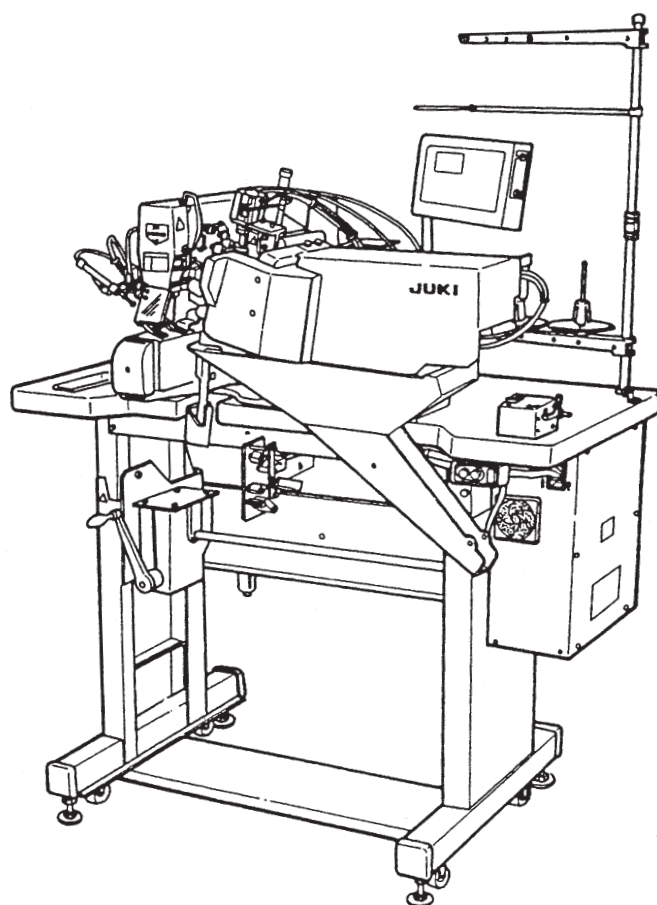


2-needle, Automatic Belt-loop Attaching Machine

MOL-254

ENGINEER'S MANUAL



PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the sewing machine. This manual describes "Adjustment Procedure", "Results of Improper Adjustment", and other functions which are not covered by the Instruction Book intended for the maintenance personnel and sewing operators at a sewing factory.

All personnel engaged in repair of MOL-254 are required to carefully read Section 2 "Standard Adjustment" which contains important information on the maintenance of MOL-254.

The "Standard Adjustment" consists of two parts; the former part presents illustration and simplified explanation for the convenience of reconfirmation of the required adjustment values in carrying out actual adjustment after reading this manual once; and the latter part provides "Results of Improper Adjustment" in which sewing and/or mechanical failures, and the correcting procedures are explained for those persons who perform such adjustment for the first time.

It is advisable to use "MOL-254 Parts Book" together with this Engineer's Manual.

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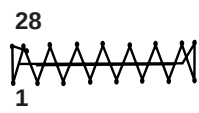
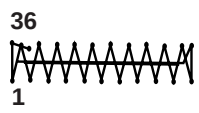
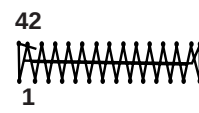
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*** The description covered in this engineer's manual is subject to change for improvement of the commodity without notice.**

1. SPECIFICATIONS

- | | |
|---|--|
| 1) Max. sewing speed | : 2,500 rpm (sewing pitch : 3.4 mm or less) |
| 2) Hook | : Horizontal semi-rotary hook (oil wick lubrication) |
| 3) Bobbin | : 1.8 fold hook |
| 4) Thread take-up | : Link thread take-up |
| 5) Needle | : DPx17 #19 to #21
For domestic : DPx17 #19
For export : DPx17 #21 |
| 6) Range of thread specification | : Cotton thread #30 to #50, spun thread #30 to #50 |
| 7) Number of stitches | : Panel selection method from among 28 stitches, 36 stitches and 42 stitches
(28 stitches at the time of delivery)
(Max. 64 stitches when external ROM is used.) |
| 8) Replacement of number of stitches | : Panel selection method |
| 9) Number of bartacking patterns stored in memory | : Standard number of patterns : 9 patterns
(Max. 99 patterns when external ROM is used.) |
| 10) Needle bar stroke | : 45.7 mm |
| 11) Stitch adjustment method | : Panel input method |
| 12) Bartacking width | : 1.0 mm to 3.0 mm (2.3 mm at the time of delivery) |
| 13) Bartacking length | : 7.0 mm to 22.0 mm (10.0 mm at the time of delivery) |

14) Needle entry

28 stitches	36 stitches	42 stitches
		

- | | |
|---|--|
| 15) Thread trimming method | : Knife method (Hook on this side : Air cylinder drive method)
Knife method (Hook on rear side : Electromagnetic valve solenoid drive method) |
| 16) Lift of cloth presser foot | : 21 mm (from top surface of cloth presser lower plate to bottom surface of cloth presser) |
| 17) Cloth feed method | : Intermittent feed (2-shaft drive by stepping motor) |
| 18) Sewing machine drive method | : DD • AC servomotor (450W) mounted onto machine head |
| 19) Thread presser drive method | : Air cylinder drive |
| 20) Cloth presser drive method | : Air cylinder drive |
| 21) Wiper drive method | : Air cylinder drive |
| 22) Sewing machine lubrication method | : Manual oiling (centralized oil-wick lubrication) |
| 23) Lubricating oil | : New Defrix Oil No. 2 |
| 24) Center distance of needle adjustment method | : Needle portion : manual moving method
Hook portion : stepping motor drive moving method
(in 0.01 mm steps) |
| 25) Length of center distance of bartacking | : 40.0 mm to 70.0 mm
(57.15 mm (2 and 1/4") at the time of delivery) |
| 26) Loop width | : 9 mm to 20 mm (12 mm at the time of delivery) |
| 27) Allowance of loop folding | : 11 mm (excluding cross cut section) |
| 28) Allowance of loop presser | : 4 mm |

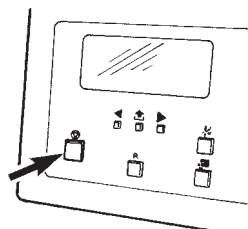
29) Loop cut method	: Selection of cross cut and straight cut (Range : 9 mm to 20 mm) (Cross cut at the time of delivery)
30) Loop cut	: Cutting method by engaging moving knife with counter knife
31) Loop bending	: Fork folding method
32) Loop supply drive method	: Front and rear assisted drive method (stepping motor)
33) Loop length setting	: Automatic recognition method
34) Loop splice detection	: Potentiometer automatic splice detection method
35) Bobbin thread winder device	: Single and separated drive
36) Temporary stop function	: Possible to stop the machine during sewing
37) Bobbin thread counter	: Selection method of UP/DOWN counter (Front and rear hooks can be separately set. Device automatically stops at COUNT UP.)
38) Fork drive method	: AC servomotor (120W)
39) Loosing loop mechanism	: Optional
40) Loop pull-out mechanism	: Optional
41) Needle thread breakage detector	: Optional
42) Needle cooler	: Optional
43) Air gun	: Optional
44) Table height	: Provided with adjustable stand function (Manual type) 920 mm to 1,250 mm (from floor level to top surface of throat plate)
45) Dimensions	: Width : 1,200 mm Length : 800 mm Height : 1,350 mm (excluding thread stand) (When table comes down to the lowest.)
46) Gross weight	: 2,250N (230 kgf)
47) Power consumption	: 350VA
48) Operating temperature range	: 5 to 35
49) Operating humidity range	: 35% to 80% (no dew condensation)
50) Line voltage	: AC200V, 220V, 230V, 240V, 380V, 400V ± 10 % (Power frequency : 50/60 Hz)
51) Air pressure used	: 0.5 MPa (5 kgf/cm ²)
52) Air consumption	: 52 /min. (N / min) (Splice processing : 1 cycle/min, excluding optional)

2. NAMES AND FUNCTIONS OF COMPONENTS

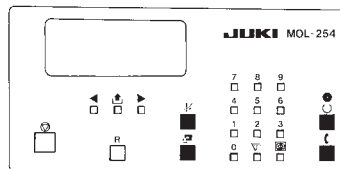
[1] Names and functions of the main unit

Temporary stop switch

The switch is used to temporarily stop the machine operation.



Operation box panel <P29>



The panel is used to specify/display/actuate functions.

Sewing machine head

The machine head performs sewing while making the motor drive the needles.

Clamp feed device

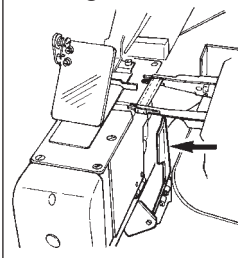
The device is used to assist in loop feeding.

Thread stand

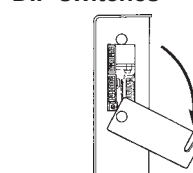
The stand is used to set needle thread and the thread to be supplied to the bobbin winder.

Start switch

Start switch used for starting up the sewing.



DIP switches



Used to select functions.

Bobbin winder

Used to wind a bobbin with thread.

Loop feeding device

The device feeds out the loop. (Optional)

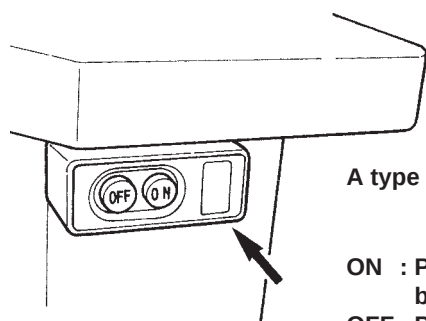
Control box

Controls the whole machine.

Loop supplying device

Performs a series of loop supplying procedure.

(Note) 1. The <P 29> appearing in the text above indicates that a detailed explanation for the relevant component is given on page(s) 29.



A type (standard)

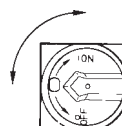
ON : Press the black button.
OFF : Press the red button.

Power switch (varies in accordance with destination.)

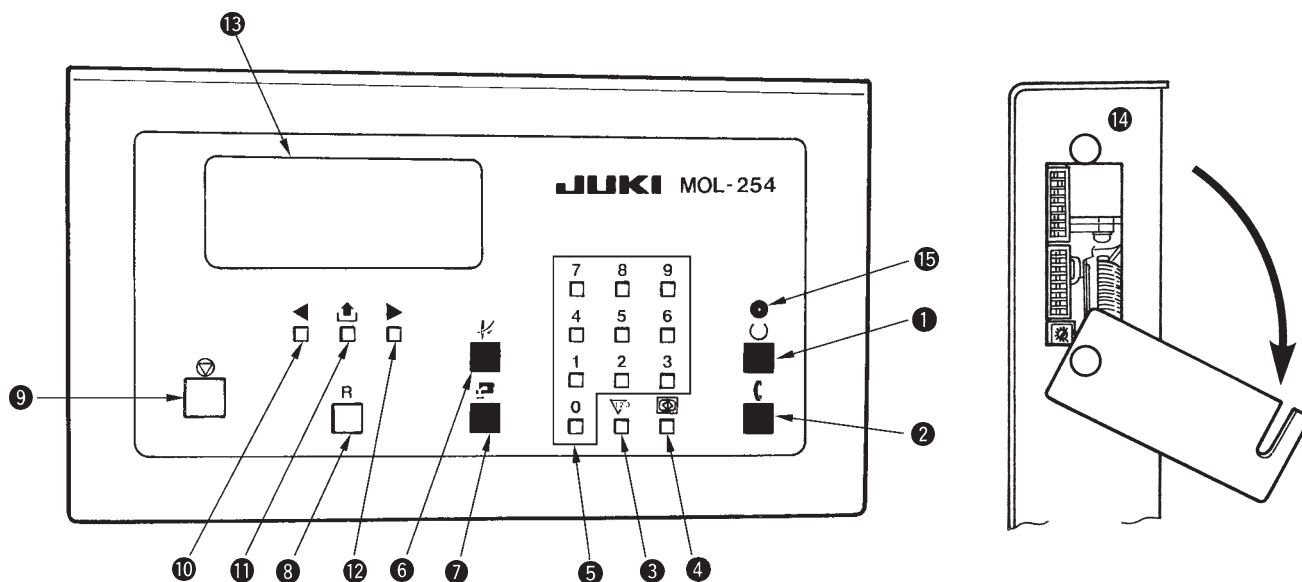


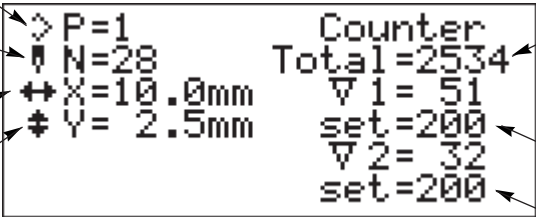
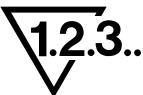
B type (for high-voltage)

ON : Turn the center grip of the switch clockwise.
OFF : Turn it counterclockwise.



[2] Names and functions of operation box panel



Name of switch	Function
1 Set ready switch 	This switch is used to perform origin retrieval of the sewing machine and loop supplying device. The machine is set to the sewing stand-by state. Display screen moves to sewing screen. Sewing ready lamp (green) lights up in the sewing stand-by state. When pressing the set ready switch again, the lamp goes out and the setting screen appears. Caution : A hazardous state arises when this switch is turned ON, since the belt loop supplying device operates at a high speed. Keep your hands or any other part of your body away from the area of loop supplying device drive and under the presser foot of the machine.
<u>Pattern No.</u> <u>Number of stitches</u> <u>Length of bartacking</u> <u>Width of bartacking</u>  <u>Total counter</u> <u>1st hook counter and set value</u> <u>2nd hook counter and set value</u> <u>Sewing screen</u>	
2 Set-back switch 	a. This switch is used to re-set a belt loop at the stand-by position. Caution : A hazardous state arises when this switch is turned ON, since the belt loop supplying device operates at a high speed. Keep your hands or any other part of your body away from the area of the belt loop supplying device drive and under the presser foot of the machine. b. When selecting step operation, this switch acts as the step-feed switch.
3 Counter key 	This key is used to enter the counter setting screen. (Refer to page 33 of the Instruction Manual.)

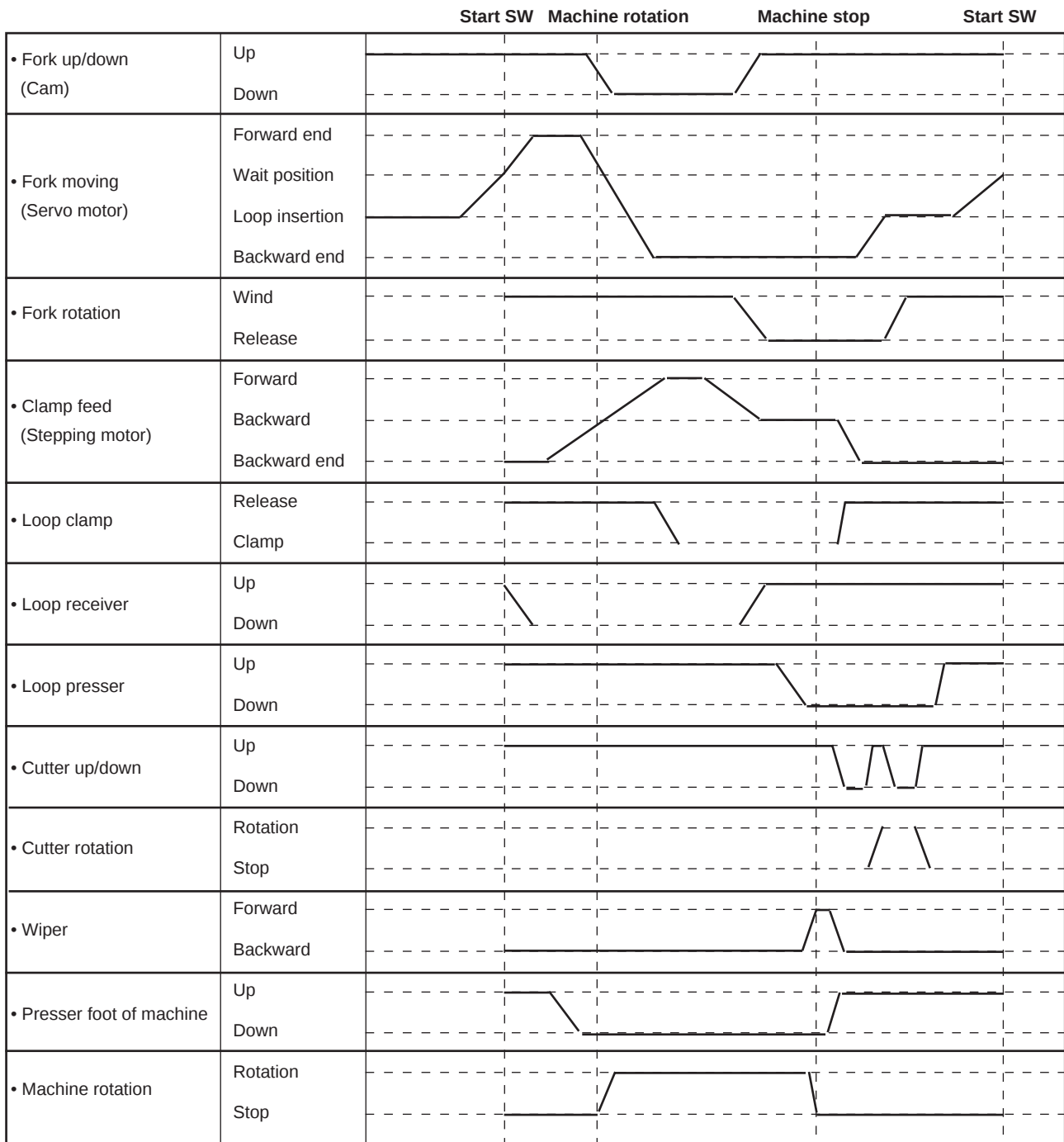
④ Standard screen key 	a. This key is used to enter the setting screen. b. When changing the sewing data, keep pressing this key for 10 seconds to release data-lock, In addition, data is locked when keeping pressing this key again.
⑤ Ten key	These keys are used when inputting various nematic data.
⑥ Needle threading switch 	Presser foot of the machine comes down and the threading is facilitated. Caution : A hazardous state arises when this switch is turned ON, since the belt loop supplying device operates at a high speed. Keep your hands or any other part of your body away from the area of the belt loop supplying device drive and under the presser foot of the machine.
⑦ Bobbin replacement switch 	This switch is used when replacing bobbin. Center-to-center distance between 1st hook and 2nd hook can be widened to the maximum. Caution : A hazardous state arises when this switch is turned ON, since the belt loop supplying device operates at a high speed. Keep your hands or any other part of your body away from the area of the belt loop supplying device drive and under the presser foot of the machine.
⑧ Reset switch 	Screen returns from the alarm display screen or the like to the standard screen. The following functions are performed. 1. Release of the alarm (When the alarm screen is displayed.) 2. Reset of the sewing counter (When the counter screen is displayed.) (When the count up screen is displayed.) 3. Reset of the total counter (When the counter screen is displayed.) 4. End of the machine adjustment screen 5. End of the check program
⑨ Temporary stop switch 	This switch is used to temporarily stop the operation or stop the operation. Caution : Re-start cannot be performed when the temporary stop switch is operated during the operation.
⑩ Left cursor key 	a. This key scrolls setting item to the left when displaying setting screen or the like. b. This key performs presser foot jump feed operation (traveling backward) when displaying the sewing screen. (Refer to page 36 of the Instruction Manual.)
⑪ Screen change-over key 	This key selects setting item.
⑫ Right cursor key 	a. This key scrolls setting item to the right when displaying setting screen or the like. b. This key performs presser foot jump feed operation (traveling forward) when displaying the sewing screen. (Refer to page 36 of the Instruction Manual.)
⑬ Display screen	This screen performs various displays.
⑭ DIP switches	These switches change over various settings. (Refer to page 50 of the Instruction Manual.)
⑮ Set ready LED switch	Green color

3. TIMING CHART

This diagram gives a basic timing chart. It has to be noted that the operation may vary if an alarm occurs or input from any of switches and sensors is made.

(Caution) For the basic operation flow, refer to page 25 of the Instruction Manual.

Standard operating timing chart



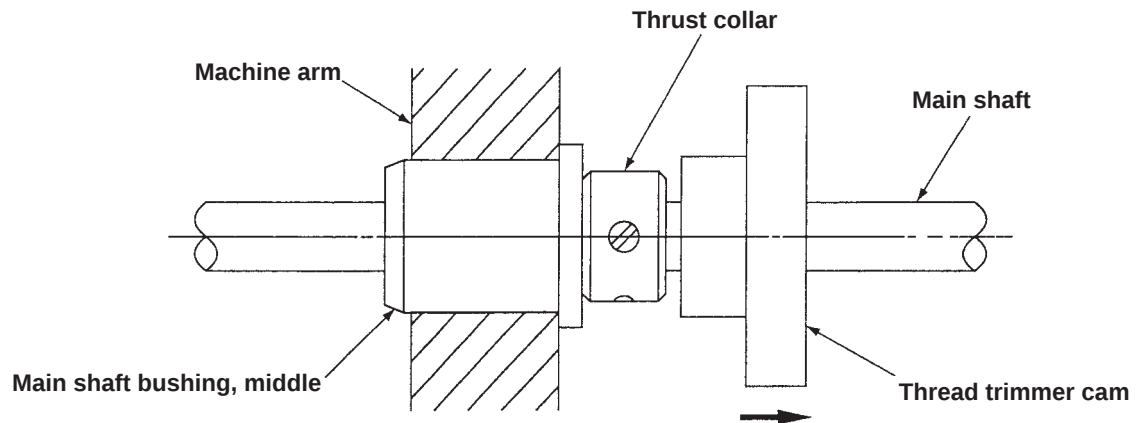
4. STANDARD ADJUSTMENT

[1] Machine head components

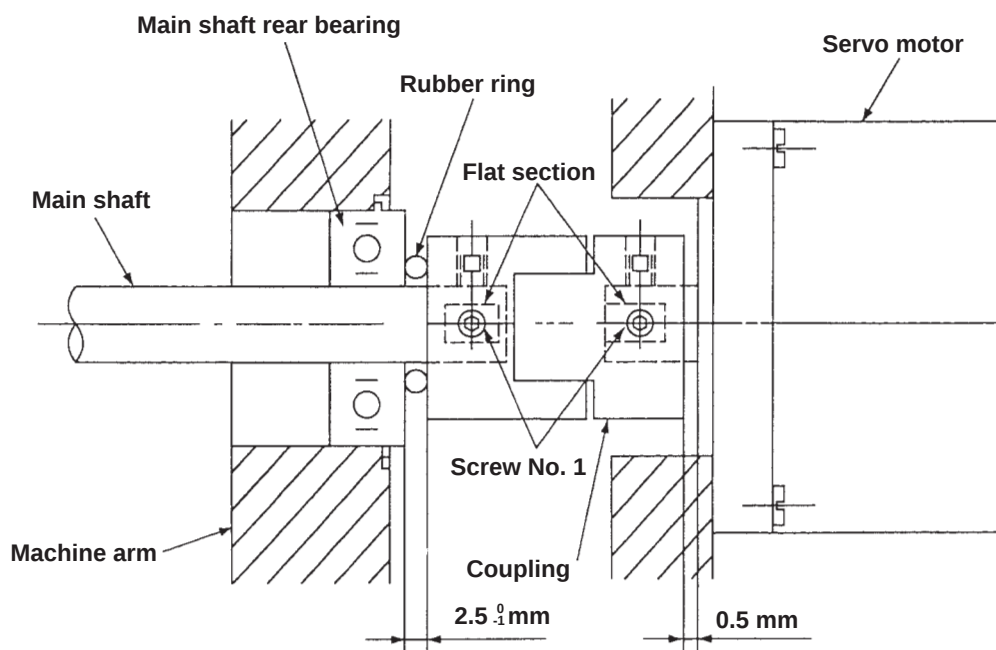
Standard Adjustment

(1) Adjustment of the main shaft components

1) Removing the play of main shaft



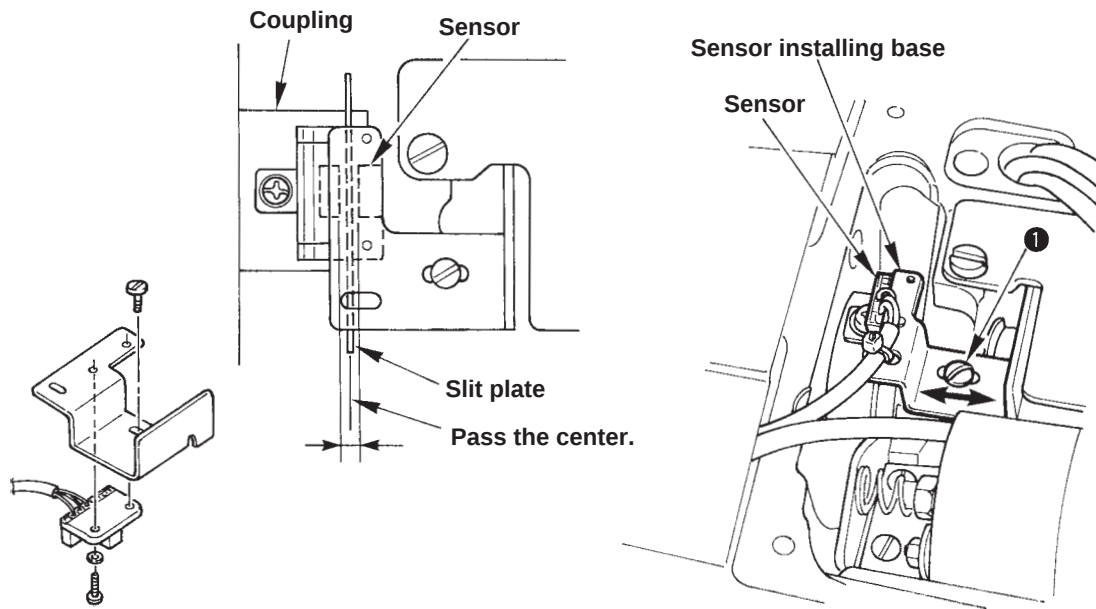
2) Installing the main shaft coupling



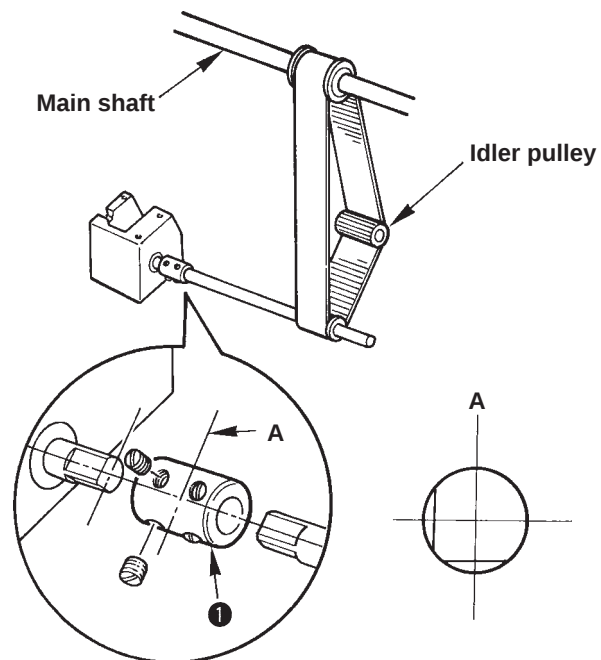
Adjustment Procedures	Results of Improper Adjustment
○ Pulling the thread trimmer cam in the direction of the arrow mark, lightly press the thrust collar to the main shaft bushing, middle to fit the thrust collar.	
Provide a clearance of 0.5 mm between the servo motor and the coupling, and fit the screw No. 1 to the flat section to install the coupling. Insert the rubber ring (R0154240100) in between the main shaft rear bearing and the coupling, provide a clearance of 2.5 mm between them, and fit the screw No. 1 to the flat section to install the coupling. Be sure to align the positions of the two screws in the direction of rotation when making the respective couplings engage with each other.	○ If the phase of the coupling is improper, the main shaft does not stop at the normal angle. ○ If the coupling installing clearance is larger than the specified value, moving gap of the coupling in the axial direction is lost. As a result, main shaft torque will occur.

Standard Adjustment

3) Adjusting the main shaft sensor



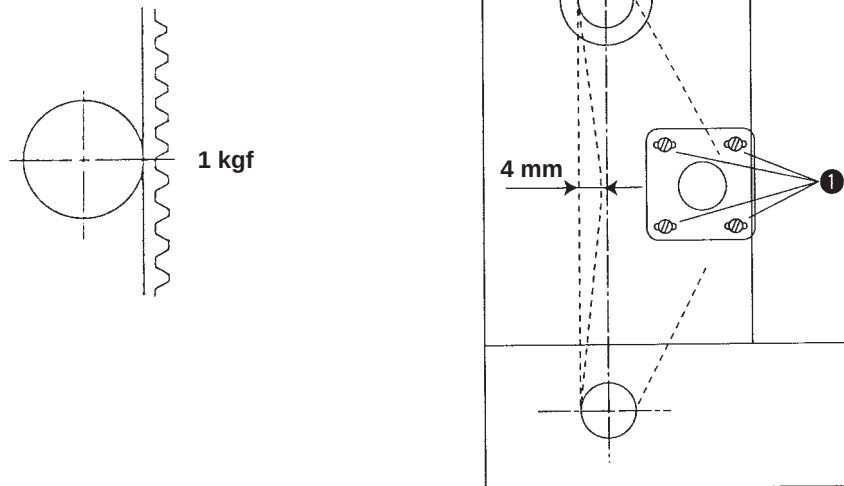
4) Stretching the timing belt (Main shaft-to-hook driving shaft for the front side timing)



Adjustment Procedures	Results of Improper Adjustment
○ Adjust so that the slit plate passes almost the center of the sensor and there is no interference, then tighten setscrew ❶.	
1) Bring the needle bar to the lowest position of its stroke. 2) Loosen the idler pulley and loosen the timing belt. 3) Adjust the setscrews in connecting collar ❶ at the lowest position of the needle bar as shown in the figure on the left. 4) Stretch the timing belt with the idler pulley and check the position of the setscrews. (The position becomes as form A.) (Caution) The position of the screw may be shifted when stretching the belt. Stretch the belt again since the crest of the belt is shifted by one.	Timing with the hook on the rear side is improper and stitch skipping or defective thread pulling will result.

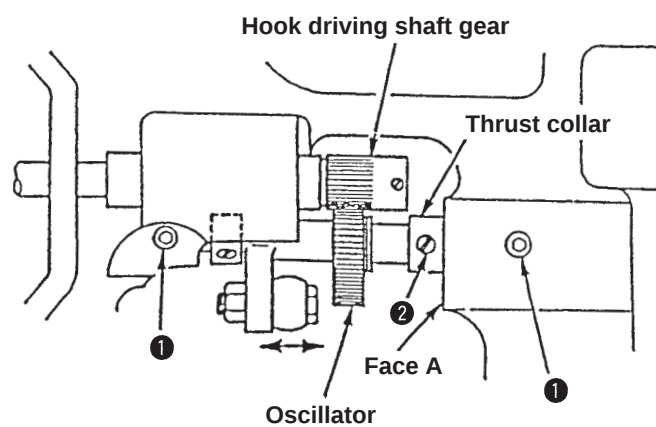
Standard Adjustment

5) Adjusting the idler



(2) Adjusting the hook driving shaft components

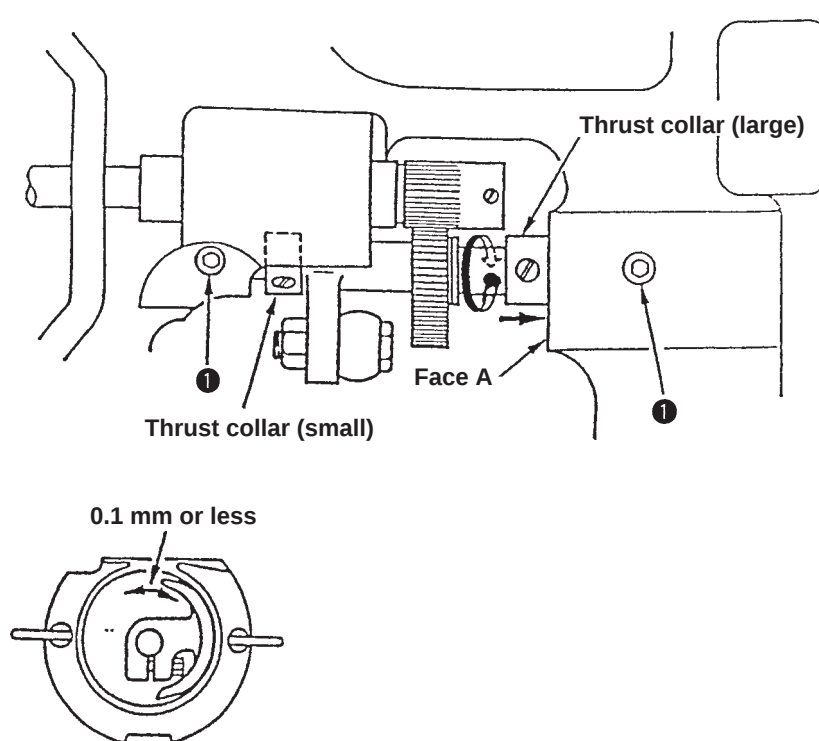
1) Adjusting the longitudinal position of the oscillator



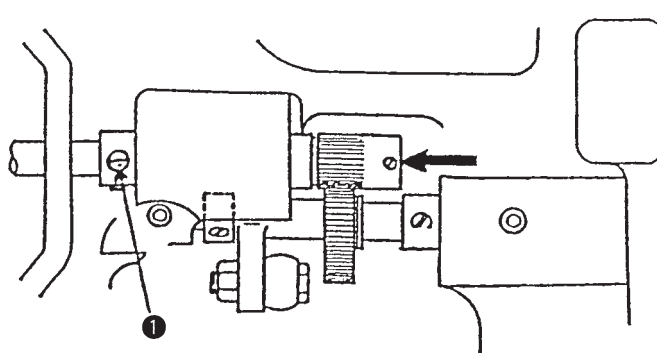
Adjustment Procedures	Results of Improper Adjustment
Loosen setscrews ❶ and adjust the idler. Using the belt tension as the standard, adjust the tension so that the belt sags 4 mm when the center of the belt is applied with a 1 kgf load.	If the timing belt is excessively pressed, main shaft torque is increased. As a result, heat is produced or worn-out of bearing is advanced, or belt is damaged early.
Loosen setscrews ❶ and ❷. When turning the main shaft several times, the oscillator moves in the direction of the arrow mark and naturally moves to the position where there is no load. Temporarily tighten setscrew ❶. Make the thrust collar come in contact with face A on the machine bed and tighten setscrew ❷.	○ If the longitudinal position of the oscillator is improper, seizure of the oscillator or main shaft crank will result.

Standard Adjustment

2) Adjusting the backlash of the oscillator gear



3) Removing the play of the hook driving shaft



Adjustment Procedures	Results of Improper Adjustment
Loosen setscrew ❶. Perform the adjustment of the backlash by turning thrust collar (large) in the direction of the arrow mark while making the collar (large) closely come in contact with face A on the machine bed. Adjust the gap of the backlash so that the gap is 0.1 mm or less at the top end of the shuttle driver and the gear smoothly rotates. Tighten setscrew ❶. (Caution) Be sure to keep the direction as shown in the figure with regard to the direction of rotation when removing the backlash.	○ If the backlash is too large, hook noise will be increased. ○ If the backlash is too small, seizure of the oscillator or main shaft crank will result. ○ If the longitudinal position of the oscillator is shifted when adjusting the backlash, seizure of the oscillator or main shaft crank will result.
Play in the axial direction Loosen two setscrews ❶ in the thrust collar and tighten the setscrews in the state that the hook driving shaft is pressed in the direction of the arrow mark.	

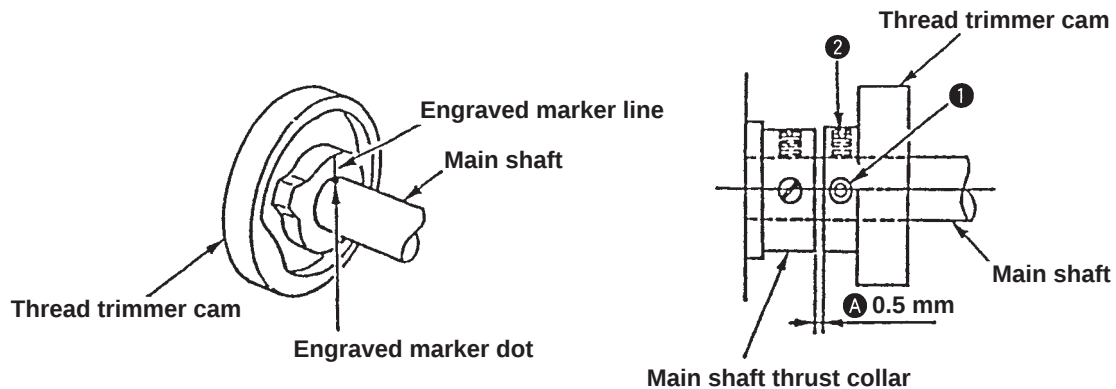
Standard Adjustment

(3) Adjusting the thread trimmer mechanism components

1) Adjusting the position of the thread trimmer cam

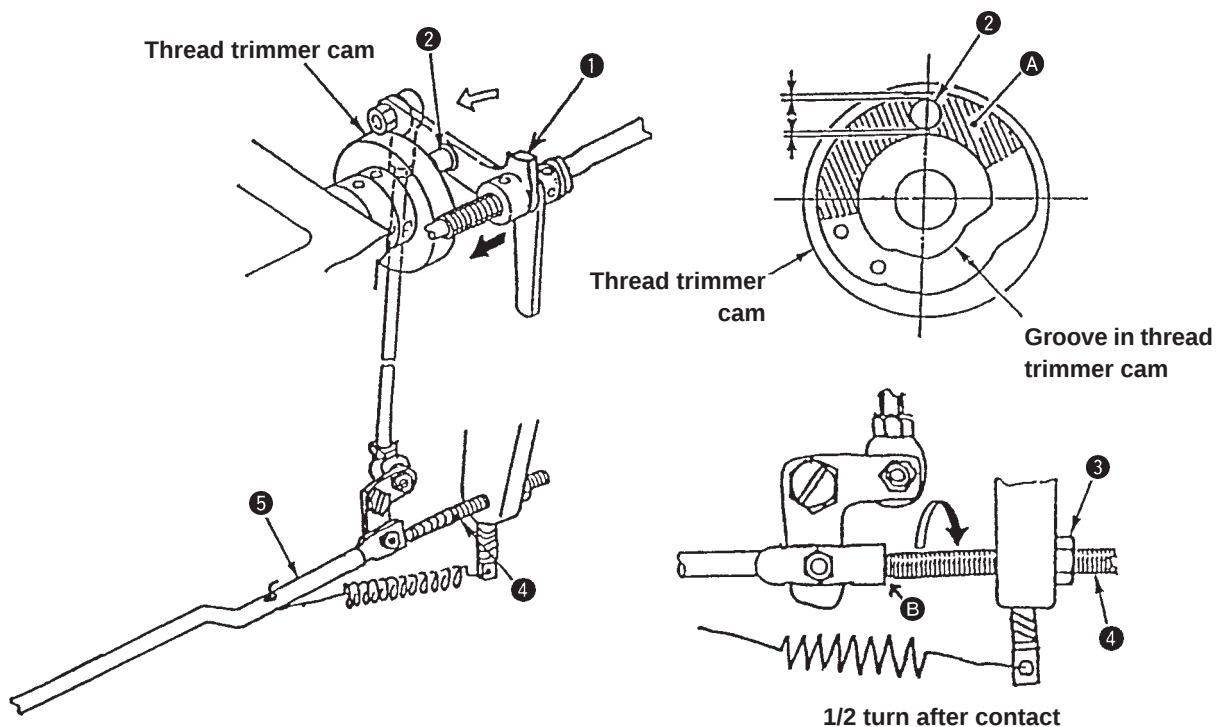
Position in the main shaft direction : adjust clearance **A** provided between the thread trimmer cam and the main shaft thrust collar to 0.5 mm.

Position in the direction of rotation : Align the engraved marker dot on the main shaft with the engraved marker line on the thread trimmer cam.



2) Adjusting the thread trimmer link stopper screw

Make sure that there is a clearance between thread trimmer roller **2** and both end faces of the groove in the thread trimmer cam and the roller smoothly enters the groove when pressing cam follower **1** in the direction of the arrow mark (→) at the supporting run section (range A) of the thread trimmer cam.



Adjustment Procedures	Results of Improper Adjustment
○ Determine the position of the thread trimmer cam and tighten screw No. 1 ❶ of the thread trimmer cam from the upper face of the sewing machine. Turn the main shaft by 1/4 in the normal direction of rotation, and similarly, tighten screw No. 2 ❷ from the upper face of the sewing machine. (Loosen the screws in the thread trimmer cam in the order of ❷ → ❶.)	○ Failure of thread trimming will occur. ○ Machine-lock will occur at the start of sewing or at the time of thread trimming. ○ Return to the initial position of the thread trimmer mechanism is delayed, and defective thread tightness of the first stitch at the start of sewing will occur. (Caution) When machine-lock occurs, check the play of main shaft in the axial direction, position and timing of the thread trimmer cam, or related components.
Tilt the machine head. Turn the main shaft to fit thread trimmer roller ❷ to supporting run section ❶ of the groove in the thread trimmer cam. Loosen nut ❸ and loosen thread trimmer link stopper screw ❹ up to the position where the screw is away from section ❷ of the thread trimmer connecting rod. Press cam follower ❶ in the direction of the arrow mark and lightly fit thread trimmer roller ❷ to the thread trimmer cam. (The roller does not enter the groove in the cam.) Start tightening thread trimmer link stopper screw ❹. Top end of thread trimmer link stopper screw ❹ comes in contact with section ❷ of the thread trimming rod. When further tightening the screw, cam follower ❶ turns in the direction of the arrow mark (←), then thread trimmer roller ❷ which has been lightly pressed enters the groove in the thread trimmer cam. Further, tighten by 1/2 turn thread trimmer link stopper screw ❹ from the time when thread trimmer roller ❷ has entered the groove in the thread trimmer cam, and tighten nut ❸ to fix the screw. At this time, fix thread trimmer link stopper screw ❹ so that it turns no further and tighten nut ❸.	○ Failure of thread trimming will occur. ○ Machine-lock will occur at the start of sewing or at the time of thread trimming. ○ Return to the initial position of the thread trimmer mechanism is delayed, and defective thread tightness of the first stitch at the start of sewing will occur. (Caution) When machine-lock occurs, check the play of main shaft in the axial direction, position and timing of the thread trimmer cam, or related components.

Standard Adjustment

3) Adjusting the thread trimming cylinder (front side)

- The clearance of ❶ is 1 mm at the stroke end of the pulling side of the thread trimming cylinder when the thread trimming cam is as shown in Fig. 1 (concave of the thread trimmer cam comes below).

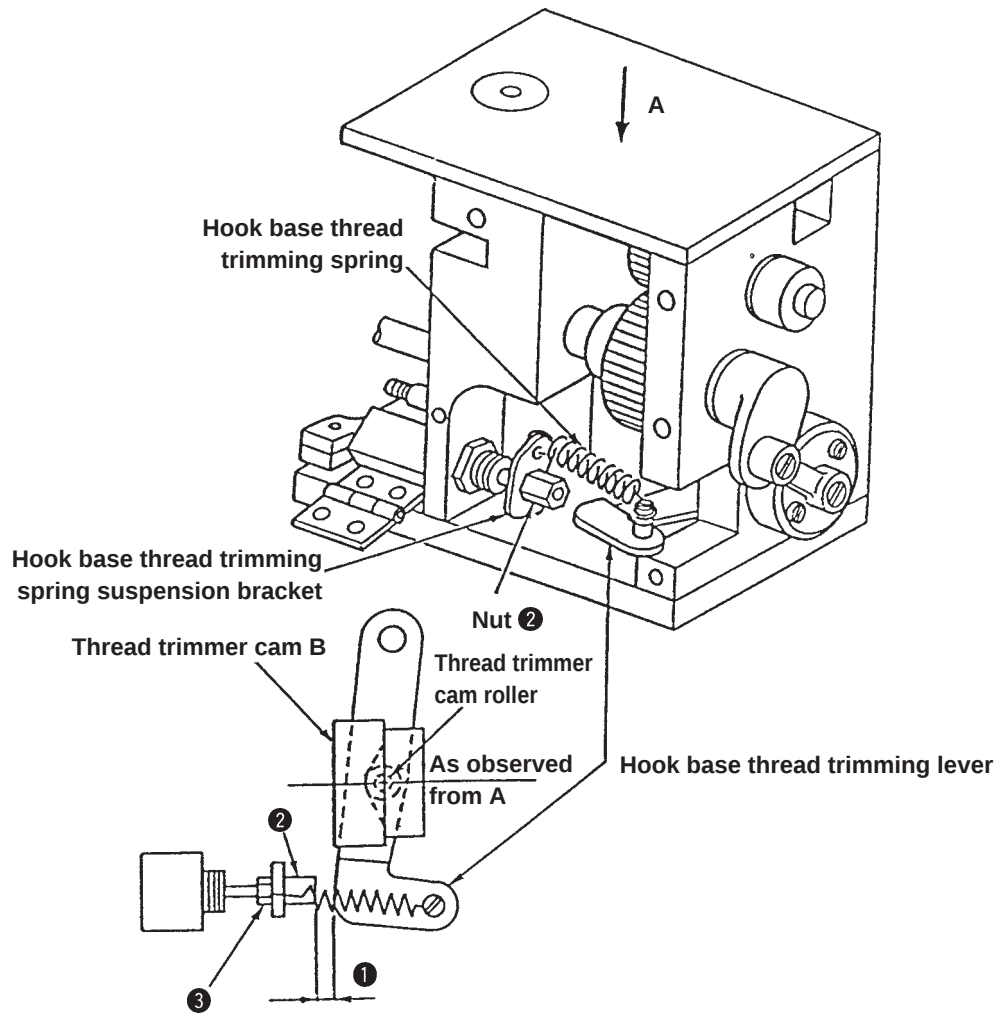


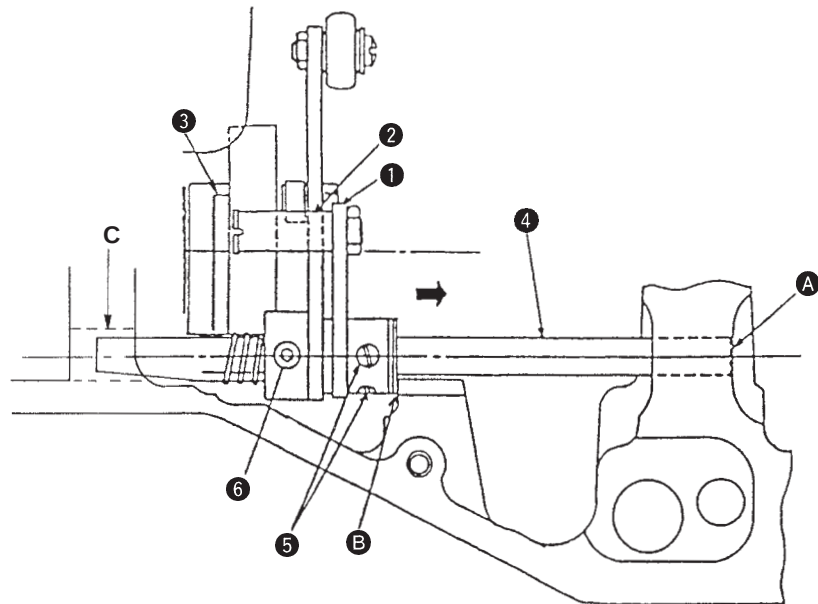
Fig. 1

Adjustment Procedures	Results of Improper Adjustment
Loosen nuts ② and ③ to adjust the thread trimming cylinder.	If the clearance is smaller than 1 mm, moving knife locating in the sewing position will excessively protrude from the throat plate. This causes the moving knife to interfere with the moving knife on the opposite side when making the distance between this side seam and far side seam smaller.

Standard Adjustment

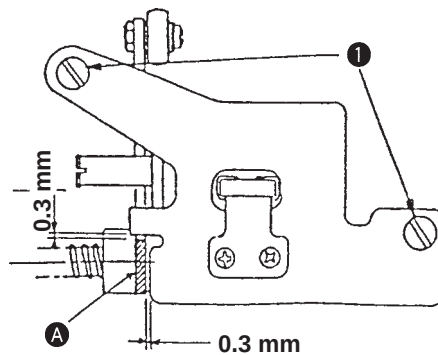
4) Position of the thread trimmer shaft

Make sure that the rear end of thread trimmer shaft ④ is aligned with worked plane A on the machine arm in the state that thread release pin ② in thread release arm ① comes off thread release notch ③ (thread trimmer stopper support comes in contact with stopper section B on the machine arm).



5) Position of the cam follower stopper

The clearances between notch A of the cam follower and the cam follower are 0.3 mm respectively in the state that the thread trimming operation is not performed (thread trimmer stopper support comes in contact with stopper section B on the machine arm).



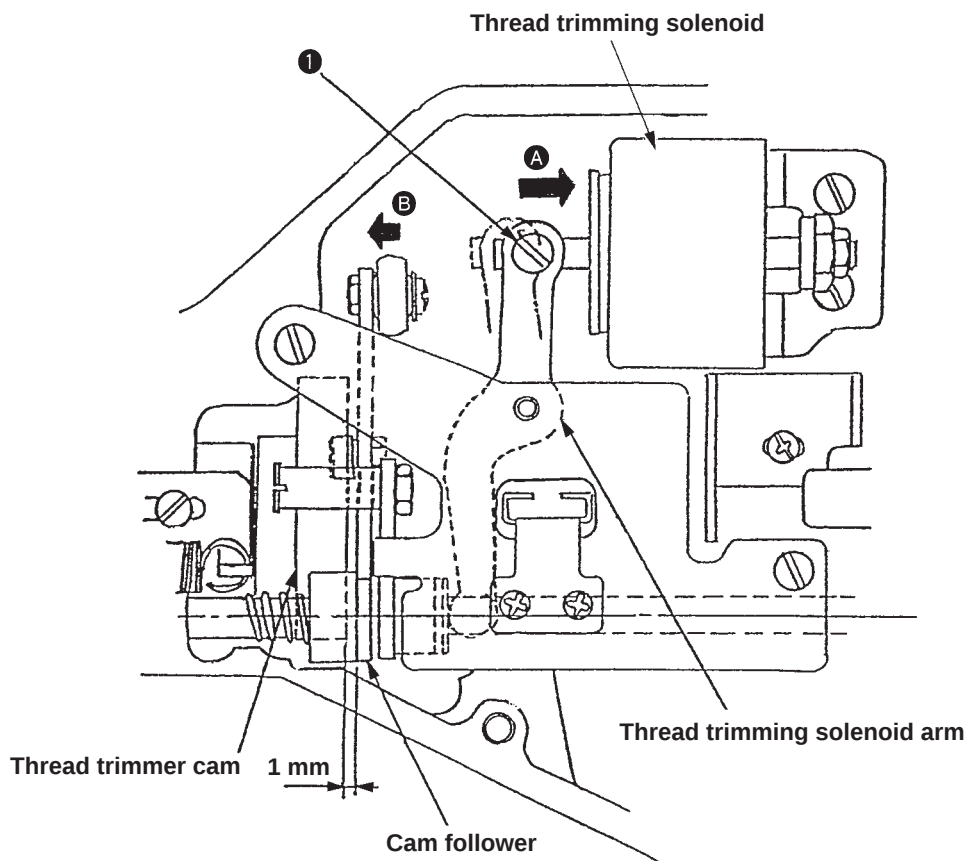
Adjustment Procedures	Results of Improper Adjustment
Loosen setscrew ❹ in the cam follower. (Shaft is possible to rotate.) Loosen two setscrews ❺ in the thread release arm thrust collar. Align the rear end of thread trimmer shaft ❸ with worked plane ❶ on the machine arm and tighten two setscrews ❺ in the thread release arm thrust collar. Press the cam follower in the direction of the arrow mark (←) and tighten setscrew ❹ in the cam follower while removing the play.	○ If thread trimmer shaft ❸ is mistakenly adjusted, receiving amount of front section ❷ of thread trimmer shaft becomes improper and the thread trimmer shaft may be prized resulting in failure of thread trimming or machine-lock. ○ The occurrence of the play will result in defective disk releasing.
○ Loosen two setscrews ❶ in the cam follower stopper in the state that the thread trimming operation is not performed, adjust the respective clearances to 0.3 mm, and tighten setscrews ❶.	○ Machine-lock or failure of thread trimming will occur.

Standard Adjustment

6) Position of the thread trimming solenoid

Turn the main shaft to the supporting run section of the thread trimmer cam [refer to ② Adjusting the thread trimmer link stopper screw], move the thread trimming solenoid in the direction of the arrow mark **A**, and the cam follower moves in the direction of **B**.

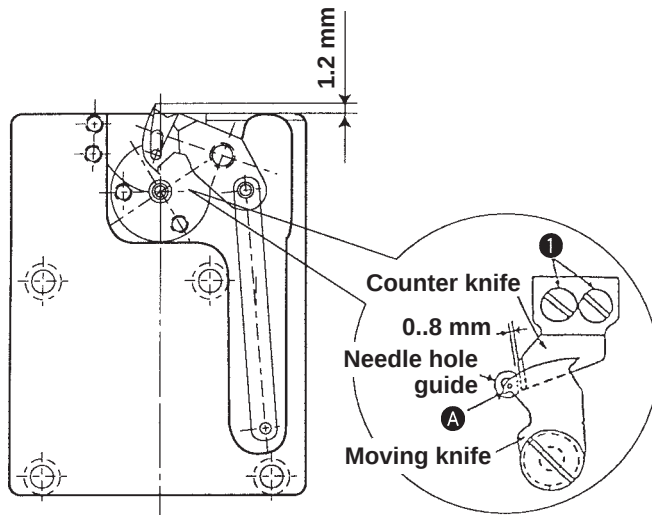
At this time, the clearance provided between the roller attaching face of cam follower and the cam face of thread trimmer cam is 1 mm.



Adjustment Procedures	Results of Improper Adjustment
Loosen adjustment screw ❶ in the thread trimming solenoid and adjust the position of thread trimming solenoid arm so that a clearance of 1 mm is provided between the cam face of thread trimmer cam and the roller attaching face of cam follower. Then, fix adjustment screw ❶.	○ Thread trimming roller enters the groove in thread trimmer cam and failure of thread trimming or machine-lock will occur. ○ Return to the initial position of the thread trimmer mechanism is delayed, or release of thread tension disk rising is delayed. As a result, defective thread tightness at the start of sewing or stitch skipping will occur.

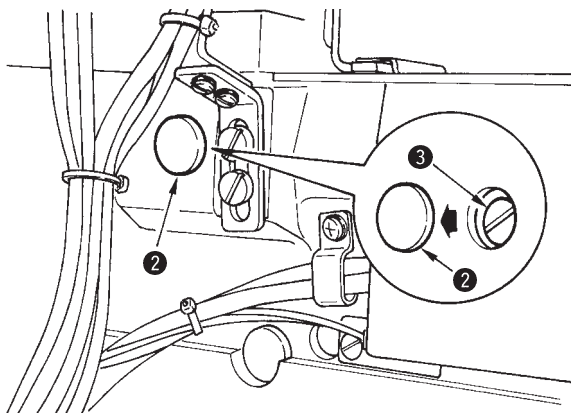
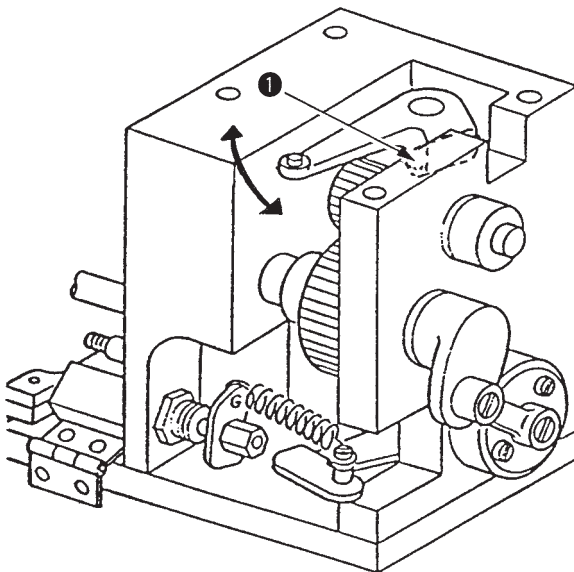
Standard Adjustment

7) Adjusting moving and counter knives



Position of the moving knife
Adjust the position so that the top end of moving knife protrudes 1.2 mm from the front end of throat plate.

Position of the counter knife
Clearance between the counter knife and the needle hole guide is 0.8 mm.



Standard Adjustment

8) Height of the moving and counter knives

Perform a trial cut of two pieces each of #80 and #5 threads with the moving and counter knives (by operating the thread trimming lever by hand after having removed the throat plate to check that the respective pairs of threads are properly cut).

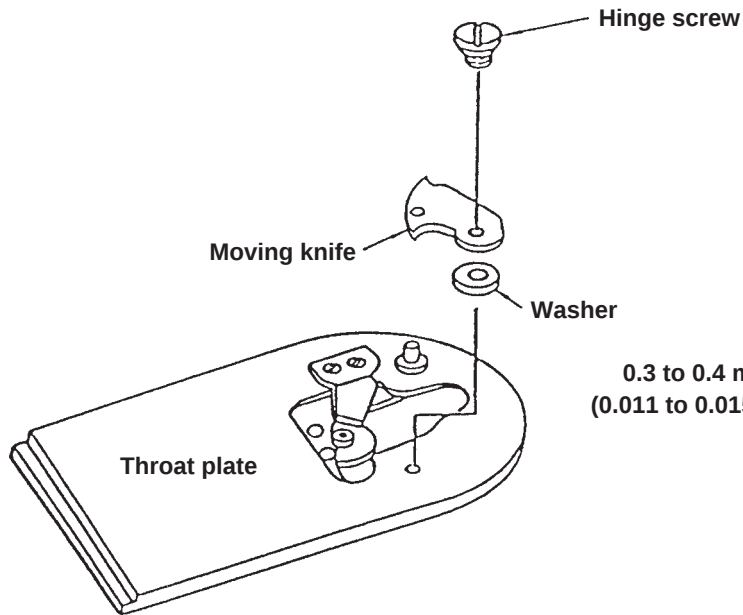


Fig. 8-1

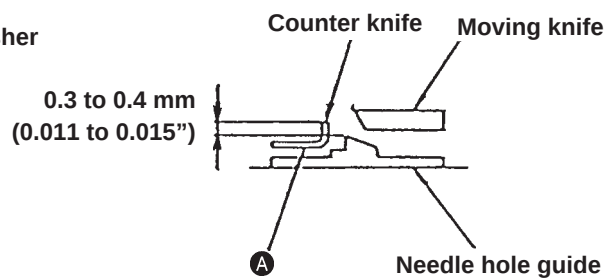


Fig. 8-2

9) Parallelism of the blade tip of the counter knife

So as to cut two pieces of thread (needle thread and bobbin thread) uniformly, the surface of the counter knife is in parallel to the throat plate installing plane.

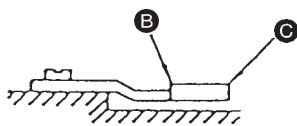
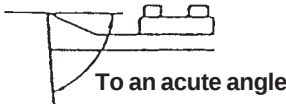


Fig. 9-1

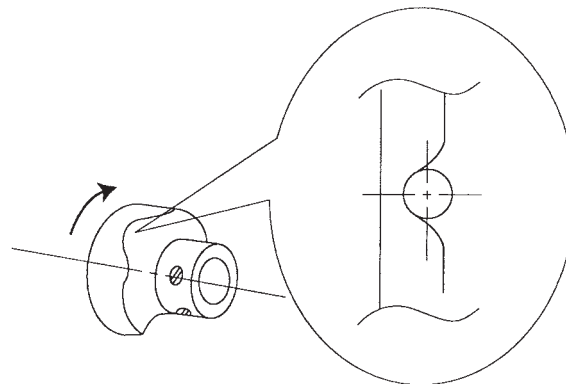
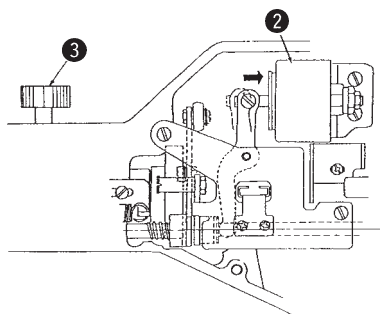
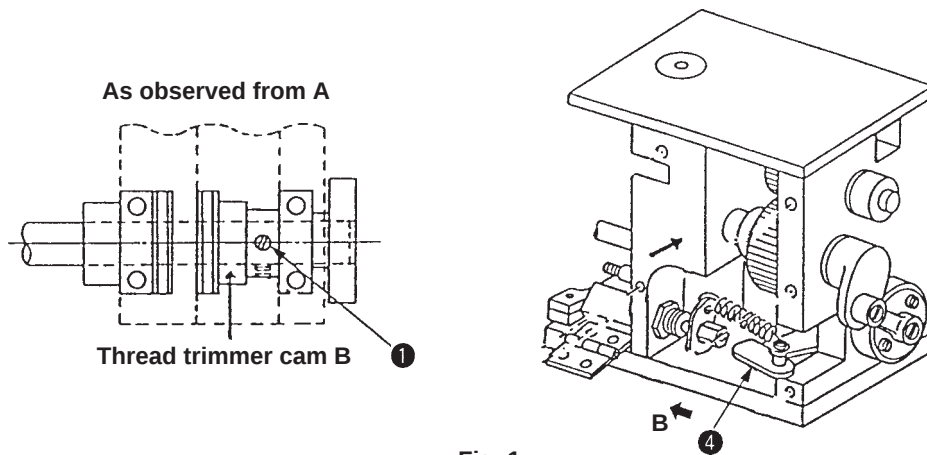
(The counter knife blade is in parallel to the throat plate installing plane. The difference in height between B and C should be 5 / 100 or less.)

Adjustment Procedures	Results of Improper Adjustment																								
Adjust the height of the moving knife according to the thickness of washer. If proper adjustment of the moving knife cannot be obtained, select and use one of the following parts. <table><tr><th>Part No.</th><th>Name of part</th><th>Thickness</th></tr><tr><td>B242328000A</td><td>Washer</td><td>0.4 mm</td></tr><tr><td>B242328000B</td><td>Washer</td><td>0.5 mm</td></tr><tr><td>B242328000C</td><td>Washer</td><td>0.6 mm</td></tr><tr><td>B242328000D</td><td>Washer</td><td>0.7 mm</td></tr><tr><td>B242328000E</td><td>Washer</td><td>0.8 mm</td></tr><tr><td>B242328000F</td><td>Washer</td><td>0.65 mm</td></tr><tr><td>B242328000G</td><td>Washer</td><td>0.75 mm</td></tr></table>	Part No.	Name of part	Thickness	B242328000A	Washer	0.4 mm	B242328000B	Washer	0.5 mm	B242328000C	Washer	0.6 mm	B242328000D	Washer	0.7 mm	B242328000E	Washer	0.8 mm	B242328000F	Washer	0.65 mm	B242328000G	Washer	0.75 mm	
Part No.	Name of part	Thickness																							
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B242328000E	Washer	0.8 mm																							
B242328000F	Washer	0.65 mm																							
B242328000G	Washer	0.75 mm																							
1) If the difference in height between the needle hole guide and the blade of the counter knife has not been adjusted to a value within the range of 0.3 to 0.4 mm, adjust it by prizing off portion A (Fig. 8-2) with a screwdriver or the like. (At this time, check the parallelism between the blade and the throat plate installing plane.) 2) If the thread is not cut on B side, shave C side appropriately. If the thread is not cut on C side, shave B side appropriately.  Fig. 9-2 3) If the thread is not cut even after carrying out the adjustment steps 1) and 2), replace the moving knife or the counter knife with a new one.	Thread trimming failure will occur. ○ If side B is lower than side C, the thread will not be cut on C side. ○ If the side C is lower than side B, the thread will not be cut on B side.																								

Standard Adjustment

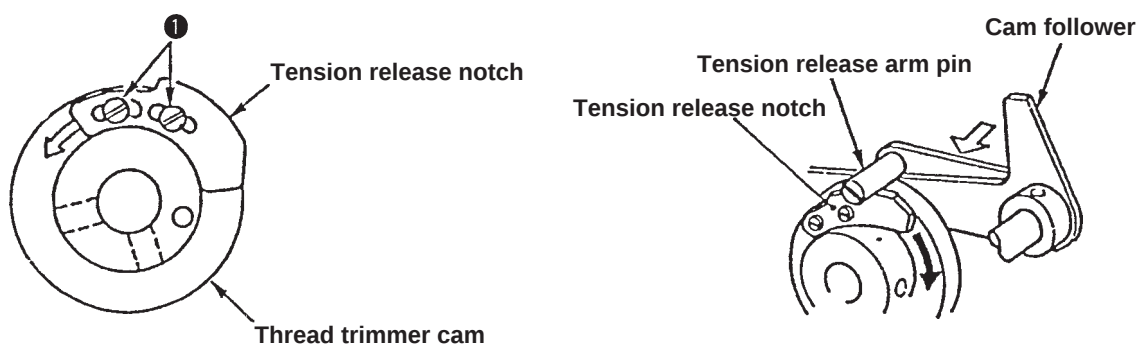
10) Adjusting the thread trimmer cam timing (only for this side)

Adjust the timing of the moving knife on this side and that on far side so that the moving knife on this side is located at its travel end when the moving knife on far side starts returning from its travel end.



(4) Adjusting the tension release mechanism components

1) Installing position of the tension release notch

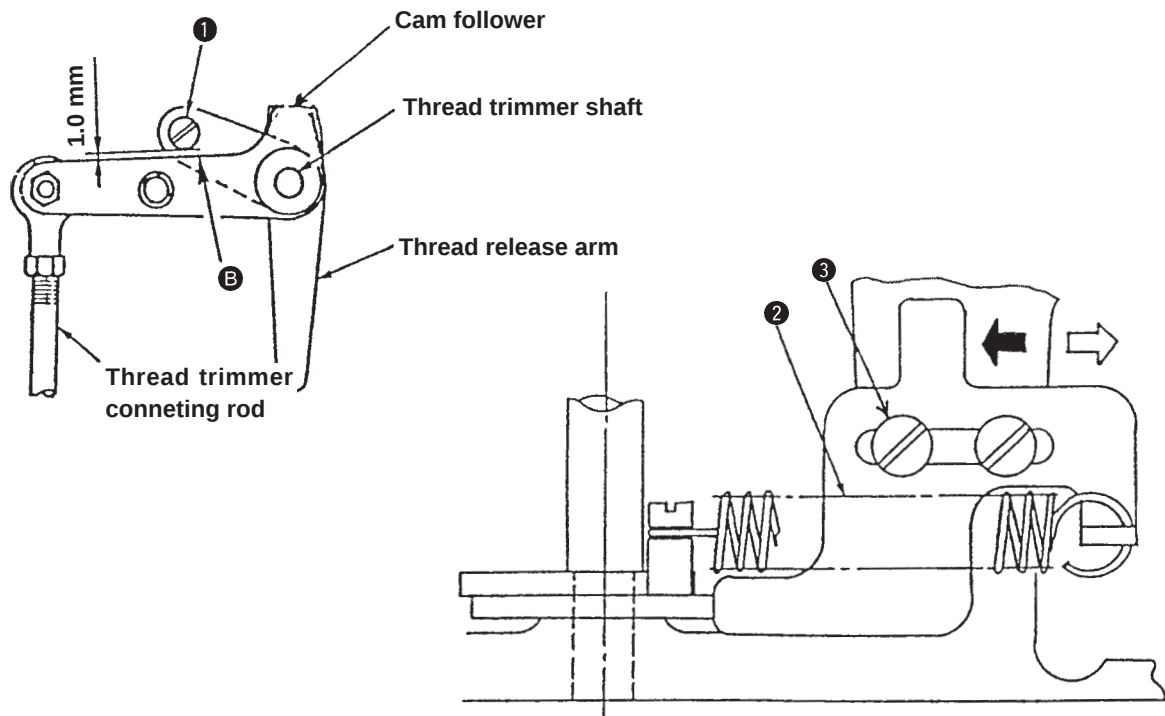


Adjustment Procedures	Results of Improper Adjustment
1) Expel air from the machine. 2) Remove the side cover from the hook base. 3) Loosen two setscrews ❶ in the thread trimmer cam B and adjust the timing of the thread trimmer cam. At this time, check the timing of the thread trimmer cam with the thread trimming cylinder pressed toward the left side. 4) Turn pulley ❸ while pulling by hand thread trimming solenoid ❷ in the direction of A and bring the moving knife to its travel end. 5) Move ❹ in the direction of B and adjust the thread trimmer cam B so that the roller comes to the bottom of cam groove of the thread trimmer cam B.	○ If the timing between the moving knife on this side and that on far side differs from the standard adjustment, thread trimming failure will occur. ○ If the timing of the moving knife on this side at its travel end is not adjusted properly, needle thread may be cut short.
Loosen two setscrews ❶ in the tension release notch and move the tension release notch to the center of the slot. Then securely tighten two setscrews ❶ to fix the notch. After the adjustment, turn the main shaft in the normal direction of rotation () while pressing by hand the cam follower in the direction of the arrow mark (), ride the thread release arm pin on the thread release notch. Then detach the hand from the cam follower and make the main shaft rotate in the normal direction. Make sure that the tension release arm pin comes off the thread release notch at the position beyond the highest dead point of the thread take-up lever.	○ Length of remaining needle thread after thread trimming may be short. In addition, the length may vary. ○ Slip-off of thread at the start of sewing will result.

Standard Adjustment

2) Position of the tension release stopper

Adjust the clearance provided between end face **B** of the cam follower and tension release arm pin **1** to 1.0 mm in the state that the thread trimming operation is not performed.

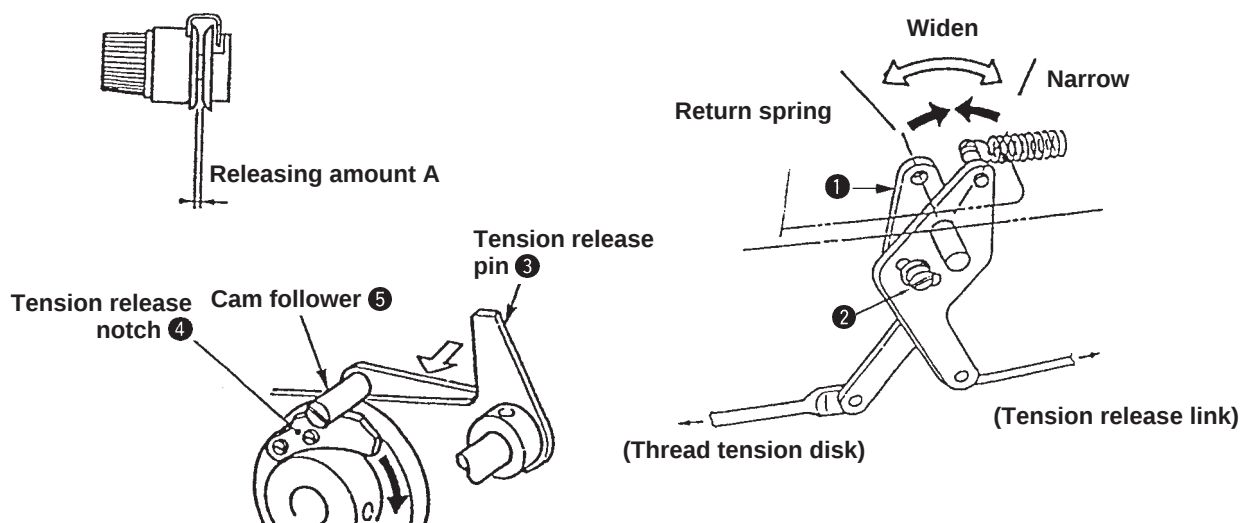


3) Releasing amount of the thread tension disk

Make thread trimming operation (tension release operation) after turning ON the power, or pressing the cam follower in the direction of when turning OFF the power, rotate the main shaft in the normal direction to make thread trimming operation, and ride the tension release arm pin on the tension release notch.

At this time, adjust the releasing amount A of the thread tension disk to 0.6 to 0.8 for the (H) type, sewing machine for the heavy-weight materials.

(Caution) Releasing amount of the thread tension disk will slightly vary according to the thread count used.

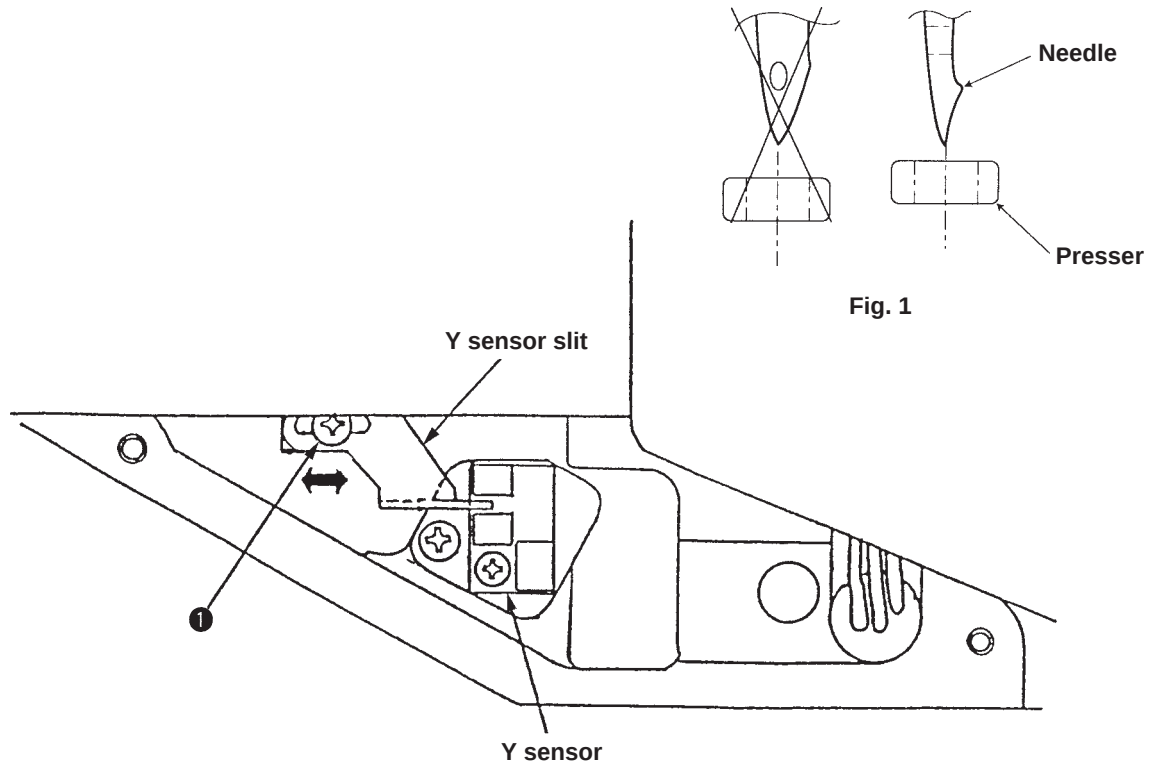


Adjustment Procedures	Results of Improper Adjustment
Remove tension release return spring ②. Loosen two setscrews ③ and press the tension release stopper in the direction of the arrow mark () while making the tension release stopper closely come in contact with the tension release adjusting arm. Then the clearance provided between the cam follower and the tension release arm pin becomes smaller, and when pressing the stopper in the direction of the arrow mark (), the clearance becomes larger. Adjust the clearance to 1.0 mm and tighten two setscrews ③ to fix the stopper. At this time, make end face A of the tension release stopper closely come in contact with the worked plane of the machine arm. When the adjustment is completed, hook the tension release return spring on the spring suspension bracket and the tension release stopper. (Caution) After having adjusted the position of the tension release stopper, perform the adjustment of releasing amount of the thread tension disk of the next item.	○ If the clearance is excessively large, when adjusting the releasing amount to a rather extensive value, the disk is not fully closed. As a result, defective sewing will result. ○ If there is no clearance, defective operation of the thread trimmer shaft (a load is applied) will occur resulting in failure of thread trimming or machine-lock.
1) Remove the top cover and make sure that tension release pin ③ rides on tension release notch ④. 2) If not, press by hand cam follower ⑤ in the direction of to rotate the main shaft in the normal direction of rotation and make the state as shown in the figure on the left. 3) In the state as shown in the figure, loosen setscrew ② in the tension release adjusting arm and move tension release adjusting arm ① to the right and left. Then the releasing amount of the tension disk will vary. H type : 0.6 to 0.8 (Caution) If the releasing amount is excessively small, length of remaining thread after thread trimming will vary. On the contrary, if it is excessively large, defective disk closing after releasing the disk releasing operation will result.	○ If the releasing amount of the tension disk is excessively small, length of remaining thread after thread trimming is reduced or the variation of the length will be increased. ○ If the releasing amount of the tension disk is excessively large, the disk is not fully closed after releasing the disk releasing operation resulting in defective sewing.

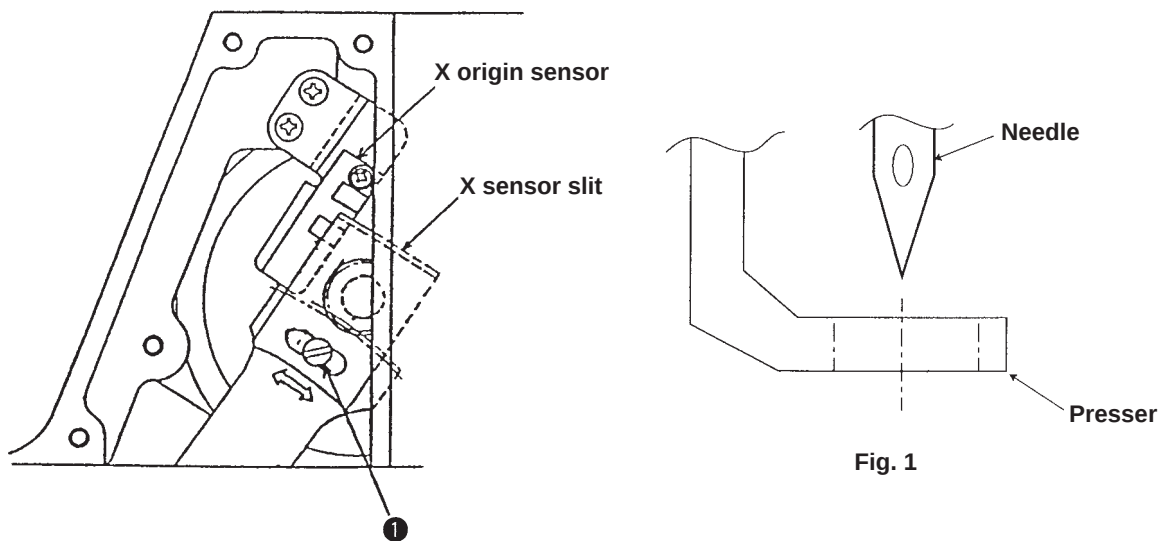
Standard Adjustment

(5) Adjusting the sensor components

1) Adjusting the Y origin sensor



2) Adjusting the X origin sensor

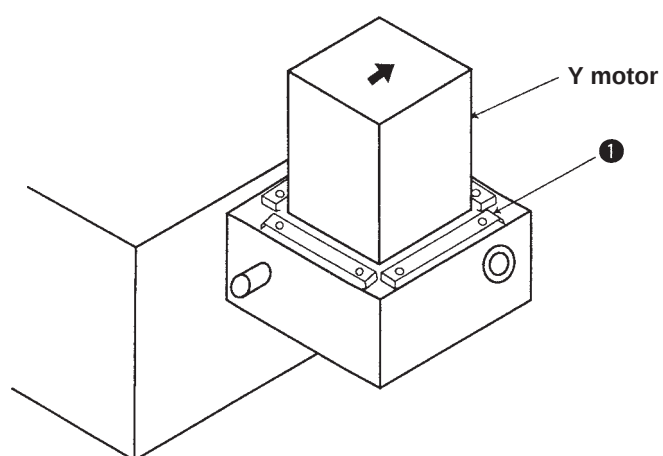
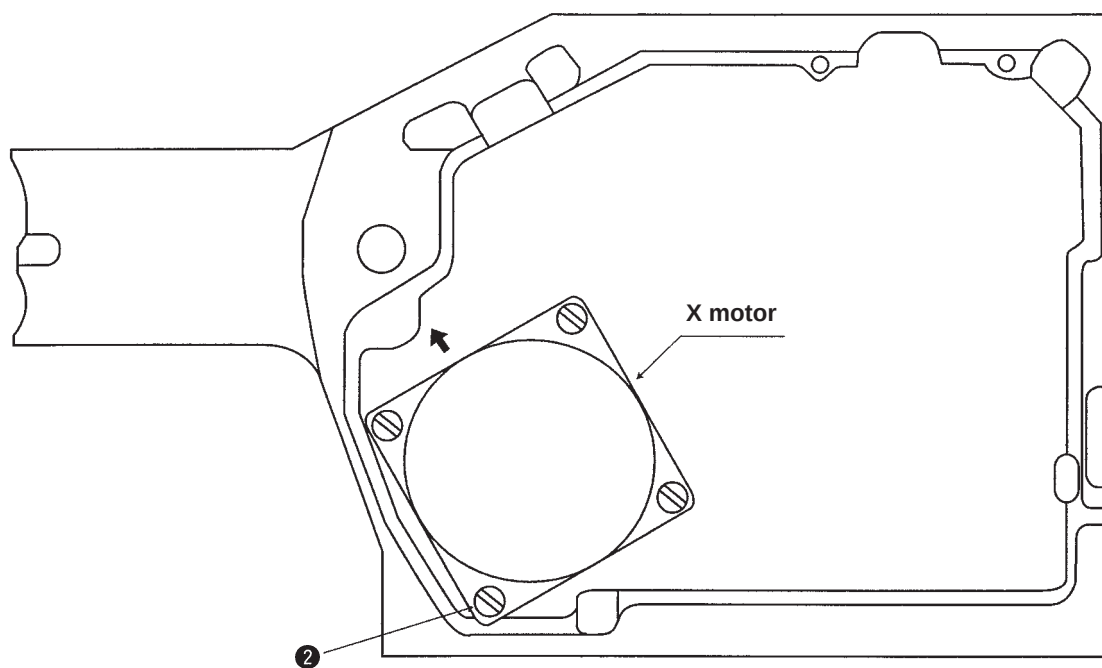


Adjustment Procedures	Results of Improper Adjustment
Set the set value of <CB> on the operation box panel to "0.0" to perform the origin retrieval. At this time, loosen sensor slit setscrew ❶ and adjust the sensor in the direction of the arrow mark so that the center inside the presser is aligned with the needle tip as shown in Fig. 1. (Caution) After performing the adjustment, make sure that the slit plate does not interfere with the sensor. Be sure to perform the adjustment with the presser on far side. The diagram shows a square box representing the sensor area. Inside the box is a crosshair. A downward-pointing arrow is positioned to the right of the crosshair. Below the box, the text "0.0" is displayed.	
Set the set value of <CA> on the operation box panel to "0.0" to perform the origin retrieval. At this time, loosen sensor slit setscrew ❶ and adjust the sensor in the direction of the arrow mark so that the center inside the presser is aligned with the needle tip as shown in Fig. 1. (Caution) After performing the adjustment, make sure that the slit plate does not interfere with the sensor. Be sure to perform the adjustment with the presser on far side. The diagram shows a square box representing the sensor area. Inside the box is a crosshair. A leftward-pointing arrow is positioned above the crosshair. Below the box, the text "0.0" is displayed.	

Standard Adjustment

(6) Adjusting the feed mechanism components

1) Adjusting the position of the X/Y motors

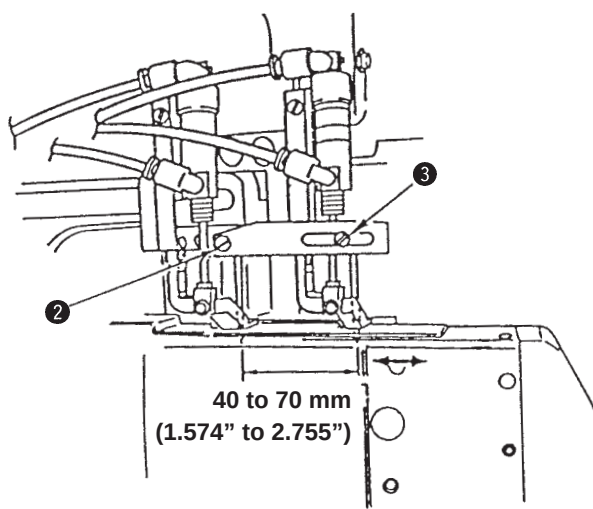
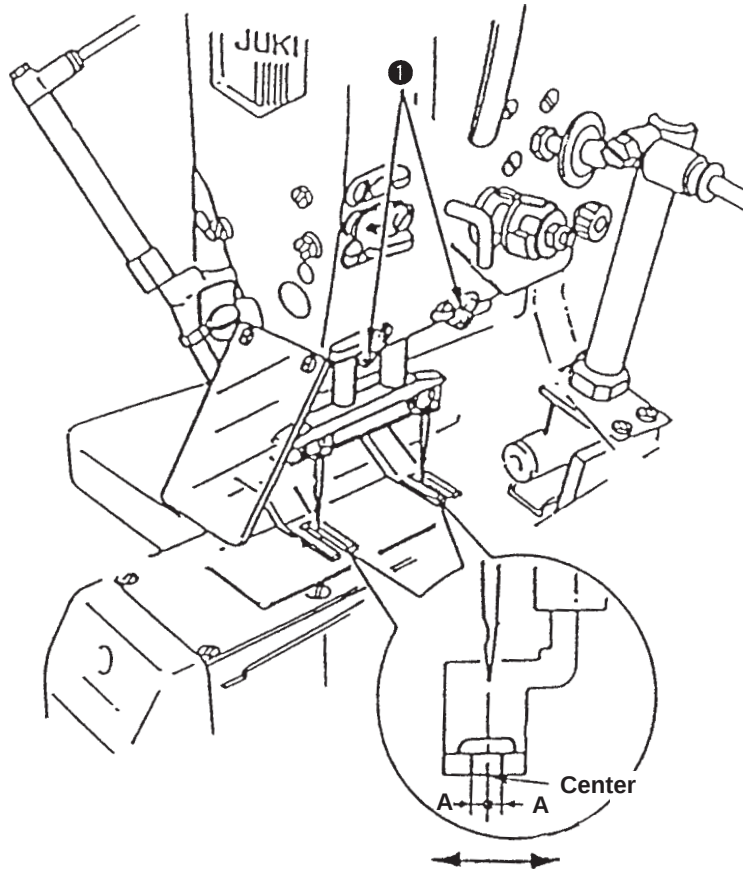


Adjustment Procedures	Results of Improper Adjustment
1. Lightly press the Y motor in the direction of the arrow mark and tighten three setscrews ❶ again. 2. Loosen four setscrews ❷, lightly press the X motor in the direction of the arrow mark (), and tighten setscrews ❷ again. If the pressing is insufficient, backlash of gear will be increased and the accuracy of needle entry will be decreased. Defective feed will result as well.	If the pressing is insufficient, defective needle entry will occur, and if the pressing is excessive, X-Y moving torque will be produced and defective moving will occur.

Standard Adjustment

2) Adjusting the position of the cloth presser foot

Adjust so that clearances A provided between the needle and the cloth presser foot should be equal in front and in the rear.



Adjustment Procedures	Results of Improper Adjustment
Far side : The position has been factory-adjusted at the time of delivery since it is used as reference when assembling the relevant components. If it should be out of the correct position, re-adjustment has to be carried out taking the following procedure. 1) Perform the adjustment with the Y direction key of X-Y origin compensation on the operation box panel. This side : When performing the Y direction origin compensation for adjusting the position on far side, the position on this side is surely shifted. Perform re-adjustment. 1) Make sure that the clearance provided between needles is the sewing size used and adjust the clearance if necessary. Loosen setscrew ❸ to adjust it. 2) Loosen two setscrews ❶ in the front presser foot installing base and adjust so that the needles is placed in the direct side-to-side center in the slit on the presser foot. (Caution) Be sure to adjust the timing of the hook on this side when the needle gauge is changed.	If the clearances provided between the cloth presser foot and the needle are not equal, thread breakage or needle breakage will result.

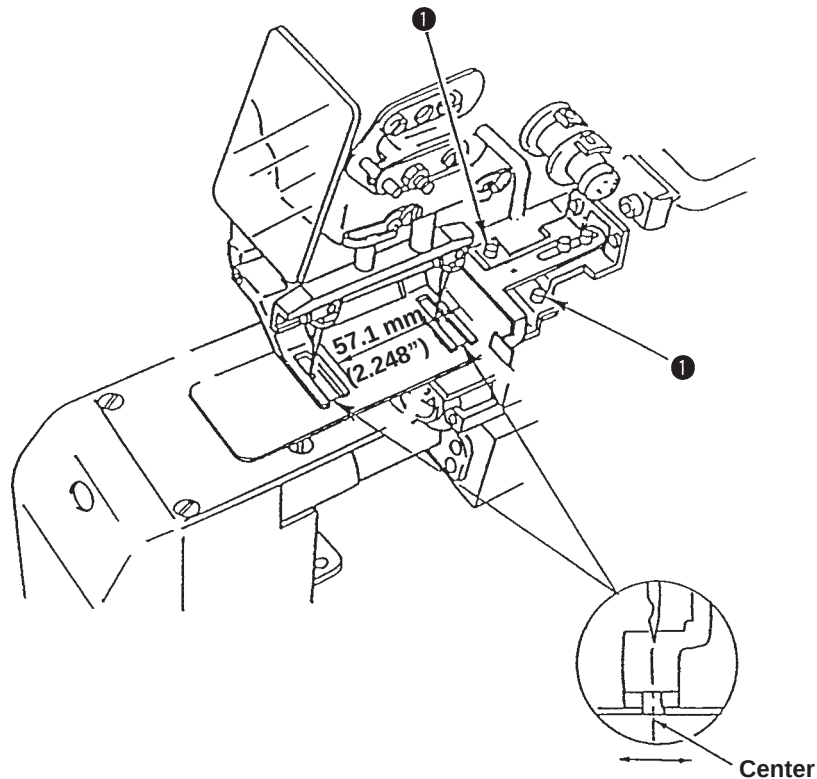
Standard Adjustment

3) Adjusting the position of the cloth presser lower plate

Adjust so that the cloth presser foot and the cloth presser lower plate are aligned with each other in terms of the longitudinal and lateral positions.

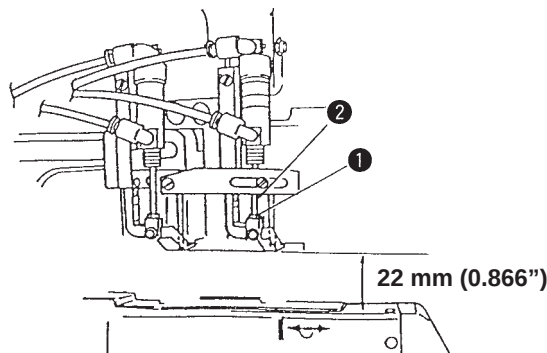
At this time, the clearance provided between needles is 57.1 mm.

If it is necessary to additionally machine the cloth plate lower plate blank supplied as accessory to change the distance between the needles, make sure with special attention of the clearance provided between the cloth presser foot and the lower plate.



4) Adjusting the lift of the cloth presser foot

Vertical clearance provided between the underside of the cloth presser foot and the top surface of the throat plate is 22 mm when the cloth presser foot goes up.



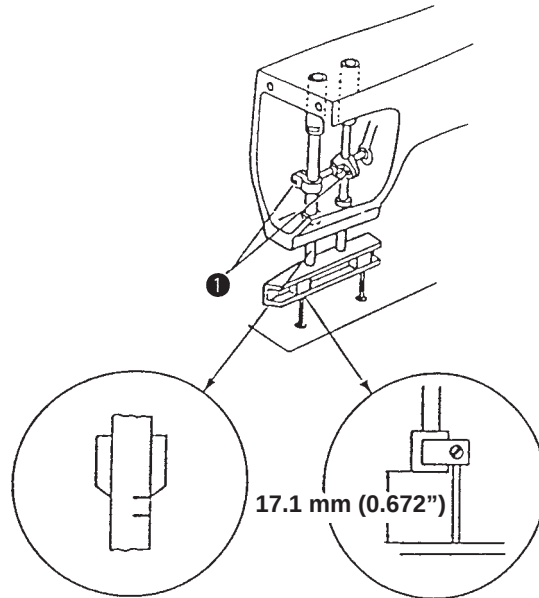
Adjustment Procedures	Results of Improper Adjustment
Loosen setscrews ❶ to adjust the position.	If the lower plate protrudes from the cloth presser foot, it will interfere with needle and needle breakage or thread breakage may occur.
Loosen lock nut ❶ in the presser bar lifting cylinder and turn cylinder rod ❷ to adjust the lift.	If the presser foot is excessively raised, skew may be produced. If the presser foot is excessively lowered, it will interfere with the belt loop supplying device or belt loops.

Standard Adjustment

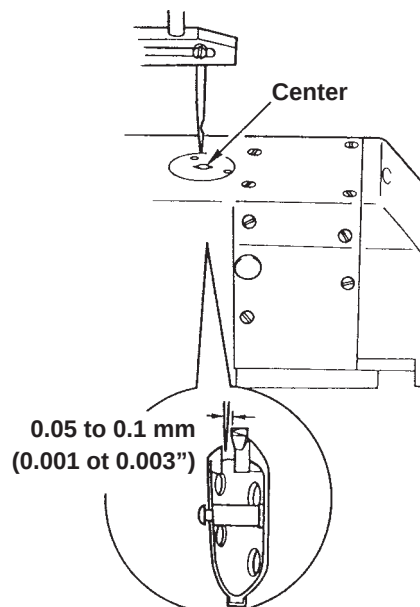
(7) Adjusting the position of the needle bar and the hook

1) Adjusting the height of the needle bar

Adjust so that the upper engraved marker line on the needle bar on this side is aligned with the lower end face of the needle bar lower bushing at the lowest dead point of the needle bar. At this time, the clearance provided between the top surface of the throat plate and the needle bar connecting base is 17.1 mm.



2) Changing the position of the throat plate (hook base) (Adjustment of the 1st hook)



Adjustment Procedures	Results of Improper Adjustment
1) Remove the face plate. 2) Loosen two setscrews ❶ in the needle bar connection and move the needle bar up or down to adjust the height. 3) After performing the adjustment, securely tighten two setscrews.	If the engraved marker line on the needle bar is higher than the end face of the lower bushing, stitch skipping may occur often, and if it is lower, pull-up of thread may be defective.
Change the operation box panel to the adjustment screen. (Refer to page 45 of the Instruction Manual.) Select the hook adjustment mode <BB> and press the selection key . The hook adjustment screen appears. The hook moves in a unit of 0.01 mm with the ten key “1” (open) or “7” (close), and is possible to move in a unit of 0.1 mm with the ten key “2” or “8”. However, moving 0.1 mm cannot be accepted when the needle bar is not in the stop position. The clearance provided between the needle and the hook can be adjusted by the panel according to the adjusted needle gauge (Caution) ○ At this time, be sure to check the needle and the needle hole. ○ Be sure to press “R” key after performing the adjustment.	If the clearance provided between the needle and the hook is excessively large, stitch skipping or thread breakage will occur and if it is excessively small, blunt of the blade point of hook or thread breakage will occur.

Standard Adjustment

3) Adjusting needle-to-inner hook timing (Same adjustment for this side and far side)

- 1) Needle bar timing
When the needle bar goes up from its lowest dead point, the lower engraved marker line on the needle bar is aligned with the end face of the needle bar lower bushing. (Fig. 1)
- 2) Hook timing
The center of the needle is aligned with the blade point of inner hook (section A) at the time of step 1) (Fig. 2)
- 3) Clearance provided between the needle and the shuttle driver
Clearance provided between the needle and the shuttle driver is 0 mm at the time of step 2). (Fig. 3)
- 4) Clearance provided between the needle and the blade point of inner hook (Adjustment of the 2nd hook)
Clearance provided between the needle and the blade point of inner hook (section B) is 0.05 mm to 0.1 mm at the time of step 2). (Fig. 4)
- 5) Clearance provided between the needle and the shuttle
Clearance provided between the side face of needle and the shuttle is 7.5 mm. (Fig. 5)
- 6) Clearance provided between the inner hook and the shuttle driver is 0.5 to 0.7 mm. (Fig. 2)

1) Needle bar timing

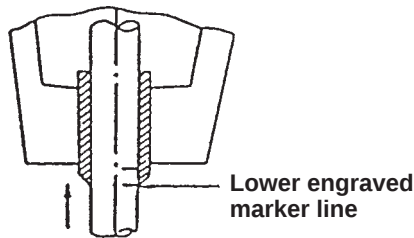


Fig. 1

2) Hook timing

0.5 to 0.7 mm
(0.019 to 0.028")

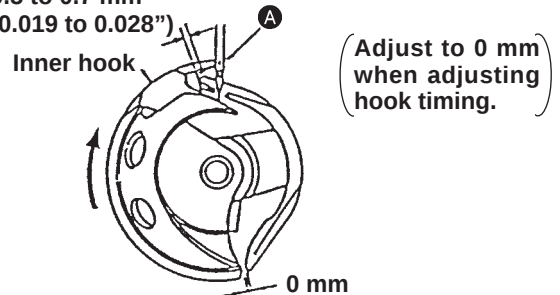


Fig. 2

3) Clearance provided between needle and shuttle driver

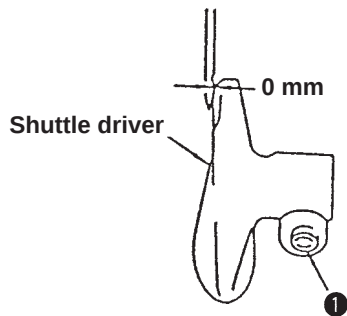


Fig. 3

4) Clearance provided between needle and blade point of inner hook

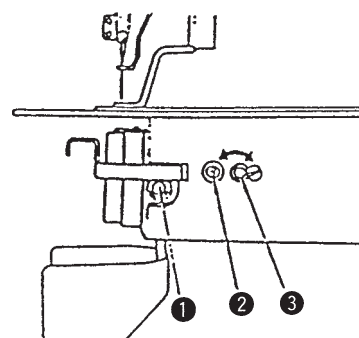
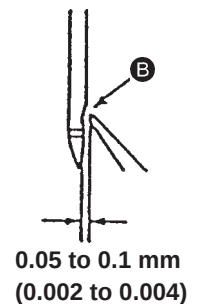


Fig. 4



5) Clearance provided between needle and shuttle

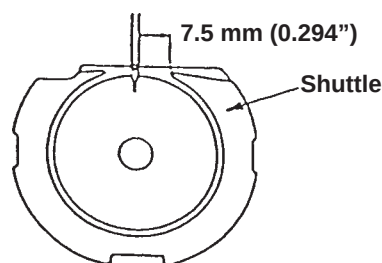


Fig. 5

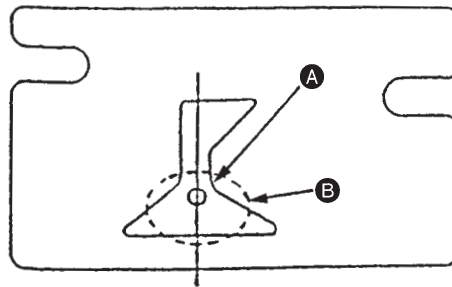
Adjustment Procedures	Results of Improper Adjustment
1) Align the lower engraved marker line with the end face of the bushing referring to the height of the needle bar of the standard adjustment. 2) Loosen setscrew ❶ in the shuttle driver and adjust the direction of rotation and the longitudinal direction. (Caution) Be sure to turn the inner hook in the direction of the arrow mark as shown in (Fig. 2) when performing the adjustment of the inner hook timing. 4) Loosen setscrew ❷ in the shuttle and turn eccentric shaft ❸ to adjust the clearance. 5) Loosen setscrew ❷ in the shuttle and adjust the clearance. Take care when adjusting the clearance provided between the needle and the blade point of the inner hook of the item 4). (Caution) The clearance provided between the inner hook and the shuttle driver in the direction of rotation is 0.5 mm to 0.7 mm as shown in (Fig. 2). Tap section ❹ to adjust the clearance. After performing the adjustment, make sure that the upper and lower clearances of section ❸ in terms of the inner hook are equal. The diagram shows a top-down view of a sewing machine shuttle. It features a central circular hub with a smaller circle in the middle. Surrounding this hub is a larger circular frame. Two specific points are labeled: 'C' is located at the top of the frame, pointing to a small adjustment feature. 'D' is located on the right side of the frame, pointing to a larger, curved adjustment area. The frame has several internal lines and segments, suggesting a complex internal mechanism. Fig. 6	1) For floppy materials, slightly retard the hook timing. On the contrary, for heavy-weight materials, slightly advance the hook timing. (For the prevention of stitch skipping) 2) If the clearance provided between the needle and the shuttle driver is larger than 0 mm, the needle is bent in the direction of the blade point of the inner hook. As a result, the blade point of the inner hook and the needle will be damaged. On the contrary, if the clearance is smaller, stitch skipping will occur. 3) If the clearance provided between the needle and the blade point of the inner hook is larger than 0.05 to 0.1 mm, stitch skipping will occur. On the contrary, if it is smaller, the needle and the blade point of the inner hook come in contact with each other, and scratch on them will occur resulting in thread breakage or hangnail. 4) If the clearance provided between the the side face of the needle and the shuttle is smaller than 7.5 mm, needle thread spreading becomes insufficient. As a result, a phenomenon that needle thread is caught in the inner hook is likely to occur. 5) If the clearance provided between the inner hook and the shuttle driver is larger than 0.5 mm to 0.7 mm, hook noise will be increased. On the contrary, if it is smaller, thread, when thick thread or the like is used, will fail to smoothly come out of the hook. As a result, defective thread tightness will occur.

Standard Adjustment

4) Adjusting the position of the shuttle upper spring (Same adjustment for this side and far side)

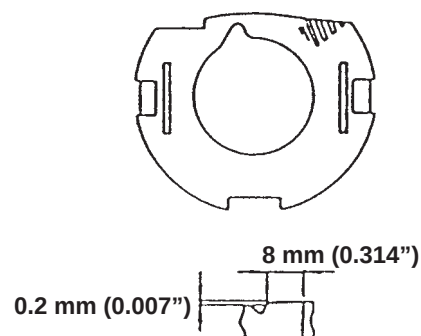
The lateral position in terms of the needle entry point should be equal on both left and right sides. Adjust the longitudinal position so that the rear end of the needle is aligned with corner section **A**.

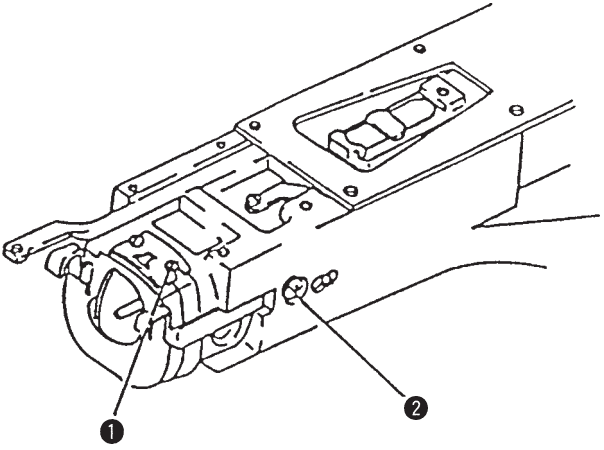
(Caution) If there is a scratch on section **B**, bobbin thread breakage will occur. Polish there when there is a scratch.



5) Form of the inner hook presser

If the blade point of the inner hook is excessively worn out, remove the inner hook presser and make sure that the dimension of the slant section on the rear side is 0.2 mm X 0.8 mm.

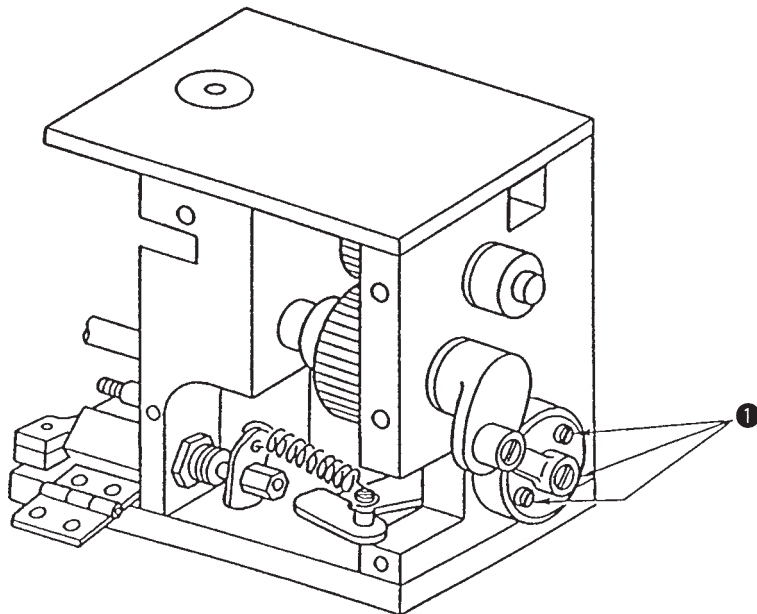
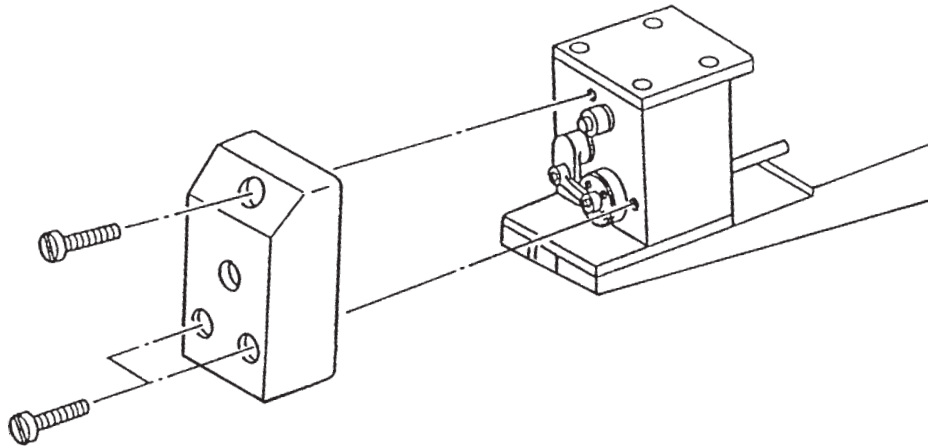


Adjustment Procedures	Results of Improper Adjustment
Remove the cloth feed base, the cloth presser lower plate, and the throat plate, and adjust the position with screw ❶. (Caution) ○ Positions on the left and right sides will vary according to the fixed position of shuttle set screw ❷. ○ Make sure of the position of the shuttle upper spring when adjusting hook timing (especially, adjusting the blade point of the hook). 	○ If the position is shifted in any direction, front/rear or left/right, a phenomenon that needle thread is caught in the hook will occur. ○ If the position is excessively moved to the rear, moving knife may not catch needle thread.
When the dimension of 0.2 mm X 0.8 mm is not obtained, correct it with oil stone.	

Standard Adjustment

6) Adjusting the timing of the hook on this side

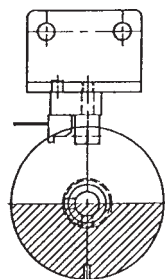
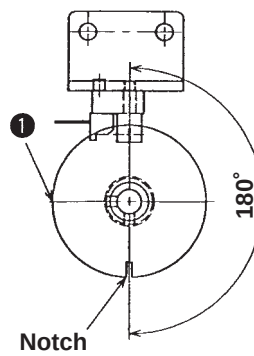
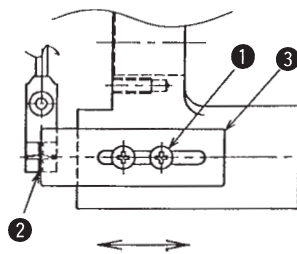
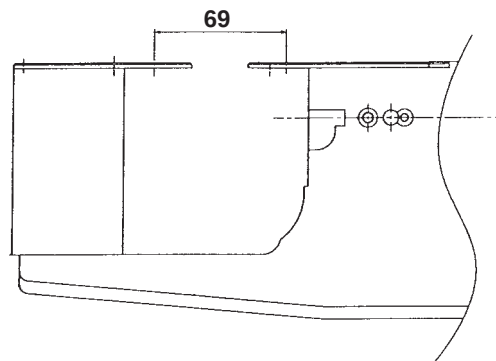
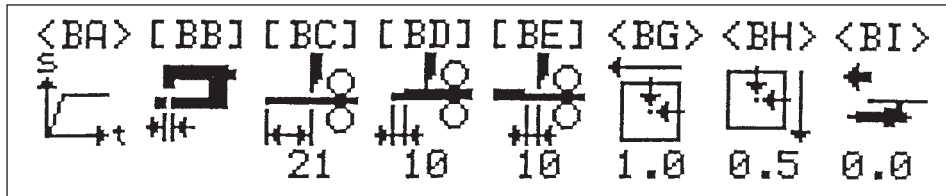
The timing of the hook on this side and that of the hook on far side should be adjusted so that the respective hooks invert simultaneously at the time of catching the thread.



Adjustment Procedures	Results of Improper Adjustment
1) Remove the cover from the hook base. 2) Loosen three setscrews ❶ in the removing shaft crank and adjust the hook timing. (Caution) The timing has been factory-adjusted at the time of delivery. Basically, do not loosen setscrews ❶. There is a marking.	If the hook timing is not correct, the needle will not enter the recess on the shuttle body when it comes down, causing the needle to interfere with the hook. In this case, needle breakage will occur or the thread will fail to smoothly come out of the hook. Or, the thread may fail to come out of the hook resulting in stitch skipping or thread breakage.

Standard Adjustment

7) Adjusting procedure of the hook removing sensor

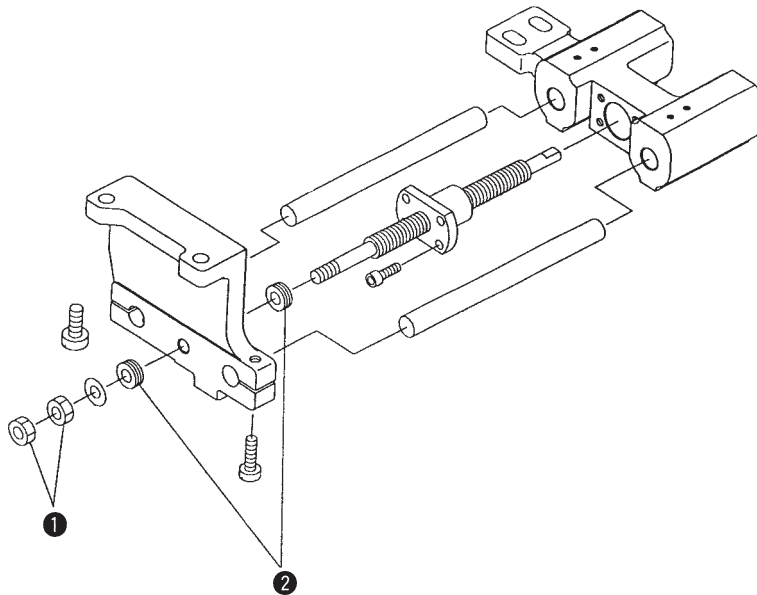


Adjustment Procedures	Results of Improper Adjustment
1. Set the operation box panel to the adjustment screen and select [BB], hook adjustment mode. 2. Move the hook with the ten key so that the center-to-center of the needle holes on this side and far side is 69 mm as shown in Fig. 1. 3. Tilt the machine head and loosen setscrews ❶ in the hook removing sensor slit attached to the hook removing unit to move the sensor slit in the direction of the arrow mark. Then fix sensor slit ❸ at the position where hook removing sensor LED ❷ lights up. 4. Fix the notch of hook removing shaft sensor slit ❶ attached to the hook removing motor at the position where the notch is turned by 180° from the sensor. 5. Turn OFF the power once, and re-turn ON the power to move the hook with the ten key under the hook adjustment mode. The adjustment is completed if the hook removing shaft motor sensor slit is within the slant section in the figure at the moment when the LED lights up. (Caution) If the slit is outside the aforementioned range, the hook position may vary. Perform re-adjustment. 6. Then move the hook up to the adjusted needle width and perform hook timing adjustment.	

Standard Adjustment

8) Adjusting the play in the hook removing ball screw

When there is a play in the hook base (front side) in the moving direction, make sure that there is any play in the thrust bearings of the ball screw.



Adjustment Procedures	Results of Improper Adjustment
Screw ball screw lock nuts ❶ (double nut) so that thrust bearings ❷ smoothly turn without any play.	

Standard Adjustment

(8) With regard to sewing

1) Adjusting the thread take-up spring

Stroke : Stroke of the thread take-up spring on this side may be different from that of the thread take-up spring on far side.

Tension : Adjust the thread take-up spring tension in accordance with the thread tension.

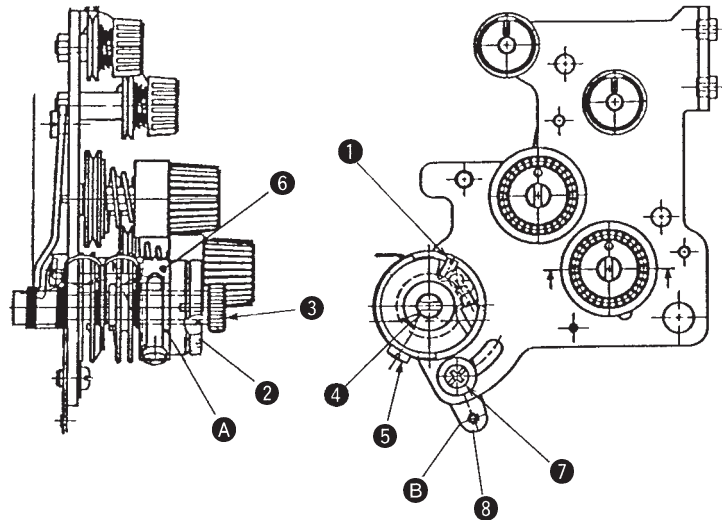


Fig. 1

Fig. 2

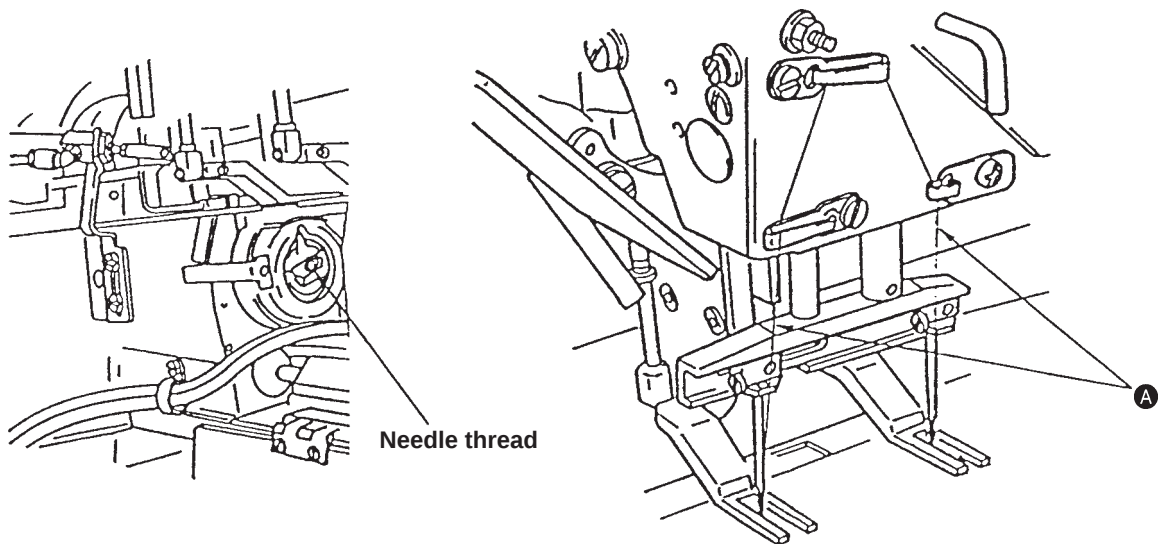


Fig. 3

Fig. 4

Adjustment Procedures	Results of Improper Adjustment
Adjusting the stroke 1) Turn OFF the power to the machine while the sewing machine is being actually engaged in sewing. 2) Turn the handwheel by hand until the needle thread is caught by the hook and starts to turn in the inner hook, then stop the handwheel before the thread completes its turning motion (Fig. 3). 3) At this time, check how the respective threads are tensed at portion A. For the respective threads, loosen 7 and adjust the stroke with 8 for far side and loosen 5 and adjust it with 6 for this side so as to slightly tense each thread. Tension Far side : Loosen nut 3 and turn shaft 4. This side : Loosen screw 1 and turn knob 2.	If the stroke is too large, slip-off of the thread is likely to occur. If the stroke fails to match the thread tension, the thread will excessively flop.

Standard Adjustment

2) Adjusting the position of the wiper

The wiper should be placed in a position where it spreads thread. (Refer to Fig. 1.)

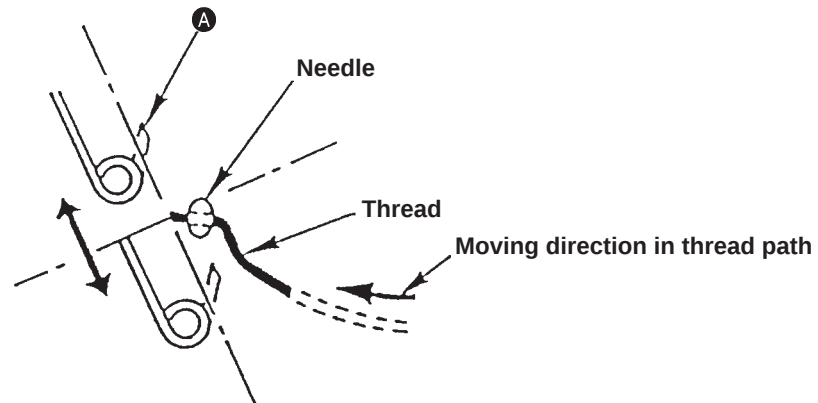


Fig. 1

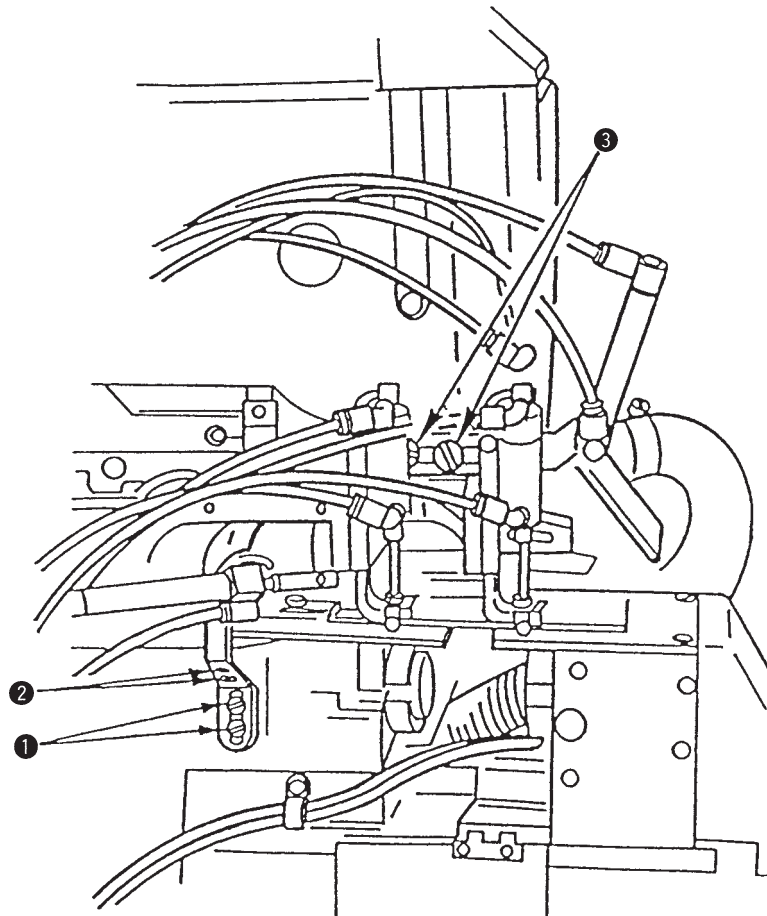
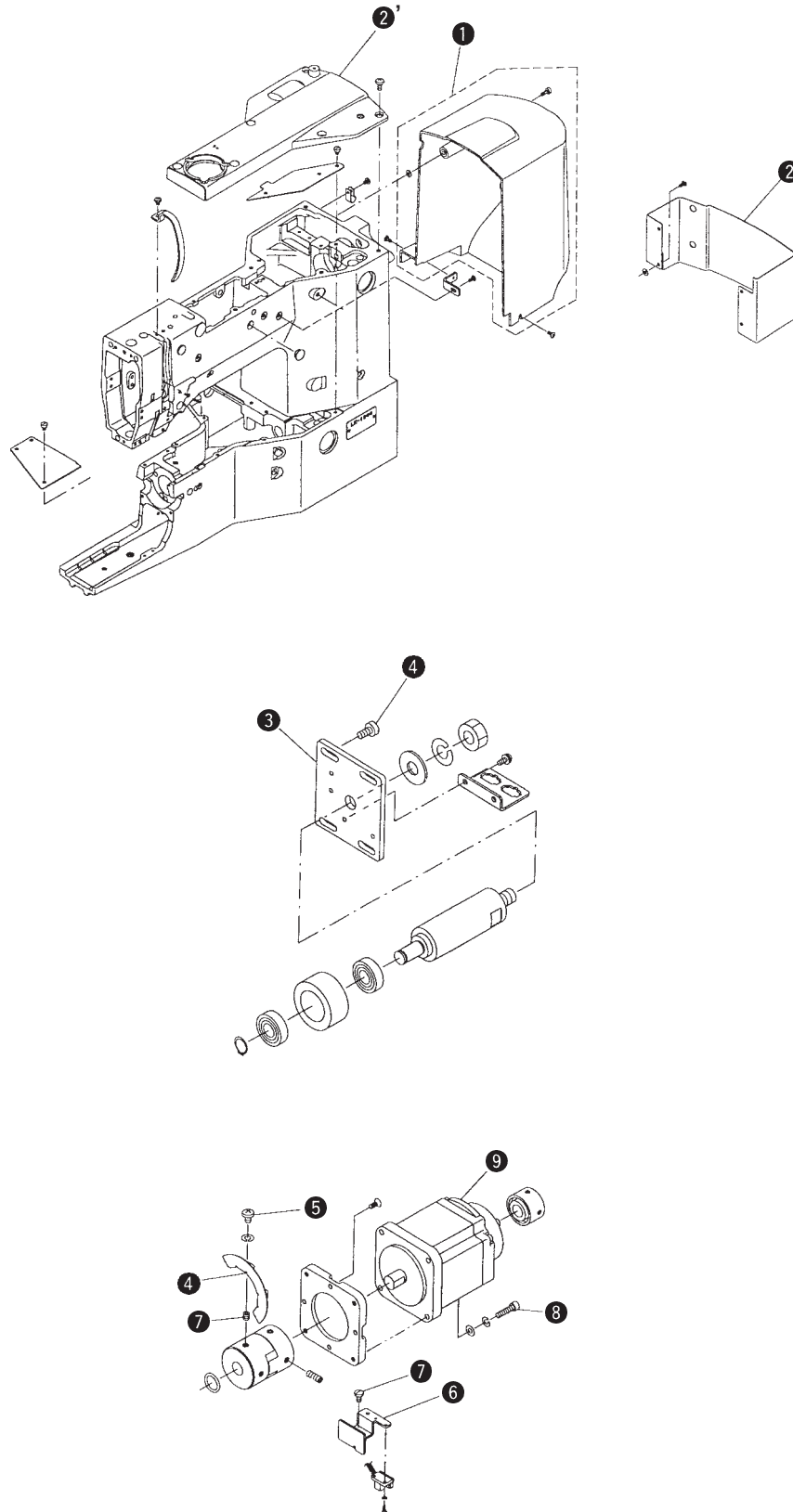


Fig. 2

Adjustment Procedures	Results of Improper Adjustment
1) Turn OFF the power to the machine and expel air from the machine while the sewing machine is being actually engaged in sewing. (Bring the needle to its stop position by turning the handwheel by hand.) 2) Pull out the wiper by hand and make sure of the relation of position with the thread. 3) Far side : Loosen setscrews ❶ and adjust the vertical direction, and loosen setscrews ❷ and adjust the longitudinal direction. 4) This side : Loosen setscrews ❸ and adjust both vertical and longitudinal directions. 5) Protruding amount of wiper : Loosen setscrew ❹ and adjust the amount for both front and far sides by taking in or out the wiper. Fig. 3	

(9) Disassembling/assembling of components

1) Disassembling/assembling of the timing belt

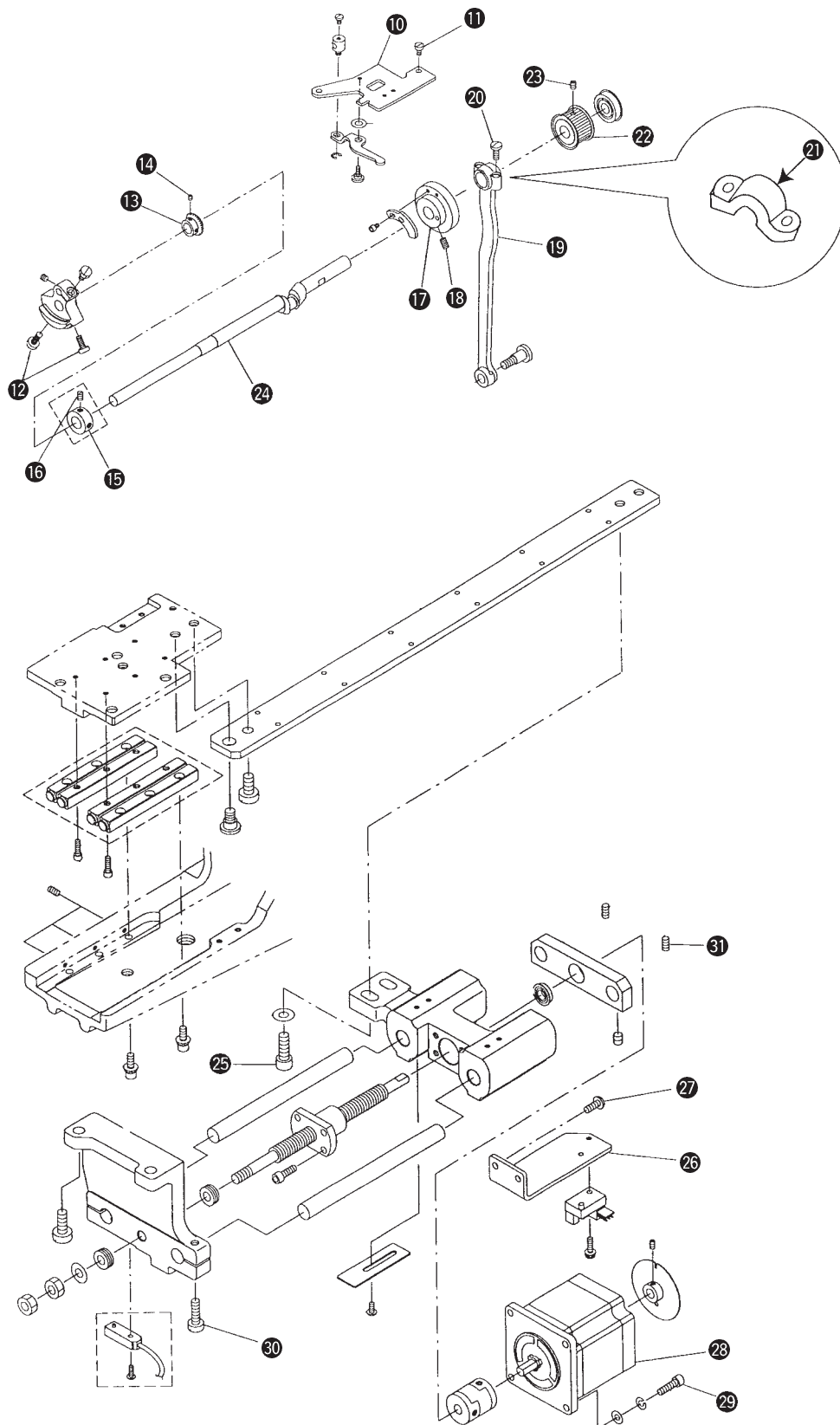


Disassembling / Assembling

1. Remove head cover A ❶ and head cover B ❷.
2. Loosen setscrew ❸ and remove idler pulley base ❹.
3. Remove top cover ❷.
4. Loosen setscrew ❺ and remove main shaft slit plate ❻.
5. Loosen setscrew ❼ and remove main shaft sensor ❽.
6. Loosen coupling setscrew ❼, remove motor setscrew ❽, and remove motor ❾ in the direction of the arrow mark.

Standard Structure

Disassembling of the timing belt

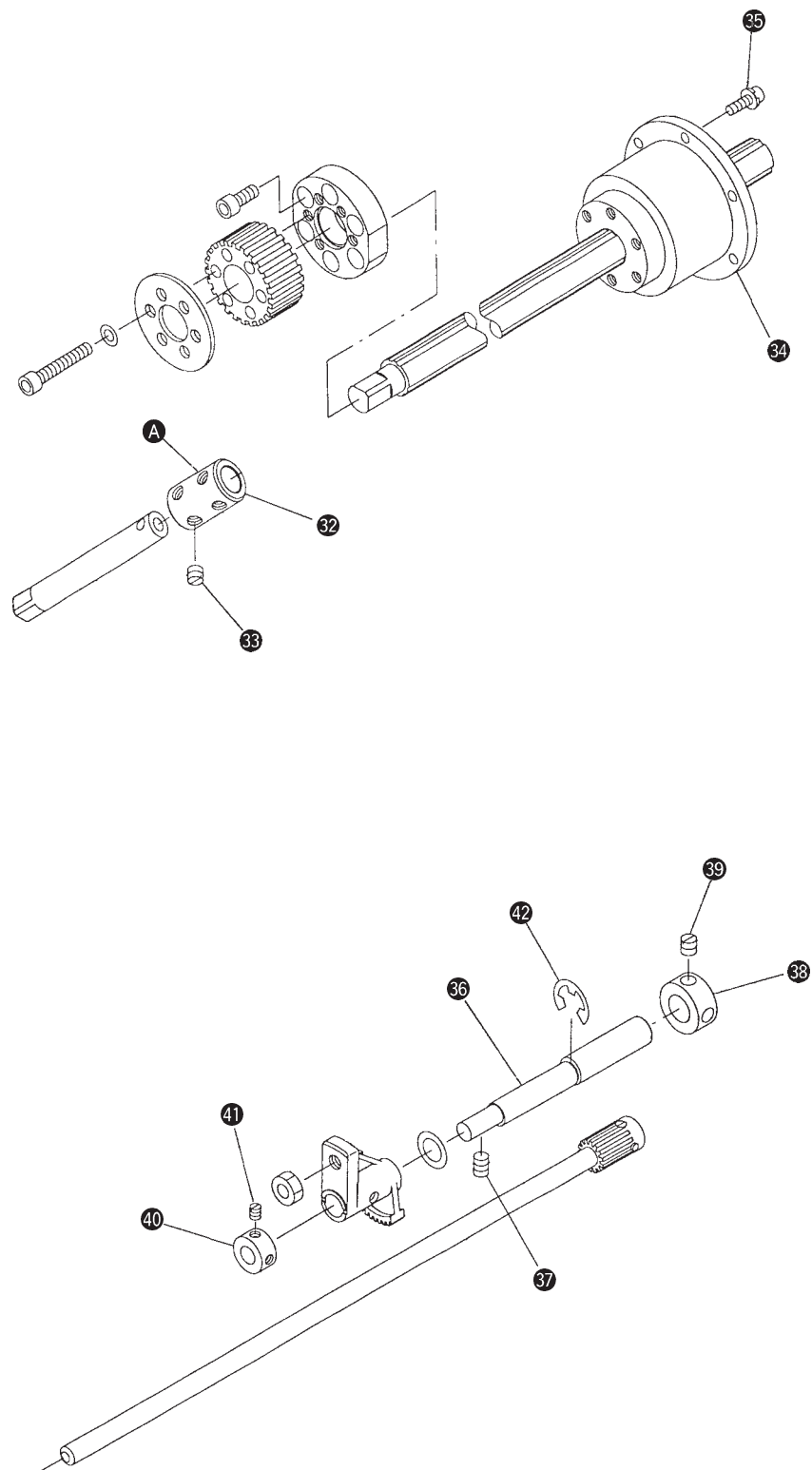


Disassembling / Assembling

- [illegible]

Standard Structure

Disassembling of the timing belt



Disassembling / Assembling

19. Loosen setscrews 33 in ball spline connecting collar 32.

At this time, loosen two setscrews only on ball spline side A.

20. Remove setscrews 35 in ball spline 34 and remove the ball spline in the direction of the arrow mark.

At this time, take care not to allow the spline shaft to slip from the ball nut.

21. Loosen setscrew 37 in oscillating eccentric shaft 36.

22. Loosen setscrews 39 in thrust collar 38 of oscillating eccentric shaft 36 and loosen setscrews 41 in thrust collar 40.

23. Remove E-ring 42 and remove the oscillating eccentric shaft in the direction of the arrow mark.

The timing belt can be removed through the aforementioned procedure.

Assembling of the timing belt

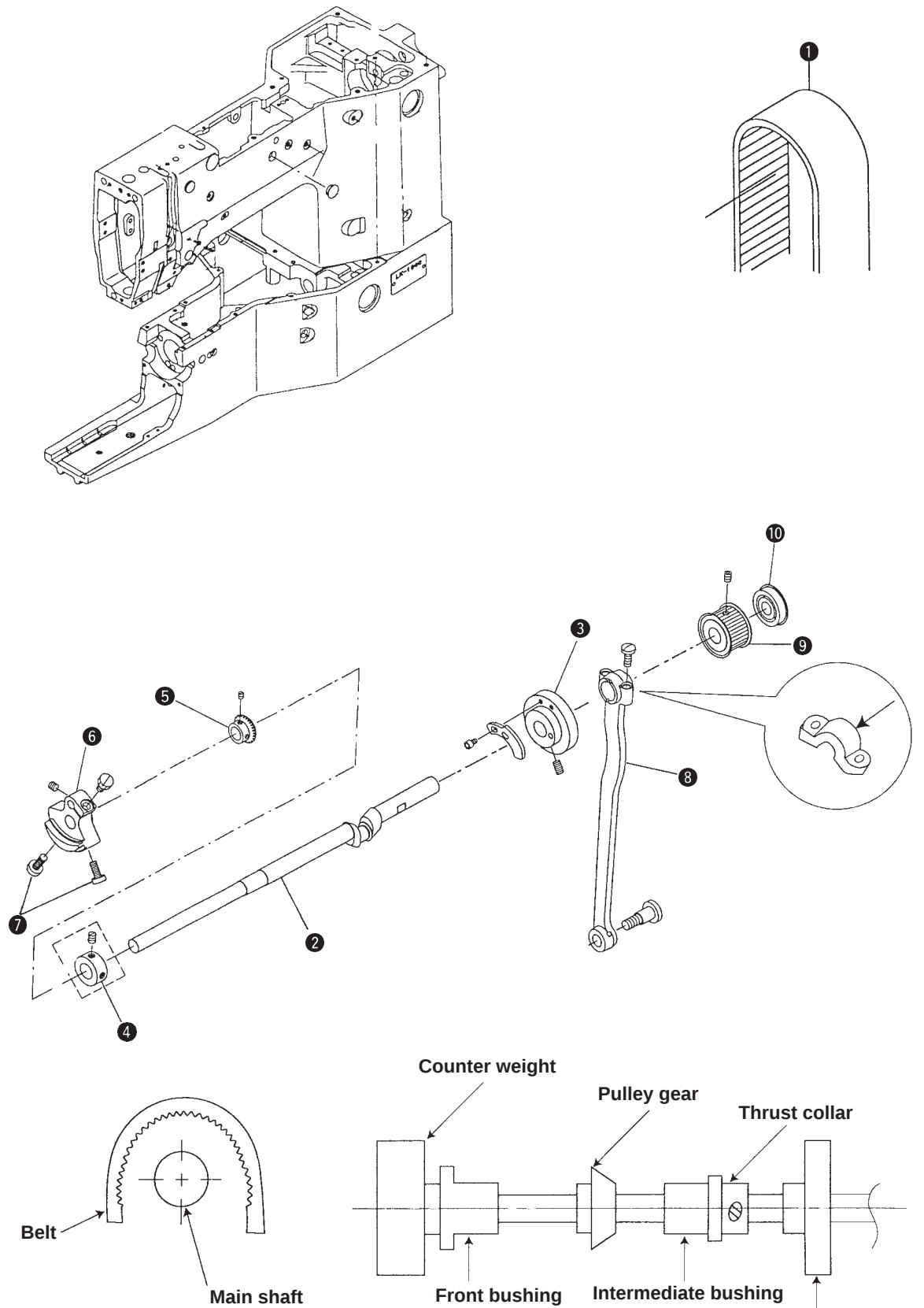


Fig. 2

Fig. 3

1. Fit timing belt ❶ inside the machine head.

(Caution) The timing belt prevents water absorption by means of the drying agent, silicagel.
Perform the tension adjustment within two hours after taking out the belt from the packing case.

2. When fitting main shaft ❷, insert thread trimmer cam ❸, thrust collar ❹ and hand pulley gear ❺ into the main shaft.

(Caution) ○ At this time, fit the timing belt around the main shaft as shown in Fig. 2.
○ Insert the parts in the order as shown in Fig. 3.

3. Insert main shaft ❷ into counter weight ❻ and fix it with setscrews ❼.

At this time, adjust the hole in the main shaft to the peak of the setscrew and fix the main shaft.
(Fig. 4)

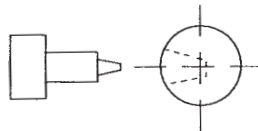


Fig. 4

4. Remove the play in the main shaft with the thrust collar. (Refer to page 7.)
5. Install the hand pulley gear.
6. Install thread trimmer cam ❸. (Refer to page 15.)
7. Install crank rod ❸.
8. Insert main shaft driving pulley ❹ into the main shaft and adjust the screw No. 1 in the direction of rotation to the flat portion of main shaft to install it.
At this time, install the pulley at the position where it is located 2 mm from the end face of the crank as shown in Fig. 5.
9. Insert rear bearing ❿.

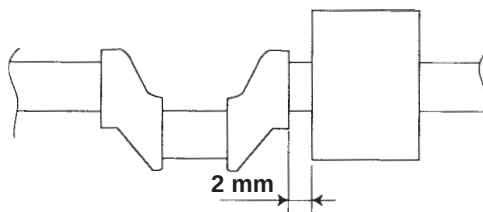
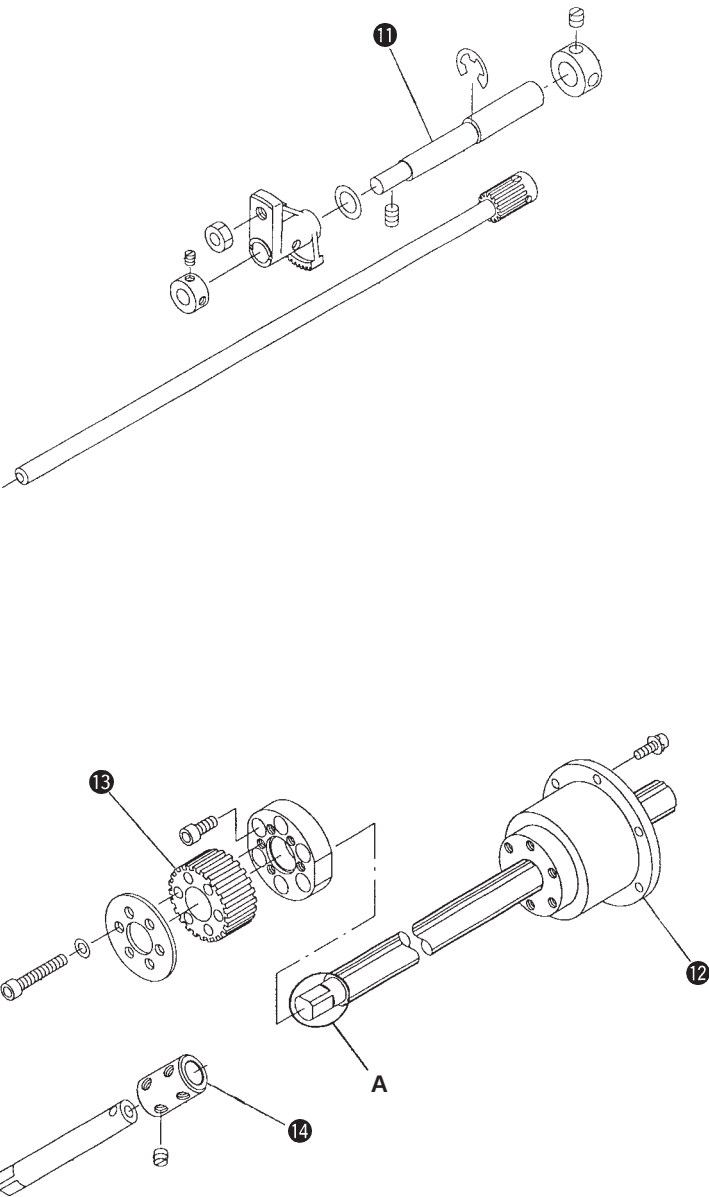


Fig. 5

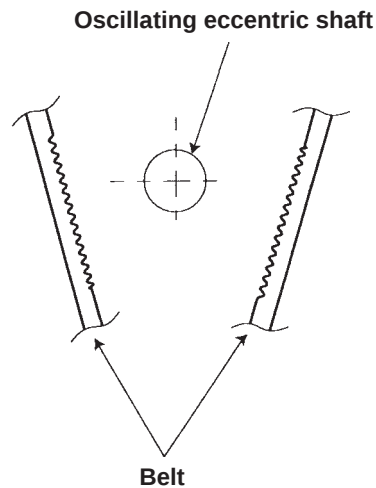
Standard Structure



Disassembling / Assembling

10. Fit the oscillating eccentric shaft. Refer to pages 11, 12, 13, and 14 for the relation of position and the adjustment.

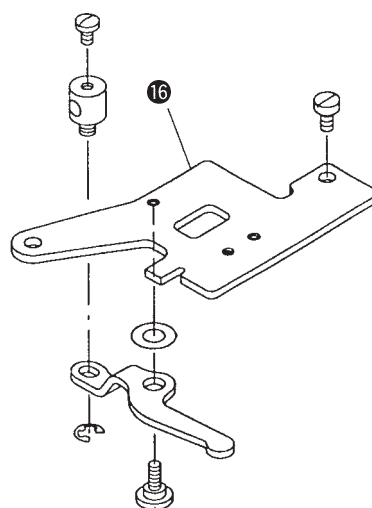
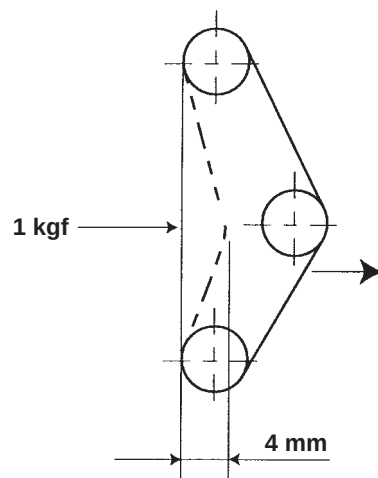
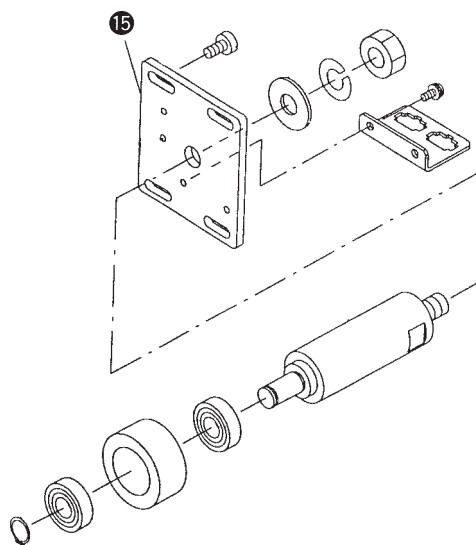
(Caution) At this time, adjust so that the oscillating eccentric cam enters between the timing belt.



11. Insert ball spline ⑫ and hook the timing belt on follower pulley ⑬ attached to ball spline ⑫.

12. Insert portion A of the top end of the spline shaft into connecting collar ⑭ to install the shaft.
Refer to page 9 for installing the belt and adjusting the belt timing.

Standard Structure



Disassembling / Assembling

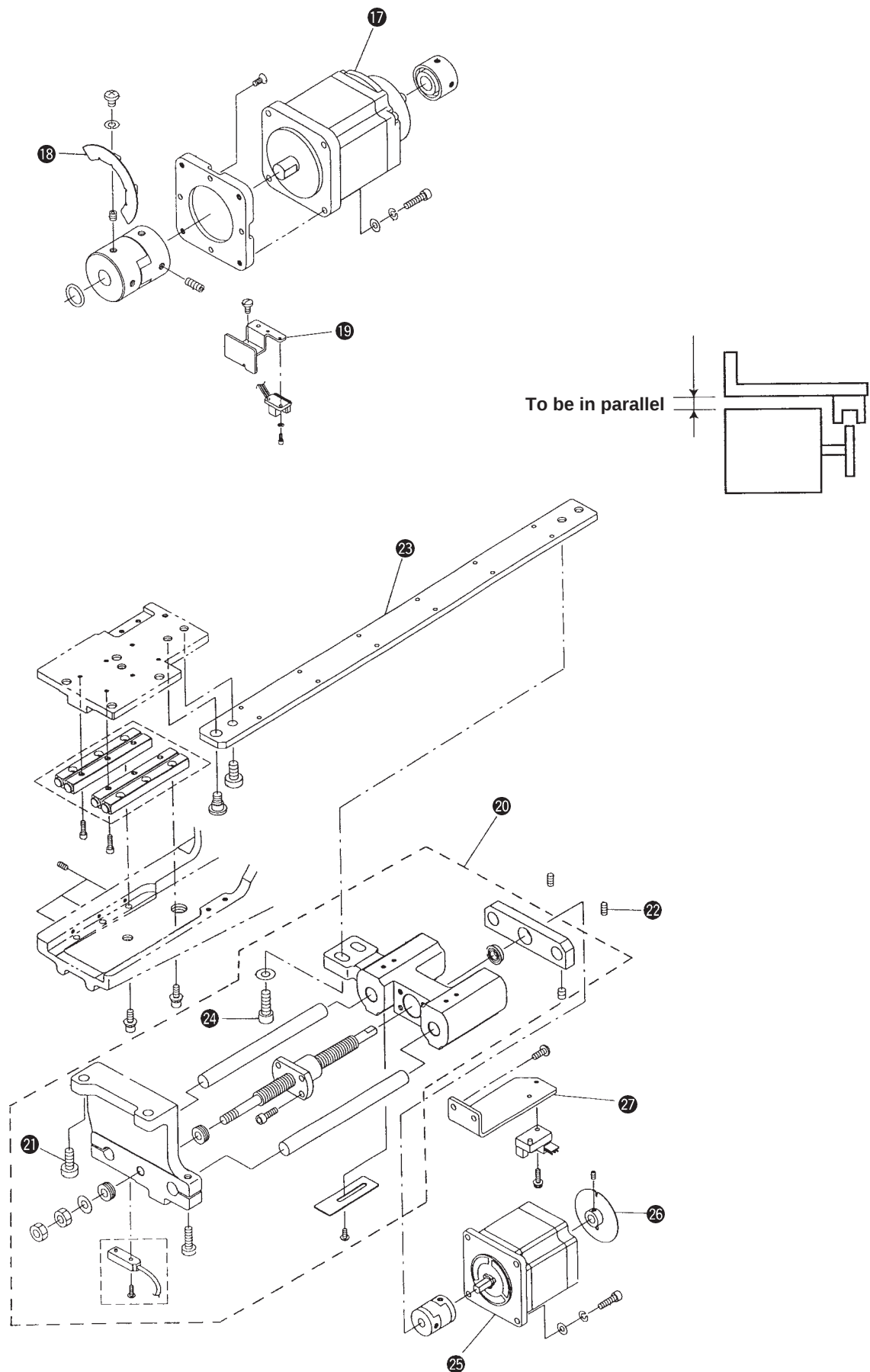
13. Install idler pulley base ⑮ and adjust the belt tension.

For reference of the belt tension, adjust so that the belt sags 4 mm when the center of the belt is pressed with a 1 kgf load.

(Caution) After adjusting the belt tension, be sure to turn the hand pulley and make sure that the belt does not interfere with other components.

14. Install cam follower stopper ⑯. Refer to page 19 for the installation.

Standard Structure



Disassembling / Assembling

15. Install main shaft motor ⑰. Refer to page 7 for the installation.
16. Install main shaft sensor slit ⑱ and main shaft sensor ⑲. Refer to page 9 for the installation.

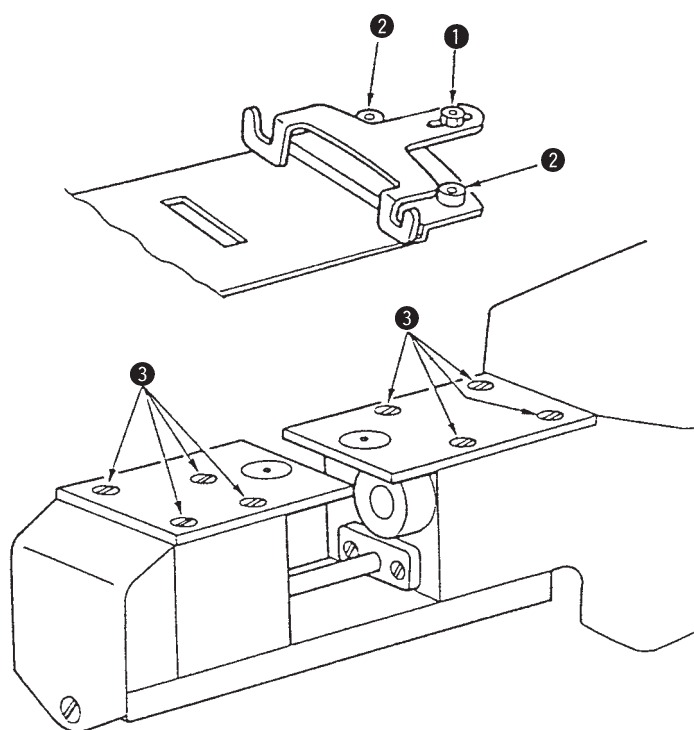
17. Install hook removing unit ⑳. Temporarily tighten unit fixing screws ㉑ and ㉒ and temporarily tighten the unit to hook connecting plate ㉓ with fixing screw ㉔.
18. Install hook removing motor ㉕ on the hook removing unit, turn motor slit plate ㉖ by hand, move the hook fully up to the end of its stroke several times to perform centering, and fix fixing screws ㉑, ㉒ and ㉔ at the position where there is no moving torque.
19. Install hook removing shaft sensor ㉗. Install the sensor almost in parallel with the motor.

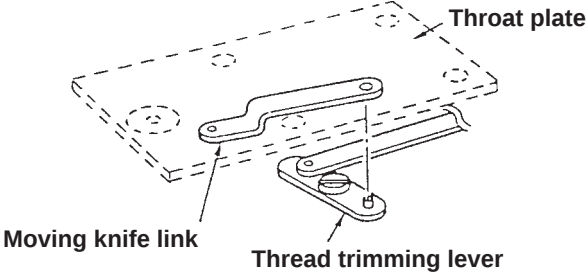
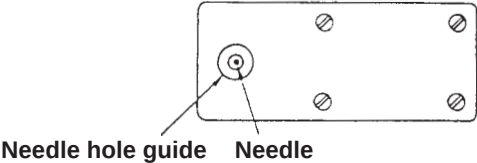
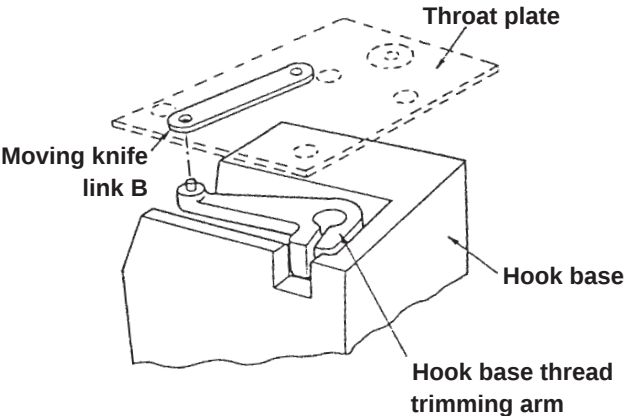
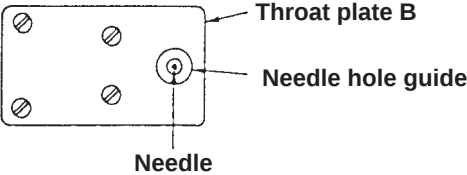
(Caution) When removing the hook removing unit, be sure to re-adjust the hook position.
Refer to page ? for adjusting procedure.

2) Disassembling/assembling of the throat plate

- 1) Loosen setscrew ❶ in the cloth feed plate guide, remove setscrews ❷ to remove the cloth presser lower plate.
- 2) Remove setscrews ❸ to remove the throat plates.

* Perform the assembling by reversing the above disassembling order.



Cautions to be taken when disassembling	Cautions to be taken when assembling
(Caution) When removing the throat plate, be sure to perform the initial confirmation of the moving knife.	○ When installing the throat plate (far side), fit the hole in the moving knife link over the pin of the thread trimming lever.  ○ When fixing the throat plate, position the throat plate so that the needle meets the center of the hole in the needle hole guide.  ○ When installing the throat plate (this side), fit the hole in the moving knife link B over the pin of the hook base thread trimming arm.  ○ When fixing the throat plate B, position the throat plate B so that the needle meets the center of the hole in the needle hole guide. 

3) Disassembling/assembling of the hook removing cross roller

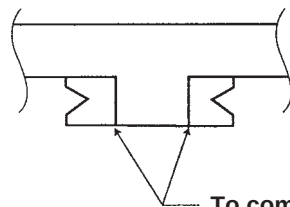
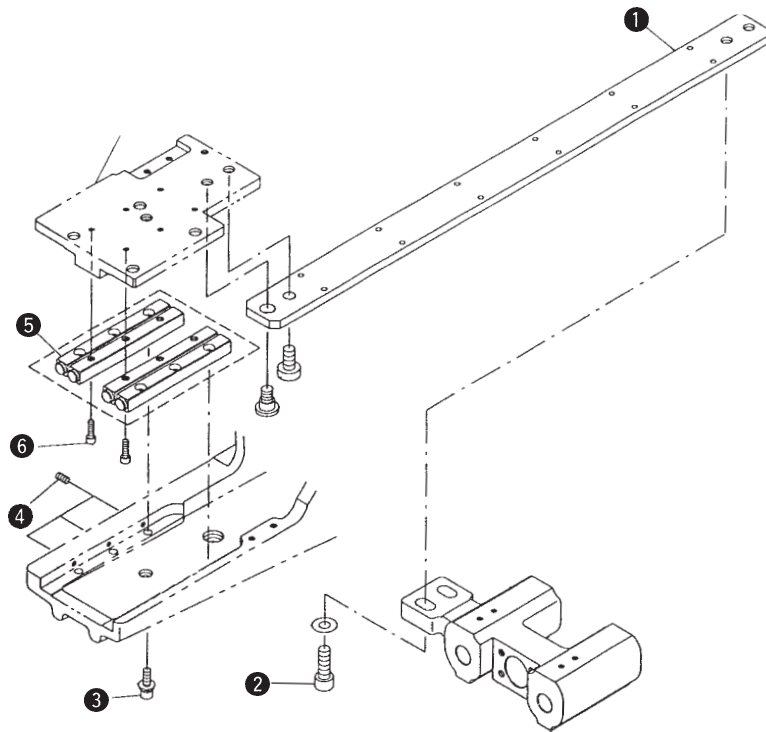


Fig. 1

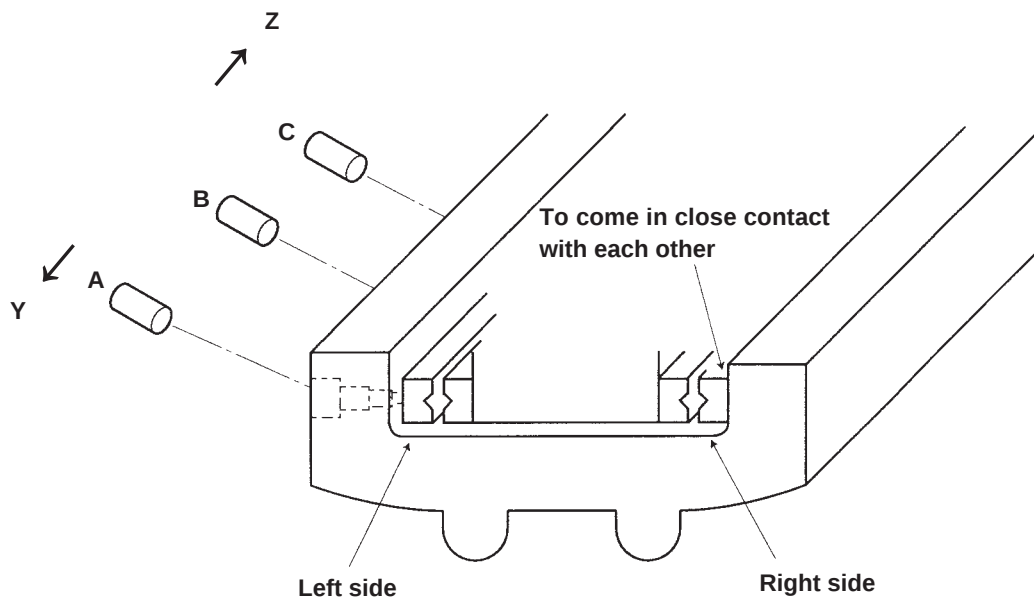


Fig. 2

Disassembling / Assembling

Disassembling

1. Remove setscrews ② fixing hook connecting plate ①.
2. Loosen three pressing screws ④ in cross roller ⑤ and remove six cross roller screws ③ to remove the first hook.
3. Remove six hexagonal bolts ⑥ in the cross roller to remove the cross roller.

Assembling

1. Fix cross roller ⑤ to base ⑦ with bolts ⑥. At this time, assemble so that the end face of the base comes in close contact with the cross roller. (Fig. 1)
2. Enter the cross roller which has been set to the machine bed and temporarily tighten six screws ③.
3. Apply pressure to pressing screws ④ in the cross roller to make the right side of the cross roller come in close contact with the end face of the machine bed, and fix the cross roller. (Fig. 2)
4. Loosen the pressing screws once and apply pressure again. At this time, when applying pressure, move base ⑦ to the position of pressing screws A, B, and C to apply pressure.

- Example
- When tightening pressing screw C, move base ⑦ to Z side.
 - When tightening pressing screw A, move base ⑦ to Y side.

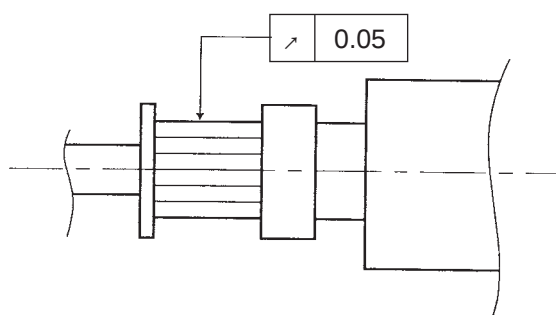
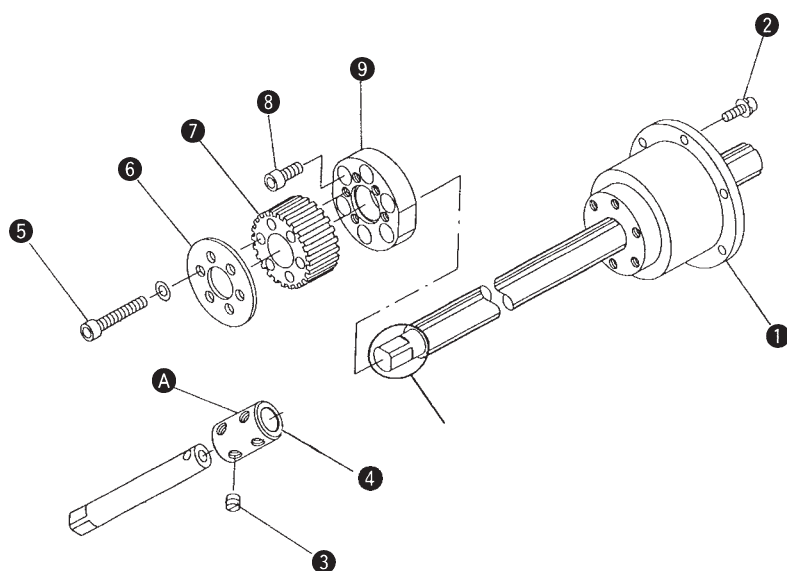
(Caution) Set the cross roller pressing screw torque to 1 kgf.mm or less.
After adjusting the pressure, make sure that the hook base smoothly moves without any play.

5. Fix hook connecting plate ① with setscrews ②.

(Caution) When removing or adjusting the hook removing components, be sure to re-adjust the hook position. Refer to page ? for the adjustment procedure.

Standard Adjustment

4) Disassembling/assembling of the ball spline



Disassembling / Assembling

Disassembling

1. Remove setscrews ② in ball spline ①.
2. Loosen setscrews ③ in connecting collar ④ and remove the ball spline in the direction of the arrow mark.
3. Remove setscrews ⑤ fixing follower sprocket ⑦ and belt guide ⑥.
4. Remove setscrews ⑧ fixing sprocket base ⑨.

Assembling

1. Fix sprocket base ⑨ to ball spline ① with setscrews ⑧.
2. Fix follower sprocket ⑦ and belt guide ⑥ to sprocket base ⑨ with setscrews ⑤.
At this time, assemble follower sprocket ⑦ so that the deflection in the outer diameter is within 0.05 as against the ball spline shaft.
3. Insert ball spline ① and fix it with setscrews ② and ③.
Refer to pages 9 and 11 when fixing the ball spline.

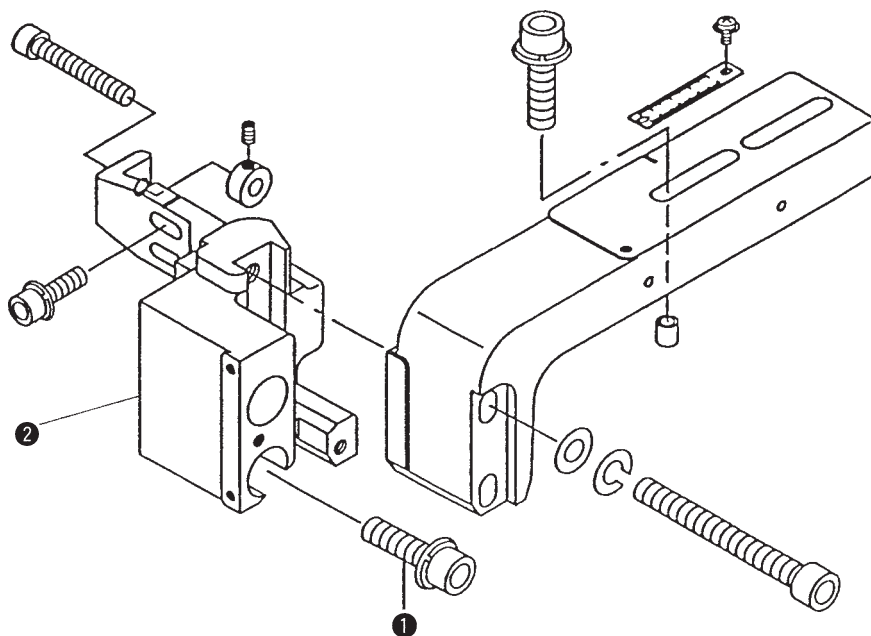
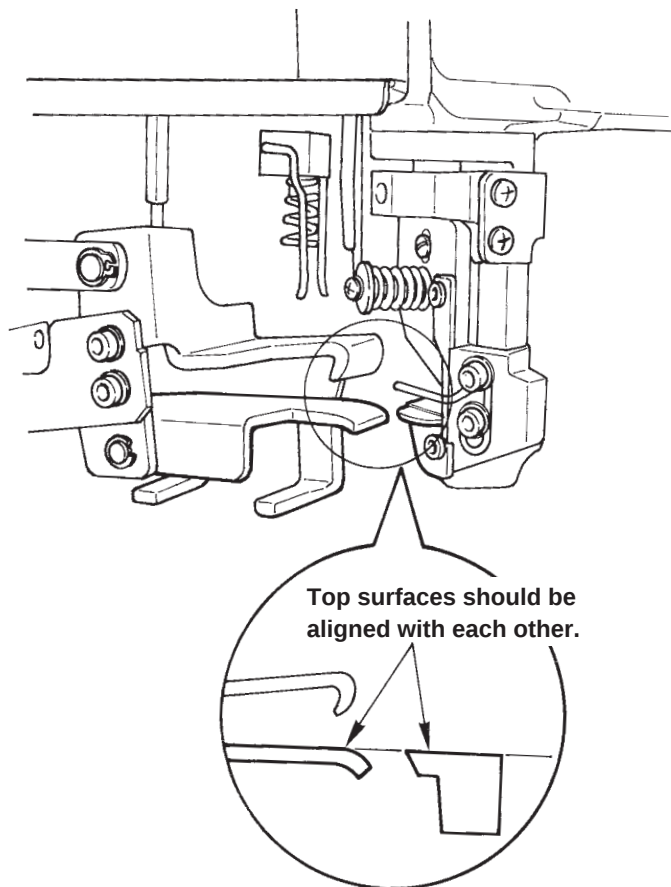
[2] Device components

Standard Adjustment

(1) Loop cut components

1) Adjusting the height of the loop cut knife unit

- The top surfaces of the counter knife and the loop clamp base plate should be aligned with each other when the loop clamp base plate is approached to the loop cut counter knife.

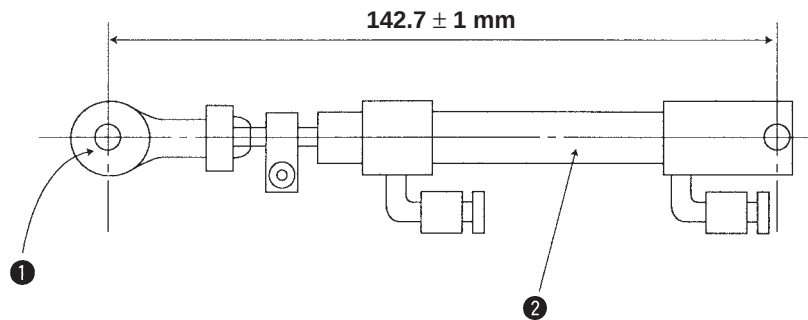


Adjustment Procedures	Results of Improper Adjustment
1. Remove the cover from the feed gear. 2. Loosen two setscrews ❶ in the knife device bracket and move knife device bracket ❷ up or down to adjust the height of the top surfaces.	○ If the height of the top surface of the loop clamp base plate is different from that of the loop cut counter knife, the loop clamp unit may not be able to securely catch the belt or defective winding after drawing out the belt will result.

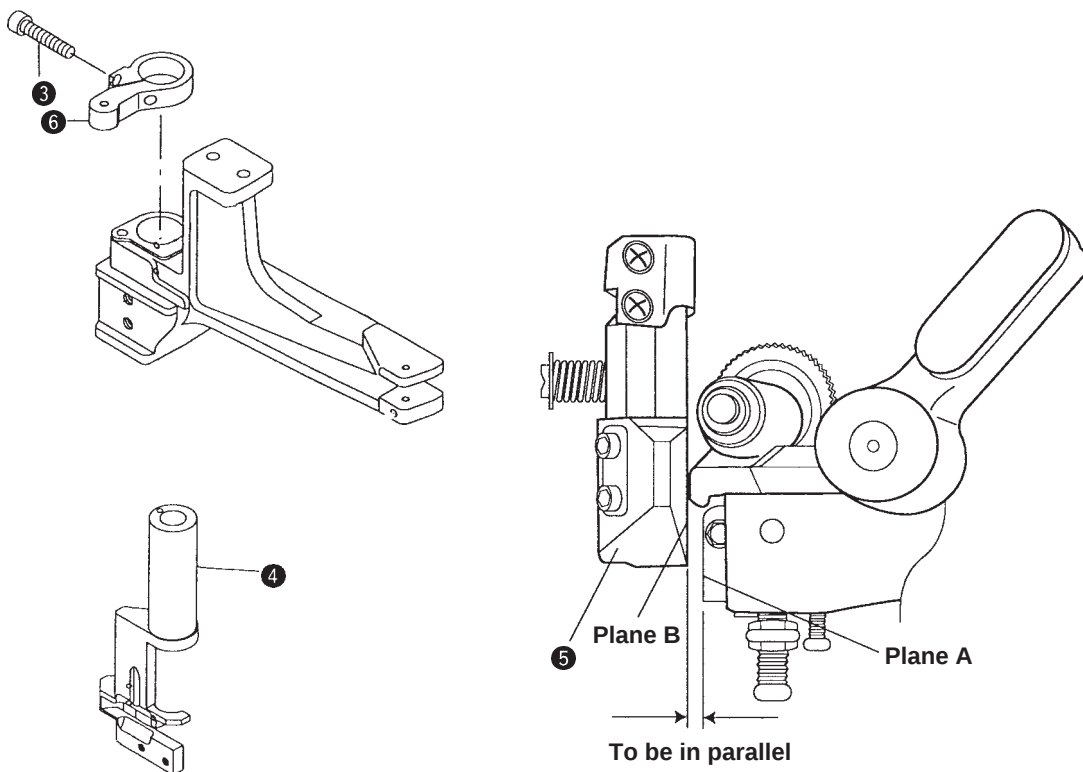
Standard Adjustment

2) Adjusting the cross cut angle of the loop cut knife

1. The assembling dimension of the knife turn rod end connected to the knife turn cylinder should be 142.7 ± 1 mm.



2. Adjust so that processed plane A of the loop feeding base should be almost in parallel with processed plane B of the counter knife base in the state that the knife turn cylinder is fully drawn.

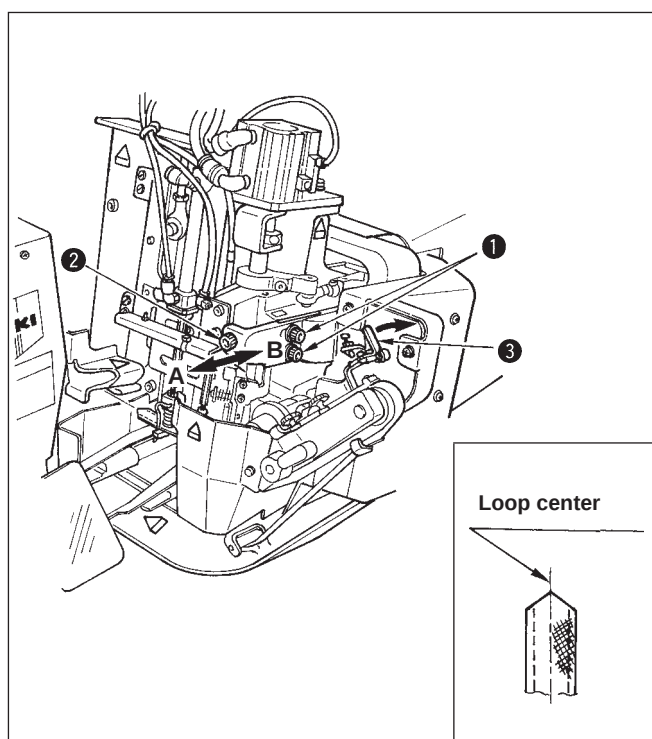


Adjustment Procedures	Results of Improper Adjustment
1. Loosen the lock nut in knife turn rod end ❶, turn the rod of knife turn cylinder ❷, and adjust the assembling dimension to the specified standard one.	○ If the position of the knife turn rod end is not proper, the cross cut angle (107°) is not obtained. ○ The knife interferes with other components when the knife turns. (Caution) Cross cut angle (107°) is a fixed value. It cannot be changed.
2. Loosen screw ❸ in the counter knife base bracket, and adjust the position of counter knife base bracket ❹ so that processed plane A of loop feeding base is almost in parallel with processed plane B of counter knife base ❺, and fix the counter knife base bracket.	○ When the loop end of the cross cut is not a clear isosceles triangle, belt loop cannot be wound enough resulting in dog ear.

Standard Adjustment

3) Adjusting the position of the loop cut center

1. For the cross cut type, adjust the loop cut position to the center of the loop.



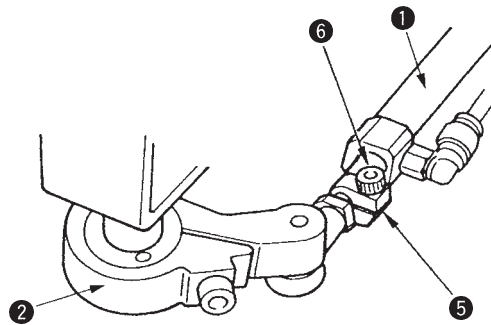
Adjustment Procedures	Results of Improper Adjustment
1. Loosen fixing screw ❶ in the knife base bracket and move adjustment screw ❷ of the loop cut center in the direction A or B to adjust the position of the loop cut center. 2. Turn ON the power and supply air to the machine. 3. When the cut position has been adjusted, pull the belt loop splice detector lever ❸ to this side to feed a small amount of the loop. 4. Pressing the standard screen key, press ten key 3. Then, the cross cut knife works. Actually cut the belt and make sure of the cross cut position. (Caution) The aforementioned operations can be actuated only when the setting screen is displayed.	○ If the cross cut center is not in the regular position, dog ear will result.

Standard Adjustment

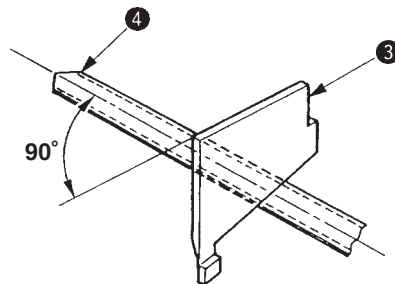
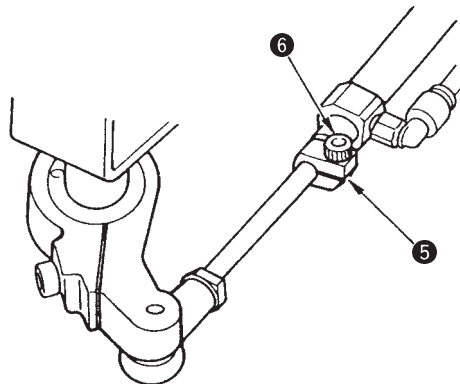
4) Changing the straight cutting

1. Adjust so that the loop cut knife is at straight angle against the belt loop.

* State of the cross cut

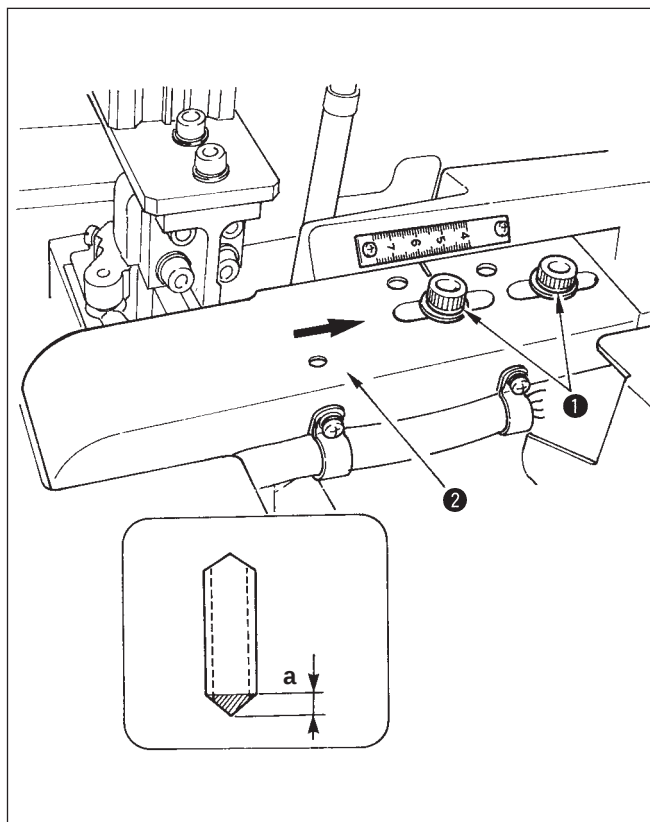
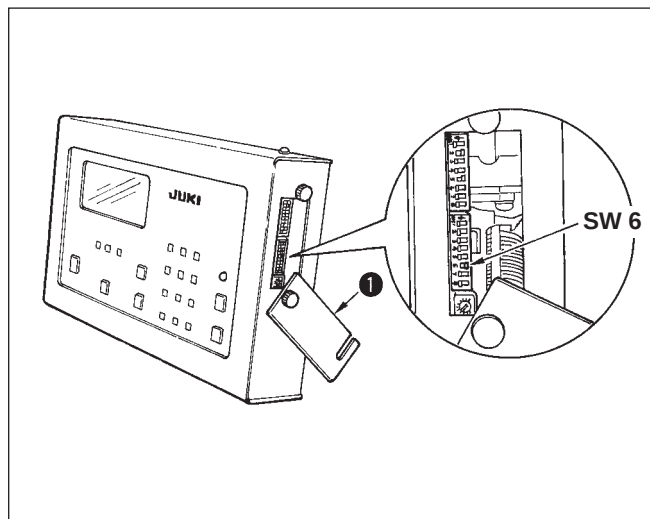


* State of the straight cut

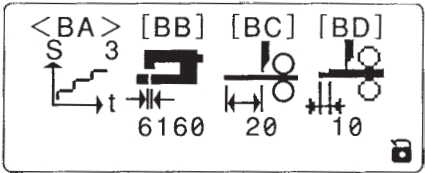


Adjustment Procedures	Results of Improper Adjustment
1. Remove the chip cover. 2. Draw out the rod in knife turn cylinder ❶ and turn counter knife base ❷ to adjust so that loop cut knife ❸ is almost at right angle against belt loop ❹. 3. Fit clamp collar ❺ to the bushing on the rod side of cylinder, and fix it with setscrew ❻.	○ After the completion of adjustment, perform a trial of sewing and confirm that loop supplying has been performed as adjusted. ○ If there is any trouble upon the confirmation, adjust again with the same adjustment procedure.

Standard Adjustment



Standard Adjustment

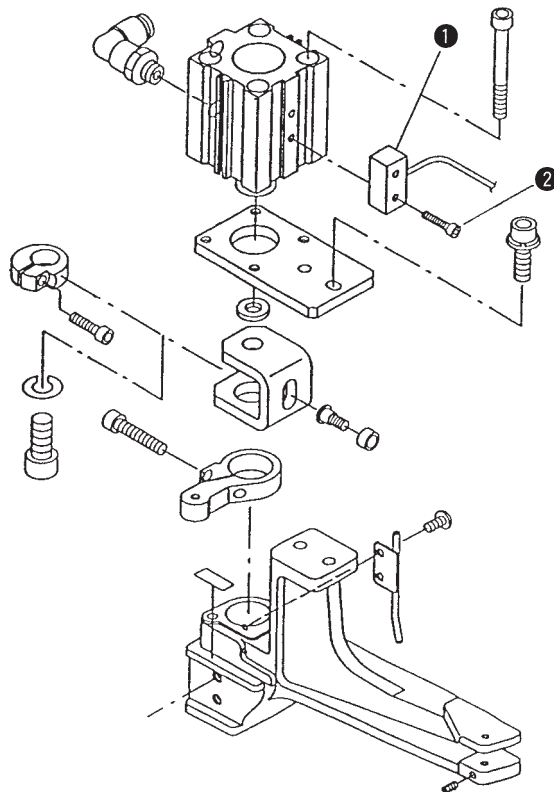
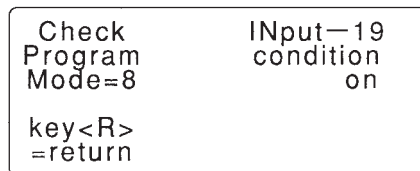
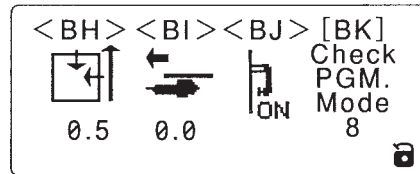


Adjustment Procedures	Results of Improper Adjustment
7. Turn ON the power and supply air to the machine. 8. Pressing the standard screen key, press ten key "0" to set the screen to the adjustment screen. 9. Make the "BC" screen flashing with the cursor key and input with the ten key the value which is the value currently being displayed minus dimension "a". 10. Press the standard screen key to complete the adjustment. (Caution) For the straight cutting, the chip cover is not used. Leave the cover removed.	○ For the moving amount of the knife unit guide rail and "BC" input value, actually perform a trial of sewing and confirm since the folding amount differs according to the material of the belt loop.

Standard Adjustment

5) Adjusting the loop cut cylinder sensor

1. The lamp of sensor ❶ should light up when the cylinder is in the lowest position of its stroke. At this time, make sure that the lamp lights up at the highest position of sensor ❶.

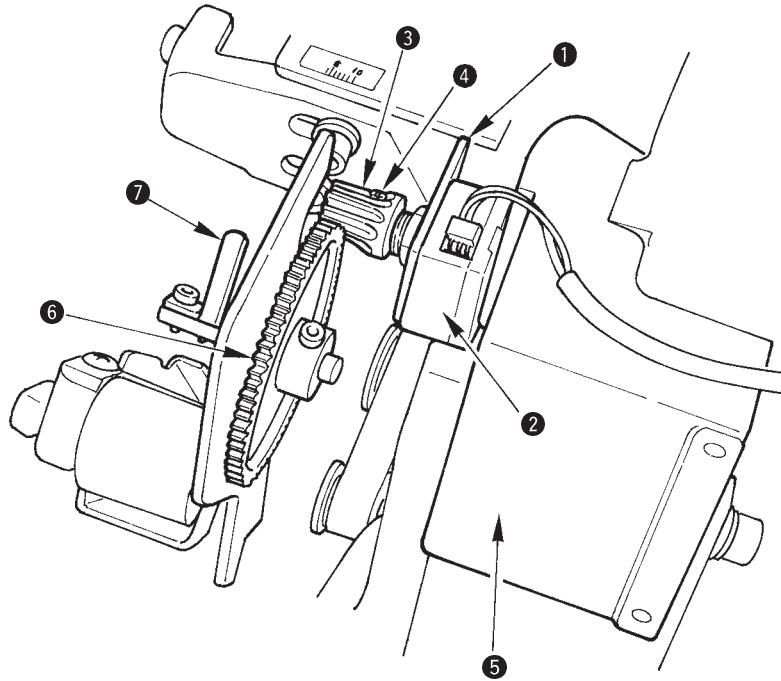


Adjustment Procedures	Results of Improper Adjustment
1. Turn ON the power and supply air to the machine. 2. Pressing the standard screen key, press ten key "0" to enter the adjustment screen. 3. Make "BK" screen flashing with the cursor key and input ten key 8, further press the screen changeover key to enter the check program screen. 4. Input ten key 19. Then, the state of the loop cut cylinder sensor is displayed ON/OFF. (Lamp of the sensor also displays ON/OFF.) 5. Loosen fixing screw ② of the loop cut cylinder position sensor. 6. Press No. 1 button of the solenoid valve on the device side to drive the loop cut cylinder to lower the cylinder to the lowest position of its stroke while gradually moving the sensor from the upper side to the lower side. Then, fix the sensor at the position where the display of state is changed over from OFF to ON. (Caution) When pressing the No. 1 button of the solenoid valve, the loop cut knife is actuated. Do not place your hand under the loop cut knife.	○ Adjustment of the sensor position will affect the cycle time. ○ When the sensor detects the cylinder before the loop cut cylinder is in the lowest position of its stroke, it will cause the belt loop not to be surely cut.

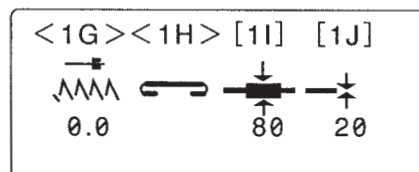
Standard Adjustment

6) Adjusting the installation of the belt loop splice sensor

1. Backlash between the shaft gear of the difference in height portion and the sensor gear of the difference in height portion is 0.03 to 0.2 mm.



○ Data input screen



Adjustment Procedures	Results of Improper Adjustment
1. Install potentiometer ❷ on sensor plate of difference in height portion ❶. 2. Temporarily fix sensor gear of difference in height portion ❸ to potentiometer ❷. At this time, fix the sensor gear so that fixing screw ❹ in the sensor gear of difference in height portion faces to the upper side. 3. Install sensor plate of difference in height portion ❶ on knife device bracket ❺. At this time, make the lower side screw of the fixing screws in the sensor plate of difference in height portion the center of rotation, and install the sensor plate so that the backlash between shaft gear of difference in height portion ❻ and sensor gear of difference in height portion ❸ is 0.03 to 0.2 mm. (Caution) After installation, draw by hand detector plate of difference in height portion ❼ and check that the detector plate smoothly returns (rotates) without being caught by means of the spring force of the shaft spring of difference in height portion when detaching hand. 4. Turn ON the power and supply air to the machine. 5. Press the standard screen key, make “*1” screen flashing with the cursor key, and press the screen changeover key to enter the difference in height portion input screen.	○ If the rotating torque occurs, detecting accuracy of the difference in height portion is excessively deteriorated. (Caution) “*” of *1 means the pattern number.

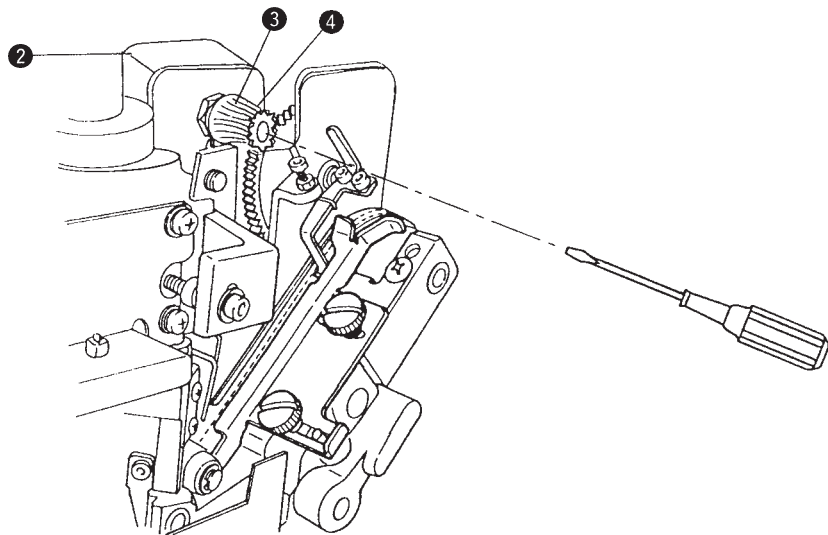
Standard Adjustment

7. Level meter on the panel is displayed on scale 3 to 5 in the state that there is no belt loop.

[Difference in height portion input screen]

* Belt Loop *
 ▷ P= 1 level
 Key [1] = level
 Adjustment
 Key [R] = Return

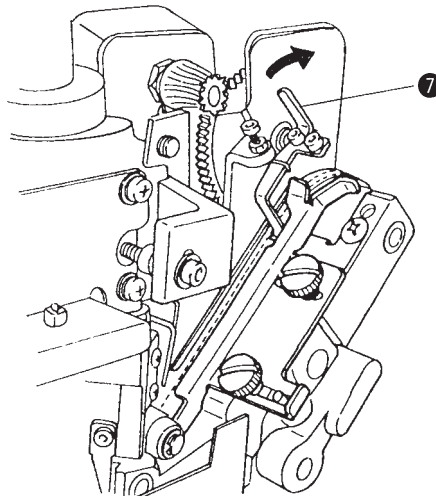
Level meter



* Belt Loop *

level

[7] = Feed
 [9] = set
 [R] = Return



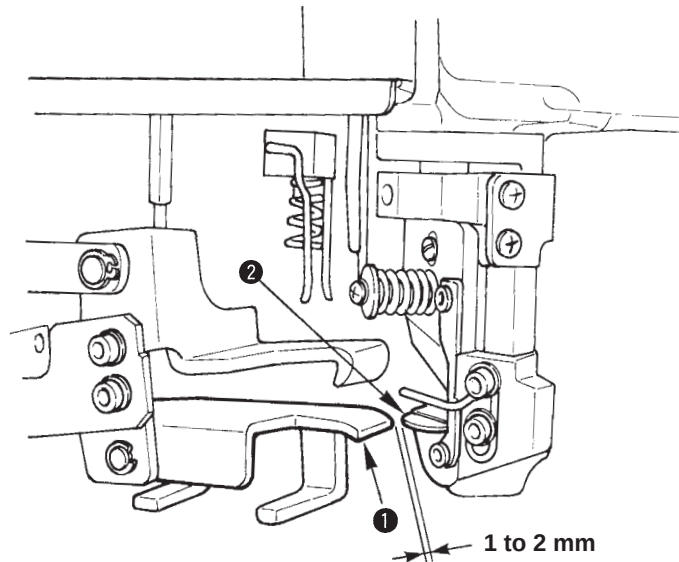
Adjustment Procedures	Results of Improper Adjustment
6. Loosen fixing screw ④ in the sensor gear of difference in height portion, insert the slotted screwdriver into the shaft hole in sensor gear of difference in height portion ③, and turn the shaft of potentiometer ②. 7. Fix sensor gear of difference in height portion ③ to the potentiometer at the position where the level meter on the panel is displayed on scale 3 to 5 and the level meter surely increases when further lifting the detector plate of difference in height portion in case where there is no belt loop. 8. When further lifting detector plate of difference in height portion ⑦, the loop feeding roller starts moving. Adjust screw ① of detector lever stopper of difference in height portion at this position.	○ The position where the loop feeding roller starts moving is the position determined by software. Be sure to adjust with the stopper. If the positions do not match each other, the loop feeding roller fails to work.

Standard Adjustment

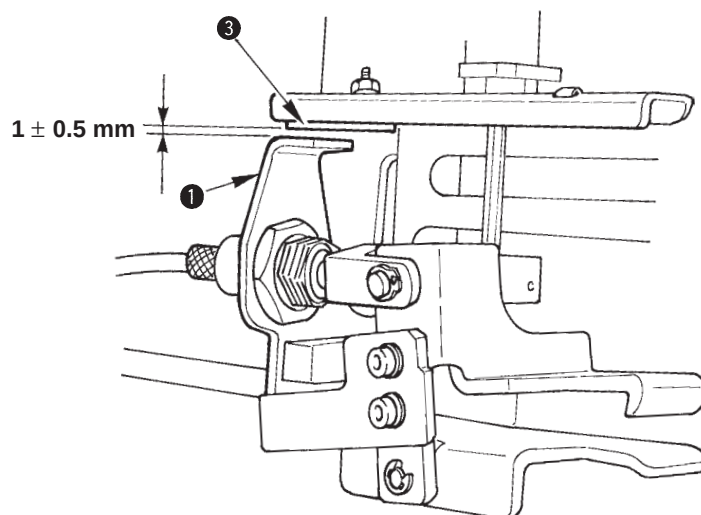
(2) Loop clamp feed components

1) Adjusting the loop clamp base plate front sensor

1. Operate the machine by the step operation and adjust the clearance provided between the loop clamp base plate and the cross cut receiving portion to 1 to 2 mm when the loop clamp base plate travels to its front end.



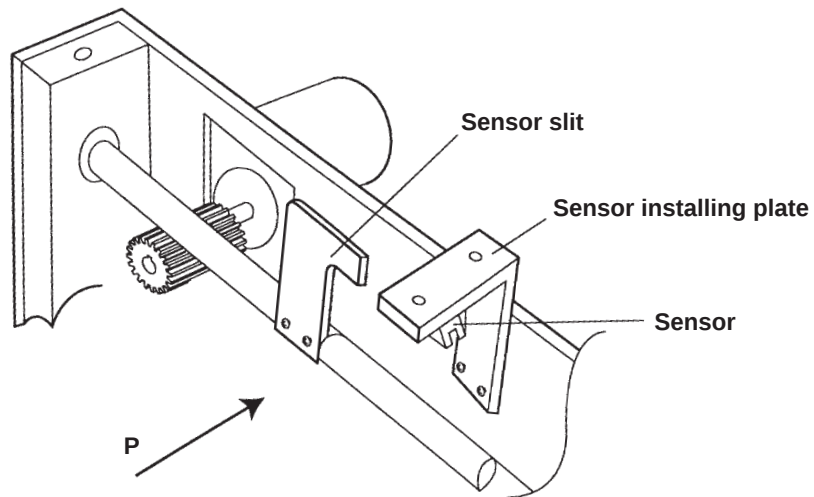
2. The clearance provided between the top surface of the loop clamp base plate and the loop clamp base plate front sensor is 1 ± 0.5 mm.



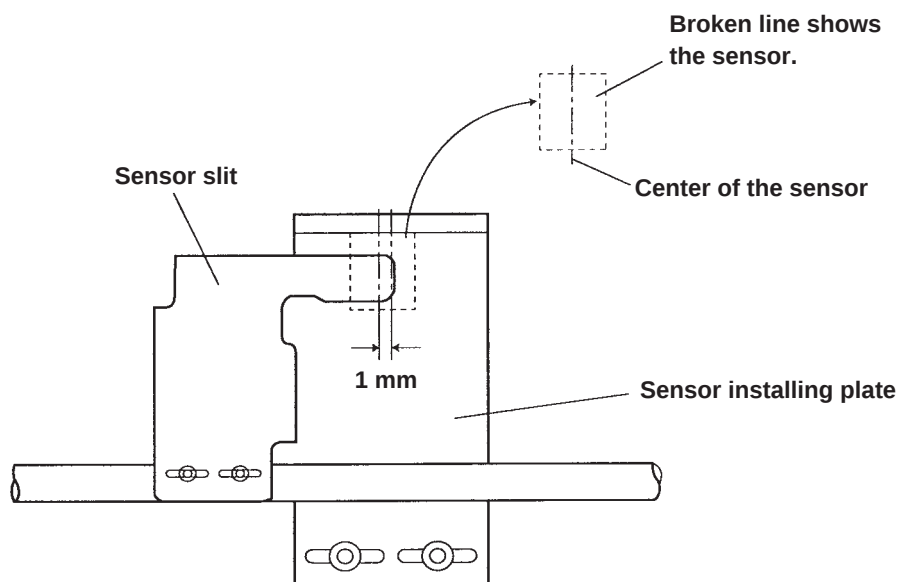
Standard Adjustment

2) Adjusting the loop clamp base plate rear sensor

1. The loop clamp guide plate sensor should overlap approximately 1 mm with the sensor slit at the position where the loop clamp base plate travels to its rear end.



* Viewed from P direction

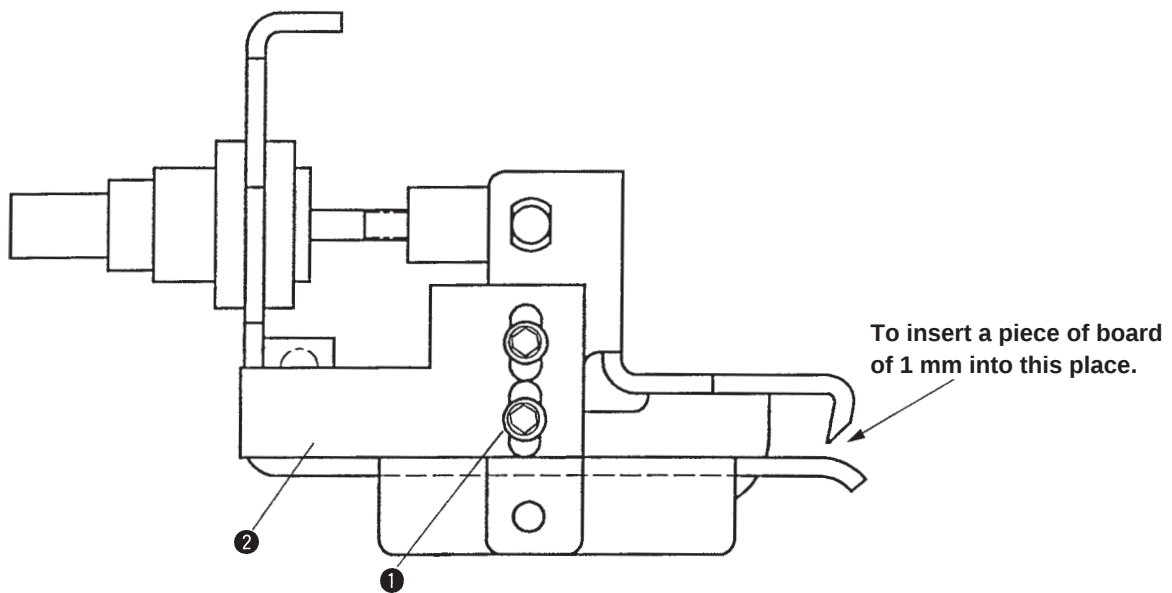
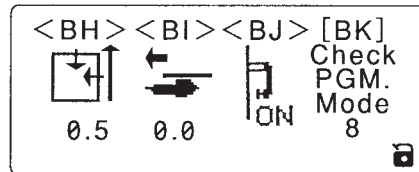


Adjustment Procedures	Results of Improper Adjustment
1. Move loop clamp base plate ❶ by hand to travel it to its rear end. 2. At this position, adjust the sensor installing plate to the position where the sensor overlaps approximately 1 mm with the sensor slit of loop clamp guide plate ❸.	○ If the position of the sensor located on the rear side of the loop clamp base plate is improper, step-out of the sensor will occur at the time of origin retrieval of the loop clamp base plate, the position where the drawing of belt loop is completed will shift or it will interfere with the belt loop folding shaft. It also affects the cycle time. So, adjust the sensor to the specified dimension.

Standard Adjustment

3) Adjusting the loop clamp lever loop existence sensor

1. Press No. 6 button of the solenoid valve on the device side and adjust the loop clamp detector plate to the position where the display of state changes over from OFF to ON and further the display of state continues to be OFF when a piece of board of 1 mm in thickness is inserted.

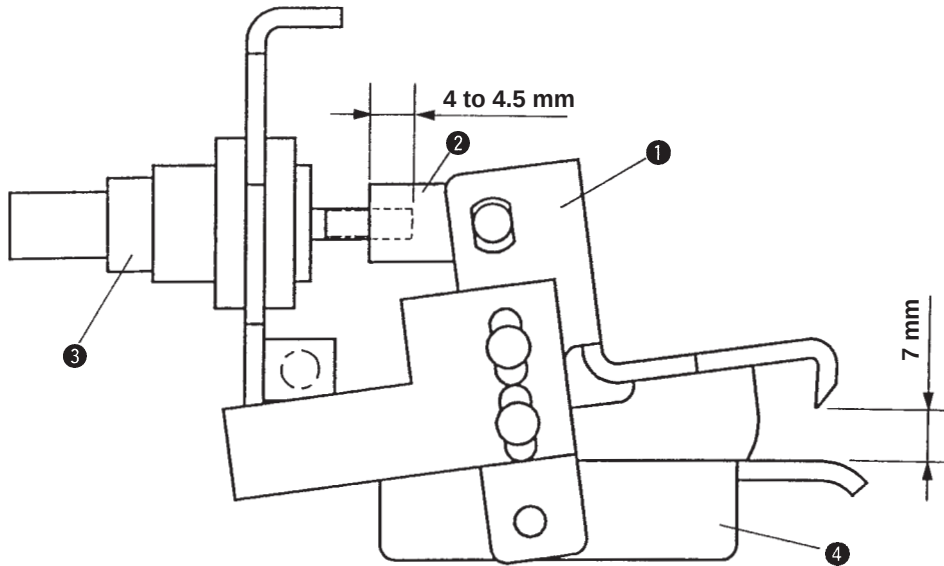


Adjustment Procedures	Results of Improper Adjustment
1. Turn ON the power and supply air to the machine. 2. Pressing the standard screen key, press ten key "0" to enter the adjustment screen. 3. Make "BK" screen flashing with the cursor key, input ten key 8, and further press the screen change-over key to enter the check program screen. 4. Input 5 with ten key and the state of the loop clamp lever loop existencse sensor is displayed ON/OFF. 5. Loosen fixing screws ❶ in the loop clamp detector plate. 6. Press No. 6 button of the solenoid valve on the device side and adjust the loop clamp detector plate ❷ to the position where the display of state changes over from OFF to ON and further the display of state continues to be OFF when a piece of board of 1 mm in thickness is inserted. Then, fix the detector plate. (Caution) When pressing No. 6 button of the solenoid valve, the loop clamp lever works. Do not place your hand or the like under the loop clamp lever. (Caution) Even when moving the loop clamp lever by hand to adjust the loop clamp detector plate without supplying air to the machine, the lever may not work since the move of the lever is different from the actual move of the lever. Be sure to check through the aforementioned adjustment procedure.	○ If the installing position of the sensor slit is improper, the sensor cannot judge whether or not the belt loop is clamped and the clamp action continues in repition even if there is a belt loop or the action continues even if there is no belt loop.

Standard Adjustment

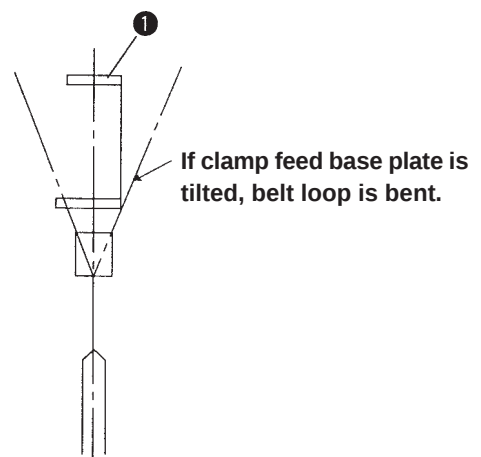
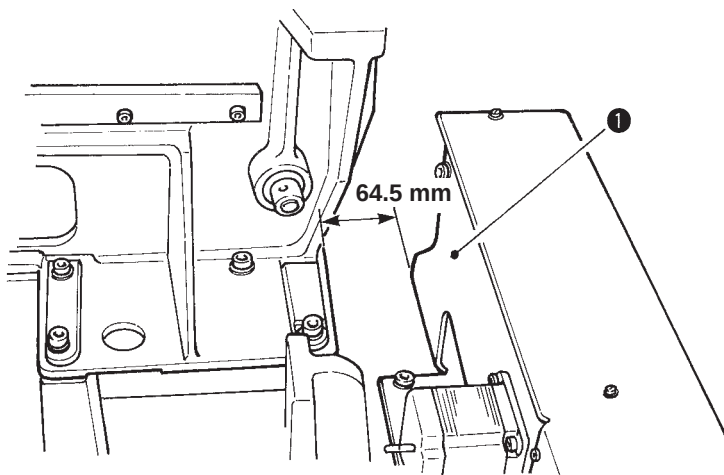
4) Adjusting the opening amount of the loop clamp base

1. Length of engagement of the knuckle joint is 4 to 4.5 mm.
Opening width of the loop clamp lever is 7 mm



5) Adjusting the position of the loop clamp feed unit

1. Clearance between the lower left side of the loop supply frame and the right side face of the clamp feed base plate should be 64.5 mm of the standard dimension and be in parallel.



Adjustment Procedures	Results of Improper Adjustment
1. Adjust the length of engagement of knuckle joint ❷ attached to loop clamp lever ❶ and the rod of open/close cylinder ❸ to 4 to 4.5 mm. 2. Move the open/close cylinder to and fro and adjust so that the distance from the top surface of loop clamp base plate ❹ to the opening of loop clamp lever ❶ is approximately 7 mm. 3. Supply air to the machine. 4. Press No. 6 button of the solenoid valve on the device side and make sure that the top end of the loop clamp lever comes in contact with the loop clamp base plate.	If the opening of the loop clamp lever is excessively wide, it may interfere with the belt loop click. When the opening is closed, the loop clamp lever does not engage with the loop clamp base plate. As a result, the loop may not be able to be held.
1. Loosen the fixing screw in clamp feed base plate and adjust the position to the specified dimension.	○ If the position is improper, the belt loop may not be able to be securely clamped or the clamp feed base plate may interfere with the belt receiver unit. ○ If the parallelism is not obtained, the belt loop is not at right angles with the fork resulting in the dog ear.

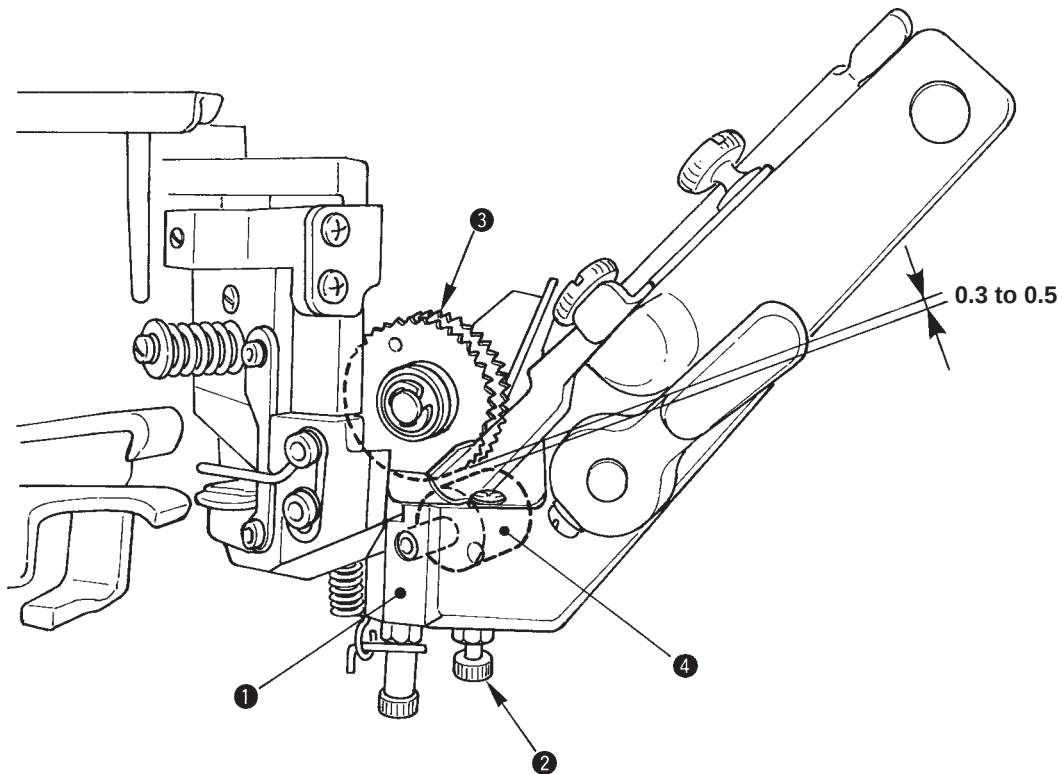
Standard Adjustment

(3) Belt loop feed components

1) Adjusting the height (clearance) of the loop feed roller

1. Clearance provided between the loop feed roller and the roller placed under the loop feed roller is 0.3 to 0.5 mm.

(Caution) It is recommended to change the adjustment value according to the belt loops.



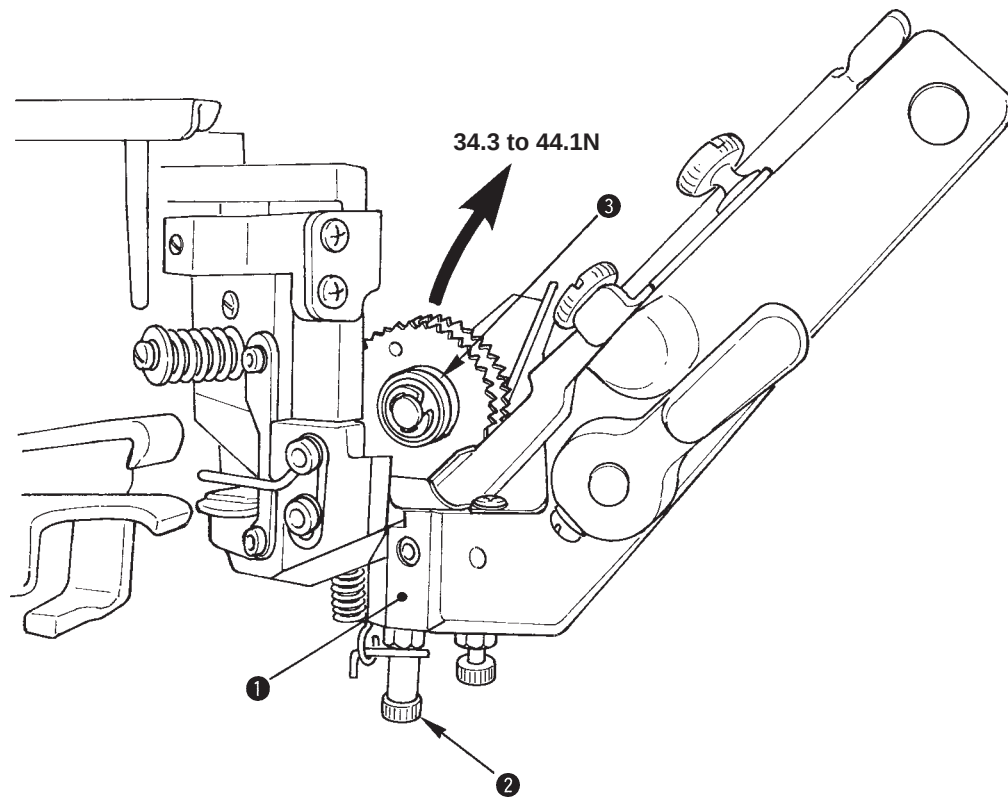
Adjustment Procedures	Results of Improper Adjustment
1. Remove the chip cover. 2. Turn height adjusting screw ❷ of the loop feed roller placed under loop feed base ❶ and adjust the clearance provided between loop feed roller ❸ and roller ❹ to the standard value, 0.3 to 0.5 mm. 3. Turning the screw clockwise will increase the clearance, and turning it counterclockwise will decrease the clearance. 4. Attach the chip cover.	○ If the clearance is smaller as against the belt loop, the belt loop may be damaged by the feed teeth of the roller. ○ If the clearance is larger as against the belt loop, it is not possible to securely feed the belt loop. Especially, the process of overlapped section (splice section) may not be securely conducted since it is conducted by the loop feed roller only.

Standard Adjustment

2) Adjusting the pressure of the loop feed roller

1. Lift the rotary shaft of the feed roller and adjust the pressure to 34.3 to 44.1N.

(Caution) It is recommended to change the adjustment value according to the belt loops.

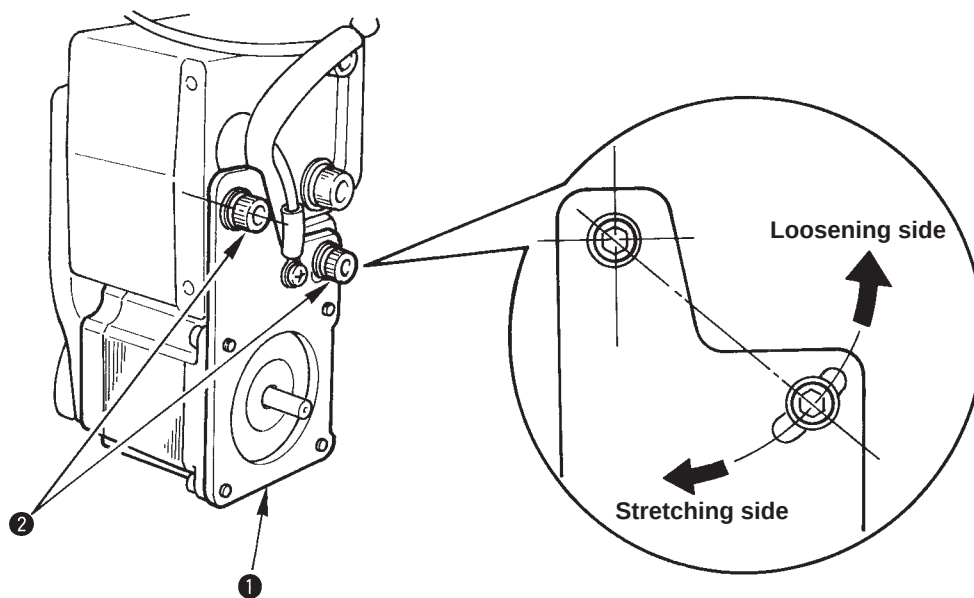
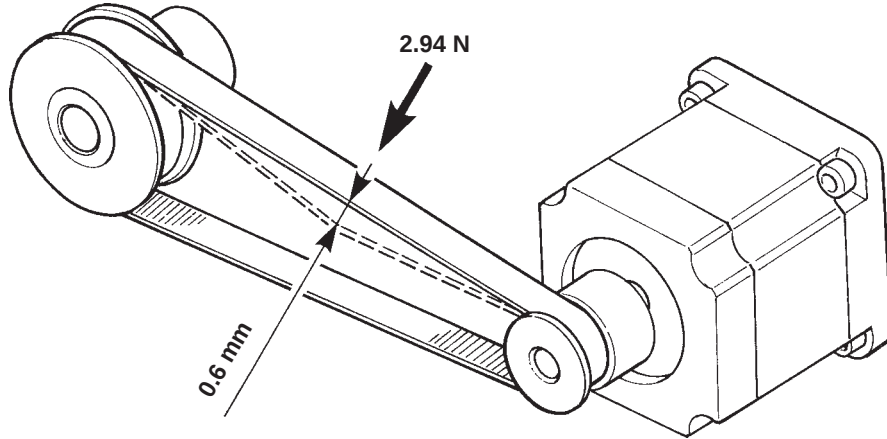


Adjustment Procedures	Results of Improper Adjustment
1. Remove the chip cover. 2. Turn pressure adjustment screw ❷ of the loop feed roller placed under loop feed base ❶ and adjust the pressure of loop feed roller ❸. Lift the rotary shaft of loop feed roller ❸ in the direction of the arrow as shown in the figure on the left and adjust the pressure to 34.3 to 44.1 N. 3. Turning the screw clockwise will increase the pressure, and turning it counterclockwise will decrease the pressure. 4. Attach the chip cover.	○ If the pressure is higher as against the belt loop, the belt loop may be damaged by the feed teeth of the belt loop feed roller. ○ If the pressure is lower as against the belt loop, it is not possible to securely feed the belt loop. Especially, if the pressure is excessively low, the process of overlapped section (splice section) may not be securely conducted since it is conducted by the loop feed roller only.

Standard Adjustment

3) Adjusting the tension of the loop feed roller belt

1. Adjust the belt tension so that the belt sags approximately 0.6 mm when the center of the belt is pressed with 2.94N force.



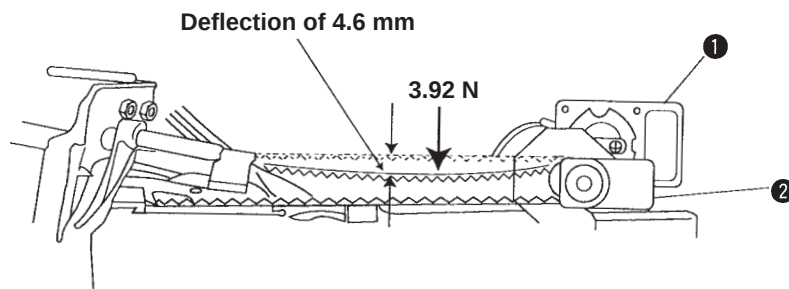
Adjustment Procedures	Results of Improper Adjustment
1. Loosen fixing screws ❷ in feed motor bracket ❶, and stretch the belt while turning the bracket and motor clockwise making the position of the upper screw on this side the center of rotation. 2. Check that the belt tension is adjusted so that the belt sags approximately 0.6 mm when the center of the belt is pressed with 2.94N force. (To attach the belt, lightly press the sprocket to the belt to such an extent that the belt does not sag and the proper tension is obtained.)	○ If the belt is excessively stretched, the service life of belt will be deteriorated or driving torque will occur. ○ If the belt is insufficiently stretched, tooth skipping of belt will occur.

Standard Adjustment

(4) Belt loop supply components

1) Adjusting the tension of the loop supply belt

1. Adjust the belt tension so that the belt sags approximately 4.6 mm when the center of the belt is pressed with 3.92 N.

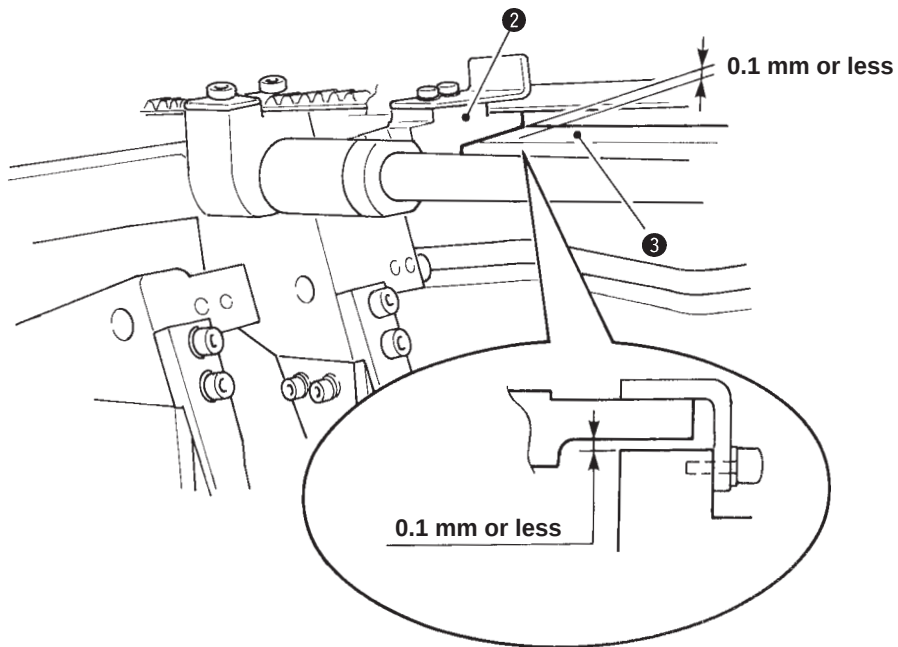
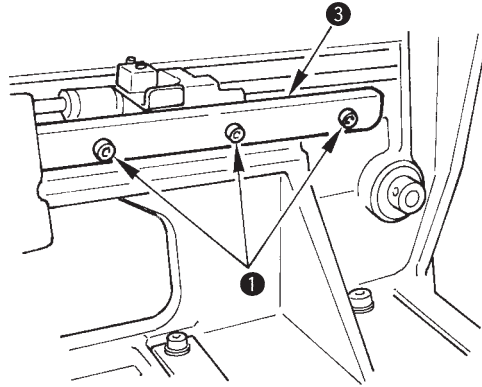


Adjustment Procedures	Results of Improper Adjustment
1. Loosen the fixing screws in the motor installing base and stretch the belt with belt tension adjustment screw ②. 2. Check that the belt tension is adjusted so that the belt sags approximately 4.6 mm when the center is pressed with 3.92 N.	○ If the belt is excessively stretched, the service life of belt will be deteriorated or driving torque will occur. ○ If the belt is insufficiently stretched, tooth skipping of belt will occur.

Standard Adjustment

2) Adjusting the play in the rotation of the loop supply slide base

Adjust so that the play in the loop supply slide base in terms of the rotating direction should be 0.1 mm or less at the shoulder portion of the loop supply slide base.

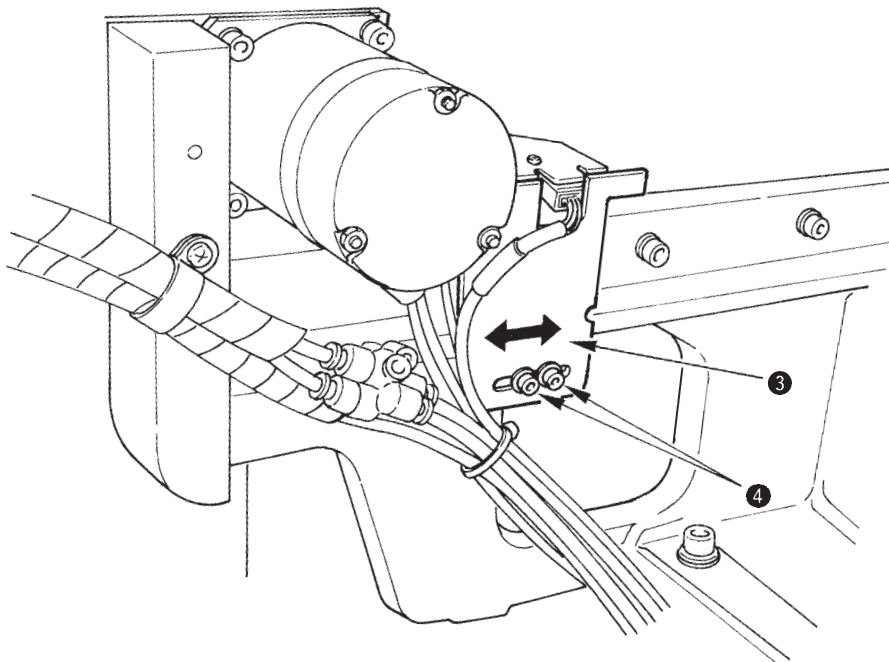
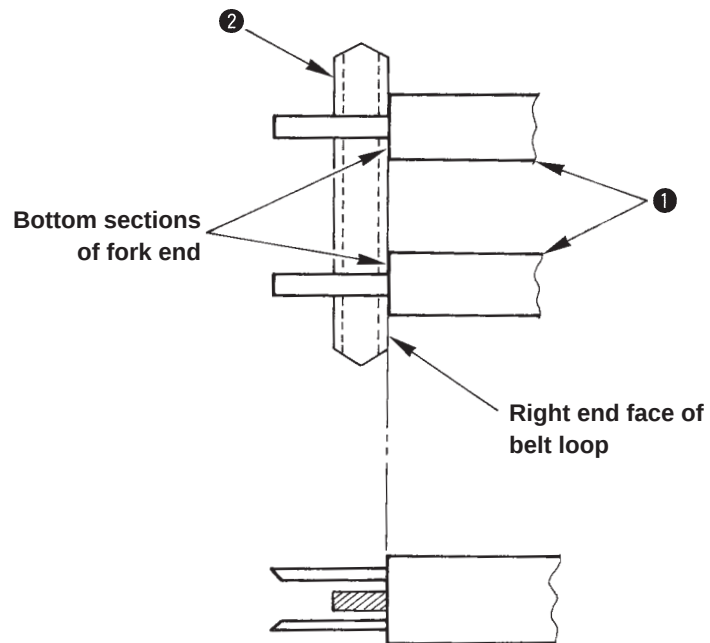


Adjustment Procedures	Results of Improper Adjustment
1. Loosen fixing screws ❶ in the loop supply slide base guide and move loop slide base guide ❸ up or down to adjust so that the clearance at the shoulder portion of loop supply slide base ❷ is 0.1 mm or less. 2. At this time, check that the loop supply slide base slides smoothly without unevenness of torque within the movable range.	○ If the clearance is improper, defective delivery from the belt receiver to the fork or that from the fork to the machine will result.

Standard Adjustment

3) Adjusting the loop supply slide base sensor

1. Adjust the position of the sensor to the position where the bottoms of the fork end of the forks are aligned with the right end faces of the belt loops when the forks clamp the belt loops at the belt receiver portion.

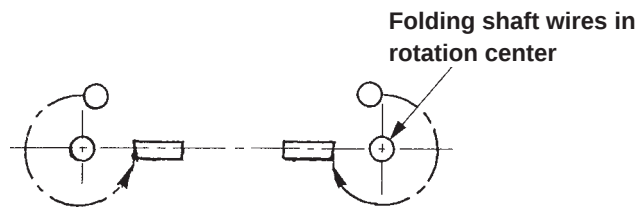
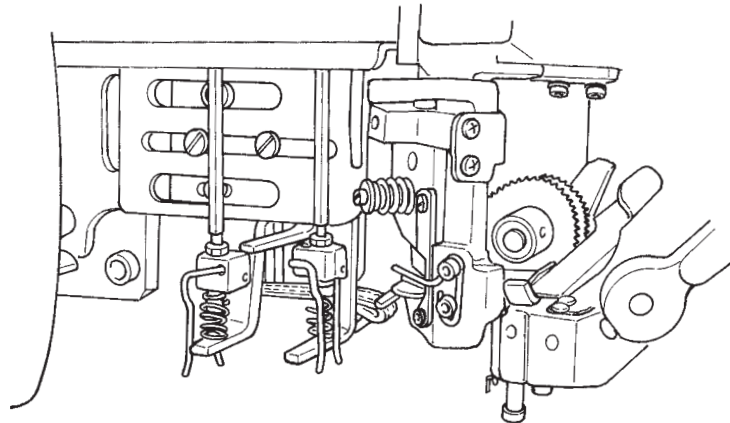


Adjustment Procedures	Results of Improper Adjustment
1. Turn ON SW 2 of the DIP switches which are located on the upper and lower sides on the right side of the operation box panel to set the stop operation mode. 2. Turn ON the power and supply air to the machine. 3. Put the belt loop. 4. Press the set back switch to step forks ❶ up to the belt loop clamping position in step operation. 5. At this time, adjust sensor installing plate ❸ so that the right end faces of belt loops ❷ are aligned with the bottoms of the fork end of forks ❶ If there is any clearance, adjust the sensor installing plate as much as the clearance to the machine side (left side). On the contrary, if there is no clearance and the fork is pressing the belt loop, adjust the installing plate toward separating it from the machine (right side). 6. When the position of the sensor installing plate has been adjusted, be sure to open and close the hook cover once. Then, press the set back switch to continue the step operation. 7. When the adjustment is completed, securely fix sensor installing plate ❶ with fixing screws ❹. Perform fine adjustment of the position of the fork with the panel since it has the electrical fine adjustment function. Refer to the item "Fork origin compensation" in the Instruction Manual on page 48.	○ The position of the loop supply slide base sensor has to be re-set when the circuit board has been replaced.

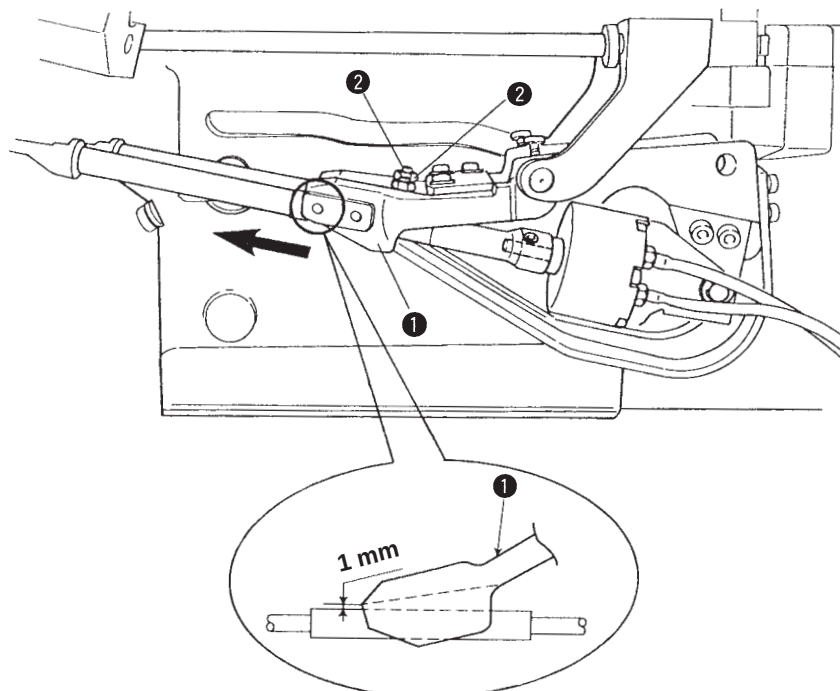
Standard Adjustment

4) Adjusting the height of the fork (up/down of this side and far side)

1. Clearances provided between the top surface sides of the forks in the right and left rotation centers and the bottom surfaces of the belt loops should be equal respectively at the positions where the forks clamp the belt loops from the loop receivers.



2. At this time, check that a clearance is provided between the top surface of front fork end of the folding shaft metal and the folding shaft.
Standard clearance is 1 mm.

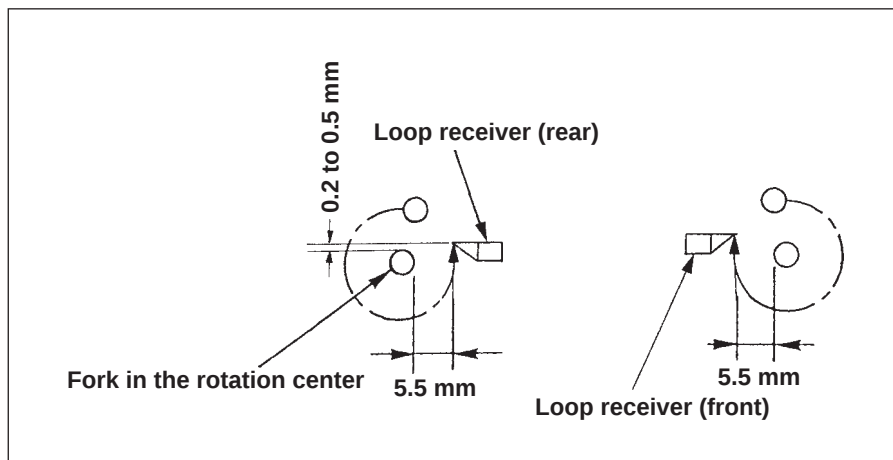
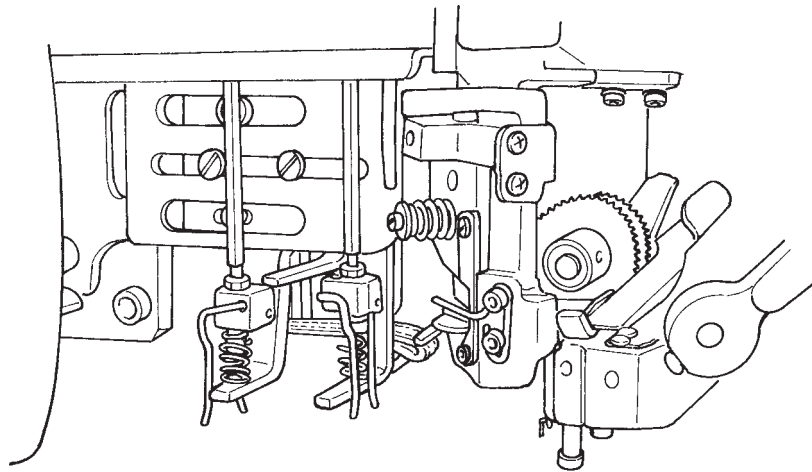
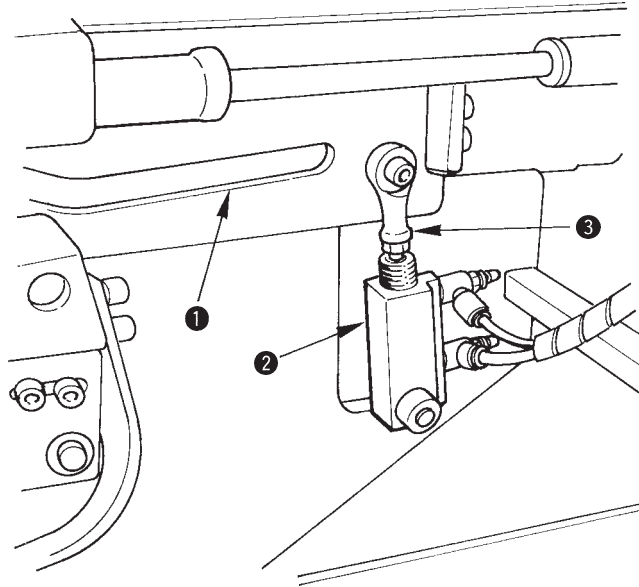


Adjustment Procedures	Results of Improper Adjustment
2. Align the heights of forks in the right and left rotation centers with screws ❷ for adjusting the height of folding shaft assembled in folding shaft metals ❶. (Caution) If the heights of the forks, front and rear, are aligned with each other, it is OK even when the clearance is “0”. The clearance, 1 mm, is the dimension which has been factory-set at the time of delivery.	○ Dog ear will result. ○ Delivery on the one side of forks only will be unstable.

Standard Adjustment

5) Adjusting the height of the fork (up/down of the unit)

1. A clearance of 0.2 to 0.5 mm should be securely provided between the top surface side of the fork in rotation center and the bottom surface of the belt loop at the position where the fork clamps the belt loop from the loop receiver.

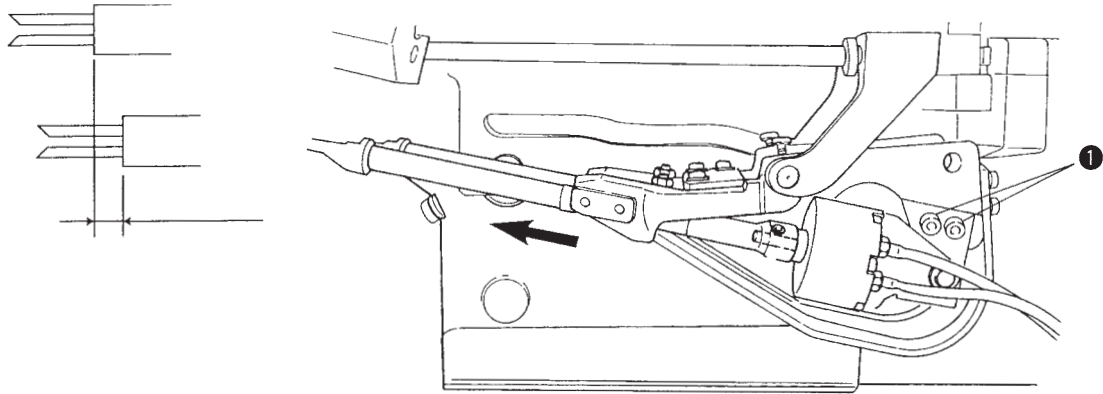


Adjustment Procedures	Results of Improper Adjustment
1. Loosen the lock nut of rod end ❸ assembled in the rod of up/down cylinder ❷ of loop supply cam ❶. 2. Change the length of engagement between the cylinder rod and the rod end to adjust so that a clearance of 0.2 to 0.5 mm provided between the top surface side of the fork in rotation center and the bottom surface of the belt loop is securely obtained at the position where the fork clamps the belt loop from the loop receiver. Turning the cylinder clockwise will increase the clearance provided between the belt loop and the fork, and turning it counterclockwise will decrease the clearance. 3. Standard length of engagement is 6.7 mm.	○ Dog ear will result. ○ Delivery of belt loop will be unstable.

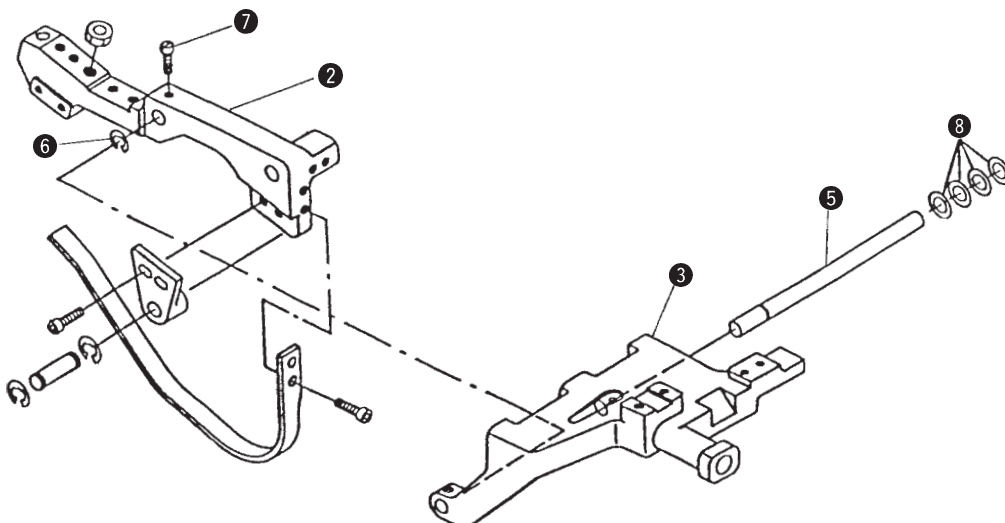
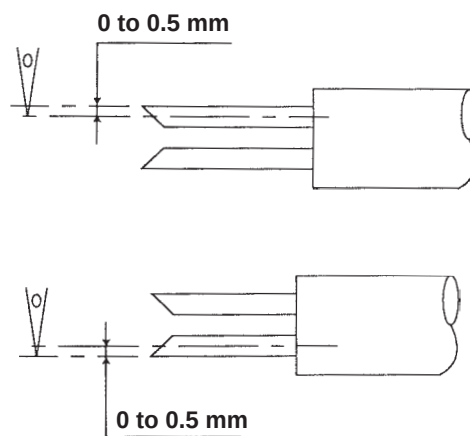
Standard Adjustment

6) Adjusting the position of the fork and the needle

1. Parallelism of the fork ends of the respective forks as against the two sewing machine needles should be within 0.1 mm.



2. The space between the center of the sewing machine needle and the center of the fork in the rotation center is "0" or within 0.5 mm to the outside of belt loop.

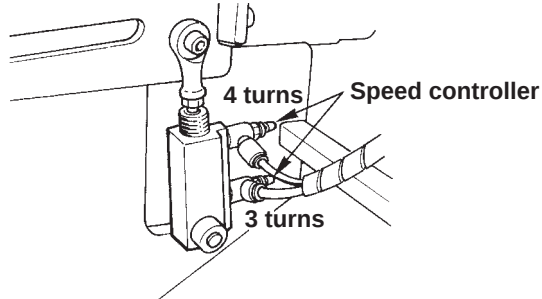


Standard Adjustment

(5) Adjusting the air speed controller

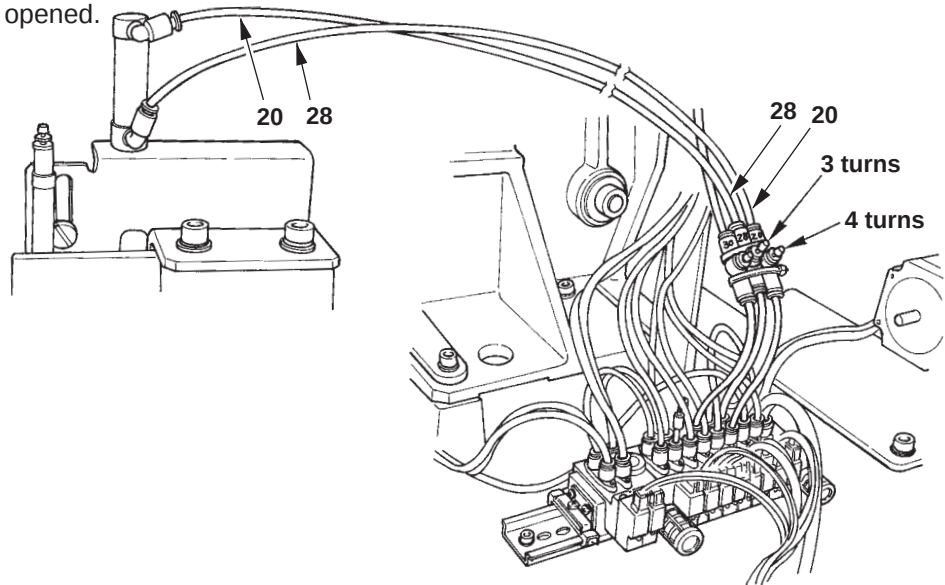
1) Cam up/down cylinder

1. Adjustment amount of the speed controller on the rod side : Give the adjustment screw four turns after fully opened.
2. Adjustment amount of the speed controller on the anti-rod side : Give the adjustment screw three turns after fully opened.



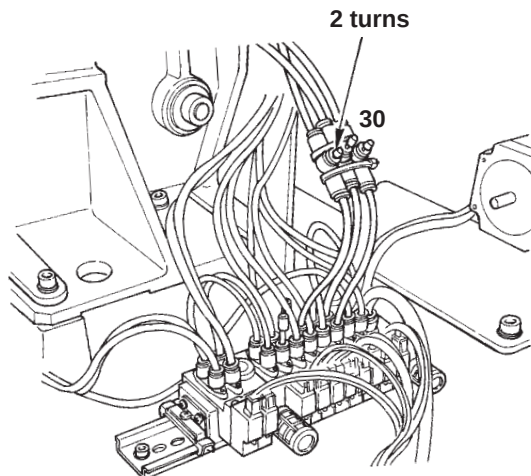
2) Belt presser removing base cylinder

1. Adjustment amount of the speed controller on the rod side : Give the adjustment screw four turns after fully opened.
2. Adjustment amount of the speed controller on the anti-rod side : Give the adjustment screw three turns after fully opened.



3) Belt presser cylinder

1. Adjustment amount of the speed controller on the rod side : Give the adjustment screw two turns after fully opened.

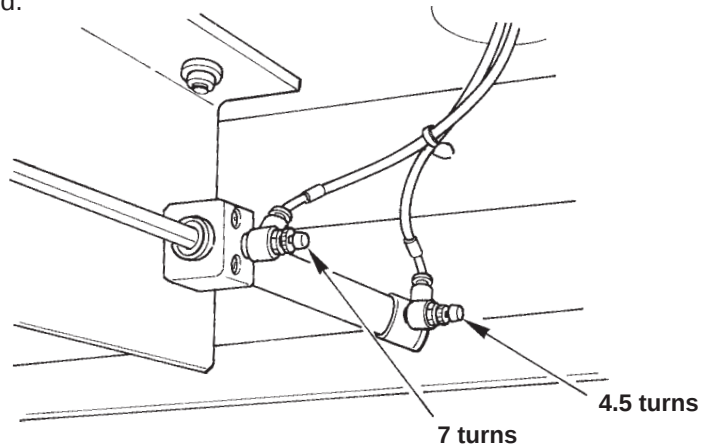


Adjustment Procedures	Results of Improper Adjustment
	○ If the speed adjustment of the cylinder is insufficient, stress is produced more than necessary, and looseness of components will occur earlier than expected. Or, if the action is slower than the timer, interference with other components will result.
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	○ If the speed adjustment of the cylinder is insufficient, stress is produced more than necessary, and looseness of components will occur earlier than expected. Or, if the action is slower than the timer, interference with other components will result.

Standard Adjustment

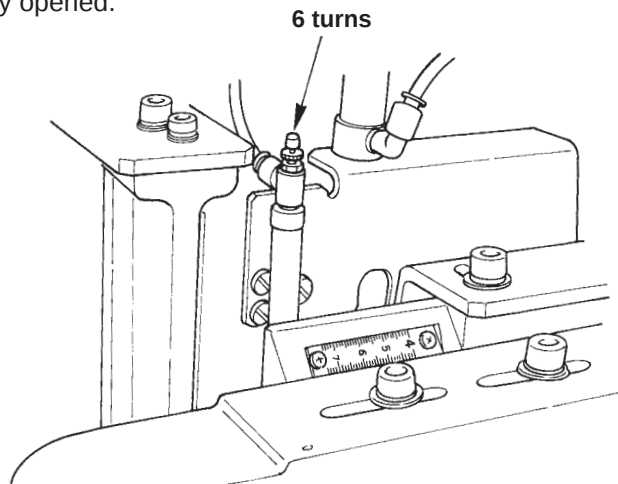
4) Loop pull-out cylinder (Optional)

1. Adjustment amount of the speed controller on the rod side : Give the adjustment screw 7 turns after fully opened.
2. Adjustment amount of the speed controller on the anti-rod side : Give the adjustment screw 4.5 turns after fully opened.



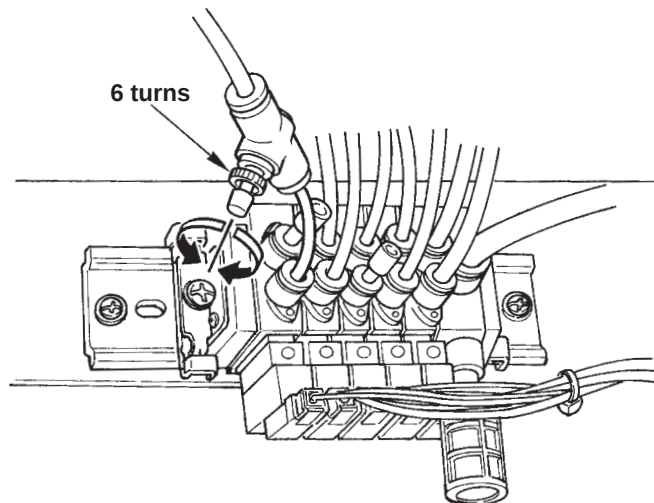
5) Fullness cylinder (Optional)

1. Adjustment amount of the speed controller on the anti-rod side : Give the adjustment screw six turns after fully opened.



6) Needle cooler (Optional)

1. Adjustment amount of the speed controller : Give the adjustment screw two turns after fully opened.



Adjustment Procedures	Results of Improper Adjustment
	○ If the speed adjustment of the cylinder is insufficient, belt loop is not sufficiently drawn and slackening of the belt loop required for the supply device may not be performed.
	○ If the speed adjustment of the cylinder is insufficient, stress is produced more than necessary, and looseness of components will occur earlier than expected. Or, if the action is slower than the timer, interference with other components will result.

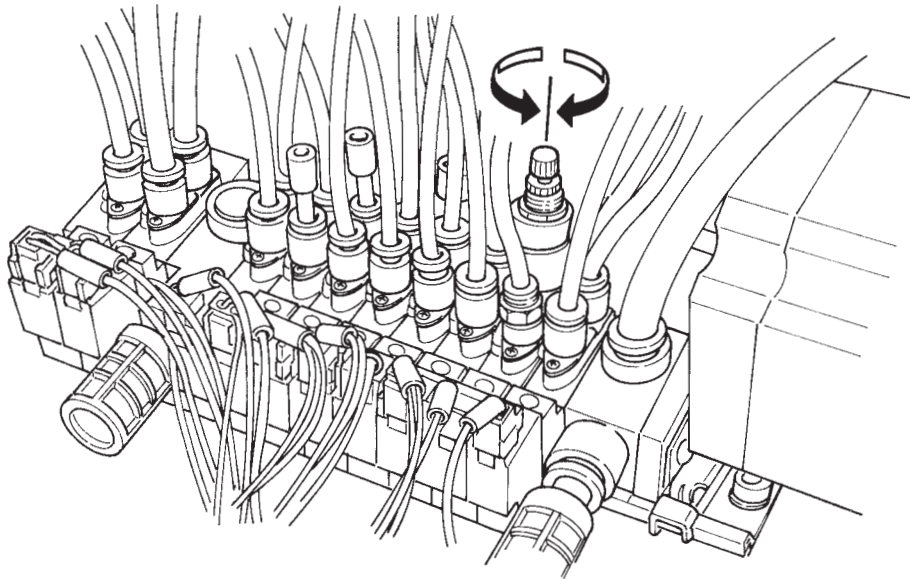
Standard Adjustment

(6) Adjusting the pressure reduction controller

1) Loop folding cylinder

1. This pressure reduction valve adjusts the turning force of the fork turning cylinder. Generally reduce the pressure for the thin belt loops and fold the belt loops with less force to obtain the stability. Increase the pressure for the thick belt loops and fold the belt loops with big force to obtain the stability.

Adjust the valve when the state of loop folding is unstable due to the dog-ear or the like.

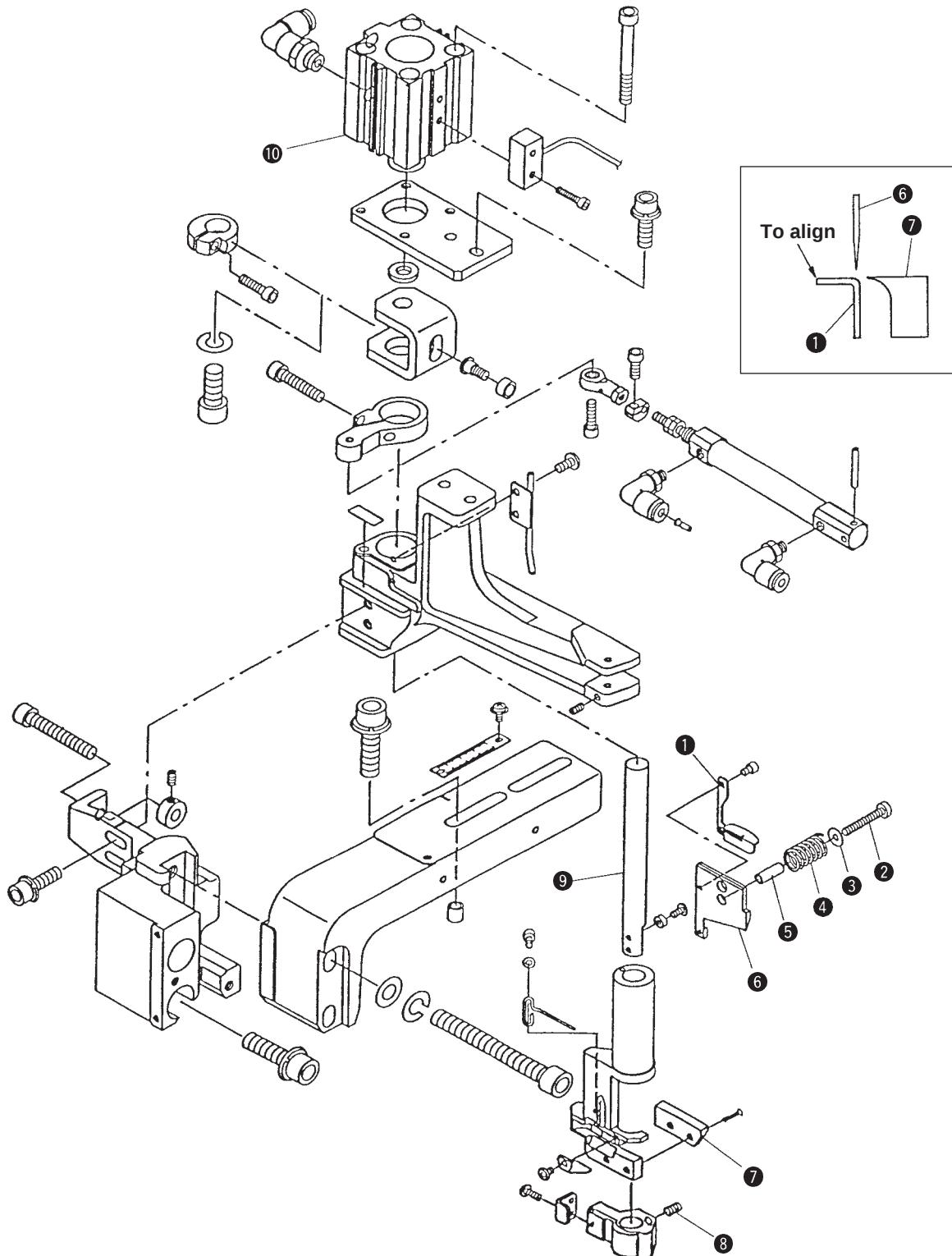


If the amount of pressure reduction is large, the fork interferes with other components. So, be careful.

Adjustment Procedures	Results of Improper Adjustment
1. Reduce the pressure as low as possible to such an extent that the belt loop can be neatly folded.	○ If the force when folding up the belt loop is excessively strong, an extra force is applied to the shaft of the folding shaft cylinder. As a result, the service life of the cylinder will be deteriorated.

(7) Disassembling/assembling

1) Disassembling/assembling of the loop cut knife and the counter knife



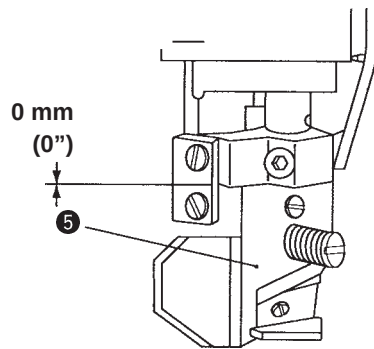
Disassembling / Assembling

1. Tilt the sewing machine head and make a space for working.
2. Remove cross cut support ①.
3. Remove screw ②, remove plain washer ③, spring ④ and collar ⑤, and remove plain cut knife ⑥.
4. Remove counter knife ⑦, and replace it with a new one (G5409254000).
5. Replace the loop cut knife with a new one (G5412254000), install collar, spring and plain washer in the order by reversing the above disassembling order, and fix them with the screw.

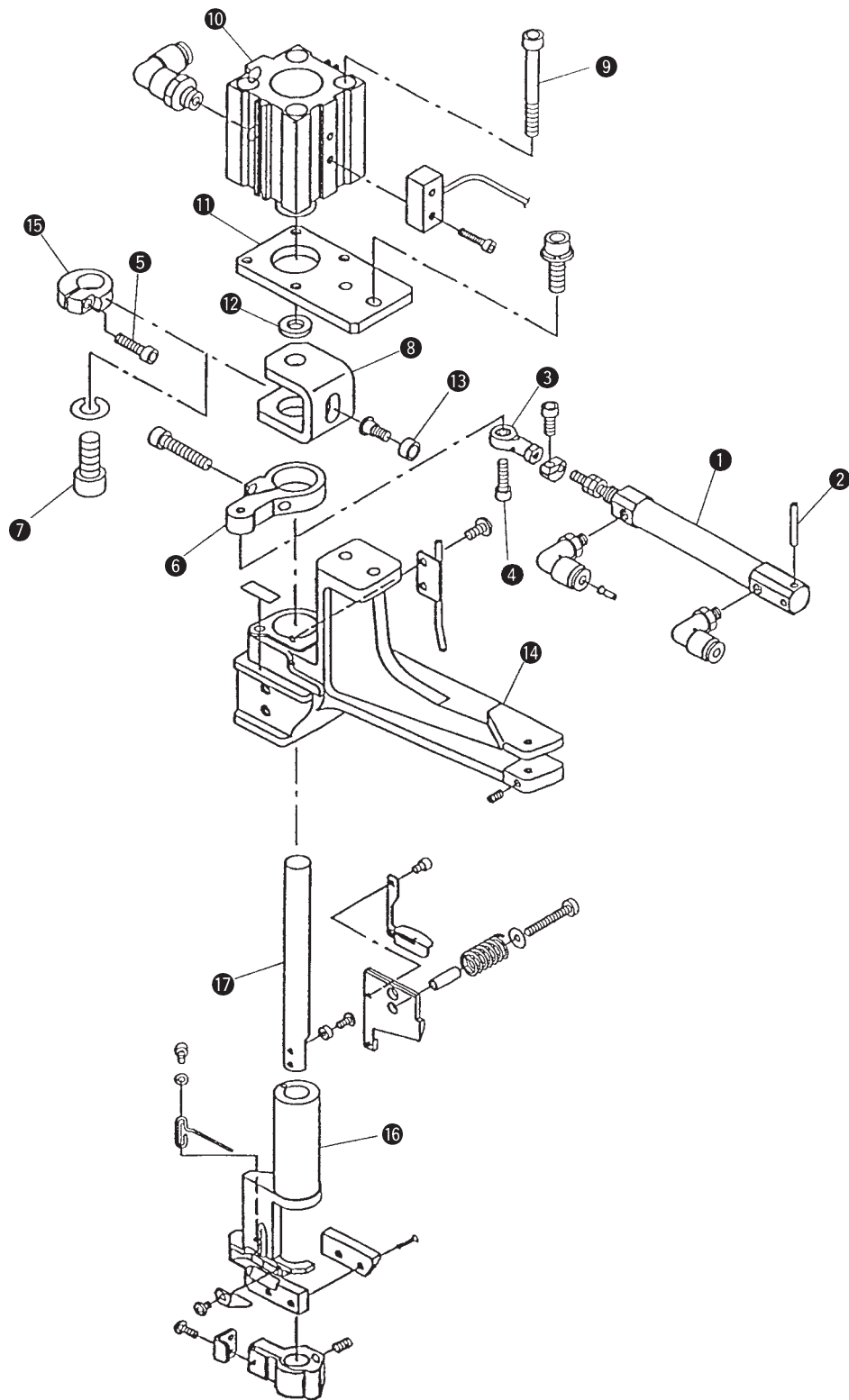
(Caution) Make sure that the screw is securely tightened since the compressed amount of the spring is determined by the height of the collar.

6. Loosen screw ⑦ in the moving knife base and move moving knife shaft ⑨ so that the top surface of loop cut knife ⑥ is aligned with the bottom face of moving knife shaft ⑨.
7. Draw loop cut cylinder ⑩ to move loop cut knife ⑥ to the highest position. At this time, fix cross cut support ① at the position where the belt loop receiving face of cross cut support ① is aligned with the top surface of counter knife ⑦. At this time as well, check that counter knife ⑦ does not interfere with cross cut support ①.
8. Turn ON the power and supply air to the machine. Feed the belt loop using the loop feed lever, and simultaneously press the standard screen key and "3" to cut the belt loop. Then, check the sharpness

Top surface of moving knife is aligned with bottom face of moving knife base.
(Clearance : 0 mm)



2) Disassembling/assembling of the loop cut knife drive components



Disassembling / Assembling

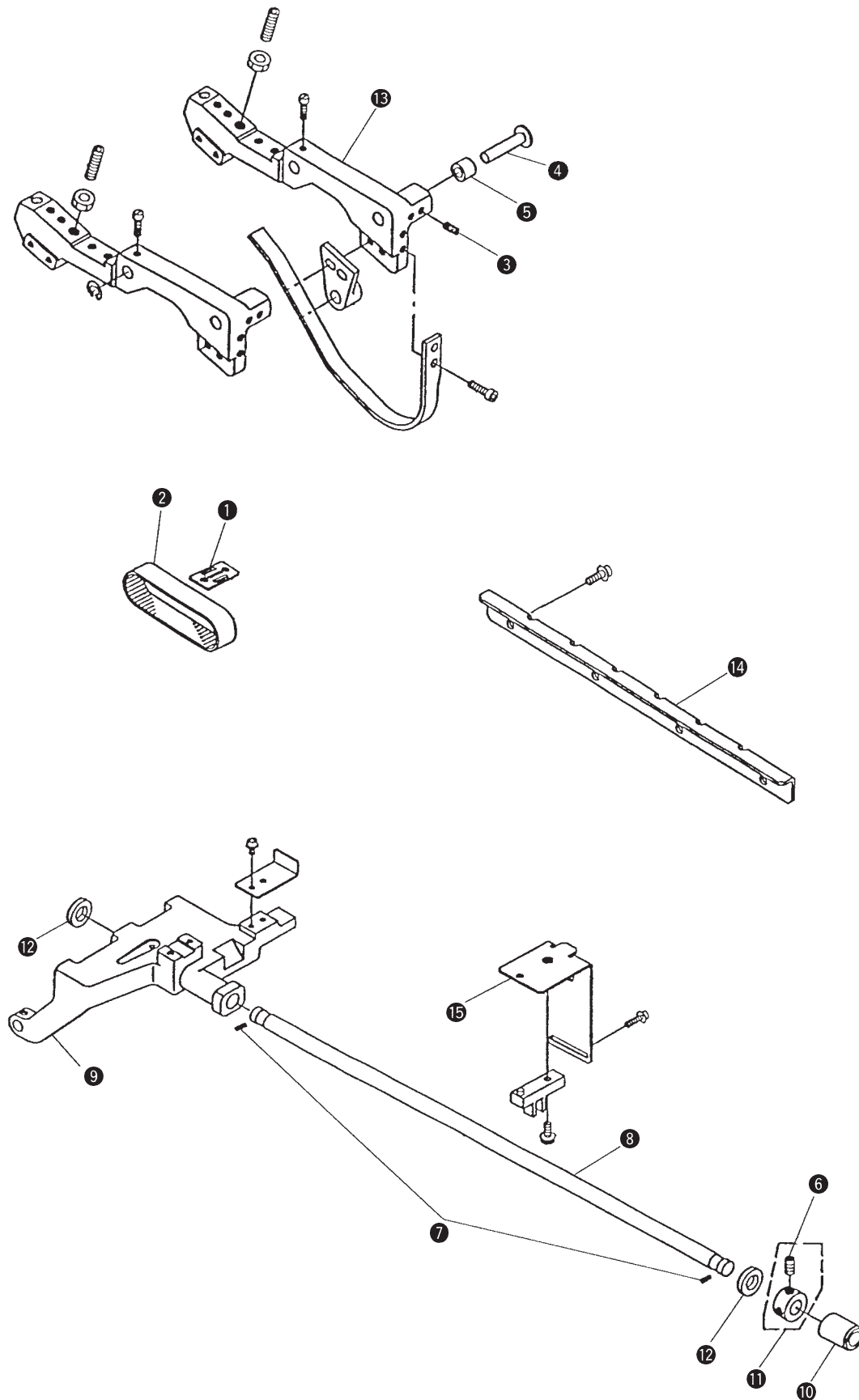
Disassembling

1. Draw out fulcrum shaft ② in knife turn cylinder ①.
2. Remove screw ④ in rod end ③ assembled to knife turn cylinder ①.
3. Loosen setscrew ⑤ in the moving knife shaft fixing thrust collar.
4. Loosen counter knife base bracket ⑥ and draw down the counter knife base unit.
5. Loosen screw ⑦ in the knife shaft joint and remove knife shaft joint ⑧.
6. Remove screw ⑨ in the knife drive cylinder and remove knife drive cylinder ⑩.
7. Here, replace knife drive cylinder ⑩ and knife turn cylinder ①.

Assembling

1. Fix knife drive cylinder ⑩ to knife cylinder bracket ⑪.
2. Insert plain washer ⑫ between the cylinder and knife shaft joint ⑧, and fix the joint. At this time, check that the slot in the center of knife shaft joint is assembled in roller ⑬.
3. Inserting the counter knife base unit from the lower side into knife base bracket ⑭, assemble counter knife base bracket ⑥ and moving knife shaft fixing thrust collar ⑮.
4. Temporarily fix counter knife base bracket ⑥ so that counter knife base ⑯ turns smoothly on knife base bracket ⑭ without looseness in the vertical direction.
5. Install knife turn cylinder ① on knife base bracket ⑭ and fix fulcrum shaft ②.
6. Install rod end ③ on counter knife base bracket ⑥. Here, adjust the cross cut angle of the loop cut knife. (See page 77.)
7. Fix moving knife shaft fixing thrust collar ⑮ to knife shaft joint ⑧ while removing the thrust play so that the top surface of moving knife shaft ⑰ comes in contact with screw ⑦ in knife shaft joint ⑧. At this time, check that counter knife base ⑯ turns smoothly.
8. Adjust the knife drive sensor. (See page 87.)

3) Disassembling/assembling of the loop supply



Disassembling / Assembling

Disassembling

1. Remove the loop supply cover.
2. Remove belt receiver ❶ and separate timing belt ❷ from the loop supply unit.
3. Loosen screw ❸ in the cam roller shaft and remove cam roller shaft ❹ and cam roller ❺ from the rear side of the loop supply frame.
4. Loosen screws ❻ in the stopper thrust collar.
5. Loosen screws ❼ in the loop supply guide shaft, draw out loop supply guide shaft ❸, and remove loop supply slide base ❾.

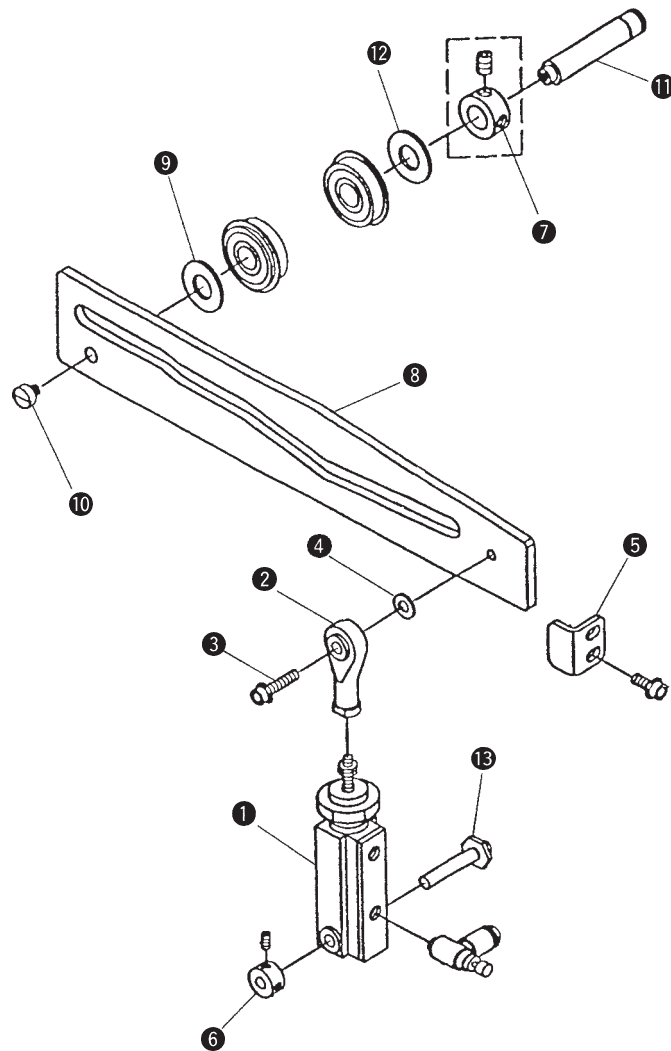
Further, although disassembling of the following three portions can be performed, refer to the respective pages for the disassembling.

- Disassembling/assembling of the loop supply cam portion(See page 131.)
- Disassembling/assembling of the loop supply belt portion (See page 133.)
- Disassembling/assembling of the loop supply unit portion (See page 135.)

Assembling

1. Insert loop supply guide shaft ❸ from the rear of the supply frame, further, insert sleeve ❿, thrust collar ⓫, rubber stopper ⓬ (1 pc.), supply slide base, and rubber stopper (1 to 2 pcs.) in the written order, insert loop supply guide shaft ❸ into the bearing portion on the left side of the supply frame, and fix loop supply guide shaft ❸ at the position where the left end face of the loop supply guide shaft is aligned with the rear end face of the bearing portion of the supply frame.
2. Fix thrust collar ⓫ while removing the thrust play of sleeve ❿ by thrust collar ⓫.
3. Assemble cam roller ❺ and cam roller shaft ❹ to folding shaft metal ⓬ through the supply cam groove from the rear side of the supply frame. At this time, check that cam roller ❺ turns smoothly without looseness.
4. Apply grease to the supply cam groove.
5. Adjust loop supply slide guide ⓭ so that the vertical looseness of the sliding shoulder of loop supply slide base ❾ is 0.1 mm or less in the whole sliding range.
6. Fix belt receiver ❶.
7. Adjust loop supply slide base sensor ⓮. (See page 111.)

4) Disassembling/assembling of the loop supply cam components



Disassembling / Assembling

Disassembling

1. Remove screw ③ in knuckle joint ② of cam up/down cylinder ①. At this time, simultaneously, plain washer ④ for adjusting the height located under knuckle joint ② comes off. So, be careful.
2. Remove loop supply cam maintenance plate ⑤.
3. Remove fixing cylinder thrust collar ⑥.
4. Remove thrust collar ⑦ for fixing the loop supply cam rotary shaft and draw out supply cam ⑧ from the supply frame. At this time, simultaneously, plain washer ⑨ for adjusting the height located under the supply cam comes off. So, be careful.
5. It is possible to remove loop supply cam rotary shaft ⑪ attached to the supply cam by removing screw ⑩.
6. Here, replace supply cam ⑧ and cam up/down cylinder ①.

Assembling

1. Assemble knuckle joint ② to cam up/down cylinder ①. At this time, the length of engagement is approximately 6.8 mm. However, re-adjust the height of the supply cam by the delivery of the belt loop. (See page 115.)
2. Attach loop supply cam rotary shaft ⑪ to supply cam ⑧.

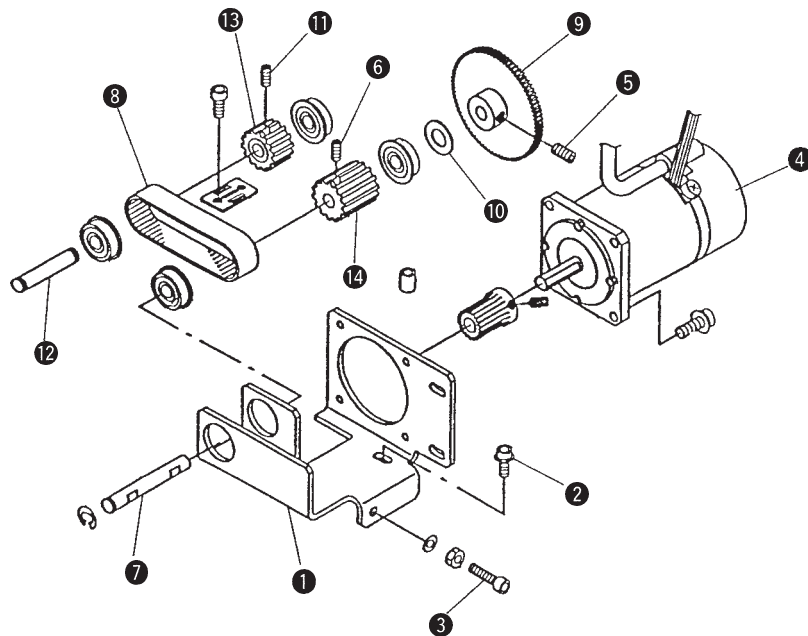
(Caution) Take care to attach the supply cam so that it is attached in the direction illustrated on the figure left since there is an attaching direction of it.

3. Put plain washer ⑨ for adjusting the height on loop supply cam rotary shaft ⑪ and insert it into the supply frame.
4. Assemble plain washer ⑫ and thrust collar ⑦ to the loop supply cam rotary shaft coming from the rear side of the supply frame and fix thrust collar ⑦ while removing the thrust play in the direction of the rotary shaft.
5. At this time, check that supply cam ⑧ turns smoothly without looseness.
6. Attach loop supply cam maintenance plate ⑤. At this time, check that supply cam ⑧ turns smoothly without looseness.
7. Insert cam up/down cylinder ① into rotary fulcrum shaft ⑬ and attach thrust collar ⑥ so that the cylinder is caught between the shaft and the collar. At this time, check that cam up/down cylinder turns smoothly without looseness.

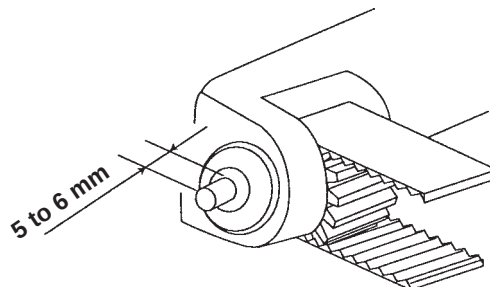
(Caution) Note that the joint portion of the supply cam up/down cylinder should be located on the right side (opposite side of the machine head).

8. Fix knuckle joint ② of cam up/down cylinder ① to supply cam ⑧. At this time, insert plain washer ④ for adjusting the height between supply cam ⑧ and knuckle joint ②.

5) Disassembling/assembling of the loop supply belt components



1. Protrude the installing position of the follower sprocket shaft by 5 to 6 mm from the bearing on this side.



5. Proper tension of the supply belt : The belt should sag 4.6 mm when the center of the belt is pressed with a load of approximately 40N (400gf).

(Caution) Be sure to measure the tension when the fixing screw is tightened since the tension changes when the fixing screw in the supply motor installing plate is tightened or loosened.

6. Length of engagement of the supply motor and the driving gear should protrude by $3.4 \text{ mm} \pm 0.2 \text{ mm}$ from the motor shaft.
7. Adjust the backlash amount between the driving gear and the follower gear to 0.08 to 0.12 mm in the full gears.

(Caution) If the backlash is smaller than the specified value, an abnormal noise will occur from the gears.

If the backlash is excessively large, the supply position will vary resulting in defective sewing.

Disassembling / Assembling

Disassembling

1. Loosen fixing screw ② in motor installing plate ①.
2. Loosen screw ③ for adjusting the belt tension attached to motor installing plate ①.
3. Remove supply motor ④.
4. Loosen screw ⑤ for fixing follower gear and screw ⑥ for fixing driving sprocket, and draw out driving sprocket shaft ⑦. Here, one side of belt loop supply belt ⑧ comes off.
5. Plain washer ⑩ is placed between follower gear ⑨ and the bearing. So, be careful.
6. Loosen screw ⑪ for fixing follower sprocket assembled in the supply frame and draw out follower sprocket shaft ⑫. Here, belt loop supply belt ⑧ comes off.
7. Replace belt loop supply belt ⑧ and supply motor ④.

Assembling

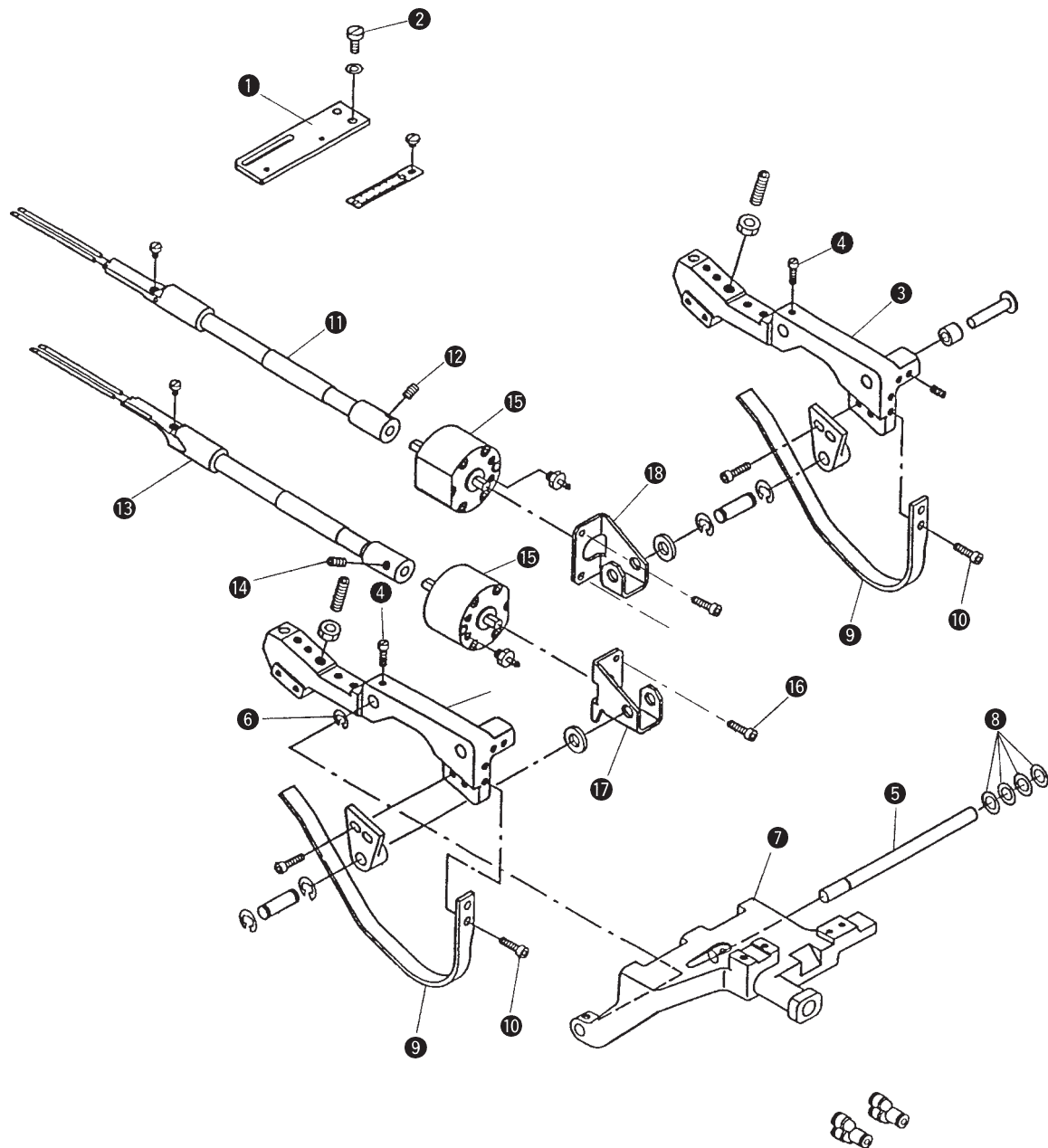
1. Set belt loop supply belt ⑧ and follower sprocket ⑬ to the supply frame, insert follower sprocket shaft ⑫, and fix follower sprocket ⑬.
2. Set belt loop supply belt ⑧, driving sprocket ⑭, plain washer ⑩ and follower gear ⑨ to supply motor installing plate ①, and insert driving sprocket shaft ⑦.
3. Adjusting the screw position of follower gear ⑨ to the flat portion of driving sprocket shaft ⑦, fix the gear while removing the play in the axial direction. (The flat portion is one place and there is no distinction between screw No. 1 and screw No. 2.)
4. Making the clearances of both sides of driving sprocket ⑥ and adjusting the screw position of the driving sprocket to the flat portion of driving sprocket shaft ⑦, fix driving sprocket ⑥. (The flat portion is one place and there is no distinction between screw No. 1 and screw No. 2.)
5. Make use of screw ③ for adjusting the belt tension attached to the supply motor installing plate, and adjust the belt tension to the proper one.
6. Attach the driving gear to the supply motor.

(Caution) There are two flat portions on the motor shaft. Adjust the flat portions to the screw positions of the driving gear to attach the motor.

(There is no distinction between screw No. 1 and screw No. 2.)

7. Attach the supply motor to the supply motor installing plate and fix it while adjusting the backlash.
8. Apply JUKI genuine grease (13525506) TEMPLEX Grease N2 to the driving gear and the follower gear.

6) Disassembling/assembling of the loop supply unit



Disassembling / Assembling

Disassembling

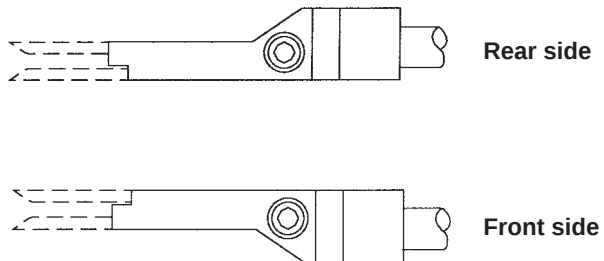
1. Remove screw ② in loop folding connecting plate ① and remove loop folding connecting plate ①.
2. Remove screw ④ in folding shaft metal ③.
3. Remove E-ring ⑥ fixing supply cam lever shaft ⑤ and draw out supply cam lever shaft ⑤ from loop supply slide base ⑦.
At this time, simultaneously remove plain washers ⑧ for adjusting the position of rear folding shaft metal.
4. Remove screws ⑩ in rear folding shaft presser springs ⑨, and remove folding shaft presser springs ⑨.
5. Remove screw ⑫ in rear folding shaft ⑪ and screw ⑭ in front folding shaft ⑬ and remove rear folding shaft ⑪ and front folding shaft ⑬.
6. Remove screws ⑯ in rotary cylinders ⑮ and remove rotary cylinders ⑮.
7. Here, front and rear folding shafts ⑬ and ⑪, and rotary cylinders ⑮ can be replaced.

Assembling

1. Attach rotary cylinders ⑮ to front folding shaft rotor base ⑰ and to rear folding shaft rotor base ⑱.
(Caution) Check that the cut faces of rotary cylinders face each other in front and rear.
2. Attach front and rear folding shafts ⑬ and ⑪ respectively to rotary cylinders ⑮.

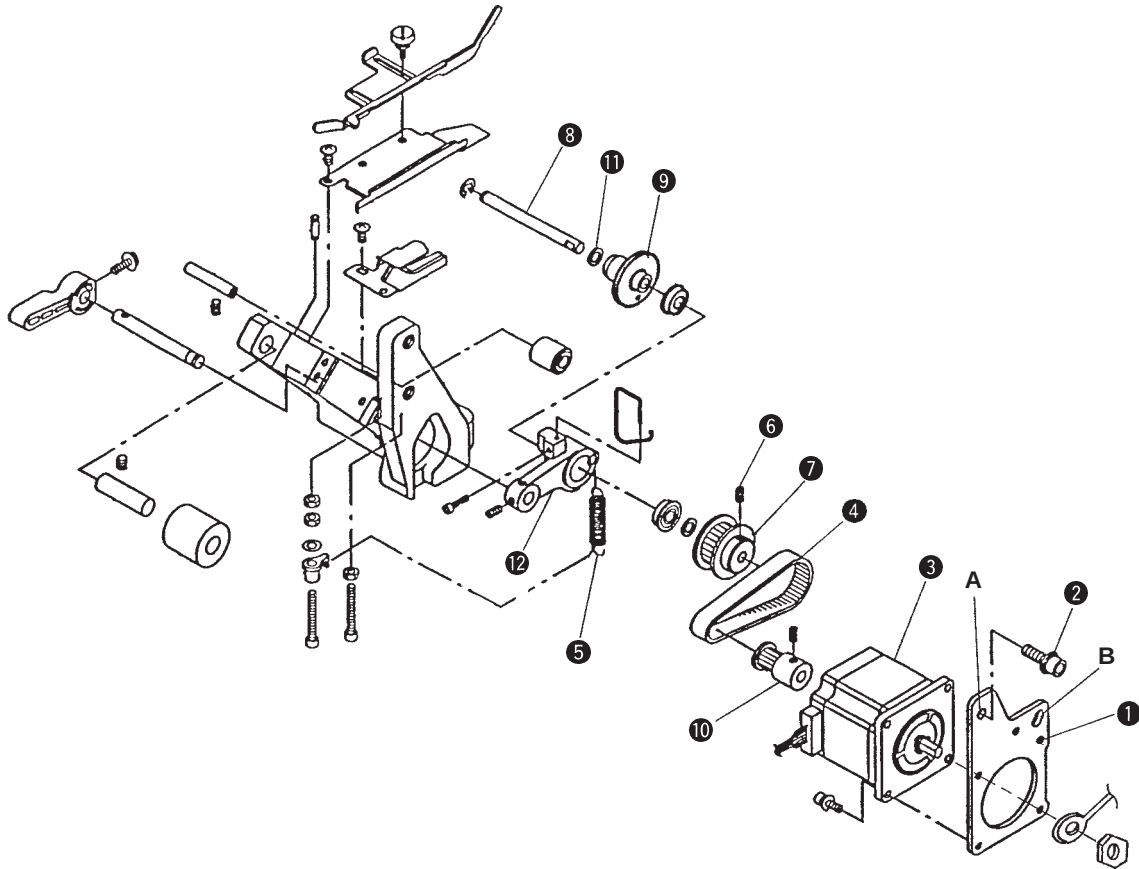
(Caution) How to distinguish the rear and front folding shafts

When the screws in the folding wires are placed upward, gather the cut sections of the shafts as shown in the figure on the right and judge the respective shafts.

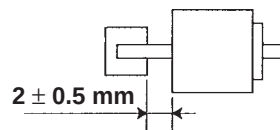


3. Attach folding shaft presser springs ⑨.
4. Insert supply cam lever shaft ⑤ from the rear side of loop supply slide base ⑦, assemble plain washers ⑧ for adjusting the position of rear folding shaft metal, the rear side unit of folding shaft metal ③, and the front side unit of the folding shaft metal, and attach E-ring ⑥ for fixing.
5. Adjust folding shaft metal ③ to the flat portion of supply cam lever shaft ⑤ and fix it while removing the play between the folding shaft rear unit and the loop supply slide base.
6. Fix loop folding connecting plate ①.
7. Temporarily fix the front folding shaft. (See 178 page for positioning.)

7) Disassembling/assembling of the loop feed roller components



1. Attach the feed motor so that the clearance provided between the feed motor and the feed motor sprocket is 2 ± 0.5 mm.



9. Adjust the belt tension so that the belt sags 0.6 mm in the center when the center of the belt is pressed with a 2.2 to 3.0 N load (200g to 300g).

Disassembling / Assembling

Disassembling

1. Remove the feed gear cover.
2. Remove screw ❷ in feed motor installing plate ❶, and remove feed motor ❸ together with feed motor installing plate ❶.
3. Remove feed roller belt ❹.
4. Remove feed roller spring ❺.
5. Loosen screw ❻ in the feed roller sprocket and remove feed roller sprocket ❼.
7. Here, feed roller ❾, consumable part, can be replaced.
8. Remove the earth cord of feed roller motor ❸.
9. Remove feed motor ❸ from feed motor installing plate ❶.
10. Remove feed motor sprocket ❿.
11. Here, feed motor ❸ can be replaced.

Assembling

1. Attach feed motor sprocket ❿ to feed motor ❸.

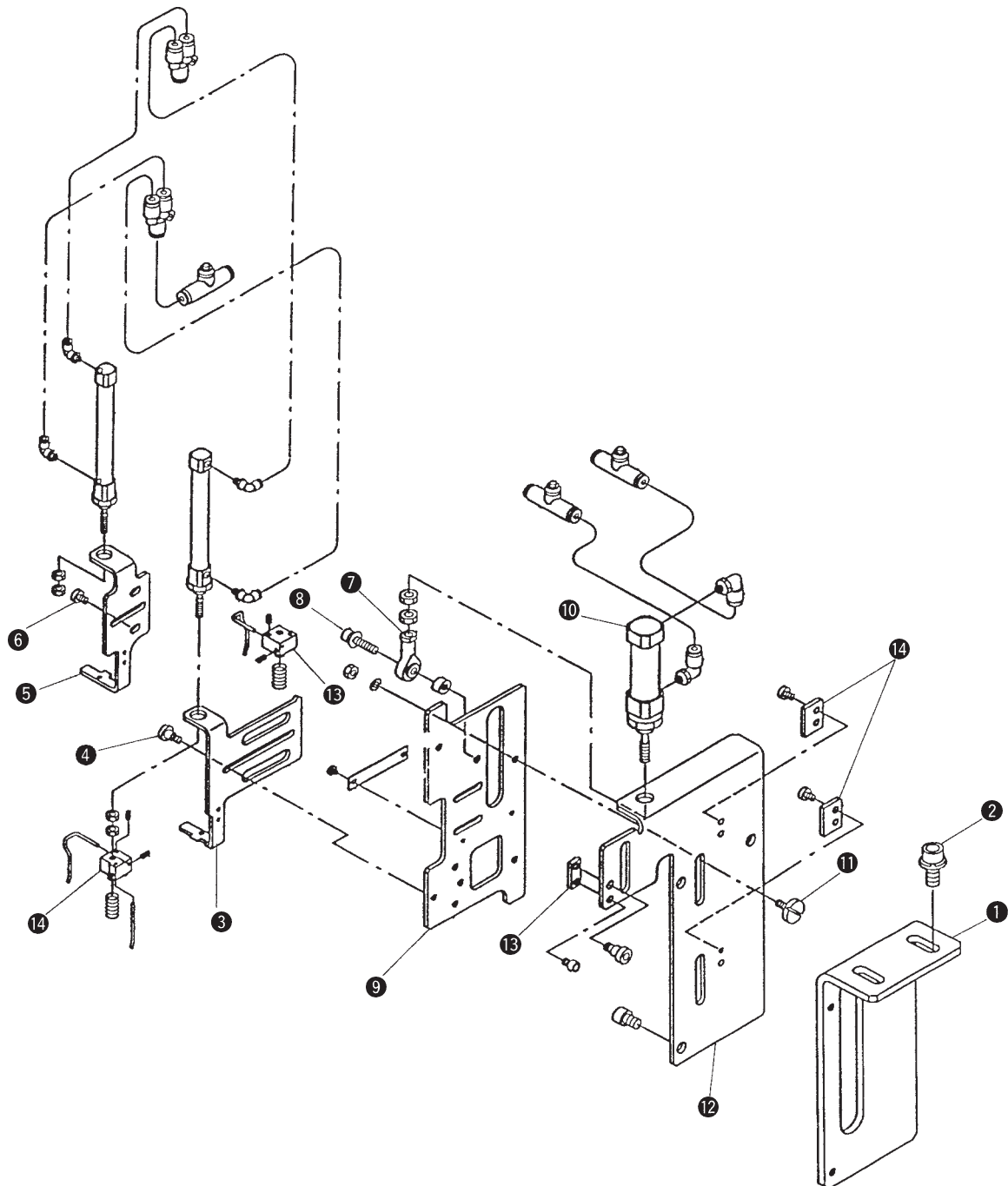
(Caution) Take care of the position of the motor cable (direction). (See the figure on the left.)

2. Attach feed motor ❸ to feed motor installing plate ❶.
3. Attach the earth cord to feed motor installing plate ❶.

(Caution) Take care of the attaching position of the earth cord. (See the figure on the left.)

4. Insert plain washer ❶ into the feed roller shaft and insert feed roller ❾ into feed roller lever ❷ from the machine head side.
5. Insert feed roller sprocket ❼ from the opposite side of the machine head of feed roller lever ❷ and fix it while removing the thrust play in feed roller shaft ❶. There is one flat portion on feed roller shaft ❶. Adjust it to screw No. 1 when turning it counterclockwise as observed from the right side.
7. Attach feed roller spring ❺.
8. Putting feed roller belt ❹ on roller sprocket ❼, further assemble the feed roller motor and put feed roller belt ❹ on feed motor sprocket ❿ as well. Here, temporarily fix feed motor installing plate ❶.
9. Perform the tension adjustment of feed roller belt ❹ by turning the screw position of section B making screw A in feed motor installing plate ❶ the rotation center.
10. Attach the feed gear cover.

8) Disassembling/assembling of the belt presser unit



Disassembling / Assembling

Disassembling

1. Belt presser unit can be removed by removing screw ② in loop presser unit base ①.
2. Remove screw ④ in loop catch (front) ③ and remove loop catch (front) ③.
3. Remove screw ⑥ in loop catch (rear) ⑤ and remove loop catch (rear) ⑤.
4. Remove screw ⑧ in rod end ⑦.
5. Remove up/down cylinder ⑩ in loop presser removing base ⑨.
6. Remove guide screw ⑪ in loop presser removing base ⑨ and remove loop presser removing base ⑨.

Assembling

1. Attach loop presser removing base ⑨ to loop presser support base ⑫ with guide screw ⑪. At this time, adjust the play in the lateral direction by the clearance of guide screw ⑪.
For the play in the longitudinal direction, adjust it with guide plates ⑬ and ⑭. At this time, check that loop presser removing base ⑨ moves up and down smoothly without looseness.

2. Attach up/down cylinder to loop presser support base ⑫ and attach rod end ⑦ to loop presser removing base ⑨.

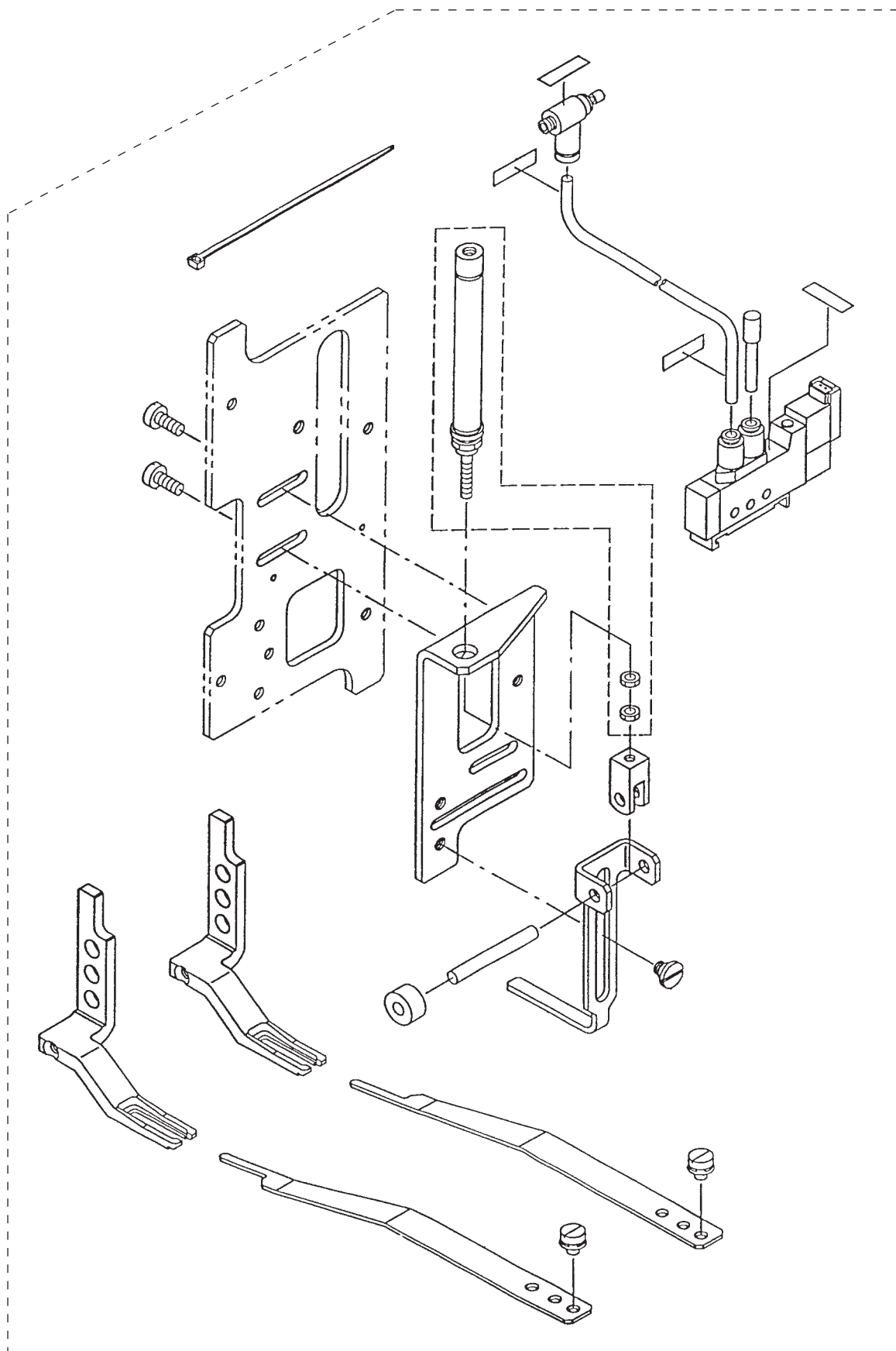
At this time, check that loop presser removing base ⑨ moves up and down smoothly.

(Caution) Adjust the length of engagement of rod end ⑦ and up/down cylinder ⑩ later.

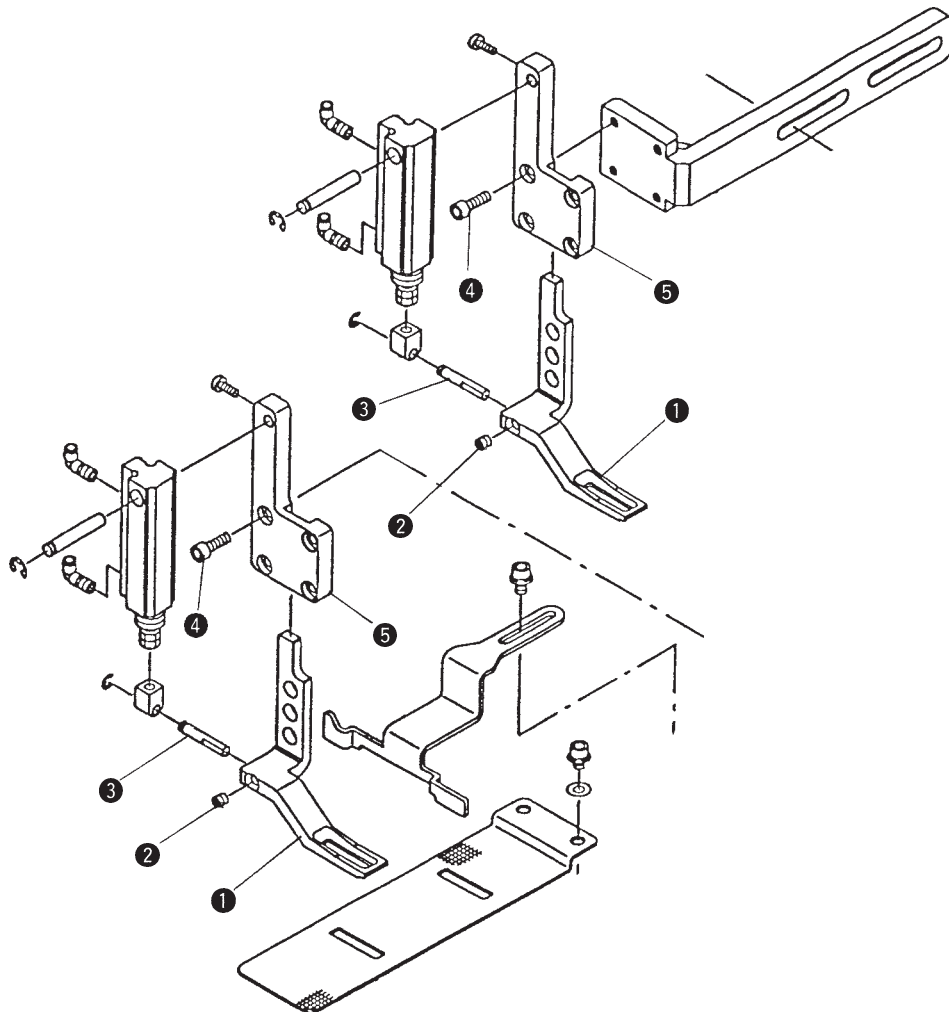
3. Attach loop catch (rear) ⑤.
4. Attach loop catch (front) ③.
5. Lower the cylinder in the state that belt loop is not placed and fix loop gather brackets (front) and (rear) at the position where the spring is shrunk by one turn after the spring has interfered with the loop catch.

[8] Installing of the optional parts.

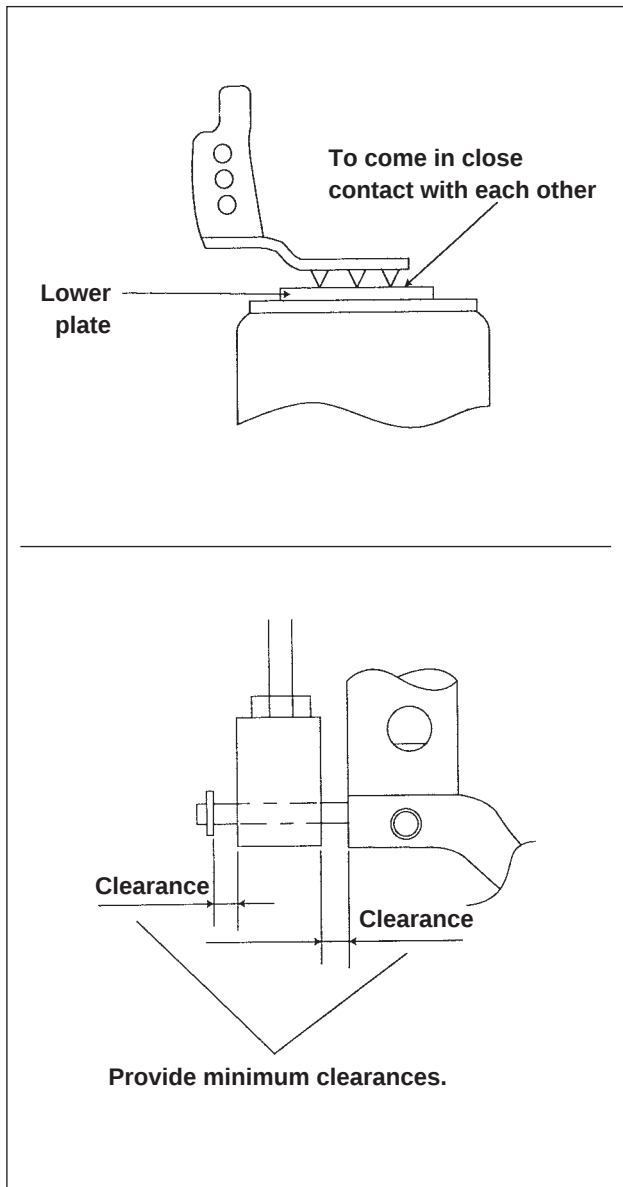
1) Installing of the fullness device



1. Turn OFF the power and expel air from the machine.

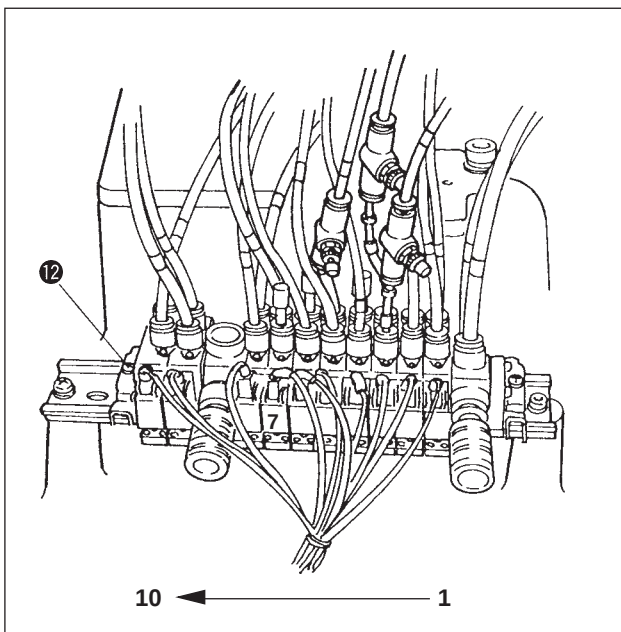
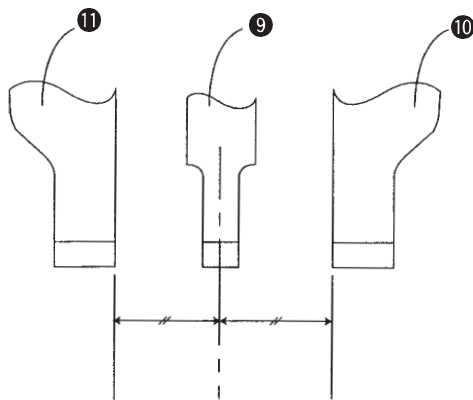
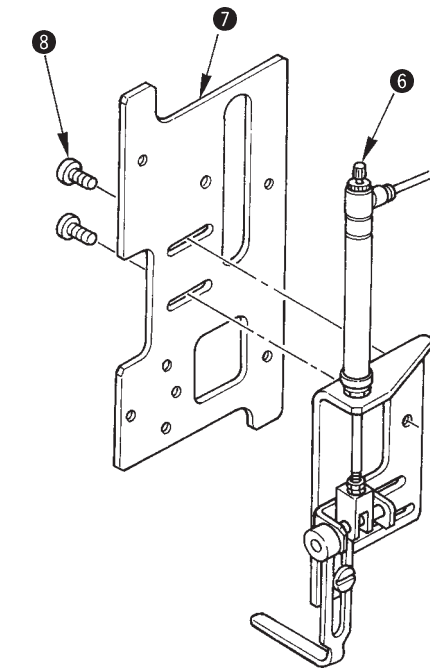


2. So as to replace cloth presser feet ① with the cloth presser feet for the fullness device, loosen screws ② in the up/down cylinder stopper pins and draw out up/down cylinder stopper pins ③.
3. Remove screws ④ and remove cloth presser base lids ⑤. Then, replace the cloth presser feet with ones for the fullness (13877816).



4. When installing the cloth presser base lid after having replaced the cloth presser foot, install the lid after positioning so that the cloth presser foot comes in close contact with the lower plate.
5. Fix the up/down cylinder stopper pin. At this time, check that the flat portion of the pin is aligned with screw ②.

Fix the pin while providing minimum clearances between the cylinder and the cylinder knuckle so that there is no torque when the cylinder moves up or down.



6. Install fullness base asm. ⑥ on the rear face of belt loop removing base ⑦ from under the belt receiver, and temporarily fix it from the top surface with screws ⑧.

7. Fix the fullness base asm. after adjusting so that fullness lever ⑨ is placed almost in the enter of loop catch (front) ⑩ and loop catch (rear) ⑪.

8. Loosen the fixing screw in the device solenoid valve unit, separate the solenoid valve in the direction of the arrow mark, and assemble the solenoid valve for fullness.

(Assemble the solenoid valve in the 7th position.)
At this time, securely insert the rubber ring supplied as accessory to the solenoid valve. Otherwise, air leakage will result.

9. Put the stop plug on port A.

10. Connect the connector "VL9" from the solenoid valve cable asm. to the solenoid valve for fullness.

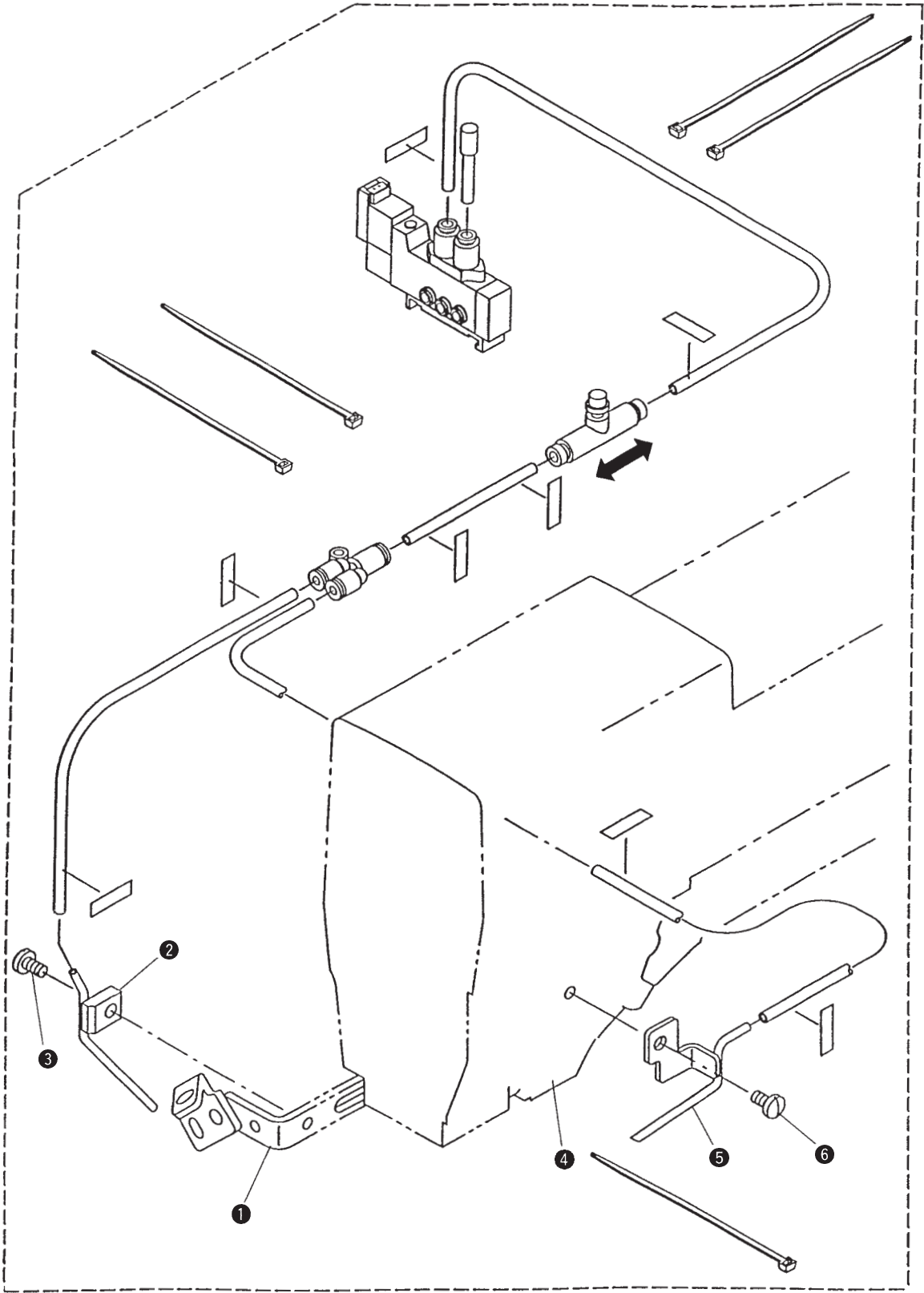
11. Insert the air pipe into port B and connect it to the speed controller of fullness cylinder.
Fix the air pipe together with other air pipes with the cable clip band.

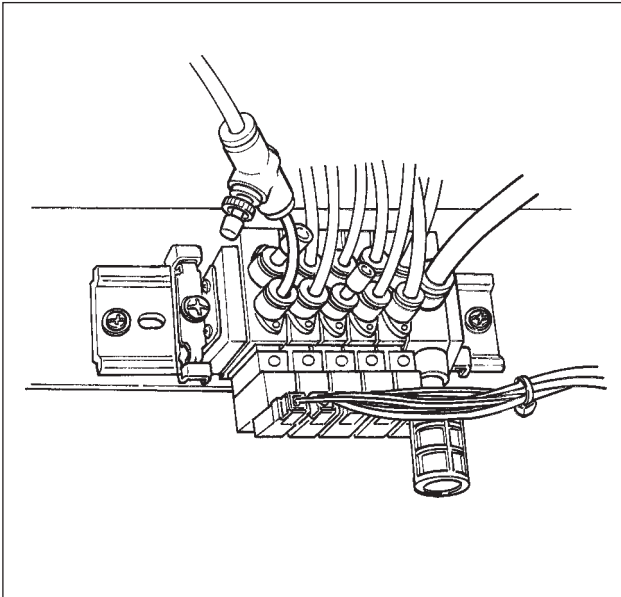
12. Turn ON the lower DIP SW No. 3 located on the right side of operation box panel.

13. Check the speed controller of fullness cylinder.
(For the standard adjustment value, give six turns after fully opened.)

14. Finally, enter the data value to "1H>" on the panel to complete the operation.

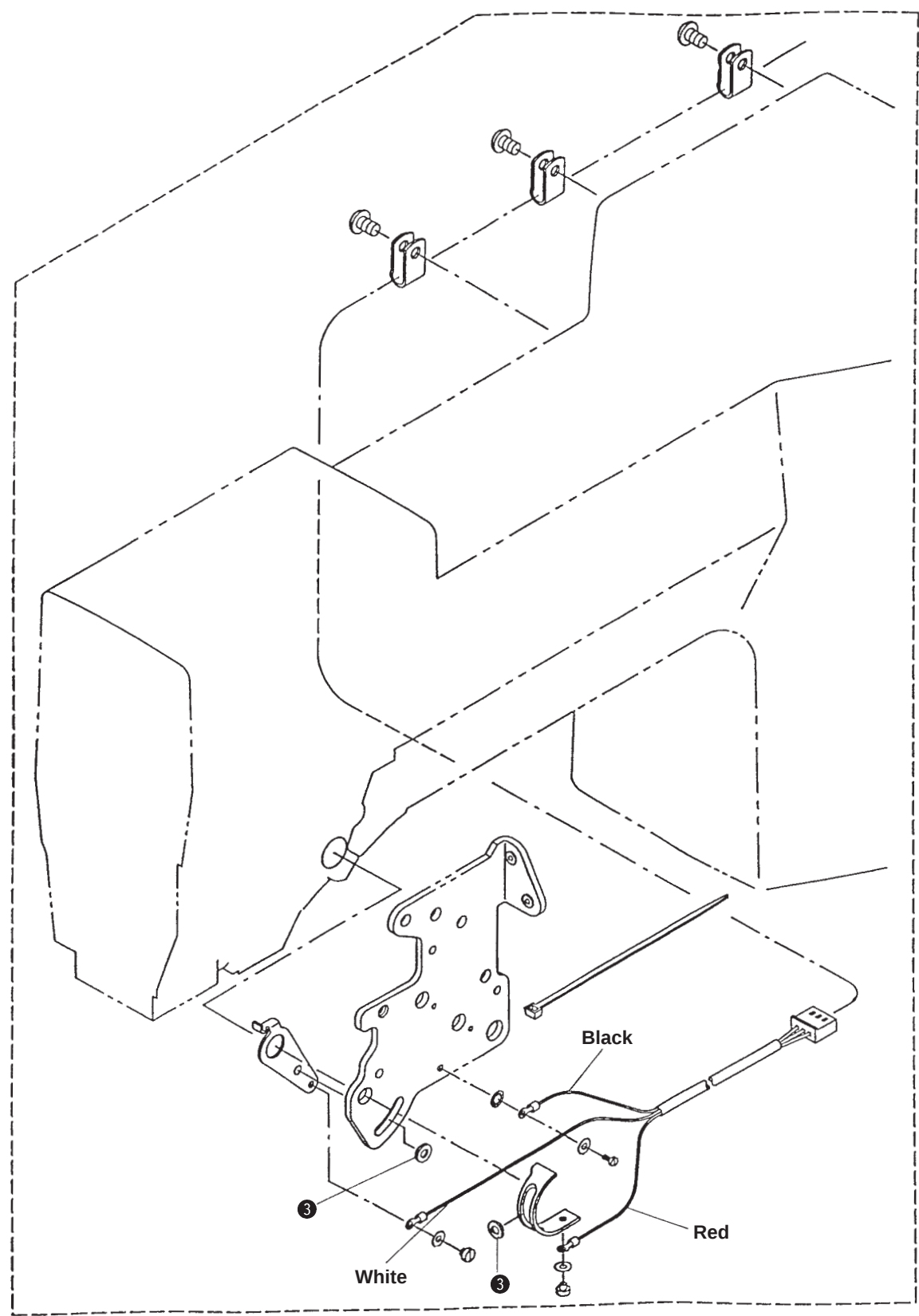
2) Installing of the needle cooler

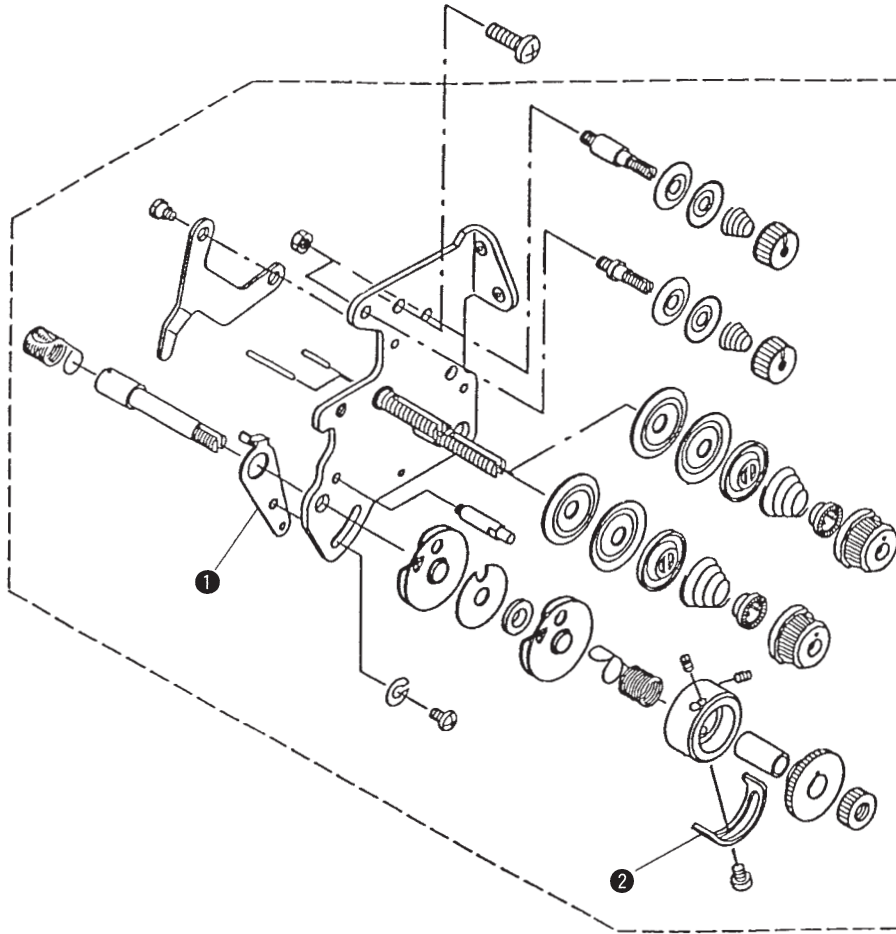




1. Turn OFF the power and expel air from the machine.
2. Fix NC base A asm. ② to wiper cylinder base ① with screw ③. (See the figure on the left.)
3. Fix NC base B asm. ⑤ to machine arm ④ with screw ⑥.
4. Loosen the fixing screw in the machine head solenoid valve unit, separate the solenoid valve in the direction of the arrow mark, and assemble the solenoid valve for needle cooler.
(Assemble the solenoid valve in the first position.)
At this time, securely insert the rubber ring supplied as accessory to the solenoid valve. Otherwise, air leakage will result.
5. Put the stop plug on port B.
6. Connect the connector "VL15" from the solenoid valve cable asm. to the solenoid valve for fullness.
7. Insert the air pipe into port A.
Cut the air pipe in a proper length and perform the piping as shown in the figure on the left.
After performing the piping, fix air pipes with the cable clip band so that they do not interfere with the sewing.
8. Adjust the air volume of the speed controller.

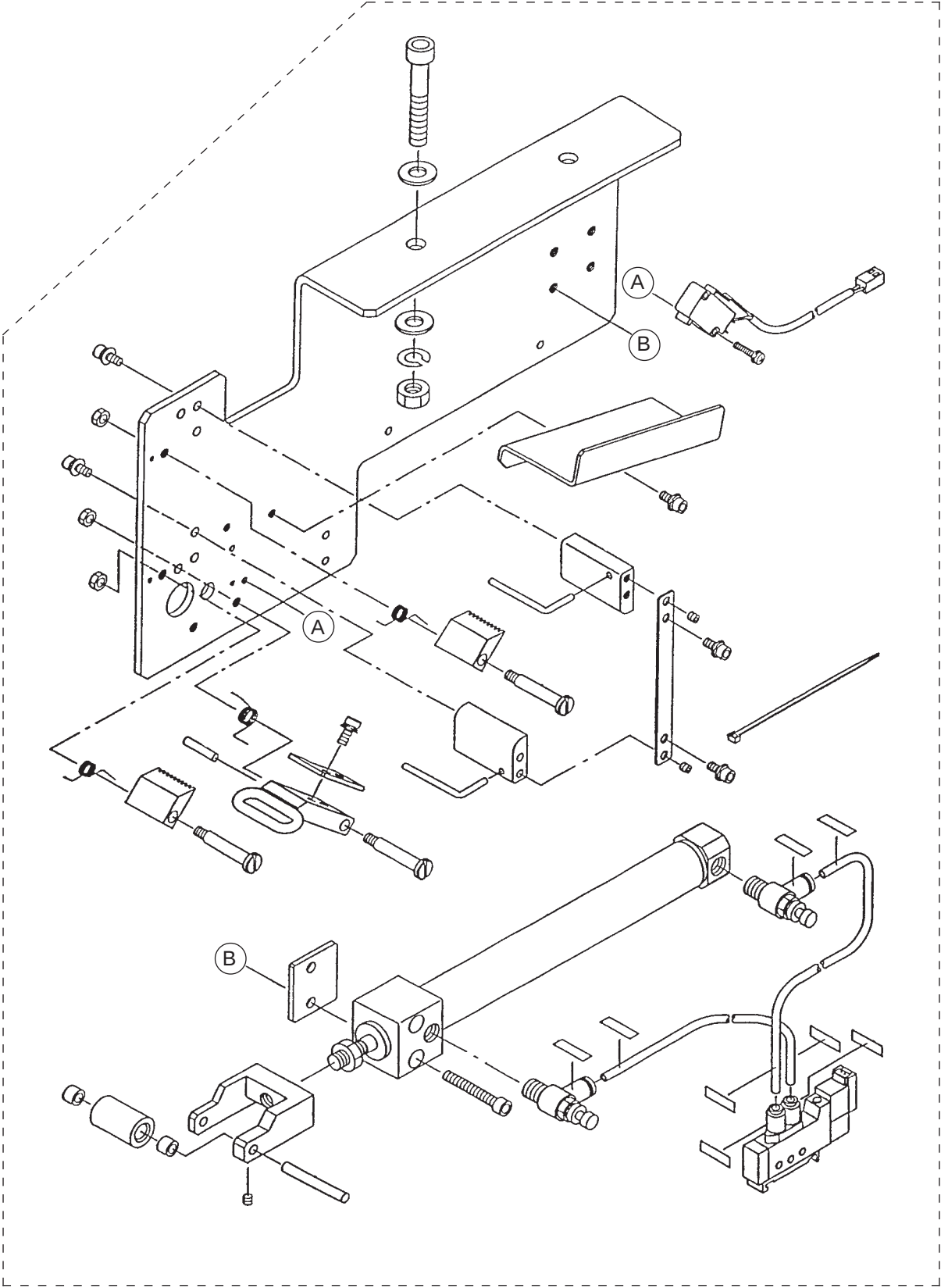
3) Installing of the thread breakage detector device

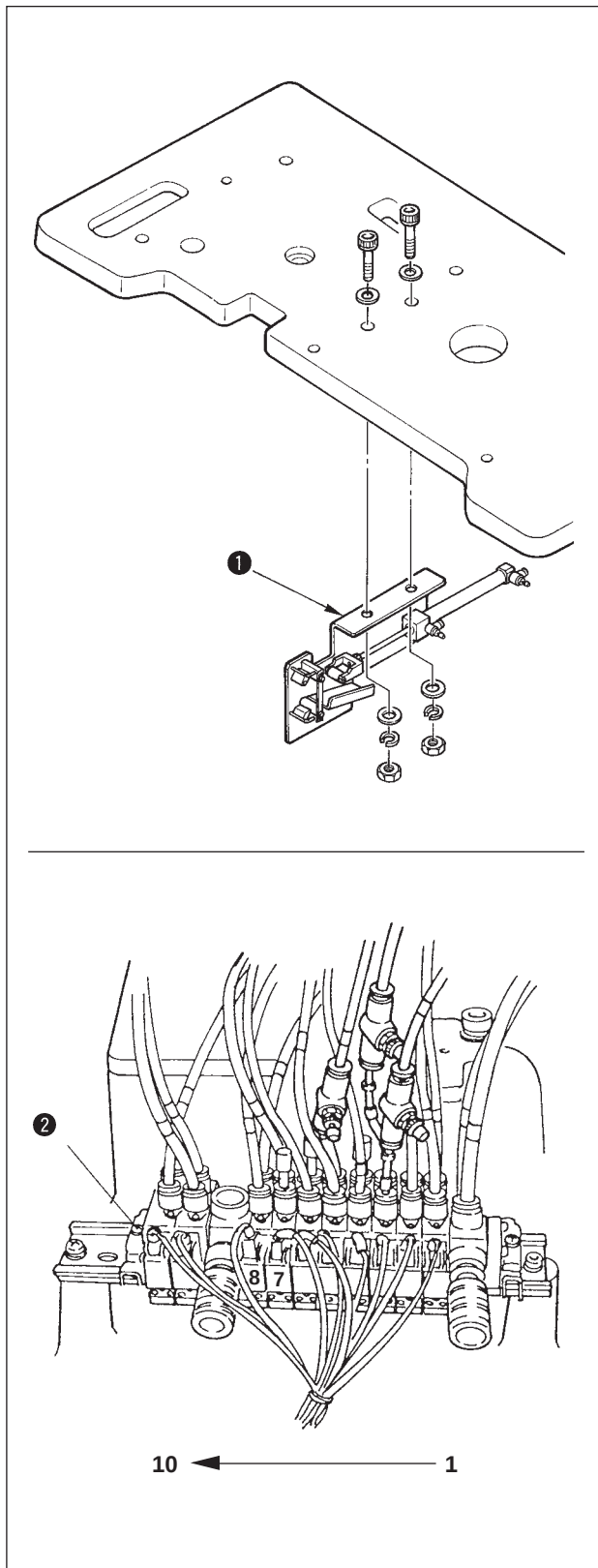




1. Break down the thread take-up spring portion of the thread tension asm. and replace thread take-up spring adjusting plates (A) ❶ and (B) ❷ with those for thread breakage detector.
At this time, all the adjustment values of the thread take-up spring stroke and the spring tension become ineffective. So, it is recommended to record the adjustment values in advance.
2. When replacing the thread take-up spring adjusting plates (A) and (B) with those for thread breakage detector and fixing those for thread breakage detector, fix plain washer ❸ for insulation without fail.
3. Connect the cable terminals referring to the figure on the left.
Black : Ground
Red : 1st thread
White : 2nd thread
4. Fixing the cable on the machine head, pass it through the duct under the machine table and insert it into the connector of CN16 on the MAIN circuit board of the control box. (See 180 page.)
5. Turn ON the upper DIP SW No. 3 located on the right side of the operation box panel.
6. When all installing works have been completed, check the operation.

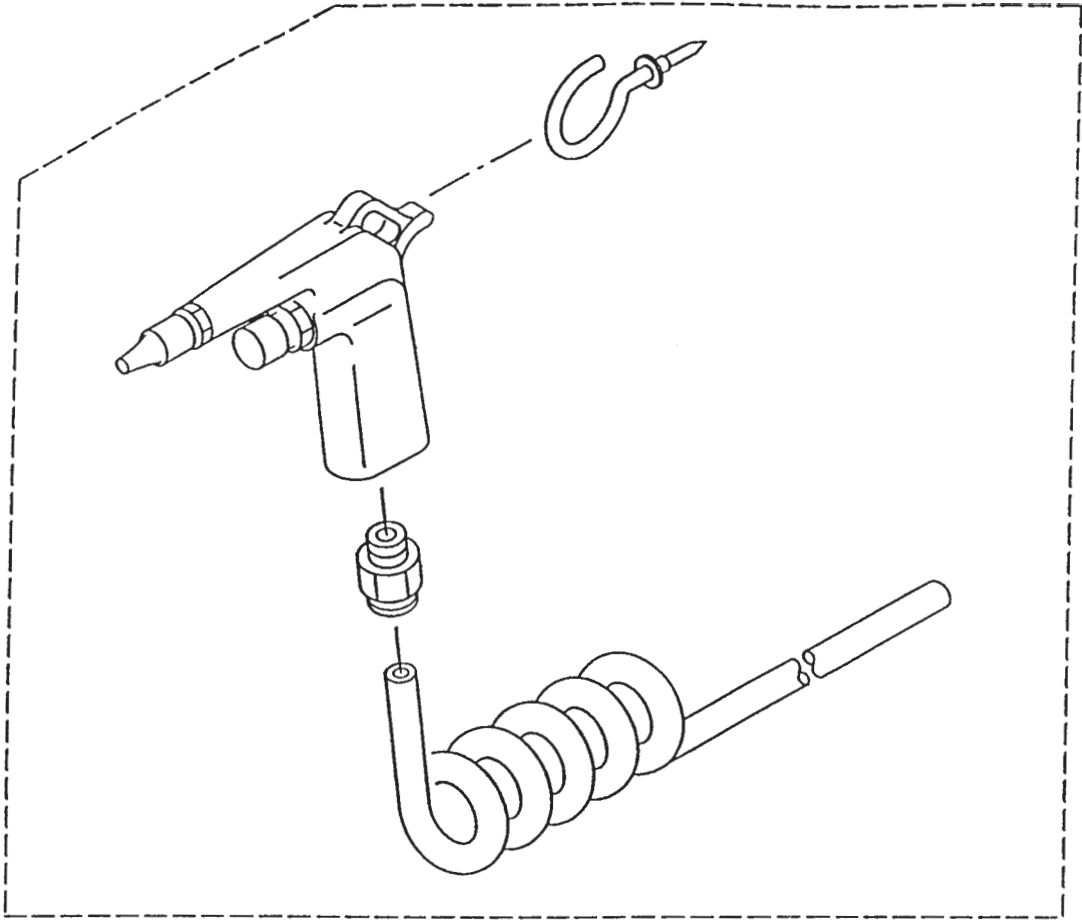
4) Installing of the loop pull-out device

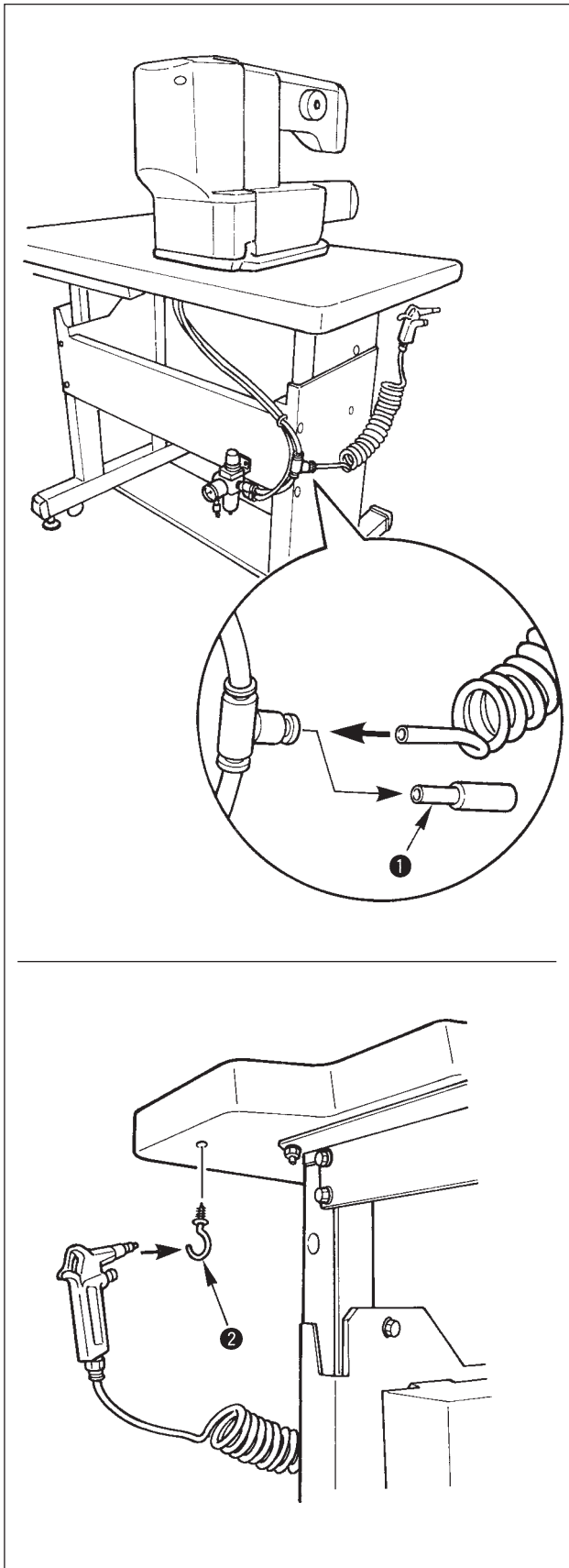




1. Install loop pull-out device base asm. ① on the underside of the machine table.
2. Loosen screw ② in the device solenoid valve unit, separate the solenoid valve in the direction of the arrow mark and assemble the solenoid valve for loop pull-out device.
(Assemble the solenoid valve in 7th or 8th position.)
At this time, securely insert the rubber ring supplied as accessory to the solenoid valve. Otherwise, air leakage will result.
3. Perform piping of solenoid valve port A to the speed controller on the cylinder rod side and of solenoid valve port B to the speed controller on the cylinder end side respectively.
4. Connect the connector "VL10" from the solenoid valve cable asm. to the solenoid valve for loop pull-out device.
5. Insert the connector of the loop lock detector switch into CN10 on the MAIN circuit board of the control box.
6. Turn ON the upper DIP SW No. 4 located on the right side of the operation box panel.

5) Installing of the air gun





1. There is a branch on the way of piping on the exhaust side of the filter regulator. Remove the branch with this stopper plug ❶ and insert the spiral tube of air gun asm. into it.

2. There is a hole for air gun on the left front side of the underside of machine table. Screw cord holder ❷ there.

3. Put the air gun main body on the cord holder.

5. OPERATION BOX PANEL

[1] Operating procedure of the maintenance screen

Turn ON the upper DIP SW No. 2 located on the right side of the operation box panel, and pressing the standard screen key, press ten key "1" to enter the adjustment screen.

(1) [CA] Setting of starting angle of the 1st hook thread trimming cylinder drive

[CA]
cut-1

deg
270

Starting angle of the 1st hook thread trimming cylinder drive can be set.
The angle at which the rod of thread trimming lever enters the cam is specified.

(2) [CB] Setting of ending angle of the 1st hook thread trimming cylinder drive

[CB]
cut-1

deg
360

Ending angle of the 1st hook thread trimming cylinder drive can be set.
Angle at which thread is actually trimmed is specified.

(3) [CC] Setting of starting angle of the 2nd hook thread trimming solenoid drive

[CC]
cut-2

deg
80

Starting angle of the 2nd hook thread trimming solenoid drive can be set.
The angle at which the rod of thread trimming lever enters the cam is specified.

(4) [CD] Setting of the speed of the loop clamp feed unit

[CD]

SPEED
2000

Maximum speed of the longitudinal movement of the loop clamp feed unit can be set.
Standard setting : 2,000 Unit : PPS

Standard speed of the loop clamp feed unit is determined at the necessary speed for actually performing sewing work.

If the speed is set at more than 2,000, the speed of the loop clamp feed unit is increased and the cycle time of the machine is increased. However, it is necessary to actually limit the handling time within 0.5s and not substantial to increase the speed more than 2,000.

Further, speed is inverse proportion to driving torque. If the speed is increased, the torque is decreased, and drawing force of belt loop is decreased.

(5) [CE] Setting of the machine head X-Y drive timing

<CE>
Move
End
50°

Timing of the movement of needle and movement of machine head X-Y can be selected.

Standard is 50°, and 30° and 70° can be selected.

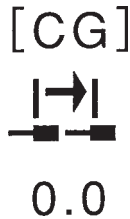
The angle to be set means the ending angle of the X-Y movement. The setting is changed depending on the problem whether needle pierces or needle comes off since the time of X-Y movement is the same.

(6) [CF] Setting of the period of time during which the cloth presser foot stops



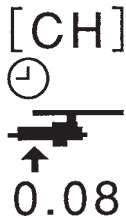
The cloth presser foot when delivering the belt loop presses belt loop and the fork comes off after a certain time has passed. The period of this time can be set.
Standard set value is 0.00s.
If the dog ear is dissatisfied, set the period of this time longer so that the cloth presser foot can securely press the belt loop.
However, the cycle time is extended as much as the set value.

(7) [CG] Setting of traveling backward distance of the fork at low speed at the time of set back



When performing the set back, the loop travels backward further from the place where it comes in contact with the stopper plate.
This is the function to travel backward the fork at low speed to securely eliminate the loop at this time.
This function does not work at set value "0". The function works with the input value and the traveling backward distance is inputted.
The speed of traveling backward at this time is constant and cannot be changed.

(8) [CH] Setting of the length of time at the time of change-over of the supply slide base cam



Standard setting time is 0.08s.
Perform change-over of the supply cam up/down cylinder before this time in anticipation of the time when the supply slide base travels backward to the end of its stroke.

(9) [CI] Setting of waiting time when the supply slide base travels backward to the end



Standard setting time is 0.03s.
Length of time to wait for calming down of damping of the jumping movement when the folding shaft is changed over to up position by means of the change-over of cam.
If the shaft goes to clamp the belt loop before calming down of damping of the jumping movement, the shaft may not be able to securely clamp the belt loop.
The setting time affects the cycle time when the belt loop is clamped at the first time, and set back is performed.
When sewing is continuously performed, it takes time until the belt loop is drawn out and this setting time does not affects the cycle time.

**(Caution) When clamping mistake of the belt loop occurs even if the setting time is extended, slippage of the height of fork is considered. Check the installing dimension of the components.
(See page 115.)**

(10) [CJ] Function of individual operation of the machine head



Driving of the machine drive motor only is performed.

The respective modes, M-0, M-1 and M-2 can be selected.

M-0 : Individual operation of machine head is prohibited. (Normal operation is prior.)

M-1 : Machine head drive motor runs at the specified speed.

M-2 : Machine head drive motor runs at the specified speed and stop of setting time is repeated.

Start button for starting operation is the starting switch of the upper DIP SW No. 8 located on the right side of the operation box panel for safety.

(11) [CK] Setting of the number of revolutions of the machine head motor



Number of revolutions of the machine head motor when operating [CJ] is set.

This is the number of revolutions at the time of start, and the number of revolutions can be changed through the operation box panel when the machine head starts up.

This is not displayed unless M-1 or M2 of [CJ] setting is set.

(12) [CL] Setting of the machine head motor operating time



Operating time of the machine head when operating [CJ] is set. This setting performs operation and stop based on the number of revolutions set in [CK] and stop time of set value in [CM].

Operation or stop is performed based on [CM] set value.

This is not displayed unless M-2 of [CJ] setting is set.

(Caution) The machine head operates within the setting time regardless of the number of stitches.

(13) [CM] Setting of the machine head motor stop time

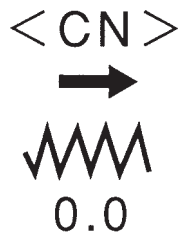


Stop time of the machine head when operating [CJ] is set. This setting performs operation and stop based on the number of revolutions set in [CK] and operating time of set value in [CL].

This is not displayed unless M-2 of [CJ] setting is set.

(Caution) The machine head operates within the setting time regardless of the number of stitches.

(14) [CN] Setting of the position compensation of the machine head and the supply device



Compensation of the position of the machine head and the supply device is performed.

Positioning using the positioning jig or the like is performed in the production line.

However, the final fine adjustment is electrically performed.

[2] Initial setting table

Initial set values of the memory switches are as follows.

No.	Item	Default value	Unit	Setting range	Remarks
NA	Selection of pattern	1	—	1 to 9	But, 1 to 99 when external ROM is used
NB	Setting of max. number of revolutions	1000	rpm	500 to 2500	
NC	Setting of number of stitches	28	Needle	28, 36, 42	
ND	Setting of length of bartacking	10	mm	7 to 22	
NE	Setting of width of bartacking	2.5	mm	1 to 3.2	
NF	Setting of width of belt loop	12.0	mm	9 to 20	
NG	Fine adjustment of bartacking position	0.0	mm	0 to 9.9	
NH	Setting of fullness	0.0	mm	0 to 9.9	Range in use is 3.5 to 6 mm. (See Instruction Manual.)
NI	Setting of detection of belt loop splice	**	Level	0 to 999	Dependin on adjustment value of the machine used
NJ	Setting of detection of belt loop	**	Level	0 to 999	Depending on adjustment value of the machine used
AB	Setting of 1st hook counter	0	Times	0, 1 to 9999	
AD	Setting of 2nd hook counter	0	Times	0, 1 to 9999	
BA	Sewing machine start-up speed	3	Level	1 to 5	
BB	Adjustment of 1st hook	(57.15)	mm	39000 to 7100	Depending on adjustment value of the machine used
BC	Belt feeding amount	(20)	mm	0 to 99	Depending on adjustment value of the machine used
BD	Setting of splice cutting (front)	10	mm	0 to 99	
BE	Setting of splice cutting (rear)	10	mm	0 to 99	
BF	Setting of wiper operating time	0.06	sec.	0.00 to 9.99	
BG	X-axis origin compensation of sewing machine presser	*.*	mm	0.0 to 9.9	Depending on adjustment value of the machine used
BH	Y-axis origin compensation of sewing machine presser	*.*	mm	0.0 to 9.9	Depending on adjustment value of the machine used
BI	Fork origin compensation	*.*	mm	0.0 to 9.9	Depending on adjustment value of the machine used

No.	Item	Default value	Unit	Setting range	Remarks
BJ	Setting of thread presser operation	ON		ON, OFF	
BK	Selection of check program mode	0	—	4, 6, 7, 8	
CA	Setting of starting angle of 1st hook thread trimming cylinder drive	270	deg	0° to 359°	
CB	Setting of ending angle of 1st hook thread trimming cylinder drive	360	deg	0° to 999°	
CC	Setting of starting angle of 2nd hook thread trimming solenoid drive	80	deg	75° to 280°	
CD	Setting of speed of loop clamp feed unit	2000	pps	1000 to 4000	
CE	Setting of machine head X-Y drive timing	50°	deg	30°, 50°, 70°	
CF	Setting of stop time of sewing machine presser	0.00	sec.	0.00 to 9.99	
CG	Setting of traveling backward distance of fork at low speed at the time of set back	00.0	mm	00.0 to 99.9	
CH	Setting of change-over time of supply slide base cam	0.08	sec.	0.00 to 9.99	
CI	Setting of waiting time when supply slide base travels backward to the end	0.03	sec.	0.00 to 9.99	
CJ	Function of individual operation of machine head	M-0	—	M-0, M-2, M-3	
CK	Setting of number of revolutions of machine head motor	500	rpm	500 to 2500	Used when M-2 or M-3 is set
CL	Setting of operating time of machine head motor	1.20	sec.	0.5 to 9.99	Used when M-3 is set
CM	Setting of stop time of machine head motor	1.20	sec.	0.5 to 9.99	Used when M-3 is set
CN	Setting of compensation of position of machine head and supply device	*, *	mm	0.0 to 9.9	Depending on adjustment value of the machine used

Caution : Setting range of level B and level C is the range of mechanical input and not that of actual drive.

6. DIP SWITCHES ON THE CIRCUIT BOARD

[1] DIP switches on MAIN circuit board

The DIP switches on the MAIN circuit board are described in the table below.

No.	Name (function) of mode	Standard setting	Description
SW1	Change-over of thread trimming speed	OFF	When the switch is set to ON, the speed is set to low.
SW2	Change-over of loop cut rotation operation	OFF	When the switch is set to ON, loop cut goes up after rotation when belt loop width is 16 mm or more
SW3	Manual change-over of start-up speed	OFF	When the switch is set to ON, setting of individual data is effective.
SW4	Change-over of loop cut operation	OFF	When the switch is set to ON, rear cut operation is set.
SW5	Change-over of starting switch operation	OFF	When the switch is set to ON, continuous operation is effective.
SW6	No setting	OFF	
SW7	Change-over of cut operation of splice discharging	OFF	When the switch is set to ON, cutting on the way is possible.
SW8	No setting	OFF	

(Caution) Data can be taken in by re-turning ON the power.

1. Change of thread trimming speed is performed. Standard is set to high speed.
Actually, thread spreading speed is changed. Use this switch when short trimming of thread in thread spreading occurs.
SW1 does not function normally until it is changed together with DIP SW No. 7 on the sewing machine servo circuit board (SDC). So, be careful.
2. Perform the change-over when the belt loop width is 16 mm or more and scattering of cross cut chips is remarkable.
Cycle time is delayed to some extent.
3. This switch is used for confirmation of design. Be sure to turn OFF when using it in sewing.
It is possible to set the starting speed of the machine head motor with MANUAL.
4. This switch changes the sequence of delivery of belt loop receiver and fork.
Normally, belt loop is delivered to fork after cutting, but when the switch is turned ON, the belt loop is cut after the fork has come to the delivery position.
Cycle time is delayed by approximately 0.2s. Use this switch when the delivery of belt loop is terrible.
5. This switch allows the start switch to input continuously. For the standard setting, the start switch is designed not to start even if the start switch is pressed before the belt loop comes to the intermediate waiting position. This function is used for durability test or the like and the safety function is ignored.
Be sure to use the switch with OFF without fail.
6. No setting
7. This is a function not to discharge belt loop splice at one time but to cut it in small pieces on the way when belt loop splice discharging is performed.
Secondary trouble of belt loop splice can be avoided by cutting in small pieces. However, cycle time is increased. It is recommended to use the switch with OFF.
8. No setting

[2] DIP switches on SDC circuit board

The DIP switches on the SDC circuit board are described in the table below.

The SDC circuit board is used in common with other models. When using the MOL-254, use the DIP switches other than SW7 with the following setting.

Turning ON the switches other than SW7 will result in trouble. Be sure not to change the setting without fail.

No.	Name (function) of mode	Standard setting	Description
SW1	Selection of model type	OFF	OFF for MOL-254
SW2	Selection of model type	OFF	OFF for MOL-254
SW3	Selection of specified operation of reverse revolution to lift needle	OFF	OFF for MOL-254
SW4	Selection of reverse revolution to increase penetration force	OFF	OFF for MOL-254
SW5	Selection of rotating direction of main shaft of sewing machine	OFF	OFF for MOL-254
SW6	Selection of woodruff plate sensor active	OFF	OFF for MOL-254
SW7	Change of speed of thread trimming	OFF	OFF for high speed ON for low speed
SW8	Selection of speed input method	OFF	OFF for MOL-254

(Caution) Data can be taken in by re-turning the power.

SW7 performs the change of thread trimming speed. Standard is set to high speed.

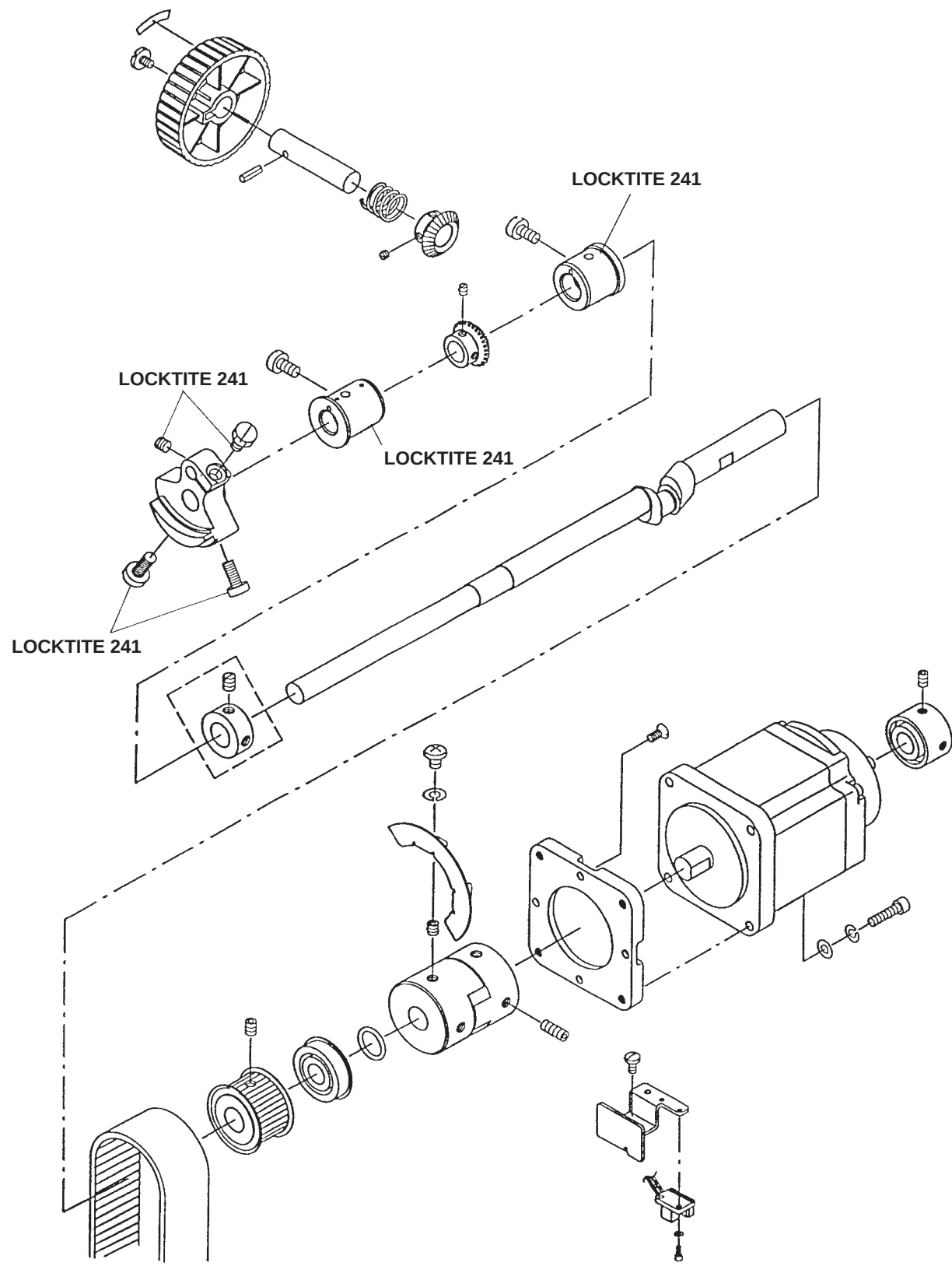
Actually, thread spreading speed is changed. Use this switch when short trimming of thread in thread spreading occurs.

SW7 does not function normally until it is changed together with DIP switch No. 1 on the MAIN circuit board. So, be careful.

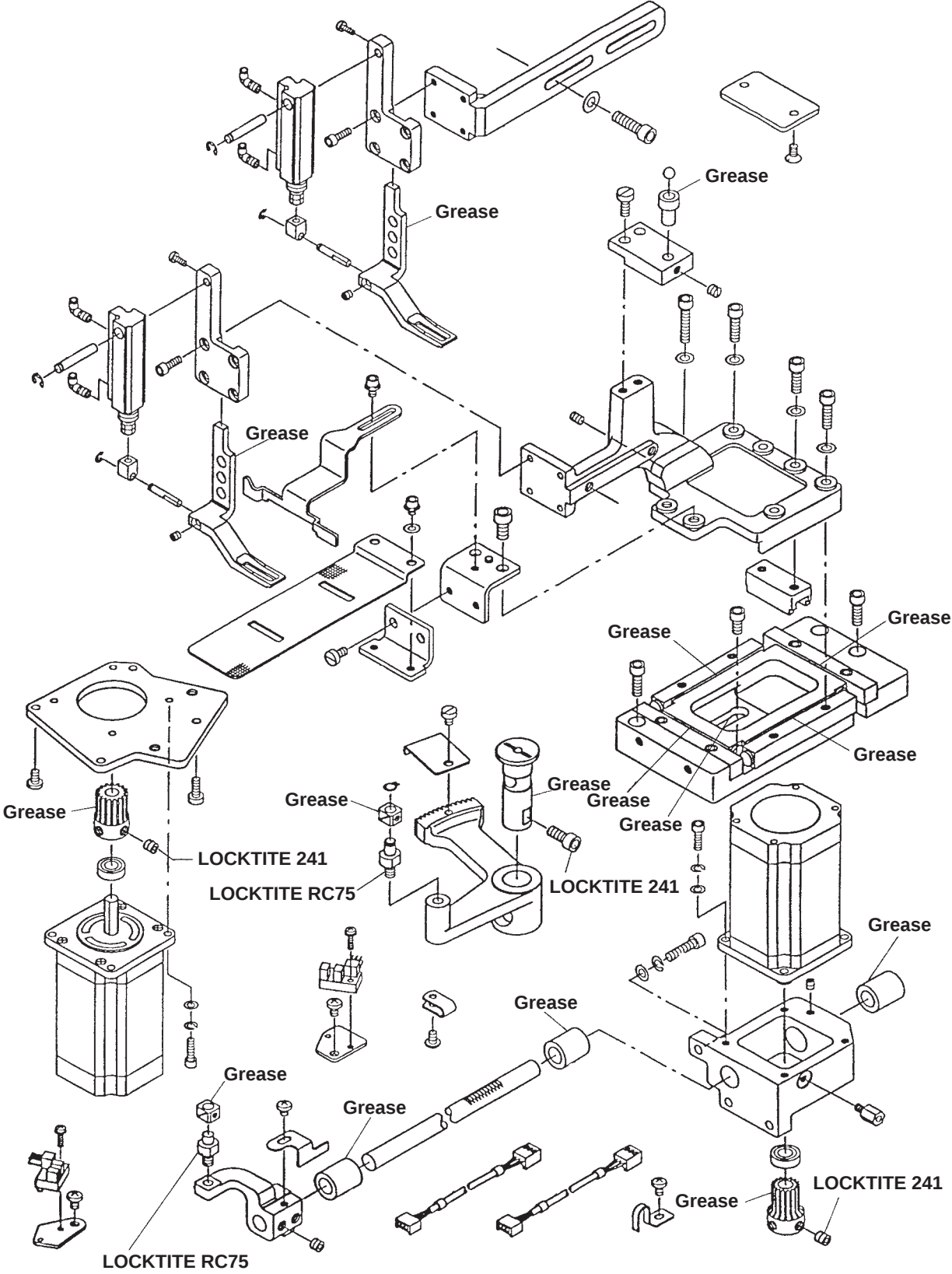
[1] Needle bar components



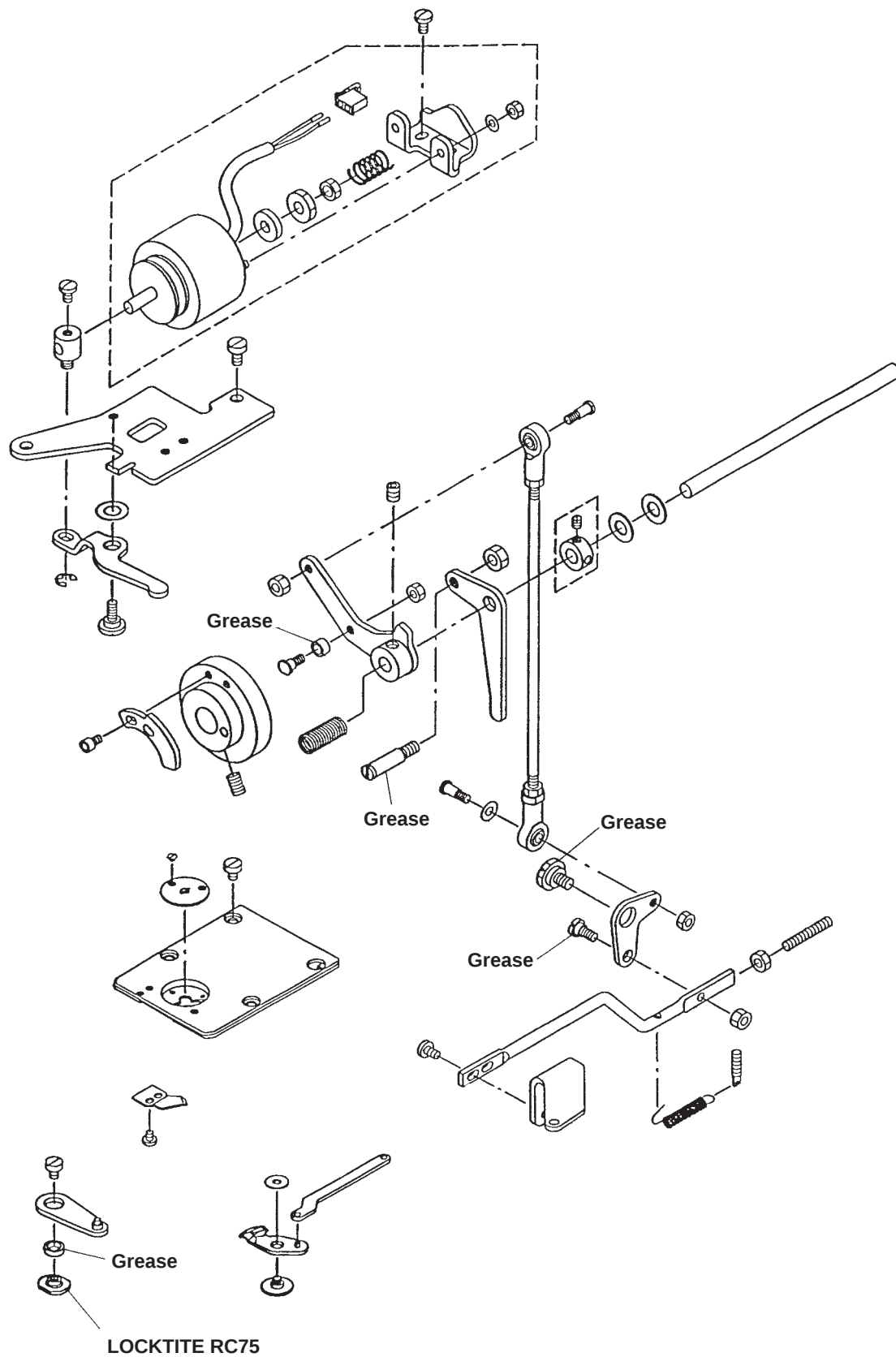
[2] Main shaft components



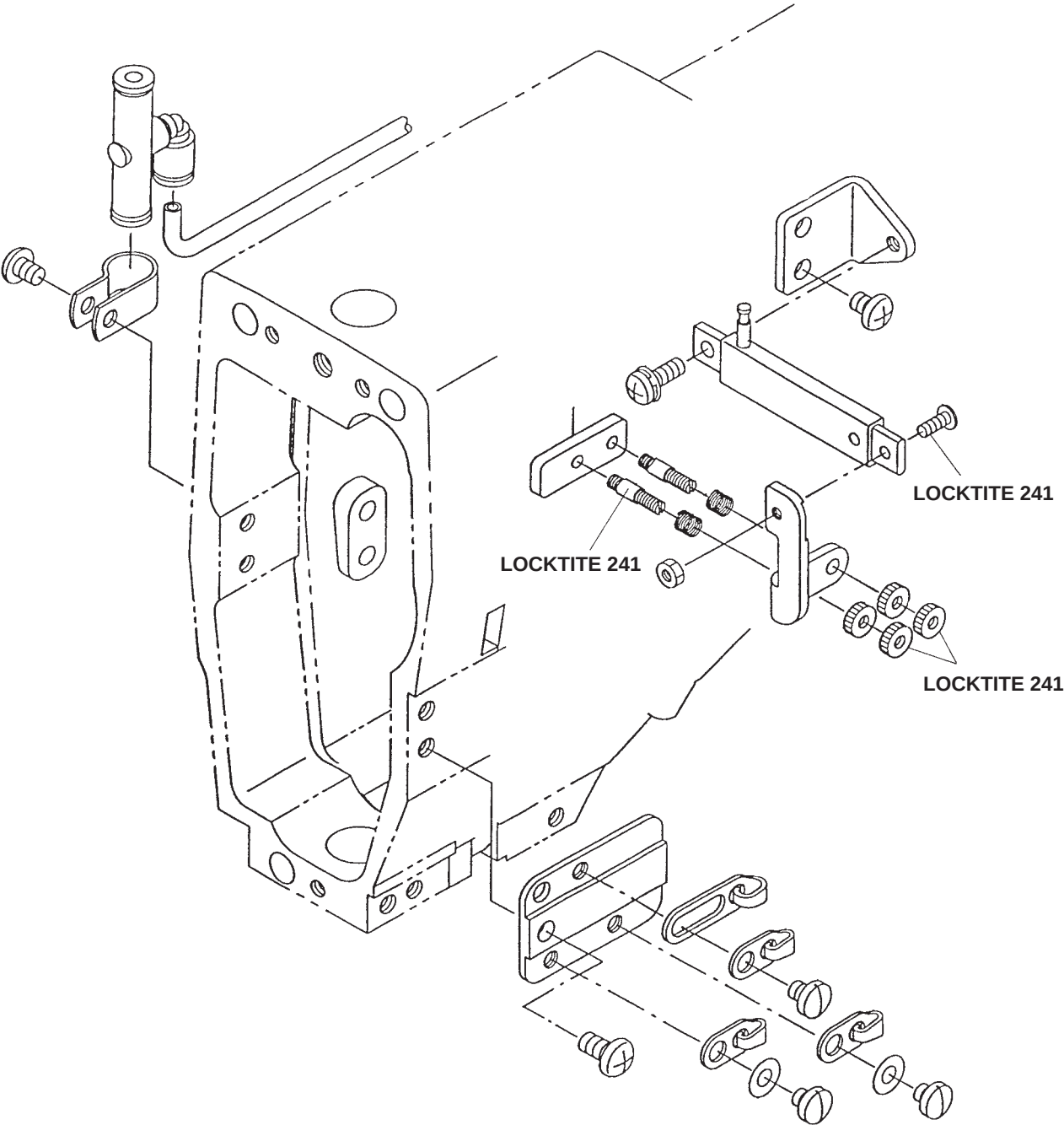
[3] Feed mechanism components



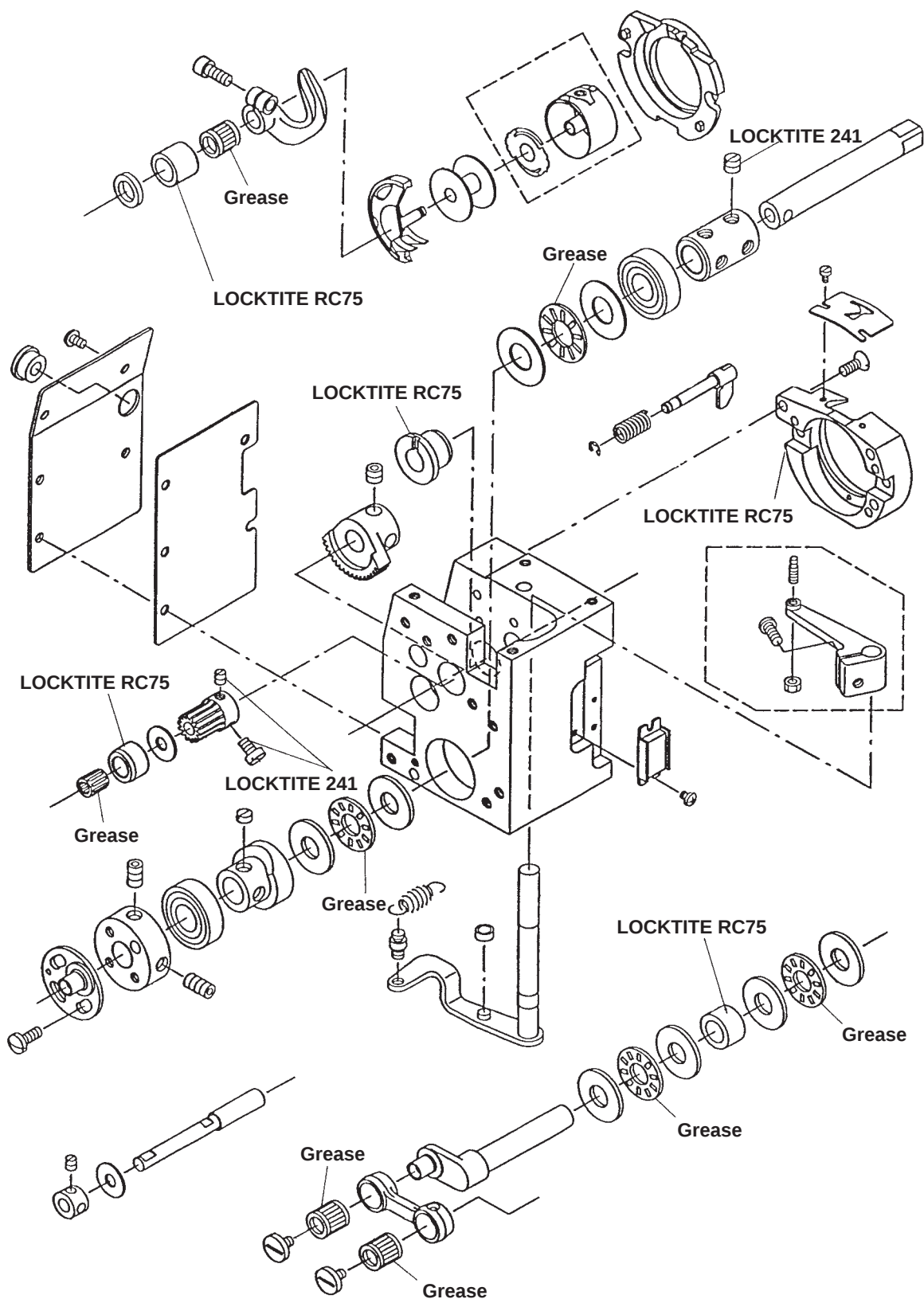
[4] Tension release and thread trimmer mechanism components



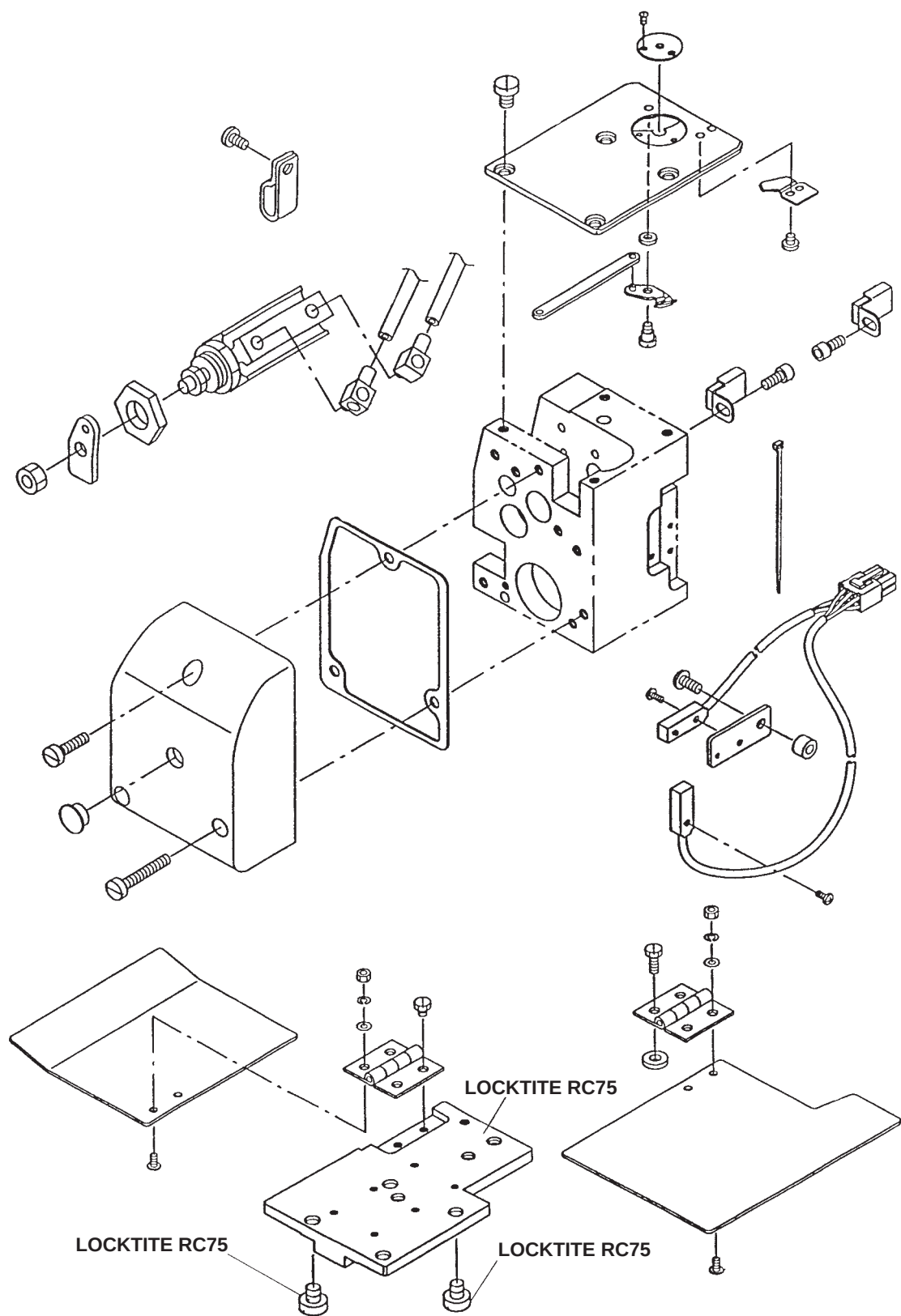
[5] Thread presser components



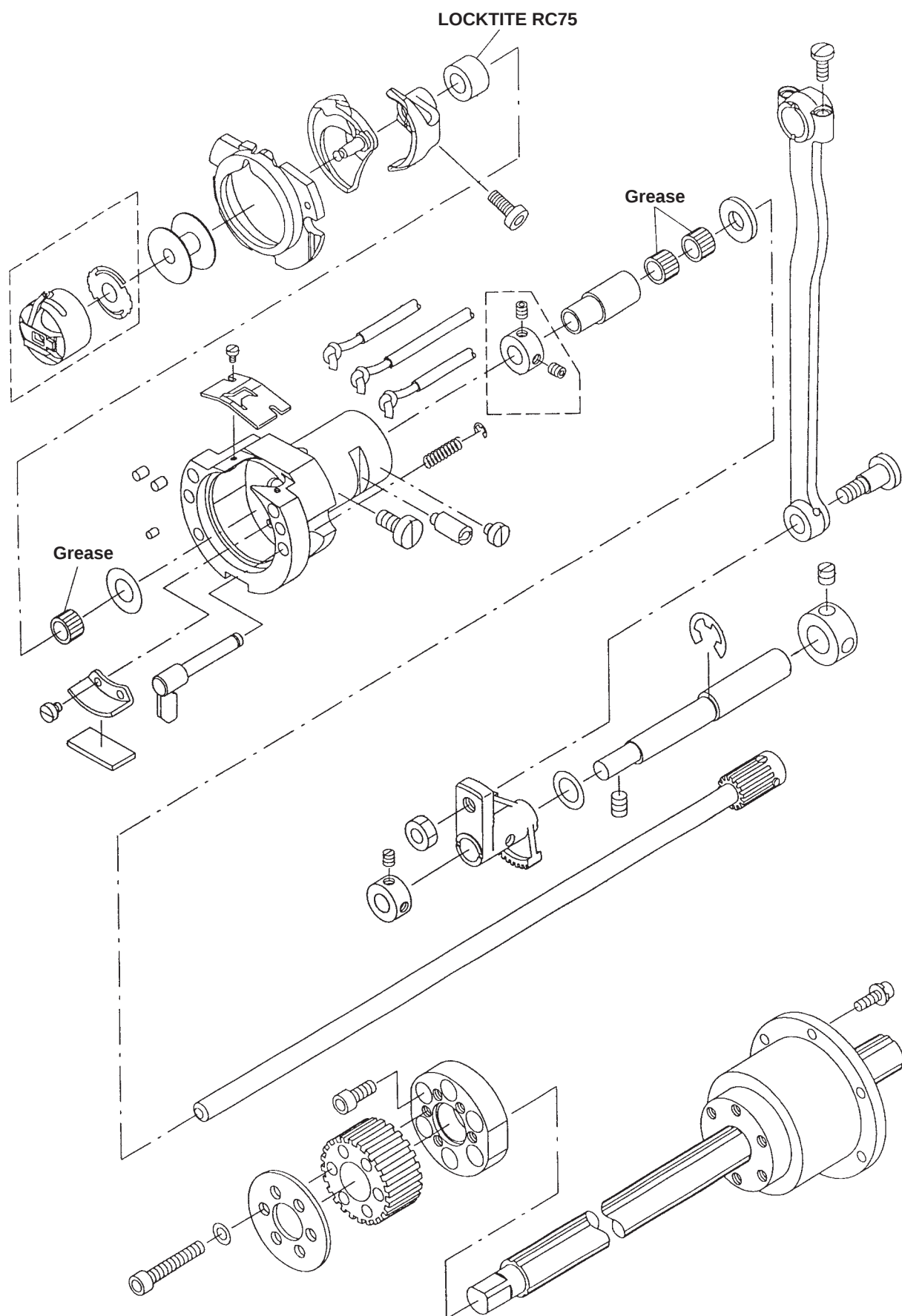
[6] Hook base components (1)



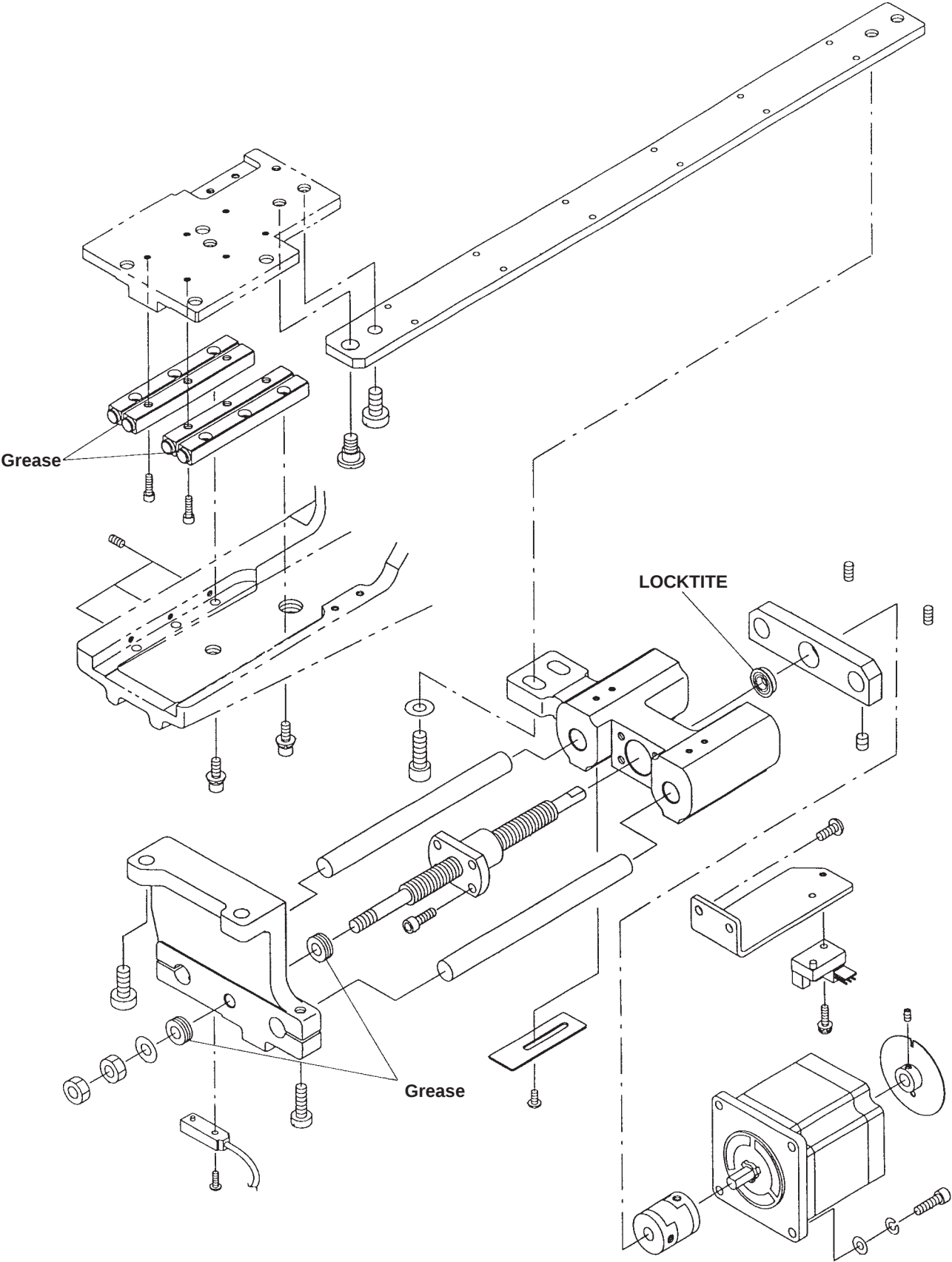
[7] Hook base components (2)



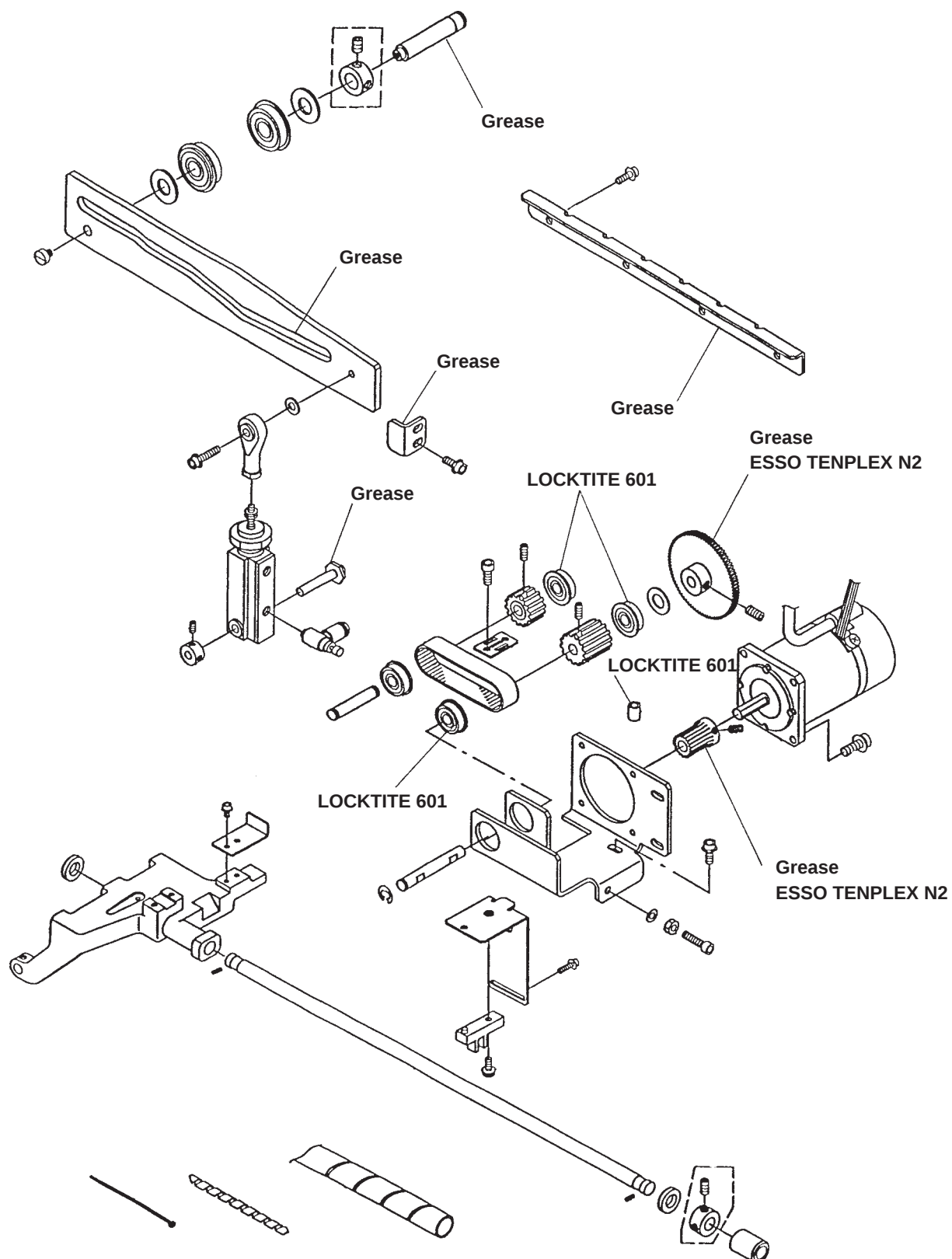
[8] Hook driving shaft components



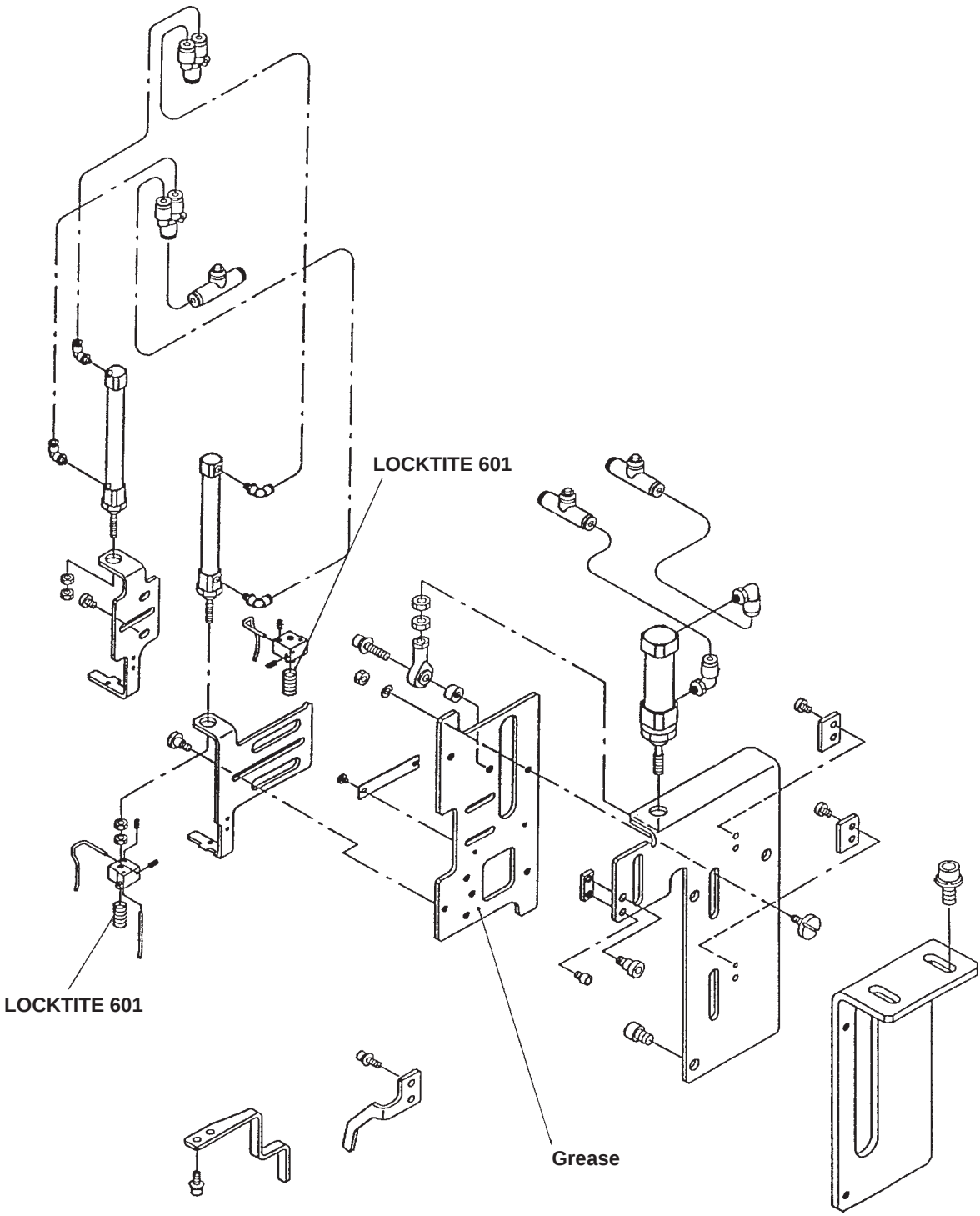
[9] Hook move components



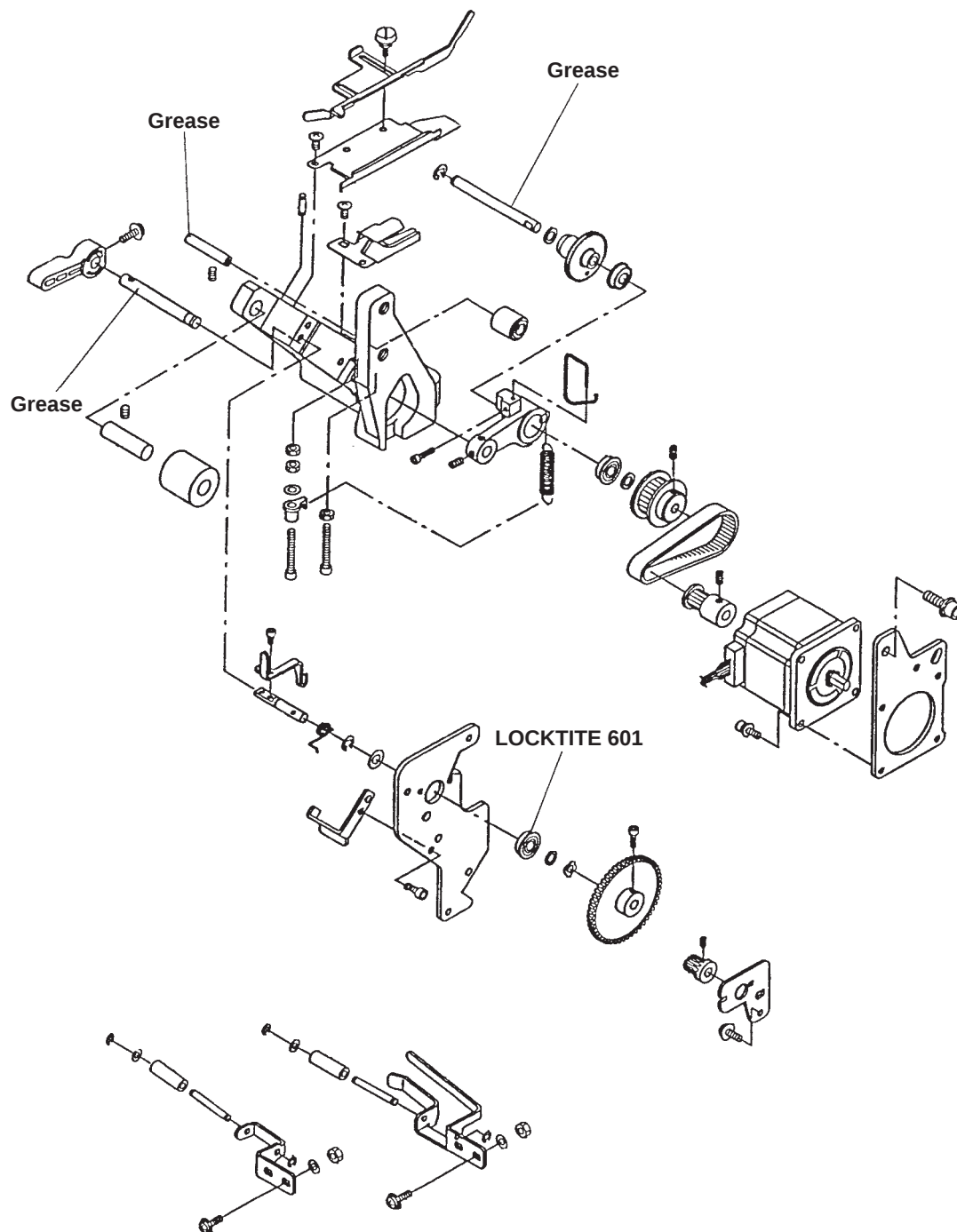
[10] Belt loop supply components



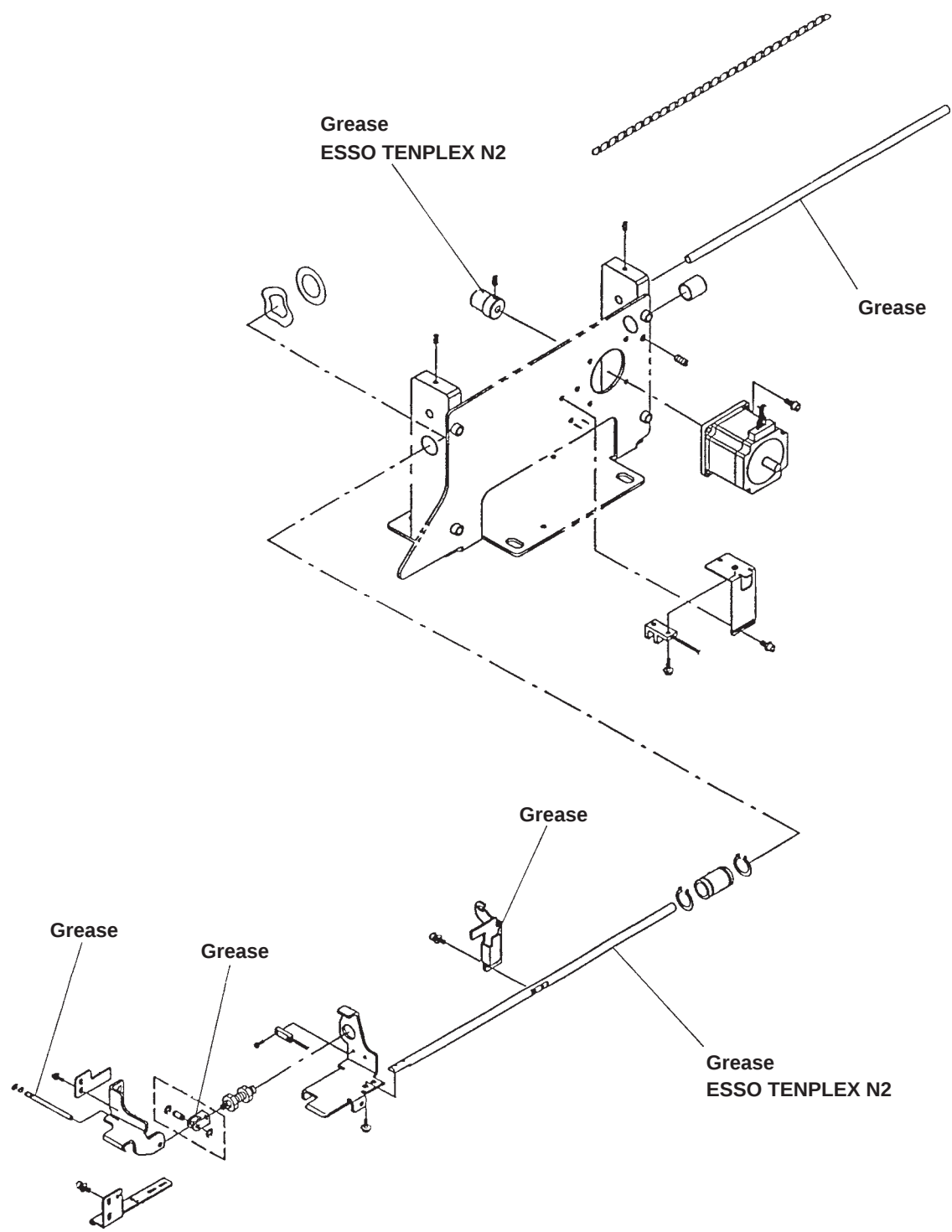
[11] Belt receiver components



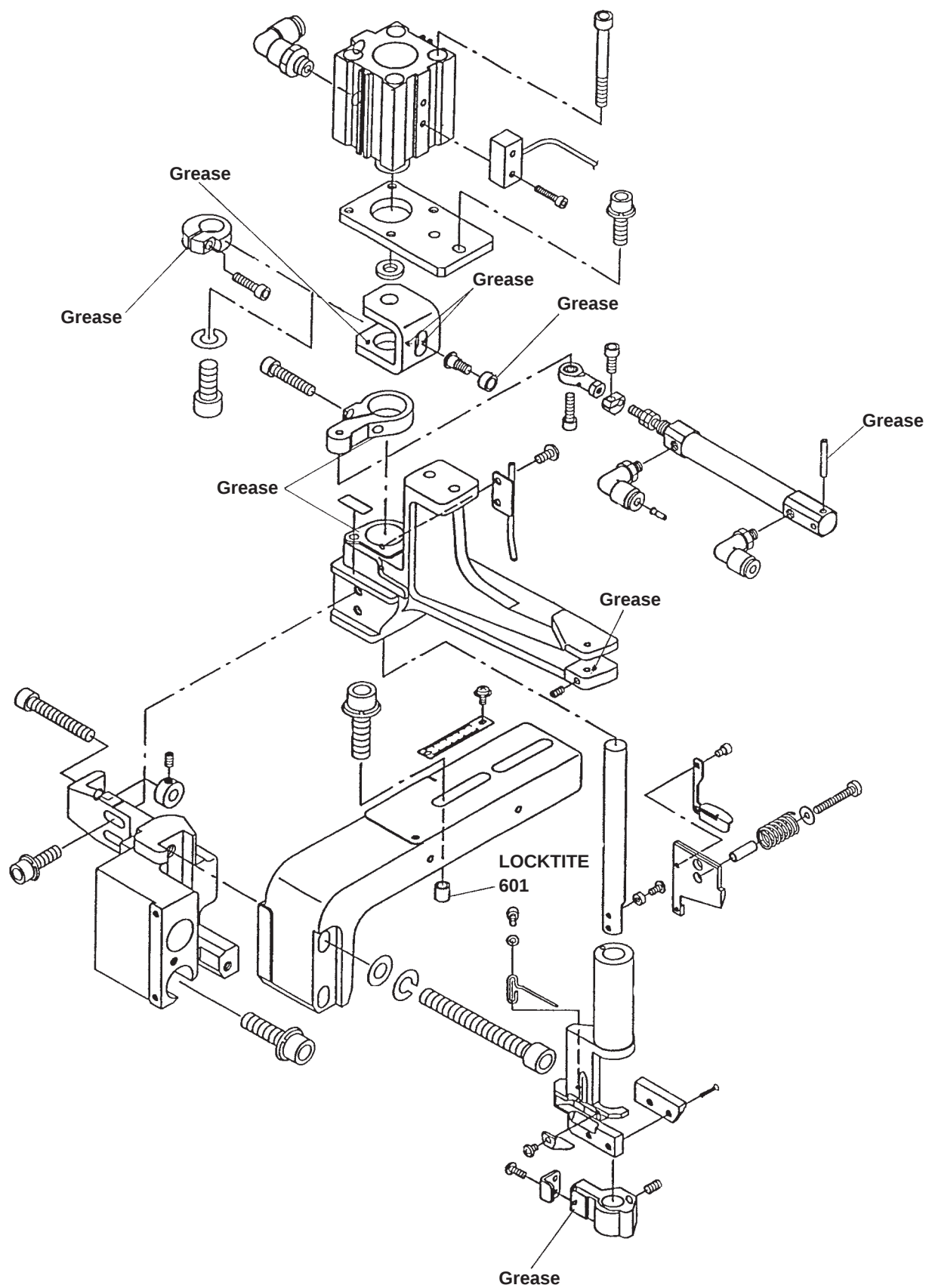
[12] Belt loop feed components



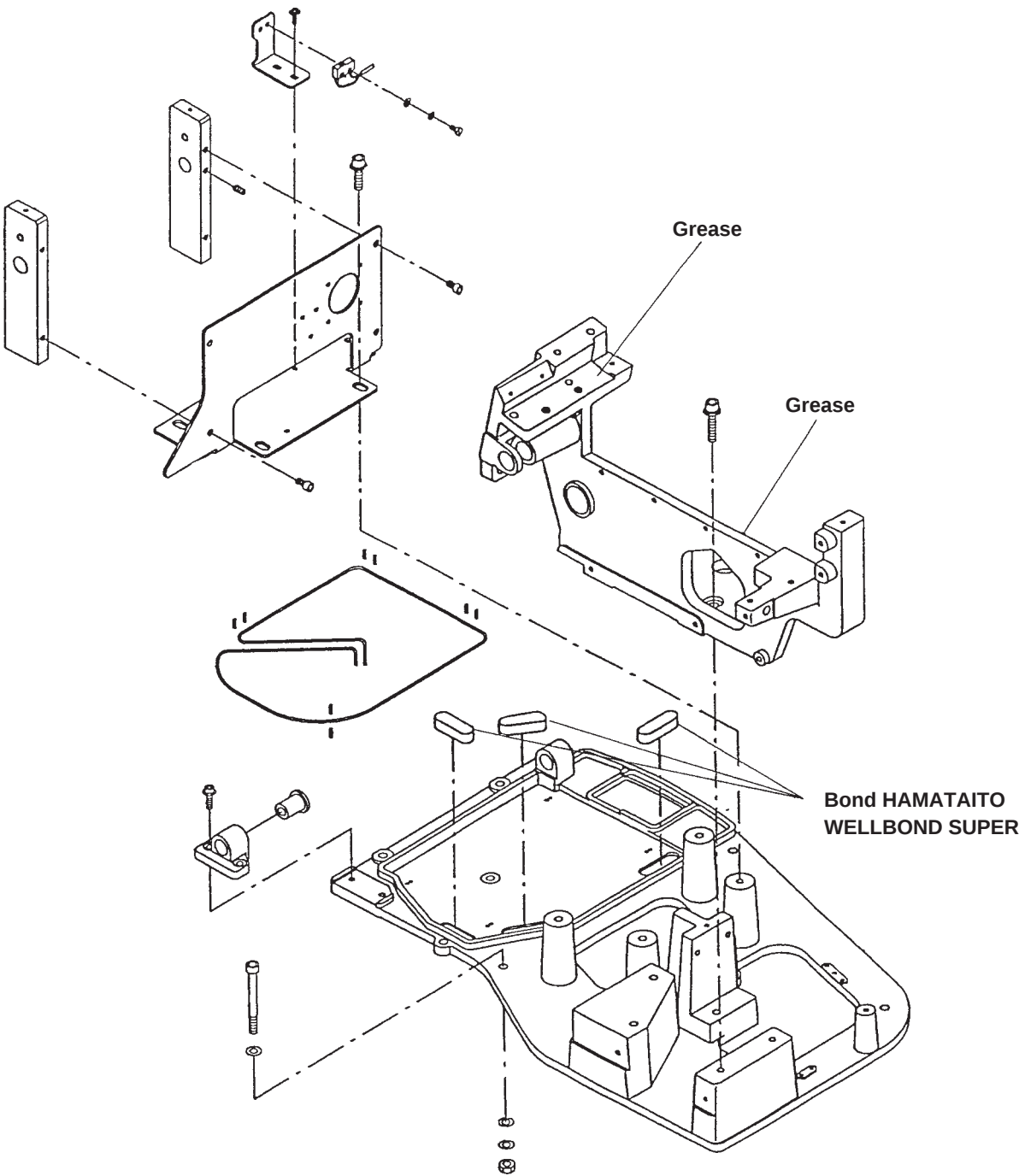
[13] Clamp feed components



[14] Knife components

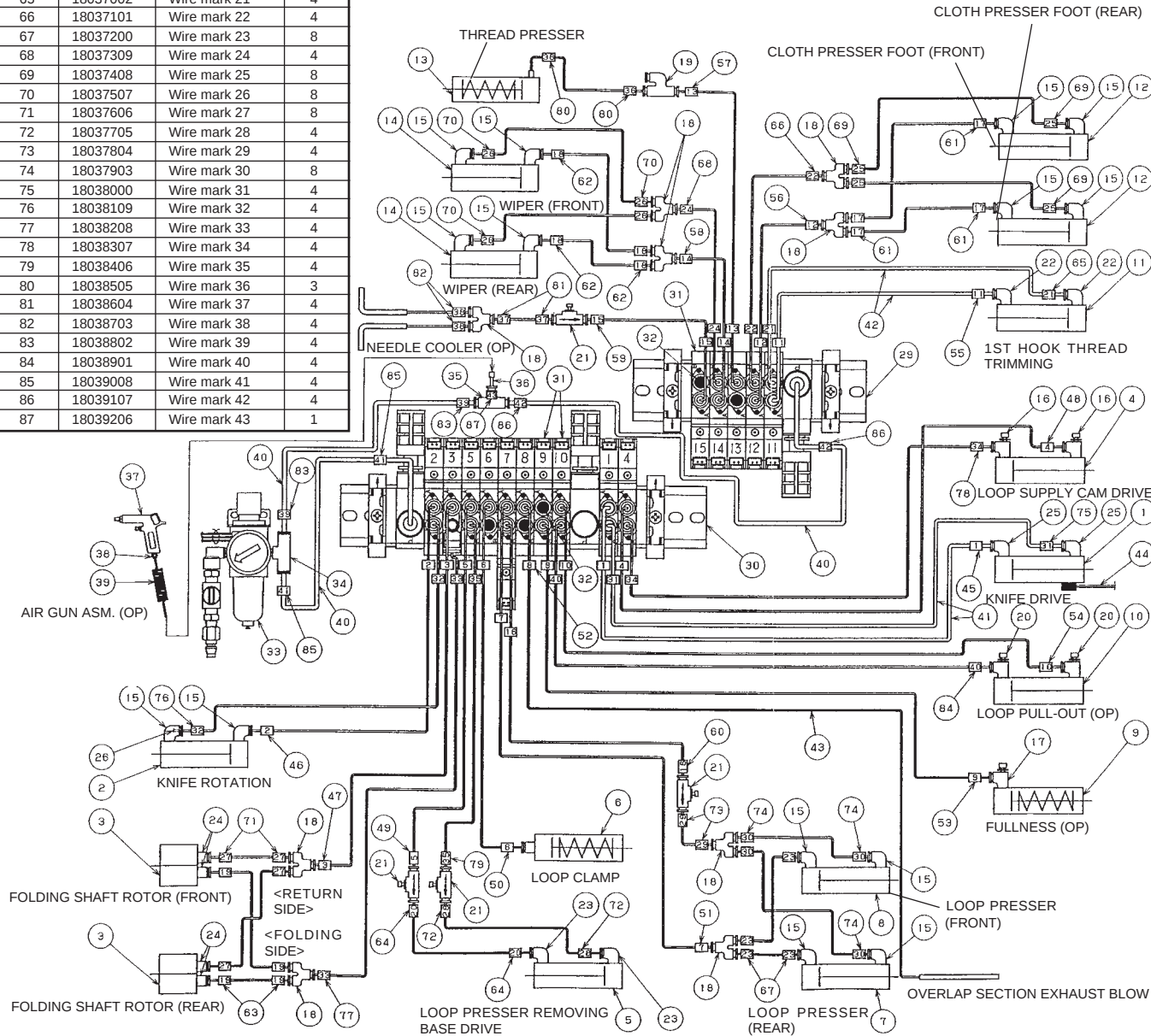


[15] Supplying device base components



8. PNEUMATIC CIRCUIT DIAGRAM

No.	Part No.	Name of part	Q'ty
61	18036608	Wire mark 17	8
62	18036707	Wire mark 18	8
63	18036806	Wire mark 19	8
64	18036905	Wire mark 20	4
65	18037002	Wire mark 21	4
66	18037101	Wire mark 22	4
67	18037200	Wire mark 23	8
68	18037309	Wire mark 24	4
69	18037408	Wire mark 25	8
70	18037507	Wire mark 26	8
71	18037606	Wire mark 27	8
72	18037705	Wire mark 28	4
73	18037804	Wire mark 29	4
74	18037903	Wire mark 30	8
75	18038000	Wire mark 31	4
76	18038109	Wire mark 32	4
77	18038208	Wire mark 33	4
78	18038307	Wire mark 34	4
79	18038406	Wire mark 35	4
80	18038505	Wire mark 36	3
81	18038604	Wire mark 37	4
82	18038703	Wire mark 38	4
83	18038802	Wire mark 39	4
84	18038901	Wire mark 40	4
85	18039008	Wire mark 41	4
86	18039107	Wire mark 42	4
87	18039206	Wire mark 43	1



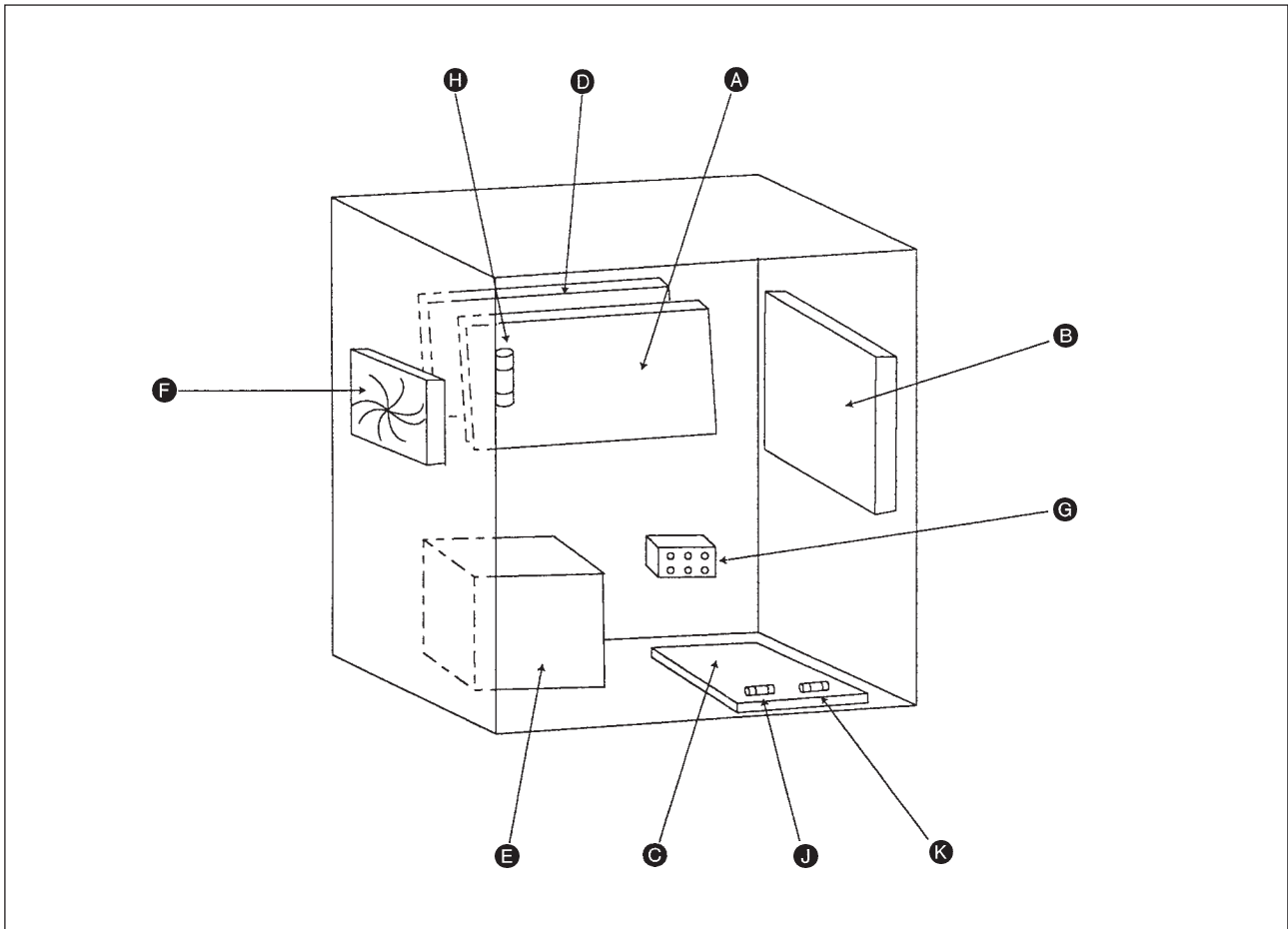
No.	Part No.	Name of part	Q'ty
1	PA3201503A0	Knife drive cylinder	1
2	PA1004513A0	Knife rotation cylinder	1
3	G5061254000	Folding shaft rotor	2
4	PA1602006A0	Loop supply cam drive cylinder	1
5	PA1602005A0	Loop presser removing base drive cylinder	1
6	PA1001025A0	Loop clamp cylinder	1
7	PA1005501A0	Loop presser (rear) cylinder	1
8	PA1005501A0	Loop presser (front) cylinder	1
9	PA1003003A0	Fullness (OP) cylinder	1
10	PA2015005A0	Loop pull-out (OP) cylinder	1
11	PA1501515A0	1st hook thread trimming cylinder	1
12	PA1002507A0	Cloth presser foot cylinder	2
13	PA060101500	Thread presser cylinder	1
14	PA1004001A0	Wiper cylinder	2
15	PJ304040504	Elbow joint ø4-M5	14
16	PC010508000	Speed controller OUT ø4-M5	2
17	PC010507000	Speed controller IN ø4-M5	1
18	PJ308040002	Y joint ø4	9
19	PV010014000	Quick exhaust valve	1
20	PC015108000	Speed controller OUT ø4-PT 1/8	2
21	PC012406000	Speed controller ø4 inline	4
22	PJ0460540002	Pipe joint ø6	2
23	PJ304040506	Elbow joint ø4 (ø0.8)	2
24	PJ032059006	Pipe joint ø4	4
25	PJ304065101	Elbow joint ø6-PT 1/8	2
26	PC022403F00	Insert ring	1
27			
28			
29	G5612540A0	Solenoid valve A asm.	1
30	G56022540A0	Solenoid valve B asm.	1
31	PV150209000	Solenoid valve ø4	3
32	PX500014000	Plug ø4	2
33	G56042540A0	Filter regulator asm.	1
34	PJ308085202	Branch ø8-PT 1/4	1
35	PJ305080001	T-cheese ø8-ø6	1
36	PX950001000	Plug ø6	1
37	16111403	Air gun	1
38	PJ301065103	Air gun joint	1
39	G5458116000	Coil tube	1
40	BT0800501EB	Air tube ø8	
41	BT0600401EB	Air tube ø6	
42	BT0600401EF	Air tube ø6 (white)	
43	BT0400251EB	Air tube ø4	
44	G54212540A0	Knife lowering detector sensor asm.	1
45	18035006	Wire mark 1	4
46	18035105	Wire mark 2	4
47	18035204	Wire mark 3	4
48	18035303	Wire mark 4	4
49	18035402	Wire mark 5	4
50	18035501	Wire mark 6	4
51	18035600	Wire mark 7	4
52	18035709	Wire mark 8	4
53	18035808	Wire mark 9	4
54	18035907	Wire mark 10	4
55	18036004	Wire mark 11	4
56	18036103	Wire mark 12	4
57	18036202	Wire mark 13	4
58	18036301	Wire mark 14	4
59	18036400	Wire mark 15	4
60	18036509	Wire mark 16	4

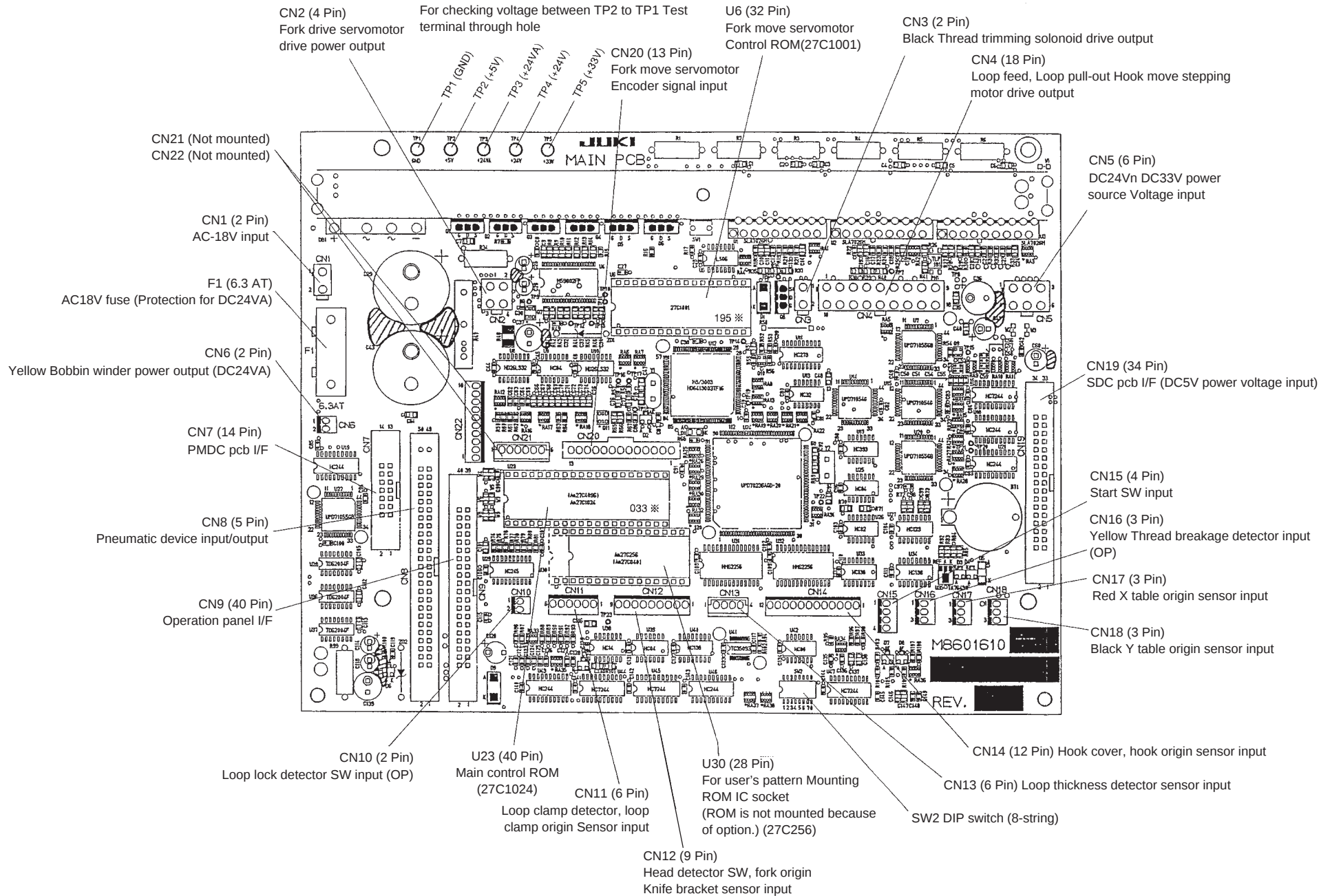
9. CONTROL BOX

[1] Explanation of components

The electrode which is hazardous for human body is exposed and the radiator plate is exothermic inside the control box. Be sure to turn OFF the power and draw out the power plug from the receptacle. Then perform the maintenance or inspection work after a lapse of five minutes or more.

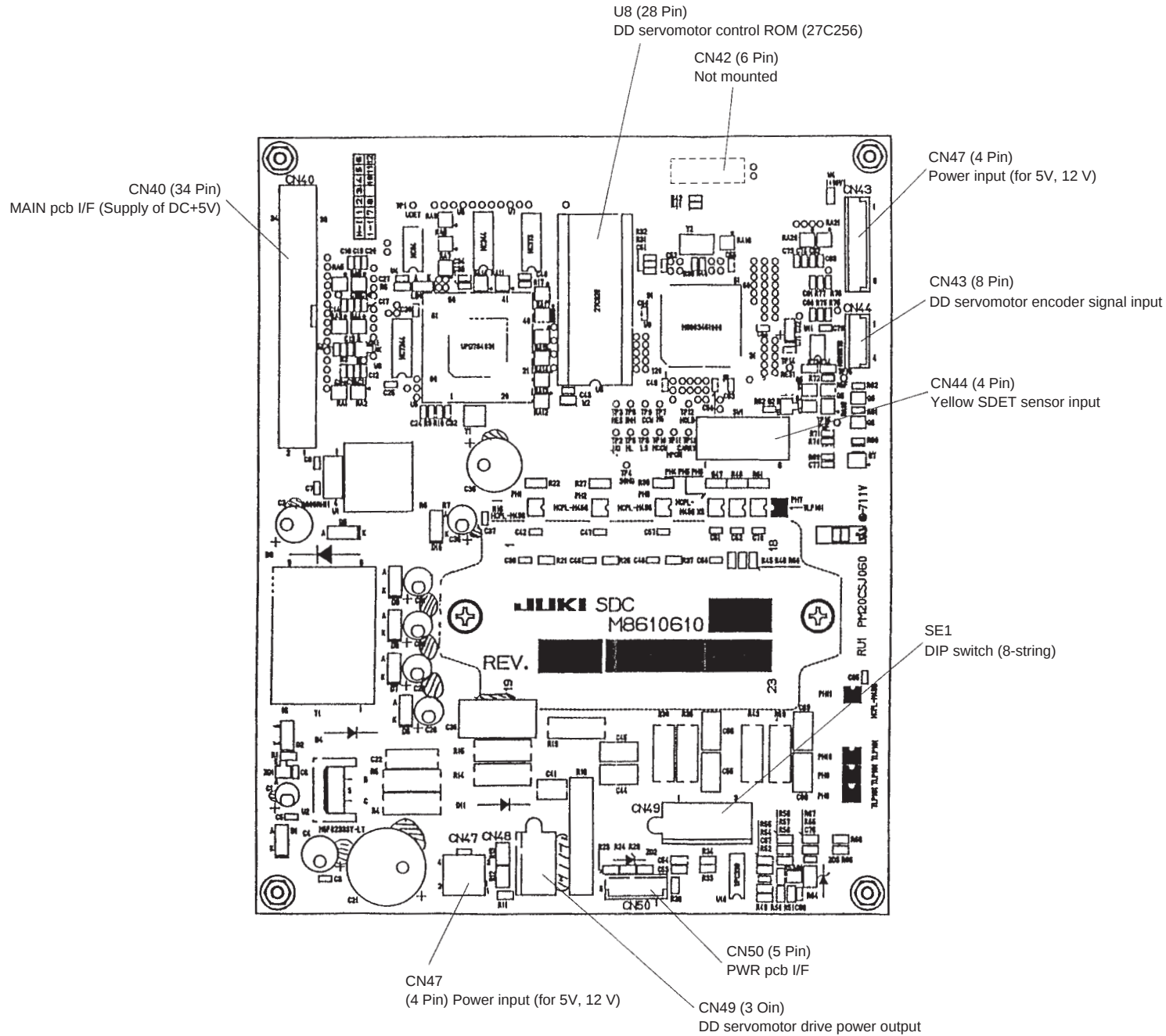
Since this kind of maintenance work has to be performed by qualified electricians, nearest authorized dealers, or engineers of our service center, it is prohibited for those who do not correspond to these conditions to perform the maintenance or inspection work.





(2) SDC CIRCUIT BOARD

Circuit board to perform the control of the sewing machine head motor
(Supply of control power DC + 5V voltage)



(3) Power circuit board

This is a circuit board to supply the respective power voltages DC24V, DC33V and DC85V.

(4) PMDC circuit board

X-Y table stepping motor driver circuit board

(5) Transformer

This is a transformer to change the commercial power voltage to the control voltage.

(6) Fan motor

This is a fan motor to protect temperature rise inside the control box.

(7) Power change-over tap

This is a change-over tap to adapt the input voltage to the commercial power voltage at the destination.

(8) F1 fuse (6.3AT)

For DC + 24V (Protection of power for loop supply servomotor)

(9) F5 fuse (6.3AT)

For DC + 33V (Protection of power for stepping motor and thread trimming solenoid)

(10) F6 fuse (6.3AT)

For DC + 85V (Protection of X-Y table stepping motor and DC + 24V)

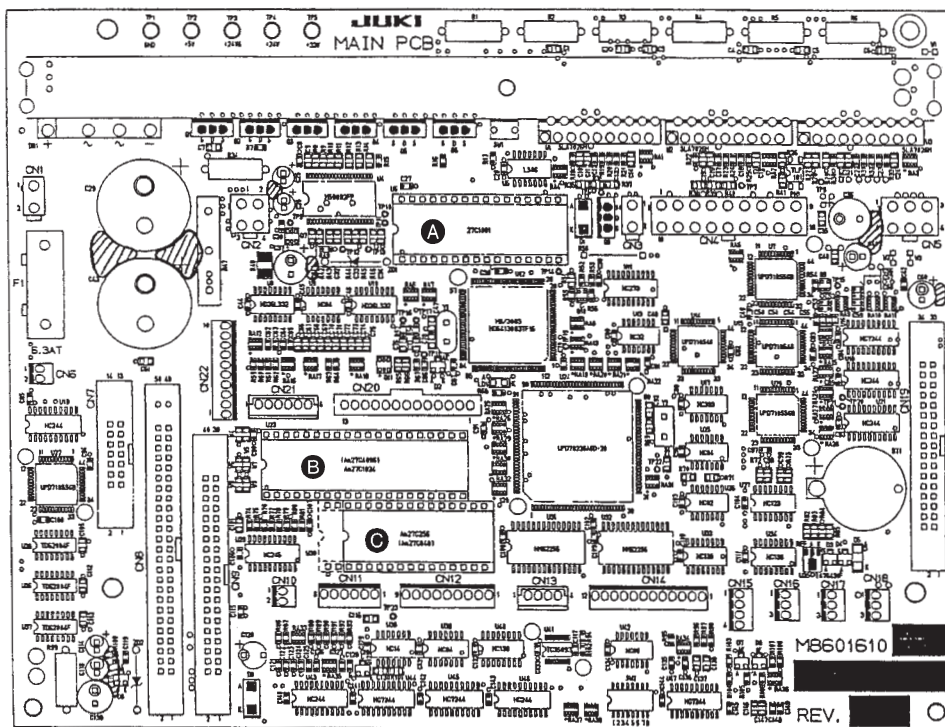
[2] Replacing the parts

(1) Replacing EPROM

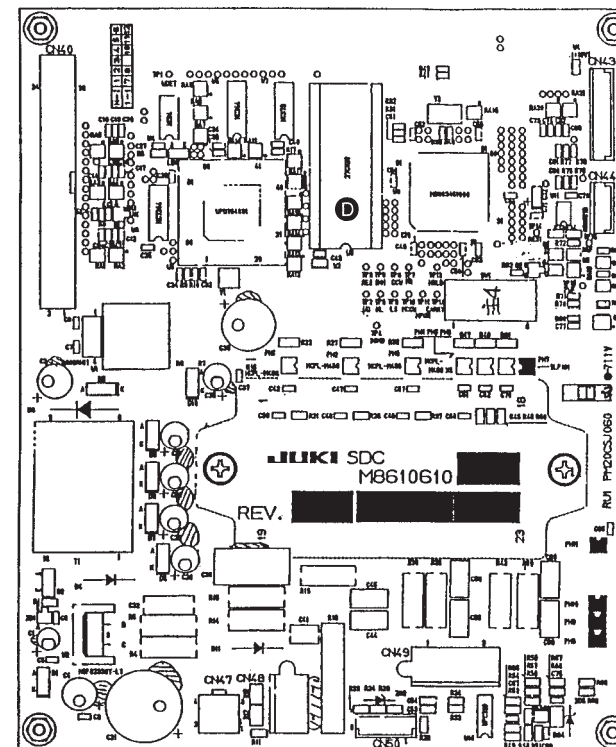
There are four places where the EPROMs are mounted in total in this machine.

Mount the designated ROMs on the respective designated places.

There are three places, **A**, **B** and **C** where the EPROMs are mounted on the MAIN circuit board.



For the SDC circuit board, the place where EPROM is mounted is in **D**.



- A** U6-27C1001 (32 Pin) "HL010520195" : ROM for fork move servomotor control
- B** U23-27C1024 (40 Pin) "HL015930033" : ROM for main operation control
- C** U30-27C256 (28 Pin) not mounted : ROM for corresponding to special corresponding user's pattern data (It is possible to create data with PGM-20.)
- D** U8-27C256 (28 Pin) "HL008423064" : ROM for DD servomotor control

* The mark "*" attached to the end of ROM discrimination seal varies according to "Rev" of ROM.

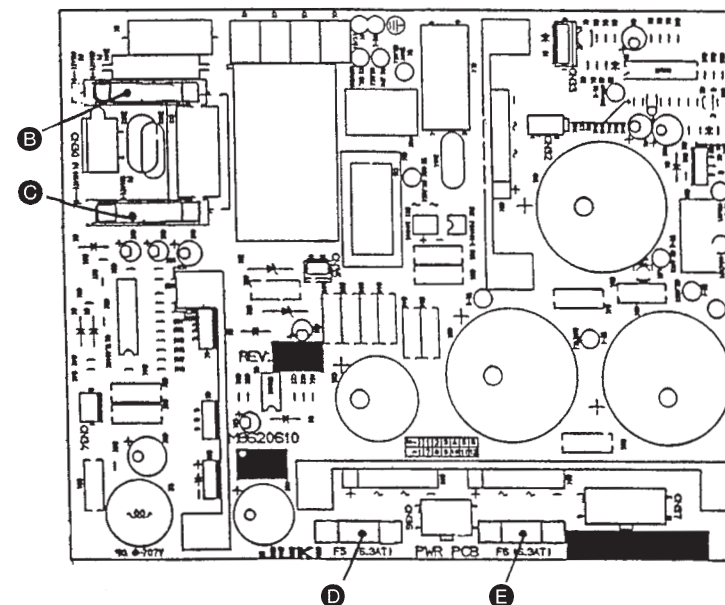
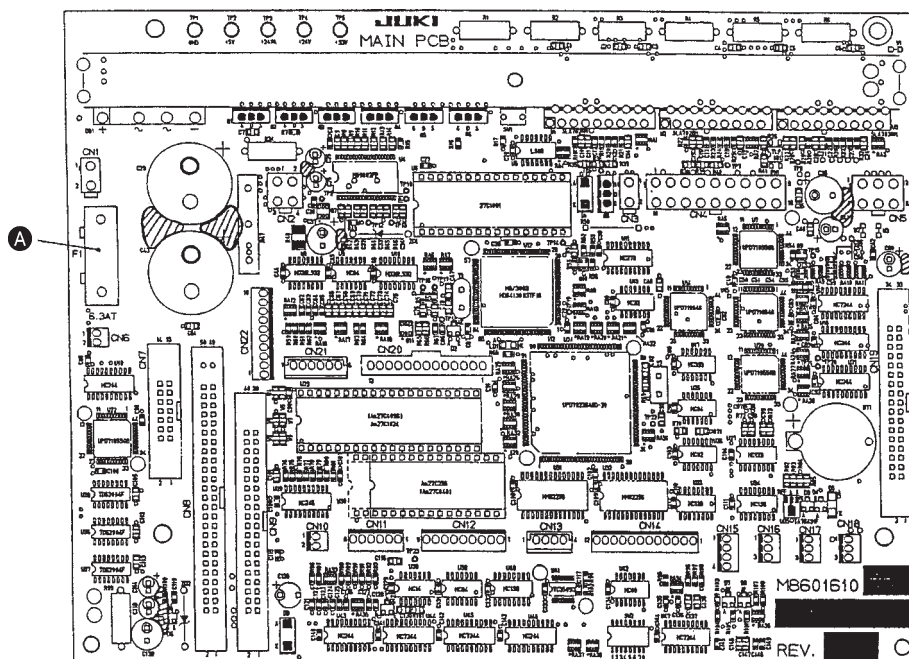
(2) Replacing the fuse

Fuses which can be replaced are mounted in three places in total in this machine.

Replace the fuse with a new one with a specified capacity when the fuse has blown out.

There is one place where the fuse is mounted on the MAIN circuit board.

There are four places where the fuses are mounted on the PWR circuit board. (F2 and F4 are not mounted.)



- Ⓐ F1 (6.3AT) : Fuse for AC18V (DC24VA) protection
- Ⓑ F1 (20AT) : Impossible to replace because of direct attaching (Replace the circuit board.)
- Ⓒ F3 (20AT) : Impossible to replace because of direct attaching (Replace the circuit board.)
- Ⓓ F5 (6.3AT) : Fuse for DC33V protection (Stepping motor, thread trimming solenoid, and power protection)
- Ⓔ F6 (6.3AT) : Fuse for DC85V protection (X-Y stepping motor, and DC24V power protection)

[3] Change of the power specifications

The power voltage for MOL-254 can be changed by change-over of the transformer tap inside the control box so as to avoid stock of the complete machines which are different in the power specifications because of the different destinations.

In addition, by stocking all the machines with 3-phase specifications, it is possible to correspond to the single phase specifications by means of simple remodelling of the power cord.

Remodelling points at the time of change of power specifications are described below. Refer to the description to respond the request.

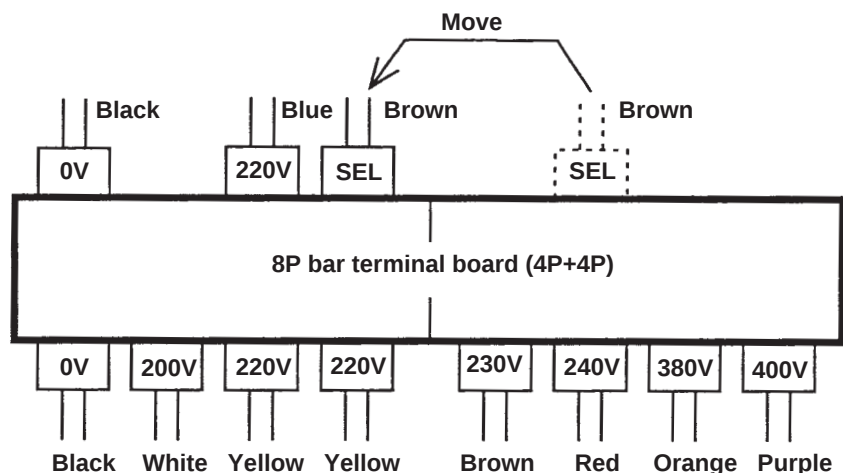
(1) [General export]

1) Setting of the power voltage specifications

- Fix the brown wire with a marker printed “SEL” which is to be changed to the power tap to be used from among transformer taps (8P bar terminal board) inside the control box to the power tap section to be used.

Indication of the tap is printed on the facing wire on the terminal board.

Example : 240V → 220V



*** Note :** Never change the blue wire with the marker of 220V since it is for the main shaft motor power.

2) Setting of the phase of power (Remodelling of the power cord)

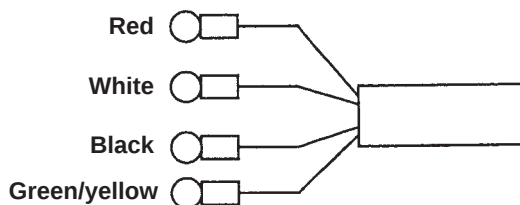
*** Note :** It is not necessary to remodel with 3-phase power.

When changing 3-phase to single phase, it is necessary to cut one wire on the power plug side.

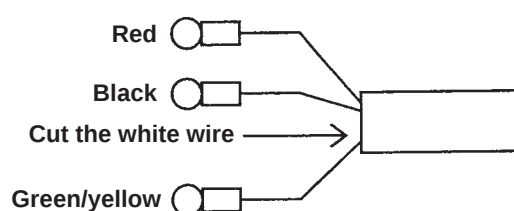
Cut the brown wire at the root of sheath.

Example) 3-phase 240V → 1-phase 220V

3-phase : 240V



1-phase : 220V



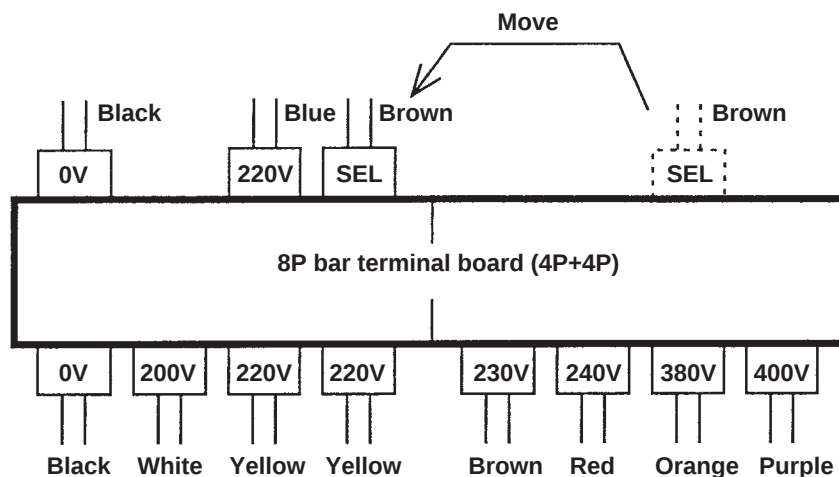
(2) [For CE and general export, high voltage]

1) Setting of the power voltage specifications

- Fix the brown wire with a marker printed “SEL” which is to be changed to the power tap to be used from among the transformer taps (8P bar terminal board) in the control box to the power tap section to be used.

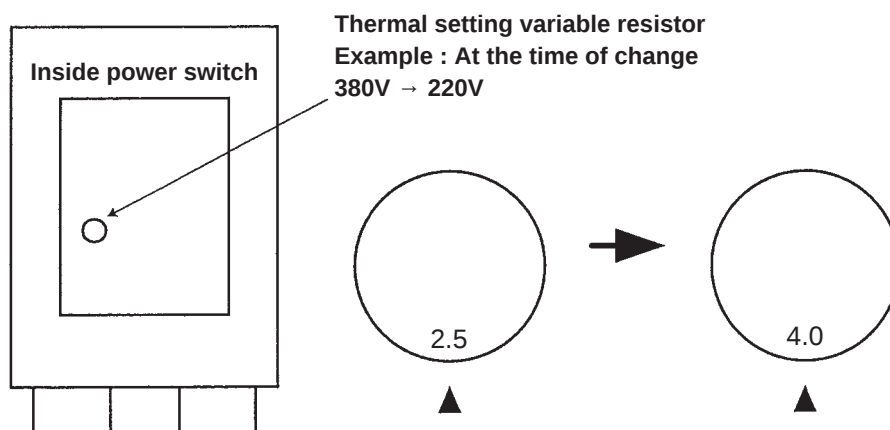
Indication of the tap is printed on the facing wire on the terminal board.

Example : 380V → 220V



*** Note : Never change the blue wire with the marker of 220V since it is for the main shaft motor power.**

- Set the thermal trip set value of the power switch.
Open the cover of the power switch and set the thermal set value.
For the single phase power voltage, 220, 230 or 240V, set the thermal set value to the maximum 4.0, and for the 3-phase power voltage, 380 or 400V, set the value to the minimum 2.5.

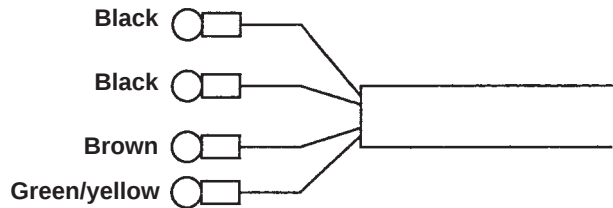


2) Setting of the phase of the power (Remodelling of the power cord)

*** Note : It is not necessary to remodel with the 3-phase power.**

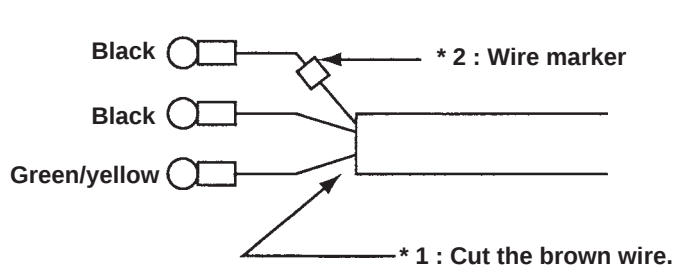
- When changing 3-phase to single phase, it is necessary to cut one wire on the power plug side.
- Attach a C-type ring shaped wire marker on either one of the black wires.

3-phase : 380, 400V



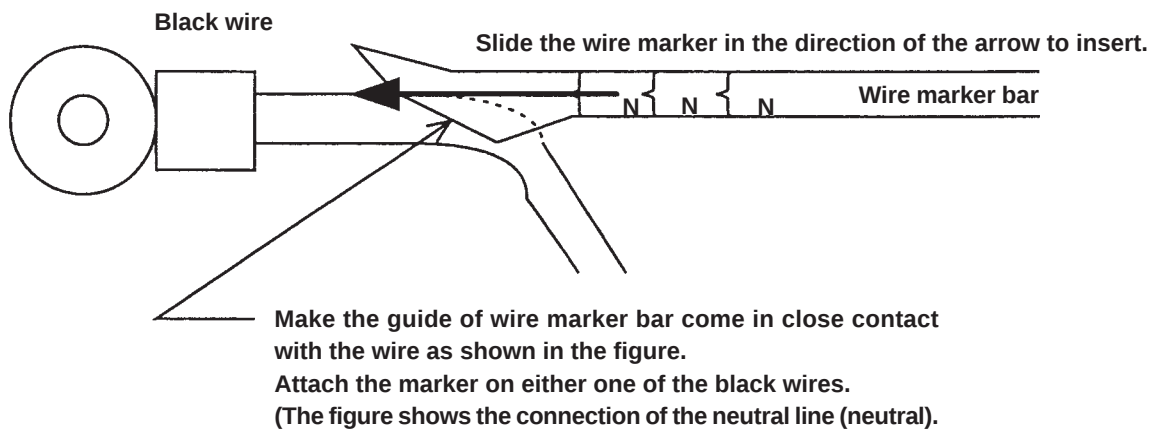
Remodelling to single phase

1-phase : 220, 230, 240V



*** 1 : Cut the brown wire at the root of sheath.**

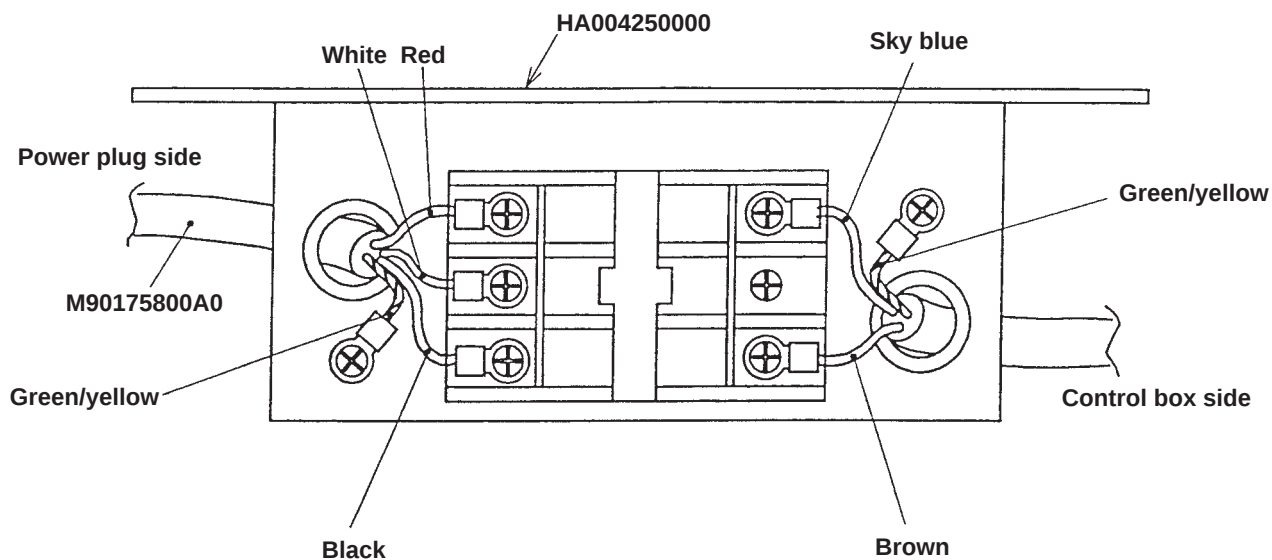
*** 2 : Insert the wire marker supplied.
See the figure below.**



10. POWER SWITCH

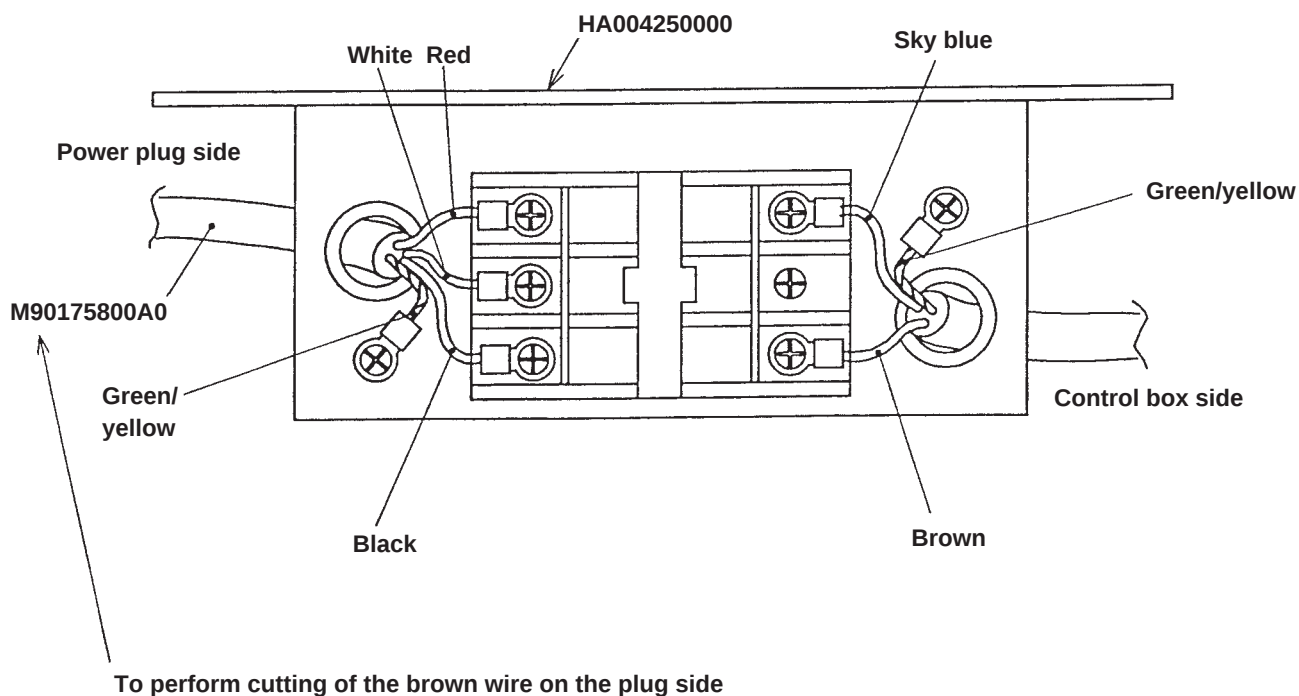
[1] Power switch for domestic and general export (low voltage)

3-phase : for 200V, 220V, 230V, 240V



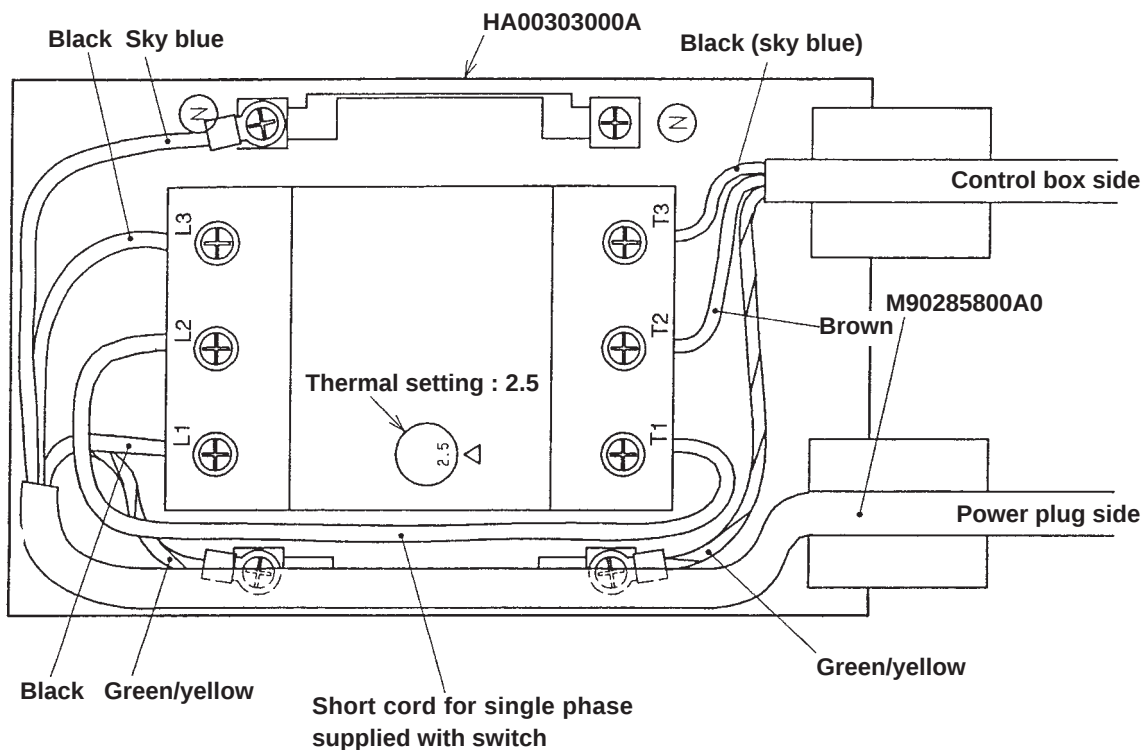
[2] Power switch for general export (low voltage)

Single phase : for 200V, 220V, 230V, 240V



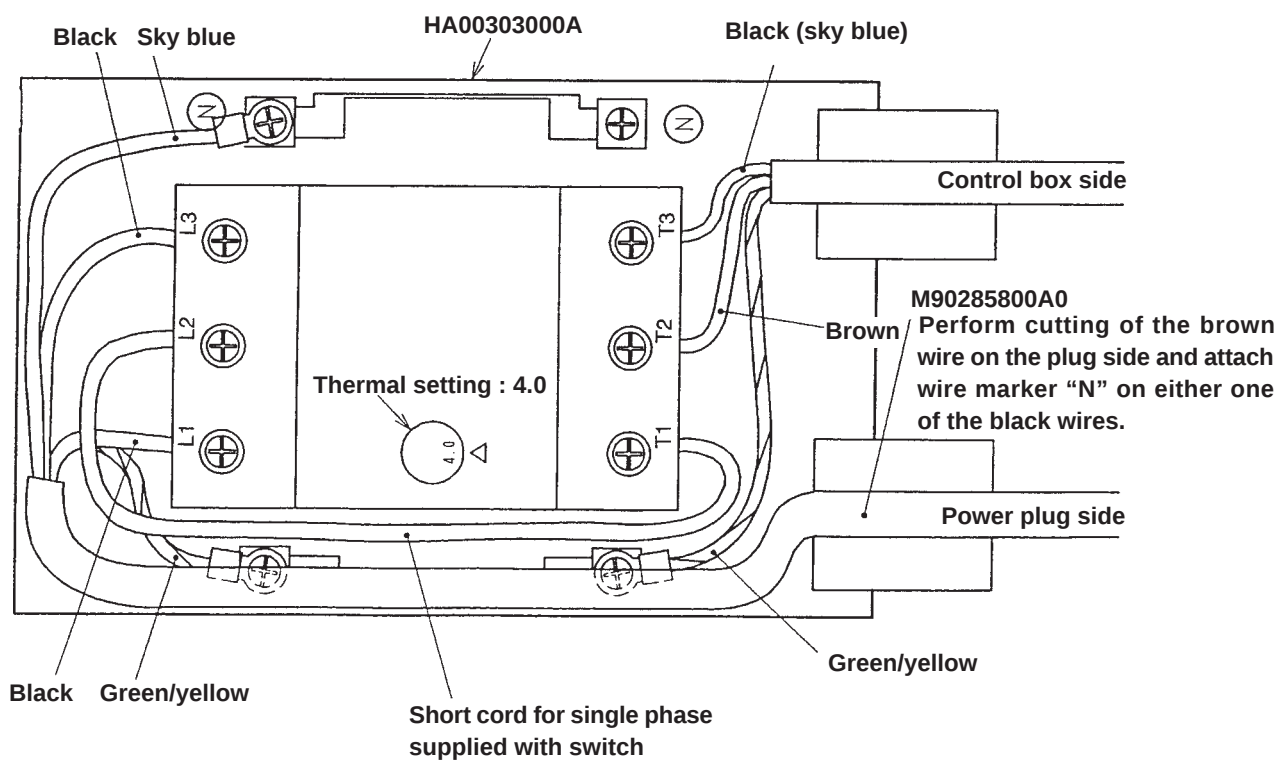
[3] Power switch for CE marking and general export (high voltage)

3-phase : for 380V, 400V

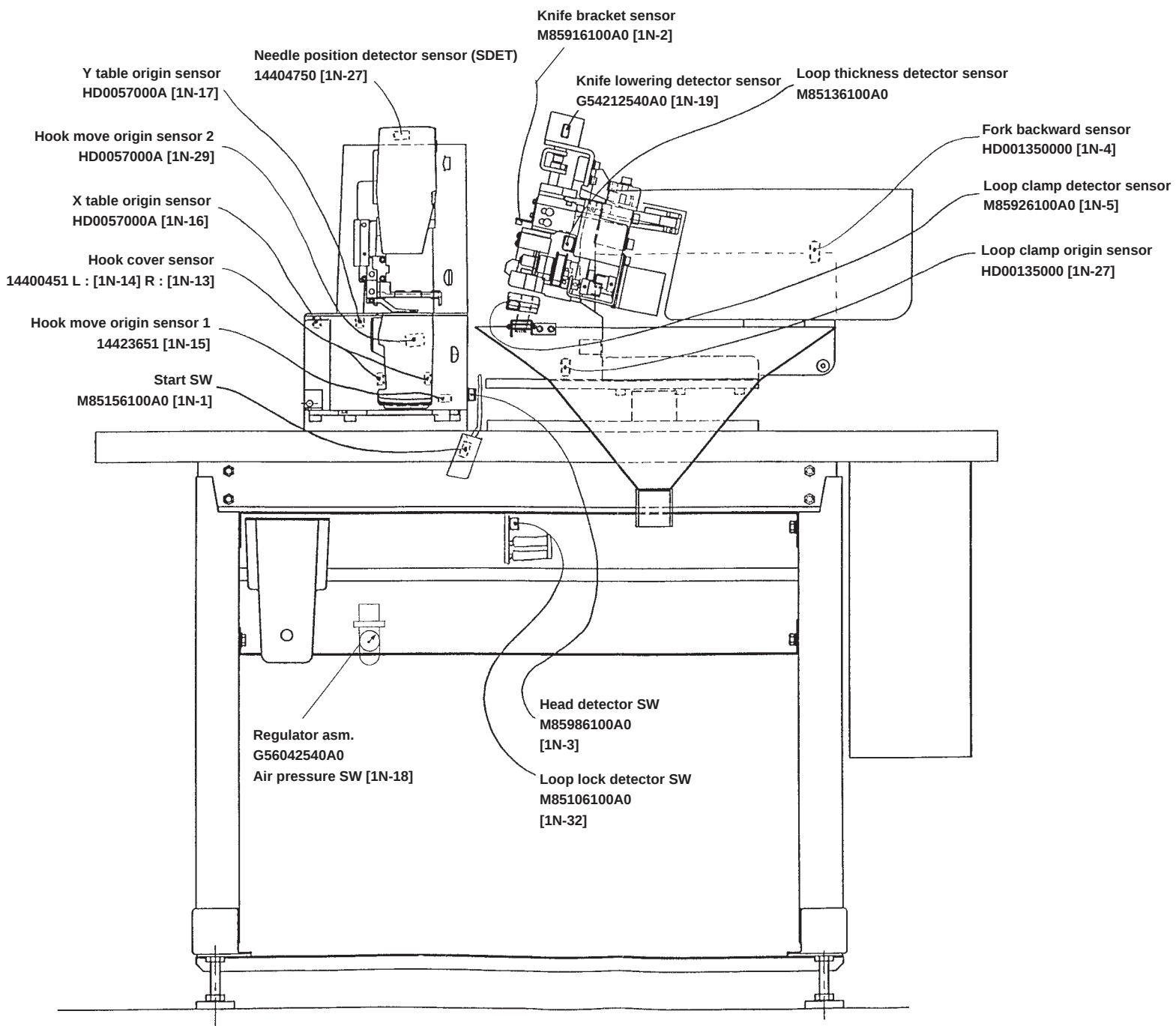


[4] Power switch for CE marking

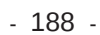
Single phase : for 220V, 230V, 240V



11. NAME AND INSTALLING POSITION OF THE SWITCH SENSOR



[1] Block diagram

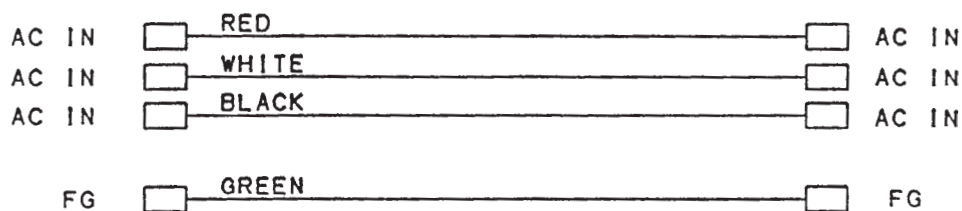


No.	Part No.	Name of Part	Q'ty	Remarks
1	M85156100A0	Start switch asm.	1	
2	M85136100A0	Loop thickness detector sensor asm.	1	
3	M8598610AA0	Machine head detector switch asm.	1	
4	HD001350000	Photo sensor	1	
5	M85916100A0	Knife bracket sensor asm.	1	
6	HD001350000	Photo sensor	1	
7	M85926100A0	Loop clamp detector sensor asm.	1	
8	14400451	Hook cover sensor cable asm.	1	
9	14400451	Hook cover sensor cable asm.	1	
10	14423651	Hook move origin sensor 1 cable asm.	1	
11	HD00057000A	Photo sensor	1	
12	HD00057000A	Photo sensor	1	
13	HD00057000A	Photo sensor	1	
14	M85166100A0	Thread breakage detector cable asm.	1	
15	M85106100A0	Loop lock detector switch asm.	1	
16	14410203	X feed stepping motor	1	
17	14410104	Y feed stepping motor	1	
18	G5230254000	Stepping motor	1	
19	G5230254000	Stepping motor	1	
20	G5230254000	Stepping motor	1	
21	13870266	Bobbin winder asm.	1	
22	14108906	Thread trimming solenoid	1	
23	G5001254000	Device servo motor	1	
24	M6001610AA0	Motor A asm.	1	
25	14404750	SDET sensor asm.	1	
26	G56022540A0	Solenoid valve B asm.	1	
27	PV150209200	5-port solenoid valve (ø6)	1	
28	PV150209000	5-port solenoid valve (ø4)	1	
29	PV150209100	5-port solenoid valve (M5)	1	
30	PV150209000	5-port solenoid valve (ø4)	1	
31	PV150209000	5-port solenoid valve (ø4)	1	
32	PV150209000	5-port solenoid valve (ø4)	1	
33	PV150210000	5-port solenoid valve (ø4 double)	1	
34	PV150209000	5-port solenoid valve (ø4)	1	
35	PV150209000	5-port solenoid valve (ø4)	1	
36	PV150209000	5-port solenoid valve (ø4)	1	
37	PV150209000	5-port solenoid valve (ø4)	1	
38	PV150209000	5-port solenoid valve (ø4)	1	
39	PV150209000	5-port solenoid valve (ø4)	1	
40	PV150209000	5-port solenoid valve (ø4)	1	

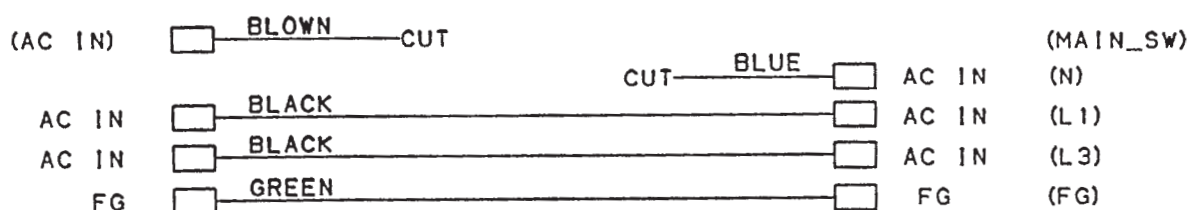
No.	Part No.	Name of part	Q'ty	Remarks
41	PV1502090005	5-port solenoid valve (ø4)	1	
42	G56012540A0	Solenoid valve A asm.	1	
43	G56042540A0	Regulator asm.	1	
44	G54212540A0	Knife lowering detector sensor asm.	1	
45	G56032540A0	Solenoid valve cable asm.	1	
46	M85806100A0	Operation panel asm.	1	
47	M8601610AA0	MAIN circuit board A asm.	1	
48	M86055800A0	PMDC circuit board asm.	1	
49	M8610610AAA	SDC circuit board AA asm.	1	
50	M8620610AAA	PWR circuit board AA asm.	1	For domestic
50	M8620610BAA	PWR circuit board BA asm.	1	For export
51	HA004250000	Power switch	1	Excluding Europe and high voltage area
51	HA00303000A	Power switch	1	For Europe and high voltage area
52	M89016100A0	Transformer asm.	1	
53	M85405800A0	FAN asm.	1	
54	M90175800A0	Power cable asm.	1	Excluding Europe and high voltage area
54	M90285800A0	Power cable asm.	1	For Europe and high voltage area
55	M85126100A0	Supply device sensor relay cable asm.	1	
56	M85116100A0	Loop clamp sensor relay cable asm.	1	
57	M85146100A0	Hook sensor relay cable asm.	1	
58	14410658	X origin sensor cable asm.	1	
59	14410559	Y origin sensor cable asm.	1	
60	M85086100A0	Solenoid valve relay cable asm.	1	
61	M85076100A0	PMDC.I/F cable asm.	1	
62	M85046100A0	Stepping motor relay cable asm.	1	
63	M85066100A0	Bobbin winder relay cable asm.	1	
64	M85036100A0	Thread trimming Mg relay cable asm.	1	
65	M85026100A0	Fork motor relay cable	1	
66	M85196100A0	SDC.I/F cable asm.	1	
67	M8530610AA0	AC power cable asm. A	1	Excluding Europe and high voltage area
67	M8530610AA0	AC power cable asm. C	1	For Europe and high voltage area
68	M85056100A0	DC power cable asm.	1	
69	M85446100A0	SDET relay cable asm.	1	
70	M85626100A0	X/Y motor relay cable asm.	1	
71	G85251920A0	LCD circuit board asm.	1	
72	G86021950A0	PANEL circuit board A asm.	1	
73	E9567319000	Earth mark seal	4	
74	14075758	Earth wire	2	
75	G85142860A0	Earth wire	1	
76	EA9500B0100	Cable band	10	
77	EA9500B0200	Cable band	5	

[2] Wiring diagram

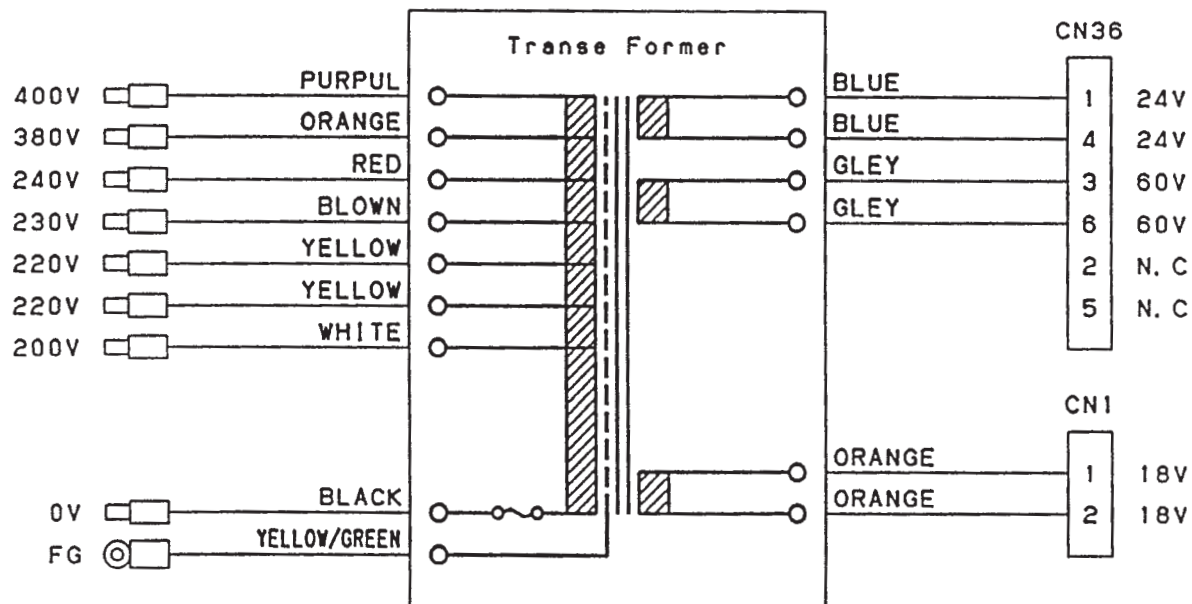
(1) Power cable asm. circuit diagram A (for domestic and general export (low voltage))



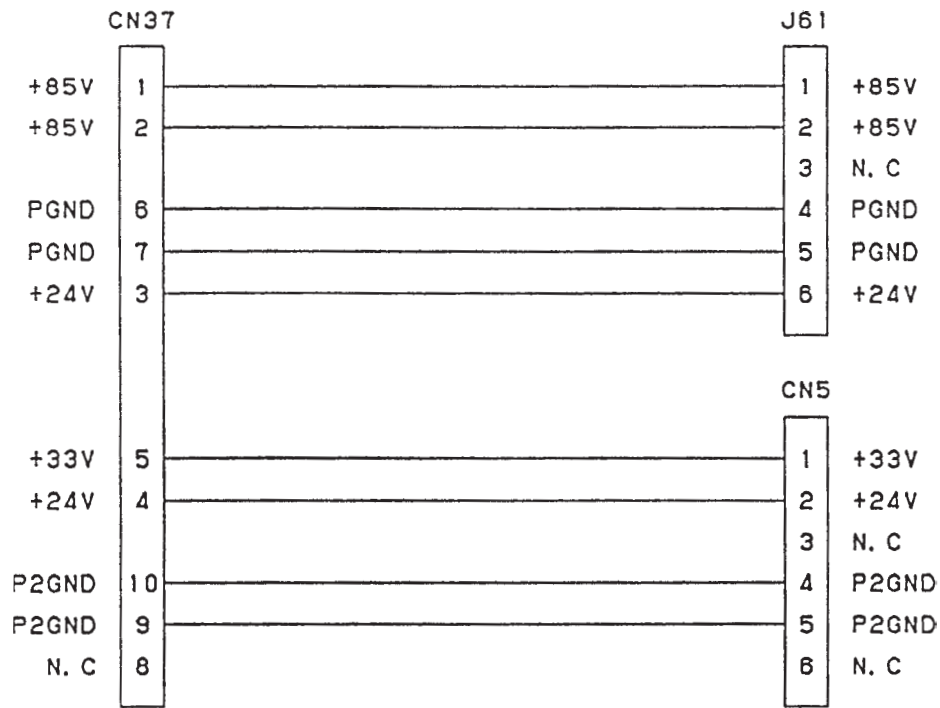
(2) Power cable asm. circuit diagram B (for CE and general export (high voltage))



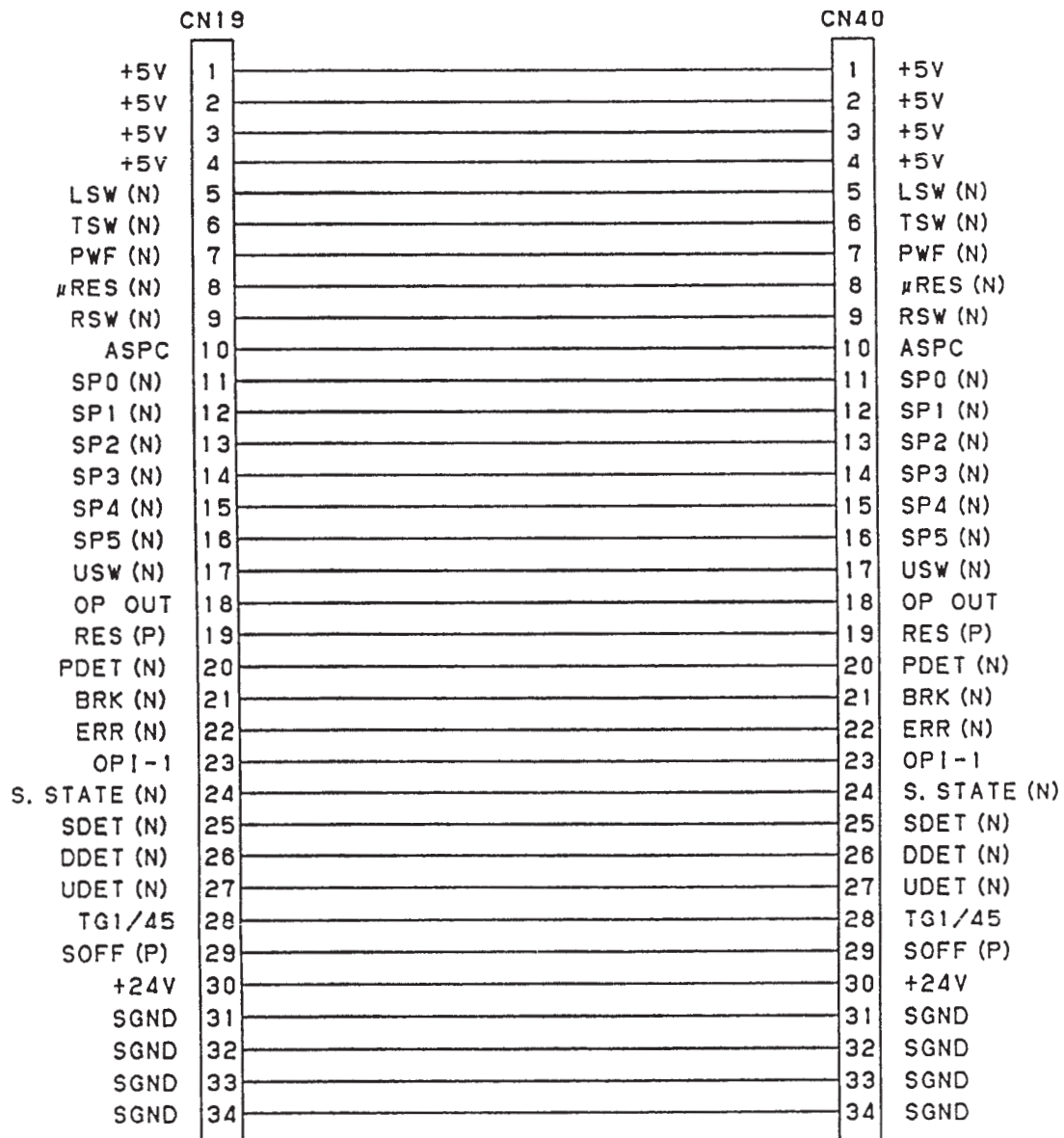
(3) Transformer asm. circuit diagram



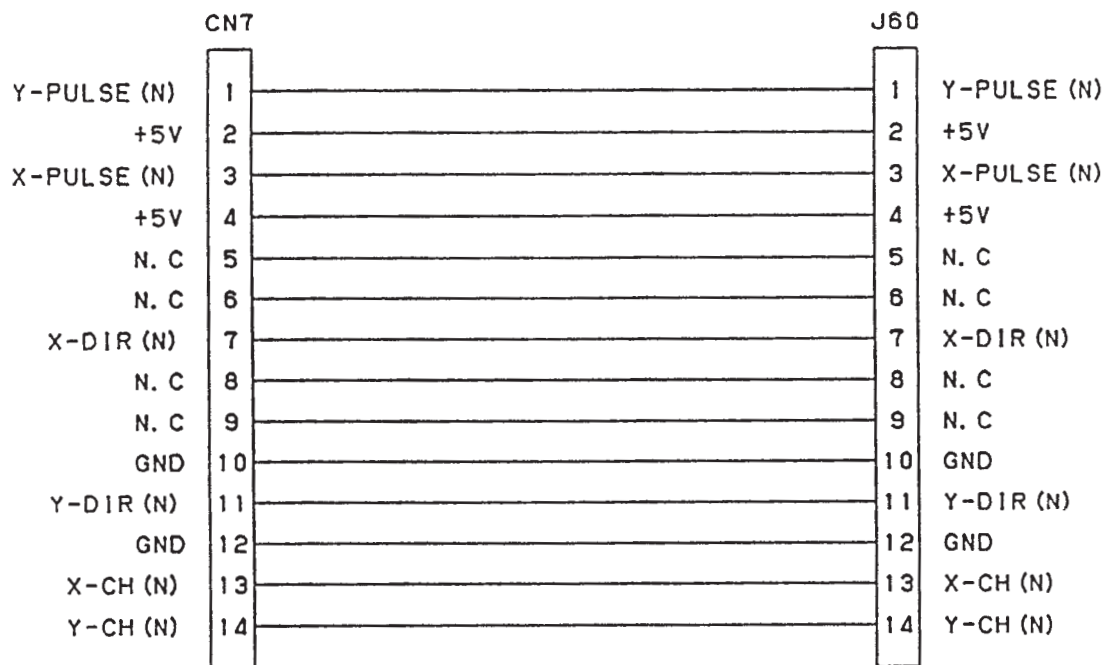
(4) DC power cable asm. circuit diagram



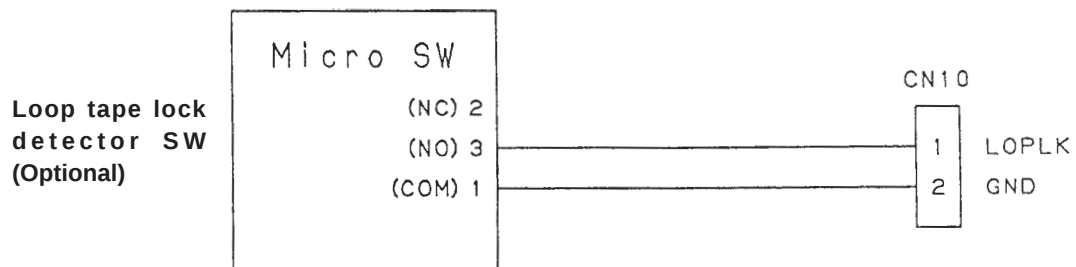
(5) SDC•I/F cable asm. circuit diagram



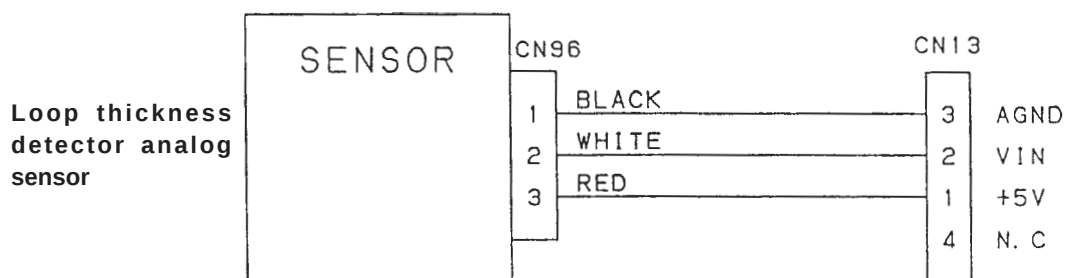
(6) PMDC•I/F cable asm. circuit diagram



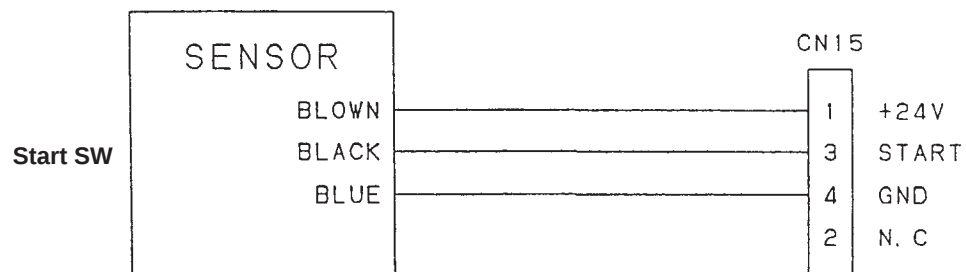
(7) CN10 wiring cable circuit diagram



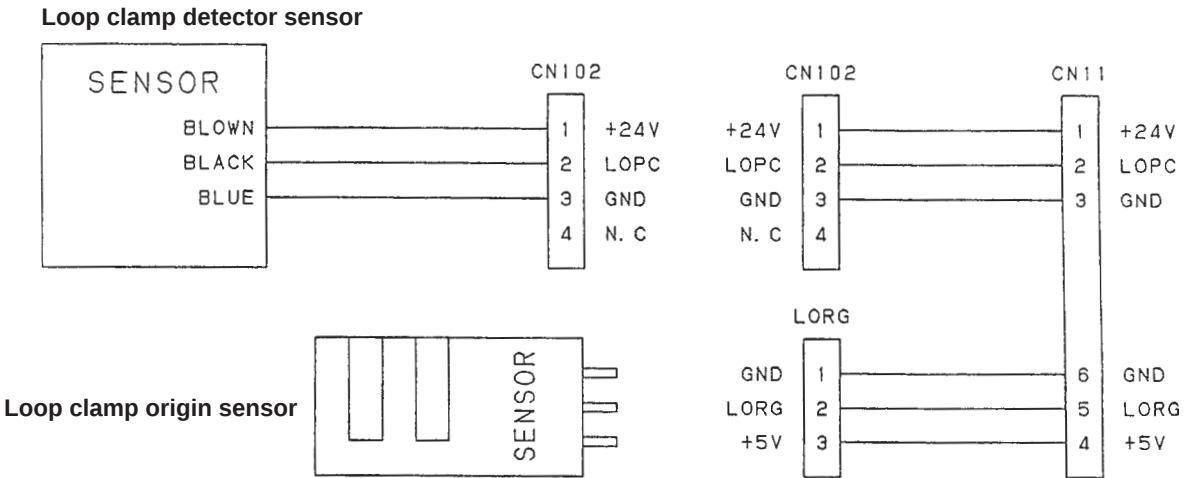
(8) CN13 wiring cable circuit diagram



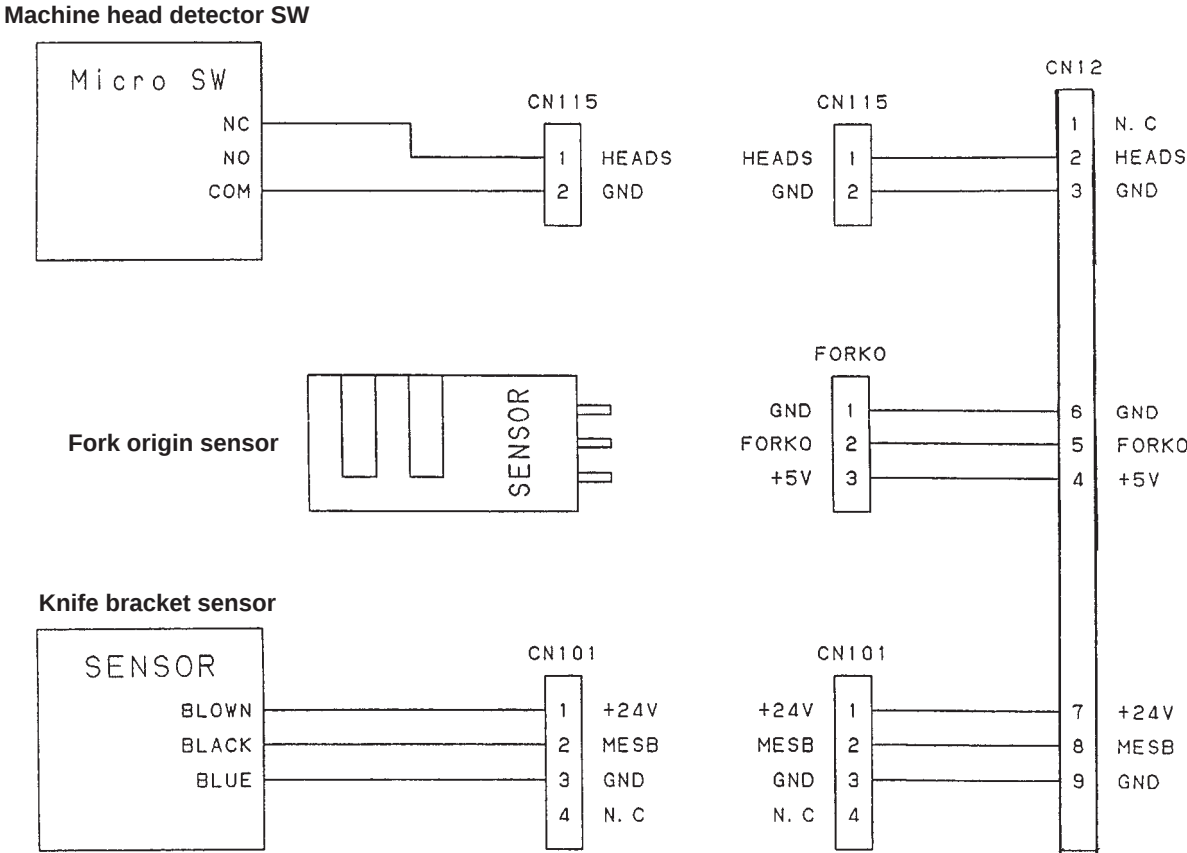
(9) CN15 wiring cable circuit diagram



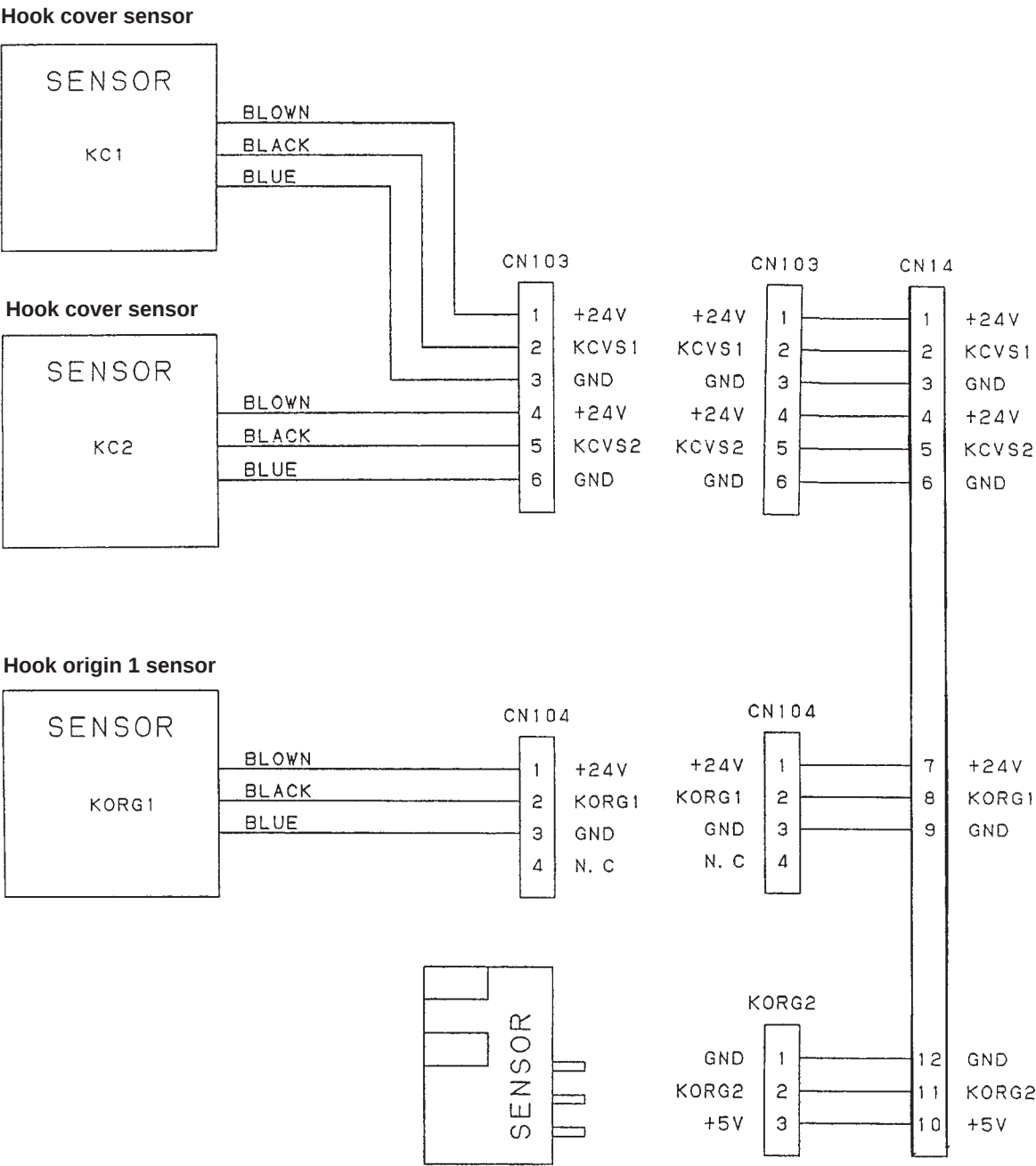
(10) CN11 wiring cable circuit diagram



(11) CN12 wiring cable circuit diagram

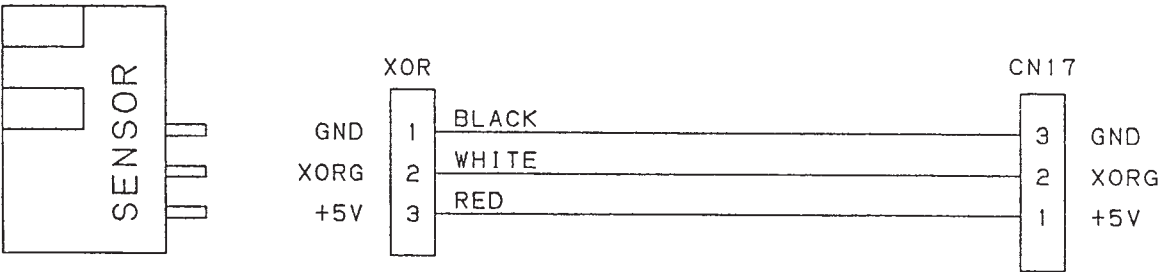


(12) CN14 wiring cable circuit diagram

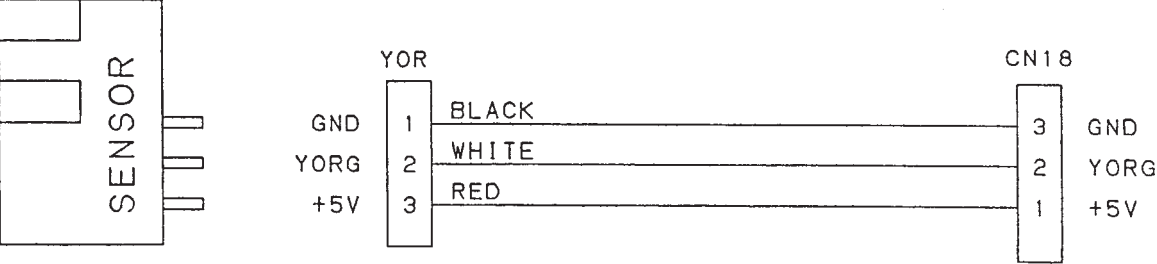


(13) X/Y table origin sensor wiring cable circuit diagram

X table origin sensor

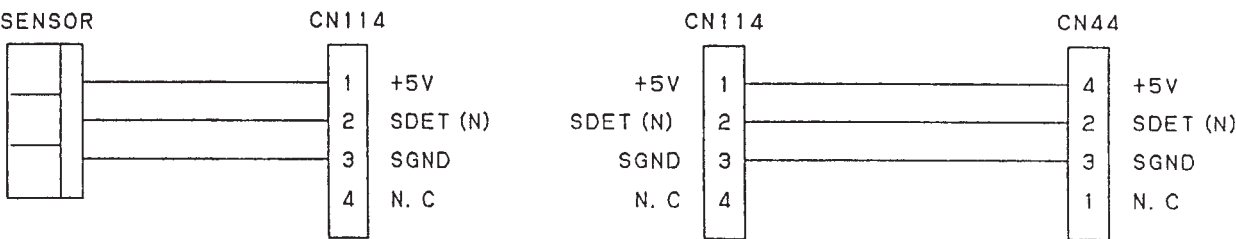


Y table origin sensor

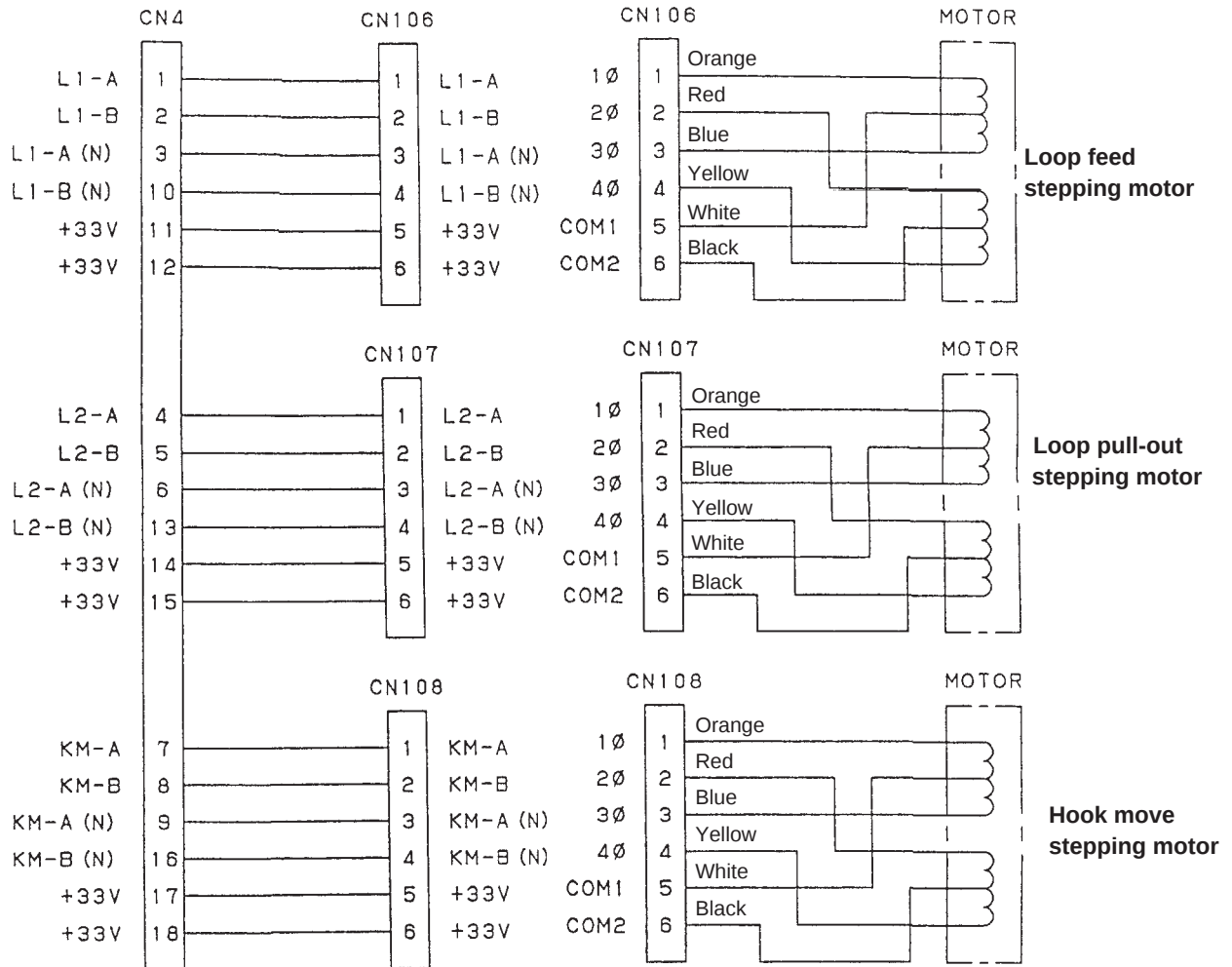


(14) SDET sensor wiring cable circuit diagram

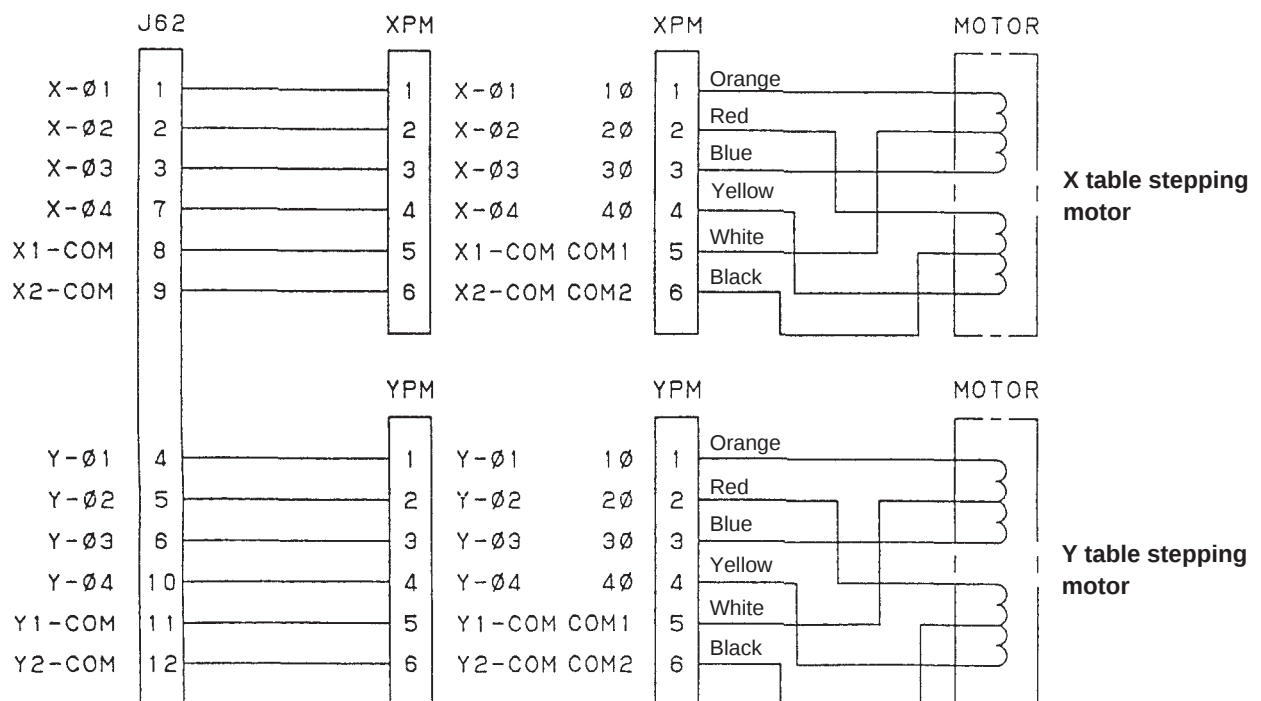
SDET sensor
(Main shaft detecting woodruff plate sensor)



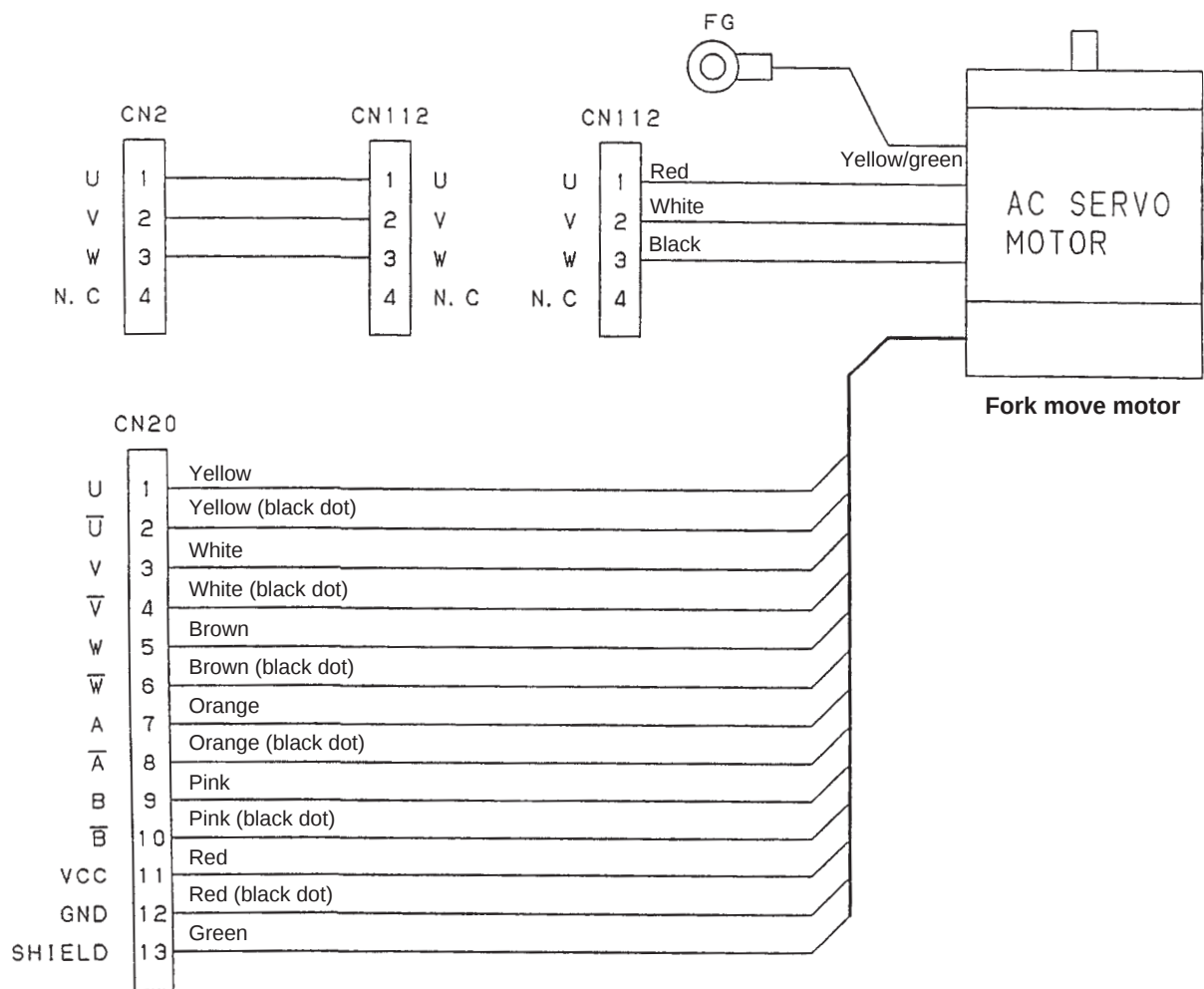
(15) Stepping motor wiring cable circuit diagram



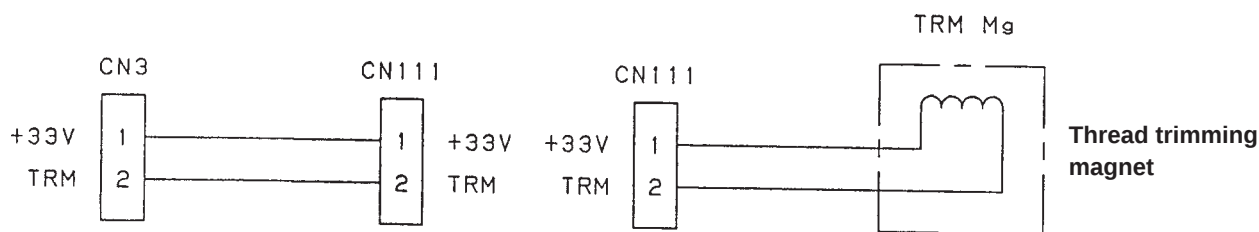
(16) X/Y table stepping motor wiring cable circuit diagram



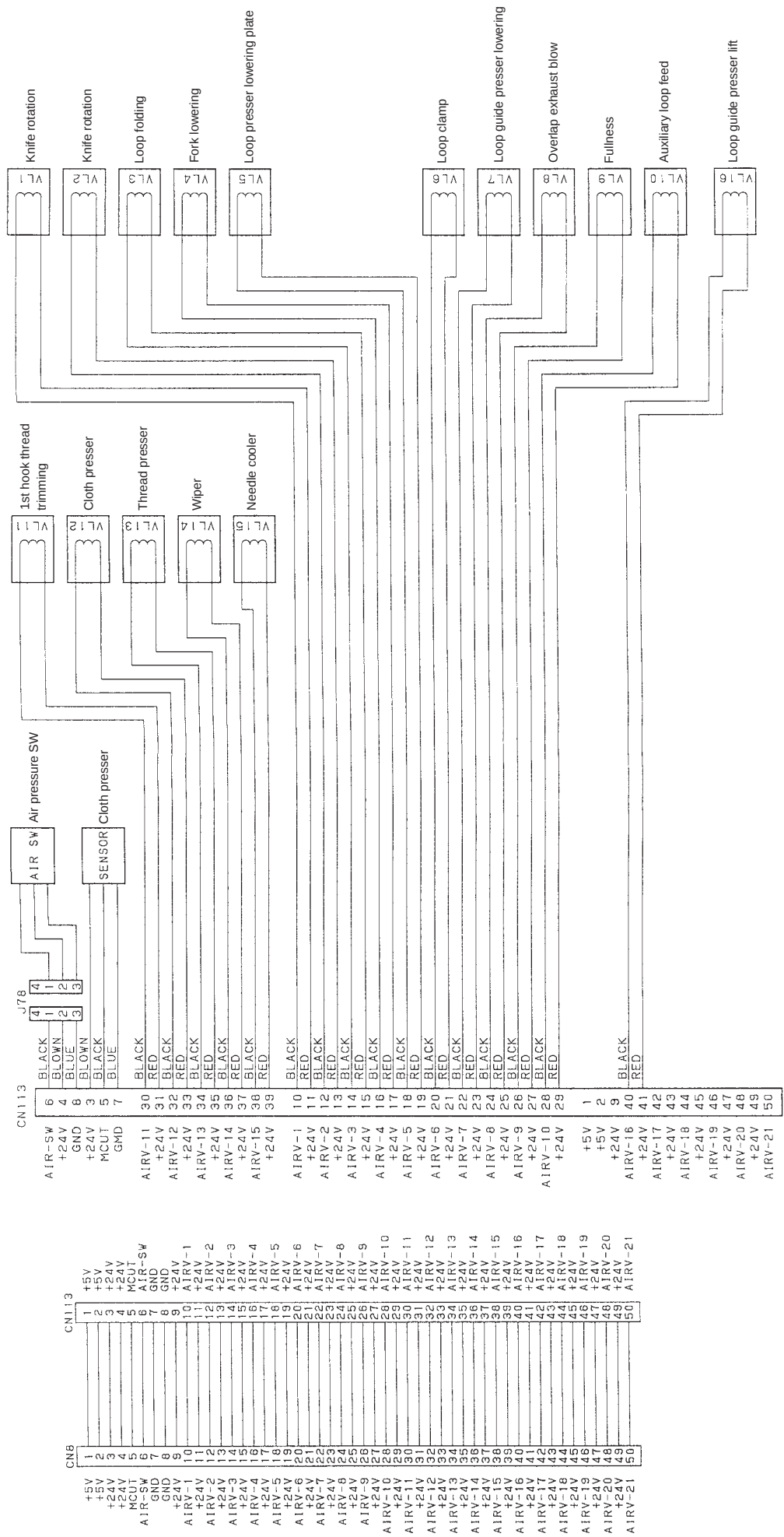
(17) Fork move servo motor wiring cable circuit diagram



(18) Thread trimming Mg. wiring cable circuit diagram



(19) Solenoid valve wiring cable circuit diagram



[3] Sensor input/output table

[Sensor on input side]

No.	Name of sensor	Connector No.
1	Start switch	[CN15-3]
2	Knife bracket sensor	[CN12-8]
4	Fork backward end sensor	[CN12-5]
5	Loop clamp detector sensor	[CN11-2]
6	Loop clamp move origin sensor	[CN11-5]
11	Right needle thread breakage detector	[CN16-1]
12	Left needle thread breakage detector	[CN16-2]
13	Hook cover sensor 2	[CN14-5]
14	Hook cover sensor 1	[CN14-2]
15	Hook move origin sensor	[CN14-8]
16	X table origin sensor	[CN17-2]
17	Y table origin sensor	[CN18-2]
18	Air pressure detector sensor	[CN8-6]
19	Khife lowering sensor	[CN8-5]
29	Hook move rotation sensor	[CN14-11]
32	Loop lock sensor	[CN10-1]
41	DIP-SW 1 on CPU circuit board	
42	DIP-SW 2 on CPU circuit board	
43	DIP-SW 3 on CPU circuit board	
44	DIP-SW 4 on CPU circuit board	
45	DIP-SW 5 on CPU circuit board	
46	DIP-SW 6 on CPU circuit board	
47	DIP-SW 7 on CPU circuit board	
48	DIP-SW 8 on CPU circuit board	

[Sensor on output side]

No.	Name of sensor	Connector No.
1	Knife operation	[CN13-10] (VL1)
2	Knife rotation	[CN13-12] (VL2)
3	Loop folding	[CN13-14] (VL3)
4	Fork lowering (ON : lift)	[CN13-16] (VL4)
5	Loop presser lower plate drive	[CN13-18] (VL5)
6	Loop clamp	[CN13-20] (VL6)
7	Loop guide presser (front/rear)	[CN13-22] (VL7)
8	Overlapped section exhaust blow	[CN13-24] (VL8)
9	Fullness	[CN13-26] (VL9)
10	Auxiliary loop feed	[CN13-28] (VL10)
11	1st hook thread trimming	[CN13-30] (VL11)
12	Cloth presser	[CN13-32] (VL12)
13	Thread presser	[CN13-34] (VL13)
14	Wiper	[CN13-36] (VL14)
15	Needle cooler	[CN13-38] (VL15)

13. TROUBLES AND CORRECTIVE MEASURES

[1] Machine head components

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
1. Machine lock	Defective return of the thread trimming link	Interference of the cam follower stopper with the cam follower	Adjust the clearance provided between the cam follower stopper and the cam follower.
		Interference of the thread release arm with thread release link	Adjust the position of the thread release stopper.
	Position of the thread trimmer cam is wrong.	Marker line on the thread trimmer cam is not adjusted to the marker line on the main shaft.	Adjust the thread trimmer cam.
	Position of the thread trimmer solenoid arm is wrong.	Thread trimmer solenoid arm comes in contact with the thread trimming link. (Longitudinal direction)	Adjust the position of the thread trimmer solenoid arm. (Longitudinal direction)
		Cam follower comes in contact with the cam follower stopper and fails to rotate. (Rotating direction)	Adjust the position of the thread trimmer solenoid arm. (Rotating direction)
	Position of the thread trimming link stopper screw is wrong.	Thread trimmer roller is not properly entered in the groove of the thread trimmer cam.	Adjust the position of the thread trimming link stopper screw.
	Moving knife moves slow (far side).		Adjust the knife pressure of the moving knife.
	Initial position of the moving knife is wrong.		Adjust the initial position of the moving knife.
2. Noise occurs from the face plate section.	Clearance provided between the inner hook and the shuttle driver is large.		Adjust the position of the oscillator.
			Adjust the clearance provided between the inner hook and the shuttle driver.
3. Wiper fails to sweep thread.	Wiper interferes with the needle.	Installing position of the wiper is wrong.	Adjust the installing position of the wiper.
	Wiper operating time is short.		Lengthen the operating time.
	Defective operation of the wiper cylinder		Replace the cylinder.
	Defective operation of the wiper cylinder solenoid valve		The solenoid valve is defective.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
4. Vibration is large.	Grounding of the sewing machine is improper		Securely fix the sewing machine with the level adjuster.
5. Abnormal noise	Backlash between the oscillator and the hook driving shaft is large.		Adjust the oscillator.
6. Deformation in sewing shape	Adjustment of the backlash of the X feed gear is improper.		Adjust the backlash of the X feed gear.
	Adjustment of the backlash of the Y feed gear is improper.		Adjust the backlash of the Y feed gear.
	Moving torque in X direction is large.	Adjustment of the backlash between the stepping motor gear and the X feed arm is improper.	Adjust the backlash of the X feed gear.
	Moving torque in Y direction is large.	Adjustment of the backlash between the stepping motor gear and the Y feed arm is improper..	Adjust the backlash of the Y feed gear.
	Presser pressure is low.	Adjustment of the regulator is improper.	Adjust the regulator.
		Supplying air pressure is low.	Adjust the supplying air pressure.
	There is looseness in the cloth feed base ball.		Adjust the looseness.
7. Cloth presser foot fails to go up or come down.	Supplying air pressure is low.		Adjust the supplying air pressure.
	Adjustment of the regulator is improper.		Adjust the regulator.
	Presser lifting cylinder fails to properly operate.		Check the connector connection.
			Replace the cylinder.
	Solenoid valve fails to properly operate.		Replace the solenoid valve.
	Lifting and lowering operation of the presser is slow.	The presser foot is bent.	Replace the presser foot.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
8. Hook move fails to move.	Trouble of the hook move motor	Disconnected connector	Connect the connector.
			Replace the motor.
	Hook move proximity sensor is defective.	Disconnected connector	Connect the connector.
			Replace the sensor.
	Hook move shaft sensor is defective.	Disconnected connector	Connect the connector.
			Replace the sensor.
	Spline shaft move is defective.		Replace the ball spline.
	Rotation of the ball screw is defective.		Replace the ball screw.
9. There is looseness in the hook base (front side).	Hook base cross roller move is defective.		Replace the cross roller.
	Pressure given to the hook base cross roller is insufficient.		Increase the pressure.
	Hook base cross roller is damaged.		Replace the cross roller.
	Ball screw nut is damaged.		Replace the ball screw.
	Looseness in the ball screw thrust section		Adjust the looseness.
	Hook connecting plate screw is loosened.		Tighten the screw.
	Hook move unit setscrew section is loosened.		Tighten the screw.

2) With regard to sewing

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
1. Slip-off of thread at the start of sewing	Stitch skipping at the first stitch	Cloth feed as against needle is improper.	Narrow the cloth feed as against needle at the start of sewing. (Change of cloth feed as against needle)
			Delay the sewing speed at the start of sewing.
			Change the direction or position of the cloth feed as against needle at the start of sewing.
		Penetration resistance of thread as against cloth is small.	Use a thinner needle. (Lower the count number of the needle used.)
	Length of remaining needle thread is insufficient.	Tension of the thread tension No. 1 is high.	Adjust the tension of the thread tension No. 1.
		Thread release timing is delayed.	Adjust the thread release timing.
		Rising amount of the thread tension disk No. 2 is small.	Adjust the thread release.
		Stroke of the thread take-up spring is large.	Adjust the thread take-up spring.
		Tension of the thread take-up spring is low.	Adjust the thread take-up spring.
		Difference in height between the needle hole guide and the counter knife is too high.	Adjust the height of the counter knife.
		Needle thread tension is high and thread is excessively stretched.	Adjust the needle thread tension.
		There is a scratch at the thread spreading section of the moving knife.	Polish with buff the thread spreading section of the moving knife, or replace the moving knife.

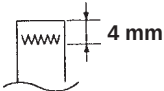


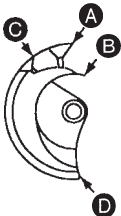
To the next page

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
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Length of the remaining bobbin thread is insufficient.	Difference in height between the needle hole guide and the counter knife is high.	Adjust the height of the counter knife.
	Clearance provided between the needle hole guide and the counter knife is small.	Adjust the position of the counter knife.
	There is a scratch on the bottom face of the needle hole guide.	Polish the needle hole guide or replace it.
	There is a scratch at the thread spreading section of the moving knife.	Polish with buff the thread spreading section of the moving knife, or replace the moving knife.
	There is a scratch in the shuttle hook upper spring.	Remove the scratch or replace the spring.
	Bobbin thread tension is too high.	Adjust the bobbin thread tension.
The sewing product is apt to flop.		Take up the slack in the sewing product.
Threading the needle bar thread guide is wrong.		Refer to the item "Threading the needle bar thread guide".
Bobbin runs idle and bobbin thread protrudes.		Use the exclusive bobbin and bobbin case for MOL-254.
		Increase the tension of the idle prevention spring.
Setting of thread trimming angle on the operation panel is wrong.		Adjust the setting.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
2. Needle breakage	Clearance provided between the needle and the needle guard section of the shuttle driver is improper.		Adjust the clearance provided between the needle and the shuttle driver.
	Clearance provided between the needle and the inner hook is improper.		Adjust the clearance provided between the needle and the inner hook.
	Feed timing is improper.		Change the timing.
	Needle comes in contact with the moving knife.		Adjust the position of the moving knife.
	Needle comes in contact with the presser.		Adjust the position of the presser.
	Needle comes in contact with the wiper.		Adjust the installing position of the wiper.
	Needle is bent.		Replace the needle.
	Needle is too thin.		Change the needle to one suitable for the sewing product.
	There is a scratch in the needle hole guide.		Remove the scratch, or replace the needle hole guide.
3. Stitch skipping	Clearance provided between the needle and the inner hook is large.		Adjust the clearance provided between the needle and the inner hook.
	Needle-to-inner hook timing is improperly adjusted.		Adjust the needle-to-inner hook timing.
	Adjustment of the clearance provided between the needle guard section of the shuttle driver and the needle is improper.		Adjust the clearance provided between the needle and the shuttle driver.
	The sewing product is apt to flop.		Take up the slack in the sewing product.
	Needle is bent or has a blunt tip.		Replace the needle.
	Needle thread loop falls.		Attach the needle with its long groove slanting slightly. (Approx. 20fl)
	Cloth feed timing is improper.		Change the timing.
	Loop end is not pressed.		Adjust the loop supply device.
			

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
4-1. Needle thread breakage	Scratch in the inner hook	Scratch at section A (Inner hook comes in contact with needle.)	Polish the blade point with polishing bar or the like after smoothing the blade point of inner hook with oil stone. Adjust clearance provided between needle and inner hook.
		Scratch at section B (Occurs when needle is bent, or broken.)	Polish with polishing bar or the like after smoothing the scratch with oil stone.
		Scratch at section C (Inner hook is caught on needle when it is removed.)	Polish with polishing bar or the like after smoothing the scratch with oil stone.
		Scratch at section D	Polish with polishing bar or the like after smoothing the scratch with oil stone.
	Thread is caught in the hook.	Position of the shuttle upper spring is improper.	Adjust the position of the shuttle upper spring.
		Blade point section A of the hook has become like "R".	Replace the inner hook.
			
		Position of the shuttle is improper.	Adjust the position of the shuttle.
		Needle thread tension is low.	Adjust the tension of the needle thread.
		Thread take-up spring tension is low.	Adjust the tension of the thread take-up spring.
		Length of the remaining needle thread is long.	Adjust the thread tension No. 1.
		Cloth feed as against needle is improper.	Narrow the cloth feed as against needle at the start of sewing.
			Delay the sewing speed at the start of sewing.
			Change the direction or position of the cloth feed as against needle at the start of sewing.
	There is a scratch in the shuttle driver.		Remove the scratch and polish with buff, or replace the shuttle driver.
	Clearance provided between the shuttle driver and the inner hook is small.		Adjust the clearance provided between the shuttle driver and the inner hook.
	There is a scratch in the needle hole guide.		Remove the scratch or replace the needle hole guide.
	Finish of the needle eyelet is improper.		Replace the needle.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
4-2. Bobbin thread breakage	Bobbin thread tension is too high.		Adjust the bobbin thread tension.
	There is a scratch in the needle hole guide.		Polish with polishing bar after smoothing the scratch with oil stone.
	There is a scratch in the corner of the bobbin case.		Polish with polishing bar after smoothing the scratch with oil stone.
	Adjustment of bobbin thread is improper.		Adjust the lower plate.
	Adjustment of the thread take-up spring is improper.	Stroke of the thread take-up spring is too large.	Adjust the thread take-up spring.
		Tension of the thread take-up spring is too high.	Adjust the thread take-up spring.
	Rotation of the inner hook is defective.	Shuttle race face clogs with lint.	Remove the inner hook and remove the lint.
		Shortage of oil amount	Lubricate oil to the hook.
	Loop end is not pressed.		Adjust the loop supply device.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
5. Thread breakage at the time of thread trimming	Thread release timing is improper.	Thread release timing is slow.	Adjust the thread release timing.
		Rising amount of the thread tension disk No. 2 is small.	Adjust the thread release.
	There is a scratch in the thread spreading section of the moving knife.		Polish the scratch with polishing bar or the like taking care of the blade section.
	There is a scratch in the shuttle upper spring.		Remove the scratch.
	Difference in height between the needle hole guide and the counter knife is high.	Thread is trimmed before the blade of moving knife trims.	Adjust the height of the counter knife.
	Clearance provided between the needle hole guide and the counter knife is small.	Thread is trimmed before the blade of moving knife trims.	Adjust the position of the counter knife.
	There is a scratch on the bottom face of the needle hole guide.	Thread is trimmed with the needle hole guide.	Polish the needle hole guide or replace it.
	Thread spreading timing of the moving knife is improper.		Adjust the initial position of the thread trimmer cam and the moving knife.
	Needle thread tension is too high.		Adjust the needle thread tension.
	Stroke of the thread take-up spring is small.		Adjust the thread take-up spring.
	Tension of the thread take-up spring is high.		Adjust the thread take-up spring.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
6. Defective thread trimming	Knife sharpness is defective.	Friction between the moving and counter knives	Replace the moving knife or counter knife.
		Engagement between the moving and counter knives is improper.	Adjust the height or position of the moving knife.
		Parallelism of the blade tip of the counter knife is improper.	Adjust the parallelism of the blade tip of the counter knife.
		Installing position of the counter knife is improper.	Adjust the installing position of the counter knife.
	Lint remains in the hook cover.	There is a burr at thread spreading section A of the moving knife, and thread trimming shape becomes like  and lint remains.	Polish the burr with polishing bar or the like taking care of the blade section, or replace the moving knife.
		There is a scratch in the shuttle upper spring, and thread trimming shape becomes like  and lint remains.	Remove the scratch.
	Moving knife does not spread thread.	Adjustment of the initial position of the moving knife is improper.	Adjust the initial position of the moving knife.
		Locus of the moving knife is improper.	Replace the moving knife or the throat plate.
		Position of the thread trimmer cam is improper.	Adjust the position of the thread trimmer cam.
		Position of the shuttle upper spring is improper.	Adjust the position of the shuttle upper spring.
	Stitch skipping at the last stitch.	Needle-to-inner hook timing and the clearance are improper.	Adjust the timing or the clearance.
		Fall of the needle thread loop	Attach the needle with its long groove facing slightly to the right. (Appox. 20°)
	Bobbin thread is not trimmed.	Cloth feed as against needle at the last stitch is narrow.	Adjust the stitch length of the last stitch to 1 mm or more.
		Bobbin thread tension is low.	Increase the bobbin thread tension.
		Needle hole in the needle hole guide is large.	Change the needle hole guide to one with small diameter of the hole.

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Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
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	Thread trimming solenoid fails to work. (Far side)		Replace the solenoid.
	Thread trimming cylinder fails to work. (This side)		Replace the cylinder.
	Cylinder solenoid valve (This side)		Replace the solenoid valve.
7. Poorly tensed stitches are made.	Adjustment of the thread tension No. 2 is improper.	Replace the solenoid.	Adjust the tension of the thread tension No. 2.
	Thread tension No. 2 is rising.		Adjust the thread release mechanism.
	Adjustment of the thread take-up spring is improper.	Tension of the thread take-up spring is low.	Adjust the thread take-up spring.
		Stroke of the thread take-up spring is large.	Adjust the stroke of the thread take-up spring.
	Clearance provided between the inner hook and the shuttle driver is improper.		Adjust the clearance provided between the inner hook and the shuttle driver.
	Selection of the needle used is improper.	Needle used is thin.	Replace the needle with a thicker one.
	Selection of the needle hole guide is improper.	Hole diameter of the needle hole guide is small as against the needle used and the thread.	Change the needle hole guide to one with large diameter of the hole.
	Feed timing is improper.		Change the timing.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
8. Defective sewing when synthetic thread is used	Thread breakage due to heat	Sewing speed is fast.	Decrease the maximum sewing speed.
		Needle is thick.	Use a thin needle or a super needle for synthetic thread.
			Use the needle cooler. (Optional)
	Hangnail of thread	Defective thread path	Polish the respective thread paths with polishing bar or the like.
		Finish of the needle eyelet is improper.	Replace the needle.
	Thread rises at the start of sewing.	Cloth feed as against needle is improper.	Narrow the cloth feed as against needle at the start of sewing.
			Delay the sewing speed at the start of sewing.
			Change the direction or position of the cloth feed as against needle at the start of sewing.
		Penetration resistance of thread as against cloth is small.	Use a thin needle. (Lower the count number of the needle used.)
		Feed timing is improper.	Change the timing.
	Stitch skipping due to heat	Sewing speed is fast.	Change the maximum sewing speed. (Electrical components)
		Needle is thin.	Use a thick needle. (Raise the count number of the needle used.)
		Fall of the needle thread loop	Attach the needle with its long groove slanting slightly (Approx. 20°)
	Uneven tensed stitches due to stretch of thread	Sewing speed is fast.	Decrease the sewing speed through the operation box panel.
		Tension of the thread tension No. 2 is high.	Decrease the tension of the thread tension No. 2.

[2] Device components

(1) Trouble and corrective measure

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Belt loops cannot be cut.	The loop cut knife fails to cut belt loops sharply.		Grind or replace the knife.
	The loop cut knife fails to properly engage with the counter knife.	The moving knife fixing screw is loosened.	Tighten the moving knife fixing screw.
	The loop cut cylinder fails to move.	Solenoid valve has broken. Or, the solenoid valve connector is disconnected.	Replace the solenoid valve. Check the connection of the connector.
	The loop cut cylinder does not move smoothly.	Adjustment of the lower position sensor of the loop cut knife cylinder is improper.	Re-adjust the lower position sensor of the loop cut knife cylinder to the proper position.
Belt loops cannot be cut neatly.	Blade is worn out.		Grind or replace the blade.
	Worn-out or broken blade of the counter knife		Grind or replace the counter knife.
Cross cutter fails to cut belt loops at the center.	The position at which the cross cutter cuts belt loops is not correct.		Adjust the position of the cross cut knife referring to the item "Changing the width of belt loops".
	The belt loop guide plate is shifted.		Adjust the belt loop guide referring to the item "Changing the width of belt loops".

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Belt loop splice is not detected.	Data has not been inputted.		Input the data value with the belt loop used.
	Belt loop which is different from input data is used.		Replace the belt loop with the correct one or input data with the belt loop used.
	Level meter fails to work.	Fixing screws of gear, sensor installing plate, etc. are loosened.	Adjust the parts to the correct positions and fix the loosened screws.
		Sensor has broken.	Replace the sensor.
Belt loop splice is mistakenly detected.	Belt loop which is different from input data is used.		Replace the belt loop with the correct one or input data with the belt loop used.
	Fixing screws of gear, sensor installing plate, etc. are loosened.		Adjust the parts to the correct positions and fix the loosened screws.
	Adjustment of the backlash of reduction gear in the splice detector mechanism is improper.		Adjust the backlash amount of the reduction gear.
Belt loop splice section remains at cross cut section.	The splice judge setting position is not adjusted to the width of belt loop.	Set value of [BD] (front) or [BE] (rear) of the splice judge setting position is not adjusted to the width of belt loop.	Adjust the set value of [BD] (front) or [BE] (rear) of the splice judge setting position.
	Belt loop is being caught.		Remove the cause of being caught from the belt loop.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Belt loops cannot be fed.	Belt loop feed roller fails to rotate.	Motor fails to work.	Replace the motor or check the connection of the connector.
		Sprocket fixing screw is loosened.	Tighten the fixing screw in the sprocket.
		There is no belt tension.	Adjust the belt tension to the proper one.
Belt loops cannot be fed at the specified dimension.	Belt loop feed roller rotates but belt is not supplied.	The loop width guide comes in excessive contact with belt.	Adjust the loop width guide to the proper dimension.
		Height of the belt loop feed roller is too high.	Adjust the height of the loop feed roller to the proper dimension.
		Pressing pressure of the belt loop feed roller is too low.	Adjust the pressing pressure of the loop feed roller to the proper one.
		Belt is being caught in the roller.	Remove the cause of being caught from the belt.
Clamp feed fails to clamp the belt.	Cylinder fails to move.	Solenoid valve has broken.	Replace the solenoid valve.
		Connector is disconnected.	Check the connection of the connector.
	Belt feeding amount is insufficient.		Change the belt feed [BC] data to the + (plus) side.
	Clamp feed forward amount is insufficient.	Position of the sensor is improper.	Adjust the sensor to the proper position.
	Clamp feed opening fails to close.	Length of engagement of the cylinder and the knuckle is too long.	Adjust the length of engagement to the proper dimension.
		Rotation shaft has come off.	Install the shaft.
	Height of the loop cut unit is improper.		Adjust the height so that the top surface of the clamp feed base plate is aligned with the height of the counter knife.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Clamp feed cannot pull out the belt.	Position of the clamp feed rear sensor is wrong.		Adjust the position of the rear sensor.
	Belt loop is being caught.		Remove the cause of being caught from the belt.
Belt loop cannot be clamped by folding wire.	Heights of the folding wires are not equal.		Adjust the heights of the front and rear folding shafts.
	Heights of the folding shafts are not equal.	Protruding amount of the supply cam up/down cylinder is improper.	Adjust the length of engagement of the supply cam up/down cylinder and the rod end.
	Belt is bent.		Change over the belt loop cut operation. (DIP SW No. 4 on the CPU circuit board)
Rear folding amount is insufficient.	The length is too short.	Belt feed amount [BC] is small.	Set the proper dimension.
		Position of the clamp feed front sensor is improper.	Adjust the position of the front sensor.
	The length is too long.	Belt feed amount [BC] is large.	Set the proper dimension.

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Front folding amount is insufficient.	The length is too short.	Position of the belt loop cut unit is set excessively to the rear side.	Adjust the belt loop cut unit to the proper position.
	The length is too long.	Position of the belt loop cut unit is set excessively to the front side.	Adjust the belt loop cut unit to the proper position.
Left and right bartacking positions are shifted with each other.	Width of the belt loop is improper.		Input the width of the belt loop used. "(nF) value"
	Position of the belt loop supply is shifted.		Adjust the position with the bartacking position fine adjustment setting "nG".
Upper and lower bartacking positions are shifted with each other.	The folding shaft is not at right angles with the machine head.	Two needles and the tips of the two folding shafts are not parallel.	Set the two needles and the tips of the two folding shafts to parallel.
	Belt is not supplied parallel to the belt folding shaft.	The clamp feed base plate is bent.	Set the clamp feed base plate and the machine head to parallel.
	Longitudinal position of the folding shaft is shifted.		Adjust the longitudinal position of the folding shaft to the proper one.

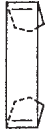
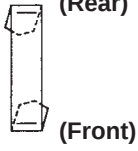
Optional

Trouble	Cause (1)	Cause (2)	Checking order and adjusting procedure
Loop pull-out device fails to work.	The connector of the solenoid valve is wrong.		Connect the correct connector. VL10
	DIP switch is not turned ON.		Turn ON the upper DIP switch No. 4 on the right side of the operation box panel.
Loop pull-out device operates slow.	Adjustment amount of the speed controller of the cylinder is improper.		Adjust the speed to the proper one.
Belt loop tension releasing device fails to work.	The connector of the solenoid valve is wrong.		Connect the correct connector. VL9
	DIP switch is not turned ON.		Turn ON the lower DIP switch No. 3 on the right side of the operation box panel.
	Data value is not inputted to the panel setting screen "nH".		Input the necessary releasing amount.
Belt loop tension releasing device operates slow.	Adjustment amount of the speed controller of the cylinder is improper.		Adjust the speed to the proper one.
Needle thread breakage detector fails to work.	DIP switch is not turned ON.		Turn ON the upper DIP switch No. 3 on the right side of the operation box panel.
	Cable has broken.		Replace the cable.
	The thread take-up spring fails to work.	Adjustment amount is improper.	Adjust the stroke and tension of the spring to the proper ones.
		The thread take-up spring has broken.	Replace the thread take-up spring.
	The needle cooler fails to work.	The connector of the solenoid valve is wrong.	Connect the correct connector. VL15

(2) Corrective measures for the dog-eared belt loop

Dog-eared belt loops may be produced as described below. To correct the failed belt loops, first check that the belt loop receiver components are properly positioned to provide adequate relations among them. In addition, consider the following.

1. For light-weight belt loops, slight deviation from the reference does not cause a serious problem in most cases. For heavy-weight belt loops or stiff belt loops in which an interlining is inserted, even slight deviation from the reference may result in a serious problem. So, it is necessary to perform the accurate adjustment of the components.
2. Dog-eared belt loops are apt to be produced when the belt loops are bent. If the pattern of dog-eared belt loops are not uniform when continuously sewing them or dog-eared belt loops are suddenly made, check first that belt loops do not have any problem.
3. Belt loops are likely to bend aslant in accordance with direction of texture, resulting in the trouble of dog-eared belt loops. In this case, the dog-eared belt loop appears as C where the dog-eared portions on the front and rear are alternately oriented. This trouble can be corrected to a certain extent by taking corrective measures for C.
4. Positioning of the belt-loop shifter is a decisive factor to determine the finished quality of the belt loop. This means that positioning of the belt-loop shifter becomes more and more difficult as variation in width of belt loops become larger, there by making the correction of dog-eared belt loops difficult. It is therefore recommended to use belt loops that have uniform width.
If belt loops have no defect and the reference position is correct, adjust the related components referring to the "Cause and corrective measure" in accordance with failures.

Phenomenon	Cause	Corrective measure
 Left-hand side of belt loop is dog-eared.	1. Loop gather clicks B (front/rear) excessively press the side of belt loop. 2. Folding shaft excessively protrudes.	1. Move the loop gather click B to the left and adjust the distance between the side face of the loop catch and the loop gather. 2. Move the folding shaft to the right so that it recedes. Change to the right side the [BI] value on the adjustment screen of the operation box panel. See the Instruction Manual on page 48.
 Right-hand side of belt loop is dog-eared.	1. Distance between loop gather clicks B (front/rear) and the side face of the loop catch is larger than the belt loop width. 2. Folding shaft excessively recedes.	1. Move the loop gather click B to the right to adjust the distance mentioned in the left column to the belt loop width. 2. Advance the folding shaft to the left. Change to the right side the [BI] value on the adjustment screen of the operation box panel. See the Instruction Manual on page 48.
 Dog-eared portions on the front and rear of belt loop are alternately oriented.	1. Distance between loop gather clicks (front/rear) and the side face of the loop catch is different from the belt loop width. 2. For the front and rear folding shafts, one excessively recedes and the other excessively extrudes. 3. Belt loops are likely to bend aslant because of belt loop texture direction.	1. Move the loop gather click to the left for the side of belt loop on which dog-eared portion appears on the left, or to the right for the side of belt loop on which dog-eared portion appears on the right. 2. Move the folding shaft back toward the right for the side of belt loop on which dog-eared portion appears on the left, or forward toward the left for the side of belt loop on which dog-eared portion appears on the right. This adjustment makes the folding shaft metal bracket advance. 3. Perform the same adjustment as those described in the corrective measures 1 and 2.
Heavy-weight interlined and stiff belt loop	1. Pressure of the loop folding cylinder is insufficient.	1. Turn the pressure reducing knob attached to B-port of the device SV unit No. 3 clockwise to increase the pressure.
Heavy-weight and stiff belt loop is used and belt tension releasing amount is set to a large amount.	1. When supplying belt loops, the belt loops come in contact with the sole of the presser foot and moves away from the correct position.	Lifting amount of the presser foot is insufficient. Adjust the height of the presser foot (22 mm above the top surface of the throat plate).
 Belt loop greatly tilts to the right.	Presser foot fails to move up or down smoothly, and the presser foot fails to fully descend when the belt loop completely comes out of the folding wire.	Expel air from the machine. Raise or lower the the presser foot by hand to check its movement. If the installing section of the presser foot cylinder jars, correct it.

[3] Electrical components

When the phenomenon has not been corrected after performing the corrective measures referring to the item "Checking point and corrective measure", the circuit board or sensor is considered to be damaged. Replace the part with one described in the item "Replacing part".

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
1	Alarm No. [AL-01] is displayed on the operation box panel immediately after turning ON the power. (Sewing machine motor fails to rotate.)	Check the alarm LED on the SDC circuit board.		SDC circuit board
		1-time flashing, motor-lock, is displayed.	Turn main shaft by hand and remove the mechanical cause if it does not rotate smoothly. It is considered that connector CN49 is disconnected or the cable has broken. Correctly connect it.	
		5-time flashing, motor driver element error, is displayed.	It is considered that the circuit board has broken. Replace the circuit board.	
		6-time flashing, detection of low voltage of power voltage, is displayed.	Check the operating power and setting of the power changeover tap.	
		8-time flashing, detection of high voltage of power voltage, is displayed.	Check the operating power and setting of the power changeover tap.	
		10-time flashing, input of motor control method, is displayed.	It is considered that the circuit board has broken. Replace the circuit board.	
2	Alarm No. [AL-01] is displayed on the operation box panel while the sewing machine motor is rotating. (Including the needle-up detection rotation immediately after turning ON the power)	Check the alarm LED on the SDC circuit board.		SDET sensor
		2-time flashing, defective upper dead point sensor, is displayed.	It is considered that connector CN44 or CN114 is disconnected, or the cable has broken. Correctly connect it.	SDC circuit board
		3-time flashing, detection of defective motor encoder, is displayed.	It is considered that connector CN43 is disconnected, or the cable has broken. Correctly connect it.	Main shaft servo motor
		4-time flashing, detection of defective motor position sensor, is displayed.	It is considered that sewing machine main shaft servo motor has trouble.	
		5-time flashing, motor driver element error, is displayed.	Check whether the fan motor is rotating, or the filter clogs with dust.	
		7-time flashing, detection of motor control current limitation value, is displayed.	It is considered that a heavy load is applied to main shaft during rotation of the sewing machine. Check whether there is any torque that produces problem.	
		9-time flashing, defective motor rotation direction, is displayed.	It is considered that the sewing machine servo motor has trouble.	
3	Alarm No. [AL-04] is displayed on the operation box panel while the sewing machine motor is rotating.	Errors frequently occur after changing the sewing data.	Check whether the set value of machine head X-Y drive timing is the standard value, 50°. In case of setting of 70°, re-set the data [CE] to 50.	SDET sensor SDC circuit board MAIN circuit board
4	Alarm No. [AL-07] is displayed on the operation box panel while the sewing machine motor is rotating.	Errors frequently occur after changing the sewing data.	Check whether the set value of machine head X-Y drive timing is the standard value, 50°. In case of setting of 70°, re-set the data [CE] to 50.	
5	Alarm No. [AL10] is displayed on the operation box panel.	Error is not recovered although the specified value of air pressure is supplied.	It is considered that connector J78, CN113 or CN8 is disconnected, or the cable has broken. Correctly connect it.	Air regulator
		Error occurs during operation, but is recovered later.	Supply or adjust air so that the air pressure indicating pointer becomes 0.5 Mpa. Use air piping method and supply source with which the pointer does not become lower than 0.4 Mpa during sewing.	

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
6	Alarm No. [AL-13] is displayed on the operation box panel.	Fan filter clogs with dust.	Clean the fan motor filter and the exhaust slot.	MAIN circuit board
		Fan motor fails to rotate.	It is considered that connector CN34 is disconnected, or the cable has broken. Correctly connect it.	Fan motor
7	Thread breakage detection operation is defective.	Thread breakage detection error appears although needle thread is not trimmed.	Check the connection (resistance value) between thread breakage detector plate and machine head (FG). Adjust so that the resistance value between machine head and the detector plate is 0Ω when the thread take-up spring comes in contact with the detector plate and it is infinite when the thread take-up spring leaves from the detector plate.	Thread breakage detection device
		Thread breakage detector fails to work although needle thread is trimmed.	Re-adjust as described above. Check the setting whether thread breakage detection is effective. (ON the upper SW3 of DIP switches on the side of the operation box panel) It is considered that connector CN16 is disconnected or the cable has broken. Correctly connect it.	Thread breakage detection device
8	Data setting is not possible.	Sewing data [1*] can refer, but setting or change cannot be performed.	Data lock function is working when "DATA LOCK" is displayed at the bottom of the screen. Hold pressing the standard screen key for 10 seconds or more to release the data lock.	MAIN circuit board
		Adjustment data [B*] can refer, but setting or change cannot be performed.	Data lock function is working when "DATA LOCK" is displayed at the bottom of the screen. Hold pressing the standard screen key for 10 seconds or more to release the data lock.	
			Adjustment screen protect is performed when there is a padlock mark indication at the lower right of the screen. Turn ON the upper SW2 of DIP switches on the operation box panel to release the protect.	
9	Alarm No. [AL-32] is displayed on the operation box panel when pressing the start switch.	Machine head is located at normal position, but error cannot be released.	It is considered that connector CN115 or CN12, or the cable has broken. Correctly connect it.	Head detection SW
10	Belt loop splice cutting procedure is abnormal.	Splice cutting section is supplied as normal loop.	There is a possibility of maladjustment. Perform again the setting of belt loop splice detection with the loop currently used.	Loop thickness sensor
			Check whether there is any place where a load is applied to the belt in the supplying route of the belt loop. (Especially, check whether the splice section is being caught in some place or there is any slide at motor gear section making use of the step operation function.)	
		Splice border line is sometimes supplied.	Re-check the splice cutting setting [BD] and [BE] and set them to the proper values.	
11	Belt loop length is different from the set value.	The length becomes sometimes shorter than the set value.	Check whether there is any place where a load is applied to the belt in the supplying route of the belt loop. (Especially, check whether the splice section is being caught in some place or there is any slide at motor gear section making use of the step operation function.)	Loop feed/pull-out stepping motor
		Belt loop which is slack in the center is supplied.	Check whether the fullness setting is proper.	MAIN circuit board
12	Alarm No. [AL-44] is displayed on the operation box panel immediately after turning ON the power.	Alarm remains and the display cannot return to the normal state.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
13	Error is not displayed on the operation box panel, but initial operation fails after turning ON the power.	This occurs after replacing mistakenly the ROM. (Inserting ROM in the reverse direction, mounting different ROM, etc.)	It is considered that a part of memory data is damaged (lost). Perform initial setting of the memory data.	MAIN circuit board
14	Alarm No. [AL-45] is displayed on the operation box panel during belt loop supply operation.	Loop pull-out device stops before the pull-out position.	It is considered that the loop pull-out stepping motor has stepped out and stopped on the way. Check whether there is any mechanical interference between the pull-out device and some place.	MAIN circuit board
			It is considered that connector CN107 or CN4 is disconnected, or the cable has broken. Correctly connect it.	
		Loop pull-out device goes over the pull-out position, collides with the knife bracket and stops.	It is considered that adjustment of the knife bracket sensor is defective. Perform adjustment of the sensor.	Knife bracket sensor
			It is considered that connector CN101 or CN12 is disconnected, or the cable has broken. Correctly connect it.	
15	Alarm No. [AL-48] is displayed on the operation box panel at the time of fork origin retrieval operation.	Input of the fork backward end (origin) sensor is defective when the fork recedes.	It is considered that adjustment of the fork backward end (origin) sensor is defective. Perform adjustment of the sensor.	Fork origin sensor
			It is considered that connector CN12 or connector directly attached to the sensor is disconnected, or the cable has broken. Correctly connect it.	
16	Alarm No. [AL-49] is displayed on the operation box panel immediately after turning ON the power.	Check the alarm LED on the MAIN circuit board.		
		1-time flashing, motor-lock, is displayed.	Move the fork by hand and remove the mechanical cause if it does not move smoothly.	Fork servo motor
			It is considered that connector CN112 or CN12 is disconnected, or the cable has broken. Correctly connect it.	MAIN circuit board
		2-time flashing, blown-out of fuse, is displayed.	Replace F1 fuse 6.3AT mounted on the MAIN circuit board since the fuse has blown out. It is considered that the cause is due to the collision of the fork with some place while operating. Check whether there is any problem.	Fuse MAIN circuit board
		3-time flashing, defective power voltage, is displayed.	Check the operating power and setting of the power changeover tap.	MAIN circuit board
		4-time flashing, defective boosting voltage, is displayed.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
		5-time flashing, disconnection of encoder cable, is displayed.	It is considered that connector CN20 is disconnected, or the cable has broken. Correctly connect it.	MAIN circuit board
		6-time flashing, detection of abnormal current, is displayed.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
		7-time flashing, abnormal temperature, is displayed.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
16	Alarm No. [AL-49] is displayed on the operation box panel immediately after turning ON the power.	8-time flashing, shift of fork position	It is considered that adjustment of the fork backward end (origin) sensor is improper. In addition, check whether the sensor slit clogs with dust such as lint or the like.	Fork origin sensor
			It is considered that connector CN12 or connector directly attached to the sensor is disconnected, or the cable has broken. Correctly connect it.	
		9-time flashing, fork overrun error	Move the fork by hand and remove the mechanical cause when the uneven torque is large and especially the torque at the top end of the fork is light.	MAIN circuit board
		10-time flashing, accumulated pulse overflow	Move the fork by hand and remove the mechanical cause when it does not move smoothly.	
		11-time flashing, defective overload	It is considered that the MAIN circuit board has been damaged when the alarm occurs many times. Replace the circuit board.	Fork servo motor
		12-time flashing, defective overload		
		13-time flashing, defective number of rotations		
		14-time flashing, system error		
17	Alarm No. [AL-50] is displayed on the operation box panel.	Alarm frequently occurs, or it is impossible to release the alarm after it has occurred.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
18	Alarm No. [AL-51] is displayed on the operation box panel.	Alarm frequently occurs, or it is impossible to release the alarm after it has occurred.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
19	Alarm No. [AL-52] is displayed on the operation box panel.	Alarm frequently occurs, or it is impossible to release the alarm after it has occurred.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
20	Alarm No. [AL-53] is displayed on the operation box panel.	Alarm frequently occurs, or it is impossible to release the alarm after it has occurred.	It is considered that the MAIN circuit board is damaged. Replace the circuit board.	MAIN circuit board
21	Alarm No. [AL-55] is displayed on the operation box panel.	Alarm occurs while the belt loop is being fed.	Check whether there is any portion where a load is applied to the belt loop in the route of the optional auxiliary belt loop supply device and belt loop supply source. (Belt loop is entangled, and the belt loop rotates in the reverse direction by the reaction after the belt loop has been fed when the belt loop is supplied by reel. This gives a load to the belt loop.)	Loop lock detection SW

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
22	Alarm No. [AL-56] is displayed on the operation box panel.	This occurs when the belt loop splice is being eliminated.	Check the length of belt loop cut section. When the length is 200 mm or more, make the splice length less than 200 mm. There is a possibility of maladjustment when the length is less than 200 mm. Perform re-setting of belt loop splice detector with the belt loop currently used.	Loop thickness detector SW MAIN circuit board
			Check whether there is any portion where a load is applied to the belt in the route of belt loop supply. (Especially, check whether the splice section is caught in somewhere or whether there is any slide in the feed motor gear section making use of the step operation function.)	
		This occurs when the belt loop splice is not being eliminated.	There is a possibility of maladjustment. Perform re-setting of belt loop splice detector with the belt currently used.	
			Check whether there is any portion where a load is applied to the belt in the route of belt loop supply. (Especially, check whether the splice section is caught in somewhere or whether there is any slide in the feed motor gear section making use of the step operation function.)	
23	Alarm No. [AL-61] is displayed on the operation box panel.	Alarm occurs although the hook cover is closed.	It is considered that connector CN103 or CN14 is disconnected, or the cable has broken. Correctly connect it.	Hook cover sensor
			It is considered that the hook cover sensor or hook cover is not properly adjusted. Perform re-adjustment.	
24	Alarm No. [AL-62] is displayed on the operation box panel.	It is considered that the 1st hook unit moved to its forward end and has stopped immediately after turning ON the power.	It is considered that connector CN104 or CN14 is disconnected, or the cable has broken. Correctly connect it.	Hook move origin sensor 1
			There is a possibility of maladjustment. Perform re-adjustment of the hook move origin sensor 1.	
		It is considered that the 1st hook unit has stopped while the needle is almost aligned with the needle hole immediately after turning ON the power.	It is considered that connector CN14 or connector directly attached to the sensor is disconnected, or the cable has broken. Correctly connect it.	Hook move origin sensor 2
			There is a possibility of maladjustment. Perform re-adjustment of the hook move origin sensor 2. In addition, check whether the sensor slit clogs with dust such as lint or the like.	
25	Bobbin winder device fails to work.	Error No. [AL-49] is displayed on the operation box panel.	Fuse of the bobbin winder device power has blown. Replace the fuse.	Fuse
		The state is that there is no error display on the operation box panel.	Check whether the switch with thermal fuse attached to the device is turned ON.	Bobbin winder device
			Check whether the bobbin presser is raised.	
			It is considered that connector CN105 or CN6 is disconnected, or the cable has broken. Correctly connect it.	

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
26	X/Y sewing table feed varies.	X-axis feed steps out.	Move the table by hand in the direction of X-axis and remove the mechanical cause when the table does not move smoothly.	PMDC circuit board X-axis stepping motor
			Check whether the cloth is pulled while the move of garment body to the next loop sewing place during sewing is considered.	
			It is considered that connector CN109 or J62 is disconnected, or the cable has broken. Correctly connect it.	
		Y-axis feed steps out.	Move the table by hand in the direction of Y-axis and remove the mechanical cause when the table does not move smoothly.	Y-axis stepping motor
			It is considered that connector CN110 or J62 is disconnected, or the cable has broken. Correctly connect it.	
		Feed completely fails to move.	It is considered that connector CN7, CN109, CN110, J60, J61 or J62 is disconnected, or the cable has broken. Correctly connect it.	
		Optional user's sewing data is used.	It is considered that sewing cannot be performed at the max. spec. number of rotations in accordance with the sewing data pattern (pattern of cloth feed as against needle) created by the user. Consult us about this matter since it is considered that setting of the max. number of rotations as against each pitch of the user's data is necessary. There is also a case where simply reducing the max. number of rotations with the operation box panel is effective.	
27	Power specifications have been changed.	Power voltage has been changed.	Change-over of the transformer input tap can meet whichever voltage, 220V, 230V, 240V, 380V or 480V. Perform the work referring to the item "Change-over of the power specifications".	
		Number of power phases has been changed from 3-phase to single phase.	It is possible to change the 3-phase power specifications to the single-phase power specifications by simple remodelling. Perform the work referring to the item "Change-over of the power specifications".	Power cable (Remodelling accepted)
		Number of power phases has been changed from single-phase to 3-phase.	In order to change the single-phase power specifications to the 3-phase power specifications, it is necessary to perform the troublesome work of remodelling to some extent. Perform the work of the cable by reversing the remodelling procedure of 3-phase → single-phase referring to the item "Change-over of the power specifications". (Actually, all installation of electric equipment of this machine is of single-phase and the power cable is not electrically connected even when the power cable is changed to the 3-phase specifications. The machine operates normally even when the single-phase power cables are connected to two cords in the 3-phase power.	Power cable (Remodelling accepted)

No.	Phenomenon	Detailed state	Checking point and corrective measure	Replacing part
28	Nothing is displayed on the operation box panel.	Screen is bright and back-light is lighting.	There is a possibility of blown-out of fuse F6 (6.3AT) mounted on the PWR circuit board. Check it.	Fuse
			It is considered that connector CN19 or CN40 is disconnected, or the cable has broken. Correctly connect it.	Operation box panel
		Screen is dark and back-light is not lighting.	There is a possibility of blown-out of fuse F5 (6.3AT) mounted on the PWR circuit board. Check it.	Fuse
			It is considered that connector CN9 is disconnected, or the cable has broken. Correctly connect it.	Operation box panel
29	Data has disappeared from the operation box panel.	The set data cannot be stored when turning OFF the power.	It is considered that battery back-up is abnormal. Replace the MAIN circuit board. At this time, be sure to re-turn ON the power and make a memorandum of the origin set values such as <BB>, <BG>, <BH>, <BI>, etc. in order to re-input important data in the replacing circuit board.	MAIN circuit board
30	Output of the belt loop thickness detector sensor is abnormal.	Output of the sensor does not change.	It is considered that connector CN13 is disconnected, or the cable has broken. Correctly connect it.	Loop thickness detector SW
			Effective range of output of this sensor is the specified range of 90° only. It is considered that there is a possibility of maladjustment of outside of the range. Check the sensor for the state of adjustment.	
31	The sewing machine does not start even when pressing the start switch.	Alarm No. is not displayed on the operation box panel.	Check whether the sewing machine is in the sewing possible state that the set ready LED lights up.	Start SW
			It is considered that connector CN15 is disconnected, or the cable has broken. Correctly connect it.	MAIN circuit board
			It is considered that the start switch and the switch lever are improperly adjusted. Perform re-adjustment.	
32	Thread trimming operation is abnormal.	The 1st hook thread trimmer fails to operate.	The cause is due to the drive of air cylinder when the operation indication lamp of the solenoid valve lights up. Check the air piping.	Solenoid valve
			It is considered that connector No. 11 directly attached to the solenoid valve, connector CN8 or CN113 is disconnected, or the cable has broken. Correctly connect it.	
		The 2nd hook thread trimmer fails to operate.	It is considered that connector CN3 or CN111 is disconnected, or the cable has broken because of the operation by the thread trimmer solenoid. Correctly connect it.	MAIN circuit board
33	The power is cut when using the machine under the high voltage specifications.	Thermal protect of the power switch for high voltage is operating.	Check whether the thermal set value as against the operating power voltage is correct. For the power voltage, 220V, 230V and 240V, set the value to [4.0] and for the power voltage, 380V and 400V, set the value to [2.5].	Power SW