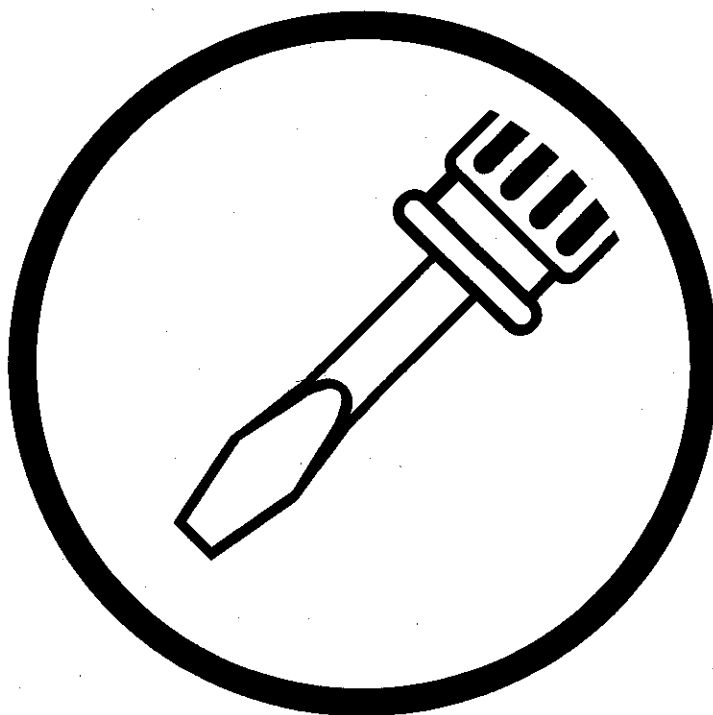


BAS-47

SERVICE MANUAL

COMPACT COMPUTERIZED MONOGRAMMING MACHINE



brother®



CONTENTS

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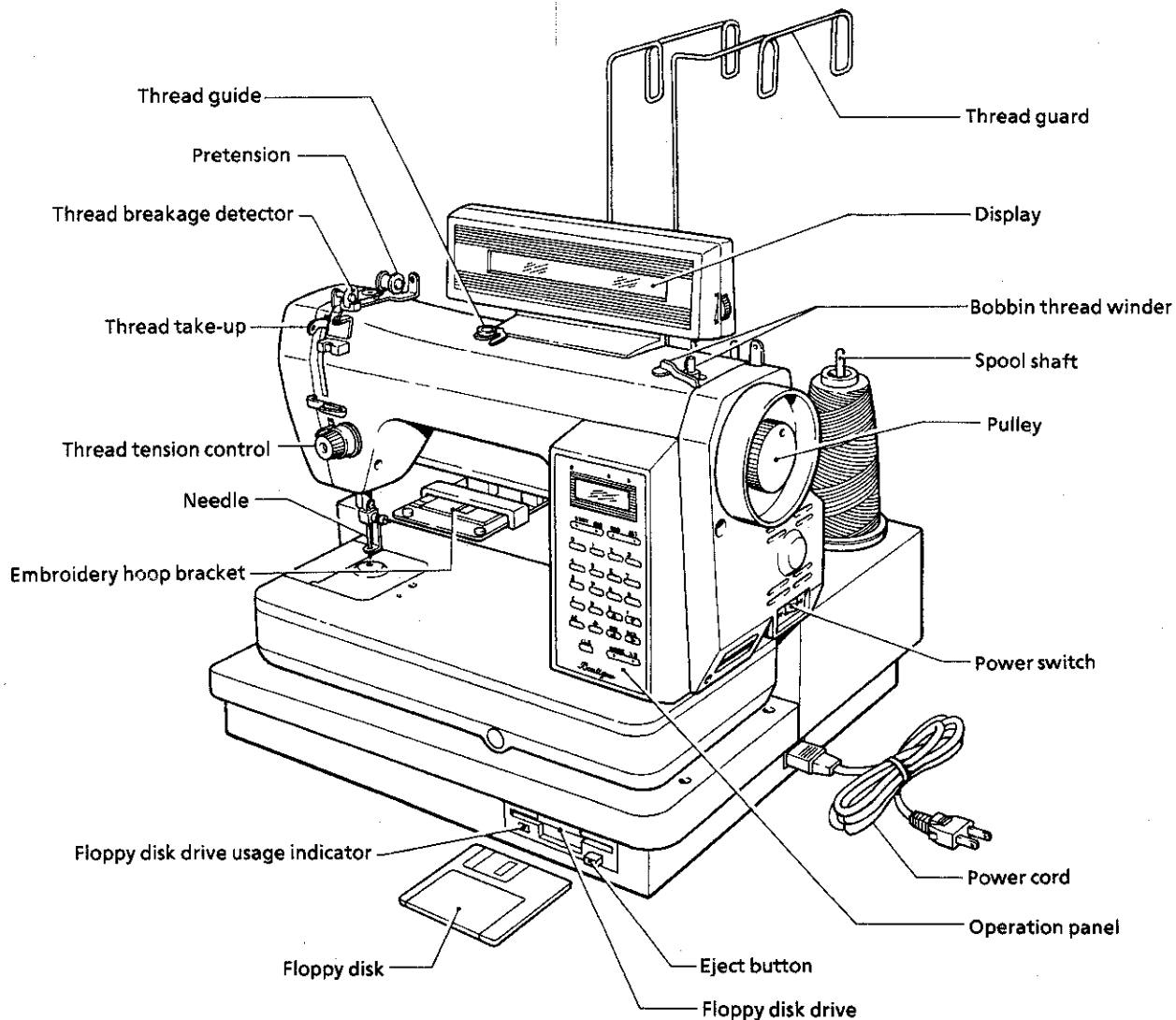
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MAIN PARTS' NAMES



Sewing machine model	BAS-47
Application	Monogramming on suits, shirts, sportswear, handkerchiefs, and the like
Maximum sewing speed	1,000 spm (Either of low, medium, or high speed is selectable.)
Sewing area	120 mm × 100 mm
Stitch pitch	0.1 - 12.7 mm
Storage medium	3.5 floppy disk
Sound level	maximum sewing speed 1,000 spm L Aeg = 78 dB (measuring method: ISO7779)
Power supply	Single phase 120V · 220V · 240V
Machine dimensions	400 mm (D) × 520 mm (W) × 460 mm (H)
Weight	30 kg

TROUBLESHOOTING GUIDE

※ Problems requiring simple adjustment

Problem	Cause	What to check	Solution	Page	
1 Needle breaks	Needle is bent, needle tip blunted, or eye is clogged.	Needle	Replace	6	
	Needle improperly installed.	Needle facing, height	Reinstall needle properly.	6	
	Poor needle to rotary hook timing	Needle bar lift stroke	See needle to rotary hook timing adjustment.	49	
		Needle bar height			
		Needle to rotary hook point gap			
	Needle comes out of needle clamp.		Tighten needle screw securely.	6	
	Incorrect presser foot installation	Presser foot screw or presser foot hole Needle should be inserted into hole of presser foot.	Reposition presser foot.	50	
	2 Thread breakage (snapped or frayed)	Needle improperly installed.	Needle facing, height	Reinstall needle properly.	6
		Needle is bent, needle tip blunted, or eye is clogged.	Needle	Replace	6
		Machine improperly threaded	Threading	Thread properly.	8
Excessive needle thread tension		Needle thread tension	Set to appropriate tension.	8	
Excessive bobbin thread tension		Bobbin thread tension	Set to appropriate tension.	9	
Excessive thread take-up spring tension		Thread take-up spring stroke	Adjust.	9	
Rough edge or surface on rotary hook or needle plate causing thread to break.		Rotary hook and needle plate surfaces	Remove any rough edge or surface with emery paper.		
Needle comes out of needle clamp.			Tighten needle screw securely.	6	
Incorrect presser foot installation		Presser foot height	Adjust height.	50	
Rotary hook oil has run out.			Lubricate rotary hook.	56	

Problem	Cause	What to check	Solution	Page
3 Skipped stitches	Needle improperly installed.	Needle facing, height	Reinstall needle properly.	6
	Needle is bent, needle tip blunted, or eye is clogged.	Needle	Replace	6
	Wrong needle being used.	Needle count and length	Replace with a needle one size larger.	6
	Machine improperly threaded	Threading	Thread properly.	8
	Poor needle to rotary hook timing	Needle bar lift stroke	See needle to rotary hook timing adjustment.	49
		Needle bar height		
		Needle to rotary hook point gap		
	Thread take-up spring is too weak to raise bobbin thread.	Thread take-up spring tension	Adjust	9
	Blunt rotary hook point	Rotary hook point	Replace rotary hook.	49
	Bobbin spinning, shortening the length of thread from the bobbin case, and preventing bobbin thread from rising.	Bobbin case presser spring	Replace the spring.	11
Incorrect presser foot installation	Presser foot height	Adjust height.	50	
4 Needle thread does not tighten.	Low needle thread tension		Increase tension.	8
	Excessive bobbin thread tension		Decrease tension.	9
	Incorrect presser foot installation	Presser foot height	Adjust height.	50
	Incorrect thread take-up spring length	Thread take-up spring	Thin material: Increase length. Thick material: Decrease length.	9
5 Bobbin thread does not tighten.	Excessive needle thread tension		Decrease tension.	8
	Low bobbin thread tension		Increase tension.	9
	Incorrect presser foot installation	Presser foot height	Adjust height.	50

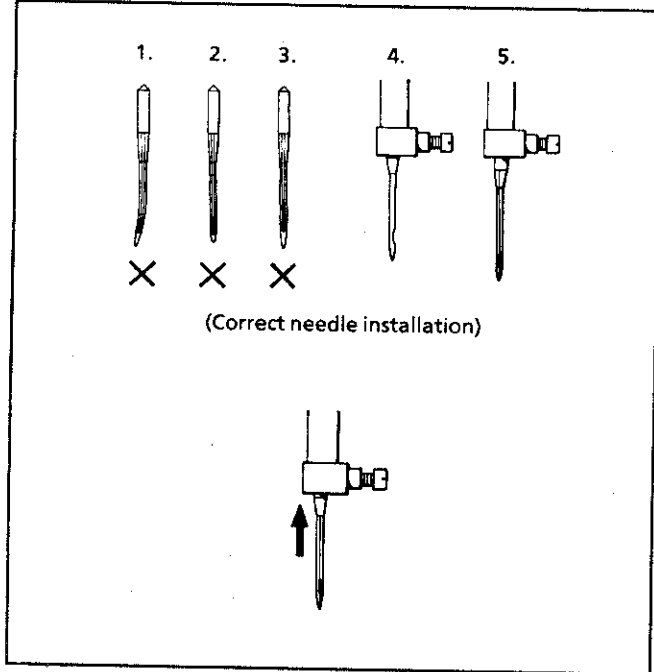
Problem	Cause	What to check	Solution	Page
6 Improper tightening of looping, etc.	Poor finishing of the thread path.	Check all thread paths.	Polish with emery paper or a fine file.	/
	Poor bobbin sliding.	Pull out bobbin thread, check bobbin thread tension.	Replace bobbin, or replace rotary hook assembly.	11
	Small rotary hook to position bracket gap.	Check the gap.	See needle to rotary hook timing adjustment.	49
	Rotary hook oil has run out.		Lubricate rotary hook.	56
7 Needle thread breakage detector actuated during sewing, then stopped.	Needle thread breaks.	Needle thread path	Replace needle thread.	/
	Machine stops even though needle thread has not broken.	Needle thread removed from needle thread sensor.	Lead needle thread through sensor.	8
			Adjust needle thread tension.	8
	Needle thread comes out of pretension.		Thread properly.	8
	Insufficient pretension		Adjust pretension.	9
8 Machine overloaded.	Needle bent or blunt		Replace	7
	Thread wraps around rotary hook.	Check rotary hook assembly.	See needle to rotary hook timing adjustment.	49
	Machine operation is heavy.	Check the drive mechanism of the upper and lower shafts.	Adjust the drive mechanism.	55
		Cannot repair.	Ask your dealer to have it repaired.	/
	Loose stop motion assembly		Secure the stop motion assembly.	13
9 Disk error	Defective disk	Check by inserting a different (good) floppy.	Replace the disk.	13
	Defective disk drive.	Insert disk No. 1 to check.	Replace drive.	13

Problem	Cause	What to check	Solution	Page
10 Poor pattern	Defective pulse motor		Replace motor	26 34
	Defective feed mechanism in X-Y axis	Drive gear screw loose.	Adjust drive gear position.	/
		Stretched wire	Adjust or replace wire	28 34
	Insufficient material tension		Pull material taut.	/
	Incorrect clamping of embroidery hoop.		Lock clamp at correct position.	/
11 Feed mechanism does not return to proper home position.	Defective feed mechanism in X-Y axis		See 10 above.	5
	Defective origin sensor	Check the origin sensor.	Check position of origin sensor.	/
	Defective circuit board.		Replace.	24 41
12 Power does not come on.	Electrical trouble, possibly blown fuse, circuit board, other.		Refer to the troubleshooting flow chart.	66

1 Needle breaks

Needle is bent, needle tip blunt, or groove is clogged.

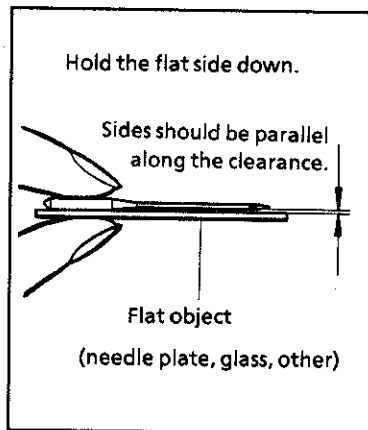
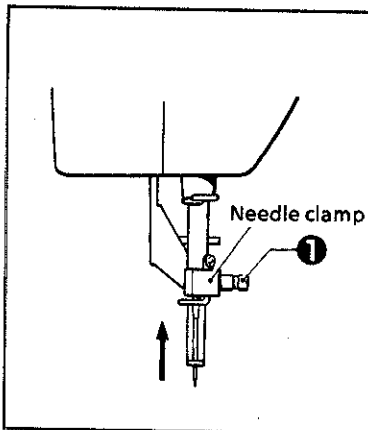
★ Check the following:



- 1) Is the needle bent?
- 2) Is the needle tip blunt?
- 3) Is the needle groove clogged?
- 4) Is the needle installed in the correct direction?
- 5) Is the needle installed at the correct height?

Needle improperly installed

★ Correct needle installation



- 1) Loosen the screw ❶, and replace the needle with a new one.
- 2) Insert the needle with the flat side facing left, until the needle cannot be inserted any more. Securely tighten the screw ❶.

NOTE: Use a straight needle.

To determine if a needle is bent, hold it against a flat object to check their surfaces are parallel and the clearance is even.

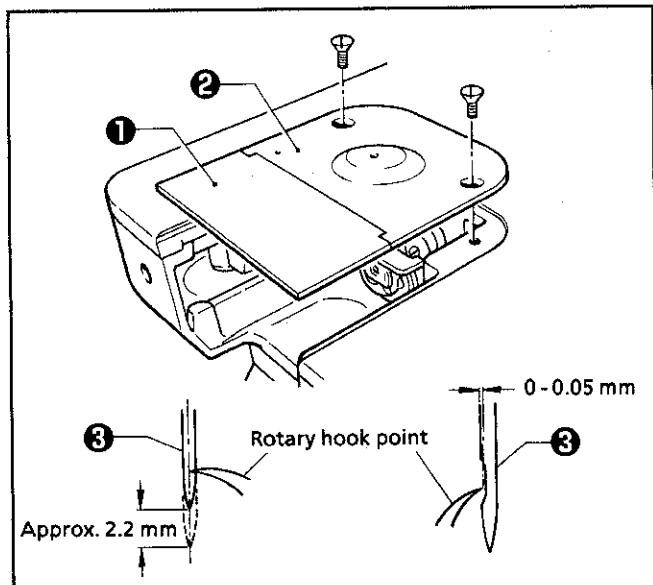
Materials and needles

Material type	Needle type and size	
Denim Artificial leather Real leather	DB x K5	#11 - #14 #11U - #14U
Handkerchief Dress shirt Towel	DB x K5	#9 - #11 #9U - #11U

NOTE: When using special threads such as gold, silver, and rame yarn, use a heavy-duty needle (#11 - #14) for better finishing.

Poor needle to rotary hook timing

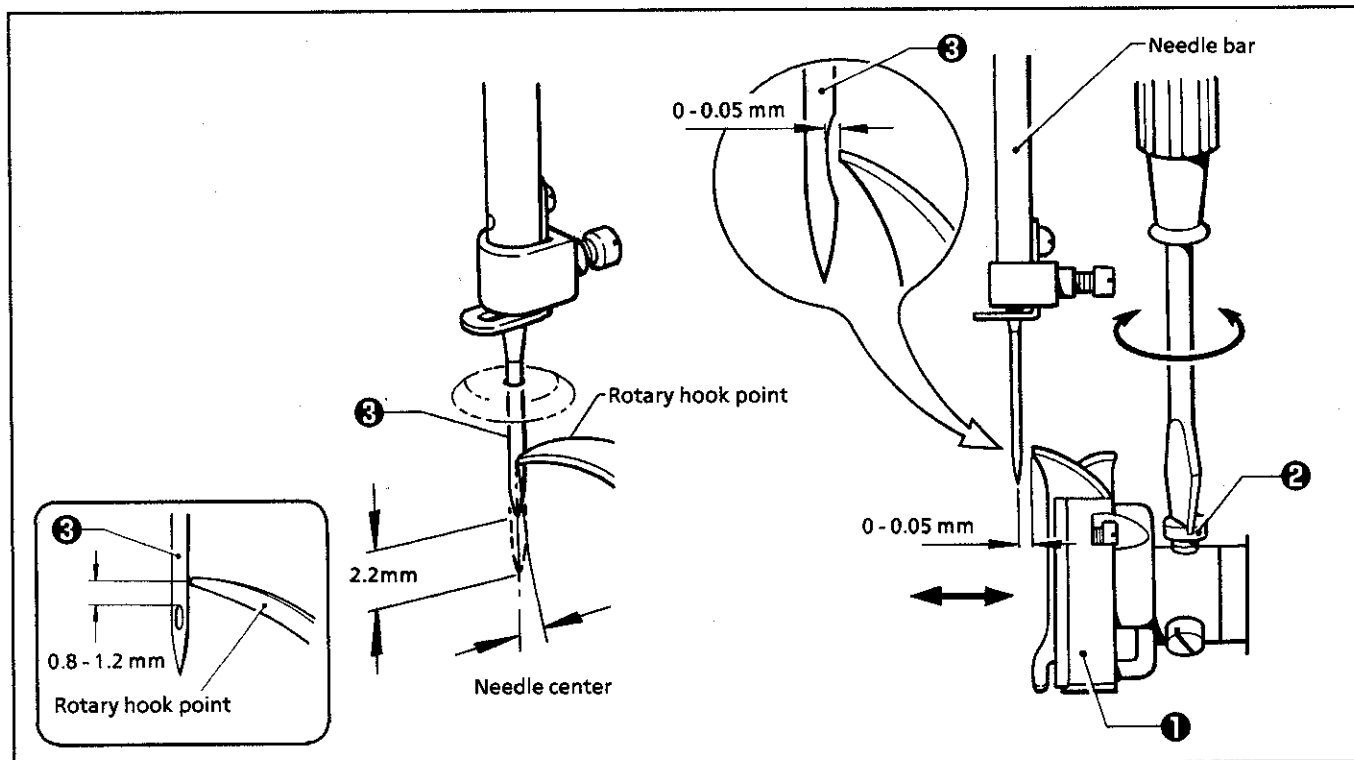
★ Remove the slide plate ① and the needle plate ②.



Check the following:

- 1) Is the rotary hook point aligned with the center of the needle ③ when the needle bar is raised approx. 2.2 mm above its lowest point?
- 2) Is the clearance between the rotary hook point and the needle ③ from 0 to 0.05 mm?

★ Needle to rotary hook timing



- 1) Loosen the three screws ② around the rotary hook ①.
- 2) Raise the needle ③ approximately 2.2 mm above its lowest point. (The reference line on the needle bar should be aligned with the end of the bushing.) Align the rotary hook point with the center of the needle ③, and adjust the clearance between the needle groove and the rotary hook point to 0 - 0.05 mm so that the rotary hook point does not make contact with the needle ③.
- 3) Tighten the three screws ② around the rotary hook ①.
- 4) Loosen the screw of the needle bar clamp. Move the needle bar up or down so that the distance from the top end of the needle eye to the rotary hook point is 0.8 - 1.2 mm.

Incorrect presser foot installation

★ Refer to page 50.

2 Thread breakage

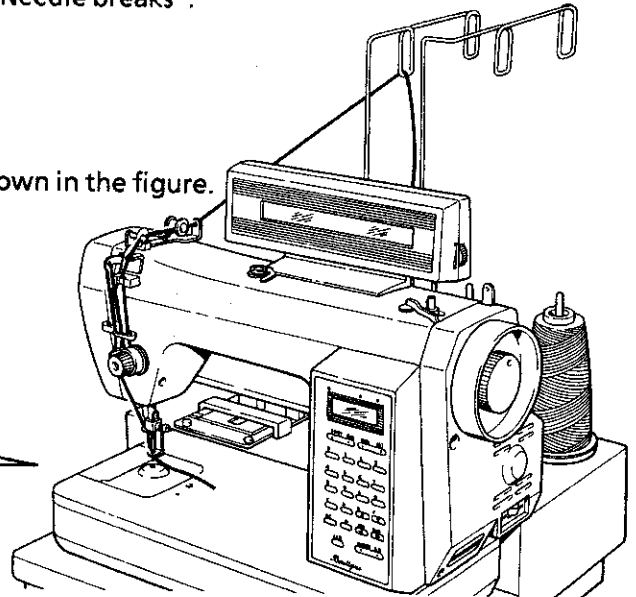
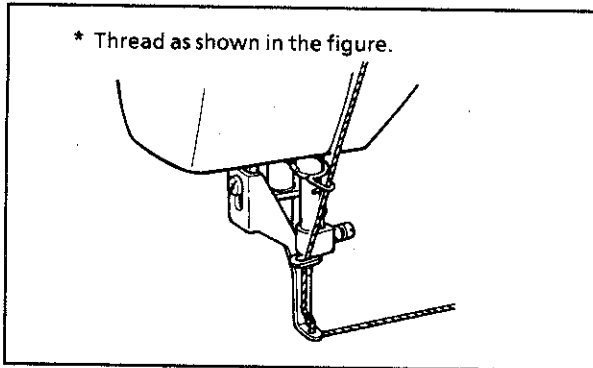
Needle improperly installed

Needle is bent, needle tip blunt, or groove is clogged.

Incorrect threading

★ Refer to page 6, "Needle breaks".

★ Check that the thread is passed through the machine as shown in the figure.

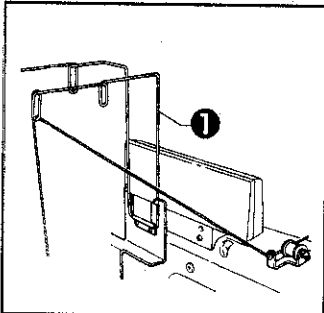


1 Pass the thread through the thread guard.

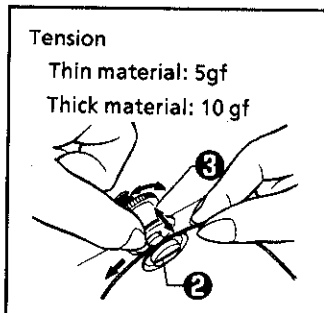
2 Pass the thread through the pretension.

3 Pass the thread around the thread breakage detector.

4 Pass the thread through the tension disk.



Pass the thread from the outside to the inside through the thread guard ①.

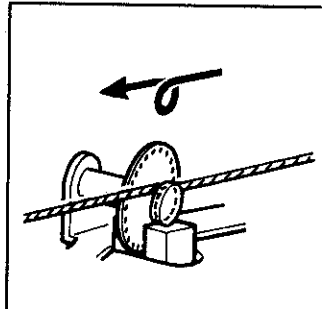


Tension

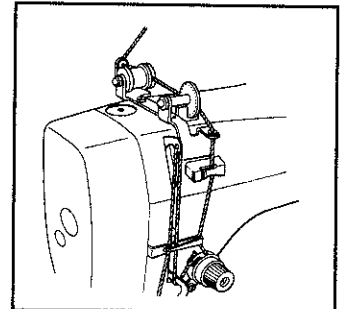
Thin material: 5gf

Thick material: 10 gf

Press the thread guide discs ② to pass the thread through the hole of the pre-tension shaft. Adjust the thread tension using the nut ③ so that the thread resistance is very light (approx. 5 gf).



Wind the thread 2 times around the thread breakage detector so that the thread overlaps at the top. (Make sure that the thread is wrapped on the thread breakage detector.)

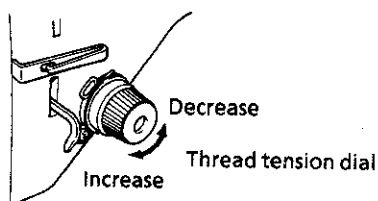


Turn the pulley to set the needle to its highest position. Pass the thread in the correct order.

Excessive needle thread tension.

★ Check if the bobbin thread is not pulled to the top of the material.

Adjust the thread tension using the thread tension dial.

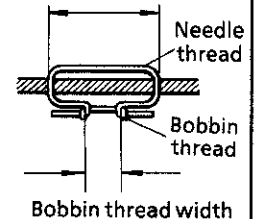


If the tension is too high, turn the dial counterclockwise.
If the tension is too low, turn the dial clockwise.

Proper stitching



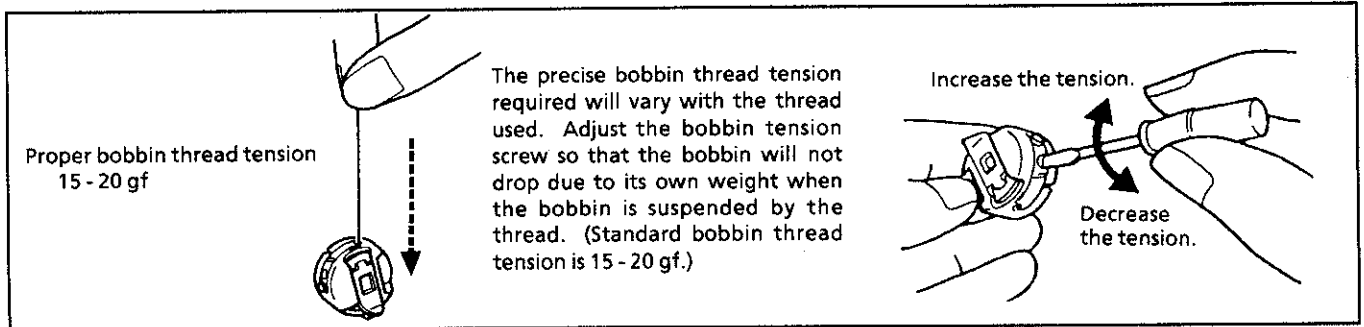
Needle thread width



Adjust the thread tension dial so that the needle thread is pulled to the underside of the material, and the bobbin thread stitch width is about 1/3 of the needle thread stitch width.

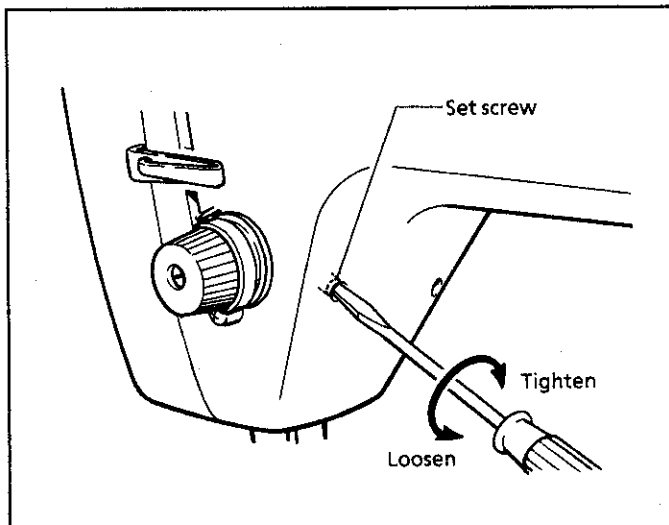
Excessive bobbin thread tension

★ Adjust the bobbin thread to the correct tension.

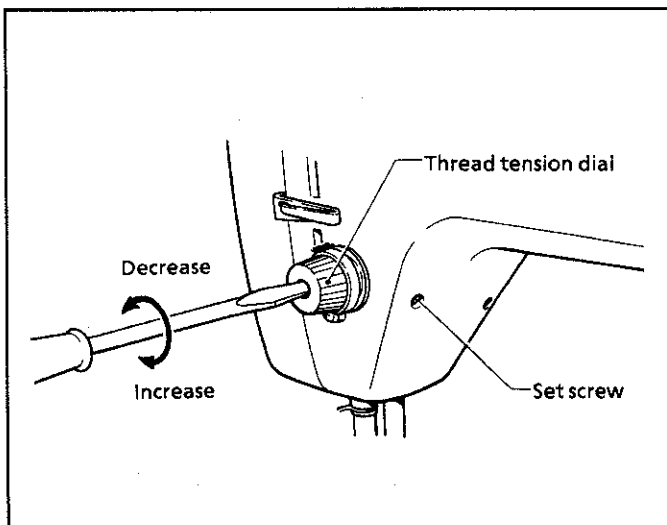


Excessive thread take-up spring tension

★ If the thread take-up spring tension is too high, the needle thread may break; if too low, the needle thread may be caught in the rotary hook.



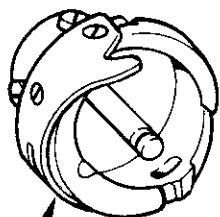
- 1) Loosen the set screw.
(There is no need to remove it.)



- 2) Insert a screwdriver into the slot of the tension stud.
Turn the screwdriver clockwise to increase the tension.
Turn the screwdriver counterclockwise to decrease the tension.
- 3) After adjustment, securely tighten the set screw.

Damaged rotary hook surface where the thread passes

- ★ Check for any burrs where the thread passes.
(The rotary hook may have burrs or be scratched when the needle breaks.)



Surface where thread passes

* If any scratches or burrs are found, remove them with very fine emery paper (#1000 - 1500) or polishing compound.

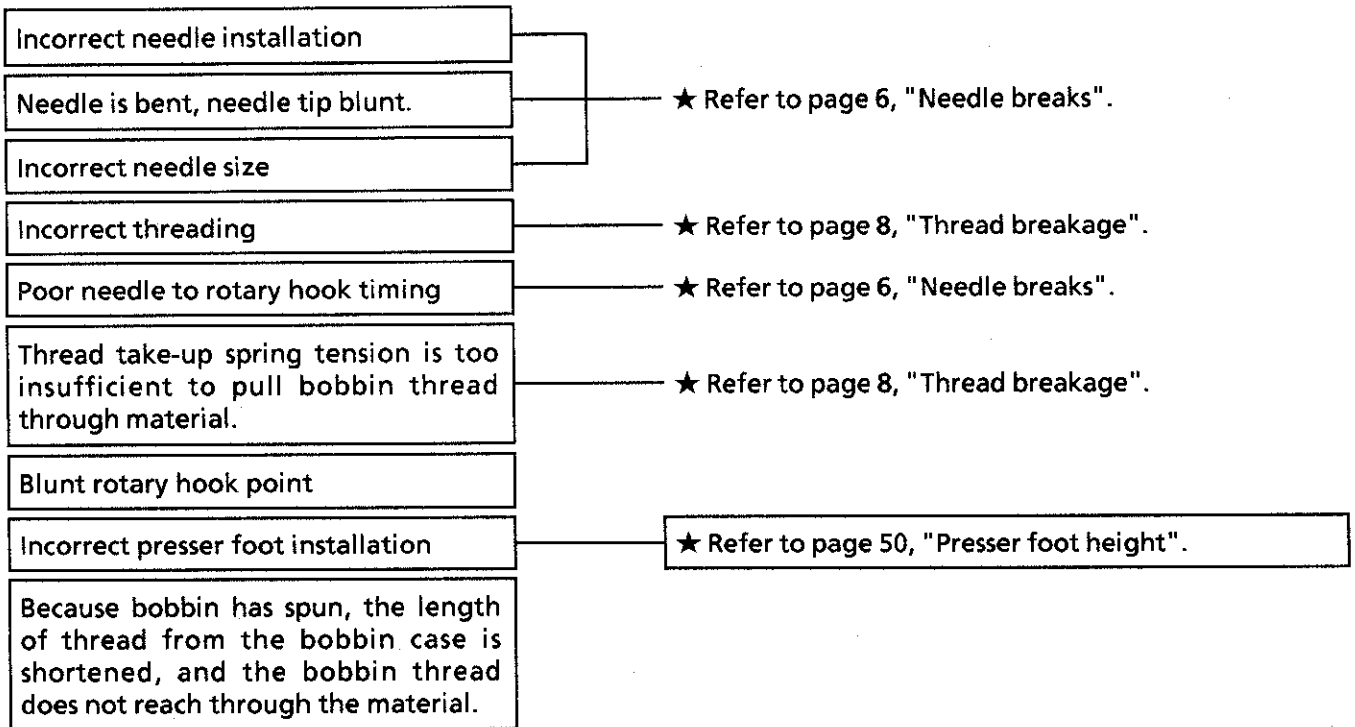
Incorrect presser foot installation

★ Refer to page 50.

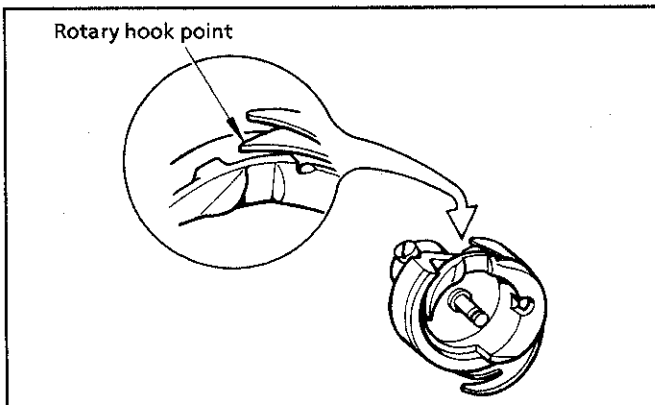
Rotary hook oil has run out.

★ Refer to page 56.

3 Skipped stitches

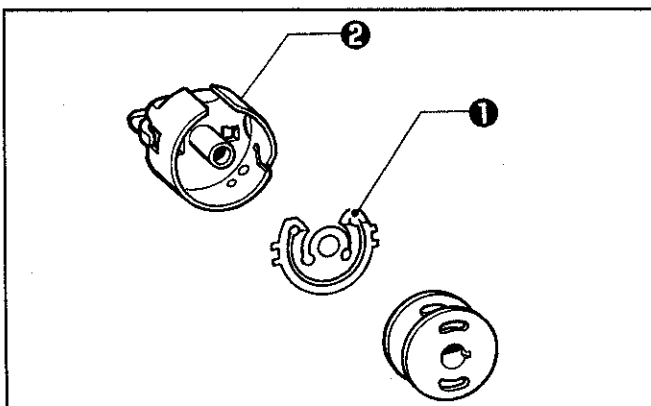


★ Check the rotary hook point.



- 1) If the rotary hook point is blunt or damaged, replace the rotary hook with a new one.
- 2) Refer to page 7 when replacing the rotary hook.

★ Check the spinning prevention spring ①.



- * If the spinning prevention spring is defective, the bobbin may spin in the rotary hook, resulting in the thread getting tangled.
- 1) Make sure that the bobbin thread is not tangled inside the bobbin case ②.
 - 2) Check the bobbin thread tension referring to page 9.
 - 3) Make sure that the bobbin is free when inserted in the bobbin case ②.
 - 4) If the spring ① is unsuitable, replace it.

4 Needle thread does not tighten.

- Needle thread tension is too low. ★ Refer to page 8, "Thread breakage".
- Bobbin thread tension is too high.
- Incorrect presser foot installation ★ Refer to page 50, "Presser foot height".

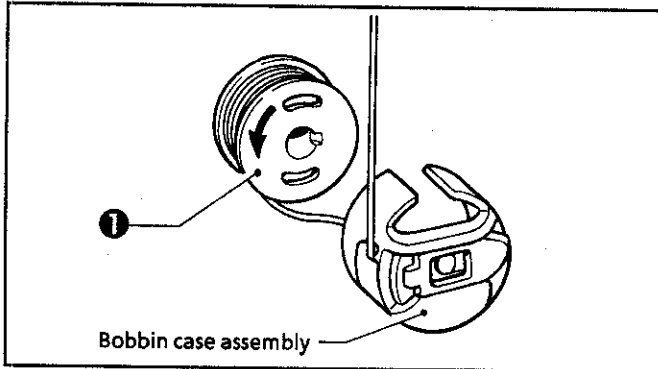
5 Bobbin thread does not tighten.

- Needle thread tension is too high. ★ Refer to page 8, "Thread breakage".
- Bobbin thread tension is too low.
- Incorrect presser foot installation ★ Refer to page 50, "Presser foot height".

6 Improper tightening of looping

- Poor finishing of the thread path ★ Refer to page 8, "Thread breakage".
- Poor bobbin sliding

★ Check for any burrs on the bobbin.



- 1) Replace the bobbin ❶ with a new one if burred or scratched.
- 2) Check the bobbin thread tension referring to page 9.

Clearance between the rotary hook and the inner rotary hook stopper plate is too small.

★ Make sure that the thread passes easily even when a thick thread is used.

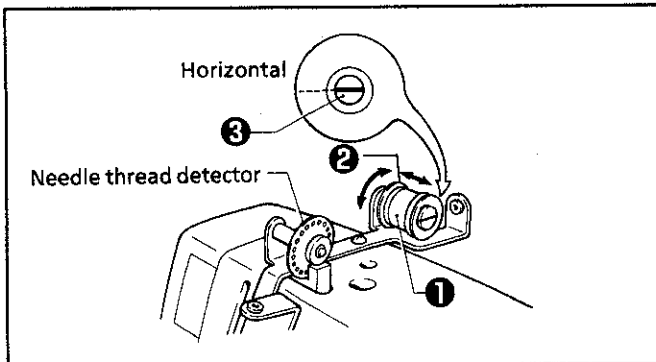
7 Thread breakage detector actuated during sewing.

Needle thread breaks.

★ Pass the needle thread through the machine referring to page 8.

Machine stops.

★ Slightly increase the tension of the pretension if the needle thread deviates on the thread breakage detector during sewing. (Standard tension is 5 gf.)



Press the pretension ① and adjust the nut ② so that resistance is slightly applied to the thread.

* The slot in the pretension shaft ③ should be horizontal or slightly raised to the right.

8 Machine overloaded.

Needle is blunt or bent.

★ Replace the needle with a new one referring to page 8.

Thread is tangled on the rotary hook.

★ Adjust the timing between the needle and the rotary hook referring to page 6.

Machine operation is sluggish.

★ Turn the pulley manually to check the load.

Loose stop motion assembly

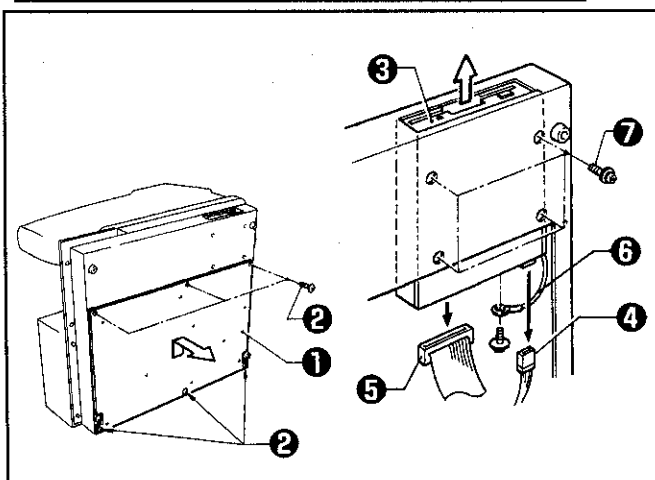
★ Secure the stop motion assembly.
(Hold the pulley with one hand, and secure the stop motion assembly with the other.)

9 Disk error

Defective floppy disk

★ Insert another floppy disk to see if it works correctly.

Defective floppy disk drive (FDD)



Insert floppy disk No.1 into the floppy disk drive. If the floppy disk drive is defective, replace it with a new one as follows:

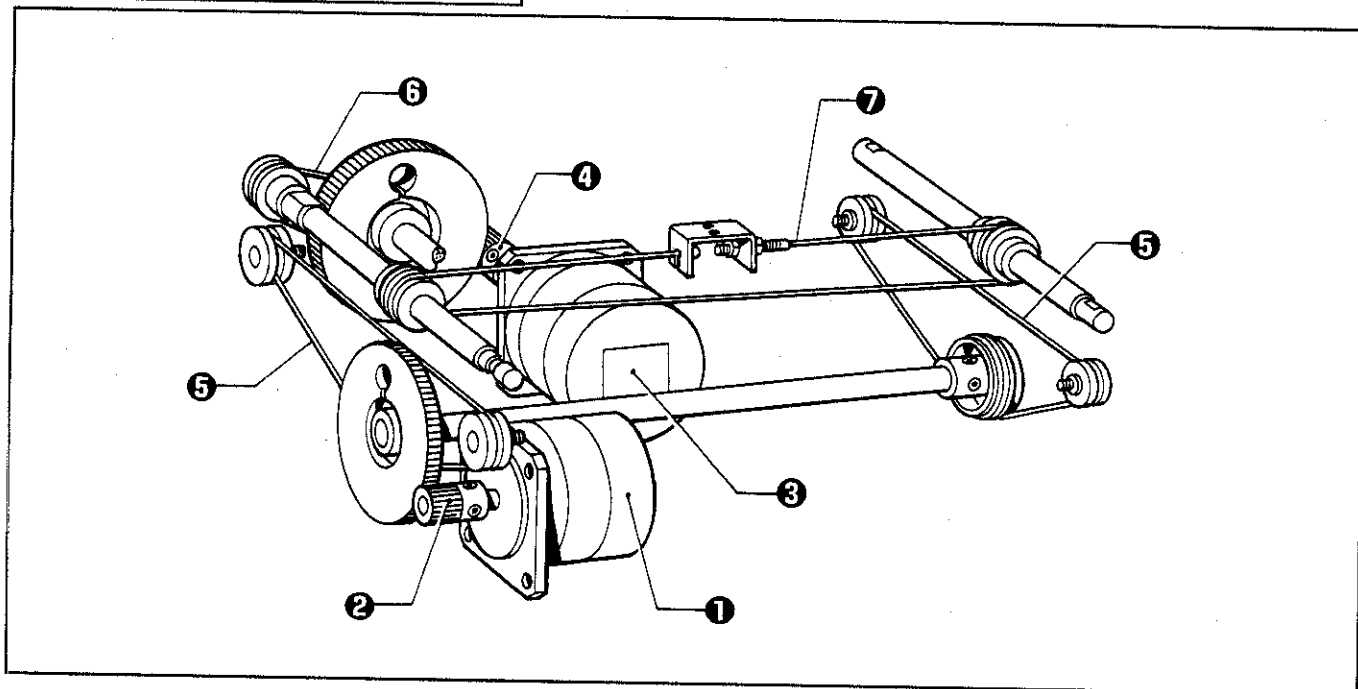
- 1) Remove the body base ① from the machine head. (Refer to page 18.)
- 2) Remove the connector ③, the flat cable ④, and the ground wire ⑤ from the floppy disk drive ②.
- 3) Remove the four screws from the underside of the body base ①, and replace the floppy disk drive ② with a new one.

10 Poor pattern appearance

Defective pulse motor.

★ Check the X and Y pulse motors, and replace if necessary.

Defective feed mechanism in X-Y axis.



- 1) Make sure that the screws ② in the gear for the Y pulse motor ① are securely tightened.
- 2) Make sure that the screws ④ in the gear for the X pulse motor ③ are securely tightened.
- 3) Make sure that the left and right Y mini wires ⑤, the X drive wire ⑥, and the X mini wire ⑦ are not stretched.
- 4) Check the X and Y pulse motors, and replace if necessary.
(If a wire has been cut, ask your dealer to have it repaired.)

11 Feed mechanism does not return to correct home position.

Defective feed mechanism in X-Y axis

★ Refer to above item.

Incorrect home position sensor

★ Replace X and Y index circuit boards with new ones. (See page 39.)

Defective circuit board

★ Replace the circuit board in question (the main circuit board, power circuit board, or the PMD circuit board) with a new one. (See page 61.)

12 Power is not turned on.

Electrical trouble;
blown fuse or defective circuit board

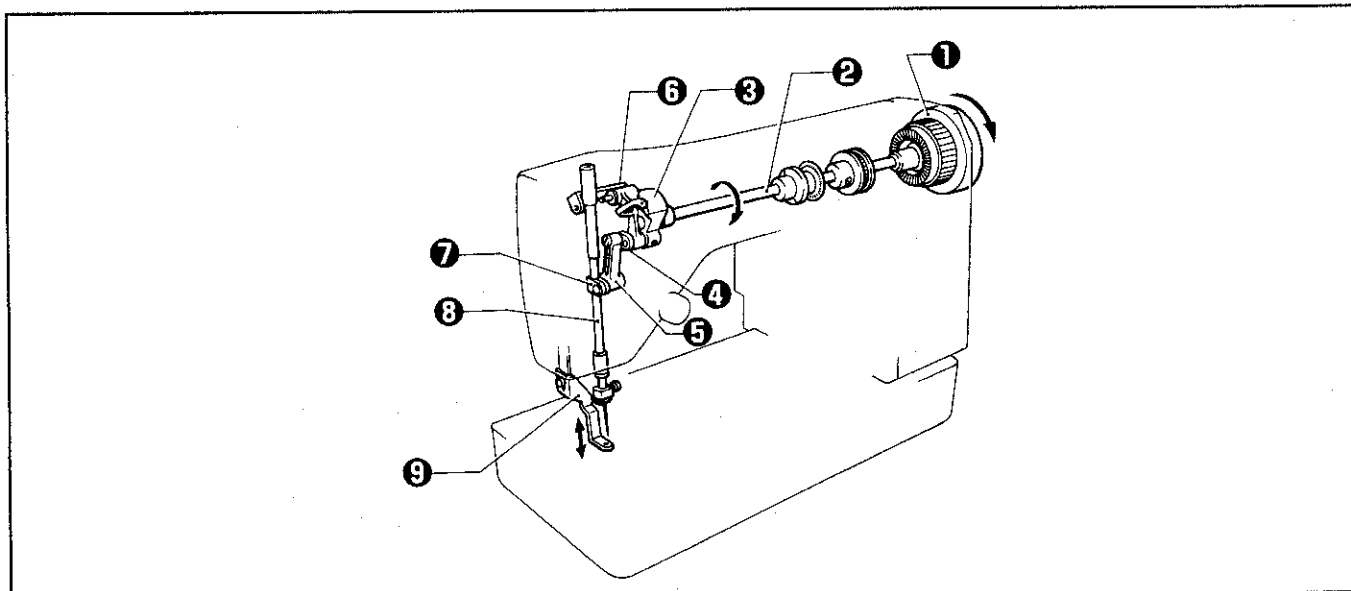
★ Replace as necessary, referring to troubleshooting flowchart (page 65).

13 Tapering pattern width

- 1) When pattern width tapers off in X direction, make sure that the X drive wire ⑥ and the X mini wire ⑦ are not stretched.
- 2) When pattern width tapers off in Y direction, make sure that the left and right Y mini wires ⑤ are not stretched.

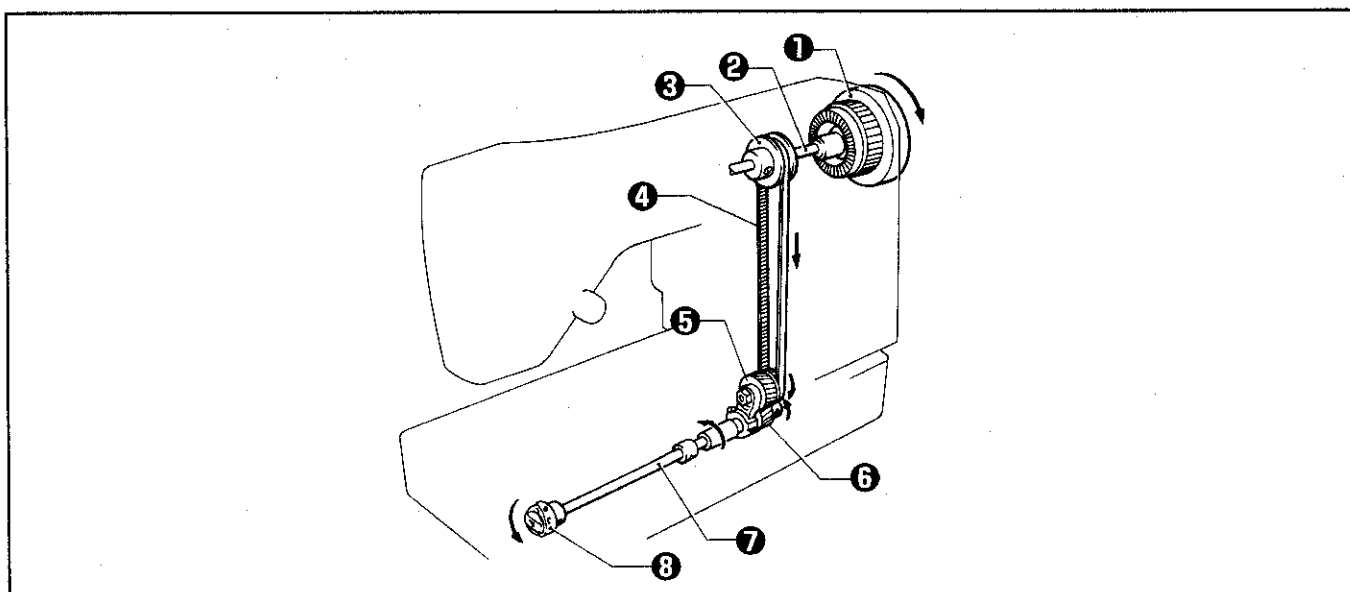
MECHANICAL DESCRIPTION

1 Upper shaft and needle bar mechanism



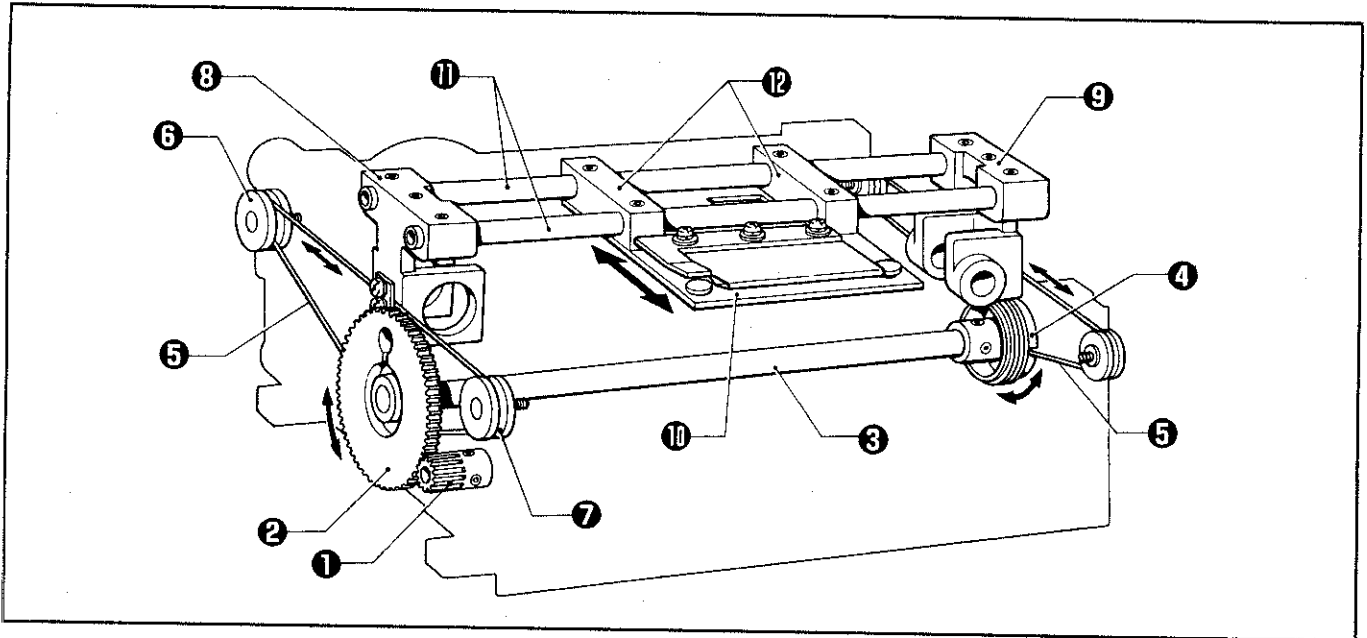
- 1) When the pulley ① is turned in the direction of the arrow, the motion is transmitted to the upper shaft ②, and the thread take-up crank ③ is turned.
- 2) Motion is transmitted to the needle bar crank rod ⑤ and the thread take-up support shaft ⑥ through the needle bar crank ④ attached to the thread take-up crank ③.
- 3) The needle bar ⑧ is moved up and down by the needle bar clamp ⑦.
- 4) The thread take-up support shaft ⑥ moves the presser foot ⑨ up and down.

2 Lower shaft and rotary hook mechanism



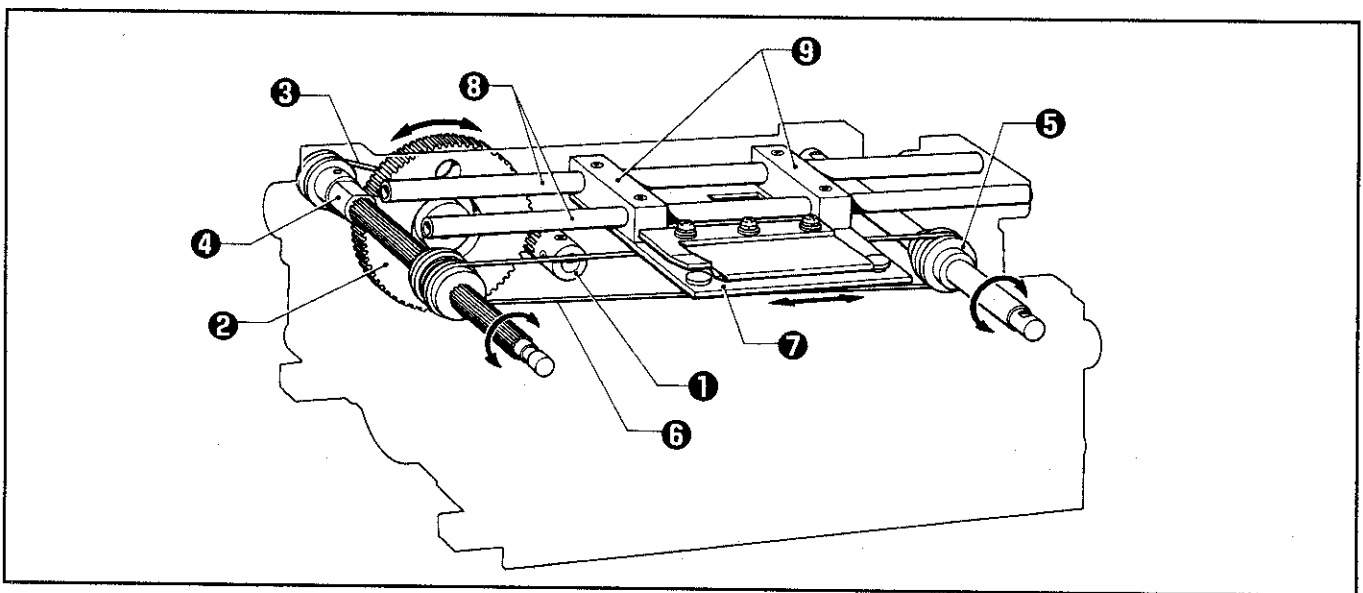
- 1) When the pulley ① is turned in the direction of the arrow, the motion is transmitted to the upper shaft ②, and timing pulley U ③ is turned.
- 2) Timing pulley U ③ transmits the motion to the lower shaft gear ⑥ connected to the idle pulley ⑤ via the timing belt ④.
- 3) Motion is transmitted to the lower shaft ⑦ connected to the lower shaft gear ⑥, and the rotary hook ⑧ rotates in the direction of the arrow.

3 Feed guide mechanism - 1



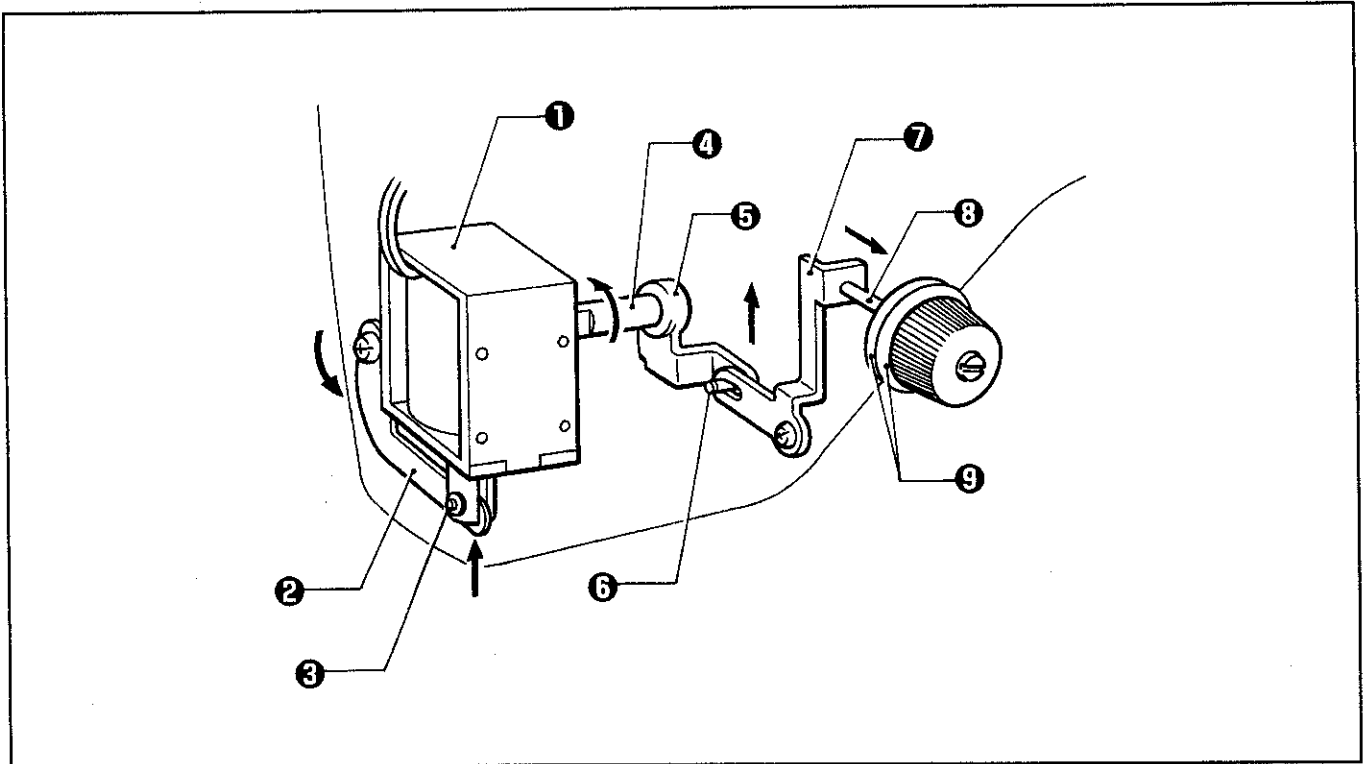
- 1) The Y pulse motor gear ① drives the gear pulley ②, which thus drives pulley Y ④ via the pulley shaft ⑥.
- 2) Both ends of the left and right Y mini wires ⑤ are secured to the gear pulley ② and pulley Y ④, and are secured to bush holders L ⑧ and R ⑨, through tension pulley L ⑥ and support B ⑦.
- 3) The slide plate ⑩ is connected to the sliders ⑫ mounted on the slide shafts ⑪ inserted in bush holders L ⑧ and R ⑨.
- 4) When the gear pulley ② is turned, the left and right Y mini wires ⑤ operate, and the slide plate ⑩ is moved in the Y direction (back and forth) on the shafts between bush holders L ⑧ and R ⑨.

4 Feed guide mechanism - 2



- 1) The spline shaft assembly ④ is driven by the X-pulse motor gear ① via the gear pulley ② and the X drive wire ③.
- 2) When the spline shaft assembly ④ turns, the slide plate ⑦, which is secured to the X mini wire ⑤ via the idle pulley ⑤, is moved on the slide shafts ⑧ in the X direction (to the left and right) along with the sliders ⑨.

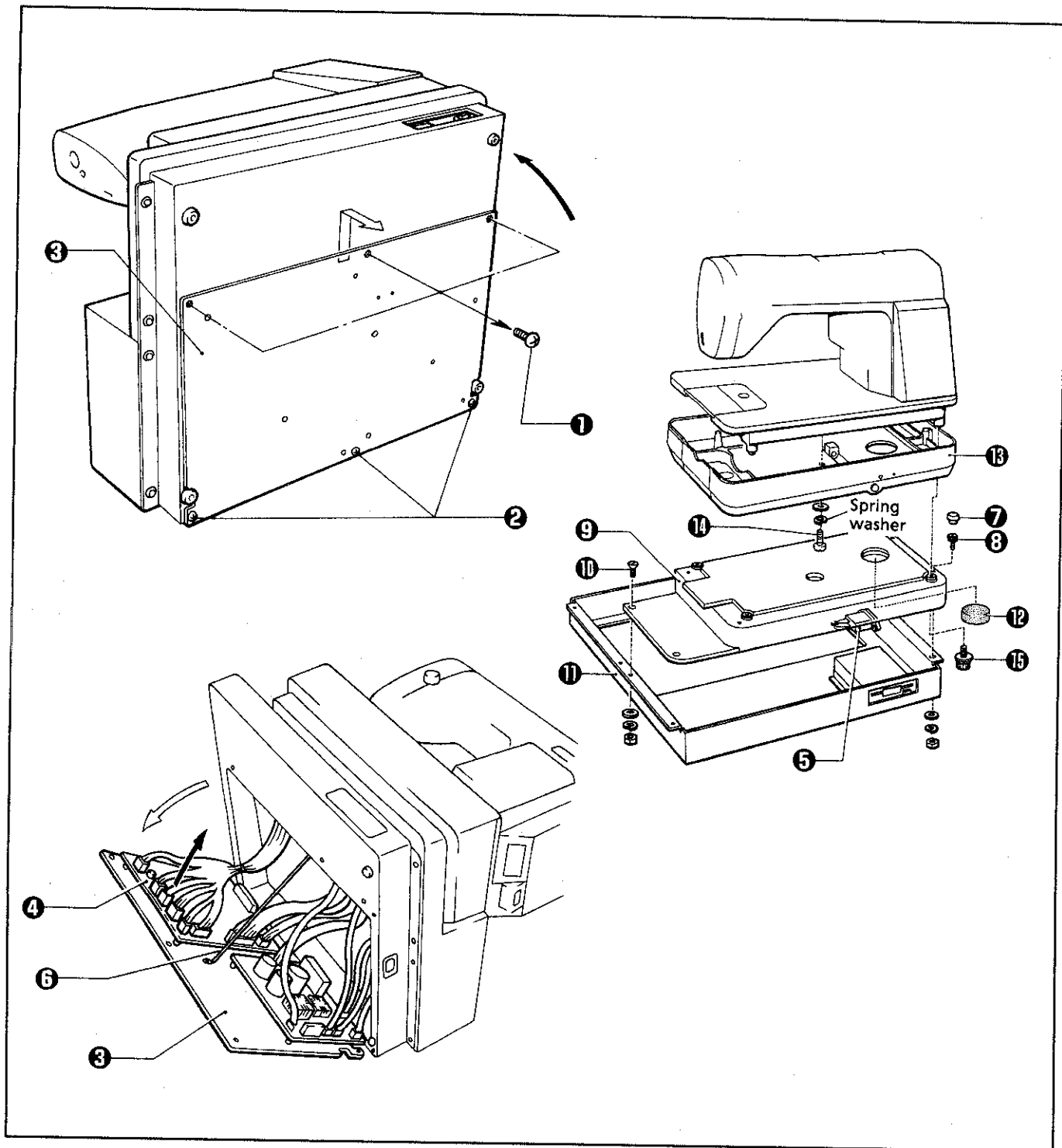
5 Tension release



- 1) When the solenoid signal is received, the solenoid ① moves the solenoid lever ② and the solenoid pin ③.
- 2) The connecting pin ④ and the thread release connecting lever ⑤ rotate via the solenoid lever ②, and the thread release lever ⑦ presses the thread release pin ⑧ via the thread release pin ⑥, then the tension disc ⑨ is opened.

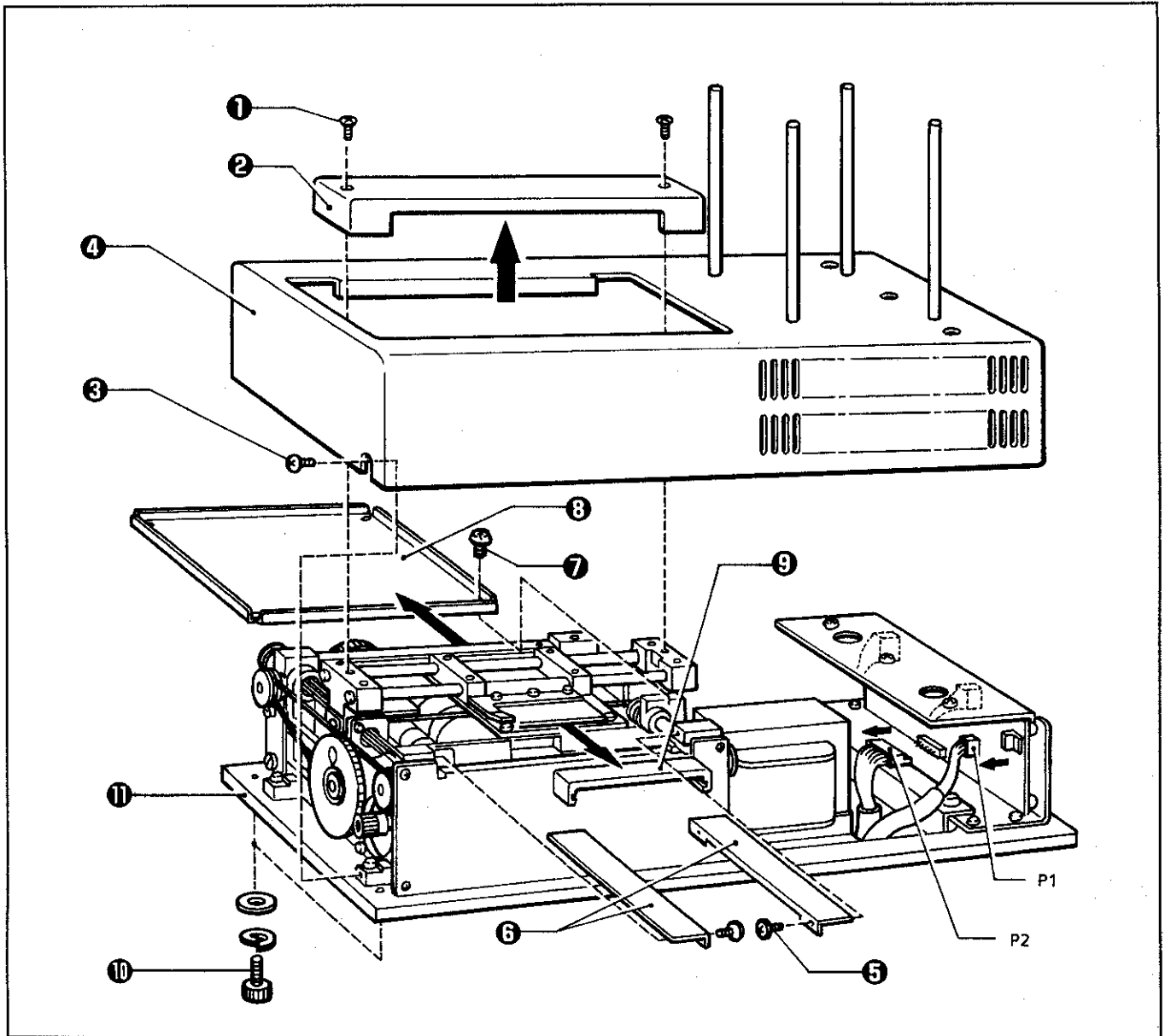
DISASSEMBLY

1 Machine head



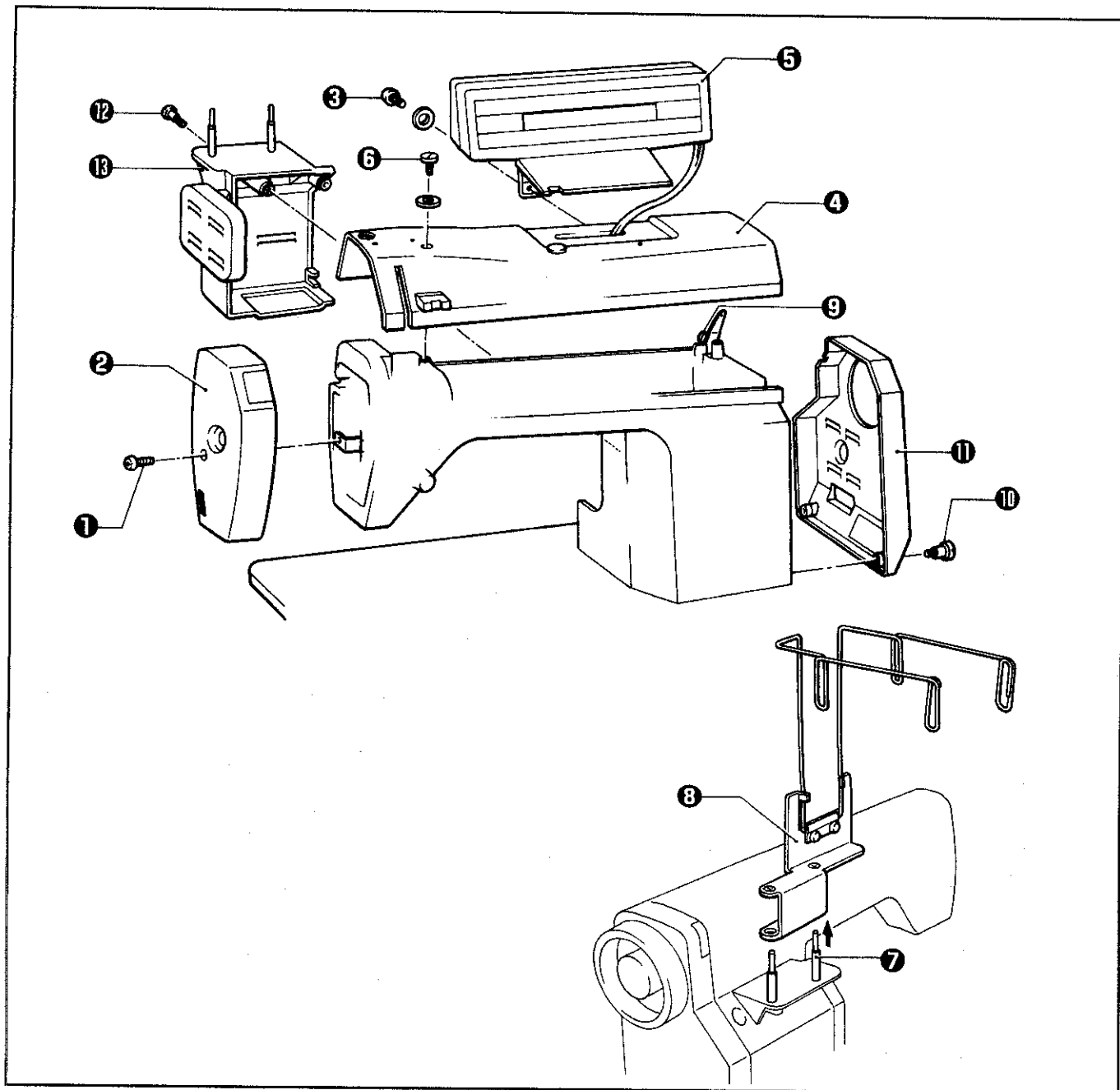
- 1) Tilt the machine head until it stops as shown in the figure above. Remove the three screws ①, loosen the three screws ②, and remove the circuit board set plate ③ by lifting it upward, being careful of the wiring and cables.
- 2) Remove the connectors from the main circuit board ④.
- 3) Remove the connectors from the noise filter ⑤.
- 4) Remove the ground wire ⑥ from the circuit board set plate ③.
- 5) Remove the two oil caps ⑦, the two bolts ⑧, and the two screws ⑩ of the sewing machine fix bracket ⑨. Remove the machine head from the body base ⑪ (along with the sponge ⑫).
- 6) Remove the screw ⑭ from the center of the bottom cover ⑮, and the machine head from the bottom cover ⑮.
- 7) Remove the four bolts ⑮. Remove the machine head from the sewing machine fix bracket ⑨.

2 X-Y feed unit cover



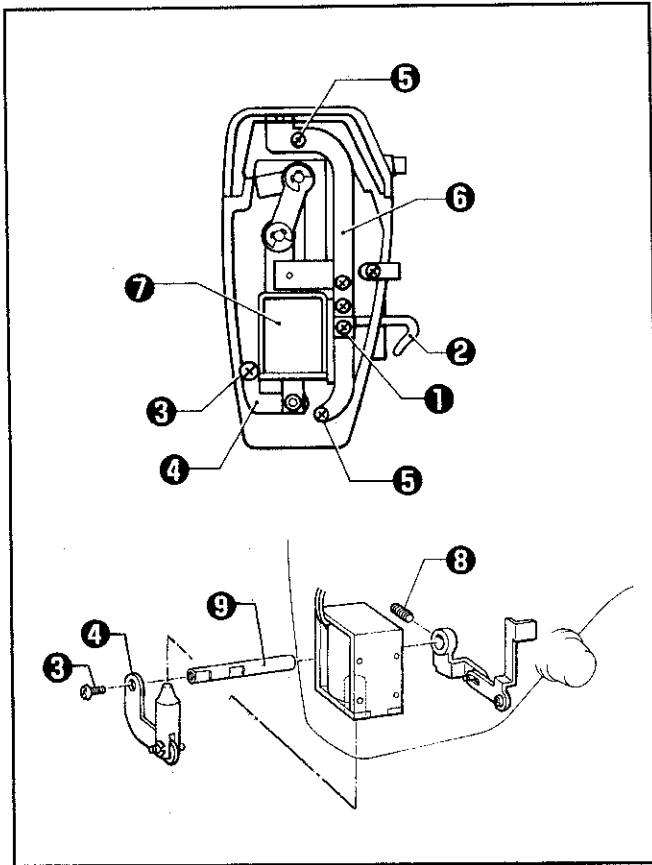
- 1) Remove the two screws ①, and the slide cover ②.
- 2) Loosen the five screws ③, and remove the carriage cover ④.
- 3) Remove the four screws ⑤, and the left and right covers US ⑥.
- 4) Remove the four screws ⑦, and cover U ⑧.
- 5) Remove the slider cover ⑨.
- 6) Remove connectors P1 and P2.
- 7) Remove the four screws ⑩, and the carriage base ⑪ from the body base.

3 Machine covers



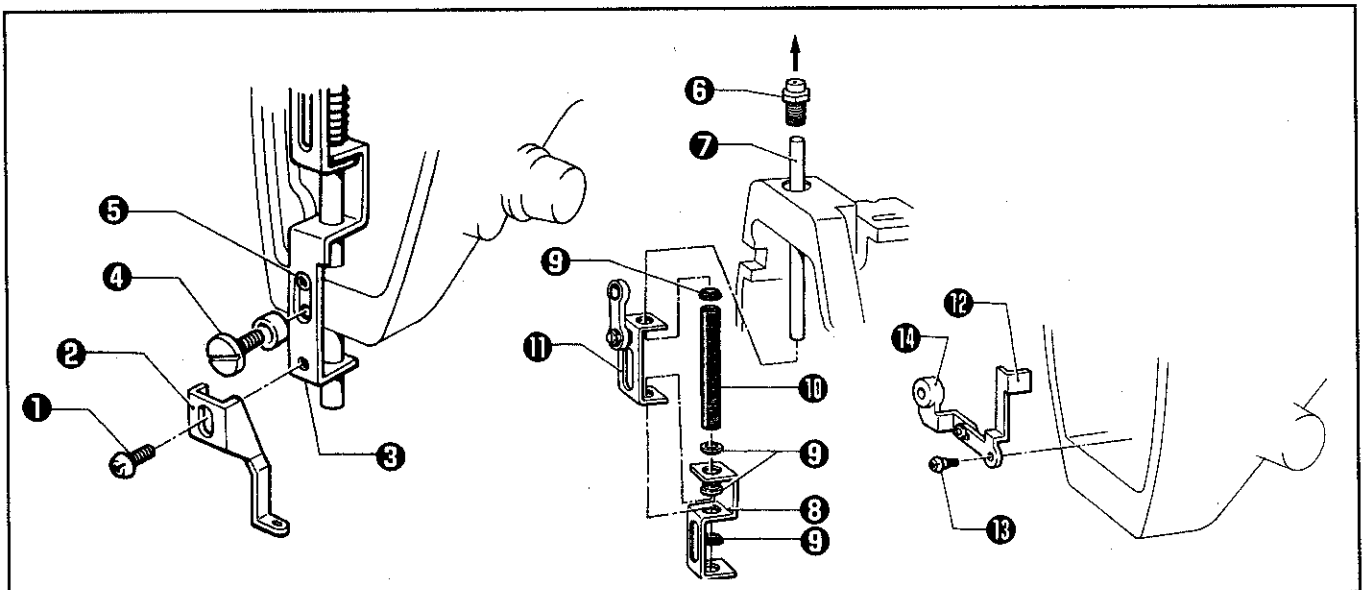
- 1) Remove the screw ①, and the face plate ②.
- 2) Remove the two screws ③, and the LCD module ⑤ from the upper cover ④. (Remove the two cords for LCD module ⑤ from the cord holders, and pull them out from the main circuit board.)
- 3) Remove the two screws ⑥, and the upper cover ④.
- 4) Remove the thread guide support ⑧ from the spool stand ⑦.
- 5) Loosen the screw ⑨, and remove the three screws ⑩, and the belt cover ⑪.
- 6) Remove the two screws ⑫, and the motor cover ⑬.

4 Tension release



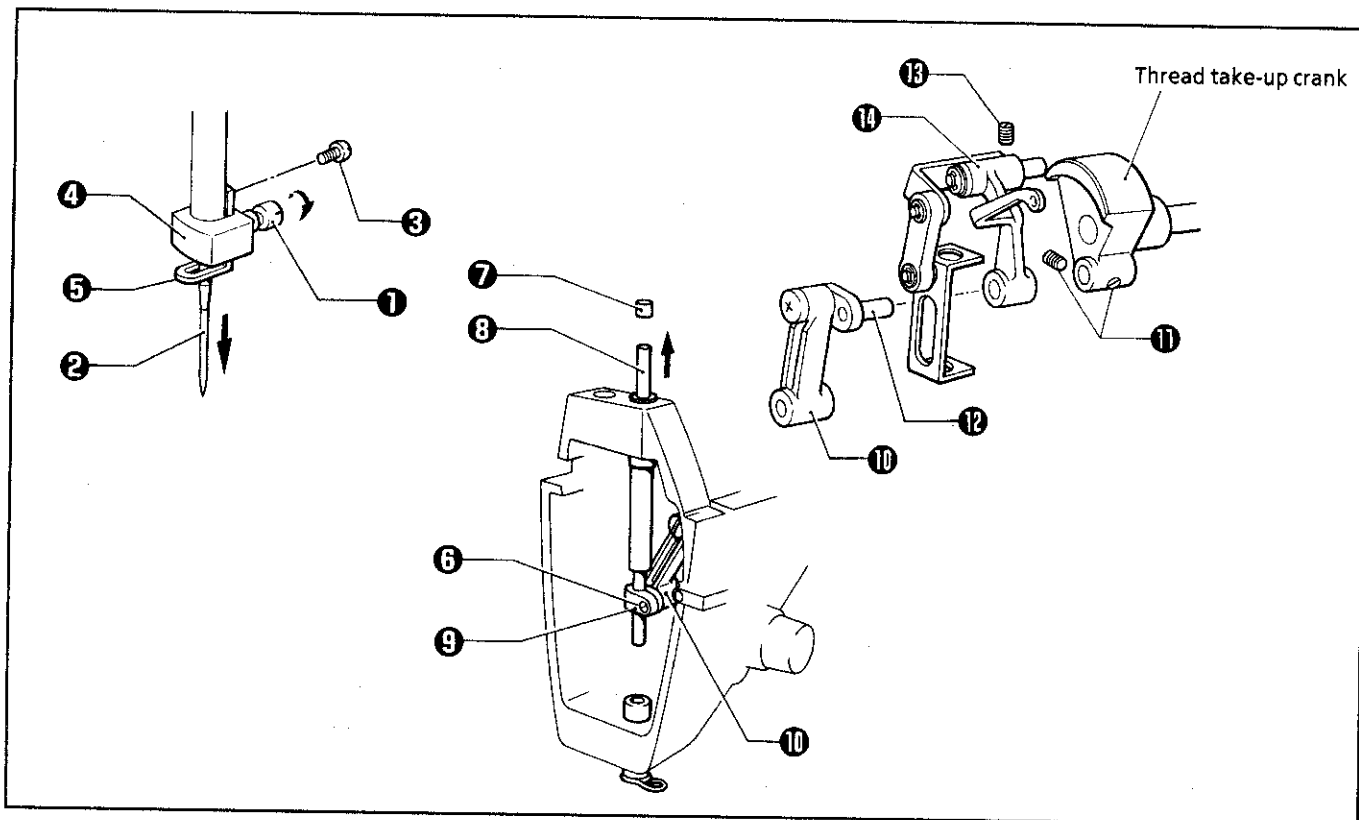
- 1) Remove the screw ①, and the thread hook ②.
- 2) Remove the screw ③, and the solenoid lever ④.
- 3) Remove the two screws ⑤, the face plate base plate ⑥, and the tension release solenoid ⑦.
- 4) Loosen the set screw ⑧, and remove the connecting pin ⑨.

5 Presser bar mechanism



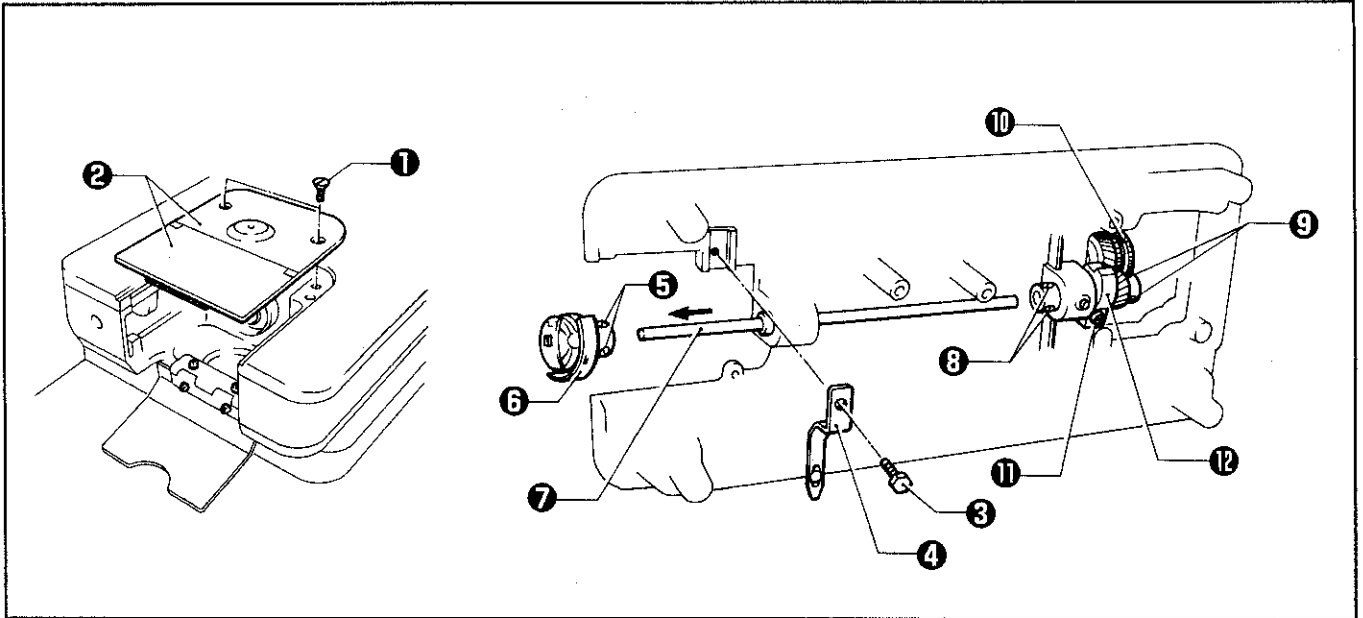
- 1) Remove the screw ①, and the presser foot ② from the presser foot set plate ③.
- 2) Remove the screw ④ and the collar, and loosen the set screw ⑤.
- 3) Remove the presser cap ⑥, then the presser bar ⑦ by lifting it upward.
- 4) The presser foot set plate ⑧, the four presser foot bushes ⑨, the spring ⑩, and the presser foot guide ⑪ will come off in this order.
- 5) Remove the screw ⑬ of the thread release lever ⑫, and the thread release lever ⑫ along with the thread release connecting lever ⑭.

6 Needle bar mechanism



- 1) Loosen the screw ①, and remove the needle ②.
- 2) Remove the screw ③, and the needle bar thread guide ⑤ along with the needle clamp ④.
- 3) Loosen the screw ⑥.
- 4) Remove the felt ⑦, and the needle bar ③ by lifting it upward. (The needle bar clamp ⑧ will come off the needle bar ③ and needle bar crank rod ⑩.)
- 5) Loosen the two set screws ⑪, and remove the needle bar crank ⑫.
- 6) Loosen the set screw ⑬, and remove the link thread take-up assembly ⑭.

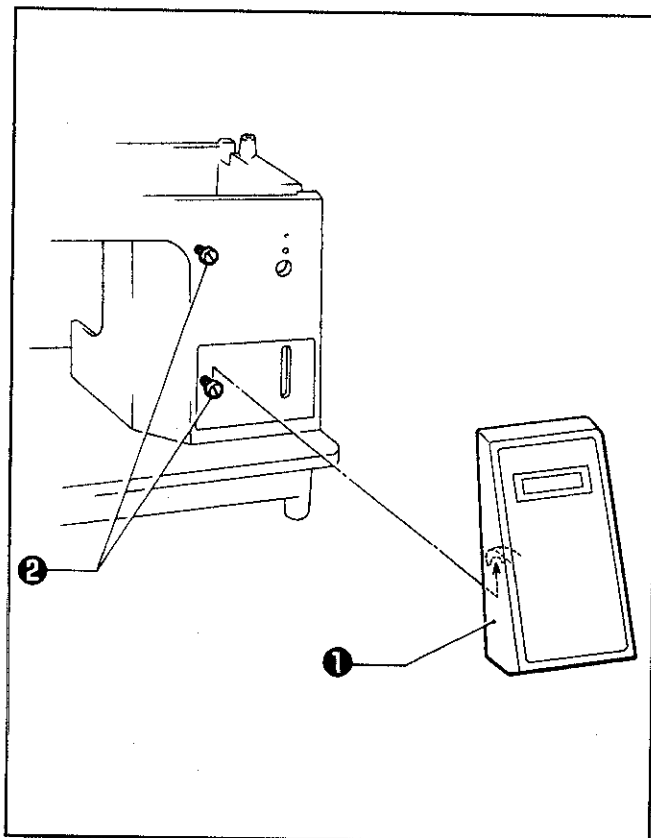
7 Lower shaft mechanism



- 1) Remove the two screws ①, and the needle plate ②.
- 2) Tilt the machine head until it stops.
- 3) Remove the bolt ③, and the inner rotary hook stopper plate ④.
- 4) Loosen the three screws ⑤ securing the rotary hook ⑥, and remove the rotary hook ⑥ from the lower shaft ⑦.
- 5) Loosen the set screws ⑧ of the set collar and the set screws ⑨ of the lower shaft gear, and remove the lower shaft ⑦ by pulling it toward the front of the rotary hook ⑥.
- 6) When replacing the timing belt ⑩, loosen the screw ⑪, and remove the timing belt ⑩ by moving the gear base ⑫ back and forth.

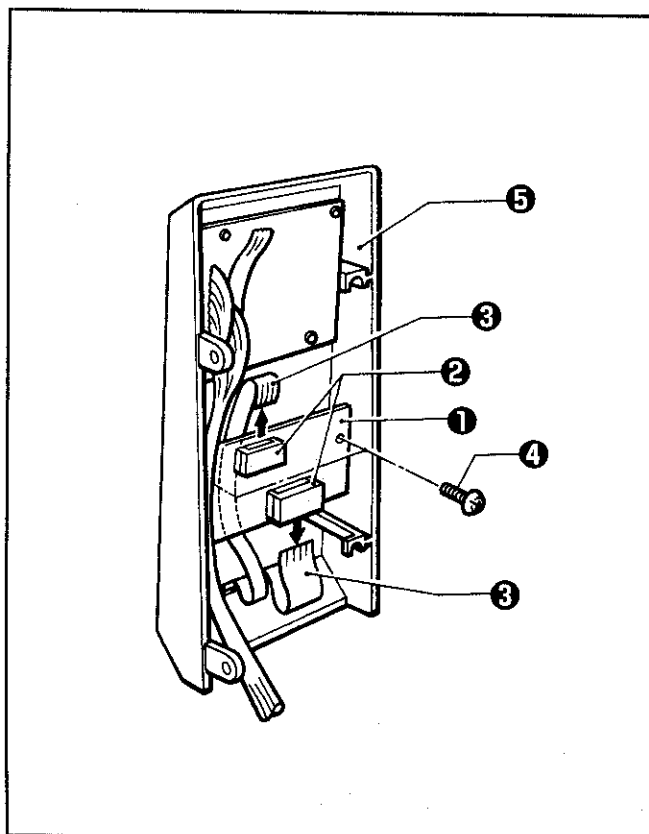
8 Display unit assembly

(1) Operation panel



Remove the operation panel **1** from the shoulder screws **2** by lifting it upward.

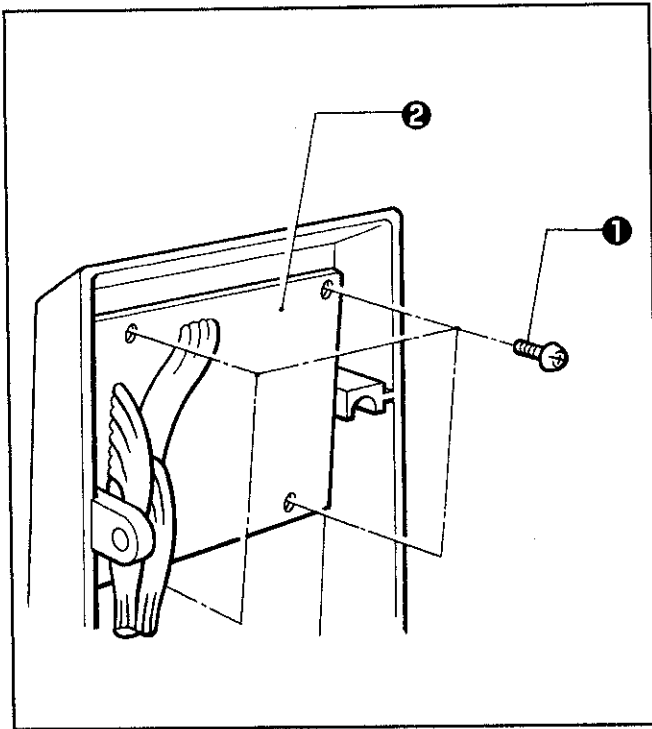
(2) Relay circuit board



1) Press the connector **2** from both sides to unlock the connector **2** on the relay circuit board **1**, and remove the flat cable **3** by pulling it toward the front.

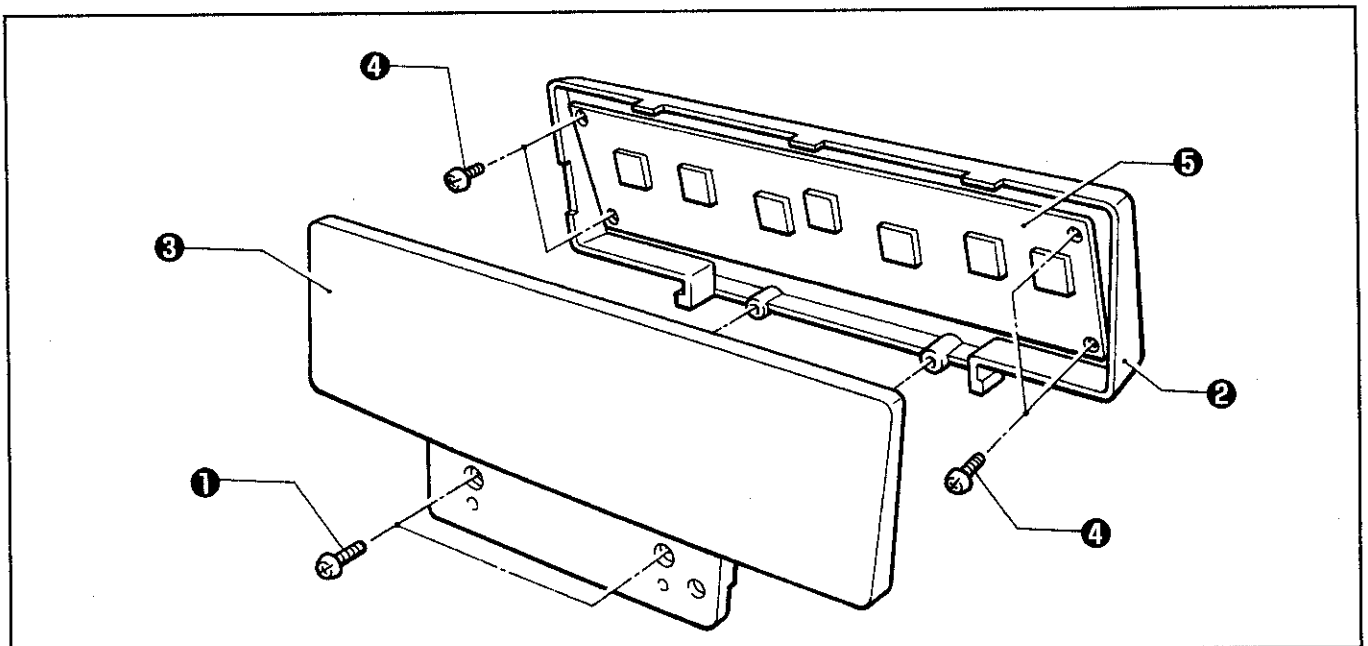
2) Remove the two screws **4**, and the relay circuit board **1** from the switch panel plate **5**.

(3) Panel circuit board assembly



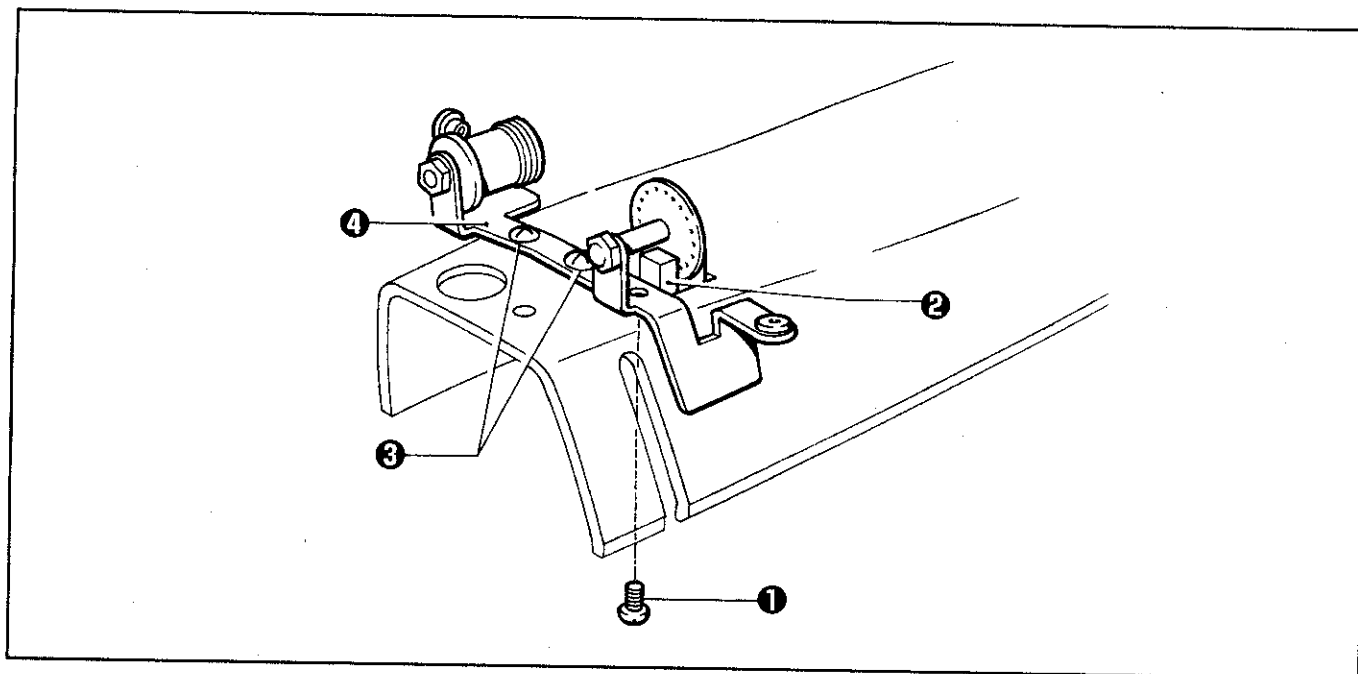
Remove the four screws ①, and the panel circuit board ② from the switch panel plate.

(4) LCD module circuit board assembly



- 1) Remove the two screws ① and the indication panels (front) ② and (rear) ③.
- 2) Remove the four screws ④ from the indication panel (front) ②. Remove the LCD module circuit board ⑤.

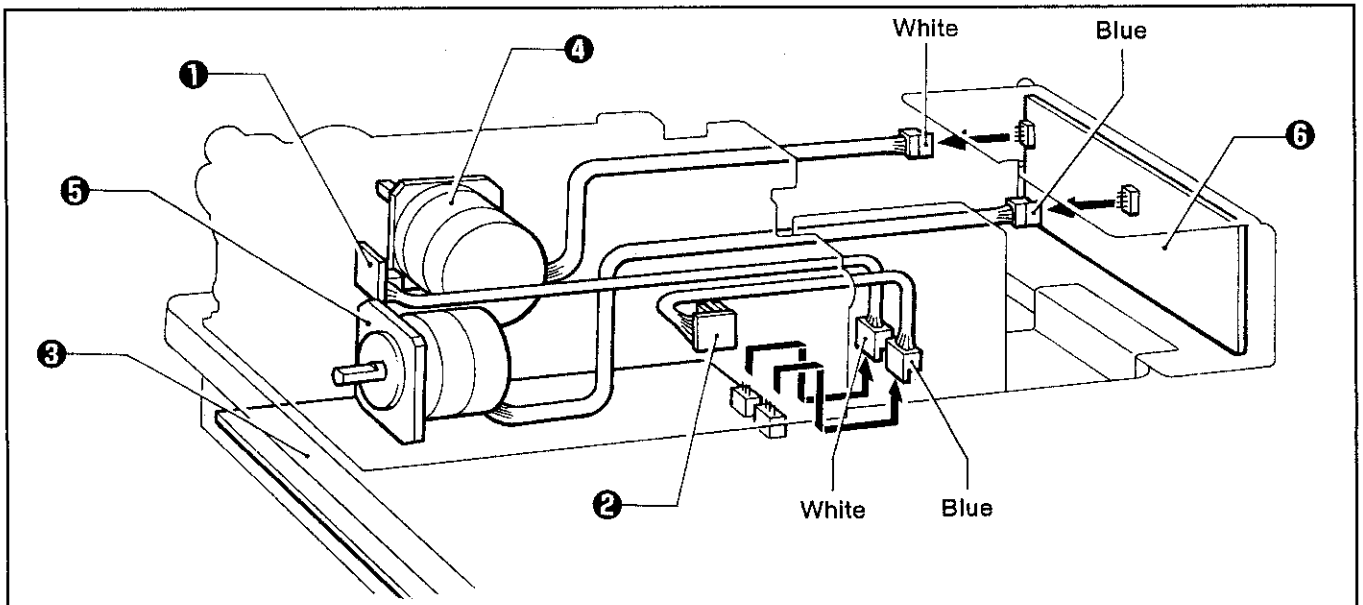
9 Thread breakage detector



- 1) Remove the screw ① from the underside of the upper cover, and the thread breakage detector ②.
- 2) Remove the two screws ⑤, and the thread breakage sensor plate ④.

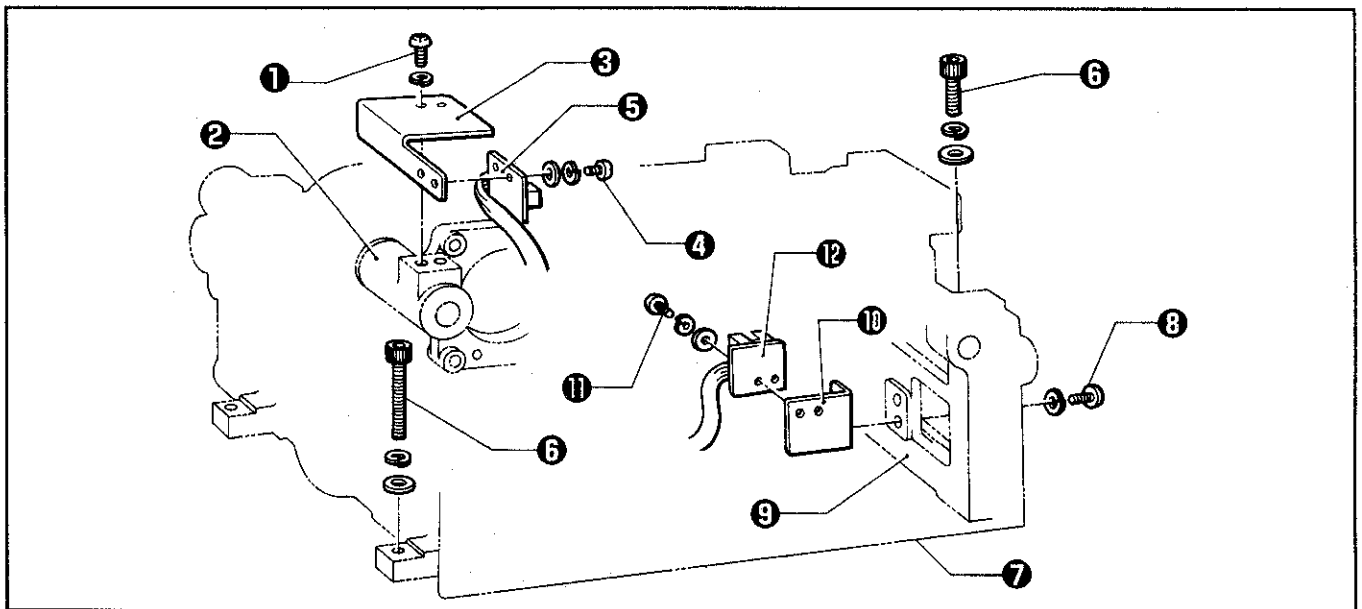
10 Power table

(1) Connectors



- 1) Remove the connectors of the X index circuit board ① and the Y index circuit board ② from the main circuit board assembly ③.
- 2) Remove the connectors of the X pulse motor ④ and the Y pulse motor ⑤ from the PMD circuit board ⑥.

(2) X and Y index circuit boards



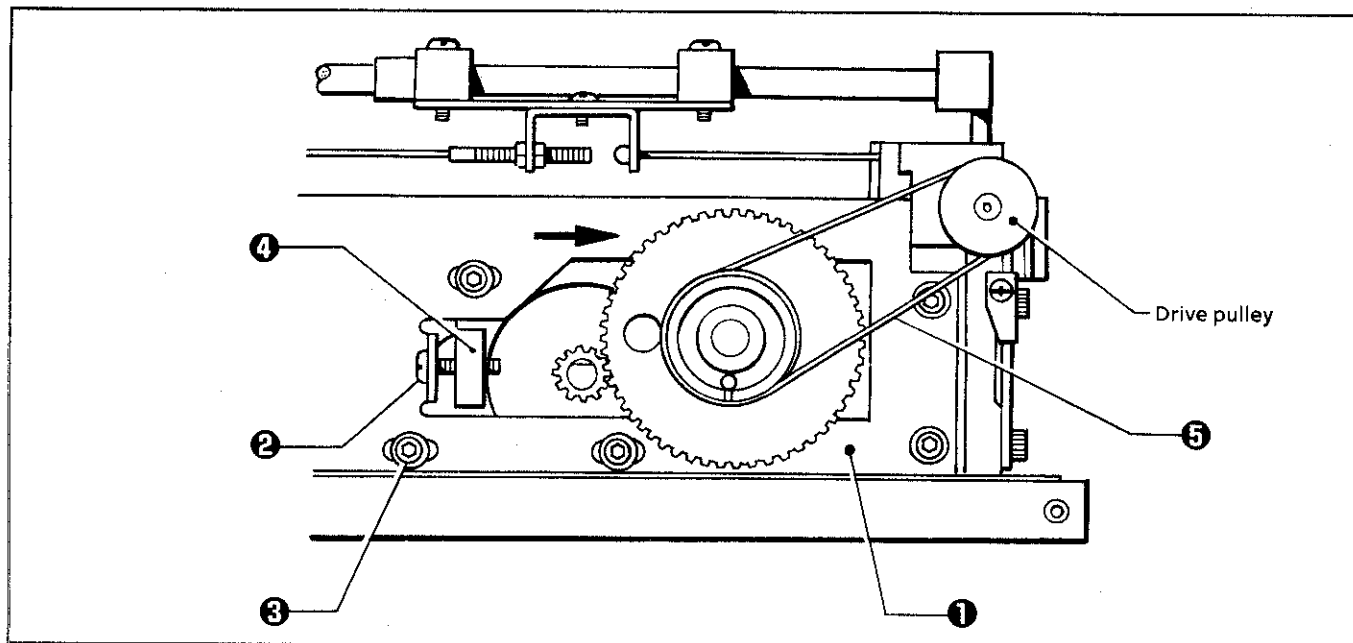
= X index circuit board =

- 1) Remove the two screws ①, and sensor bracket X ③ from motor bracket X ②.
- 2) Remove the two screws ④, and the X index circuit board assembly ⑤ from sensor bracket X ③.

= Y index circuit board =

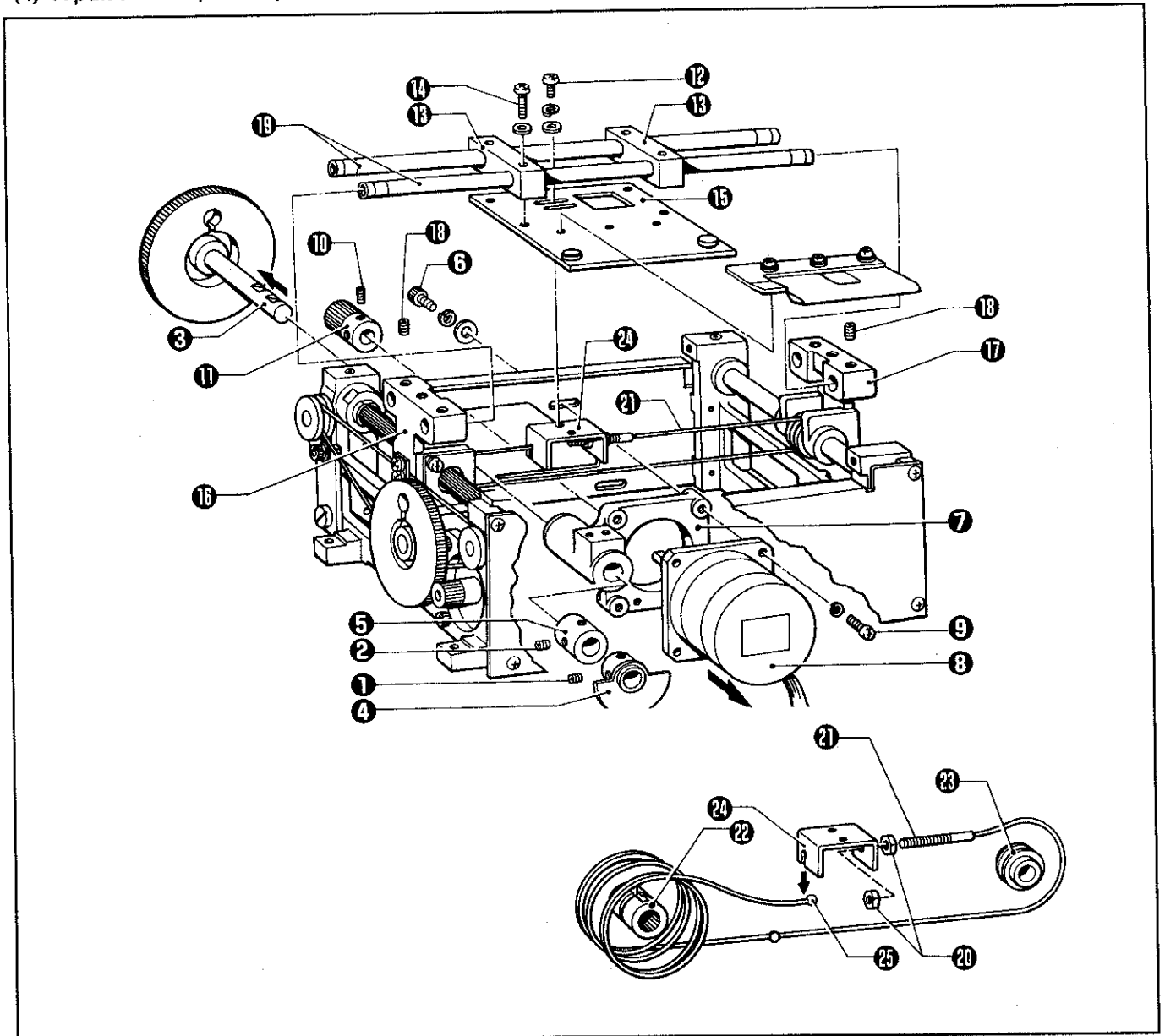
- 3) Remove the four bolts ⑥, and the X-Y feed unit assembly ⑦.
- 4) Remove the two screws ⑧, and sensor bracket Y ⑩ from frame L ⑨.
- 5) Remove the two screws ⑪, and the Y index circuit board assembly ⑫ from sensor bracket Y ⑩.

(3) X drive wire



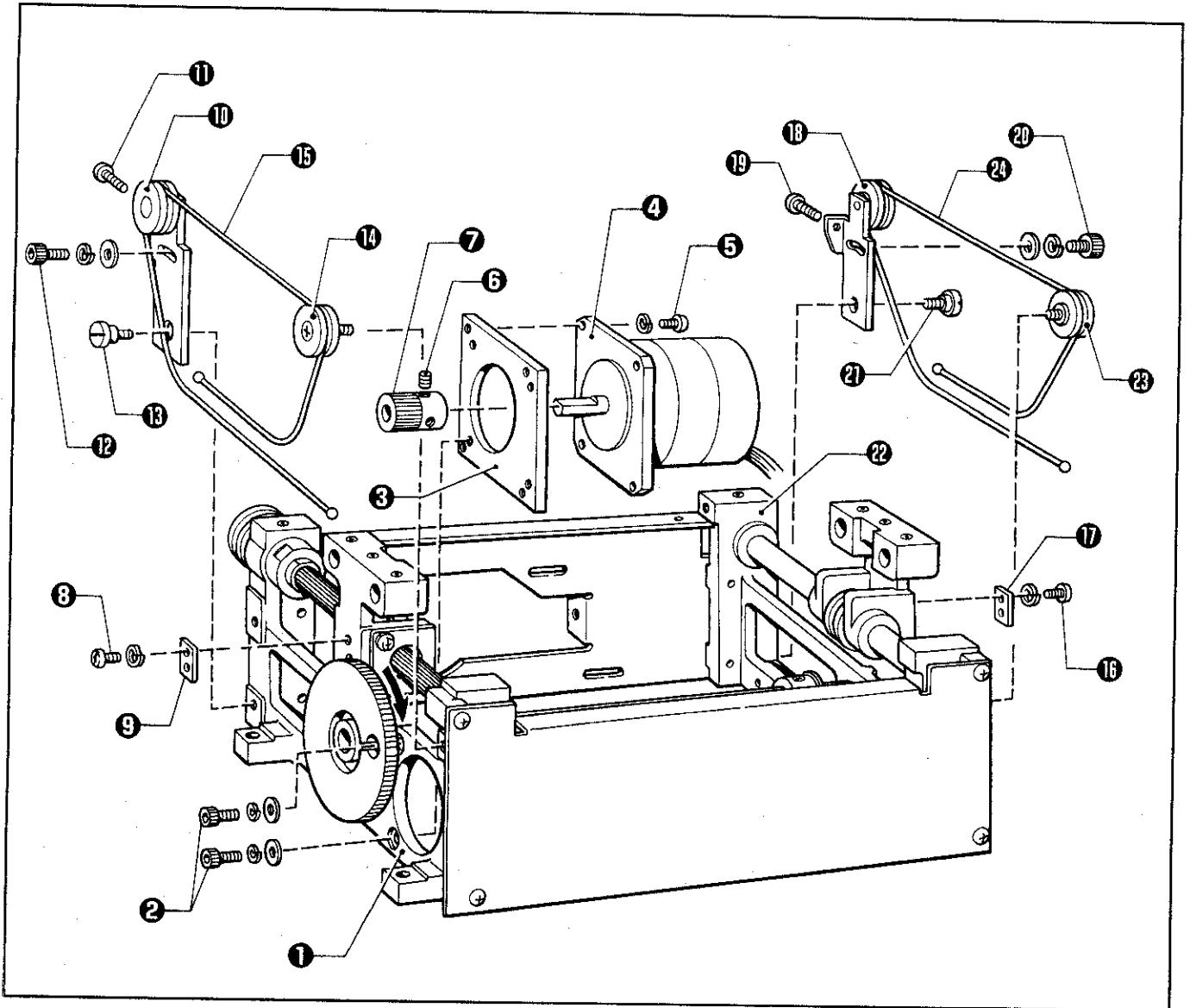
- 1) Remove the adjustment screw ② in the back of the base plate ①.
- 2) Loosen the three screws ③ in the base plate ①, move motor bracket X ④, and remove the X drive wire ⑤.

(4) X pulse motor, sliders, X mini wire



- 1) Loosen the set screws ① and ②, and remove the gear shaft ③, the home position dog ④, and collar (X) ⑤.
- 2) Remove the three screws ⑥, and motor bracket X ⑦. (When replacing the X pulse motor ③, remove the four screws ⑧, loosen the set screw ⑩, and remove the gear ⑪.)
- 3) Remove the two screws ⑫, the four screws ⑬ of the left and right sliders ⑭, and the slide plate assembly ⑮.
- 4) Loosen the four set screws ⑯ in bush holders L ⑰ and R ⑱, and remove the slide shaft ⑲ from the left and right sliders ⑳.
- 5) Loosen the nut ㉔, and remove the X mini wire ㉑.
- 6) Remove the X mini wire ㉑ from the spline shaft assembly ㉒ and the idle pulley ㉓, and the end ball ㉕ from the wire hook ㉔.

(5) Y mini wires



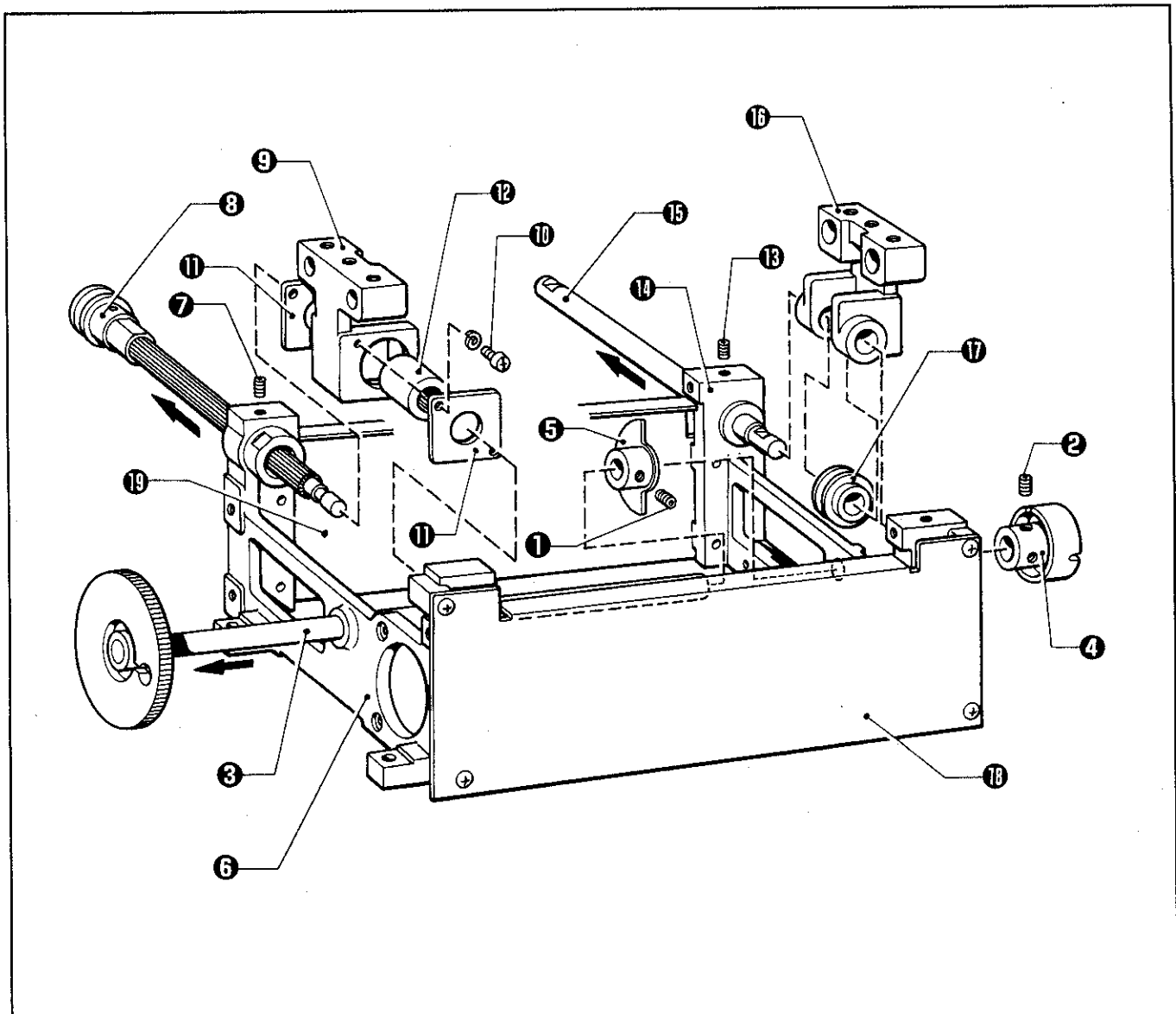
= Left frame side =

- 1) Remove the four bolts ② from frame L ①, and the motor bracket Y assembly ③. (When replacing the Y pulse motor ④, remove the four screws ⑤, loosen the set screw ⑥, and remove the gear ⑦.)
- 2) Remove the two screws ⑧, and the wire presser ⑨.
- 3) Loosen the screw ⑪, the bolt ⑫, and the shoulder screw ⑬ securing tension pulley L ⑩. (There is no need to remove them from frame L ①.)
- 4) Remove support B ⑭, and the Y mini wire ⑮.

= Right frame side =

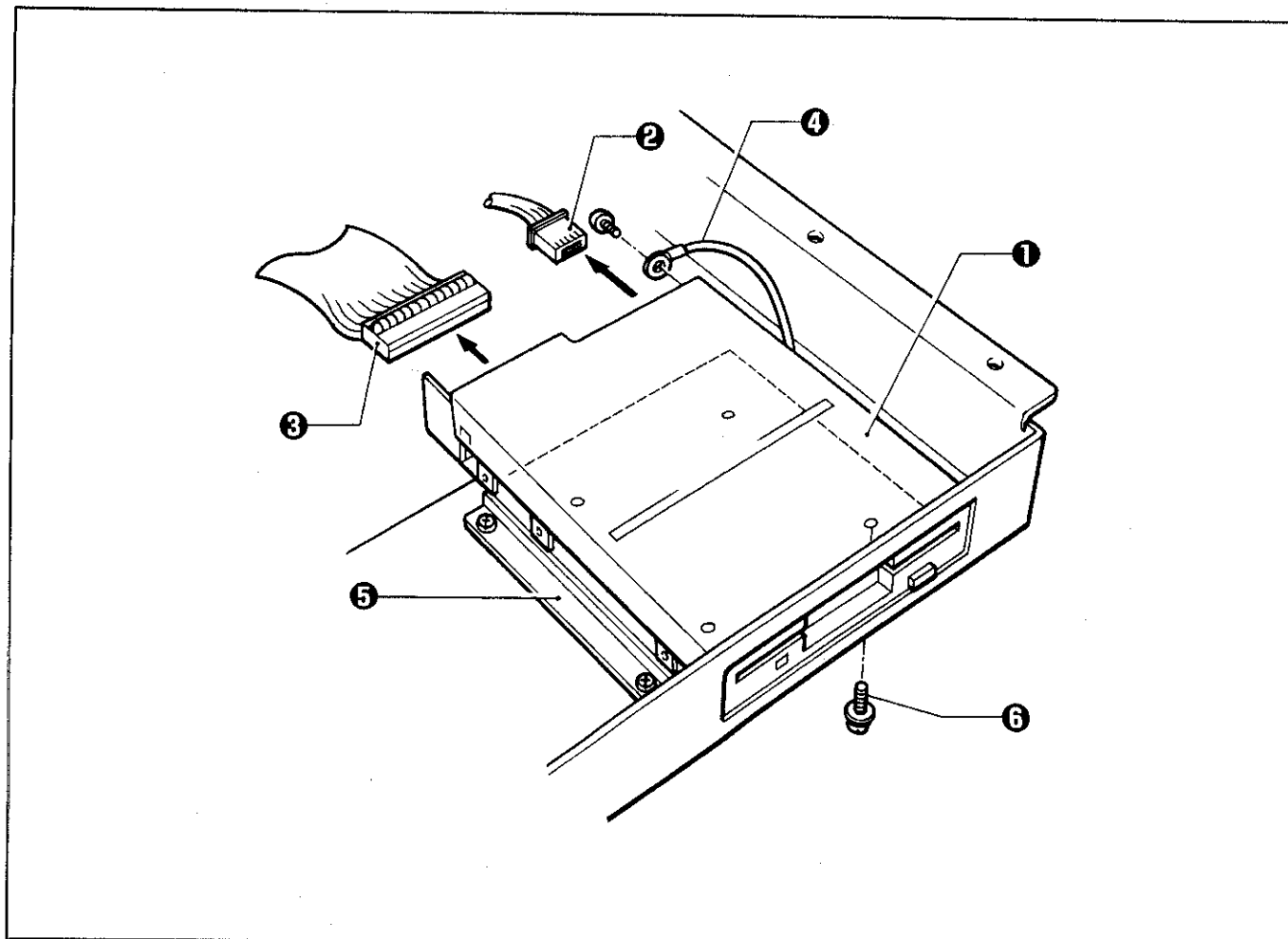
- 5) Remove the two screws ⑯, and the wire presser ⑰.
- 6) Loosen the screw ⑱, the bolt ⑳, and the shoulder screw ㉑ securing tension pulley R ⑱. (There is no need to remove them from frame R ㉒.)
- 7) Remove support B ㉓, and the Y mini wire ㉔.

(6) Frame



- 1) Loosen the set screws ① and ②. Remove pulley Y ④ and the home position dog ⑤ while pulling out the pulley shaft ③.
NOTE: When pulling out the pulley shaft ③, make sure that the home position dog ⑤ does not strike the Y index circuit board assembly.
- 2) Loosen the set screw ⑦ in frame R ⑥.
- 3) Remove the spline shaft ③ by pulling it to the rear, and remove metal holder L ⑥.
- 4) Remove the four screws ⑩, the front and back nut pressers ⑪ and the spline bush ⑫ from metal holder L ⑥.
- 5) Loosen the set screw ⑬, pull out the guide shaft ⑮ from frame L ⑭, and remove bush holder R ⑯ and the idle pulley ⑰.
NOTE: Do not disassemble the connecting plate ⑬, the base plate ⑱, and frames R ⑥ and L ⑭.

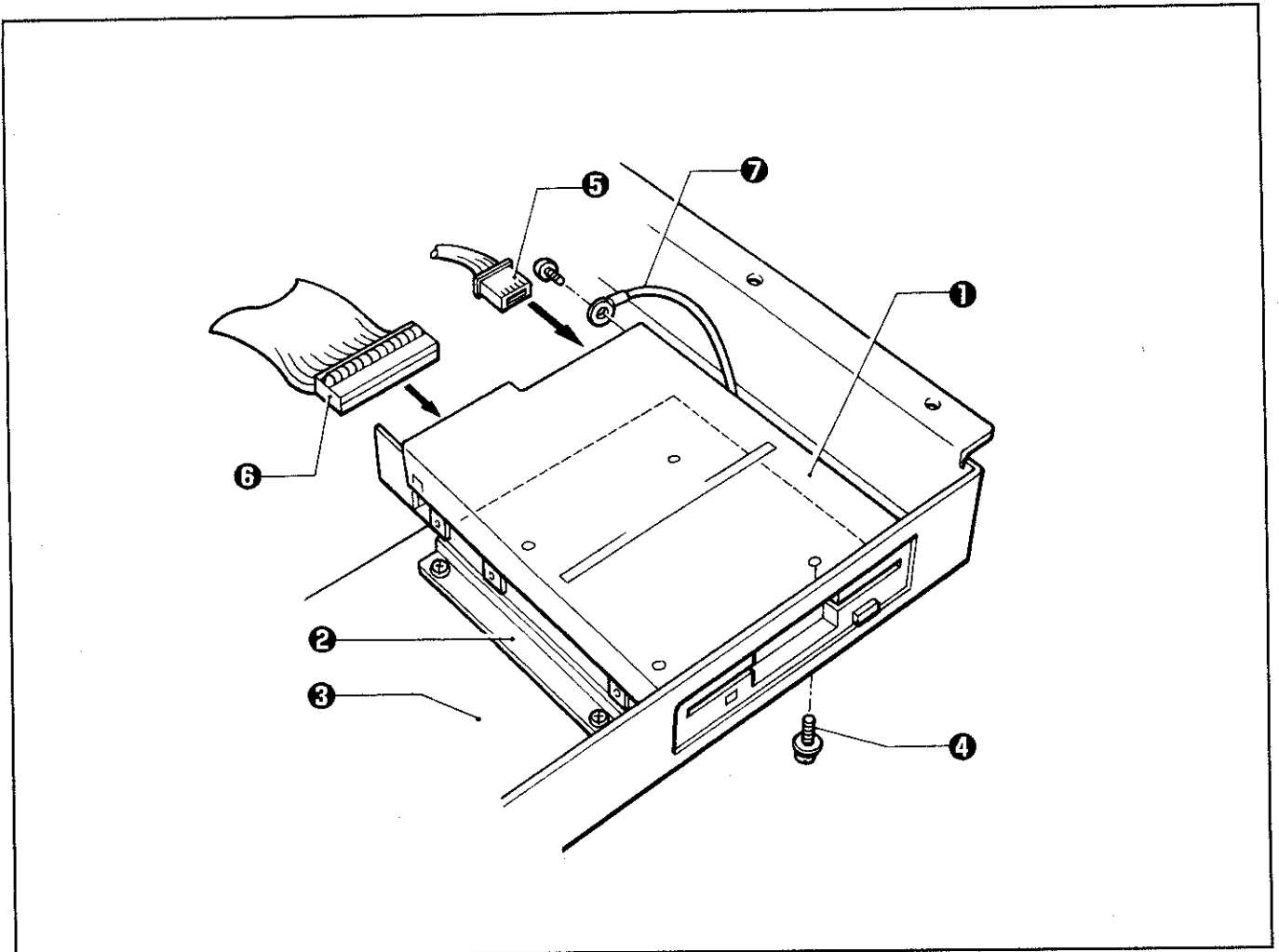
11 Floppy disk drive assembly



- 1) Remove the connector ②, the flat cable ③, and the ground wire ④ from the floppy disk drive ①.
NOTE: One of the screws securing the floppy bracket is also used to connect the ground wire ④.
- 2) Remove the four screws ⑥ from the underside of the body base ⑤. Remove the floppy disk drive ①.

ASSEMBLY

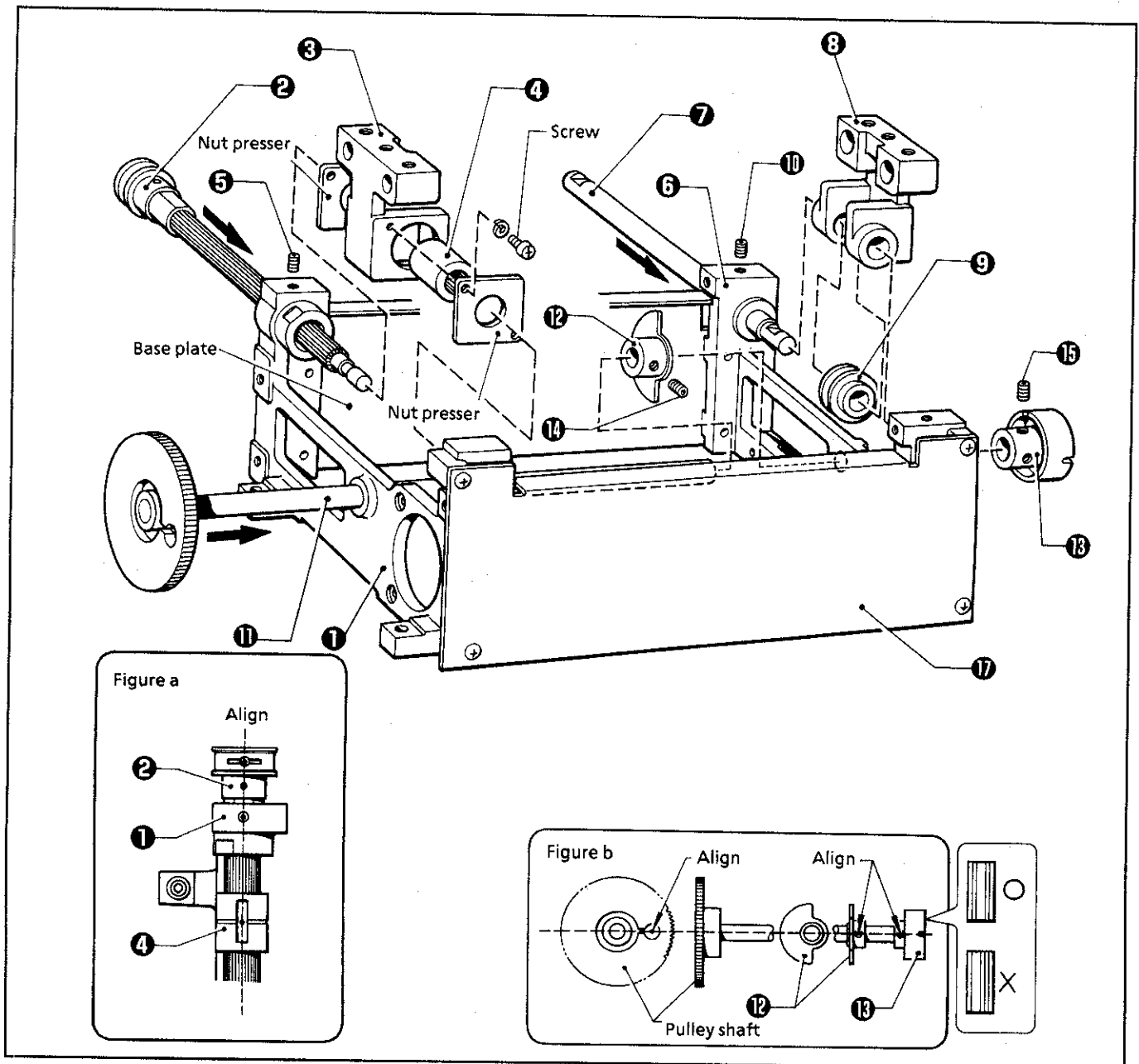
1 Floppy disk drive assembly



- 1) Put the floppy disk drive ① on the floppy bracket ②, and attach it using the four screws ④ from the underside of the body base ③.
NOTE: If the four screws ④ securing the floppy disk drive ① to the floppy bracket ② are tightened too much, the floppy disk drive ① may not operate correctly. Be careful and tighten the screws with about 9 gf.
- 2) Attach the connector ⑤, the flat cable ⑥, and the ground wire ⑦ to the floppy disk drive ①.

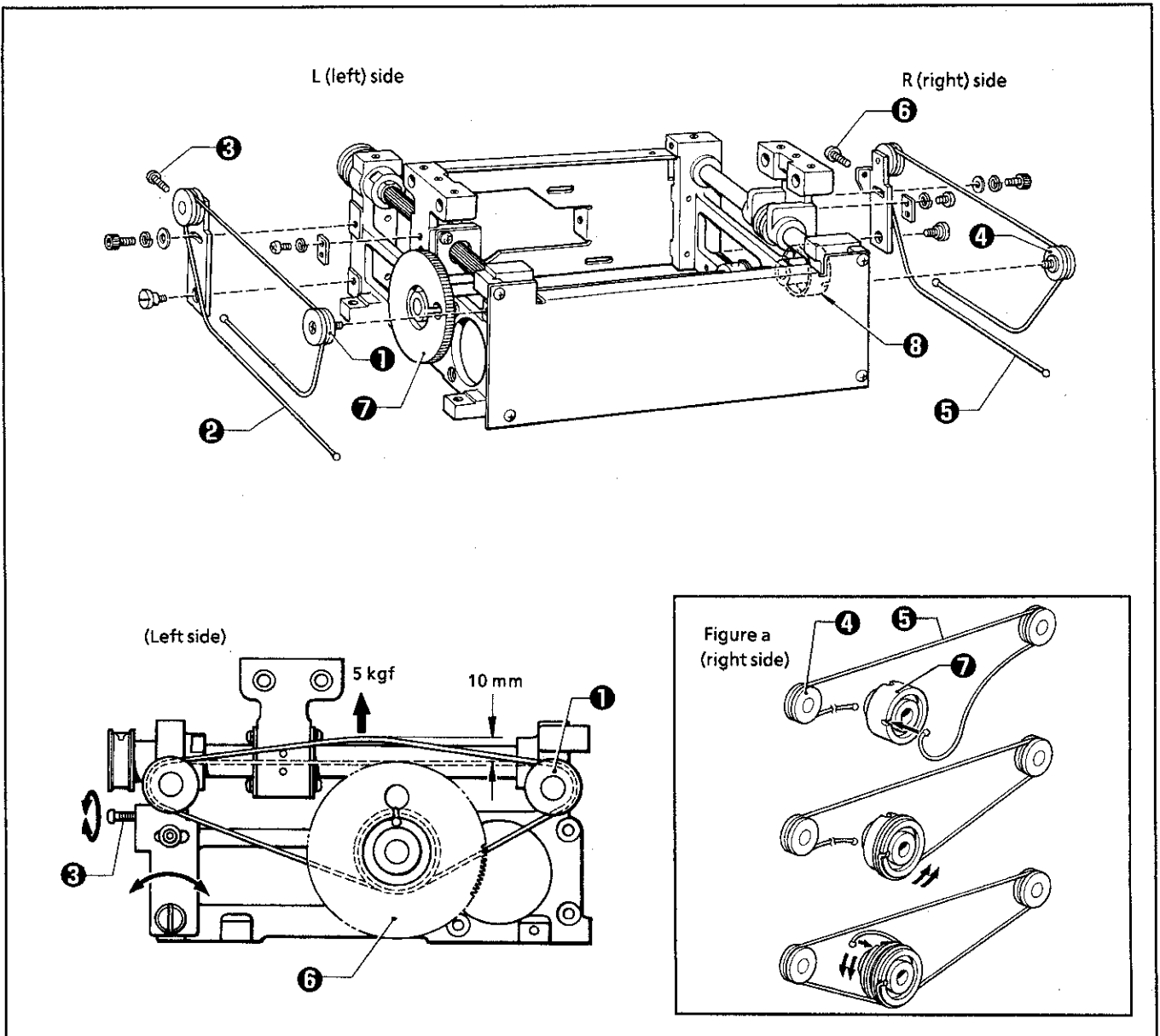
2 Power table

(1) Frame



- 1) Pass the spline shaft assembly ② through frame R ①, and attach bush holder R ③.
NOTE: Align the keyway in the spline shaft bush ④ and the hole in the spline shaft assembly ② as shown in figure a.
- 2) Securely tighten the set screw ⑤ on the screw flat of the spline shaft assembly ②.
- 3) Pass the guide shaft ⑦ through frame L ⑥, position the idle pulley ⑨ between arms of bush holder L ③, before sliding them onto the guide shaft ⑦. Then further slide the guide shaft ⑦ into frame L ⑥, and lock it using the set screw ⑩.
- 4) Pass the pulley shaft ⑪ through frame R ①, and then slide the home position dog ⑫ on it. Next slide the pulley shaft ⑪ through frame L ⑥ before mounting pulley Y ⑬ on it. (When attaching the home position dog ⑫, make sure that it does not strike the Y index substrate.)
- 5) Tighten the set screw ⑭ of the home position dog ⑫, and the set screw ⑮ of pulley Y ⑬.
- 6) When attaching pulley Y ⑬ to the pulley shaft ⑪, adjust the wire around it so it is as shown in figure b.
NOTE: The hole in the pulley shaft assembly should be at the top at this time.

(2) Y mini wires



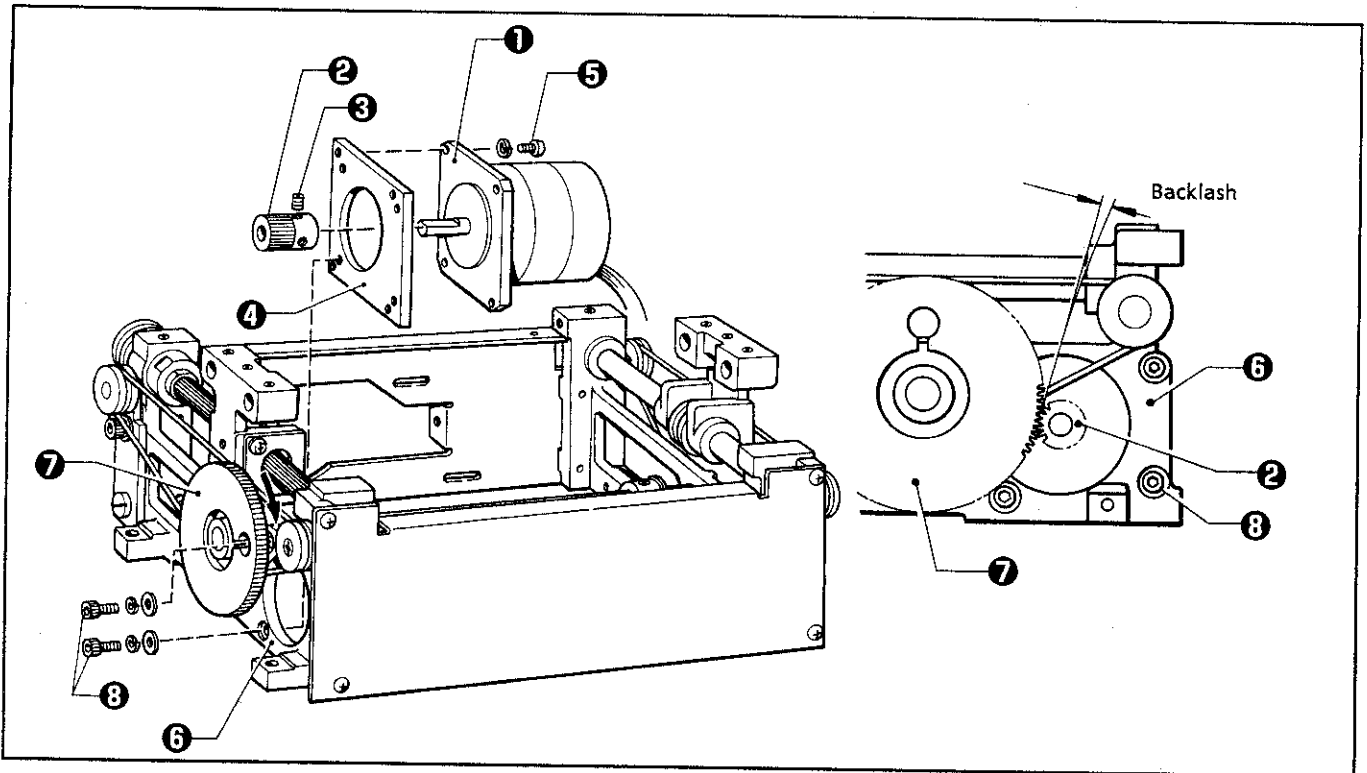
= Left frame side =

- Attach support B ①.
- Attach the Y mini wire ②. (See figure a.)
- Adjust the tension of the Y mini wire ②. (Apply a 5 kg load to the center of the Y mini wire ②, and adjust the screw ③ so that there is approximately 10 mm of give.)

= Right frame side =

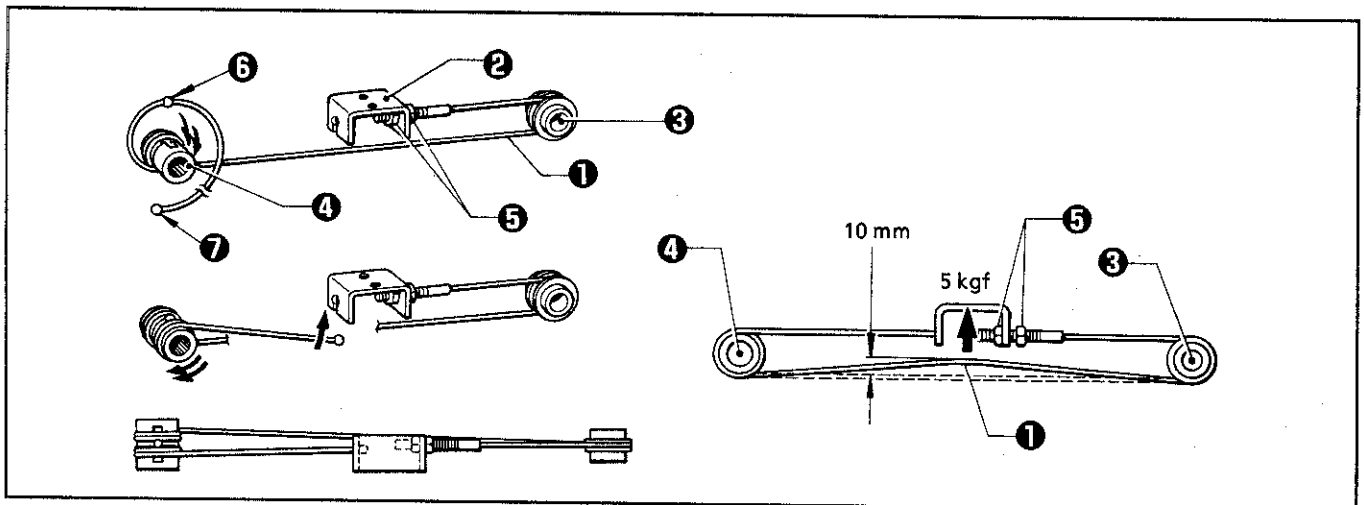
- Attach support B ④.
- Attach the Y mini wire ⑤. (Wrap it on as for the left side.)
- Adjust the tension of the Y mini wire ⑤ using the screw ⑥. (Adjust it as for the left side.)
- Refer to figure a when wrapping the left and right Y mini wires ② and ⑤ around the gear pulley ⑦ and pulley Y ③, respectively.

(3) Y pulse motor (only for replacement)



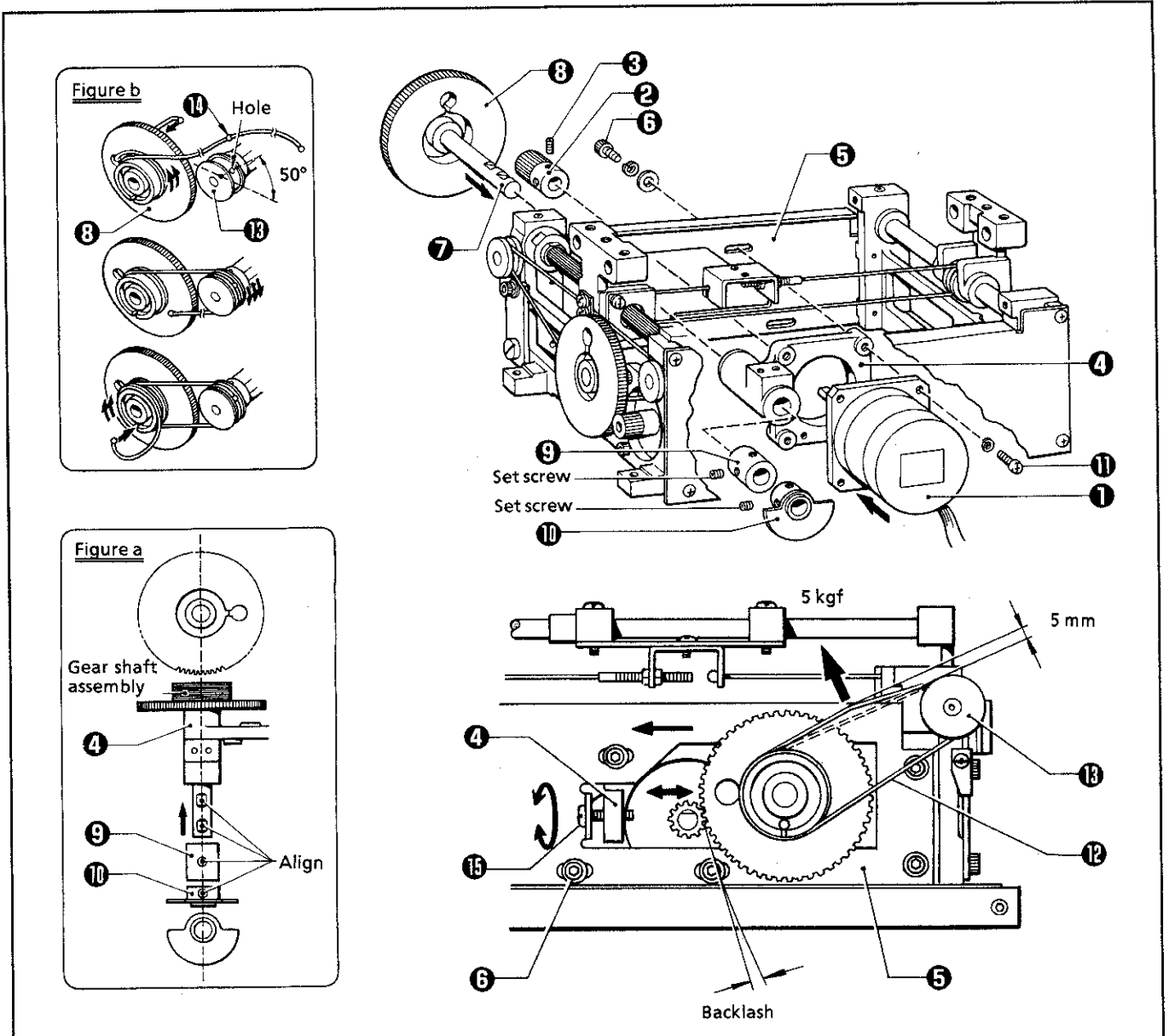
- 1) Attach the gear ② to the Y pulse motor ① using the two set screws ③, and attach motor bracket Y ④ using the four screws ⑤.
- 2) Adjust the backlash so that the gear ② and the gear pulley ⑦ rotate smoothly without any looseness between them. Attach motor bracket Y ④ to frame R ⑥ using the four screws ⑧.

(4) X mini wire



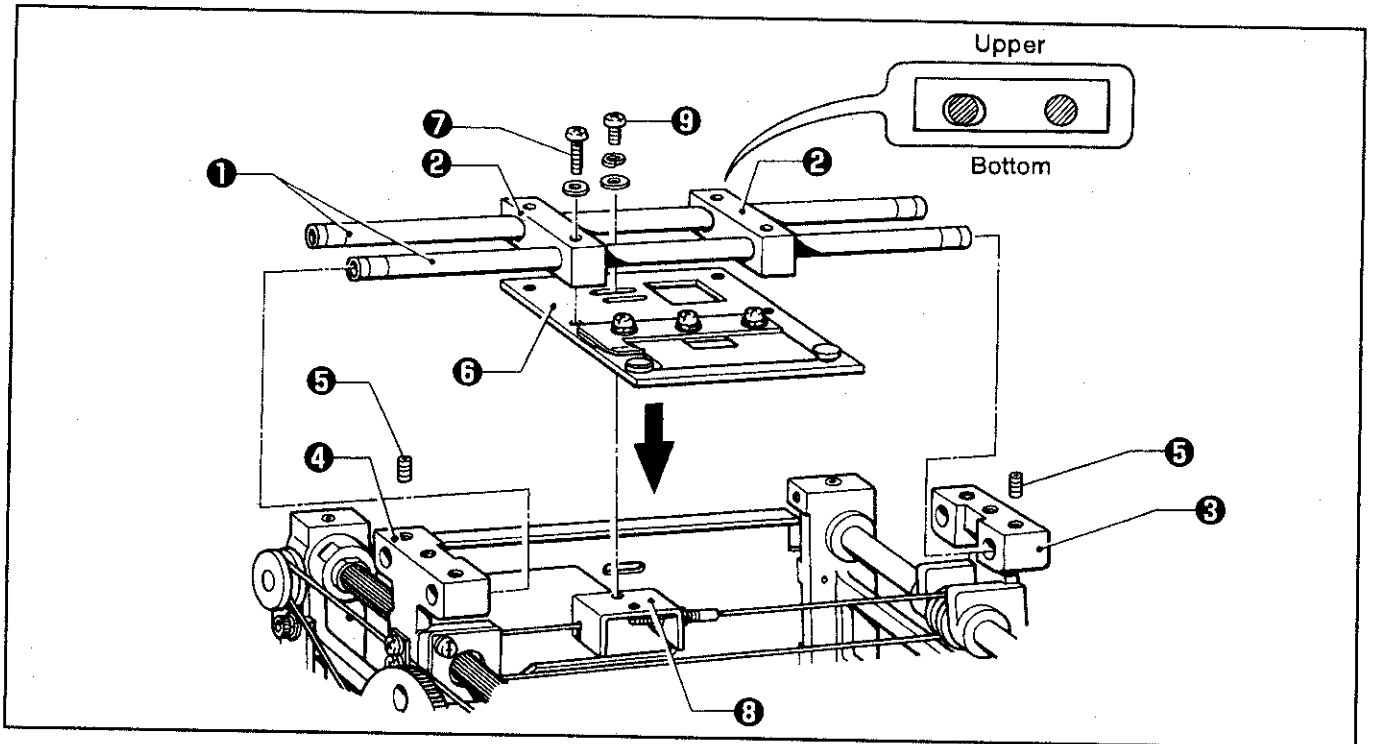
- 1) Attach the X mini wire ① to the wire hook ②.
(Be sure to check the direction of wire that is looped around the idle pulley ③ and the spline shaft bush ④.)
NOTE: Attach the X mini wire ① to the right of the wire hook ② using the two nuts ⑤, and wrap the wire ① around the idle pulley ③. Insert a ball ⑤ into the notch in the spline shaft bush ④, and wrap the wire ① twice around the spline shaft bush ④ following the groove in it, then insert the end ball ⑦ into the notch on the left of the wire hook ②.
- 2) Adjust the tension of the X mini wire ①.
NOTE: After checking the X mini wire ① is not twisted, apply a 5 kg load (5 kgf) to the center of the wire ①, and adjust the nut ⑤ until the give is approximately 10 mm.

(5) X pulse motor, gear pulley, X drive wire



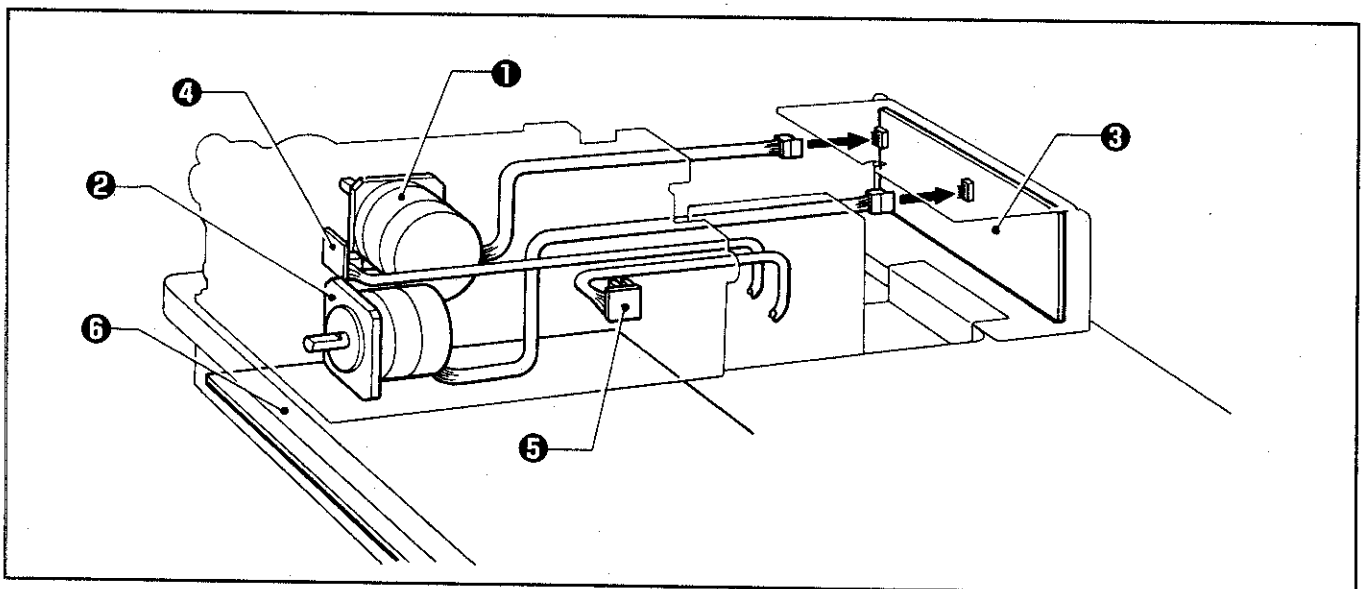
- 1) Attach the gear ② to the X pulse motor ① using the three set screws ③.
- 2) Temporarily attach motor bracket X ④ to the base plate ⑤ using the three screws ⑥.
- 3) Attach the gear shaft ⑦ (with the gear pulley ③), collar (X) ⑨, and the home position dog ⑩ to motor bracket X ④.
NOTE: Align the screw flats of the gear shaft ⑦ with the screw positions of collar (X) ⑨ and the home position dog ⑩ as shown in figure a.
- 4) Engage the gear pulley ③ and the gear ②, attach them to motor bracket X ④ using the four screws ⑪ while adjusting them so that they move smoothly without backlash.
- 5) Attach the X drive wire ⑫. (Refer to figure b.)
NOTE: Set the wire mounting slot in the gear pulley ③ and the hole (3.6 mm diameter) in the drive pulley ⑬ about 50° apart, wrap the wire twice around the gear pulley ③, once around the drive pulley ⑬, insert the ball ⑭ into the hole in the drive pulley ⑬, wrap the wire once around the pulley ⑬, and then twice around the gear pulley ③.
- 6) Adjust the tension of the X drive wire ⑫. (Loosen the three screws ⑥, apply a 5 kgf load to the center of the X drive wire ⑫, turn the adjustment screw ⑮ so that there is about 5 mm of give, and then retighten the three screws ⑥.)

(6) Sliders



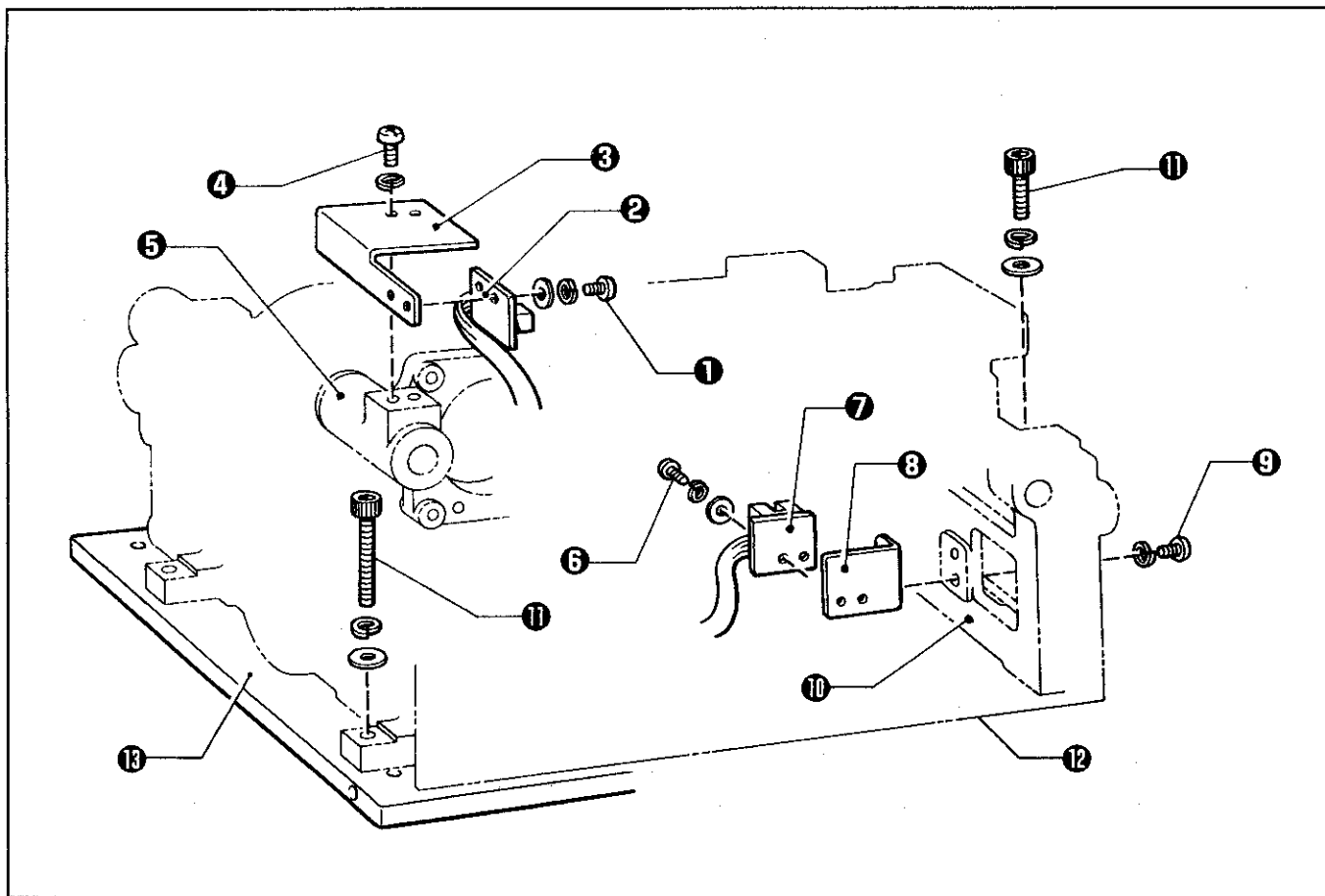
- 1) Pass the two slide shafts ① through bush holder L ③, insert the two sliders ② into the shafts, and pass them through bush holder R ④.
NOTE: Install the slider so that the round hole in it is facing the front and the oval one is facing the rear.
- 2) Attach the slide plate ⑥ to the left and right sliders ② using the four screws ⑦.
- 3) Secure metal holders L ③ and R ④ using the four screws ⑤.
- 4) Attach the wire hook ⑧ to the slide plate ⑥ using the two screws ⑨.
* Refer to page 55, "11 Feed guide mechanism."

(7) Connectors



- 1) Attach the connectors of the X pulse motor ① and the Y pulse motor ② to those on the PMD circuit board assembly ③.
- 2) Attach the connectors of the X index circuit board assembly ④ and the Y index circuit board assembly ⑤ to those on the main circuit board assembly ⑥.
NOTE: Secure the cords with cord holders.

(8) X and Y index circuit board assemblies



[X index circuit board assembly]

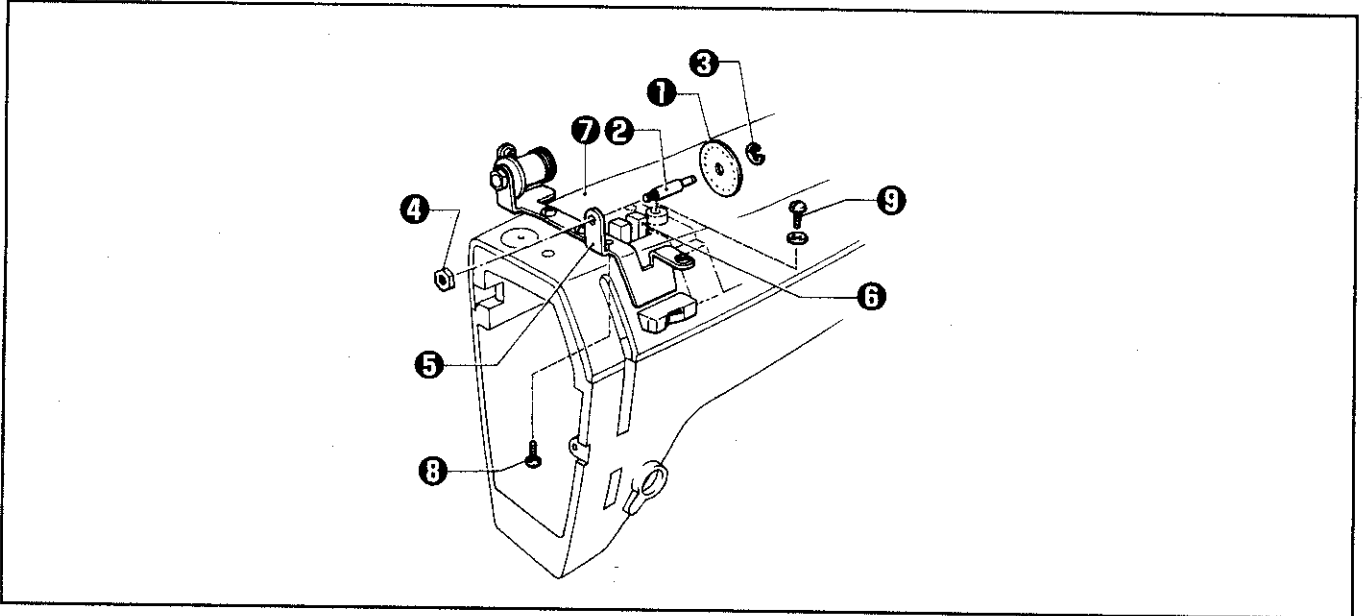
- 1) Attach the X index circuit board assembly ② to sensor bracket X ③ using the two screws ①.
- 2) Attach sensor bracket X ③ to motor bracket X ⑤ using the two screws ④.

[Y index circuit board assembly]

- 3) Attach the Y index circuit board assembly ⑦ to sensor bracket Y ⑧ using the two screws ⑥.
- 4) Attach sensor bracket Y ⑧ to frame L ⑩ using the two screws ⑨.
- 5) Attach the X-Y feed unit assembly ⑫ to the carriage base ⑬ using the two bolts ⑪.

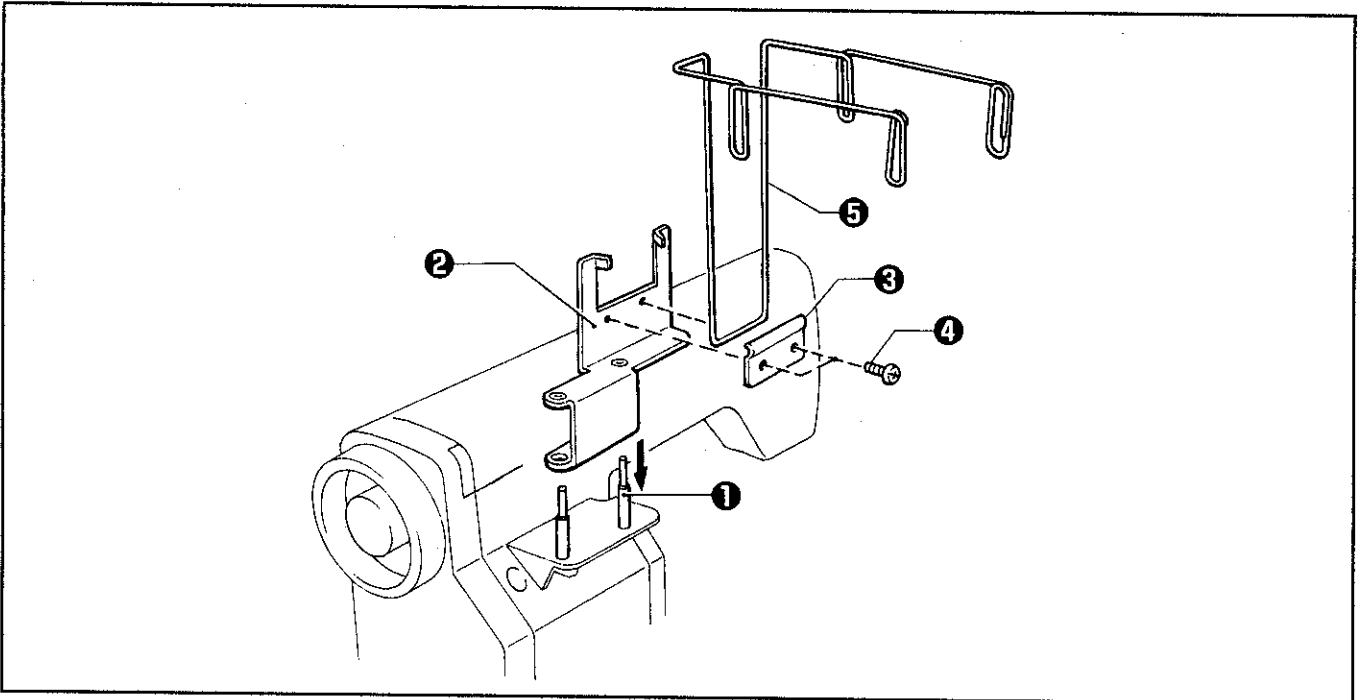
3 Thread breakage detector

(1) Thread breakage detector



- 1) Attach pulley A ① and the pulley shaft ② to the thread breakage sensor plate ⑤ using the retaining ring ③ and the nut ④.
- 2) Attach the thread breakage detector ⑥ to the upper cover ⑦ using the screw ⑧.
- 3) Attach the upper cover ⑦ to the machine head using the two screws ⑨.

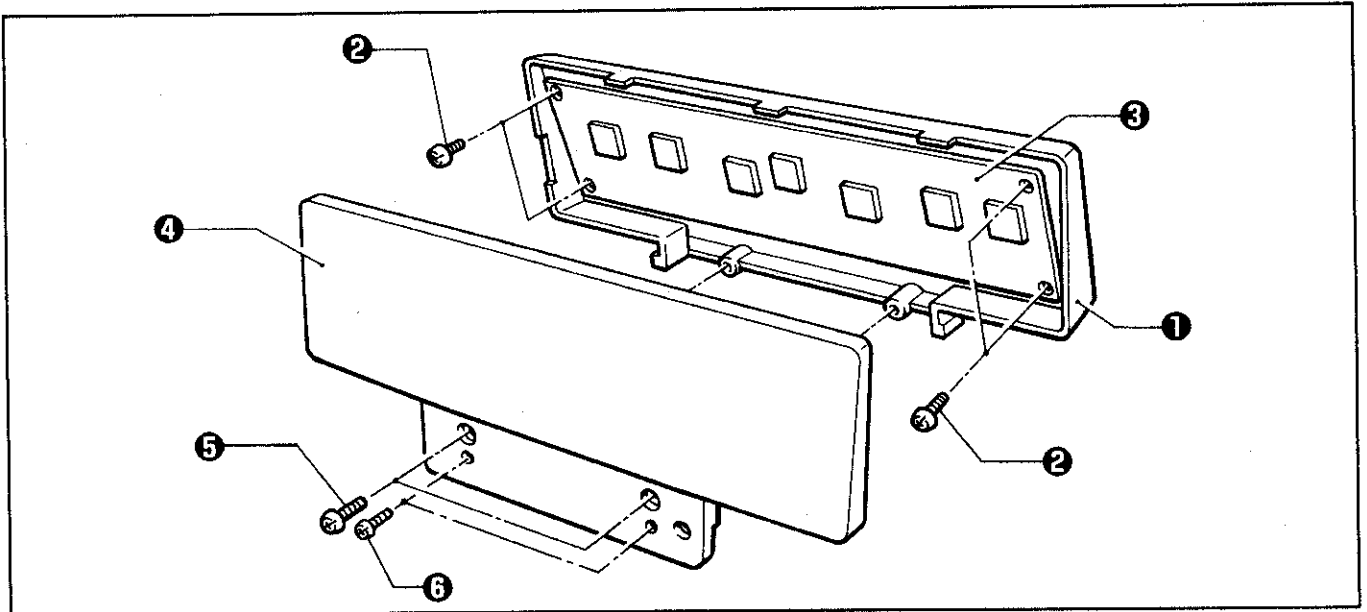
(2) Thread guide



- 1) Insert the thread guide support ② into the motor cover ①.
- 2) Attach the thread guide stopper plate ③ to the thread guide support ② using the two screws ④.
- 3) Attach the thread guide ⑤ to the thread guide stopper plate ③ and the thread guide support ②.

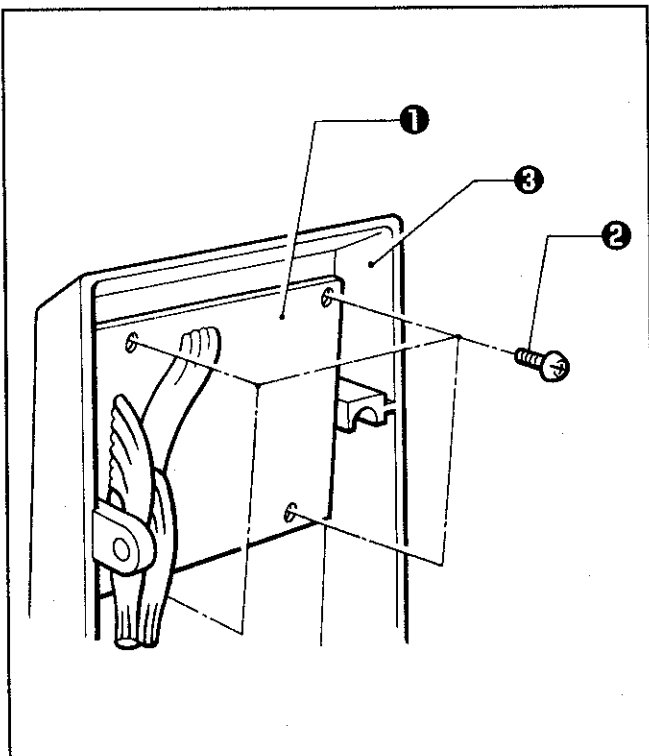
4 Display unit assembly

(1) LCD module circuit board



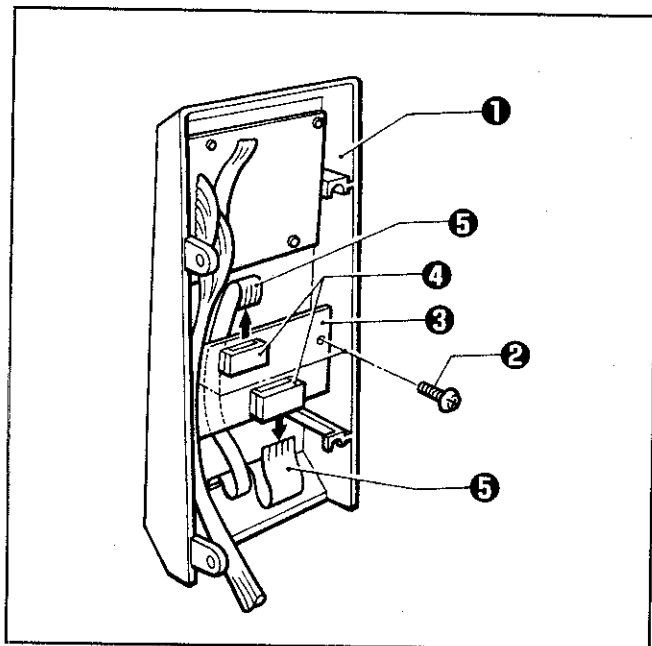
- 1) Attach the LCD module circuit board ③ to the indication panel (front) ① using the four screws ②.
- 2) Attach the indication panels (front) ① and (rear) ④ using the two screws ⑤.
- 3) Attach the LCD case assembly to the machine head using the two screws ⑥.

(2) Panel circuit board



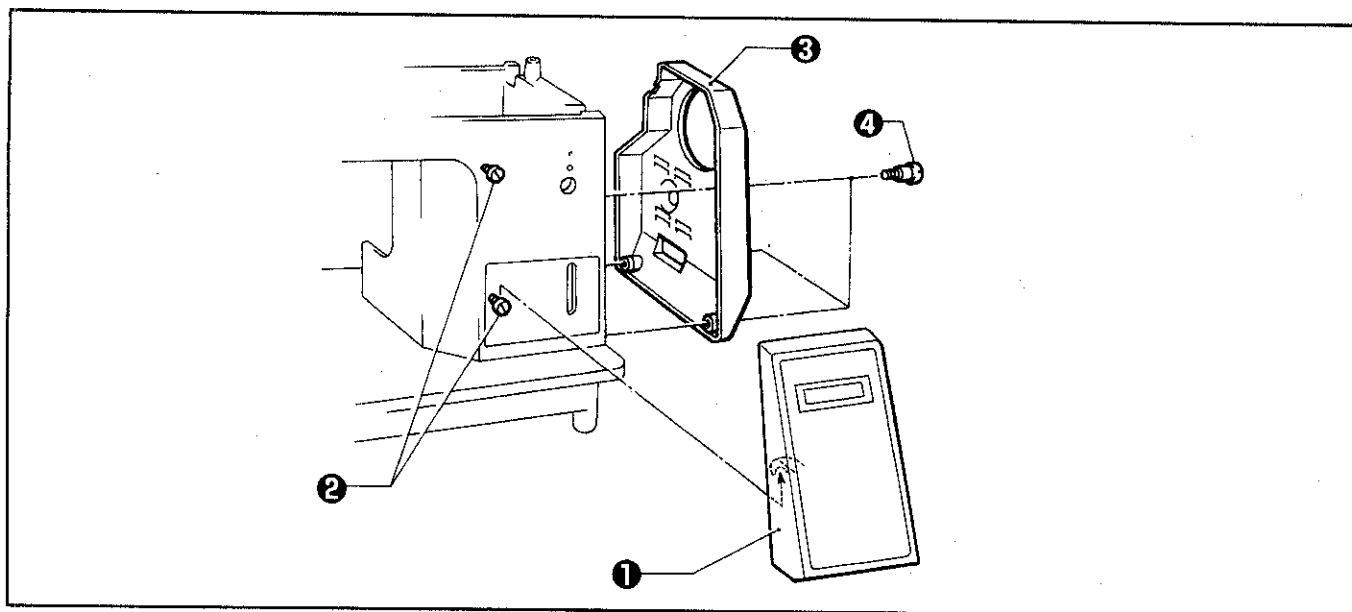
Attach the panel circuit board ① to the switch panel plate ③ using the four screws ②.

(3) Relay circuit board



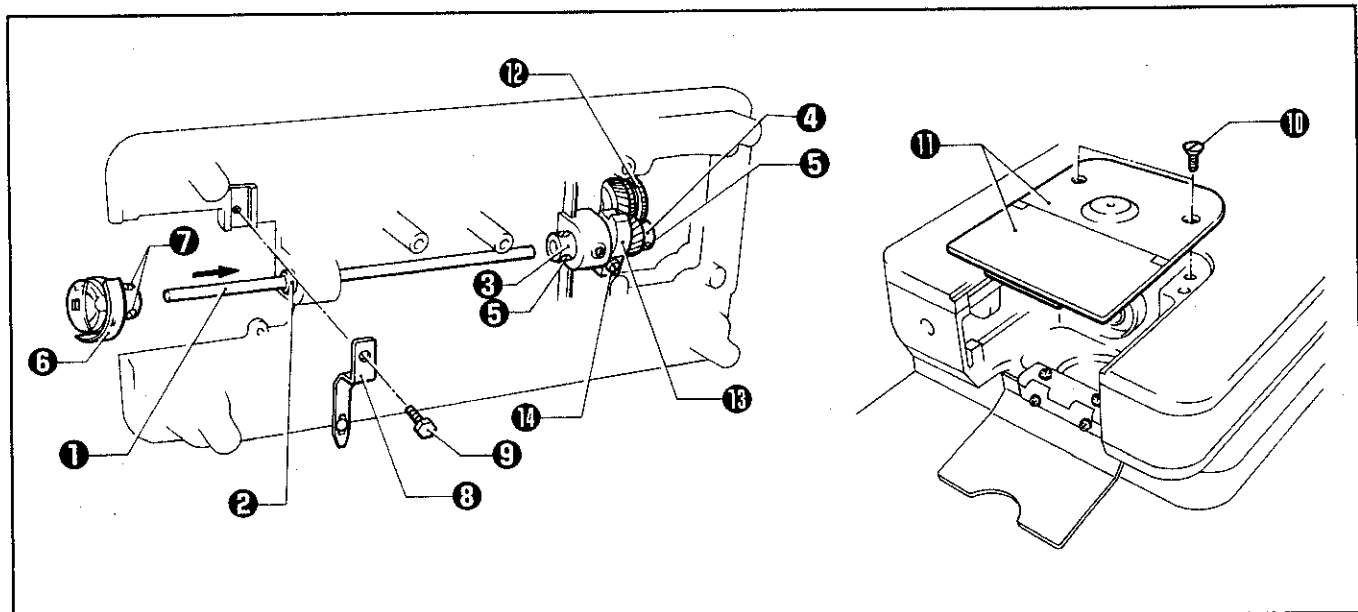
- 1) Attach the relay circuit board ③ to the switch panel plate ① using the two screws ②.
- 2) Insert the two flat cables ⑤ into the connector ④ of the relay circuit board ③, and lock them.

(4) Operation panel assembly



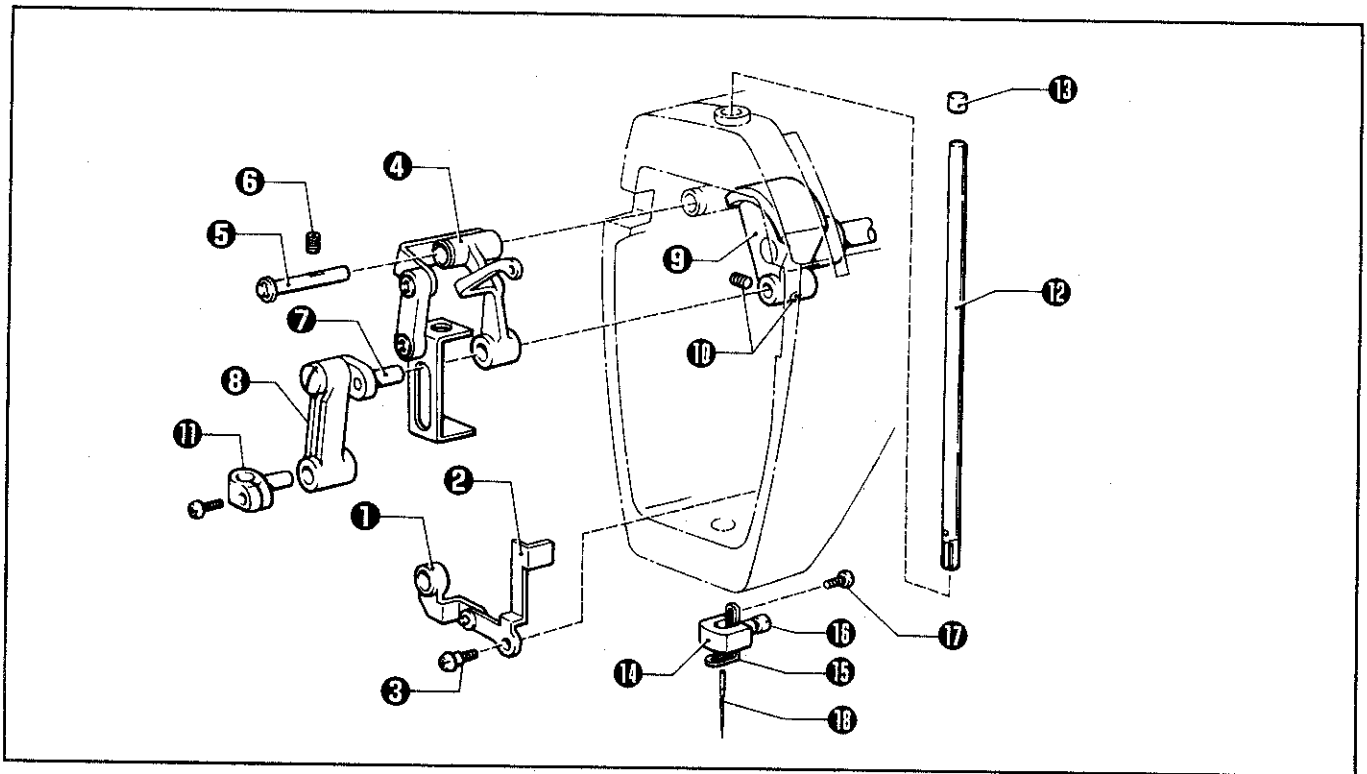
- 1) Attach the two shoulder screws ② to the front of the machine head, and slide the panel assembly ① on the front of the machine head until the shoulder screws ② are fully inserted into the notches.
- 2) Attach the belt cover ③ and the operation panel assembly ① using the three shoulder screws ④.

5 Lower shaft mechanism



- 1) Tilt the machine head until it stops.
- 2) Pass the lower shaft ① through the bush ②. Place the set collar ③, lower shaft bush R, and the lower shaft gear ④ on the lower shaft ①.
- 3) Tighten the set screws ⑤ of the set collar ③ and the lower shaft gear ④ so that there is no looseness of the lower shaft ①.
- 4) Attach the rotary hook ⑥ to the lower shaft ① using the set screw ⑦.
- 5) Secure the inner rotary hook stopper plate ⑧ using the bolt ⑨.
- 6) Raise the machine head. Attach the needle plate ⑪ using the two screws ⑩.
- 7) When replacing the timing belt ⑫, loosen the screw ⑭ of the gear base ⑮, and move the gear base ⑮ backward or forward to adjust the tension of the belt ⑫.
* Refer to page 52, "Timing belt tension."

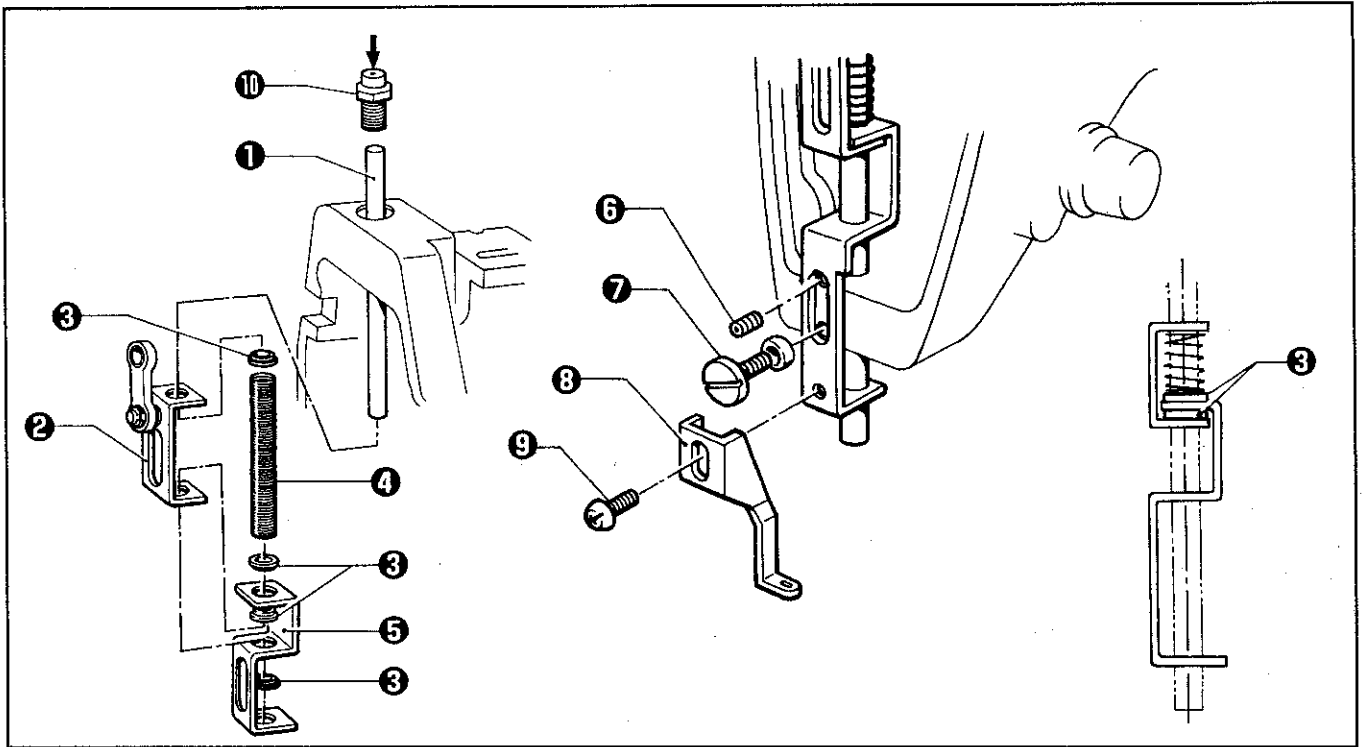
6 Needle bar mechanism



- 1) Attach the thread release connecting lever ① to the thread release lever ②. Attach them to the machine head using the screw ③.
- 2) Slide the thread take-up support shaft ⑤ in the link thread take-up assembly ④ into the arm. Tighten the set screw ⑥.
- 3) Attach the needle bar crank ⑦ and the needle bar crank rod ③ to the thread take-up crank ⑧ using the two set screws ⑩.
- 4) Attach the needle bar clamp ⑪ to the needle bar crank rod ③, insert the needle bar ⑫ from the top of the machine head into the needle bar clamp ⑪. (Insert the felt ⑬ into needle bar bush U.)
- 5) Attach the needle clamp ⑭ and the needle bar thread guide ⑮ to the needle bar ⑫ using the set screw ⑮ and the screw ⑰.
- 6) Pass the needle ⑬ through the needle clamp ⑭, and attach it to the needle bar ⑫ using the set screw ⑮.

* Refer to page 49, "Needle bar height."

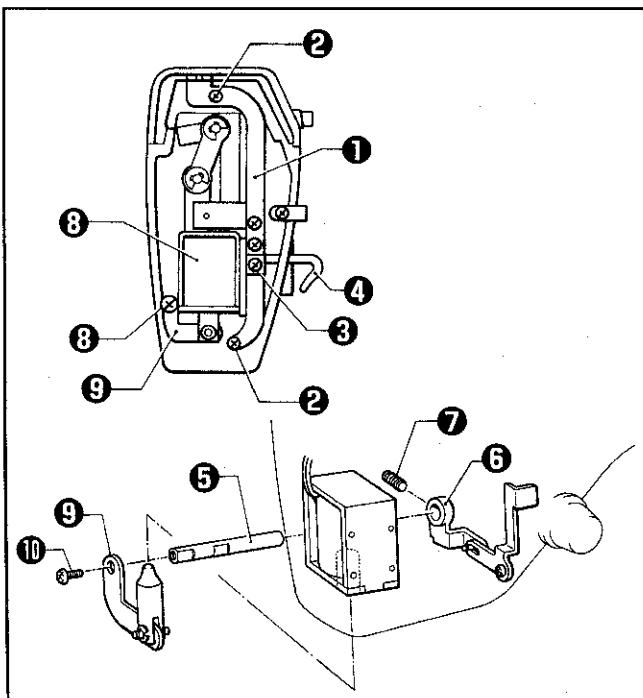
7 Presser bar mechanism



- 1) Pass the presser bar ① through the machine head, and place the presser foot guide ②, the presser foot bush ③, the spring ④, the presser foot bush ③, and the presser foot set plate ⑤ on the presser bar ① in this order. (See figure a.)
- 2) Set the set screw ⑥ to the the screw flat on the presser bar ①, and tighten it.
- 3) Insert the roller into the slot of the presser foot set plate ⑤, and attach the presser foot set plate ⑤ to the machine head using the screw ⑦.
- 4) Attach the presser foot ⑧ to the presser foot set plate ⑤ using the screw ⑨.
- 5) Attach the presser cap ⑩ to the machine head 1.

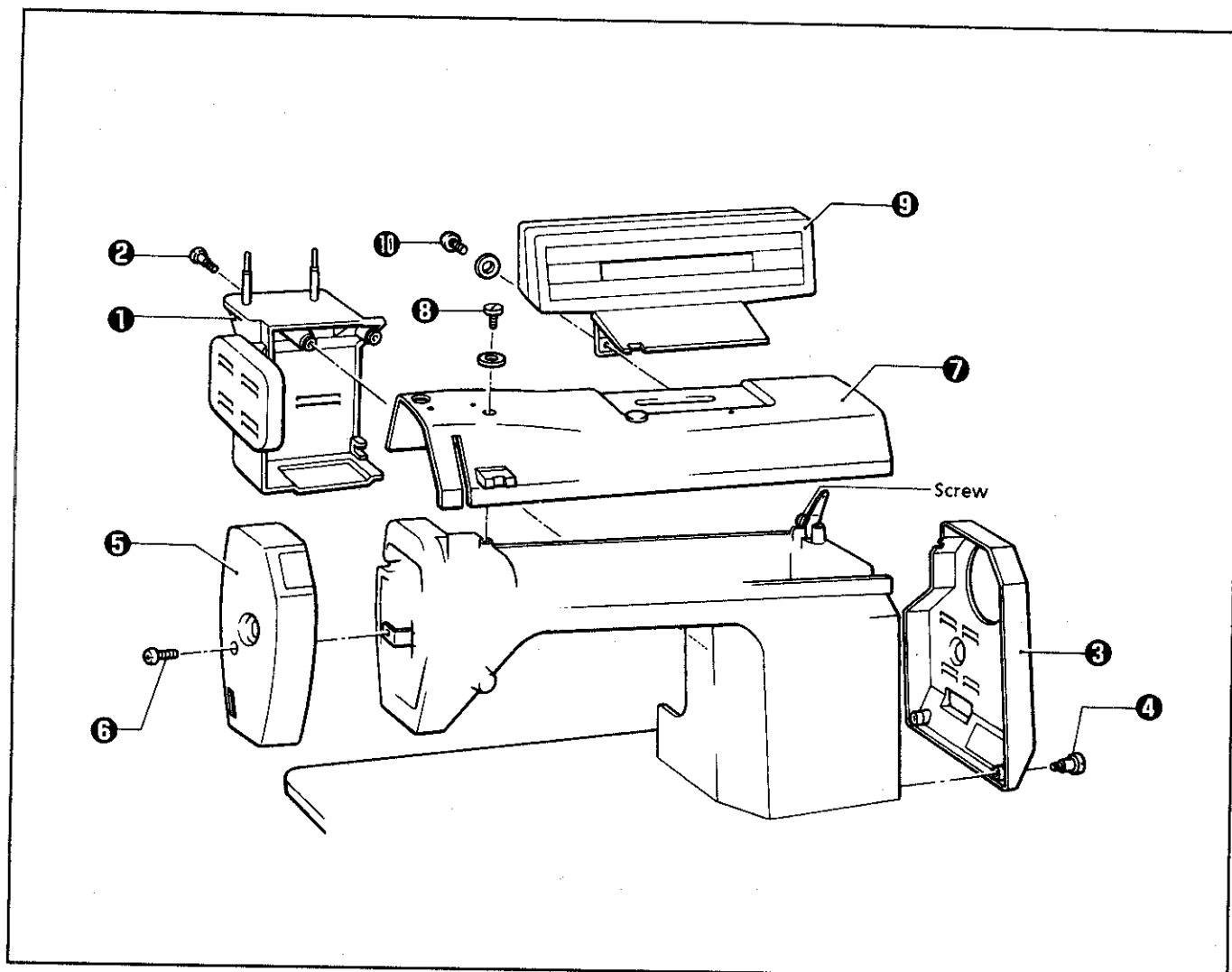
* Refer to page 50, "Presser foot height."

8 Tension release



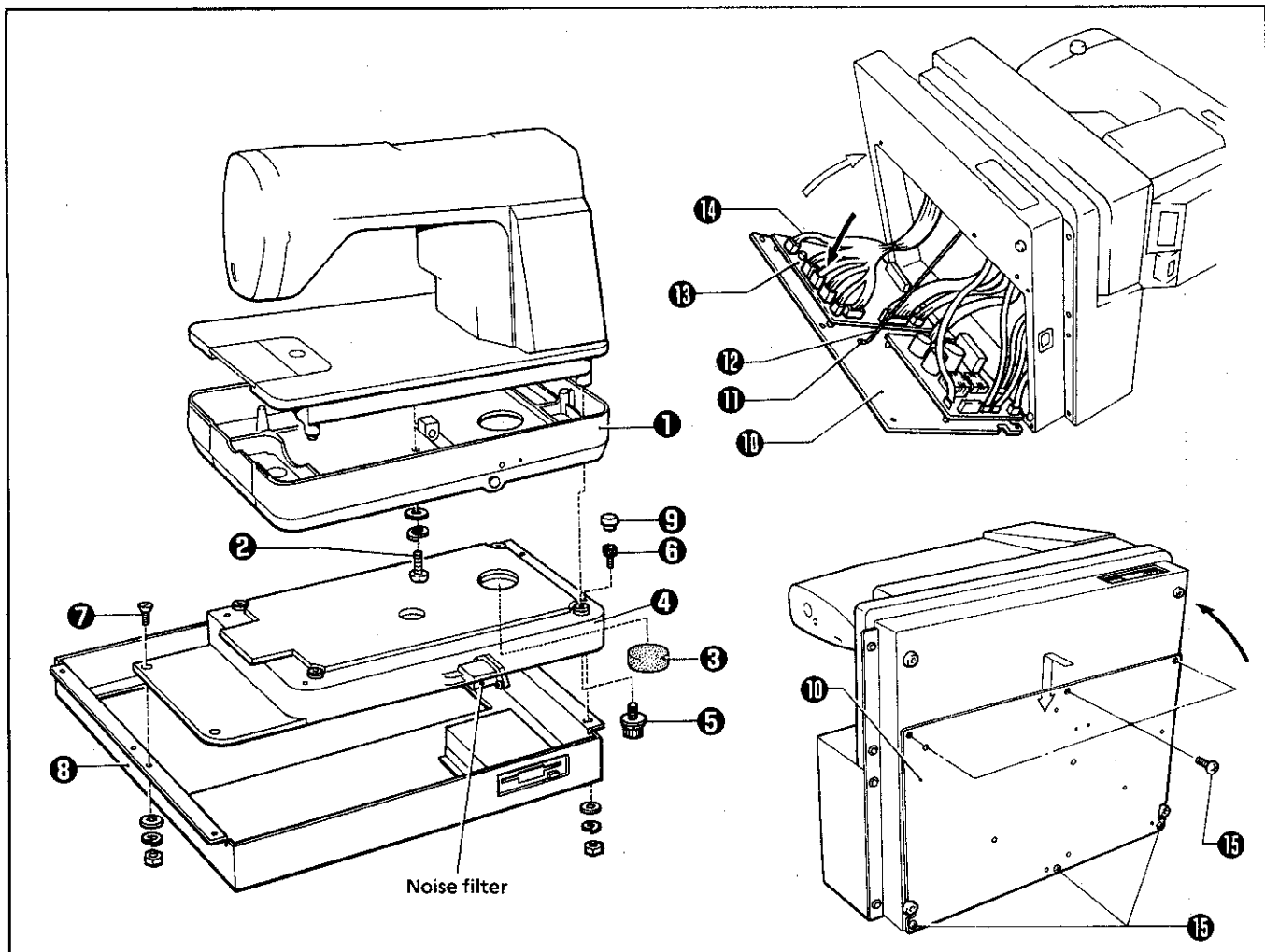
- 1) Attach the face plate base plate ① to the machine head using the two screws ②.
- 2) Attach the thread hook ④ using the screw ③.
- 3) Pass the connecting pin ⑤ through the machine head, and attach it to the thread release connecting lever ⑥ using the set screw ⑦.
- 4) Attach the plunger to the thread release solenoid ⑧.
- 5) Attach the solenoid lever ⑩ to the connecting pin ⑤ using the screw ⑩.

9 Machine head covers



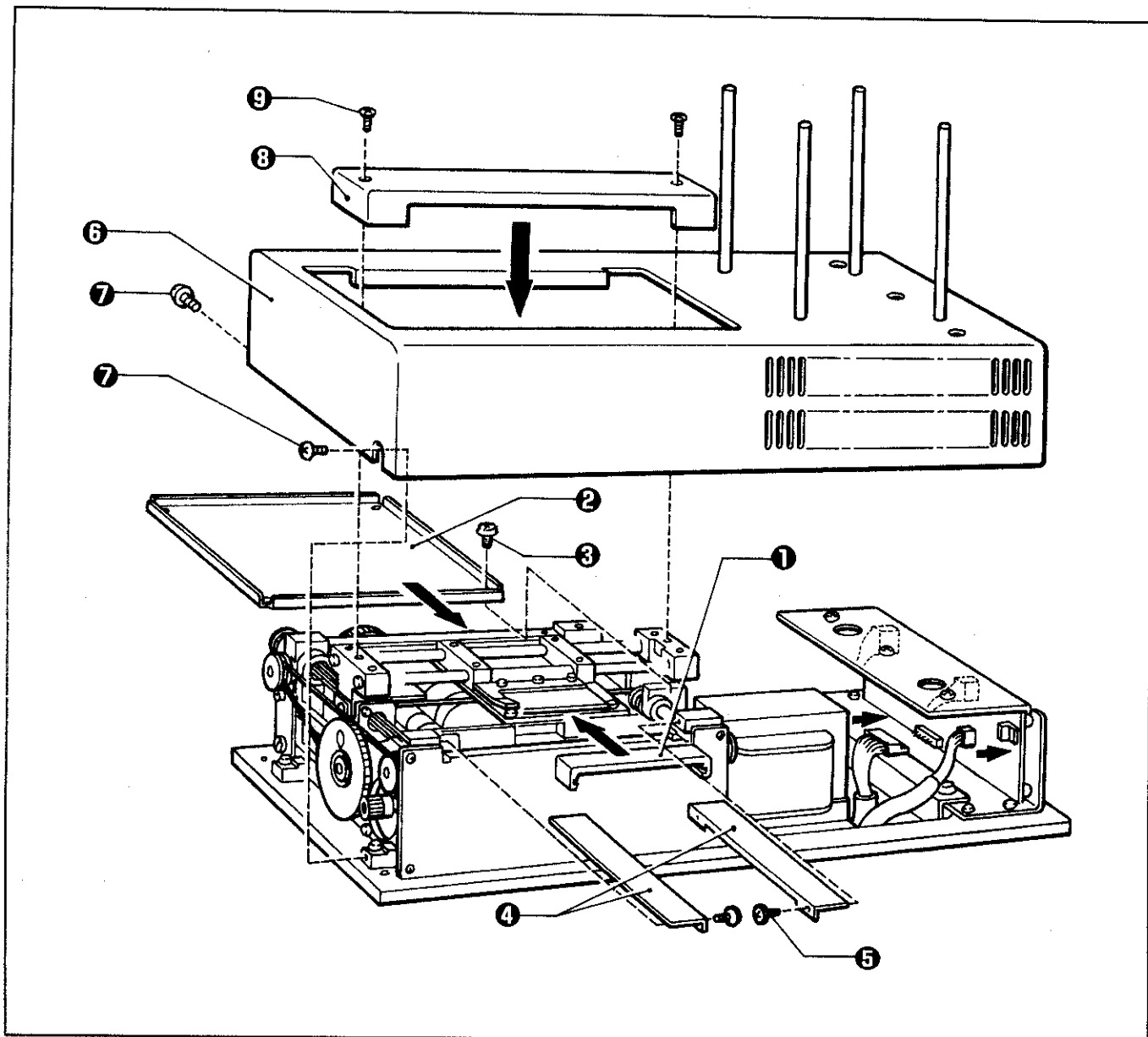
- 1) Attach the motor cover ① using the two screws ②.
- 2) Attach the belt cover ③ using the three screws ④ and the screw ⑥.
- 3) Attach the face plate ⑤ using the screw ⑥.
- 4) Pass the cords through the machine head, and attach the upper cover ⑦ using the two screws ⑧.
- 5) Attach the LCD module ⑨ to the upper cover ⑦ using the two screws ⑩.

10 Machine head



- 1) Tilt the machine head until it stops. Attach the bottom cover ① to the machine head using the screw ②.
- 2) Insert the sponge ③ into the sewing machine fix bracket ④.
- 3) Attach the sewing machine fix bracket ④ to the machine head using the four bolts ⑤.
- 4) Attach the body base ③ to the machine head using the two bolts ⑥ and the two screws ⑦. (Cover the oil caps ⑧ over the holes for the bolts ⑥ tightened.)
- 5) Attach the ground wire ⑫ to the circuit board set plate ⑩ using the screw ⑪.
- 6) Plug the connector ⑭ into the main circuit board ⑬.
- 7) Plug the machine head connectors into the main circuit board ⑬.
- 8) Attach the circuit board set plate ⑩ to the body base ③ using the six screws ⑮.

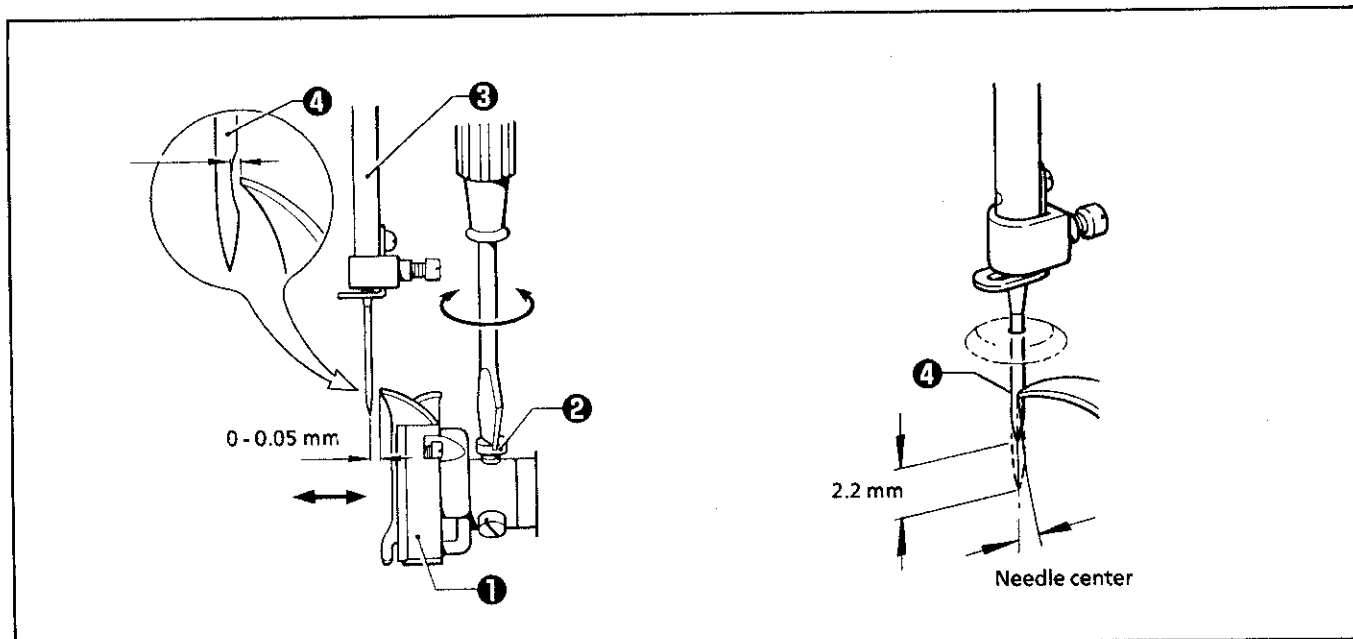
11 X-Y feed unit covers



- 1) Attach the slider cover ①.
- 2) Attach cover U ② using the four screws ③.
- 3) Attach the left and right covers US ④ using the four screws ⑤.
- 4) Attach the carriage cover ⑥ using the five screws ⑦.
- 5) Attach the slide cover ⑧ using the two screws ⑨.

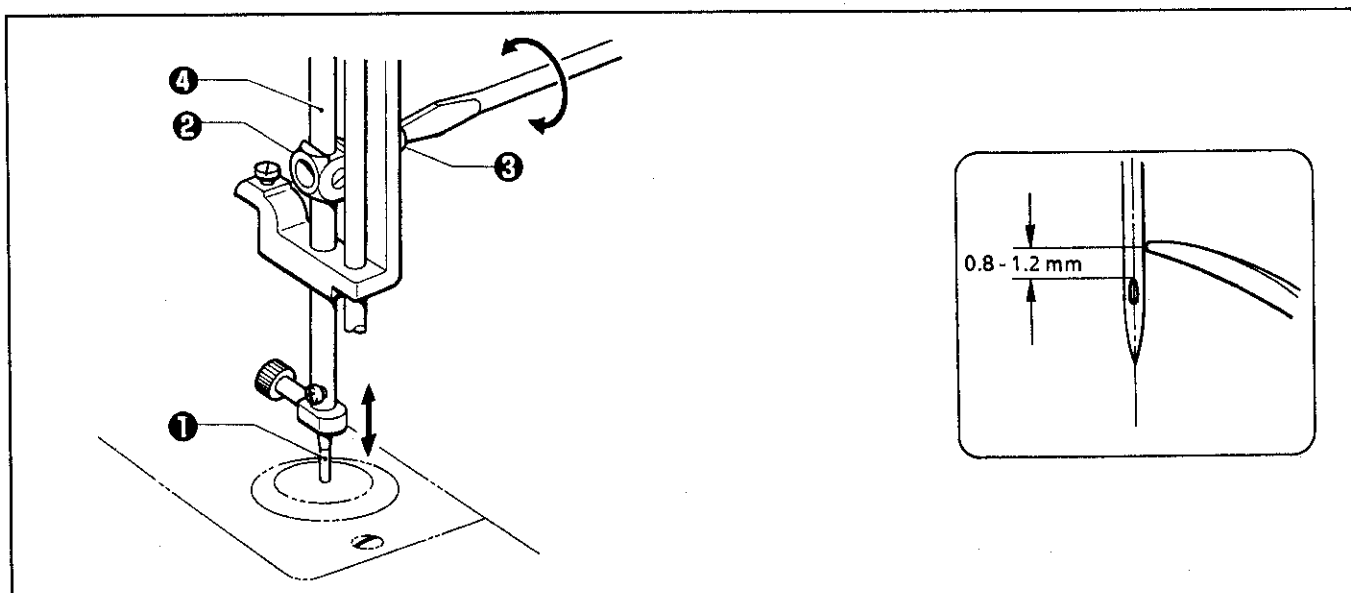
ADJUSTMENT

1 Needle and rotary hook timing



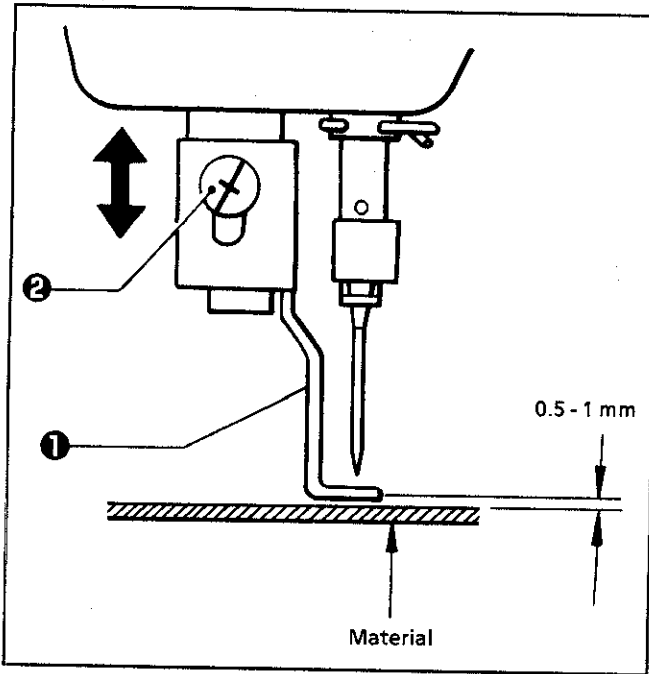
- 1) Loosen the three screws ② around the rotary hook ①.
- 2) Turn the pulley toward you until the needle bar ③ is raised 2.2 mm from its lowest point (the reference line of the needle bar is aligned with the bottom of the bush). The rotary hook point should be aligned with the center of the needle ④. Adjust the clearance between the needle groove and the rotary hook point to 0 - 0.05 mm. The rotary hook point should not make contact with the needle ④.
- 3) Tighten the three screws ② around the rotary hook ①.

2 Needle bar height



- 1) Turn the pulley toward you to align the rotary hook point with the center of the needle ①.
- 2) Loosen the screw ③ in the needle bar clamp ②, and move the needle bar ④ up or down to adjust the clearance between the upper end of the needle eye and the rotary hook point to 0.8 - 1.2 mm.
- 3) Tighten the screw ③ in the needle bar clamp ②.

3 Presser foot height

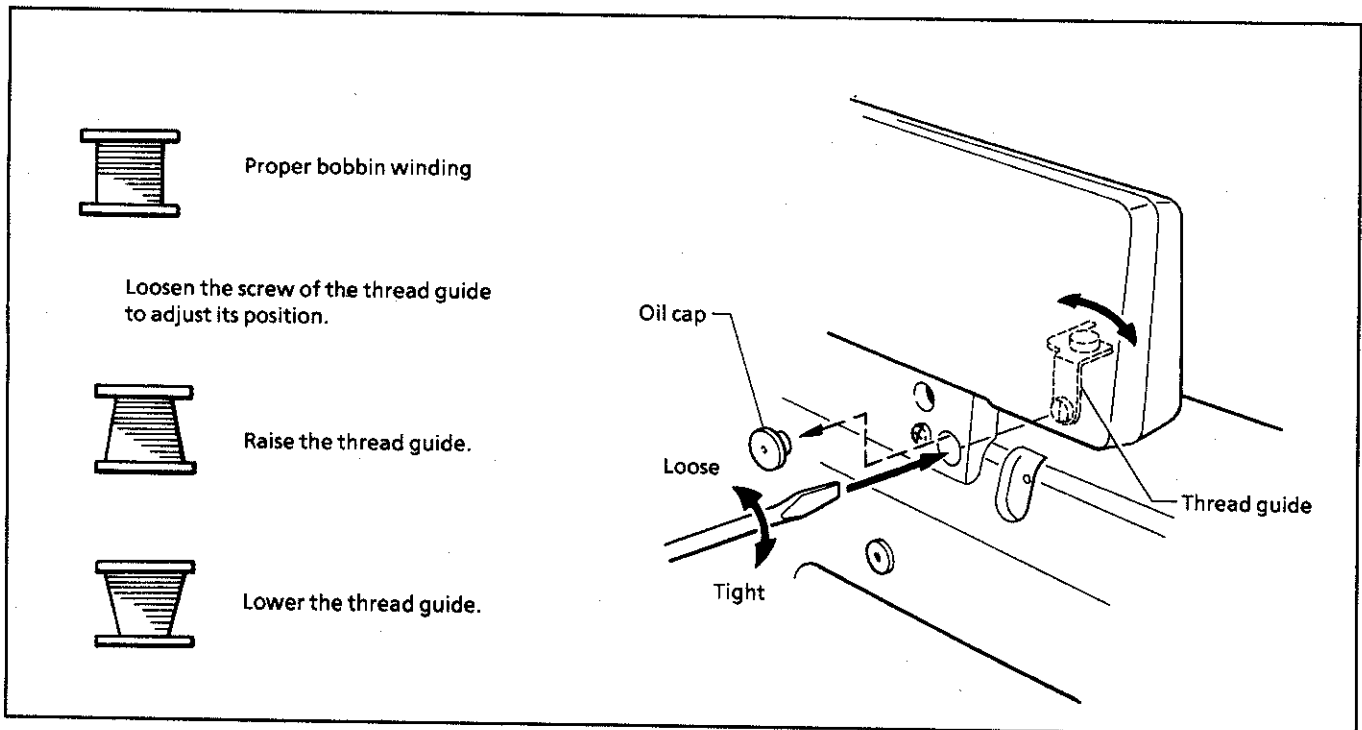


Turn the pulley to lower the presser foot ① to its lowest point. Loosen the screw ②, and move the presser foot ① up or down to adjust the clearance between the material surface set in the embroidery hoop and the bottom of the presser foot ① to 0.5 - 1 mm.

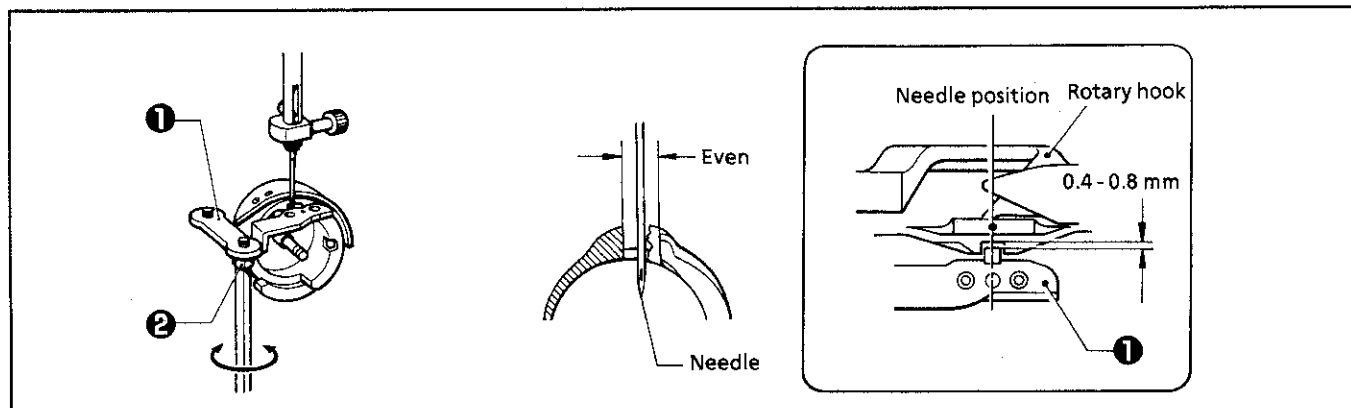
NOTE: Before tightening the screw, make sure that the needle is centered in the hole of the presser foot ①.

4 Thread guide

If the bobbin thread is not wound around the bobbin evenly, it may cause the improper bobbin thread tension.

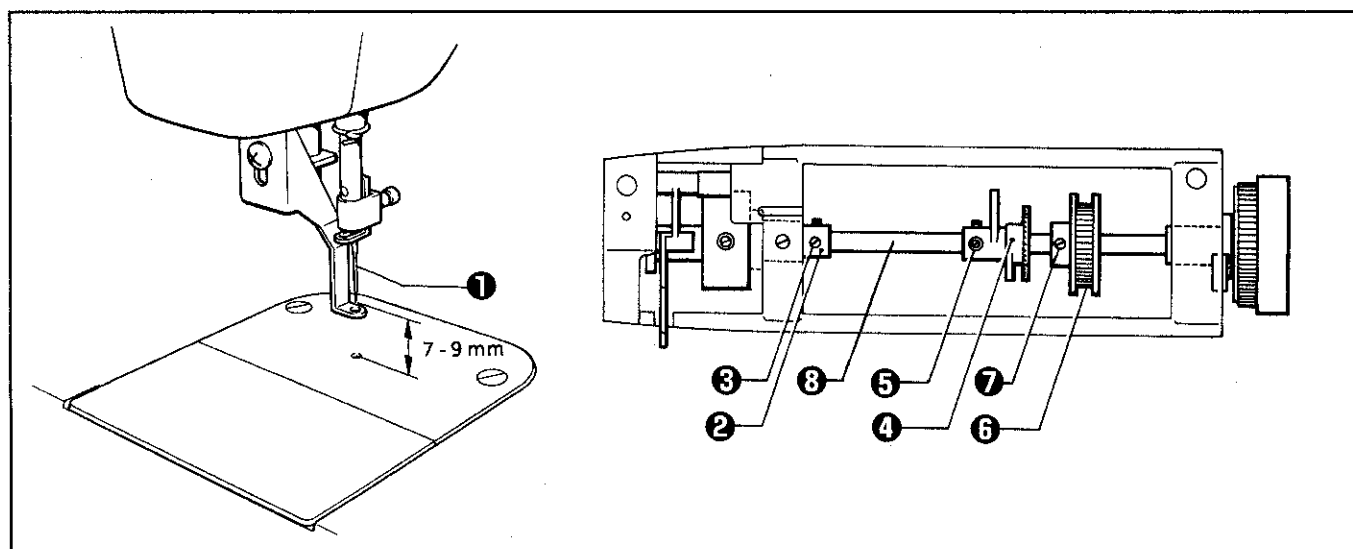


5 Inner rotary hook stopper plate position



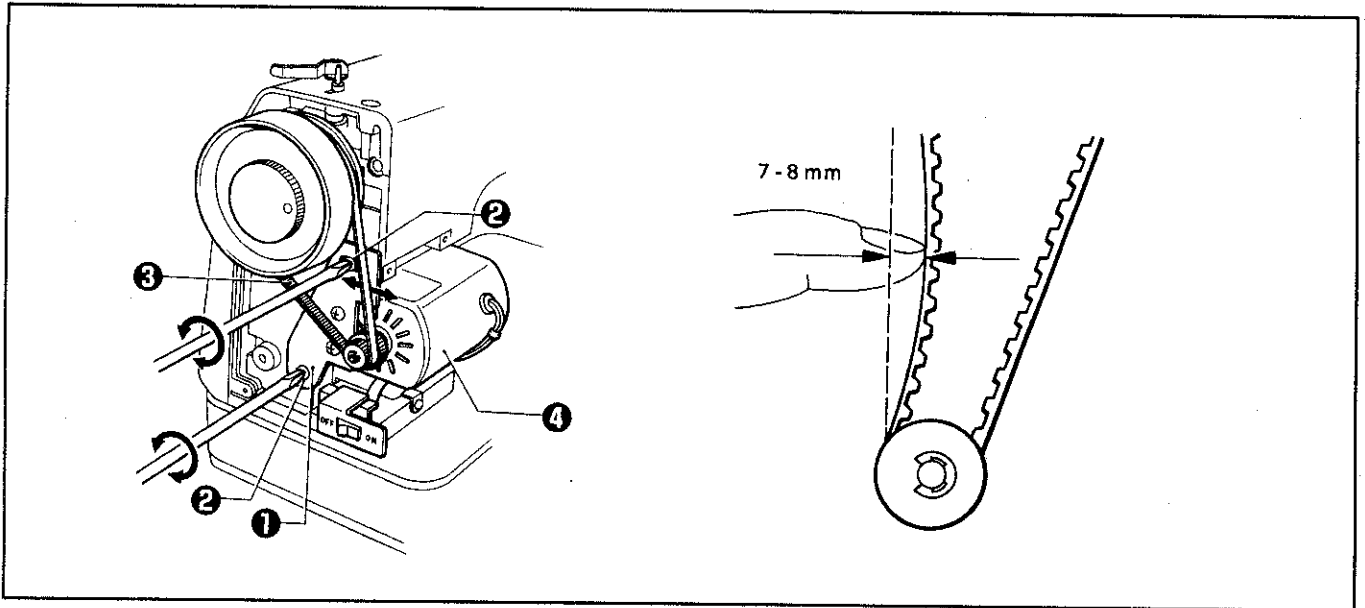
- 1) Loosen the bolt ② in the inner rotary hook stopper plate ①.
- 2) Adjust the position of the inner rotary hook stopper plate ① in the back and forth direction as shown in the figure above.
- 3) Attach the inner rotary hook stopper plate ① so that it is centered in the needle. The needle should not make contact with the rotary hook.
- 4) Tighten the bolt ② in the inner rotary hook stopper plate ①.

6 Rotary shutter position



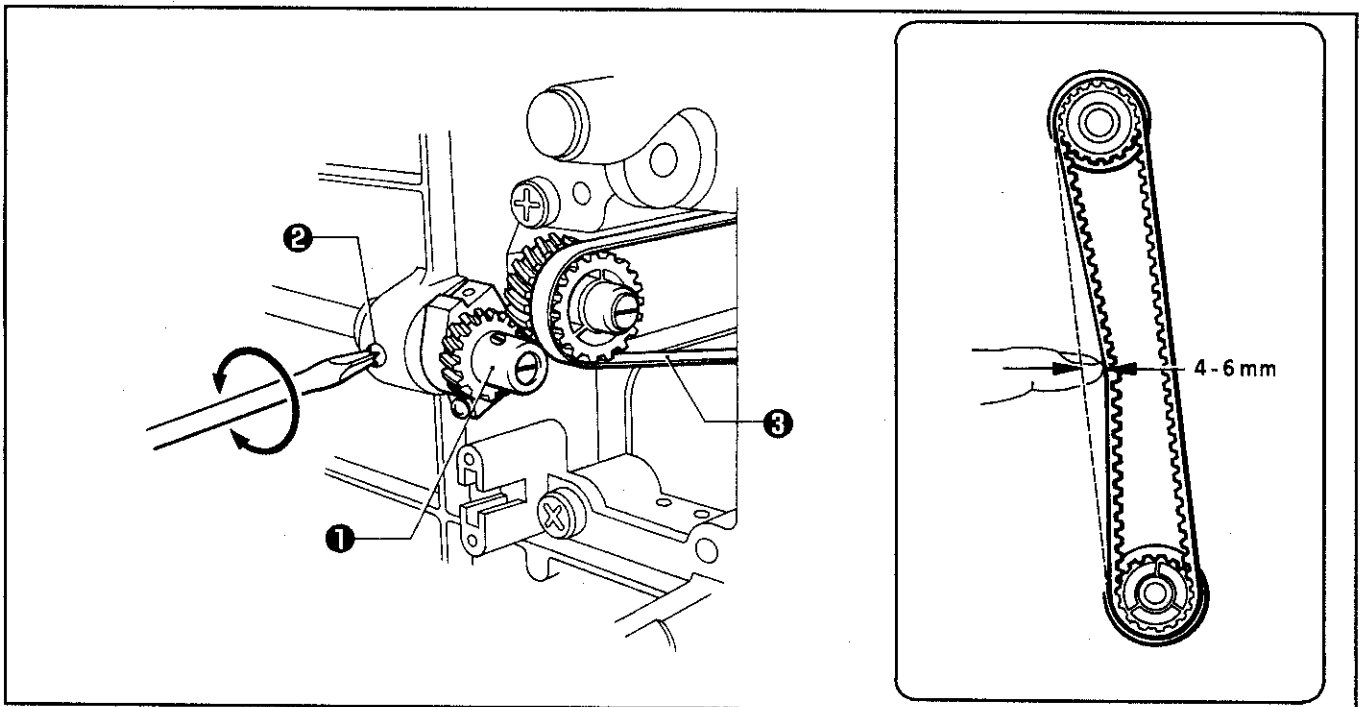
- 1) Turn on the power.
- 2) Input sewing data (of letters), and move the needle ① to the sewing start point.
- 3) Turn the pulley slowly toward you until the needle point almost reaches the needle plate top, then press the jog key.
- 4) A message asking that the pulley be turned will appear on the display along with a few beeps being issued. Turn the pulley in the opposite direction to raise the needle until the machine stops beeping and the message disappears. At this time, the needle should be 7 - 9 mm above the needle plate.
- 5) If the distance is not 7 - 9 mm, turn off the power, and make positioning adjustment.
- 6) Remove the two screws, and the top cover.
- 7) Turn the pulley, and adjust the set screw ③ of the set collar ②, the set screw ⑤ of the rotary shutter ④, and the set screw ⑦ of the timing pulley ⑥ to each screw flat on the upper shaft ③.
- 8) After checking the above items, tighten the set screw ⑤ in the rotary shutter ④.

7 Motor belt tension



- 1) Loosen the two screws ② of the motor holder ①.
- 2) Move the motor ④ in the direction of the arrow to adjust the timing belt tension so that the slack will be 4 - 7 mm when an approximately 500 g load is applied to the center of the timing belt ③.
- 3) Securely tighten the two screws ② of the motor holder ①.

8 Timing belt tension

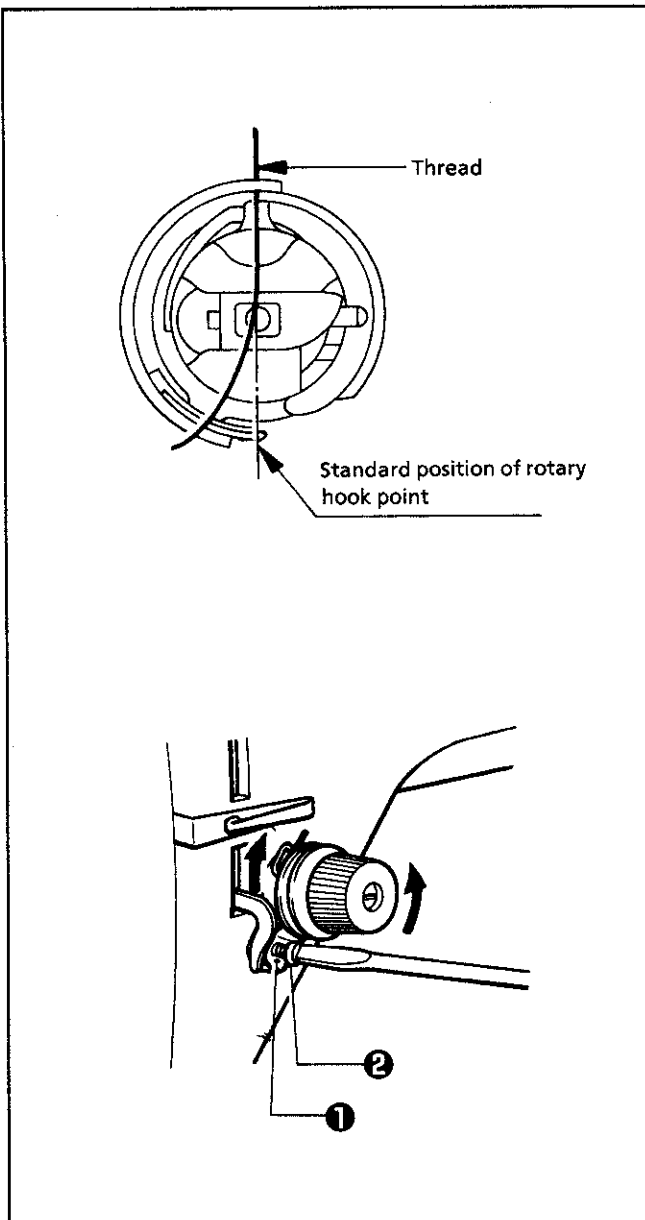


Tilt the machine head until it stops, and remove the body base, the sewing machine fix bracket, and the bottom cover.

- 1) Loosen the screw ② of the gear base ①.
- 2) Move the gear base ① backward or forward to adjust the tension of the timing belt ③ so that the slack will be 4 - 6 mm when an approximately 500 g load is applied to the center of the timing belt ③.
- 3) Tighten the screw ② of the gear base ①.

9 Thread tension

(1) Thread take-up spring working position



When the thread take-up spring working length is correct, it will start operating when the rotary hook point is positioned just past where it catches the thread.

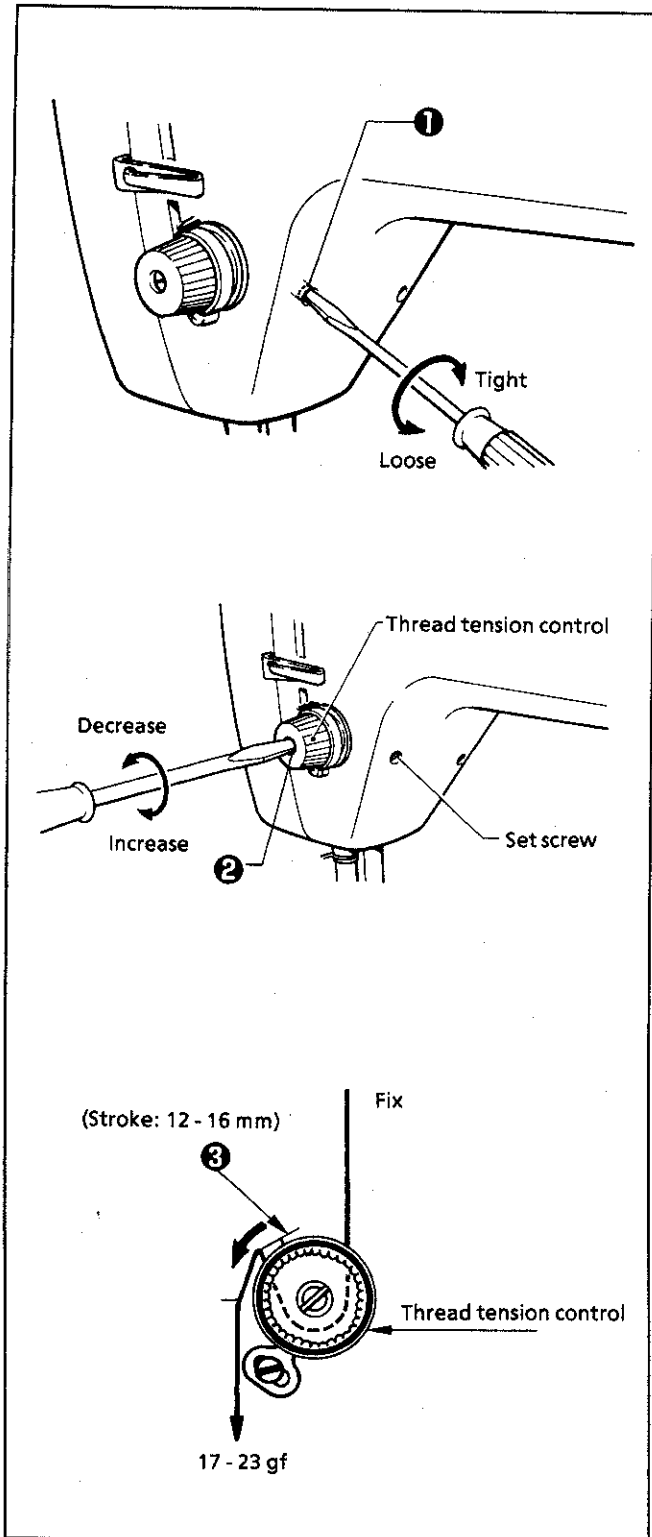
[Adjusting the working length of the thread take-up spring]

Loosen the screw ② in the adjust plate ①, and move the adjust plate ① to the left or right to adjust the spring working length.

NOTE: If the length is too long, it may cause thread breakage.

If the length is too short, the thread may be apt to be caught in the rotary hook, and thread tension may worsen (the needle thread may not be taut).

(2) Thread take-up spring tension



If the spring tension is too high, thread breakage may occur; if too low, thread may be apt to be caught into the rotary hook.

1) Loosen the set screw ①. (There is no need to remove it.)

2) Insert a screwdriver into the slot of the tension stud ② to adjust the spring tension.

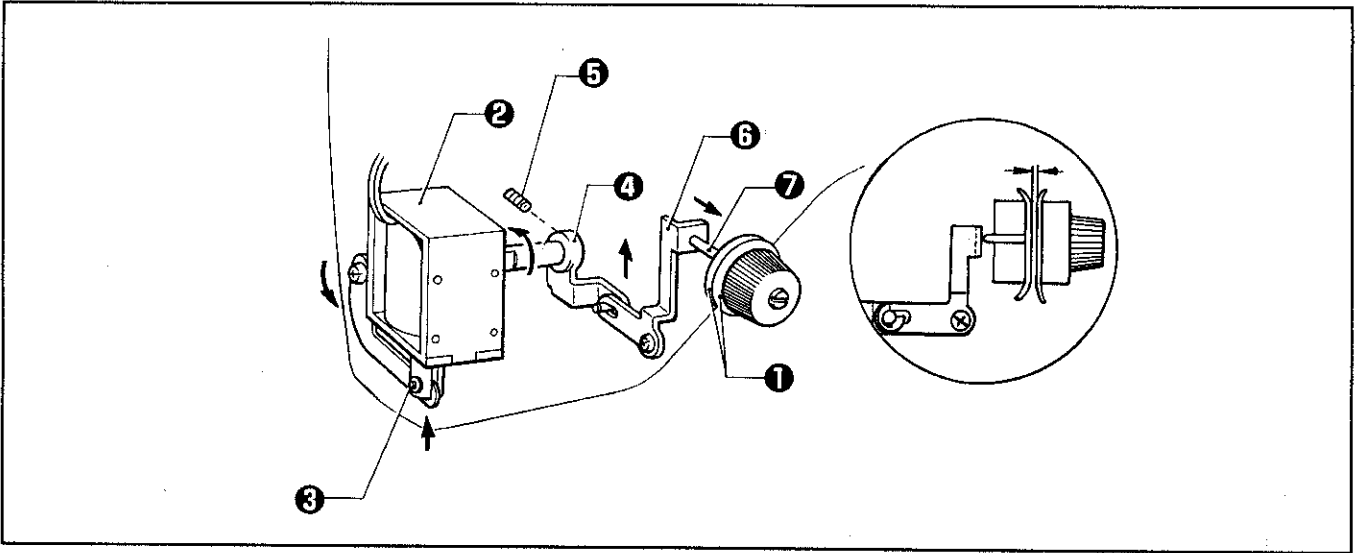
- Turn the screwdriver clockwise to increase the tension of the spring ③.
- Turn the screwdriver counterclockwise to decrease the tension of the spring ③.

* Standard tension

- Spring stroke is 12 - 16 mm.
- Spring tension is 17 - 23 gf when its stroke is correct.

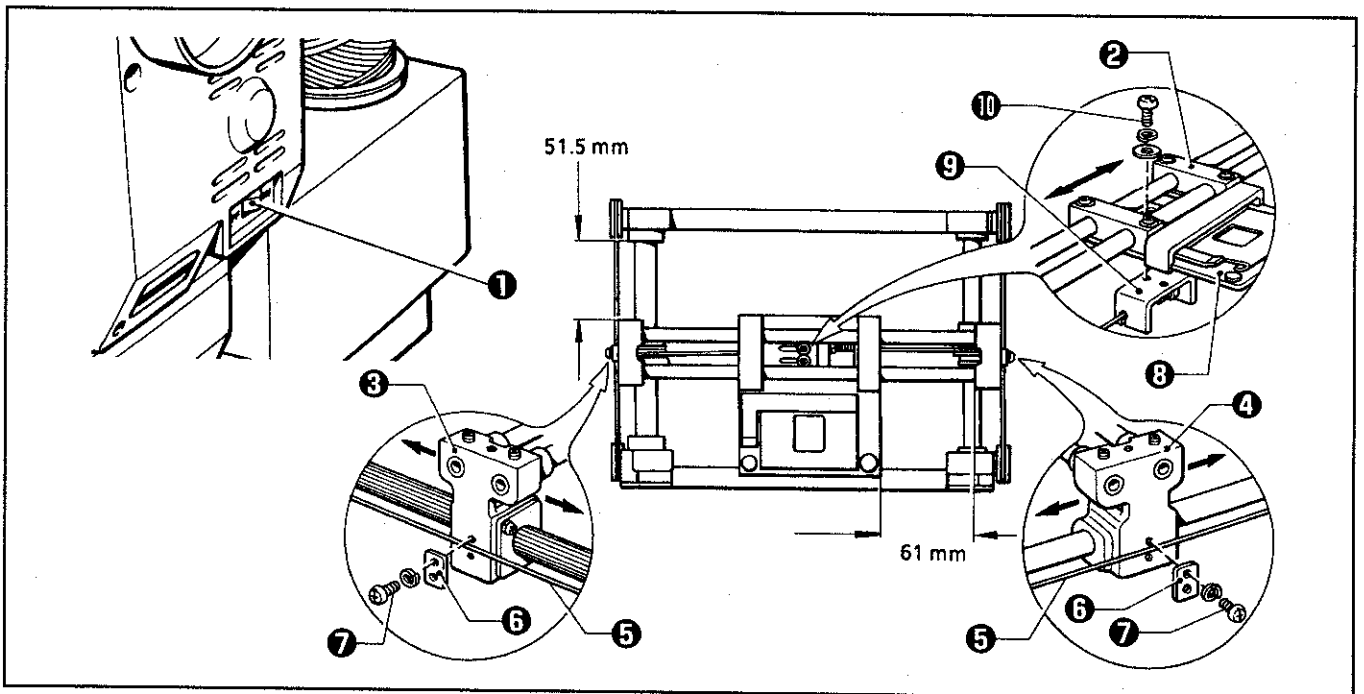
3) After adjusting the tension, securely tighten the set screw ①.

10 Tension release



- 1) Insert a 2 mm thick gauge or block into the clearance between the two tension discs ①.
 - 2) Push up the plunger ③ of the solenoid ②, and loosen the set screw ⑤ of the thread release connecting lever ④.
 - 3) Move the thread release connecting lever ④ in the direction of the arrow. When the end of the thread release lever ⑤ makes contact with the thread release pin ⑦, securely tighten the set screw ⑤ of the thread release connecting lever ④.
- * After adjustment, move the solenoid ② and the plunger ③ up and down to adjust the clearance between the tension discs ① to 2 mm.

11 Feed guide mechanism



- 1) Turn the power switch ① on.
- 2) Set the positions for the sliders ② and bush holders L ③ and R ④ to measure as shown in the figure above.
- 3) Attach the left and right Y mini wires ⑤ to bush holders L ③ and R ④ using the wire pressers ⑥ and the four screws ⑦.
- 4) Attach the slide plate ③ to the wire hook ⑨ using the two screws ⑩.

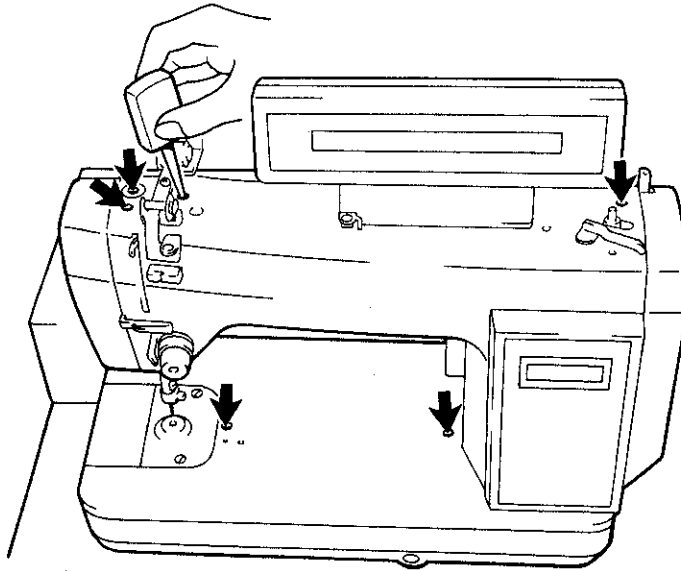
LUBRICATION

1 Machine head

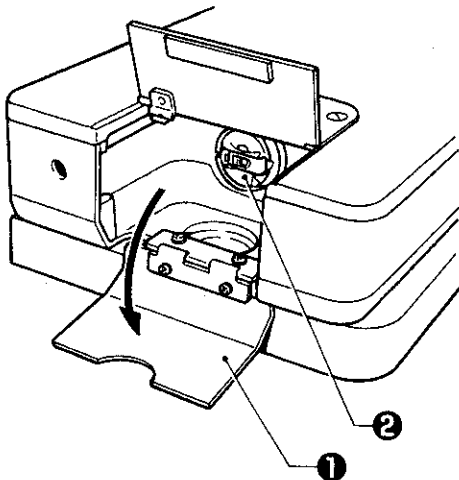
Be sure to use the Brother-specified sewing machine oil for lubrication.

* Too much lubrication may cause the oil to drip on the material.

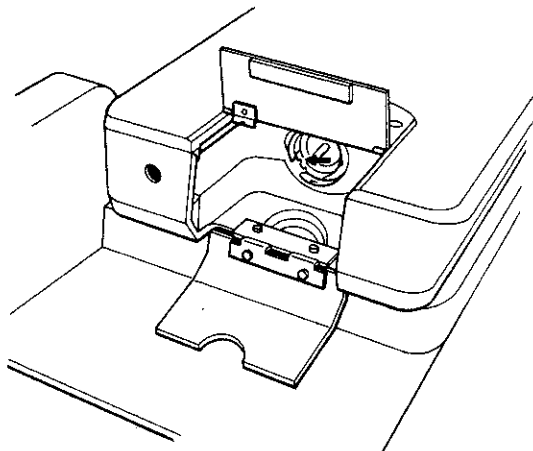
- * When the machine is used for several hours every day, add 2 - 3 drops of oil at each position indicated by an arrow in the figure once a day.
- * Be sure to lubricate before using the machine, and let the machine idle.



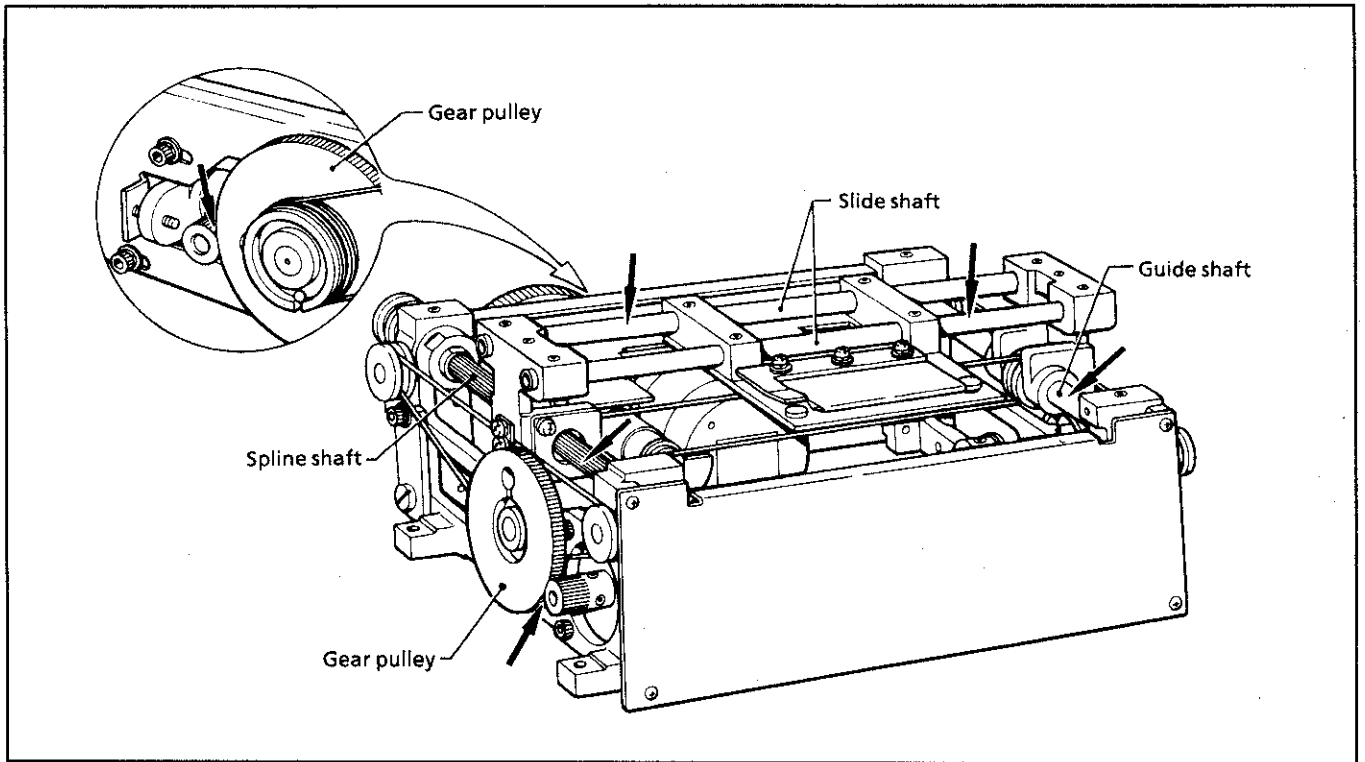
Open the needle plate side cover ①.
Remove the bobbin case ②.



Add a drop of oil on the rail of the rotary hook.
NOTE: Do not lubricate anywhere other than the rotary hook.



2 Feed guide mechanism



Apply grease at the positions indicated by the arrows.

ELECTRICAL SYSTEMS

1 Connector descriptions

(1) Main circuit board

Connector No.	Connection	Main signal	What occurs with poor contact
P21	Main circuit board – sensor cover	Low bobbin thread remainder detection sensor input signal	Low bobbin thread remainder indicator does not light.
P23	Main circuit board – thread breakage detector sensor	Thread breakage sensor input signal	Thread breakage stop occurs even though upper thread is not broken.
P24	Main circuit board – NP circuit board	Needle up/down signals Sync signal Needle up stop signal Speed signal + 5V	Machine pulley does not turn. (overload)
P25	Main circuit board – LCD contrast control	Contrast input signal	Display does not come on.
P26	Main circuit board – LCD module	LCD output signal	Display does not come on.
P27	Main circuit board – 7-segment circuit board	7-segment circuit board output signal	7-segment display does not come on.
P28	Main circuit board – 7-segment circuit board	LAMP display output signal	Low bobbin thread remainder indicator does not light. Centering indicator does not light.
P29	Main circuit board – relay circuit board (key panel)	Switch panel input signal	Does not accept key/switch input.
P30	Main circuit board – FDD	FDD control signal	Disks cannot be read. (Disk error reported.)
P31	Main circuit board – PMD circuit board	X-Y pulse motor control signal	<ul style="list-style-type: none"> • Home position cannot be detected. • Monogrammed letters shift position. • Carriage does not move.
P32	Main circuit board – Y index circuit board	Y axis home position detection input signal	Y-axis home position cannot be detected.
P33	Main circuit board – X index circuit board	X axis home position detection input signal	X-axis home position cannot be detected.
P34	Main circuit board – power circuit board	Machine motor control signal	Machine pulley does not turn. (overload)
P35	Main circuit board – speed sensor circuit board	+ 35V	Machine pulley does not turn. (overload)
P36	Main circuit board – thread release solenoid	+ 35V	Thread release solenoid does not operate.
P37	Main circuit board – power circuit board	+ 5V (all main circuit board) + 35V (thread release solenoid)	Control functions do not operate properly. Thread release solenoid does not operate.
P38	Main circuit board – bar-code reader	Bar-code reader control signal	Bar code cannot be read.

(2) Power circuit board

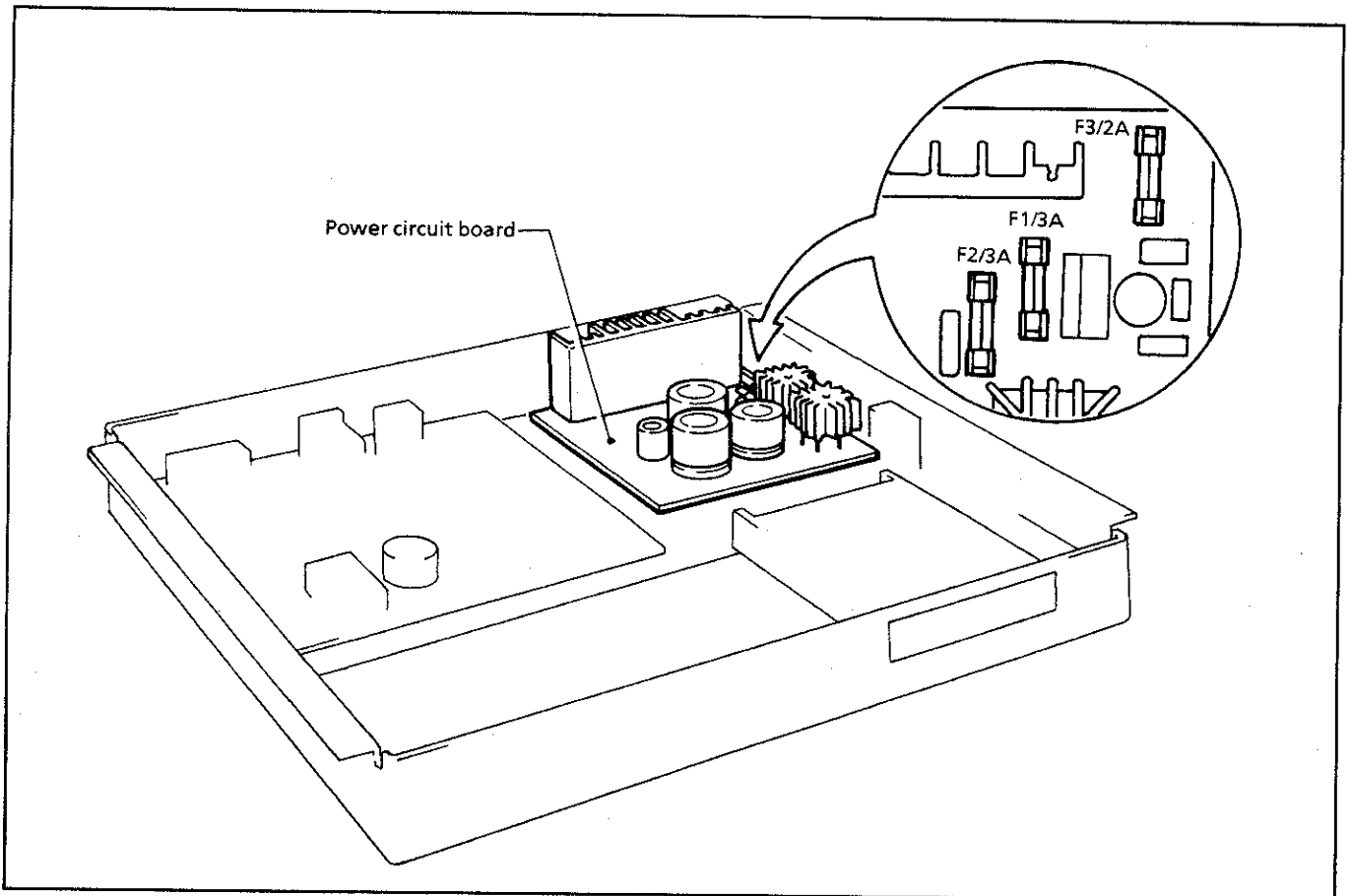
Connector No.	Connection	Main signal	What occurs with poor contact
P10	Power circuit board – transformer	26V	Control functions do not operate properly. (No operation whatsoever.)
P11	Power circuit board – circuit board	+ 35V (thread release solenoid) + 5V (all main circuit board)	Control functions do not operate properly. (No operation whatsoever.)
P12	Power circuit board – FDD	+ 5V	Disks cannot be read. (Disk error reported.)
P13	Power circuit board – PMD circuit board	+ 35V	<ul style="list-style-type: none"> • Home position cannot be detected. • Monogrammed letters shift position.
P14	Power circuit board – transformer	100V AC	Machine pulley does not turn. (overload)
P15	Power circuit board – machine motor	100V AC	Machine pulley does not turn. (overload)
P16	Power circuit board – main circuit board	Machine motor control signal	Machine pulley does not turn. (overload)

(3) PMD circuit board

Connector No.	Connection	Main signal	What occurs with poor contact
P1	PMD circuit board – main circuit board	Control signal	<ul style="list-style-type: none"> • Home position cannot be detected. • Monogrammed letters shift position.
P2	PMD circuit board – power circuit board	+ 35V	Home position cannot be detected
P3	PMD circuit board – Y pulse motor	+ 35V	<ul style="list-style-type: none"> • Y-axis home position cannot be detected. • Monogrammed letters shift position.
P4	PMD circuit board – X-pulse motor	+ 35V	<ul style="list-style-type: none"> • X-axis home position cannot be detected. • Monogrammed letters shift position.

2 Fuse descriptions

(1) Fuse locations



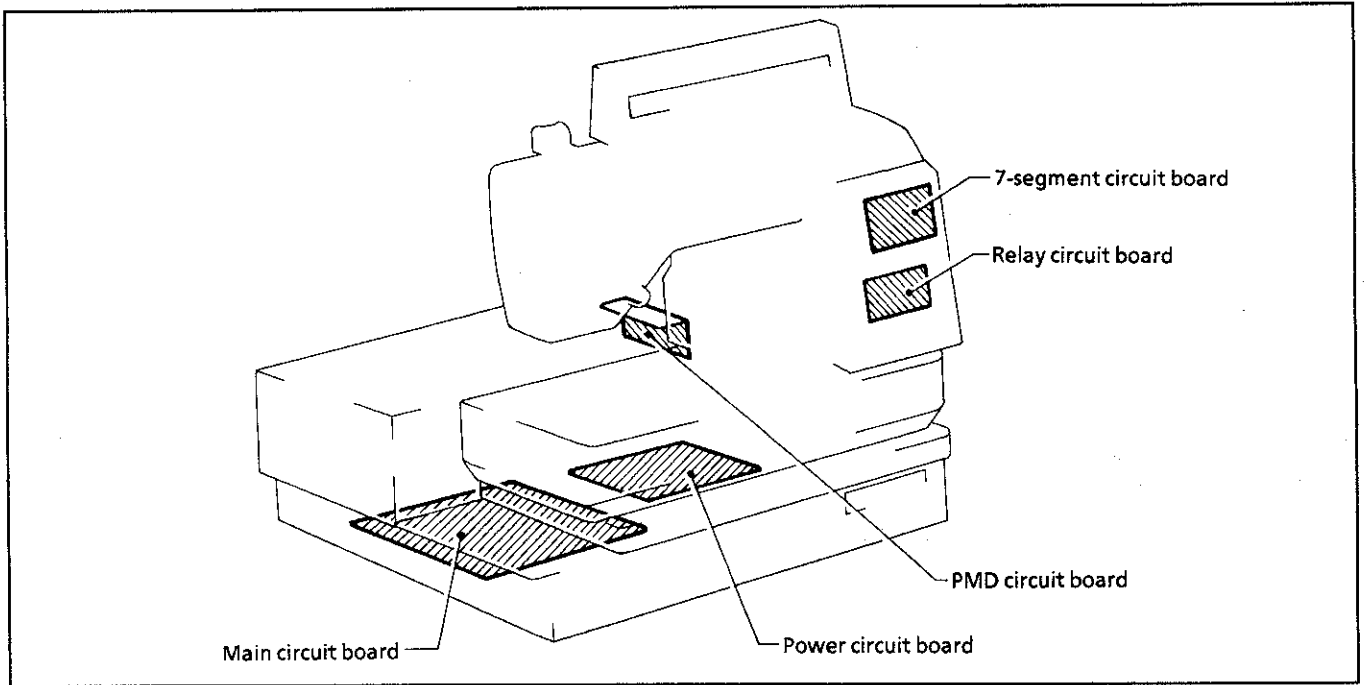
- 1) Replace fuses on the power circuit board with new ones. (See page 18.)
- 2) The fuse holder containing fuses F1, F2, and F3, is located near connector P10 at the right of the power circuit board.
- 3) Fuse type and capacity
 - Fuse F1: Slow blow fuse, 3A-250V (for pulse motor)
 - Fuse F2: Slow blow fuse, 3A-250V (for circuit board logic and solenoid)
 - Fuse F3: 3.15-250V (for machine motor)
- 4) Fuse replacement
 - When fuse F1 blows, the pulse motor will not turn (home position cannot be detected), and monogramming will not be performed correctly (position of letters will shift).
 - When fuse F2 blows, no machine response or operation is possible, the motor and pulley will not turn, and the machine motor will overload.
 - When fuse F3 blows, the machine motor will not turn, resulting in overload.
 - Replace the appropriate fuse should the above happen.

NOTE: Be sure to replace the fuses with ones of equivalent and capacity.

Fuse	Part name	Part code
F1 F2	G fuse SD6-3A-N1	S0994-600
F3	G fuse MQ2-3.15N	S32050-000

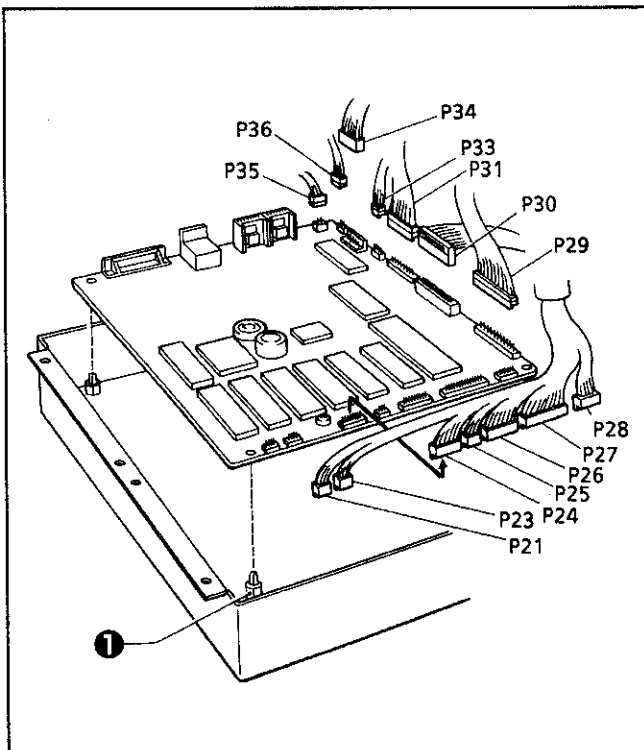
3 Circuit board descriptions

(1) Circuit board locations



(2) Circuit board function and replacement (Be sure to turn off the power, and then open the cover.)

<Main circuit board>



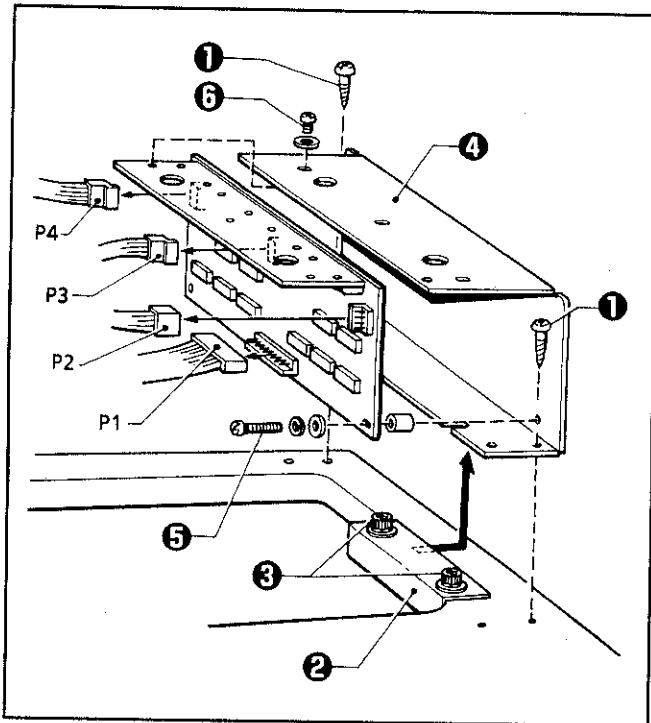
= Function =

- Machine motor control
- Pulse motor circuit board control
- Floppy disk control
- LCD module control
- Key/switch panel input signal selector
- Solenoid drive
- Sensor input selector

= Replacement =

- (1) Remove connectors P21 to P36 (15 connectors).
- (2) Squeeze the tapping supports ❶ claws together to remove the circuit board.
- (3) To install, align the positioning holes in the circuit board with tapping supports ❶, and then press the circuit board onto the supports at the same time.
- (4) Hold and press lightly at the back of the circuit board to connect. Do not apply excessive force.

<PMD circuit board>

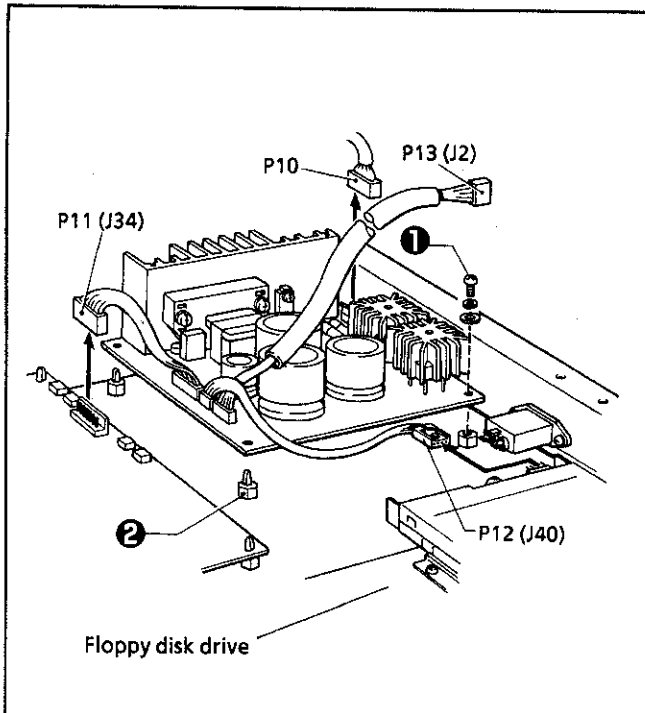


= Function =
 · Pulse motor drive

= Replacement =

- (1) Remove the four screws ❶.
- (2) Loosen the two screws ❸ in the ground plate ❷, and pull the side cover ❹ off.
- (3) Remove connectors P1 - P4 (four connectors).
- (4) Remove the four screws ❺ and the three screws ❻, and replace the circuit board.

<Power circuit board>



= Function =

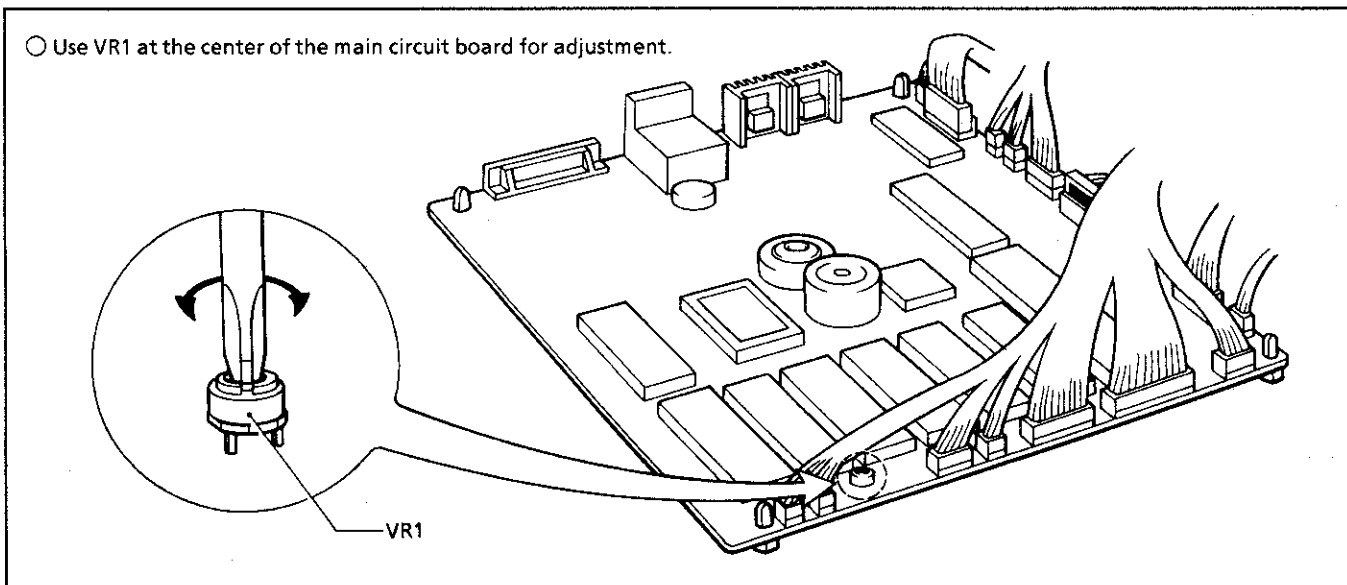
- + 5V output for circuit board logic
- + 5V output for floppy disk drive
- AC100V output for machine motor
- + 35V output for solenoid
- + 35V output for pulse motor

= Replacement =

- (1) Remove connector P10.
- (2) Remove connector P11 from the main circuit board.
- (3) Remove connector P12 from the floppy disk drive.
- (4) Remove the X-Y feed unit assembly cover, and connector P13 from the PMD circuit board.
- (5) Remove the screw ❶.
- (6) Squeeze the tapping supports ❷ claws together to remove the circuit board.
- (7) To install, align the positioning holes in the circuit board with tapping supports ❷, and then press the circuit board onto the supports at the same time.
- (8) Tighten the screw ❶.
 Hold and press lightly at the back of the circuit board to connect. Do not apply excessive force.

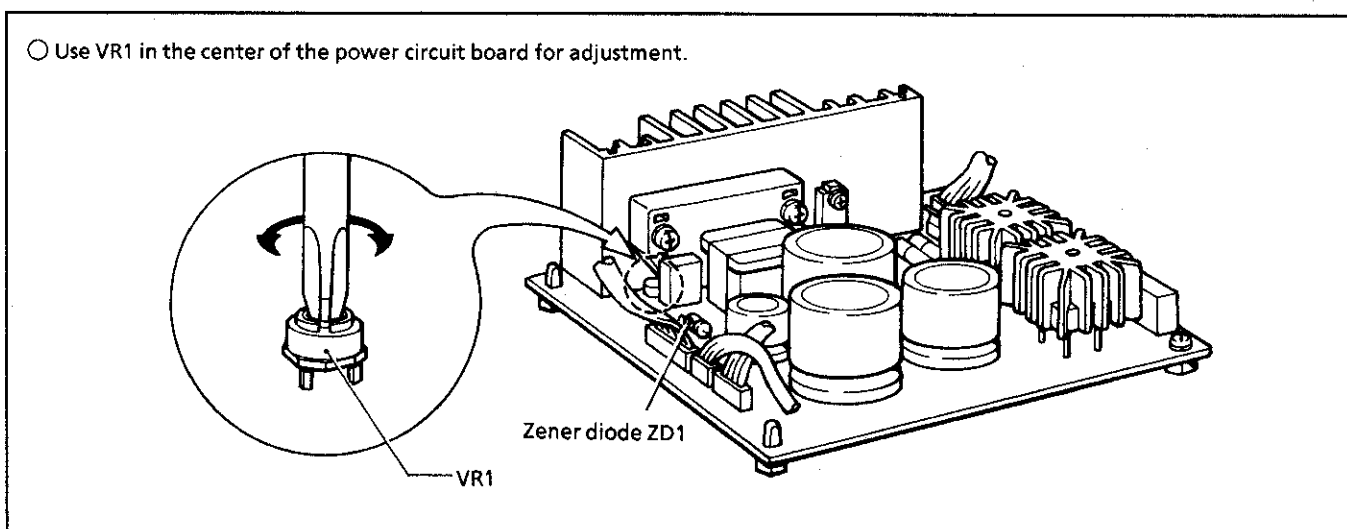
4 Voltage control level adjustment

(1) Bobbin thread monitor indicator, power supply voltage control level



- 1) Turn the power switch off, and remove the base cover so that adjustment control VR1 on the main circuit board can be turned with a screwdriver.
- 2) Prepare a bobbin wound with approximately 10 m of #100 spun thread.
- 3) Set the machine to the test mode. (See page 64.)
- 4) Press the **A** key on the key panel and check that the bobbin thread monitor indicator lights. If it does not light, turn adjustment control VR1 slightly and then press the **A** key again. Repeat this procedure until the bobbin thread monitor indicator lights when the **A** key is pressed.
- 5) Turn the power switch off again, and reinstall the base cover using the screws.

(2) Power supply voltage control level adjustment



- 1) Turn the power switch off, and remove the base cover so that adjustment control VR1 on the main circuit board can be turned with a screwdriver.
- 2) Turn the power switch on.
- 3) Measure the voltage at both poles of Zener diode ZD1 with a tester. Turn VR1 so that the measured voltage is $5.15\text{ V} \pm 0.05\text{ V}$.
- 4) Turn the power switch off again, and reinstall the base cover using the screws.

5 Test mode function description

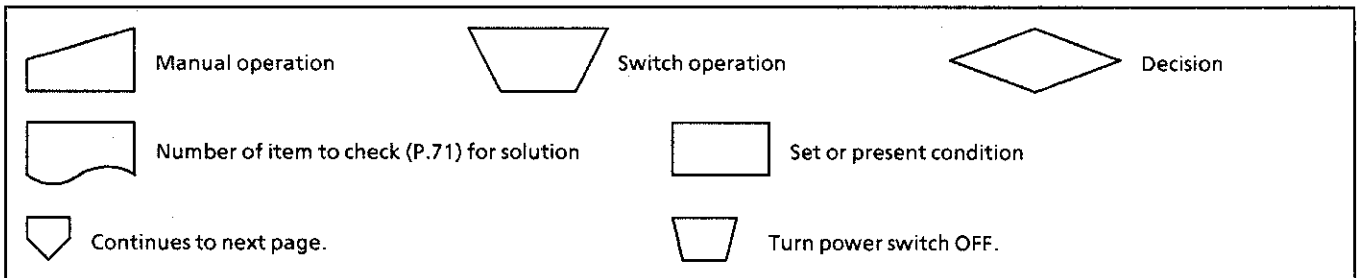
The test program is started by pressing and holding **START** and **ENTER**, and then turning the power switch on.

* Press **END** to terminate the test mode. The machine will enter the default mode at this time (the same mode assumed when the power is first turned on).

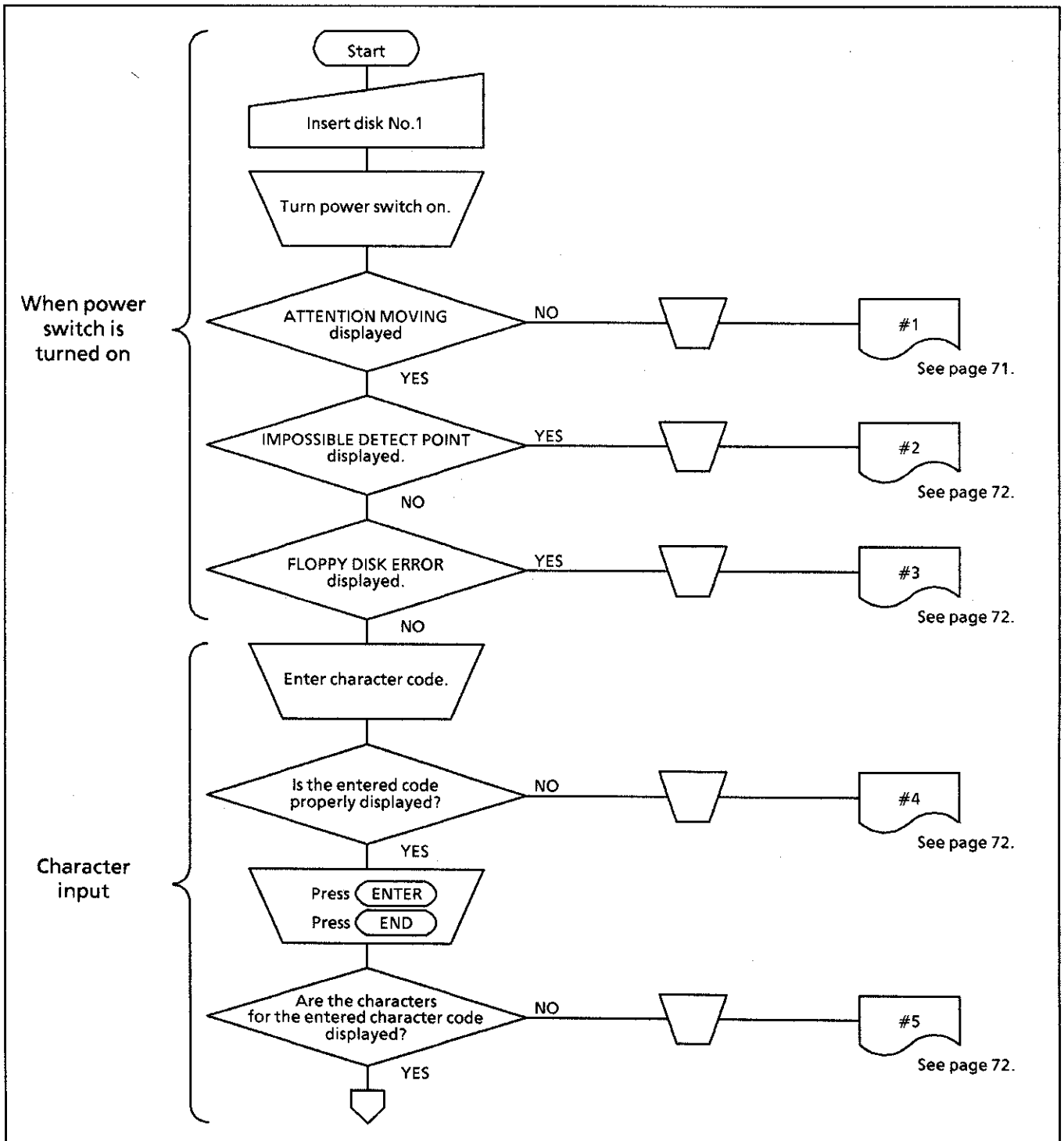
Test number (key)	Display status	Function
1 key	Test: sewing speed at 1000 spm	The machine motor will turn at 1000 rpm $\begin{matrix} +10 \text{ rpm} \\ -50 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
2 key	Test: sewing speed at 900 spm	The machine motor will turn at 900 rpm $\begin{matrix} +10 \text{ rpm} \\ -50 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
3 key	Test: sewing speed at 800 spm	The machine motor will turn at 800 rpm $\begin{matrix} +10 \text{ rpm} \\ -30 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
4 key	Test: sewing speed at 650 spm	The machine motor will turn at 650 rpm $\begin{matrix} +10 \text{ rpm} \\ -30 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
5 key	Test: sewing speed at 500 spm	The machine motor will turn at 500 rpm $\begin{matrix} +10 \text{ rpm} \\ -30 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
6 key	Test: sewing speed at 400 spm	The machine motor will turn at 400 rpm $\begin{matrix} +10 \text{ rpm} \\ -30 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
7 key	Test: sewing speed at 300 spm	The machine motor will turn at 300 rpm $\begin{matrix} +10 \text{ rpm} \\ -30 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
8 key	Test: sewing speed at 150 spm	The machine motor will turn at 150 rpm $\begin{matrix} +10 \text{ rpm} \\ -10 \text{ rpm} \end{matrix}$ OVERLOAD will be displayed if the motor cannot turn.
9 key	Test: 7 seg & lighting	The 7-segment display (4 digits) will appear as 8.8.8.8 , and all indicators will light.
A key	Test: thread remainder sensor	When thread is wound onto the bobbin, the bobbin thread monitor will go out, and will light when the bobbin is empty.
B key	P-ROM Ver.	The version of the P-ROM installed will be displayed for about 2 sec.
C key	Solenoid test	The upper thread release solenoid is on. The solenoid operates for about 3 sec., and automatically turns off.
CLR key	Start at test mode	Stops the motor during test operation. Lighted indicators and the 7-segment display will go out.

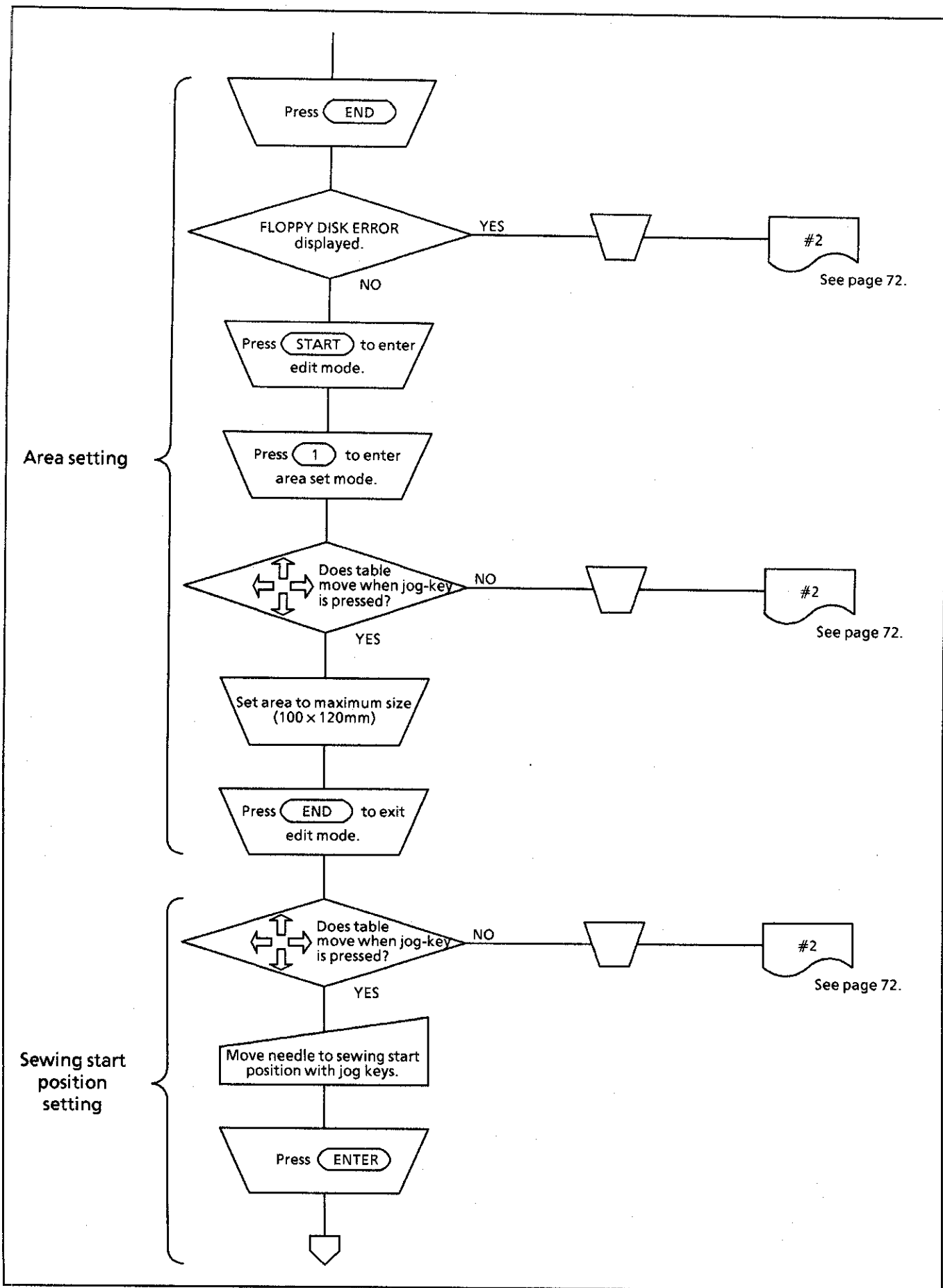
6 Troubleshooting flow chart

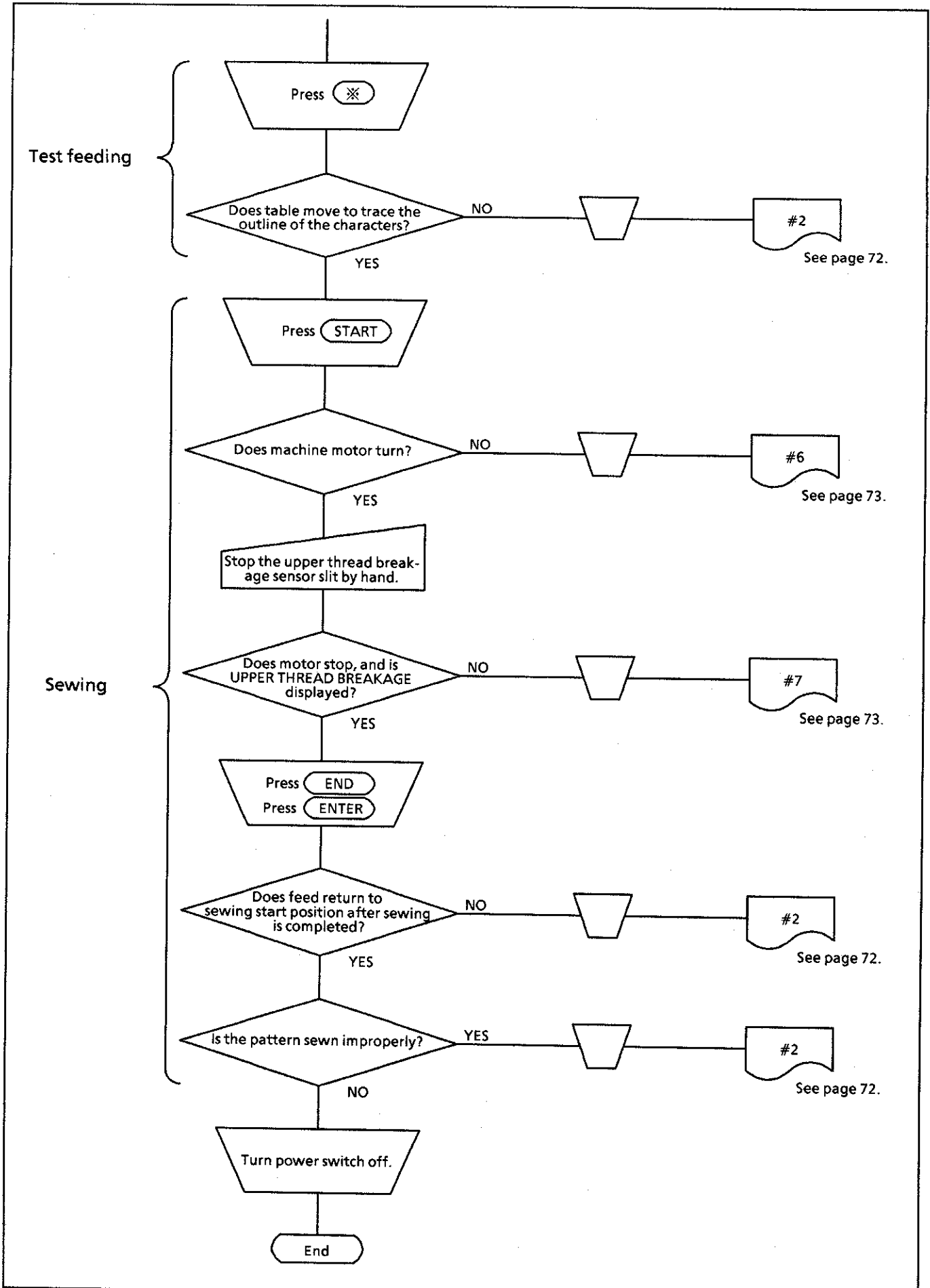
Legend



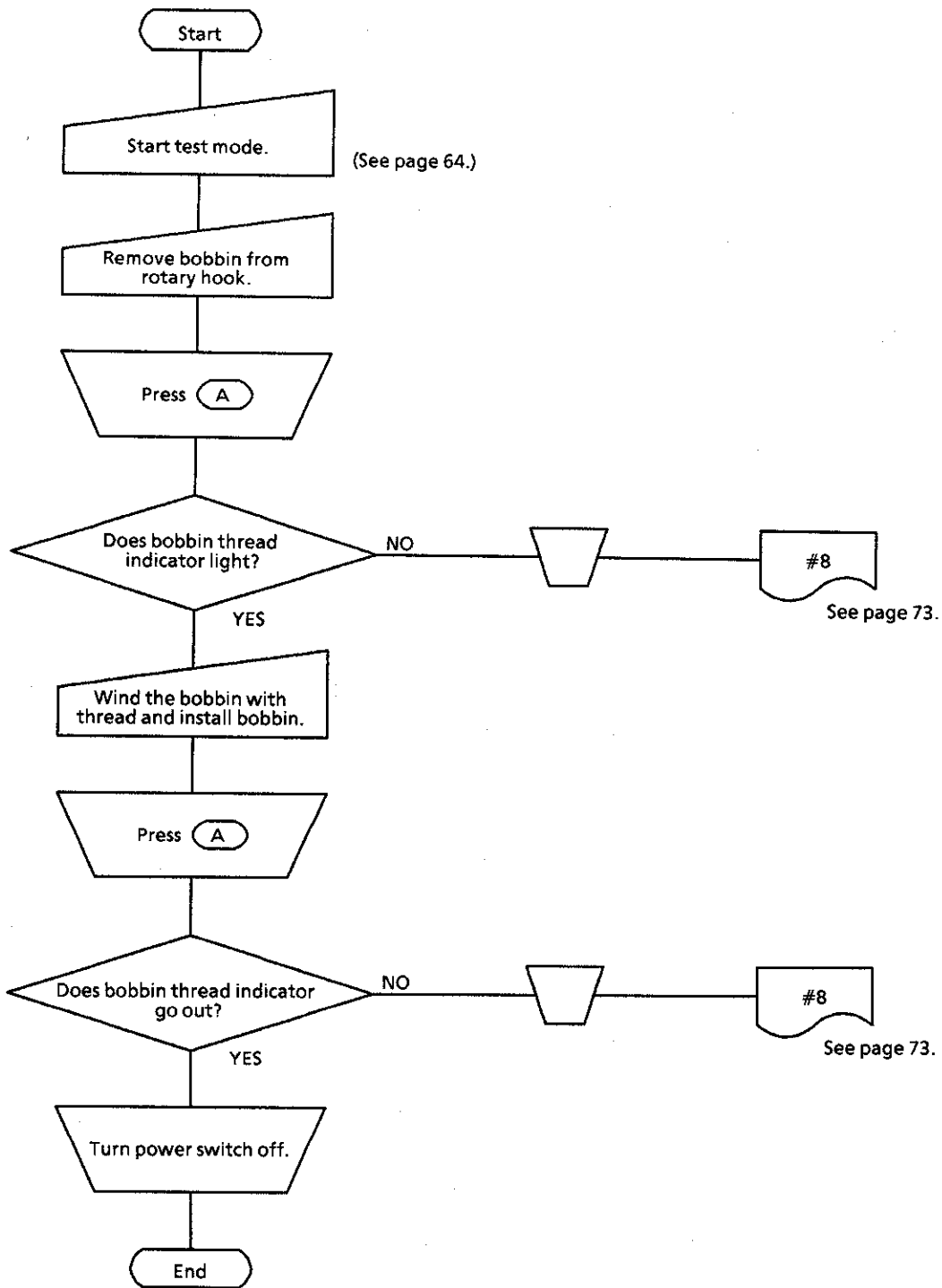
(1) Machine control



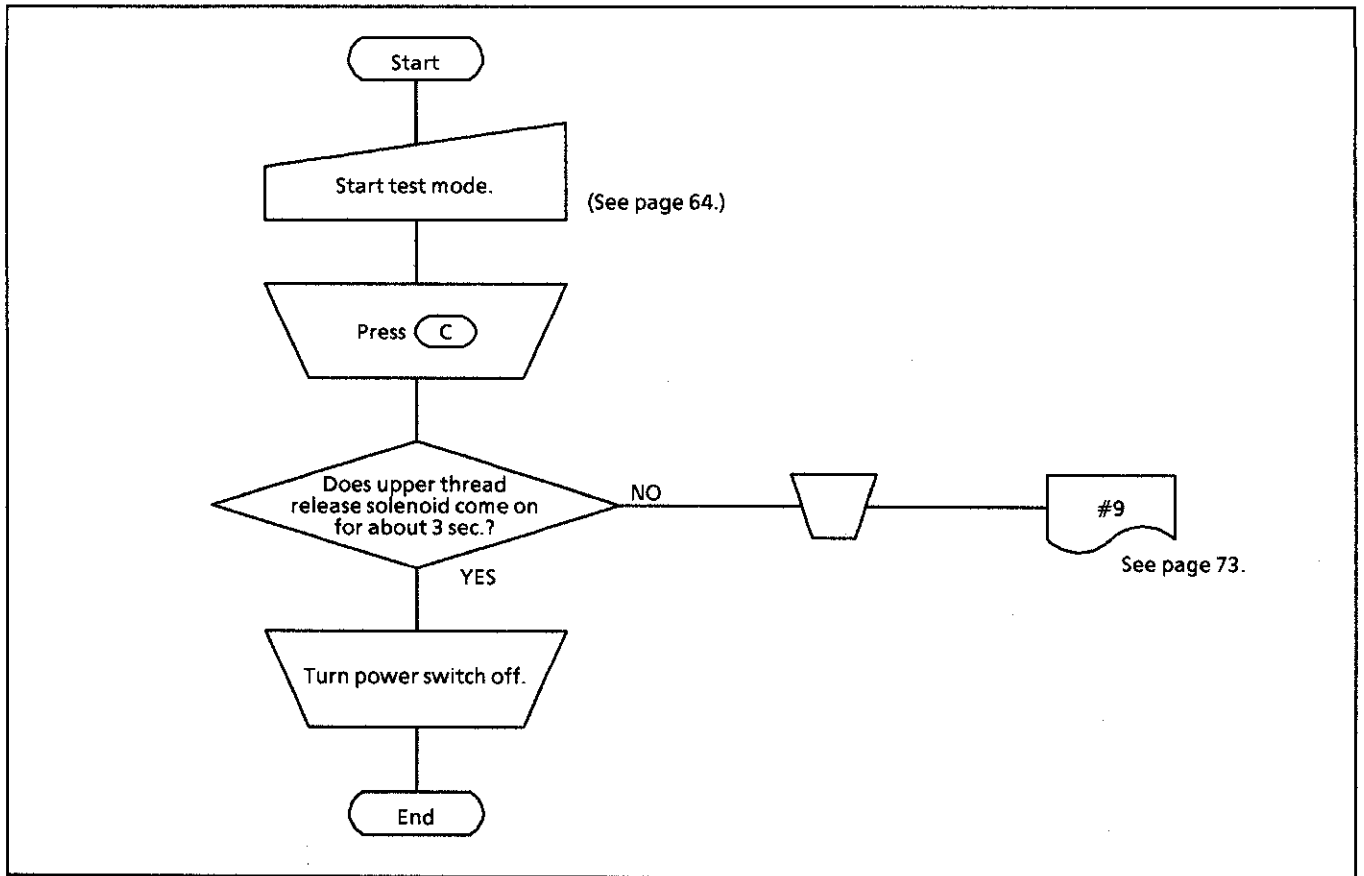




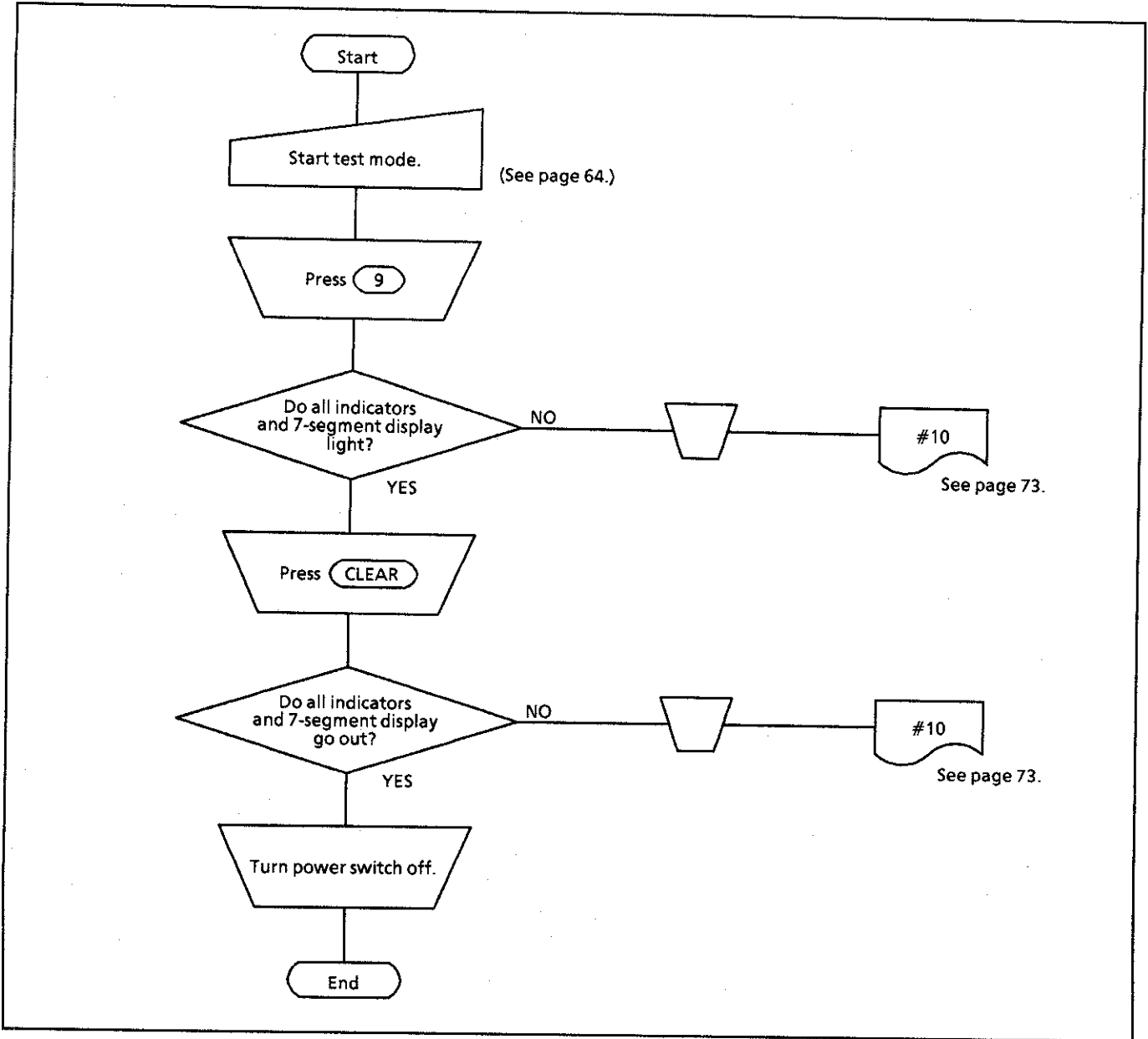
(2) Bobbin thread remainder sensor



(3) Upper thread release solenoid



(4) Indicators, 7-segment display (4-digit number)



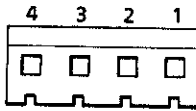
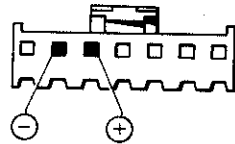
7 Troubleshooting

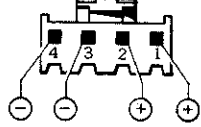
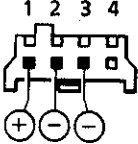
«Cautions on problem diagnostics»

1. Be sure to turn the power switch off before unplugging or plugging in the cord.
2. Turn the power switch off before opening the box cover.
3. Turn the power off and measure the resistance for items marked with a letter in a circle. Turn the power on and measure the voltage for items marked with a letter in a box.
4. When replacing the fuses, be sure to use ones of equivalent type and capacity.

«Before adjustments»

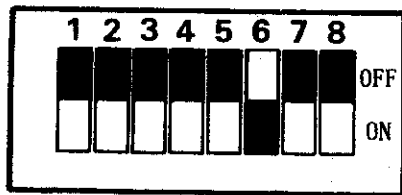
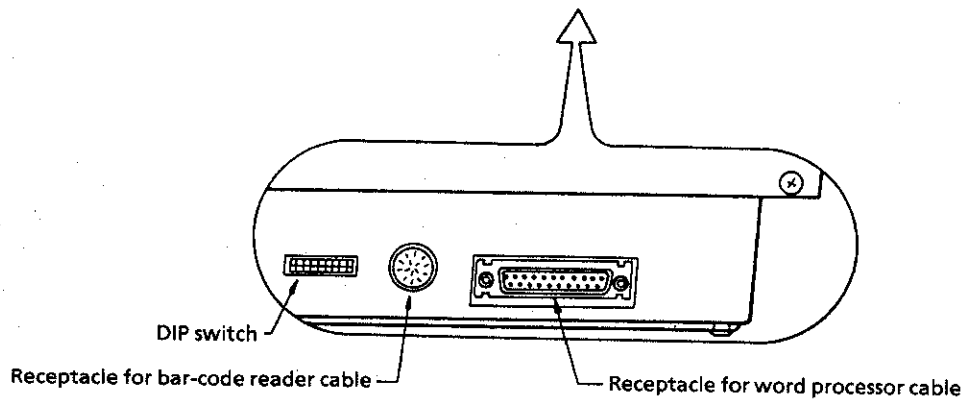
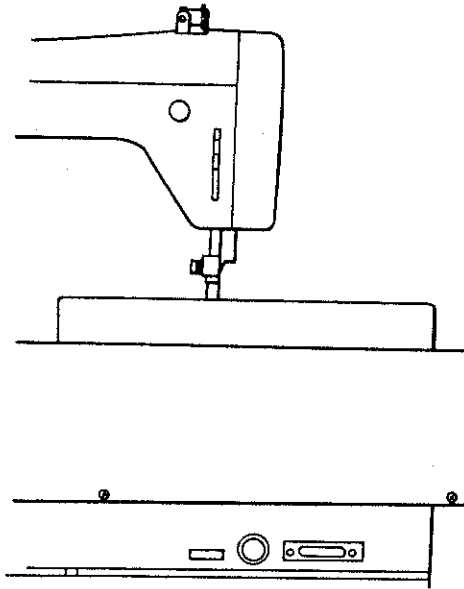
1. Check the fuses.
2. Make sure all plugs are properly connected.
3. Refer to the flow charts to identify the problem (indicated reference #number), and refer to that number in the following tables.

Problem	Cause	What to check, repair, adjust	Parts to replace if defective	Reference page
#1 ATTENTION MOVING is not displayed.	1. No power supply.	A . Check the single phase power supply voltage with a tester.		
	2. Defective power supply switch	A . Turn power switch on, and measure for conductivity with tester probes at both poles of switch	Plug case WOJ assembly	74
	3. Blown fuse	A . Remove fuse F2, and check for conductivity. OK if conductivity present.	Fuse F2 (3A)	60
	4. Defective display	A . Replace LCD module circuit board.	LCD module circuit board assembly	25
	5. Defective transformer 	A . Disconnect plug P10 in the power circuit board, and measure the voltage. OK if 26 - 28 VAC present at No.1 & 2. OK if 26 - 28 VAC present at No. 3 & 4.	Transformer assembly	74
	6. Defective power circuit board 	A . Disconnect plug P37 in main circuit board, and measure the voltage. OK if 5 VDC No. 5 ⊕ No. 6 ⊖	Power circuit board assembly	74
	7. Defective main circuit board	Replace the main circuit board with a new one.	Main circuit board	62

Problem	Cause	What to check, repair; adjust	Parts to replace if defective	Reference page
#2 Carriage does not move.	1. Defective pulse motor power supply (carriage does not move.) 	A. Disconnect plug P2 on PMD circuit board, and measure voltage with tester across P2 terminals. OK if +35 to +40 VDH	Power circuit board	74
	2. Defective cable (carriage does not move.)	A. Disconnect plugs P31 and P1 at both ends of the PMD harness, and check for conductivity. OK if conductivity present across corresponding terminals.	PMD harness	74
	3. Defective PMD circuit board (carriage does not move.)	A. Replace PMD circuit board with a new one.	PMD circuit board	62
	4. Blown fuse (carriage does not move.)	A. Remove fuse F1 and check for conductivity. OK if conductivity present.	Fuse F1 (3A)	60
	5. Defective positioning sensor (Carriage moves but cannot perform home position detection.)	A. Replace index circuit board.	X index circuit board Y index circuit board	27 39
#3 Disk cannot be read.	1. Defective floppy disk	A. Replace disk.	Floppy disk	32, 33
	2. Defective FDD power supply 	A. Disconnect plug P4 (four pin) in the FDD, and measure the voltage at the plug terminals. OK if 5 VDC No. 1 Open No. 2 & No. 3 ... ⊖ No. 4 ⊕	Power circuit board	74
	3. Defective FDD cable	A. Disconnect the plugs at both ends of the FDD cable, and check for conductivity. OK if conductivity present at corresponding terminals.	FDD cable	74
	4. Defective main circuit board	A. Replace floppy disk drive with a new one.	Main circuit board	61
	5. Defective floppy disk drive	A. Replace floppy disk drive with a new one.	Floppy disk drive	13
#4 Entered code number is not properly displayed.	1. Defective 7SEG circuit board	A. OK if all 7-segment characters are displayed in test mode 9.	7SEG circuit board	74
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61
#5 Characters corresponding to entered code is not displayed.	1. Defective display	A. Replace LCD module circuit board.	LCD module circuit board assembly	25
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61

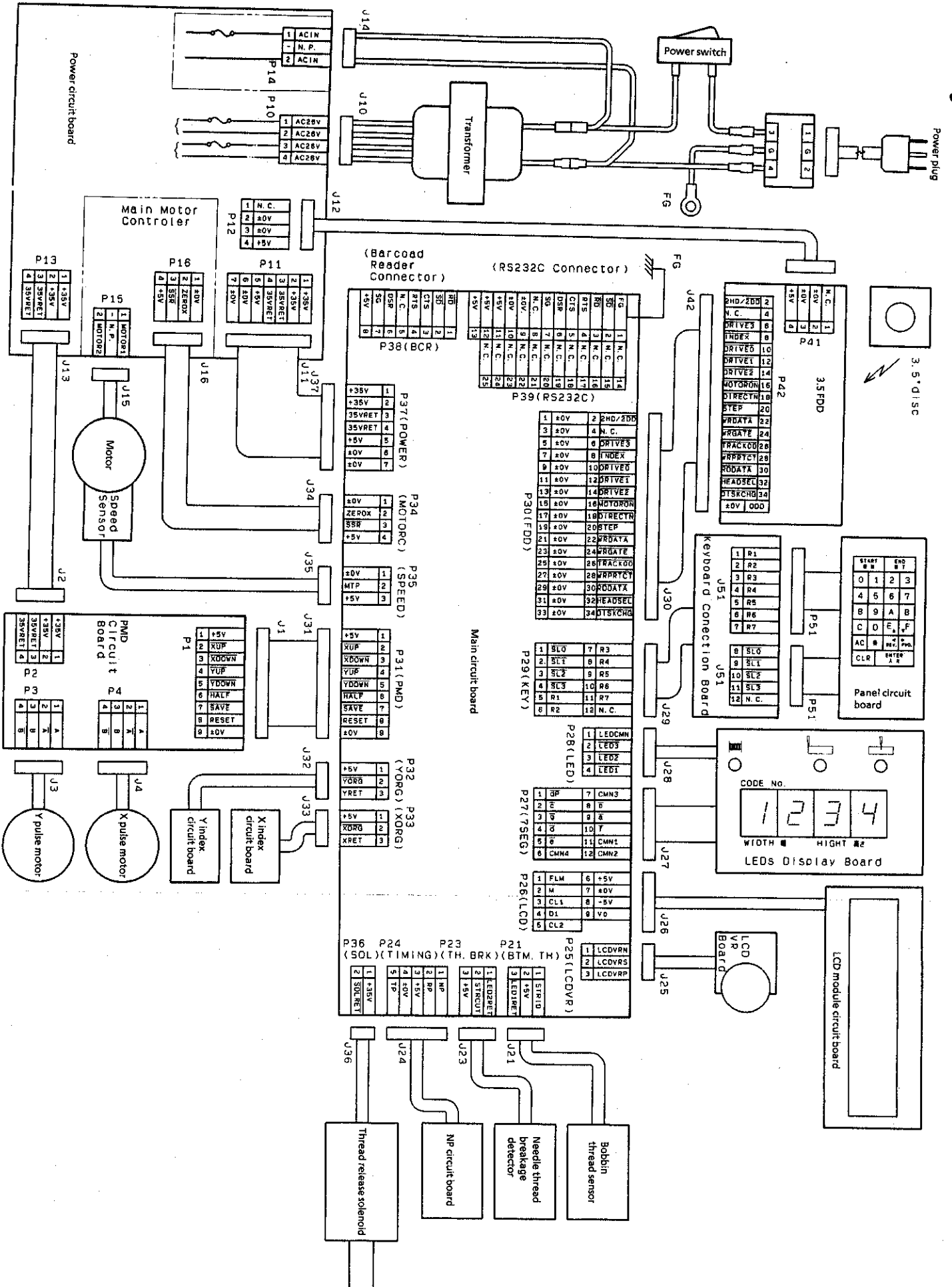
Problem	Cause	What to check, repair, adjust	Parts to replace if defective	Reference page
#6 Machine motor does not turn.	1. Machine not properly adjusted	A. Is pulley rotation stiff?		
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61
	3. Defective machine motor	A. Replace machine motor with a new one.	Machine motor	52
#7 Thread breakage detector does not function (or remains always on).	1. Defective thread breakage detector	A. Does sensor slit turn? B. Poor contact at plug P23 in thread breakage detector. C. Shorted sensor.	Thread breakage detector	26 74
#8 Bobbin monitor indicator does not light (or remains always on).	1. Defective bobbin thread sensor	A. Replace bobbin thread sensor.	Sensor cover assembly Bed cover assembly	
	2. Improperly adjusted bobbin thread sensor	A. Adjust bobbin monitor indicator.		63
	3. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61
#9 Thread release solenoid does not operate.	1. Defective solenoid	A. Disconnect solenoid plug P36, and measure resistance at plug terminals. OK if 60Ω at No.1 and 2.	Solenoid	74
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61
	3. Improperly adjusted solenoid	A. Adjust solenoid.		55
#10 Indication panel does not light (or remains always on).	1. Defective LCD module circuit board	Replace LCD module circuit board with a new one.	LCD module circuit board	25 41
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61
Operation panel display does not come on (or is always on).	1. Defective panel circuit board	A. Replace panel circuit board with a new one.	Panel circuit board	25 41
	2. Defective main circuit board	A. Replace main circuit board with a new one.	Main circuit board	61

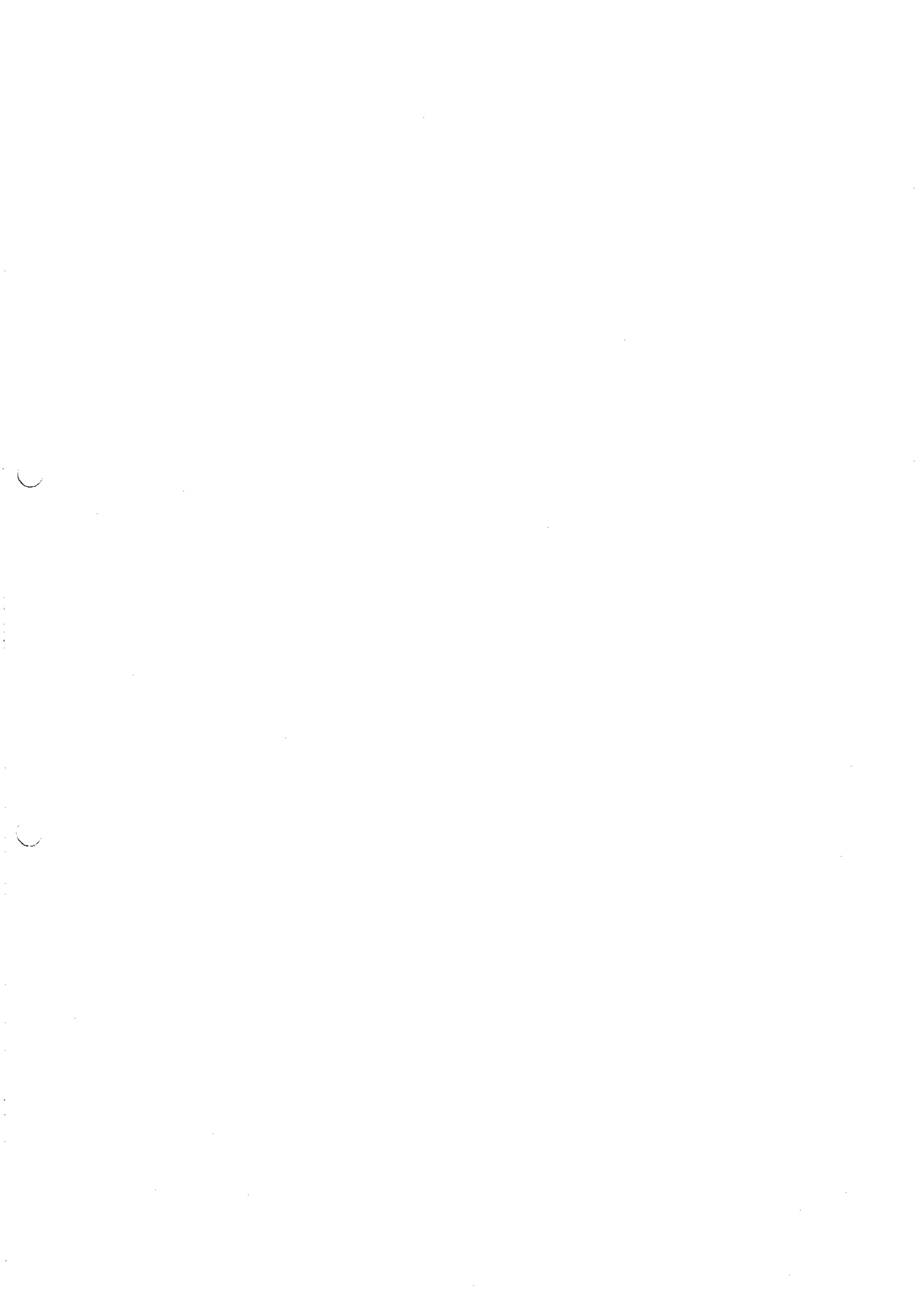
8 DIP switch functions



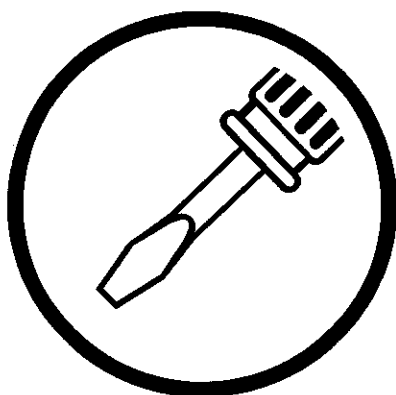
* All the DIP switches except No.6 are preset to OFF when shipped.

DIP switch functions		
SW	OFF	ON
1	Needle thread breakage detector is activated.	Needle thread breakage detector is not activated.
2	Unused (always set to OFF)	
3	∕	
4	∕	
5	∕	
6	∕	
7	∕	
8	∕	





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