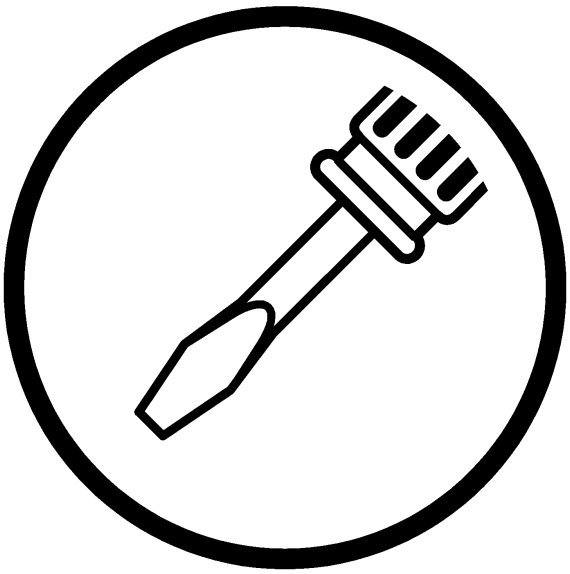
BE-1204B-BC
BE-1204C-BC
BE-1206B-BC

SERVICE MANUAL

Please read this manual before making any adjustments

TWELVE NEEDLE FOUR HEAD EMBROIDERY MACHINE
TWELVE NEEDLE FOUR HEAD EMBROIDERY MACHINE<WIDE AREA>
TWELVE NEEDLE SIX HEAD EMBROIDERY MACHINE



brother

This service manual is intended for BE-1204B, 1204C, 1206B; be sure to read the BE-1204B, 1204C, 1206B instruction manual before this manual.

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

As a result of research and improvements regarding this product, some details of this manual may not be the same as those for the product you purchased.
If you have any questions regarding this product, please contact a Brother dealer.

SAFETY INSTRUCTIONS

1 Safety indications and their meanings

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

Indications

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

Symbols

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

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

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

2 Notes on safety

⚠ DANGER

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

⚠ CAUTION

Environmental requirements

- Use the sewing machine in an area which is free from sources of strong electrical noise such as high-frequency welders.
  Sources of strong electrical noise may cause problems with correct operation.
- Any fluctuations in the power supply voltage should be within ±10% of the rated voltage for the machine.
  Voltage fluctuations which are greater than this may cause problems with correct operation.
- The power supply capacity should be greater than the requirements for the sewing machine's electrical consumption.
  Insufficient power supply capacity may cause problems with correct operation.
- The air supply should have a capacity greater than the machine consumption. If air is not supplied sufficiently, a machine malfunction may occur.
- 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.
- Do not use this machine outdoors.

Installation

- Machine installation should only be carried out by a qualified technician.
- Never operate the sewing machine with any ventilation openings blocked.
- Keep the ventilation openings of the sewing machine free from the accumulation of lint or dust.
- Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.
- The sewing machine weighs approximately 700 kg.
  The installation should be carried out by four or more people.
- Do not connect the power cord until installation is complete, otherwise the machine may operate if the start switch is pressed by mistake, which could result in injury.
- Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.
- 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.
- Secure the machine with the adjustment bolts on the sound floor so that it will not move.

Installation

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

⚠ CAUTION

Sewing

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

Keep children away from the sewing machine.

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.

Always use the proper needle plate. Any wrong plate can cause needles to break.

Do not use a bent needle.

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
- When cleaning the machine.

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

Do not operate this machine where aerosol (spray) products are being used or where oxygen is being administered.

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 moving parts, press any objects against the machine, or pull/push the cloth during sewing. Doing so may result in personal injury, machine damage, or needle breakage.

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

Never drop or insert foreign objects or a screwdriver into the ventilation openings or the machine inside.
Touching any high-voltage area may result in an electric shock.

Never damage, alter, heat, or put a strain on the power cable as well as other cables. Doing so may result in a fire or an electric shock.

If the controller is exposed to water or a chemical agent or if its entry is found inside the controller, turn off the power switch immediately.
Continuing to use the machine under such a condition may result in a fire or an electric shock.

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

Disassembly, assembly, 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 cable (do not pull on the cable itself) from the wall outlet before attempting to perform the following operations. Otherwise, the machine is started if the start switch is pressed by mistake. Injury may occur in such a case.

- When carrying out inspection, adjustment, or maintenance
- When replacing consumable parts such as a rotary hook, a knife, or a fluorescent lamp

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.
When replacing a fluorescent lamp, use the same-type lamp having a rating of 40 watts. Wait until the fluorescent lamp cools off before replacement. Failure to do so can result in burns.

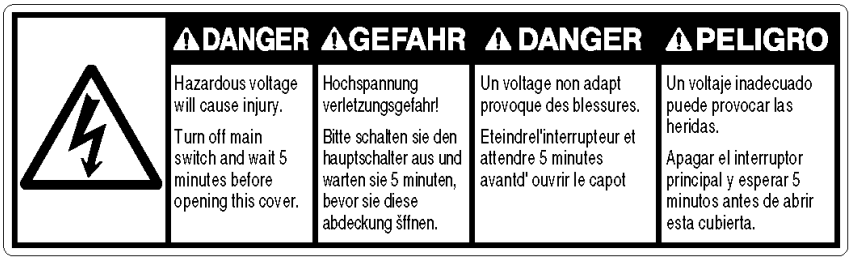
If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

Any problems in machine operation which result from unauthorized modifications to the machine will not be covered by the warranty.

3 Warning labels

* The following warning labels appear on the sewing machine.
Please follow the instructions on the labels at all times when using the machine. If the labels have been removed or are difficult to read, please contact your nearest Brother dealer.

1 Electric shock danger display



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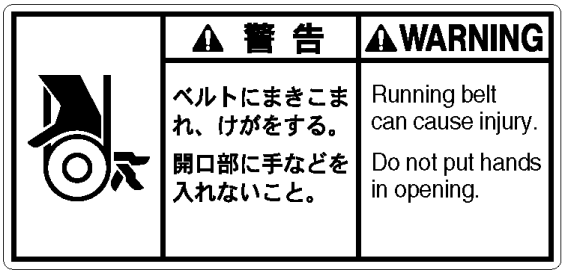
2 Electric shock danger display

Hazardous voltage will cause injury.

3 Injury warning display



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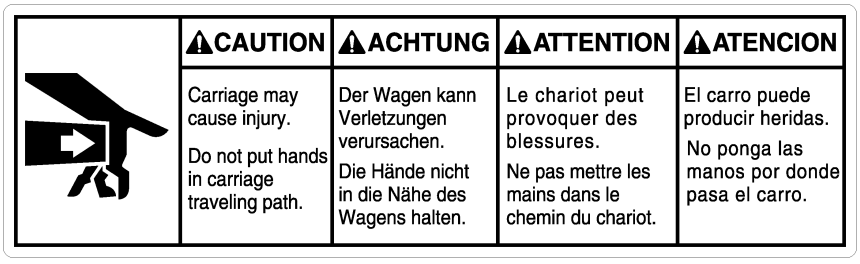
4 Injury caution display



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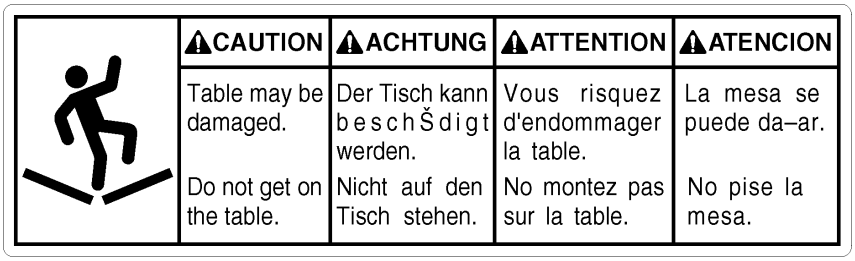
5 Injury caution display



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6 Injury caution display

Never touch or push the thread take up during operation as it may result in injuries machine.

7 Injury caution display

Never touch or push the needle bar during operation as it may result in injuries or damage to the sewing machine.

8 High temperature caution display

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9 High temperature caution display

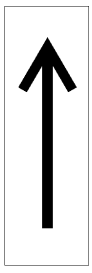
W1206Q

Do not touch this part during activitation or for 30 minutes after shut-off. Otherwise burns may result.

10 Ground mark

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.

11 Direction of operation



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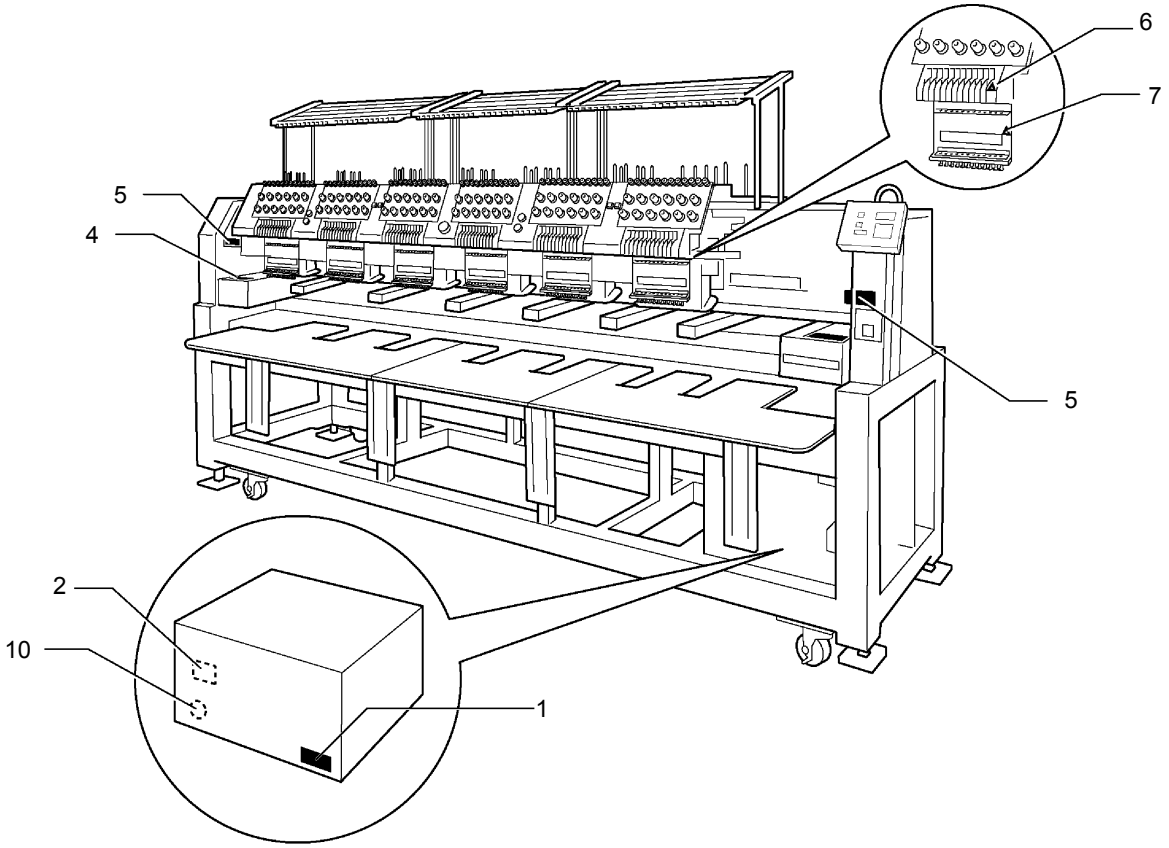

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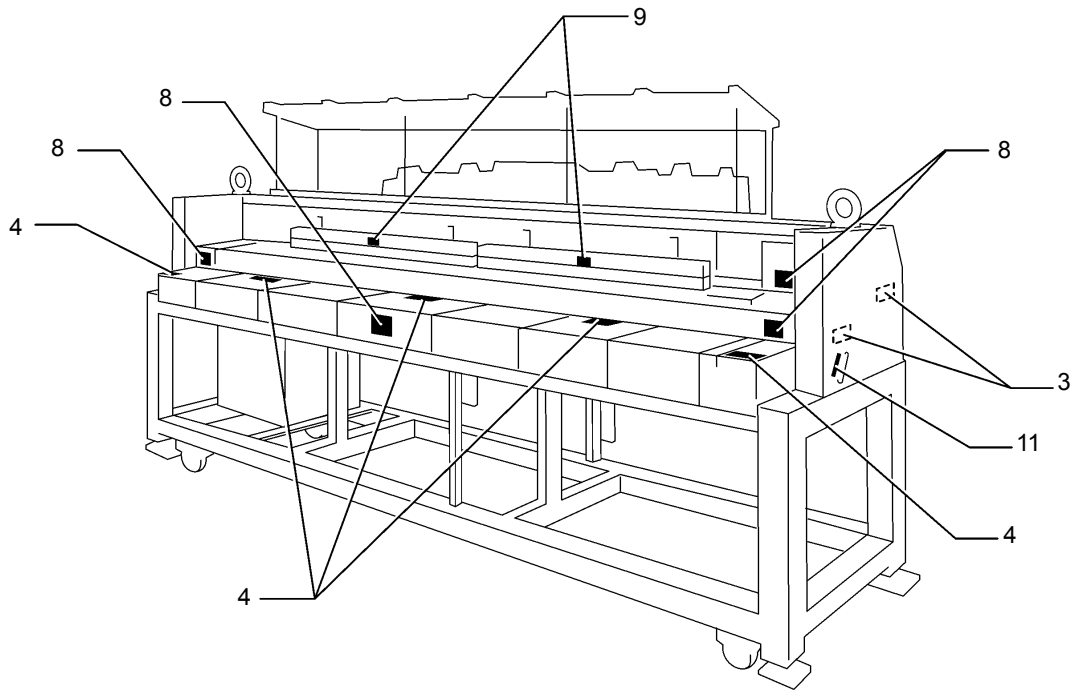


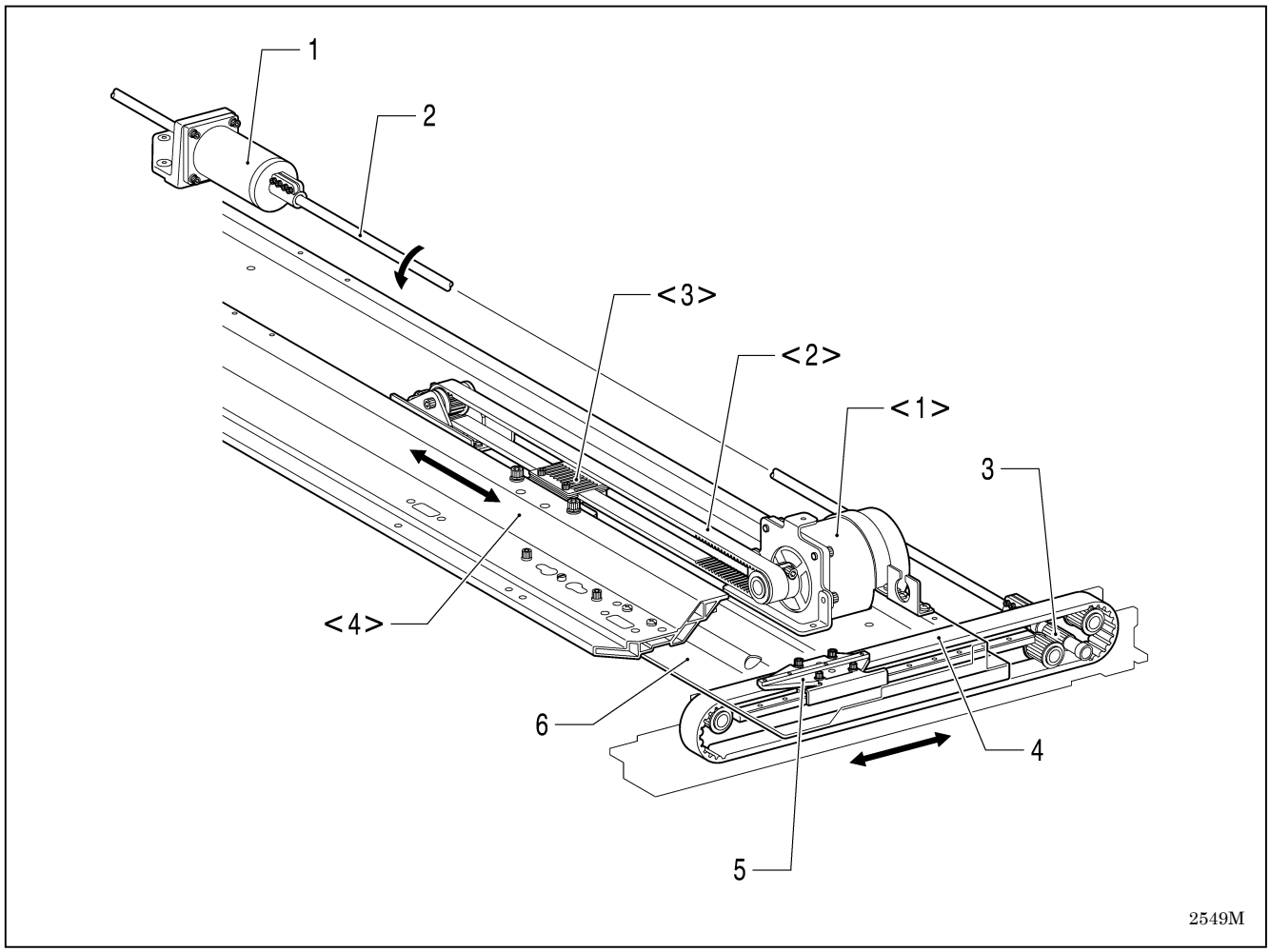
W1208Q

Contents

Chapter 1 Mechanical Descriptions

The mechanisms operate in the order of the numbers given in the illustrations.

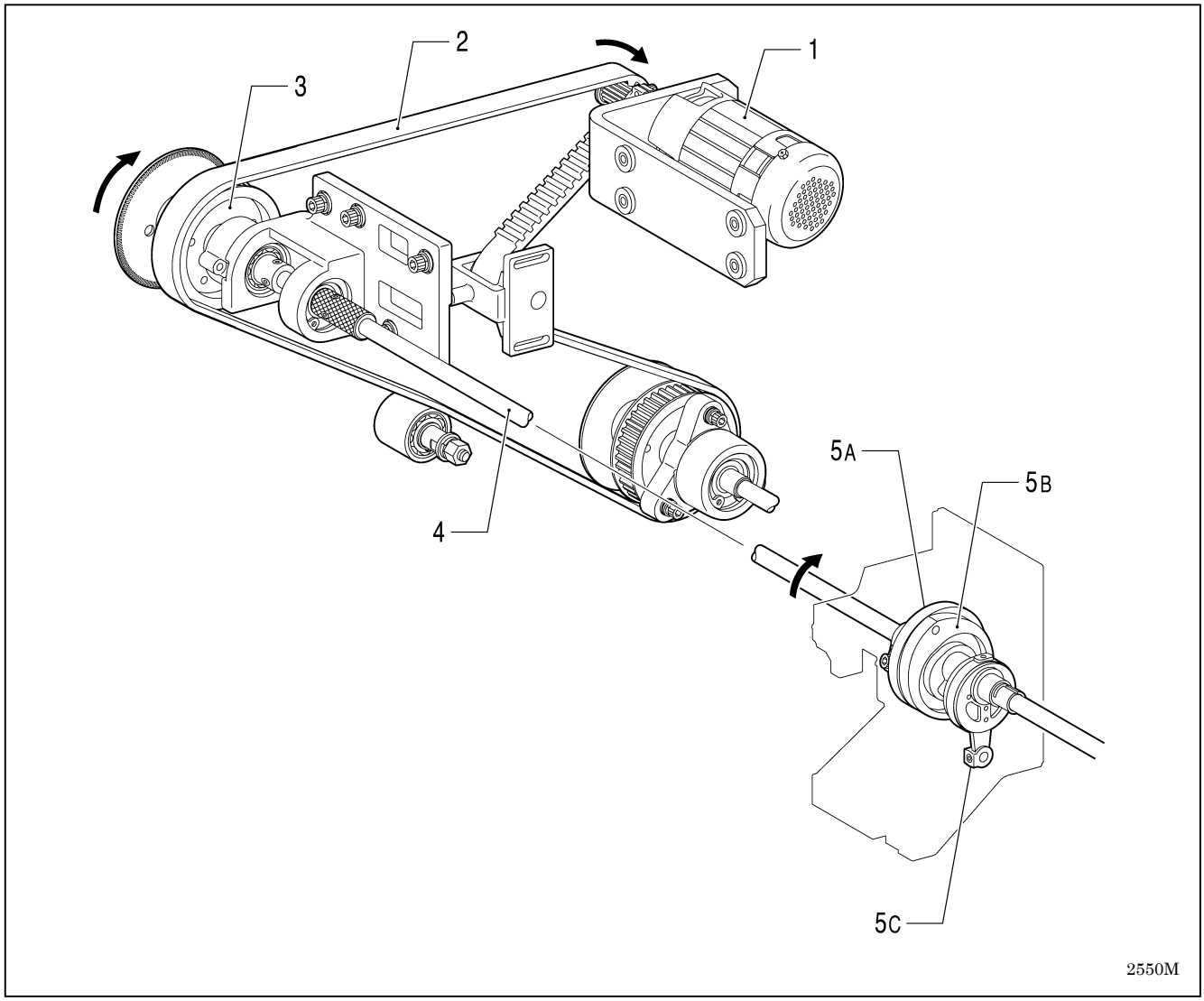
1. Feed guide mechanism



[X direction]
<1>.X-pulse motor
<2>.Timing belt
<3>.X-driving carriage
<4>.X-feed frame

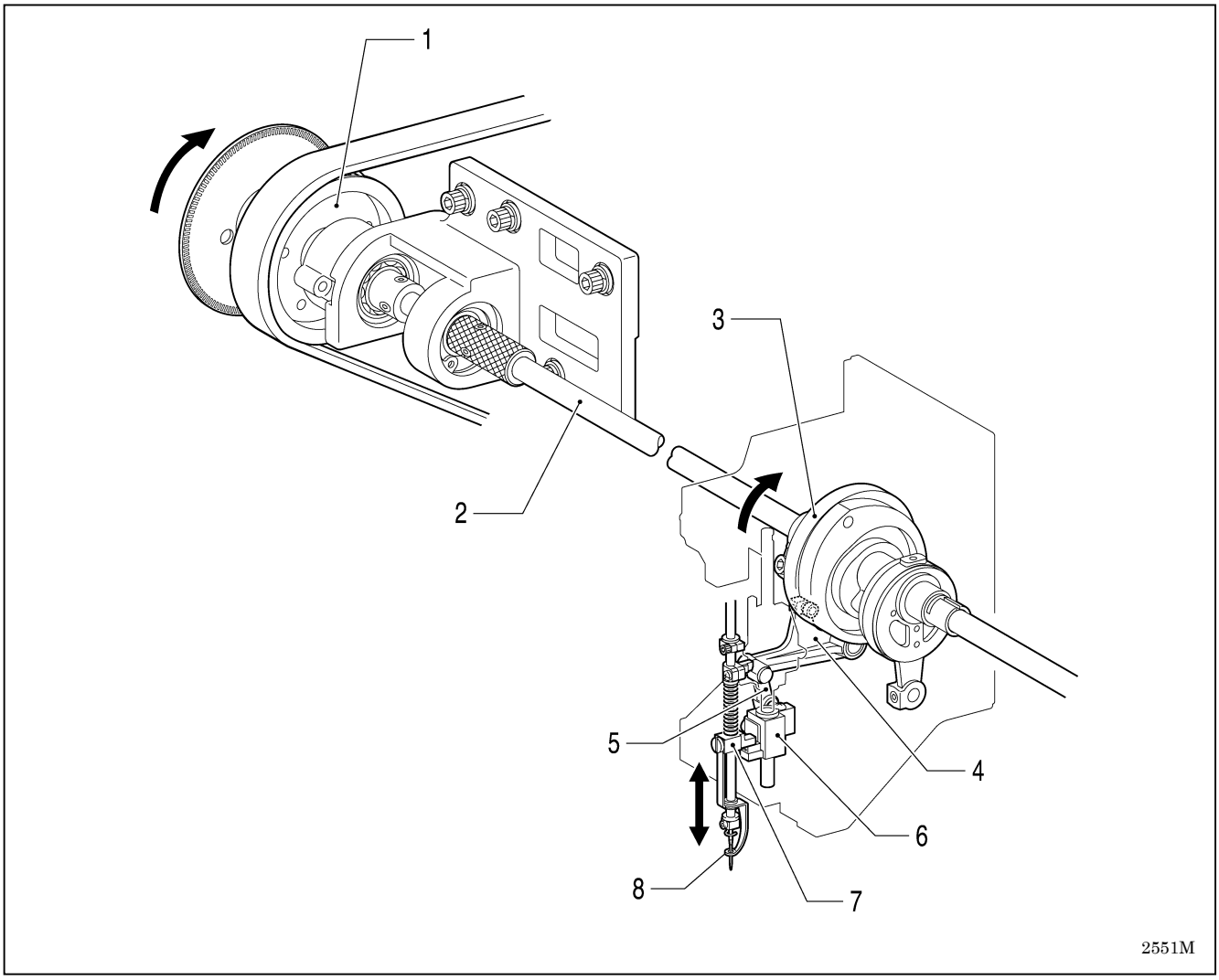
[Y direction]
1.Y-pulse motor
2.Y-driving connecting shaft
3.Y-driving pulley
4.Y-driving belt
5.X-carriage
6.Y-feed frame

2. Crank shaft mechanism



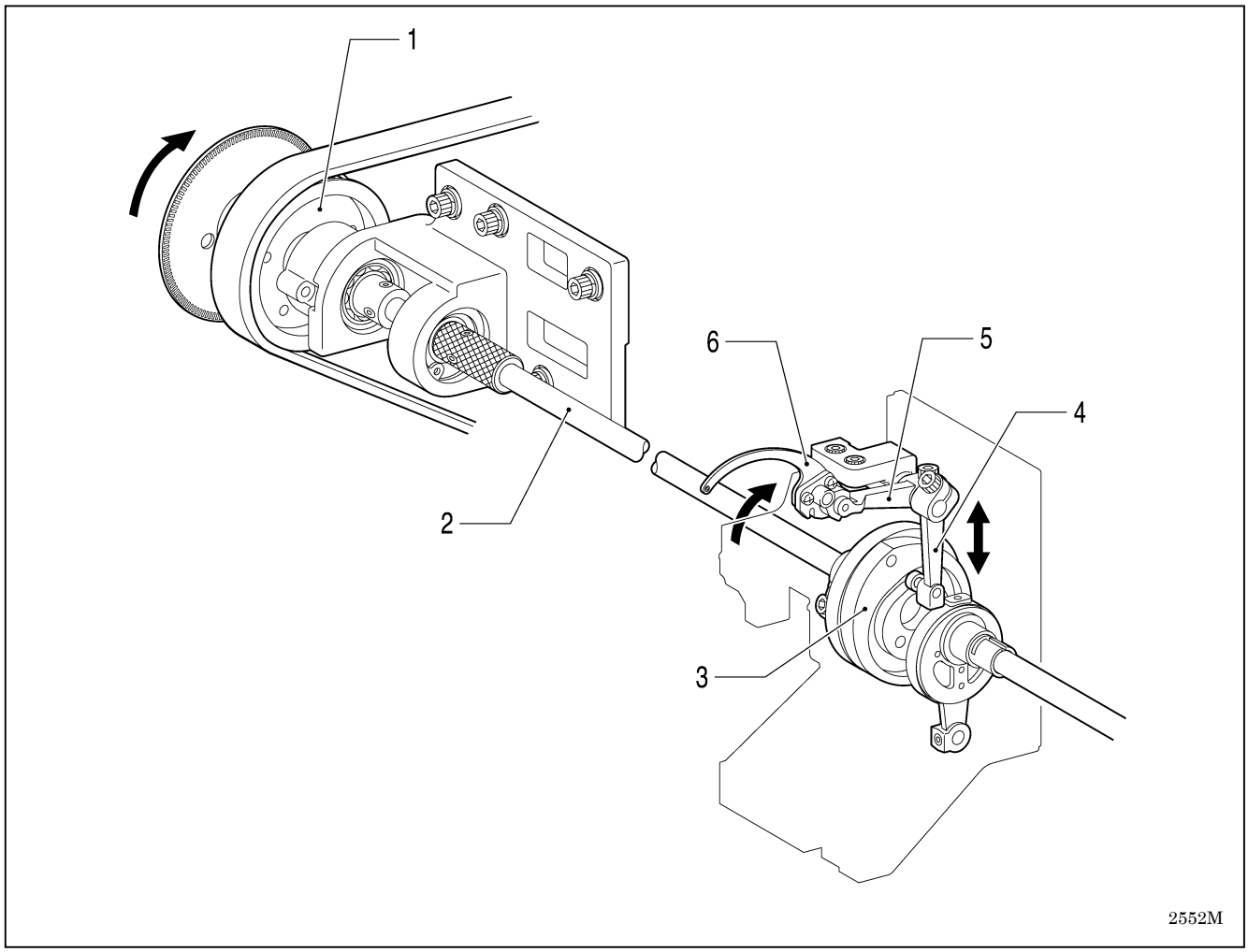
1.Motor
2.Timing belt
3.Driving pulley
4.Connecting shaft upper
5A.Cloth presser cam
5B.Thread take-up driving cam
5C.Needle bar driving cam

3.Presser foot mechanism



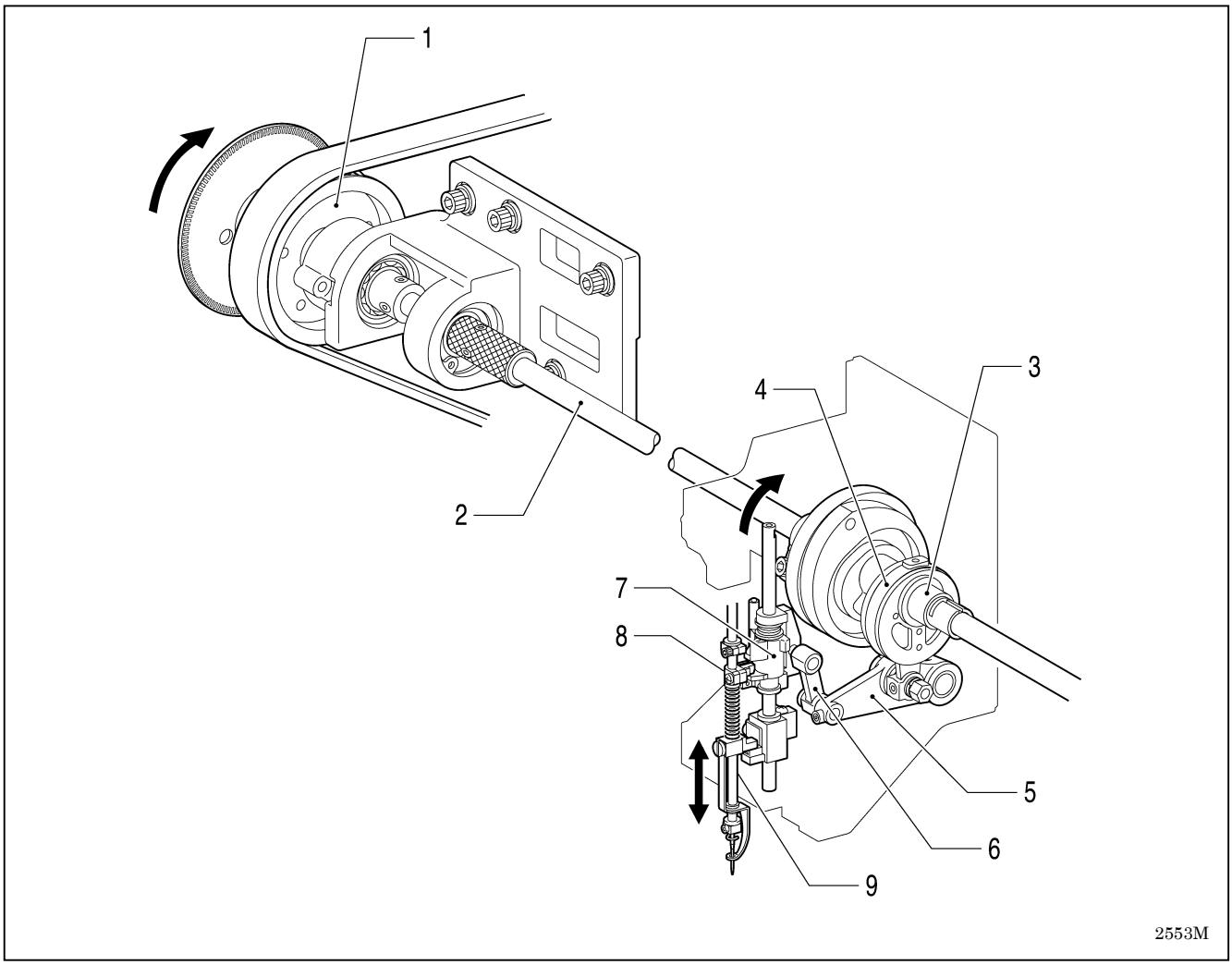
1.Driving pulley
2.Connecting shaft upper
3.Presser foot cam
4.Work clamp driving lever assy
5.Driving connector
6.W-clamp lifting parts
7.Work clamp bracket
8.Presser foot

4.Thread take-up mechanism



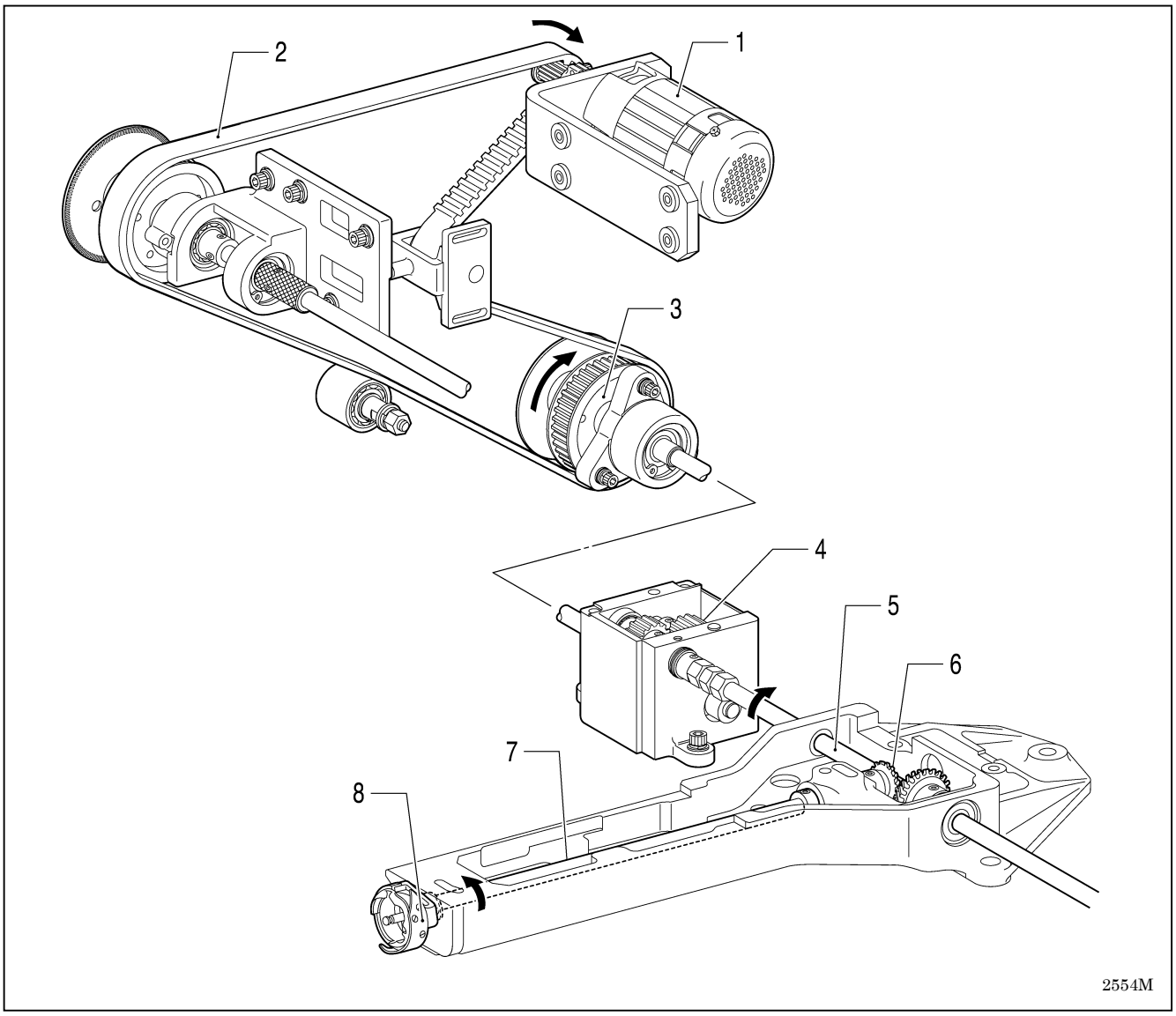
1.Driving pulley
2.Connecting shaft upper
3.Thread take-up driving cam
4.Thread take-up driving lever
5.Lever
6.Thread take-up lever

5. Needle bar mechanism



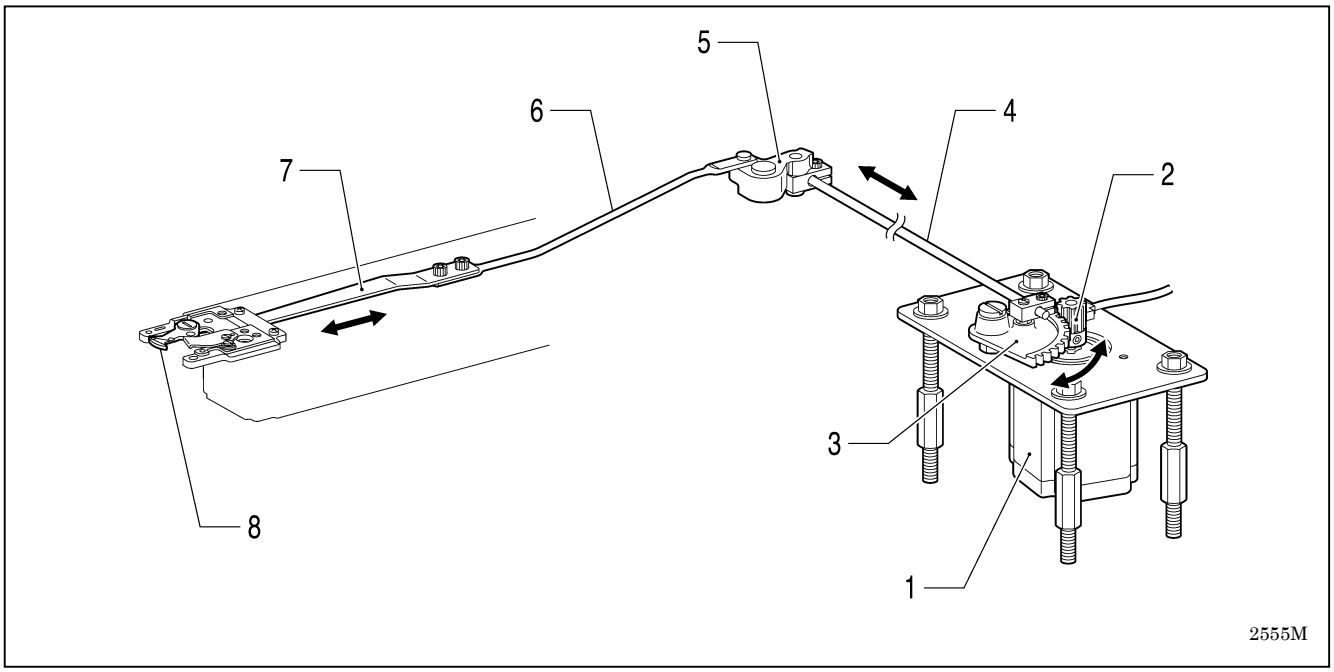
1.Driving pulley
2.Connecting shaft upper
3.Needle bar driving cam
4.Connecting rod
5.Needle bar driving lever
6.Driving connector
7.Needle bar lifting parts
8.Needle bar clamp
9.Needle bar

6.Lower shaft and rotary hook mechanisms



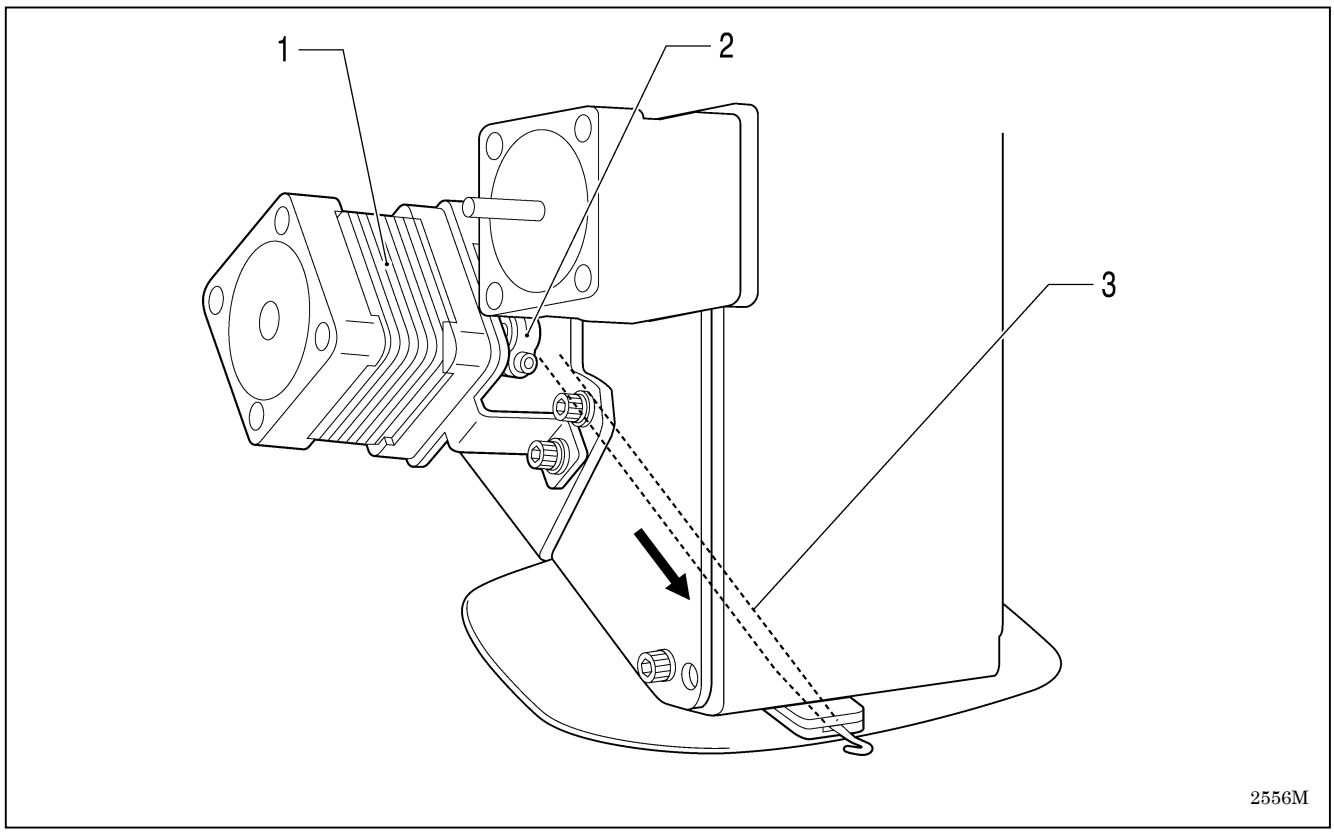
1.Motor
2.Timing belt
3.Driving pulley
4.Gear
5.Driving shaft lower
6.Lower shaft gear
7.Lower shaft
8.Rotary hook

7.Thread trimmer mechanism



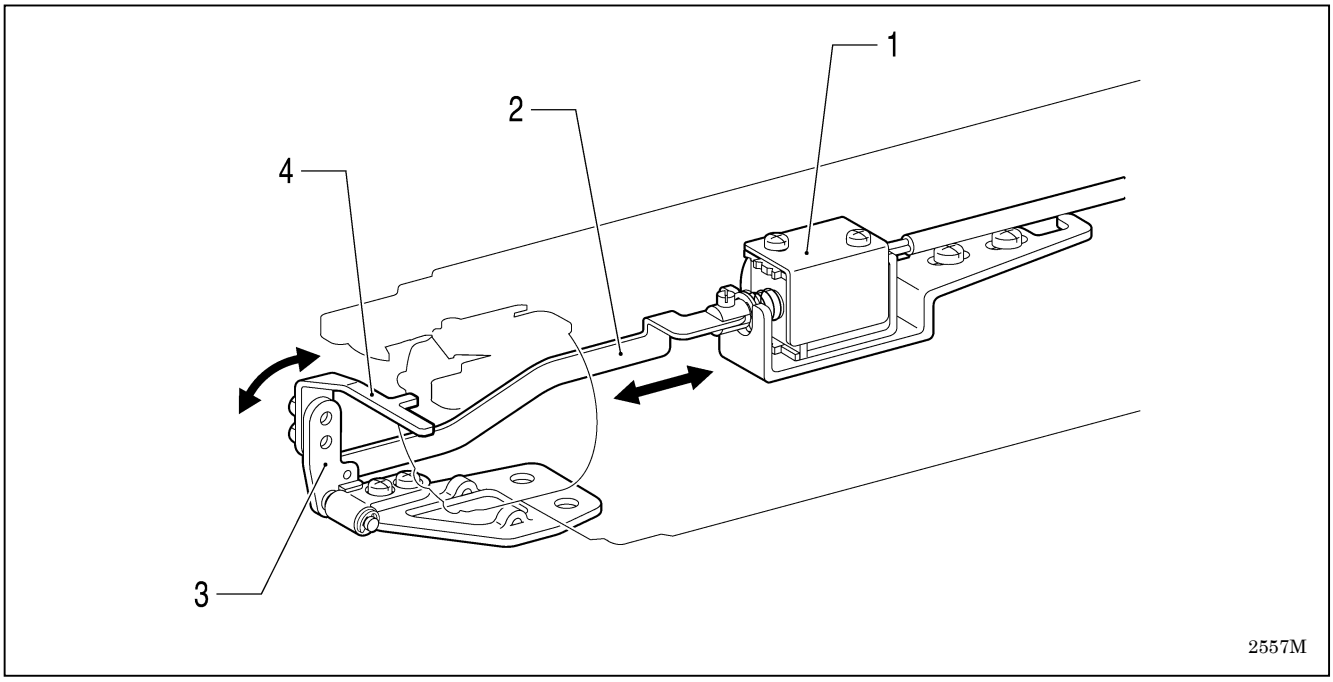
1.Thread trimmer motor
2.Thread trimmer gear
3.Driving lever
4.Connedtion shaft
5.T-trimmer connecting rod lever
6.T-trimmer connecting rod, B
7.T-trimmer con. rod assy, A
8.Movable knife

8.Thread wiper mechanism



1.Wiper motor bracket
2.Wiper lever
3.Upper thread hook

9.Picker mechanism



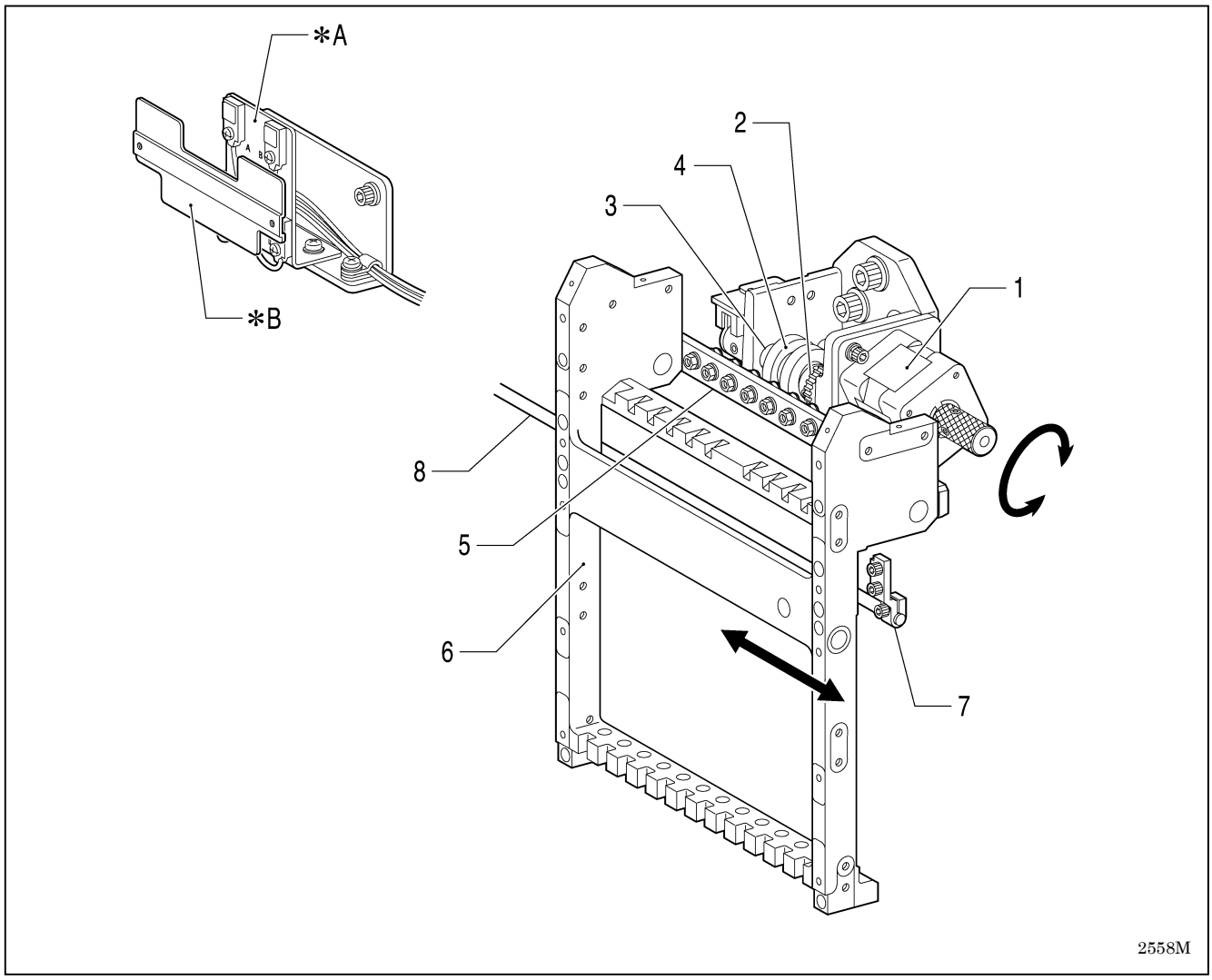
1.Picker solenoid

2.Picker lever

3.Picker base

4.Picker

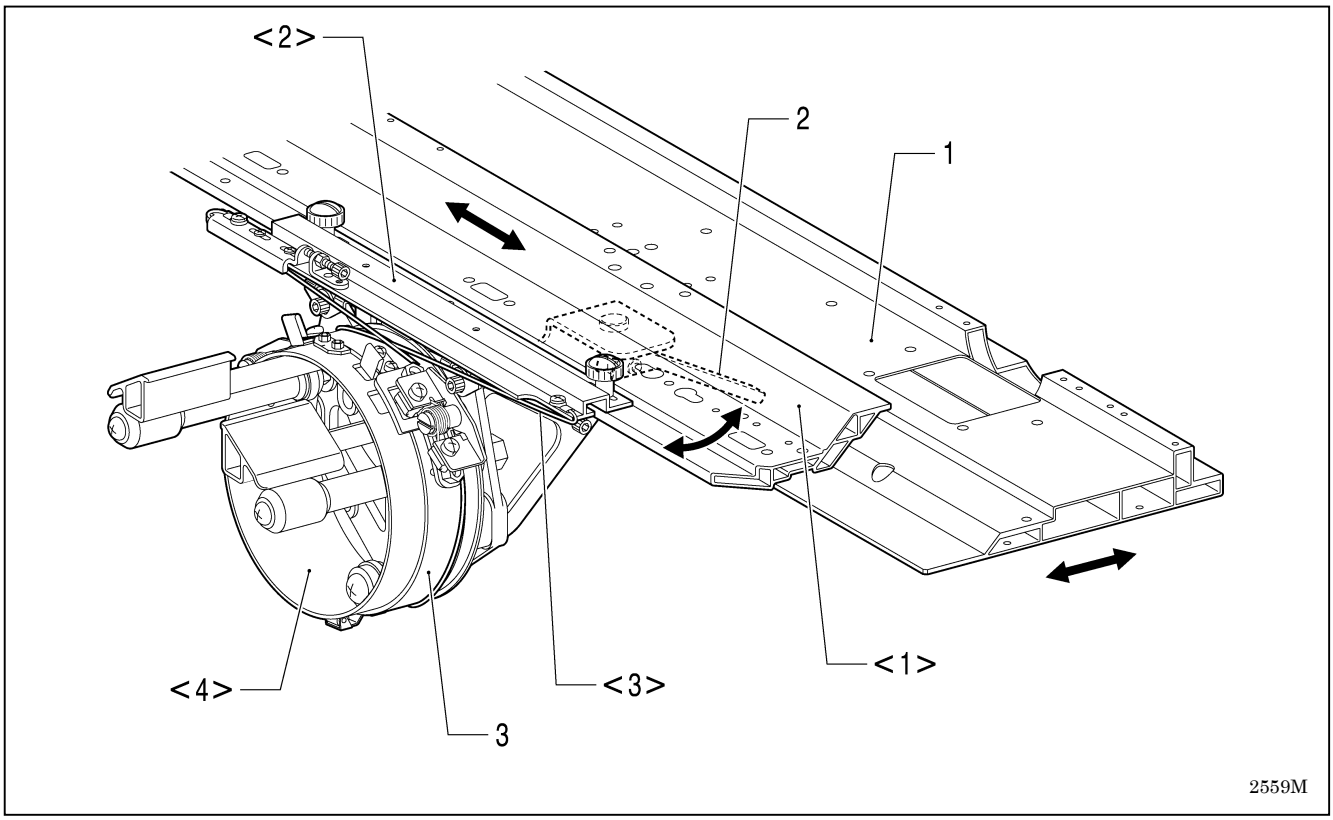
10.Needle bar flip-up mechanism



1.Change color motor
2.Change color gear
3.Shaft
4.Change cam
5.Change roller base
6.Needle bar case
7.Change bracket collar
8.Connection shaft

*A Change color sensor
*B Dog

11.Cap frame device



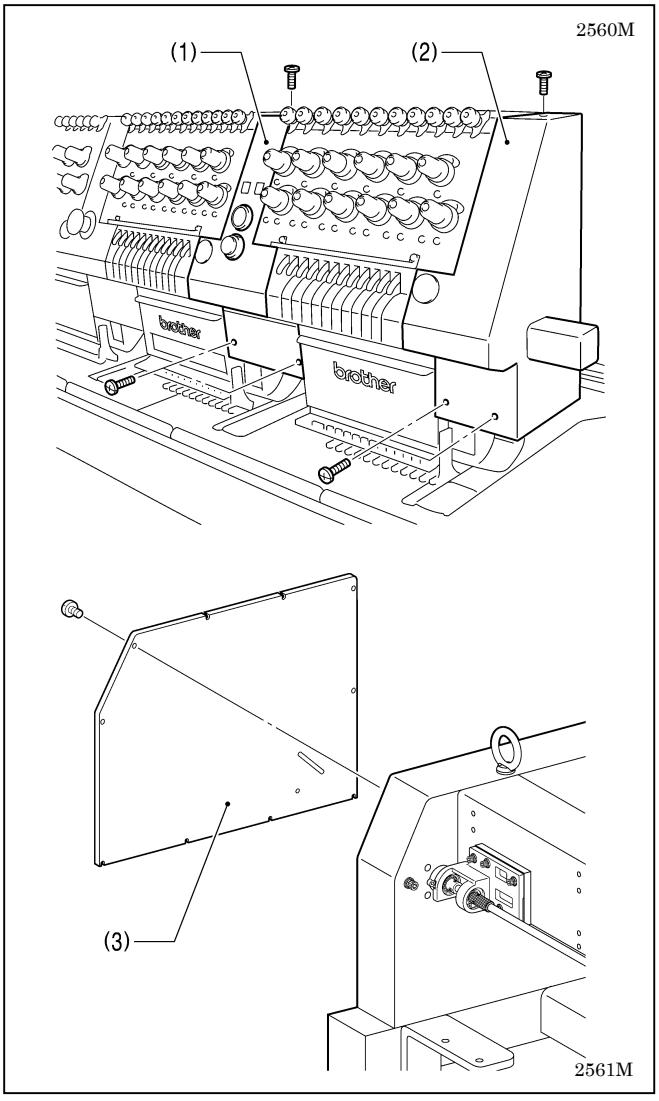
[X direction]
<1>.X-feed frame
<2>.Cap frame
<3>.Wire
<4>.Driving ring

[Y direction]
1.Y-feed frame
2.Fixing lever
3.Driving ring

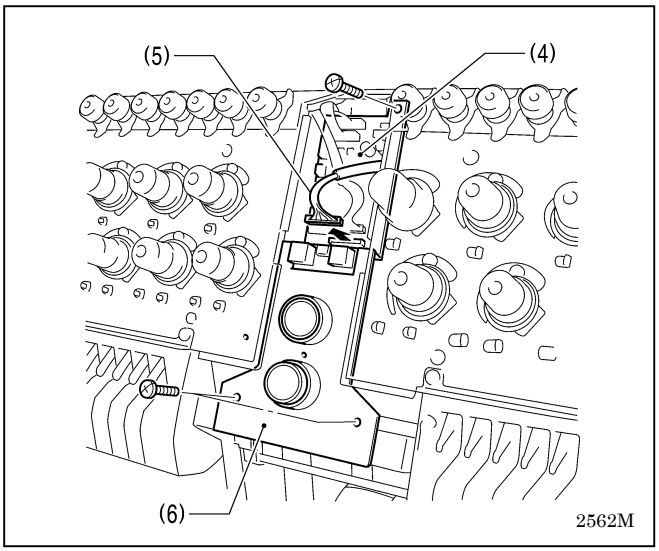
Chapter 2 Parts replacement and adjustment

1. Replacement and adjustment of jump driving assy, cloth presser cam, thread take-up driving cam, needle bar driving cam, driving belt and upper shaft sensor

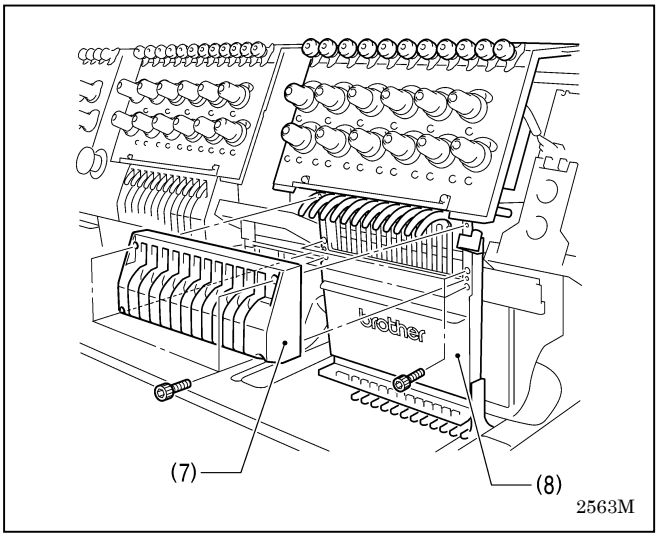
[Removing procedure]



1. Unscrew the screws of cover lower and upper (1) and cover R (2) to remove them.
   Unscrew the screws of side cover L (3) to remove it.
   Also remove the other covers.

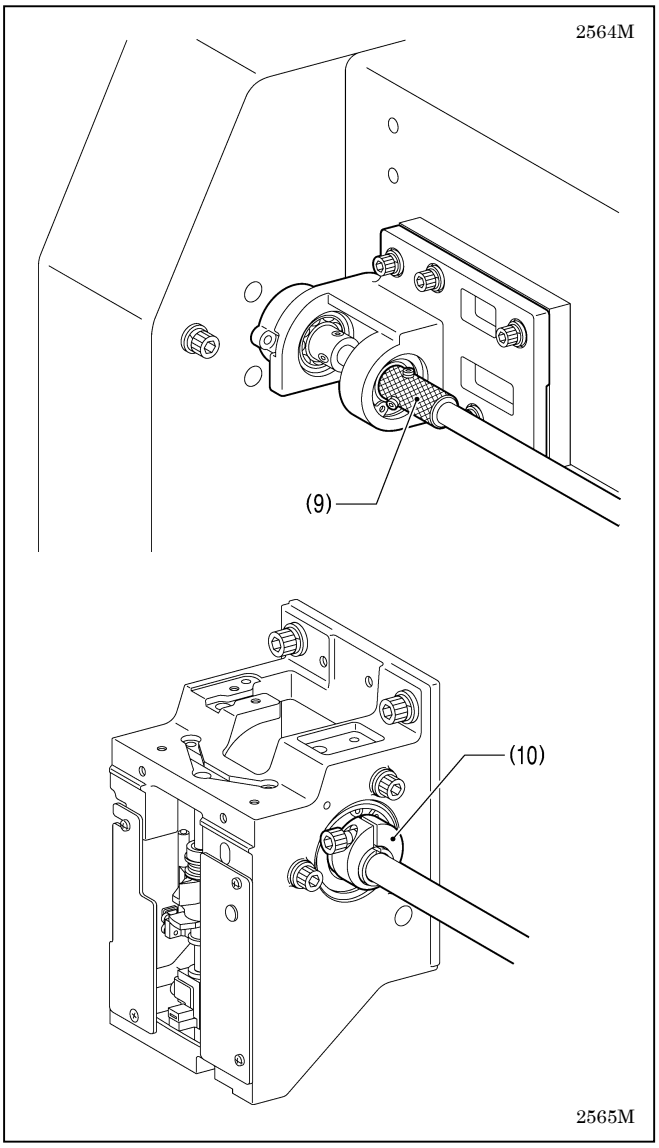


2. Detach the connector of tension base harness (5) from I/O PCB (4).
   Unscrew the screws of base (6) to remove it.

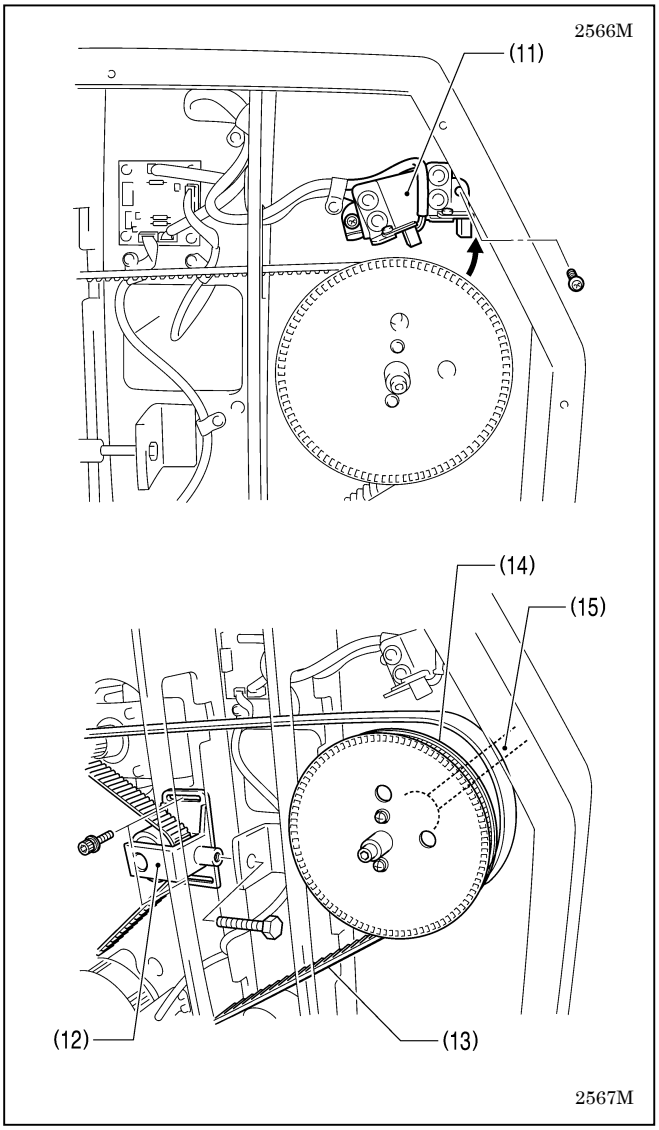


3. Take off 4 bolts of thread take-up cover (7) to remove it.

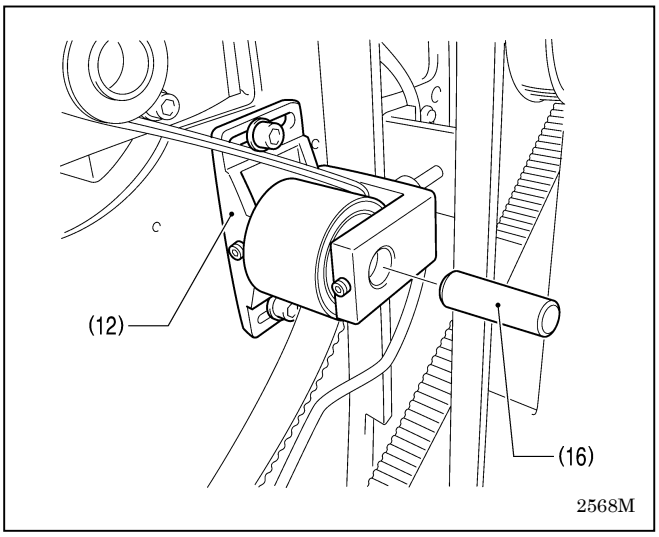
4. Take off 4 bolts of needle bar case (8) to remove it.



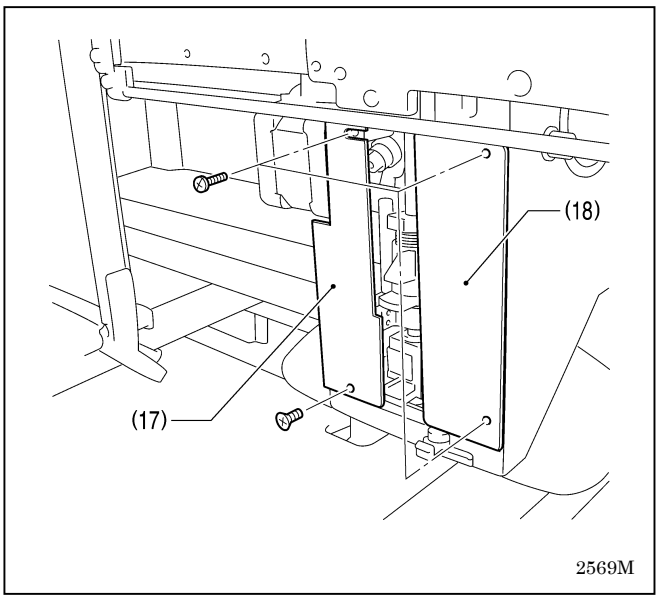
5. Loosen 2 bolts of bearing collar pulley (9), and also loosen 1 bolt of needle bar cam collar (10) of each head.



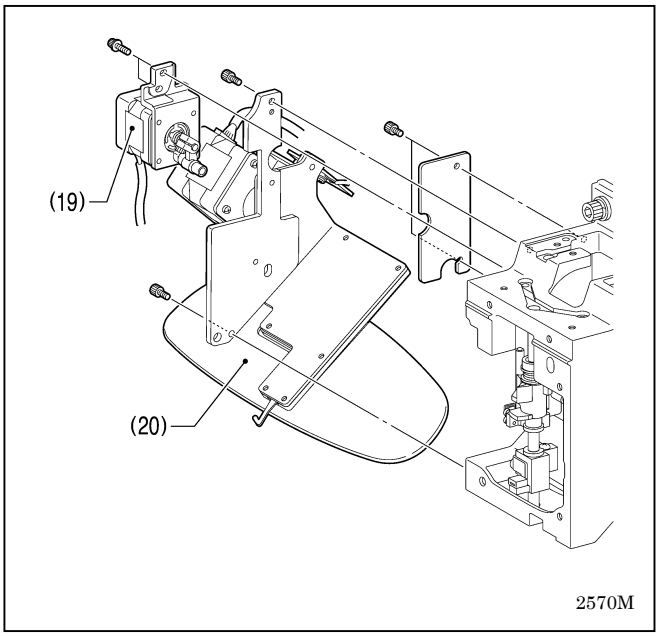
6. Unscrew 1of 2 screws of upper shaft sensor base plate (11), and then loosen the other one to fasten upper shaft sensor base plate (11) upward temporary.
Take off 3 bolts of tensor pulley holder (12) to remove it.
Detach driving belt (13) from driving pulley (14).
Extract driving shaft upper (15) together with driving pulley (14).



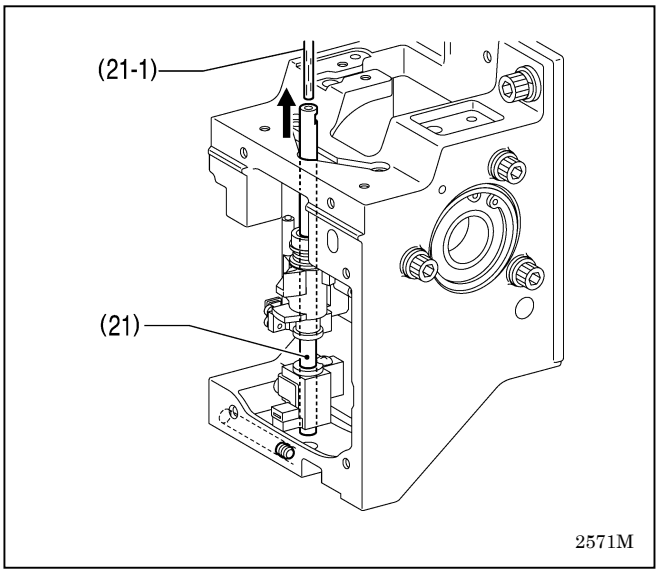
7. To replace driving belt, loosen 2 set screws of tension pulley holder (12) to extract tension shaft (16), and then detach driving belt (13).



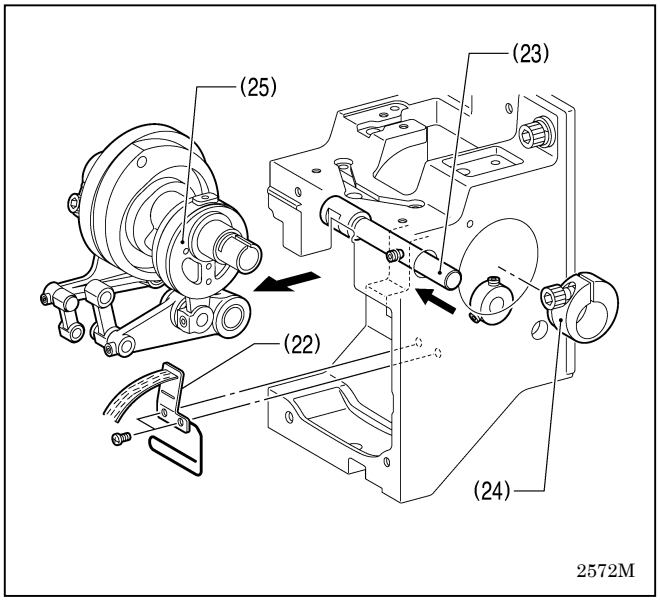
8. Unscrew 2 screws each of front cover R (17) and front cover L (18) to remove both of them.



9. Take off 2 bolts of jump driving assy (19) to remove it.
Take off 2 bolts of wiper driving assy (20) to remove it.

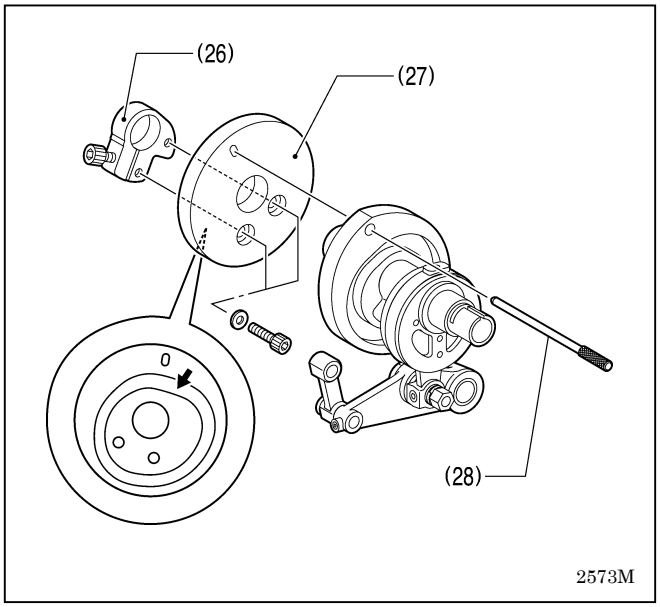


10. Remove the base needle bar felt (21-1) and loosen a set screw, socket to pull out the base needle bar (21).



11. Unscrew 2 screws of oil support A (22) to remove it.
Loosen 3 set screws of driving lever shaft (23) to extract it.
Loosen 1 bolt of needle bar cam collar (24) to remove it.

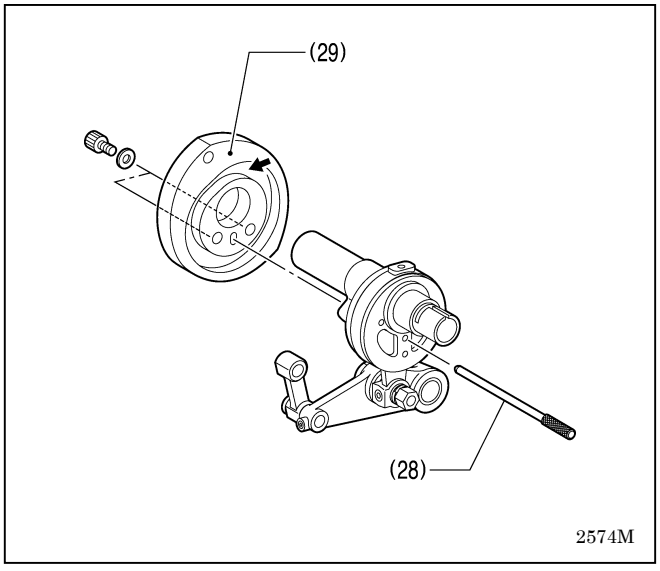
Now needle bar cam (25) can be detached.



12. Loosen 1 bolt of cloth presser cam collar (26) to remove it.
Loosen 2 bolts of cloth presser cam (27) to remove it.
To mount cloth presser cam collar (26), insert positioning gauge pin (28) into the positioning hole on the cam and fasten 1 bolt.
Grease the groove of cloth presser cam (27) indicated by the arrow in the drawing.

CAUTION

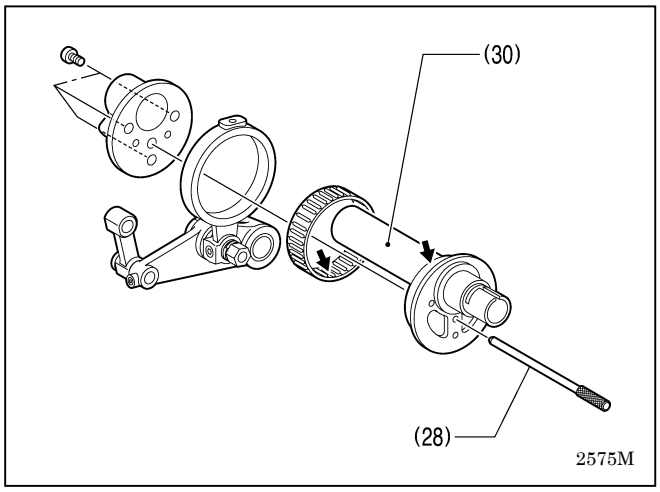
Use the positioning gauge pin included in the attachment of the sawing machine.
Use the attached grease tank EM-30L for the greasing.



13. Take off 2 bolts of thread take-up driving cam (29) to remove it.
To mount thread take-up driving cam (29), insert positioning gauge pin (28) into the positioning hole on the cam and fasten 2 bolts.
Grease the groove of thread take-up driving cam (29) indicated by the arrow in the drawing.

CAUTION

Use the positioning gauge pin included in the attachment of the sawing machine.
Use the attached grease tank EM-30L for the greasing.



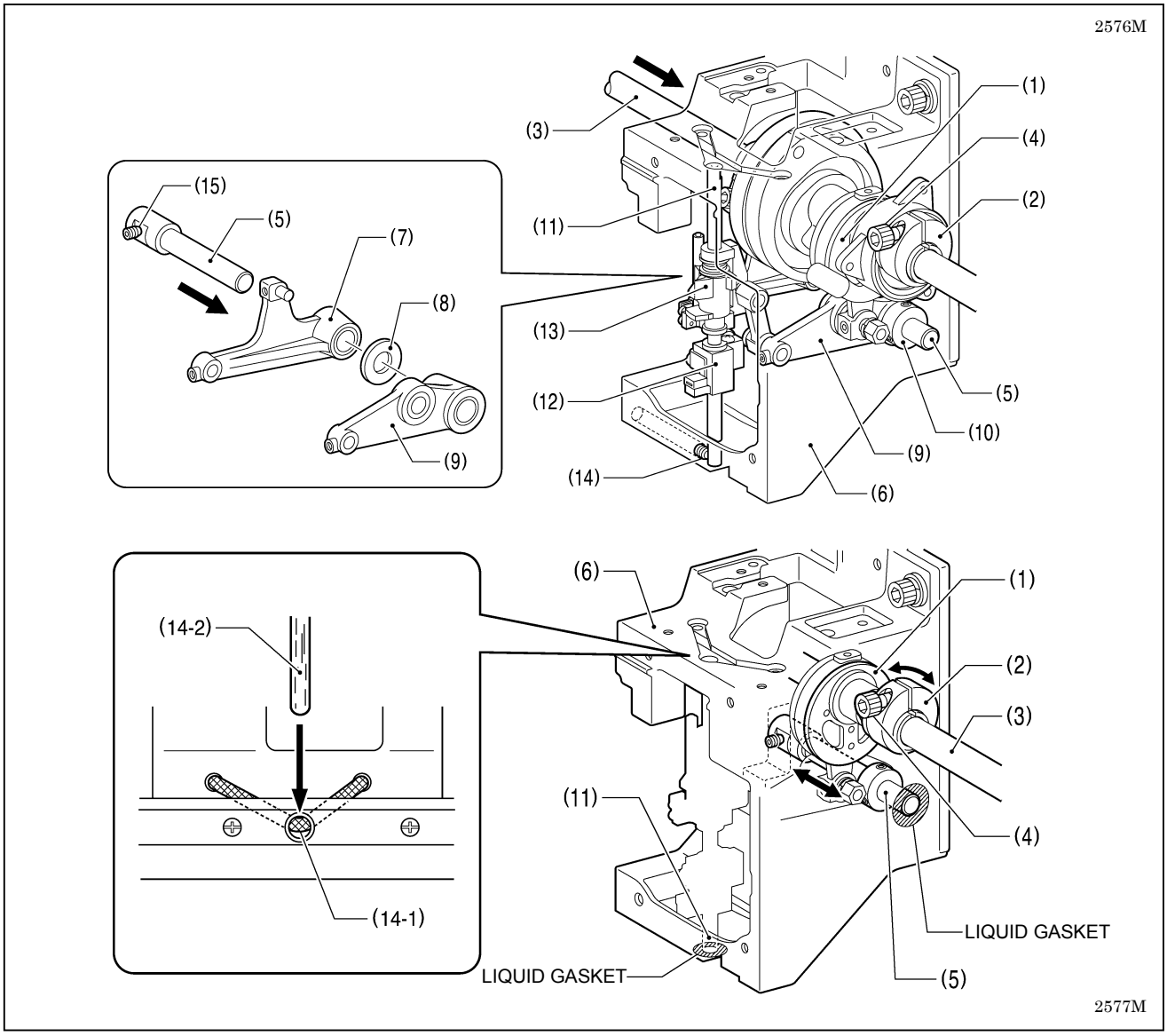
14. Unscrew 2 screws of needle bar driving cam (30) to remove it.
Grease needle bar driving cam (30) at the position indicated by the arrow in the drawing.
To mount needle bar driving cam (30), insert positioning gauge pin (28) into the positioning hole on the cam and fasten 2 screws.

CAUTION

Use the positioning gauge pin included in the attachment of the sawing machine.
Use the attached grease tank EM-30L for the greasing.

[Mounting procedure]

To mount pieces, follow the reverse procedure to the disassembly. The followings are the key points in the mounting.



1. Grease the connecting shaft upper on spots that touches bearings of the driving pulley, driving shaft support or each head.
2. Attach needle bar cam collar (2) to needle bar driving cam (1), insert driving shaft upper (3) and fasten the bolt (4) temporary so that needle bar driving cam (1) rotates easily.
3. Insert driving lever shaft (5) into head (6), work clamp driving lever (7), spacer (8), needle bar driving lever (9) and set screw collar (10), then fasten 3 set screws.
4. Spread a sealing agent on the left side of head (6) and lever shaft (5) to prevent oil leak.
5. Insert base needle bar (11) into head (6), work clamp lifting parts (12), and needle bar lifting parts (13), and fasten 1 set screw (14).
6. Reset the wick (14-1) so that it touches the base needle bar felt (14-2).
7. Spread a sealing agent on the bottom faces of head (6) and base needle bar (11) to prevent oil leak.

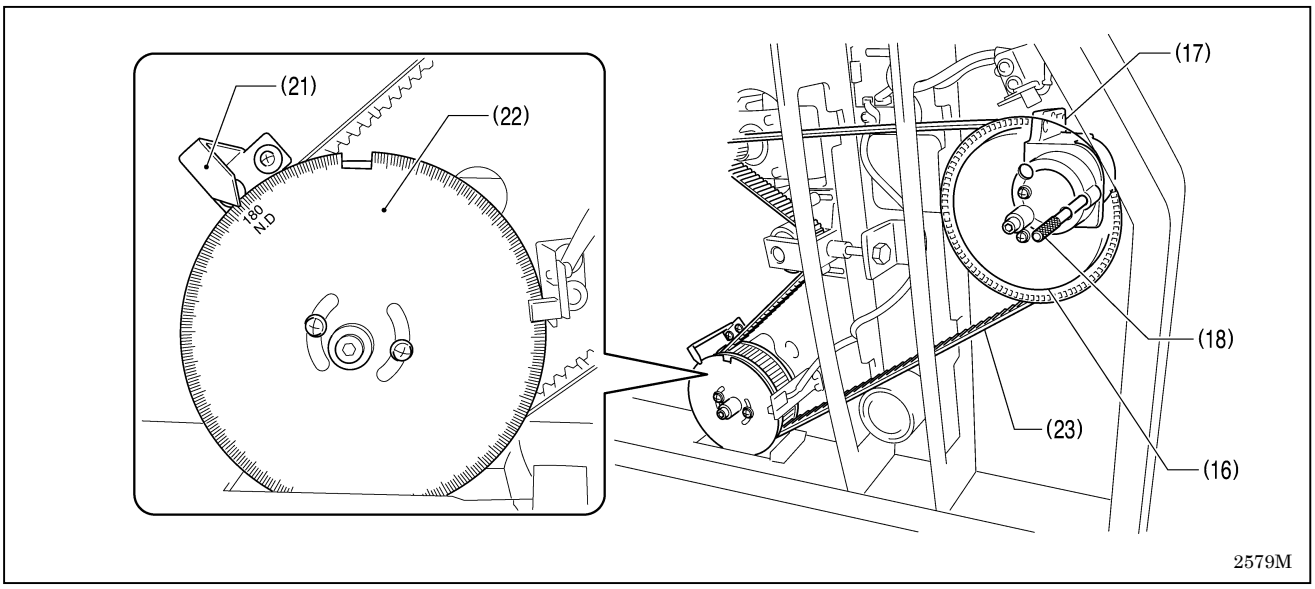
CAUTION

Rotate needle bar cam collar (2) and see if needle bar driving cam (1) rotates easily. If not, loosen 1 set screw (15) of driving lever shaft (5) to shift it toward the thrust for adjustment.

CAUTION

Use three bond 1215 commercially available for the sealing.

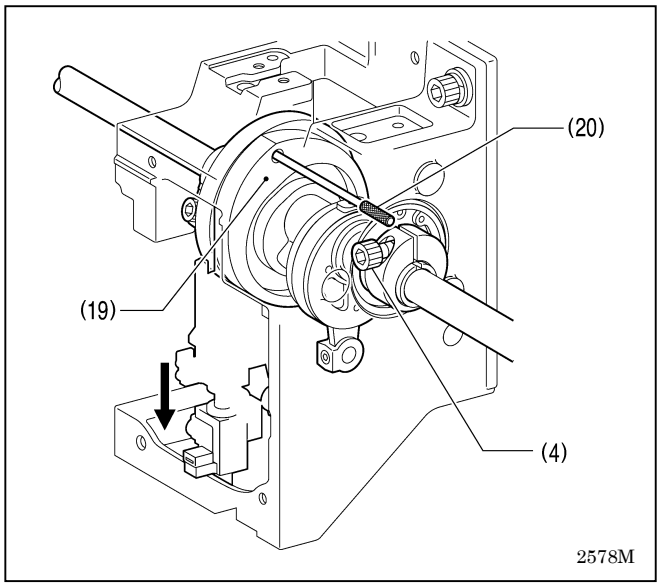
Use the attached grease tank EM-30L for the greasing.



9. Align driving pulley (16) and the positioning hole on pulley case upper (17), then insert positioning bar (18) therein.

CAUTION

Use the positioning bar (18) included in the attachment of the sawing machine.

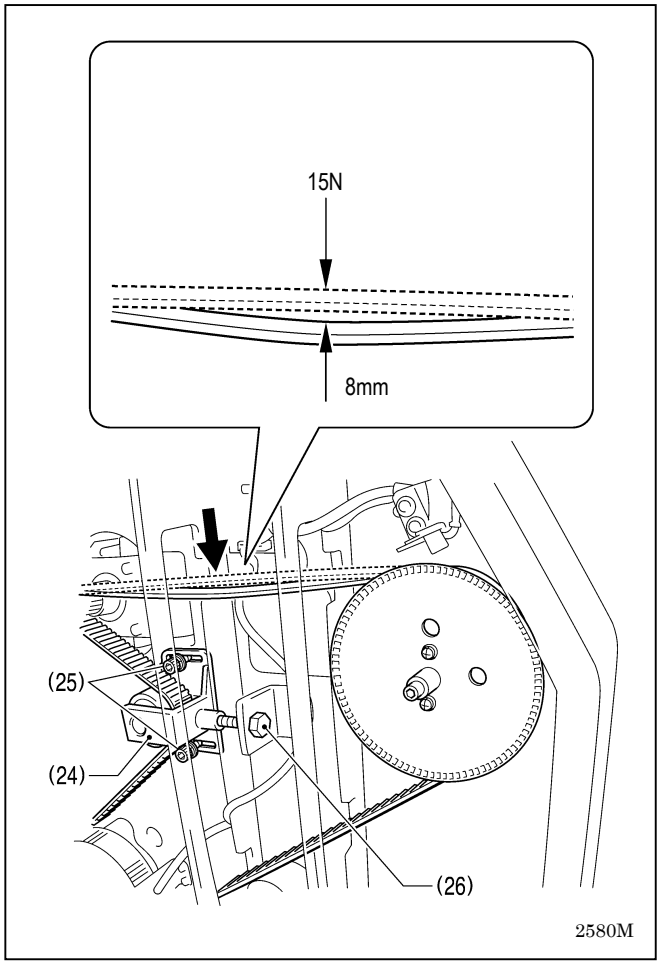


10. Repeat the following procedure for each head in order: Align the hole on the right side of the head and the positioning hole of thread take-up driving cam (19) (needle bar bottom dead center), then insert positioning gauge pin (20) therein. Also align slit of needle bar driving cam (1) and needle bar cam collar (2), and fasten bolt (4) to fix them.

CAUTION

Use the positioning gauge pin included in the attachment of the sawing machine.

11. Adjust arrow plate (21) and scale plate (22) to make 180 degrees angle each other, then attach driving belt (23) on them.



12. Temporarily fasten 2 bolts (25) which are fixing tension pulley holder (24).

13. Turn tension adjusting bolt (26) for the adjustment.

    Clockwise turn: Increases the tension

    Anticlockwise turn: Decreases the tension

14. Fasten 2 bolts (25) of tension pulley holder (24), then adjust the holder so that the bending should be about 8 mm when pushed with the force of 15 N at the center of the belt.

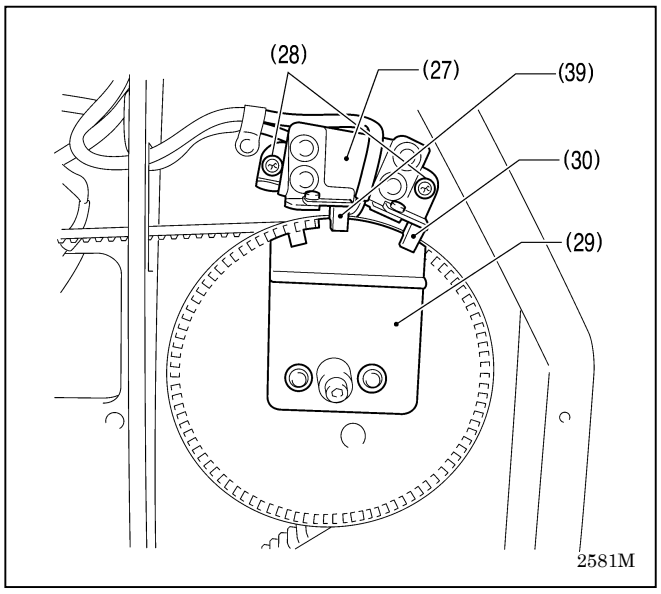
    Measuring with the sonic tension meter by Gates Unitta Asia Company,

    Unit weight :4.0g/mm

    Width :20mm

    Span :310mm

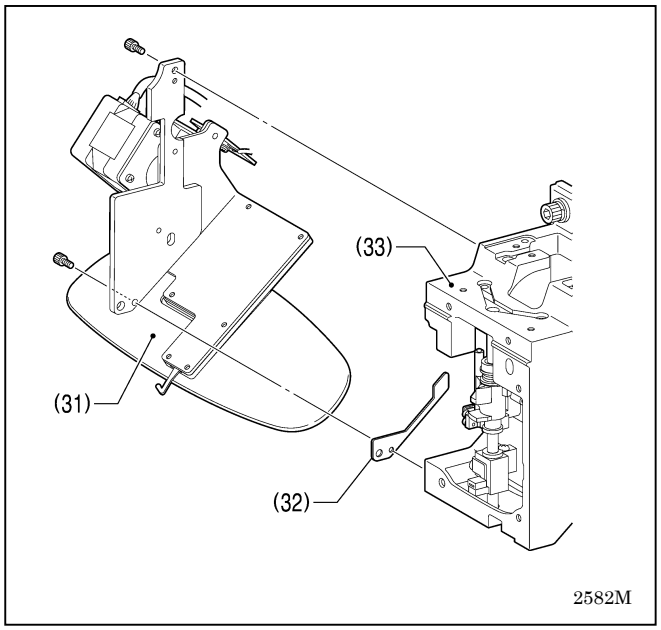
    Adjust the tension to be 130 N ± 10 N when (A) is twanged. Be sure to clear around the belt so that nothing touches it when twanged.



15. Fasten 2 screws (28) of upper shaft sensor base plate (27) temporarily.
    Put sensor position plate (29) as shown in the illustration, adjusting its position so as to touch both phase-A sensor (30) and phase-B sensor (39) lightly, and then fasten the 2 screws (28) of upper shaft sensor base plate (27) firmly.

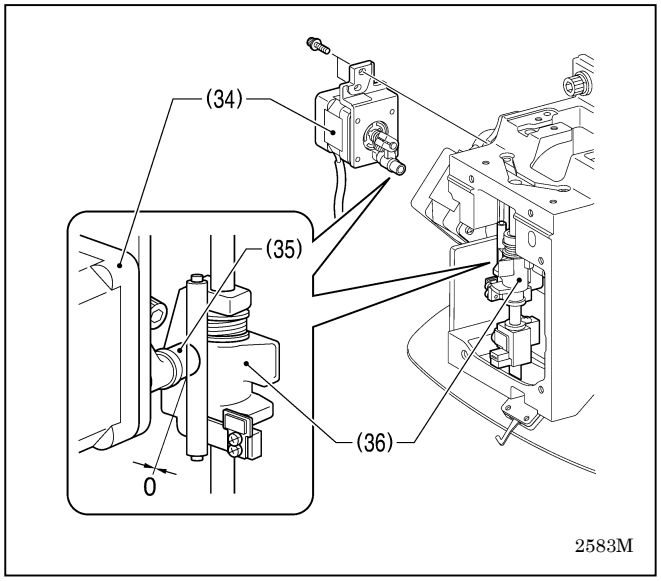
    CAUTION

    Use the sensor positioning plate (29) included in the attachment of the sewing machine.

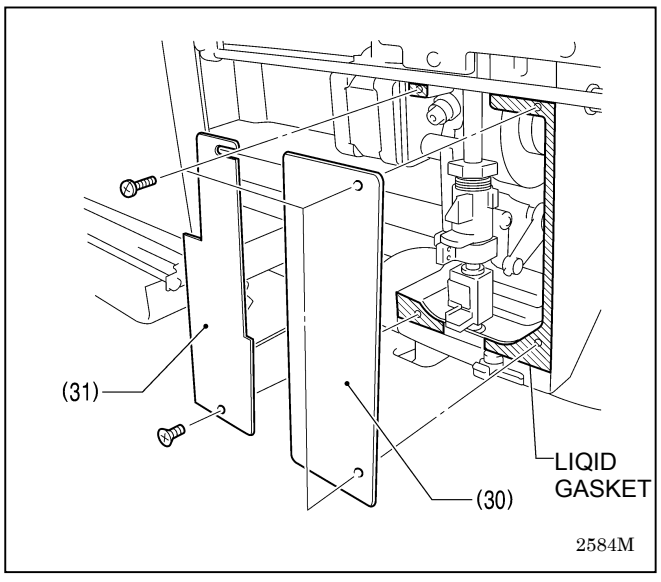


16. Insert bed frame side packing (32) between heads (33), then attach wiper driving assy (31) with 2 bolts.

No need to adjust any parts in this case.
If troubled, follow the description on Page 2-13. “Replacement and adjustment of stepping motor for thread sweeping and wiper sensor”.



17. Fasten 2 bolts to fix jump driving assy (34) at the position where jump lever (35) and jump base (36) make no spaces between them.

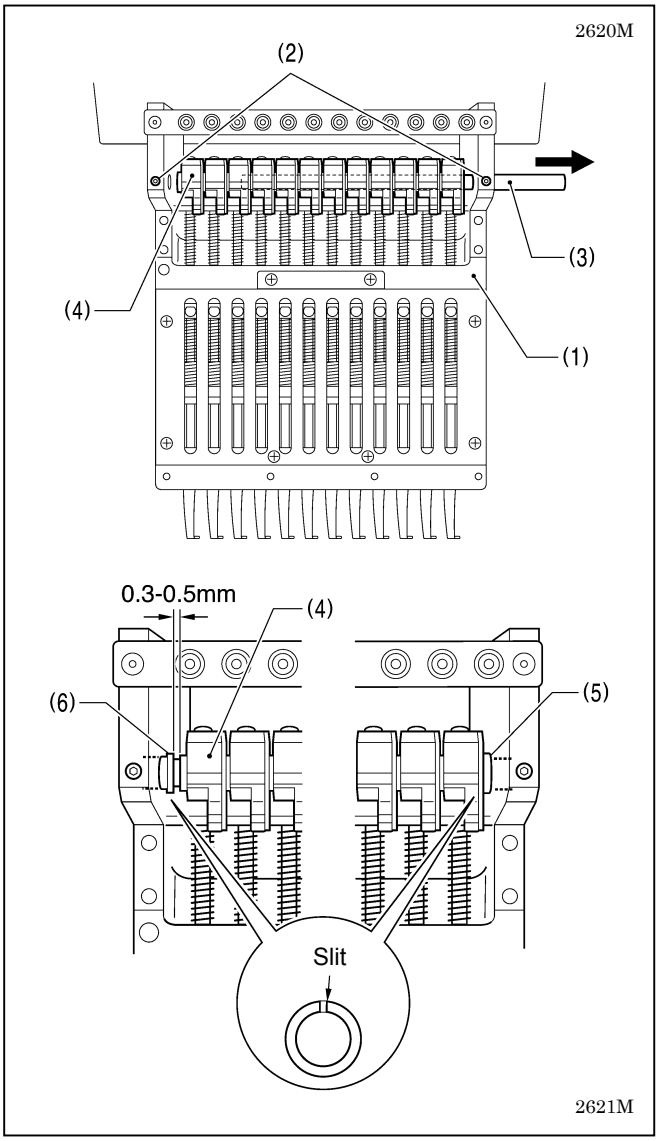


18. Spread a sealing agent around the contact points between the head and the bottom faces of front cover R (30) and front cover L (31) to prevent oil leak, then attach those covers with 2 screws each.

CAUTION

Use three bond 1215 commercially available for the sealing.

2. Replacement and adjustment of thread take-up lever



1. Detach needle bar case (1).

   Refer to "1. Replacement and adjustment of jump driving assy, cloth presser cam, thread take-up driving cam, needle bar driving cam, driving belt and upper shaft sensor" for information on how to detach needle bar case (1).

2. Loosen the right and left set screws, (2) to pull out thread take-up shaft (3), then detach thread take-up lever (4).

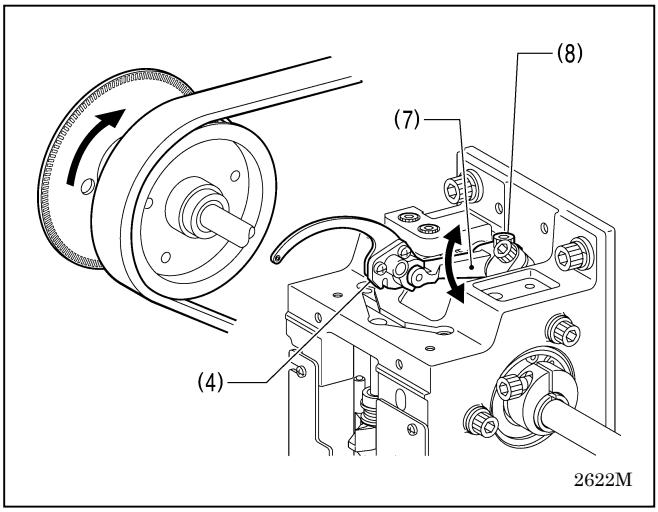
   To mount pieces after the replacement, follow the reverse procedure to the above.

(Instructions for the mounting)

1. Put the slit of thread take-up position bush (5) upward and make the faces of needle bar case stick together on visor before fastening set screws.

2. Put the slit of thread take-up adjusting bush (6) upward as well and keep the clearance between thread take-up adjusting bush (6) and thread take-up lever (4) to be within 0.3 to 0.5 mm before fixing them.

Turn driving pulley and follow the procedure below to adjust the heights of the other thread take-up lever (4) and lever (7) to be even when driving pulley is angled at 100 degrees (stop position).

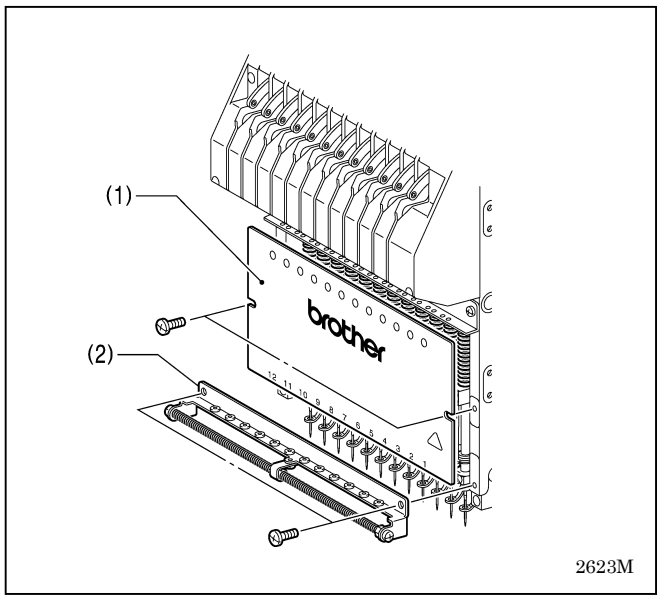


Loosen bolt, socket (8) which is fixing lever (7) to adjust the height of thread take-up lever (4) when driving pulley is angled at 100 degrees (stop position).

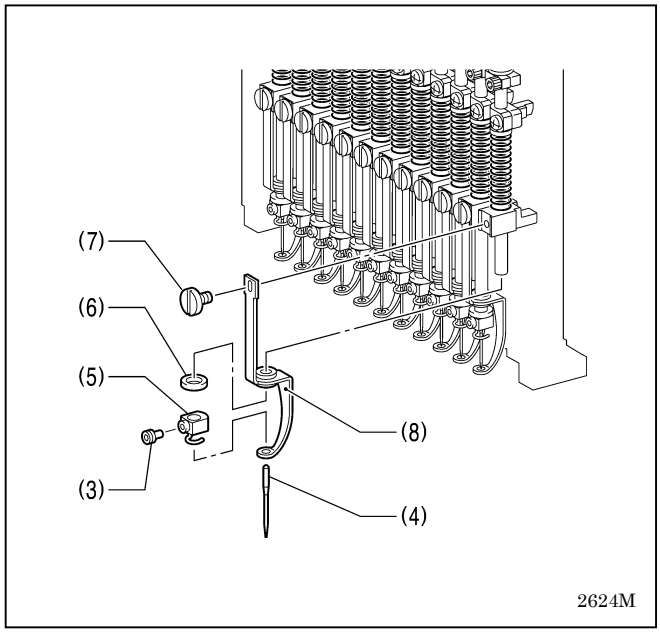
CAUTION

Adjust the position not to make a noise "Click" when changing the color.

3. Replacement and adjustment of work clamp

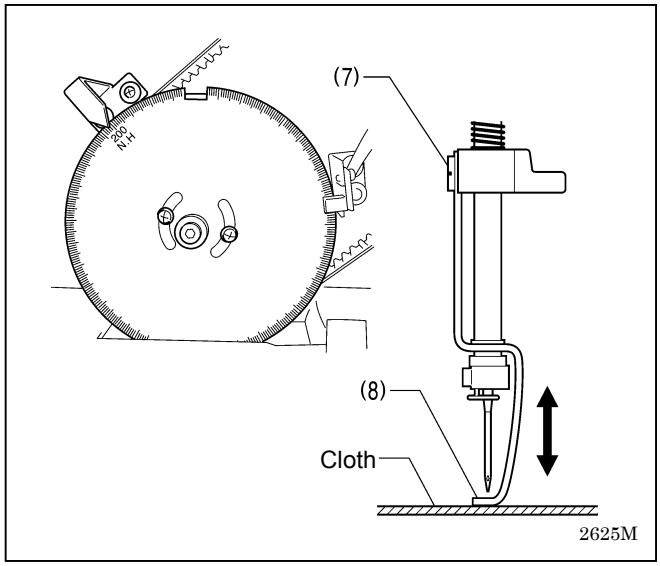


1. Unscrew 2 screws of lower cover (1) to detach it.
2. Unscrew 2 screws of lower thread eyelet (2) to detach it.



3. Unscrew needle clamp screw (3) to detach needle (4), needle bar thread guide (5) and work clamp cushion (6).
4. Unscrew screw, M3 (7) to detach work clamp (8).

To mount pieces after the replacement, follow the reverse procedure to the above.



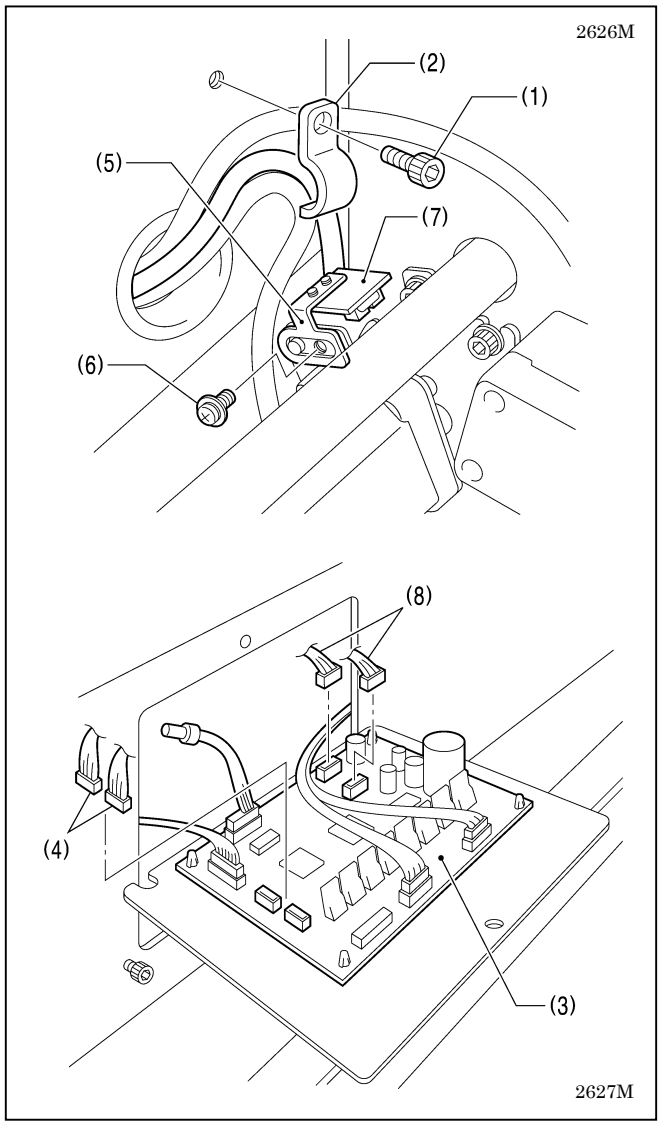
How to adjust the height of work clamp (8)

1. Loosen screw, M3 (7) to adjust the height of work clamp (8) so that the bottom face of cloth presser and the upper surface of the cloth touch each other at the alignment point of the N.H mark (200 degrees) and the arrow plate (contact point between the needle and rotary hook).

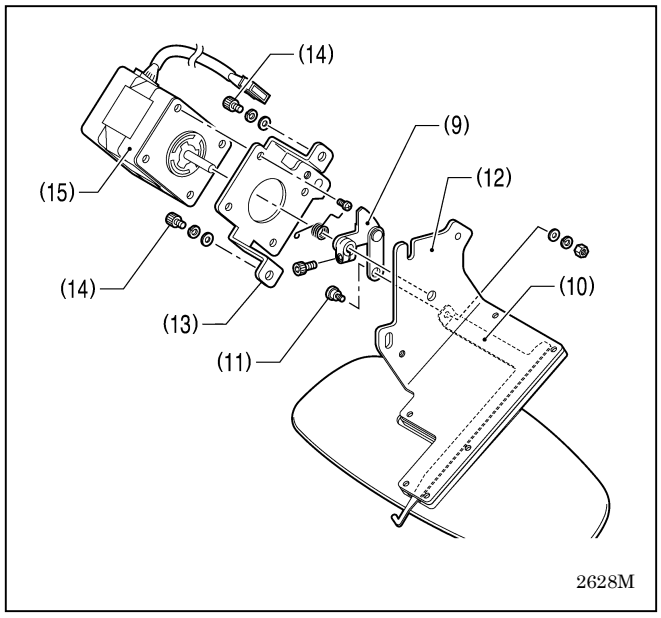
4.Replacement and adjustment of stepping motor for thread sweeping and wiper sensor

Turn off the power of the sewing machine.

[How to detach]



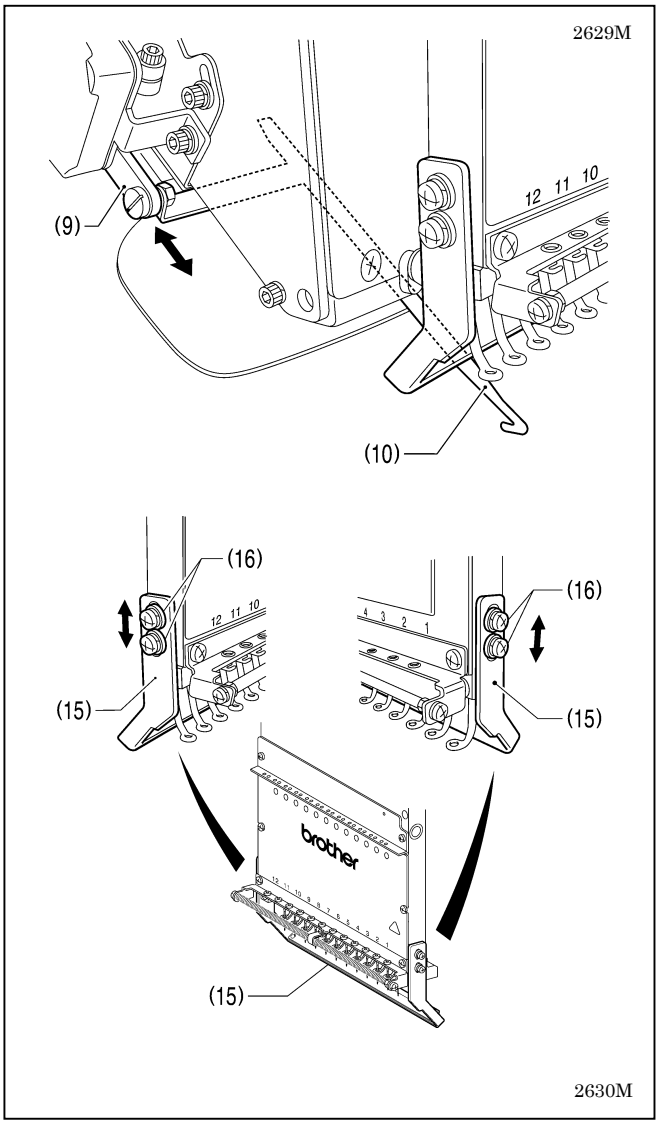
1. Detach bolt (1) and then detach cord holder washer (2).
2. Detach wiper sensor connector P2 or P3 (4) from head PCB (3).
3. Unscrew 1 screw (6) of wiper sensor bracket (5) and replace sensor PCB (7).
4. Detach wiper stepping motor connector P8 or P9 (8) from head PCB (3)



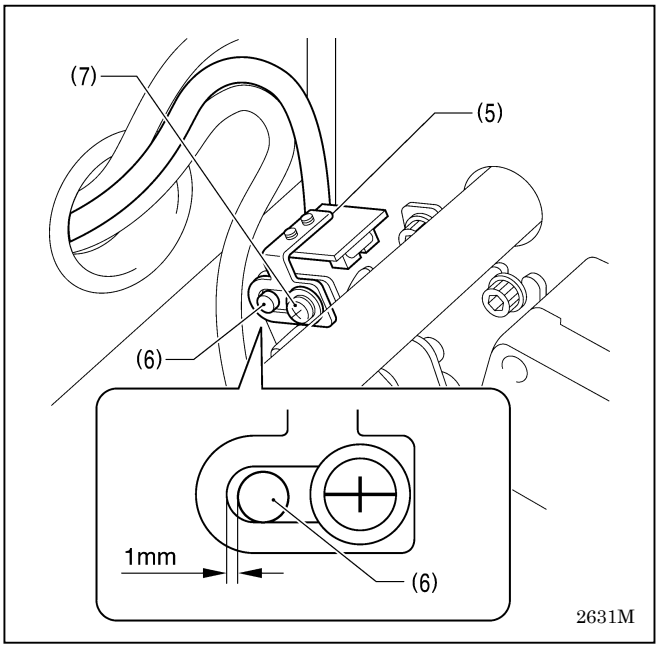
5. Detach the nut of shoulder screw (11) to detach upper thread hook (10) from wiper lever (9).
6. Detach 2 bolts (14) to detach wiper motor bracket (13) from wiper assy reference base (12), then replace stepping motor (15).

[How to mount]

To mount pieces, follow the reverse procedure to the disassembly.Key points in the mounting and the adjustment afterward are described below.



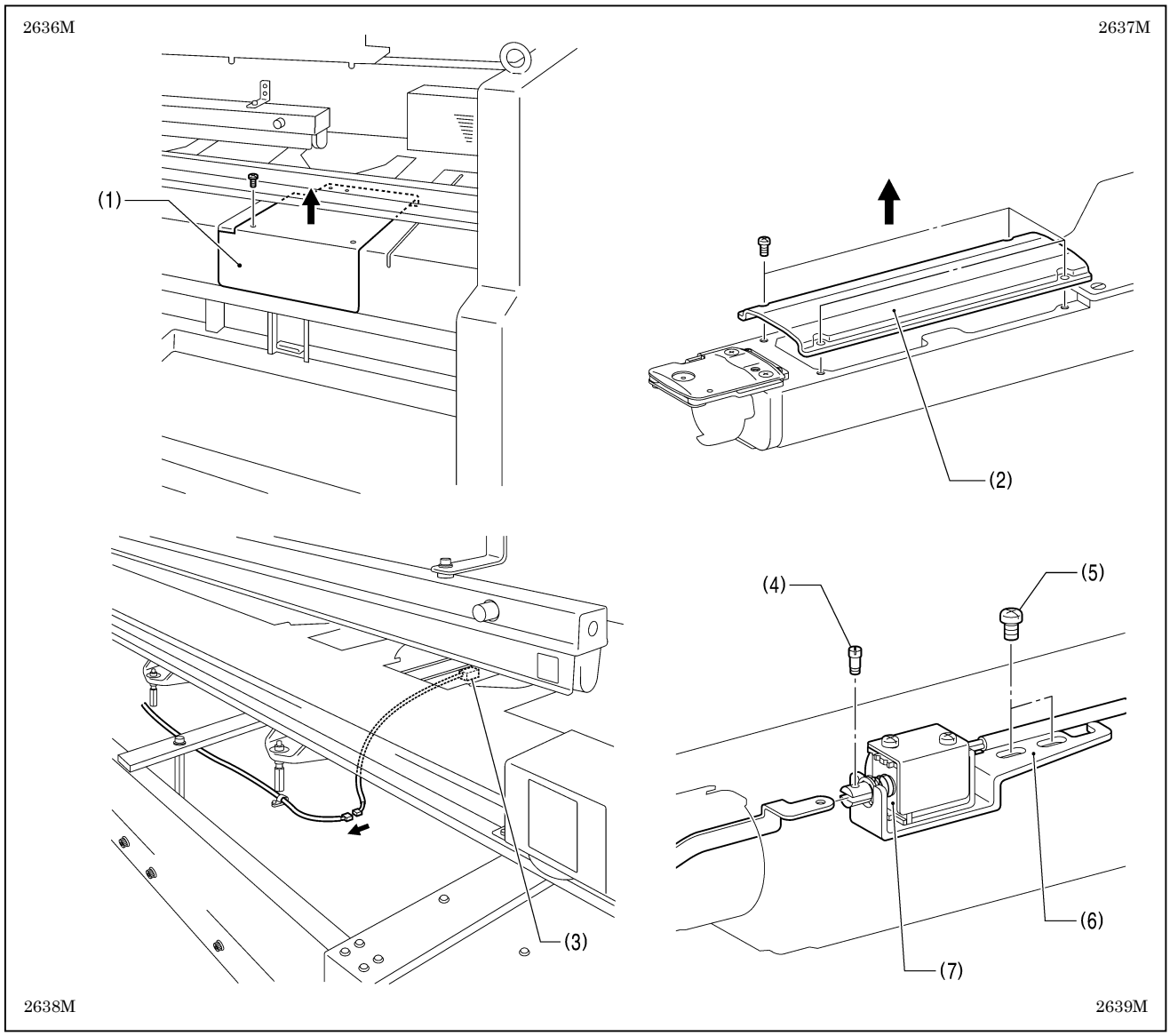
1. Mount wiper lever (9) and upper thread hook (10), and then move them with fingers in the direction of arrow to see if they can be moved easily. If not, loosen 4 set screws (16) of thread nipper (15) to adjust the height until they become lighter. Then check needle bar No. 1 and No. 12.



2. Put wiper sensor bracket (5) according to the arrow direction, adjusting the gap between the emboss (6) to be 1 mm as shown in the illustration, and then secure the bracket with 1 screw (6).

5. Replacement and adjustment of picker solenoid

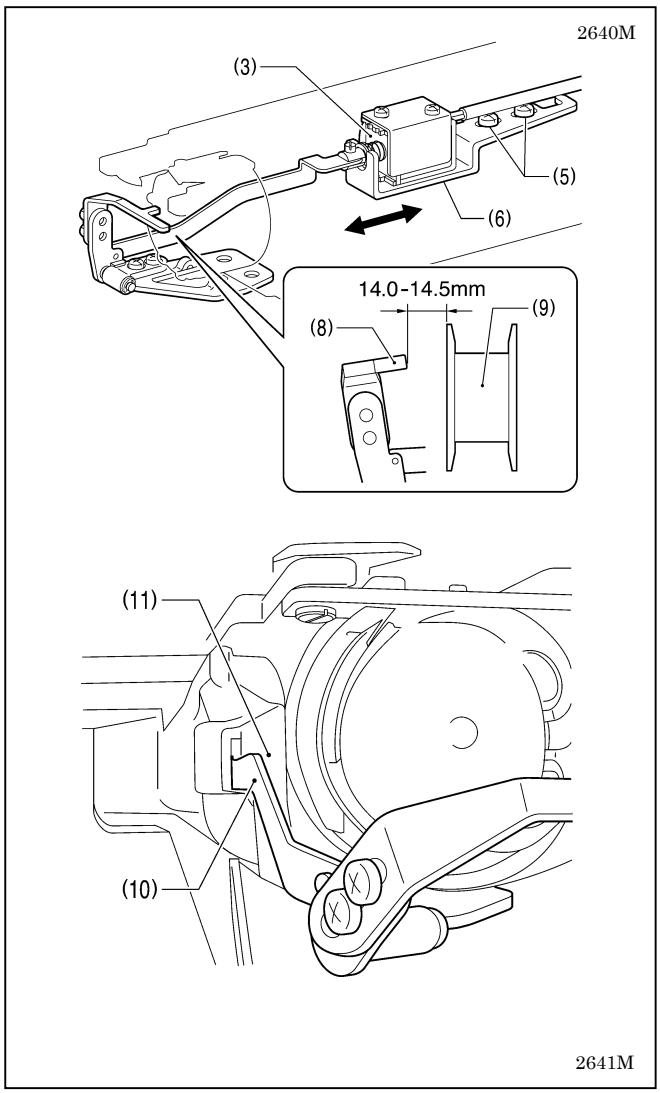
[How to detach]



1. Unscrew screws of table cover (1) and bed cover B (2), and then remove each cover.
2. Disconnect the connector of picker solenoid (3).
3. Unscrew picker shoulder screw (4).
4. Unscrew 2 screws (5) to detach picker setting plate (6), and then replace picker solenoid (7).

[How to mount]

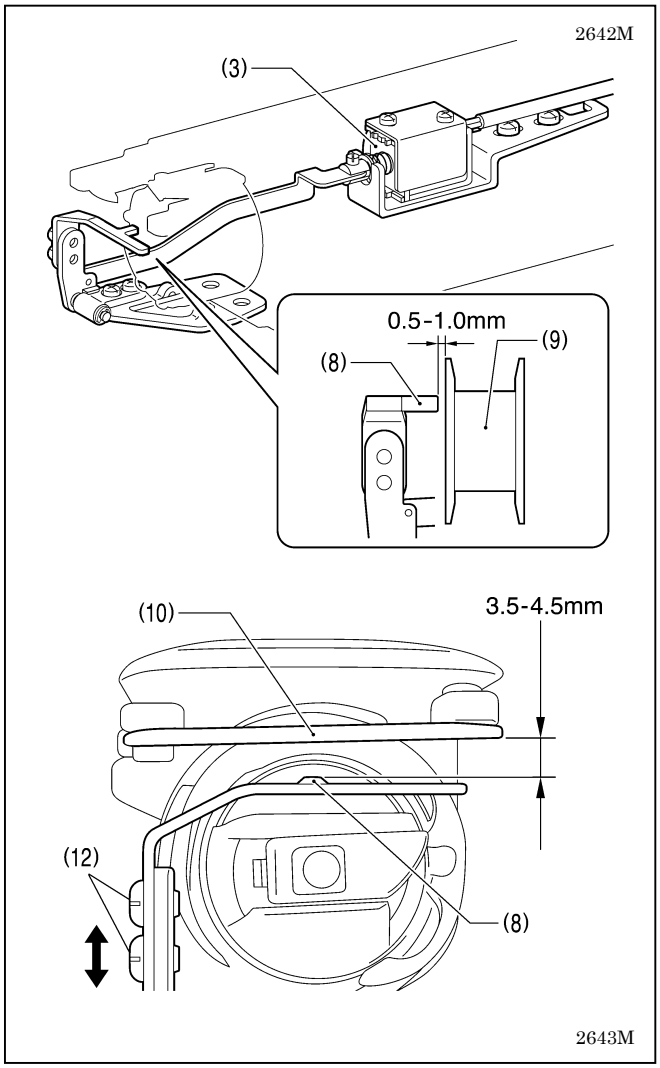
To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting and the adjustment afterward are described below.



1. Adjust the position of picker setting plate (6) by moving it back and forth so that the tip of picker (8) keeps 14.0-14.5 mm distance from bobbin (9) when picker solenoid (3) is turned off, and then fasten 2 screws (5) there.

(Cautions in the mounting)

1. Confirm that picker lever (10) does not touch bed (11).

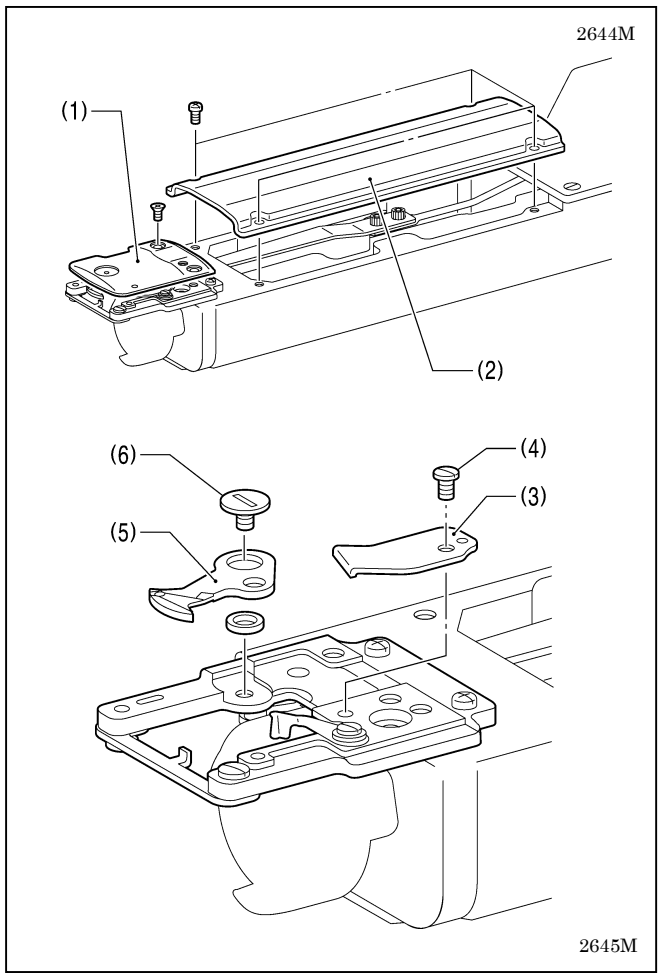


2. Check if the distance between the tip of picker (8) and bobbin (9) is whithin 0.5 to 1.0 mm when picker solenoid (3) is turned on. If it is less, repeat the adjustment of 1. again.

3. Check if the distance between the upper surface of the tip of picker (8) and the bottom face of rotary hook sttopper is within 3.5 to 4.5 mm. If the distance is out of range, loosen 2 screws (12) to adjust the height of picker (8).

6. Replacement and adjustment of movable knife and fixed knife

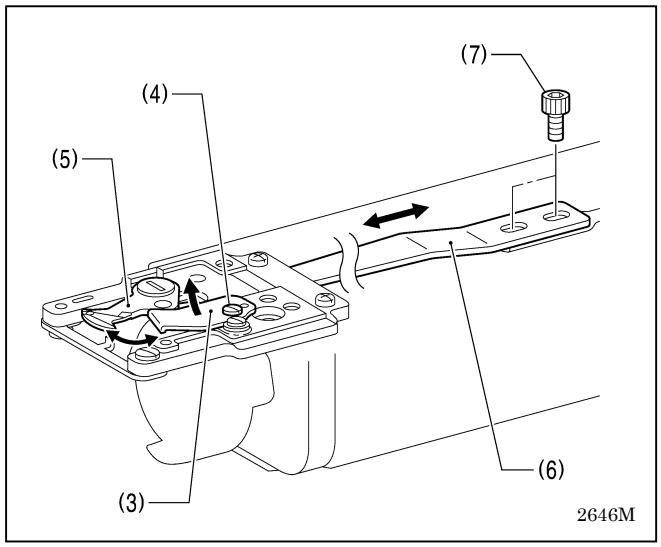
[How to detach]



1. Unscrew screws of needle plate (1) and bed cover B (2), and then remove both.
2. Unscrew screw (4) of fixed knife (3) and screw (6) of movable knife (5), and then detach both knives.

[How to mount]

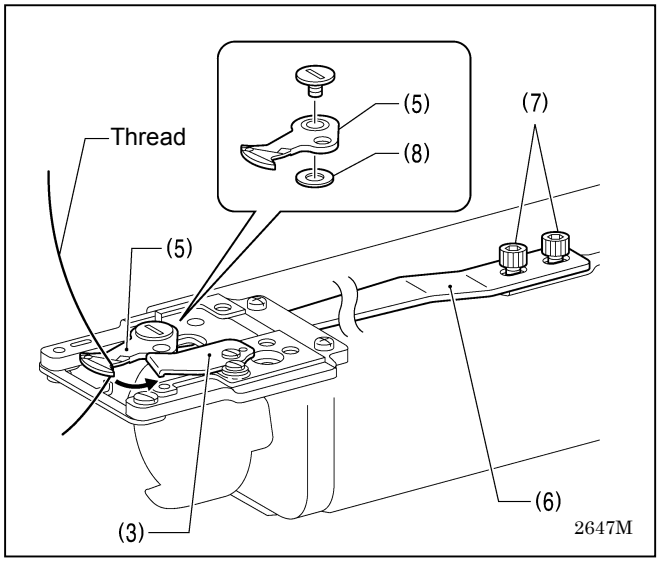
To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting and the adjustment afterward are described below.



1. Attach movable knife (5).
2. Detach 2 bolts (7) of T-trimmer con. rod assy, A (6).
3. Slide the tip of fixed knife (3) to the left and fasten 1 screw (4) temporarily.
4. Fasten screw (4) of fixed knife (3) gradually with shifting movable knife (5).

CAUTION

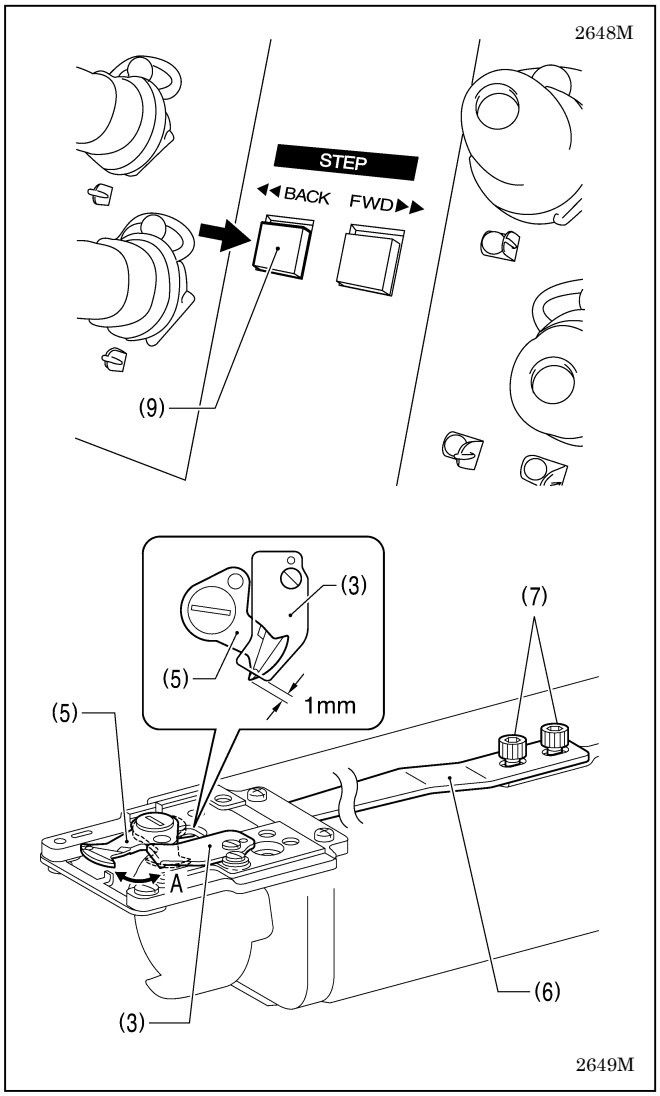
A quick fastening of screw (4) of fixed knife (3) might destroy both knives when operating.



5. Put a thread between movable knife (5) and fixed knife (3) to cut it for testing.

6. If it does not cut well, insert movable knife spacer (8) in the attachment beneath movable knife (5) to increase the pressure of the knife.

7. Fasten 2 bolts (7) of T-trimmer con. rod assy, A (6) temporarily.

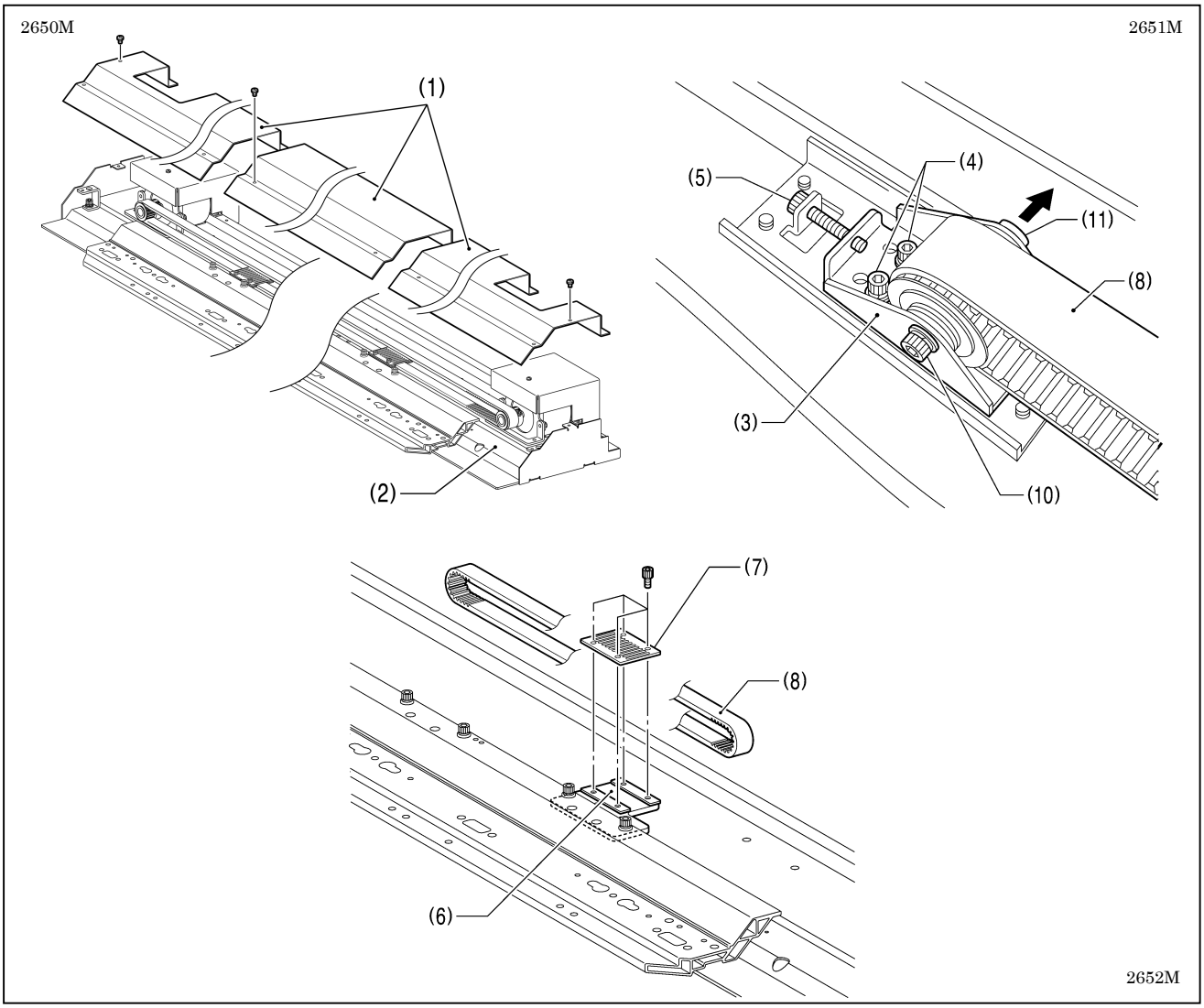


8. Shift to the test mode.
   For Stand Alone type : Refer to Chapter 4
   For PC Control type : Refer to Chapter 5

9. Pushing step back switch (9) will operate movable knife (5) indicated by the arrow.
   Loosen 2 bolts (7) of T-trimmer con. rod assy, A (6) for the adjustment so that the tip of movable knife (5) sticks out by 1 mm from fixed knife (3) when it is in the side A.

7. Replacement and adjustment of Timing belt, X

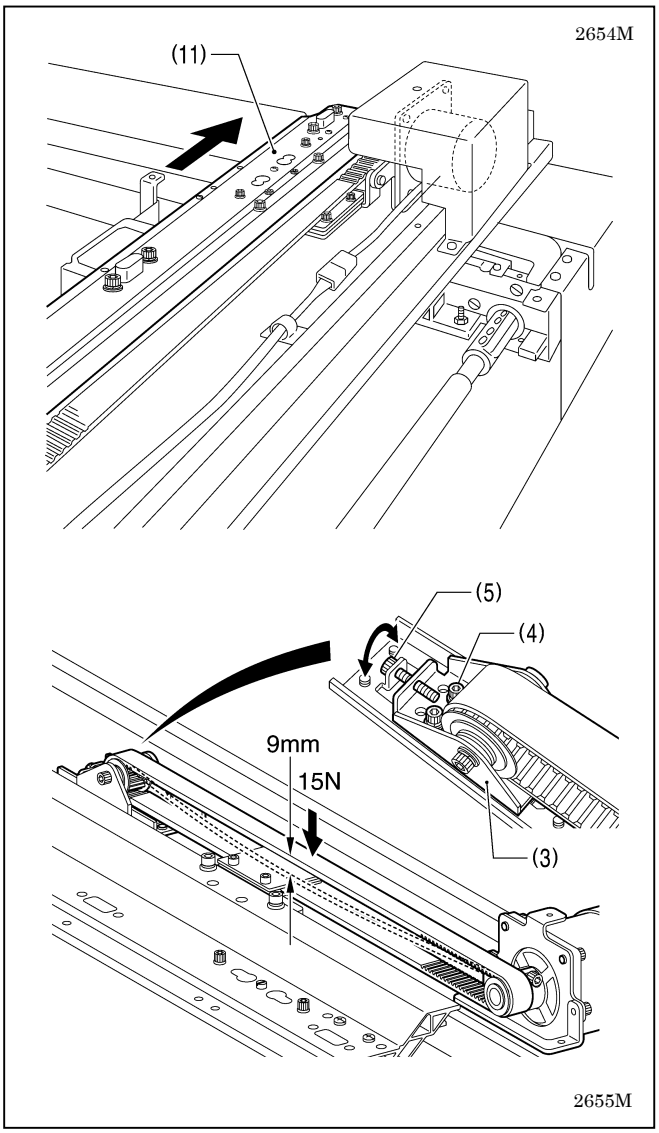
[How to detach]



1. Turn off the power.
2. Unscrew screws of X-feed cover L, R and C (1) to detach them from Y-frame (2).
3. Loosen 2 bolts (4) fixing X-pulley bracket (3) to loosen bolt, socket (5) to the limit which is for the belt tension adjusment.
4. Detach 4 bolts of belt stopper plate, 20 (7) attached to X-driving carriage (6), and then detach timing belt (8) and belt stopper plate, 20 (7) from X-driving carriage (6).
5. Loosen bolts (10), extract pulley shaft (11), and remove timing belt (8).

[How to mount]

To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting and the adjustment afterward are described below.

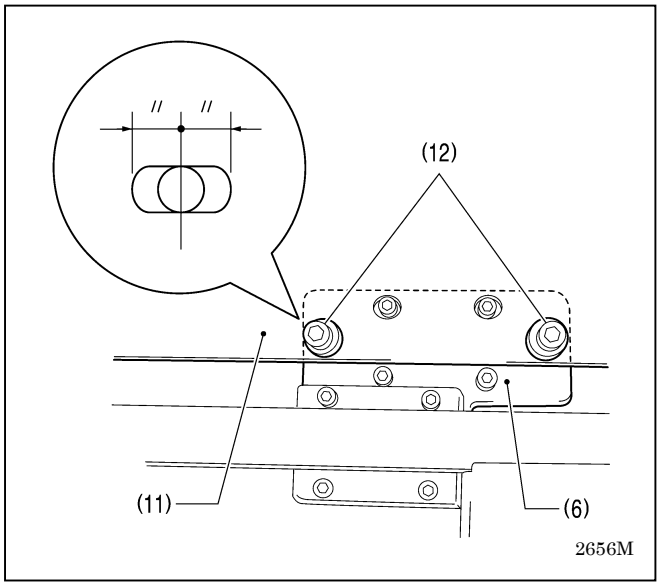


1. Slide X-feed frame (10) to the limit to the X pulse motor side.

2. Loosen 2 bolts (4) fixing X-pulley bracket (3) and turn bolt (5) to adjust the belt tension.
   - Right turn : Increases the tension.
   - Left turn : Decreases the tension.

3. Fasten 2 bolts fixing X-pulley bracket (3), and adjust the deflection under the force of 15 N pressing down at the belt center to be 9 mm.

   Measuring with the sonic tension meter by Gates Unitta Asia Company,
   Unit weight : 4.0 g/mm
   Width : 20 mm
   Span : 653 mm
   Adjust the tension to be 200 N ± 10 N when twanged at the point indicated by the arrow. Be sure to clear around the belt so that nothing touches it when twanged.



4. Follow the procedures below to adjust sewing machines with double X-pulse motors.
   Loosen 2 bolts (12) of X-feed frames (11) attached to the right and left X-driving carriages.
   Turn on the power to keep X-pulse motor excited, and then fasten 4 bolts (12) on X-feed frame (11) in total on the right and left sides, adjusting each position to have even clearances on the both sides of the bolt in the hole.

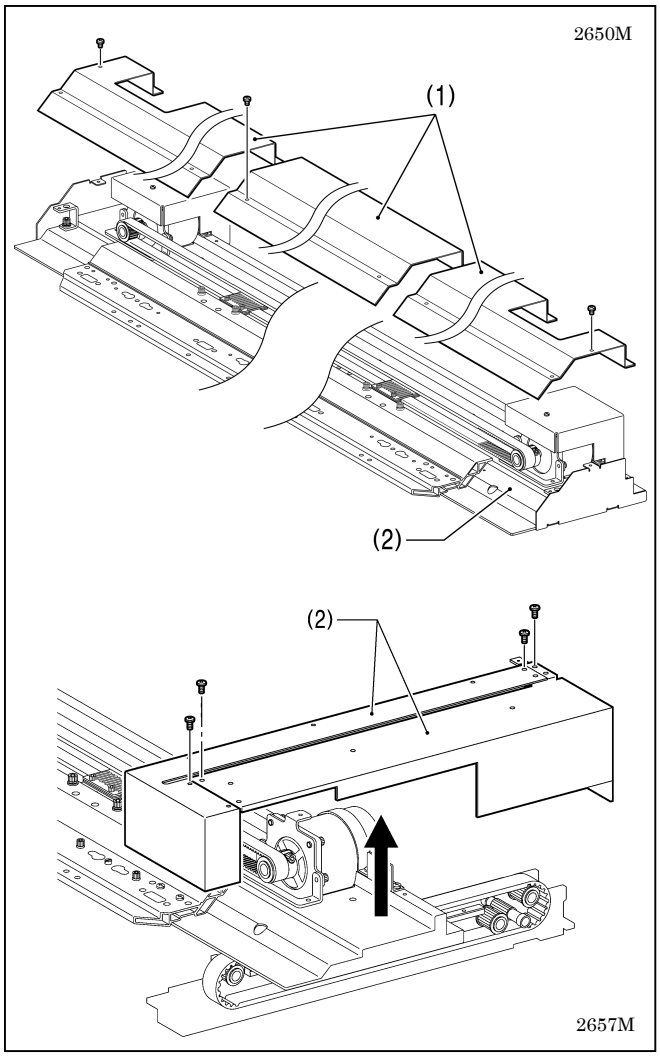
   CAUTION

   If this adjustment has been done improperly, X feeding might be failed during the sewing.

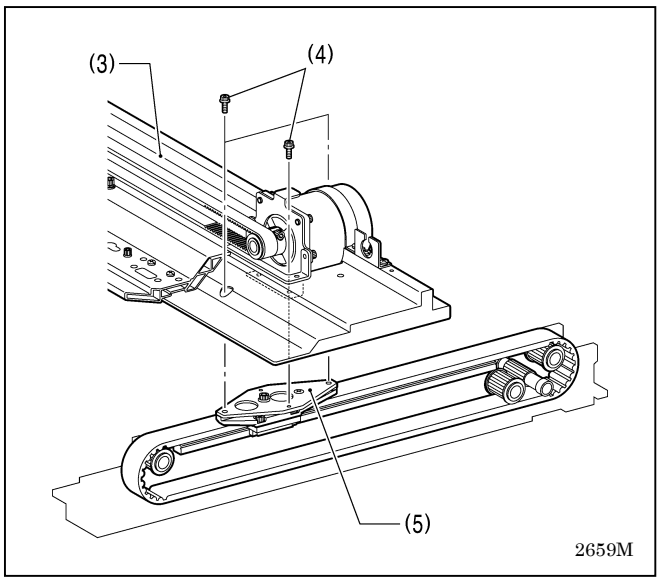
   X feeding failures might be caused also by the improper frame settings for the sewing machine.

8. Replacement and adjustment of Timing belt, Y

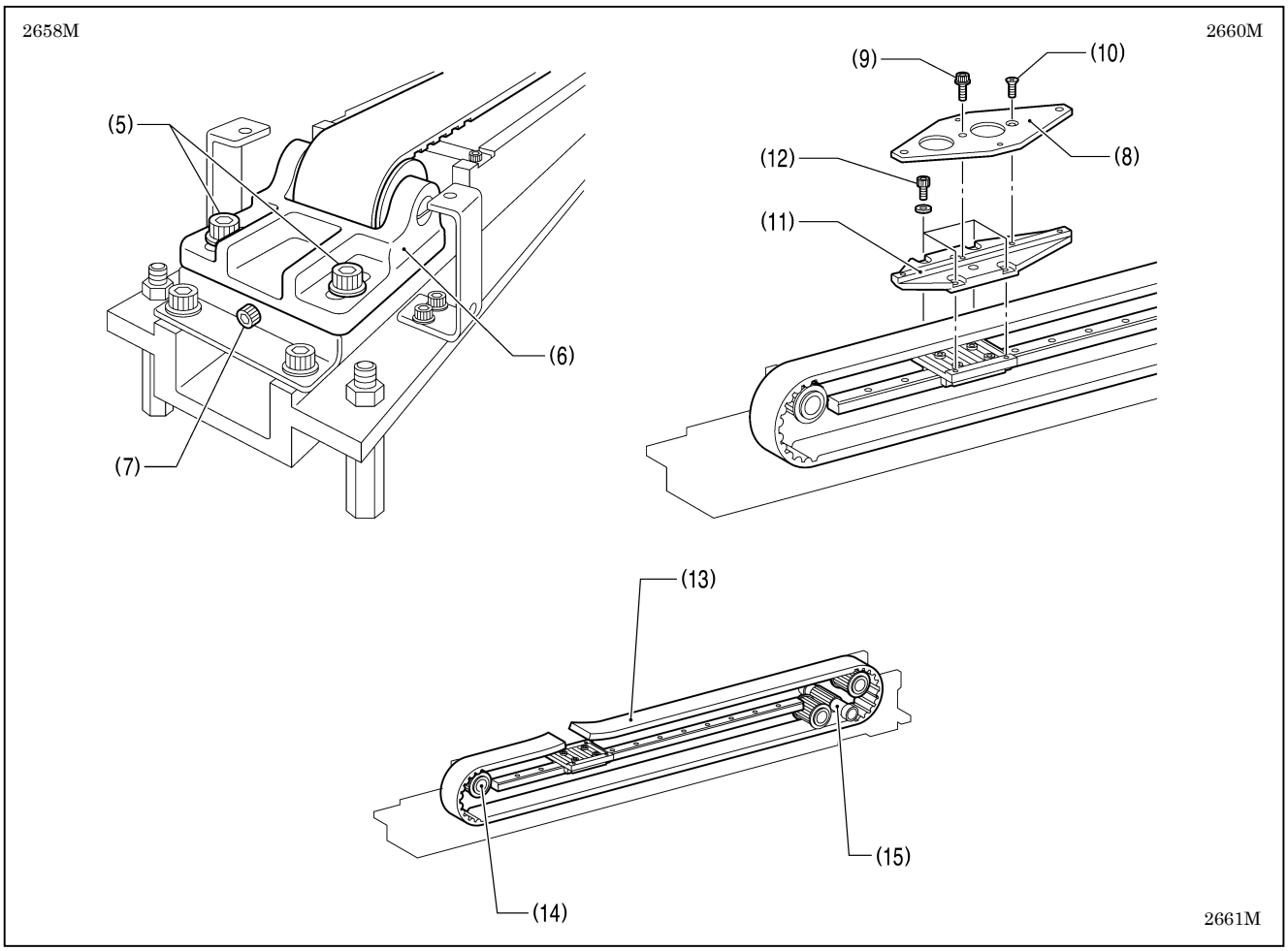
[How to detach]



1. Turn off the power.
2. Unscrew screws of X-feed cover L, R, C (1) and X-motor cover to detach them all from Y-frame (2) .
3. Unscrew screws of Y-feed cover front and rear (2) to detach them from Y-cover support.



4. Detach 6 bolts (4) in total on the both sides of Y-feed frame (3) to detach it from Y-carriage (5) on the both sides.



5. Loosen 2 bolts (5) fixing pulley bracket YF (6) and then loosen bolt (7) to the limit for the belt tension adjustment.

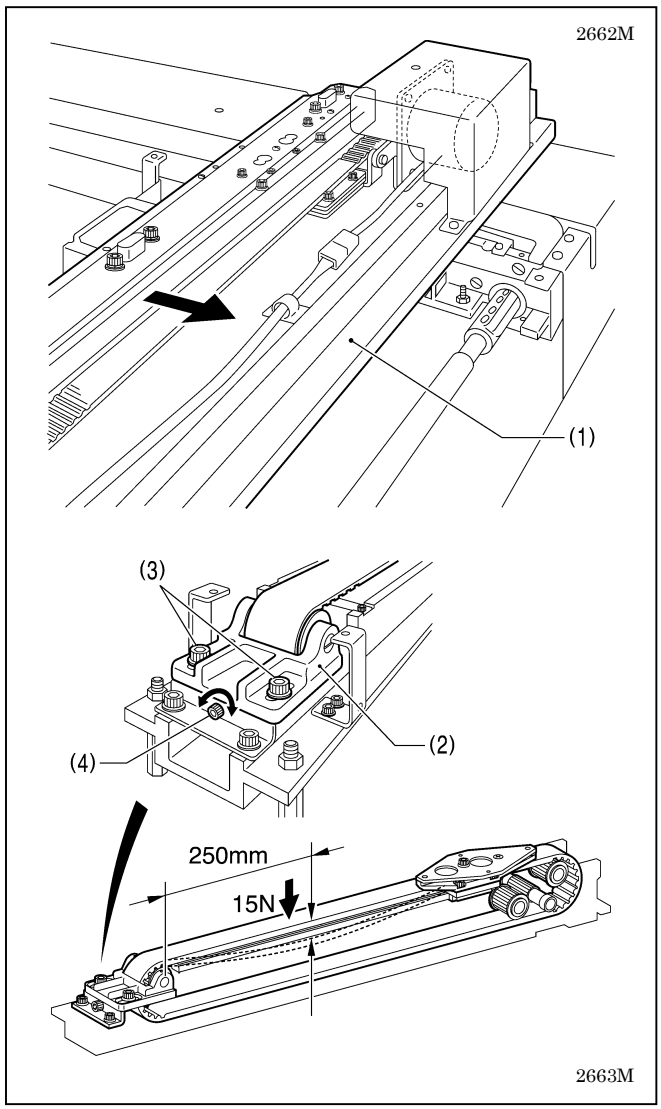
6. Unscrew 1 bolt, socket (9) and 1 screw, flat (10), and then detach Y-frame support plate (8).

7. Unscrew 4 bolts (12) to detach Y-carriage (11).

8. Detach Y-driving belt (13) from Y pulley A (14) and Y-driving pulley (15) etc.

[How to mount]

To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting and the adjustment afterward are described below.



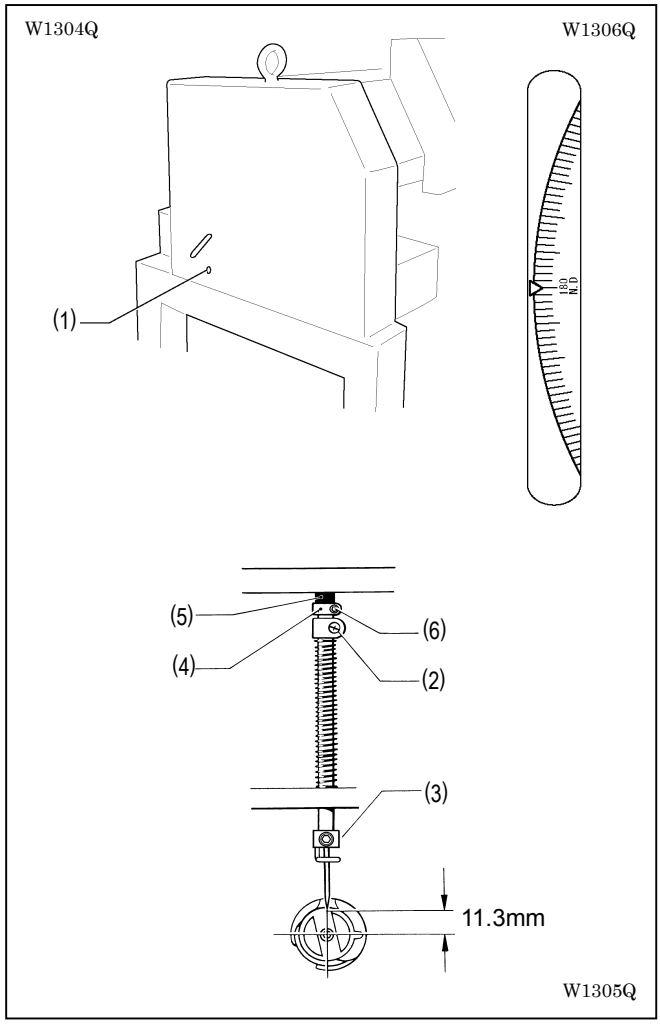
1. Slide Y-feed frame (1) to the back from the front face of the sewing machine to the limit.

2. Loosen 2 bolts (3) fixing pulley bracket, YF (2) and loosen bolt, socket (4) to the limit for the belt tension adjustment.
   - Right turn : Increases the tension.
   - Left turn : Decreases the tension.

3. Fasten 2 bolts (3) fixing pulley bracket, YF (2), and adjust the deflection under the force of 15 N pressing down on the belt at the point of 250 mm from the front timing pulley to be about 3 mm.

   Measuring with the sonic tension meter by Gates Unitta Asia Company,
   Unit weight : 4.0 g/mm
   Width : 35 mm
   Span : 590 mm
   Adjust the tension to be 370 N ±10 N when twanged at the point indicated by the arrow. Be sure to clear around the belt so that nothing touches it when twanged.

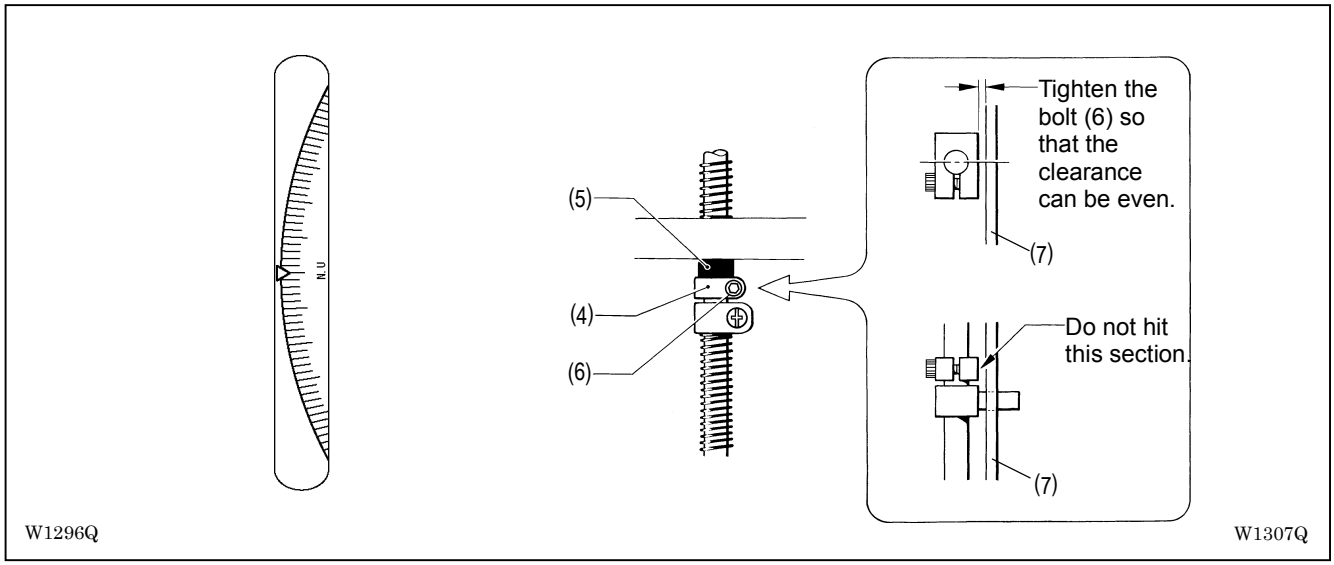
9. Adjusting Needle Bar Height



1. Put the attached T-shaped hexagonal wrench (4 mm) into the hole (1) on the left side of the machine body, and adjust the arrow plate to align with 180° (N.D mark) to move the needle bar to the lowest point.

2. Loosen Needle bar guide bracket set screw (6) and the bolt (3) of the top dead center stopper (4) when the needle tip is positioned 11.3 mm above the center of the rotary hook shaft. Adjust the position of the needle bar thread guide so that the set screw (2) on it is turned to the right by 25 - 30°. Tighten Needle bar guide bracket set screw (6) securely.

   When tightening the needle bar clamp set screw (6), the hole in the needle bar guide should face the front.

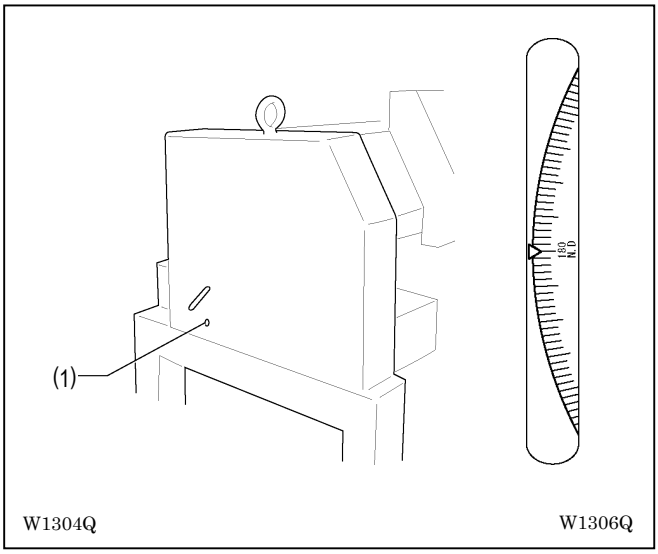


3. Set the needle bar at the highest position (where the arrow plate and the “N.U.” mark are aligned). Lightly press the top dead center stopper (4) toward the cushion rubber (5), and tighten Socket head bolt for top dead center stopper (6) while pressing down the needle bar clamp so that it faces the front. (Tightening torque: 0.78 N • m)
   - Make sure that the top dead center stopper does not hit the needle bar guide rail (7) at this time.
   - When tightening the upper dead point stopper bolt (6), insert the longer side of the attached wrench into the bolt and tighten it by using the shorter side.
     Excessive tightening may make the needle bar movement sluggish.

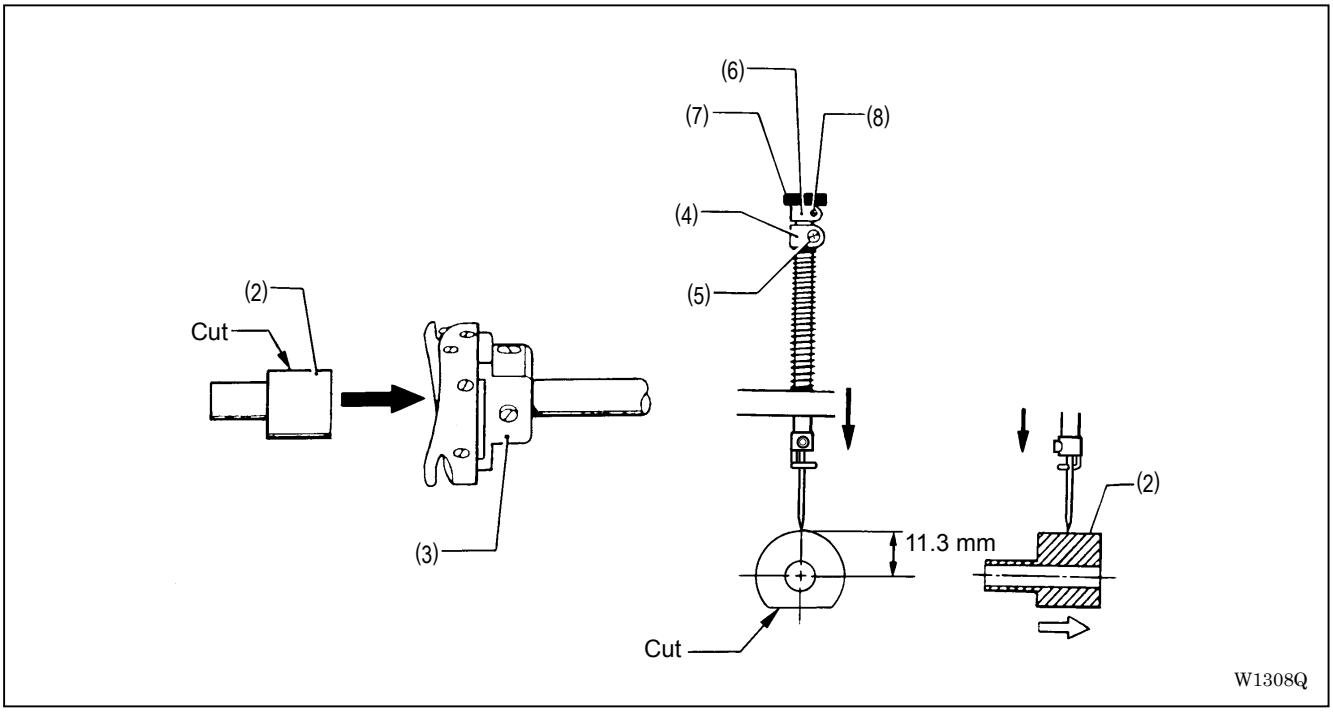
■When using the bottom dead center gauge

CAUTION

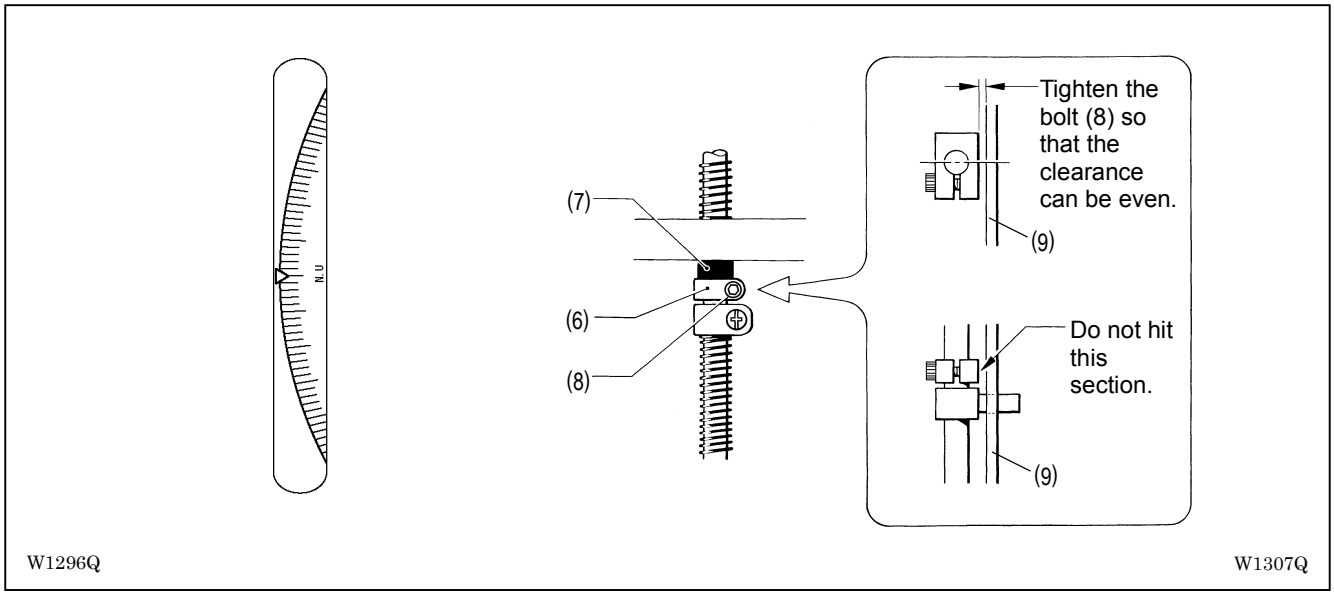
Use the gauge (S58553001 Bottom dead center gauge) included in the accessories of the sewing machine for this operation.



1. Put the attached T-shaped hexagonal wrench (4 mm) into the hole (1) on the left side of the machine body, and adjust the arrow plate to align with 180 degrees (N.D mark) to move the needle bar to the lowest point.

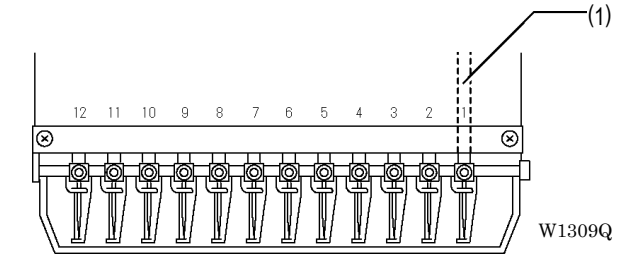


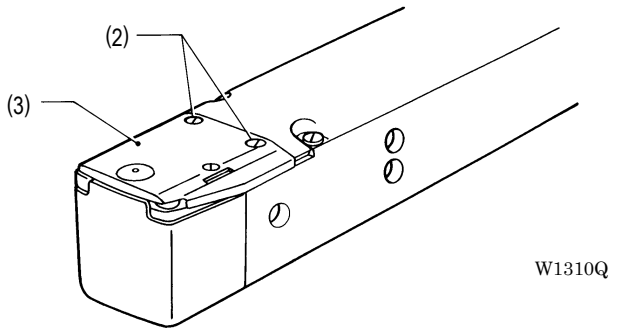
2. Insert the bottom dead center gauge (2) into the rotary hook (3).
3. Loosen the screw (5) of the needle bar clamp (4) and Socket head bolt for top dead center stopper (8), then move the needle bar up and down until the needle tip touches the gauge (2) lightly.
   - The needle point should touch the 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.
4. Tighten the screw (5) of the needle bar clamp (4) securely.

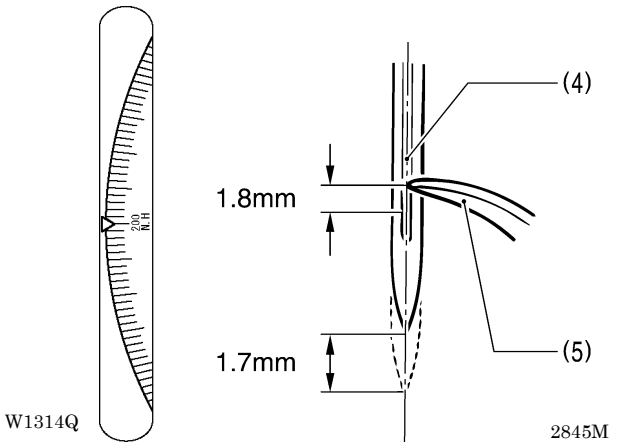


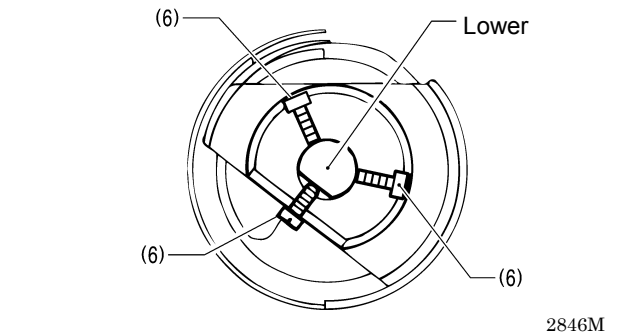
5. Set the needle bar at the highest position (where the arrow plate and the "N.U.”mark are aligned). Lightly press the top dead center stopper (6) toward the cushion rubber (7), and tighten Socket head bolt for top dead center stopper (8) while pressing down the needle bar clamp so that it faces the front. (Tightening torque: 0.78 N • m)
   - Make sure that the top dead center stopper (6) does not hit the needle bar guide rail (9) at this time.
   - When tightening the upper dead point stopper bolt (8), insert the longer side of the attached wrench into the bolt and tighten it by using the shorter side.
     Excessive tightening may make the needle bar movement sluggish.

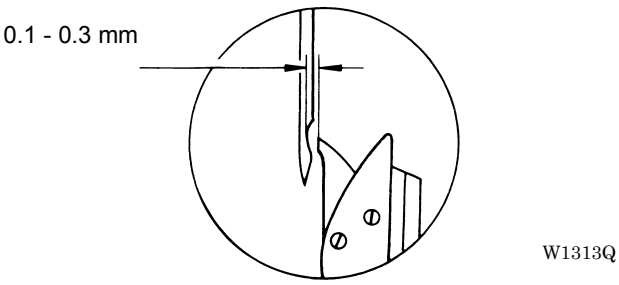
10. Attachment and Adjustment of Rotary Hook











1. Turn the power switch off.
2. Select the needle bar No. 1 (1).
3. Remove two flat screws (2) and dismount the needle plate (3).
4. Adjust so that the needle (4) and the point of rotary hook (5) should meet at the position (where the arrow plate aligns with N.H mark (200 ˚)) higher by 1.7 mm than the needle bar lowest point (180 ˚).

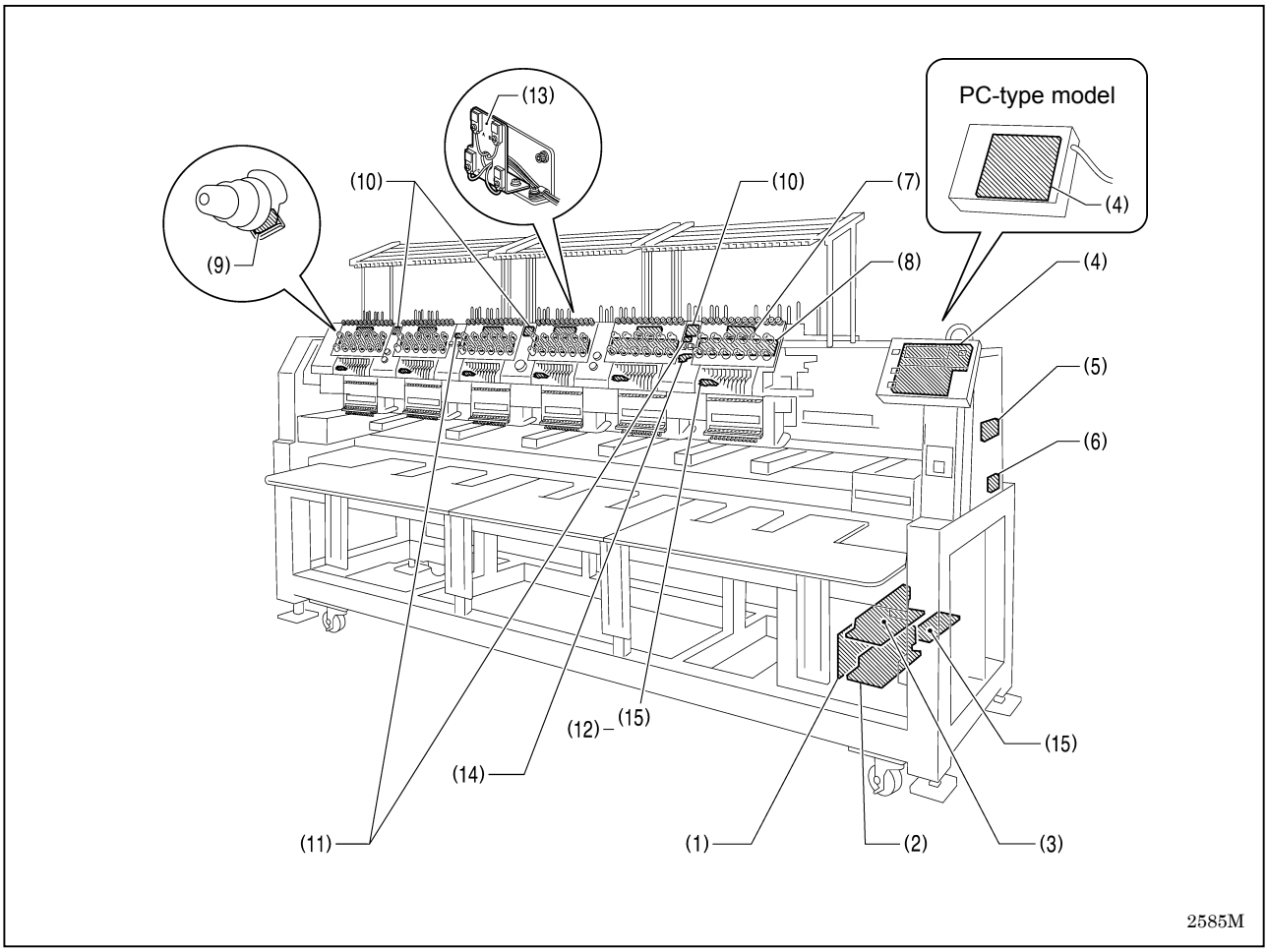
   Perform this after the height adjustment of the needle bar.
5. Turn the rotary hook manually until the point of rotary hook (5) turns up.
6. Adjust the clearance between the needle and the rotary hook to be within 0.1 to 0.3 mm.

   Confirm that the height of the needle bar is 1.8 mm then.
7. Temporarily fasten either one of screws (6).
8. Check with needle bars of No. 2 to No. 12 if the clearance between each needle and the rotary hook is within 0.1 to 0.3 mm.

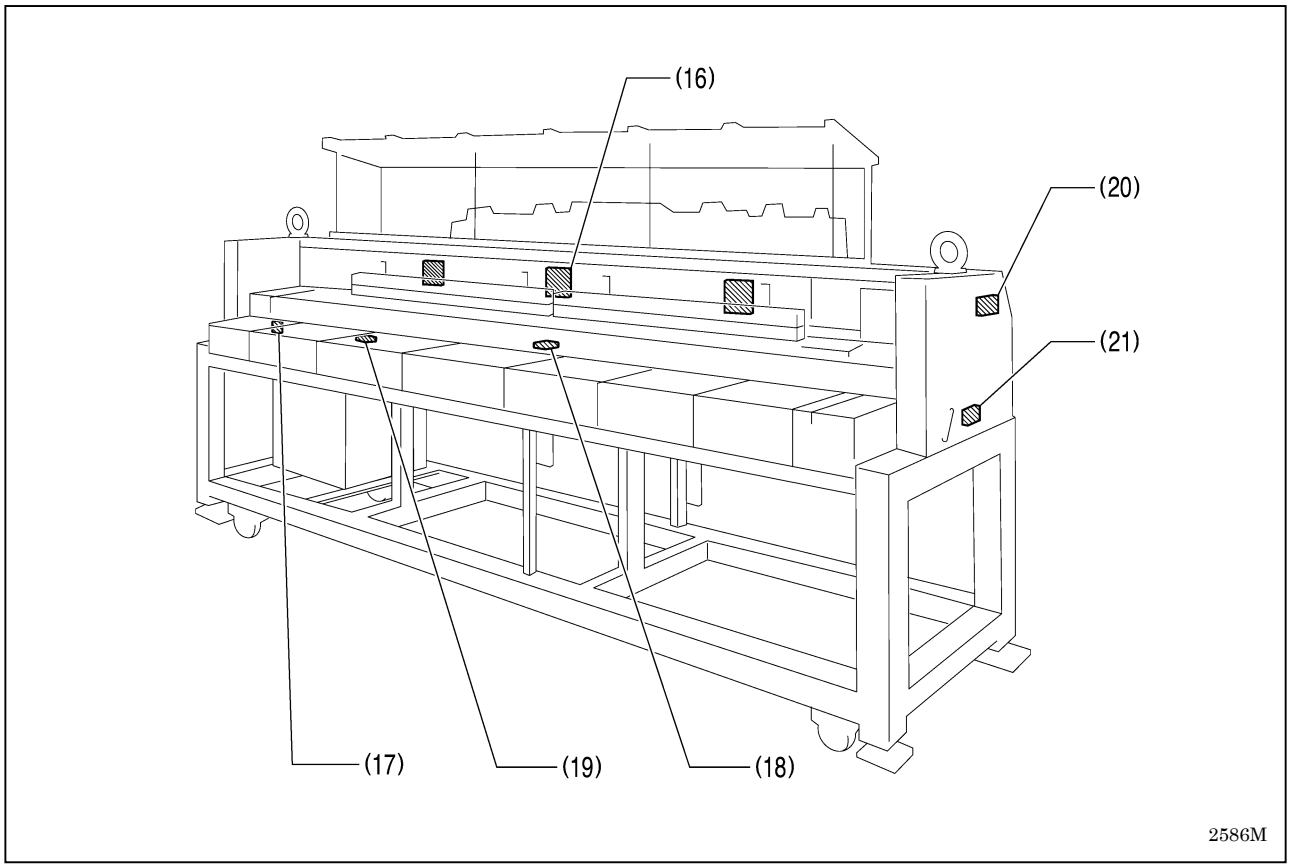
   If there are any needles with clearances out of the range above, adjust them again to get proper clearances.
9. Fully tighten the screw (6).

Chapter 3 Electrical components

1. Location of the PCB



(1) Main PCB
(2) D-drive PCB
(3) Power supply PCB
(4) Panel PCB
(5) I/O PCB
(6) Picker PCB
(7) Head switch PCB
(8) Tension base PCB
(9) Thread breakage sensor PCB
(10)Head-head I/O PCB
(11)Step switch PCB
(12)Wiper sensor PCB
(13)Index sensor A, B, C, D
(14)Index sensor PCB
(15)SBUS PCB (PC –type model)



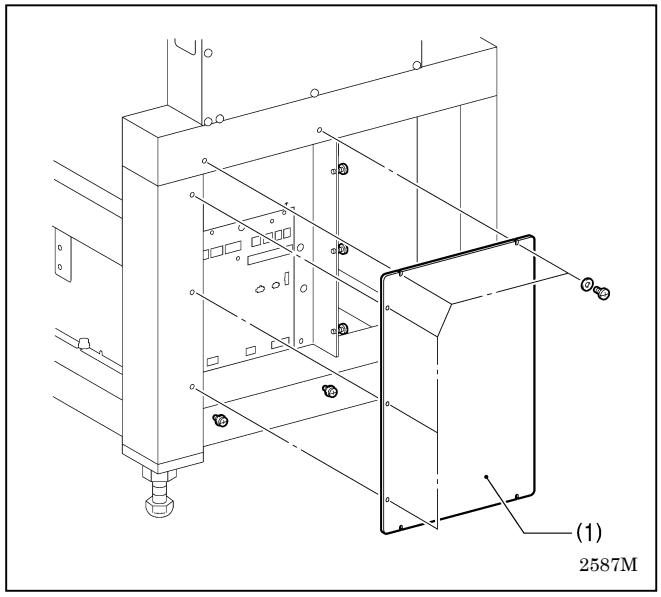
(16)Head PCB
(17)Y-feed sensor
(18)X-feed sensor
(19)Thread breakage sensor PCB
(20)Encoder sensor A, B
(21)Needle stop position sensor

DANGER

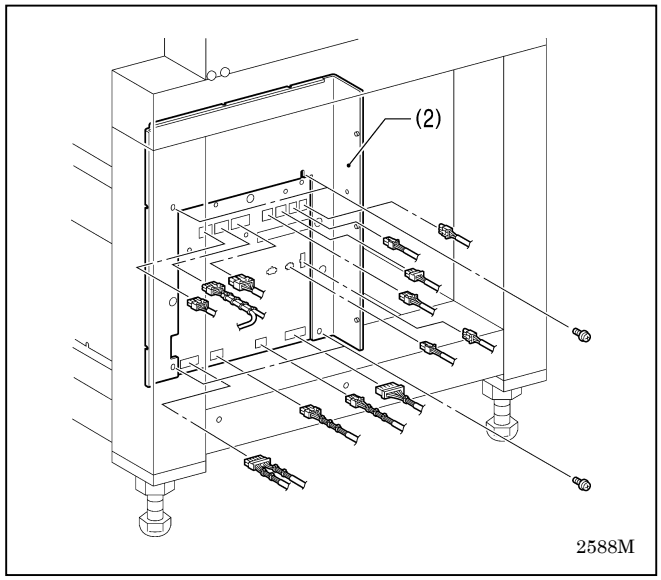
Before opening the cover of control box, be sure to turn off the main power switch, pull out the plug and wait for 5 minutes at least.
Touching the high voltage parts might cause serious injuries.

2.Replacement of PCB inside the control box

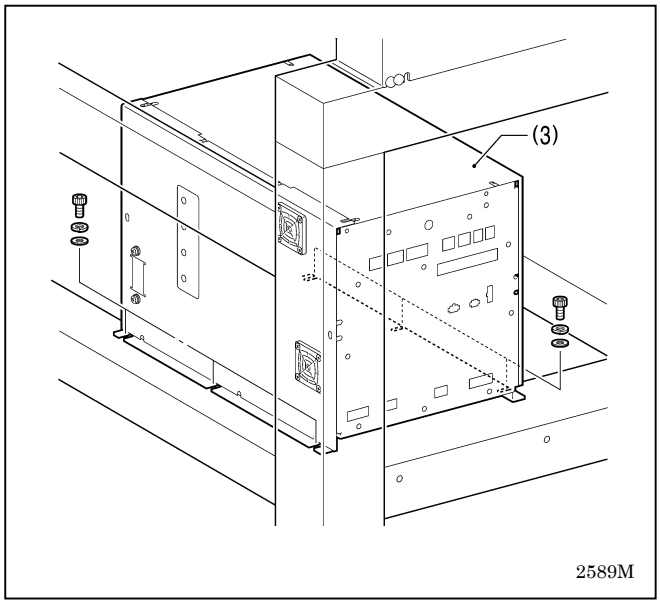
2-1.How to detach and attach the control box



1. Loosen 5 screws and unscrew remaining 5 screws on the right side cover of the sewing machine, and then remove the side cover (1).



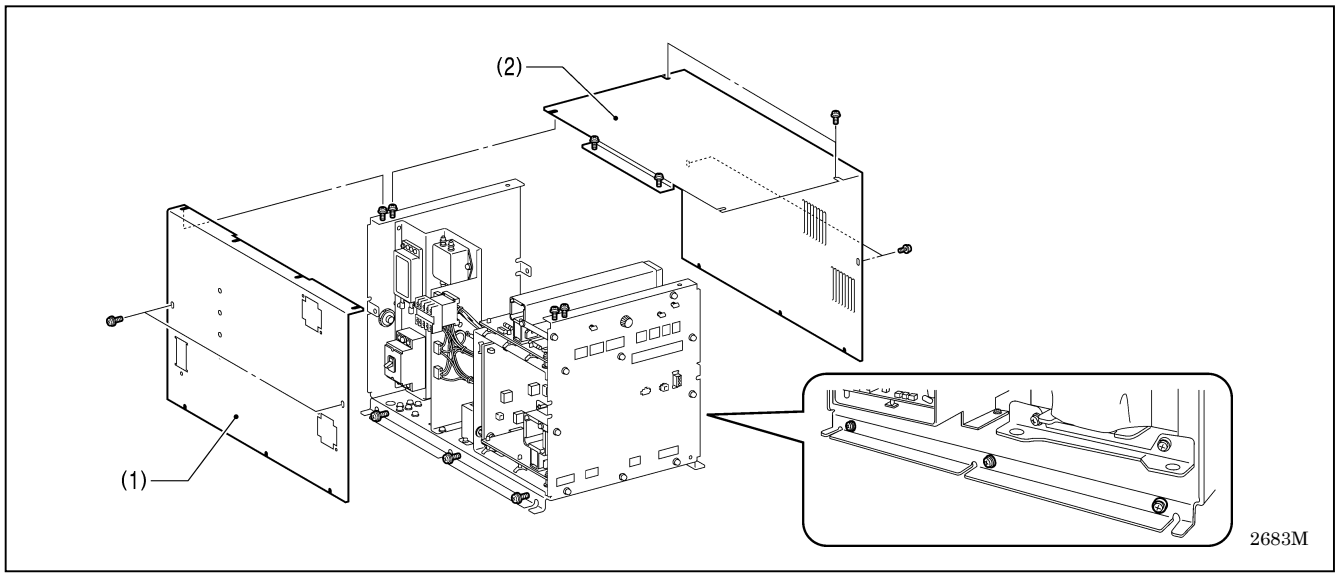
2. Pull out all connectors on the right side of control box.
3. Unscrew 4 screws fixing inner cover, A (2) and control box.



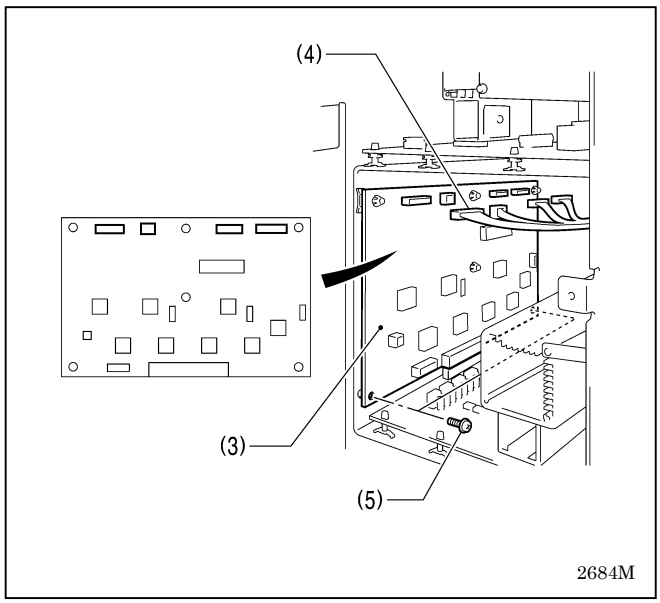
4. Unscrew 6 bolts (3 in front, 3 on back) fixing control box (3) and the sewing machine main body, and then detach control box.

* To mount it, follow the reverse procedure to the above.

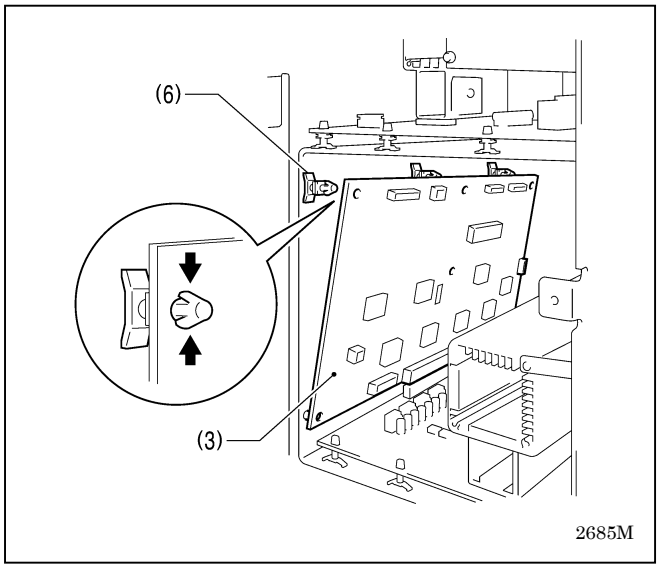
2-2. Replacement of the main PCB



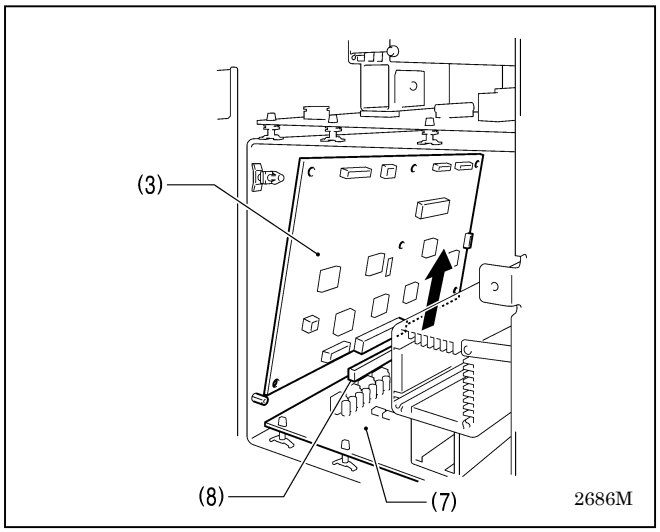
1. Unscrew 2 screws and loosen remaining 7 screws on the box cover F (1) to remove it.
2. Unscrew 6 screws and loosen remaining 5 screws on the box cover R (2) to remove it.



3. Remove 4 (3 for SA-type model) connectors (4) connected to the main PCB (3).
4. Unscrew 2 screws (5) on the main PCB (3).

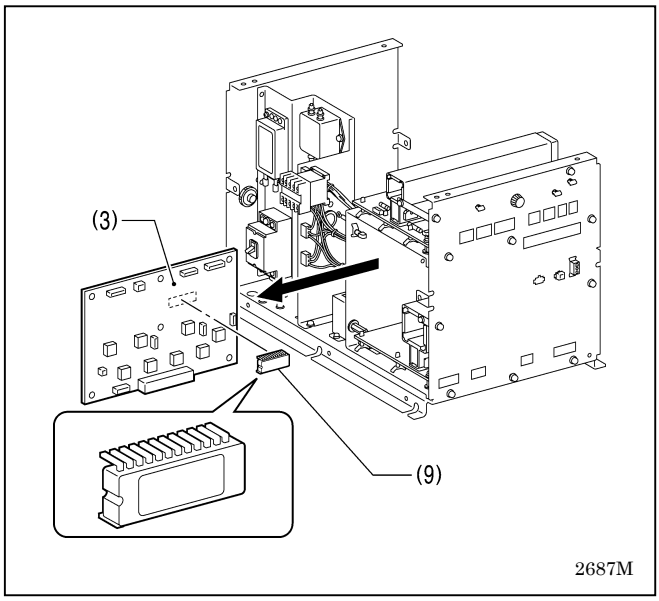


5. Fold down 4 tabs of the PCB support (6) to detach it from the main PCB (3).



6. Pull up the main PCB (3) aslant to remove it from the connector (8) of the drive PCB (7).

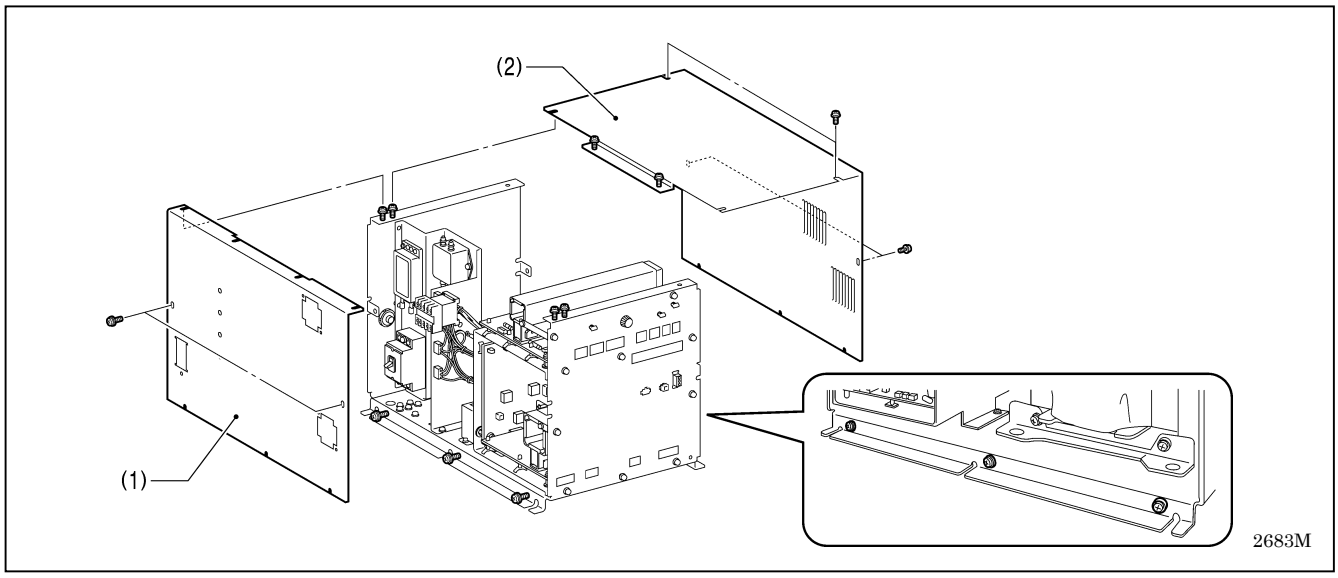
7. Pull the main PCB (3) to slide it out.



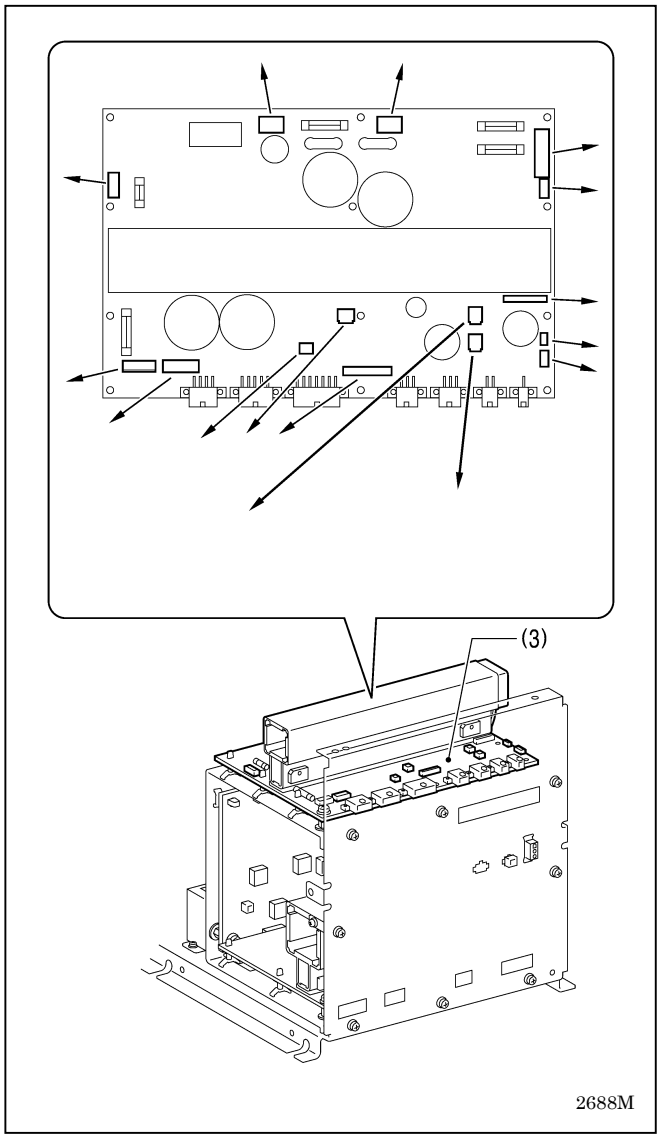
8. Detach the P-ROM (9) from the main PCB (3).

* To mount it, follow the reverse procedure to the above.

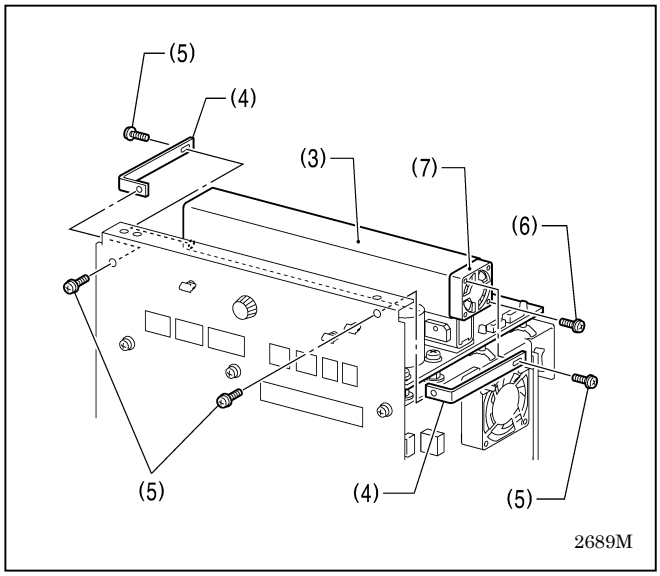
2-3. Replacement of the power supply PCB



1. Unscrew 2 screws and loosen remaining 7 screws on the box cover F (1) to remove it.
2. Unscrew 6 screws and loosen remaining 5 screws on the box cover R (2) to remove it.

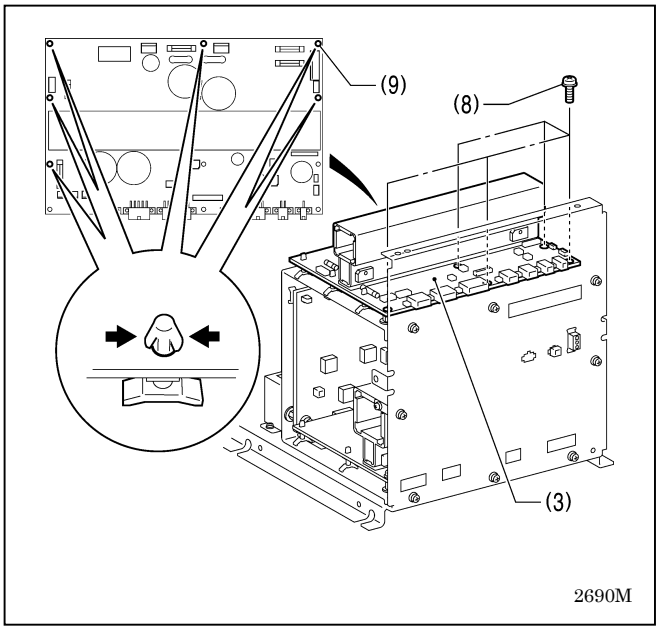


3. Remove all 15 connectors connected to the power supply PCB (3).



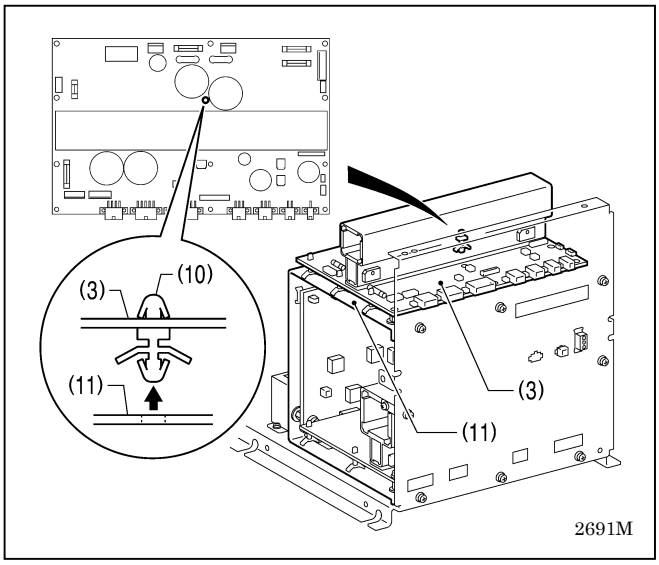
4. Unscrew 4 screws (5) on the right and left side of the heatsink stay B (4) to detach it.

5. Unscrew 1 screw (6) on the cooling fan (7) mounted on the power supply PCB (3) and detach the fan.

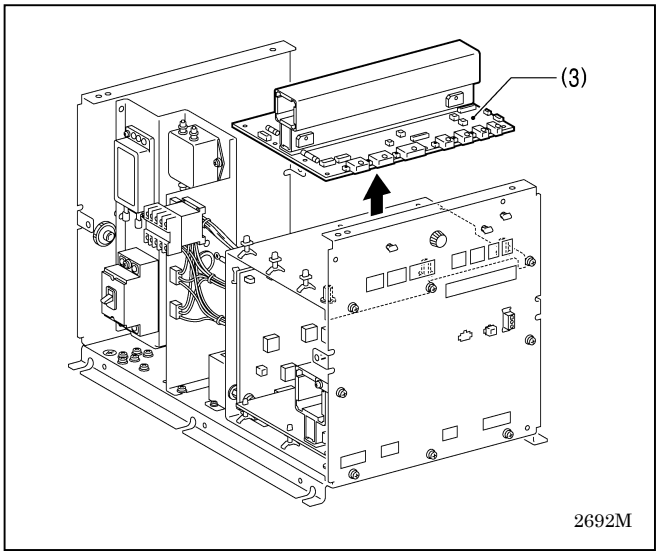


6. Unscrew 5 screws (8) on the power supply PCB (3).

7. Fold down 6 tabs (except for the 1 in the PCB center) of the PCB support (9) to detach it from the power supply PCB (3).



8. Fold down 1 tab of the PCB support (10) in the center of the PCB to detach the support from the PCB setting plate (11).

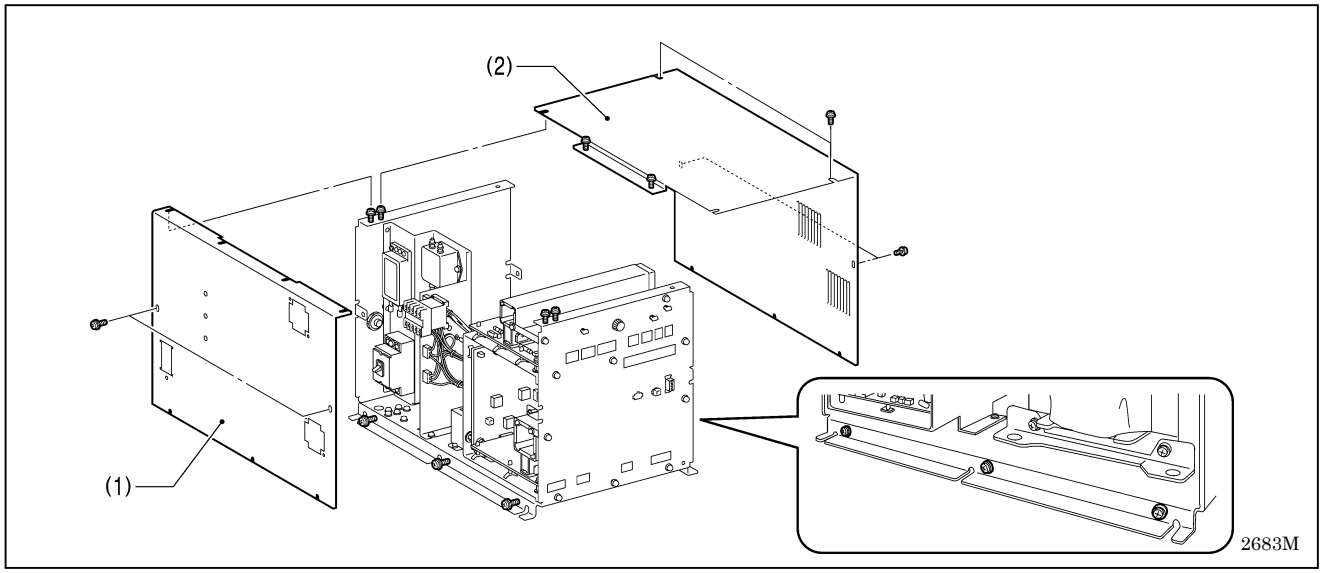


9. Pull up the power supply PCB (3) to detach it.

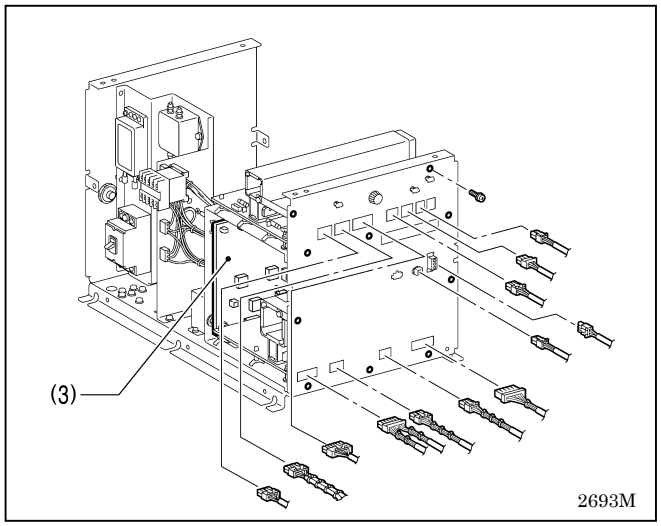
10. Fold down 1 tab of the PCB support (10) in the center of the PCB to detach the support from the power supply PCB (3).

* To mount it, follow the reverse procedure to the above.

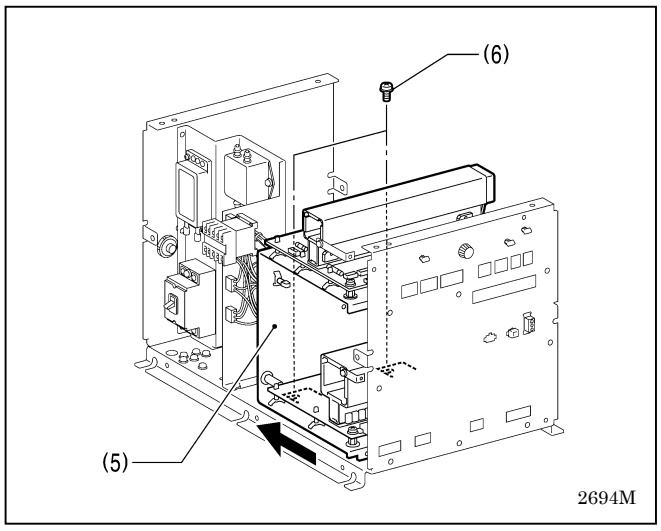
2-4. Replacement of the drive PCB



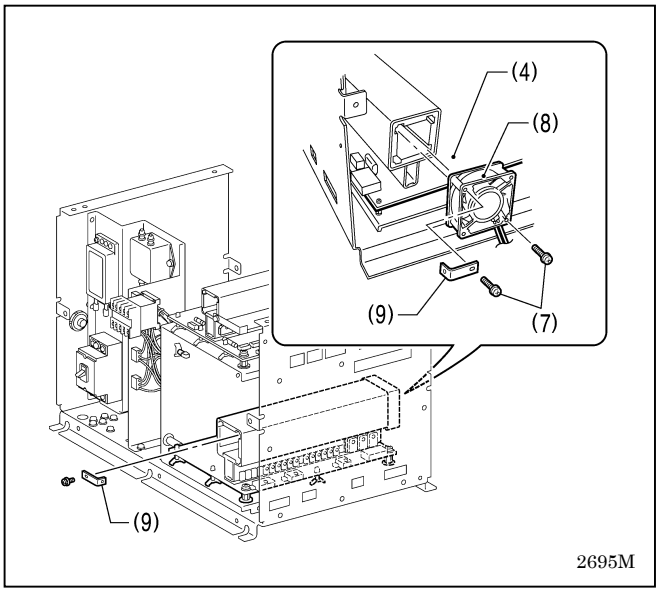
1. Unscrew 2 screws and loosen remaining 7 screws on the box cover F (1) to remove it.
2. Unscrew 6 screws and loosen remaining 5 screws on the box cover R (2) to remove it.



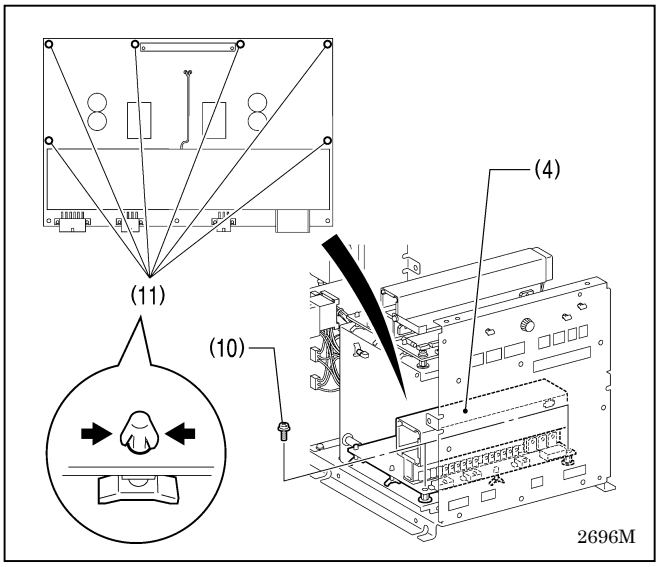
3. Remove all connectors connected to the right side of the box and unscrew 10 screws on the same side.
4. Detach the main PCB (3) according to the procedure described in “2-2. Replacement of the main PCB“ in the Chapter 3.



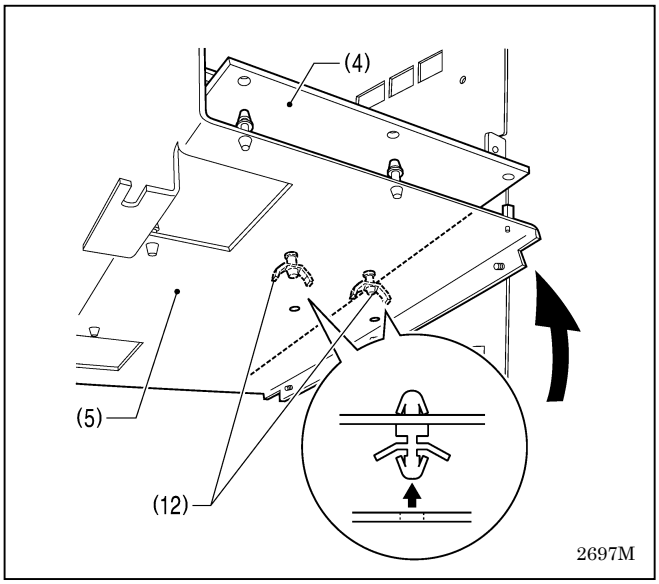
5. Unscrew 2 screws (6) on the PCB setting plate (5) to shift it toward the center of the box.



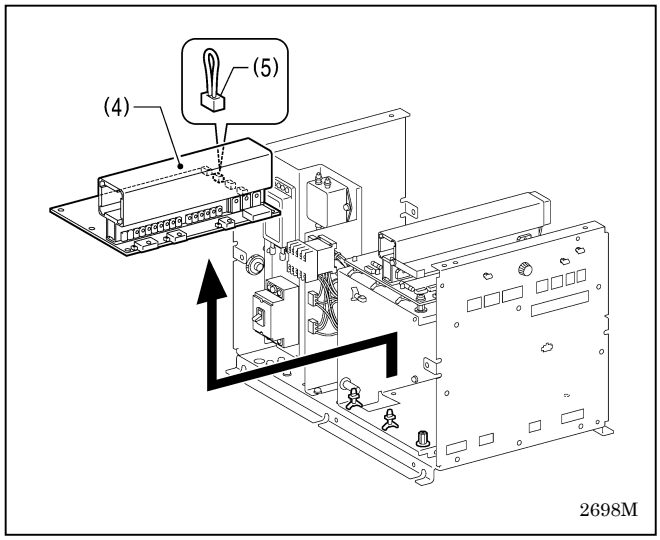
6. Remove all connectors connected to the drive PCB (4).
7. Unscrew 2 screws (7) to detach the cooling fan (8) mounted on the drive PCB (4).
8. Detach the heat sink stay (9) on the other side.



9. Unscrew 2 screws (10) on the drive PCB.
10. Fold down 6 tabs (other than 2 in the PCB center) of the PCB support (11) to detach it from the drive PCB (4).



11. Fold down lower 2 tabs of the PCB support (12) in the PCB center to detach it from the PCB setting plate (5).

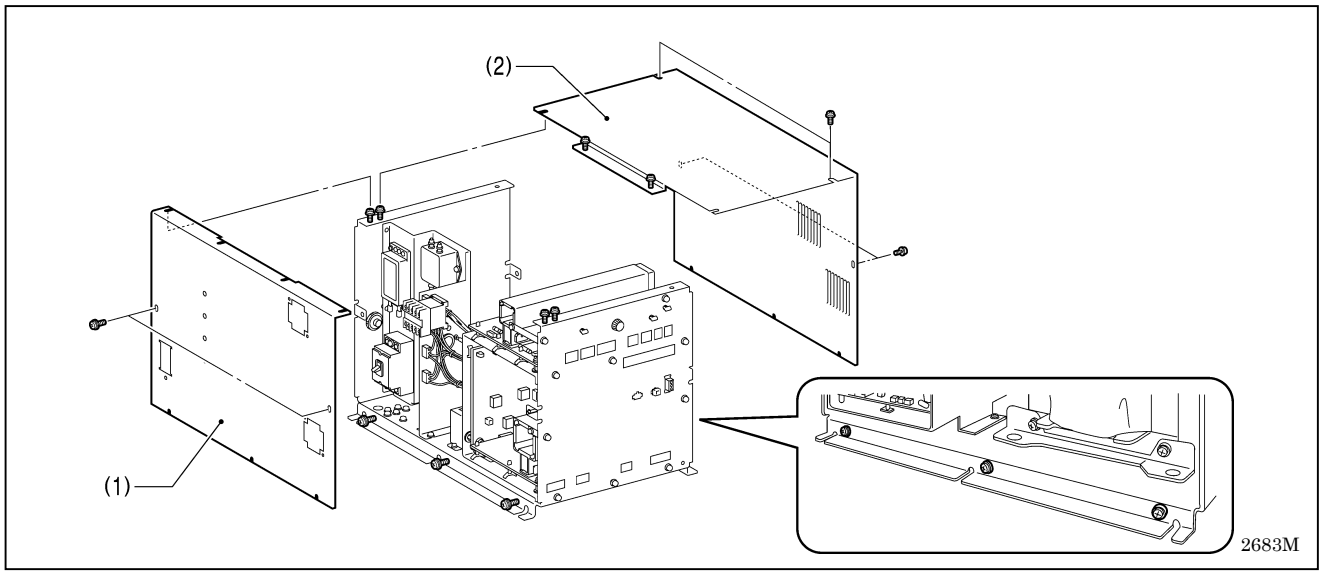


12. Pull up the drive PCB (4) to detach it.
13. For models without the beam sensor, remove sensorless harness (5) from the 2P connectors.

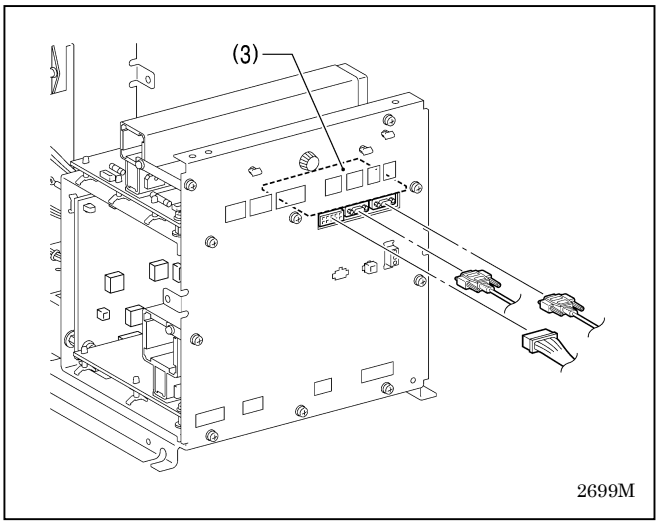
* To mount it, follow the reverse procedure to the above.

* When attaching connectors to the right side of the box, be sure to connect corresponding connectors with the same marking shown on the right side of the box.

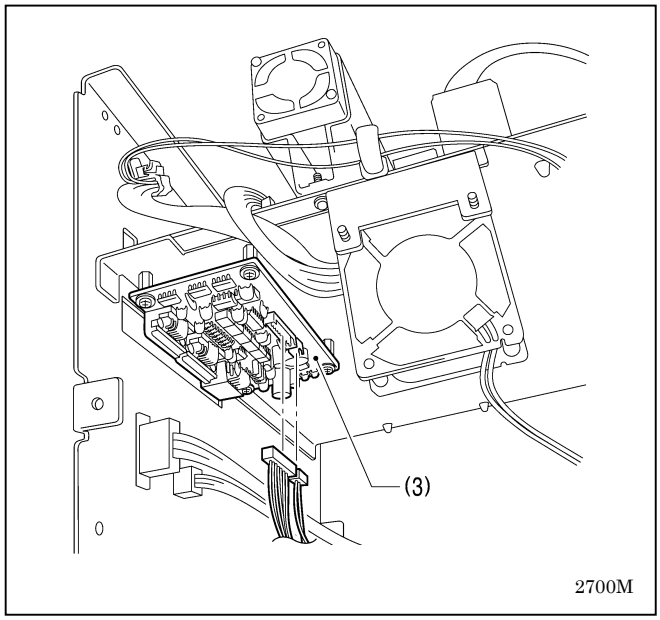
2-5. Replacement of the SBUS PCB (For PC-type model)



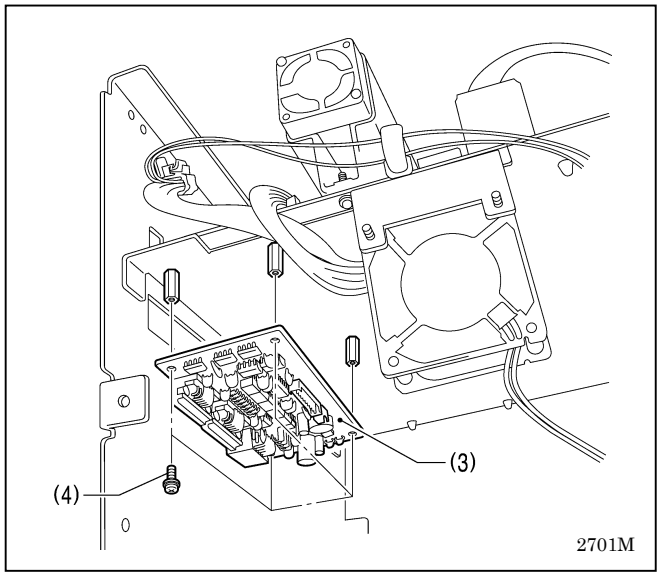
1. Unscrew 2 and loosen remaining 7 screws on the box cover F (1) to remove it.
2. Unscrew 6 and loosen remaining 5 screws on the box cover R (2) to remove it.



3. Disconnect all 3 connectors on the right side of the box which are connected to the SBUS PCB (3).



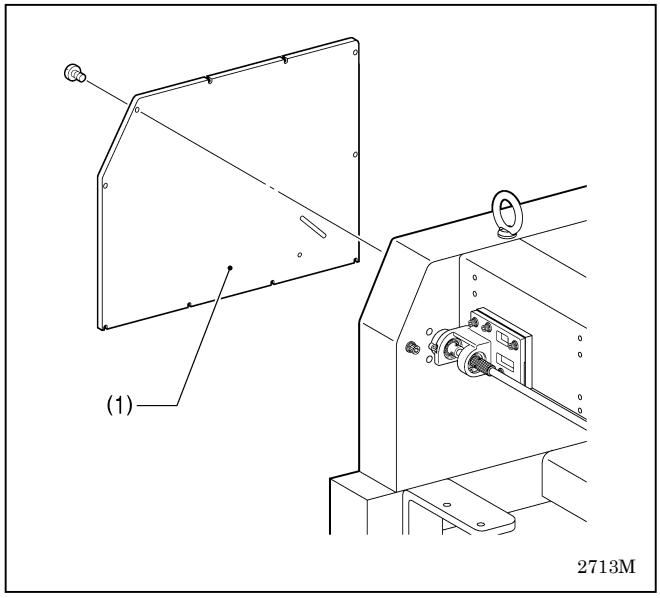
4. Disconnect all 2 connectors connected to the SBUS PCB (3).



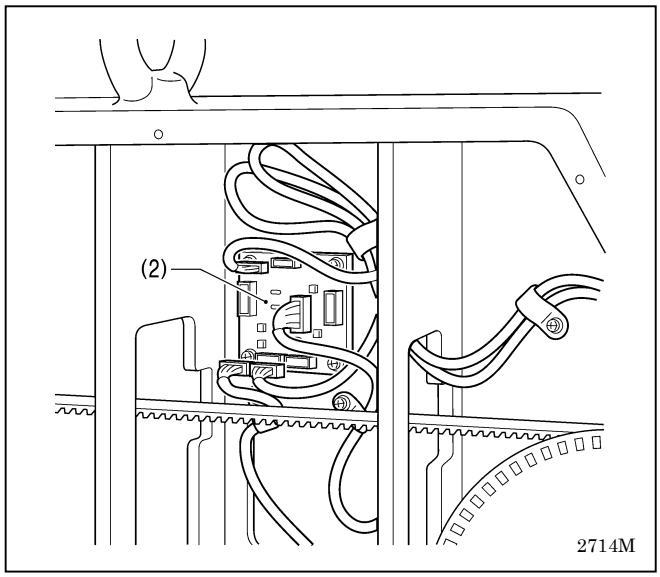
5. Unscrew 4 screws (4) on the SBUS PCB (3).
6. The SBUS PCB (3) can be detached now.

* To mount it, follow the reverse procedure to the above.

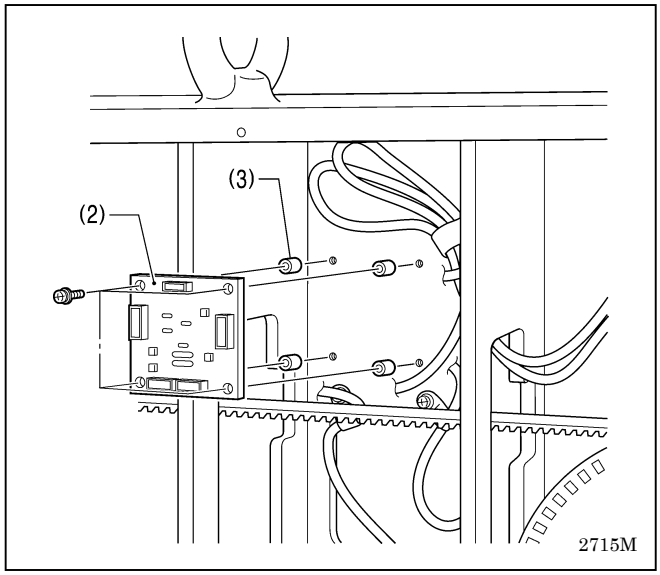
2-6. Replacement of the relay PCB



1. Unscrew 7 and loosen remaining 3 screws on the side cover L (1) to remove it.



2. Remove all connectors connected to the relay PCB (2).

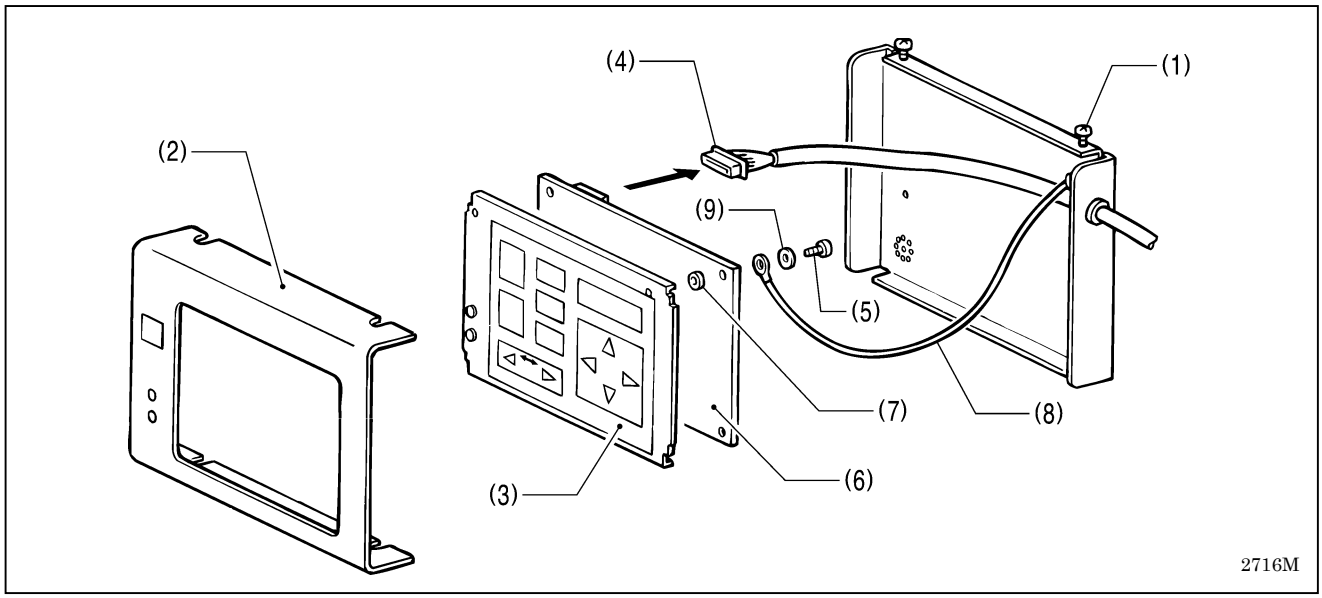


3. Unscrew 4 screws fixing the relay PCB (2) to detach it.

   Be careful not to lose 4 PCB spacers (3).

* To mount it, follow the reverse procedure to the above.

2-7. Replacing the panel PCB (For PC-type model)



1. Loosen the four screws (1) securing the operation panel at the top and bottom, and remove the panel cap (2) by lifting it.

2. Separate the sheet holder plate (3) slowly, and remove the connector (4) from the rear of the panel PCB.

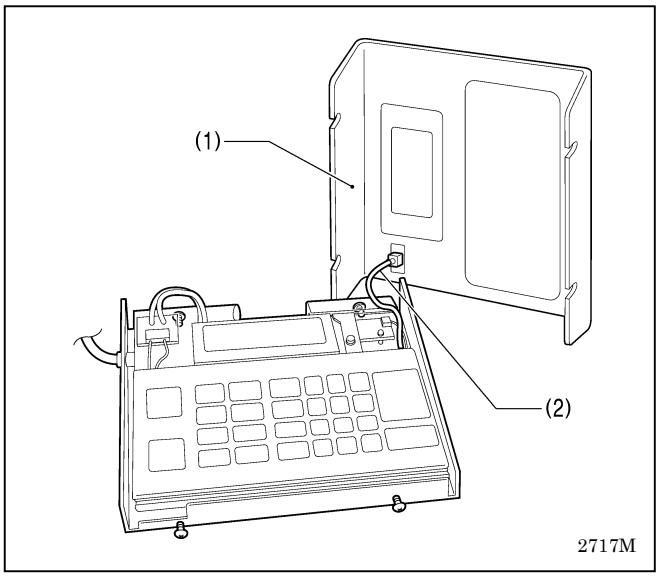
3. Remove the five screws (5) from the rear of the PCB, and replace the panel PCB (6) with a new one.

   After replacing the panel PCB, reverse the above procedure for re-assembly.

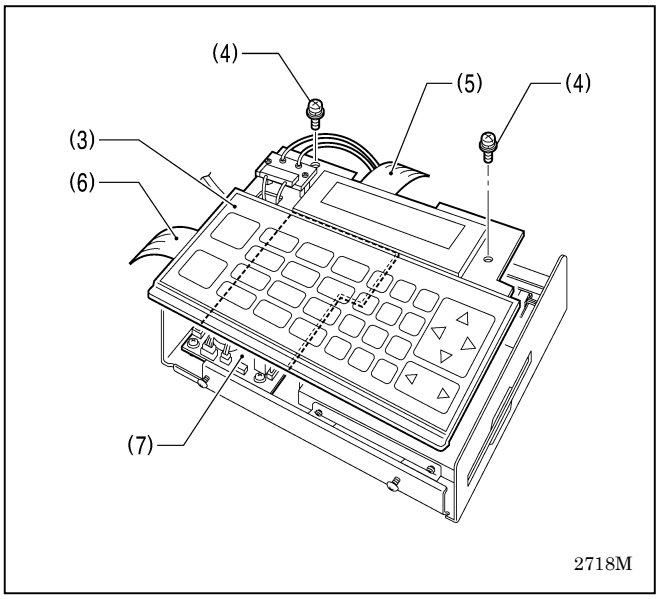
CAUTION

- After replacing the panel PCB, be sure to attach the ground wire and connector.
- When removing and reattaching connectors, do not pull on the cables; hold the connectors.
- Do not lose the collar (7) which is to be placed between the shaft holder plate (3) and the panel PCB (5).
- Attach the ground wire (8) to the panel PCB (6) using the screw (5) and the plain washer (9). As to the remaining three holes, insert screws with two plain washers on each. Pay attention to the number of plain washers as they influence the position of the holes.

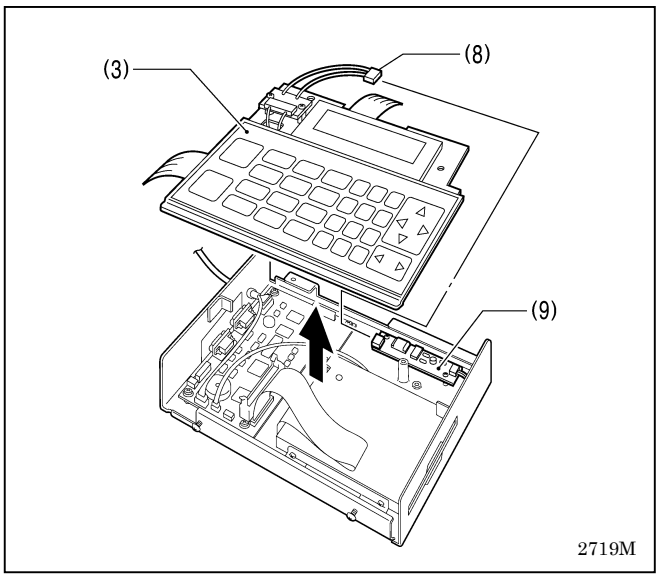
2-8. Replacement of the control panel PCB (For SA-type model)



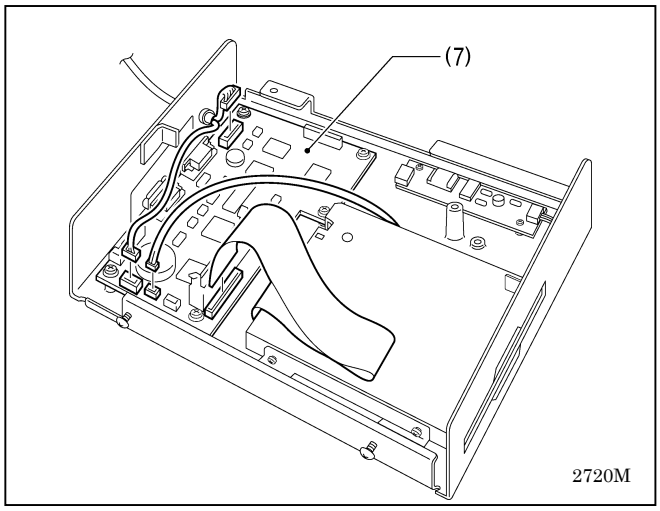
1. Loosen 4 screws in total on the upper and lower side of the control panel main body and lift up the panel cover (1). Put the panel cover aside with care not to bring any tension to the harness (2) of the cap switch.



2. Unscrew 2 screws (4) fixing the sheet key support (3) and lift up the sheet key support (3) slightly to detach the LCD harness (5) and the sheet key harness (6) from the control panel PCB (7).

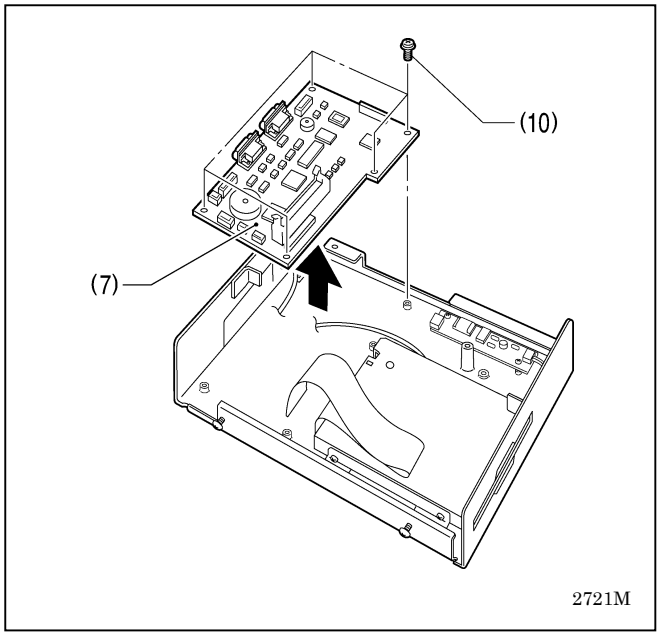


3. Lift up the sheet key support (3) to disconnect the inverter harness (8) from the inverter PCB (9) and separate them completely from the panel body.



4. Disconnect all connectors attached to the control panel PCB (7).

   When handling the FDD harness, unlock the connector first.

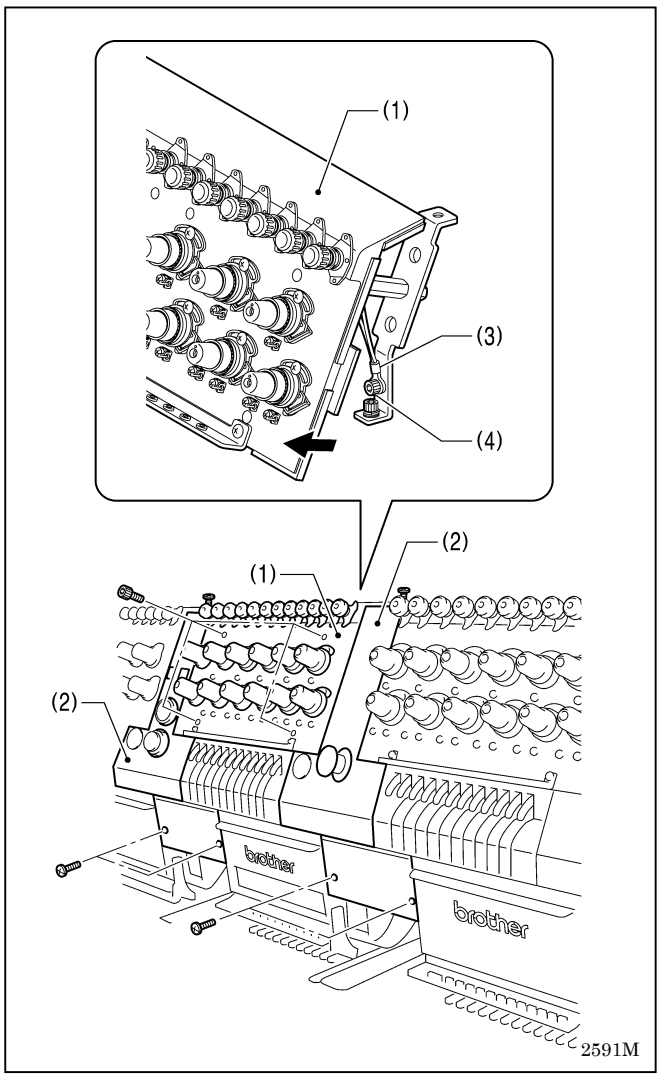


5. Unscrew 5 screws (10) fixing the control panel PCB (7).

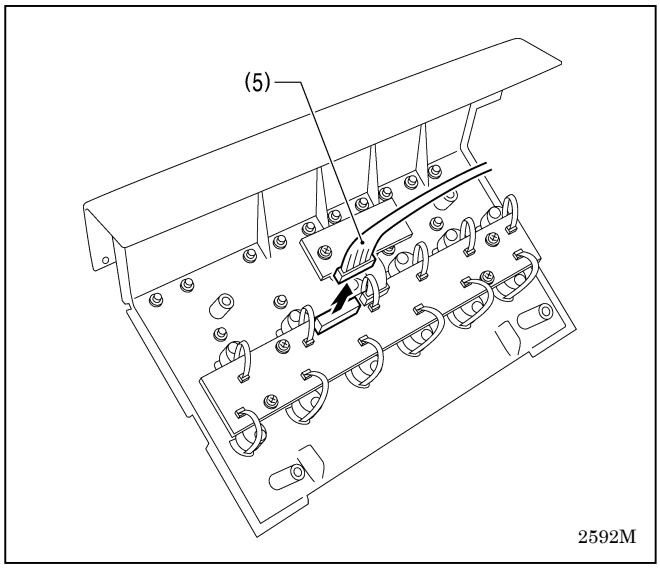
6. The control panel PCB (7) can be detached now.

* To mount pieces, follow the reverse procedure to the disassembly above.

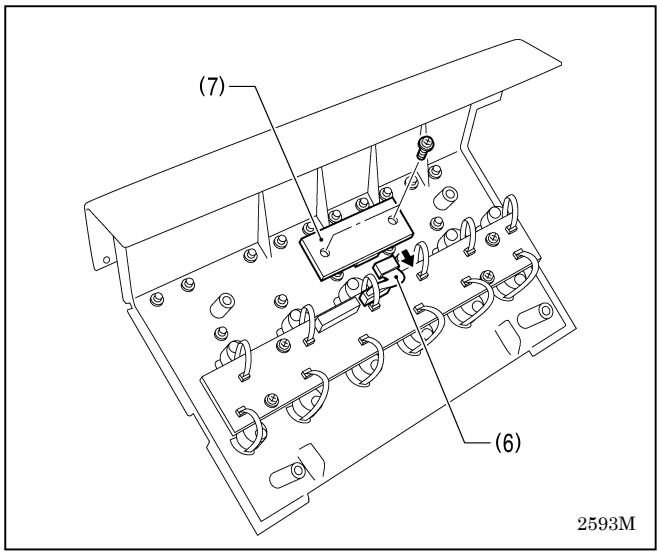
3. Replacement of head switch PCB of thread tension base and tension base PCB



1. Loosen upper 2 screws and unscrew remaining 4 screws fixing cover (2) between the both sides of tension base (1), and then remove cover (2).
2. Unscrew 4 bolts, socket fixing tension base (1).
3. Lift tension base (1) slightly on the front side.
   Be careful about fixed ground wire (3) connected to tension base (1).
4. Unscrew bolt, socket (4) of the ground terminal to disconnect it.

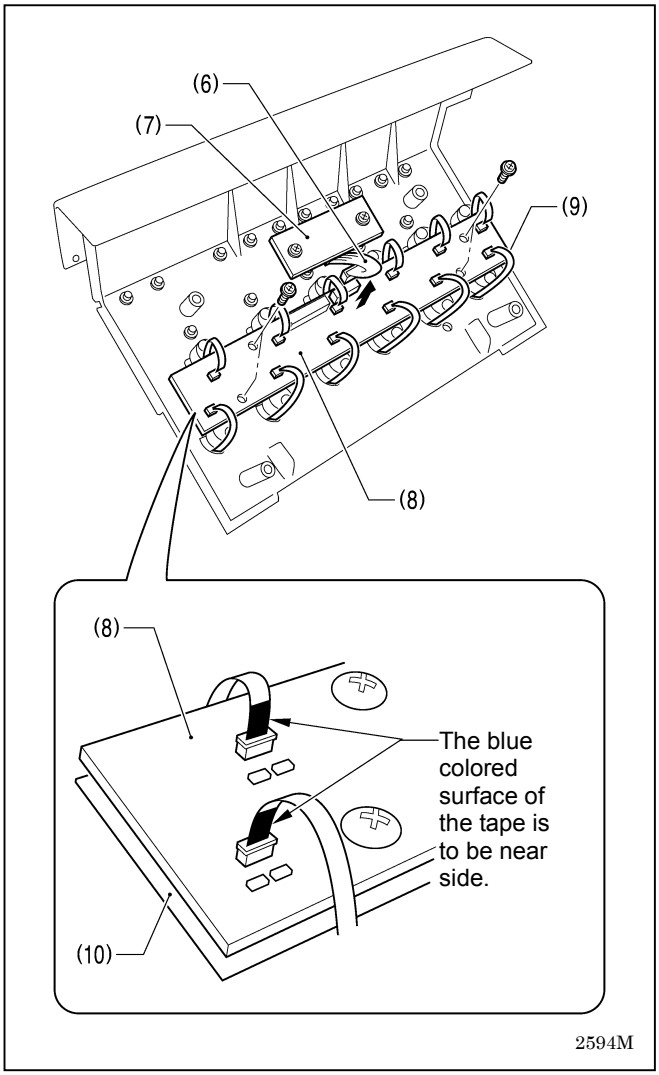


5. Disconnect head-head tension base harness connector (5).



6. Disconnect tension base harness connector (6) connecting tension base PCB and head switch PCB (7).

7. Unscrew 2 screws fixing head switch PCB to detach it.



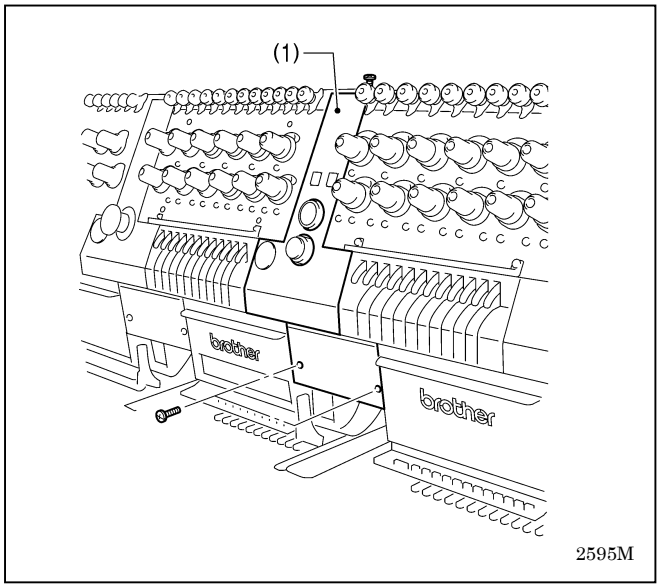
8. Disconnect tension base harness connector (6) connecting tension base PCB (8) and head switch PCB (7).

9. Detach 12 thread breakage sensor harnesses (9) of P1 to P12 from the connector connecting tension base PCB (8).

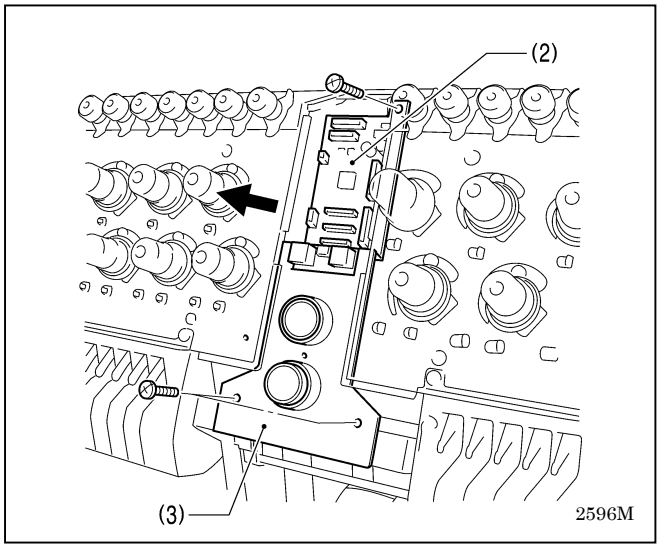
10. Unscrew 4 screws fixing tension base PCB (8) and tension base PCB sheet (10) and then detach tension base PCB (8).

* To mount it, follow the reverse procedure to the above.

4. Replacement of I/O PCB (1, 2) and step back/forward switch PCB

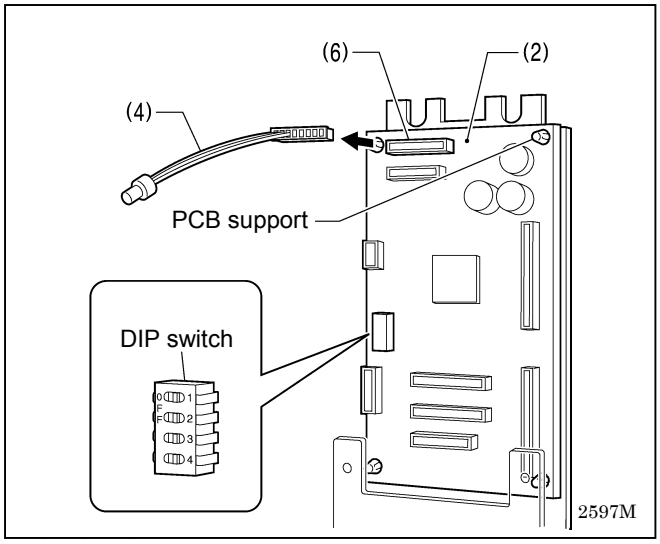


1. Loosen upper 1 screw and unscrew remaining 3 screws fixing cover (1) between the head No. 3 and No. 4, and then remove cover (1).



2. Take out all connectors connected to I/O PCB (1, 2) (2).

3. Unscrew 2 screws under cover base (3) and upper 1 screw on I/O PCB (2), and then take out I/O PCB (1, 2) (2) and step back/foward switch together with cover base (3).



4. Disconnect terminal connector (4) from P6 connector (6) on I/O PCB (1, 2) (2).

   Be sure not to lose I/O terminal connector (4) (connector with 3 blue lines) detached here.

CAUTION

In four head embroidery machine, this terminal connector (4) is connected to I/O PCB (1, 2) (2) between the head No. 3 and No. 4.
In six head embroidery machine, this is connected to I/O PCB (1, 2) (2) between the head No. 5 and No. 6.

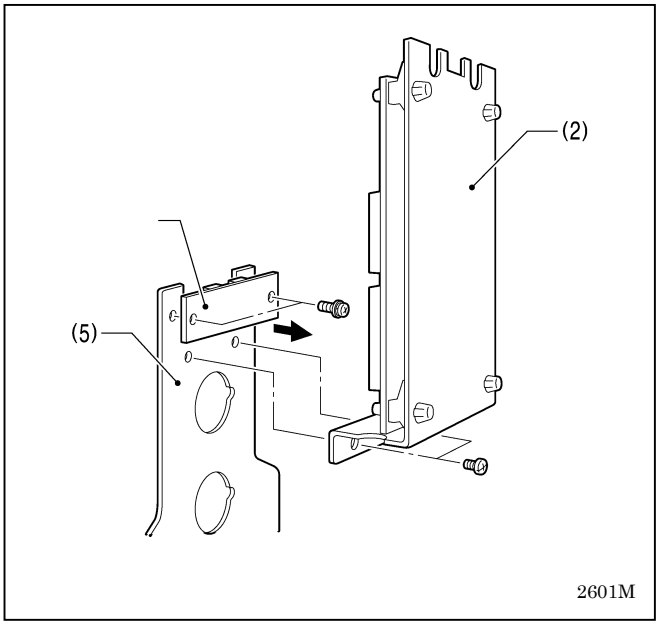
Follow the DIP switch settings below when replaced I/O PCB (1, 2).

For four head embroidery machine

	SW1	SW2	SW3	SW4
No. 1 and No. 2 head PCB	**ON**	OFF	OFF	OFF
No. 3 and No. 4 head PCB	OFF	**ON**	OFF	OFF

For six head embroidery machine

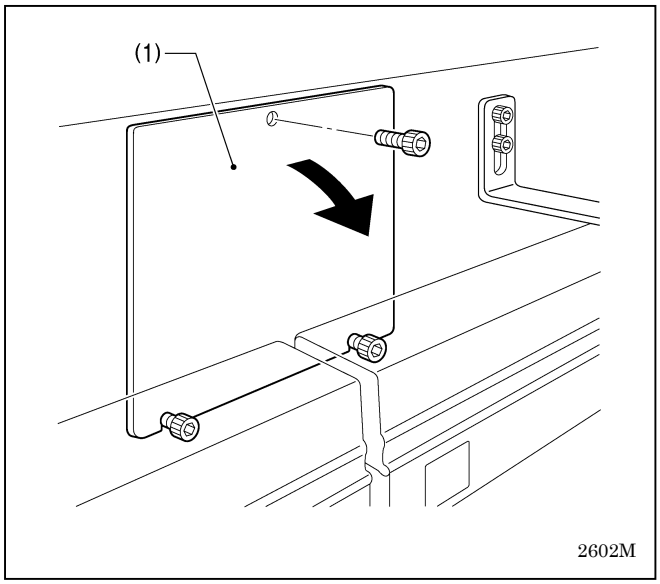
	SW1	SW2	SW3	SW4
No. 1 and No. 2 head PCB	**ON**	OFF	OFF	OFF
No. 3 and No. 4 head PCB	OFF	**ON**	OFF	OFF
No. 5 and No. 6 head PCB	**ON**	**ON**	OFF	OFF



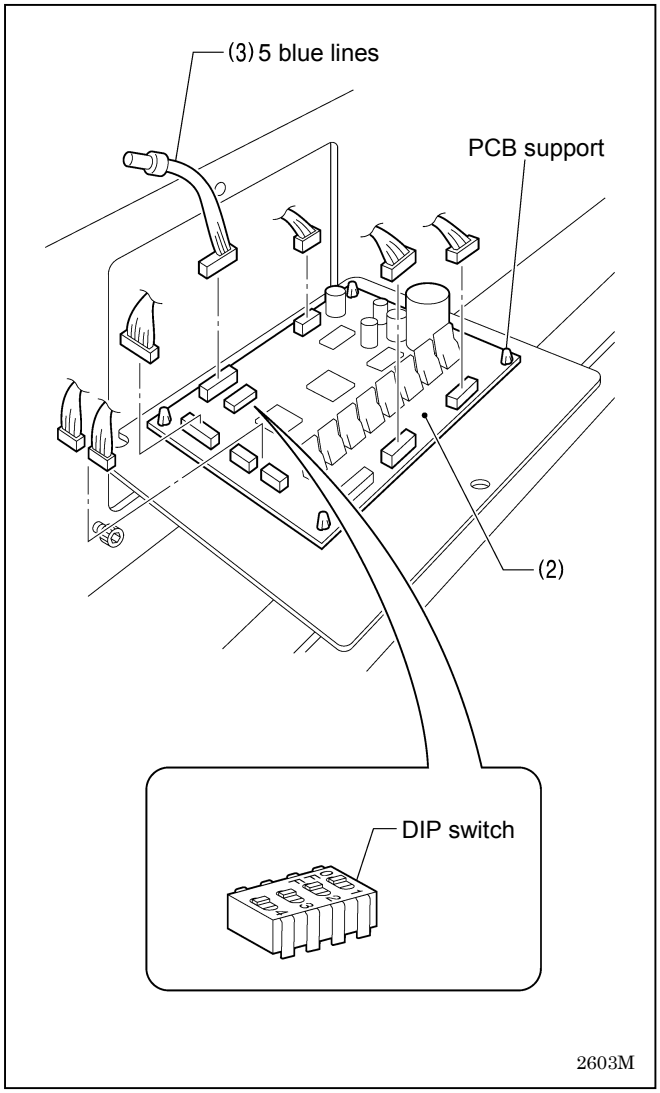
5. Unscrew 2 screws connecting I/O PCB (1, 2) (2) and step back/forward switch PCB (5).

* To mount it, follow the reverse procedure to the above.

5. Replacement of head PCB



1. Unscrew upper 1 bolt, socket and loosen lower 2 bolts, socket on bridge cover (1) and pull down bridge cover (1).



2. Disconnect the connector on head PCB (2).
3. Detach terminal connector (3) from P5 connector.

   Be sure not to lose terminal connector (3) (connector with 5 blue lines).

CAUTION

In four head embroidery machine, this terminal connector (3) is connected to head PCB (2) between the head No. 3 and No. 4. In six head embroidery machine, this is connected to head PCB (2) between the head No. 5 and No. 6.

CAUTION

Follow the DIP switch settings below when replaced head PCB.

For four head embroidery machine

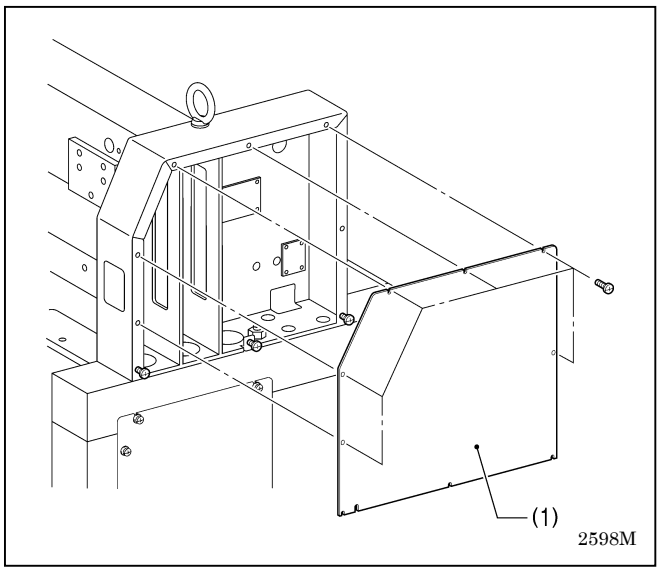
	SW1	SW2	SW3	SW4
No. 1 and No. 2 head PCB	**ON**	OFF	OFF	OFF
No. 3 and No. 4 head PCB	OFF	**ON**	OFF	OFF

For six head embroidery machine

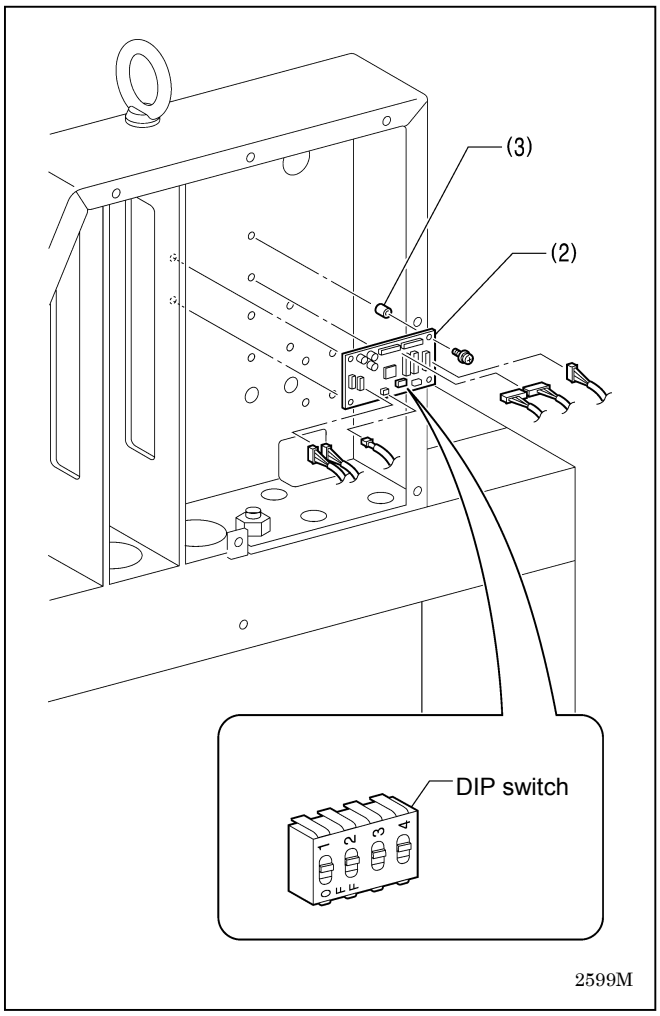
	SW1	SW2	SW3	SW4
No. 1 and No. 2 head PCB	**ON**	OFF	OFF	OFF
No. 3 and No. 4 head PCB	OFF	**ON**	OFF	OFF
No. 5 and No. 6 head PCB	**ON**	**ON**	OFF	OFF

* To mount it, follow the reverse procedure to the above.

6. Replacement of I/O PCB



1. Loosen lower 3 screws and unscrew remaining 6 screws on side cover(1) of the sewing machine, and then remove the side cover.



2. Disconnect the connector on I/O PCB (2).

3. Unscrew 4 screws fixing I/O PCB (2) to detach it.

   Be sure not to lose 4 spacers (3).

   CAUTION

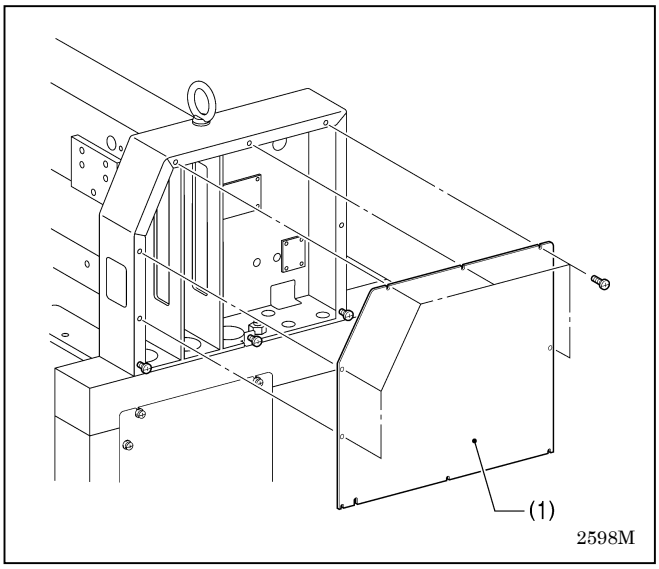
   DIP switch settings on I/O PCB

SW1	SW2	SW3	SW4
OFF	OFF	OFF	OFF

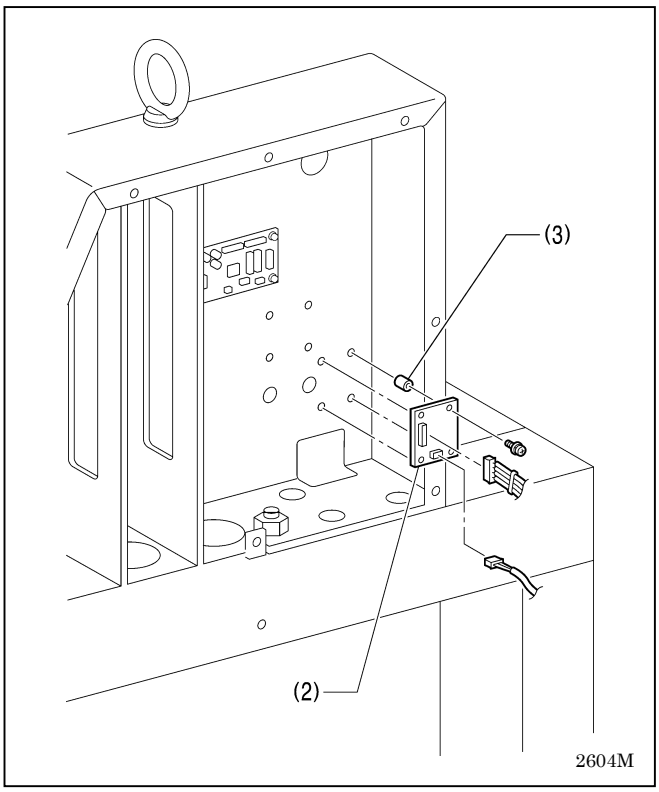
   All set to OFF.

* To mount it, follow the reverse procedure to the above.

7. Replacement of picker PCB



1. Loosen lower 3 screws and unscrew remaining 6 screws on side cover (1) of the sewing machine, and then remove side cover (1).

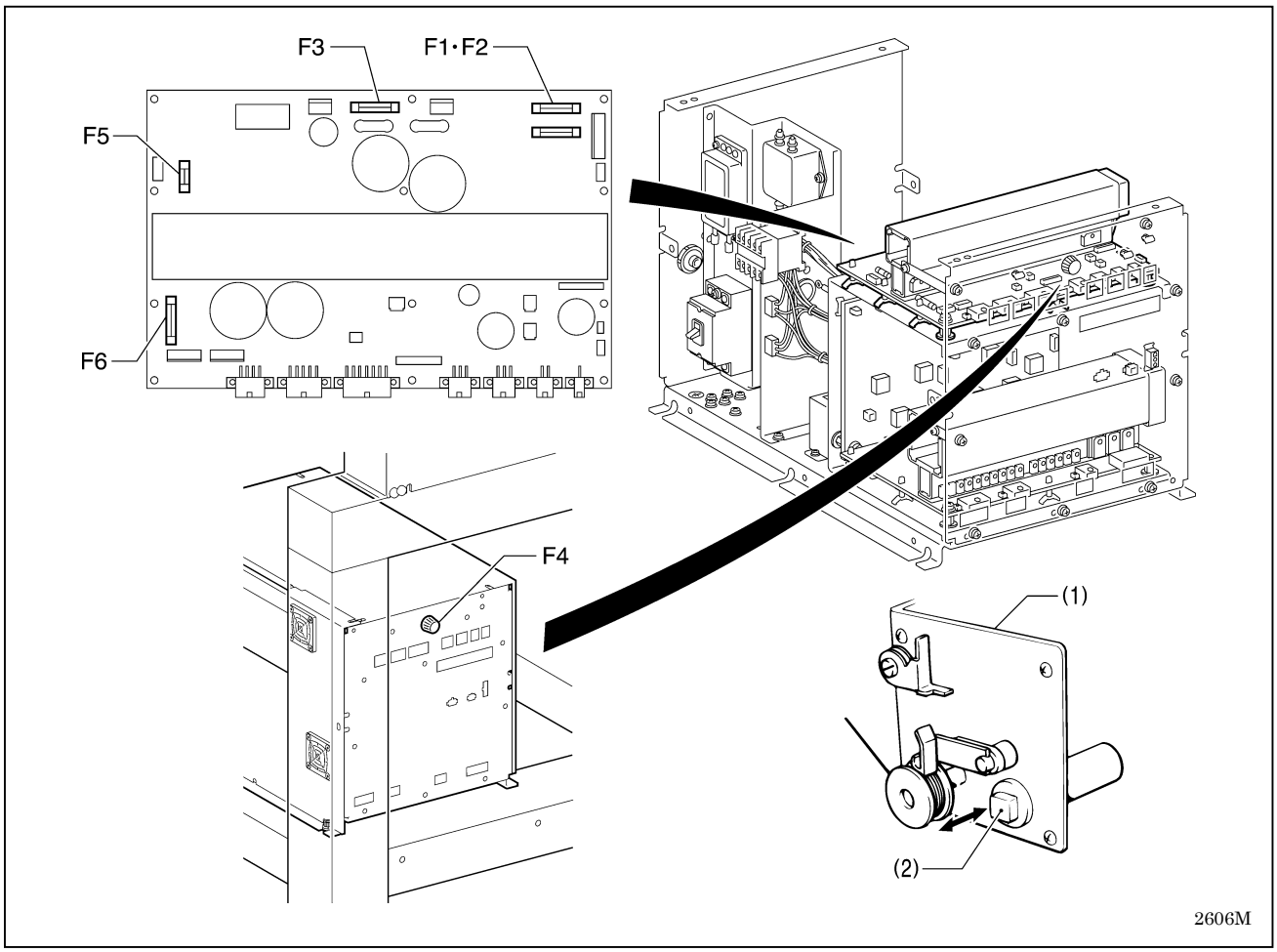


2. Disconnect the connector on picker PCB (2).
3. Unscrew 4 screws fixing picker PCB (2) to detach it.

   Be sure not to lose 4 spacers (3).

* To mount it, follow the reverse procedure to the above.

8. Fuses



1. Remove the cover of control box.

2. 5 fuses are attached on the power supply PCB in the upper part inside the control box.
   Another fuse holder is attached on the right side of the control box.

   CAUTION

   Before the replacement, be sure to turn off the power.

8-1. Types and capacity of fuses

No.	Fuse type and capacity	Article number	Product name
F1, F2	8A-250V (Semi time-lag fuse)	S56790000	GFUSE8A-250V
F3	5A-250V (Normal-blow fuse)	S56791000	GFUSE5A-250V
F4	5A-125V (Slow-blow fuse)	S56794000	GFUSE5A-125V
F5	0.4A-125V (Slow-blow fuse)	S56793000	GFUSE0.4A-125V
F6	6A-250V (Semi time-lag fuse)	S56792000	GFUSE6A-250V

CAUTION

Bobbin winder device (1) and the bobbin winder motor do not work while circuit protector (2) is working. In this case, leave them for a while to cool down and then push in circuit protector (2) to cancel the protection (It will be pushed back if the cooling down is not enough).

8-2. Replacement of fuses

CAUTION

Refer to the table below describing each case of the blowout of fuses.

CAUTION

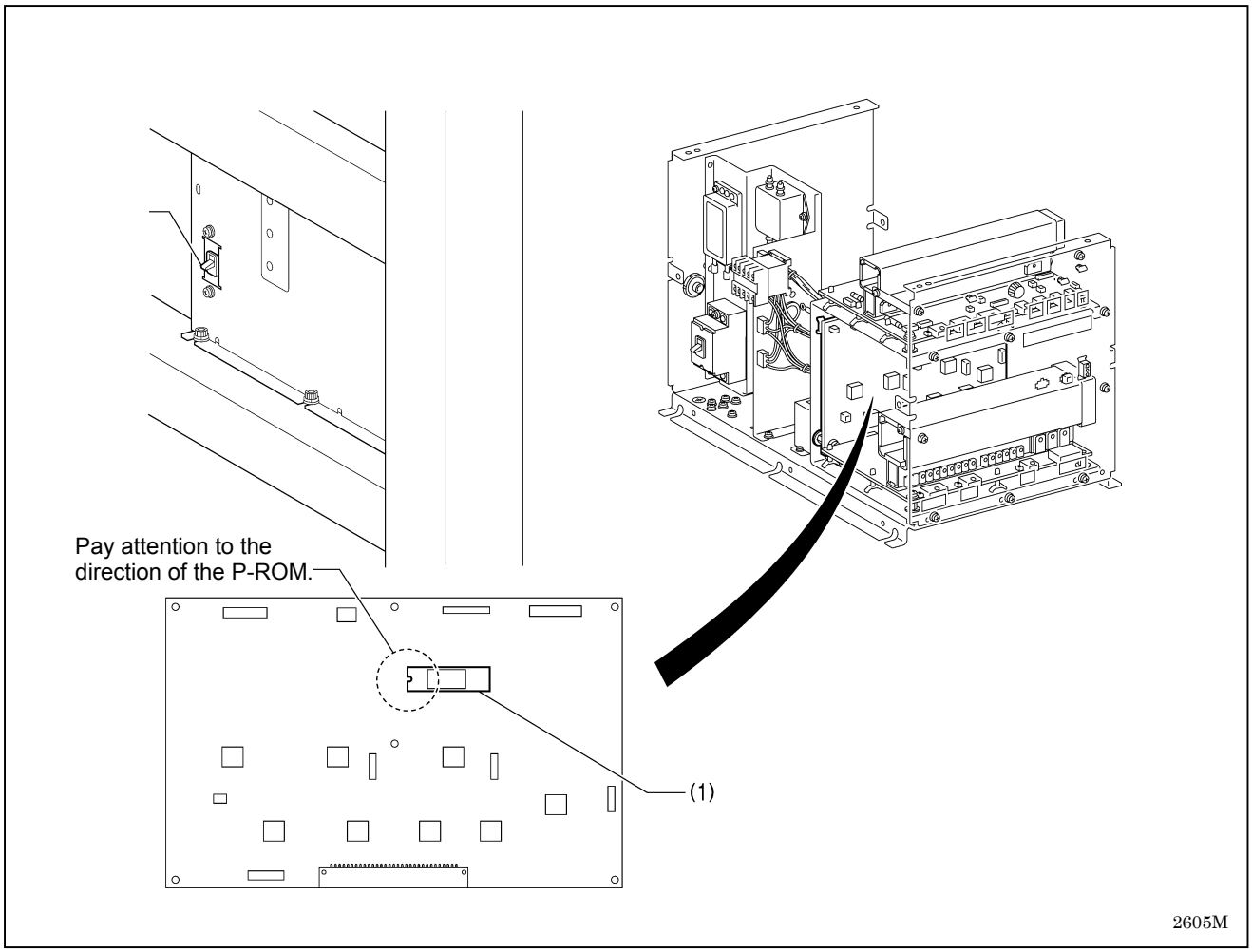
Be sure to replace with a fuse of the same type and capacity as before.

CAUTION

Be sure to fasten the socket of the fuse to be replaced.

Fuse No.	Status
F1, F2	Thread trimmer motor does not perform the home position detection on startup of the sewing machine. “Thread trimmer motor Home position error” is displayed in SA type machines. E-B9 is displayed in PC type machines.
F3	Machine motor does not work. “Machine motor locked” is displayed in SA type machines. E-A1 is displayed in PC type machines.
F4	The fluorescent lamp lights but the power is not supplied to the sewing machine.
F5	The fluorescent lamp lights but the power is not supplied to the sewing machine.
F6	Carriage does not detect the XY home position on startup of the sewing machine. “Y axis home position error” is displayed in SA type machines. E-14 is displayed in PC type machines.
circuit protector (2)	The bobbin cannot be winded.

9. Description of P-ROM



CAUTION

Before the replacement, be sure to turn off the power supply.

CAUTION

Pay particular attention on handling of P-ROM(1).

Confirm that all pins are set in the socket properly.

CAUTION

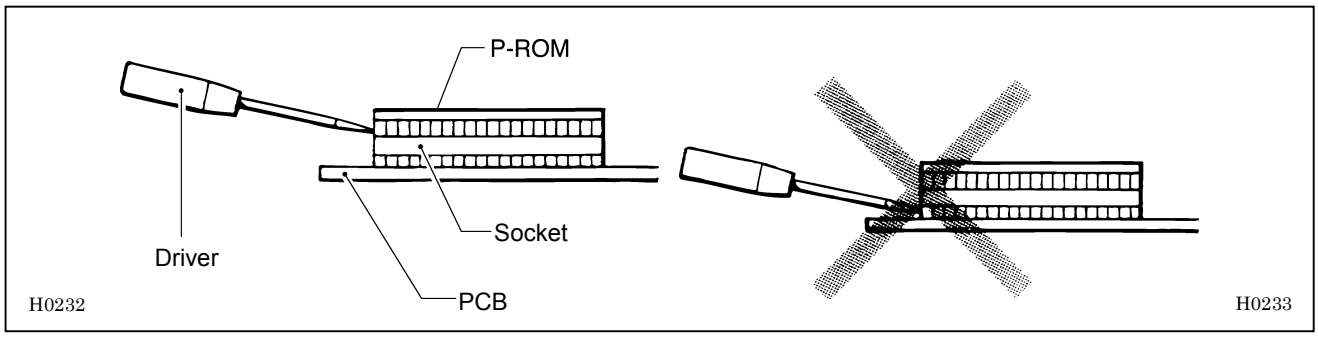
Be sure not to put any irregular force on the PCB when attaching the P-ROM (1) to it.

CAUTION

Check if the P-ROM (1) is attached both in a proper position and direction.

CAUTION

For the P-ROM replacement, use a tool specially made for P-ROM removal if available. When using a driver etc. for this purpose, be sure not to damage the P-ROM, socket or PCB. Try to pull the each side of the P-ROM alternatively little by little, in this case.

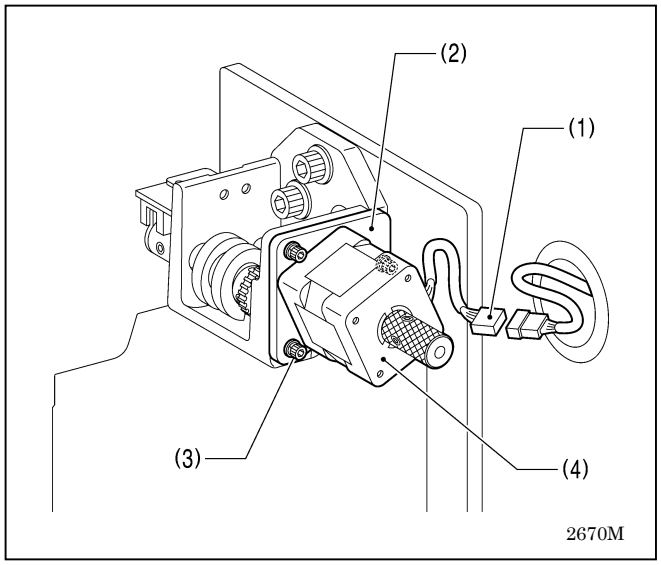


10.Replacement of change color motor, collar, w/dog and change color sensor PCB

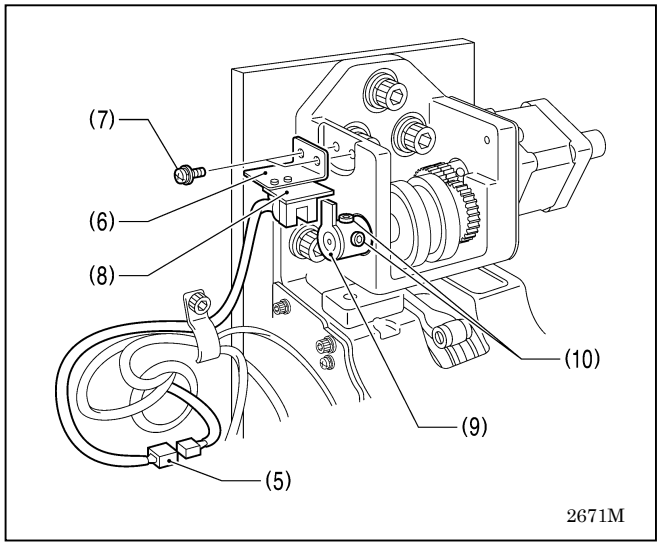
[How to detach]

Turn off the power of the sewing machine.

1. Detach the needle bar case (Page xxx) from head No. 1, referring descriptions for the replacement and adjustment of jump driving assy, cloth presser cam, thread take-up driving cam, needle bar driving cam, driving belt and upper shaft sensor.



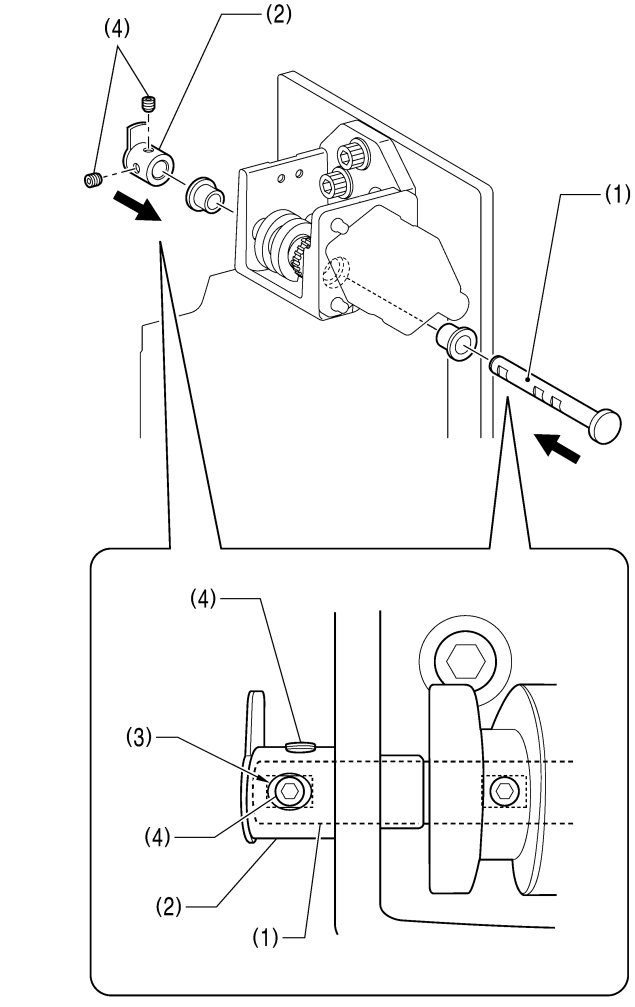
2. Detach connector (1).
3. Unscrew 3 bolts, socket (3) to detach motor setting plate (2).
4. Replace change color motor (4).



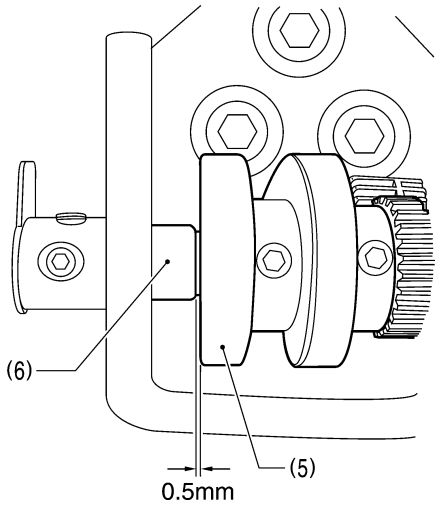
5. Detach connector (5).
6. Unscrew 2 set screws (7) to detach PCB setting plate (6).
7. Replace sensor PCB (8).
8. Loosen 2 bolts, socket to detach collar, w/dog (9) for the replacement.

[How to mount]

To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting are described below.



2672M



2673M

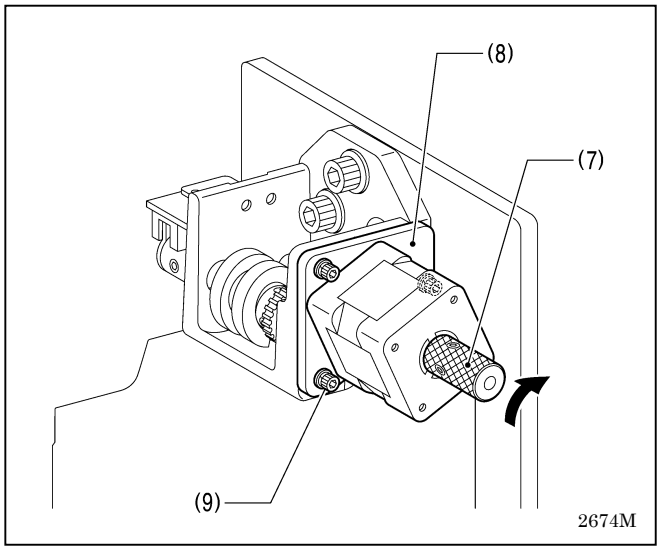
1. Rotate shaft (1) to locate the screw mark in horizontal position.

2. Turn the dog of collar, w/dog (2) upright and locate the screw hole (3) in the place indicated in the drawing. Fasten 2 bolts, socket adjusting shaft (1) so as not to get shaky. The location of screw hole (3) corresponds with the screw mark of shaft (1).

3. Check if the clearance between change cam (5) and flange bush (6) is 0.5 mm or more.

   This clearance gap should not change during this adjustment with replacement.

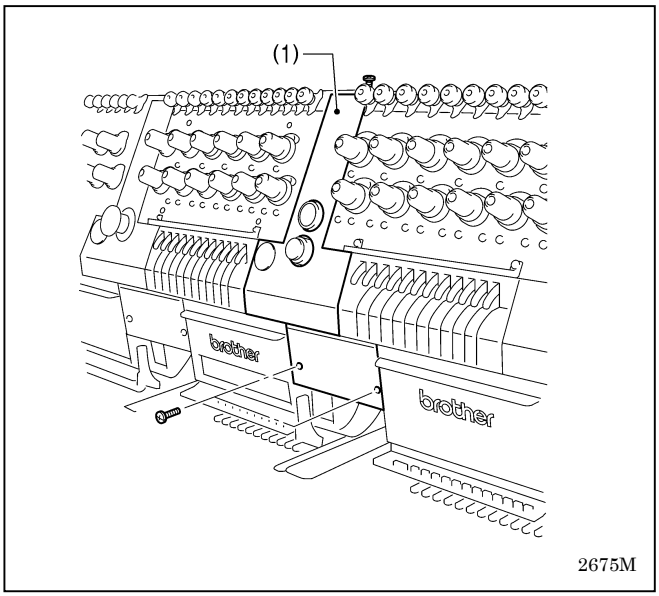
   Should there be any problem with the clearance, readjust the mounting such as shaft (1) of collar, w/dog (2).



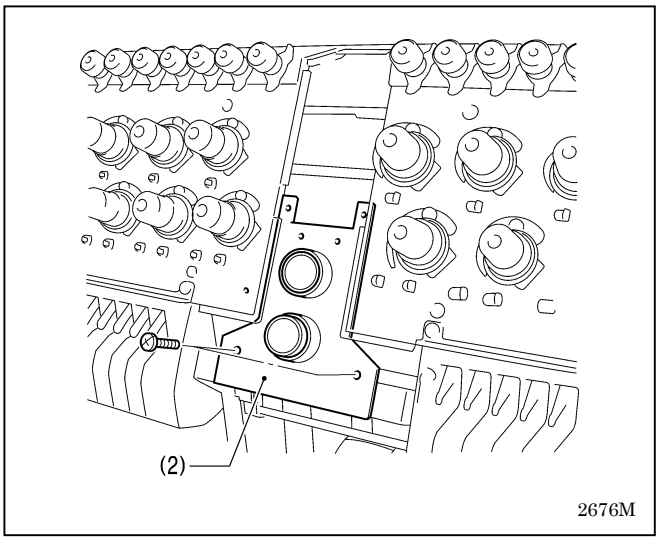
4. If change pulley (7) has heavy feeling in rotating, loosen 3 bolts, socket (8) to relocate motor setting plate (8).

11. Replacement and adjustment of index sensor

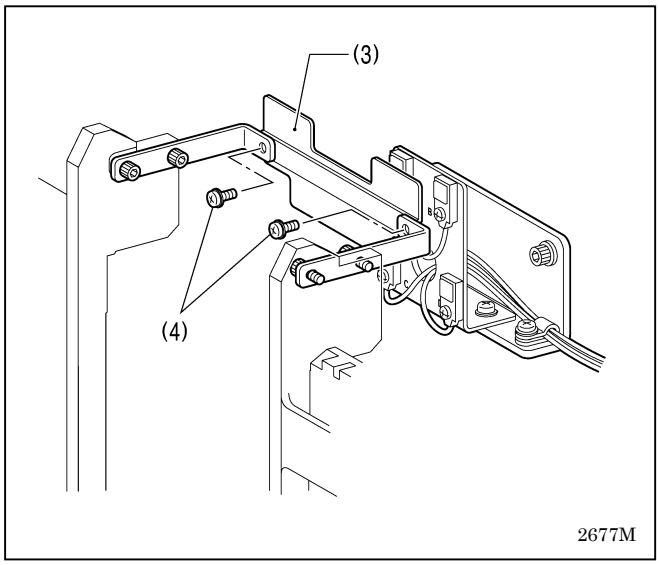
Turn off the power of the sewing machine.



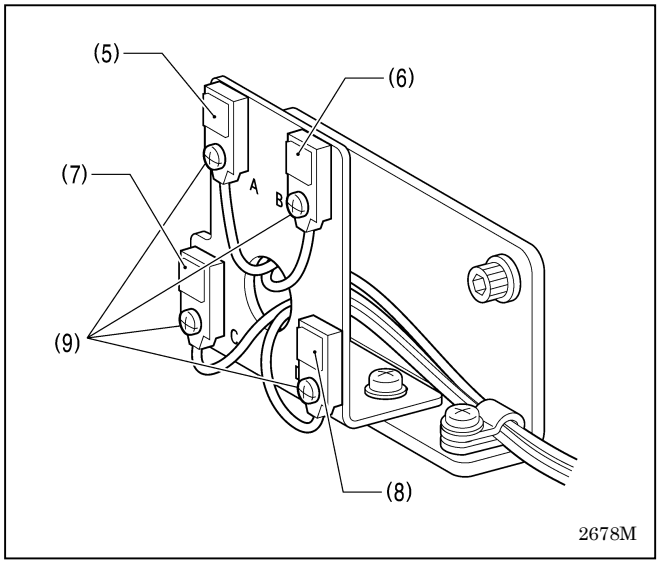
1. Loosen the upper 1 and unscrew remaining 2 screws of cover (1) between the heads No. 2 and No. 3 to detach cover (1).



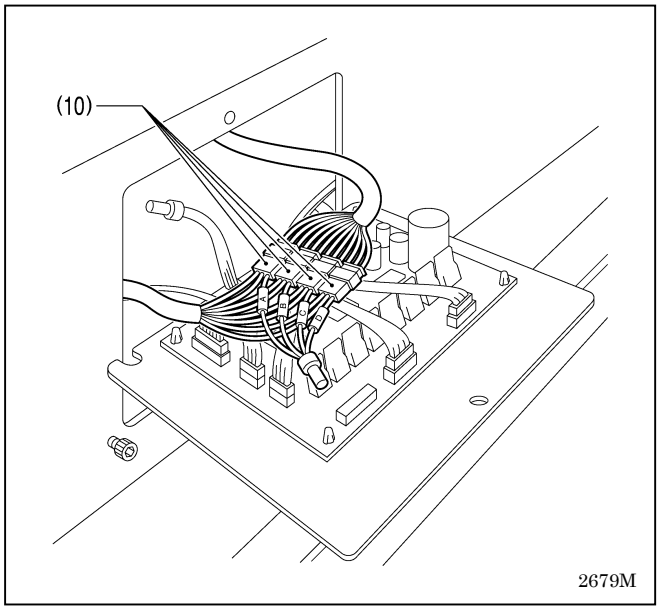
2. Unscrew 2 screws of cover base (2) to detach it.



3. Unscrew 2 set screws (4) of sensor dog (3) to detach it.



4. Unscrew 1 set screw (9) of change color sensor to replace change color sensors of A (5) to D (8).



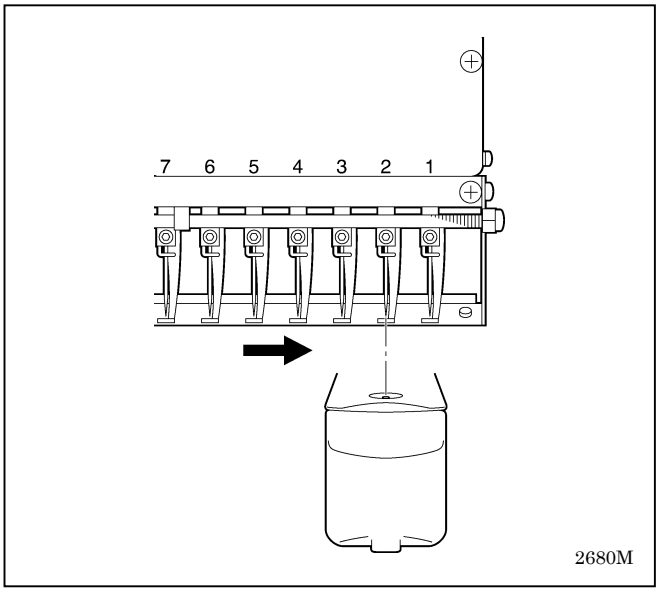
5. Remove the bridge cover between the heads No. 1 and No. 2 on the backside of bridge, and then pull down the bridge.
   Disconnect required ones of connectors (10) on the back of head PCB with a mark corresponding to the selected change color sensors A, B, C or D.

   CAUTION

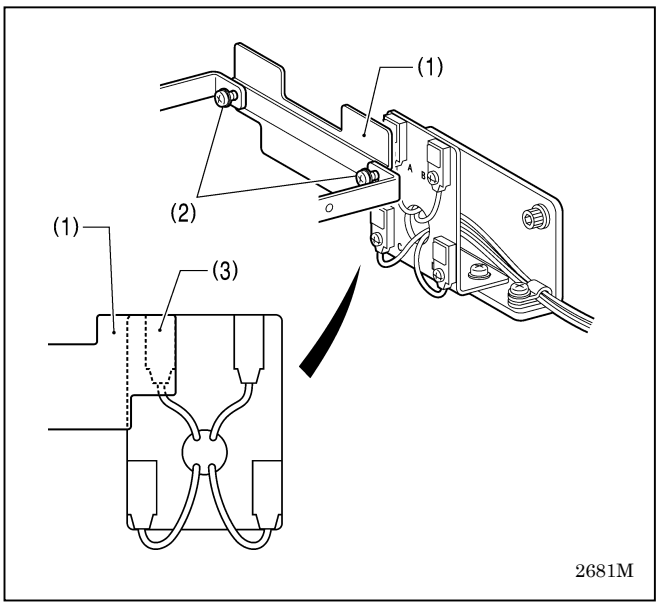
   The change color sensors A to D have all the same components.
   Be sure to reconnect those connectors properly when they are detached.

[How to mount]

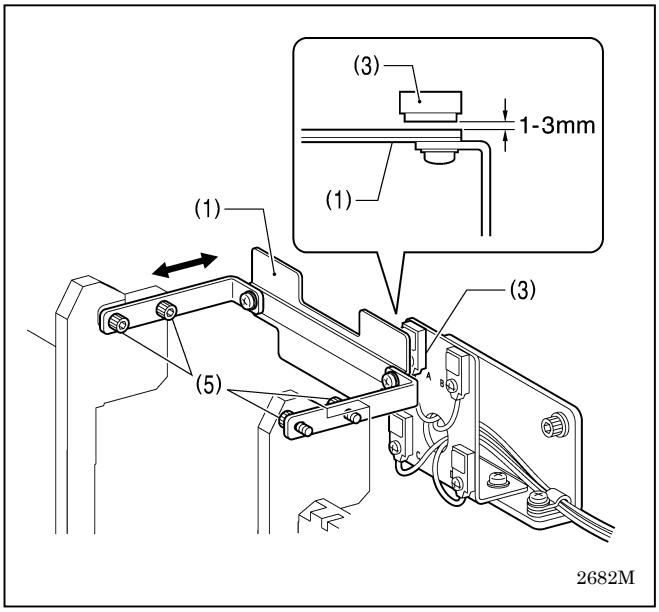
To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting are described below.



1. Select the needle bar number 2.



2. Loosen 2 set screws (2) of sensor dog (1).
3. Locate sensor dog (1) to be faced change color sensor A (3) indicated in the drawing.

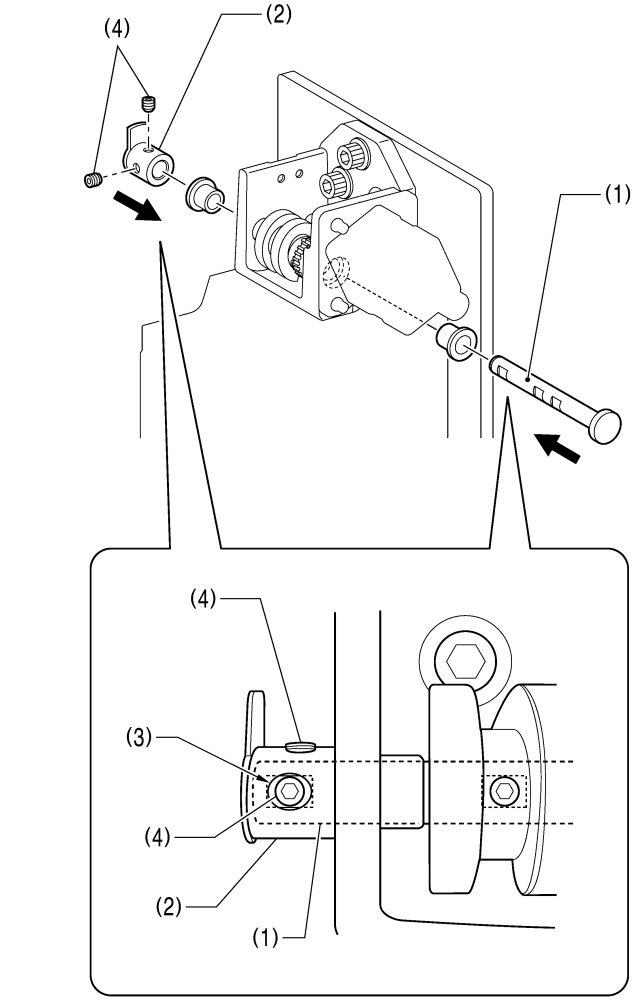


4. Check if the clearance between sensor dog (1) and change color sensor A (3) stays within 1 to 3 mm.

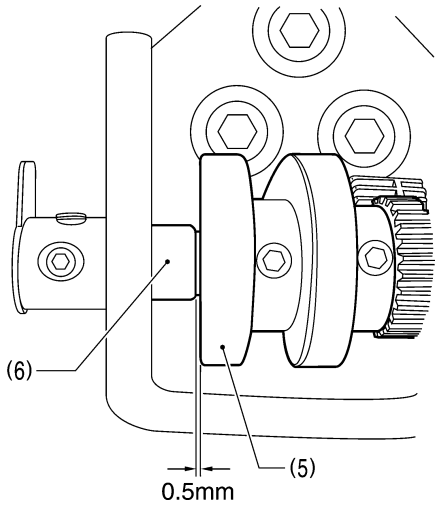
   This clearance gap should not change during this adjustment with replacement. If the clearance gap does not conform, loosen 4 set screws (5) in total on change color dog stay (4) to readjust its location.

[How to mount]

To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting are described below.



2672M



2673M

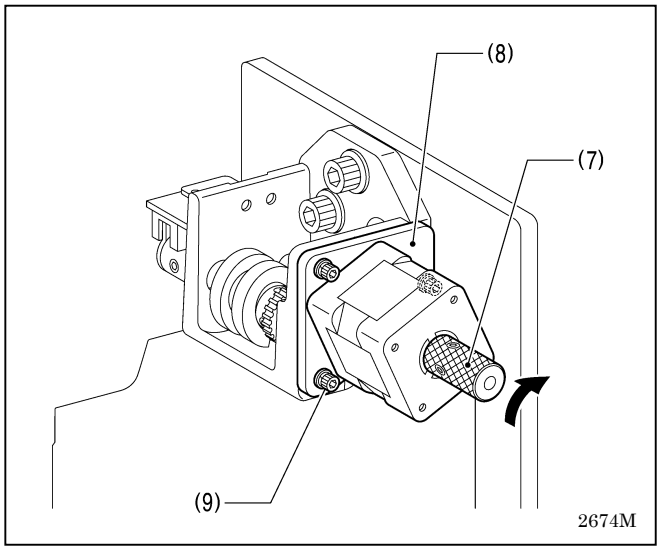
1. Rotate shaft (1) to locate the screw mark in horizontal position.

2. Turn the dog of collar, w/dog (2) upright and locate the screw hole (3) in the place indicated in the drawing. Fasten 2 bolts, socket adjusting shaft (1) so as not to get shaky. The location of screw hole (3) corresponds with the screw mark of shaft (1).

3. Check if the clearance between change cam (5) and flange bush (6) is 0.5 mm or more.

   This clearance gap should not change during this adjustment with replacement.

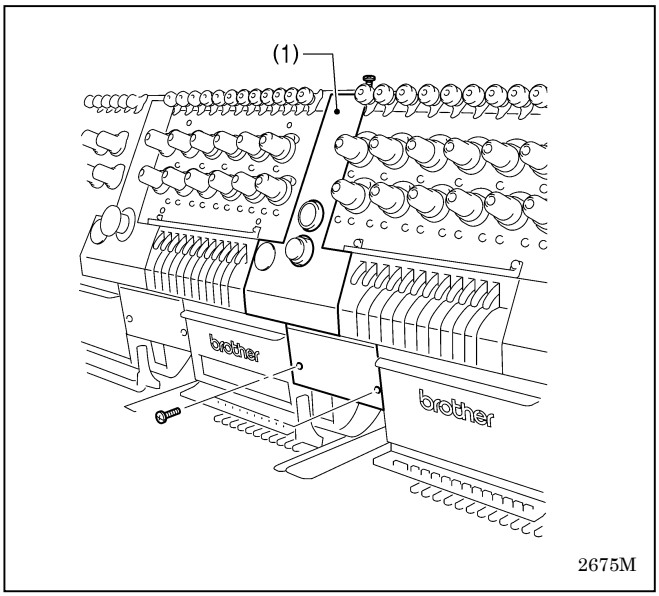
   Should there be any problem with the clearance, readjust the mounting such as shaft (1) of collar, w/dog (2).



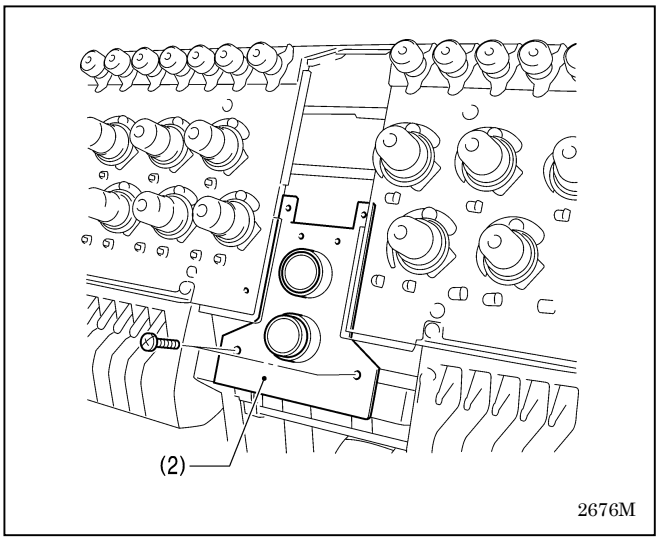
4. If change pulley (7) has heavy feeling in rotating, loosen 3 bolts, socket (8) to relocate motor setting plate (8).

11. Replacement and adjustment of index sensor

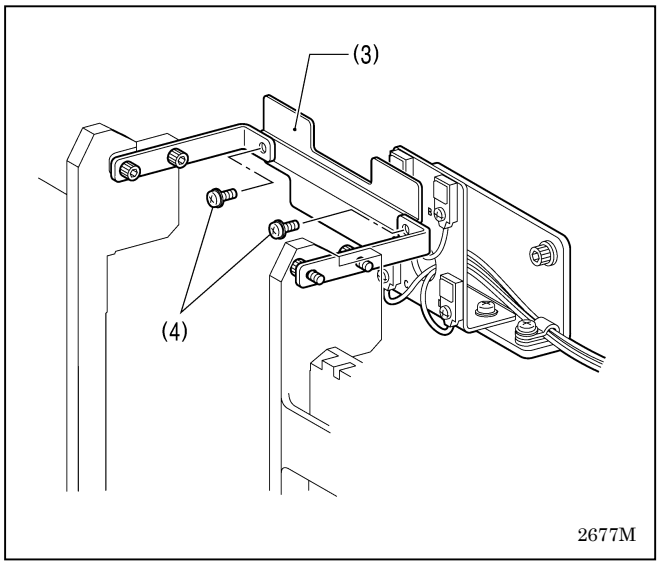
Turn off the power of the sewing machine.



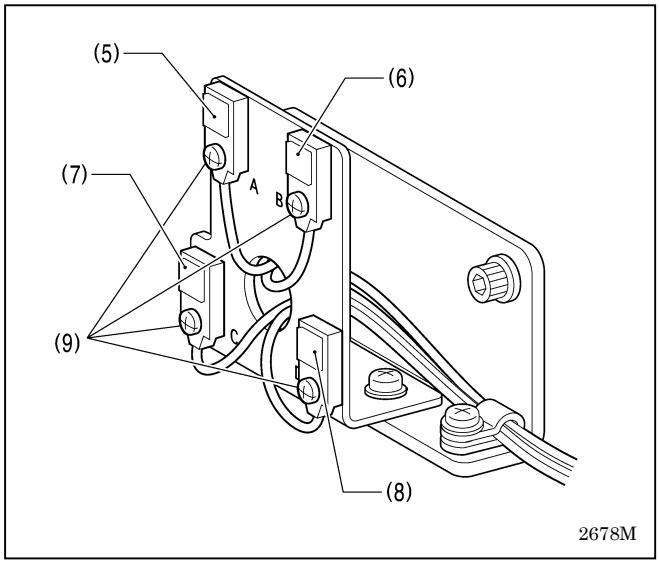
1. Loosen the upper 1 and unscrew remaining 2 screws of cover (1) between the heads No. 2 and No. 3 to detach cover (1).



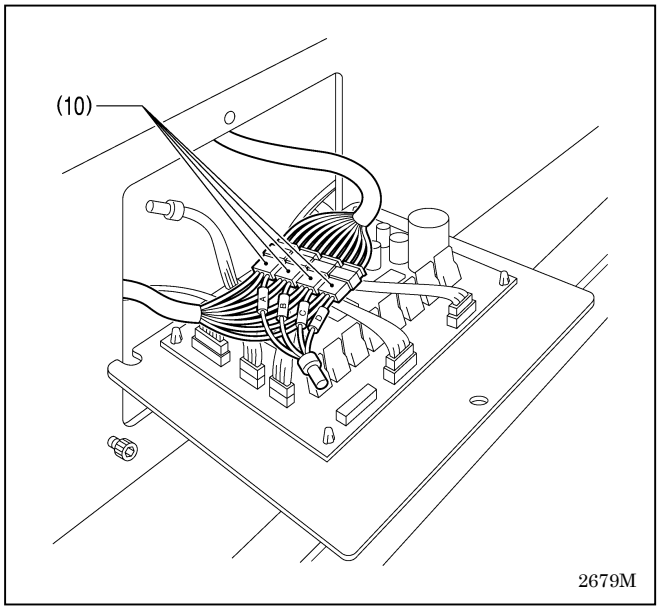
2. Unscrew 2 screws of cover base (2) to detach it.



3. Unscrew 2 set screws (4) of sensor dog (3) to detach it.



4. Unscrew 1 set screw (9) of change color sensor to replace change color sensors of A (5) to D (8).



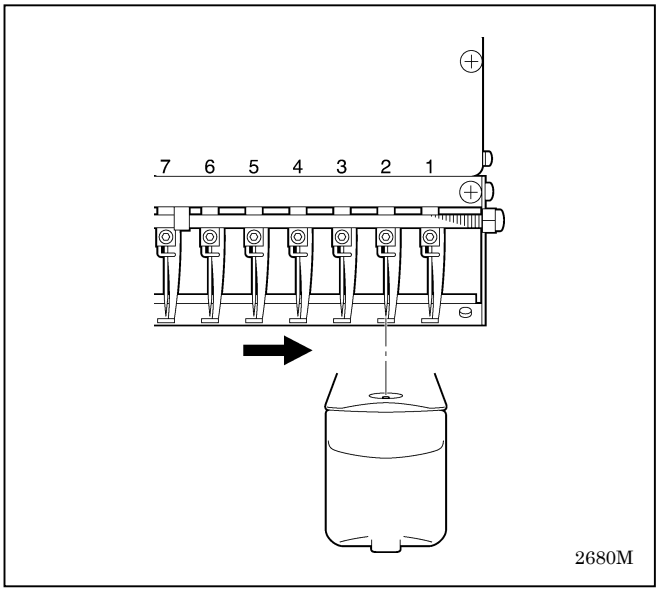
5. Remove the bridge cover between the heads No. 1 and No. 2 on the backside of bridge, and then pull down the bridge.
   Disconnect required ones of connectors (10) on the back of head PCB with a mark corresponding to the selected change color sensors A, B, C or D.

   CAUTION

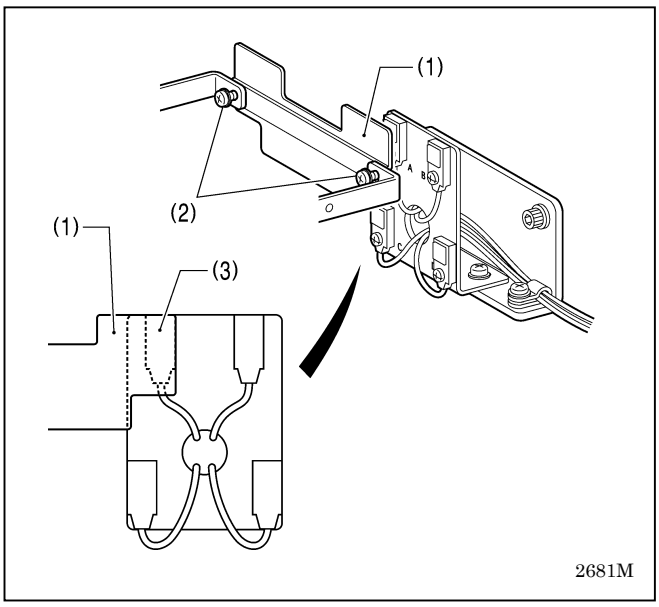
   The change color sensors A to D have all the same components.
   Be sure to reconnect those connectors properly when they are detached.

[How to mount]

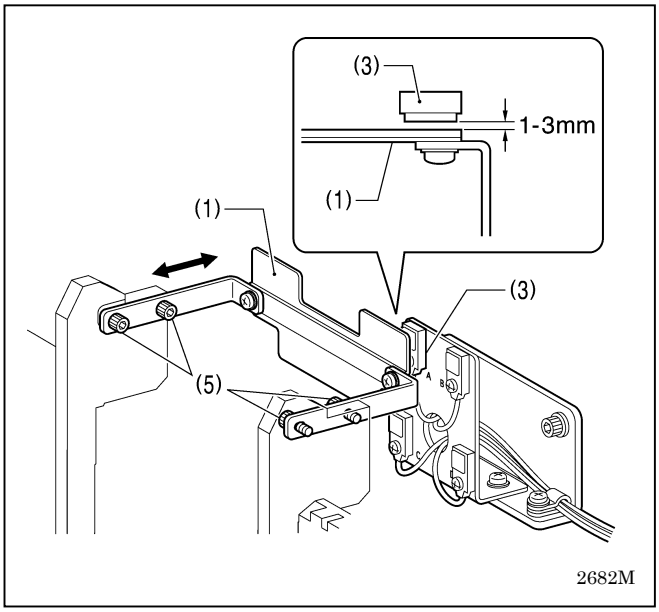
To mount pieces, follow the reverse procedure to the disassembly. Key points in the mounting are described below.



1. Select the needle bar number 2.



2. Loosen 2 set screws (2) of sensor dog (1).
3. Locate sensor dog (1) to be faced change color sensor A (3) indicated in the drawing.

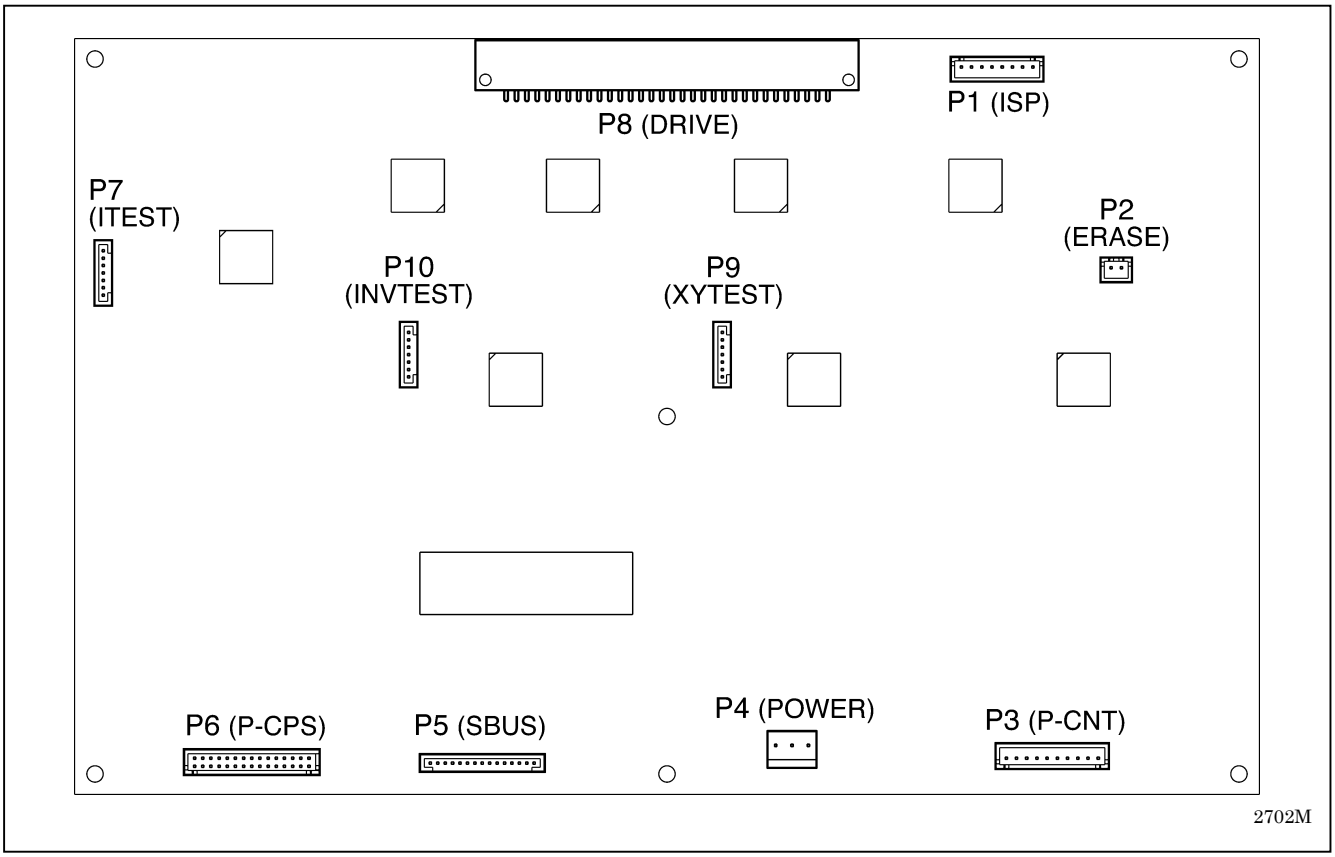


4. Check if the clearance between sensor dog (1) and change color sensor A (3) stays within 1 to 3 mm.

   This clearance gap should not change during this adjustment with replacement. If the clearance gap does not conform, loosen 4 set screws (5) in total on change color dog stay (4) to readjust its location.

12. Description of connectors

12-1. Main PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	ISP	1	+5V	DC 5 V Input	Disconnected	
		2	GND	GND		
		3	TCA	Flash writing signal		
		4	GND	GND		
		5	TDO	Flash writing signal		
		6	TMS	Flash writing signal		
		7	TDI1	Flash writing signal		
		8				
P2	ERASE	1	ELS	ERASE signal	Disconnected	
		2	GND	GND		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P3	P-CNT	1	P24V1	AC 24 V input	Power supply PCB P3	“Power PCB error”
		2	P24V2	AC 24 V input		
		3	PERR	DC 40 V overcurrent warning signal input		
		4	PWOFF	DC 40 V output control signal output		
		5	VOLT	Voltage input proportional to AC 18 V		
		6	0V	GND		
		7	FAN	Power supply PCB cooling fan interruption error signal input		
		8	TP200	Signal input with feeding of AC 200 V		
		9	TP220	Signal input with feeding of AC 220 V		
		10	TP230	Signal input with feeding of AC 230 V		
		11	TP240	Signal input with feeding of AC 240 V		
P4	POWER	1	+5V	DC 5 V Input	Power supply PCB P20	The sewing machine cannot be started
		2				
		3	5RET	DC 5 V GND		
P5	SBUS	1	SCKO	SBUS communication signal	SBUS PCB P4	Faulty communication with PC
		2	SCKI	SBUS communication signal	(Only for PC-type models)	
		3	TXD	SBUS communication signal		
		4	DATA	SBUS communication signal		
		5	SACK	SBUS communication signal		
		6	SREQ	SBUS communication signal		
		7	S/R	SBUS communication signal		
		8	REQE	SBUS communication signal		
		9	GND	GND		
		10	SBUS	SBUS communication signal		
		11	MSD	SBUS communication signal		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		12	PSEL	SBUS communication signal		
		13	PSD	SBUS communication signal		
		14	PSCK	SBUS communication signal		
		15	/STOP	PC panel STOP SW input signal		
P6	P-CPS	1	RXD	SA panel communication signal	Power supply PCB P10	The sewing machine cannot be started
		2	CTS	SA panel communication signal		
		3	DSR	SA panel communication signal		
		4	TXD	SA panel communication signal		
		5	RTS	SA panel communication signal		
		6	DTR	SA panel communication signal		
		7	0V	GND		
		8	JUMP_A	Jump motor A phase output signal		
		9	JUMP_B	Jump motor B phase output signal		
		10	HRXD	Head PCB communication signal		
		11	HTXD	Head PCB communication signal		
		12	HSCK	Head PCB communication signal		
		13	IRXD	I/O PCB communication signal		
		14	ITXD	I/O PCB communication signal		
		15	ISCK	I/O PCB communication signal		
		16	0V	GND		
		17	+24V	DC 24 V output		
		18	A	Encoder A phase signal		
		19	B	Encoder B phase signal		
		20	NLUP	Needle up signal		
		21	TYPE0	Model identifier signal 0		
		22	TYPE1	Model identifier signal 1		
		23	TYPE2	Model identifier signal 2		
		24	TYPE3	Model identifier signal 3		

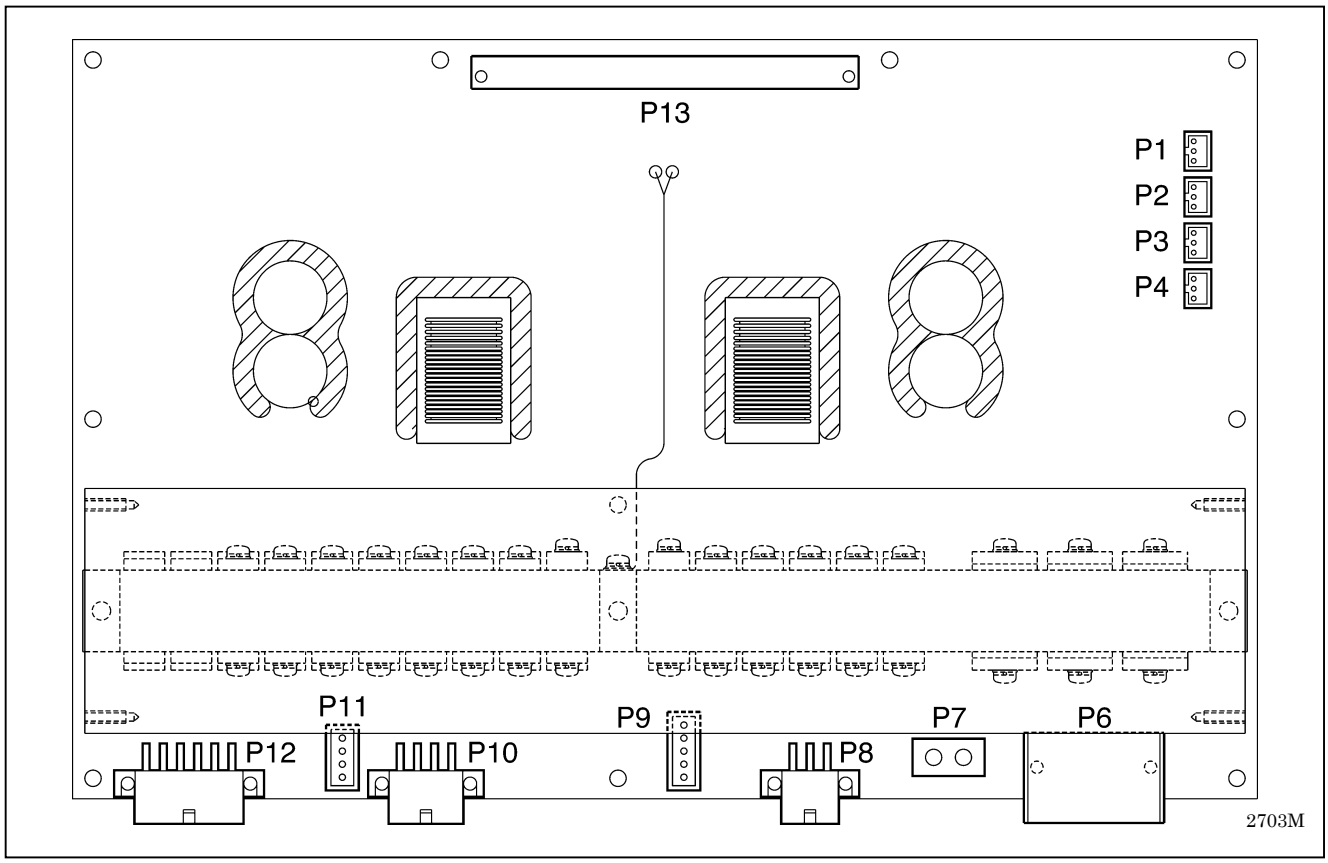
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		25	TYPE4	Model identifier signal 4		
		26	TYPE5	Model identifier signal 5		
		27	TYPE6	Model identifier signal 6		
		28	0V	GND		
		29	PICKER	Picker output signal		
		30	0V	GND		
P7	ITEST	1	+5V	DC 5 V Input	Disconnected	
		2	0V	GND		
		3	**	I/F CPU test input signal		
		4	**	I/F CPU test input signal		
		5	**	I/F CPU test input signal		
		6	**	I/F CPU test input signal		
		7	**	I/F CPU test input signal		
P8	DRIVE	1	FAN 1	FAN 1 input signal	Drive PCB P13	PCB direct connection
		2	GND	GND		
		3	FAN2	FAN 2 input signal		
		4	GND	GND		
		5	SAFE	Safety sensor output signal		
		6	GND	GND		
		7	VINV	Main shaft motor output signal		
		8	POA	Main shaft motor W phase output signal		
		9	POB	Main shaft motor V phase output signal		
		10	POC	Main shaft motor U phase output signal		
		11	NEA	Main shaft motor W phase output signal		
		12	NEB	Main shaft motor V phase output signal		
		13	NEC	Main shaft motor U phase output signal		
		14	GND	GND		
		15	DRIVE 10	X motor 1&2 connection signal		
		16	GND	GND		
		17	TEMP	Thermistor input signal		
		18	GND	GND		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		19	POUT	Output signal to auxiliary power supply		
		20	POUT	Output signal to auxiliary power supply		
		21	VY	Y motor output signal		
		22	YAPO	Y motor A phase output signal		
		23	YBPO	Y motor B phase output signal		
		24	YCPO	Y motor C phase output signal		
		25	YDPO	Y motor D phase output signal		
		26	YEPO	Y motor E phase output signal		
		27	YANO	Y motor A phase output signal		
		28	YBNO	Y motor B phase output signal		
		29	YCNO	Y motor C phase output signal		
		30	YDNO	Y motor D phase output signal		
		31	YENO	Y motor E phase output signal		
		32	+5V	DC 5 V output		
		33	RIY	Y motor input signal		
		34	+5V	DC 5 V output		
		35	RIX	X motor input signal		
		36	VX	X motor output signal		
		37	XAPO	X motor A phase output signal		
		38	XBPO	X motor B phase output signal		
		39	XCPO	X motor C phase output signal		
		40	XDPO	X motor D phase output signal		
		41	XEPO	X motor E phase output signal		
		42	XANO	X motor A phase output signal		
		43	XBNO	X motor B phase output signal		
		44	XCNO	X motor C phase output signal		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		45	XDNO	X motor D phase output signal		
		46	XENO	X motor E phase output signal		
		47				
		48				
		49	VI	Change color motor output signal		
		50	IAPO	Change color motor A phase output signal +		
		51	IANO	Change color motor A phase output signal -		
		52	IBPO	Change color motor B phase output signal +		
		53	IBNO	Change color motor B phase output signal -		
		54	IOVCI	Change color motor overcurrent input signal		
		55	GND	GND		
		56	TOVCI	Change color motor overcurrent input signal		
		57	GND	GND		
		58	VT	Thread trimmer motor A phase output signal		
		59	TAPO	Thread trimmer motor A phase output signal +		
		60	TANO	Thread trimmer motor A phase output signal -		
		61	TBPO	Thread trimmer motor B phase output signal +		
		62	TBNO	Thread trimmer motor B phase output signal -		
		63				
		64				
P9	XYTEST	1	+5V	DC 5 V input	Disconnected	
		2	0V	GND		
		3	**	XY CPU test input signal		
		4	**	XY CPU test input signal		
		5	**	XY CPU test input signal		
		6	**	XY CPU test input signal		
		7	**	XY CPU test input signal		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P10		1	+5V	DC5V input	Disconnected	
		2	0V	GND		
		3	**	Main shaft CPU test input signal		
		4	**	Main shaft CPU test input signal		
		5	**	Main shaft CPU test input signal		
		6	**	Main shaft CPU test input signal		
		7	**	Main shaft CPU test input signal		

12-2. Drive PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	P24V	1	+24V	DC 24 V input	Power supply PCB P24	“X-axis stepping motor connector error”
		2				
		3	24RET	DC 24 V GND		
P2	SAFE	1	+24V	DC 24 V output	Sensorless harness or BEAM sensor	Malfunction of BEAM sensor detection
		2	SAFE	Safety sensor input signal	(Optional)	
		3	24RET	DC 24 V GND		
P3	FAN2	1	+24V	DC 24 V output	Box exhaust fan	“Exhaust fan motor stop”
		2	FAN2	FAN2 output signal		
		3	24RET	DC 24 V GND		
P4	FAN1	1	+24V	DC 24 V output	Drive PCB fan	“Exhaust fan motor stop”
		2	FAN1	FAN1 output signal		
		3	24RET	DC 24 V GND		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
* P6	UVW	1	W	Main shaft motor W phase output signal	Main shaft motor	“Main (Z) motor lock”
		2	V	Main shaft motor V phase output signal		
		3	U	Main shaft motor U phase output signal		
		4				
		5	FG	GND		
P7	P300V	1	+300V	DC 300 V input	Power supply PCB P18	“Tread trimming motor origin point error”
		2	300RET	DC 300 V GND		
* P8	Y-MOTOR	1	YA	Y motor A phase output signal	Y-axis motor	“Y-axis home position error”
		2				
		3	YE	Y motor E phase output signal		Abnormal noise in Y-axis motor
		4	YB	Y motor B phase output signal		
		5	YC	Y motor C phase output signal		
		6	YD	Y motor D phase output signal		
P9	P140V	1	+140V	DC 140 V input	Power supply PCB P14	“X-axis home position error”
		2	+140V	DC 140 V input		
		3				
		4	140RET	DC 140 V GND		
		5	140RET	DC 140 V GND		
* P10	X-MOTOR	1	XE	X motor E phase output signal	X-axis motor	“X-axis stepping motor
		2	VSENS	X motor 1&2 connection signal		connector error”
		3				
		4	XA	X motor A phase output signal		Abnormal noise in X-axis motor
		5	XD	X motor D phase output signal		
		6	24RET	DC 24 V GND		
		7	XC	X motor C phase output signal		
		8	XB	X motor B phase output signal		

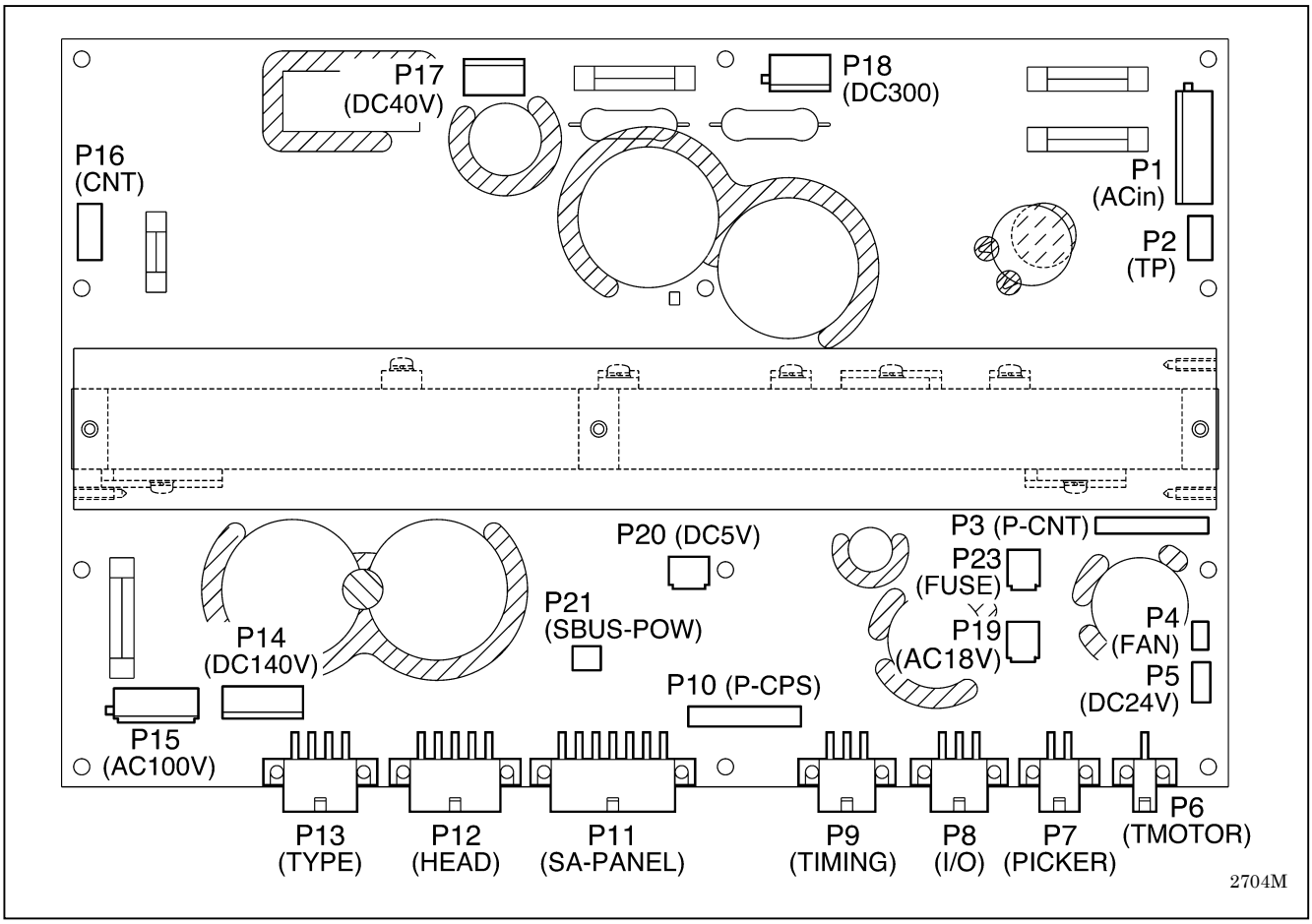
Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P11	P40V	1	+40V	DC 40 V input	Power supply PCB P17	“Tread trimming motor origin point error”
		2	+40V	DC 40 V input		
		3	40RET	DC 40 V GND		
		4	40RET	DC 40 V GND		
* P12	T/I-MOTOR	1	T-AP	Thread trimming motor A phase output signal +	Thread trimming motor	“Tread trimming motor origin point error”
		2	+40V	DC 40 V output		
		3	T-AN	Thread trimming motor A phase output signal -		“Needle bar case lock”
		4	I-AP	Change color motor A phase output signal +	Change color motor	
		5	+40V	DC 40 V output		
		6	I-AN	Change color motor A phase output signal -		
		7	T-BP	Thread trimming motor B phase output signal +	Thread trimming motor	
		8	+40V	DC 40 V output		
		9	T-BN	Thread trimming motor B phase output signal -		
		10	I-BP	Change color motor B phase output signal +	Change color motor	
		11	+40V	DC 40 V output		
		12	I-BN	Change color motor B phase output signal -		
P13	DRIVE	1	FAN1	FAN1 input signal	Main PCB P8	PCB direct connection
		2	GND	GND		
		3	FAN2	FAN2 input signal		
		4	GND	GND		
		5	SAFE	Safety sensor output signal		
		6	GND	GND		
		7	VINV	Main shaft motor input signal		
		8	POA	Main shaft motor W phase input signal +		
		9	POB	Main shaft motor V phase input signal +		
		10	POC	Main shaft motor U phase input signal +		
		11	NEA	Main shaft motor W phase input signal -		
		12	NEB	Main shaft motor V phase input signal -		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		13	NEC	Main shaft motor U phase input signal -		
		14	GND	GND		
		15	DRIVE10	X motor 1&2 connection signal		
		16	GND	GND		
		17	TEMP	Thermistor output		
		18	GND	GND		
		19	POUT	Input signal to auxiliary power supply		
		20	POUT	Input signal to auxiliary power supply		
		21	VY	Y motor input signal		
		22	YAPO	Y motor A phase input signal +		
		23	YBPO	Y motor B phase input signal +		
		24	YCPO	Y motor C phase input signal +		
		25	YDPO	Y motor D phase input signal +		
		26	YEPO	Y motor E phase input signal +		
		27	YANO	Y motor A phase input signal -		
		28	YBNO	Y motor B phase input signal -		
		29	YCNO	Y motor C phase input signal -		
		30	YDNO	Y motor D phase input signal -		
		31	YENO	Y motor E phase input signal -		
		32	+5V	DC 5 V input		
		33	RIY	Y motor output signal		
		34	+5V	DC 5 V input		
		35	RIX	X motor input signal		
		36	VX	X motor input signal		
		37	XAPO	X motor A phase input signal +		
		38	XBPO	X motor B phase input signal +		
		39	XCPO	X motor C phase input signal +		
		40	XDPO	X motor D phase input signal +		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		41	XEPO	X motor E phase input signal +		
		42	XANO	X motor A phase input signal -		
		43	XBNO	X motor B phase input signal -		
		44	XCNO	X motor C phase input signal -		
		45	XDNO	X motor D phase input signal -		
		46	XENO	X motor E phase input signal -		
		47				
		48				
		49	VI	Change color motor input signal		
		50	IAPO	Change color motor A phase input signal +		
		51	IANO	Change color motor A phase input signal -		
		52	IBPO	Change color motor A phase input signal +		
		53	IBNO	Change color motor A phase input signal -		
		54	IOVCI	Change color motor overcurrent output signal		
		55	GND	GND		
		56	TOVCI	Thread trimming motor overcurrent output signal		
		57	GND	GND		
		58	VT	Thread trimming motor input signal		
		59	TAPO	Thread trimming motor A phase input signal +		
		60	TANO	Thread trimming motor A phase input signal -		
		61	TBPO	Thread trimming motor B phase input signal +		
		62	TBNO	Thread trimming motor B phase input signal -		
		63				
		64				

*: Connectors on the right side of the control box which are connected directly to external devices.

12-3. Power supply PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	ACin	1	AC200	AC 200 V to 240 V power input	Large transformer	“Tread trimming motor origin point error”
		2	AC200	AC 200 V to 240 V power input		
		3				
		4	FG	Ground		
P2	TP	1	240V	Power input (Tap signal)	Contactor	“Error D9”
		2	230V	Power input (Tap signal)		
		3	220V	Power input (Tap signal)		
		4	200V	Power input (Tap signal)		
		5				
		6	PG	Power input		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P3	P-CNT	1	P24V1	AC 24 V output	Main PCB P3	“Power PCB error”
		2	P24V2	AC 24 V output		
		3	PERR	DC 40 V overcurrent warning signal output		
		4	PWOFF	DC 40 V output control signal input		
		5	VOLT	Voltage output proportional to AC 18 V		
		6	0V	GND		
		7	FAN	Power supply PCB cooling fan interruption error signal output		
		8	TP200	Signal output with feeding of AC 200 V		
		9	TP220	Signal output with feeding of AC 220 V		
		10	TP230	Signal output with feeding of AC 230 V		
		11	TP240	Signal output with feeding of AC 240 V		
P4	FAN	1	+24V	DC 24 V output	Power supply PCB fan	“Exhaust fan motor stop”
		2	FAN	FAN input		
		3	24RET	DC 24 V GND		
P5	DC 24 V	1	+24V	DC 24 V output	Drive PCB P1	“X-axis stepping motor connector error”
		2				
		3	24RET	DC 24 V GND		
* P6	TMOTOR	1	+24V	DC 24 V output	Lower thread winding motor (Optional)	Lower thread winding motor malfunction
		2	24RET	DC 24 V GND		
* P7	PICKER	1	+24V	DC 24 V output	Picker PCB P1	Picker malfunction
		2	PICKER	Picker output signal		
		3	24RET	DC 24 V GND		
		4				
*P8	I/O	1	+24V	DC 24 V output	I/O PCB (Right side of the sewing machine)	“Head CPU communication error”
		2	ISCK	I/O PCB communication signal	P5	
		3	ITXD	I/O PCB communication signal		
		4	IRXD	I/O PCB communication signal		
		5	+24V	DC 24 V output		
		6	24RET	DC 24 V GND		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
* P9	TIMING	1	24RET	DC 24 V GND	Relay PCB P3	“Main (Z) motor lock”
		2	B	Encoder B phase signal input		“Needle stop position error”
		3	NLUP	Needle up signal input		“XY CPU communication error”
		4	A	Encoder A phase signal input		The main shaft does not accelerate after the start of sewing
		5	+24V	DC 24 V output		
		6				
P10	P-CPS	1	RXD	SA panel communication signal	Main PCB P6	The sewing machine cannot be started
		2	CTS	SA panel communication signal		
		3	DSR	SA panel communication signal		
		4	TXD	SA panel communication signal		
		5	RTS	SA panel communication signal		
		6	DTR	SA panel communication signal		
		7	0V	GND		
		8	JUMP_A	Jump motor A phase input signal		
		9	JUMP_B	Jump motor B phase input signal		
		10	HRXD	Head PCB communication signal		
		11	HTXD	Head PCB communication signal		
		12	HSCK	Head PCB communication signal		
		13	IRXD	I/O PCB communication signal		
		14	ITXD	I/O PCB communication signal		
		15	ISCK	I/O PCB communication signal		
		16	0V	GND		
		17	+24V	DC 24 V output		
		18	A	Encoder A phase signal input		
		19	B	Encoder B phase signal input		
		20	NLUP	Needle up signal output		
		21	TYPE0	Model identifier signal 0		

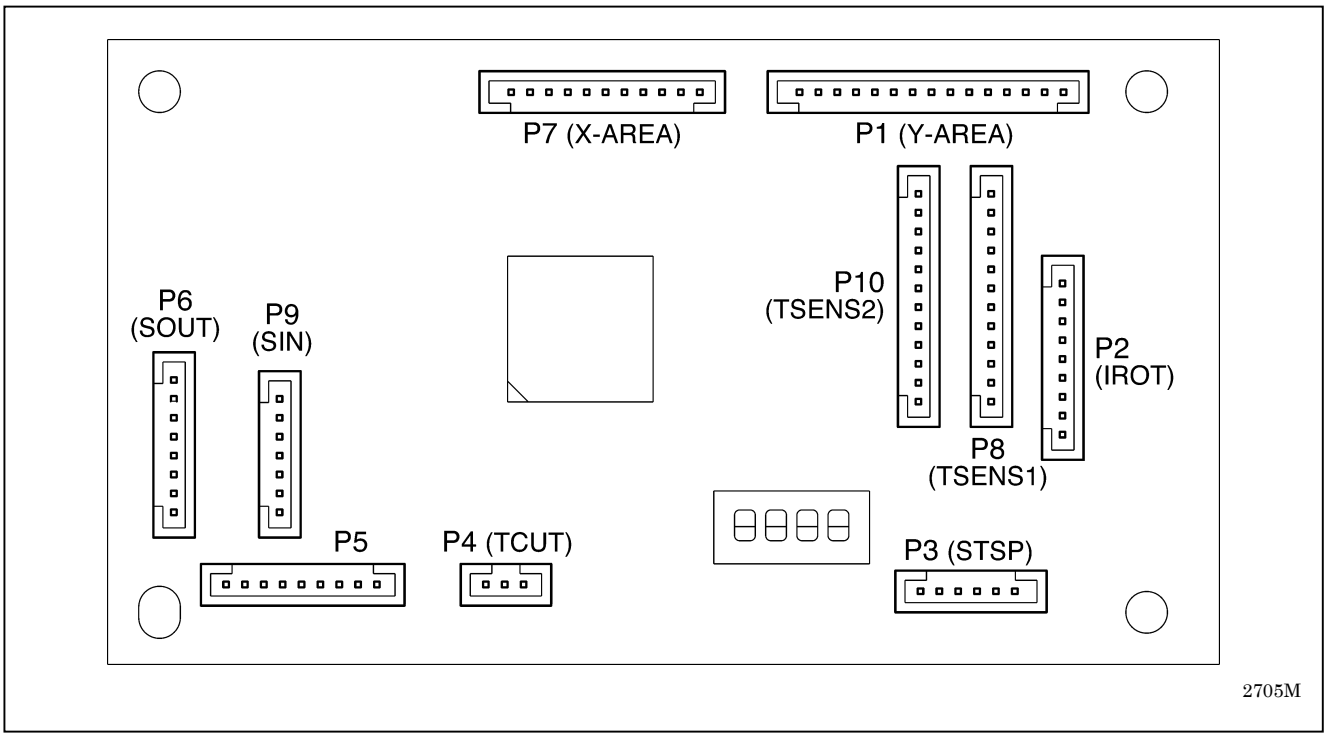
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		22	TYPE1	Model identifier signal 1		
		23	TYPE2	Model identifier signal 2		
		24	TYPE3	Model identifier signal 3		
		25	TYPE4	Model identifier signal 4		
		26	TYPE5	Model identifier signal 5		
		27	TYPE6	Model identifier signal 6		
		28	0V	GND		
		29	PICKER	Picker input signal		
		30	0V	GND		
* P11	SA-PANEL	1	RXD	SA panel communication signal	SA panel (Only for SA-type models)	The sewing machine cannot be started
		2	CTS	SA panel communication signal		
		3	DSR	SA panel communication signal		
		4	TXD	SA panel communication signal		
		5	RTS	SA panel communication signal		
		6	DTR	SA panel communication signal		
		7	0V	GND		
		8	FG	Ground		
		9	+5V	DC 5 V output		
		10	+5V	DC 5 V output		
		11	5RET	DC 5 V GND		
		12	5RET	DC 5 V GND		
		13	+24V	DC 24 V output		
		14	24RET	DC 24 V GND		
* P12	HEAD	1	+24V	DC 24 V output	Head PCB (for No. 1 and 2)	“Head CPU communication error”
		2	HSCK	Head PCB communication signal	P4	
		3	HTXD	Head PCB communication signal		
		4	HRXD	Head PCB communication signal		
		5	JUMP_A	Jump motor A phase output signal		
		6	JUMP_B	Jump motor B phase output signal		
		7	+40V	DC 40 V output	Head PCB P10	
		8	40RET	DC 40 V GND		
		9	+24V	DC 24 V output		
		10	24RET	DC 24 V GND		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
* P13	TYPE	1	TYPE0	Model identifier signal	Model identifier harness	“Cannot specify model.”
		2	TYPE1	Model identifier signal		
		3	TYPE2	Model identifier signal		
		4	TYPE3	Model identifier signal		
		5	TYPE4	Model identifier signal		
		6	TYPE5	Model identifier signal		
		7	TYPE6	Model identifier signal		
		8	0V	GND		
P14	DC140V	1	+140V	DC 140 V output	Drive PCB P9	“X-axis stepping motor connector error”
		2	+140V	DC 140 V output		
		3				
		4	140RET	DC 140 V GND		
		5	140RET	DC 140 V GND		
P15	AC100V	1	AC100	AC 100 V power input	Large transformer	“X-axis stepping motor connector error”
		2				
		3	AC100	AC 100 V power input		
P16	CNT	1	AC18	AC 18 V power input (Compact transformer)	Compact transformer	The power cannot be turned on
		2	AC18	AC 18 V power input (Compact transformer)		
		3				
		4	+24V	DC 24 V output (for contactors)	Contactor	
		5	24RET	DC 24 V output (for contactors)		
P17	DC 40 V	1	+40V	DC 40 V output	drive PCB P11	“Tread trimming motor origin point error”
		2	+40V	DC 40 V output		
		3	40RET	DC 40 V GND		
		4	40RET	DC 40 V GND		
P18	DC300	1	+300V	DC 300 V output	drive PCB P7	“Main (Z) motor lock”
		2	300RET	DC 300 V GND		
P19	AC18V	1	AC18	AC 18 V power input (Large transformer)	Large transformer	The power cannot be turned on
		2	AC18	AC 18 V power input (Large transformer)		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P20	DC 5 V	1 2 3	+5V 5RET	DC 5 V output DC 5 V GND	main PCB P4	The sewing machine cannot be started
P21	SBUS-POW	1 2	+5V 5RET	DC 5 V output DC 5 V GND	SBUS PCB P5 (Only for PC-type models)	Faulty communication with PC
P23	FUSE	1 2		Fuse (AC 18 V)	Fuse holder (F4) (Right side of the box)	The power cannot be turned on

*: Connectors on the right side of the control box which are connected directly to external devices.

12-4. IO PCB



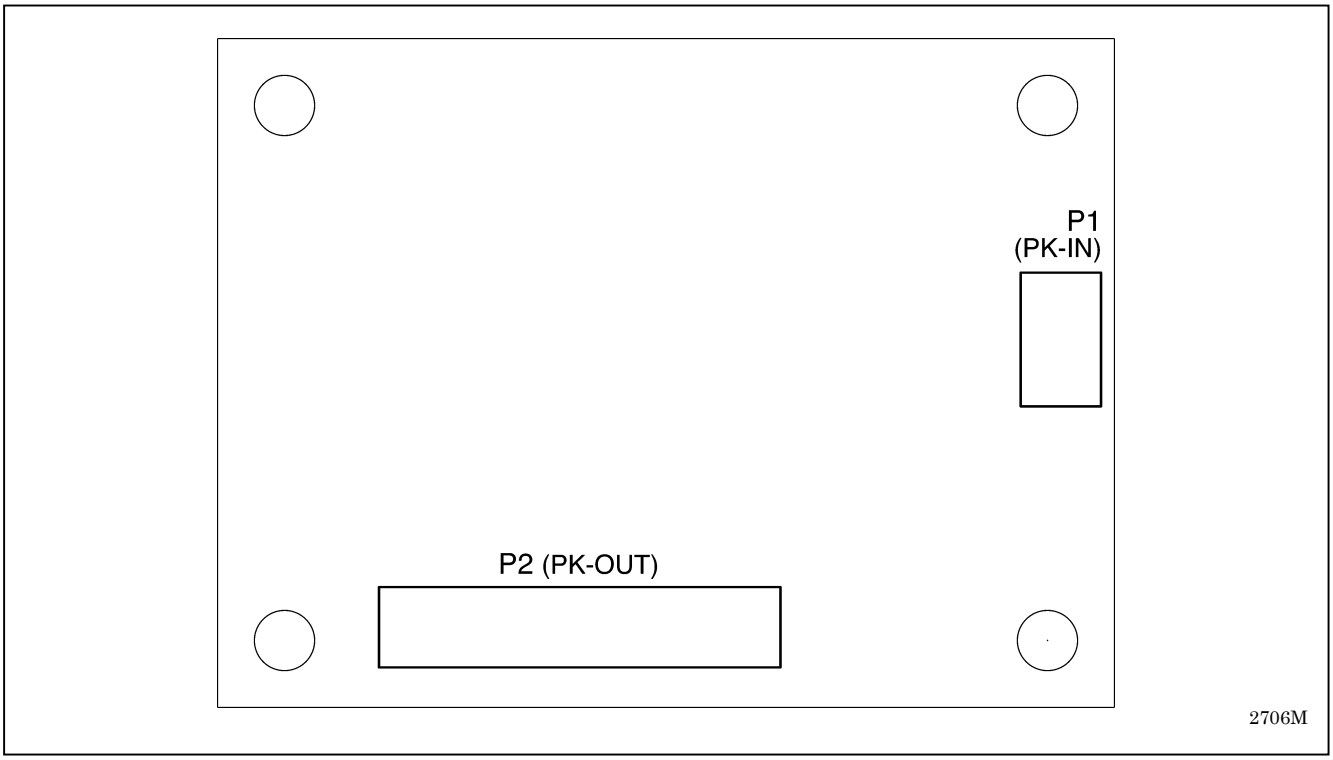
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	Y-AREA	1	+24V	DC 24 V output	When used on the side face,	“Thread trimming motor origin point error”
		2	YPOS	Cap frame Y origin input signal	Y carriage origin point sensor	
		3	GND	DC 24 V GND	Thread trimming motor origin point sensor	When detecting the origin of the carriage, Y carriage hits the rear
		4	+24V	DC 24 V output		
		5	YF-	Square frame Y origin input signal		
		6	GND	DC 24 V GND	Disconnected when used between the heads	
		7	+24V	DC 24 V output		
		8	YF+	Thread trimming motor origin point input signal		
		9	GND	DC 24 V GND		
		10	+24V	DC 24 V output		
		11	YC-	Not in use		
		12	GND	DC 24 V GND		
		13	+24V	DC 24 V output		
		14	YC+	Not in use		
		15	GND	DC 24 V GND		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P2	IROT	1	+5V	DC 5 V output	When used on the side face of the sewing machine, change color sensor	“Needle No. reading error”
		2	IROT0	Needle bar case position sensor 0 signal		
		3	IROT1	Needle bar case position sensor 1 signal		
		4	IROT2	Needle bar case position sensor 2 signal	Disconnected when used between the heads	
		5	IROT3	Needle bar case position sensor 3 signal		
		6	IROT4	Needle bar case position sensor 4 signal		
		7	ISENS	Needle bar case position neutral proximity sensor signal		
		8	GND	DC 5 V GND		
		9	+24V	DC 24 V output		
P3	STSP	1	FWD	Forward SW input signal	Disconnected when used on the side face of the sewing machine	“Release stop SW to operate!”
		2	BACK	Back SW input signal		
		3	GND	DC 24 V GND	When used between the heads,	Malfunction of step SW
		4	ST	START SW input signal	START/STOP SW	
		5	SP	STOP SW input signal	Step SW PCB P1	
		6	GND	DC 24 V GND		
P4	TCUT	1	+24V	DC 24 V output	When used on the side face of the sewing machine,	The frame selector is fixed to the cap frame
		2	TCUT	Frame selector input signal	Frame selector SW (Only for PC-type models)	
		3	GND	DC 24 V GND		
					Disconnected when used between the heads	
P5				Connector dedicated to program recording	Disconnected	

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P6	SOUT	1	+24V	DC 24 V output	Head-head I/O PCB adjoining on the left P5	“Head I/O CPU communication error”
		2	SCKIN	I/O PCB communication signal		
		3	RXDIN	I/O PCB communication signal	When used in the left end of the sewing machine,	
		4	TXDIN	I/O PCB communication signal	Terminal harness	
		5	+24V	DC 24 V output		
		6	GND	DC 24 V GND		
		7	GND	DC 24 V GND		
		8	NC			
P7	X-AREA	1	+24V	DC 24 V output	X carriage origin point sensor	When detecting the origin of the carriage, X carriage hits the left side
		2	XPOS	X origin input signal		
		3	+24V	DC 24 V output		
		4	XF-	Not in use		
		5	+24V	DC 24 V output		
		6	XF+	Not in use		
		7	+24V	DC 24 V output		
		8	XC-	Not in use		
		9	+24V	DC 24 V output		
		10	XC+	Not in use		
		11	GND	DC 24 V GND		
P8	TSENS1	1	+5V	DC 5 V output	Disconnected when used on the side face of the sewing machine	Head LED does not illuminate
		2	TBRK1	Thread breakage sensor 1 input signal		
		3	LEDR1	Red LED lamp 1		The head cannot be designated as a suspended head
		4	LEDG1	Green LED lamp 1	When used between the heads,	
		5	ISEL0	Thread breakage sensor selective output signal	Tension bracket PCB P11	Malfunction of mending
		6	ISEL1	Thread breakage sensor selective output signal	(For heads with odd numbers)	
		7	ISEL2	Thread breakage sensor selective output signal		Misdiagnosis in thread breakage detection

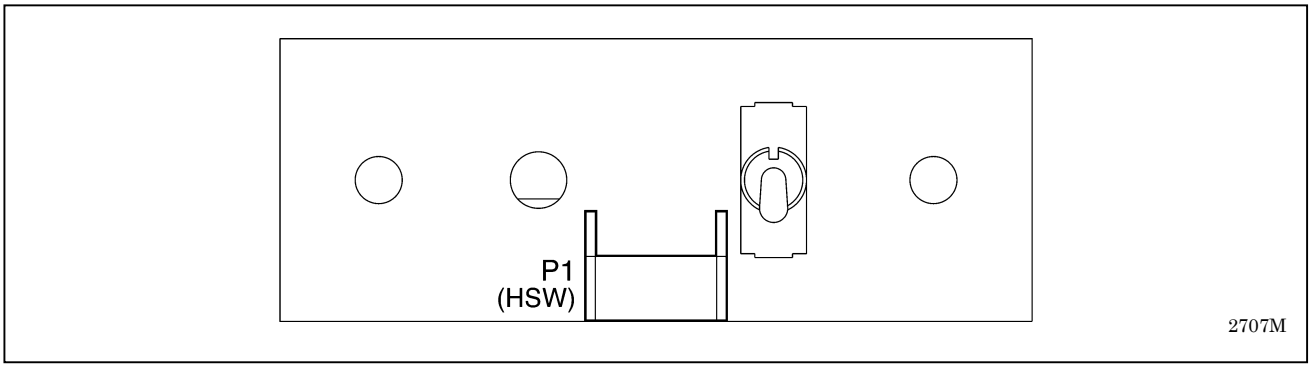
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		8	ISEL3	Thread breakage sensor selective output signal		
		9	ISEL4	Thread breakage sensor selective output signal		
		10	HSW1	Head SW 1		
		11	MSW1	Mending SW1		
		12	GND	DC 5 V GND		
P9	SIN	1	+24V	DC 24 V output	When used on the left side of the sewing machine,	“Head I/O CPU communication error”
		2	SCKOUT	I/O PCB communication signal	Power supply PCB P8	
		3	RXDOUT	I/O PCB communication signal	(I/O on the left side of the box)	
		4	TXDOUT	I/O PCB communication signal		
		5	+24V	DC 24 V output	When used between the heads,	
		6	GND	DC 24 V GND	I/O PCB adjoining on the right P6	
		7	GND	DC 24 V GND		
P10	TSENS2	1	+5V	DC 5 V output	Disconnected when used on the left side of the sewing machine	Head LED does not illuminate
		2	TBRK2	Thread breakage sensor 2 input signal		
		3	LEDR2	Red LED lamp 2 output		The head cannot be designated as a suspended head
		4	LEDG2	Green LED lamp 2 output	When used between the heads,	
		5	ISEL0	Thread breakage sensor selective output signal	Tension bracket PCB P11	Malfunction of mending
		6	ISEL1	Thread breakage sensor selective output signal	(For heads with even numbers)	
		7	ISEL2	Thread breakage sensor selective output signal		Misdiagnosis in thread breakage detection
		8	ISEL3	Thread breakage sensor selective output signal		
		9	ISEL4	Thread breakage sensor selective output signal		
		10	HSW2	Head SW 2 input		
		11	MSW2	Mending SW 2 input		
		12	GND	DC 5 V GND		

12-5. Picker PCB



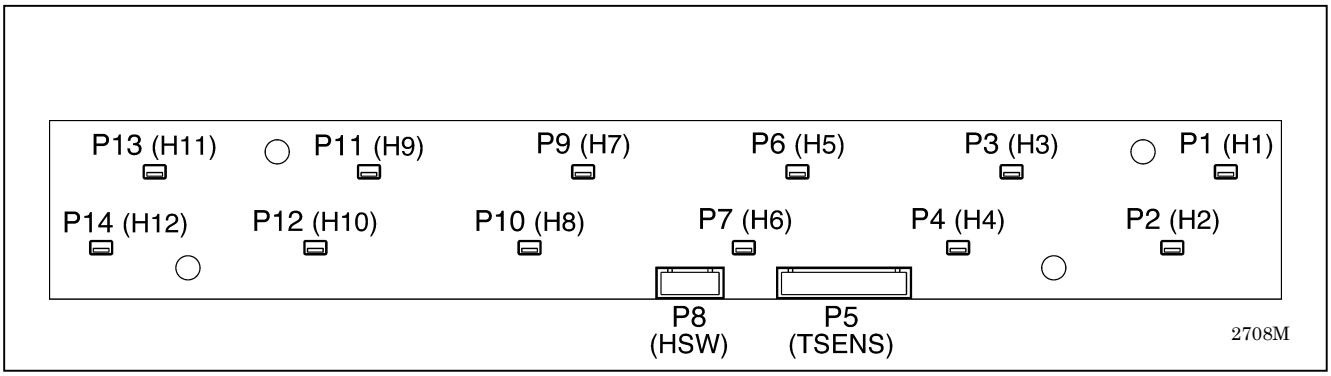
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	PK-IN	1	+24V	DC 24 V output	Power supply PCB P7	Malfunction of picker
		2	PICKER	Picker input signal	(Picker on the left side of the box)	
		3	GND	DC 24 V GND		
P2	PK-OUT	1	P1+	Picker 1 solenoid power supply	Picker solenoid (No. 1 head)	Malfunction of picker
		2	P1-			
		3	P2+	Picker 2 solenoid power supply	Picker solenoid (No. 2 head)	
		4	P2-			
		5	P3+	Picker 3 solenoid power supply	Picker solenoid (No. 3 head)	
		6	P3-			
		7	P4+	Picker 4 solenoid power supply	Picker solenoid (No. 4 head)	
		8	P4-			
		9	P5+	Picker 5 solenoid power supply	Picker solenoid (No. 5 head)	
		10	P5-			
		11	P6+	Picker 6 solenoid power supply	Picker solenoid (No. 6 head)	
		12	P6-			

12-6. Head switch PCB



Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	HSW	1	LEDR	Red LED lamp input	Tension bracket PCB P8	Head SW and mending SW do not work
		2	LEDG	Green LED lamp input		Head LED does not illuminate
		3	HSW	Head SW output		
		4	MSW	Mending SW output		
		5	0V	GND		

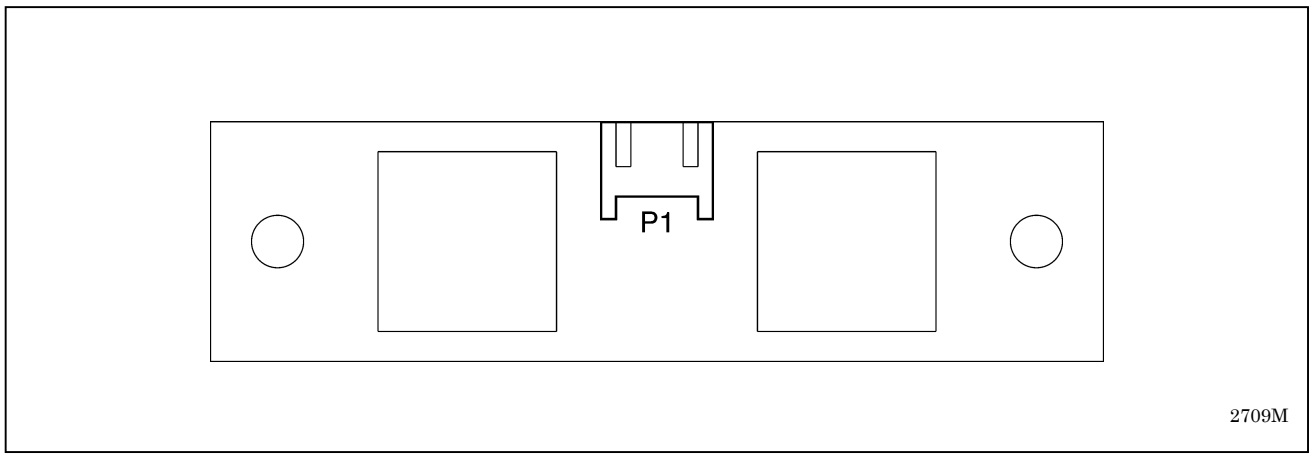
12-7. Tension base PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	H1	1	0V	DC 5 V GND	Thread stud base assy set	Misdiagnosis in thread breakage detection
P2	H2	2	5V	DC 5 V output		
P3	H3	3	OUT1	Thread breakage detection input signal		
P4	H4	4	OUT2	Thread breakage detection input signal		
P6	H5	5	0V	DC 5 V GND		
P7	H6	6	0V	DC 5 V GND		
P9	H7					
P10	H8					
P11	H9					
P12	H10					
P13	H11					
P14	H12					
P5	TSENS	1	5V	DC 5 V input	For heads with odd numbers	Head LED does not illuminate
		2	TBRK	Thread breakage sensor output signal	I/O PCB P8	
		3	LEDR	Red LED lamp input		The head cannot be designated as a suspended head
		4	LEDG	Green LED lamp input	For heads with even numbers	
		5	ISEL0	Thread breakage sensor selective input signal	I/O PCB P10	Malfunction of mending
		6	ISEL1	Thread breakage sensor selective input signal		
		7	ISEL2	Thread breakage sensor selective input signal		Misdiagnosis in thread breakage detection
		8	ISEL3	Thread breakage sensor selective input signal		
		9	HSW	Head SW output		

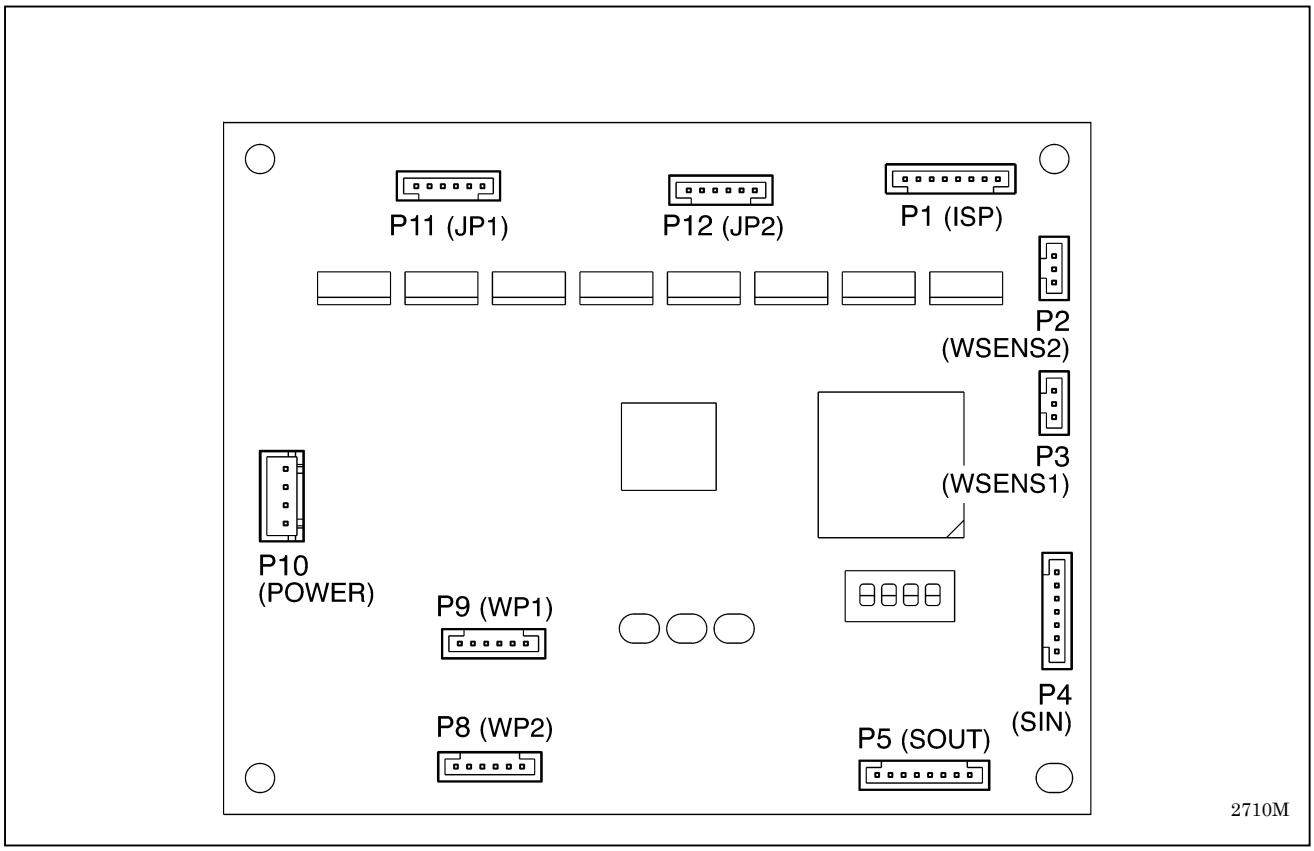
Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
		10	MSW	Mending SW output		
		11	0V	DC 5 V GND		
P8	HSW	1	LEDR	Red LED lamp output	Head switch PCB P1	Head SW and mending SW do not work
		2	LEDG	Green LED lamp output		Head LED does not illuminate
		3	HSW	Head SW input		
		4	MSW	Mending SW input		
		5	0V	GND		

12-8. Step switch PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1		1	FSW	Forward SW output signal	I/O PCB P3	Head-head step back / forward SW does not work
		2	BSW	Back SW output signal		
		3	GND	DC 5 V GND		

12-9. Head PCB

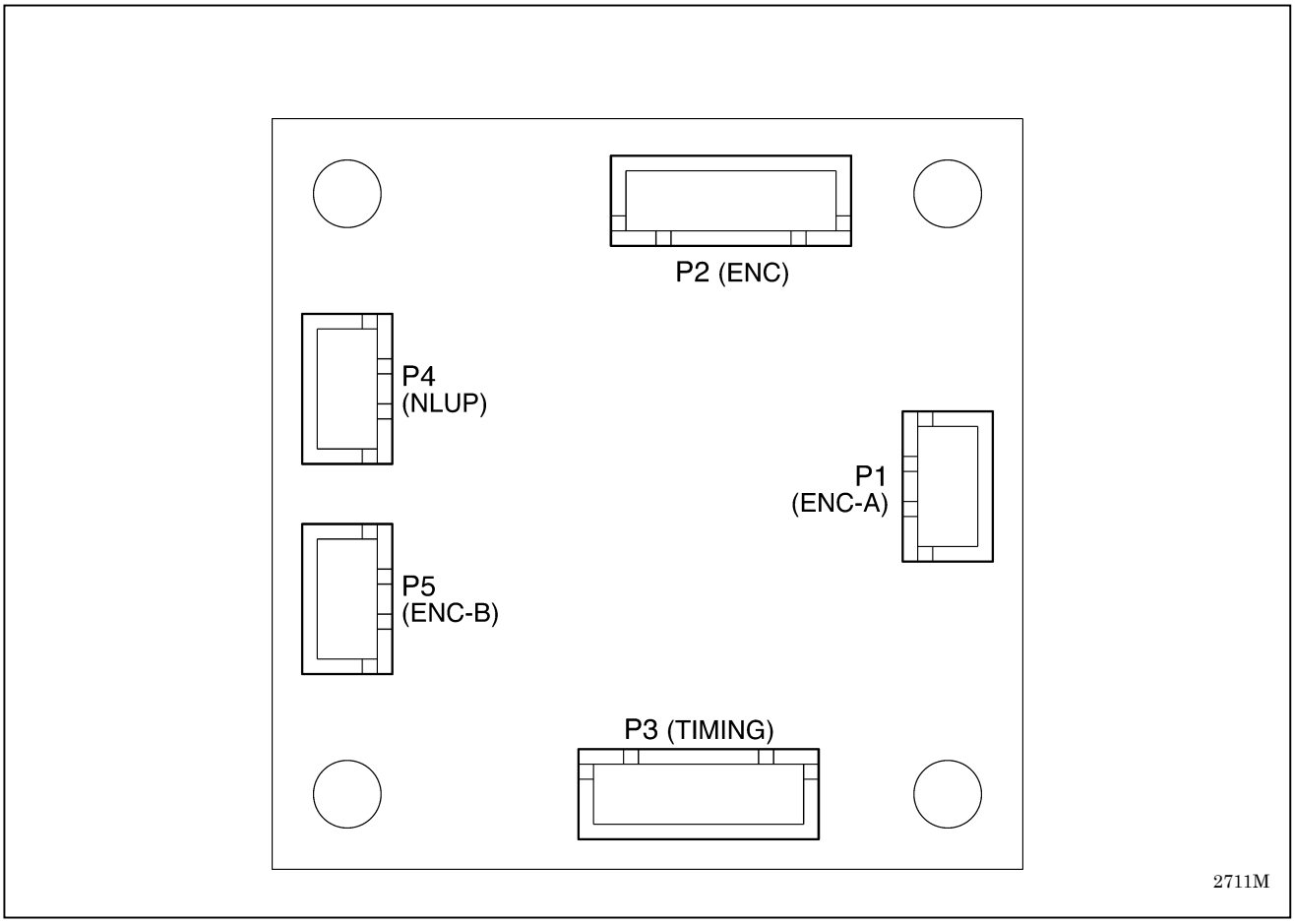


Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	ISP	1	+5V	DC 5 V output	Not in use	
		2	0V	DC 5 V GND		
		3	TCK			
		4	0V	DC 5 V GND		
		5	TD0			
		6	TMS			
		7	TDI			
		8	NC			
P2	WSENS2	1	+24V	DC 24 V output	Wiper sensor (For heads with even numbers)	“Wiper out error”
		2	WIPER2	Wiper sensor 2 input signal		
		3	GND	DC 24 V GND		
P3	WSENS1	1	+24V	DC 24 V output	Wiper sensor (For heads with odd numbers)	“Wiper out error”
		2	WIPER1	Wiper sensor 1 input signal		
		3	GND	DC 24 V GND		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P4	SIN	1	+24V	DC 24 V output	Head PCB adjoining on the right P5	“Head CPU communication error”
		2	SCKOUT	Head PCB communication signal		
		3	RXDOUT	Head PCB communication signal	Head PCBs for No. 1 and 2 heads are power supply PCB P12	
		4	TXDOUT	Head PCB communication signal		
		5	JPAOUT	Head PCB communication signal	(Head on the left side of the box)	
		6	JPBOUT	Head PCB communication signal		
		7	GND	DC 24 V GND		
P5	SOUT	1	+24V	DC 24 V output	Head PCB adjoining on the left P4	“Head CPU communication error”
		2	SCKIN	Head PCB communication signal	(Head PCB for the last head is terminal harness)	
		3	RXDIN	Head PCB communication signal		
		4	TXDIN	Head PCB communication signal		
		5	JPAIN	Head PCB communication signal		
		6	JPBIN	Head PCB communication signal		
		7	GND	DC 24 V GND		
		8	NC			
P8	WP2	1	WP2A	Wiper 2 pulse motor output signal	Wiper motor	“Wiper out error”
		2	NC		(For heads with even numbers)	
		3	WP2B	Wiper 2 pulse motor output signal		Malfunction of wiper
		4	WP2C	Wiper 2 pulse motor output signal		
		5	NC			
		6	WP2D	Wiper 2 pulse motor output signal		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P9	WP1	1	WP1A	Wiper 1 pulse motor output signal	Wiper motor	“Wiper out error”
		2	NC		(For heads with odd numbers)	
		3	WP1B	Wiper 1 pulse motor output signal		Malfunction of wiper
		4	WP1C	Wiper 1 pulse motor output signal		
		5	NC			
		6	WP1D	Wiper 1 pulse motor output signal		
P10	POWER	1	+40V	DC 40 V output	Power supply PCB P12	“Head CPU communication error”
		2	P0V	DC 40 V GND	(Head on the left side of the box)	
		3	+24V	DC 24 V output		
		4	P0V	DC 24 V GND		
P11	JP1	1	JP2A+	Jump 1 pulse motor output signal	Jump motor	Malfunction of jumping
		2	JP2A	Jump 1 pulse motor output signal	(For heads with odd numbers)	
		3	JP2A-	Jump 1 pulse motor output signal		Needle bar does not ascend at the main shaft stop position
		4	JP2B+	Jump 1 pulse motor output signal		
		5	JP2B	Jump 1 pulse motor output signal		
		6	JP2B-	Jump 1 pulse motor output signal		
P12	JP2	1	JP1A+	Jump 2 pulse motor output signal	Jump motor	Malfunction of jumping
		2	JP1A	Jump 2 pulse motor output signal	(For heads with even numbers)	
		3	JP1A-	Jump 2 pulse motor output signal		Needle bar does not ascend at the main shaft stop position
		4	JP1B+	Jump 2 pulse motor output signal		
		5	JP1B	Jump 2 pulse motor output signal		
		6	JP1B-	Jump 2 pulse motor output signal		

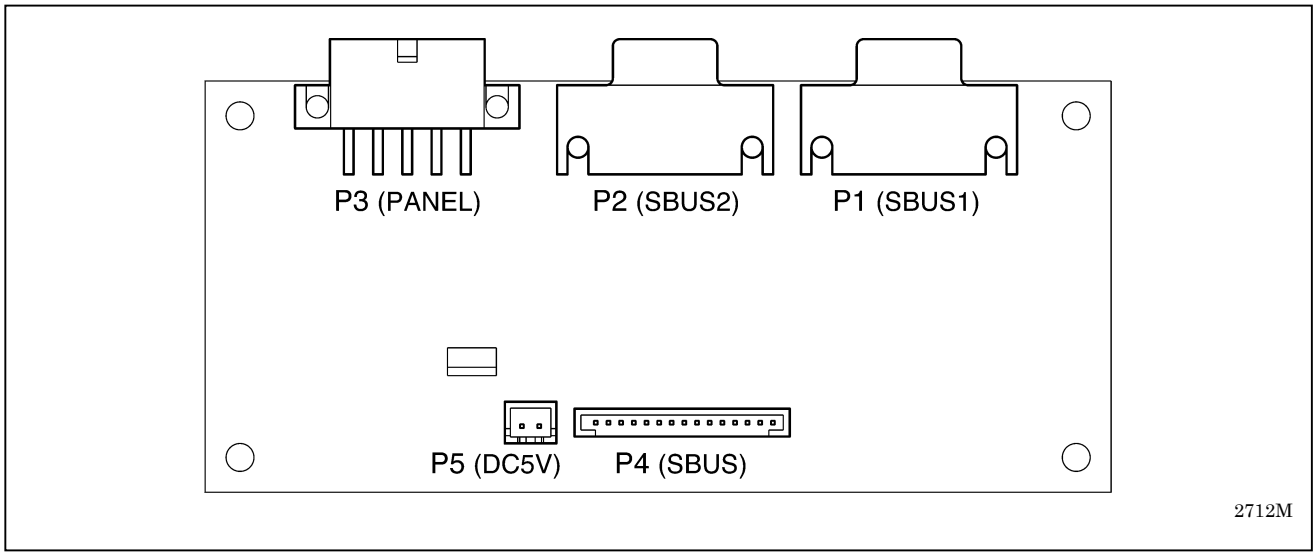
12-10. Relay PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P1	ENC-A	1	+24V	DC 24 V output	Upper shaft sensor A phase	“Main (Z) motor lock”
		2	A	A phase sensor signal input	(Right side)	
		3	0V	DC 24 V GND		
P2	ENC	1	0V	DC 24 V GND	Disconnected	
		2	B	B phase signal input		
		3	NLUP	Needle up signal input		
		4	A	Encoder A phase signal input		
		5	+24V	DC 24 V output		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P3	TIMING	1	A	A phase sensor signal output	Power supply PCB P9	“Main (Z) motor lock”
		2	+24V	DC 24 V input	(Timing on the left side of the box)	“Needle stop position error”
		3	B	B phase sensor signal output		“XY CPU communication error”
		4	NLUP	Needle up signal output		The main shaft does not accelerate after the start of sewing
		5	0V	DC 24 V GND		
P4	NLUP	1	+24V	DC 24 V output	Needle up sensor	“Needle stop position error”
		2	NLUP	Needle up signal input	(Lower shaft)	
		3	0V	DC 24 V GND		
P5	ENC-B	1	+24V	DC 24 V output	Upper shaft sensor B phase	The main shaft does not accelerate after the start of sewing
		2	B	B phase sensor signal input	(Left side)	
		3	0V	DC 24 V GND		

12-11. SBUS PCB



Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
* P1	SBUS1	1	CLK+	SBUS communication signal	Interface board of PC	Faulty communication with PC
		2	CLK-	SBUS communication signal		
		3	DATA+	SBUS communication signal		
		4	DATA-	SBUS communication signal		
		5	SACK+	SBUS communication signal		
		6	SACK-	SBUS communication signal		
		7	SREQ+	SBUS communication signal		
		8	SREQ-	SBUS communication signal		
		9	GND	GND		

Connect or No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
* P2	SBUS2	1	CLK+	SBUS communication signal	Other embroidery machines	Faulty communication with PC
		2	CLK-	SBUS communication signal	Or the termination	
		3	DATA+	SBUS communication signal		
		4	DATA-	SBUS communication signal		
		5	SACK+	SBUS communication signal		
		6	SACK-	SBUS communication signal		
		7	SREQ+	SBUS communication signal		
		8	SREQ-	SBUS communication signal		
		9	GND	GND		
* P3	PANEL	1	DATA+	PC panel communication signal	For PC-type models	The sewing machine cannot be started
		2	DATA-	PC panel communication signal	Operation panel	
		3	CLK+	PC panel communication signal		
		4	CLK-	PC panel communication signal		
		5	+5V	DC 5 V output		
		6	GND	GND		
		7	/STOP	PC panel STOP SW input signal		
		8	GND	GND		
		9	NC			
		10	FG	GND		

Connector No.	Connector name	Pin No.	Signal name	Description of signals and direction of them	Connected to	Reaction to insertion incomplete or breaking of wire
P4	SBUS	1	SCKO	SBUS communication signal	Main PCB P5	Faulty communication with PC
		2	SCKI	SBUS communication signal		
		3	TXD	SBUS communication signal		
		4	DATA	SBUS communication signal		
		5	SACK	SBUS communication signal		
		6	SREQ	SBUS communication signal		
		7	S/R	SBUS communication signal		
		8	REQE	SBUS communication signal		
		9	GND	GND		
		10	SBUS	SBUS communication signal		
		11	MSD	SBUS communication signal		
		12	PSEL	SBUS communication signal		
		13	PSD	SBUS communication signal		
		14	PSCK	SBUS communication signal		
		15	/STOP	PC panel STOP SW output signal		
P5	DC 5 V	1	+5V	DC 5 V output	Power supply PCB P21	Faulty communication with PC
		2	GND	GND		

*: Connectors on the right side of the control box which are connected directly to external devices.

Chapter 4 Test Mode (For Stand – Alone type)

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 "961961" as the password and press the key.

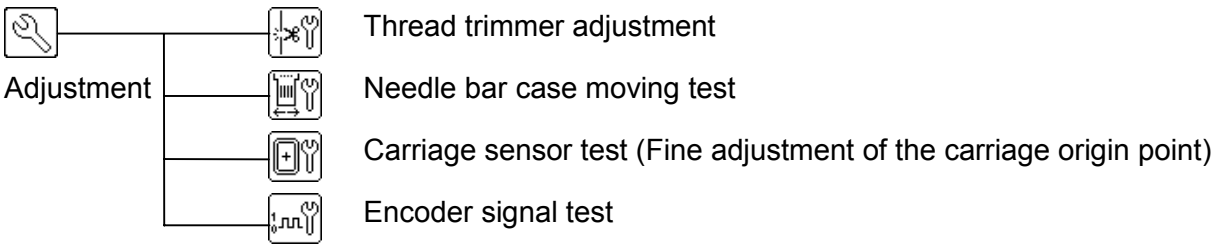
2743M 2744M 2745M
2746M 2747M

2. Selecting the test mode menu

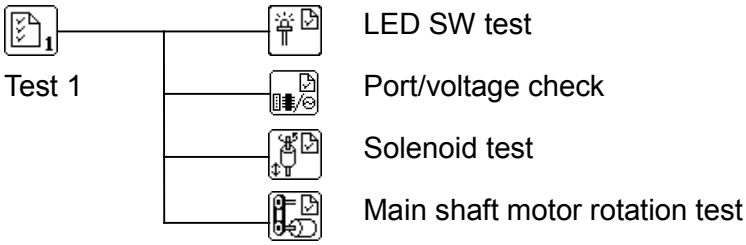
The test mode is comprised of the following three modes.

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

The menus for each mode are as follows:

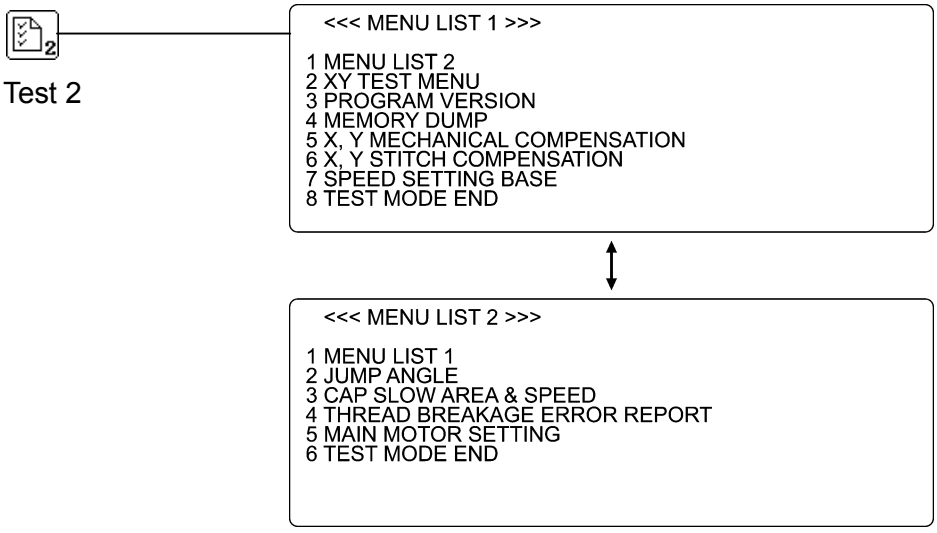


2748M 2749M 2750M
2751M 2752M



2753M 2754M 2755M
2756M 2757M

2758M



2724M

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 LIST 1" and "MENU LIST 2".

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 [save] 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 [save] key or [DEL▽] key on the " Result screen" and clear the displayed data on the result screen.

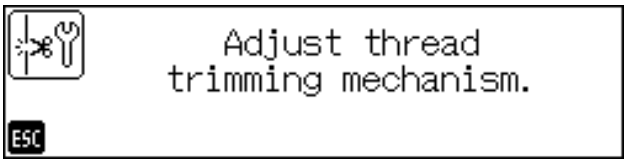
The details of the test are described in "Detailed version of CPU in the machine" on or after page 4-11.

2759M 2760M 2761M
2762M 2763M 2765M

3. Function of the test mode

3-1. Thread trimmer adjustment

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

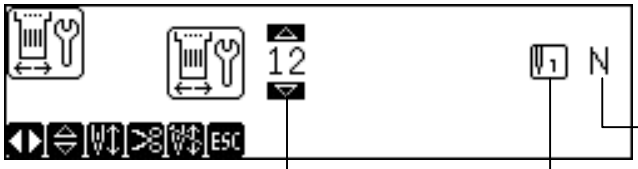


2797M

Adjust it referring to chapter 2 "6.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



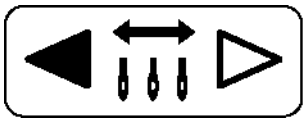
N:normal position
O:abnormal position

2785M

Moving speed set value

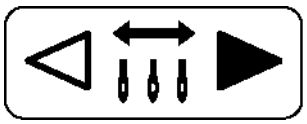
Needle bar number

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

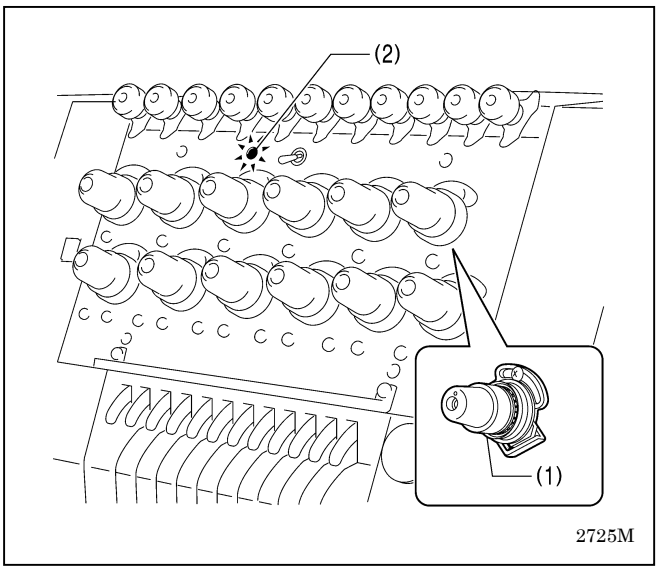


2781M

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

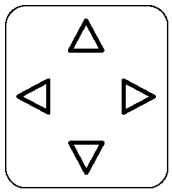


2768M



2725M

- Rotate the rotary disc (1) of the selected needle bar then look at the thread tension base lamp (2) blink.
- When the △ or ▽ jog key is pressed, the needle bar's travel speed can be changed.


2769M

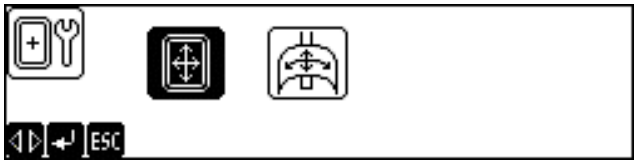
Jog key (△) ..... increases the set value by one.

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 twelve needles.
- 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.

2760M 2761M 2770M
2771M 2767M

3-3. Carriage sensor test (Fine adjustment of the carriage origin point)



2786M

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

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

2787M

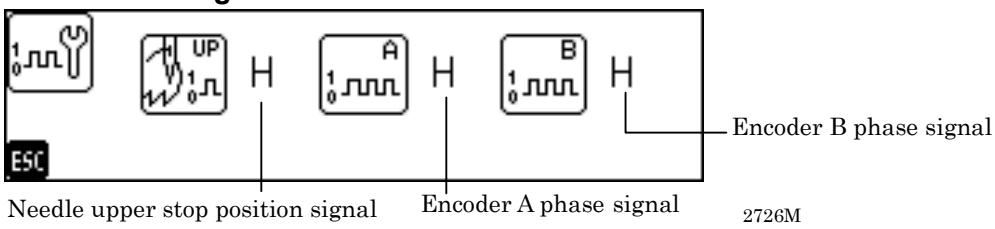
Select the frame using the jog key (◁ ▷) and press the [↵] key. The message on the display will change from “The frame can be moved” to “Finding the origin point”, and then the origin point detection starts.

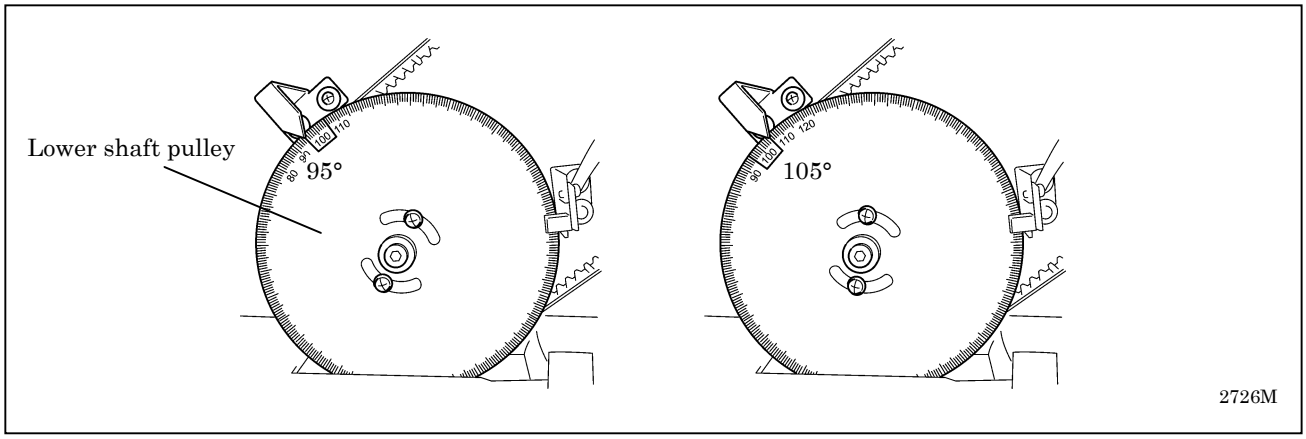
2788M

Fine adjustment of the origin point can be done with the jog key [△ ◁ ▷ ▽]. Press the [END] key to determine the adjusted position. Press the [ESC] key to cancel the adjustment and return to the previous screen.

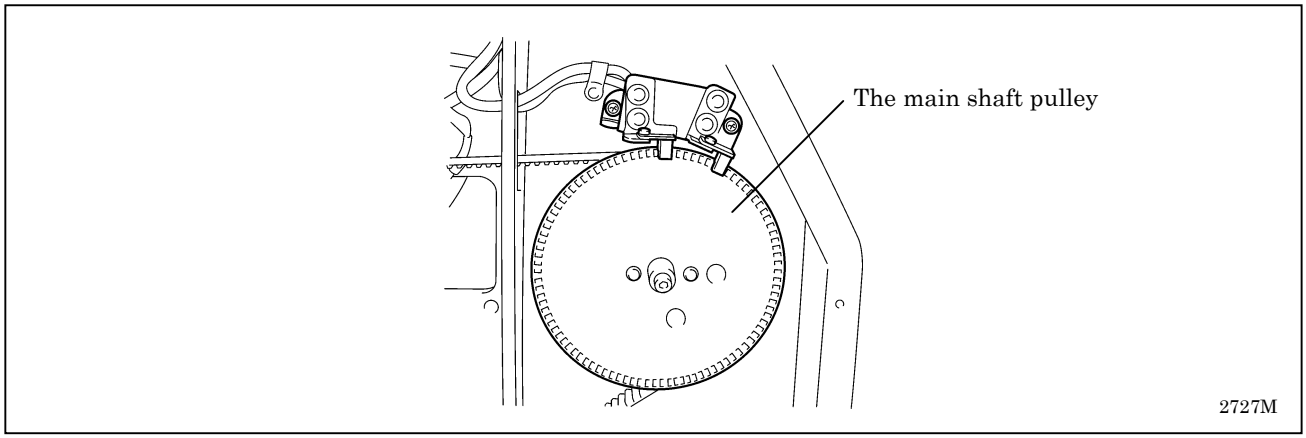
2744M 2745M 2747M
2769M 2764M 2767M

3-4. Encoder signal test





When the lower shaft pulley is turned at the needle upper stop position (at 95 to 105 degrees of the scale on the lower shaft pulley), the buzzer sounds and "H" is displayed.



The displays of A and B phase signals will show "H" and “L” alternately according to the rotation of the main shaft pulley.

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

CAUTION

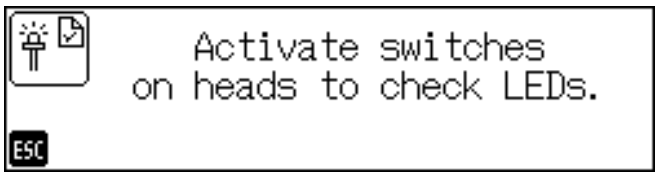
Refer to the following sections:

- Chapter 3. "10. Replacement of the change color motor, collar, w/dog and change color sensor PCB"
- Chapter 3. "11. Replacement and adjustment of the index sensor"

2767M

3-5. LED SW test

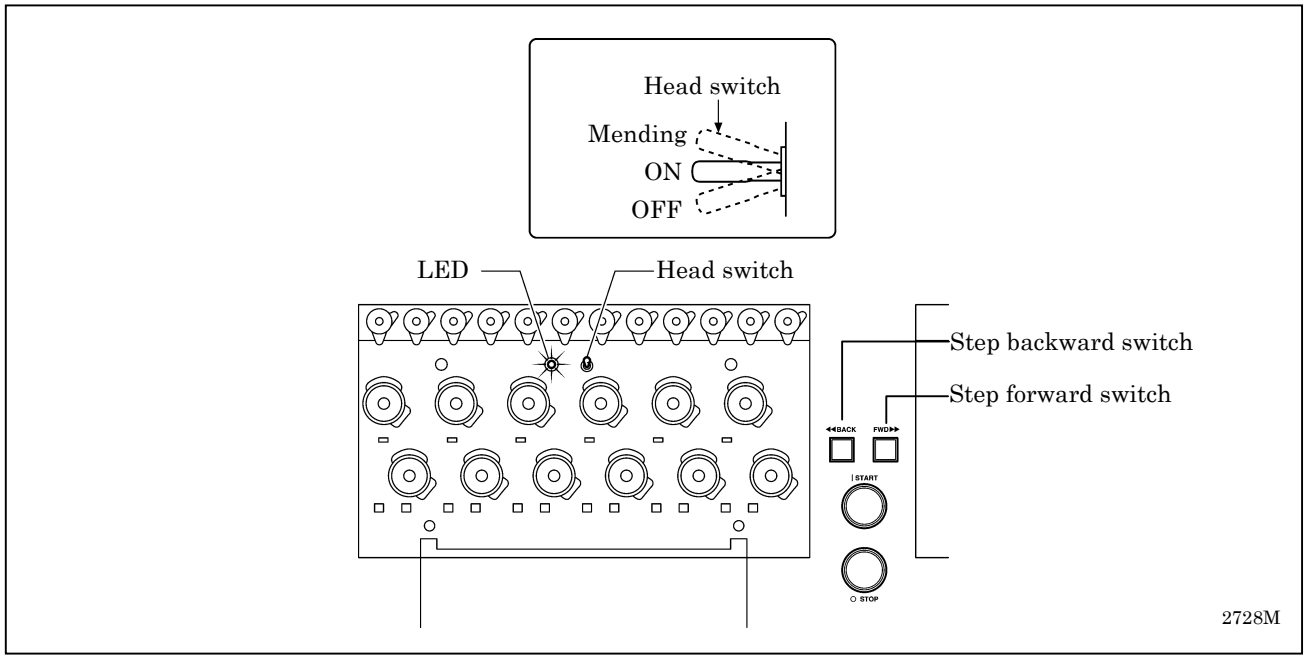
Follow the procedure below to test switches and LEDs by operating the head switch and the step forward/backward switch.



2798M

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

2767M

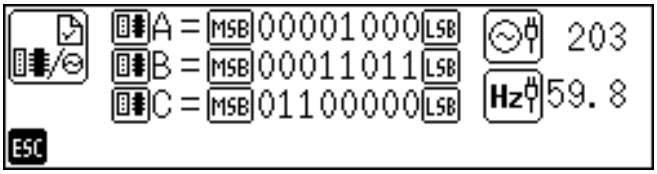


2728M

Head switch	Step forward/backward switch	LED (lamp)
ON	FWD▶▶	Illuminates green
ON	◀◀BACK	Illuminates red
OFF	FWD▶▶	Turns off
OFF	◀◀BACK	Turns off
Mending	FWD▶▶	Blinks green
Mending	◀◀BACK	Blinks red

2729M 2730M

3-6. Port/voltage check



2772M

- Displays the current power supply voltage.
- Displays the current power supply frequency.
- Displays the current status of ports A, B, and C.

2773M 2774M 2775M

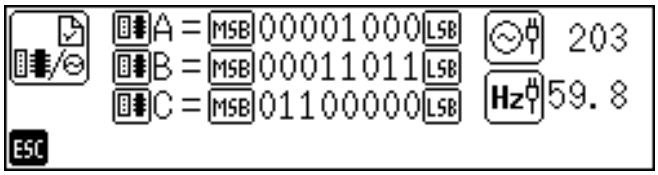
Details of what are displayed are as follows:

	MSB							LSB
	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Port A	Beam sensor	PC - typep CAPSW 0:FLAT 1:CAP	Tubular round frame SW 0:Tubular round frame 1:other	0	0	Needle stop position sensor	Encoder A signal sensor	Encoder B signal sensor
PortB	Thread trimming sensor	Square frame Y origin point sensor	X origin point sensor	Cap frame Y	0	0	0	0
PortC	0	0	Change color origin point sensor	0	Change color position sensor 4	Change color position sensor 3	Change color position sensor 2	Change color position sensor 1

* 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.

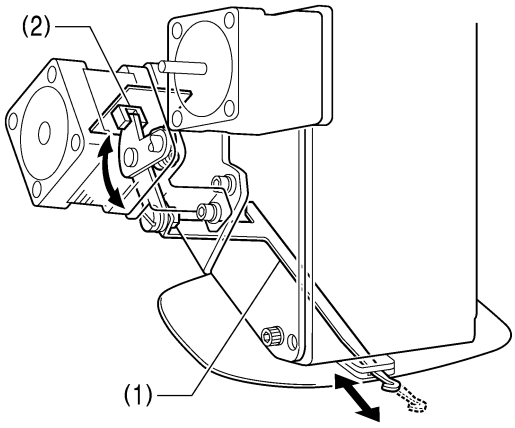
2782M 2783M 2775M

3-7. Solenoid test

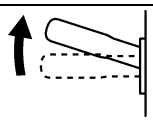


2772M

The switches and keys have functions as follows.

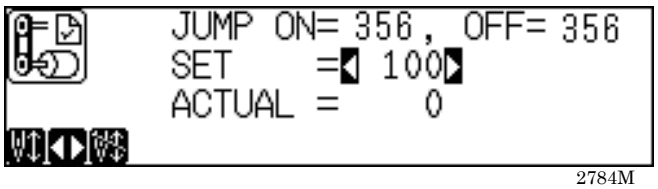


2731M

SW/Key	Function
	The wiper motor runs and drives the upper thread guide hook of the head once.
FWD▶▶	Excites all jump motors of all heads at the ON position.
◀◀BACK	Switch ON or OFF all jump motors.
1	All upper thread guide hooks (1) move once. The display will change to 6 keeping its reversing display when any of 1 to 6 upper thread guide hooks (1) stay out. The status of the sensor (2) will have been light receivable then.
2 ABC	Drives all jump motors repeatedly. Press the STOP key to stop.
3 DEF	Keeps the driving of all jump motors. Press the STOP key to cancel.
ESC	Returns to the menu.

2732M 2729M 2730M
2759M 2780M 2777M
2771M 2778M 2767M

3-8. Main shaft motor rotation test



2784M

- ◁ ▶ steps up the set value of the speed.
- ◀ ▷ steps down the set value of the speed.
- The ON or OFF angle for jumping can be changed by using the jog key △ ◁ ▷ ▽. (This will be cancelled when the power of the sewing machine is turned off.)
- 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.

2768M 2781M 2769M
2770M 2771M 2767M

3-9. Detailed version of CPU in the machine

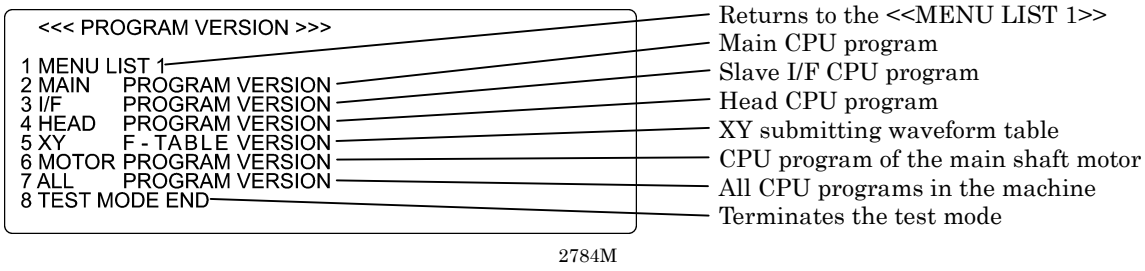
```
<<< MENU LIST 1 >>>

1 MENU LIST 2
2 XY TEST MENU
3 PROGRAM VERSION
4 MEMORY DUMP
5 X, Y MECHANICAL COMPENSATION
6 X, Y DRIVE PARAMETER
7 SPEED SETTING BASE
8 TEST MODE END
```

2742M

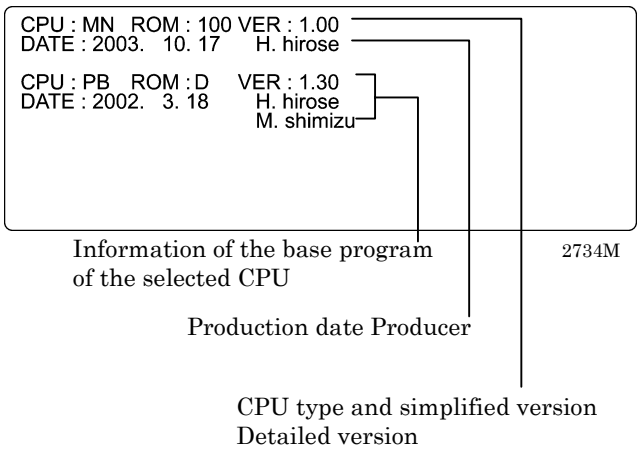
Select "3. PROGRAM VER." in <<MENU LIST 1>>.

CAUTION

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



2784M



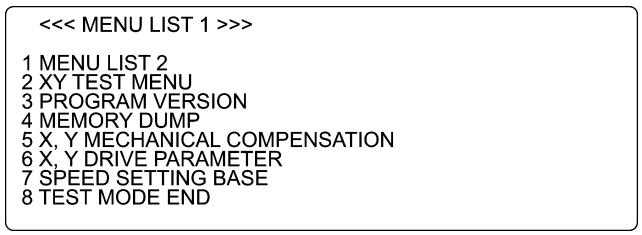
2734M

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>>.

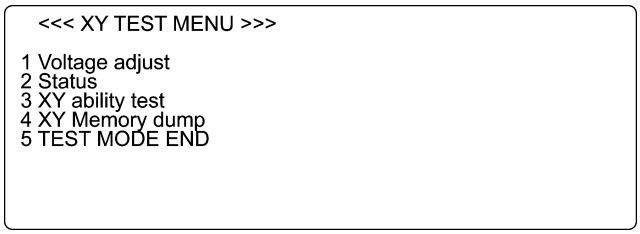
2762M

3-10. Power supply voltage adjustment



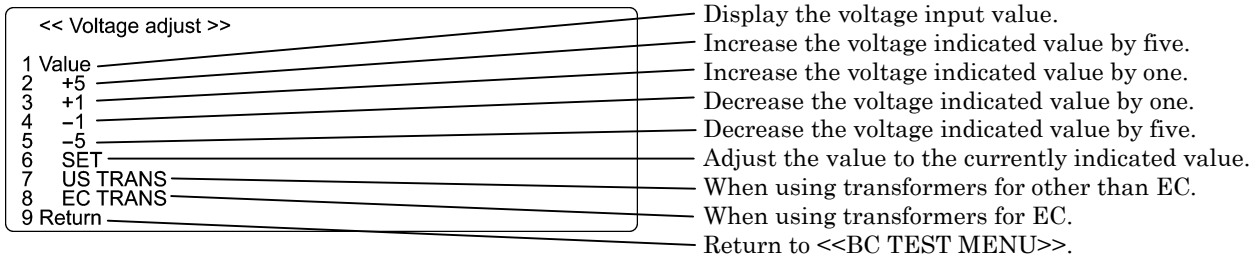
2742M

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

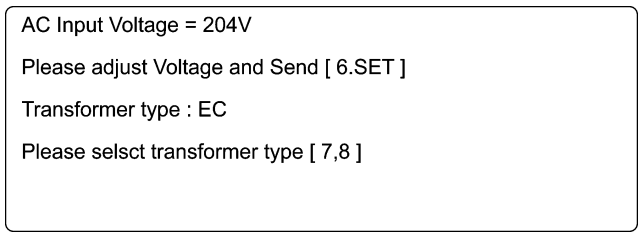


2735M

Select “1. Voltage adjust” in the <<XY TEST MENU>>.



2736M



2737M

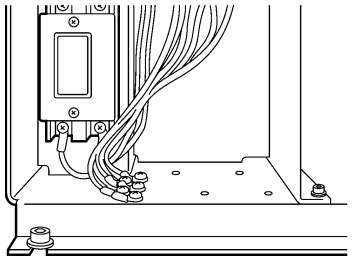
Select “1. Value” in the <<Voltage adjust>> then current input voltage and the transformer in use will be displayed as shown left.

- Setup the transformer. * Refer to the figure in note 1 for the types of transformers.
- Measure the power voltage of the sewing machine with testers etc. Watch out for an electric shock when measuring. Points to be measured are: Breaker terminals of the sewing machine, connectors of the connector terminals on the back side of the control box, between 1st and 2nd pins of 18, the AC power source, and so on.
- 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.

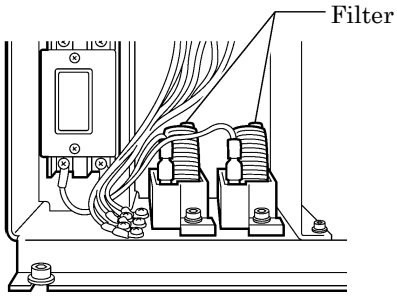
CAUTION

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.

* Open the front cover and check if the transformer has a filter to identify its type.



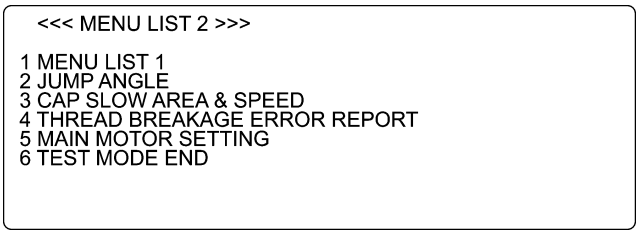
For other than EC
(US TRANS)



For EC
(EC TRANS)

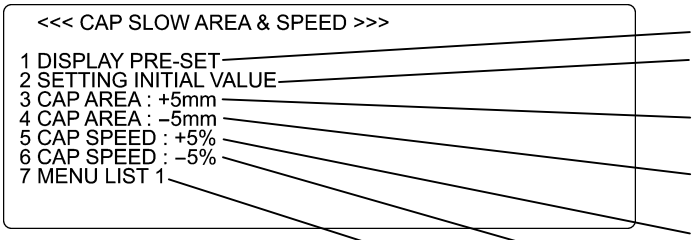
2738M

3-11. Modifications of X-direction slowing area of a cap frame and its reduction ratio



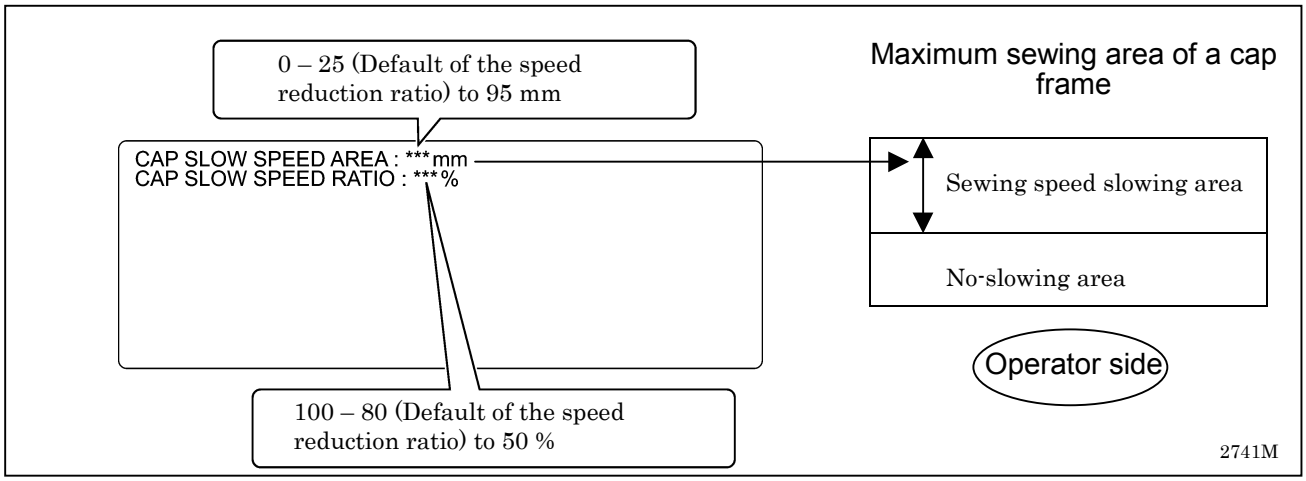
2739M

Select “3. CAP SLOW AREA & SPEED” in <<MENU LIST 2>>.



Shows the current set values.
Initializes the set values. (Slowing area 25 mm and reduction ratio 80 %)
Broadens the slowing area for sewing of a cap frame by 5 m in Y direction.
Narrows the slowing area for sewing of a cap frame by 5 m in Y direction.
Increases the speed reduction ratio for sewing of a cap frame by 5 %.
Decreases the speed reduction ratio for sewing of a cap frame by 5 %.
Returns to the menu 1.

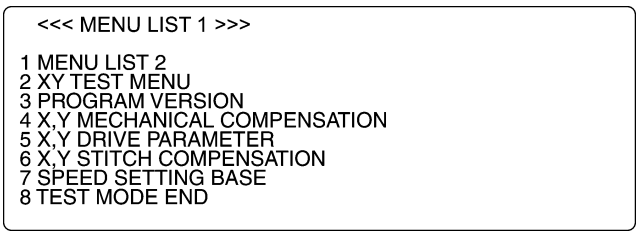
2740M



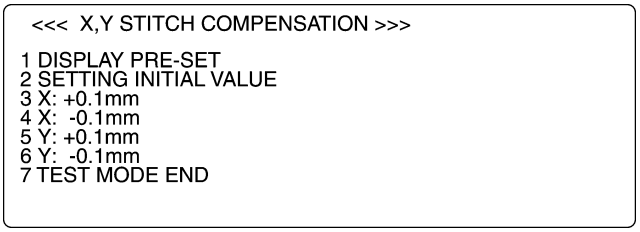
2741M

If set values are all fine, select “7.MENU LIST 1” to return to the menu 1.

3-12. Modification of the stitch compensation value on the sewing machine



2847M



2848M

1. Select “6 X, Y STITCH COMPENSATION” from << MENU LIST 1 >>.

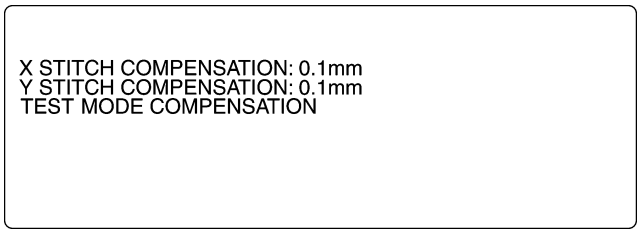
2. Press “7” key. Then press “ESC” key to quit the test mode.
   Input required compensation values for X and Y individually, and then press “7” to return to << MENU LIST 1 >>.

   CAUTION

   X : From - 0.5 to 2.0 mm, in 0.1 mm unit.
   Y : From - 0.5 to 2.0 mm, in 0.1 mm unit.

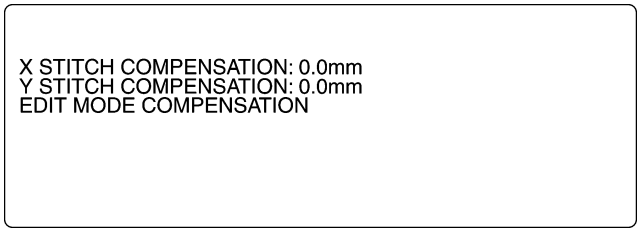
3. The messages will be shown as below when the compensation value modification is completed by pressing “1” through “6” key.

Cases that the compensation values in the test mode are adopted:



2849M

Cases that the compensation values modified in the edit mode are adopted (The compensation values in the test mode are both 0.)



2850M

4. Priority between the 2 compensation values; the preset value in the machine and the modified value on the operation panel.

   If the compensation values for X and Y are both set to 0 in the test mode, the values set in the edit mode on the operation panel (on the PC controller) will be adopted. If either of them in the test mode are not 0, the values set in the test mode will be adopted and those set in the edit mode (on the PC controller) will be ignored. The values set in those 2 modes will never be combined.

   The adopted mode will be shown on the test mode screen.
   If “TEST MODE COMPENSATION” is shown, the values set in the test mode are adopted.
   If “EDIT MODE COMPENSATION” is shown, the values set in the edit mode are adopted.

Chapter 5 Test mode (For PC Control type)

1. Test mode on the operation panel

1-1. Starting test mode

- With the PC in standby mode, press the STOP switch and jog switch (△). “tcut” appears in the window (7 segment LED), and the machine controller will enter test mode 1.
- With the machine stopped, press the STOP switch and jog switch (▷). “bEEP” appears in the window (7 segment LED), and the machine controller will enter test mode 2.

2760M 2745M

1-2. Selecting test mode menu

- Jog switches (◁ , ▷) are used to indicate test mode menus from “tcut” to “A-go” on the 7 segment LED.

  Caution

  In test mode 2, only “bEEP” (error sound switching) menu appears.

“tcut” :	Thread trimmer adjustment
“CASE” :	Needle bar case test
“org” :	Home position searching test
“Ecd” :	Encoder signal test
“dISP” :	Switches and LEDs test (operation panel and machine head)
“AC” :	Power voltage and frequency indication
“Port” :	Port check
“SOL” :	Solenoid test
“FEEd” :	Driving shaft rotation test
“bEEP” :	Error sound switching (only test mode 2)

- Select a test item and press the START switch. The selected test starts.

2744M 2745M

1-3. Test mode functions

1-3-1. Thread trimmer adjustment

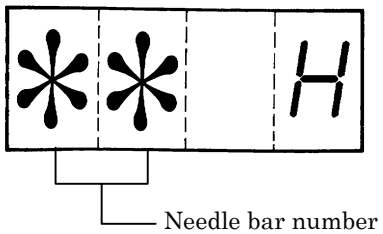
1. Indication "tcut" will blink on the 7 segment LED, and the head will be ready for adjustment of the thread trimmer. (Refer to Chapter 2 "6.Replacement and adjustment of movable knife and fixed knife".)

2. Press the STOP switch after the thread trimmer has been adjusted.

3. Indication "tcut" on the 7 segment LED, which was blinking, will return to its usual status.

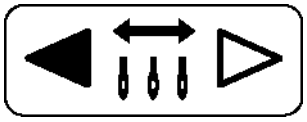
1-3-2. Needle bar case test

1. The 7 segment LED shows "** H."



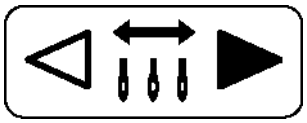
2799M

2. Press the left switch to change the needle bar to the next toward needle bar no.12.



2781M

3. Press the right switch to change the needle bar to the next toward needle bar no.1.



2781M

4. Press the check switch to display S-** on the 7 segment LED. Change needle bar movement speed.
   - ** is a number that will be determined as a parameter of speed when the needle bar case moves; the number can be set from 5 (fastest) to 30 (slowest).
   - Jog switch (△) is used to decrease needle bar case speed parameter number one by one and increase movement speed.
   - Jog switch (▽) is used to increase needle bar case speed parameter number one by one and decrease movement speed.
   - When the start switch is pressed, "LOOP will appear on the 7 segment LED, and the needle bar case endurance test will start. Press the stop switch to finish the test.
   - When the thread trimming switch is pressed, "1-12" will appear on the 7 segment LED, and the thread trimming test will start. Press the stop switch to finish the test.
   - When the stop switch is pressed, the machine controller will return to the needle bar case test mode.

5. After needle bar case test, press the stop switch. Indication "CASE" will appear on the 7 segment LED.

2760M 2761M

1-3-3. Home position searching test

1. The 7 segment LED shows "C-F."

2. Press jog switch (▷) or (◁).

   (▷): The 7 segment LED shows "FLA" with 3 beeps and the frame moves to the holder base frame home position. (This is not available when the sewing machine is set for the cap frame.)

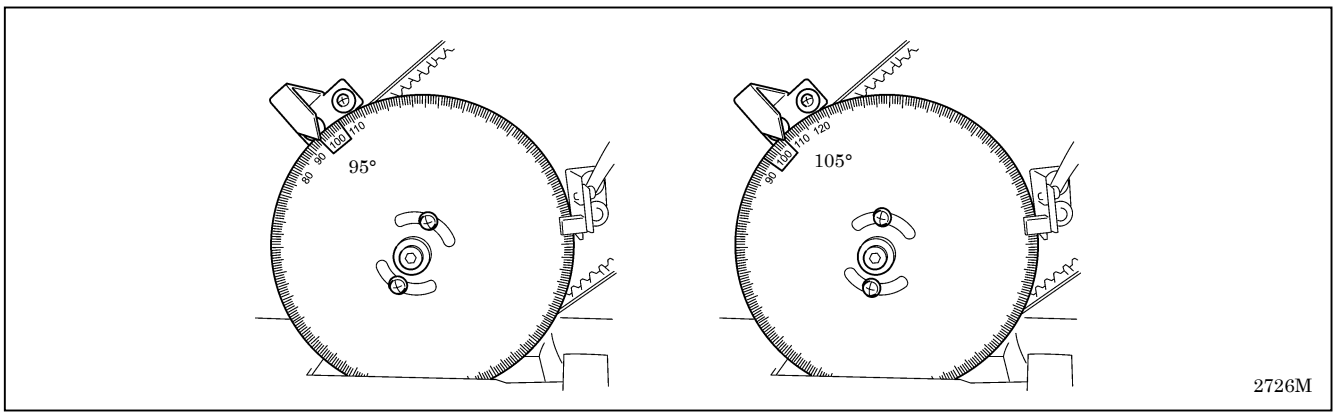
   (◁): The 7 segment LED shows "CAP" with 3 beeps and the frame moves to the cap frame home position.

   2745M 2744M

3. Press the STOP switch to finish home position searching test. The 7 segment LED will show "Org."

1-3-4. Encoder signal test

1. The main shaft angle will be shown on the indicator,in the range of the needle up stop position (while the indicator on the pulley is in the range from 95° to 105°), turn the pulley. The buzzer will beep.

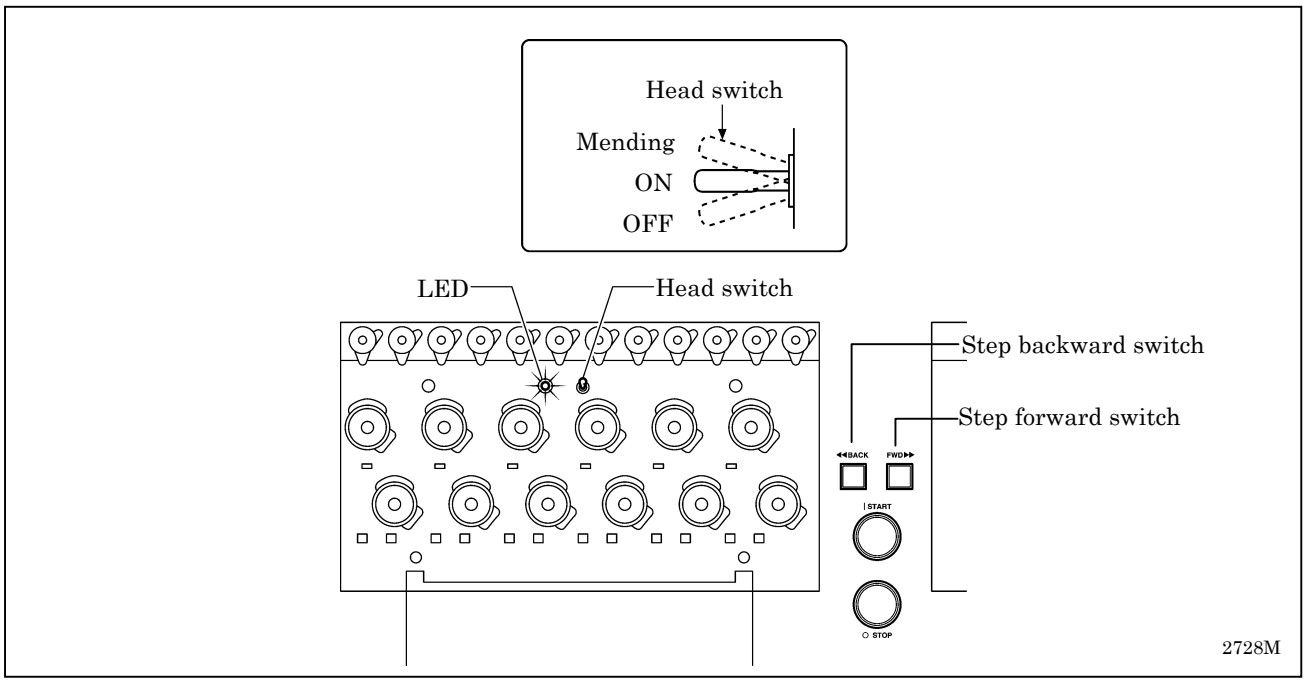


2. Press the stop switch to finish the encoder signal test. "Ecd" will appear on the 7 segment LED.

1-3-5. Switch and LED test on operation panel and head

1. Indication "dISP" will blink on the 7 segment LED.

2. Set each of Head switch, and step forward/backward switch as follows to test their LEDs.



Head switch	Step forward/backward switch	LED (lamp)
ON	FWD▶▶	Illuminates green
ON	◀◀BACK	Illuminates red
OFF	FWD▶▶	Turns off
OFF	◀◀BACK	Turns off
Mending	FWD▶▶	Blinks green
Mending	◀◀BACK	Blinks red

3. Press the start switch. The numbers from 10 to 1500 appear in order in multiples of 10.

Caution

If the test is finished halfway, press the stop switch.

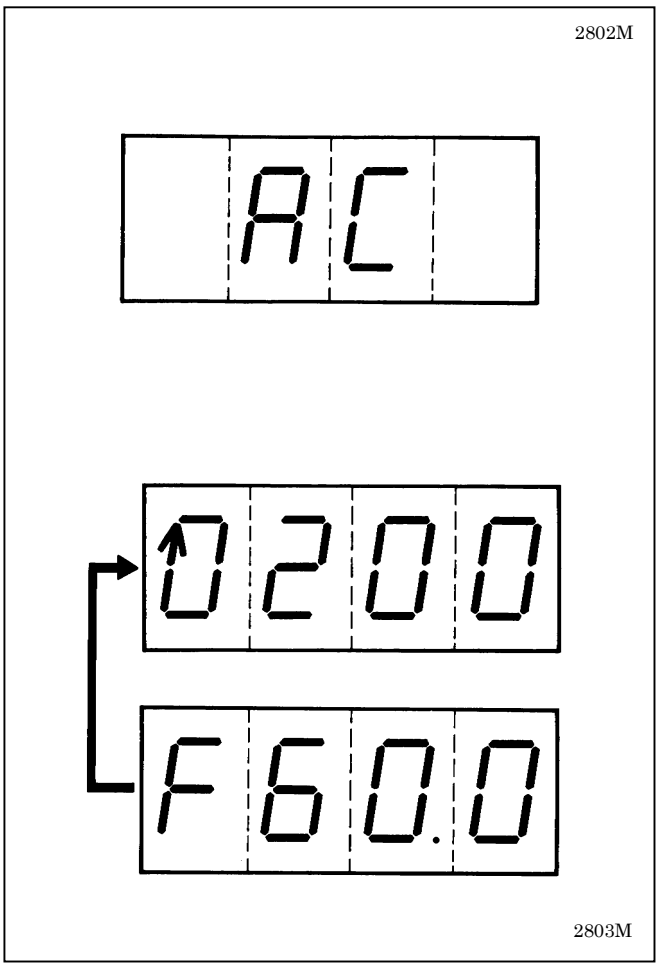
4. Press the check switch to test switches. When a switch is pressed, the indication on the 7 segment LED will vary as follows:

[Start] switch :	"P-0A"
[Check] SW :	“P-0b”
[Stop] switch :	"P-0F" (Finish SW Test)
[Thread trimming] switch :	"P-41"
[Hoop feed] switch :	"P-40"
[Needle bar change left] :	"P-44"
[Needle bar change right] :	"P-43"
[◁] switch :	"P-05"
[▷] switch :	"P-04"
[△] switch :	"P-06"
[▽] switch :	"P-07"

2745M 2744M 2760M 2761M

5. Press the stop switch twice to finish the switch and LED tests. The indication "dISP" on the 7 segment LED, which was blinking, will return to its usual status.

1-3-6. Power voltage and frequency indication



2802M 2803M

1. With "AC" indicated on the 7 segment LED, press the start switch.

2770M

2. The voltage measured on the machine will appear on the 7 segment LED.

3. Press the check switch to indicate the frequency for a time.

2824M

4. Press the stop switch to finish the indication. "AC" will reappear on the 7 segment LED.

2771M

1-3-7. Port check

1. "P--" will appear on the 7 segment LED.
2. Press the jog switch (△), (▷), or (▽) to check each port.

- (△)..... Indicates the condition of external port A using a hexadecimal code, "PA**."
- (▷)..... Indicates the condition of external port B using a hexadecimal code, "PB**."
- (▽) Indicates the condition of external port C using a hexadecimal code, "PC**."
- When the stop switch is pressed, the indication will be finished. "P--" will reappear on the 7 segment LED.

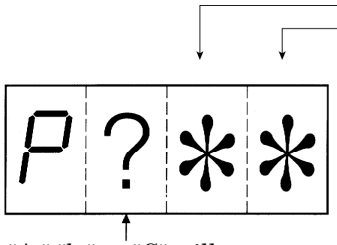
3. With "P--" indicated on the 7 segment LED, press the stop switch to finish the port check. "Port" will appear on the 7 segment LED.

	MSB									LSB
	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	BIT0	
Port A	Beam sensor	PC - typep CAPSW 0:FLAT 1:CAP	Tubular round frame SW 0:Tubular round frame 1:other	0	0	Needle stop position sensor	Encoder A signal sensor	Encoder B signal sensor	Head 2 bed retracting flag 1:Retracted	
PortB	Thread trimming sensor	Square frame Y origin point sensor	X origin point sensor	Cap frame Y	0	0	0	0		
PortC	0	0	Change color origin point sensor	0	Change color position sensor 4	Change color position sensor 3	Change color position sensor 2	Change color position sensor 1		

* 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.

2782M 2783M 2775M

■ Meaning of code on 7 segment LED.



"A," "b," or "C" will appear here.

BIT	7	6	5	4	BIT	3	2	1	0
0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	0	0	0	1
2	0	0	1	0	2	0	0	1	0
3	0	0	1	1	3	0	0	1	1
4	0	1	0	0	4	0	1	0	0
5	0	1	0	1	5	0	1	0	1
6	0	1	1	0	6	0	1	1	0
7	0	1	1	1	7	0	1	1	1
8	1	0	0	0	8	1	0	0	0
9	1	0	0	1	9	1	0	0	1
A	1	0	1	0	A	1	0	1	0
b	1	0	1	1	b	1	0	1	1
C	1	1	0	0	C	1	1	0	0
d	1	1	0	1	d	1	1	0	1
E	1	1	1	0	E	1	1	1	0
F	1	1	1	1	F	1	1	1	1

2804M

1-3-8. Solenoid test

1. With "SOL" indicated on the 7 segment LED, press the start switch, and "S-00" will appear on the 7 segment LED.

   Caution

   "**" of "S-**" shows the status of the wiper sensor on each head using a hexadecimal number.

   The 7 segment LED shows for example:

   "S-20" when the wiper of the head 6 only is advanced.

   "S-0" when the wiper of the head 5 only is advanced.

   "S-08" when the wiper of the head 4 only is advanced.

   "S-04" when the wiper of the head 3 only is advanced.

   "S-02" when the wiper of the head 2 only is advanced.

   "S-01" when the wiper of the head 1 only is advanced.

2. Press the jog switch (△), the check switch, or the hoop feed switch to execute the following functions

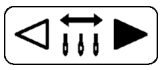
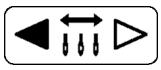
- Jog switch (△) ..... Operates the wiper once.
- Check switch..... Repeats operation of the jump (Press the stop switch to finish it.)
- Hoop feed switch ..... Keeps the jump activated.

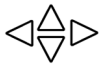
3. Press the stop switch to finish the solenoid test. "SOL" will appear on the 7 segment LED.

2760M

1-3-9. Driving shaft rotation test

1. Press either of the following switches to set the rotation of the driving shaft.

Switch		Description
Needle bar change left switch	 2825M	Sets rotation speed to +50. (Can increase up to 1000.) The set rotation speed will appear on the 7 segment LED.
Needle bar change right switch	 2826M	Sets rotation speed to -50. (Can decrease to 100.) The set rotation speed will appear on the 7 segment LED.

Jog switch	 2769M	Do not press these keys during this test.
Hoop feed switch	 2800M	Do not press these keys during this test.
Thread trimming switch	 2801M	Do not press these keys during this test.
Check switch	 2827M	Do not press these keys during this test.

2. Press the start switch to rotate the driving shaft.

2770M

The driving shaft can be stopped using the stop switch.

2771M

1-3-10. Error sound switching (only test mode 2)

1. "on" (with error sound) or "OFF" (without error sound) appears on the 7 segment LED.
2. Press the check switch to switch on / OFF of the error sound.
3. Press the stop switch to finish the setting of error sound. "bEEP" will appear on the 7 segment LED.

2. Test mode and each function on the PC

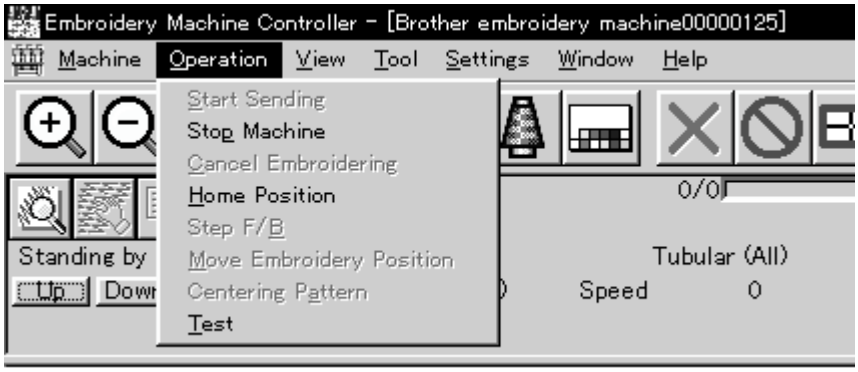
Caution

Most functions are performed on the PC, however the emergency stop switch can not be controlled from the PC.
Turn off the power of the machine in the case of unavoidable circumstances.

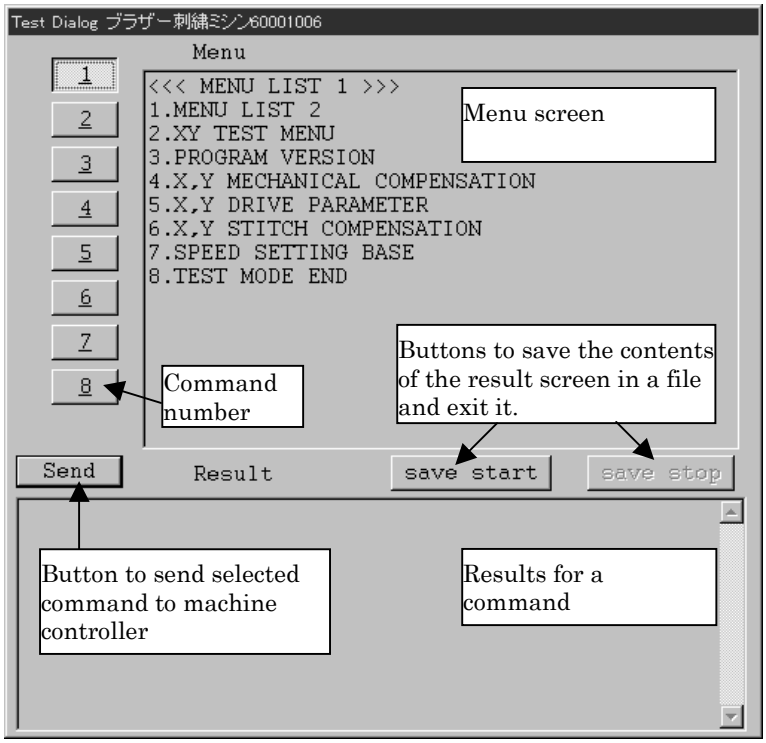
2-1. PC test mode

Operation on the PC

1. Make the window for the machine to be tested active. Click on [Test] in the [Operation] menu.



2. The dialogue box will open. Input "bestest", and click on [OK].
3. Test mode menu list 1 will open. Test modes are arranged in hierarchical order; see "Test mode menu list" for details. A menu screen has the menu title and available commands in the current level. Click on a command number, then [Send] to execute the command. You can also select a command using a number key and Enter key on the keyboard. If the command you select is a command to enter the next menu, the next menu appears; if you select a command to display results, the results appears.



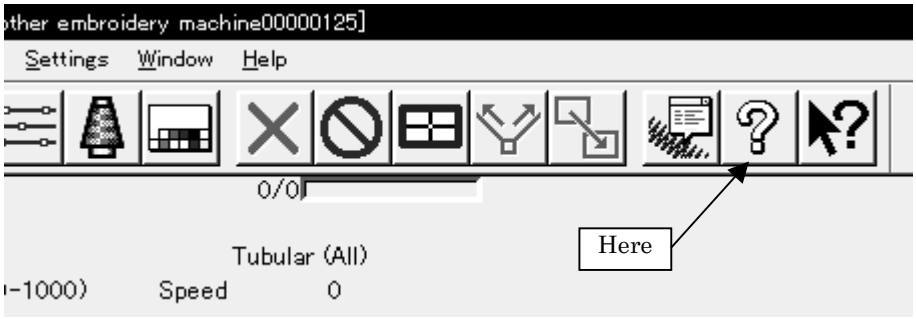
2807M

When finishing the test mode, return to the original stage from the current stage, and select command "6.TEST MODE END" to close the test mode dialogue.
When executing save start, the contents of all result screens until save stop is executed will be saved in a file that has been specified.

2-2. Confirming the program version

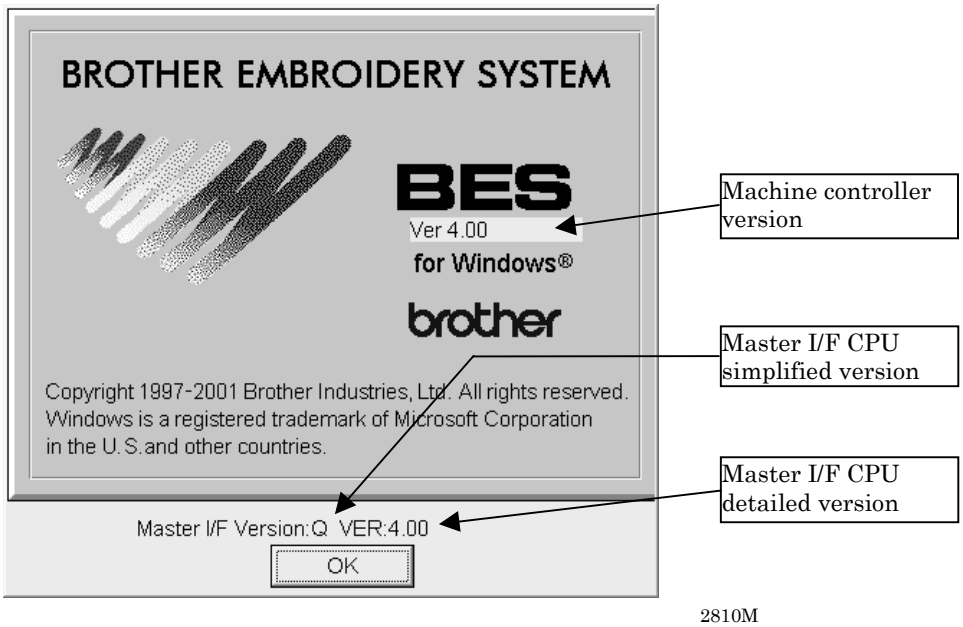
2-2-1. Version for machine controller and master I/F CPU program

1. Click on [?] in the machine controller's toolbar.



2809M

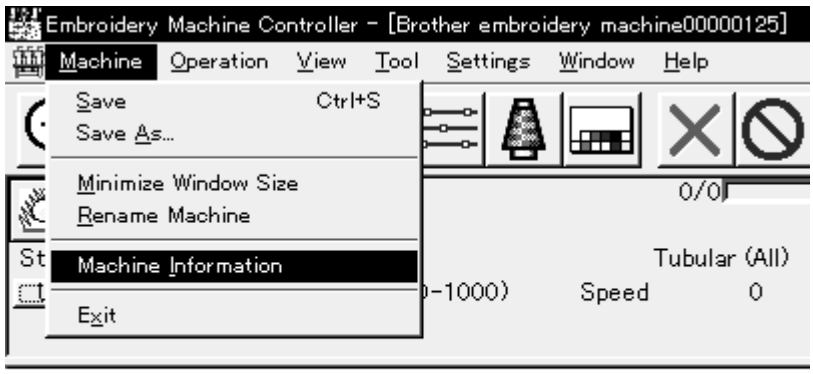
2. The dialog box about this application will appear indicating machine controller's and master I/F's versions. After confirming the version number, click on [OK] to close the dialog.



2810M

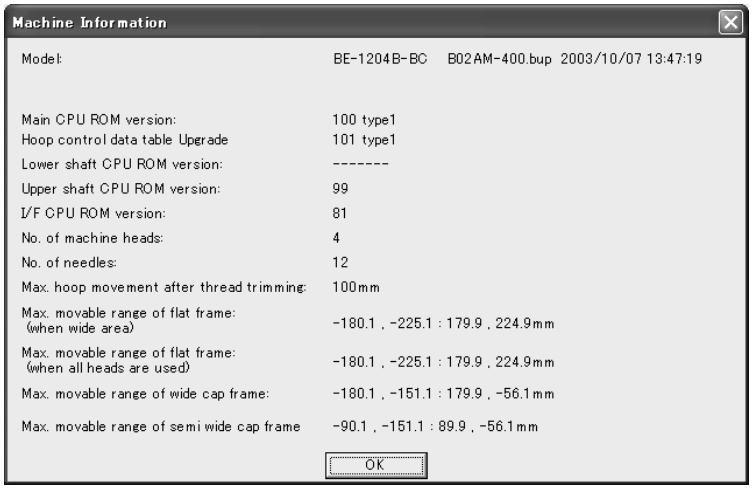
2-2-2. CPU simplified version

1. Activate the window of the machine you want to confirm its CPU program version, and select [Machine Information] from Machine menu.



2812M

2. The machine feature dialogue will appear indicating the main CPU ROM version, the lower shaft CPU ROM version, the upper shaft CPU ROM version, the I/F CPU ROM version and so on. After confirming the versions, click on [OK] to close the dialog box.



2814M

2-2-3. CPU detail version

1. Referring to "1. PC test mode," enter the PC test mode menu list 1.

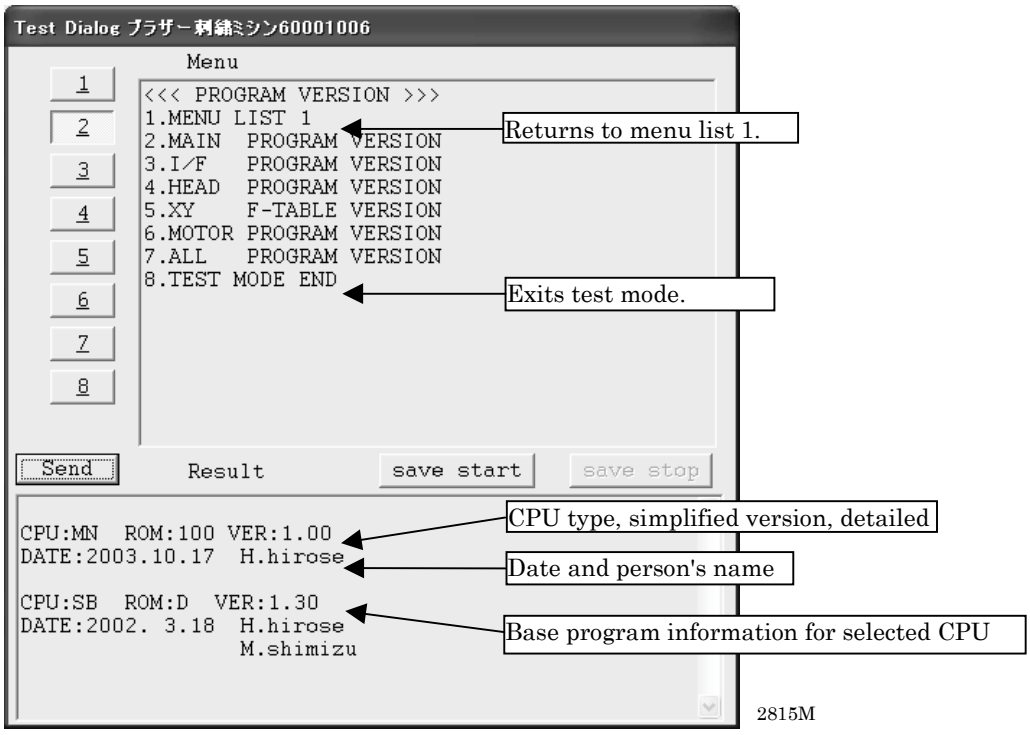
2. Perform command "3. PROGRAM VER."

   Caution

   Refer to "1. PC test mode" for operation procedure.

3. Select a number from 2 to 6 to indicate the version number of a desired CPU program on the result screen.

   2: Main CPU program
   3: Bobbin motor program
   4: Slave I/F CPU program
   5: Panel and head CPU program
   6: XY wave form table
   7: All CPU programs in machine



After confirming the information, exit the test mode to close the dialog box.

2-3. Power supply voltage adjustment

Caution

BES-960 checks the power supply voltage to control it optimally even if it varies or to cope with abnormal voltage supplies.
This function is adjusted before shipment from the factory. However, if the main PCB, the power supply PCB, or the control box is replaced, the adjustment becomes ineffective.
Be sure to adjust the power supply voltage as follows when replacing the main PCB, the power supply PCB, or the control box:

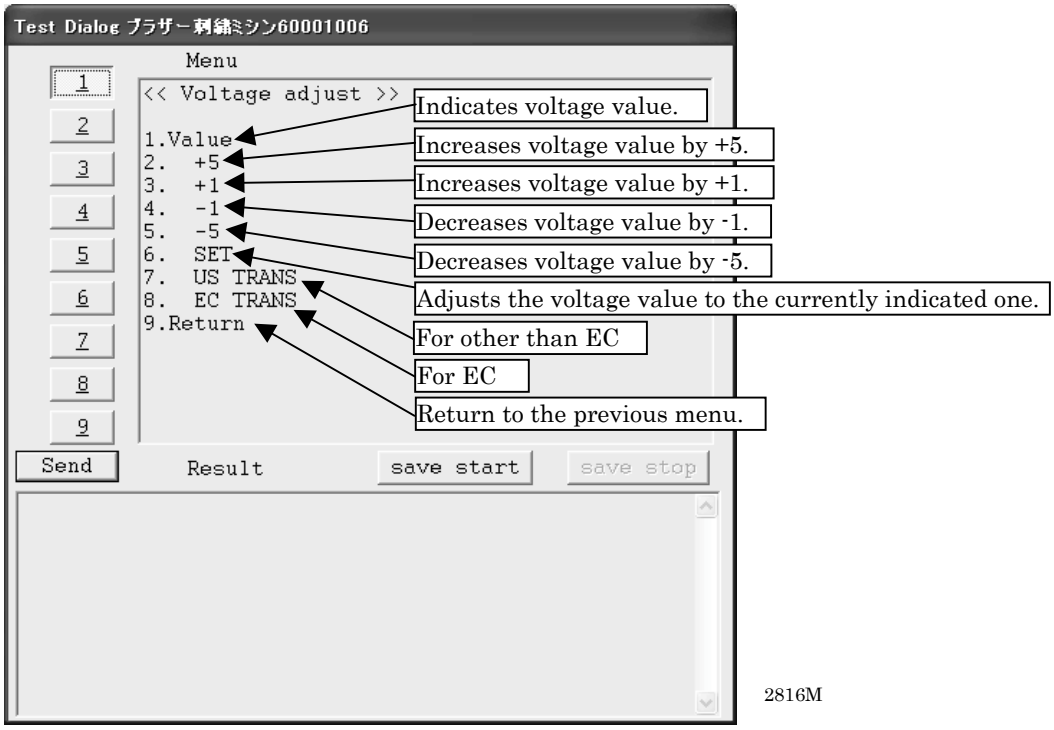
Operation on the PC

1. Referring to "1. PC test mode," enter the PC test mode menu list 1.
2. Perform command "2. XY TEST MENU."

Caution

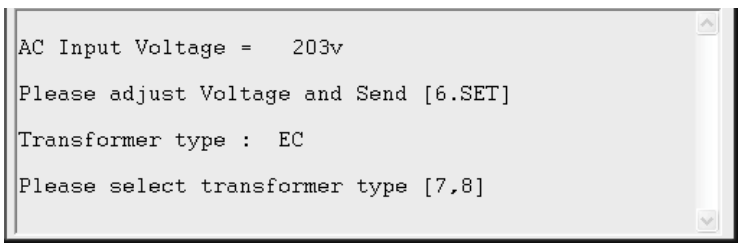
Refer to "1. PC test mode" for the operation procedure.

3. Perform command "1. Voltage adjust" from the BC test menu. The Voltage adjust menu will appear.



2816M

4. Perform command "1. Value" from the Voltage adjust menu. The current voltage value will appear.



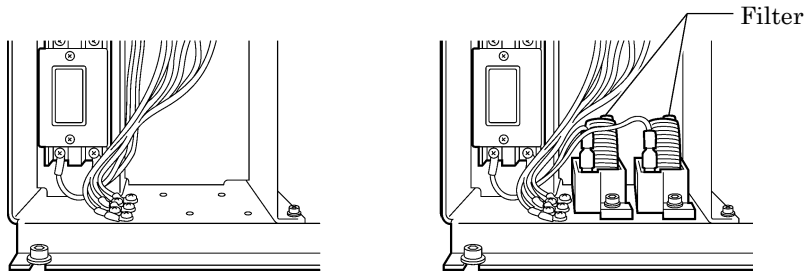
2817M

5. Carefully measure 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 at the rear of the control box, and power source outlet.

6. Using commands 2-5, change the value indicated on the screen to the measured value, and perform command "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 command "2. +5" once (214 + 5 = 219), and then command "3. +1" once (219 + 1 = 220).

7. Execute the command 7 or 8 to configure the transformer.
Choose “7. US TRANS” if the control box in-use is for other than EC area.
Choose “8. EC TRANS” if the control box in-use is for EC area.

* Open the front cover and check if the transformer has a filter to identify its type.



For other than EC
(US TRANS)

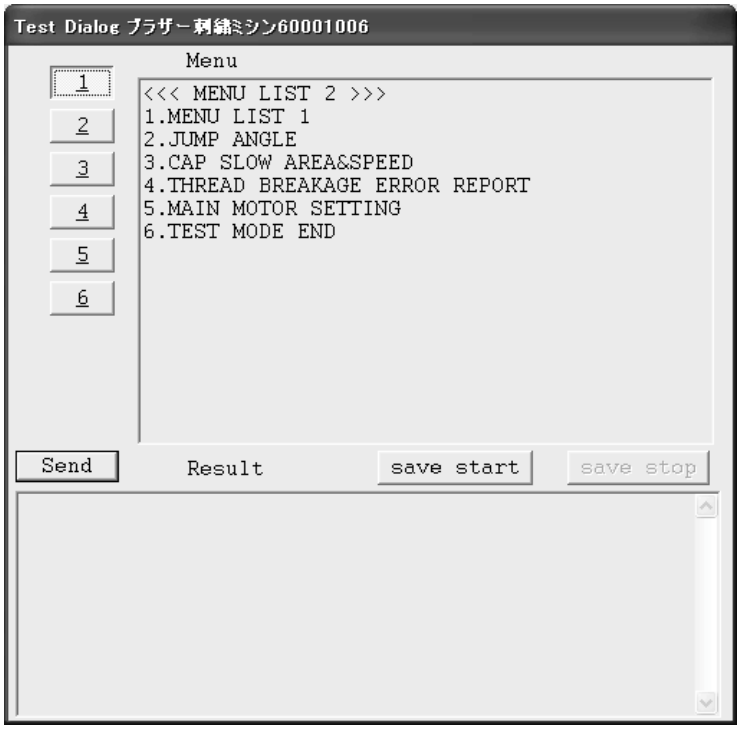
For EC
(EC TRANS)

2738M

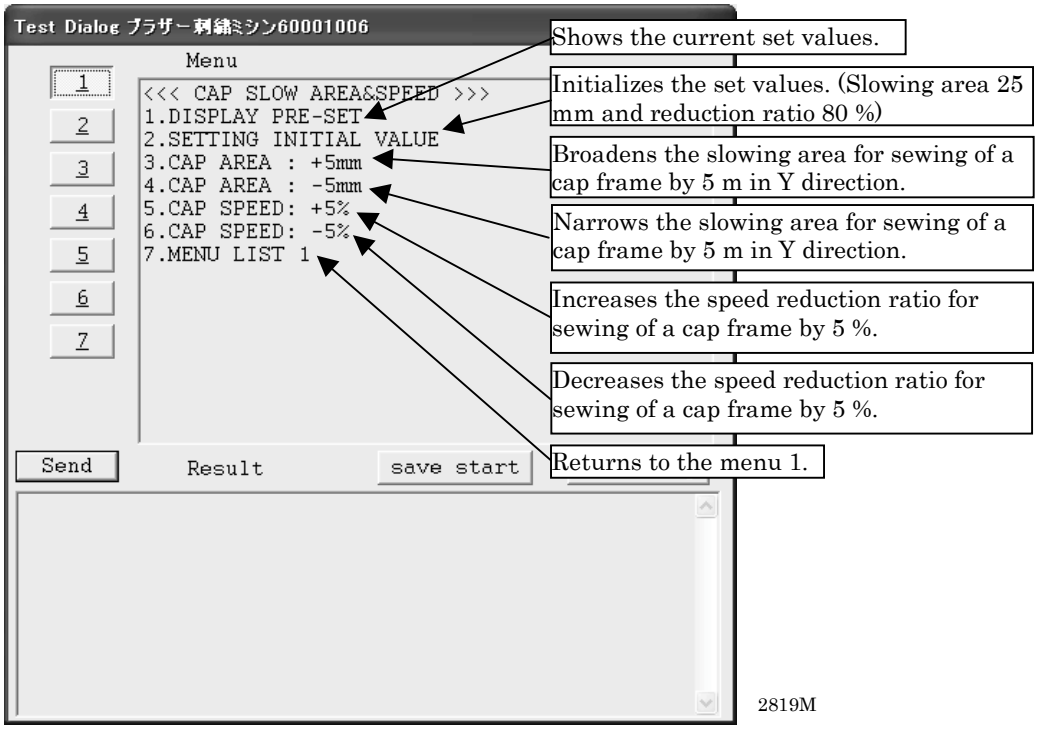
8. Perform command "1. Value" again to reconfirm the voltage. The power supply voltage slightly fluctuates while it is being adjusted. If it is within ± 2 V, it is OK. After the voltage has been adjusted, perform command "9. Return" to return to the previous menu, and exit from the test mode.

2-4. Modifications of X-direction slowing area of a cap frame and its reduction ratio

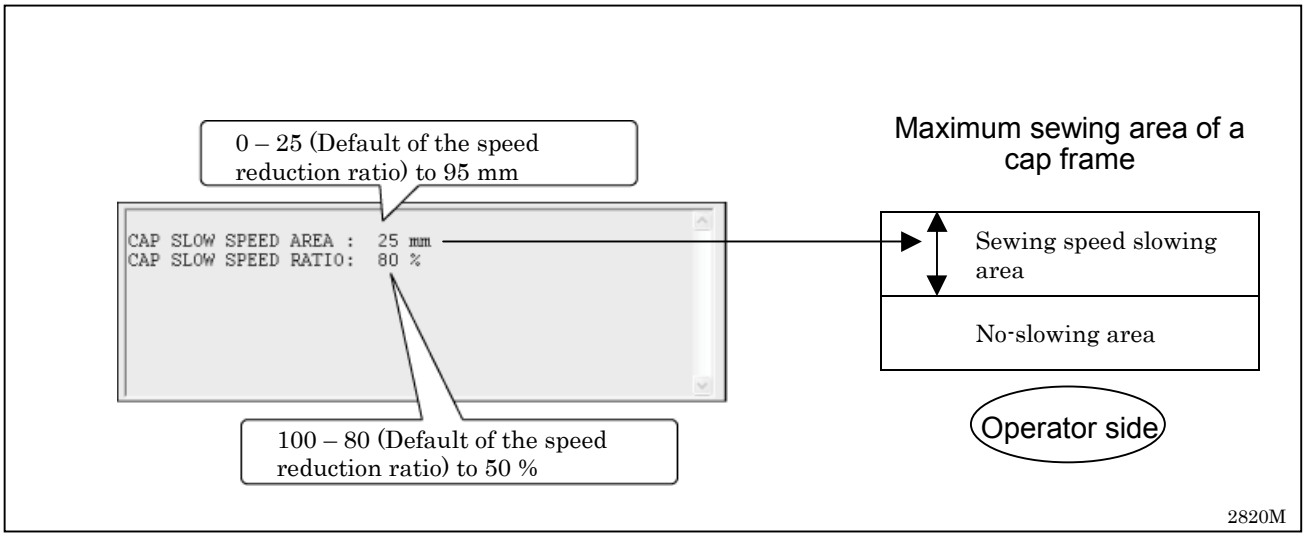
Select “3. CAP SLOW AREA & SPEED” in <<MENU LIST 2>>.



2818M



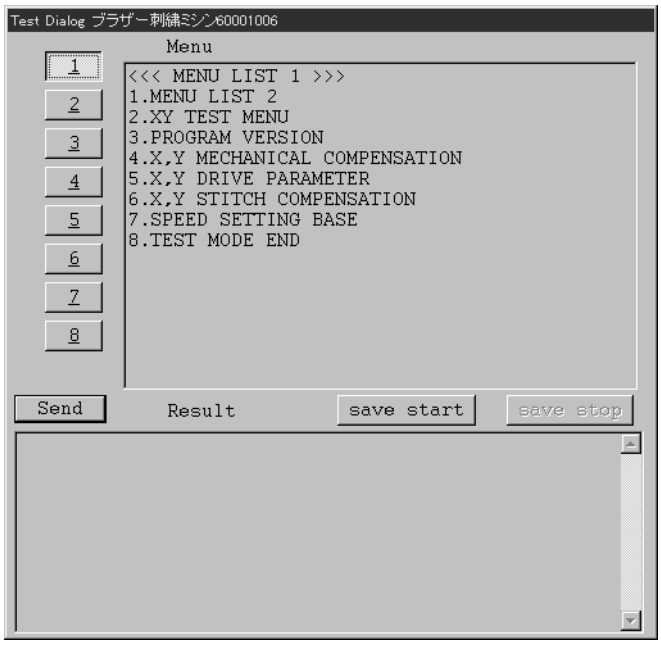
2819M



If set values are all fine, select “7.MENU LIST 1” to return to the menu 1.

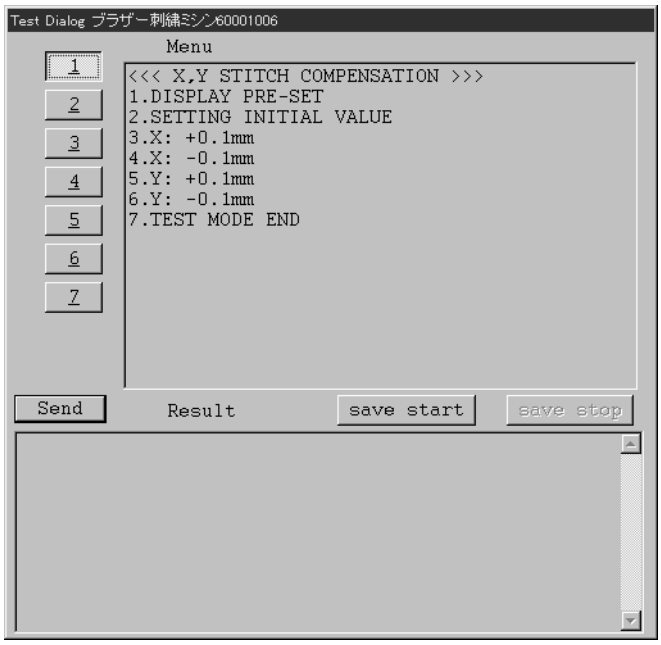
2-5. Modification of the stitch compensation value on the sewing machine

1. Select “6. X, Y STITCH COMPENSATION” from << MENU LIST 1 >>.



2807M

2. Press “7” key. Then press “ESC” key to quit the test mode.



2852M

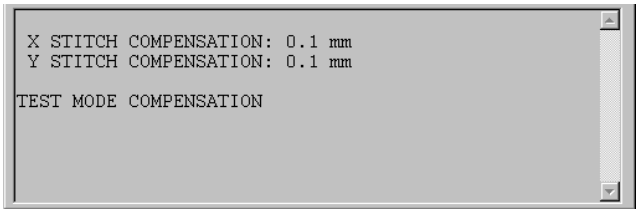
Input required compensation values for X and Y individually, and then press “7” to return to << MENU LIST 1 >>.

CAUTION

X : From - 0.5 to 2.0 mm, in 0.1 mm unit.
Y : From - 0.5 to 2.0 mm, in 0.1 mm unit.

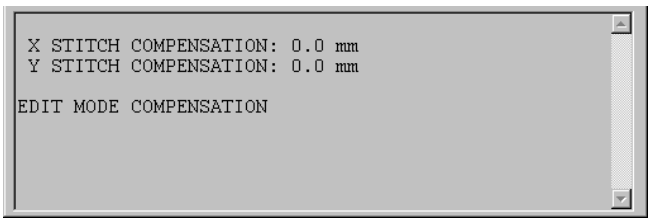
3. The messages will be shown as below when the compensation value modification is completed by pressing “1” through “6” key.

   Cases that the compensation values in the test mode are adopted:



2853M

   Cases that the compensation values modified in the edit mode are adopted (The compensation values in the test mode are both 0.):



2854M

4. Priority between the 2 compensation values; the preset value in the machine and the modified value on the operation panel.

   If the compensation values for X and Y are both set to 0 in the test mode, the values set in the edit mode on the operation panel (on the PC controller) will be adopted. If either of them in the test mode are not 0, the values set in the test mode will be adopted and those set in the edit mode (on the PC controller) will be ignored. The values set in those 2 modes will never be combined.

   The adopted mode will be shown on the test mode screen.

   If “TEST MODE COMPENSATION” is shown, the values set in the test mode are adopted.

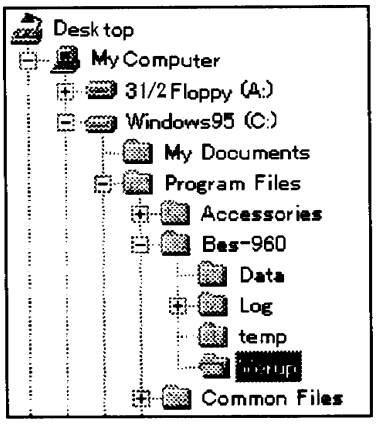
   If “EDIT MODE COMPENSATION” is shown, the values set in the edit mode are adopted.

Chapter 6 Upgrading version of machine program

■ This chapter explains how to upgrade the version of BES960BC programs using the upgrade file which is supplied on the machine controller CD-ROM, a floppy disk, or sent by e-mail.

1. Copy the upgrade file for BES960BC onto the hard disk of the PC connected to the machine.

- File to copy — Copy the file "BES960-xxx.bup". "xxx" of the file name is a 3-digit number to identify the version.
- Where to copy — In the Verup folder in which the machine controller has been installed.
  If you have not specified the drive or folder when installing, the file will be copied to C:/Program Files/Bes-960/Verup



2851M

  This folder is automatically created when the machine controller is started. If this folder already contains an old upgrade file, create another folder and move it to avoid misoperation because of handling the inappropriate upgrade file.

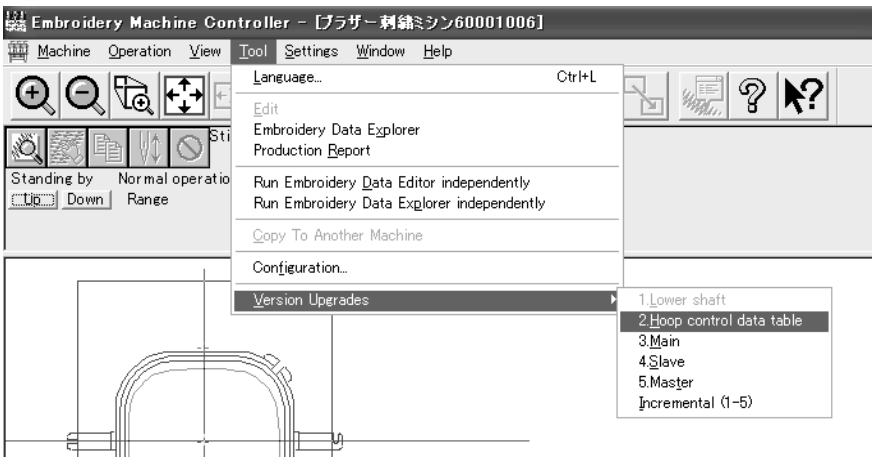
- If you copy from the CD-ROM — While pressing the Shift key, put the disk of BROTHER EMBROIDERY SYSTEM in the CD-ROM drive, and copy the upgrade file from the Verup folder in the CD-ROM drive. The Shift key is used to prevent any setup programs from booting up; it should be kept pressed for a while. If any setup program boots up, cancel the setup before copying.

2. Start the machine controller, and turn on the machine that will be upgraded. If the machine is about to restart sewing after suspension, cancel sewing from the machine panel, and then click x button on the machine's toolbar. (A pattern in the middle of sewing will be canceled.) When the READY lamp on the machine panel is lit, click x button on the machine's toolbar to cancel the sewing data.

3. In the window for a machine to be upgraded, move the pointer to the Tool menu to select the Upgrade Interface Board. The sub menu will appear with four commands to upgrade CPUs. The number of CPUs to be upgraded once is only one. When upgrading each CPU, repeat steps 3-8 for each. Select "1. Lower shaft." (Refer to the figure below.)

   Caution

   This model does not require the upgrade for the “1. Lower shaft”.



2823M

4. The password dialog box will open. Input bes-960, and click [OK].

5. The system will ask you whether to upgrade the CPU or not. Click [OK] to upgrade it.

6. The dialogue box for selecting an upgrade file will open. Select the latest upgrade file copied in step 1, and click [Open].

7. When the upgrade for the version of the selected CPU starts, the indicator shows the degree of the upgrade progress performed. On the machine panel, "P. Upd" will be blinking with the buzzer sounding. (When upgrading the version of a slave CPU, nothing appears on the machine panel.) Do not operate the machine while upgrading.

8. Once upgrading of the version has been normally completed, the status bar (on the bottom of the PC's screen) shows "Normal operation: Version upgrade has been completed," and the machine panel shows "P.End." For a slave CPU, the machine window shuts and re-opens. When upgrading of the version is not normally completed, perform the upgrade for the CPU again.

9. With "P.End" displayed on the machine panel, repeat the above steps 3 to 8 until the versions of all CPUs on the machine have been upgraded. After upgrading the versions of all CPUs, press the stop switch on the machine panel. The machine will restart with its version upgraded.

10. If the PC is connected to multiple machines, repeat the above steps 2-9 to upgrade the versions of other machines.

11. When all machines connected to the PC have been upgraded completely, go to step 3, and click "5. Master" to upgrade the version of the interface board inserted in the slot of the PC. Then perform the above steps 4 - 7.

12. When the version of the master (the interface board) has been upgraded completely, the status bar shows "version upgrade has been completed," and the machine's window shuts and re-opens. When the upgrade is not normally completed, perform the master version upgrade again. This completes version upgrade of the machine.

Chapter 7 Maintenance

⚠ CAUTION

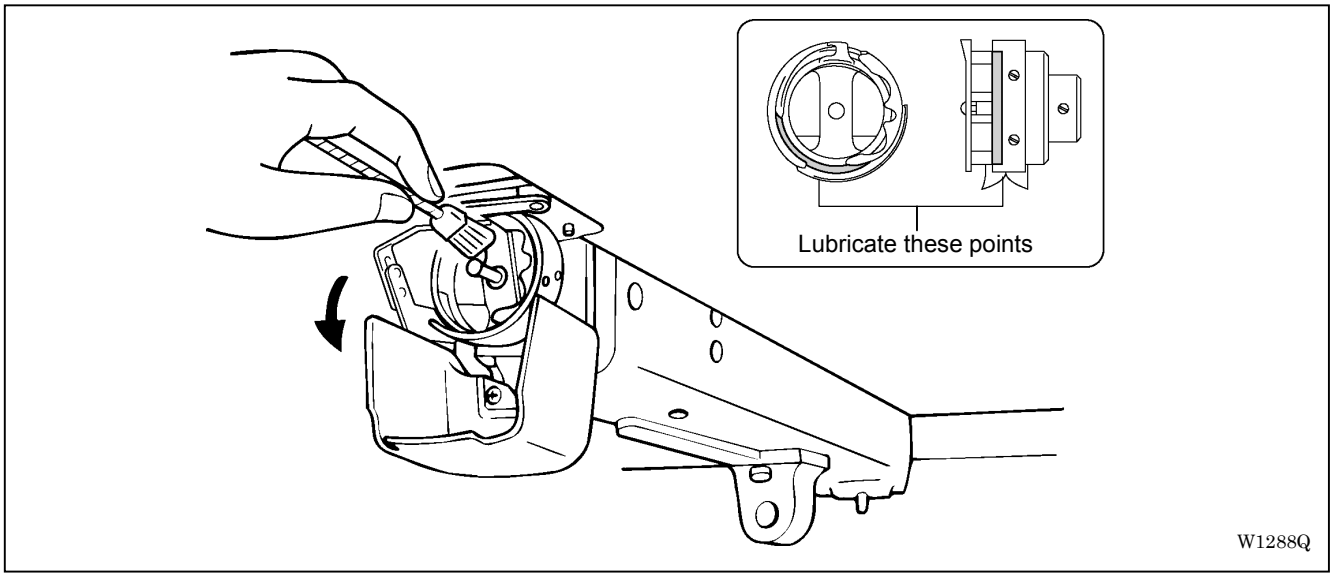
Turn off the power switch before starting maintenance.
Failure to do so may start the machine unintentionally through an accidental activation of the START switch, resulting in bodily injuries.

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.
- 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.
- Never use benzene or thinner for cleaning the machine.

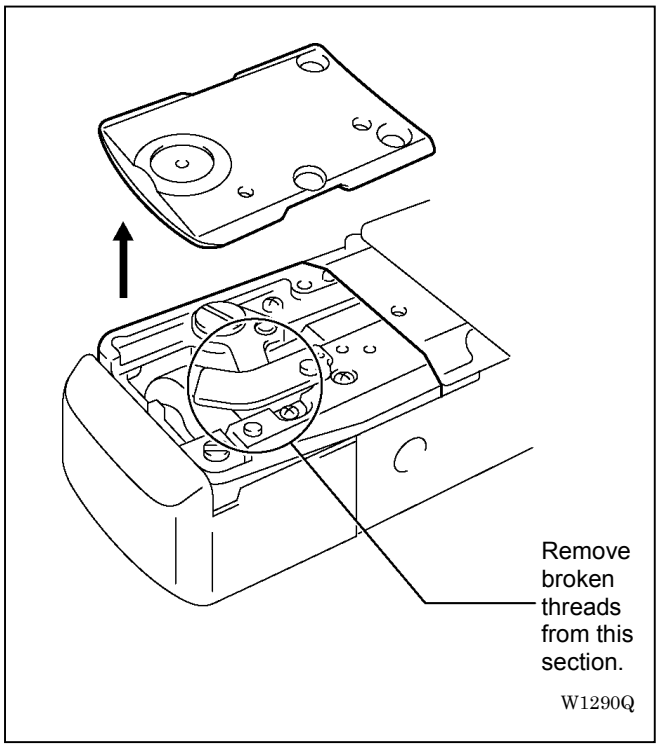
1. Cleaning

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.
- In case of thread breakage errors or noises of the rotary hook, one drop lubricate the race of the rotary hook in every 3 or 4 hours operation.
- Use the dropper provided to supply oil. Use Brother's specified oil (Nippon Oil, Embroidery Lube 10N; VG10).
  * If this type of lubricating oil is difficult to obtain , the recommended oil to use is <Exxon Mobil Essotex SM10; VG10>.
- 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.

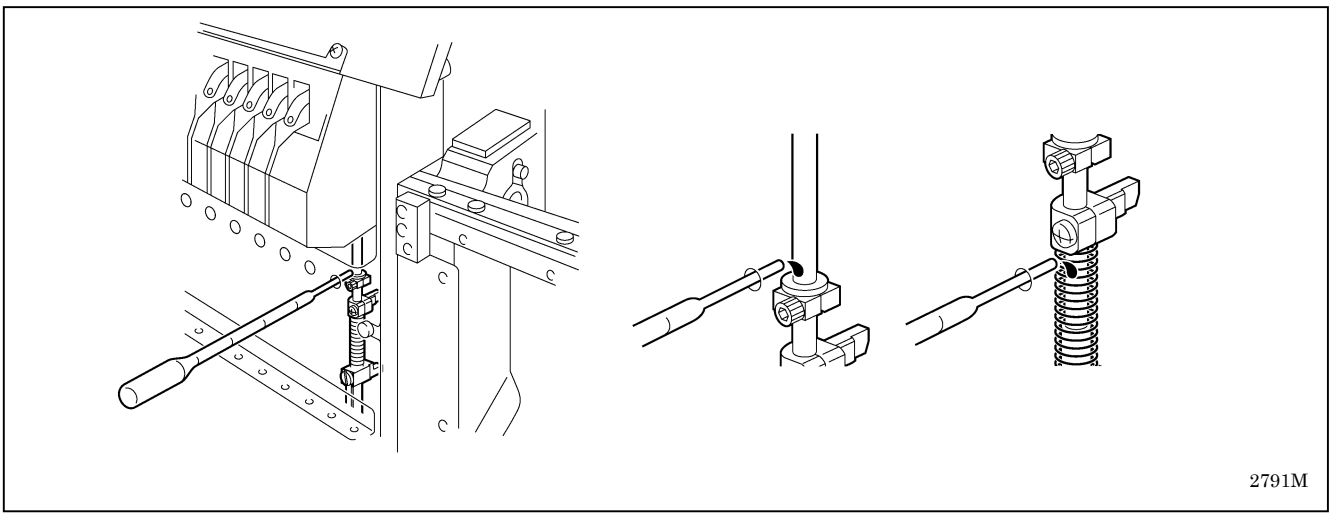
2. Oiling

Supply oil to the following places at regular intervals.

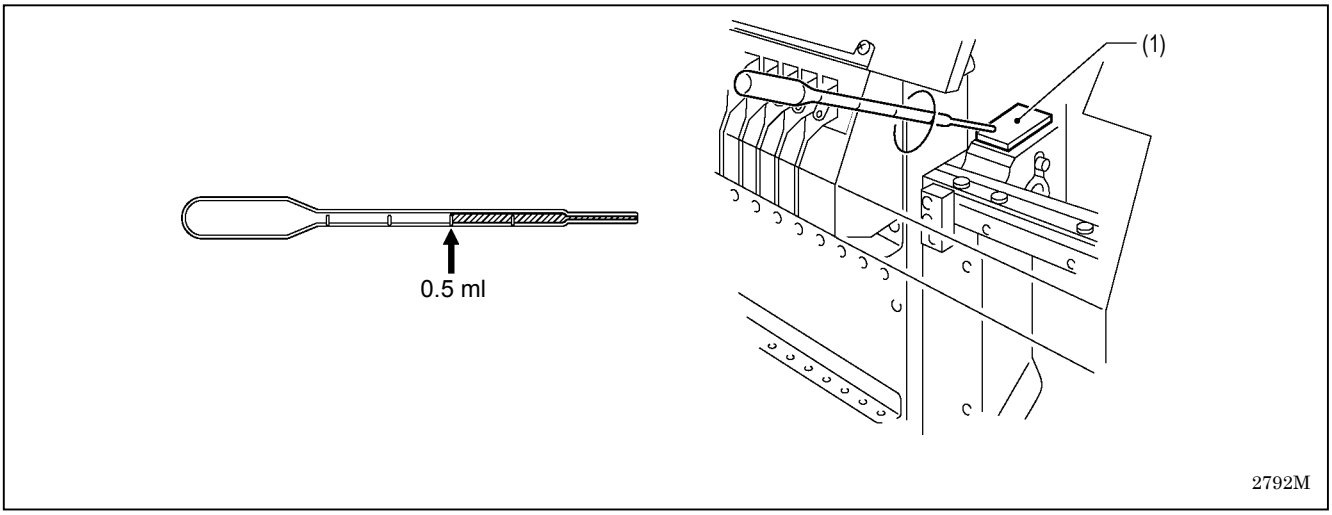
- When oiling, be sure to supply Brother's specified oil (Nippon Oil, Embroidery Lube 10N; VG10) using the dropper.
  * If this type of lubricating oil is difficult to obtain , the recommended oil to use is <Exxon Mobil Essotex SM10; VG10>.
- Excessive oiling may cause the material to be stained.
- Be sure to wipe off excessive oils with waste cloth etc.

2-1. Head

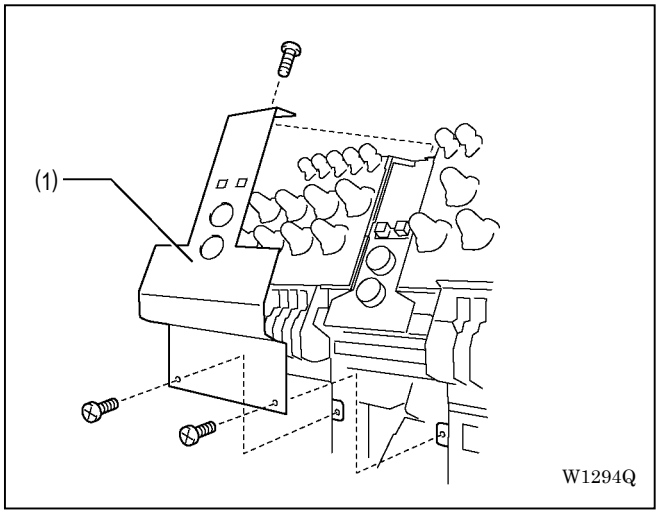
■ Supply one or two drops of oil to each needle bar from the oil supply hole of the lower cover daily.



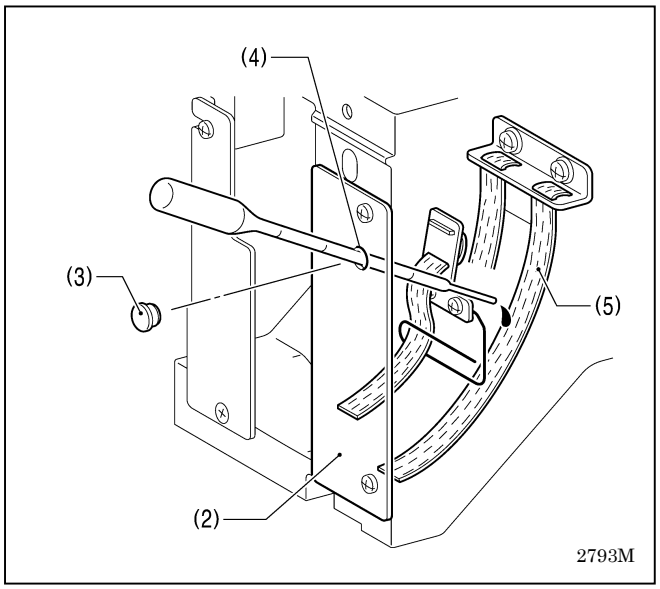
■ Supply 0.5ml of oil to the felt on the top surface of the head once a weak.



■ Supply 0.5 ml of oil to the wick through the oiling hole on the front cover once per 3 months.



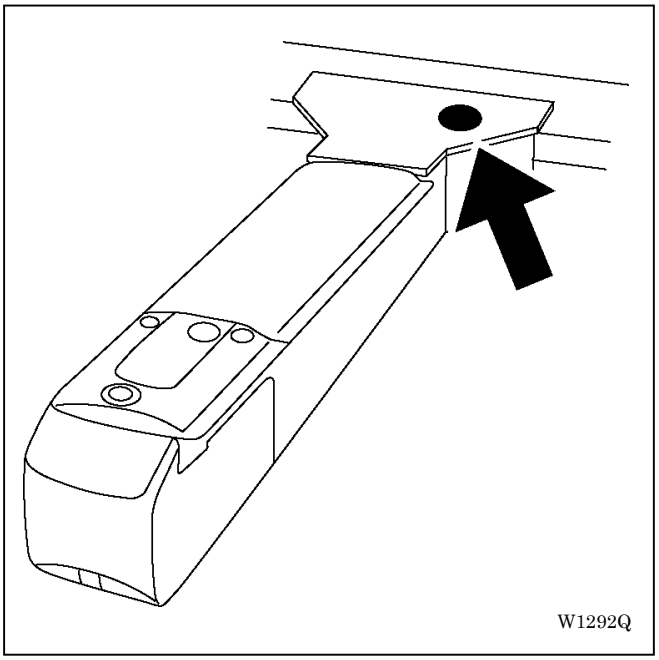
1. Remove the head cover. (1) .



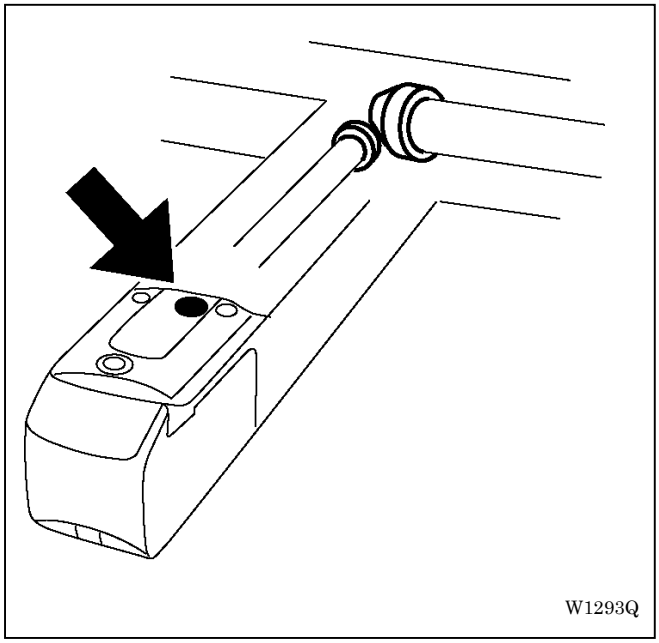
2. Move the needle bar case to the needle bar No.1 position.

3. Remove the rubber cap (3) from the front cover (2) and supply 0.5 ml of oil to the flat wick (5) through the oiling hole (4) using the attached dropper.

2-2. Lower shaft



■ Lubricate the lower shaft bush R through the hole once a month.



■ Lubricate the lower shaft bush F every 3 months.

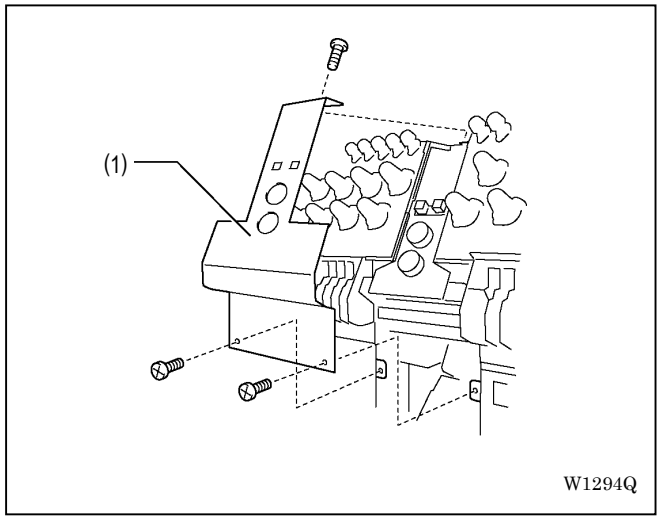
3. Greasing

Supply grease to the following places at regular intervals.

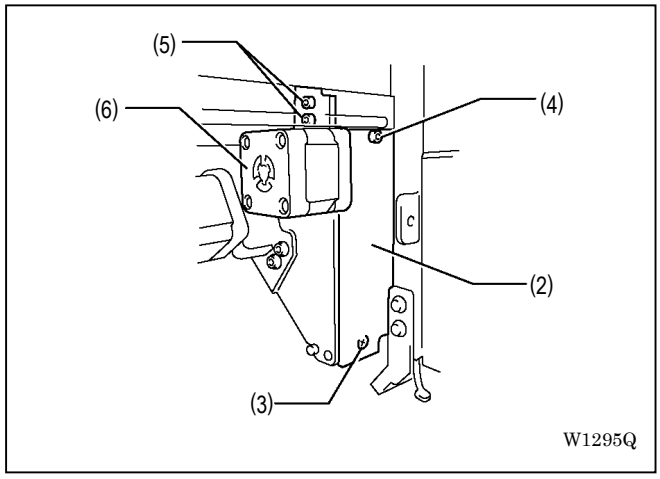
- When greasing, be sure to use the grease tank EM-30L (white) provided with the machine.

3-1. Cam grooves

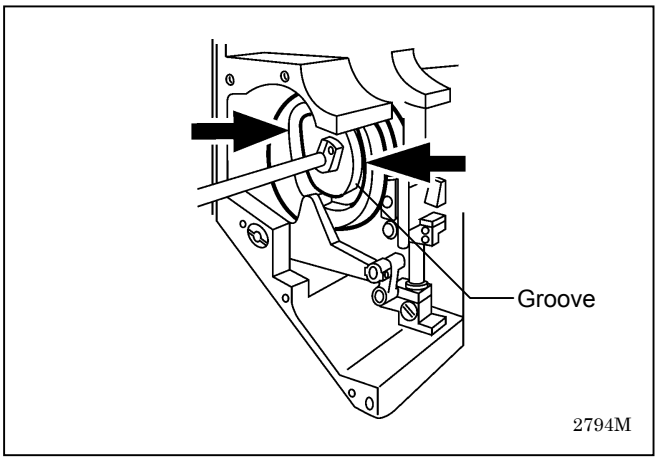
■ Supply grease to cam grooves (two positions) once a month.



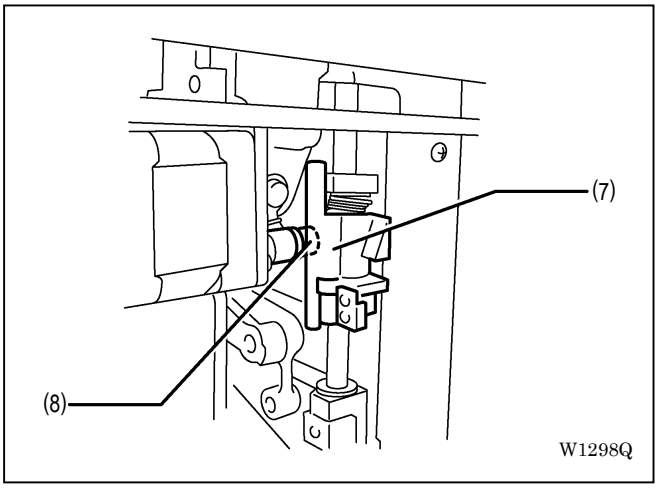
1. Remove the head cover (1).



2. Move the needle bar case to the needle bar No.12 position.
3. Unscrew the lower flat screw (3) fixing the head front cover L (2), and loosen the upper fixing screw (4). Remove the head front cover L (2).
4. Unscrew the two adjusting bolts (5) and detach the jump part stepping motor (6).



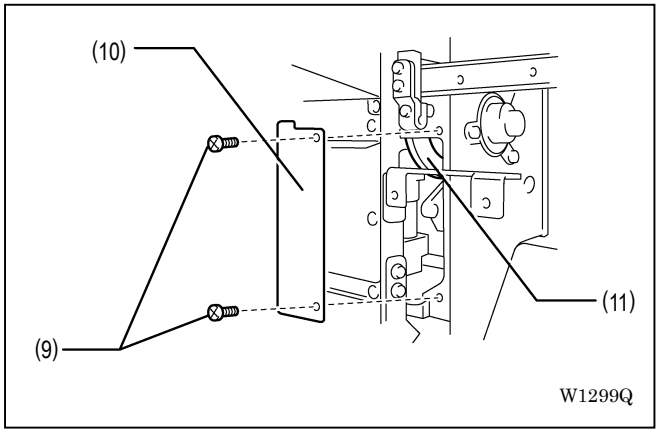
5. Grease all the cam grooves of the work clamp cam.



6. Attach the jump part stepping motor (6) and tentatively tighten the adjusting bolt (5).

7. Adjust the position of the bolt (5) so that the jump part (7) touches the roller (8) of the jump lever assembly, then fully tighten the bolt (5).

   Adjust the roller (8) not to push the jump part (7) but just touches it.



8. Attach the head cover front L (2).

   Apply seal adhesive (equivalent of Three Bond 1215) to the attaching face of the head before attaching the cover.

9. Move the needle bar case to the needle bar No.1 position.

10. Unscrew the 2 fixing screws (9) fixing the head front cover R (10), and remove the head front cover R (10).

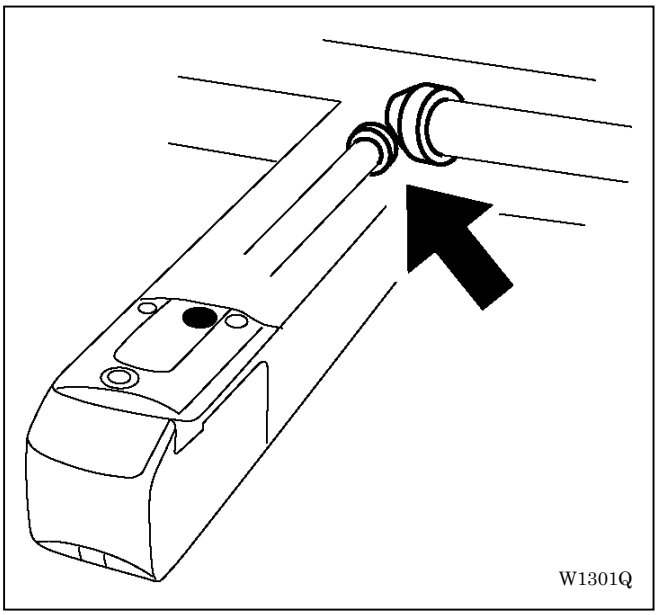
11. Grease all the cam grooves of the thread take-up driving cam (11).

12. Attach the head front cover R (10).

    Apply seal adhesive (equivalent of Three Bond 1215) to the attaching face of the head before attaching the cover.

3-2. Lower gear

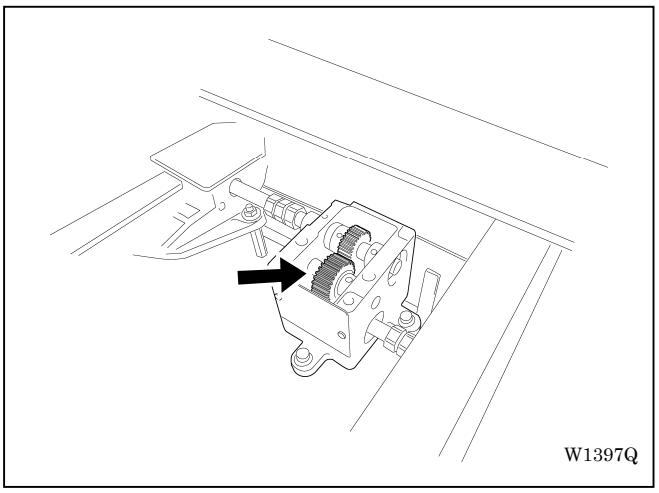
■ Supply grease to the lower gear every three months.



1. Unscrew the 4 flat head screws fixing the bed cover B, and remove the bed cover B.
2. Grease the lower gear.
3. Attach the bed cover B.

3-3. Driving shaft

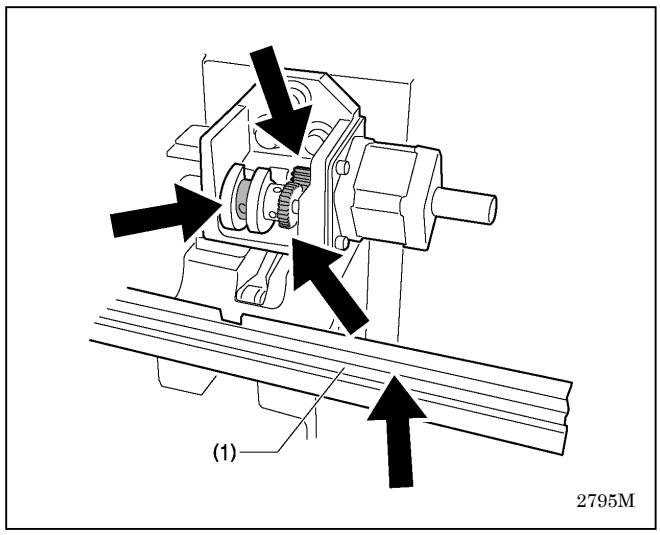
■ Supply grease to the driving shaft every three months.



1. Unscrew four screws fixing the table cover L, and remove the table cover L.
2. Grease the intermediate gear.
3. Attach the table cover L.

3-4. The needle bar change mechanism and the case guide rail UL

■ The needle bar change mechanism and the case guide rail UL require greasing once per 3 months using the attached grease.



1. Unscrew 3 screws securing the head-head cover and the head-head cover R to remove all head-head covers and the head-head cover R.
2. Grease the cam grooves, 2 gears and the case guide rail UL (1).
3. Put back all head-head covers and the head-head cover R.

Chapter 8 Troubleshooting

1. Mechanical Section

Problem	Check points	Measures
Only in narrow satin stitches, lower thread appears on the right side of the cloth.	Tension of the thread take-up spring	Adjust the thread take-up spring by increasing its tension slowly until the lower thread disappears from the right side of the cloth. Refer to “Adjustment of tension spring” in the Instraction manual.
	Tension of the bobbin case and the pathway of the lower thread	Adjust the lower thread to keep its tension between about 0.15 and 0.3 N. Be sure to remove the thread from the thread guide in the bobbin case before this adjustment. The tension was adjusted to be about 2.5 N in factory. Using the optional gauge set TM-3 (59956001) is highly recommended.
		Check if the bobbin is installed correctly. Also check if the lower thread is properly set to the thread guide in the bobbin case. Refer to “Replacing bobbin” in the Instruction.
Due to step-out of the feeding, stitched patterns are misaligned.	The setting of the controller	Check if the embroidery hoop actually installed and its setting on the controller are matched. If they are not matched, step-out of the feeding may occur. Refer to “Embroidery hoop” of the “Setting of Machine” in the Instruction manual.
Upper thread breakage or abnormal sound in the rotary hook.	Oiling on the rotary hook	Supply a drop of oil to the raceway of the rotary hook once per 3 or 4 hours operation. Refer to “Cleanig” of the “Maintenance” in the Instruction manual.

2. Electrical Section

Cautions

- Be sure to turn off the power of the machine and unplug the power cord before checking cable connections.
- When you check connection of the cables as instructed in this manual, also check connection and continuity between connectors.
- Carry out items described in the "Measures" section in order of appearance.
- Some checks and replacement works can be conducted only by repair people. In such cases, contact your dealer.

Symptom	Measures
The machine does not operate even if the power is turned on.	• Is the power cord of the machine plugged in? → Plug in the power cord. • Isn't the emergency stop switch locked ? → Cancel the locking. • Is the connector at the side of the control box connected? → Connect it after checking the connector name. • Is the connector in the control box connected? → Connect it after checking the types and colors of the connectors. • Aren't the fuses on the side face of the control box burnt out ? • Aren't the fuses on the power supply PCB in the control box burnt out ? → Replace the fuse with a new one. If the fuse is blown again, something is faulty. Check to see if the wiring is correct. Replace the control box with a new one.
The machine does not operate even if the power is turned on. The message, "Release stop SW to operate!", is displayed on the panel.	• Check if the connections are proper, beginning with the head-head STOP switch until the head-head PCB. • When using a 6-head machine, verify that the terminal connector is connected to P3 on the head-head I/O PCB located between No. 3 and No. 4 heads.
The needle stop position error occurs.	• Is the pulley manually turned and out of the stop angle? → Turn the pulley, adjust the needle at the stop position, and reset the error. • Check the signal of the stop position sensor in the encoder test mode. → Refer to the adjustment or cable connection block diagram and check connection from the needle position detention sensor to the main PCB. Replace the needle position detection sensor with a new one.
X-axis or Y-axis home position detection error occurs.	• Was the XY carriage moving? → If so, refer to the block diagram showing the cable connections and check to see if connection from the X and Y area sensor to the drive PCB is proper. • Was the XY motor rotating? → If so, check the XY carriage mechanism. • If the XY motor is not rotating, refer to the cable connection block diagram and check to see if connection from the XY motor to the drive PCB is proper.

Symptom	Measures
The thread breakage error frequently occurs although thread is not broken.	• Enter the CASE test mode and turn the thread breakage sensor pulley corresponding to each needle bar of the head with which this error occurs while switching the needle bar from number 1 in ascending order and check to see that the red LED on the head blinks. → If there is no problem, lower the thread breakage sensitivity value of the machine controller. (The standard value is 0.) • Check connection from the thread breakage sensor PCB to the thread tension base PCB if it does not blink. • Replace the thread breakage sensor harness. • Change the thread stud base. • Change the tension bracket PCB.
The X-axis motor connector connection error occurs.	• Refer to the block diagram showing the cable connections and check the connection from the two X motors (one X motors in four head models) on the left and right to the main PCB.
The main shaft motor lock error occurs.	• Enter the encoder signal mode and manually turn the main shaft pulley. → If it is abnormally heavy, the main shaft mechanism is faulty. • Does the main shaft motor rotate at all when the error occurs? → If it does not rotate at all, check fuse F1 and F2 on the power supply PCB in the control box. Refer to the block diagram showing the cable connections and check to see if connection from the main shaft motor to the drive PCB is proper. • Is the main shaft ROM mounted on the main PCB properly ? • Manually turn the main shaft pulley in the encoder signal test mode and check to see if the stop position signal and encoder signal are proper. → If either of the signals does not change, refer to the block diagram showing the cable connections and check to see if connection from the stop position sensor to the power supply PCB is proper.
ERROR A8 frequently occurs.	• In the encoder signal test mode, manually turn the main shaft pulley and check to see that the stop position signal is correct. → If the signal does not change, refer to the cable connection block diagram and check to see if connection from the stop position sensor to the power supply PCB is proper.
Power frequency error occurs.	• Check if the connection between both P3-s on the power supply PCB and on the main PCB is proper.
Wiper out error occurs.	• Does the wiper on the error head remain projected? → If the wiper is tangled with a thread, remove it. If the wiper does not return smoothly, adjust it. • Enter the solenoid test mode and operate the wiper motor. Check the icon on the panel. → If the icon is not reversed white, check to see if connection from the wiper sensor to the head PCB is proper. Replace the wiper sensor with a new one. Replace the head PCB with a new one.
ERROR C7 occurs.	• Turn the power off once and on again. If the same error occurs again, replace the main PCB with a new one.

Symptom	Measures
Main shaft rotation speed error occurs.	• Enter the encoder signal test mode and manually turn the main shaft pulley. → If it is abnormally heavy, the main shaft mechanism is faulty. • Refer to the block diagram showing the cable connections and check to see if connection from the main shaft motor to the drive PCB is proper.
Power voltage upper or lower limit error occurs.	• Is the tap voltage in the control box (connector connection) adjusted to the power voltage of the area where the machine is used? → If not, switch the connector connection. • Check the input voltage values in the port/voltage check test mode. Measure the power supply voltage with the tester and compare them. → If the voltage value is significantly out of the normal range (± 5v or more), calibrate it with the voltage calibration in the test mode. • When you cannot enter the test mode because this error frequently occurs, set the voltage to a relatively high value with the machine controller if it is E-D2 and to a relatively low value if it is E-D3 to avoid errors. Check and calibrate the voltage in the test mode. • Check to see the connection of connector P2 of the power supply PCB to connector P10 of the power supply PCB in the control box is proper. • Is the power supply abnormally low because a machine with a large capacity (compressor and the like) is used? →Change the power source to another system. It is preferable to use a stabilized power supply etc. for the source. • Replace the power PCB with a new one. Replace the main PCB with a new one.
Only a certain head does not operate.	• Is the head out of action with either the head switch or the machine controller? • Refer to the block diagram showing cable connections and check to see that other cables are connected to the head switch PCB and the head PCB and the head PCB properly.
Wiper motor does not operate.	• Check to see if connection from the wiper motor to connector P8 and P9 of the head PCB is proper. • Replace the head PCB with a new one.
Abort of the exhaust fan motor occurs. (Fans are stopped.)	• Haven't any harnesses etc. been entangled in the fan ? • Isn't the harness of the fan disconnected to the PCB, or doesn't it have any breaking of wire ? • Change the fan.
Abort of the exhaust fan motor occurs. (Fans are all moving.)	• Doesn't the harness (yellow) of the fan have any breaking of wire ? • Check if the connection between both P3-s on the main PCB and on the power supply PCB is proper. • Change the main PCB.
The picker solenoid does not work.(In all heads)	• Check if the connections are proper, beginning with P1 on the picker PCB until P7 on the power supply PCB. • Change the picker PCB. • Change the main PCB. • Change the power suppply PCB.

Symptom	Measures
The picker solenoid does not work. (In some heads)	• Check if the connection between the picker solenoid and the picker PCB is proper. • Measure the resistance of the picker solenoid. The normal value is about 45 ohm. → If the measured value is abnormal, change the solenoid. • Change the picker PCB.
Origin point error of the thread trimming motor occurs. (The thread trimming motor is working.)	• Check if the connections are proper, beginning with the thread trimming sensor until the I/O PCB on the right side of the sewing machine. • Adjust the thread trimming sensor. • Change the thread trimming sensor. • Change the I/O PCB on the right side of the sewing machine.
Origin point error of the thread trimming motor occurs. (The thread trimming motor does not work.)	• Aren't there any waste thread captured in the movable knife ? • Try to rotate the connecting shaft of the thread trimming mechanism by hand to check if it moves smoothly. → If not, the thread trimming mechanism must have a trouble. • Check if the connection between the thread trimming motor and the right side of the sewing machine is proper. • Measure the resistances between No. 1 and No. 3 pins and between No. 4 and No. 6 pins among the connectors of the thread trimming motor. Its normal value is about 1.8Ω and the resistance between No. 1 and No. 6 pins has to be infinite. If any of them are improper, change the thread trimming motor. • Check if the connection between the connector P11 on the main PCB and P17 on the power supply PCB is proper. • Check the fuses F1 and F2 on the power supply PCB. → Change them if blown out. And if the blowout occurs again, change the power supply PCB. • Change the drive PCB.
Overcurrent error in the thread trimming motor occurs.	• Aren't there any waste thread captured in the movable knife ? • Try to rotate the connecting shaft of the thread trimming mechanism by hand to check if it moves smoothly. → If not, the thread trimming mechanism must have a trouble. • Rotate the main shaft pulley by hand. → If there is any point which sensed unusually heavy, the main shaft mechanism must have a trouble. • Measure the resistances between No. 1 and No. 3 pins and between No. 4 and No. 6 pins among the connectors of the thread trimming motor. Its normal value is about 1.8Ω and the resistance between No. 1 and No. 6 pins has to be infinite. → If any of them are improper, change the thread trimming motor. • Check if there is any breaking of wire or disconnection of connectors on the A and B phase harnesses of the upper shaft sensor. → Change the upper shaft sensor if any. • Change the drive PCB.

Symptom	Measures
Needle bar case lock occurs. (The change color motor is working.)	• Remove the cover R and try to rotate the change color pulley by hand. → If there is any point which sensed unusually heavy or catchy, adjust the change color mechanism or the needle bar case etc. • Rotate the change color pulley by hand to move it halfway. Then press the change color key on the operation panel and check if the needle bar case returns to the correct position. → If it does not move, change the index sensor N PCB. • Change the I/O PCB on the right side of the sewing machine.
Needle bar case lock occurs. (The change color motor does not work.) Overcurrent error in the change color motor occurs.	• Check if the connections are proper, beginning with the change color motor until the drive PCB referring to the block diagram of the cable connection. • Measure the resistances between No. 1 and No. 3 pins and between No. 4 and No. 6 pins among the connectors of the change color motor. Its normal value is about 6.6Ω and the resistance between No. 1 and No. 6 pins has to be infinite. → If any of them are improper, change the change color motor. • Change the drive PCB.
Wrong needle bar numbers are shown on the panel or display.	• Possibility of a mistake in the installation of the change color sensor dog. • Possibility of a malfunction in any of the index sensors A to D, or a mistake in connections of them.
The jump motor does not work. Overcurrent error in the jump motor occurs.	• Check if the connections between the jump motor and the connector P11 or P12 on the head PCB are proper. • Measure the resistances between No. 1 and No. 3 pins and between No. 4 and No. 6 pins among the connectors of the thread trimming motor. Its normal value is about 3Ω and the resistance between No. 1 and No. 6 pins has to be infinite. → If any of them are improper, change the jump motor. • Change the head PCB.
Power supply PCB error occurs.	• Check if the connection between both P3-s on the main PCB in the control box and on the power supply PCB are proper. • Change the power supply PCB.
Communication error between the head-head CPUs occurs.	• Check if the dip switches on the I/O PCBs between the heads or located on the right side of the machine are correctly set. Also check if the connectors of P6 and P9 are firmly connected. • Check if the connectors of “I/O” on the right side of the box are connected properly. • Check if the connection between P6 on the main PCB and P10 on the power supply PCB is proper. • Change the I/O PCB which shows an error.
Communication error between the head CPUs occurs.	• Check if the dip switches on the head PCB are correctly set. Also check if the connectors P4 and P5 are firmly connected. • Check if the connectors of “HEAD” on the right side of the box are connected properly. • Check if the connection between P6 on the main PCB and P10 on the power supply PCB is proper. • Change the head PCB which shows an error.

Chapter 9 Error code list (For Stand Alone)

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.	
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	Home position detection is out of range	Home position detection out of range	This is not usually displayed.
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	Adjust the position of needle bar case manually, then 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 proper position sensor is faulty.
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	Lower thread breakage error	Lower thread broke during embroidering.	After the replacement of the lower thread, press the STOP or turn ON the F/B switch on the head to either side.
E-0D	ERROR 0D	The machine does not return to the home position.	This is not usually displayed.
E-0E	ERROR 0E	Mending finish	
E-0F	Needle bar No. reading error	Failed in the reading of needle bar No.	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty, or the color change position sensor is faulty.
E-10	The beam sensor turned ON	Abort by the beam sensor ON	Press the STOP or turn ON the F/B switch on the head to either side.
E-11	X sensor reading error	Failed in the reading of X home position sensor	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty.
E-12	Y sensor reading error	Failed in the reading of X home position sensor	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty.

Code	Error Messages	Error	Measures
E-13	Performing the home position detection for the hoop position adjustment	This is displayed in case that the machine had been shut down while the hoop was moving and now is started up in a mode without the home position detection, or in case that the machine is started up in a mode without the home position detection after pressing the CAP SW to change the hoop.	Press the [↵] to start the home position moving.
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 restart.	Stop error during SSP processing (when pressing the stop key while the hoop is moving)	Hoop movement restarts if you press [START].
E-16	Needle bar No. of the destination is abnormal	Needle bar No. of the destination is out of range	Press the [STOP], or turn ON the F/B switch on the head to either side to cancel the error and set up the needle bar setting again.
E-17	Speed range abnormal	Speed range is out of range	This is not usually displayed.
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 not displayed in this model.
E-1F	Presser foot down error	Presser foot down error while searching for home position just after the power is turned on.	
E-21	Area over [+X]	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 [+Y]	Hoop overhang (+Y)	
E-23	Area over [+X, +Y]	Hoop overhang (+X, +Y)	
E-24	Area over [-X]	Hoop overhang (-X)	
E-25	Area over [+X, -X]	Hoop overhang (+X, -X)	
E-26	Area over [-X, +Y]	Hoop overhang (-X, +Y)	
E-27	Area over [+X, -X, +Y]	Hoop overhang (+X, -X, +Y)	
E-28	Area over [-Y]	Hoop overhang (-Y)	
E-29	Area over [+X, -Y]	Hoop overhang (+X, -Y)	
E-2A	Area over [+Y, -Y]	Hoop overhang (+Y, -Y)	
E-2B	Area over [+X, +Y, -Y]	Hoop overhang (+X, +Y, -Y)	

Code	Error Messages	Error	Measures
E-2C	Area over 	Hoop overhang (-X, -Y)	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-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)	
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.	This is not displayed in this model.
E-41	This function is not supported. Turn off the power	Invalid start-up error	
E-42	XY movement error	XY movement error	Press the STOP or turn on the F/B switch on the head to either side. If this error occurs frequently, check if the tension of the pulley belt is proper.
E-43	Slave I/F EEPROM read error	I/F CPU failed to read EEPROM data	Turn the power off and on once. If the same error occurs again, the main PC is faulty.
E-44	Inter-head CPU communication error	Failed in the communication with inter-head CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the inter-head CPU may be disconnected.
E-45	Head CPU communication error	Failed in the communication with head CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the head CPU may be disconnected.
E-46	XY CPU communication error	Failed in the communication with XY CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the main PCB is faulty.
E-47	I/F CPU communication error	Failed in the communication with I/F CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the main PCB is faulty.
E-48	Main shaft rotation abnormal	The main shaft rotated the opposite way	Turn OFF the power and check if the sensors of the encoder A and B are connected correctly, not mixed-up each other. If those connections are correct, then check if the pin connections of the main shaft motor connectors are correct.
E-49	Can not identify the machine model	Can not identify the machine model	Turn OFF the power, check if the model identification harness is connected properly, and turn ON the power again.
E-4A	I/O CPU communication error	Failed in the communication with I/O CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the I/O PCB may be disconnected.

Code	Error Messages	Error	Measures
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	
E-A5	Spindle CPU error	Spindle motor CPU error	
E-A6	ERROR A6	Spindle motor CPU communication command error	
E-A7	ERROR A7	Spindle motor CPU send/receive error	
E-A8	ERROR A8	Spindle stop position signal error	Adjust the pulley stop position (100 °) 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	Spindle CPU parameter error	Spindle CPU parameter error	This is not displayed in this model.
E-B0	Lower shaft CPU error	Lower shaft CPU error	
E-B1	Thread jammed in rotary hook	Thread tangle in rotary hook	
E-B2	Hook motor origin point error	Hook motor origin point error	
E-B3	Hook motor standby position error	Hook motor standby position error	
E-B4	Hook motor standby position error	Hook motor motor mode error	
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	
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 on once. If the same error occurs again, the lower shaft motor is faulty.
E-BA	Power supply frequency error	Power supply frequency 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-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	This is not displayed in this model.
E-BE	Lower shaft version-up error	Lower shaft version-up error	
E-BB, BF	ERROR BB, BF	Lower shaft motor undefined error	
E-C1	ERROR C1	Area over during embroidering	

Code	Error Messages	Error	Measures
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	Check the connection of the communication cable of the panel. If the cable is connected correctly , press the STOP or turn on the F/B switch on the head to either side. If the cable is disconnected , turn off the power and connect the cable.
E-C4	Presser foot down error	Presser foot down error	This is not usually displayed.
E-C5	ERROR C5	Measured voltage value could not be received form the lower shaft motor CPU.	
E-C6	ERROR C6	Voltage value could not be transferred to the lower shaft motor CPU.	
E-C7	ERROR C7	Lower shaft error	
E-C8	ERROR C8	Hook motor origin point error	
E-C9	Embroidering start error	Embroidering start error	
E-CA	ERROR CA	No sewing permisson	
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	Spindle rotation command sending error	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	This is not usually displayed.
E-CF	ERROR CF	Rated voltage value could not be received from the lower shaft motor CPU.	
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.	This is not usually displayed.
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-D4	Thread trimming motor overcurrent	Thread trimming motor overcurrent	Turn OFF the power. The possible causes for this error are, troubles of the thread trimming motor, troubles of the main PCB, and troubles of the drive PCB.
E-D5	Needle bar case motor overcurrent	Needle bar case motor overcurrent	Turn OFF the power. The possible causes for this error are, troubles of the needle bar case motor, troubles of the main PCB, and troubles of the drive PCB.
E-D6	Jump motor overcurrent	Jump motor overcurrent	Turn OFF the power. The possible causes for this error are troubles of the jump motor and troubles of the head PCB.
E-D7	Temperature rise error Clean the fan filter	The temperature of the heat sink on the drive PCB rose excessively	Turn OFF the power and check if the fan filter has any clogging.

Code	Error Messages	Error	Measures
E-D8	Temperature sensor abnormal	Temperature sensor abnormal	Turn OFF the power. The possible causes for this error are troubles of the thermistor and troubles of the drive PCB.
E-E1	X-axis pulse motor overcurrent stop Turn off the power	X-axis pulse motor overcurrent stop	Turn OFF the power and ON once. If the same error occurs again, the pulse motor or the drive 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 OFF the power again. If the same error occurs again, the fan or the power PCB is faultly.
E-E4	Hook motor error	Lower shaft communication error	This is not displayed in this model.
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-EE	ERROR EE	Abnormal data received in the inner-machine communication	
E-EF	ERROR EF	Receiving error on interface	
E-F1	ERROR F1	Receive time up error	
E-F2	ERROR F2	Request-to-waiting time up error	
E-F3	ERROR F3	Request-to-receive 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	This is not usually displayed.
E-FA	ERROR FA	Interface receive data check sum error	
E-FB	ERROR FB	Send time up error	
E-FF	ERROR FF	No status is returned from spindle, lower shaft motor, or CPU.	

Chapter 10 Error code list (For PC Control type)

Code	Error	Measures
E-00	No error occurs.	This is not usually displayed.
E-01	Either motor of main shaft, X- or Y-axis, or lower shaft has locked.	
E-02	Overtravel occurs during home position detecting movement.	
E-03	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	Home position detection out of range	This is not usually displayed.
E-05	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	Adjust the position of needle bar case manually, then 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 proper position sensor is faulty.
E-07	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	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 detection error	Turn the power off and on once. If the same error occurs again, the X-axis mechanism is faulty.
E-0A	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	Stop or emergency stop during sewing	This is not usually displayed.
E-0C	Lower thread broke during embroidering.	After the replacement of the lower thread, press the STOP or turn ON the F/B switch on the head to either side.
E-0D	The machine does not return to the home position.	This is not usually displayed.
E-0E	Mending finish	
E-0F	Failed in the reading of needle bar No.	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty, or the color change position sensor is faulty.
E-10	Abort by the beam sensor ON	Press the STOP or turn ON the F/B switch on the head to either side.
E-11	Failed in the reading of X home position sensor	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty.
E-12	Failed in the reading of X home position sensor	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the I/O CPU communication is faulty.
E-13	This is displayed in case that the machine had been shut down while the hoop was moving and now is started up in a mode without the home position detection, or in case that the machine is started up in a mode without the home position detection after pressing the CAP SW to change the hoop.	Press the ↵ to start the home position moving.

Code	Error	Measures
E-14	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	Stop error during SSP processing (when pressing the stop key while the hoop is moving)	Hoop movement restarts if you press START.
E-16	Needle bar No. of the destination is out of range	Press the STOP, or turn ON the F/B switch on the head to either side to cancel the error and set up the needle bar setting again.
E-17	Speed range is out of range	This is not usually displayed.
E-18	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	Destination coordinates error	This is not usually displayed.
E-1B	The machine has reached the mending stop position.	
E-1C	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	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	When the power is turned on, bed can not be retracted.	This is not displayed in this model.
E-1F	Presser foot down error while searching for home position just after the power is turned on.	
E-21	Hoop overhang (+X)	Pattern or the needle position is out of the embroidering area. Reset the embroidering area with the PC or move the hoop to the sewable position.
E-22	Hoop overhang (+Y)	
E-23	Hoop overhang (+X, +Y)	
E-24	Hoop overhang (-X)	
E-25	Hoop overhang (+X, -X)	
E-26	Hoop overhang (-X, +Y)	
E-27	Hoop overhang (+X, -X, +Y)	Pattern or the needle position is out of the embroidering area. Reset the embroidering area with the PC or move the hoop to the sewable position.
E-28	Hoop overhang (-Y)	
E-29	Hoop overhang (+X, -Y)	
E-2A	Hoop overhang (+Y, -Y)	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-2B	Hoop overhang (+X, +Y, -Y)	
E-2C	Hoop overhang (-X, -Y)	
E-2D	Hoop overhang (+X, -X, -Y)	
E-2E	Hoop overhang (-X, +Y, -Y)	
E-2F	Hoop overhang (+X, -X, +Y, -Y)	
E-31	Needle overhang (+X)	
E-32	Needle overhang (+Y)	
E-33	Needle overhang (+X, +Y)	
E-34	Needle overhang (-X)	
E-36	Needle overhang (-X, +Y)	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-38	Needle overhang (-Y)	
E-39	Needle overhang (+X, -Y)	
E-3C	Needle overhang (-X, -Y)	
E-40	The status of presser foot is issued as an alarm when every second machine is used.	This is not usually displayed.

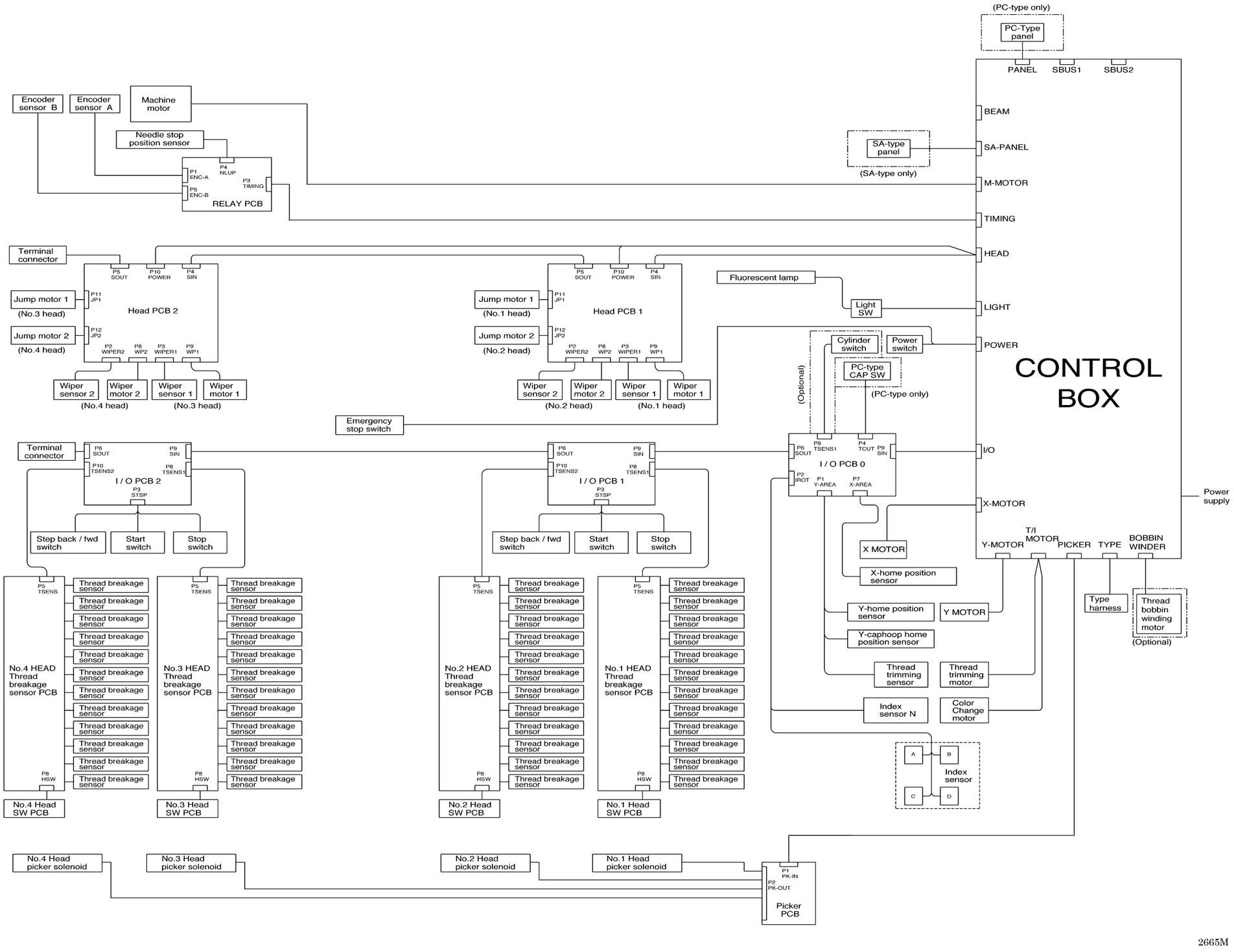
Code	Error	Measures
E-41	Invalid start-up error	This is not usually displayed.
E-42	XY movement error	Press the STOP or turn on the F/B switch on the head to either side. If this error occurs frequently, check if the tension of the pulley belt is proper.
E-43	I/F CPU failed to read EEPROM data	Turn the power off and on once. If the same error occurs again, the main PC is faulty.
E-44	Failed in the communication with inter-head CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the inter-head CPU may be disconnected.
E-45	Failed in the communication with head CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the head CPU may be disconnected.
E-46	Failed in the communication with XY CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the main PCB is faulty.
E-47	Failed in the communication with I/F CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the main PCB is faulty.
E-48	The main shaft rotated the opposite way	Turn OFF the power and check if the sensors of the encoder A and B are connected correctly, not mixed-up each other. If those connections are correct, then check if the pin connections of the main shaft motor connectors are correct.
E-49	Can not identify the machine model	Turn OFF the power, check if the model identification harness is connected properly, and turn ON the power again.
E-4A	Failed in the communication with I/O CPU	Press the STOP or turn ON the F/B switch on the head to either side. If the same error occurs again, the connector of communication cable on the I/O PCB may be disconnected.
E-A1	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 PC board temperature too high	This is not usually displayed.
E-A3	Spindle motor voltage too low	
E-A4	Spindle motor voltage too high	
E-A5	Spindle motor CPU error	
E-A6	Spindle motor CPU communication command error	
E-A7	Spindle motor CPU send/receive error	
E-A8	Spindle stop position signal error	Adjust the pulley stop position (100 °) 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	Spindle CPU parameter error	This is not displayed in this model.
E-B0	Lower shaft CPU error	
E-B1	Thread tangle in rotary hook	
E-B2	Hook motor home position error	
E-B3	Hook motor standby position error	
E-B4	Hook motor motor mode error	
E-B5	Hook motor communication error	
E-B6	Hook motor parameter error	
E-B7	Hook motor overheat error	
E-B8	Hook motor overcurrent error	
E-B9	Thread trimming motor zero point error	Turn the power off and on once. If the same error occurs again, the lower shaft motor is faulty.

Code	Error	Measures
E-BA	Power supply frequency 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-BC	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	This is not displayed in this model.
E-BE	Lower shaft version-up error	
E-BB, BF	Lower shaft motor undefined error	
E-C1	Area over during embroidering	
E-C2	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	Embroidering data buffer empty	Check the connection of the communication cable of the panel. If the cable is connected correctly , press the STOP or turn on the F/B switch on the head to either side. If the cable is disconnected , turn off the power and connect the cable.
E-C4	Presser foot down error	This is not displayed in this model.
E-C5	Measured voltage value could not be received form the lower shaft motor CPU.	
E-C6	Voltage value could not be transferred to the lower shaft motor CPU.	
E-C7	Lower shaft error	
E-C8	Hook motor home position error	
E-C9	Embroidering start error	
E-CA	No sewing permisson	
E-CB	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	Shuttle thread entanglement automatic reset	This is not usually displayed.
E-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	This is not usually displayed.
E-CF	Rated voltage value could not be received from the lower shaft motor CPU.	
E-D0	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.	This is not usually displayed.
E-D2	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	
E-D4	Thread trimming motor overcurrent	Turn OFF the power. The possible causes for this error are, troubles of the thread trimming motor, troubles of the main PCB, and troubles of the drive PCB.
E-D5	Needle bar case motor overcurrent	Turn OFF the power. The possible causes for this error are, troubles of the needle bar case motor, troubles of the main PCB, and troubles of the drive PCB.
E-D6	Jump motor overcurrent	Turn OFF the power. The possible causes for this error are troubles of the jump motor and troubles of the head PCB.

Code	Error	Measures
E-D7	The temperature of the heat sink on the drive PCB rose excessively	Turn OFF the power and check if the fan filter has any clogging.
E-D8	Temperature sensor abnormal	Turn OFF the power. The possible causes for this error are troubles of the thermistor and troubles of the drive PCB.
E-E1	X-axis pulse motor overcurrent stop	Turn OFF the power and ON once. If the same error occurs again, the pulse motor or the drive PCB is faulty.
E-E2	Y-axis pulse motor overcurrent stop	
E-E3	Cooling fan motor stop A Press R.	Turn OFF the power and check the fan harness. Turn OFF the power again. If the same error occurs again, the fan or the power PCB is faultly.
E-E4	Lower shaft communication error	This is not usually displayed.
E-E5	Over-run error during interfacing to main PCB CPU	
E-E6	Framing error during interfacing to main PCB CPU	
E-E7	Parity error during interfacing to main PCB CPU	
E-E8	Receiving time up error during interfacing to main PCB CPU	
E-E9	Send/Receive inconsistent error during interfacing to main PCB CPU	
E-EA	ACK code receiving error during interfacing to main PCB CPU	
E-EB	Send/Receive ID code error during interfacing to main PCB CPU	
E-EC	Send data checksum error during interfacing to main PCB CPU	
E-ED	Data empty error during interfacing to main PCB CPU	
E-EE	Abnormal data received in the inner-machine communication	
E-EF	Receiving error on interface	
E-F1	Receive time up error	
E-F2	Request-to-waiting time up error	
E-F3	Request-to-receive time up error	
E-F4	Receive command error	
E-F5	NACK code receiving error	
E-F6	Data requested for needle position can not be returned.	
E-F7	It is not receive command for the request one.	
E-F8	PRE code error	
E-F9	No applicable command	
E-FA	Interface receive data check sum error	
E-FB	Send time up error	
E-FF	No status is returned from spindle, lower shaft motor, or CPU.	

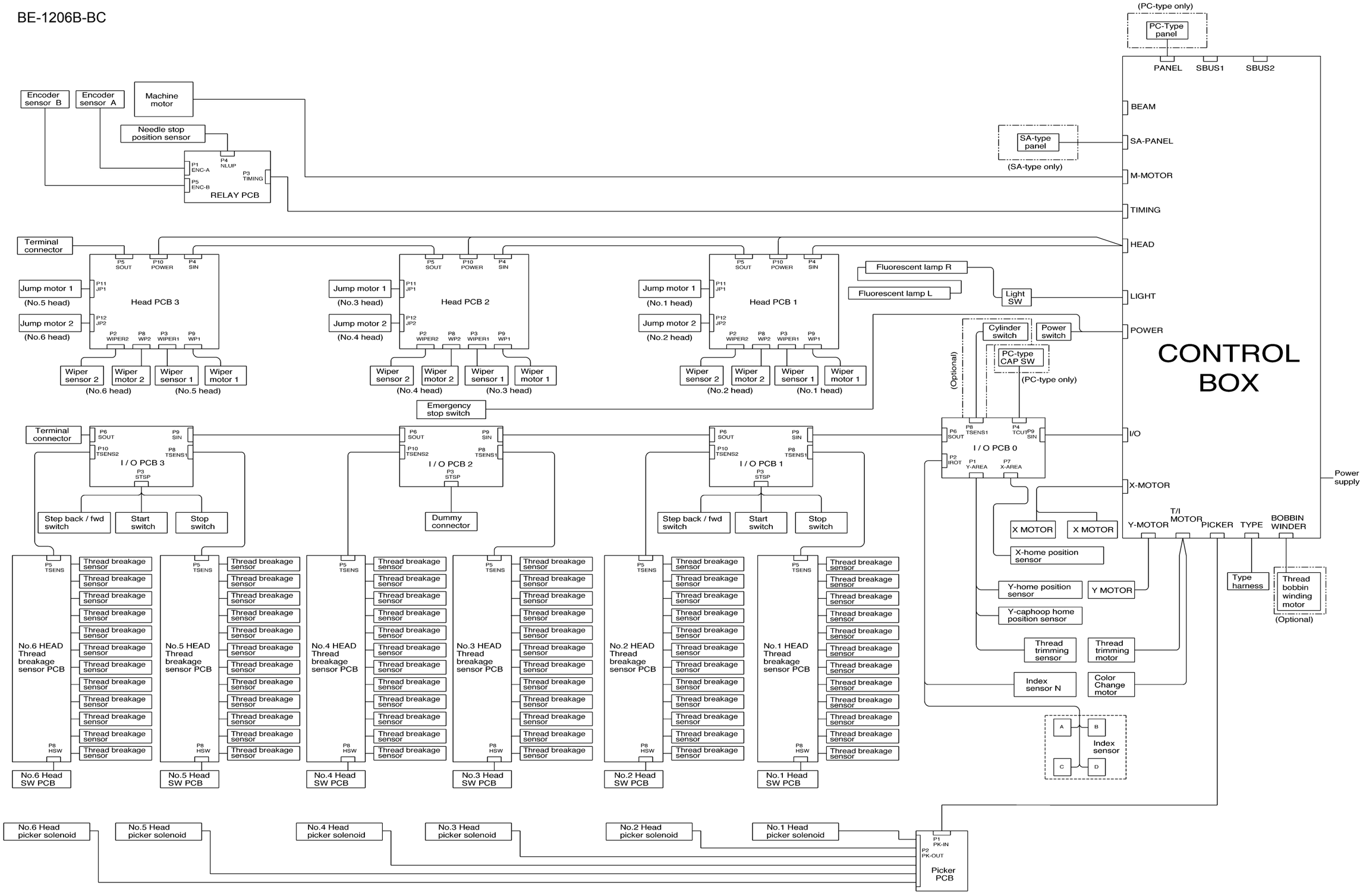
Chapter 11 Block Figure

BE-1204B-BC
BE-1204C-BC



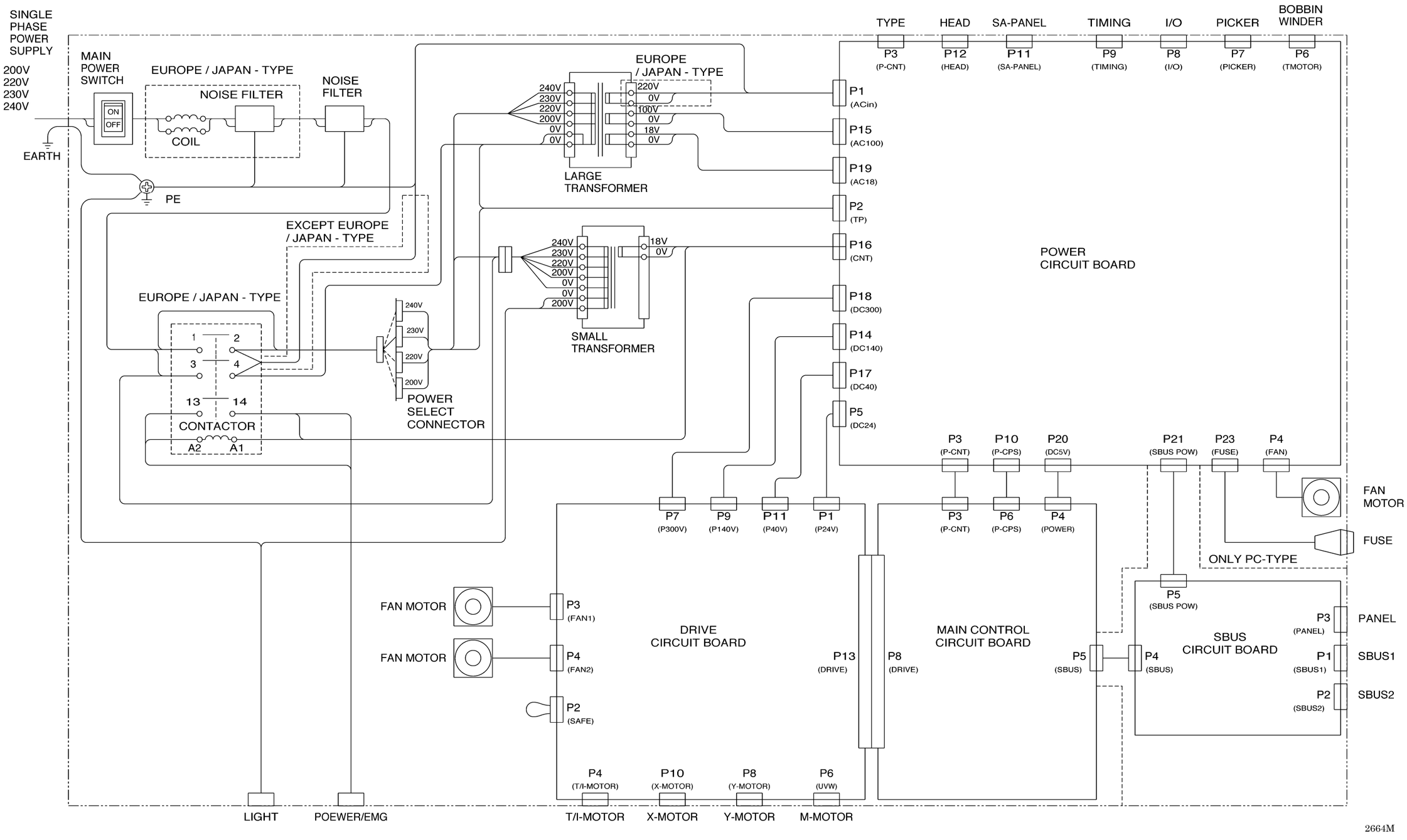
2665M

BE-1206B-BC

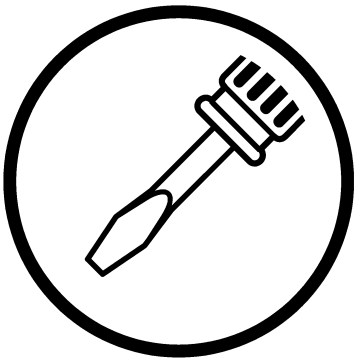


2666M

Contorol Box



2664M



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