

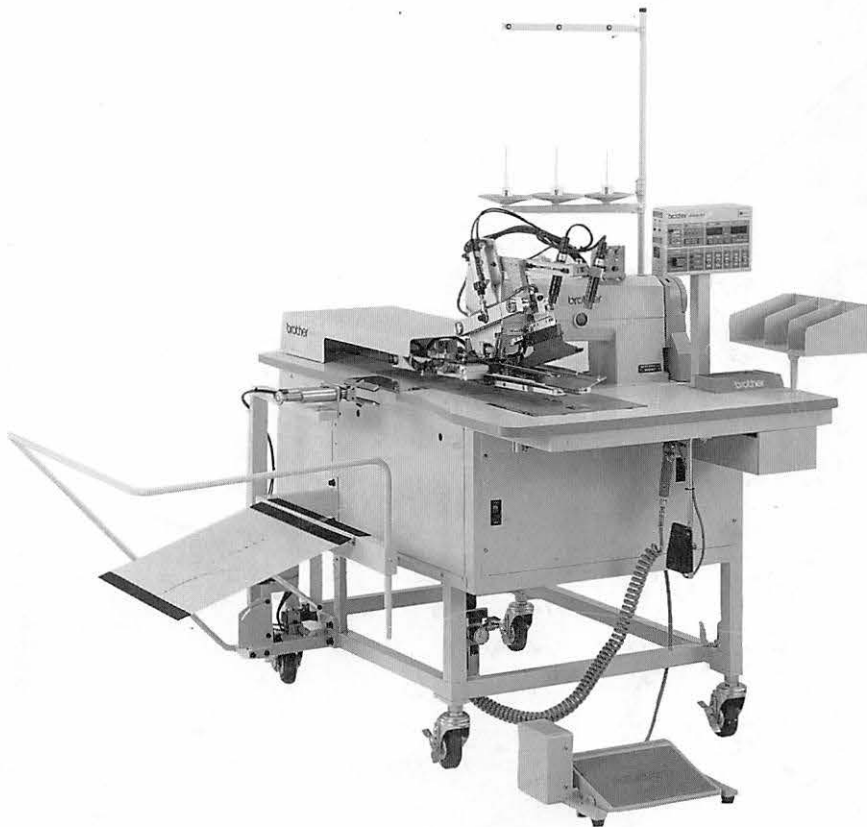
**AUTOMATIC LOCK STITCH POCKET
WELTING SEWING MACHINE FOR
FLAP ATTACHMENT**

SERVICE MANUAL

FOR

BAS-600

BAS-601



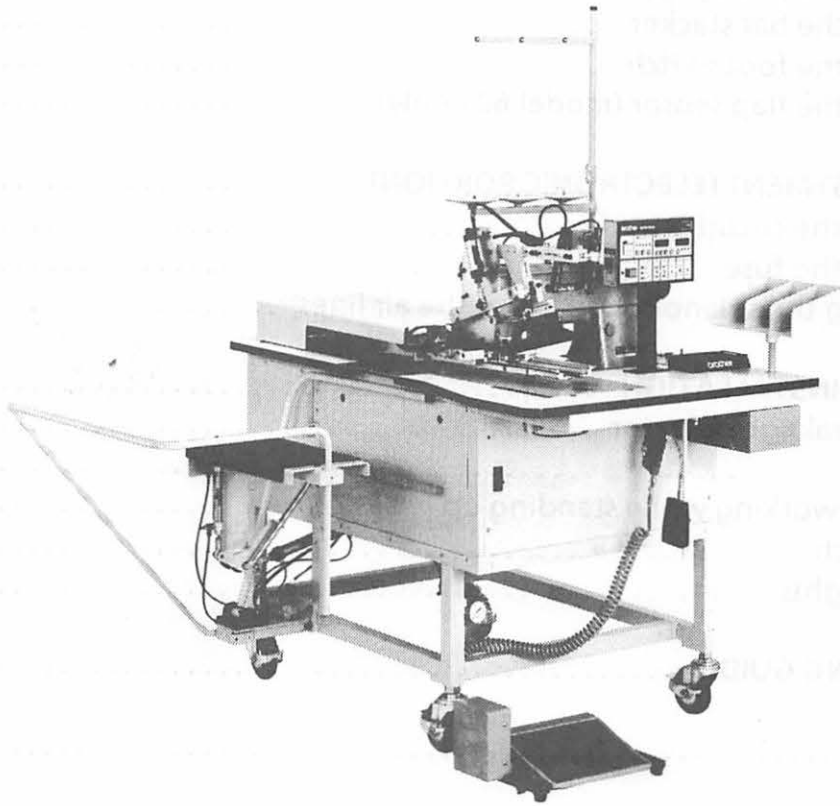
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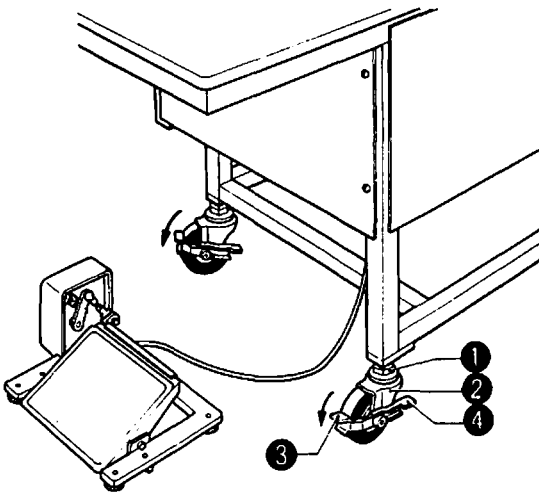
SPECIFICATIONS



Model	151-600	151-601
Machine head	LT2-B833 twin needle, lockstitch	
Sewing speed	2500 spm (variable to 2200 spm with DIP switch setting)	
Flap sewing	No	Yes
Needle	Mt x 190 #16(#16-#18)	
Gauge size	Standard 10 mm (8, 12, 14, 16, 18, 20 mm)	
Seam length	Gauge size to 14 mm 28-190 mm from 16 mm 36-190 mm ※ Flap stitch 80-180 mm	
Stitch length	Lockstitch 1.4-2.8 mm Backstitch Condensed 0.8-1.4 mm Backtack Same as lockstitch (Stitch length at sewing start is 1/2 lockstitch stitch length.) (Adjusted with DIP switch setting.)	
Thread type	Thread for automatic sewing machines (spun core #50)	
Power supply	3-phase 220V, 50/60 Hz, 500W (2 lines of 3-phase supply used)	
Dimensions	820 D x 1300 W x 1155 H mm	

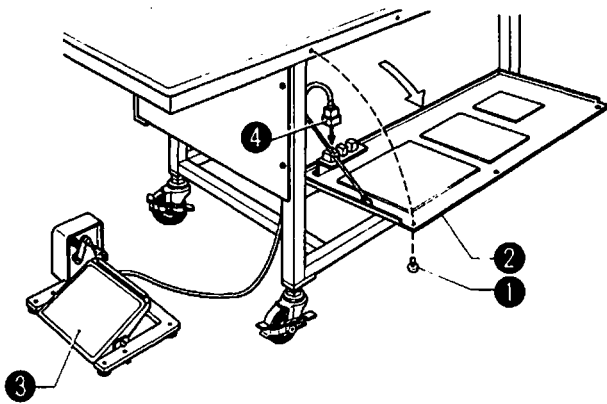
INSTALLATION

1. Setting up the table



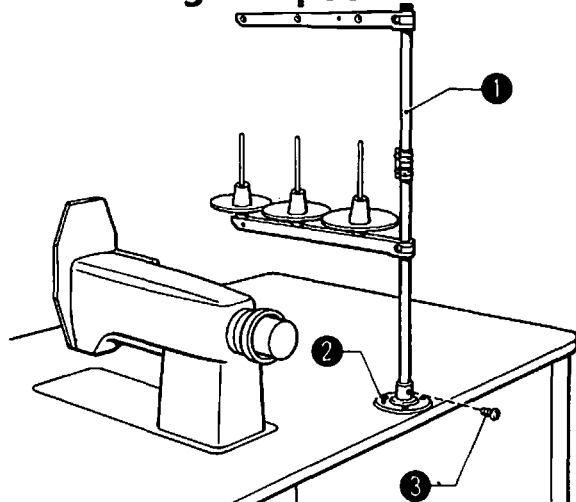
- ★ Set the machine table on a level surface. Loosen the nut ①, and turn the caster ② to adjust the height.
- ★ Lock the casters so the table will not move. Lower the lever ③ to lock the caster ②. Lower the lever ④ to move the table.

2. Installing the treadle



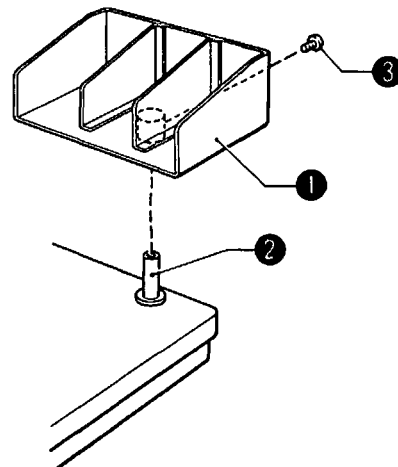
- ★ Remove the three screws ①, and open the side panel ②.
- Plug the 12P connector ④ for the treadle ③ into the side panel connector block.

3. Installing the spool stand



- ★ Set the spool stand ① onto the bracket ② and secure with the screw ③.

4. Installing the material holder

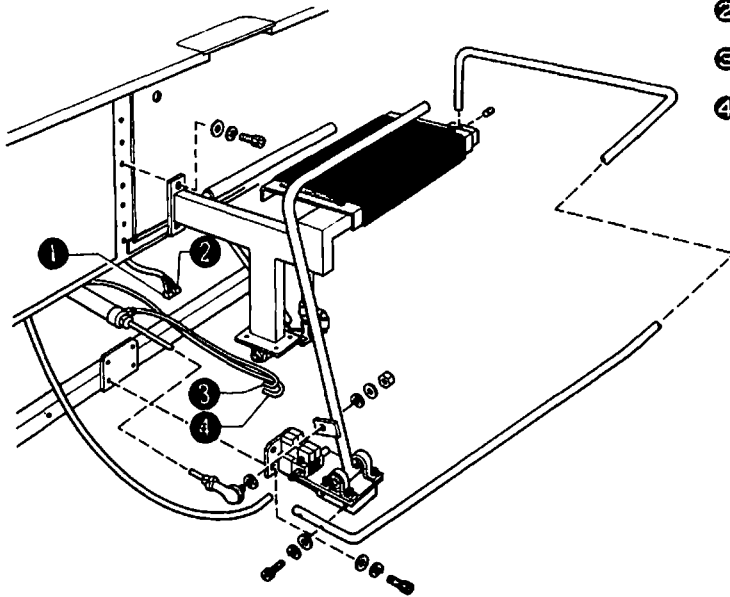


- ★ Set the material holder ① onto the stud ② and secure with the screw ③.

5. Installing the stacker

Installing the bar type stacker

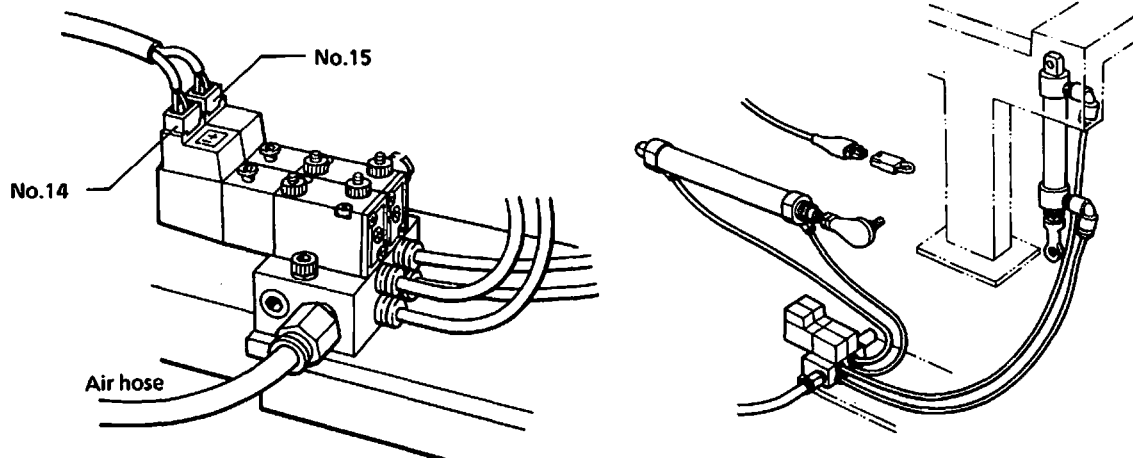
★ Refer to the figure below to install the stacker.



- ❶ Connector No.14
- ❷ Connector No.15
- ❸ Air hose
- ❹ Air hose

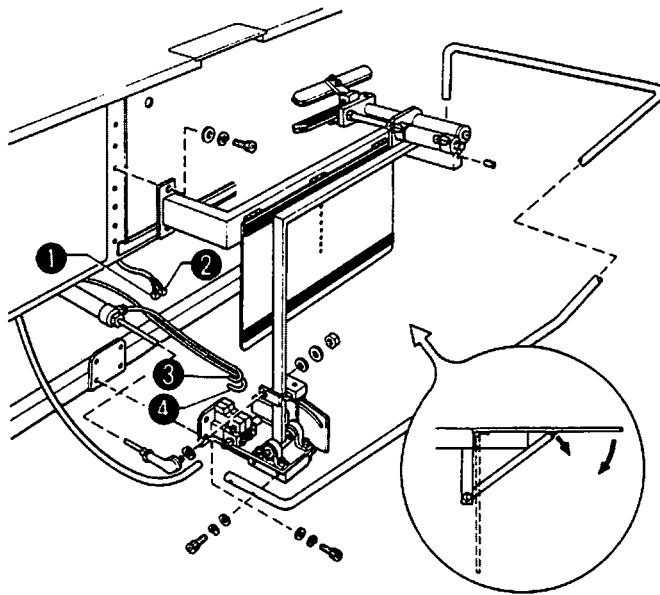
Connecting the power supply connector and the air hoses

★ Connect the connectors as numbered.



Installing the pickup type stacker

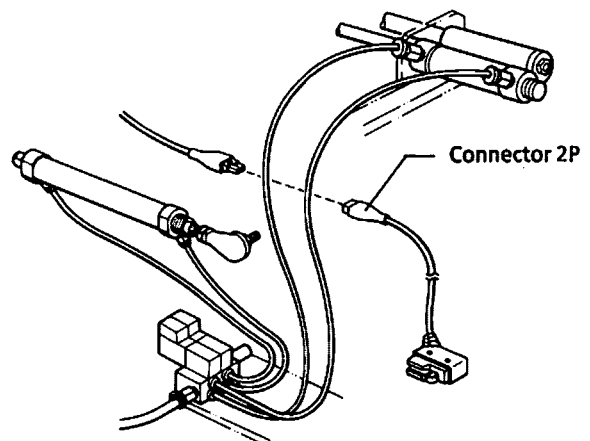
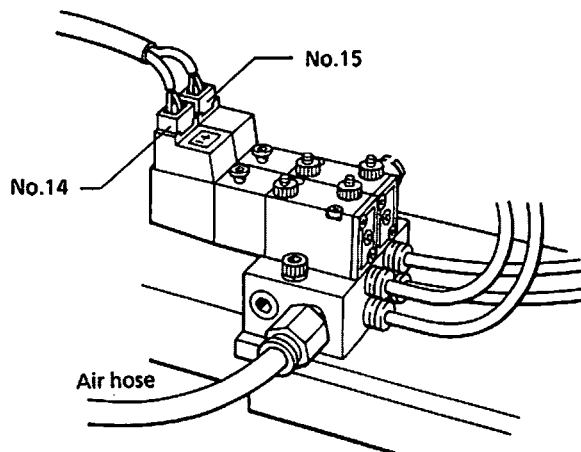
★ Refer to the figure below to install the stacker.



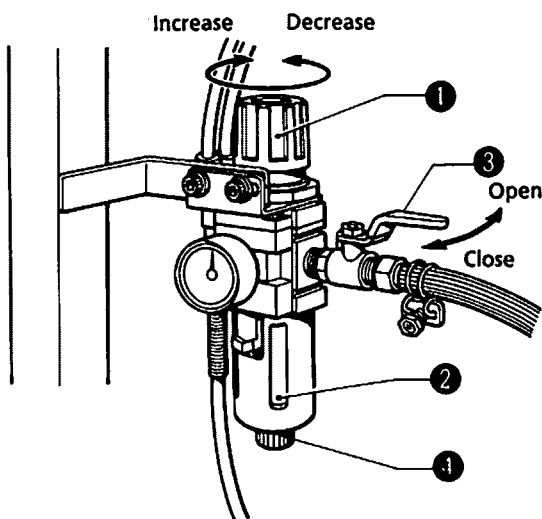
- ❶ Connector No.14
- ❷ Connector No.15
- ❸ Air hose
- ❹ Air hose

Connecting the power supply connector and the air hoses

★ Connect the connectors as numbered.



Air pressure adjustment



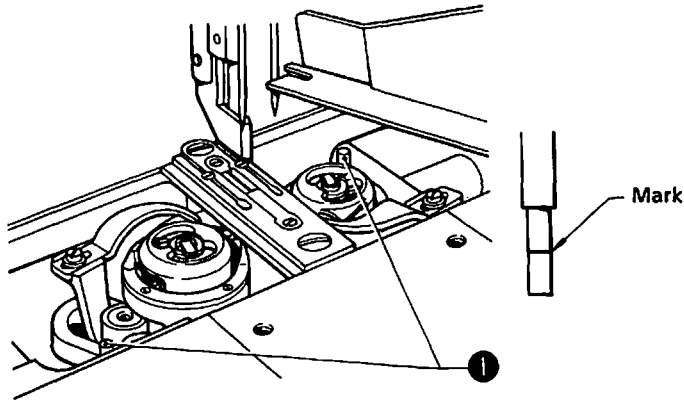
1. The standard operating air pressure is 5 kg/cm². Turn the handle ❶ to adjust the pressure.
 2. If water collects in the bottle ❷, close the air cock ❸, and turn the drain cock ❹ slowly in the direction of the arrow to drain the water.
- ※ Be sure to close the drain cock ❹ after letting the water out.

LUBRICATION

Be sure to use Brother-specified machine oil (High White #70).

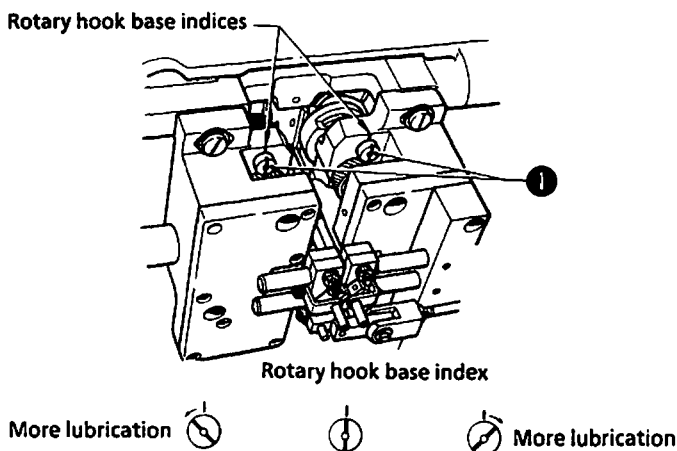
Advance the carriage feed when lubricating and adding oil to the rotary hook. (Refer to page 8.)

1. Adding oil to the rotary hook oil tank



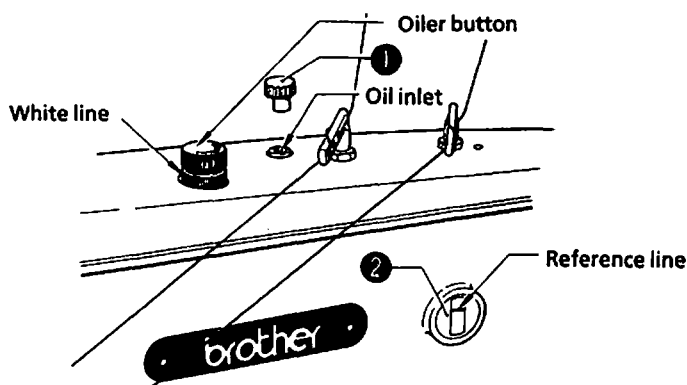
- ★ Remove the oil gauges ①, and add oil from the gauge hole until the oil reaches the full mark on the gauge.
- ★ When the oil level reaches the end of the oil gauges ①, no more oil will be supplied to the rotary hook.

2. Adjusting the rotary hook lubrication



- ★ Turn the two oil adjusting screws ① from the rotary hook base indices to adjust lubrication, as shown in the figure on the left.

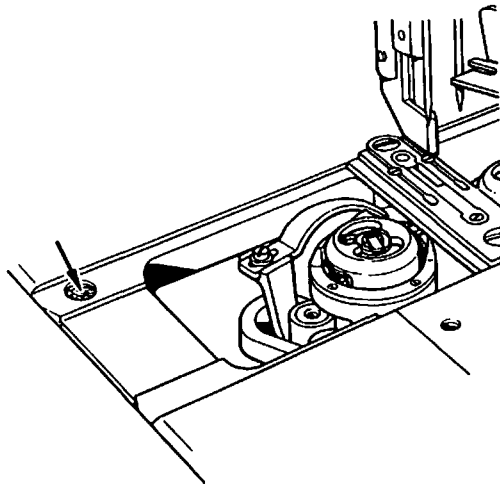
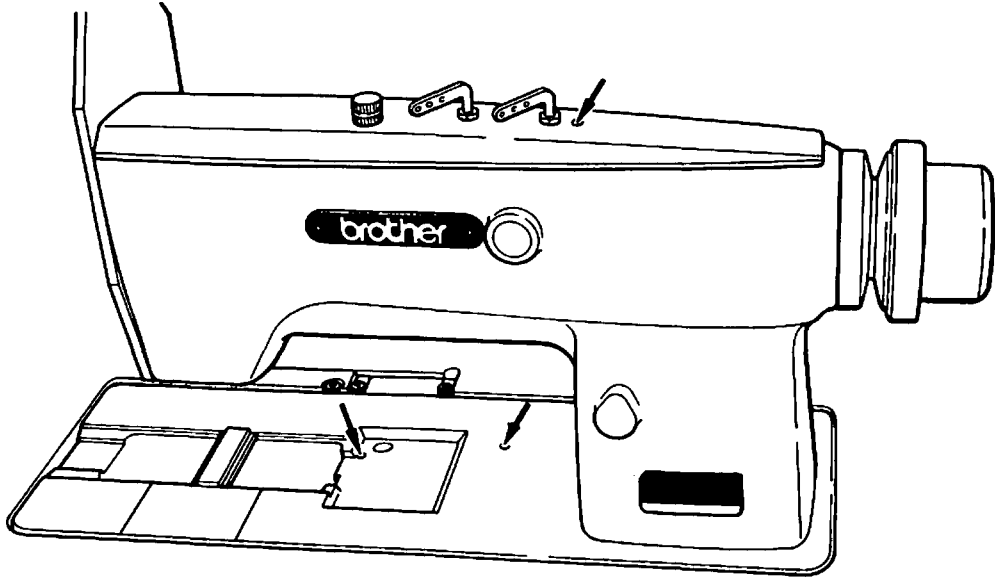
3. Filling the arm top oil tank



- ★ Remove the oil inlet cap ① and add oil until the tank is filled to the reference line on the oil gauge window ②.
- ★ Add oil if oil cannot be seen in the window.
- ★ When using the machine, push the oiler button to the white line, and turn the button in the direction of the arrow.
 - ※ Be sure to return the button to its original position when the machine is not in use.
 - ※ When starting the machine, set the oiler button ON for 5-10 minutes.

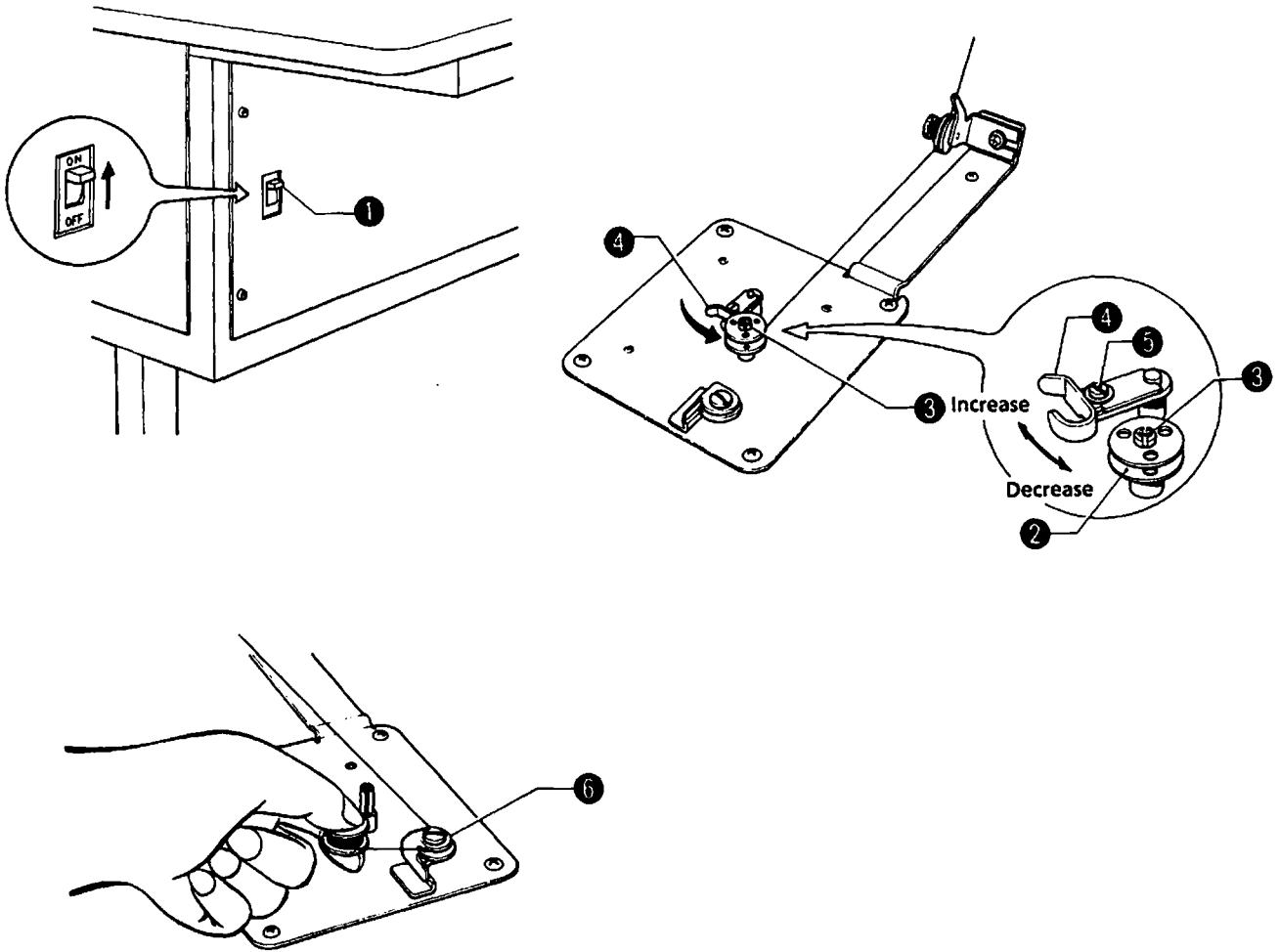
4. Regular lubrication

★ Before sewing, be sure to add a drop or two of oil at each of the points indicated by the arrows in the figure.



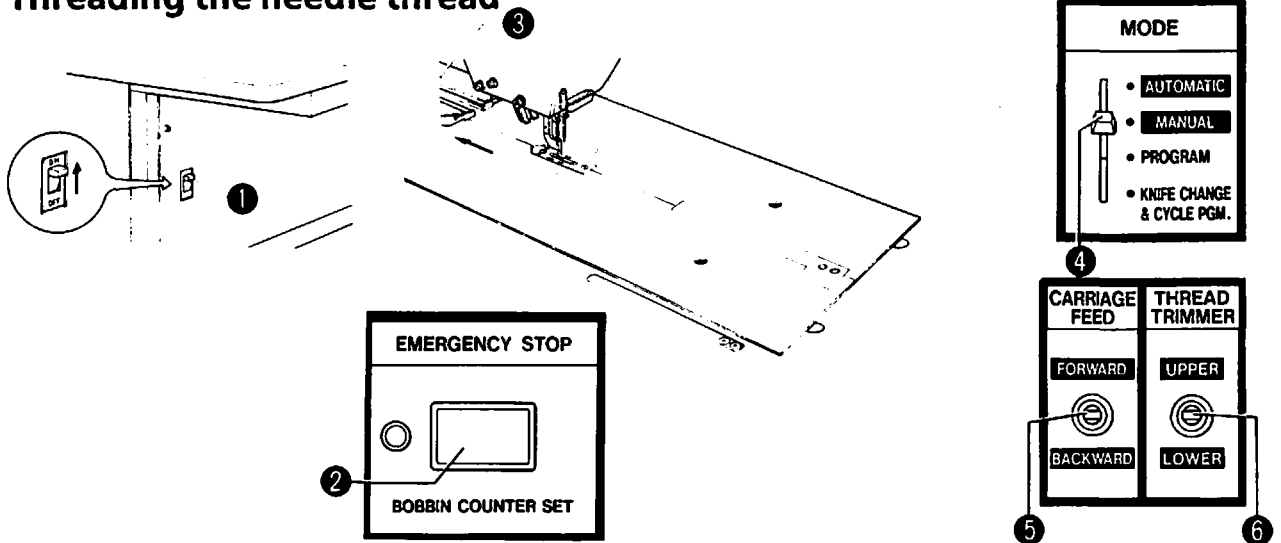
CORRECT OPERATION

1. Winding the bobbin thread



1. Set the power switch ① to ON.
2. Slide an empty bobbin ② onto the bobbin winder shaft ③.
3. Thread the thread from the spool stand as shown in the figure, and wrap the thread around the bobbin ② 5-6 times.
4. Shift the lever ④ in the direction of the arrow. The power will come on automatically, and the bobbin winder shaft ③ will begin winding the bobbin.
5. When the bobbin is full, the lever will automatically return, and the bobbin winder shaft ③ will stop.
6. To adjust the amount of thread wound onto the bobbin ②, loosen the screw ⑤ and shift the lever ④ right or left.
7. Remove the bobbin ② from the bobbin winder shaft ③, and wrap the thread onto the thread holder ⑥ to cut it.

2. Threading the needle thread



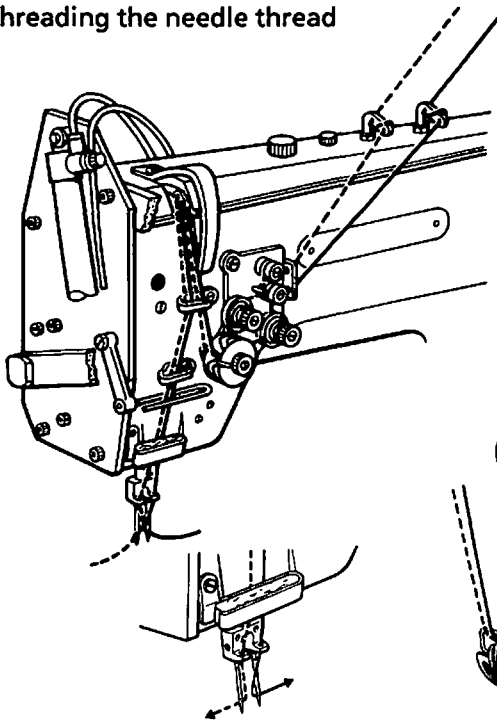
★ Threading is easier if the carriage feed advances to give more space around the needle.

Before threading

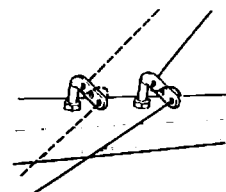
[To advance the carriage feed]

1. Set the power switch ❶ to ON. (An alarm will sound once.)
The EMERGENCY STOP indicator will blink.
2. Press EMERGENCY STOP ❷. (The alarm will sound twice.)
The carriage feed ❸ will move to its home position.
3. Set MODE ❹ to MANUAL.
4. Set CARRIAGE FEED ❺ to FORWARD to advance the carriage feed.
 - ※ While setting THREAD TRIMMER ❻ to UPPER, set CARRIAGE FEED ❺ to FORWARD to fast-forward the carriage feed to the thread trimmer position.

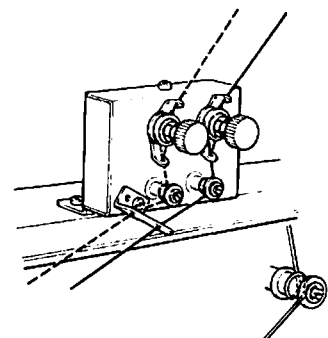
★ Threading the needle thread



Without a needle thread breakage detector

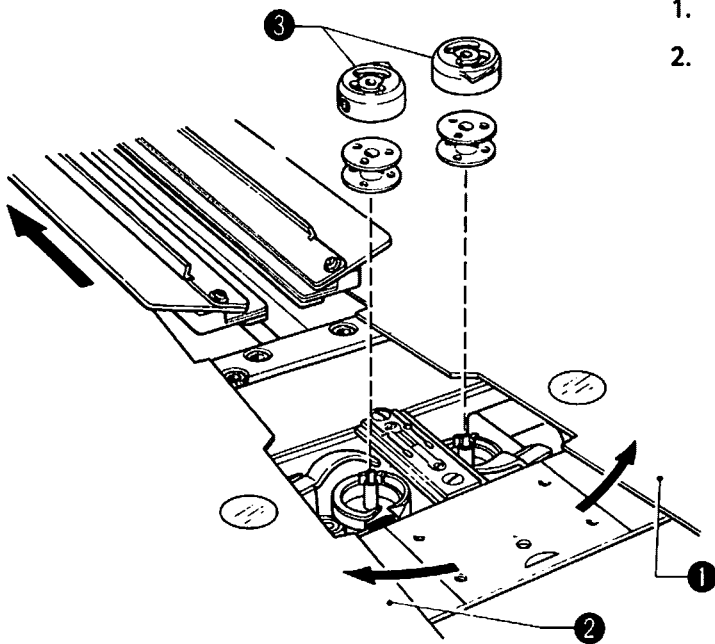


With a needle thread breakage detector



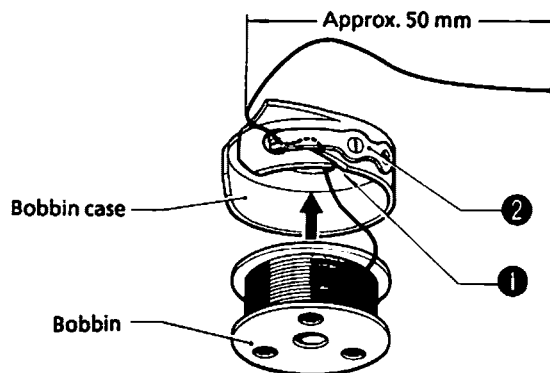
3. Threading the bobbin thread

Removing the bobbin case



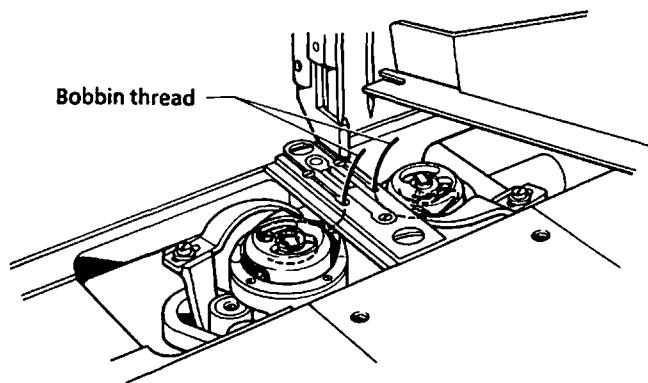
1. Open the slide plates (R) ❶ and (L) ❷.
2. Holding the corners of the bobbin cases ❸, remove the bobbin cases ❹.

Threading the bobbin case



1. Insert the bobbin into the bobbin case.
2. Pass the thread through the notch ❶ and under the tension spring ❷.
3. Pull approximately 50 mm of thread from the hole at the end of the tension spring ❷.
4. Insert the bobbin case into the rotary hook.

4. Holding the needle and bobbin threads

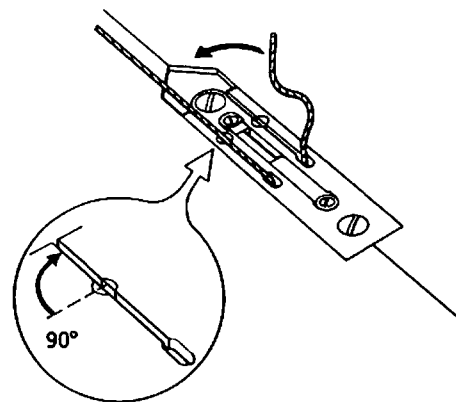
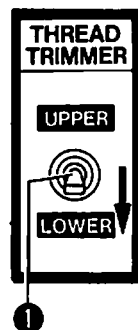
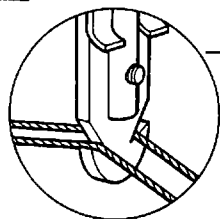
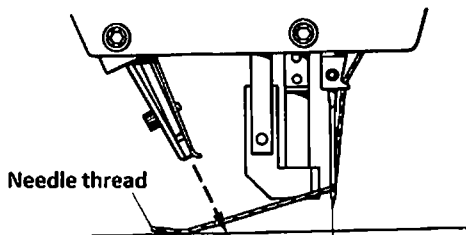


★ Insert the bobbin case (bobbin) into the rotary hook and close the rotary hook handle.

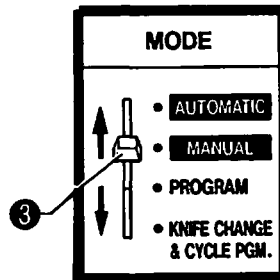
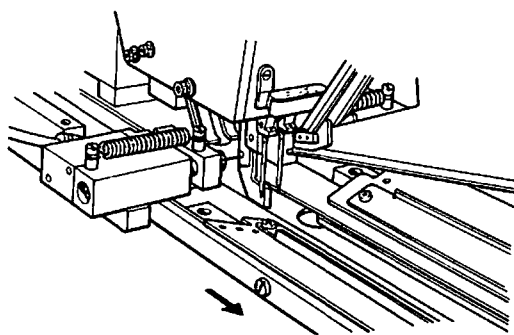
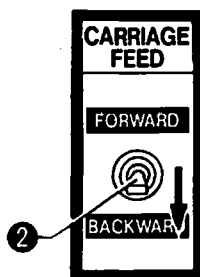
1. To bring the bobbin thread up, hold the needle thread and turn the pulley forward by hand.
2. Set **THREAD TRIMMER ①** to **UPPER** to lower the movable knife.

Note: Be careful to keep hands and other articles away from the knife when it operates.

3. Set the two needle threads on the movable knife.
4. Reset **THREAD TRIMMER ①** to raise the movable knife, and to cut and hold the needle threads.
5. Set **THREAD TRIMMER ①** to **LOWER** to turn the fixed knife 90° as shown in the figure.
6. Insert the threads into the needle plate grooves, and reset **THREAD TRIMMER ①**. The fixed knife will cut and hold the bobbin threads.



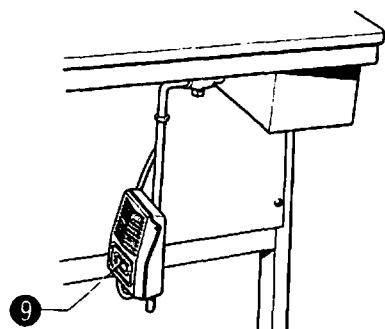
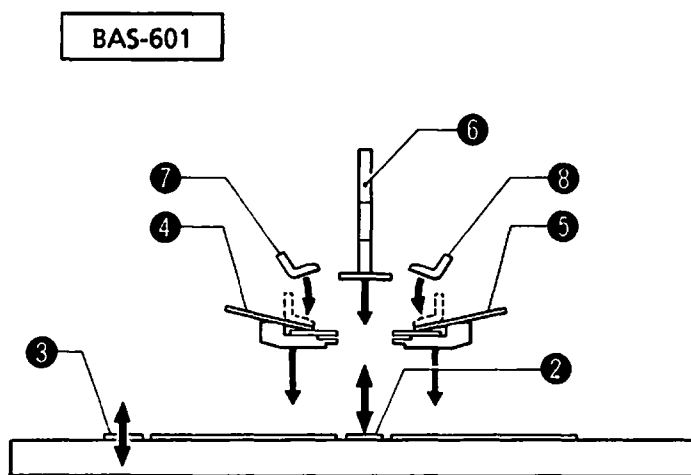
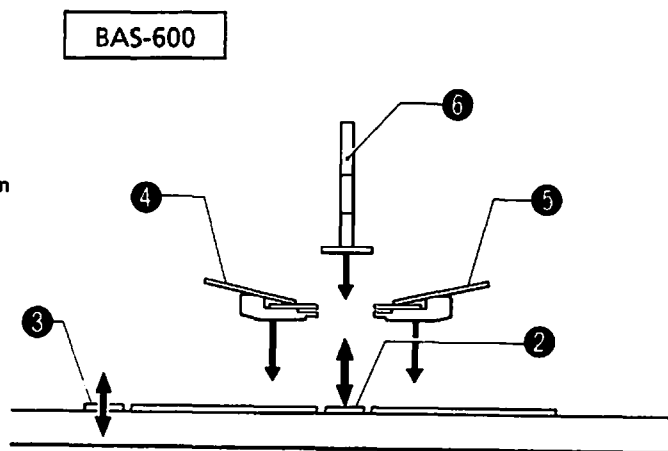
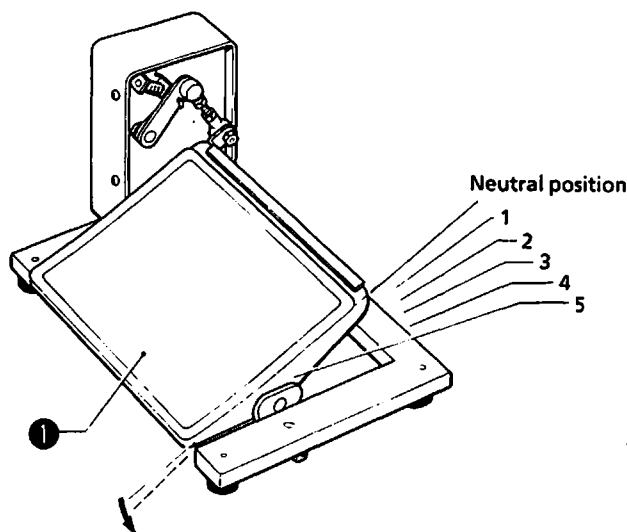
[To retract the carriage feed]



1. Close the slide plates.
2. Set **CARRIAGE FEED ②** to **BACKWARD** to retract the carriage feed.

※ If **MODE ③** is set to any position other than **MANUAL**, the carriage feed will retract to its home position quickly.

TREADLE AND START SWITCH DESCRIPTION



- ★ When running a flap sewing program, the machine will not operate when the start switch is pressed unless the flap presser is down.
- ★ During normal sewing, the machine will operate when the start switch is pressed after the folding plate operates.
- ★ Set MODE to either AUTOMATIC or MANUAL.

1. Treadle operation

1. When the treadle ❶ is pressed back, the padding cloth presser foot springs (R) ❷ and (L) ❸ will rise.
 2. When the treadle ❶ is released, the padding cloth presser foot springs (R) ❷ and (L) ❸ will descend.
 3. When the treadle ❶ is pressed to position 1, the carriage feed (L) ❹ will descend.
 4. When the treadle ❶ is pressed to position 2, the carriage feed (R) ❺ will descend.
 5. When the treadle ❶ is pressed to position 3, the binder ❻ will descend and the folding plate will operate.
 6. When the treadle ❶ is pressed to position 4, the flap presser (L) ❼ will descend.
 7. When the treadle ❶ is pressed to position 5, the flap presser (R) ❽ will descend.
 8. When the start switch ❾ is pressed, the carriage feeds will operate.
- ※ The order in which the carriage feeds and the flap pressers operate (3,4,6,7 above) can be changed by resetting the DIP switches. (Refer to page 12.)

★ The treadle can be set for 3, 4 or 5 position operation by setting the DIP switches.

	PSW-25	OFF	ON	OFF	ON
	PSW-26	OFF	OFF	ON	ON
Treadle	Position 1	Right carriage feed	Left carriage feed	Left and right carriage feeds	Left and right carriage feeds
	Position 2	Left carriage feed	Right carriage feed	Binder, Folding plate	Binder, Folding plate
	Position 3	Binder, Folding plate	Binder, Folding plate	Flap presser ①	Left and right flap pressers
	Position 4	Flap presser ①	Flap presser ①	Flap presser ②	—————
	Position 5	Flap presser ②	Flap presser ②	—————	—————

When the flap presser ① is on the left, the flap presser ② will be on the right; when the flap presser ① is on the right, the flap presser ② will be on the left.

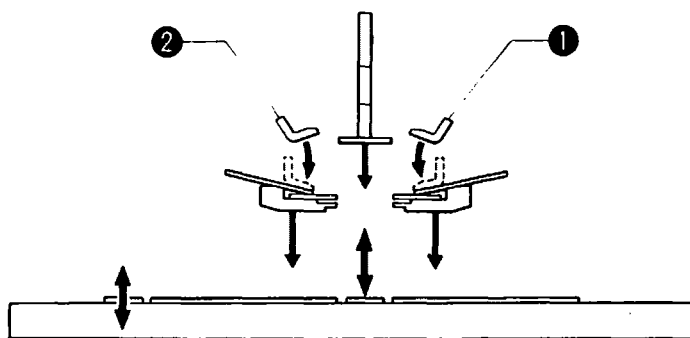
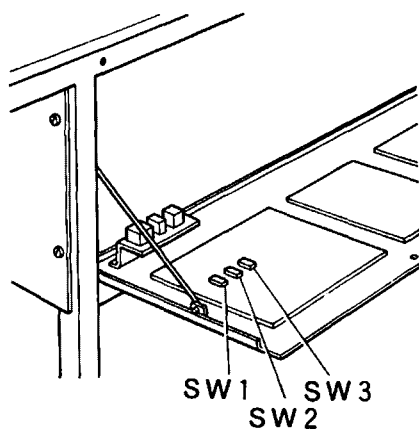
The condition of PSW-27 determines which of the flap pressers operates. Refer to the instruction manual.

S W 2

ON

sw21	22	23	24	25	26	27	28
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OFF



2. Treadle operation for operation standing up

Set DIP switch 28 to OFF to adjust the treadle for two position operation (one position forward, one backward). This makes operation and material placement easier when the operator is standing up.

1. When the treadle is pressed back, the padding cloth presser foot springs (R) and (L) will rise.
2. When the treadle is released, the padding cloth presser foot springs (R) and (L) will descend.
3. When the treadle is pressed to position 1, the carriage feed (L) will descend.
4. When the treadle is held down for another 0.5 sec., the carriage feed (R) will descend.
5. When the treadle is held down for another 1.7 sec., the binder will descend and the folding plate will operate.
6. When the treadle is held down for yet another 1.5 sec., the flap presser (L) will descend.
7. When the treadle is held down for yet another 1 sec., the flap presser (R) will descend.
8. When the start switch is pressed, the carriage feeds will operate .

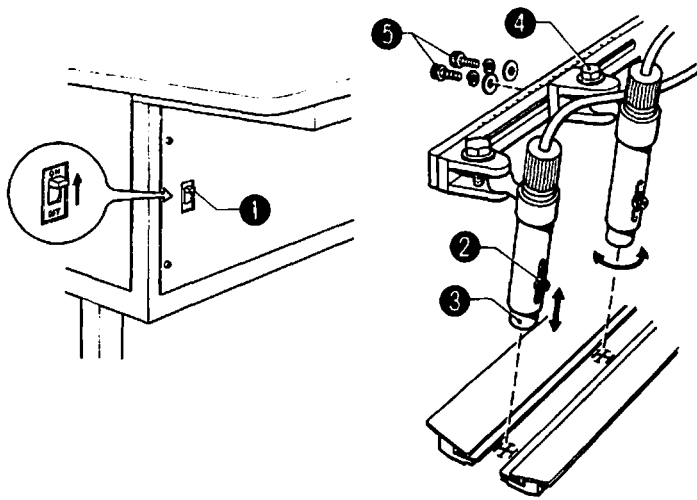
If the treadle is released after steps 3-7 above, the carriage feeds and other components will not be released, but will be held in the above positions.

To proceed to the next step, press the treadle to position 1 again. At this time, operation will begin immediately irrespective of the time the treadle is pressed.

To return to a previous step, press back the treadle. The machine will return to one step each time the treadle is pressed back.

3. Marking light

1) Adjusting the focus



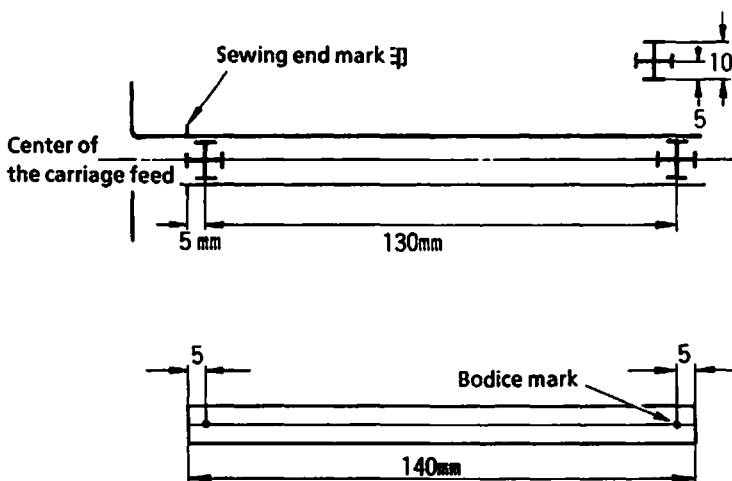
★ The marking light will come on when the power switch ① is turned on.

★ Loosen the screw ② and raise or lower the lens hood ③ to focus the [±] mark projected on the material. This [±] mark should be focused sharply.

By loosening the bolt ④, adjust the positions of the focused [±] marks properly so that one is at the sewing start and the other is at the sewing end.

※ The right-left position of the [±] mark at the sewing start is adjusted by loosening the two bolts ⑤.

2) Adjusting the marking light position



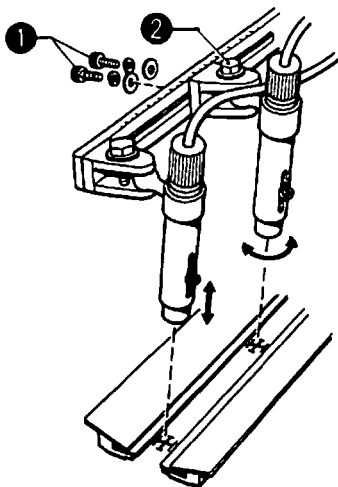
★ Loosen the bolt ① to adjust the position of the marking light as desired.

Ex. 1: When sewing start and end are determined

If the seam is 140 mm and the bodice marks are inset 5 mm each

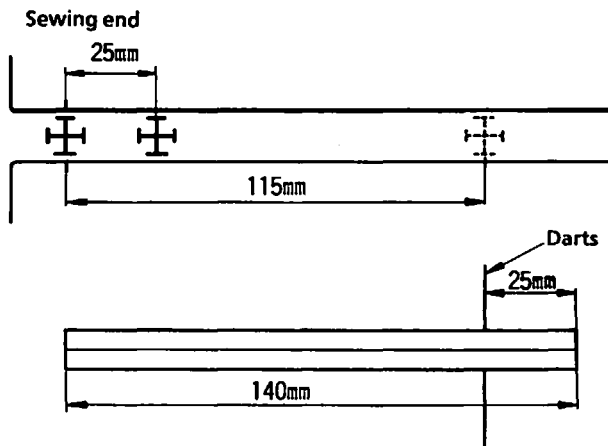
★ If the marking lights are positioned like the figure on the left and the bodice marks are aligned with the center of the [±] marks, a welt 140 mm long will be formed at the expected positions.

★ If the seam length changes, loosen the bolt ② to adjust the marking light positions.



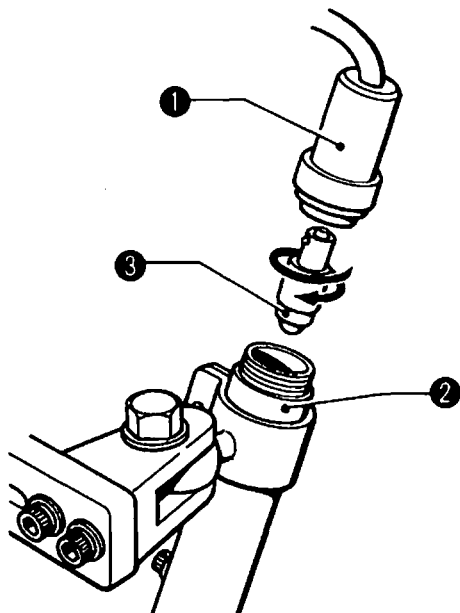
Ex. 2: When the darts are the reference

- ★ If the seam length is 140 mm, and divided 25 mm to the right and 115 mm to the left based on the darts



- ★ If the marking lights are adjusted as shown in the figure on the left, and the bodice darts are centered on the right [⊕] mark and the sewing end position on the right side of the bodice is aligned with the center of the left [⊕] mark, a welt will be sewn as shown in the figure on the left.

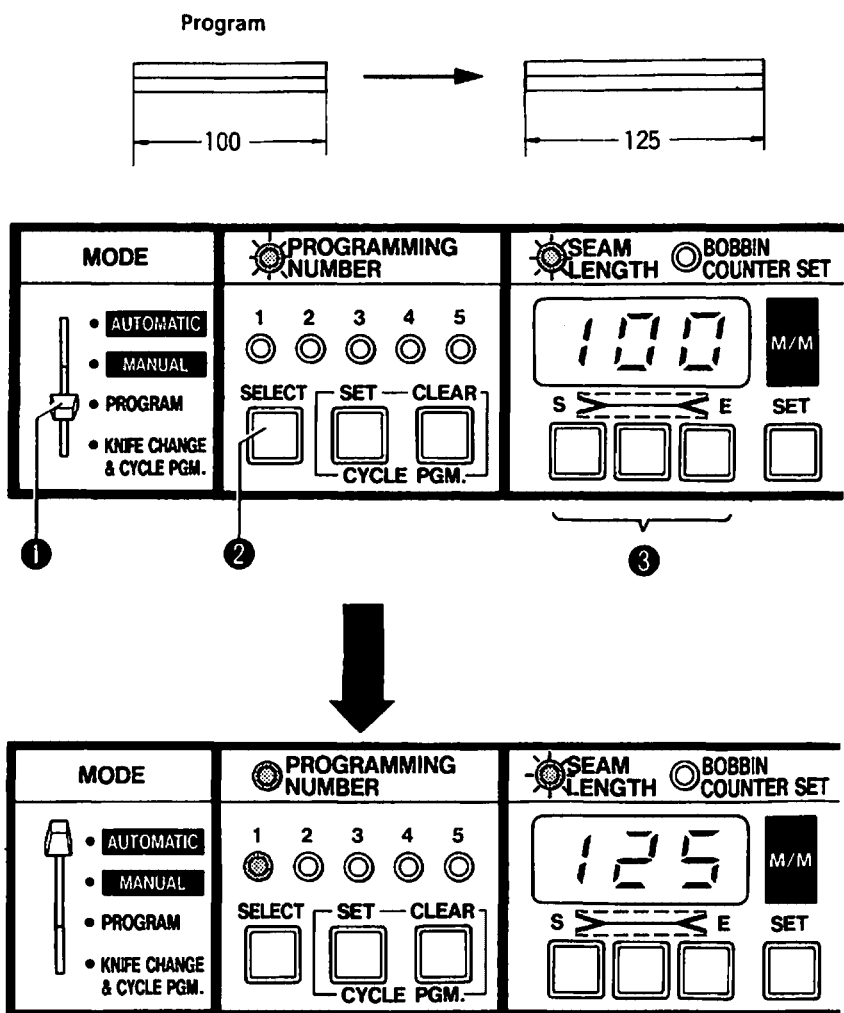
3) Replacing the marking light bulb



1. Turn the cap ❶ counterclockwise to remove it from the receptacle ❷.
2. While pressing in the light bulb ❸, turn it counterclockwise to remove it from the cap ❶. Replace the bulb ❸.
3. Reassemble by reversing steps 1. and 2.

PROGRAMMING

1. Entering a standard sewing program



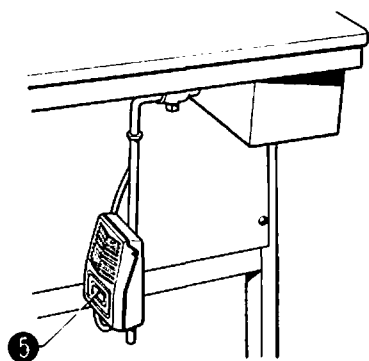
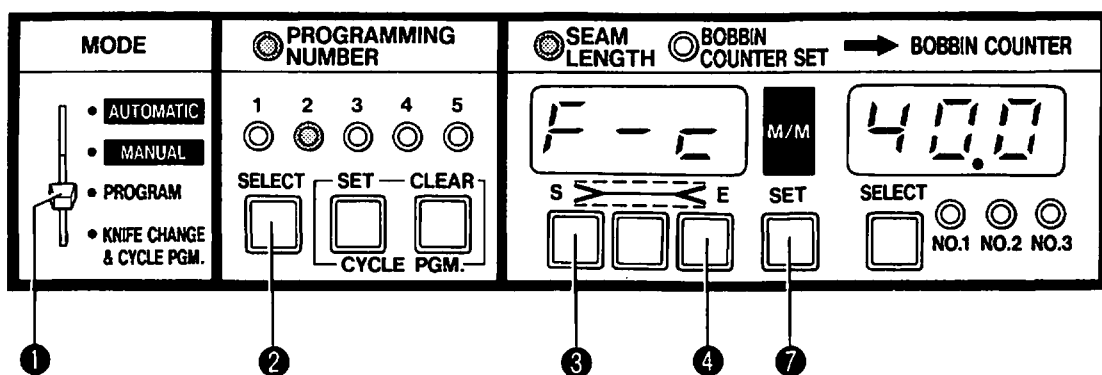
- ★ Set MODE to PROGRAM. The PROGRAMMING NUMBER and SEAM LENGTH indicators will blink.
- ★ Flap sewing is selected when "F-□" or "F-□" is displayed.

Ex. : Entering a standard sewing program

Change the seam length of programming number 1 from 100 to 125.

1. Set MODE ❶ to PROGRAM.
2. Press SELECT ❷ so that PROGRAMMING NUMBER indicator 1 lights.
3. Enter the seam length for the standard sewing program.
Press the switches ❸ to change the displayed seam length from 100 to 125.
4. Change MODE ❶ to any position other than PROGRAM.
 - ※ Changes in the program settings are stored when MODE is reset. If the power is turned off before resetting MODE, the changes will not be stored in the program.
5. Set MODE ❶ to AUTOMATIC to sew.

2. Entering a flap sewing program

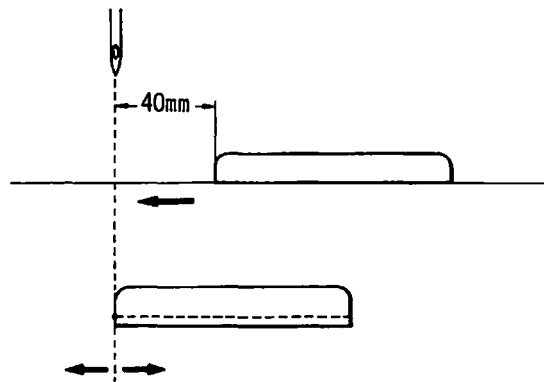
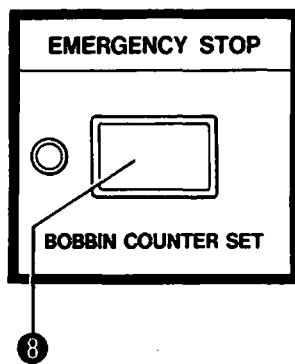


- ★ Flap sewing programming is not possible on the BAS-600.
- ★ Set MODE to PROGRAM. The PROGRAMMING NUMBER and SEAM LENGTH indicators will blink.
- ★ Flap sewing is selected when "F-□" or "F-□" is displayed.
"F-□" indicates right flap, "F-□" indicates left flap sewing.
- ★ Correct the sewing start position (correction data).

Ex. : Entering a flap sewing program

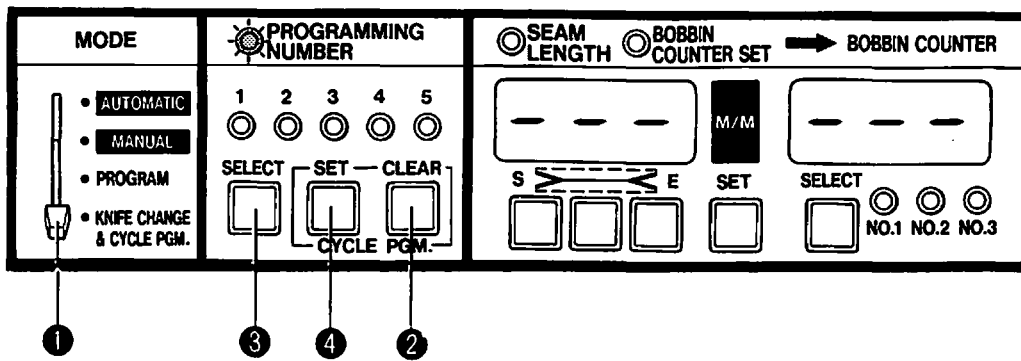
Change programming number 2 to right flap sewing, and correct the sewing start position.

1. Set MODE ① to PROGRAM.
2. Press SELECT ② so that PROGRAMMING NUMBER indicator 2 lights.
3. Select flap sewing and either right or left flap.
Press the switch ③ (100's place) to display "F".
Press the switch ④ (1's place) to display "□".
4. Set a flap.
5. Press the start switch ⑤.

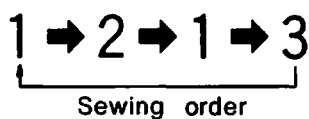


6. The flap sensor will detect the flap edge, and the carriage feed will move forward 40 mm and stop. The distance moved after material edge detection will appear in the BOBBIN COUNTER display: "40.0".
7. Set CARRIAGE FEED ⑥ to FORWARD or BACKWARD to move the carriage feed so that the flap edge is at the sewing start (needle) position. The carriage feed can move by 0.2 mm increments.
8. Press SET ⑦ after the sewing start position is located. The carriage feed will return to its home position, and the correction data shown in the BOBBIN COUNTER display will be stored. If EMERGENCY STOP ③ is pressed without pressing SET ⑦, the carriage feed will return to its home position but the correction data will not be stored.
9. Changes in the program will be stored when MODE ① is reset to any position other than PROGRAM.
 - ※ Changes in the program settings are stored when MODE ① is reset. If the power is turned off before resetting MODE, the seam length will not be changed.
 - ※ If the only change to be made is the right or left flap selection, steps 4-8 can be skipped.

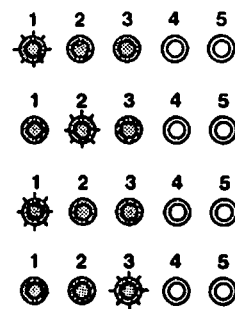
3. Entering a cycle sewing program



Cycle sewn repeatedly



⊙ Program number



- ★ CYCLE PGM allows up to six selections from any of program numbers 1-5 to be combined in any order.
- ★ See the preceding pages to set a standard or flap sewing program in program numbers 1-5.

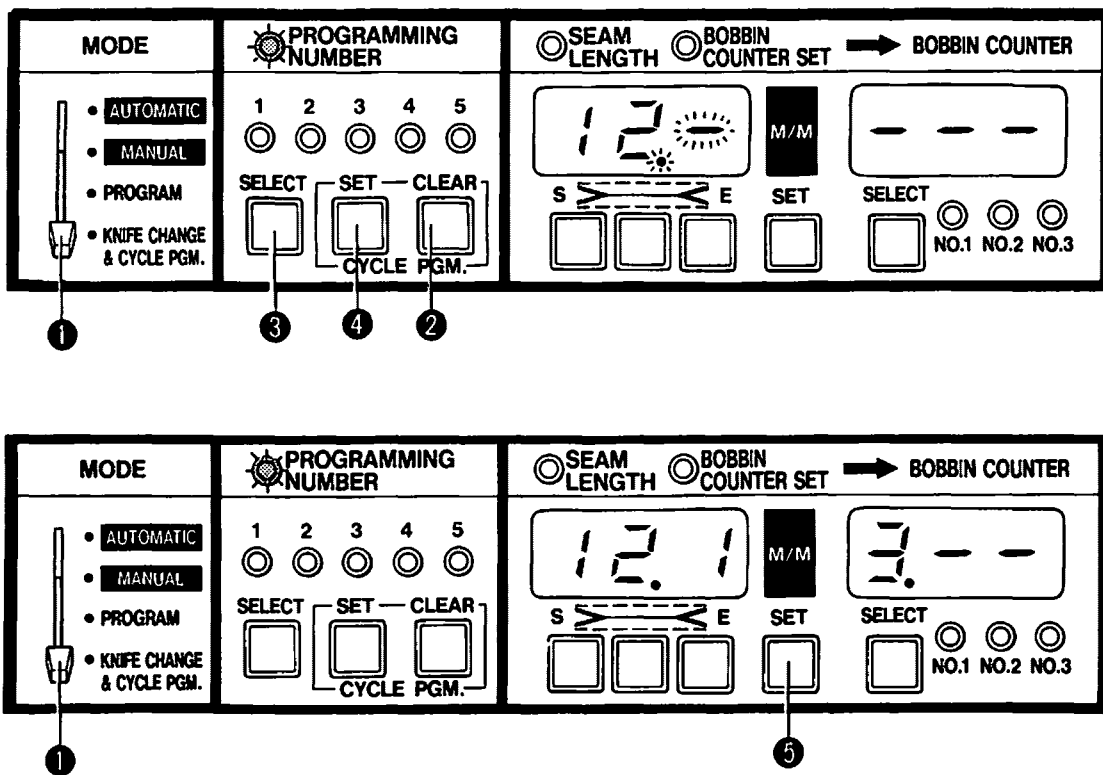
Ex. : Entering a cycle sewing program

Set a 1→2→1→3 sewing cycle.

1. Set MODE ① to KNIFE CHANGE & CYCLE PGM.
 2. Press CYCLE PGM. CLEAR ②.
 3. Press SELECT ③ to select program number 1.
 4. Press CYCLE PGM. SET ④ to store program number 1.
 5. Press SELECT ③ to select program number 2.
 6. Press CYCLE PGM. SET ④ to store program number 2.
 7. Press SELECT ③ to select program number 1.
 8. Press CYCLE PGM. SET ④ to store program number 1.
 9. Press SELECT ③ to select program number 3.
 10. Press CYCLE PGM. SET ④ to store program number 3.
 11. Reset MODE ① to any position other than KNIFE CHANGE & CYCLE PGM.
- ⊙ If stacker operation is not programmed, it will be automatically programmed after the last program number (3 above).
 - ✘ The changes in the sewing cycle are stored when MODE ① is reset. No changes in the sewing cycle will be stored if the power is turned off without resetting MODE.
 - ✘ If a mistake is made in the order, press CLEAR ② and reprogram from the beginning.

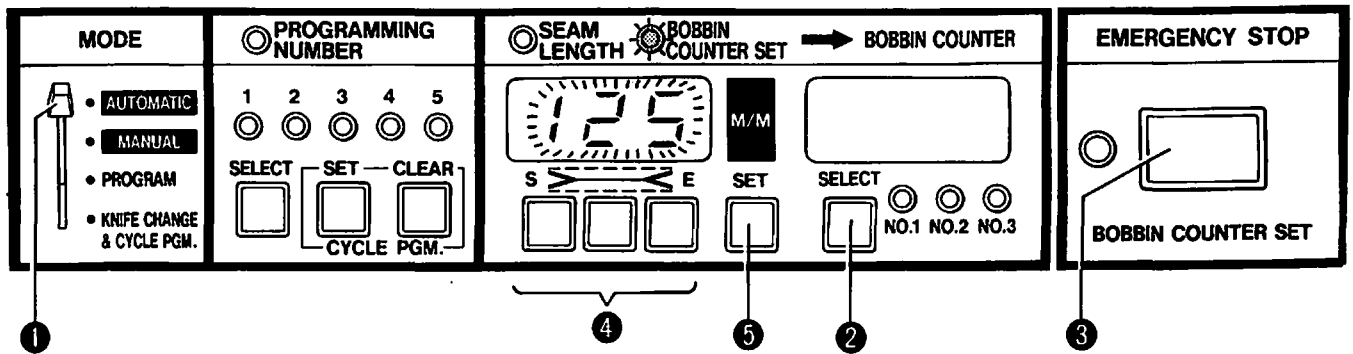
4. Operating the stacker during cycle sewing

★ Program the following cycle: program #1→2→stacker operation→1→3→stacker operation.



1. Set MODE ❶ to KNIFE CHANGE & CYCLE PGM.
2. Press CYCLE PGM. CLEAR ❷.
3. Press SELECT ❸ to select program number 1.
4. Press CYCLE PGM. SET ❹ to store program number 1.
5. Press SELECT ❸ to select program number 2.
6. Press CYCLE PGM. SET ❹ to store program number 2.
7. Press BOBBIN COUNTER SET ❺. A period "." will be displayed to store stacker operation in the program cycle.
 - ※ The stacker does not operate while the period "." is blinking.
8. Press SELECT ❸ to select program number 1.
9. Press CYCLE PGM. SET ❹ to store program number 1.
10. Press SELECT ❸ to select program number 3.
11. Press CYCLE PGM. SET ❹ to store program number 3.
12. Press BOBBIN COUNTER SET ❺. A period "." will be displayed to store stacker operation in the program cycle.
13. Reset MODE ❶ to any position other than KNIFE CHANGE & CYCLE PGM.
 - ※ Changing the MODE ❶ stores the order of the sewing cycle. No changes in the sewing cycle will be stored if the power is turned off without resetting MODE.
 - ※ If a mistake is made in the order, press CLEAR ❷ and reprogram from the beginning.

5. Setting the bobbin counter

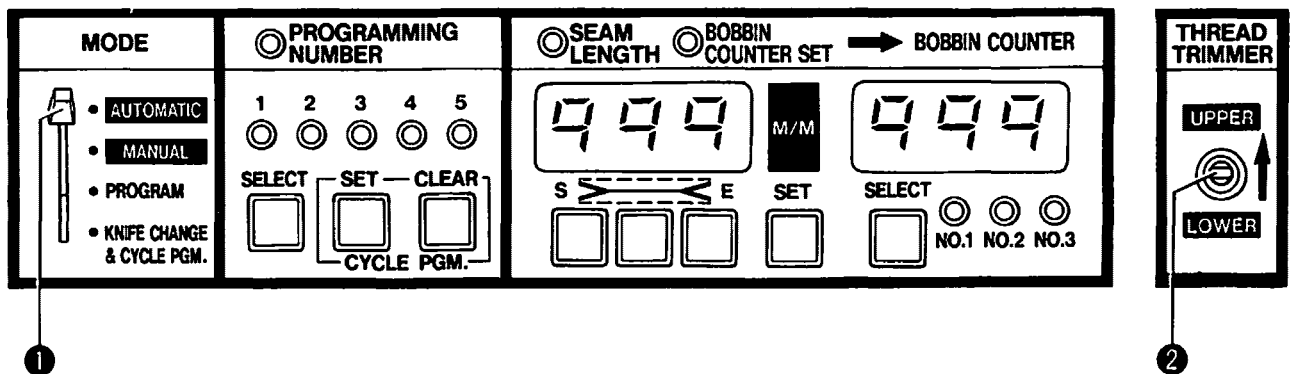


1. Set MODE ① to AUTOMATIC.
2. Press SELECT ② to select the bobbin number 1-3.
3. Press BOBBIN COUNTER SET ③. The BOBBIN COUNTER SET indicator will blink. The latest set number for the bobbin will be shown in the BOBBIN COUNTER SET display.
4. Use the switches ④ to change the setting.
5. Press SET ⑤ when the changes are completed or if no changes are made. (The number shown in the BOBBIN COUNTER SET display will appear in the BOBBIN COUNTER display.) The BOBBIN COUNTER SET indicator will go out.

Seam length / Thread type	50 mm	100 mm	150 mm
Spun core #50	500 pcs.	340 pcs.	260 pcs.

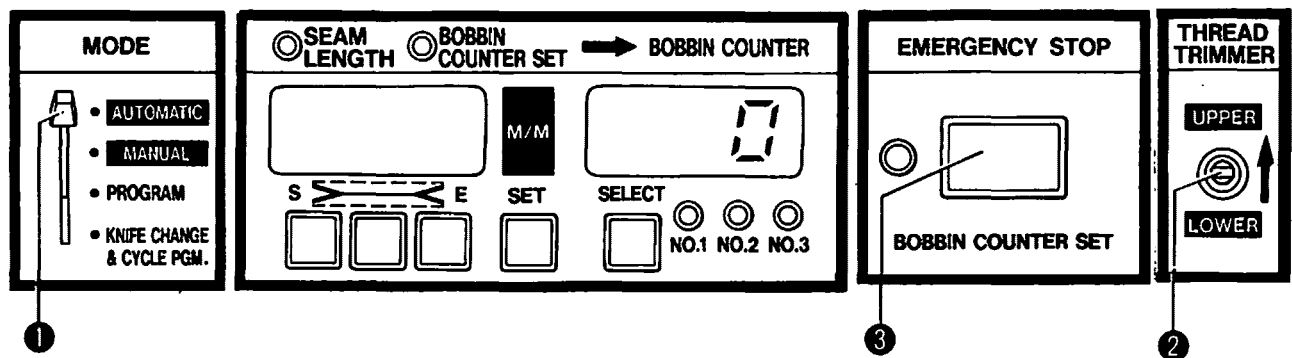
※ Refer to the table on the left for the numbers to be entered for BOBBIN COUNTER.

6. Checking the number of work pieces



1. Set MODE ❶ to AUTOMATIC.
2. Press THREAD TRIMMER ❷ to UPPER.
The counter will increase by one each time a piece is completed. From 0 to 999, 999 work pieces can be counted.

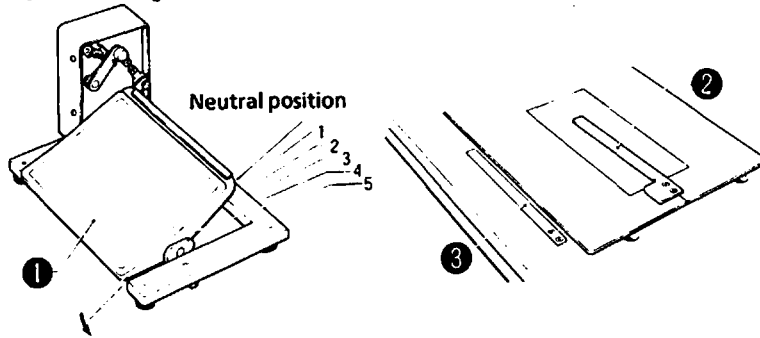
7. Clearing the work piece counter



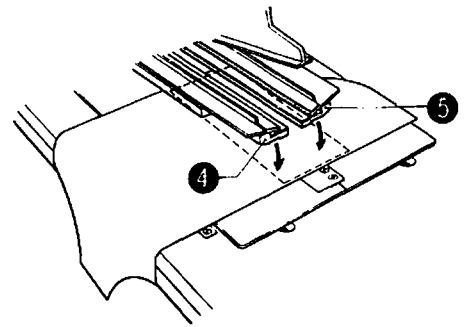
1. Set MODE ❶ to AUTOMATIC.
2. With THREAD TRIMMER ❷ set to UPPER, press BOBBIN COUNTER SET ❸. The counter will be set to 0.

8. Setting the material

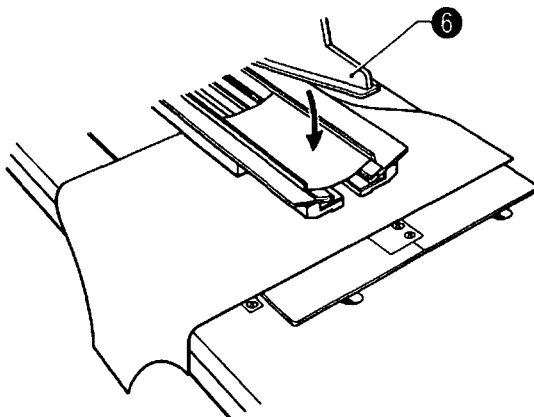
1. Padding cloth presserfoot



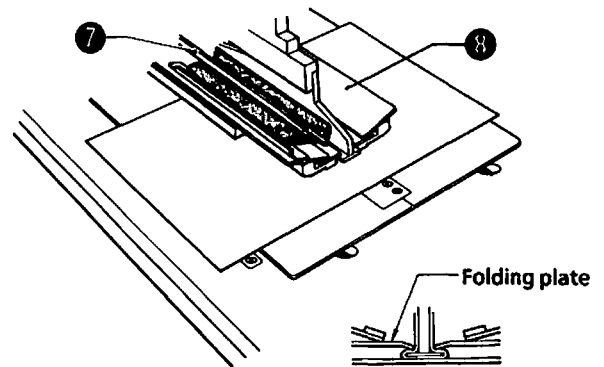
2. Bodice



3. Welt material



4. Flap



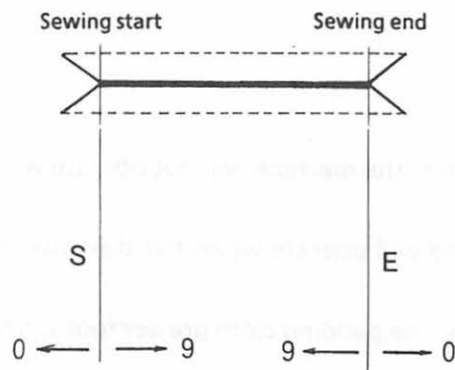
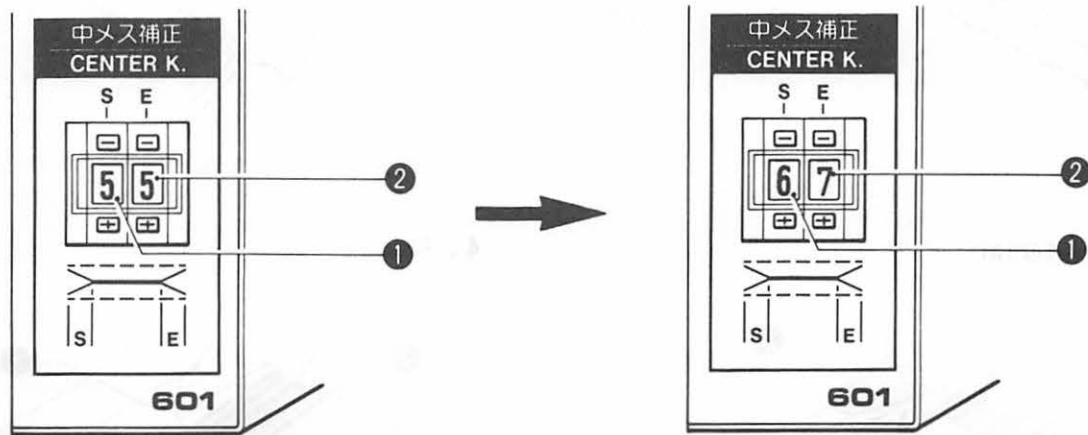
★ When running a flap sewing program, the machine will not operate when the start switch is pressed unless the flap presser is down.

★ During normal sewing, the machine will operate when the start switch is pressed after the folding plate operates.

1. When the treadle ① is pressed back, the padding cloth presser foot springs (R) ② and (L) ③ will rise.
2. Set the padding (or material) in place.
3. When the treadle ① is released, the padding cloth presser foot springs (R) ② and (L) ③ will descend to secure the padding.
※ If the padding is sewn to the material already, steps 1-3 are unnecessary.
4. Set the bodice in place.
5. When the treadle ① is pressed to position 1, the carriage feed (L) ④ will descend.
6. When the treadle ① is pressed to position 2, the carriage feed (R) ⑤ will descend.
7. Set the welt in place.
8. When the treadle ① is pressed to position 3, the binder ⑥ will descend and the folding plate will operate. (The binder ⑥ will descend to hold the welt, then the welt will be folded.)
※ The folding plate will operate 0.25-0.35 sec. after the binder ⑥ descends.
9. Set either the right or the left flap.
10. When the treadle ① is pressed to position 4, the flap presser (L) ⑦ will descend.
11. When the treadle ① is pressed to position 5, the flap presser (R) ⑧ will descend.
12. This completes material setting.

ADJUSTMENT

1. Adjusting the center knife position

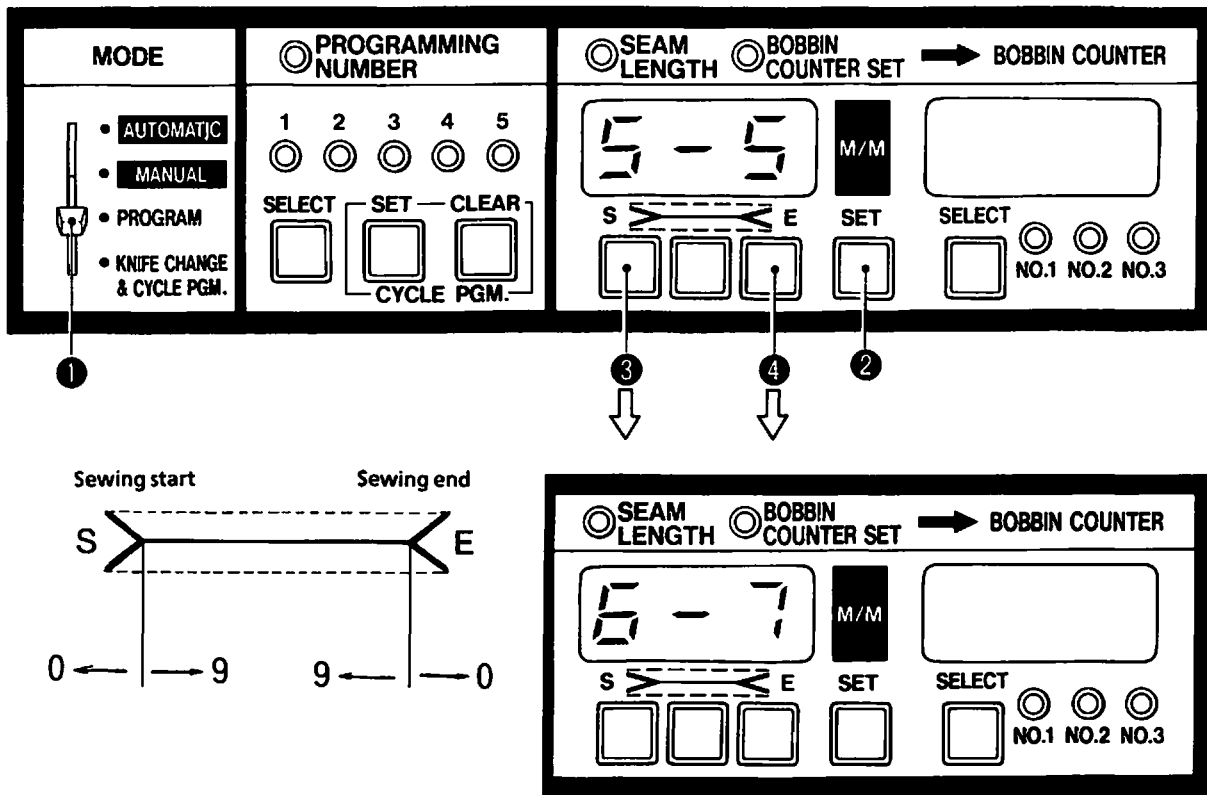


- ★ The center knife position adjustment should be done according to material thickness.
The higher the number of the center knife position, the farther inside the center knife is positioned.

Ex. : Change the sewing start "S" value from 5 to 6, and the sewing end "E" value from 5 to 7.

1. Press the switch ① for the sewing start "S" position to change the 5 to 6.
 2. Press the switch ② for the sewing end "E" position to change the 5 to 7.
- ※ The above change made before sewing start is effective in any mode.
 - ※ The center knife moves approximately 0.36 mm when the correction value changes by one.

2. Adjusting the corner knife position



- ★ The corner knife position adjustment should be done according to material thickness.
The higher the number of the corner knife position, the farther inside the corner knife is positioned.

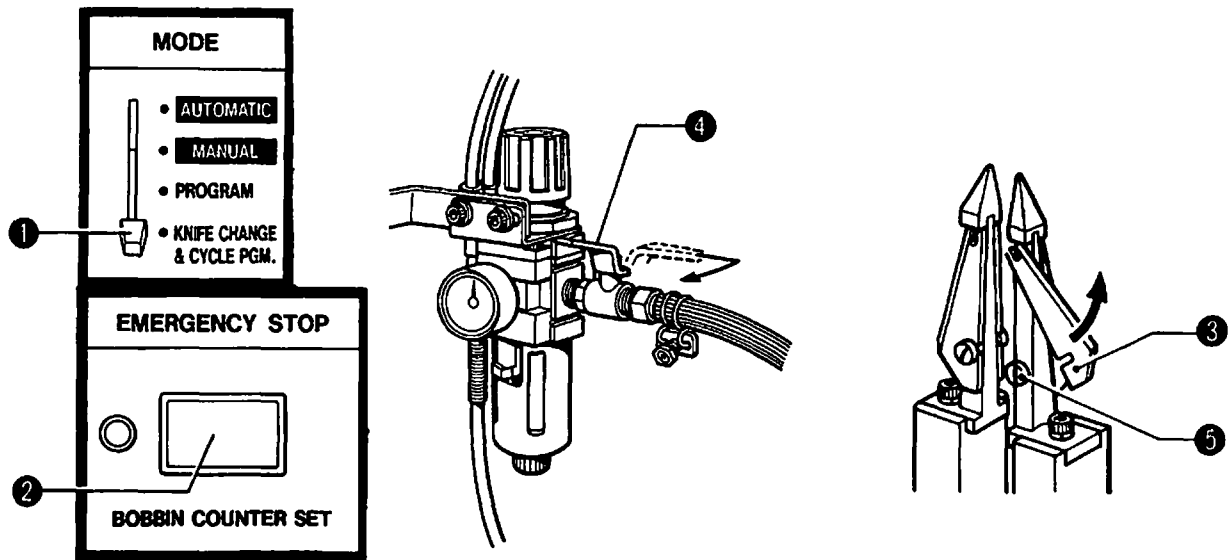
Ex. : Change the sewing start "S" value from 5 to 6, and the sewing end "E" value from 5 to 7.

1. Set MODE ❶ to PROGRAM.
 2. Press SET ❷.
The corner knife position will be shown in the display.
 3. Press SEAM LENGTH ❸ to display a 6.
 4. Press SEAM LENGTH ❹ to display a 7.
 5. Corner knife correction data will be stored when SET ❷ is pressed or when MODE ❶ is reset to any position other than PROGRAM.
If the power is turned off without pressing SET ❷ or resetting MODE ❶, the correction data will not be stored.
- ※ The corner knife will not operate when the center knife switch is OFF (even if the corner knife switch is ON).
 - ※ The corner knife moves approximately 0.3 mm when the correction value changes by one.

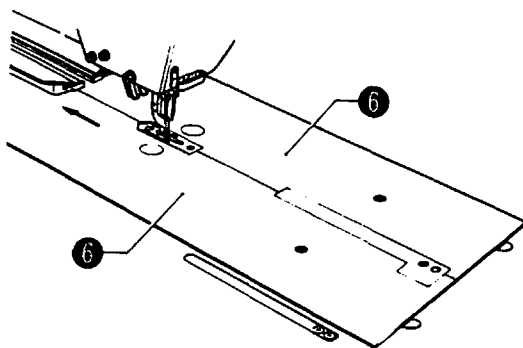
DISASSEMBLY

Preparations for disassembly

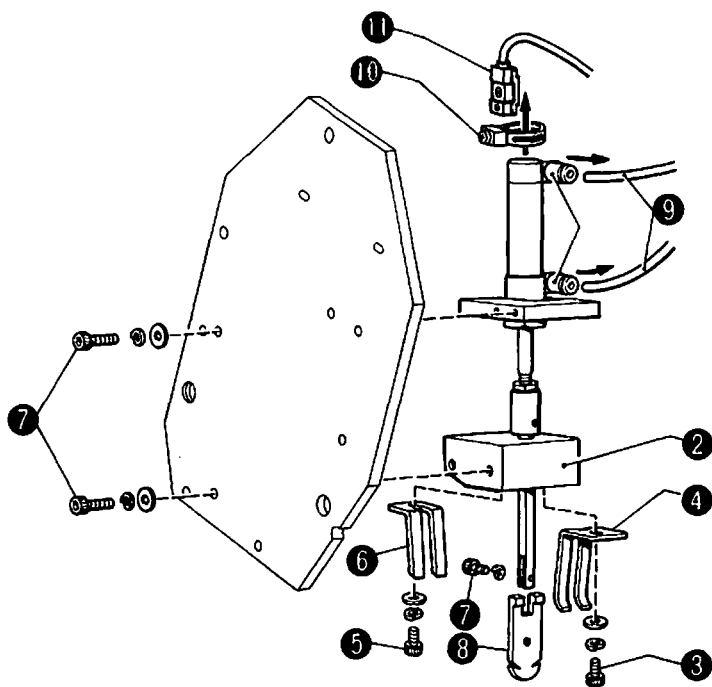
[Removing the corner knife]



1. Set MODE ① to KNIFE CHANGE & CYCLE PGM.
2. Press EMERGENCY STOP ②.
An alarm will sound once, and the carriage feed will move to the knife replacement position.
The alarm will sound again when the carriage feed stops.
3. Press EMERGENCY STOP ②.
The alarm will sound twice, the carriage feed and the flap presser will descend, and the corner knife ③ will rise above the table.
※ Keep your hands away from the knife.
"AIR OFF" will be displayed.
4. Turn the air cock ④ to stop the air supply. (Bleed the air.)
5. Loosen the screw ⑤ and replace the corner knife ③.
6. Remove the right and left slide plates ⑥.

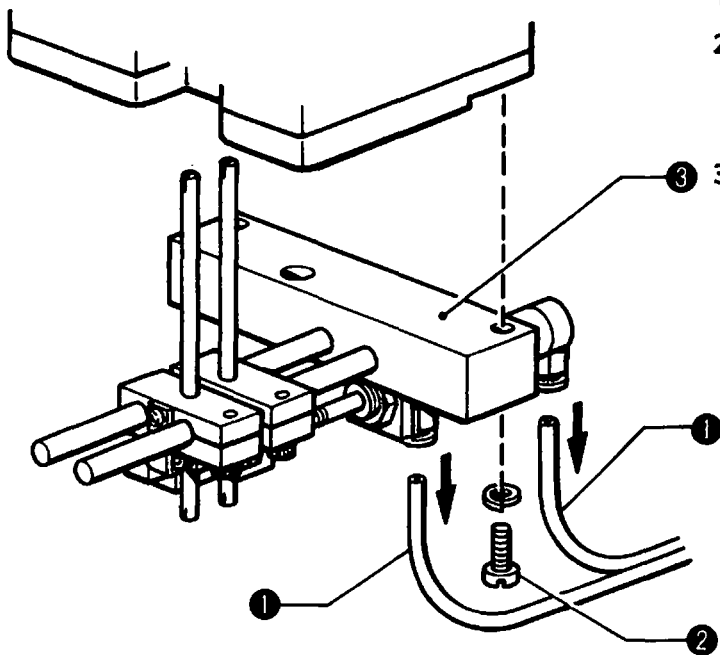


Movable knife assembly



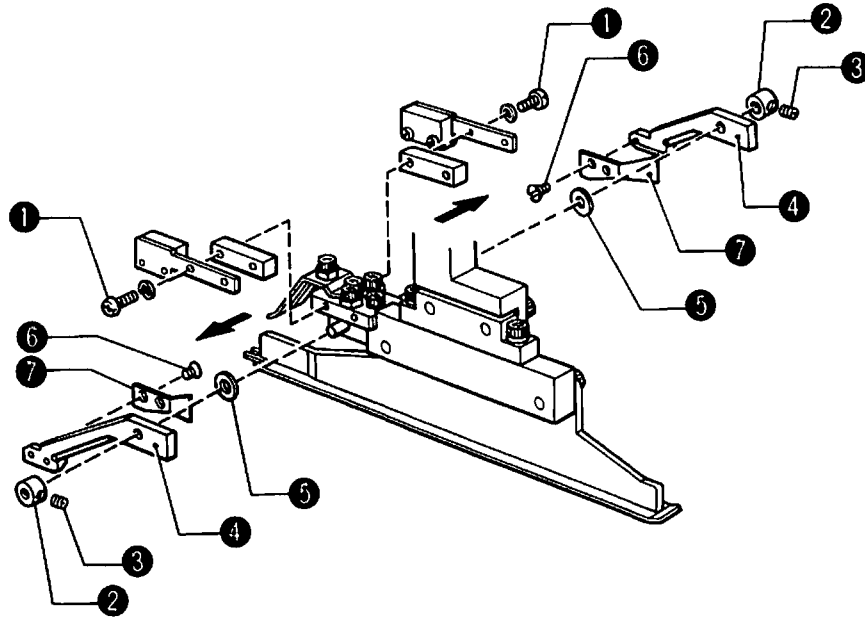
1. Remove the four bolts ① to remove the spring washer, the washer and the movable knife assembly ②.
2. Remove the bolt ⑤, the washer, the spring washer and the spring ④.
3. Remove the bolt ⑤, the washer, the spring washer and the fixed knife ⑥.
4. Remove the bolt ⑦, the spring washer and the movable knife ③.
5. Disconnect the two air hoses ①.
 ※ Mark the hoses with tape to remember which goes where for reassembly.
6. Loosen the screw in the bracket ⑩, and remove the cylinder sensor ⑪ upward.

Fixed knife assembly



1. Tilt the machine head until it stops.
2. Disconnect the two air hoses ①.
 ※ Mark the hoses with tape to remember which goes where for reassembly.
3. Remove the two screws ②, the spring washer and the fixed knife bracket ③.

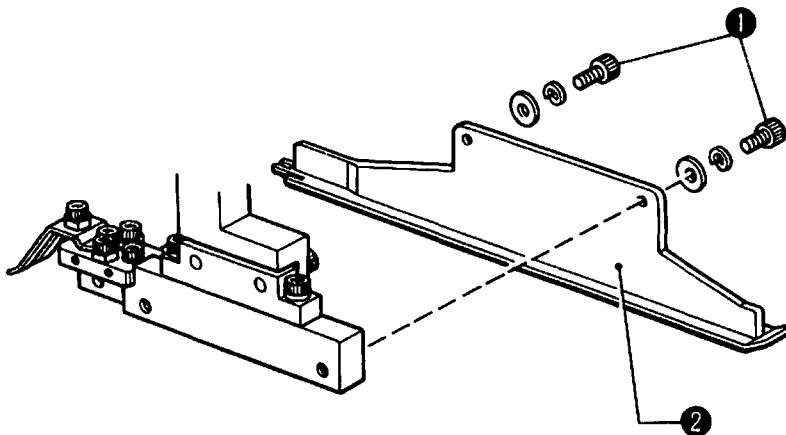
1. Removing the cloth guide (left)



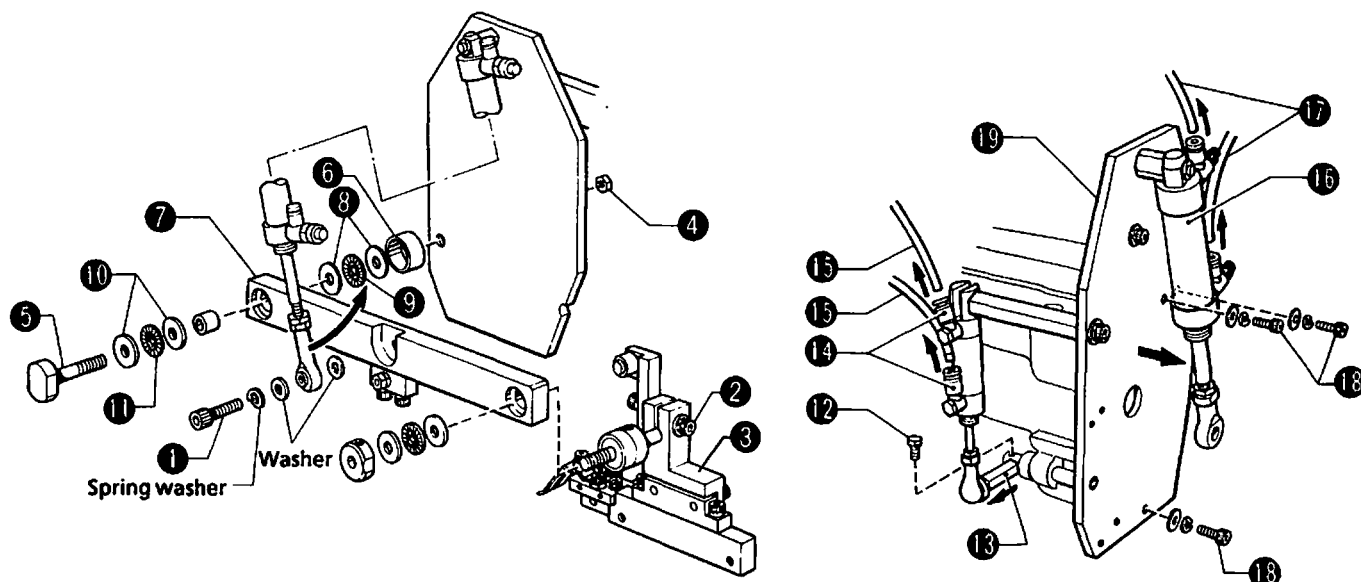
1. Remove the two screws ①, the flap sensor and the sensor bracket.
2. Loosen the two screws ③ in the set collar ②. Remove the set collar ②, the cloth guide arm ④ and the spacer ⑤.
3. Remove the two screws ③ in the cloth guide arm ④, then remove the cloth guide ⑦.

2. Removing the binder

1. Remove two bolts ①, the spring and flat washers and the binder assembly ②.



3. Removing the face plate

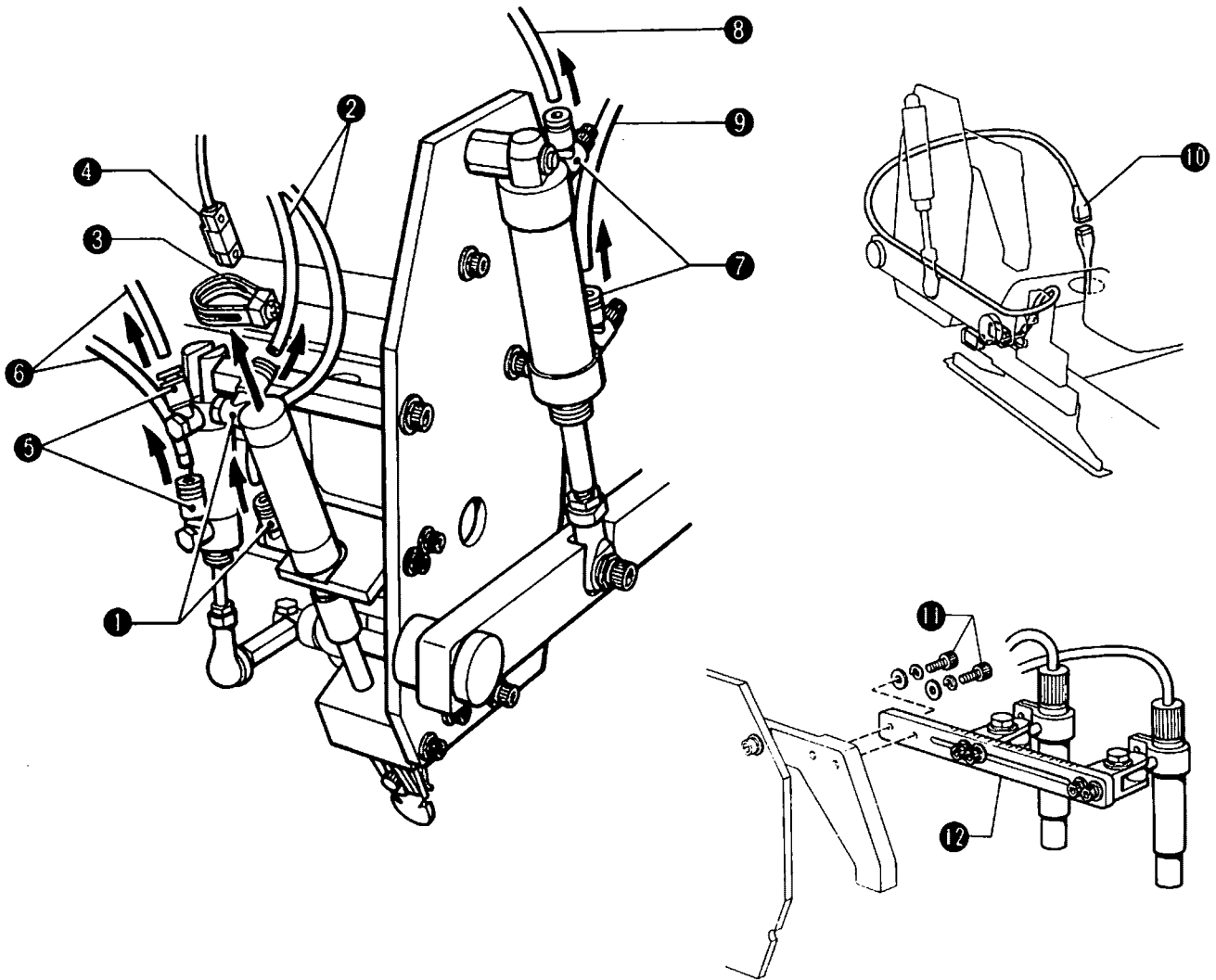


1. Remove the bolt ①, the spring washer and the two washers.
2. Loosen the bolt ② and remove the ruler fitting plate ③ to the right.
 ※ When removing the ruler fitting plate ③, make sure it does not touch other parts.
3. Remove the nut ④, then remove the fulcrum shaft ⑤, bearing cover ⑥ and arm ⑦ to the left.
4. Remove the bearing cover ⑥, two washers ⑧, bearing ⑨, and arm ⑦, washer ⑩ and bearing ⑪ from the fulcrum shaft ⑤.
5. Loosen the bolt ⑫ and remove the connecting shaft ⑬.
6. Disconnect the two air hoses ⑮ from the cylinder ⑭.
7. Disconnect the two air hoses ⑰ from the center knife drive cylinder ⑱.
8. Remove the three bolts ⑲, the three flat and spring washers, then remove the face plate ⑲.
 ※ If the arm is not disassembled, lift the arm and tie the cam with a string, then remove the bolt, the spring and flat washers. Turn the cylinder assembly so that the bolts ⑲ can be loosened, and perform step 8.

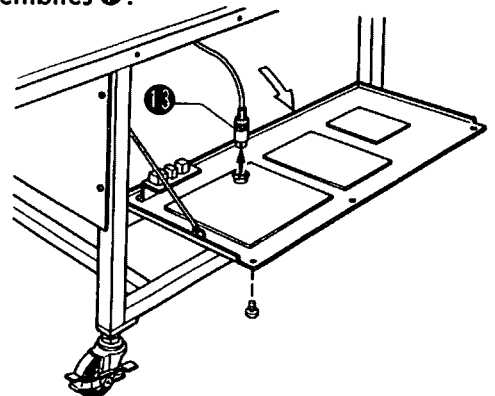
4. Removing the machine head

★ This should be done after removing the face plate and fixed knife assemblies from the head.

★ Follow the procedures below if the face plate assembly is attached. (The fixed knife assembly has been removed.)



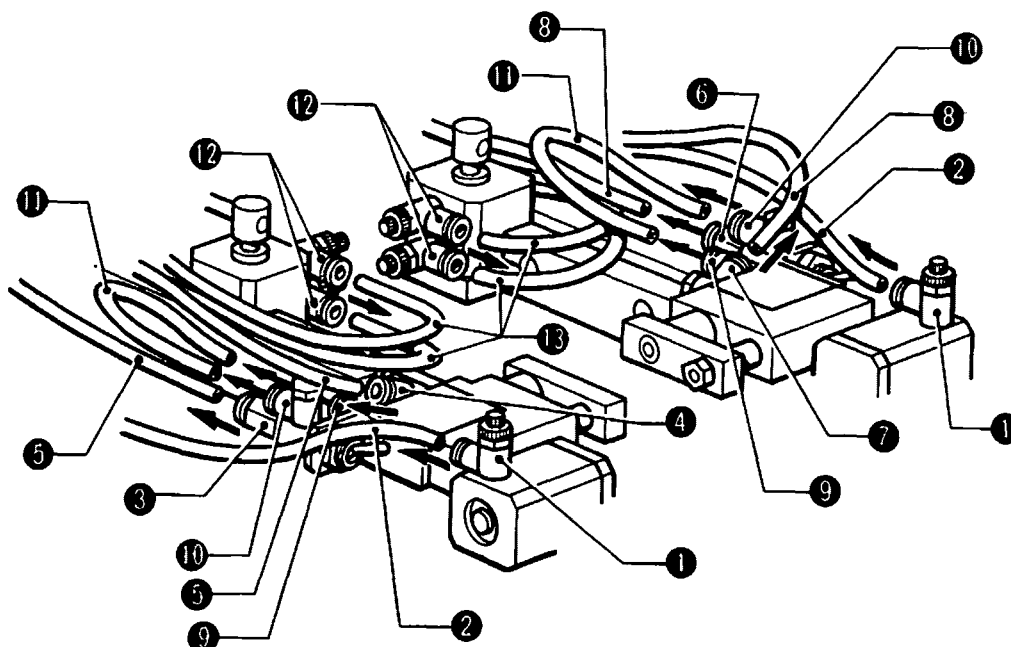
1. Disconnect the two air hoses ② from the two S-elbows ①.
2. Loosen the screw ③ and remove the cylinder sensor ④.
3. Disconnect the two air hoses ⑥ from the two S-elbows ⑤.
4. Disconnect the two air hoses ③ and ⑨ from the two cylinder assemblies ⑦.
5. Disconnect the connector ⑩ at the back of the machine head.
6. Remove the two bolts ⑪ and the lamp bracket ⑫.
7. Tilt the machine head until it stops.
8. Remove the V-belt.
9. Disconnect the detector connector ⑬ from the PCB.
10. Lower the head from the table.



5. Removing the carriage feed mechanism

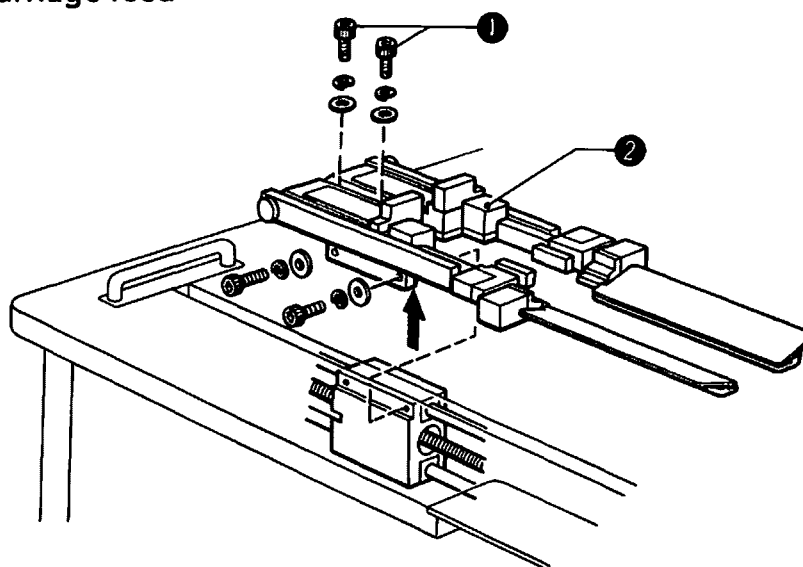
(1) Removing the air hoses

※ Mark the hoses with tape to assure correct reconnection.



1. Disconnect the air hoses ② from the speed control joints ① on the right and left carriage feeds.
2. Disconnect the two air hoses ⑤ from the joint ③ and the S-elbow ④ on the left carriage feed.
3. Disconnect the two air hoses ③ from the joint ③ and the S-elbow ⑦ on the right carriage feed. Disconnect the air hoses ⑪ from the joints ③ and S-elbows ⑩ on the right and left carriage feeds. (The hoses do not have to be disconnected.)
4. Disconnect the four air hoses ⑬ from the speed control joints ⑫ on the right and left carriage feeds.

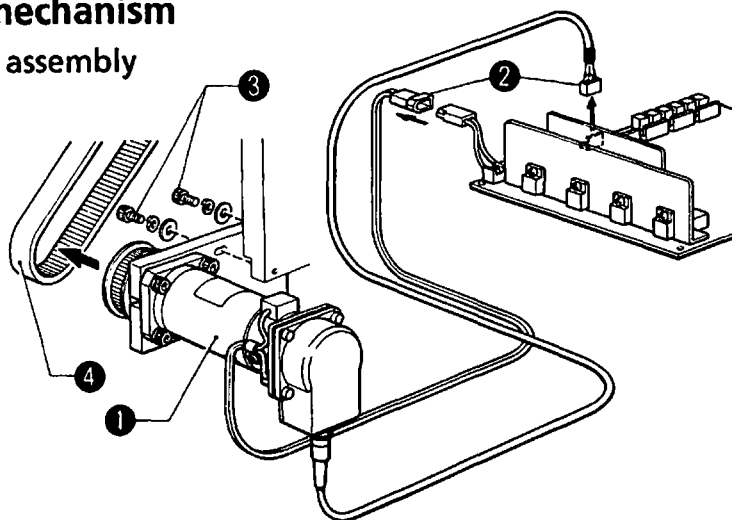
(2) Removing the carriage feed



1. Remove the two bolts ① and the carriage feed assembly ②.

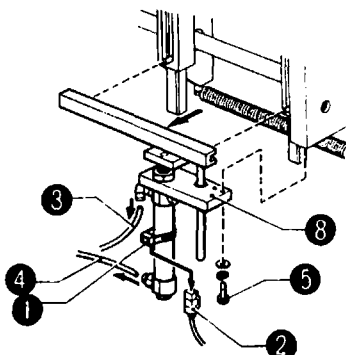
6. Removing the feed mechanism

(1) Removing the DC motor assembly



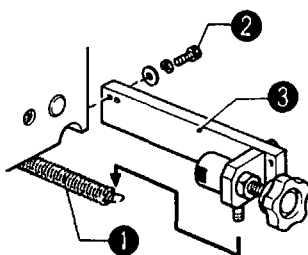
1. Disconnect the two connectors ② in the DC motor assembly ①.
2. Loosen the two bolts ③ and remove the timing belt ④.
3. Remove the two bolts ③, the flat and spring washers, and the DC motor assembly ①.

(2) Removing the corner knife cylinder assembly



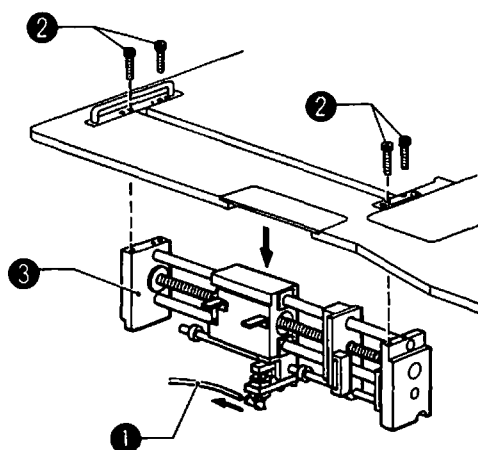
1. Loosen the screw ① and remove the cylinder sensor ② downward.
 2. Disconnect the air hoses ③ and ④.
 3. Remove the two bolts ⑤, the washer, the spring washer and the corner knife cylinder assembly ⑧.
- ※ Mark the hoses with tape to assure correct reconnection.

(3) Removing the corner knife adjusting base



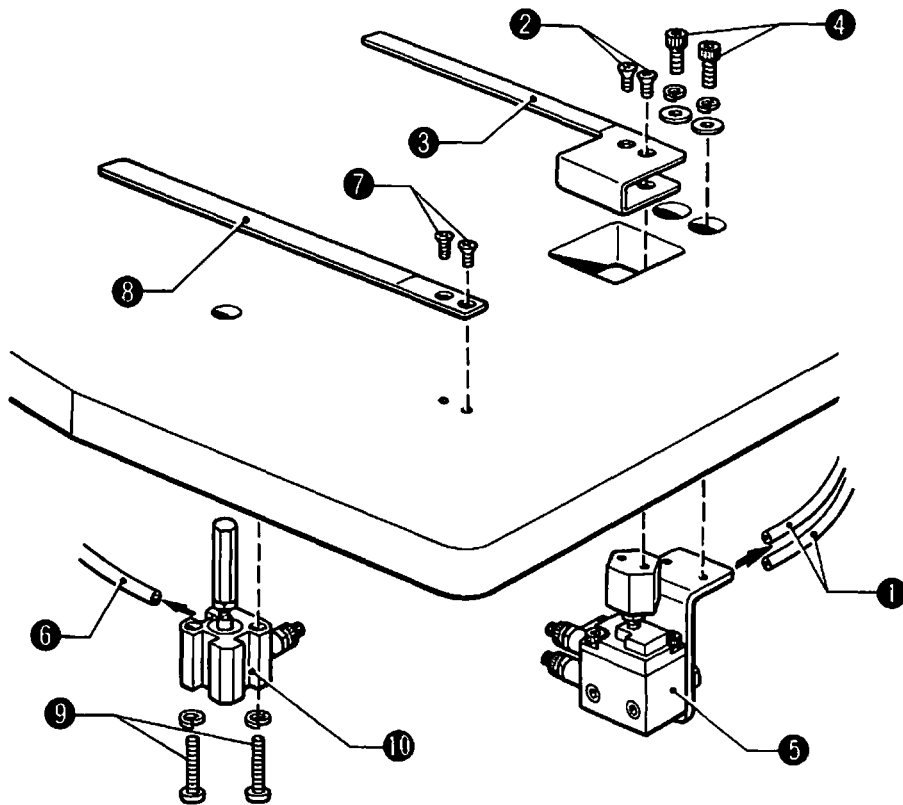
1. Remove the spring ①.
2. Remove the two bolts ②, the flat and spring washers, and the corner knife adjusting base ③.

(4) Removing the feed mechanism assembly



- ※ Do not remove or disassembly the feed mechanism unless absolutely necessary.
1. Disconnect the air hose ①.
 2. Remove the four bolts ② and the feed mechanism assembly ③.
- ※ Be sure not to drop the feed mechanism assembly ③.

7. Removing the padding cloth presser assembly



(1) Removing the padding cloth presser foot spring (R)

1. Disconnect the two air hoses ①.
2. Loosen the two screws ② and remove the padding cloth presser foot spring (R) ③.
3. Remove the two bolts ④ and remove the cylinder assembly ⑤ from the table.

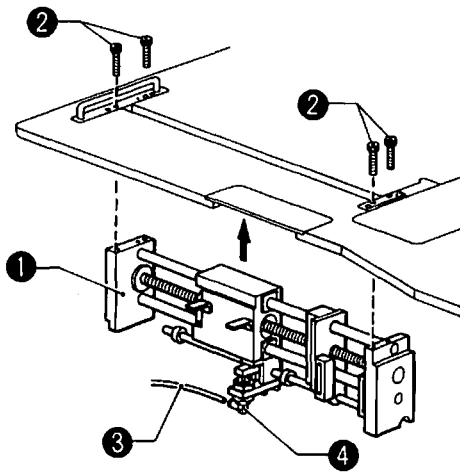
(2) Removing the padding cloth presser foot spring (L)

1. Disconnect the air hose ⑥.
2. Remove the two screws ⑦ and remove the padding cloth presser foot spring (L) ⑧ from the table.
3. Loosen the two screws ⑨ and remove the cylinder assembly ⑩ from the table.

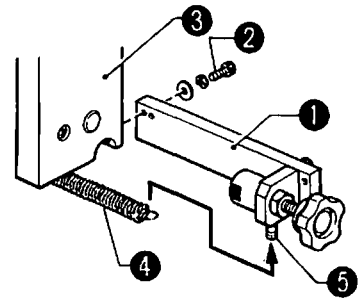
ASSEMBLY

1. Attaching the feed mechanism assembly

- (1) Attaching the feed mechanism assembly (2) Attaching the corner knife adjusting base

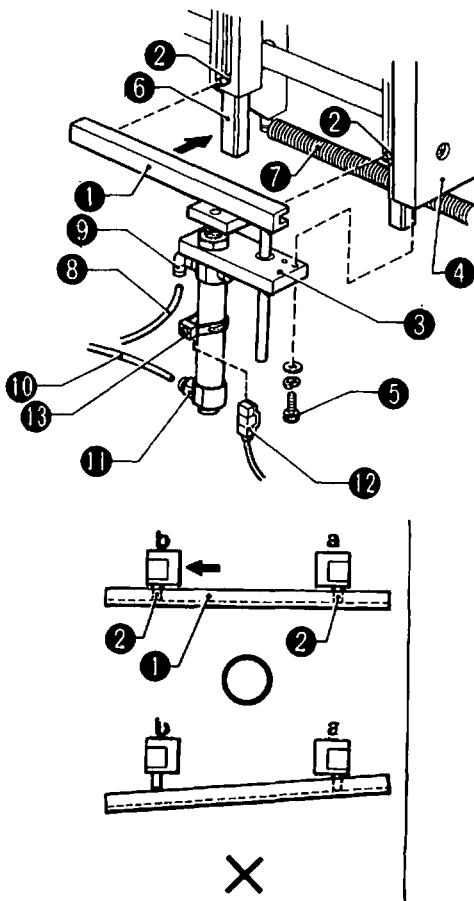


1. Attach the feed mechanism assembly ① to the frame with the four bolts ②.
2. Insert the air hose ③ into the S-elbow ④.
 ※ The carriage feed position needs to be adjusted later.



1. Attach the corner knife adjusting base ① to the ball screw support (R) ③ with the two bolts ②, the flat and spring washers.
2. Mount the spring ④ on the spring peg ⑤.
 ※ The corner knife adjusting base position needs to be adjusted later.

(3) Attaching the corner knife cylinder assembly



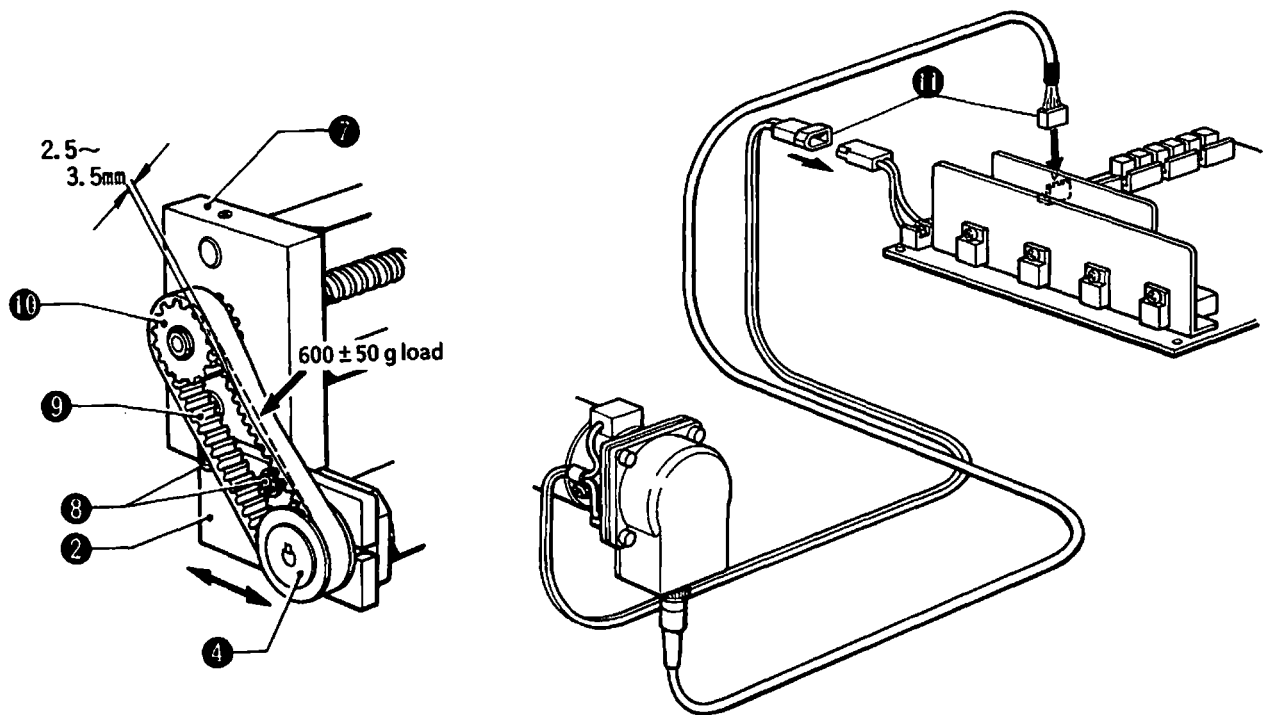
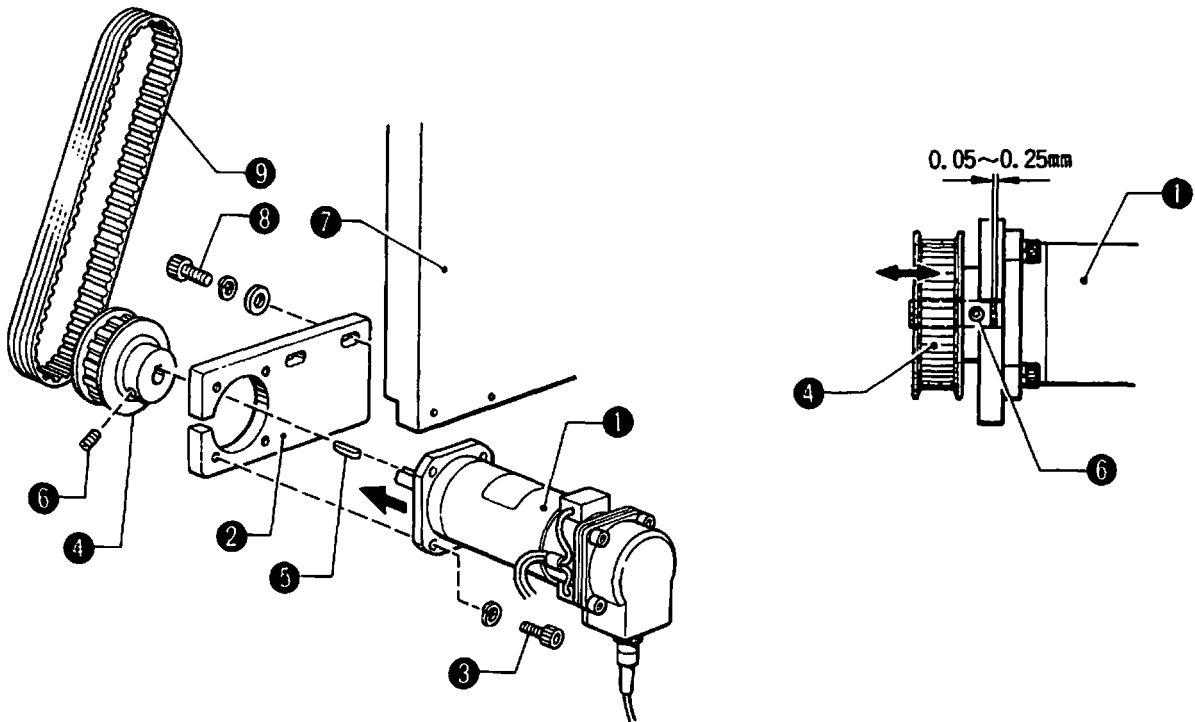
1. Insert the pin ② into the channel in the corner knife lifting plate ①. Attach the corner knife cylinder assembly ③ to the ball screw support (R) ④ with the two flat and spring washers and bolts ⑤.

※ At this time, make sure the corner knife lifting plate ① is not inserted too far back towards the pin ②. If it is, the slider ⑥ might stop on the way when it is pulled to the left by hand and released. Make sure the slider ⑥ smoothly returns to its original position by the pressure of the spring ⑦.

Check that the pin ② is not removed from the channel in the corner knife lifting plate ① because the pin ② is not inserted properly.

2. Connect the air hose ⑩ to the joint ⑨ and connect the air hose ⑪ to the half union ⑪.
3. Insert the cylinder sensor ⑫ into the fitting plate, and tighten the screw ⑬ temporarily.
 ※ The corner knife sensor needs to be adjusted later.

(4) Attaching the DC motor assembly

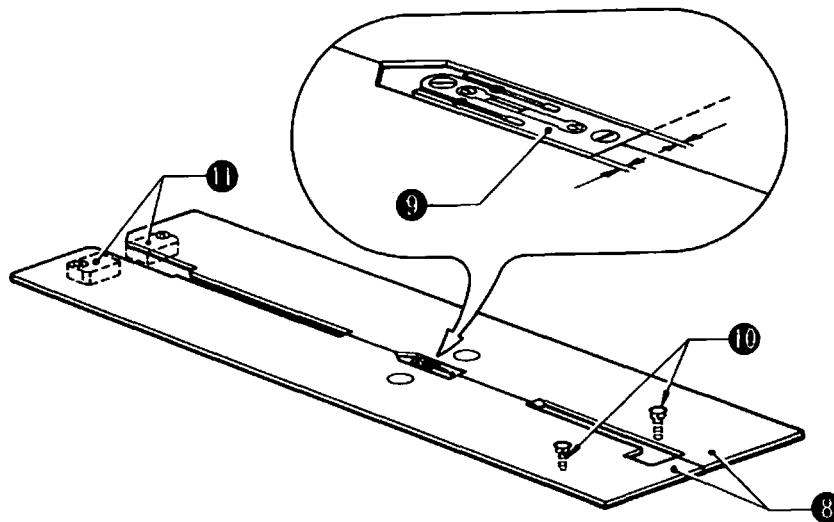
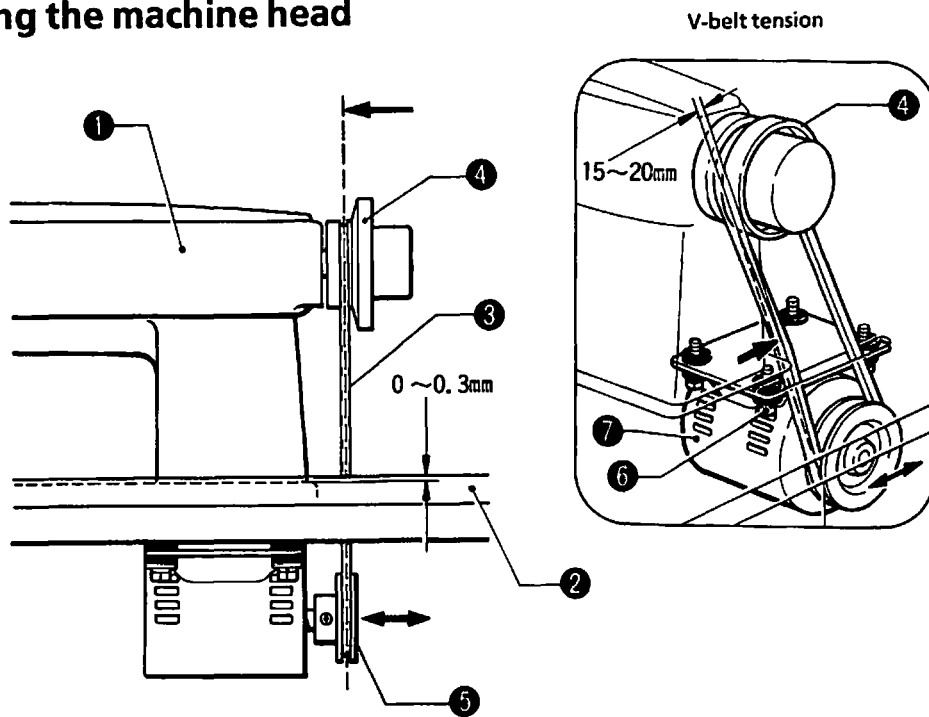


1. Attach the DC motor assembly ① to the motor bracket ② with the four washers and bolts ③.
2. Insert the timing pulley B ④ and the key ⑤ into the DC motor shaft. Set the gap between the pulley B ④ and the motor shaft bush to 0.05-0.25 mm, and tighten the two screws ⑥.
3. Attach the DC motor assembly ① to the support L ⑦ with the two washers, spring washers and bolts ③, then tighten temporarily.

[Adjusting the timing belt of the DC motor assembly]

4. Mount the timing belt ⑨ on the timing pulleys ⑩ and B ④. Firmly tighten the bolts ③ so that there is 2.5-3.5 mm of give when a 600 ± 50 g load is applied to the center of the timing belt ⑨.
5. Connect the two connectors ⑪ of the DC motor assembly ①.

2. Attaching the machine head



1. Set the head ① onto the table ②.

※ Make sure that the bed surface of the head ① and the top of the table ② are flush or that there is not more than a 0.3 mm step, and that the machine head does not wobble.

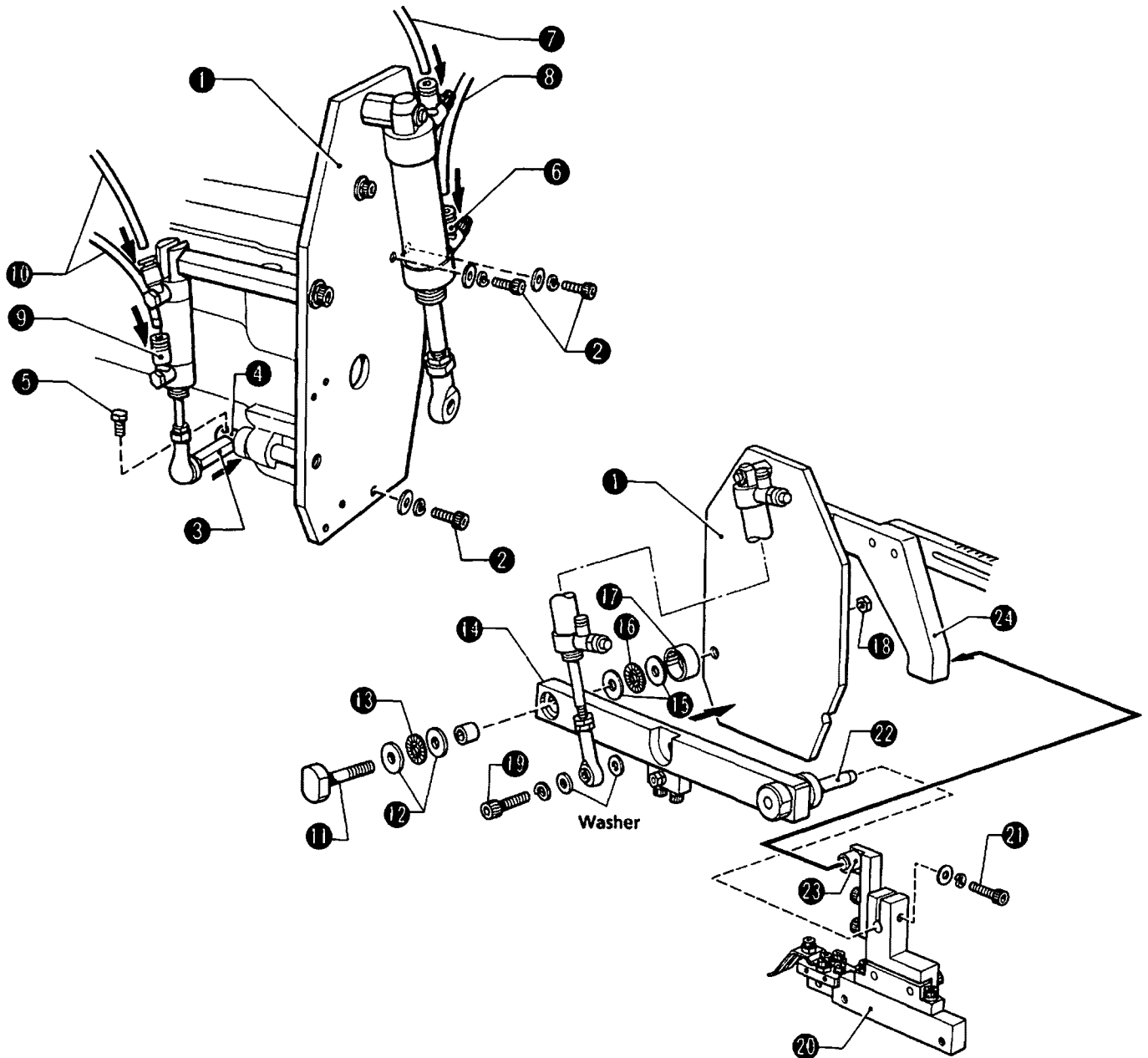
2. Mount the V-belt ③ on the machine pulley ④ and the motor pulley ⑤.

The V-belt ③ tension should allow 15-20 mm of give when the belt ③ is pressed by hand. Also make sure that the centers of the machine pulley ④ and motor pulley ⑤ are aligned. If they are not, loosen the four hex bolts ⑥ and slide the motor ⑦ to adjust the alignment.

3. Connect the hall element cord assembly from the pulley to J26 on the circuit board. (Refer to page 87.)

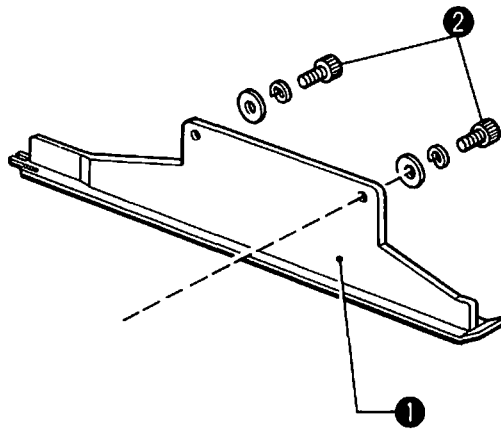
4. Positions the slide plates (R) and (L) ⑨ so that there is no gap at the front of the needle plate ⑩, and so that the gaps on the right and left sides of the slide plates are equal. Adjust the positioning bolt ⑩ and the fulcrum pin guides (R) and (L) ⑪ so that there is no play front-back or right-left.

3. Attaching the face plate



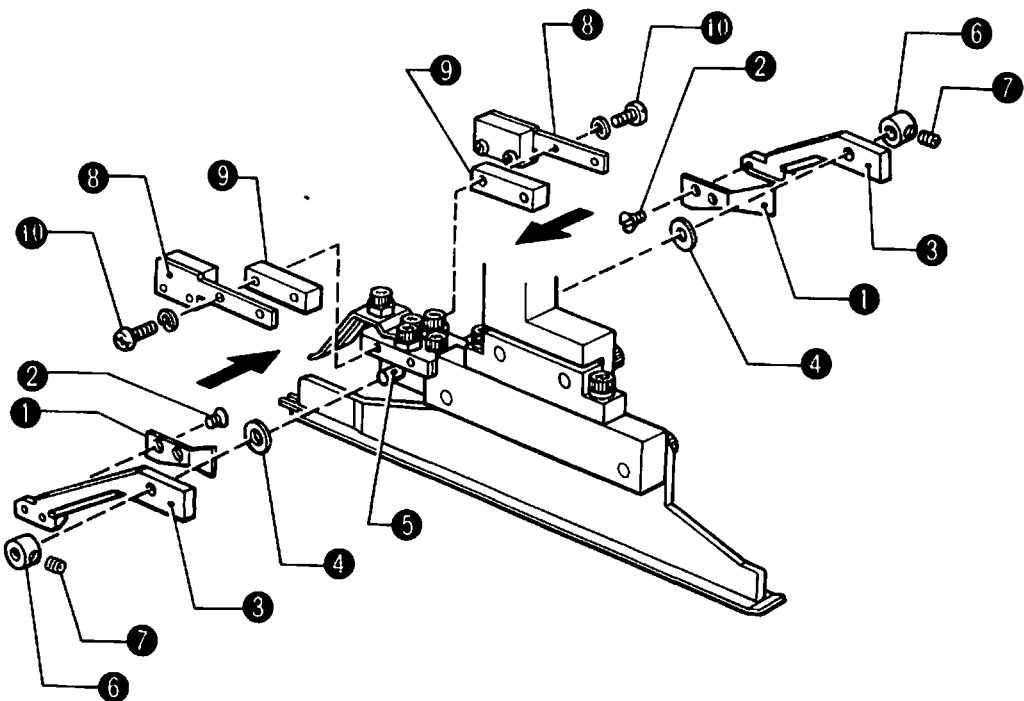
1. Attach the face plate ① to the head with the three washers, spring washers and bolts ②.
2. Insert the connecting shaft ③ into the hole of the selector lever ④ and tighten the bolt ⑤.
3. Insert the air hoses ⑦ and ⑧ into the center knife drive cylinder ⑥.
4. Connect the two air hoses ⑩ to the cylinder ⑥.
5. Place the two washers ⑫ and the bearing ⑬ on the fulcrum shaft ⑪, then insert the fulcrum shaft ⑪ into the arm ⑭. Place the two washers ⑮, the bearing ⑯ and the bearing cover ⑰ on the fulcrum shaft ⑪.
6. Insert the fulcrum shaft ⑪ into the screw-hole of the face plate ①, and tighten the nut ⑱ temporarily.
7. Attach the cylinder ⑥ with the bolt ⑲ and the spring washer and washer.
8. Tighten the fulcrum shaft ⑪ and the nut ⑱ so that there is no play right-left in the arm ⑭.
9. Place the ruler fitting plate ⑳ on the ruler fulcrum shaft ㉒, then tighten the bolt ㉑.
When the cam follower ㉓ is placed on the grooved cam ㉔, be careful that the cam follower does not hit any parts.

4. Attaching the binder



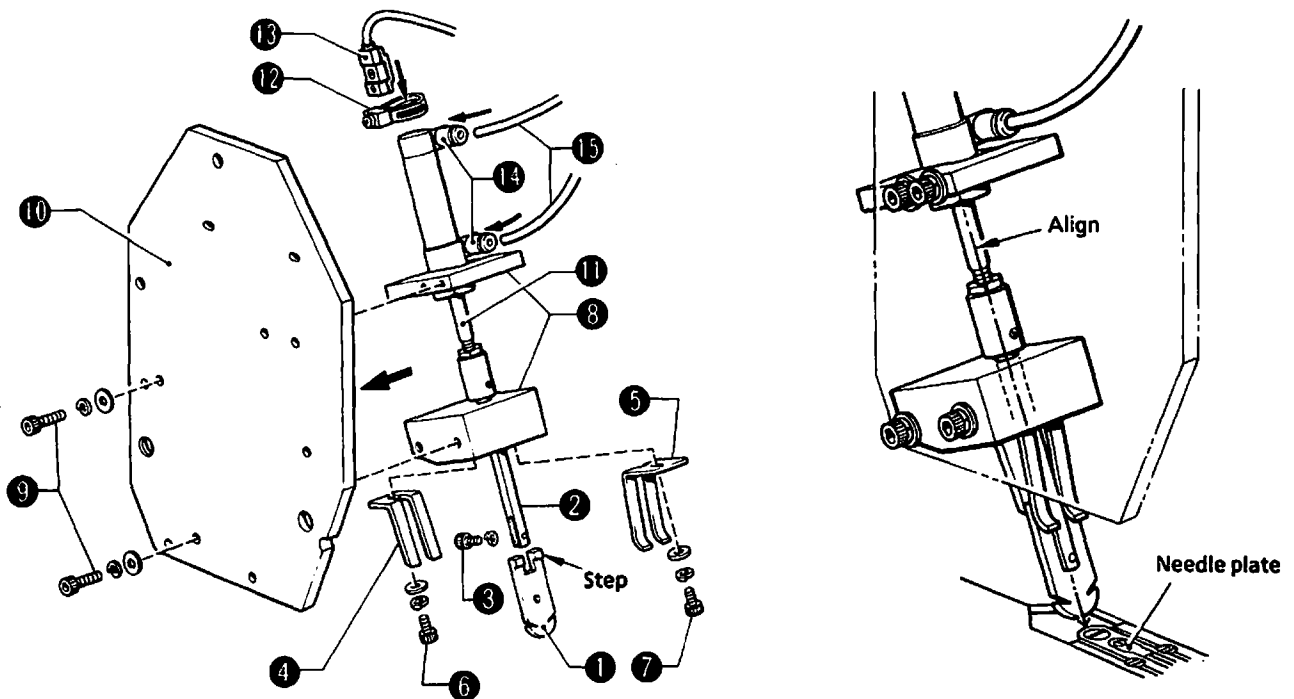
1. While lifting up and pulling forward the face plate assembly ⑤, attach the binder assembly ① to the ruler fitting plate with the two spring and flat washers, and bolts.
2. Make the binder and the needle plate parallel by adjusting the height between the binder and the slide plate.

5. Attaching the cloth guide (Same attachment method for both right and left sides)



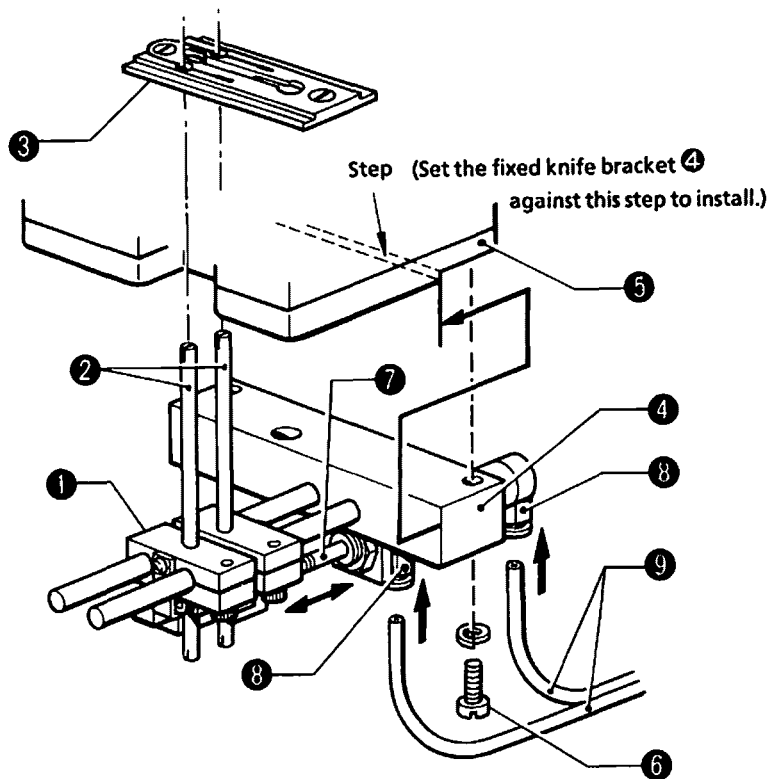
1. Attach the cloth guide ① to the cloth guide arm ③ with the two screws ②.
 2. Put the spacers ④ on the fulcrum shaft ⑤. The number of spacers ④ must meet the gauge size.
 3. Place the cloth guide arm ③ and the set collar ⑥ onto the fulcrum shaft ⑤, and tighten the two screws ⑦ so that there is no play right-left in the cloth guide arm ③ and that the arm moves smoothly up and down (down by the spring pressure).
 4. Attach the flap spacer ⑧ and the sensor base ⑨ with the screw ⑩.
- ★ Check the cloth guide adjustment.

6. Attaching the movable knife assembly



1. Align the hole of the movable knife ① with that of the knife bar ②. Tighten the washer and bolt ③.
2. Secure the fixed knife ④ and the thread retainer spring ⑤ temporarily ⑥ with the two washers, spring washers and bolts ⑥ and ⑦.
3. Check that the knife bar ② moves smoothly and easily up and down. Adjust the fixed knife ④ and the thread retainer spring ⑤ to contact the movable knife ①.
 - ※ If the angle of the thread retaining spring ⑤ is poor, a thread will not be properly held. Also, if the bolts ⑥ and ⑦ are tightened too much, the knife operation will become too heavy.
4. Attach the fixed knife assembly ⑧ to the face plate ⑩ with the four washers, spring washers and bolts ⑨. Be sure the cylinder rod ⑪ and the knife rod ② are straight and not twisted. Also, make sure the cylinder rod ⑪ moves easily and does not strike the head when moved up and down by hand.
 - ※ The pressure should be adjusted as lightly as will cut the thread. If the thread is not cut properly, increase the pressure slightly.
5. Insert the cylinder sensor ⑬ into the fulcrum clamp ⑫, then temporarily tighten the screw of the clamp ⑫ to adjust the sensor.
6. Connect the two air hoses ⑮ to the cylinder S-elbow ⑭.

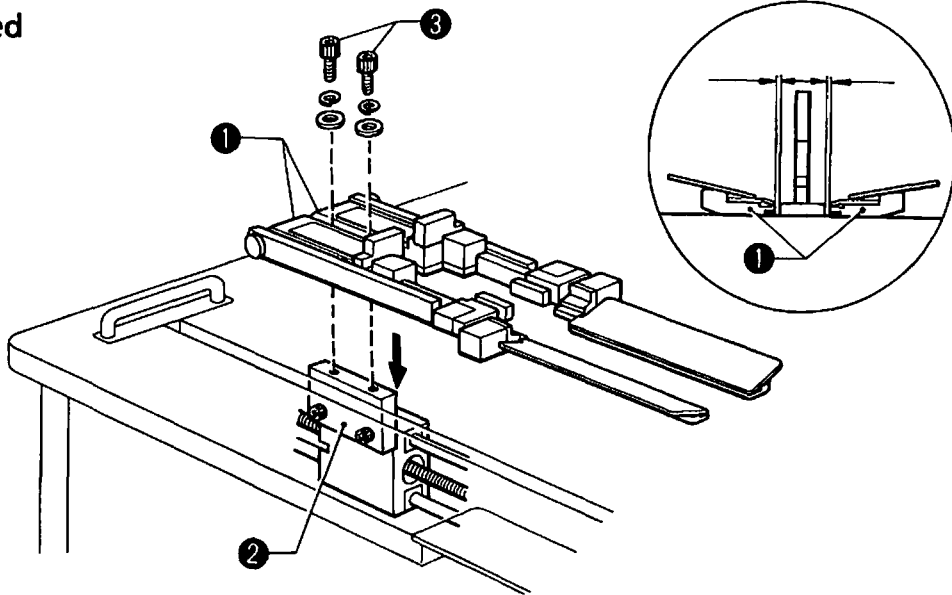
7. Attaching the fixed knife assembly



1. Remove the slide plates (R) and (L), then tilt the machine head.
2. Align the two fixed knives ② of the knife holder (L) ① with the holes of the needle plate ③, then insert the knives ②.
3. Attach the fixed knife bracket ④ to the rotary hook base (R) ⑤ with the two screws ⑥.
※ The position will not change when the fixed knife bracket ④ is fitted against the step in the rotary hook base (R) ⑤.
4. Move the cylinder shaft ⑦ right or left by hand to make sure it moves smoothly and easily.
5. Connect the two air hoses ⑧ to the cylinder ⑨.
6. Right the machine head and attach the slide plates (R) and (L).
※ The fixed knife position needs to be adjusted later.

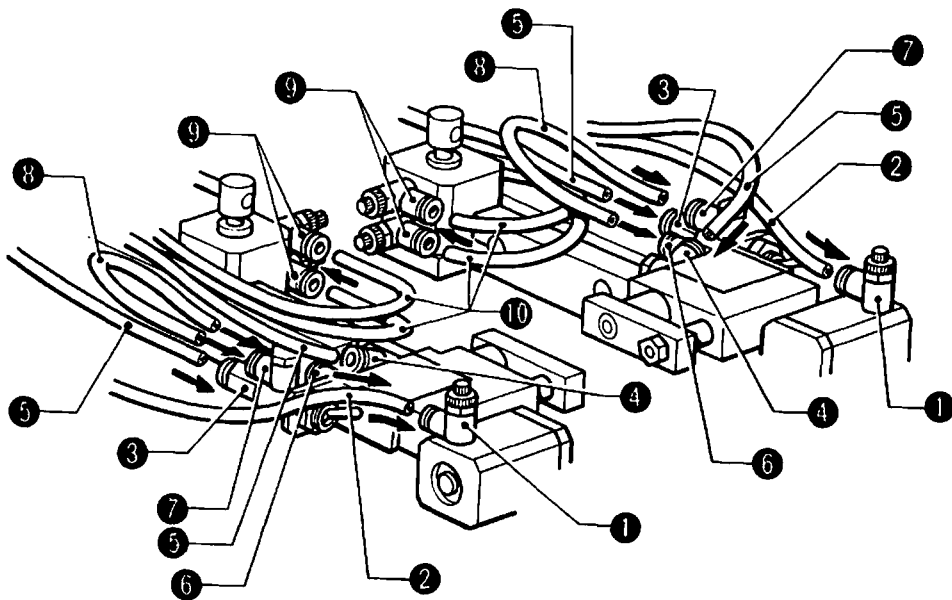
8. Attaching the carriage feed assembly

(1) Carriage feed



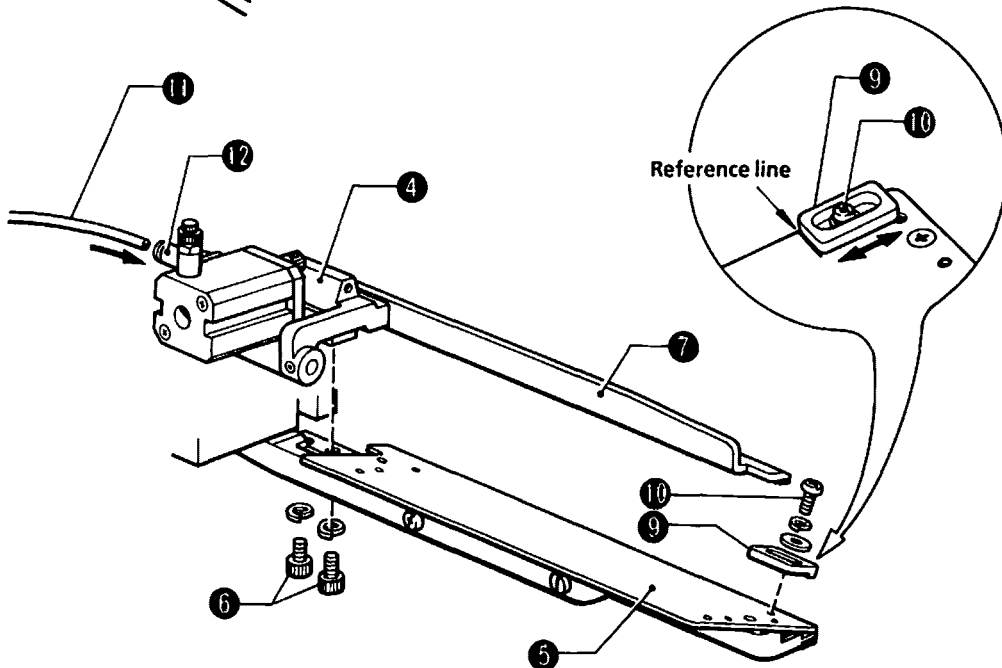
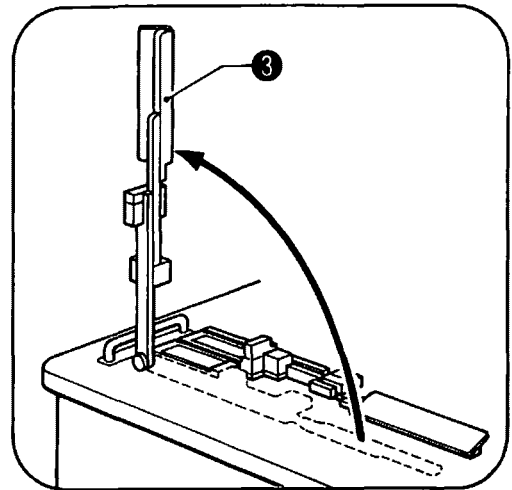
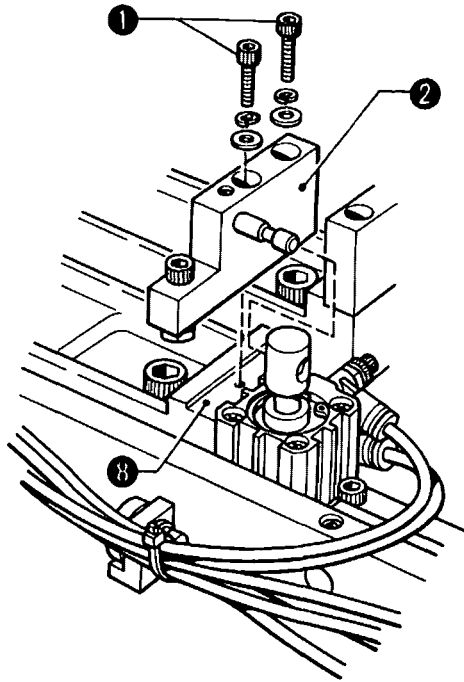
1. Attach the carriage feed assembly ① to the carriage feed fitting plate ② with the two flat and spring washers and bolts ③.
2. Make sure there is a uniform 1 mm gap to the binder assembly on right and left sides of the carriage feed. If the gap is incorrect, loosen the bolts ③ and shift the carriage feed assembly ① right or left to adjust the gap. This adjustment will be required only after the carriage feed assembly ① is removed, and it is not usually needed.
 - ※ After attachment, make sure the needle and the carriage feed reference line UR are aligned at the sewing end position.

(2) Air hoses (The steps 1, 3 and 4 must be done on the both right and left carriage feeds.)



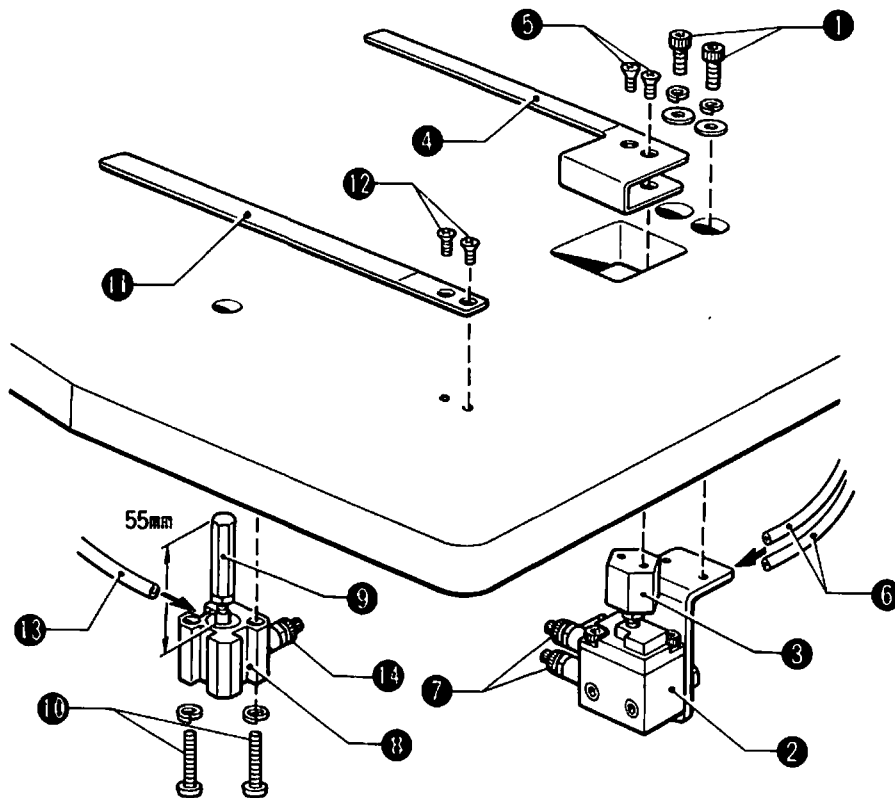
1. Connect the air hose ② to the flap presser cylinder ①.
2. Connect the two air hoses ⑤ to the folding plate cylinder ③ and the S-elbow ④ on the left carriage feed. Connect the two air hoses ⑤ to the joint ③ and the S-elbow ④ on the right carriage feed.
3. Connect the air hose ⑧ to the folding plate cylinder ③ and the S-elbow ⑦.
4. Connect the two air hoses ⑩ to the carriage feed lifting cylinder ⑨.

(3) Flap presser assembly (if not attached)



1. Remove the two bolts ❶ and the connecting shaft supporter ❷.
2. Stand up the carriage feed ❸.
3. Attach the flap presser assembly ❹ to the left carriage feed ❺ with the two spring washers and bolts ❸.
※ Make sure that when the flap presser assembly ❹ makes contact with the carriage feed ❺, there is a 1 mm gap at the back of the flap presser (L) ❷.
4. Repeat the same steps for the right carriage feed.
5. Gently tilt the carriage feed.
6. Attach the connecting shaft supporter ❷ to the carriage feed movable base ❺ with the bolts ❶.
7. Attach the flap stopper ❸ to the carriage feed ❺ with the washer and spring washer, and screw ❿.
※ The flap stopper ❸ adjustment may be required depending on the flap shape.
8. Connect the air hose ❾ to the cylinder assembly ❿.

9. Attaching the padding cloth presser foot



(1) Padding cloth presser foot spring (R)

1. Attach the cylinder assembly ② to the table with the two washers and spring washers, washer bases and bolts ①.
2. Attach the padding cloth presser foot spring (R) ④ to the spring fitting shaft ③ with the two screws ⑤.
3. Connect the two air hoses ⑥ to the cylinder speed control joint ⑦.

(2) Padding cloth presser foot spring (L)

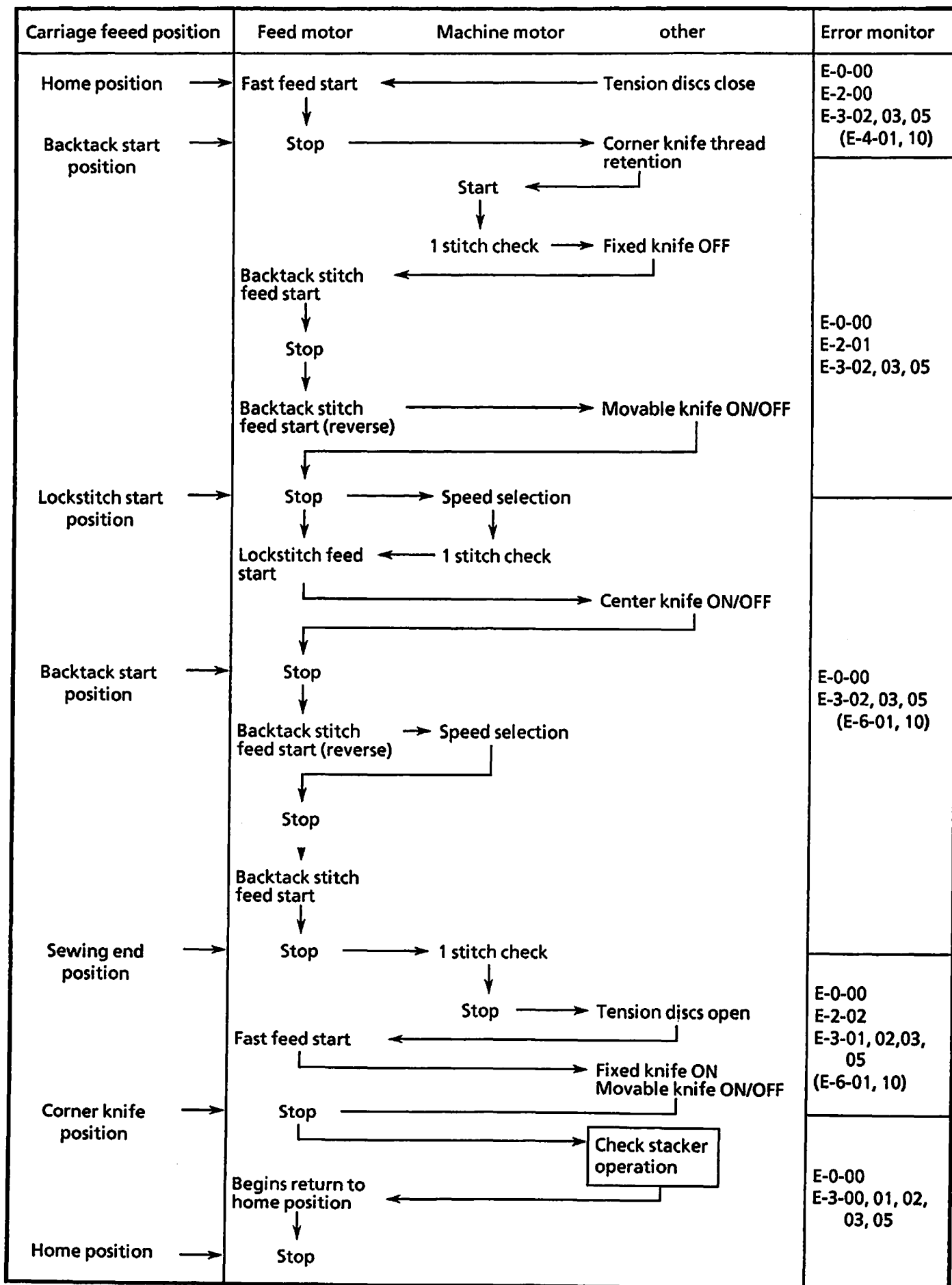
1. Set the top end of the cylinder ⑧ 55 mm apart from the end of the padding cloth pusher ⑨.
2. Attach the cylinder ⑧ to the table with the two spring washers and screws ⑩.
3. Attach the padding cloth presser foot spring (L) ⑪ to the table with the two screws ⑫.
4. Connect the air hose ⑬ to the speed control joint ⑭.

10. Other

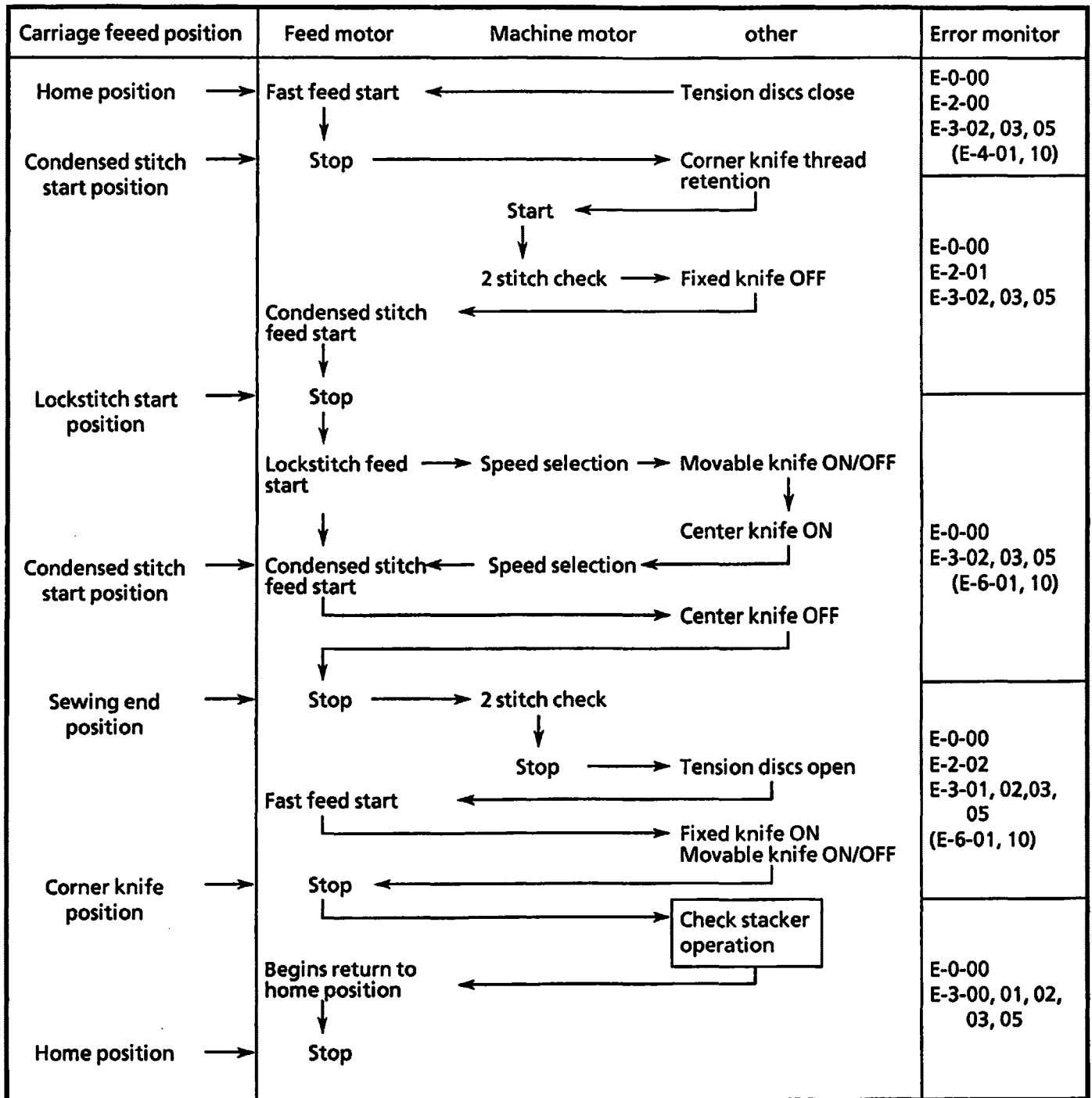
1. Make sure that there is no excessive play in any parts, that parts do not rub, that all screws and bolts are tight, and that operation is normal.
2. Turn on the air and the power, and set MODE to MANUAL.
3. Set a piece of material under the carriage feed and operate the treadle. Press the start switch to move the carriage feed to the sewing end position.
Check that the needle is aligned with the U-R reference line on the carriage feed. If it is not, perform "§8. (1) Carriage feed" in page 40, so that the gap between the carriage feed and the binder is 1 mm.
4. Replace the knife and attach the corner knife.
5. Check the sewing operation. Next, turn the center knife switch to ON and sew. Then turn the corner knife switch to ON and sew.
6. Sew and adjust any improperly adjusted places. Refer to the sewing flow chart on the next page.

SEWING FLOW CHART

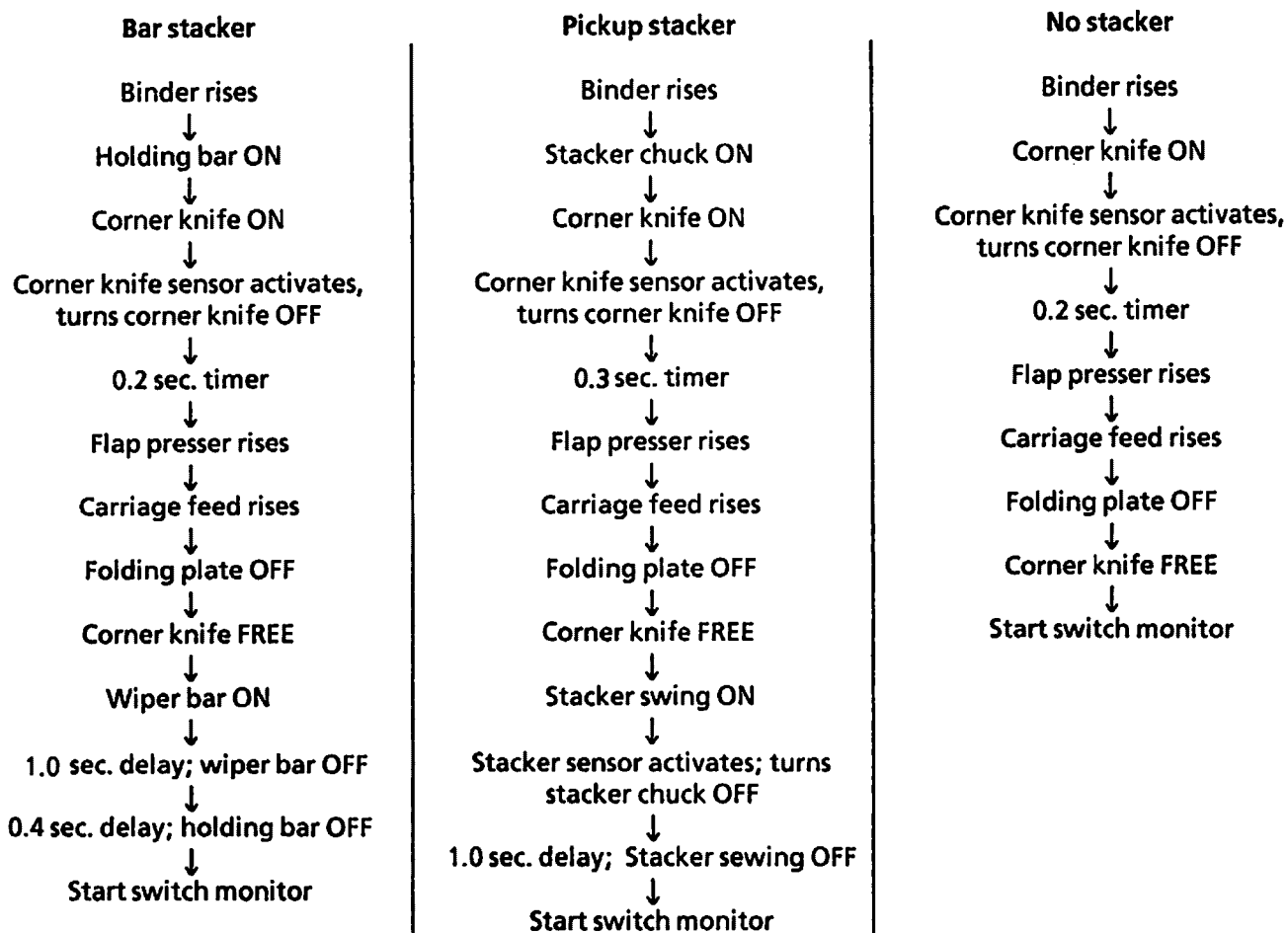
1. Backtacking



2. Condensed stitch



3. Stacker operation



Start switch monitor ON	Regular stitching; cycle sewing end	Stacker switch ON	Stacker operates; carriage feed stops
		Stacker switch OFF	Carriage feed stops
	During cycle sewing	Stacker switch ON	Carriage feed stops
		Stacker switch OFF	Carriage feed stops
Start switch monitor OFF	Regular stitching; cycle sewing end	Stacker switch ON	Stacker operates; carriage feed resets
		Stacker switch OFF	Cloth held; carriage feed resets
	During cycle sewing	Stacker switch ON	Cloth held; carriage feed resets
		Stacker switch OFF	Cloth held; carriage feed resets

Operation of the stacker and carriage feed after sewing

4. I/O checking

★ Switch malfunctions can be isolated and identified with the following procedure.

1. Turn off the power.
2. Replace the main circuit board ROM with the I/O check ROM.
3. Turn on the power.
4. Set the switch to be checked to ON or OFF.
5. "※" will be replaced with numbers from 0 to 9 at the start and end of the center knife correction switch.

Switch		Indicator
Mode	Automatic	" x 1 x " (Length display)
	Manual	" x 2 x " (Length display)
	Program	" x 3 x " (Length display)
	Knife change & cycle pgm.	" x 4 x " (Length display)
Center knife position correction switch	Start	"※ x x " (Length display)
	End	" x x ※ " (Length display)
Emergency stop		Emergency stop
Program	Start	Needle thread breakage
	Set	No bobbin thread
	Clear	Program error
x 100		Program 1
x 10		Program 2
x 1		Program 3
Bobbin thread	Set	Program 4
	Select	Program 5
Corner knife ON		Seam length
Center knife ON		Bobbin thread setting
Carriage feed	Advance	Bobbin thread 2 "----" (Bobbin thread display)
	Retract	Bobbin thread 2 "___" (Bobbin thread display)
Knife	Movable ON	Bobbin thread 3 "----" (Bobbin thread display)
	Fixed ON	Bobbin thread 3 "___" (Bobbin thread display)
Stacker ON		Bobbin thread 1
Treadle	Padding cloth presser foot	"111" (Bobbin thread display)
	Carriage feed ①	"222" (Bobbin thread display)
	Carriage feed ②	"333" (Bobbin thread display)
	Binder	"444" (Bobbin thread display)
	Flap presser ①	"555" (Bobbin thread display)
	Flap presser ②	"666" (Bobbin thread display)
Start		Program number

Note: If the indicator corresponding to one of the above switches does not light, a switch malfunction should be assumed.

5. DIP switch descriptions (supplement)

PSW11-

PSW13 ... Determines the lockstitch pitch.

PSW14 Selects either backtack or condensed stitches for fraying prevention.

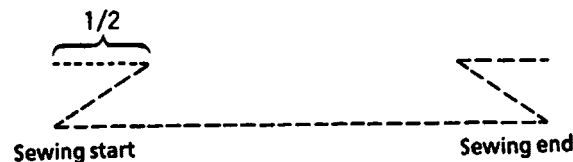
PSW15-

PSW16 ... Set the fraying prevention stitch length.

※ Should be 4-5 mm for backtack stitches.

PSW17-

PSW18 ... Set the condensed stitch pitch. The backtack pitch is equal to the lockstitch pitch, except that it is 1/2 that of the lockstitch pitch at the sewing start only.



PSW21 Selects the sewing speed according to cloth sewability.

PSW22 Selects the speed of the carriage feed to the sewing position according to cloth sewability.

PSW23 Selects the speed of the carriage feed to the corner knife position according to cloth sewability.

PSW24 Selects the sewing speed according to the folding of the welt.

PSW25-

PSW26 ... Control carriage feed operation. When wrinkles are easily formed during bodice setting, either right or left carriage feed can operate earlier (5 step operation). When wrinkles are not easily formed, both of the carriage feeds can operate at the same time (4 or 3 step operation) to shorten the cloth setting time.

PSW27 Determines whether the flap presser on the flap cloth setting side operates at the 4th or 5th treadle position.

PSW28 Selects the treadle operation.

PSW31 Automatically adjusts the positions of the center and corner knives according to the gauge size.

PSW32 Selects whether or not to use the thread breakage detector. Must be OFF if the thread breakage detector is not attached.

PSW33 Selects whether the carriage feed returns automatically, or manually with the start switch, after sewing end.

PSW34-

PSW35 ... Selects the stacker type.

PSW36 Adjusts the home position sensor, the overrun sensor on the home position side and the overrun sensor. Must be adjusted after attachment and before the system starts.

PSW37 Writes standard data to memory. Standard data must be written to memory after attachment and before the system starts.

6. Relationship between machine speed and feed speed due to stitch pitch

Lockstitch pitch	1.4 mm	1.6	1.8	2.0	2.2	2.4	2.6	2.8
Machine speed	2500 spm	2188	2500	2500	2273	2500	2308	2143
Feed speed	3.5 m/min.		4.5 m/min.	5 m/min.		6 m/min.		

PSW21 = ON

Lockstitch pitch	1.4 mm	1.6	1.8	2.0	2.2	2.4	2.6	2.8
Machine speed	2200 spm	1925	2200	2200	2000	2200	2031	1886
Feed speed	3.0 m/min.		3.96 m/min.	4.4 m/min.		5.28 m/min.		

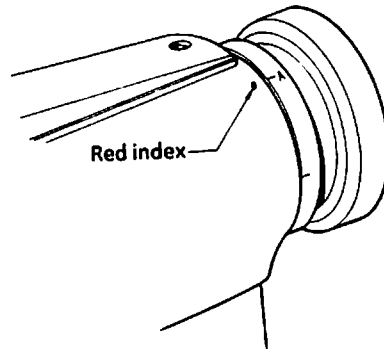
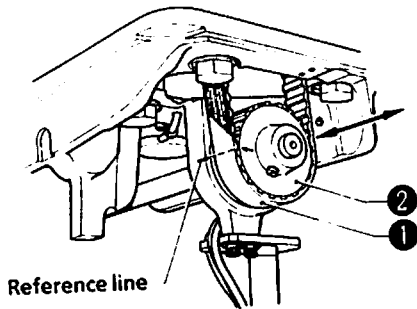
PSW21 = OFF

Condensed pitch	0.8 mm	1.0	1.2	1.4
Machine speed	2188 spm	1750	1458	1250
Feed speed	1.75 m/min.			

Condensed pitch	1.4 mm	1.6	1.8	2.0	2.2	2.4	2.6	2.8
Machine speed	1571 spm	1375	1222	1100	1000	917	846	786
Feed speed	2.2 m/min.							

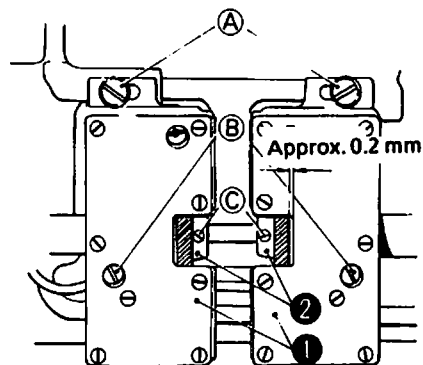
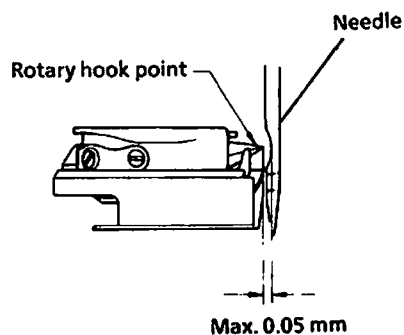
STANDARD ADJUSTMENT (MECHANICAL PORTION)

1. Adjusting the upper and lower shaft timing



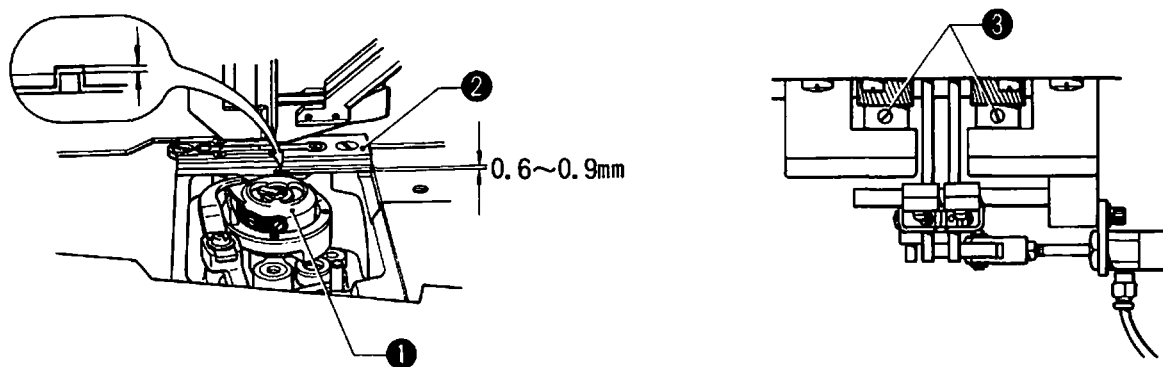
1. Remove the needle.
2. Tilt the machine head and remove the timing belt ❶.
3. Align scale A on the pulley with the red index.
4. Without moving the upper shaft, align the arrow on the lower belt ❷ with the arm bed reference line and remount the timing belt.
5. Return the machine head to its original position and attach the needle.

2. Adjusting the needle and the rotary hook timing



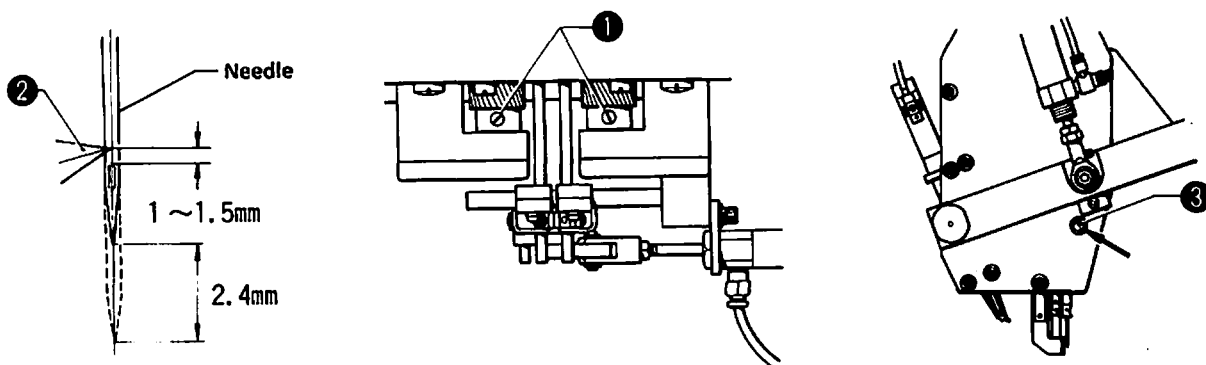
1. The gap between the needle and the rotary hook point should be 0.05 mm. Loosen the screws ❶, ❷ and ❸, and shift the rotary hook base ❹ right or left to adjust the gap.
 2. The gap between the inside of the rotary hook base ❹ and the lower shaft gear ❺ should be approximately 0.2 mm. Shift the lower shaft gear ❺ right or left to adjust the gap.
- ※ Be sure that the screw stops do not change when the screws ❸ are tightened in the gear ❺.

3. Adjusting the gap between the rotary hook and the needle plate



- ★ The gap between the rotary hook ① and the needle plate ② should be 0.6-0.9 mm. Loosen the two screws ③ and raise or lower the rotary hook ① to adjust the gap.

4. Adjusting the needle bar lift stroke and the needle bar height



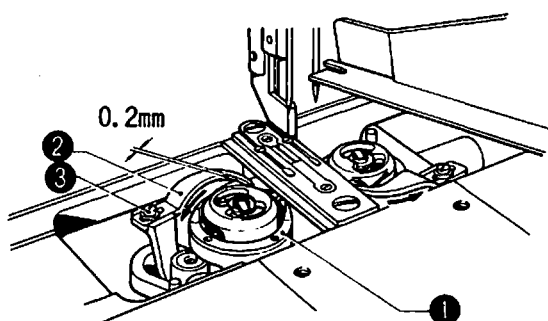
(1) Needle bar lift stroke

- ★ The rotary hook point should be aligned with the needle center when the needle is 2.4 mm above its down position. Loosen the two screws ① and turn the rotary hook ② to adjust the stroke.

(2) Needle bar height

- ★ The gap between the needle hole top and the rotary hook point should be 1-1.5 mm when the rotary hook point is aligned with the needle center. Loosen the screw ③ and raise or lower the needle bar to adjust the height.

5. Adjusting the gap between the rotary hook and the bobbin case opener



- ★ The gap between the rotary hook ① and the bobbin case opener ② should be 0.2 mm when the bobbin case opener ② is shifted all the way in the direction of the arrow. Loosen the screw ③ and shift the bobbin case opener ② right or left to adjust the gap.

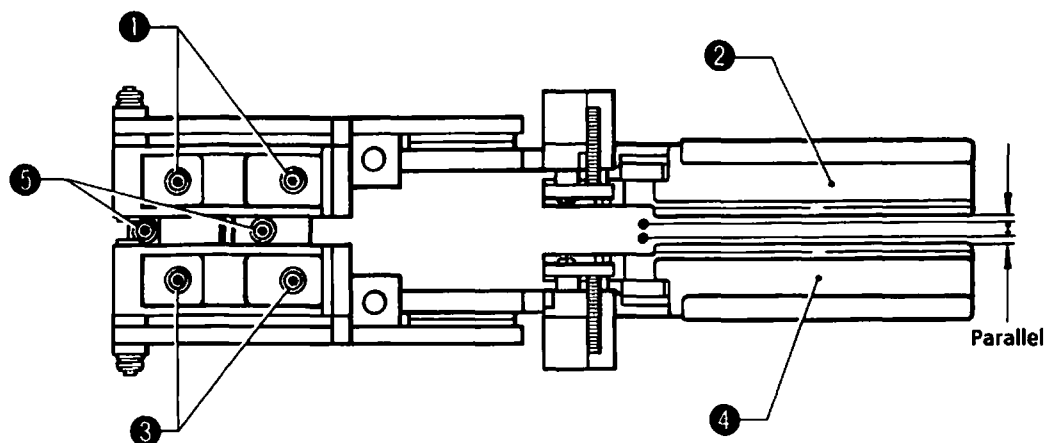
6. Adjusting the carriage feed mechanism

(1) Carriage feed

<Making the needle and the carriage feed in parallel>

1. Return the carriage feeds to their stop positions.

When moving, the carriage feeds should be parallel with the needles (as shown in the figure below).



(Adjustment)

Loosen the bolt ① to shift the carriage feed (R) ② right or left.

Loosen the bolt ⑤ to shift the carriage feed (L) ④ right or left.

Loosen the bolt ⑥ to shift the carriage feeds (R) ② and (L) ④ right or left together.

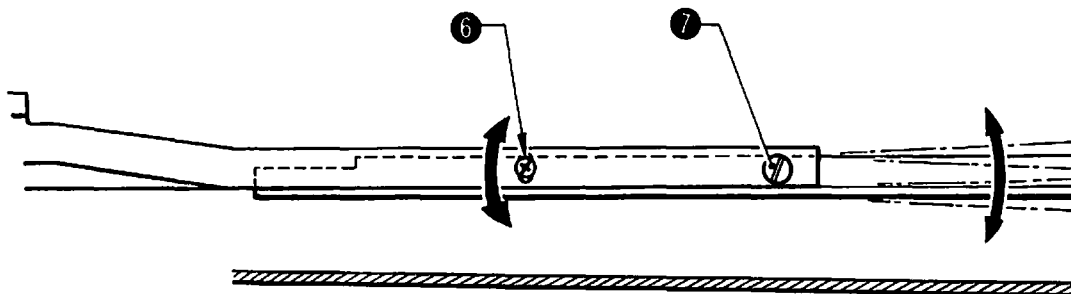
<Adjusting the carriage feed angle>

- ★ The carriage feed should contact a material evenly.

(Adjustment)

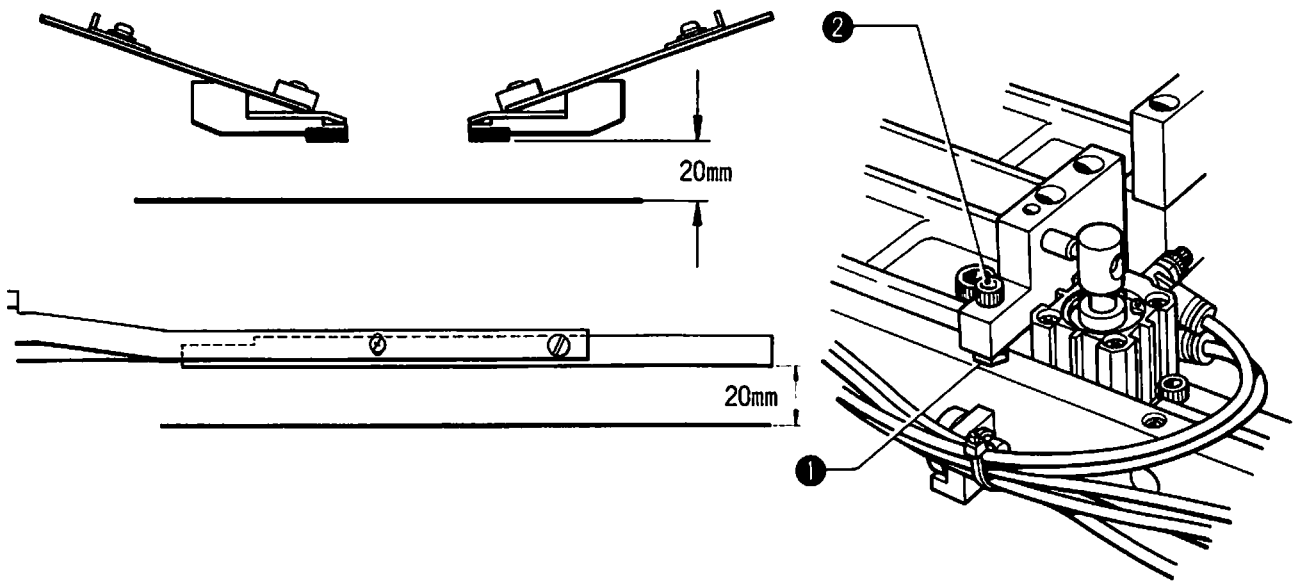
Loosen the screws ⑥ and ⑦ to adjust the angles of the carriage feeds ② and ④.

Set a piece of material under the carriage feeds ② and ④ to press the material. At this time, by pulling the material slightly, check that the fore and back parts of the carriage feeds press the material evenly.



<Adjusting the carriage feed height>

★ The carriage feed front should be approximately 20 mm high when they are at their home positions.



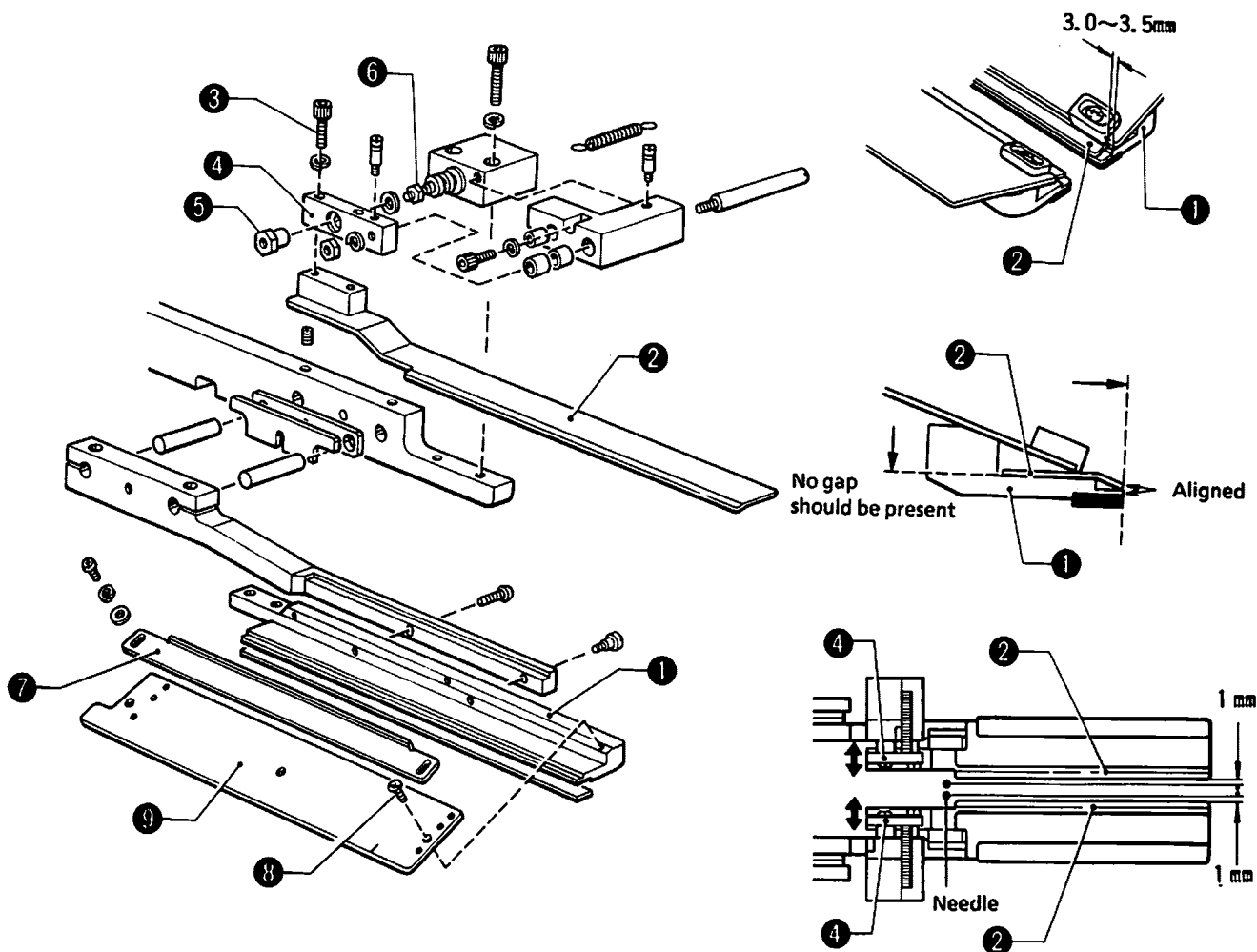
(Adjustment)

After loosening the nut ①, adjust the height using the bolt ②.

Loosen the bolt ② to raise, tighten the bolt ② to lower, the carriage feeds.

※ At this time, check that the flap presser does not strike the machine head when setting the power switch to OFF and manually move the carriage feeds back and forth.

(2) Folding plate



1. Adjusting the position

The edge of the carriage feed ① should be aligned with the edge of the folding plate ②, and the folding plate ② should be within 3-3.5 mm of the end of the carriage feed ①.

(Adjustment)

Loosen the two bolts ③, and shift the folding plate ② right or left so that its edge is aligned with that of the carriage feed ①. Slide the folding plate ② back and forth so that the gap to the edge of the carriage feed is 3-3.5 mm, then tighten the bolts ③.

2. Make sure that the folding plate ② is not above the carriage feed surface.

(Adjustment)

Bend the folding plate ② so that it lies flat on the carriage feed surface.

3. When the folding plate ② is furthest out, there should be a gap between it and the needle.

※ To check, manually pull the cylinder connecting plate ④ towards the needle, and move the carriage feed ① back and forth.

(Adjustment)

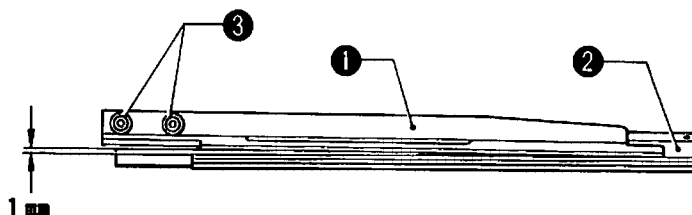
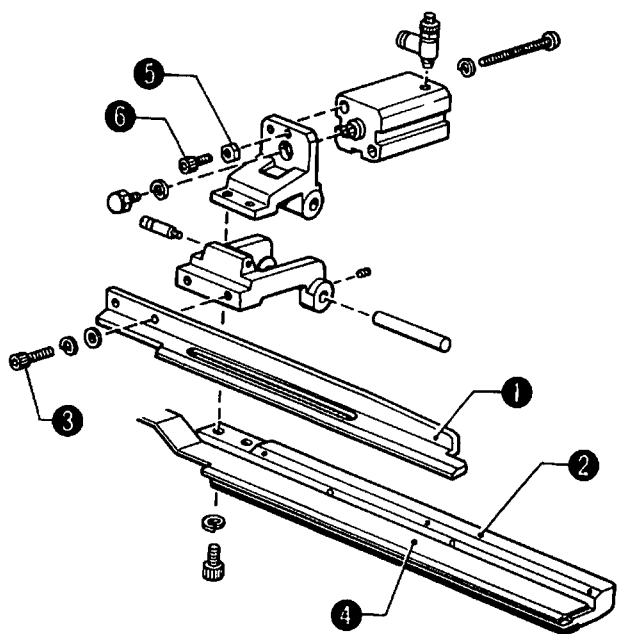
Bleed the air.

Pull the cylinder connecting plate ④ towards the folding plate ② by hand. Turn the pulley to lower the needle. Loosen the nuts ⑤ and ⑥, reduce the gap between the needle and the folding plate ②. Tighten the nut ⑤ until the gap between the needle and the folding plate ② is 1 mm. Then, holding the nut ⑤ with a wrench, tighten the nut ⑥.

※ While moving the cylinder connecting plate ④ toward the needle by hand, tighten the nut ⑤.

4. When the gauge is set for single welts larger than 16 mm, mount the folding plate supporting plate ⑦ to the carriage feed U-SR ⑨ with the two screws ⑧.

(3) Flap presser



1. Flap presser angle
When the front of the flap presser ① contacts the carriage feed ②, there should be a 1 mm gap at the back of the flap presser ①.

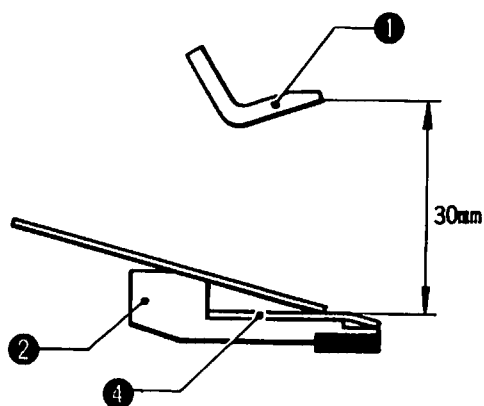
(Adjustment)

Loosen the two bolts ⑤, adjust the flap presser ① so that it presses the entire flap. Then tighten the bolts ⑤.

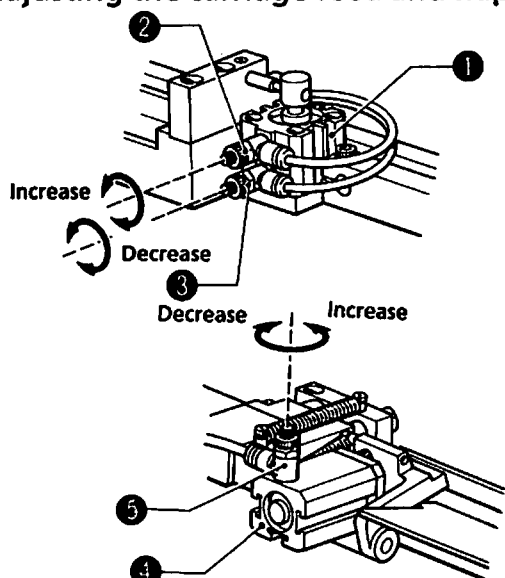
2. Flap presser lift stroke
The flap presser ① should be approximately 30 mm above the folding plate ④. The carriage feed ② should not contact other parts when it is moved back and forth by hand.

(Adjustment)

Loosen the nut ⑥. Tighten the bolt ⑥ to increase, or loosen the bolt ⑥ to decrease, the height. Tighten the nut ⑥ when the height is approximately 30 mm.

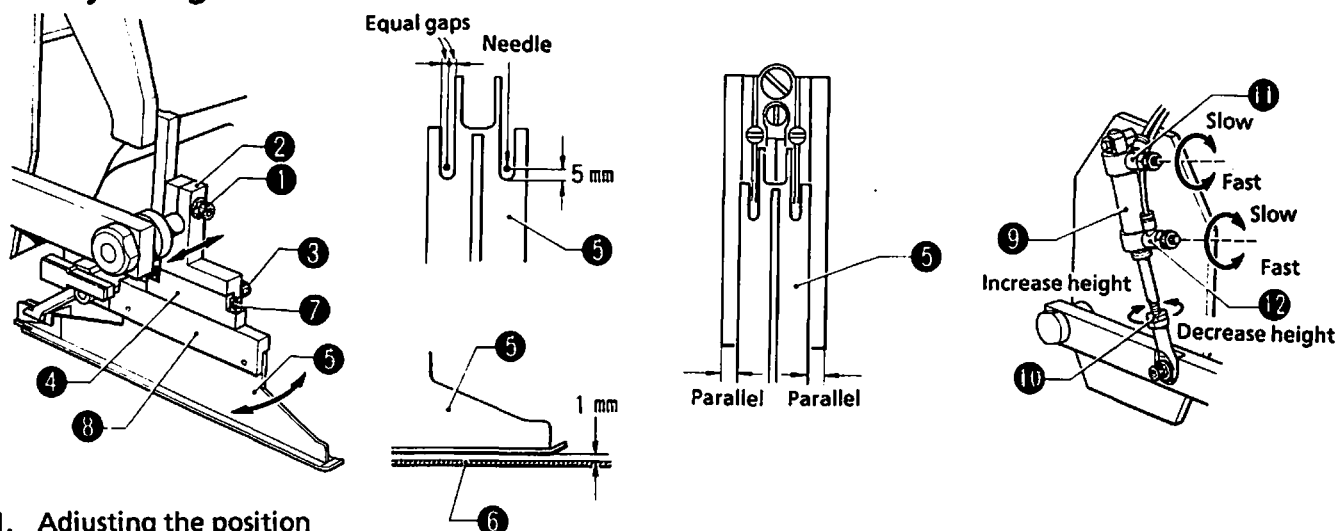


(4) Adjusting the carriage feed and flap presser operating speed



1. Carriage feed descent speed
Adjust the speed control joint ② of the cylinder assembly ① to the speed at which no shock in carriage feed operation occurs.
2. Carriage feed lifting speed
Adjust the speed control joint ③ of the cylinder assembly ① to the speed at which no shock in carriage feed operation occurs. Tighten to decrease, or loosen to increase, the speed.
3. Flap presser descent speed
Adjust the speed control joint ⑤ of the cylinder assembly ④ to the speed at which no shock in flap presser operation occurs. Tighten to decrease, or loosen to increase, the speed.

7. Adjusting the binder



1. Adjusting the position

When the binder is down, the needle should descend to approximately the center of the needle location in the binder. The gap between the needle and the binder indent should be 5 mm.

(Right-left adjustment)

Loosen the bolt ① and shift the fitting plate A ② right or left so that the needle descends to approximately the center of the needle location. Then tighten the bolt ①.

(Front-back adjustment)

Loosen the two bolts ⑤ and shift the fitting plate B ④ back and forth so that the gap between the needle and the binder indent is approximately 5 mm and so that the gap between the bottom of the binder ⑤ and the top of the slide plate ⑥ is 1 mm. Then tighten the bolts ⑤.

2. Parallelism to the carriage feed

The binder ⑤ should be parallel to the inner surface of the carriage feed when the binder ⑤ is lowered and seen from the front.

(Adjustment)

Loosen the two bolts ⑦ and shift the fitting plate C ⑧ right or left so that the binder is parallel to the needle plate. Then tighten the bolts ⑦.

※ Be sure that the needle descends to the center of the binder needle location.

3. Cloth slide plate height

When the binder ⑤ is lowered, the gap between the bottom of the binder ⑤ and the top of the cloth slide plate ⑥ should be approximately 1 mm (standard) and these surfaces should be parallel.

※ The gap should be enough so that two piles of the material will move easily under the binder ⑤.

(Adjustment)

Loosen the nut ⑩ of the cylinder ⑨, and turn the cylinder shaft until the gap is approximately 1 mm (standard). Then tighten the nut ⑩.

4. Vertical speed of the binder

The speed should be adjusted so that the binder travels as fast as possible without any shock on the ascending or descending stroke. It should descend earlier than the folding plate operation.

(Adjustment)

Ascent

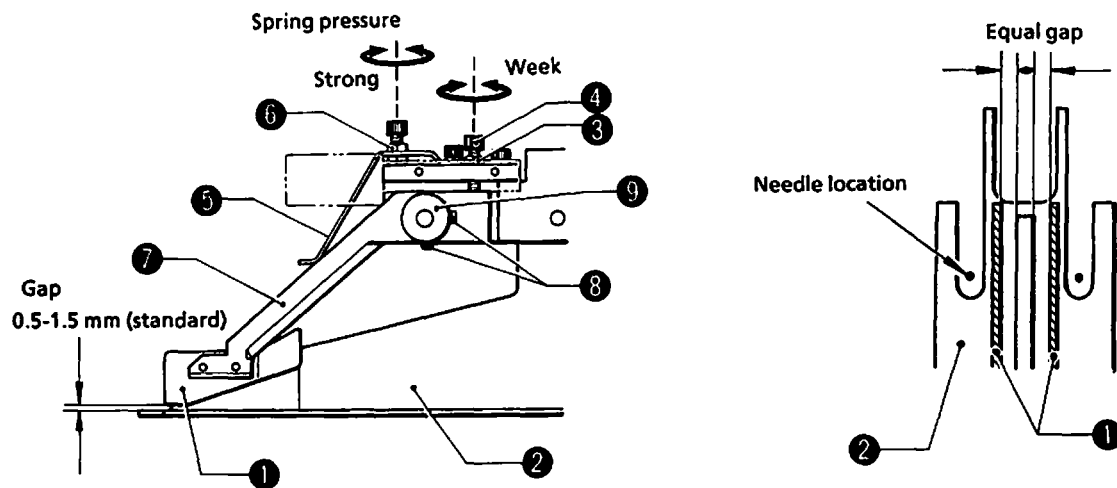
Loosen (turn counterclockwise) the speed control ⑪ on the top of the cylinder ⑨ to increase the speed; tighten (turn clockwise) to decrease the speed.

Descent

Loosen (turn counterclockwise) the speed control ⑫ on the bottom of the cylinder ⑨ to increase the speed; tighten (turn clockwise) to decrease the speed.

※ The folding plate timer can be adjusted to 250 msec. or 350 msec. using DIP switch 24.

8. Adjusting the cloth guide



1. Right-left cloth guide position

The gap between the cloth guide ① and the binder assembly ② should be equal on right and left sides. The cloth guide ① should not contact both the needle and the binder assembly ②.

※ The gap width will vary with the gap between the binder and the needle.

2. Cloth guide height

The gap between the bottom of the cloth guide ① and the top of the binder assembly ② should be 0.5-1.5 mm (standard).

※ The gap should be adjusted according to material thickness, and should allow the material to slide easily over the cloth guide ①.

(Adjustment)

Loosen the nut ③, and turn the bolt ④ (tighten to raise, loosen to lower) to adjust the gap. Then, while holding the bolt ④ so that it will not turn, tighten the nut ③.

3. Plate spring tension

Adjust the tension of the plate spring ⑤ in the cloth guide ①.

※ The tension will vary with material thickness. If the tension too weak, the welt may vary or needles may break. If it is too strong, the welt may be pulled.

(Adjustment)

Turn the nut ⑥ clockwise to increase the tension, or counterclockwise to decrease the tension.

4. Cloth guide movement

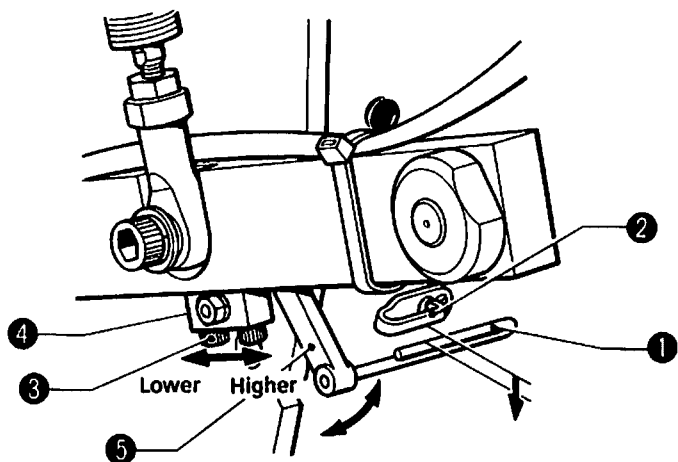
There should be no play on the right and left sides of the cloth guide arm ⑦. The arm should rise more than 5 mm when lifted by hand, and should be descend smoothly by the presser of the plate spring ⑤.

(Adjustment)

Loosen the two screws ⑧ and move the set collar ⑨. Adjust the cloth guide arm ⑦ so that there is no play on the right and left sides, and that it rises more than 5 mm when lifted by hand. Tighten the screws ⑧.

※ When the flap sensor is already attached, adjust the sensor fitting screw so that it does not hit the plate spring ⑤ and the cloth guide arm ⑦.

9. Adjusting retention (Required to assure thread remainder for sewing start.)



1. When the binder assembly rises, the retention hook ① should be lower than the arm thread guide M ② and should not hit such parts as the flap sensor.

(Adjustment)

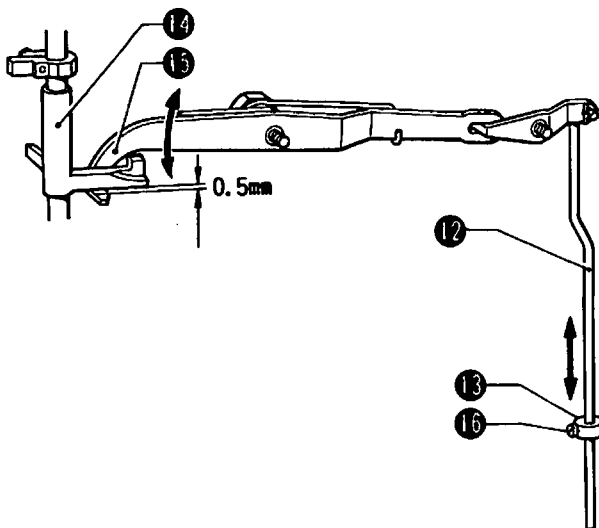
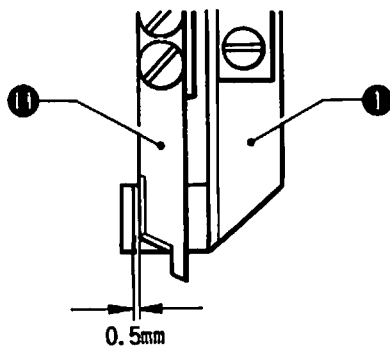
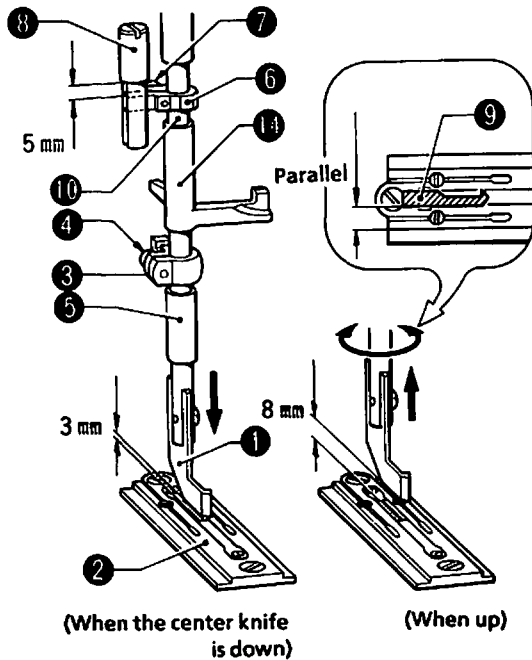
Loosen the two bolts ③, shift the cam follower plate ④ right or left to adjust the height. Then tighten the bolts ③.

※ If the retention hook ① is too high, a needle thread might not be retained properly. If it is too low, a thread might cast off the needle at sewing start.

2. Make sure the retention arm ⑤ moves easily by its own weight.

10. Adjusting the center knife assembly

(1) Adjusting the center knife guide



1. When the center knife guide ① is down (the power OFF), the center knife guide ① should be 3 mm above the top of the needle plate ②.

(Adjustment)

Loosen the screw ④ in the presser bar bracket ③. Adjust the gap between the center knife guide ① and the top of the needle plate ② to 3 mm. Set the presser bar bracket ③ against the presser bar bush ⑤, and tighten the screw ④.

2. When the center knife guide ① is up (the power and the air supply ON), the center knife guide ① should be 8 mm above the top of the needle plate ②.

(Adjustment)

Loosen the screw ⑦ in the presser bar guide ⑥. When the center knife guide ① is down (the power OFF), raise or lower the presser bar guide ⑥ so that the gap between the presser bar guide ⑥ and the bush ⑤ is 5 mm. Turn the presser bar ⑩ so that the guide ① is parallel to the fixed knife ⑨. Then tighten the screw ⑦.

3. The gap between the center knife ⑪ and the center knife guide ① should be 0.5 mm.

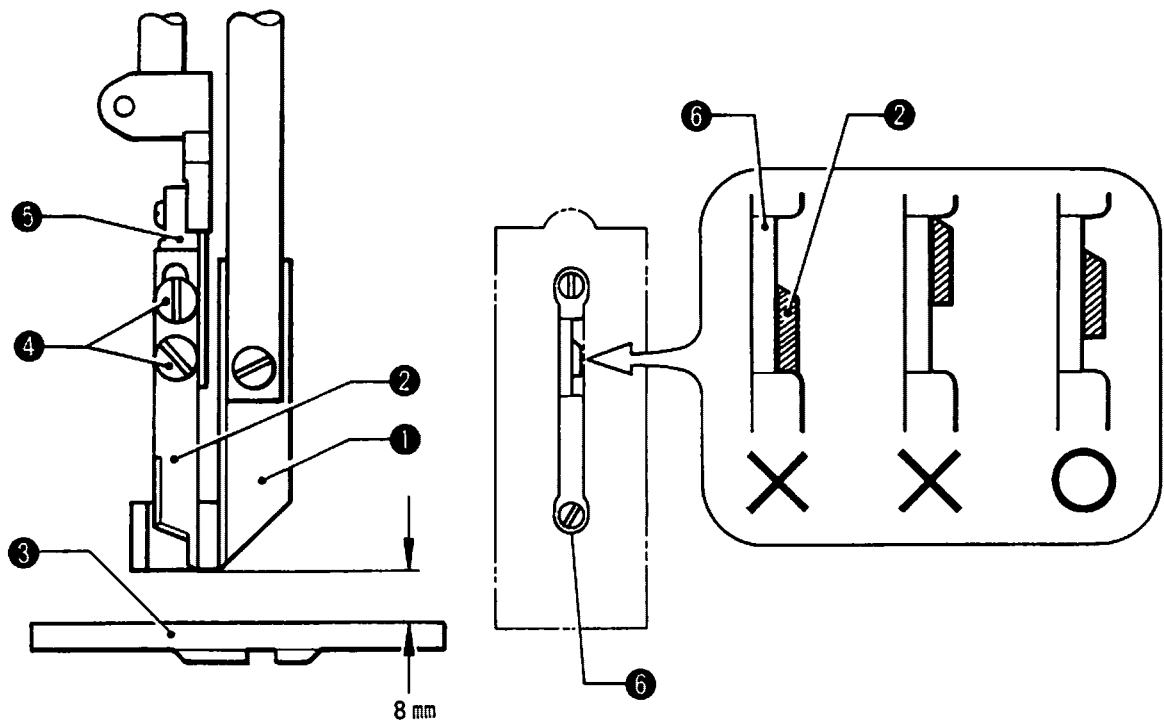
(Adjustment)

The gap will change with the center knife guide ① position.

4. Adjusting the set collar ⑮ in the knee lifter connecting rod ⑫

When the knee lifter connecting rod ⑫ is down (the gap between the center knife ⑪ and the needle plate ② is 3 mm), raise or lower the set collar ⑮ so that the gap between the presser bar lifter ⑭ and the knee lifter lifting lever ⑮ is approximately 0.5 mm. Then tighten the screw ⑯.

(2) Adjusting the center knife



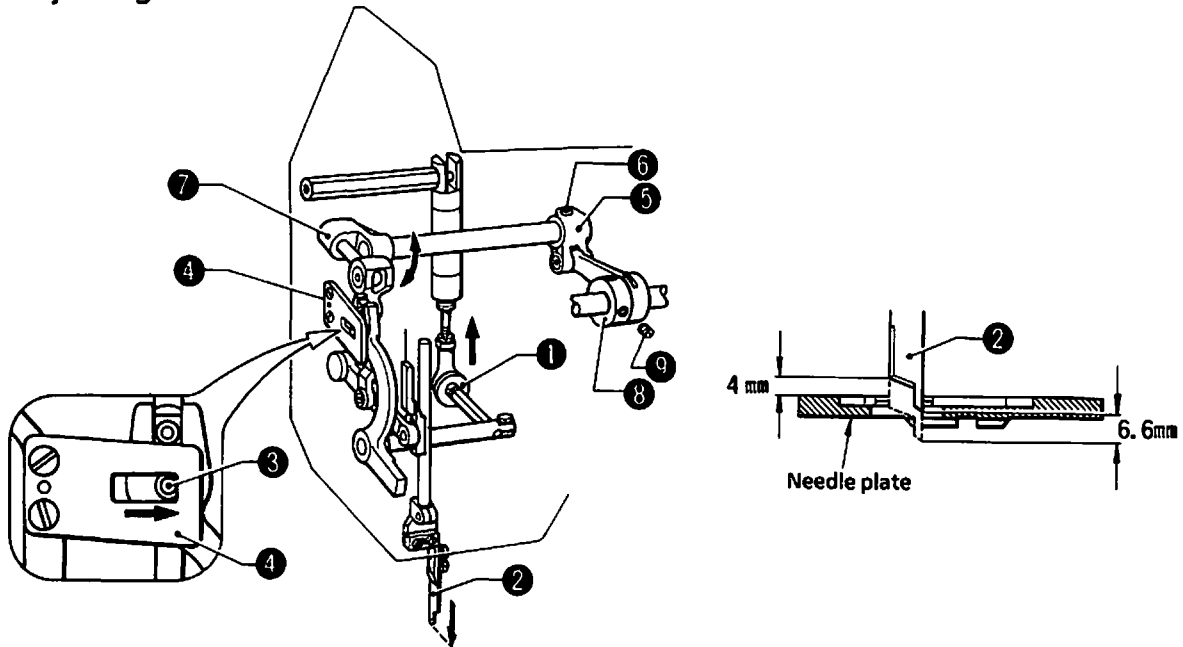
When the center knife guide ① is up (the power and the air supply ON), the gap between the center knife ② tip and the needle plate ③ top should be 8 mm (the same height as the center knife guide ①).

(Adjustment)

Loosen the two stud screws ④, and raise or lower the center knife ② so that the gap between the center knife ② and the needle plate ③ top is 8 mm. Tighten the screws ④.

※ Attach the center knife guide ② so that it contacts the back of the knife bracket ⑤, and so that the center knife ② does not contact the fixed knife ⑥.

(3) Adjusting the center knife stroke



1. The center knife stroke should be approximately 6.6 mm.

(Check)

Set the power and the air supply to OFF. While raising the link ball ① by hand, turn the pulley to move the center knife ② up and down.

At this time, make sure the center knife ② stroke is approximately 6.6 mm. When the center knife ② is at its up position, the gap between the needle plate top and the corner of the center knife ② should be 4 mm.

(Adjustment)

- Set the power and the air supply to OFF. While raising the link ball ① by hand, set the pin ③ all the way to the right inside the channel of lever stopper ④. Turn the pulley to move the center knife ② to its down position, then stop the pulley.
 - Loosen the screw ⑤ in the drive arm ⑥. Change the angle of the upper knife rock shaft ⑦ so that the center knife ② is 4 mm above the needle plate top. Tighten the screw ⑤. At this time, check that the needle clamp does not hit the center knife holder by turning the pulley.
 - Check that the stroke is 6.6 mm.
2. Make sure that the center knife ② reaches its down position with a slight delay after the needle bar reaches its down position.

(Adjustment)

Make sure the screw ⑧ in the eccentric wheel ⑨ is properly positioned to the screw stop in the arm shaft. If it is not, reset the screw ⑧.

- ★ The gap between the center knife ② and the needle should be 5.5 mm.

Center knife ② ON timing

Small gauge (8, 10, 12, 14mm)
Large gauge (16, 18, 20 mm)

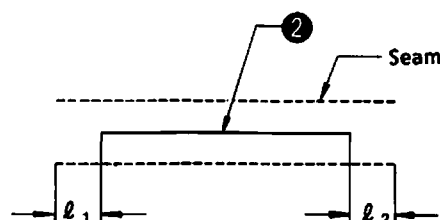
Center knife compensation 0

$l_1 = l_2 = 5.5 \text{ mm}$ -approx. 0.3 mm
 $l_1 = l_2 = 9.4 \text{ mm}$ -approx. 0.3 mm

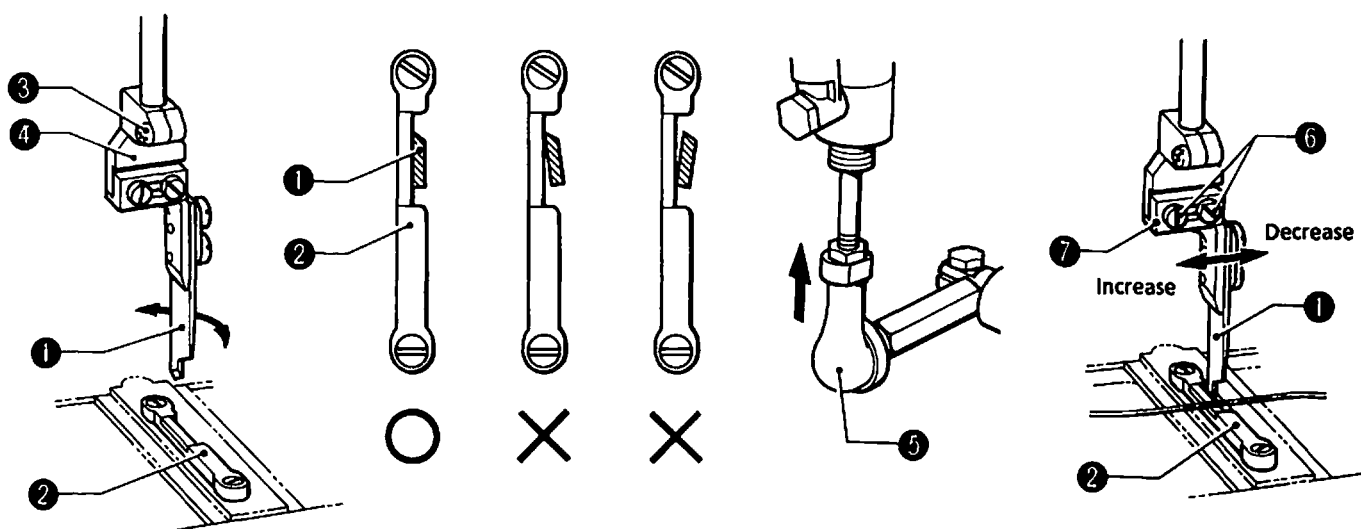
Compensation (1 increment)

Compensation 9

8.5 mm
12.5 mm



(4) Adjusting the center knife pressure



1. Adjusting the center knife right-left angle

The center knife ① should be parallel to, and flush with, the cutting edge of the fixed knife ②.

(Adjustment)

Loosen the screw ③, and turn the center knife holder ④ right or left to adjust the parallelism of the fixed knife ② and the center knife ①. Then tighten the screw ③.

2. Adjusting the center knife pressure

※ If the knife pressure is greater than required, the knife will wear more quickly, and the knife will not cut properly.

(Check for correct knife pressure)

1. After turning off the power and the air supply, set a thread over the fixed knife ②.
2. Turn the pulley while raising the link ball ⑤ by hand. When the center knife ① descends and crosses with the fixed knife ②, check that the thread is cut.
3. When the center knife ① crosses with the fixed knife ②, the pulley should not get stiff and the center knife ① should move smoothly.

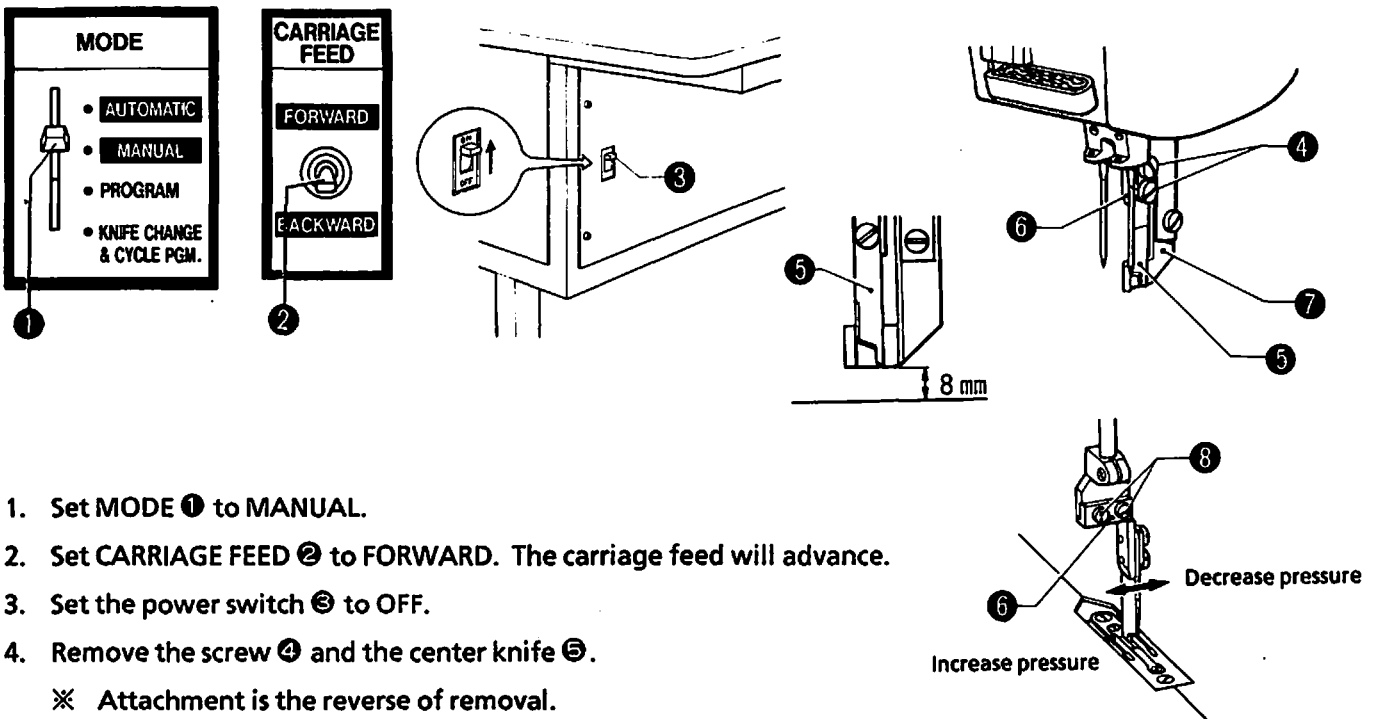
(Adjustment)

Loosen the two screws ⑥, and shift the knife bracket ⑦ right or left.

When the center knife ① crosses with the fixed knife ②, adjust the center knife ① so that it moves smoothly and the pulley does not get stiff.

Tighten the screws ⑥.

(5) Replacing the center knife

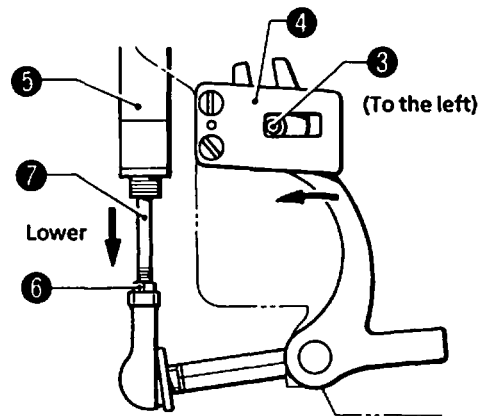
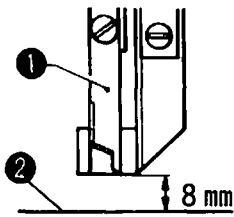
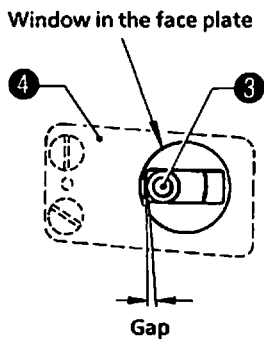


1. Set MODE ① to MANUAL.
2. Set CARRIAGE FEED ② to FORWARD. The carriage feed will advance.
3. Set the power switch ③ to OFF.
4. Remove the screw ④ and the center knife ⑤.
※ Attachment is the reverse of removal.

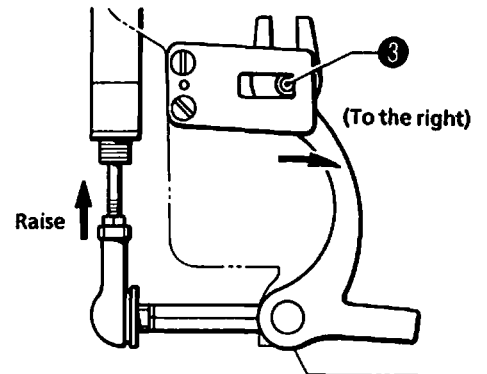
Cautions on attachment

- Align the center knife ⑤ with the screw-hole in the center knife bracket ⑥, and secure it with the screw ④.
- The tip of the center knife ⑤ should be 8 mm above the needle plate top. (Align the knife with the center knife guide bottom.)
- Set the power switch to ON, and make sure the center knife tip does not protrude from the center knife guide ⑦.

(6) Adjusting the center knife cylinder



◀ Cylinder rod extended ▶



◀ Cylinder rod raised ▶

Look through the round window on the face plate when the center knife ① is 8 mm above the needle plate ②. The pin ③ should be on the left side of the cylinder lever stopper ④, and there should be a small gap.

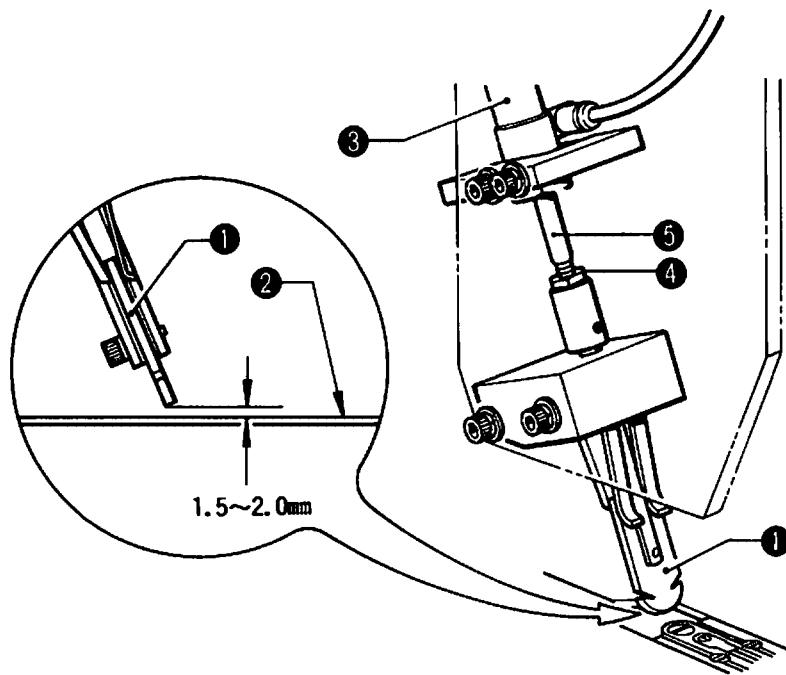
(Adjustment)

Turn off the power and the air supply, and extend the cylinder rod.

Loosen the nut ⑥ on the cylinder ⑤. Extend or retract the cylinder rod ⑦ so that there is a small gap between the pin ③ and the left side of the stopper plate ④. Then tighten the nut ⑥.

11. Adjusting the movable knife assembly

(1) Adjusting the movable knife stroke



When the movable knife ① is at the bottom of its stroke, there should be a 1.5-2.0 mm gap to the top of the cloth slide plate ②.

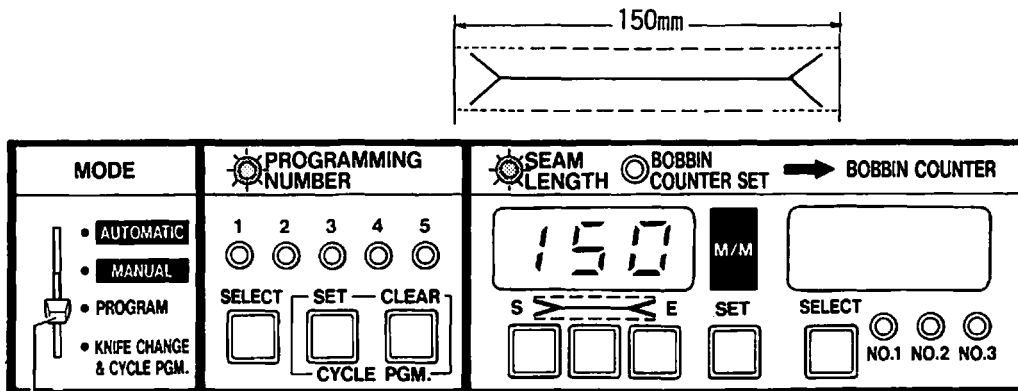
(Adjustment)

Loosen the nut ④ in the cylinder assembly ③, and extend or retract the cylinder rod ⑤ to adjust the gap.

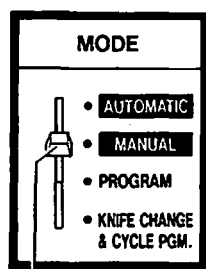
Extend the rod to decrease the gap.

Retract the rod to increase the gap.

(2) Adjusting the movable knife sensor



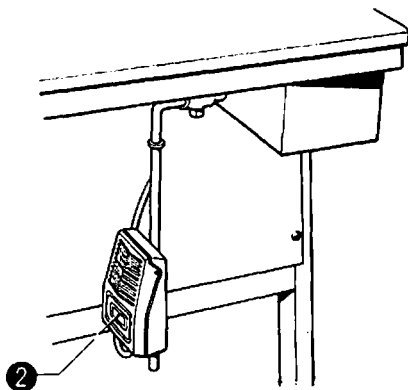
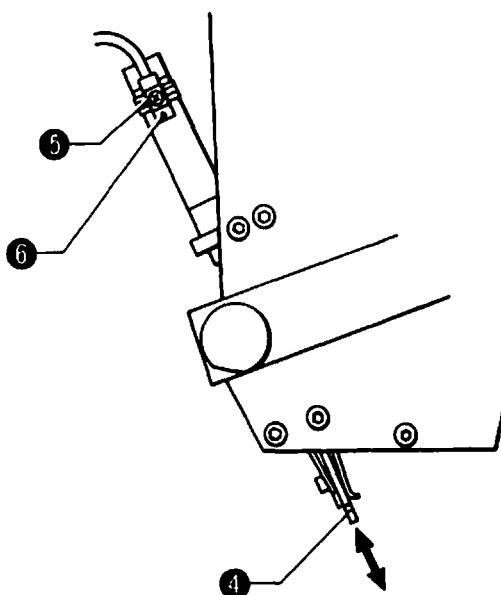
①



①



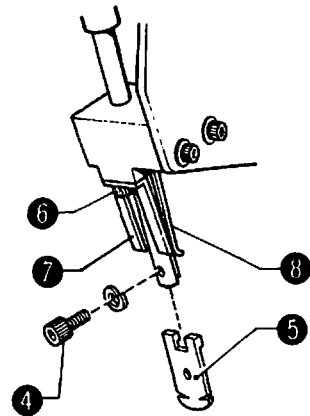
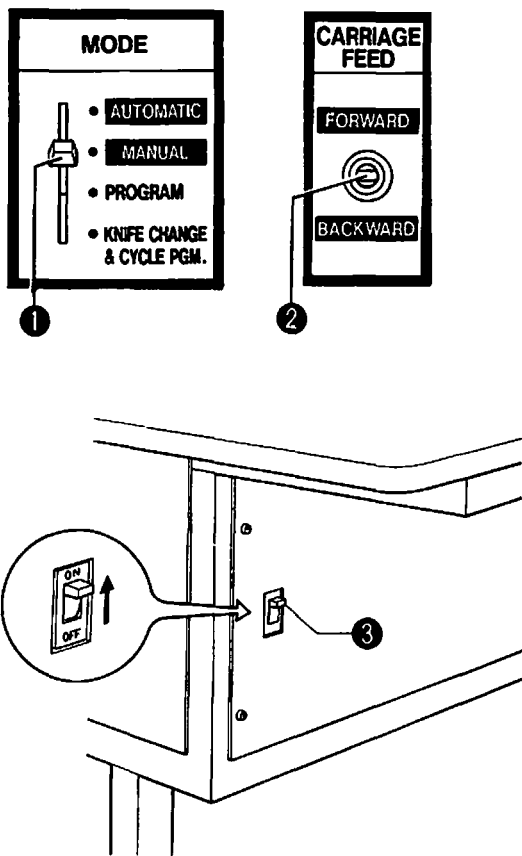
③



②

1. Set MODE ① to PROGRAM.
Set the seam length to 150 mm.
 2. Set MODE ① to MANUAL.
 3. Set a piece of material in place so that the cushion on the back of the carriage feed does not wear.
 4. Press the start switch ②.
The carriage feed will move to the sewing start position.
 5. Set THREAD TRIMMER ③ to UPPER. The movable knife ④ will descend.
Adjust the timing of when the thread trimmer becomes OFF using the movable knife sensor ⑤.
 6. Slide the movable knife sensor ⑤ up or down, and secure where the movable knife ④ does not strike the flap presser (folding plate).
- ※ When the movable knife ④ is OFF, it will not operate if the movable knife sensor indicator ⑥ is already on.

(3) Replacing the movable knife



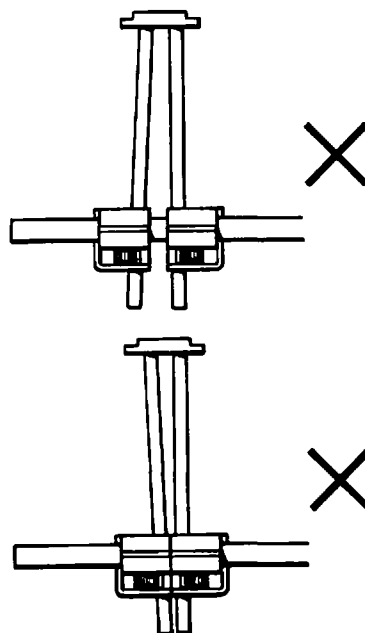
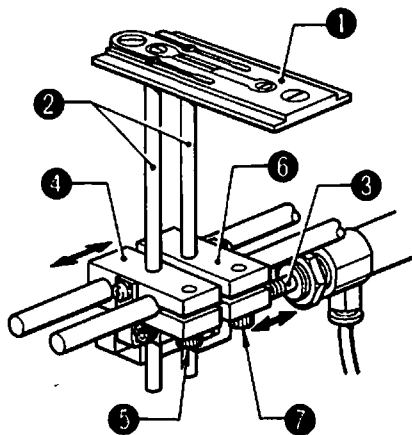
1. Set MODE ① to MANUAL.
 2. Set CARRIAGE FEED to FORWARD to move the carriage feed out of the way so that knife replacement is easier.
 3. Set the power switch ③ to OFF.
 4. Remove the screw ④ and the movable knife ⑤.
 5. Remove the screw ⑥ and the fixed knife ⑦.
- ※ Attachment is the reverse of removal.

Caution on attachment

- There should be no gap between the fixed knife ⑦ and spring ⑧ and the movable knife ⑤. The fixed knife ⑦ and the spring ⑧ should be pressed properly.
- ※ Increase the pressure if the knife does not cut properly. Refer to page 38.

12. Adjusting the fixed knife assembly

(1) Adjusting the fixed knife right-left position



When the fixed knife ② is in the two knife holes of the needle plate ①, move the cylinder rod ③ right or left by hand. The cylinder rod ③ should move smoothly.

※ If the rod ③ is stiff, the knife ② may be twisted because only the top of the fixed knife ② is in the needle plate knife holes.

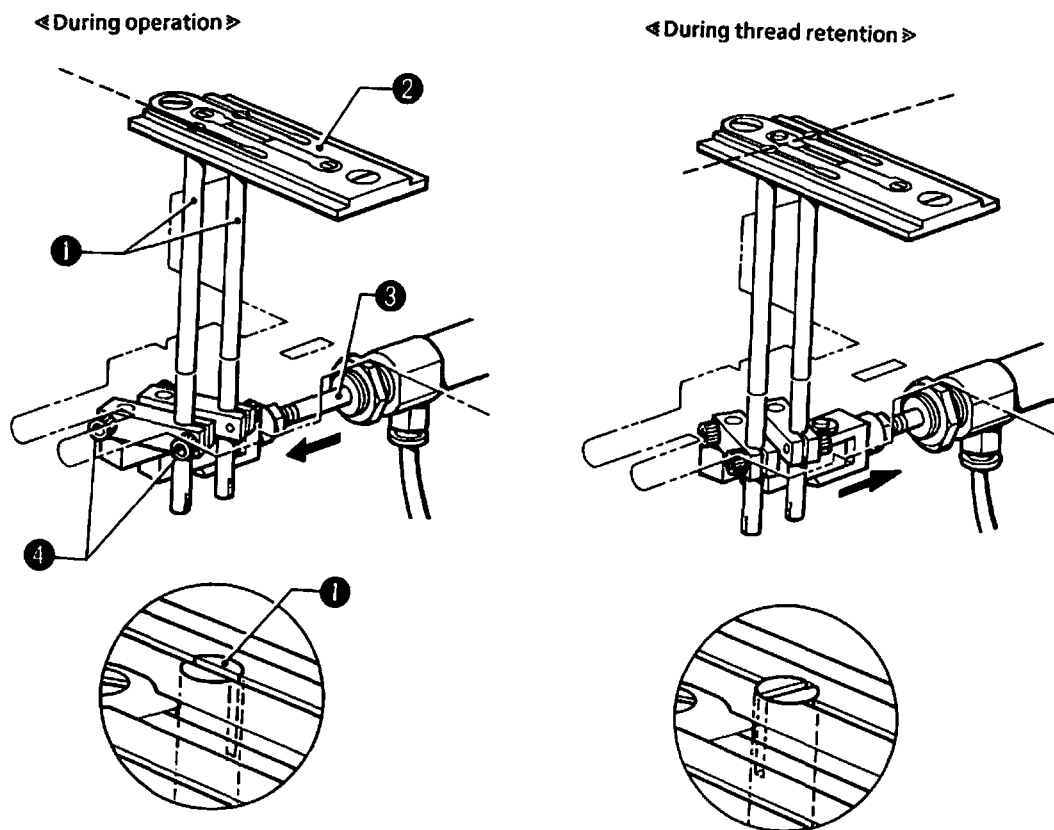
(Adjustment)

1. Loosen the bolt ⑤ in the knife holder (L) ④.

2. Move the knife holder (L) ④ right or left. Tighten the bolt ⑤ to where the rod ③ moves easily.

※ There is usually no need to loosen the bolt ⑦ in the knife holder (R) ⑥. However, if the right knife is not positioned properly or if the cylinder rod is stiff, loosen the bolt ⑦ in the knife holder (R) ⑥, and adjust the position of the knife holder (R) ⑥ while moving the cylinder rod ③. Then tighten the bolt ⑦ to where the rod ③ moves easily.

(2) Adjusting the fixed knife height and angle



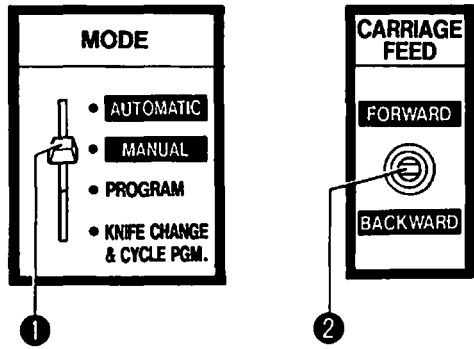
The fixed knife ① should be flush with the top of the needle plate ② or up to 0.2 mm lower. The groove of the fixed knife ① should align with the needle plate channel when the knife operates (when the cylinder rod ③ retracts).

(Adjustment)

Loosen the bolt ④, and move the fixed knife ① up or down to adjust the height. Turn the knife ① right or left so that the knife ① is parallel to the channel in the needle plate ② when the knife ① operates (when the cylinder rod ③ extends to the left). Then tighten the bolt ④.

※ Sew to make sure there are neither thread trimming errors nor thread retention errors.

(3) Replacing the fixed knife

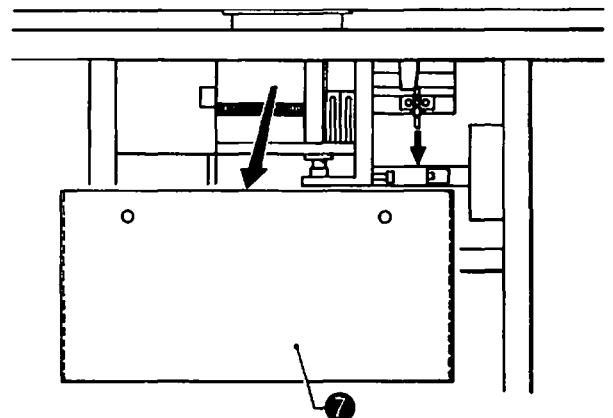
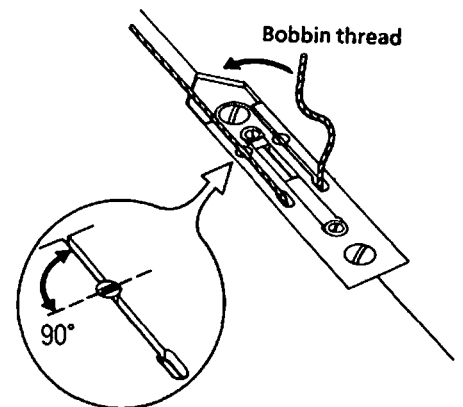
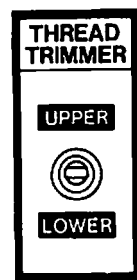
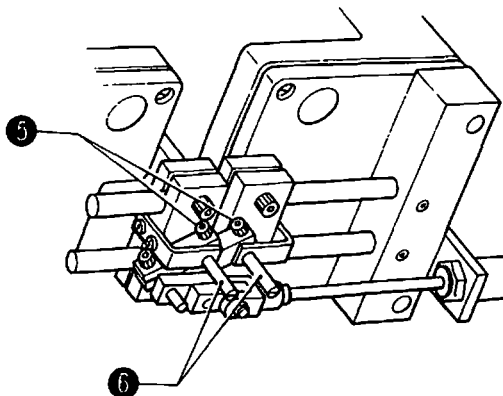
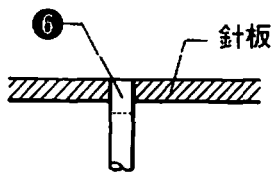
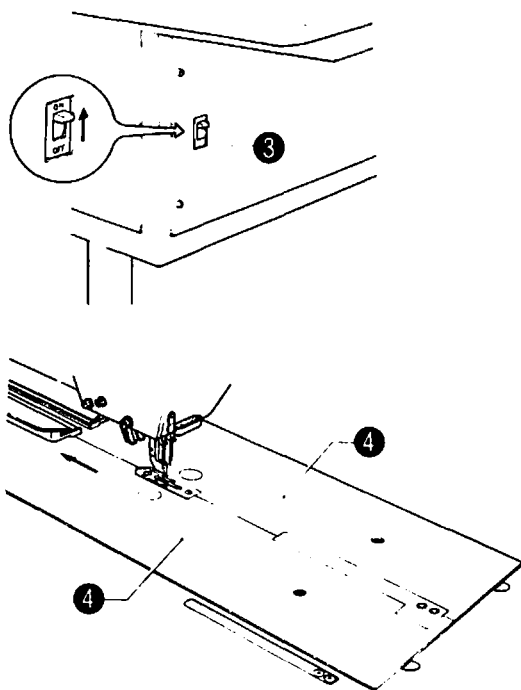


1. Set MODE ① to MANUAL.
2. Set CARRIAGE FEED ② to FORWARD. The carriage feed will advance.
3. Set the power switch ③ to OFF.
4. Remove the slide plates (R) and (L) ④.
5. Tilt the machine head.
6. Loosen the two screws ⑤, and right the machine head.
7. Remove the right front cover ⑦, then remove the fixed knife ⑥ from the underside of the table.

※ Attachment is the reverse of removal.

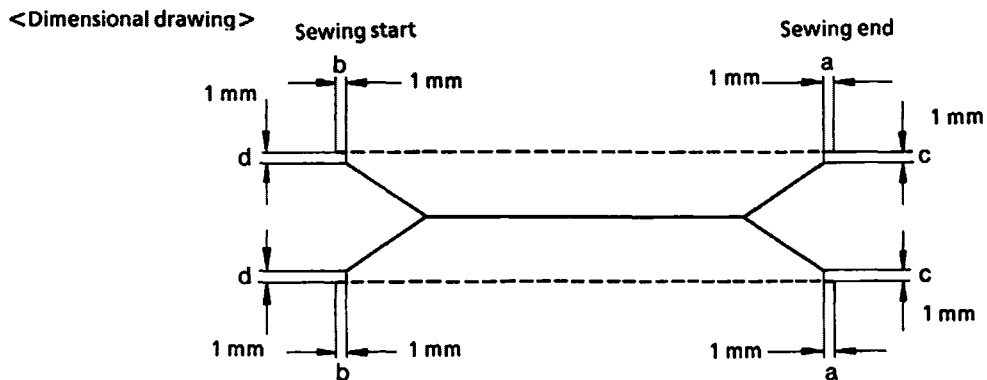
Cautions on attachment

- Be sure the fixed knife ⑥ does not extend above the needle plate top.
- When the cylinder rod is fully retracted, the groove in the fixed knife ⑥ should be aligned with the groove in the needle plate.



13. Adjusting the corner knife

(1) Adjusting the corner knife standard position

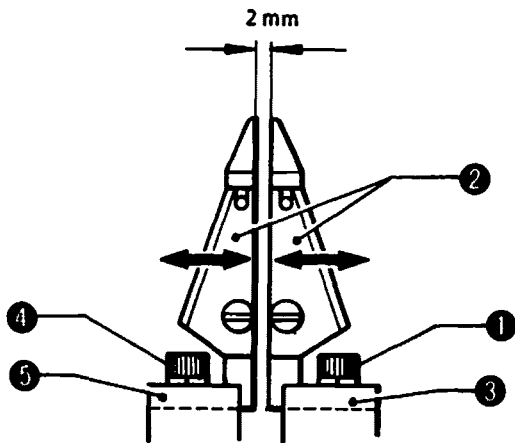


After corner knife position adjustment 5-5 and center knife compensation 0-0 with a two ply serge, the above dimensions will be 1 mm.

※ Adjust the corner knife position according to material thickness.

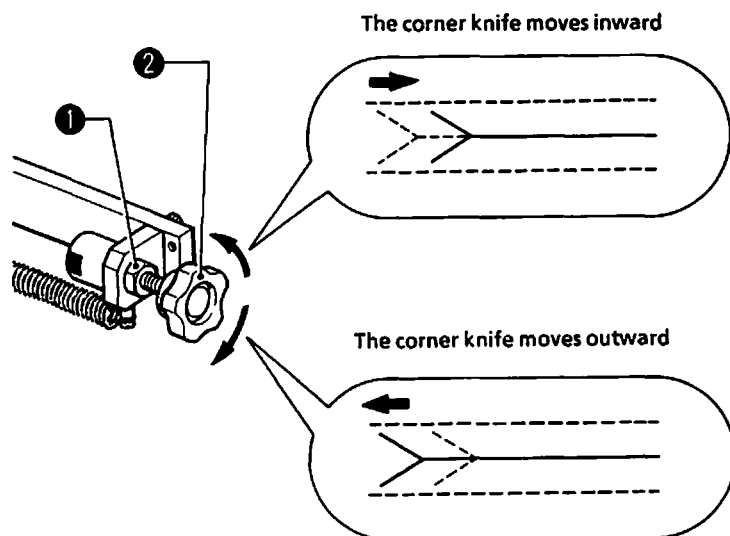
(2) Adjusting the corner knife front-back position (standard)

1. Sewing end side corner knife position



- ① Set the mode switch to KNIFE CHANGE & CYCLE PGM., raise the corner knife, and bleed the air.
 - ② The corner knife ② cutting position should be 1 mm inside as shown in Fig. a. Loosen the bolt ① on the sewing end side, and move the slider ⑤ back and forth to adjust it, then tighten the bolt ①.
 - ③ Loosen the bolt ④ on the sewing start side, and adjust the slider ⑤ back and forth so that the gap between the back sides of the two corner knives ② is 2 mm, then tighten the bolt ④.
- ※ When the slider is replaced during gauge replacement, replace one slider (either on the sewing start or sewing end side) and adjust the gap to 2 mm. There should be no significant change in the cutting position.

2. Sewing start side corner knife position



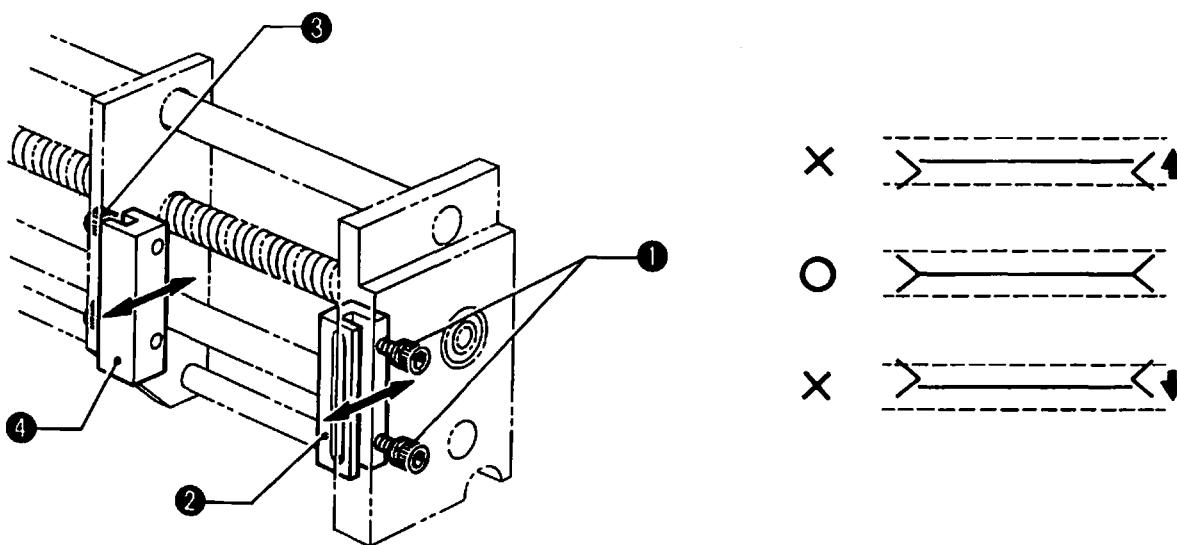
- ※ After performing the adjustment in 1. on the preceding page, perform this adjustment if the sewing start front-back position is not correct.
Adjust so that the corner knife cutting position of the sewing start side is 1 mm inside as shown in Fig. b on the preceding page.

(Adjustment)

Loosen the nut ①, turn the knob ② to adjust it, then tighten the nut ①.

※ Sew to confirm the above dimensions.

(3) Adjusting the corner knife right-left position (angle) (standard)



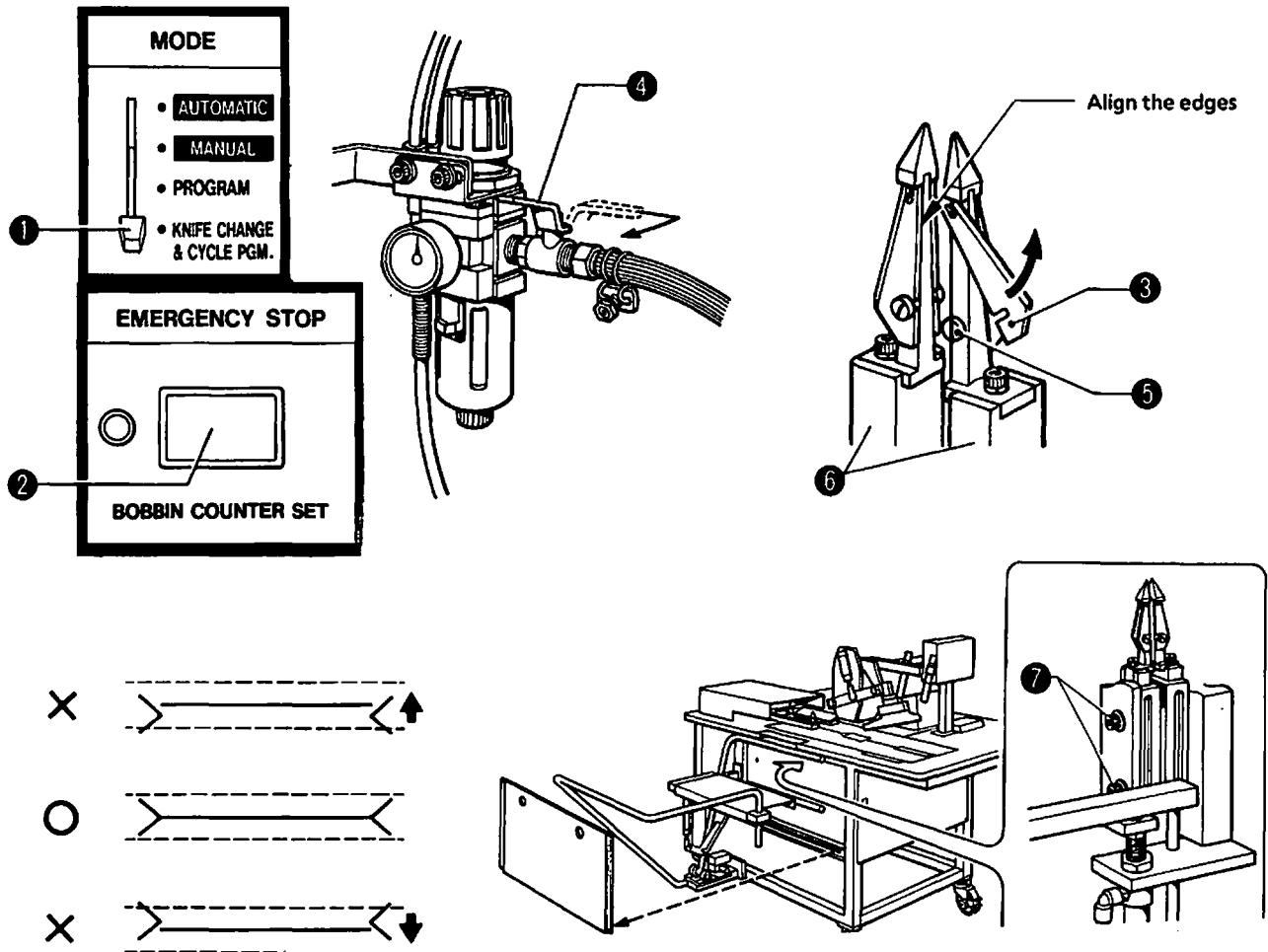
- ★ The sewing end position of the corner knives should be 1 mm inside the seam, as with the sewing start position shown in Fig. c and Fig. d on the preceding page. The right and left gaps should also be identical.

(Adjustment)

Sewing start side: Loosen the two bolts ③, move the slide guide (R) ④ right or left to obtain the dimensions (Fig. d), then tighten the bolts ③.

Sewing end side: Loosen the two bolts ①, move the slide guide (L) ② right or left to obtain the dimensions (Fig. c), then tighten the bolts ①.

(4) Replacing the corner knife

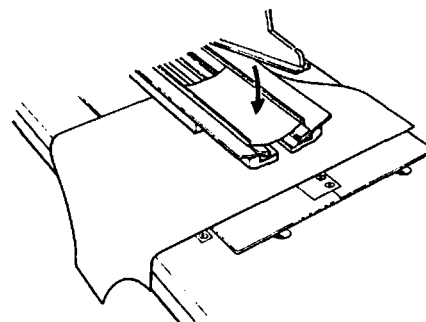
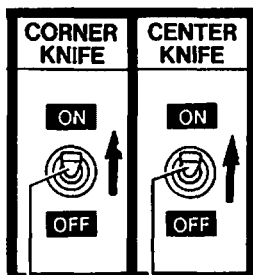
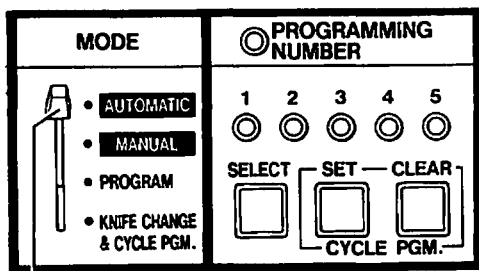
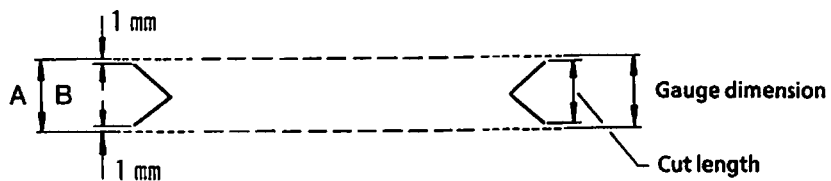


1. Set MODE ① to KNIFE CHANGE & CYCLE PGM.
2. Press EMERGENCY STOP ②.
An alarm will sound once, and the carriage feeds will move to the knife replacement position. The alarm will sound once more when the carriage feeds stop.
3. Press EMERGENCY STOP ② once more.
The alarm will sound twice, the carriage feeds and the flap pressers will descend, and the corner knives ③ will rise above the table.
※ Keep your hands away from the rising knife.
4. Turn the air cock ④ to stop the air supply. (Bleed the air.) The display shows "AIR OFF."
5. Loosen the screw ⑤, and replace the corner knife ③.
※ Align the edge of the corner knives ③ with the edge of the slider ⑥.
6. After replacing the knives, turn the air cock ④ to restore the air supply.
7. Press EMERGENCY STOP ②.
The alarm will sound twice, the carriage feeds and the flap pressers will rise, and the corner knives ③ will descend.
The carriage feeds will move to the stop position, and the alarm will sound once.

Caution on attachment

- If the corner knives are not in the center as shown in the figure, loosen the screws ⑦, and adjust the corner knives angle.

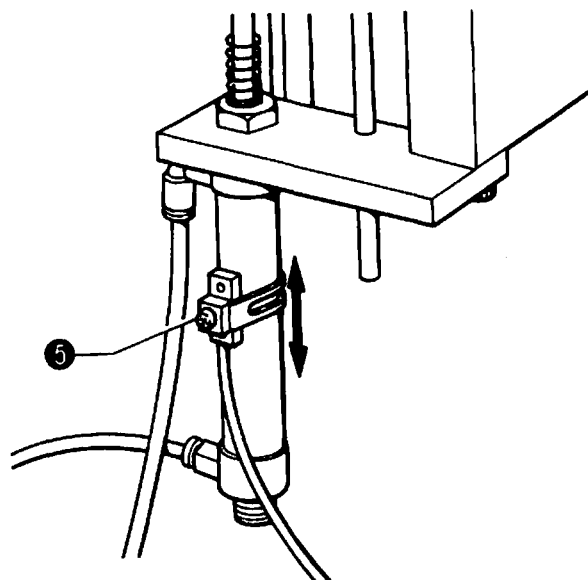
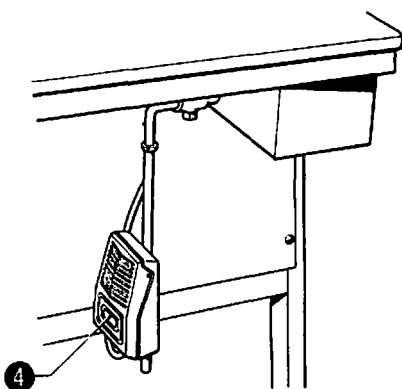
(5) Adjusting the corner knife sensor



1

2

3

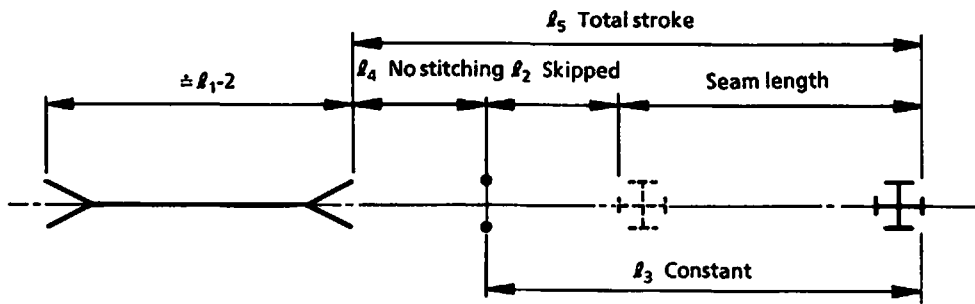


4

5

1. Set MODE ❶ to AUTOMATIC.
2. Set CORNER KNIFE ❷ and CENTER KNIFE ❸ to ON.
3. Set a piece of material in place, and press the start switch ❹.
4. When the corner knife operates after sewing, adjust the position of the sensor ❺ where the alarm stops. Make sure the blade of the corner knife cuts the material at this time. If the sensor position is too low, the corner knife will not rise enough.

(6) Corner knife operation timing to seam length



l_1 : Seam length

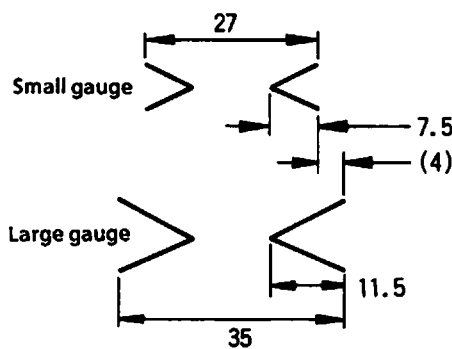
l_2 : Feed amount to sewing start position

l_3 : Feed amount from feed operation start to sewing end position
 $(l_3 = l_1 + l_2)$

l_4 : Feed amount from sewing end position to corner knife operating position

l_5 : Total feed amount
 $(l_5 = l_1 + l_2 + l_4)$

	l_1	l_2	l_3 ($l_1 + l_2$)	l_4	l_5 ($l_1 + l_2 + l_4$)	(m/m)
Small gauge	28-190	47-209	237	124	361	
Large gauge	36-190	47-201	237	120	357	

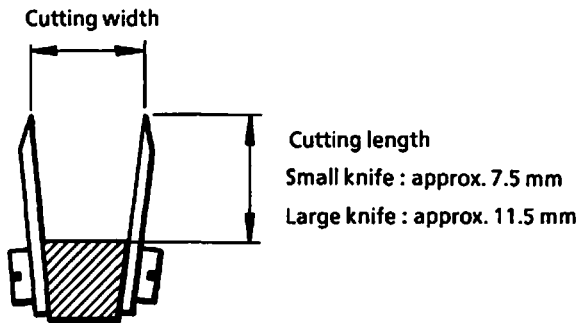


★ Because the cutting length of the large knives (L) for the large gauges (16, 18, 20 mm) are 4 mm longer than that of the small knives (S) for small gauges (8, 10, 12, 14 mm), the dimensions below will be measured with the large or small gauge.

No stitch feed (l_4)	Small gauge 124 mm	Large gauge 120 mm
Min. sewing length	Small gauge 28mm	Large gauge 36mm

※ Actual dimensions when the material is cut: 27→26, 35→34

(7) Corner knife cutting width



1. To increase cutting width greater than standard:

※ When the material is thin, increase the cutting width to obtain a better finish angle.

Turn over one corner knife when attaching it (so that the left side of the knife is attached on the right side for example) to increase width 0.8 mm.

Turn over both knives to increase width 1.6 mm.

2. To increase the cutting length by attaching the corner knife (L) on the small gauge:

Cutting width increases 0.8 mm.

Cutting length increases from 7.5 mm to 11.5 mm.

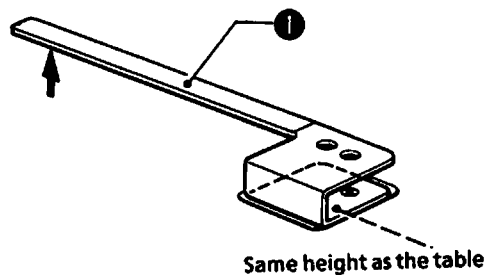
※ Set DIP switch 3-1 to OFF, and turn the knob to bring the corner knife 4 mm closer to the front.

Cutting width according to gauge size

Gauge size (mm) \ Knife cutting width (mm)	8	10	12	14	16	18	20
Standard	6	8	10	12	14	16	18
One corner knife reversed	6.8	8.8	10.8	12.8	14.8	16.8	18.8
Both corner knives reversed	7.6	9.6	11.6	13.6	15.6	17.6	19.6
Using corner knife (L)	6.8	8.8	10.8	12.8			

14. Adjusting the padding cloth presser foot

(1) Adjusting the padding cloth presser foot spring (R) height

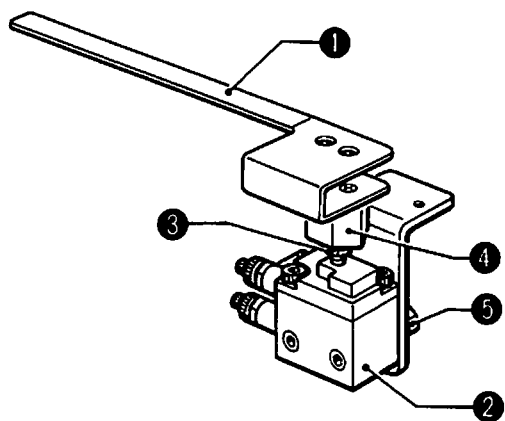


★ When the padding cloth presser foot spring (R) ① is raised (when the treadle is pressed back), the installation surface should be the same height as the table.

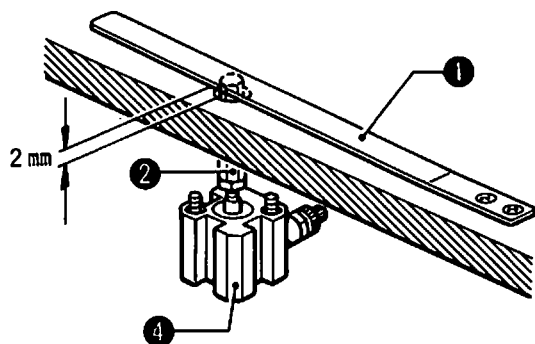
(Adjustment)

Loosen the nut ⑤ of the cylinder assembly ②, and adjust the length of the cylinder rod so that the distance between the top of the cylinder and the spring fitting shaft ④ is 33.5 mm.

Also, loosen the nut ⑤ and adjust the height of the cylinder ② so that the padding cloth presser foot spring (R) ① holds the padding cloth when the padding cloth presser foot spring (R) ① is down, and then tighten the nut ⑤.



(2) Adjusting the padding cloth presser foot spring (L) height



1. When the padding cloth presser foot spring (L) ① is raised, the padding cloth pusher ② should be 2 mm higher than the table.

(Adjustment)

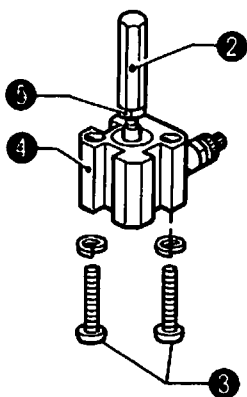
Remove the two screws ③ and the cylinder assembly ④ from the table.

Loosen the nut ⑤, and adjust the length of the cylinder rod, then tighten the nut ⑤.

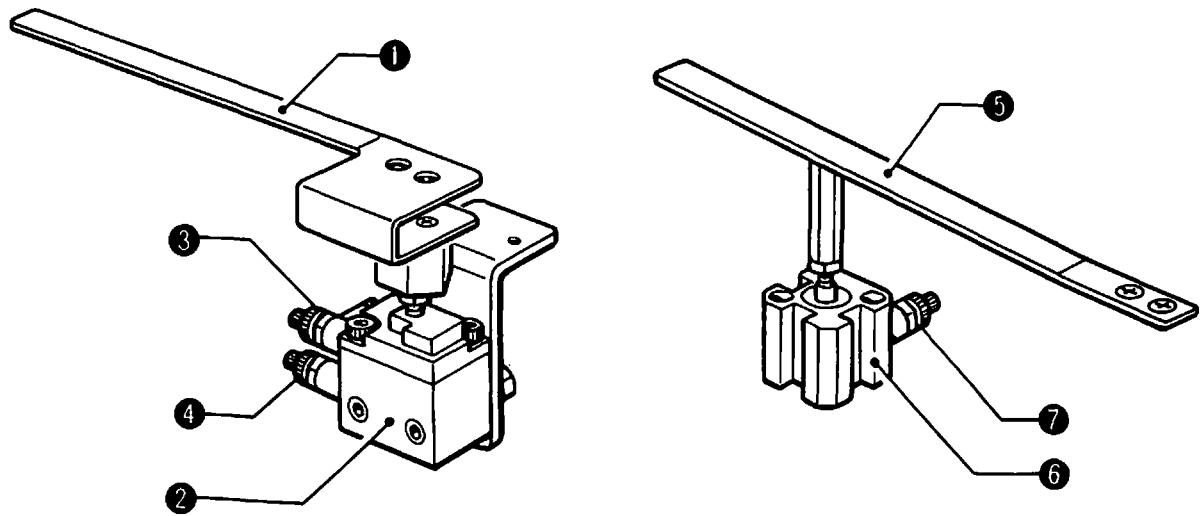
Remount the cylinder assembly ④ to the table with the screws ③.

2. Make sure the spring tension of the two springs (R) and (L) is adjusted so that when the padding cloth or sacking is being positioned, the cloth will not slip easily, and so that when the carriage feed operates, the padding cloth and sacking can be removed smoothly.

3. Make sure that when sewing has been completed and the carriage feed returns to the home position with the material held, the material does not catch on the spring (R) or (L).

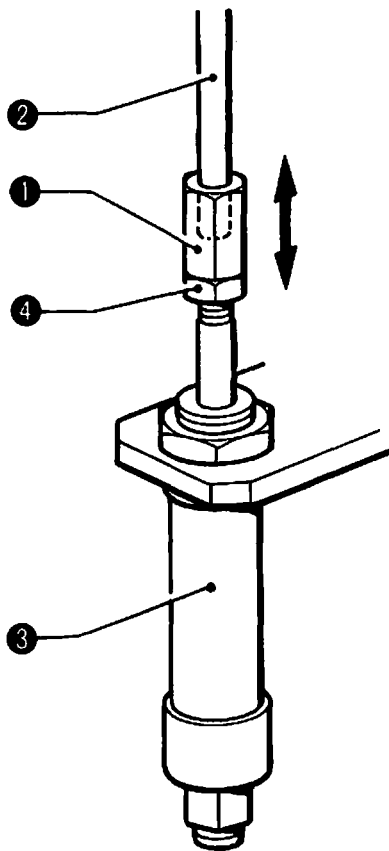


(3) Adjusting the padding cloth presser foot ascend speed



- 1. Adjusting the padding cloth presser foot (R) ① ascend and descend speed**
The ascend and descend speed should be adjusted to be as fast as possible without shock in presser foot operation.
(Adjustment)
Tighten the screw ③ of the cylinder assembly ② to decrease the ascend speed, and loosen it to increase the speed.
Tighten the screw ④ of the cylinder assembly ② to decrease the descend speed, and loosen it to increase the speed.
- 2. Adjusting the padding cloth presser foot (L) ⑤ ascend speed**
The ascend speed should be adjusted to be as fast as possible without shock in presser foot operation.
(Adjustment)
Tighten the screw ⑦ of the cylinder assembly ⑥ to decrease the ascend speed, and loosen it to increase the speed.

15. Adjusting the tension release



- (1) Adjusting the tension release cylinder assembly pusher
With the power OFF, move the pusher ① up or down by hand to adjust the gap (play) between the pusher ① and the knee lifter lifting bar ② to 1-2 mm.

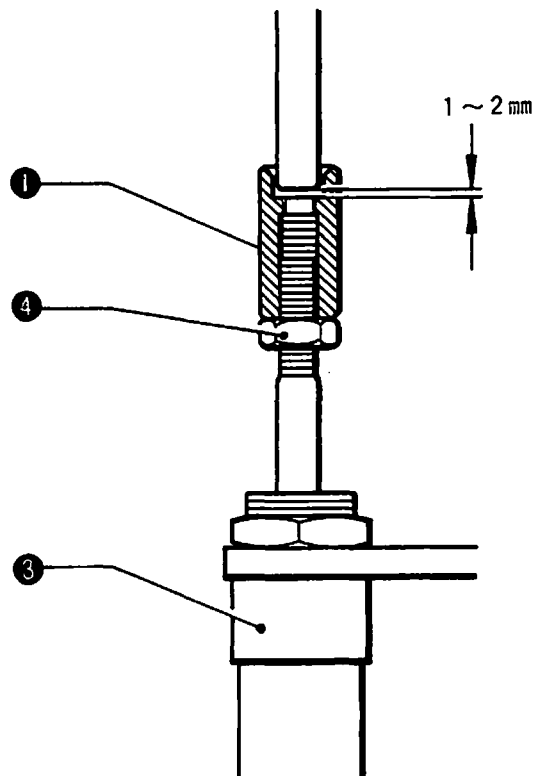
(Adjustment)

Remove the front cover, loosen the nut ④ in the tension release cylinder assembly ③, and adjust the length of the cylinder rod to obtain the above 1-2 mm gap.

Then tighten the nut ④, and remount the front cover.

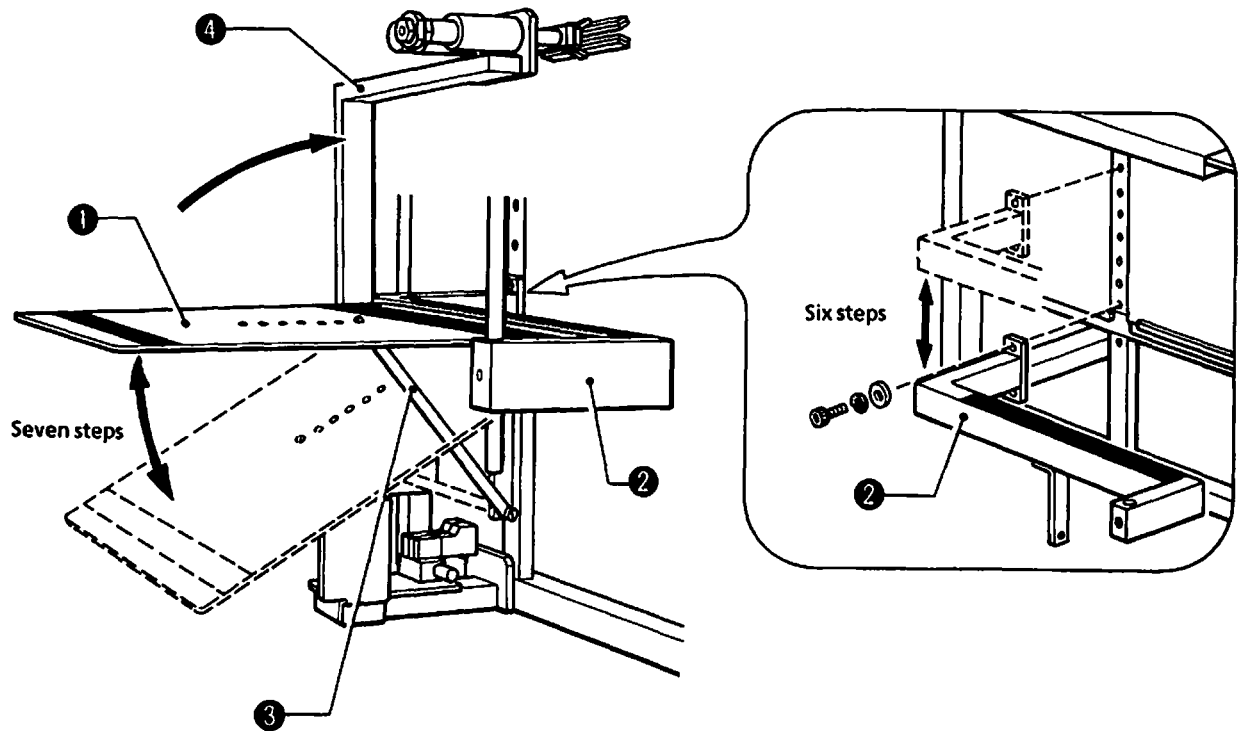
- (2) Make sure the play in the needle thread tension disc is at least 0.5 mm when the tension release operates (the power OFF, not sewing).

※ Adjust the pusher as above and the thread tension.



16. Adjusting the pickup type stacker

(1) Adjusting the stacker table position



1. Stacker table ① height

There are six vertical adjustment positions for the stacker table depending upon the installation position of the cloth stock arm ②.

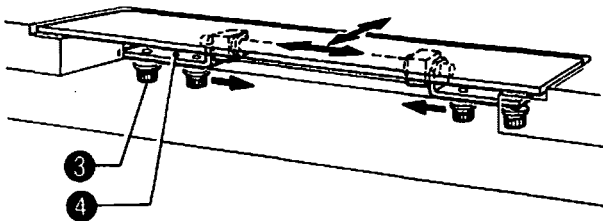
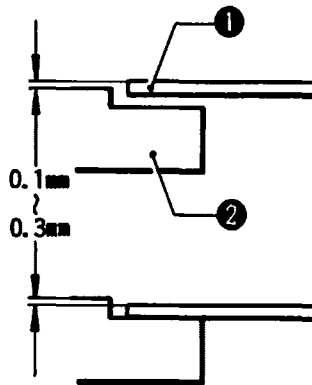
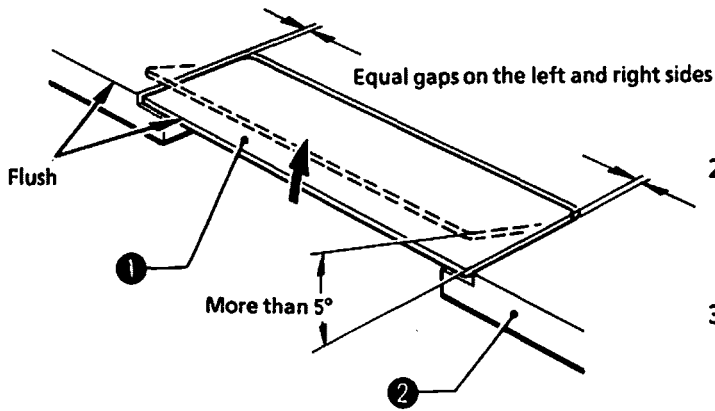
Raise the arm to reduce the stock number; lower the arm to increase the number.

2. Stacker table angle

The stacker table can be adjusted to one of seven angles depending upon the hole in the stacker table ① into which the table supporter bar ③ is inserted.

※ When the above stacker table ① height and angle adjustments have been completed, move the stacker arm ④ in the direction of normal operation by hand to make sure the arm does not strike the stacker table ①. If the arm strikes the table, readjust the angle and height.

(2) Adjusting the sub table position

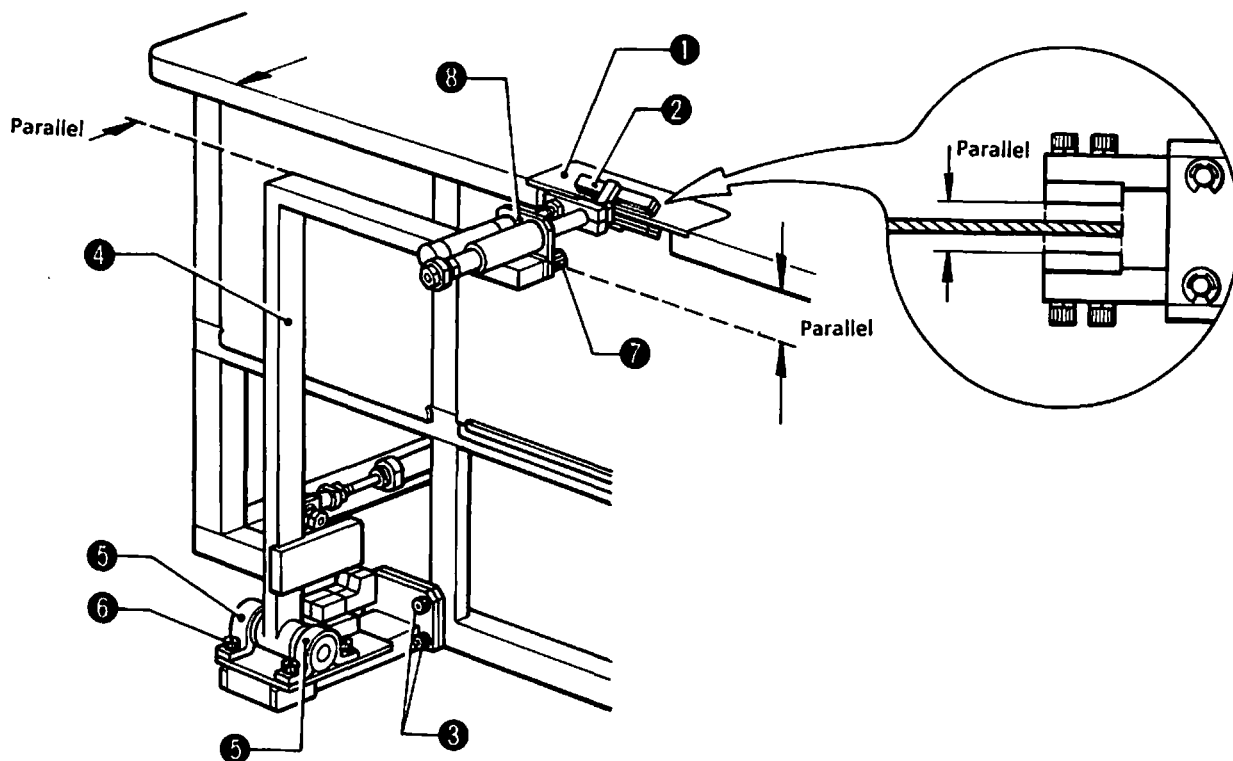


1. Sub table ① right-left position
Adjust the sub table ① so that the gaps between the sub table ① and the table ② are identical on the right and left sides, and there is no play on either side.
 2. Sub table ① height
The sub table ① should be at most 0.1 mm higher, and at most 0.3 mm lower than the table ②.
 3. Sub table ① front-back position
The sub table ① should be approximately flush with the front of the table ②.
 4. Sub table ① operating angle
There should be at least a 5° angle in the sub table ① when the table is raised.
- ※ The table will not rise if adjustment 3. above is not correct.

(Adjustment)

- (1) Loosen the four bolts ③.
- (2) To remove any play right-left, slide the sub table supporter ④ towards the center, and move the sub table ①. Move the sub table ① back and forth so that the front-back edge of the sub table ① is flush with the table ②, and so that the gaps on the right and left sides are identical. Tighten the bolts ③.
- (3) Make sure that the conditions in 1.-4. above are satisfied, and that the sub table ① moves smoothly up and down. (If the table is too heavy, the sub table supporter ④ may be too close.)

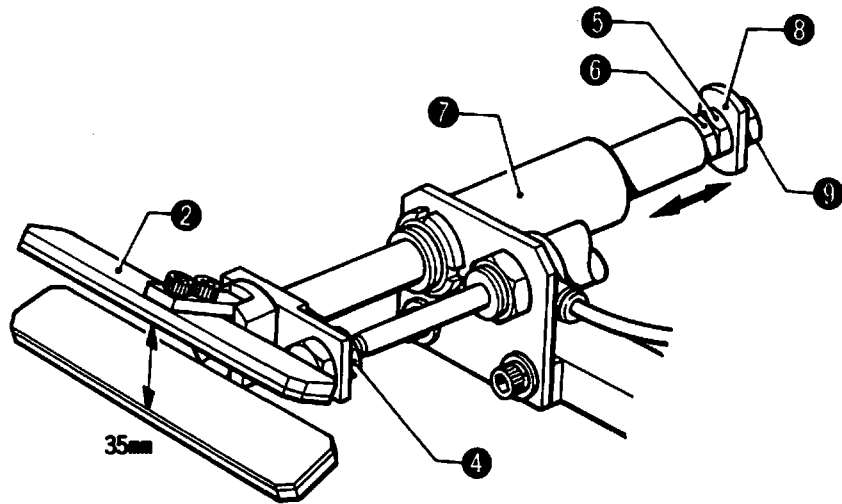
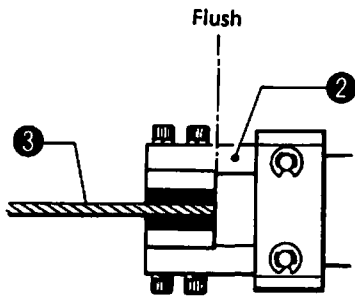
(3) Adjusting the stacker clamp position



Make sure the chuck holder ② is positioned at the center of the sub table ① and parallel to it.

(Adjustment)

1. Loosen the four bolts ⑥, and adjust the stacker arm ④ so that the top of the stacker arm ④ is parallel to the table surface, then tighten the bolts ⑥.
2. Loosen the four bolts ⑥ in the two pillow blocks ⑤, adjust the stacker arm ④ so that it is parallel with the edge of the table, then tighten the bolts ⑥.
3. Loosen the two bolts ⑦, adjust the fitting plate ③ vertically so that the chuck holder ② is positioned at the center of the sub table ①, then tighten the bolts ⑦.



Make sure the pickup reaches to the edge of the sub table.

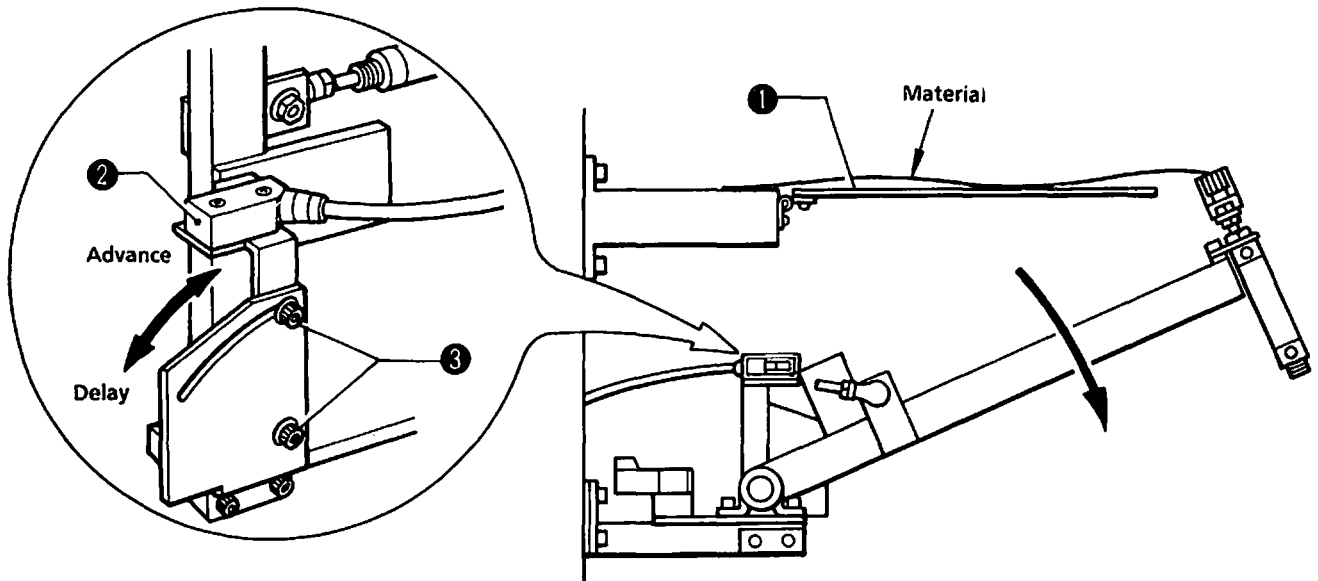
(Adjustment)

1. Press the check button ① to operate the chuck holder assembly ② and check that the chuck holder assembly ② is flush with the edge of the sub table ③.
2. Loosen the nut ④, and adjust the length of the cylinder rod so that the edge of the chuck holder assembly ② is flush with the edge of the sub table ③, then tighten the nut ④.
3. The standard opening of the chuck holder assembly ② should be 35 mm.

(Adjustment)

1. Loosen the nuts ⑤ and ⑥.
2. Tighten the nut ⑤ towards the slide guide ⑦ to decrease the opening, and loosen the nuts ⑤ away from the slide guide ⑦ to increase the opening.
3. When the position is adjusted, tighten the nuts ⑤ and ⑥.
4. Tighten the nut ⑨ to hold the stopper ⑧ where the chuck holder assembly ② closes when it operates.

(4) Adjusting the cloth release timing



★ Adjust the position of the limit switch assembly ② so that the material is deposited on the stacker table ①.

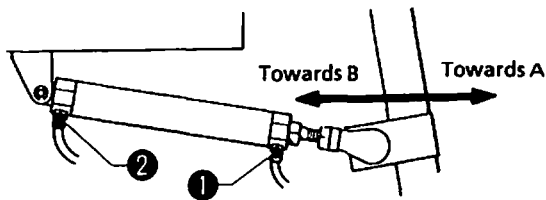
(Adjustment)

Loosen the two bolts ③, move the limit switch assembly ② to the top right or bottom left so that the material is deposited on the stacker table ①, then tighten the bolts ③.

Move the limit switch assembly ② to the top right to advance the cloth release timing.

Move the limit switch assembly ② to the bottom left to delay the cloth release timing.

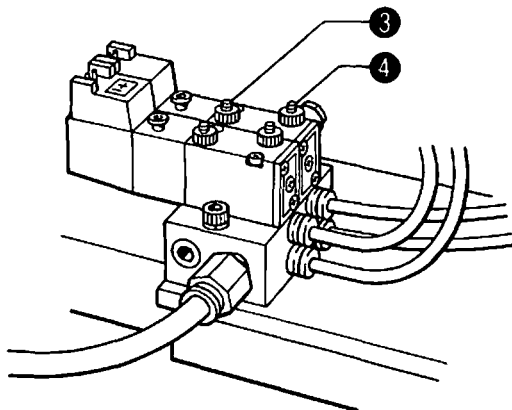
(5) Adjusting the pickup type stacker operating speed and the stop cushion



Adjusting the cushion when stopping towards A
Tighten the screw ① to decrease the stop speed.
Loosen the screw ① to increase the stop speed.

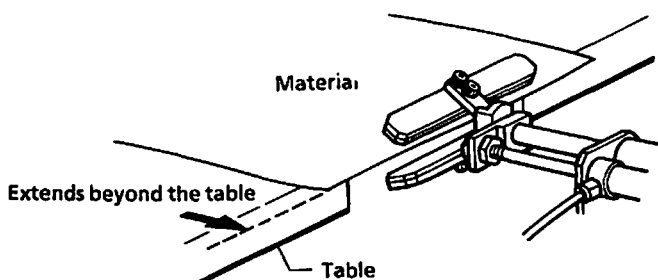
Adjusting the cushion when stopping towards B
Tighten the screw ② to decrease the stop speed.
Loosen the screw ② to increase the stop speed.

※ The pickup type stacker cannot be used unless the material extends beyond the table on the stacker side.



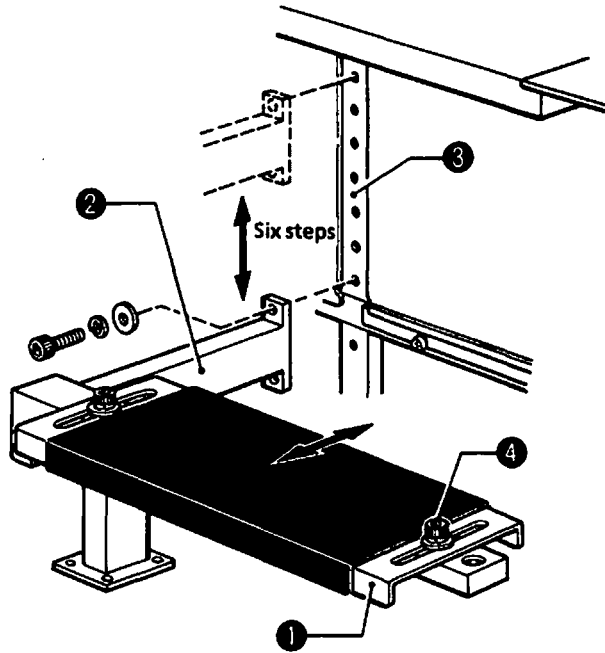
Adjusting the speed in direction A
Tighten the screw ③ clockwise to decrease the air cylinder speed.
Loosen it to increase the speed.

Adjusting the speed in direction B
Adjust the valve speed control screw ④ as above.



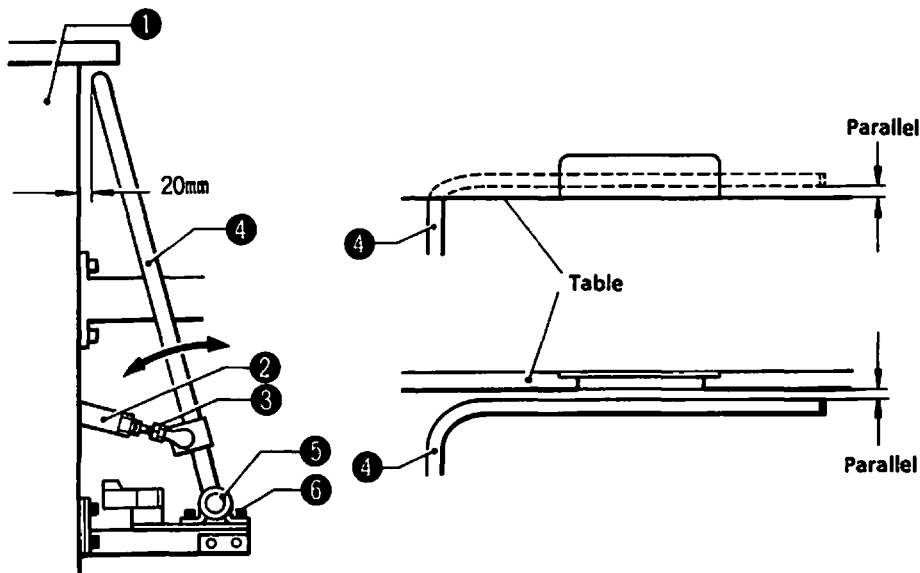
17. Adjusting the bar stacker

(1) Stacker plate



1. Stacker plate ① height
The height can be adjusted in six steps depending upon the position of the bar stacker cloth base ② in the frame ③.
2. Stacker plate ① right-left position
Loosen the two bolts ④, adjust the position of the stacker plate ① right or left so that the cloth drapes evenly over the stacker plate ①, then tighten the bolts ④.

(2) Stacker bar stop position



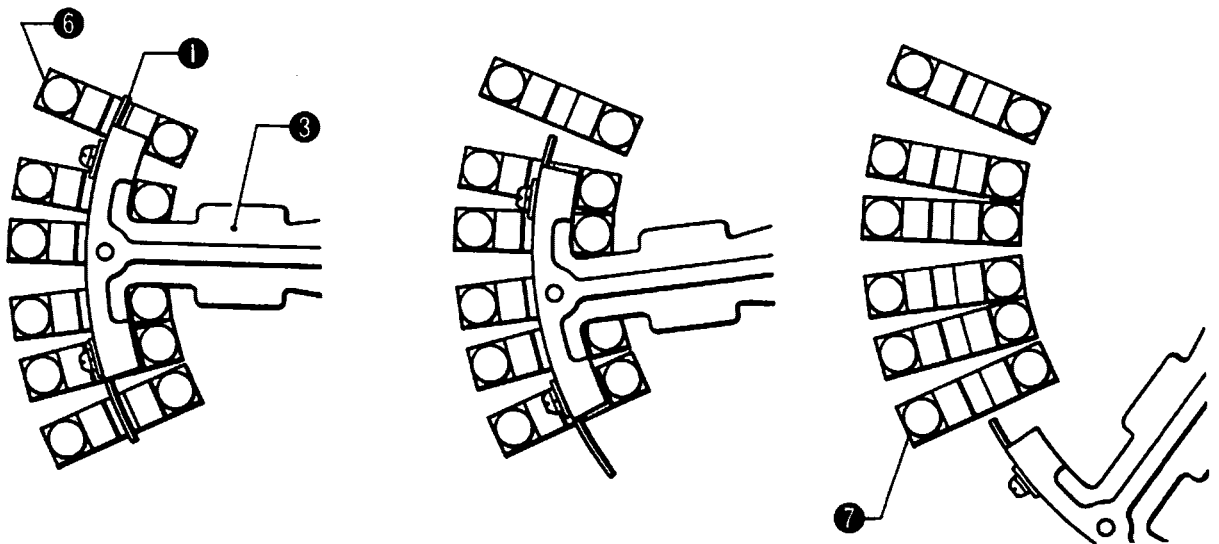
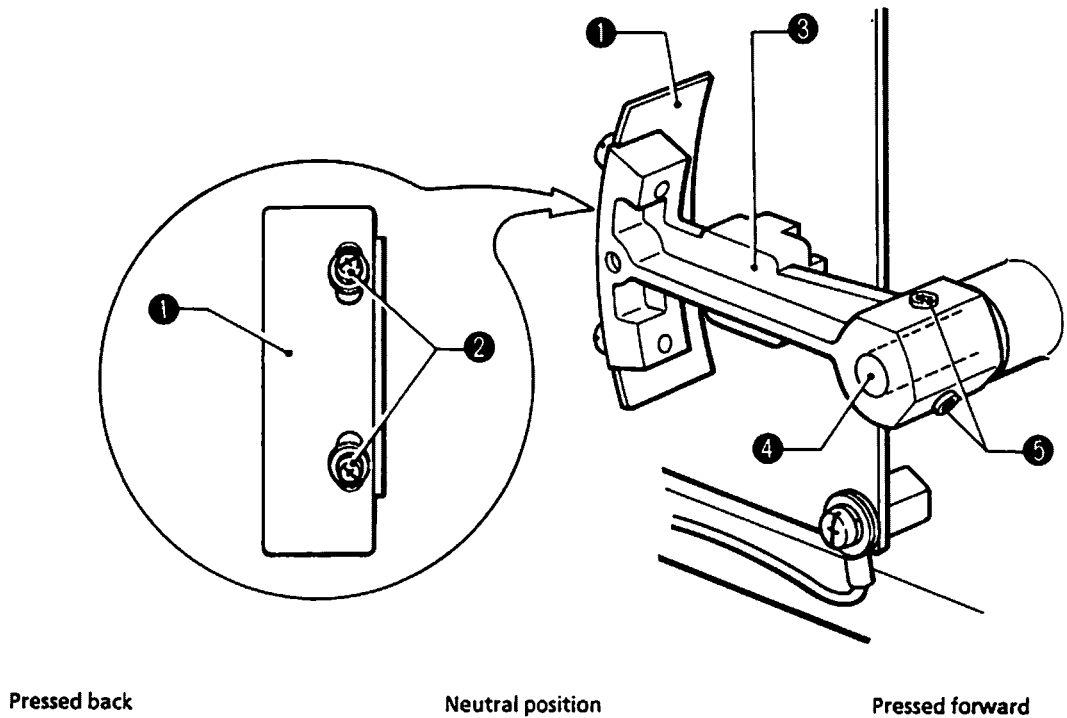
★ Make sure the stacker bar stops 20 mm from the frame ①, and is below and parallel to the table.

(Adjustment)

1. Loosen the nut ⑤ in the cylinder assembly ②, adjust the length of the cylinder rod so that the stacker bar ④ is 20 mm from the frame ①, then tighten the nut ⑤.
2. Loosen the four bolts ⑥ in the pillow block ⑤, adjust the stacker bar ④ so that it is parallel to the edge of the table, then tighten the bolts ⑥.

※ The stacker bar must not extend beyond the table.

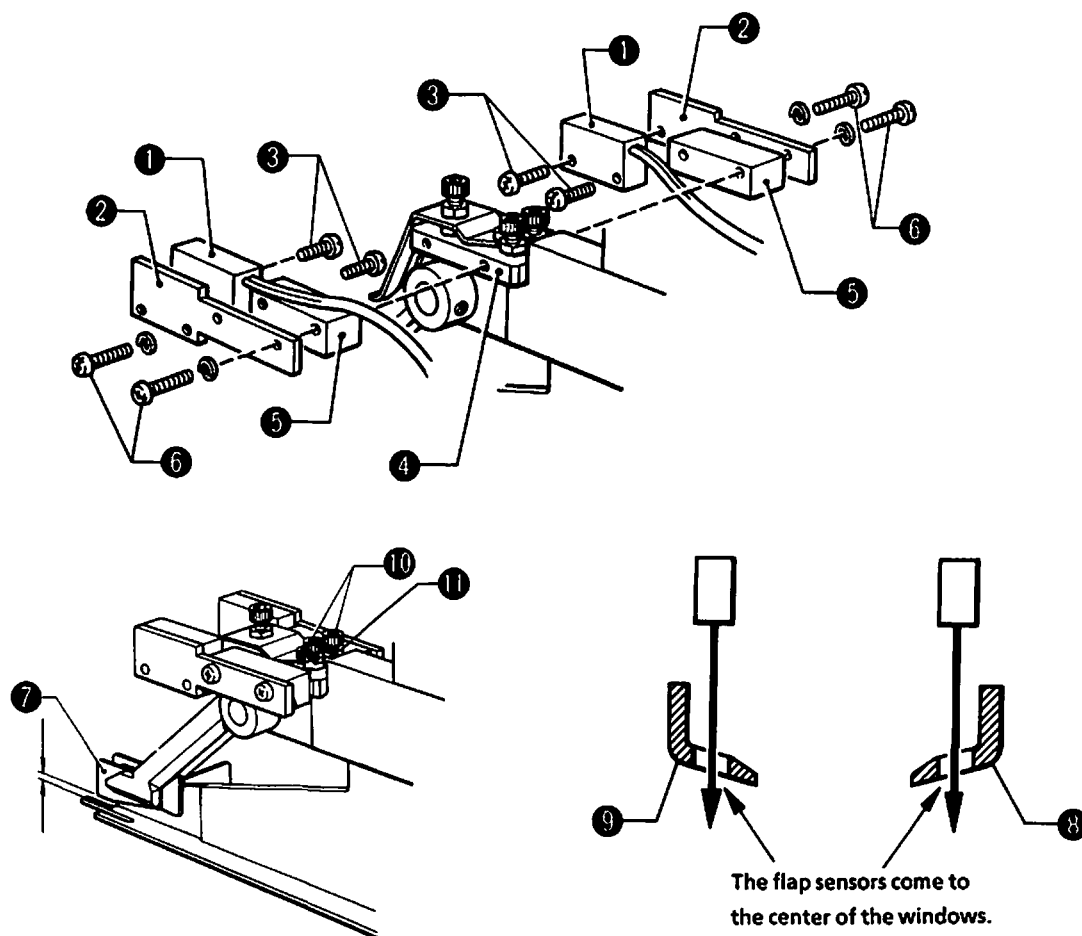
18. Adjusting the foot switch



★ Adjust the treadle so that the all switches become ON when the treadle is pressed.

- Attach the photocoupler actuator plate ① to the arm ③ so that the screws ② come to the centers of the oval holes.
- Secure the arm ③ to the foot switch lever ④ with the two screws ⑤ so that there is no play right-left.
- Position the arm ③ so that: ① when the treadle is pressed back, the photocoupler actuator plate ① breaks the top photosensor ⑥: ② when the treadle is pressed forward, the top of the photocoupler actuator plate ① is free of the bottom photosensor ⑦. Fine adjustment can be made by loosening the screws ② and moving the photocoupler actuator plate ①.

19. Adjusting the flap sensor (model 601 only)



1) Attach the flap sensor on the sensor base

Tighten the screws ⑥ so that the sensor ① is on the inside of the sensor base ②.

※ Put the seals on the sensor ① to distinguish left (L) and right (R). (Right: **R** Left: **L**)

2) Attach the sensor base to the spring base ④.

Insert the flap spacer ⑤ between the sensor base ② and the spring base ④, and tighten it halfway with the screws ⑥ to the spring base ④.

Secure the sensor base ② so that the cloth guide ⑦ rises at least 5 mm.

※ The flap spacer ⑤ and the screws ⑥ should be replaced corresponding to the gauge width.

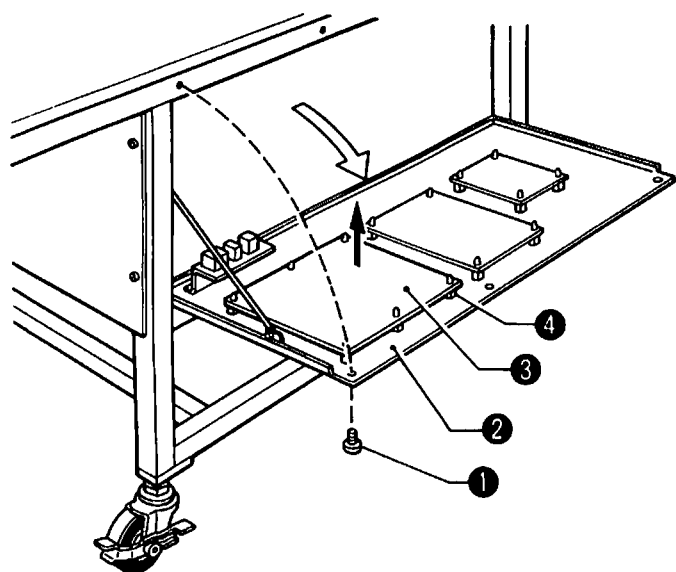
3) Flap sensor right-left position

Loosen the bolts ⑩ and the nut ⑪ so that the both right and left flap sensors come to the centers of the windows in the flap pressers (R) ⑨ and (L) ⑧.

STANDARD ADJUSTMENT (ELECTRONIC PORTION)

1. Replacing the circuit board

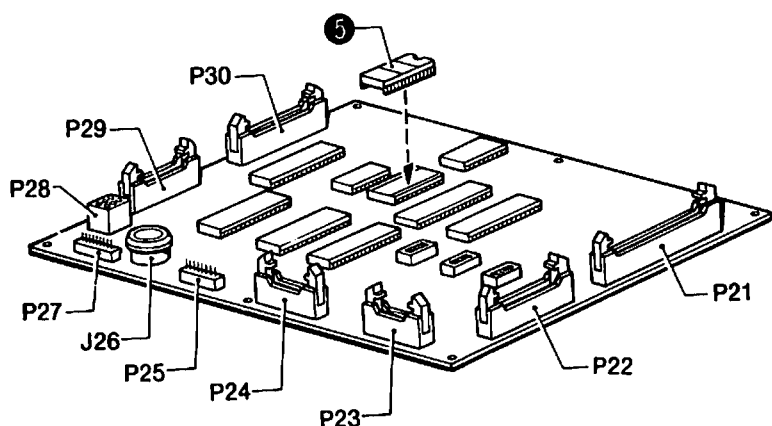
(1) Replacing the main circuit board



1. Remove the three screws ❶ and open the cover ❷.
2. Disconnect the connectors in the main circuit board ❸.
3. Remove the main circuit board ❸ from the six supports ❹.

4. Connector assignments

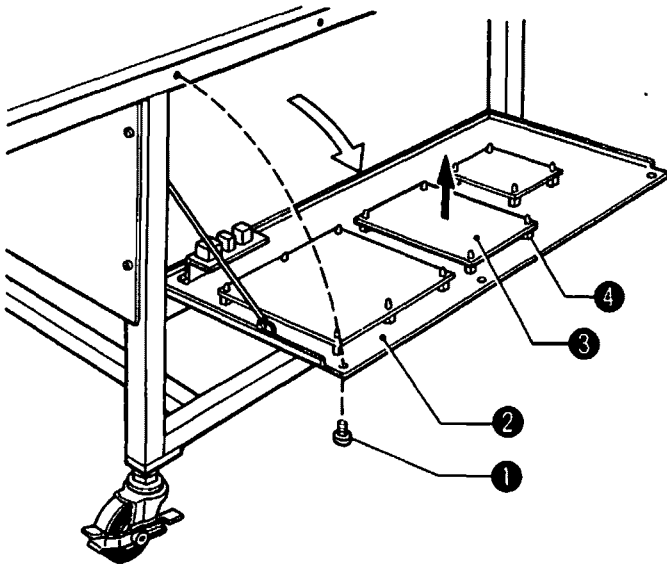
- P21 ... Not used
- P22 ... Panel circuit board in operation box
- P23 ... Flap circuit board (BAS-601 only) in operation box
- P24 ... Relay panel, foot switch, start switch, thread breakage monitor
- P25 ... Position sensor, cylinder sensor
- J26 ... Synchronizer
- P27 ... Machine motor circuit board
- P28 ... Power supply unit
- P29 ... Solenoid valve
- P30 ... DC motor circuit board



5. When attaching the main circuit board ❸, refer to the following and reverse the removal procedure above.

- ※ Firmly connect the connectors, and lock those with locks.
- ※ Make sure the PROM ❸ is connected.
- ※ Set DIP switches 1-3 as the switches set in the removed circuit board. (To change the settings, see pages 50-51 of the instruction manual for main circuit board DIP switch settings.)

(2) Replacing the DC motor circuit board

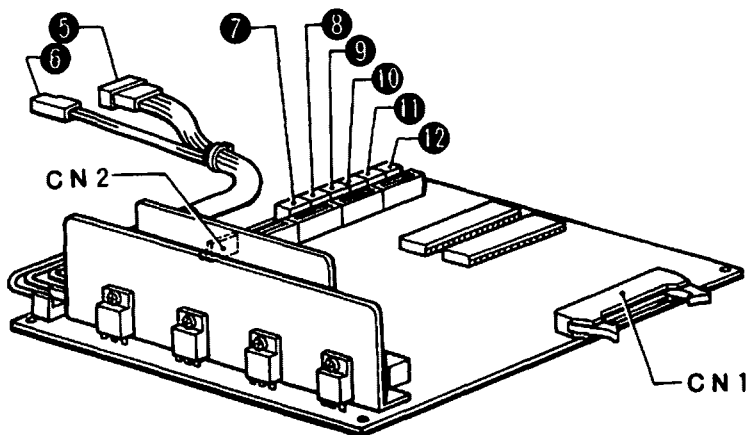


1. Remove the three screws ❶ and open the cover ❷.
2. Disconnect the connectors in the DC motor circuit board ❸.
3. Remove the DC motor circuit board ❸ from the four supports ❹.
4. Connector assignments

CN1	Main circuit board
CN2	DC motor encoder
4P connector ❺	..	Power supply unit
2P connector ❻	..	DC motor
5. When attaching the DC motor circuit board ❸, refer to the following and reverse the removal procedure above.

※ Firmly connect the connectors, and lock those with locks.

※ The switches ❷-❹ are set prior to shipping. Confirm the settings and do not change them.



Switch ❷ ... STEPU .. [Ø]

Switch ❸ ... STEPL .. [4]

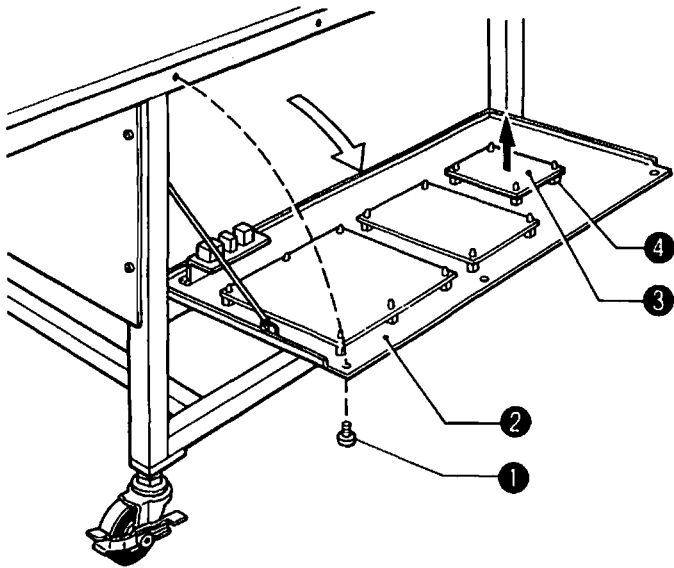
Switch ❹ ... HPU [Ø]

Switch ❺ ... HPMU .. [Ø]

Switch ❻ ... HPML .. [E]

Switch ❼ ... HPL [Ø]

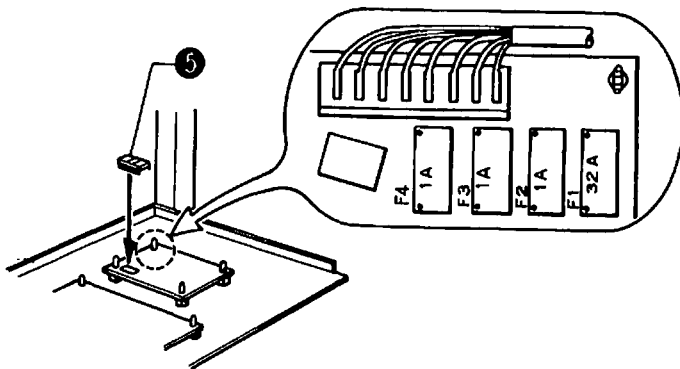
(3) Replacing the machine motor circuit board



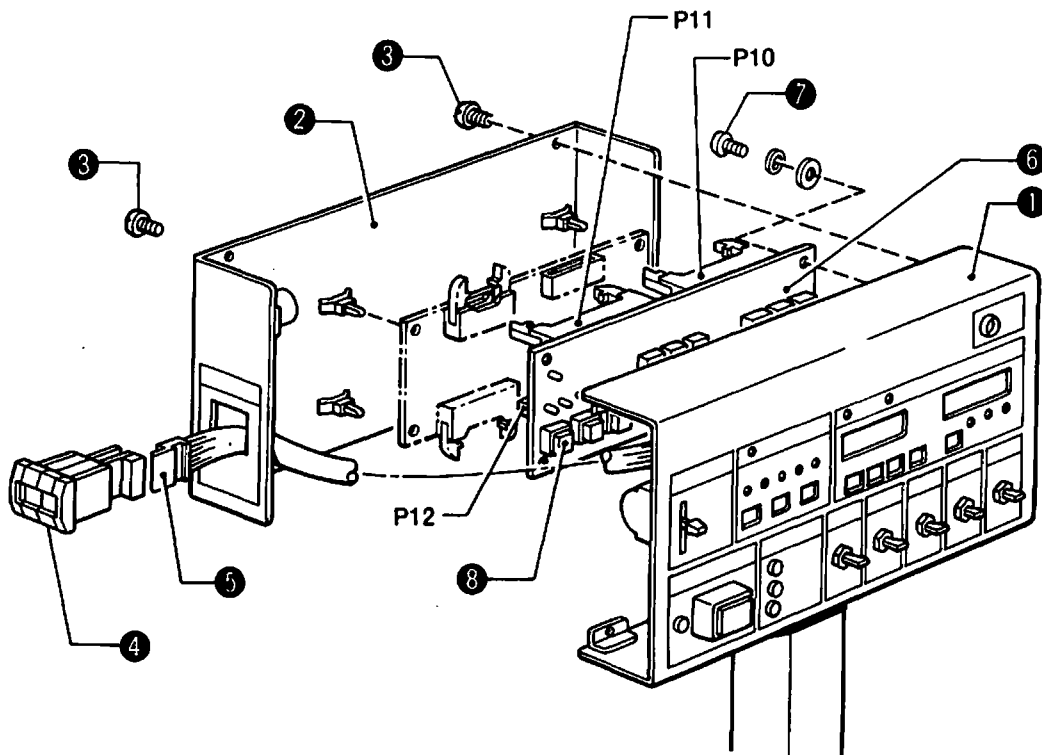
1. Remove the three screws ① and open the cover ②.
2. Disconnect the connectors in the machine motor circuit board ③.
3. Remove the machine motor circuit board ③ from the four supports ④.
4. Connector assignments
P1 .. Power supply unit
P2 .. Power supply unit
P3 .. Main circuit board
5. When attaching the machine motor circuit board ③, refer to the following and reverse the removal procedure above.

- ※ Firmly connect the connectors, and lock those with locks.
- ※ Make sure the PROM ⑤ is connected.
- ※ Make sure the fuses F1-F4 are the correct ones.

- Fuse F1 ... 3.2 A
- Fuse F2 ... 1.0 A
- Fuse F3 ... 1.0 A
- Fuse F4 ... 1.0 A

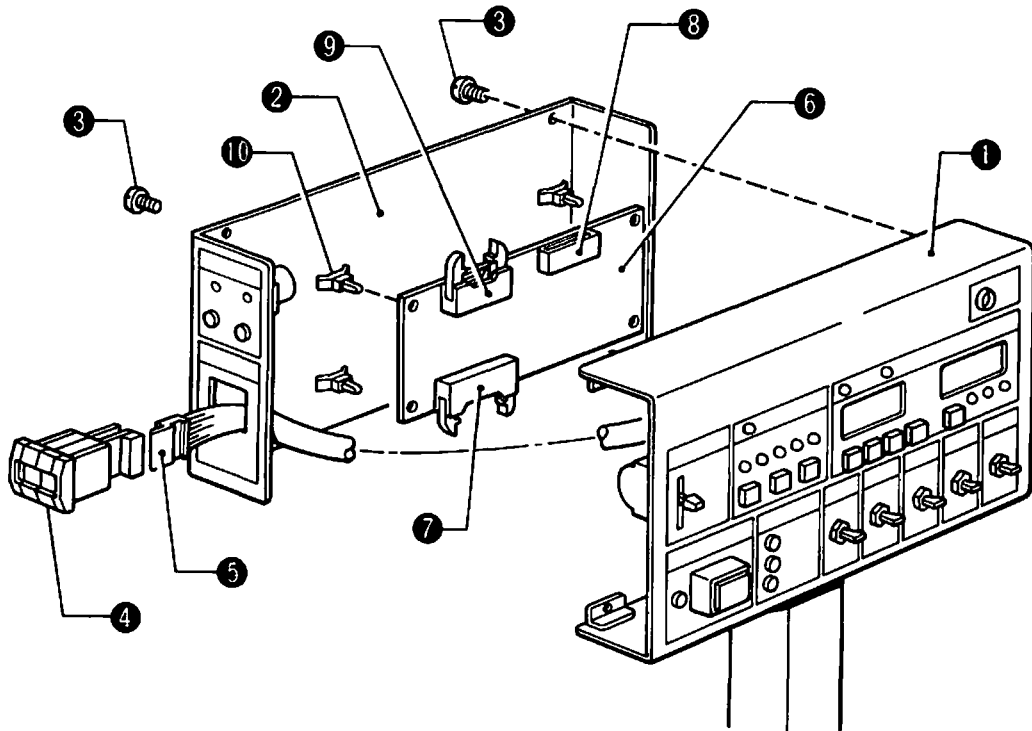


(4) Replacing the panel circuit board



1. Remove the two screws ③ and open the cover ② of the operation box ① slightly.
2. Disconnect the connector ⑤ attached to the switch ④, and remove the cover ②.
3. Disconnect all connectors on the panel circuit board ⑥.
4. Remove the screw ⑦, and remove the panel circuit board ⑥.
5. Connector assignments
 - P10 ... Main circuit board
 - P11 ... Panel operation switch
 - P12 ... Buzzer
6. When attaching the panel circuit board ⑥, refer to the following and reverse the removal procedure above.
 - ※ Tighten the screw ⑦ where the switches ③ on the panel circuit board ⑥ operate correctly.
 - ※ Firmly connect the connectors, and lock those with locks.

(5) Replacing the flap circuit board (BAS-601 only)



1. Remove the two screws ③ and open the cover ② of the operation box ① slightly.
2. Disconnect the connector ⑤ on the switch ④.
3. Disconnect the connectors P13 ⑦ and P15 ⑧ on the flap circuit board ⑥.
4. Remove the cover ②.
5. Remove the connector P14 ⑨ on the flap circuit board ⑥.
6. Remove the flap circuit board ⑥ from the four supports ⑩.
7. Connector assignments
 - ⑦ P13 Main circuit board
 - ⑨ P14 Sensitivity adjustment control, indicator
 - ⑧ P15 Flap sensor
8. When attaching the flap circuit board ⑥, refer to the following and reverse the removal procedure above.
 - ※ Firmly connect the connectors, and lock those with locks.
 - ※ Controls VR1 and VR2 on the flap circuit board ⑥ are used as a supplement to adjust the sensitivity on the cover ②.

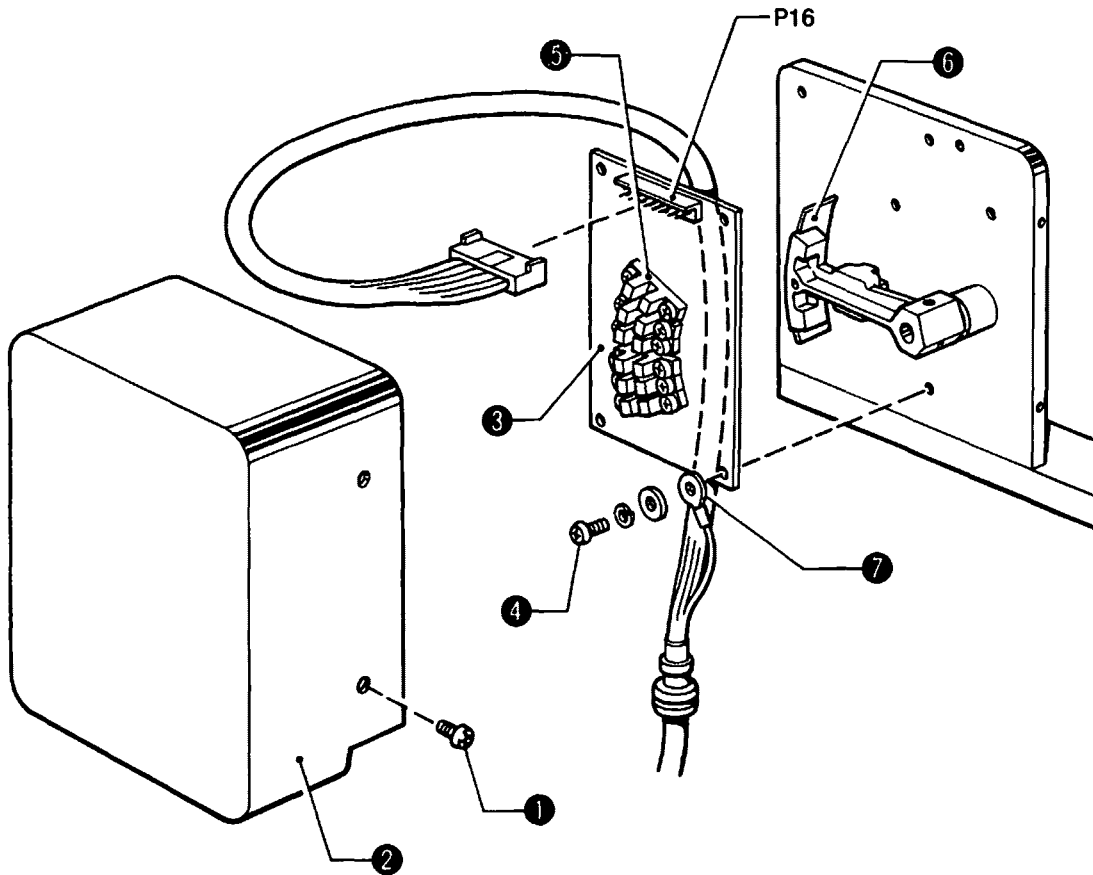
If the adjustment can be completed with the control on the cover ②, adjustment of VR1 and VR2 is not necessary.

VR1 ... Right flap sensor

VR2 ... Left flap sensor

Turn either control left to increase sensitivity; as sensitivity increases, the position of the controls on the cover at which the indicator will light and go out will shift counterclockwise.

(6) Replacing the foot switch (treadle) circuit board

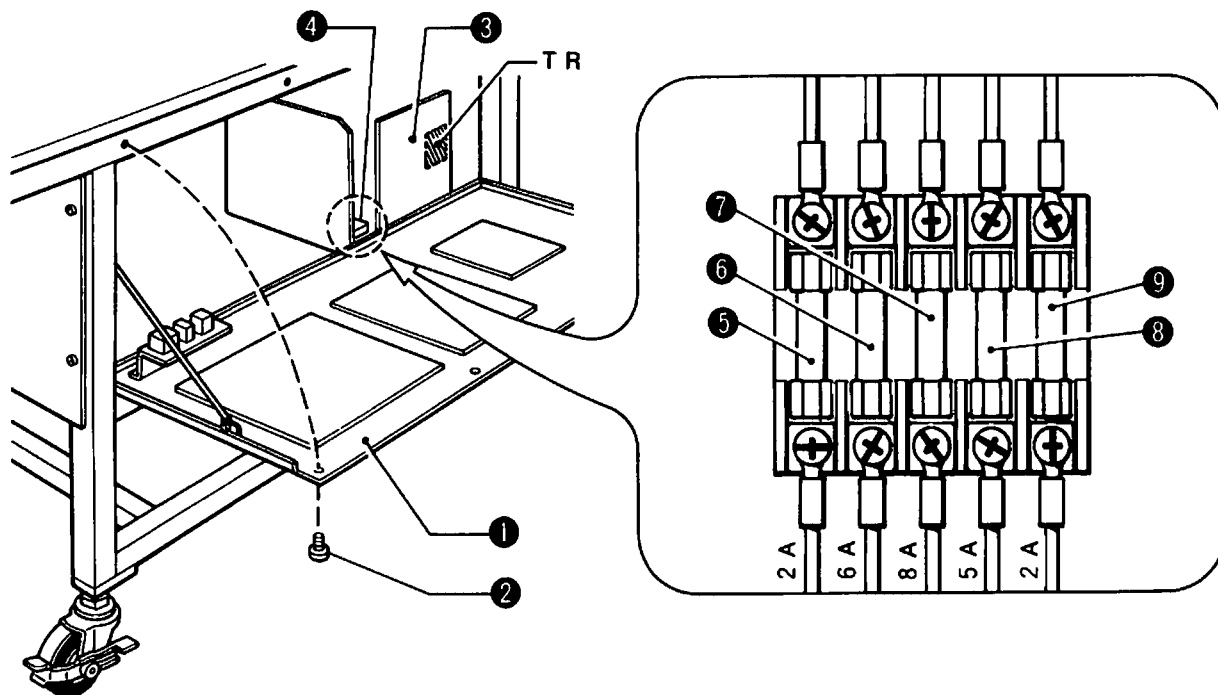


1. Remove the four screws ① and remove the cover ②.
2. Disconnect the connectors on the foot switch circuit board ⑤.
3. Remove the four screws ④ and remove the foot switch circuit board ③.
4. Connector assignments
P16 From relay panel to main circuit board
5. When attaching the foot switch circuit board ③, refer to the following and reverse the removal procedure above.
 - ※ Firmly connect the connectors, and lock those with locks.
 - ※ Make sure the photosensor ⑤ on the circuit board does not contact the photocoupler actuator plate ⑥. Also, confirm that the operation position of the photocoupler actuator plate ⑥ is as described in "Adjusting the foot switch" on page 85. (The position of the photocoupler actuator plate ⑥ to the circuit board should not change unless the photocoupler actuator plate ⑥ is removed.)
 - ※ Do not forget to tighten the ground terminal ⑦.

2. Replacing the fuse

- ★ When a fuse blows, refer to the table below to assure replacement with one of equivalent capacity.
- ★ When the fuse ⑨ blows, refer to page 115. Make sure the machine motor circuit board and the driver have no problems, then replace the fuse.

(1) Power supply unit fuses



1. Remove the three screws ② and open the cover ①.
2. Replace the fuses ⑤-⑨ in the fuse holder ④ on the power supply unit ③.

	Capacity	Application	What happens when fuse blows
Fuse ⑤	2A	Valve power supply	Cylinder does not operate.
Fuse ⑥	6A	5V power supply	Power supply indicator goes out; machine does not operate.
Fuse ⑦	8A	High voltage power supply	Error message E-3-03 or E-3-05 appears.
Fuse ⑧	5AFB	Machine motor power supply	Error message E-2-01 appears.
Fuse ⑨	2A	Thread winding motor power supply	Thread winding motor does not operate.

Fuse ⑧, 5AFB is a fast-blow fuse; all others are standard (ø6.4 x 30 m/m)

(2) Circuit board fuses

The machine motor circuit board is the only circuit board with on-board fuses. See page 89 for replacement.

	Capacity	Application	What happens when fuse blows
Fuse F1	3.2A	Machine motor driver power supply	Error message E-2-01 appears.
Fuse F2	1A		
Fuse F3	1A		
Fuse F4	1A		

Special fuses are used.

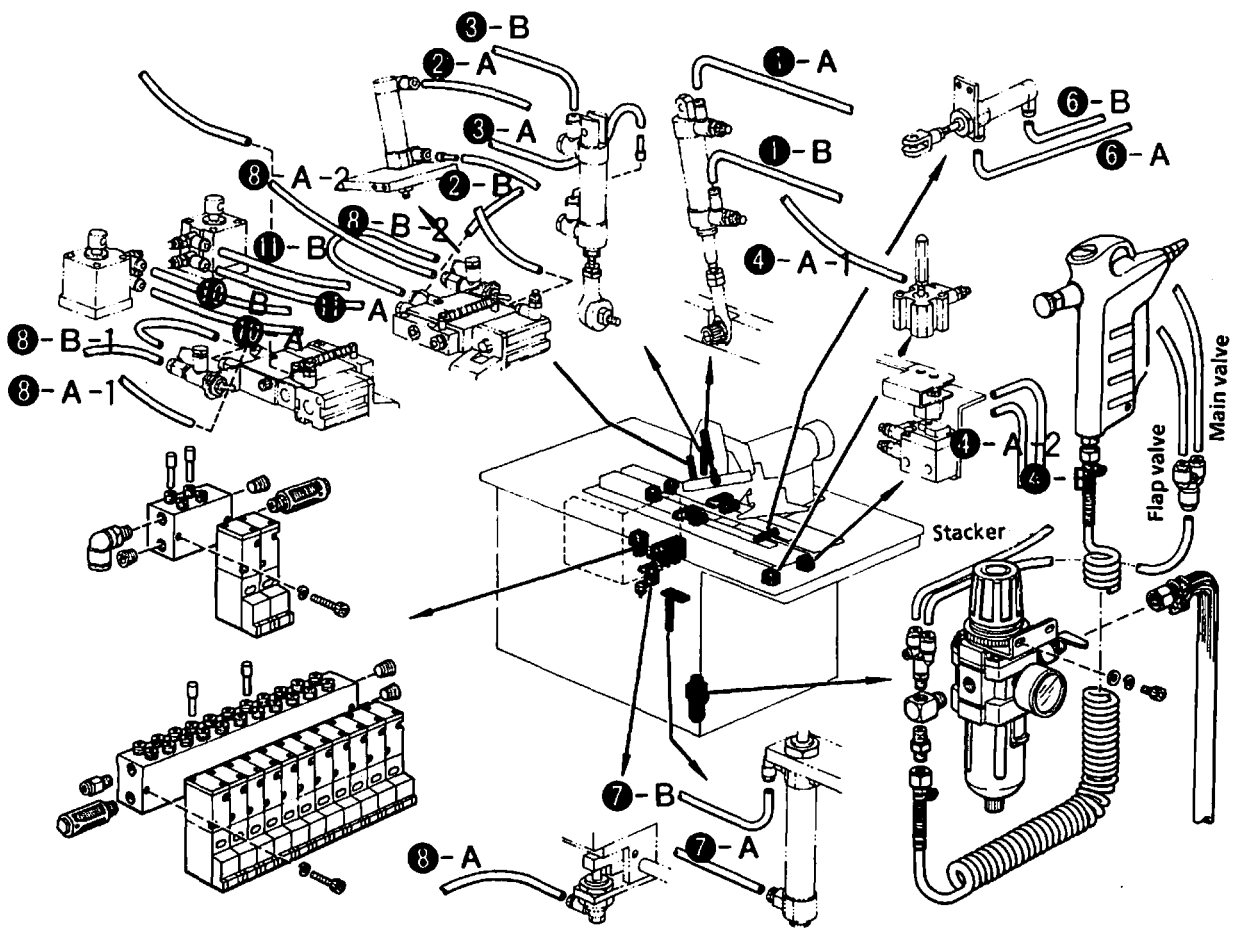
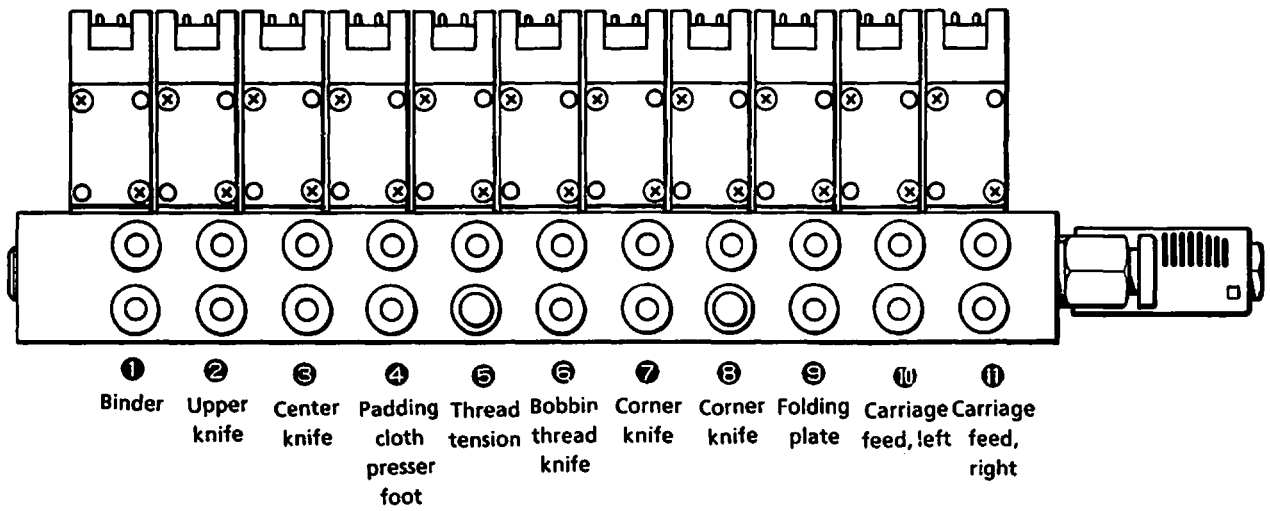
F1 Microfuse LM32 (mfd. by Daito Tsushin)

F2-F4 ... Microfuse LM10 (mfd. by Daito Tsushin)

3. Connecting the solenoid valves and the air lines

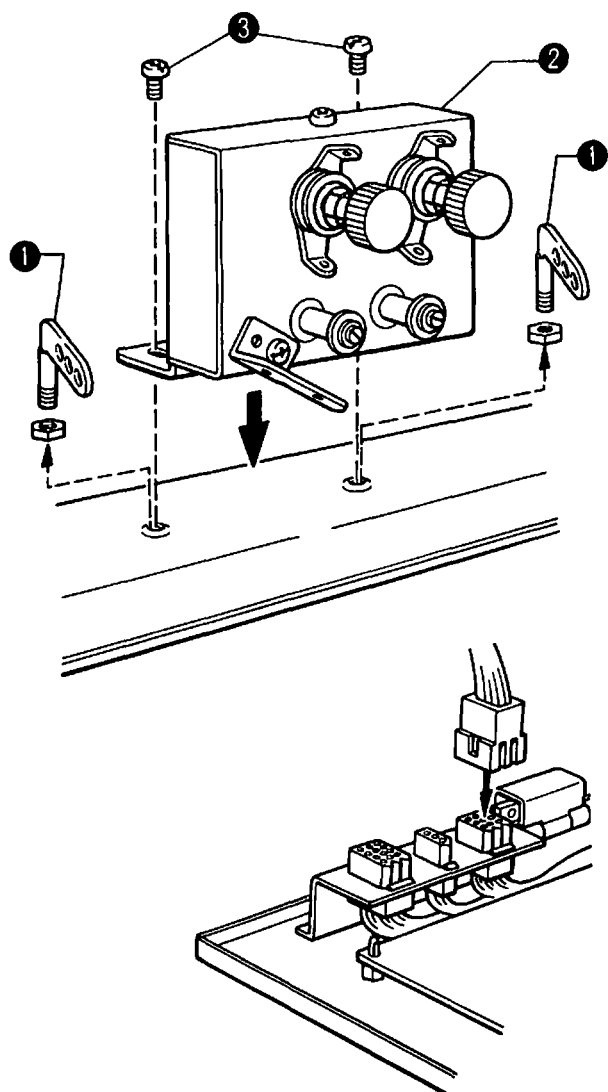
<Main valve>

Connect the air hoses to the appropriate valve units by referring to the air hose codes in the figure below.



OPTIONAL PARTS INSTALLATION

1. Thread breakage detector

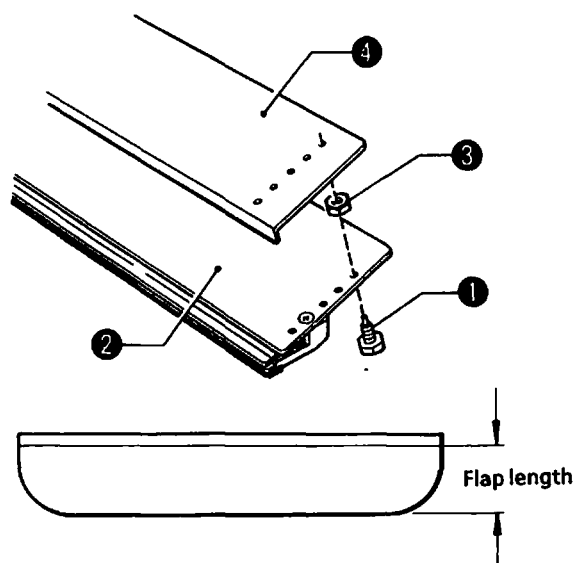


★ When the thread breaks, the machine feed is stopped automatically so that the material is not damaged.

<Attachment>

- (1) Remove the two thread guides ①.
- (2) Attach the thread breakage detector ② with the two screws ③ provided.
- (3) Pass the cord through the hole in the table, and connect it to the circuit board.

2. Flap guide

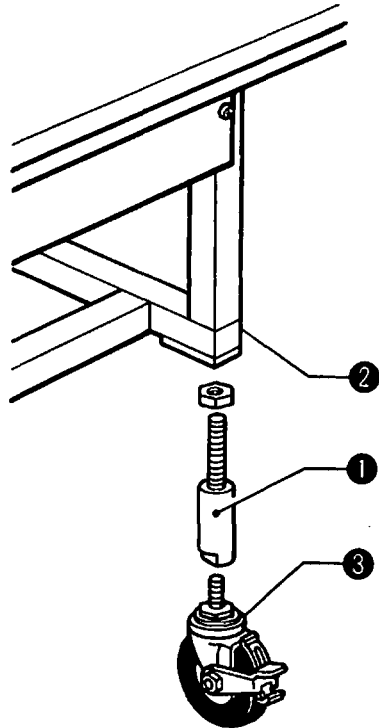


★ Easily adjusts the flap length after flap sewing has been completed.

<Attachment>

- (1) Pass the flap guide pin ① through the back of the carriage feed U-R ②, and secure it with the nut ③.
- (2) Fit the hole of the flap guide ④ over the flap guide pin ①, and secure it.
- (3) Adjust the position of the flap guide pin ① so that the number on the side of the hole matches the flap length after sewing has been completed in the figure on the left.

3. Spacer for working while standing up

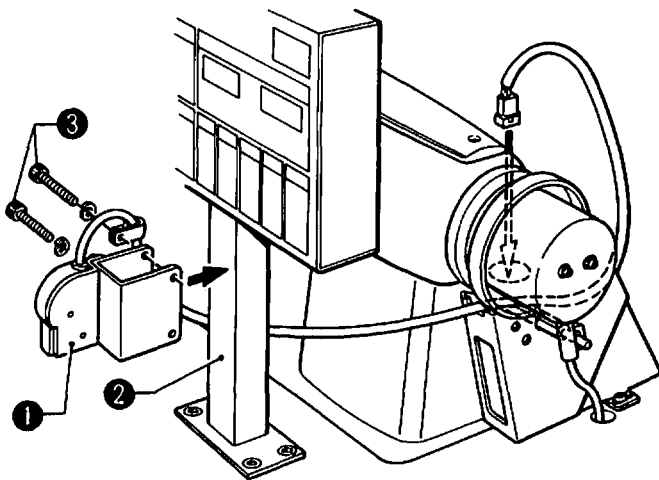


★ These spacers are used to raise the table height for working while standing up.

<Attachment>

Insert the spacers ① between the frame ② and the casters ③.

4. Hand switch



★ Used to start machine operation when standing up. Used in place of the knee switch.

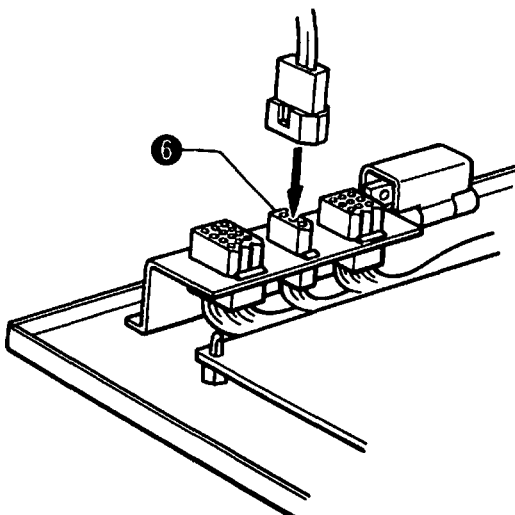
<Attachment>

(1) Attach the hand start switch assembly ① to the control box support ② with the two bolts ③.

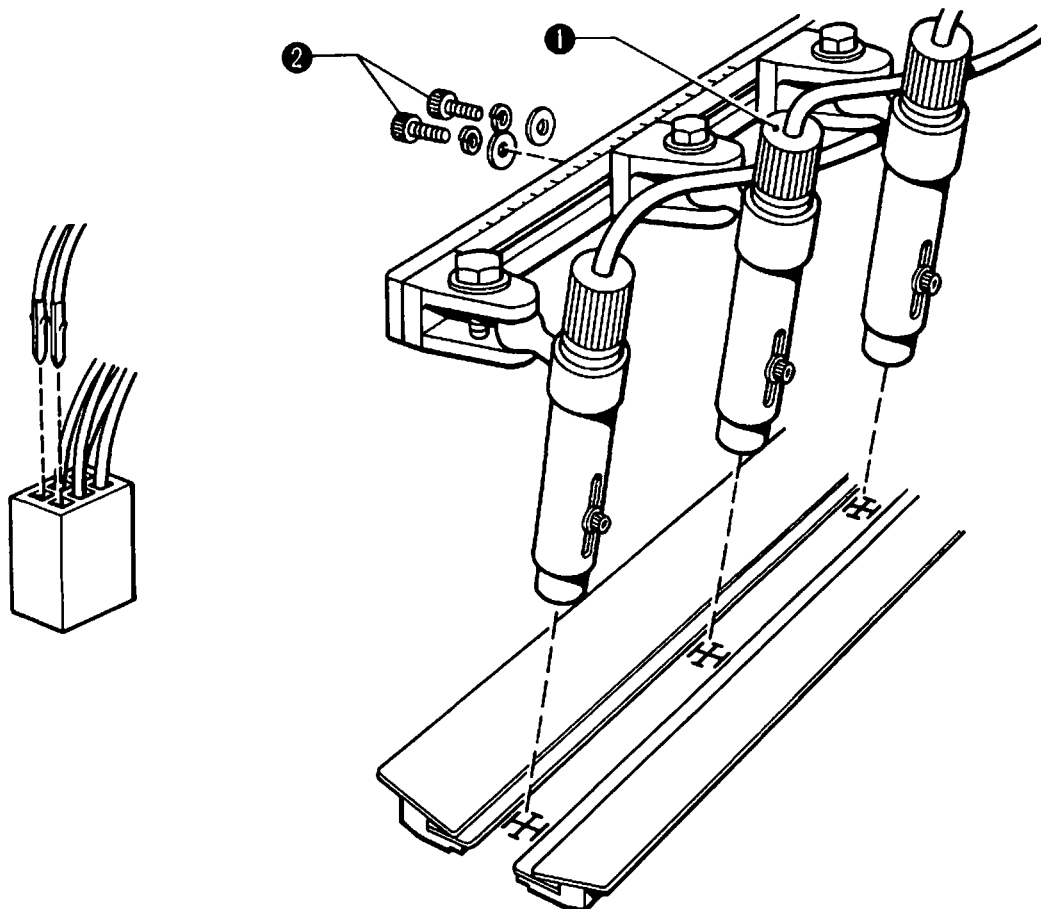
(2) As shown in the figure, pass the code through the hole in the table.

(3) Connect the connector to the 2P connector ④.

※ If the knee switch is connected, connect the hand switch connector in its place.



5. Marking lights



★ Three marking lights can be used when the darts serve as the positioning reference.

<Attachment>

(1) As shown in the figure above, attach the marking light assembly ① with the bolts ②.

(2) Hold the cord together with the cords from the other two lights, and connect the connector.

※ The connectors can be plugged into either hole.

TROUBLESHOOTING GUIDE

Problem	Cause	Check	Solution	
Thread breaks Skipped stitches	Damaged rotary hook holding slot in the needle plate.		Polish the rotary hook holding slot.	
	Improper needle thread tension.	Needle thread tension.	See "Thread tension."	
	Improper needle and rotary hook timing.	Bobbin case opener and rotary hook gap.		Set gap to 0.2 mm.
		Needle and rotary hook point gap.		Set gap to 0.05 mm.
		Rotary hook and needle plate gap.		Set gap to approx. 1.2 mm.
		Needle bar lift stroke and height.		Adjust needle bar lift stroke and height.
	Insufficient lubrication to rotary hook assembly.	Rotary hook lubrication	Adjust lubricating oil supply.	
	Improper thread take-up spring tension and stroke	Thread take-up spring stroke and tension.	See "Thread tension."	
	Rotary hook point damaged.		Polish rotary hook point.	
	Improper needle and needle guard gap.		Set gap to 0-0.15 mm.	
	Improper threading.	Threading.	See "Threading thread."	
	Improper needle installation.	Needle direction.	Install needle in proper direction.	
	Bent or blunt needle.	Needle.	Replace needle.	
	Scratch, burr on cloth guide.	Cloth guide.	Remove burr and polish.	
	Seizure, thread jam in rotary hook race.		Lubricate or replace.	
Burr on edge of binder.		Remove burr and polish.		
Improper cloth guide height.				

Problem	Cause	Check	Solution
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Loose threads	Same as "Thread breaks, skipped stitches" section on the preceding page. Also other causes are listed below.		
	Bobbin stucks.		Replace bobbin.
	Excessive binder and slide plate gap.		See "Adjusting binder vertical and horizontal position."

Excessive puckering	Needle thread tension is too high.	Needle thread tension.	Set it as weak as possible.
	Bobbin thread tension is too high.	Bobbin thread tension.	Set it as weak as possible.
	Thread take-up spring is too strong.	Thread take-up spring tension.	Set it as weak as possible.
	Thread take-up spring stroke is too large.	Thread take-up spring stroke.	Set it as small as possible.
	Improper cloth guide height.		See "Adjusting cloth guide height" (page 56).
	Sewing speed is too fast. (Motor speed is too fast.)		Decrease sewing speed. (Replace motor pulley with smaller one.)
	Improper binder and slide plate gap.		See "Adjusting binder vertical and horizontal position" (page 55).
	Using polyester thread.		Replace with spun core thread.

Problem	Cause	Check	Solution	
Needle thread trimming misses Thread retention errors	Damaged or bent movable knife tip.		Replace movable knife.	
	Movable knife tip and needle plate gap is too large.		Set gap to 1.5-2.0 mm.	
	Improper tension release adjustment.		Adjust tension release.	
	Spring not holding thread.	Improper spring installation; striking knife bar?	Install spring not to strike knife bar.	
		Thread retention section of spring bent?	Replace spring.	
		Proper spring pressure?	See "Adjusting pressure."	
	Retention not properly adjusted.	Height when retention arm is raised.	See "Adjusting retention" (page 57).	
	Excessive knife pressure makes operation heavy.		See "Adjusting knife pressure."	
	Bobbin thread trimming misses Thread retention errors	Knife tip is too low.	Knife position.	See "Adjusting fixed knife" (page 67).
		Improper bobbin thread trimming unit installation.		See "Adjusting fixed knife" (page 67).
Burr on knife tip.			Replace knife. (Exchange movable and fixed knives.)	
Knife groove not aligned with needle plate groove.			Straight line between knife and needle plate groove when cylinder retracted.	

Problem	Cause	Check	Solution	
Skipped stitches, thread cast-offs at sewing start	Needle up stop position is too high.	Height from needle plate to needle tip after thread trimming.	See "Adjusting needle position detector."	
	Bobbin thread not held after thread trimming.		See "Adjusting fixed knife" (page 67).	
	Bobbin spinning?	Bobbin wound over 80%?	Wind bobbin less than 80% capacity.	
	Thread take-up spring tension too high, or stroke too large.	Thread take-up spring.	Decrease thread take-up spring tension, or reduce stroke.	
	Needle thread not held after thread trimming.		See "Adjusting movable knife" (page 64).	
	Thread take-up in retention too little.		See "Adjusting retention" (page 57).	
	Thread not loose during thread trimming.		Adjust tension release.	
	Bobbin races during thread trimming.	Bobbin thread not running in normal direction.		Bobbin thread winds in the same direction rotary hook rotates.
		Bobbin wound over 80%?		Wind bobbin less than 80% capacity.
		Racing prevention spring tension too weak.		Replace racing prevention spring.
Broken needle	Needle and rotary hook tip strike.		See "Needle and rotary hook timing" (page 49).	
	Needle and needle guard strike.		Adjust gap.	
	Needle and needle plate hole strike.		Adjust needle bar base position.	
	Needle strikes other components.	Binder position.		See "Descend speed of binder" (page 55).
		Folding plate extension.		See "Folding plate" (page 53).
Folding plate free.		Turn folding plate ON. See "Single welt sewing" (page 54).		

Problem	Cause	Check	Solution
Welting width different in right and left	Binder-needle gap not identical on both sides.	Needle in center of binder needle groove?	See "Descend speed of binder" (page 55).
	Binder-carriage feed gap not identical on right-left.	Improper binder shape?	Replace binder.
	Binder-carriage feed gap not identical on right-left.		See "Carriage feed" (page 51).
	Improper gap between needle and folding plate.		See "Folding plate" (page 53).
	Flap folding plate OFF during single welt flap sewing.		Turn folding plate ON. See "Single welt sewing" (page 54).
	Folding plate free.		See "Folding plate" (page 53).
Welting width not identical at sewing start and end	Carriage feed not parallel to needle.		Install so feed parallel to needle. See "Installing feed unit" (page 55).
	Carriage feed not parallel to binder.	Binder straight to needle?	Install binder straight to needle.
			Install carriage feed parallel to binder. See "Carriage feed" (page 51).
Welting slips	Insufficient gap between binder and slide plate.		See "Adjusting binder" (page 55)
	Caught on cloth guide.	Cloth guide and binder gap.	See "Adjusting cloth guide height and width" (page 57).
		Excessive cloth guide arm spring pressure.	Adjust pressure.
	Insufficient gap between binder and carriage feed.		See "Carriage feed" (page 51).
	Loading speed too fast.		Reduce speed with DIP 22 for material sliding easily.

Problem	Cause	Check	Solution
Improper sewing end corner knife position (front, back)	Improper slider position.		See "Adjusting corner knife position" (page 70).
	DIP switch 31 (gauge) not set for gauge in use.		Set ON 8-14 mm gauge. Set OFF 16-20 mm gauge.
Improper sewing start corner knife position (front, back)	Improper positioning rod position.	If occurs every time.	See "Sewing start side corner knife position" (page 71).
		Positioning rod caught in mid-stroke?	See "Installing positioning rod" (page 71).
		Clamp presser cushion torn or peaking?	Replace clamp presser assembly.
Improper corner knife position (right, left)	Improper corner knife slider installation.		See "Adjusting corner knife position."
	Insufficient carriage feed pressure.	Air pressure 5.0kg/cm ² ?	Set air pressure to 5.0 kg/cm ² .
		Carriage feed hold entire bodice?	See "Carriage feed" (page 51).
Center knife does not cut well	Defective corner knife.		Replace. (See "Installing corner knife.")
	Improper center knife position. (front, back)	a = 6.5mm (8-14 mm gauge) 16-20 mm gauge)	See "Adjusting center knife assembly" (page 58)
		Insufficient carriage feed presser foot spring pressure.	Air pressure 5.0kg/cm ² ?
	Carriage feed hold entire bodice?		See "Carriage feed" (page 51).
	Carriage feed caught somewhere?		Install correctly. See "Carriage feed" (page 54).
Due to cloth type.		Apply unwoven material on cloth.	

Problem	Cause	Check	Solution	
Corner knife does not cut well	Due to cloth type.		Apply unwoven material on cloth.	
	Defective center knife.		Replace center knife. (page 58)	
	Defective fixed knife.		Replace fixed knife.	
	Improper center knife pressure adjustment.		Adjust center knife pressure.	
	Insufficient carriage feed pressure.	Air pressure 5.0kg/cm ² ?		Set air pressure to 5.0 kg/cm ² .
		Carriage feed hold entire bodice?		See "Carriage feed" (page 51).
		Check carriage feed operation.		Install correctly. See "Carriage feed."

Cylinders do not operate	Low air pressure.	Air pressure 5.0kg/cm ² ?	Set air pressure to 5.0 kg/cm ² .	
	Excessive load during operation.	Heavy operating parts?	Adjust. (See each adjusting procedure.)	
	Defective cylinder.	Bent rods?	Replace cylinder. (See adjusting procedure.)	
	Defective air tube.	Air leak in line?	Replace air tube.	
	Solenoid valve not operating.	Connector short, poor connection?		Repair or replace.
		24V DC present?		Replace cylinder.
		Solenoid valve OK?		Replace valve.

ERROR CODES

- 1) Some problems will be notified by an error code, others will not. Refer to both sections.
- 2) A defective circuit board (main circuit board and others) can also cause problems. If the problem cannot be corrected, replace the circuit board.
- 3) Be sure to turn the power off before checking conductivity.
- 4) A special I/O diagnostics PROM is available to check the operation of the operation box switches, the treadle, and the foot switches.

1. Error codes

※ Refer to the table below to repair when an error code is displayed.

① <E-0-00> Displayed when carriage feed is moving.

Cause	Check	Solution	Page
1. Emergency stop switch pressed during carriage feed operation.	<Normal operation>	See reset procedure and reset.	33 (Instruction manual)
2. Emergency stop signal received during carriage feed operation.	Emergency stop switch conductivity.	Replace emergency stop switch.	90
3. Defective emergency stop circuit.	_____	Replace main circuit board.	87

② <E-1-00> Displayed when power is turned on.

1. Start switch pressed or shorted.	Disconnect start switch connector; if error message goes out, check start switch conductivity.	Replace start switch.	
2. Defective start switch circuit.	_____	Replace main circuit board.	87

③ <E-1-01> Displayed when power is turned on.

Cause	Check	Solution	Page
1. Treadle pressed to reverse.	<Normal operation>	Release treadle so it returns to neutral.	
2. Disconnected connector.	Foot switch circuit board connector J16 Relay panel 12P connector Main circuit board connector J24	Reconnect connectors.	92 87
3. Short in harness.	Treadle harness conductivity.	Replace harness.	
4. Improper positioning of treadle photosensor actuator.	Remove cover and check position.	Readjust.	85
5. Defective treadle signal circuit.	Disconnect relay panel 12P connector, short #4 and #8 pins in relay panel; if error code goes out, check foot switch circuit board; if it does not go out, check main circuit board.	Replace main circuit board.	87

④ <E-1-02> Displayed when power is turned on.

1. Treadle depressed.	<Normal operation>	Release treadle so it returns to neutral.	
2. Improper positioning of treadle photosensor actuator.	Remove cover and check position.	Readjust.	87
3. Defective treadle signal circuit board.	Disconnect relay panel 12P connector; if error code goes out, check foot switch circuit board; if it does not go out, check main circuit board.	Replace foot switch circuit board.	92
		Replace main circuit board.	87
4. Shorted harness.	Treadle harness conductivity.	Replace harness.	

⑤ <E-2-00> Displayed before carriage feed operates, and when carriage feed is at home position or thread trimming position.

Cause	Check	Solution	Page
1. Machine not at needle up position.	<Normal operation>	Turn pully by hand to needle up position.	
2. Improper positioning of needle up sensor.	Remove cover and check needle up sensor position.	Readjust.	
3. Disconnected connector.	Main circuit board connector P26	Reconnect connector.	87
4. Short in harness or defective needle up sensor circuit.	Disconnect main circuit board connector P26, short #4 and #7 pins in main circuit board; if error code goes out, check detector; if it does not go out, check main circuit board.	Replace detector. Replace main circuit board.	87

⑥ <E-2-01> Displayed during automatic sewing.

1. Machine starts, but does not begin sewing within specified time. (First stitch signal not received.)	Turn pully by hand to check if operation is extremely heavy.	Adjust if operation is heavy.	
2. Machine V-belt off.	V-belts	Mount belt.	
3. Pully screws loose.	Set screws in pully	Tighten.	
4. Disconnected connector.	Main circuit board connector J27 Machine motor circuit board connectors J1, J2, J3 Machine motor connector	Reconnect connector.	87
5. Blown fuse.	Power supply unit 5AFB fuse (Fuse ③, page 93) Machine motor circuit board fuse	Replace fuse. (Make sure machine turns easily by hand before power is turned on, and that machine circuit board and driver have no troubles.)	93 115
6. Short in harness.	Machine motor drive harness conductivity.	Replace harness.	
7. Defective drive circuit, including machine motor circuit board.	_____	Replace machine motor circuit board. Replace drive circuit.	89
8. Defective machine motor.	Shorted or broken coil, or mechanically locked.	Replace machine motor.	
9. Defective needle up sensor.	Turn pully by hand to make sure <E-2-00> error code or normal display appears.	Replace detector.	

⑦ <E-2-02> Displayed during automatic sewing.

Cause	Check	Solution	Page
1. Sewing not completed during specified time. (Needle up signal not received.)	Turn pulley by hand to check if operation is extremely heavy.	Adjust if operation is heavy.	
2. Unstable needle up signal.	Turn pulley by hand to make sure <E-2-00> error code or normal display appears.	Replace detector.	

⑧ <E-3-00> Displayed when carriage feed returns to home position.

1. Carriage feed overruns home position.	Cut power supply when error is displayed; disconnect main circuit board connector J25, and check conductivity at pins #3 and #4 in sensor. If "0n," home position is overrun.	Readjust.	
2. Improper positioning of home position overrun sensor.			
3. Home position overrun, or defective home position sensor or sensor circuit.	Check conductivity. Make sure conductivity is "∞" when dog is far from, "0n" when close to.	Replace sensor. Replace main circuit board.	87
4. Defective DC motor encoder.	_____	Replace DC motor.	31, 34

⑨ <E-3-01> Displayed when carriage feed is at corner knife operating position or moves to home position.

1. Improper positioning of end overrun sensor.	Cut power supply when error is displayed; disconnect main circuit board connector J25, and check conductivity at pins #5 and #6 in sensor. If "0n," home position is overrun.	Readjust.	
2. Defective end overrun sensor or sensor circuit.	Check conductivity. Make sure conductivity is "∞" when dog is far from, "0n" when close to.	Replace sensor. Replace main circuit board.	87
3. Defective DC motor.	_____	Replace DC motor.	88

⑩ <E-3-02> Displayed when carriage feed moves.

1. Carriage feed does not finish moving within specified time.	Check if carriage feed operation is heavy.	Adjust if operation is heavy.	
2. DC motor belt off.	DC motor timing belt	Mount belt.	34
3. Loose pulley screw.	Motor and carriage feed timing pulley screws		34

① <E-3-03> Displayed when carriage feed moves.

Cause	Check	Solution	Page
1. Disconnected connector.	Main circuit board connector J30 DC motor circuit board 4P connector and connector CN1	Reconnect connector.	87
2. Blown fuse.	Power supply unit 8A fuse (Fuse⑦, page 93)	Replace fuse.	93
3. Defective DC motor circuit board.	_____	Replace DC motor circuit board.	88

② <E-3-04> Displayed when resetting after error code displayed. (e.g. "emergency stop")

1. Carriage feed does not finish moving within specified time.	Check if carriage feed operation is heavy.	Adjust if operation is heavy.	
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③ <E-3-05> Displayed when carriage feed moves.

1. Carriage feed emergency stop.	Check if carriage feed operation is heavy.	Adjust if operation is heavy.	
2. Disconnected connector.	Main circuit board connector J25 DC motor circuit board 2P connector and connector CN3	Reconnect connector.	87 88
3. Blown fuse.	Power supply unit 8A fuse (Fuse⑦, page 93)	Replace fuse. (Make sure carriage feed is not heavy before power is turned on.)	93
4. Improper positioning of home position sensor.	Disconnect main circuit board connector J25; check conductivity at pins #1 and #2 in sensor. Make sure conductivity is "∞" when dog is far from, "0Ω" when close to.	Readjust.	
5. Defective home position sensor or sensor circuit.		Replace sensor.	
6. Loose screw in DC motor circuit board terminal block.		Replace main circuit board.	87
		Tighten screws in terminal block.	88
7. Defective DC motor.	_____	Replace DC motor.	31, 34

⑭ <E-3-06> Displayed when power is turned on.

Cause	Check	Solution	Page
1. Carriage feed overrun home position.	Carriage feed at home position overrun position. (Normal operation)	Move carriage feed by hand slightly away from operator's side.	87
2. Defective home position overrun sensor or sensor circuit.	Disconnect main circuit board connector J25; check conductivity at pins #3 and #4 in sensor. Make sure conductivity is "∞Ω" when dog is far from, "0Ω" when close to.	Replace sensor. Replace main circuit board.	

⑮ <E-4-01 or E-4-10> Displayed during flap program operation; E-4-01 is for right flap errors, E-4-10 is for left flap errors.

1. Dust or other obstruction on flap sensor reflector (folding plate) or emitter.	_____	Clean sensor and reflector.	86
2. Improper positioning of flap sensor.	Check sensor operation with flap sensor adjustment.	Readjust.	
3. Disconnected connector, or short in harness (including flap sensor.)	Main circuit board connector J23 Flap circuit board connector J13, J14, J15 Flap sensor relay connector Flap sensor harness conductivity.	Reconnect connector. Replace harness (including flap sensor.)	87 91
4. Improper adjusting of flap sensor sensitivity, or defective sensor circuit for adjustment control.	Check sensor operation with flap sensor adjustment.	Readjust. Replace control. Replace flap circuit board.	91

⑯ <E-5-00> Displayed when power is turned on.

Cause	Check	Solution	Page
1. Memory erased due to extended non-use.	_____	Turn power on and wait for 15 min. and recharge back-up capacitor, then write to memory with PSW-36.	87
2. Memory contents not retained due to defective memory back-up circuit.	Recharge, then check if error code still displayed after writing.	Replace main circuit board.	

⑰ <E-6-01 or E-6-10> Displayed during automatic sewing; E-6-01 is for right, E-6-10 is for left thread breakage errors; E-6-11 is for both right and left thread breakage.

1. Needle thread broke.	Check needle and bobbin thread breakage.	Thread.	8, 9
2. Defective thread breakage detector operation.	Make sure detector threading is correct.	Thread correctly.	8
	Make sure pulley is turned by hand easily.	Replace thread breakage detector.	95
3. Disconnected connector, or short in harness (including thread breakage sensor.)	Relay panel 9P connector Thread breakage sensor harness conductivity.	Reconnect connector. Replace thread breakage sensor.	95
4. Defective thread breakage sensor circuit.	_____	Replace main circuit board.	87
5. Improperly set DIP switch.	Check "monitor on" status even though thread breakage detector is not installed.	Set PSW-32 OFF.	

⑱ <E-7-00> Displayed when memory written with DIP switch (PSW-37).

Program data write error.	_____	Replace main circuit board.	87
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2. Error code not displayed.

※ Refer to the table below to repair when an error code is not displayed.

① Carriage feed does not operate. (Power indicator off)

Cause	Check	Solution	Page
1. Disconnected connector or short in harness.	Check connections in power supply line, including power outlet, and check harness conductivity. Main circuit board connectors J22 and J28, harness conductivity. Panel circuit board connectors J10 and J11, harness conductivity.	Reconnect connector. Replace harness.	87
2. Extremely low power supply voltage or power supply connector improperly wired.	Power supply voltage and outlet wiring.	Wire correctly.	
3. Blown fuse.	Power supply unit 6A fuse (Fuse⊗, page 93)	Replace fuse.	93
4. Loose screw in breaker, transformer.	Screws in power supply outlet, breaker, transformer, fuse holder.	Tighten.	
5. Short in breaker, transformer, noise filter.	Check conductivity.	Replace parts.	
6. Defective power supply circuit, main circuit board, or panel circuit board.		Replace power supply unit, main circuit board, or panel circuit board.	87 90

② Carriage feed does not operate. (Power indicator on but home position not located)

1. Defective emergency stop switch.	Emergency stop switch conductivity.	Replace emergency stop switch.	90
2. Short in emergency stop switch circuit.	_____	Repair short.	

③ Valve (cylinder) does not operate.

Cause	Check	Solution	Page
1. Disconnected connector.	Main circuit board connector J29 Valve unit connectors	Reconnect connector.	87
2. Blown fuse.	Power supply unit 2A (Fuse⑤, page 93)	Replace fuse.	93

④ Thread winding motor does not turn.

1. Disconnected connector.	Thread winding motor relay connector.	Reconnect connector.	93
2. Blown fuse.	Power supply unit 2A fuse. (Fuse⑤, page 93)	Replace fuse.	
3. Loose transfer screw.	Power supply transformer #40 and #41 terminals.	Tighten.	
4. Improper adjustment or short in thread winding unit switch.	Check conductivity.	Readjust or replace switch.	
5. Defect or short in thread winding power supply circuit.	Check voltage.	Repair short or replace parts.	
6. Defective thread winding motor.	_____	Replace thread winding motor.	

⑤ Marking lights do not light.

1. Disconnected connector.	Marking light relay connector	Reconnect connector.	14
2. Loose transfer screw.	Power supply transfer #5 and #6 terminals	Tighten.	
3. Short in light or harness.	Check conductivity.	Replace light. Replace harness.	

⑥ Can't start.

Cause	Check	Solution	Page
1. Defective start switch or short in harness.	Check conductivity.	Replace start switch or harness.	96
2. Disconnected connector.	Relay panel 3P connector	Reconnect connector.	

⑦ Center knife position cannot be adjusted.

1. Disconnected connector or short in harness.	Digital switch connector on control box cover	Reconnect connector.	90
2. Defective digital switch.	_____	Replace digital switch.	

⑧ Abnormal noise during corner knife operation.

1. Improper positioning of corner knife sensor.	_____	Readjust.	70
2. Defect or short in corner knife sensor.	_____	Replace corner knife sensor.	

⑨ Movable knife strikes folding plate during operation.

1. Improper positioning of movable knife sensor.	_____	Readjust.	64
2. Defect or short in movable knife sensor.	_____	Replace movable knife sensor.	