

SERVICE MANUAL FOR SEWING MACHINE

**BLQP
BL500A**

LIST of UPDATE RECORD

[illegible]

GENERAL INFORMATION

Note to repairmen Regarding repairs on Brother sewing machines:

Since most of the manufacturing processes for producing LSIs for micro-computers etc. are conducted through MOS technology, it is important that precautions are taken during manufacturing and use of such products to prevent damage resulting from static electricity. For this reason, manufacturing and assembly are carried out under strict supervision.

The same care should be taken during servicing of these products.

Please take the following precautions during repairs.

1. Always wear rubber gloves when handling printed circuit boards, do not touch metal parts with bare hands.
2. Keep your body earthed during repairs to prevent charges of static electricity.
3. During storage and transporting of circuit boards, they should be wrapped in regulation aluminum foil or kept in anti-static bags, and should not be subjected to shocks.
4. When carrying out repairs and adjustments, take care not to scratch boards or touch circuits with screwdrivers and so forth.

CONTENTS

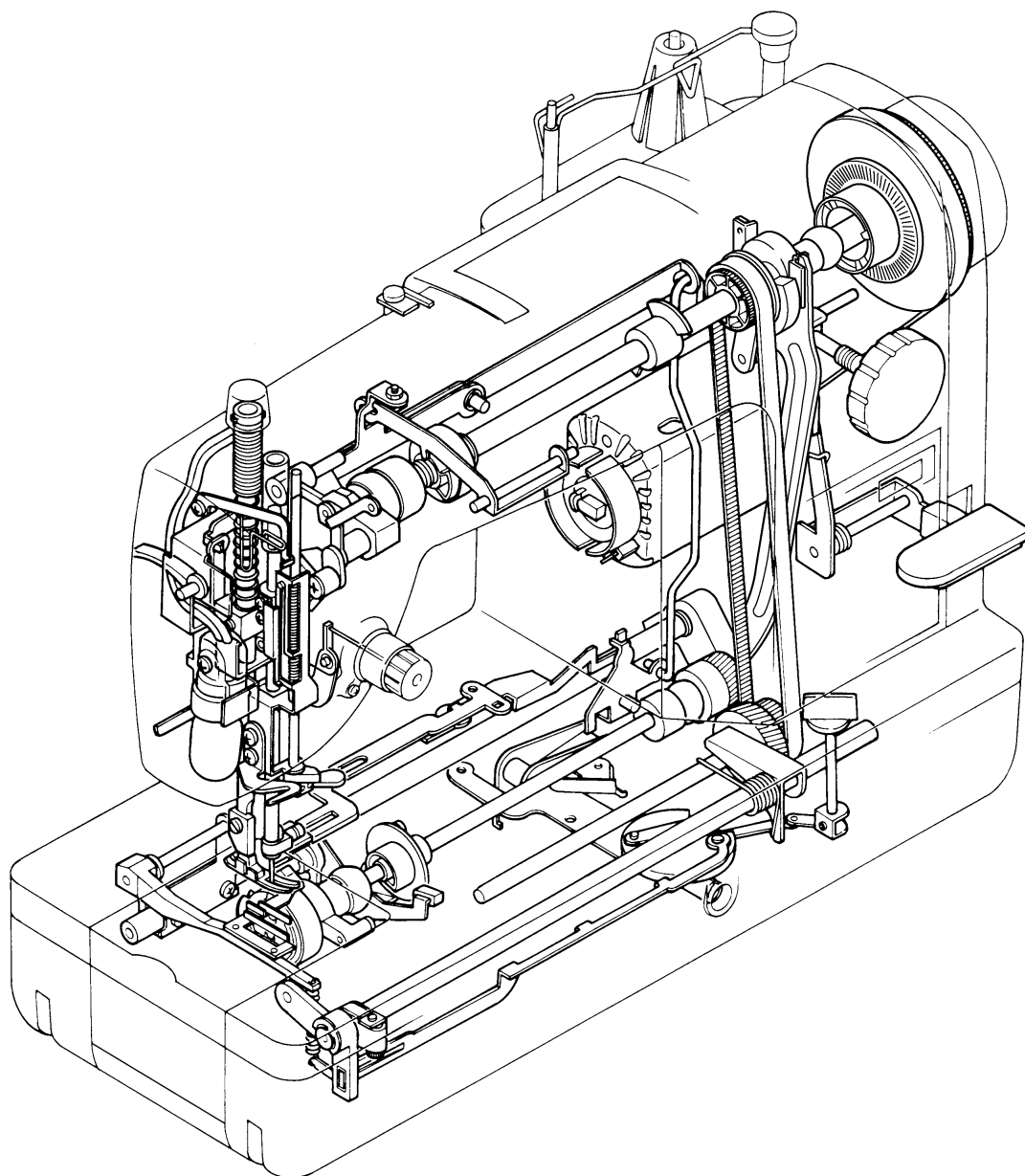
I. PRINCIPAL MECHANISMS	1
II. DISASSEMBLING AND REASSEMBLING THE SEWING MACHINE.....	8
III. HOW TO ADJUST MECHANICAL ELEMENTS	52
IV. ELECTRICAL ADJUSTMENTS	80
V. MECHANICAL ADJUSTMENTS	90

I. PRINCIPAL MECHANISMS

1. MECHANICAL DRAWINGS	2
2. POWER TRANSMISSION CHART.....	3
3. ELECTRONIC PARTS ARRANGEMENT CHART.....	5
4. MAIN MOTOR CONTROL	6
5. OTHER ELECTRONIC COMPONENT FUNCTIONS	7

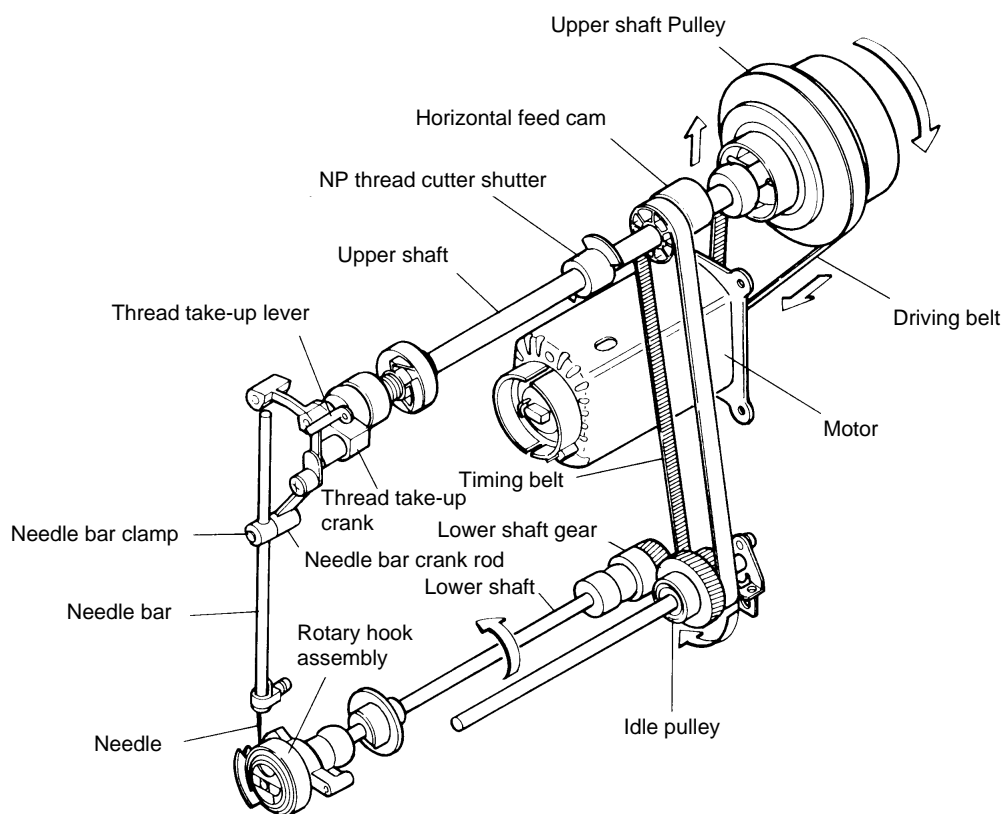
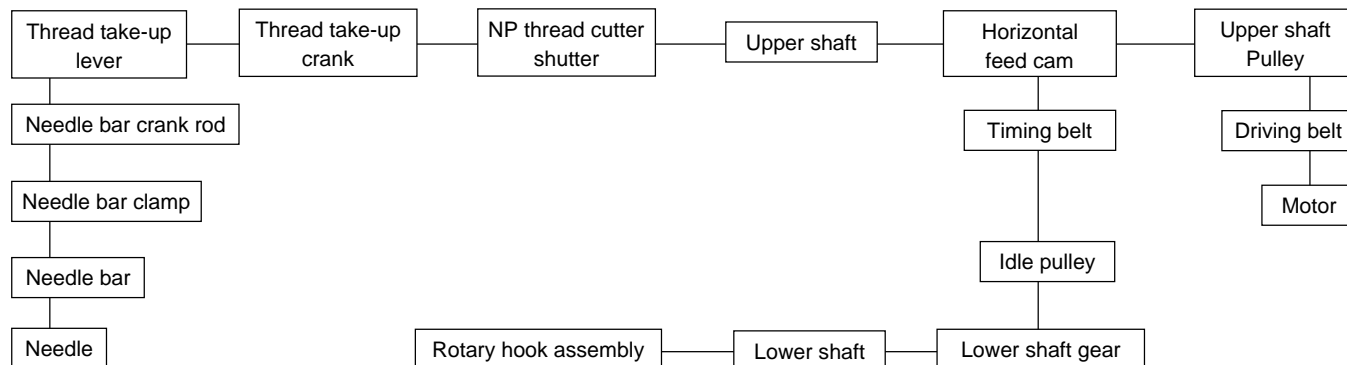
I. PRINCIPAL MECHANISMS

1. MECHANICAL DRAWINGS

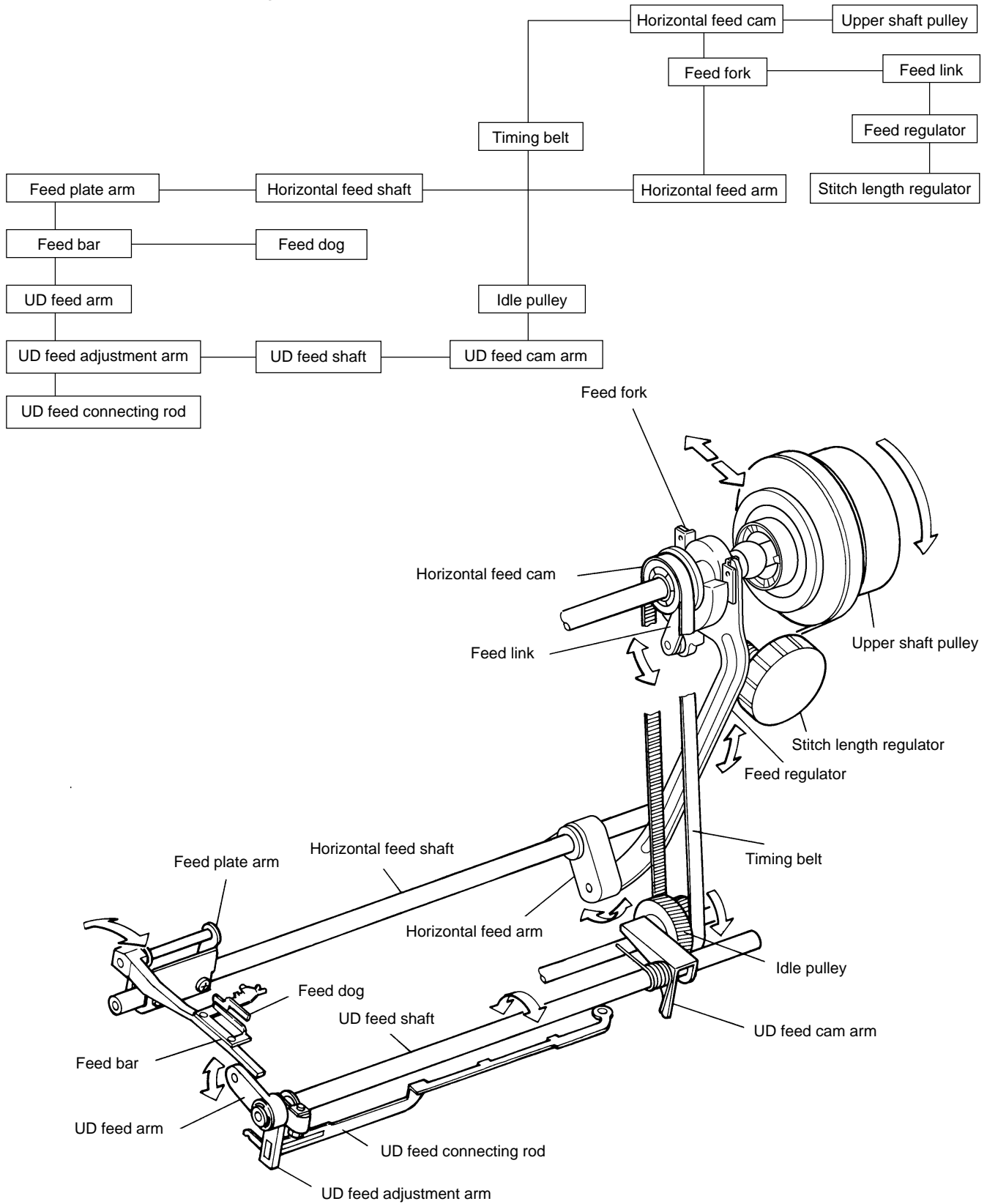


2. POWER TRANSMISSION CHART

- (A) Generating mechanism of needle bar
Thread take-up lever
Rotary hook movement

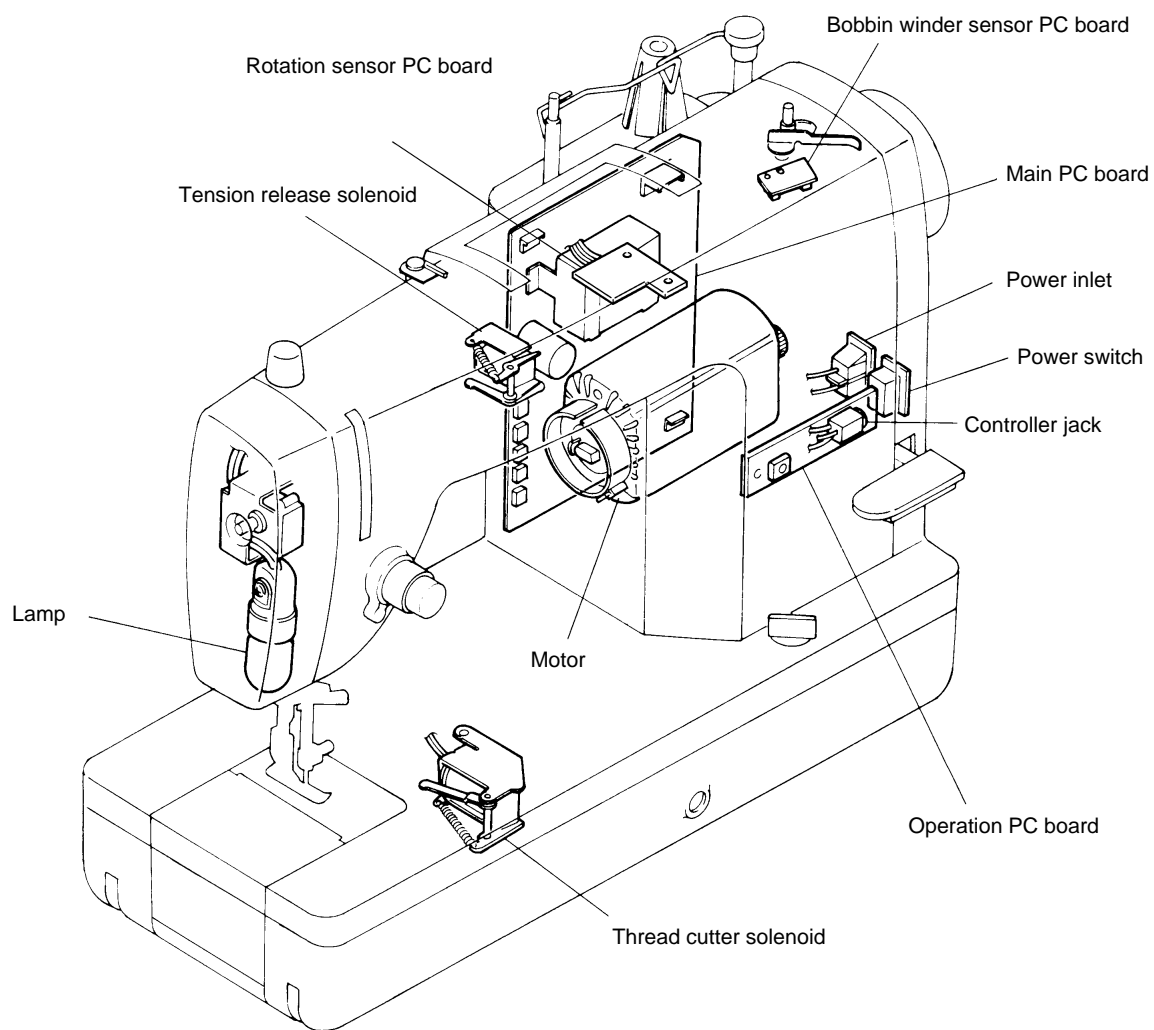


(B) Mechanism of feed dog movement



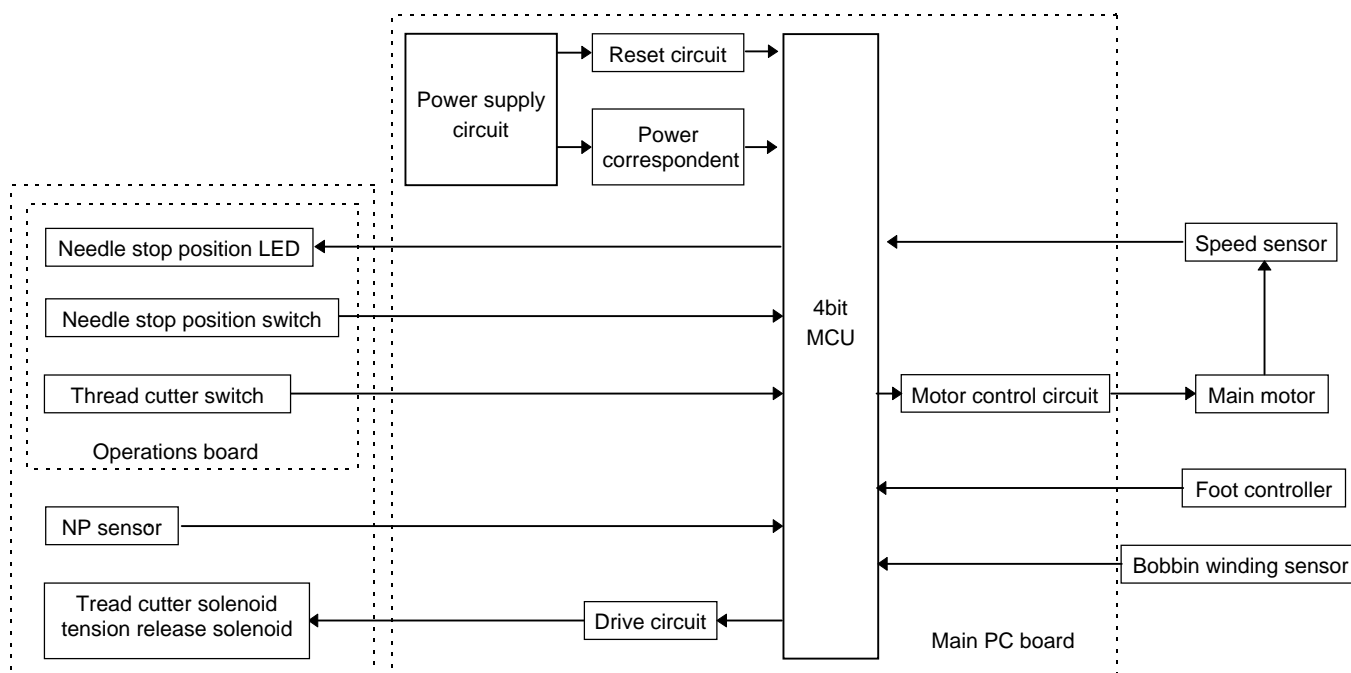
3. ELECTRONIC PARTS ARRANGEMENT CHART

Caution: The shape of the lamp and lamp socket is different for 120 V sewing machines and 220 V to 240 V sewing machines. (Illustration shows 120 V machine)



4. MAIN MOTOR CONTROL

The main motor for the sewing machine is required to smoothly change from low speed to high speed without any fluctuations due to load or temperature change. To fully comply with this requirement, the PQ1300 adopts phase controlled by power Mos FET using Power motor. This sewing machine uses electronic breaker circuits via main motor power braking for immediate stopping of sewing operations in the event of problems.



5. OTHER ELECTRONIC COMPONENT FUNCTIONS

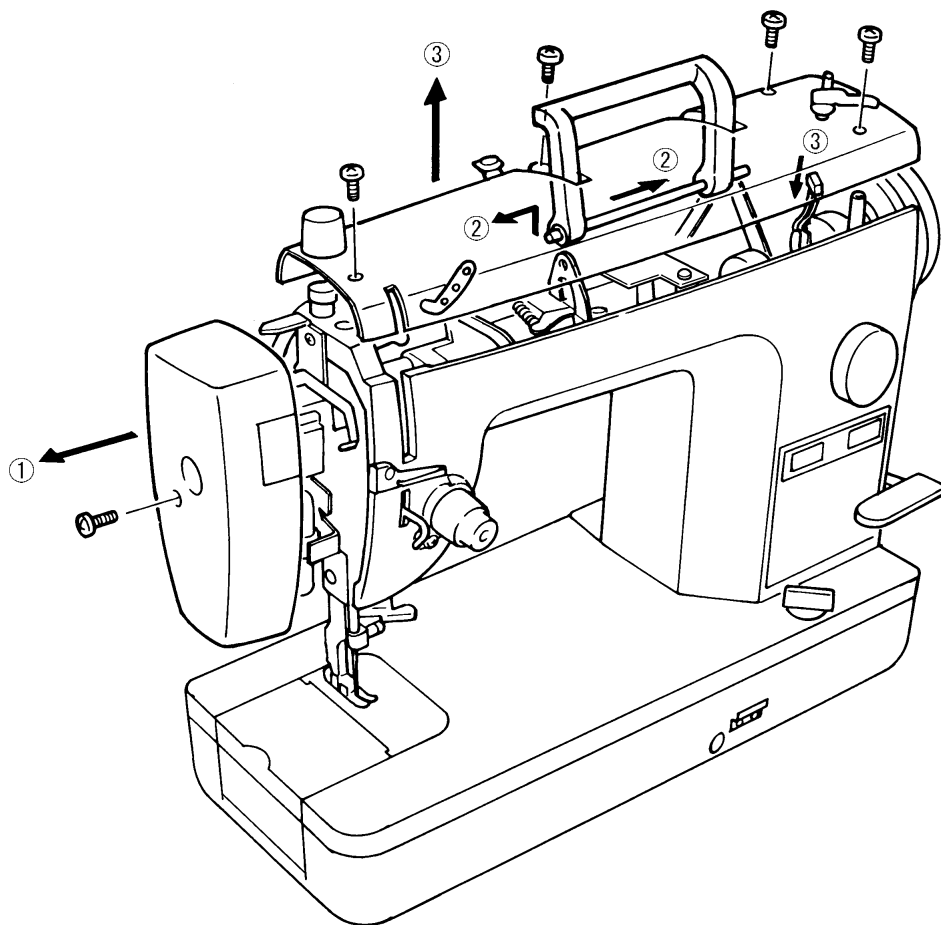
Foot controller.....	Starts and stops the machine.
Junction for foot controller	When using the foot controller , connect it to this terminal.
Speed sensor	Detects rotative speed of main motor. Detects rotative speed via shutter and photointerruptor attached to main motor shaft.
Bobbin winder sensor	Detects if the machine is set up for bobbin winding and when the bobbin is full.
Needle stop position switch	Push to determine if machine will always stop with the needle lowered through the fabric, or if the machine will just stop, regardless of needle position. Immediately after the power is turned on, it is set so the machine is in the stop with needle lowered through the fabric.
Needle stop position LED	Lights up when machine is set to always stop sewing with needle lowered through fabric. To prevent power overload, the light will be extinguished for four seconds after emergency stopping.
Thread cutter switch	Trims thread. When the machine is idle, it will cut the thread regardless of needle position, then raise needle and stop.
Rotation sensor	Timing for driving thread cutter and tension release solenoids. Also detects whether needle is raised or lowered. Detects rotation angle of upper shaft via shutter and photointerruptor installed on the shaft.
Transformer	Insulated transformer for driving solenoids and powering electric circuits.
Lamp	120 V/15 W sewing machine lamp for 120 V sewing machine, 240 V/15W sewing machine lamp for 220 V to 240 V sewing machine.

II. DISASSEMBLING AND REASSEMBLING THE SEWING MACHINE

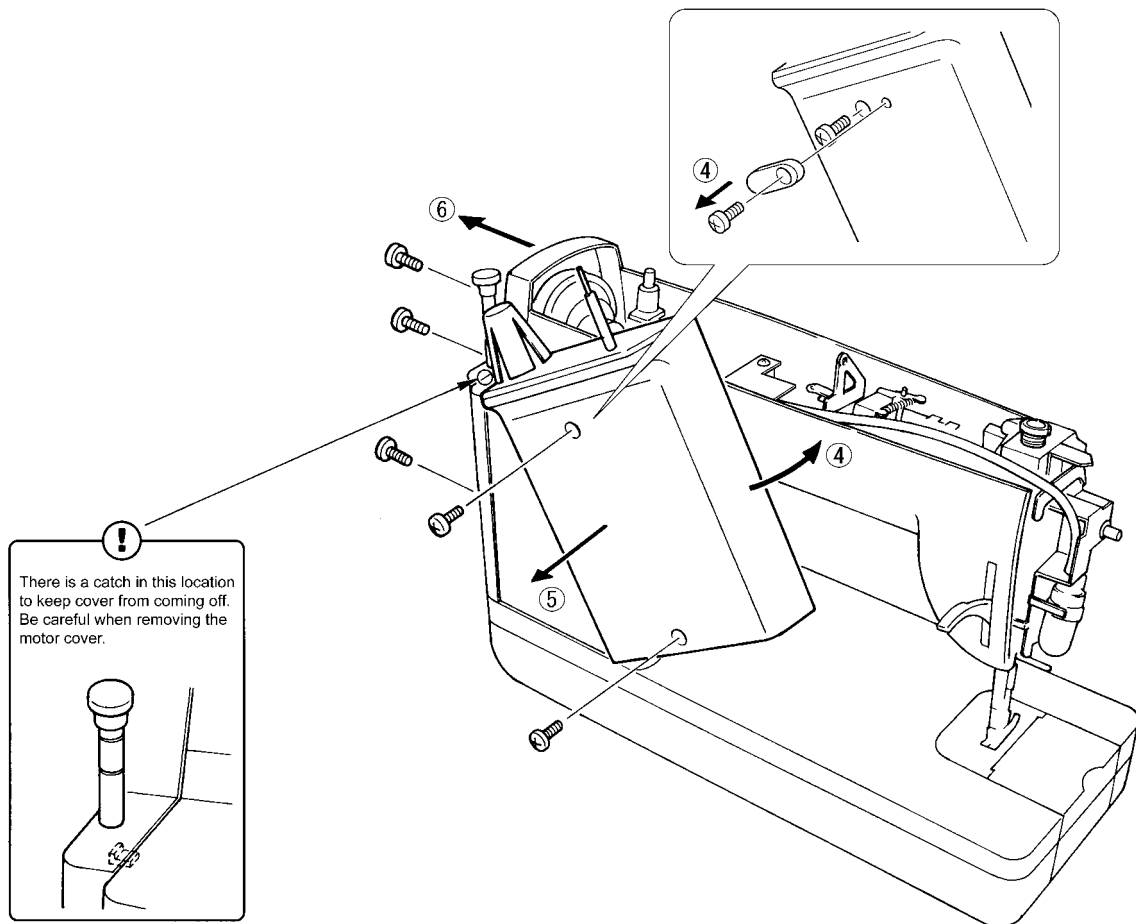
1. DISASSEMBLING AND REASSEMBLING THE
OUTER PARTS AND MAIN PARTS.....9
2. LEAD WIRE ARRANGEMENT51

1. DISASSEMBLING AND REASSEMBLING THE OUTER PARTS AND MAINPARTS

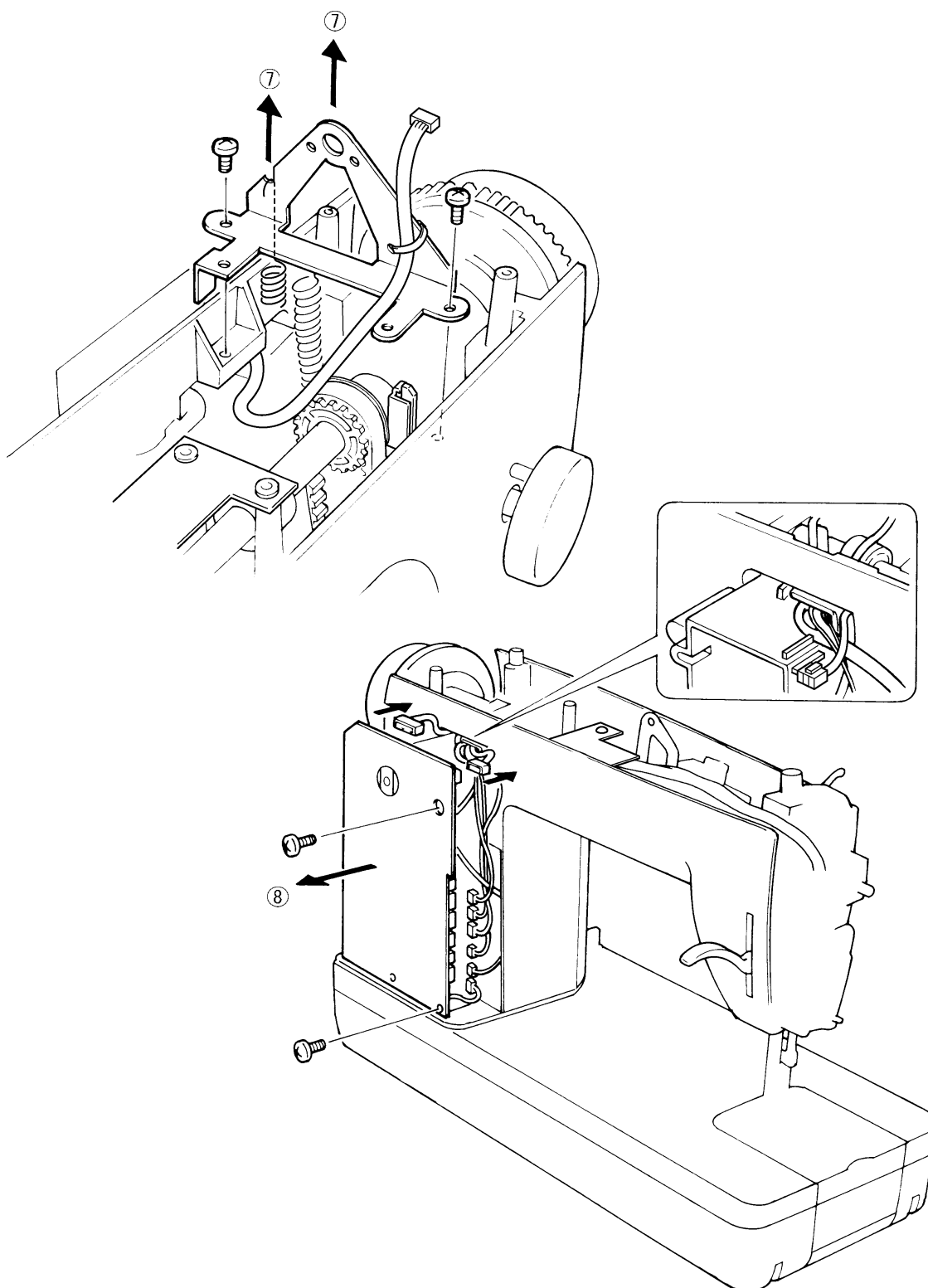
1. Remove the screw securing the face plate, and the face plate by sliding it to the left.
2. Remove all four screws from top plate. Slide handle shaft to the side, then slide it out of handle holder L, then out of handle holder R.
3. After removing the connector from bobbin winder sensor board, lift off top plate.



4. Remove both screws from motor cover. Push the motor cover towards the back of the arm, twist it in the direction shown by the (4) arrow on the illustration, and remove catch from belt cover.
For the 220 V to 240 V sewing machine, to remove the screw on top of the motor cover, first remove the motor cover cap screw, then remove the motor cover cap.
5. Pull the motor cover towards you to remove it.
6. Remove all three screws from belt cover and remove belt cover to the side.



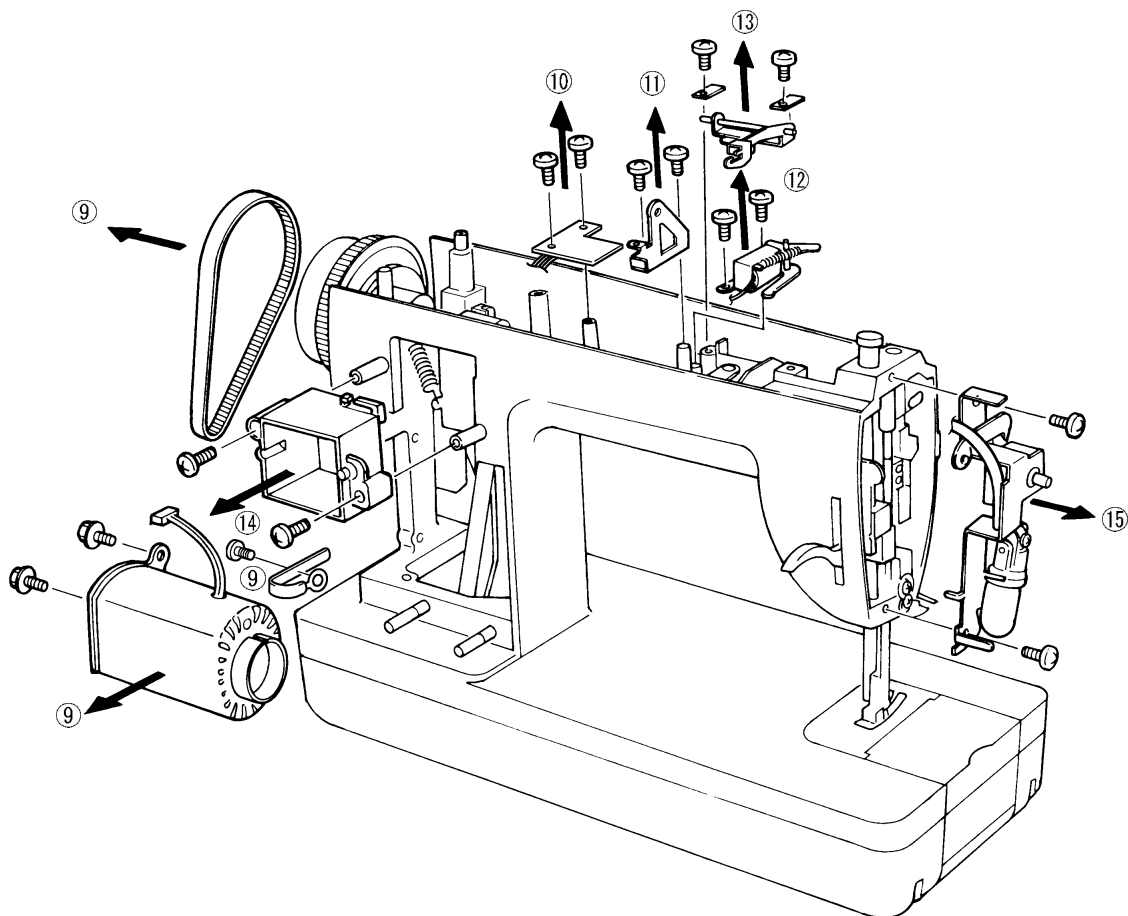
7. Remove the spring and cut the fixing belt. Remove the bobbin winder sensor harness from the handle holder R, then unscrew both screws from the handle holder R and remove the handle holder R.
8. Disconnect all 10 main PC board assembly connectors. Unscrew both main PC board screws. Remove each harness from harness guide of transformer cover. Remove the main PC board and the bobbin winder sensor harness.



9. Remove the switch holder harness attachment device. Cut harness fixing band in 2 places and remove. Remove both screws holding the motor, then remove the motor and the motor belt.
10. Remove both screws from the needle position sensor board, then remove the needle position sensor board.
11. Cut the band connecting the sewing light cable and handle holder. Remove both screws on handle holder L. Remove handle holder L.
12. Remove both screws on tension release solenoid. Remove tension release solenoid.
13. Remove both screws from tension release plate A and remove it. Remove O ring.
14. Remove both screws from transformer cover and remove it.
15. Remove both screws from sewing Lamp assembly and remove it.

NOTE

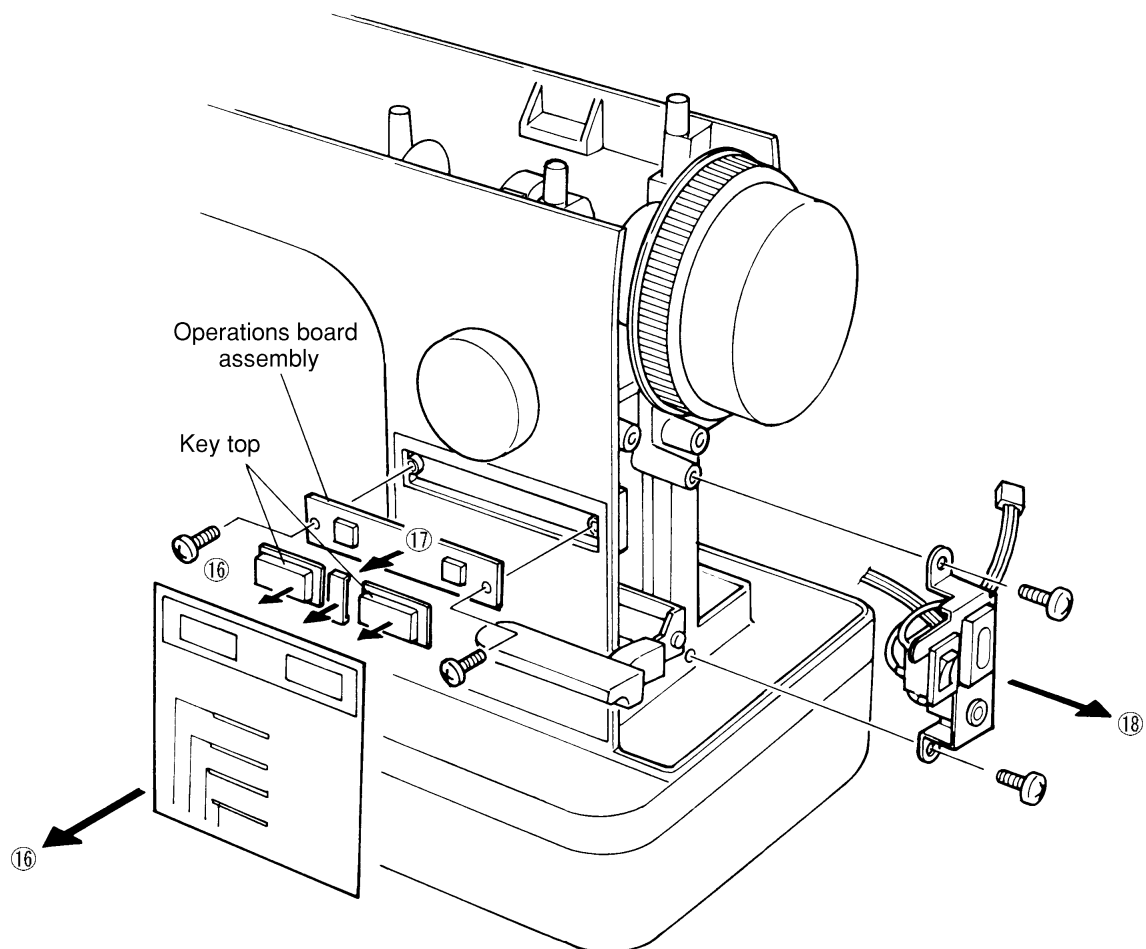
The shape of sewing lamp assembly is different for 120 V sewing machines and 220 V to 240 V sewing machines. (Illustration shows 120 V machine)



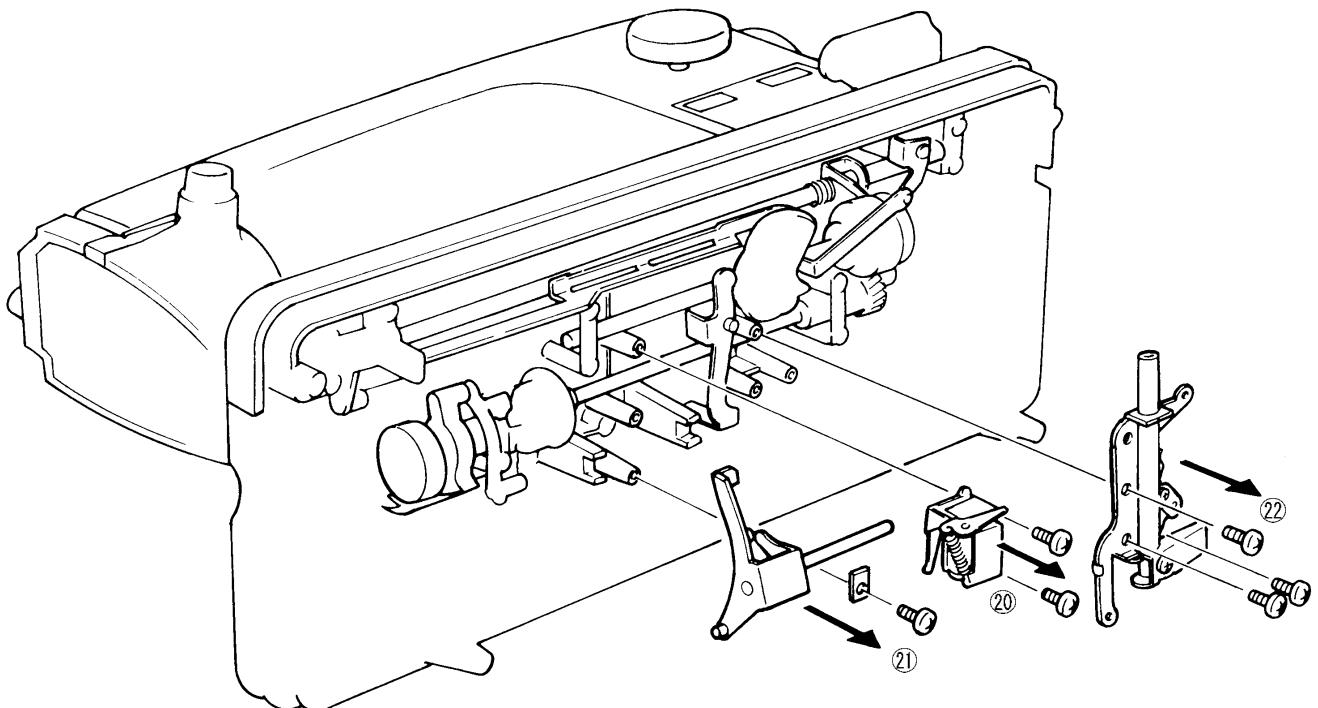
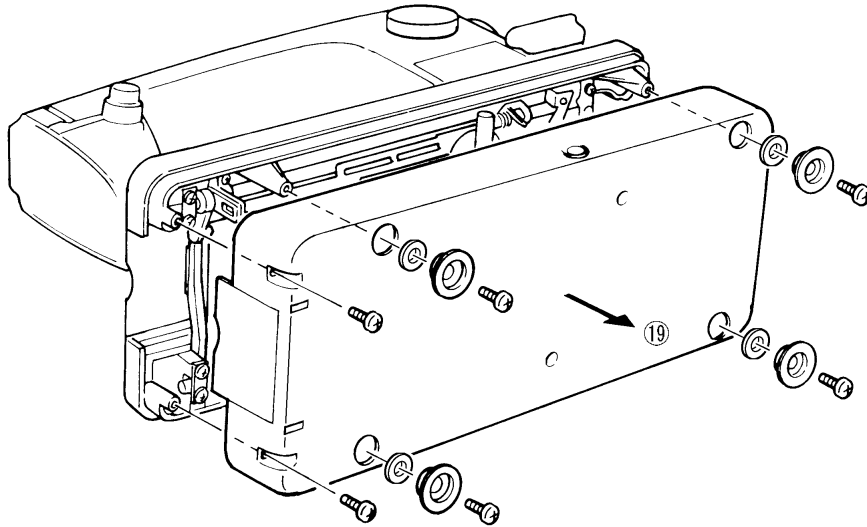
16. Remove drop operation panel, key tops and SW spacer.
17. Remove both screws from operations board assembly and remove it.
18. Remove both screws from switch holder and remove it.

Disassembly Point

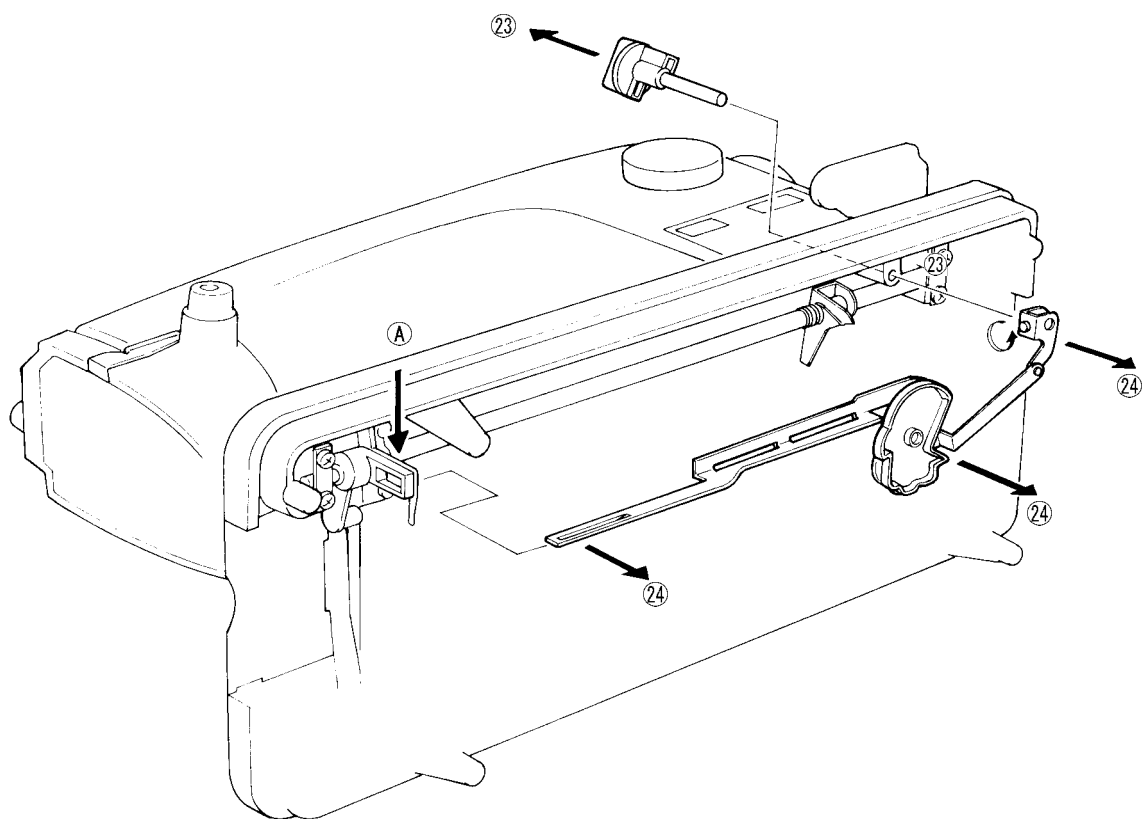
16. The back is attached by adhesive. Once removed, it cannot be reattached, so do not remove drop operation panel unless you need to replace the key tops or reverse stitching lever.



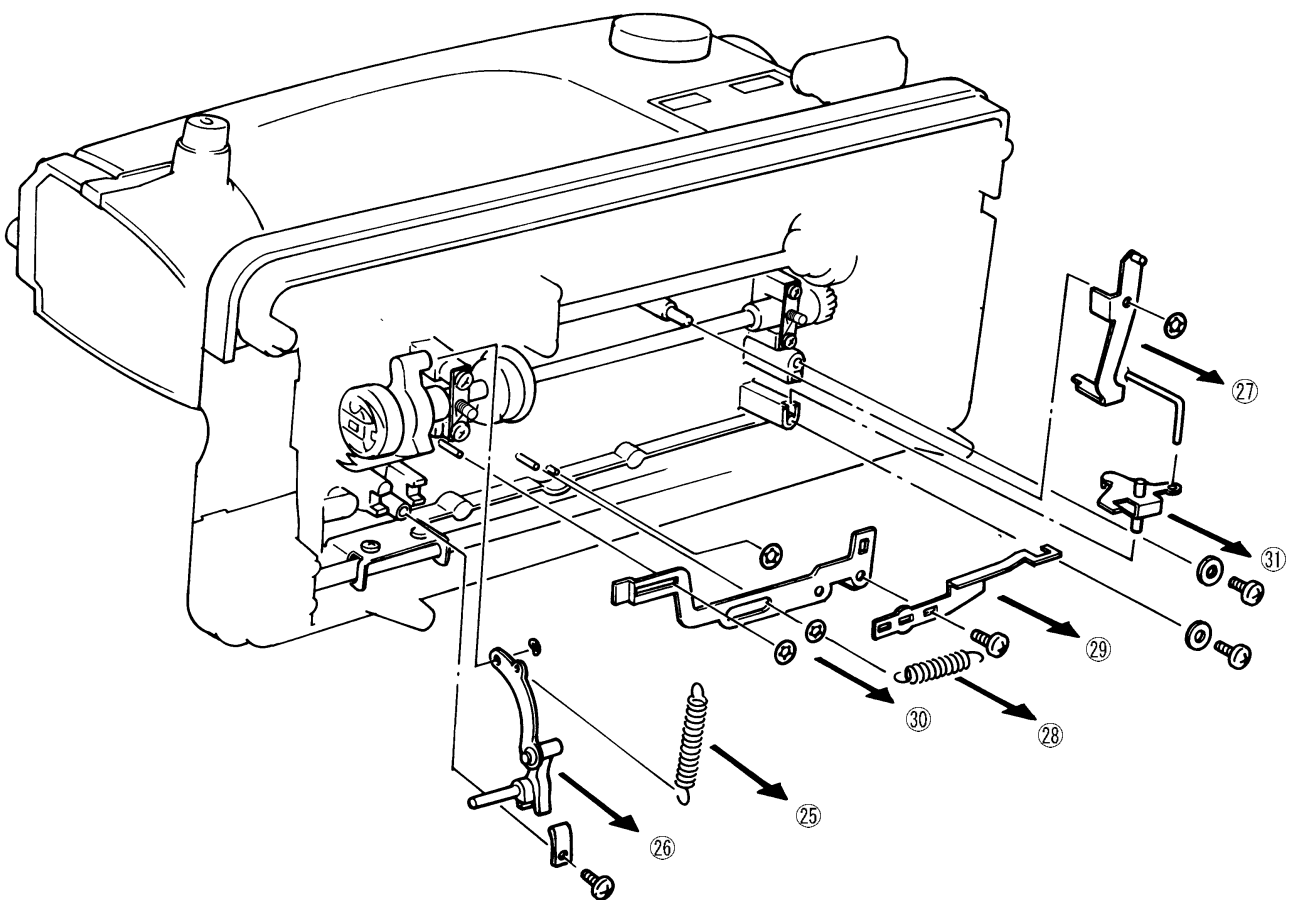
19. Lay machine down on its side on a flat, sturdy surface. Remove (6) screws from under cover. Remove (4) cushions. Pull under cover away from machine to remove.
20. Remove both screws from thread cutter solenoid. Remove both harness fixing CS retaining ring. Remove thread cutter solenoid.
21. Remove screw from thread cutter cam lever shaft. Remove shaft bracing plate and thread cutter cam lever.
22. Remove (3) screws from knee lifter shaft bracket and remove it.



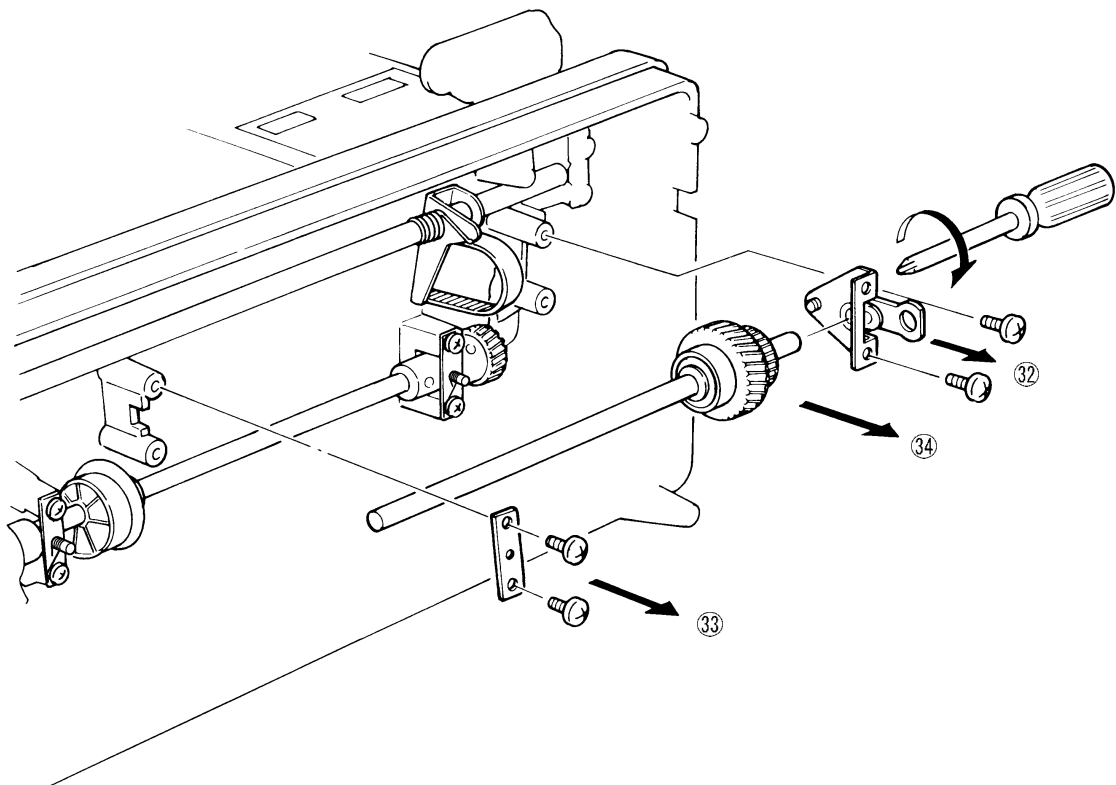
23. Loosen feed dog adjustment knob screw and remove knob.
24. Remove left side of UD exchange connecting rod from section "A". Remove lower needle cam, lower needle cam connecting rod, and knob axis lever.



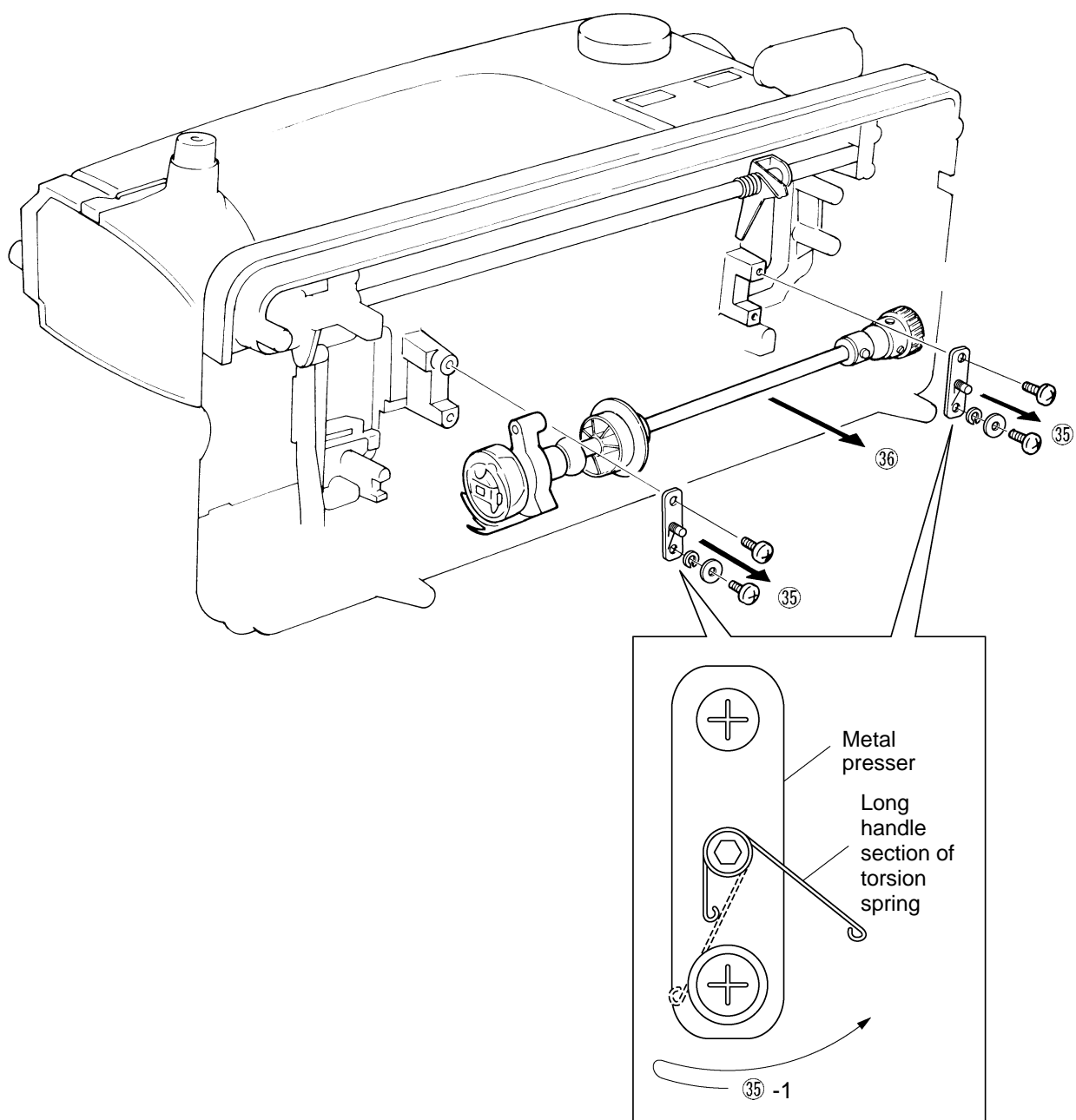
25. Remove spring of thread cutter connecting rod.
26. Remove thread cutter connecting rod, thread cutter holder fixing CS retaining ring, and thread cutter lever screws. Remove shaft bracing plate L, thread cutter lever and thread cutter connecting rod unit.
27. Remove lower needle exchange connecting rod fixing CS retaining ring. Remove lower needle exchange connecting rod.
28. Remove lower needle connecting rod spring.
29. Remove lower needle UD connecting rod screw. Remove lower needle UD connecting rod.
30. Remove all 3 fixing CS retaining rings from lower needle connecting rod. Remove lower needle connecting rod.
31. Remove both screws from claw lever. Remove both washers and claw lever.



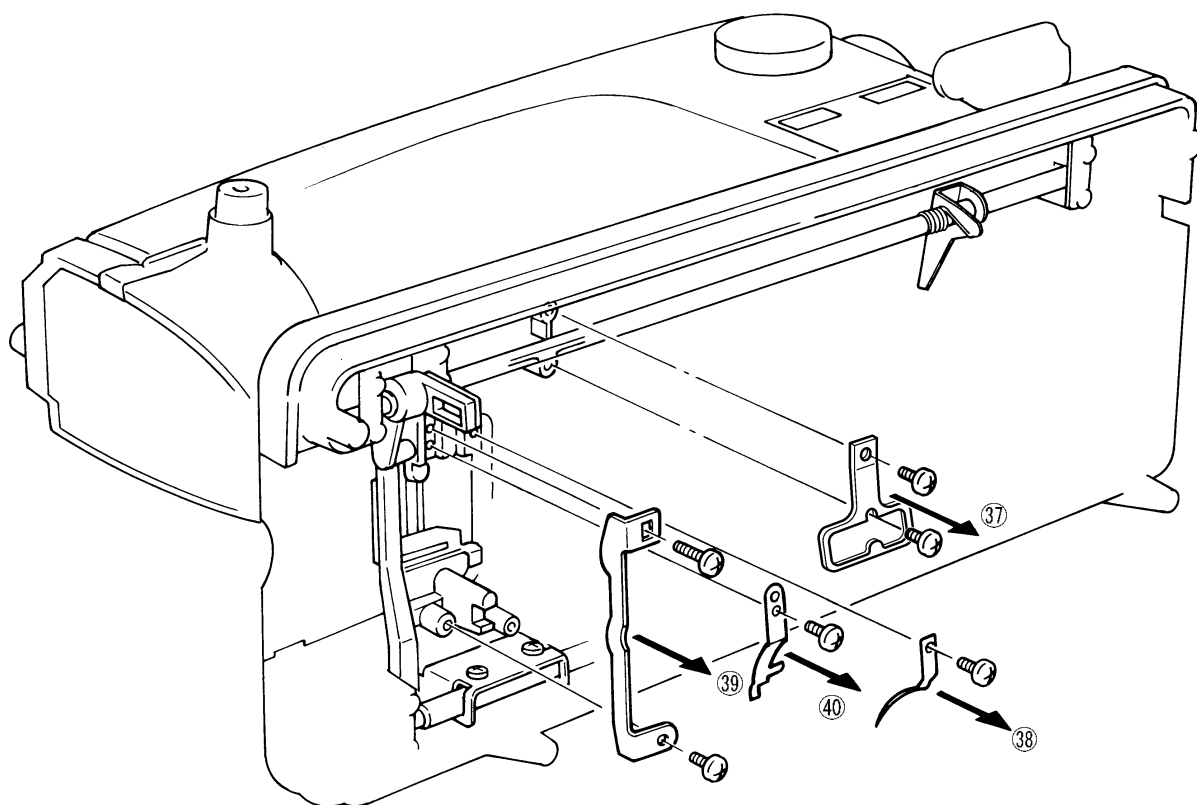
32. Unscrew and remove both panhead screws from tension regulator unit. Remove tension regulator unit.
33. Remove both screws from shaft bracing plate and remove it.
34. Slide Idle pulley assembly to the side and remove timing belt.



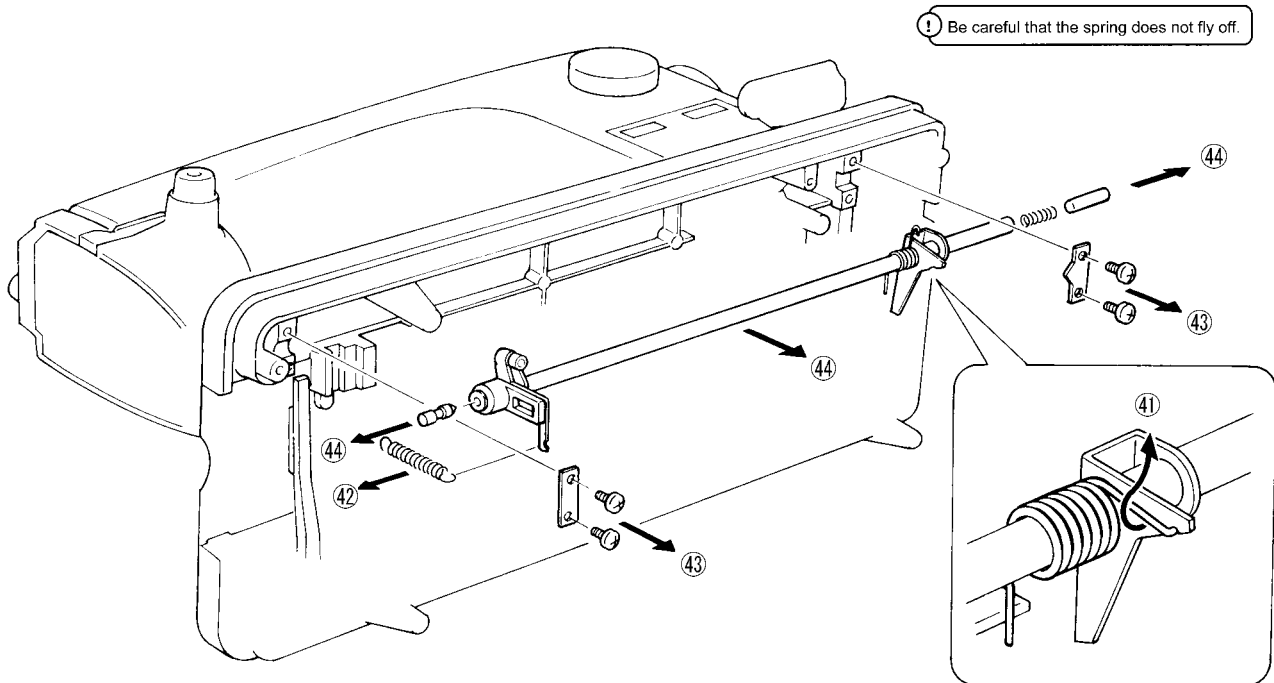
- 35-1. Remove the long handle section of the torsion spring from the receiving section.
- 35-2. Remove the four screws (two each left and right) holding the metal presser.
- *The screws that catch the handle section of the torsion spring each have one washer and one spring washer.
36. Remove lower shaft assembly.



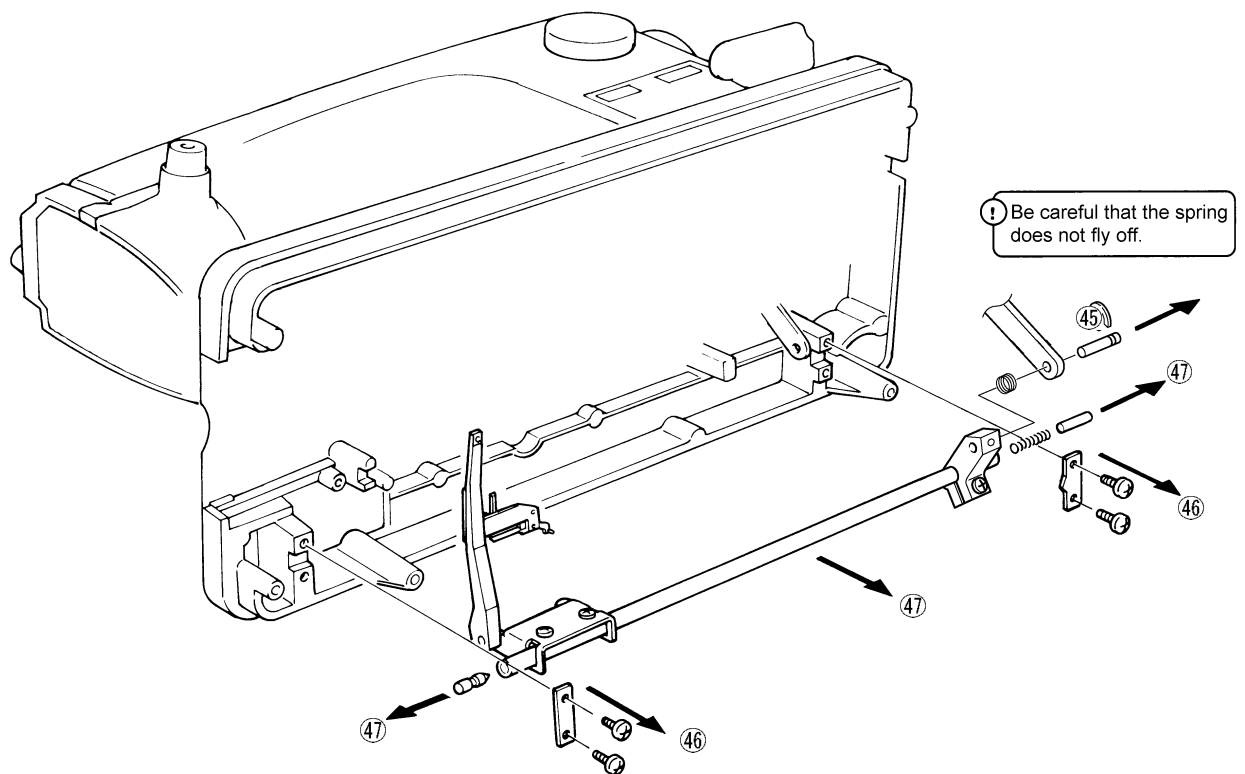
37. Remove screws from buffer plate and remove it.
38. Remove screw from thread manipulator and remove it.
39. Remove both screws from rotary hook bracket and remove it.
40. Remove screw from fixed blade and remove it.



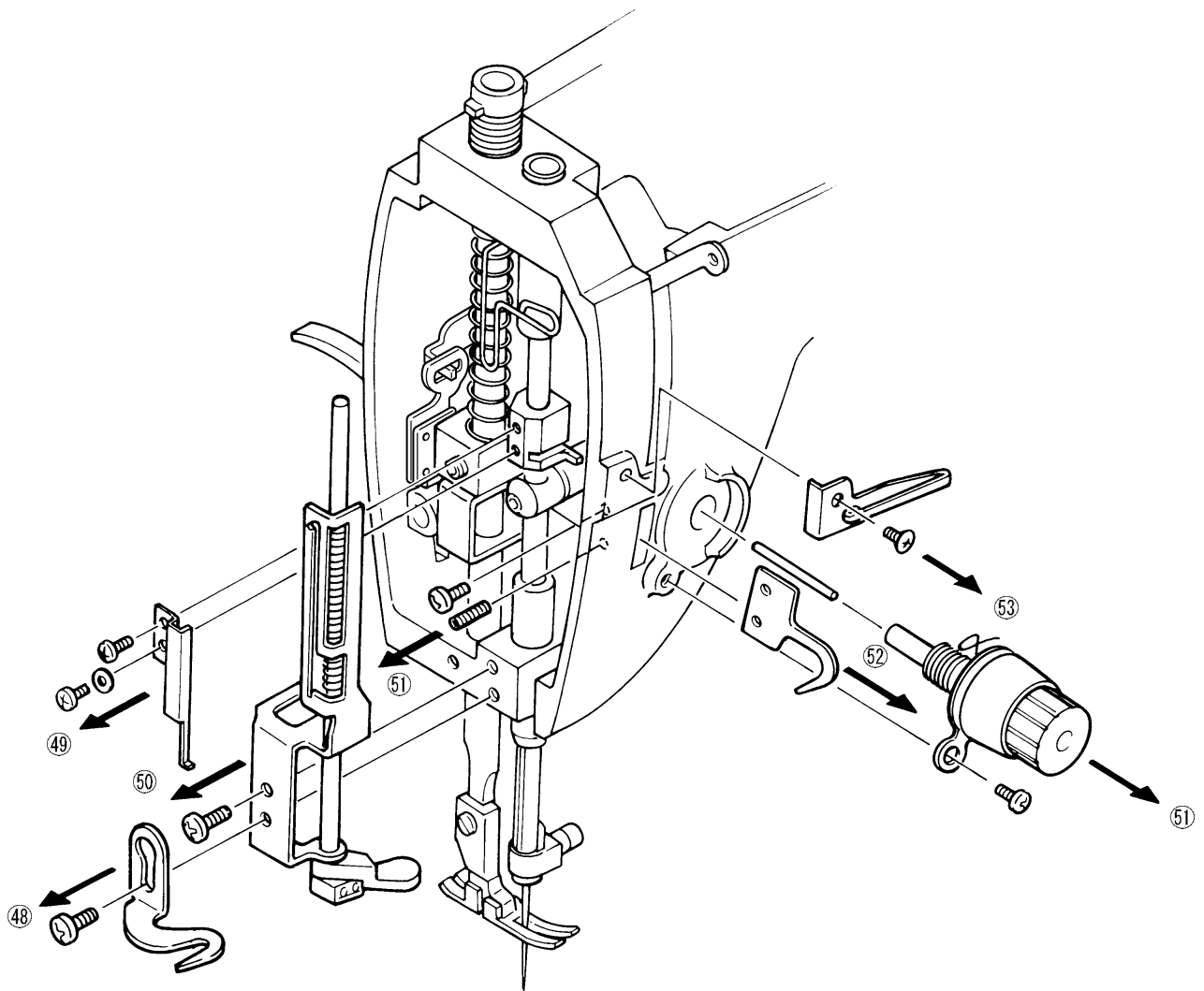
41. Remove end of UD feed cam spring from UD feed cam arm.
42. Remove spring.
43. Remove screws from both shaft bracing plate and remove shaft bracing plate.
44. While taking care that compressed spring does not fly off support shaft on side of pulley, remove UD feed shaft and center shaft, support shaft, and compressed spring.



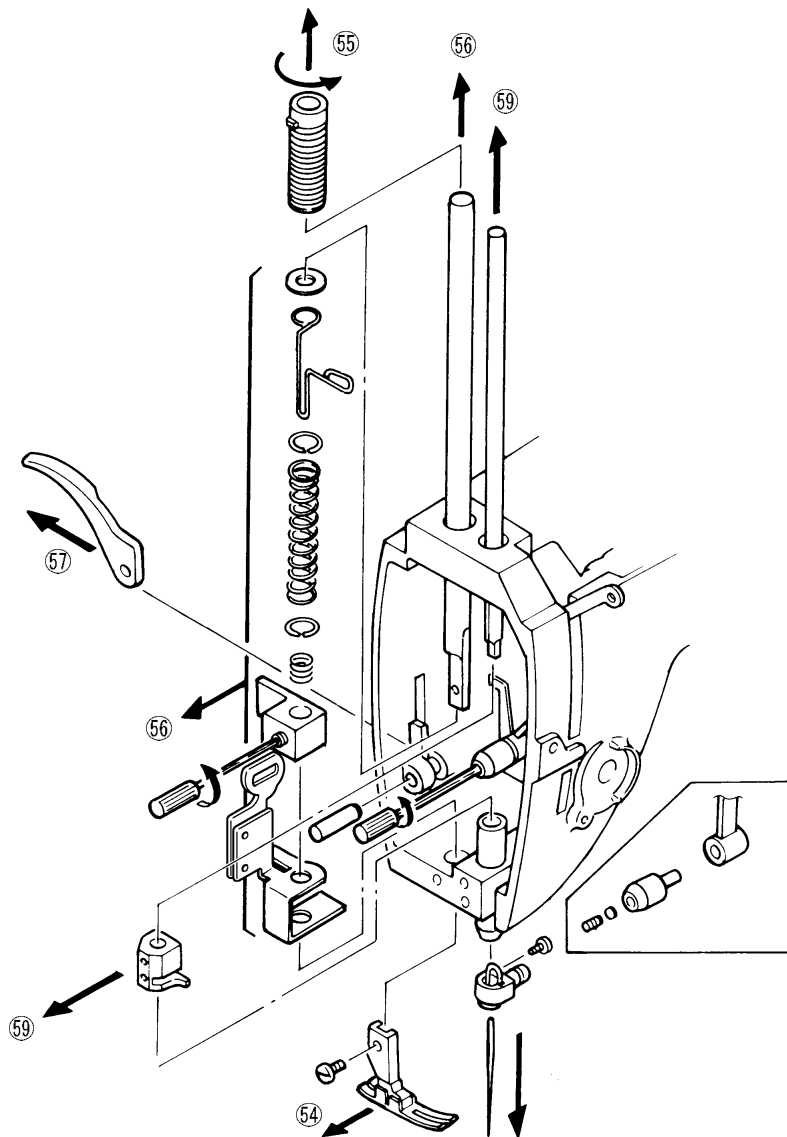
45. Remove E-shaped ring. Remove bottom of feed fork from horizontal feed arm.
46. Remove (4) screws from shaft bracing plates and remove both shaft bracing plates.
47. While being careful that compressed spring does not fly off support shaft o side of the hand wheel, remove center shaft, support shaft, and compressed spring of horizontal feed shaft.



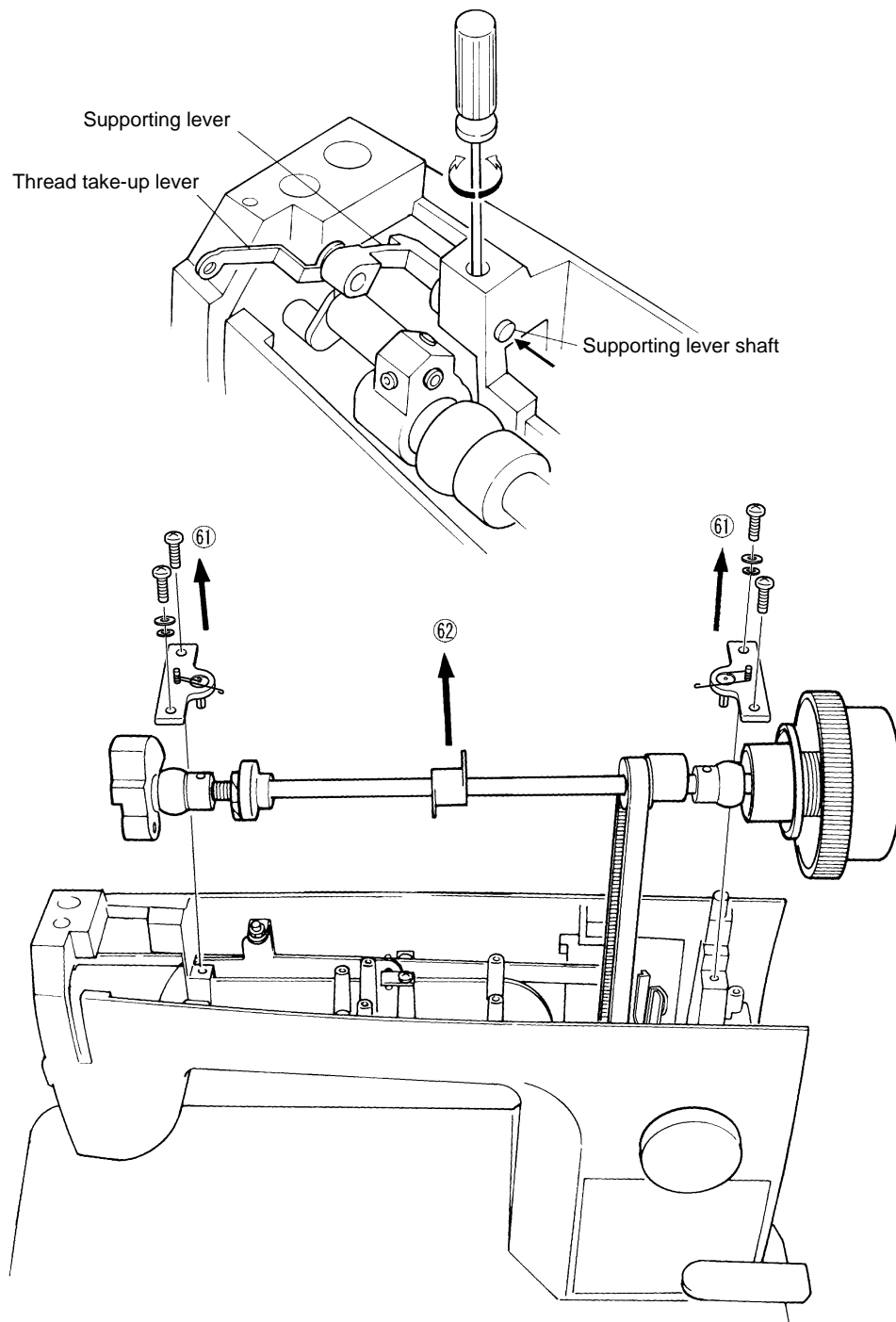
48. Remove screw from face plate thread guide and remove it.
49. Remove screws from ranging board and remove it.
50. Remove screws from needle threader assembly and remove it.
51. Remove tension block bar set screw from side facing the face plate.
Remove tension block disc A screw. Remove tension block.
52. Remove screw from tension spring thread guide and remove thread guide.
53. Remove screw from thread guide plate and remove it.



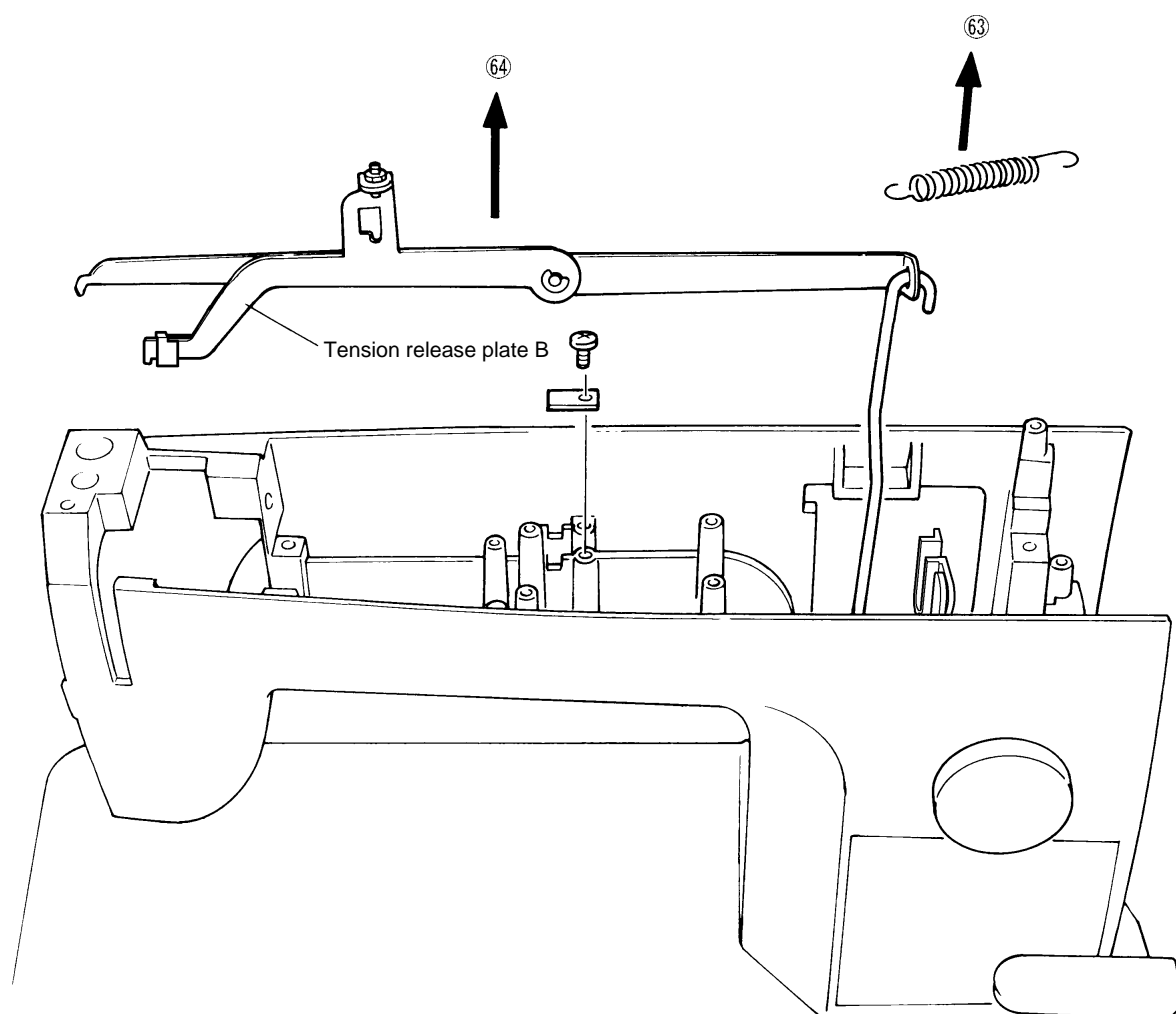
54. Remove screw from sewing foot and remove foot.
55. Unscrew presser foot adjustment screw and remove it.
56. Loosen presser bar clamp set screw . Remove presser bar. Remove presser spring U, presser spring D, presser spring washer, guide rod, and presser bar clamp presser bar lift.
57. Remove stud for presser foot lift to the side, and remove foot lift to the back.
58. Loosen needle clamp screw, and remove needle. Loosen needle bar thread guide screw. Remove needle clamp assembly needle stabilizing board and needle bar thread guide.
59. Loosen needle bar clamp set screw and needle threader position setter screws. Remove needle bar Remove needle threader position setter. Remove needle bar clamp from needle bar crank rod. While doing this, be careful that the washer on the end of the needle bar clamp set screw does not fall off.



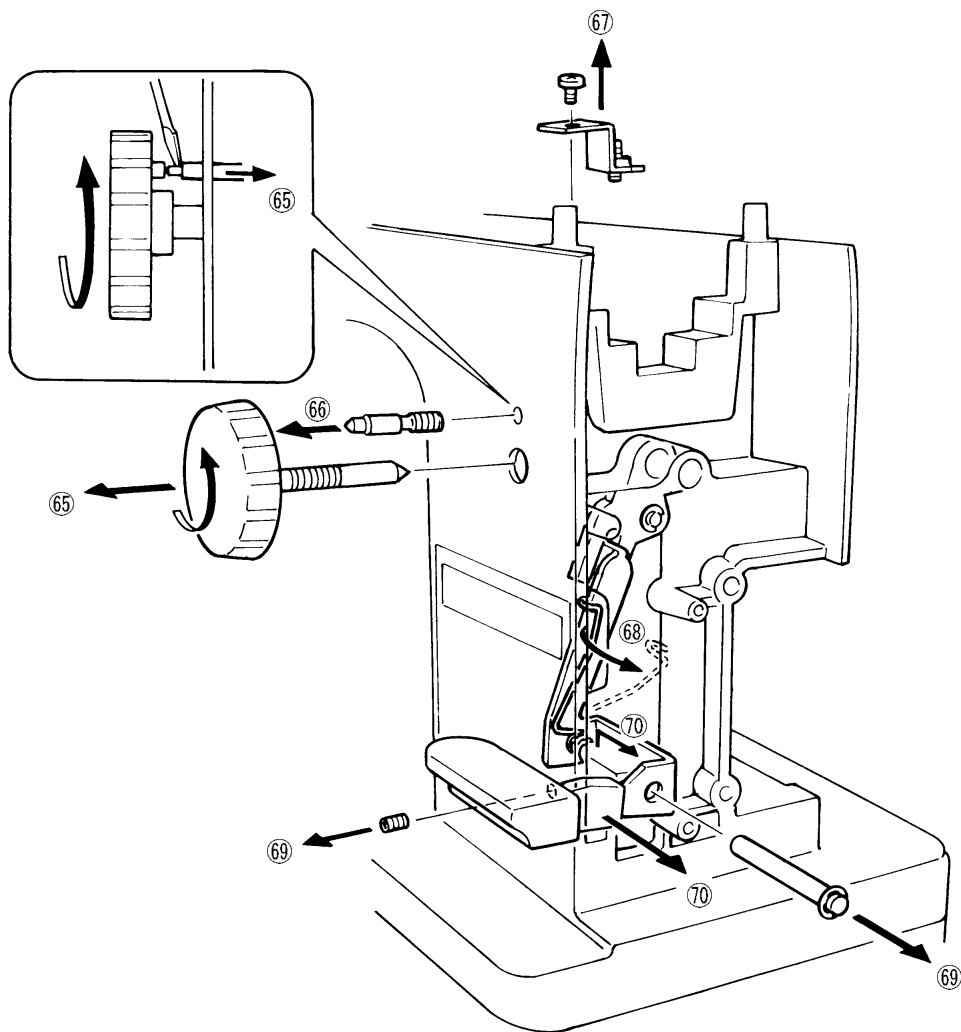
60. Loosen needle bar crank screws (2). Slide needle bar crank to the left and remove thread take-up lever support.
- 61-1. Remove the long handle section of the torsion spring from the receiving section. (See the illustration on Page 18.)
- 61-2. Remove the four screws fastening the presser plate (two each left and right).
*The screws that caught the handle section of the torsion spring each have one washer and one spring washer.
62. Remove upper shaft assembly.



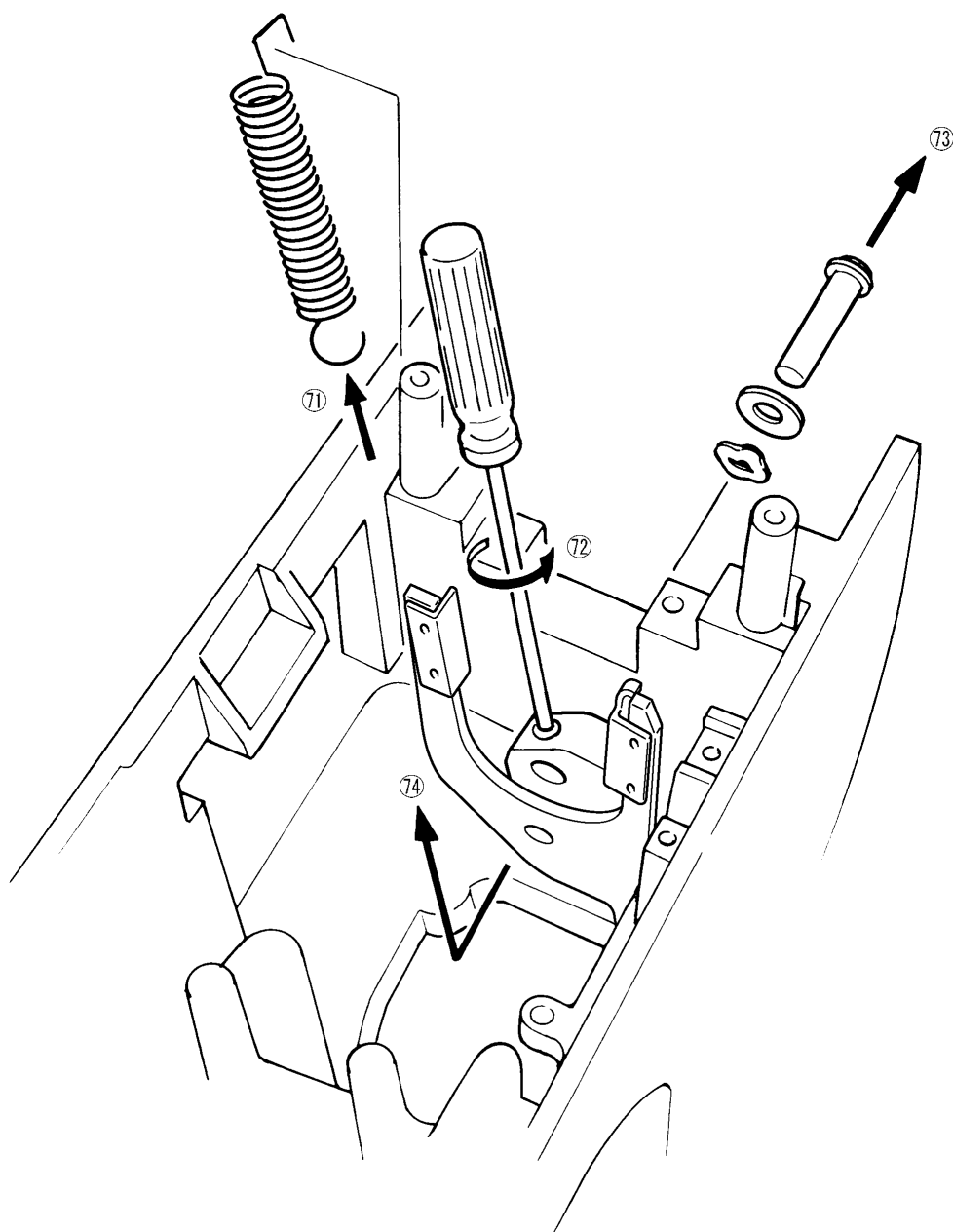
63. Remove spring. (If the spring that should have been removed in step 7 is remaining.)
64. Remove screw from shaft bracing plate and remove it. Remove knee control lever, tension release plate B and knee control drag link.



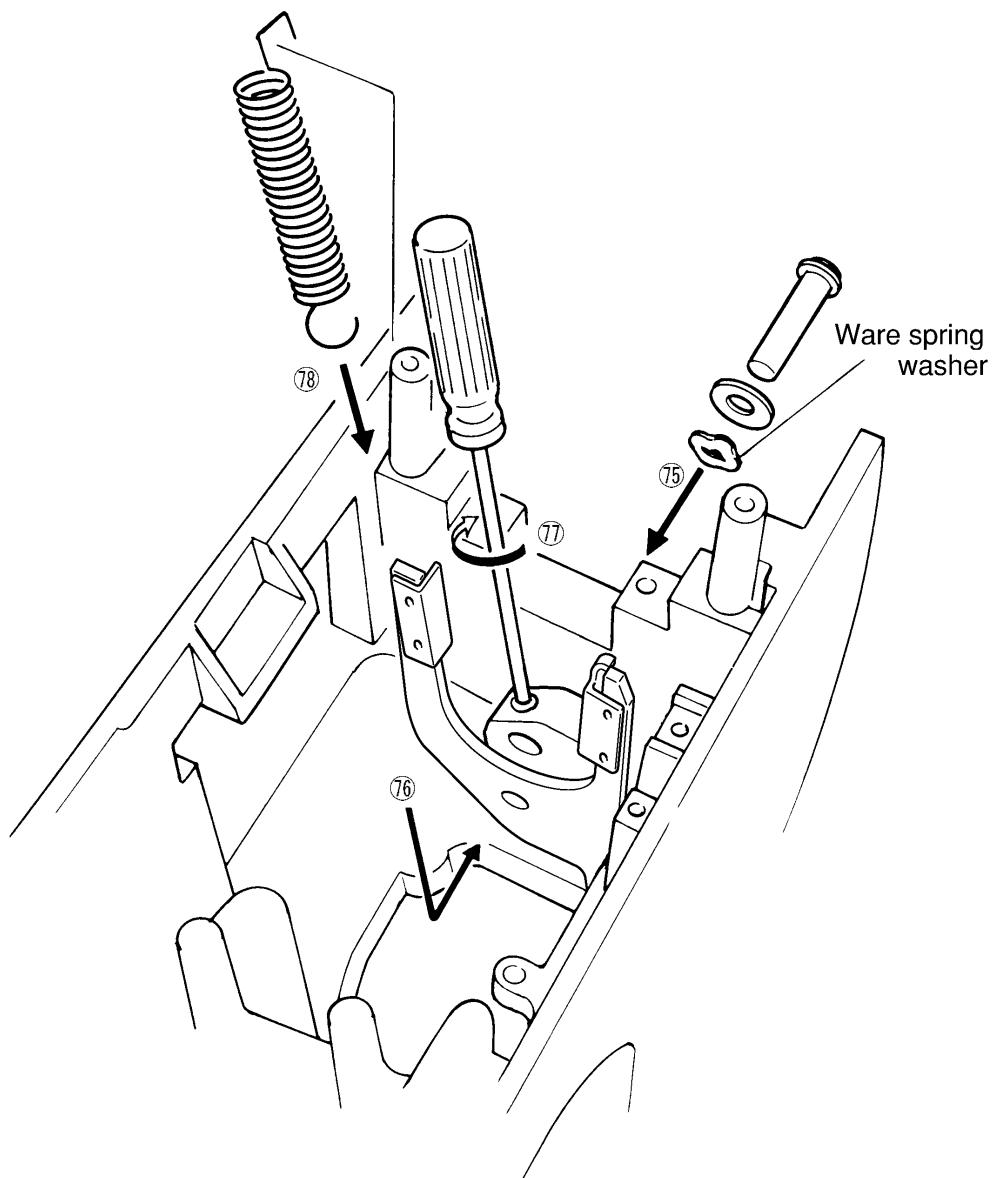
65. Push knob position reading pin in with a standard screwdriver and unscrew stitch length regulator to the left to remove.
66. Remove knob position reading pin and compressed spring.
67. Remove screw from stitch length regulator brace and remove it.
68. Remove spring side of exchange lever spring from exchange lever.
69. Remove set screw from exchange lever shaft, and remove exchange lever shaft.
70. Remove exchange lever and exchange lever spring.



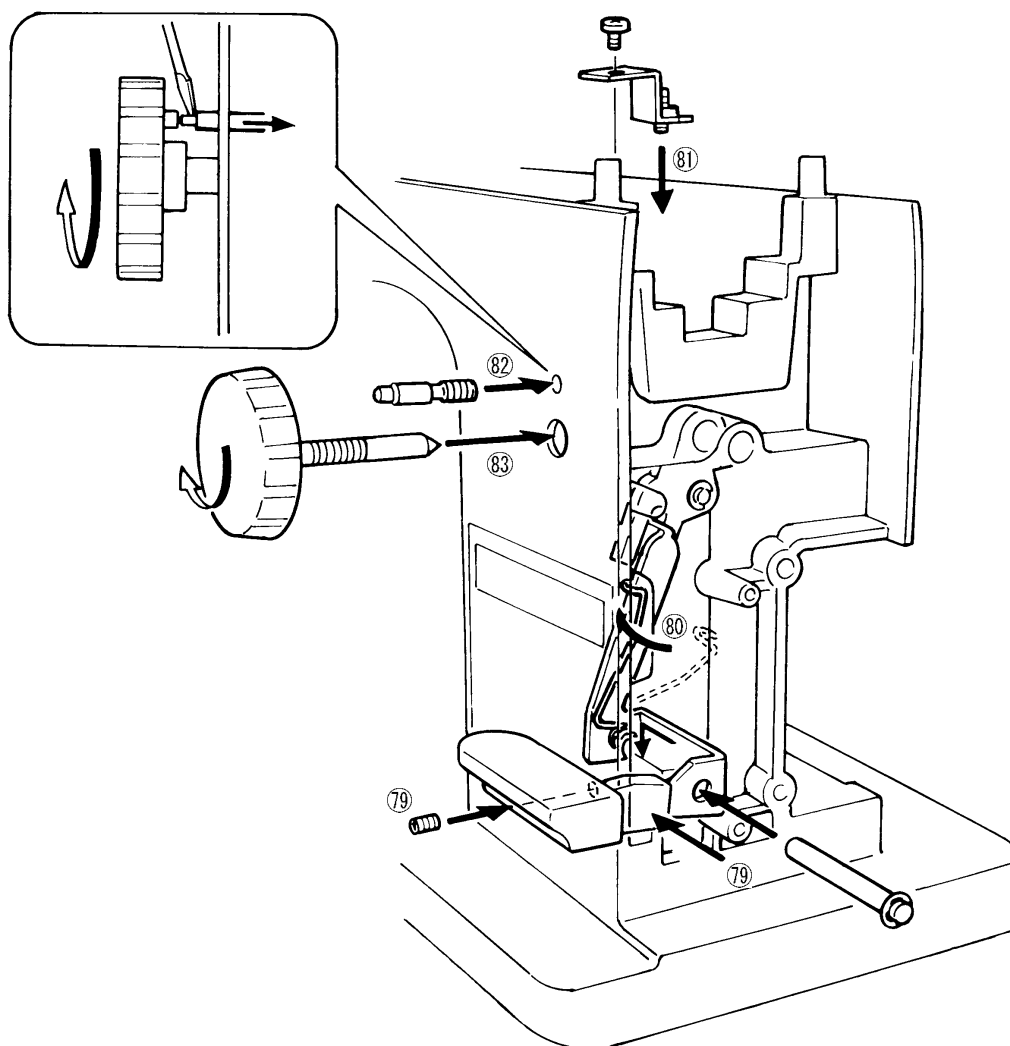
71. Remove spring.
72. Loosen feed regulator shaft set screw.
73. Remove feed regulator shaft and washers.
74. Lift out feed fork assembly.



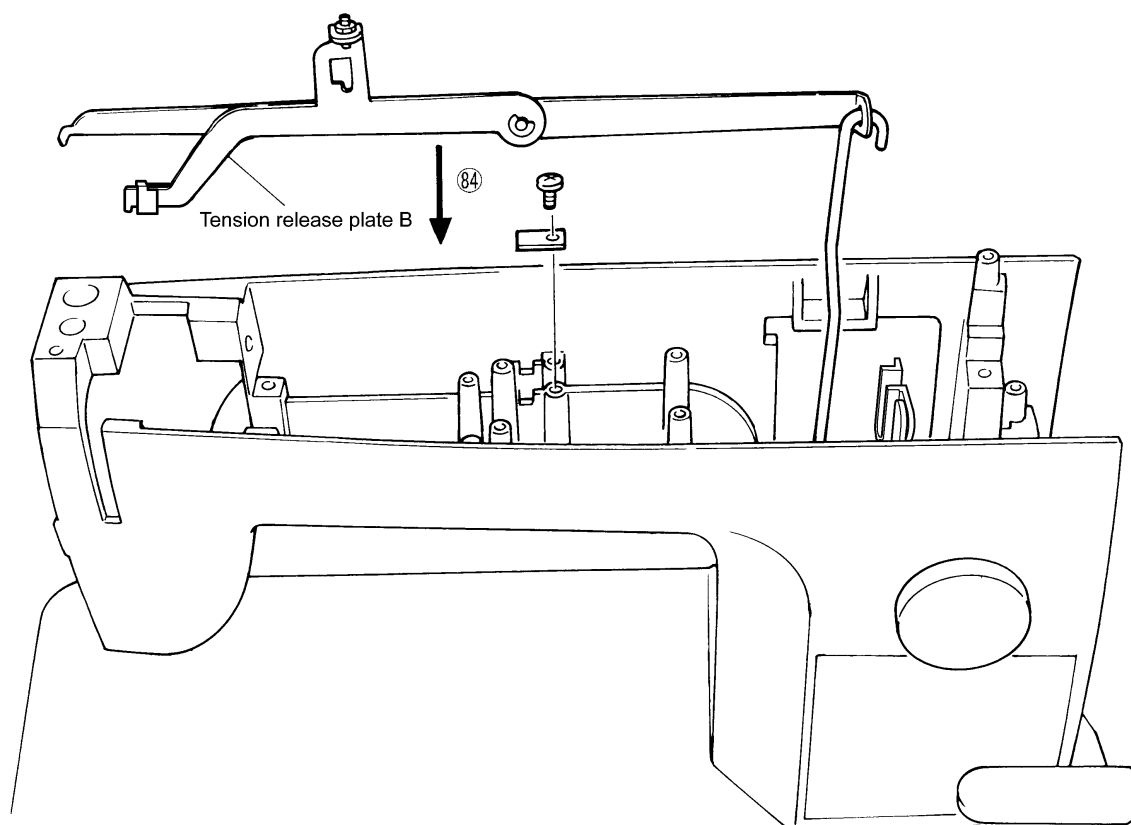
75. Fit wave spring washer and regular washer to feed regulator shaft, and run feed regulator shaft through hole in arm.
76. Insert feed fork assembly from the top, and insert into feed regulator shaft.
77. While keeping wave spring washer compressed, fix in place with feed regulator shaft set screw. (Until the feed regulator shaft turns freely.)
78. Hook up spring between arm and feed regulator.



79. Insert exchange lever and exchange lever spring from the outside through the hole in the arm, fasten to exchange lever shaft with set screw.
80. Attach spring end of exchange lever spring to exchange lever.
81. Attach stitch length regulator brace to arm with screws.
82. Attach knob position reading pin and compressed spring to arm.
83. Screw stitch length regulator knob into arm by turning it to the right. Lastly, screw in knob position reading pin.



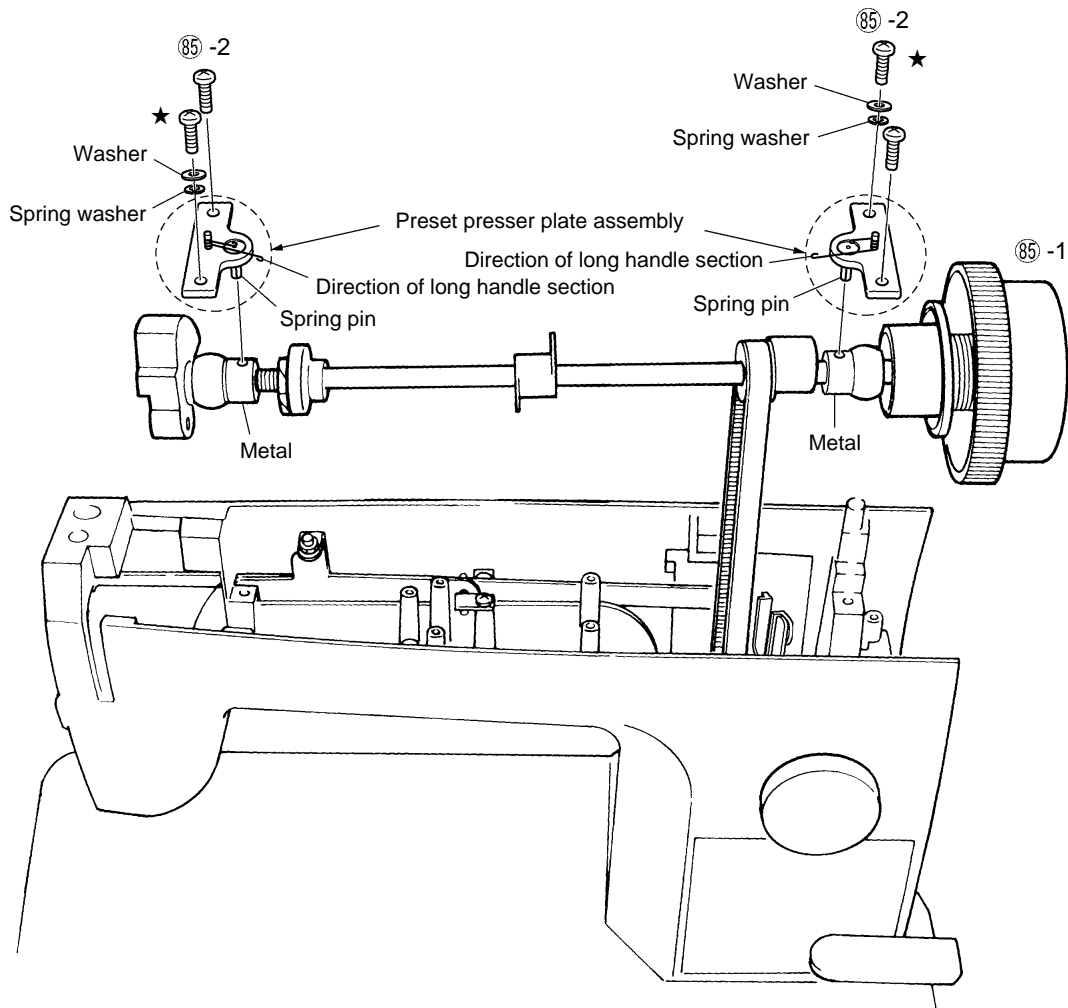
84. Attach knee control lever and tension release plate B assembly to arm with shaft bracing plate and screw.



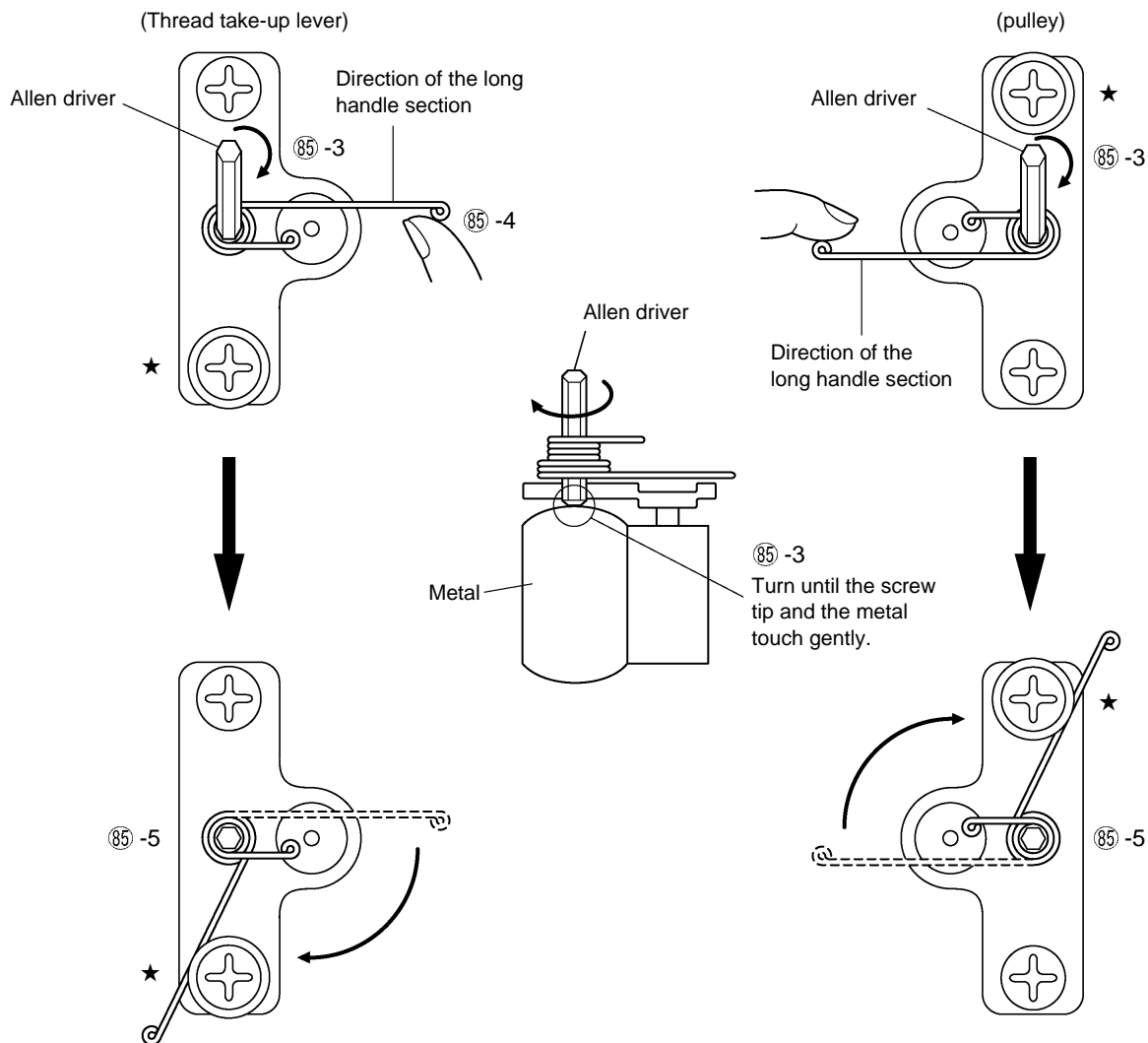
85. Fasten the upper shaft to the arm according to the procedure in 85-1 through 85-5.
- 85-1. Pass the timing belt over the upper shaft, then set the upper shaft assembly on the arm. At this time, the small hole in the upper shaft metal side should face straight up.
- 85-2. Before starting this step, place one washer and one spring washer on each of the screws at the position marked with *.
- Face the long handle section of the torsion spring in the preset (*) presser plate assembly in direction shown in the figure, then place the spring pin of the presser plate into the small hole in the upper shaft metal side and fasten with the two screws.

Critical

- * Preset the distance the presser screw sticks out before installing the presser plate assembly. If you leave out this operation, the metal can be damaged when the upper shaft is installed and seizing can result. For details on this procedure, see "Metal Presser Assembly Presetting Procedure" on Page 33.

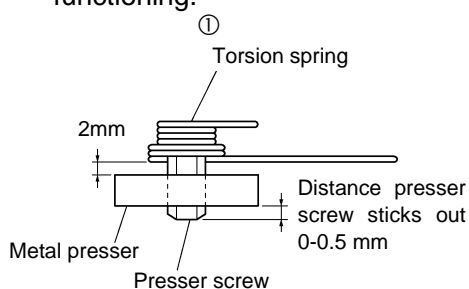


- 85-3. While using your fingers to hold the long handle section of the torsion spring facing the direction shown in the figure, turn the presser screw clockwise with the Allen driver until the tip of the screw gently touches the metal (*).
- * If you turn the screw too far, this will damage the presser.
- 85-4. Remove the Allen driver, turn the long handle section of the torsion spring with your fingertips and check that when the screw tip gently touches the presser, the direction of the long handle section is about the same as that shown in the figure (*).
- * If the direction is incorrect, correct it according to the instructions in "How to Change the Direction of the Long Handle Section after Mounting on the Arm Bed" on Page 33. If you assemble with this direction still incorrect, this causes seizing of the metal and play in the shaft.
- 85-5. While deflecting the long handle section of the torsion spring, place under the washer at the position marked *.
86. Turn the presser screw counter clockwise about 45 degrees with the Allen driver, then check that when you release your hands the force of the spring returns the assembly to its original angle. (This checks that the spring is functioning.)

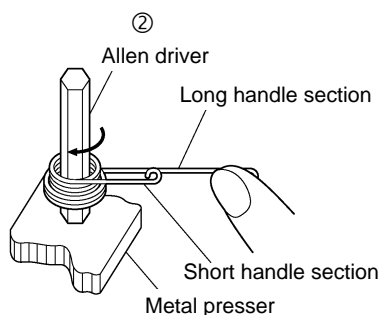


■Metal presser assembly presetting procedure

- ① Set the clearance between the torsion spring long handle section and the metal presser to about 2 mm. (Figure 1)
- ② Fasten the metal presser and while holding either the long handle section or short handle section of the torsion spring so that it does not turn, turn the presser screw with the Allen driver and set the distance that the tip sticks out to 0-0.5 mm. The direction to turn the Allen driver and which handle of the spring, the short or the long, to hold depends on whether you are increasing the distance the screw sticks out or decreasing it. (Figure 2a, Figure 2b)
- * If you turn the Allen driver other than as explained, this can deform the spring and damage its functioning.

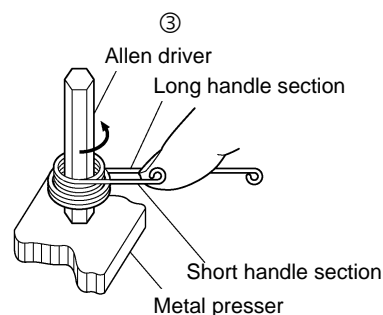


(Figure 1)



Increasing the distance the presser screw sticks out

(Figure 2a)



Decreasing the distance the presser screw sticks out

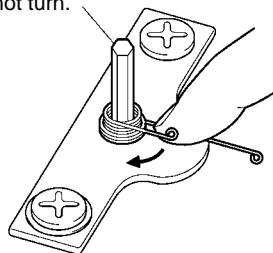
(Figure 2b)

■How to change the direction of the long handle section after mounting on the arm bed

(When you want to turn the long handle section clockwise)

Hold the presser screw with the Allen driver so that it does not turn and turn the short handle section clockwise with your fingertips.

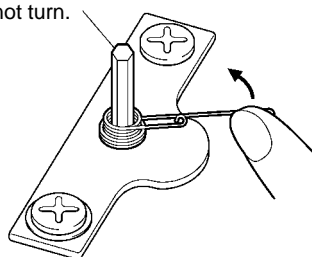
Hold the screw with the Allen driver so that it does not turn.



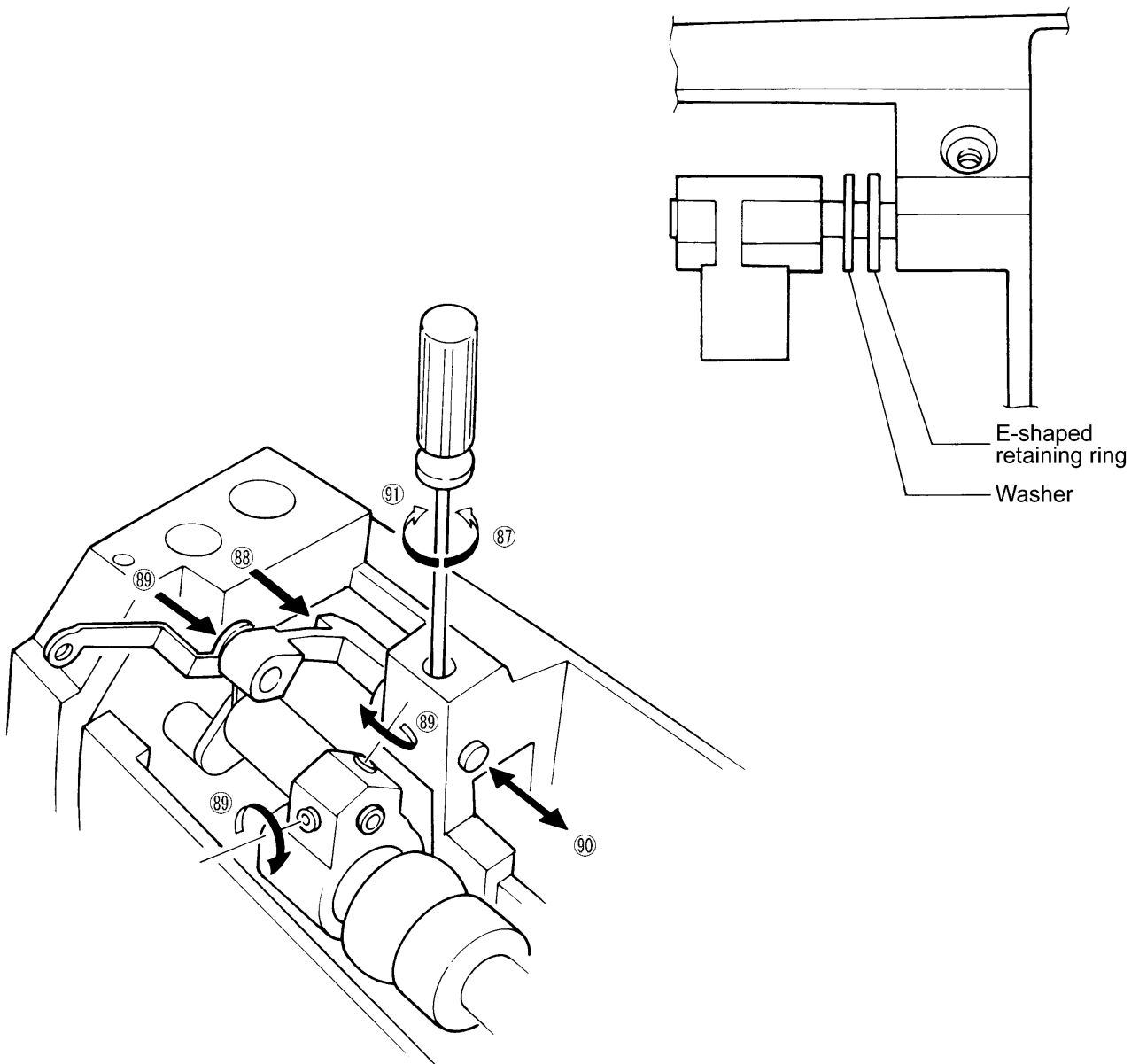
(When you want to turn the long handle section counter-clockwise)

Hold the presser screw with the Allen driver so that it does not turn and turn the long handle section counter-clockwise with your fingertips.

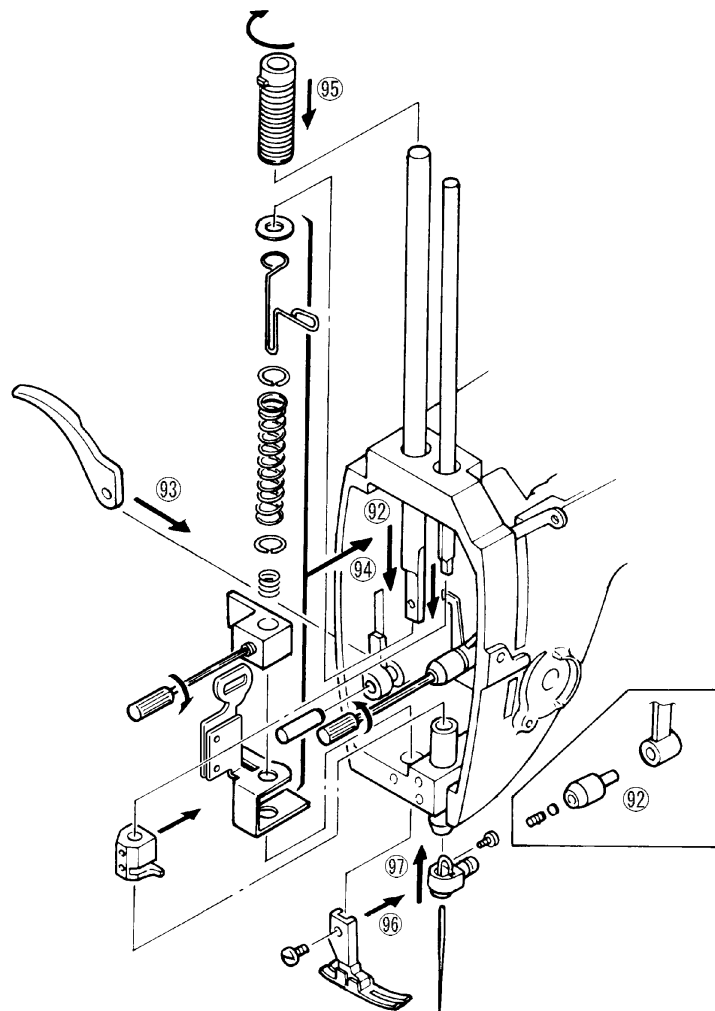
Hold the screw with the Allen driver so that it does not turn.



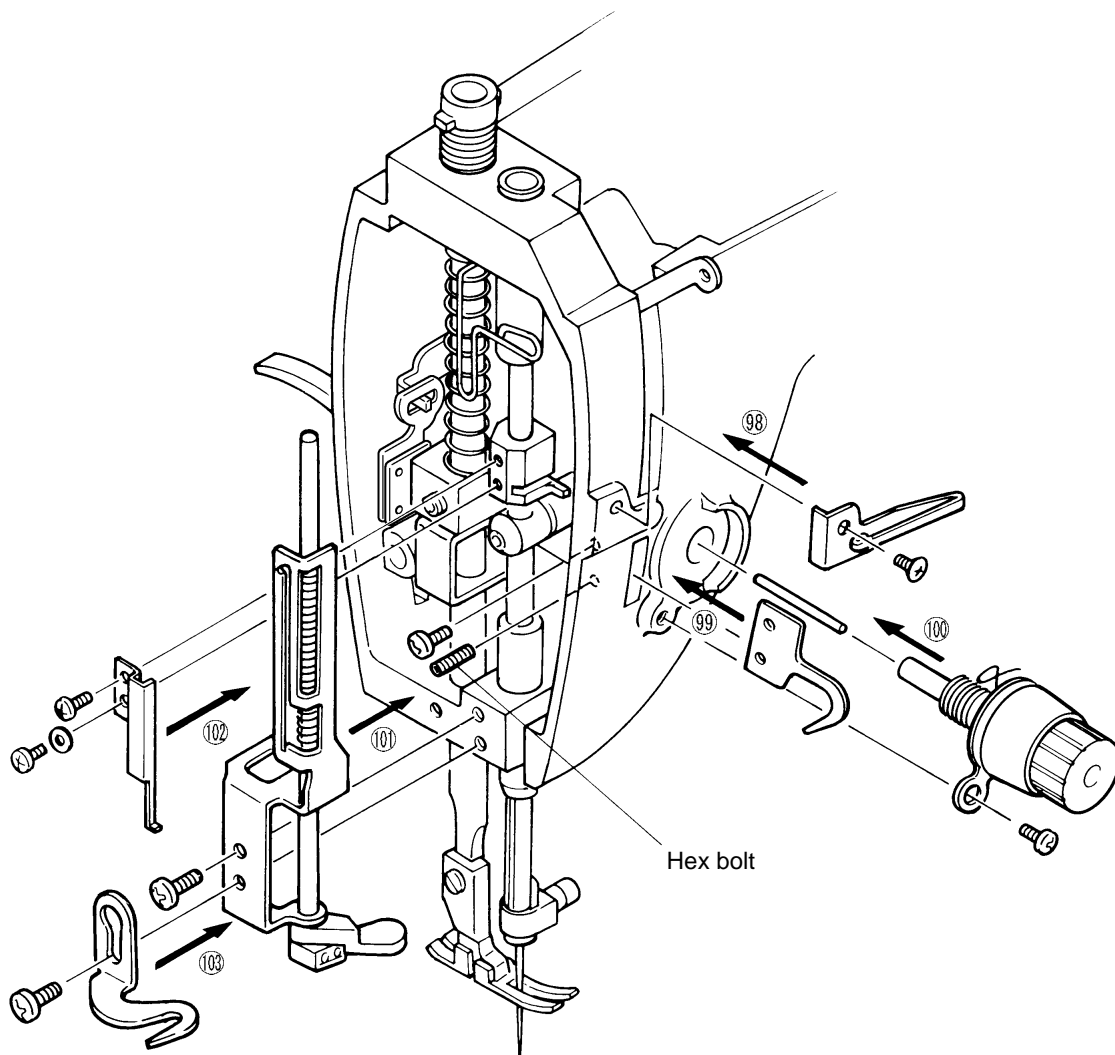
87. Loosen thread take-up lever stud set screw.
88. Attach thread take-up lever support with thread take-up lever stud. Stud should pass through E-shaped retaining ring, washer, as shown in diagram.
89. While taking care that needle bar crank is set to designated position and lines up properly with thread take-up crank, fasten securely with screws in two places. Then attach thread take-up lever shaft and thread take-up lever support hole.
90. Refer to [Adjustments 11] for instructions on how to adjust left-right direction of thread take-up lever stud.
91. Fasten thread take-up lever stud set screw securely.



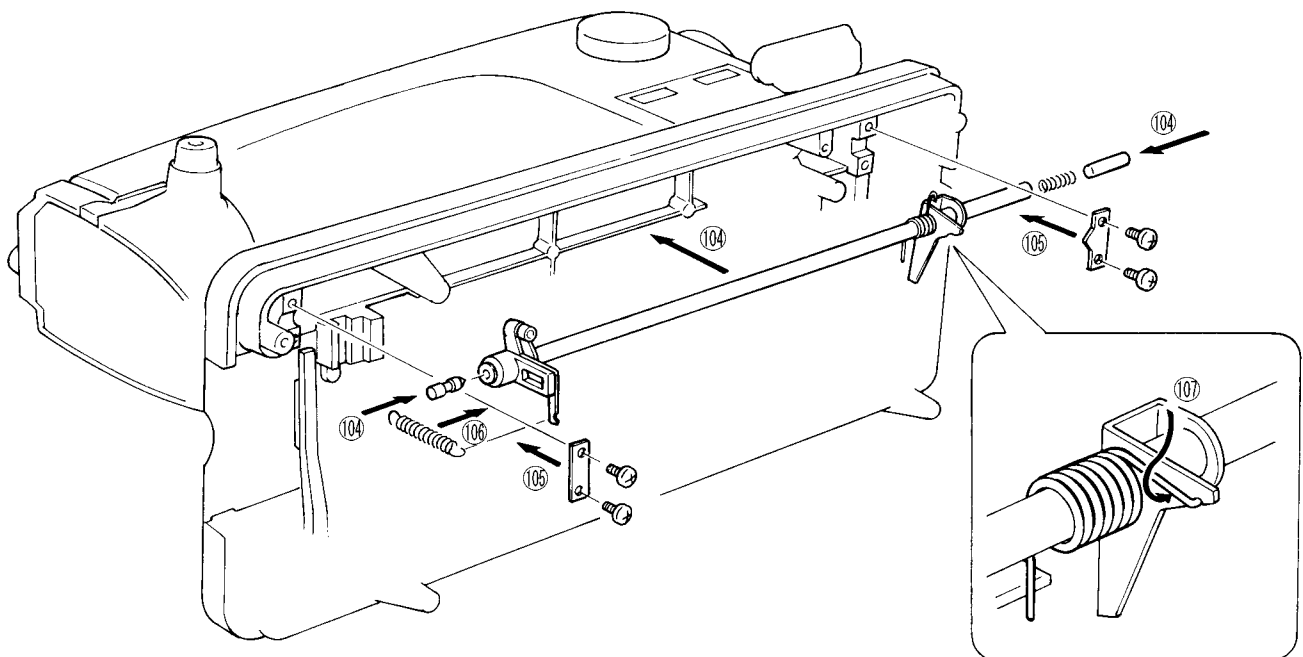
92. Attach needle bar clamp to needle bar crank rod. Pass needle bar through needle bar brace U, needle threader position setter, needle bar clamp and needle bar brace D, in that order. After inserting washer in screwhole, temporarily fasten needle bar clamp screws.
93. Attach foot lift to arm via presser lifting shaft.
94. Pass presser bar through arm through at the top of the foot adjustment screw screwhole. At this time, pass presser bar clamp and presser bar lift through presser bar adjacent to designated position. Then, add presser spring D, presser spring washer and presser spring U to presser bar, in that order, from the top of the bar. Push presser spring U downwards to make room between top of presser bar and inside of arm. Attach needle bar rod and poly-slide to presser bar. Next, add presser spring washer to presser bar from the top of bar.
95. Screw in foot adjustment screw.
96. Attach foot to presser bar with presser foot screw. Refer to [Adjustments 10] for instructions on adjusting height of foot lift.
97. Attach needle clamp assembly, needle bar thread guide and incorrect needle insertion prevention plate to needle bar. Fix in place with needle bar guide screw.



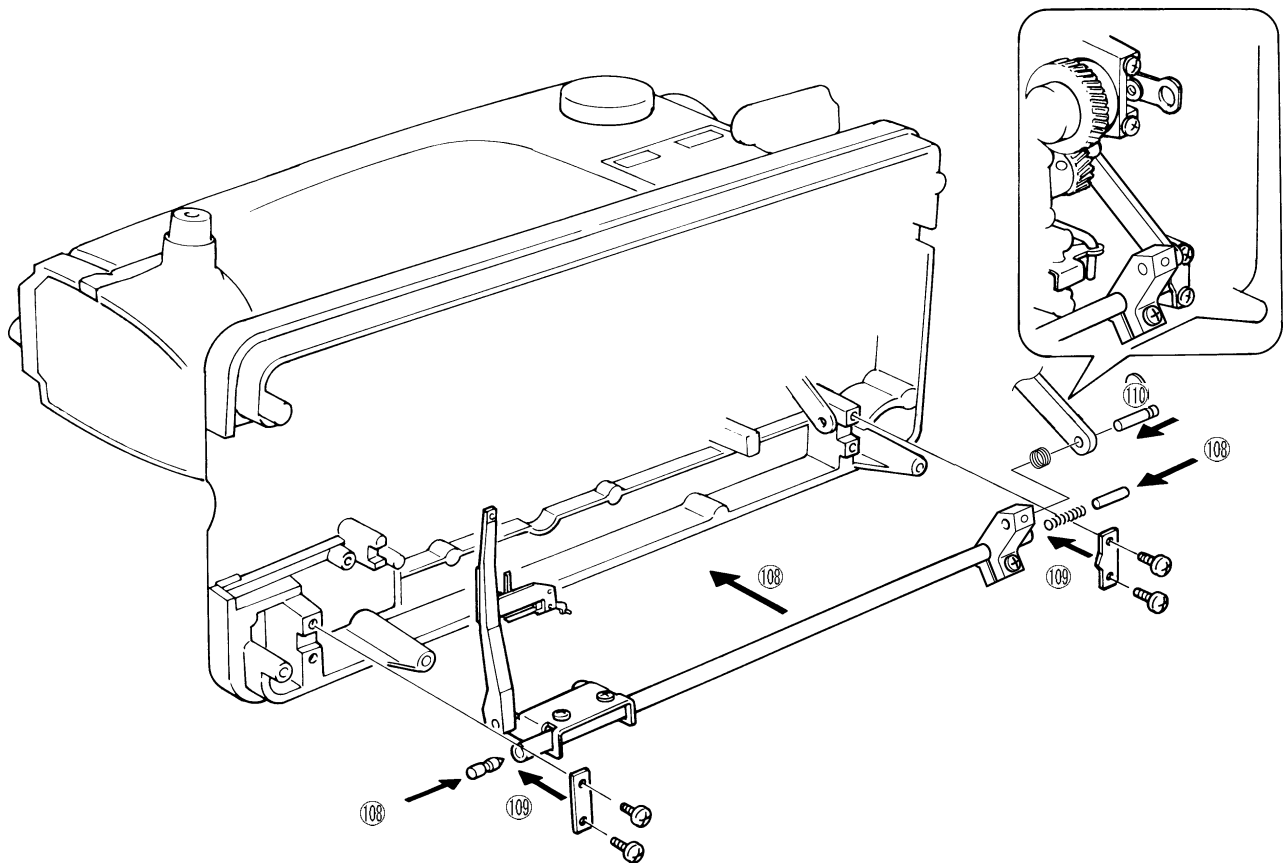
98. Attach thread guide plate to arm with screw.
99. Attach thread take up spring thread guide to arm with screw.
100. Insert tension release pin into tension block bar, then attach tension block to arm. Fasten tension block to arm with tension block bar set screw and tension block disc A screws. Refer to [Adjustments 13] and [Adjustments 14] for instructions on adjusting stroke and tension of tension spring.
101. Attach needle threader assembly to arm with screws.
102. Temporarily fasten ranging board to needle threader position setter with 2 screws. (See 135 for adjustments.)
103. Attach face plate thread guide with screws.



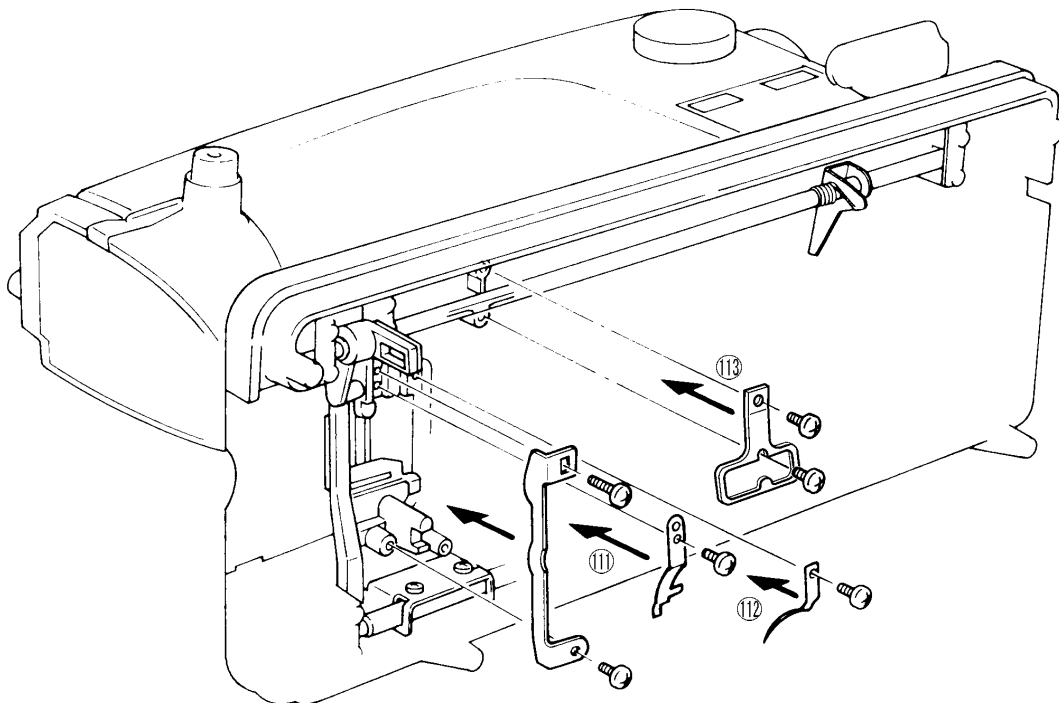
104. Attach center shaft to face plate side of UD feed shaft. Attach compressed spring and support shaft to pulley side. While pushing in support shaft, attach UD feed shaft to bed.
105. Attach both shaft bracing plates, with two screws each.
106. Hook up spring between UD feed adjustment arm and feed bar.
107. Attach end of UD feed cam spring to UD feed cam arm.



108. Attach center shaft to face plate side of horizontal feed shaft. Attach compressed spring and support shaft to hole on pulley side. While pushing in support shaft, attach horizontal feed shaft to bed.
109. Attach both shaft bracing plates with 2 screws each. Refer to [Adjustments 9] for instructions on adjusting left-right direction of feed dogs.
110. Use screw to attach the horizontal feed shaft set in hole at bottom of the horizontal feed arm and feed fork with E shaped retaining ring.



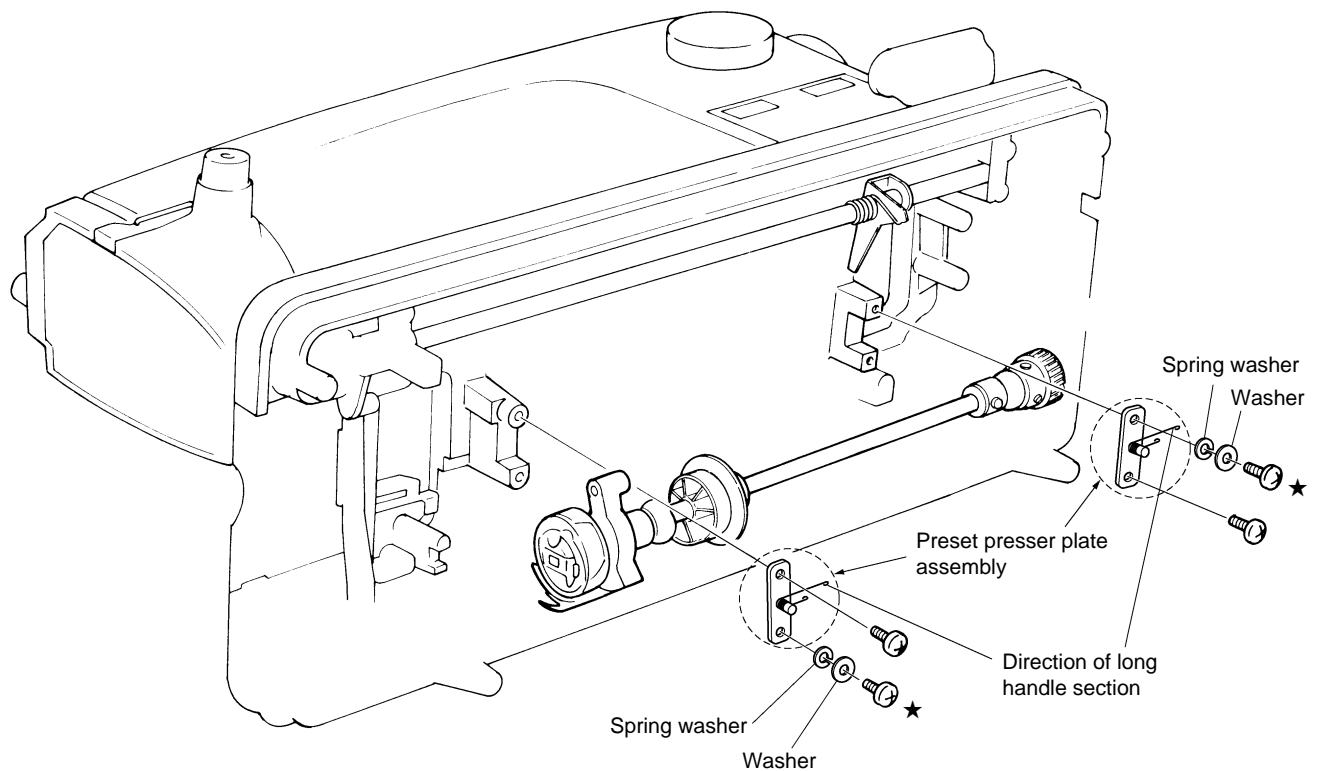
111. Fasten fixed blade to bed with screws (See 136 for height adjustment.)
112. Fasten thread manipulator temporarily to bed with screws. (See 136 for adjusting position.)
113. Attach buffer plate to bed with screws. (See 131 for height adjustment.)



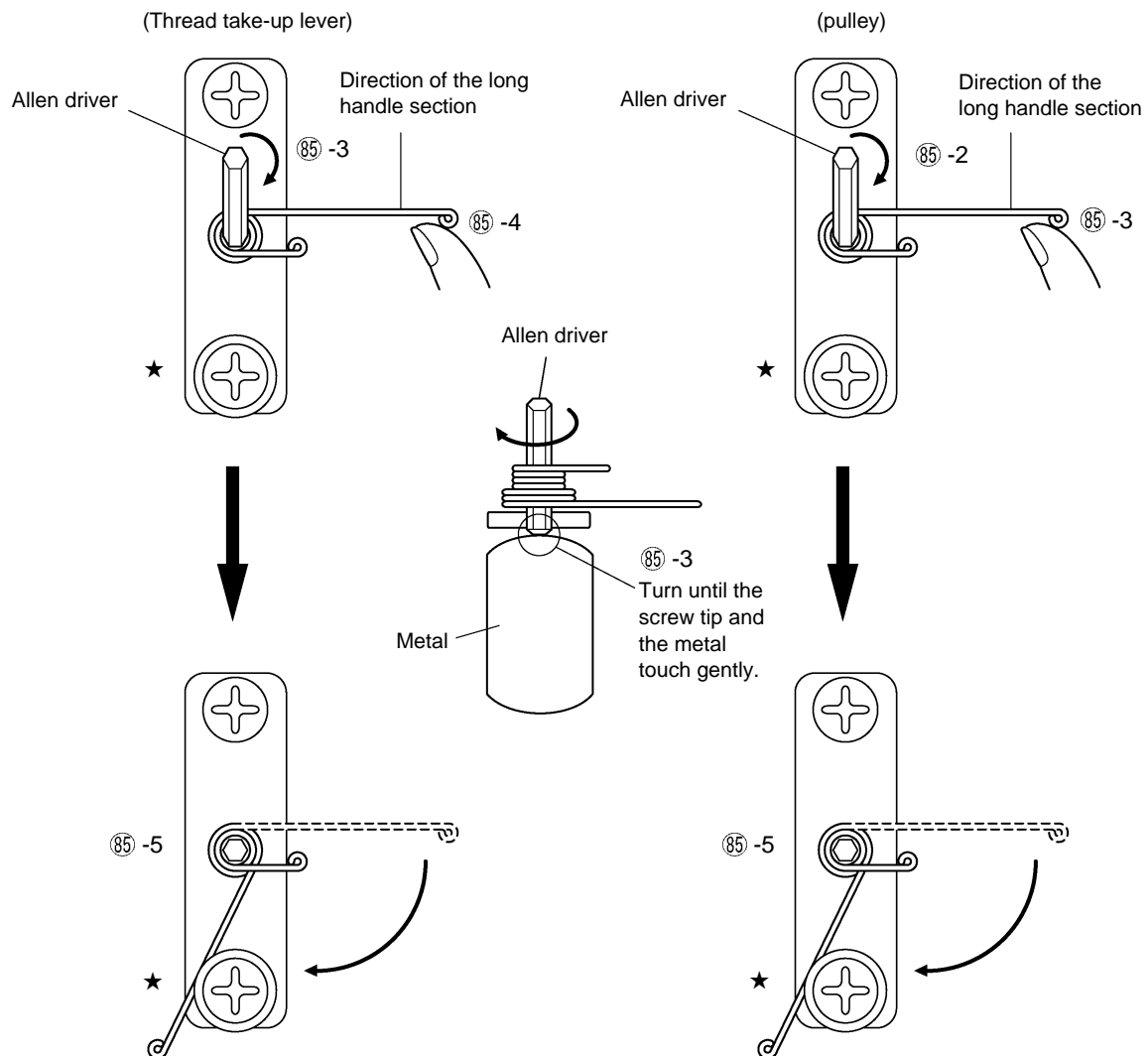
114. Fasten the lower shaft to the bed according to the procedure in 114-1 through 114-4.
- 114-1. Before starting this step, place one washer and one spring washer on each of the screws at the position marked with *. While inserting the spring pin that extends from the presser plate seating into the hole on the lower shaft presser side surface, place the lower shaft assembly on the bed and face the long handle section of the torsion spring in the preset (*) metal plate assembly in the direction shown in the figure, then fasten with the two screws.

Critical

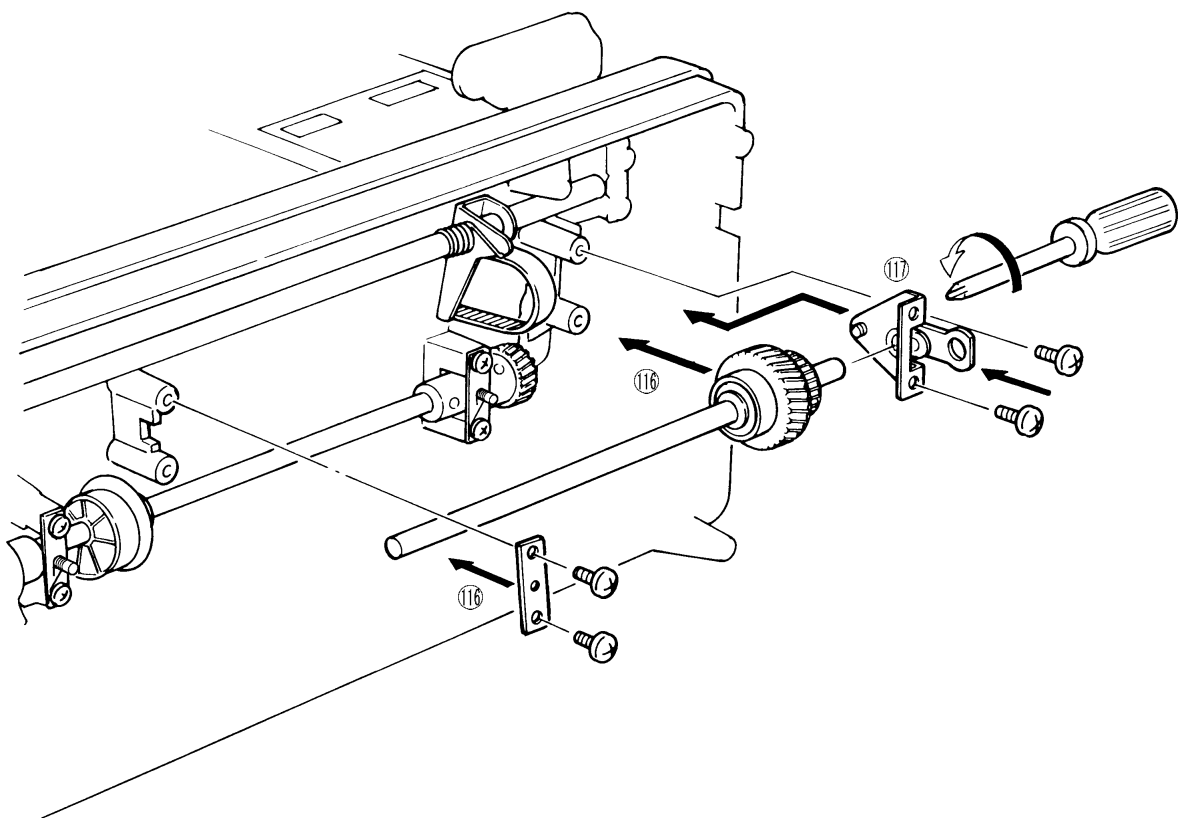
- * Preset the distance the presser screw sticks out before installing the presser plate assembly. If you leave out this operation, the metal can be damaged when the lower shaft is installed and seizing can result. For details on this procedure, see "Presser Plate Assembly Presetting Procedure" on Page 33.



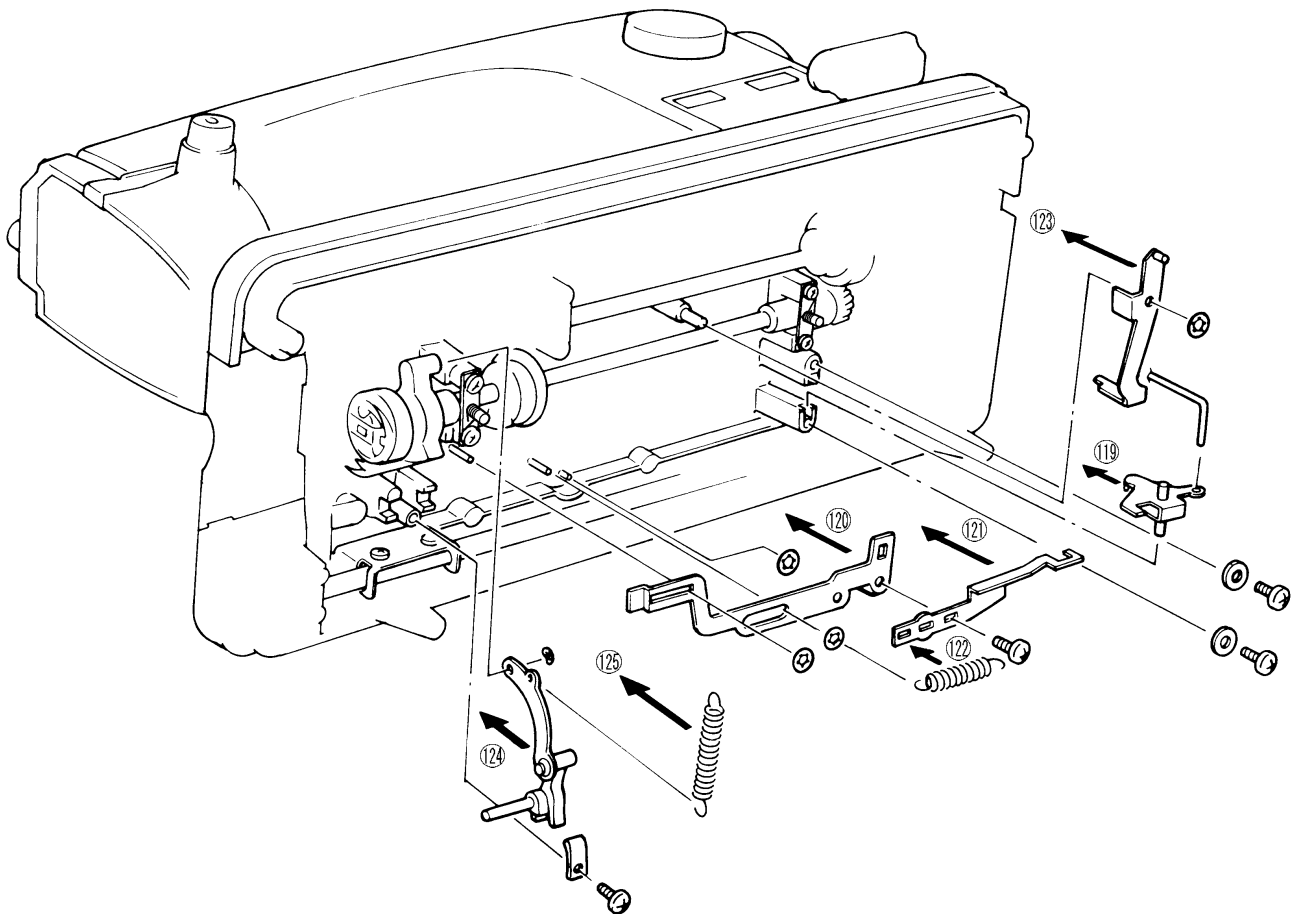
- 114-2. While using your finger to hold the long handle section of the torsion spring facing the direction shown in the figure, turn the presser screw clockwise with the Allen driver and turn until the tip of the screw gently touches the presser (*).
- * If you turn the screw too far, this will damage the metal.
- 114-3. Remove the Allen driver, turn the long handle section of the torsion spring with your fingertips and check that when the screw tip gently touches the metal, the direction of the long handle section is about the same as that shown in the figure (*).
- * If the direction is incorrect, correct it according to the instructions in "How to Change the Direction of the Long Handle Section after Mounting on the Arm Bed" on Page 33. If you assemble with this direction still incorrect, this causes seizing of the presser and play in the shaft.
- 114-4. While deflecting the long handle section of the torsion spring, place under the washer at the position marked *.
115. Turn the presser screw counter clockwise about 45 degrees with the Allen driver, then check that when you release your hands the force of the spring returns the assembly to its original angle. (This checks that the spring is functioning.)



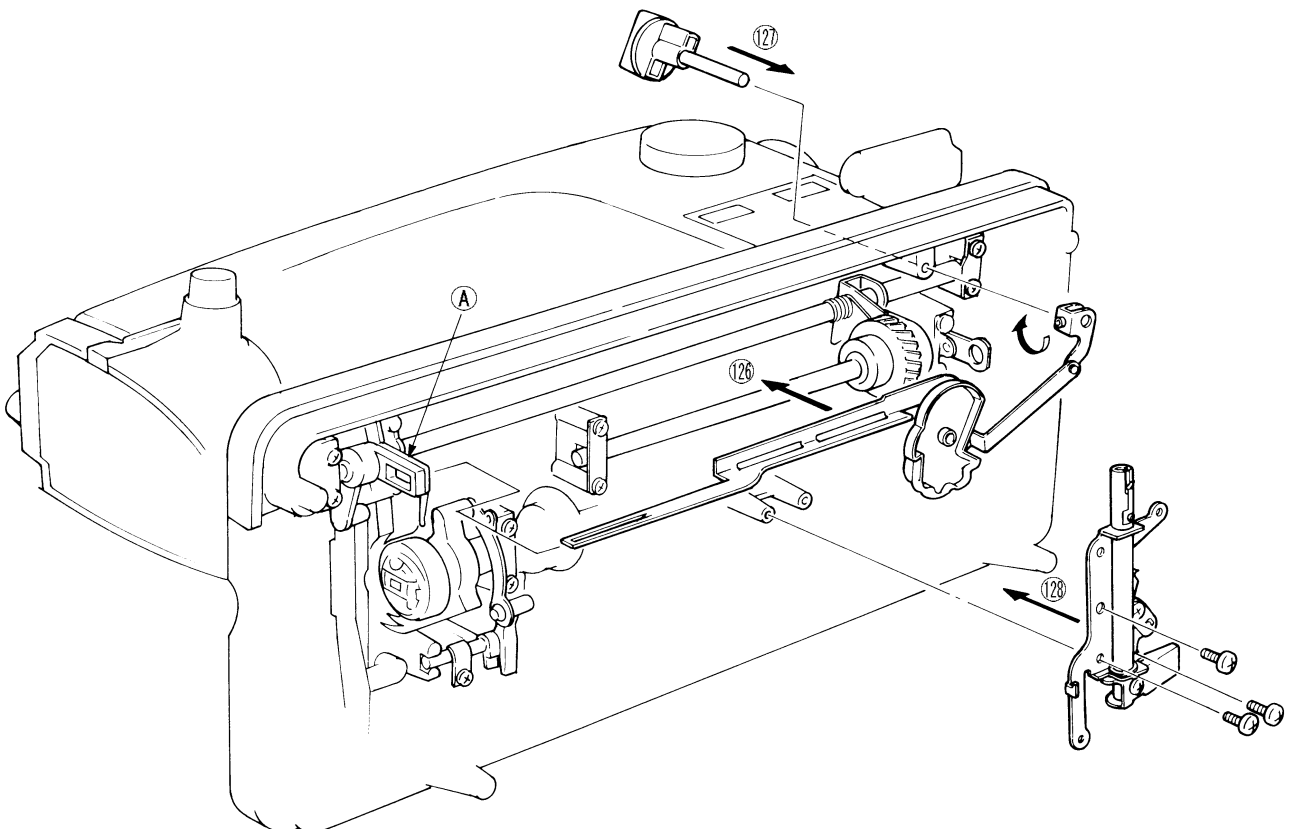
116. While timing belt is attached to idle pulley, attach idle pulley assembly to bed, and fix shaft bracing plate and screws to face plate side of shaft. For timing belt phase adjustments, see [Adjustments 2].
117. Attach tension regulator unit to bed with screws.
118. While referring to [Adjustments 3], carry out timing belt tension adjustment, gearing backlash adjustments with lower shaft gear adjustments.



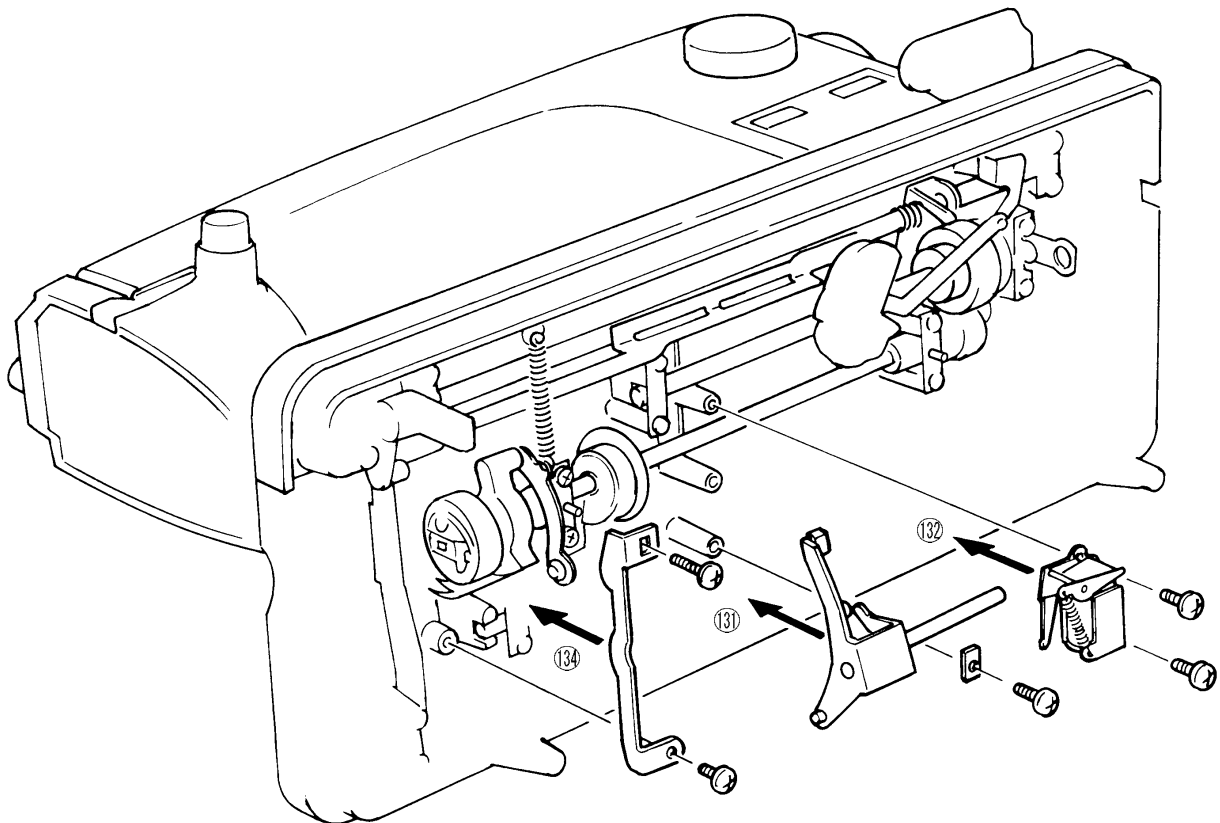
119. After passing claw lever through hole on end of knee control drag link, attach claw lever to bed with 2 washers and 2 screws.
120. Attach feed pin connecting rod with CS retaining rings in three places. (Make sure that it operates smoothly.)
121. Temporarily attach feed pin UD connecting rod to feed pin connecting rod with screws.
122. Attach feed pin connecting rod spring between CS retaining ring and feed pin connecting rod.
123. Attach feed pin exchange connecting rod with CS retaining ring.
124. Attach thread cutter lever and thread cutter connecting rod unit with fixed shaft plate L, screw and CS retaining ring.
125. Hook up thread cutter connecting rod spring between thread cutter connecting rod CS retaining rings.



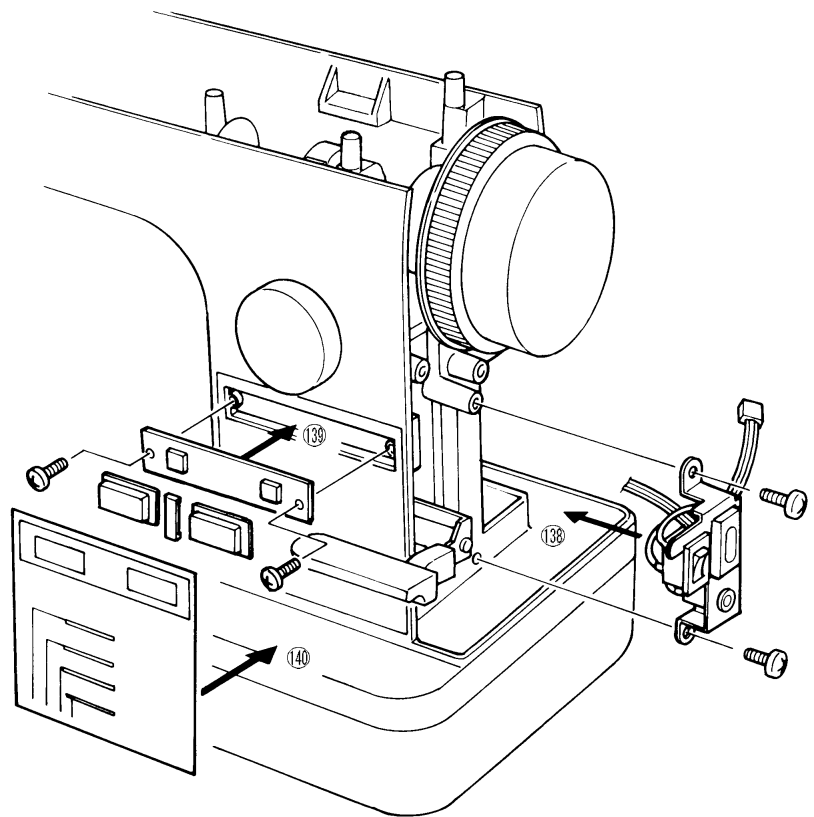
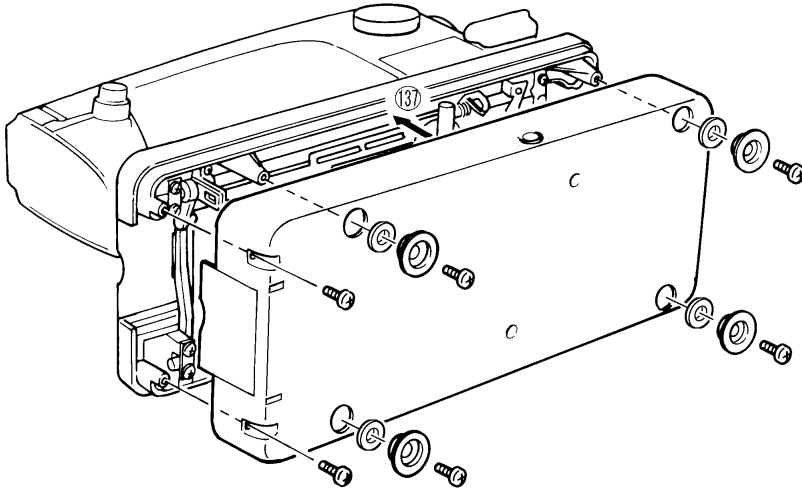
126. Insert left end of UD exchange connecting rod into section A, attach feed pin cam to shaft.
127. Pass feed dog adjustment knob through top of bed, and temporarily fasten with set screw.
128. Attach cross axle holder with 3 screws. Be careful not to bend notch spring.
129. Refer to [Adjustments 15] for instructions on adjusting feed pin cam, feed dog adjustment knob and notch spring screw.
130. Refer to [Adjustments 16] for instructions on adjusting position of feed pin UD connecting rod, then fix in place with feed pin UD connecting rod screws.



131. Attach thread cutter cam lever with shaft bracing plate and screw. Refer to [Adjustments 21] for directions on adjusting clearance between thread cutter cam, and adjusting buffer thread spring height.
132. Attach thread cutter solenoid using 2 screws, guide and fix harness in two places with CS retaining rings.
133. While referring to corresponding [Adjustments] sections, carry out the following adjustments:
 4. Adjusting timing and clearance between points of needle and rotary hook
 5. Adjusting needle bar height adjustment
 7. Adjusting height of feed dogs
 8. Adjusting front-back position of feed dogs
134. Refer to [Adjustments 6] for instructions on attaching rotary hook rotation prevention bracket.
135. Refer to [Adjustments 18] for instructions on making adjustments to automatic needle threader, and fasten needle threader position setter screws.
136. Refer to corresponding [Adjustments] sections while making the following adjustments:
 22. Adjustment of fixed blade height
 23. Adjustment of movable blade differential
 24. Adjustment of thread manipulator position



137. Attach under cover to bed with cushions and cushion washers, and 6 screws.
138. Attach switch holder to arm with 2 screws.
139. Attach operations board assembly to arm with 2 screws.
140. Insert SW spacer into arm. Affix feed dog adjustment board and key tops to arm. (This can be done easily if you temporarily attach the key tops to the surface of the feed dog adjustment board with cellophane tape.)



141. Attach sewing light assembly with 2 screws. Then insert indicator rod into indicator.

NOTE

The shape of sewing lamp assembly is different for 120 V sewing machines and 220 V to 240 V sewing machines. (Illustration shows 120 V machine)

142. Attach transformer cover to arm with 2 screws.

143. While referring to [Adjustments 25], affix thread cutter tension release A to arm with fixed plate and screw.

144. Refer to [Adjustments 26] for instructions on adjusting *thread cutter tension release differential.

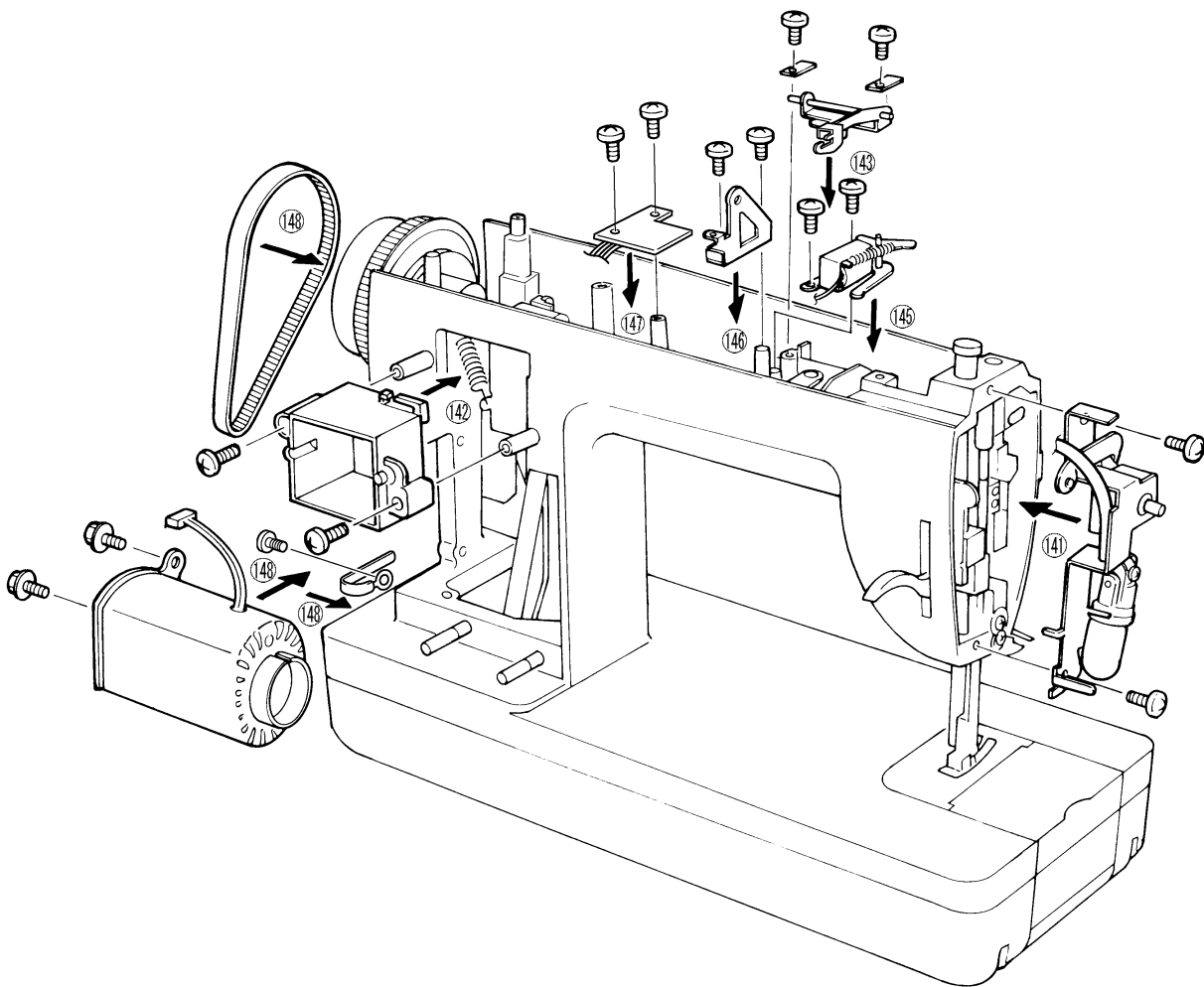
145. While referring to [Adjustments 27], attach tension release thread solenoid to arm with 2 screws.

146. Attach handle holder L to arm with 2 screws, secure tension release solenoid and sewing lamp harness with band.

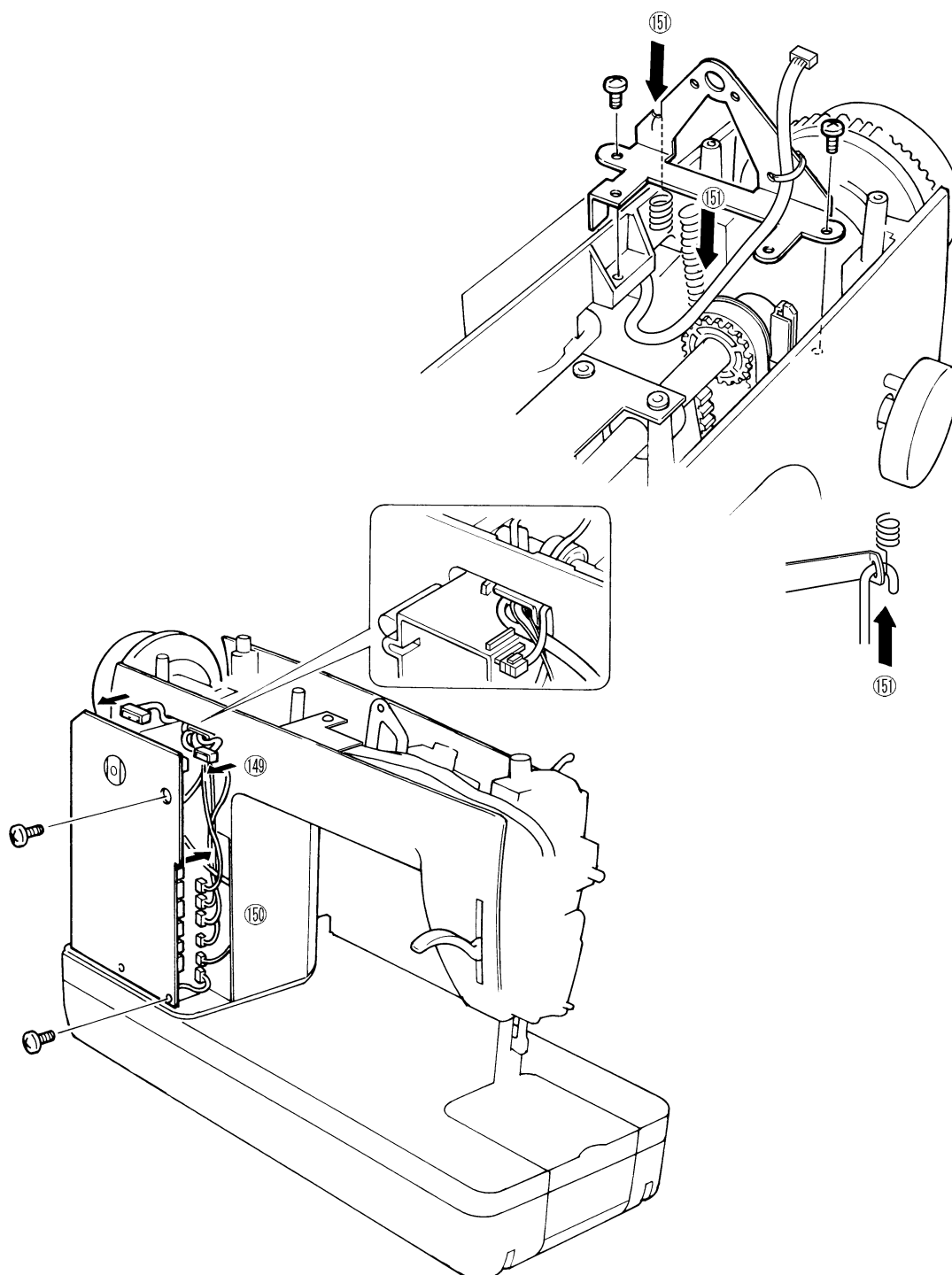
147. Attach needle position sensor board to arm with 2 screws.

148. Temporarily attach motor to arm with 2 screws. Attach motor belt between pulley and motor. While referring to [Adjustments 1], adjust tension and attach motor to arm.

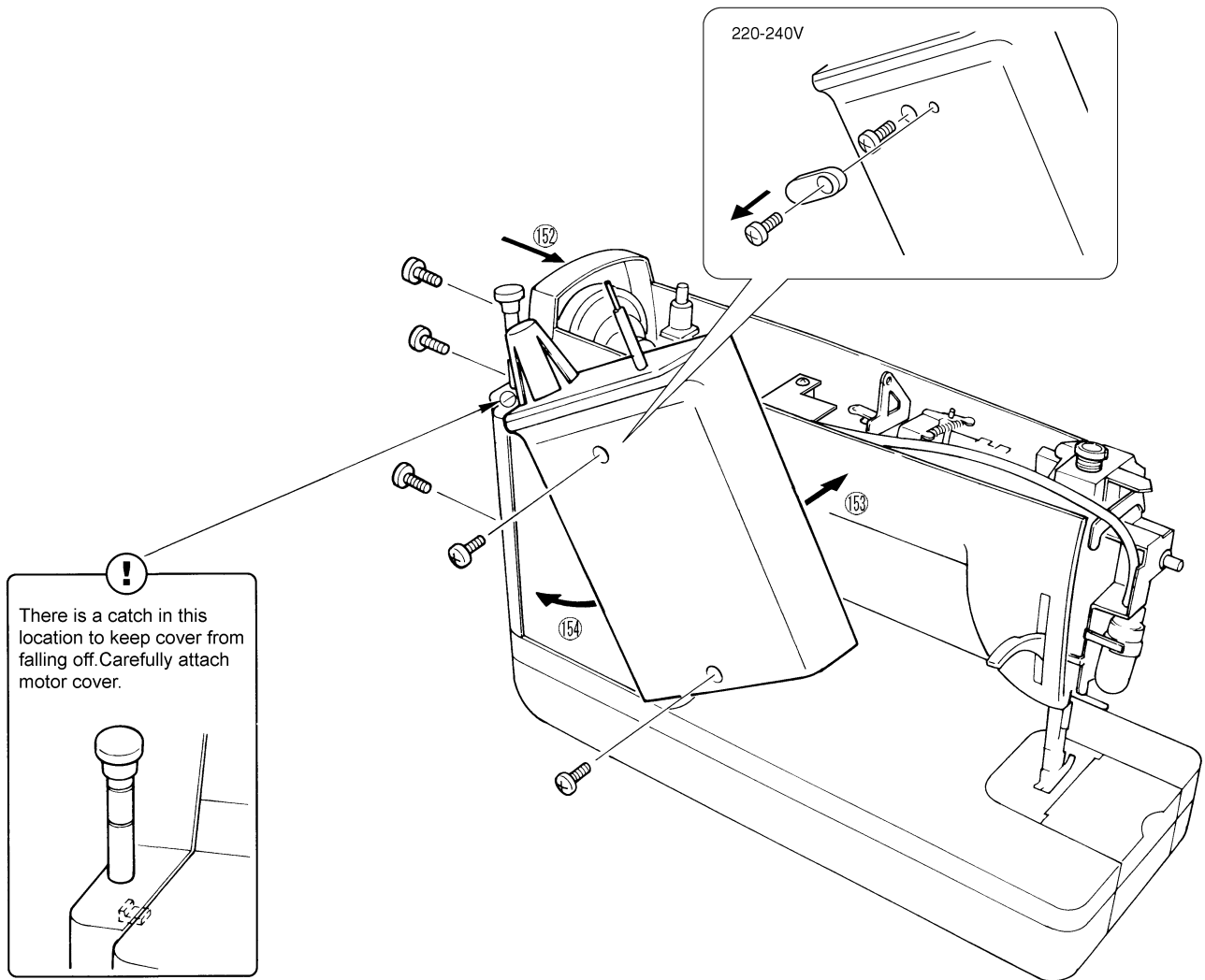
Secure the operation PC board and foot controller jack harness in 2 places with band. Secure power harness from switch holder with harness attachment device.



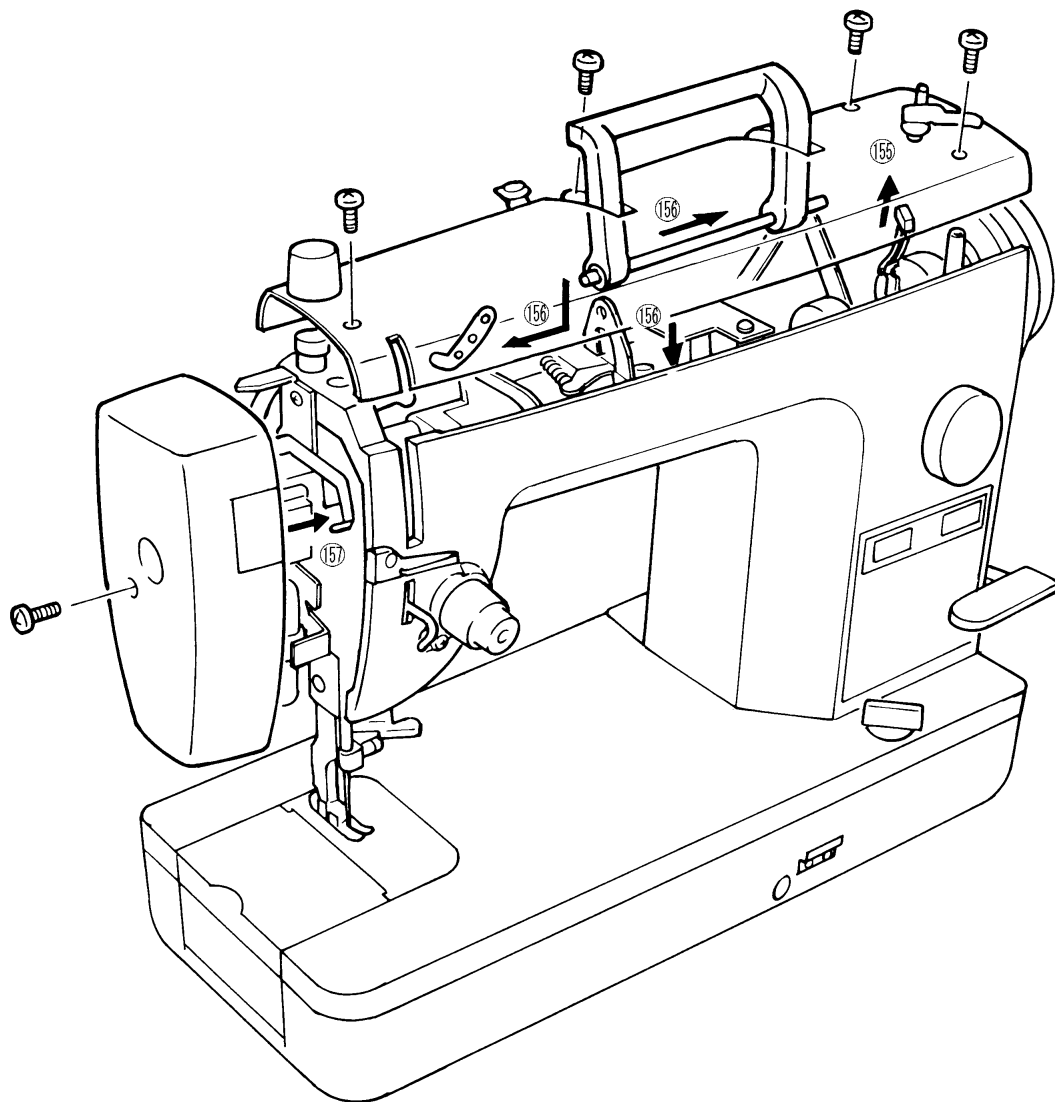
149. Attach main PC board to arm with 2 screws.
150. Connect all 10 connectors.
151. Attach handle holder R to arm with 2 screws, attach spring between handle holder R and knee lift rod. Fasten bobbin sensor harness to handle holder R with harness fixing band.



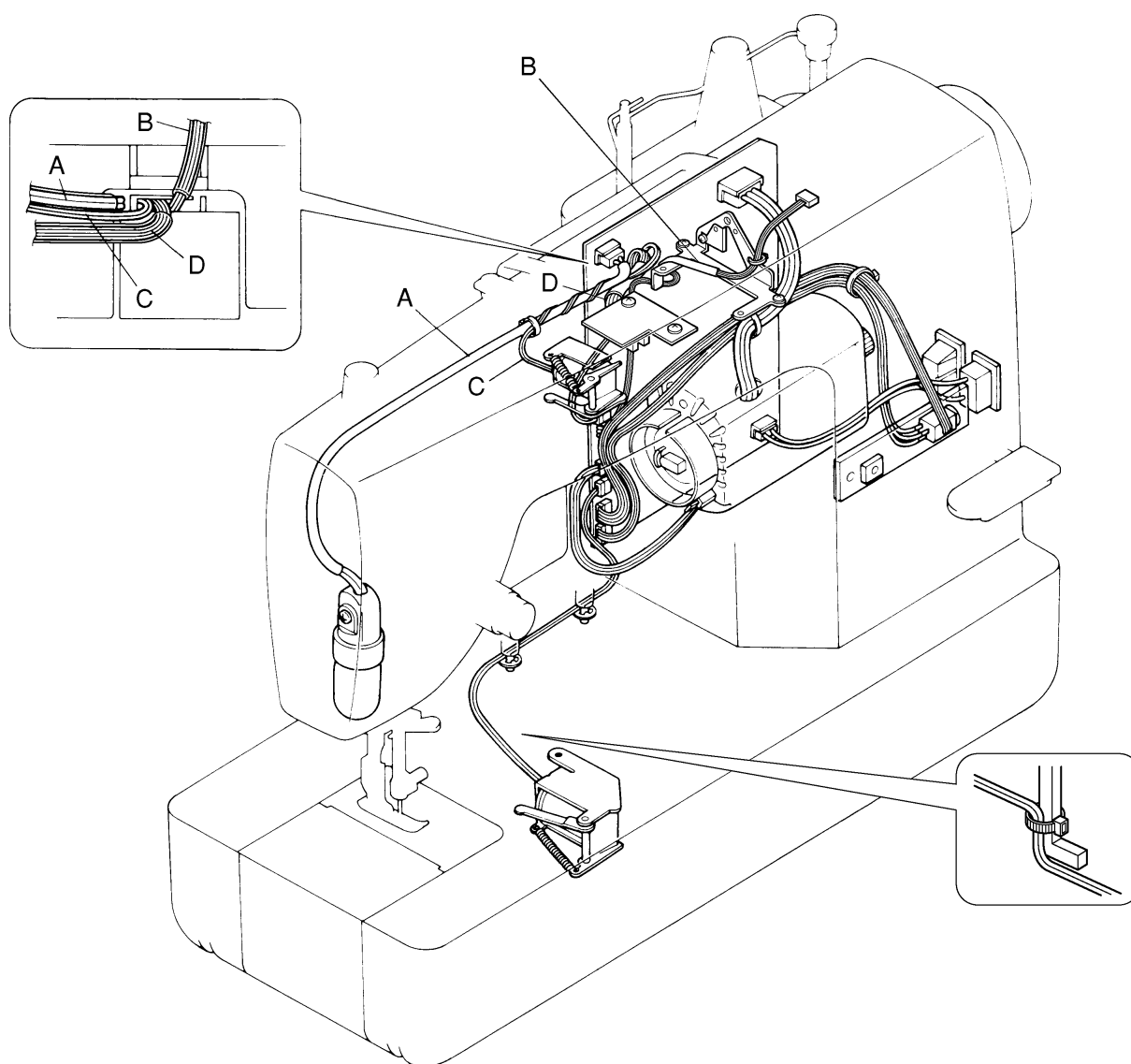
152. Attach belt cover to arm with 3 screws.
153. Line up motor cover with rear of the arm as illustrated, attach belt cover to catch.
154. Run motor cover along back of arm, and attach to arm with 2 screws.
For the 220 V to 240 V sewing machine, attach the motor cover cap to the motor cover with the motor cover cap screw.



- 155. Attach connector to bobbin winder sensor board.
- 156. After inserting handle shaft in handle holder R, slide to the side and insert shaft into handle holder L.
Attach top cover with 4 screws. (Turn presser knob to fit presser foot adjustment screw.)
- 157. Attach face plate with screws.



2. LEAD WIRE ARRANGEMENT



III. HOW TO ADJUST MECHANICAL ELEMENTS

1. ADJUSTING MOTOR BELT TENSION	53
2. PHASE ADJUSTMENT OF UPPER SHAFT AND IDLE PULLEY (ATTACHING TIMING BELT).....	54
3. ADJUSTING TENSION OF TIMING BELT, BACKLASH.....	55
4. ADJUSTING TIMING AND CLEARANCE BETWEEN POINTS OF NEEDLE AND ROTARY HOOK	56
5. ADJUSTING NEEDLE BAR HEIGHT ADJUSTMENT	57
6. ADJUSTING ROTARY HOOK ROTATION PREVENTION BRACKET POSITION.....	57
7. ADJUSTING HEIGHT OF FEED DOGS	58
8. ADJUSTING FRONT-BACK POSITION OF FEED DOGS	59
9. ADJUSTING LEFT-RIGHT POSITION OF FEED DOGS	60
10. ADJUSTING PRESSER BAR HEIGHT	61
11. PRESSER ROD LIFT UP/DOWN HEIGHT ADJUSTMENT	62
12. ADJUSTING AXIAL DIRECTION POSITION OF THREAD TAKE-UP LEVER STUD.....	63
13. ADJUSTING BOBBIN WINDER CATCH AND SHUTTER POSITIONS.....	64
14. ADJUSTING TENSION SPRING ADJUSTMENT SCREW	65
15. ADJUSTING STRENGTH OF TENSION SPRING	66
16. ADJUSTING POSITIONS OF FEED DOG ADJUSTMENT KNOB, FEED PIN CAM, AND NOTCH SPRING	67
17. ADJUSTING POSITION OF FEED PIN AND CONNECTING ROD.....	68
18. ADJUSTING HEIGHT OF FEED PIN.....	69
19. ADJUSTING NEEDLE THREADER	70
20. ADJUSTING POSITION OF THREAD CUTTER-CAM.....	71
21. ADJUSTING POSITION OF THREAD CUTTER SOLENOID	72
22. ADJUSTING POSITION OF THREAD CUTTER CAM LEVER, AND HEIGHT OF BUFFER SPRING	73
23. FIXED BLADE HEIGHT ADJUSTMENT	74
24. ADJUSTING MOVABLE BLADE DIFFERENTIAL.....	75
25. ADJUSTING POSITION OF THREAD MANIPULATOR.....	76
26. ADJUSTING THREAD CUTTER TENSION RELEASE A POSITION.....	76
27. ADJUSTING TENSION RELEASE DIFFERENCE.....	77
28. ADJUSTING TENSION RELEASE SOLENOID POSITION.....	78
29. PHASE ADJUSTMENT OF NEEDLE POSITION SHUTTER.....	79

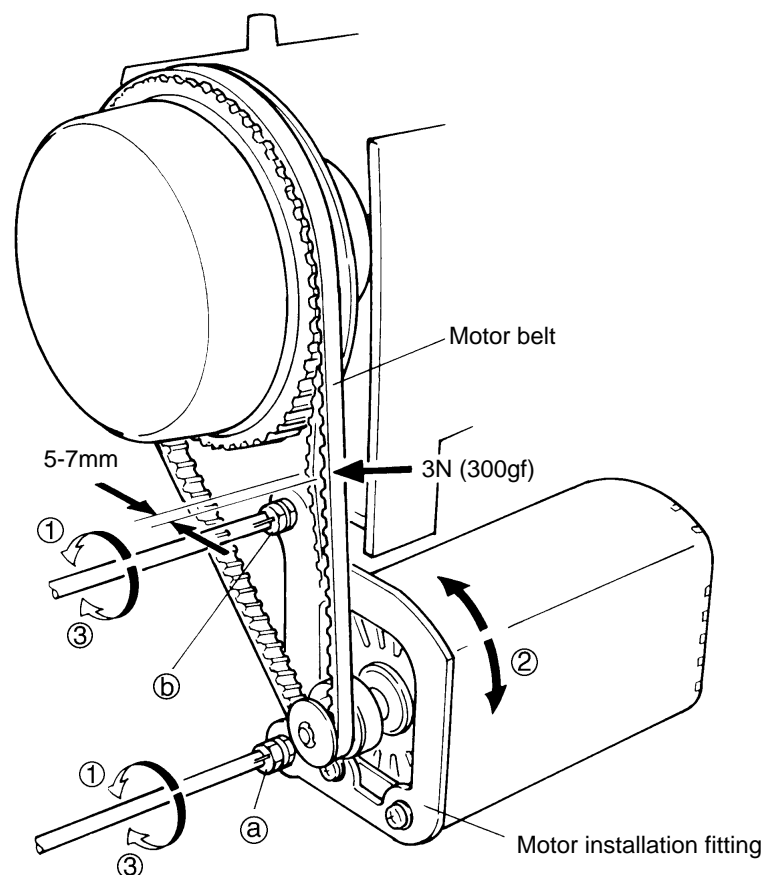
1. ADJUSTING MOTOR BELT TENSION

STANDARD

While applying 3N (300gf) of pressure to center of motor belt, move over 5-7mm.

ADJUSTMENT

1. Loosen screws (a) and (b).
2. Move motor fixture from side to side, and adjust tension.
3. When finished, fasten securely with screws (a) and (b).



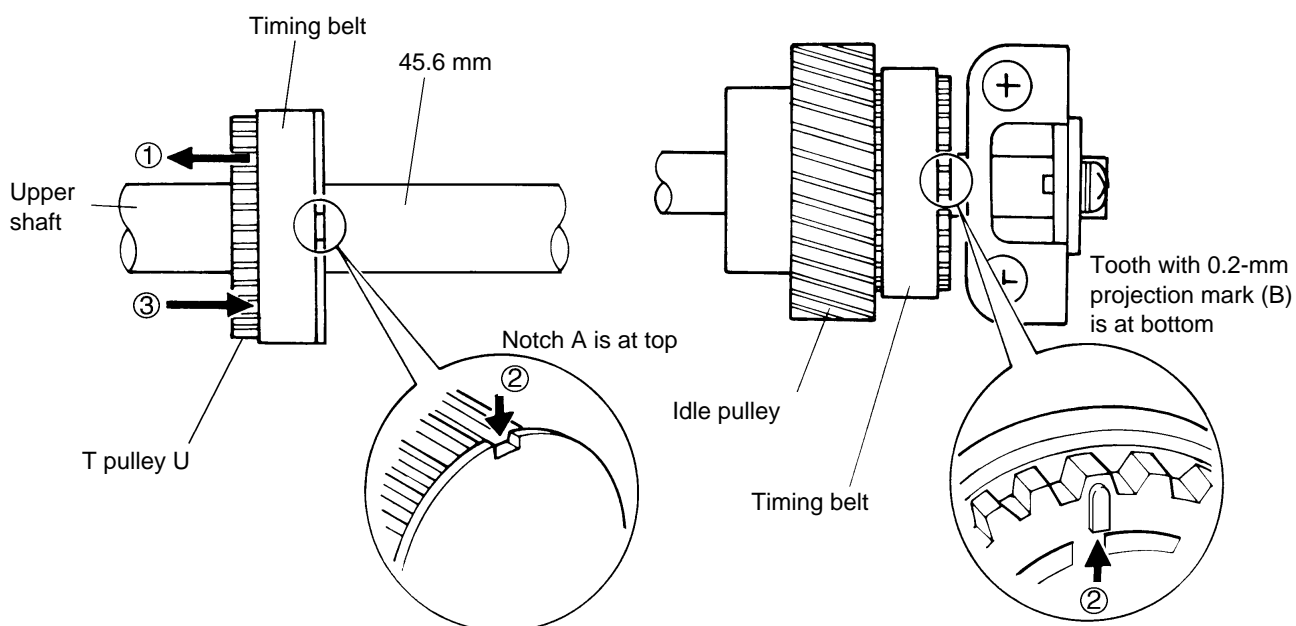
2. PHASE ADJUSTMENT OF UPPER SHAFT AND IDLE PULLEY (ATTACHING TIMING BELT)

STANDARD

Position as in diagrams so that when notch A of T pulley U is positioned at top (needle bar in its uppermost position), the tooth of the idle pulley marked with the 0.2-mm projection mark (B) is at bottom.

ADJUSTMENT

1. Slide timing belt of T pulley U to the left.
2. Adjust T pulley U and idle pulley to standard rotation phase.
3. Attach timing belt to T pulley U.



3. ADJUSTING TENSION OF TIMING BELT, BACKLASH

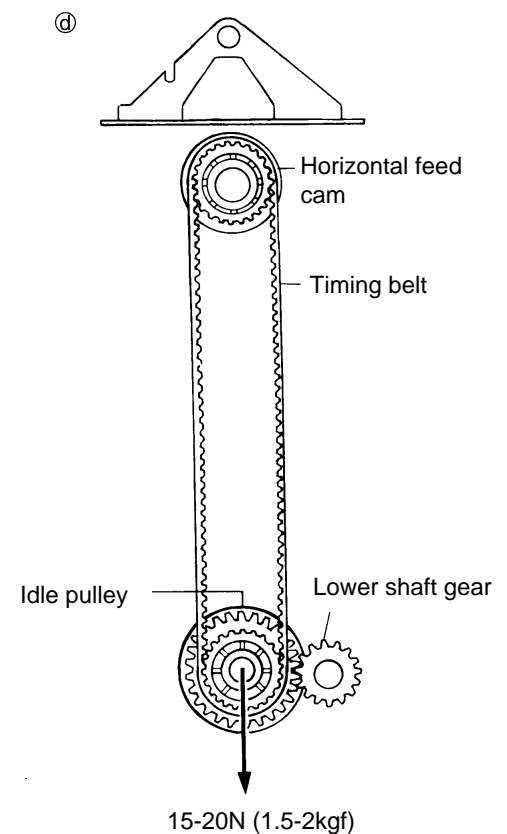
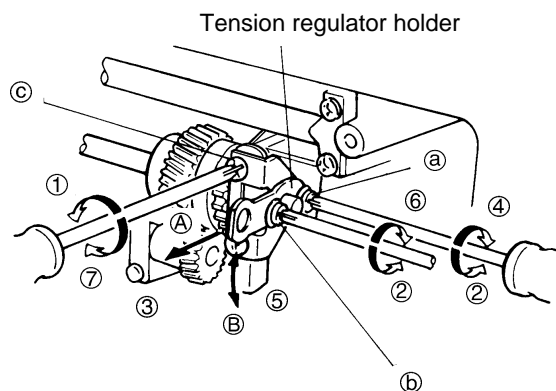
STANDARD

- Tension of timing belt (tension between pulleys) should be 15-20N (1.5-2 kgf).
- For correct backlash of lower shaft gear and idle pulley, the idle pulley backlash zero range (range in which play is not felt by touch) must be from 1/3 to 2/3 of the entire rotation of the pulley.

ADJUSTMENT

*Carry out phase adjustment of upper shaft 2. and idle pulley beforehand.

1. Loosen tension regulator holder. Loosen a and b screws.
2. Pull tension regulator holder in the direction indicated by A at 15-20N (1.5-2kgf), set belt tension. (This is easier if spring is attached to tension adjustment holder hole.)
3. Move tension regulator holder as far as it will go in the direction indicated by B on the diagram, and tighten screws.
4. Move end of tension regulator holder in the direction indicated by B, and adjust backlash. (If I doesn't turn easily, loosen screw b little bit.)
5. After adjustment, then securely fasten b screw, then a screw.
6. Tighten c screw securely.



4. ADJUSTING TIMING AND CLEARANCE BETWEEN POINTS OF NEEDLE AND ROTARY HOOK

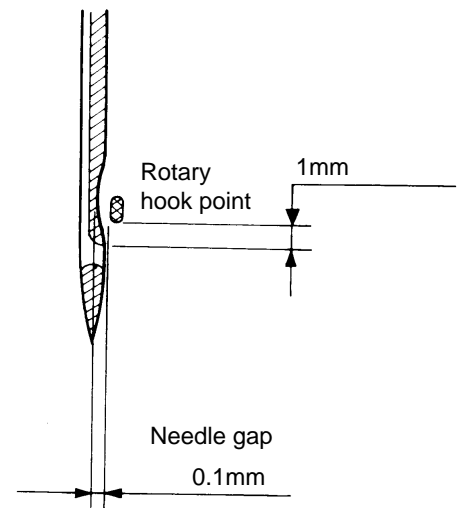
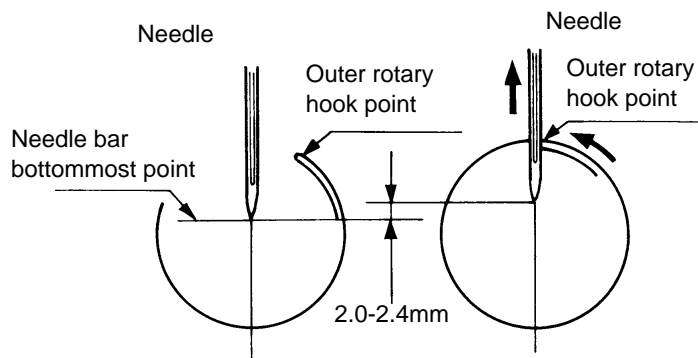
STANDARD

While needle bar is 2.0-2.4mm above its lowermost position, so that outer rotary hook point is even with center of needle. While in this position, if clearance between needle (HLX5#11) and rotary hook point is under 1mm, rotary hook point and needle should not be touching.

ADJUSTMENT

* First carry out adjustments to 2.upper shaft and belt adjusting pulley phase, 19.threadcutter cam phase, 3.timing belt tension and backlash, and 7.needle bar height.

1. Remove needle plate and rotary hook rotation prevention bracket.
2. Loosen 3 rotary hook screws.
3. Adjust timing and clearance between points of needle and rotary hook.
4. Tighten all 3 rotary hook screws securely.



NOTE

- | | |
|--|---|
| Timing is behind | Could result in increased thread breakage and poor locking of upper thread. |
| Timing is ahead | Could increase the chances of looped stitches. |
| Rotary hook is out of oil..... | Will not lock upper thread. |
| If needle gap is too big | Could result in skipped stitches. |
| Not enough clearance for needle gap..... | Could cause rotary hook point to hit needle, possible resulting in damage to needles and rotary hook point, and resulting in thread breakage. |

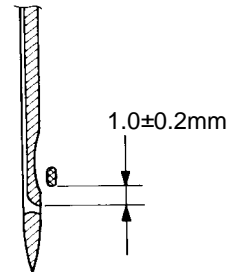
5. ADJUSTING NEEDLE BAR HEIGHT ADJUSTMENT

STANDARD

When needle bar is positioned 2.2mm above its lowermost position, there should be $1 \pm 0.2\text{mm}$ between top of needle eye and bottom of rotary hook point (when using HLx5 #11 needles).

ADJUSTMENT

1. Position needle bar 2.2mm from its lowermost position.
2. While in this position, loosen needle clamp set screw.
3. Adjust height of needle bar. Line up direction of rotation of needle bar so that needle clamp screw is parallel with upper shaft.
4. Fasten needle clamp set screw.



6. ADJUSTING ROTARY HOOK ROTATION PREVENTION BRACKET POSITION

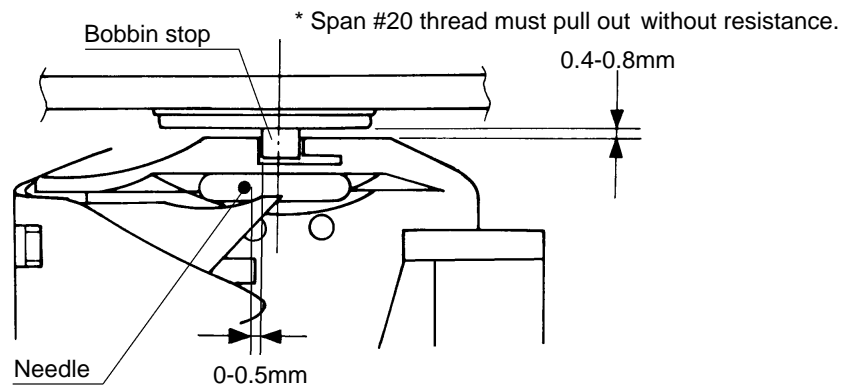
STANDARD

When clearance between needle and rotary hook point is adjusted correctly, there should be 0mm to 0.5mm clearance between bobbin stop and rotary hook and needle should be positioned so side of needle comes 0-0.5mm from side of bobbin stop as shown in diagram below.

ADJUSTMENT

1. Loosen 2 inner rotary hook rotation prevention bracket screws.
2. Adjust clearance between bobbin stop and rotary hook, and needle position.
3. Fasten inner rotary hook bracket screws.

Diagram showing top view with needle plate removed



NOTE

- Too much clearance Failure of the rotary hook to line up correctly with bobbin stop can result in needle breakage and could make sewing impossible.
- Not enough clearance Failure of the upper thread to pass through easily can result in poor tension (poor locking of stitches) and thread breakage.

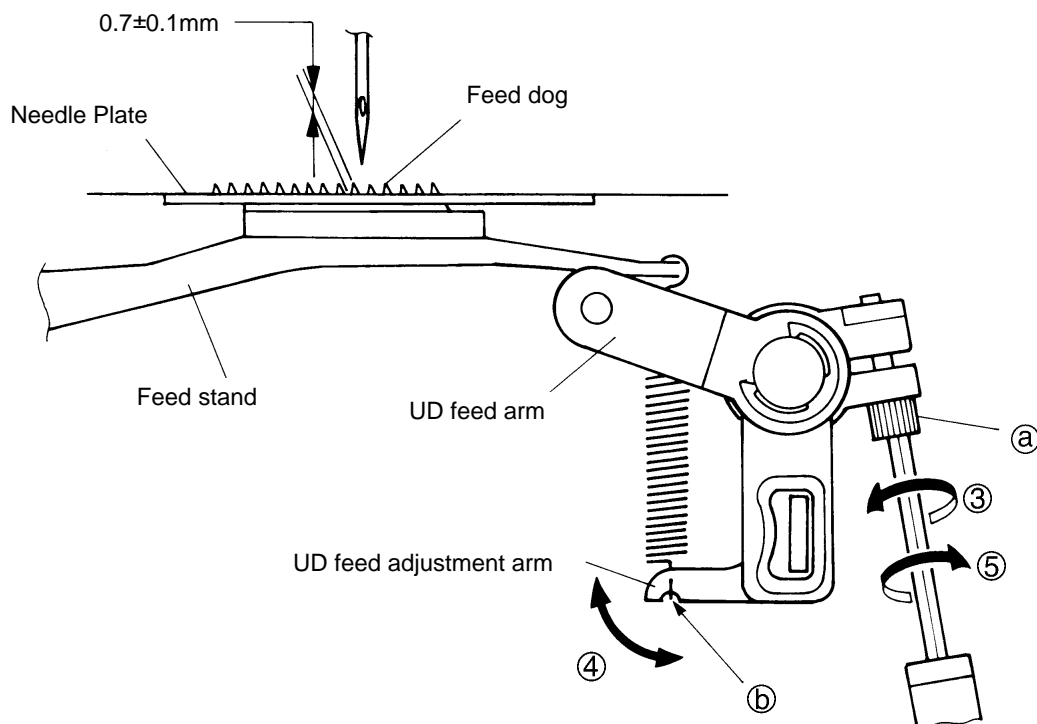
7. ADJUSTING HEIGHT OF FEED DOGS

STANDARD

With feed dog adjustment knob turned to "lightweight fabrics" position and foot raised, maximum height of feed dogs should be 0.7 ± 0.1 mm from side of eye to top of needle plate as shown in diagram.

ADJUSTMENT

1. Turn feed dog adjustment knob to "lightweight fabrics" position.
2. Turn pulley until feed dogs are in their highest position.
3. Loosen Allen screw on UD feed adjustment arm.
4. Move spring attachment groove on UD feed adjustment arm b in direction indicated by arrow on diagram, and adjust height of feed dogs. (Do not adjust at the UD feed arm.)
5. After adjustment, fasten screws securely.



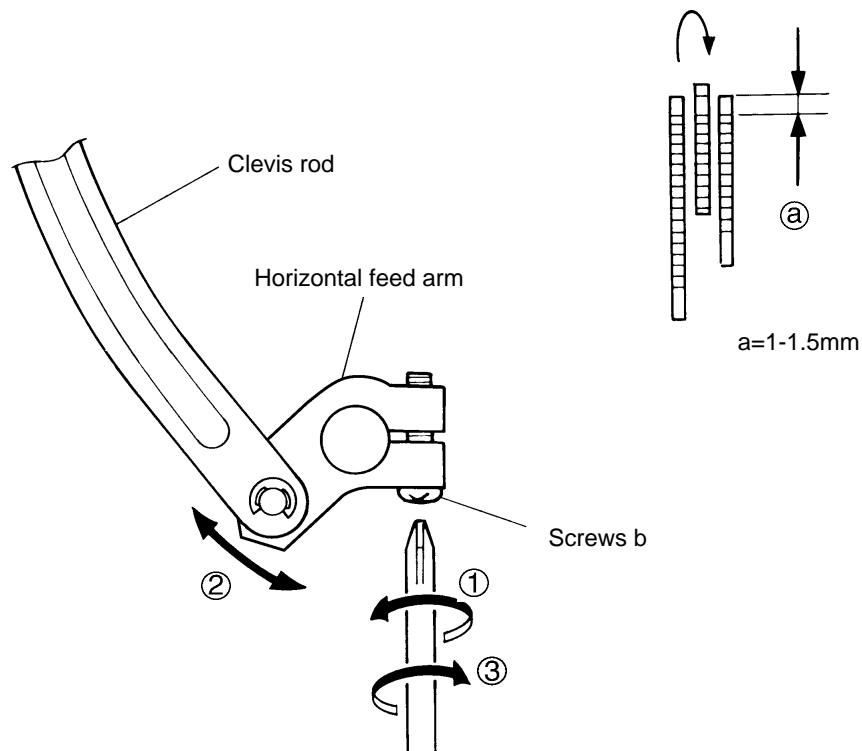
8. ADJUSTING FRONT-BACK POSITION OF FEED DOGS

STANDARD

When stitch length (pitch) is set to maximum and pulley turned, clearance between feed dogs rear of feed dog grooves (a) should be 1-1.5mm.

ADJUSTMENT

1. Loosen horizontal b screw in feed arm.
2. Move horizontal feed arm, adjust so that clearance between feed dogs and rear of feed dog grooves in needle plate is 1-1.5mm during maximum feed.
3. After finishing adjustments, fasten b screw securely so it doesn't come loose.



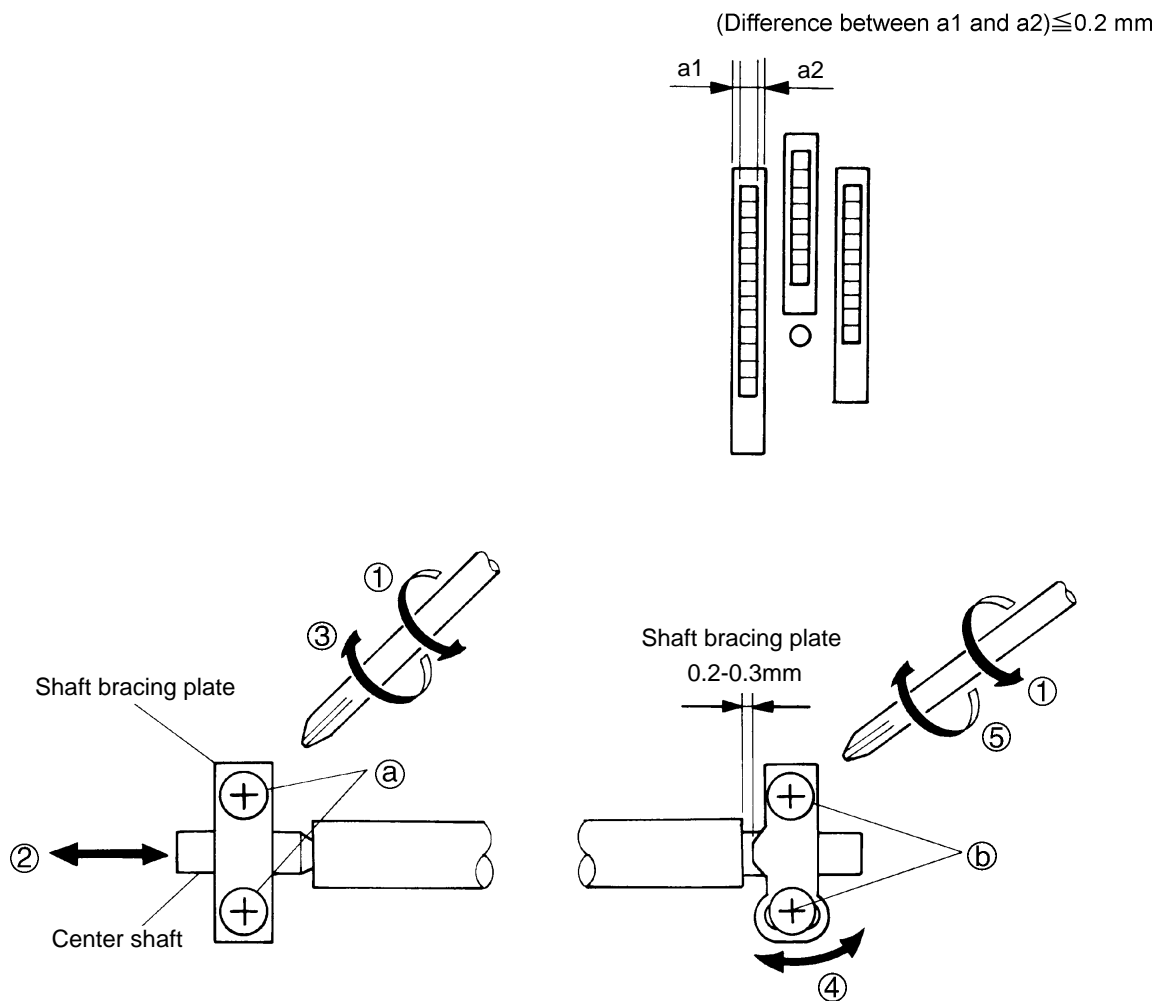
9. ADJUSTING LEFT-RIGHT POSITION OF FEED DOGS

STANDARD

Feed dogs should be divided parallel to long groove of needle plate with a clearance variance of within 0.2mm.

ADJUSTMENT

1. Loosen screws on shaft bracing plates of horizontal feed shaft.
2. Move center shaft from side to side, and adjust left-right position of feed dogs.
3. While maintaining position of center shaft, fasten shaft bracing plate screws (a).
4. Move shaft bracing plate R and adjust clearance between end of horizontal feed shaft to 0.2-0.3mm.
5. Fasten shaft bracing plate R screws in two places.



*Adjust shaft bracing plate R of vertical feed shaft to same standards.

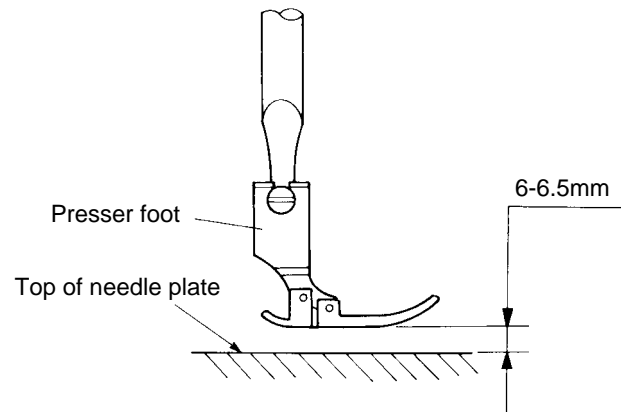
10. ADJUSTING PRESSER BAR HEIGHT

STANDARD

While presser foot lever is raised up one step, space between top of needle plate and bottom of foot should be 6-6.5mm.

ADJUSTMENT

1. Raise presser foot lever and loosen presser bar clamp setscrew.
2. Adjust height between top of needle plate and bottom of presser foot. Then, attach presser foot so needle hole and feed dog grooves of needle plate are positioned correctly.



11. PRESSER ROD LIFT UP/DOWN HEIGHT ADJUSTMENT

ADJUSTMENT STANDARD

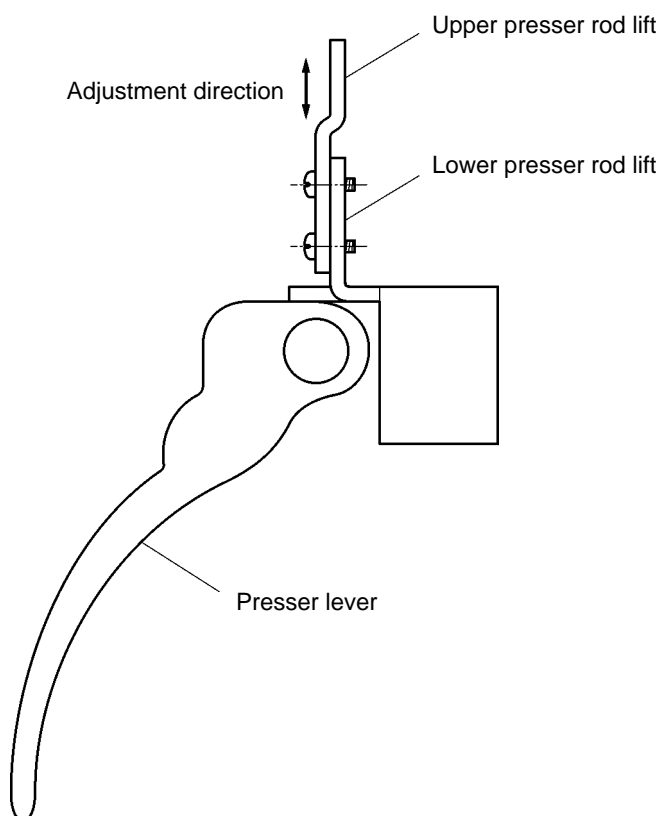
When the presser pressure is "thin", just the weight of the knee lift lever should prevent the presser from jumping off the needle plate top surface.

ADJUSTMENT PROCEDURE

1. Set the presser pressure to "thin", then lower the presser lever.
2. Loosen the two screws linking the upper presser rod lift and the lower presser rod lift.
3. Lower the upper presser rod lift appropriately, then tighten the two screws.
4. Check that when the knee lift lever is installed, just its weight prevents the presser from jumping off the needle plate top surface.

NOTE

The purpose of this adjustment is to reduce the play when the knee lift lever is used. If this adjustment is incorrect, with the weight of the knee lift lever applied, the presser jumps off the needle plate top surface and cannot hold the fabric in place.



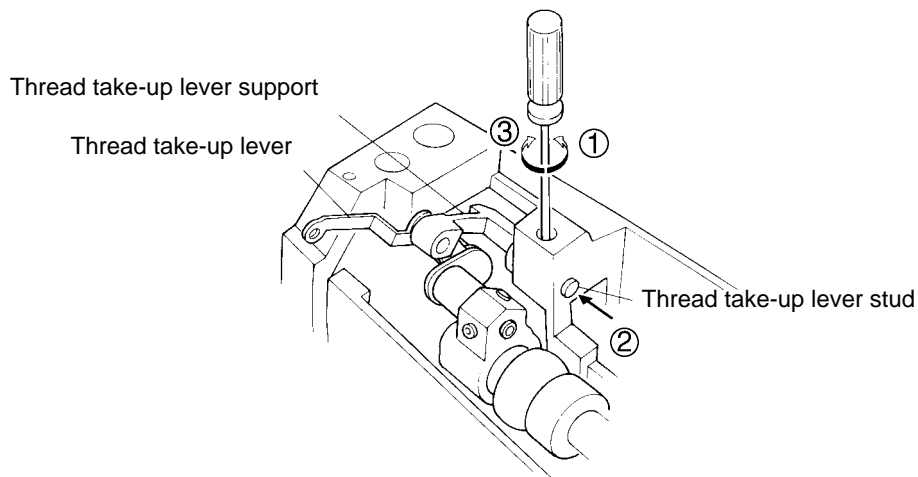
12. ADJUSTING AXIAL DIRECTION POSITON OF THREAD TAKE-UP LEVER STUD

STANDARD

No clearance between thread take-up lever and thread take-up lever support. If pushed to hard, it could cause the creation of irregular noises and loss of power consumption buildup.

ADJUSTMENT

1. Loosen thread take-up lever stud screw.
2. Push thread take-up lever stud gently to the left and adjust .
3. Fasten thread take-up lever stud setscrew



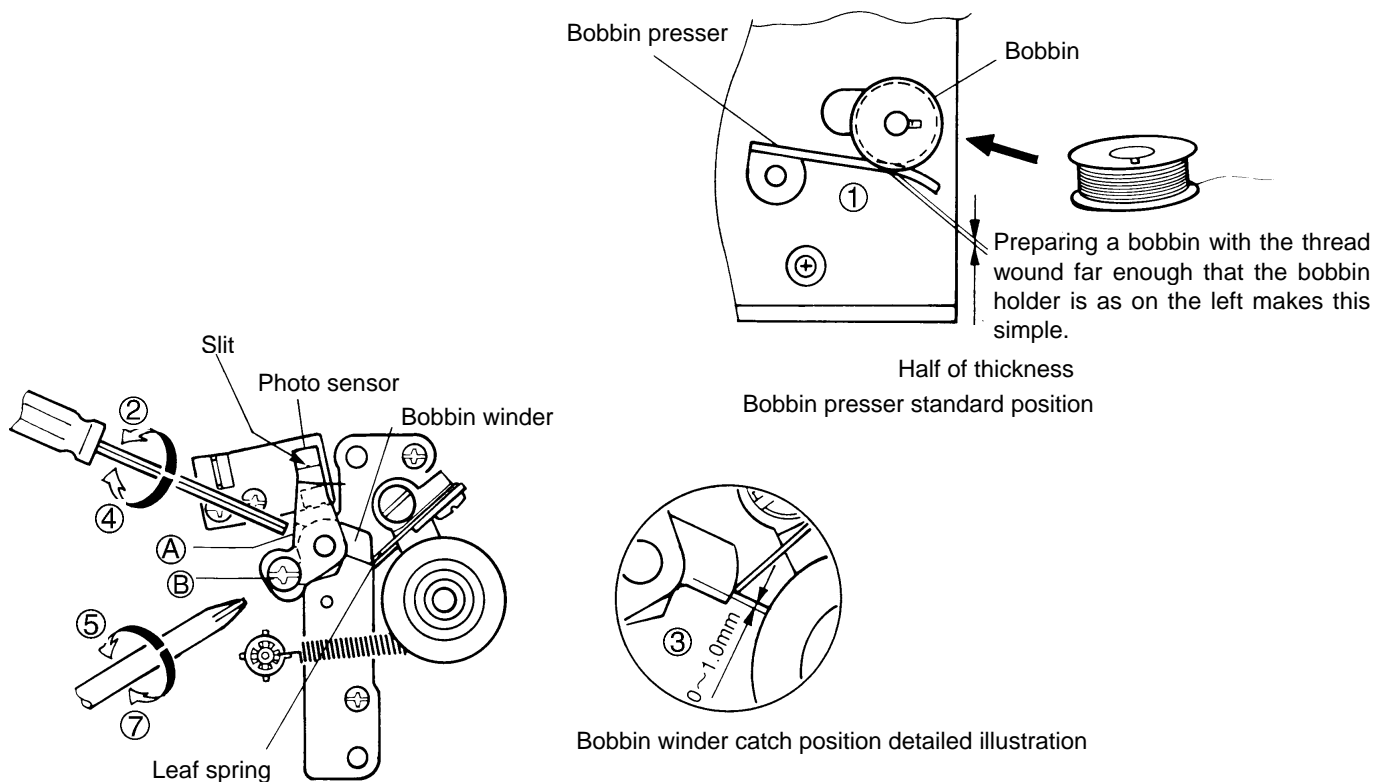
13. ADJUSTING BOBBIN WINDER CATCH AND SHUTTER POSITIONS

STANDARD

1. When bobbin presser is set in standard position, there should be 0-1mm between baseline of bobbin winder catch and tip of leaf spring (see detailed illustration).
2. When bobbin winder operations are carried out and stopped automatically, outside of bobbin should be within range of bobbin presser thickness.

ADJUSTMENT

1. Set bobbin presser to standard position(see diagram).
2. Loosen bobbin winder catch set screw A.
3. Set rotation position of bobbin winder catch as shown in detailed illustration.
4. Fasten bobbin winder lock catch A.
5. Loosen shutter screws B.
6. Adjust shutter so the photo sensor slit and shutter line up.
7. Fasten shutter screws B.
8. Attach to machine, and check adjustment standard 2.
9. If not in line, move (6) adjustment positions little by little, while repeating (5)-(8) until set to adjustment standard 2.



14. ADJUSTING TENSION SPRING ADJUSTMENT SCREW

STANDARD

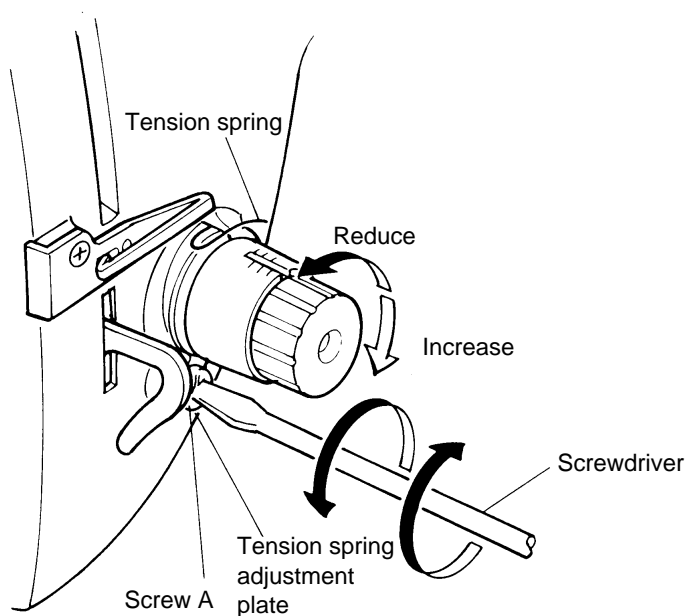
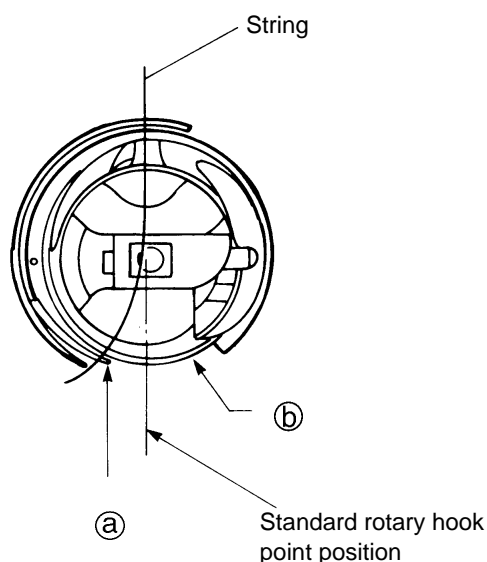
Rotary hook point should pick up thread, when it comes directly to the bottom, it should initiate tension spring.

ADJUSTMENT

1. Loosen screws A.
2. Move tension spring adjustment board the right and left.
3. Securely fasten screws A.

NOTE

Too much differential.....Thread breakage can result. (position a of rotary hook case point)
Not enough differentialRotary hook eating thread and/or poor thread tension can result. (poor locking of upper thread)(position b of rotary hook point).



15. ADJUSTING STRENGTH OF TENSION SPRING

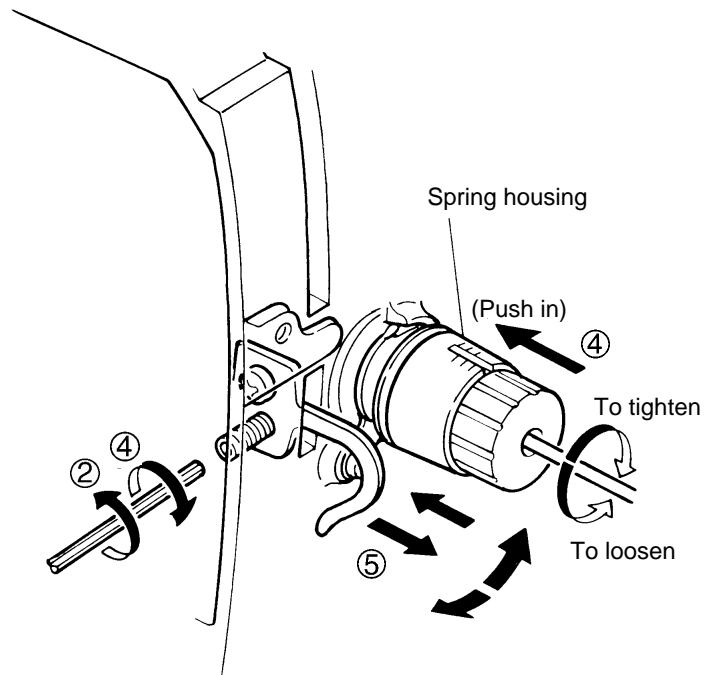
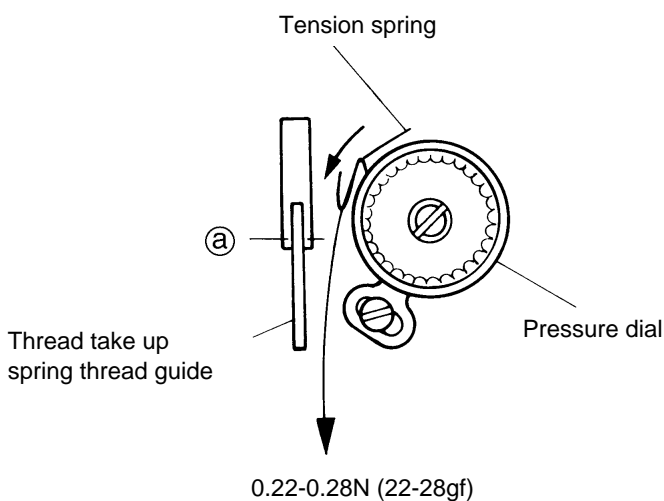
*Tension spring is too tight, it can result in thread breakage. If it is too tight, it could result in rotary hook eating thread.

STANDARD

When thread is run through tip of tension spring, pulled downwards, and end of tension spring lines up with bottom of thread take up spring thread guide (a), tension should be 0.22-0.28N (22-28gf).

ADJUSTMENT

1. Remove face plate.
2. Loosen setscrew in tension block.
3. Adjust tension block bar with screwdriver as illustrated.
 - Turning screwdriver to the right tightens tension spring.
 - Turning screwdriver to the left tightens tension spring.
4. After completing adjustments, push in tension block bar, check to make sure it is not floating from arm, then screw in setscrew securely.
5. If the scale is not on top of the tension block, pull spring housing forwards and turn so scale is on top, and then push it back in.



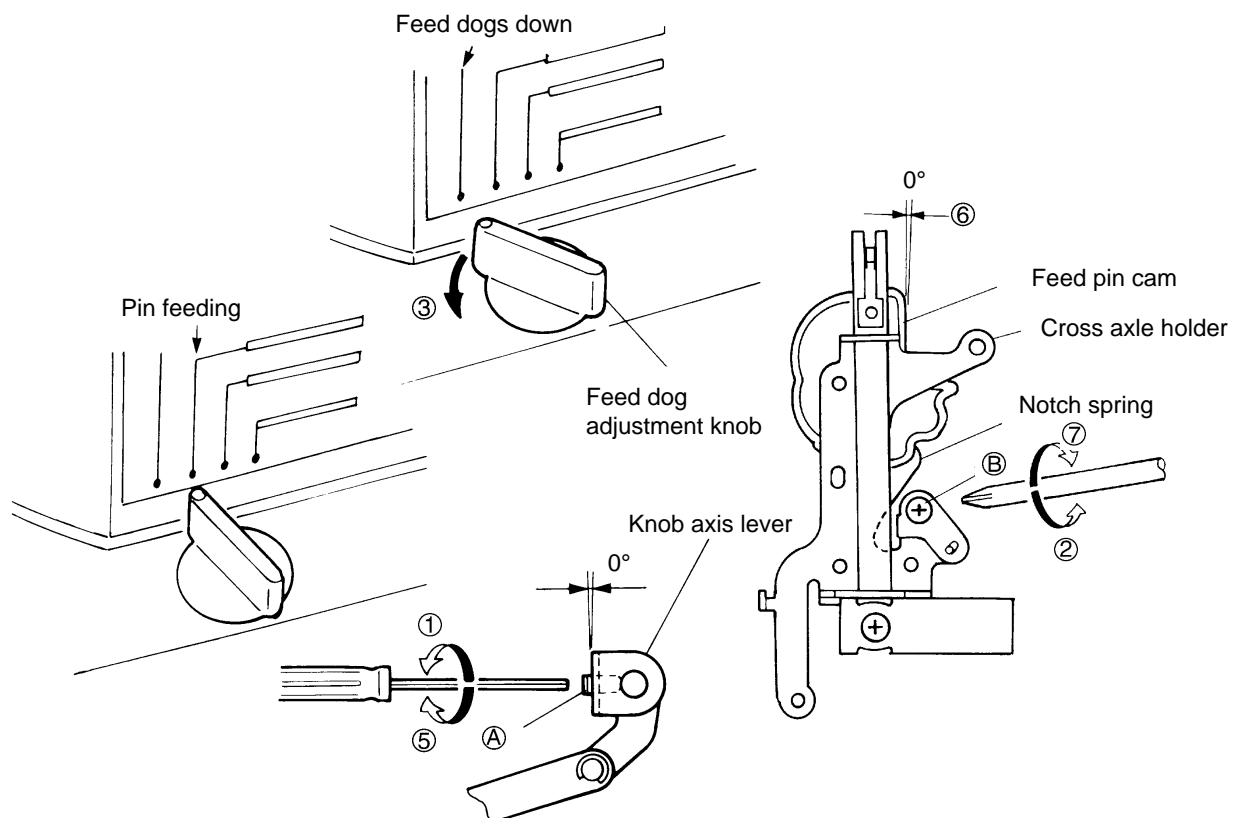
16. ADJUSTING POSITIONS OF FEED DOG ADJUSTMENT KNOB, FEED PIN CAM, AND NOTCH SPRING

STANDARD

When feed dog adjustment knob to "Feed dogs down" position, knob axis lever should be positioned as shown in diagram and feed dogs should be lowered. When set to "Pin feeding" position, feed pin cam should be in the position illustrated, and height of feed dogs should be 0.7 ± 0.1 mm.

ADJUSTMENT

1. Loosen knob axis lever set screw A.
2. Loosen notch spring screw B.
3. Turn feed dog adjustment knob all the way to the left.
4. Adjust position of knob axis lever.
5. Fasten knob axis lever set screw A.
6. Turn feed dog adjustment knob to the right, and adjust position of feed pin cam.
7. In this position, adjust so that notch spring passes through V-shaped groove in outside of feed pin cam, and fasten screw B on notch spring.
8. Turn feed dog adjustment knob to check that it clicks into each position and that the height of feed dogs changes accordingly.



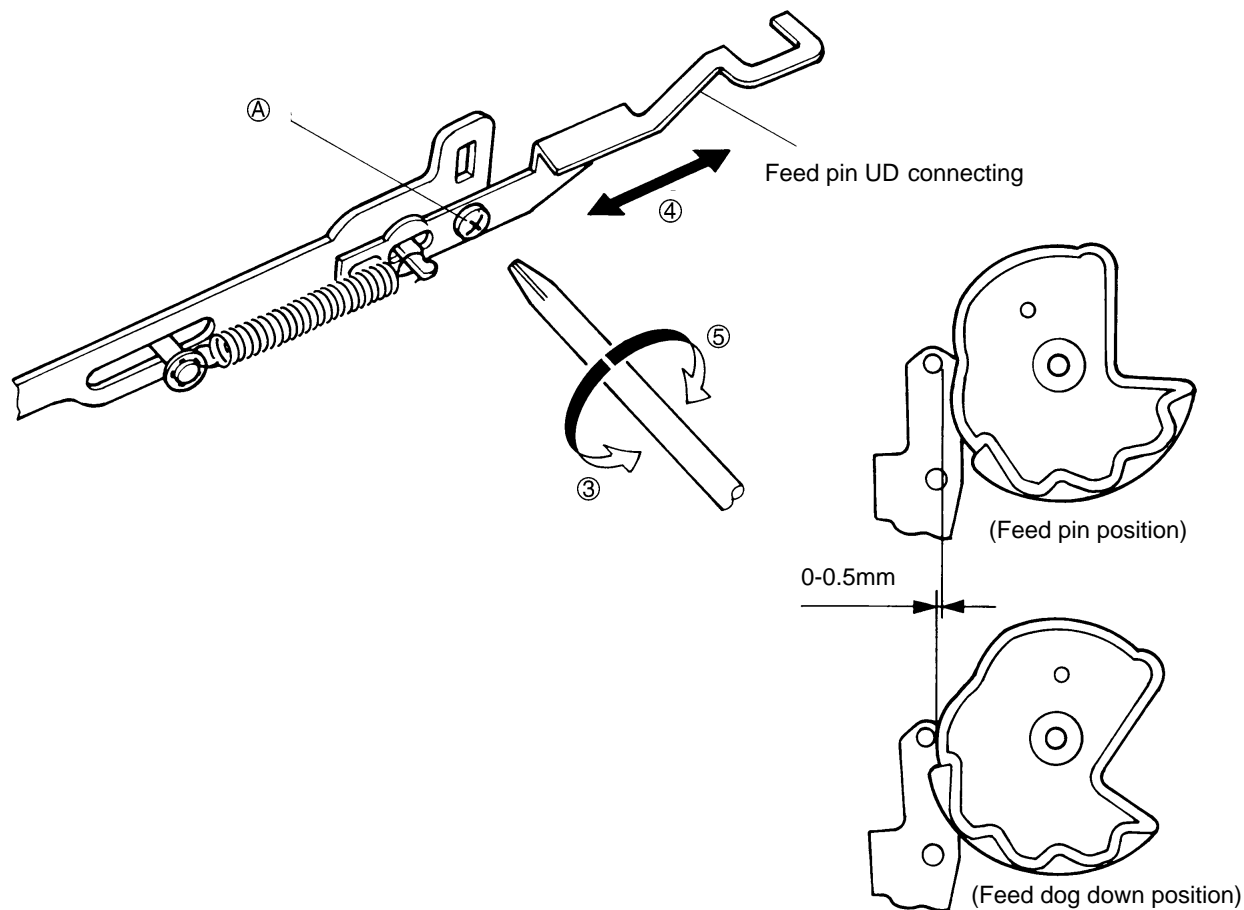
17. ADJUSTING POSITION OF FEED PIN UD CONNECTING ROD

STANDARD

While pushed in, flip feed dog adjustment knob between "Pin feeding" and "Feed dogs down" positions. Ascension of feed pin exchange connecting rod pin should be within 0-0.5mm.

ADJUSTMENT

1. Raise foot.
2. Flip feed dog adjustment knob between "Pin feeding" and "Feed dogs down" positions and check actions of feed pin exchange connecting rod pin and cam surface.
3. Loosen feed pin UD connecting rod screws.
4. Adjust position of feed pin UD connecting rod.
5. Fasten feed pin UD connecting rod screws.
6. Re-check adjustment standard.



18. ADJUSTING HEIGHT OF FEED PIN

STANDARD

With feed dogs in their uppermost position, the point of needle should be 3-3.5mm from surface of needle plate.

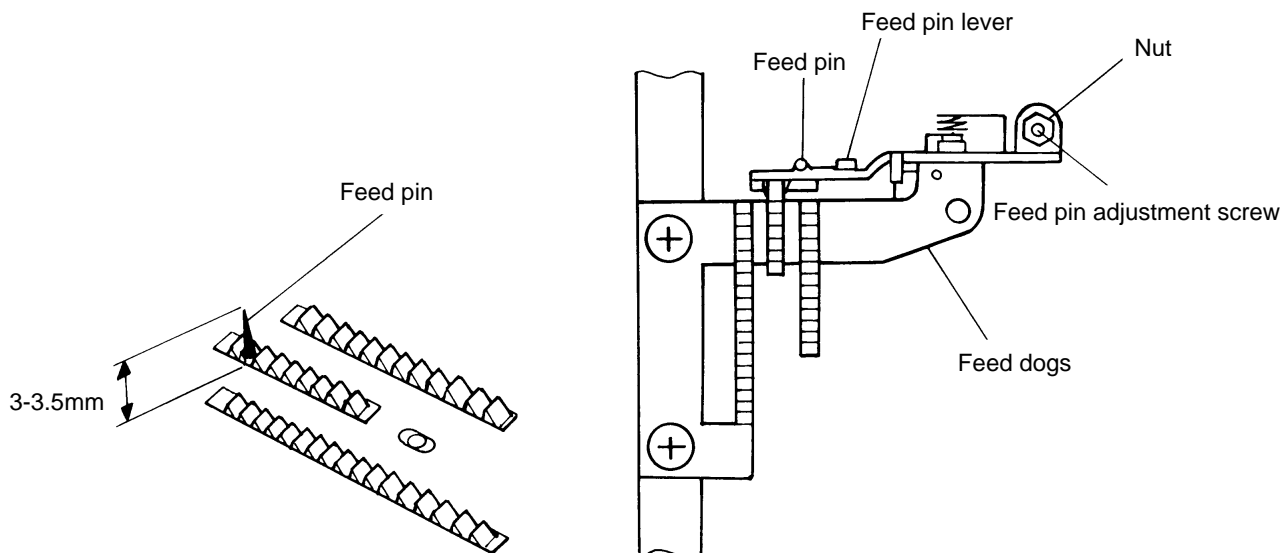
ADJUSTMENT

1. Remove foot.
2. Lower foot lift.
3. Turn feed dog adjustment knob to "Lightweight fabrics" position.
4. Turn hand wheel, until feed dogs are in their uppermost position.
5. Loosen nut, and turn back feed pin adjustment screw slightly.
6. Set feed dog adjustment knob to "Pin feeding" position.
7. Turn feed pin feed pin adjustment screw, adjust height of feed pin so it is within 3-3.5mm from surface of needle.
8. Tighten nut, and check actions of feed pin.

*Check to make sure there is space between the feed pin lever and feed dogs.

NOTE

If feed pin height is set higher than standard height (3-3.5mm), then needle will hit the feed dogs.



19. ADJUSTING NEEDLE THREADER

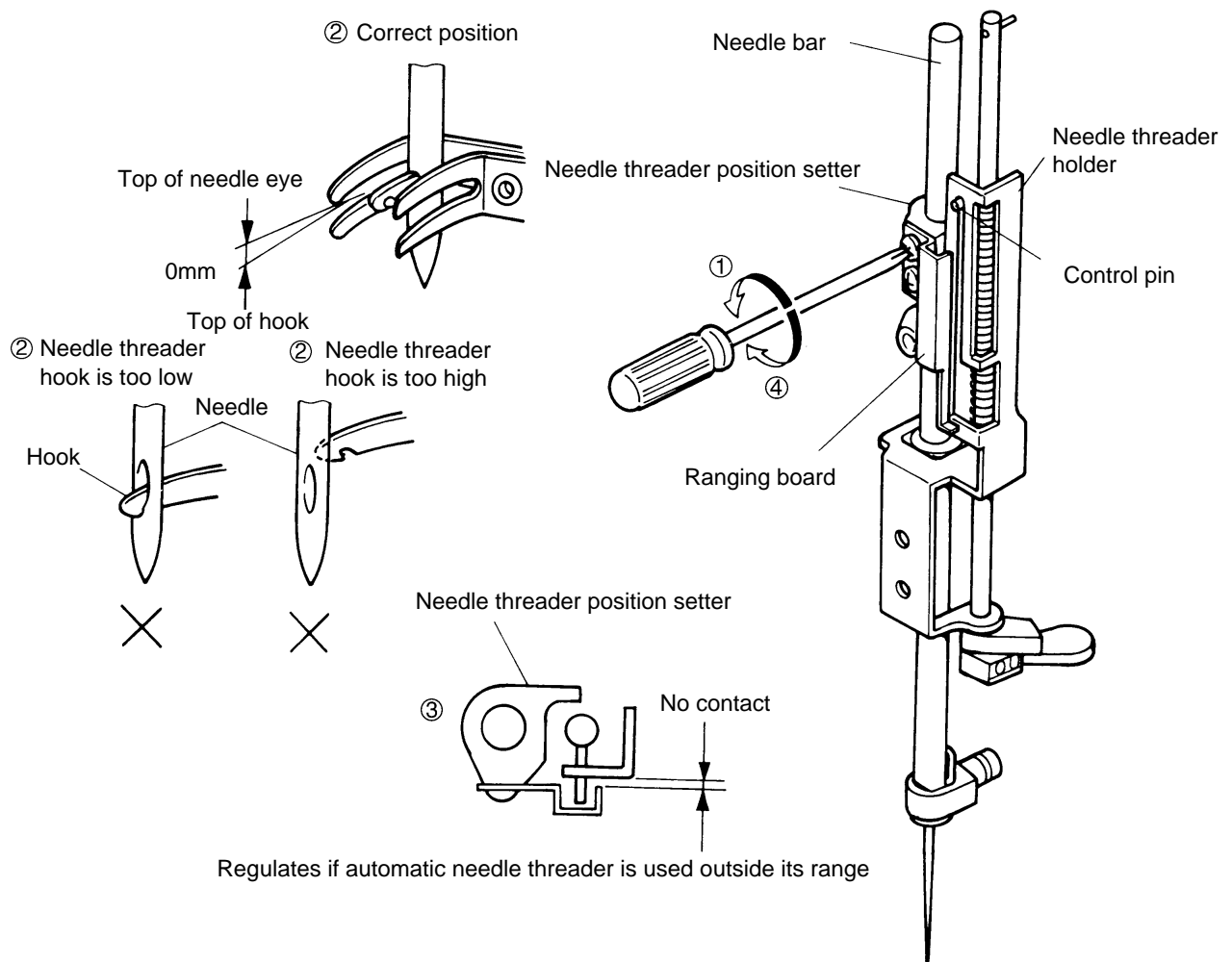
STANDARD

Vertical position of needle threader hook should be set so top of needle threader hook lines up with top of needle eye of the needle.

ADJUSTMENT

*Adjust height of needle bar height before hand.

1. Loosen needle threader position setter screws.
2. Adjusts up-down direction of needle threader position setter.
3. Rotation of needle threader position setter should be set so that during vertical movement of needle bar, ranging board does not come into contact with needle threader holder or control pin. Check also to make sure that if automatic needle threader is used outside of its range, control pin of needle threader shaft is regulated by ranging board.
4. Tighten needle threader position setter screws.



20. ADJUSTING POSITION OF THREAD CUTTER-CAM

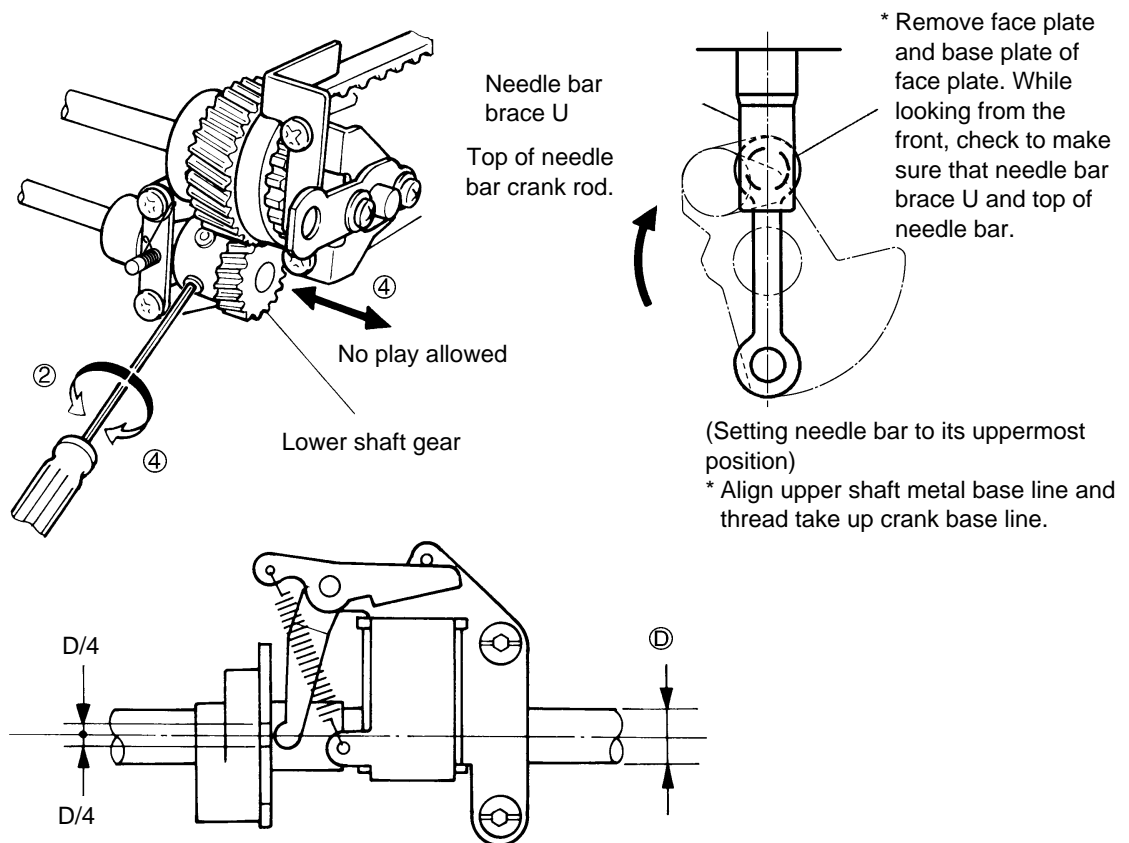
STANDARD

When needle bar is in its uppermost position, notch on thread cutter cam should be within the range illustrated in the diagram (part width $D/2$).

ADJUSTMENT

* First, carry out adjustments to 2. upper shaft and belt adjusting pulley phase, 3. timing belt tension, and backlash. Refer to the appropriate sections for each adjustment.

1. Turn the hand wheel towards the front of the sewing machine, so needle bar is raised to its uppermost position.
2. Loosen 2 lower shaft gear set screws.
3. Adjust thread cutter cam phase.
4. Fasten 2 lower shaft gear set screws. Then make sure there is no play in shaft bearing of lower shaft.
5. Turn hand wheel towards front of sewing machine, again raise needle bar to its highest position, and check that thread cutter cam phase is correct.
6. Adjust timing of 4. needle and rotary hook, and adjust clearance between needle and rotary hook.



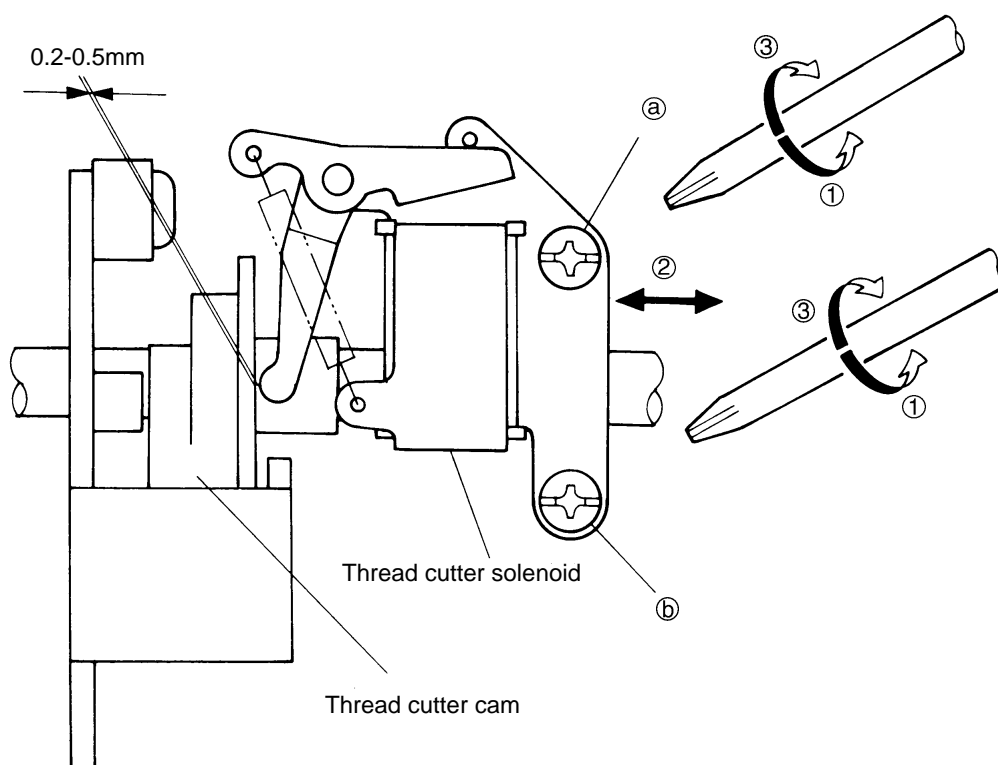
21. ADJUSTING POSITION OF THREAD CUTTER SOLENOID

STANDARD

Clearance between thread cutter solenoid tip of contact maker and thread cutter cam should be 0.2-0.5mm when solenoid is idle.

ADJUSTMENT

1. Unscrew a and b screws.
2. Check clearance between thread cutter solenoid tip of contact maker and thread cutter cam.
3. Fasten a and b screws.



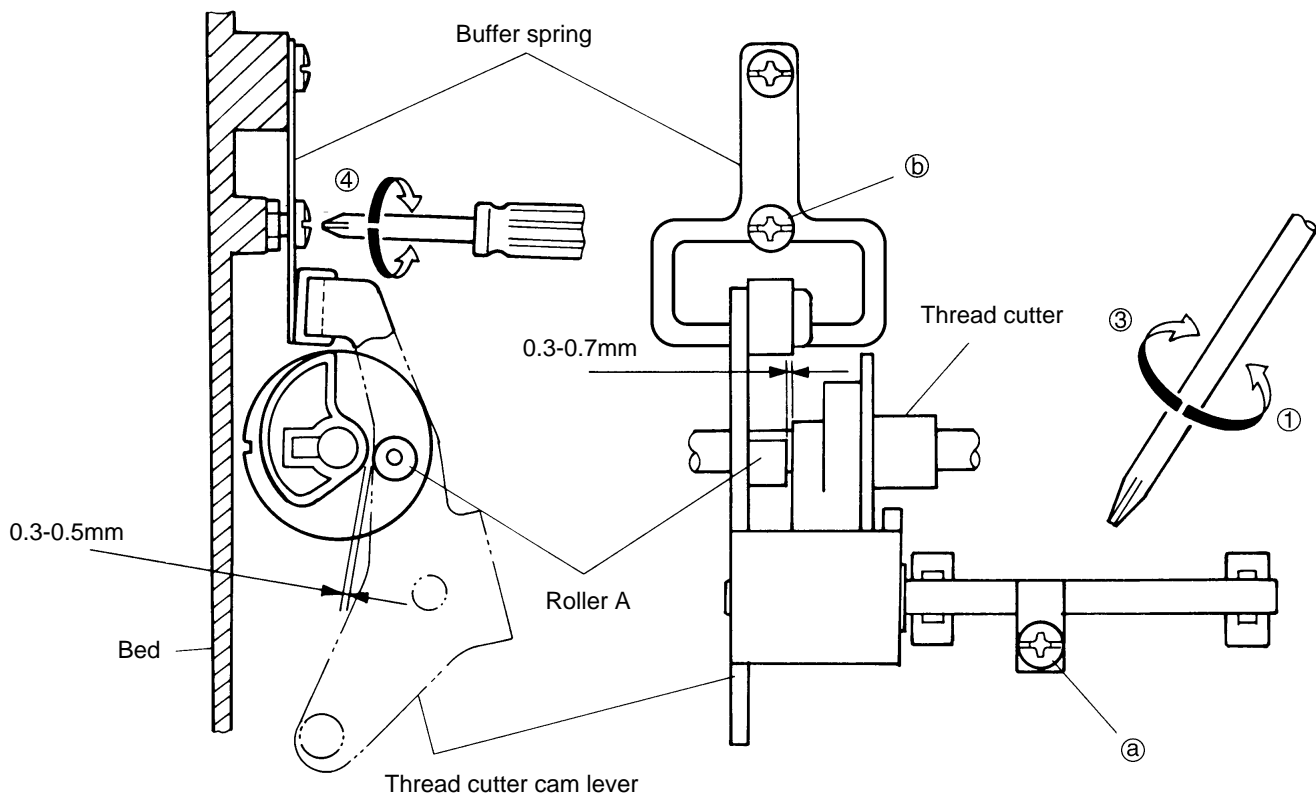
22. ADJUSTING POSITION THREAD CUTTER CAM LEVER, AND HEIGHT OF BUFFER SPRING

STANDARD

1. When thread cutter cam is idle, clearance between end of thread cutter cam lever roller A and end of thread cutter cam should be 0.3-0.7mm.
2. When thread cutter cam lever is idle, there should be 0.3-0.5mm of space between outside of thread cutter cam lever roller A and narrowest point of thread cutter cam when it is in its operative position.

ADJUSTMENT

1. Loosen shaft bracing plate screws (a).
2. Adjust shaft bearing of thread cutter cam lever.
3. Fasten screws (a).
4. Turn buffer spring height adjustment screw (b) and adjust idle height of thread cutter cam lever.



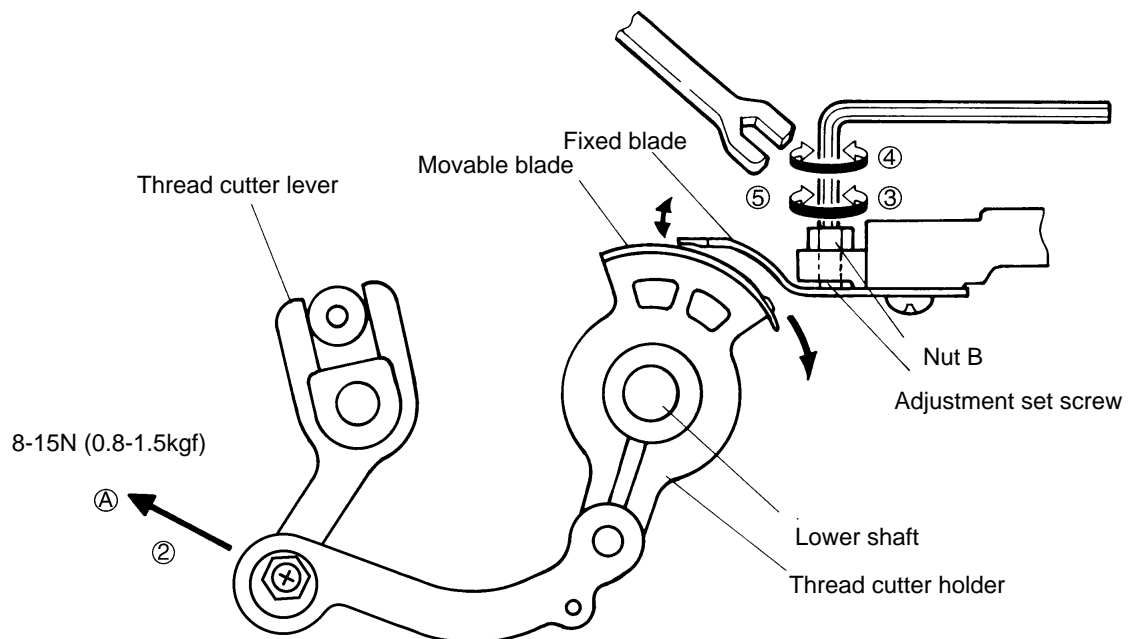
23. FIXED BLADE HEIGHT ADJUSTMENT

STANDARD

Move thread cutter lever. maximum load when movable and fixed blades are balanced should be is 8-15N (0.8-1.5kgf) when thread cutter lever moves in the direction illustrated by A.

ADJUSTMENT

1. Remove (2) needle plate screws. remove needle plate.
2. Move thread cutter lever, measure load when movable and fixed blades are balanced.
3. Loosen nut B.
4. Adjust height of fixed blade and adjustment screw C.
5. Fasten nut B.
6. Check balance load.



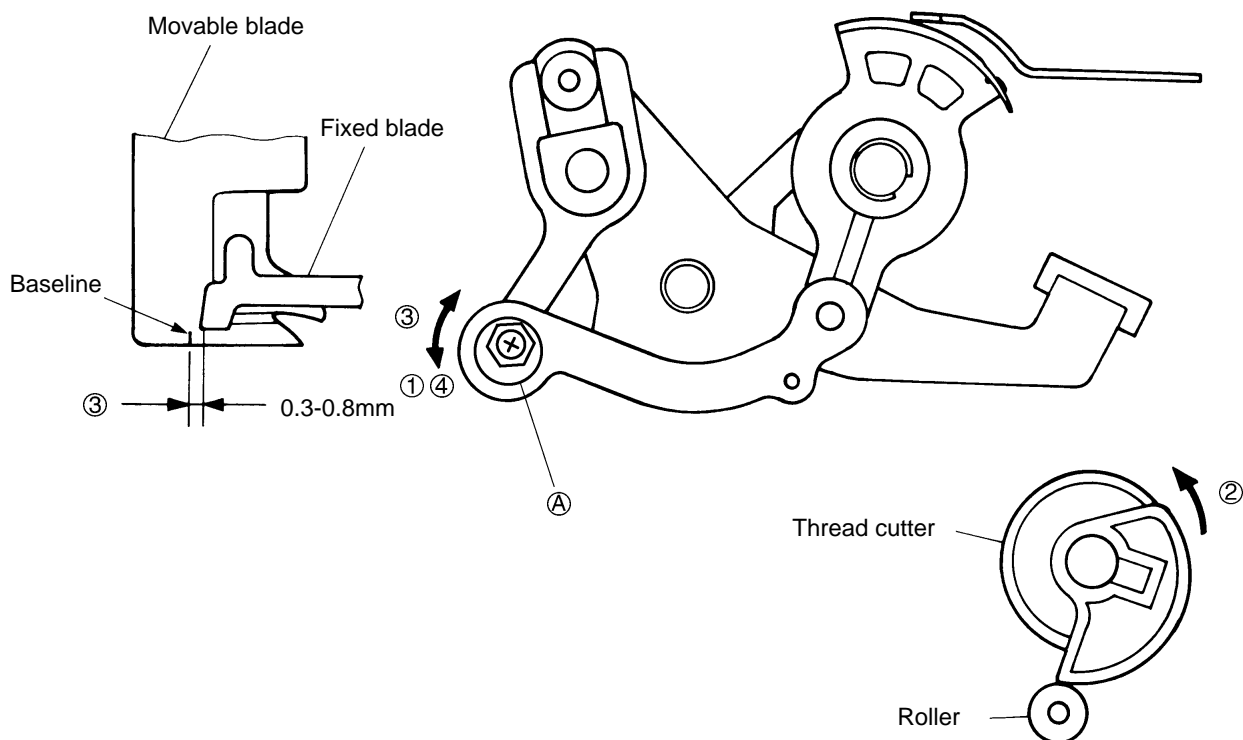
24. ADJUSTING MOVABLE BLADE DIFFERENTIAL

STANDARD

Turn upper shaft pulley with your hand and operate thread cutter. Maximum diferential of movable blade should be 0.3-0.8mm in the direction from baseline illustrated in diagram, as illustrated in the right diagram.

ADJUSTMENT

1. Loosen screw A.
2. Turn upper shaft pulley with your hand, operate thread cutter cam and thread cutter so that roller is positioned so that thread cutter cam is in its uppermost position.
3. Turn adjustment nut Z and adjust operative position of movable blade.
4. Fasten screw A.



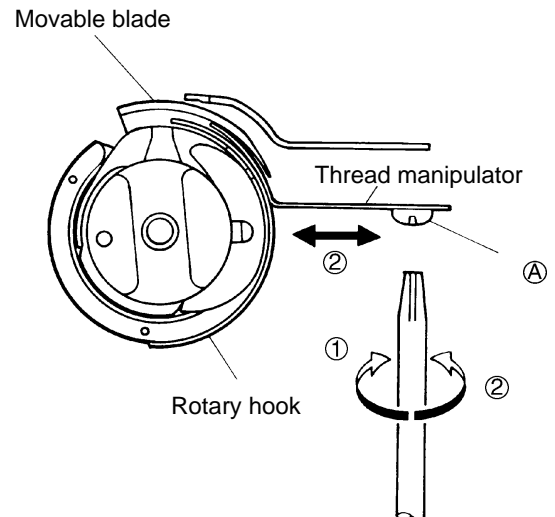
25. ADJUSTING POSITION OF THREAD MANIPULATOR

STANDARD

Thread manipulator should not come into contact with rotary hook and movable blade during operation.

ADJUSTMENT

1. Loosen thread manipulator screw A.
2. Adjust position of thread manipulator.
3. Fasten thread manipulator screw A.



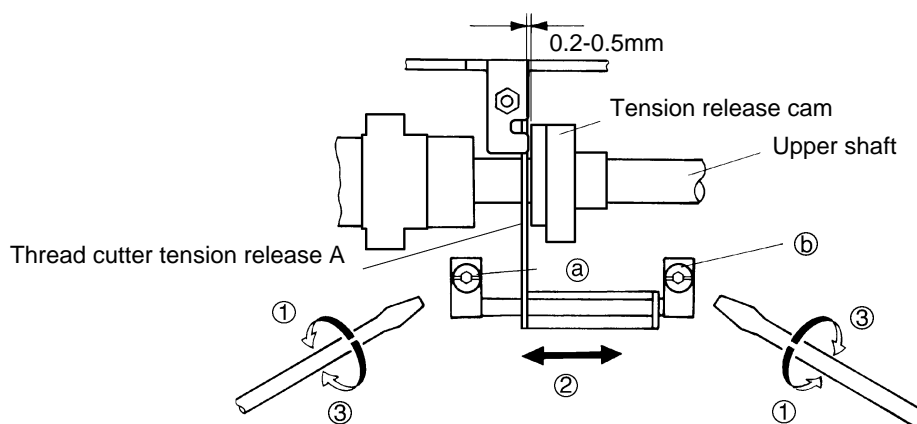
26. ADJUSTING THREAD CUTTER TENSION RELEASE A POSITION

STANDARD

Clearance between cam point of contact of thread cutter tension release A and tension release cam should be 0.2-0.5mm when cam is in its idle position.

ADJUSTMENT

1. Loosen a and b screws.
2. Adjust clearance between cam point of contact of thread cutter tension release A and tension release cam.
3. When finished with adjustments, fasten a and b screws securely.



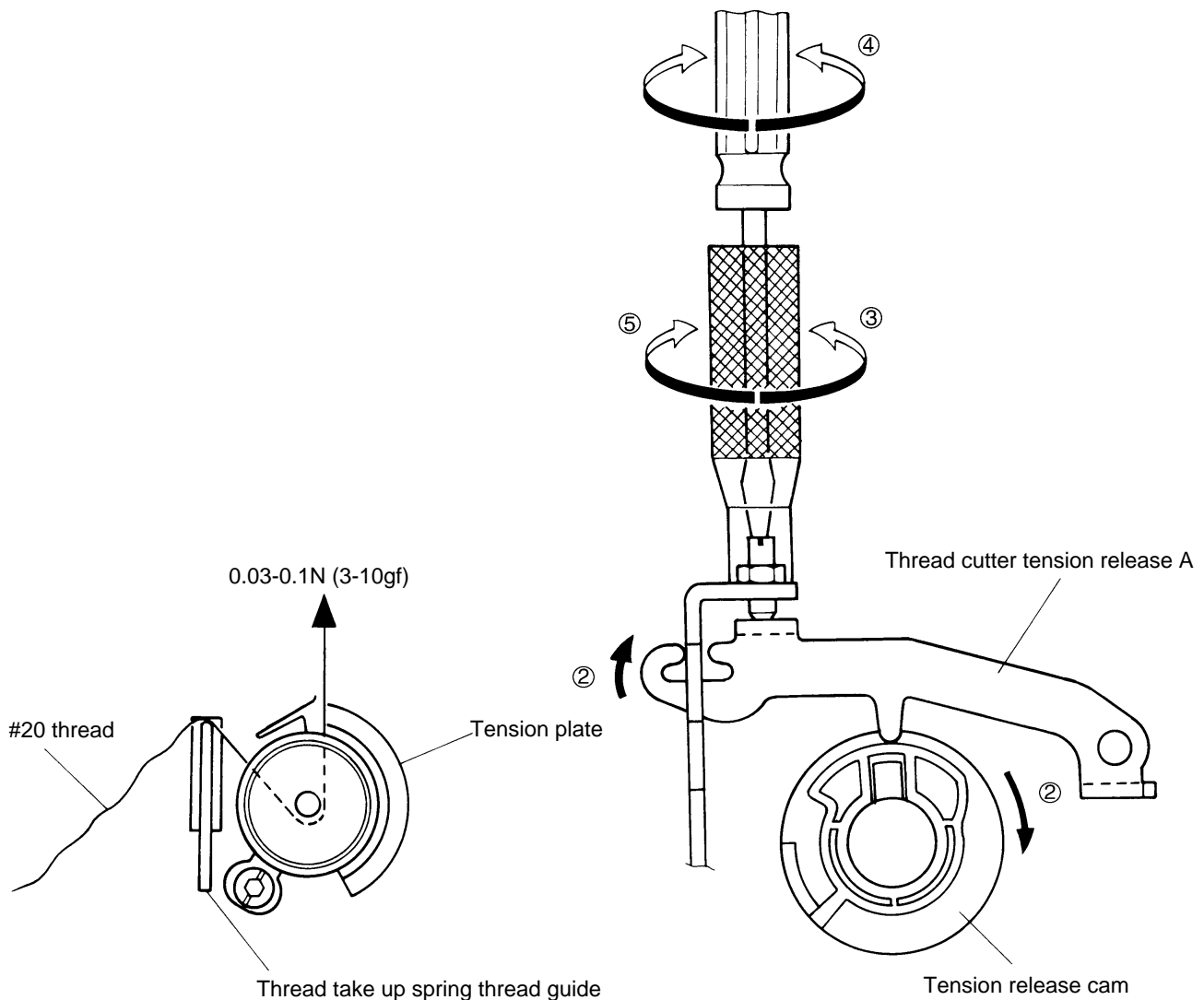
27. ADJUSTING TENSION RELEASE DIFFERENCE

STANDARD

Operate tension release solenoid, move tension release cam into operative position so thread cutter tension release A is in its highest position. When in this position, tension should be within the range of 0.03-0.1N (3-10gf) when #20 thread passes through tension block.

ADJUSTMENT

1. Lower foot.
2. While rotating upper shaft with hand, move tension release cam to operative position, and raise thread cutter tension release A to its uppermost position.
3. Loosen fixing nut of tension release differential adjustment screw.
4. Adjust to above adjustment standards via adjustment screw.
5. Fasten fixing nut of adjustment screw.



28. ADJUSTING TENSION RELEASE SOLENOID POSITION

STANDARD

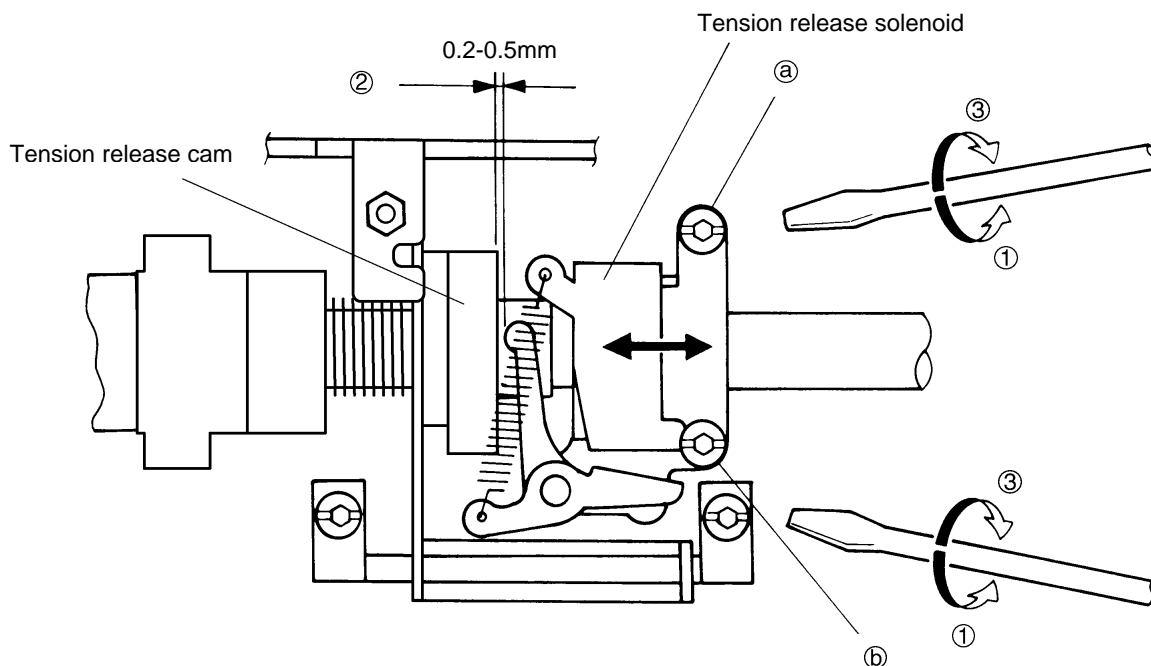
Clearance between tension release solenoid contact tip and tension release cam should be 0.2-0.5mm when solenoid is idle.

ADJUSTMENT

1. Loosen a and b screws.
2. Adjust clearance between tension release solenoid contact tip and tension release cam.
3. After completing adjustments, fasten screws securely.

NOTE

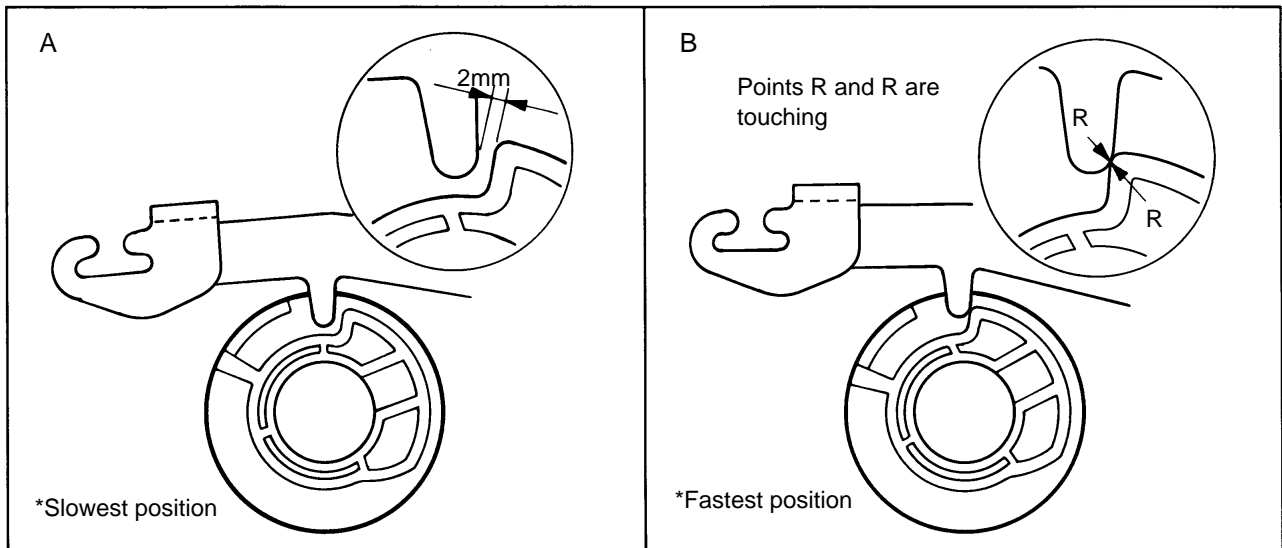
Do not oil the space between the tension release cam and upper shaft. (Whenever operation is not smooth, apply a small amount of sewing machine oil or another low viscosity oil, put the cam onto the upper shaft and move it back and forth, then wrap.)



29. PHASE ADJUSTMENT OF NEEDLE POSITION SHUTTER

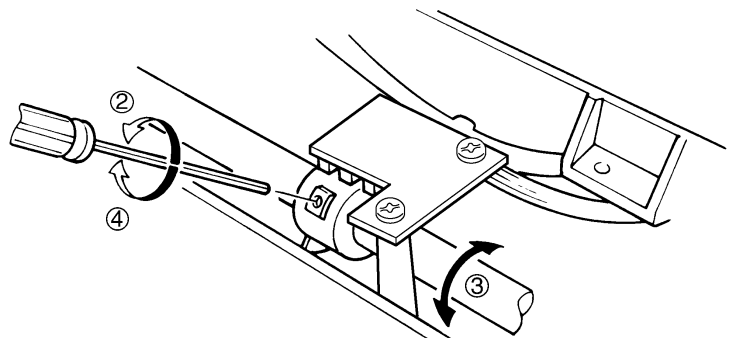
ADJUSTMENT

Set feed dog height to "Heavyweight Fabrics", set foot pressure to maximum, lower foot, turn pressure dial to maximum tension, push thread cutter button ten times, and check alignment of (when idle) upper shaft tension release cam and tension release lever contact tip that they are within the range indicated by the diagram below.



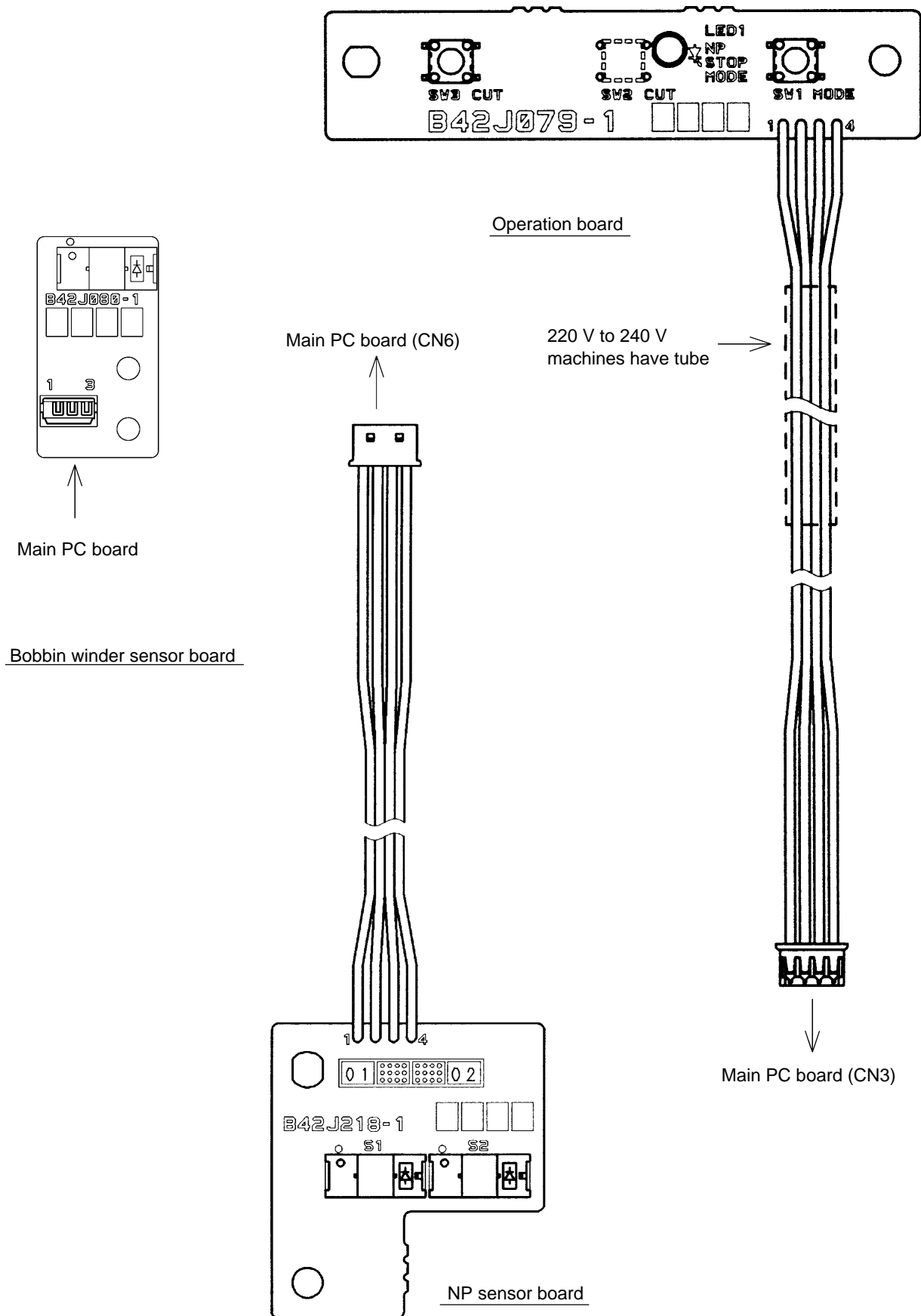
ADJUSTMENT

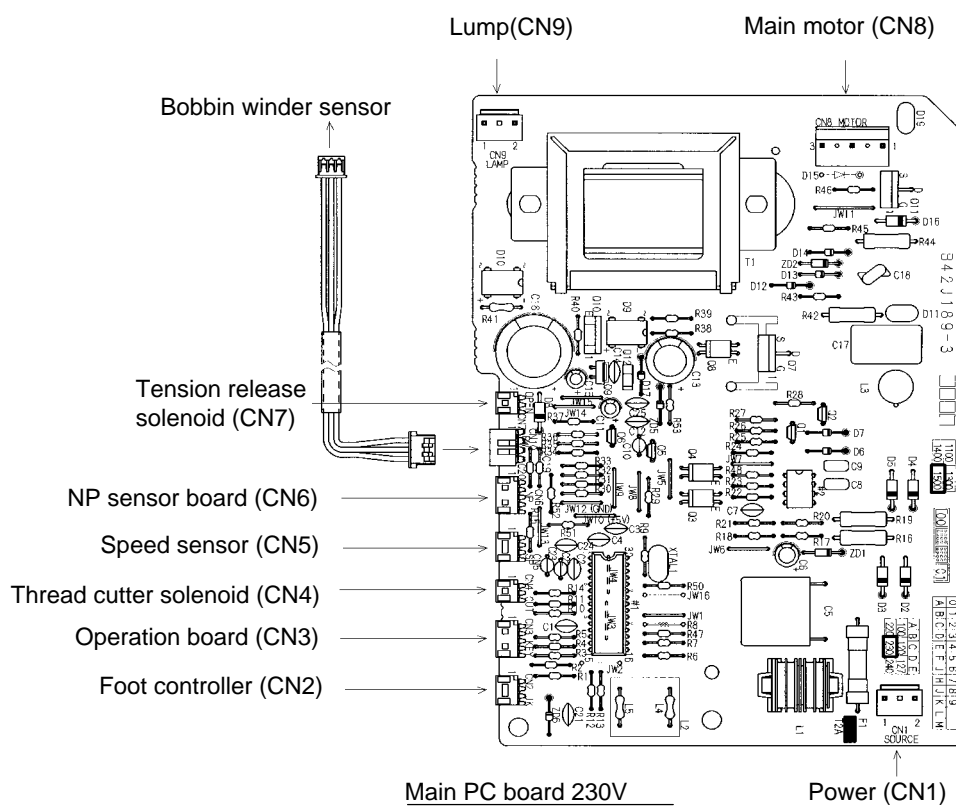
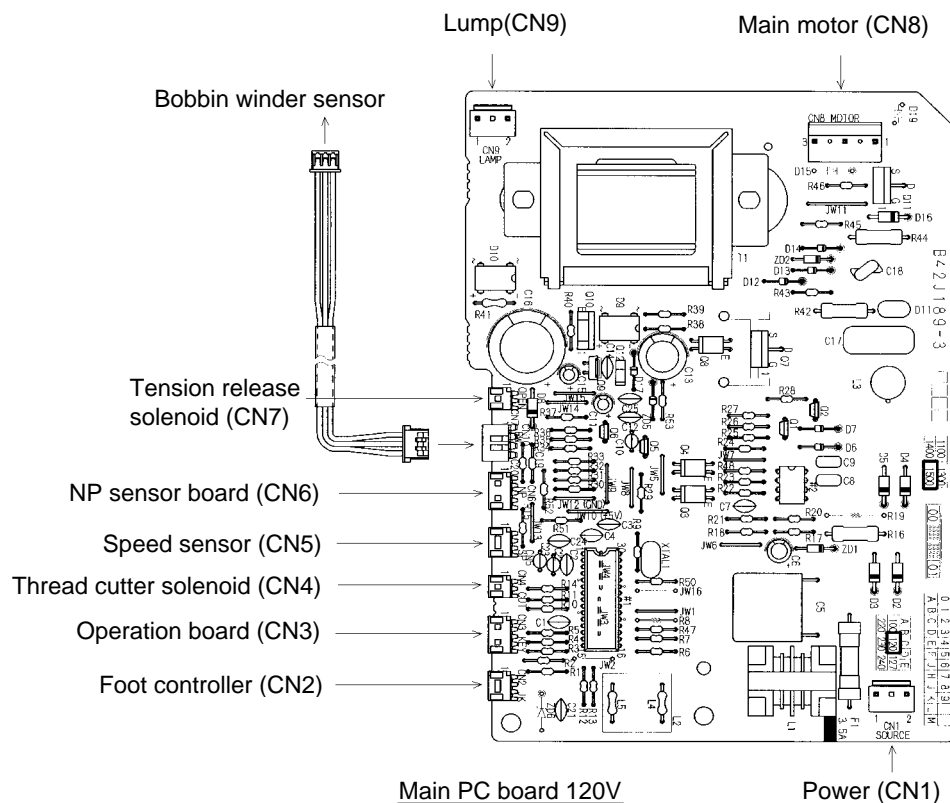
1. Turn pulley, so rotation of needle bar 45 degree from uppermost position.
2. Loosen needle position shutter set screw.
3. In diagram A, shutter is sped up (turn towards the front of the sewing machine). In diagram B, shutter is slowed down (turn in opposite direction).
4. Fasten needle position shutter set screw.
5. Check if following adjustment standard.



IV. ELECTRICAL ADJUSTMENTS

1. LAMP DOES NOT LIGHT UP.....	83
2. LAMP WILL NOT TURN OFF.....	83
3. MOTOR DOESN'T RUN WHEN FOOT CONTROLLER IS STEPPED ON	84
4. WHEN FOOT CONTROLLER IS DEPRESSED, MAIN MOTOR RUNS AT MAXIMUM SPEED FOR ABOUT A SECOND AND THEN STOPS	85
5. THE MAIN MOTOR DOES NOT ROTATE EVENLY.....	85
6. SEWING MACHINE DOES NOT STOP EVEN WHEN FOOT CONTROLLER IS RELEASED.....	86
7. WHEN SEWING AT MAXIMUM SPEED, SEWING MACHINE TAKES OVER 0.3 SECONDS TO STOP SEWING, EVEN WHEN FOOT CONTROLLER IS RELEASED RAPIDLY.....	86
8. SEWING MACHINE DOESN'T STOP DURING BOBBIN WINDER OPERATIONS, EVEN WHEN THE BOBBIN IS FULL	86
9. NEEDLE DOESN'T STOP IN LOWERED POSITION, REGARDLESS OF NEEDLE STOP POSITION.....	86
10. NEEDLE STOP POSITION LED DOESN'T LIGHT UP WHEN POWER IS TURNED "ON"	87
11. THE NEEDLE STOP POSITION LED IS BLINKING SLOWLY (ABOUT ONCE PER SECOND)	88
12. WILL NOT RELEASE NEEDLE STOP POSITION, EVEN WHEN NEEDLE STOP POSITION BUTTON IS DEPRESSED	88
13. THREAD CUTTER DOESN'T FUNCTION PROPERLY, EVEN WHEN THREAD CUTTER BUTTON IS DEPRESSED	88





ELECTRICAL ADJUSTMENTS

*Measure the resistance by cutting off the power, then removing the connector to be measured from the board. For the check locations, see the diagram.

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
1. Lamp does not light up.	<ol style="list-style-type: none"> Is the lamp screwed completely into the socket? Is resistance between lamp electrodes 75 to 90 ohms for 120 V machine, or 360 to 520 ohms for 220 V to 240 V machine? Is main PC board lamp connector (CN9) connected? When lamp switch was turned on, was resistance between pin 1 and pin 2 of the lamp connector (CN9) disconnected from main PC board 75 to 90 ohms for 120 V machine or 360 to 520 ohms for 230 V machine? Is the power cord inserted in an AC 100 V outlet? Is the power cord plugged in? Is the voltage between electrodes in the section of the power cord plugged into the machine 120 V for the 120 V machine, or 220 V to 240 V for the 220 V to 240 V machine? Is the power cord plugged into the machine? Is the power connector of main PC board (CN1) connected? Is the voltage between pins 1 and 2 of main PC board power connector (CN1) 120 V for the 120 V machine, or 220 V to 240 V for the 220 V to 240 V machine? Other. 	<ol style="list-style-type: none"> Not screwed in far enough. Lamp burned out due to vibration or age, or lamp is defective. Forgot to connect the connector. Lamp assembly is defective. Power not arriving from the outlet. Forgot to plug in the power cord. Break in the power cord. Forgot to plug into the machine. Forgot to connect the connector. Switch holder assembler is defective. Main PC board is defective. Electrical parts are broken and/or fuse is blown, etc. 	<ol style="list-style-type: none"> Screw lamp completely into the socket. Replace lamp. If main PC board's fuse is blown, replace main PC board assembly. Connect the connector. Replace lamp assembly. Confirm there is no blackout. Confirm that the breaker is not thrown. Plug in the power cord. Replace the power cord. Plug power cord into machine. Connect the connector. Replace switch holder assembly. Replace main PC board assembly.
2. Lamp will not turn off.	<ol style="list-style-type: none"> Is the lamp switch turned to OFF? Other. 	<ol style="list-style-type: none"> Switch is not turned to OFF. Lamp switch is defective. 	<ol style="list-style-type: none"> Turn the switch to OFF. Replace lamp assembly.

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
3. Motor doesn't run when foot controller is stepped on.	<ol style="list-style-type: none"> 1. Does pulley turn? 2. When power switch is turned "ON", is 1-2 voltage of main PC board power connector (CN1) AC120V for 120 V machine, or 220 V to 240 V for 220 V to 240 V machine? 3. Is main PC board main motor connector (CN8) connected? 4. Is resistance between main motor connector (CN8) pin (red lead wires) and 3 pin (black lead wires) 40 to 70 ohms for 120 V machine, or 80 to 120 ohms for 220 V to 240 V machine? 5. Is the main PC board speed sensor connector (CN5) connected? 6. When pin 2 (white lead wire) of main PC board speed sensor connector (CN5) is + on a voltage meter and pin 1 (red lead wire) is -, and pulley is turned slowly, does DC fluctuate between DC 0 V and DC 5 V? 7. Is main PC board jack connector (CN2) connected? 8. Is resistance between pin 2 (white lead wire) and pin 3 (blue lead wire) of jack connector (CN2) disconnected from main PC board less than 1 ohm when the foot controller is plugged into the jack, and infinity when not plugged into the jack? 9. Is resistance between foot controller plug terminals less than 100 ohms when the foot controller is not stepped on, and 10k ohms when foot controller is fully depressed? 10. Is resistance between foot controller plug terminals, with foot controller not stepped on and plug's bellows section flexed 100 ohms or less? 	<ol style="list-style-type: none"> 1. There is a malfunction in the machinery. 2. Power is not being supplied to main PC board. 3. Forgot to connect the connector. 4. Main motor is defective. Internal temperature fuse is blown, etc. 5. Forgot to connect the connector. 6. Speed sensor is defective. 7. Forgot to connect the connector. 8. Jack assembly is defective. 9. There is a wire break in the foot controller, or the internal volume is insufficient. 10. There is a wire break in the foot controller's bellows section. 	<ol style="list-style-type: none"> 1. Adjust so it turns freely (mechanical check). 2. Carry out inspections 5 to 10 from Problem 1 "Lamp does not light up." 3. Connect the connector. 4. Change main motor. 5. Connect the connector. 6. Replace MM-352S board assembly. 7. Connect the connector. 8. Replace jack assembly. 9. Replace foot controller. 10. Replace foot controller.

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
3. Motor doesn't run when foot controller is stepped on.	<p>11. When foot controller is plugged into jack, is resistance between pin 1 (red lead wire) and pin 3 (blue lead wire) of the jack connector (CN2) disconnected from main PC board less than 100 ohms when foot controller is not stepped on, and 10k ohms when foot controller is stepped on?</p> <p>12. Is resistance between pin 1 (red lead wire) and pin 3 (blue lead wire) of operations board connector (CN3) disconnected from main PC board less than 1 ohm when needle stop position button is depressed, and infinity when not depressed?</p> <p>13. Is resistance between pin 1 (red lead wire) and pin 4 (yellow lead wire) of operations board connector (CN3) disconnected from main PC board less than 1 ohm when thread cutter button is depressed, and infinity when not depressed?</p> <p>14. Did you step on foot controller less than 1 second after turning on power or plugging foot controller into jack?</p> <p>15. Other.</p>	<p>11. Jack assembly is defective.</p> <p>12. Needle stop position button is in continually depressed condition. Or operations board assembly is defective.</p> <p>13. Thread cutter button is in continually depressed condition. Or operations board assembly is defective.</p> <p>14. Specifications. For safety, motor will not operate for one second even if foot controller is stepped on.</p> <p>15. Main PC board assembly is defective.</p>	<p>11. Replace jack assembly.</p> <p>12. Adjust installation of operations board, or replace operations board.</p> <p>13. Adjust installation of operations board, or replace operations board.</p> <p>14. None.</p> <p>15. Replace main PC board assembly.</p>
4. When foot controller is depressed, main motor runs at maximum speed for about a second and then stops.	<p>1. Is the speed sensor operating normally? Carry out inspection 6 of Problem 3 "Motor doesn't run when foot controller is stepped on."</p> <p>2. Other.</p>	<p>1. Speed sensor is defective.</p> <p>2. Main PC board assembly is defective.</p>	<p>1. Replace MM-352S board assembly.</p> <p>2. Replace main PC board assembly.</p>
5. The main motor does not rotate evenly.	<p>1. Is the area around the main motor's speed sensor attachment dirty?</p> <p>2. Did the problem occur when the machine was cold?</p> <p>3. Other.</p>	<p>1. Operation is not normal due to dirt on speed sensor's signal.</p> <p>2. If problem occurs when machine warms up, speed sensor is defective.</p> <p>3. Main PC board assembly is defective.</p>	<p>1. Clean speed sensor and shutter of dust, oil, etc. If they can not be cleaned, replace main motor.</p> <p>2. Replace MM-352S board assembly.</p> <p>3. Replace main PC board assembly.</p>

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
6. Sewing machine does not stop even when foot controller is released.	<ol style="list-style-type: none"> 1. Does machine not stop when needle stop position setting is cancelled? 2. Does resistance between foot controller's plug terminals show stabilized value? Is resistance less than 100 ohms when foot controller is not stepped on? 3. Does problem occur no matter how many times action is repeated? 4. Other 	<ol style="list-style-type: none"> 1. If machine stops, main PC board assembly break circuit is defective. 2. Foot controller's internal volume is insufficient. 3. If problem does not re-occur, foot controller volume is insufficient. 4. Main PC board is defective. 	<ol style="list-style-type: none"> 1. Replace main PC board assembly. 2. Replace foot controller. 3. Replace foot controller. 4. Replace main PC board assembly.
7. When sewing at maximum speed, sewing machine takes over 0.3 seconds to stop sewing, even when foot controller is released rapidly (for B635, when needle position is released).	<ol style="list-style-type: none"> 1. Is resistance between pin2 (blue lead wires) and pin 3 (black lead wires) of the main motor connector (CN8) disconnected from main PC board 9 to 12 ohms for 120 V machine, or 30 to 50 ohms for 220 V to 240 V machine? 2. Other. 	<ol style="list-style-type: none"> 1. There is a break in blue lead wire, so the motor's brake does not catch. 2. Main PC board assembly break circuit is defective. 	<ol style="list-style-type: none"> 1. Replace the main motor. 2. Replace main PC board assembly.
8. Sewing machine doesn't stop during bobbin winder operations, even when the bobbin is full.	<ol style="list-style-type: none"> 1. Are bobbin winder shutter and bobbin winder sensor plate attached properly? 2. Is the bobbin winder sensor board connector connected? 3. When main PC board's pin 2 for bobbin winder sensor (white lead wire) voltmeter is + and pin 1 (red lead wire terminals) are -, does voltage fluctuate between DC 0V and 5V when bobbin winder axis is slowly moved? 4. Other. 	<ol style="list-style-type: none"> 1. Because attachment is incorrect, the full position is skewed. 2. Signal is not sent because connector is disconnected. 3. Bobbin winder sensor is defective, or there is a break in the lead wire for bobbin winder sensor from main PC board. 4. Main PC board assembly is defective. 	<ol style="list-style-type: none"> 1. Adjust the attachment. 2. Connect the connector. 3. Replace the thread winder sensor board assembly or the main PC assembly. 4. Replace main PC board assembly.
9. Needle doesn't stop in lowered position, regardless of needle stop position. (B635)	<ol style="list-style-type: none"> 1. Is angle of rotation shutter correct? 2. Is NP sensor connector of main PC board (CN6) connected? 	<ol style="list-style-type: none"> 1. Position of rotation shutter is skewed. 2. NP sensor connector (CN6) is unconnected. 	<ol style="list-style-type: none"> 1. Adjust rotation shutter's position. 2. Connect the connector.

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
9. Needle doesn't stop in lowered position, regardless of needle stop position.	<p>3. NP sensor plate connector (CN6) pin 2 (white lead wires) voltmeter is + and pin 1 (red lead wires) is -, and when pin 3 (blue lead wires) is + and pin 1 (red lead wires) is -, does voltage fluctuate between DC 0V and 5V when pulley is slowly turned?</p> <p>4. Are bobbin winder shutter and bobbin winder sensor plate properly installed?</p> <p>5. Is bobbin winder sensor plate connector connected?</p> <p>6. When main PC board bobbin winder sensor pin 2 (white lead wire) voltmeter is + and pin 1 (red lead wire) is -, does voltage fluctuate between DC 0V and 5V when bobbin winder axis is moved slowly?</p> <p>7. Other.</p>	<p>3. NP sensor is defective, or there is a break in a lead wire, or parts of the main PC board are defective.</p> <p>4. If the shutter enters the sensor, the signal is sent during bobbin winding, and stops without regard to needle position.</p> <p>5. If it is not connected, signal is sent during bobbin winding, and stops without regard to needle position.</p> <p>6. Bobbin winder sensor is defective, or there is a break in the lead wire for bobbin winder sensor from main PC board.</p> <p>7. Main PC board assembly is defective.</p>	<p>3. Replace NP sensor board assembly, or main PC board assembly.</p> <p>4. Adjust the assembly.</p> <p>5. Connect the connector.</p> <p>6. Replace thread winder sensor assembly, or main PC board assembly.</p> <p>7. Replace main PC board assembly.</p>
10. Needle stop position LED doesn't light up when power is turned "ON".	<p>1. When power switch is turned ON, is the voltage between pin 1 and pin 2 of main PC board power connector (CN1) AC 100 V?</p> <p>2. Is NP sensor operating correctly? Carry out inspections 2 and 3 of Problem 9, "Needle doesn't stop in lowered position, regardless of needle stop position."</p> <p>3. Is operations board connector of main PC board (CN3) connected?</p> <p>4. With operations board connector (CN3) unconnected and main PC board's operations board connector (CN3) pin 1 (red lead wire) voltmeter is + and pin 2 (white lead wire) is -, is the voltage DCV?</p>	<p>1. Power is not reaching main PC board.</p> <p>2. See causes 2 and 3 for Problem 9.</p> <p>3. If not connected, power will not reach the LED.</p> <p>4. Main PC board's LED lighting circuit is defective.</p>	<p>1. Carry out inspections 5 to 10 of Problem 1 "Lamp does not light up."</p> <p>2. According to the results of inspections, refer to number 2 and 3 of Problem 9.</p> <p>3. Connect the connector.</p> <p>4. Replace main PC board assembly.</p>

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
10. Needle stop position LED doesn't light up when power is turned "ON".	5. With operations board connector (CN3) connected and main PC board's operations board connector (CN3) pin 1 (red lead wire) voltmeter is + and pin 2 (white lead wire) is -, is the voltage DC 1.5V to 2.5 V? 6. Other.	5. LED is defective, or there is a break in a lead wire. 6. Main PC board assembly is defective.	5. Replace operations board assembly. 6. Replace main PC board assembly.
11. The needle stop position LED is blinking slowly (about once per second)	1. Does the light still blink if the foot controller plug is removed from the jack? 2. Is the jack assembly operating correctly? Carry out inspections 7, 8, and 11 from Problem 3 "Motor doesn't run when foot controller is stepped on." 3. Is the speed sensor operating correctly? Carry out inspections 5, 6 from Problem 3 "Motor doesn't run when foot controller is stepped on." 4. Other.	1. If blinking stops, there is a break in a wire of the foot controller. 2. Jack is defective, or there is a break in a lead wire. 3. Speed sensor is defective, or there is a break in a lead wire. 4. Main PC board assembly is defective.	1. Replace the foot controller. 2. Depending on the results of the inspections, refer to number 7, 8 or 11 of Problem 3. 3. Depending on the results of the inspections, refer to number 5 or 6 of Problem 3. 4. Replace main PC board assembly.
12. Will not release needle stop position, even when needle stop position button is depressed.	1. Is the operations board switch operating correctly? Carry out inspections 12, 13 from Problem 3 "Motor doesn't run when foot controller is stepped on." 2. Other.	1. The button is in a continually depressed condition, or the operations board assembly is defective. 2. Main PC board assembly is defective.	1. Adjust the operations board assembly, or replace the operations board assembly. 2. Replace the main PC board assembly.
13. Thread cutter doesn't function properly, even when thread cutter button is depressed.	1. Does thread cutter solenoid lever move freely? 2. Is the main PC board's thread cutter solenoid connector (CN4) connected? 3. Is resistance between thread cutter solenoid connector disconnected from main PC board (CN4) pin 1 and pin 2 between 15 to 19ohms? 4. Does tension release solenoid lever move freely? 5. Is the main PC board's tension release solenoid connector (CN7) connected?	1. Thread cutter device adjustment is not correct. 2. Forgot to connect the connector. 3. Solenoid is defective or there is a break in a lead wire. 4. Tension release device adjustment is not correct. 5. Forgot to connect the connector.	1. Adjust the thread cutter device. 2. Connect the connector. 3. Replace the thread cutter solenoid assembly. 4. Adjust tension release device. 5. Connect the connector.

PROBLEM	CHECK CONTENTS	CAUSE	CORRECTION
13. Thread cutter doesn't function properly, even when thread cutter button is depressed.	<p>6. Is resistance between tension release solenoid connector detached from main PC board (CN7) pin 1 and pin 2 between 15 to 19 ohms?</p> <p>7. Is the operations board switch operating correctly? Carry out inspections 12, 13 from Problem 3 "Motor doesn't run when foot controller is stepped on."</p> <p>8. Is the foot controller stepped on?</p> <p>9. Is the foot controller operating correctly? Carry out inspection 9 from Problem 3 "Motor doesn't run when foot controller is stepped on."</p> <p>10. Is the thread winder shaft on the bobbin winder side?</p> <p>11. Is the thread winder sensor operating correctly? Carry out inspections 4 to 6 from Problem 9 "Needle doesn't stop in lowered position, regardless of needle stop position."</p> <p>12. Is the NP sensor operating correctly? Carry out inspections 2, 3 from Problem 9 "Needle doesn't stop in lowered position, regardless of needle stop position."</p> <p>13. Other.</p>	<p>6. Solenoid is defective, or there is a break in a lead wire.</p> <p>7. The switch in a consistently depressed condition, or the operations board assembly is defective.</p> <p>8. If the foot controller is stepped on while the machine is stopped the thread cutter button does not operate.</p> <p>9. Foot controller's internal volume is insufficient.</p> <p>10. When winding the bobbin thread cutter can not be used.</p> <p>11. When bobbin winding signal is being sent thread cutter can not be used.</p> <p>12. See causes 2 and 3 for Problem 9.</p> <p>13. Main PC board assembly is defective.</p>	<p>6. Replace tension release solenoid assembly.</p> <p>7. Adjust the operations board assembly, or replace the operations board assembly.</p> <p>8. Check.</p> <p>9. Replace the foot controller.</p> <p>10. Check.</p> <p>11. Depending on the results of the inspections, refer to number 2, 3 of Problem 9.</p> <p>12. Depending on the results of the inspections, refer to number 4, 5 or 6 of Problem 9.</p> <p>13. Replace main PC board assembly.</p>

V. MECHANICAL ADJUSTMENTS

A. SEWING

1. FABRIC DOESN'T FEED	91
2. NEEDLE BREAKAGE	91
3. UPPER THREAD BREAKAGE	91
4. LOWER THREAD BREAKAGE	91
5. SKIPPED STITCHES	92
6. POOR STITCH TENSION	92
7. PUCKERING OF FABRIC	92
8. PULLEY IS DIFFICULT TO ROTATE OR WILL NOT ROTATE.....	92

B. THREAD CUTTER

1. DOESN'T CUT THREAD.....	93
2. DOESN'T CUT UPPER THREAD.....	93
3. DOESN'T CUT LOWER THREAD.....	93
4. SEWING MACHINE LOCKS UP WHEN CUTTING THREAD. OR MOVABLE BLADE DOES NOT RETURN TO FORMER POSITION	93
5. AFTER TRIMMING THREAD, UPPER THREAD COMES OUT OF NEEDLE	94

C. NEEDLE THREADER

1. NEEDLE THREADER HOOK DOESN'T PASS THROUGH EYE OF THE NEEDLE	94
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A. SEWING

PROBLEM	CAUSE	CORRECTION
1. Fabric doesn't feed.	1. Foot pressure is too low.	Turn pressure adjustment dial to the right so indicator needle falls and foot pressure is increased. Refer to ① P.4.
	2. Height of feed dogs is incorrect.	Adjust height of feed dogs. Refer to ⑤ P.54.
2. Needle breakage.	1. Needles are bent or dull.	Change needles. Refer to ① P.6.
	2. Needle is not attached properly.	Attach properly. Refer to ① P.6.
	3. Fabric is being pulled needlessly.	Do not pull or push fabric very hard while sewing, your hands should be used only to make sure the fabric feeds evenly under the needle without turning.
	4. Needle hits rotary hook . Needles are bent. No clearance between needle and rotary hook point.	Attach the correct needle and adjust clearance between needle and rotary hook point. Refer to ⑤ P.56.
3. Upper thread breakage.	1. Threading is incorrect.	Rethread properly. Refer to ① P.10.
	2. Thread is twisting up where it's not supposed to.	Rethread properly. Refer to ① P.10.
	3. Thread tension is too high.	Check the relationship between the fabric, thread and needle you are using, and adjust thread tension so it is not too tight. Refer to ① P.11.
	4. Needle is not attached correctly.	Attach correct needle. Refer to ① P.6.
	5. Wrong needle is being used.	Use correct sewing machine needle. Refer to ① P.6.
	6. Rotary hook is scratched.	Sand away small scratches with sandpaper (#800). In the event of deep scratches, replace rotary hook.
4. Lower thread breakage.	1. Bobbin case is incorrectly threaded.	Rethread correctly. Refer to ① P.8.
	2. Tension spring of bobbin case is too tight.	Loosen tension spring screw, and reattach thread tension. Refer to ① P.11.
	3. Rotary hook is scratched.	Sand away small scratches with sandpaper (#800). In the event of deep scratches, replace rotary hook.

*In the above, ① means owner's manual ⑤ means service manual.

PROBLEM	CAUSE	CORRECTION
5. Skipped stitches.	1. Needle is bent or needlepoint is dull.	Change needles. Refer to ①P.6.
	2. Needle is not attached correctly.	Attach correctly. Refer to ①P.6.
	3. Using wrong needle.	Use correct sewing machine needle. Refer to ①P.6.
	4. Thread scraps are accumulated under needle plate.	Remove needle plate and clean underneath it. Refer to ①P.17.
	5. Not using the correct needle for the fabric and thread being used.	Attach properly. Refer to ①P.11.
	6. Incorrect threading.	Attach properly. Refer to ①P.9,10.
	7. Bad timing between needle and rotary hook point.	Adjust timing. Refer to ⑤P.51,53.
6. Poor stitch tension	Poor upper thread and lower thread tension.	Correct thread tension. Refer to ①P.11.
7. Puckering of fabric.	1. Thread tension is too high.	When sewing on lightweight fabrics, Set the upper and lower thread. Tension as low as possible. Refer to ①P.11.
	2. Threading is incorrect.	Attach correctly. Refer to ①P.9,10.
	3. Foot pressure is too high.	Turn foot pressure knob to the left to reduce pressure. Refer to ①P.4.
	4. Stitch length (pitch) is set too high.	Reduce stitch length. When sewing on lightweight fabrics, proper stitch length should be about 2mm. Refer to ①P.3.
8. Pulley is difficult to rotate or will not rotate.	1. Thread is taken in to the shuttle. 2. Thread is wrapped around the thread take up or upper shaft.	Remove the thread where it is wrapped or tangled.

*In the above, ① means operation manual ⑤ means service manual.

B. THREAD CUTTER

PROBLEM	CAUSE	CORRECTION
1. Doesn't cut thread.	1. Overlap with the of movable blade and fixed blade is too little (or too much).	Adjust movable blade maximum differential, for correct overlap Refer to (S) P.75.
	2. Surface pressure on movable blade and fixed blade is too low (or too much).	Adjust fixed blade height, correct balance load. Refer to (S) P.74.
	3. Poor thread cutter cam phase.	Adjust to correct phase. Refer to (S) P.71.
	4. Poor needle position shutter phase.	Adjust to correct phase Refer to (S) P.79.
	5. Movable blade and fixed blade are dull	Change settings of fixed and movable blades
	Poor action movable blade	
	1. Not enough space between roller and thread cutter cam.	Adjust installation position of thread cutter cam lever position and set to proper clearance. Refer to (S) P.71.
	2. Thread cutter solenoid connector came disconnected.	Connect. Refer to (S) P.48.
	3. Rubber buffer fell off.	Insert into thread cutter cam lever.
	4. Poor action of thread cutter cam shaft bearing.	Change lower shaft assembly. Refer to (S) P.18,40.
	5. Poor action of thread cutter holder.	Adjust lower shaft gear shaft bearing position so thread cutter cam holder turns freely.
2. Doesn't cut upper thread	1. Poor needle clearance or timing.	Adjust timing of needle and rotary hook, and clearance between needle and rotary hook point. Refer to (S) P.56.
	2. See items 1-5 and 6-5 of "doesn't cut thread".	Refer to corresponding sections of this manual.
3. Doesn't cut lower thread.	1. Lower tension is too low (almost zero).	Adjust tension spring screw and attach tension. Refer to (O) P.11.
	2. See items 1-5 and 6-5 of "doesn't cut thread".	Refer to corresponding sections of this manual.
4. Sewing machine locks up when cutting thread. Or movable blade does not return to former position.	1. Insufficient (or excessive) space between the tension discs during thread trimming.	Adjust tension release differential, to the amount for thread trimming. Refer to (S) P.77.
	2. See items 1-5 and 6-5 of "doesn't cut thread".	Refer to corresponding sections of this manual.

*In the above, (O) means operation manual, (S) means service manual.

PROBLEM	CAUSE	CORRECTION
5.After trimming thread, upper thread comes out of needle.		
5-1. Upper thread comes out after thread is trimmed	1. Tension release solenoid connector has come loose.	Connect. Refer to ⑤P.48.
	2. Poor action from tension release cam shaft bearing.	Change upper shaft assembly. Refer to corresponding sections of this manual.
	3. See items 1 and 3 of "doesn't cut thread" and item 1 of "during thread trimming".	Refer to corresponding sections of this manual.
5-2. Upper thread comes out during first 13 stitches	1. Position of rotary hook rotation prevention bracket is no good.	Adjust to correct position. Refer to ⑤P.57.
	2. See item 1 of "doesn't cut upper thread".	Refer to corresponding sections of this manual.

*In the above,①means operation manual ⑤means service manual.

C NEEDLE THREADER

PROBLEM	CAUSE	CORRECTION
1. Needle threader hook doesn't pass through eye of the needle	1. Needle threader position setter is not adjusted properly.	Adjust height of needle threader position setter. Refer to ⑤P.70.
	2. Needle threader hook or hook guard is bent.	Change needle threader hook assembly.
	3. Needle is bent.	Change needle. Refer to ①P.6.

*In the above,①means operation manual ⑤means service manual.

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