SM ESI

Service Manual For Computerized Sewing Machine
Model ESI

BECAUSE CREATIVITY IS THE ESSENCE OF SEWING

GENERAL INFORMATION

This service manual has been compiled for explaining repair procedures of the MODEL 895.
This was produced based on up-to-date product specifications at the time of issue, but there may have been changes of specifications for the purpose of improvements.
Contact manufacturer or local sales company for information concerning such changes.

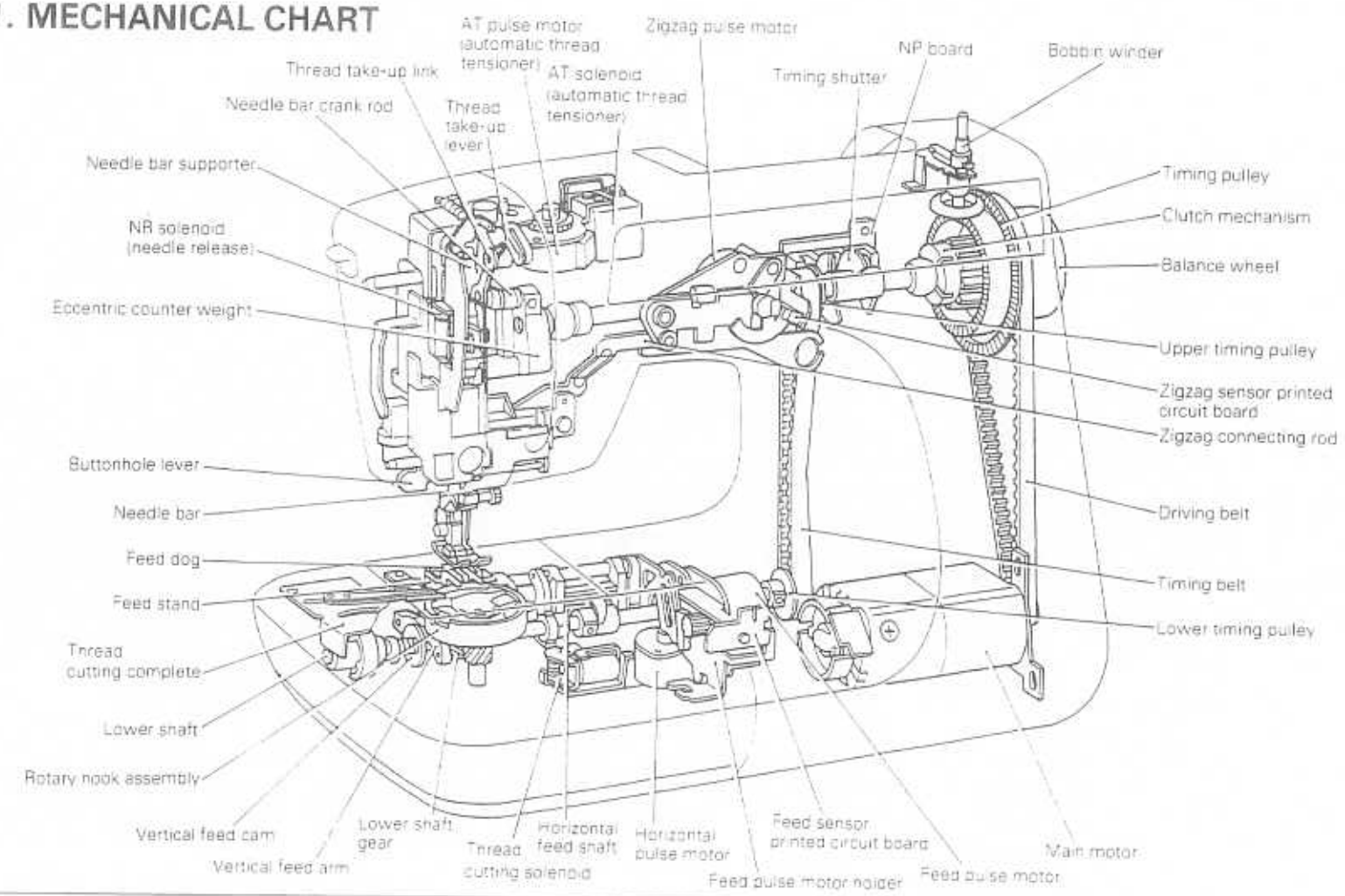
Brother Industries, Ltd.
Nagoya, Japan

CAUTION

1. Always use rubber gloves when handling printed circuit boards and never touch the metal portion of a printed circuit board with bare hands.
2. Keep your body earthed in order to avoid generating static electricity.
3. Pack printed circuit boards in aluminum foil and avoid subjecting them to any form of impact during storage or transportation.
4. Do not touch or damage the metal portion of a printed circuit board with a screwdriver or any other tool while making repairs or the like.

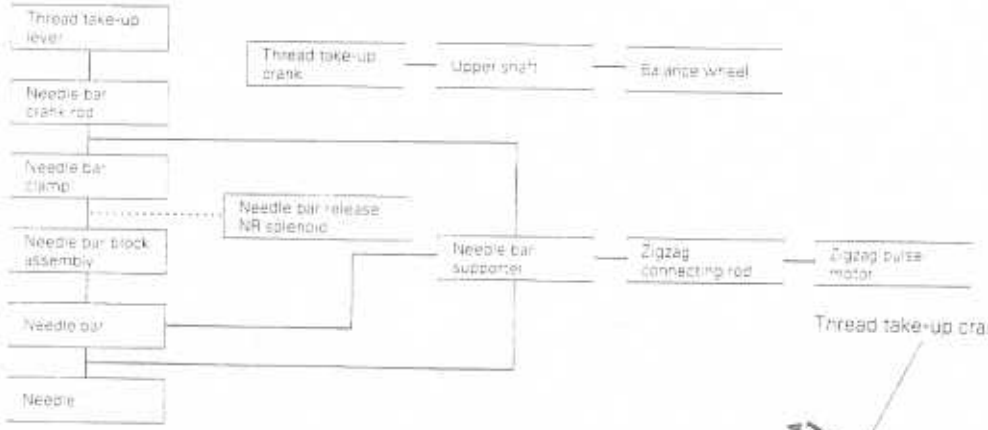
I. PRINCIPAL MECHANISMS

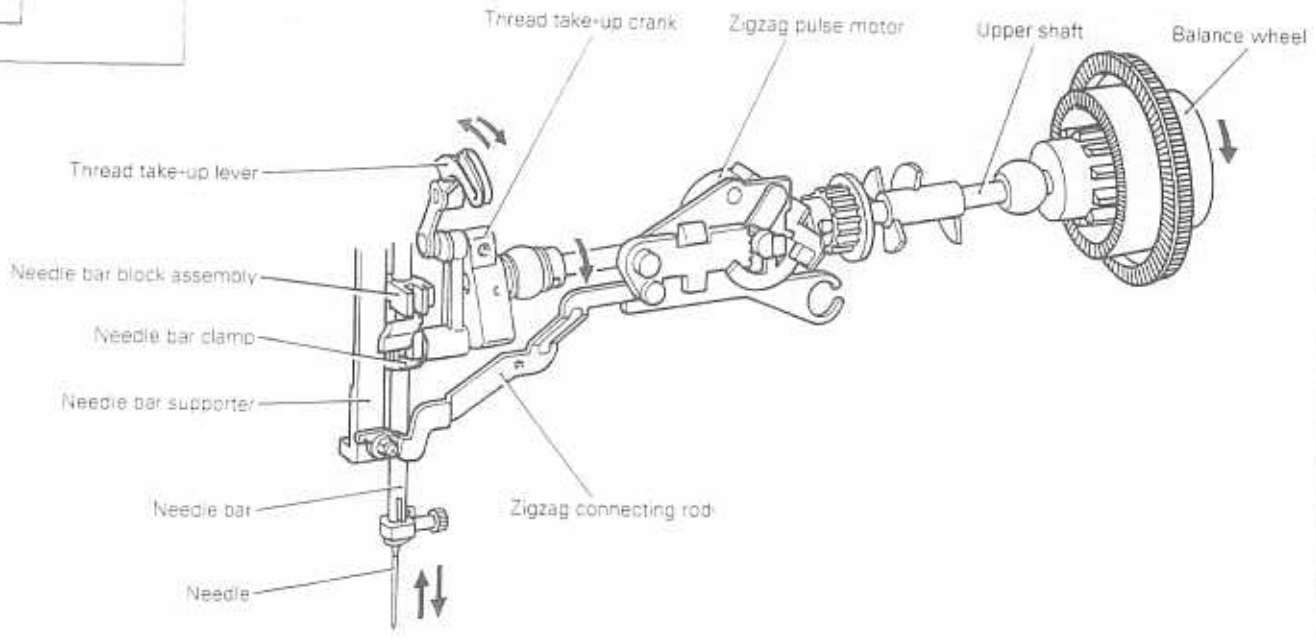
1. MECHANICAL CHART



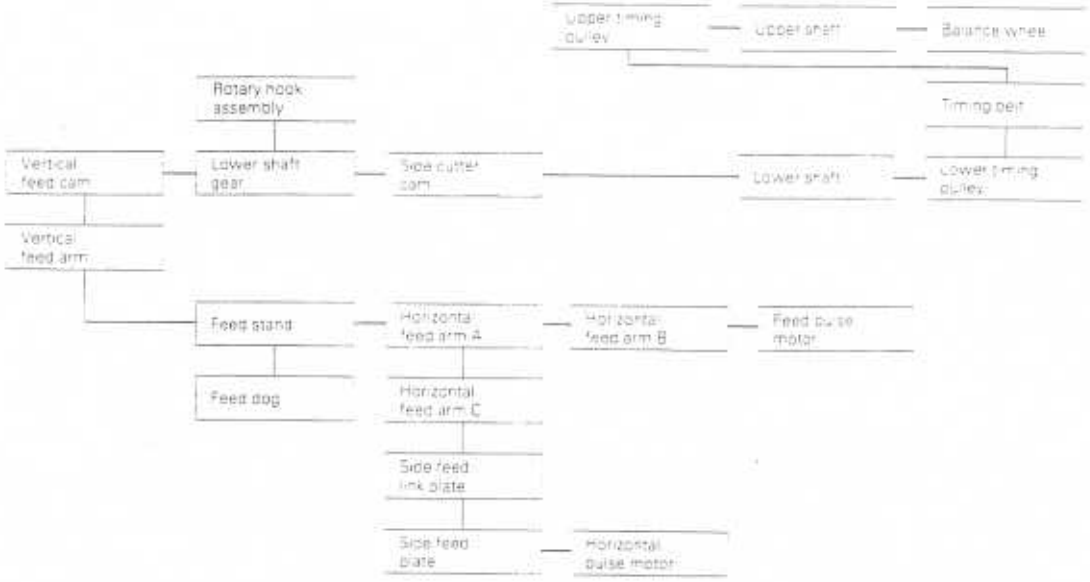
2. POWER TRANSMISSION CHART

(A) Generating mechanism of needle bar, thread take-up lever and zigzag movements

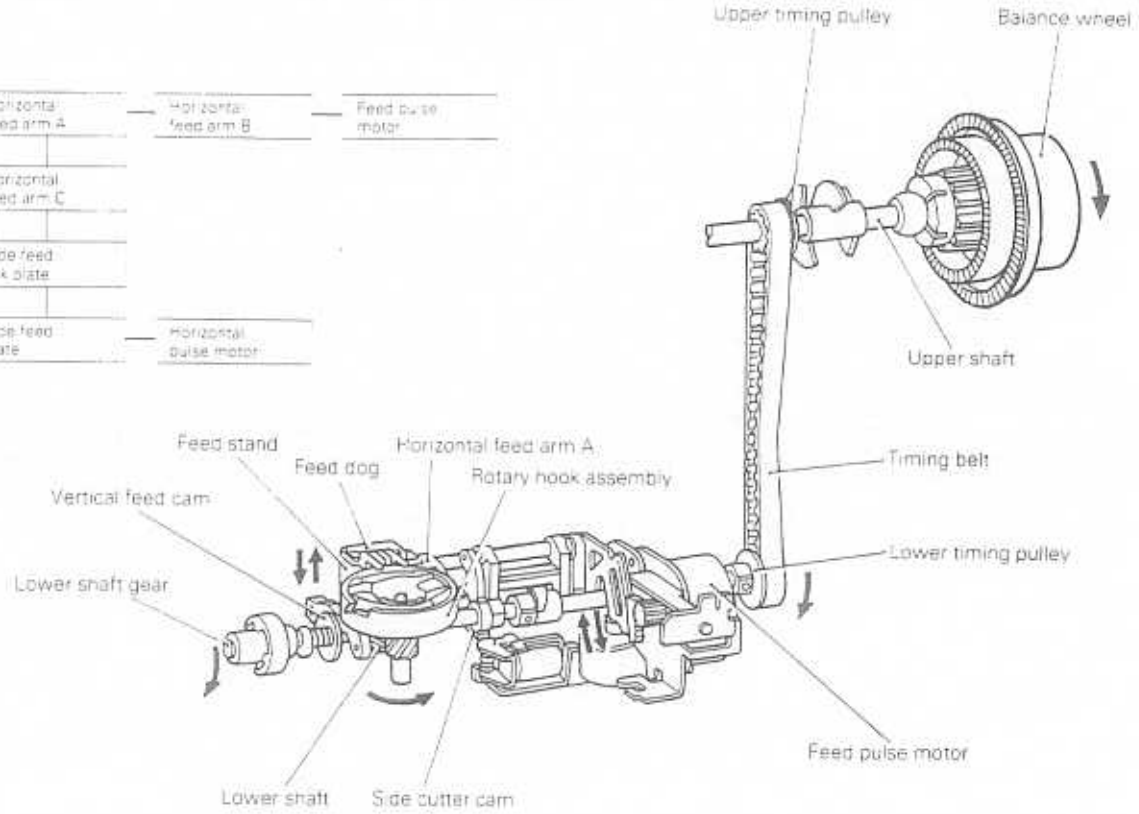




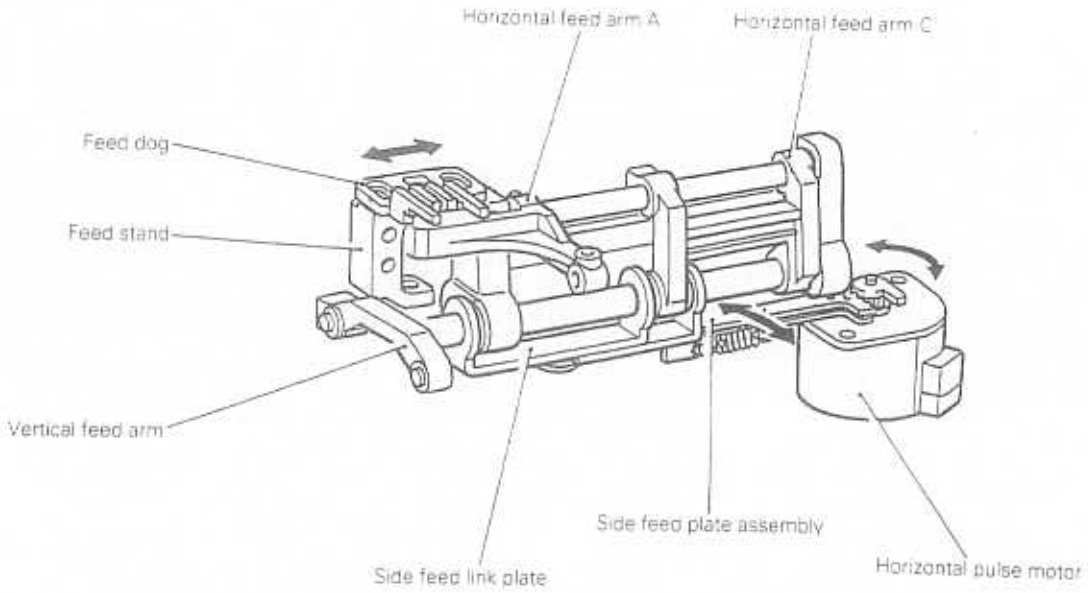
(B) Mechanism of feed dog and rotary hook movement



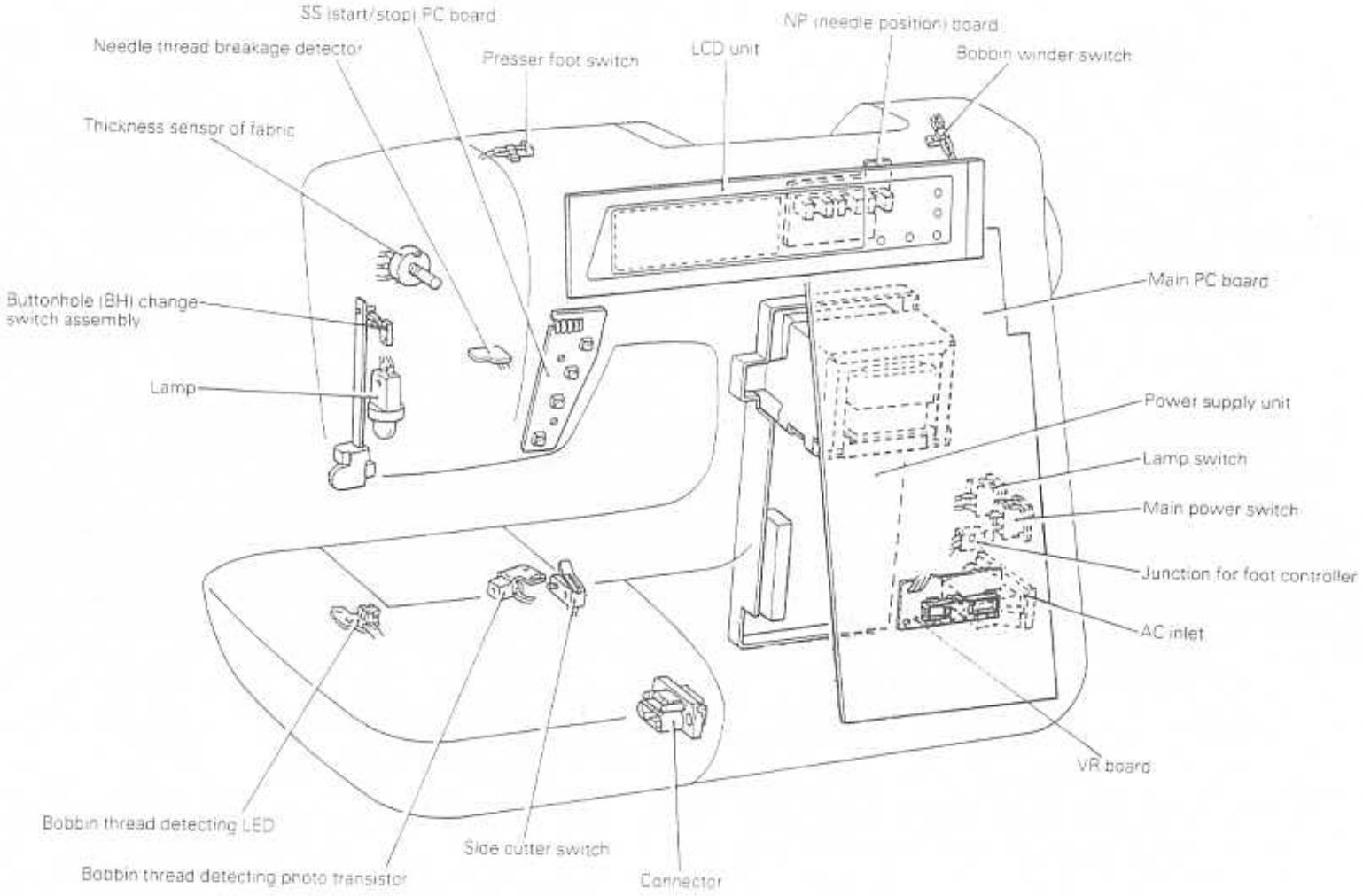
1. Vertical and horizontal feed and rotary hook mechanism



2. Horizontal feed mechanism

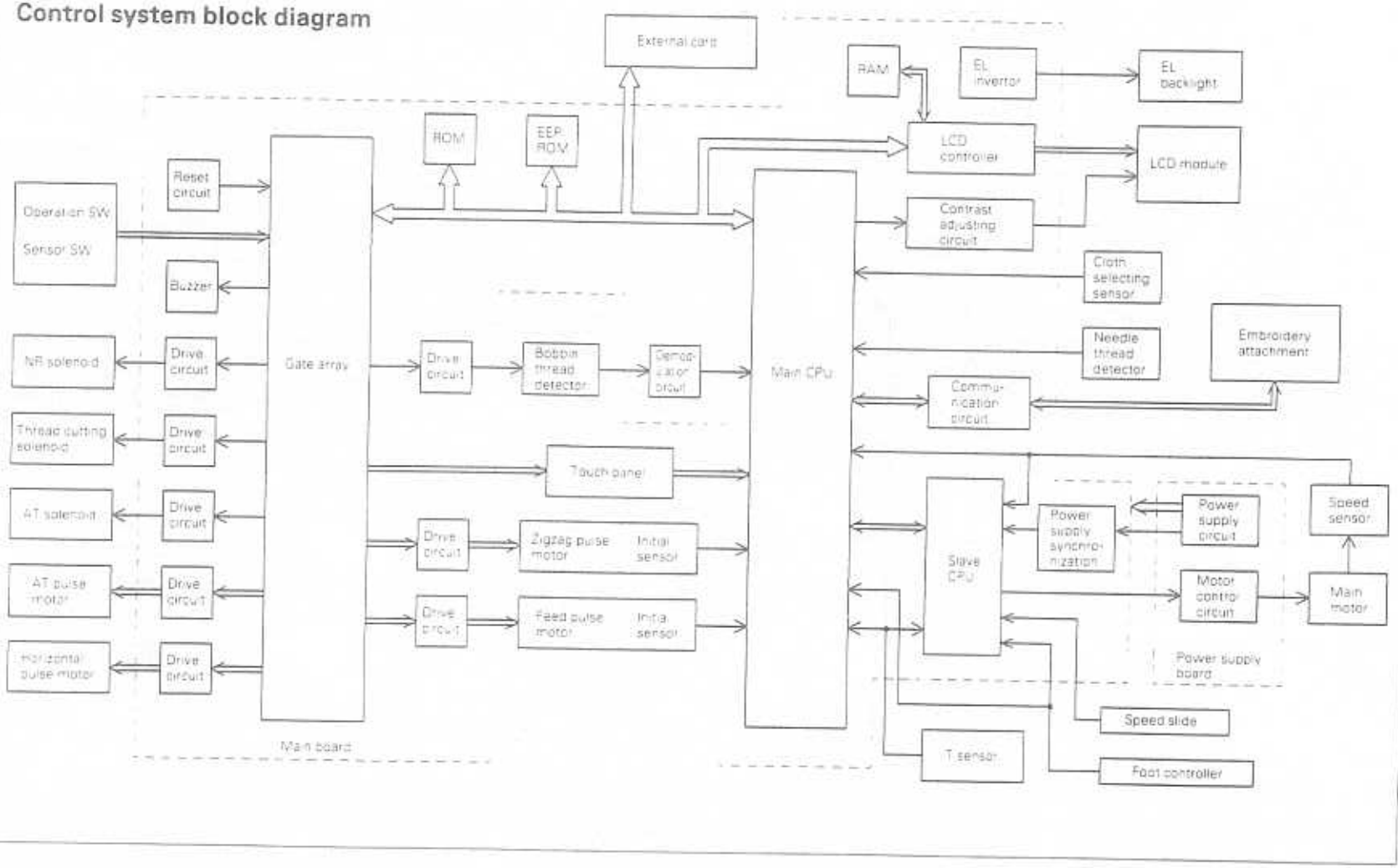


3. ELECTRONIC PARTS ARRANGEMENT CHART



4. CONTROL SYSTEM BLOCK DIAGRAM

Control system block diagram



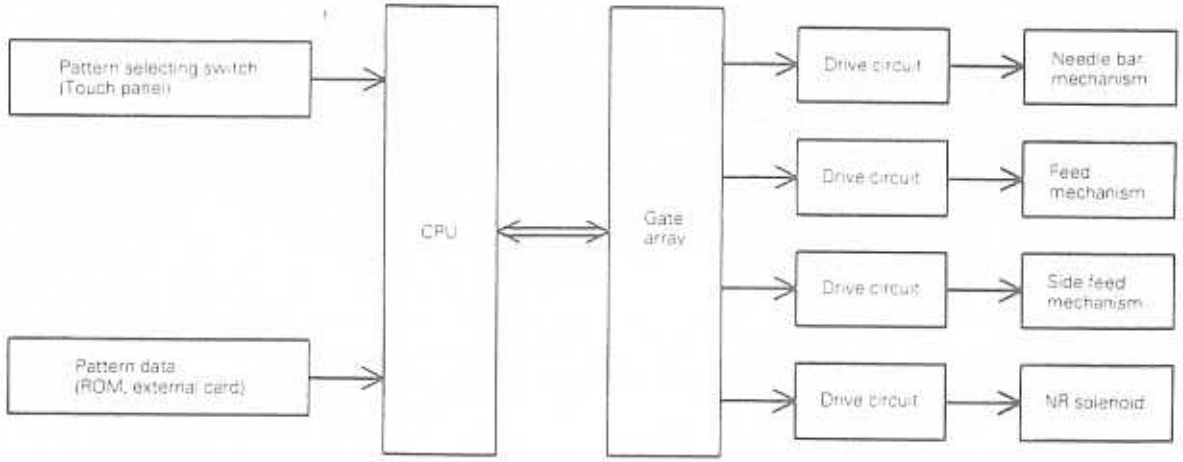
5. MAIN MOTOR CONTROL

The main motor for the sewing machine is required to smoothly changes from low speed to high speed without any fluctuations due to load or temperature changes. To fully comply with this requirement, the Super Galaxy (Model 895) is adopting an SSR controlled motor which has been the result of extensive research.

6. PATTERN GENERATOR

For conventional sewing machines, the pattern was generated by rocking the needle bar and the feed regulator by means of a pattern cam onto which the pattern data had been mechanically engraved. In contrast to this, this model stores the data electronically in memory and uses a feed pulse motor, horizontal pulse motor and a zigzag pulse motor to directly rock the needle bar and the feed regulator to generate the pattern. As a result of this, it is possible to increase the number of patterns and the number of stitches simply by adding extra memory capacity, so that about 850 patterns comprising a total of approximately 88,000 stitches can be stored. In addition, the pulse motors must move the position of the needle while the needle is raised and stop it in the correct position (and similarly, they must move the position of the feed regulator while the needle is lowered), so that highly-precise positioning and a fast response speed are requires. Because of this, the feed pulse motor, horizontal pulse motor and a zigzag pulse motor were adopted, and the circuit structure employed is a simple open-loop structure.

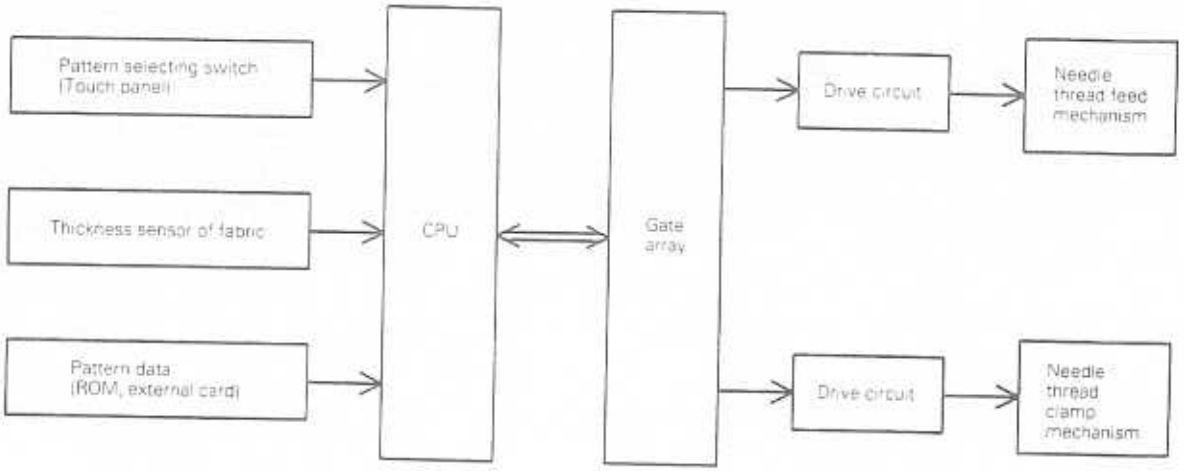
Block diagram of pattern generator control



7. AUTOMATIC THREAD TENSION

On former models, the operator has adjusted the thread tensions of the needle and bobbin threads by changing the pressure between the tension disks.
On this model, however, the thread tension is calculated based on the horizontal and vertical movements of the embroidery frame, and the appropriate needle thread amount is fed by the thread tension pulse motor.
This always gives you correct thread tension regardless of thread, kinds of fabric or sewing speed.

Automatic thread tension block diagram



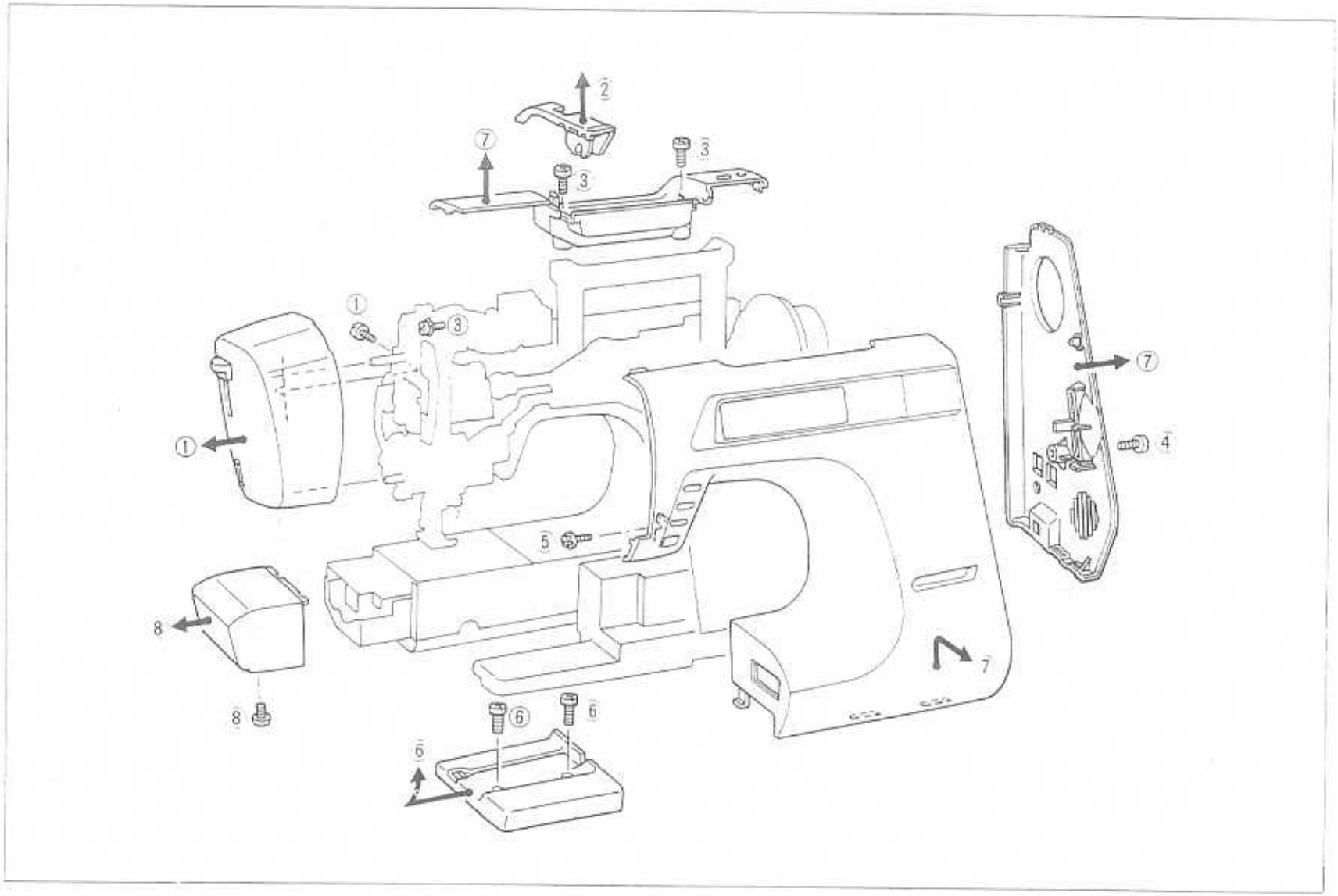
8. OTHER ELECTRONIC COMPONENT FUNCTIONS

Start/stop switch	used to start and stop (SS) the machine. If you want to start sewing at low speed, keep this switch depressed and start sewing.
Backstitch switch	used for backstitching and lockstitching. Backstitching is performed at low speed in the reverse direction to sewing while the button is pressed. For lockstitching, three stitches are made at the current needle position and then sewing stops.
Needle position (UP/DOWN) switch	used to change the needle position either up or down.
Automatic thread cutter switch	used to cut the thread automatically. When you press this switch, the machine will automatically cut the thread, regardless of the needle position, and stop with the needle at its upper position.
Touch panel	used to select pattern and input test mode number required for sewing by simply touching the display on the panel. This simplifies the operation for selecting the desired pattern and number.
Buttonhole stitch switch	used to detect the edges of the buttonhole stitch by means of the buttonhole stitch presser foot and lever.
Buttonhole stitch lever switch	used to detect whether the buttonhole stitch lever is raised or lowered.
Presser foot switch	used to detect whether the position of the presser foot lifter is raised or lowered.
N.P. sensor	used to detect the needle position (N.P.), and the timing between the pulse motors for the automatic thread tension and embroidery, and the solenoids for automatic thread tensioning, needle bar release, and thread cutting. The N.P. sensor detects the rotation angle of the upper shaft with the N.P. shutter and the photo interrupter.
Speed sensor	used to detect the rotation speed of the main motor.
Side cutter switch	used to detect whether the side cutter has been set or not.
Bobbin winder switch	used to detect whether the bobbin winder has been set when winding the lower thread.
Junction for foot controller	when using the foot controller, connect it to this terminal.
Transformer	used for driving the pulse motors and solenoids, to illuminate the lamps and to supply power to the electronic circuitry.
Lamp	is 8V 2.4W.

II. DISASSEMBLING AND REASSEMBLING THE SEWING MACHINE

1. OUTER PARTS

1. Remove the screw and the face plate by sliding it to the left.
2. Pull out thread guide cover upward.
3. Lift up the carrying handle, loosen the two screws securing the top cover and the screw on the left side of the carrying handle, and then lift up the top cover and turn it to remove it.
4. Remove the screw securing the belt cover.
5. Loosen the screw on the left side of the front cover.
6. Remove the two screws, and pull out the base plate by sliding it to the left.
7. Raise the front cover, and release the two catches on it. Remove the five connectors for the front cover, and then remove the front cover.
8. Lay the sewing machine on its side; remove the screw and the free arm cover by sliding it to the left.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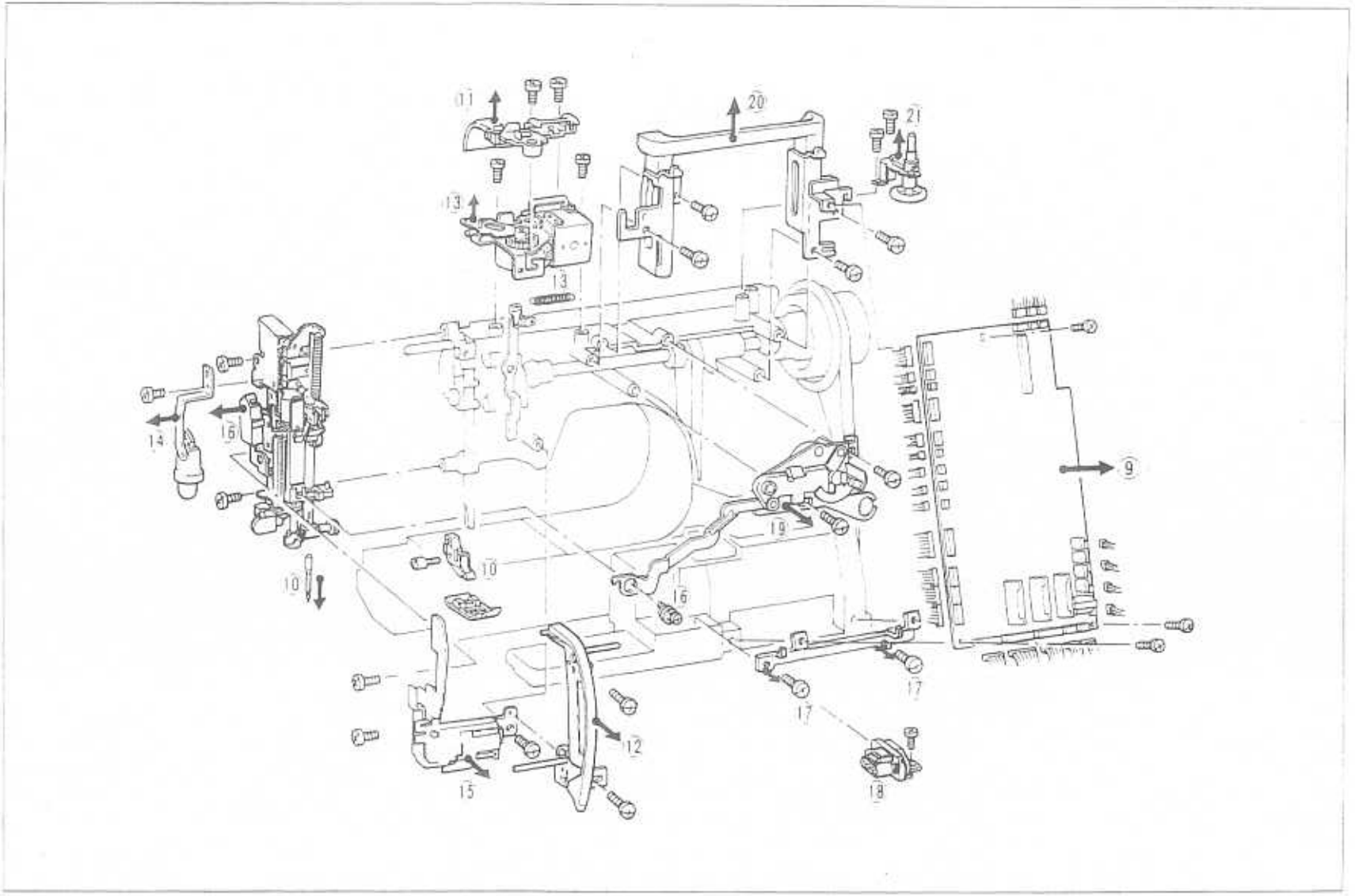
9. Remove the 25 connectors, the three screws, and the main PC board.
10. Remove the screw, the presser holder and the presser foot, and the needle.
11. Remove the two screws, and thread guide cover.
12. Remove the two screws and the thread guide plate.
13. Lower the presser foot bar. Remove spring from the hole of the tension releaser. Remove the two screws and the ATPM unit.
14. Remove the screw and the lamp holder.
15. Remove the three screws, and the copying unit holder.
16. Remove the lock screw securing the zigzag adjusting nut (eccentric nut) and the two screws securing base of the face plate, and then remove the needle bar supporter assembly.
17. Remove the two screws and set plate D.
18. Remove the screw and the connector to be removed to the embroidery unit.
19. Remove the two screws, and then remove the zigzag pulse motor holder assembly.
20. Remove the four screws and the L and R handle holders.
21. Remove the two screws and the bobbin winder assembly.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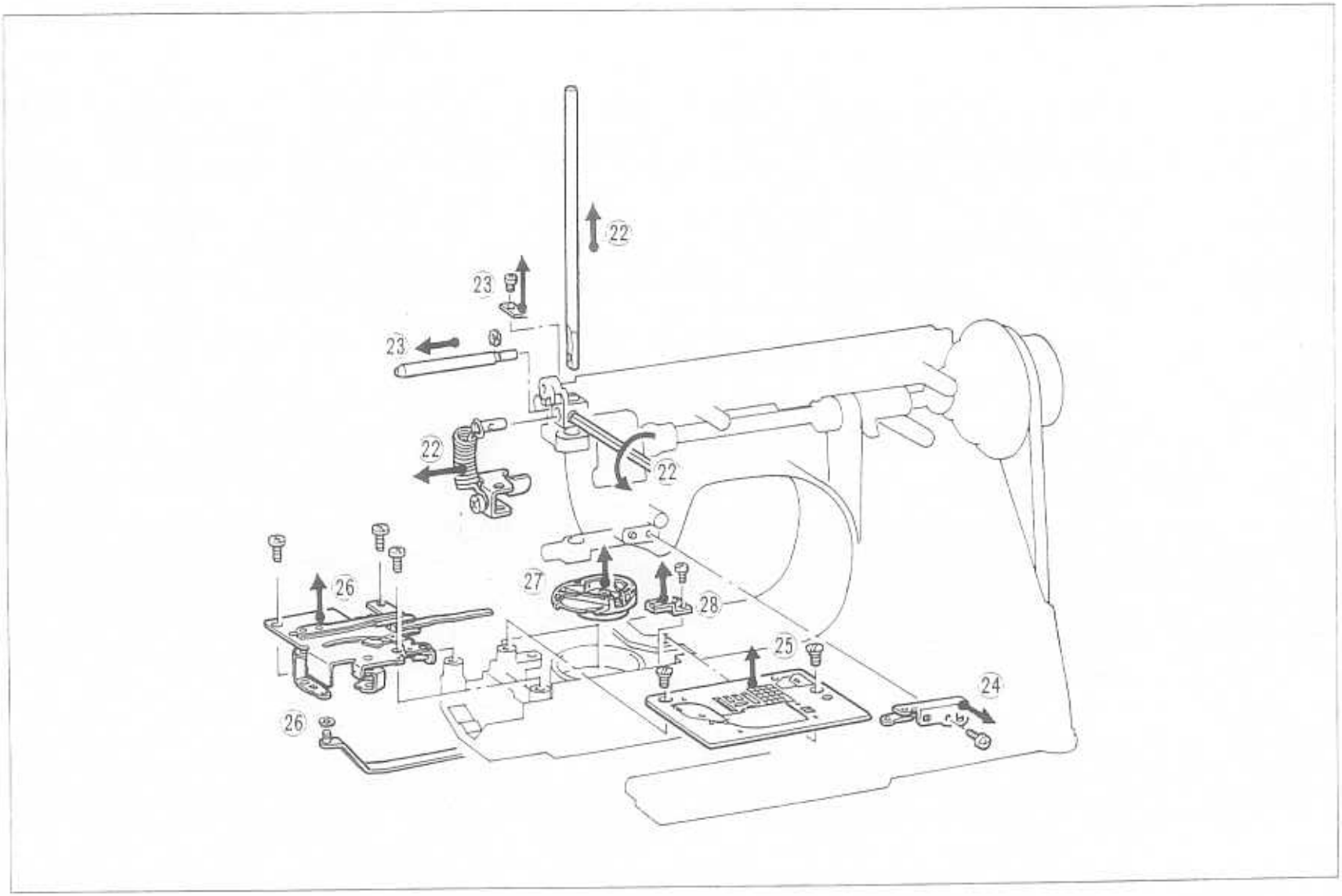
22. Loosen the screw and remove the presser bar spring stud. Loosen the screws securing the needle bar block assembly, and remove the presser bar by lifting it from above, and then the needle bar block assembly and the presser bar spring.
23. Remove the stop ring, the screw of the presser plate, and the thread take-up lever stud by sliding it to the left.
24. Remove the screw and the needle bar supporter stud holder.
25. Remove the two screws and the needle plate.
26. Remove the stop ring, the three screws, and the thread cutting complete.
27. Remove the inner rotary hook.
28. Remove the screw and the inner rotary hook bracket.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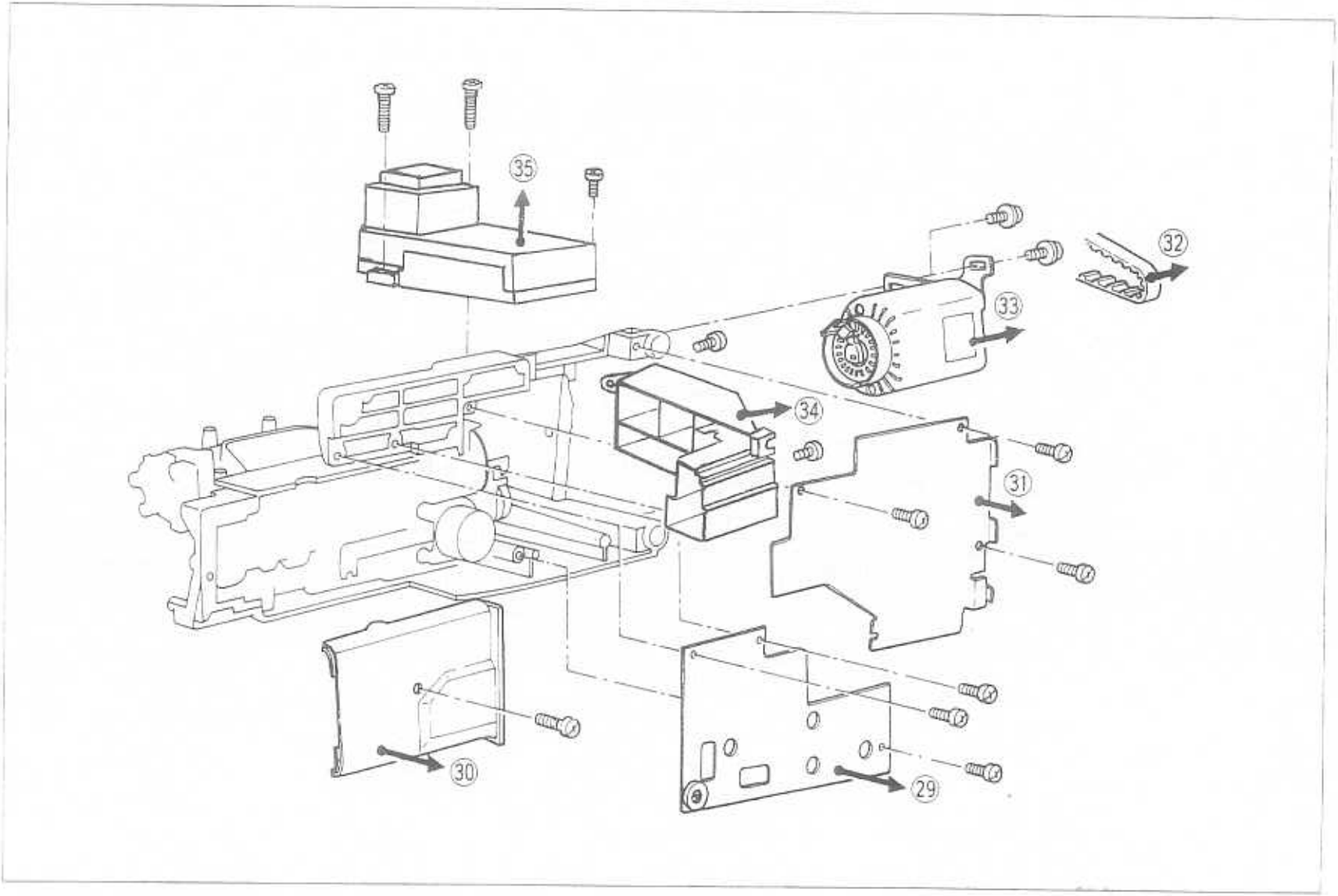
29. Lay the sewing machine on its side; remove the three screws and the base plate setter.
30. Remove the screw and the bed cover.
31. Remove the three screws and the base cover.
32. Remove the belt.
33. Remove the motor connector from the power supply unit, the two screws securing the motor holder, and the motor.
34. Remove the two screws and the switch holder.
35. Remove the three screws and the power supply unit.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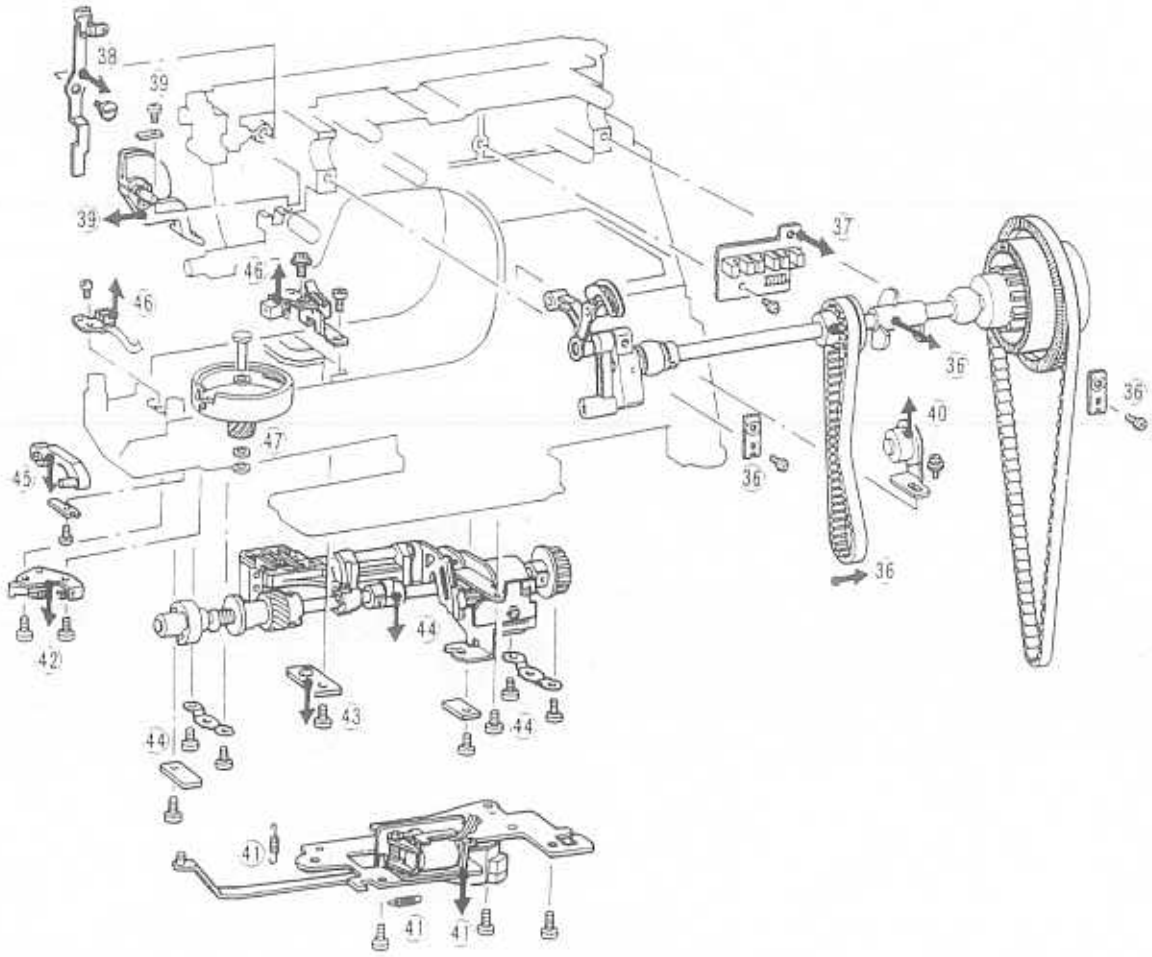
36. Remove the timing belt from the lower thread timing pulley. Remove the two screws securing the two presser plates, and the upper shaft assembly.
37. Remove the screw and the N.P. board assembly.
38. Remove the stud screw and the tension releaser assembly.
39. Remove the screw of the presser plate, and the presser foot lifter.
40. Remove the screw and the belt adjusting pulley.
41. Remove the three screws and the two spring, then remove the thread cutting base plate.
42. Remove the two screws and the drop lever assembly.
43. Remove the screw and the lower shaft supporting plate.
44. Remove the four screws securing the bushing presser and the three screws securing the feed unit, and then remove the lower shaft assembly and the vertical and horizontal feed unit assembly.
45. Remove the screw securing the stop plate, and the vertical feed arm.
46. Remove the screws, the photo diode assembly, and the SC switch holder.
47. Loosen the screw, and remove the outer rotary hook shaft and the outer rotary hook.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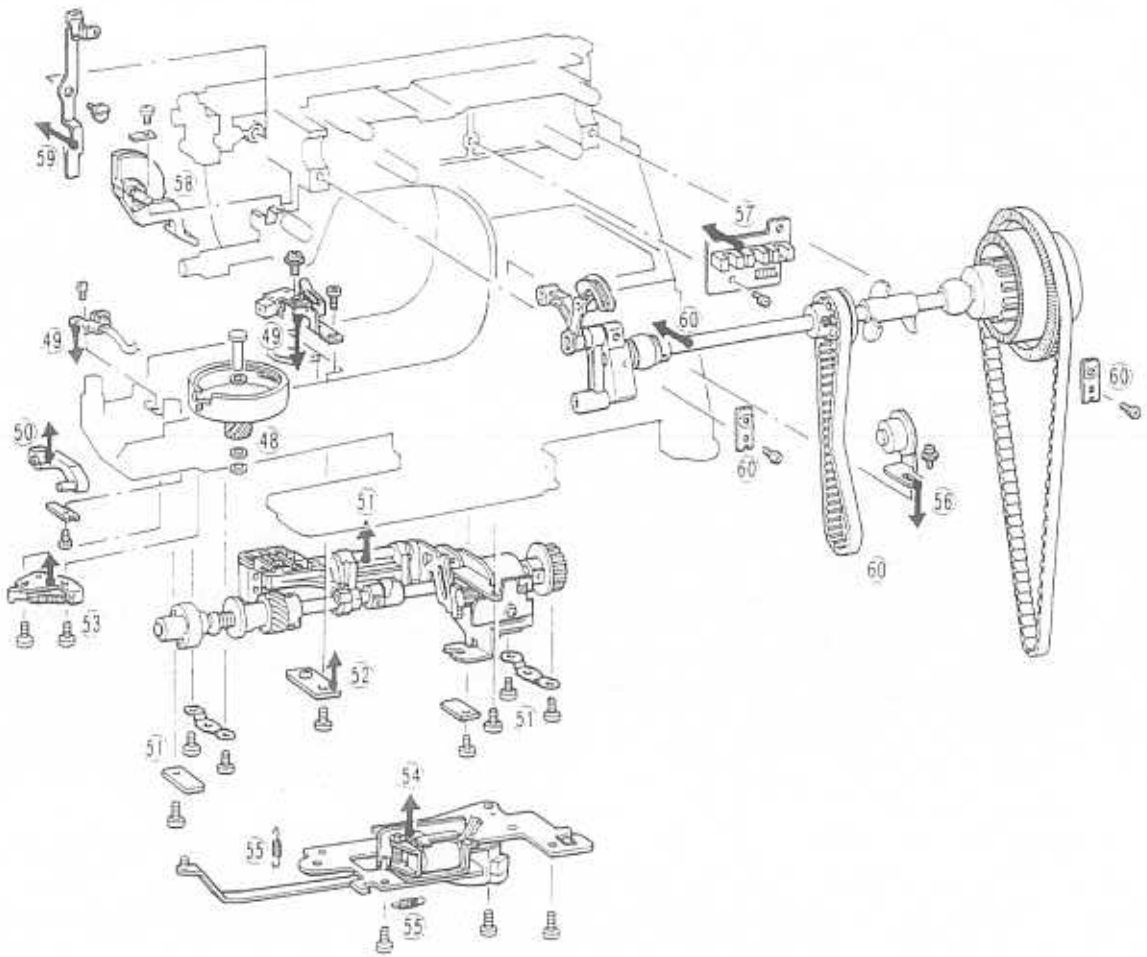
48. Secure the outer rotary hook using the outer rotary hook shaft and the three spacers.
49. Attach the photo diode assembly and the SC switch holder using the screws.
50. Attach the vertical feed arm using the presser plate and the screw.
51. Attach the vertical and horizontal feed unit assembly and the lower shaft assembly at the same time using the two bushing presser, the two presser plates and the seven screws.
52. Attach the lower shaft supporting plate using the screw.
53. Attach the drop lever assembly using the two screws.
54. Attach the thread cutting base plate using the three screws.
55. Attach the horizontal feed spring and the vertical feed spring.
56. Attach the belt adjusting pulley using the screws.
57. Attach the N.P. board assembly using the screws.
58. Secure the presser foot lifter using the presser plate and the screw.
59. Attach the tension releaser using the stud screw.
60. Insert the timing belt over the upper shaft assembly, secure the latter using the two presser plates and the two screws, and loop the timing belt over the upper and lower timing pulley.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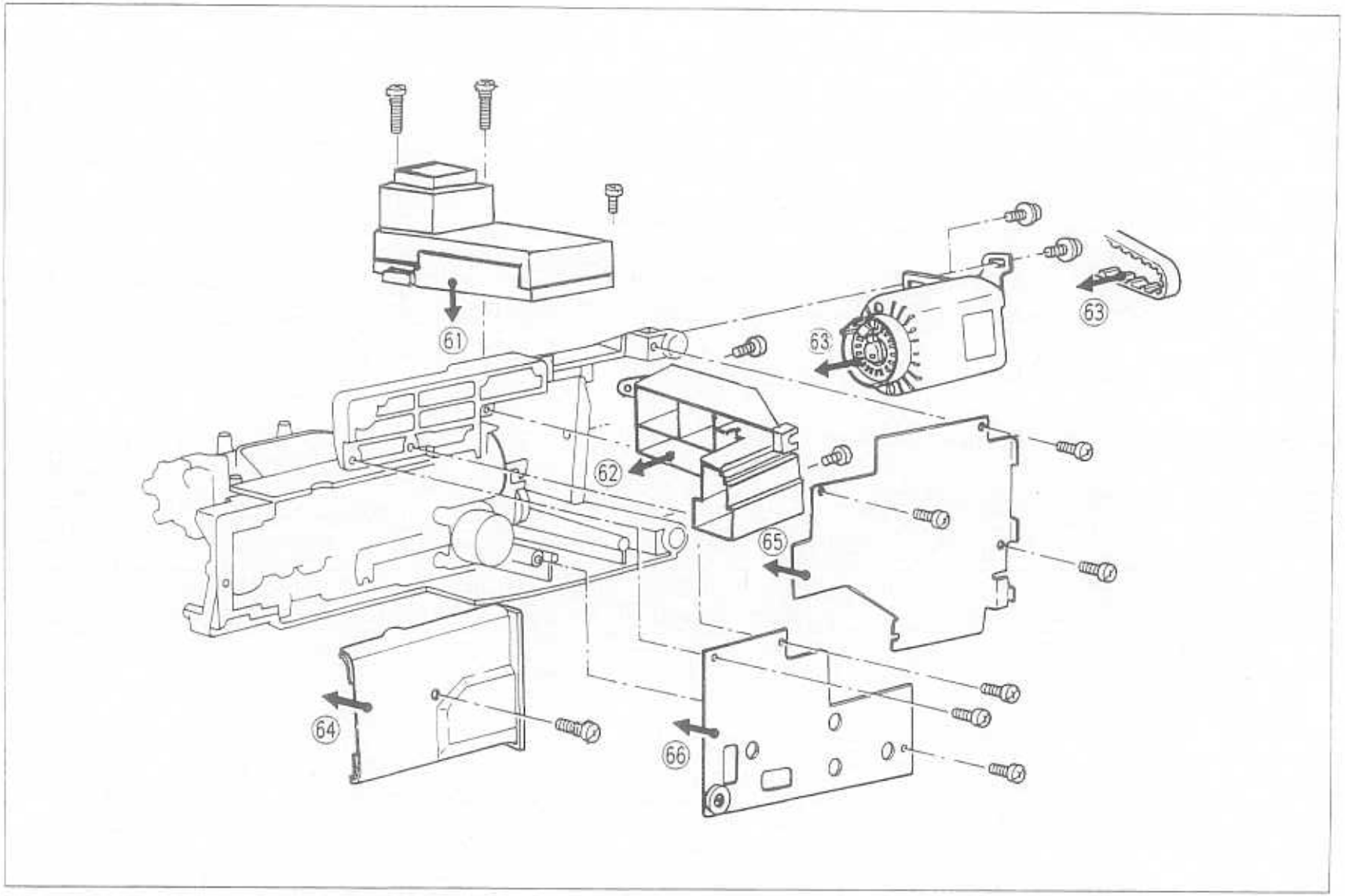
61. Attach the power supply unit using the three screws.
62. Attach the switch holder using the two screws.
63. Insert the motor connector into the power supply unit, loop the belt around the upper timing pulley and the motor, and attach the motor using the two screws.
64. Attach the bed cover using the screw.
65. Secure the base cover using the three screws.
66. Attach the base plate setter using the three screws.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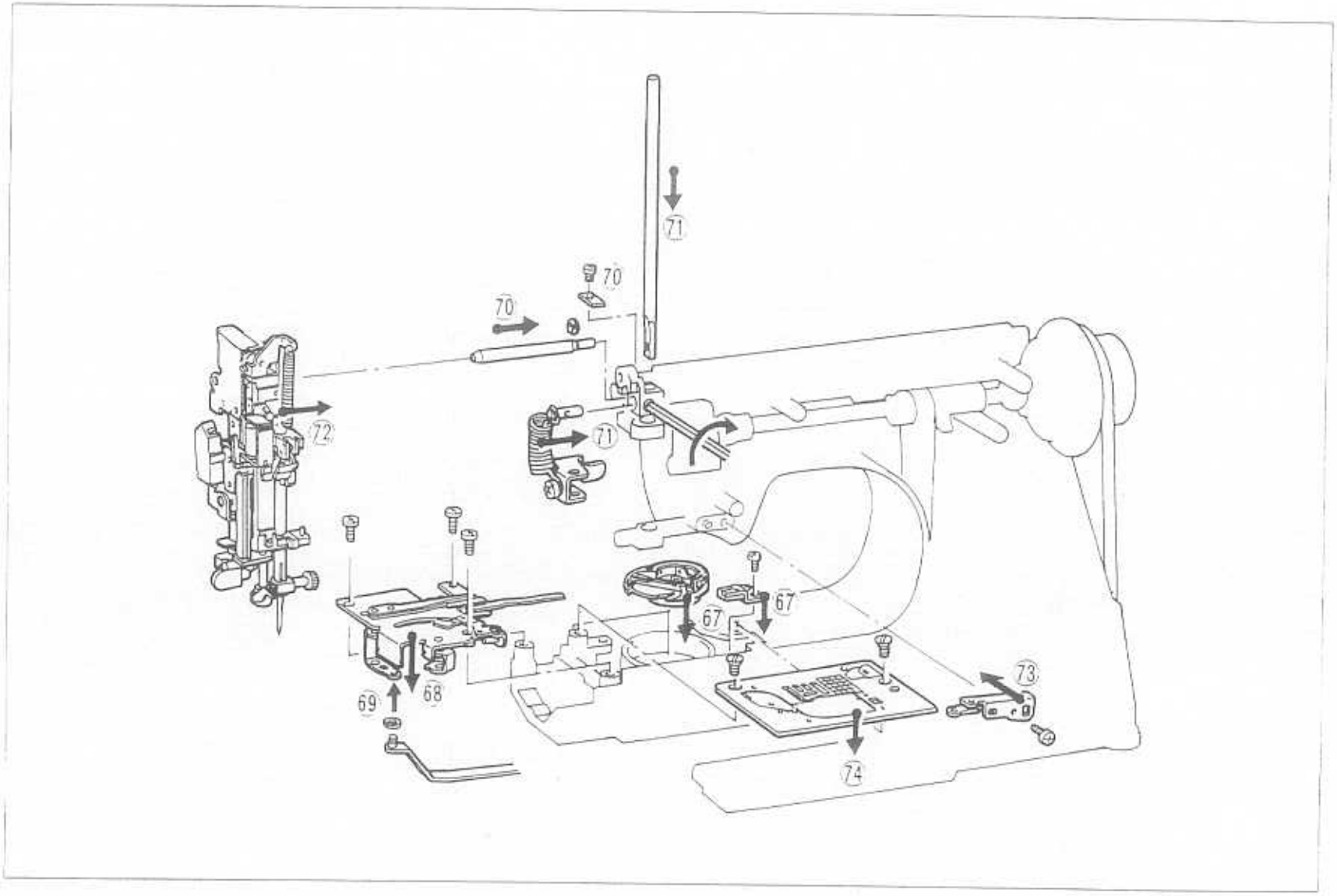
67. Insert the inner rotary hook into the outer rotary hook, and attach the inner rotary hook bracket to the latter using the screw.
68. Attach the thread cutting complete using the three screws.
69. Attach thread cutting lever C to the thread cutting connecting rod using the stop ring.
70. Insert the thread take-up lever stud into the arm, the washer, and the thread take-up link, and secure them using the presser plate and the screw.
71. Insert the presser bar into the needle bar block assembly, hang the spring on the presser bar spring stud, and secure them using the screw.
72. Insert the needle bar supporter assembly into the thread take-up lever stud, and the needle bar clamp shaft into the needle bar crank rod, and secure them using the two screws.
    ※ At this time, set the PT lever assembly on top of the needle bar block assembly.
73. Insert the needle bar supporter stud holder into the pin, and secure them using the screw.
74. Attach the needle plate using the two screws.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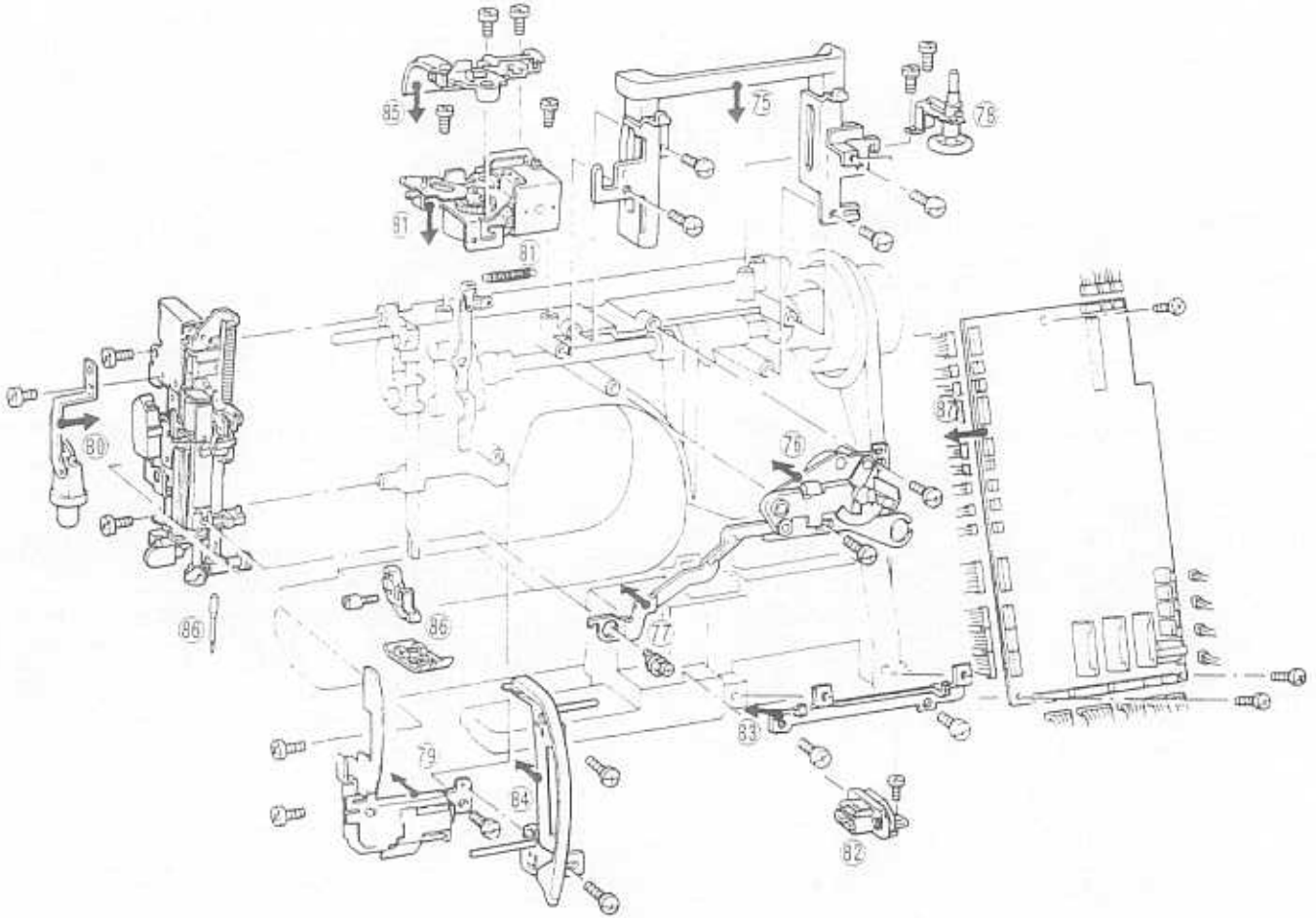
75. Attach the L and R handle holders to the carrying handle using the four screws.
76. Attach the zigzag pulse motor holder assembly using the two screws.
77. Connect the zigzag connecting rod assembly with the zigzag adjusting nut (eccentric nut) and the lock screw.
78. Attach the bobbin winder assembly using the two screws.
79. Attach the copying unit holder using the three screws.
80. Attach the lamp holder using the screw.
81. Lower the presser foot bar. Attach the ATPM unit using the two screws. Insert the spring hook into the hole of the tension releaser.
82. Attach the connector for the embroidery unit using the screw.
83. Secure the set plate D using the two screws.
84. Attach the thread guide plate using the two screws.
85. Attach the thread guide cover using the two screws.
86. Secure the needle and the presser foot using the screw. Connect the zigzag presser foot to the presser holder.
87. Attach the main PC board using the three screws. Attach the main PC board to the 25 connectors.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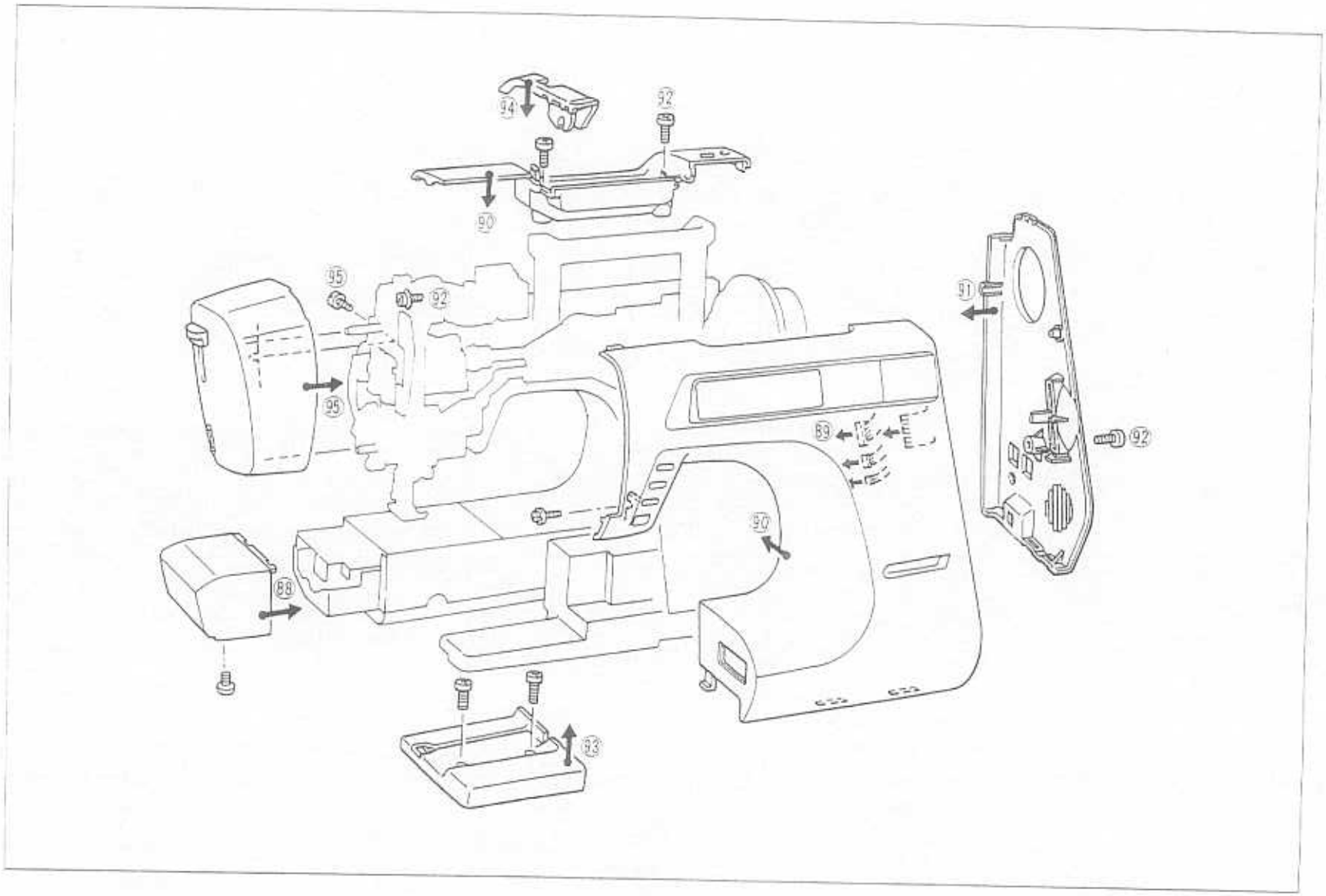
88. Place the free arm cover on the arm, and secure them using the four screws.
89. Attach the five connectors on the front cover to the main PC board.
90. Set the catches on both ends of the top cover in the front cover, and attach the front cover to the handle holder catches.
91. Slightly raise the right side of the top cover, and attach the belt cover.
92. Tighten the two screws for the top cover, the screw on the left side of the carrying handle, and the screw for the belt cover.
93. Insert the base plate by sliding it from the left, and attach it to the base plate setter using the two screws.
94. Place thread guide cover on the top cover.
95. Attach the face plate using the screw.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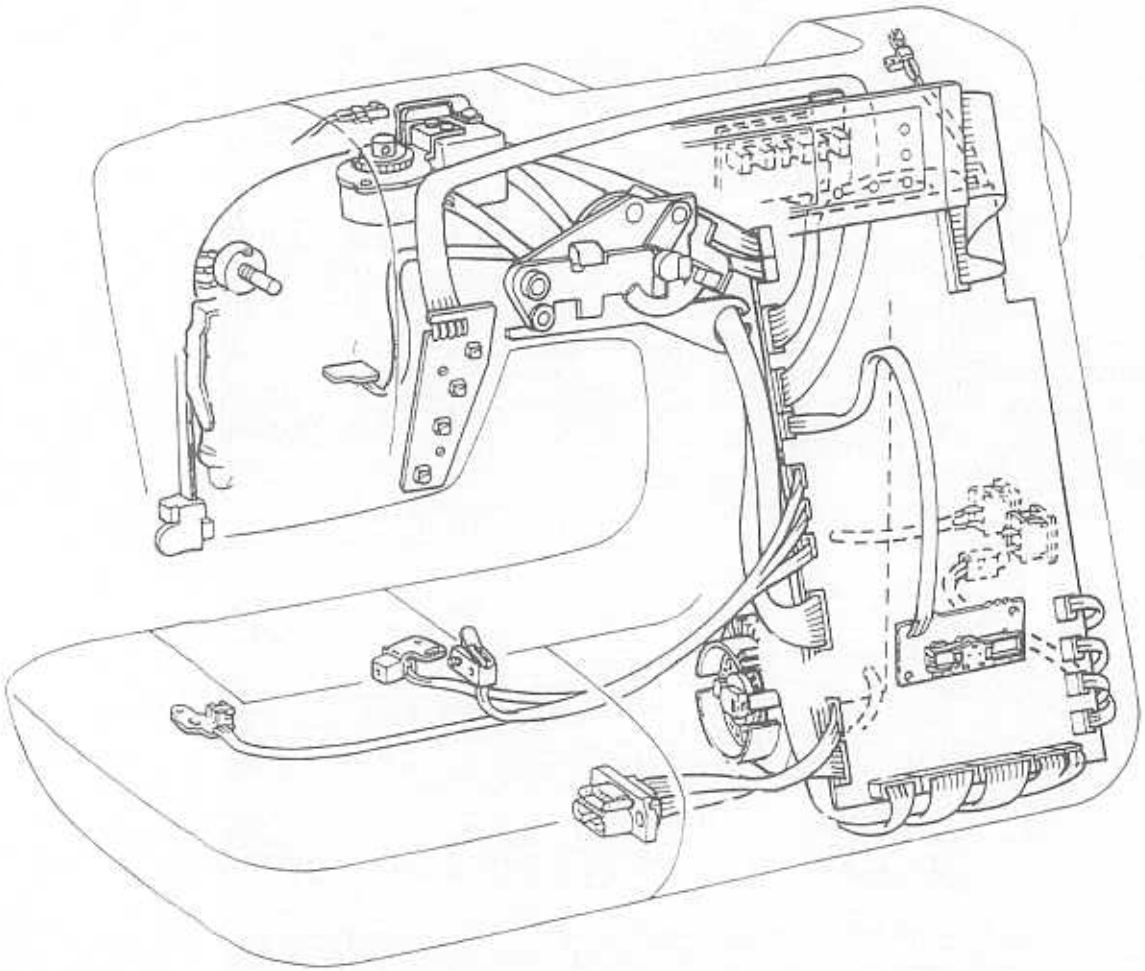
2. LEAD WIRE ARRANGEMENT



III. HOW TO ADJUST MECHANICAL ELEMENTS

1. SETTING THE TEST MODE

BASIC TEST MODES

To set the test mode, turn on the power switch while keeping the "BASIC SEWING" and "CARD" keys pressed down. A series of numerals will then be displayed on the touch panel. Press the respective numeral to set the desired test mode.

	Adjustment Item	Test Mode No.
1	Pulse motor replacement	1
2	Timing of needle and rotary hook	6
3	Needle down position adjustment	5, 24
4	Needle bar height	8
5	Horizontal position of feed dog	8
6	Checking detection of fabric thickness	3
7	Bobbin thread detector	20
8	Thread take-up spring adjustment	22
9	Language replacement	23

→ Other test mode numbers are not related to adjustment.

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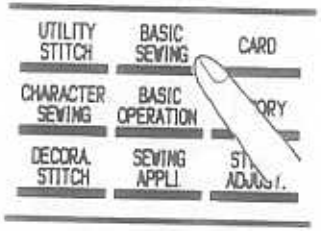

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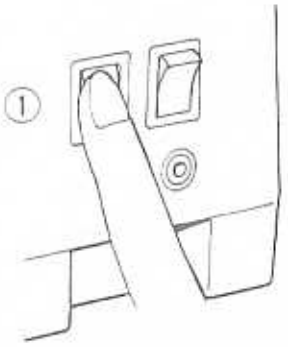


2. TENSION OF MOTOR BELT AND TIMING BELT

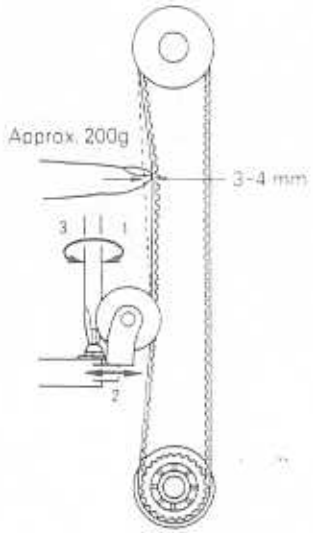
STANDARD

There should be 4-6 mm slack in the motor belt when the center of the motor belt is pressed with a force of 200g.
There should be 3-4 mm slack in the timing belt when it is pressed with a force of 200g.

ADJUSTMENT

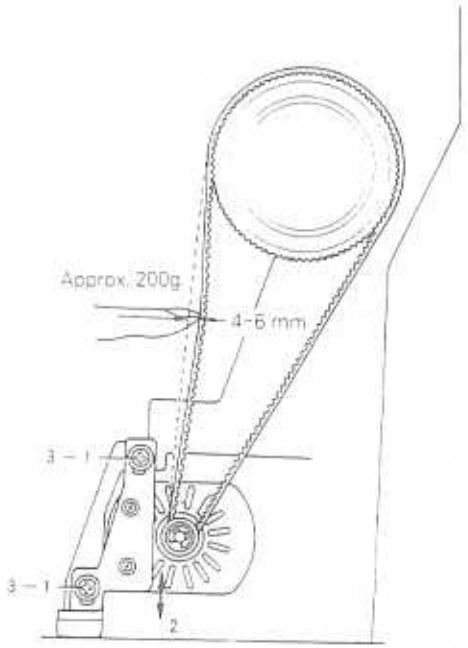
Timing belt

1. Loosen the screw of the belt adjusting pulley.
2. Adjust the position of the belt adjusting pulley.
3. Tighten the screw of the belt adjusting pulley.



Motor belt

1. Loosen the two screws securing the motor holder.
2. Adjust the belt tension by moving the motor holder.
3. Tighten the two screws.



3. TIMING OF NEEDLE BAR AND FEEDING MECHANISM

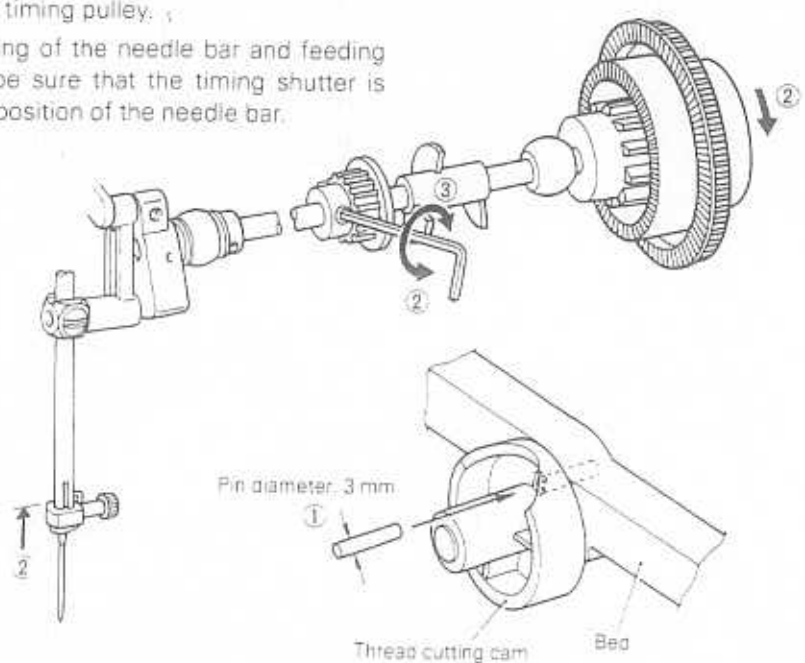
STANDARD

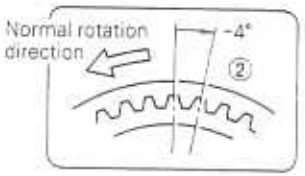
With the pin inserted into the thread cutter cam, the balance wheel should be turned -4° from the position where the needle bar is at its highest point.

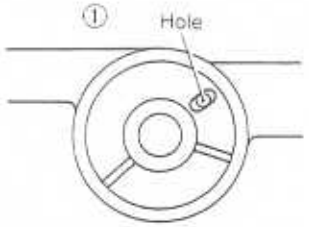
ADJUSTMENT

1. Align the thread cutter cam hole with the bed hole, and insert the pin into them. (The pin diameter is 3 mm.)
2. Loosen the screw of the upper timing pulley, and turn the balance wheel -4° from the position where the needle is at its highest point.
3. Tighten the screw of the upper timing pulley.

NOTE: After matching the timing of the needle bar and feeding mechanism, check to be sure that the timing shutter is 9° ± 1° from the lowest position of the needle bar.







4. POSITION OF N.P. (NEEDLE POSITION) SHUTTER

STANDARD

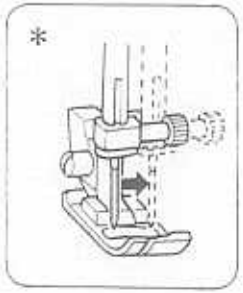
When the needle bar is at its lowest point, the screw of the N.P. shutter should be facing the front. (0° ± 1°)

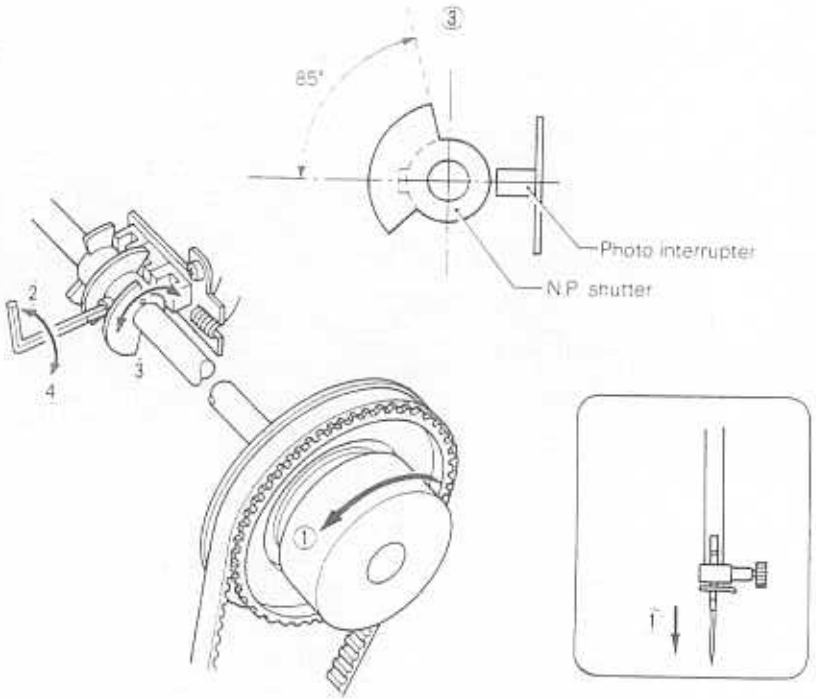
ADJUSTMENT

1. Turn the balance wheel to move the needle bar to its lowest point.
2. Loosen the screw securing the N.P. shutter.
3. Adjust the position of the screw for the N.P. shutter so that it is facing the front.
4. Tighten the screw for the N.P. shutter.

NOTE: Make sure that the edge of the N.P. shutter does not make contact with the photo interrupter when you turn the balance wheel by hand.

※ To visually determine the standard position, choose a zigzag pattern, lift up the presser foot lever and turn the balance wheel manually. Adjust the N.P. shtter so that the needle moves left and right when the tip of the needle passes the side of the presser foot (approximately 6 mm above the needle plate).





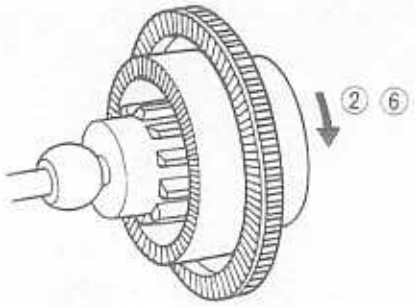
5. NEEDLE DOWN POSITION ADJUSTMENT

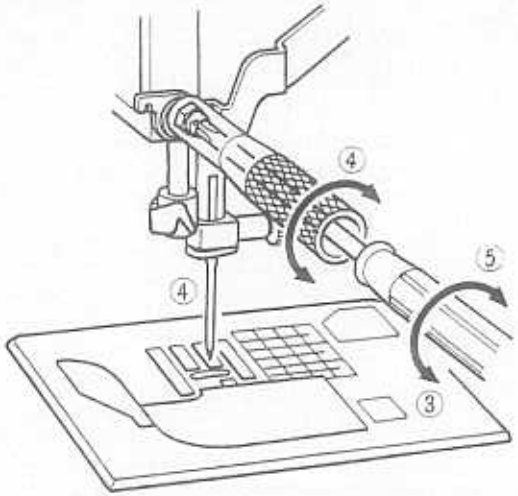
STANDARD

When test mode "5" is selected, the needle should be exactly in the middle of the needle plate hole in the needle down position.

ADJUSTMENT

1. Select test mode "5".
2. Turn the balance wheel to move the needle to the needle down position.
3. Loosen the screw securing the zigzag connecting rod assembly.
4. Turn the balance wheel to move the needle to the left and right, and then turn the zigzag adjusting nut by using the box wrench to set the needle in the center of the needle hole.
5. Tighten the screw securing the zigzag connecting rod assembly.
6. Turn the balance wheel and check the needle down position.





6. TIMING OF NEEDLE AND ROTARY HOOK (CLEARANCE BETWEEN THE NEEDLE AND THE ROTARY HOOK POINT)

STANDARD

When test mode "6" is selected and the needle is raised 2.9–3.3 mm from its lowest position, the rotary hook point should be positioned at the right side of the needle.

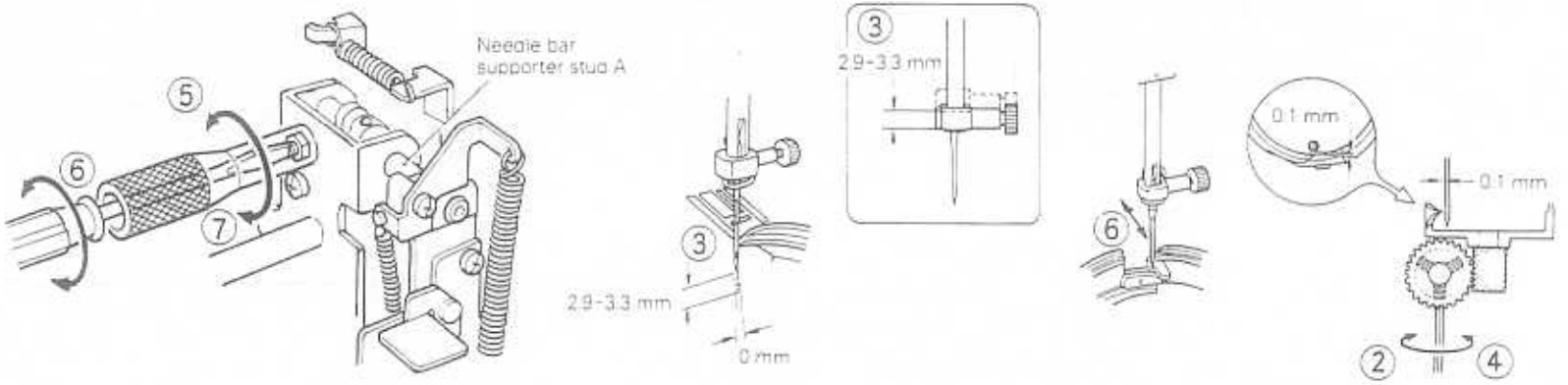
The clearance between the needle and the rotary hook point should be 0.1 mm or less, and they should never touch each other.

ADJUSTMENT

1. Select test mode "6".
2. Loosen the three screws of the lower shaft gear.
3. Adjust the clearance between the needle and the rotary hook. (When the needle is raised 2.9–3.3 mm from its lowest position, the rotary hook point should be positioned at the right side of the needle.)
4. Tighten the three screws of the lower shaft gear.
5. Loosen the adjusting nut.
6. Turn the eccentric screw, and set the clearance between the needle and the rotary hook point to 0.1 mm or less. Make sure that the needle does not make contact with the rotary hook point.

   NOTE: The eccentric screw should be turned less than half a turn.
7. Tighten the adjusting nut.

   NOTE: If the clearance between the needle and the rotary hook point cannot be adjusted to 0.1 mm or less by turning the eccentric screw less than half a turn, loosen the screw of the collar, and move needle bar supporter stud A either backward or forward.



7. NEEDLE BAR HEIGHT

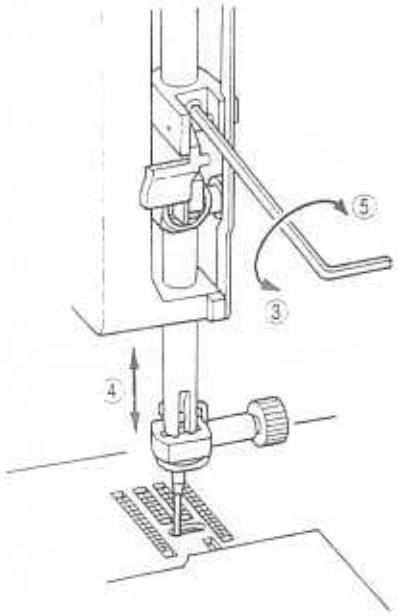
STANDARD

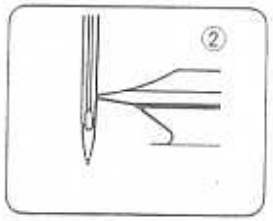
When test mode "6" is selected, turn the pulley so that the needle meets the rotary hook point. At this time, the clearance between the upper end of the needle eye and the bottom of the rotary hook point should be 0.9-1.3 mm.

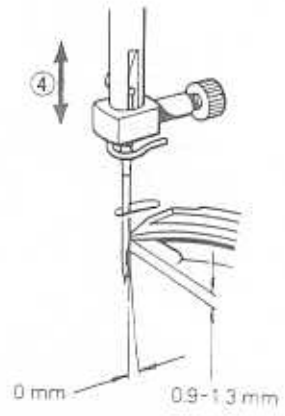
ADJUSTMENT

1. Select test mode "6".
2. Turn the pulley so that the needle meets the rotary hook point.
3. Loosen the screw of the needle bar block assembly.
4. Move the needle bar vertically to adjust the clearance to between 0.9-1.3 mm.
5. Tighten the screw of the needle bar block assembly.

NOTE: The needle bar clamp should be parallel to the side of the needle plate. If the needle bar is loose when you adjust the needle bar height, it may result in sewing troubles.







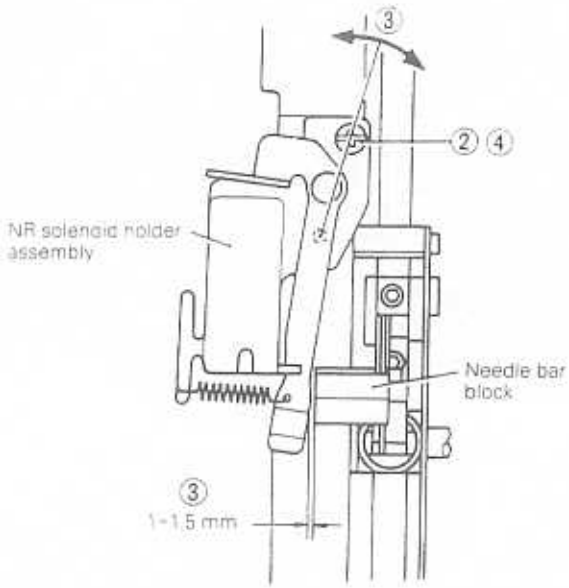
8. NEEDLE BAR RELEASE

STANDARD

The clearance between the NR solenoid holder assembly and the needle bar block should be 1-1.5 mm when the needle bar is at its highest point.

ADJUSTMENT

1. Turn the pulley to move the needle bar to its highest point.
2. Loosen the screw of the NR solenoid holder assembly.
3. Adjust the clearance between the NR solenoid holder assembly and the needle bar block to 1-1.5 mm.
4. Tighten the screw of the HR solenoid holder assembly.



9. HORIZONTAL POSITION OF FEED DOG

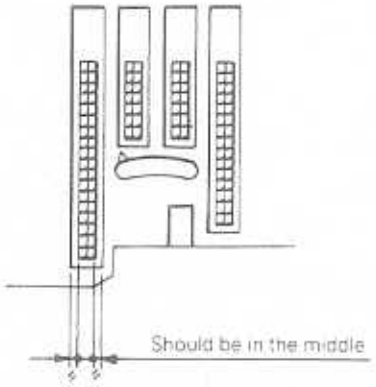
STANDARD

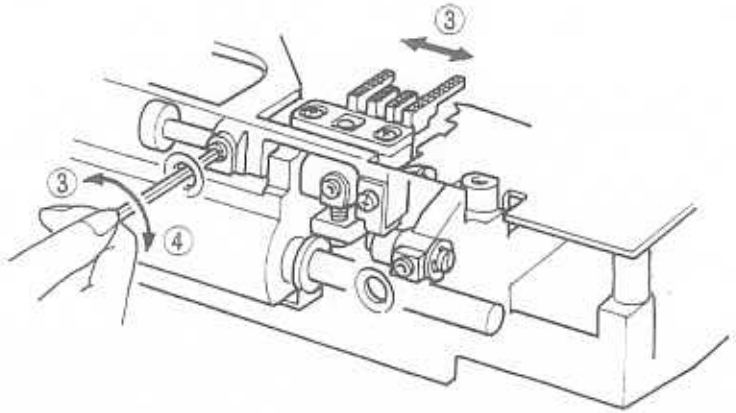
The feed dog should be installed parallel to and exactly in the middle of the long channel of the needle plate so that the horizontal (Y) pulse motor is energized when the feed dog is at the center position.

ADJUSTMENT

1. Turn on the power. (Moves to the left needle position.)
2. Turn the balance wheel until the horizontal pulse motor is energized. (The feed dog will be in the center position.)
3. Loosen the screw securing the horizontal feed arm A and move the feed dog to the right and left so that it is exactly in the middle of the long channel of the needle plate.
4. Tighten the screw to secure horizontal feed arm A.

NOTE: Check to be sure that the feed dog does not touch the needle plate after test mode "8" is selected and the balance wheel is turned to operate the horizontal (Y) pulse motor.





10. HEIGHT OF FEED DOG

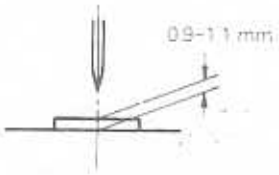
STANDARD

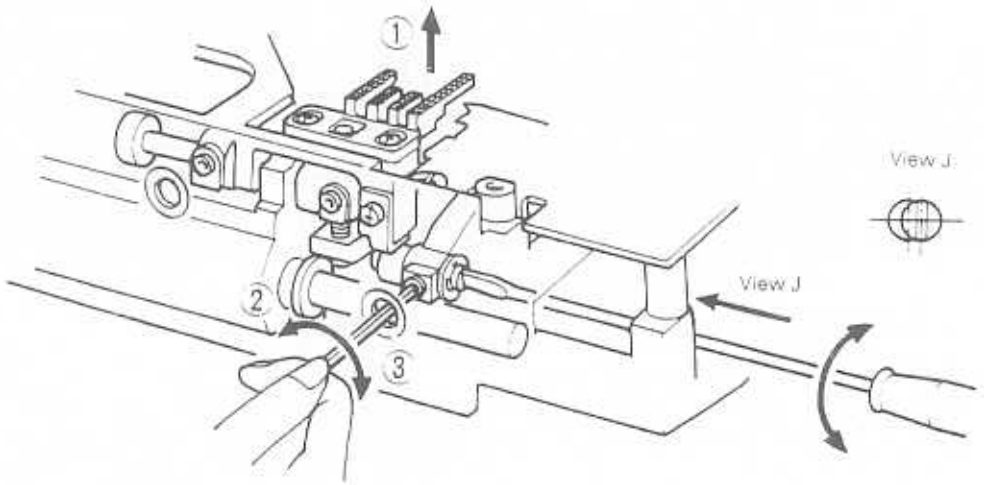
When the balance wheel is turned to raise the feed dog to its highest position, the standard height of the feed dog above the needle plate should be 0.9–1.1 mm.

ADJUSTMENT

1. Turn the balance wheel to raise the feed dog to its highest position.
2. Loosen the screw securing the vertical feed roller shaft, and then turn the vertical feed roller shaft to adjust the feed dog height to within 0.9–1.1 mm.
3. Tighten the screw securing the vertical feed roller shaft.

NOTE: The inclination of the vertical feed shaft should be at the back after adjustment.





11. PRESSER BAR HEIGHT

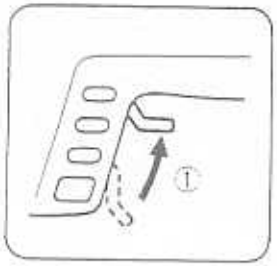
STANDARD

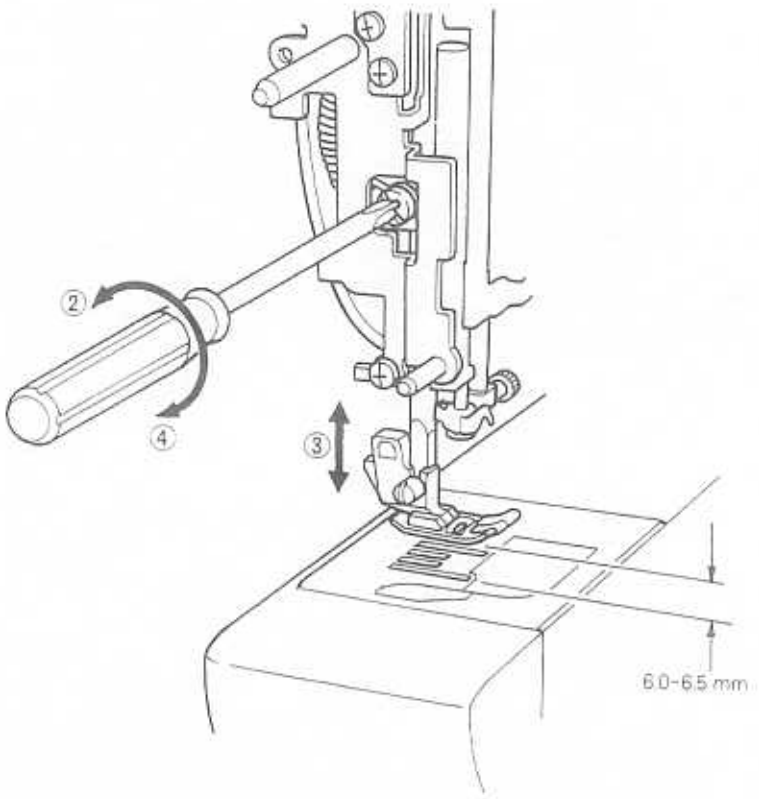
The clearance from the needle plate top to the bottom of the presser bar should be 6.0-6.5 mm.

ADJUSTMENT

1. Raise the presser foot lifter.
2. Loosen the screw of the presser bar guide bracket.
3. Adjust the height of the presser bar by moving it vertically.
4. Tighten the screw of the presser bar guide bracket.

NOTE: The presser foot should be positioned in the center of the needle hole of the needle plate.





12. CHECKING DETECTION OF FABRIC THICKNESS

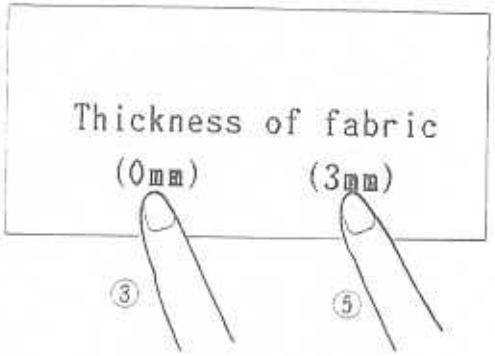
STANDARD

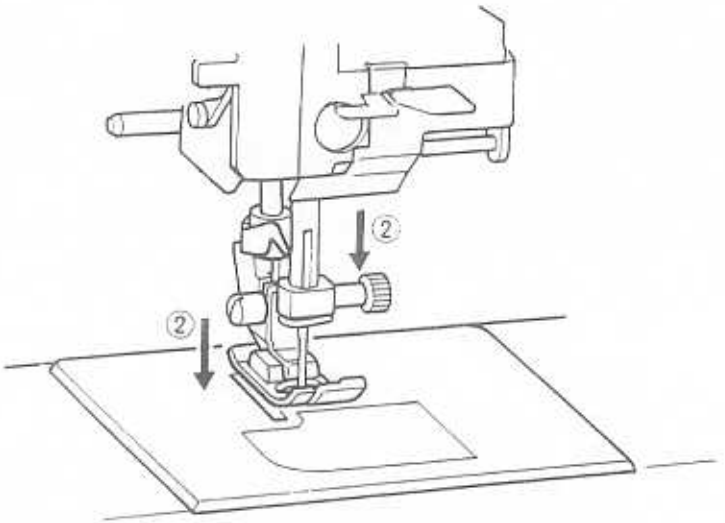
When the fabric thickness is set to 0 mm and 3 mm in test mode "3", the buzzer should sound twice if operation is normal.

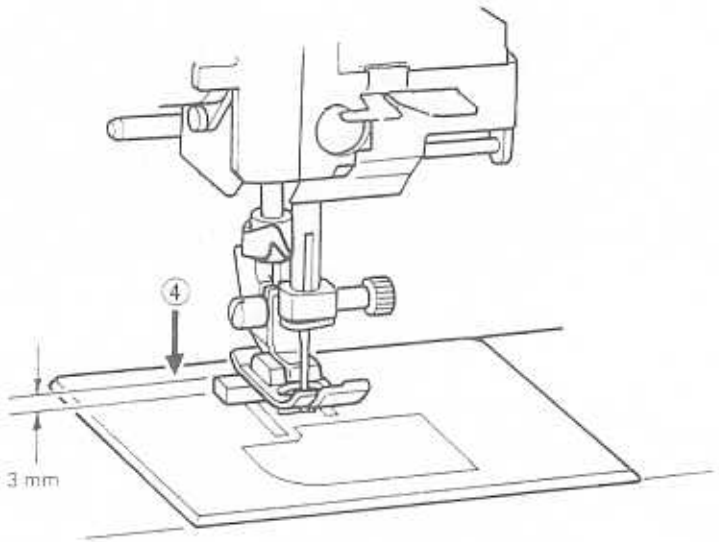
ADJUSTMENT

1. Select test mode "3"
2. Install the J presser foot and then lower the presser foot to set the needle bar to the lowest position.
3. Press 0 mm on the display. (The buzzer should sound twice.)
4. Inset a spacer with a thickness of 3 mm beneath the J presser foot.
5. Press 3 mm on the display. (The buzzer should sound twice.)

NOTE: If the values read in steps (3) and (5) are normal, the buzzer will sound twice each time. If they are not normal, the buzzer will sound four times each time.



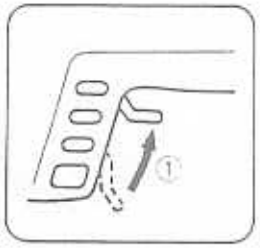


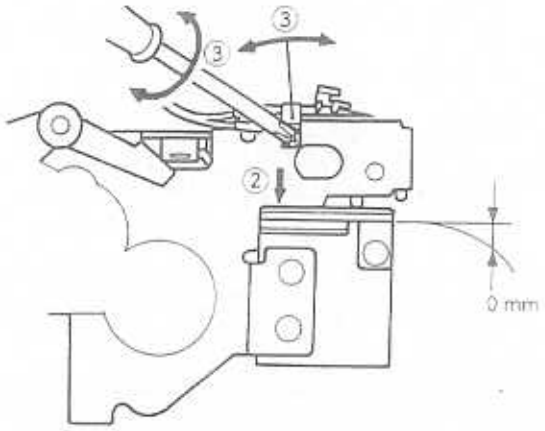


13. THREAD TENSION RELEASE

STANDARD

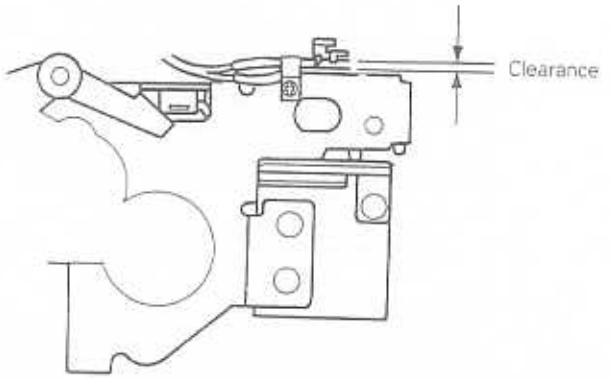
1. Turn on the power and lower the presser foot lifter.
2. Make sure that when thread cutting button is pressed, thread cutter operates normally.
3. Raise the presser foot lifter, at that time, so the solenoid is opened.





ADJUSTMENT

1. Raise the presser foot lifter.
2. Adjust the clearance of the solenoid should be 0.
3. Tighten the screw to turn on the presser foot switch.
4. Release the hand and lower presser foot.
5. Make sure that presser foot switch is off.



14. POSITION OF BUTTONHOLE SWITCH LEVER

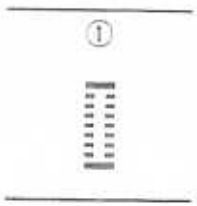
STANDARD

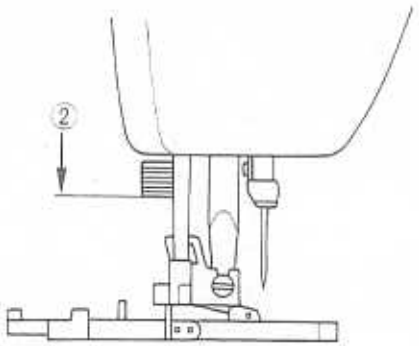
When lowering buttonhole lever, and the clearance of front part of buttonhole foot is 1.5 mm and lowering presser foot lever, at this time BH 0 touches with BH 1 (refer to illustration).

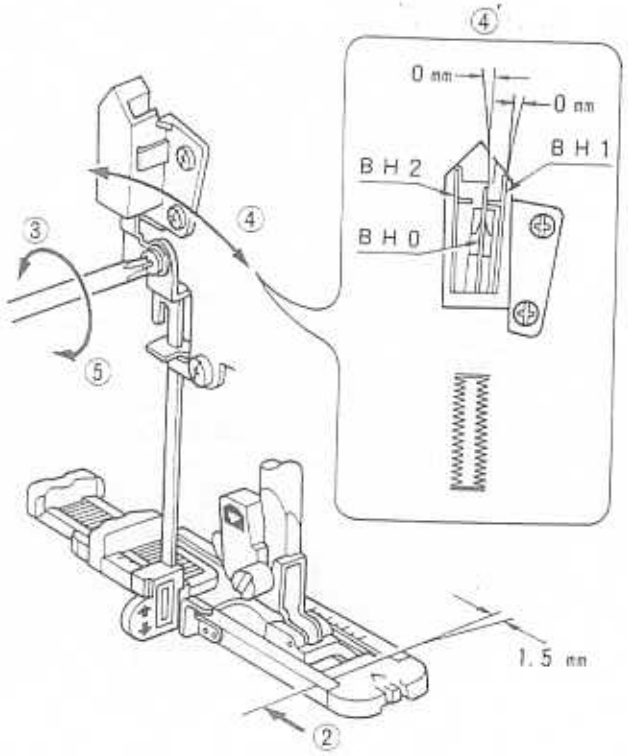
ADJUSTMENT

1. Turn on power switch and select pattern
2. Fit the buttonhole foot. Make the clearance of it at 1.5 mm, and lower the presser foot lever.
3. Loosen a screw of buttonhole lever.
4. Adjust the position of buttonhole lever.
5. Tighten a screw of buttonhole lever.

NOTE: In case that the legs are shorter than the standard bend the BH 1 to be far from BH 0.
In case that the legs are longer than the standard, bend the BH 2 to be close to BH 0.







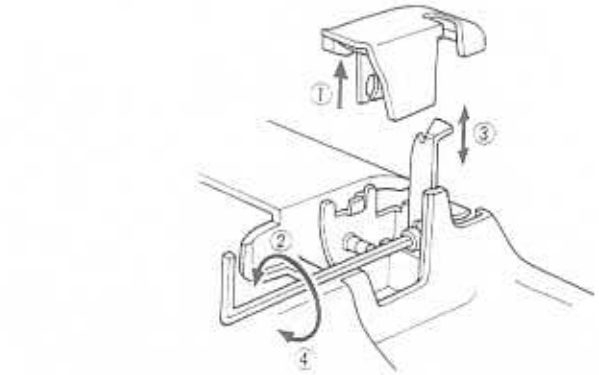
15. BOBBIN WINDER

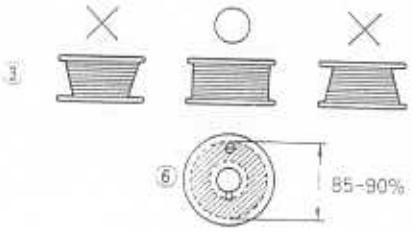
STANDARD

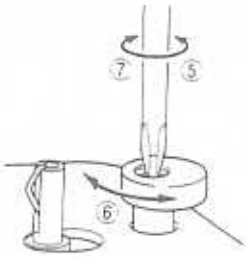
The thread should be wound parallel to the bobbin and around about 85-90% of the bobbin at low speed.
The clearance between the bobbin winder switch and the bobbin winder assembly should be 0.5-1.0 mm.

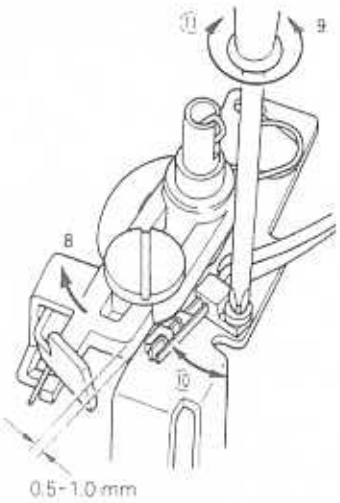
ADJUSTMENT

1. Remove thread guide cover by lifting it from above.
2. Loosen the bobbin winding guide screw.
3. Adjust the bobbin thread amount so that the thread is evenly wound around the bobbin by moving the bobbin winding guide vertically.
4. Tighten the bobbin winding guide screw.
5. Loosen the screw securing the bobbin presser slightly.
6. Turn the bobbin presser to adjust the bobbin thread amount.
7. Tighten the screw of the bobbin presser.
8. Set the bobbin winder assembly to the left.
9. Loosen the screw of the bobbin winder switch.
10. Adjust the clearance between the bobbin winder switch and the bobbin winder assembly to 0.5-1.0 mm.
11. Tighten the screw of the bobbin winder switch.









16. BOBBIN THREAD DETECTOR

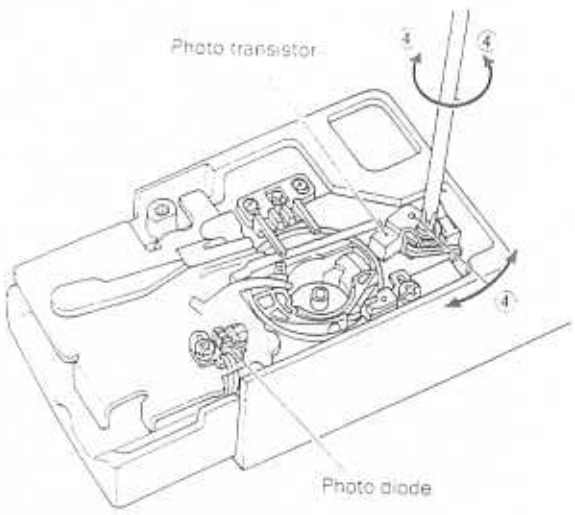
STANDARD

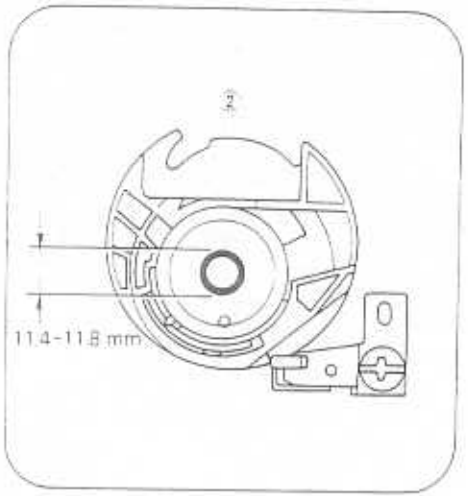
When the amount of the bobbin thread has decreased until the bobbin diameter is 11.4-11.8 mm, the message "Bobbin thread is running out." should appear on the display.

ADJUSTMENT

1. Select test mode No.20 on the touch panel.
2. Turn the balance wheel in its normal rotation direction, align the opening of the outer rotary hook with the photo diode, and make sure that "0.0" appears on the display.
3. Wind the bobbin thread around the bobbin until the diameter of the bobbin is 11.4-11.8 mm, and set the bobbin in the inner rotary hook.
4. Loosen the screw holding the photo transistor, slightly turn the photo transistor to the left until "- -" appears on the display. Then turn it to the right until "0.0" appears on the display, and tighten the screw.

   NOTE: Keep around the photo transistor and the photo diode clean.





17. INNER ROTARY HOOK BRACKET POSITION

STANDARD

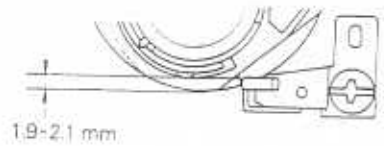
When the inner rotary hook bracket and the rotary hook meet, the spring of the inner rotary hook bracket and the inner rotary hook should overlap each other by 1.9-2.1 mm.

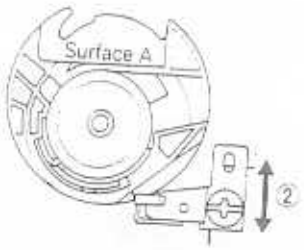
ADJUSTMENT

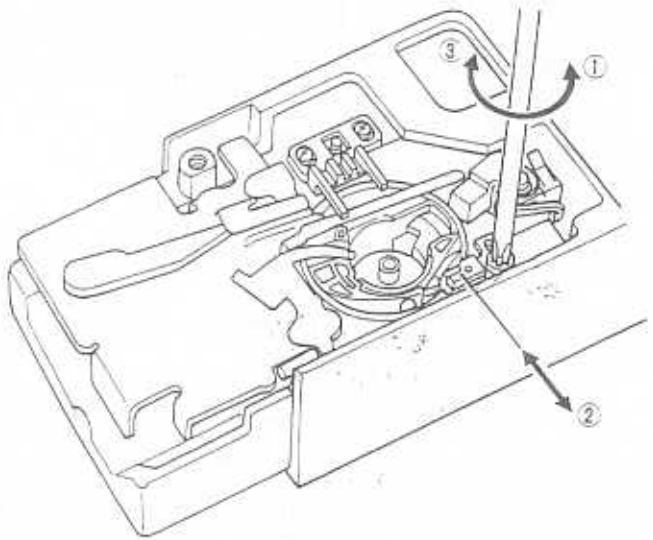
1. Loosen the screw securing the inner rotary hook bracket.
2. Adjust the position of the inner rotary hook bracket by moving it vertically and/or horizontally.

   NOTE: Surface A of the inner rotary hook bracket should be perpendicular to the feeding direction.
3. Tighten the screw of the inner rotary hook bracket.

   ※ There is a test mode (test mode "10") for checking the rotary hook sound.







18. INNER ROTARY HOOK TENSION

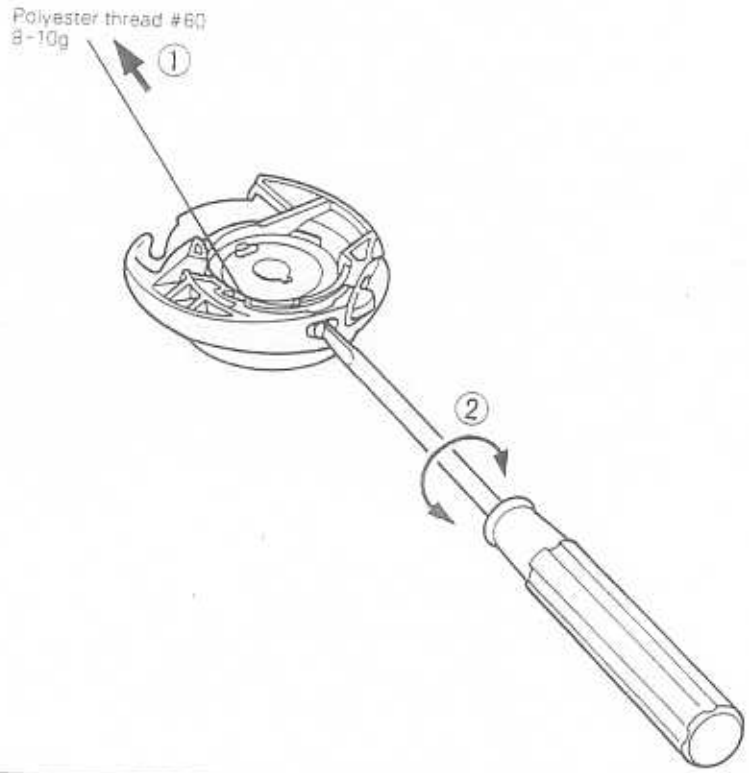
STANDARD

While slowly pulling polyester thread #60 using a tension gauge, inner rotary hook tension should be 8-10g. The difference between this and the tension for silk thread (#80) should be 2-3g.

ADJUSTMENT

1. Pass polyester thread #60 through the inner rotary hook correctly, and pull it using the tension gauge.
2. Adjust the tension by turning the screw to either the right or left using a screwdriver.

   NOTE: After adjusting the tension, lock the screw with paint.



19. NEEDLE THREADER

USING THE NEEDLE THREADER

There are a wide variety of different needles and sewing machine threads available. The right ones should be selected in accordance with the sewing conditions. The accessory needle threader is designed to make threading of needles easier, but it cannot handle every single circumstance of use (combinations of needle and thread) that may occur. It can be used with some combinations but not with others, and if it can be used, the pattern may not be sewn correctly due to the particular sewing conditions. Do not use the needle threader without gaining a thorough understanding of how to use it, otherwise the needle threader may be damaged or needle threading may not be possible. Be sure to read and understand the following so that you can handle customer complaints.

NOTE:

1. Needle threader accept only circle marked needle and thread combinations.
2. *marked combination is not recommended since it might lead to the breakage of needle threader imperfect performance.
3. Lower the presser foot when you use needle threader.
4. Nylon transparent thread is applicable in needle #14-16.
5. Do not turn the balance wheel when you use needle threader.
6. Do not lower the needle threader lever while the machine is running. If it is lowered, the needle threader may be broken, rendering it unusable. Besides this, it may cause the needle to break, which could result in injury.
7. If a #9 needle is used, the variation in needle precision may result in the needle being slightly difficult to thread.
8. Needle should be located above needle plate for more than 8 mm for threading.
9. Needle threader does not work when you use the side-cutter. Thread the needle before attaching the side cutter.
10. When doing embroidery, use a #14 golden needle. Use special Brother #50 embroidery thread and #50-#80 silk thread for the embroidery thread.

Needle \ Thread	#30	#50	#60	#80	#100	#120
#9	×	×	×	○	○	○
#11	×	×	○	○	○	*
#14	×	○	○	○	*	*
#16	*	○	○	*	*	*
#18	*	*	*	*	*	*

20. NEEDLE THREADER (CHECKING THE HOOK POSITION IN HORIZONTAL DIRECTION)

STANDARD

The measure from inside of the hook guard to the center point of hook is 0.42 mm.

CHECK

As sewing needle HA X 1 (#14) is standard, so prepare 5 pcs. of brand-new sewing needle HA X 1 (#14) and check by changing all of these.

After Checking,

1. In case that, hook gets through eyelet of all needles ..... Nothing is the matter.
2. In case that, hook does not get through eylet of all needles ..... Adjust by bending hook.
3. In case that, hook does not get through eyelet of some needles ..... Needles through which the hook does not get, are bad.

(Example for checking)

When you check 5 pcs. of brand-new sewing needle, HA X 1 (#9) on condition that it achieves above first case, if the hook does not get through eyelet of all of these needle, all of these 5 needles are bad and you judge the hook position is not bad.

ADJUSTMENT

In case the hook is bad after above checking, adjust the hook by bending with pliers. In this time, do not bend hook guard.

21. NEEDLE THREADER (EXCHANGE)

HOW TO EXCHANGE NEEDLE THREADER

1. Remove needle and lower the presser foot.
2. Push down needle threader to take out.
3. Place new one so that guide is immediately under the guide pin as shown figure Ⓐ.
4. Push needle threader all the way up so that guide is placed in the pin.

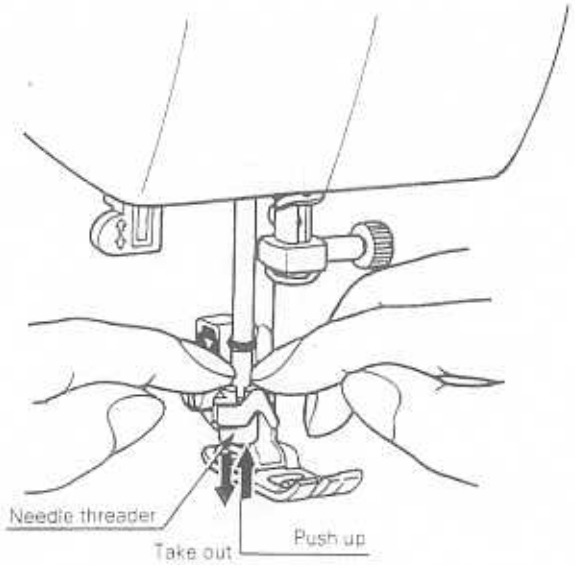


Figure Ⓐ

22. NEEDLE THREADER (CHECKING THE HOOK IN STANDARD POSITION)

STANDARD

1. The clearance between the top of hook and the top of needle eye is 0 mm.
2. Threading is capable when needle is located higher than 8 mm from the needle plate.

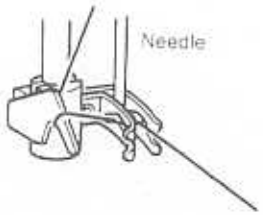
CHECK (refer to illustration)

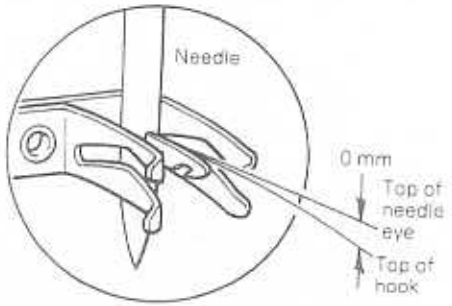
Case A

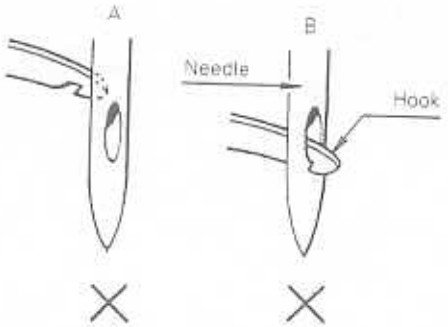
Hook position is too high. (Hook hits needle and cannot get through needle eye.)

Case B

Hook position is too low. (Hook gets through needle eye but it catches bottom part of needle eye.)







23. NEEDLE THREADER (CHECKING THE HOOK POSITION IN VERTICAL DIRECTION)

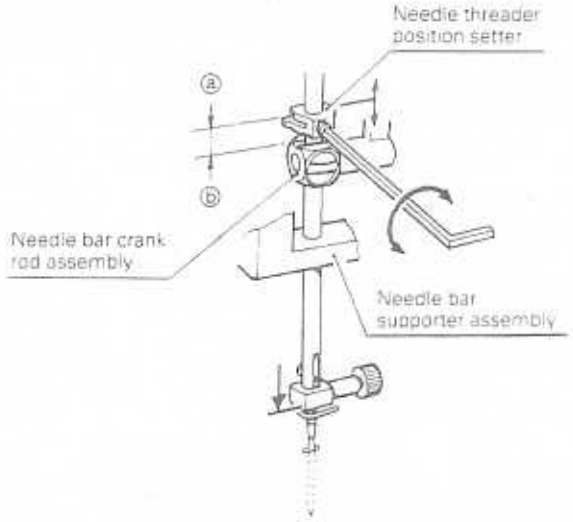
Case A (Hook point is too high)

1. Remove face plate and loosen the screw.
2. Adjust needle threader position setter slightly down and check the clearance between the top of hook and top of needle eye is 0 mm.
3. Check if the needle threader position setter ⓐ and the needle bar crank rod assembly ⓑ is parallel.

Case B (Hook point is too low)

Adjust needle threader position setter slightly up and check the clearance between the top of hook and top of needle eye is 0 mm.
In case part ⓐ and part ⓑ is not parallel or the hook does not work, readjust needle threader by loosening the screw.

If ⓐ and ⓑ are not parallel, the needle threader will not be held by the needle threader position setter (refer to Fig. 1), the hook will not enter the eyelet of the needle (hook will not move) and the needle will not be threaded when the needle threader lever is lowered. In this case, loosen the screw securing the needle threader position setter and turn the needle threader position setter slightly to the left to make it parallel.
In addition, if the needle threader position setter is turned too far so that it is still not parallel too left, it may hit other parts, causing damage (refer to Fig. 2). If a part is damaged, it must be replaced. If no part is damaged, loosen the screw securing the needle threader position setter and turn the needle threader position setter slightly to the right to make it parallel.



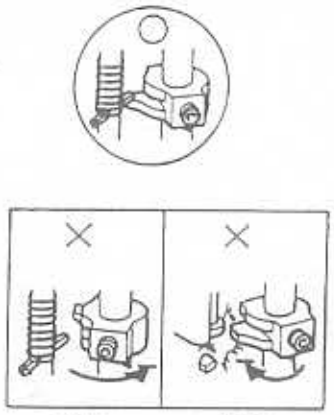
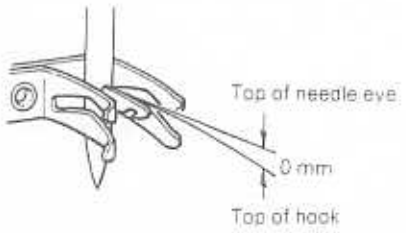


Fig. 1 Fig. 2



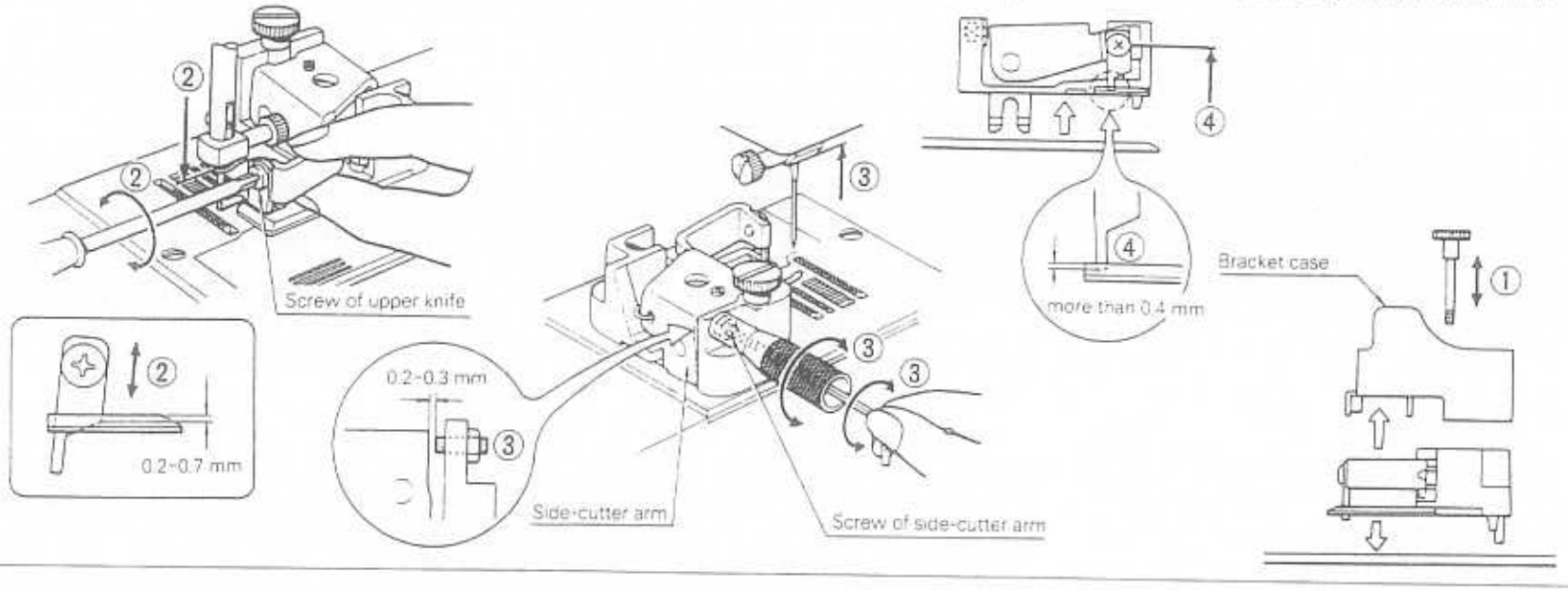
24. SIDE-CUTTER ADJUSTMENT (MEETING OF UPPER KNIFE AND LOWER KNIFE)

STANDARD

1. When side-cutter is set on machine and needle bar is at lowest position, both knives meet each other by 0.2–0.7 mm.
2. Set needle bar at highest position and after adjusting the clearance between screw of side-cutter arm and side-cutter arm to be 0.2–0.3 mm, both knives meet each other more than by 0.4 mm, with side-cutter removing from machine and side-cutter arm raising at highest position.

ADJUSTMENT

1. Remove bracket case and attach side-cutter to machine.
2. Set needle bar at lowest position and adjust both knives to meet each other by 0.2–0.7 mm. Then tighten the screw of upper knife securely.
3. Set needle bar at highest position and adjust the clearance between screw of side-cutter arm and side-cutter arm is 0.2–0.3 mm.
4. Remove side-cutter from machine, raise side-cutter arm at highest position, and adjust upper knife to meet with knife by more than 0.4 mm.



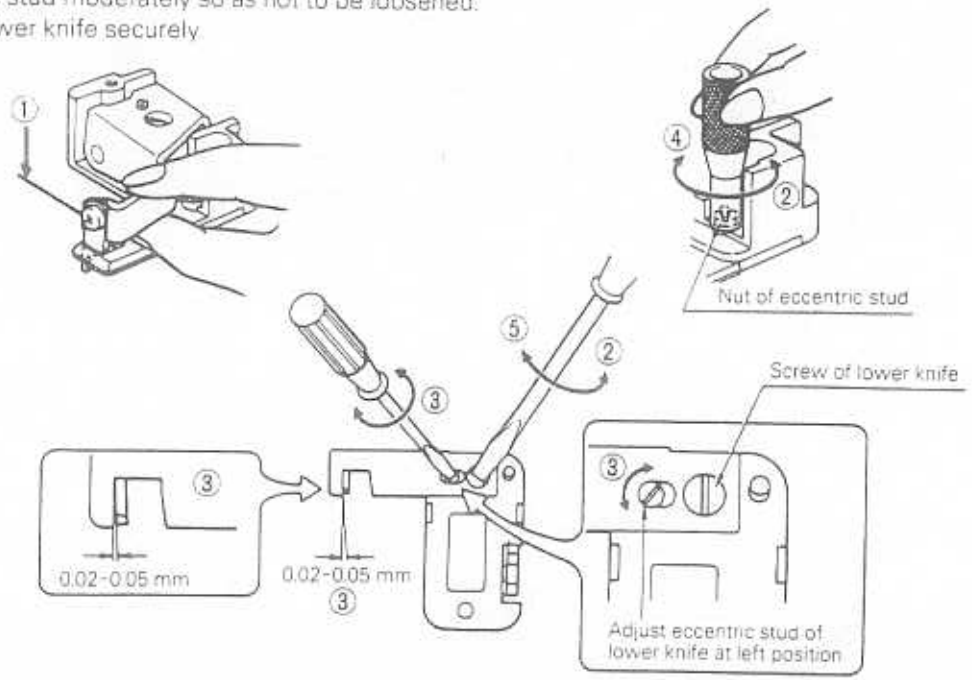
25. SIDE-CUTTER ADJUSTMENT (CLEARANCE BETWEEN UPPER KNIFE AND LOWER KNIFE)

STANDARD

Clearance between upper knife and lower knife is 0.02-0.05 mm at back side.

ADJUSTMENT

1. Remove side-cutter from machine, and meet upper knife with lower knife by moving side-cutter arm.
2. Loosen screw of lower knife and nut of eccentric stud slightly.
3. Adjust eccentric stud of lower knife to obtain the clearance between upper knife and lower knife by 0.02-0.05 mm at back side. (At this time, adjust eccentric stud of lower knife at left position as illustrated)
4. Tighten nut of eccentric stud moderately so as not to be loosened.
5. Tighten the screw of lower knife securely.



26. SHAPE ADJUSTMENT FOR ONE POINT MARK

STANDARD

When a one point mark such as "Rabbit", "Helicopter" or "BH" is selected and test sewing is carried out, each pattern should be sewn within their own limit.

ADJUSTMENT

Operations for each pattern

(Rabbit Pattern)

Power ON → DECORA stitch → N presser foot → One point mark → Next page → Rabbit pattern → Sew

(Helicopter Pattern)

Power ON → DECORA stitch → N presser foot → One point mark → Next page (twice) → Helicopter pattern → Sew

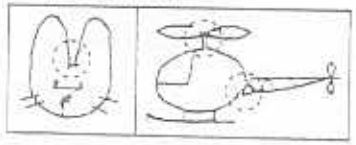
(Large Alphabet Pattern)

Power ON → Character sewing → N presser foot → Large alphabet → Character B Character H → Sew

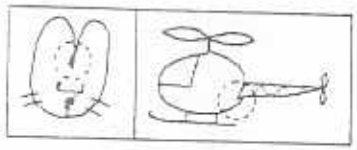
NOTE: These patterns should not be test sewn and checked in a continuous sequence.

Sample of shape limit for one point mark

Opening



Overlapping

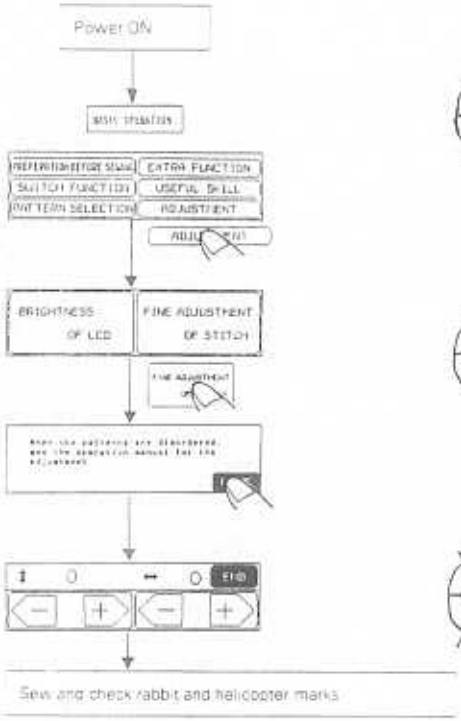


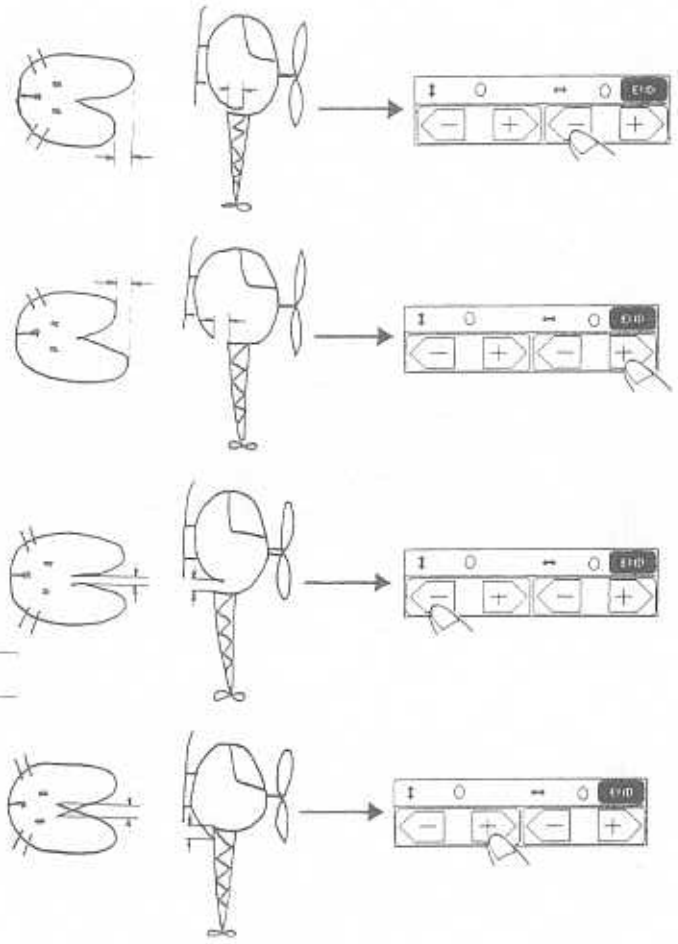
Sample of shape limit for large alphabet pattern

Opening

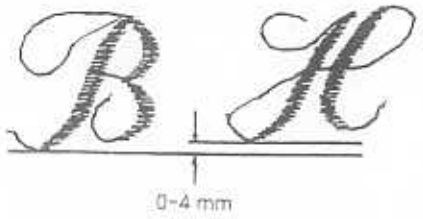
Overlapping

ADJUSTMENT


Power ON
EXTRA FUNCTION
USEFUL SKILL
ADJUSTMENT
BRIGHTNESS OF LED
FINE ADJUSTMENT OF STITCH
END
Sew and check rabbit and helicopter marks




1-8 mm


0-4 mm

27. LANGUAGE REPLACEMENT MODE

BASIC LANGUAGE

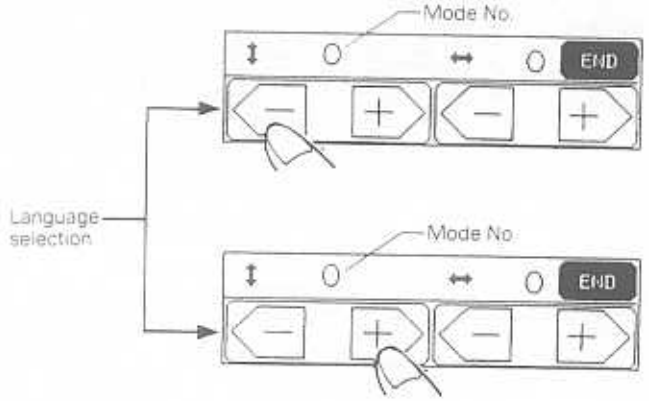
The model 895 sewing machine is programmed with the ten languages which are shown in the table. Each language has a mode number assigned to it. Before this machine and machines similar to it are shipped, the language is set to correspond to the country where the machine is to be sent. If you need to change the language display, it is possible to set the machine to the language replacement mode and then to select a mode number to change the display language.

LANGUAGE REPLACEMENT

1. Turn on the power switch while keeping the "BASIC SEWING" and "CARD" keys pressed down to set the test mode. (Refer to page 32.)
2. Select "23" from the numbers displayed on the touch panel to set the mode in which the display language can be changed. (Refer to page 32.)
3. Press the [+] or [−] key (left-hand side only) on the touch panel to select the language mode number.
4. Check to be sure the desired mode number is selected.
5. Once the mode setting is completed, turn the power switch off to cancel the language replacement mode, and then back on again.

Programmed languages and their mode numbers

Mode No.	Language
0	English
1	German
2	Dutch
3	French
4	Italian
5	Spanish
6	Danish
7	Swedish
8	Norwegian
9	Finnish



IV. HOW TO ADJUST ELECTRONIC ELEMENTS

HOW TO ADJUST ELECTRONIC ELEMENT

* You must turn off the power and remove connectors from printed circuit boards before measuring resistance.

PROBLEM	CHECK	REMEDY
1. When power is turned on, buzzer does not sound and nothing appears on display.	1) If the voltage between both inlet terminals is measured when the power cord is plugged in, is the standard voltage (AC120V, 220V, 230V, 240V) displayed? 2) When power switch is set to on, is resistance between both ends less than 1 Ω? 3) Remove connector CN13 from power supply board, and check following voltages using tester. Voltage between pins 4 and 5 should be 8 to 12 VDC. Voltage between pins 6 and 7 should be 22 to 26 VDC. 4) Is fuse blown? 5) Others	2) Replace power supply unit assembly. 3) Replace power supply unit assembly. 4) Replace fuse after correcting defect that caused fuse to blow. 5) Replace SS PC board assembly.
2. After the power is turned on, pulse motors do not return to their home positions with respect to the needle position. (Zigzag pulse motor when needle bar is raised and feed and horizontal feed pulse motors when needle bar is lowered. The edge pulse motor is not dependent on the needle bar position.)	1) Are the resistances between the connector pins given below normal for the pulse motors which do not return to the home position? Zigzag (CN19) ..... 1-3, 2-3, 4-5, 4-6 → 10-12Ω Feed (CN18) ..... 1-3, 2-3, 4-5, 4-6 → 7-8Ω Horizontal (CN17) ..... 1-6, 2-5, 3-6, 4-5 → 75-85Ω Edge (CN14) ..... 1-3, 2-3, 4-5, 4-6 → 100-120Ω 2) Set the home position for the same pulse motors irrespective of needle position. 3) Is a fuse blown? 4) Is the voltage between pins 6-7 normal when the output connector (CN13) is disconnected from the main power board? Between 6-7 22-26V DC 5) Others	1) Replace the pulse motor which shows an abnormality. 2) Replace NP board assembly. 3) Replace fuse after correcting defect that caused fuse to blow. 4) Replace power supply unit assembly. 5) Replace main PC board assembly.

3. Pattern cannot be selected.	1) Does switch on SS PC board remain pressed? 2) When the foot controller is connected, does it remain depressed? 3) Patterns other than side cutter cannot be selected. 4) Others	1) Adjust or exchange SS PC board assembly. 2) Check foot control unit operation. 3) If condition does not change after reassembling side cutting switch, replace it. 4) Replace LCD module.
4. Main motor does not run.	1) Does balance wheel rotate easily? 2) Is main motor connector (CN3 on power supply unit) attached properly? 3) Is resistance of both ends on main motor connector (CNJ on power supply unit) 24 to 34 Ω? 4) Do START/STOP switch, needle position switch, and thread cutter switch operate correctly? Voltage between ends of each switch should be: under 1 Ω when switch is pressed. infinity when switch is released. 5) Is presser foot lifter lowered? Does presser foot switch operate correctly? When presser foot lifter is raised, CN3 resistance is under 1 Ω. When presser foot lifter is lowered, it is inifinity. 6) Others	1) Adjust balance wheel position. 2) Check connector connection. 3) Replace main motor. 4) Replace SS PC board assembly. 5) If condition does not change after reassembling presser foot switch, replace it. 6) Replace main PC board or power supply unit assembly.

5. Operation of main motor is not stable, maximum speed operation is not possible, or operation cannot be controlled.	1) When turning on power and moving speed slide, does voltage between pins 2 and 3 of connector CN9 (for speed slide) change from 0 to 5 VDC? 2) When turning balance wheel opposite way to its normal rotation direction, does voltage between pins 2 and 1 of connector CN21 (for speed sensor) change to either 0 or 5 VDC? 3) When turning balance wheel opposite way to its normal rotation direction, do voltages between pins 3 and 2, pins 4 and 2, and pins 5 and 2 of connector CN4 (for NP board) change to either 0 or 5 VDC? 4) Others	1) Replace VR board assembly. 2) Replace main motor. 3) Replace NP board assembly. 4) Replace main PC board.
6. Correct patterns are not created.	1) If the power is turned off and the needle bar is moved horizontally by hand, does it move easily? 2) Is the N.P. shutter in the correct position? 3) Are the resistances between the connector pins for the zigzag, feed and horizontal pulse motors normal? Zigzag (CN19) ..... 1-3, 2-3, 4-5, 4-6 → 10-12Ω Feed (CN18) ..... 1-3, 2-3, 4-5, 4-6 → 7-8Ω Horizontal (CN17) ..... 1-6, 2-5, 3-6, 4-5 → 75-85Ω 4) Do the voltages between pins 2-3, 2-4 and 2-5 of the N.P. board assembly connector (CN4) alternate between 0-5 VDC when the sewing machine is turned slowly in reverse? 5) Other	1) Adjust the installation position so that it moves easily. 2) Check N.P. shutter position referring to page 35. 3) Replace pulse motor. 4) Replace NP board assembly. 5) Replace main PC board assembly.

7 Buttonholes are not stitched correctly.	1) Is the stitch foot set correctly?	1) Check stitch foot.
	2) Is the resistance between pins 4-5 of the junction board BH connector (white, 5-pin) normal? When buttonhole lever is lowered ..... 1Ω or less When buttonhole lever is raised ..... ∞	2) Adjust button hole lever or replace BH switch assembly.
	3) Is the resistance between pins 1-8 of the junction board connector (CN5) normal? When buttonhole lever is lowered ..... 1Ω or less When buttonhole lever is raised ..... ∞	3) Replace junction board assembly
	4) When the buttonhole lever is lowered and in the conditions below, is the resistance between pins 1-2 and 2-3 of the junction board connector (white, 5-pin) normal? Between 1-2 / Between 2-3 Buttonhole lever is pulled forward ..... 1Ω or less / ∞ Buttonhole lever is pushed back ..... ∞ / 1Ω or less	4) Adjust button hole lever or replace BH switch assembly.
	5) When the buttonhole lever is lowered and in the conditions below, is the resistance between pins 1-6 and 1-7 of the junction board connector (CN5) normal? Between 1-6 / Between 1-7 Buttonhole lever is pulled forward ..... 1Ω or less / ∞ Buttonhole lever is pushed back ..... ∞ / 1Ω or less	5) Replace junction board assembly
	6) Other	6) Replace main PC board assembly.

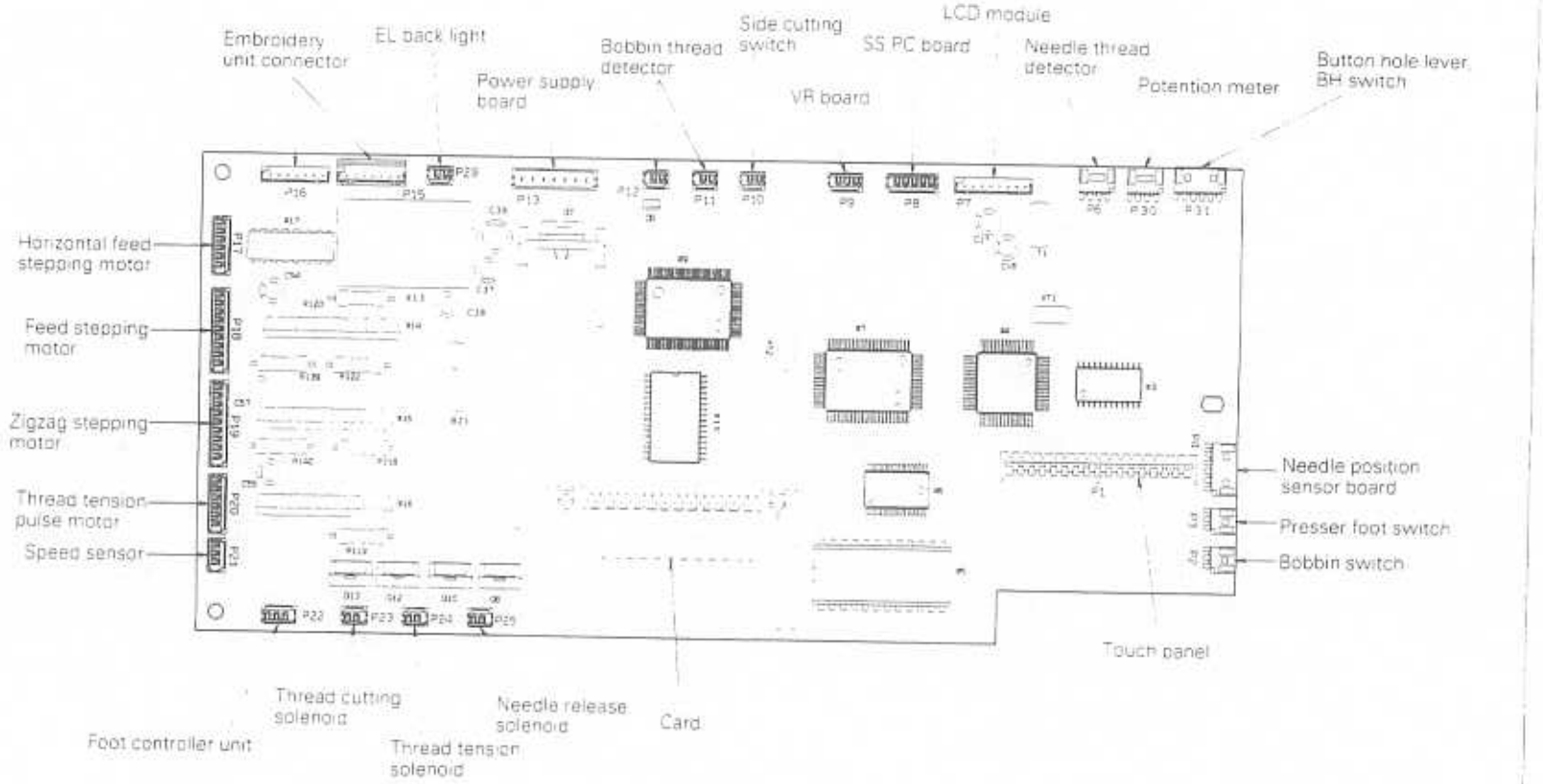
8. Manual operation of feed and zigzag pulse motors is not possible.	1) Do manual keys of feed and zigzag pulse motors turn off and on normally, and do the LCDs change? 2) Are the resistances between the pins below of the feed and zigzag pulse motors normal? Feed (CN18) ..... 1-3, 2-3, 4-5, 4-6 → 7-8Ω Zigzag (CN19) ..... 1-3, 2-3, 4-5, 4-6 → 10-12Ω 3) Other	1) Replace LCD module. 2) Replace feed stepping motor or zigzag stepping motor. 3) Replace main PC board assembly.
9. Vertical movement of needle bar and backstitch operation are abnormal.	1) Are the resistances between both sides of the SS PC board assembly switches 1Ω or less and in the kΩ range respectively when the switches are turned off and on? 2) Is the position of the NP shutter normal? 3) Do the voltages between pins 2-3, 2-4 and 2-5 of the NP board assembly connector (CN4) alternate between 0-5V when the sewing machine is turned slowly in reverse? 4) Does the voltage between pins 1-2 of the speed sensor connector (CN21) alternate between 0-5V when the sewing machine is turned slowly in reverse? 5) Is the bobbin winder switch turned off? 6) Others	1) Replace SS PC board assembly. 2) Adjust N.P. shtter position referring to page 35. 3) Replace NP board assembly. 4) Replace main motor. 5) Adjust the bobbin winder mechanism (Refer to page 46.) 6) Replace main PC board assembly.
10. Foot controller does not operate normally when depressed.	1) Is the resistance between pins 2-3 of the pin jack connector (CN22) 1Ω or less when there is no pin jack and ∞ when there is a pin jack? 2) Does the resistance between pins 1-3 of the pin jack connector (CN22) change from the low Ω range to 10 kΩ when there is a pin jack and the foot controller is depressed? 3) Others	1) Replace pin jack assembly. 2) Replace foot controller. 3) Replace main PC board assembly.

11. Thread tension is not correct.	1) Is thread route correct? 2) Are the 0 mm and 3 mm fabric thickness adjustments correct? 3) Turn off power and lower presser foot. When turning AT pulse motor gear manually, does it turn easily, and together with roller? 4) Are resistances between pins 1 and 3, pins 2 and 3, pins 4 and 5, and pins 4 and 6 of connector CN20 (for AT pulse motor) 8 to 9 Ω? 5) Is resistance between pins 1 and 2 of connector CN24 (for AT solenoid) 47 to 57 Ω? 6) Is the voltage between pins 1-2 of the junction board connector (CN5) approx. 1.5V DC when the presser foot is lowered and approx. 4V DC when it is raised? 7) Others	1) Check thread route. 2) Check (Refer to page 43.) 3) Adjust or replace ATPM holder complete. 4) Replace AT pulse motor. 5) Replace AT solenoid. 6) Replace thickness sensor of fabric assembly or junction board assembly. 7) Replace main PC board.
12. Needle bar release mechanism does not operate correctly.	1) Does lever of NR solenoid operate smoothly? 2) Is resistance between pins 1 and 2 of connector CN25 (for NR solenoid) 15 to 19 Ω? 3) Others	1) Adjust needle bar release mechanism referring to page 39. 2) Replace NR solenoid holder assembly. 3) Replace main PC board assembly.
13. Thread cutter does not operate correctly.	1) Does lever of thread cutting solenoid operate smoothly? 2) Is resistance between pins 1 and 2 of connector CN23 (for thread cutting solenoid) 15 to 19 Ω? 3) Others	1) Adjust thread cutting mechanism referring to pages 55 and 56. 2) Replace thread cutting solenoid. 3) Replace main PC board assembly.
14. Display does not appear clearly.	1) Is resistance between pins 8 and 6 of connector CN7 (for LCD module) -5 to -9 Ω? 2) Others	1) Replace thread cutting solenoid. 2) Replace LCD module or main PC board assembly.

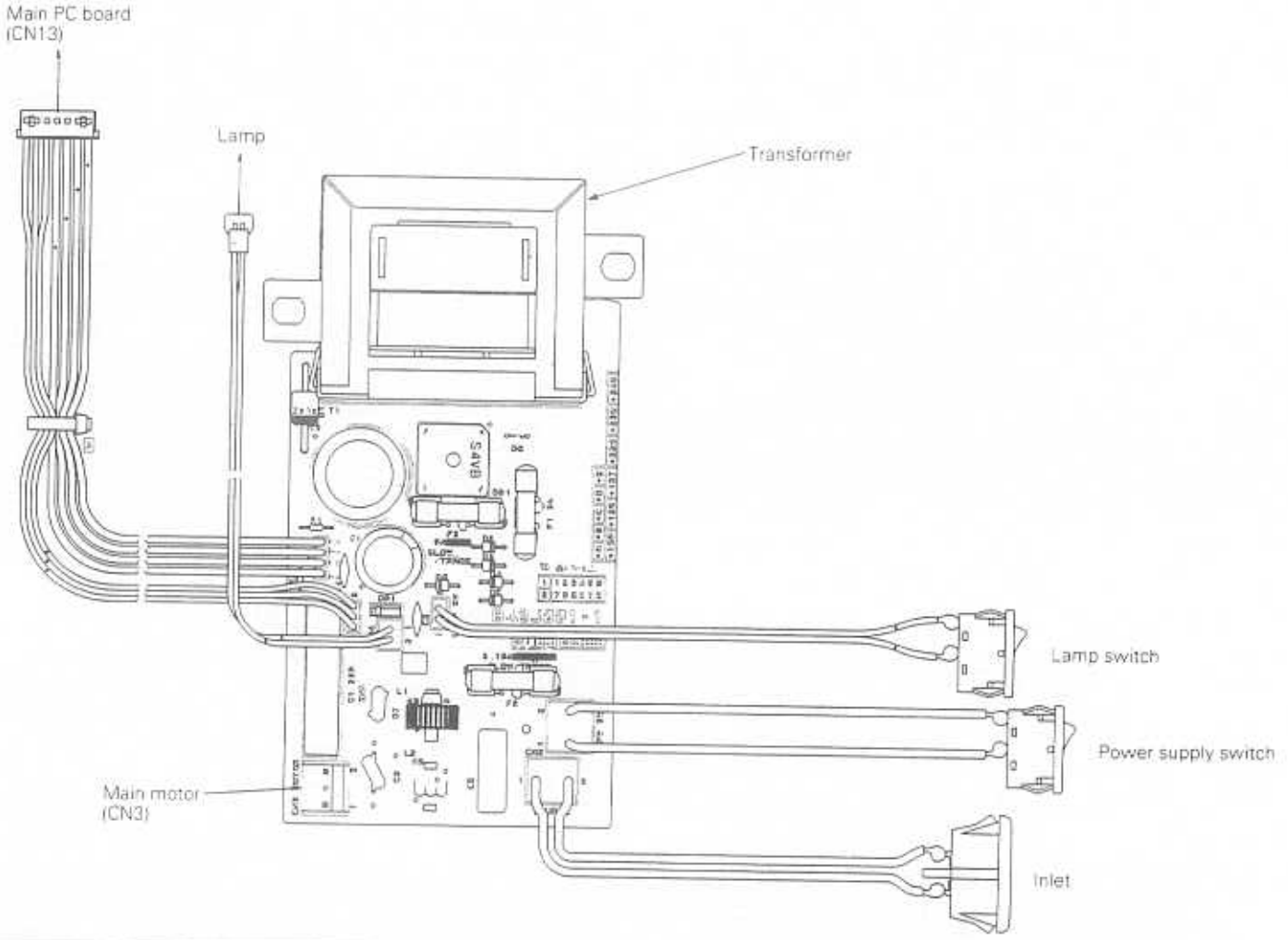
15. Thread cannot be wound around bobbin.	1) Is resistance between both ends of connector CN2 (for bobbin winder switch) under 1 Ω when thread is wound, or infinity in other cases? 2) Is bobbin winder attached correctly? 3) Others	1) Replace bobbin winder switch assembly. 2) Adjust bobbin winder position referring to page 46. 3) Replace main PC board.
16. Needle thread breakage detector does not operate correctly.	1) When passing thread through thread route and setting thread condition as follows, is voltage between pins 2 and 3 of connector CN6 (for needle thread breakage detector) correct? When thread is tensioned ..... 5 VDC When thread is loose ..... 0 VDC 2) Others	1) If condition does not change after adjusting thread take-up spring, replace needle thread breakage detecting PC board. 2) Replace main PC board.
17. Bobbin thread detector does not operate correctly.	1) Are both ends of bobbin thread detector correctly positioned? 2) After selecting test mode No.20, is voltage between pins 1 and 2 of connector CN12 (for bobbin thread detecting LED) approx. 1 VDC? 3) After selecting test mode No.20 and inserting the bobbin as follows, is voltage between pins 2 and 1 of connector CN11 (for bobbin thread detecting photo-diode) correct? Bobbin without thread ..... 0.1 to 0.2 VDC Bobbin with thread ..... approx. 5 VDC 4) Others	1) Correct directions of bobbin thread detector ends referring to page 47. 2) Replace photo-diode assembly. 3) Replace photo-transistor assembly. 4) Replace main PC board.

18. Embroidery unit does not work correctly.	1) Is your card a communication card? Is embroidery unit connected to sewing machine correctly? 2) Is embroidery unit installed in sewing machine correctly? Are timing belt tension, gear meshing, and wiring correct? 3) Are resistances between following pins of connectors CN4 and CN3 on X and Y pulse motors correct? X pulse motor (Connector CN4) —— Resistances between pins 1 and 3, 2 and 3, 4 and 5, 4 and 6 should be 14–16 Ω. Y pulse motor (Connector CN3) —— Resistances between pins 1 and 3, 2 and 3, 4 and 5, 4 and 6 should be 12–14 Ω. 4) Does embroidery frame move correctly? Is needle directly above embroidery sheet's center point? 5) Is power supply voltage of embroidery PC board between following jumper wires correct? Voltage between jumper wires JW3 and JW1 —— 5 VDC Voltage between jumper wires JW2 and JW1 —— 22 to 26 VDC 6) Others	1) Check your card and connection between embroidery unit and sewing machine 2) Adjust position of embroidery unit. (Torque of embroidery frame is important.) 3) Replace X or Y pulse motor. 4) If only origin of Y axis is incorrect after adjusting X and Y initial shutters, replace Y initial sensor unit. In other cases, replace embroidery PC board assembly. 5) If condition does not change after checking voltage of main PC board or insertion of the embroidery unit connector, replace connector or embroidery PC board assembly. 6) Replace embroidery PC board or main PC board assembly.
19. EL back light does not illuminate.	1) Remove EL back light connector from the LCD board assembly, is voltage between pins 1 and 2 of connector CN29 (for EL back light) approx. AC 150V or more? 2) Others	1) Replace LCD board assembly. 2) Replace LCD module or main PC board assembly.

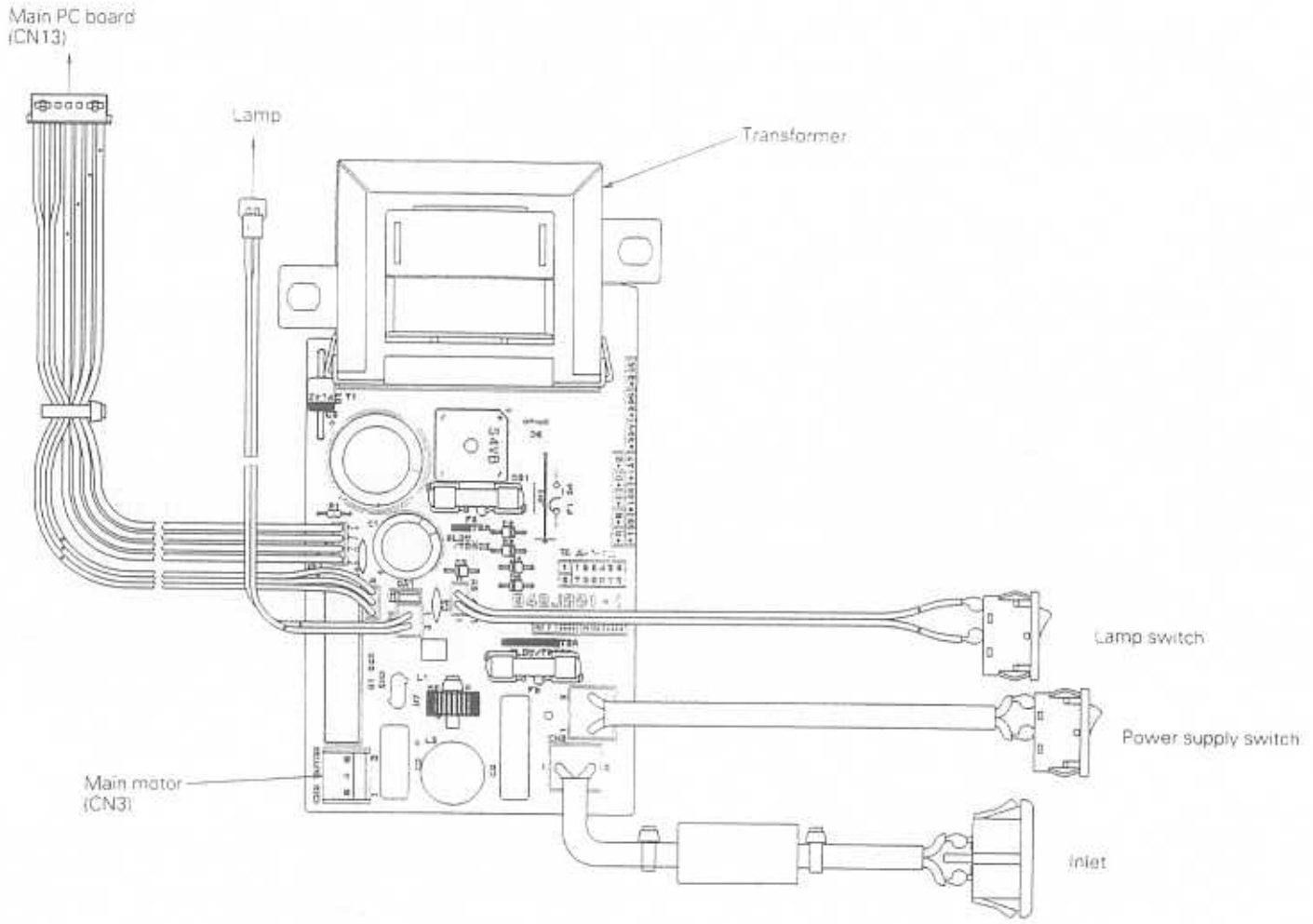
Main PC board



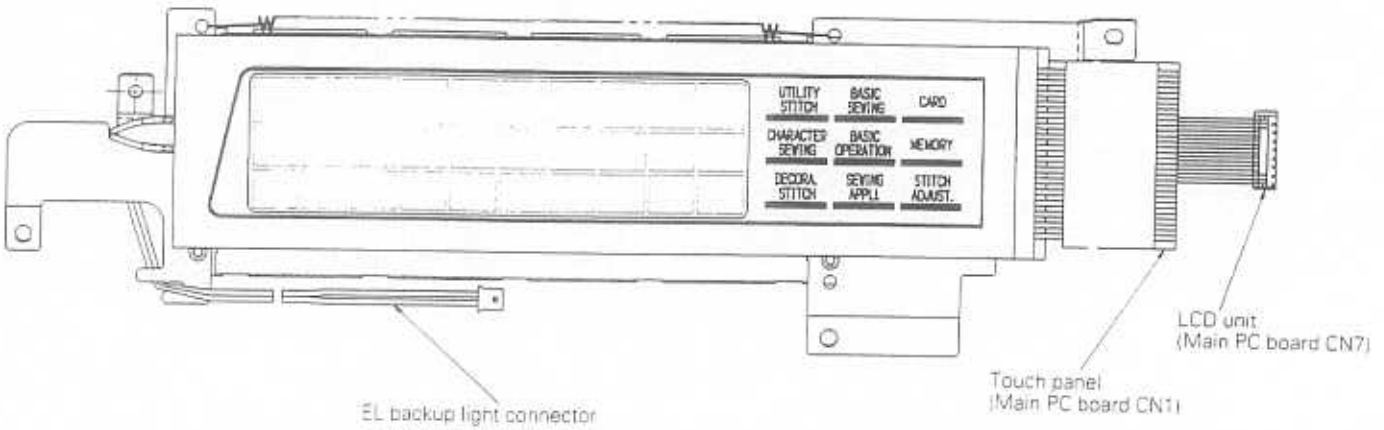
Power supply board (120V)



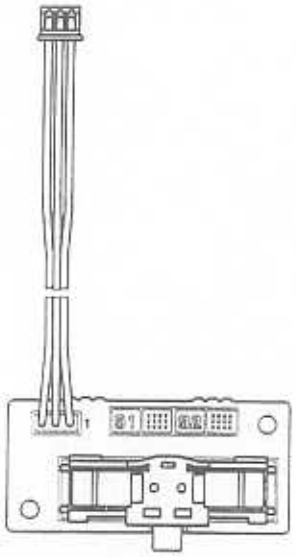
Power supply board (220V, 230V, 240V)



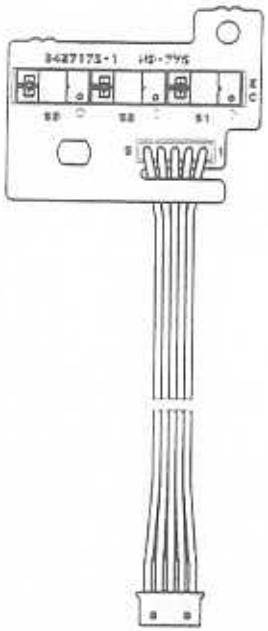
LCD unit


UTILITY STITCH
BASIC SEWING
CARD
CHARACTER SEWING
BASIC OPERATION
MEMORY
DECORA. STITCH
SEWING APPLI.
STITCH ADJUST.
EL backup light connector
Touch panel
(Main PC board CN1)
LCD unit
(Main PC board CN7)

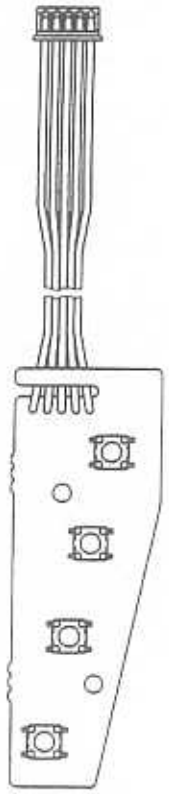
Other PC boards



VR board

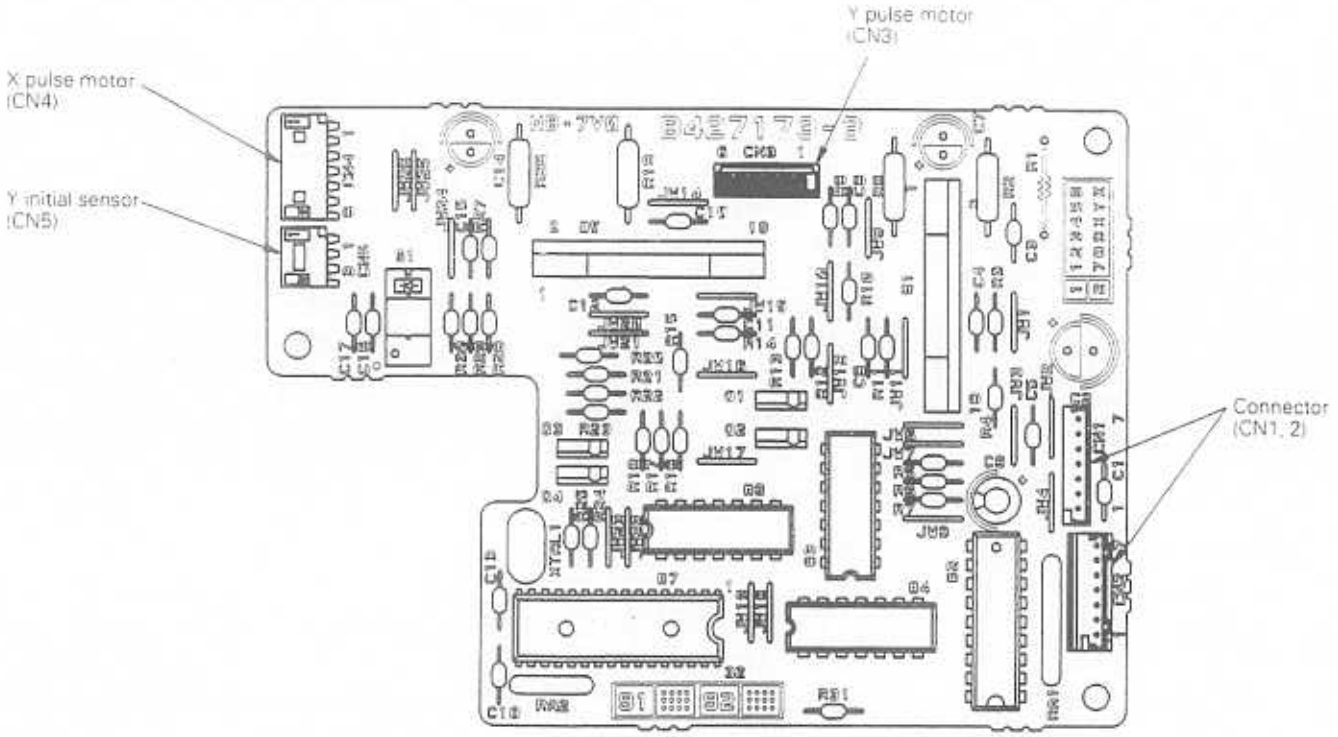


NP board

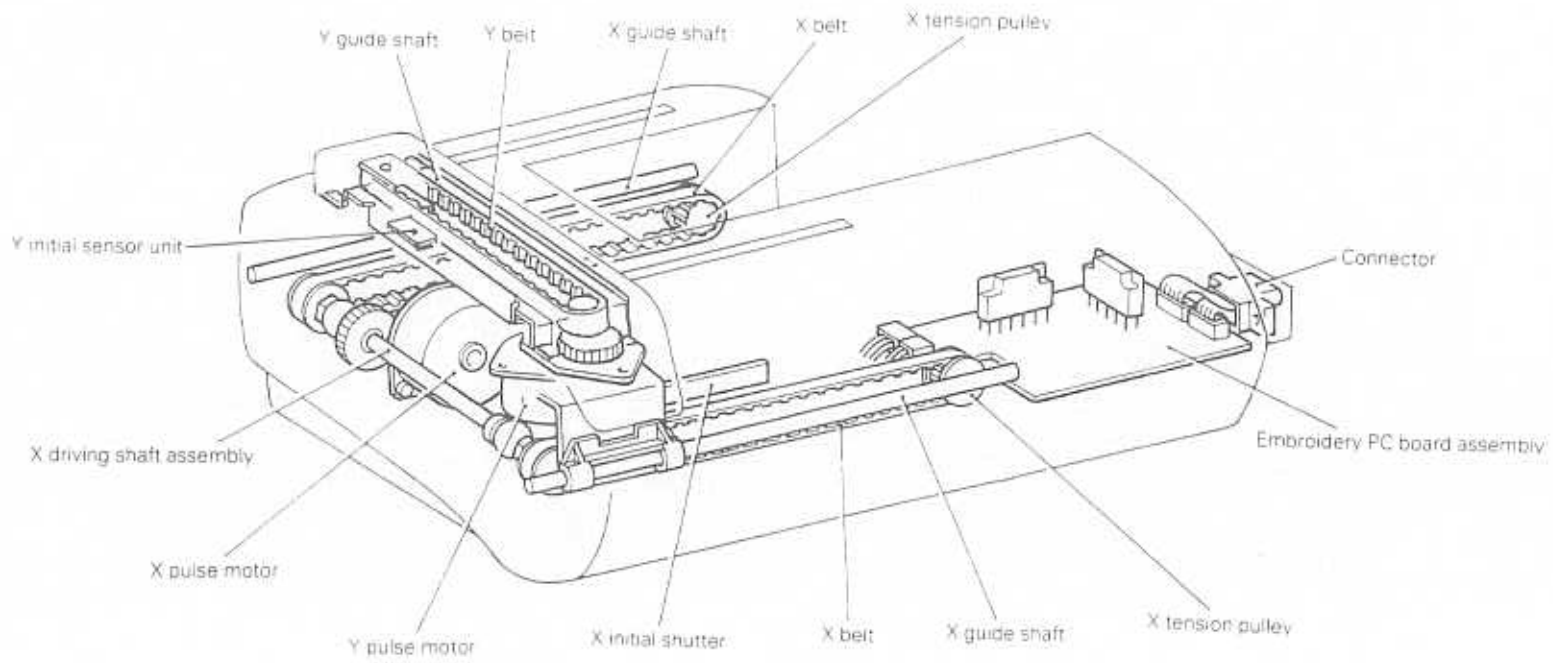


SS PC board

Embroidery PC board



V. EMBROIDERY UNIT MECHANISM

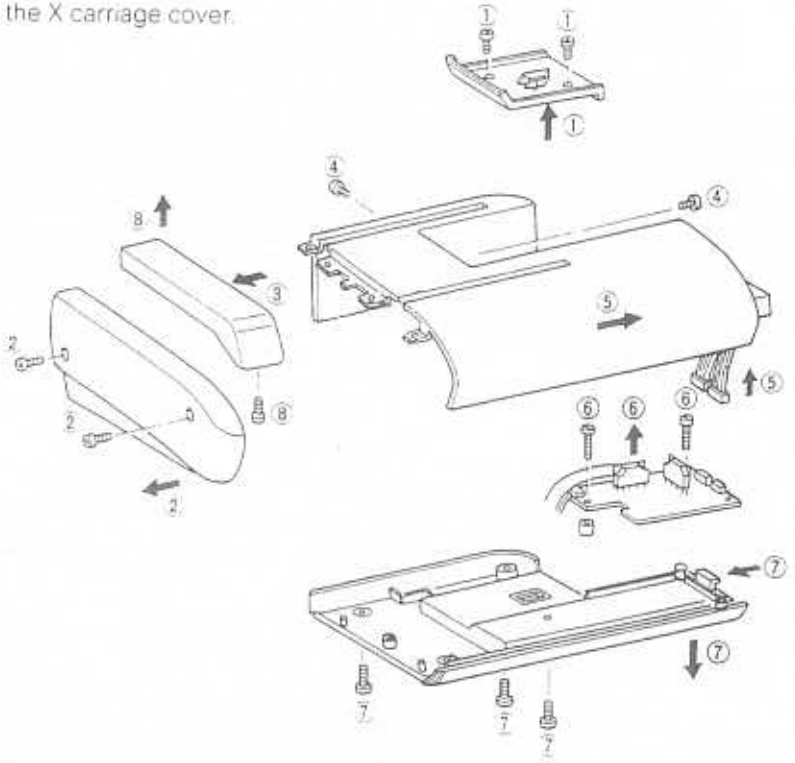


VI. DISASSEMBLING AND REASSEMBLING THE EMBROIDERY UNIT

1. Remove the two screws and the bottom cover S.
2. Remove the two screws and the side cover.
3. Move the X carriage unit all the way to the left.
4. Remove the two screws securing the main cover.
5. Remove the main cover by sliding it to the right, and disconnect the two connectors on the back of the main cover.
6. Remove the three screws and spacers, and the embroidery PC board, and disconnect the three connectors on the PC board.
7. Remove the three screws, and the bottom cover L.
8. Remove the screw from the bottom of the embroidery unit, and the X carriage cover.

Reassemble the embroidery unit in the reverse order.

NOTE: Do not disassemble other than the above-mentioned parts.



VII. EMBROIDERY UNIT ADJUSTMENTS

1. TIMING BELT TENSION FOR THE X DIRECTION

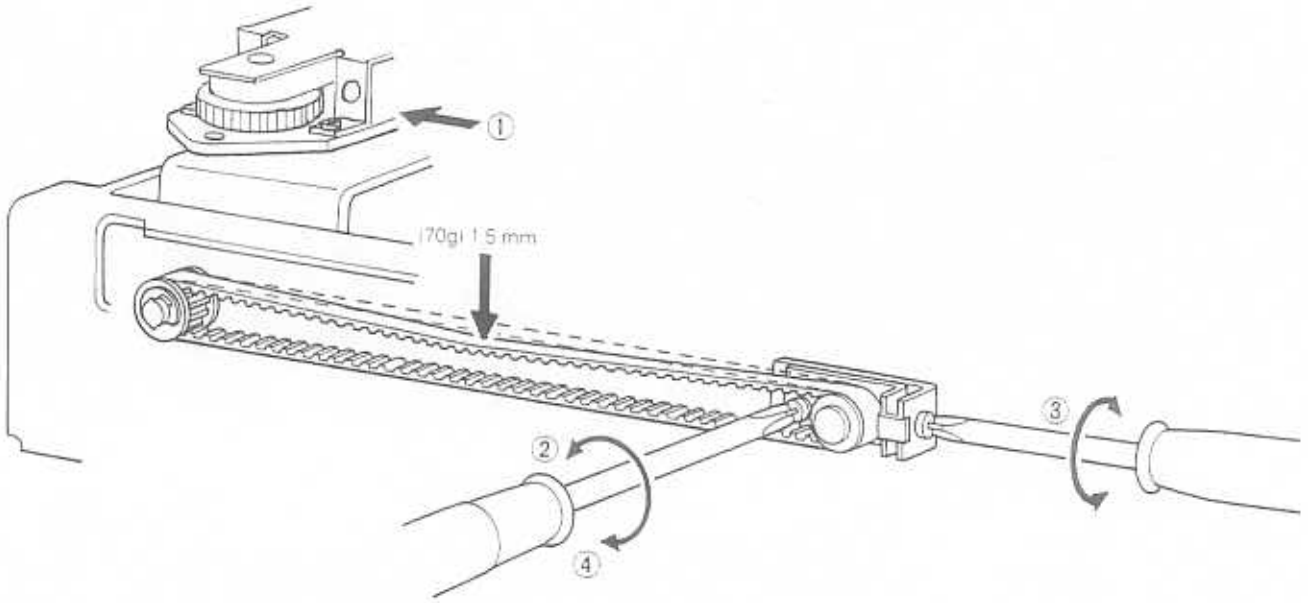
STANDARD

There should be 1.5 mm slack in the timing belt looped around the X driving shaft and the X tension pulley shaft, when the center of the belt is pressed by a force of 70g after the X carriage unit is moved all the way to the left.

ADJUSTMENT

1. Move the X carriage unit all the way to the left.
2. Loosen the screw of the X tension pulley.
3. Adjust the position of the X tension pulley by turning the adjusting screw.
4. Tighten the screw of the X tension pulley.

After adjusting the tension, lock the adjusting screw with paint.



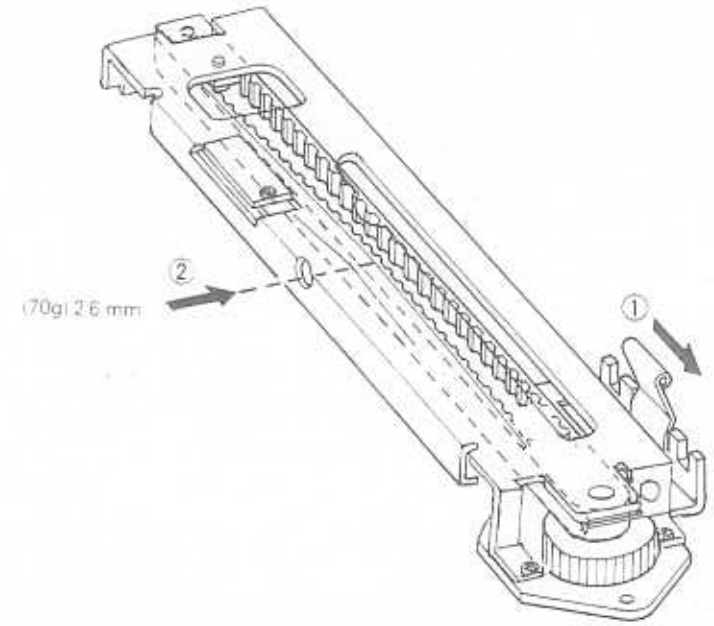
2. TIMING BELT TENSION FOR THE Y DIRECTION

STANDARD

There should be 2.6 mm slack in the timing belt when it is pressed through the hole of the X carriage unit with a force of 70g after the Y carriage is moved all the way forward.

ADJUSTMENT

1. Move the Y carriage all the way forward.
2. Press the timing belt through the measuring hole of the X carriage unit with a force of 70g to make sure that there is 2.6 mm slack in the belt.



3. X INITIAL SHUTTER POSITION

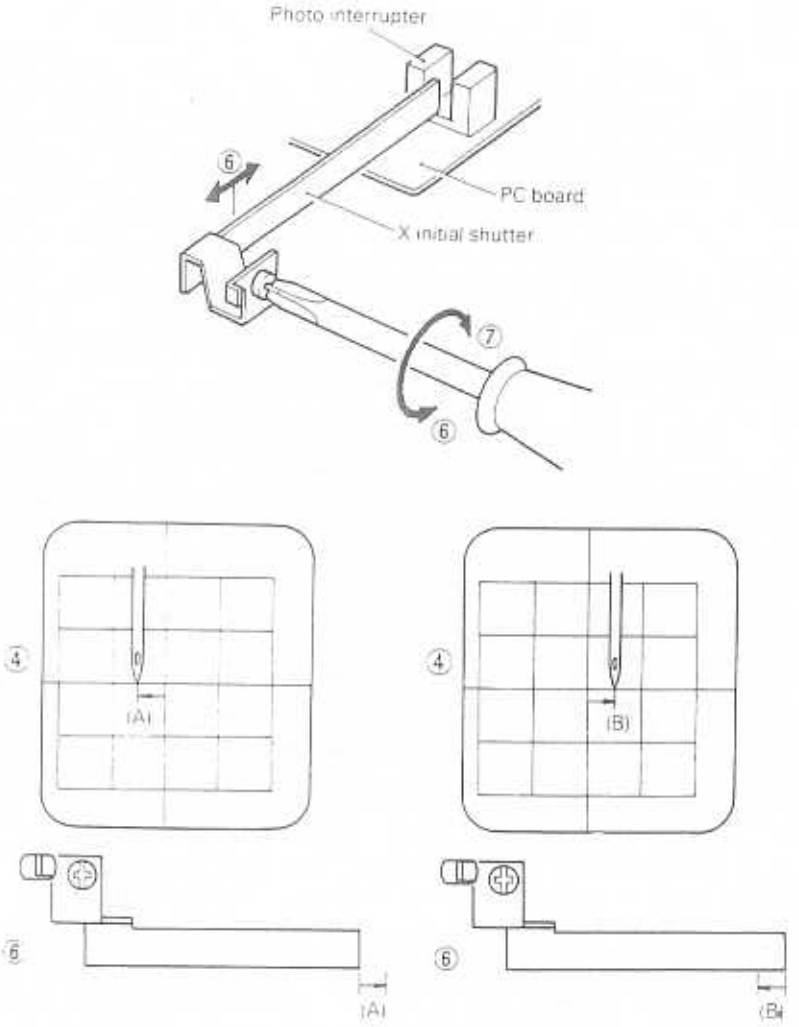
STANDARD

When you select embroidery pattern, the initial position of the embroidery frame should be in the center of the sewing area and the needle should align with the center of the reference line on the embroidery sheet.

ADJUSTMENT

1. Connect the embroidery unit to the sewing machine.
2. Place the embroidery sheet on the unit.
3. Turn on the power switch.
4. Turn the pulley to approach the needle point to the embroidery sheet, and check the position of the needle tip on the sheet. If the needle is not aligned with the center mark on the sheet, measure the distance from the needle to the center mark on the sheet.
5. Remove the embroidery unit from the sewing machine, along with the main cover.
6. Loosen the screw of the X initial shutter, and adjust the distance to 0 by moving the X initial shutter to either the right or left.
7. Tighten the screw of the X initial shutter.

   NOTE: If the needle does not align with the initial position of the sheet, repeat steps 5 to 7.



4. X CARRIAGE POSITION

STANDARD

Both sides of a pattern should be completely embroidered.

ADJUSTMENT

1. Move the X carriage to the center manually.
2. Loosen the two screws of the X driving gear.
3. Position the X driving gear by slightly moving the X carriage to either the right or left.
   ※ Check to be sure that the belt presser plate is firmly pressing the X belt.
4. Tighten the two screws of the X driving gear.
   NOTE: Make sure that the tension of the X belt is correct by moving the X carriage to the left manually.