

COMPUTER SEWING MACHINE

HZL-X Series

SERVICE MANUAL

CONTENTS

[1] Specifications of HZL-X Series	1
[2] Search by trouble (related to mechanical components)	3
[3] Principal parts	4
[4] Disassembling the machine covers	5
[5] PCB connection diagram	9
[6] Adjustment	13
6-1 Adjusting the needle bar height	13
6-2 Adjusting the needle entry point	14
6-3 Feed dog height	14
6-4 Timing belt	15
6-5 Feed timing	15
6-6 Timing between the needle and the hook	16
6-7 Clearance between the needle and the blade point of hook	17
6-8 Position of the hook rotation stopper plate	18
6-9 Adjusting the bobbin thread tension	18
6-10 Adjusting the disk opening amount	19
6-10-1 Adjusting the thread tension release adjusting plate	19
6-10-2 Pretension disk opening amount	19
6-10-3 Tension disk opening amount	20
6-10-4 Base tension opening amount	20
6-11 Adjusting the needle thread tension	21
6-12 Vertical position of the needle threading hook	22
6-13 Adjusting the auxiliary hook height	23
6-14 Adjusting the opening amount of auxiliary hook	24
6-15 Adjusting the presser bar height	24
6-16 Motor belt	25
6-17 Automatic thread trimming	26
6-17-1 Lateral position of the thread trimming mechanism base	26
6-17-2 Phase of the catching unit driving cam	27
6-17-3 Replacing the thread trimming blade	28
6-18 Longitudinal feed	29
6-19 Knee lifting wire	30
6-20 Automatic presser foot lifting	31
6-20-1 Auto-lifter cam lever	31
6-20-2 Presser-lifter position sensor	32
6-20-3 Adjusting the height of the presser foot when it is lifted	33
6-21 Straight stitch slide plate	35
6-21-1 Adjusting the position of the straight stitch slide plate	35
6-21-2 Straight stitch slide plate sensor PCB	36
6-22 Service mode	37
6-22-1 Service mode screen	37
6-22-2 Service-mode items and descriptions	37



CAUTION:

Be sure to observe the following to protect against a fire, electrical shock, injury or damaged components.

- * Be sure to unplug the machine before disassembly, assembly or adjustment of the machine.
- * Be sure to carefully prevent electric cords from being caught, coated surfaces from being damaged as well as wrong wiring during assembly.
- * Be sure to use the proper genuine parts when changing any of the machine parts.

[1] Specifications of HZL-X Series

(1) Power switch

- 220-240V AC common to 50/60 Hz
- 120V AC common to 60 Hz

(2) Power consumption

- 75 W

(3) Dimensions and weight

- Dimensions Main unit: 445 (width) × 210 (depth) × 290.5 (height) (mm)
Case set: 510 (width) × 257 (depth) × 305 (height) (mm)
- Weight Main unit: 10.3 kg

(4) Revolution control

- Slide style speed control
 - Straight stitch 80 to 1,050 sti/min (SPM)
 - Pattern stitch 80 to 750 sti/min (SPM)
 - Reverse stitch 80 to 1,050 sti/min (SPM)
(Sewing speed other than the specified range can be set optionally.)
80 to 1,050 sti/min (SPM) (when the speed controller is used.)
 - Bobbin winding 1,500 to 3,000 sti/min (RPM)
 - Low-speed start 80 to 110 sti/min (SPM) (approx. 1 second only when the power switch is turned ON.)
- Foot controller
 - Even when the foot controller is used, the speed control function by means of the slider is effective.
 - To stop the machine, either release the foot controller or press start/stop button.
 - The number of revolutions is controlled in the way same with the case of the slide speed control.
 - Toe-up pedaling function can be set optionally.
- Safety control
 - When the motor shaft of the sewing machine is accidentally constrained, the power supply to the motor is stopped within two seconds.
 - When the motor is overheated, the built in thermal switch stops the power to the motor.
 - Note that the machine can be restarted once the motor spontaneously cools down.

(5) Stop position

- Upon finishing sewing, the machine stops according to the preset needle stop position (with its needle up or down).
- Upon finishing reverse stitching, the machine stops with its needle down.
- Needle moves down when the machine has preset so that the needle stops at its up position and needle up/down button is pressed.
- Needle moves up when the machine has preset so that the needle stops at its down position and needle up/down button is pressed.
- In the case of fault, the machine stops immediately (stop position varies).

(6) Zigzag width

- Max. 7 mm depending on the pattern selected

(7) Amount of feed

- The amount of feed is changed in increments of 0.2 mm by the stitch length adjusting dial (or button).
(For the parallel parts of a buttonhole and satin stitches, the amount feed is changed in increments of 0.1 mm.)
Default setting: 2.4 mm (for straight stitching)

(8) Pattern selection

- 10-pattern direct selection: MENU key + Numeric keys
- Dot-matrix LCD



(9) Number of patterns that can be selected

- Max. 70 patterns

(10) Number of patterns

- HZL-DX7 : 300
- HZL-DX5 : 200

(11) Automatic threading device

- The hook section makes a turn by lowering the threading lever, and automatically returns to its original position after completion of threading.

(12) Automatic lock stitch

When the backtacking switch is turned ON:

- Straight stitch: Three stitches are sewn in normal direction and three stitches are sewn in reverse direction at the beginning and end (the reverse switch is turned ON) of sewing.
Amount of feed: Same with the preset amount of feed
- Other patterns: Zero-feed is inserted and one each stitch is sewn in the normal and reverse directions at the beginning and end (the reverse switch is turned ON) of sewing.
Amount of feed: Fixed at 0.6 mm

(13) Buttonholing

Auto-return type full automatic buttonholing

Buttonholing size detection

(14) Save and call patterns

Selected patterns and pattern settings can be stored in memory.

In addition, the pattern can be called up from memory for sewing.

Number of patterns that can be stored in memory: 10 (folders)

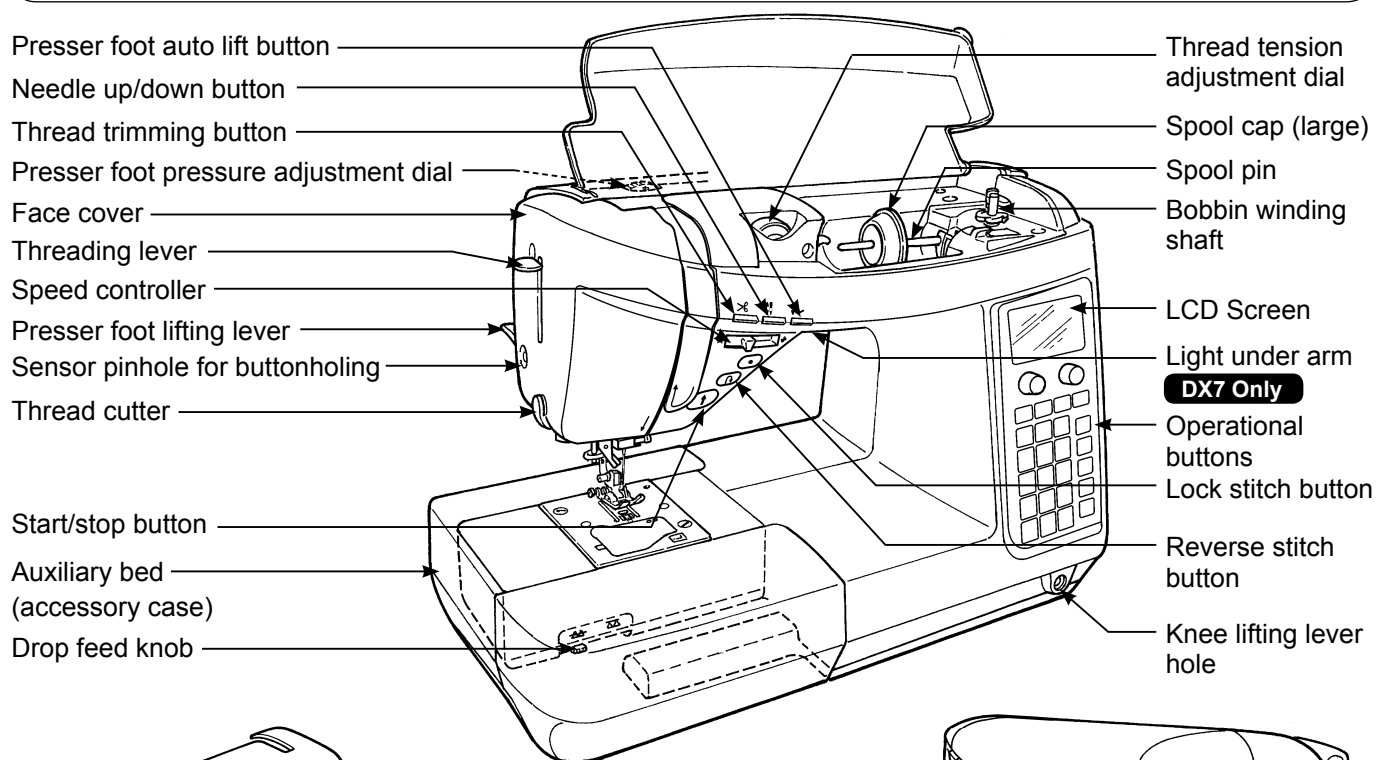
(15) Helpful messages

- Presser foot lifting lever
- Buttonholing foot
- Display of pattern storage limitation
- Pattern clear prompt
- Memory storage
- Acceptance of setting change
- 2-needle setting
- Motor lock
- Straight stitch selection

[2] Search by trouble (related to mechanical components)

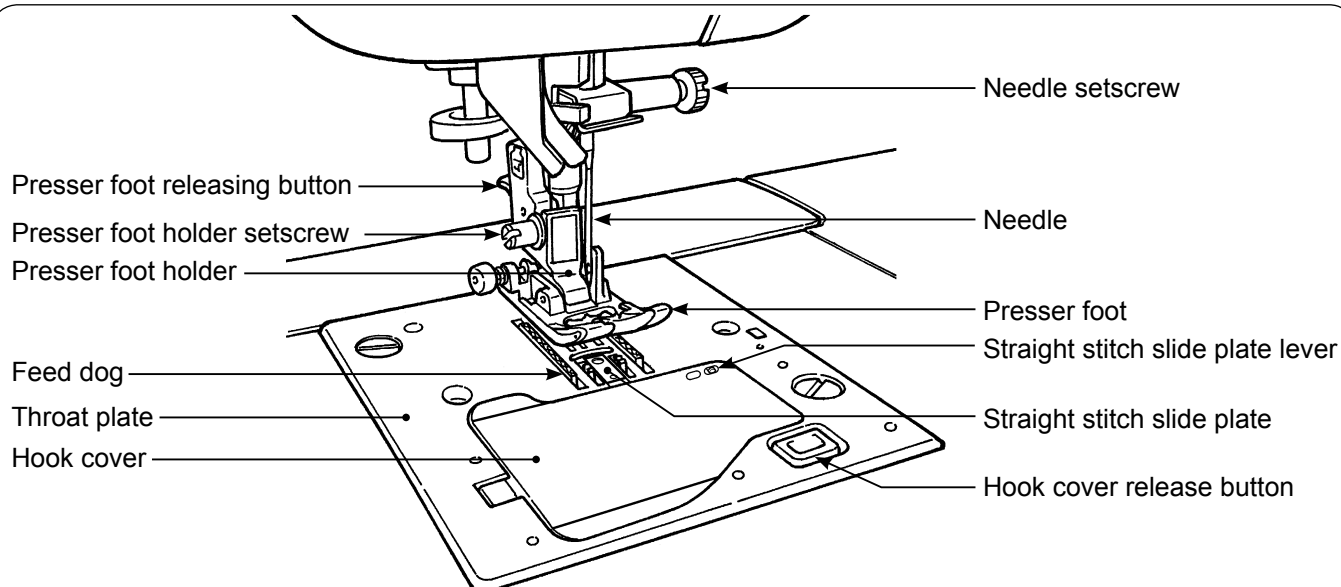
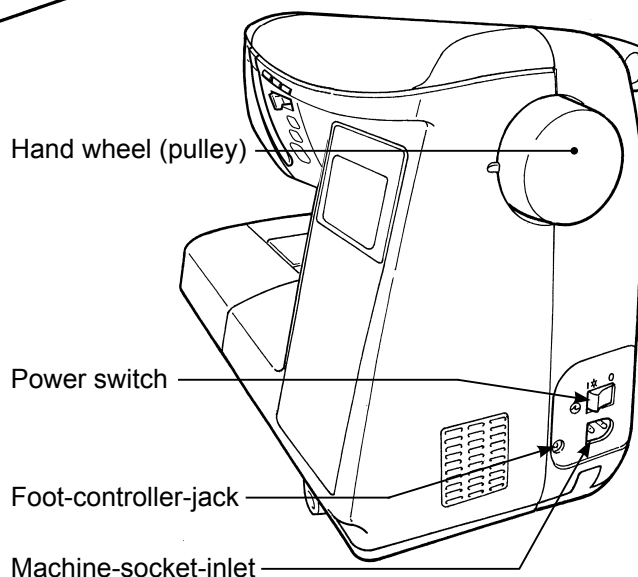
Phenomenon	Item to be checked
Faulty thread tension	6-8: Position of the hook rotation stopper plate 6-9: Adjusting the bobbin thread tension 6-10-2: Pretension disk opening amount 6-10-3: Tension disk opening amount 6-10-4: Base tension opening amount 6-11: Adjusting the needle thread tension
Stitch skipping	6-1: Adjusting the needle bar height 6-2: Adjusting the needle entry point 6-5: Feed timing 6-6: Timing between the needle and the hook 6-7: Clearance between the needle and the blade point of hook
Thread breakage	6-1: Adjusting the needle bar height 6-6: Timing between the needle and the hook 6-8: Position of the hook rotation stopper plate
Hitch stitch	6-2: Adjusting the needle entry point
Faulty material feed	6-3: Feed dog height 6-15: Adjusting the presser bar height
Contact between needle and throat plate or hook	6-2: Adjusting the needle entry point 6-5: Feed timing 6-6: Timing between the needle and the hook
Faulty pattern shape	6-3: Feed dog height 6-18: Longitudinal feed
Faulty automatic thread trimming	6-17-1: Lateral position of the thread trimming mechanism base 6-17-2: Phase of the catching unit driving cam 6-17-3: Replacing the thread trimming blade
Faulty operating noise	6-4: Timing belt 6-16: Motor belt
Needle threader	6-12: Vertical position of the needle threading hook
Fails to start sewing	6-20-1: Auto-lifter cam lever 6-20-3: Adjusting the height of the presser foot when it is lifted
Faulty automatic presser foot lifting height	6-19: Knee lifting wire 6-20-1: Auto-lifter cam lever 6-20-2: Presser-lifter position sensor 6-20-3: Adjusting the height of the presser foot when it is lifted
Straight stitch slide plate	6-21-1: Adjusting the position of the straight stitch slide plate 6-21-2: Straight stitch slide plate sensor PCB

[3] Principal parts



* Do not put heavy objects onto hard case and wide table.

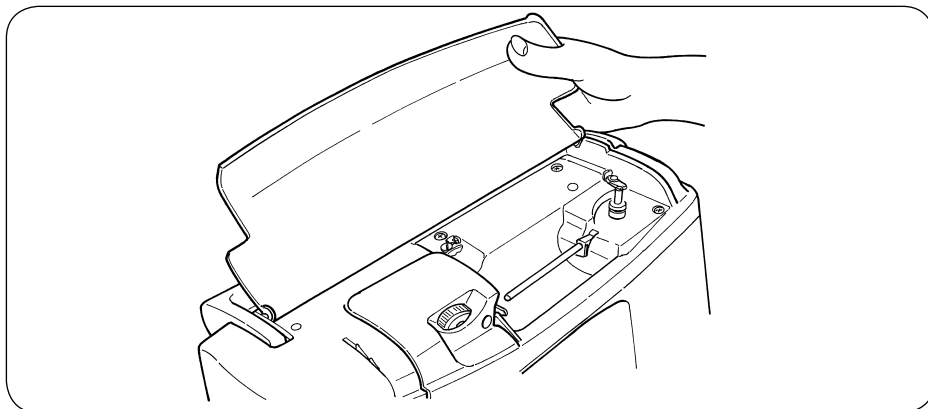
* Do not remove the styrene foam fitted inside the hard case. If it is removed, the sewing machine can be damaged when it is placed in the hard case or other problems can occur.



[4] Disassembling the machine covers

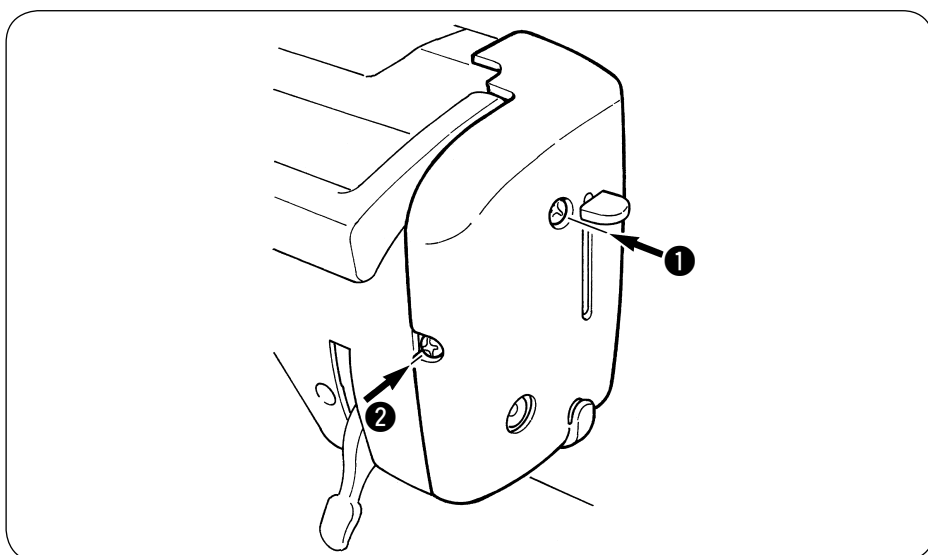
1) Top cover

- To remove the top cover, bow the hinge section of the right side of the cover.



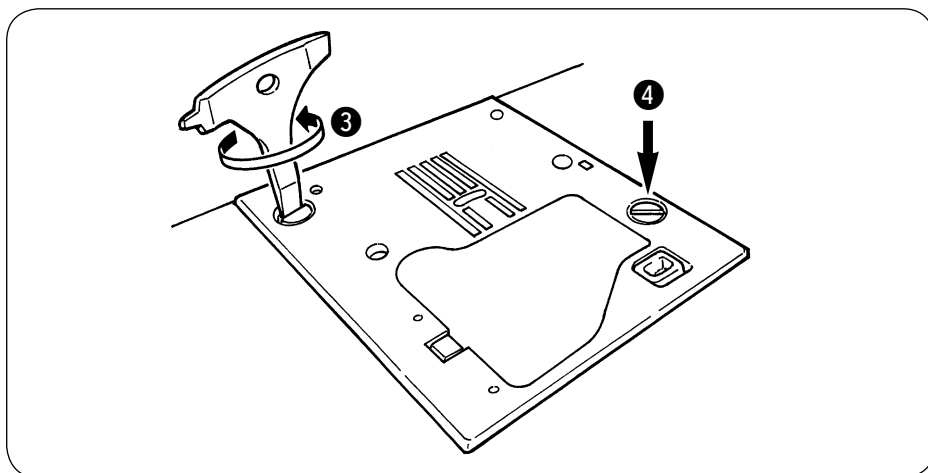
2) Face cover

- Remove setscrews ❶ and ❷ from the face cover.
Then, remove the face cover.



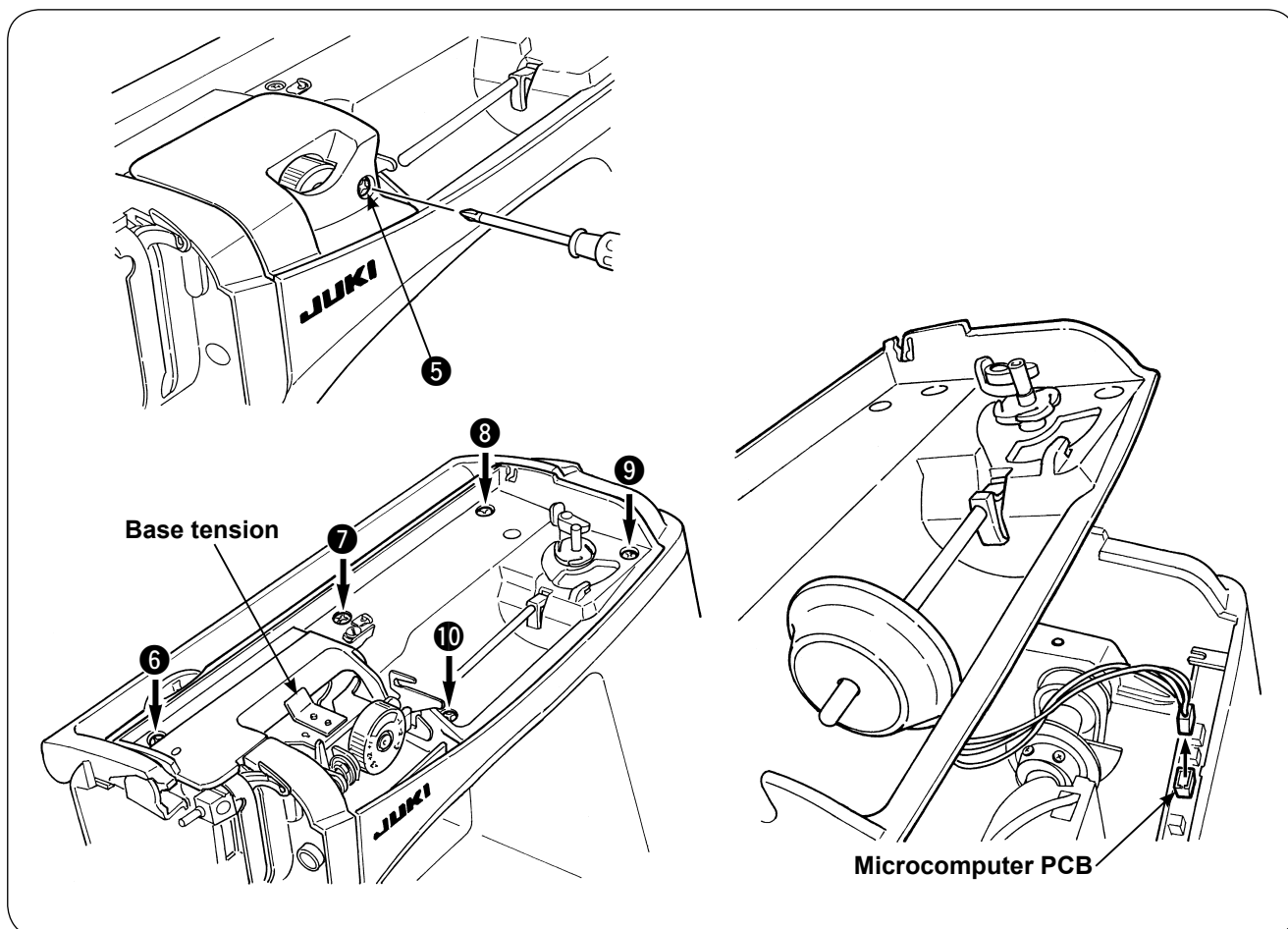
3) Throat plate

- Remove setscrews ❸ and ❹ from the throat plate.
Then remove the throat plate.



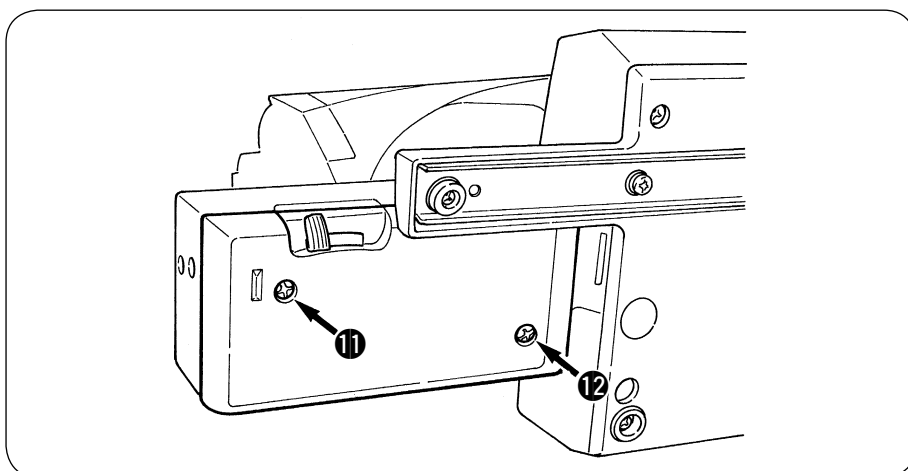
4) Spool cover

- Remove setscrew **5** from the thread tension cover.
Remove the thread tension cover.
- Remove setscrews **6** to **10** from the spool cover.
- Pull out the cable of bobbin winder motor from the microcomputer PCB.
- Remove the spool cover from the main unit of the machine, paying attention to the base tension.



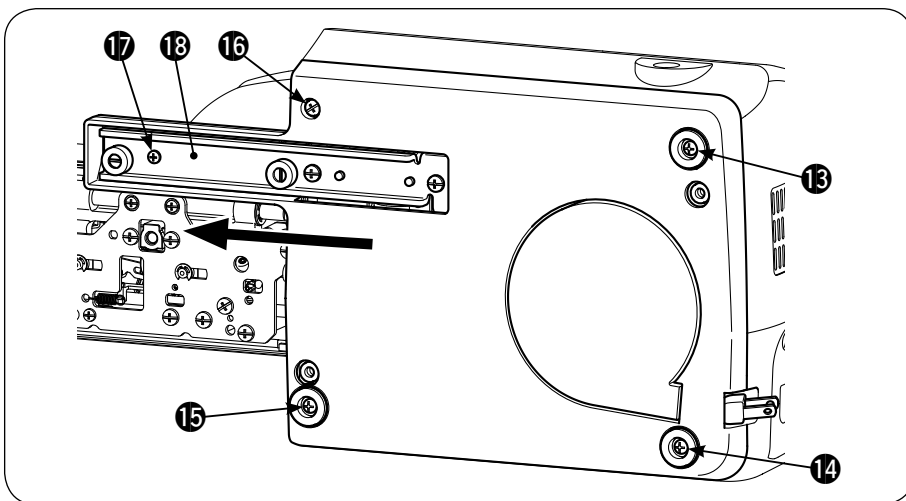
5) Bottom cover of the free arm

- Remove setscrews **11** and **12** from the bottom cover of the free arm.
Remove the bottom cover.



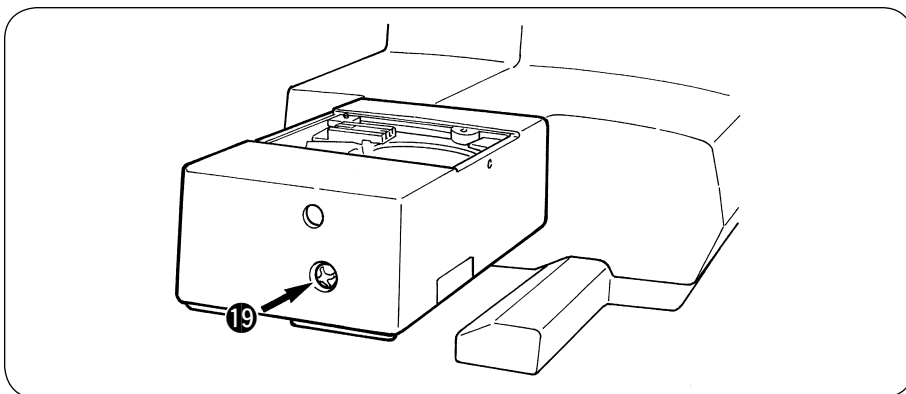
6) Bed cover

- Remove setscrews **13** to **15** from the rubber cushion of the bed cover. Remove setscrew **16** from the bed cover. Remove setscrew B **17** from the bed cover. Pull out the bed cover from the metal plate **18** in the direction of the arrow.



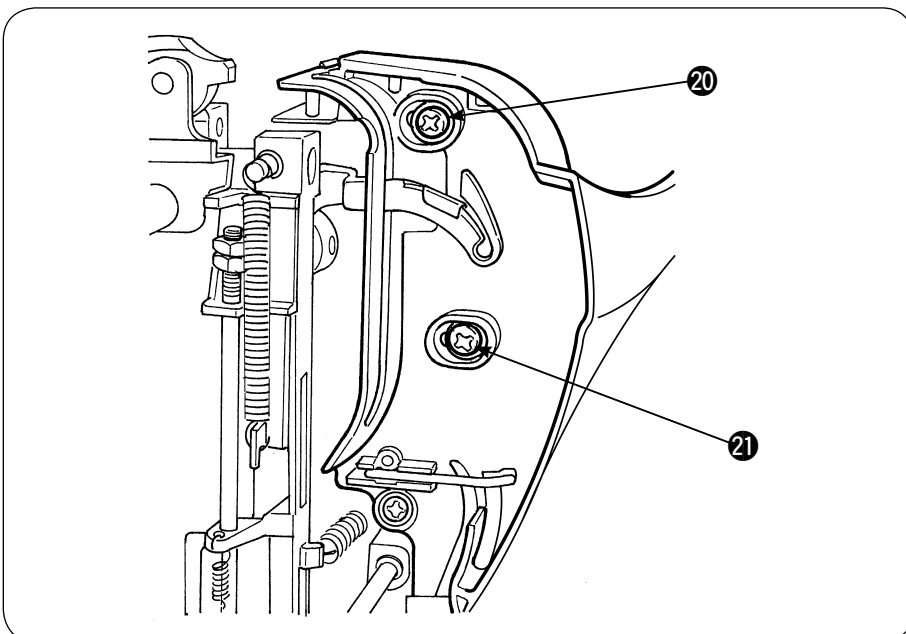
7) Upper cover of the free arm

- Remove setscrew **19** from the upper cover of the free arm. Remove the upper cover.



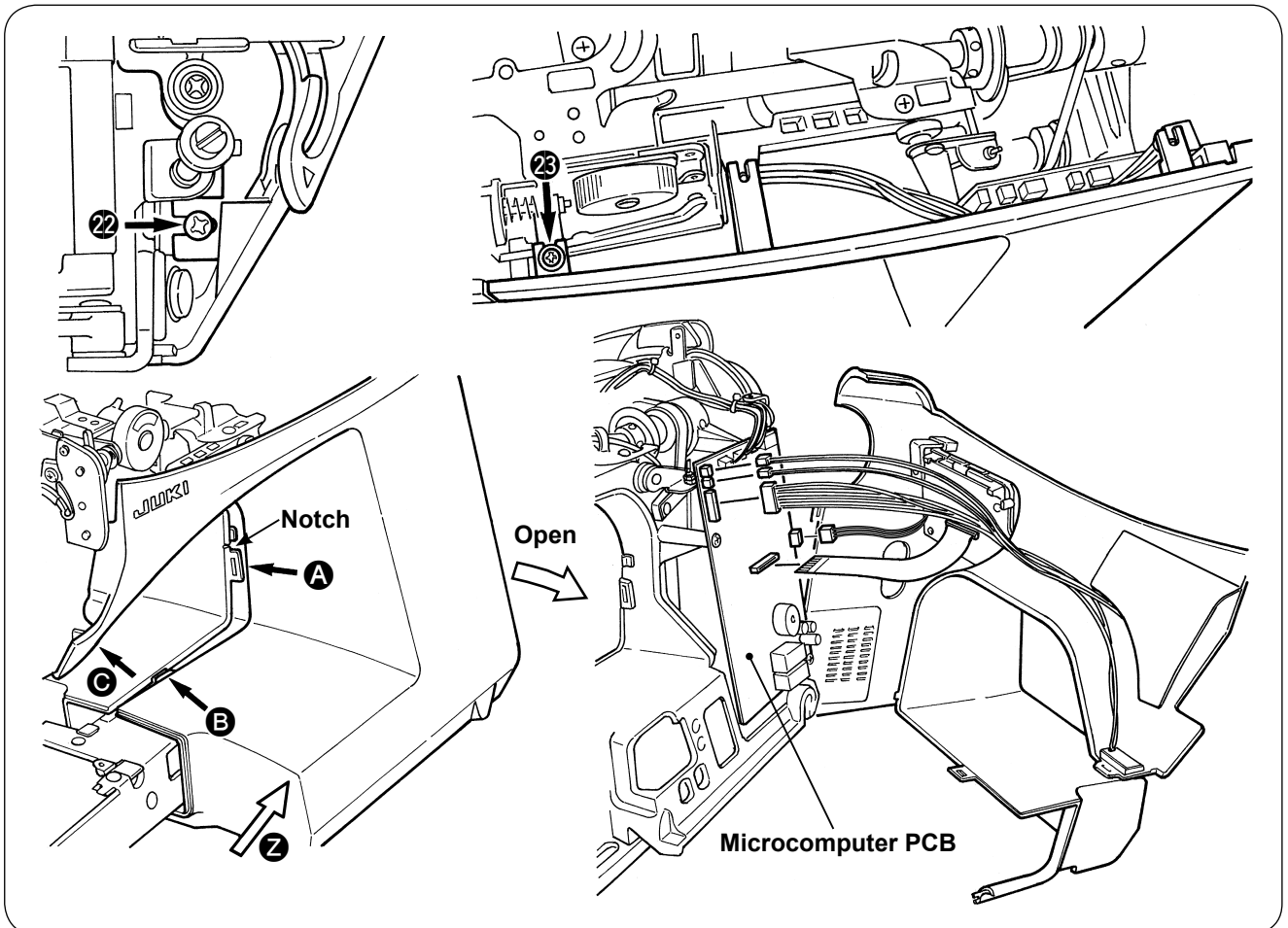
8) Face plate cover

- Remove setscrews **20** and **21** from the face plate cover. Remove the face plate cover.



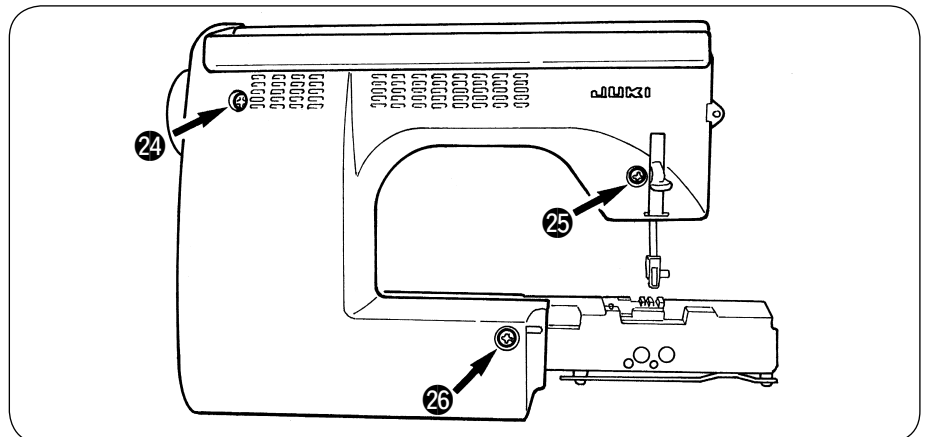
9) Front panel

- Remove setscrews 22 and 23 from the front panel.
- Put a thin screwdriver in the notch in the rising section under the arm and pry off the front panel and hook A of the rear panel.
- Opening the right side of the front panel in the direction of the arrow, tap Z section with your hand to remove hook B located at the bed surface.
- Lastly, remove hook C located at the lower side of the machine jaw.
- Remove connectors for SUMI-card, start switch, LED lamp and microcomputer panel I/F cable from the microcomputer PCB when necessary.



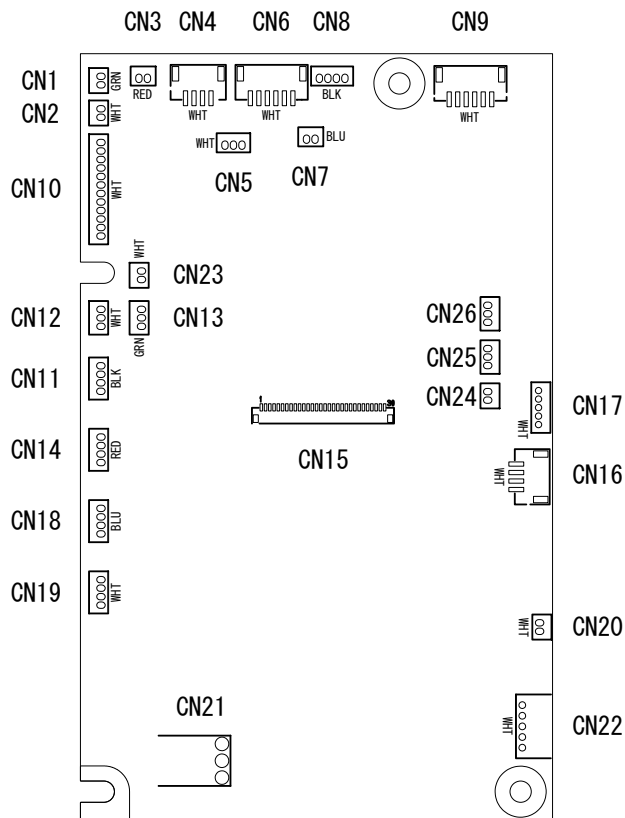
10) Rear panel

- Remove setscrews 24, 25 and 26 from the rear panel.
- Remove the rear panel with the presser foot lifting lever raised.



[5] PCB connection diagram

• Microcomputer PCB (Common to HZL-X Series)

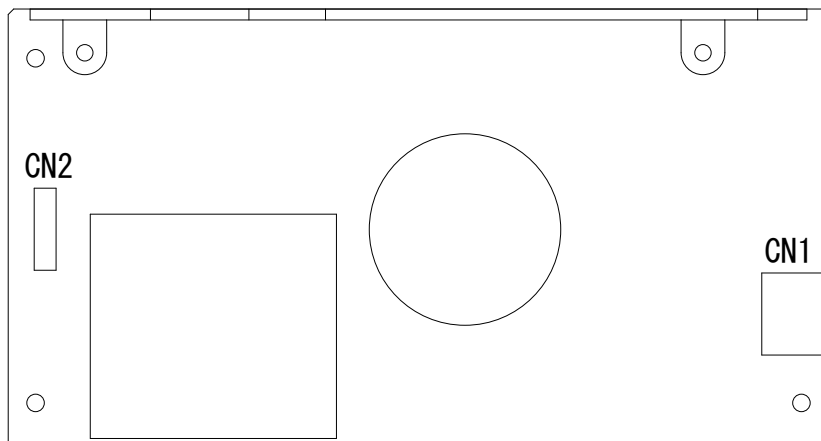


Connector No.	Destination	Terminal No.	
CN1	On hand LED PCB 1	1	5V
CN2	Under arm LED PCB	1	5V
CN3	On hand LED PCB 2	1	5V
CN4	Bobbin winding motor	1	Bobbin winder switch
		2	GND
		3	Bobbin winder motor (+) (29V)
		4	Bobbin winder motor (-)
CN5	Presser-lifter STM position detection PCB	1	5V
		2	Detection signal
		3	GND
CN6	Flash memory interface	1	5V
		6	GND
CN7	OST SW (Not installed)	1	Presser foot lifting switch
		2	GND
CN8	BH SW	1	GND
		2	BHR SW
		3	BHS SW
		4	5V
CN9	Main shaft detection PCB	1	5V
		2	Motor pulse
		3	S1
		4	S2
		5	S3
		6	GND

Connector No.	Destination	Terminal No.	
CN10	SW/slide volume PCB	1	LED G
		2	LED R
		3	Reverse stitch switch
		4	S/S switch
		5	Thread trimming switch
		6	Needle up/down switch
		7	Auto-lifter switch
		8	Lock stitch switch
		9	GND
		10	Speed control variable resistor
		11	NC
		12	5V
CN11	Presser-lifter STM	1	$\bar{A}$
		2	A
		3	B
		4	$\bar{B}$
CN12	Thread trimming STM original point detection PCB	1	Detection signal
		2	
		3	GND
CN13	Presser-lifter STM original point detection PCB	1	Detection signal
		2	
		3	GND
CN14	Needle throwing STM	1	$\bar{A}$
		2	A
		3	B
		4	$\bar{B}$
CN15	Panel PCB	1-3	LED
		4-7	Switch strobe
		8-11	LCD backlight
		12-16	LCD signal
		17	3.3V
		18	GND
		19-22	Rotary switch
		23-29	Switch data
		30	GND
CN16	For factory	2	GND
		4	GND
CN17	Microcomputer panel I/F cable (asm.)	1	5V
		2	UART Tx
		3	UART Rx
		4	Clock signal
		5	GND
CN18	Feed STM	1	$\bar{A}$
		2	A
		3	B
		4	$\bar{B}$

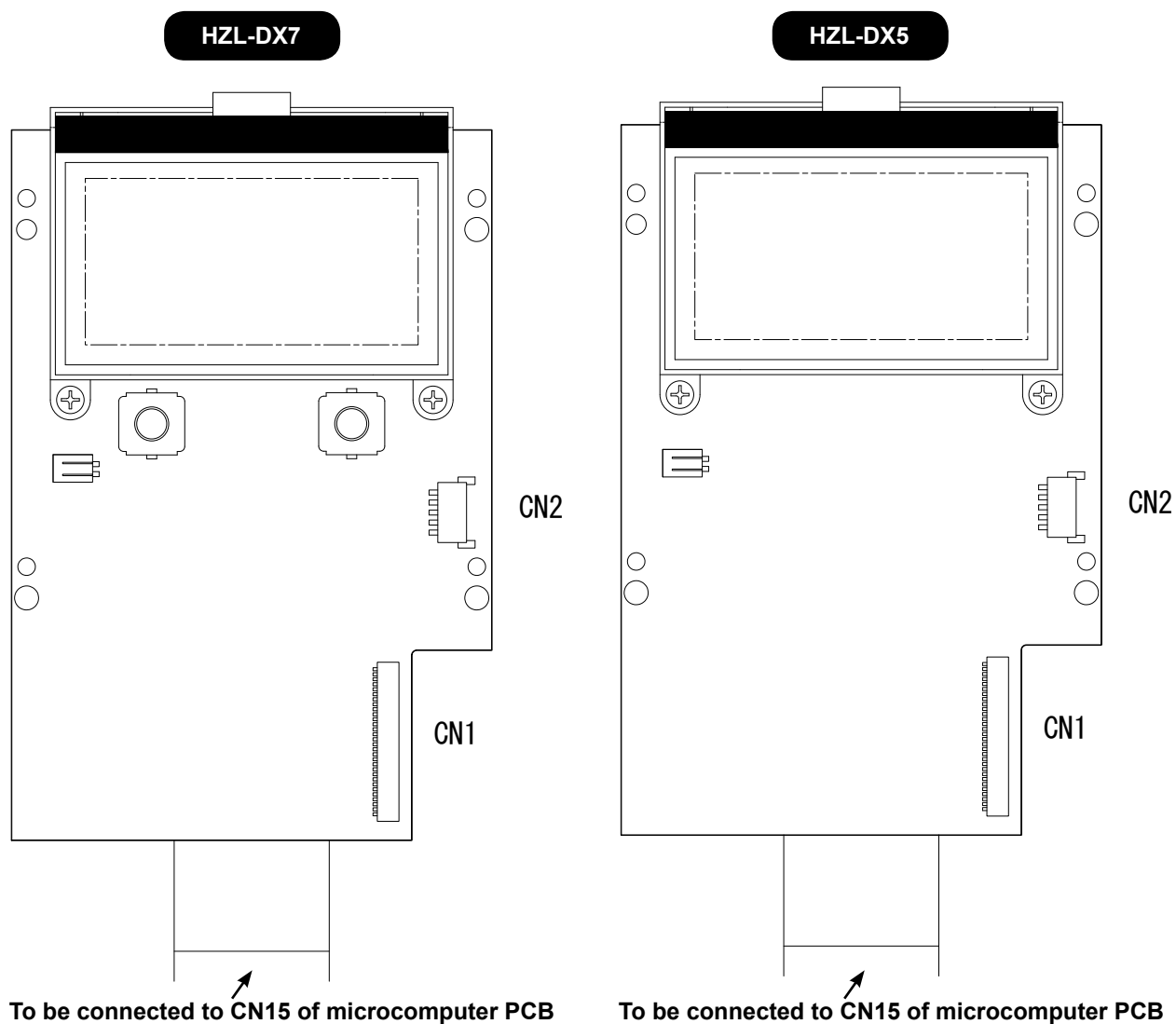
Connector No.	Destination	Terminal No.		
CN19	Thread trimming STM	1	$\bar{A}$	8.5Ω
		2	A	
		3	B	8.5Ω
		4	$\bar{B}$	
CN20	Controller socket	1	GND	
		2	Controller	
CN21	Motor filter PCB	1	Main motor (+) (29V)	
		2	Main motor (-)	
		3	FG	
CN22	Power supply relay lead wire	1	30V	
		2	30V	
		3	NC	
		4	GND	
		5	GND	
CN23	Straight stitch slide plate sensor PCB	1	Straight stitch slide plate switch	
		2	GND	
CN24	Reserve 1 (Not installed)	2	GND	
CN25	Reserve 2 (Not installed)	3	GND	
CN26	Reserve 3 (Not installed)	1	5V	
		3	GND	

• Power PCB



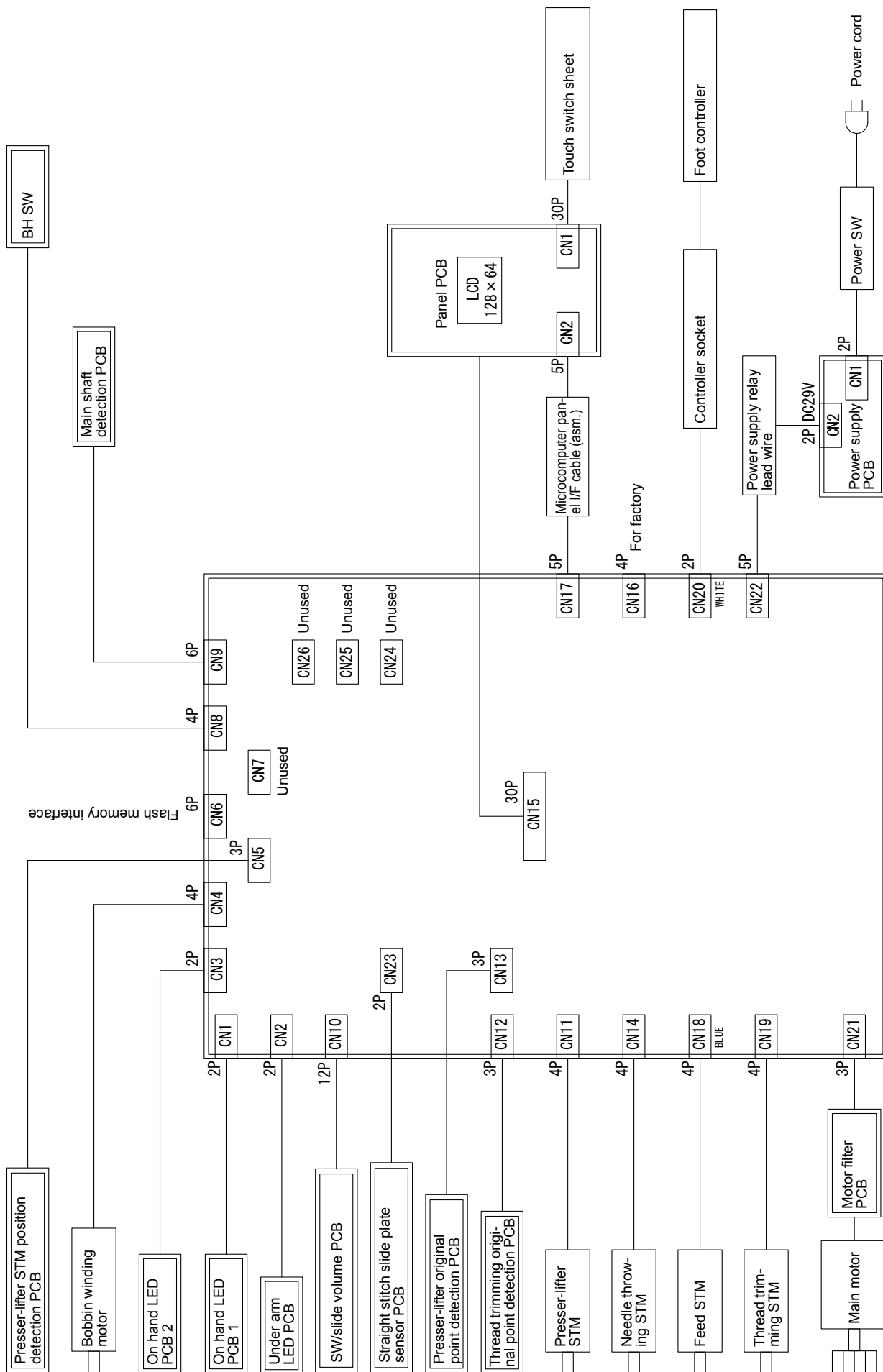
Connector No.	Destination	Check
CN1	Power SW	AC input
CN2	Power supply relay lead wire	1-2PIN 29V, 4-5PIN GND (FG)

• Display PCB



Connector No.	Destination	Terminal No.	
CN1	Touch switch sheet	1	GND
		2-29	Touch switch signal
		30	GND
CN2	Microcomputer panel I/F cable (asm.)	1	5V
		2	UART Tx
		3	UART Rx
		4	Clock signal
		5	GND

• Connection block diagram



[6] Adjustment

6-1 Adjusting the needle bar height

- Remove the face cover.

Adjustment value:

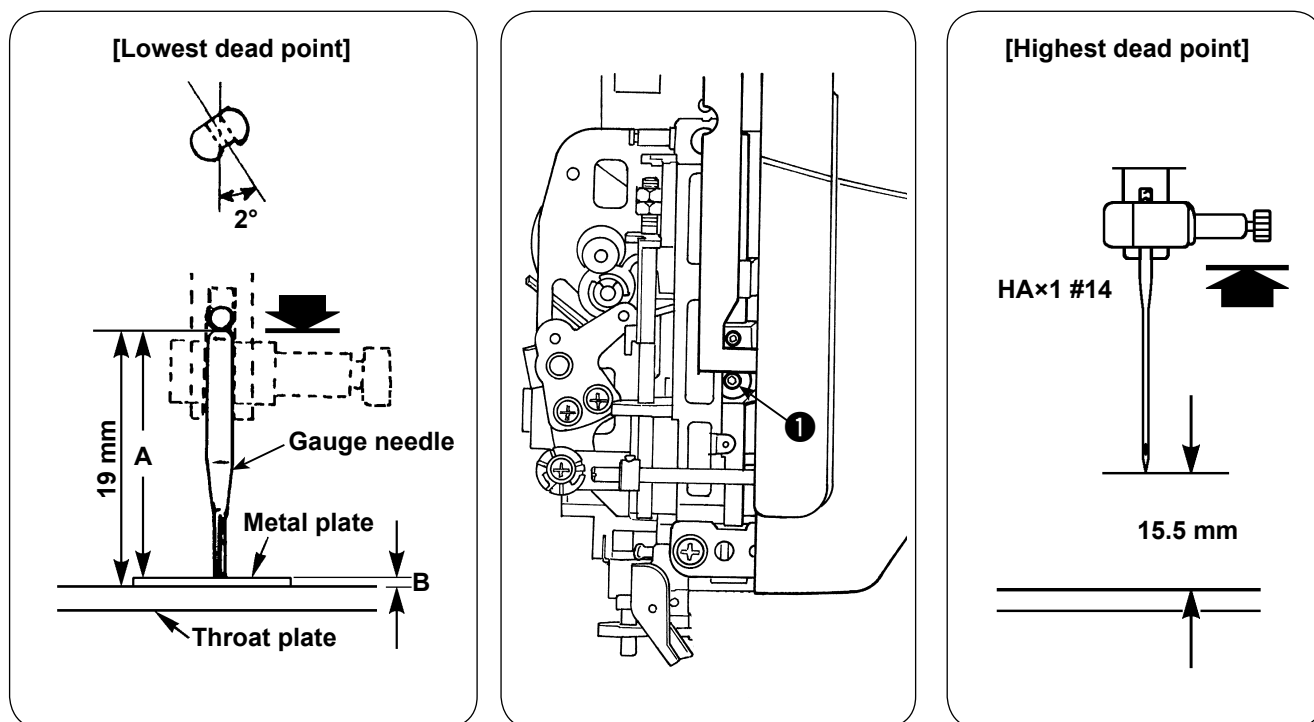
- Distance from the bottom end of the pin inside needle bar surface to the top surface of the throat plate: 19 mm
- When the needle is mounted, the needle eye tilts rightward by 2 degrees.

Adjustment procedure 1.

1. Select the straight stitch using the pattern selecting button. Choose center needle position.
2. Make a gauge needle by cutting a household needle HA×1 to dimension A. Fit the gauge needle into the needle bar.
3. Prepare an appropriate metal plate of thickness B. ($A = 19 \text{ mm} - B$)
4. Bring the needle bar to its lowest dead point. Slightly loosen needle bar connecting stud setscrew ❶ as long as the needle does not slip off from the connecting stud.
5. Place the metal plate on the throat plate. Move the needle bar up and down by hand to adjust so that the cut surface of the gauge needle aligns with the top surface of the metal plate. Then, turn the needle bar by two degrees of an angle as illustrated in the sketch below.
6. Temporarily tighten needle bar connecting stud setscrew ❶ and reconfirm that the needle bar is correctly adjusted. Then, securely tighten the setscrew.

Adjustment procedure 2.

1. Assemble a household HA×1 needle #14 into the needle bar, bring the needle bar to its highest dead point. Move the needle bar in the same way as described in procedure 1 to adjust the needle bar height so that the needle tip is spaced 15.5 mm from the top surface of the throat plate.

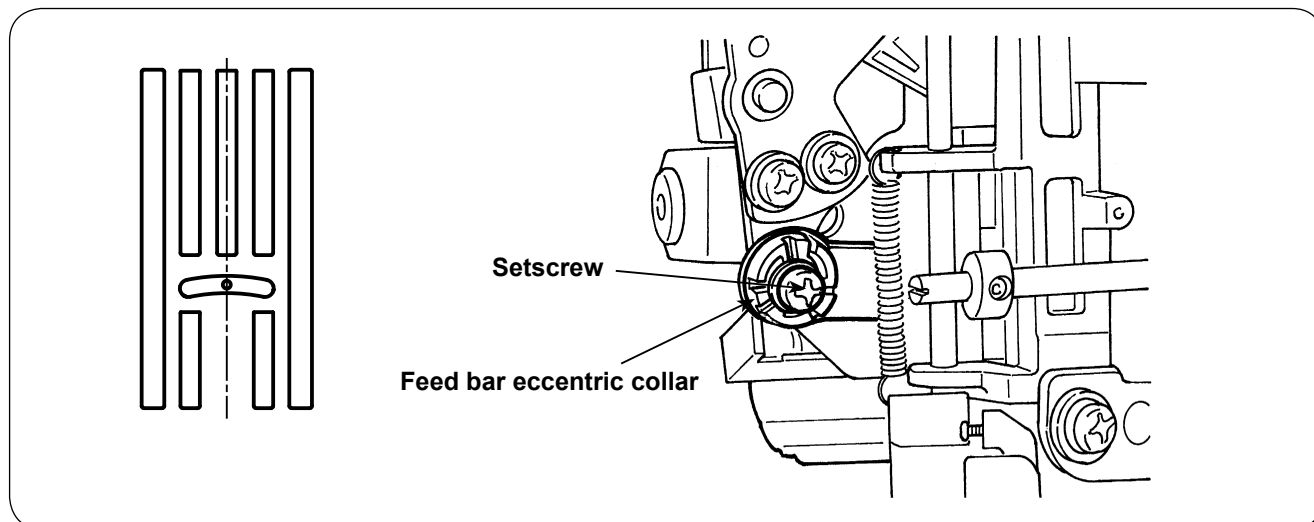


6-2 Adjusting the needle entry point

- Remove the face cover.

Adjustment procedure

1. Select the straight stitch using the pattern selecting button. Choose center needle position.
2. Assemble a needle #14 into the needle bar, loosen the setscrew in the eccentric collar and adjust the feed bar eccentric collar so that the needle meets the center of the needle slot in the throat plate when it reaches the top surface of the throat plate by turning the hand wheel.

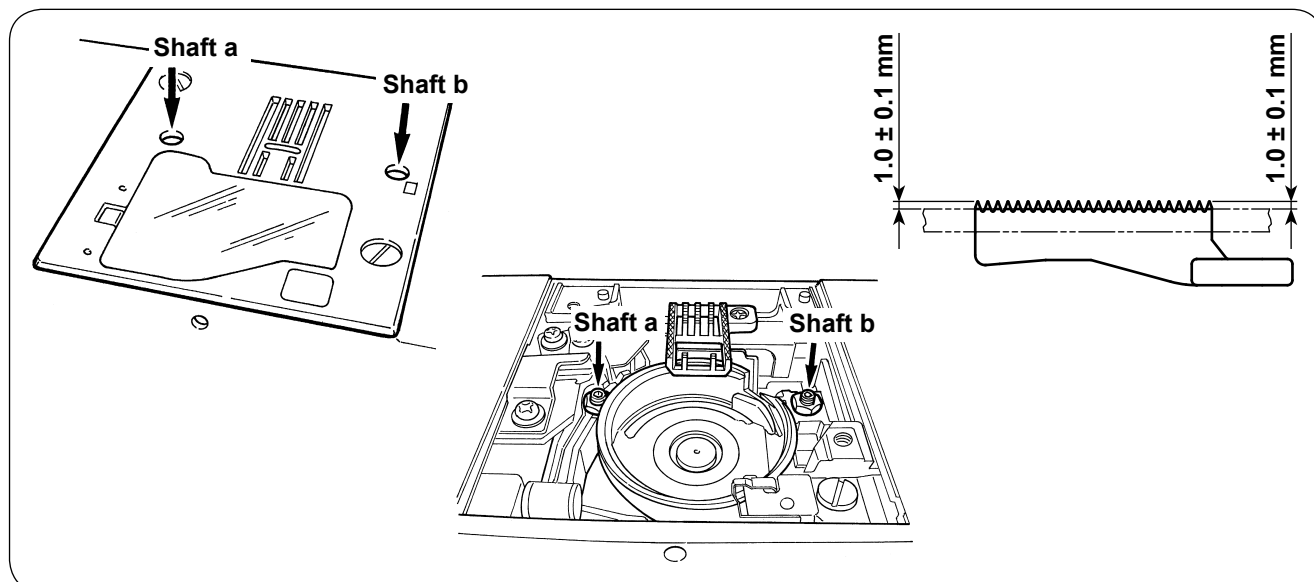


6-3 Feed dog height

- Do not remove the throat plate.

Adjustment procedure

1. Set the amount of feed to 0 (zero).
 2. Turn the hand wheel to bring the feed dog to its highest dead point.
 3. Turn left side shaft a and right side shaft b with a 2 mm hexagonal wrench.
 4. Adjust the feed dog height so that the front and rear ends of the feed dog are spaced 1.0 ± 0.1 mm from the top surface of the throat plate.
- Adjust the rear end height of the feed dog with shaft a, and front end height with shaft b.

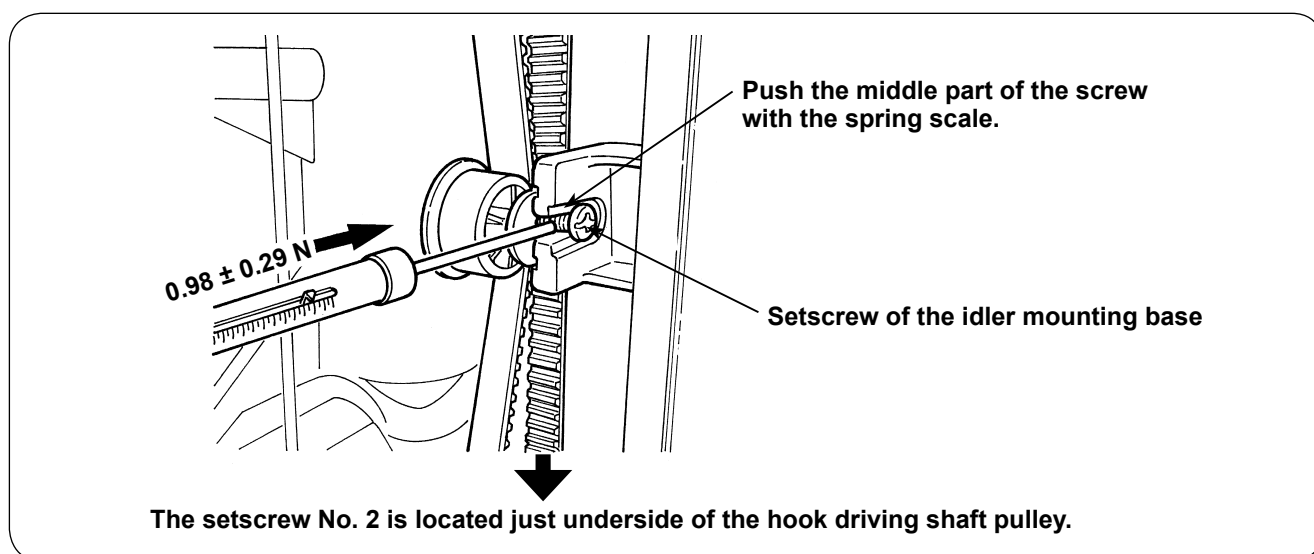


6-4 Timing belt

- Remove the front panel and the microcomputer PCB.

Adjustment procedure

1. Loosen the setscrew in the idler mounting base and loosen the timing belt.
2. Turn the hand wheel to bring the needle bar to its lowest dead point.
3. Turn the hook driving shaft to bring the feed dog to its lowest dead point.
4. Carefully keeping the condition described in steps 2 and 3, set the timing belt on the hook driving shaft pulley (by temporarily tightening the setscrew in the idler mounting base) so that the setscrew No. 2 in the pulley is brought to just underside of the pulley.
5. Applying 0.98 ± 0.29 N force to the idler by means of a spring scale, securely tighten the setscrew.

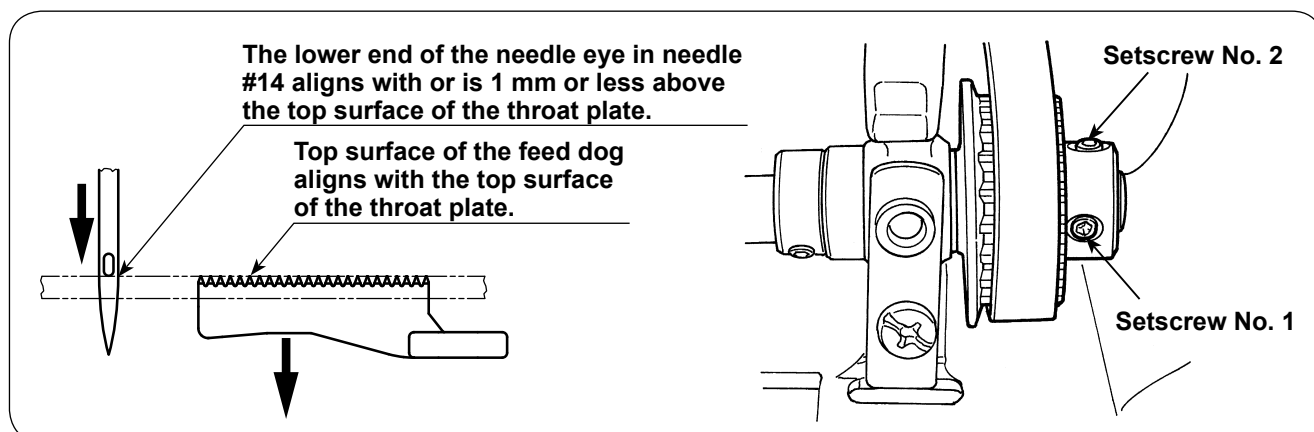


6-5 Feed timing

- After checking the feed dog height and the needle bar height, carry out adjustment of the feed timing.

Adjustment procedure

1. Assemble a HA×1 needle #14 into the needle bar.
2. Loosen setscrew No. 2 in the hook driving shaft pulley.
3. Loosen setscrew No. 1 in the hook driving shaft pulley. Adjust the pulley so that the lower end of the needle eye in the descending needle #14 is aligned with the top surface of the throat plate when the top surface of the descending feed dog is aligned with the top surface of the throat plate by turning the hand wheel toward you. After adjustment, tighten the setscrew No. 2.
4. Turn the main shaft by one revolution to confirm the timing.



6-6 Timing between the needle and the hook

- Remove the throat plate, the bed cover and the bottom cover of the free arm.

Method for checking

1. Check to be sure that the needle entry point and needle bar height are correct.
2. Select the straight stitch. Select the right needle position by using the zigzag width adjusting dial.
(The needle entry point is shifted to the rightmost side.)
3. Now, turn the hand wheel by hand to bring the needle bar to its lowest dead point.
4. Turn the hand wheel further to gradually lift the needle bar until point **C** where the needle center is aligned with the tip of blade point of the hook is reached.
5. At this time, check to be sure that the distance **D** from the tip of blade point of the hook to the upper end of the needle eye is 3.1 to 3.3 mm. If this distance is not correctly provided, carry out the following adjustment.

Adjustment procedure

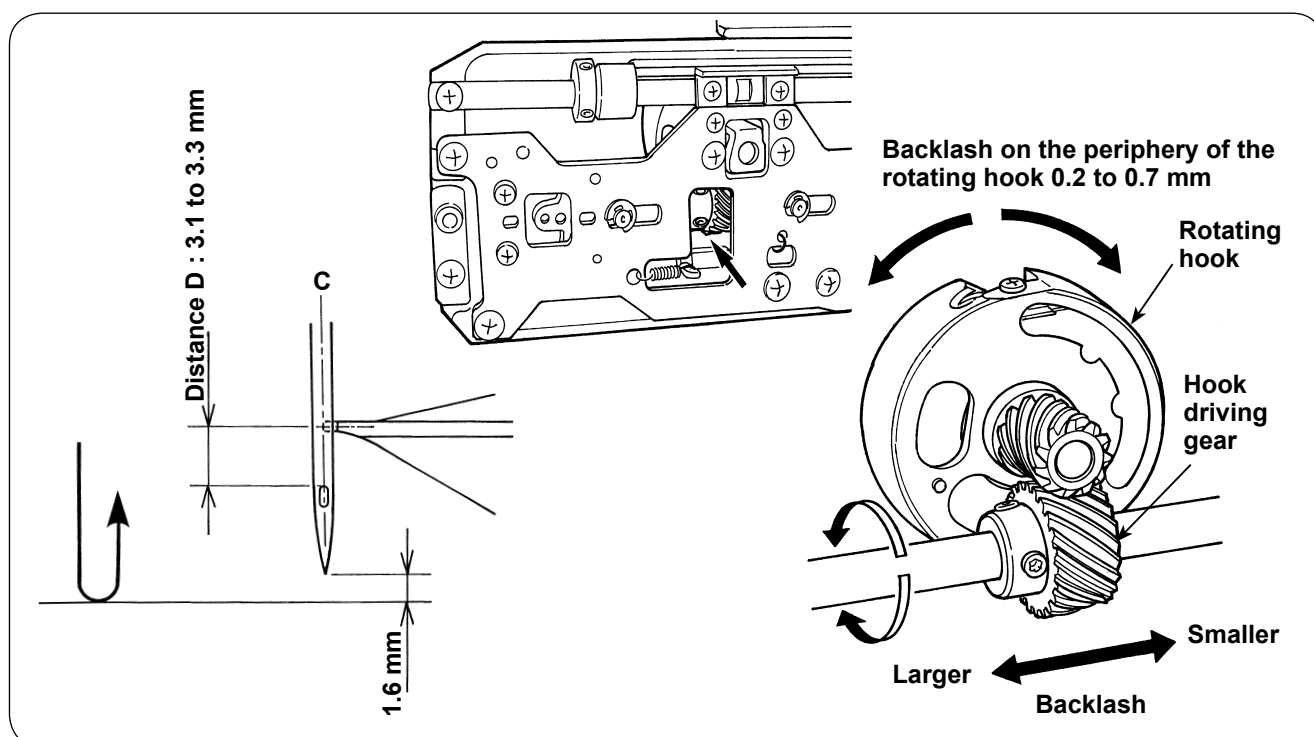
1. Loosen the setscrew in the hook driving gear which is not visible from underside of the sewing machine when the needle center aligns with the tip of blade point of the hook.
2. Select the straight stitch and the right needle position. Move the hook driving gear in the rotational direction to adjust distance **D** of 3.1 to 3.3 mm is provided between the tip of blade point of the hook and the upper end of the needle eye when the needle bar is lifted by 1.6 mm from the lowest dead point by turning the hand wheel by hand.

At this time, the backlash between the hook driving gear and the gear on the hook side may change depending on the location of the hook driving gear on the hook driving shaft. Adjustment should, therefore, be carried out with the visible setscrew temporarily tightened, while carefully observing the hook driving gear in both the rotational direction and axial direction. Adjust the backlash to 0.2 to 0.7 mm on the periphery of the rotating hook.

3. After confirming the timing between the needle and hook is correctly adjusted, securely tighten both setscrews.

(Caution) After adjustment of the hook, the hook race surface and the bobbin case holder may be stained with dirt, oil or grease. Wipe them off with alcohol where necessary.

If those parts are left stained, chattering or thread slip-off noise of the bobbin case holder can occur.

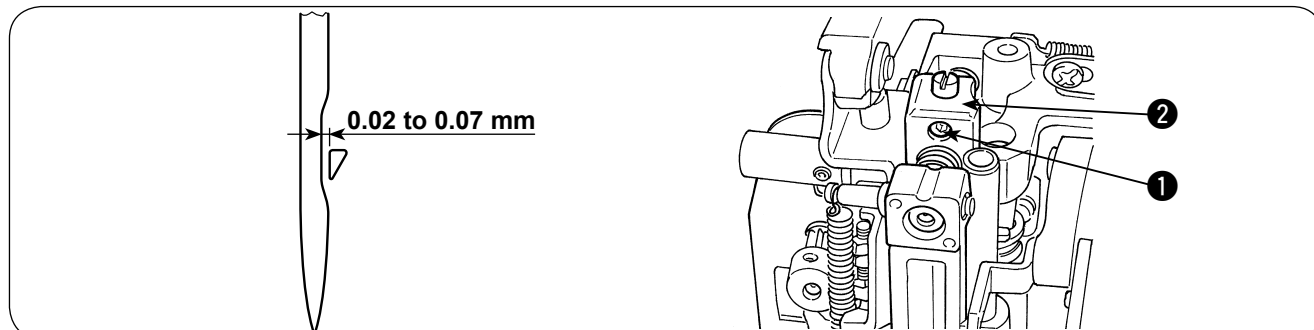


6-7 Clearance between the needle and the blade point of hook

- Remove the face cover and the throat plate.

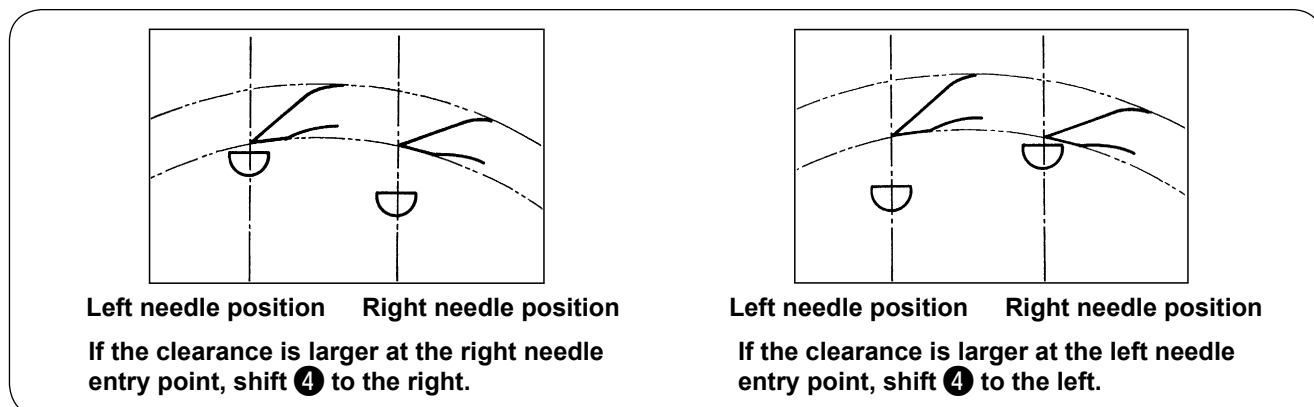
Adjustment procedure

1. Loosen screw ❶. Adjust the clearance between the needle and the blade point of the hook to 0.02 to 0.07 mm by turning adjusting shaft ❷.



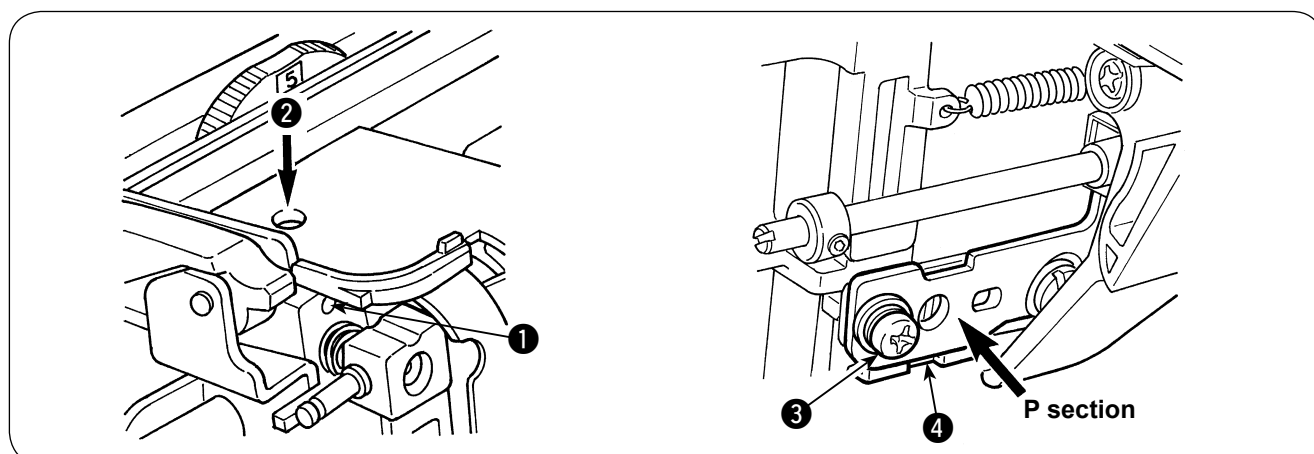
Adjusting the balance of the clearances at the right and left needle entry points

1. Select the zigzag pattern and set the zigzag width to 7 mm. Adjust the balance of the clearances provided between the needle and the blade point of the hook at the right and left needle entry points.



Adjustment procedure

1. Select No. 2: FAGOTT of the service mode.
2. Gradually turn adjusting shaft ❷ to find a position where the needle deviates slightly. Now, temporarily tighten screw ❶.
3. Slightly loosen setscrew ❸. Adjust the lateral balance of the needle bar by slightly moving right-left adjuster ❹ while carefully listening to the noise produced when the needle deviates at the right and left needle entry points. Then, securely tighten setscrew ❸.
4. Additionally turn shaft ❷ and securely tighten screw ❶ at the position where the needle does not deviate.
5. Lightly tap P section with fingers. If you hear a needle deviation noise at the right and left needle entry points, the optimum clearance is provided between the needle and the hook.



6-8 Position of the hook rotation stopper plate

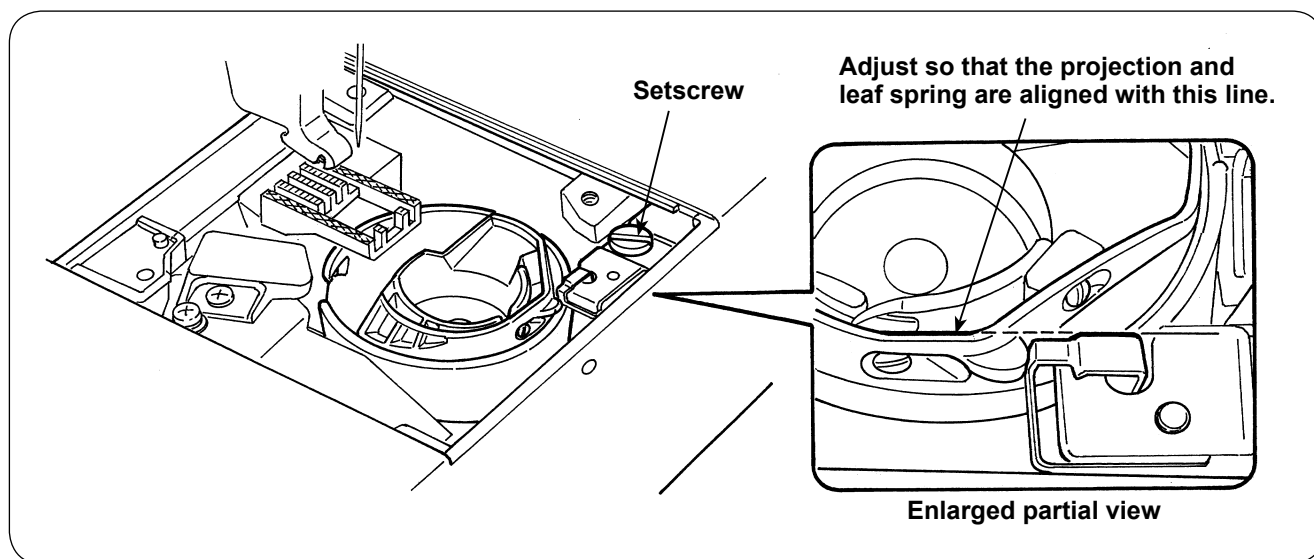
- Remove the throat plate.

Adjustment procedure

1. When the bobbin case holder is placed inside the rotating hook, loosen the setscrew and determine the longitudinal position of the rotation stopper plate so that the projection of the bobbin case holder and the leaf spring of the rotation stopper plate are located as illustrated in the enlarged partial view. To adjust the lateral position of the rotation stopper plate, press the plate in the right direction by the amount of play and secure with the setscrew.

* The hook race surface and the bobbin case holder may be stained with dirt, oil or grease. Wipe them off with an alcohol-soaked cloth where necessary.

If those parts are left stained, chattering or thread slip-off noise of the bobbin case holder can occur.

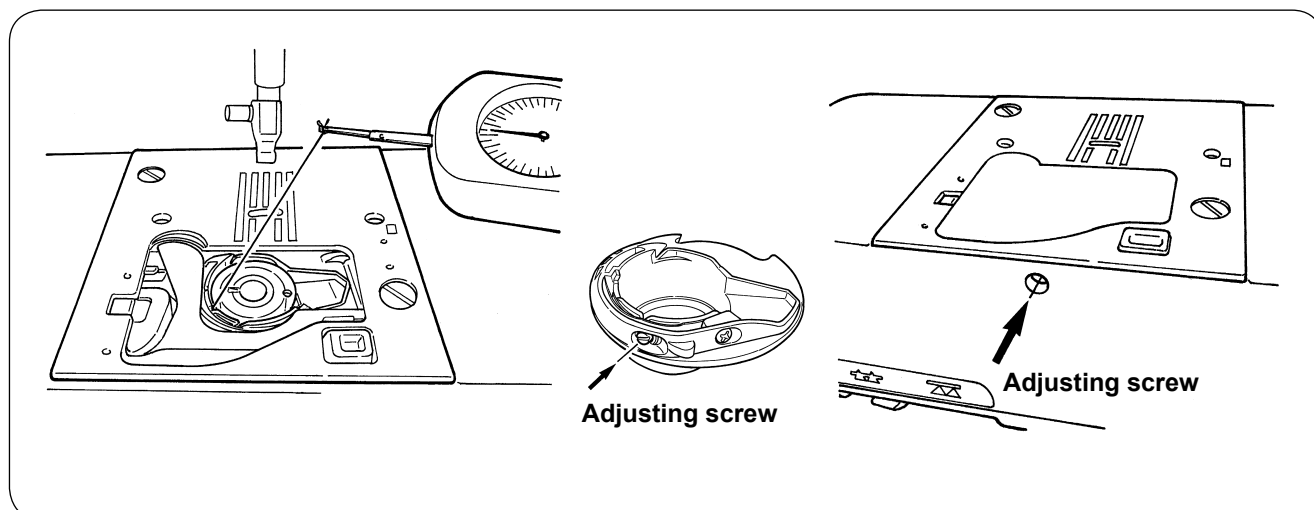


6-9 Adjusting the bobbin thread tension

- Remove the throat plate.

Adjustment procedure

1. Position the bobbin case holder and a tension gauge as illustrated in the sketch below. Using SHAPPE Span thread #60, adjust the bobbin thread tension to 0.13 ± 0.02 N with the adjusting screw. At this time, carefully prevent the bobbin thread from coming in contact with the throat plate or other related parts.



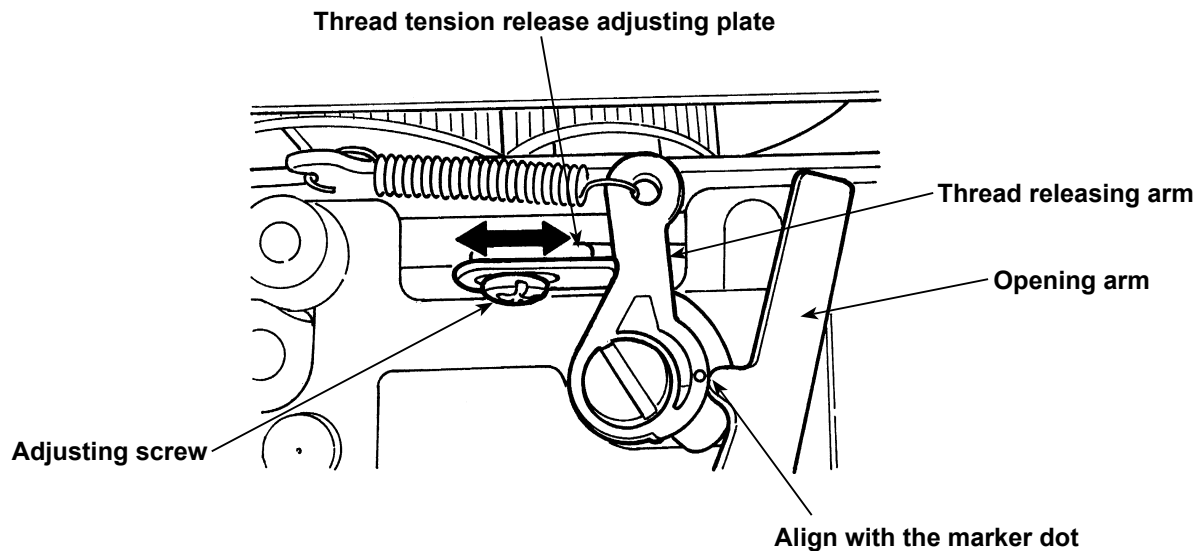
6-10 Adjusting the disk opening amount

6-10-1 Adjusting the thread tension release adjusting plate

- Remove the face cover, the thread tension cover and the spool cover.

Adjustment procedure

1. Raise the presser foot lifting lever.
2. Loosen the adjusting screw and adjust the thread tension release adjusting plate so that the top end of claw of the opening arm aligns with the marker dot on the thread releasing arm.



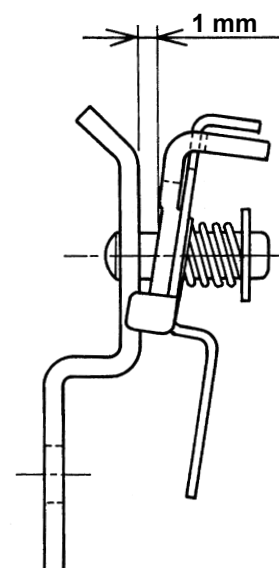
6-10-2 Pretension disk opening amount

- Remove the face cover, the thread tension cover and the spool cover.

Adjustment procedure

1. Raise the presser foot lifting lever.
2. Adjust the pretension disk float adjusting screw so that the opening amount of the pretension disk becomes approximately 1 mm.

Note that the tension of the pretension is fixed and not adjustable.

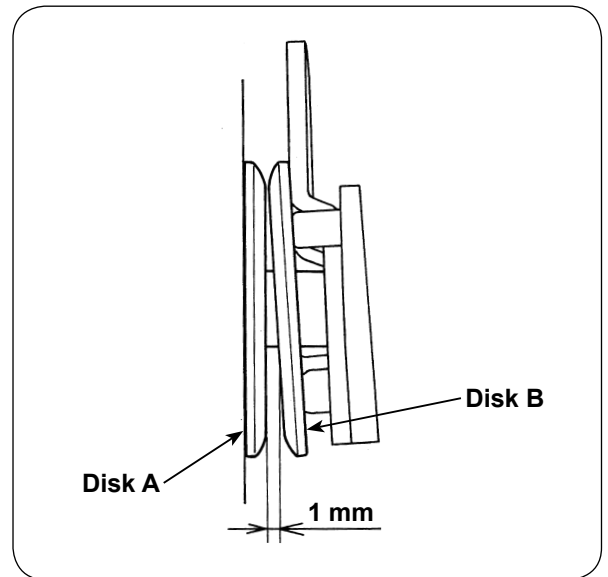


6-10-3 Tension disk opening amount

- Remove the face cover, the thread tension cover and the spool cover.

Adjustment procedure

1. Maximize the tension with the thread tension adjustment dial. Raise the presser foot lifting lever.
2. Adjust the clearance between tension disks (A) and (B) to 1 mm by turning the thread tension float adjusting screw.

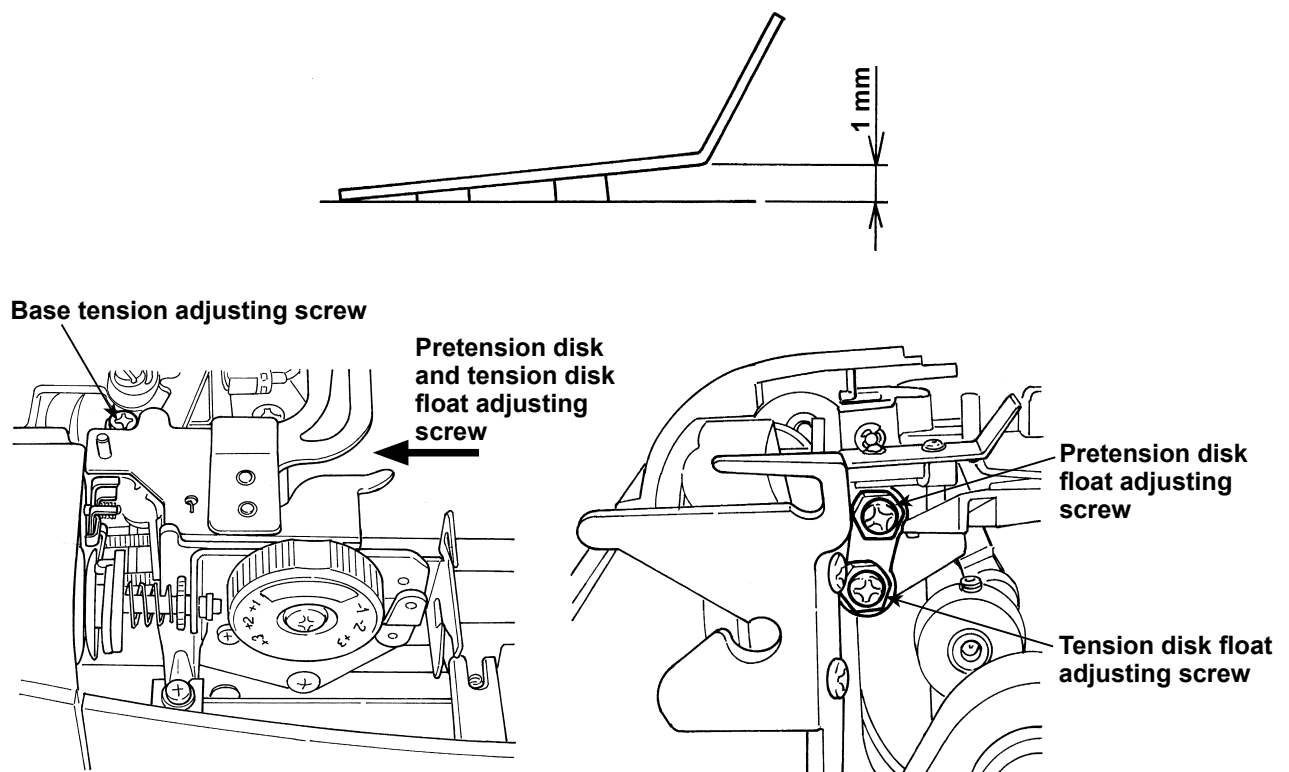


6-10-4 Base tension opening amount

- Remove the face cover, the thread tension cover and the spool cover.

Adjustment procedure

1. Raise the presser foot lifting lever.
2. Adjust the base tension opening amount to 1 mm by turning the base tension adjusting screw.



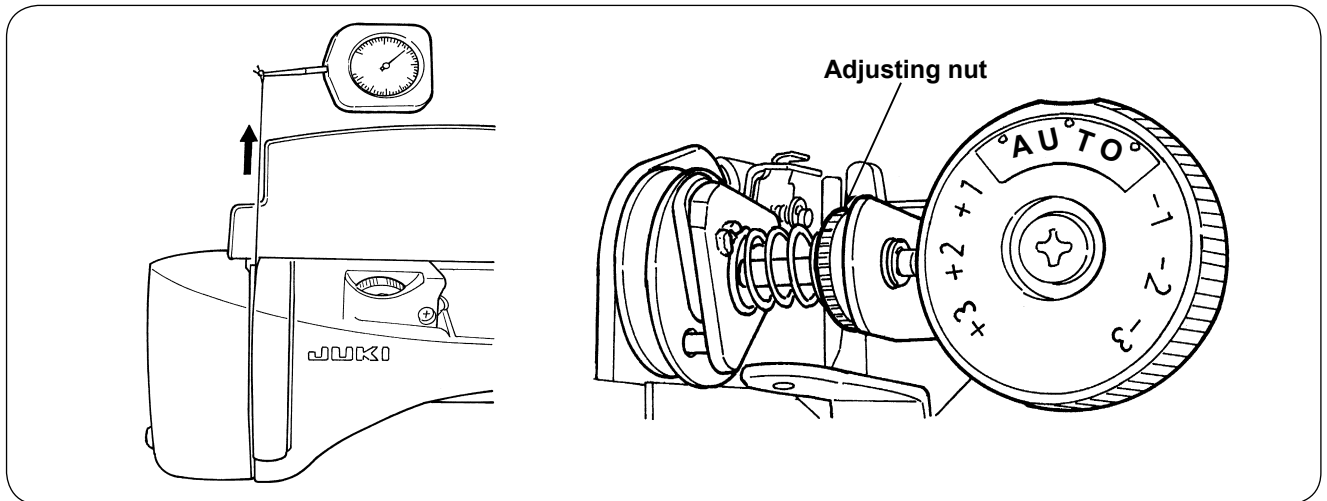
* The pretension disk float adjusting screw and the tension disk float adjusting screw can be turned without loosening the nuts.

6-11 Adjusting the needle thread tension

- Remove the thread tension cover.

Adjustment procedure

1. Raise the presser foot lifting lever.
2. Turn the thread tension adjustment dial to bring its "AUTO" section to the top.
3. Prepare SHAPPE Span thread #60 and a tension gauge. Thread the base tension and the tension disk.
4. Lower the presser foot lifting lever. Turn the adjusting nut to adjust the tension so that the tension gauge gives a reading of 0.49 to 0.59 N.



6-12 Vertical position of the needle threading hook

- Remove the face cover.

Adjustment procedure

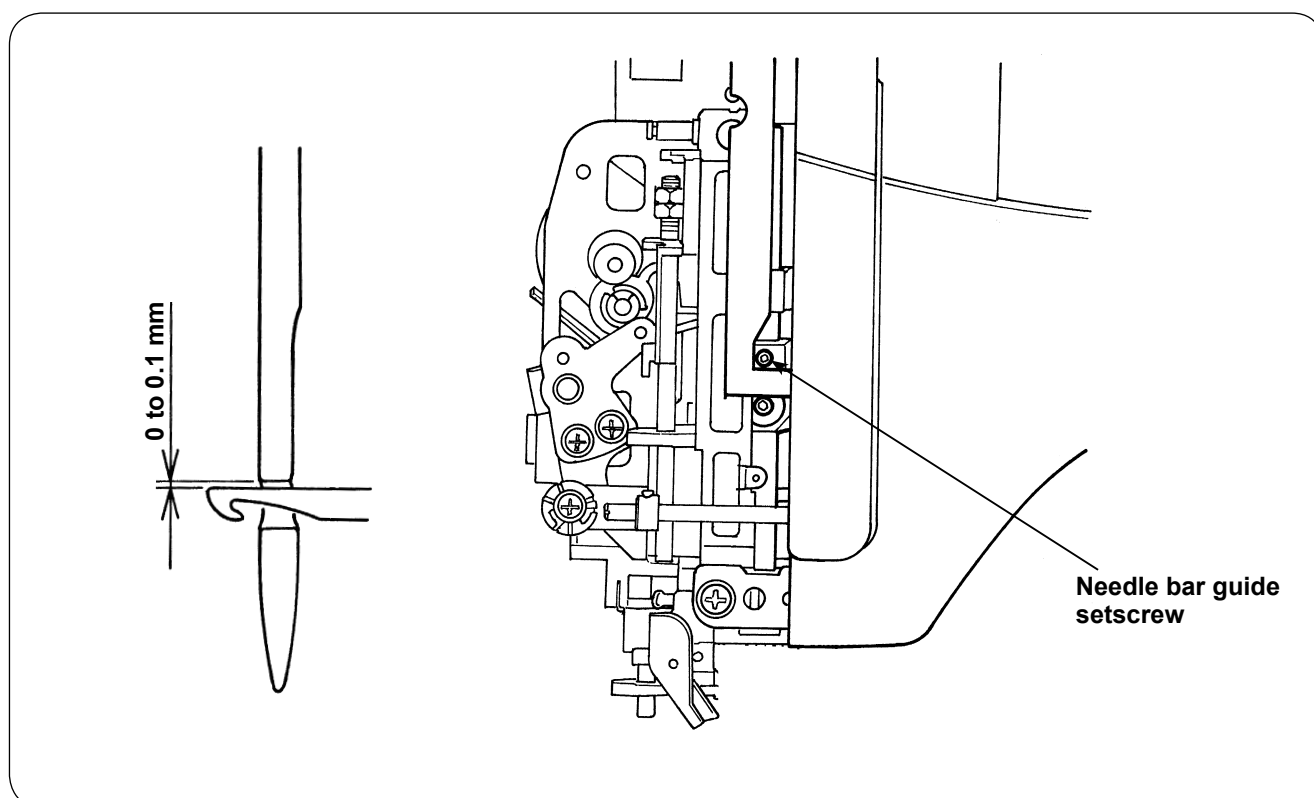
1. Assemble a household HA×1 needle #11 into the needle bar.
2. Turn the hand wheel to bring the needle bar near its highest dead point and stop the hand wheel when the needle bar reaches the location where the setscrew in the needle bar guide is visible.
3. Lower the threading lever to its lowest dead point. Check whether a clearance of 0 to 0.1 mm is provided between the top end of the needle threading hook and the upper end of the needle eye. (If the clearance is not 0 to 0.1 mm, the needle may not be threaded depending on the size of the needle used.)
4. Fit a hexagonal wrench on the needle bar guide setscrew to loosen it slightly.
 - If the needle threading hook position is too low → Move the needle bar guide upward and temporarily tighten the setscrew.
 - If the needle threading hook position is too high → Move the needle bar guide downward and temporarily tighten the setscrew.

Adjust the needle threading hook carefully, checking its position with respect to the needle eye.

When the needle threading hook enters and exits from the needle eye, the needle should never be bent by the hook.

If the needle threading hook position deviates to the right or left, correct the bend in the needle threading hook with the tip of a thin screwdriver or change the needle threading hook with a new one.

5. When the needle threading hook is correctly positioned, fully tighten the setscrew.

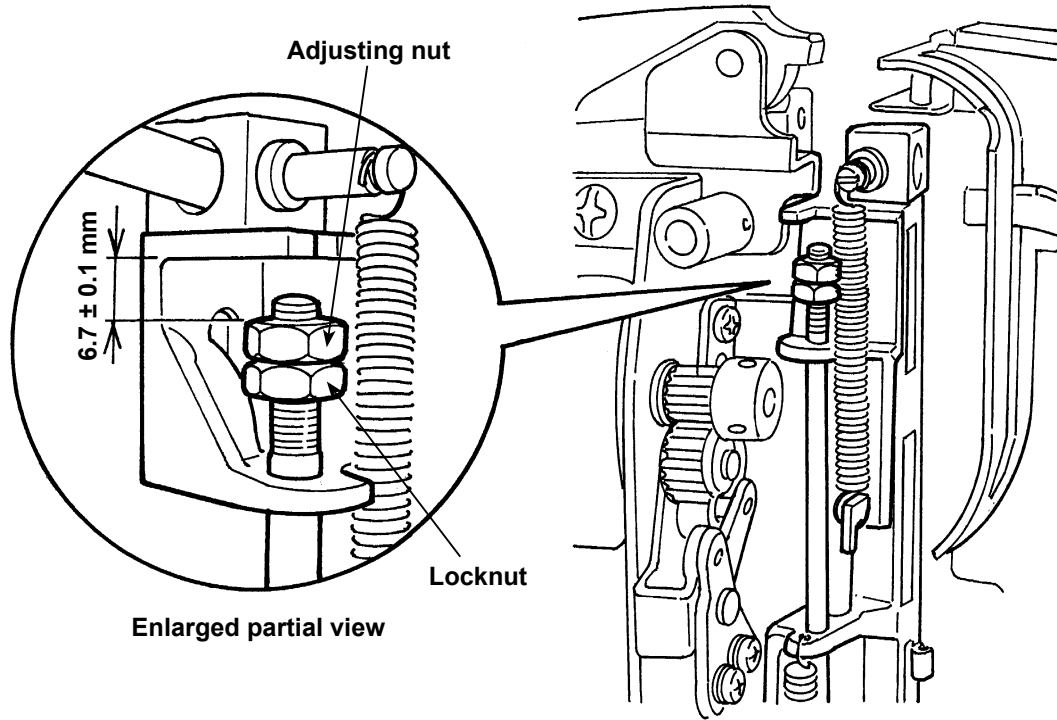


6-13 Adjusting the auxiliary hook height

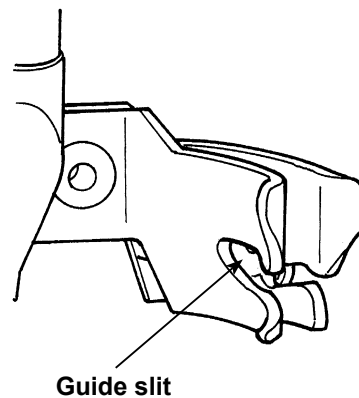
- Remove the face cover.

Adjustment procedure

1. Loosen the locknut. Adjust the adjusting nut so that the distance shown in the enlarged partial view is obtained.
2. Tighten the locknut to fix the adjusting nut.



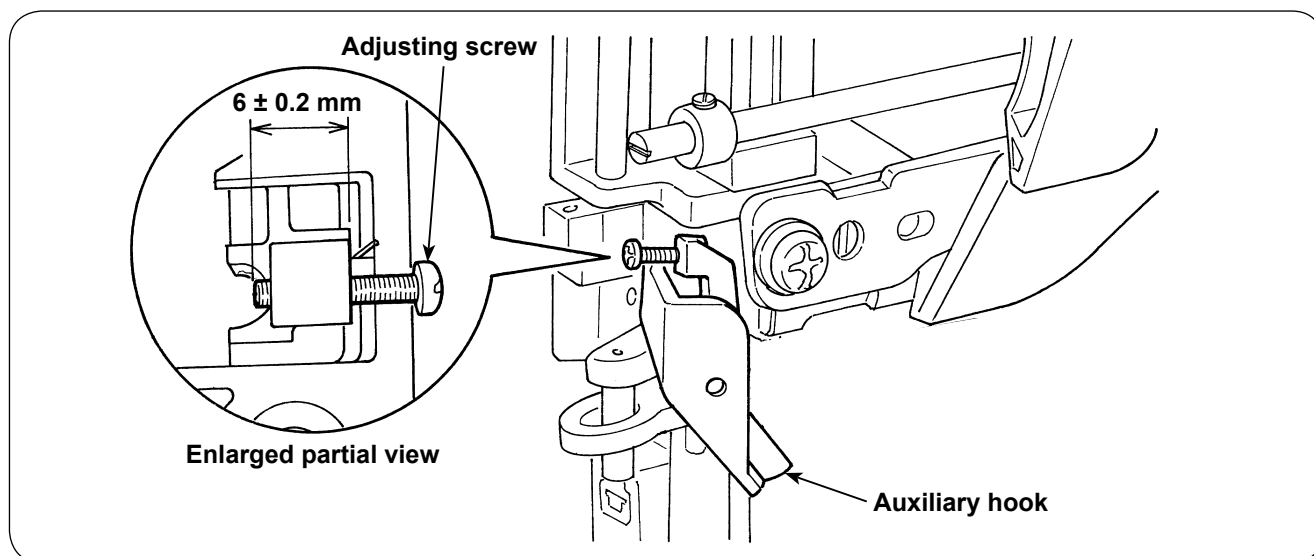
(Caution) If the thread does not enter the guide slit of the needle threading hook when threading the needle, check the distance and adjust it correctly.



6-14 Adjusting the opening amount of auxiliary hook

Adjustment procedure

1. Adjust the adjusting screw to the distance shown in the enlarged partial view.



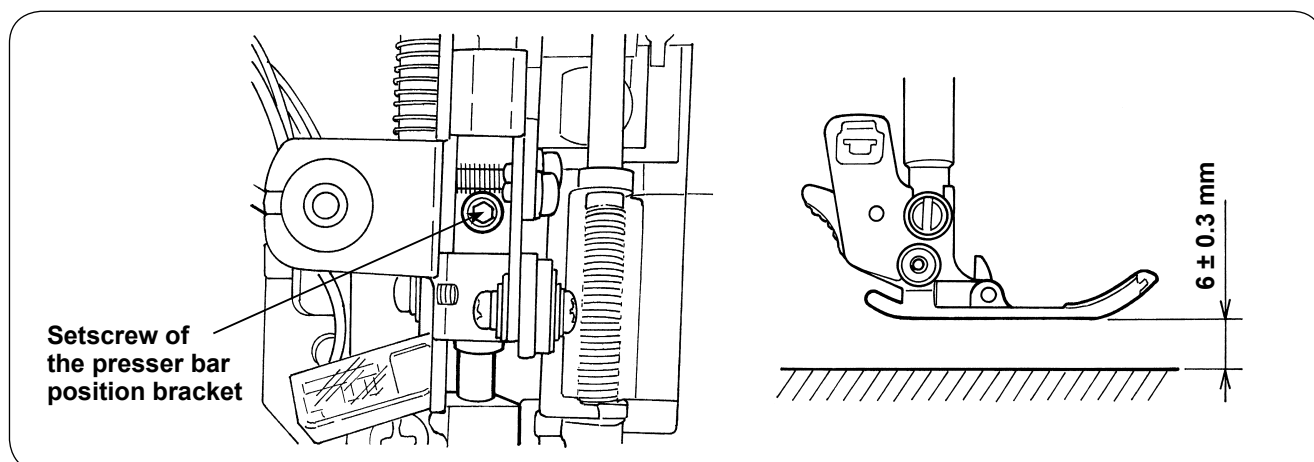
(Caution) If the auxiliary hook still keeps the thread after completion of needle threading, or if the auxiliary hook releases the thread before the needle threading hook catches the thread, adjust the adjusting screw. (The amount and timing of opening can be adjusted.)

6-15 Adjusting the presser bar height

- Remove the face cover.

Adjustment procedure

1. Assemble the standard presser foot in the presser foot holder. Raise the presser foot lifting lever.
2. Loosen the setscrew of the presser bar position bracket. Adjust the distance from the top surface of the throat plate to the bottom face of the standard presser foot to 6 ± 0.3 mm. At this time, check the direction of the presser bar so that the standard presser foot is in parallel to the feed dog groove and so that the needle slot in the throat plate is nearly aligned with the slot in the standard presser foot.

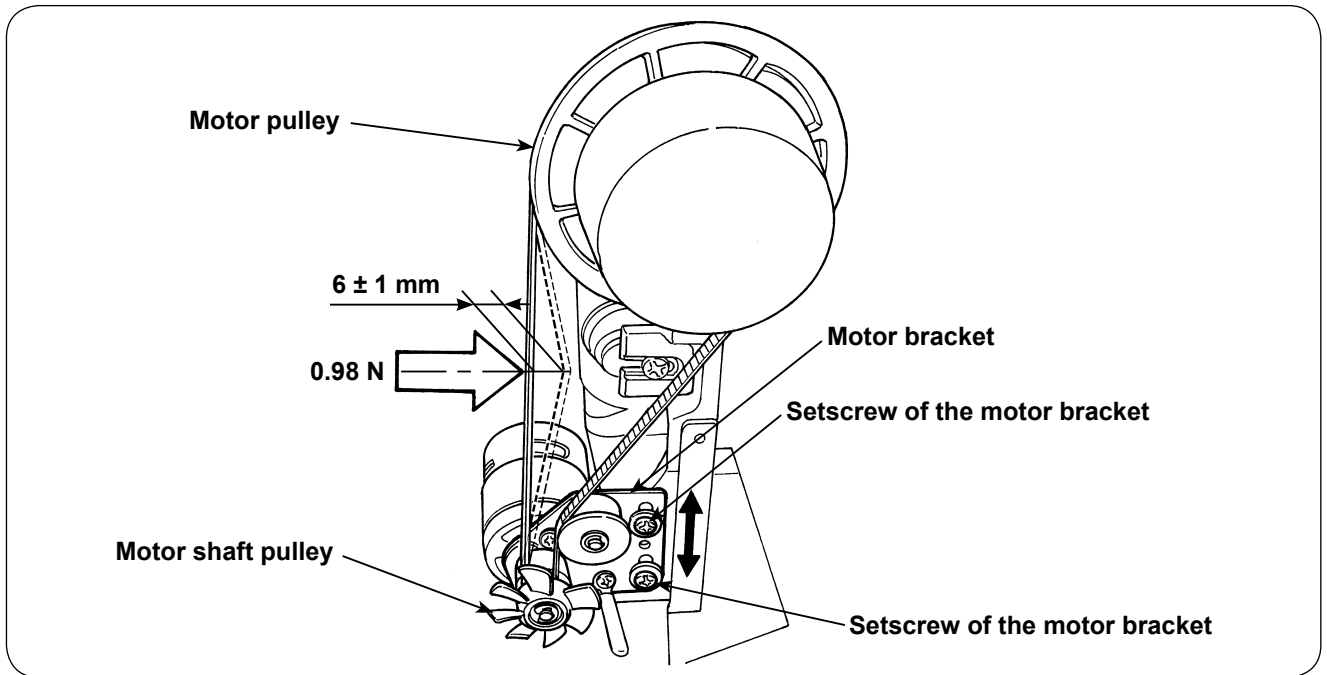


6-16 Motor belt

- Remove the front panel.

Adjustment procedure

1. Set the motor timing belt to the motor pulley and the motor shaft pulley.
2. Adjust the motor bracket so that the belt deflection amount becomes 6 ± 1 mm when pressing the center of the belt with a force of 0.98 N. After completion of adjustment, tighten the setscrew in the motor bracket.

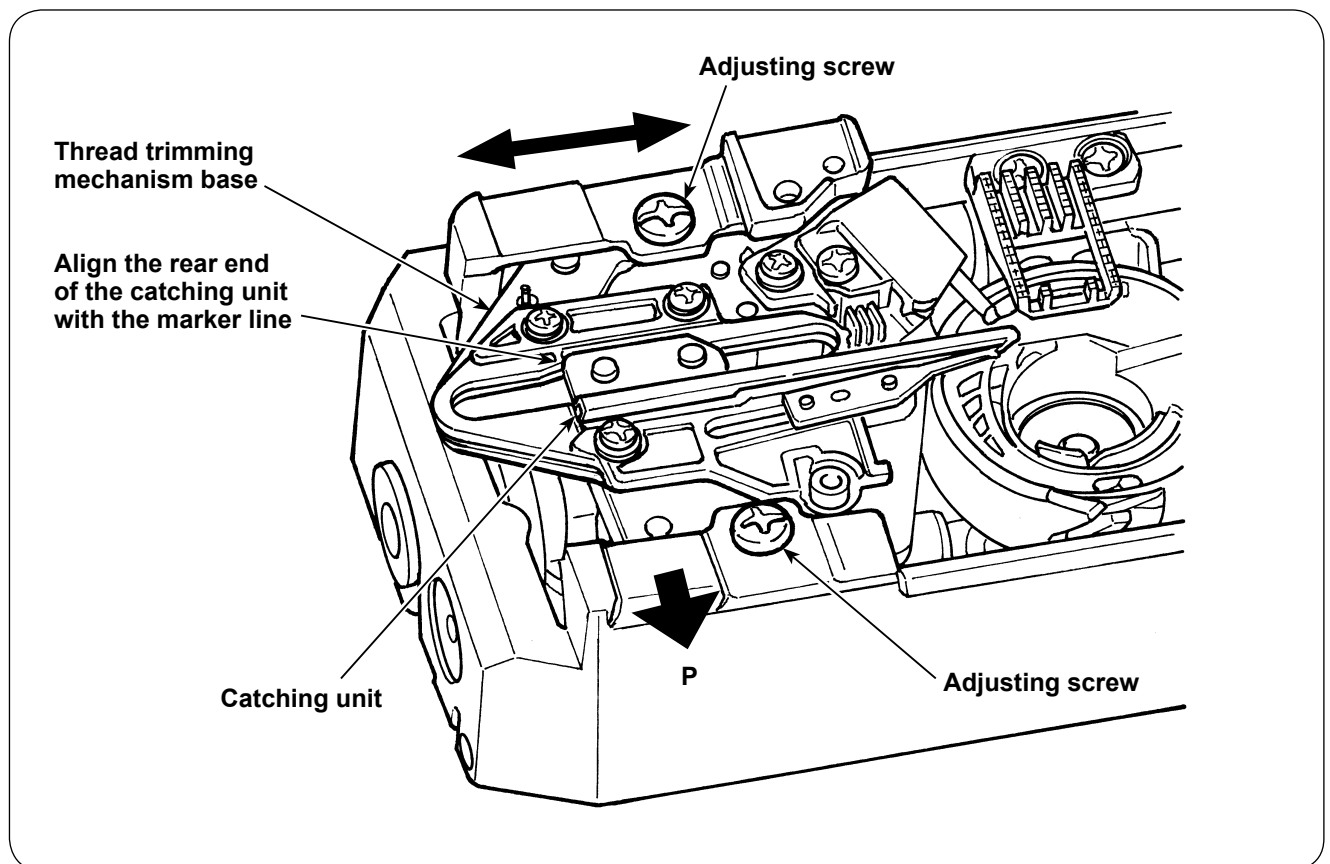


6-17 Automatic thread trimming

6-17-1 Lateral position of the thread trimming mechanism base

Adjustment procedure

1. Turn the power switch OFF. Then, turn the power switch ON with the reverse stitch button and the thread trimming button held pressed simultaneously.
2. The Service mode screen is displayed. Select "12".
3. Press the automatic back-tack thread trimming button to activate the thread trimming mechanism.
4. In the aforementioned state, loosen two adjusting screws and move the thread trimming mechanism base laterally with pressed in P direction until the rear end of the catching unit is aligned with the marker line. Then, tighten the adjusting screws.



(Caution) If the thread trimming mechanism base is inclined, a malfunction can be caused.
Be sure to press the mechanism base toward P direction so that it will not tilt.

6-17-2 Phase of the catching unit driving cam

○ Carry out the adjustment with the power OFF.

Adjustment procedure

1. Loosen setscrews ❶ and ❷.
2. Turn the cam driving shaft in the direction of the arrow as shown in Fig. A, and the catching unit driving cam will rotate in the direction as shown in Fig. B. Turn the cam until it comes in contact with the pin.
3. Turn the intermediate gear in the direction of the arrow as shown in Fig. A until it comes in contact with the pin. (See Fig. C.)
4. In the aforementioned state, securely tighten setscrew ❶ while removing a thrust play between the cam driving shaft and the cam driving gear, right as shown Fig. D.
5. The aforementioned step connects the shaft and the gear. Then, turn the intermediate gear so that set-screw ❷ is brought to the front side. Then, securely tighten setscrew ❷.

Fig. A

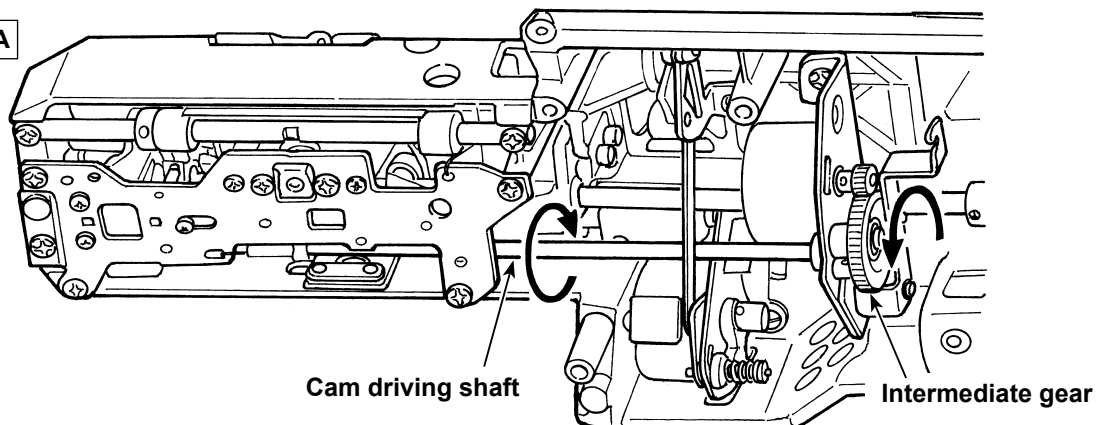


Fig. B

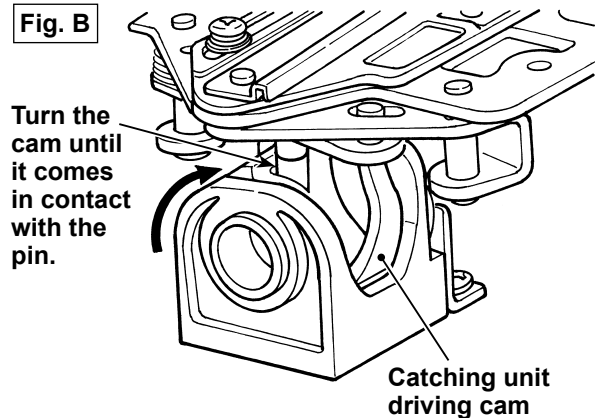


Fig. C

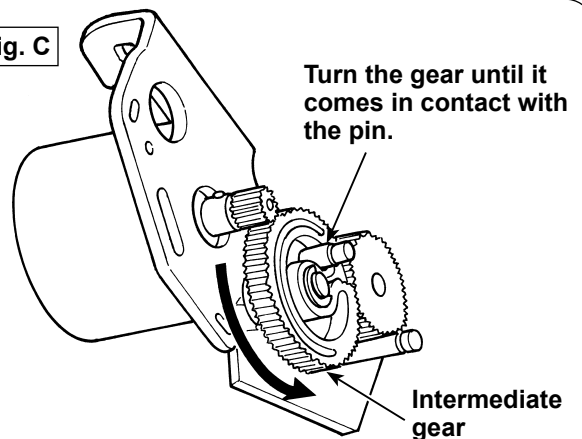
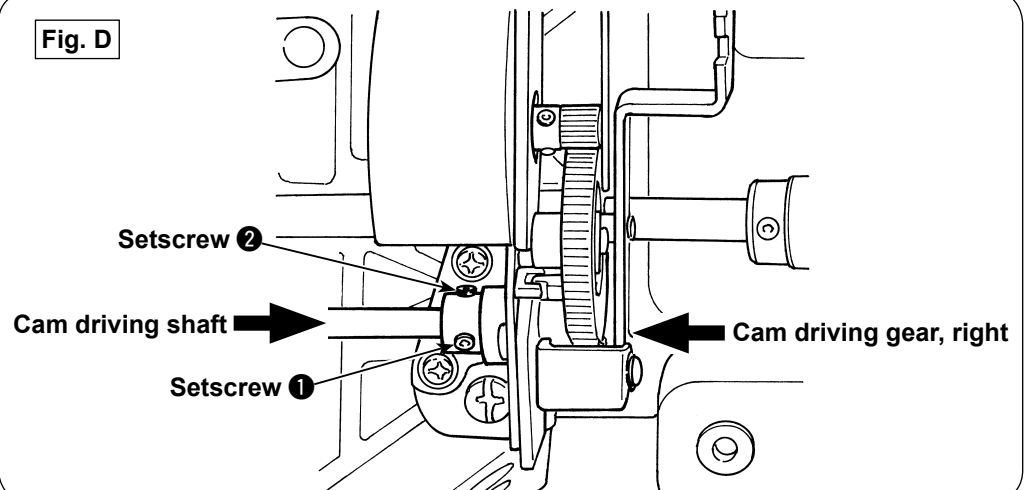
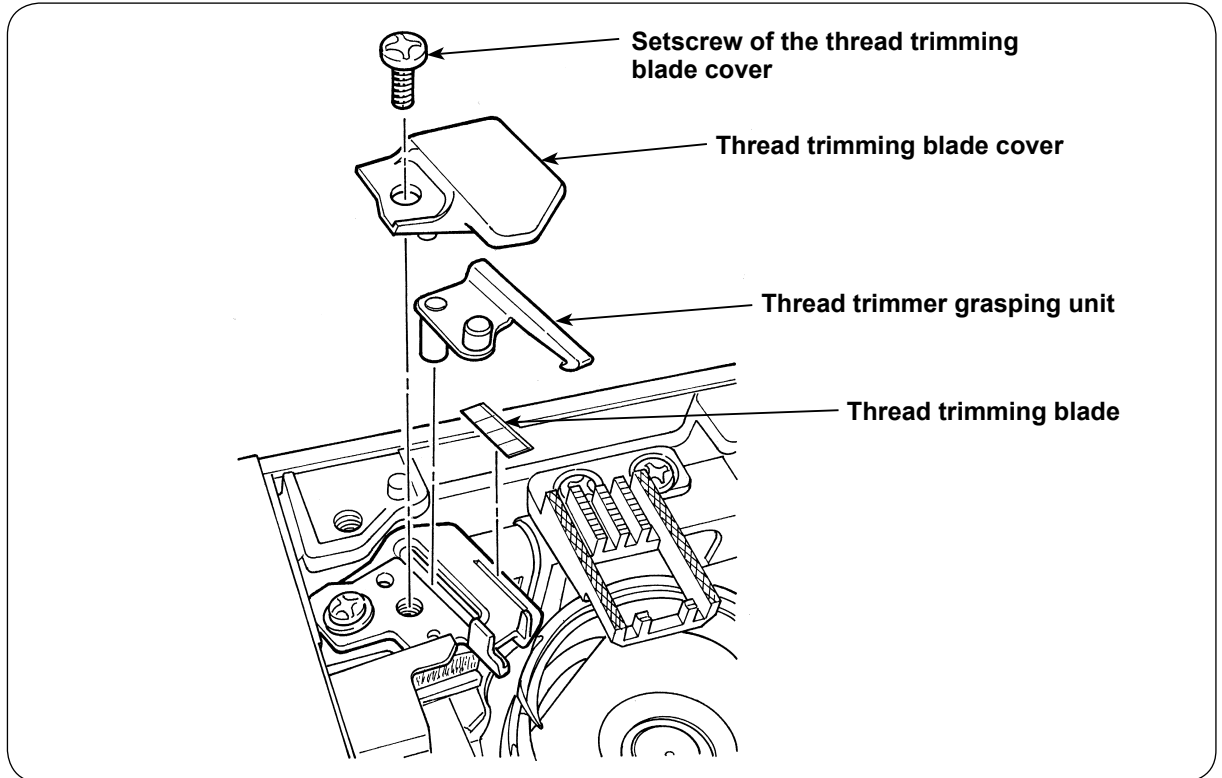


Fig. D

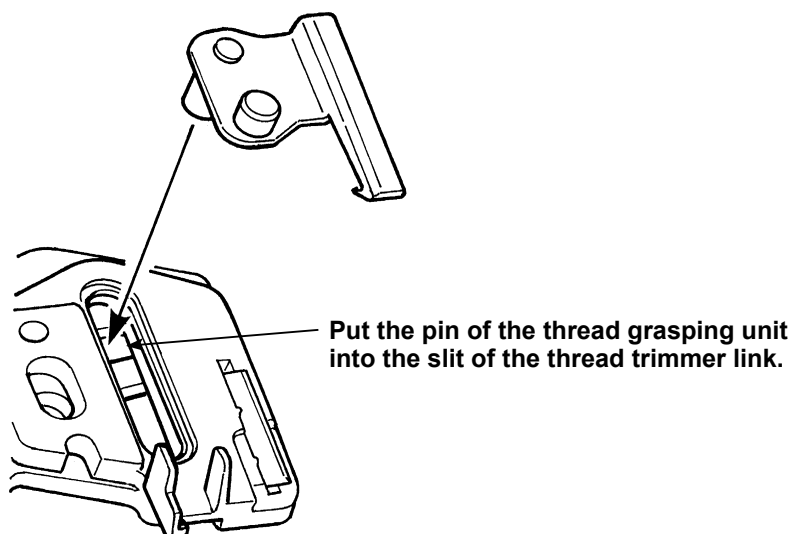


6-17-3 Replacing the thread trimming blade

1. Remove the throat plate.
2. Remove the setscrew of the thread trimming knife cover. Remove the thread trimming knife cover, the thread trimmer grasping unit and the thread trimming knife.
3. Reversing the disassembly procedure, assemble the parts. (Refer to the Caution below.)



(Caution) When assembling the thread trimmer grasping unit, put its pin into the slit in the thread trimmer link at the lower side of the mechanism section as illustrated below. Thread trimming cannot be performed if the pin has not entered the slit.



6-18 Longitudinal feed

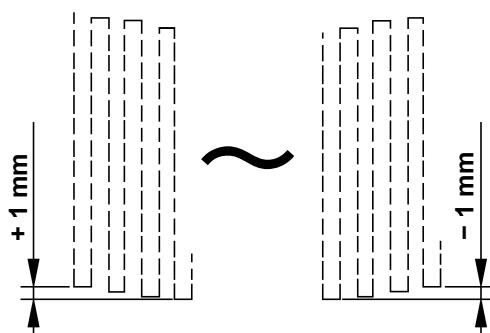
Preparation for adjustment

Turn OFF the power switch. Keep pressing both the reverse stitch button and thread trimming button simultaneously and turn ON the power switch. The service mode screen appears on the display. Select "No. 3" to change over the screen to the sewing pattern for adjusting darning.

Adjustment procedure

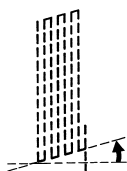
Sew a darning sewing pattern three times under the aforementioned sewing conditions.

Turn the stitch length adjusting dial in the case of the DX7 model, or press the stitch length adjusting button in the case of the DX5 model to adjust so that the bottom end of the left row seam and that of the right row seam of the third pattern lie on a straight line as illustrated in the sketch (tolerance 0 ± 1 mm).

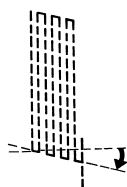


Direction of adjustment of lengthwise feed

- In the case the lower end of the right line is higher than the lower end the inner left line $\Rightarrow$ Adjust in "+" direction



- In the case the lower end of the right line is lower than the lower end the inner left line $\Rightarrow$ Adjust in "-" direction

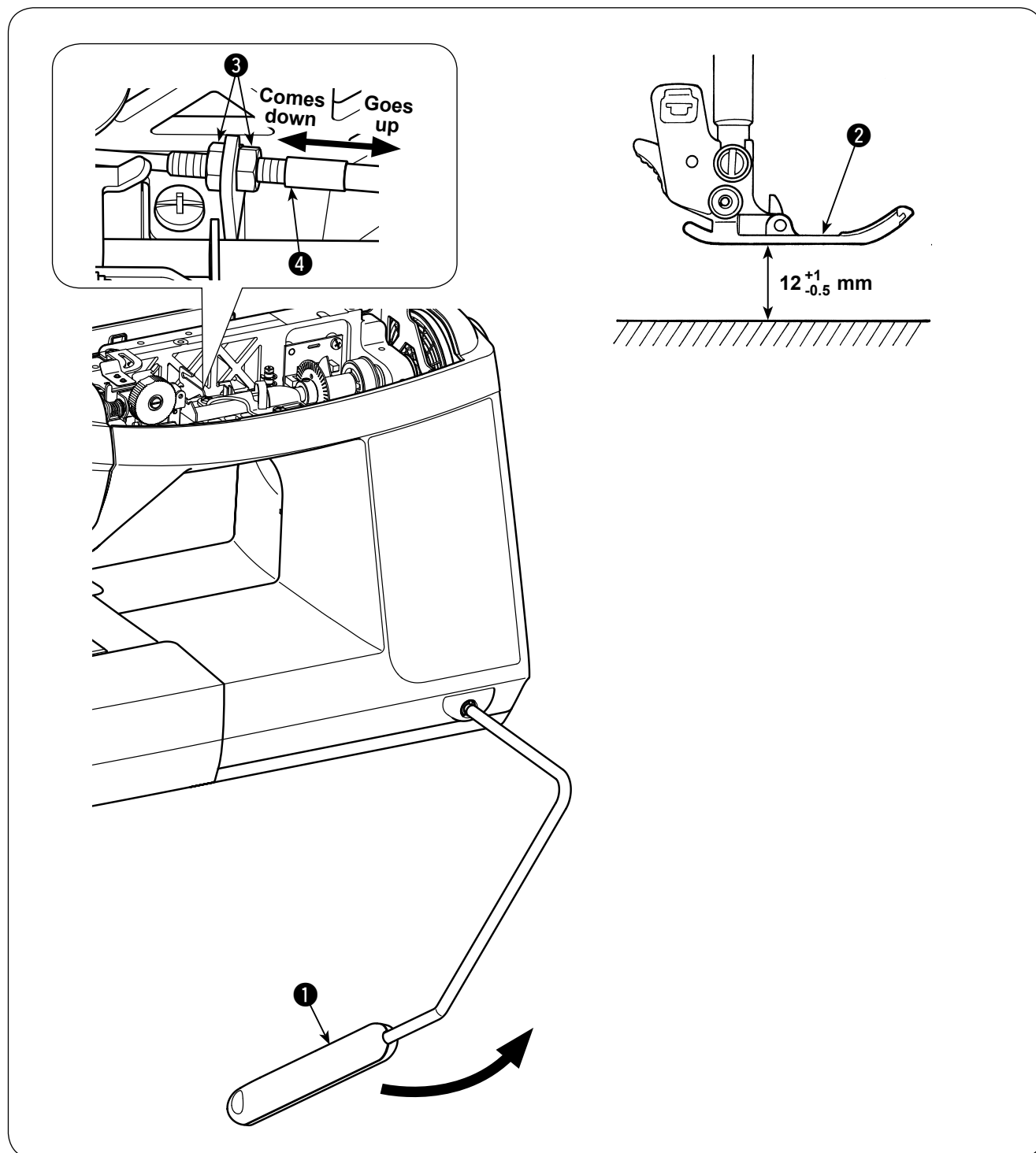


6-19 Knee lifting wire

- Remove the face cover, the thread tension cover and the spool cover.

Adjustment procedure

1. Assemble the knee lifting lever **1**.
2. Loosen the locknut **3**. Adjust the wire **4** so that the height of presser foot **2** becomes $12^{+1}_{-0.5}$ mm when you fully turn the knee lifter lever **1** in the direction of the arrow until it will go no further.
3. Tighten the locknut.



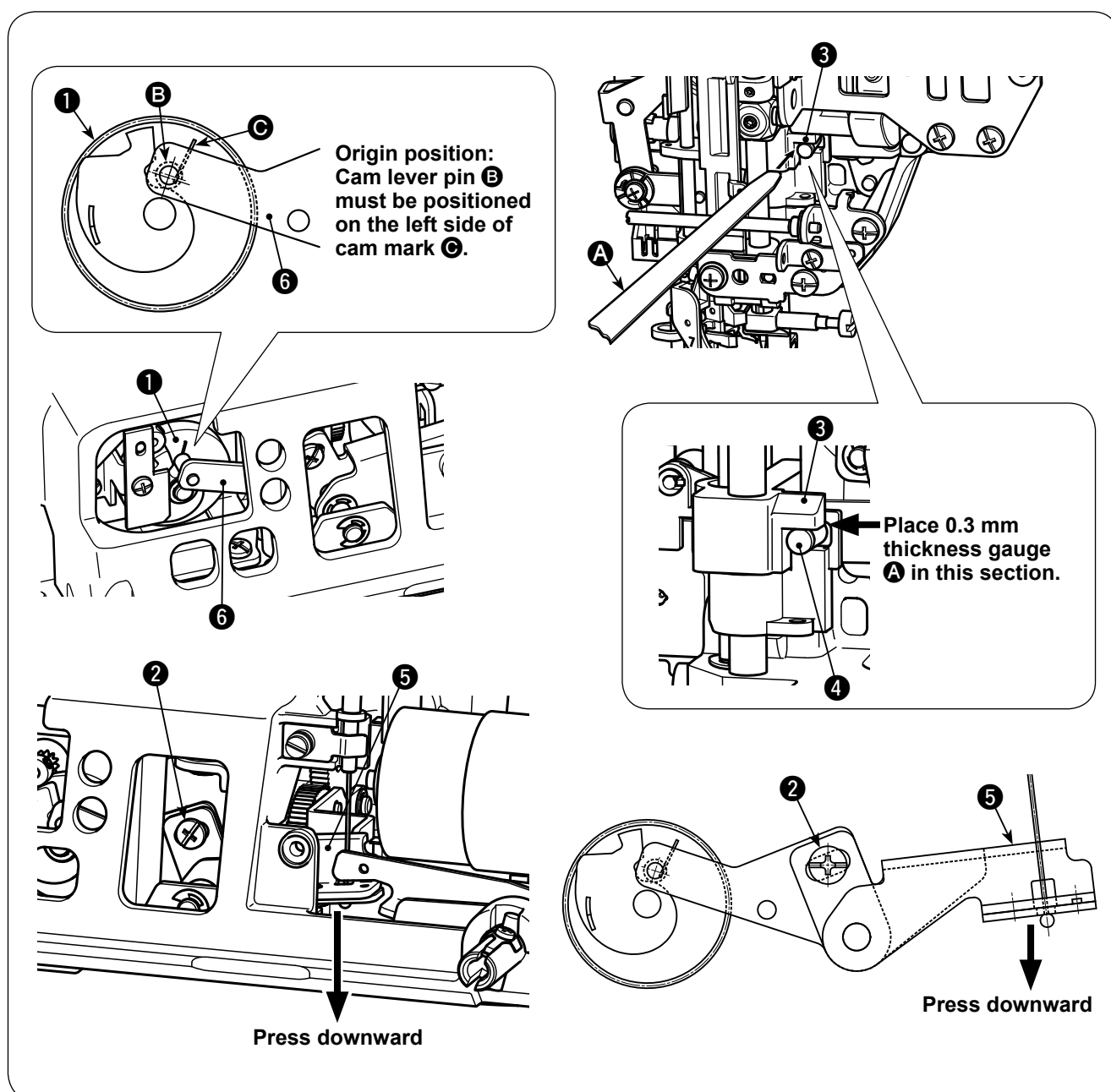
6-20 Automatic presser foot lifting

6-20-1 Auto-lifter cam lever

- Remove the front panel and the microcomputer PCB.

Adjustment procedure

1. Check to be sure that auto-lifter cam **1** is at its origin position (see the figure below). (Turn the power ON before starting the adjustment to bring auto-lifter cam **1** to its origin position.)
2. Assemble the throat plate. Assemble the standard presser foot (presser foot A) in the presser foot holder. Lower the presser foot.
At this time, check to be sure that the feed dog does not appear above the top surface of throat plate.
3. Loosen the setscrew **2** of the cam lever.
4. Place 0.3 mm thickness gauge **A** between presser bar position bracket **3** and knee-lifter plate **4**. Press cam lever arm **5** downward to remove the slack of wire. Then, tighten cam lever setscrew **2**.



6-20-2 Presser-lifter position sensor

- Remove the rear panel.

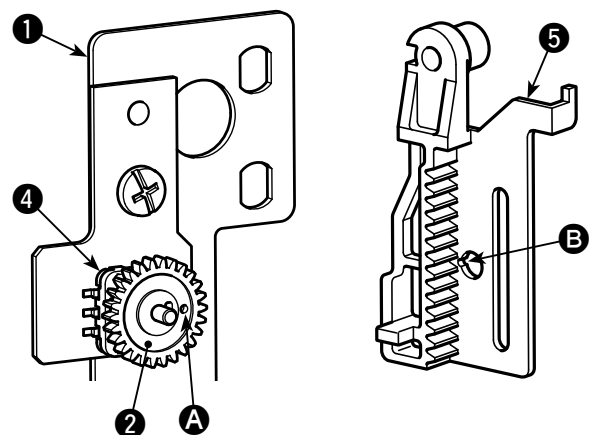
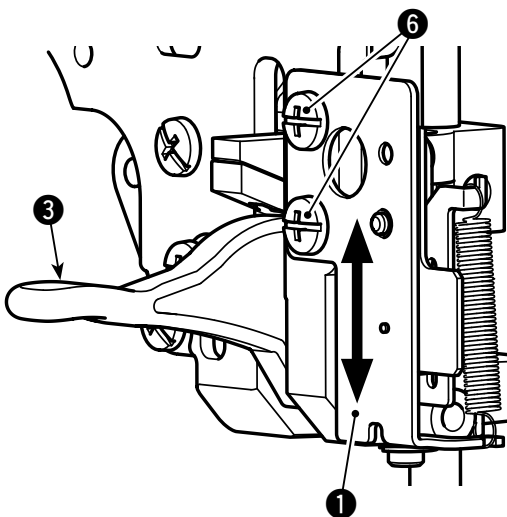
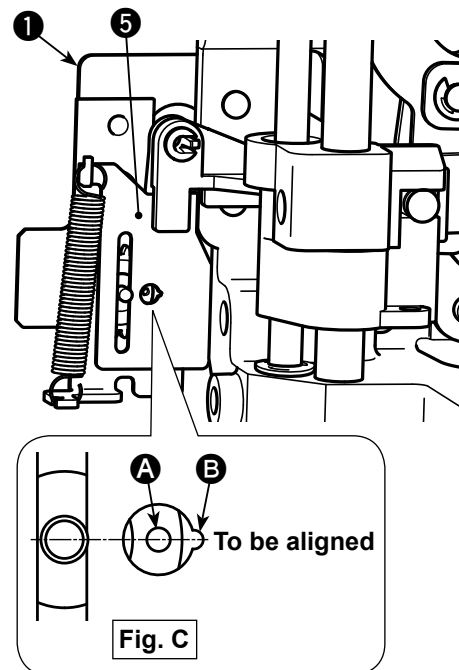
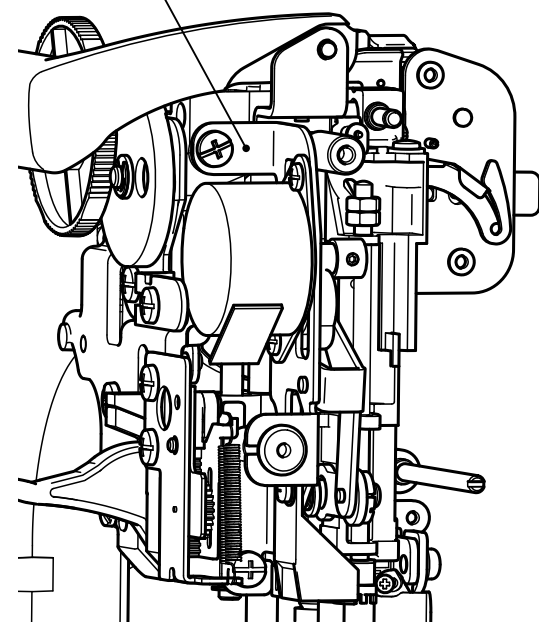
Remove the entire unit of needle throwing STM base.

* Adjust the position of mesh of sensor gear ② and the gear of sensor rack ⑤ with each other when installing presser-lifter position sensor mounting plate ①. (See Fig. C.)

Adjustment procedure

1. Temporarily tighten setscrew ⑥ of the presser-lifter position sensor mounting plate.
2. Lift presser-lifter lever ③. Move presser-lifter position sensor mounting plate ① in the direction of the arrow to adjust the height of presser-lifter position sensor ④ so that mark A on the gear ② of presser-lifter position sensor ④ is aligned with mark B on sensor rack ⑤.
3. Tighten setscrew ⑥ of the presser-lifter position sensor mounting plate.

Needle throwing STM base



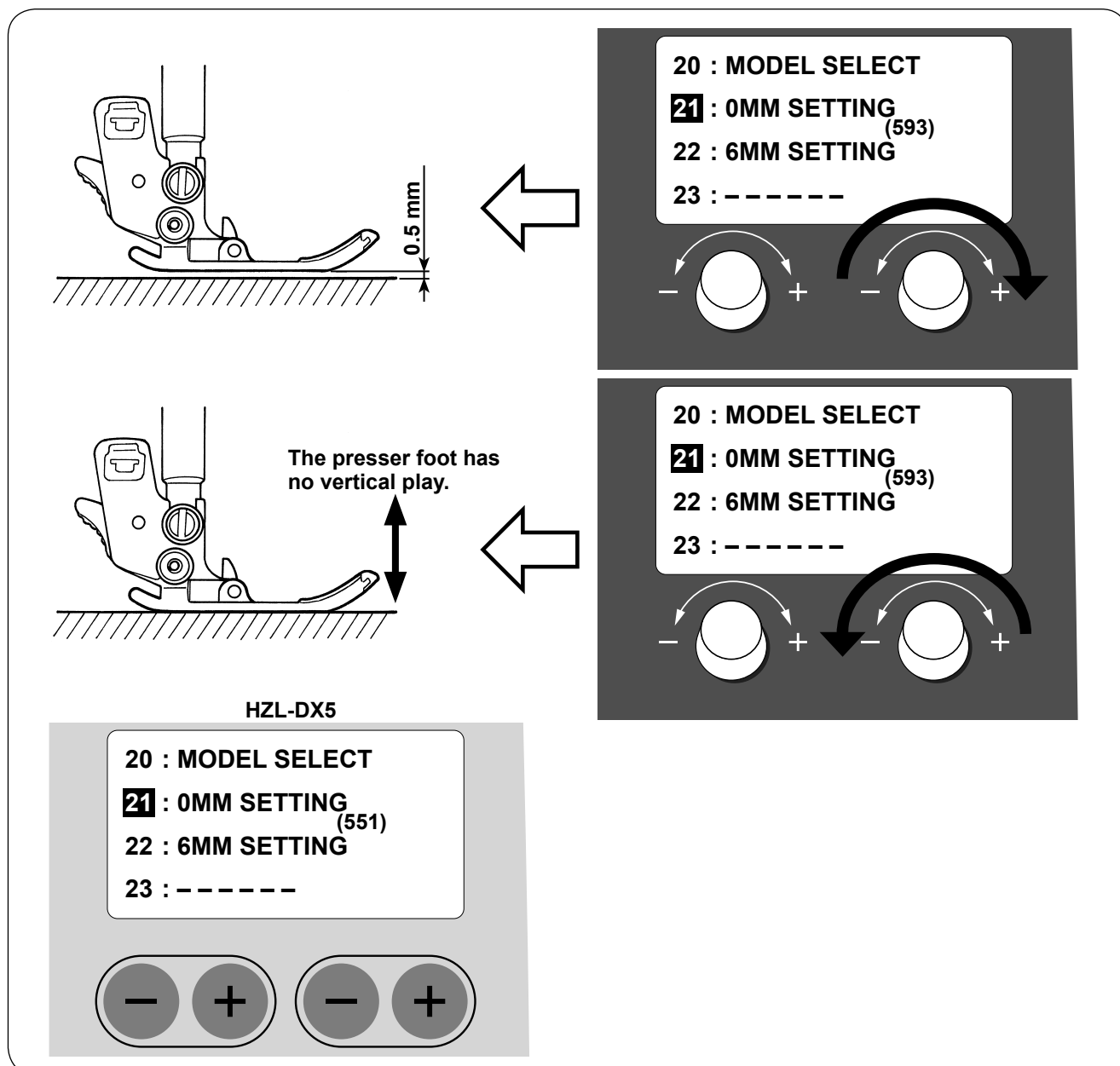
6-20-3 Adjusting the height of the presser foot when it is lifted

* Be sure to carry out the following adjustment every time you have adjusted the knee-lifter wire, auto-lifter cam lever or presser-lifter position sensor.

6-20-3-1 Adjusting the presser foot height to 0 (zero) mm

Adjustment procedure

1. Select "No. 21 : 0MM SETTING" of the service mode.
At this time, check to be sure that the feed dog does not appear above the top surface of throat plate.
2. When "No. 21 : 0MM SETTING" is selected, the presser foot goes up by approximately 0.5 mm.
If not, turn the stitch length adjusting dial in the "+" direction in the case of the DX7 model, or press the stitch length adjusting button in the case of the DX5 model to lift the presser foot by approximately 0.5 mm.
3. Place a block or the like thickness of which is 6 mm under the presser foot. Operate the sewing machine in increments of 1 pulse in the "-" direction to lower the presser foot until its vertical play is eliminated.
* Be sure to adjust the presser foot height by lowering it from its upper position. If you excessively lower the presser foot, lift the presser foot again by approximately 0.5 mm.
4. Press the "OK" button.



6-20-3-2 Adjusting the presser foot height to 6 mm

Adjustment procedure

1. Select "No. 22 : 6MM SETTING" of the service mode.

At this time, check to be sure that the feed dog does not appear above the top surface of throat plate.

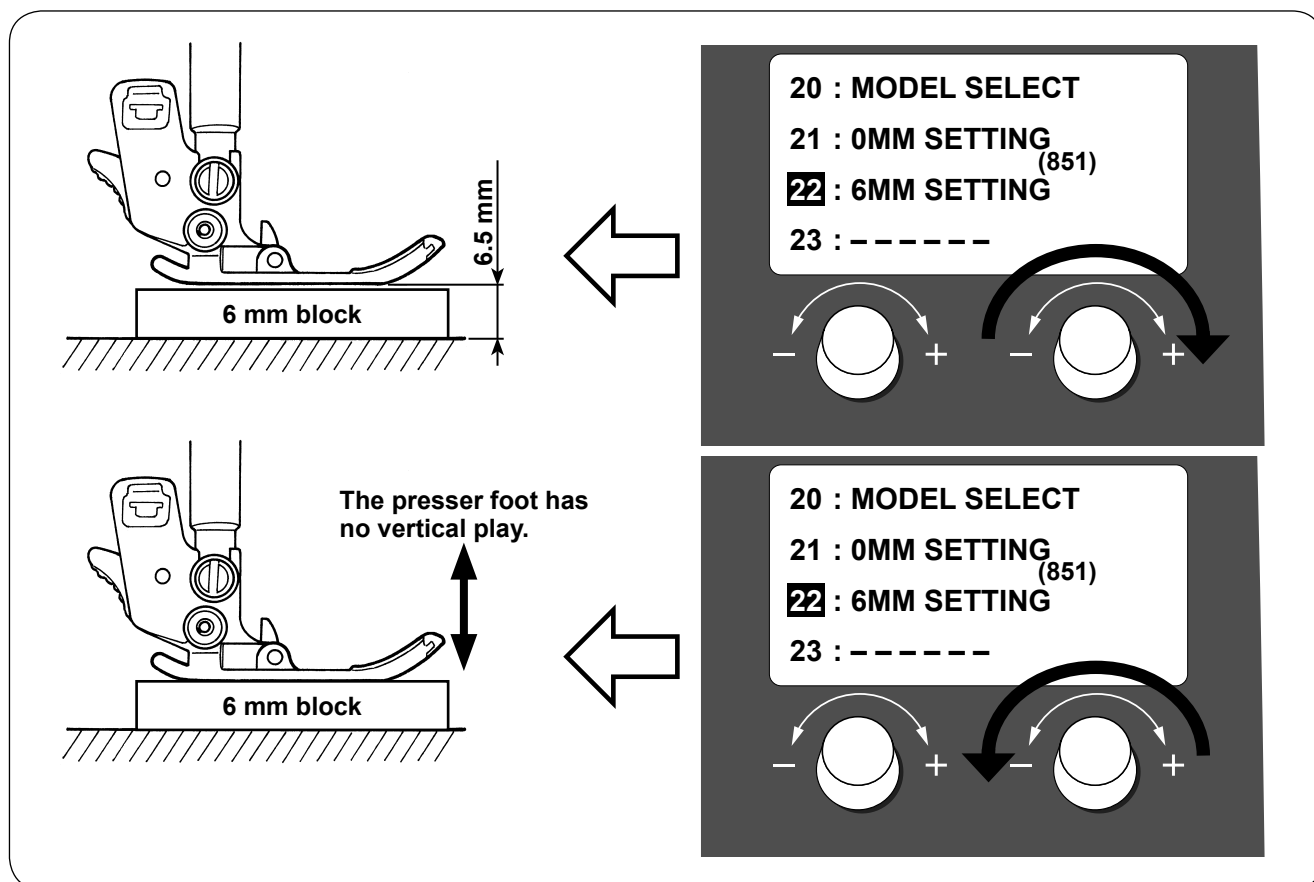
2. When "No. 22 : 6MM SETTING" is selected, the presser foot goes up by approximately 6.5 mm.

If not, turn the stitch length adjusting dial in the "+" direction in the case of the DX7 model, or press the stitch length adjusting button in the case of the DX5 model to lift the presser foot by approximately 6.5 mm.

3. Place a block or the like thickness of which is 6 mm under the presser foot. Operate the sewing machine in increments of 1 pulse in the "-" direction to lower the presser foot until its vertical play is eliminated.

*** Be sure to adjust the presser foot height by lowering it from its upper position. If you excessively lower the presser foot, lift the presser foot again by approximately 6.5 mm.**

4. Press the "OK" button.



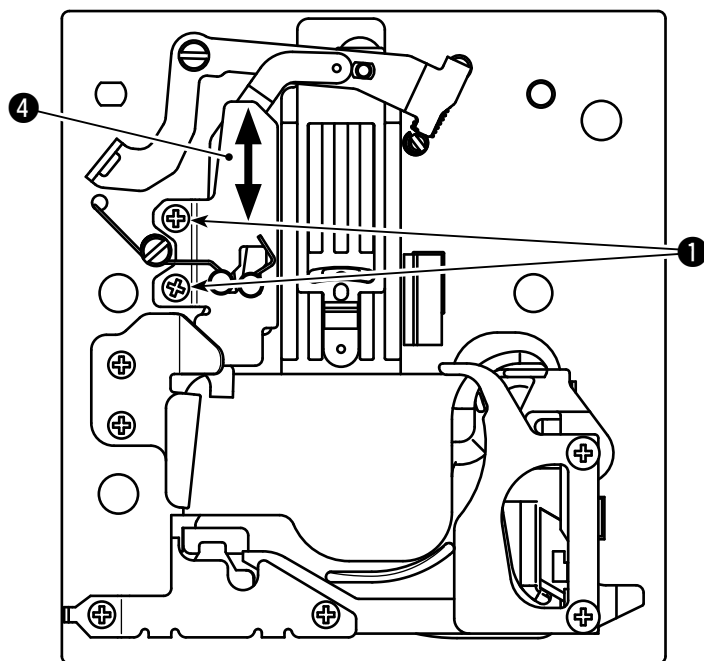
6-21 Straight stitch slide plate

6-21-1 Adjusting the position of the straight stitch slide plate

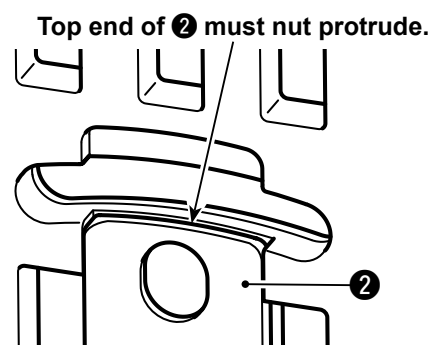
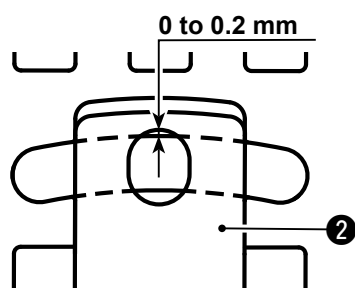
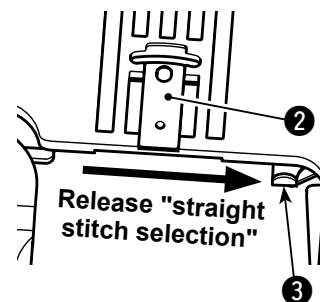
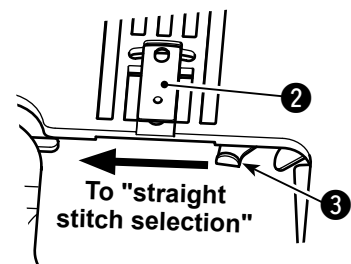
- Remove the throat plate.

Adjustment procedure

1. Temporarily tighten the setscrew **1** of the lever holder.
2. Move operating lever **3** to the left to set straight stitch slide plate **2** in the "straight stitch selection".
3. Adjust the vertical position of lever holder **4** so that the edge of needle hole in straight stitch slide plate **2** protrudes from the edge of needle slot in the throat plate by 0 to 0.2 mm. Then, tighten the setscrew **1** of the lever holder.
4. Move operating lever **3** to the right to release the "straight stitch selection" of straight stitch slide plate **2**. Check to be sure that the top end of straight stitch slide plate **2** does not protrude from the needle slot in throat plate.



Back surface of throat plate



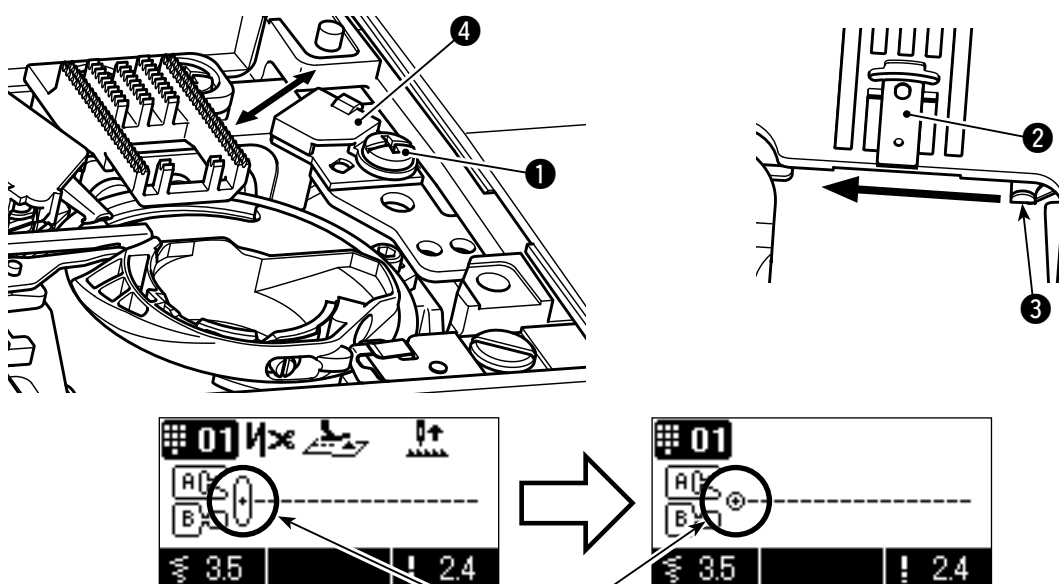
6-21-2 Straight stitch slide plate sensor PCB

- Remove the throat plate.

Adjustment procedure

1. Temporarily tighten the setscrew ❶ of the straight stitch slide plate sensor PCB.
2. Attach the throat plate. Slowly move operating lever ❸ of straight stitch slide plate ❷ to find the position at which straight stitch slide plate changes over its mode to the "straight stitch selection". (Buzzer sounds at the moment of changeover.)
3. Change the position of straight stitch slide plate sensor PCB ❹ by moving it in the direction of the arrow to adjust the changeover position to the position as shown in Fig. A.
4. Tighten the setscrew ❶ of the straight stitch slide plate sensor PCB.
5. Attach the throat plate. Check to be sure that the sewing machine operates normally.

- (Caution) • Release the "straight stitch selection" of straight stitch slide plate ❷ to enable the use of the normal needle slot in throat plate when attaching/removing the throat plate. The normal needle slot can be used by moving operating lever ❸ to the right.**
- Take care not to allow sensor lever ❺ to hit against the sensor. If the lever hits against the sensor, sensor can break.
 - If the actuating force of operating lever ❸ in the case of the throat plate only and that in the case the throat plate is attached to the sewing machine differs significantly, check to make sure that sensor lever ❺ does not come in contact with the sensor. If the lever comes in contact with the sensor, re-adjust the position of straight stitch slide plate sensor PCB ❹.



When the mode changes over to the "straight stitch selection", the buzzer sounds and the needle hole display on the panel changes.

Top end of straight stitch slide plate ❷ is aligned with the edge of needle slot in the throat plate. (0 ± 0.2 mm)

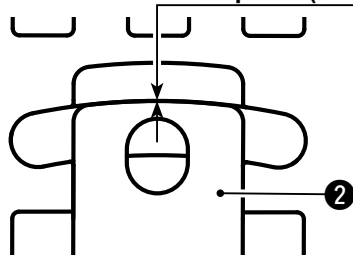
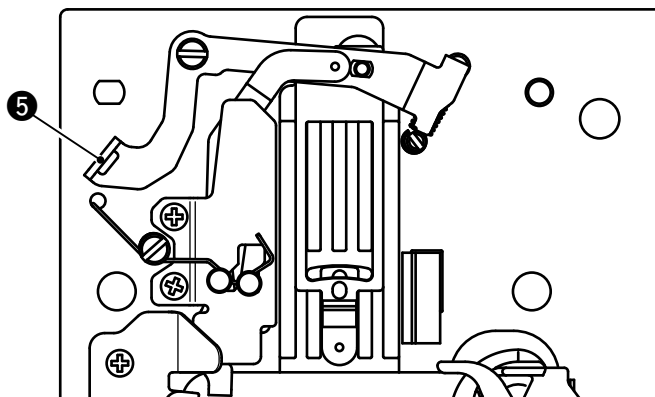


Fig. A



6-22 Service mode

6-22-1 Service mode screen

Check with item numbers and items.

[How to select the service mode]

1. When the power switch stays off, keep pressing both the reverse feed button and the thread trimming button simultaneously to turn ON the power switch.
2. The service mode screen appears on the display. Select the number corresponding to the service item to operate.

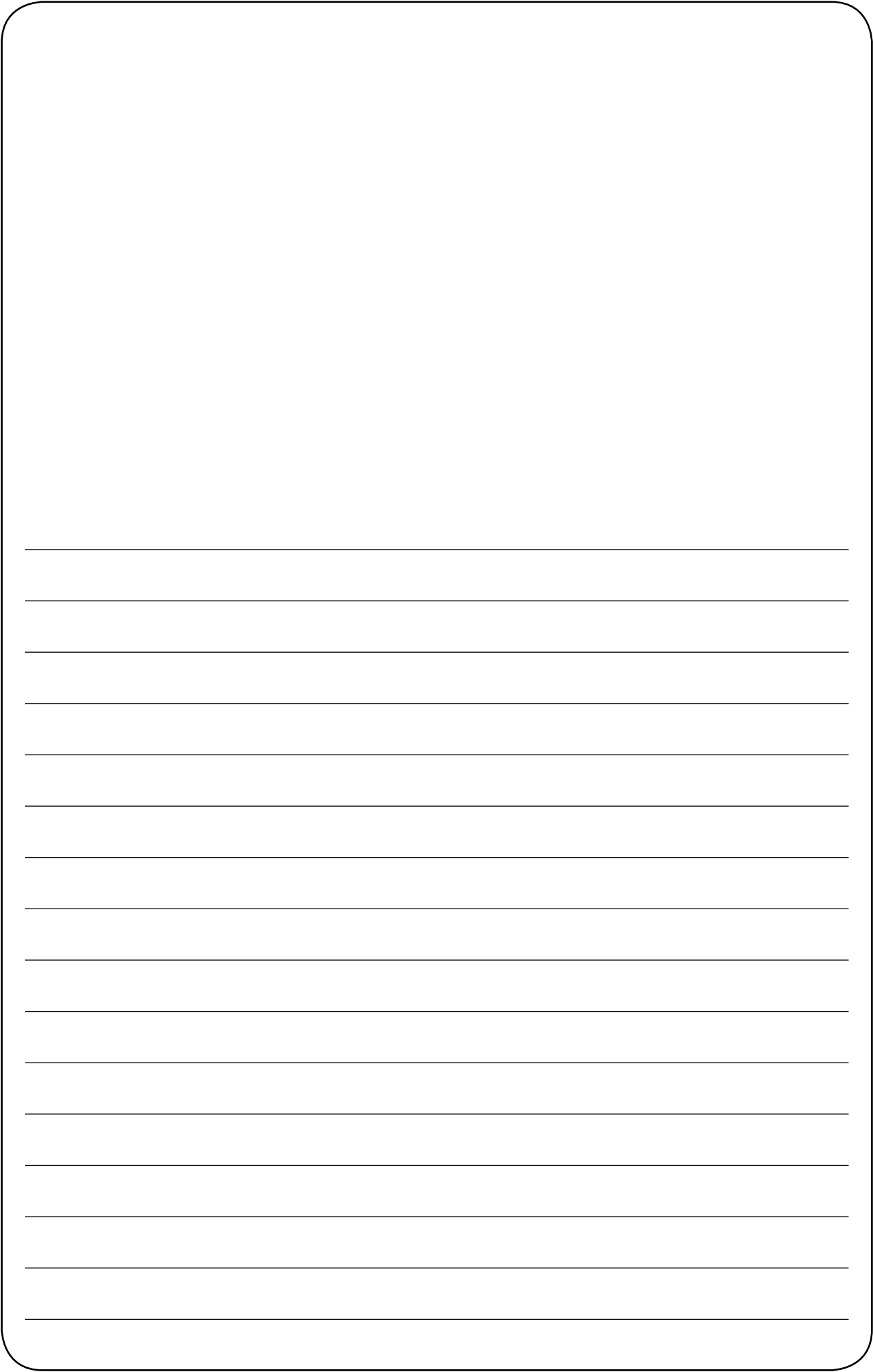
* To select the number corresponding to a target service item, shift the item shown on the screen forward or backward one after another by pressing the selection button   until the number corresponding to the target item is selected.

6-22-2 Service-mode items and descriptions

No.	Item name	Description
1	FEED 0 MODE	Select the straight stitch pattern and set the amount of feed at 0 (zero). Press the "OK" button to initialize the pattern to set the amount of feed to zero (0).
2	FAGOTT	Select the fagoting pattern. Set the zigzag width at 7.0 mm. The fagoting pattern can be sewn.
3	DARNING	Select the darning pattern. Darning pattern can be sewn with the initial value.
4	ZIG ZAG	Select the zigzag pattern. Zigzag pattern can be sewn with the initial value.
5	KIKKOU	Select the Kikkou pattern. Kikkou pattern can be sewn with the initial value.
6	OVERCASTING	Adjust the needle entry point for overcasting. Slide the needle entry points toward the needle throwing direction entirely by the specified number of pulses. The sliding amount can be adjusted with the "zigzag width adjusting" dial or button. The adjustable range of the sliding amount is [-4 to 4]. Adjustment is made in increments of 1.
7	BLIND STITCH	Adjust the needle entry points on the left side of the blind stitch. Slide the needle entry points toward the needle throwing direction entirely by the specified number of pulses. The sliding amount can be adjusted with the "zigzag width adjusting" dial or button. The adjustable range of the sliding amount is [-4 to 4]. Adjustment is made in increments of 1.

No.	Item name	Description
8	THREAD TRIM CHECK	Thread trimming condition can be checked. Perform thread trimming halfway by using the "OK" button. From this condition, manually turn the main shaft to carry out the thread trimming sequence in order.
9	SARA UKASHI (Tension release)	Bring the disks to the floating condition. Operate the "OK" button, and the disks will float.
10	STRAIGHT 500STI/MIN	The maximum sewing speed is 500 sti/min (SPM) when the straight stitch pattern is selected.
11	LCD FLASH TEST	Indications on the LCD can be checked. Every time the "OK" button is pressed, the LCD lights up entirely and goes out entirely.
12	THREAD CATCH ADJ (For adjusting the thread trimming mechanism base)	Press the "OK" button to carry out thread trimming partway. When the thread trimming operation stops, check the lateral position of the thread trimming mechanism base.
13	Reserved	
14	FEED PULSE TEST1	A straight line can be sewn with the amount of feed determined by the number of pulses. The straight stitch is selected as the sewing pattern. The number of pulses of feed can be adjusted using the "stitch length adjusting" dial or button. The straight stitch pattern can be sewn with the feed amount determined by the adjusted number of pulses.
15	FEED PULSE TEST2	Zigzag stitch can be sewn with the amount of feed determined by the number of pulses. The zigzag stitch is selected as the sewing pattern. The number of pulses of feed can be adjusted using the "stitch length adjusting" dial or button. The zigzag stitch pattern can be sewn with the feed amount determined by the adjusted number of pulses.
16	BH UPPER LIMIT	The upper limit of the scaling factor employed at the feedback operation (the operation for sewing the buttonhole of the same size again) is adjusted. The upper limit of the scaling factor employed at feedback operation can be changed with the "stitch length adjusting" dial or button. The adjustable range of scaling factor is [1.00 to 1.80]. (Default is 1.40. Adjustment is made in increments of 0.05.)
17	WIND PWM	Output value of PWM for the bobbin winder is set. The PWM output value can be adjusted using the "zigzag width adjusting" dial or button. It is possible to make adjustment while rotating the bobbin winder under the service mode. The adjustable range of PWM output value is [15.0 to 79.1]. (Default is 54.0. Adjustment is made in increments of 0.5. Note that the indication is given in increments of 0, 1.

No.	Item name	Description
18	WIND PWR UP LIMIT	The bobbin winder is provided with the function that winds thread with increased power. This function is used when winding thick thread or an increase in torque is required. The threshold value for the increase in power is set using this item of the service mode. The adjustable range of the threshold value is [20 to 60]. (Default is 40. Adjustment is made in increments of 1.)
19	Reserved	
20	MODEL SELECT	Setting is disabled.
21	0MM SETTING	Set the "0 (zero) mm position" of the auto-lifter. When selecting the function number, lift the presser foot with the auto-lifter to the height that is slightly above 0 mm in advance. The value displayed on the left represents the current set value. The value displayed on the right represents the current height of presser foot. Change the height of presser foot with the "stitch length adjusting" dial or button and confirm the new set value with "OK" button. (Default is 200.)
22	6MM SETTING	Set the "6 mm position" of the auto-lifter. When selecting the function number, lift the presser foot with the auto-lifter to the height that is slightly above 6 mm in advance. The value displayed on the left represents the current set value. The value displayed on the right represents the current height of presser foot. Change the height of presser foot with the "stitch length adjusting" dial or button and confirm the new set value with "OK" button. (Default is 537.)
23	Reserved	





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