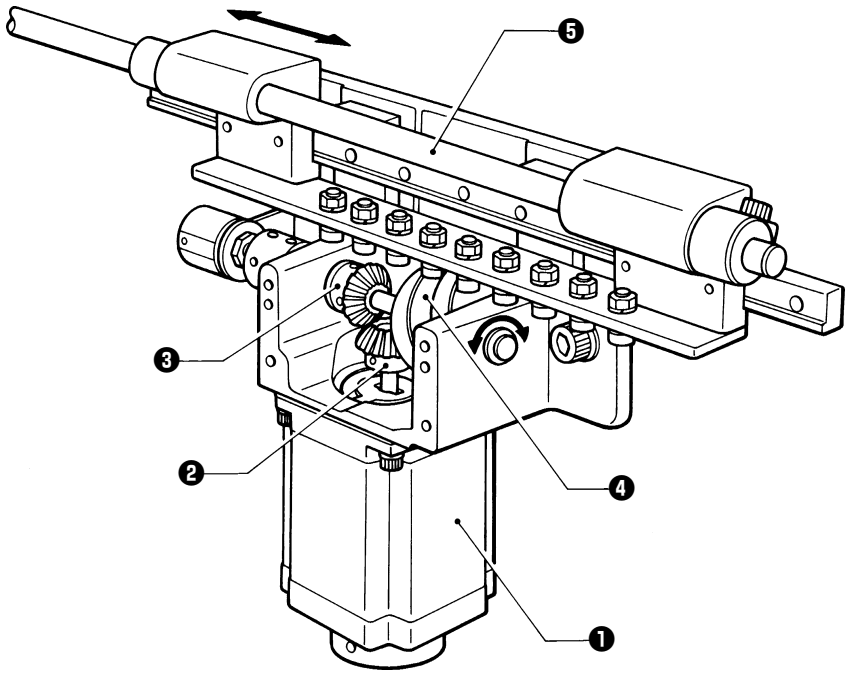
6. Needle bar mechanism



- When the pulley B ❶ rotates in the direction of the arrow, the driving shaft ❷ rotates the needle bar driving cam ❸.
- The connecting rod ❹ is connected to the needle bar driving cam ❸.
- The connecting rod ❹ moves the needle bar driving lever ❺, and the base needle bar ❽ attached to the jump bracket ❼ and the needle bar ❾ move up and down via the driving connector ❻.
- The motion of the needle bar ❾ depends on the needle bar case ❿.

7. Needle bar flip-up mechanism

■ **BES-961BC**



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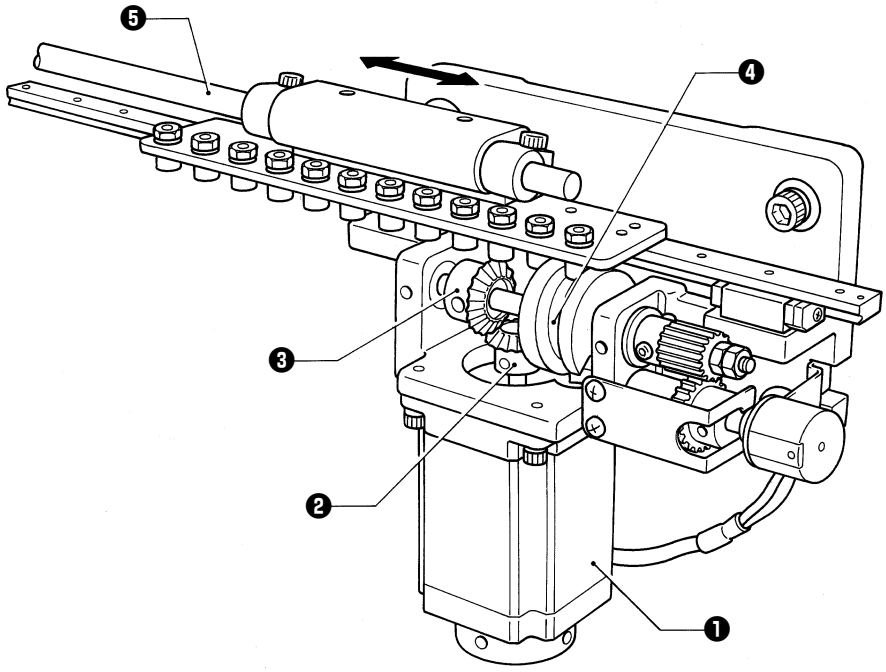
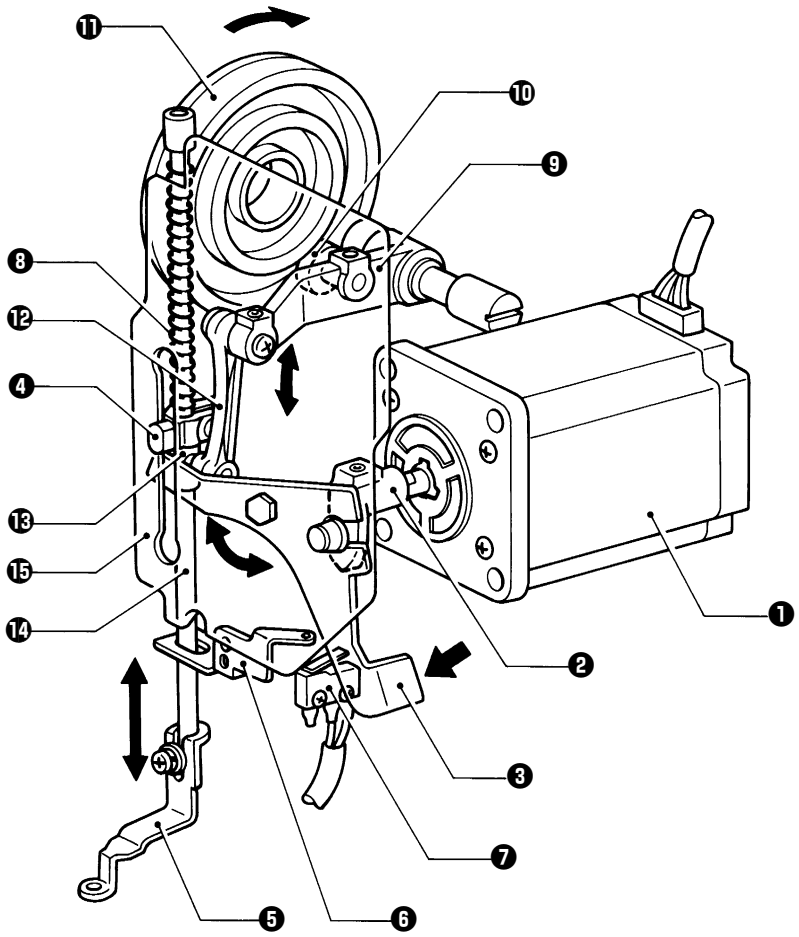


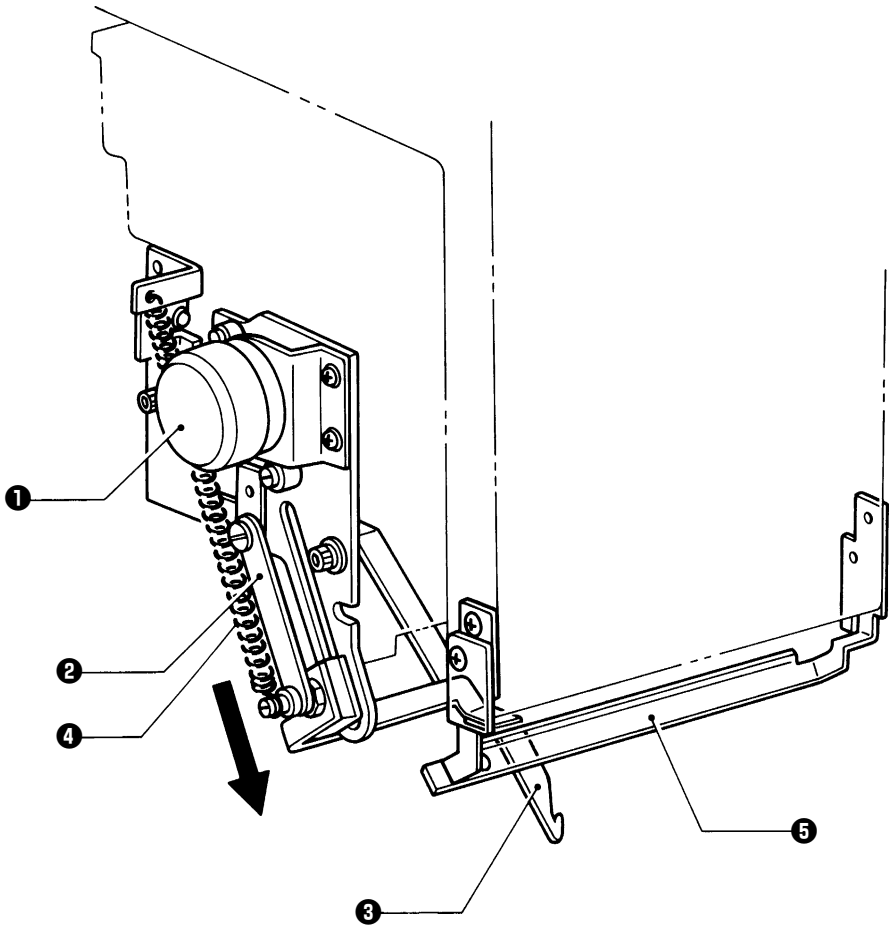
- The needle bar flip-up signal is transmitted to the pulse motor ❶ to activate bevel gears A ❷ and B ❸. The change cam ❹ switches needle bars.
- The needle bar flip-up is sent to all six machine heads via the connecting shaft ❺.

8. Presser foot lifter mechanism



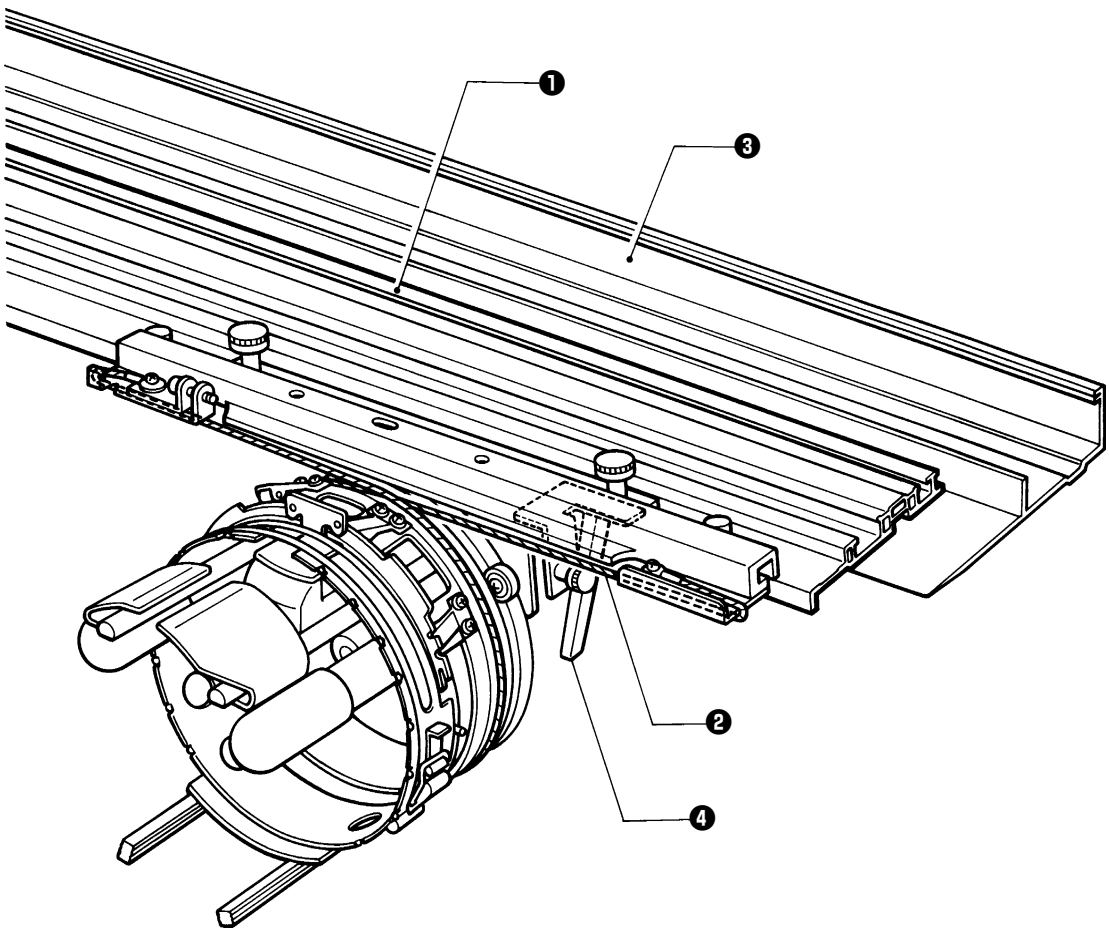
- When the power is turned on, the pulse motor ❶ receives a signal, the RET motor lever ❷ works, the W retracting lever ❸ raises the presser foot shaft clamp ❹ and the presser foot ❺ to a position decided by W motor sensor plate ❻ and the W switch assy ❼.
- When sewing starts, the pulse motor❶ is off, and the presser foot❺ is lowered by the retracting spring❽.
- The roller ❿, which is attached to the presser foot driving lever ❾ and inserted into the groove of the work clamp cam ⓫, transmits the motion to the link ⓬
- The presser foot operating base ⓭ set in the link ⓬ and the presser foot shaft clamp ❹ secured to the presser foot shaft ⓮ are connected by the retracting spring ❽. They move the presser foot ❺ up and down along the groove of the presser guide plate ⓯.
- When sewing is completed, the pulse motor ❶ receives a signal, and raises the presser foot ❺ to a position decided by W motor sensor plate ❻ and the W switch assy ❼.
- While the power is turned off, the presser foot❺ can be raised manually by pressing the W retracting lever❸.

9. Thread wiper mechanism



- After sewing is finished, the wiper solenoid ❶ moves the plate ❷ in the direction of the arrow.
- The upper thread guide hook ❸ attached to the plate ❷ trims the upper thread. The trimmed thread is raised by the spring ❹, and maintained in a position on the thread presser base ❺.

10. Cap frame device



- When the X-feed frame ❶ moves in the direction of X, the cap frame device is rotated by the wire ❷.
- When the Y-feed frame ❸ moves in the direction of Y, the motion is transmitted to the cap frame device via the fixed lever ❹.

Chapter 2 Parts Replacement and Adjustment

⚠ CAUTION

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

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

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

- **When carrying out inspection, adjustment and maintenance**

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.

Secure the machine when installing it so that it will not move by placing the leveling seat on the sound floor.

1. Replacing and adjusting the machine heads

Notes:
- Be sure to lower table F when it has been used.
- Remove all connectors and the like which are attached to the machine heads.
- Be sure to replace machine heads one by one. Do not remove two or more heads at once.
- Do not remove anything but the feed mechanism.

[Removing a machine head]

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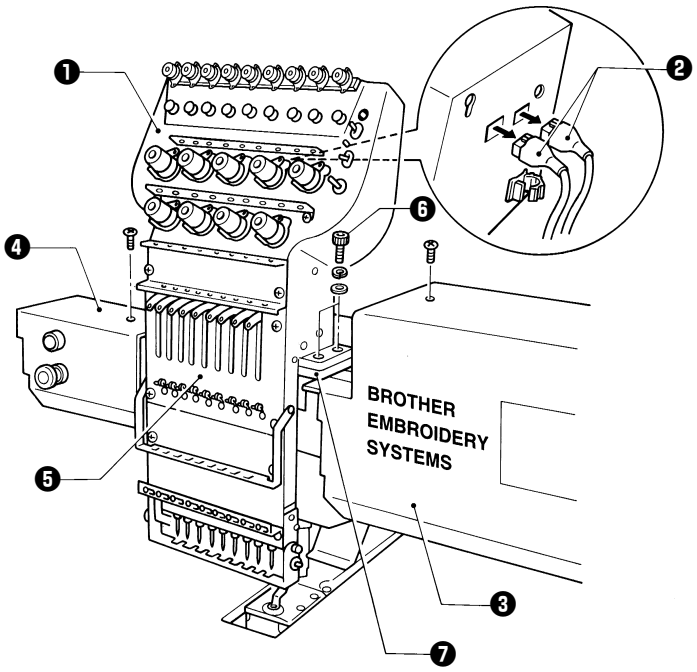

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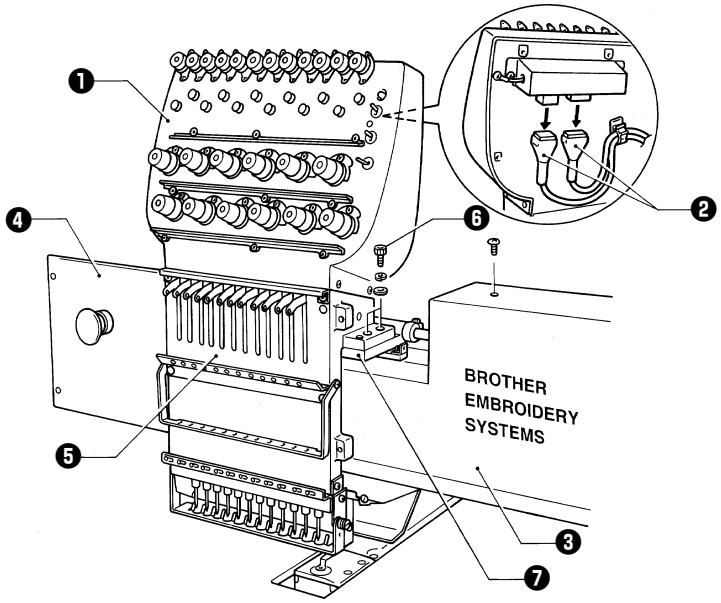

1. Remove the two connectors ❷ from the rear of the adjustment base ❶. (At this time, separate cords from cord clamps.)
2. Remove screws, the cover ❸, and the switch cover ❹. (Remove the covers for remaining machine heads.)
3. Remove the four bolts ❻, and the needle bar case ❺ from the head ❼.
   Note:
   When removing the switch cover ❹, remove switch connectors.

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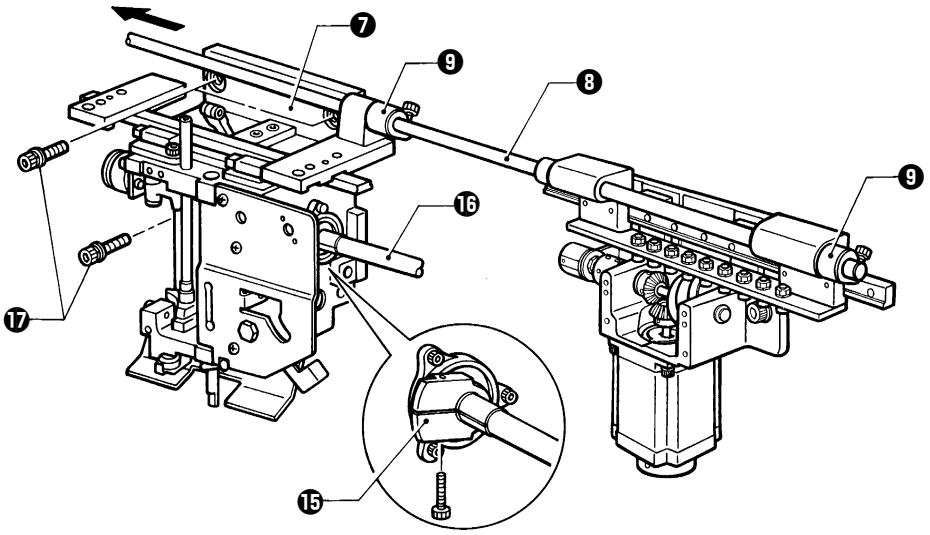

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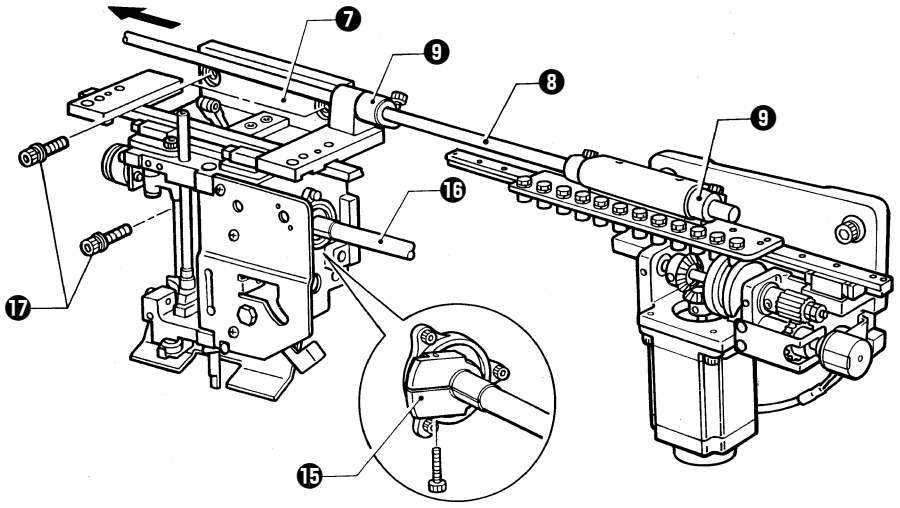
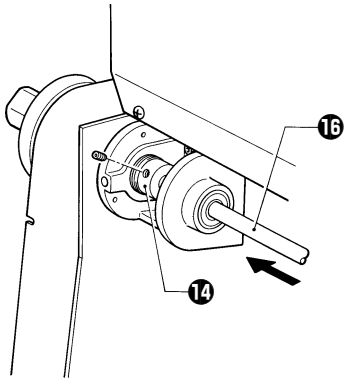
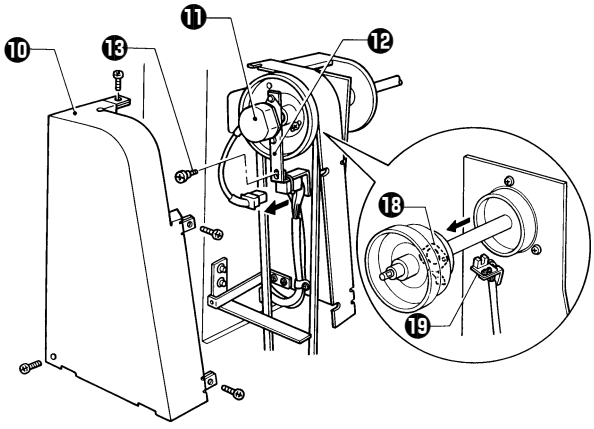


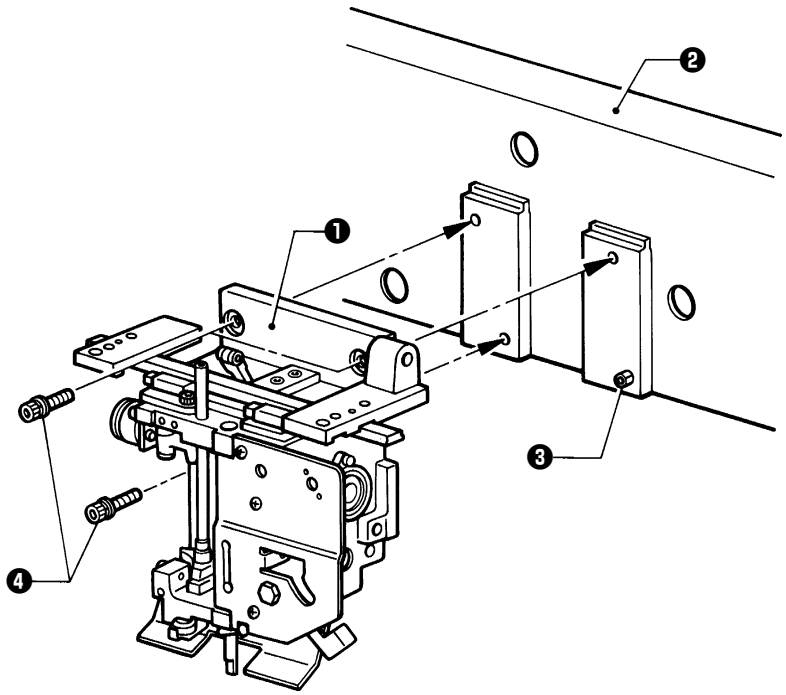




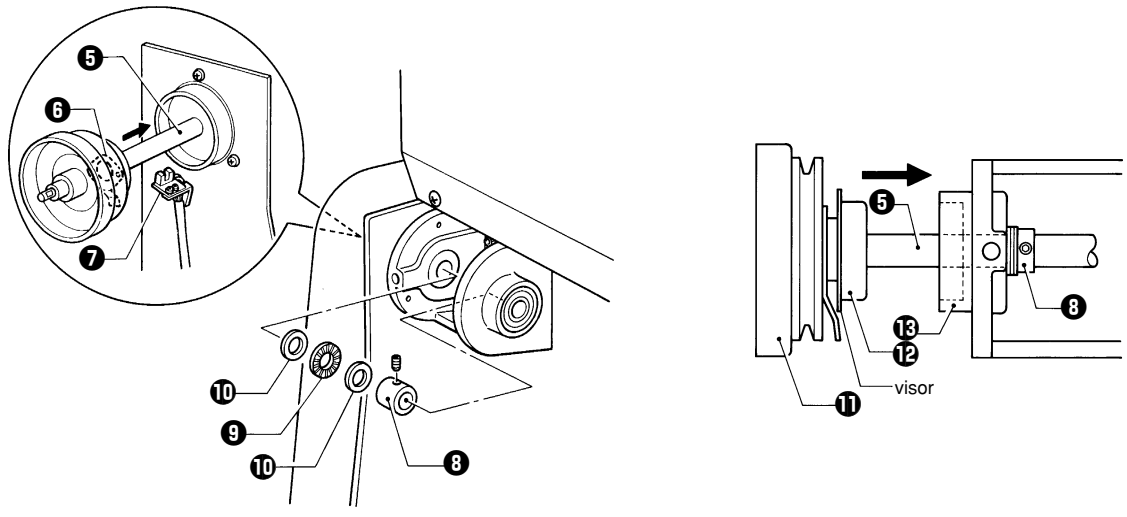
4. Loosen the fourteen bolts of the change bracket collars ❾ securing the connecting shaft ❽, and pull the connecting shaft ❽.
5. Remove belt cover B ❿, and then the connector of the rotary encoder ⓫. Remove the shoulder screw ⓲ from the encoder bracket ⓬.
6. Loosen the two set screws of the inner presser collar ⓮ and the six bolts of the collar ⓯, and pull the driving shaft ⓰ to the left.
7. Remove the three bolts ⓱ and the head ❼.

   Note:
   Pull the driving shaft at the position where the zero bight needle location dog ⓲ and the photo-sensor ⓳ do not make contact with each other. (They make contact at 80 - 120 degrees.)

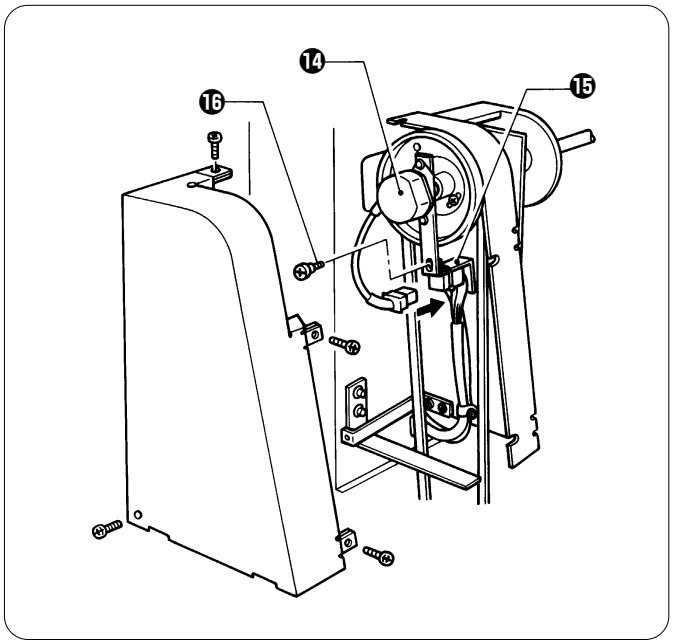
[Reassembling the head]



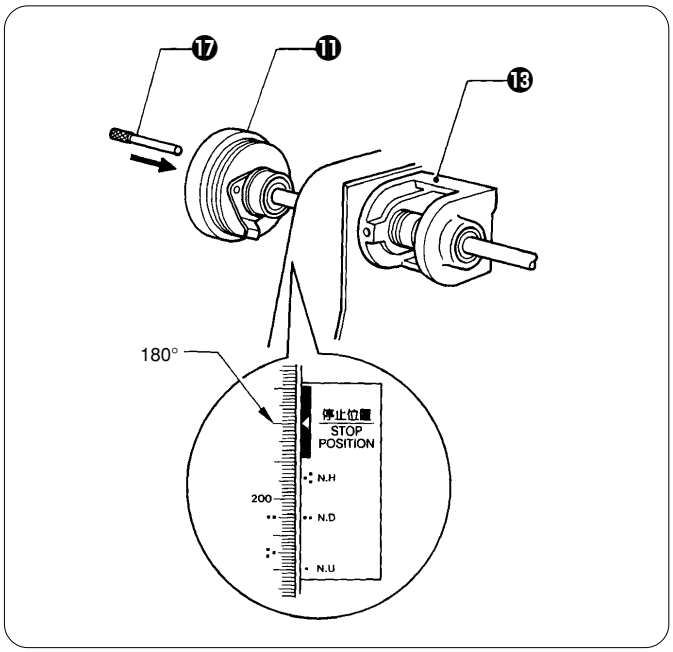
1. Hook the head ❶ on the projections of the bridge ❷, make contact with the right side of the head to the spring pin ❸, and attach the head ❶ to the bridge ❷ with the three bolts ❹.



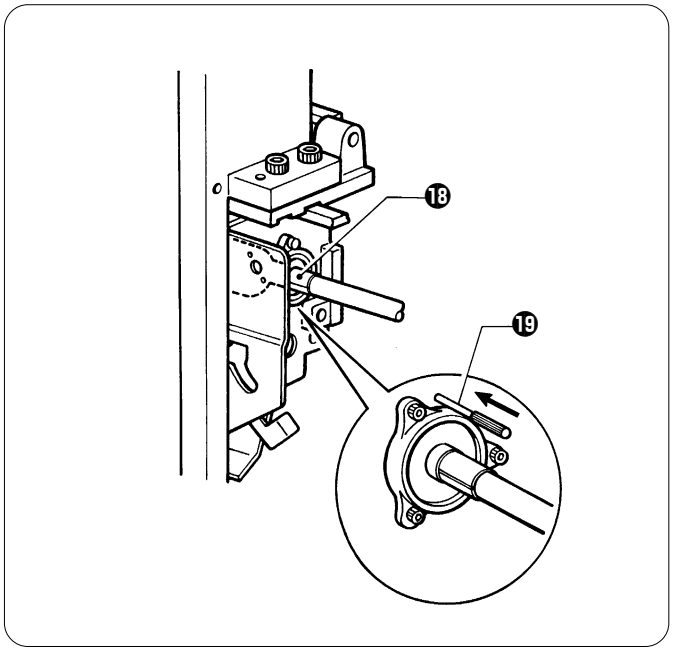
2. As shown in the figure, insert the driving shaft ❺ from the left while passing it through the inner presser collar ❽, the thrust roller bearing ❾, and the two thrust washers ❿ so that the zero bight needle location dog ❻ and the photo-sensor ❼ do not make contact with each other.
   Insert the driving shaft ❺ all the way until the visor of the bearing ⓬ makes contact with the end of the driving shaft bearing ⓭.
3. Press pulley B ⓫ so that it covers the driving shaft bearing ⓭ with the inner presser collar ❽, and tighten the set screw of the inner presser collar ❽ to eliminate end play.



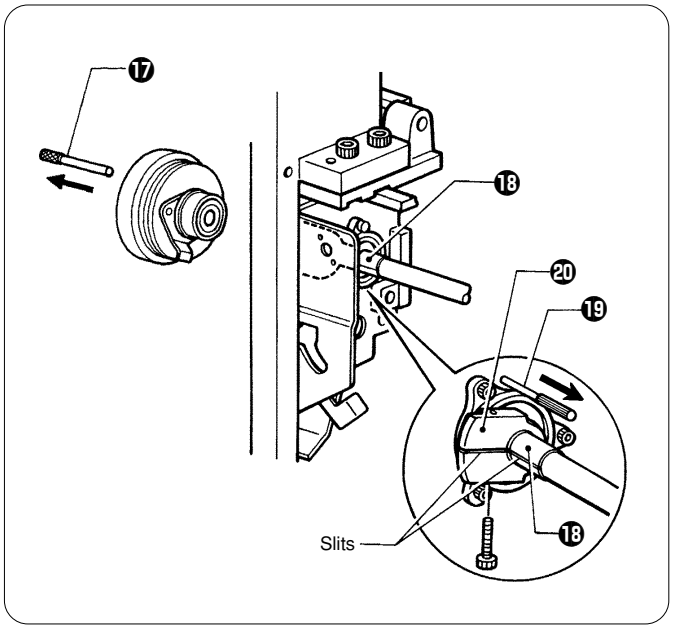
4. Attach the connector of the rotary encoder ⓮ to the encoder bracket ⓯ using the shoulder screw ⓰.



5. Insert the positioning bar ⓱ into the holes of pulley B ⓫ and the driving shaft bearing ⓭ (when the pulley indicator is aligned with 180 degree mark of the rotary encoder) to secure the driving shaft ❺.
Note:
Use optional positioning bar.



6. Align the hole on the right side of the head with that of the needle bar driving cam ⓲, and insert the gauge pin ⓳ into them.
Note:
Use optional gauge pins.



7. Align the slit of the needle bar cam ⑱ with that of the collar ⑳, and secure the latter.
   Repeat this step for all of the six heads. After this step is completed for all heads, remove the gauge pin ⑲ and the positioning bar ⑰.

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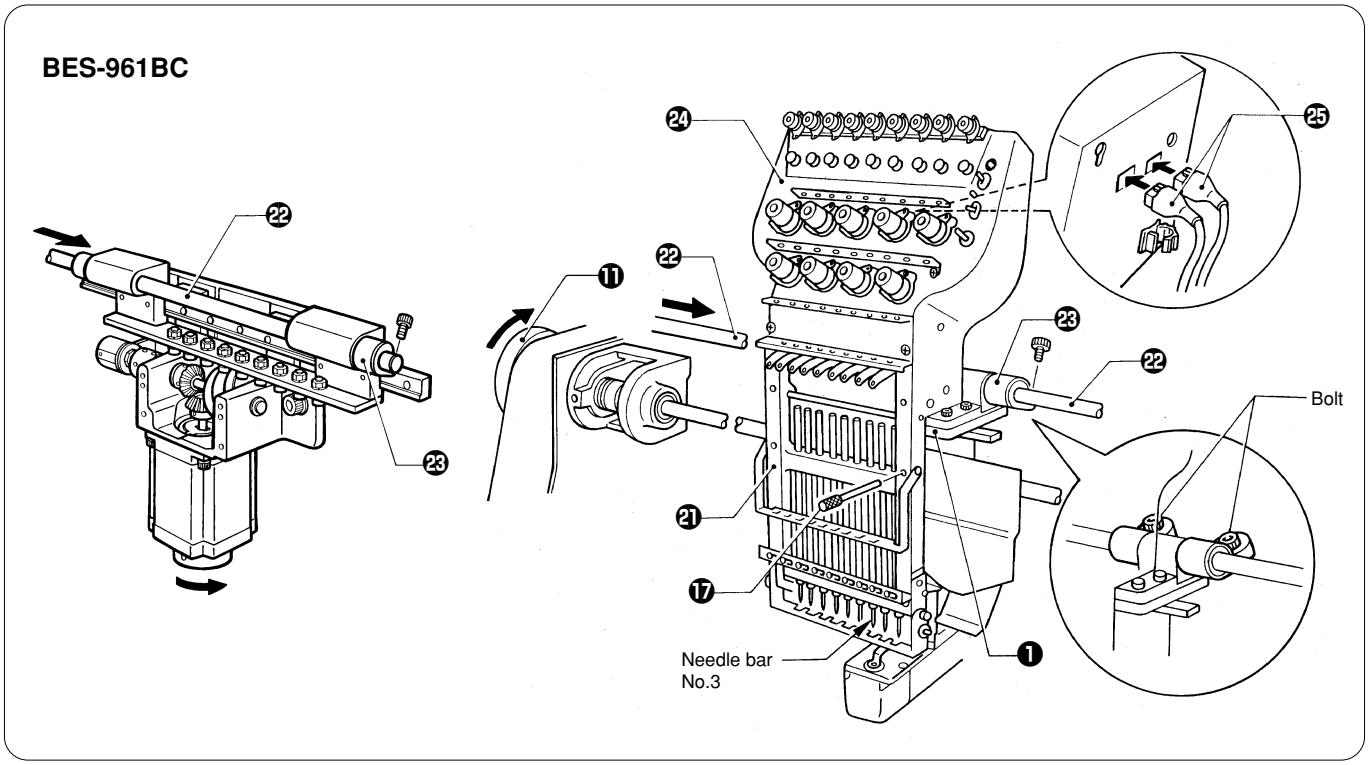
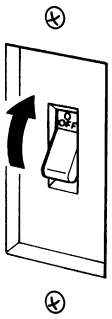


8. Install the needle bar case ㉑ on the head ❶, and insert the connecting shaft ㉒. Do not forget to pass it through the change bracket collar ㉓.
9. At needle bar No.3, insert the positioning bar ⑰ from the front of the needle bar case ㉑ into the hole of the head ❶ to secure the needle bar case ㉑. Insert another positioning bar ⑰ into needle bar case of the next head, secure two change bracket collars ㉓ while checking that the needle definitely falls into the hole on the needle plate attached to the bed.

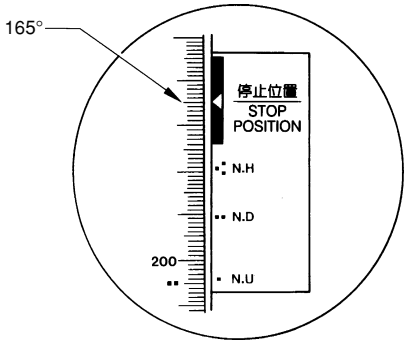
   Notes:
   Two positioning bars ⑰ are required. One is inserted into the head whose needle penetration position has been determined; the other is inserted into the head whose needle penetration position will be determined. (If both bars are used for heads whose needle penetration position is not yet determined, you will not be able to find the correct needle penetration position.)
   Turn pulley B ⑪ on each head to make sure that the needle will fall into the hole on the needle plate.

10. Attach covers, and insert two connectors ㉕ into the rear of the adjustment base ㉔.
    At this time, be sure to attach the harnesses to the cord holder, providing an allowance for the harnesses tension between the adjustment base set and the bridge. (If there is no allowance, the pattern to be sewn may be distorted during color change.)

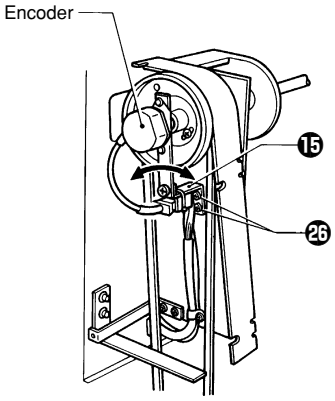


11. Turn on the power of the machine.

12. The machine starts the encoder signal test in the test mode.
Refer to "Test Mode" in chapter 4.

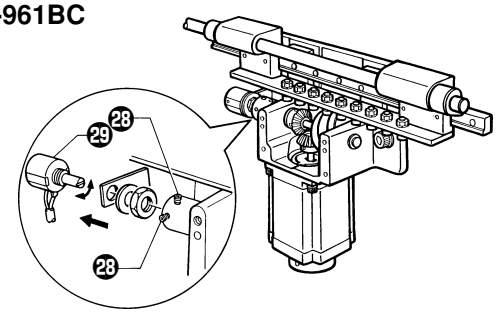


13. Turn the pulley to make sure that the buzzer will start to sound at 165 degrees and  becomes "H".



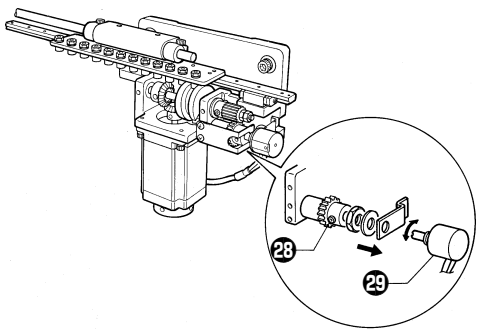
14. If it does not start to sound at 165 degrees, loosen the two screws ㉕ fixing the encoder adjusting plate ⓯ and adjust the angle.

BES-961BC



15. The machine starts the needle bar case moving test in the test mode.
Refer to "Test Mode" in chapter 4.
Check to see that  19 N and the buzzer sounds when the needle bar is No.1.
If it does not sound, loosen the set screw ㉘ of the potentiometer, remove the potentiometer ㉙ and turn the shaft for adjustment. Refer to "13. Replacing and adjusting the potentiometer" on page 37. for details.

BES-1261BC

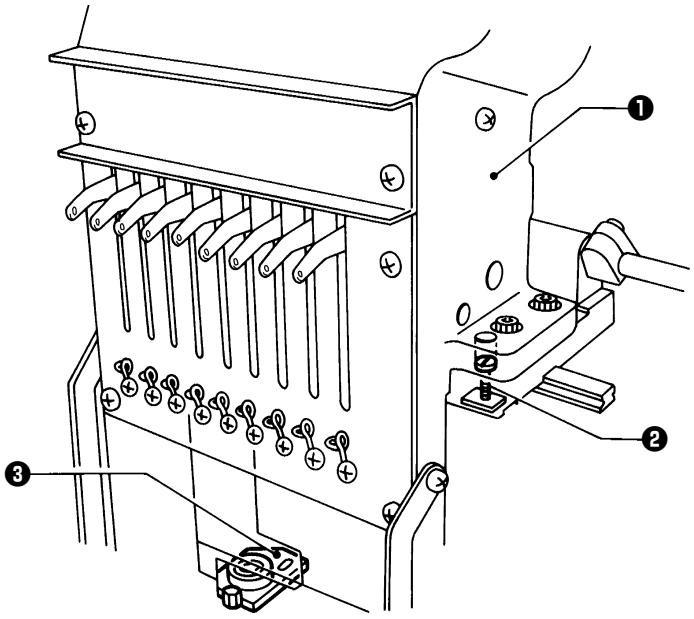


16. Press the ESC key to return to the embroidery initial screen.

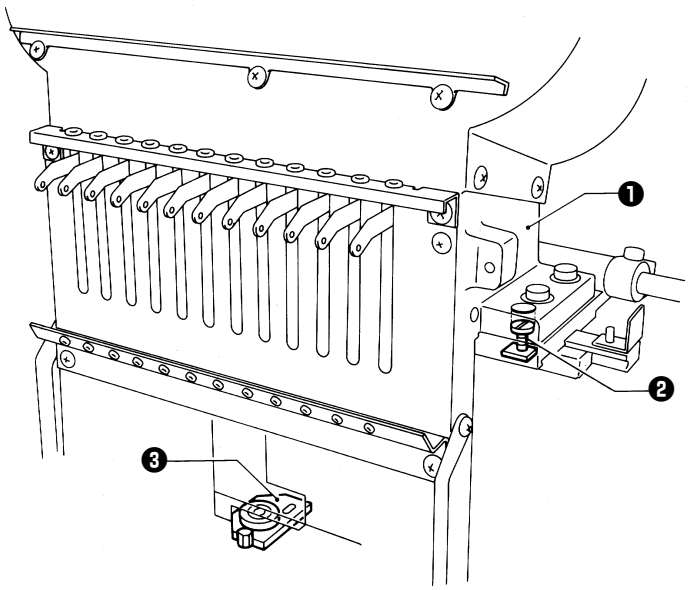
2. Removing the needle bar case

Refer to page 11, "1. Replacing and adjusting the machine heads."

BES-961BC



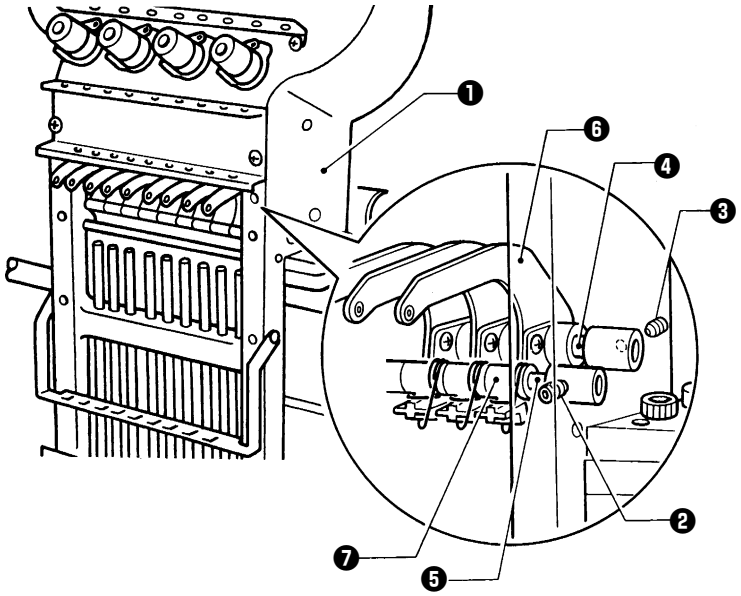
BES-1261BC

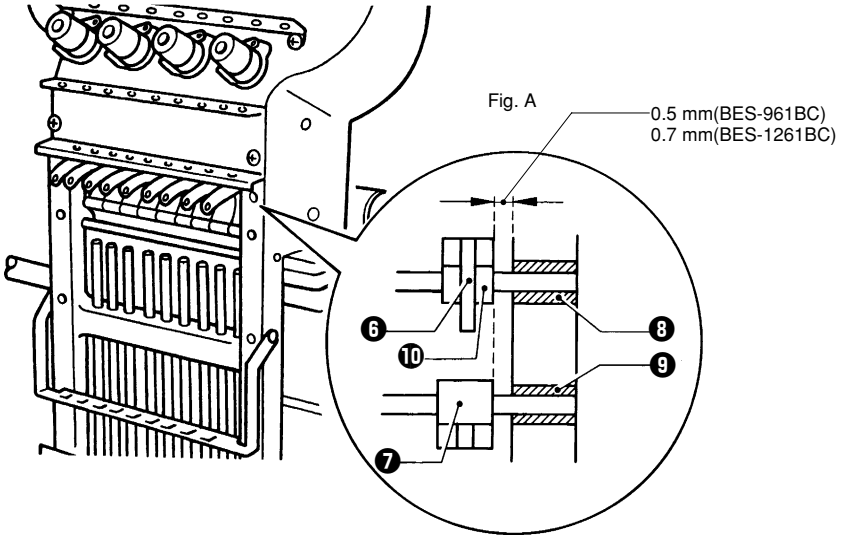


[Notes on assembly]

- The needle bar case ❶ should move to the right and left easily, and a needle should be aligned with the hole in the needle plate. (Carry out the final check of needle location in the following manner. In the position of needle bar No. 3, insert a positioning bar from the hole on the front of the needle bar case to the head hole.)
- Loosen the two positioning bars ❷ for adjusting the needle bar case ❶ or needle penetration point; adjust the positioning plate ❸ for adjusting the inclination.
- Do not loosen the positioning bars ❷ unnecessarily.

3. Replacing and adjusting the thread take-up lever



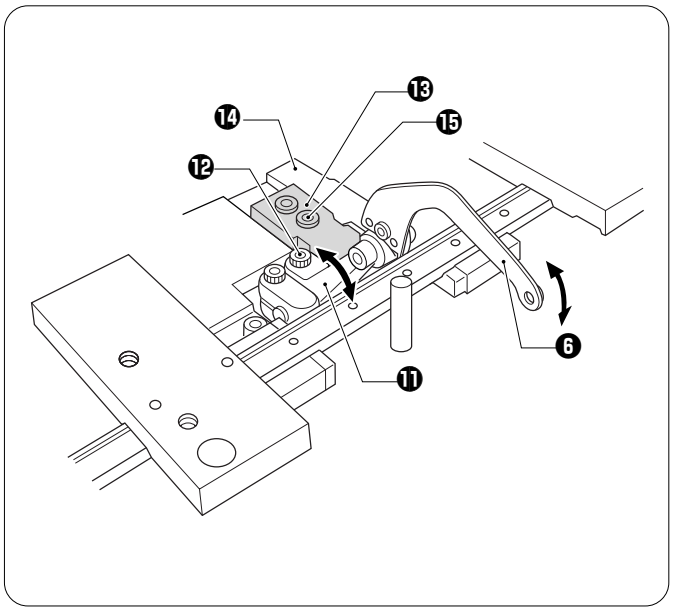


1. Loosen the set screws ❷ on the right and left of the needle bar case ❶ when viewed from the front, and the set screws ❸ on both sides of the rear of the needle bar case ❶.
2. Move the thread take-up shaft ❹ and thread take-up holding shaft ❺, and remove one or two thread take-up holding(s) ❼.
   • After replacing the thread take-up lever, reverse the above procedure for re-assembly.

[Notes on re-assembly]

• When attaching the thread take-up lever ❻ and the thread take-up holding ❼, provide a 0.5 mm (BES-961BC) and 0.7 mm (BES-1261BC) clearance from the end of the thread take-up holding ❼ to both the thread take-up shaft bush ❽ and the thread take-up holding bush ❾. The positions of the thread take-up lever ❻ and the thread take-up holding ❼ should be as shown in figure A; the thread take-up holding ❼ should be inserted into the thread take-up boss ❿ without touching the thread take-up lever ❻.

- Turn the pulley and make the following adjustment so that its height is aligned with the other needle thread take-up lever when the pulley is at 100 degrees (stop position).

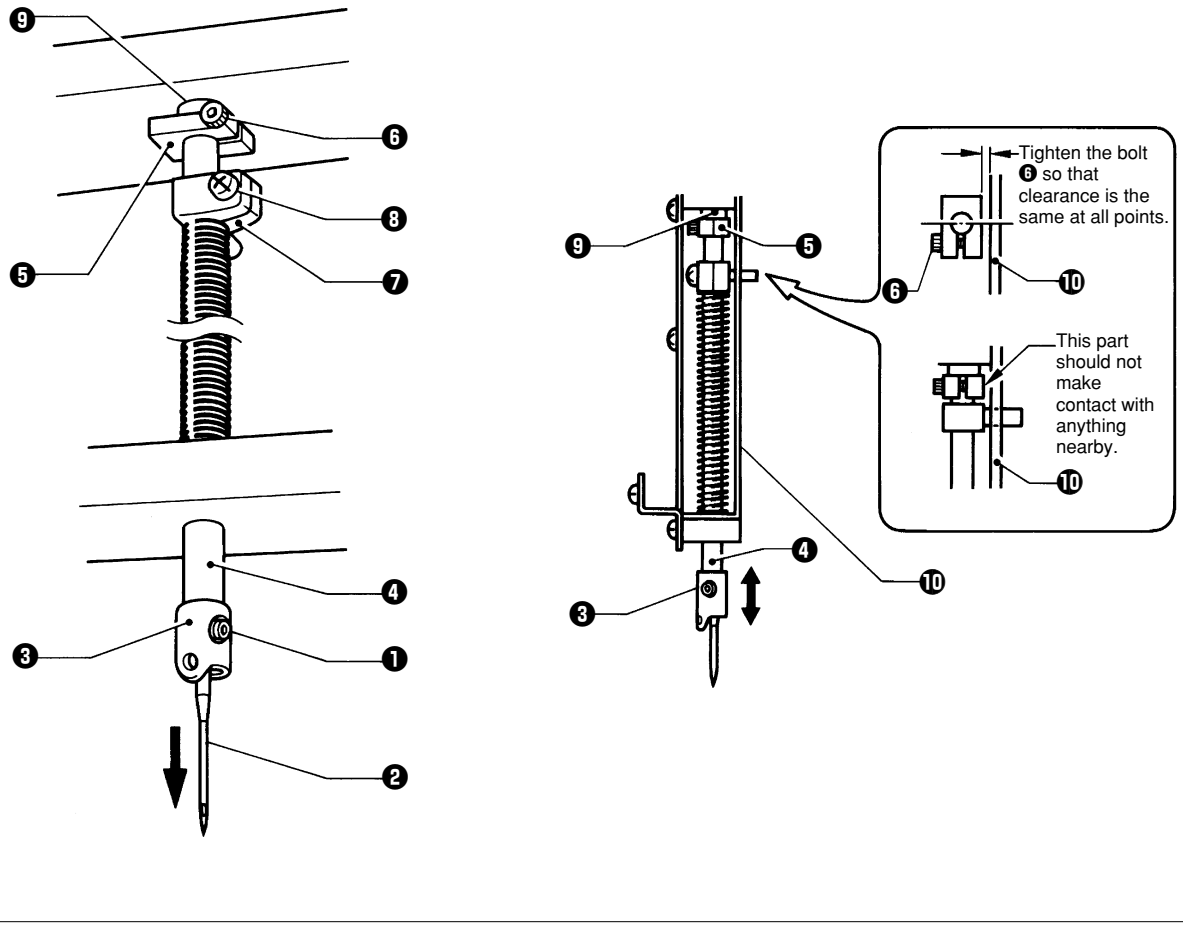


Loosen the hole bolt ⓬ securing the needle thread take-up driven lever ⓫ and adjust the position (height) of the needle thread take-up lever ❻ when the pulley is at 100 degrees (stop position).

Notes:

- Be careful not to make a chattering noise when changing colors.
- If the needle thread take-up bearing ⓭ is removed, check to see that it is securely inserted into the mounting slot of the head ⓮ to reinstall it with the hole bolt ⓯.

4. Replacing the needle bar



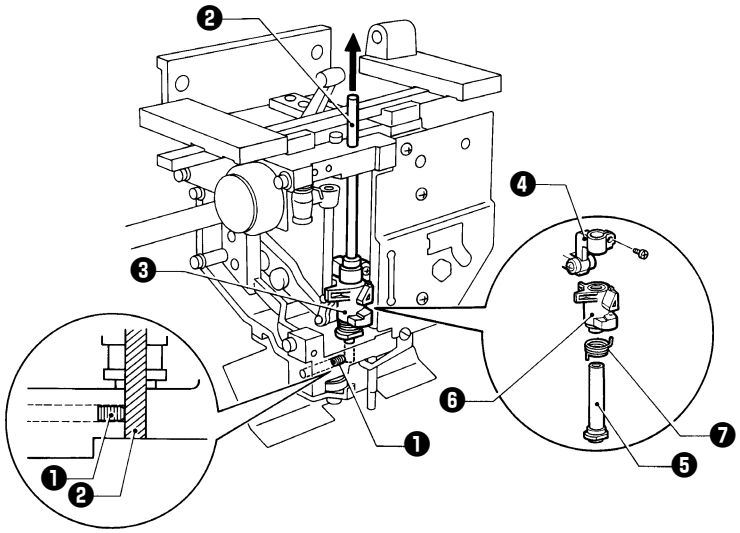
1. Remove the set screw ❶ and the needle ❷.
2. Remove the needle bar thread guide ❸ from the needle bar ❹.
3. Loosen the bolt ❻ of the top dead center stopper ❺ and the screw ❽ of the needle bar clamp ❼.
4. Remove the needle bar ❹ by pulling it downward. (The cushion rubber, the top dead center stopper, the needle bar clamp, and the spring washer will come off.)

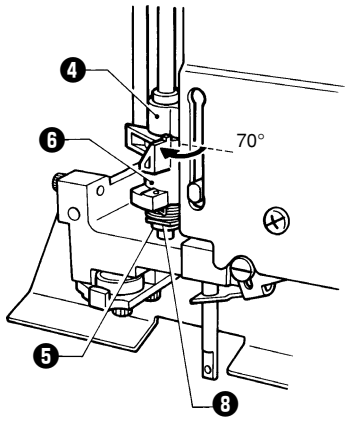
- After replacing the needle bar, reverse the above procedure for re-assembly.

[Notes on re-assembly]

- Attach the needle bar thread guide ❸ with its hole facing the front.
- Adjust bottom dead center using the bottom dead center gauge.
- Adjust the top dead center stopper by pressing it against the cushion rubber ❾ at top dead center when the jump bracket and the needle bar clamp are securely fixed in position (when the " ▮ " mark on the pulley is aligned with the one on the belt cover), and pressing the needle bar clamp downward.
  Make sure that the top dead center stopper does not make contact with the needle bar guide rail ❿.
- When tightening the bolt ❻ of the top dead center stopper, use the accessory wrench, insert the longer side of the wrench into the bolt head, and tighten it (Tightening torque: 0.78 N•m).
  Notes:
  - If the bolt is tightened too much, the needle bar may be sluggish.
  - After re-assembly, make sure that the needle bar can be retracted to the top dead center when it is pressed down and released.

5. Replacing the jump bracket





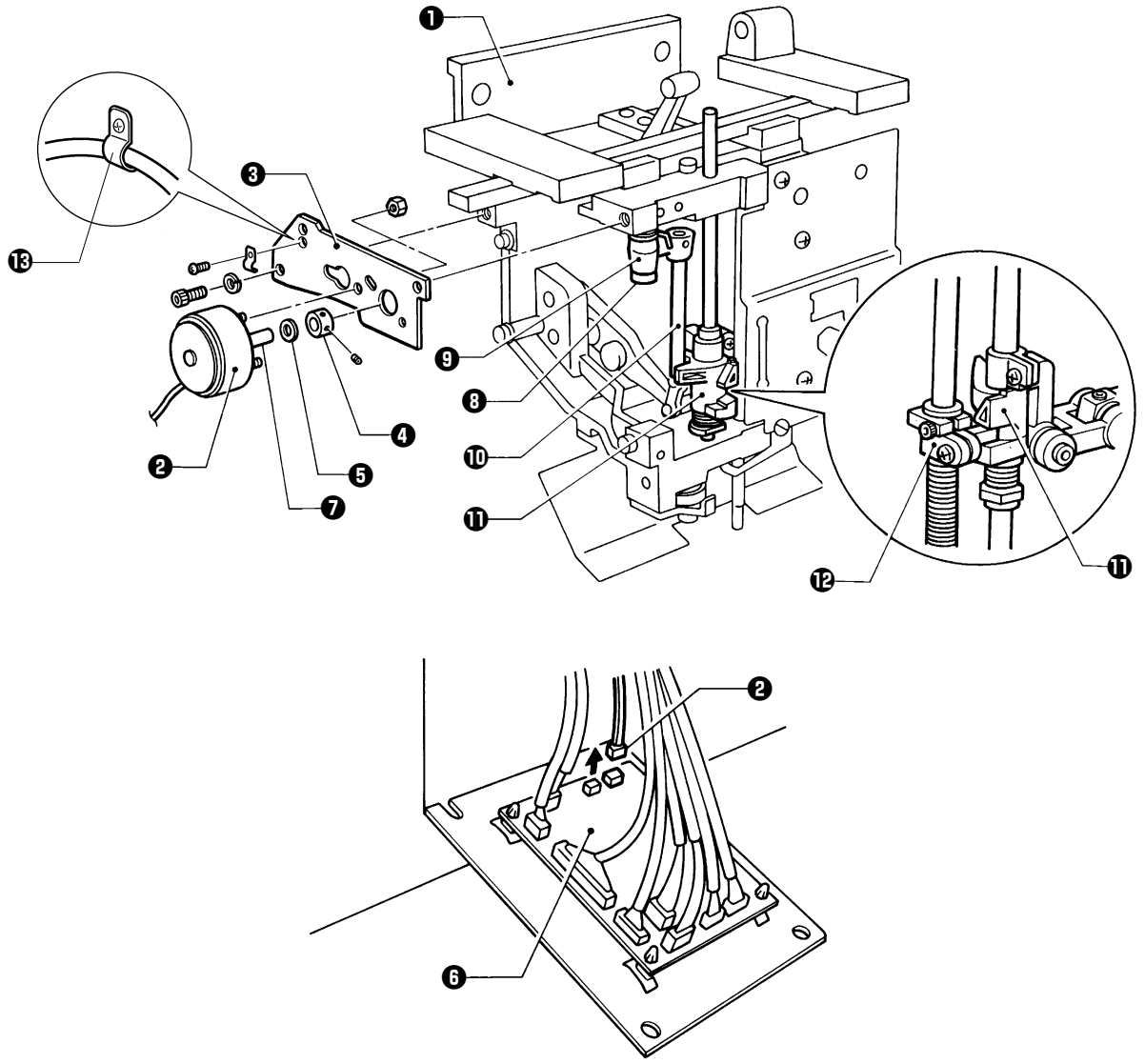
1. Loosen the screw ❶ on the left of the head.
2. Remove the base needle bar ❷ by pulling it from above. (The needle bar vertical set ❸ will come off.)
3. Loosen the screw of the jump clamp ❹, and remove the jump clamp ❹ and the jump bracket ❻ from the base needle bar bush ❺. (The jump spring ❼ will come off.)

- After replacing the jump bracket, reverse the above procedure for re-assembly.

[Notes on re-assembly]

- When loosening the screw of the jump clamp ❹, pay attention to the position of the base needle bar bush ❺ (the spring strength). Turn the jump bracket ❻ 70 degrees from the natural state (where the flat surface ❽ of the base needle bar bush ❺ faces the front). Tighten the screw so that the jump bracket ❻ can be moved easily but have no looseness vertically (it can be moved vertically only 0.03 - 0.05 mm).
- When attaching the base needle bar, align it with the bottom of the head.

6. Replacing and adjusting the jump solenoid



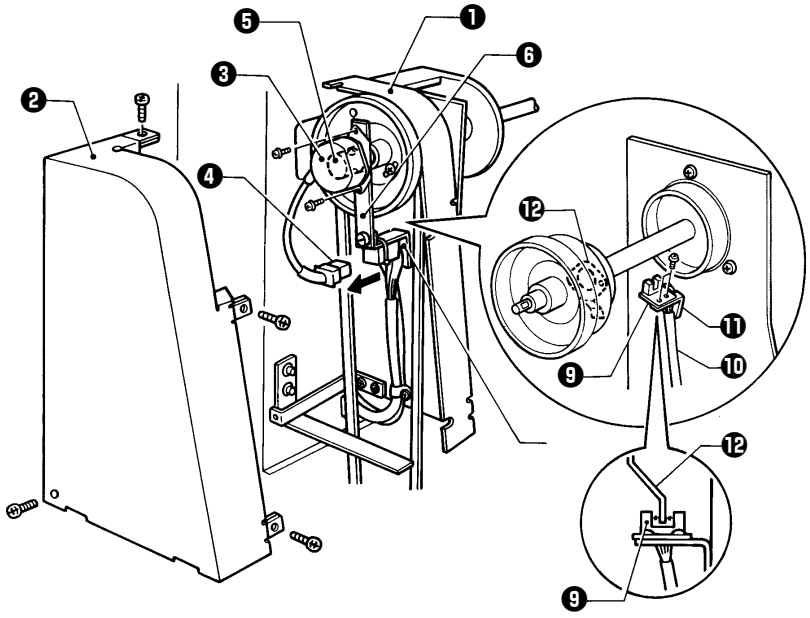
1. Remove the three bolts, and the jump solenoid ❷ and the jump solenoid base ❸ along with the spring washer from the head ❶.
2. Loosen the two set screws in the plunger ❼ of the jump solenoid ❷, and remove the set screw collar ❹ and the solenoid cushion ❺.
3. Remove the two nuts, and separate the jump solenoid ❷ from the jump solenoid base ❸.
4. Remove the connector of the jump solenoid ❷ from the head PCB ❻.

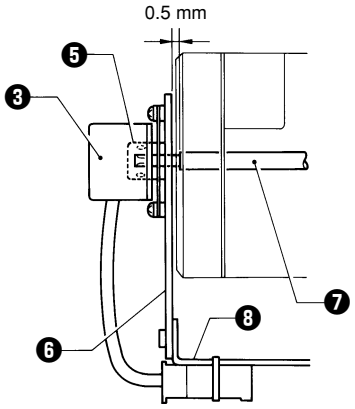
- After replacing the jump solenoid, reverse the above procedure for re-assembly.

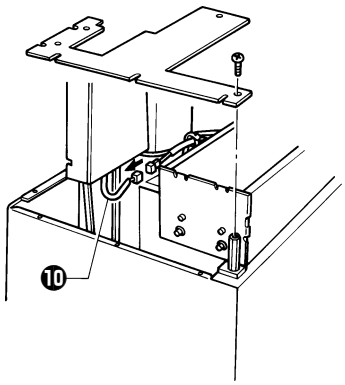
[Notes on re-assembly]

- With the plunger ❼ of the jump solenoid ❷ at the stroke end, adjust the eccentricity of the jump rotary shaft ❽ so that the pipe ❿ attached to the jump solenoid body assembly ❾ is at the front.
- Insert the protrusion of the needle bar clamp ⓬ into the recess of the jump bracket ⓫.
  Note:
  Make sure that the protrusion of the needle bar clamp ⓬ is completely inserted.
- With the plunger ❼ of the jump solenoid ❷ at the stroke end, make contact with the pipe ❿ and the jump bracket ⓫.
- When the pipe ❿ makes contact with the jump bracket ⓫, tighten the set screws of the set screw collar ❹ to secure the solenoid cushion ❺ between the jump solenoid ❷ and the set screw collar ❹.
- Secure the cable of jump solenoid ❷ with fixture ⓭.

7. Replacing the rotary encoder and the sensor PCB







Replacing the rotary encoder

1. Remove the screws, and belt covers A ❶ and B ❷.
2. Remove the connector ❹ of the rotary encoder ❸.
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.
   - After replacing the rotary encoder, reverse the above procedure for re-assembly.
   - When reassembling, check that the encoder cable is connected correctly.

[Notes on re-assembly]

- When reattaching the rotary encoder ❸, tighten the two set screws of the rotary shaft ❺ so that they are aligned with the screw flats on the driving shaft.
- Provide an approx. 0.5 mm clearance from the end of the encoder bracket ❻ to the end of the driving shaft ❼, and attach the encoder bracket ❻ to the encoder adjustment plate ❽ so that they make a right angle.
- Adjust the rotary encoder referring to chapter 3 "13-2. Adjusting the synchronizing signal."

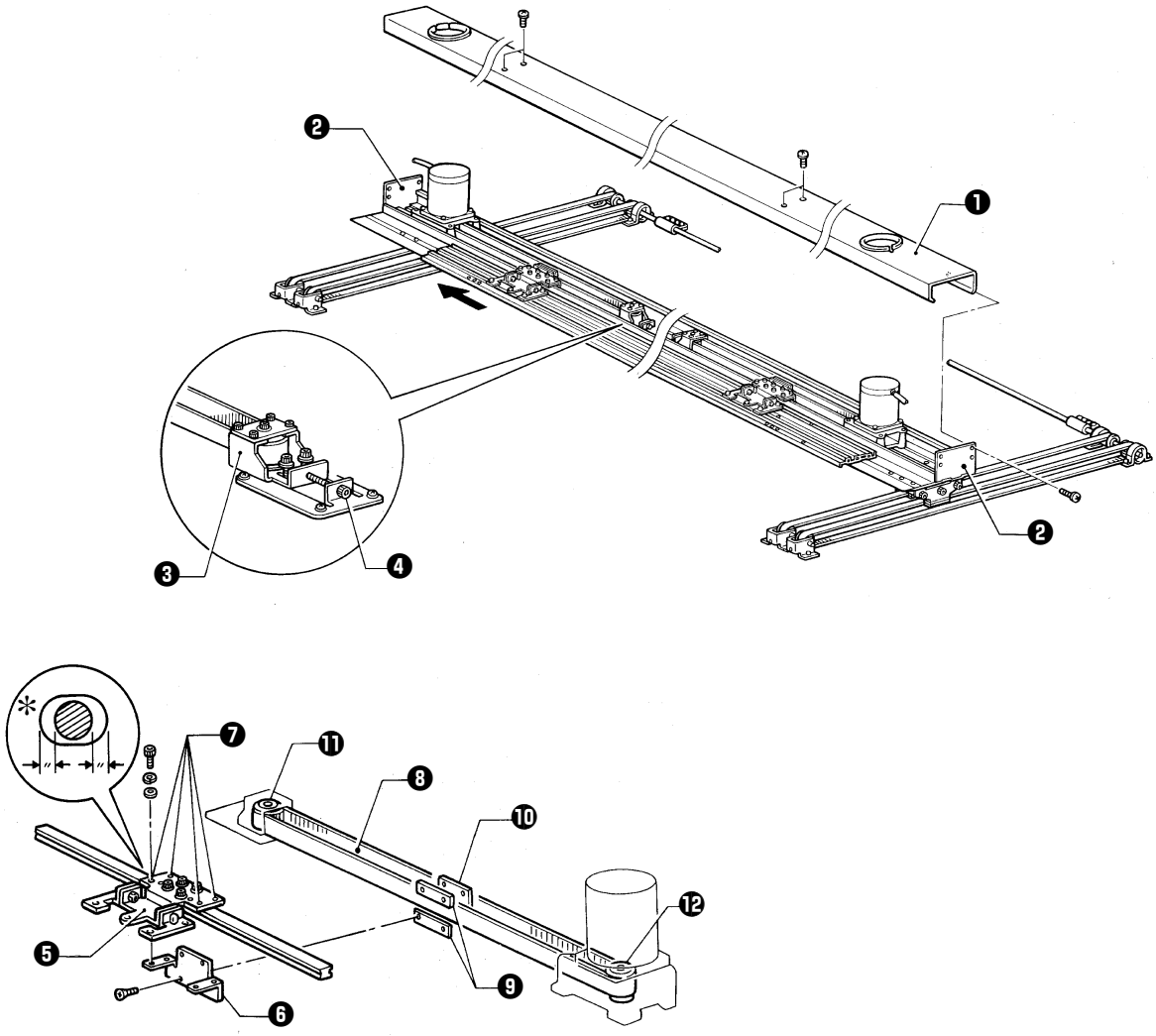
Replacing the sensor PCB

- Remove belt cover B and side cover LB, and separate the connector ⓾ from the sensor PCB ❾.
- Remove the two screws, and the sensor PCB ❾ from the needle position sensor set plate ⓫.
- After replacing the sensor PCB, reverse the above procedure for re-assembly.

[Notes on re-assembly]

- Make sure that the zero bight needle location dog ⓬ is central to the sensor PCB ❾.
- Refer to chapter 3 "13-1. Adjusting the machine stop position signal."

8. Replacing timing belt X



1. Turn off the power.
2. Remove the screws and the X-feed cover ❶ from the X-cover support plates L and R ❷.
3. Loosen the two bolts of X-pulley bracket B ❸, and the screw ❹ fully.
4. Remove the four bolts ❼ to separate the X-feed bracket ❺ and the X-belt connection plate ❻.
5. Remove the four screws from the X-belt connection plate ❻. Remove timing belt X ❽, the belt spacers ❾, and the timing belt setting plate ⓾.
6. Cut timing belt X ❽ to remove it from timing pulleys A ⓫ and X ⓬.
   • After replacing timing belt X, reverse the above procedure for re-assembly.

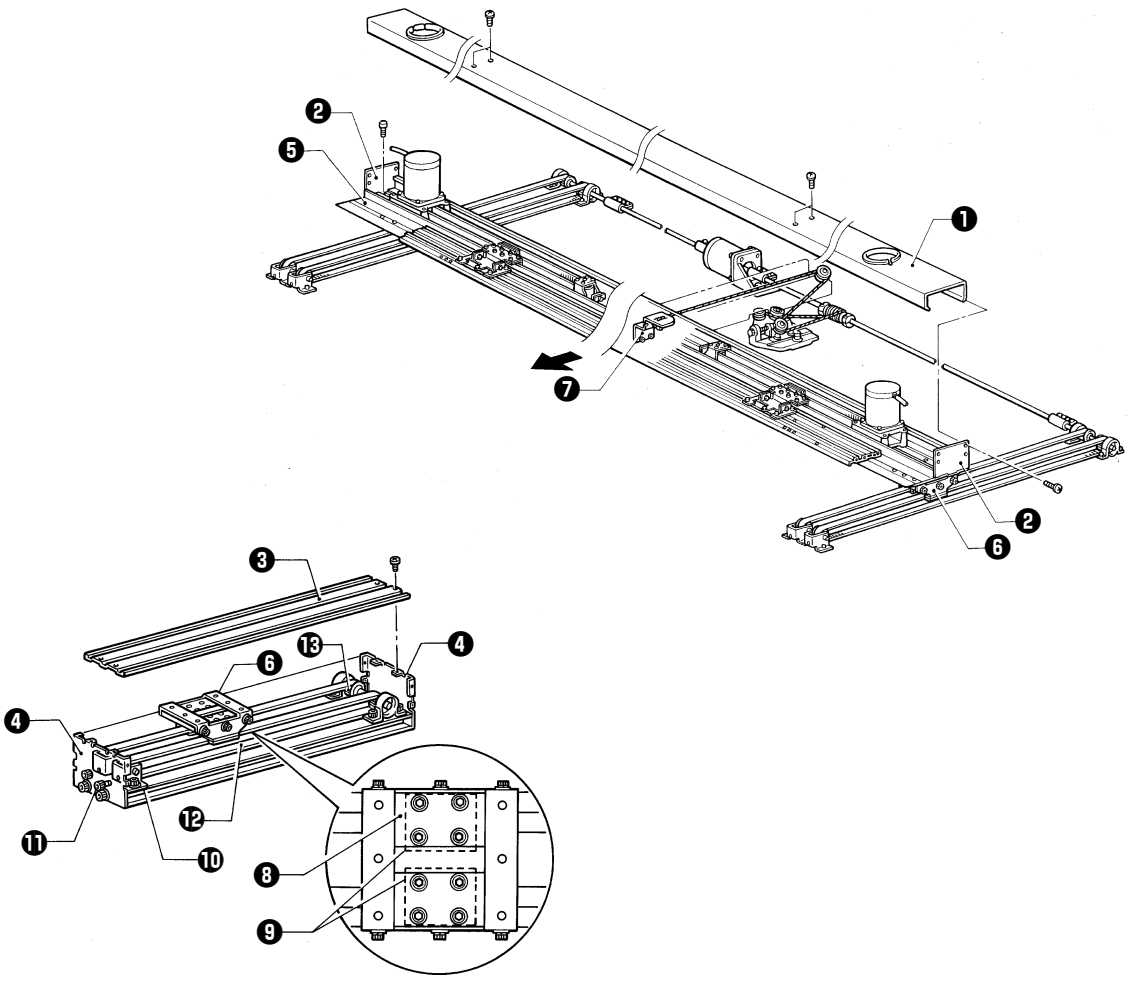
[Notes on re-assembly]

• Adjust the belt tension referring to "adjusting the timing belt tension."

* Turn on the power to magnetize the two X-motors on either side. Attach the X-belt connection plate ❻ to the X-feed bracket ❺ using the four bolts ❼ so that each of the bolts can be centered in the hole. (Do not shift bolts either way.)

• **With the power turned off, if the weight of the X-carriage varies when the connectors of the X-pulse motors on both sides are attached or separate, the X-pulse motors may be out of phase.**
Reattach the connectors of the X-pulse motors, turn on the power, and make the above adjustment again.

9. Replacing timing belt Y



1. Turn off the power.
2. Remove the screws and the X-feed cover ❶ from the X-cover support plates L and R ❷.
3. Remove the screws of Y-feed cover U ❸ to separate it from the Y-feed cover support plate.
4. Remove the thirteen screws of the Y-feed frame ❺. Remove the Y-feed frame ❺ from the Y-carriage ❻ and the rail connecting plate ❼, and shift the Y-feed frame ❺ toward the front.
5. From the top of the Y-carriage ❻, loosen the bolts of the timing belt setting plate ❾ from the holes of the Y-carriage base ❽.
6. Loosen the two bolts ⓫ securing the Y-pulley bracket ⓾ and the bolts securing the Y-feed cover support plate ❹.
7. Cut timing belt Y ⓬ to remove it from timing pulleys A ⓭ and B.

Notes:

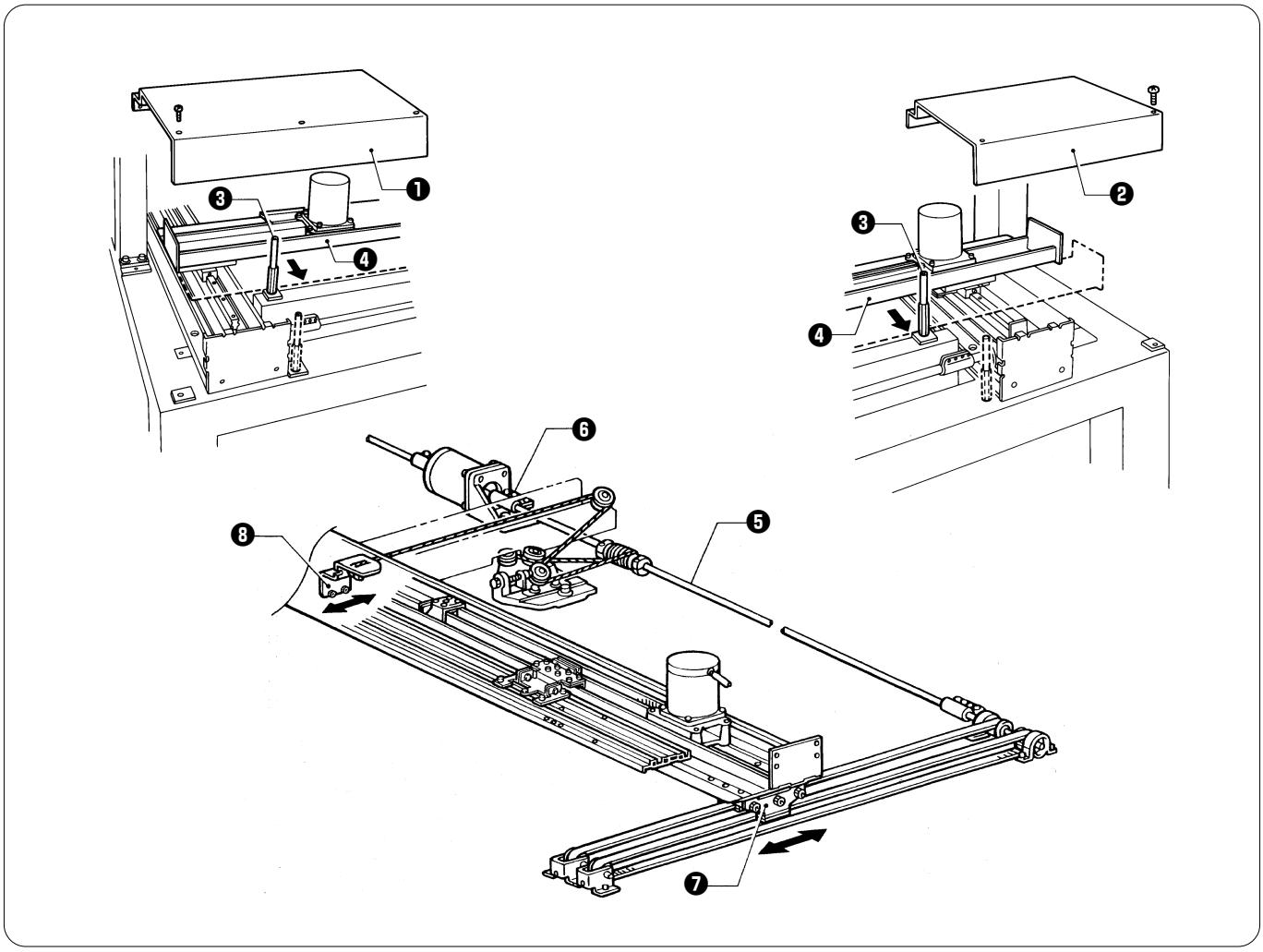
When replacing timing belt Y, cut it.

- After replacing timing belt Y, reverse the above procedure for re-assembly.
- Adjust the belt tension before installing the Y-feed frame.

- **After replacement, make sure that Y-feed resistance is 147 N with the tubular frame on, and 157 N with the cap frame attachment on. If the resistance is too great, adjust the Y-carriage.**

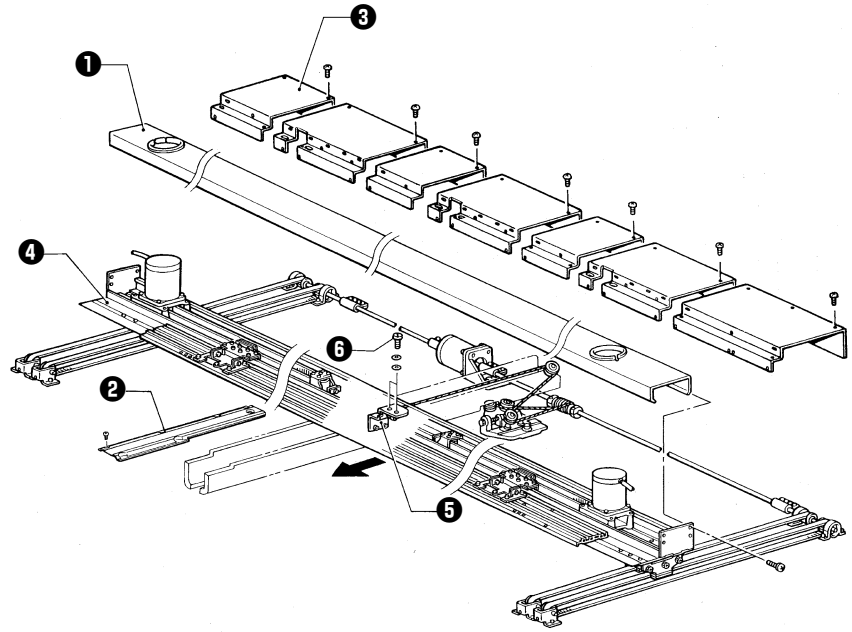
[Notes on re-assembly]

Positioning the Y-feed frame

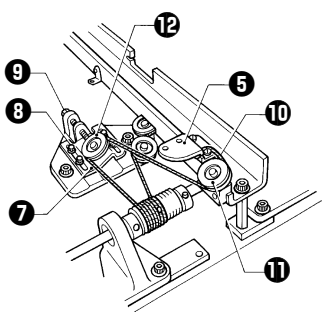


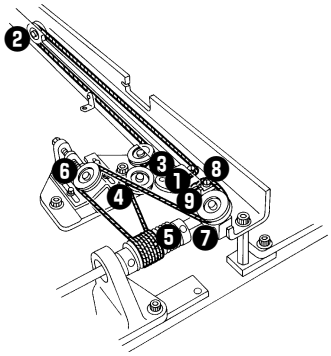
1. Remove table covers L ❶ and R ❷.
2. From the back of the frame, reinsert post LB ❸ that is the third from the left, and post LB ❸ that is the third from the right, into the extreme left and right holes on the second steel tube, respectively.
3. Press the Y-feed frame ❹ against posts LB ❸ and secure it using the screws.
4. Return posts LB ❸ to their previous positions.
   Note:
   In step 3., if the screw holes do not match, loosen the bolts of coupling 15 ❻ connected to the connecting shaft ❺, move the Y carriage ❼ or the rail connecting plate ❽ back and forth to adjust the positions of the screw holes.

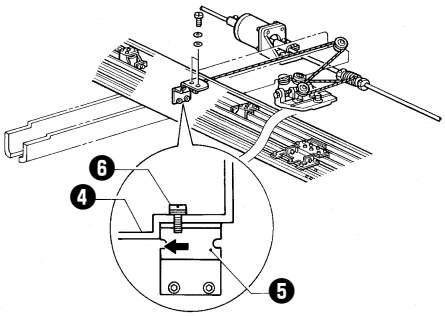
10. Replacing the driving wire



■ Install the driving wire





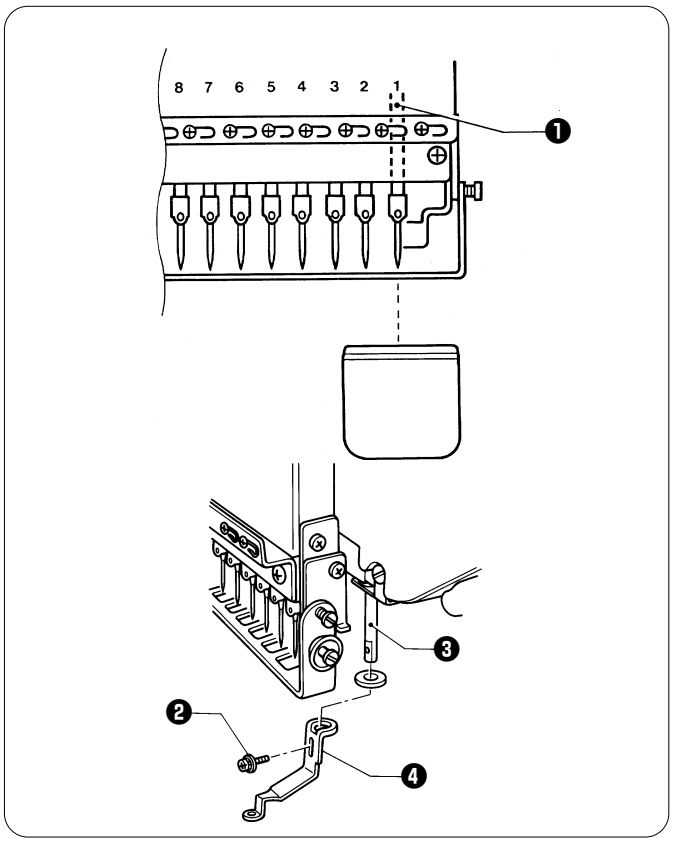


[Removing the driving wire]

1. Remove the screws, the X-feed cover ❶, bed cover C ❷, and the table cover ❸.
2. Remove the two screws ❻ securing the Y-feed frame ❹ and the rail connecting plate ❺, and move the Y-feed frame ❹ all the way toward the front.
   Note:
   Perform this step from the rear of the machine.
3. Loosen the four bolts ❽ securing the pulley base ❼ and the bolt ❾.
4. Remove the driving wire ❿ from the rail connecting plate ❺. Remove the pulley ⓫ and the driving pulley ⓬.
5. After replacing the driving wire ❿, reverse the above procedure for re-assembly.
   Note:
   When attaching the rail connecting plate ❺ to the Y-feed frame ❹ using the two screws, make the rail connecting plate ❺ make contact with the L-shaped portion on the back of the Y-feed frame ❹.

11. Replacing and adjusting the presser lifter parts

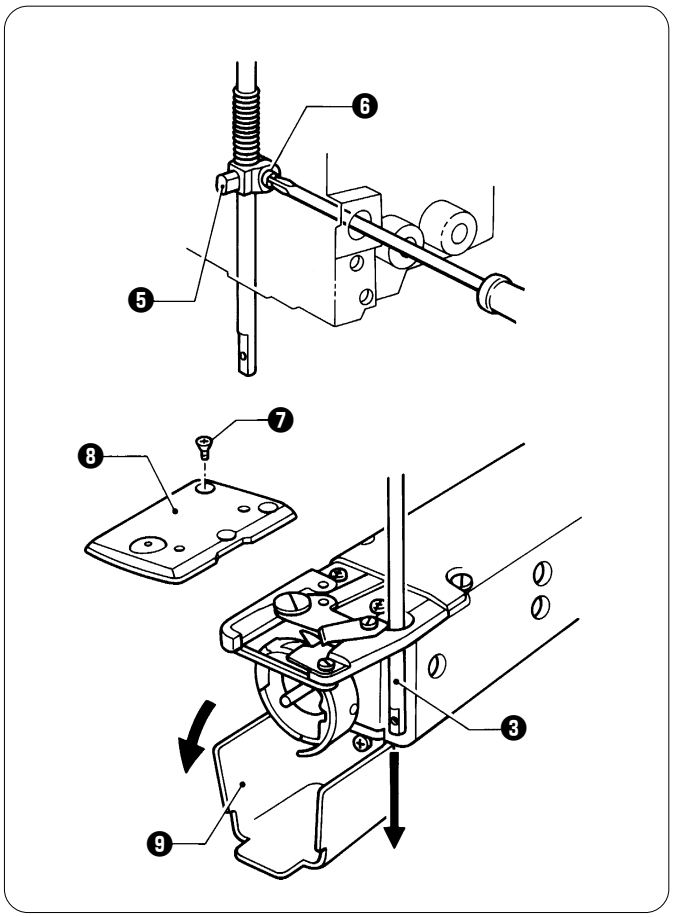
11-1. Presser foot



[Replacing the presser foot]

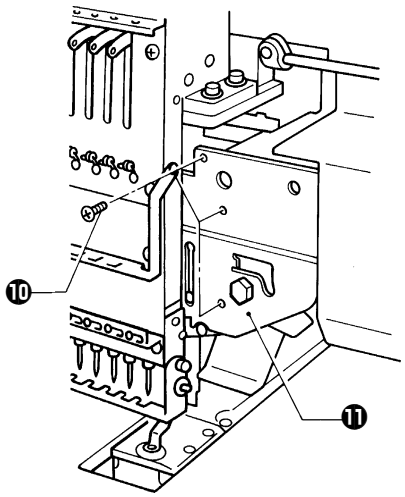
1. Select needle bar no.1 ❶.
2. Remove SEMS ❷ (screw with spring and flat washer), and the presser foot ❹ from the presser foot shaft ❸.
   - After replacing the presser foot, reverse the above procedure for re-assembly.
   - When attaching the presser foot, align its hole with the needle point. (Loosen SEMS ❷ to adjust the height of the presser foot ❹ at this time.)

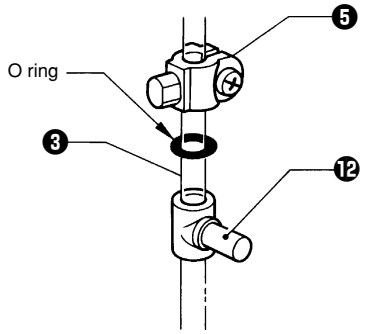
11-2. Presser foot shaft



When the needle bar case is attached [Replacing the presser foot shaft]

1. Select needle bar no.1.
2. Remove the presser foot from the presser foot shaft.
3. Insert a screwdriver through the hole on the side of the head, and loosen the screw ❻ of the presser foot shaft clamp ❺.
4. Remove the screw ❼, and the needle plate ❽.
5. Open rotary hook cover B ❾.

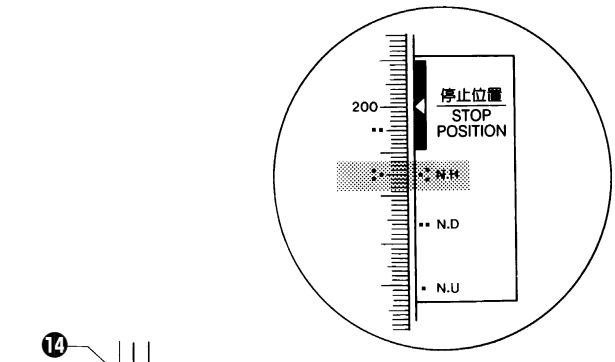


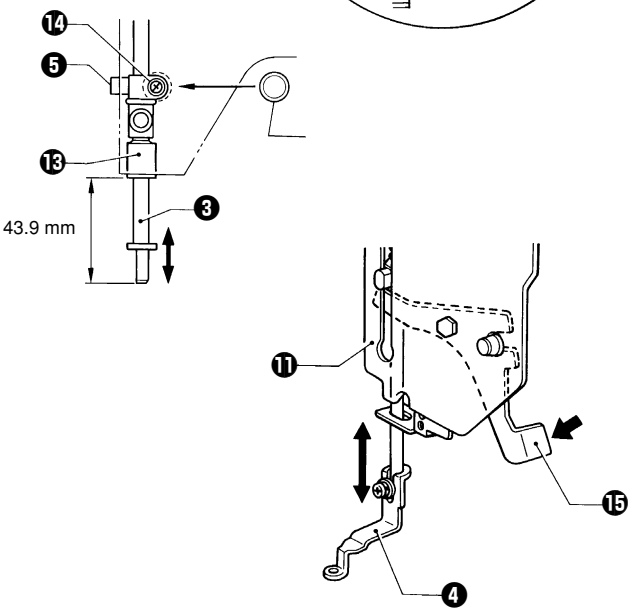


6. Remove the three screws ⓾, and the presser foot guide plate ⓫.
7. Remove the presser foot shaft ❸ by pulling it downward, and pass it through the hole of the needle plate bracket.
   Note:
   The presser foot shaft can also be removed from above if it can not be removed downward because of being bent.
   (When removing the presser foot shaft from above, remove the needle bar case.)
   When removing the presser foot shaft, the spring may pop out. Be careful.
- After replacing the presser foot shaft, reverse the above procedure for re-assembly.

[Notes on re-assembly]

- The screw of the presser foot shaft clamp ❺ should be kept loose.
- Before attaching the presser foot shaft ❸, be sure to insert the O ring between the presser shaft clamp ❺ and the presser foot operating base ⓬.

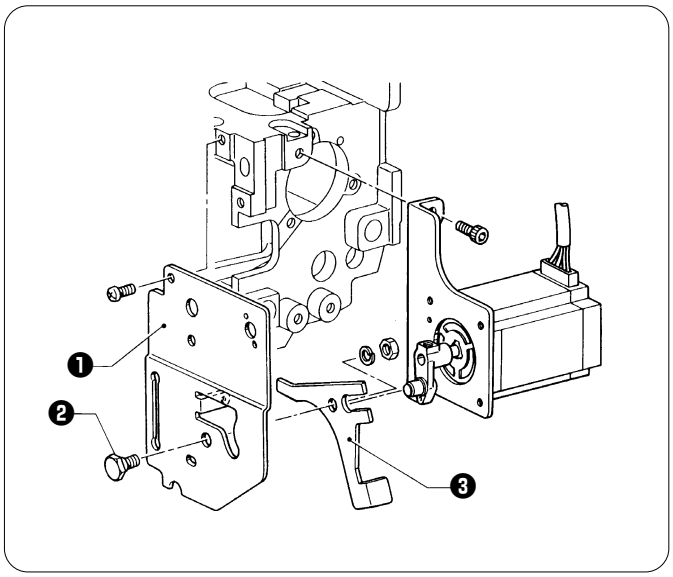




[Adjusting the presser shaft]

1. Turn the pulley until the "▞" mark on the pulley is aligned with that on the cover.
2. Move the presser foot shaft ❸ vertically so that the distance from the end of presser foot shaft bush D ⓭ to the presser foot shaft ❸ is 43.9 mm.
3. Securely tighten the screw ⓮ of the presser foot shaft clamp ❺.
4. After replacing and adjusting the presser shaft, make sure that the presser foot ❹ rises and lowers smoothly by moving it manually using the W retracting lever ⓯.
   Note:
   If the presser foot has stopped halfway while rising, the presser foot guide plate ⓫ may be attached on an angle.
   When tightening the screw of the presser foot shaft clamp, attach the presser foot to the end of the presser shaft, and align the hole in the needle plate with the center of the hole in the presser foot.

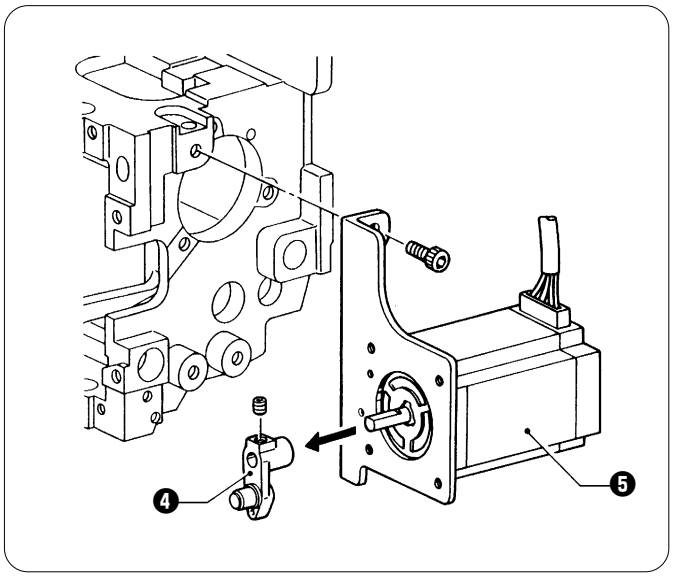
11-3. Replacing and adjusting the W retracting lever and the RET motor lever



[Replacing the W retracting lever]

Remove the nut of the retracting lever shaft ❷ from the presser foot guide plate ❶. Remove the W retracting lever ❸.

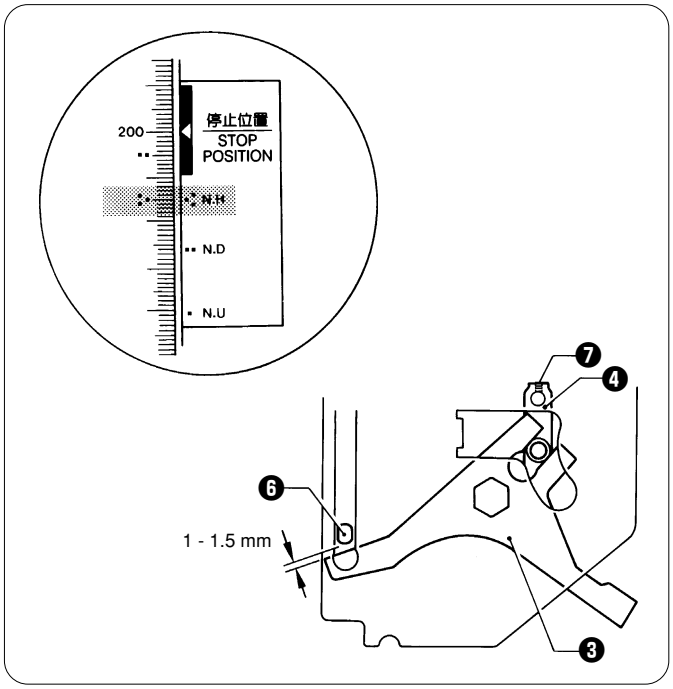
- Reverse the above procedure for re-assembly.



[Replacing the RET motor lever]

Loosen the set screw of the RET motor lever ❹, and remove it from the pulse motor ❺.

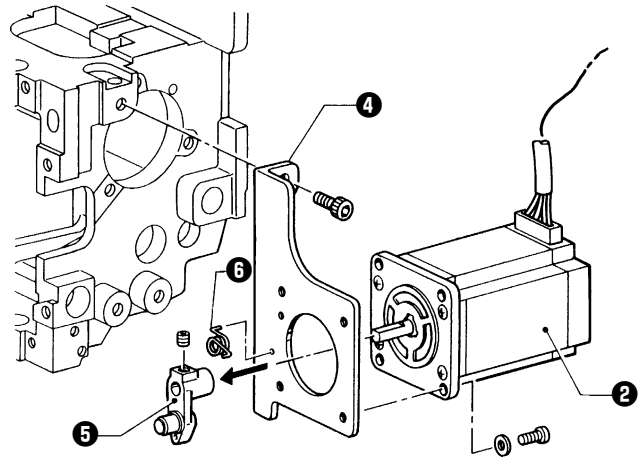
- Reverse the above procedure for re-assembly.

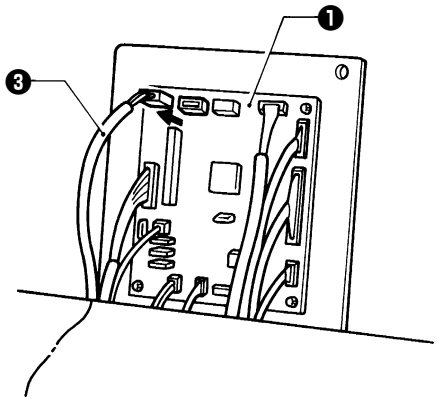


[Adjustment]

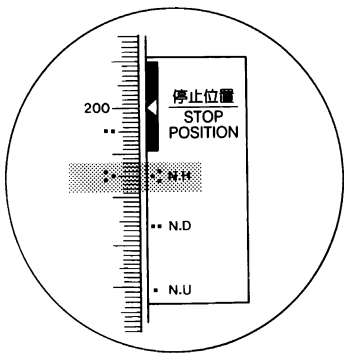
- Before making this adjustment, turn off the pulse motor ❺.
- Turn pulley B until "▟" mark on the pulley is aligned with that on the cover.
  At this time, there should be a 1 - 1.5 mm clearance between the W retracting lever ❸ and the shaft of the presser foot shaft clamp ❻. Loosen the screw ❼ of the RET motor lever ❹ to adjust it.

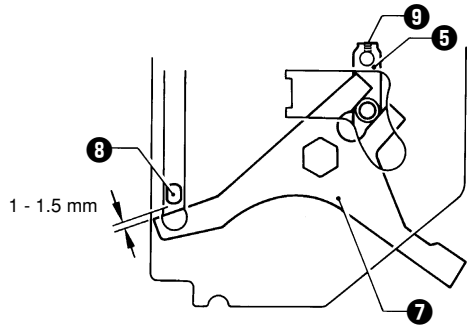
11-4. Replacing and adjusting the pulse motor





1. Remove the connector ❸ of the pulse motor ❷ from the head PCB ❶.
2. Remove the two bolts, and the motor setting plate ❹ from the head.
3. Loosen the set screw of the RET motor lever ❺, and remove it from the pulse motor ❷. (At this time, remove the coil spring ❻.)
4. Remove the four bolts of the motor setting plate ❹. Remove the pulse motor ❷.
5. After replacing the pulse motor, reverse the above procedure for re-assembly.





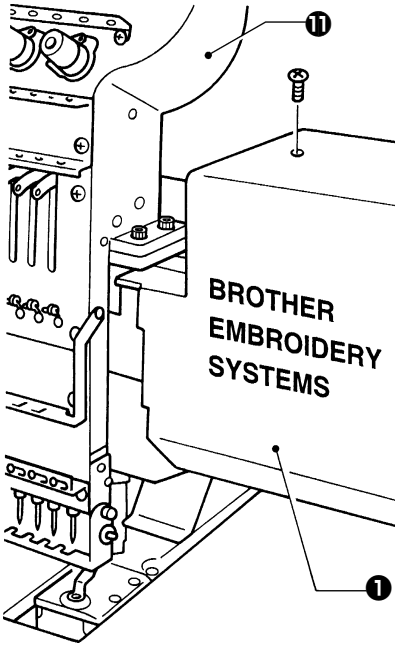
[Adjustment]

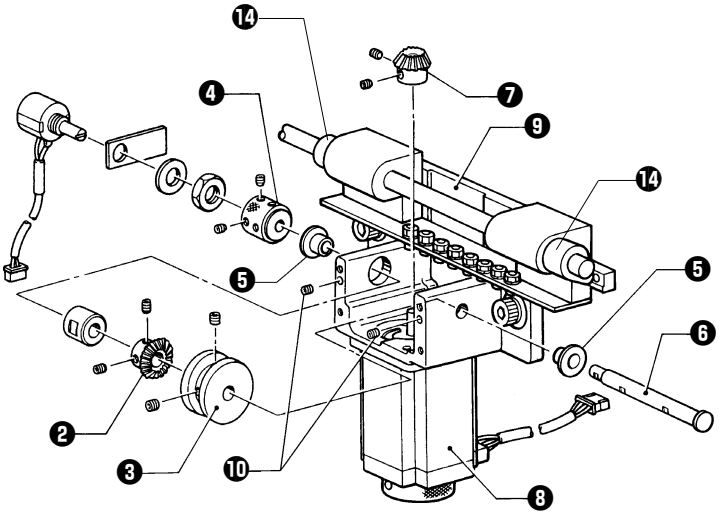
Turn pulley B until "▞" mark on the pulley is aligned with that on the cover.

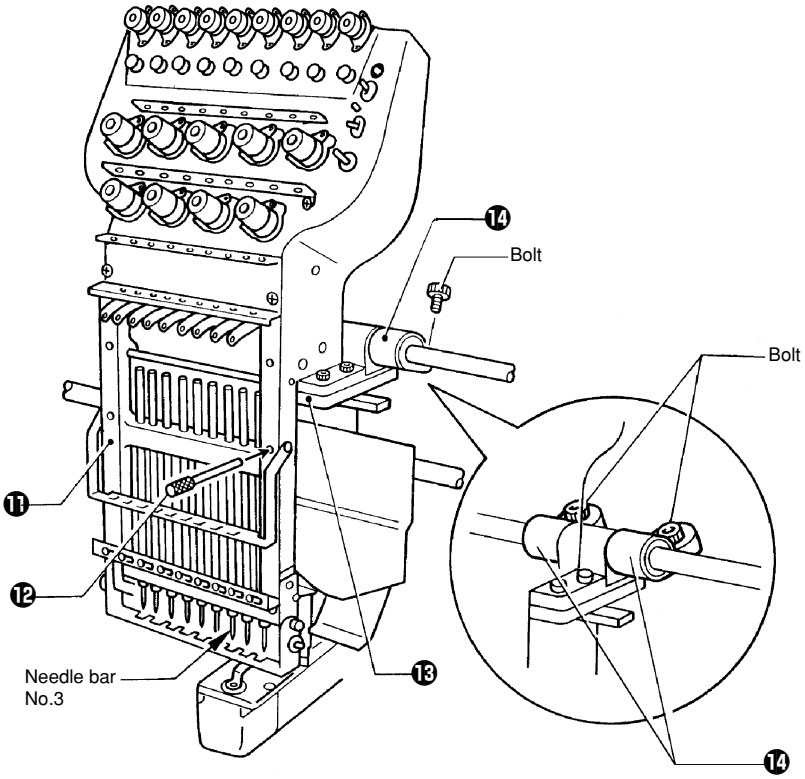
At this time, there should be a 1 - 1.5 mm clearance between the W retracting lever ❼ and the shaft ❽ of the presser foot shaft clamp. Loosen the set screw ❾ of the RET motor lever ❺ to adjust it.

12. Replacing and adjusting the gears related to the needle bar flip-up mechanism

BES-961BC







[Replacing the cam gears]

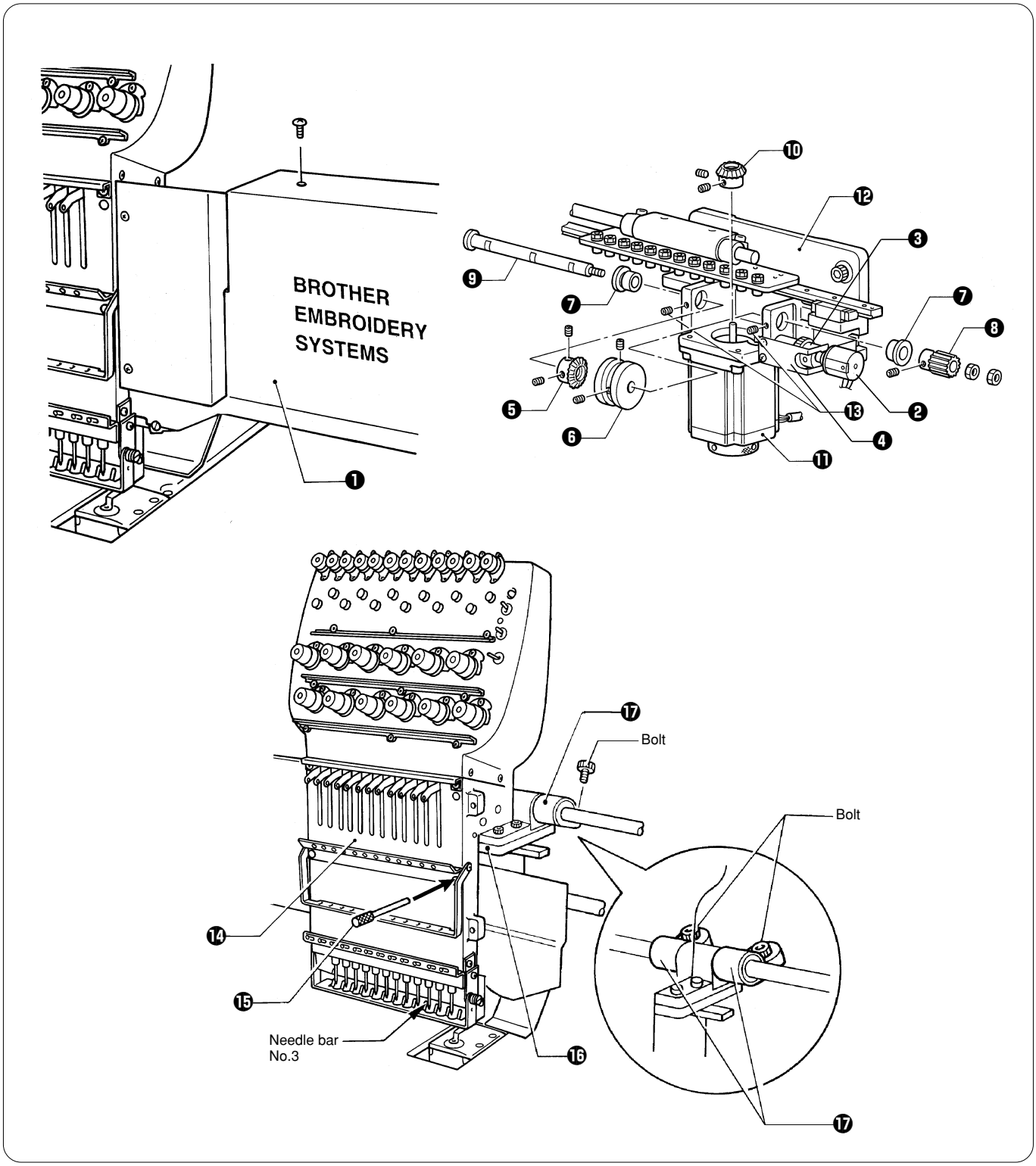
1. Loosen the screw, and remove the cover ❶.
2. Loosen the set screws of bevel gear B ❷, the change cam ❸, the change box collar ❹, and the two flange bushes ❺, and remove the cam shaft ❻.
3. Loosen the set screws, and remove bevel gear A ❼ from the shaft of the pulse motor ❽.

[Assembly and adjustment]

1. Fit bevel gear A ❼ around the shaft of the pulse motor ❽.
2. When inserting the cam shaft ❻ into the change box ❾, place the screw flat of the cam shaft ❻ so it is on the side. Pass the two flange bushes ❺, the change cam ❸, bevel gear B ❷, and the change box collar ❹ through the cam shaft ❻.
   Note:
   The change cam ❸ should be attached with its straight portion facing the front (toward the needle bar).

3. Secure two flange bushes ❺ between change box collar ❹ and cam shaft ❼. Check that cam shaft ❻ rotates smoothly without rattling.
   Note:
   When attaching the change collar ❹, either screw hole can be used so long as it is over the screw flat.
4. Insert the positioning bar ⓬ into the hole of the head ⓭ through the hole on the front of the needle bar case ⓫ at the position of needle bar No. 3 and secure the needle bar case ⓫. Insert another positioning bar into the adjacent needle bar case and secure two pieces of the change bracket collar to each head ⓮ with bolts while checking to see that the needle drops into the hole of the needle plate attached to the head.
5. Align the position of the change cam ❸ with needle bar No.3, and tighten the set screws of the change cam ❸.
6. Securely tighten all set screws.

BES-1261BC



[Replacing the cam gears]

1. Loosen the screw, and remove the cover ❶.
2. Remove the potentiometer ❷, reduction gear B ❸, and reduction gear plate B ❹.
3. Loosen the set screws of bevel gear B ❺, the change cam ❻, the two flange bushes ❼, and reduction gear A ❽. Remove the two nuts of reduction gear A ❽, and then the cam shaft ❾.
4. Loosen the set screws, and remove bevel gear A ❿ from the shaft of the pulse motor ⓫.

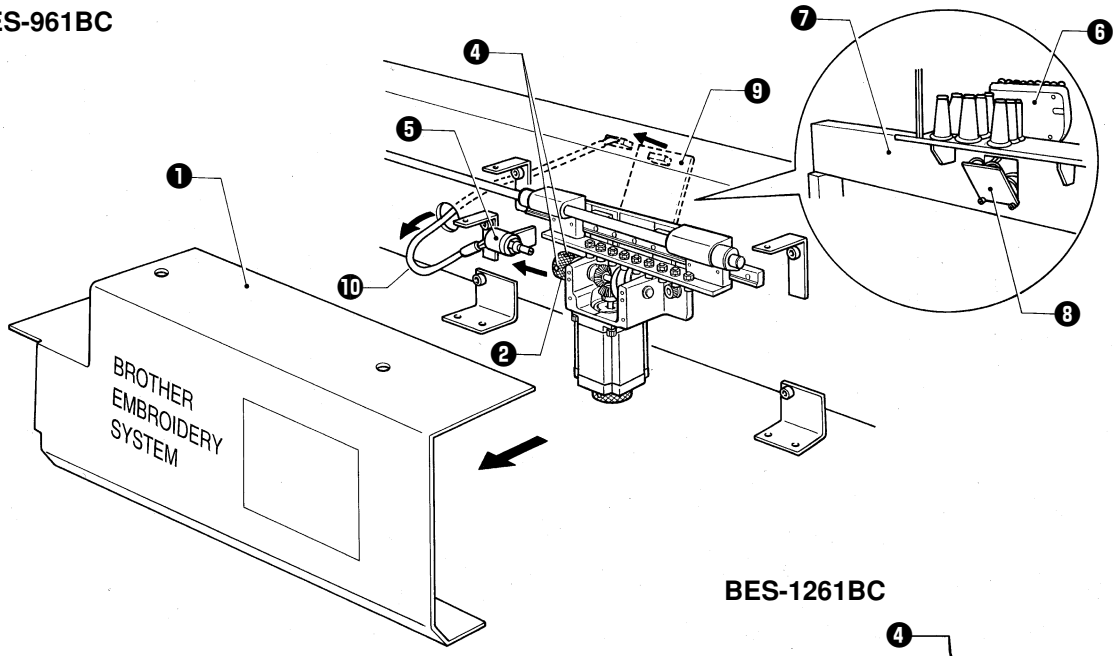
[Assembly and adjustment]

1. Fit bevel gear A ❿ around the shaft of the pulse motor ⓫.
2. When inserting the cam shaft ❾ into the change box ⓬, place the screw flats of the cam shaft ❾ so they are on the side. Pass the two flange bushes ❼, the change cam ❻, bevel gear B ❺, and reduction gear A ❽ through the cam shaft ❾.
   Note:
   The change cam ❻ should be attached with its straight portion facing the needle bar case.

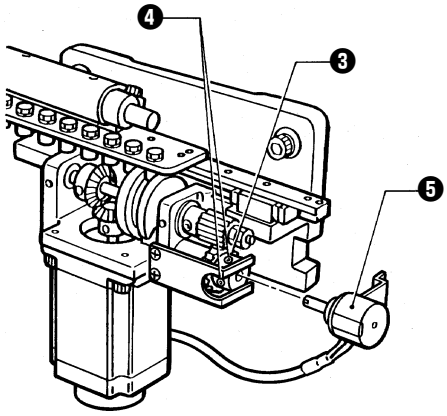
3. Place the two flange bushes ❼ on both sides of the cam shaft ❾, and tighten the two set screws ⓭.
4. Adjust the positions of the cam shaft ❾ and reduction gear A ❽ so that they can rotate smoothly without end play.
   Note:
   When attaching reduction gear A ❽, either screw hole can be used so long as it is over the screw flat.
5. Secure reduction gear A ❽ using the two nuts.
6. Insert the positioning bar ⓯ into the hole of the head ⓰ through the hole on the front of the needle bar case ⓮ at the position of needle bar No. 3 and secure the needle bar case ⓮. Insert another positioning bar into the adjacent needle bar case and secure two pieces of the change bracket collar to each head ⓱ while checking to see that the needle drops into the hole of the needle plate attached to the head.
7. Align the position of the change cam ❻ with needle bar No.3, and tighten the set screws of the change cam ❻.
8. Securely tighten all set screws.

13. Replacing and adjusting the potentiometer

BES-961BC



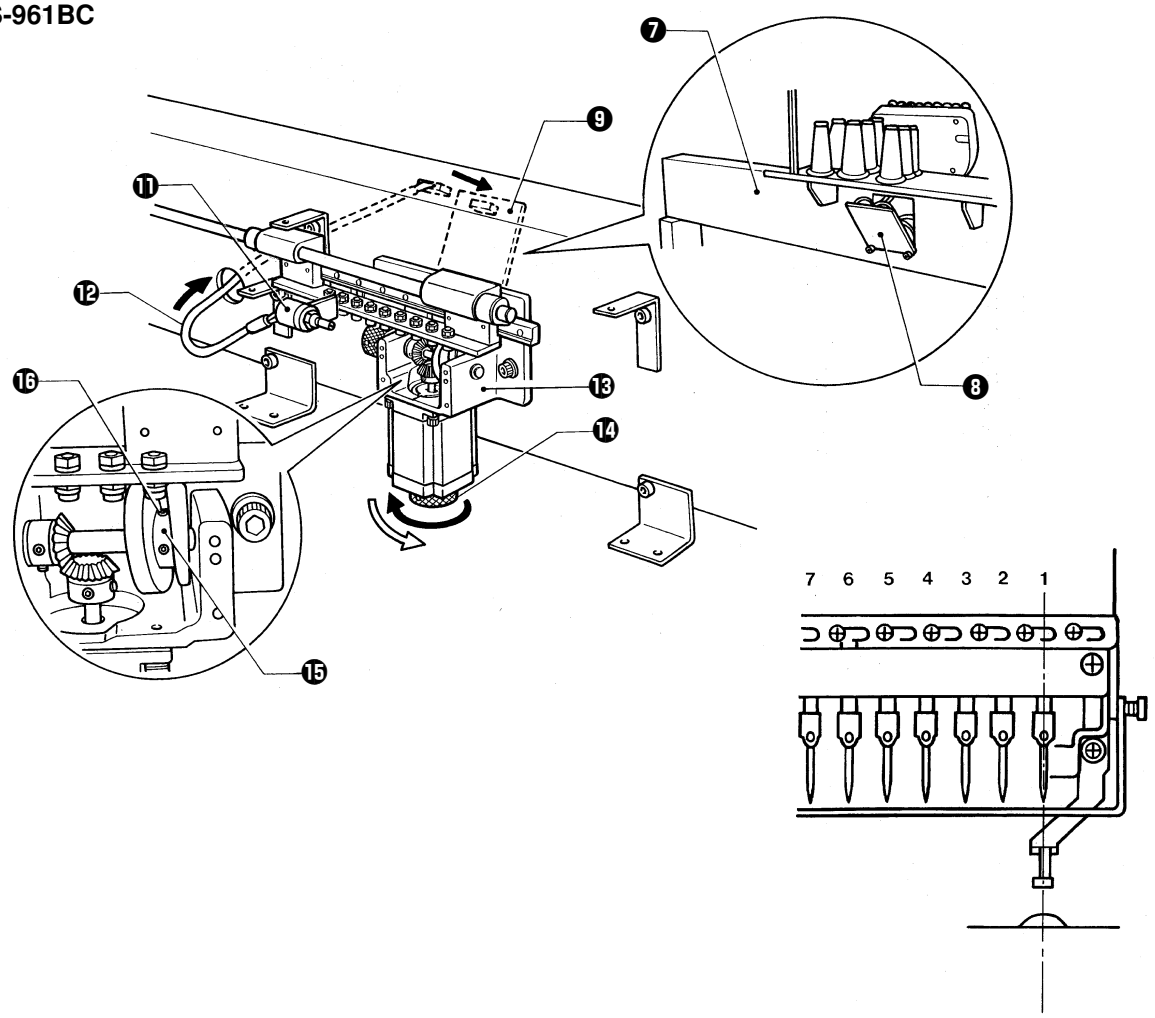
BES-1261BC



1. Turn off the sewing machine power.
2. Remove the color change cover ❶ which is attached to the change box at the front-right of the sewing machine.
3. Loosen the set screws ❹ of the change collar ❷ (BES-961BC) or reduction gear ❸ (BES-1261BC), and then remove the potentiometer ❺.
4. Remove the bolts, and then open the bridge cover ❽ which is at the rear of the bridge ❼ on machine head No. 1 ❻, while being careful not to touch the machine head circuit board and harnesses.
5. Gently pull the cable ❿ of the potentiometer ❺ which is connected to connector P7 of the machine head circuit board ❾ to disconnect it from the machine head circuit board ❾.

Refer to page 176 “18-4. Change Color Section” to lead cable.

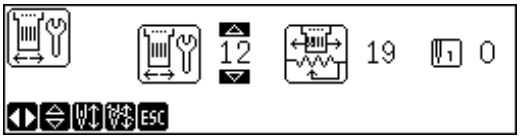
BES-961BC



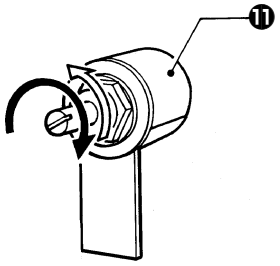
6. Pass the cable ⓬ for the new potentiometer ⓫ into the bridge ❼ from the change box side, and connect it to connector P7 of the machine head circuit board ❾.
7. Install the bridge cover ❽ to the bridge ❼, while being careful not to touch the machine head circuit board and harnesses.
8. Without the potentiometer ⓫ installed to the change box ⓭, press and hold the (△) jog key on the operation panel and turn on the power.
9. Turn the knob ⓮ at the bottom of the change box ⓭ counterclockwise (when looking from above) as far as it will go, and then turn it about 1/3 of a turn back clockwise so that the set screw ⓯ on the change cam ⓯ is facing directly upward.

Note:
Needle bar No. 1 will be at the sewing position at this time.

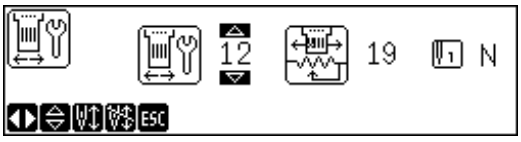
10. Turn on the power of the machine.



11. The machine starts the needle bar moving test in the test mode. Refer to "Test Mode" in chapter 4.

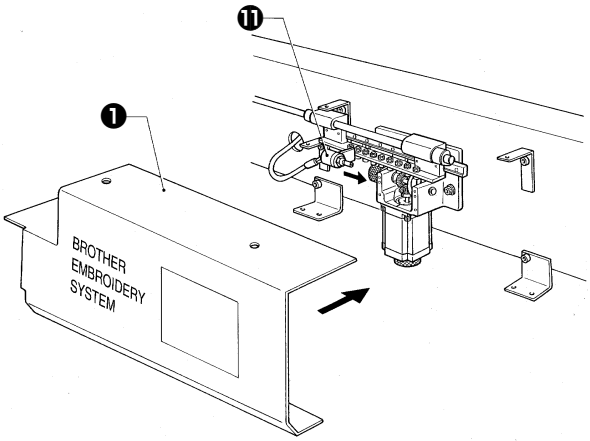


12. Turn the potentiometer ⓫ all the way to the left as shown in the illustration to the left. When it is then turned gently to the right, the buzzer on the operation panel sounds.

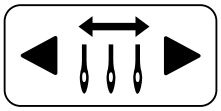


- The point where the buzzer sounds is the potentiometer ⓫ position for the first stitch. The operation panel will be displayed as shown in the illustration to the left at this time.

13. Install the potentiometer to the change box while the buzzer is sounding.
Notes:
  - Install the potentiometer ⓫ while the buzzer is sounding so that it does not move out of its adjusted position.
  - Install the potentiometer while paying attention not to move the needle position adjusted in step 9.

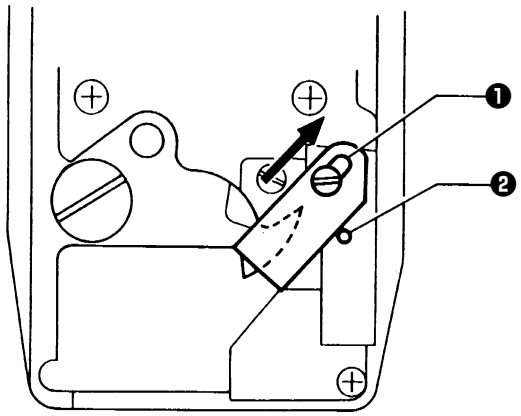


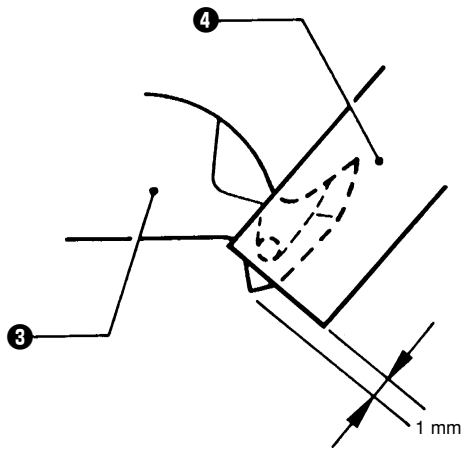
14. Once the potentiometer has been installed, press the key to move the needle bar case on the operation panel to needles 1 to 9 (BES-961BC) or needles 1 to 12 (BES-1261BC) in order to check operation.



15. After checking the operation, install the color change cover ❶.

14. Replacing and adjusting the movable and fixed knives





- After replacing the movable and fixed knives, attach them as follows:

[Fixed knife position]

When attaching the fixed knife ❶, while pressing it against the pin ❷, move the fixed knife ❶ all the way backward until it stops at the end of its slot.

[Movable knife position]

The tip of the movable knife ❸ always should be positioned so that it projects 1 mm from the fixed knife ❹. Adjust the position of the movable knife using the connecting rod so that it is the same as after thread trimming.

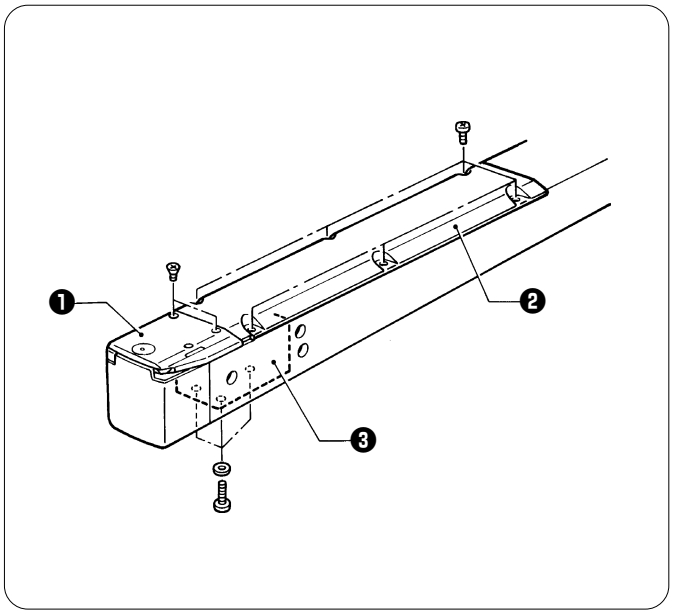
- Refer to "Adjustment of thread trimmer " in chapter 3, Standard Adjustment.

Notes:

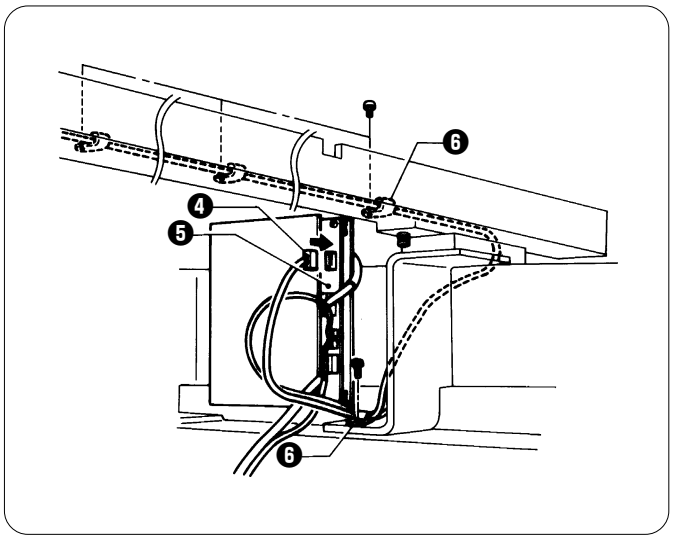
- If a thread trimming error occurs, the pressure be-tween the movable and fixed knives may be inappropriate even if they make contact with each other. In this case, put one or two spacers between the movable knife and the needle plate base to adjust the pressure.
- When the movable knife is retracted too much, it can not go between the upper and lower threads, resulting in a thread trimming error.

15. Replacing and adjusting the lower shaft module

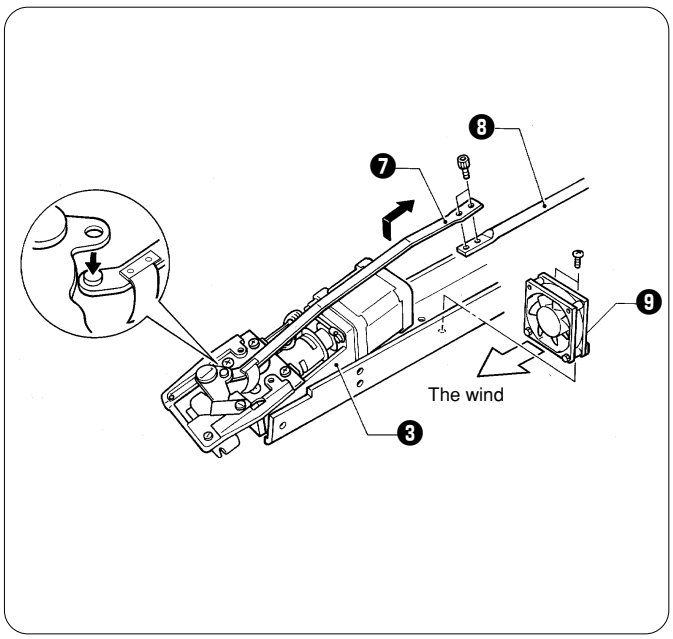
Note: Be sure to turn off the power before proceeding with that below.



1. Remove the screws, embroidery needle plate B ❶ and bed cover ❷.
2. Remove the three screws and washers securing the lower shaft case ❸.

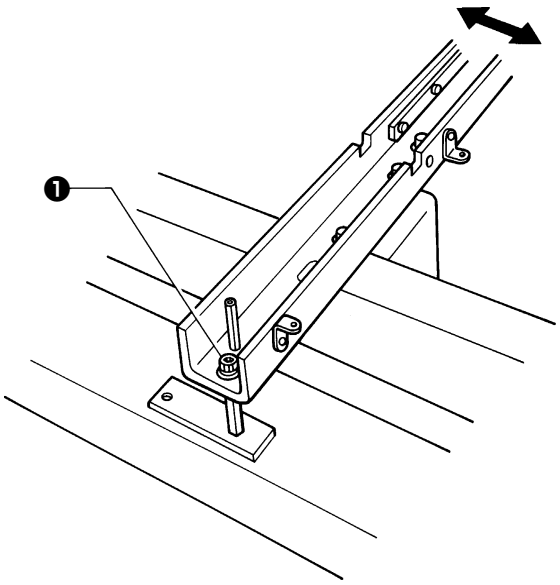


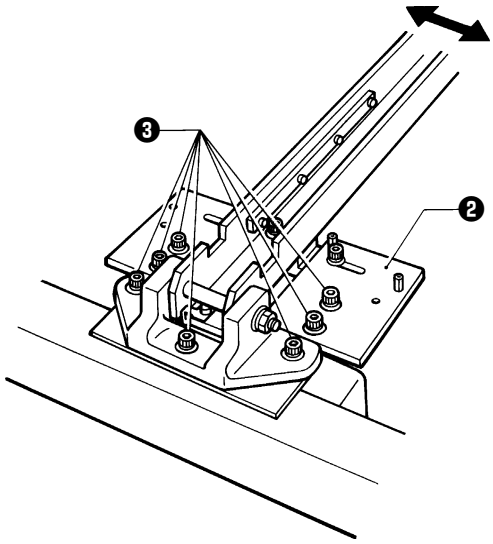
3. Remove the connector ❹ of the lower shaft sensor harness and the connector of the lower shaft stepping motor harness from the BC PCB ❺. (At this time, remove the harness from the cord clamp ❻.)
   Note:
   Remove a connector if its harness is not connected to the connector on the PCB but connected in a cylinder.

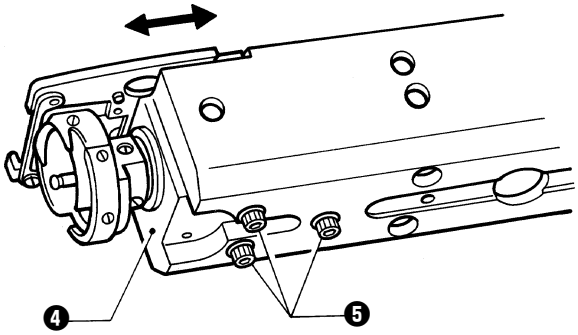


4. Remove the two bolts to separate connecting rod B ❼ from connecting rod C ❽. (Leave the protrusion on the tip of the connecting rod off the movable knife.)
5. Remove the two screws, and the DC fan motor assembly ❾ by lifting it upward.
   Note:
   The DC motor assembly is removed just for removing the lower shaft stepping motor harness and the lower shaft sensor harness. Keep the connector of the DC motor assembly attached.
6. Remove the lower shaft case ❸.
7. After replacing the lower shaft module, reverse the above procedure for re-assembly.

- Be sure to refer to the page indicating the items to be checked when replacing the lower shaft module.







[Adjustment]
Checking the needle penetration location

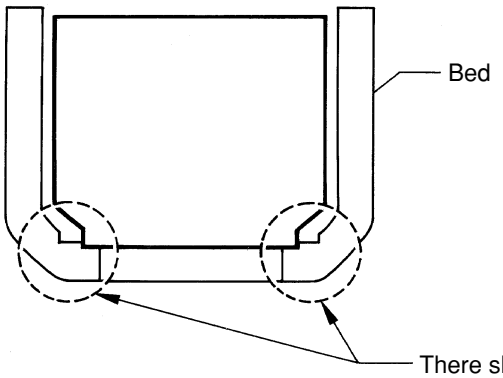
- Right and left adjustment
  Loosen the three bolts ❶ for a fixed bed or seven bolts ❸ securing bed support A ❷ for a retracting bed. Move the bed in the direction of the arrow to adjust it.
- Position the needle bar case using the positioning bar, then set the needle at its lowest position to adjust it so that it is at the center of the outer rotary hook.

- Back and forth adjustment
  Loosen the three screws ❺, and move the lower shaft case ❹ back and forth to adjust it.

Notes:
- When checking the needle penetration point at the lower shaft module, be sure to adjust the thread trimming.
- As to the clearance or meeting point between the needle and rotary hook, refer to chapter 3.

Items to be checked when replacing the lower shaft module

- When attaching the lower shaft module, make sure that the two harnesses of the lower shaft module are not caught between the lower shaft fan and the bed.
- When fixing the harnesses of the lower shaft module to the bed using the cord holder, be sure to attach them at the same position as they were before they were removed.
- When the bed and the lower shaft module are viewed from the front, make sure that the lower shaft module is securely attached to the bed without any inclination, and then adjust the needle penetration position.



- When adjusting the needle penetration position, place the needle plate on the lower shaft module, turn the pulley 140 degrees, and tighten the screws and the bolts to fix the lower shaft module at the position where the needle is centered in the hole in the needle plate in the back and forth directions.
  Then, move the needle plate so that the needle is centered in the hole of the needle plate in the right and left directions. Make sure that the needle plate is parallel to the needle plate base.

[Adjustment]

Loosen the four screws of the needle plate base, move the needle plate base with the needle plate temporarily attached, to the left and right to adjust the needle to the center of the hole in the needle plate.

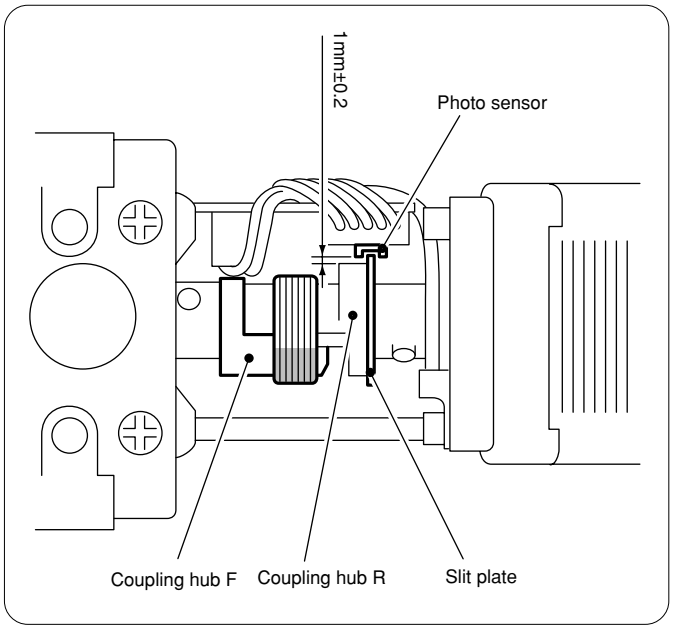
Notes:

- After moving the needle plate base, be sure to adjust the thread trimmer.
- When adjusting the needle penetration position, first adjust it for needle bar No.5, and then check the remaining needle bars for their needle penetration positions.

- When attaching the harnesses of the lower shaft module to the BC PCB, do not mistakenly attach the wrong connectors.

	Connector color (on BC PCB)	
Fixed bed	White (for cooling fan)	Red
Retracting bed	Blue (for cooling fan)	Blue

- Be sure to again adjust the needle bar height, timing position, the clearance between the needle and the rotary hook point, and the thread trimmer.
- Perform "8. BC Auto Test" (select on the BC test menu) as a final check. Refer to page 94, “3-14. Lower shaft module test.”
- After adjustment, perform sewing and carefully check the lower shaft module at the highest speed. If there is an abnormal sound coming from the lower shaft module, again replace it with a new one.



[Adjusting the lower shaft sensor]

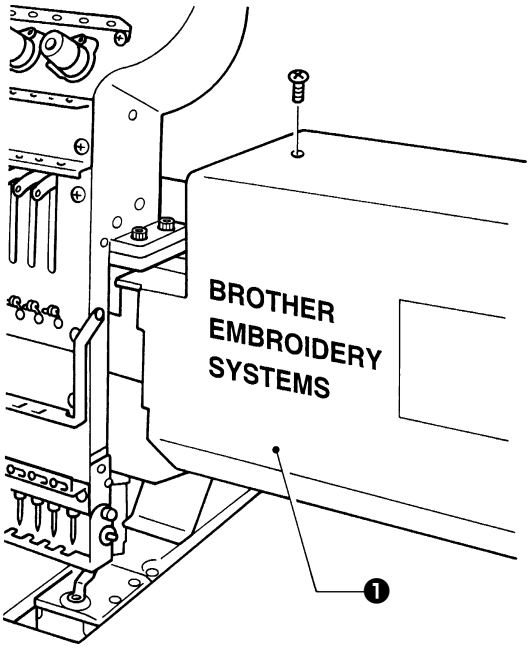
1. Remove the cover from the detached lower shaft module.

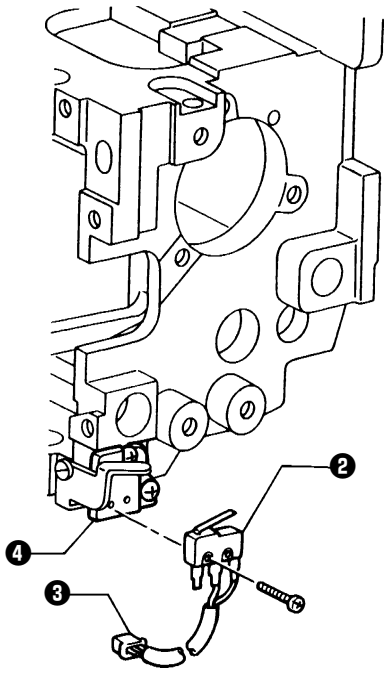
2. Check the position of the slit plate of the coupling hub (set) as follows:
   - Check to see if the photo sensor does not make contact with the slit plate.
   - Check to see if the clearance between the photo sensor and the coupling hub R is proper.

3. Check the sensor after making the above checks. Replace the sensor PCB if the measured result is not acceptable.

16. Replacing the presser foot switch

BES-961BC



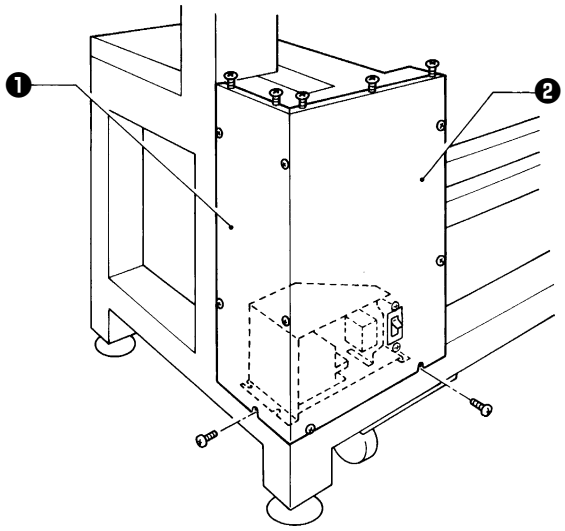


1. Remove the screw, and the cover ❶ on the right of the head you want to replace. (The figure shows head no. 1.)
2. Remove the connector ❸ of the switch ❷ from the head PCB.
3. Remove the two screws, and separate the switch ❷ from the micro switch holder ❹.

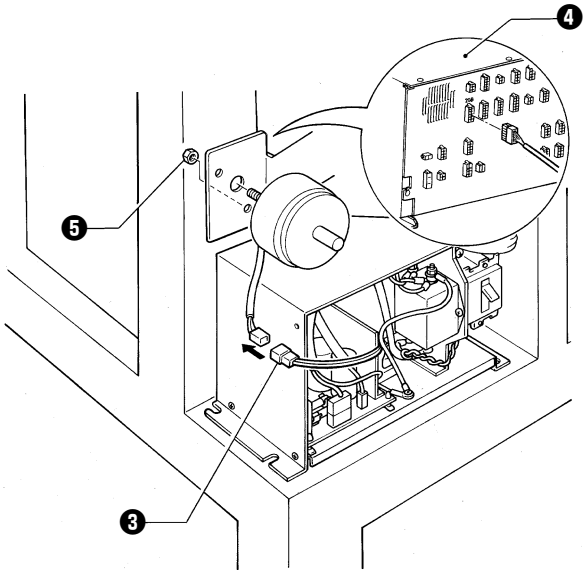
- Reverse the above procedure for re-assembly.

Note:
As to adjustment, refer to "9. Adjusting the switch" in chapter 3 Standard Adjustment.

17. Replacing and adjusting the solenoid that controls pulley



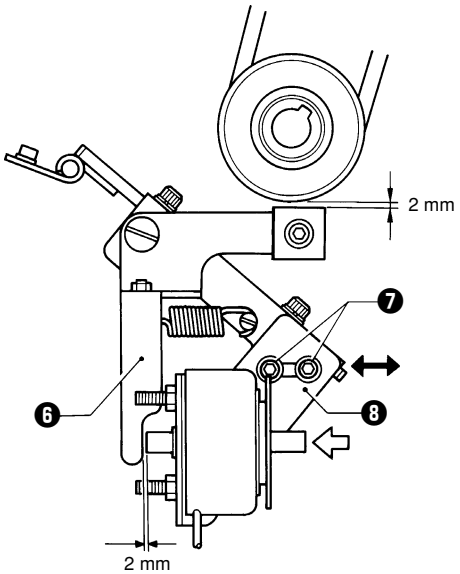
1. Remove the screws, and motor covers L ❶ and F ❷.



2. Separate the connector of the solenoid from that of power supply PCB B ❸. Remove the connector from 20B on the rear of the control box ❹.

3. Remove the two nuts ❺ and the solenoid.

4. After replacing the solenoid, reverse the above procedure for re-assembly.



5. With the solenoid turned off (when it has completely retracted), there should be a 2 mm clearance between the tip of the solenoid and the pulley stop lever ❻. Loosen the two bolts ❼ of the solenoid bracket ❽ to adjust it in the direction of the arrow.

Chapter 3 Adjustment

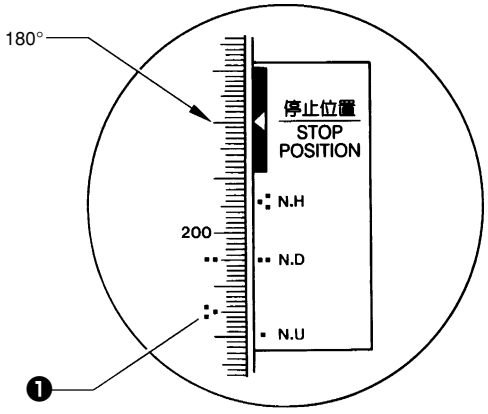
⚠ CAUTION

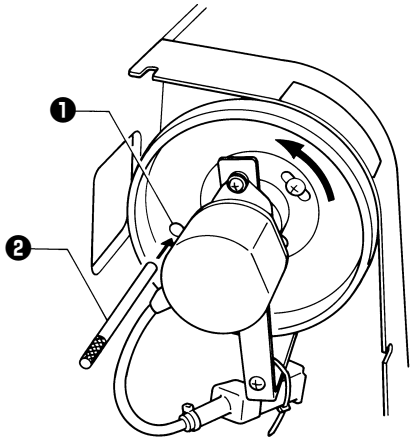
Turn off the power switch and pull out the plug before starting adjustment. Failure to do so may start the machine unintentionally through an accidental activation of the START switch, resulting in bodily injuries.
• Adjustment

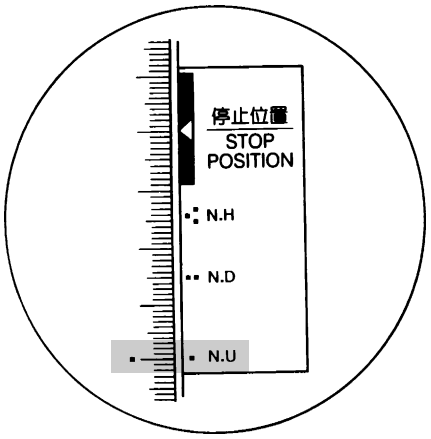
If adjustment should be made while the power switch is turned on, pay special attention to your safety.

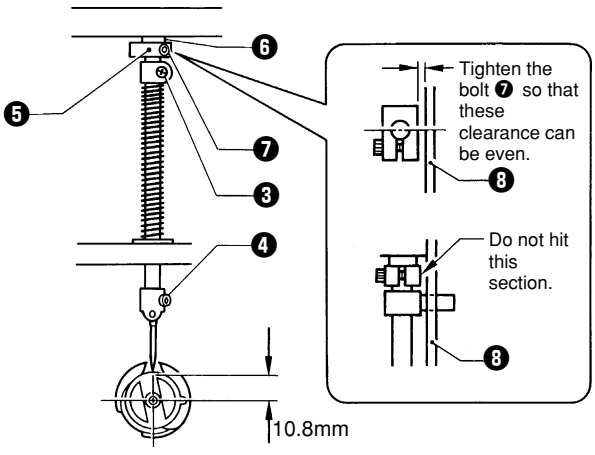
Maintenance and inspection of the machine should be conducted only by trained engineers.

1. Adjusting needle bar height



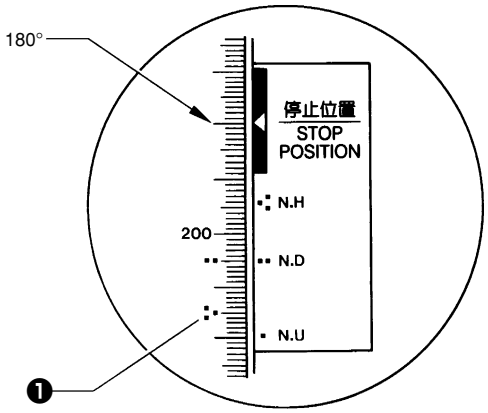


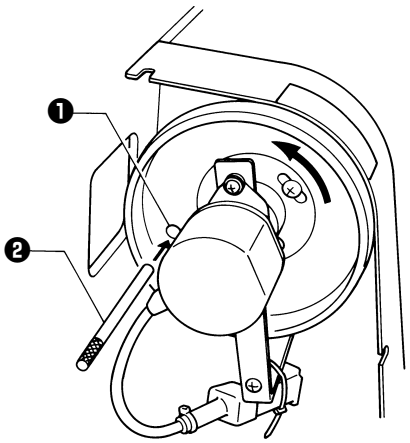


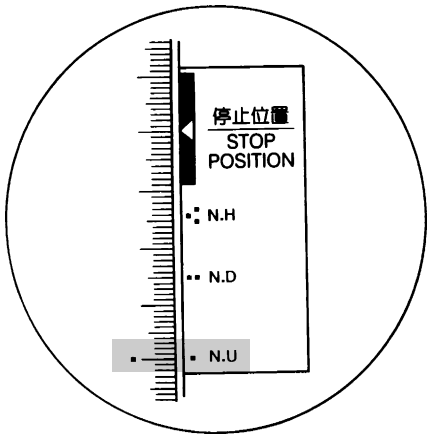


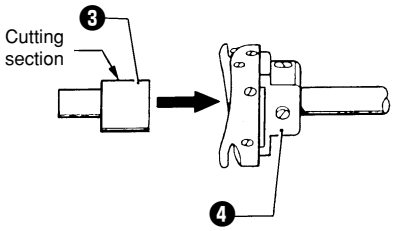
1. Dismount the pulley cover and turn the pulley B ❶ until the pulley scale indicates 180˚ and the needle bar is set at the lowest position. (The pulley "▮▮" mark and the stop mark "▮▮" are aligned.)
2. Insert the positioning bar ❷ into the hole of the pulley B ❶ and fix the drive shaft.
   Note:
   Turn the pulley B ❶ securely in the clockwise direction to eliminate a backlash.
3. Loosen the needle bar clamp set screw ❸ and the bolt ❼ of the top dead center stopper ❺ when the needle tip is positioned 10.8 mm above the center of the rotary hook shaft. Adjust the position of the needle bar thread guide so that the set screw ❹ on it is turned to the right by 25 ~ 30˚. Tighten the needle bar clamp set screw ❸ securely.
   Note:
   When tightening the needle bar clamp set screw ❸, the hole in the needle bar guide should face the front.
4. After adjustment is finished, remove the positioning bar ❷.
5. Set the needle bar at the highest position (where the pulley B ❶ indication mark " ▮ " and the cover indication mark " ▮ " are aligned). Lightly press the top dead center stopper ❺ toward the cushion rubber ❻, and tighten the top dead center stopper bolt ❼ while pressing down the needle bar clamp so that it faces the front.
   Notes:
   - Make sure that the top dead center stopper does not hit the needle bar guide rail ❽ at this time.
   - When tightening the bolt ❼ of the top dead center stopper, use the accessory wrench, insert the longer side of the wrench into the bolt head, and tighten it. (Tightening torque: 0.78N·m)
     (If the bolt is tightened too much, the needle bar may be sluggish.)
   - After adjustment, make sure that the needle bar can return to top dead center when it is pressed down 10 mm and then released.
   - The (rotation) direction of the needle bar may be changed after its height is adjusted. Make sure that the long groove of the needle faces the front.

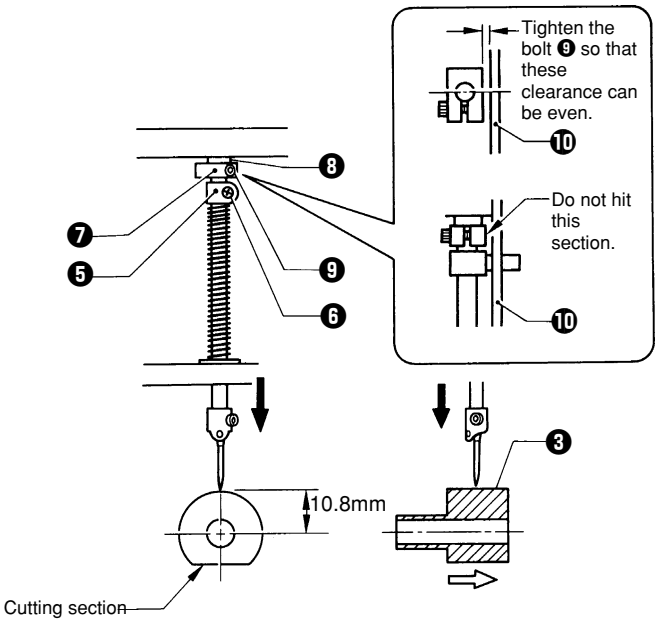
When using the bottom dead center gauge





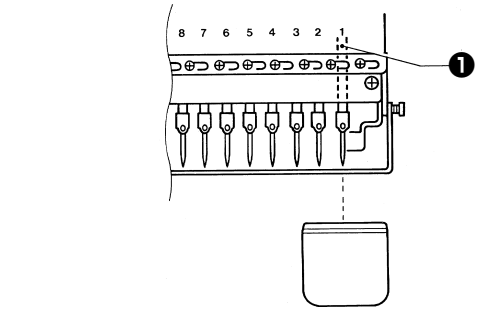




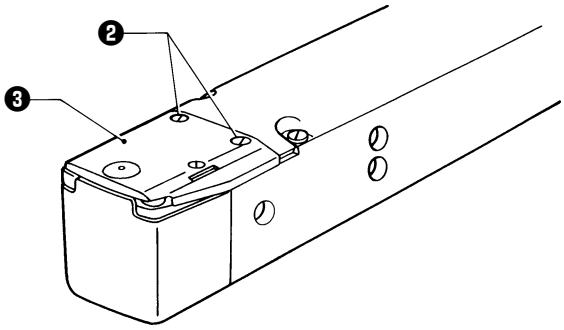


1. Turn the pulley B ❶ until the scale of pulley B ❶ indicates 180˚ (where the pulley B ❶ indication mark "▮▮" and the stop mark "▮▮" are aligned) and the needle bar is set at the lowest position.
2. Insert the positioning bar ❷ into the hole of the pulley B ❶ and fix the drive shaft.
   Note:
   Turn the pulley B ❶ securely in the clockwise direction.
3. Insert the bottom dead center gauge ❸ into the rotary hook ❹.
4. Loosen the screw ❻ and bolt ❾ of the needle bar clamp ❺ and move the needle bar up and down until the needle tip touches the gauge ❸ lightly.
   Notes:
   - The needle point should touch the gauge at a place other than the cutting section.
   - The bottom dead center gauge should be set in or removed from the rotary hook with its cutting section facing upward.
5. Tighten the screw ❻ of the needle bar clamp ❺ securely.
6. After adjustment is finished, remove the positioning bar ❷.
7. Set the needle bar at the highest position (where the pulley B ❶ indication mark " ▮ " and the cover indication mark " ▮ " are aligned). Lightly press the top dead center stopper ❼ toward the cushion rubber ❽, and tighten the top dead center stopper bolt ❾ while pressing down the needle bar clamp so that it faces the front.
   Notes:
   - Make sure that the top dead center stopper ❼ does not hit the needle bar guide rail ❿ at this time.
   - When tightening the bolt 6 of the top dead center stopper, use the accessory wrench, insert the longer side of the wrench into the bolt head, and tighten it. (Tightening torque: 0.78N·m)
     (If the bolt is tightened too much, the needle bar may be sluggish.)
   - After adjustment, make sure that the needle bar can return to top dead center when it is pressed down 10 mm and then released.
   - The (rotation) direction of the needle bar may be changed after its height is adjusted. Make sure that the long groove of the needle faces the front.

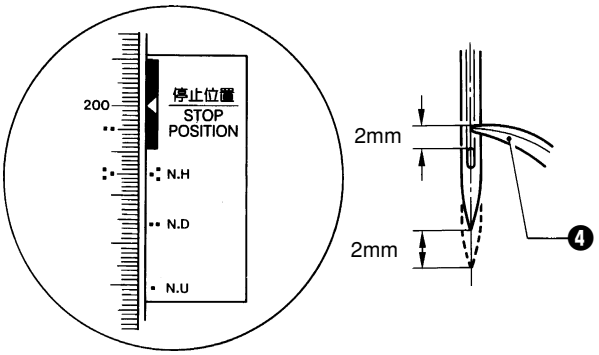
2. Adjustment of clearance between needle and rotary hook



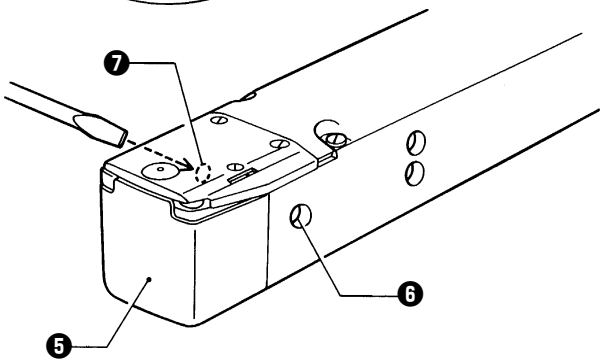
1. Turn the power switch off.
2. Select the needle bar No. 1 ❶.



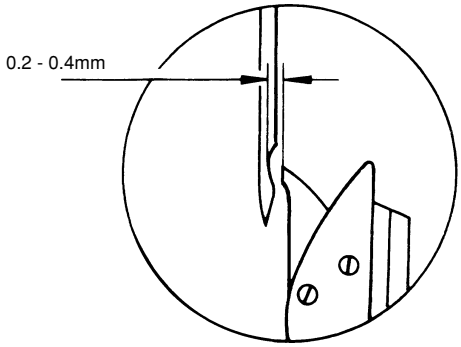
3. Remove two flat screws ❷ and dismount the needle plate ❸.



4. Align the pulley indication mark "▄" and the stop mark "NH▄" by turning the pulley.
5. Turn the rotary hook ❹ manually so that the point comes upward.

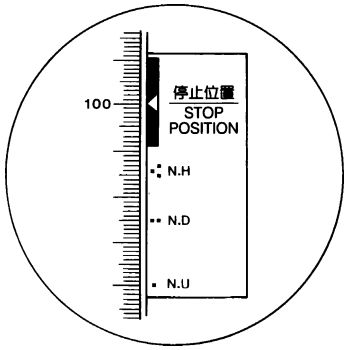


6. Loosen the set screw ❻ on the side of the bed ❺.
7. Turn the eccentric screw ❼ on the left side of the bed ❺ using a regular screwdriver and adjust a clearance between the needle and the rotary shaft to 0.2 - 0.4 mm.



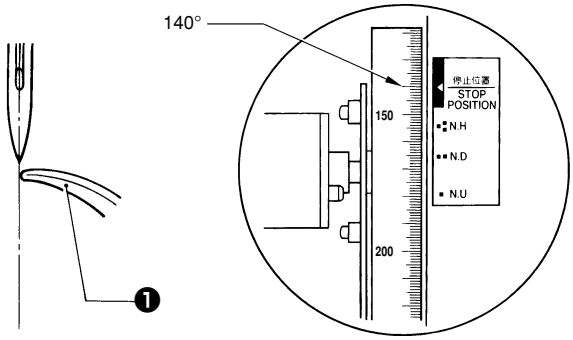
8. Adjust the clearance between the needle and the rotary hook's point to 0.2 - 0.4 mm at the needle bar No. 9 (No. 12 needle for BES-1261BC).
   Notes:
   - If the clearance between the needle and the rotary hook point is not within 0.2 - 0.4 mm, again perform from step 4 as described above, and set the smaller clearance between either needle bar No.1 or 9 (No.1 or 12 for BES-1261BC) and the rotary hook point to approx. 0.2 mm.
   - If the clearance between the needle and the rotary hook point is 0.5 mm or more, replace the needle and the needle bar with new ones.
   - If the clearance is too small when a thicker material is sewn, the needle may be bent or broken.

3. Adjustment of timing between needle and rotary hook

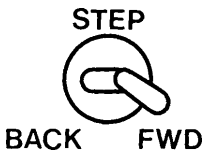


1. Turn on the power of the machine.

2. The machine starts the rotary hook timing adjustment in the test mode. Refer to "Test Mode" in chapter 4.
The rotary hook of each head turns to the currently set timing position so that the rotary hook can be adjusted.

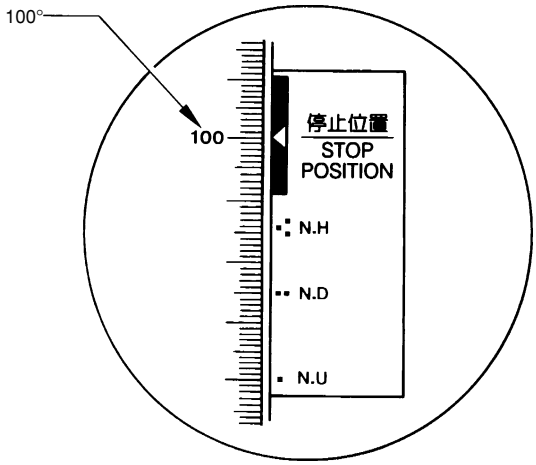


3. Manually turn pulley B until the relationship between the needle point and the rotary hook's point ❶ can be easily checked (at around 140 degrees of the scale).



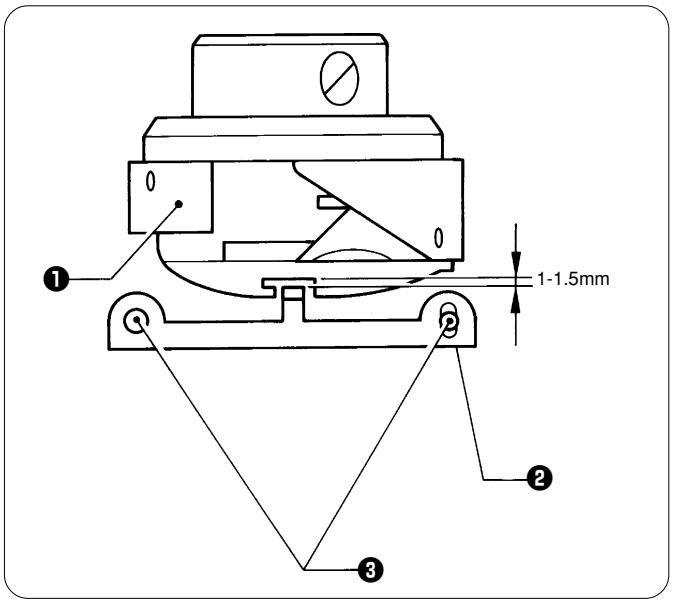
4. Press the STEP FWD/ BACK switch to move the rotary head of each head to adjust it.
   - STEP FWD
     For rotating the rotary hook little by little in the clockwise direction
   - STEP BACK
     For rotating the rotary hook little by little in the counterclockwise direction

   Make this adjustment for each head so that the needle and the rotary hook's point can fit with each other.



5. After adjustment is finished for each head, set pulley B to the stop position (at 100 degrees of the scale) and press the ESC key three times to return to the embroidery initial screen.
The aligned position adjusted according to the above procedure is stored and the rotary hook returns to the stop position.

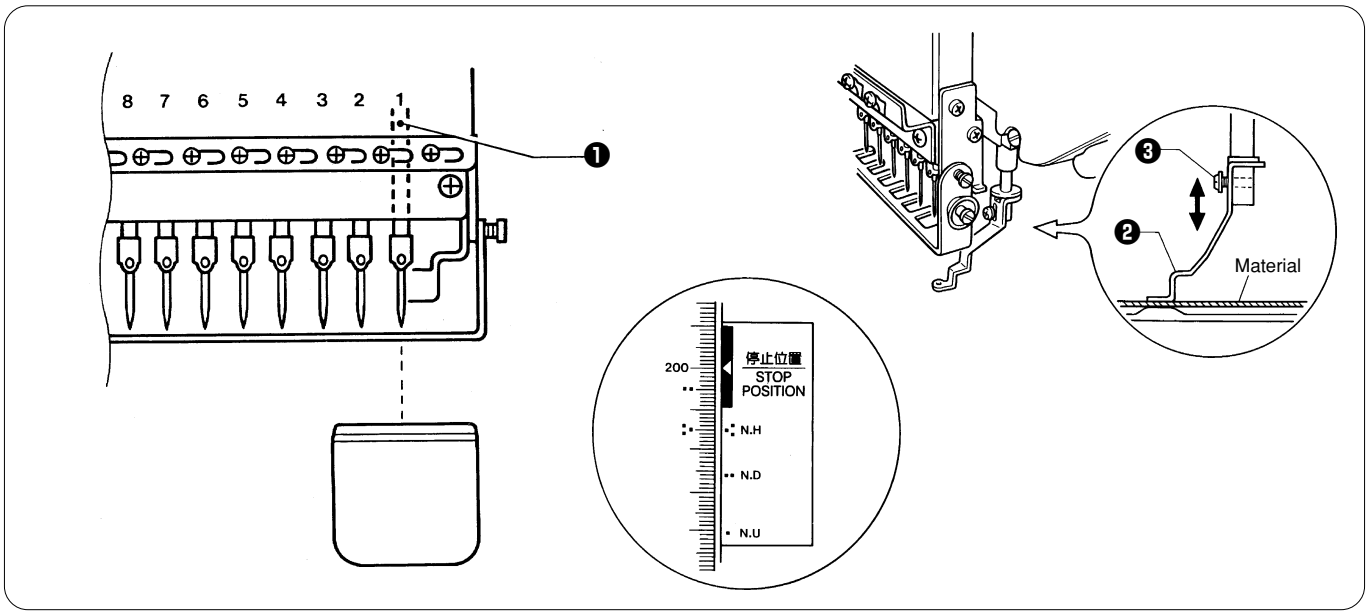
4. Adjusting the clearance between the rotary hook and the inner rotary



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 1-1.5mm.
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.

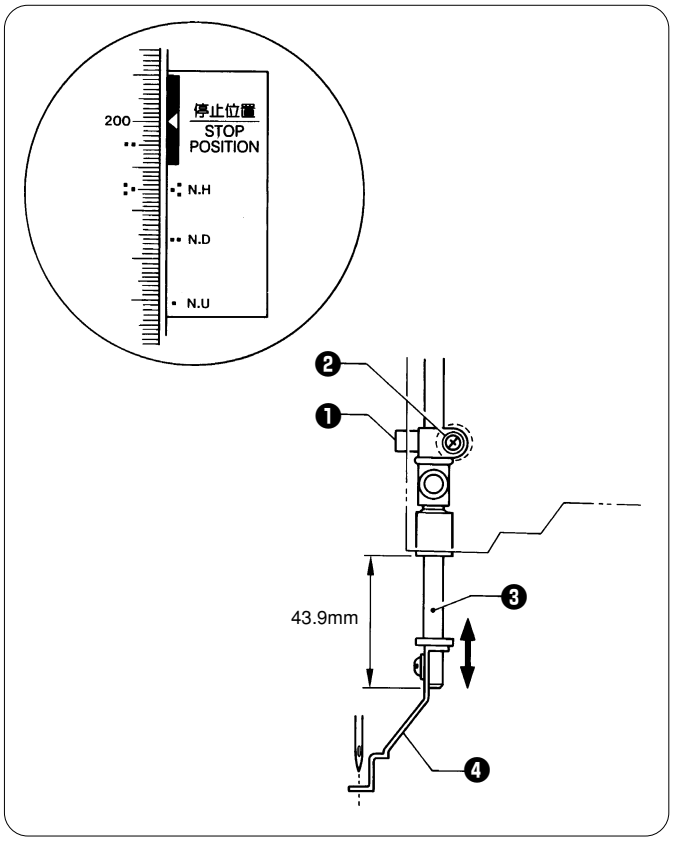
   Notes:
   - If the inner rotary hook stopper does not come to the center of the needle, the needle or the needle bar may be bent. If both are not bent, replace the inner rotary stopper with a new one.
   - If there is no problem with the needle or the needle bar, set the needle to its bottom dead center to check if the needle comes to the center of the shaft of the outer rotary hook.
     If it does, move the needle plate base to the left and right to center the needle.
     (At this time, re-adjust the thread trimmer.)
     If it does not, adjust the needle penetration position.
   - If the two clamping bolts securing the inner rotary hook stopper are loosened, the thread trimming guide plate moves along with it. Therefore, be sure to reinstall the thread trimming guide plate properly after adjusting the inner rotary hook stopper.
     (Pull the plate to the forefront and secure it.)

5. Adjustment of presser foot height



1. Turn the power switch off.
2. Select the needle bar ❶ No.1.
3. Loosen the SEMS ❸ of the presser foot ❷, and adjust the presser foot ❷ until it comes above the cloth top surface when it is at the bottom dead center (where the pulley indication mark "▟" and the cover indication mark "▟" are aligned).

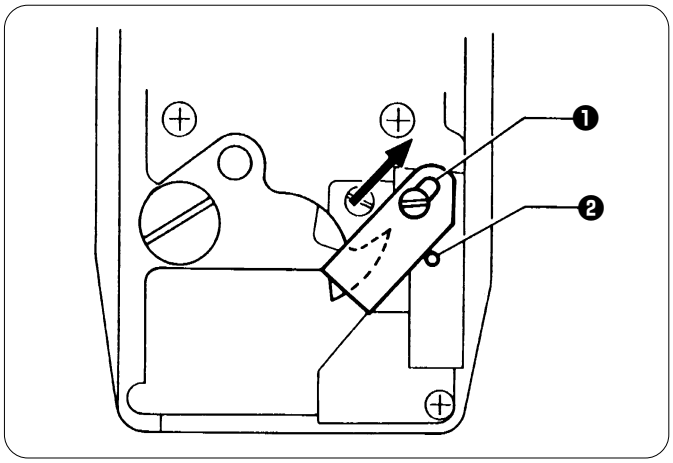
Adjusting the position of the presser shaft



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 ❷ of the presser shaft clamp ❶ using a screwdriver inserted through the hole in the side of the machine head. Adjust the position of the presser shaft ❸ so that the presser shaft ❸ is 43.9mm.
   [Adjustment]
   Turn the pulley until the ▟ mark on the pulley is aligned with the one on the belt cover. Attach the presser foot ❹, which is lowered to the bottom dead point, to the presser shaft clamp ❶. Loosen the screw ❷ of the presser shaft clamp ❶ at the place where the bottom of the presser foot makes contact with the needle plate (for holder base).
3. Securely tighten the screw ❷ of the presser shaft clamp ❶.
4. Make sure that the needle is inserted into the center of the hole in the presser foot ❹ when it is lowerd.

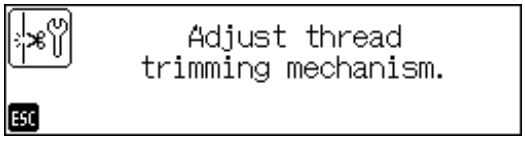
6. Adjustment of thread trimmer

6-1. Attaching the fixed knife

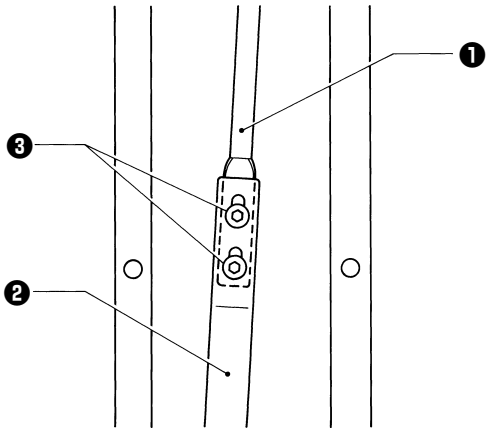


Attach the fixed knife ❶ to the pin ❷ and move it backward to the end of the slot, then mount it there.

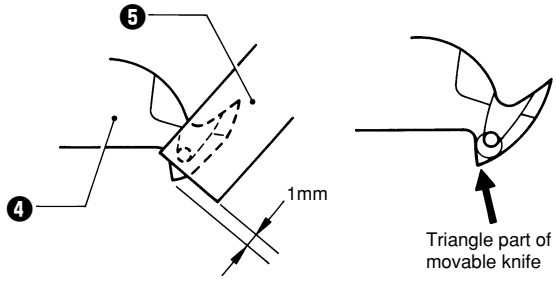
6-2. Checking the movable knife position



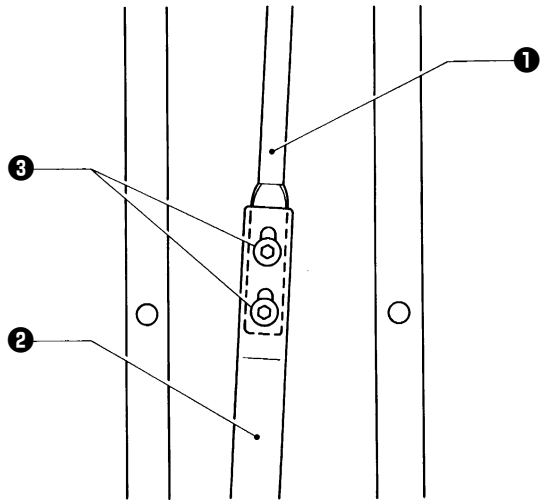
1. Turn the power switch on and wait until the hoop home position detection is finished.
2. Carry out "Thread trimmer adjustment" in the test mode.



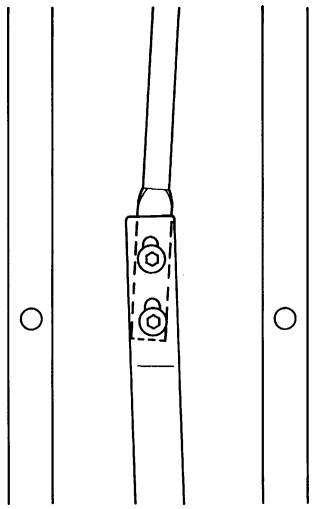
3. Loosen two bolts ❸ that connect the thread trimmer connecting rods C ❶ and B ❷.



4. Tighten the two bolts ❸ until the triangle part of the movable knife ❹ is projected by 1 mm from the fixed knife ❺.



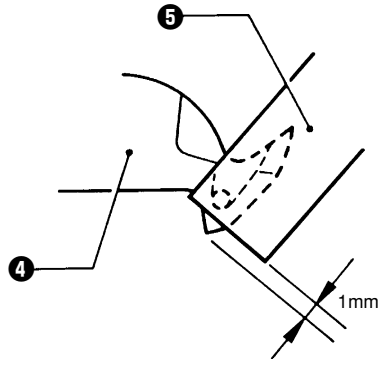
* Bad example



* Precautions for tightening the two bolts ❸:

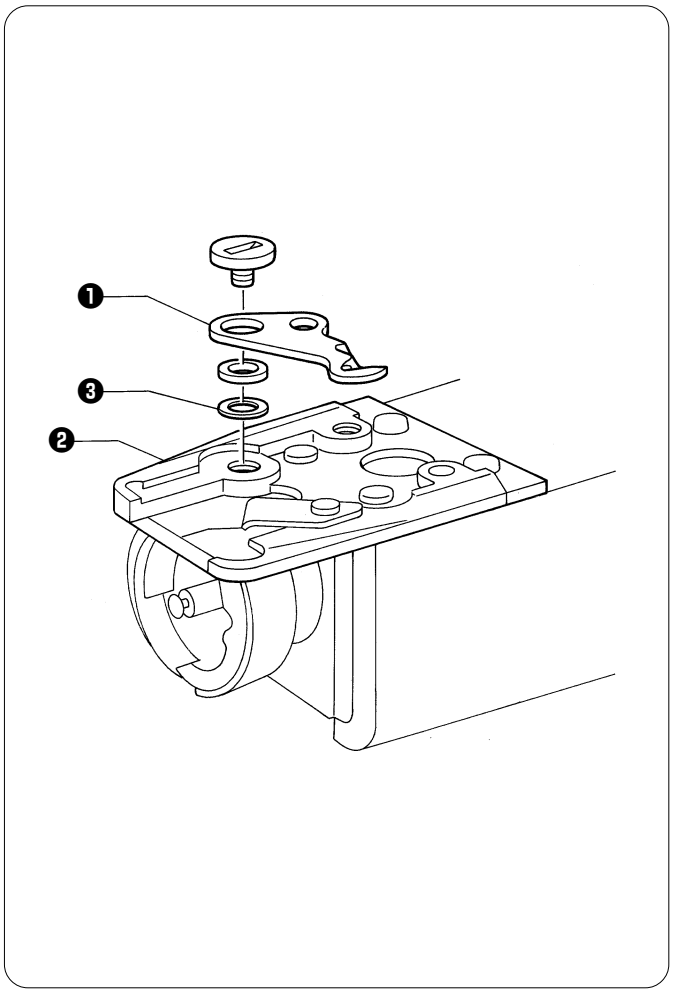
- The thread trimmer connecting rod B ❷ has a backlash of about 0.1 - 0.2 mm back and forth. Tighten the two bolts ❸ while pulling them forward by the backlash amount.
- Tighten the two bolts ❸ so that the thread trimmer connecting rods B ❷ and C ❶ are positioned in a straight line.

5. After adjustment is finished, press the ESC key four times to return to the embroidery initial screen.



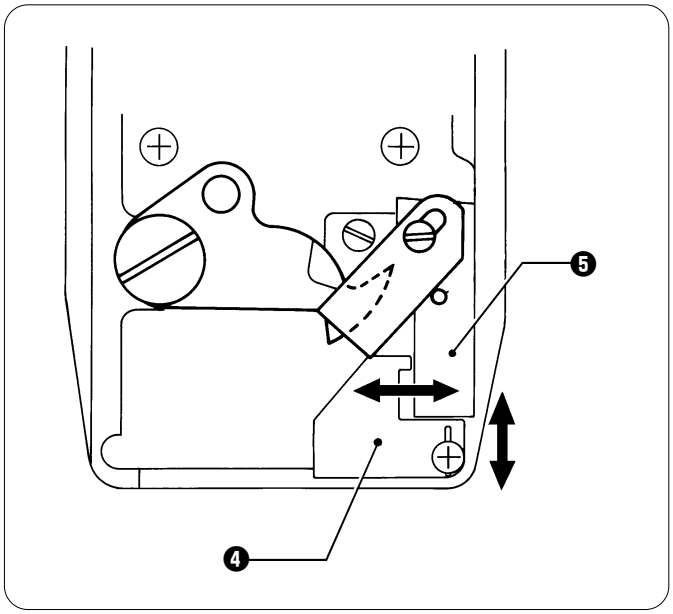
6. Turn the power switch off once, then on again. Check that the clearance between the movable knife ❹ and the fixed knife ❺ is 1 mm.
7. When adjusting again, follow the step 2 and after.
   Note:
   When the movable knife is retracted too much, a thread trimming error may occur.

If thread trimming error often occurs



When the upper thread is trimmed, a thread trimming error occurs due to inappropriate pressure between the movable and fixed knives even if they make contact with each other. In this case, put one or two spacers ❸ between the movable knife ❶ and the needle plate base ❷ to adjust the pressure.

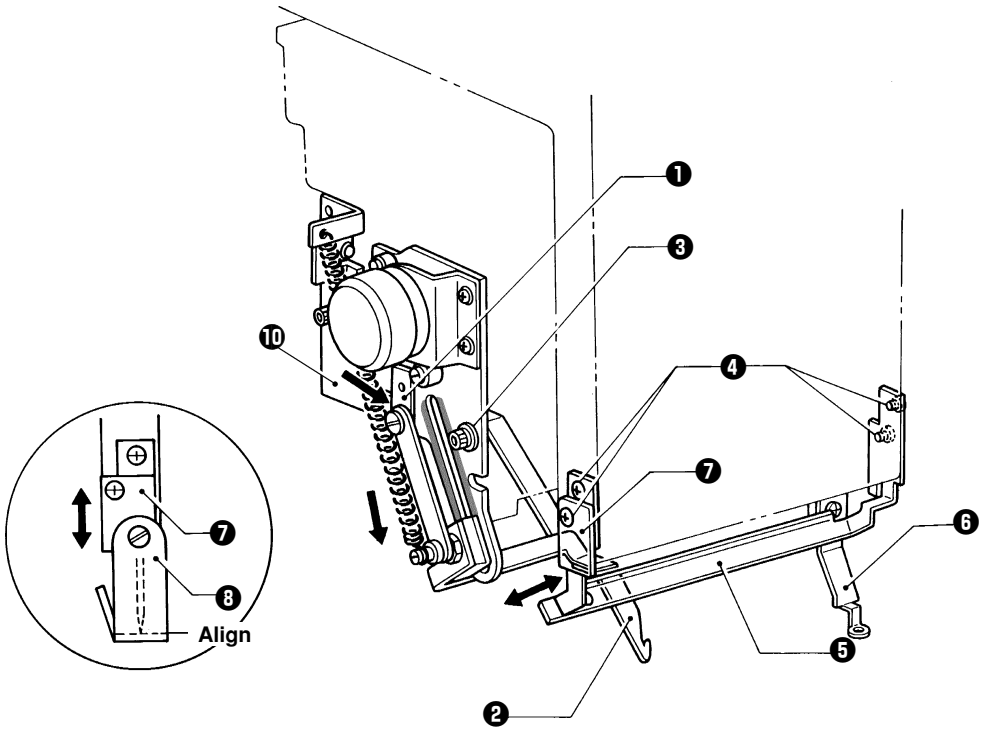
Note:
Adjust the pressure between the fixed and movable knives by putting two threads of rayon 2/120d between them and carrying out thread trimming.



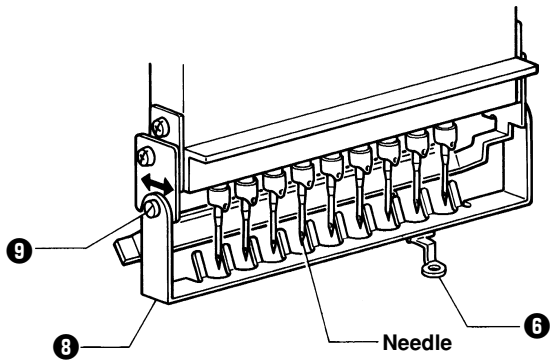
[Adjusting the thread trimming guide plate]

Adjust the thread trimming guide plate ❹ so that it is placed horizontally on the needle plate base ❺ and vertically to the forefront.

7. Adjusting the thread wiper

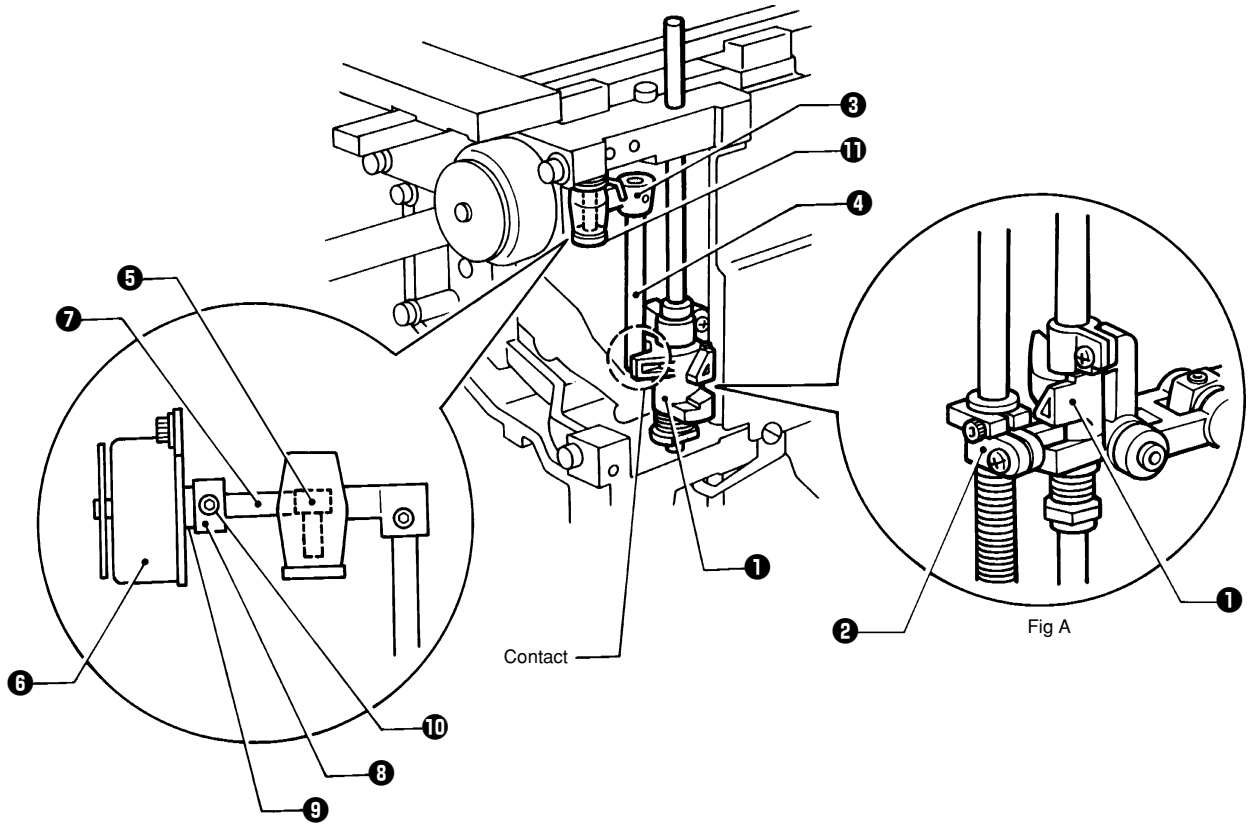


■ **BES-961BC**



1. Move solenoid arm ❶ in the direction of the arrow with your finger. Loosen three bolts ❸ and adjust thread hook ❷ for smooth movements.
2. If there is a difference in motion between needle bars No. 1 and No. 9 (No. 12 for BES-1261BC), loosen four screws ❹ and make an adjustment by moving thread presser base ❺ in the direction of the arrow.
   Make sure that no interference will occur when pressure foot ❻ is raised by the solenoid.
3. Move finger guard plate ❼ up and down, and align the top of finger guard ❽ with the tips of the needles.
4. After the above steps are complete, check thread hook ❷ for smooth movements.
   If the thread hook does not move smoothly, apply grease (Grease Tank BR2 (black)) to the gray part of thread guide solenoid base ❿ and check its movements.
   Notes:
   - Care should be taken if the finger guard is inclined. If the finger guard in such a state is pushed excessively toward the needle at the time of color change, it may interfere with the presser foot.
   - Then make an adjustment in the crosswise direction by sliding bolt o of finger guard ❽.

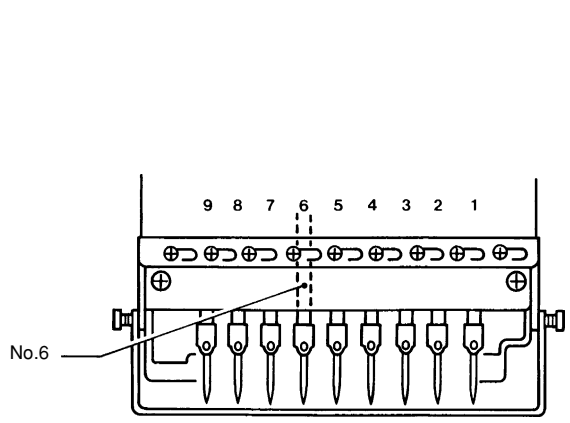
8. Adjusting the jump solenoid

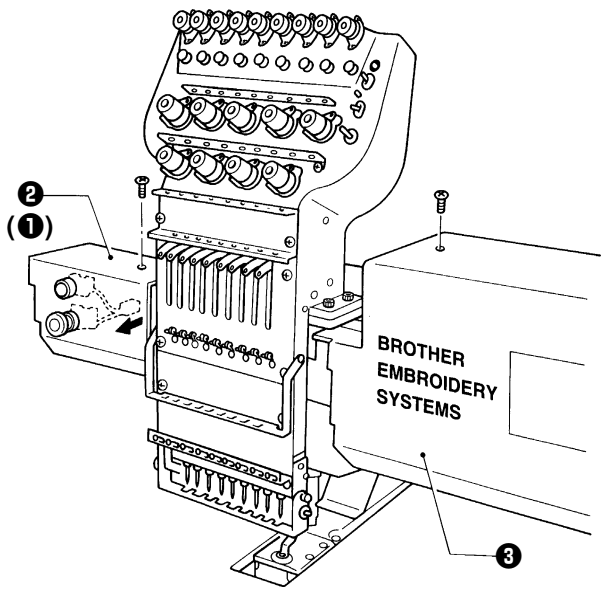


1. Check to see that the projection of the needle bar connecting bracket ❷ completely fits into the recess of the jump bracket ❶. (Refer to figure A.)
2. Make the jump rotary pipe ❹ of the jump rotary body assy ❸ make contact with the jump bracket ❶. Make the plunger ❼ of the jump solenoid ❻ make contact with the jump rotary body shaft ❺, which is opposite the jump rotary body ❸. Place the solenoid cushion ❾ between the jump solenoid ❻ and the set collar ❽, and tighten the set screw ❿.
3. Adjust the jump guide shaft ⓫ and the set collar ❽ so that the needle bar clamp ❷ can be taken off the jump bracket ❶ when the plunger ❼ of the jump solenoid ❻ is at the stroke end.
   Note:
   After adjustment, make sure that, at low speed, the jump solenoid always jumps and returns to its original position.

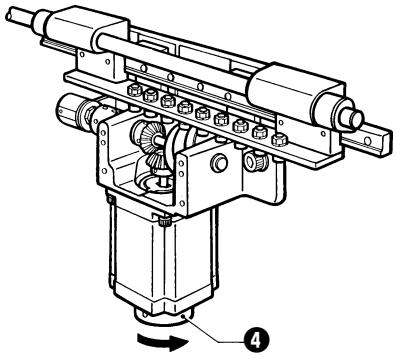
9. Adjusting the switch

BES-961BC

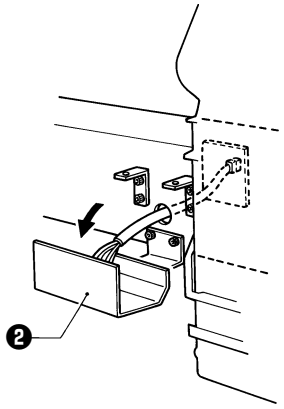




1. Select needle bar no.6, and turn off the power.
2. Remove screws, the UR cover ❶, the UR switch cover ❷, and the cover ❸.
   Note:
   When removing the UR switch cover, remove the emergency stop switch connector.

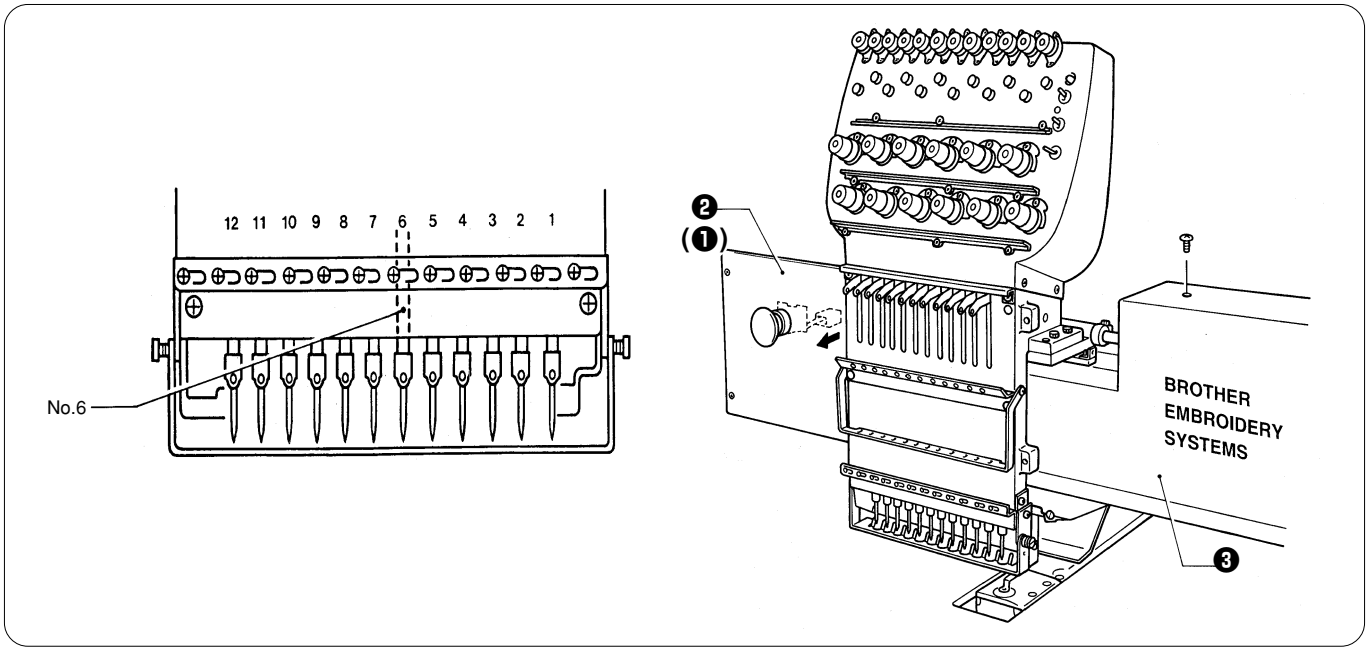


3. Turn the change pulley ❹ to set needle bar no. 1.

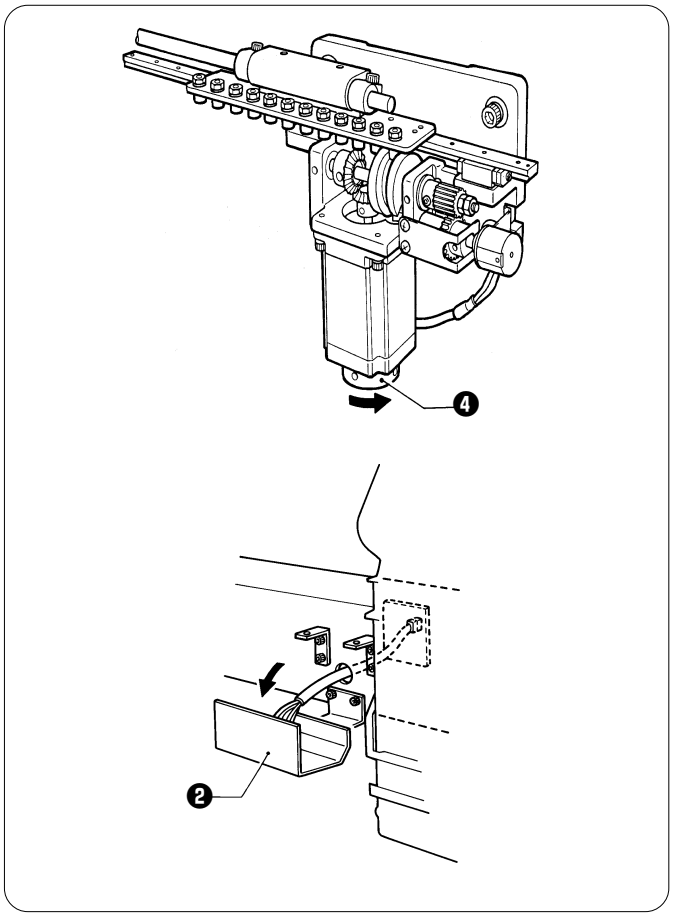


4. Attach the emergency stop switch connector of the UR switch cover ❷. The UR switch cover ❷ will hang down.

BES-1261BC



1. Select needle bar no.6, and turn off the power.
2. Remove screws, the UR cover ❶, the UR switch cover ❷, and the cover ❸.
   Note:
   When removing the UR switch cover, remove the emergency stop switch connector.

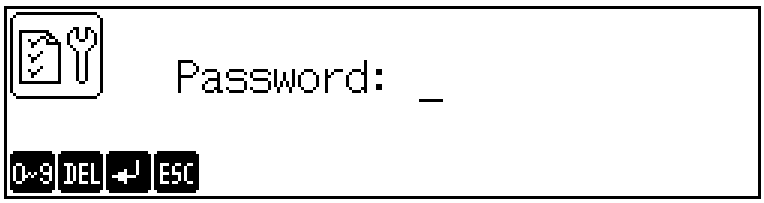


3. Turn the change pulley ❹ to set needle bar no. 1.

4. Attach the emergency stop switch connector of the UR switch cover ❷. The UR switch cover ❷ will hang down.

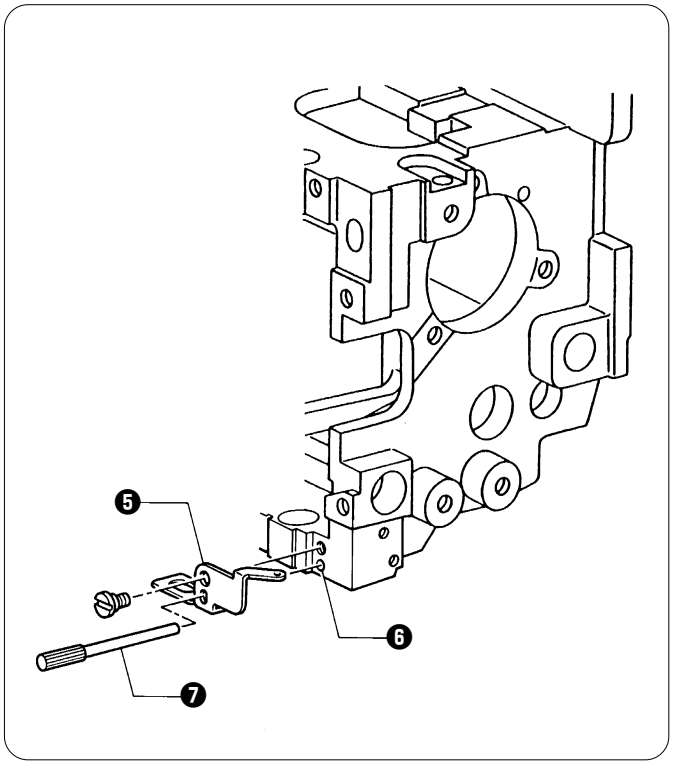
5. While pressing the jog switch △ on the standalone panel, turn on the power.

   The following screen is displayed when you subsequently press the key.

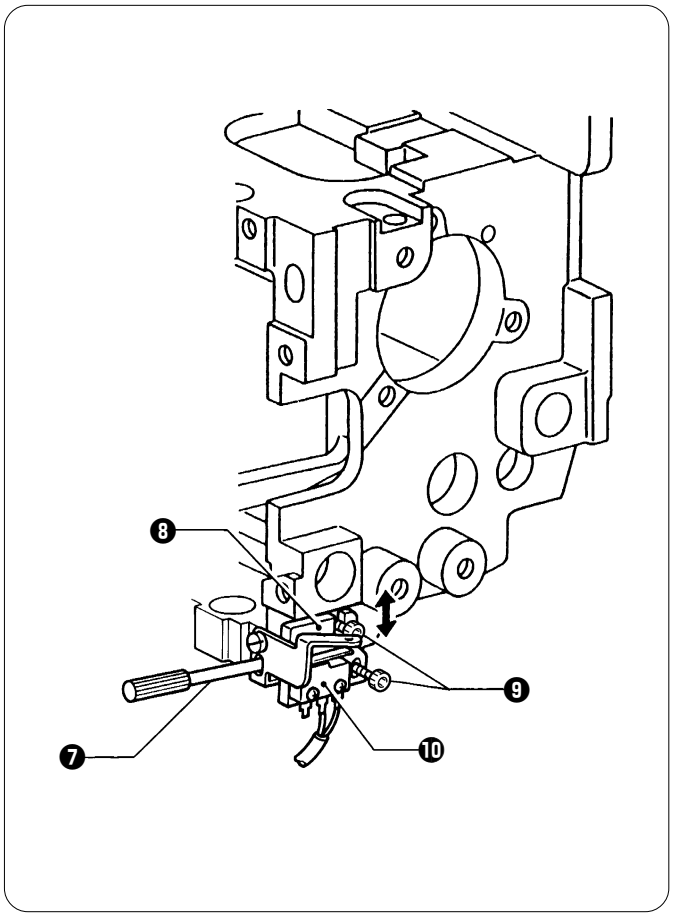


   Input "961" as the password when the above screen is displayed and press the key. The menu screen for adjustment is displayed.

6. Select presser foot from . The presser foot will lower.



7. Match the slot of the W motor sensor plate ❺ and ø 3 mm diameter hole in the head ❻, and insert the gauge pin ❼ to secure the W motor sensor plate ❺.



8. Loosen the two perforated bolts ❾, and vertically move the micro switch holder ❽, which is on the lower right of the head, until the switch ❿ is turned on, and then secure the micro switch holder ❽.
   • When the switch ❿ is on, the buzzer sounds and the MENDING lamp (green) on the head is lit.
   Note:
   Secure the micro switch holder ❽ in the position just after the switch ❿ is on.
   If it is secured at a higher position at that time, the presser foot may retract at a lower position.
9. Remove the gauge pin ❼, and adjust the switch on each head in order.

10. After all heads are adjusted, make sure the presser foot rises and lowers normally by pressing the jog keys (△) and (▽) on the panel.
   • In particular, make sure the presser foot does not make contact with the thread clamp when the presser foot is rising.

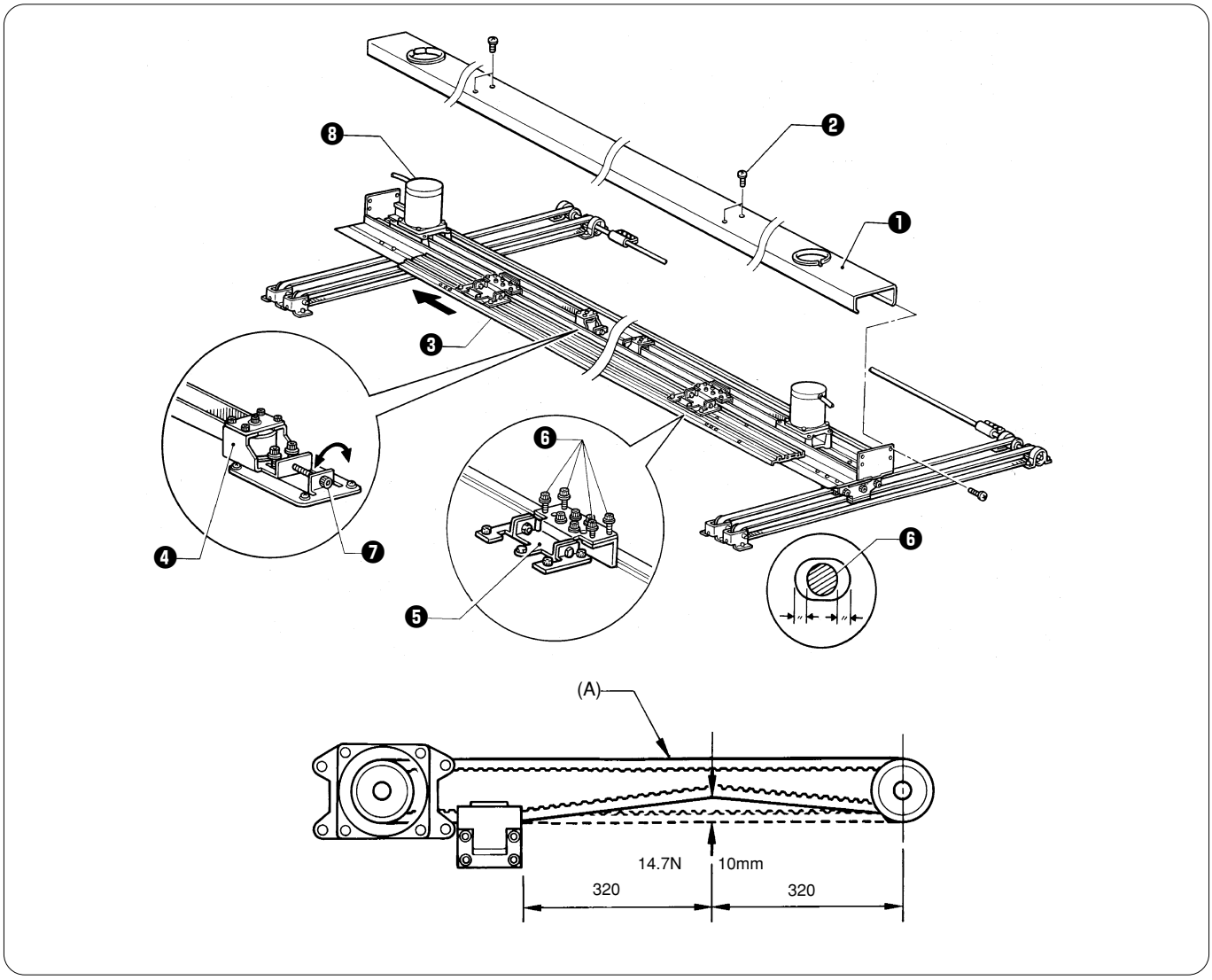
11. Press the ESC key three times to return to the password input screen and turn off the power.

12. Turn the change pulley ❹ to select needle bar no. 6, and reattach the covers.

13. Turn on the power. Make sure that the presser foot rises and the carriage moves to the home position.

10. Adjusting the timing belt tension

10-1. Timing belt X

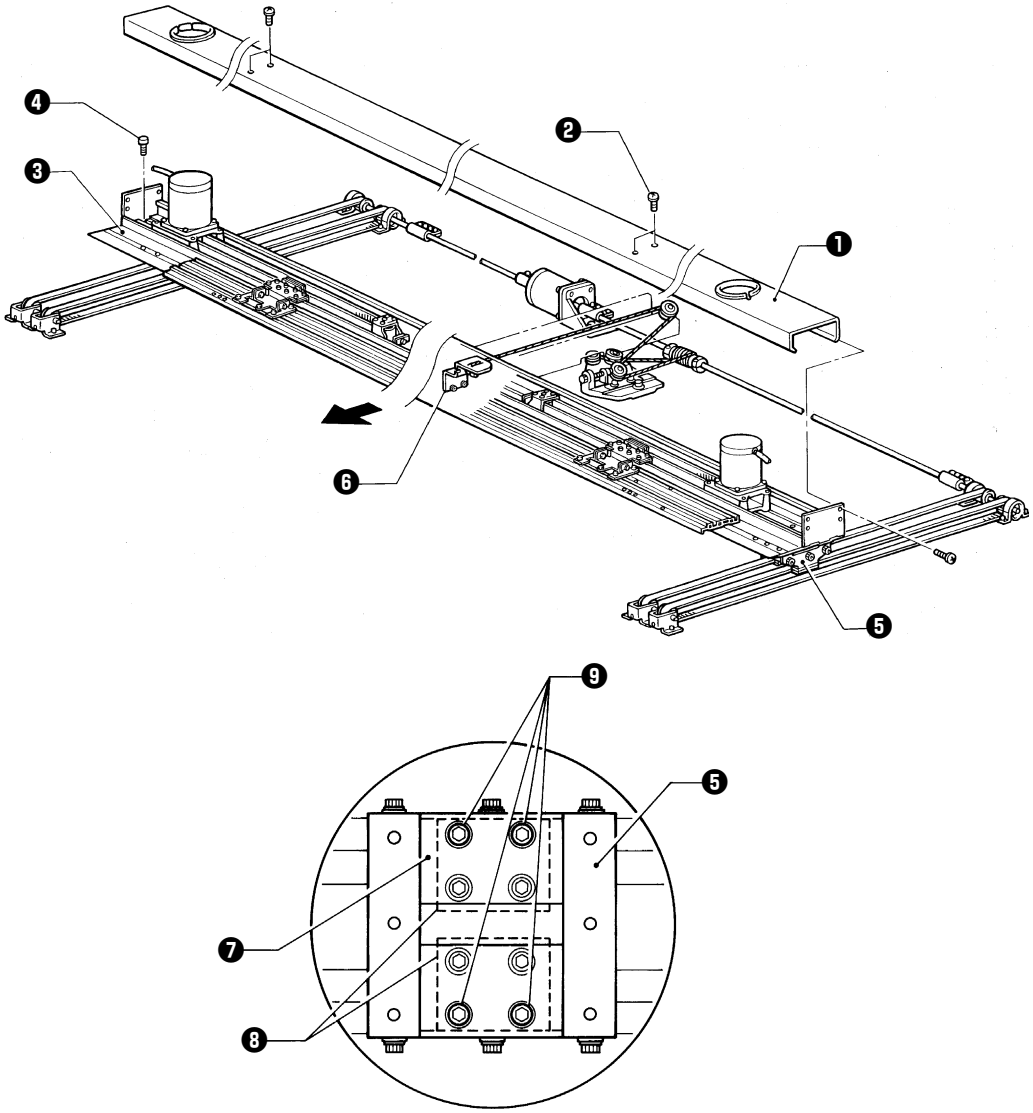


1. Remove the screws ❷, and the X-feed cover ❶.
2. Move the X-feed frame ❸ all the way towards the pulse motor.
3. Loosen the two screws of X-pulley bracket B ❹ and the four screws ❻ of the X-feed bracket ❺.
4. Turn the adjusting screw ❼ to adjust the belt tension.
   Clockwise: Tension will be increased.
   Anti-clockwise: Tension will be decreased.
5. Tighten the screws of X-pulley bracket B ❹ and the X-feed bracket ❺. Adjust the belt tension so that the slack will be approx. 10 mm with a load of 14.7 N applied to the place indicated by the arrows as shown in the above figure.
   With the power turned off, if the weight of the X-carriage varies when the connectors of the X-pulse motors on both sides are attached or separate, the X-pulse motors may be out of phase.
   Reattach the connectors of the X-pulse motors, turn on the power, and make the above adjustment again.
6. Turn on the power to magnetize the X motors ❽ on both sides. Secure the X-feed bracket ❺ using the screws ❻ so that they are in the center of each hole. Secure another X-feed bracket ❺ in the same way.
   Note:
   The screws ❻ should be central in every hole.

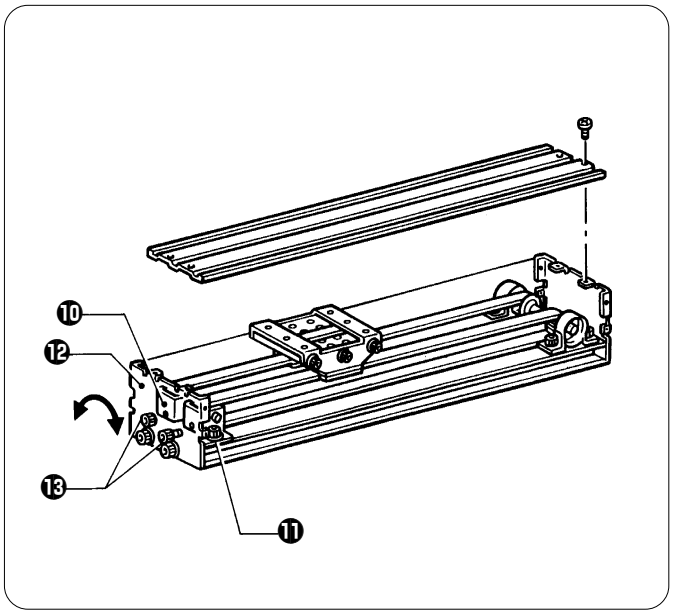
When measuring the slack using a sonic tension meter manufactured by Unitta Inc., input the following:

When measuring at point (A)
Weight: 4.0
Width: 20
Span: 806
Adjust the belt tension so that a sonic tension meter applies 206 N ± 9.8 N to the belt when it bounces at point (A).
At this time, nothing should be making contact with the belt.

10-2. Timing belt Y

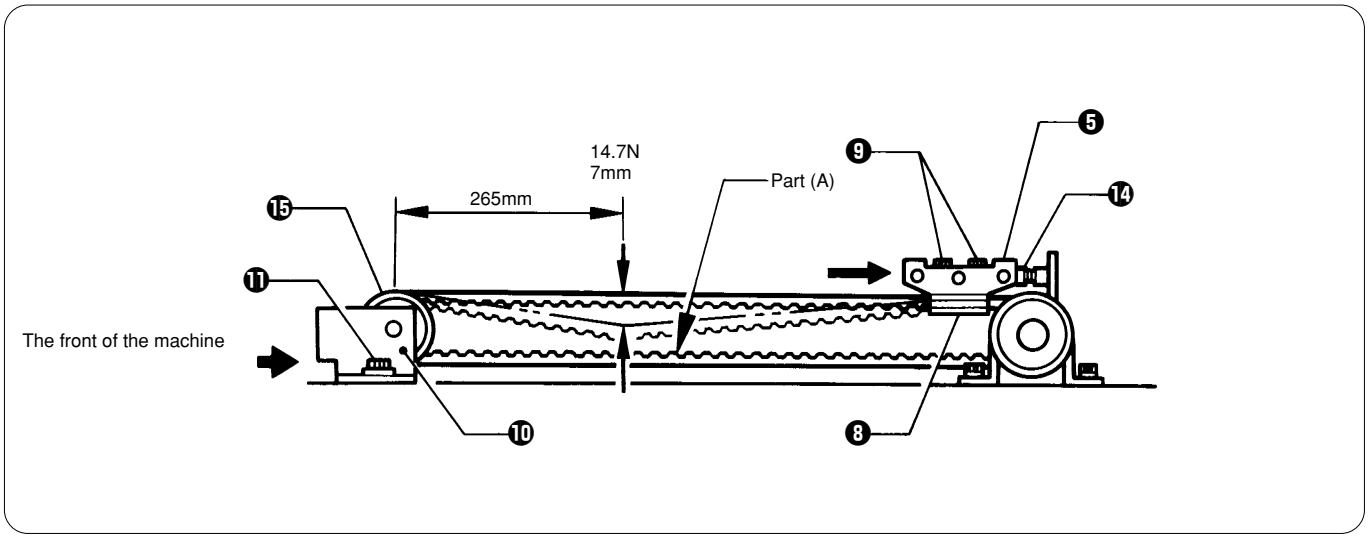


1. Remove the screws ❷ and the X-feed cover ❶.
2. Remove the 13 screws ❹ from the Y-feed frame ❸. Remove the Y-feed frame ❸ from the Y-carriage ❺ and the rail connecting plate ❻, and shift the Y-feed frame ❸ toward the front.
3. Viewed from the top of the Y-carriage ❺, loosen the 16 bolts ❾ of the timing belt setting plate❽ from the holes of the Y-carriage ❼. (Do not remove them.)



4. Loosen the eight bolts ⑪ securing the Y-pulley bracket ⑩.
5. Turn the tension adjusting bolts ⑬ of the Y-feed cover support plate ⑫ to adjust the belt tension.

   Clockwise: Tension will be increased.
   Anti-clockwise: Tension will be decreased.



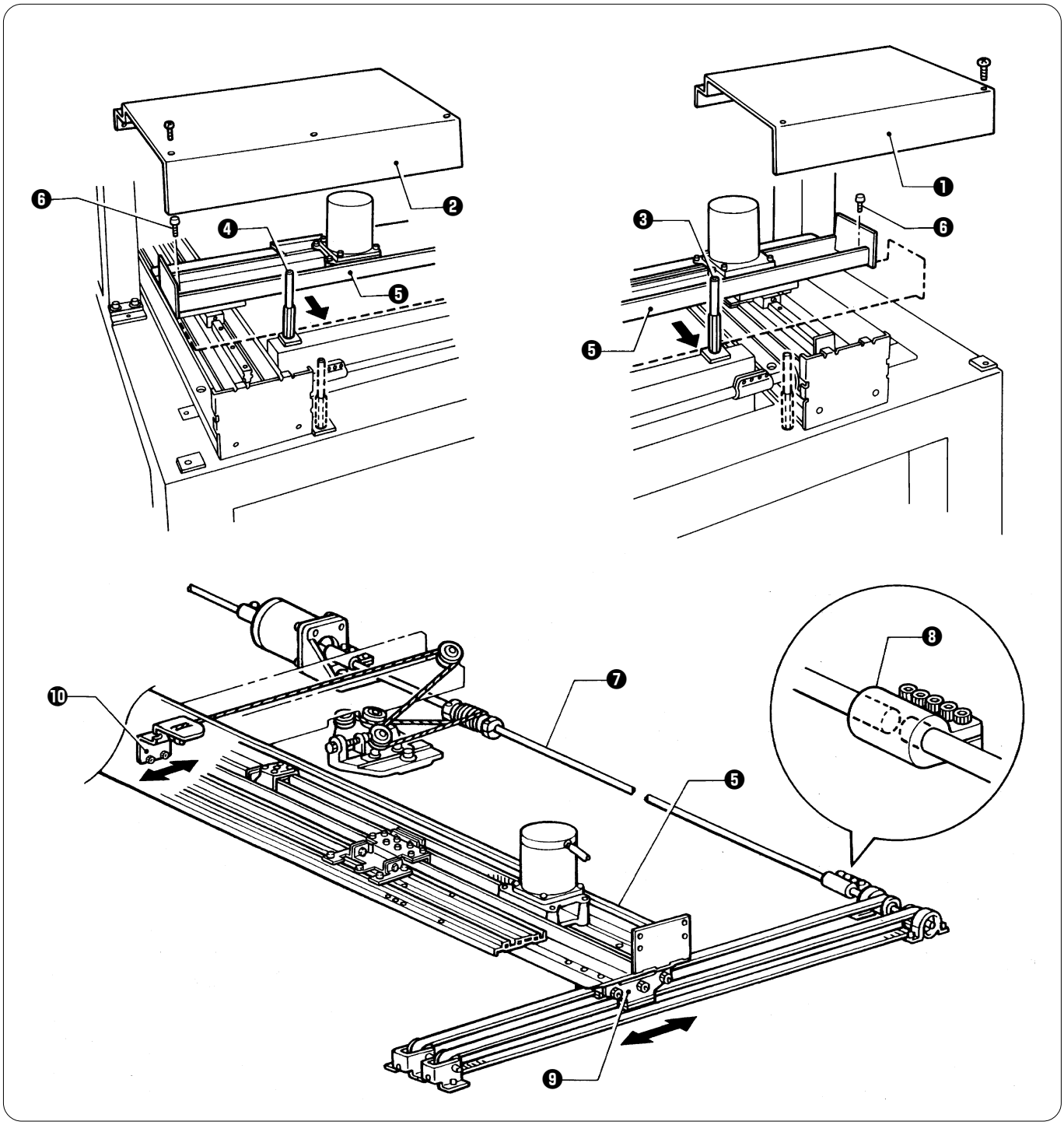
6. Move the Y-carriage ❺ all the way backward (from the front of the machine) until it makes contact with stopper R ⑭.
7. Tighten the screws ❾ of the timing belt setting plate ❽ which is on either timing belt Y to be measured. Apply a load of 14.7 N to the position 265 mm away from the pulley ⑮ at the front, and adjust the belt tension so that the slack will be approx. 7 mm.
   Note:
   Do not adjust the belt tension when the timing belt setting plates on both sides are secured.

When measuring the slack using a sonic tension meter manufactured by Unitta Inc., input the following:

When measuring at point (A)
Weight: 4.0
Width: 20
Span: 640
Adjust the belt tension so that a sonic tension meter applies 206 N ± 9.8 N.

Note:
Before measuring the slack of the belt, tighten the eight bolts ⑪ securing the Y-pulley bracket ⑩.

8. After adjusting the tension of the four belts, tighten the bolts ❾ of the timing belt setting plate ❽.
   Note:
   After replacement, make sure that Y-feed resistance is 147 N with the tubular frame on, and 157 N with the cap frame attachment on. If the resistance is too great, adjust the Y-carriage.



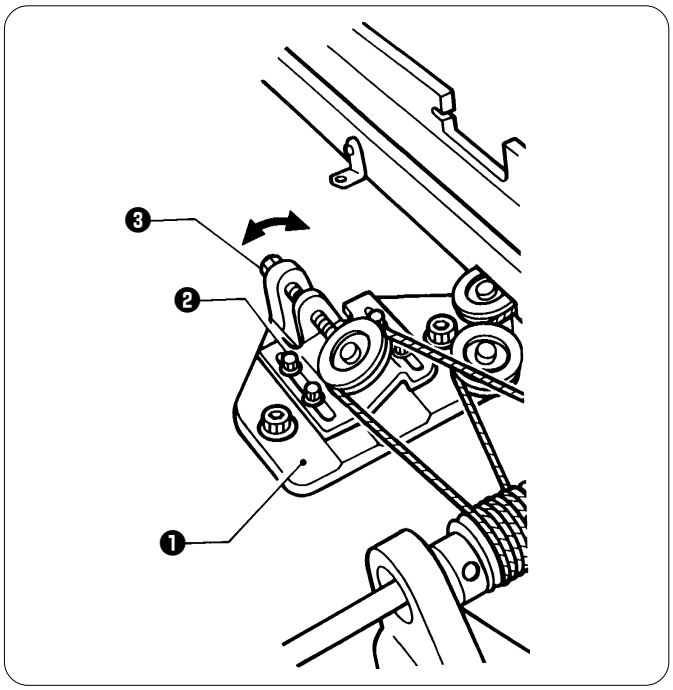
Positioning Y-feed frame (Perform from the rear of the machine.)

1. Remove the screws, and table covers L ❶ and R ❷.
2. From the back of the frame, reinsert post LB ❸ that is the third from the left, and post LB ❹ that is the third from the right, into the extreme left and right holes on the second steel tube, respectively.
3. Press the Y-feed frame ❺ against posts LB ❸ and ❹ and secure it using the 13 screws ❻.
4. Return posts LB ❸ and ❹ to their previous positions.

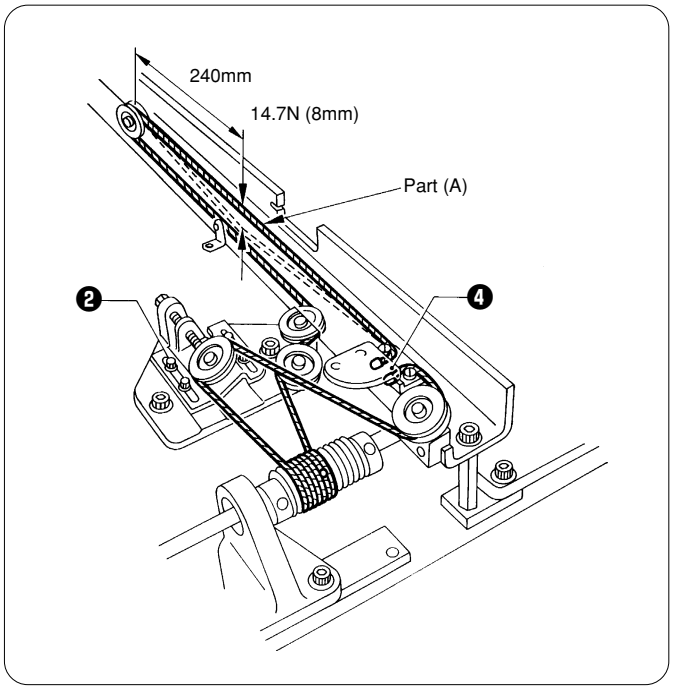
Note:

When the Y-feed frame ❺ is secured and the screw holes do not match, loosen the bolts of coupling 15 ❽ connected to the connecting shaft ❼, and move the Y-carriage ❾ or the rail connecting plate ❿ back and forth to adjust the positions of the screw holes.

11. Adjusting the driving wire



1. Loosen the four bolts ❷ of the pulley base ❶, and turn the bolt ❸ to adjust the wire tension.



2. Move the rail connecting plate ❹ all the way backward (viewed from the front), and adjust the wire tension so that the slack will be approx. 8 mm with a load of 14.7 N applied to the position 240 mm away from the pulley at the front.
Note:
Before measuring the slack, tighten the four bolts ❷ to secure the pulley base.

When measuring the slack using a sonic tension meter manufactured by Unitta Inc., input the following:

When measuring at point (A)
Weight: 19.1
Width: 1
Span: 480
Adjust the belt tension so that a sonic tension meter applies 206 N ± 9.8 N to the belt.

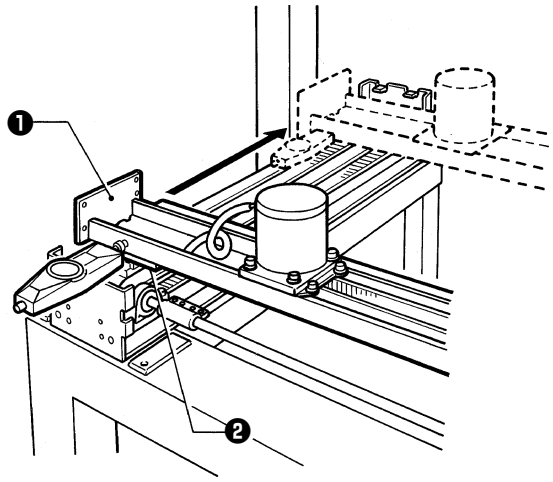
Note:
After replacement, make sure that Y-feed resistance is 147 N with the tubular frame on, and 157 N with the cap frame attachment on. If the resistance is too great, adjust the Y-carriage.

12. Adjusting the Y-carriage

The sliding resistance of the Y-carriage with the tubular frame on is 147 N, and with the cap frame attachment on, 157 N. If the measured sliding resistance is greater than these standard values, adjust the Y-carriage as follows:

How to measure the sliding resistance of the Y carriage

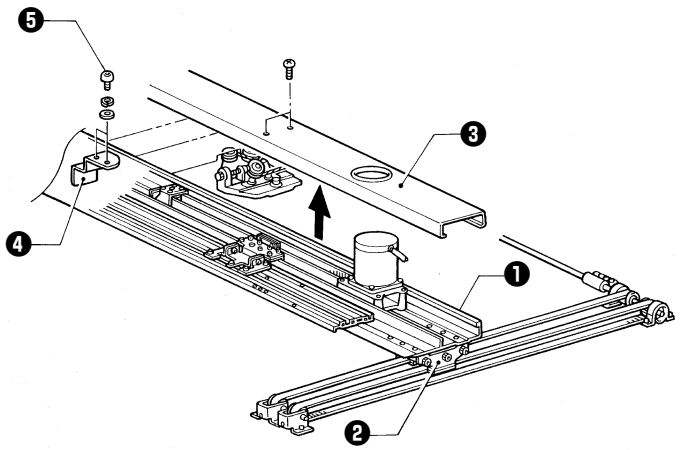
- Using a push-pull gauge, slowly press the place where the Y-feed frame ❶ makes contact with the Y carriage ❷ in the direction of the arrow, and measure the sliding resistance of the Y-carriage for all of its stroke. (Compare the maximum measured sliding resistance to the standard value.)



- If the Y-carriage movement is impeded, perform the following adjustments starting with step 1 until the resistance is equal to the standard value.
- If the Y-carriage gradually becomes impeded as it is moved from the back to the front or in the latter half of the movement to the front, perform step 4.

  Note:
  After each adjustment, do not fail to measure the sliding resistance of the Y-carriage in the manner described above.

- Remove the X-feed cover ❸ and the button head screws ❺ to separate the Y-feed frame ❶ and the rail connecting plate ❹, and measure the resistance of the Y-carriage ❷.



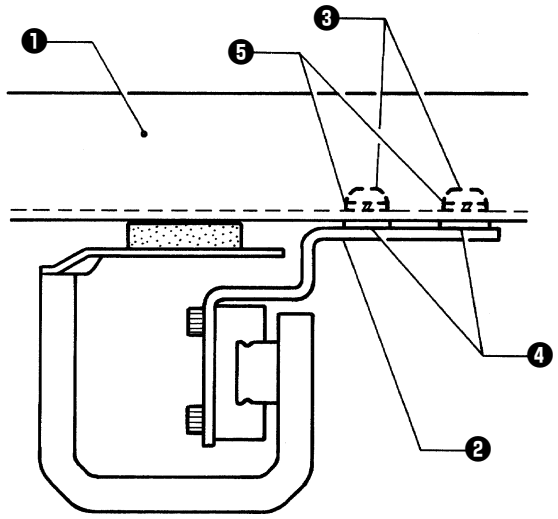
12-1. When the sliding resistance of the Y-carriage is below the standard value

Check the clearance between the Y-feed frame ❶ and the rail connecting plate ❷.

When there is no clearance
Move the Y-feed frame ❶ as close as possible to the needle plate side when viewed from the rear of the machine, and tighten the button head screws ❸.

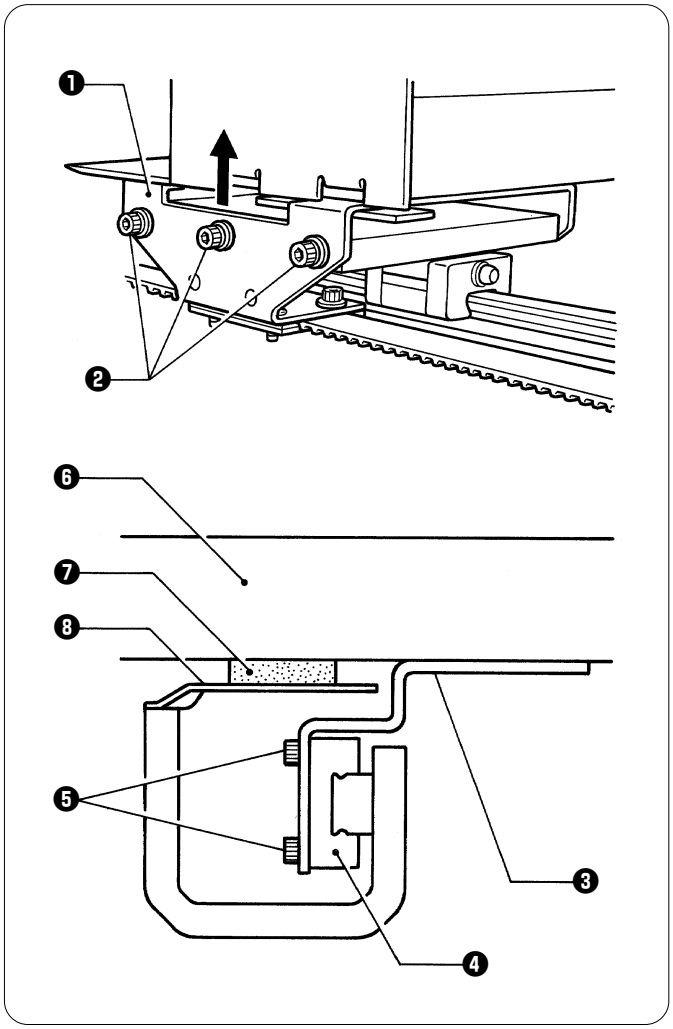
Note:
When a button head screw can not be inserted into a hole in the rail connecting plate ❷, move the Y-feed frame ❸, temporarily insert another button head screw into the hole, and securely tighten the button head screw which is on the needle plate side.

When there is clearance
Insert the washer ❹ between the Y-feed frame ❶ and the rail connecting plate ❷, and tighten the button head screws ❸ and the spring washers ❺.



- After adjustment, measure the sliding resistance of the Y-carriage again. If the measured resistance is still not equal to the standard value, perform step 12-2.

12-2. When the sliding resistance of the Y-carriage is over the standard value even after adjustment 12-1



- Loosen the bolts ❷ on both sides of the Y-carriage ❶, raise the Y-carriage ❶ to adjust the clearance between the Y carriage ❶ and the Y-feed frame, and retighten the bolts ❷.

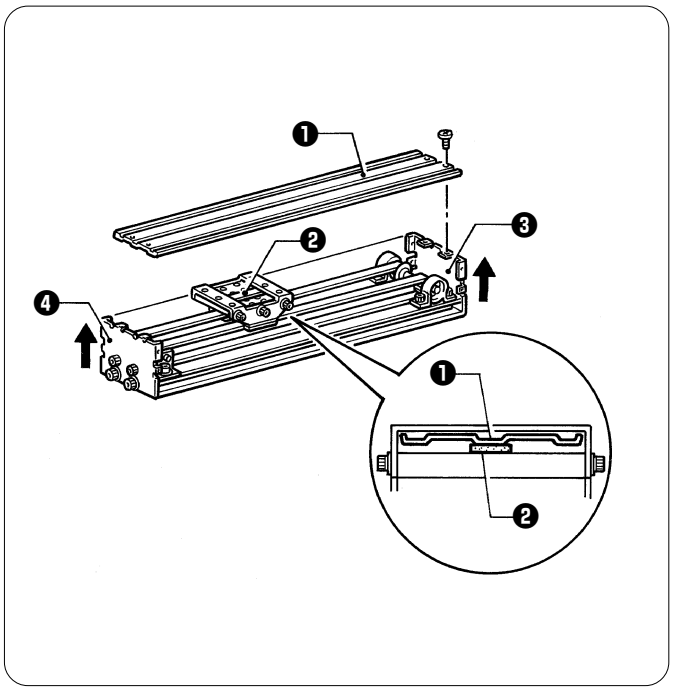
- Loosen the bolts ❺ to separate the rail connecting plate ❸ and the linear guide ❹, raise the rail connecting plate ❸ so as not to leave a gap between the felt ❼ on the back of the Y-feed frame ❻ and the bed cover ❽, and then retighten the bolts ❺.

  Note:
  When the position of the rail connecting plate ❸ is changed as described above, the clearance between the tubular frame and the needle plate may become greater, resulting in the needle plate rattling during sewing.
  Do not raise the front (the needle plate side) of the rail connecting plate ❸ too much.

- After this adjustment, measure the sliding resistance of the Y-carriage again. If it is still over the standard value, make adjustment written in 12-3.

12-3. When the sliding resistance of the Y-carriage is over the standard value

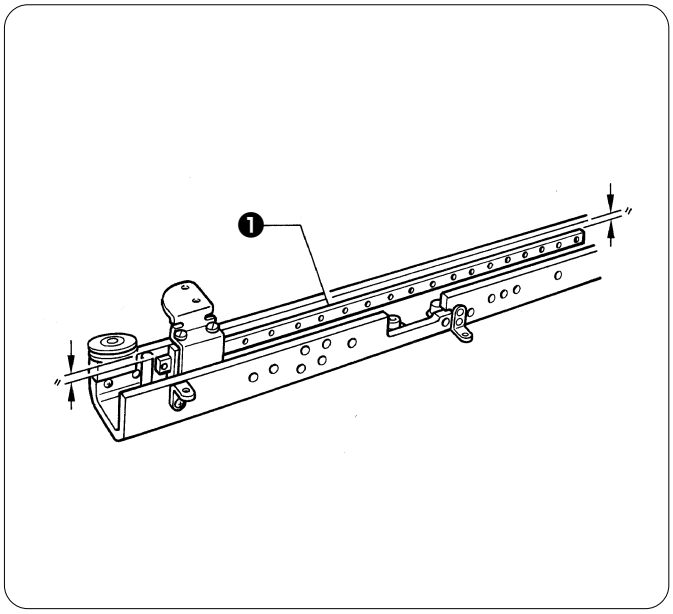
Remove both Y-feed covers U ❶, measure the sliding resistance of the Y-carriage again. If the sliding resistance becomes less, check the following items:



- Check if Y-feed covers U ❶ that hold spacer felt ❷ down are deformed. If they are, straighten them.
- When the sliding resistance becomes great before and after the Y-carriage, reattach the Y-feed cover support plates ❸ and ❹ as high as possible.

Notes:
- If Y-feed cover U is raised too much, it may creak during sewing. Do not change its position more than necessary. (To prevent vibration, have the Y-feed cover U just make contact with the Y-carriage.)
- Finish adjustments 1 to 3 when the sliding resistance is equal to the standard value.
  There is no need to perform all adjustments.

12-4. When linear guide 505L, which is attached to machine head No.3, is not parallel to the top surface of the bed

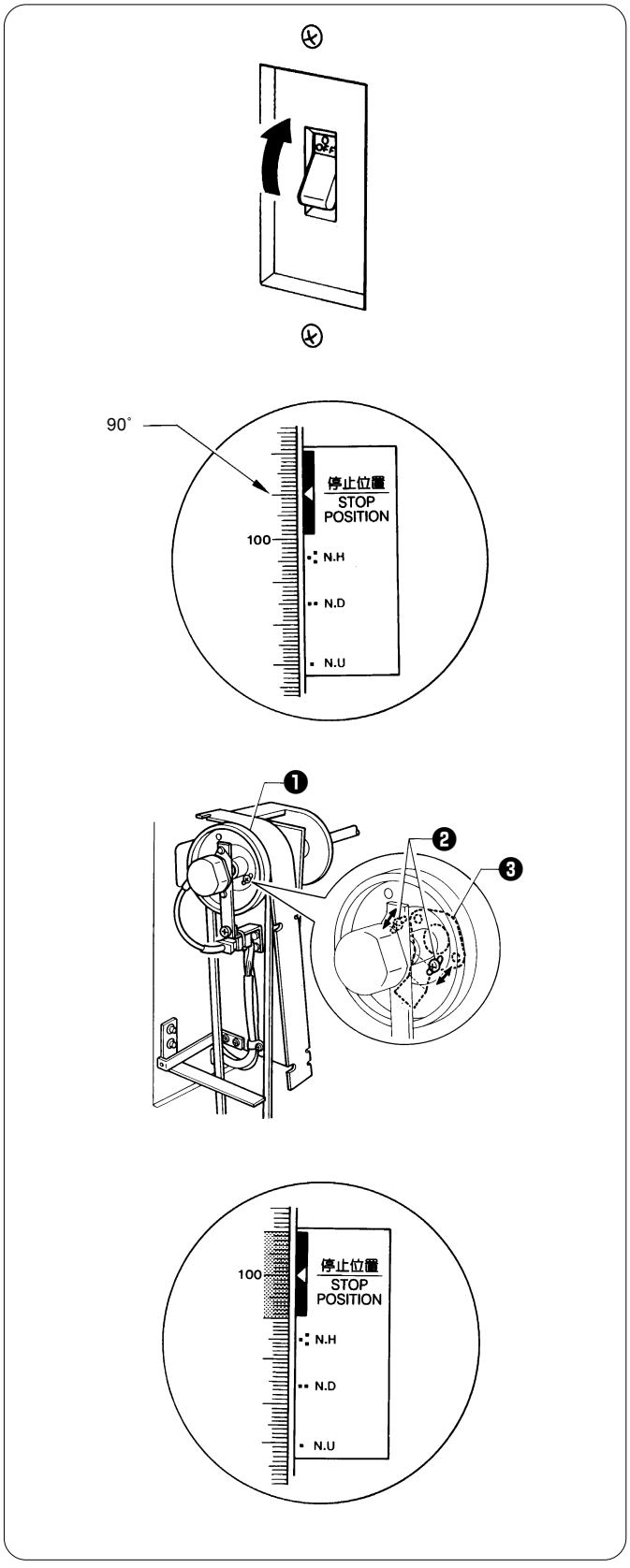


- Loosen the bolts of linear guide 505L ❶, move the Y-feed frame to adjust the height of linear guide 505L ❶ at both ends of the stroke. (The felts should just touch the top surface of the bed.)

13. Adjusting the rotary encoder and sensor PCB

- The rotary encoder and sensor PCB is used to detect the needle stop position and synchronize hoop motion.
- When the machine stops after thread trimming or is stopped for an emergency during sewing, the needle bar is in the jump condition (stopped in the raised position), and its thread take-up stops at the same position as the other eight.

13-1. Adjusting the machine stop position signal

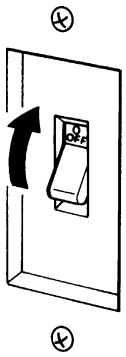


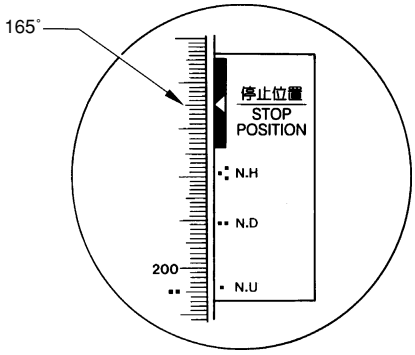
1. Turn on the power, and the machine starts the encoder signal test in the test mode.
   Refer to page 79, "Test mode".

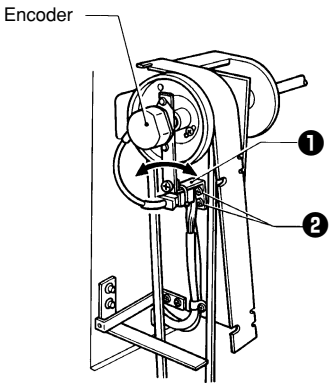
2. Turn pulley B ❶ in the normal direction. Loosen the screws ❷ to adjust the dog ❸ so that the buzzer starts sounding and UP becomes "H" when the scale on the pulley indicates 90 degrees.

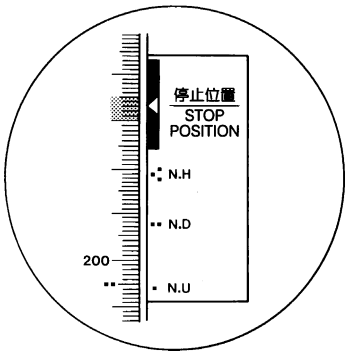
* If the stop position signal is correctly adjusted, UP becomes "H" and the buzzer sounds when the scale on the pulley indicates between 90 and 110 degrees.

13-2. Adjusting the synchronizing signal









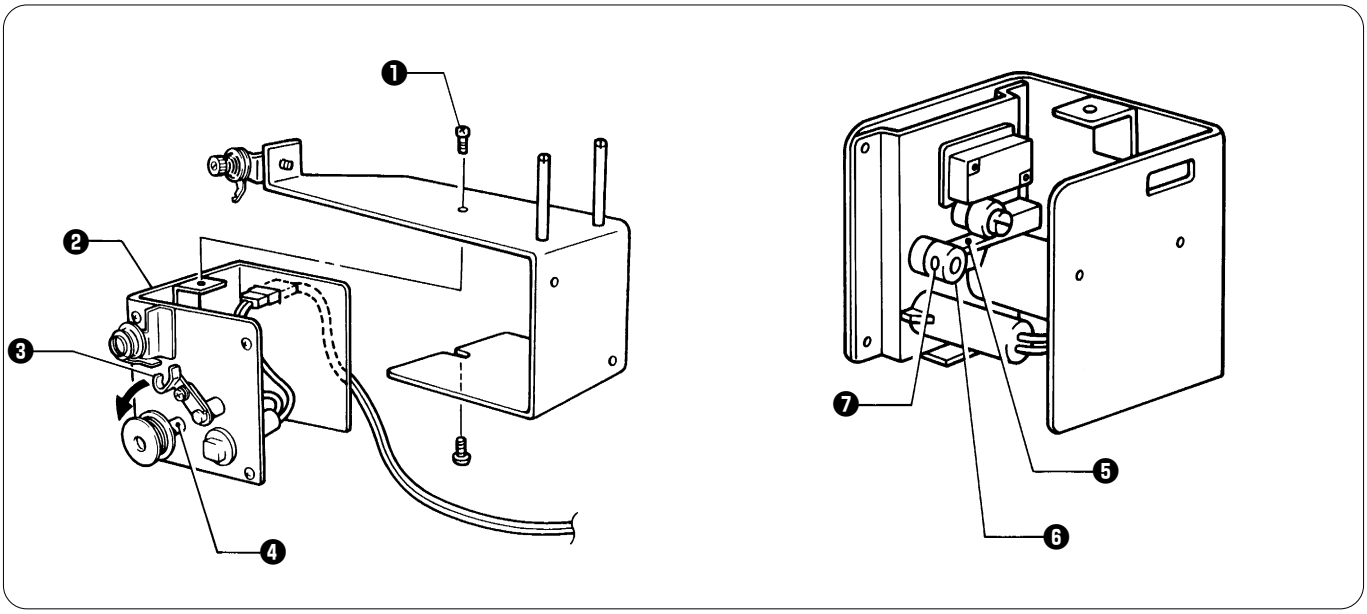
1. Turn on the power, and the machine starts the encoder signal test in the test mode.
   Refer to page 79, "Test mode".

2. Loosen two screws ❷ at the arm side of the encoder adjustment plate ❶ to adjust the angle so that the buzzer sounds and  becomes "H" when the scale on the pulley indicates 165 degrees.

* If the synchronous signal is correctly adjusted,  becomes "H" and the buzzer sounds when the scale on the pulley indicates between 165 and 170 degrees.

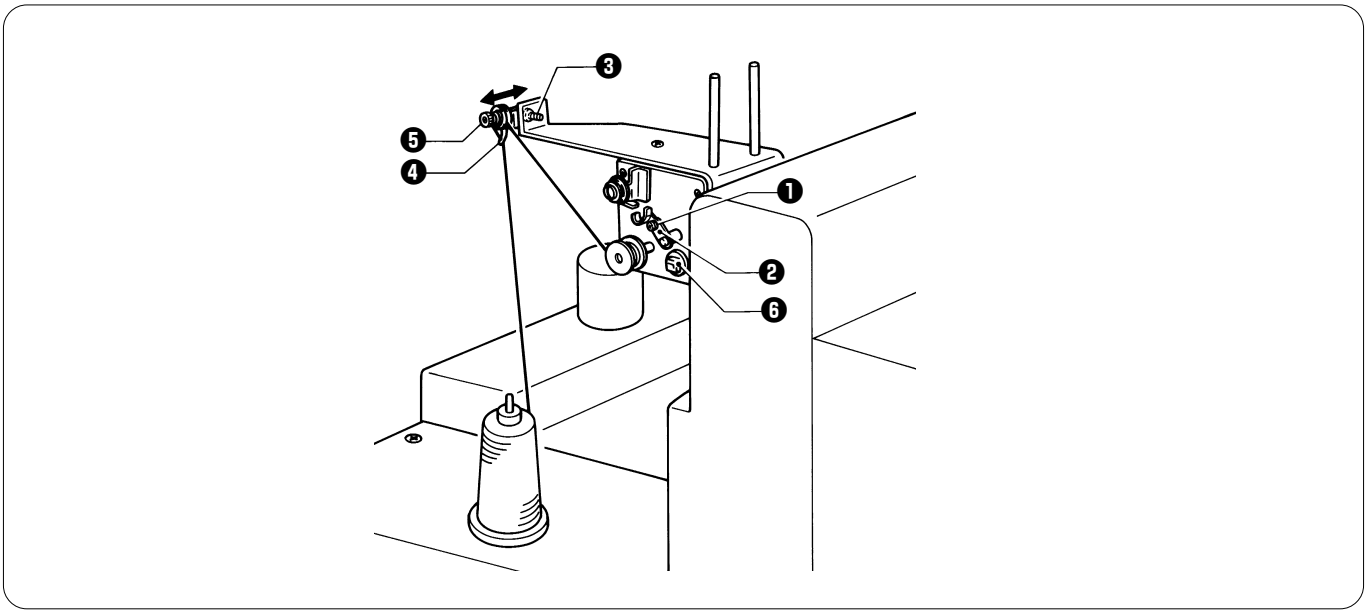
14. Adjusting the bobbin winder

14-1. Positioning the bobbin winder claw



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

14-2. Positioning the bobbin presser



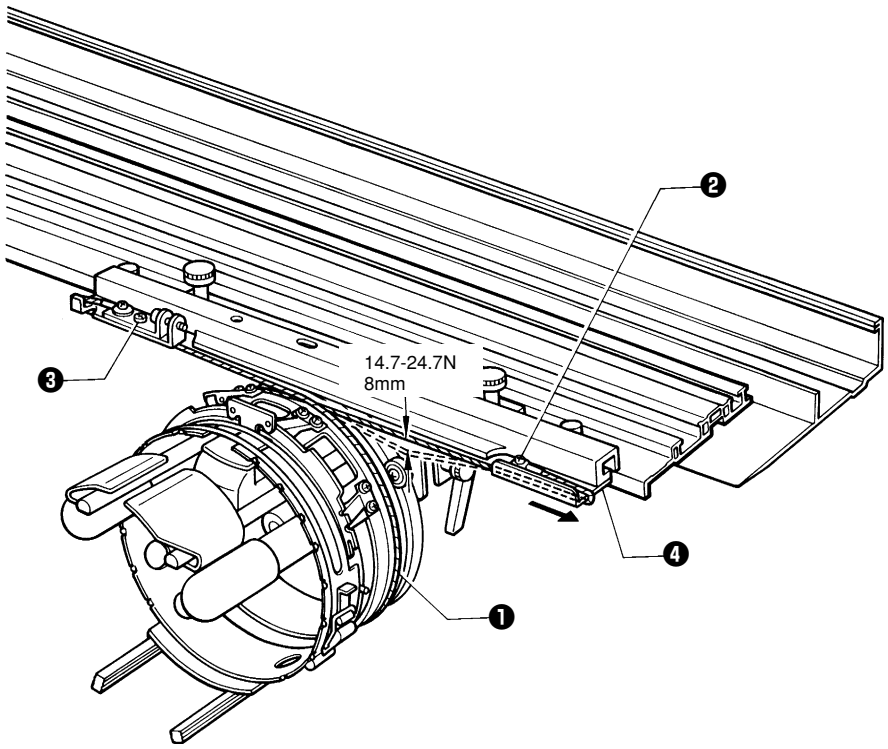
Loosen the screw ❶, and adjust the bobbin presser ❷ by moving it so that the proper amount of thread can be wound on the bobbin.

Notes:

- If the thread is not wound evenly on the bobbin, loosen the screw ❸, and move the thread guide ❹ to the right and left. To wind more thread on the bobbin, loosen the screw ❶, and move the bobbin presser ❷.
- If the thread comes out of the thread guide ❹, loosen the knob ❺. If the thread is wound too loose, tighten the knob ❺.
- The bobbin winder motor does not operate if the circuit protector ❻ has tripped. In such a case, leave the circuit protector until it has cooled off, then reset it. (If the protector is not left to cool off and you reset it by pressing it, the protector will immediately trip again.)

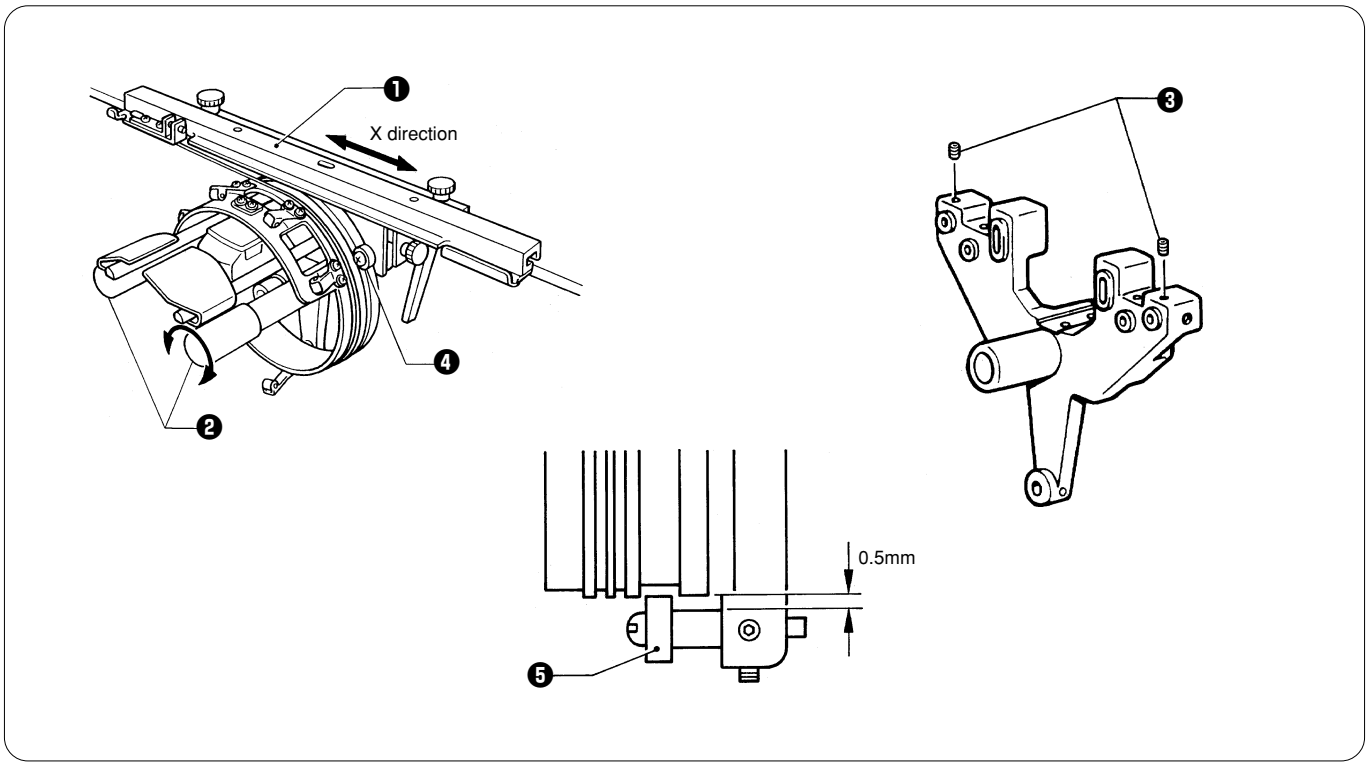
15. Adjusting the wire of the cap frame attachment

15-1. Adjusting the wire tension



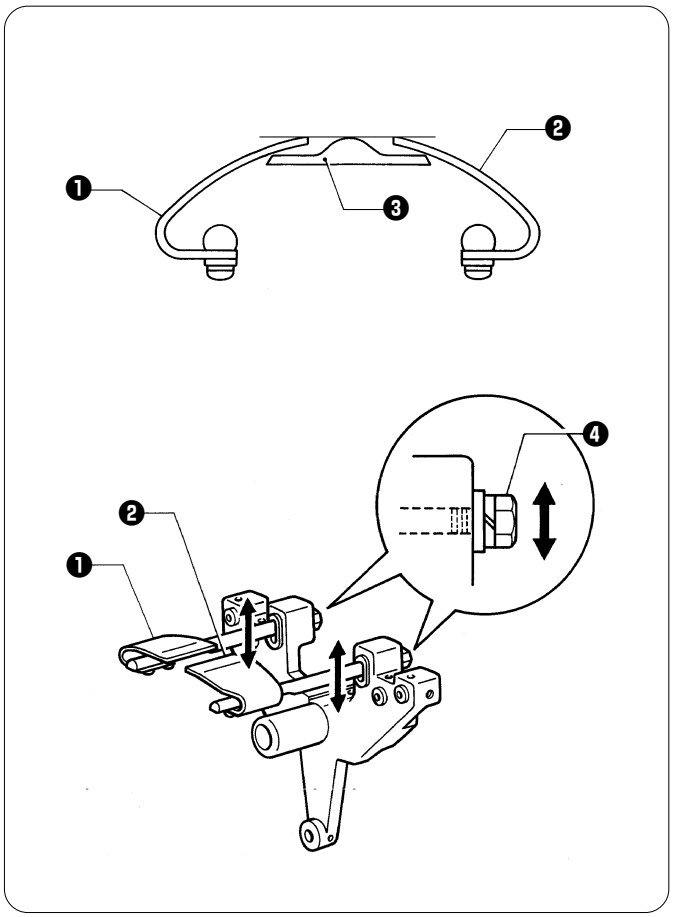
1. Loosen the screw ❸, and adjust the wire tension ❶ by tightening the screw ❷ so that the wire is equally tensioned at each end.
2. After adjustment, tighten the screw ❸.
3. Move the wire base ❹ to either side. Adjust the wire tension so that the slack will be 8 mm with a load of 14.7 - 24.7 N applied to the middle of the wire ❶, as shown in the figure.

15-2. Adjusting the feed roller



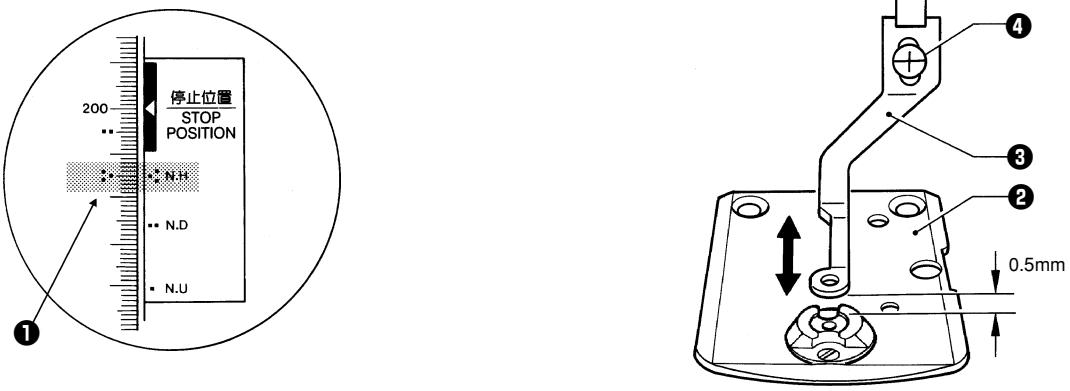
When the cap frame sash ❶ moves in the X direction, make sure that the feed roller ❷ turns.
If it does not turn, loosen the two set screws ❸ and retighten the bearings ❹ on both sides.
(Make sure that there is a 0.5 mm clearance for the bearing ❺.)

15-3. Adjusting cap support plates L and R



Loosen the nut ❹, and move cap support plates L ❶ and R ❷ up and down to align them with the top of the needle plate ❸.

15-4. Adjusting the presser foot height



1. Turn the pulley B ❶ until the "▞" mark on the pulley B ❶ is aligned with the "▞" mark on the belt cover.
2. Loosen the screw ❹, and adjust the presser foot ❸ height by moving it up and down so that there is a 0.5 mm clearance between the needle plate ❷ and the presser foot ❸.

Chapter 4 Test Mode

1. Entering into the test mode

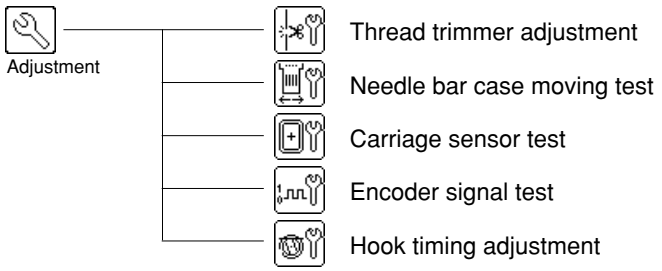
1. Press the key twice on the embroidery initial screen.
2. Select the icon with the ◁ or ▷ jog key and press the key.
3. Input "961" as the password and press the key.

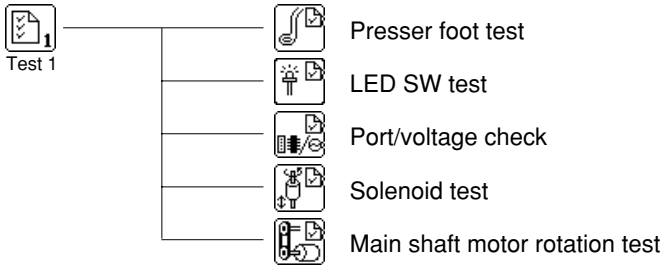
2. Selecting the test mode menu

The test mode is comprised of the following three modes.

Select each icon with the ◁ or ▷ jog key and press the key.

The menus for each mode are as follows:





Test 2

```
  **************************
  *  WELCOME TO TEST MODE  *
  **************************
  <<< MENU LIST 1 >>>

1 MENU LIST 2
2 BC TEST MENU
3 PROGRAM VER.
4 BRIDGE TYPE SET
5 OVER PULSE SET
6 Mail
7 TEST MODE END
```

↕

```
  <<< MENU LIST 2 >>>

  Please hit any key

1 MENU LIST 1
2 MEMORY DUMP
3 USING VOLTAGE
4 Death BC Hook No.
5 X,Y MECHANICAL COMPENSATION
6 ERROR WIPER INFOMATION
7 X,Y DRIVE PARAMETER

8 TEST MODE END
```

Select the menu by inputting the first figure of each menu with a numeric key in test 2 of the test mode.

Pressing the [1 _-.] key will switch between "MENU LIST1" and "MENU LIST2".
Only six lines are displayed on the screen. However, the screen scrolls and the sections not displayed are shown if you press the △ or ▽ jog key.
It is switched to the highlighted "Result screen" if you select the item which displays the result. Press the [*] key to return to the normal menu screen.

If you press the [FD] key on the "Result screen", the data on the result screen can be stored on the floppy disk. Moreover, pressing the [DEL▽] key will clear the displayed data on the result screen.

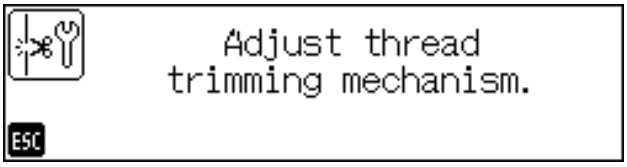
If "Insufficient memory" is displayed during the test, press the [FD] key or [DEL▽] key on the " Result screen" and clear the displayed data on the result screen.

The details of the test are described in "Detailed version of CPU in the machine" on or after page 89.

3. Function of the test mode

3-1. Thread trimmer adjustment

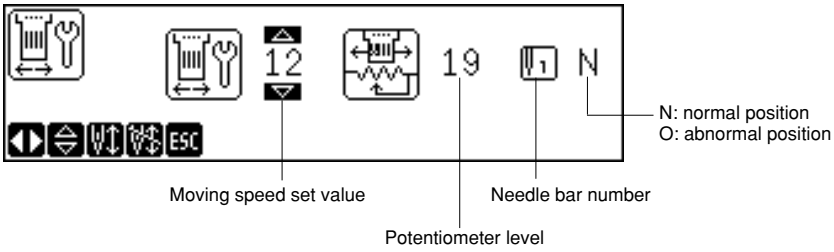
The following screen is displayed when you enter the test mode.



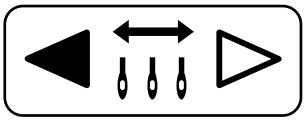
Adjust it referring to "Thread trimmer adjustment" in the manual.

Press the ESC key after adjustment is finished and return to the menu selection screen.

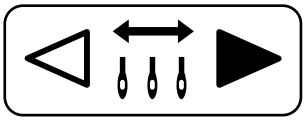
3-2. Needle bar moving test



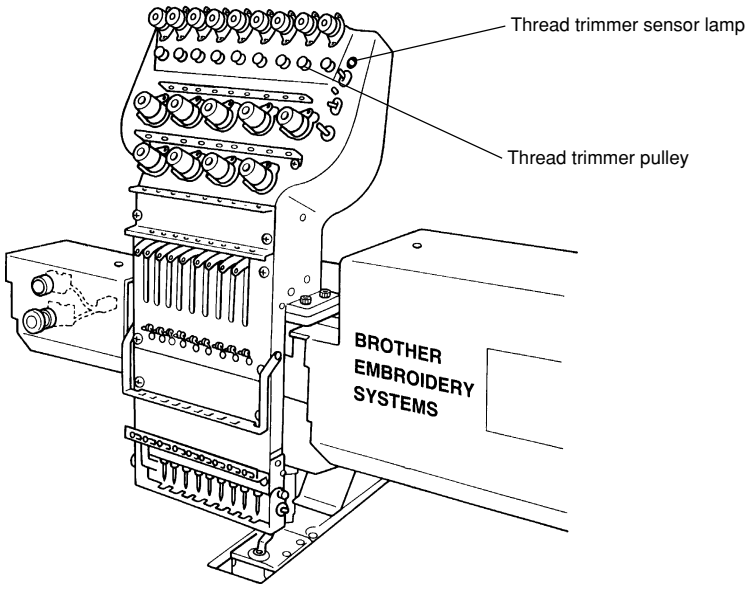
- If you press the left needle bar switch key, the number of the needle bar increases by one.



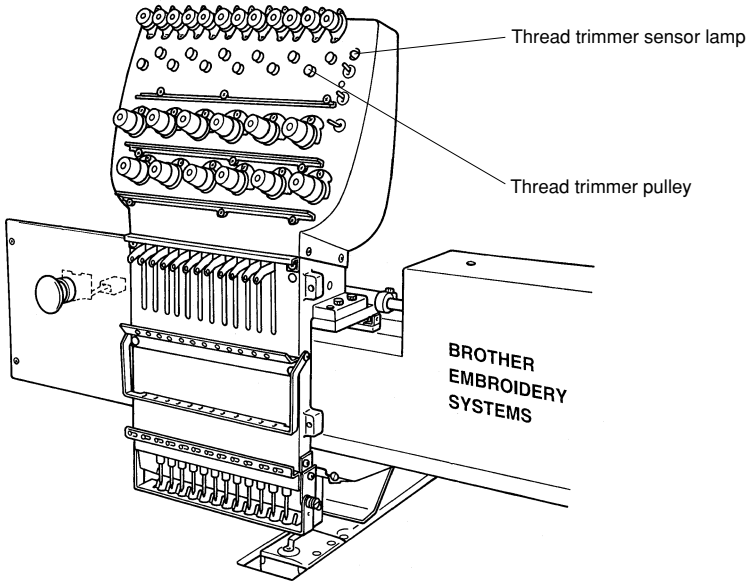
- If you press the right needle bar switch key, the number of the needle bar decreases by one.



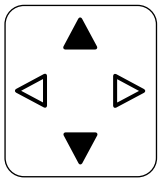
BES-961BC



BES-1261BC



- When the thread trimmer pulley of the needle bar selected is turned, the thread trimmer sensor lamp (red) will blink.
- When the △ or ▽ jog key is pressed, the needle bar's travel speed can be changed.

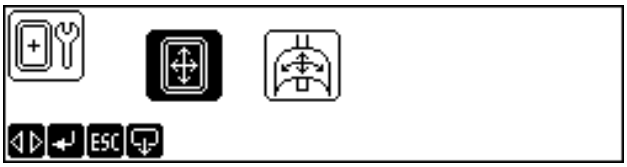


Jog key (△) ..... increases the set value by one.
Jog key (▽) ..... decreases the set value by one.

- The set values can be set between 8 (fast) and 30 (slow). The standard set value is 12.
- When the START key is pressed, the contentious needle bar switching operation is repeated between one needle and nine needles (twelve needles for BES-1261BC).
- When the STOP key is pressed, the above operation stops.
- When the thread trimming key is pressed, the thread trimming test is carried out starting from the first needle. When the tests for all needles are finished, operation returns to the state when the thread trimming key was pressed and the machine stops.

  When the STOP key is pressed during the test, the test is interrupted and the machine stops.
- When the ESC key is pressed, the display returns to the menu selection screen.

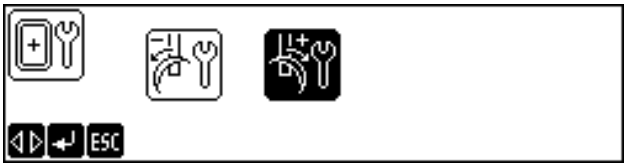
3-3. Carriage sensor test



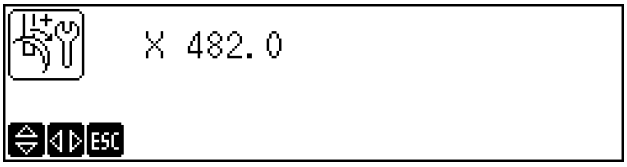
Select the flat hoop or cap hoop icons with the jog keys (◁ and ▷).

When the [↵] key is pressed, the hoop moves to the origin of the selected icon.

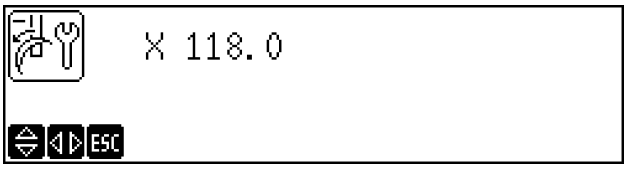
When the [⏎] key is pressed, the message, "The hoop moves" changes to the message, "Detecting the origin" and the machine starts the over-travel sensor test.



Select an icon with the jog keys (◁ and ▷) and press the [↵] key. The message, "Moving frame" changes to the message, "Detecting home position" and the coordinate value of the over-travel sensor is displayed.



The hoop can be moved with the jog keys [△ ◁ ▷ ▽]. The buzzer sounds when the screen shown at left is displayed if the installation position of the over-travel sensor and the sensor dog is properly adjusted.



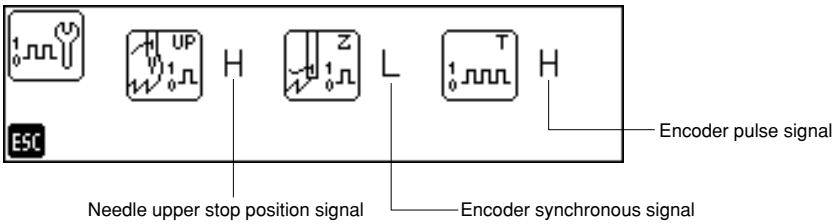
If the buzzer does not sound, adjust the over-travel sensor installation position and sensor dog so that the buzzer sounds between 481.5 to 482.5 and 117.5 to 118.5.

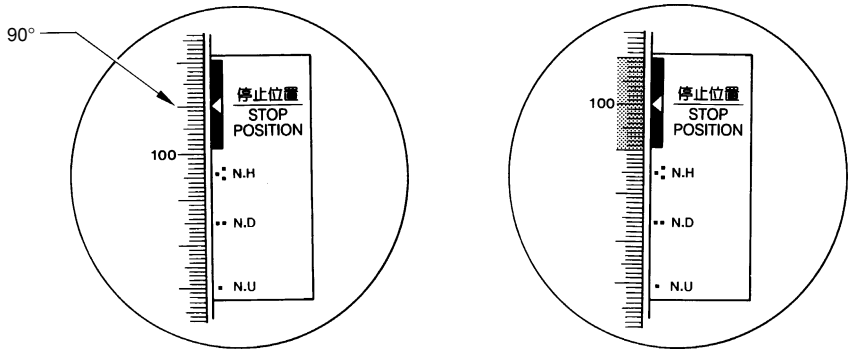
When the [ESC] key is pressed, the message, "Moving frame" changes to the message, "Detecting home position" and the machine returns to the over-travel sensor test.

When the [ESC] key is pressed again, the machine returns to the carriage sensor test.

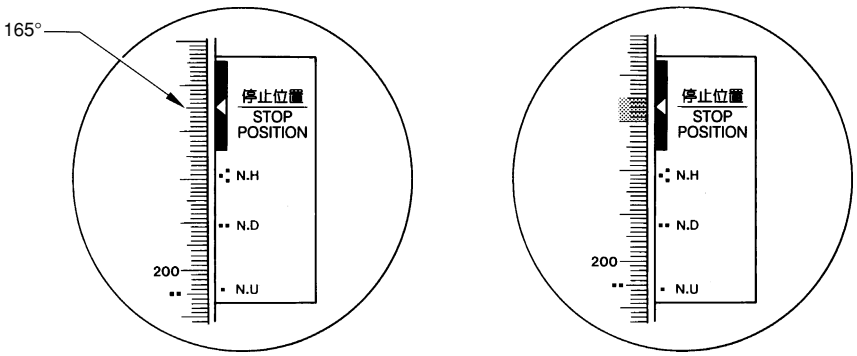
Note:
Refer to "9. Replacing Y-feed sensor PCB" on page 130 and "10. Replacing X-feed sensor PCB" on page 131.

3-4. Encoder signal test





When the pulley is turned at the needle upper stop position (at 90 to 110 degrees of the scale on the pulley), the buzzer sounds and "H" is displayed.

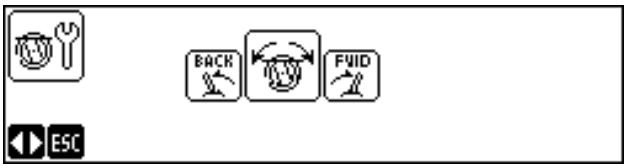


When the pulley is turned at the synchronous signal position (at 165 to 170 degrees of the scale on the pulley), "H" is displayed. The pulse signal displays "H" or "L" alternatively according to the rotation of the pulley.

When the ESC key is pressed, the display returns to the menu selection screen.

Note:
Refer to "13. Adjusting the rotary encoder and sensor PCB" on page 73.

3-5. Hook timing adjustment



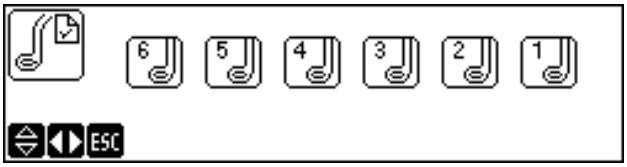
Operate the [Step forward/back] switch on the top and adjust the hook timing position.

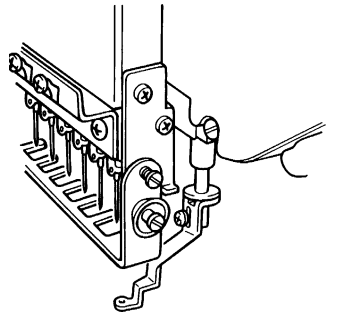
- STEP FWD switch
  For rotating the rotary hook little by little in the clockwise direction
- STEP BACK switch
  For rotating the rotary hook little by little in the counterclockwise direction

When the ESC key is pressed, the display returns to the menu selection screen.
The position at this time is stored as the timing position.

Note:
Refer to "3. Adjustment of timing between needle and rotary hook" on page 52.

3-6. Presser foot test

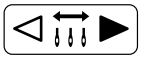


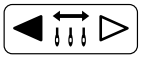


When the jog switch (△) is pressed, the presser foot of the entire head rises,  is displayed, and the buzzer sounds.

When the jog switch (▽) is pressed, the presser foot of the entire head lowers and  is displayed.

ON/OFF of brake solenoid

When  is pressed, the main shaft brake is released.

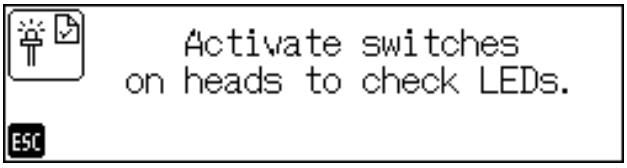
When  is pressed, the main shaft brake is applied.

When the ESC key is pressed, the presser foot rises and the display returns to the menu selection screen.

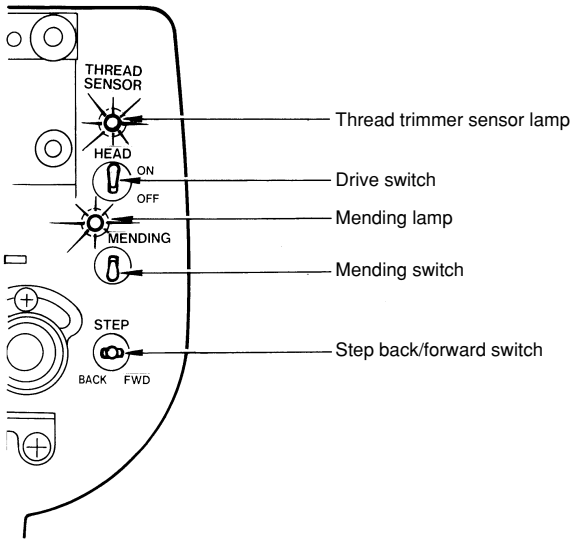
Note:
Refer to "5. Adjustment of presser foot height" on page 54.

3-7. LED SW test

Operate the drive switch, mending switch, and step forward/back switch as shown below to test the switches and LEDs.

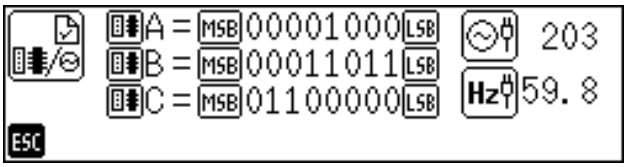


When the ESC key is pressed, the display returns to the menu selection screen.



Switches		LEDs (lamps)
Drive switch = OFF	Step forward/back switch = OFF	Thread trimmer sensor lamp = OFF
Drive switch = ON	Step back	Thread trimmer sensor lamp = ON
Drive switch = ON	Step forward	Thread trimmer sensor lamp = Blink
Drive switch = OFF	Mending switch = ON	Mending lamp = ON
Drive switch = ON	Mending switch = ON	Mending lamp = Blink
Mending switch = OFF		Mending lamp = OFF

3-8. Port/voltage check



Displays the current power supply voltage.

Displays the current power supply frequency.

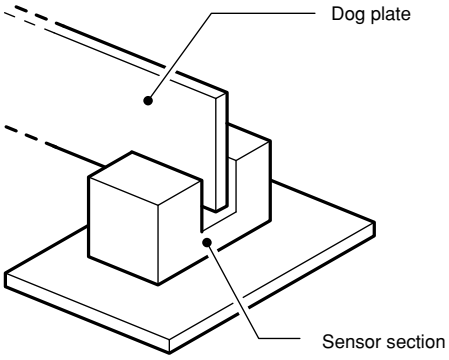
Displays the current status of ports A, B, and C.

Details of what are displayed are as follows:

	MSB BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0 LSB
Port A	0	0	0	0	0	The bed of head 6 Retreat sensor 1: Retreat state	The bed of head 4 Retreat sensor 1: Retreat state	The bed of head 2 Retreat sensor 1: Retreat state
Port B	X overcurrent 1: X overcurrent 0: Normal	Y overcurrent 1: Y overcurrent 0: Normal	X origin sensor Origin by 0→1	Y origin sensor Origin by 0→1	-X area sensor 1: within area 0: (*)	+X area sensor 1: out of area 0: within area	1	1
Port C	Cooling fan motor Stop flag 1: stop 0: rotation	Lower shaft CPU Error flag 0: lower shaft error 1: no error	Main shaft CPU Error flag 0: Main shaft error 1: no error	0	0	0	0	0

* : When bit5 for the X origin sensor is seto to “0”, it represents “out of area”. When it is set to “1”, it represents “within area”.

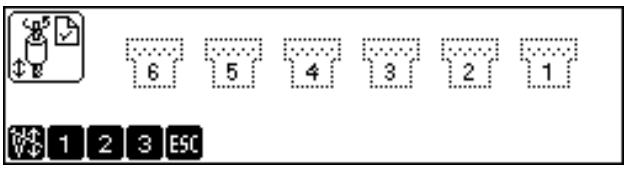
- The retreat flag of the head corresponds with the retreat head sensor PCB.
  X origin sensor, -X area sensor, and +X area sensor correspond with X feed sensor PCB.
  Y origin sensor corresponds with Y feed sensor PCB.
- As for each sensor signal, "1" indicates that the sensor is shielded and "0" indicates that the sensor receives light.



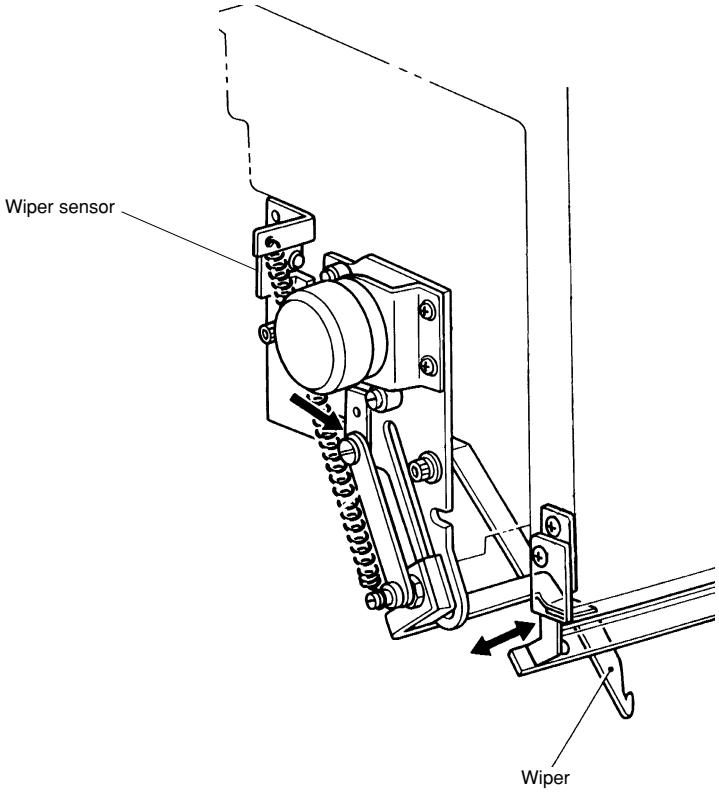
"Shielded" refers to the state when the dog plate is in the sensor section.
"Receiving light" refers to the state when the dog plate is removed from the sensor section.

Note:
Refer to "1. PCBs locations" in chapter 7 "Electrical components" for the installation position of each PCB.

3-9. Solenoid test



The presser foot lowers and the screen shown to the left is displayed.



When the 1 key is pressed, the wiper operates once. 6 is displayed while the screen is highlighted if any of wipers 1 to 6 remain projected.
The sensor receives light (the dog plate is removed) at this time.

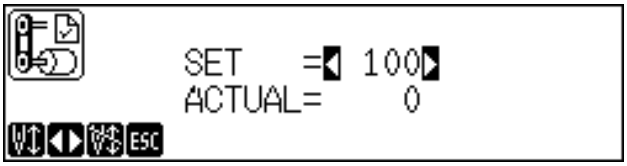
When the 2 ABC key is pressed, driving of the jump solenoid is repeated. When the STOP key is pressed, it stops.

When the 3 DEF key is pressed, driving of the jump solenoid is maintained. When the STOP key is pressed, it is cancelled.

When the ESC key is pressed, the presser foot rises and the display returns to the menu selection screen.

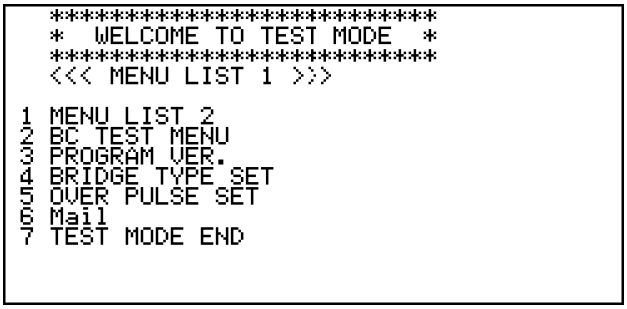
Note:
Refer to "9. Adjusting the switch" in chapter 3 "Standard adjustment" on page 60.

3-10. Main shaft motor rotation test



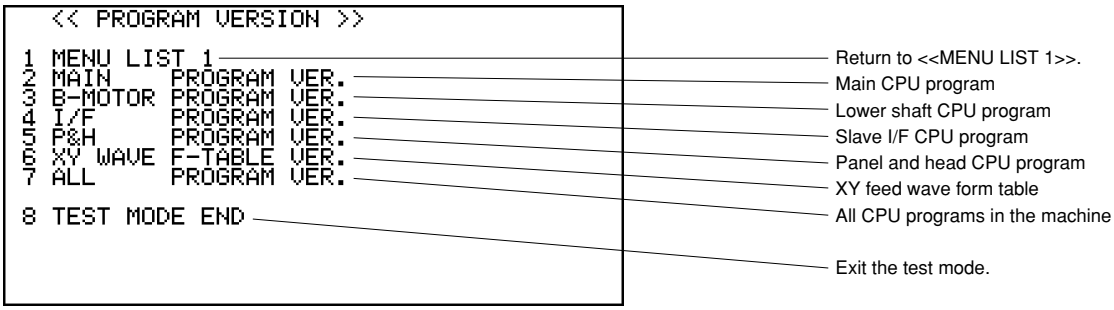
- ◁ ▶ steps up the set value of the speed.
- ◀ ▷ steps down the set value of the speed.
- When START is pressed, the main shaft starts rotating.
- When STOP is pressed, the main shaft stops rotating.
  The actual rotation number is indicated after "ACTUAL=".
- When the ESC key is pressed, the display returns to the menu selection screen.

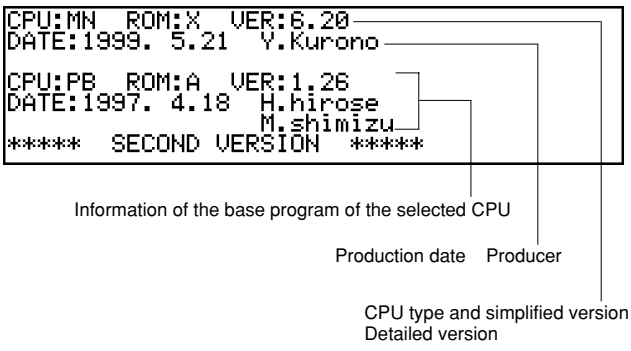
3-11. Detailed version of CPU in the machine



Select "3. PROGRAM VER." in <<MENU LIST 1>>.

Note:
Refer to "2. Selecting the test mode menu" to enter <<MENU LIST 1>>.

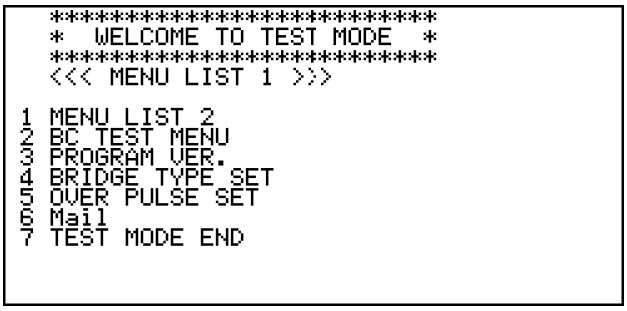




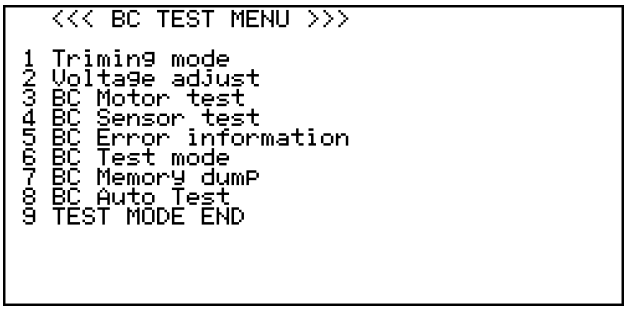
When 2 to 7 is selected in <<PROGRAM VERSION>>, the screen shown to the left (example) is displayed.

When the * key is pressed, it returns to <<PROGRAM VERSION>>.

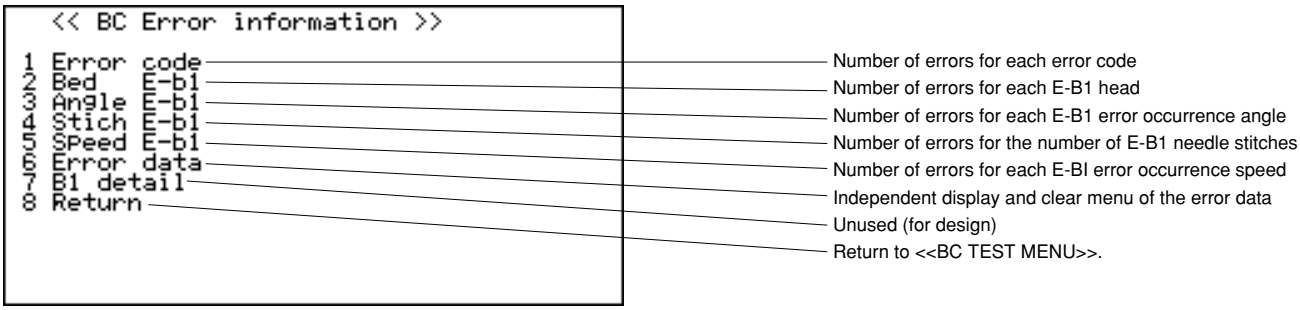
3-12. Checking and clearing BC errors

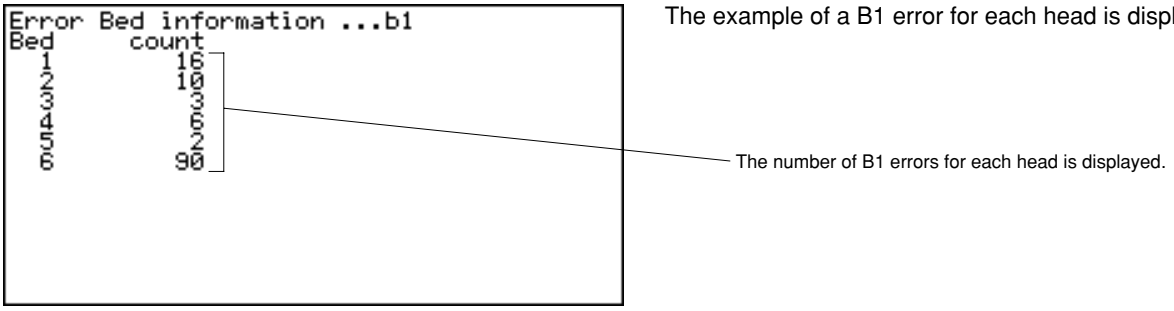


Select "2. BC TEST MENU" in <<MENU LIST 1>>.



Select "5. BC Error information".



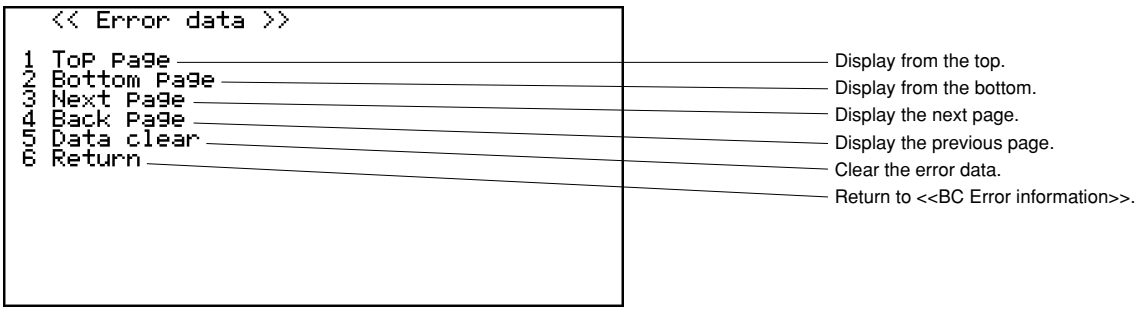


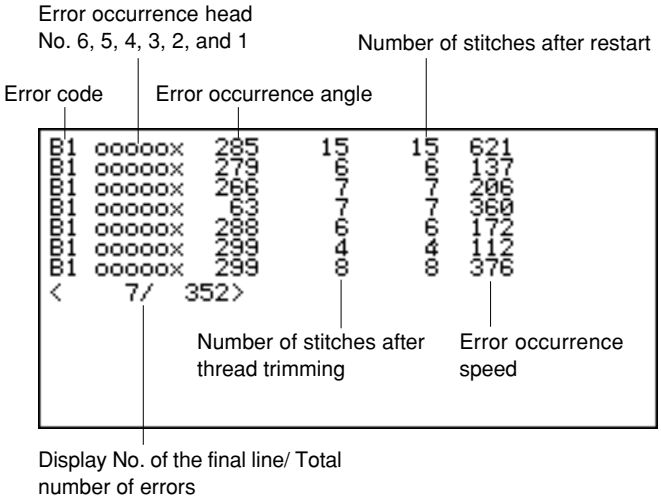
The example of a B1 error for each head is displayed.

When checking the error data independently, carry out "6. Error data" to clear the error data. Independent error data can be displayed by 1 to 4 in the <<Error data>> menu. The data is displayed in order of occurrence. The data displayed in the final section of the bottom page is the latest error data. Each error data consists of one line and seven datum are shown on one page as shown on the following result screen.

- The error code is the code when an error occurs and there are seven types of error codes such as B1, B7, B8, D0, D1, D2, and D3.
- An X indicates the head with which the head error occurred.
- The error occurrence angle indicates the angle of the main shaft where an error occurs.
- The number of stitches after thread trimming indicates the point of the needle where the error occurred since the last thread trimming.
- The number of stitches after restart indicates the point of the needle where the error occurred since embroidery is stopped by changing color, trimming thread, or turning on the stop switch.
- The error occurrence speed indicates the main shaft speed when the error occurred.

Please note that the items other than the error code are not very important because errors other than E-B1 are not related to embroidery.

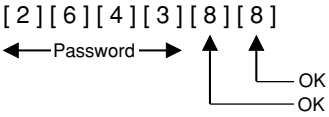




When "1. Top Page " or "2. Bottom Page" is selected in <<Error data>>, the screen shown to the left is displayed.
The command No. of <<Error data>> can also be used in this state.

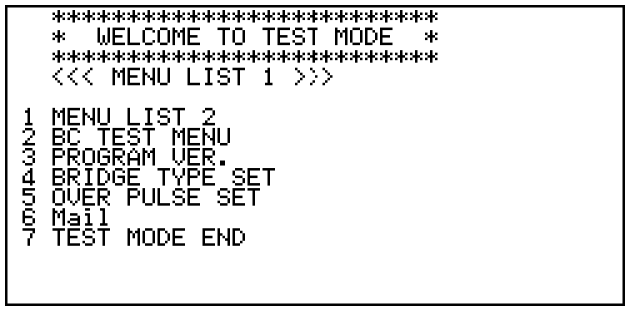
When the * key is pressed, the screen returns to << Error data>>.

Select "5. Data clear" to clear the error data.
Input the password digit by digit when the password input screen is displayed and select "8. OK" when the password is input. When the password is correct, the message, "Data clear. OK?" is displayed on the result screen. If all the data can be cleared, select "8. OK". If not, select "9. Return" to return to << BC Error information>>.
The series of operations including the password to clear the error data is as follows:

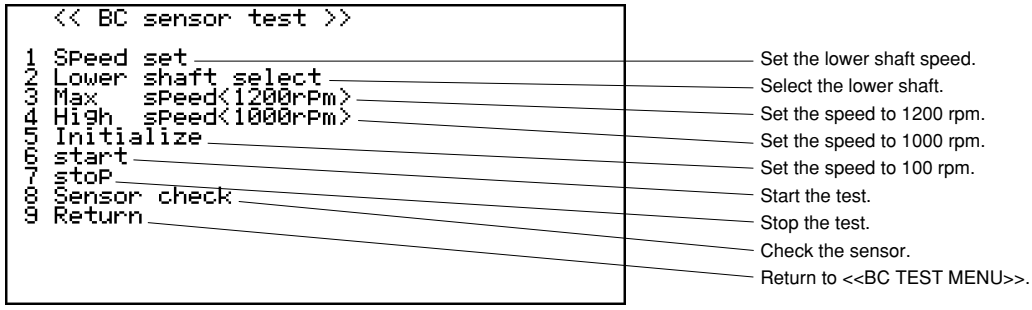


When the error data is properly cleared, the message, "Data clear complete" is displayed. Press the * key to return to the menu screen.

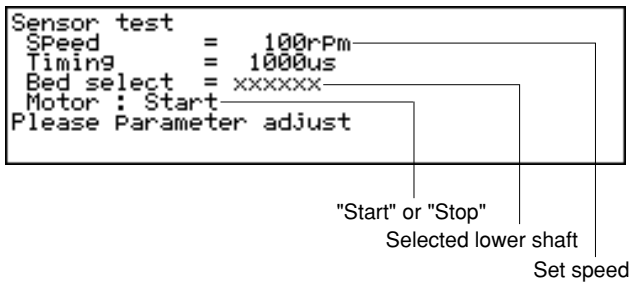
3-13. Lower shaft sensor test



When "2. BC TEST MENU" is selected in <<MENU LIST 1>>, the screen shown to the left is displayed.
When "4. BC Sensor test" is selected, the following screen is displayed.

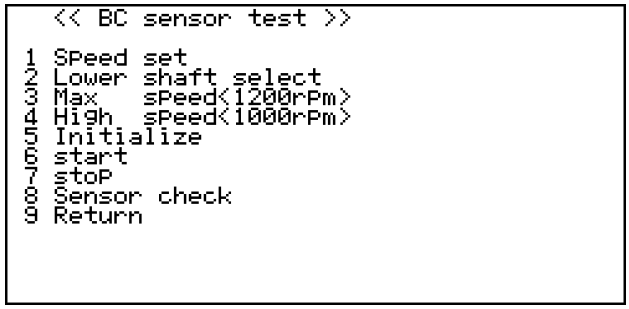


- Assign the lower shaft one by one and rotate it to check the signal of the lower shaft sensor.
- The number of rotations of the lower shaft in the test mode is indicated as that of the main shaft, not as its actual number. Therefore, the actual number of rotations of the lower shaft is twice as many as the number indicated.

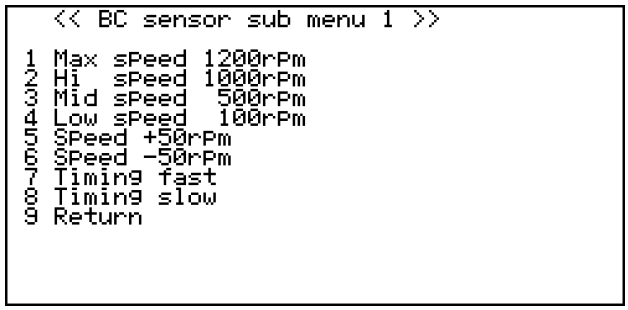


When "6. Start" is selected in <<BC Sensor test>> and the lower shaft is rotated, the screen shown to the left is displayed.

When the speed is not shown as 100 rpm yet on the above screen, press the * key to return to <<BC Sensor test>>.



When the set speed is not 100 rpm, select "1. Speed set" and set the speed to 100 rpm or select "5. Initialize".
When "5. Initialize" is selected, the set speed is indicated as 100 rpm on the above screen.
When the * key is pressed, the screen returns to << BC Sensor test>>.



- When "1. Speed set" is selected, the screen shown to the left is displayed.
- When "4. Low speed 100rpm" is selected, the set speed becomes 100 rpm.
  When the * key is pressed, the screen returns to << BC Sensor sub menu>>.
- When "9. Return" is selected, the screen returns to << BC Sensor test>>.

```
   << BC sensor sub menu 2 >>

 1 Lower shaft 1 on/off
 2 Lower shaft 2 on/off
 3 Lower shaft 3 on/off
 4 Lower shaft 4 on/off
 5 Lower shaft 5 on/off
 6 Lower shaft 6 on/off
 7 All on
 8 All off
 9 Return
```

Select "2. Lower Shaft Select" in <<BC Sensor test>>. When 1 to 8 is selected on the screen shown to the left, the following screen is displayed.

```
Motor test
 UPPer sPeed =   200rPm
 Lower sPeed =   100rPm
 Timing      =  1000us
 Interval T  =     1ms
 Bed select  = xxxxoo
 Motor : Start
```

Speed of the lower shaft motor

Operating lower shaft motor

- The lower shaft motor can also be selected with the 1 key to 8 TUV key on this screen.
- Rotation of lower shafts of heads No. 1 to 6 can be turned on or off by selecting 1 to 6 in <<BC sensor sub menu 2>>. Moreover, rotation of all the lower shafts can be turned on or off by selecting 7 or 8.
  However, the speed cannot be suddenly increased to 200 rpm or more if the machine is turned off. Select "5. Initialize" or "1. Speed set" in the <<BC Sensor test>> menu and lower the speed to around 100 rpm.
- The sensor check is carried out only for one lower shaft. The lower shaft with the smaller head number is checked when the multiple lower shafts are rotating.
- Return to <<BC Sensor test>> by "9. Return" after selecting the lower shaft.
- Carry out "3. MAX speed<1200 rpm.> in <<BC Sensor test>>. The lower shaft rotates at 2400 rpm.

```
Sensor test
 SPeed       =  1200rPm
 Timing      =  1000us
 Bed select  = xxxxoo
 Motor : Start
Please Parameter adjust
```

Speed

When the * key is pressed, the screen returns to <<BC Sensor test>>.

```
   << BC sensor test >>

 1 SPeed set
 2 Lower shaft select
 3 Max   sPeed<1200rPm>
 4 High  sPeed<1000rPm>
 5 Initialize
 6 start
 7 stoP
 8 Sensor check
 9 Return
```

Select "8. Sensor Check" in <<BC Sensor test>>. The sensor of the lower shaft with the smallest head number is checked among all the lower shafts rotating and the result is displayed.

```
Bed   1   SPeed  1200rPm
Sensor A  OK
  Data n = 127  Error n =   0  Z duty =  60
  Duty avg =  40  Duty max =  43  Duty min =  38
Sensor B  OK
  Data n = 127  Error n =   0  Z duty =  62
  Duty avg =  40  Duty max =  43  Duty min =  38
```

Note:

Scroll the screen with the ◁ △ ▽ ▷ keys to show sections not displayed.

- There are two sensors (A and B) in the lower shaft module and the check results of each signal are displayed. If the check results of sensor A and sensor B are both acceptable, the lower shaft sensor of the head tested is normal. If the check result is not acceptable, refer to "15. Replacing and adjusting the lower shaft module" in chapter 2 and adjust the sensor.
- When all the sensor tests are finished, be sure to carry out "7. Stop" to stop the lower shaft and return to <<BC TEST MENU>> by "9. Return" to exit the test mode. Please note that the lower shaft is not supposed to stop in the test mode even if it is stopped in "2. Lower shaft select".

3-14. Lower shaft module test

```
   <<< BC TEST MENU >>>

1 Timing mode
2 Voltage adjust
3 BC Motor test
4 BC Sensor test
5 BC Error information
6 BC Test mode
7 BC Memory dumP
8 BC Auto Test
9 TEST MODE END
```

Select "8. BC Auto Test" in <<BC TEST MENU>>. The following screen is displayed.

```
   << BC Auto Test >>

1 Idling run
2 StoP
3 Auto self test run
4 DisPlay result
5 Test run under oPeration
6 Return
```

- Start running-in.
- Stop running-in and automatic test.
- Start the automatic out-of-step limit test.
- Display the test result.
- For shipping inspection
- Return to <<BC TEST MENU>>.

- Carry out "1. Idling run" to conduct running-in. All the hooks start running-in with a stable accelerating and decelerating pattern and parameters and the like of the accelerating and decelerating pattern are displayed. It is recommended to spend four hours conducting running-in. Carry out "2. Stop" to finish running-in.
- Carry out "3. Auto self test run" to test the automatic out-of-step limit of the lower shaft module. The message, "Auto Motor test NOW!" is displayed and the out-of-step limit is automatically tested in four accelerating and decelerating patterns starting from the No.1 lower shaft module. When the test of the No. 6 lower shaft module is finished, all the hooks furnish origins and stop.
- Carry out "4. Display result" if all the lower shaft modules stop or rotation of the hook to be tested stops. The test result is displayed.
  An example of the test result is as follows:

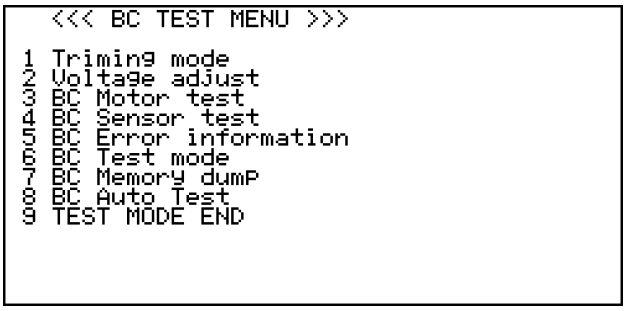
Auto test result

Lower shaft module No. — Test values of four patterns — Judgement of the automatic test results

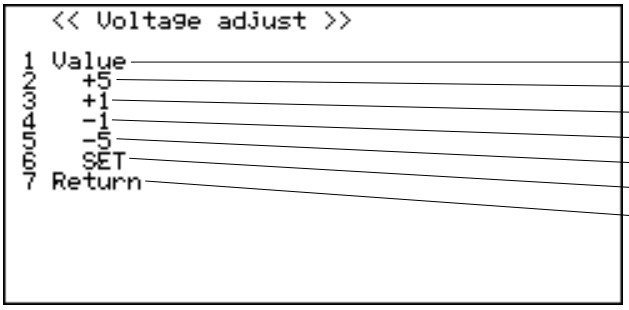
No.	TP1	TP2	TP3	TP4	JUDGE	
1	340	450	470	470	OK	← The result of the automatic test is acceptable.
2	360	490	480	490	OK	
3	330	460	450	440	OK	
4	340	470	440	850	NG	← The result is not acceptable because it is beyond the out-of-step limit.
5	Error					← The module does not rotate properly (because it is not connected).
6	340	0	0	0	—	← The automatic test is still being carried out.

- Select "2. Stop" to interrupt the automatic test.
- The test result can be confirmed up to the midpoint where the test is finished if the automatic test is interrupted.
- When the test is finished, select "2. Stop" to stop rotation if there are any rotating lower shafts and select "6. Return" to return to <<BC TEST MENU>>.

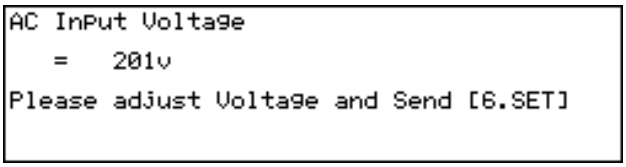
3-15. Power supply voltage adjustment



Select "2. Voltage adjust" in <<BC TEST MENU>>.



Display the voltage input value.
Increase the voltage indicated value by five.
Increase the voltage indicated value by one.
Decrease the voltage indicated value by one.
Decrease the voltage indicated value by five.
Adjust the value to the currently indicated value.
Return to <<BC TEST MENU>>.



When "1. Value" is selected in <<Voltage adjust>>, the current voltage input value is indicated as shown on the screen to the left.

- Carefully measure the power supply voltage of the machine using a tester. Major measuring points are breaker terminals in the machine, between pins 1 and 2 of connector 18 of the connector terminal at the rear of the control box, and the power source outlet.
- Use items 2 to 5 and perform "6. SET" to adjust the value indicated on the screen to the measured value.
  For example, assume the measured value is 220 V and the value indicated on the screen is 214 V. To display the measured value, 220 V, on the screen, perform "2. +5" once and "3. +1" once (214 + 5 + 1 = 220), then perform "6. SET" to adjust the voltage.
- Perform "1. Value" again to reconfirm the voltage. Although the power supply voltage slightly fluctuates while it is being adjusted, it is acceptable if it is within ±2 V. After the voltage has been adjusted, perform "7. Return" to return to <<BC TEST MENU>>, and exit from the test mode.

Note:
The machine checks the power supply voltage to control it optimally even if it varies or to cope with abnormal voltage levels. This function is adjusted before shipment from the factory. However, if the main PCB, the power PCB, or the control box is replaced, the adjustment becomes ineffective. Be sure to adjust the power supply voltage when replacing the main PCB, the power PCB, or the control box.

Chapter 5 Upgrading version of machine program

This chapter explains how to upgrade the version of programs using the upgrade file which is supplied on the floppy disk, or sent by e-mail.

1. Downloading the file

1. Create a temporary directory (i.e., C:\TEMP) to save a self-extracting file on the hard disk.
2. Click the language of the file to download and start downloading the file.
3. Designate the directory created in step 1 above to save the downloaded file.
4. Double-click the downloaded file to extract it.
   The downloaded file can also be extracted by clicking the [Start] button and selecting [Run the file]. Input the directory created in step 1 above and the name of the downloaded file and click the [OK] button. (For example, "C:\TEMP\961V***" for nine needles and "C:\TEMP\1261V***" for twelve needles.)

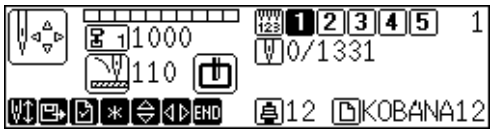
2. Creating the installation disk

When the file is extracted according to "1. Downloading the file" above, the following three files are created.
A: BESx61-***setup.bup (BESx61-***setup.bup for twelve needles)
B: BESx96x***M.bup (BESx126x-***M.bup for twelve needles)
C: BESxx1-***P.bup (BESxx1-***P.bup for twelve needles)
(*** varies according to the version of the software downloaded.)

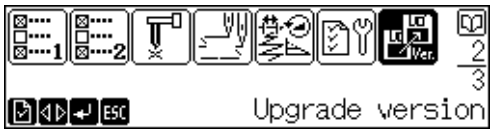
1. Prepare three empty 1.4MB floppy disks.
2. Copy file A described above to the first floppy disk. Write "BESx61-***SETUP.BUP" on the label.
3. Copy file B described above to the second floppy disk. Write "BES96x-***M.BUP" on the label ("BES126x-***M.BUP" for 12 needles).
   (*** varies according to the version of the software downloaded.)
4. Copy file C described above to the third floppy disk. Write "BESxx1-***P.BUP" on the label.
   (*** varies according to the version of the software downloaded.)

3. Using the installation disk (upgrading the program)

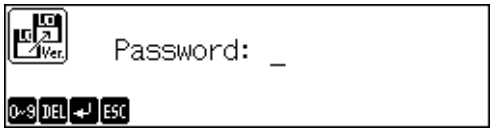
1. Press the key twice during standby.



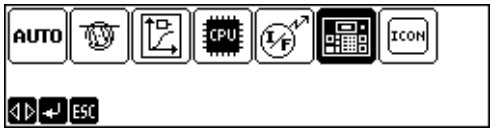
2. Press the jog keys (◁ ▷), select (on the right end), and press the key.
(Do not insert the installation disk yet.)



3. Input "961" as the password and press the key.
(Delete the incorrect password with the DEL key and input the correct one.)



4. Select and press the key.



5. Press the key to continue the upgrading procedure.

6. Insert the floppy disk with the label "BESx61-***SETUP.BUP" when the following screen is displayed and press the key.

Go to step 8 if the following screen is displayed.

7. Installation from "BESx61-***SETUP.BUP" starts.

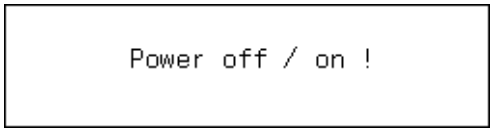
8. The following screen is displayed when installation is completed. Insert the floppy disk with "BES96x-***M.BUP" ("BES126x-***M.BUP" for twelve needles) written on its label and press the key.

9. Installation from "BES96x-***M.BUP" ("BES126x-***M.BUP" for twelve needles) starts.

10. The following screen is displayed when installation is completed. Insert the floppy disk with "BESxx1-***P.BUP" written on its label and press the ↵ key.

11. Installation from "BESxx1-***P.BUP" starts.

12. The following screen is displayed when installation is completed. Remove the floppy disk and turn off the power of the sewing machine. This completes the upgrading procedure.

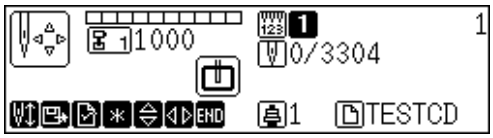


4. Checking and changing the bridge type and hook type

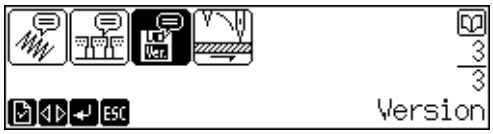
Be sure to check the following setting items and reset any incorrect settings after upgrading the program.

4-1. Checking the setting

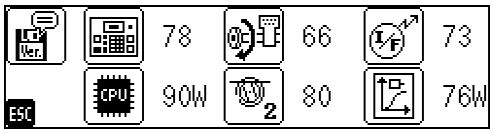
1. Press the [key] key three times on the initial screen.



2. Select [Ver] with the ◁ ▷ key.



3. When the [↵] key is pressed, the following version screen is displayed.



Each setting is displayed as follows.
The version numbers vary, depending on the versions of the installed software and the CPU.

4. Checking the bridge setting
   1) Normal bridge setting (bridge width = 100 mm)

   [CPU] 90 S [bridge] 76 S

   The underlined sections are both indicated as "S".

   2) Wide bridge setting (bridge width = 150 mm)

   [CPU] 90 W [bridge] 76 W

   The underlined sections are both indicated as "W".

   When the bridge type is not suitable for the machine, change it according to "Changing the bridge type" described later and rewrite the [bridge] table data.

5. Checking the hook type setting
   1) Hook type 1 setting

   [hook] 80

   The value of the icon becomes "1".

   2) Hook type 2 setting

   [hook] 80

   The value of the icon becomes "2".

   Return to the previous screen by pressing the [ESC] key when checking is completed.

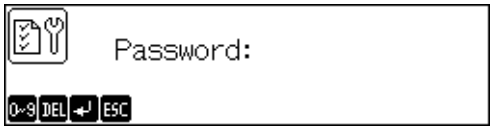
   When the hook type is not suitable for the machine, change the setting according to "Changing the hook type" described later.

Change the settings of the machine if they are improper.

4-2. Changing the bridge type

1. Enter the test mode.

2. Press the key twice on the initial screen. Select with the ◁ ▷ key and press the key. The following screen is displayed.



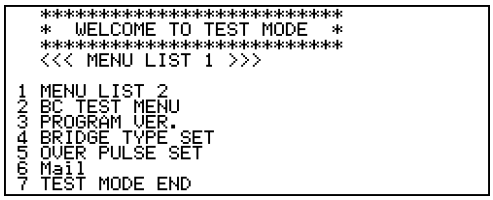
   Input "961" as the password here. Three asterisks will be displayed.

   Press the key to enter the test mode.

3. Selecting the test mode menu
   The following screen is displayed in the test mode.

   Select with the ◁ ▷ key. Press key to enter <<MENU LIST 1>>.

4. Selecting BRIDGE TYPE SET
   The following screen is displayed in <<MENU LIST1>>.



   Select "BRIDGE TYPE SET" with the numeric key '4'.

5. Selecting the bridge
   The following screen is displayed in <<<BRIDGE TYPE SET>>>.

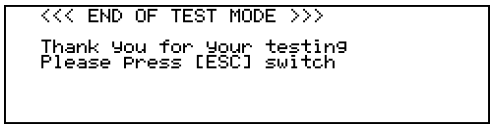
   Check the currently set bridge type with the numeric key '1'.
   Switch the bridge type with the numeric key '2' or '3'.

Normal bridge setting

Wide bridge setting

   Press to return to <<<BRIDGE TYPE SET>>>.

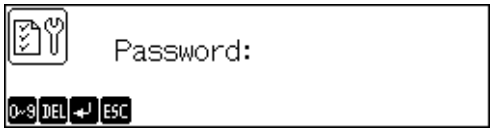
6. Returning to the initial screen
   Select "5. TEST MODE END" with the numeric key '5'.



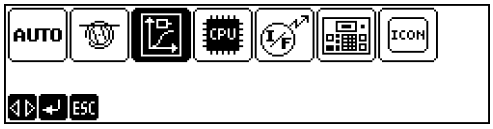
   Press ESC twice to return to the initial screen.

7. Rewrite the table data.
   Press key twice on the initial screen. Select "Upgrading" with ◁ ▷ key.

   Press key.



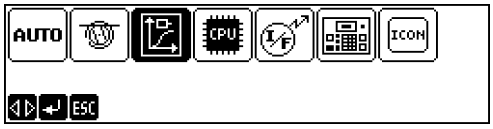
   Input "961" as the password. Three asterisks are displayed.
   Press key to enter the upgrading menu.



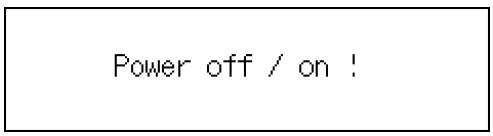
   Select with ◁ ▷ key. Insert the floppy disk for upgrading (disk 1) and press key.

8. When the message "OK to upgrade?" is displayed, press key.
   Installation of the table data starts.

9. Installation is completed when the following screen is displayed.



   Press ESC key to display the following screen.

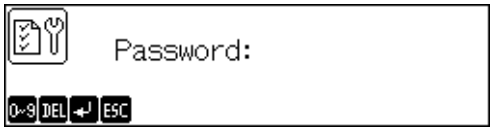


   Turn on the power of the sewing machine again.

10. Check the version information again. (Refer to "Checking the setting" on page 99.)

4-3. Changing the hook type

1. Enter the test mode.
2. Press the key twice on the initial screen. Select with the ◁ ▷ key and press the key. The following screen is displayed.



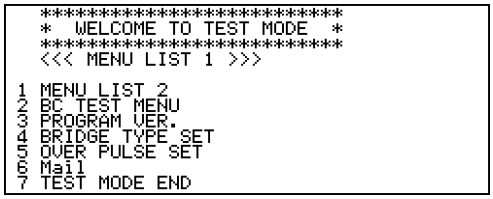
Input "961" as the password here. Three asterisks are displayed.

Press the key to enter the test mode.

3. Selecting the test mode menu
The following screen is displayed in the test mode.

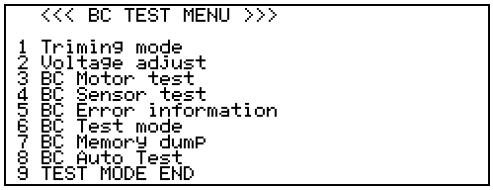
Select with the ◁ ▷ key. Press key to enter <<MENU LIST 1>>.

4. Selecting BC TEST MODE
The following screen is displayed in <<MENU LIST1>>.



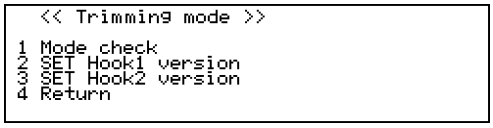
Select "BC TEST MENU" with the numeric key '2'.

5. Selecting Trimming mode
The following screen is displayed in <<<BC TEST MENU>>>.



Select "Trimming mode" with the numeric key '1'.

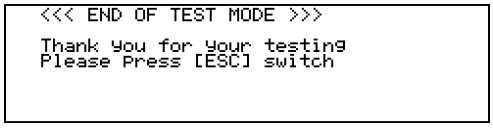
6. Changing the thread trimming setting
The following screen is displayed in <<Trimming mode>>.



7. Select "SET Hook2 version" with the numeric key '3'.
Setting is completed when the following screen is displayed.

Press DEL key to return to the screen shown in 5.

8. Returning to the initial screen
   Select "4 Return" with the numeric key '4' to return to the screen shown in 4.
   Select "9. TEST MODE END" with the numeric key '9'.



   Press ESC key twice to return to the initial screen.

9. Refer to "Checking the setting" on page 99 and check the version again.

Chapter 6 Maintenance

⚠CAUTION

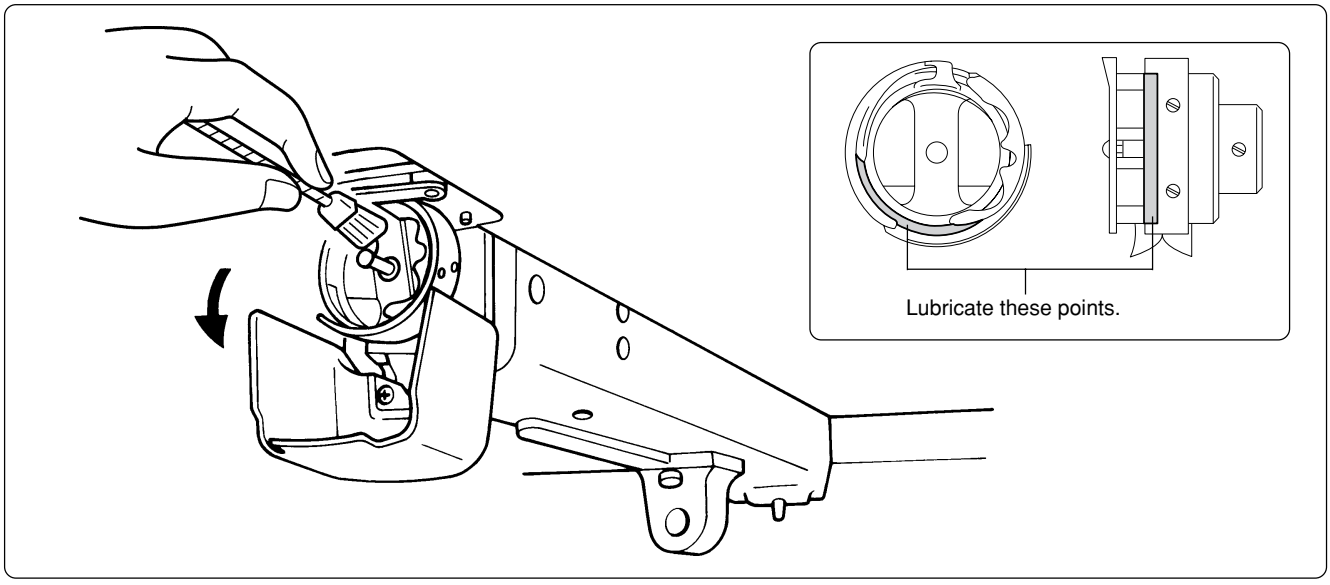
Turn off the power switch before starting maintenance.
Failure to do so may start the machine unintentionally through an accidental activation of the START switch, resulting in bodily injuries.

Be sure to wear protective goggles and gloves when handling the lubricating oil or grease, so that no oil or grease gets into your eyes or onto your skin, otherwise inflammation can result.
Furthermore, do not drink the oil or grease under any circumstances, as they can cause vomiting and diarrhoea.
Keep the oil out of the reach of children.

- Keep the machine clean at all times to prevent machine trouble.
- Keep the machine clean.
  Remove dirt with a soft, dry cloth. If necessary, clean with the detergent-soaked cloth, then wipe off the detergent with a cloth dampened with (hot) water.
- Caution
  Never use benzene or thinner for cleaning the machine.

1. Cleaning Rotary Hook

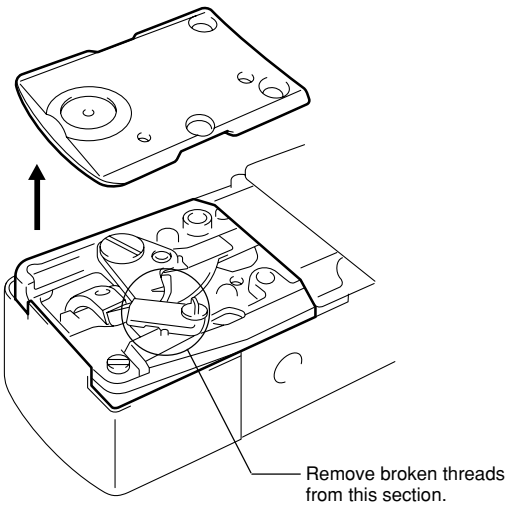
1-1. Cleaning and Lubrication of Rotary Hook



- Clean rotary hooks daily using the brush provided at the time of lubrication. If a rotary hook is too dirty, cleaning with a compressor (compressed air) is recommended.
- If thread breakage or rotary hook noise occurs during embroidering, lubricate the race of the rotary hook.

Notes:
- Use the dropper provided to supply oil. Use BROTHER's embroidery machine oil (equivalent to Nisseki Sewing Lub No. 10).
- Supply a proper amount of oil. Any excess may stain fabrics, etc.

1-2. Cleaning of Needle Plate



Broken threads left around the movable or fixed knives or the lower thread holding plate may result in thread trimming failure or parts damage. Clean them once a month.

2. Oiling

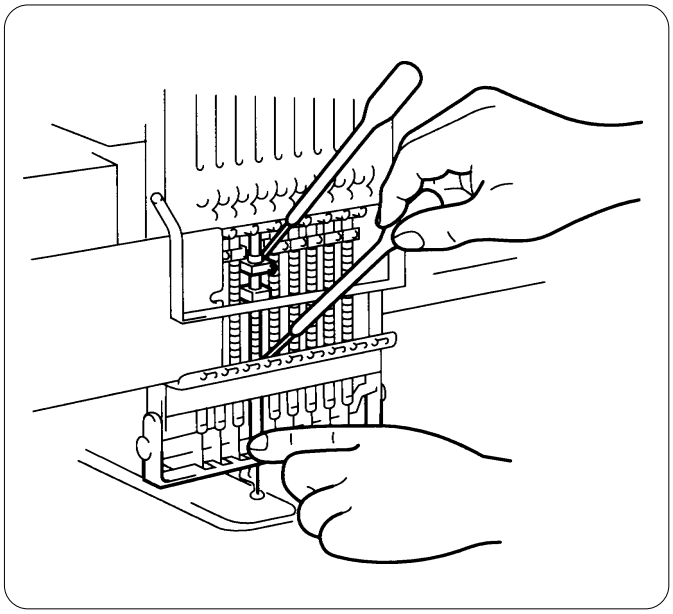
To extend the machine's service life, supply oil to the following places at regular intervals.

Notes:

- When oiling, be sure to supply Brother's machine oil (Nisseki Sewing Lube #10 or the equivalent) using the dropper.
- Excessive oiling may cause the material to be stained.

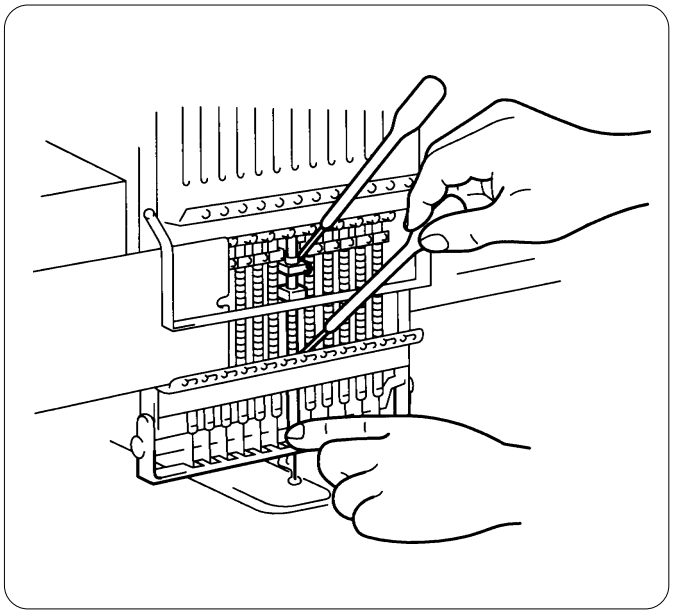
2-1. Head

BES-961BC



Supply oil to the needle bars (18 positions) once a day as shown on the left.

BES-1261BC



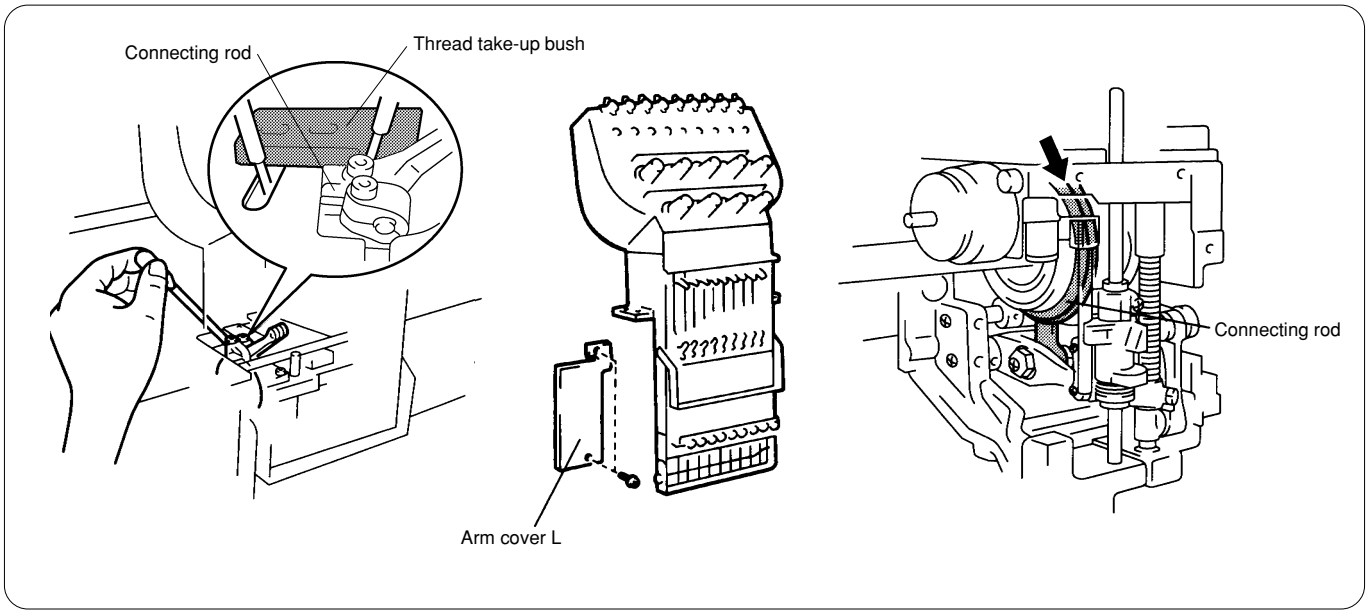
Supply oil to the needle bars (24 positions) once a day as shown on the left.

BES-961BC

Lubricate the following part indicated by the arrow ("clearance" between the connecting rod and the needle thread take-up bearing) once a week.

Note:

- In lubrication, select needle bar No.9 and remove arm cover L to check the lubrication area. Be sure to wipe off excessive oil spilt at the lower part of the arm.

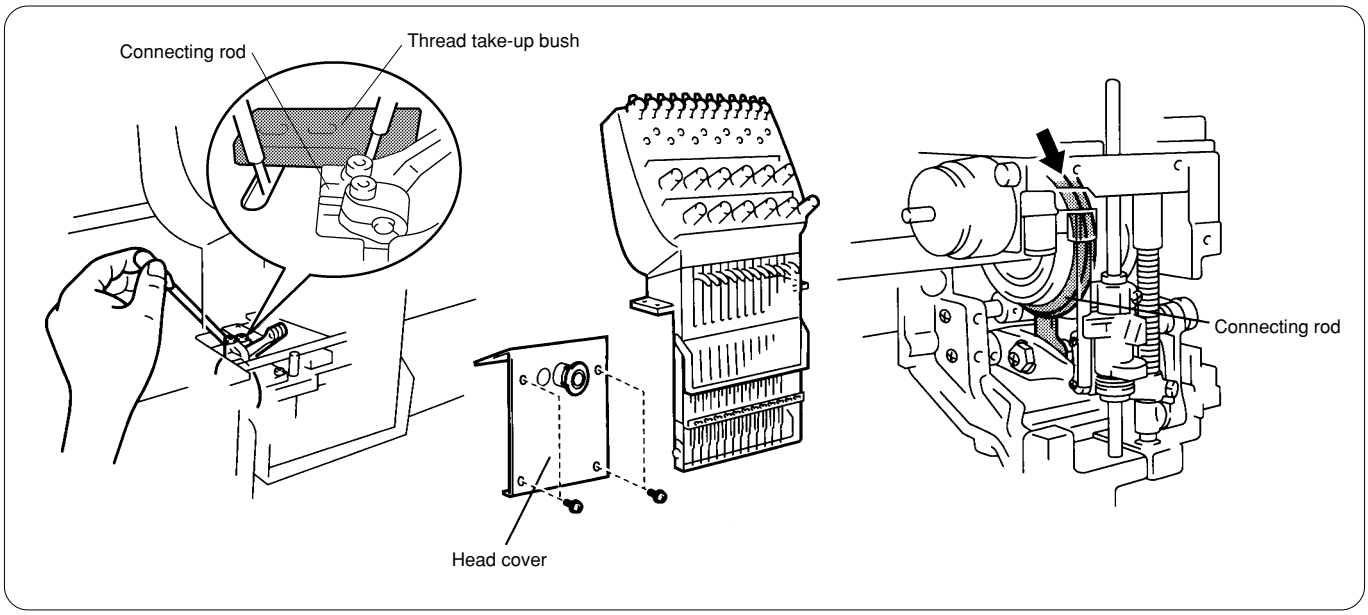


BES-1261BC

Lubricate the following part indicated by the arrow ("clearance" between the connecting rod and the needle thread take-up bearing) once a week.

Note:

- In lubrication, select needle bar No.12 and remove the head cover to check the lubrication area. Be sure to wipe off excessive oil spilt at the lower part of the arm.



3. Greasing

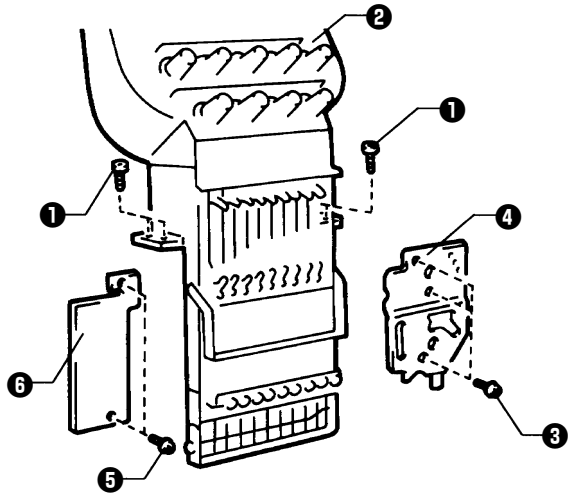
To extend the machine's service life, supply grease to the following places at regular intervals.

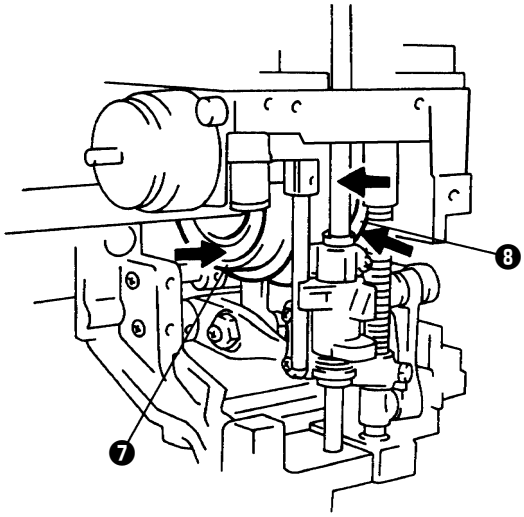
Notes:

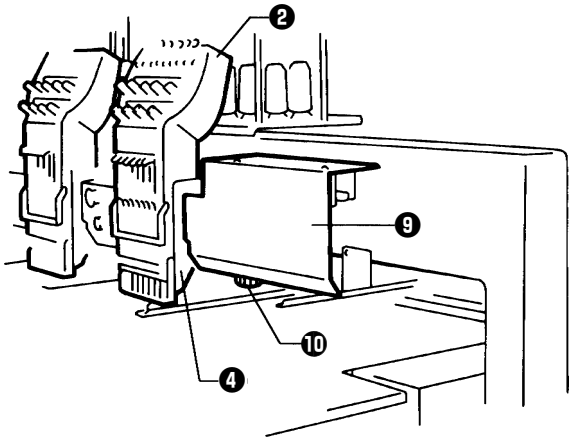
- When greasing, be sure to use the grease tank BR2 (black) provided with the machine.
- For overhauling, contact your distributor or refer it to trained experts.

3-1. Head

Grease two places indicated by the arrow once a month.







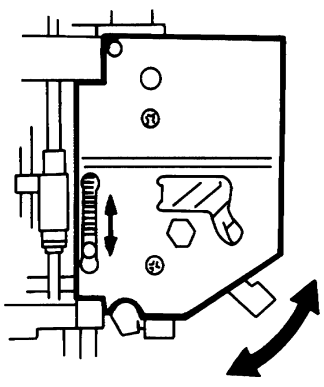
BES-961BC

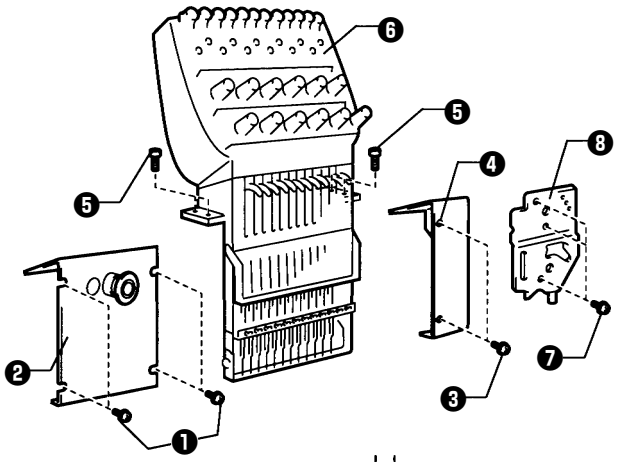
1. Remove two connectors from the rear of the needle bar case.
2. Loosen four bolts ❶, and remove the needle case ❷.
3. Loosen three screws ❸, and remove the presser foot guide plate ❹.
4. Loosen two bolts ❺, and remove the arm cover L ❻.
5. Grease all the grooves of the thread take-up cam ❼ and the work clamp cam ❽.

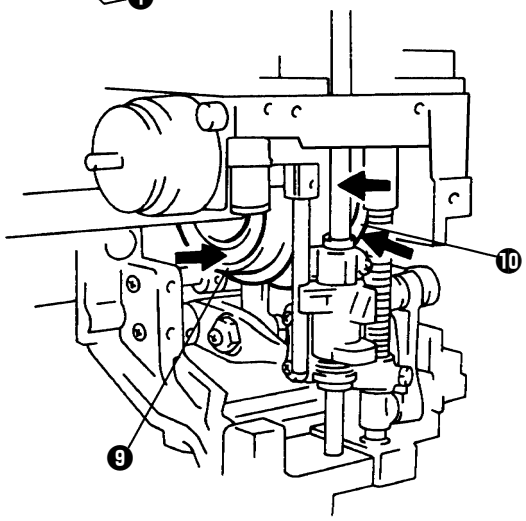
* After greasing, assemble in the reverse order.

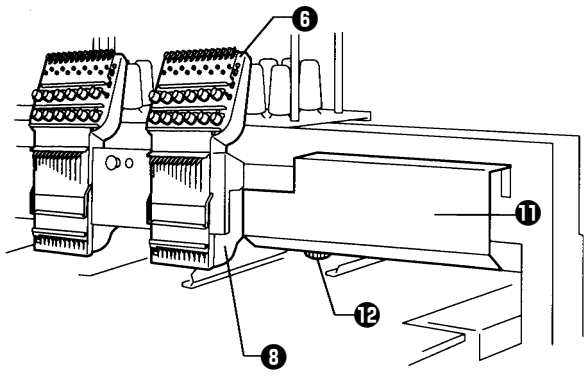
Notes:

- When assembling the needle bar case ❷, place it on the machine and turn the change pulley ❿ behind the cover ❾ at right. Check that it is engaged, and then tighten the bolts.
- When attaching the presser foot guide plate ❹, move the presser foot up and down by the retracting lever to check that is it not distorted.









BES-1261BC

1. Remove two connectors from the rear of the needle bar case.

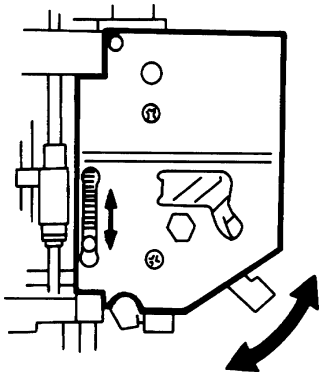
2. Loosen four screws ❶, and remove the head cover ❷, and loosen two screws ❸ and remove the head cover R❹.
   Note:
   Because the heads No.1 and No.2 have the head covers R and L respectively, remove both the the covers when greasing.

3. Loosen four bolts ❺, and remove needle bar case ❻.

4. Loosen three bolts ❼, and remove presser foot guide plate ❽.

5. Grease all the grooves of the thread take-up cam ❾ and the work clamp cam ❿.

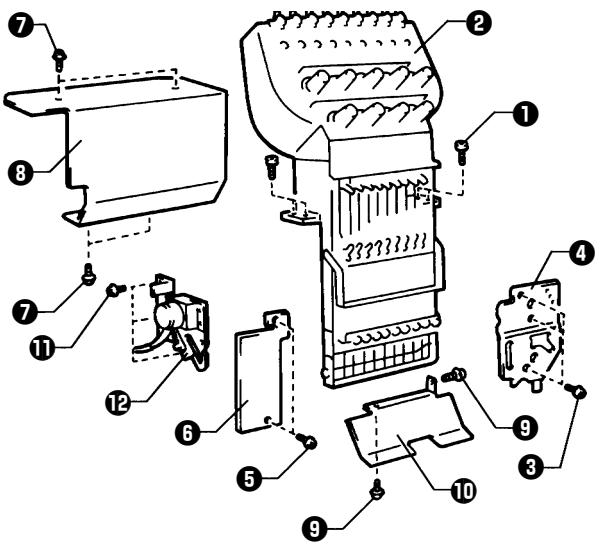
* After greasing, assemble in the reverse order.
Notes:
- When assembling the needle bar case ❻, place it on the machine and turn the change pulley ⓬ behind the cover ⓫ at right. Check that it is engaged, and then tighten the bolts.
- When attaching the presser foot guide plate ❽, move the presser foot up and down by the retracting lever to check that is it not distorted.

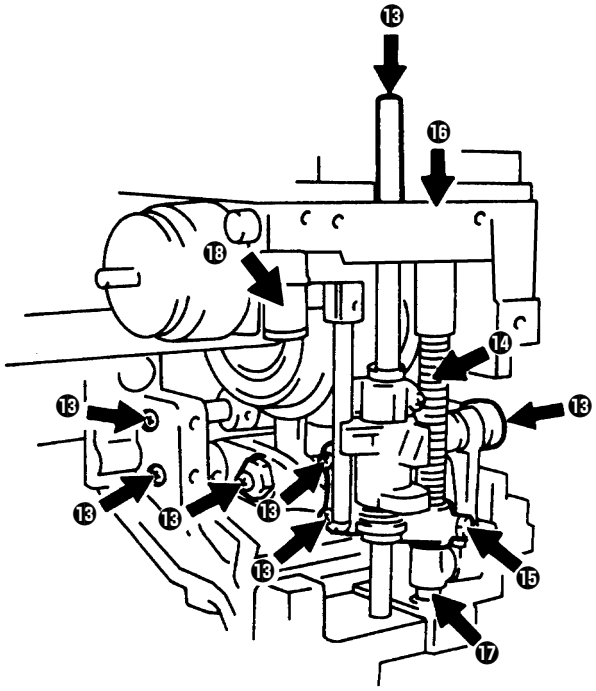


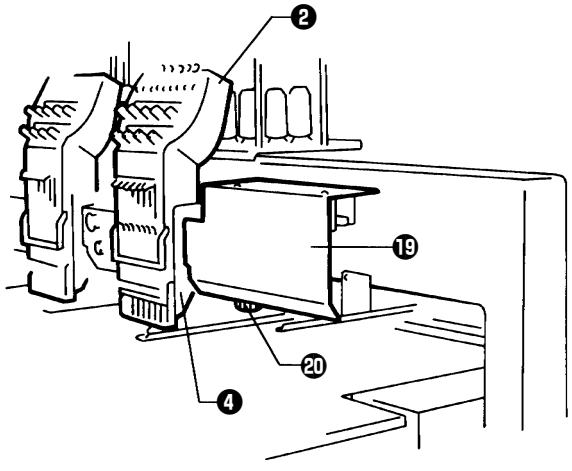
Grease the places indicated by the arrow once in six months.

Note:

When greasing, be sure to use the grease tank BR2 (black) provided with the machine.







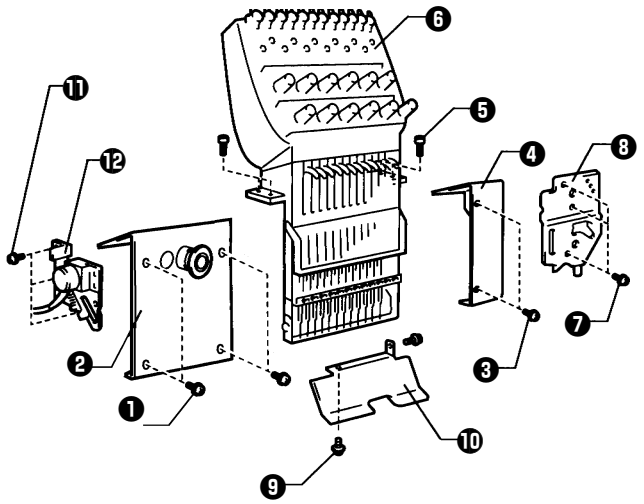
BES-961BC

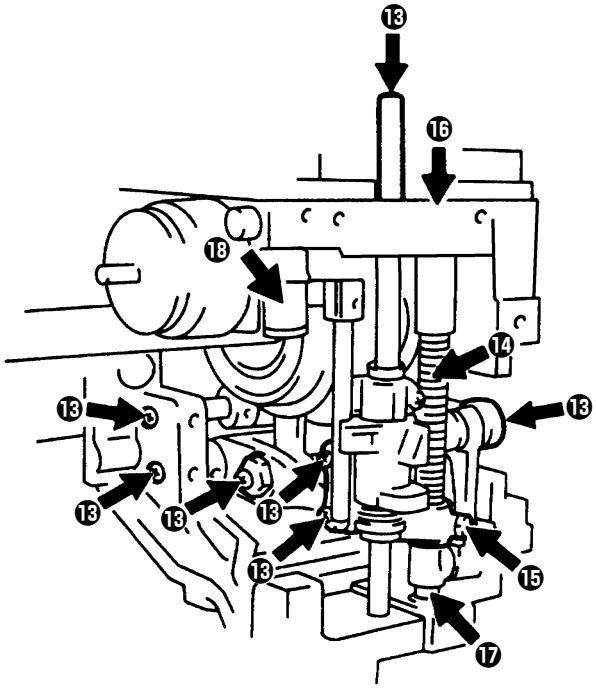
1. Remove two connectors from the rear of the needle bar case.
2. Loosen four bolts ❶, and remove the needle case ❷.
3. Loosen three screws ❸, and remove the presser foot guide plate ❹.
4. Loosen two screws ❺, and remove the arm cover L ❻.
5. Loosen four screws ❼, and remove the head cover ❽.
6. Loosen two bolts ❾, and remove the cap eaves guide ❿.
7. Loosen three bolts ⓫, and remove the wiper solenoid assembly ⓬.
8. Remove the screws ⓭ at the places indicated by the arrow, insert grease into the tapped hole using the syringe. Then tighten the screws. Also grease the presser bar spring ⓮, the presser bar guide bracket ⓯, the presser bar metal U ⓰ and D ⓱, and jump rotary shaft ⓲ .

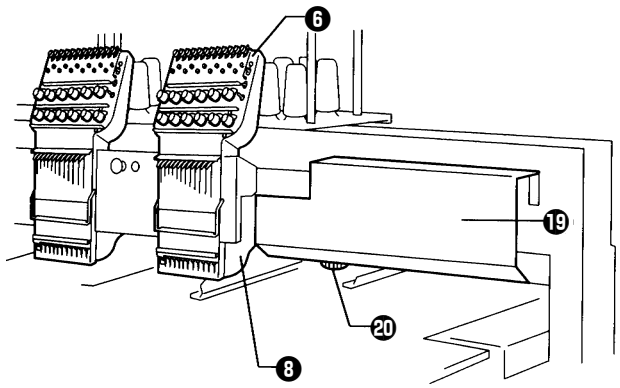
* After greasing, assemble in the reverse order.

Notes:

- When assembling the needle bar case ❷, place it on the machine and turn the change pulley ⓴ behind the cover ⓳ at right. Check that it is engaged, and then tighten the bolts.
- When attaching the presser foot guide plate ❹, move the presser foot up and down by the retracting lever to check that is it not distorted.







BES-1261BC

1. Remove two connectors from the rear of the needle bar case.

2. Loosen four screws ❶, and remove the head cover ❷, and loosen two screws ❸ and remove the head cover R❹.
   Note:
   Because the heads No.1 and No.2 have the head covers R and L respectively, remove both the the covers when greasing.

3. Loosen four bolts ❺, and remove the needle case ❻.

4. Loosen three screws ❼, and remove the presser foot guide plate ❽.

5. Loosen two bolts ❾, and remove the cap eaves guide ❿.

6. Loosen three bolts ⓫, and remove the wiper solenoid assembly ⓬.

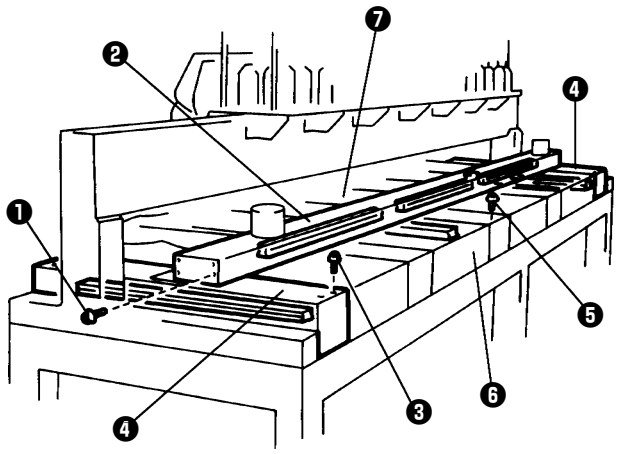
7. Remove the screws ⓭ at the places indicated by the arrow, insert grease into the tapped hole using the syringe. Then tighten the screws. Also grease the presser bar spring ⓮, the presser bar guide bracket ⓯, the presser bar metal U ⓰ and D ⓱, and jump rotary shaft ⓲ .

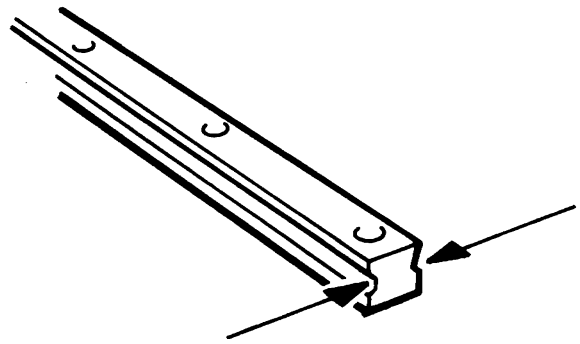
* After greasing, assemble in the reverse order.
Notes:
- When assembling the needle bar case ❻, place it on the machine and turn the change pulley ⓴ behind the cover ⓳ at right. Check that it is engaged, and then tighten the bolts.
- When attaching the presser foot guide plate ❽, move the presser foot up and down by the retracting lever to check that is it not distorted.

3-2. Feed Guide Section

Inspect X-feed linear guides (3 positions) and Y-feed linear guides (one position each on the right and left and one position on the No. 3 bed) once a month and apply grease to lubricate them.

Note:
When greasing, be sure to use the grease tank 30 provided with the machine.





Procedure

1. Loosen 12 screws ❶, and remove the X-feed cover ❷.

2. Loosen eight screws ❸, and remove the Y-feed cover ❹ from the right and left.

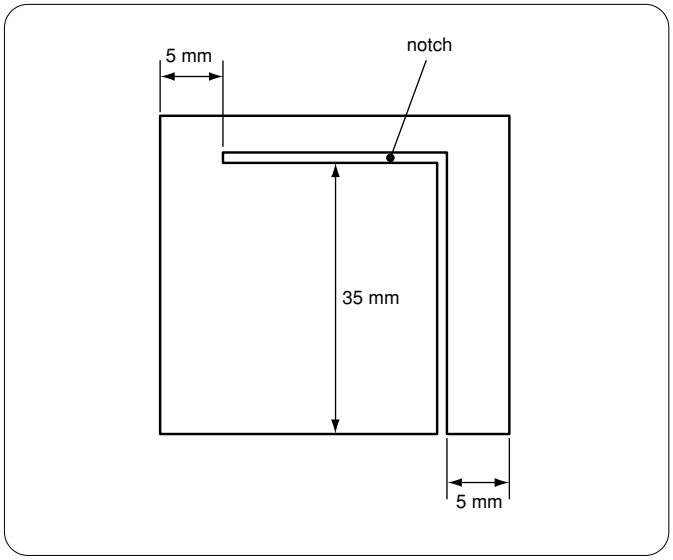
3. Loosen 13 screws ❺, and remove the bed covers B ❻ and C ❼.

4. Grease the X-feed linear guides (3 positions), the Y-feed linear guides (one each on the right and left), and the linear guide inside the No. 3 bed. Slide the guide to spread grease entirely.

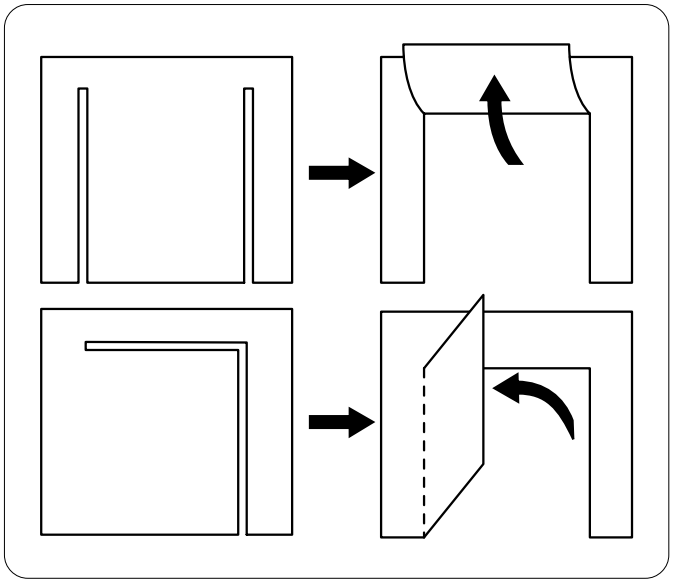
* After greasing, assemble in the reverse order.

3-3. Greasing the lower shaft module

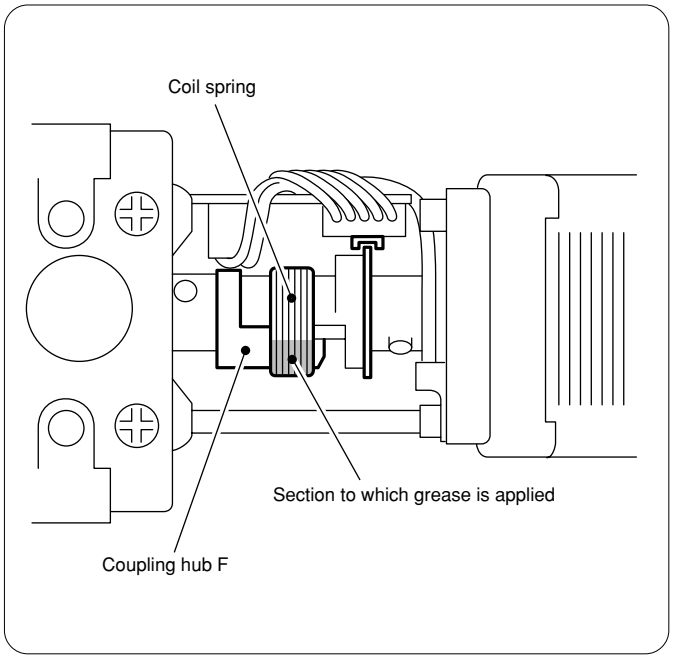
Refer to "15. Replacing and adjusting the lower shaft module" on page 38 to remove the peripheral parts of the lower shaft module.



1. Remove the peripheral parts so that the top of the case cover of the lower shaft can be seen.
2. Remove the tape covering the notch if the lower shaft's case cover is notched.
   When there is no notch, make one with a knife.
   Note:
   Be careful not to make a deep notch to avoid cutting the harness on the rear of the lower shaft's case cover.



3. Place the cover so that the notch is on the top as shown in the illustration to the left.



4. Evenly apply the supplied grease tank 30 (white) when the coil spring is engaged with the edge of the coupling hub F.
   Note:
   Replace the lower shaft module if the coil spring is not engaged with the edge j of the coupling hub F, but is only displaced.

5. Apply the grease between each coil spring while setting up the supplied driver between coil springs.
   Note:
   Be careful not to get any grease on the PCB or the encoder.

6. Turn the needle gap adjusting screw to let grease conform to the coil springs.

7. Turn on the power of the sewing machine and measure the out-of-step limit of the lower shaft module in the test mode.
   * Refer to "Lower shaft module test" on page 94 for the measuring procedure for the out-of-step limit of the lower shaft module.

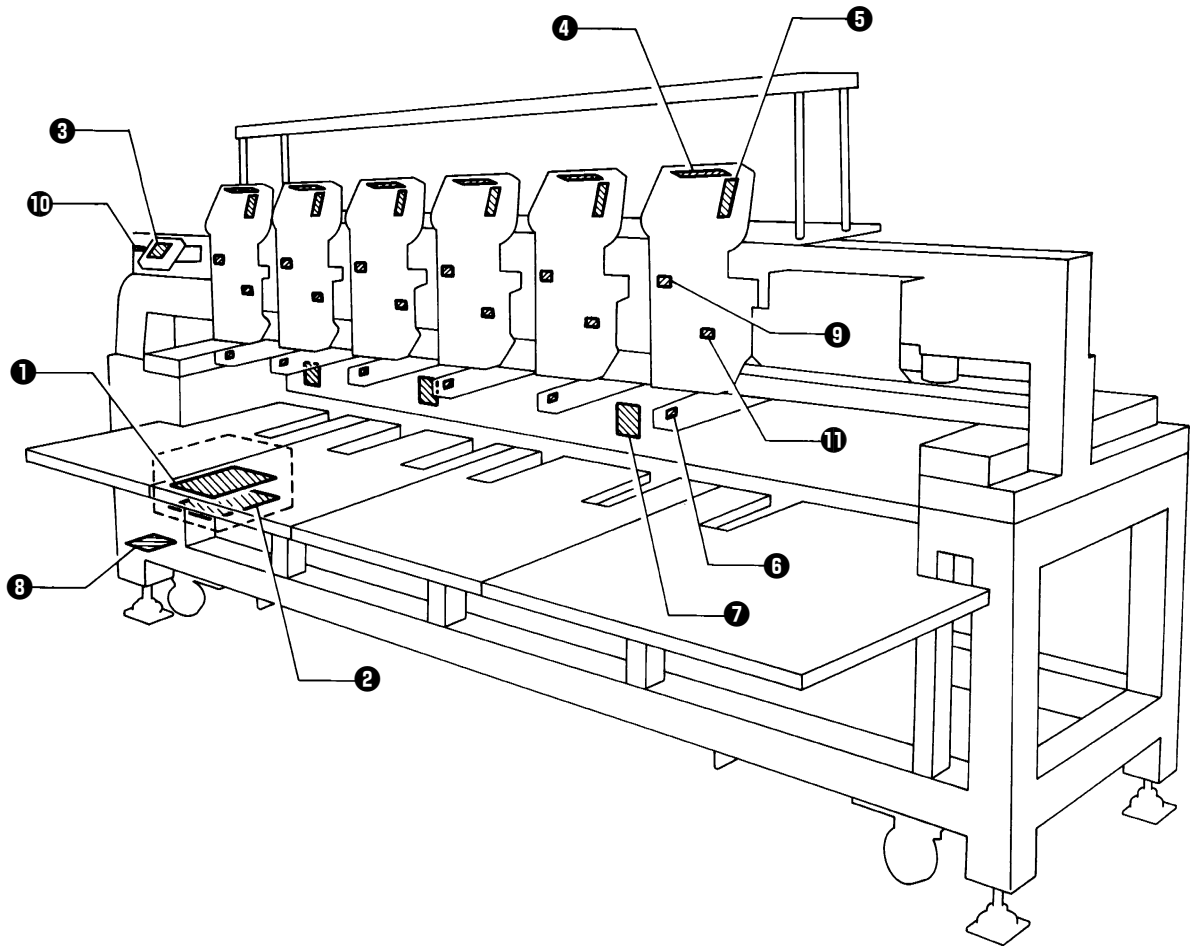
8. Replace the lower shaft module if it cannot be repaired even if being checked in the test mode.

9. Install the lower shaft's case cover and secure it with polyester tape.
   * Use heatproof tape to secure it if polyester tape is not available.
   * Reassemble the module by reversing this procedure.

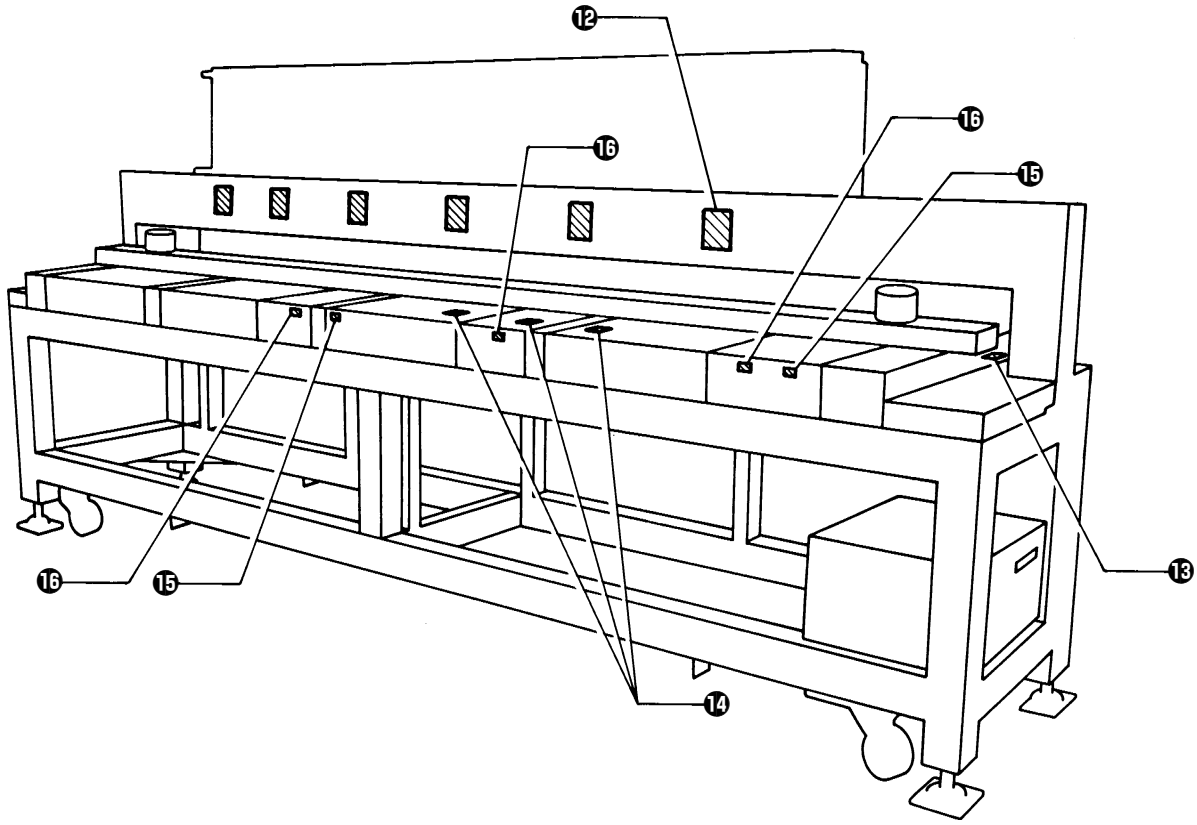
10. Carry out the thread trimming test for checking.

Chapter 7 Electric Components

1. PCBs locations



❶ Main PCB ❷ Power supply PCB in control box ❸ Panel PCB ❹ TR breakage sensor PCB ❺ Head switch PCB ❻ BC sensor PCB ❼ BC PCB ❽ Power supply PCB B (in power supply base) ❾ Sensor PCB ❿ Sensor PCB ⓫ Switch assy



⓬ Head PCB ⓭ Y feed sensor PCB ⓮ X feed sensor PCB ⓯ Thread trimming sensor PCB ⓰ Retracting bed sensor PCB

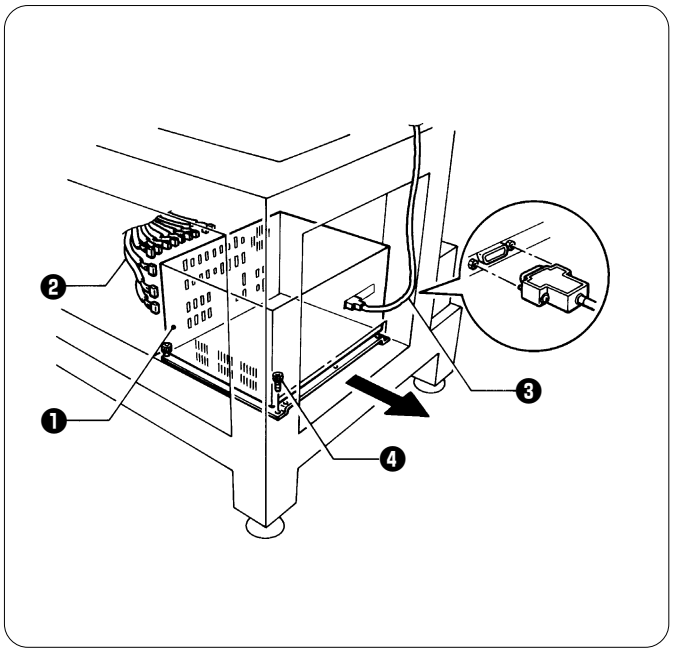
⚠ DANGER

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.

Note:
Before replacing or adjusting any PCB in the control box, be sure to turn off the power and remove the power supply plug from the socket.

2. Replacing the PCBs in the control box

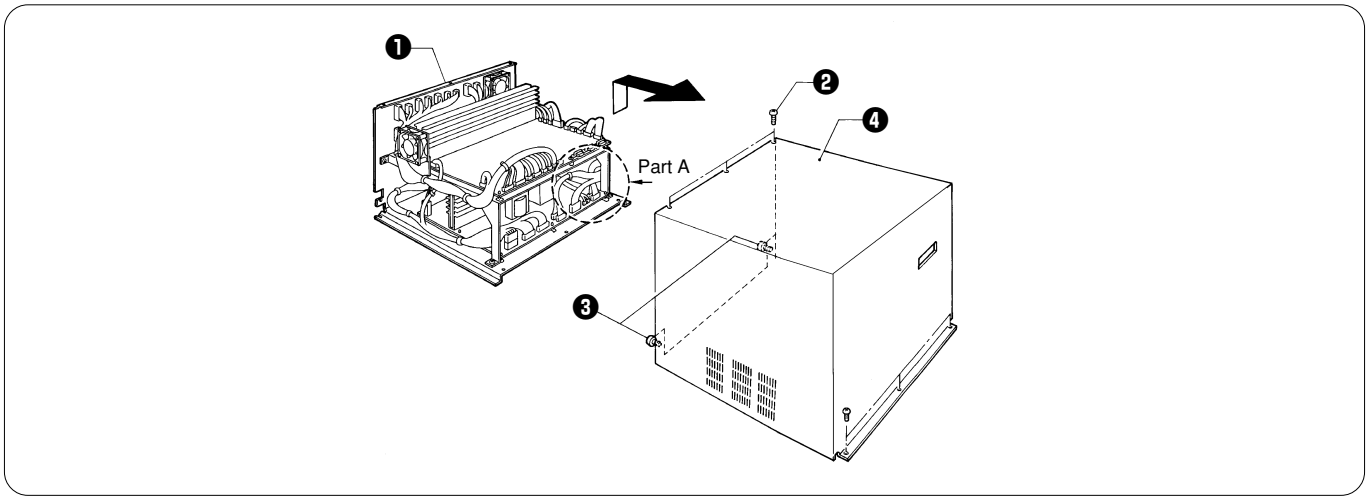
2-1. Removing and reattaching the control box



1. Remove all connectors ❷ from the rear of the control box ❶.
2. Loosen the two screws of the cable ❸ to remove its connector.
3. Remove the four bolts ❹ to separate the control box ❶ from the machine.

* Reverse the above procedure for re-assembly.

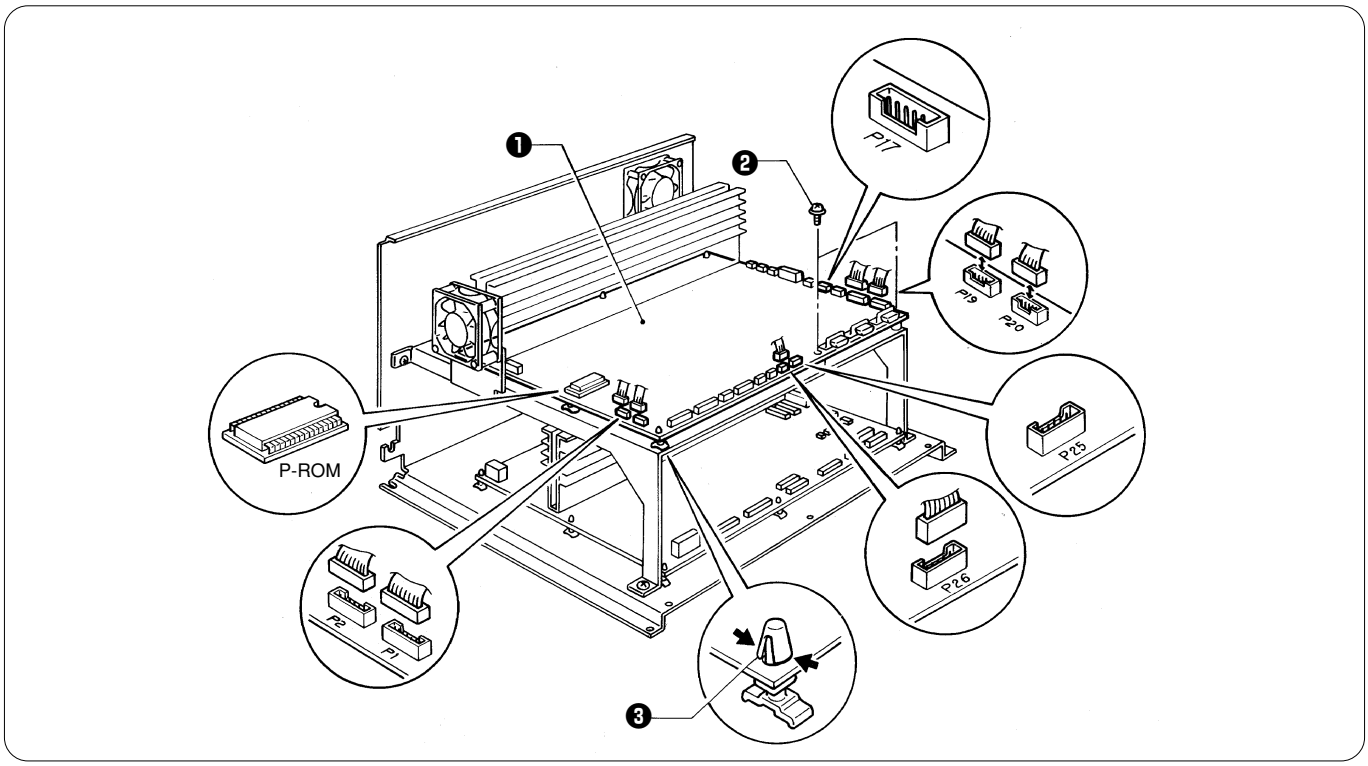
2-2. Removing and reattaching the control box cover



1. Remove the eight screws ❷ from the control box ❶. (Loosen the two screws ❸.)
2. Remove the control box cover ❹ by lifting it a little and pulling toward the front.
   Pay attention not to cut any harnesses wired inside the control box especially around part A.

* Reverse the above procedure for re-assembly.

2-3. Replacing the main PCB



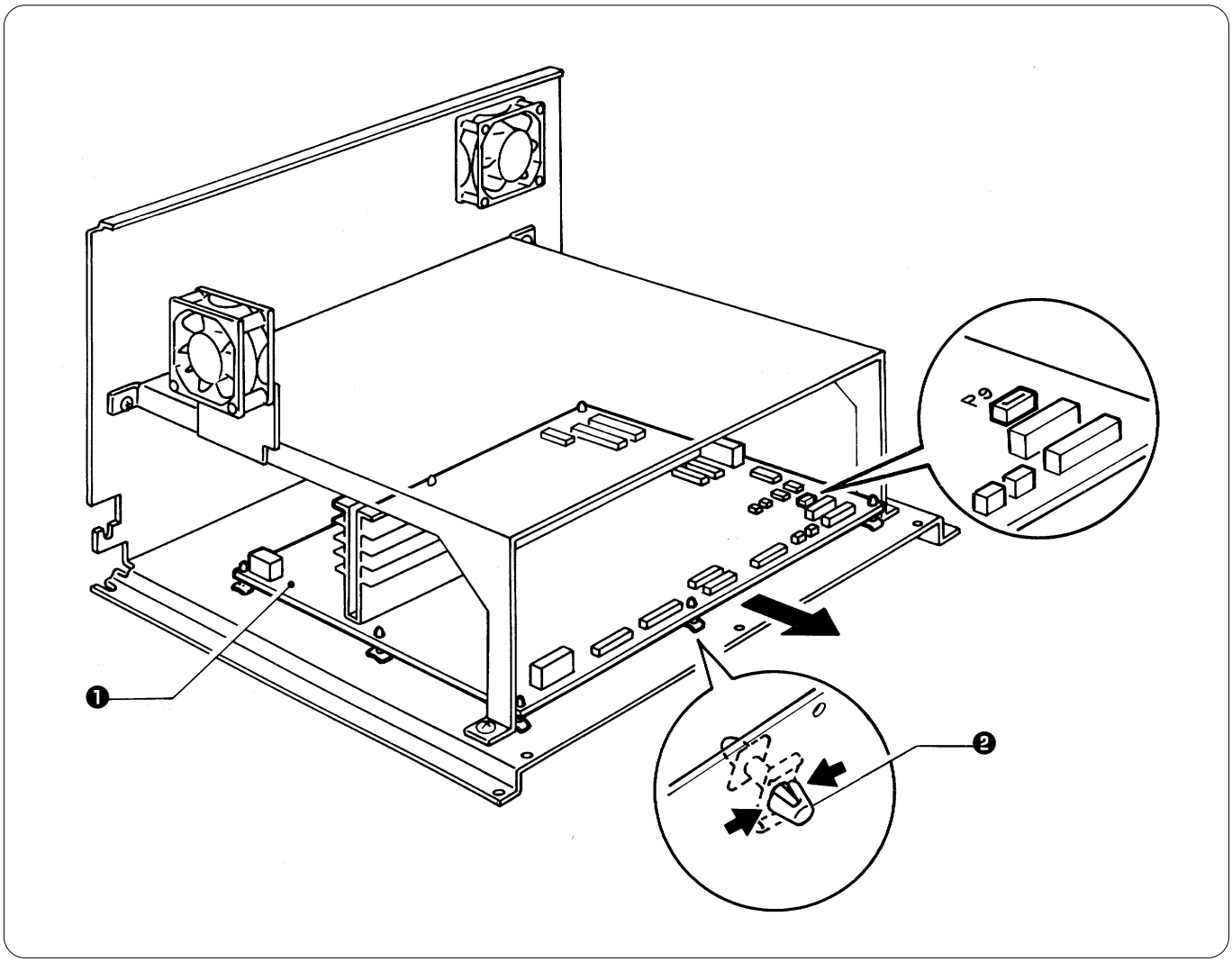
1. Remove all connectors from the main PCB ❶.
2. Remove the two screws ❷ and then separate the main PCB ❶ from the control box by pressing the clamps of the four PCB supports ❸ inward.

* Reverse the above procedure for re-assembly.

Notes:

- When reattaching connectors, support the rear of the main PCB ❶, and insert them without excessive force.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors. Especially for connectors P1, P2, P19, P20, and P26, hold them straight so as not to apply any force to their surroundings.
- Handle PCBs carefully. To avoid damage due to static electricity, do not touch the IC pins.
- Connectors P17 and P25 are unused and are not connected to cables.
- Make sure the replaced PCBs and the P-ROM chips are mounted.

2-4. Replacing the power supply PCB



1. Remove all connectors from the power supply PCB ❶.
2. While pressing the clamps of the nine supports ❷ inward from the bottom of the control box, remove the power supply PCB ❶ and supports ❷ from the control box.
3. Remove the supports ❷ from the power supply PCB ❶, and attach them to the power supply PCB to be replaced.
4. Match the supports ❷ with the holes on the bottom of the control box, and attach the power supply PCB to the control box by pressing each support.

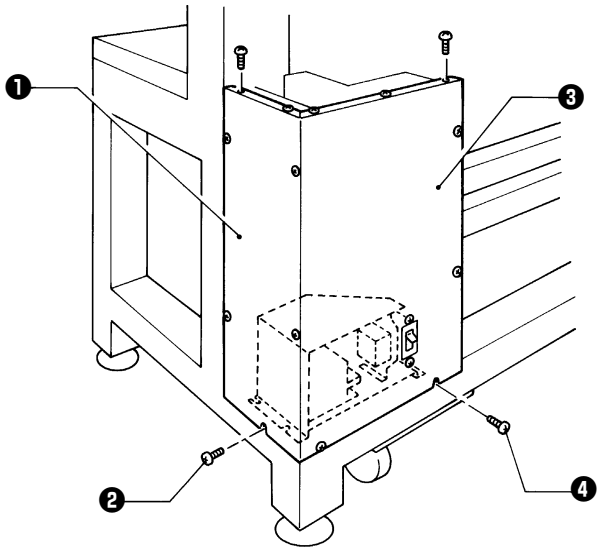
* Reverse the above procedure for re-assembly.

Notes:

- When reattaching connectors, support the rear of the power supply PCB ❶, and insert them without excessive force.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- Treat PCBs carefully as ICs in the PCBs are easily damaged by static electricity. Also, do not touch the IC pins.
- When removing the PCB, turn off the power, leave it as it is for at least 5 minutes, and make sure that electrical charge of the capacitor on the PCB has been released.
- Since an electrical charge may remain in the removed power supply PCB, do not touch the bottom (soldered surface) of the board and anything lead in part. As well, pay attention not to cause a short by putting the board on anything metal.
- Connector P9 is unused and not connected to a cable.

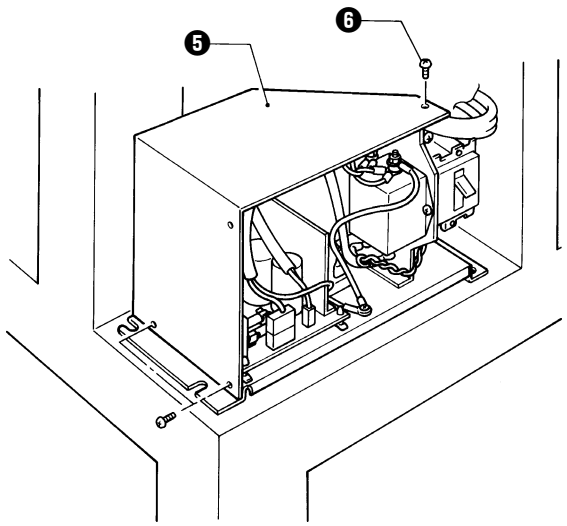
3. Replacing power supply PCB B in the power supply base

3-1. Removing and attaching the leg cover and the power supply base cover



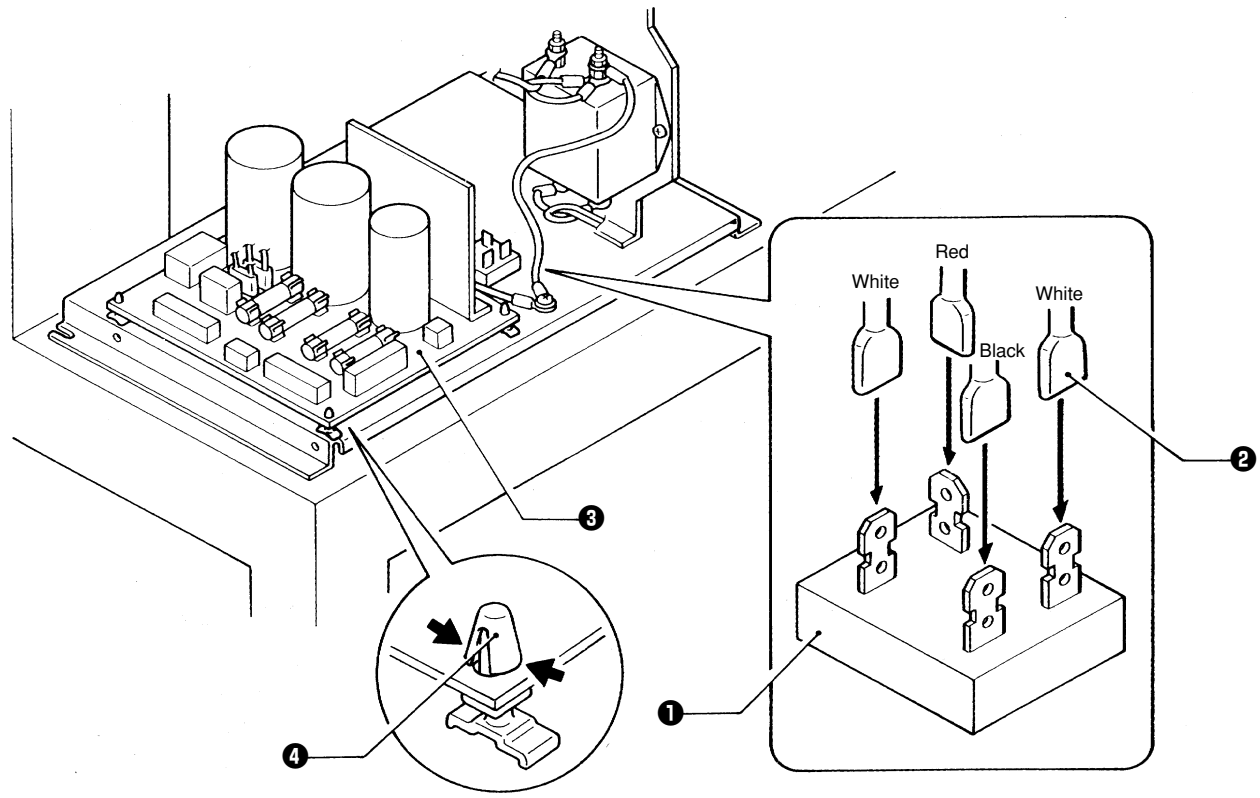
1. Remove the seven screws ❷ on the top and side of motor cover L ❶, and then separate it from the machine leg.

2. Remove the seven screws ❹ on the top and side of motor cover F ❸, and then separate it from the machine leg.



3. Remove the three screws ❻, and the power base cover ❺.
   * Reverse the above procedure for re-assembly.

3-2. Replacing power supply PCB B in the power supply base



1. Remove the four faston receptacles ❷ from the bridge diode ❶.
2. Remove all connectors from power supply PCB B ❸.
3. Remove power supply PCB B ❸ while pressing the clamps of the four supports ❹ inward, and replace it with a new one.

* Reverse the above procedure for re-assembly.

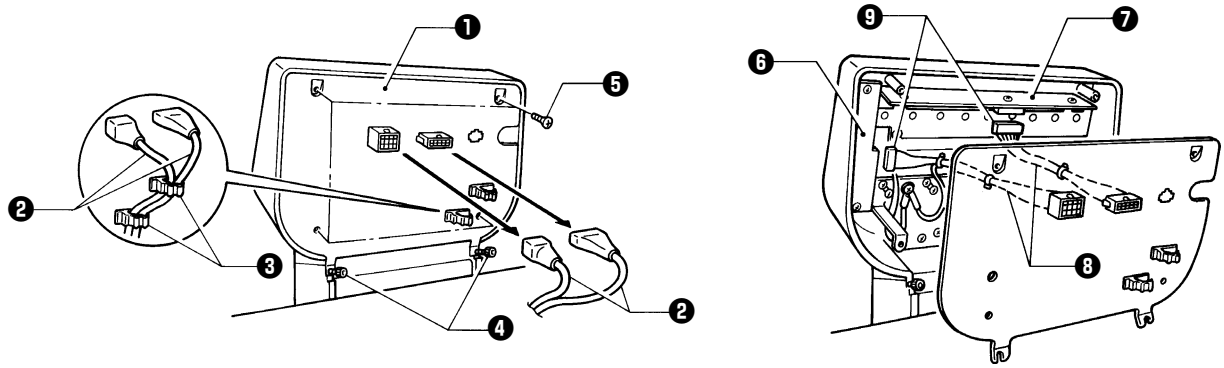
Notes:

- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- When attaching the faston receptacles, refer to figure A; attach them to their respective positions according to the color of each lead wire.
- When removing the PCB, turn off the power, leave it as it is for at least 5 minutes, and make sure that electrical charge of the capacitor on the PCB has been released.
- Since an electrical charge may remain in the removed power supply PCB, do not touch the bottom (soldered surface) of the board and anything lead in part. As well, pay attention not to cause a short by putting the board on anything metal.

4. Replacing the head switch PCB on the adjustment base

4-1. Removing and reattaching the adjustment base cover

BES-961BC

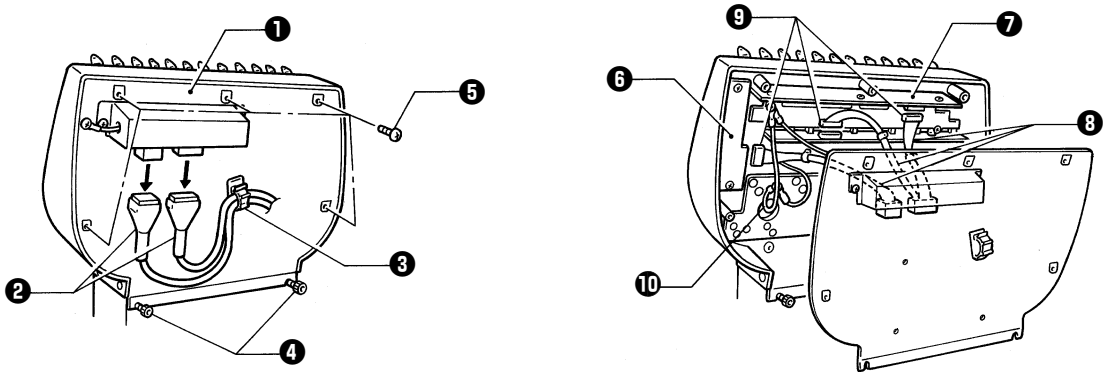


1. Remove the two connectors ❷ from the adjustment base cover ❶. Unlock the cord holders ❸ and remove the cables.
2. Loosen the two bolts ❹ of the adjustment base cover ❶.
3. Remove the four screws ❺, and the adjustment base cover ❶.
   Inside of the adjustment base cover ❶, the two harnesses ❽ are connected to the head switch PCB ❻ and the TR breakage sensor PCB ❼. Remove the two connectors ❾ from the head switch PCB ❻ and the TR breakage sensor PCB ❼.

* Reverse the above procedure for re-assembly.

Note:
If the harnesses of the connectors ❷ are not fixed by the cord holders ❸ after reattachment, the harnesses may make contact with the driving shaft of the needle bar case.

BES-1261BC



1. Remove the two connectors ❷ from the adjustment base cover ❶. Unlock the cord holders ❸ and remove the cables.
2. Loosen the two bolts ❹ of the adjustment base cover ❶.
3. Remove the six screws ❺ (one is for attaching the ground wire), and the adjustment base cover ❶.
   Inside of the adjustment base cover ❶, the three harnesses ❽ are connected to the head switch PCB ❼ and the TR breakage sensor PCBs ❼. Remove the three connectors ❿ from the head switch PCB ❻ and the TR breakage sensor PCBs ❼.

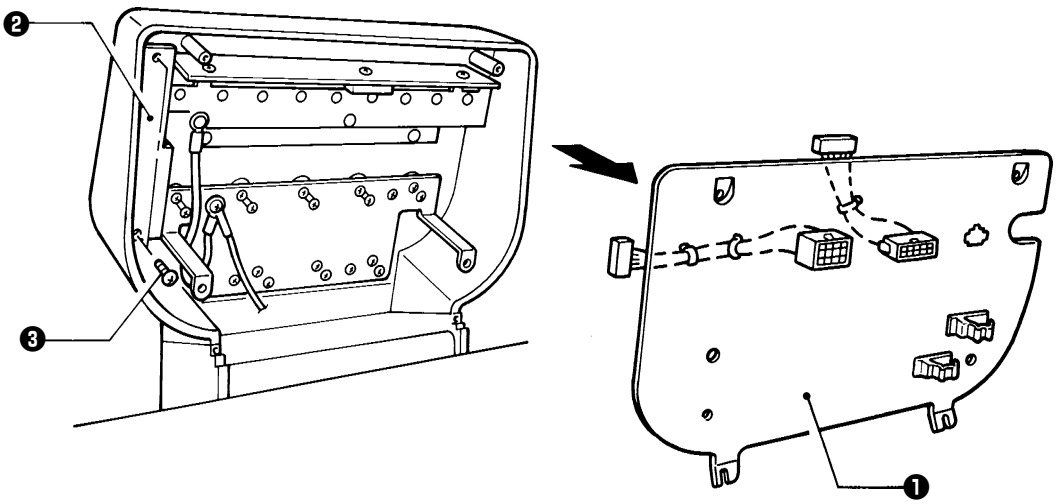
* Reverse the above procedure for re-assembly.

Notes:

- Attach the blue connector to the upper TR breakage sensor PCB ❼, and the white connector to the lower one.
- If the harnesses of the connectors ❷ are not fixed by the cord holders ❸ after reattachment, the harnesses may make contact with the driving shaft of the needle bar case.
- Be sure to reattach the ground wire ❿.

4-2. Replacing the head switch PCB

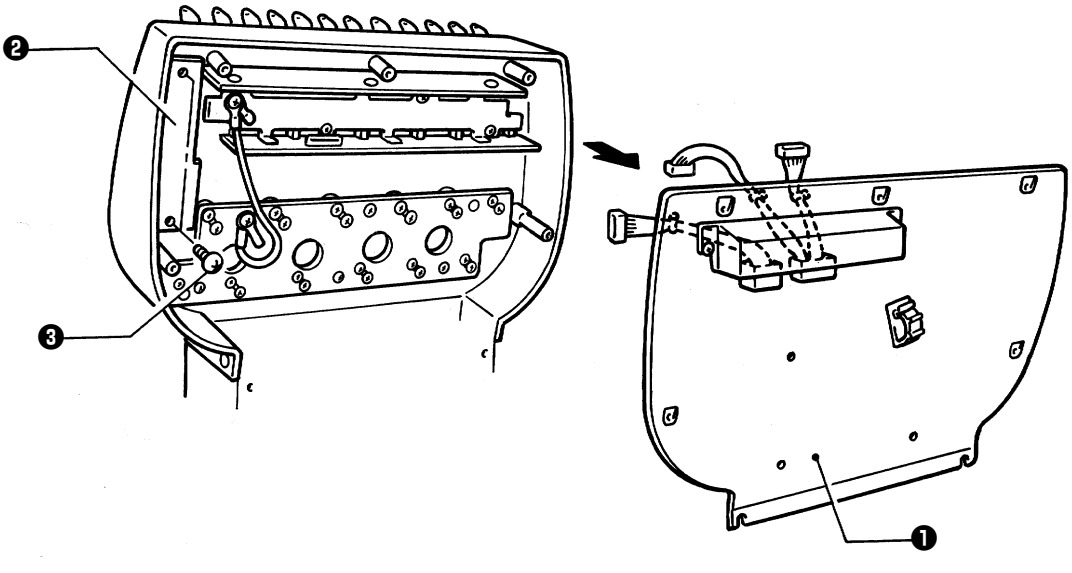
BES-961BC



1. Remove the adjustment base cover ❶.
   Note:
   Refer to 4-1 for details.
2. Remove the two screws ❸ securing the head switch PCB ❷.
3. Remove the head switch PCB ❷.

* Reverse the above procedure for re-assembly.

BES-1261BC

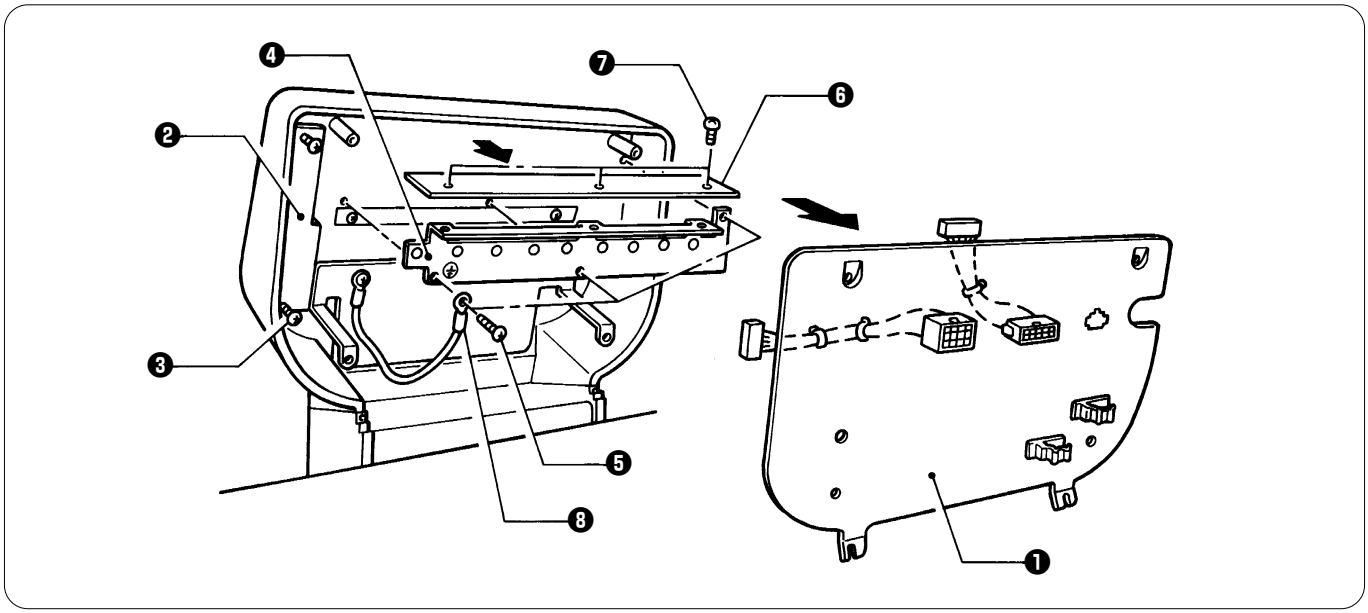


1. Remove the adjustment base cover ❶.
   Note:
   Refer to 4-1 for details.
2. Remove the two screws ❸ securing the head switch PCB ❷.
3. Remove the head switch PCB ❷.

* Reverse the above procedure for re-assembly.

4-3. Removing the TR breakage sensor PCB

BES-961BC



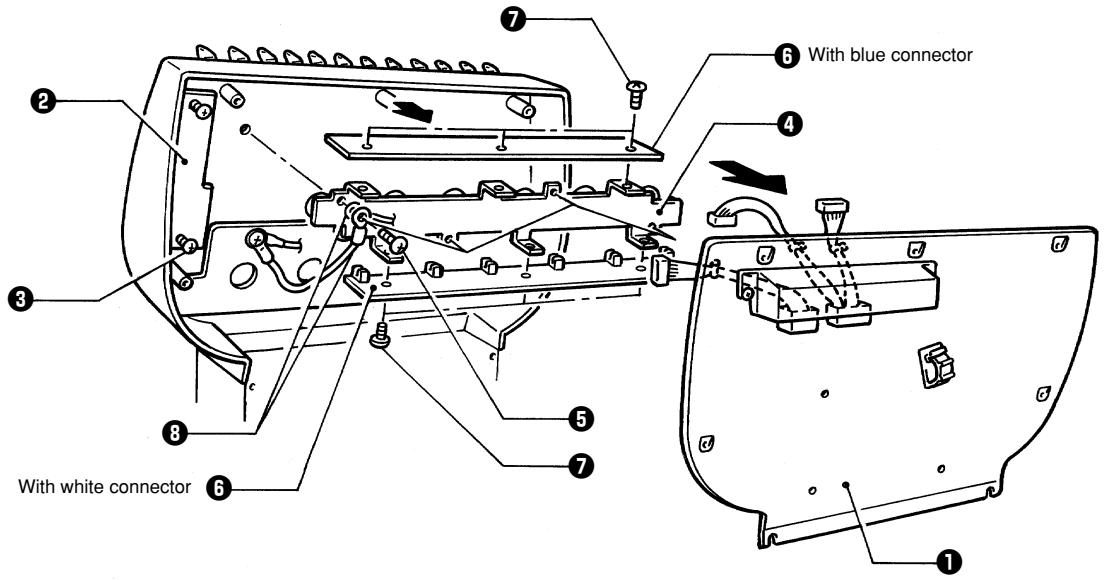
1. Remove the adjustment base cover ❶.
   Note:
   Refer to 4-1 for details.
2. Loosen the two screws ❸ securing the head switch PCB ❷.
3. Remove the three screws ❺ securing the thread breakage plate ❹.
4. Remove the thread breakage plate ❹ and the TR breakage sensor PCB ❻ from the adjustment base.
5. Remove the three screws ❼ securing the thread breakage plate ❹ to the TR breakage sensor PCB ❻.
6. Remove the TR breakage sensor PCB ❻.

* Reverse the above procedure for re-assembly.

Notes:

- Attach the ground wire ❽ to the thread breakage plate ❹ using the screw ❺.
- After replacing the PCB, be sure to attach the ground wire and connectors.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- When removing the TR breakage sensor PCB ❻ and the thread breakage plate ❹, do not make contact with the head switch PCB ❷.

BES-1261BC



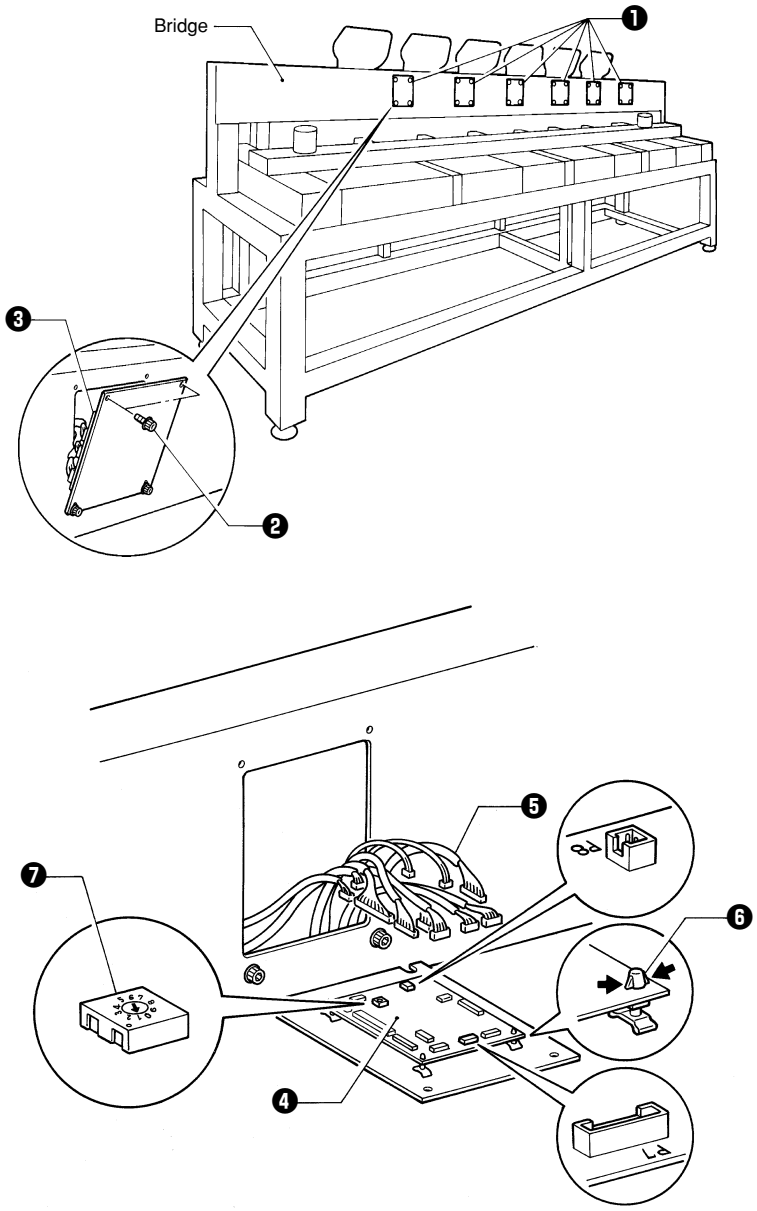
1. Remove the adjustment base cover ❶.
   Note:
   Refer to 4-1 for details.
2. Loosen the two screws ❸ securing the head switch PCB ❷.
3. Remove the four screws ❺ securing the thread breakage plate ❹.
4. Remove the thread breakage plate ❹ and the TR breakage sensor PCBs ❻ from the adjustment base.
5. Remove the six screws ❼ securing the TR breakage sensor PCBs ❻ to the thread breakage plate ❹.
6. Remove the TR breakage sensor PCBs ❻.

* Reverse the above procedure for re-assembly.

Notes:

- Attach the ground wire ❽ to the thread breakage plate ❹ using the screw ❺.
- After replacing the PCB, be sure to attach the ground wire ❽ and connectors.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- When removing the TR breakage sensor PCBs ❻ and the thread breakage plate ❹, do not make contact with the head switch PCB ❷.
- The blue and the white connectors are attached to the upper and lower TR breakage sensor PCBs ❻, respectively.

5. Replacing the head PCB



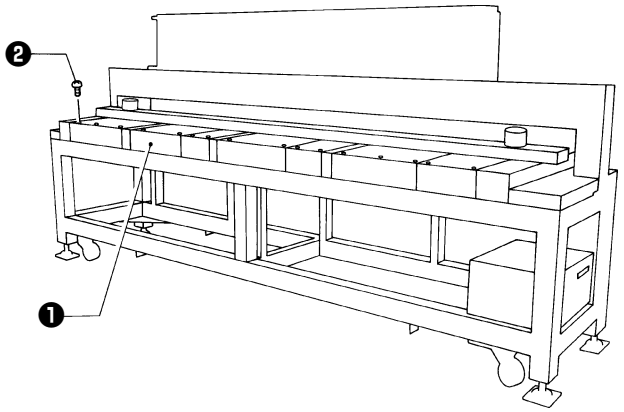
1. Remove the two upper bolts ❷ of the bridge cover ❶. (Just loosen the lower bolts.)
2. Remove the bridge cover ❶. The head PCB ❸ is attached to the inside of the bridge cover ❶.
   Note:
   The head PCB ❸ has the connectors ❹ on it. Handle it carefully so as not to damage any wires nor apply excessive force.
3. Remove connectors ❹ from the head PCB ❸.
4. Remove the head PCB ❸ by pressing the clamps of the four supports ❺ inward, and replace it with a new one.

* Reverse the above procedure for re-assembly.

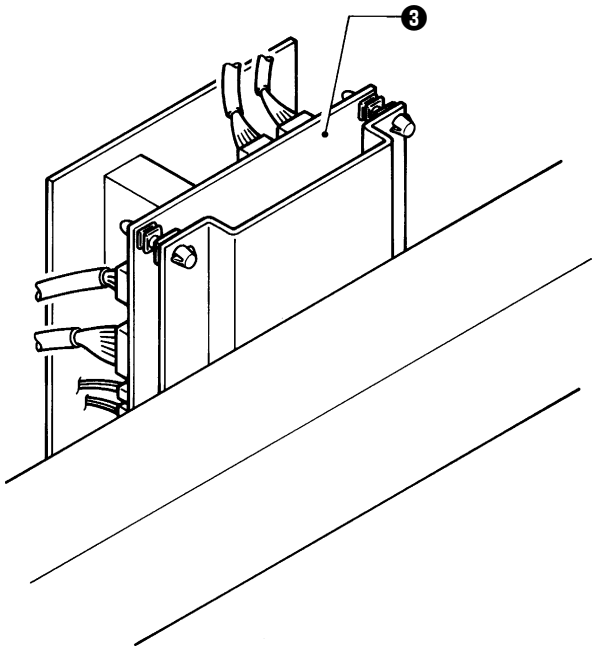
Notes:

- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- When attaching the head PCB ❸, set the rotary switch ❻ on the head PCB ❸ to the head number.
- Connectors P7 on the head, except for no.1, are unused and not connected to a cable.
- Connector P8 is unused and not connected to cable.

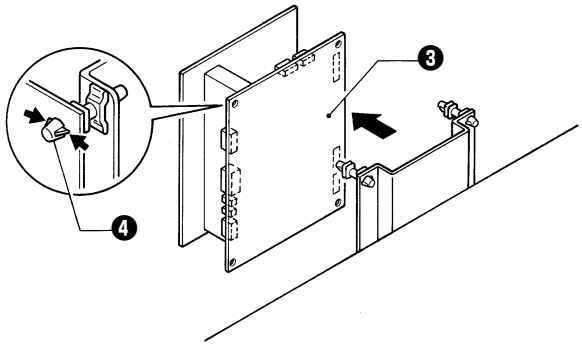
6. Replacing the BC PCB



1. Remove the eight screws ❷, and the table cover ❶ upward.



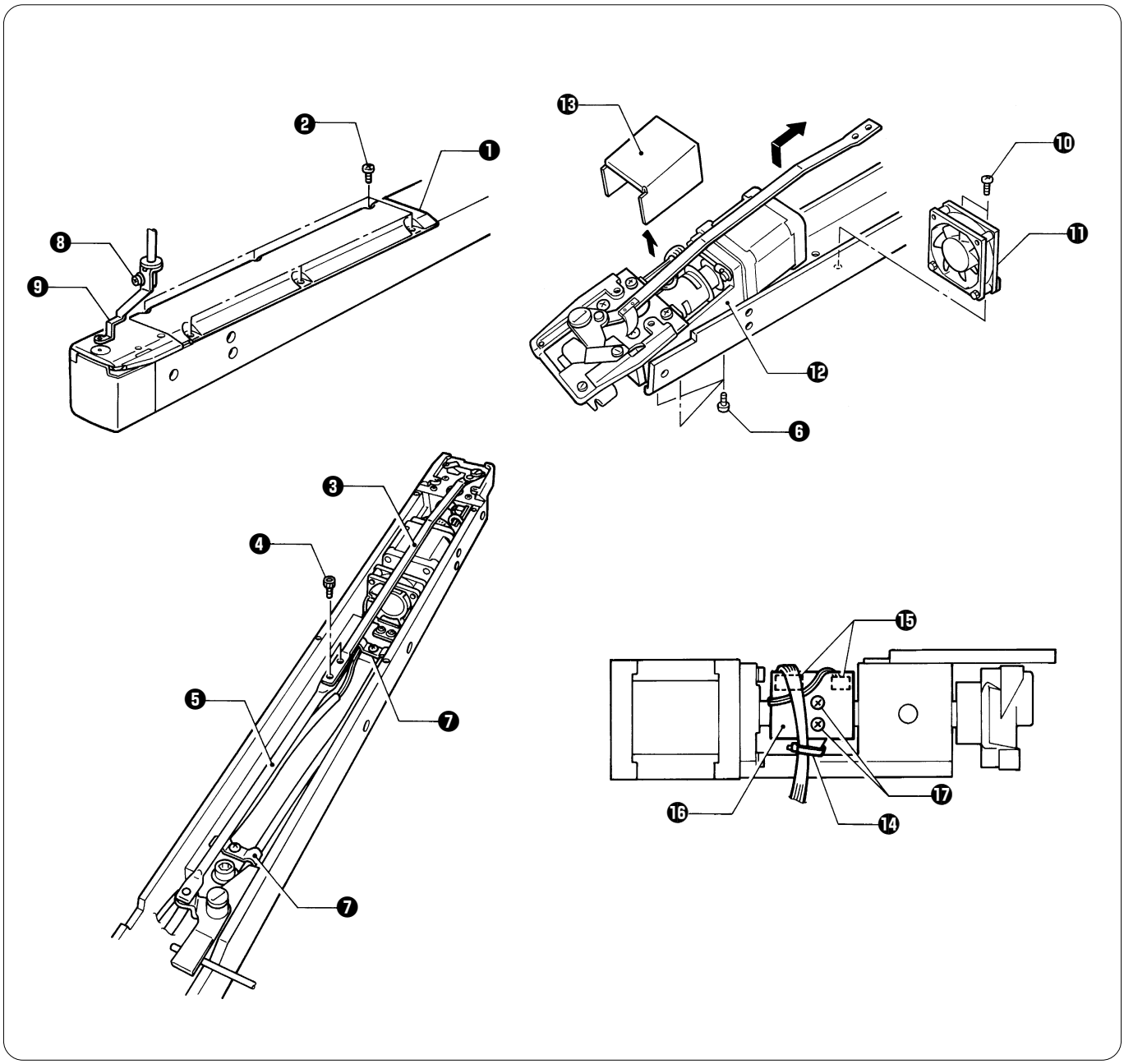
2. Remove all connectors from the BC PCB ❸.



3. Remove the BC PCB ❸ by pressing the clamps of the four supports ❹ inward, and replace it with a new one.
* Reverse the above procedure for re-assembly.

Note:
Pay close attention to the handling of the PCB.

7. Replacing the BC sensor PCB



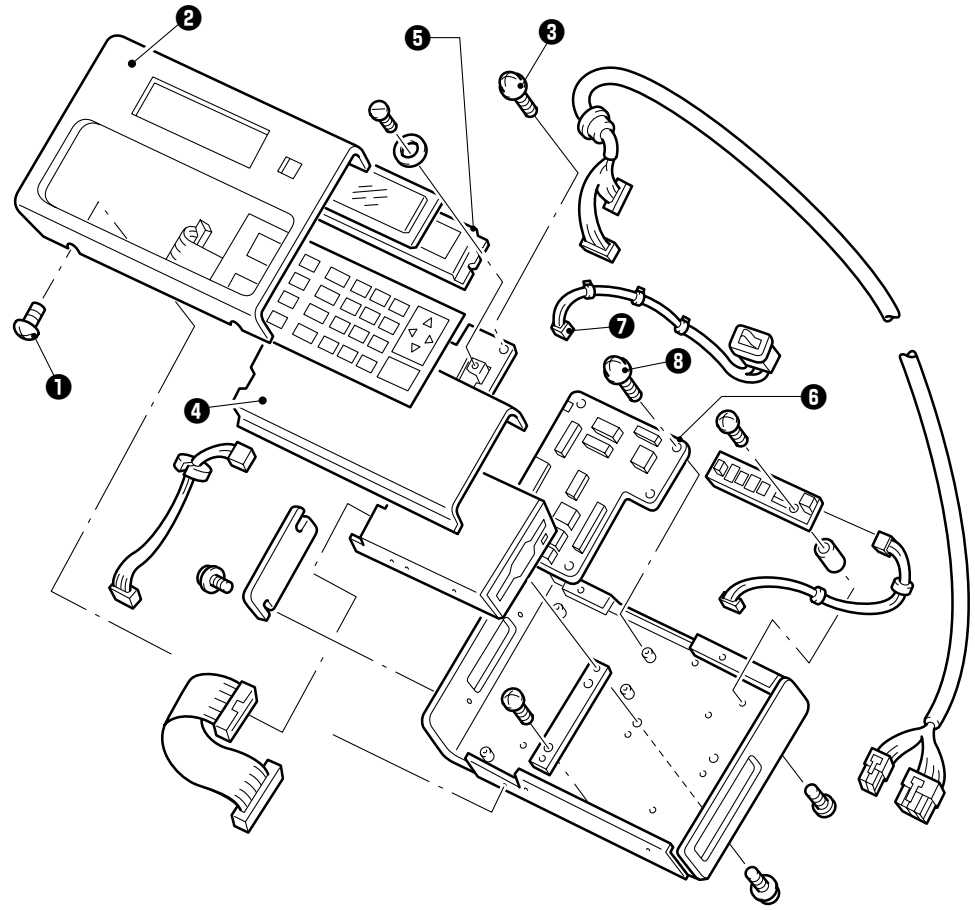
1. Remove the six screws ❷ and the bed cover ❶.
2. Remove the two bolts ❹ and separate connecting rod B ❸ from connecting rod C ❺.
3. Remove the three screws ❻ from the lower shafe module.
4. Remove the two cord clamps ❼.
5. Remove the screw ❽ and separate the presser foot ❾.
6. Remove the two screws ⓾, and the fan ⓫ from the bed.
7. Lift the lower shaft module ⓬ at the rear, and pull it backward as shown in the figure.
8. Remove the lower shaft case cover ⓭.
9. Cut the band ⓮, and remove the two connectors ⓯.
10. Remove the two screws ⓱, and replace the BC sensor PCB ⓰ with a new one.

* Reverse the above procedure for re-assembly.

Notes:

- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- Refer to chapter 2, "15. Replacing and adjusting the lower shaft module" for checking the needle penetration point.
- Refer to chapter 2, "14. Replacing and adjusting the movable and fixed knives" for adjusting the movable knife.

8. Replacing the panel PCB



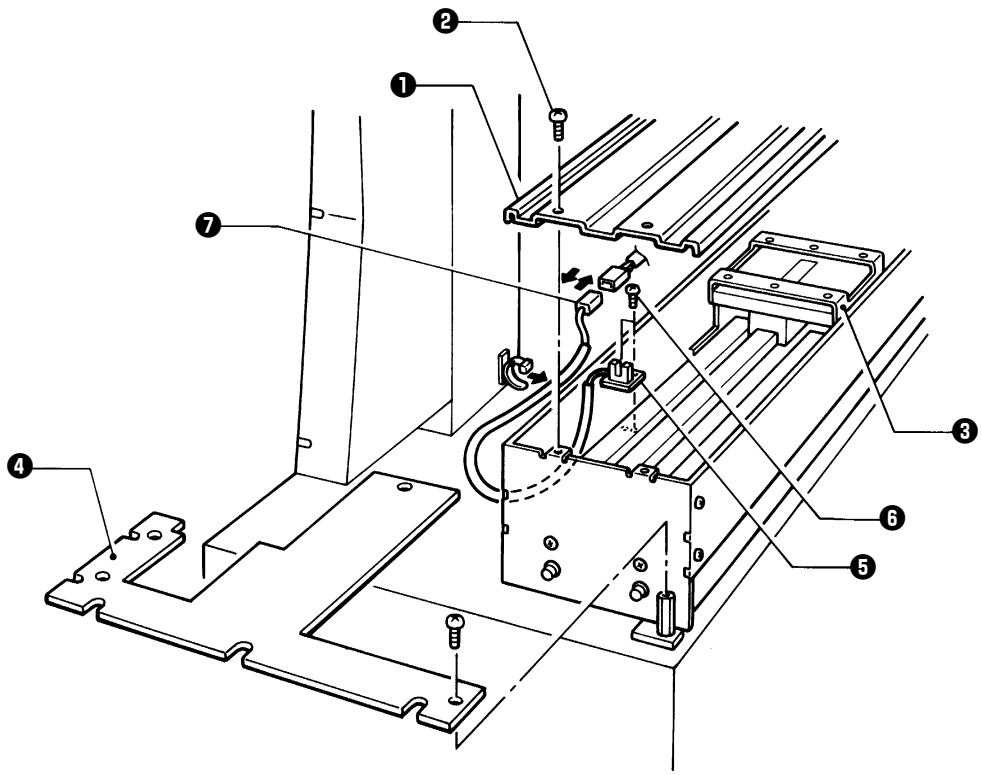
1. Loosen the four screws ❶ securing the panel at the top and bottom, and lift the panel cap ❷ by opening it from the key sheet side.
2. Remove two screws ❸ and float the key sheet support ❹ to disconnect the flat cable connecting the LCD ❺ with the panel PCB ❻.
3. Open the key sheet support ❹ from the right end and disconnect the flat cable connecting the key sheet with the panel PCB ❻. Remove the key sheet support ❹.
4. Disconnect the harness connector ❼ connected to the switch on the operation panel and remove the panel cap ❷.
5. Disconnect all the connectors connected to the panel PCB ❻.
6. Remove five screws ❽ and remove the panel PCB ❻.
7. Replace the panel PCB ❻ with a new one.

* Reassemble the operation panel by reversing this procedure.

Notes:

- Be sure to reconnect all the cables after replacing the panel PCB ❻.
- When connecting or disconnecting cables, be sure to hold the connectors but do not pull on the cables.
- Connect or disconnect the flat cable while holding it perpendicular to the connector. Especially avoid connecting the cable to the connector at a slant.

9. Replacing the Y-feed sensor PCB



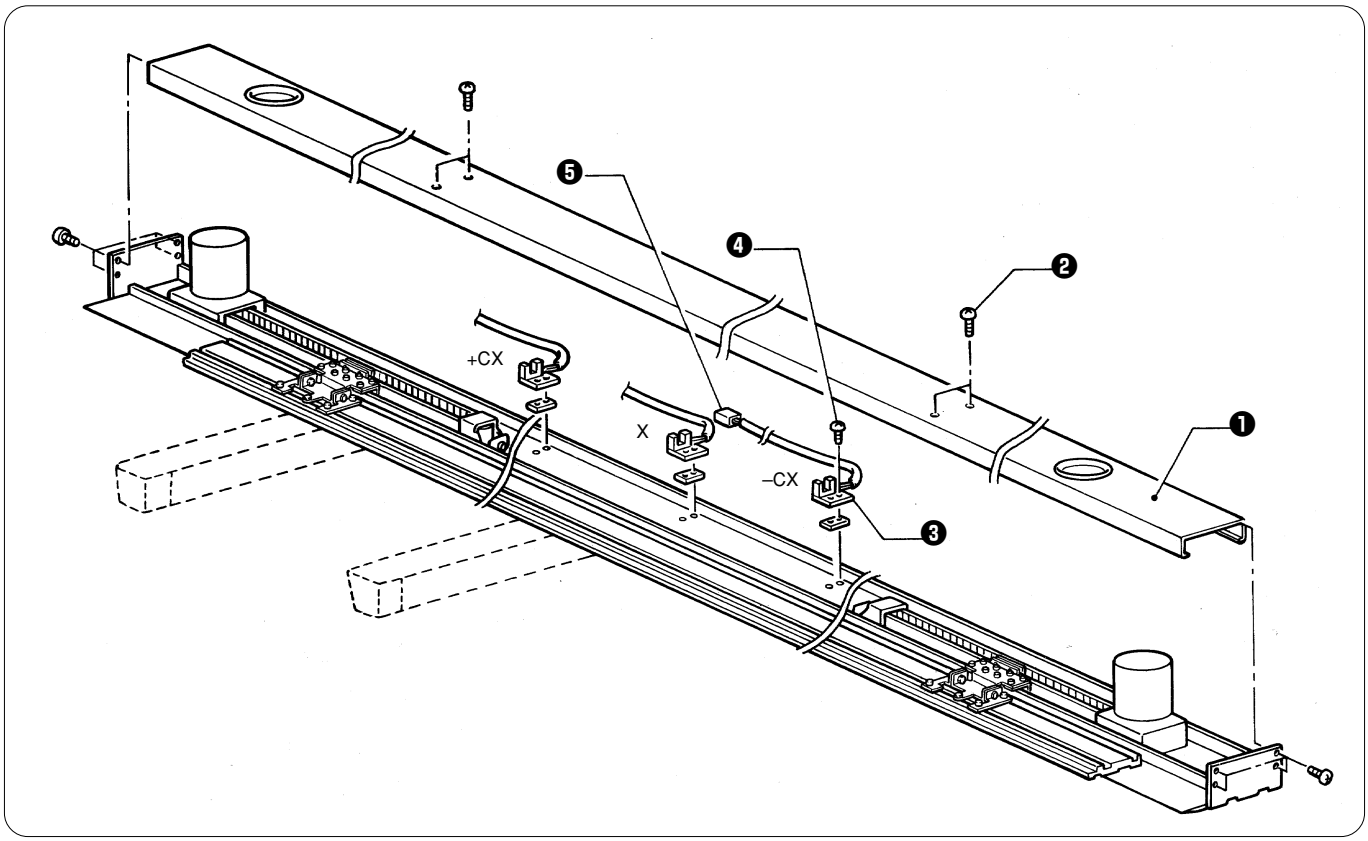
1. Remove the four screws ❷, and separate Y-feed cover U ❶ from the Y-carriage ❸ slowly.
2. Remove the four screws, and side cover LF ❹.
3. Remove the two screws ❻, and the connector ❼, and replace the Y-feed sensor PCB ❺.

* Reverse the above procedure for re-assembly.

Notes:

- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- Do not forget to attach the spacer to the bottom of the PCB.

10. Replacing the X-feed sensor PCB



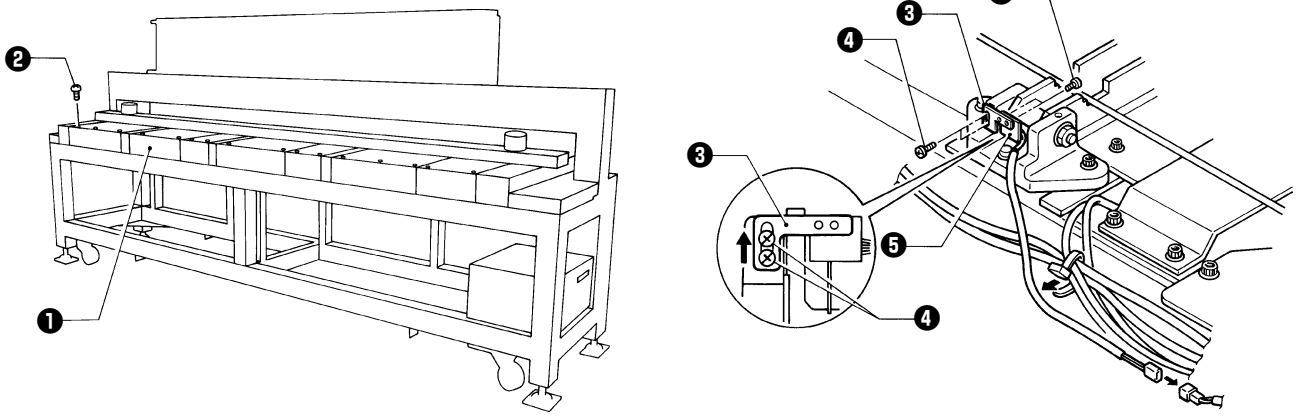
1. Remove the 12 screws ❷, and the X-feed cover ❶.
2. Remove the two screws ❹, and the connector ❺, and replace the X-feed sensor PCB ❸ with a new one.

* Reverse the above procedure for re-assembly.

Notes:

- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- Do not forget to attach the spacer to the bottom of the PCB.
- There are three kinds of X-feed sensor PCBs ❸: +CX, X, and –CX. Do not put them in other than their specified positions.

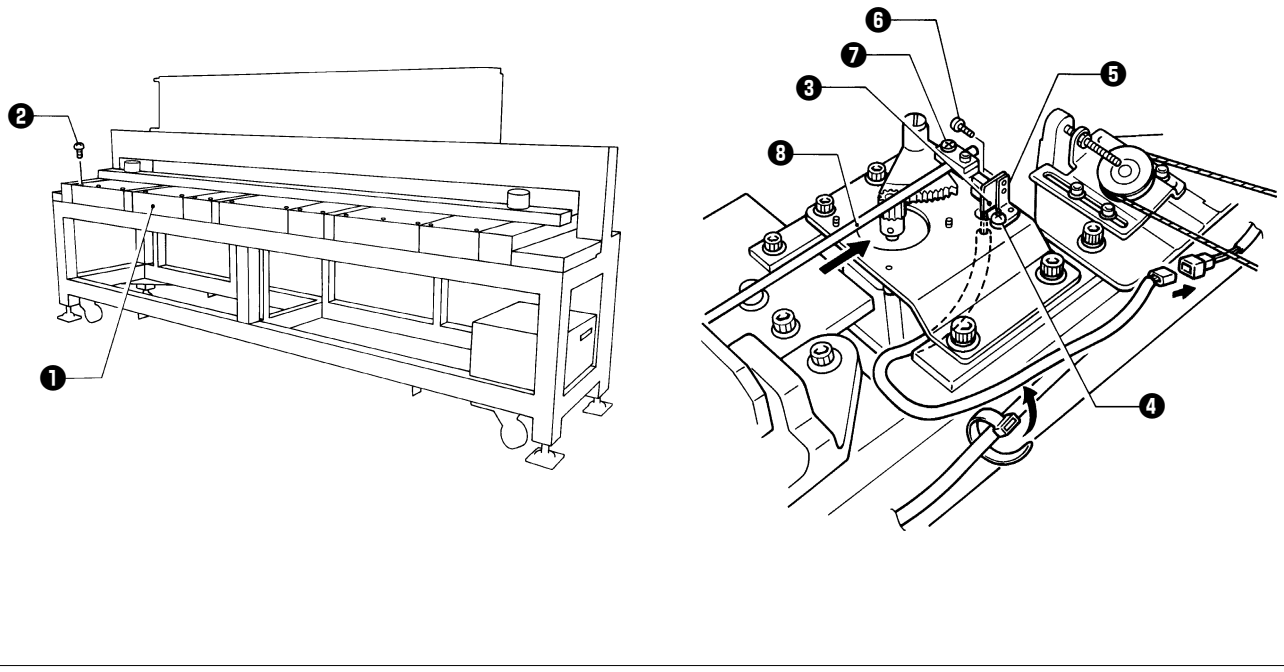
11. Replacing the retracting bed sensor PCB



1. Remove the eight screws ❷, and then the table cover ❶ by slowly pulling it upward.
2. Remove the two screws ❹, and the retracting bed sensor PCB ❺ along with the dog plate ❸.
3. Remove the connector from the retracting bed sensor PCB ❺.
4. Remove the two screws ❻, and replace the retracting bed sensor PCB ❺ with a new one.
   * Reverse the above procedure for re-assembly.
5. After replacing the retracting bed sensor PCB, adjust the position of the bed retracting sensor.
   Attach the dog plate ❸ to the highest position.
   The machine will start to recognize the head which is stopped via the dog plate ❸ after the bed is inclined about 10 degrees.

Notes:
- When retracting the beds and operating the machine, the beds should make complete contact with the machine leg.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors.

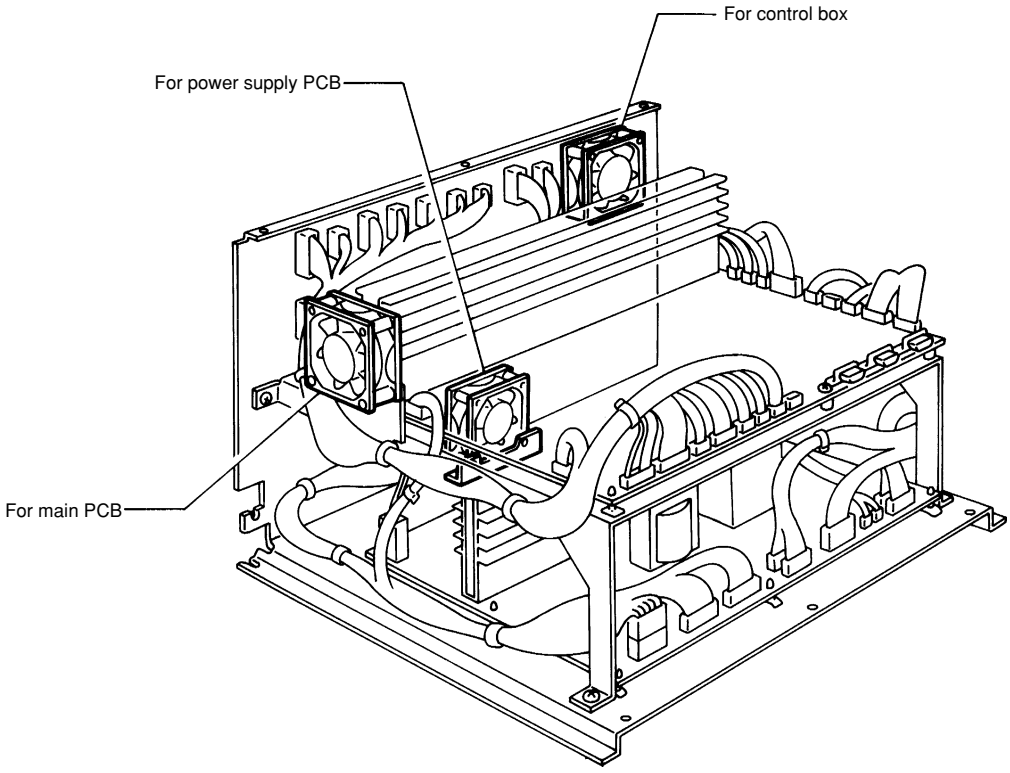
12. Replacing the thread trimming sensor PCB



1. Remove the five screws ❷. Remove the table cover ❶ by slowly pulling it upward.
2. Remove the screw ❹, TR dog plate ❸, and thread trimming sensor PCB ❺.
3. Remove the two screws ❻, and replace the thread trimming sensor PCB ❺ with a new one.
   * Reverse the above procedure for re-assembly.
4. After replacing the thread trimming sensor PCB, loosen the screw ❼, and turn on the power.
5. Move the connecting rod ❽ all the way in the direction of the arrow, and tighten the screw ❼.

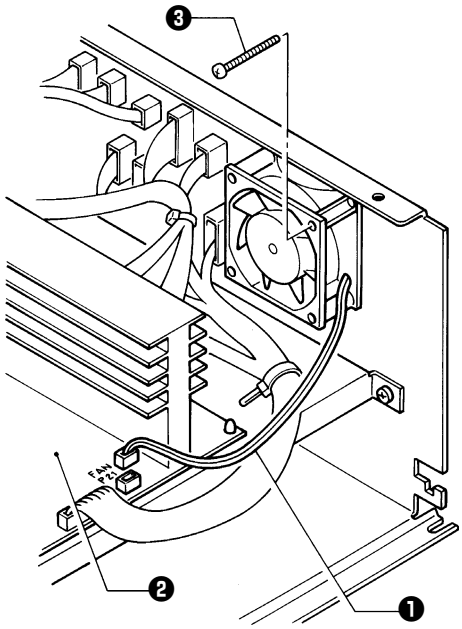
Note:
When removing and reattaching connectors, do not pull on the cables; hold the connectors.

13. Replacing the cooling fans



Note:
As to the control box, refer to "2-2. Removing and reattaching the control box cover."

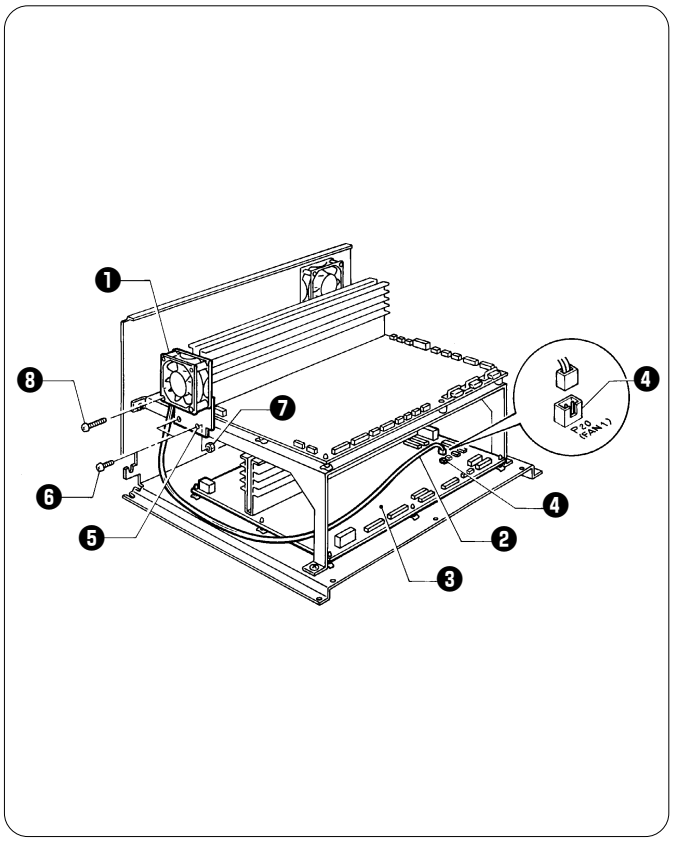
13-1. Replacing the control box fan



1. Remove the connector ❶ of the control box fan from P12 (FAN) on the main PCB ❷.
2. Remove the four screws ❸, and replace the control box fan with a new one.

* Reverse the above procedure for re-assembly.

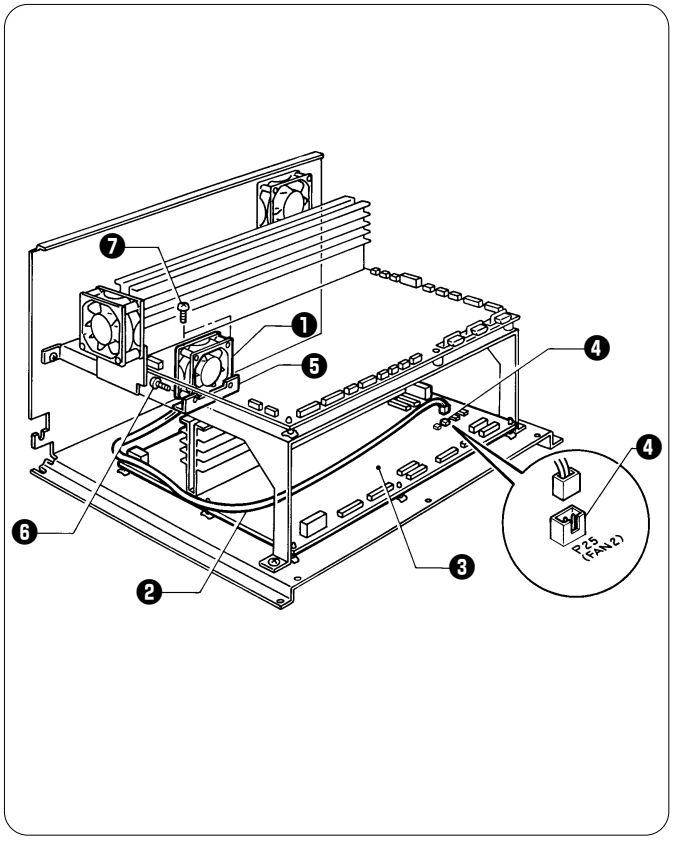
13-2. Replacing the main PCB fan



1. Remove the connector ❷ of the main PCB fan ❶ from P20 (FAN1) ❹ on the power supply PCB ❸.
2. Remove the two screws ❻ and the nut ❼ to separate the main PCB fan ❶ and the fan setting plate ❺ together.
3. Remove the two screws ❽, and replace the main PCB fan ❶ with a new one.

* Reverse the above procedure for re-assembly.

13-3. Replacing the power supply PCB fan

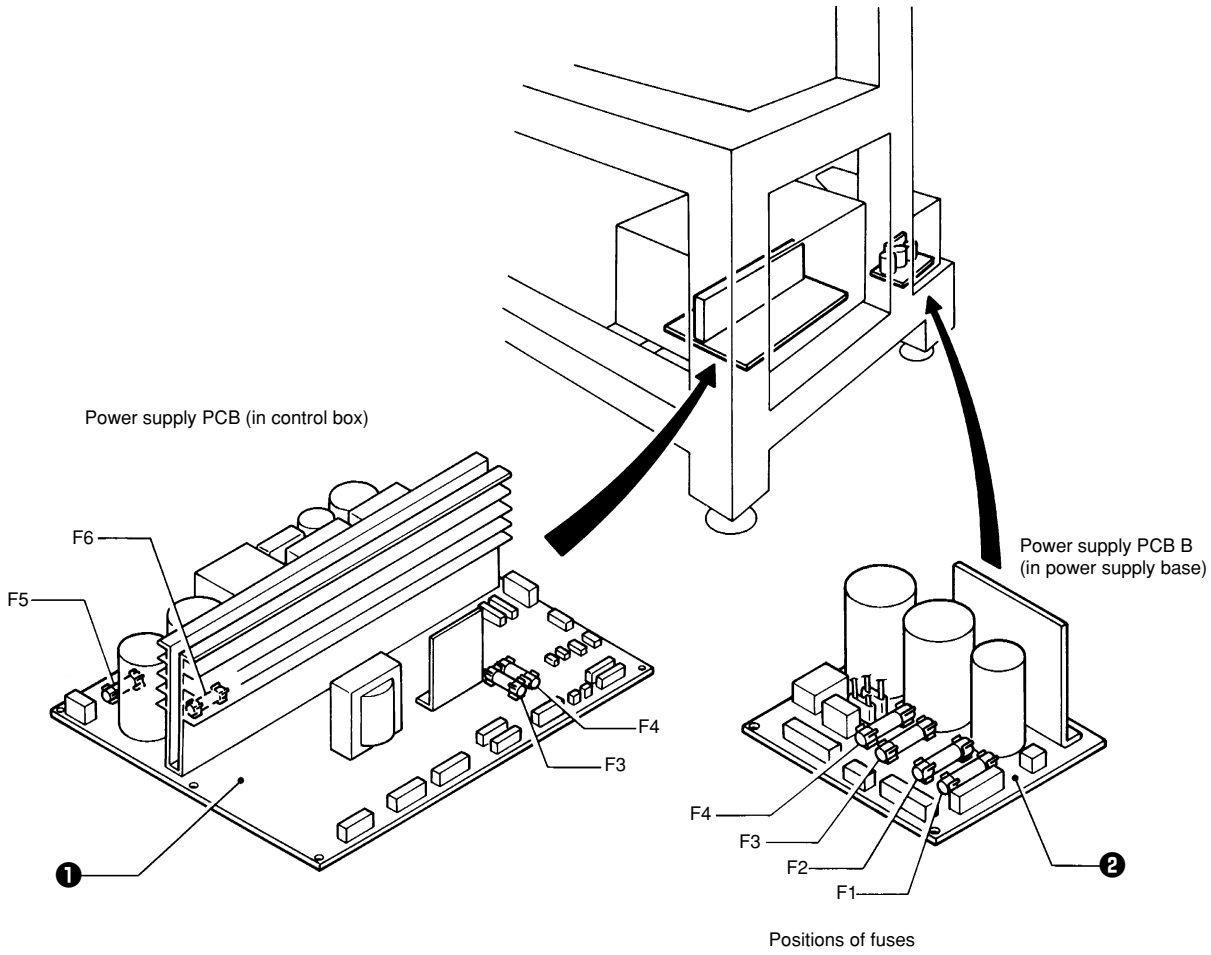


1. Remove the connector ❷ of the power supply PCB fan ❶ from P25 (FAN2) ❹ on the power supply PCB ❸.
2. Remove the two screws ❻ from the rear of the control box, and separate the power supply PCB fan ❶ and the fan setting plate ❺ together.
3. Remove the two screws ❼, and replace the power supply PCB fan ❶ with a new one.

* Reverse the above procedure for re-assembly.

14. Fuses

14-1. Fuse positions



Positions of fuses

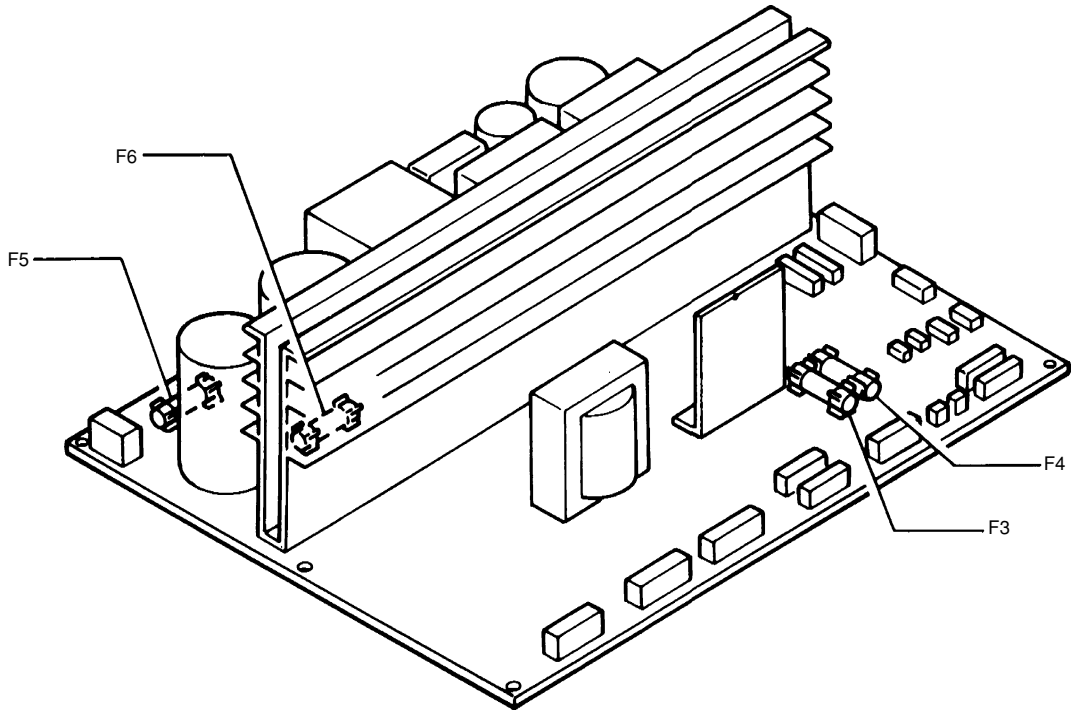
Notes:
- As to the control box, refer to "2-2. Removing and reattaching the control box cover."
- As to the leg cover and the power base cover, refer to "3-1. Removing and attaching the leg cover and the power supply base cover."

1. Fuses F3-F6 are mounted on the power supply PCB ❶ in the control box.
2. Fuses F1-F4 are mounted on power supply PCB ❷ in the power supply base.

Notes:
- Before replacing a fuse, be sure to turn off the power and wait for at least 5 minutes after the power plug has been removed from the socket.
- Be sure to use only fuses of authorized types and capacities.
- During replacement, tightly install each fuse into its socket.

14-2. Fuse type and capacity

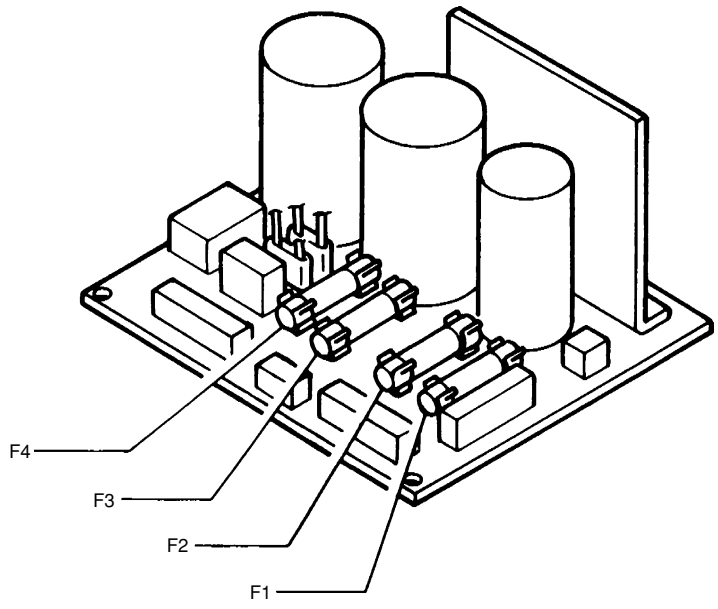
Fuses on the power supply PCB in the control box



Note:
Fuses F1 and F2 are not used.

No	Address	Fuse type and capacity	Part code	Remarks
1	F3	Glass tube fuse 0.2A/125V	S43643000	For RS232
2	F4	Glass tube fuse 1A/125V	S43642000	For RS232 and lower shaft fan
3	F5	Glass tube fuse 8A/250V (instantaneous fuse)	S43641000	For driving shaft motor
4	F6	Glass tube fuse 8A/250V (instantaneous fuse)	S43641000	+55V switching power supply (X and Y motors, Thread trimming motor, Hook motor)

Fuses on power supply PCB B in the power supply base



No.	Address	Fuse type and capacity	Part code	Remarks
5	F1	Glass tube fuse 8A/250V	620833080	For AC power supply This supplies AC power supply to the control box.
6	F2	Glass tube fuse 8A/250V	620833080	
7	F3	Glass tube fuse 8A/250V	620833080	+24 V power supply (Color change motor, presser foot motor, main shaft brake solenoid, fan in control box, lower shaft, thread trimming control power supply)
8	F4	Glass tube fuse 15A/250V	S02887000	+50V power supply (Jump solenoid, wiper solenoid)

14-3. Replacing the fuses

The following shows problems when a fuse has blown. (For reference when replacing fuses)

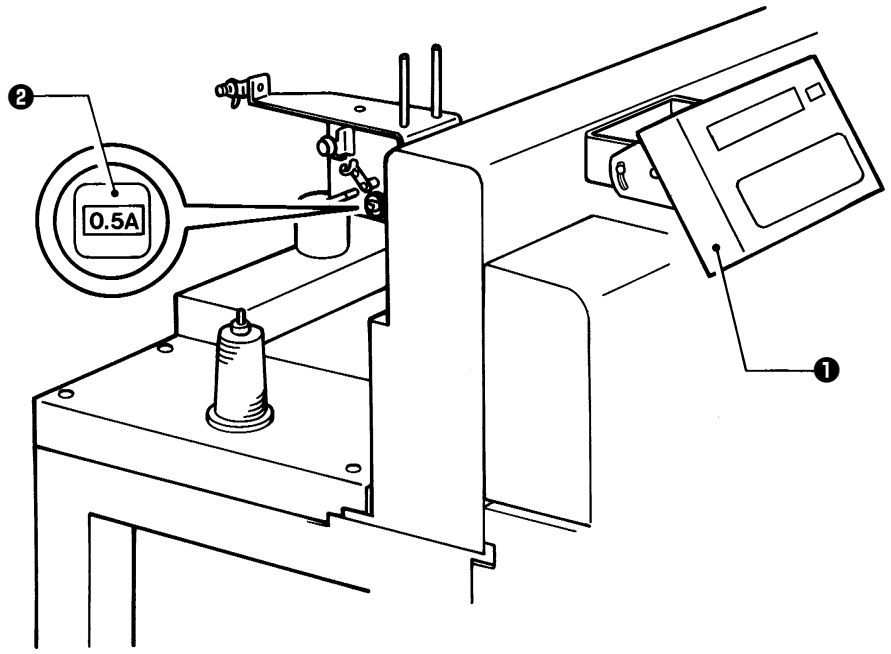
Fuses on the power supply PCB in the control box

No.	Fuses on the power supply PCB in the control box Problem
F3	The machine does not operate even if the power is turned on. The initial screen remains displayed.
F4	All lower shaft fans do not rotate. The machine does not operate even if the power is turned on. The initial screen remains displayed.
F5	The main shaft motor does not run. The message, "Main(Z) motor lock" is displayed.
F6	X axis, Y axis, and lower shaft do not move at all. Thread trimmer does not operate. The messages, "X-axis home position error" and "Thread trimming motor origin point error" are displayed.

Fuses on power supply PCB in the power supply base

No.	Fuses on power supply PCB B in the power supply base Problem
F1	Machine does not work even when power is turned on. LCD with backlighting is not lit.
F2	The same above
F3	Color change can not be done. Thread trimmer and lower shaft do not work. The messages, "Needle bar case lock", "Thread trimming motor origin point error", and "Presser foot down error" are displayed.
F4	Wiper and jump bracket do not work.

15. Handling the circuit protector of the bobbin winder (optional)

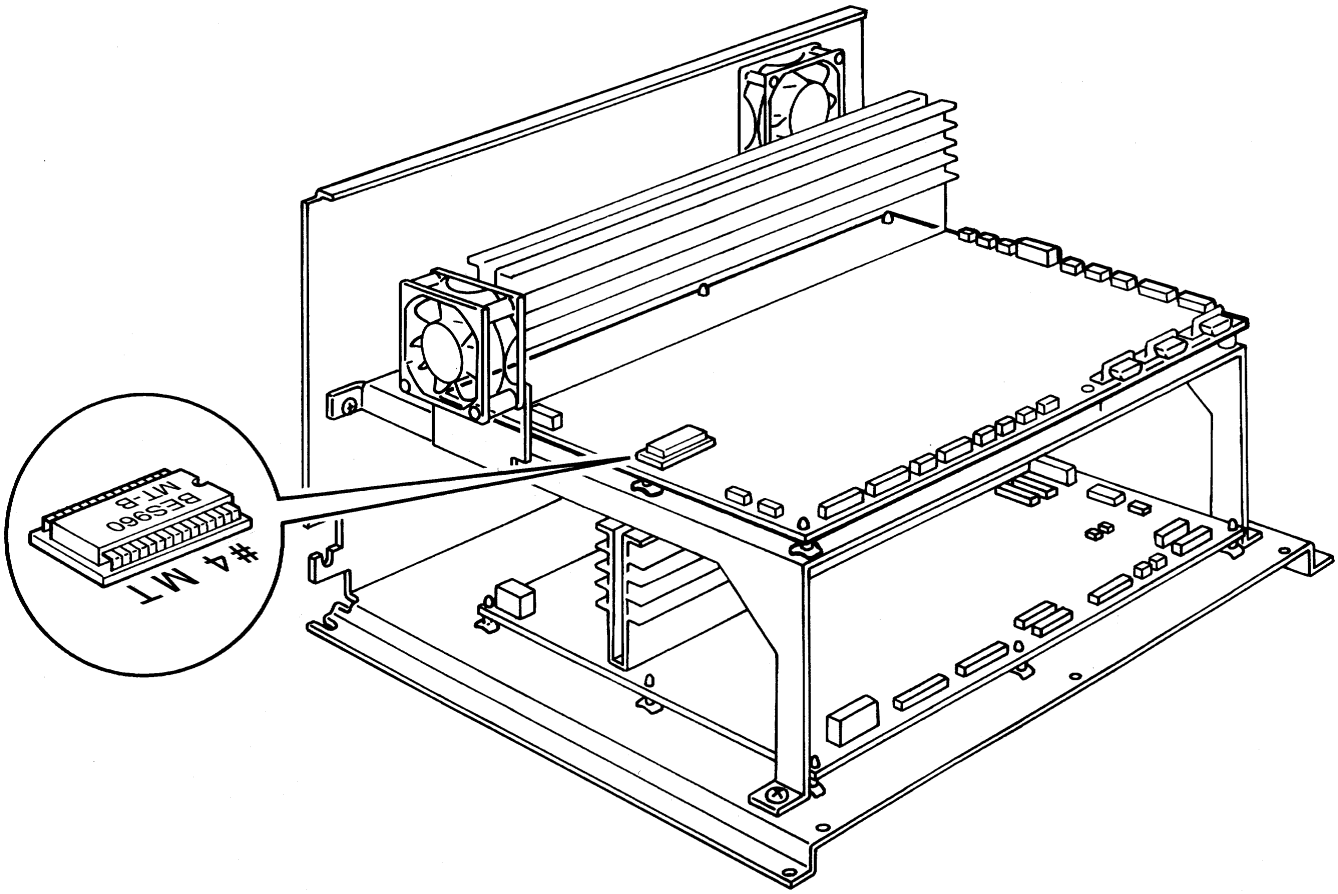


The bobbin winder is installed at the rear of the bridge which is attached to the operation panel ❶ (on the left head when viewed from the operator side).

Note:

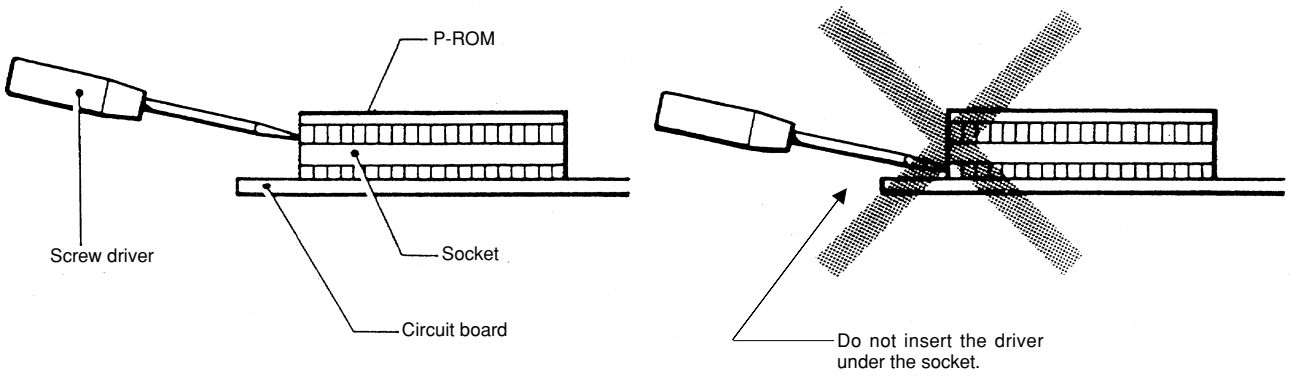
After the circuit protector ❷ has tripped, the bobbin winder motor will not rotate. Let the protector ❷ cool for a while before resetting it or it may trip again soon.

16. P-ROM position



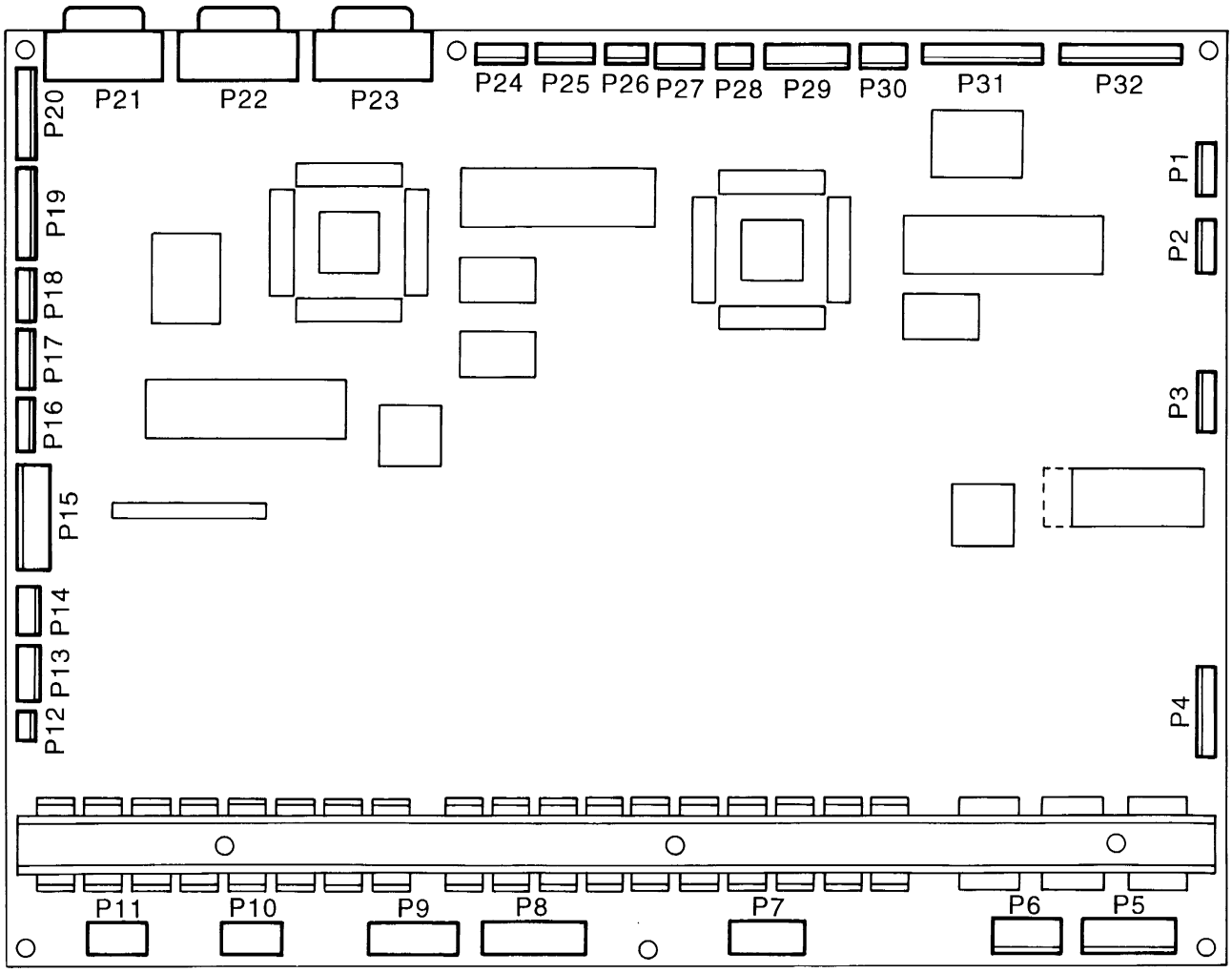
Notes:

- Be sure to turn off the power before replacement
- Use care when handling the PROMs. Make sure the pins are properly inserted in the sockets.
- Do not apply excessive force when mounting the PROM on the circuit board.
- Confirm that the PROMs are in the correct position and direction.
- Use ot 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.



17. Connectors

17-1. Main PCB connectors



Connectors on the main PCB

Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P1	Main PCB - Power supply PCB in control box (P27)	Main shaft brake Expansion signal	Main shaft brake remains locked.
P2	Main PCB - Bed retracting sensor	Bed retracting sensor	Red lamp is not lit even when HEAD switch is on (thread breakage sensor is activated). Heads No. 2, 4, and 6 are suspended. Presser foot does not retract.
P3	Not mounted	For testing	
P4	Main PCB - Power supply PCB in control box (P12)	Inverter control power supply	Error "Main(Z) motor lock" appears when embroidering is started.
P5	Main PCB - Main shaft motor	Main shaft motor output	Error "Main(Z) motor lock" appears when embroidering is started.
P6	Main PCB - Power supply PCB in control box (P19)	Main shaft motor power supply	Error "Main(Z) motor lock" appears when embroidering is started.
P7	Main PCB - Y motor	Y motor output	Error "Y-axis home position error" appears when power is turned on.
P8	Main PCB - X motor	X motor output	Error "X-axis stepping motor connector error" appears when power is turned on.
P9	Main PCB - Power supply PCB in control box (P3)	+55 V power supply (X and Y motors, and thread trimmer motor)	Error "Thread trimming motor origin point error" appears when power is turned on.
P10	Main PCB - Thread trimmer motor 1	Thread trimmer motor 1 output	Error "Thread trimming motor origin point error" appears when power is turned on.
P11	Main PCB - Thread trimmer motor 2	Thread trimmer motor 2 output	Error "Thread trimming motor origin point error" appears when power is turned on.
P12	Main PCB - Cooling fan in control box	Cooling fan power supply Cooling fan stop signal	Error "Exhaust fan motor stop" appears when power is turned on.
P13	Main PCB - BC PCB (P9)	Lower shaft drive signal	Error "Hook motor origin point error" appears when power is turned on.
P14	Main PCB - INDEX motor	INDEX motor output	Error "Needle bar case lock" appears when needle bar is changed for color change.

Connectors on the main PCB

Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P15	Main PCB - Power supply PCB in control box (P17)	Main PCB power supply	Nothing works.
P16	Main PCB - Power supply PCB in control box (P10)	Power supply control	Error "Power voltage upper limit error" appears when power is turned on.
P17	Unused	For lower shaft testing	
P18	Main PCB - Thread trimming sensor	Thread trimming sensor	Error "Thread trimming motor origin point error" appears when power is turned on.
P19	Main PCB - BC PCB 1 (P10) - BC PCB 2 (P10)	+5 V power supply Control signal	Error "Hook motor origin point error" appears when power is turned on.
P20	Main PCB - BC PCB 3 (P10)	+5 V power supply Control signal	Error "Hook motor origin point error" appears when power is turned on.
P21	Not connected (This is not used in this specification.)	For communication cable (SBUS)	
P22	Not connected (This is not used in this specification.)	For communication cable (SBUS)	
P23	Main PCB - Operation panel	For communication line (RS232C)	The machine does not work even if the power is turned on.
P24	Not mounted	For testing	
P25	Unuse	For testing	
P26	Main PCB - Needle position detection sensor - rotary encoder	Main shaft encoder Stop position sensor	Error "Main(Z) motor lock" appears when embroidering is started.
P27 P28	Main PCB - START-STOP switch	Start switch Stop switch	P27: Embroidering is not started even when start switch has pressed. P28: "Release stop SW to operate!" is indicated when power is turned on.
P29	Not connected (This is not used in this specification.)		
P30	Main PCB - Head PCB (P4)	Communication line	Error "Needle bar case lock" appears when power is turned on.

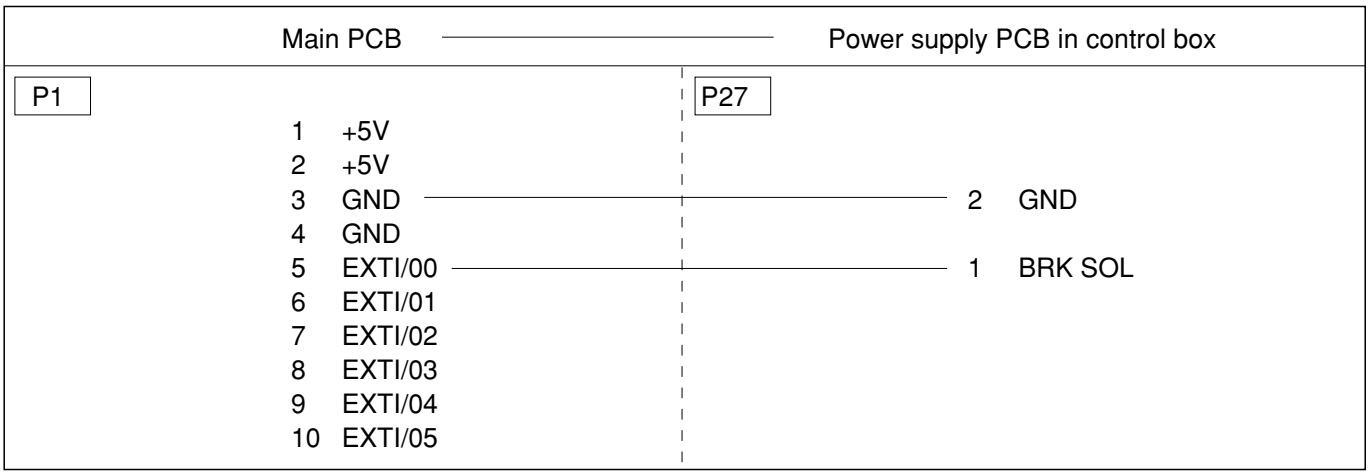
Connectors on the main PCB

Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P31	Main PCB - Y area sensor	Y home position sensor	Error "Y-axis home position error" appears when power is turned on.
P32	Main PCB - X area sensor	X home position sensor CAP limit sensor	Error "X-axis home position error" appears when power is tuned on.

Cable signals

Main PCB		Power supply PCB in control box	
P15		P17	
1	+24V	1	+24V
2	GND	2	SOV
3	+12V	3	+12V
4	GND	4	SOV
5	–12V	5	–12V
6	+5V	6	+5V
7	GND	7	SOV
P9		P3	
1	+Vm	1	+55V
2	+Vm	2	+55V
3		3	
4		4	
5	GND	5	POV
6	GND	6	POV
P6		P19	
1	GND	1	±0V
2	DC300V	2	DC300V
P4		P12	
1	VA	1	E20V
2	GA	2	E0V
3		3	
4	VB	4	F20V
5	GB	5	F0V
6		6	
7	VC	7	G20V
8	GC	8	G0V
9		9	
10	VN	10	H20V
11	GN	11	H0V
P16		P10	
1	ZCROSS	1	ZCROSS
2	DCMON	2	DCMON
3	GND	3	GND
4	IERR	4	IERR
5	FSTOP	5	FSTOP
6	P-OFF	6	P-OFF

Cable signals



Cable signals

Main PCB			PANEL BACK			LOCAL		
P32			32			X area sensor		
1	+5V	———	1	Vk	———	1	AN	
2	XINDEX	———	2	XINDEX	———	2	C	X
3	GND							
4	F 5V							
5	OVTR-X							
6	GND							
7	F 5V							
8	OVTR+X							
9	GND							
10	C 5V	———	3	Vk	———	1	AN	
11	COVTR-X	———	4	COVTR-X	———	2	C	-CX
12	GND							
13	C 5V	———	5	Vk	———	1	AN	
14	COVTR+X	———	6	COVTR+X	———	2	C	+CX
15	GND	———	7	GND	———	3	COMX,COM-CX,COM+CX	
			8					
P31			31			Y area sensor		
1	+5V		1	Vk		1	AN	
2	YINDEX		2	YINDEX		2	C	Y
3	GND		3	GND		3	COM	
4	F 5V		4	Vk				
5	OVTR-Y		5	OVTR-Y				
6	GND		6	GND				
7	F 5V		7	Vk				
8	OVTR Y		8	OVTR+Y				
9	GND		9	GND				
10	C 5V		10	Vk				
11	COVTR-Y		11	COVTR-Y				
12	GND		12	GND				
13	C 5V		13	Vk				
14	COVTR+Y		14	COVTR+Y				
15	GND		15	GND				
			16					
P26			26			Rotary encoder		
1	A		1	A	———	1	A	
2	B		2	B	———	6	B	
3	Z		3	Z	———	3	Z	
4	+5V		4	+5V	———	4	+5V	
5	GND		5	GND	———	5	GND	
6						Needle position detection sensor		
7	+5V	———	6	Vk	———	1	AN	
8	NLUP	———	7	NLUP	———	2	C	
9	GND	———	8	GND	———	3	COM	

Cable signals

Main PCB	PANEL BACK	LOCAL
P14 1 OUT1 2 OUT2 3 OUT3 4 OUT4	C 1 OUT1 2 OUT2 3 OUT3 4 OUT4	INDEX motor (color change motor) 1 A Orange 2 $\overline{A}$ Blue 3 B Red 4 $\overline{B}$ Yellow
Power supply PCB in control box P6 1 +24V 2 3 GND	6 1 +24V 2 GND	Bobbin winder motor 1. +24V White 2. GND Black
Main PCB P5 1 U 2 V 3 W	M 1 U 2 V 3 W 4 E	Machine motor 1 U Red 2 V White 3 W Black 4 E Yellow/Green
P8 1 A 2 B 3 C 4 D 5 E 6 CONNECT 7 GND	X 1 A 2 B 3 C 4 D 5 E 6 CONNECT 7 GND 8	X motor (two) 1 A Black 2 B Red 3 C Orange 4 D Yellow 5 E Blue 6 CNT 7 8
P7 1 A 2 B 3 C 4 D 5 E	Y 1 A 2 B 3 C 4 D 5 E 6	Y motor 1 A Black 2 B Red 3 C Orange 4 D Yellow 5 E Blue 6

Main PCB	PANEL BACK	Head PCB (No.2 ~ 6)		Head PCB (No.1)	
P30 1 DATA+ 2 DATA— 3 CLK+ 4 CLK—	30 1 SDT 2 $\overline{SDT}$ 3 SCK 4 $\overline{SCK}$	P4 1 SDT 2 $\overline{SDT}$ 3 SCK 4 $\overline{SCK}$	P6 1 SDT 2 $\overline{SDT}$ 3 SCK 4 $\overline{SCK}$	P4 1 SDT 2 $\overline{SDT}$ 3 SCK 4 $\overline{SCK}$	P6 1 SDT 2 $\overline{SDT}$ 3 SCK 4 $\overline{SCK}$

Cable signals

Main PCB		PANEL BACK		LOCAL	
P27		27		START–EM switch	
1	START	1	START	1	START
2	GND	2	GND	2	GND
3	STOP	3	STOP		
4	GND	4	GND		
P28					
1	N. C.	5	N. C.	3	N. C.
2	N. O	6	N. O	4	N. O
3	COM	7	COM	5	GND
P29		29		Operation panel	
1	DATA+	1	SDT		
2	DATA–	2	SDT		
3	CLK+	3	SCK		
4	CLK–	4	SCK		
5	+5V	5	+5V		
6	GND	6	GND		
7	STOP	7	STOP		
8	GND	8	GND		
		9			
		10	FG		
P2		2		Bed retracting sensor	
1	Vk	1	Vk	1	AN
2	BED1	2	BED1	2	C
3	GND	3	GND	3	COM
4	Vk	4	Vk	1	AN
5	BED2	5	BED2	2	C
6	GND	6	GND	3	COM
7	Vk	7	Vk	1	AN
8	BED3	8	BED3	2	C
9	GND	9	GND	3	COM
10	Vk	10			
11	BED4	11			
12	GND	12			

Main PCB		PANEL BACK		BC PCB(No2,3)			BC PCB(No1)		
P13		13		P8		P9	P8		P9	
1	+24V	1	+24	1	+24V	1 +24V	1	+24V	1	+24
2	BCLK	2	BCLK	2	CLK0	2 CLK1	2	CLK0	2	CLK1
3	BDIR	3	BDIR	3	DIR0	3 DIR1	3	DIR0	3	DIR1
4	BSAV	4	BSAV	4	SAY0	4 SAV1	4	SAV0	4	SAV1
5	BBRK	5	BBRK	5	BRK0	5 BRK1	5	BRK0	5	BRK1
		6		6	GND		6	GND		

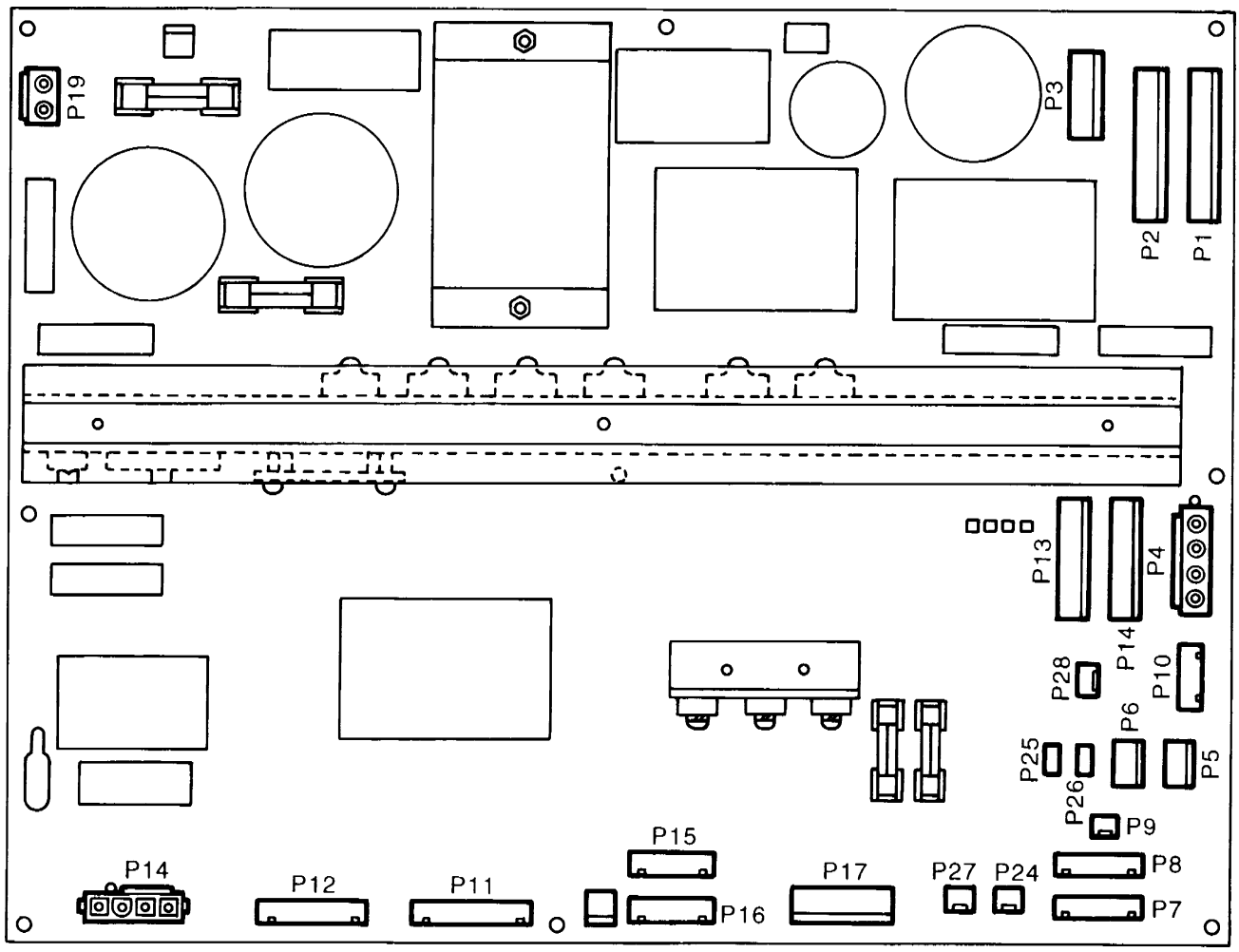
Cable signals

Main PCB		Panel back		BC PCB	
P19		19A		P10	
1	+5V	1	+5V	1	+5V
2	GND	2	GND	2	GND
3	$\overline{\text{BSEL}}$	3	$\overline{\text{BSEL0}}$	3	LENB
4	BENCA	4	BENCA0	4	LOUTA
5	BENCB	5	BENCB0	5	LOUTB
6	+5V	6	+5V	6	+5V
7	GND	7	GND	7	GND
8	$\overline{\text{BSEL}}$	8	$\overline{\text{BSEL1}}$	8	RENB
9	BENCA	9	BENCA1	9	ROUTA
10	BENCB	10	BENCB1	10	ROUTB
11	EMGX	11	EMGX	11	EMG
12	+5V	1	+5V	1	+5V
13	GND	19B 2	GND	P10 2	GND
14	$\overline{\text{BSEL}}$	3	$\overline{\text{BSEL2}}$	3	LENB
15	BENCA	4	$\overline{\text{BENCA2}}$	4	LOUTA
16	BENCB	5	$\overline{\text{BENCB2}}$	5	LOUTB
17	+5V	6	+5V	6	+5V
18	GND	7	GND	7	GND
19	$\overline{\text{BSEL}}$	8	$\overline{\text{BSEL3}}$	8	RENB
20	BENCA	9	BENCA3	9	ROUTA
21	BENCB	10	BENCB3	10	ROUTB
22	EMGY	11	EMGY	11	EMG
P20		A20		P10	
1	+5V	1	+5V	1	+5V
2	GND	2	GND	2	GND
3	$\overline{\text{BSEL}}$	3	$\overline{\text{BSEL4}}$	3	LENB
4	BENCA	4	BENCA4	4	LOUTA
5	BENCB	5	BENCB4	5	LOUTB
6	+5V	6	+5V	6	+5V
7	GND	7	GND	7	GND
8	$\overline{\text{BSEL}}$	8	$\overline{\text{BSEL5}}$	8	RENB
9	BENCA	9	BNCA5	9	ROUTA
10	BENCB	10	BENCB5	10	ROUTB
11	EMGX	11	EMGX	11	EMG
12	+5V				
13	GND				
14	$\overline{\text{BSEL}}$				
15	BENCA				
16	BENCB				
17	+5V				
18	GND				
19	$\overline{\text{BSEL}}$				
20	BENCA				
21	BENCB				
22	EMGY				

Cable signals

Main PCB		Panel back			
P18		18		Thread trimming sensor	
1	Vk	1	Vk	1	AN
2	TSENS1	2	TSENS1	2	C
3	GND	3	GND	3	COM
4	Vk	4	Vk	1	AN
5	TSENS2	5	TSENS2	2	C
6	GND	6	GND	3	COM
7	Vk	7			
8	TSENS3	8			
9	GND	9			
10	Vk	10			
11	TSENS4	11			
12	GND	12			
P10		T		Thread trimming motor	
1	A+	1	A+	1	A Orange
2	A–	2	A–	2	$\overline{A}$ Blue
3	B+	3	B+	3	B Red
4	B–	4	B–	4	$\overline{B}$ Yellow
P11					
1	A+	5	A+	1	A Orange
2	A–	6	A–	2	$\overline{A}$ Blue
3	B+	7	B+	3	B Red
4	B–	8	B–	4	$\overline{B}$ Yellow

17-2. Connectors in power supply PCB in the control box



Power supply PCB in control box

Connector No.	Connecting point		Drive signal	Symptoms resulting from improper connection or breakage
P1 P2	Power supply PCB - BC PCB		Power supply for +55V (lower shaft motor) and +12V (lower shaft fan)	Error "Hook motor origin point error" appears when power is turned on.
P3	Power supply PCB - Main PCB (P9)		+55V power supply (X and Y motors, and thread trimming motor)	Error "Thread trimming motor origin point error" appears when power is tuned on.
P4	Power supply PCB - Power supply PCB B in power supply base (P6)		+50V power supply	Needle bar does not jump. Wiper does not work.
P5	Power supply PCB - Power supply PCB B in power supply base (P1)		+24V power supply	Error "Power supply frequency error" "Exhaust fan motor stop" or "Cooling fan motor stop" appears when power is turned on. And "Exhaust fan motor stop" appears finally.
P6	Power supply PCB in control box - Bobbin winder motor		+24V power supply	Bobbin can not be wound when bobbin winder motor is connected.
P7 P8	Power supply PCB - Head PCB		+24V power supply	Error "Presser foot down error" appears when power is turned on.
P9	Unused		+24V power supply for expansion	
P10	Power supply PCB - Main PCB (P16)		Power supply control	Error "Power voltage upper limit error" appears when power is turned on.
P11	Power supply PCB - Transformer 729VA		AC 14 V	Error "Main(Z) motor lock" appears when embroidering is started.
P12	Power supply PCB - Main PCB (P12)		Inverter control power supply	Error "Main(Z) motor lock" appears when embroidering is started.
P13 P14	Power supply PCB - Head PCB		+50V power supply	Needle bar does not jump. Wiper does not work.
P15 P16	Power supply PCB	Head PCB	+5V power supply	Error "Needle bar case lock" "Presser foot down error" appears when power is turned on.
		Panel PCB	+5V power supply	Backlighting LCD does not light.
P17	Power supply PCB - Main PCB		Main PCB power supply (+5V, ±12V, +24V)	Nothing works.
P18	Power supply PCB - Power supply PCB B in power supply base (P2)		AC 200 V power supply	Nothing works. Backlighting LCD does not light.
P19	Power supply PCB - Main PCB (P6)		Main shaft motor power supply (+300V)	Error "Main(Z) motor lock" appears when embroidering is started.

Power supply PCB in control box

Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P20	Power supply PCB - Cooling fan 1	Cooling fan power supply Cooling fan stop signal	Error "Cooling fan motor stop" appears when power is turned on.
P25	Power supply PCB- Cooling fan 2	Cooling fan power supply Cooling fan stop signal	Error "Cooling fan motor stop" appears when power is turned on.
P26	Power supply PCB - Power supply PCB B in power supply base (P7)	Power cut detection input	Error "Power supply frequency error" appears when power is turned on.
P27	Power supply PCB - Main PCB (P1)	Main shaft brake signal	Driving shaft stop position is apt to be improper. Error "Needle stop position error" appears.
P28	Power supply PCB - Main shaft brake solenoid	Main shaft brake solenoid output	The same above

Cable signals

Power supply PCB in control box						PANEL BACK	Head PCB
P7	P8	P13	P14	P15	P16	1H	P12
		1 DC50V				1 Vmm	1 Vmm
		,,				2 Vmm	2 Vmm
		5 GND				3 POV	3 POV
		,,				4 POV	4 POV
1 DC24V						5 +24V	5 +24V
5 GND						6 24VGND	6 24VGND
				5 GND		7 GND	8 GND
				1 +5V		8 +5V	7 +5V
						2H	P12
		2 DC50V				1 Vmm	1 Vmm
		,,				2 Vmm	2 Vmm
		6 GND				3 POV	3 POV
		,,				4 POV	4 POV
2 DC24V						5 +24V	5 +24V
6 GND						6 24VGND	6 24VGND
				6 GND		7 GND	8 GND
				2 +5V		8 +5V	7 +5V
						3H	P12
		3 DC50V				1 Vmm	1 Vmm
		,,				2 Vmm	2 Vmm
		7 GND				3 POV	3 POV
		,,				4 POV	4 POV
3 DC24V						5 +24V	5 +24V
7 GND						6 24VGND	6 24VGND
				7 GND		7 GND	8 GND
				3 +5V		8 +5V	7 +5V
						4H	P12
		4 DC50V				1 Vmm	1 Vmm
		,,				2 Vmm	2 Vmm
		8 GND				3 POV	3 POV
		,,				4 POV	4 POV
4 DC24V						5 +24V	5 +24V
8 GND						6 24VGND	6 24VGND
				8 GND		7 GND	8 GND
				4 +5V		8 +5V	7 +5V
						5H	P12
			1 DC50V			1 Vmm	1 Vmm
			,,			2 Vmm	2 Vmm
			5 GND			3 POV	3 POV
			,,			4 POV	4 POV
	1 DC24V					5 +24V	5 +24V
	5 GND					6 24VGND	6 24VGND
					5 GND	7 GND	8 GND
					1 +5V	8 +5V	7 +5V

Cable signals

Power supply PCB in control box						PANEL BACK	Head PCB
P7	P8	P13	P14	P15	P16	6H	P12
			2 DC50V			1 Vmm	1 Vmm
			,,			2 Vmm	2 Vmm
			6 GND			3 POV	3 POV
			,,			4 POV	4 POV
	1 DC24V					5 +24V	5 +24V
	5 GND					6 24VGND	6 24VGND
					6 GND	7 GND	8 GND
					2 +5V	8 +5V	7 +5V
							Panel PCB
						8H	
					7, 8	7 GND	GND
					3, 4	8 +5V	+5V

Cable signals

Power supply PCB in control box			PANEL BACK			BC PCB	
P1			1			P4	
1	+55V	———	1	+55V	———	1	+Vmm
2	+55V		2	+55V		2	+Vmm
5	+12V		3	+12V		3	+12V
7	POV		4	GND		4	GND
8	POV		5	GND		5	GND
3	+55V		6	+55V		P4	
4	+55V		7	+55V		1	+Vmm
6	+12V		8	+12V		2	+Vmm
9	POV		9	GND		3	+12V
10	POV		10	GND		4	GND
						5	GND
P2			2			P4	
1	+55V		1	+55V		1	+Vmm
2	+55V		2	+55V		2	+Vmm
5	+12V		3	+12V		3	+12V
7	POV		4	GND		4	GND
8	POV		5	GND		5	GND
3	+55V		6				
4	+55V		7				
6	+12V		8				
9	POV		9				
10	POV		10				

Power supply PCB in control box			PANEL BACK			Power supply PCB B in power supply base	
P5			5			P1	
1	DC24V	———	1	DC24V	———	1	DC24V
2							
3	GND		2	GND		2	GND
P4			4			P6	
1	DC50V	———	1	DC50V	———	1	DC50V
2	DC50V		2	DC50V		4	DC50V
3	GND		3	0V		3	GND
4	GND		4	0V		6	GND
						2	
						5	
						Transformer	
P11			11				
1	AC14V	———	1	AC14V	———	10	AC14V
2	0V		2	0V		11	0V
3							
4	AC14V					12	AC14V
5	0V		3	AC14V		13	0V
6			4	0V			
7	AC14V		5	AC14V		14	AC14V
8	0V		6	0V		15	0V
9							
10	AC14V		7	AC14V		16	AC14V
11	0V		8	0V		17	0V

Cable signals

Power supply PCB in control box		PANEL BACK		Power supply PCB in control box	
P18		18		P2	
1	AC200V	1	AC200V	1	AC200V
2	AC200V	2	AC200V	2	AC200V
		3		3	
3	FG	4	E	4	FG
P28		20B		Pulley stop solenoid	
1	+24V	1	SOL	1	+
2	0V	2	0V	2	—
				Power supply PCB B in power supply base	
P26				P7	
1	AC18V	3	AC18V	1	AC18VO
2					
3	AC18V	4	AC18V	2	AC18VO

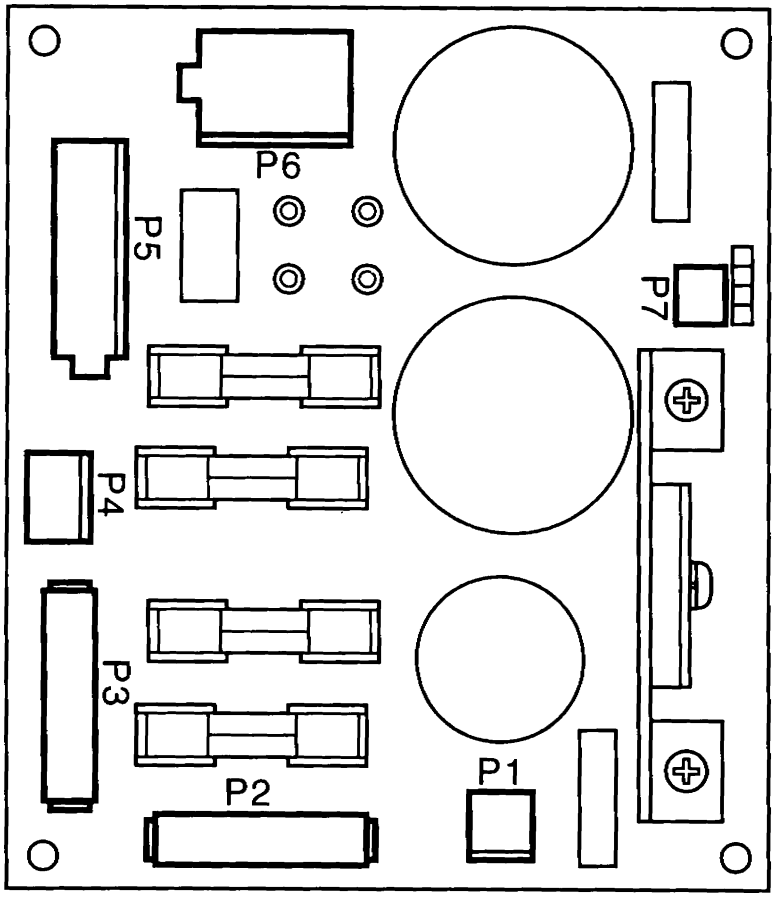
Power supply PCB B in power supply base		Bridge diode
P14	+Red	+
P13	—Black	—
P12	~White	~
P11	~White	~

P5		Transformer
1	AC39V	AC39V
2	AC39V	AC39V
3	0V	0V
4	0V	0V

P4		
1	AC18V	AC18V
2		
3	0V	0V

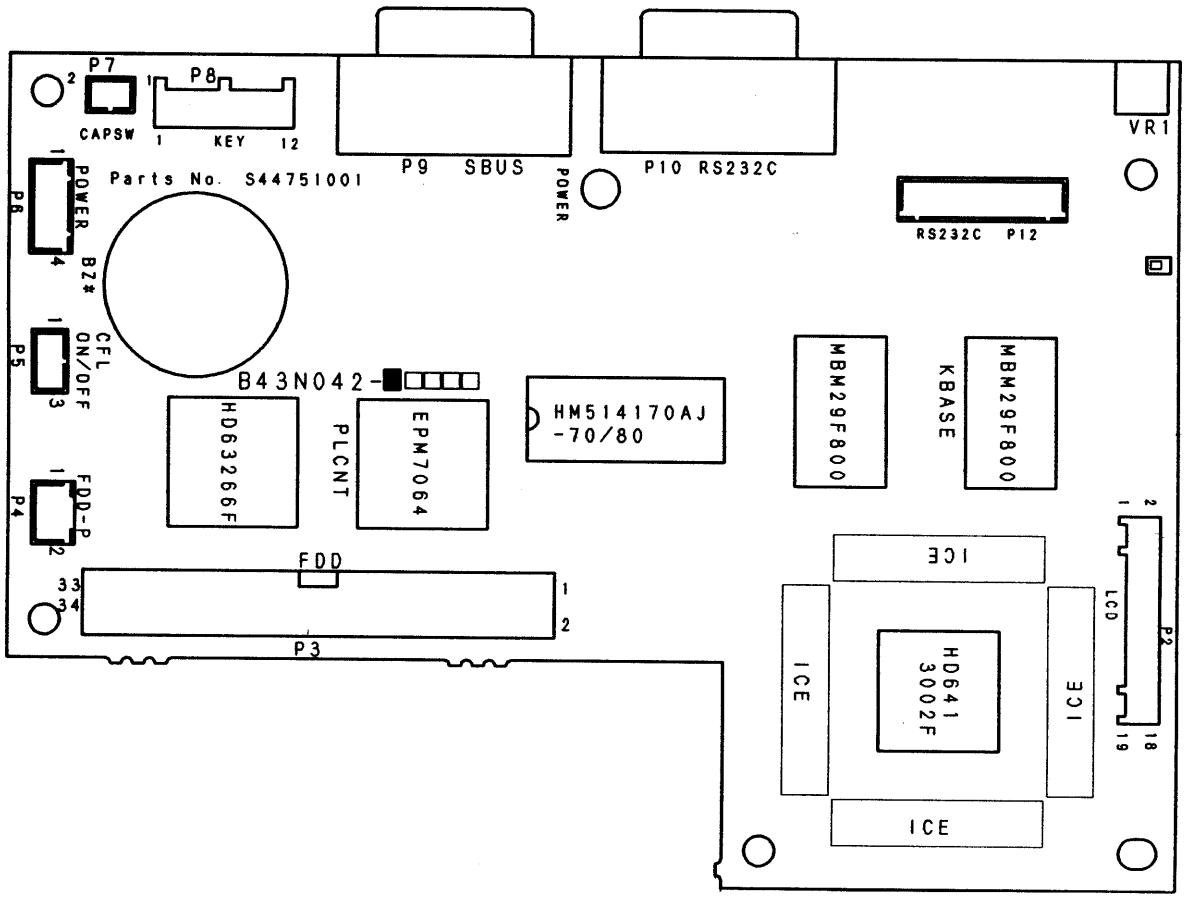
P3		Noise filter
1		3
2		4
3		
4		

17-3. Connectors in power supply PCB B in power supply base



Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P1	Power supply PCB B - Power supply PCB in control box (P5)	+24V power supply	Error "Power supply frequency error" "Exhaust fan motor stop" or "Cooling fan motor stop" appears when power is turned on.
P2	Power supply PCB B - Power supply PCB in control box (P18)	AC200V power supply	Nothing works. Backlighting LCD does not light.
P3	Power supply PCB B - Noise filter 3.4	AC power supply input	Nothing works. Backlighting LCD does not light.
P4	Power supply PCB B - Transformer	AC18V input	Error "Power supply frequency error" "Exhaust fan motor stop" or "Cooling fan motor stop" appears when power is turned on.
P5	Power supply PCB B in power supply base - Transformer	AC39V input	Needle bar does not jump. Wiper does not work.
P6	Power supply PCB B - Power supply PCB in control box (P4)	DC50V output	The same above
P7	Power supply PCB B - Power supply PCB in control box (P26)	Power cut detection	Error "Power supply frequency error" appears when power is turned on.

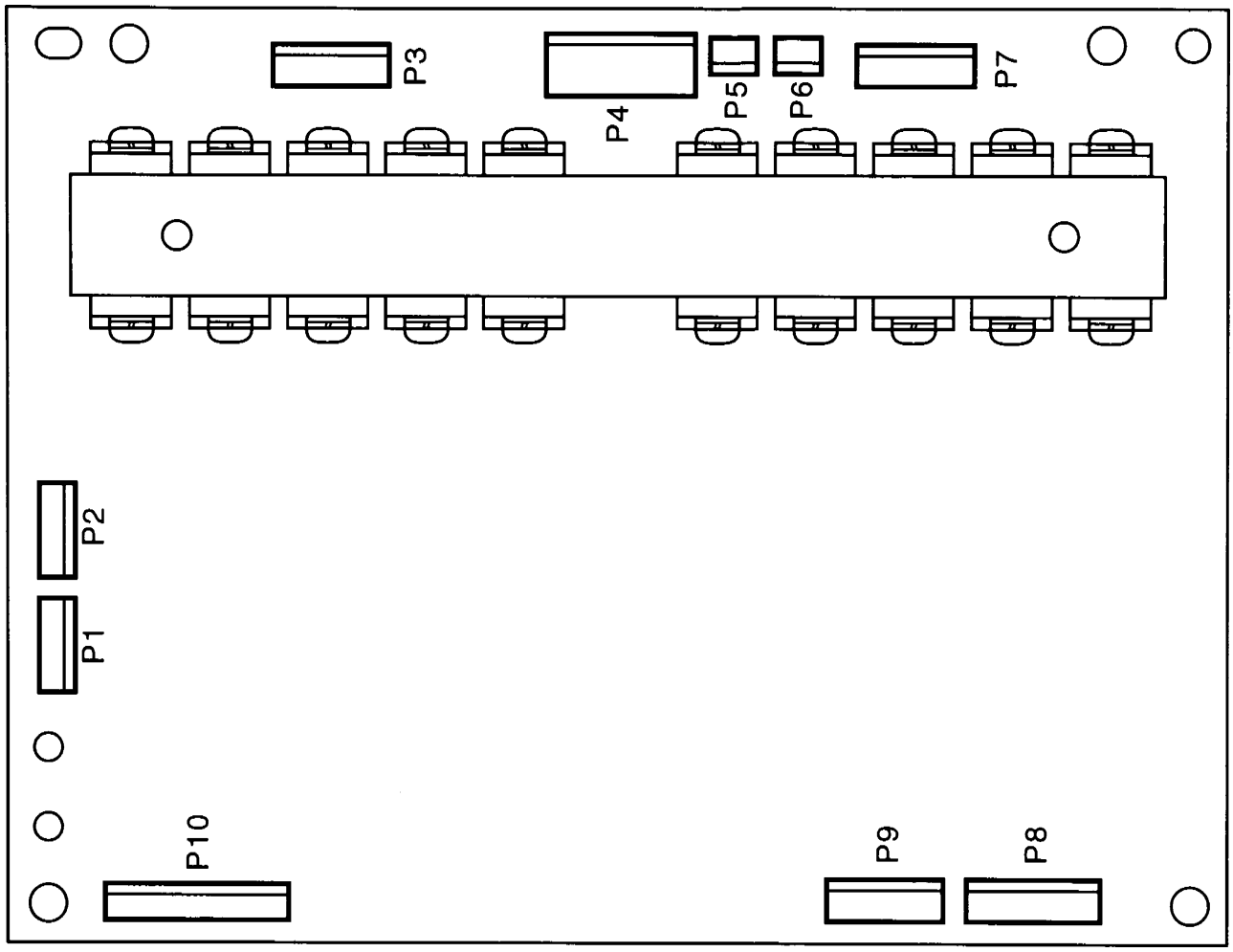
17-4. Connector in panel PCB



Connector No.	Connecting point	Main signals	Symptoms resulting from improper connection or breakage
P1	Not used		
P2	LCD unit (LCD)	Control signal	The floppy disk cannot be read.
P3	Floppy disk drive	Control signal	Nothing is displayed on LCD.
P4	Floppy disk drive	+5V power supply	The floppy disk cannot be read.
P5	Power PCB for backlighting	+5V power supply Backlight ON/OFF signal	Backlighting LCD does not light.
P6	Control box	+5V power supply	Backlighting LCD does not light. Nothing is displayed on LCD.
P7	Switch for cap frame	+5V power supply	The setting is not switched to the hat hoop even if the power is turned on after it is switched to the hat hoop side.

Connector No.	Connecting point	Main signals	Symptoms resulting from improper connection or breakage
P8	Sheet key switch	Switch signals	Key operation is disabled.
P9	Not used (This is not used in this specification.)		
P10	Not connected (This is used when connecting to the PC.)	RS232C	
P11	Not connected	RS232C	
P12	Main PCB	RS232C	The initial screen remains displayed.
P13~P16	Not connected		

17-5. Connectors in BC PCB

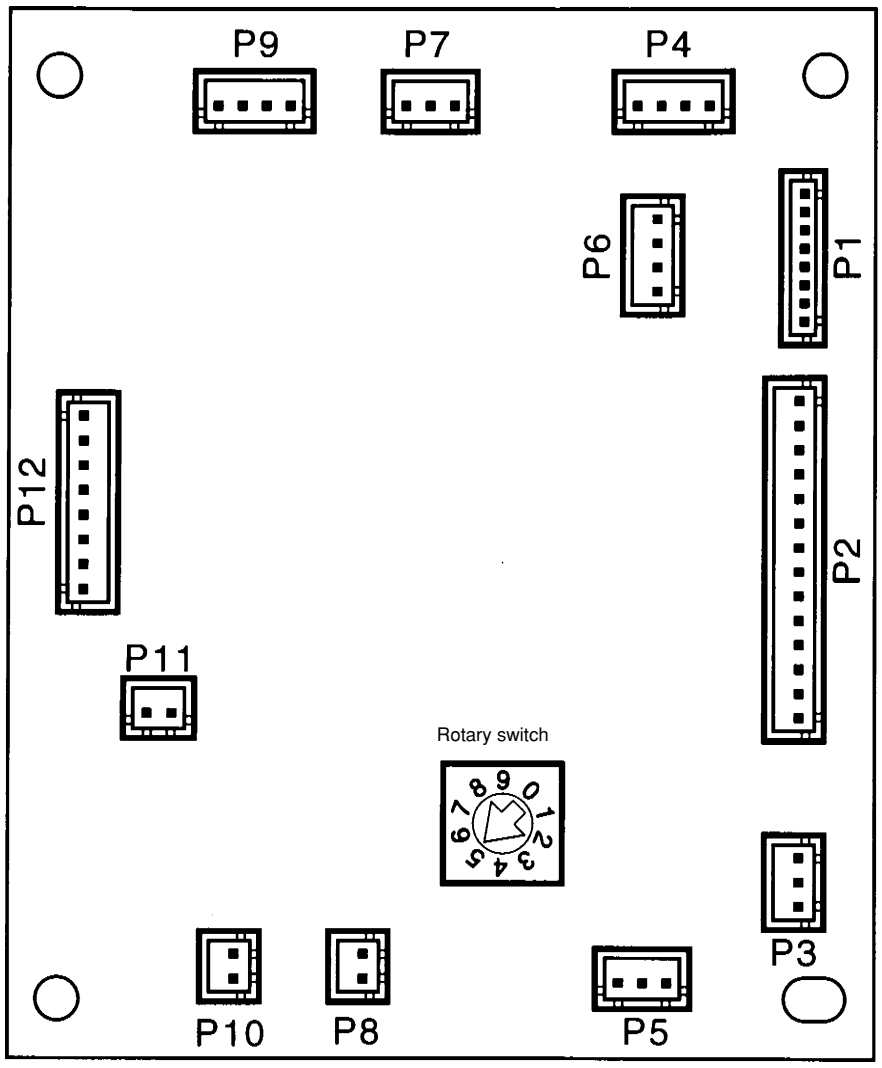


Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P1	BC PCB - Fixed bed lower shaft sensor	Lower shaft encoder input Thermister input	Error "Hook motor origin point error" appears when power is turned on.
P2	BC PCB - Retracting bed lower shaft sensor	Lower shaft encoder input Thermister input	Error "Hook motor origin point error" appears when power is turned on.
P3	BC PCB - Fixed bed lower shaft stepping motor	Motor output	Error "Hook motor origin point error" appears when power is turned on.
P4	BC PCB - Power supply PCB in control box	+55V power supply +12V power supply	Error "Hook motor origin point error" appears when power is turned on.
P5	BC PCB - Fixed bed DC fan motor	Fan power supply	Error "Thread jammed in rotary hook" or "Hook motor overheat error" appears when power is turned on.
P6	BC PCB - Retracting bed DC fan motor	Fan power supply	Error "Thread jammed in rotary hook" or "Hook motor overheat error" appears when power is turned on.
P7	BC PCB - Retracting bed lower shaft stepping motor	Motor output	Error "Hook motor origin point error" appears when power is turned on.
P8	BC PCB - Main PCB or next BC PCB	Common control signal	Error "Hook motor origin point error" appears when power is turned on.
P9	BC PCB - Next BC PCB or terminal harness	Common control signal	Error "Hook motor origin point error" appears when power is turned on.
P10	BC PCB - Main PCB	+5V power supply Control signal	Error "Hook motor origin point error" appears when power is turned on.

Cable signals

BC PCB					
P1			BC sensor PCB (thermister)		
	1	BENCA		1	PH1
	2	BENCB		2	PH2
	3	GND		3	0V
	4	BTHM		4	THM
	5	+5V		5	+5V
P2			BC sensor PCB (thermister)		
	1	BENCA		1	PH1
	2	BENCB		2	PH2
	3	GND		3	0V
	4	BTHM		4	THM
	5	+5V		5	+5V
P3 (LMOTOR)			Lower shaft motor		
	1	A		1	Black
	2	B		2	Blue
	3	C		3	Yellow
	4	D		4	Orange
	5	E		5	Red
P7 (RMOTOR)			Lower shaft motor		
	1	A		1	Black
	2	B		2	Blue
	3	C		3	Yellow
	4	D		4	Orange
	5	E		5	Red
P5 (LFAN)			Lower shaft DC fan motor		
	1	+12V		1	White +12V (red)
	2	GND		2	Black GND (black)
P6 (RFAN)			Lower shaft DC fan motor		
	1	+12V		1	White +12V (red)
	2	GND		2	Black GND (black)

17-6. Connectors in head PCB



■ Rotary switch is used by setting it to the same number as the head to be used (1-6).

Connector No.	Connecting point	Drive signal	Symptoms resulting from improper connection or breakage
P1	Head PCB - Head switch PCB	Head switch POWER LED	Head switch malfunctions. Head LED is not lit.
P2	Head PCB - TR breakage sensor PCB	Sensor selection signal Sensor signal	Thread breakage detection often happens.
P3	Head PCB - Pressor foot switch	Presser foot switch	When presser foot rises, a strange sound is made, and error "Presser foot down error" appears.
P4	Head PCB - Main PCB or next head PCB	Communication line	Error "Needle bar case lock" appears when power is turned on.
P5	Head PCB - Wiper sensor	Wiper sensor	When wiper has not retracted properly, it is not regarded as an error.
P6	Head PCB - Next head PCB or terminal harness	Communication line	Error "Needle bar case lock" appears when power is turned on.
P7	Head PCB - Needle position detection sensor (for head No.1 only: unused for other heads.)	Potentiometer	Error "Needle bar case lock" appears when power is turned on.
P8	Not connected	For expansion Solenoid output	
P9	Head PCB - Presser foot motor	Presser foot motor output	Error "Presser foot down error" appears when power is turned on.
P10	Head PCB - Jump solenoid	Jump solenoid output	Needle bar does not jump.
P11	Head PCB - Wiper solenoid	Wiper solenoid output	Wiper does not work. Note: No error code appears.
P12	Head PCB - Power supply PCB in control box	+50V, +24V, +5V power supply	Error "Presser foot down error" appears when power is turned on.

Cable signals

Head PCB

P7 (INDEX)		Needle bar position sensor	
1	+5V	1	+5V
2	INDEX	2	SIG
3	GND	3	GND

P9 (F-PM)		Presser foot motor		
1	A	1	B	Red
2	$\overline{A}$	2	$\overline{B}$	Yellow
3	B	3	$\overline{A}$	Blue
4	$\overline{B}$	4	A	Orenge

P-1 (H-SW)		Relay connector		Head switch PCB	
1	+5V	1	+5V	1	+5V
2	$\overline{MENDLED}$	2	$\overline{MENDLED}$	2	$\overline{MENDLED}$
3	$\overline{UBKLED}$	3	$\overline{UBKLED}$	3	$\overline{UBKLED}$
4	$\overline{MENDSW}$	5	$\overline{MENDSW}$	4	$\overline{MENDSW}$
5	$\overline{OFFSW}$	6	$\overline{OFFSW}$	5	$\overline{OFFSW}$
6	$\overline{FWDSW}$	7	$\overline{FWDSW}$	6	$\overline{FWDSW}$
7	$\overline{BACKSW}$	8	$\overline{BACKSW}$	7	$\overline{BACKSW}$
8	GND	9	0V	8	GND
				9	FG

P2 (UPBRK)		Relay connector		TR breakage sensor PCB	
1	NB1	1	NB1	1	PH1
2	NB2	2	NB2	2	PH2
3	NB3	3	NB3	3	PH3
4	NB4	4	NB4	4	PH4
5	NB5	5	NB5	5	PH5
6	NB6	6	NB6	6	PH6
7	NB7	7	NB7	7	PH7
8	NB8	8	NB8	8	PH8
9	NB9	9	NB9	9	PH9
10	NB10				
11	NB11				
12	NB12				
13	UBRK	10	UBRK	10	UBRK (C-COM)
14	GND	11	GND	11	GND (E-COM)
		12			

Head PCB

P3 (FSENS) — Presser foot sensor

1	+5V	———	1	AN
2	FOOT		2	C
3	GND		3	COM

P5 (WSENS) — Wiper sensor

1	+5V	———	1	AN
2	WIPER		2	C
3	GND		3	COM

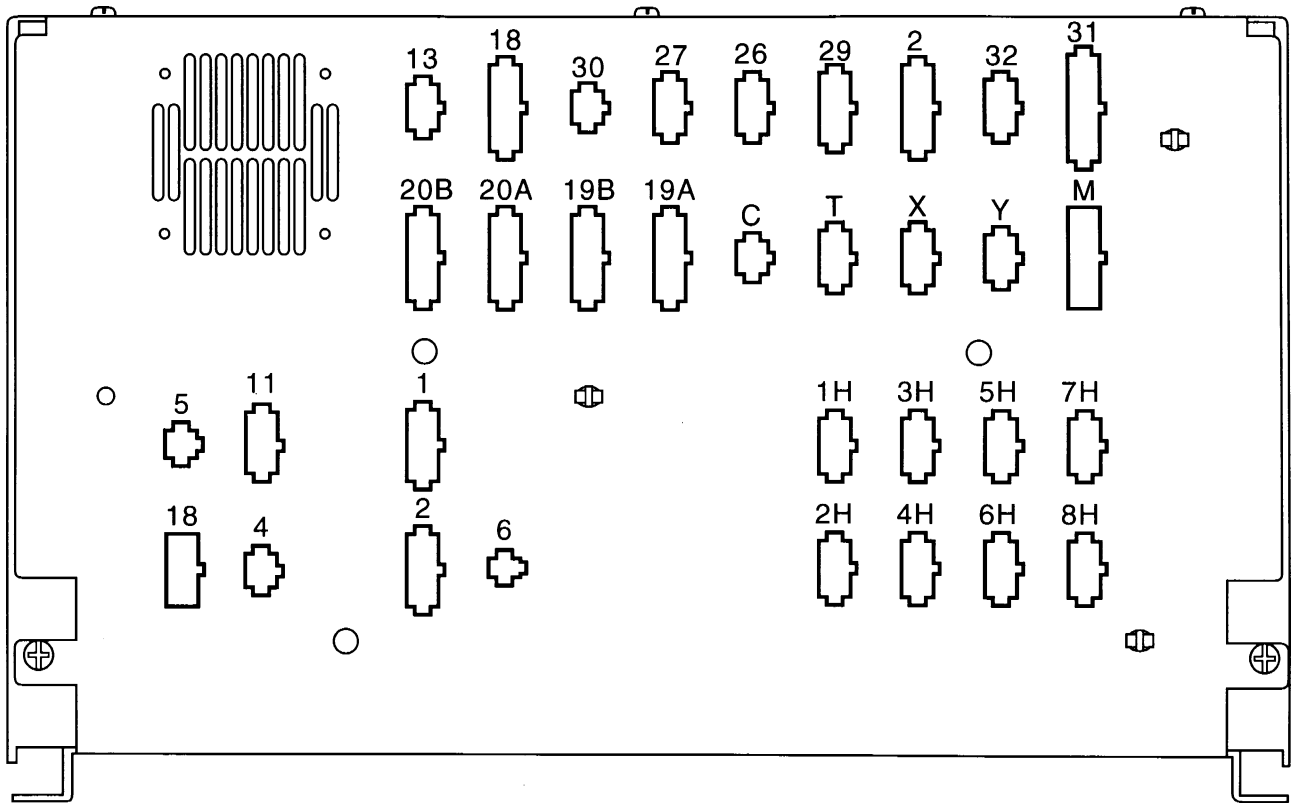
P10 (JUNP) — Jump solenoid

1	Vmm	———	1	J
2	$\overline{\text{JSOL}}$		2	

P11 — Wiper solenoid

1	Vmm	———	1	W
2	$\overline{\text{WSOL}}$		2	

17-7. Connectors on the rear of the control box



Connectors on the rear of the control box

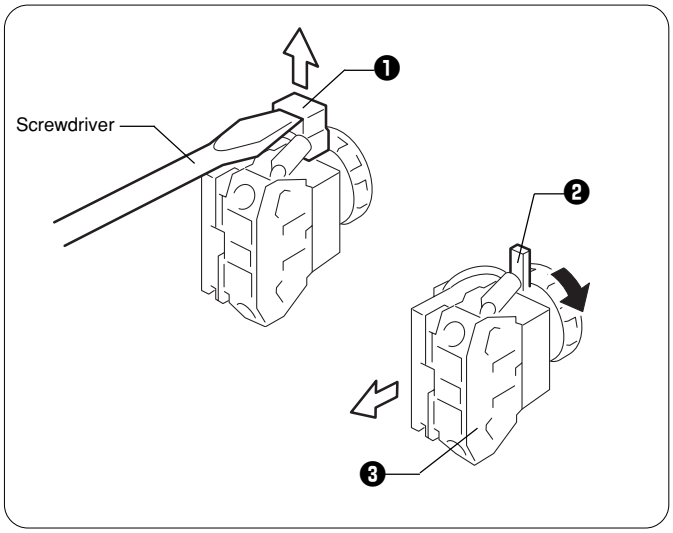
Connector No.	Connecting point	Symptoms resulting from improper connection or breakage
13	BC PCB (P8)	Error "Hook motor origin point error" appears when power is turned on.
18	Thread trimming sensor	Error "Thread trimming motor origin point error" appears when power is turned on.
30	Head PCB (P4)	Error "Needle bar case lock" appears when power is turned on.
27	START - EM switch	"Emergency stopping" appears when power is turned on.
26	Needle position detection sensor and rotary encoder	Error "Main(Z) motor lock" appears when power is turned on.
29	Not connected (This is not used in this specification.)	
2	Bed retracting sensor	Even when HEAD switch is on, no red lamps on heads Nos.2, 4, and 6 are lit, and embroidering can not be done. Presser feet of heads Nos. 2, 4, and 6 can not be retracted.
32	X area sensor	Error "X-axis home position error" appears when power is turned on.
31	Y area sensor	Error "Y-axis home position error" appears when power is turned on.
20B	Power supply PCB B in power supply base (P26) - main shaft brake solenoid	Error "Power supply frequency error" appears when power is turned on.
20A	BC PCB (1) (P10)	Error "Hook motor origin point error" appears when power is turned on.
19B	BC PCB (2) (P10)	Error "Hook motor origin point error" appears when power is turned on.
19A	BC PCB (3) (P10)	Error "Hook motor origin point error" appears when power is turned on.
C	INDEX motor	Error "Needle bar case lock" appears when power is turned on.
T	Thread trimming motor	Error "Thread trimming motor origin point error" appears when power is turned on.
X	X motor	Error "X-axis stepping motor connector error" appears when power is turned on.

Connectors on the rear of the control box

Connector No.	Connecting point	Symptoms resulting from improper connection or breakage
Y	Y motor	Error "Y-axis home position error" appears when power is turned on.
M	Machine motor	Error "Main(Z) motor lock" appears when embroidering starts.
1H-6H	Head PCB (P12)	Error "Needle bar case lock" or "Presser foot down error" appears when power is turned on.
7H	Not connected	
8H	Panel PCB	The machine does not operate. Backlighting LCD does not light.
5	Power supply PCB B in power supply base (P1)	Error "Power supply frequency error", "Exhaust fan motor stop", or "Cooling fan motor stop" appears when power is turned on.
11	Transformer	Error "Main(Z) motor lock" appears when embroidering starts.
18	Power supply PCB B in power supply base (P2)	Nothing works. Backlighting LCD does not light.
4	Power supply PCB B in power supply base (P6)	Needle bar does not jump. Wiper does not work. Note: No error code appears.
1	BC PCB (P4)	Error "Hook motor origin point error" appears when power is turned on.
2	BC PCB (P4)	Error "Hook motor origin point error" appears when power is turned on.
6	Bobbin winder motor	Bobbin winding can not be done when bobbin winder is connected.

18. Connection of Switches around the Spindle

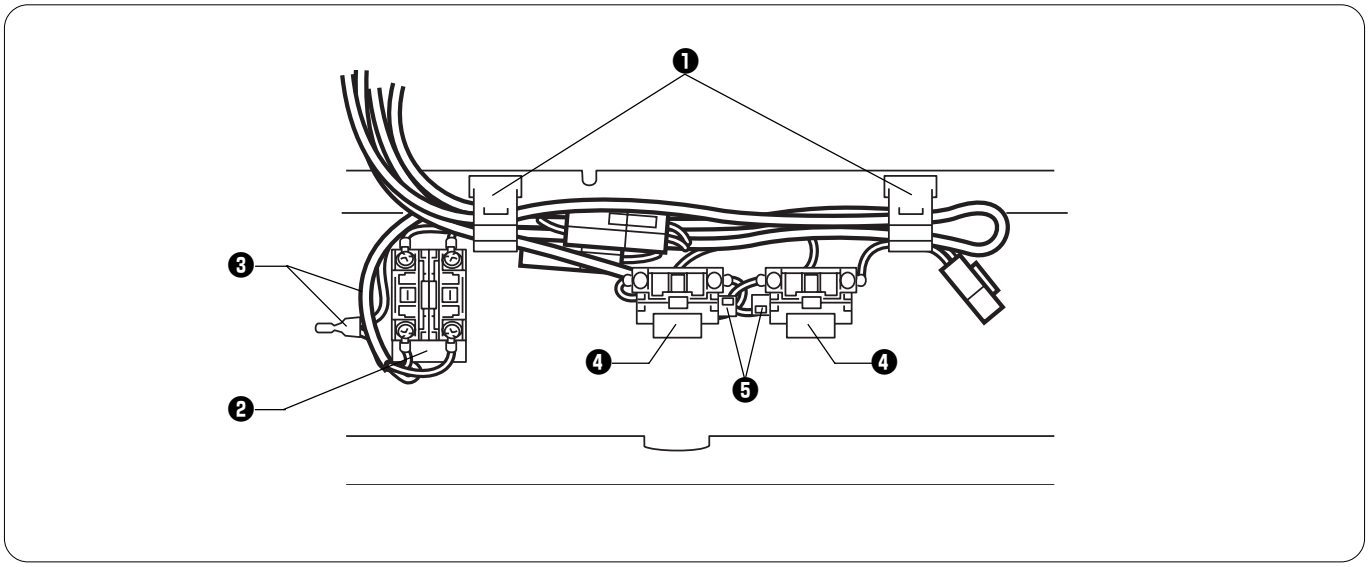
18-1. Removing the Switch



1. Fit a screwdriver into the lever stopper ❶, and remove the stopper by pushing it up.
2. Lower lock lever ❷, and remove switch ❸.

* To reattach the switch, reverse the above procedure.

18-2. EMERGENCY and POWER Switches



If the switch cover LE has been removed, follow the instructions below for reattaching it.

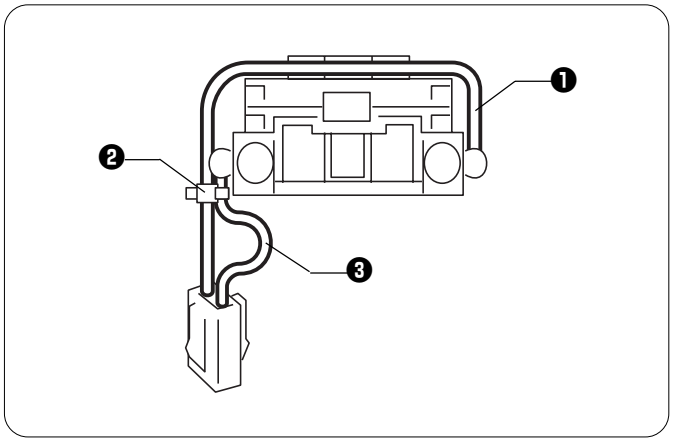
- Put EMERGENCY and POWER switches ❹ in a horizontal position on the back of the switch cover. Put fluorescent lamp switch ❷ in an upright position.
  Note:
  Attach fluorescent lamp switch ❷ in an upright position. It cannot be attached in a horizontal position. Attach the other switches in a horizontal position.
- Secure the cables of the switches with cord clamps ❶ without slack.
- Lead cables ❸ of fluorescent lamp switch ❷ along its left side and secure them with cord clamps ❶.
- Hold the switch cables under the cabtire cable when securing them. Put switches ❹ in such a manner that lock levers ❺ face each other. The distance between the switches ❹ and the spindle is longer as compared with attaching them vertically.

18-3. Switch Cover

If the switch cover for BES-1261BC has been removed, follow the instructions below for reattaching it.

■ Connection of the start switch

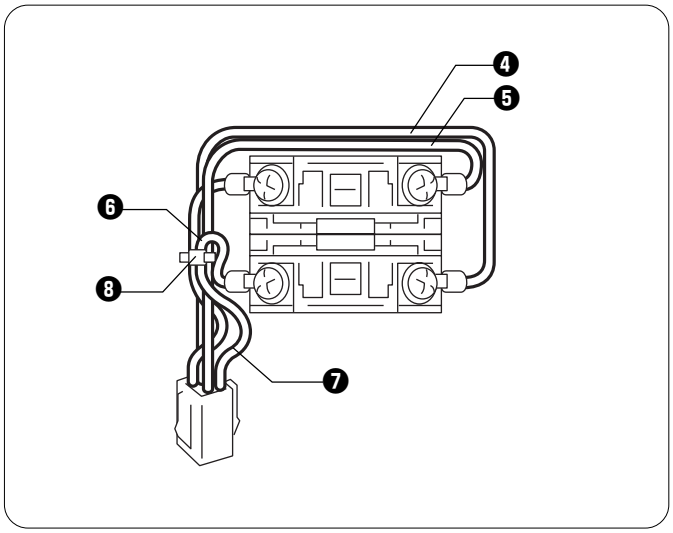
(The switch is viewed from its back in this figure. The top of the switch is positioned at the upper part of the switch cover.)



- Lead white cable ❶ over the switch, and secure it with tie band ❷ on the left side.
- To hold white cable ❶ on the switch, allow slack in black cable ❸ between tie band ❷ and the connector, and secure the cable with tie band ❷.

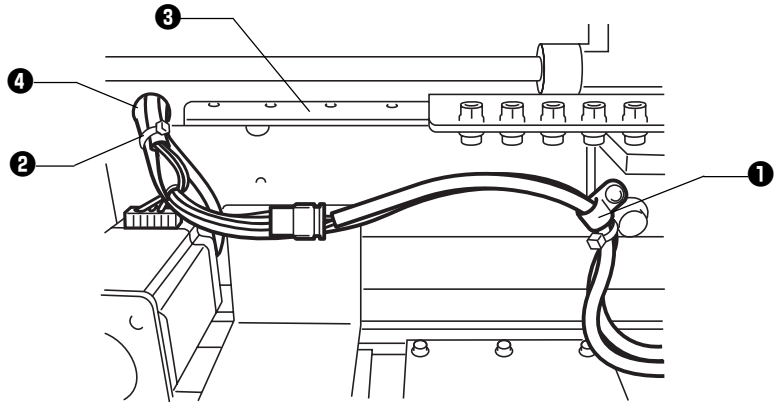
■ Connection of the stop switch

(The switch is viewed from its back in this figure. The top of the switch is positioned at the upper part of the switch cover.)



To hold white cable ❹ and green cable ❺ on the switch, allow slack in red cable ❻ and black cable ❼ between tie band ❽ and the connector, and secure the cables with tie band ❽.

18-4. Change Color Section



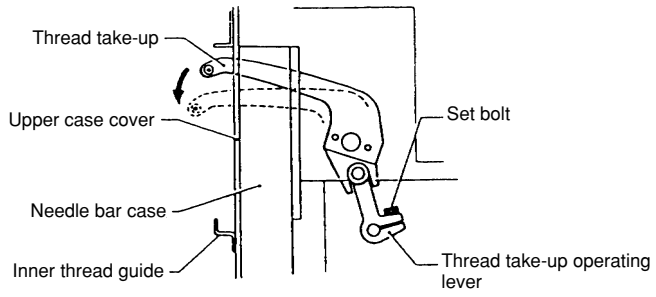
If the cover has been removed from the change color section, follow the instructions below for reattaching it.

- Secure the cables within the cover with cord holder ❶ and tie band ❷ to keep the cables from contact with linear guide ❸ for change color function.
- Check that the cables are not raised and are separated from linear guide ❸.
- Screw cord holder ❶ tightly at an angle of about 45 degrees.
- Secure the following cables with tie band ❷ before bridge hole ❹, and keep them from contact with linear guide ❸.
  - Presser foot motor cable
  - Presser foot sensor cable
  - Motor cable from the right side
  - Potentiometer cable

Chapter 8 Finding Cause of Problem

1. Mechanical problems

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
Machine operates incorrectly.	• Is set screw of rotary encoder loosened? • Is set screw of machine pulley loosened? • Is set screw of pulley B loosened? • Are timing belts for X- and Y-carriages loosened? • Are timing belts for X- and Y-carriages damaged? • Are set screws of pulleys A and B loosened? • Are set screws of couplings in X- and Y-pulse motors loosened? • Is sewing data in floppy disk normal?
Upper shaft is locked at some point of a cycle.	• Is thread take-up stopped with striking upper case cover? [HOW to adjust]  Remove adjustment base. Loosen bolt of thread take-up coupled driving lever to adjust movable range of thread take-up. Then retighten it. • Are positions of needle bar clamp and top dead center stopper correct?

2. Electrical parts

Notes:
- Before checking cable connections, be sure to turn off the sewing machine and remove the power supply plug from the socket.
- When checking cable connections, perform continuity test between connectors.
- In the Check and solution column, follow the items in order from the top.

Problem	Check and solution
The power is turned on but the machine does not operate. LCD with backlighting on the panel is not lit either.	• Is the power plug of the machine correctly connected? → Connect it properly. • Has the connector on the rear of the control box come off? → Connect it properly while checking the connector number and harness number. • Have any connectors in the power supply base and inside the control box come off? → Connect them after checking type and color. • Has fuse F1 or F2 of the power supply PCB inside the power supply base blown? → Replace with a new one. If the either one blows again, there may be potential trouble. Is there any wrong wiring? If yes, replace the control box.
The power is turned on, but the machine does not operate. The message, "Release stop SW operate!" is displayed on the panel.	• STOP switch between heads remains activated? → Reset the STOP switch between heads. • Refer to the block diagram showing cable connections and check that the connection between the STOP switch between heads and the main PCB is correct.
• The message "Remove unused presser foot, ..." is displayed on the panel when the power is turned on. • The LED on machine head no.2, no.4, or no.6 does not come on, and the presser foot remains lowered.	• Is retracting bed sensor adjusted properly? → Adjust the sensor on the machine head which is affected. (Refer to "Adjusting retracting bed sensor.") • Refer to the cable connection block diagram to check the connections from retracting bed sensor to the main PCB. • Is "every second head" set in the panel?
An overtravel error occurs.	• Is the frame out of cap frame area? → Move the frame into the cap frame area, and turn on the power. • In PORT test mode, check ON/OFF signal of X area sensor. → If the signal does not change, refer to the cable connection block diagram to check the connections from the X area sensor to the main PCB. If trouble still continues, replace the X area sensor

A needle stop position error occurs.	• After the pulley is turned manually, is it beyond the stop angle? →Turn the pulley manually until it is aligned with the stop position, and cancel the error. • In the encoder test mode, check the signal of the stop position sensor. → Adjust or refer to the cable connection block diagram to check the connections from the needle position sensor to the main PCB. Replace the needle position sensor. • Does the main shaft brake solenoid operate? → If not, refer to the cable connection block diagram to check the connections from the brake solenoid to the power supply PCB and between connector P27 on the power supply PCB and connector P1 on the main PCB. • Check the resistance of the main shaft brake solenoid at the connector of the solenoid. If it is approx. 50 ohms, it is OK. → If it is nowhere near 50 ohms, replace the solenoid. In this case, the power supply PCB inside the control box may be broken. If the solenoid does not operate after replacement, replace the power supply PCB inside the control box. • Is there any problem with the main shaft mechanism such as a loose screw in the main shaft pulley?
Needle bar case lock occurs	• Does the INDEX motor turn? → If not, refer to the cable connection diagram to check the connections from the INDEX motor to the main PCB. • At the connector of the INDEX motor, check the resistance between pins 1 and 2, and pins 3 and 4. If they are approx. 4.4 ohms, they are OK. → If they are nowhere near 4.4 ohms, replace the INDEX motor. If there is still problem after that, replace the main PCB. • Turn the color changing pulley manually. → If it is too sluggish, adjust the color change mechanism and the needle bar case. • Deactivate the initial settings of the machine, and turn on the power. In SOL test mode, operate the head solenoids. → When a head solenoid and the ones following it do not operate, refer to the cable connection diagram, and check the connection of the machine head communication line. • When only machine head 1 does not work → Check the connection of communication line to machine head 1 and the power supply harness for machine head 1. • Does the setting of the rotary switch on the machine head PCB conform to each machine head? → If not, adjust the setting of the rotary switch according to each machine head. • Deactivate the initial settings of the machine, and turn on the power. In needle bar case moving test mode, turn the color changing pulley manually. Does the figure on the panel change? → If not, check the connection between the connector of the needle position sensor and connector P7 on machine head 1 PCB. • Replace the needle bar position sensor (potentiometer). • Replace machine head PCB 1.

X-axis or Y-axis home position error occurs.	• Does the XY carriage move? → If it moves, refer to the cable connection diagram to check the connections from the XY area sensor to the main PCB. • Does the XY motor turn? → If it turns, check the XY carriage mechanism. • If the XY motor does not turn, refer to the cable connection block diagram to check the connections from the XY motor to the main PCB.
Thread breakage error occurs even though thread has not broken.	• In needle bars test mode, activate the needle bars from no.1 in order using switches to find which needle bar has this problem. Turn the thread breakage sensor pulley corresponding to the needle bar which has the problem, and check whether the red LED on the machine head is blinking. → If it is blinking, set the value of the thread breakage sensitivity in the panel to a lower number. (The standard is 10.) • When the red LED is not blinking, check the connections from thread breakage sensor PCB to the machine head PCB. • Replace the thread breakage sensor PCB.
X-axis stepping motor connector error occurs.	• Refer to the cable connection block diagram to check the connections from the two X motors on both sides to the main PCB.
Main(Z) motor lock occurs.	• In encoder signal test mode, turn the main shaft pulley manually. → If it is too sluggish, the main shaft mechanism may have a problem. • With this error, does the main shaft motor turn? → If it does not turn at all, check fuse F5 on the power supply PCB inside the control box. Refer to the cable connection block diagram to check the connections from the main shaft motor to the main PCB. Check the connections between connector P6 on the main PCB and connector P19 on the power supply PCB inside the control box, and between connector P4 on the main PCB and connector P12 on the power supply PCB inside the control box, and the connections from connector P11 on the power supply PCB to 14v terminal of the transformer. • In encoder signal test mode, turn the main shaft pulley manually. Are the stop position signal and encoder signal correct? → If either signal is not changed, refer to the cable connection block diagram to check the connections from the encoder, through the stop position sensor, to the main PCB.
Error A7 occurs.	• Check the upper shaft CPU ROM version. If it is version A, replace with a newer ROM whose version is B or later. (PROM #4 on the main PCB)
Error A8 occurs.	• Is the stop position signal proper when manually turning the main pulley in the encoder signal test mode? → Refer to the block diagram showing the cable connections and check to see if the connection between the stop position sensor and the main PCB is correct if the signal does not change.
Thread frequently jams in rotary hook.	• Is there any thread tangled around the rotary hook? → Remove any waste thread from the rotary hook. • Conduct BC sensor test in test mode. → If there is anything abnormal, replace the lower shaft module. (Refer to "Replacing the lower shaft module.") • Check the voltage applied between pin 8 of connectors 1H and 7 on the back of the control box. → If the voltage is less than 4.8 V, replace the power board within the box.

Thread frequently jams in rotary hook.	• In test mode, check the synchronization limitation among all lower shaft modules (auto test). → If the test shows a lower shaft module whose timing is different from others, replace it. (Refer to "Replacing the lower shaft module.") • Check whether the lower shaft fan in the bed where the error often occurs turns normally. → If the fan is not turning, check the connection between the lower shaft fan and the BC PCB. If trouble still continues though connection is OK, replace the lower shaft fan. → If no lower shaft fan is turning, check fuse F4 on the power supply PCB in the control box. • Is the hole on the side of the bed where the error often occurs clogged with dust? → Clean the hole
Hook motor origin point error occurs.	• Is there any thread tangled around the rotary hook? → Remove any waste thread from the rotary hook. • Does the lower shaft where the error occurs turn? → If it turns, check the connection between the lower shaft sensor PCB and the BC PCB. Adjust the lower shaft sensor. If trouble still continues, replace the lower shaft sensor PCB. • If the lower shaft where the error occurs does not turn, check the connection between the lower shaft motor and the BC PCB. Replace the lower shaft module. (Refer to "Replacing the lower shaft module.") Replace the BC PCB.
Hook motor standby position error occurs.	• Did you turn the rotary hook manually? → If so, this is not error. • Check the connection between the lower shaft sensor PCB and the BC PCB. If trouble still continues, replace the lower shaft module. (Refer to "Replacing the lower shaft module.")
Hook motor overheat error occurs.	• Make sure that the lower shaft fan turns normally. → If the fan is not turning, check the connection between the lower shaft fan and the BC PCB. • If trouble still continues, replace the lower shaft fan. → If no lower shaft fan is turning, check fuse F4 on the power supply PCB in the control box. • Is the hole on the side of the bed where the error often occurs clogged with dust? → Clean the hole. • Check the connections from the thermistor in the lower shaft module to the BC PCB.
Hook motor overcurrent error occurs.	• Does the red LED for the BC PCB go off? → If not, refer to the cable connection block diagram to check the connections from the BC PCB to the main PCB. • Check the connections from the lower shaft motor to the BC PCB in the bed whose red LED is off. → If there is a short circuit because of a wire being caught, replace a harness or lower shaft module. (Refer to "Replacing the lower shaft module.") • Using a tester, measure the resistance between the following pairs of pins in the connector of the lower shaft motor: pins 1 and 2, pins 2 and 3, pins 3 and 4, pins 4 and 5, and pins 5 and 1. Make sure that resistance is approx. 2.6 ohms. → If there is anything abnormal, replace the lower shaft module. (Refer to "Replacing the lower shaft module.") • Replace the BC PCB.

Thread trimming motor origin point error occurs.	• Is waste thread tangled around the movable knife? → Clean it. • Does the thread trimming motor run? → If it runs, refer to the cable connection block diagram to check the connections from the thread trimming sensor to the main PCB. If trouble still continues, adjust the thread trimming sensor PCB. (Refer to "Replacing the thread trimming sensor PCB.") • If it does not run, refer to the cable connection block diagram to check the connections from the thread trimming motor to the main PCB. • Check the connection between connector P3 on the main PCB and connector P9 on the power supply PCB inside the control box. • Check fuse F6 of the power supply PCB inside the control box. → When the fuse has blown, replace it with a new one. If it blows again, replace the power supply PCB.
Power supply frequency error occurs.	• Check the connection between connector P16 on the main PCB and connector P10 on the power supply PCB inside the control box. • Refer to the cable connection block diagram to check the connections from connector P26 on the power supply PCB inside the control box to connector P7 on the power supply PCB in the power supply base. • Check fuse F3 of the power supply PCB in the power supply base. → When the fuse has blown, replace it with a new one. If it blows again, there may be a problem in the 24v circuit.
Wiper out error occurs.	• Does the wiper in the erroneous machine head remain advanced? → If a thread is tangled, remove it. If the wiper does not retract smoothly, adjust it. • In solenoid test mode (Refer to page 88 "Solenoid test"), check the figure indicated on the panel. → If any error is found, check the connection between the wiper sensor and the machine head PCB. Replace the wiper sensor. Replace the machine head PCB.
Presser foot down error occurs.	• Is the presser foot attached? → If not, attach it. • When the presser foot rises to the top and immediately lowers → Adjust the presser foot sensor. • When the presser foot rises to the top and generates noise for a while → Check the connections from the presser foot sensor to the machine head PCB. Replace the presser foot sensor. Replace the machine head PCB. • When the presser foot does not move at all → Check the connections from the presser foot motor to the machine head PCB. Replace the presser foot motor. Replace the machine head PCB.
Error C7 occurs.	• Is the lower shaft being tested in the test mode? → If so, refer to the operation method of the test mode and exit the test mode or turn the power off and on once. • Turn the power off and on once. If the same error occurs again, replace the main PCB with a new one.

Main(Z) motor speed error occurs.	• In encoder signal test mode, turn the main shaft pulley manually. → If it is too sluggish, there is a problem in the main shaft mechanism. • Refer to the cable connection block diagram to check the connections from the main shaft motor to the main PCB. Check the connections between connector P6 on the main PCB and connector P19 on the power supply PCB inside the control box, and between connector P4 on the main PCB and connector P12 on the power supply PCB inside the control box, and the connections from connector P11 on the power supply PCB to 14v terminal of the transformer.
Cylinder bed position error occurs.	• Is retracting bed sensor adjusted properly? → Adjust the sensor on the machine head which is affected. (Refer to retracting bed sensor adjustment.)
Power PCB error occurs.	• Check the connection between connector P16 on the main PCB and connector P10 on the power supply PCB inside the control box. • Refer to the cable connection block diagram to check the connections from connector P4 on the BC PCB to the power supply PCB inside the control box, and between connector P9 on the main PCB and connector P3 on the power supply PCB inside the control box. • Replace the power supply PCB. • Replace the main PCB.
Cooling fan motor stops. Exhaust fan motor stops. Three fans in the control box have stopped.	• Refer to the cable connection block diagram to check the connections between connector P5 on the power supply PCB inside the control box and connector P1 on the power supply PCB in the power supply base, and between connector P4 on the power supply PCB in the power supply base and 18v terminal of the transformer. • Check fuse F3 of the power supply PCB in the power supply base. → When the fuse has blown, replace it with a new one. If it blows again, there may be a problem in the 24v circuit.
Only cooling fan motor stops.	• Make sure that cooling fans on the left of the main PCB and at the rear of the power supply PCB turn. → When either fan is stopped, check the connection between stopped fan and connector P20 or P25 on the power supply PCB inside the control box. If there is no connection problem, replace the stopped fan. • When both fans turn → Check the connection between connector P16 on the main PCB and connector P10 on the power supply PCB inside the control box. Replace the main PCB.
Only exhaust fan motor stops.	• Make sure that the cooling fan on the right of the main PCB turns. → When it is stopped, check the connection between the cooling fan and connector P12 on the main PCB. If there is no connection problem, replace the stopped fan. • When the fan turns → Replace the main PCB.

Power voltage upper or lower limit error occurs.	• Is voltage setting done in the panel? → If it is not set, set the power supply voltage as specified in the area the machine is used. • Is the transformer's tap voltage (at terminal indicated as "T") equal to power supply voltage where the machine is used? → If not, change the connection of the terminal. • In Port/voltage check test mode on the machine, check the figure of the input voltage and using a tester, measure the power supply voltage for comparison. → When the measured voltage value is greatly different (more than plus/minus 5 volts), rectify the voltage in test mode. • If this error often occurs and the machine cannot go into the test mode, change the voltage setting in the panel to a higher number for upper limit error or a lower number for lower limit error, to prevent reoccurrence of error. Check it in the test mode for rectification. • Check the connection between connector P16 on the main PCB and connector P10 on the power supply PCB inside the control box. • Does the power supply sharply drop for a machine with a large capacity such as a compressor? → Separate the power source to the machine and compressor, or use a stabilizer. • Replace the power supply PCB. If trouble still continues, replace the main PCB.
X-axis pulse motor overcurrent stop occurs.	• At the respective connectors of the two X-axis motors, measure the resistance between pins 1 and 2, pins 2 and 3, pins 3 and 4, pins 4 and 5, pins 5 and 1 using a tester. It is OK if the resistance is approx. 2.1 ohms. → If there is anything abnormal, replace the motor. • Refer to the cable connection block diagram to check the connections from the X-axis motor to the main PCB. • Replace the main PCB.
Y-axis pulse motor overcurrent stop occurs.	• At the respective connectors of the Y-axis motor, measure the resistance between pins 1 and 2, pins 2 and 3, pins 3 and 4, pins 4 and 5, pins 5 and 1 using a tester. It is OK if the resistance is approx. 2.4 ohms. → If there is anything abnormal, replace the motor. • Refer to the cable connection block diagram to check the connections from the Y-axis motor to the main PCB. • Replace the main PCB.
The following errors occur: • Lower shaft flash memory error • Error E5-Error FF	Replace the main PCB.
Only a certain top part does not operate.	• Is the top part put at rest either with the top part switch or the machine controller? • Refer to the block diagram showing cable connections and check to see that other cables are connected to the top part switch PCB, the top part PCB, and the top part PCB properly.

Jump solenoids and wiper solenoids on all the machine heads do not work.	• Refer to the cable connection block diagram to check the connections from connector P4 on the power supply PCB inside the control box to connector P6 on the power supply PCB in the power supply base, and from connector P5 on the power supply PCB in the power supply base to 39 v terminal of the transformer. • Check fuse F4 on the power supply PCB in the power supply base. → When it has blown, replace it. When the power is turned on after replacement and it immediately blows again, the 50 v circuit has a problem.
Jump solenoid does not work.	• Check the connections from jump solenoid to connector P10 on the machine head PCB. • Check the resistance for a jump solenoid that does not work, at the connector. It is OK if the resistance is approx. 56 ohms. → If it is nowhere near 56 ohms, replace the solenoid. In this case, machine head PCB may be out of order. When even a new solenoid does not work, replace the machine head PCB. • Refer to the cable connection block diagram to check the connections from connector P12 on the machine head PCB to connectors P7, P8, P13, P14, P15, and P16 on the power supply PCB inside the control box. • Replace the machine head PCB.
Wiper solenoid does not work.	• Check the connections from wiper solenoid to connector P11 on the machine head PCB. • Check the resistance for a wiper solenoid that does not work, at the connector. It is OK if the resistance is approx. 28 ohms. → If it is nowhere near 28 ohms, replace the solenoid. In this case, machine head PCB may be out of order. When even a new solenoid does not work, replace the machine head PCB. • Refer to the cable connection block diagram to check the connections from connector P12 on the machine head PCB to connectors P7, P8, P13, P14, P15, and P16 on the power supply PCB inside the control box. • Replace the machine head PCB.
The BC PCB has an abnormality.	1. Turn off the machine power. 2. Separate connectors P4 and P10 from the BC PCB. At this time, if the BC PCB is removed from the machine or connectors P8 and P9 are separated from the PCB, a lower shaft connected to other BC PCB can not work. 3. Turn on the power. Hook motor origin point error will occur. The green LEDs on the two machine heads controlled by the defective BC PCB will blink. Press the HEAD switch on the machine head downward (off), and press the MENDING switch upward until the green LED goes off. 4. After all green LEDs go off, press the STOP key on the panel or step back key on the machine head to cancel the error.

The lower shaft module has an abnormality.	1. Turn off the machine power. 2. Separate connectors P1, P3, and P5 for fixed bed or P2, P4, and P6 for retracting bed, from the defective lower shaft module. 3. Turn on the machine power. Hook motor origin point error will occur. The green LEDs on the two machine heads controlled by the defective BC PCB will blink. Press the HEAD switch on the machine head downward (off), and press the MENDING switch upward until the green LED goes off. 4. After all green LEDs go off, press the STOP key on the panel or step back key on the machine head to cancel the error.

Note:
The operation above is to stop the operations of the lower shaft and lower shaft module which are connected to a defective BC PCB, resulting in causing the corresponding machine head to pause. The pause can be canceled by turning on the machine power. When you want to stop the operations of the lower shaft and lower shaft module again, return to step 3.

Chapter 9 Error code list

Code	Error Messages	Error	Measures
E-00	ERROR 00	No error occurs.	This is not usually displayed.
E-01	ERROR 01	Either motor of main shaft, X- or Y-axis, or lower shaft has locked.	
E-02	Overtravel	Overtravel occurs during home position detecting movement.	Turn the power off and on once. If the same error occurs again, the area sensor is faulty.
E-03	Stop SW was pressed during home positioning	The stop switch is pressed during home position detecting movement.	Press the STOP or turn on the F/B switch on the head to either side to restart the home position detecting movement again.
E-04	Zero positioning is out of range	Zero detecting movement out of range	Turn the power off and on once. If the same error occurs again, the home position sensor is faulty.
E-05	Needle stop position error	Needle stop position error	Adjust the pulley stop position (100 degrees) above the needle and press the STOP or turn on the F/B switch on the head to either side.
E-06	Needle bar case position error	Needle bar case position error	This is not usually displayed.
E-07	Needle case lock	Needle bar case lock	Press the STOP or turn on the F/B switch on the head to either side. If the same error occurs again, the color change mechanism is faulty.
E-08	ERROR 08	Stop switch or emergency switch was pressed while the needle bar case is traveling.	This is not usually displayed.
E-09	X-axis home position error	X-axis home position detection error	Turn the power off and on once. If the same error occurs again, the X-axis mechanism is faulty.
E-0A	Thread breakage error	Thread breaking error	After passing through the thread, press the STOP or turn on the F/B switch on the head to either side.
E-0B	ERROR 0B	Stop or emergency stop during sewing	This is not usually displayed.
E-0C	ERROR 0C	Insufficient bobbin thread	
E-0D	It is invalid because of unfinishing the job of searching home position	The machine does not return to the home position.	
E-0E	ERROR 0E	Mending finish	
E-0F	ERROR 0F	Undefined error	
E-14	Y-axis home position error	Y-axis home position error	Turn the power off and on once. If the same error occurs again, the Y-axis mechanism is faulty.
E-15	Press START for reatart.	Stop error during SSP processing (when pressing the stop key while the hoop is moving)	Hoop movement restarts if you press START.
E-16	ERROR 16	Needle with specified number is out of movable area.	This is not usually displayed.
E-17	ERROR 17	Speed Vol. No. is out of range.	
E-18	X-axis stepping motor connector error	X-axis stepping motor connector error	Turn the power off and on once after checking to see that the connector of the X-axis stepping motor is properly connected.
E-1A	ERROR 1A	Destination coordinates error	This is not usually displayed.
E-1B	ERROR 1B	The machine has reached the mending stop position.	
E-1C	Restart perimeter	The machine stops during mask tracing.	Tracing is cancelled if the STOP key is pressed when the machine is stopped during mask tracing. Press the key to continue tracing.
E-1D	Stop while transferring to next repeat pattern	The machine stops while the needle is moving between patterns during repeat sewing.	This is displayed when the stop switch is pressed while the hoop is moving. Press the START to move the hoop again. (It is necessary to press the START again to start sewing.)
Errors E-1C and E-1D are not displayed due to mechanical problems.			
E-1E	Remove unused presser foot, or it may be damaged	When the power is turned on, bed can not be retracted.	This is displayed when every other head control is selected or when the bed is retreated (including when the power is turned on). Remove the presser foot of the retreating head and press the return key or turn the F/B switch of the head to either side. If every other head control is not selected or the bed is not retreated, the bed sensor position may be faulty. Readjust it. Press the STOP key. If the same error occurs again, adjust it with the presser foot switch.

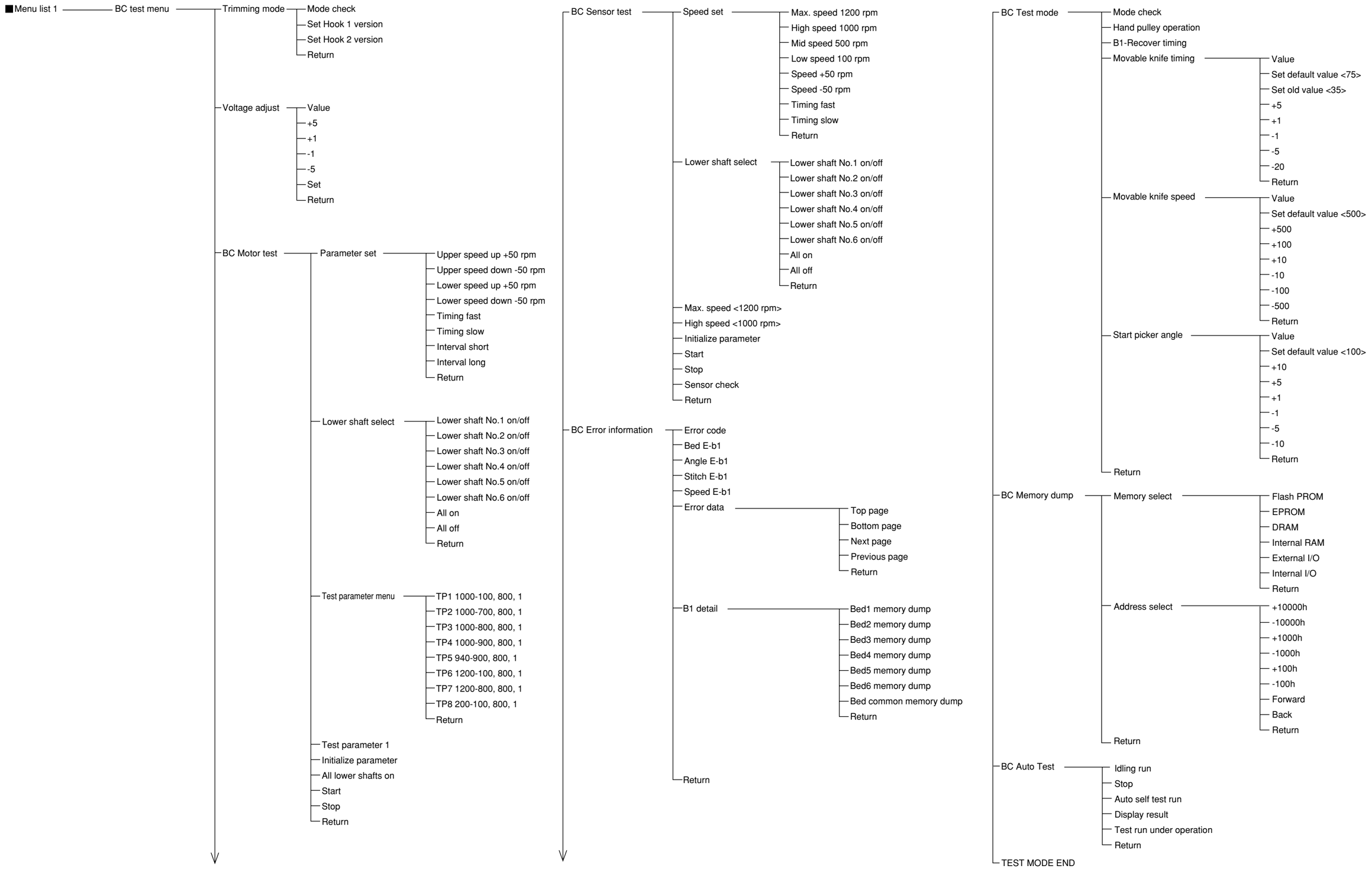
Code	Error Messages	Error	Measures
E-1F	Presser foot down error	Presser foot down error while searching for home position just after the power is turned on.	Press the STOP or turn on the F/B switch on the head to either side. If the same error occurs again, adjust the presser foot switch.
E-21	Area over 	Hoop overhang(+X)	Pattern or the needle position is out of the embroidering area. Reset the embroidering area on the panel or move the hoop to the sewable position.
E-22	Area over 	Hoop overhang(+Y)	
E-23	Area over 	Hoop overhang(+X, +Y)	
E-24	Area over 	Hoop overhang(-X)	
E-25	Area over 	Hoop overhang(+X, -X)	
E-26	Area over 	Hoop overhang(-X, +Y)	
E-27	Area over 	Hoop overhang(+X, -X, +Y)	
E-28	Area over 	Hoop overhang(-Y)	
E-29	Area over 	Hoop overhang(+X, -Y)	
E-2A	Area over 	Hoop overhang(+Y, -Y)	
E-2B	Area over 	Hoop overhang(+X, +Y, -Y)	
E-2C	Area over 	Hoop overhang(-X, -Y)	
E-2D	Area over 	Hoop overhang(+X, -X, -Y)	
E-2E	Area over 	Hoop overhang(-X, +Y, -Y)	
E-2F	Area over 	Hoop overhang(+X, -X, +Y, -Y)	
E-31	Area over 	Needle overhang(+X)	
E-32	Area over 	Needle overhang(+Y)	
E-33	Area over 	Needle overhang(+X, +Y)	
E-34	Area over 	Needle overhang(-X)	
E-36	Area over 	Needle overhang(-X, +Y)	
E-38	Area over 	Needle overhang(-Y)	
E-39	Area over 	Needle overhang(+X, -Y)	
E-3C	Area over 	Needle overhang(-X, -Y)	Reset the embroidering area on the panel or move the hoop to a sewable position.
E-40	Remove unused presser foot, or it may be damaged	The status of presser foot is issued as an alarm when every second machine is used.	Thisected or when the bed is retreated (including when the power is turned on). Remove the presser foot of the retreating head and press the return key or turn on the F/B switch on the head to either side. If every other head control is not selected or the bed is not retreated, the bed sensor position may be faulty. Readjust it.
E-41	This function is not supported. Turn off the power	Invalid start-up error	Turn the power off and on once.
E-42	ERROR 42	XY movement error	Press the STOP or turn on the F/B switch on the head to either side.
E-A1	Main(Z) motor lock	Spindle motor lock	Press the STOP or turn on the F/B switch on the head to either side. If it occurs frequently, the main shaft mechanism is faulty.
E-A2	Main(Z) PCB temperature is too high	Main PC board temperature too high	This is not usually displayed.
E-A3	Main(Z) motor voltage is too low	Spindle motor voltage too low	
E-A4	Main(Z) motor voltage is too high	Spindle motor voltage too high	

Code	Error Messages	Error	Measures
E-A5	ERROR A5	Spindle motor CPU error	This is not usually displayed.
E-A6	ERROR A6	Main shaft motor CPU communication command error	
E-A7	ERROR A7	Main shaft motor CPU send/receive error	
E-A8	Main shaft stop position sensor error	Main shaft stop position signal error	Adjust the pulley stop position (100 degrees) above the needle and press the STOP. If the error occurs frequently, the parts related to the main shaft stop position sensor are faulty.
E-A9	ERROR A9	Spindle CPU parameter error	This is not usually displayed.
E-B0	Lower shaft CPU error	Lower shaft CPU error	
E-B1	Thread jammed in rotary hook	Thread tangle in rotary hook	Check to see that no lint is tangled in the rotary hook and press the STOP or turn on the F/B switch on the head to either side.
E-B2	Hook motor origin point error	Hook motor origin point error	
E-B3	Hook motor standby position error	Hook motor standby position error	The rotary hook may be rotated forcefully. Press the STOP or turn on F/B switch on the head to either side to cancel the error. If the same error occurs again, the lower shaft sensor is improperly adjusted.
E-B4	Hook motor standby position error	Hook motor motor mode error	This is not usually displayed.
E-B5	Hook motor communication error	Hook motor communication error	
E-B6	Hook motor parameter error	Hook motor parameter error	
E-B7	Hook motor overheat error	Hook motor overheat error	Turn the power off and on once. If the same error occurs again, the lower shaft motor is faulty.
E-B8	Hook motor overcurrent error Turn off the power	Hook motor overcurrent error	
E-B9	Thread trimming motor origin point error	Thread trimming motor zero point error	Turn the power off and check the thread trimmer and turn the power on again. If it occurs again, the thread trimmer is faulty.
E-BA	Power supply frequency error	Power supply frequency error	Turn the power off and on once. If the same error occurs again, the power PCB or power supply is faulty.
E-BB, BF	ERROR BB, BF	Lower shaft motor undefined error	This is not usually displayed.
E-BC	No power error	No power error	It may usually occur momentarily when turning off the machine. If it occurs when the machine is on, it is a power failure detection error.
E-BD	Lower shaft flash memory error	Lower shaft flash memory error	Turn the power off and on once. If the same error occurs again, the main PCB is faulty.
E-BE	Lower shaft version-up error	Lower shaft version-up error	Press the STOP or turn on the F/B switch on the head to either side to cancel the error and upgrade the version again.
E-C1	ERROR C1	Area over during embroidering	Set the embroidering area again on the panel.
E-C2	Wiper out error	Wiper out error	If the wiper is tangled with a thread, remove it. Press the STOP or turn on the F/B switch on the head to either side.
E-C3	ERROR C3	Embroidering data buffer empty	This is not usually displayed.
E-C4	Presser foot down error	Presser foot down error	Press the STOP or turn on the F/B switch on the head to either side. If the same error occurs again, adjust the presser foot switch.
E-C5	ERROR C5	Measured voltage value could not be received form the lower shaft motor CPU.	This is not usually displayed.
E-C6	ERROR C6	Voltage value could not be transferred to the lower shaft motor CPU.	
E-C7	ERROR C7	Lower shaft error	The machine may be being tested in the BC test mode. Exit the test mode or turn the power off and on once. If the same error occurs again, the main PCB is faulty.
E-C8	ERROR C8	Hook motor origin point error	Check the operation of the main shaft brake and the stop position of the main shaft (100 degrees).
E-C9	Embroidering start error	Embroidering start error	This is not usually displayed.
E-CA	ERROR CA	No sewing permisson	

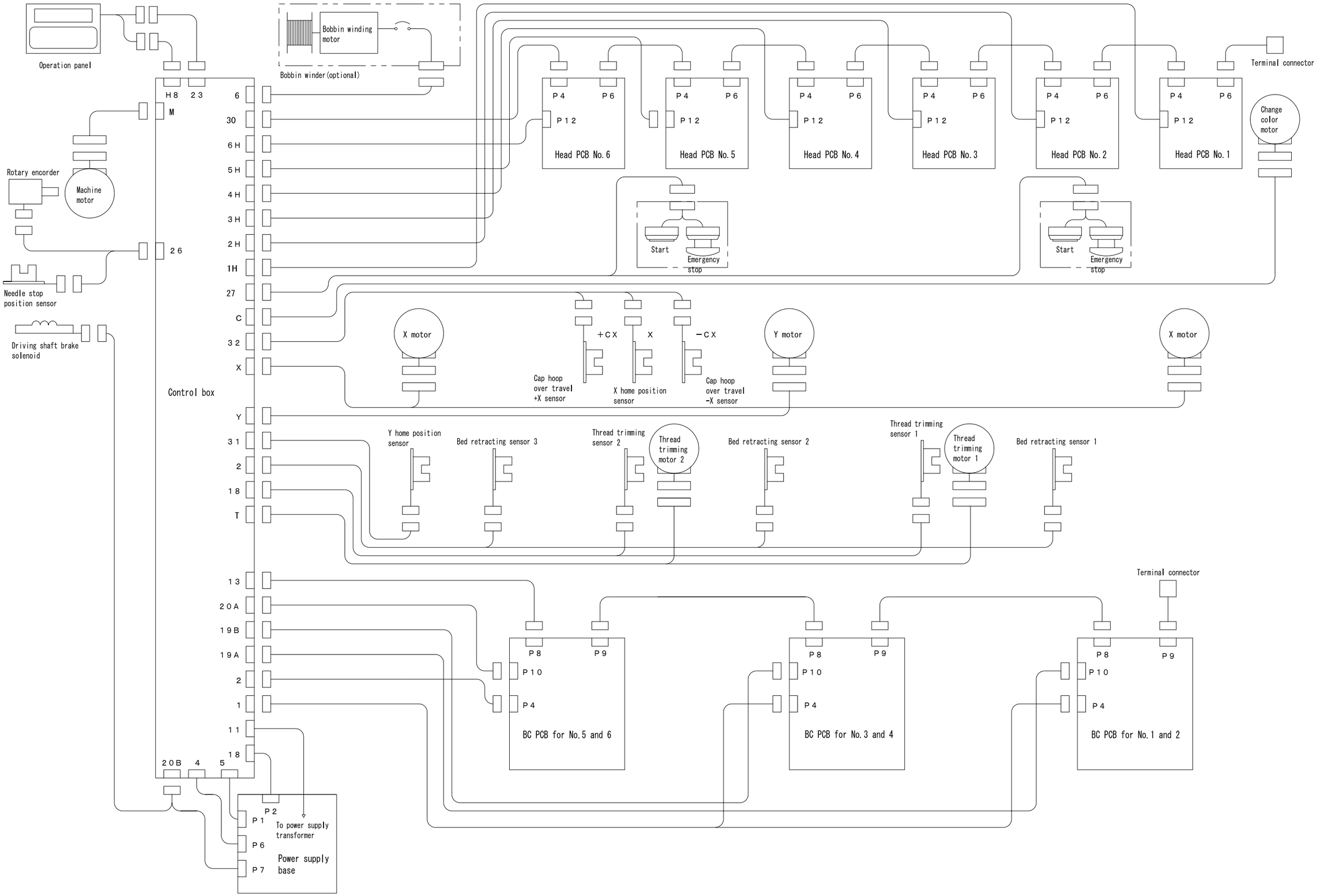
Code	Error Messages	Error	Measures
E-CB	Spindle rotation speed error	Spindle rotation speed error	Press the STOP or turn on the F/B switch on the head to either side to cancel the error and press the START. If the same error occurs again, there is a possibility that the spindle is overloaded.
E-CC	ERROR CC	Shuttle thread entanglement automatic reset	This is not usually displayed.
E-CD	ERROR CD	Speed command can not be received.	Turn the power off and on once. If the same error occurs again, the main PCB is faulty.
E-CE	Cylinder bed position error	Cylinder bed position error	Secure the bed. If the bed is secured, the bed sensor position may be faulty. Readjust it.
E-CF	ERROR CF	Rated voltage value could not be received from the lower shaft motor CPU.	Turn the power off and on once. If the same error occurs again, the main PCB is faulty.
E-D0	Power PC board error	Power PC board error	Turn the power off and on once. If the same error occurs again, the power PCB is faulty.
E-D1	Cooling fan motor stop	Cooling fan motor stop B Tum the power off.	Turn off the power and check the fan harness. Turn on the power again. If the same error occurs again, the fan or the power PCB is faulty.
E-D2	Power voltage upper limit error	Power voltage upper limit error	(1) The voltage setting is improper. -> Set it again. (2) Press the STOP or turn on the F/B switch on the head to either side. If the same error occurs again, the power PCB or the power supply is faulty.
E-D3	Power voltage lower limit error	Power voltage lower limit error	
E-E1	X-axis pulse motor overcurrent stop Turn off the power	X-axis pulse motor overcurrent stop	Turn the power off and on once. If the same error occurs again, the pulse motor or the main PCB is faulty.
E-E2	Y-axis pulse motor overcurrent stop Turn off the power	Y-axis pulse motor overcurrent stop	
E-E3	Exhaust fan motor stop	Cooling fan motor stop A Press R.	Turn off the power and check the fan harness. Turn on the power again. If the same error occurs again, the fan or the power PCB is faulty.
E-E4	Hook motor error	Lower shaft communication error	Turn the power off and on once. If the same error occurs again, the main PCB is faulty.
E-E5	ERROR E5	Over-run error during interfacing to main PCB CPU	This is not usually displayed.
E-E6	ERROR E6	Framing error during interfacing to main PCB CPU	
E-E7	ERROR E7	Parity error during interfacing to main PCB CPU	
E-E8	ERROR E8	Receiving time up error during interfacing to main PCB CPU	
E-E9	ERROR E9	Send/Receive inconsistent error during interfacing to main PCB CPU	
E-EA	ERROR EA	ACK code receiving error during interfacing to main PCB CPU	
E-EB	ERROR EB	Send/Receive ID code error during interfacing to main PCB CPU	
E-EC	ERROR EC	Send data checksum error during interfacing to main PCB CPU	
E-ED	ERROR ED	Data empty error during interfacing to main PCB CPU	
E-EF	ERROR EF	Receiving error on interface	
E-F1	ERROR F1	Send time up error	
E-F2	ERROR F2	Request-to-waiting time up error	
E-F3	ERROR F3	Request-to-recive time up error	
E-F4	ERROR F4	Receive command error	
E-F5	ERROR F5	NACK code receiving error	
E-F6	ERROR F6	Data requested for needle position can not be returned.	
E-F7	ERROR F7	It is not receive command for the request one.	
E-F8	ERROR F8	PRE code error	
E-F9	ERROR F9	No applicable command	

Code	Error Messages	Error	Measures
E-FA	ERROR FA	Interface receive data sum check error	This is not usually displayed.
E-FB	ERROR FB	Send time up error	
E-FF	ERROR FF	No status is returned from main shaft, lower shaft motor, or CPU.	

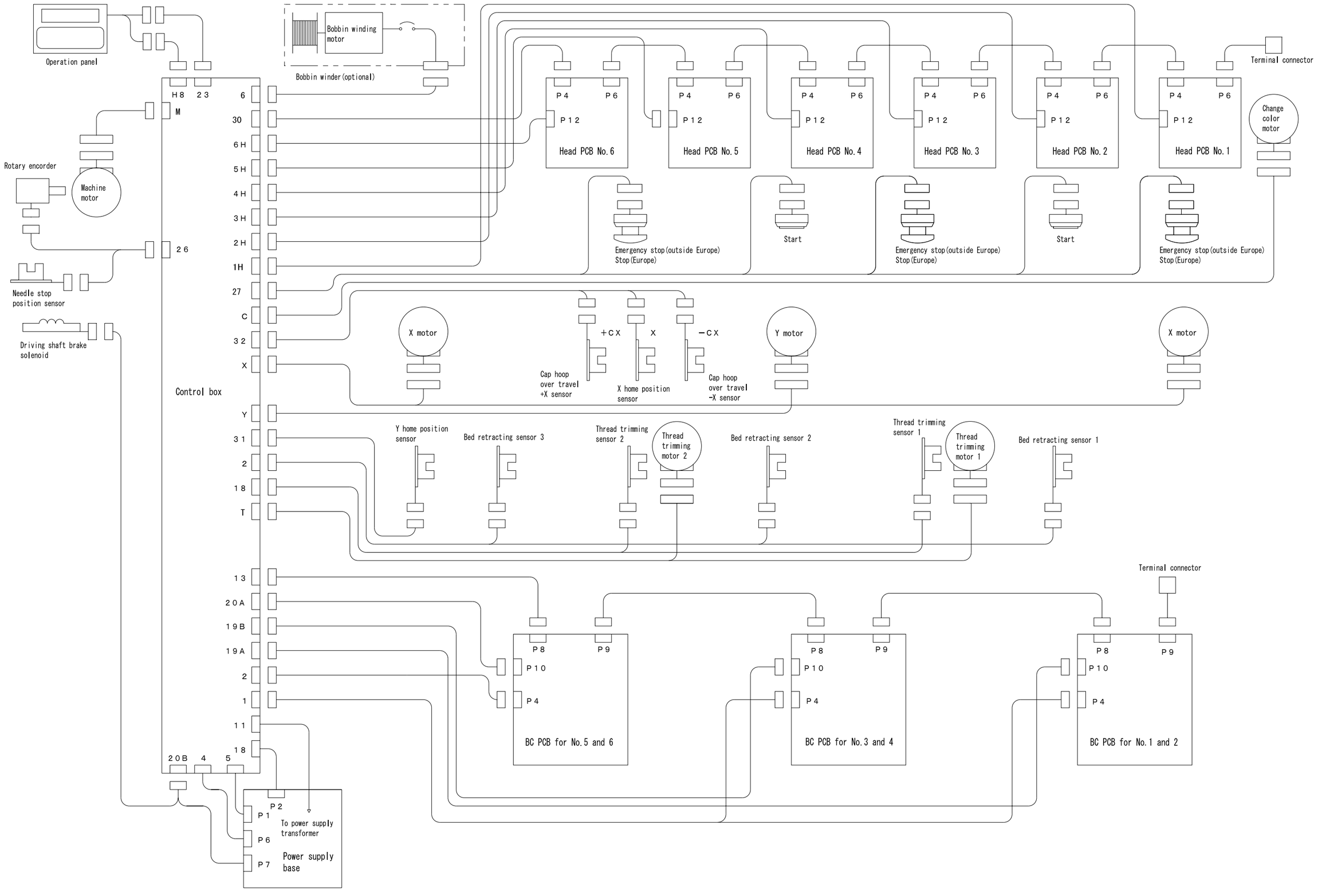
Test mode menu list



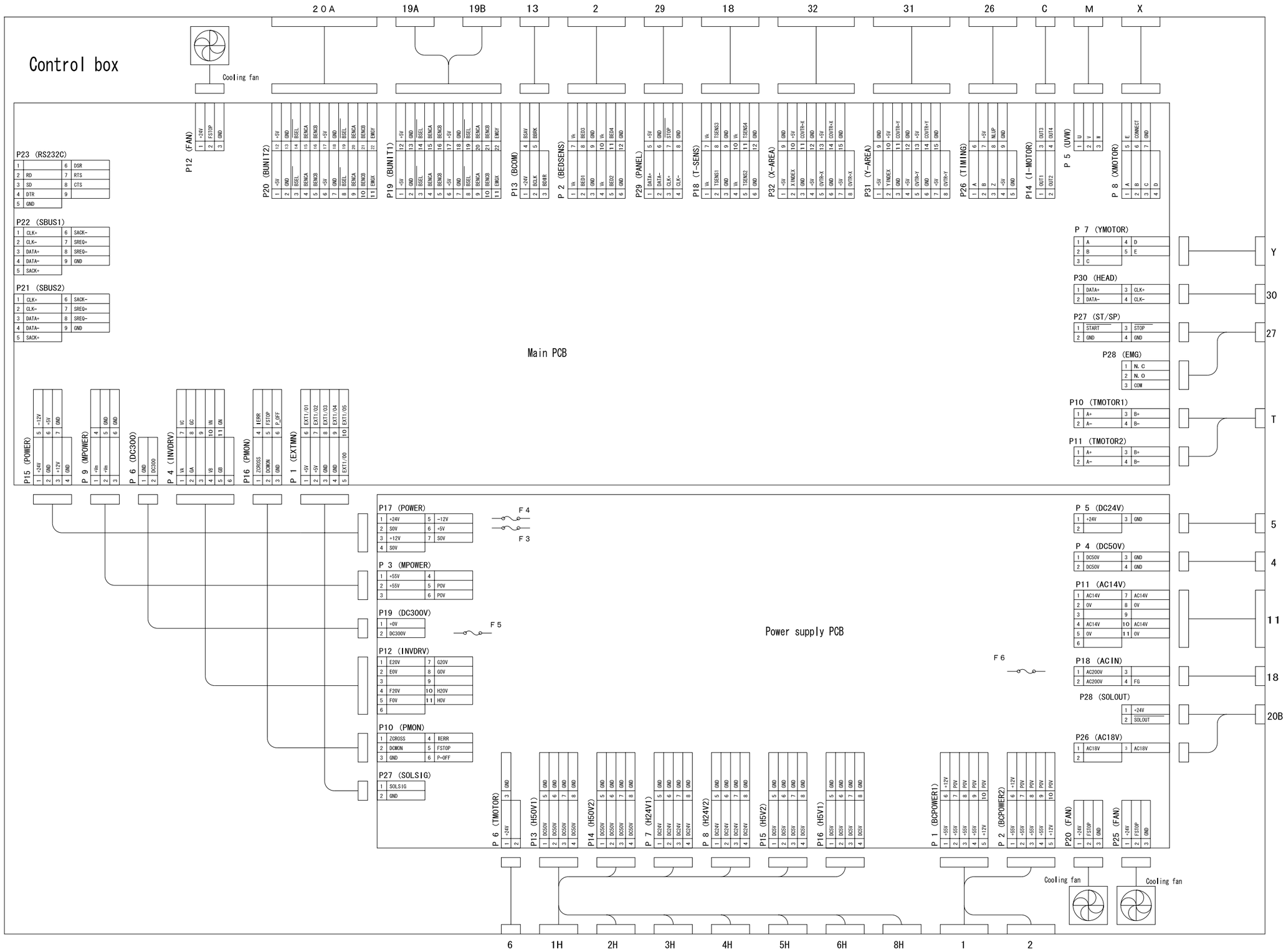
Control Block Diagram (BES-961BC)



Control Block Diagram (BES-1261BC)



Control Box (BES-961BC, 1261BC)

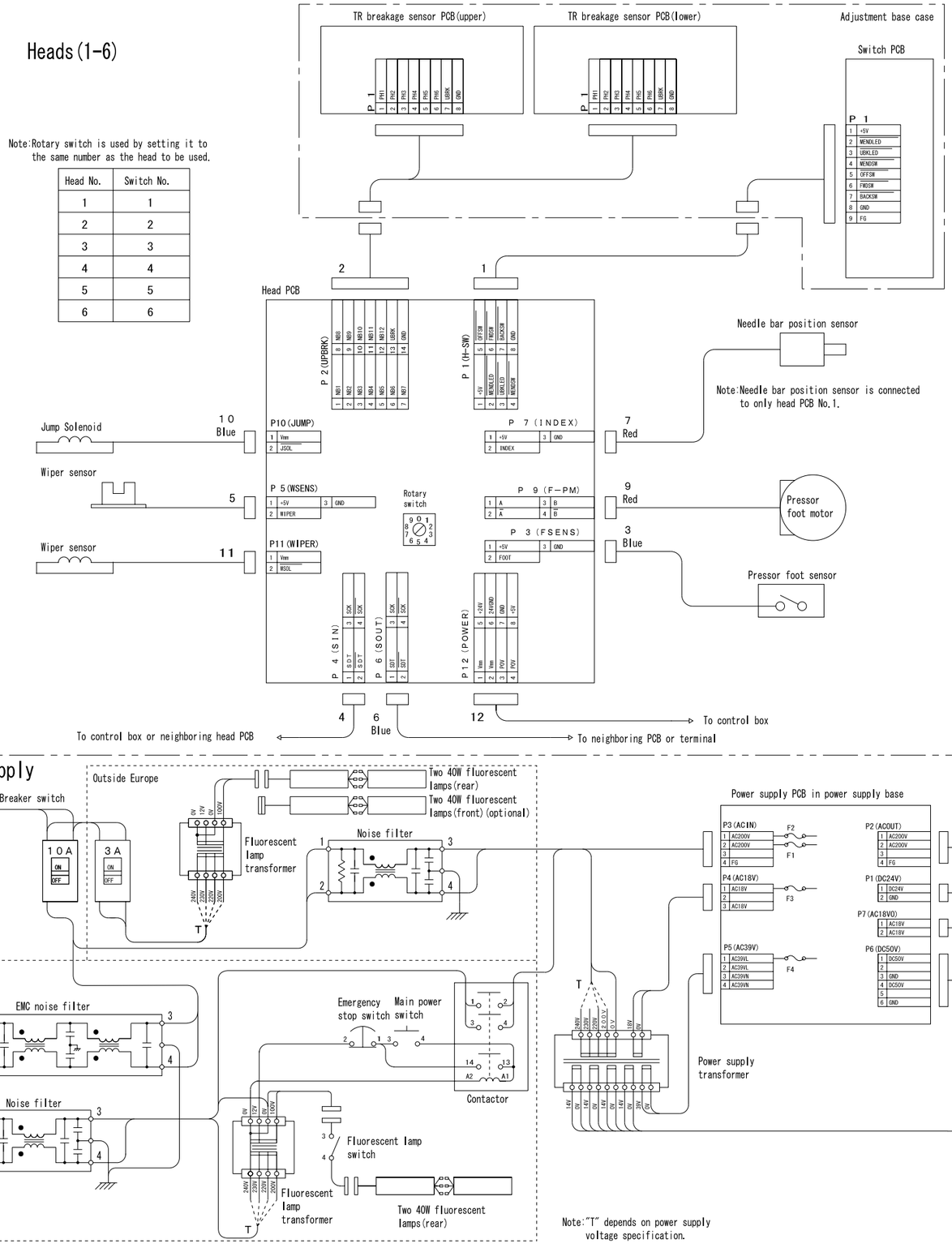


Heads (1-6)

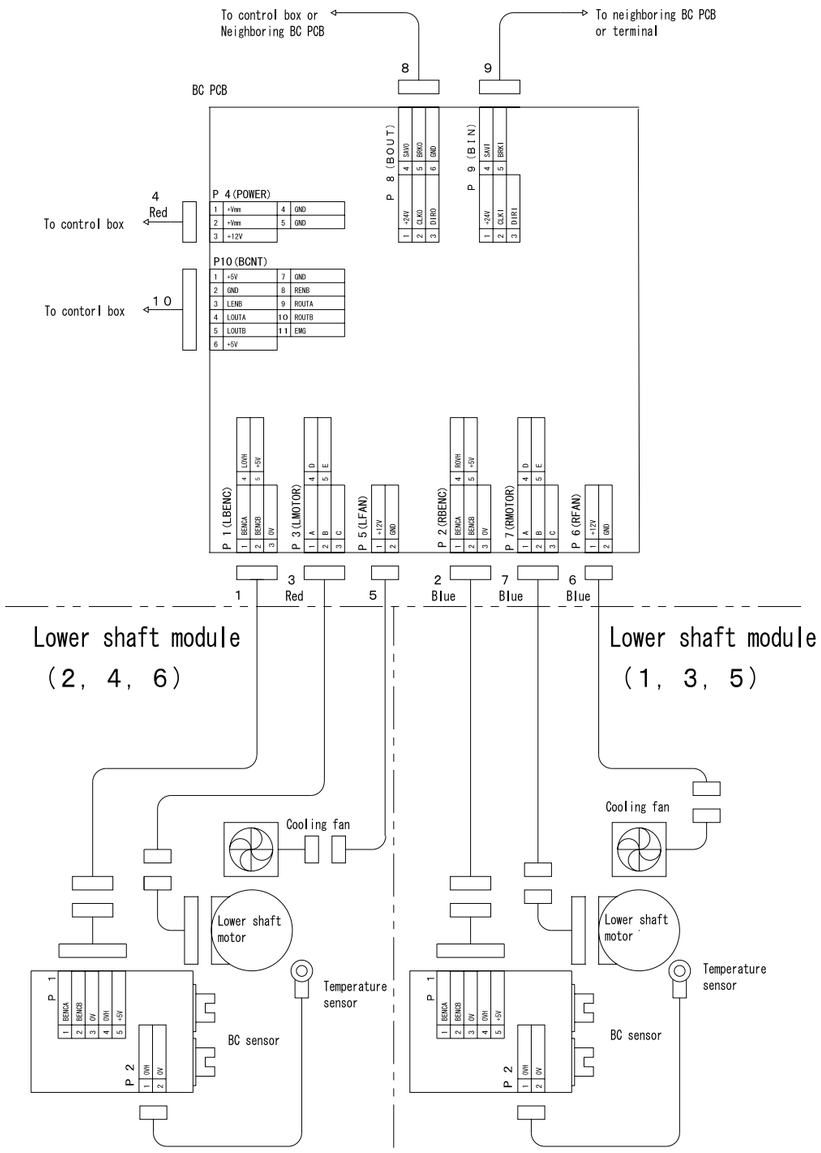
Heads (1-6)

Note:Rotary switch is used by setting it to the same number as the head to be used.

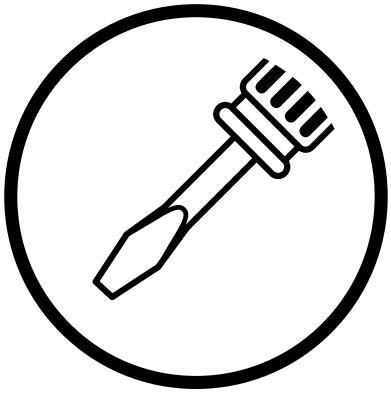
Head No.	Switch No.
1	1
2	2
3	3
4	4
5	5
6	6



Lower shaft(1-6)



brother



SERVICE MANUAL

BROTHER INDUSTRIES,LTD. NAGOYA,JAPAN

Printed in Japan

155-961, C61
I9120778
2000.4. H (1)