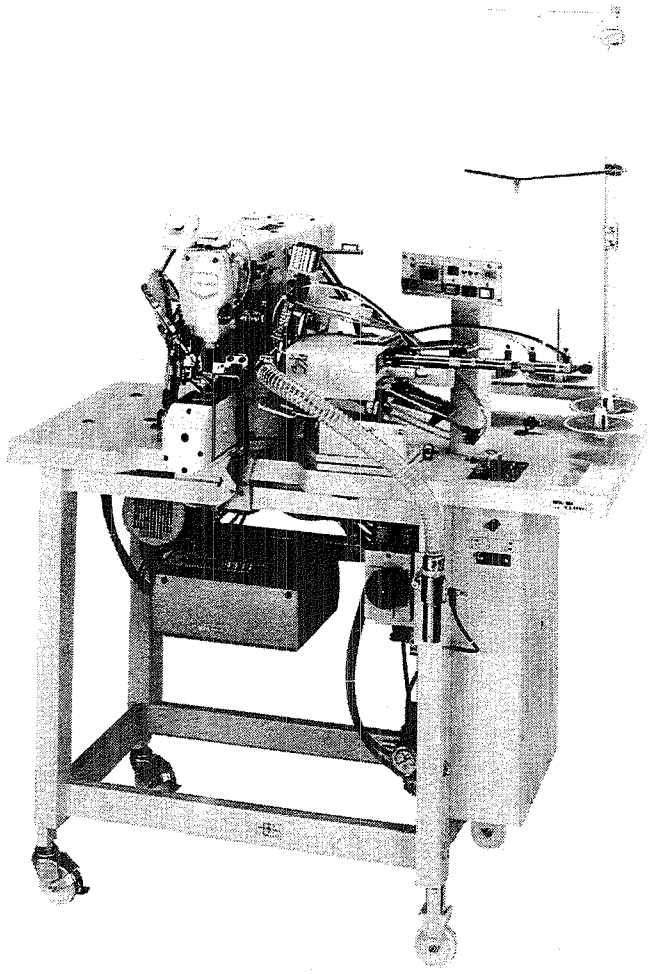
ALEX MCINTOSH

JUKI®

2-NEEDLE, AUTOMATIC BELT-LOOP ATTACHING MACHINE

MOL-154

ENGINEER'S MANUAL



No. IV-76
1995. 4

GROUNDING INSTRUCTIONS

- This machine has to be grounded. In case of a malfunction or breakdown, the earth provides a low-resistance path for electric current so as to reduce danger of electrical shock.
  This machine comes with its grounding conductor and a cord which has a power plug equipped with a grounding terminal. The power plug has to be attached in position correctly and connected to an appropriate grounded receptacle according to all the effective local rules and regulations in your area.

DANGER

1. Improperly connected conductor for grounding the machine can give rise to danger of electrical shock. The conductor for grounding the machine is the one with the surface that is colored in green with yellow stripes or simply in green without stripes. If the cord or the power plug needs to be repaired or replaced, the conductor for grounding the machine shall not be connected to an energizing terminal.
2. If you do not fully understand the grounding instructions or you are not sure whether the machine has been correctly grounded, consult with qualified electrical technicians or servicepersons.
3. Do not change the power plug equipped with the machine.
   If this power plug does not fit the receptacle available in the place of installation, have a qualified electrical technician attach an appropriate power plug to the receptacle.
4. This machine operates with the nominal rated circuit shown on the nameplate on the PSC box. A cord and power plug which conform to the rated circuit are to be prepared by your plant. Using an adapter with this machine is prohibited. If the machine needs to be re- connected so as to use it with an electric circuit of a different type, re-connecting work has to be done by a qualified serviceperson. After the re-connection, the machine has to conformed to all the effective local rules and regulations in your area.
5. If you are not sure that the PSC box and power switch have been properly grounded, consult with qualified electrical technicians.

SAFETY RULES

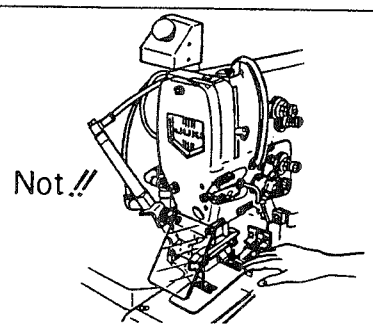
- The machine has to be operated with a full knowledge of the Instruction Manual and by appropriately trained personnel.
- The machine is only allowed to be used for intended applications.
- Operating the machine with any of the safety devices removed.
- For replacing gauge(s), threading needle(s) or performing maintenance and inspection, the power switch has to be turned OFF or the power plug has to be disconnected.
- General maintenance and inspection works have to be done by appropriately trained personnel.
- Repair, remodeling and special-adjustment works have to be performed by appropriately trained personnel or technicians.
- Repair and maintenance works on the machine equipped with pneumatic parts such as air cylinders have to be carried out with the compressed air supply shut off.
  Exceptions are only allowed for adjusting works and function checks done by appropriately trained technicians.
- Works on electric parts have to be done by electricians or appropriately trained personnel.
- Parts and circuits of the machine are not allowed to actuate with the current shut off.
- Remodeling and modifying works on the machine have to conform with relevant safety rules/standards and be approved by JUKI.
- Only spare parts designated by JUKI can be used for repairs.
- Use the machine after it has been ascertained that it conforms with safety rules/standards valid in your country.
- Maintenance works that are accompanied with the connecting/disconnecting of cable connectors and air tubes must only be done by appropriately trained personnel. When connecting cable connectors and air tubes, check that any of them is incorrectly connected.

< Meaning of warning signs >

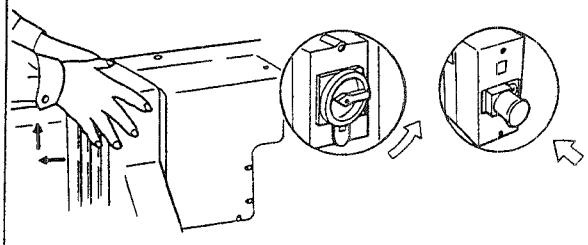

Danger of injury to operator or service staff


Items requiring special attention

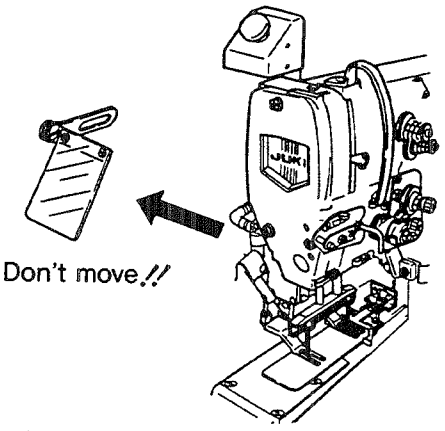
FOR SAFE OPERATION



1. Do not place your fingers near the needle entry area or inside the thread take-up cover while the machine is in operation.

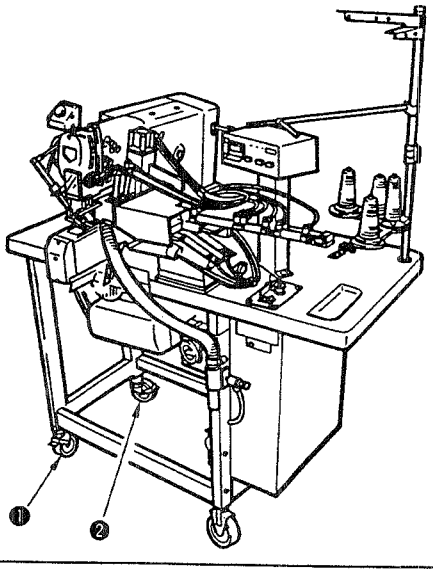


2. Before removing any of the covers provided for your machine, the power switch has to be turned OFF without fail.

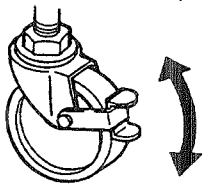


3. If your machine is provided with safety devices such as covers, finger guards and eye guards, never operate your machine with any of them removed. Whenever you detach any of them from the machine, reinstall it in its original position.

4. To ensure safety, never operate the machine with the ground wire for the power supply removed.
5. The motor is completely silent when the machine is at rest. So, attention has to be paid not to forget to turn OFF the power to the machine after the termination of work.
6. If the machine is suddenly moved from a cold place to a warm place, dew condensation may be observed. In this case, turn ON the power to the machine after you have confirmed that there is no danger of water drops in the machine.
7. In time of thunder and lightning, stop your work and disconnect the plug from the receptacle so as to ensure safety.
8. When inserting/removing the power connector, the power switch has to be turned OFF in prior.

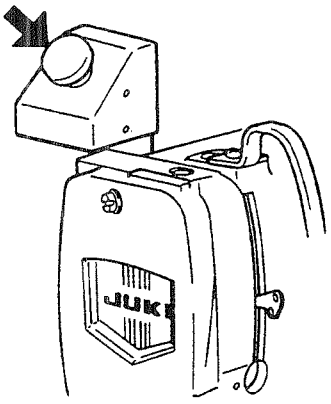


9. Casters have to be fixed before putting the machine into service.
After the machine is installed referring to item 2 of " Installation , "the lock levers of casters ❶ and ❷ have to be pressed down to fix the casters.
Before moving the machine, raise the lock levers to release the casters from the locked state.

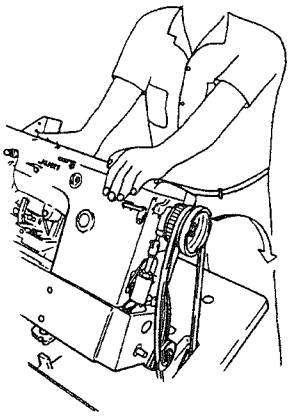


Caster is released from locked state.

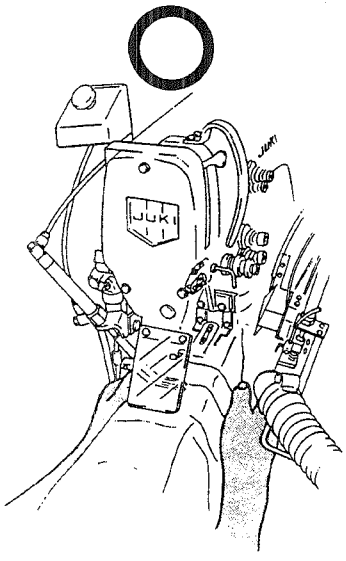
Caster is locked.



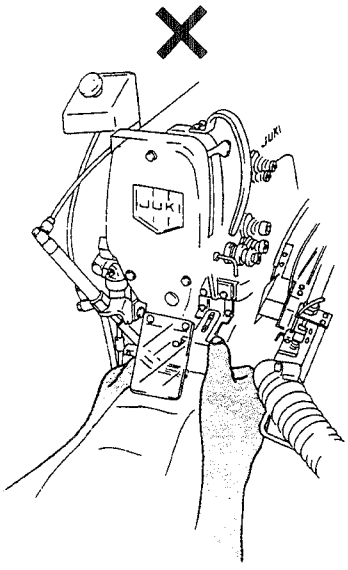
10. If it is necessary to suddenly stop the machine while it is in operation, press the pause switch.



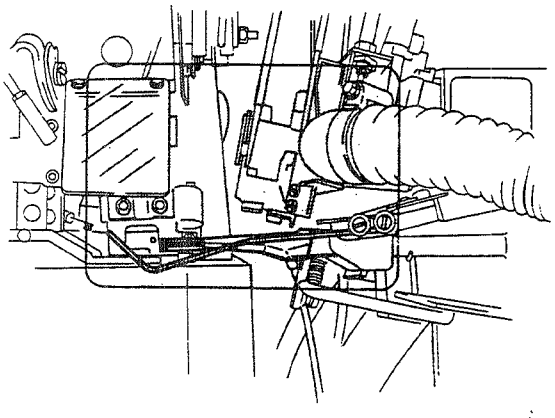
11. Carefully tilt/raise the machine as illustrated in the figure, when necessary, after having turned OFF the power switch.



Correct position of your hand when operating the machine

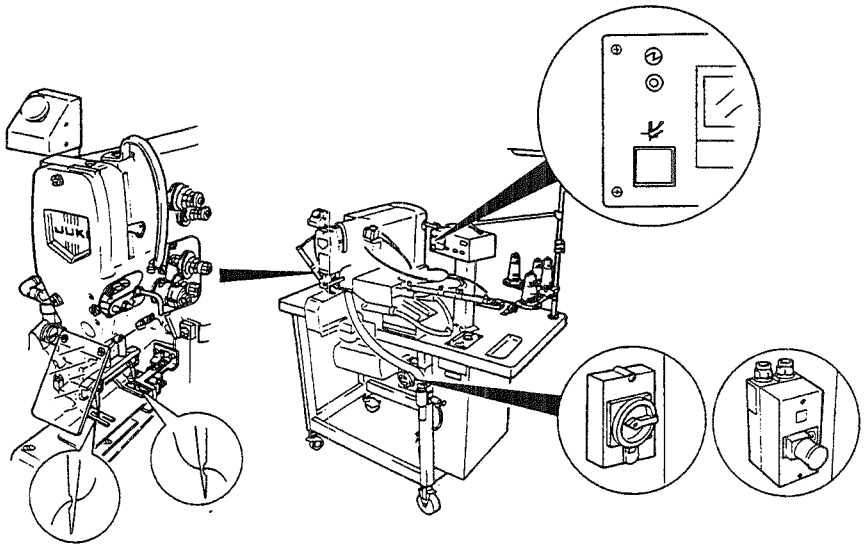


Dangerous position of your hand when operating the machine

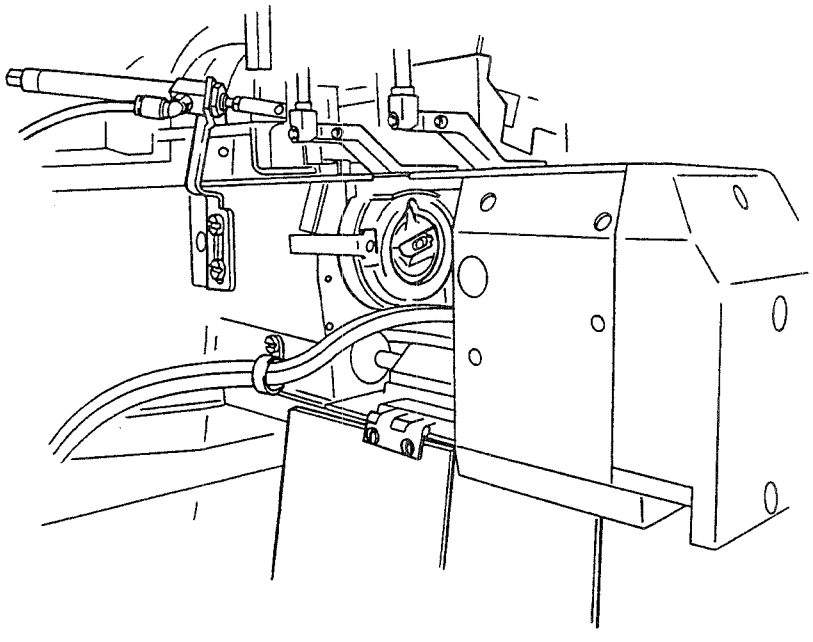


Hazardous area

12. The belt loop supplying device starts to work, simultaneously with the turning-ON of the start switch, to allow its fork to move at a high speed with a belt loop toward the area under the needle. This means that the fork could pierce into your hands or fingers if you place your hand within the dangerous area. So, it is quite necessary for you to place your hand at the correct operating position and not to put it in the dangerous area.



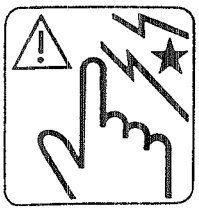
13. So as to improve efficiency in operation, needle(s) can be threaded by operating the Needle threading switch located on the operation panel while the machine is energized. To ensure safety, however, it is recommended to turn OFF the power switch to allow the machine to enter not-energized state before threading the needle. The feeding frame switch located on the operation panel electrically prevent the machine from operating. If the electric control mechanism fails, dangers such that the sewing machine rotates may arise.



14. Replacing the bobbin with the machine energized is permitted for a higher degree of efficiency. However, it is recommended to turn OFF the power switch and replace the bobbin with the machine dead from a safety standpoint. The machine is electrically controlled so that it is rendered inoperative as long as the hook cover is opened. However, there is a danger that the machine would rotate if its electric control should be defective.

Explanation of the warning label

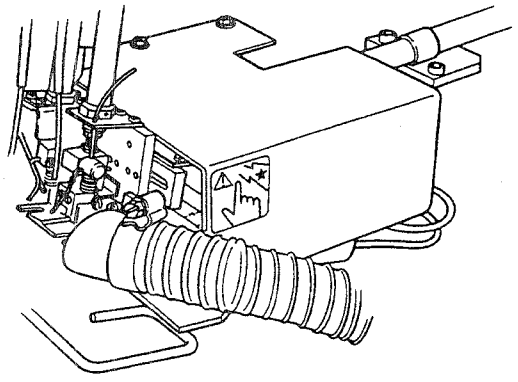
Warning about a danger that your hands/fingers may be caught in the machine



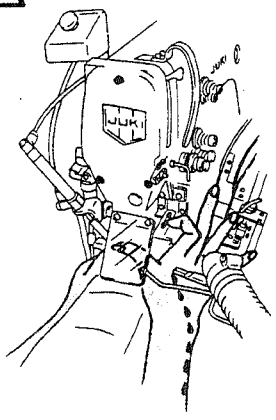
The above warning label is adhered to a location of the machine where there is a danger that your hands (right hand, in particular) and fingers may be caught in the machine or that some parts of the machine may pierce into them. When the belt loop supplying device delivers a belt loop to the sewing position (under the needle), the fork of the device moves at a high speed together with the belt loop. In this case, do your work while taking extreme caution not to allow your hands/fingers to be caught under the fork.

To ensure safety, place your hand at the correct operating position during working while referring to item 12 of "FOR SAFE OPERATION".

The label is adhered on the cover of the device.



There is a danger as illustrated below.

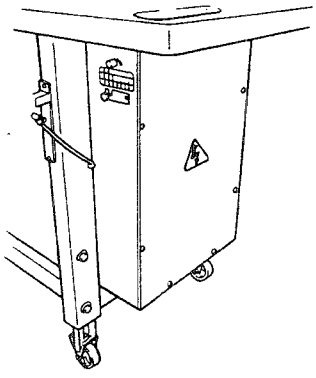


Warning about electric shock

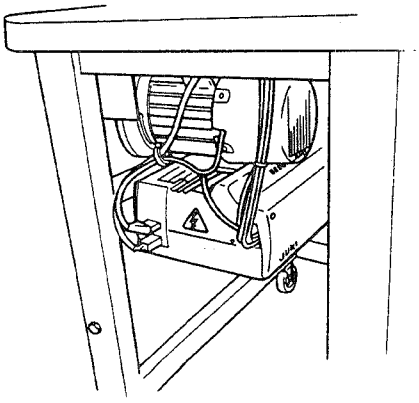
The label is adhered to a location of the control box inside which a high-voltage electrode, that is hazardous to human body, is mounted.

Cover of the control box onto which the warning label is adhered must only be opened by specially skilled electricians when doing maintenance and inspection works on the box.

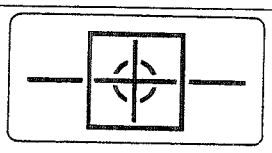
Warning label is adhered onto the cover of the control box.



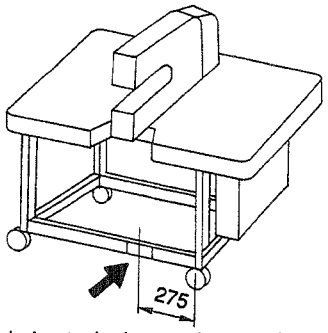
Warning label is adhered onto the motor control box.



Mark of center of gravity



Marking label of center of gravity



Adhere the label onto the front and rear of the table stand.

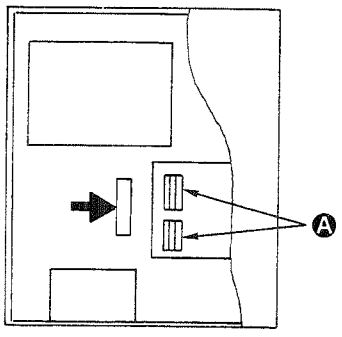
This mark is adhered on the location that indicates the center of gravity. When moving the machine by lifting it with a forklift, lift it giving consideration to the arrangement of weight of the machine referring to the mark of center of gravity.

If the weight of the machine is not adequately arranged and the machine is ill-balanced, the machine can tilt and tumble to cause a risk of injury. So, extremely careful when carrying out this work.

Warning against high temperature

Care to high Temperature.
Vorsicht : hohe Temperatur
Attention aux hautes températures

High-temperature warning label



Adhere the label onto the inside surface of the control box.

The high-temperature warning label is attached to the portion that is hot (60°C or more) while the machine is alive or immediately after turning OFF the power.

Since the heat sink of portion Ⓐ of the machine becomes hot, be extremely careful to keep your hands away from the heat sink during maintenance works or the like while the machine is alive or immediately after turning OFF the power (approximately five minutes).

The hot portion on the subject is a radiating plate of the resistor that is used for the power to the stepping motor for driving the belt-loop feeding roller. The rise of temperature is approximately 50 degrees centigrade. To prevent the portion from being hot, the motor output is switched. This produces a secondary effect where the stepping motor hums in the standby state. The phenomenon is not a trouble.

CE marking

(A)

CE JUKI CORPORATION

1995 8-2-1, KOKURYO-CHO
CHOFU-SHI, TOKYO 182, JAPAN

(B)

JUKI

JUKI CORPORATION
Made in Japan

Volts V
Amps A
Icu KA
Hertz 50 | 60 Hz Phase 2 | 3 ø
Electrical Diagram No.

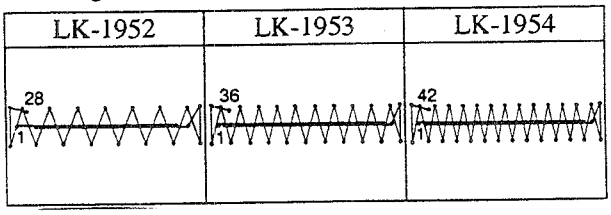
CE marking is adhered to the machines that are to be exported to any of EC member states. The marking indicates that the machine conforms to the relevant standard.

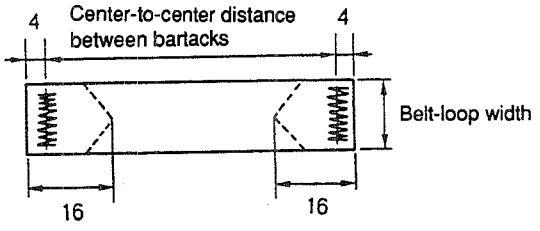
It is prohibited to export any machine to Europe (EU member states) that is not provided with the CE marking and anconformity declaration.

The machine has to be used according to the instruction of rated power supply given on (B) label.

CONTENTS

1. SPECIFICATIONS

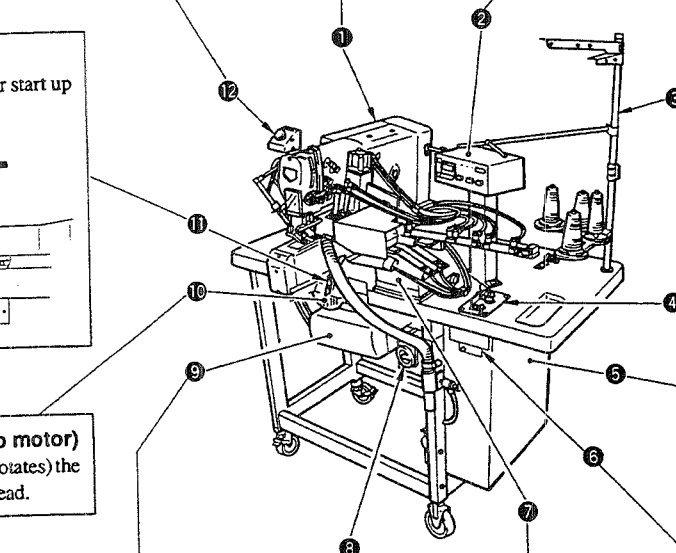
1.	Sewing speed	Max. 2,000 s.p.m.
2.	Hook	Horizontal-axis semi-rotary shuttle hook
3.	Bobbin	Bobbin for 1.8 fold bobbin
4.	Thread take-up lever	Link-type thread take-up lever
5.	Needle	DPx17 #19 to #21, standard DPx17 #21
6.	Thread	Cotton thread #30 to #50, spun thread #30 to #50
7.	Number of stitches	LK-1952 (28 stitches) - Standard LK-1953 (36 stitches) LK-1954 (42 stitches)
8.	Sewing size	Lengthwise: 1.5 to 3 mm Crosswise: 8 to 22 mm
9.	Needle bar stroke	41.2 mm
10.	Stitch adjusting method	Nut-fixing method
11.	Needle entry	
12.	Thread trimming method	By knife (Drive ... Synchronized with air cylinder and hook driving shaft)
13.	Bartacking width	1.5 to 3 mm (corresponding to the slit on the lever)
14.	Bartacking length	8 to 22 mm (corresponding to the slit on the lever)
15.	Lift of the work clamp	22 mm
16.	Change of the number of stitches	By replacing the cloth feed cam, worm and worm wheel
17.	Distance between the needles (Center-to-center distance between bartacks)	40 to 70 mm (standard 57 mm)
18.	Folding allowance	16 mm
19.	Pressing allowance	4 mm



20.	Belt-loop width	For cross-cutting 9 to 16 mm, standard 12 mm
21.	Belt-loop cutting method	Mesh-cutting by moving knife with counter knife
22.	Belt-loop folding method	Fork-folding method
23.	Belt-loop supplying method	By a stepping motor
24.	Belt-loop length setting method	By a digital switch 0 to 199 mm (The belt-loop length can be set in 1 mm steps.)
25.	Detection of belt-loop splice	Splice on belt-loop tape (Change in belt-loop thickness) is detected. Detection (by a micro-photo sensor) Automatic discharge of spliced portion of belt-loop tape is possible.
26.	Bobbin thread counter	By a No. of pcs. counter (The machine is equipped with one unit of the counter.)
27.	Setting of length of belt-loop to be supplied	By a digital switch
28.	Error indication	Error is indicated with LED
29.	Cloth feeding method	Mechanical feeding method (by a cloth feeding cam)
30.	Bobbin winder	Separate unit
31.	Machine head driving method	Acceleration/deceleration and stop of the machine are controlled by the AC servo motor.
32.	Presser foot lifter driving method	By an air cylinder

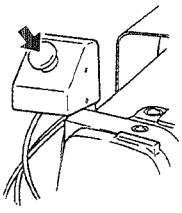
33.	Thread presser driving method	By an air cylinder
34.	Wiper driving method	By an air cylinder
35.	Machine head lubricating method	By an oiler (Centralized lubrication in the upper portion of the machine head and the left-hand shuttle hook)
36.	Lubricating oil	New Defrix Oil No. 2
37.	Adjusting method for center-to-center distance between needles	By moving the needles and shuttle hooks
38.	Outside dimensions	1000 mm (width) x 800 mm (depth) x 1250 mm (height) (lowest position)
39.	Weight	150 kg
40.	Compressed air	0.5 MPa to 0.55 MPa (5 kgf/cm^2 to 5.5 kgf/cm^2)
41.	Air consumption	18 l/min. (When the machine is equipped with all of the optional devices)
42.	Power consumption	800 VA or less
43.	Noise	Sound pressure level is 84 dB[A] or less when the machine runs at the maximum sewing speed of 2,000 s.p.m.

2. CONFIGURATION



Temporary stop switch

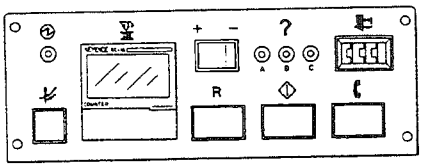
The switch is used to temporarily stop the machine operation. Once the switch is pressed, it remains ON. So, press it again to release the machine from the temporary-stop state.



Sewing machine head

The machine head perform sewing while letting the motor drive the needles.

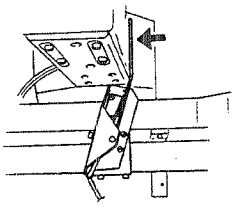
Operation box panel



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

Start switch

Start switch used for start up sewing



Thread stand

Used to set needle thread and the thread to be supplied to the bobbin winder.

Bobbin winder

Used to wind a bobbin with thread.

Control box

Controls the whole machine.

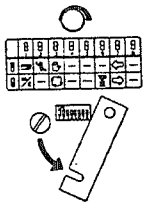
Motor (AC servo motor)

The motor drives (rotates) the sewing machine head.

PSC box (SC-6)

Motor control box controls the AC servo motor and the machine head components.

Max. speed control variable resistor and DIP switches



The variable resistor is used to limit the number of revolutions during sewing and DIP switches are used to select functions

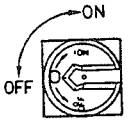
Belt loop supplying device

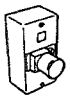
Performs a series of operations to supply belt-loops.

Power switch (differs with destinations)

A type
(general type)

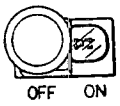
To turn ON the power switch, turn the center grip of the switch clockwise.
To turn it OFF, turn the center grip counter-clockwise.





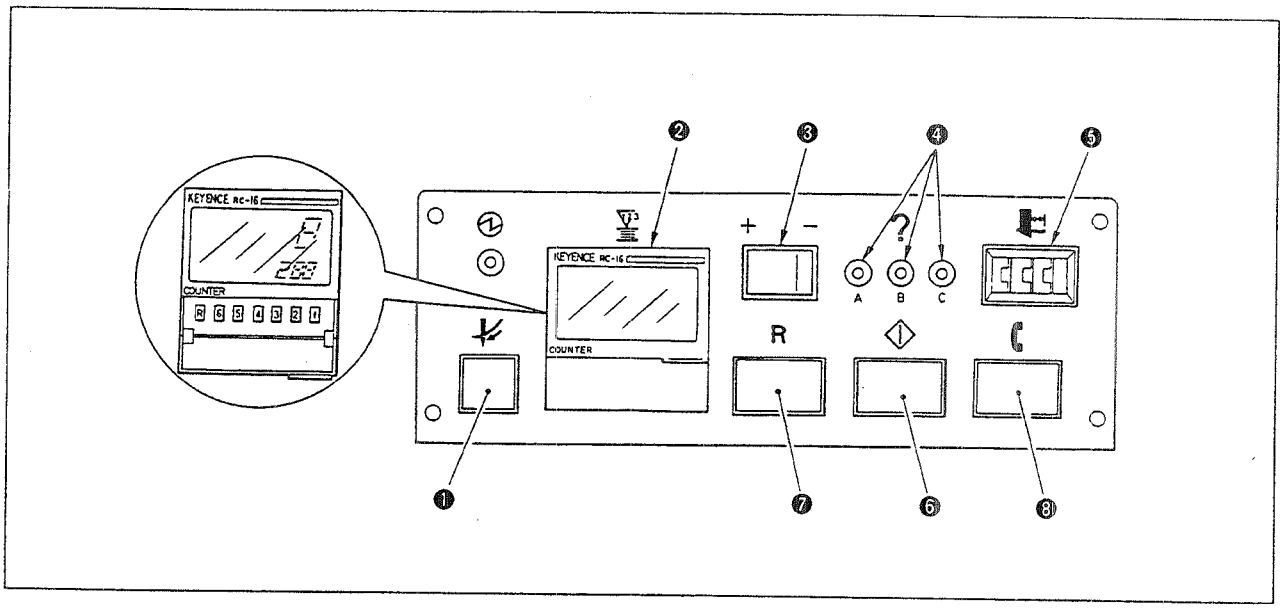
B type
(equipped with temporary stop switch)

To turn ON the power switch [1], pull up the red button once.
To turn it OFF, press the red button.



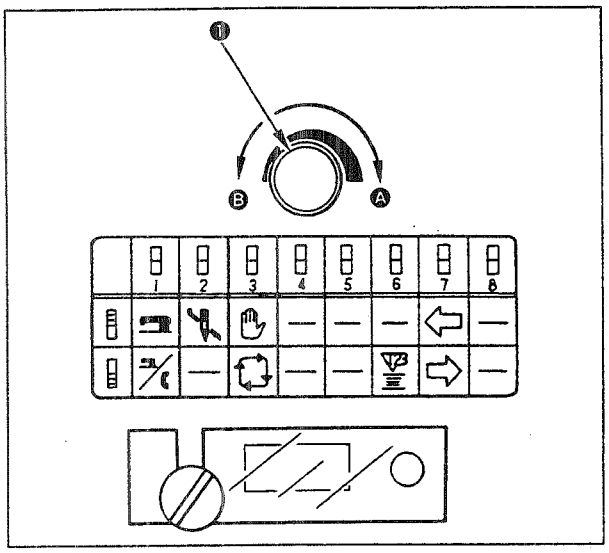
3. OPERATION

(1) Functions of the operation box panel



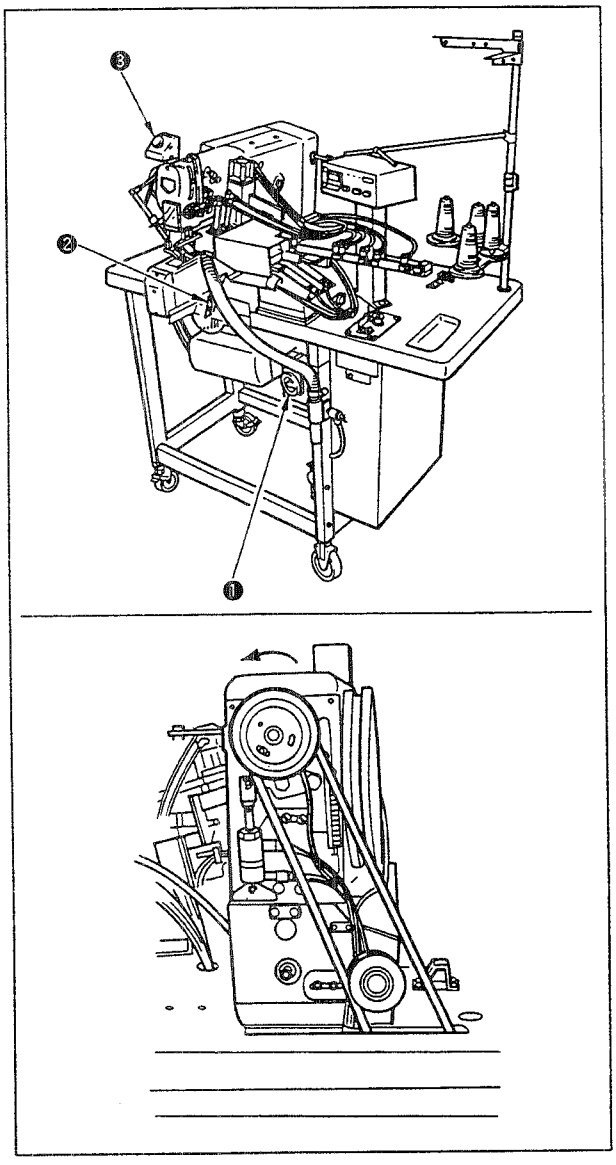
Name of switch	Function
❶ Presser foot switch	Turning ON the switch when the machine is ready for sewing facilitates the threading of a needle(s). Under this state, the sewing machine does not actuate. When the switch is turned ON again, the presser foot of the machine goes up to allow the machine to start sewing. **Thread the needle(s) with the power switch turned OFF to ensure safety.**
❷ Bobbin counter	Indicates the consumption of bobbin thread. Switches keys [1] , [2] through [6] located under the indicator correspond to the respective digits. Every time this key is pressed, the number increases to change the set value. Use the [R] key whenever resetting the counter.
❸ Bobbin counter up/down change-over switch	When the switch is set to the "+" side, the bobbin counter counts the consumption of bobbin thread by addition. When the switch is set to the "–" side, it counts the consumption of bobbin thread by subtraction. Change over the setting of this switch after turning OFF the power switch.
❹ Alarm lamp	If a failure occurs, the alarm lamp flashes on and off or lights up for warning. Refer to "12. INDICATION OF TROUBLES" for the description of indications.
❺ Belt loop length setting digital switch	The digital switch is used to specify the length to which a belt loop is cut. Belt loop cutting length can be specified in the range of 0 to 999 mm using the 3-digit digital switch. (However, the significant set value is 0 to 199 mm and the actual length slightly varies depending on the type and thickness of belt loop material to be used.)
❻ Start switch ❼ Reset switch	These switches are used to re-start the machine after the temporary stop switch has been pressed and to stop sewing before the sewing end is reached. To re-start sewing : Re-turn ON the temporary stop switch, then turn ON the re-start switch, and the machine will resume sewing. (In the event of re-starting, the inching sewing is employed.) To stop sewing : Re-turn ON the temporary stop switch, then turn ON the reset switch, and the presser foot will go up after the thread trimmer has actuated. (If you press the re-start switch after having take out the sewing product, and the machine will start the inching sewing and the cam will return to the origin.) This function is rendered ineffective during the temporary stop while the sewing machine is in the stand-by state.
❽ Set-back switch	The switch is used to re-set a belt loop at the stand-by position. **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 belt loop supplying device.** **If the machine is equipped with an easing in of fullness device (optional), belt-loops may be double-supplied to the fork if turning ON this switch with a belt-loop retained by the fork. So, it is necessary to turn OFF the power switch once, remove the belt-loop from the fork and re-turn ON the switch.**

(2) Max. sewing speed control variable resistor



The max. sewing speed is controlled using knob ❶ mounted on the control box. The sewing speed is adjustable within the range of 200 to 2,000 s.p.m. Turning the variable resistor clockwise (in direction Ⓐ) as far as it will go sets the max. sewing speed to 2,000 s.p.m. Turning the variable resistor fully counterclockwise (in direction Ⓑ) sets to 200 s.p.m.

(3) Operation



Operate the machine after you thoroughly understand a series of procedure steps referring to the basic operation flow chart. (See the next page.)

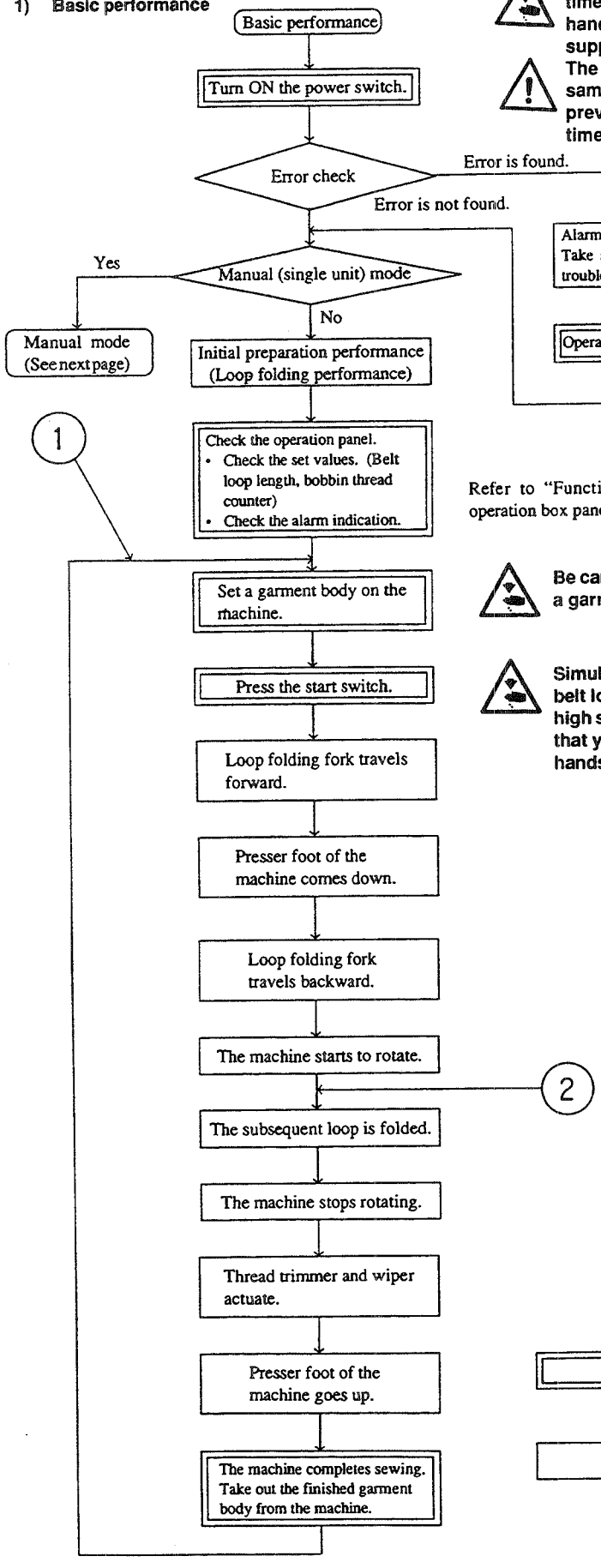
Operate the machine following the steps of procedure described below.

1) For the machine equipped with an easing in of fullness device (optional), remove the belt-loop retained by the fork.
2) Turn ON the power switch. (Turn ON switch ❶ .)
3) Set a garment body to be sewn on the machine.
4) Press the start switch. (Press switch ❷ .)
5) After the machine completes a predetermined steps of procedure, the machine automatically lifts the presser foot, actuates the thread trimmer to cut needle and bobbin threads, then stops.

1. **If the presser foot is not in the origin of the feed, the machine will rotate at a low speed and stops at the origin of the feed after it starts.**
2. **Do not turn OFF the power to the machine while the machine is in operation (rotating) unless it is really necessary.**
3. **To temporary stop the machine while the machine is in operation (rotating), press temporary stop switch ❸ . Since the temporary stop switch is provided with lock function, press switch ❸ again to release the machine from the temporary stop state.**
4. **When turning the machine by hand:**
   While the presser foot is ascending, the sewing machine pulley cannot be turned by hand. Turn OFF the power to the machine first, then turn the pulley by hand in the direction of the arrow. Confirm, before re-turning ON the power to the machine, that the white marker dot engraved on the sewing machine pulley is straight up and that you have return the cover to the predetermined position.
5. **For the machine that has a power switch provided with an emergency stop switch, the power is shut off by pressing the emergency stop switch while the machine is rotating. So, to stop the machine for any purpose other than the prevention of danger, use the temporary stop switch instead of the emergency stop switch.**

(4) Basic operation flow chart

1) Basic performance



When the power switch is turned ON/OFF, almost at the same time the belt loop supplying device actuates. So, keep your hand or any other part of your body away from the belt loop supplying device.

The wiper on the machine head actuates once nearly at the same time when turning ON the power switch (so as to prevent failed operation of the wiper after it sits idle for a long time).

Follow the instructions for resetting the alarm while referring to "12. INDICATION OF TROUBLES."

Refer to "Functions of the operation box panel."

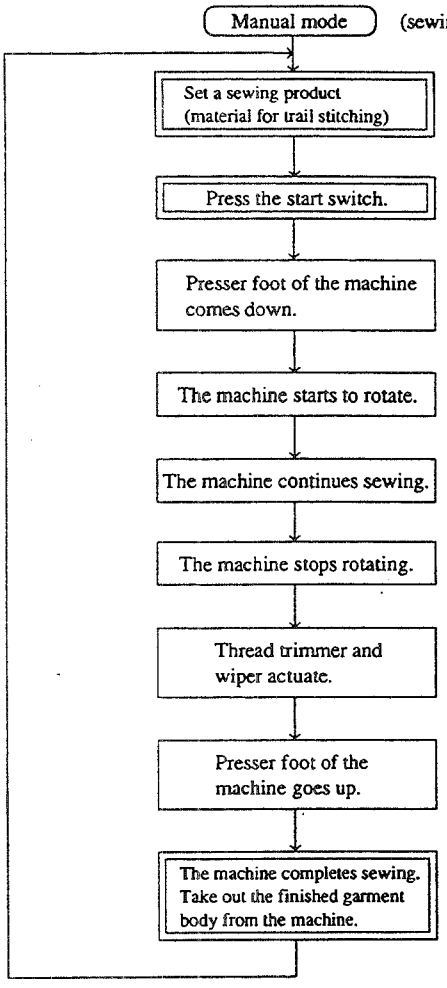
Be careful not to press the start switch by mistake when setting a garment body on the machine.

Simultaneously with turning-ON of the start switch, the folded belt loop and fork of the belt loop supplying device moves at a high speed. So, press the start switch after you have confirmed that you have placed your hands at a safe position where your hands will never be injured by the fork.

The description bounded by double rectangle indicates a step of procedure to be done by the operator.

The description bounded by single rectangle indicates a step of procedure that is automatically carried out by the machine/belt loop supplying device.

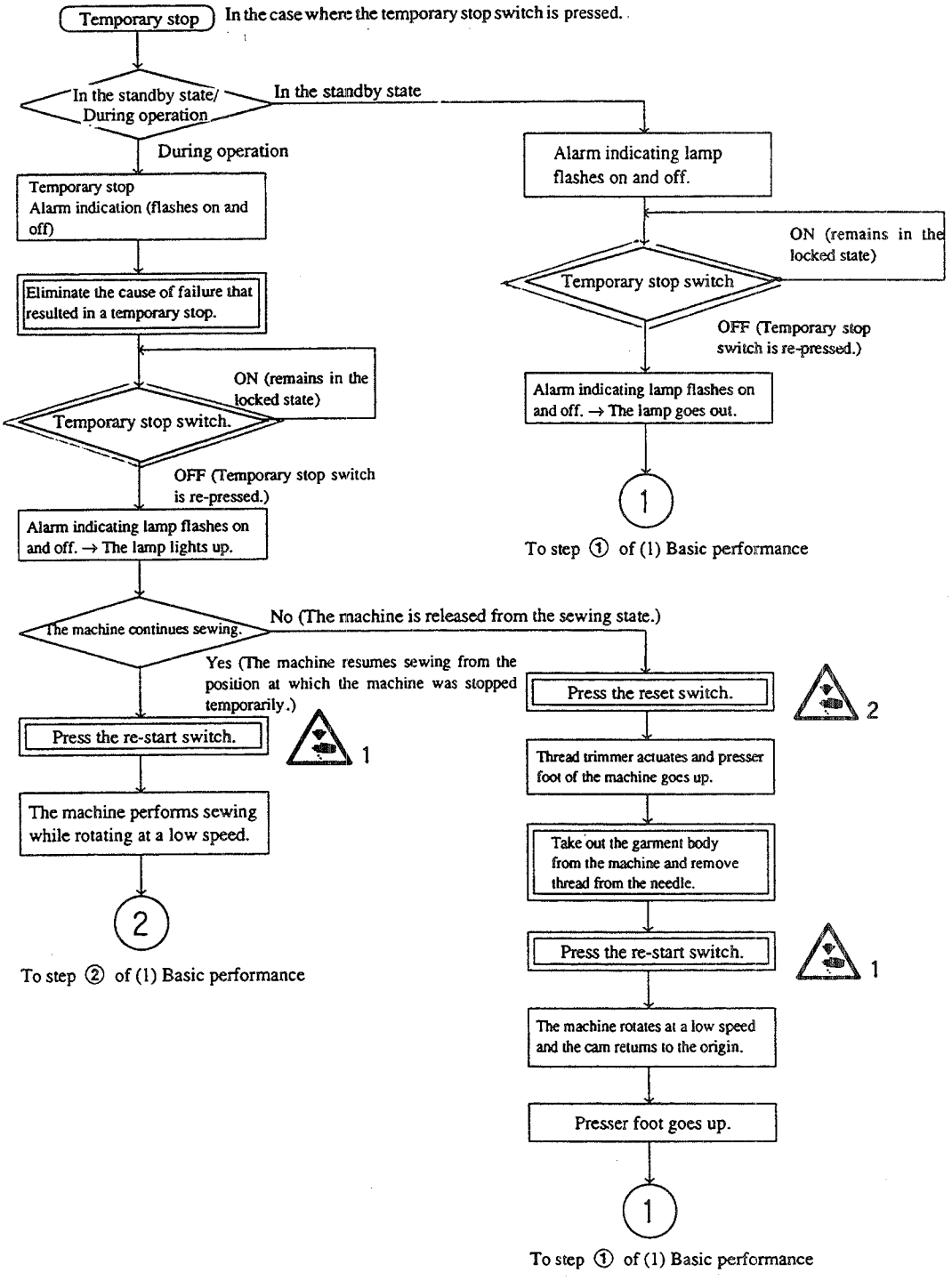
2) **Manual mode**



Be careful not to press the start switch by mistake when setting a garment body on the machine.

Simultaneously with turning-ON the start switch, the machine rotates. So, press the start switch after you have confirmed that you have not placed your hands under the needle.

3) Temporary stop



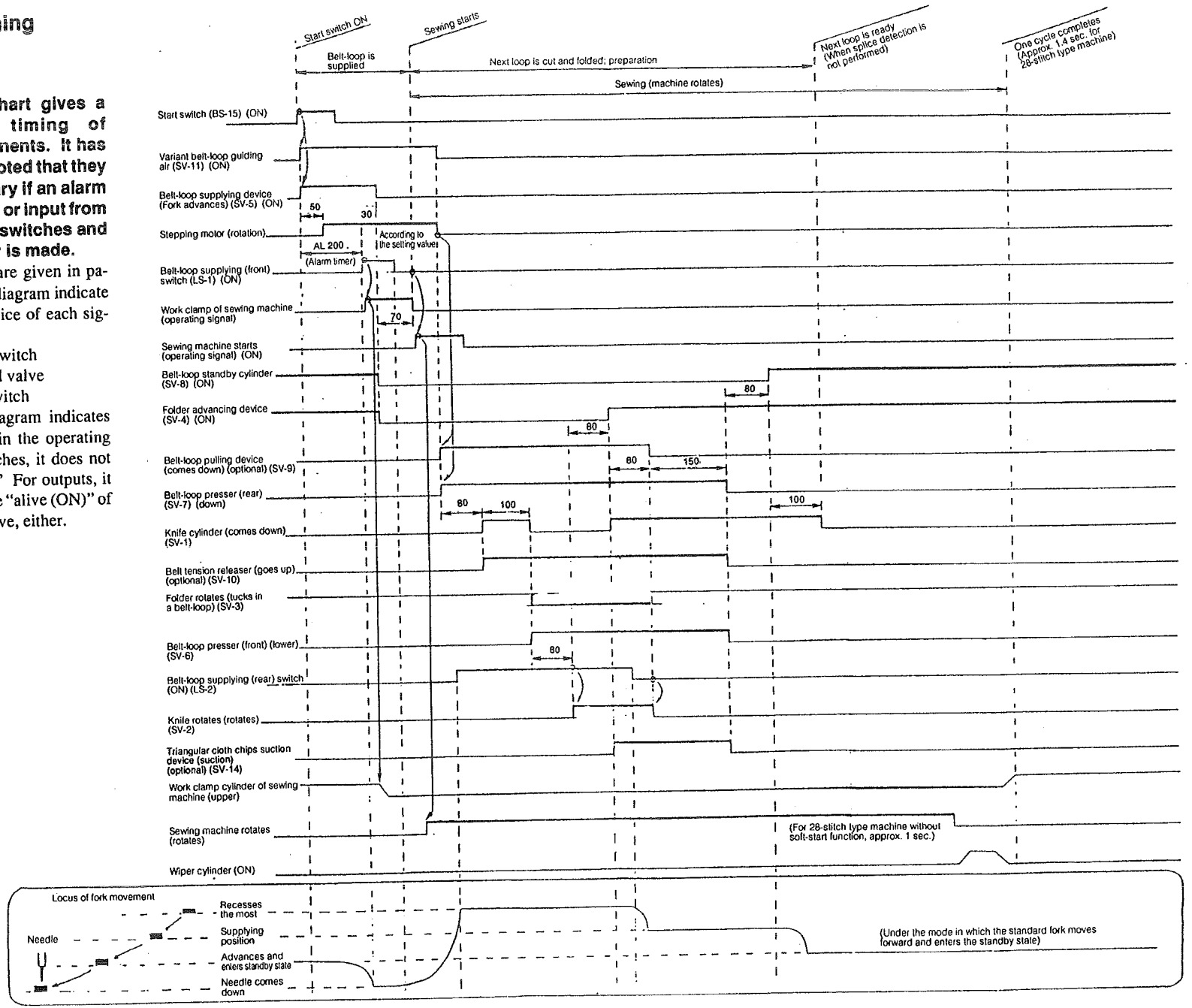
1 : Simultaneously with turning-ON the re-start switch, the machine rotates. So, press the re-start switch after you have confirmed that you have not placed your hands under the needle.

2 : When turning ON the reset switch, the sewing machine makes a revolution of one stitch for the purpose of thread trimming and actuate the thread trimmer and wiper. So, press the reset switch after you have confirmed that you have not placed your hands under the needle.

(5) Basic timing chart

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

1) Characters that are given in parenthesis in the diagram indicate the terminal device of each signal.
   BS: Button switch
   SV: Solenoid valve
   LS: Limit switch
2) "ON" in the diagram indicates the active side in the operating state. For switches, it does not indicate "close." For outputs, it does not indicate "alive (ON)" of the solenoid valve, either.

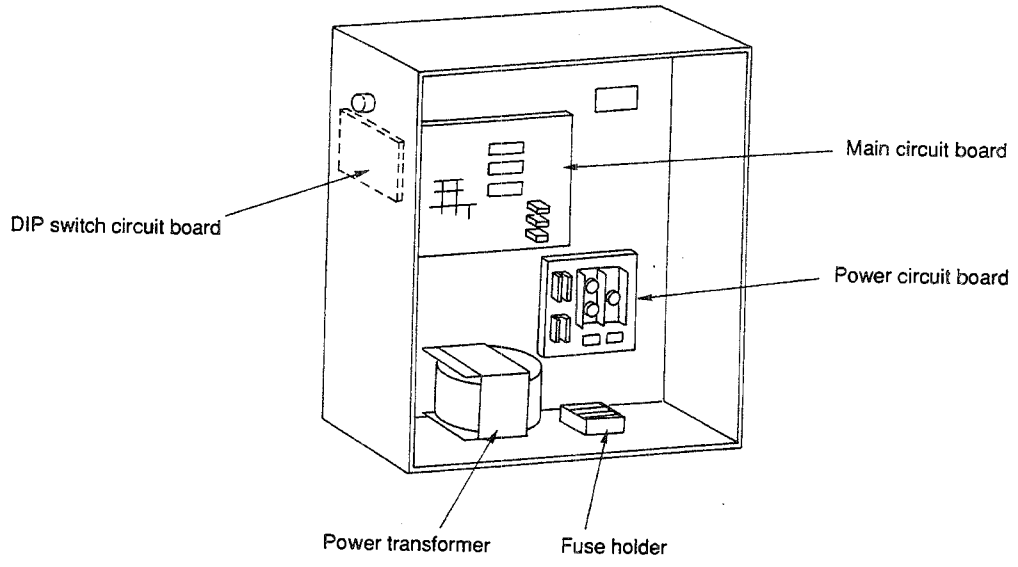


4. EXPLANATION OF FUNCTIONS OF COMPONENTS INSIDE THE CONTROL BOX

High-voltage electrodes, that are hazardous to human bodies, are exposed inside the control box. It is therefore necessary to carry out maintenance and inspection works after disconnecting the power plug from the receptacle.

Since the maintenance item has to be carried out by appropriately qualified electrical technicians or technical personnel of JUKI-authorized distributor or service center in your district, any other person is not allowed to perform maintenance and inspection works.

Schematic diagram of inside of the control box



(1) DIP switch circuit board

Circuit board locating on the front surface of the control box on which DIP switches are mounted

(2) Power transformer

Transformer used to transform the commercial supply voltage to the control voltage
Input (primary side) Applicable at 100, 115, 200, 220 or 240 Vac
Output (secondary side) 10 Vac (2 A), 18 Vac (1.5 A), 18 Vac (3 A)

(3) Fuse holder

Holder of overcurrent protecting fuses for secondary power supply of the power transformer
F1 (3 A): 10 Vac (5 Vdc) for protection
F2 (3 A): 18 Vac (24 Vdc) for protection
F3 (4 A): 18 Vac (12 Vdc) for protection

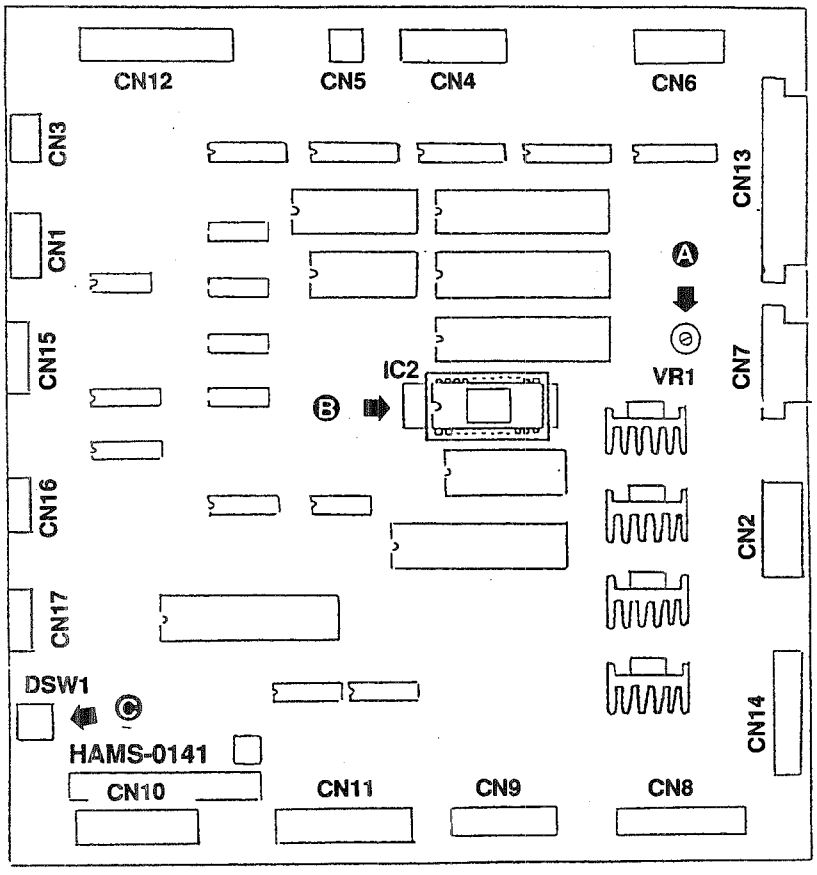
(4) Power circuit board

Power circuit board used to transform secondary side voltage of the transformer of 10 Vac and 18 Vac to control supply voltage of 5 Vdc, solenoid valve supply voltage of 24 Vdc and supply voltage of 12 Vdc for the stepping motor.
Connector J1 is an input terminal (10 Vac, 18 Vac)
Connector J2 is an output terminal (5 Vdc, 12 Vdc, 24 Vdc)

(5) Main circuit board

Main circuit board used to control the machine.

The figure below gives schematic diagram of the main circuit board.



* Major functions of components mounted on the circuit board

No.	Symbol	Remarks	Main function
1	CN1	8 pin	Connector for power supply of bobbin winder
2	CN2	6 pin	Connector for stepping motor of belt-loop feeder
3	CN3	6 pin	Connector for bobbin thread counter
4	CN4	14 pin	Connector for start switch, temporary stop switch
5	CN5	4 pin	Connector for air pressure switch
6	CN6	12 pin	Connector for sensor of belt-loop supplying device
7	CN7	10 pin	Connector for solenoid valve of belt-loop supplying device
8	CN8	10 pin	Connector interface input signal of SC-6
9	CN9	8 pin	Connector interface output signal of SC-6
10	CN10	16 pin	Connector for reserve output
11	CN11	18 pin	Connector for reserve input
12	CN12	20 pin	Connector for operation panel and hook cover sensor
13	CN13	22 pin	Connector for solenoid valve of belt-loop supplying device
14	CN14	9 pin	Connector for power input
15	CN15	8 pin	Connector for belt-loop length digital switch
16	CN16	6 pin	Connector for DIP switch circuit board
17	CN17	7 pin	Connector for reserve input
18	Ⓐ VR1	100 KΩ	Splice discharging length adjusting variable resistor
19	Ⓑ IC2	EP-ROM	Main circuit board control software ROM
20	Ⓒ DSW1	4-row	Function selecting DIP switches mounted on main circuit board

5. STANDARD ADJUSTMENTS (MACHINE HEAD COMPONENTS)

Remove the power plug or power switch when carrying out maintenance works. Shut off the air supply.

STANDARD ADJUSTMENTS

(1) Adjusting the height of the presser bar

Adjust the height of the needle bar so that the upper marker line engraved on this side needle bar meets the bottom end face of the needle bar lower bushing. At this time, a clearance of 17.1 mm is provided between the top surface of the throat plate and the needle bar connecting base.

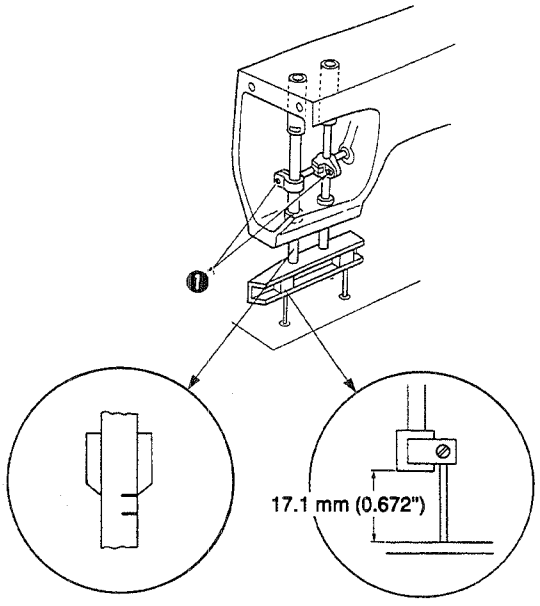


Fig. 1-1

(2) Changing the position of the throat plate (hook mounting base)

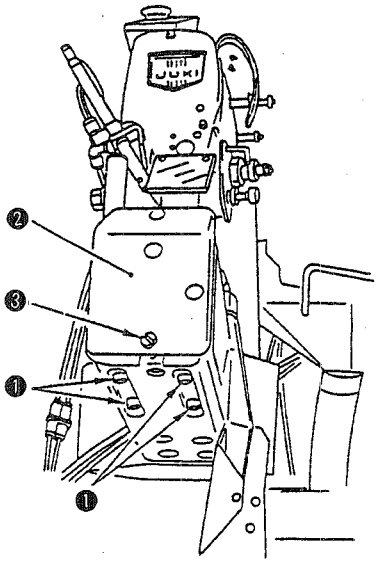


Fig. 2-1

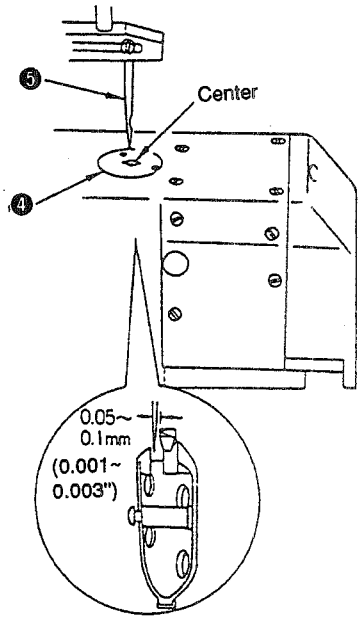


Fig. 2-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove the throat plate. 2) Loosen two screws ❶ in the needle bar connection and adjust the height of the needle bar by raising/lowering it. 3) After the adjustment, securely tighten the two screws.	If the marker line engraved on the needle bar rests higher than the end face of the bushing, stitch skipping will be likely to occur. If it rests lower than the end face of the bushing, failed lifting may occur.
1) Loosen four screws ❶ in the hook mounting base. 2) Adjust the position of the hook mounting base cover ❷ by turning hook mounting base adjusting screw ❸. Turn the adjusting screw clockwise to move the hook mounting base backward or counterclockwise to move it forward. 3) Adjust the position of the throat plate so that needle ❺ enters almost the center of needle hole guide ❹ and so that a clearance of 0.05 to 0.1 mm is provided between the blade point of the shuttle and the needle when the needle enters the needle hole guide. (Refer to "Adjusting the needle-to-shuttle relation.") 4) After the adjustment, securely fix the hook mounting base by tightening four screws ❶ in the base. (Note) **To move the hook mounting base by 10 mm or more at a time, turn the sewing machine pulley by hand until you feel that the pulley can be turned with a less pressure. Then, further turn the adjusting screw.**	

(3) Adjustment of the timing between the needle and the shuttle (Same adjustment should be respectively performed to adjust the relation between them on this side and far side.)

1) Timing of the needle bar
The needle bar goes up from the lowest point of its stroke until the lower marker line engraved on the needle bar is flush with the bottom end of the needle bar bushing (lower). (Fig. 3-1)
2) Timing of the shuttle
When the state is as described in the above 1), the center of the needle coincides with the point of the shuttle at Ⓐ. (Fig. 3-2)
3) Clearance between the needle and shuttle driver
When the state is as described in the above 2), there should be no clearance between the needle and the shuttle driver. (Fig. 3-3)
4) Clearance between the needle and the point of the shuttle
When the state is as described in 2), the clearance Ⓑ between the needle and the point of the shuttle should be 0.05 to 0.1 mm. (Fig. 3-4)
5) Clearance between the needle and the shuttle race
The clearance between the side face of the needle and the shuttle race should be 7.5 mm. (Fig. 3-5)
6) The clearance between the shuttle and shuttle driver should be 0.5 to 0.7 mm. (Fig. 3-2)

1) Timing of the needle bar

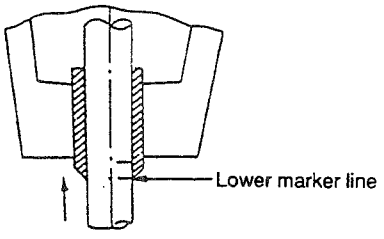
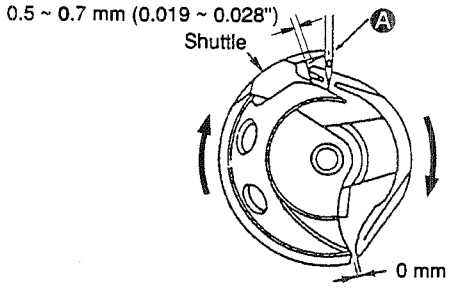


Fig. 3-1

2) Timing of the shuttle



(The clearance between the shuttle and shuttle driver should be 0 mm when adjusting the timing of the shuttle.)

Fig. 3-2

3) Clearance between the needle and the shuttle driver

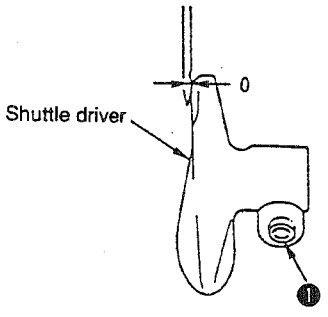


Fig. 3-3

4) Clearance between the needle and the point of the shuttle

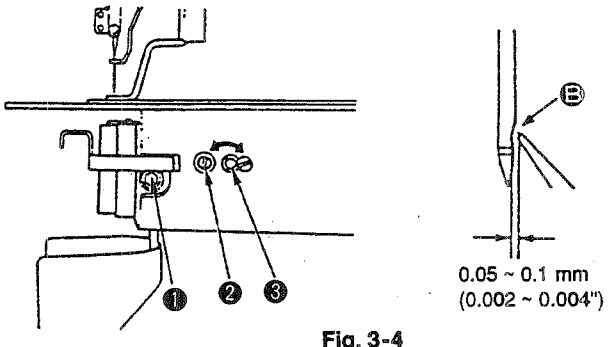


Fig. 3-4

5) Clearance between the needle and the shuttle race

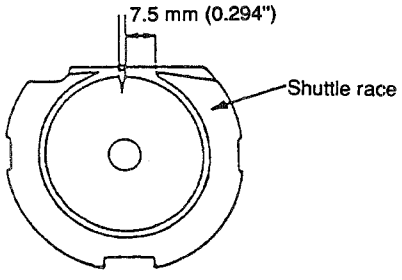
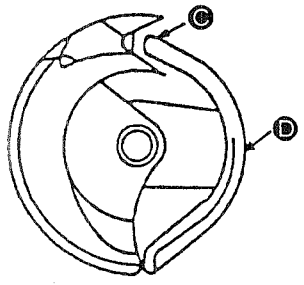


Fig. 3-5

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Referring to Standard Adjustment (1) Adjusting the height of the needle bar, make the lower marker line engraved on the needle bar flush with the bottom end of the bushing. 2) and 3) Loosen setscrew ❶ of the shuttle driver, and adjust the rotational and longitudinal directions of the shuttle driver. **[Caution] Ensure to turn the shuttle in the arrowed direction as shown in Fig. 3-2 when adjusting the timing of the shuttle.** 4) Loosen setscrew ❷ of the shuttle race, and turn eccentric shaft ❸ to make adjustment. 5) Loosen setscrew ❷ to perform adjustment. Enough care should be exercised when performing the adjustment described in 4), namely the adjustment of the clearance between the needle and the point of the shuttle. **[Note] The clearance in the rotational direction between the shuttle and the shuttle driver should be 0.5 mm to 0.7 mm as shown in Fig. 3-2.** **Adjust the clearance provided between the shuttle and the shuttle driver by tapping portion Ⓓ.** **After adjustment, check that point Ⓒ is evenly spaced vertically with respect to the shuttle.**  **Fig. 3-6**	1) and 2) For floppy materials, slightly retard the hook timing. For heavy-weight materials, on the contrary, slightly advance it. (In prevention of stitch skipping) 3) If the clearance is more than 0 mm, the needle will be bent in the direction of the shuttle point, causing scratches on the shuttle point and the needle. On the contrary, however, excessive contact between the needle and the shuttle driver may cause stitch skipping. 4) If the clearance is greater than 0.05 to 0.1 mm, stitch skipping will occur. If it is smaller than the specified values, the needle strikes the shuttle point and scratches occur, leading to thread breakage or fine splits of thread. 5) If the clearance is smaller than 7.5 mm, the needle thread will not be fully spread, often causing the needle thread to bite into the shuttle. o If the clearance between the shuttle drive and the shuttle is greater than 0.5 to 0.7 mm, the shuttle noise will be louder. On the contrary, if the clearance is not enough, poorly tensed stitches will result when sewing with a thick thread.

(4) Position of the shuttle race spring

The shuttle race spring should be evenly positioned laterally with respect to the needle entry point, and it should be positioned longitudinally so that the rear edge of the needle aligns with corner Ⓐ as shown below.

[Note] Pressure of any scratches on area Ⓑ may cause breakage of the bobbin thread. Grind and smooth out scratches if any.

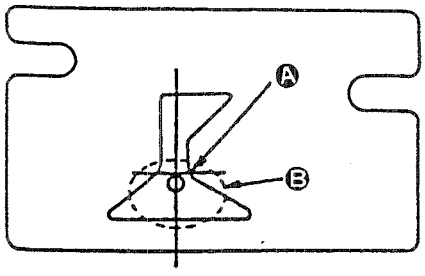


Fig. 4-1

(5) Configuration of the shuttle race ring

If the shuttle point has been found worn out severely, remove the shuttle race ring and check whether the hatched portion on the rear side measures 0.2 mm × 8 mm.

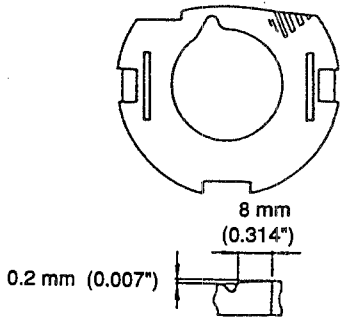
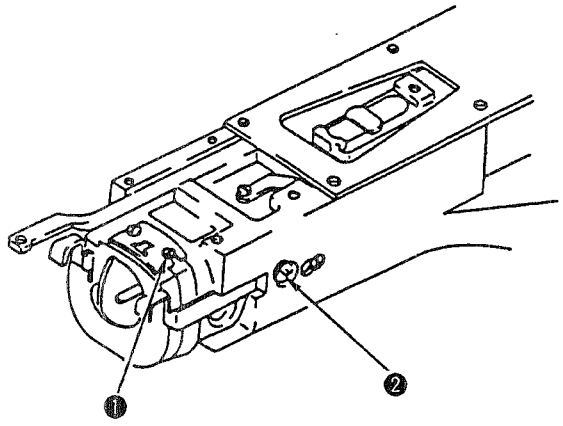


Fig. 5-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Remove the feed bracket, feed plate and throat plate, then perform adjustment using screw ❶. **[Note] The lateral position of the shuttle race spring is affected also by the locking position of setscrew ❷.**  **Fig. 4-2** ○ If the hatched portion does not measure 0.2 mm × 8 mm, correct it using an oil stone.	○ Lateral or longitudinal deviation of the shuttle race spring will cause the needle thread to bite into the shuttle race. ○ If the shuttle race spring is positioned excessively in the rear, the moving knife may fail to catch the needle thread.

(6) Adjusting the timing of the cloth feed cam

Adjust the timing of the cloth feed cam so that the feed mechanism stops when the tip of the needle descends to position that is 8 to 12 mm above the top surface of the throat plate.

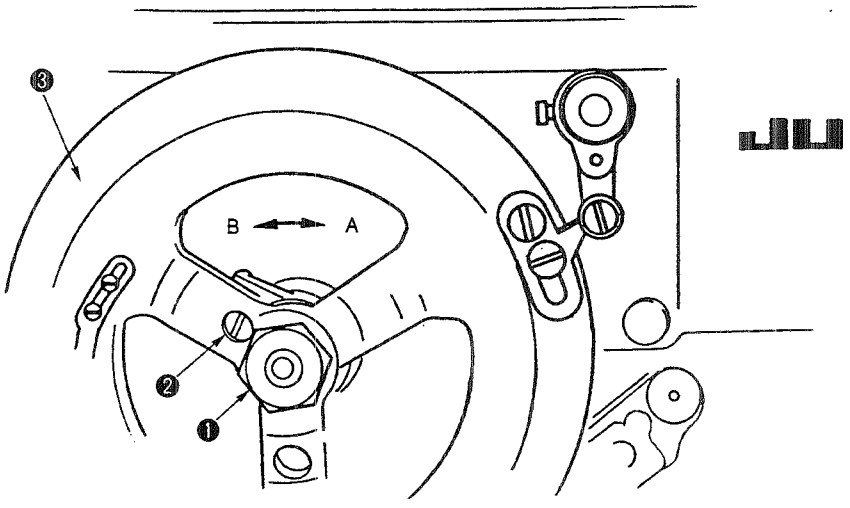


Fig. 6-1

(7) Adjusting the origin detecting sensor

Adjust so that a clearance of 1.0 to 1.5 mm is provided between the magnet and the origin detecting sensor and so that the center of the magnet is aligned with the center of the origin detecting sensor.

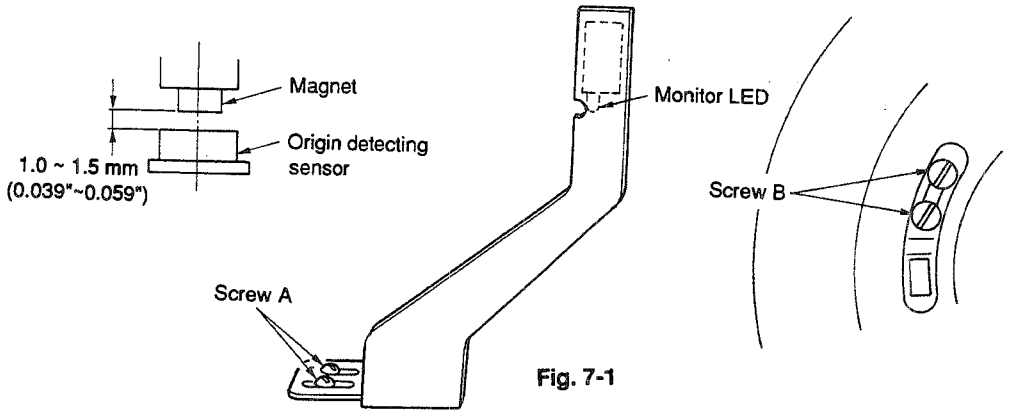


Fig. 7-1

Also, taking the position where the cam is in the origin and the presser bar is in the highest position of its stroke as "0°" adjust the magnet so that the monitor LED starts to light up in the range of 120° to 200° (160° is recommended) and goes out after 80° has been reached.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen nut ❶ of the cam shaft, loosen cam guide pin ❷, and cloth feed cam ❸ can be adjusted by turning it in the direction of rotation. Turn the cloth feed cam in direction A .... The stop position of the feed mechanism will be higher. Turn the cloth feed cam in direction B .... The stop position of the feed mechanism will be lower. After the adjustment, turn the sewing machine several times to check the timing of the cloth feed cam again. If not, the cam timing may change because of a play in the related parts. After the adjustment of the feed cam, be sure also to check the adjusted state of the tension releasing timing	If the stop position of the feed mechanism is adjusted to a value that is close to 8 mm, the lifting motion will be improved. However, the stop position is excessively lowered, the needle will be likely to bend. In this case, burred needle tip, blunt needle tip or needle breakage will result.
1) Adjust so that the needle bar is in the highest position of its stroke when the cam is in its origin. 2) Cut the angle indication tape and adhere it on the periphery of the sewing machine pulley. At this time, take the position that corresponds to both the origin of the cam and the highest dead point of the needle bar as "0°" and mark the reference line of the 0°. 3) Adjust screws A and B so that the magnet is opposed to the origin sensor and a clearance of 1.0 to 1.5 mm is provided between them when the cam is in its origin and the needle bar is in the highest dead point. 4) Turn the pulley by hand and stop it around 30° position. Now, turn ON the power to the machine. 5) Press the presser foot switch on the operation panel to lower the presser foot. 6) Loosen screw B and adjust the position of the magnet so that the monitor LED starts to light up when you have turned the sewing machine pulley by hand to reach the range of 120° to 200° (160° is recommended) and it goes out when you have turned the pulley beyond 80°.	

(8) Position of the presser foot

Turn the main shaft by hand until the feed timing for the longitudinal feed motion (the feed mechanism rocks back and forth) is reached. At this time, adjust so that clearance A provided between the needle and the presser foot is equal over the length.

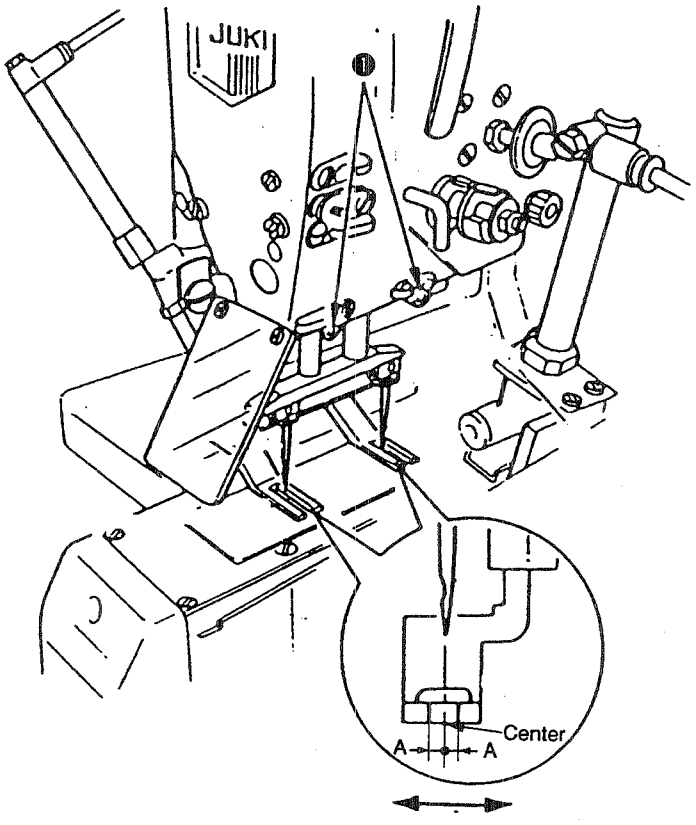


Fig. 8-1

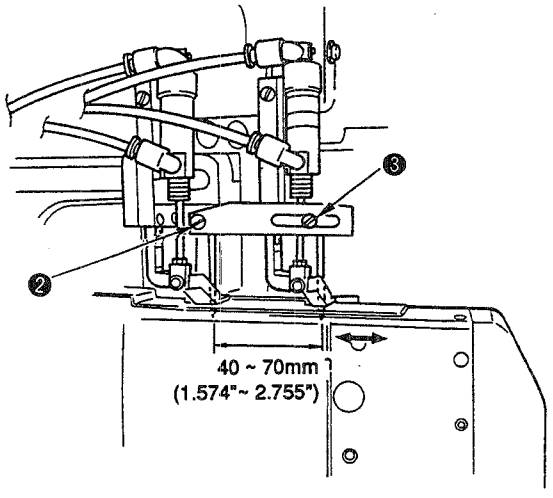


Fig. 8-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Presser foot on far side: The position of this presser foot has been factory-adjusted 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) Adjust the position of the far side needle in accordance with the clearance in the presser foot. Loosen screw ❷ and adjust the position of the far side needle. 2) Adjust the position of the throat plate in accordance with the position of the needle. 3) Re-adjust the position of the clearance provided between the shuttle body and the driver in accordance with the position of the needle. Presser foot on this side: 1) Ascertain that the needle-to-needle clearance matches the sewing size to be used and re-adjust it, if necessary. Loosen screw ❸ and perform the adjustment. 2) Loosen two screws ❶ in the front presser foot, and adjust so that the needle is placed in the direct side-to-side center in the slit on the presser foot.	

(9) Position of the feed plate

Adjust so that the presser foot and feed plate are aligned in terms of the lateral and longitudinal positions.
At this time, a clearance of 57.1 mm is provided between the needles.

☆ If it is necessary to additionally machine the feed plate blank to change the distance between the needles, extra caution has to be taken when checking the clearance provided between the presser foot and the feed plate.

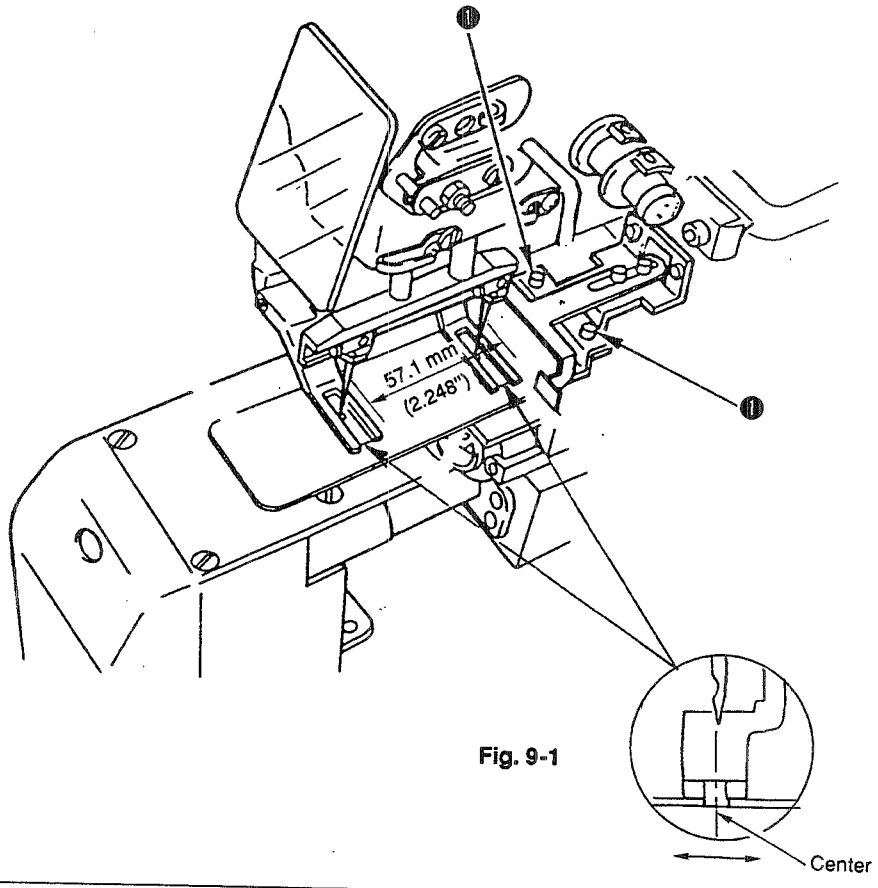


Fig. 9-1

(10) Lift of the presser foot

Vertical clearance of 22 mm should be provided between the underside of the presser foot and the top surface of the throat plate.

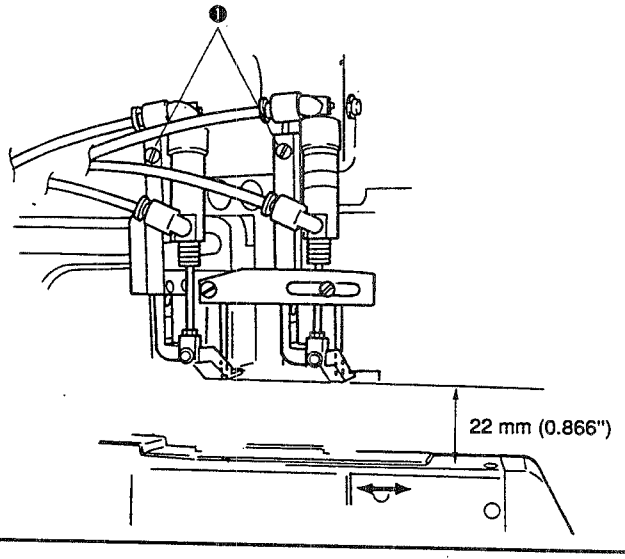


Fig. 10-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen screws ❶ and adjust the position of the feed plate.	If the feed plate and presser foot are not aligned in terms of the lateral and longitudinal positions, the feed plate will interfere with the needle resulting in needle breakage.
Loosen screws ❶ in the presser bar lifting cylinder installing shaft and adjust the lift of the presser foot.	If the presser foot is excessively raised, it will be pushed against the presser bar lifting cylinder. If the presser foot is excessively lowered, it will interfere with the belt-loop supplying device or belt-loops.

(11) Position of the wiper

The wiper should be positioned so that it spreads the thread. (See the Fig. 7-1.)

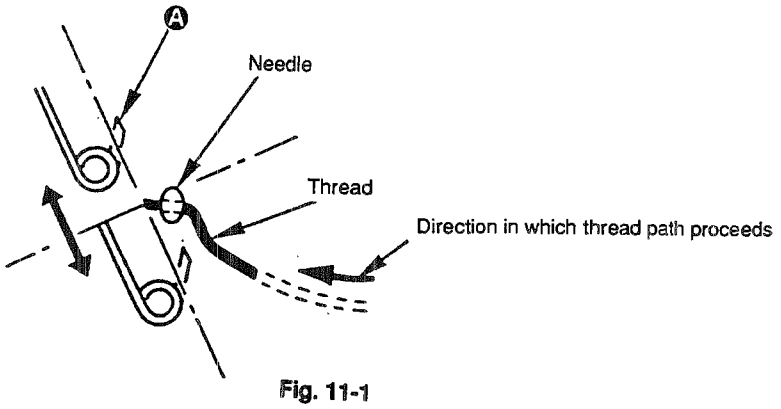


Fig. 11-1

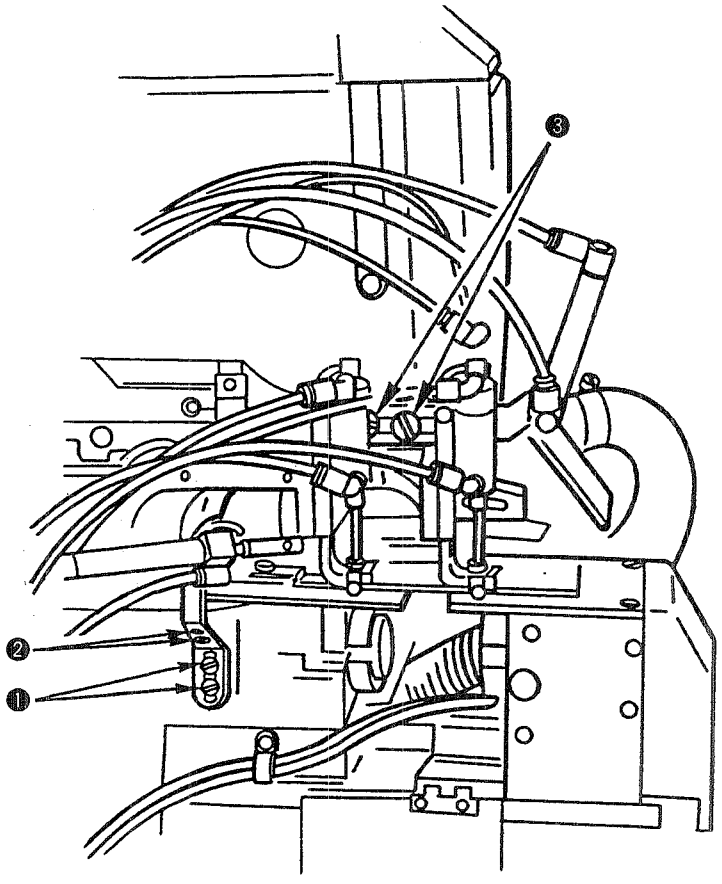
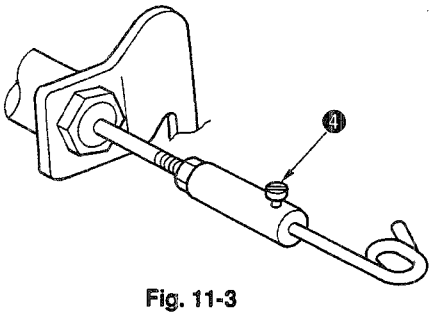


Fig. 11-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn OFF the power to the machine while the machine is engaged in an actual sewing and remove exhaust air. (Turn the pulley by hand until the needle is brought to its stop position.) 2) Make the wiper to protrude, by hand, and check the relation between the wiper and the thread. 3) Far side: Loosen screws ❶ and adjust the vertical position of the wiper. Loosen screws ❷ and adjust the longitudinal position of the wiper. 4) This side: Loosen screws ❸ and adjust both vertical and longitudinal positions of the wiper. 5) For the wipers on the far side and this side, respectively adjust them by loosening screw ❹ for each of them.  Fig. 11-3	

(12) Adjusting the releasing amount of the tension disk

When the tension disk releases: 1 mm

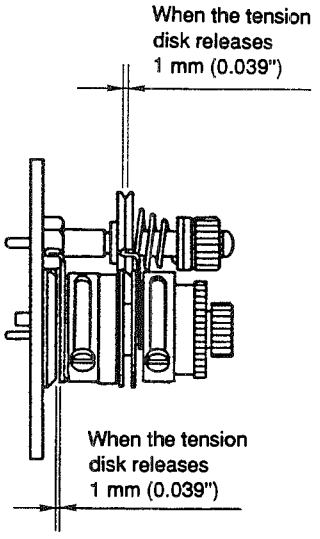


Fig. 12-1

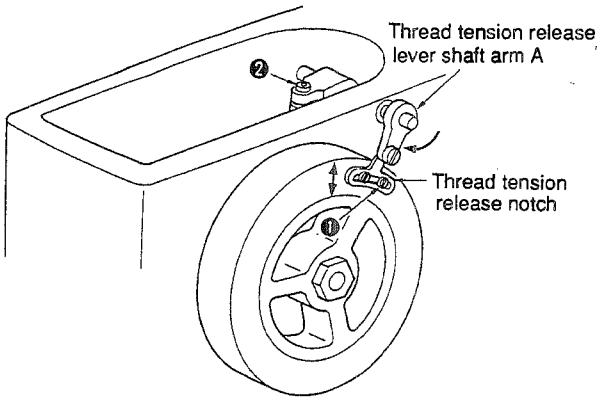


Fig. 12-2

(13) Tension releasing timing

Spun thread:

Adjust so that the thread tension is released when the thread trimmer actuates at the last stitch to spread the thread and returns to the stand-by position.

Cotton thread:

Adjust so that the thread tension is released when the thread trimmer actuates at the last stitch to spread the thread and starts to return to the stand-by position.

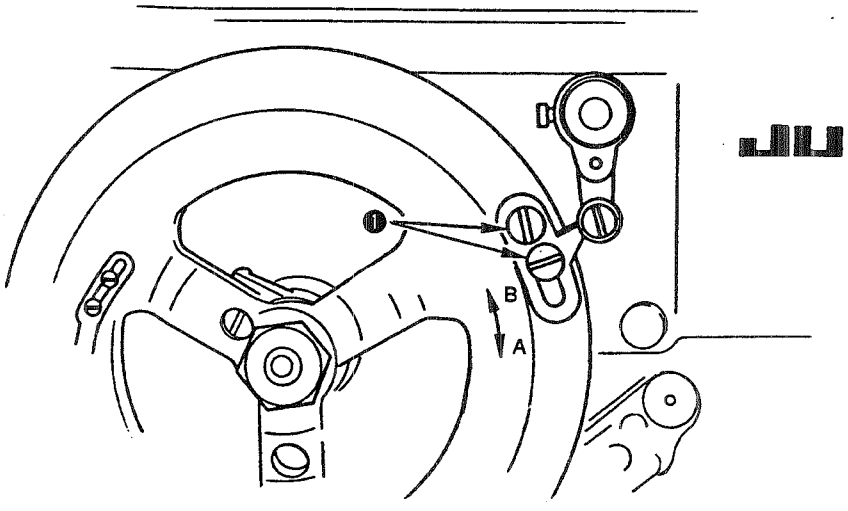
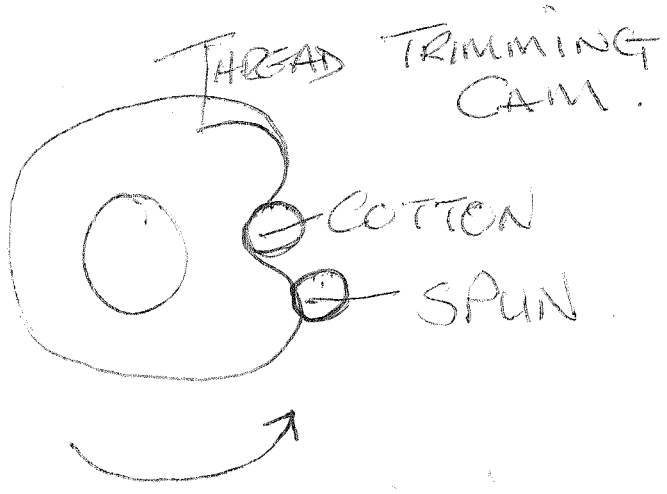


Fig. 13-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
○ Loosen two screws ❶ and move the thread tension release notch in the direction of the arrow. If the releasing amount of the tension disk cannot be appropriately adjusted, loosen screw ❷ and perform the adjustment by turning the thread tension release lever shaft arm A in the direction of the arrow.	If the releasing amount of the tension disk exceeds 1 mm, the thread flops at the start of sewing resulting in troubles such as slip-off the thread. If it is smaller than 1 mm, the thread will not be completely released. This may reduce the length of thread remaining at the needle after thread trimming.
Loosen two screws ❶ in the cloth feed cam and adjust the timing to release the thread tension. Move the cloth feed cam in direction A, and the thread tension releasing timing will be advanced. Move the cloth feed cam in direction B, and the thread tension releasing timing will be retarded.  WHEN ROLLER IS IN CENTER OF CUT OUT ON THREAD TRIMMING CAM TENSION SHOULD BEGIN TO OPEN FOR COTTON THREAD SPUN THREAD SHOULD BE LATER	If the thread tension releasing timing is too late, the needle thread will be cut too short resulting in slip-off of the needle thread at the start of next sewing. If the thread tension releasing timing is too early, the needle thread will be cut too long. This impairs the finished state of the seam on the wrong side of the material.

(14) Lateral position of the presser foot

The stitch described below is made at the center of the presser foot in terms of the lateral direction for the respective models of the sewing machines.

LK-1952: 28 stitches ... 19th stitch
LK-1953: 36 stitches ... 24th stitch
LK-1954: 42 stitches ... 27th stitch

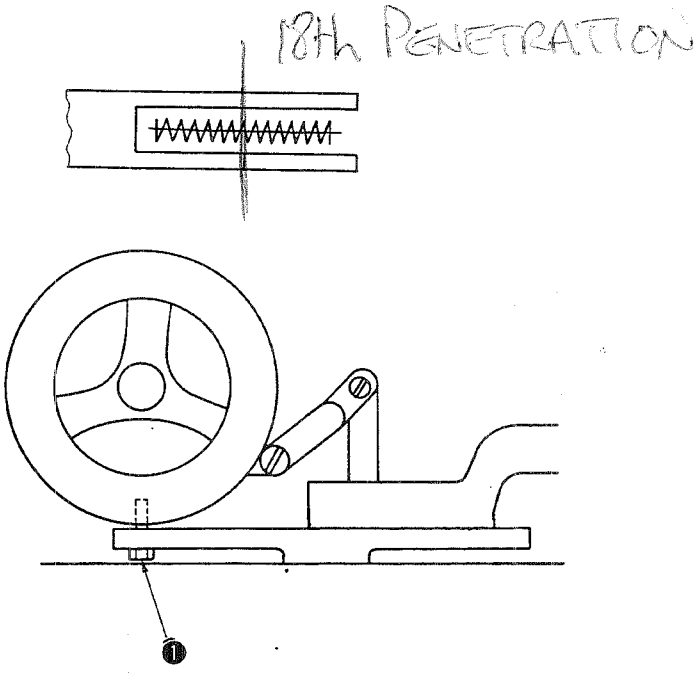


Fig. 14-1

(15) Adjusting the thread trimming cylinder (far side)

- When the thread trimming cam is in the position (the outermost periphery of the thread trimming cam) as illustrated in Fig. 15-2, clearance ❶ of 0.5 mm should be provided between the thread trimming cam and the extruding side of the thread trimming cylinder that is in its stroke end.
- Confirm that clearance ❷ is provided when the thread trimming cam is in the position illustrated in Fig. 15-3.

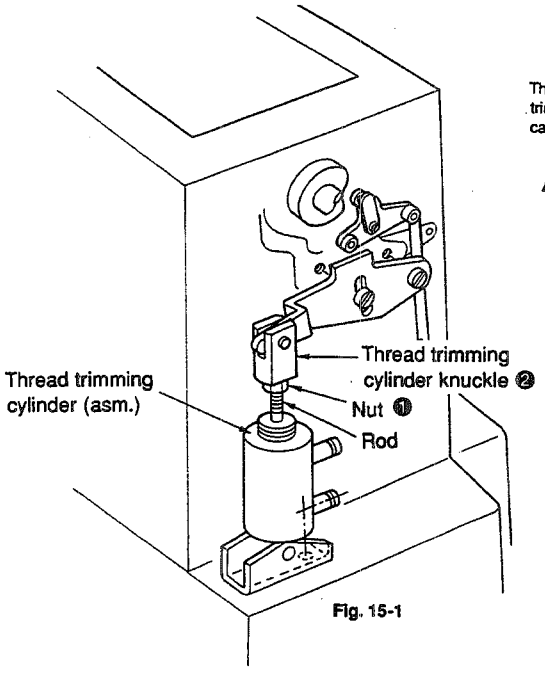


Fig. 15-1

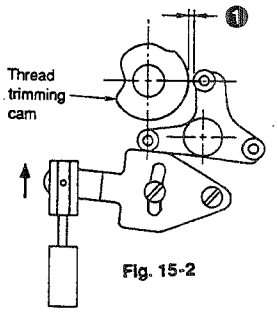


Fig. 15-2

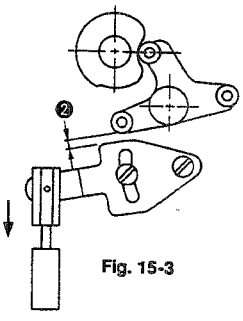


Fig. 15-3

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen nut ❶ in the feed-across cam roller shaft and perform the adjustment.	If the lateral position of the presser foot is not correct, the needle and the feed plate will interfere with each other when a larger sewing size is employed, resulting in needle breakage.
Loosen nut ❶ and perform the adjustment by turning the rod of the thread trimming cylinder.	○ If clearance ❶ is larger than the specified value, the protruding amount of the moving knife from the throat plate will become larger. ○ If clearance ❶ is larger than the specified value, clearance ❷ will be eliminated. ○ If there is no clearance ❶, the cam will be held in touch with the roller.

(16) Adjusting the thread trimming cylinder (this side)

- When the thread trimming cam is in the state as illustrated in Fig. 16-1 (recess on the thread trimming cam is brought to the lower side), clearance ❶ of 1 mm should be provided between the thread trimming cam and the retracting side of the thread trimming cylinder that is in its stroke end.

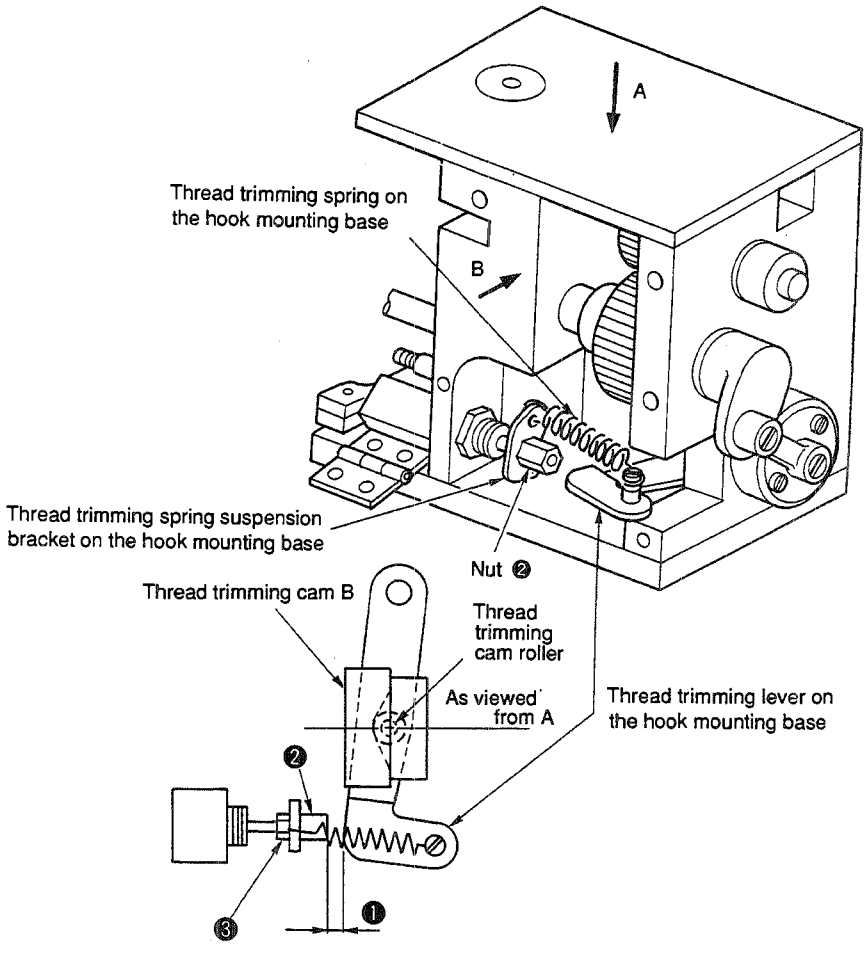


Fig. 16-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen nuts ❷ and ❸, and perform the adjustment.	If the clearance is smaller than 1 mm, the moving knife locating in the sewing position will excessively project from the throat plate. This causes the moving knife to interfere with the moving knife on the opposite side when the distance between this side seam and far side seam.

(17) Position of the moving knife

For both moving knives on far side and this side, the end of the slot in the moving knife should be aligned with the needle hole in the needle hole guide when the moving knife is in the stand-by position just before the start of thread trimming after the thread has been spread. (See the Fig. 17-1.)

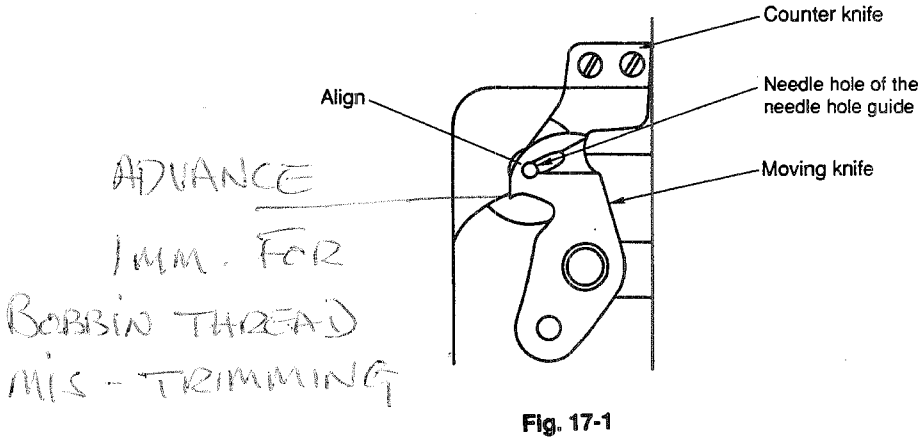


Fig. 17-1

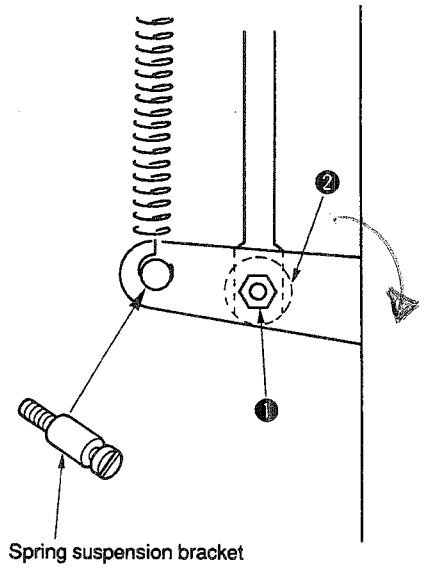


Fig. 17-2

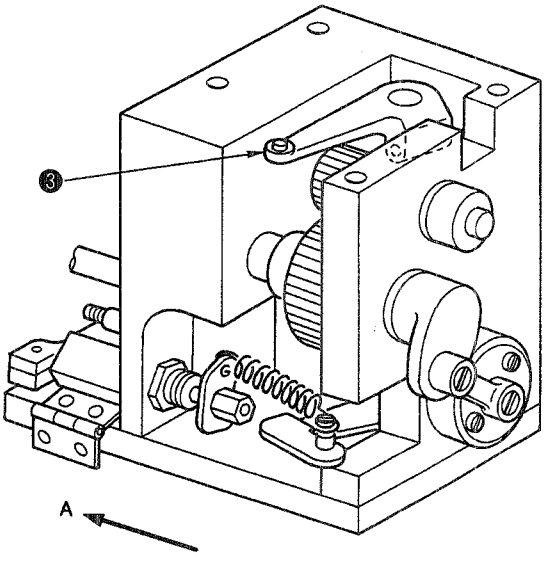


Fig. 17-3

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Expel air from the machine. Far side 2) Remove thread trimming spring suspension bracket from the thread trimming lever. Fit the thread trimming spring directly in the tapped hole for the thread trimming spring suspension bracket. 3) Loosen nut ❶ and adjust the position of the moving knife by turning eccentric hinge screw ❷. This side 4) Confirm first that moving knife on this side synchronizes to the moving knife on far side. 5) Press the thread trimming cylinder toward A, loosen screw ❸ and adjust the position of the far side moving knife. Far side and this side 6) Then, turn the sewing machine by hand until the needle reaches the lowest position of its stroke. Now, press the moving knife toward the needle until it will go no further to confirm that moving knife does not come in contact with the needle.	If the moving knife is positioned too close to the counter knife, the thread may not be spread consistently, resulting in thread trimming failure. If the moving knife is excessively spaced from the counter knife, the moving knife may interfere with the needle, resulting in needle breakage. If this side moving knife fails to synchronize to far side moving knife, this side moving knife may be defective.

(18) Adjusting the height of moving knife and counter knife

Make the moving knife and counter knife to cut in trial two pieces of #80 thread and two pieces of #5 thread (by operating the thread trimming lever by hand after having removed the throat plate to check that the respective pairs of thread are properly cut.

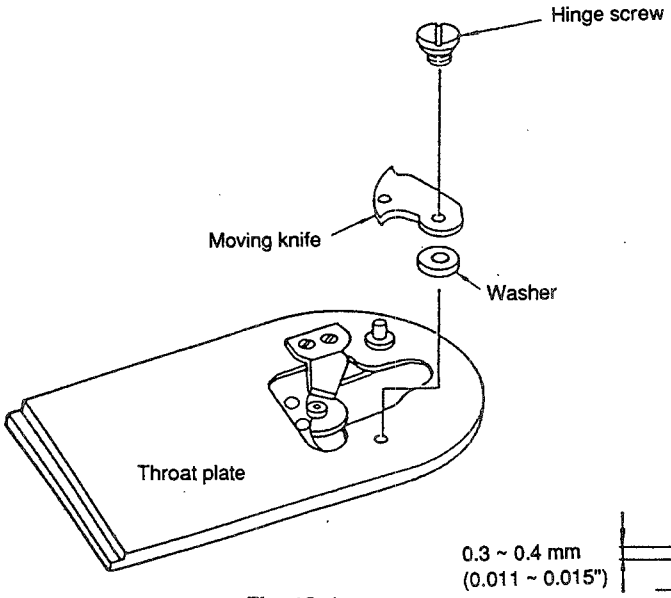


Fig. 18-1

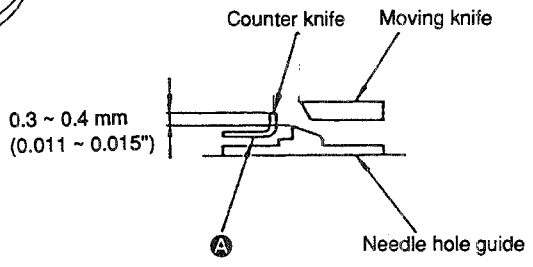
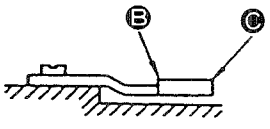


Fig. 18-2

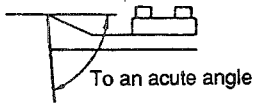
(19) Parallelism of the blade tip of the counter knife

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.



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

Fig. 19-1

HOW TO ADJUST	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. Part No. / Description / Thickness B242328000A / Washer / 0.4 mm B242328000B / " / 0.5 mm B242328000C / " / 0.6 mm B242328000D / " / 0.7 mm B242328000E / " / 0.8 mm B242328000F / " / 0.65 mm B242328000G / " / 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 Ⓐ (Fig. 18-2) 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 Ⓑ side, shave Ⓒ side appropriately. If the thread is not cut on Ⓒ side, shave Ⓑ side appropriately.  **Fig. 19-2** 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 Ⓑ is lower than side Ⓒ, the thread will not be cut on Ⓒ side. ○ If side Ⓒ is lower than side Ⓑ, the thread will not be cut on Ⓑ side.

(20) Adjusting the thread take-up spring

Stroke:

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

Tension:

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

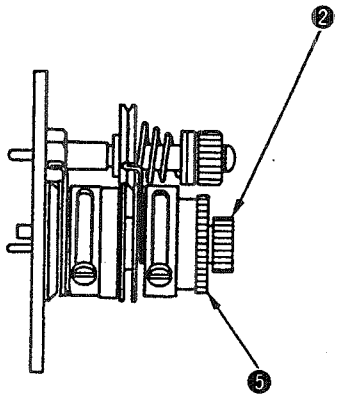


Fig. 20-1

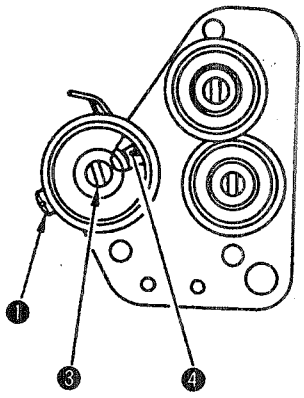


Fig. 20-2

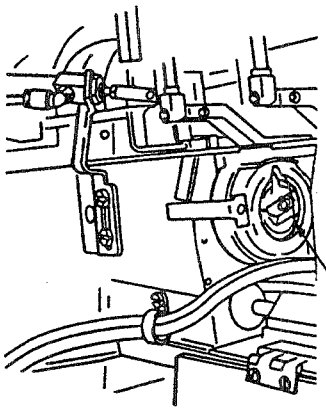


Fig. 20-3

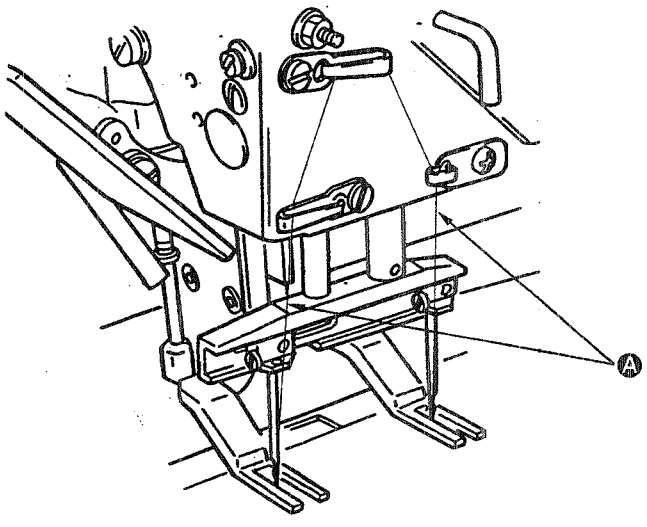


Fig. 20-4

HOW TO ADJUST	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 pulley by hand until the needle thread is tucked by the hook and start to turn in the shuttle body, then stop the pulley before the thread completes its turning motion (Fig. 20-3). 3) At this time, check how the respective threads are tensed at portion Ⓐ. For the respective threads, loosen screw ❶ and adjust the stroke of the thread take-up spring so as to slightly tense each thread. **Tension** Far side: Loosen nut ❷, and turn shaft ❸. This side: Loosen screw ❹ and turn knob ❺.	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.

(21) Tension of the V belt

Adjust so that the V belt sags by approximately 8 mm when a 500 g load is applied to the center (portion Ⓐ) of belt.

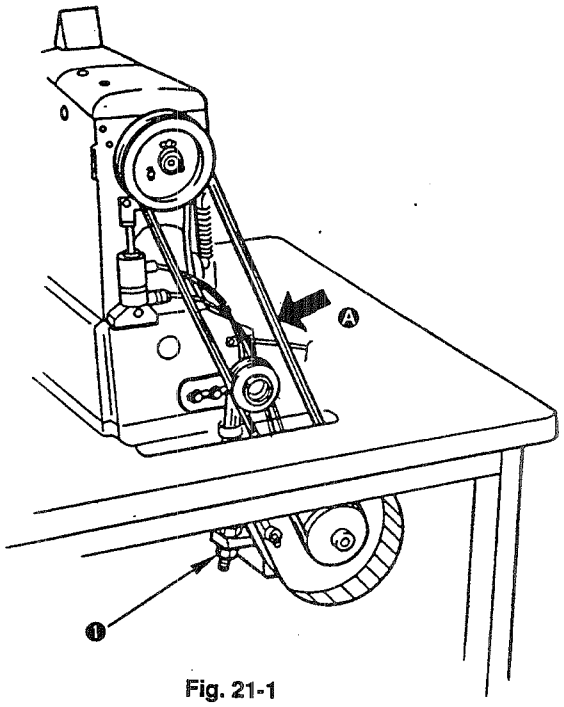


Fig. 21-1

(22) Stop position of the needle

When the needle is in the stop position, it should not jut out from the sole of the presser foot.

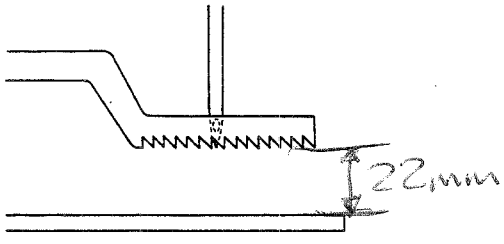


Fig. 22-1

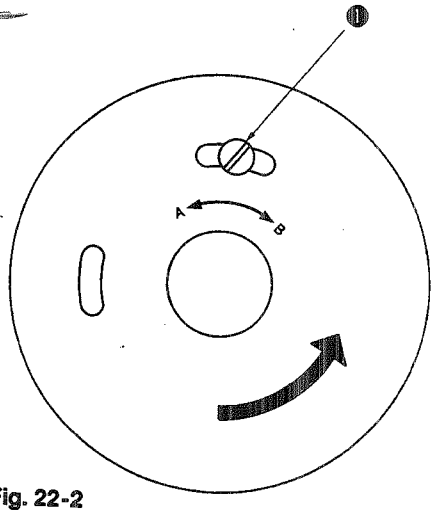


Fig. 22-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen nut ❶ of the fixing screw and adjust the tension of the V belt by changing the position at which the motor is installed up or down.	○ If the V belt is excessively tensed, the motor bearing will be worn out easily. ○ If the V belt is insufficiently tensed, it may vibrate or the stop position of the machine will vary.
1) Loosen screw ❶ in the drive pulley. To raise the needle: Turn the drive pulley in direction A. To lower the needle: Turn the drive pulley in direction B.	If the needle descends lower than the sole of the presser foot, the material may be caught by the needle tip. If the needle stops at a higher position, the thread may be likely to slip off at the start of sewing.

(23) Timing of the hook on this side

Adjust 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 tucking the thread.

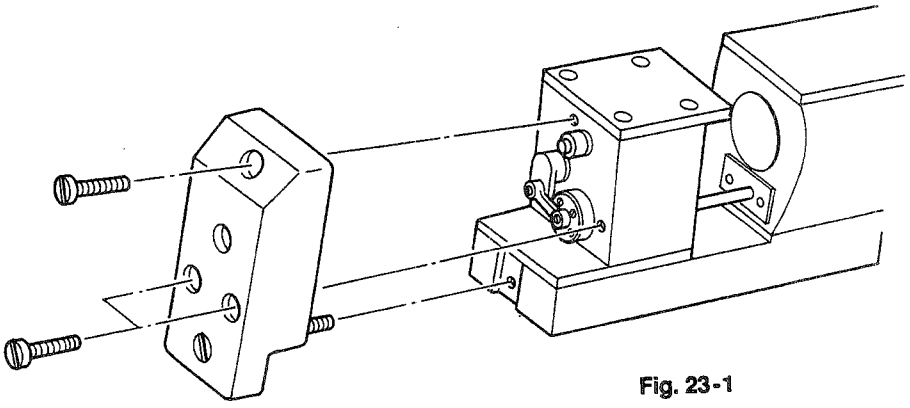


Fig. 23-1

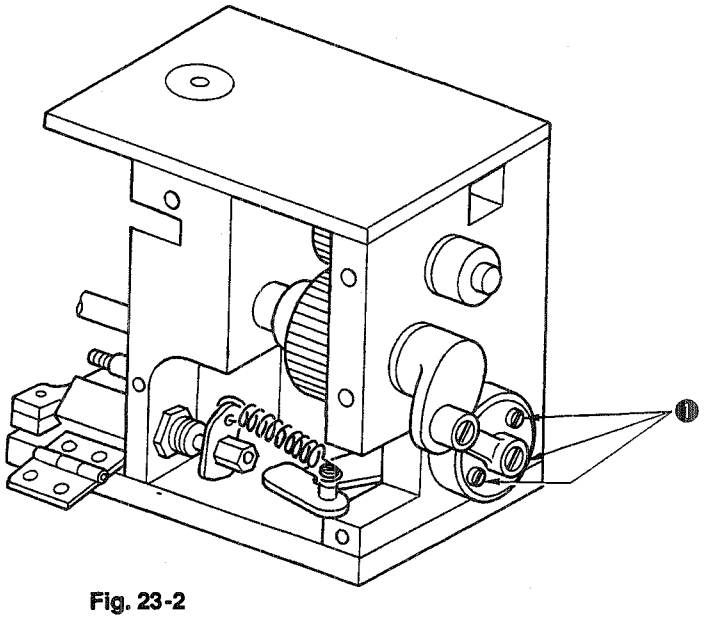
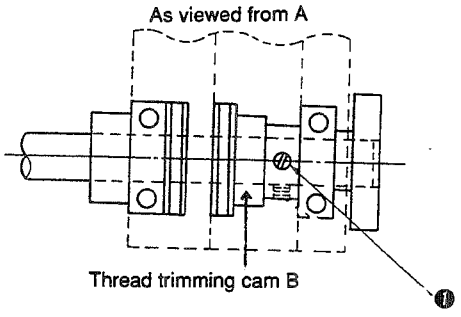


Fig. 23-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove the cover from the hook mounting base. 2) Loosen three screws ❶ in the traveling shaft crank and adjust the hook timing.	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.

(24) Timing of the thread trimming cam (only for this side)

The moving knife on this side and that on far side should spread the threads at the same timing.



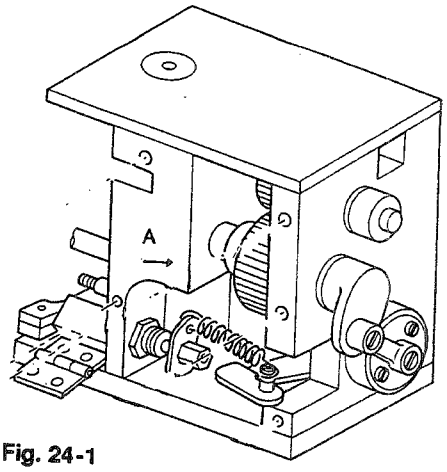


Fig. 24-1

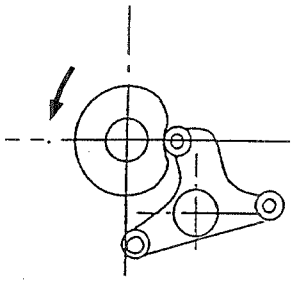


Fig. 24-2
(As viewed from pulley side)

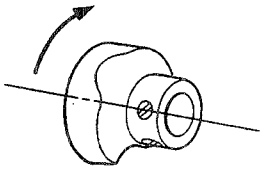
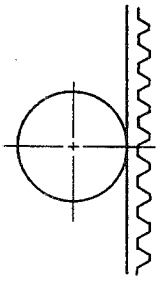


Fig. 24-3

(25) Adjusting the idler

The idler should come in slight contact with the timing belt.



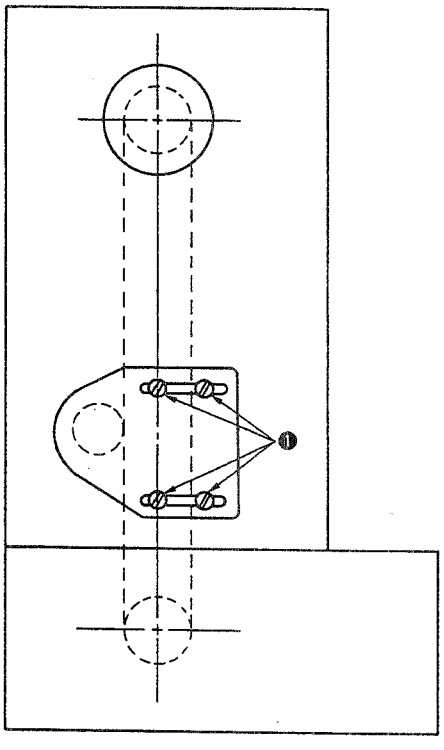


Fig. 25-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Expel air from the machine. 2) Remove the side cover from the hook mounting base. 3) Loosen two screws ❶ in the thread trimming cam B and adjust the timing of the thread trimming cam. At this time, check the timing of the thread trimming cam with the thread trimming cylinder pressed toward B. When the thread trimming cam mounted on the main shaft is in the position as illustrated in Fig. 23-2 (The thread trimming cam is on the deepest position of the slit), position thread trimming cam B as shown in Fig. 24-3 (the slit on the thread trimming cam is brought underside). At this time, the screw No. 1 is horizontally oriented.	If the timing between the moving knife on this side and that on far side differs from the standard adjustment, the thread will fail to work properly.
Loosen screws ❶ and perform the adjustment.	If the timing belt is excessively pressed, the main shaft will produce an extra torque. In this case, the idler will be hot or the life of the related bearing will be shortened.

6. STANDARD ADJUSTMENT (DEVICES)

STANDARD ADJUSTMENTS

(1) Moving knife

1) Position of the moving knife
When moving knife ❷ comes down (to the lowest point of its stroke), it should mesh with the top face of counter knife ❶ by 0.5 mm.

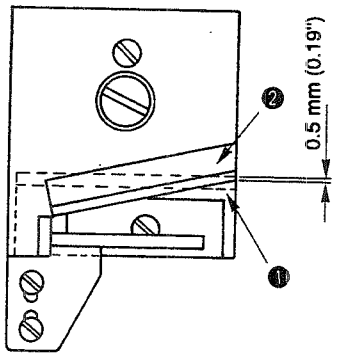


Fig. 1-1

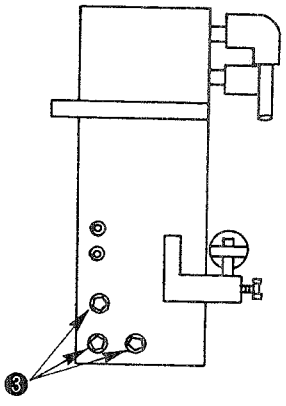


Fig. 1-2

Extreme caution must be taken during adjustment works to avoid your fingers from getting cut by moving knife ❷.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn the moving knife and loosen screws ❸ in attaching bracket. Then, perform the adjustment.	

2) Adjusting the moving knife
The top surface of moving knife ❺ should be flush with the under side of moving knife mounting base ❻.
(Clearance: 0mm)

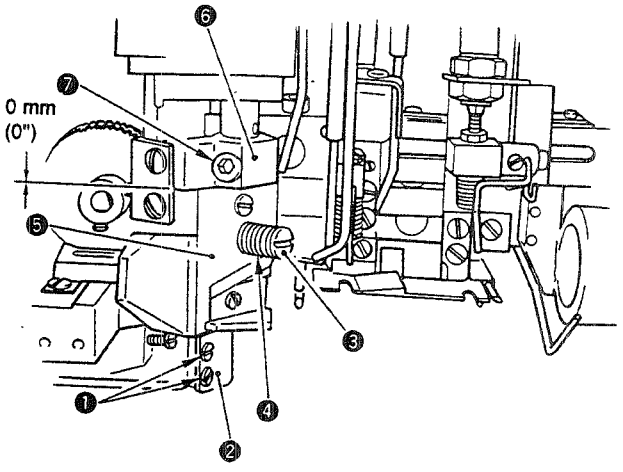


Fig. 1-3

3) Grinding the moving knife
Angle of blade: 30°

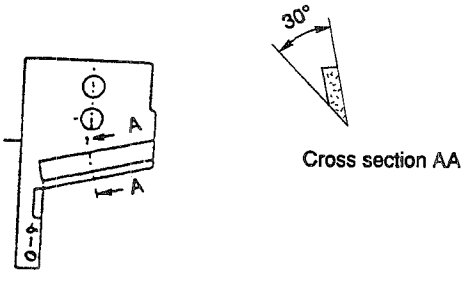


Fig. 1-4

Extreme caution must be taken during adjustment works to avoid your fingers from getting cut by moving knife ❺.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
2) Remove screws ❶ from the belt-loop support. Then remove belt-loop support ❷. Remove screw ❸ from the knife presser spring collar. Then, remove knife presser spring ❹ and the moving knife. Installation is carried out analogously in reverse order. If, when attaching moving knife ❺, the top surface is not flush with the underside of moving knife mounting base ❻, loosen screw ❼ and move moving knife mounting base ❻ so that it is correctly positioned. 3) Use a fine whetstone and grind the blade of the moving knife as shown in Fig. 1-4. **(Caution) Carefully secure the knife on the whetstone so that the correct inclination angle (30°) of the knife is maintained.**	

(2) Position of the belt-loop support and the moving knife

When moving knife ❷ is raised (to the highest point of its stroke), a 0 to 0.5 mm difference in height should be provided between the top surface of belt-loop support ❸ and the top surface of counter knife ❶.

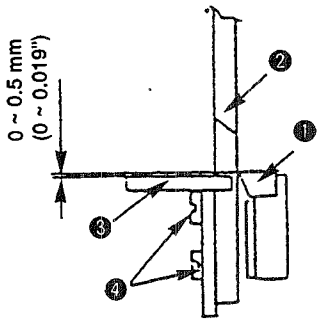


Fig. 2-1

Extreme caution must be taken during adjustment works to avoid your fingers from getting cut by moving knife ❷.

(3) Position of the belt-loop receiving plate and the counter knife

A 0 to 1 mm difference in height should be provided between the top surface of belt-loop receiving plate ❺ and the top surface of counter knife ❶.

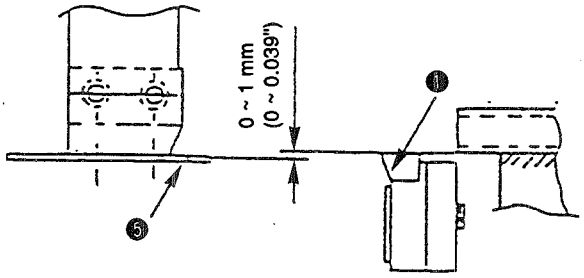


Fig. 3-1

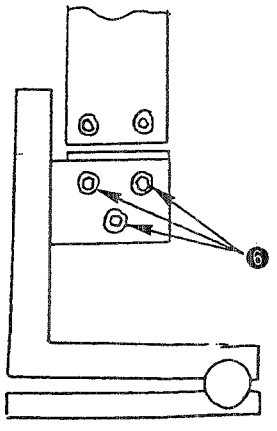


Fig. 3-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen screws ❹ and adjust the position of the belt-loop support and the moving knife. Loosen delivering bracket attaching screws ❻ and adjust the position of the belt-loop receiving plate and the counter knife. (In case where the belt-loop receiving plate is fixed and the entire portion locating behind the counter knife is moved up and down.)	

(4) Belt-loop shifter

1) Just before the belt-loop shifter presses a belt-loop, the distance between the belt-loop guides ❹ and ❺ and side face ❸ of the belt-loop receiving plate should be same as the belt-loop width.

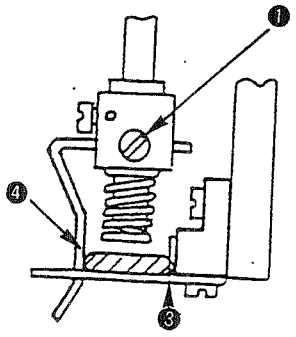


Fig. 4-1

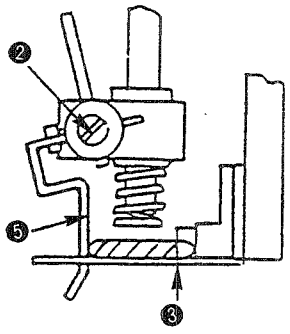


Fig. 4-2

2) When belt-loop presser spring ❼ comes down, a clearance of 0 mm should be provided between the spring and the top surface of belt-loop receiving plate ❻ .

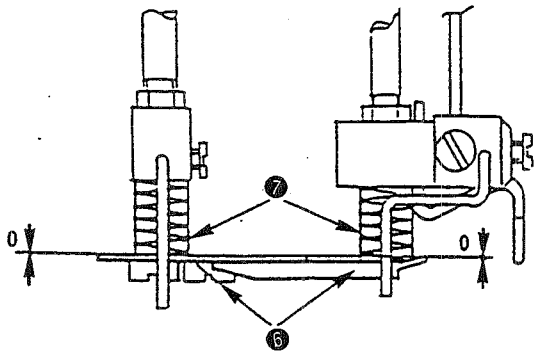


Fig. 4-3

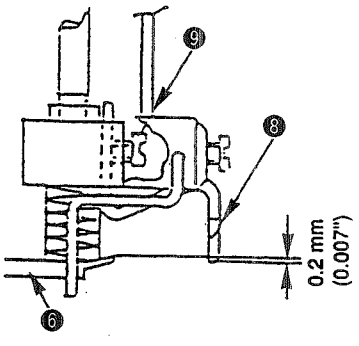


Fig. 4-4

3) A difference in height between belt-loop presser metal fitting ❽ and the belt-loop receiving plate should be 0.2 mm.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screws ❶ and ❷. Then, perform the adjustment.	
3) Loosen screw ❾ and perform the adjustment.	

(5) Belt-loop folding mechanism

(Condition) When the folding shaft advances

1) A difference in height of 0 to 0.2 mm should be obtained between lower folding metals ❷ and ❸ and the top surface of belt-loop receiving plate ❶.
2) A clearance of 2 to 2.5 mm should be provided between lower folding plates ❷ and ❸ and the end of belt-loop receiving plate ❶.
3) Plane ❻ of the fork against which fork is pressed and the side face of the belt-loop receiving plate should be flush with each other.

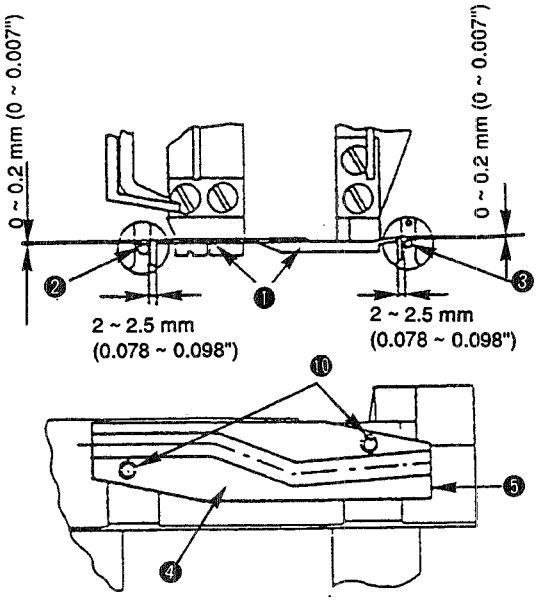
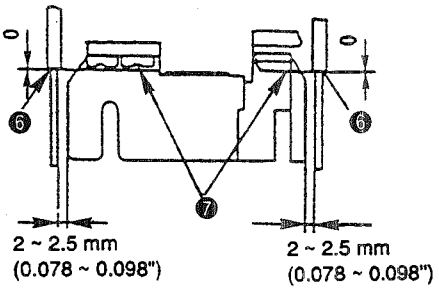


Fig. 5-1



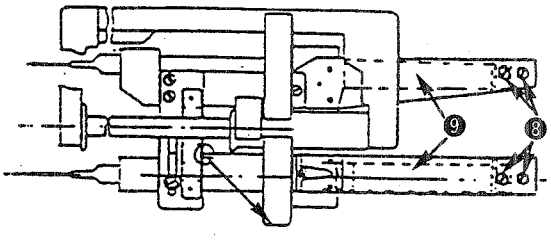


Fig. 5-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screws ⑩ and perform the adjustment by moving rear portion ❺ of belt-loop supplying cam ❹. 3) Loosen screws ❽ and perform the adjustment by moving rotor mounting base ❾.	

(6) Belt-loop supplying mechanism

1) The initial position of folding shaft ❹ is 23^{+1}_{0} mm from side face ❸ of the belt-loop receiving plate.
2) A clearance of 6 to 7 mm should be provided between the top surface of folding metal ❷ and presser foot ❶.

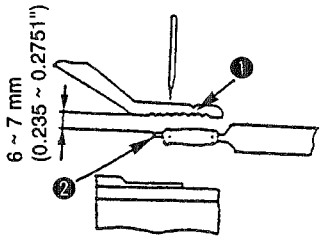


Fig. 6-1

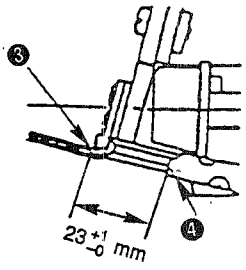


Fig. 6-2

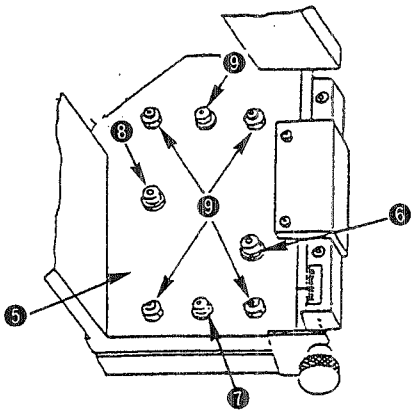


Fig. 6-3

(7) Adjustment related to the height of the folding plate

The standard height of the folding metal, when supplying a belt-loop, should be adjusted, as measured from its top surface, to 15 to 16 mm above the top surface of the throat plate.

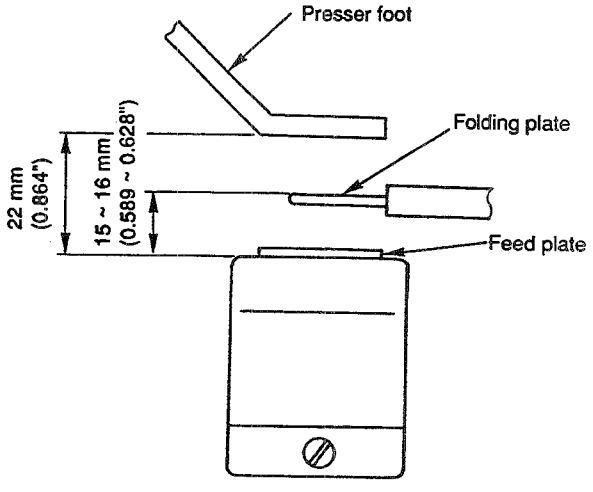


Fig. 6-4

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Loosen screws ❽ and ❻. Turn adjusting screw ❾ to move device mounting base ❺ up and down for the purpose of adjustment.	

(8) Position of the folding metal and the presser foot

The folding metal should be positioned at the center of notch in the presser foot as illustrated in Fig. 8-1.
(The position of the folding metal differs in accordance with thickness belt-loops to be sewn and dimension A that is the distance between the folding metal and the end of a belt-loop. The aforementioned adjustment is applied in case where 14 oz. denim is used and dimensions A is 4 mm.)

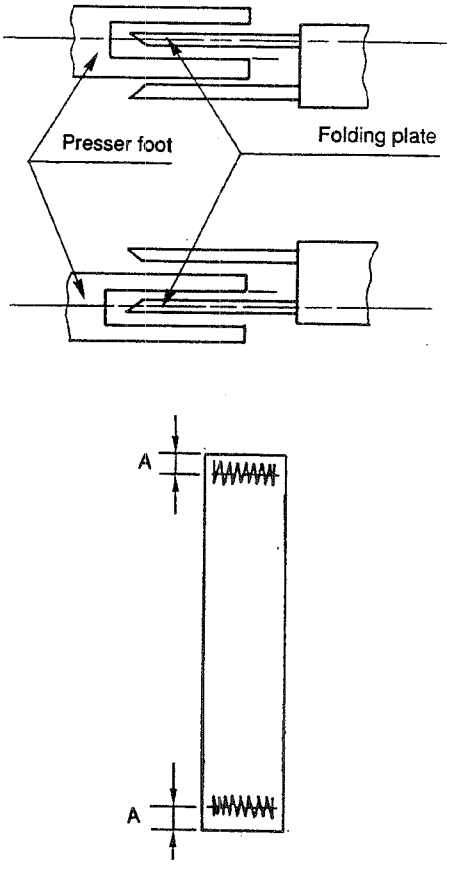


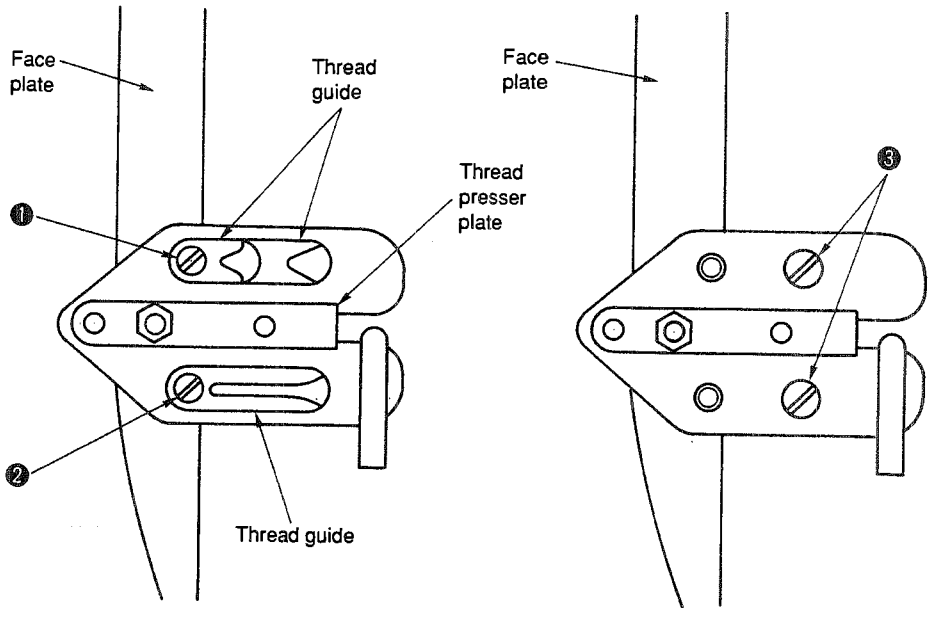
Fig. 8-1

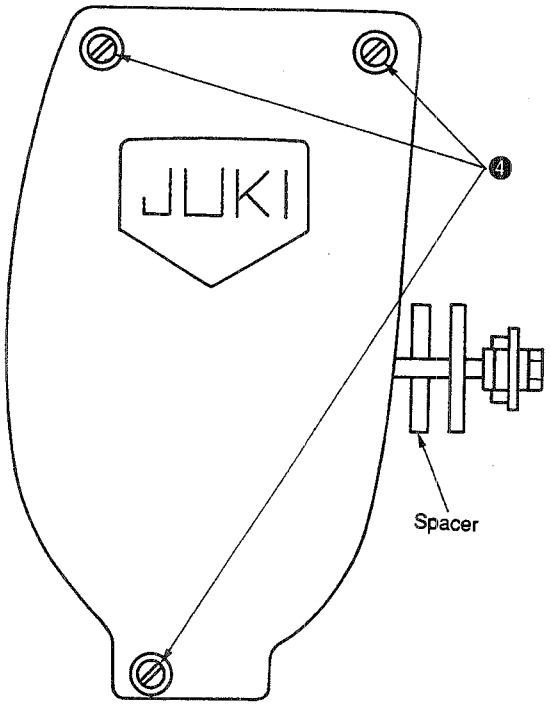
HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT

7. DISASSEMBLING/ASSEMBLING PROCEDURE AND CAUTIONS TO BE TAKEN

DISASSEMBLING/ASSEMBLING PROCEDURE

(1) Removing the face plate



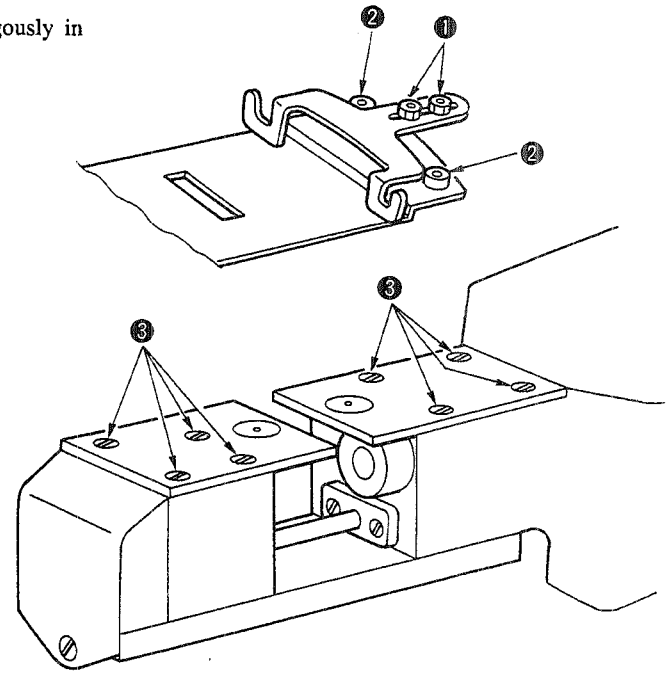


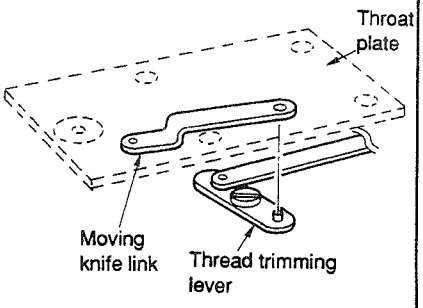
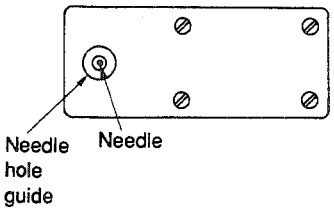
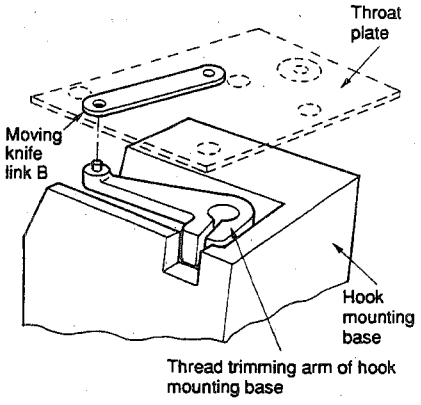
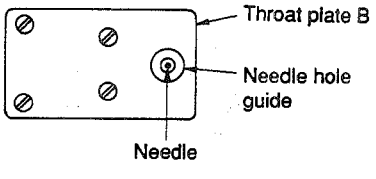
CAUTIONS TO BE TAKEN WHEN DISASSEMBLING	CAUTIONS TO BE TAKEN WHEN ASSEMBLING
1) Remove screws ❶ and ❷. Remove the thread guide. 2) Remove screws ❸. 3) Remove screws ❹. Then, remove the face plate. [Installing the face plate] 1) Attach the face plate in position and tighten screws ❹. Note that the screws should be temporarily tightened. Be sure to place a spacer in the predetermined position. 2) Place screws ❸ in position and firmly tighten them. 3) Fix the thread guide by securely tightening screws ❶ and ❷. 4) Finely adjust the face plate so that the thread presser plate smoothly moves and does not come in contact with the thread guide. Then, firmly tighten screws ❹.	

(2) Removing the throat plate

1) Loosen screws ❶ in the cloth feeding plate guide.
   Remove screws ❷ and remove the feed plate.
2) Remove screws ❸ from the throat plate and remove the throat plate.

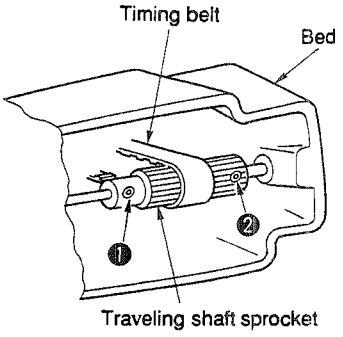
* Assembling is carried out analogously in the reverse order.

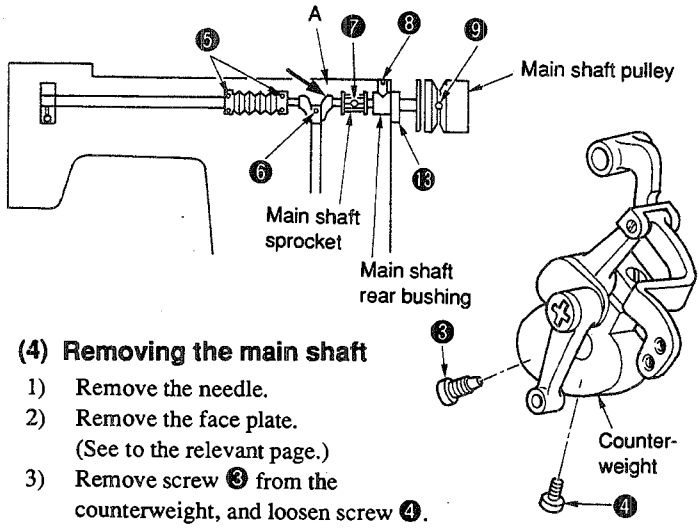


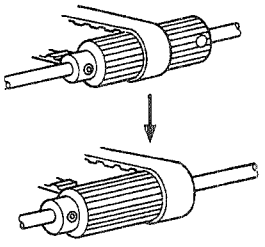
CAUTIONS TO BE TAKEN WHEN DISASSEMBLING	CAUTIONS TO BE TAKEN WHEN ASSEMBLING
	○ When attaching the throat plate (far side), fit the hole in the moving knife link over the pin of the thread trimming lever.  ○ Fix the throat plate to allow the needle to enter the center of the hole in the needle hole guide.  ○ When installing throat plate B (this side), fit the hole in the moving knife link B over the pin of the thread trimming arm of the hook mounting base.  ○ Fix throat plate B to allow the needle to enter the center of the needle hole guide. 

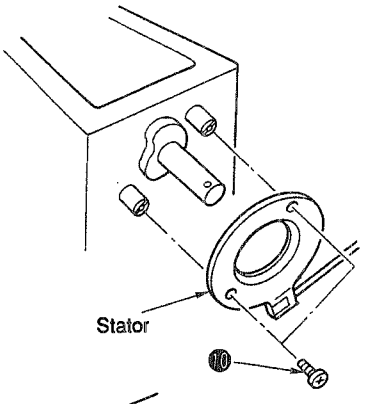
(3) Removing the main shaft and traveling shaft (common item)

1) Attach a marker line onto the main shaft sprocket and timing belt and the traveling shaft sprocket and timing belt.
2) Tilt the machine head. Loosen four screws in the traveling shaft sprocket.
   When the needle bar is in the lowest position of its stroke, loosen screw ❶ that has been tightened in the flat portion of the sprocket so that it is out of the flat portion. Remove screw ❷ since it is a tapered screw.
3) Shift the traveling shaft sprocket toward you, then turn the main shaft. Repeating this procedure will allow the traveling shaft sprocket to come closer to the main shaft intermediate bushing.
   When the traveling shaft sprocket reaches the traveling shaft intermediate bushing, press the timing belt while turning the main shaft. This will remove the timing belt from the traveling shaft sprocket.





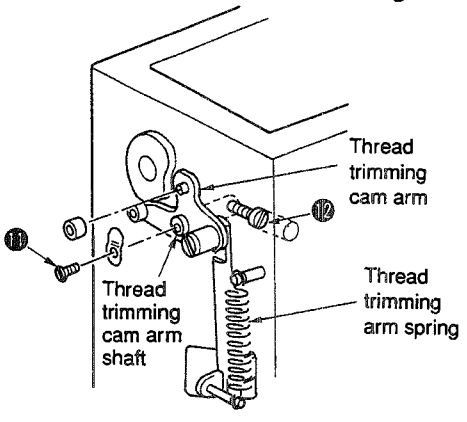


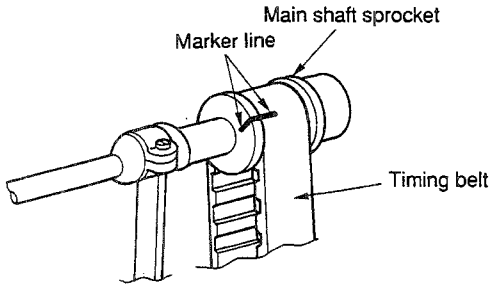
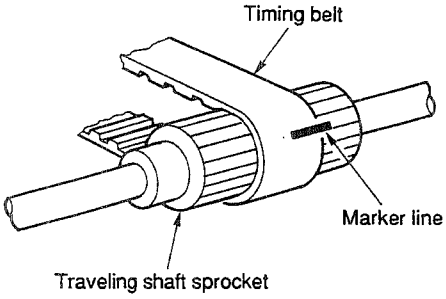


(4) Removing the main shaft

1) Remove the needle.
2) Remove the face plate.
   (See to the relevant page.)
3) Remove screw ❸ from the counterweight, and loosen screw ❹.
4) Loosen four screws ❺ in the worm.
5) Remove screw ❻ in the crank rod. Remove the cover from the crank rod.
6) Loosen two screws ❼ in the main shaft sprocket.
7) Loosen screw ❽ in the main shaft rear bushing and draw out the bushing.
8) Loosen two screws ❾ in the main shaft pulley and remove the pulley.
9) Remove screw ❿ from the stator. Remove the stator.
10) Remove the thread trimming arm spring.
11) Remove screw ⓫ and remove the cover from the thread trimming cam roller cover.
12) Loosen screw ⓬, draw out the thread trimming cam arm shaft. Then, remove the thread trimming cam arm.
13) Apply a brass rod to portion A, and draw out the main shaft together with the main shaft rear bushing while lightly tapping portion A with the brass rod.

* Assembling is carried out analogously in the reverse order.



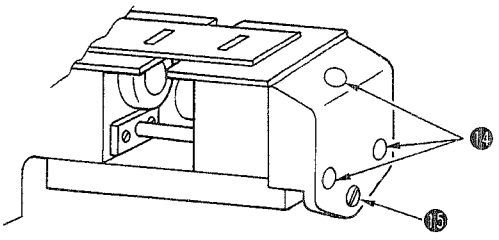
CAUTIONS TO BE TAKEN WHEN DISASSEMBLING	CAUTIONS TO BE TAKEN WHEN ASSEMBLING
○ When the needle bar is in the lowest position of its stroke, attach a marker line to the main sprocket and timing belt.  When the needle bar is in the lowest position of its stroke, attach a marker line to the traveling shaft sprocket and timing belt. (At this time, the machine head has to be tilted.)  	○ Aligning the marker line on the main shaft sprocket and that on the timing belt, put the timing belt so that the marker line on it meets that on the hook driving shaft.
Remove screw ⑧ since it is a tapered screw. The portion where the screw No. 1 ⑨ is tightened is flat, so loosen the screw until it comes off the flat portion. Be sure to tap portion A with a soft metal piece such as a brass rod. Be sure to remember that the main shaft has to be drawn out gradually.	○ Before driving in the main shaft rear bushing, put the main shaft in the counterweight in prior. ○ When driving in the main shaft rear bushing, applying a filler on the end face of thread trimming cam ⑱ and gradually tap the filler with a brass rod or the like. ○ Securely fit the top end of screw ⑧ in the slot in the main shaft rear bushing without fail and tighten the screw.

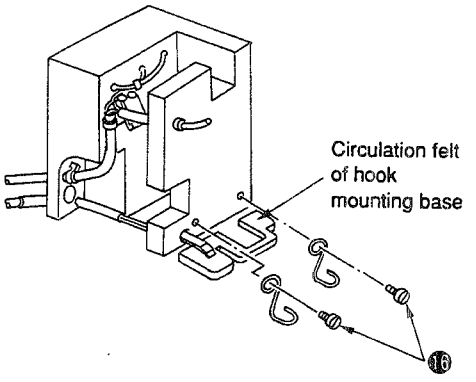
DISASSEMBLING/ASSEMBLING PROCEDURE

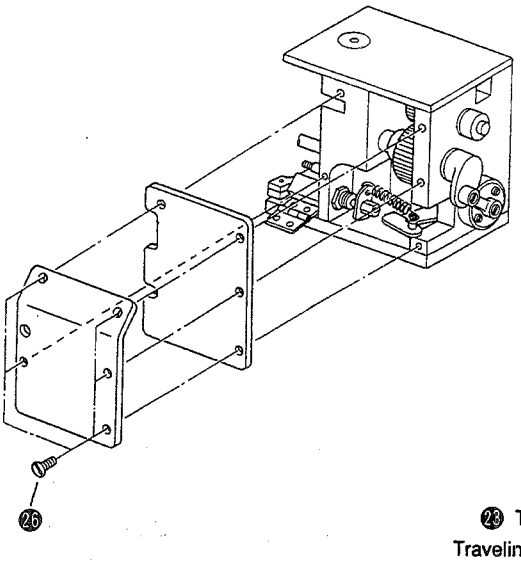
(5) Removing the traveling shaft

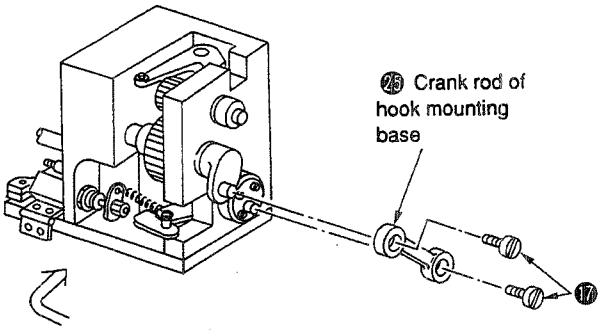
1) Remove the needle
2) Remove three screws ⑭. Remove the hook mounting base by turning hook mounting base adjusting shaft ⑮.
3) Remove five screws ㉖ and remove the hook mounting base, left.
4) Remove two screw ⑯ and remove the circulation felt of the hook mounting base.
5) Remove two left-handed screws ⑰ and remove the crank rod of the hook mounting base.
6) Loosen two screws ⑱ in the thread trimming cam.
7) Loosen two screws ⑲ in the thrust collar.
8) Draw out the traveling shaft toward you.

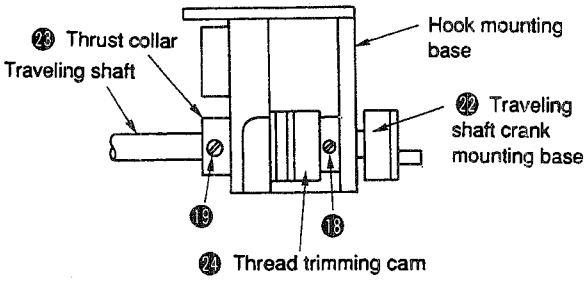
* Assembling is carried out analogously in the reverse order.



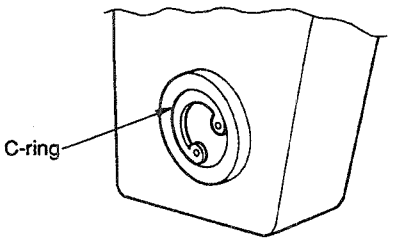






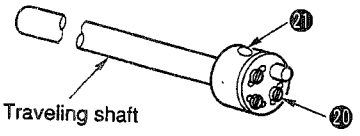


When replacing the needle bearing of the intermediate bushing and rear bushing of the traveling shaft with a new one, C ring has to be removed.



CAUTIONS TO BE TAKEN WHEN DISASSEMBLING

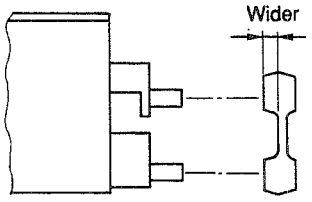
- Do not remove the portion of the circulation felt that is secured with a stapler pin.
- Never loosen three screws ⑳ in the traveling shaft crank.



- Before replacing the traveling shaft with a new one, loosen screws ㉑ in the traveling shaft crank mounting base.

CAUTIONS TO BE TAKEN WHEN ASSEMBLING

- Remove a thrust play with traveling shaft crank mounting base ㉒ and thrust collar ㉘.
- When fixing thread trimming cam ㉔, tighten screws ⑱ so that the moving knife for the throat plate on far side synchronizes to that on this side.
- When attaching the crank rod of the hook mounting base, orient the crank rod as illustrated in the sketch below.

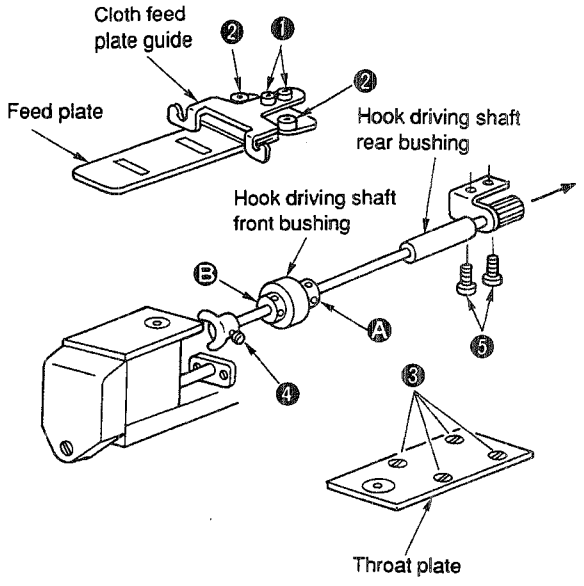


The oil hole should face upward.

(6) Removing the hook driving shaft

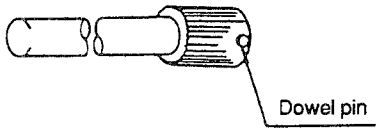
1) Remove the needle.
2) Remove the plug.
3) Loosen screws ❶ in the cloth feed plate guide. Remove screws ❷ from the feed plate and remove the feed plate.
4) Remove screws ❸ from the throat plate and remove the throat plate.
5) Loosen screw ❹ in the driver. Remove the driver.
6) Loosen two screws in thrust collar Ⓐ. Then loosen two screws in thrust collar Ⓑ.
   For thrust collar Ⓐ, loosen the screws from the underside of the bed. For thrust collar Ⓑ, loosen the screws from the throat plate installing plane.
7) To replace the hook driving shaft needle bearing with a new one, remove the hook driving shaft needle presser by removing screws ❺.
8) Remove the hook driving shaft by drawing it backward.

* Assembling is carried out analogously in the reverse order.

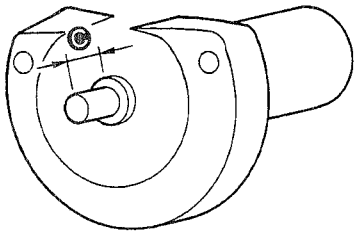


CAUTIONS TO BE TAKEN WHEN DISASSEMBLING

- When drawing out the hook driving shaft, never remove the dowel pin from the hook driving shaft gear, or else the hook driving shaft needle bearing will be damaged.

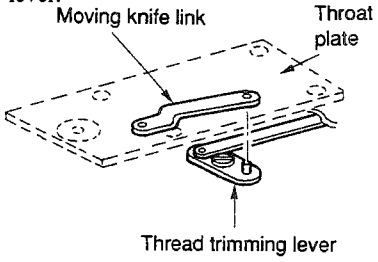


- Before loosening thrust collars Ⓐ and Ⓑ, measure the protruding amount Ⓒ of the hook driving shaft from the shuttle race needle outer wheel.

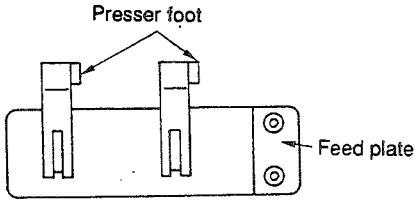


CAUTIONS TO BE TAKEN WHEN ASSEMBLING

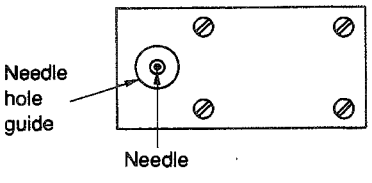
- When reassembling the same gears, put the mating faces of the gears to their original position to prevent loud gear noise.
- When attaching the hook driving shaft needle presser, take care not to allow the presser to come in contact with the hook driving shaft.
- When securing the thrust collar, adjust so that the hook driving shaft protrudes by amount Ⓒ from the shuttle race needle outer wheel.
- When installing the throat plate, 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.
- The slit in the presser foot has to meet the slit on the feed plate.

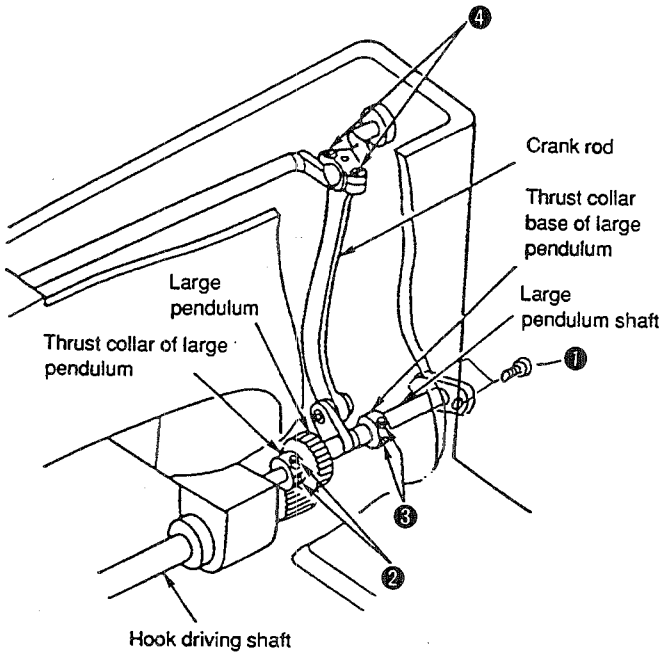


If the slits are not correctly aligned with each other, needle break will be caused.



(7) Removing the large pendulum and crank rod

1) Remove two screws ❶ from the large pendulum shaft.
2) Loosen two screws ❷ in the thrust collar of the large pendulum and two screws ❸ in the thrust collar base of the large pendulum.
3) Draw the large pendulum shaft backward until it comes off.
4) Remove screw ❹ from the crank rod and remove the crank rod and the large pendulum.

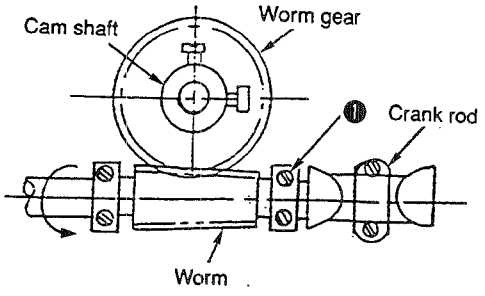


CAUTIONS TO BE TAKEN WHEN DISASSEMBLING	CAUTIONS TO BE TAKEN WHEN ASSEMBLING
○ The top cover of the crank rod has to be installed in the predetermined direction. So, it is necessary to remove it taking care of the installing direction.	○ Carefully remove an axial play in the large pendulum. ○ Turn the main shaft to check for an extra load. If an extra load is applied to the main shaft, appropriately change the position of the fixing position of the thrust collar and thrust collar base of the large pendulum.

8. MAINTENANCE (MACHINE HEAD COMPONENTS)

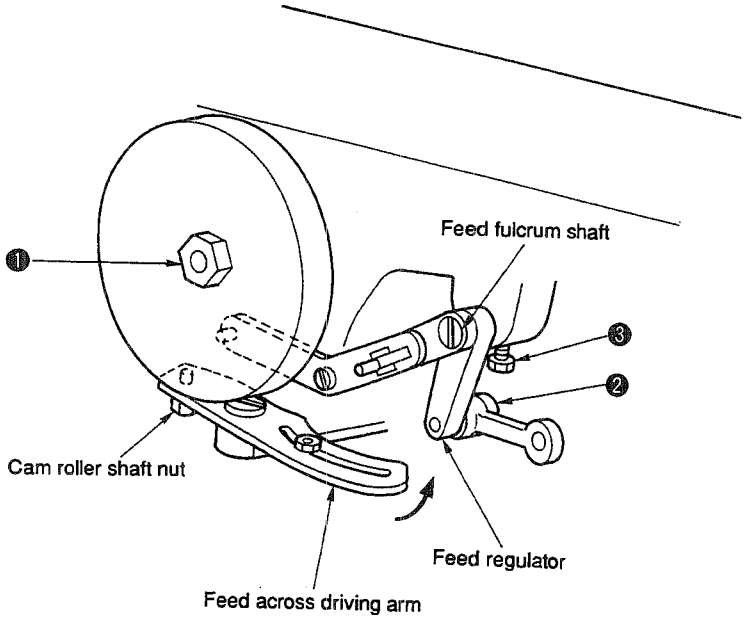
PRECAUTIONS

(1) How to remove the backlash between the worm and worm gear.



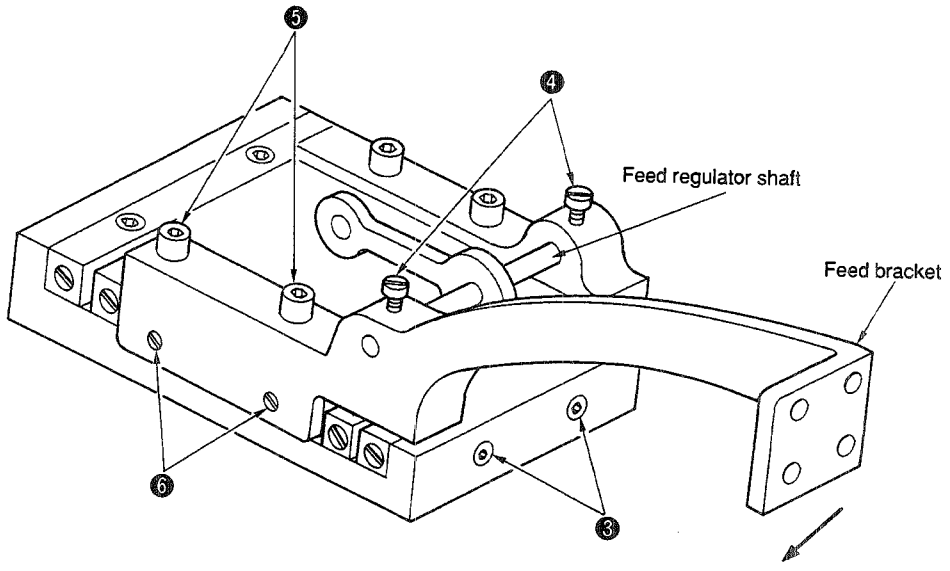
(2) How to remove the backlash of the feed bracket

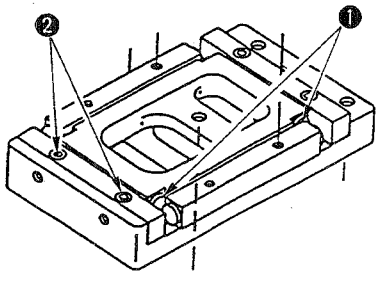
Backlash of the feed cam roller or feed slide block would lead to lateral or longitudinal backlash of the feed bracket.

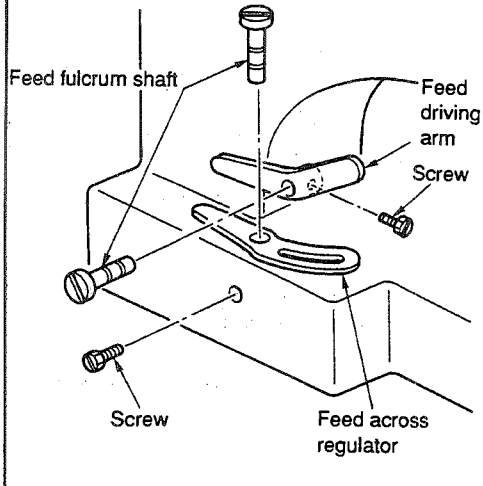


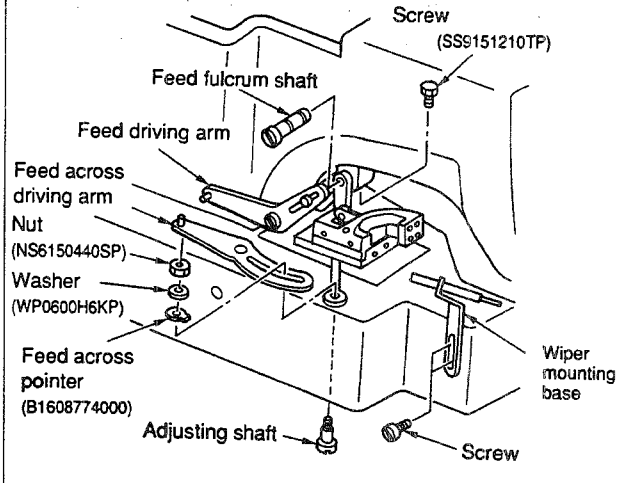
PROCEDURES	REMARKS
1) Remove the arm cover. 2) Loosen four screws ❶. 3) Holding the cam shaft, turn the worm in the direction of arrow with care taken not to disturb the timing between the main shaft and the cam shaft. This will make the worm advance toward the rear bushing of the main shaft, removing the backlash. 4) After removing the backlash, securely tighten four screws ❶. **(Note) If the timing between the main shaft and the cam shaft differs from the standard adjustment, the timing of the cloth feed cam and the thread tension releasing timing have to be re-adjusted properly.**	○ An excessive backlash would adversely affect the feed timing. ○ If no backlash is allowed, the worm will get hot, and the main shaft torque will increase. In this case, the stop position of the machine will vary.
○ Replacing the cloth feed cam roller 1) Turn the main shaft to allow the feed across driving arm to be moved fully in the direction of the arrow. 2) Loosen the cam roller shaft nut. 3) Remove nut ❶. 4) Remove the cam and replace the roller with a new one. 5) Attach the cam and securely tighten nut ❶. **(Caution) • When the cloth feed cam roller has been replaced, the center position of the feed mechanism has to be re-adjusted properly.** **• After the cam has been removed, check the block of the feed regulator for any loose fitting.** ○ Replacing the feed block 1) Remove hinge screw ❷ and loosen screw ❸. 2) Remove the feed fulcrum shaft. 3) Remove the feed regulator and replace the feed slide block with a new one. 4) After the related parts are assembled, securely tighten screws ❷ and ❸. **(Caution) When the feed regulator has been removed, check also the feed bracket for any loose fitting.**	*1 Types of cloth feed cam rollers B250228000A Cloth feed cam roller ø9.5 +0.01/+0.005 B250228000B Cloth feed cam roller ø9.5 +0.005/0 B250228000C Cloth feed cam roller ø9.5 0/–0.005 B250228000D Cloth feed cam roller ø9.5 +0.015/+0.01 *2 Types of feed slide blocks 13516604 Feed slide block 12 –0.009/–0.005 13516703 Feed slide block 12 0/–0.005 13516802 Feed slide block 12 +0.005/0 13519103 Feed slide block 12 +0.009/+0.005 13519202 Feed slide block 12 +0.013/+0.009

(3) Removing a play in the feed bracket





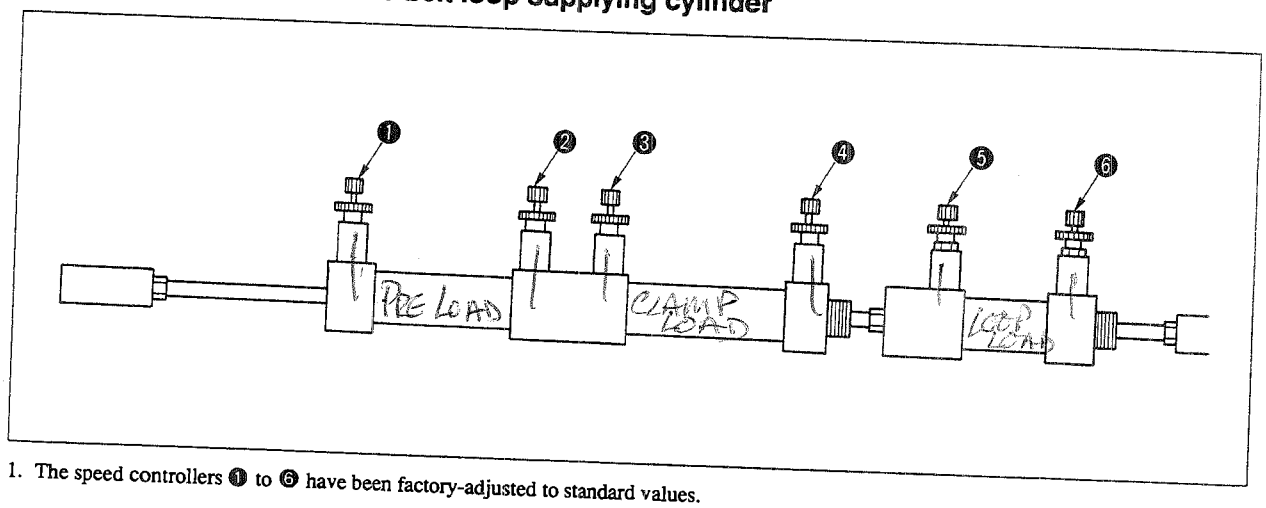




PROCEDURES	REMARKS
○ Removing a play in the feed bracket in terms of the feeding direction 1) Remove the cloth feed cam. 2) Remove the feed across driving arm and feed driving arm. 3) Remove the fulcrum shaft of the feed regulator. 4) Remove the wiper on far side together with the mounting base. 5) Remove X-Y roller stopper screws ❶. 6) Draw out the feed bracket in the direction of the arrow and loosen screws ❷ in the X-Y roller. 7) Return the feed bracket to the previous position and tighten pre-load screws ❸. 8) Ascertain that the feed bracket smoothly moves with no play. Then securely tighten screws ❷. 9) After the completion of the adjustment, re-assemble the related components analogously in reverse order. ○ Removing a play in the feed bracket in terms of the feed-across direction 1) Loosen screws ❹ and remove the feed driving lever shaft. 2) Loosen screws ❺ and tighten pre-load screw ❻. 3) Ascertain that the feed bracket smoothly moves with no play. Then securely tighten screw ❺. 4) After the completion of the adjustment, re-assemble the related components analogously in reverse order.	

9. MAINTENANCE (DEVICES)

(1) Speed controllers of the belt loop supplying cylinder



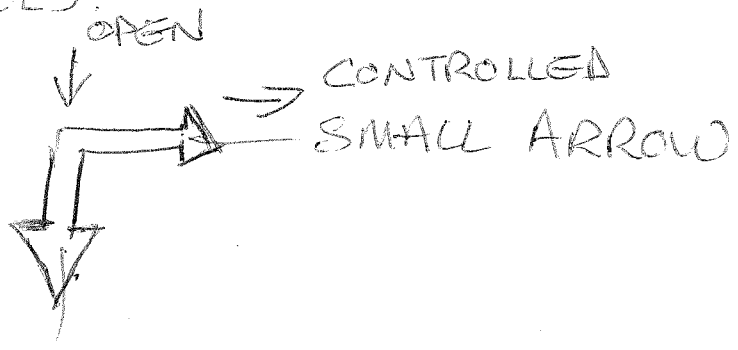
1. The speed controllers ❶ to ❻ have been factory-adjusted to standard values.

   ❶ = At the position reached by giving four or five turns after fully closed.
   ❷ = At the position reached by giving four turns after fully closed.
   ❸ = At the position reached by giving four turns after fully closed.
   ❹ = At the position reached by giving four or four and a half turns after fully closed.
   ❺ = At the position reached by giving four turns after fully closed.
   ❻ = At the position reached by giving four or five turns after fully closed.

2. These speed controllers should never be used other than PC010508000.

It is very difficult to properly adjust the speed controllers of the belt loop supplying cylinder. So, it is recommended not to adjust it unless the adjustment is really necessary.

ALL SPEED CONTROLS ARE EXAUST CONTROLS.



(2) Position of the belt-loop supporting components (belt-loop supplying and folding position)

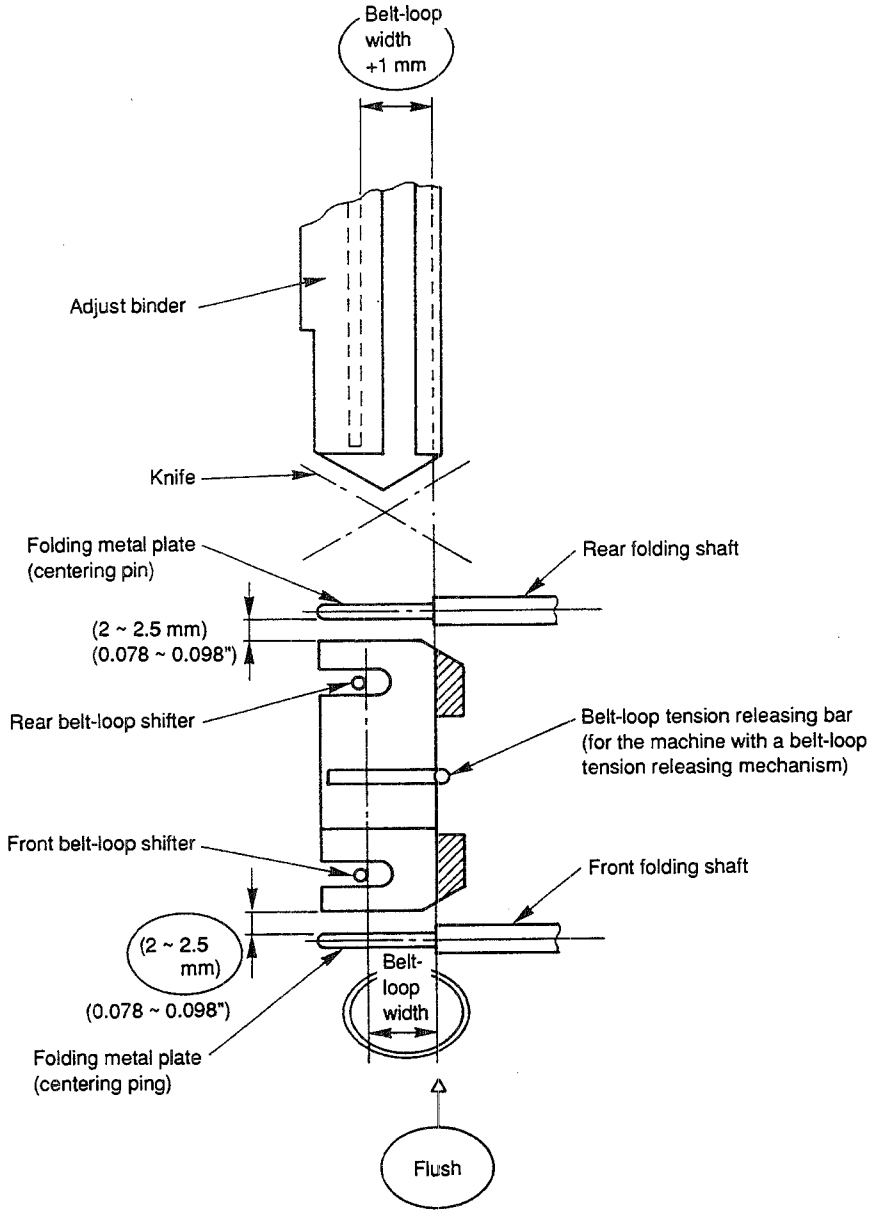
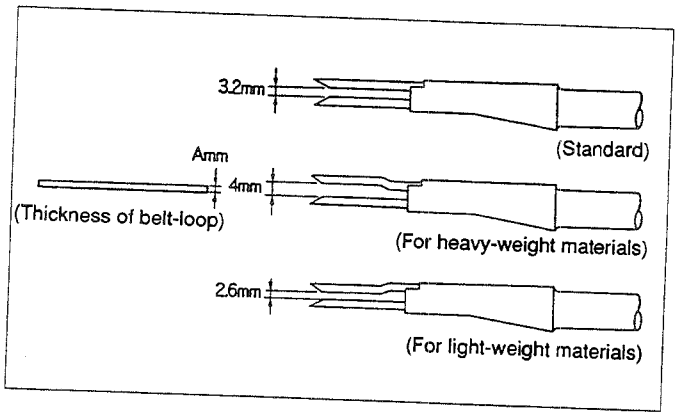


Fig. 2-1

Note) 1. The position of the folding shaft shown in the figure above is that reached when the three-step cylinder extrudes by one step.
2. The position of the belt-loop shifter is that reached when it comes down.

(3) Selecting and replacing the folder



Thickness of belt-loop A (mm)	Folding metal plate
1.6 ~ 2.3	Standard (at the time of delivery)
2.0 ~ 3.1	For heavy-weight materials
1.0 ~ 1.8	For light-weight materials

No.	Part No.
❶	G5167154000
❷	G5168154000
❸	G5167154000

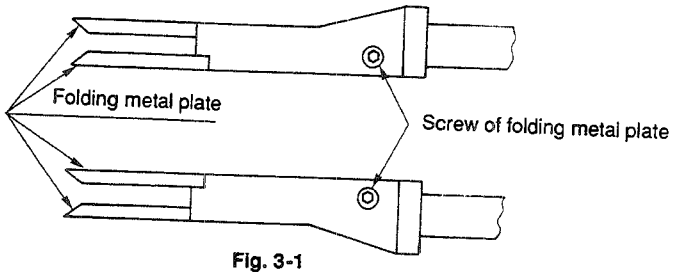
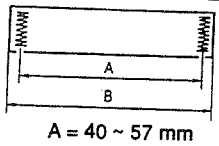
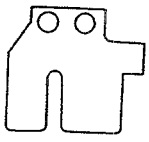
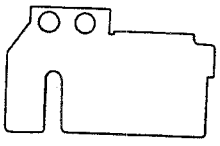


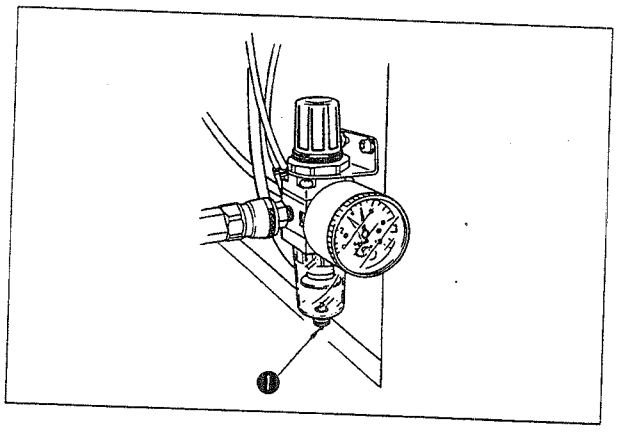
Fig. 3-1

The folding metal plate can be removed by loosening the screws in it.

(4) Selecting the rear belt-loop support plate

	Rear belt-loop support plate
 A = 40 ~ 57 mm B = 48 ~ 65 mm	 G515812200A (supplied with the unit)
A = 52 ~ 70 mm B = 60 ~ 78 mm	 G515812200B (at the time of delivery)

(5) Draining



1) Be sure to drain the machine periodically once a day.
2) Push up the portion marked by ❶, and the water gathering inside will be automatically expelled.

(6) Changing the width of belt loops

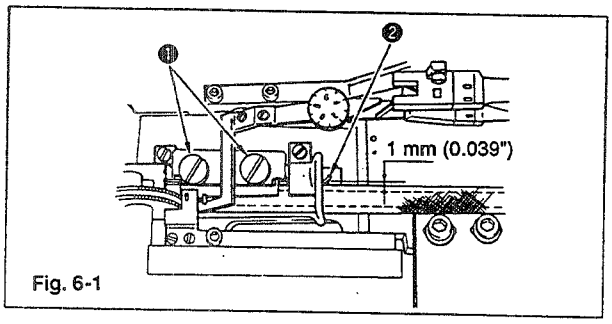


Fig. 6-1

(1) Moving the adjuster binder

Loosen screws ❶ and adjust the position of movable ruler ❷ so that a clearance of 1 mm is provided between the belt loop and the adjuster binder. Then, tighten screws ❶ .

Adjust the clearance between a belt-loop and the adjust binder to approximately 1.3 mm for a heavy-weight belt-loop (thickness of the belt-loop is 2.4 mm or more), or 0.7 mm for a light-weight belt-loop (thickness of the belt-loop is 1.5 mm or less).

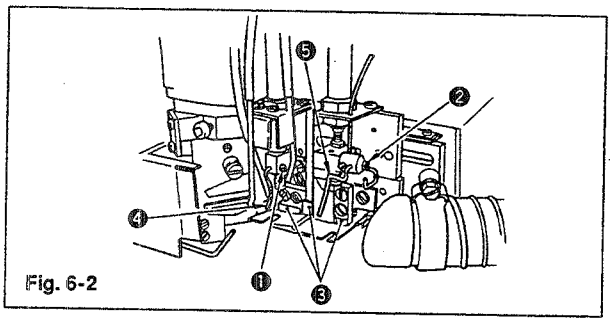


Fig. 6-2

(2) Moving the loop guide metal plates

Loosen screws ❶ and ❷ , move loop guide metal plates ❹ and ❺ until the belt loop comes in contact with surface ❸ of the receiving plate.

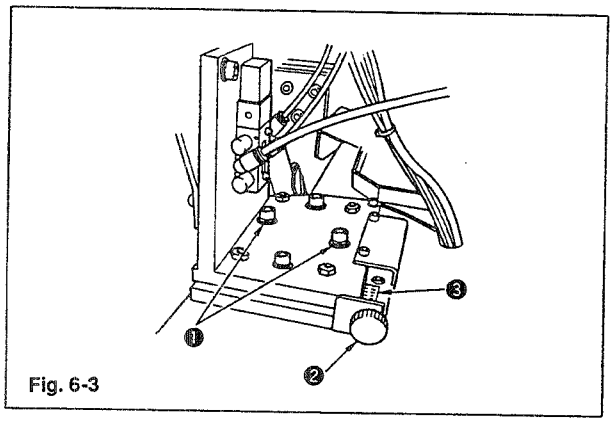
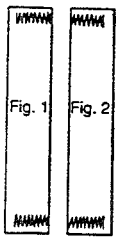


Fig. 6-3

(3) Moving the belt loop supplying device

Loosen screw ❶ and move the mounting base of the loop supplying device by turning belt loop supplying device moving knob ❷ . (Scale plate ❸ is a mere reference for positioning the belt loop supplying device.)



* If the belt loop is finished as illustrated in Fig. 1, turn moving knob ❷ counterclockwise.
If the belt loop is finished as illustrated in Fig. 2, turn moving knob ❷ clockwise.

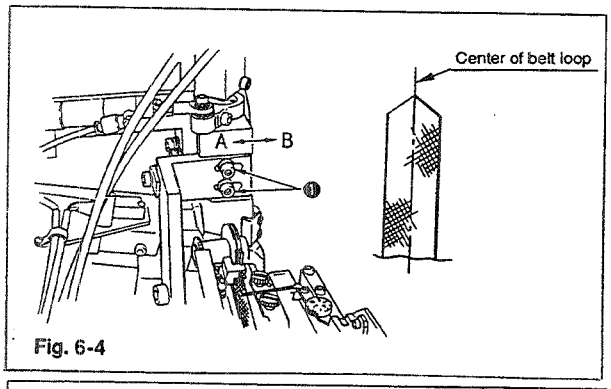


Fig. 6-4

(4) Moving the knife mounting base

Loosen screws ❶ and move the screws in direction A or B to adjust the position of the main body so that the center of the cut belt loop meets the center of the knife mounting base. (see Fig. 6-4).

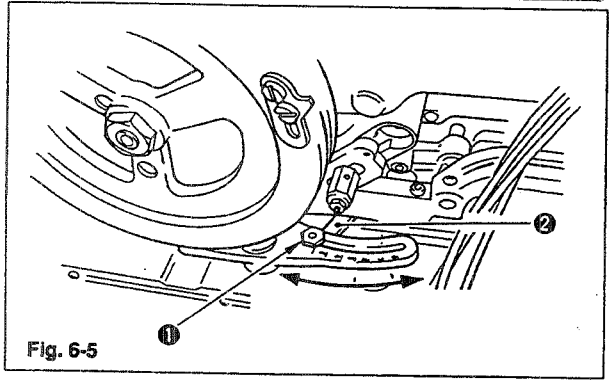


Fig. 6-5

(5) Adjusting the zigzag width for bartacking (on the machine head)

- Loosen nuts ❶. Move feed across regulator ❷ toward you to increase the bartacking length or away from you to decrease it.
- After the adjustment, tighten nuts ❶.

After the adjustment, be sure to attach the auxiliary cover.

(7) Adjusting the belt loop splice detector

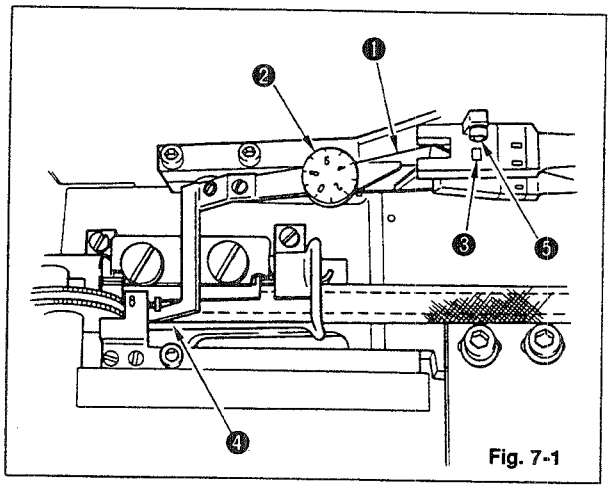


Fig. 7-1

* Belt-loop thickness for reference
Heavy-weight belt-loop: Belt-loop thickness is 2.4 mm or more
Light-weight belt-loop: Belt-loop thickness is 1.5 mm or less

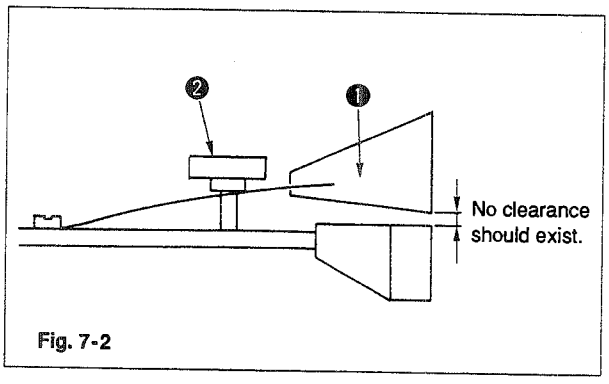


Fig. 7-2

So as to ensure safety, press the temporary stop switch (to turn it ON) during the adjustment procedure.

This adjustment has to be carried out with the power switch ON. If not, the LED will not light up.

Set a belt loop on the machine, and adjust so that LED ❸ lights up when detector plate ❶ is lowered by approximately 1 mm. Perform the adjustment by turning knob ❷ .

Detailed description of adjustment of splice detector

Place a belt-loop (with no splice) under splice detecting plate ❹. Turn adjusting knob ❷ clockwise until indicator lamp ❸ of the splice detecting switch lights up. Then, give the knob one or one and a half counterclockwise turns and fix it there.

If the belt-loop is thin or excessively thick, adjust the position of the adjusting knob using the aforementioned number of counterclockwise turns as a guide. (The thinner the belt-loop is, the smaller the number of counterclockwise turns should be given to the knob.) After the knob is fixed, ascertain that indicator lamp ❸ lights up when a splice of belt-loop is detected.

If the phenomenon illustrated in the figure on the left is observed when loosening the knob to sew extra heavy-weight belt-loops, suppose that the splice detecting switch is positioned too high. In this case, loosen screw ❺ in the splice detecting switch and lower the switch.

(8) Changing the center-to-center distance for bartacks (The center-to-center distance of bartacks can be adjusted within the range of 40 to 70 mm.)

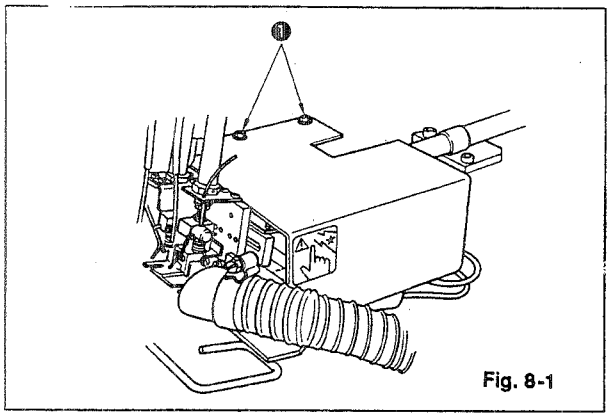
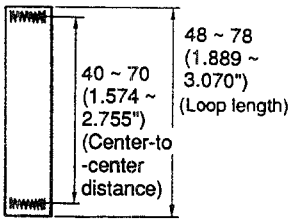


Fig. 8-1



(1) Changing the space between the needles on the sewing machine (Refer to the description given in the <Machine head components> in the "Standard Adjustment." (2) Changing the position of the throat plate (4) Position of the presser foot (5) Feed plate (7) Wiper)

1) Remove the cover.
2) Loosen screws ❶ and remove the cover.

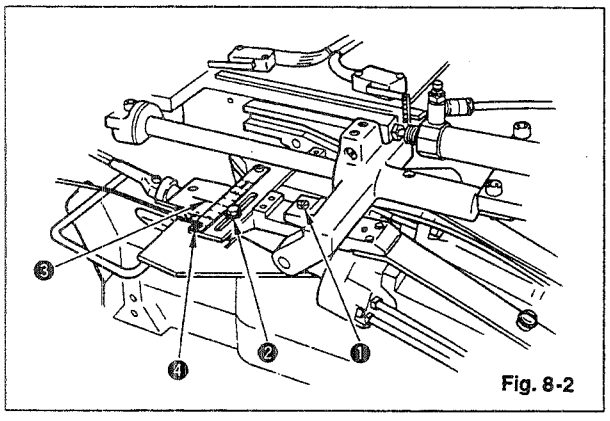


Fig. 8-2

(2) Moving the this side folding shaft

Loosen screws ❶ and ❷ , align pointer mark ❸ to desired division of scale ❹ (belt loop length). Then, tighten screws ❶ and ❷ .

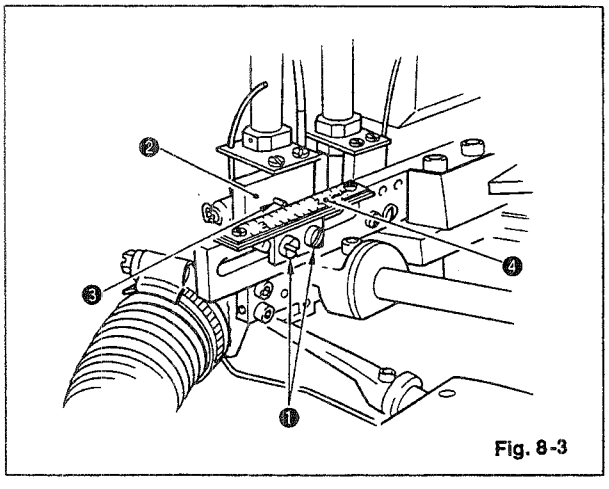


Fig. 8-3

(3) Moving the belt receiving plate

1) Loosen screws ❶ , move adjust arm ❷ to set pointer pin ❸ to a desired division of scale ❹ (belt loop length). After the adjustment, tighten screws ❶ .
2) Attach the cover in position.

(9) Replacing the belt-loop folding shaft and adjusting the folding pressure

1) Turn OFF the power and air supplies to the machine.

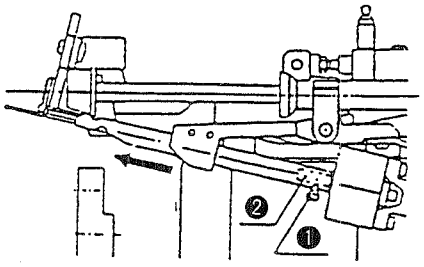


Fig. 9-1

2) Loosen screw ❶ in the folding shaft. Move the folding shaft in the direction of the arrow ⇦ until it comes off rotor shaft ❷. Then, draw the folding shaft out in the opposite direction of the arrow.

3) To install the folding shaft, carefully check the longitudinal direction of the shaft and fit it on plane A with the position of the screw aligned with the contact plane.

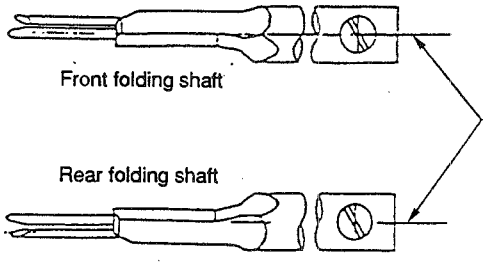


Fig. 9-2

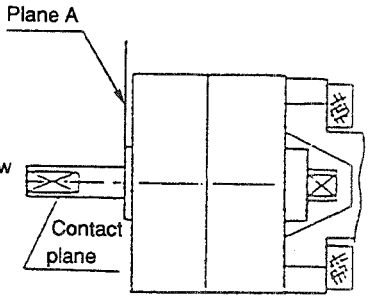


Fig. 9-3

4) Adjusting the belt-loop folding pressure
   - Minimize the pressure as long as both edges of a belt-loop to be used are properly folded. (The pressure has been factory-adjusted to 4 ± 0.5 kgf/cm^2 at the time of delivery.)

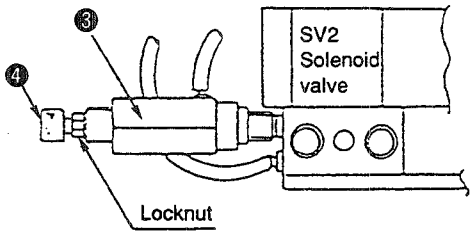


Fig. 9-4

(Adjustment)
Turn adjusting screw ❹ of belt-loop folding pressure reducing valve ❸ counterclockwise to minimize the pressure. Then, gradually turn the screw clockwise to obtain a pressure with which the belt-loop folding mechanism properly folds the belt-loop.

(10) Replacing the delivery roller chain

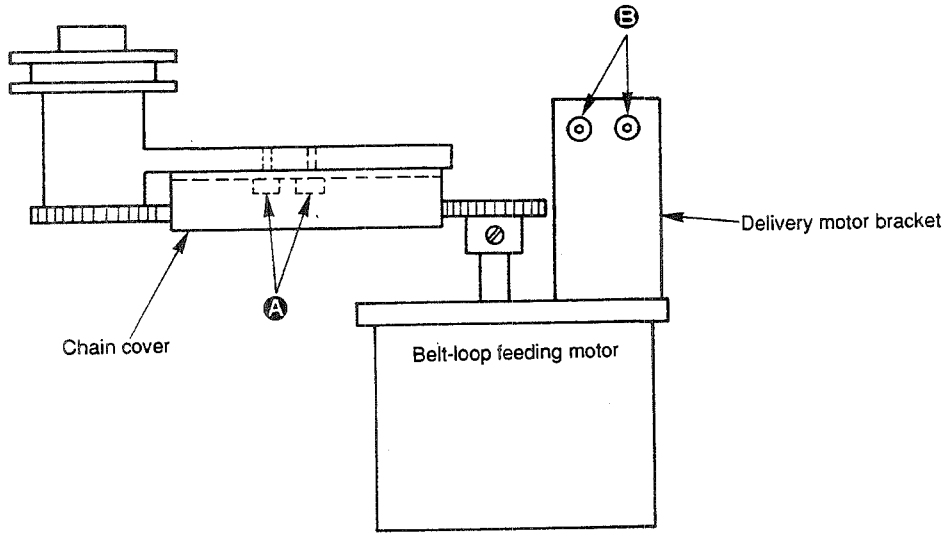


Fig. 10-1

1. Loosen screws Ⓐ and remove the chain cover.
2. Loosen screws Ⓑ and shift the delivery motor bracket to the left. Then, remove the chain.
3. Install the chain to be used.
4. Shift the delivery motor bracket to the right and temporarily tighten screws Ⓑ.

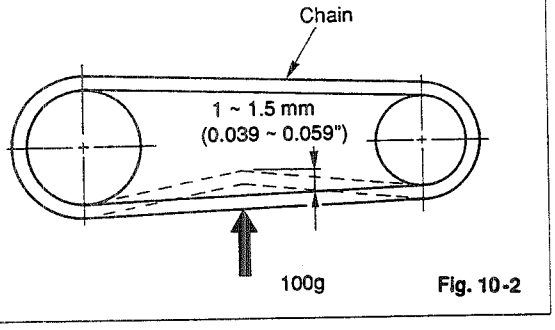


Fig. 10-2

5. Adjust the position of screws Ⓑ so that the chain sags 1 to 1.5 mm when a 100 g load is applied to the center of the chain. Then, securely tighten screws Ⓑ.
6. Apply a few drops of oil to the chain.
7. Attach the chain cover in position.
8. If the chain excessively expands, loosen screws Ⓑ and adjust the chain.

(11) Belt loop tension releasing (easing-in-of-fullness) device (optional)

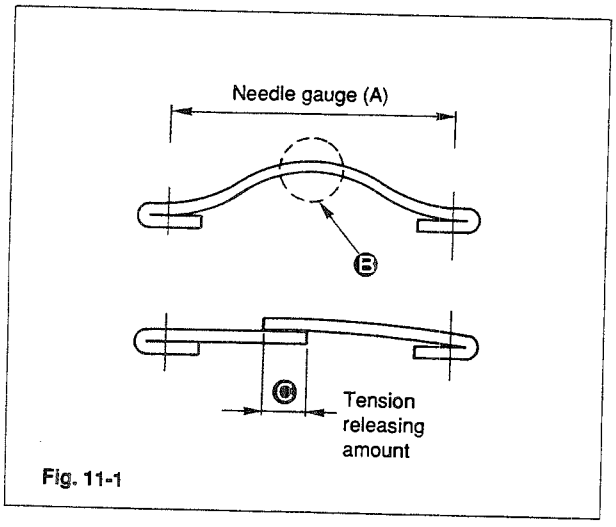


Fig. 11-1

1. Maximum amount by which the belt loop tension is released

Portion Ⓑ of the belt-loop is cut as illustrated in the Fig. 11-1. Portion Ⓒ in the Fig. 11-1 is the belt-loop tension releasing amount.
Maximum amount by which the belt loop tension is released is determined by needle gauge A.

Needle gauge (A)	Tension releasing amount Ⓒ
40 ~ 45 mm	7 mm
46 ~ 50 mm	8 mm
51 ~ 55 mm	9 mm
56 ~ 60 mm	10 mm
61 ~ 65 mm	11 mm
66 ~ 70 mm	12 mm

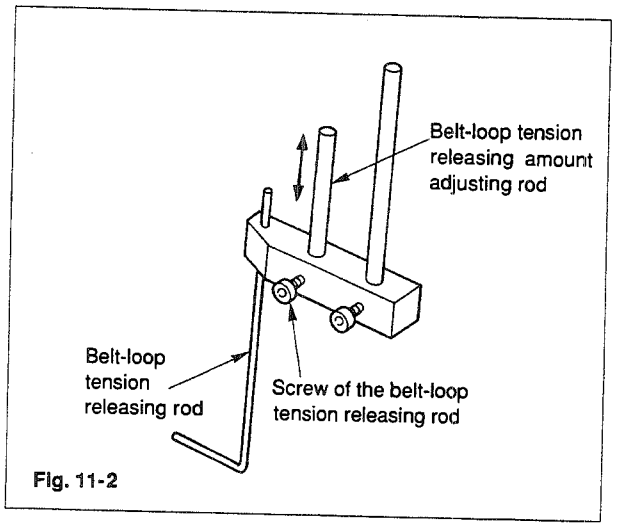


Fig. 11-2

2. Adjusting the tension releasing amount

Loosen the screw in the belt-loop tension releasing amount adjusting rod and move the rod in the direction of the arrow to adjust the belt-loop tension releasing amount.

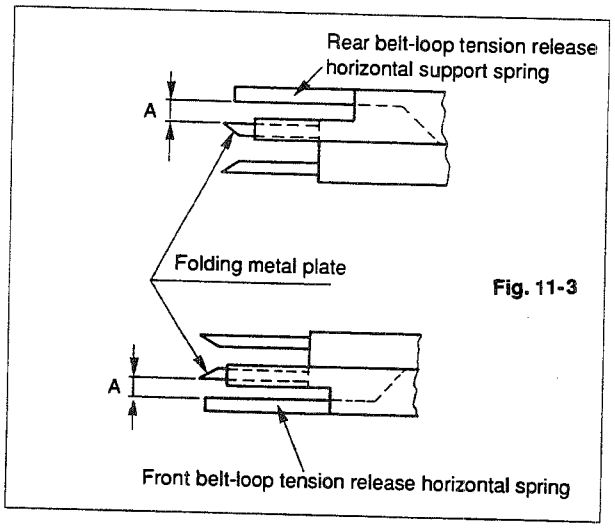
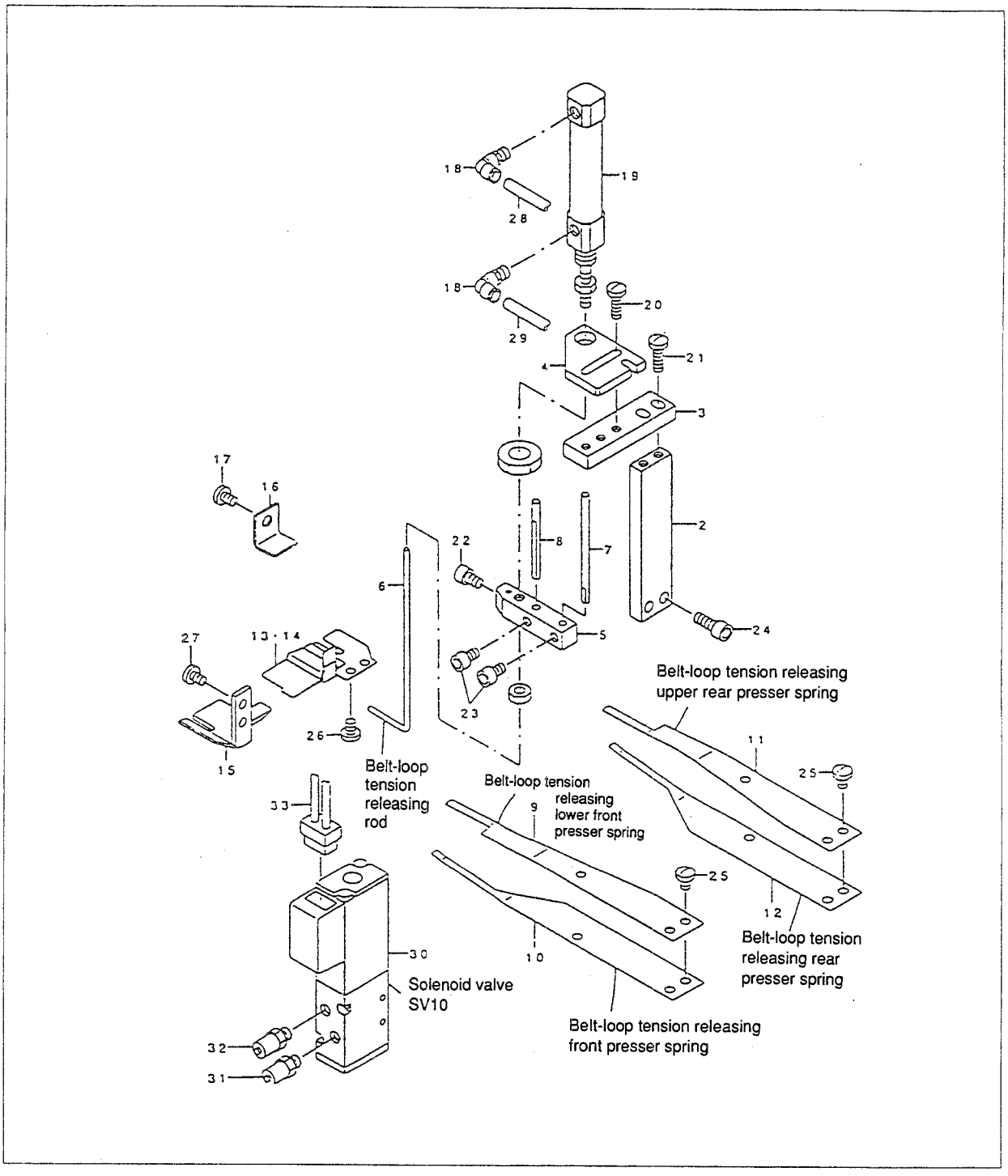


Fig. 11-3

3. Position of the belt-loop tension release horizontal support spring

Adjust dimension A of the belt-loop tension release horizontal support spring to "belt-loop thickness + 0.1 to 0.4 mm."

(12) Simple modification from the machine with a belt loop tension releasing (easing-in-of-fullness) device to the machine without it (optional)



1) Turn OFF the power and air supplied to the machine.
2) Remove the cover from the belt-loop supplying device.
3) Remove four screws No. 25 and remove four belt-loop tension releasing springs.
4) Loosen screw No. 22 and remove belt-loop tension releasing rod No. 6.
5) Remove connector (No. 33) from the solenoid valve SV10.
6) If possible, replace the belt-loop tension releasing rear support plate (No. 13 or No. 14) with the standard type one (see the Parts List).

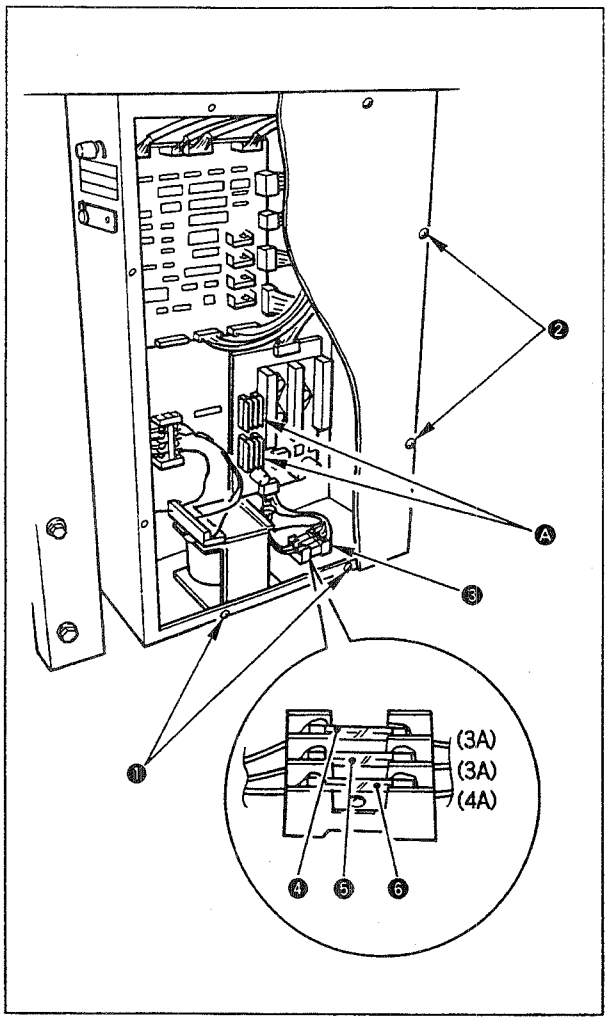
10. MAINTENANCE (ELECTRICAL COMPONENTS)

(1) Replacing the fuses

There are exposed high-voltage electrodes that are hazardous to human body inside the control box. So, it is necessary to perform maintenance and inspection works on the control box after turning OFF the power switch and disconnecting the power plug from the receptacle.

This maintenance work is only permitted when its carried by qualified electricians, JUKI's authorized distributor in your area or technicians in JUKI Service Center.

Soon after (within five minutes) after the power switch is turned OFF, radiating board Ⓐ inside the control box is very hot. So, be careful to keep your hand away from it.

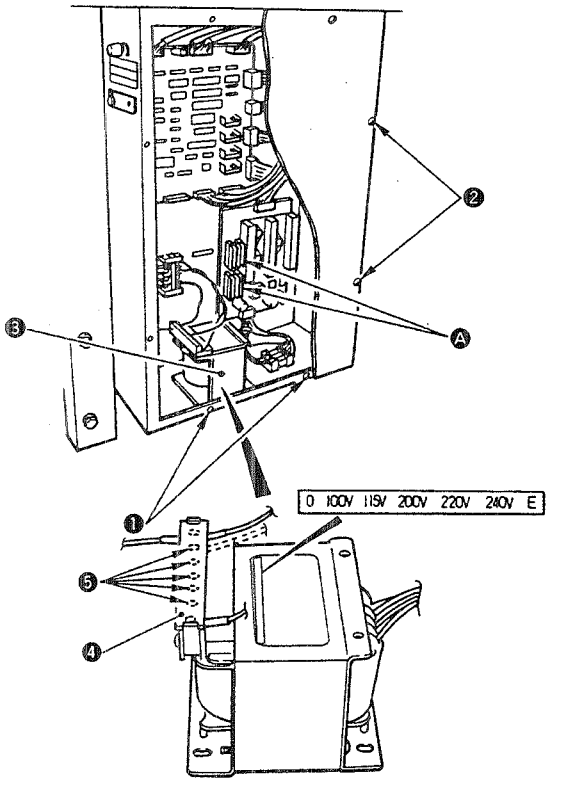


How to replace the fuses

1) Turn OFF the power switch and detach the power plug from the receptacle.
2) Remove the cover from the control box.
   Loosen two screws ❶ and remove all of six fuses ❷ .
3) Remove fuses ❹ , ❺ and ❻ from fuse holder ❸ .
4) Check whether the fuses have blown.
   Check the fuses for continuity visually as well as using a tester.
5) Replace the blown fuse with a new one.
   A new fuse with designated capacity has to be used.
   (Use a fuse supplied with the unit as an accessory.)
6) Confirm that fuses are fitted in the fuse holder according to the instructions. Then, securely fix the cover on the control box using attaching screws.

Fuses are installed not only in the control box but also in the motor control box (PSC BOX). So, also check the fuses in the motor control box.

(2) Setting the voltage type



In case of 110 or 120 V of supply voltage, connect the 115 V tap on the transformer.

How to specify (change) the voltage type

1) Turn OFF the power switch and detach the power plug from the receptacle.
2) Remove the cover from the control box.
   Loosen two screws ❶ and remove all of six fuses ❷ .
3) Check the current voltage specified against the voltage indication shown on the voltage change-over tap located on the top surface of transformer ❸ .
4) Set the voltage to the supply voltage. Remove cover ❹ , remove screws ❺ and fix the crimp-style terminal of red wire in position using screws ❺ for newly-specified terminal.
5) Confirm the setting of the supply voltage. Return cover ❹ to the previous position. Then securely fix the cover to the control box using attaching screws.

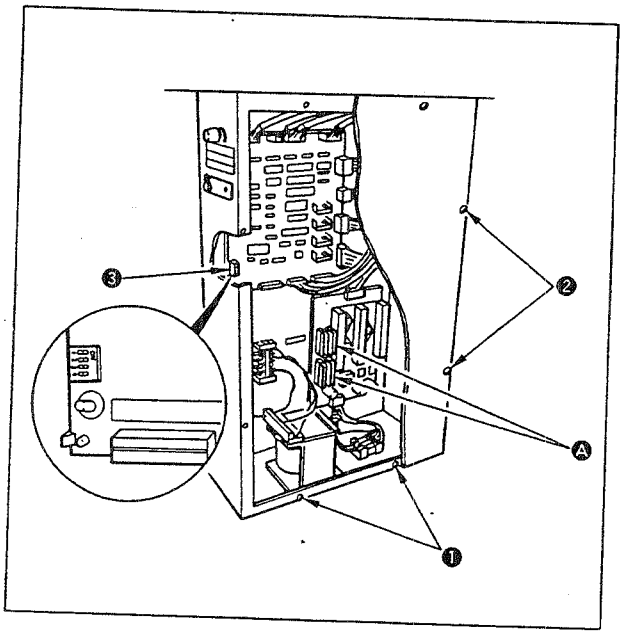
In addition to the aforementioned voltage setting, the voltage for the motor control box (PSC BOX) has to be specified.
The operating supply voltage must be ±10% of the specified voltage type.

FOR SINGLE PHASE:
CHANGE ONLY SC6 CONTROL BOX

	3 PH	1 PH	1 PH
MCL-154	220V	115V	220V
MACHINE CONTROL BOX		CHANGE TAP TO 115VOLTS	N A – USA
SC6 CONTROL BOX		CHANGE SC6 CONTROL BOX	NA – USA
MOTOR		SAME	N A USA

N.A - NOT AVAILABLE

(3) Functions of the DIP switches (mounted on the circuit board inside the control box)



How to specify (change) the voltage type

1) Turn OFF the power switch and detach the power plug from the receptacle.
2) Remove the cover from the control box.
   Loosen two screws ❶ and remove all of six fuses ❷
3) Seet DIP switch (DS1) ❸ located on the lower left portion of the main circuit board to the specification to be used.
4) Confirm the setting of DIP switch ❸ , then attach the cover to the control box and securely fix it with the screws.

Changed setting of the switch is not accepted unless the power switch is turned OFF once.

Switch No.	Name(at the time of delivery)	Description of function
DSW1-2	Cross/straight cut selection (OFF)	The switch is used to change over the cutting method for both ends of belt loop. Cross cut : Standard (The switch is set to the OFF position.) When cutting a belt loop, the knife is driven twice to cut the end of a belt loop into cone shape. Straight cut : Optional (The switch is set to the ON position.) When cutting a belt loop, the knife is driven once to cut the end of a belt loop into U-shape. **To specify the straight cutting method, the relevant parts have to be changed in addition to the change of setting of the switch.**
DSW1-1,	For maintenance	**Aging mode**
DSW1-3,	For maintenance	**Sensor ineffective mode (LS7, -8)**
DSW1-4	For maintenance	**Measurement mode**

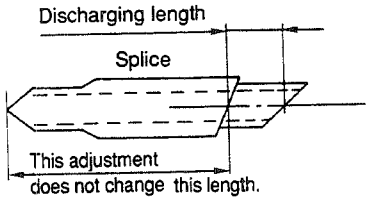
(4) Adjusting the splice discharging length

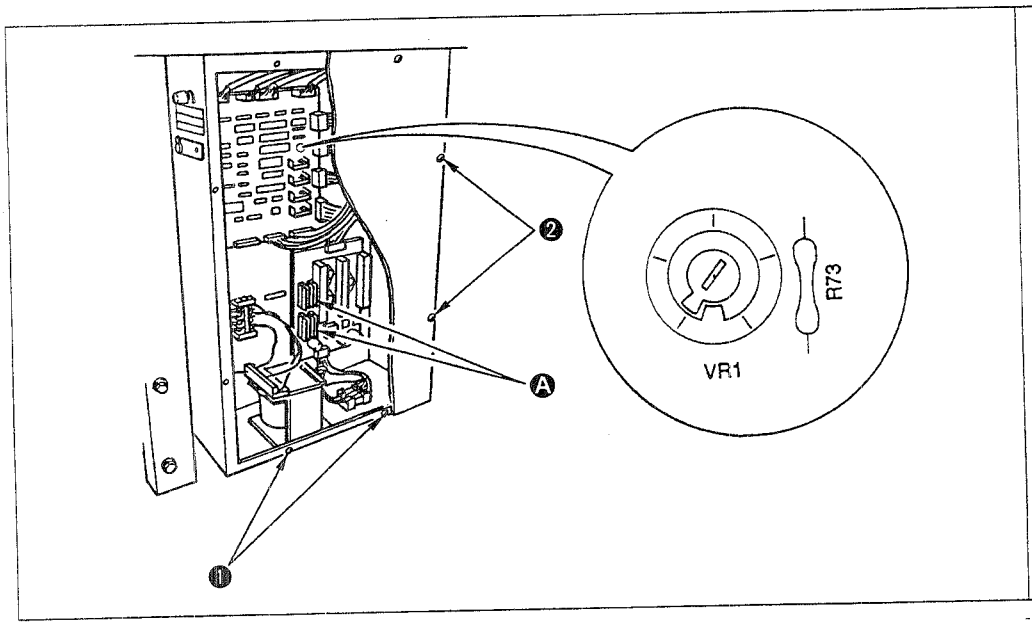
How to adjust

1) Turn OFF the power switch and detach the power plug from the receptacle.
2) Remove the cover from the control box.
   Loosen two screws ❶ and remove all six screws ❷.
3) Check the set value of the splice discharging length adjusting variable resistor mounted on the main circuit board.
4) Changing the set value of the splice discharging length adjusting variable resistor
   - To increase the discharging length from the current length
     Turn the adjusting variable resistor clockwise.
     (Turning the variable resistor clockwise by one graduation increases the splice discharging length by approximately 9 mm.)
   - To decrease the discharging length from the current length
     Turn the adjusting variable resistor counterclockwise.
     (Turning the variable resistor counterclockwise by one graduation increases the splice discharging length by approximately 9 mm.)
5) Securely fix the cover on the control box using attaching screws.

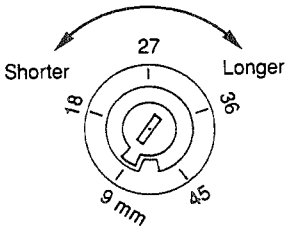
Changed set value is not accepted unless the power switch is turned OFF once.

The splice discharging length can be adjusted within the range of 9 to 45 mm as measured from the position where stepped portion of splice disappears.
(Note that the discharging length slightly varies with belt-loops.)



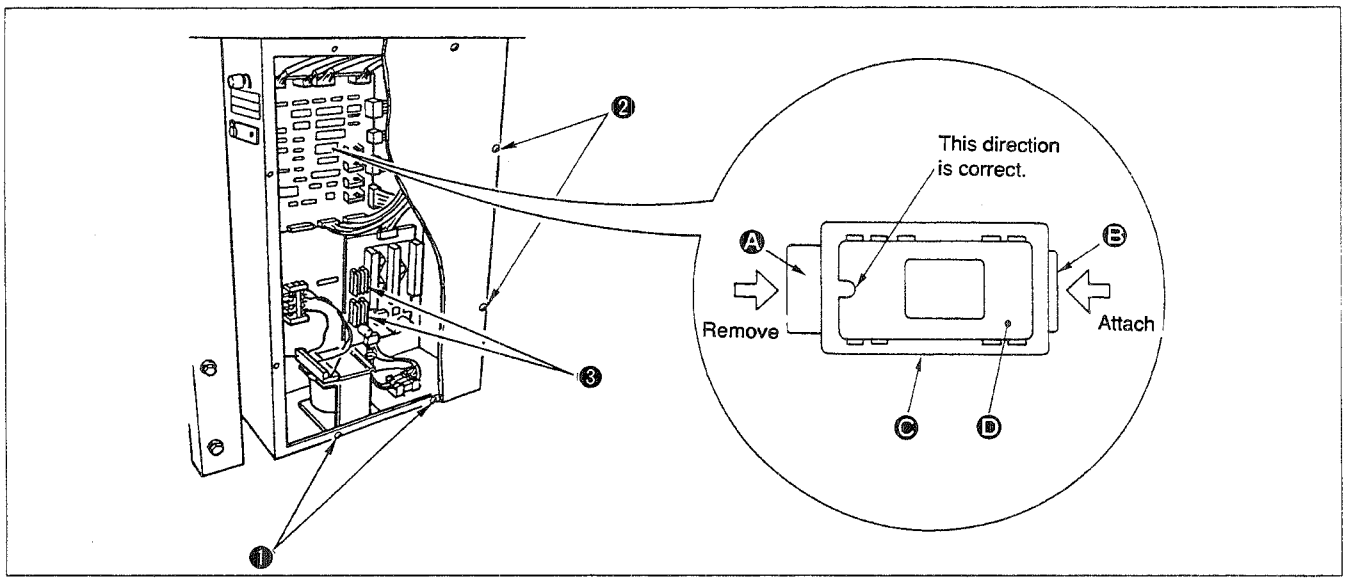


Value on variable resistor for reference



- The variable resister has been factory-set to the minimum value at the time of delivery. The discharging length is approximately 9 mm.

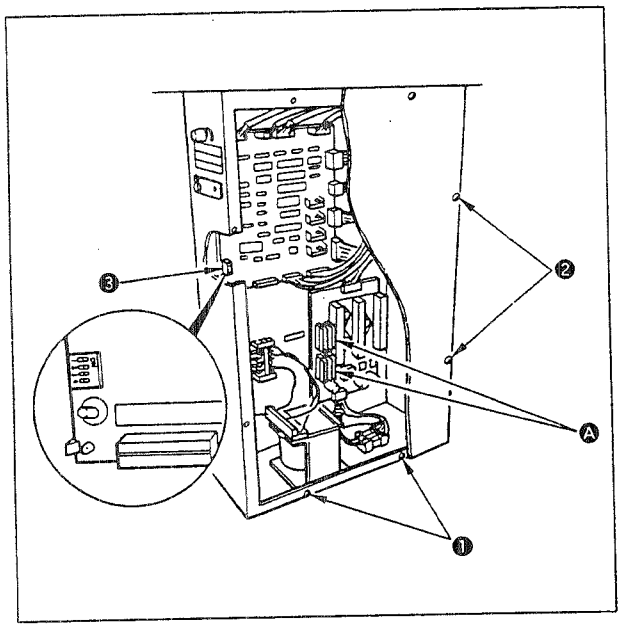
(5) Replace the EP-ROM



How to replace

1) Turn OFF the power switch and detach the power plug from the receptacle.
2) Remove the cover from the control box.
   Loosen the screws ❶ and remove all of six screws ❷.
3) Press lever Ⓐ of EP-ROM holder socket Ⓒ mounted on the main circuit board to the right. The lead of the EP-ROM cannot be unlocked unless the lever is fully pressed.
4) Draw EP-ROM Ⓓ toward you and draw it out from holder socket Ⓒ.
5) Insert the EP-ROM which replaces the removed one into holder socket Ⓒ.
   Great attention should be given not to insert the EP-ROM in a wrong direction. Carefully insert it taking extra care not to break it.
6) Press lever Ⓑ of EP-ROM holder socket Ⓒ to the left.
   Be sure to press it until it will go no further.
7) Ascertain that the EP-ROM is securely fixed. Then, attach the cover to the control box and fix it with the screws.

(6) Changing over the cutting system from cross-cut to straight-cut (Belt-loop support of the knife for flat-cutting method (G5024154000) that is separately available is necessary.)



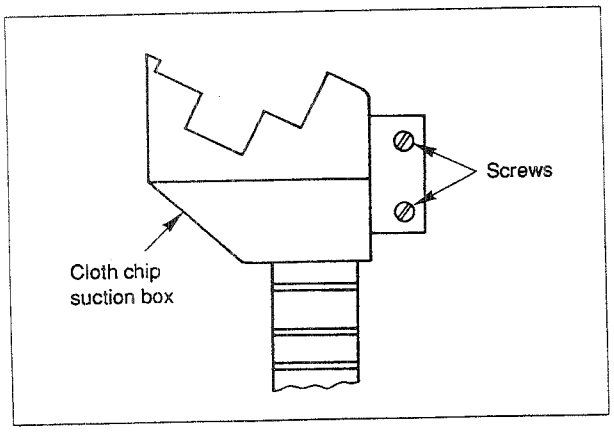
How to change the voltage type

1) Turn OFF the power switch and detach the power plug from the receptacle. Cut off air supply to the machine.
2) Remove the cover from the control box.
   Loosen two screws ❶ and remove all of six fuses ❷.
3) Set DIP switch (DS1) ❸ located on the lower left portion of the main circuit board to the specification to be used.
4) Confirm the setting of DIP switch ❸, then attach the cover to the control box and securely fix it with the screws.

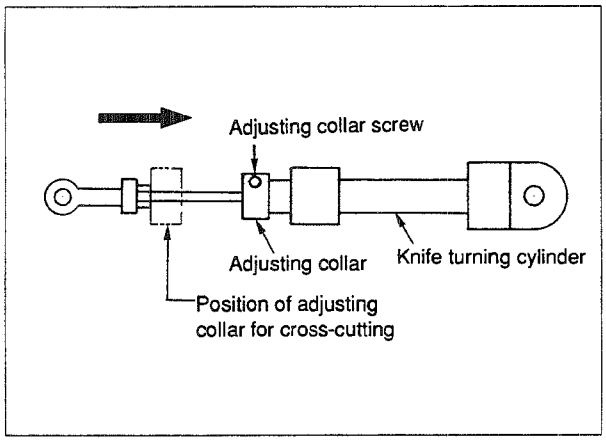
Setting of DIP switch

DSW1-2: Cross-cut/straight-cut change-over switch
Cross-cut: Standard (OFF)
Straight-cut: Optional (ON)

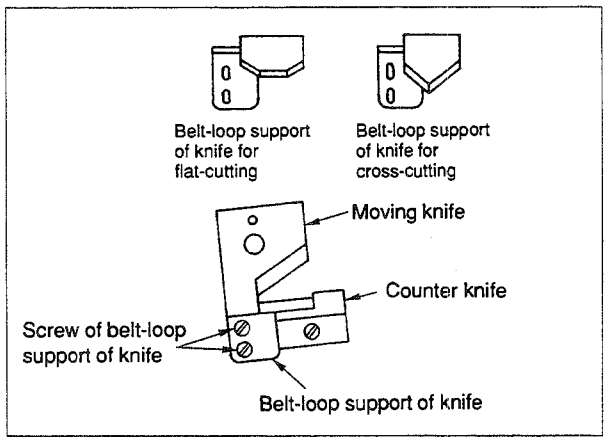
Select either type of cutting method in aforementioned step 3) in accordance with the sewing specification.



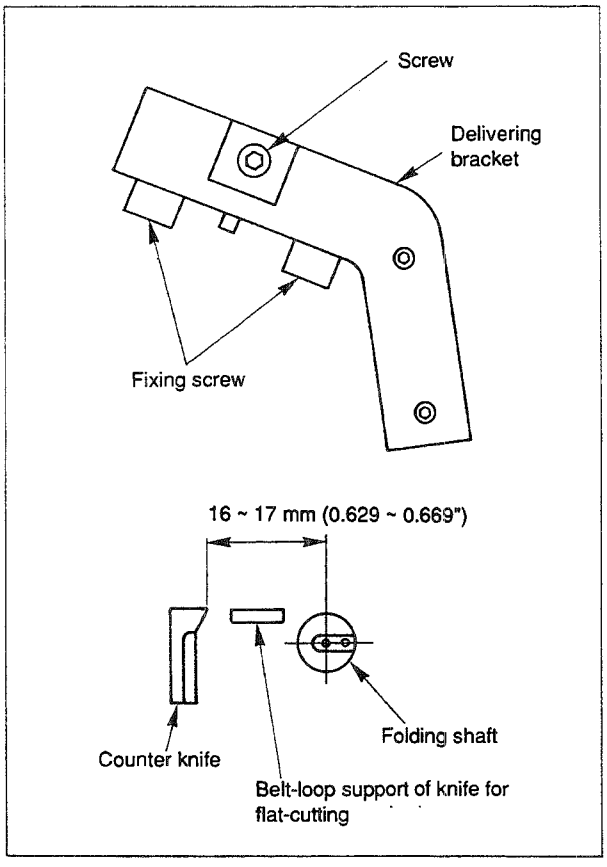
5) For the machine equipped with a cloth chip suction device, loosen the screws in the suction box and detach it from the machine.



6) Loosen the adjusting collar screw, then press the knife turning cylinder by hand in the direction of the arrow until the knife is brought to the flat-cutting position (at right angles to the belt-loop delivering direction). Then, fix the adjusting collar screw.



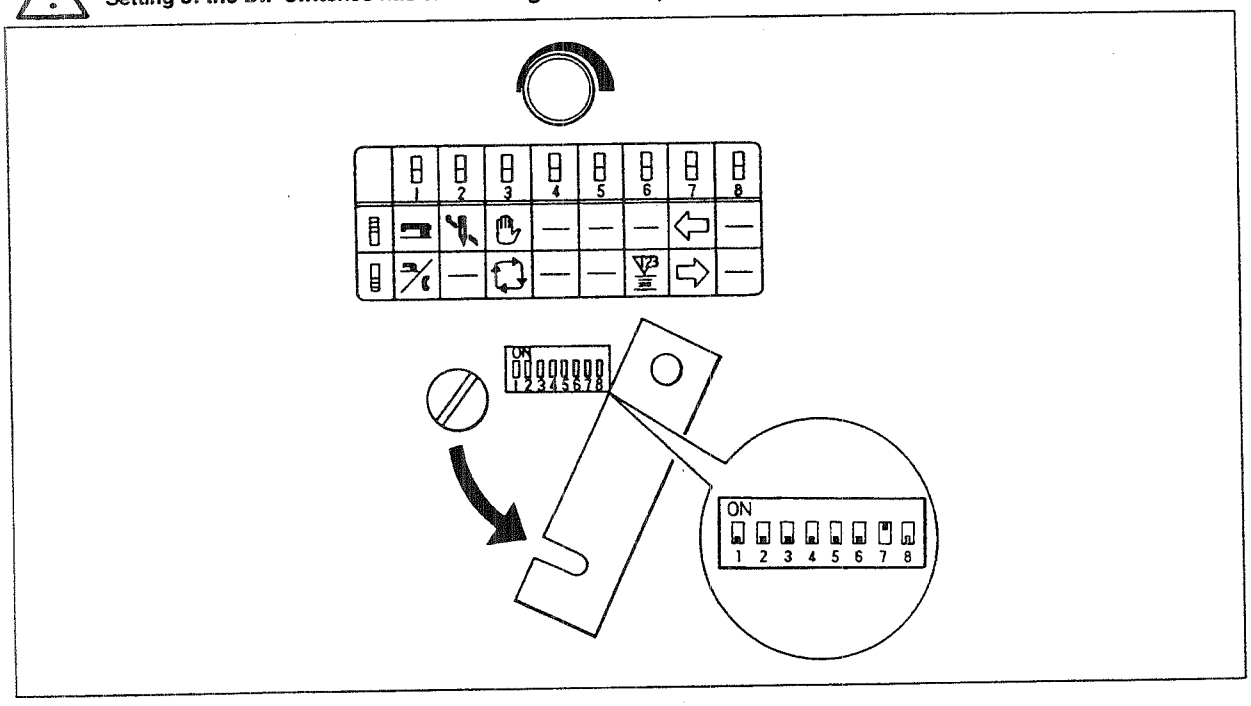
7) Replace the belt-loop support with the separately- ordered belt-loop support of the knife for flat-cutting method.
Loosen the screws in the belt-loop support of the knife and remove the belt-loop support. Then attach the belt-loop support of the knife so that it is positioned 0 to 0.2 mm lower than the counter knife.

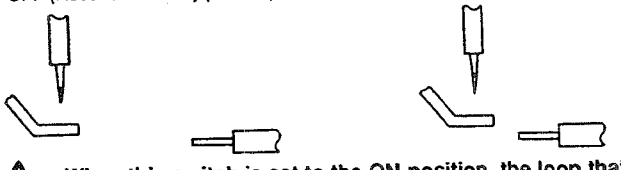


8) Moving the belt-loop delivering base
Loosen the fixing screw, turning the moving knife so that the center of the folding shaft is spaced 16 to 17 mm from the counter knife.

(7) Functions of the DIP switches

Setting of the DIP switches has to be changed with the power turned OFF.

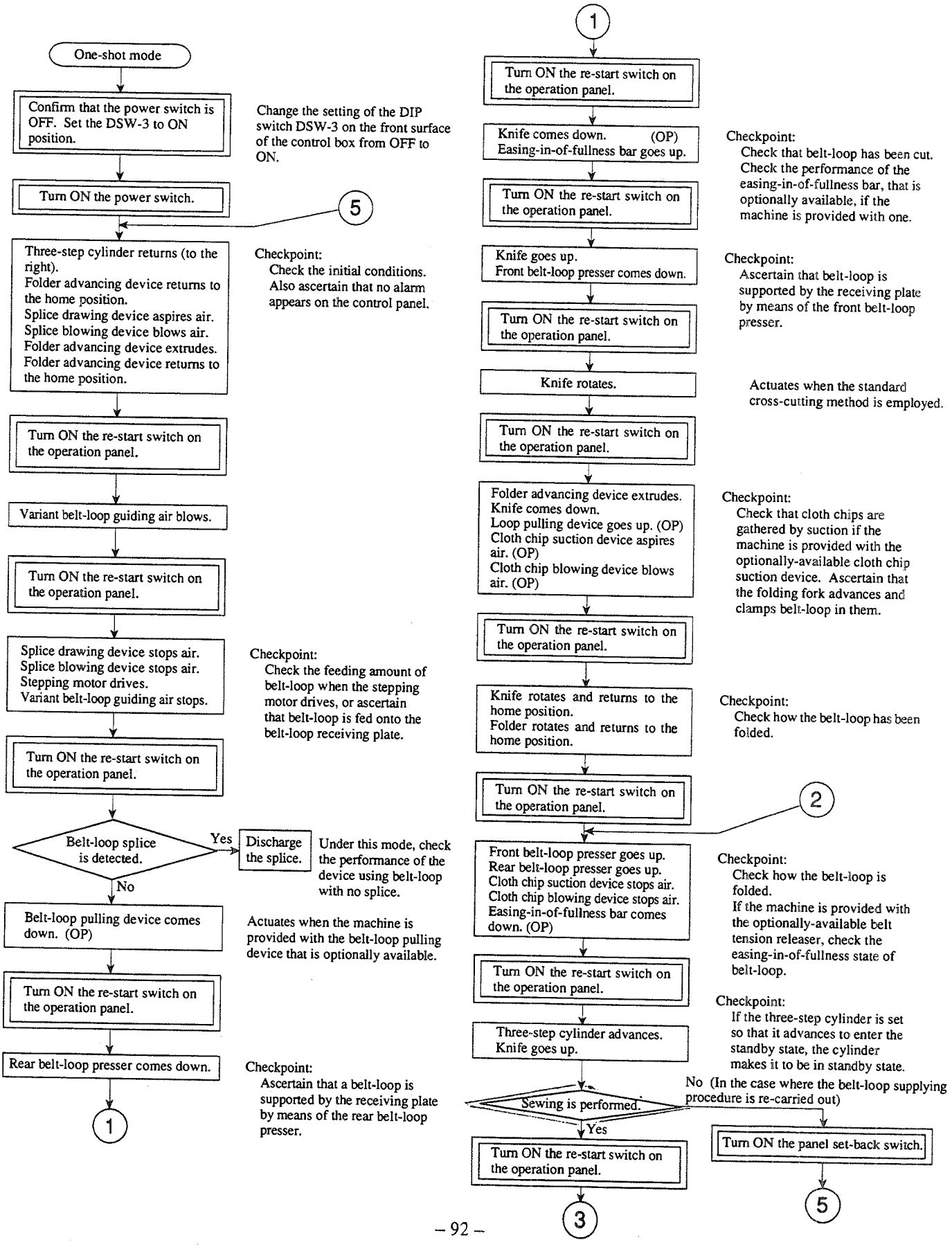


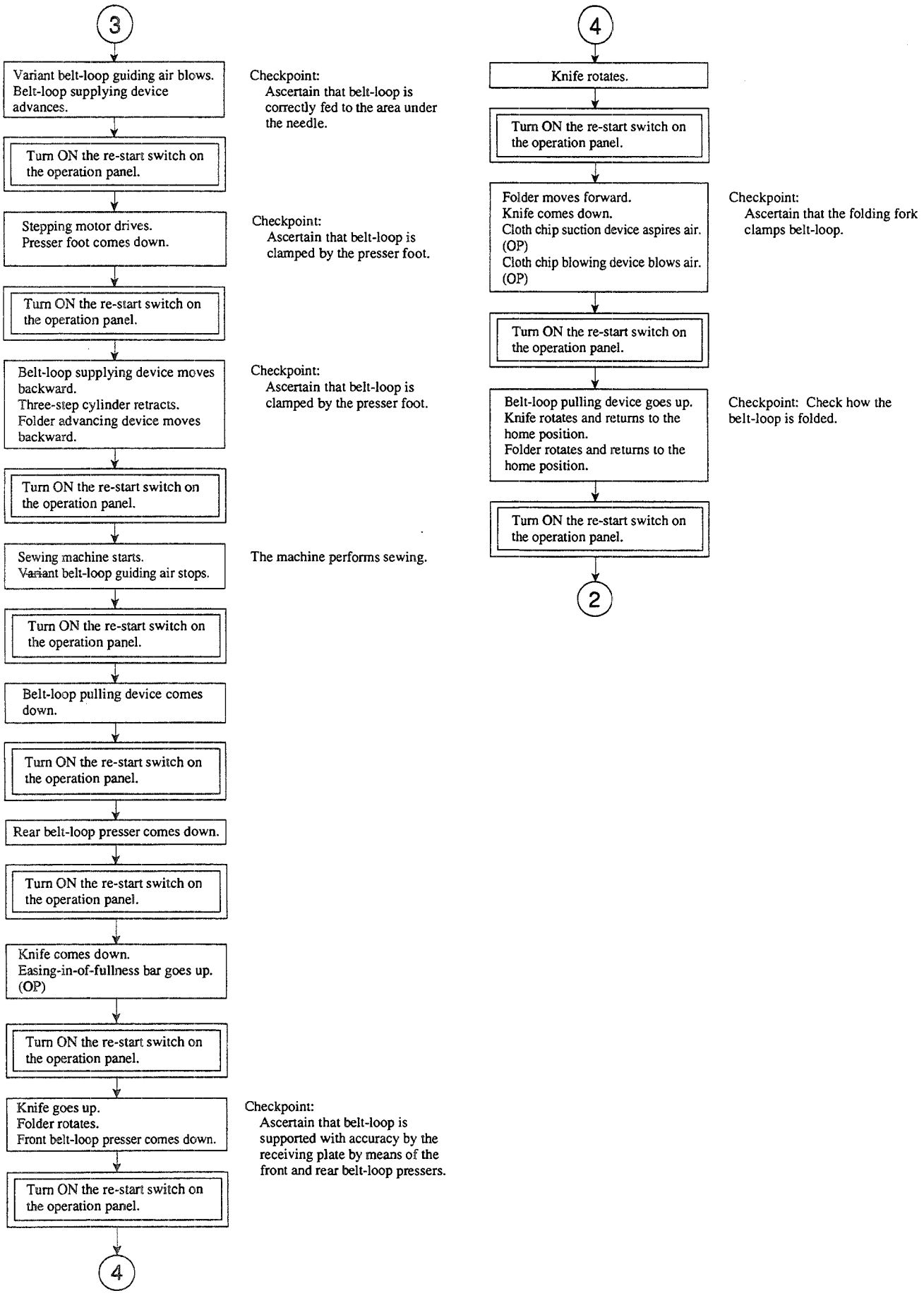
Switch No.	Name of function (at the time of delivery)	Function
DSW-1	Manual sewing mode (OFF)	Used to allow the start switch to drive the machine without actuating the belt loop supplying device. When this switch is effective, an input from any switch other than the presser foot switch, start switch and temporary switch is ineffective.
DSW-2	Thread breakage detection (OFF)	Optional device Used to change over "with/without the needle thread breakage detection." When this switch is set to the ON position, a needle thread breakage can be detected.
DSW-3	One-shot mode (OFF)	Used to divide a series of procedure for supplying a belt loop to allow the operator to check the relevant function for each step of procedure. Every time the re-start switch is turned ON, the belt loop supplying device carries out a sequence of operation steps one by one.
DSW-6	Deactivation of bobbin thread counter (OFF)	Used to deactivate the count stop function of the bobbin thread counter. When this switch is set to the ON position, the count stop function of the bobbin thread counter is rendered ineffective.
DSW-7	3-step cylinder standby position setting (ON)	Used to select the standby position of the loop supplying fork. When this switch is set to the OFF position, the standby position of the loop supplying device is set to the loop delivering position. When this switch is set to the ON position, the standby position of the loop supplying device is set to the position that is reached by advancing from the loop supplying position. OFF (Receded standby position) ON (cycle reduction mode)  **When this switch is set to the ON position, the loop that is being sewn comes close to the machine head since the loop supplying device makes preparations for supplying the subsequent loop. At this time, extreme caution must be taken not to allow your hands to come in contact with the loop.**
DSW-4 DSW-5 DSW-8	—— (OFF)	**These switches are not used.**

DEVICE

This describes the confirmation mode of the belt-loop supplying device, to be used after a failure has occurred on the belt-loop supplying device such as belt-loop cutting failure, belt-loop folding failure and failed feed of a belt-loop under the needle, under which you may carry out troubleshooting by checking the belt-loop supplying procedure step by step to find where the failure has occurred.

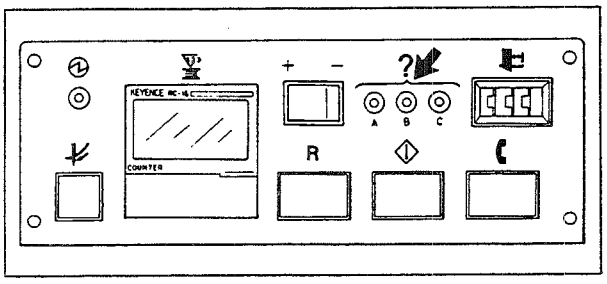
Great attention should be given, when adjusting/ ascertaining a step of procedure while the device is at rest, not to allow the device to proceed to the subsequent step.




3
Variant belt-loop guiding air blows.
Belt-loop supplying device advances.
Checkpoint:
Ascertain that belt-loop is correctly fed to the area under the needle.
Turn ON the re-start switch on the operation panel.
Stepping motor drives.
Presser foot comes down.
Checkpoint:
Ascertain that belt-loop is clamped by the presser foot.
Turn ON the re-start switch on the operation panel.
Belt-loop supplying device moves backward.
Three-step cylinder retracts.
Folder advancing device moves backward.
Checkpoint:
Ascertain that belt-loop is clamped by the presser foot.
Turn ON the re-start switch on the operation panel.
Sewing machine starts.
Variant belt-loop guiding air stops.
The machine performs sewing.
Turn ON the re-start switch on the operation panel.
Belt-loop pulling device comes down.
Turn ON the re-start switch on the operation panel.
Rear belt-loop presser comes down.
Turn ON the re-start switch on the operation panel.
Knife comes down.
Easing-in-of-fullness bar goes up.
(OP)
Turn ON the re-start switch on the operation panel.
Knife goes up.
Folder rotates.
Front belt-loop presser comes down.
Checkpoint:
Ascertain that belt-loop is supported with accuracy by the receiving plate by means of the front and rear belt-loop pressers.
Turn ON the re-start switch on the operation panel.
4
4
Knife rotates.
Turn ON the re-start switch on the operation panel.
Folder moves forward.
Knife comes down.
Cloth chip suction device aspires air.
(OP)
Cloth chip blowing device blows air.
(OP)
Checkpoint:
Ascertain that the folding fork clamps belt-loop.
Turn ON the re-start switch on the operation panel.
Belt-loop pulling device goes up.
Knife rotates and returns to the home position.
Folder rotates and returns to the home position.
Checkpoint: Check how the belt-loop is folded.
Turn ON the re-start switch on the operation panel.
2

12. INDICATION OF TROUBLES

(1) Operation box panel



Indicator lamps mounted on the operation box panel are used to give alarm indications by lighting up or flashing on and off. The description of alarm indications are as follows:

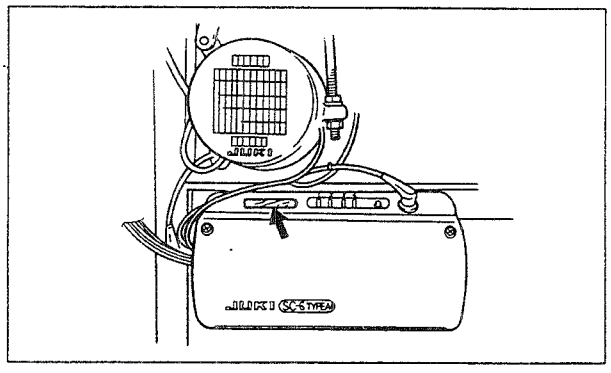
No.	Indication A B C No.	Description of alarm indication	Resetting procedure
1	● ● ○	Loop splice is defective. Splice of belt loop is too long.	Re-supply a loop using the set-back switch (To produce a splice of 100 mm or less)
2	◎ ● ◎	During temporary stop state (SW-ON) When the temporary stop switch is pressed.	Release the temporary stop switch from the locked state. (Re-press the temporary stop switch.)
3	○ ● ○	A) During temporary stop state (SW-OFF) (Temporary stop during sewing) Temporary stop state after the temporary stop switch has been released from the locked state.	1) Turn ON the re-start switch to allow the machine to resume sewing. 2) Turn ON the reset switch to allow the machine to stop sewing (thread trimming), then operate the re-start switch to allow it to return to the origin (the machine rotates at a low speed.)
		B) During temporary stop state (SW-OFF) (When the power to the machine is turned ON.) Temporary stop state after the switch is released from the locked state.	Turn ON the reset switch to allow the loop supplying device to perform the initial action for preparation.
		C) Failed origin retrieval When the sewing cam is not in its origin.	1) Turn OFF the power switch and turn the sewing machine pulley by hand until the origin is reached. 2) Turn ON the re-start switch to allow the machine to retrieve the origin. (The machine rotates at a low speed.)
4	● ◎ ●	Air pressure is insufficient. The air pressure is lower than the set value.	Adjust the air pressure to 0.5 MPa (5 kgf/cm²) and turn ON the reset switch to release the machine from the alarm state.
5	● ● ◎	SC-6 is defective. When SC-6 (sewing machine motor controller) has failed.	Turn OFF the power to the machine. Eliminate the cause of failure from SC-6 and re-turn ON the power to the machine.
6	◎ ○ ○	Failed travel of fork (front) When the fork travels forward, an input of the fork front sensor is not confirmed.	Turn OFF the power to the machine, then inspect the relevant parts, replace failed part(s) and perform adjustment so as to eliminate the cause of trouble. Then, re-turn ON the power to the machine.
7	○ ◎ ○	Failed travel of fork (rear) When the fork travels backward, an input of the fork rear sensor is not confirmed.	Turn OFF the power to the machine, then inspect the relevant parts, replace failed part(s) and perform adjustment so as to eliminate the cause of trouble. Then, re-turn ON the power to the machine.
8	○ ● ●	Warning of finish-count of bobbin thread consumption When the specified value on the bobbin thread consumption counter is reached.	Press the reset switch for the counter so as to clear (re-specify) the counted value shown on the counter.
9	● ○ ●	Warning of no existence of loop Belt loop tape is not correctly loaded in position.	Correctly load the belt loop tape in position (including the adjustment of sensor). Turn ON the set-back switch to re-supply a loop.

In the above table, the ● mark indicates the indicator lamp that goes out, the ○ mark indicates the lamp that lights up and the ◎ mark indicates the lamp that flashes on and off.

No.	Indication A B C	Description of alarm indication	Resetting procedure
10	◎ ◎ ◎	Warning of opening of hook cover When the cover of the hook in the machine head is left opened.	Close the cover of hook which has been opened.
	○ ○ ○	While the machine is at rest due to the warning of opening of hook The hook cover is closed after the machine has stopped rotating.	1) Turn ON the re-start switch to allow the machine to re-start sewing. 2) Turn ON the reset switch to allow the machine to stop sewing (thread trimming), then operate the re-start switch to allow it to return to the origin (the machine rotates at a low speed.)
11	◎ ● ●	Thread breakage detection (optional specification) When a thread breakage occurs.	1) Turn ON the re-start switch to allow the machine to re-start sewing. 2) Turn ON the reset switch to allow the machine to stop sewing (thread trimming), then operate the re-start switch to allow it to return to the origin (the machine rotates at a low speed.)
12	○ ○ ●	Auxiliary loop supplying device is defective. (Optional specification) When the auxiliary loop supplying device fails to deliver a loop.	Re-supply a loop by turning ON the set-back switch to allow the auxiliary loop supplying device to smoothly supply a loop.

In the above table, the ● mark indicates the indicator lamp that goes out, the ○ mark indicates the lamp that lights up and the ◎ mark indicates the lamp that flashes on and off.

(2) PSC box



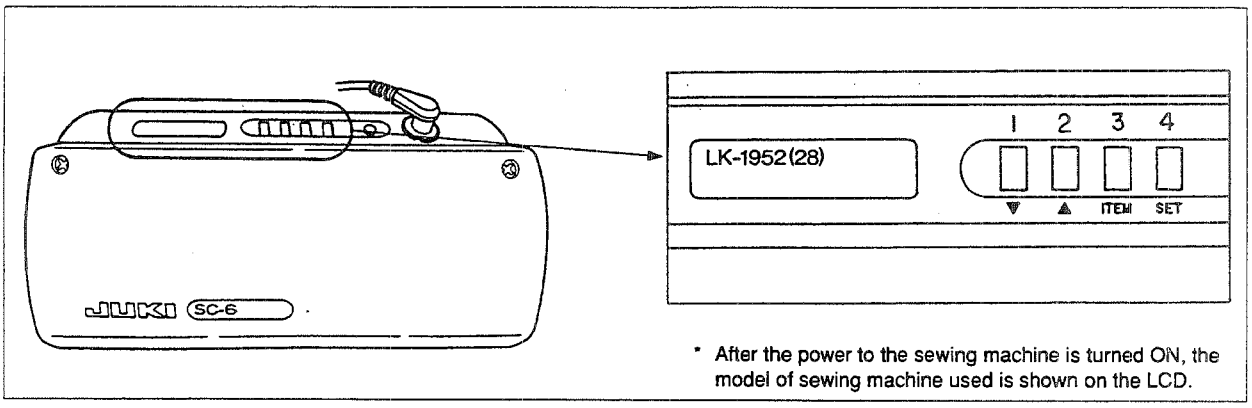
If an error is detected while the machine is in operation, the detecting buzzer sounds and the corresponding error No. appears on the LCD panel. Even when the error No. is shown on the LCD, the error may be such that only the connector has come off. So, check the description of error referring to the table below.

Error indication	Description of error detected	Item to be confirmed
E1	Input power supply failure	• Has the power plug loosened or come off the receptacle? • Has the power switch terminal loosened or come off? • Has the power fuse blown out?
E2	Motor signal failure	• Has the motor connector been securely connected?
E3	Synchronizer failure	• Has the synchronizer connector been securely connected? • Has the V belt loosened or come off?
E7	Motor is locked.	• Has the thread been tangled around the motor pulley shaft? • Has any foreign material entered the motor pulley cover?
E-34	Origin detection failure	• Has the origin detecting sensor loosened or come off?
E-36	Power failure	• Has the power failure occurred while the sewing machine was in operation (while the sewing machine was running)? • Has the power switch been turned OFF while the sewing machine was in operation (while the sewing machine was running)? • Has the power plug loosened or come off the receptacle? • Has the power switch terminal loosened or come off?

The machine is provided with many different safety devices respective which work to give an error indication or stop the sewing machine. If any of these safety devices works, turn OFF the power to the machine once and re-turn it ON.

13. PSC BOX

Various functions can be selected and specified using the four setting switches and liquid crystal display mounted on the front face of the PSC box.



* After the power to the sewing machine is turned ON, the model of sewing machine used is shown on the LCD.

(Caution) Never operate the switches in any way other than the procedure described below.

[Model of machine head to be mounted]

(1) Setting for functions

Functions can be set in two different levels, i.e., user level that is intended for users or operators of the machine and service level that is intended for technical personnel and servicemen. In the service level, the number of function items that can be specified is larger than that in the user level. Set for functions in either level according to sewing conditions.

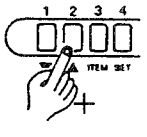
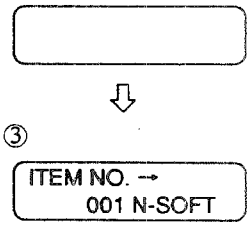
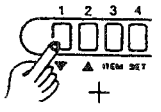
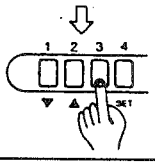
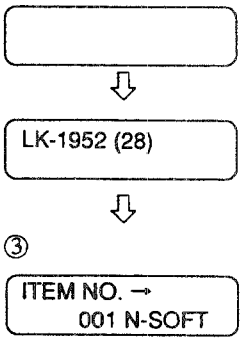
① Turn OFF the power to the machine once.

② Call the user lever or service level for the setting of functions.

< How to call the user level >
Pressing the 2 [▲] switch, turn ON the power to the machine.

< How to call the service level >
Pressing the 1 [▼] switch, turn ON the power to the machine.
Then, press the 3 [ITEM] switch.

③ Indication shown in the illustration on the right will be given on the LCD.
(If the indication does not appear on the LCD, re-perform the procedure from step ①)

	Switch operation	Indication on the LCD
①	Turn OFF the power	
②	Calling the user level  Turn ON the power	 ③ ITEM NO. → 001 N-SOFT
	Calling the service level  Turn ON the power 	 LK-1952 (28) ③ ITEM NO. → 001 N-SOFT

④ Then, select the item No. corresponding to the function you want to specify by pressing the 1 [▼] switch or 2 [▲] switch.
(Refer to the function setting table for the description of items.)

⑤ Once the item No. corresponding to the function desired has been selected, press the 4 [SET] switch.

Example)
Function for changing the number of stitches for the soft-shaft function (2 to 5)

* For example, the number of stitches for the soft-start function is changed to five.

⑥ The indication shown on the LCD will change as illustrated in the figure on the right. Now, the set value can be changed.

⑦ Press the 2 [▲] switch six times to change the number of stitches for the start to five.
(To decrease the number of stitches, press the 1 [▼] switch.)

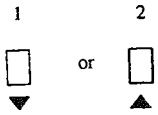
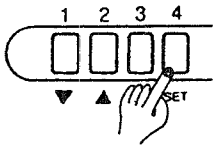
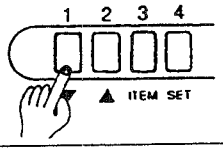
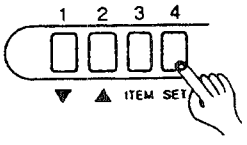
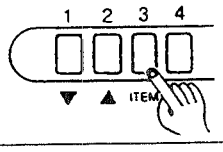
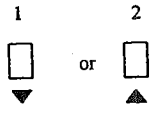
⑧ After the completion of data changing procedure, press the 4 [SET] switch to enter the modified value.

(Caution) If you omit this procedure, the modified value will not be entered.

⑨ The indication given on the LCD will change to show that data on the subsequent function item No. can be modified.

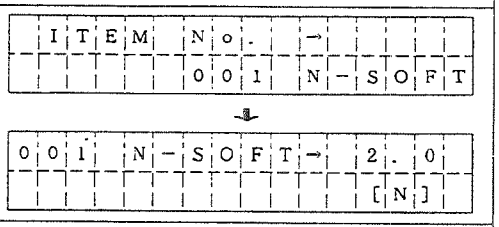
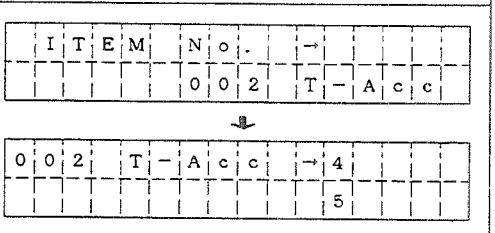
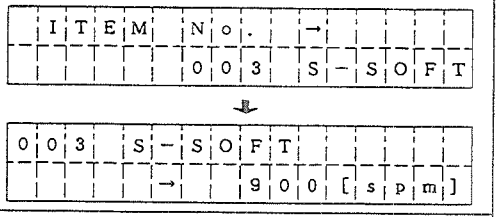
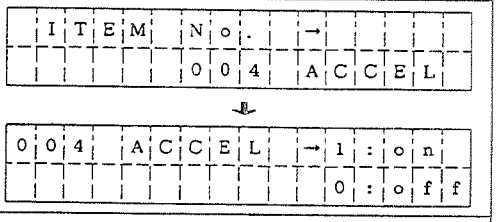
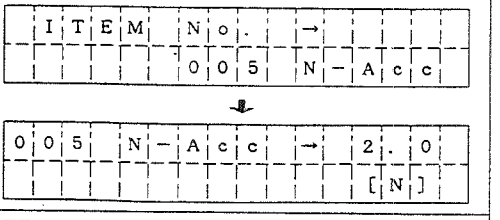
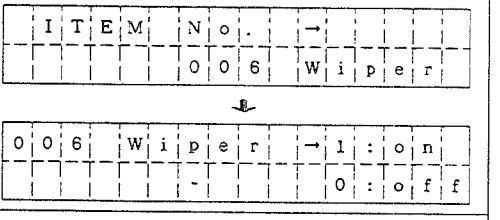
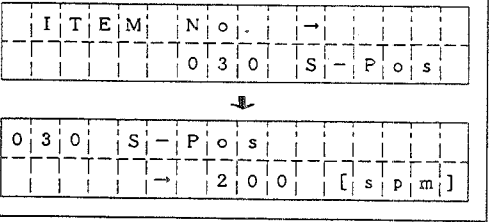
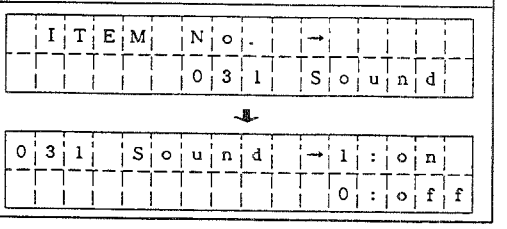
⑩ To put forward or put back the item No., press first the 3 [ITEM] switch to return the indication on the LCD to the function setting, and call the item No. desired by pressing the 1 [▼] switch or 2 [▲] switch.

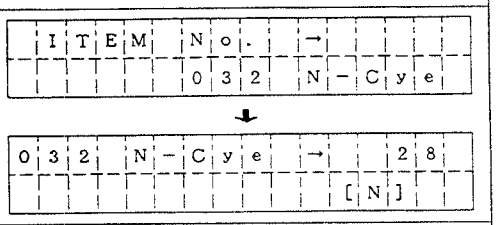
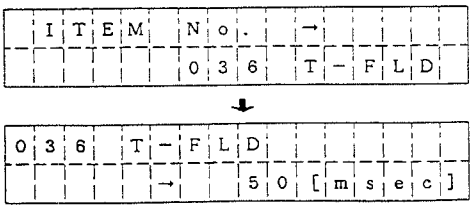
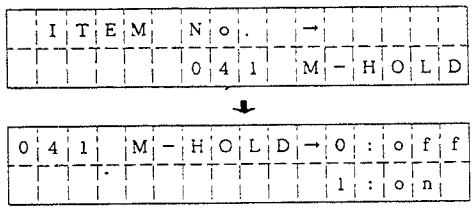
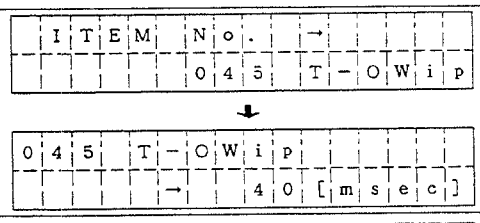
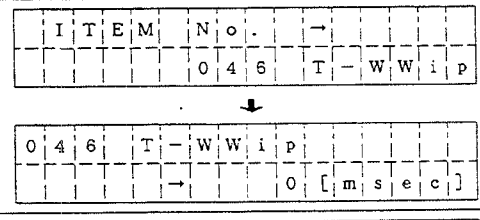
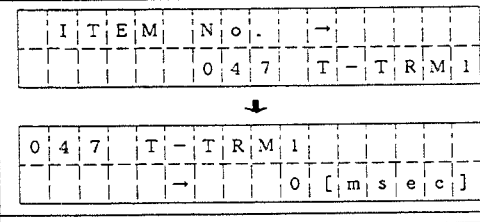
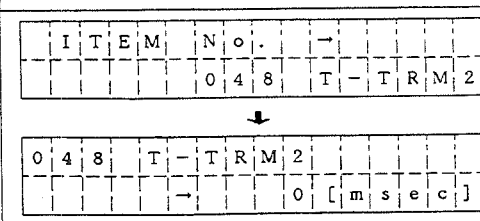
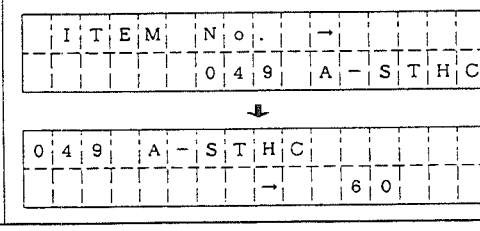
⑪ After the completion of operation described in step ⑧, turn OFF the power to the machine, then turn it ON. This will return the machine to the normal operation mode.

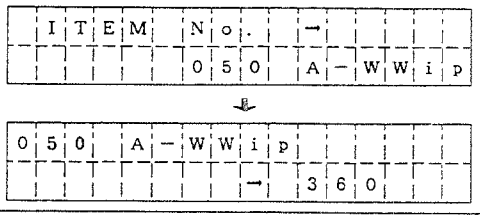
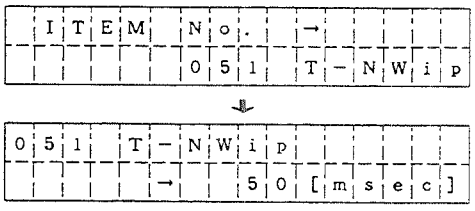
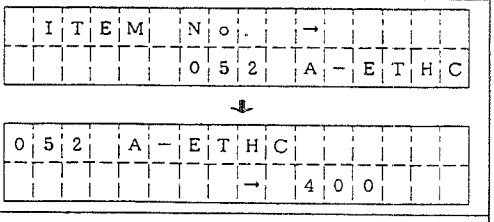
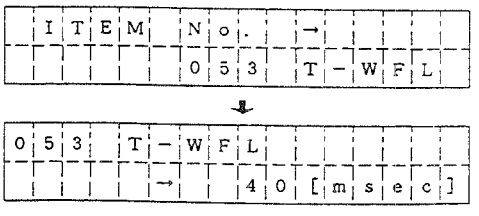
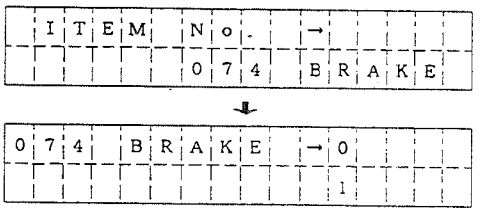
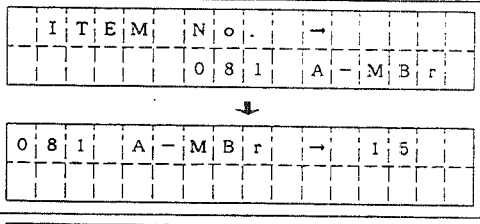
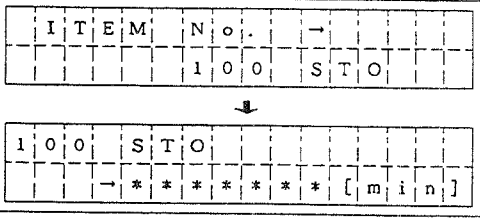
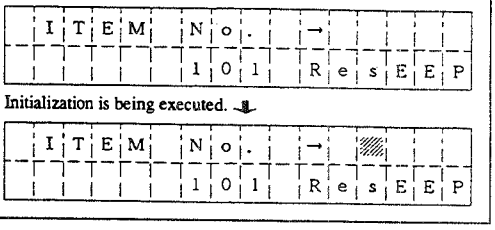
	Switch operation	Indication on the LCD
④		Selected item No. is indicated.
⑤	Example) Changing the number of stitches for the soft-start function 	ITEM NO. → 001 N-SOFT ⇩ ⑥ 001 N-SOFT → 2.0 (N)
⑦		001 N-SOFT → 5.0 (N)
⑧		001 N-SOFT → 5.0 (N) ⇩ ⑨ 002 T-Acc → 4 5
⑩		ITEM NO. → 002 T-Acc
		Selected item No. is indicated.
⑪	Turn OFF the power ⇩ Turn ON the power	⇩ LK-1952 (28)

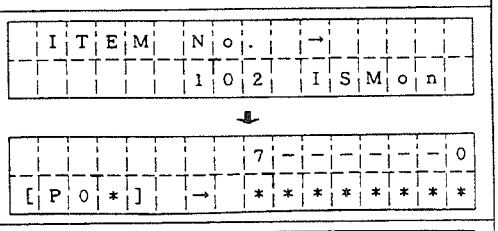
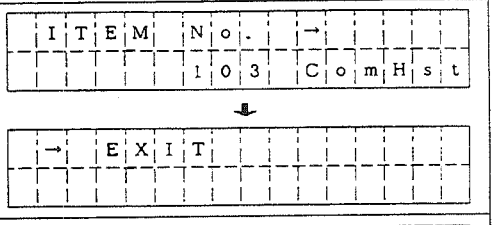
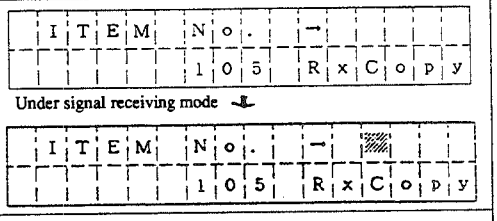
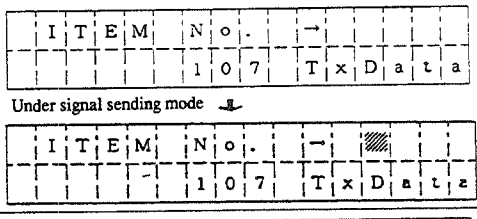
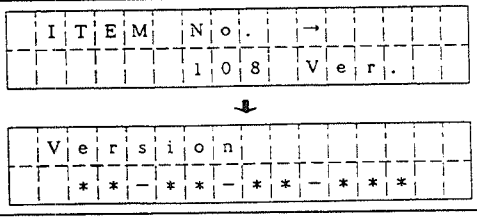
(2) Function setting table

(Caution) **Function setting No. attached with an asterisk (*) cannot be specified for some types of sewing machines.**
The set value of each function setting No. shown on the liquid crystal display is for the LK-1952 (28) model of sewing machine.

Function setting No.	Object operation level	Description of function	Data setting range	Unit	Indication shown on the liquid crystal display
001	User Service	Function to set the number of stitches for the soft-start The number of stitches for which the soft-start function works can be changed/specified. (Soft-start function is set to effective/ineffective by setting the soft-start switch to on/off.)	0.0~9.0	0.5/spm	
002	User Service	Flicker reducing function The function reduces flickering of the lamps (hand lamp, etc.) at the start of sewing. The higher the set value increases, the more effective the function will work. 0: No effect (The function is ineffective.) 1 to 8: Lower to higher degree of effectiveness **(Caution) The more effective the function works, the lower the start-up speed will become.**	0~8	—	
003	User Service	Function to set the sewing speed for the soft-start With this function, the sewing speed at the start of sewing can be changed/specified.	130~1000	10/spm	
004	User Service	Smooth-start function 1: on ..... Smooth-start function is effective. 0: off ..... Smooth-start function is ineffective.	1: on /0: off	—	
005	User Service	Function to set the number of stitches for the smooth start The number of stitches for which the smooth-start function works can be changed/specified.	0.0~9.0	0.5/spm	
006	User Service	Wiper function Whether or not the wiper is to be used can be changed/specified. If the wiper is not to be used, set the function to "0: off." This enables the work clamp foot to go up more quickly. 1: on ..... Wiper function is effective. 0: off ..... Wiper function is ineffective.	1: on /0: off	—	
030	Service	Function to set the lowest sewing speed of sewing machine The lowest sewing speed that can be specified using the max. sewing speed control variable resister (on the control box) can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	130~250	5/spm	
031	Service	Function to set a blip of click for push switches Whether or not a blip is produced when operating any of the four key switches mounted on the front face of PSC box can be changed/specified. 1: on ..... The machine produces a blip when the switch clicks. 0: off ..... The machine does not produce a blip when the switch clicks.	1: on /0: off	—	

Function setting No.	Object operation level	Description of function	Data setting range	Unit	Indication shown on the liquid crystal display
032	Service	Function to set the number of stitches for cycle sewing The number of stitches for cycle sewing can be changed/specified when changing the machine head to be mounted or replacing worms.	12~200	1/spm	
☆ 036	Service	Function to set the time to complete the lowering of the presser foot The machine is held stopped from the time when the presser foot starts to come down to the time the machine starts to rotate. The period of time during which the machine is held stopped can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	0~300	10/msec	
041	Service	Stop position retaining function When the machine is at rest (with its needle up), the main shaft of the sewing machine is held at that position by softly applying a brake. 1: on ..... The stop position retaining function is effective. 0: off ..... The stop position retaining function is ineffective. **(Caution) 1. If this function is specified, the motor produces noise while the sewing machine is at rest. This is not a sign of machine failure.** **2. If this function is rendered effective, it will be impossible to turn the hand pulley by hand.**	1: on / 0: off	—	
☆ 045	Service	Function to set the period of time during which the wiper cylinder is driven (on) The period of time during which the wiper cylinder actuates can be changed/specified. Decreasing the set value shortens the aforementioned period of time. Increasing the set value lengthens it. **(Caution) If this period of time is extremely shortened, the wiper may fail to reach the needle tip and tuck the needle thread.**	20~150	10/msec	
☆ 046	Service	Function to set the wiper cylinder driving (on) timing Timing for driving the wiper can be changed/specified. Decreasing the set value advances the wiper actuating timing. Increasing the set value retards it.	0~160	10/msec	
☆ 047	Service	Function to set the thread trimming cylinder 1 off timing Timing for actuating the thread trimmer locating this side, as observed from the front of sewing machine, can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	0~100	2/msec	
☆ 048	Service	Function to set the thread trimming cylinder 2 off timing Timing for actuating the thread trimmer locating far side, as observed from the front of sewing machine, can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	0~100	2/msec	
049	Service	Function to set the turn-off angle of the needle thread pressing cylinder If the needle thread fail to interlace with the bobbin thread at the start of sewing, the needle thread presser releasing timing (angle) can be changed/specified. Decreasing the set value advances the timing to release the needle thread presser. Increasing the set value decreases it. **(Caution) If the set value is excessively large or small, the needle thread may fail to interlace with the bobbin thread with consistency.**	0~100	5/deg	

Function setting No.	Object operation level	Description of function	Data setting range	Unit	Indication shown on the liquid crystal display
☆ 050	Service	Function to set the wiper cylinder driving (on) angle Timing for driving the wiper cylinder can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	300~360	5/deg	
☆ 051	Service	Function to set the presser foot cylinder driving (on) timing (When "function setting No. 006 wiper function" is set to ineffective.) The timing for lifting (driving) the presser foot can be changed/specified. Decreasing the set value advances the presser foot lifting timing. Increasing the set value retards it. **(Caution) If the set value is excessively small, the presser foot will go up before thread trimming. As a result, thread trimming may not be performed with consistency.**	0~200	10/msec	
052	Service	Function to set the needle thread pressing cylinder driving (on) angle Timing for retaining (driving) the wiper cylinder can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	300~400	5/deg	
☆ 053	Service	Function to set the presser foot cylinder driving (on) timing (When "function setting No. 006 wiper function" is set to effective.) The timing for lifting (driving) the presser foot can be changed/specified. Use this function when the wiper interferes with the presser foot. Decreasing the set value advances the presser foot lifting timing. Increasing the set value retards it. **(Caution) If the set value is excessively small, the wiper may interfere with the presser foot.**	-20~200	10/msec	
074	Service	Motor brake level setting function Effectiveness of brake at the time of reducing the motor speed can be changed/specified. 0: Effectiveness soft 1: Effectiveness medium 2: Effectiveness hard **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	0~2	—	
081	Service	Brake start position setting function The start position of the motor brake can be changed/specified. **(Caution) If the set value of this function is changed, the machine may fail to maintain its intended functions and performance. So, do not change the set value of this function.**	0~25	1/deg	
100	Service	Cumulative period of time indicating function The cumulative sum of period of time during which the machine is energized while the power is ON can be recorded/indicated.	0~9999999	1/min	
101	Service	Function to initialize E^2 PROM data It is possible to return the settings of all functions to the state at the time of delivery. Note that once function No. 100 and 103 cannot be returned to the previous state once they are specified. Operating procedure: Pressing [ITEM] switch, press [SET] switch, and the initialization is executed. (While the initialization is in execution, the shaded portion on the display blinks.)	—	—	

Function setting No.	Object operation level	Description of function	Data setting range	Unit	Indication shown on the liquid crystal display
102	Service	Function to indicate the state of input signal Logic state of input signals can be indicated on the display in real time. (Input section of microprocessor port) Operating procedure : Press the "▼" or "▲" key to allow the desired port No. to appear on the display. Refer to "Table of state of input signals" for the port names and allocated signal name and relevant logic.	0/1	—	
103	Service	Error hysteresis indicating function When an error occurs, the error No. and the time of occurrence are recorded/indicated. Refer to [Explanation of errors and corrective measures against errors] for the error No. and corrective measures to be taken against errors.	0~36	1/unit	
105	Service	Data receiving mode setting function It is possible to receive data from other PSC boxes or personal computers. Operating procedure : Simultaneously press the "ITEM" and "SET" keys, and the signal receiving mode is actuated. (Under the signal receiving mode, the shaded portion on the display blinks.)	—	—	
107	Service	Data sending mode setting function It is possible to send data to other PSC boxes or personal computers. Operating procedure : Simultaneously press the "ITEM" and "SET" keys, and the signal sending mode is actuated. (Under the signal sending mode, the shaded portion on the display blinks.)	—	—	
108	User Service	Control box version No. indicating function Versions of the incorporated program, various data or other relevant information are given.	—	—	

(3) Explanation of major functions

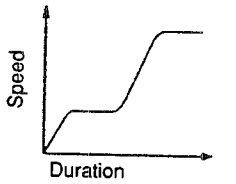
1) Soft-start function

If the needle thread may fail to interlace with the bobbin thread at the start of sewing, this function is used to improve consistency in stitching performance by limiting the sewing speed for the predetermined number of beginning stitches.
The soft-start function is rendered effective/ineffective by setting the soft-start switch (orange) mounted on the liquid crystal display panel of the PSC box to "on (the switch lights up): Effective" or "off (the switch goes out): Ineffective." (This switch has been factory-set to "off (the switch goes out): Ineffective" at the time of delivery.)
The effective number of stitches for which sewing speed is limited when the soft-start function is rendered effective can be changed/specified using the function with the function setting No. 001 to set the number of stitches for the soft-start.
The limited sewing speed to be employed during the number of stitches for the soft-start can be changed/specified using the function with the function setting No. 003 to set the sewing speed for the soft-start.

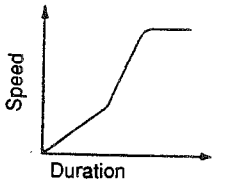
2) Smooth-start function

If the needle thread may fail to interlace with the bobbin thread at the start of sewing, this function is used to improve consistency in stitching performance by changing the start-up characteristics for the predetermined number of beginning stitches.
The smooth-start function is rendered effective/ineffective using the function setting No. 004 smooth-start function. (This function has been factory-set to "1: on (Effective)" at the time of delivery.)
The effective number of stitches that are sewn with the start-up characteristics that are taken when the smooth-start function is rendered effective can be changed/specified using the function with function setting No. 005 to set the number of stitches for the smooth-start.
The start-up characteristics that are taken when the smooth-start function is rendered effective can be changed/specified using the function No. 002 flicker reducing function.

(Caution) The soft-start function and the smooth-start function differs in the speed characteristics at the sewing start (start-up). The smooth-start function further reduces waste of time and ensures smoother start of sewing. Select either function in accordance with the finished state of stitches.



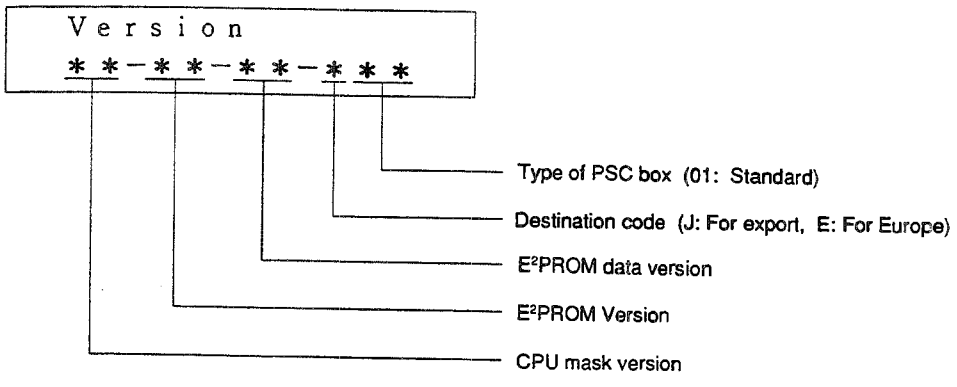
Soft-start function



Smooth-start function

3) Control box version indicating function

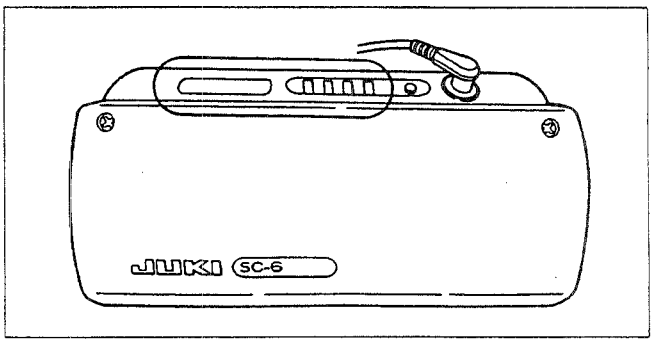
Specifications and version of the control box are shown on the display and checked.
Whenever you contact our distributor or our office in your area, please confirm the control box version shown on the display using this function.

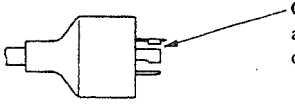
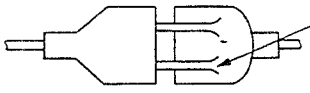
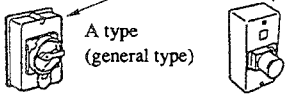
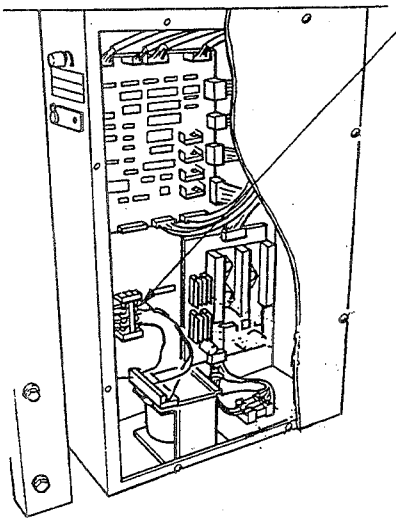
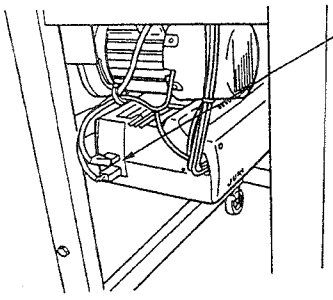


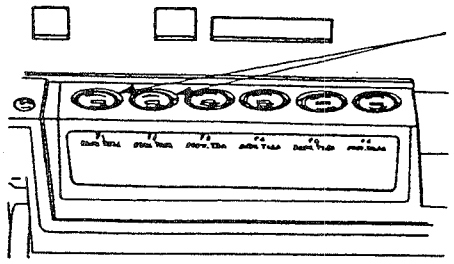
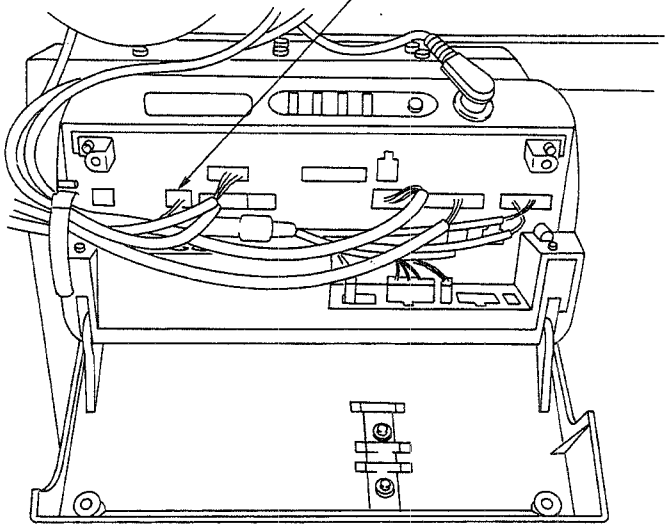
(4) Explanation of errors and corrective measures against errors

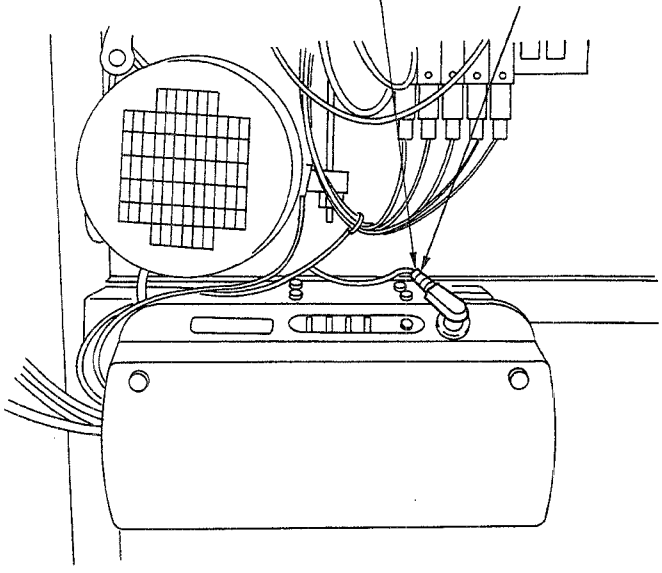
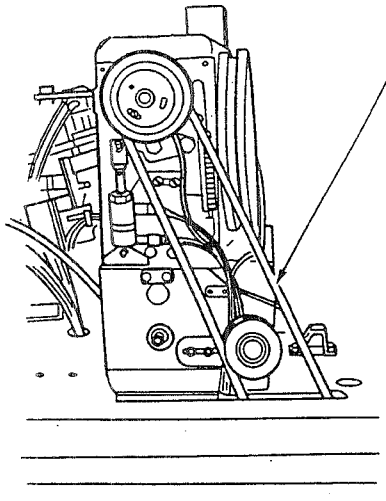
If any failure or defect is detected while the machine is in operation, a detection alarm beeps and corresponding error No. and the time at which the error occurs are shown on the liquid crystal display mounted on the front face of the PSC box.

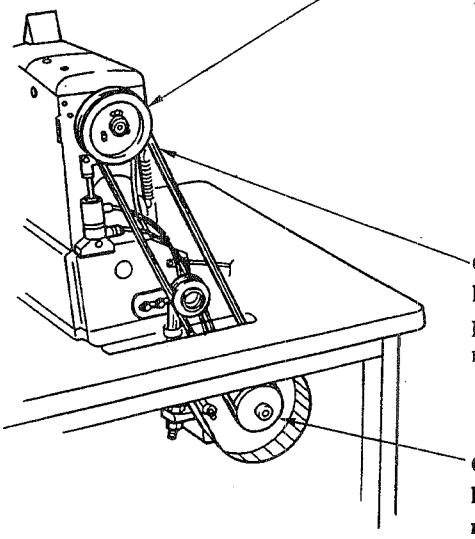
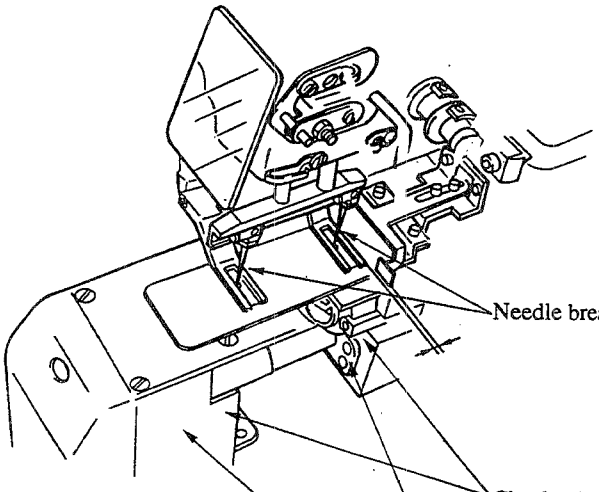
Take an appropriate corrective measure in accordance with the table below.

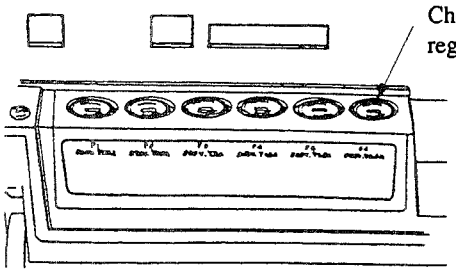
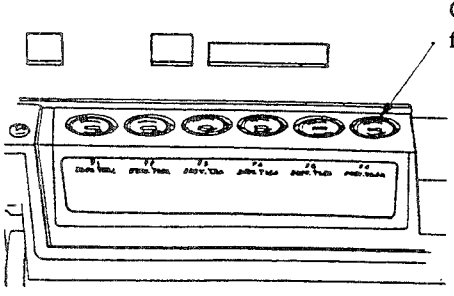


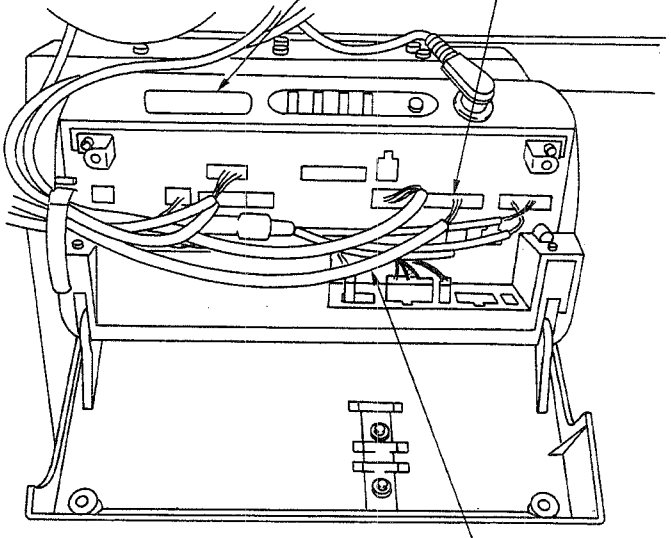
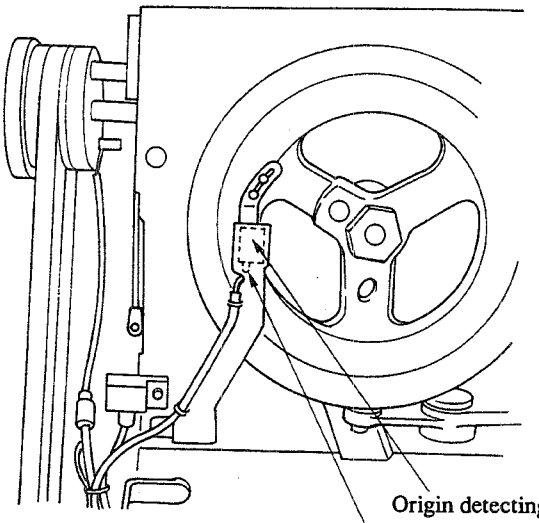
No.	Description and components to be checked	Corrective measures
E0	• Initialization of data on E^2PROM	
E1	• Failed input power supply (open phase of power supply)	
	Check whether the power plug and receptacle have loosened or come off. 	• Tighten the screw mounted in the plug. • Re-connect the plug to the receptacle.
	Check the power plug for failed contact. 	• Correct the receptacle.
	Terminal of the power switch (differs with the type of machine) has loosened or come off.  A type (general type) B type (equipped with an temporary stop switch)	• Tighten the screw inside the power switch.
	Terminal on the terminal block inside the control box has loosened or come off. 	• Tighten the screw inside the power block.
	Power connector pin has loosened or come off, or the terminal of the power terminal block has loosened or come off. (Differs with the type of machine.) 	• Re-connect the connector securely or tighten the screw inside the terminal block. (Differs with the type of machine.)

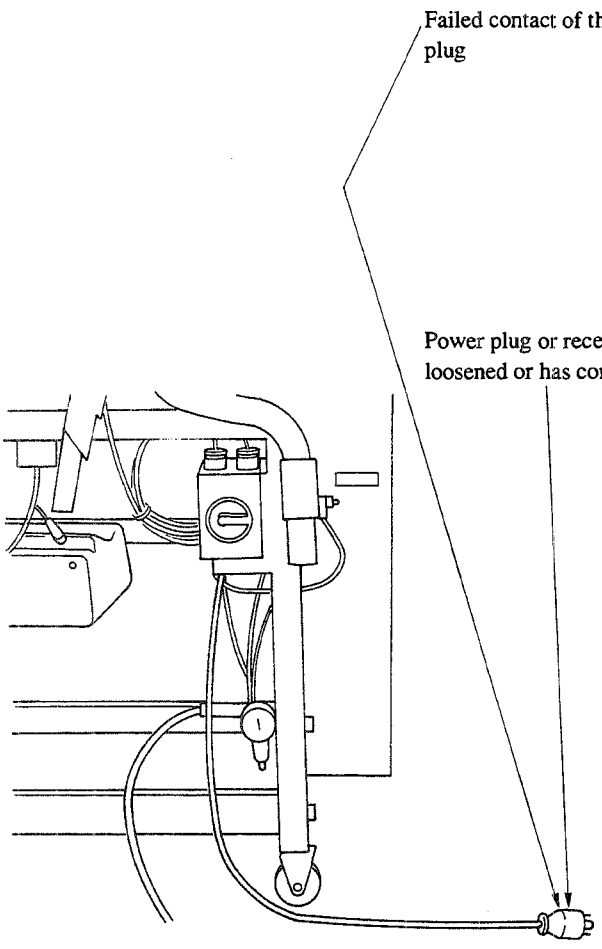
No.	Description and components to be checked	Corrective measures
	 Check whether the motor signal connector pin has loosened or come off.	• Check the fuses F1 and F2 for blow-out. Then, replace a blown out fuse, if any, with a new one.
E2	• Motor connector has come off. (The motor connection signal has not been input in the normal value.) Check whether the motor signal connector pin has loosened or come off. 	• Re-connect the connector. (Caution) **The error is not stored in memory of the hysteresis of troubles.**

No.	Description and components to be checked	Corrective measures
E3	• V belt has slipped or come off. Synchronizer connector has come off. (The motor rotates, however, the upper needle position detecting signal has not been input.)	
	Check whether the synchronizer connector has loosened or come off.	• Re-connect the synchronizer.
	Check the synchronizer for disconnection. 	• Replace the synchronizer with a new one.
	Check whether the V belt has come off, loosened or slipped. 	• Check the V belt. (Belt tension: 8 mm/500g) **(Caution) The trouble is not stored in memory of the hysteresis of troubles.**

No.	Description and components to be checked	Corrective measures
E7	• The motor has locked. (The machine fails to rotate with controlled even when the motor has been driven.)	
	 Check whether the sewing machine head has locked. (Is it possible to turn the pulley lightly by hand?)	• Correct the seizure of the machine head.
	Check whether the thread has been tangled in the pulley of the sewing machine.	• Remove the thread from the pulley.
	Check whether the thread has been tangled in the motor pulley shaft.	• Remove the pulley and eliminate the thread from the pulley.
	 Needle breakage	• Check the needle.
	Check whether the thread has been caught in the hook.	• Check the hook.
	Check whether the proper amount of oil is supplied to the hook.	• Properly adjust the amount of oil supplied to the hook.

No.	Description and components to be checked	Corrective measures
E10	• The solenoid has short-circuited. (Short-circuit signal has been detected during operation.) • Solenoid valve has failed. • Air cylinder connector has been arranged erroneously. • The transformer fuse has blown.	• Check the resistance of the solenoid valve. • Check the wiring. • Check the fuse F3.
E11	• Overvoltage of the power supply (The source voltage exceeds the normal value.) • Check whether the source voltage is correct.	• Measure the voltage.
E12	• Overcurrent of the power supply (The source current exceeds the normal value.)	• Motor has short-circuited.
E13	• Low voltage of the power supply (The source voltage is lower than the normal value.)  	• Measure the voltage. • Check the fuse F6.
E14	• Power supply detecting circuit has failed. (Overvoltage and low voltage of the power supply are simultaneously input.)  	• Check the fuse F6.
E20	• Circuit board inside the PSC box has failed. (Failure has been found during the performance checking procedure taken after turning ON the power to the machine.)	
E22	• Failed control of the motor rotation (The number of revolutions of the motor is larger than that controlled by the motor control circuit board by a specified value or more.)	
E23	• Solenoid transistor is defective. (Short-circuit signal of the solenoid transistor has been detected when turning ON the power to the machine.)	

No.	Description and components to be checked	Corrective measures
E34	• Failed detection of origin	
	The number of stitches for cycle sewing is improperly set.	• Check the set value of the number of stitches for the control box and that for the machine head.
	Connector of the origin detecting sensor has come off.	• Securely connect the origin detecting sensor connector.
		
	Disconnection of the cord of origin detecting sensor.	• Replace the origin detecting sensor unit with a new one.
		
	Origin detecting sensor has not been properly adjusted.	• Re-adjust the origin detecting sensor.
	Origin detecting sensor has failed. (Does the sensor emit light?)	• Replace the origin detecting sensor unit with a new one.

No.	Description and components to be checked	Corrective measures
E36	• Power failure (The power has given out while the sewing machine is in operation.)  Did you turn OFF the power to the machine while the sewing machine was in operation? • Did the power supply stop while the sewing machine was in operation?	• Plug • Re-connect the plug to the receptacle. • Re-turn ON the power switch. **(Caution) This trouble is not stored in memory of trouble hysteresis.**
E41	• Micro-computer has failed. (The micro-computer has failed to control the peripheral components.)	
E42	• E^2PROM (Failed access to the memory)	

(5) How to change the number of stitches when replacing the cloth feed cam

To replace the cloth feed cam of the sewing machine with one that is not supplied with a resistor pack or to attach a cloth feed cam for special number of stitches, change the number of stitches for cycle sewing on the PSC box in accordance with the number of stitches of the cloth feed cam to be used.
If the cloth feed cam to be used is supplied with a resistor pack, the number of stitches for cycle sewing can be automatically changed by replacing the resistor pack.

[Changing procedure]

① Call the service level.

② Press 1 [▼] switch or 2 [▲] switch to select ITEM No. 032.

③ Press the 4 [SET] switch. Then the indication as illustrated in the figure on the right will appear on the display. Now, you can set the number of stitches for cycle sewing.

④ Press 1 [▼] switch or 2 [▲] switch to select the number of stitches of the cloth feed cam to be used.

⑤ Press the 4 [SET] switch, and the specified value will be entered. Then the next ITEM No. will appear on the display. on the display.

⑥ Turn OFF the power to the machine, then re-turn it ON. This allows the sewing machine to resume the normal operation and completes the data changing procedure.

	Switch operation	Indication on the LCD
①	Call the service level.	ITEM NO. → 001 N-SOFT
②	1 ▼ or 2 ▲	ITEM NO. → 032 N-Cye
③	4 SET	032 N-Cye → 28 [N] LK-1952 (28)
④	1 ▼ or 2 ▲	032 N-Cye → * * [N]
⑤	4 SET	036 T-FLD → 50[msec] 041 M-HOLD → 0:OFF 1:ON
⑥	Turn OFF the power ⇩ Turn ON the power	⇩ LK-1952 (28)

(6) How to change the magnet for detecting the upper position of the needle

To adjust the magnet for detecting the upper needle position, check the upper needle position using "ITEM No. 102 Input signal monitor."

① Call the service level.

② Press the 1 [▼] switch or the 2 [▲] switch to select ITEM No. 102.

③ Press the 4 [SET] switch. Then the indication as illustrated in the figure on the right will appear on the display.

④ Press the 1 [▼] switch or 2 [▲] switch to select "P2*."

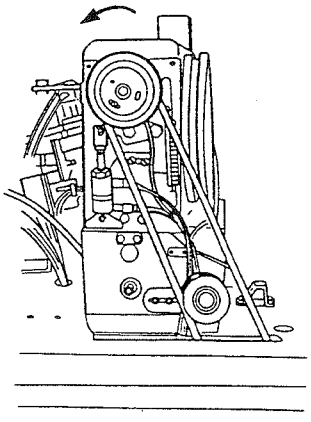
	Switch operation	Indication on LCD
①	Call the service level.	ITEM NO. → 001 N-SOFT
②	1 ▼ or 2 ▲	ITEM NO. → 102 ISMon
③	4 SET	7------0 [P0*]→11111111
④	1 ▼ or 2 ▲	7------0 [P2*]→00000101

⑤ Hold the sewing machine pulley by hand and turn it in the normal direction of rotation, i.e., in the direction of the arrow, slowly from the highest dead point of the needle bar.

⑥ Turn the pulley while observing the third indication on the display, as counted form the righmost one, which corresponds to the needle-up position detecting signal. The display shows the start of input of a needle-up signal by changing the numeral from "0" to "1."

⑦ The standard adjustment of the magnet when the upper needle position detecting signal starts to be input is 3°±1° when the highest dead point of the needle bar is taken as 0°.

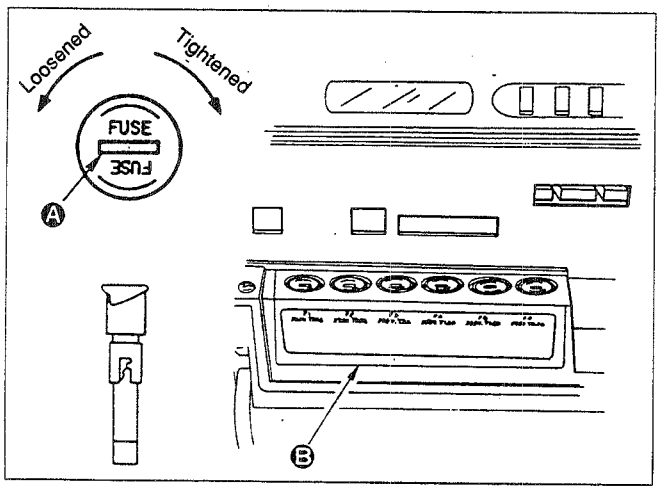
⑧ After the adjustment, turn OFF the power.



7 — — — — — — 0
[P 2 *] → 0 0 0 0 0 1 0 1

Needle-up position detecting signal

(7) Explanation of fuses



Open the front cover. Fit a screwdriver onto slit Ⓐ on the fuse cap. Turn the cap in the direction of the arrow using the screwdriver while lightly pressing the screwdriver against the slit until the cap comes off.
Use a fuse with a capacity indicated on a label attached on section Ⓑ of the connector panel.

(Caution) Be sure to replace the fuse with the power to the machine turned OFF.

Enlarged view of section Ⓑ

(The figure given below shows a fuse of 3-phase and 200 to 240 V type machine destined for JA (North America).)

F1	F2	F3	F3	F5	F6
250V,12A	250V,12A	250V,12A	250V,T1.6A	250V,T1.6A	250V,T05A

⚠ **CAUTION!**

For continued protection against risk of fire, replace only with same type and ratings of fuse.

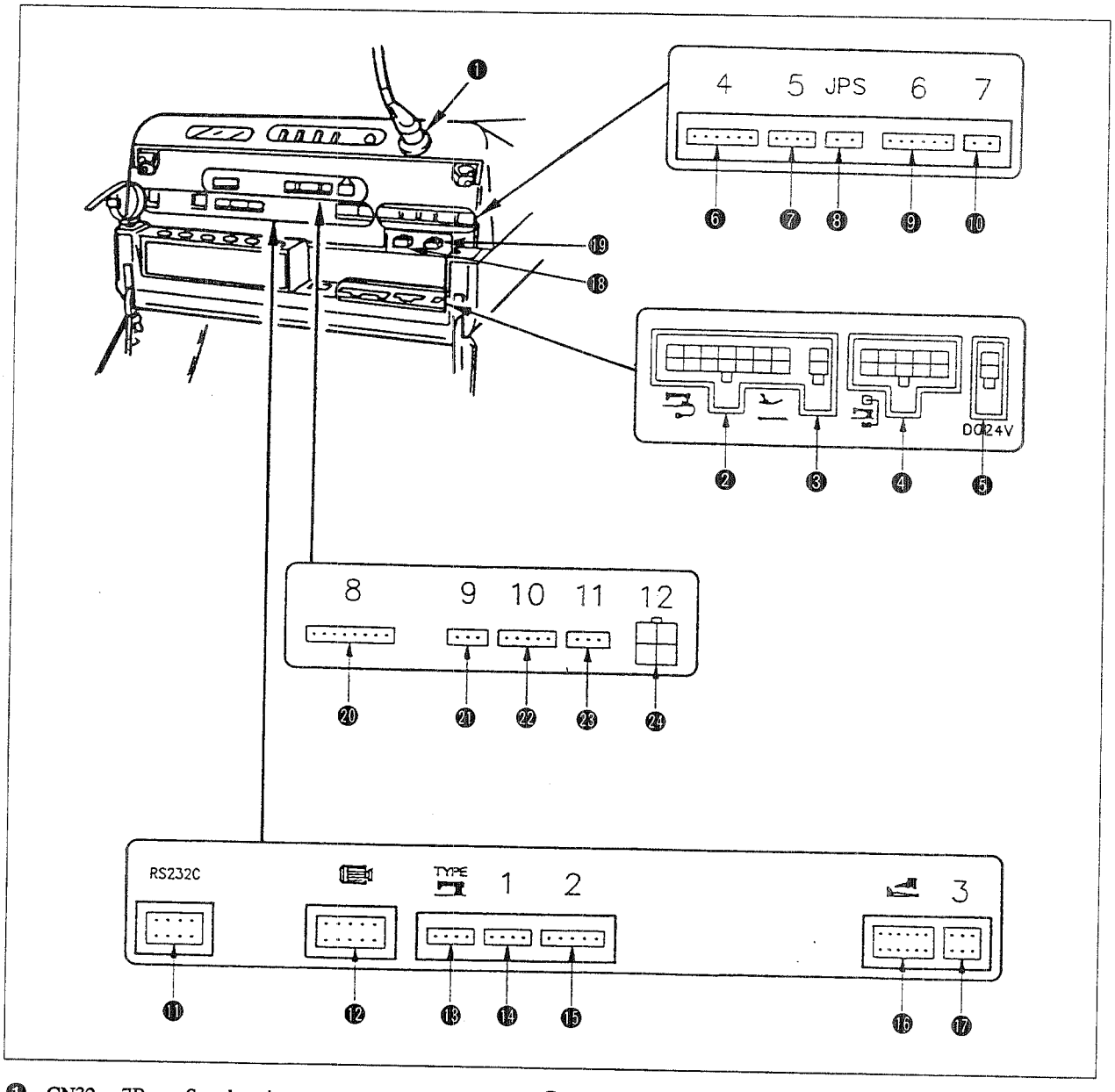
YM

* Fuse table

	200V ~ 240V 3-phase	Phenomenon caused by blown fuse	200V ~ 240V 1-phase	100V ~ 120V 1-phase	Phenomenon caused by blown fuse
F1	250V 12 A Main	E1 is indicated on the display.	250V T20A Main	250V T20A Main	The machine cannot be energized.
F2	250V 12 A Main	E1 is indicated on the display.	250V T20A Main	250V T20A Main	The machine cannot be energized.
F3	250V 12 A Main	E1 is indicated on the display.	— —	— —	—
F4	250V T1.6A Transformer	E25 is first indicated on the display, then E26 replaces it.	250V T1.6A Transformer	250V T3A Transformer	E25 is first indicated on the display, then E26 replaces it.
F5	250V T1.6A Rush-current prevention	The machine cannot be energized.	250V T1.6A Rush-current prevention	250V T1.6A Rush-current prevention	The machine cannot be energized.
F6	250V T0.5A Regeneration absorption	E13 is indicated on the display.	250V T0.5A Regeneration absorption	250V T0.5A Regeneration absorption	E13 is indicated on the display.

Fuse No.	JE (Europe) 1-phase 200V - 240V	
	Capacity of fuse Installing position	Phenomenon caused by blown fuse
F1	— —	—
F2	— —	—
F3	— —	—
F4	250V T1.6A Transformer	E25 is first indicated on the display, then E26 replaces it.
F5	250V T1.6A Rush-current prevention	The machine cannot be energized.
F6	250V T0.5A Regeneration absorption	E13 is indicated on the display.

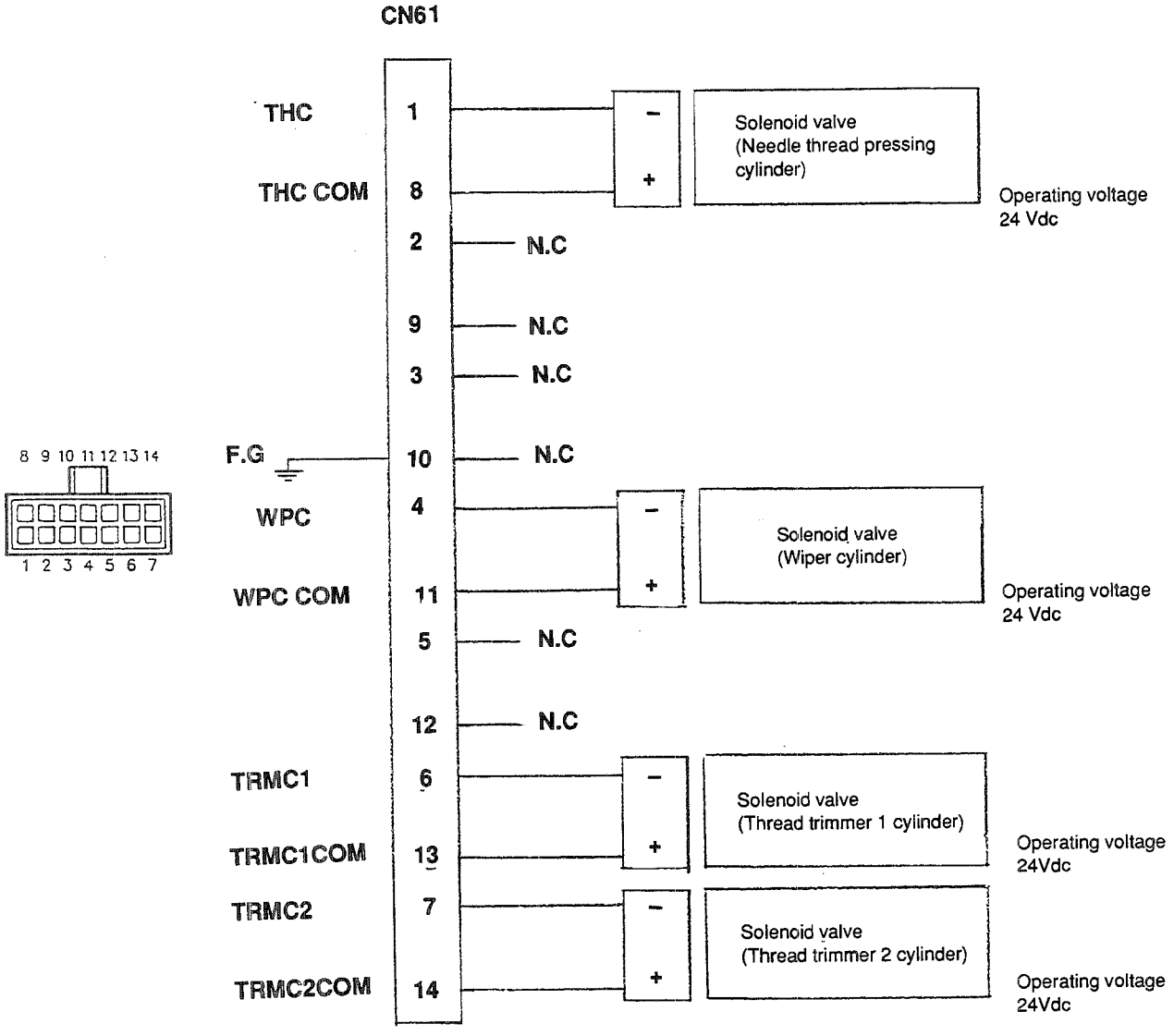
(8) Connector connection diagram



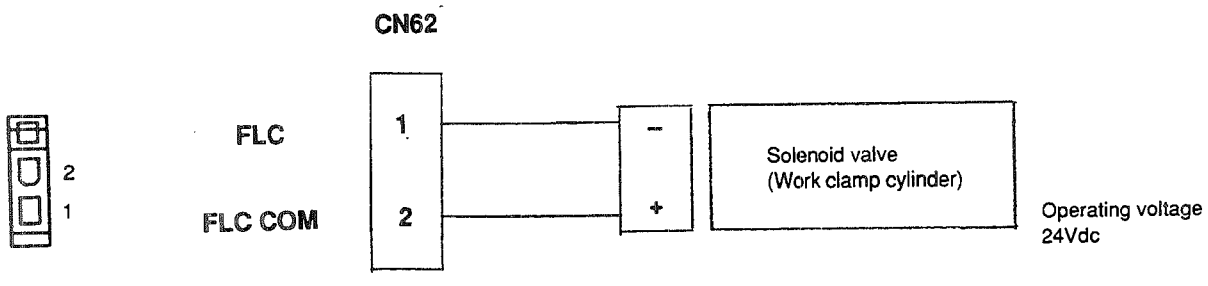
❶	CN32	7P	Synchronizer connector
❷	CN61	14P	Air cylinder connector 1
❸	CN62	2P	Air cylinder connector 2
❹	CN63	10P	Air cylinder connector 3 (option)
❺	CN64	2P	24V external output
❻	CN10	6P	Origin detection sensor connector
❼	CN11	4P	Not used
❽	CN12	2P	Not used
❾	CN13	6P	PSC box connector 1
❿	CN14	2P	Not used
⓫	CN1	8P	RS232C
⓬	CN3	10P	Motor connector
⓭	CN4	4P	Resistor pack connector
⓮	CN5	4P	Not used
⓯	CN6	5P	Not used
⓰	CN8	12P	PSC box connector 3
⓱	CN9	6P	Not used
⓲	CN93	2P	Lamp fuse holder connector 1 (AC6V/20W)
⓳	CN94	2P	Lamp fuse holder connector 2 (AC12V/20W)
⓴	CN131	8P	PSC box connector 2
㉑	CN132	3P	Not used
㉒	CN133	5P	Not used
㉓	CN134	3P	Not used
㉔	CN135	4P	Not used

(Caution) Whether or not connector No. ⓭ is installed depends on the type of machine.
Depending on the type of machine, neither connectors No. ⓲ nor ⓳ are installed, only connector No. ⓲ is installed or both of them are installed.

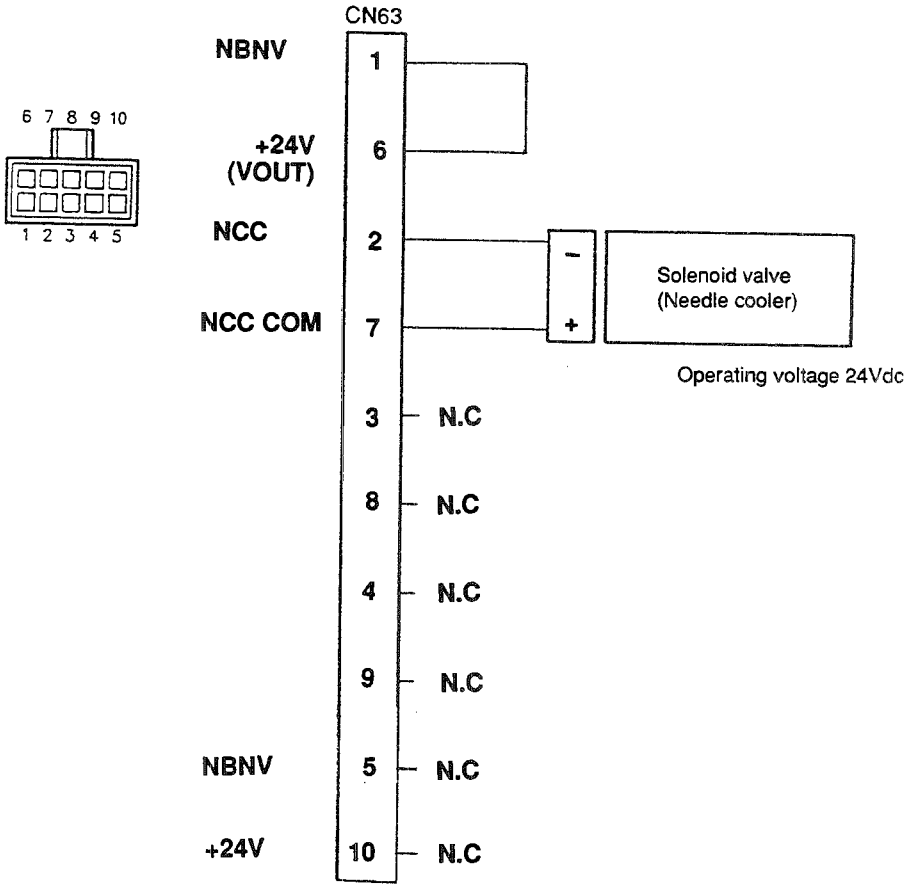
Air cylinder connector 1



Air cylinder connector 2

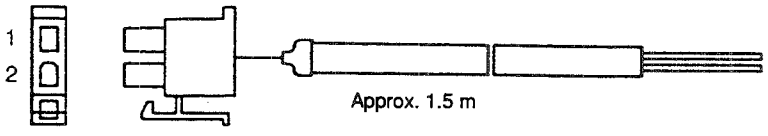


Air cylinder connector 3 (option)

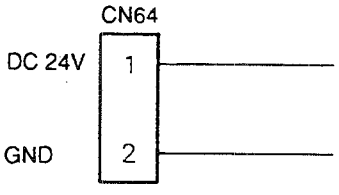


Optional cords

Junction code A asm. for 24 Vdc (Part No. M9703351AA0)



Wiring diagram

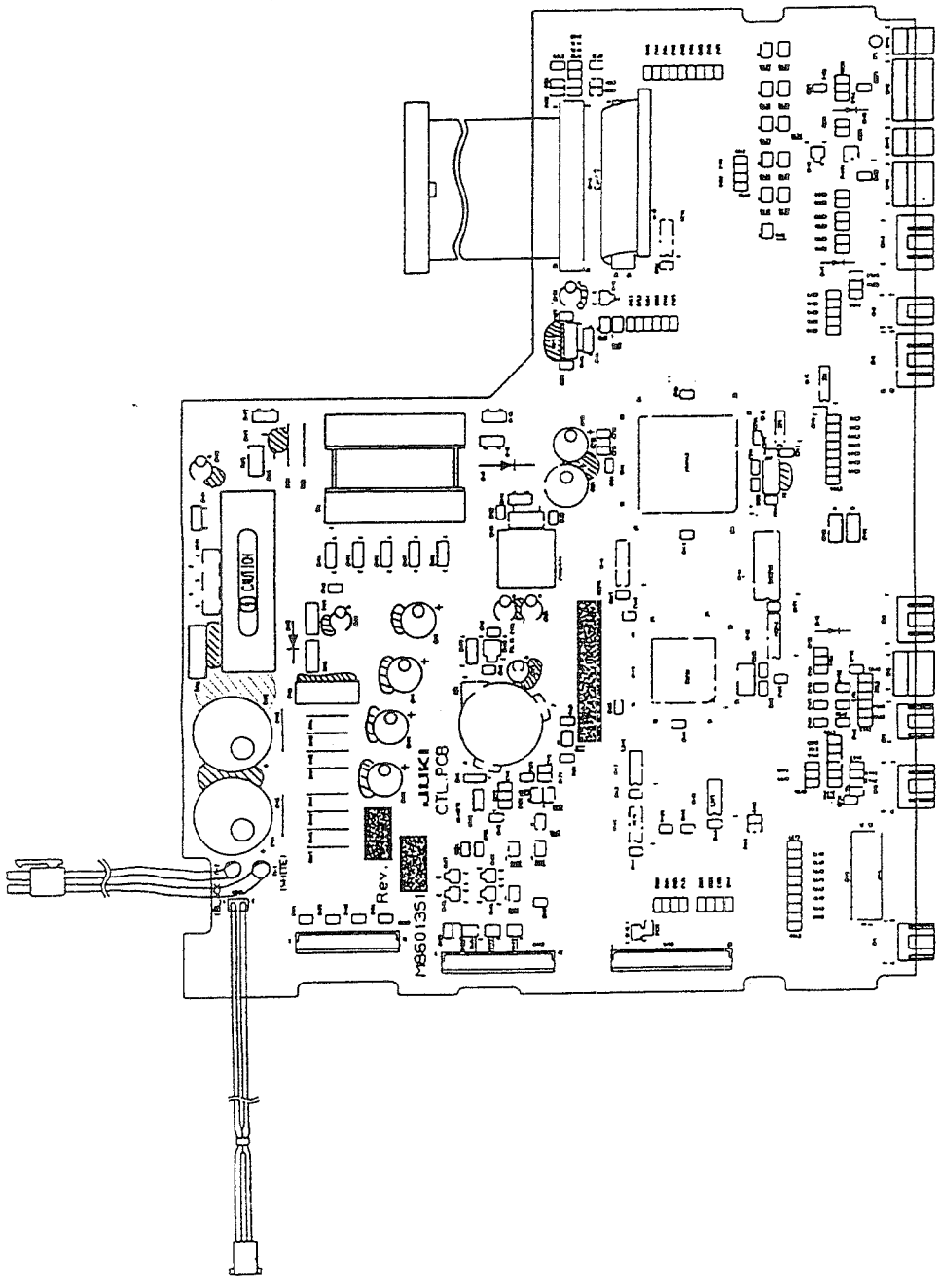


* Use the cord with a solenoid, for reference. (Up to 100 mA)

○ Use the cord with connected to the yellow connector (❺ CN64 2P on "Connector connection diagram") of 24 Vdc on the PSC box.

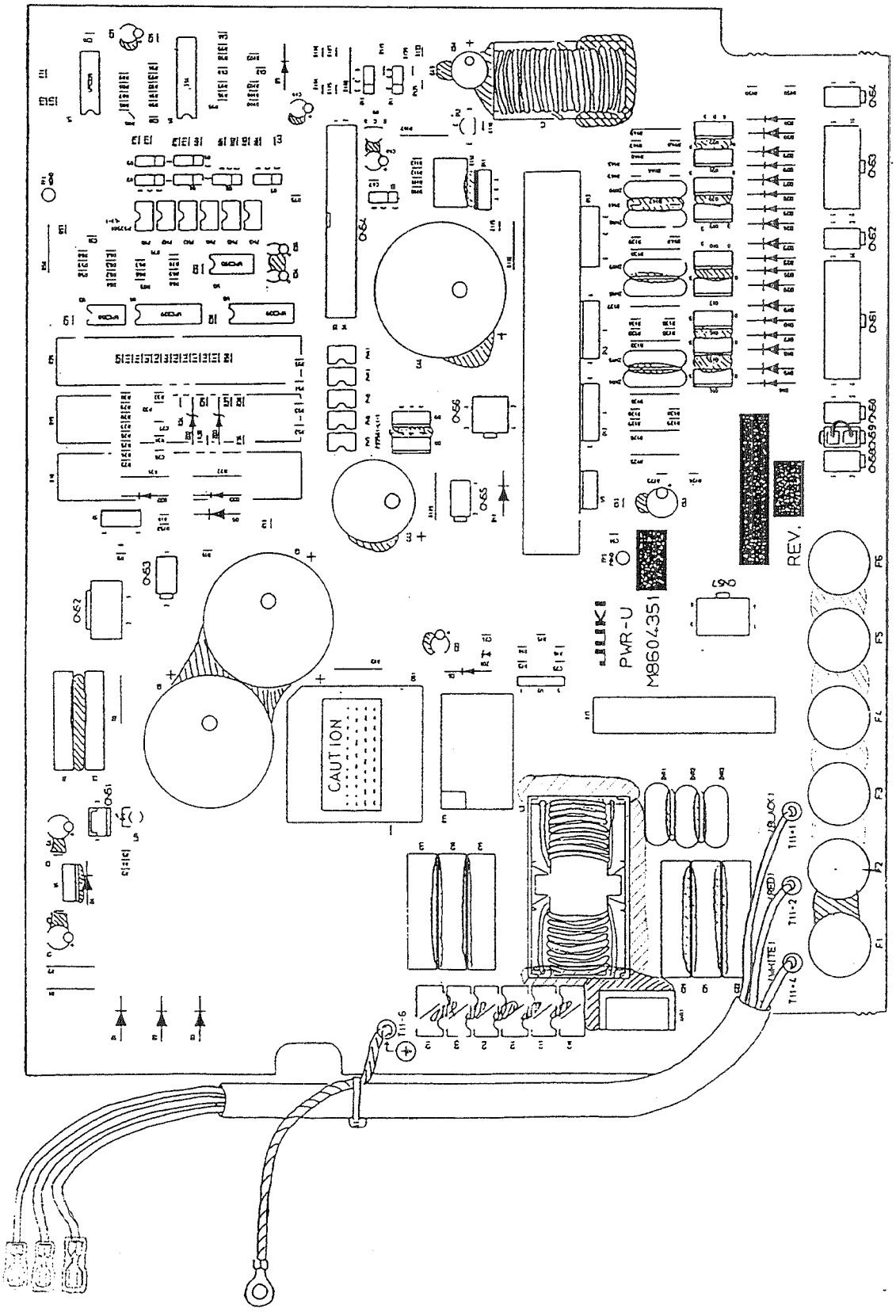
(9) Circuit board mounting diagram

1) CTL circuit board GA asm. [M8601351GAA]: Excluding JE (Europe)
   CTL circuit board GB asm. [M8601351GAB]: JE (Europe)



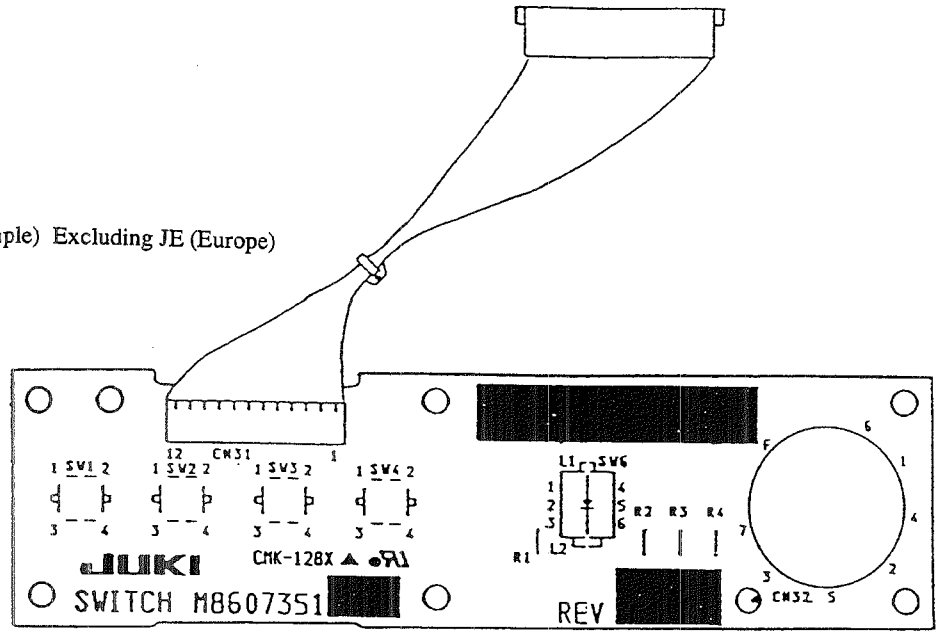
2) **Power circuit board BB asm. [M8604351BAB]: General export 3-phase 200 to 240 V**
Power circuit board CB asm. [M8605351CAB]: General export 1-phase 200 to 240 V
Power circuit board EB asm. [M8604351EAB]: JA (North America) 3-phase 200 to 240 V
Power circuit board FB asm. [M8605351FAB]: JA (North America) 1-phase 100 to 120 V
Power circuit board GB asm. [M8605351GAB]: JE (Europe) 1-phase 200 to 240 V
Power circuit board HB asm. [M8605351HAB]: General export 1-phase 100 to 120 V

(Example) JA (North America) 3-phase 200 to 240 V

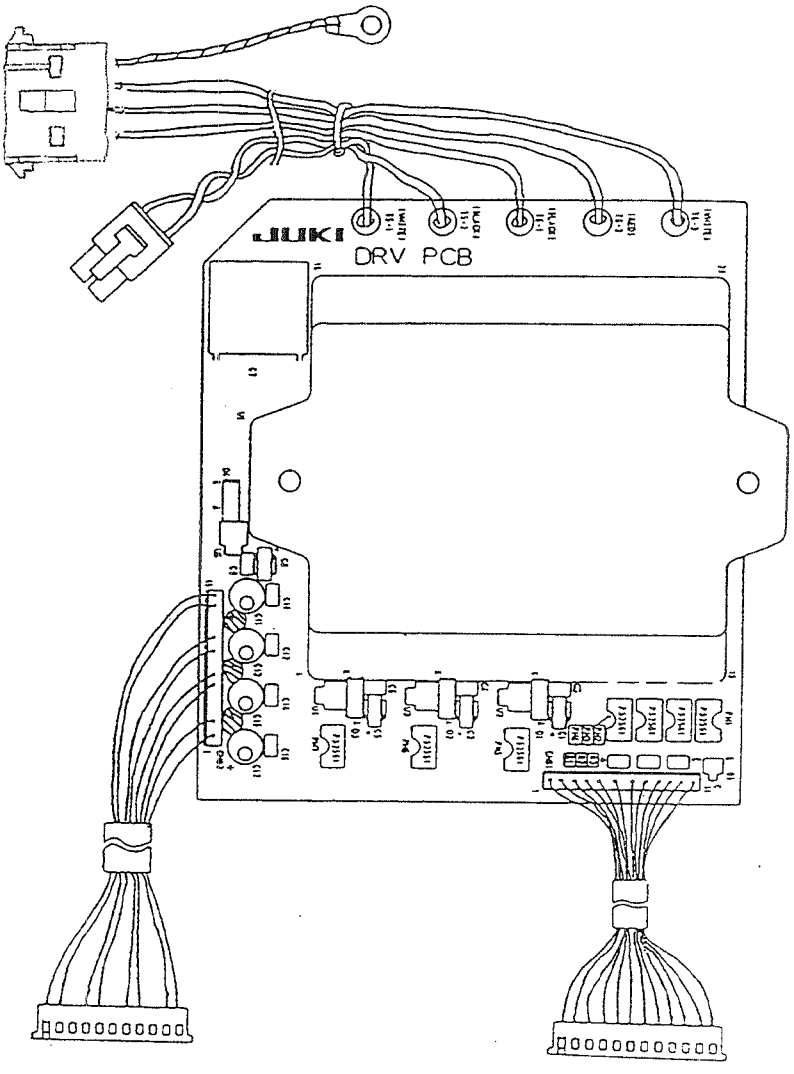


3) **SW circuit board AA asm. [M8607351AAA]: Excluding JE (Europe)**
SW circuit board AB asm. [M8607351AAB]: JE (Europe)

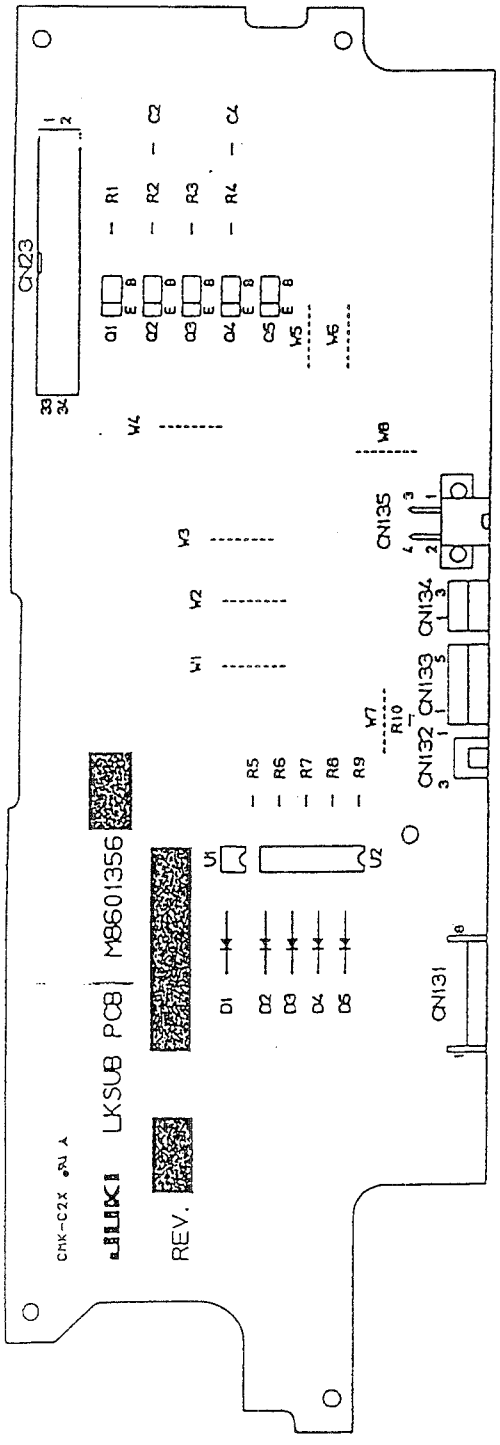
(Example) Excluding JE (Europe)



4) **DRV circuit board AA asm. [M8602351AAA]: General export**
DRV circuit board AB asm. [M8602351AAB]: JE (Europe)
DRV circuit board AC asm. [M8602351AAC]: JA (North America)

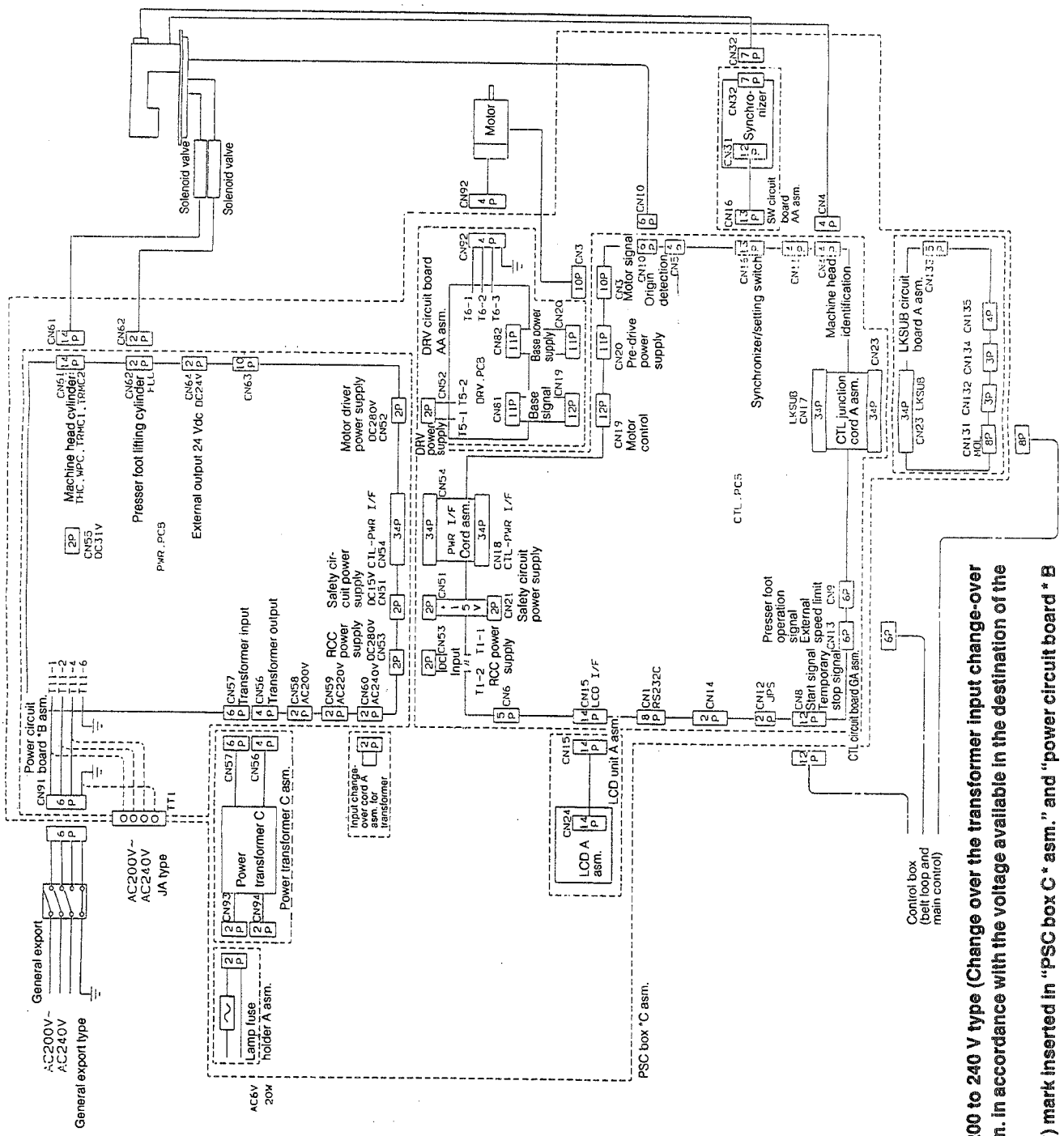


5) LK SUB circuit board A asm. [M8601356AA0]



(10) PSC block diagram

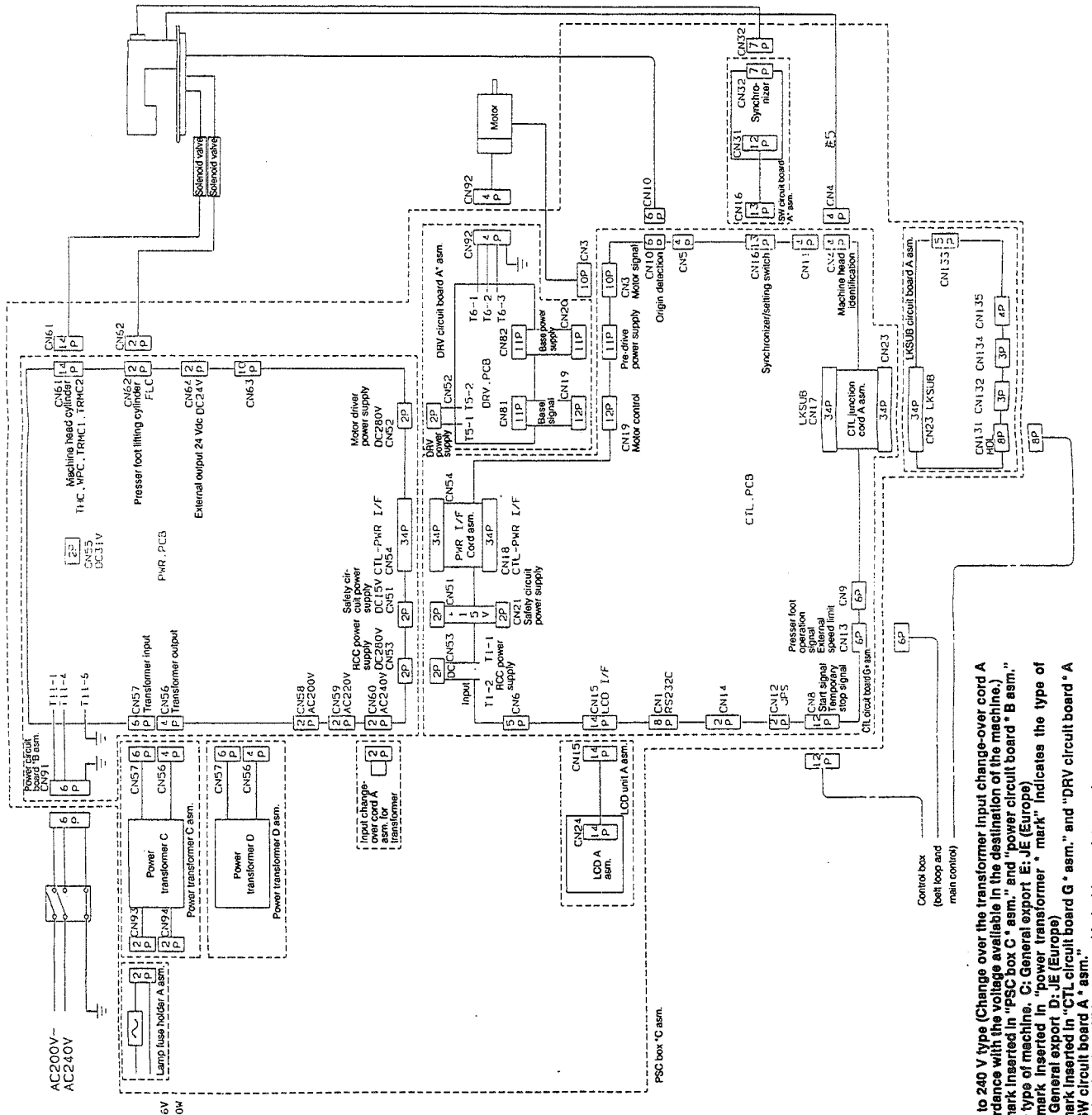
1) BLOCK DIAGRAM (General export 3-phase and 200 to 240 V type, JA (North America) 3-phase and 200 to 240 V type)



(Note) 1. 3-phase, 200 to 240 V type (Change over the transformer input change-over cord A asm. in accordance with the voltage available in the destination of the machine.)

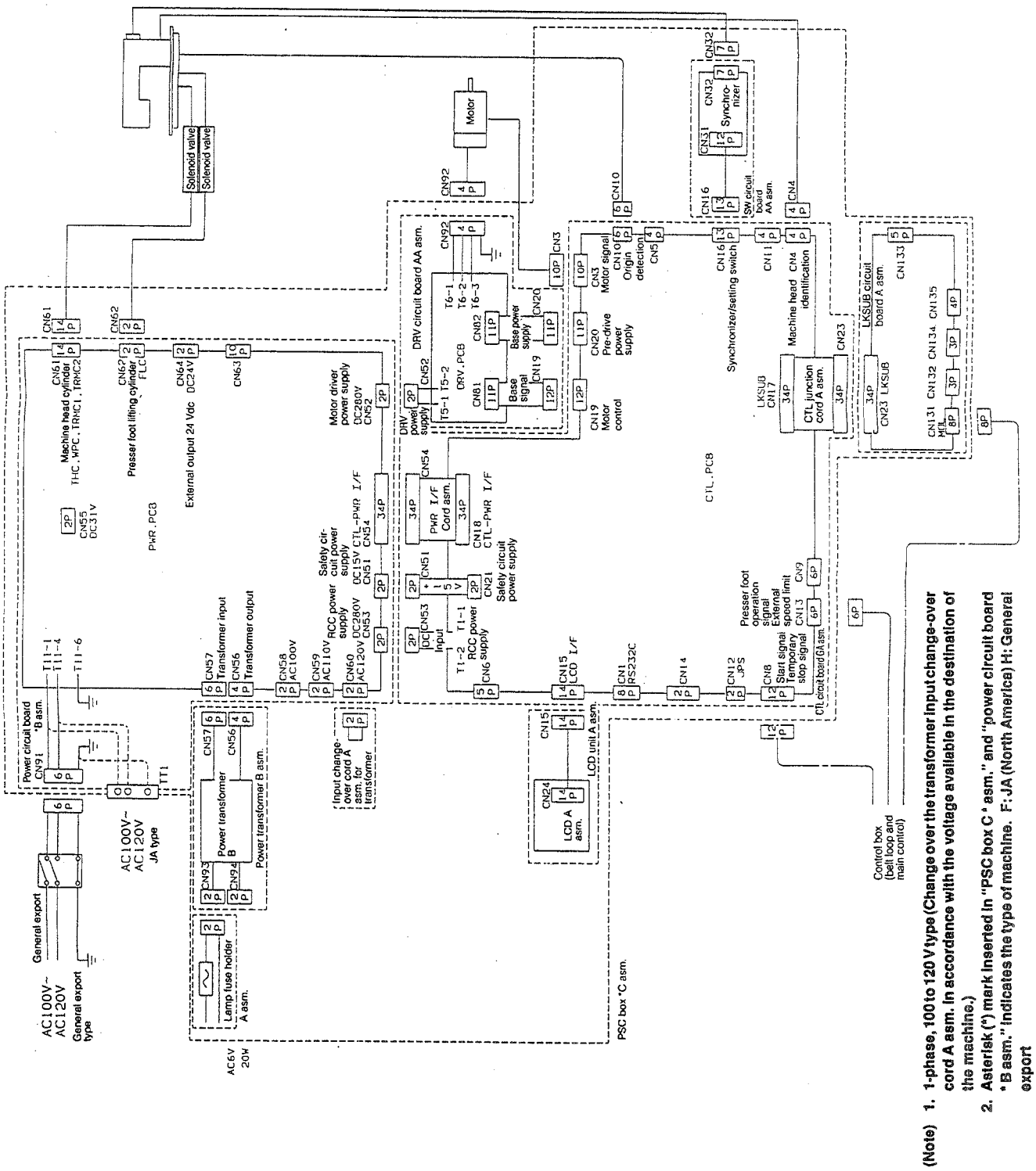
2. Asterisk (*) mark inserted in "PSC box C* asm." and "power circuit board * B asm." indicates the type of machine. B : General exbort E : JA (North America)

2) BLOCK DIAGRAM (General export 1-phase and 200 to 240 V type, JE (Europe) 1-phase and 200 to 240 V type)



(Note) 1. 1-phase, 200 to 240 V type (Change over the transformer input change-over cord A asm. in accordance with the voltage available in the destination of the machine.)
2. Asterisk (*) mark inserted in "PSC box C * asm." and "power circuit board * B asm." indicates the type of machine. C: General export E: JE (Europe)
3. Asterisk (*) mark inserted in "power transformer * mark" indicates the type of machine. C: General export D: JE (Europe)
4. Asterisk (*) mark inserted in "CTL circuit board G * asm." and "DRV circuit board * A asm." and "SW circuit board A * asm."
5. The machine destined for JE is not provided with a resistor pack.
Type of machine is indicated. A: General export B: JE (Europe)
6. JE type machine does not include a lamp fuse holder.

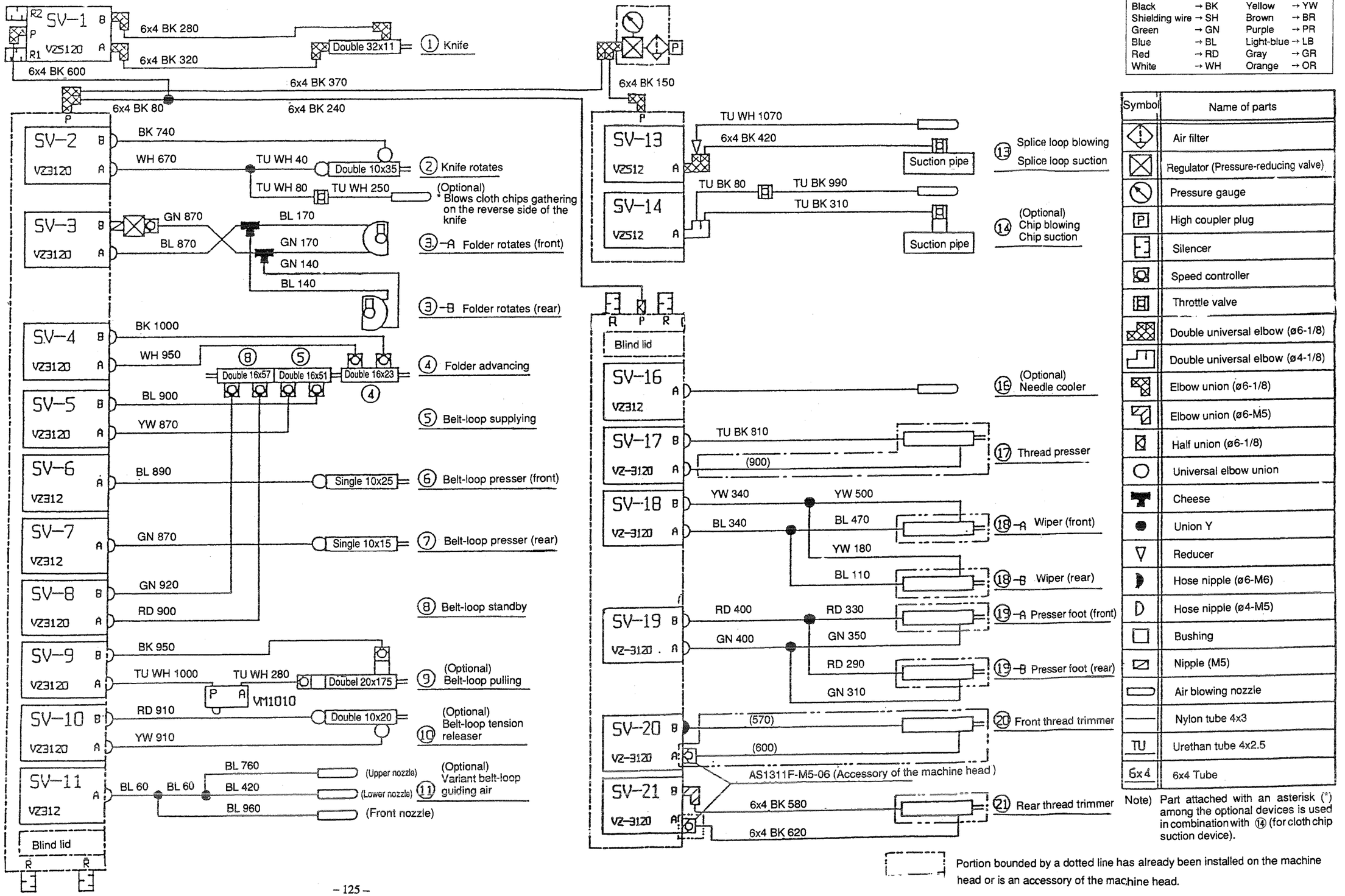
3) BLOCK DIAGRAM (General export 1-phase and 100 to 120 V type, JA (North America) 1-phase and 100 to 120 V type)



(Note) 1. 1-phase, 100 to 120 V type (Change over the transformer input change-over cord A asm. in accordance with the voltage available in the destination of the machine.)

2. Asterisk (*) mark inserted in "PSC box C * asm." and "power circuit board * B asm." indicates the type of machine. F: JA (North America) H: General export

14. PIPING DIAGRAM



Remarks			
Black	→ BK	Yellow	→ YW
Shielding wire	→ SH	Brown	→ BR
Green	→ GN	Purple	→ PR
Blue	→ BL	Light-blue	→ LB
Red	→ RD	Gray	→ GR
White	→ WH	Orange	→ OR

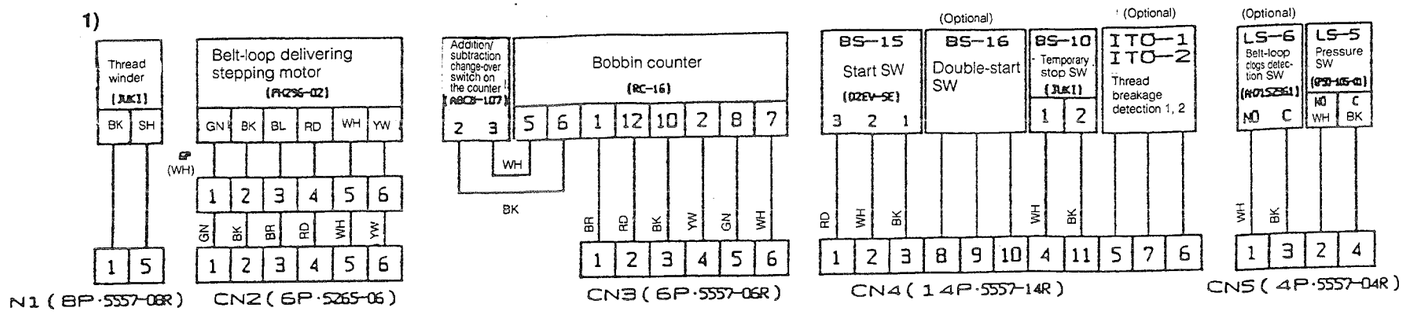
Symbol	Name of parts
	Air filter
	Regulator (Pressure-reducing valve)
	Pressure gauge
P	High coupler plug
	Silencer
	Speed controller
	Throttle valve
	Double universal elbow (ø6-1/8)
	Double universal elbow (ø4-1/8)
	Elbow union (ø6-1/8)
	Elbow union (ø6-M5)
	Half union (ø6-1/8)
	Universal elbow union
	Cheese
	Union Y
	Reducer
	Hose nipple (ø6-M6)
	Hose nipple (ø4-M5)
	Bushing
	Nipple (M5)
	Air blowing nozzle
	Nylon tube 4x3
TU	Urethan tube 4x2.5
6x4	6x4 Tube

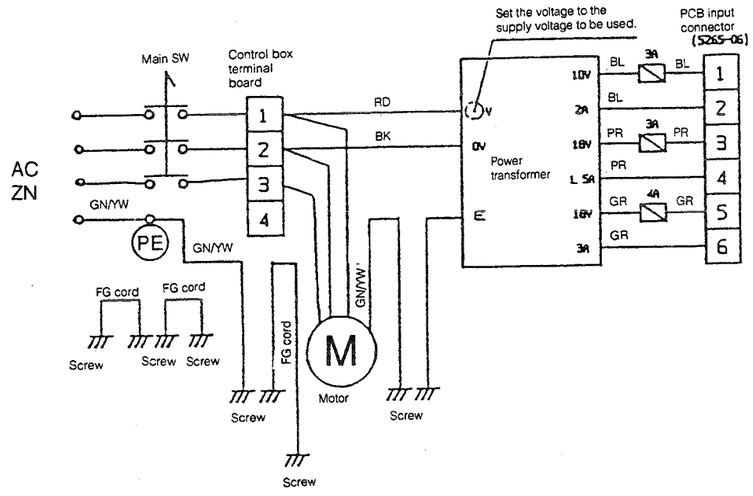
Note) Part attached with an asterisk (*) among the optional devices is used in combination with ⑭ (for cloth chip suction device).

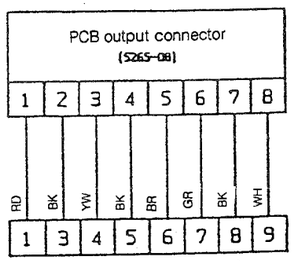
Portion bounded by a dotted line has already been installed on the machine head or is an accessory of the machine head.

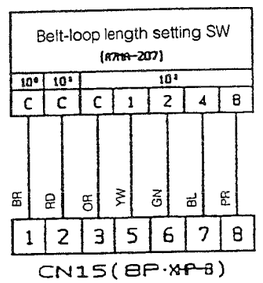
15. WIRING DIAGRAM

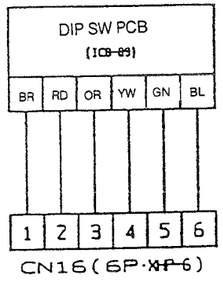
1)

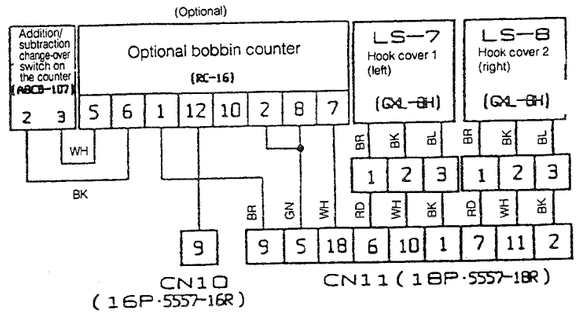




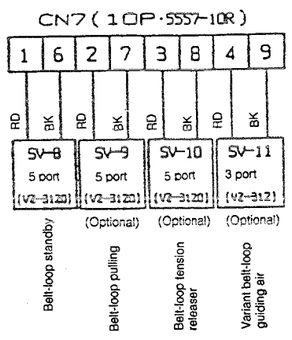


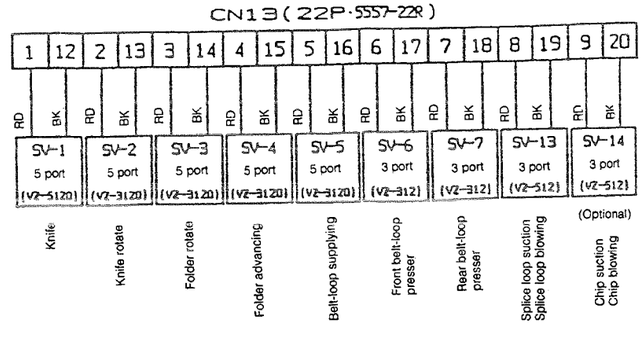


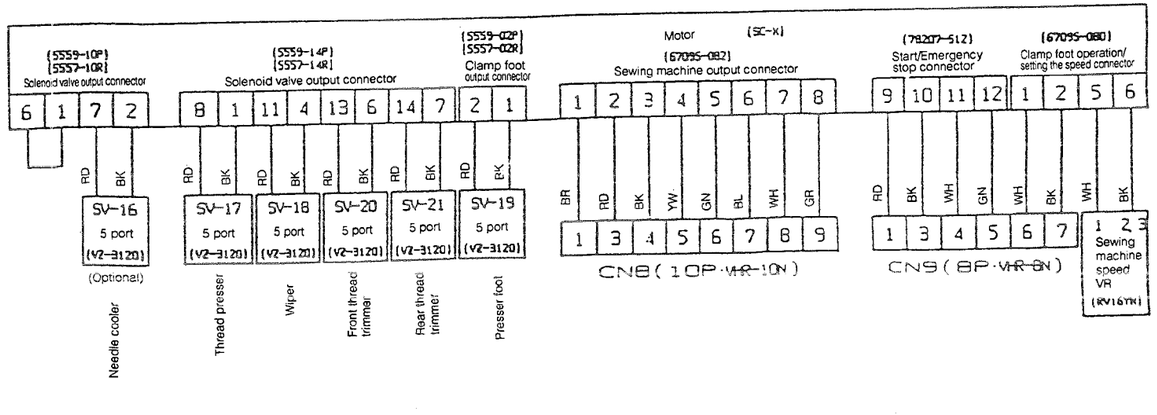




Remarks			
Black	BK	Yellow	YW
Shielding wire	SH	Brown	BR
Green	GN	Purple	PR
Blue	BL	Light-blue	LB
Red	RD	Gray	GR
White	WH	Orange	OR







2)

TRANS FORMER

AC IN

No	FUNCTION	
1	AC 240V	
2	220V	
3	200V	
4	115V	
5	100V	
6	0V	
7	E	
8	10V	
9	0V	
10	18V	(1.5A)
11	0V	
12	18V	(3A)
13	0V	

FUSE

No	FUNCTION
F1	3A
F2	3A
F3	4A

POWER BOARD

J1

No	FUNCTION
1	AC 10V
2	0V
3	18V
4	0V
5	18V
6	0V

J2

No	FUNCTION
1	+5V
2	GND
3	+24V
4	GND
5	+12V
6	+12V
7	GND
8	PMP

DIP-SW

CPU BOARD

CN1

No	FUNCTION	Remarks
1	+24V	Bobbin winder
2	+5V	
3	DEC1	
4	GND	
5	GND	
6	+5V	
7	DEC2	
8	GND	

CN2

No	FUNCTION	Remarks
1	PM3	$\overline{A}$
2	PM1	A
3	PM4	$\overline{B}$
4	PM2	B
5	+12V	B-COM
6	+12V	A-COM

CN3

No	FUNCTION	Remarks
1	+24V	Power supply
2	OUT-1	Counter output
3	OUT-2	Reset output
4	GND	GND
5	GND	GND
6	IN-1	Count-up signal

CN4

No	FUNCTION	Remarks
1	+5V	
2	IN-4	Start SW
3	GND	
4	IN-3	EMG-SW
5	IN-1	Thread breakage detector 1
6	IN-2	Thread breakage detector 2
7	GND	
8	+5V	
9	IN-5	O.P Double start
10	GND	
11	GND	
12	+5V	
13	Y-IN-1	
14	GND	

CN5

No	FUNCTION	Remarks
1	IN-1	O.P Belt-loop clogs
2	IN-2	Air pressure SW
3	GND	
4	GND	

CN8

No	FUNCTION	Remarks
1	IN-1	Needle up detection
2	IN-2	Alarm
3	IN-3	While the machine runs under the cycle operation mode.
4	IN-4	Pressing state
5	IN-5	Cycle origin upper position
6	GND	
7	GND	O.P
8	GND	O.P
9	GND	O.P

CN9

No	FUNCTION	Remarks
1	OUT-1	Start signal
2	COM	
3	OUT-2	Emergency stop signal
4	COM	
5	OUT-3	Presser foot operation signal
6	COM	
7	N.C	Unassigned terminal

CN13

No	FUNCTION	Remarks
1	+24V	
2	+24V	
3	+24V	
4	+24V	
5	+24V	
6	+24V	
7	+24V	
8	+24V	
9	+24V	
10	+24V	
11	+24V	
12	OUT-1	Knife solenoid valve
13	OUT-2	Knife rotating valve
14	OUT-3	Folder valve
15	OUT-4	Folding state
16	OUT-5	Belt-loop supplying
17	OUT-2	Belt-loop presser (front)
18	OUT-9	Belt-loop presser (rear)
19	OUT-6	Splice belt-loop blowing
20	OUT-10	Chip blowing
21	OUT-7	6
22	OUT-11	

AIR VALVE

FUNCTION	Remarks
+	Knife I/F solenoid valve (SV-1)
−	
+	Knife rotating (SV-2)
−	
+	Folder rotating (SV-3)
−	
+	Folder advancing (SV-4)
−	
+	Belt-loop supplying (SV-5)
−	
+	Belt-loop presser (front) (SV-6)
−	
+	Belt-loop presser (rear) (SV-7)
−	
+	Splice belt-loop suction (SV-13)
−	
+	Triangle cloth chip blowing (SV-14) suction
−	
+	Belt-loop standby (SV-8)
−	
+	Optional (SV-7) (Belt-loop pulling)
−	
+	Optional (SV-10) (Belt-loop releaser)
−	
+	Optional (SV-11) (Variant belt-loop guiding air)
−	

I/F-1
I/F-2
SENS 1
SENS 2
SPANEL 1
PSMT
SENS 3
PANEL 2 (22B)
PANEL 3 (22C)

CN14

No	FUNCTION	Remarks
1	+5V	
2	GND	
3	+24V	
4	GND	
5	+12V	
6	+12V	
7	GND	
8	OUT-1	Constant current control

CN16

No	FUNCTION	Remarks
1	OUT-1	SW-COM1
2	OUT-2	SW-COM2
3	D0	
4	D1	
5	D2	
6	D3	

CN17 (Reverse)

No	FUNCTION	Remarks
1	OUT-1	
2	OUT-2	
3	D0	
4	D1	
5	D2	
6	D3	
7	N.C	

CN6

No	FUNCTION	Remarks
1	+5V	
2	IN-1	Belt-loop supplying front SW
3	GND	
4	+5V	
5	IN-2	Belt-loop supplying rear SW
6	GND	
7	+5V	
8	IN-3	Splice detector SW
9	GND	
10	+5V	
11	IN-4	C.T Detector SW
12	GND	

CN7

No	FUNCTION	Remarks
1	+24V	
2	+24V	
3	+24V	
4	+24V	
5	N.C	Unassigned terminal
6	OUT-3	Loop attaching detection
7	OUT-2	O.P
8	OUT-1	O.P
9	OUT-4	O.P
10	N.C	Unassigned terminal

CN12

No	FUNCTION	Remarks
1	IN-1	Re-start SW
2	IN-2	Reset SW
3	IN-3	Set-back SW
4	IN-4	Threading SW
5	+5V	Power supply lamp
6	+5V	
7	+5V	
8	+5V	
9	Y•IN-1	Hook cover 1
10	Y•IN-1	Hook cover 2
11	GND	
12	GND	
13	GND	
14	GND	
15	GND	
16	LMP-A	Alarm lamp A
17	LMP-B	Alarm lamp B
18	LMP-C	Alarm lamp C
19	GND	
20	GND	

CN15

No	FUNCTION	Remarks
1	OUT-1	10^0 • COM
2	OUT-2	10^1 • COM
3	OUT-3	10^2 • COM
4	OUT-4	N.C
5	D0	1
6	D1	2
7	D2	4
8	D3	8

SENSOR

FUNCTION	Remarks
3	LS-1 Belt-loop supplying (front) SW
2	
1	
3	LS-2 Belt-loop supplying (rear) SW
2	
1	
+, L	LS-3 Splice detector SW
0	
−	
+, L	LS-4 Belt-loop (exist/not exist) detector SW
0	
−	

3)

SENS 1

SENSOR

	FUNCTION	Remarks
1	NO	LS-6 Belt-loop clogging detector SW
3	C	
2	NO	LS-5 Air pressure detector SW
4	C	

SENS 2

SENSOR

	FUNCTION	Remarks
1	3	BS-15 Start SW
2	2	
3	1	
8	3	Optional Double start SW
9	2	
10	1	
4	1	BS-10 Emergency stop SW
11	2	
5		Optional Thread breakage detector 1
7	TH. Br 1	
	FG	
6		Optional Thread breakage detector 2
	TH. Br 2	

SENS 3

SENSOR

	FUNCTION	Remarks
1	+24C	Bobbin windar
5	GND	

PSMT

STEPPING MOTOR

	FUNCTION	Remarks
1	1	A (Green)
2	2	A (Black)
3	3	B (Red)
4	4	B (Red)
5	5	B-COM (White)
6	6	A-COM (Yellow)

CPU BOARD
Reserving input/output

CN10 (Reversing output)

+24V	8 points
OUTPUT	8 points

CN11 (Reversing input)

+24V	4 points
INPUT	9 points
GND	5 points

PANEL

PANEL1

BOBBIN COUNTER

	FUNCTION	Remarks
1	1	Power supply (+24V)
2	12	Input counter
3	10	Input reset
4	2	GND
5	8	GND
6	7	Count-up signal
	5	UP
	6	COM
2		Addition/subtraction change-over switch on the counter
3		

PANEL2

SW. LED

	FUNCTION	Remarks
1	NO 1	BS-11 Re-start SW
11	NO 1	
2	NO 1	BS-12 Reset SW
12	NO 1	
3	NO 1	BS-13 Set-back SW
13	NO 1	
4	1	BS-14 Threading SW
14	2	
5	+	Power supply lamp
15	−	
6	+	Alarm lamp A
16	−	
17	+	Alarm lamp B
	−	
18	+	Alarm lamp C
7	−	
9	3	Hook cover detector 1
19	2	
8	1	Hook cover detector 2
10	3	
20	2	
	1	

PANEL3

LOOP LENGTH

	FUNCTION	Remarks
1	10^0 • COM	
2	10^1 • COM	
3	10^2 • COM	
5	D1	
6	D2	
7	D4	
8	D8	

SEWING SPEED-VR

SC-6 CTL-BOX

CN61

	No	FUNCTION	Remarks
1	1	THC	Thread presser solenoid
	2	OUT-1	
4	3	N.C	
	4	WPC	Wiper
6	5	OUT-2	
7	6	TRMC1	Thread trimming (front)
8	7	TRMC2	Thread trimming (rear)
	8	+24V	
	9	+24V	
11	10	FG	
	11	+24V	
13	12	GND	
14	13	+24V	
	14	+24V	

AIR VALVE

	FUNCTION	Remarks
8	+	Thread presser solenoid valve (SV-17)
1	−	
11	+	Wiper (SV-18)
4	−	
13	+	Thread trimming (front) (SV-20)
6	−	
14	+	Thread trimming (rear) (SV-21)
7	−	
2	+	presser foot (up/down) (SV-19)
1	−	

CN62

	No	FUNCTION	Remarks
1	1	FLC	Presser foot clamp
2	2	+24V	

I/F • 2

CN131

	No	FUNCTION	Remarks
1	1	UDET	Upper needle detection
2	2	ERRC	Alarm
3	3	CDD	While the machine runs under the cycle operation mode.
4	4	FLST	Presser foot state
5	5	ORGU	Cycle origin upper position
6	6	RTN	
7	7	RTN	
8	8	RTN	

I/F • 1

CN8

	No	FUNCTION	Remarks
1	1	5V	Thread presser solenoid
2	2	12V	
3	3	IN-1	
4	4	GND	
5	5	IN-2	
6	6	GND	
7	7	IN-3	
8	8	GND	
1	9	STR	Start SW signal
2	10	GND	
3	11	EMS	Emergency stop signal
4	12	GND	

CN13

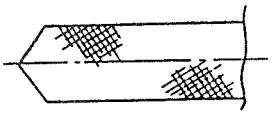
	No	FUNCTION	Remarks
5	1	MFL SW	Presser foot operation signal
6	2	S•GND	
	3	IN	
	4	S•GND	
	5	MAX. VR	Sewing speed regulating variable resistor
	6	A•GND	

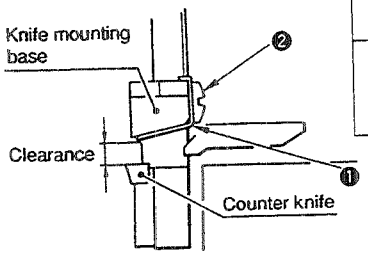
16. TROUBLES AND CORRECTIVE MEASURES

(1) Machine head components

Phenomenon	Cause	Corrective measure
1) Thread slips out of the needle eyelet.	Length of thread remaining at the needle eyelet is inconsistent.	Tension release timing and the bobbin thread tension
	Length of bobbin thread remaining is inconsistent.	Engagement between the moving knife and the counter knife
	Thread flops and tangles around the take-up thread guide.	Adjust the thread take-up spring.
	The machine fails to stop at a constant position.	Adjust the V-belt or replace it with a new one.
		Use a thinner needle.
		Use the soft-start function.
2) Thread breaks or stitches skip.	The needle has a blunt tip.	Hook timing
		Needle and presser foot
		Needle and bobbin thread
		Needle and throat plate
		Position of the moving knife
		Timing of this side hook
	The feed mechanism has a larger play.	Adjust the play in the feed mechanism.
3) Thread trimmer fails to cut threads.		
Thread trimmer fails to cut the needle thread.		Standby position of the moving knife.
	The last stitch has skipped.	Refer to "2) Stitches skip."
Thread trimmer fails to cut the bobbin thread.		This side thread trimming cam timing
		Stop position of the needle
	Thread is not drawn up properly.	Refer to "5) Thread is not drawn up properly."
4) Needle breaks.	The needle tip becomes blunt easily.	Refer to "2) Thread breaks."
		Adjust the feed timing.
	The wiper fails to sweep the thread.	Position of the wiper
5) Thread is not drawn up properly.	Thread flops.	Adjust the thread take-up spring.
		This side hook timing
		Feed timing
		Position of the take-up thread guide

(2) Device components

Phenomenon	Cause	Corrective measure
1) Belt-loops cannot be cut.	The moving knife fails to cut belt-loops sharply.	Grind the moving knife or replace it with a new one.
	The moving knife fails to properly mesh with the counter knife.	Adjust the moving knife and the counter knife.
2) Belt-loops cannot be cut neatly.	When the knife blade has worn out.	Grind the knife blade.
	The counter knife is not correctly placed.	Adjust the counter knife.
	The knife blade has cracks.	Grind the knife blade or replace it with a new one.
3) Cross-cutter fails to cut belt-loops at the center.	The position at which the cross-cutter cuts belt-loops is not correct.	Refer to the explanation of the adjustment to be performed when changing the belt-loop width.
		
4) When delivering a belt-loop, the belt-loop fails to be straight on the belt-loop receiving plate.	The binder is installed with warped.	Install the binder straight.
	The belt-loops used are poor in quality.	Replace them with good ones.
5) Belt-loops fail to enter the rear folding plate straight.	Belt-loop folding plate is improperly positioned.	Refer to the "Folding a belt-loop."
6) Belt-loops are too short/long to be properly set in place.	Belt-loop length has been incorrectly set.	Refer to the explanation of the belt-loop length setting digital switch for the delivery of belt-loops.
	Belt-loops are applied with a resistance.	Adjust so that belt-loops are fed free from resistance. Use a belt-loop feeding device.
7) Belt-loop splice is not detected.	Switch LS-3 for detecting splice on a belt-loop tape has been incorrectly set.	Refer to the "Detection of belt-loop splice."
8) Top end of belt-loop gets under the belt-loop receiving plate when feeding a belt-loop.	Difference in height between the top surface of the belt-loop receiving plate and the top surface of the counter knife is not correct.	Check that the belt-loop receiving plate is positioned 0.5 to 1 mm under the top surface of the counter knife.
	Belt-loop bends toward the wrong side (downward).	Replace the belt-loop with a neatly-finished one.

Phenomenon	Cause	Corrective measure
9) Belt-loop clogs in the binder.	Inner dimension of the binder does not match the belt-loop used.	Turn OFF the power switch and remove the belt-loop clogging inside the binder. Then, adjust the binder to the width of belt-loop used.
	The belt-loop support is positioned too high. (Top end of the belt-loop is pushed against the belt-loop receiving.)	Turn OFF the power switch and remove the belt-loop clogging inside the binder. Then, lower the belt-loop support appropriately.
	Belt-loop guide ❶ of the knife mounting base has deformed to decrease the clearance provided between the knife mounting base and the counter knife.	Turn OFF the power switch and remove the belt-loop clogging inside the binder. Then, remove screw ❶, correct belt-loop guide ❷ of the knife mounting base and attach the belt-loop guide while keeping it in absolute contact with the knife mounting base.
10) Belt-loop clogs before it is placed on the belt-loop receiving plate.	The belt-loop receiving plate is positioned too high. (Top end of the belt-loop is pushed against the belt-loop receiving plate.)	Turn OFF the power switch and remove the belt-loop that has clogged. Then, lower the belt-loop receiving plate appropriately. (Refer to the description given in the "Relation between the belt-loop receiving plate and the counter knife."
	Belt-loop bends toward the wrong side (downward).	Replace the belt-loop with a neatly-finished one.
11) Belt-loops fail to enter the front folding plate straight.	Belt-loop folding plate is improperly positioned.	Refer to "1)" of the "Folding a belt-loop."
	Belt-loop presser metal fitting is improperly placed.	Refer to "3)" of the "Belt-loop shifter."

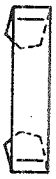
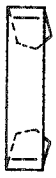
〈12) Corrective measures against dog-eared belt-loop〉

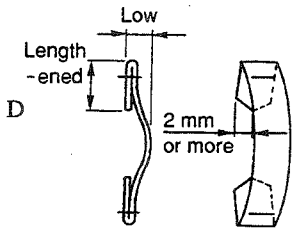
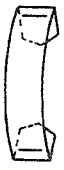
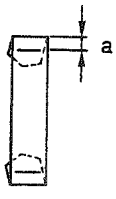
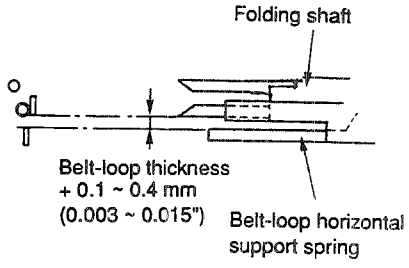
Dog-eared belt-loops of types A through G may be produced as described below. They are classified by size and orientation excluding type G. To correct the failed belt-loops, first confirm that the belt-loop supply components are properly positioned to provide adequate relation among them. In addition, 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, the belt-loop support components have to be accurately adjusted to sew them.
2. Dog-eared belt-loops may be produced when belt-loops are bent. If the state 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 dog-eared portions are in staggered configuration. This trouble can be correct to a certain extent by taking corrective measures against 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, thereby making the correction of dog-eared belt-loops difficult. It is therefore recommended to prepare belt-loops that have uniform width.

If belt-loops have no defect and the reference position is correct (seems to be correct), adjust the related components referring to the causes and corrective measures in accordance with failures.

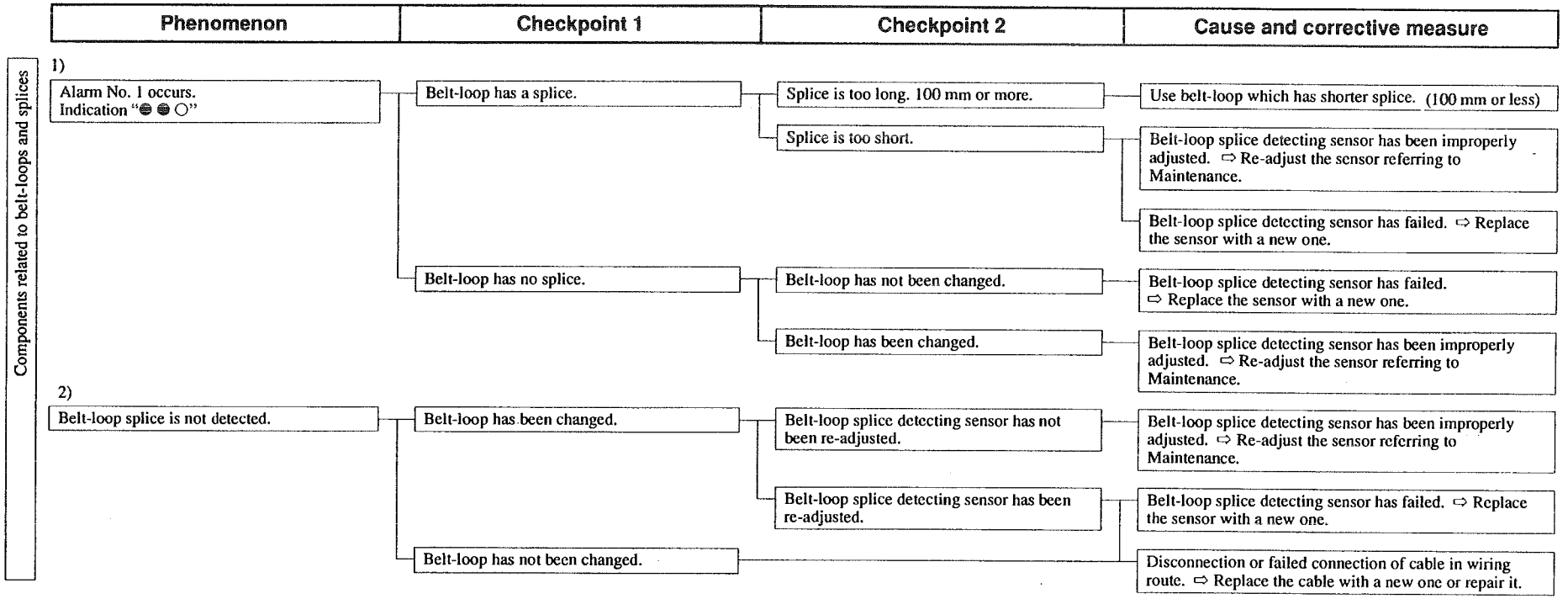
(Corrective measures against dog-eared belt-loops, when the easing-in-of-fullness device is not used, are same as those against A, B and C; i.e., ❶ and ❷ against A, ❶ and ❷ against B and ❶, ❷ and ❸ against C (excluding the adjustment of the belt-loop tension releasing rod).)

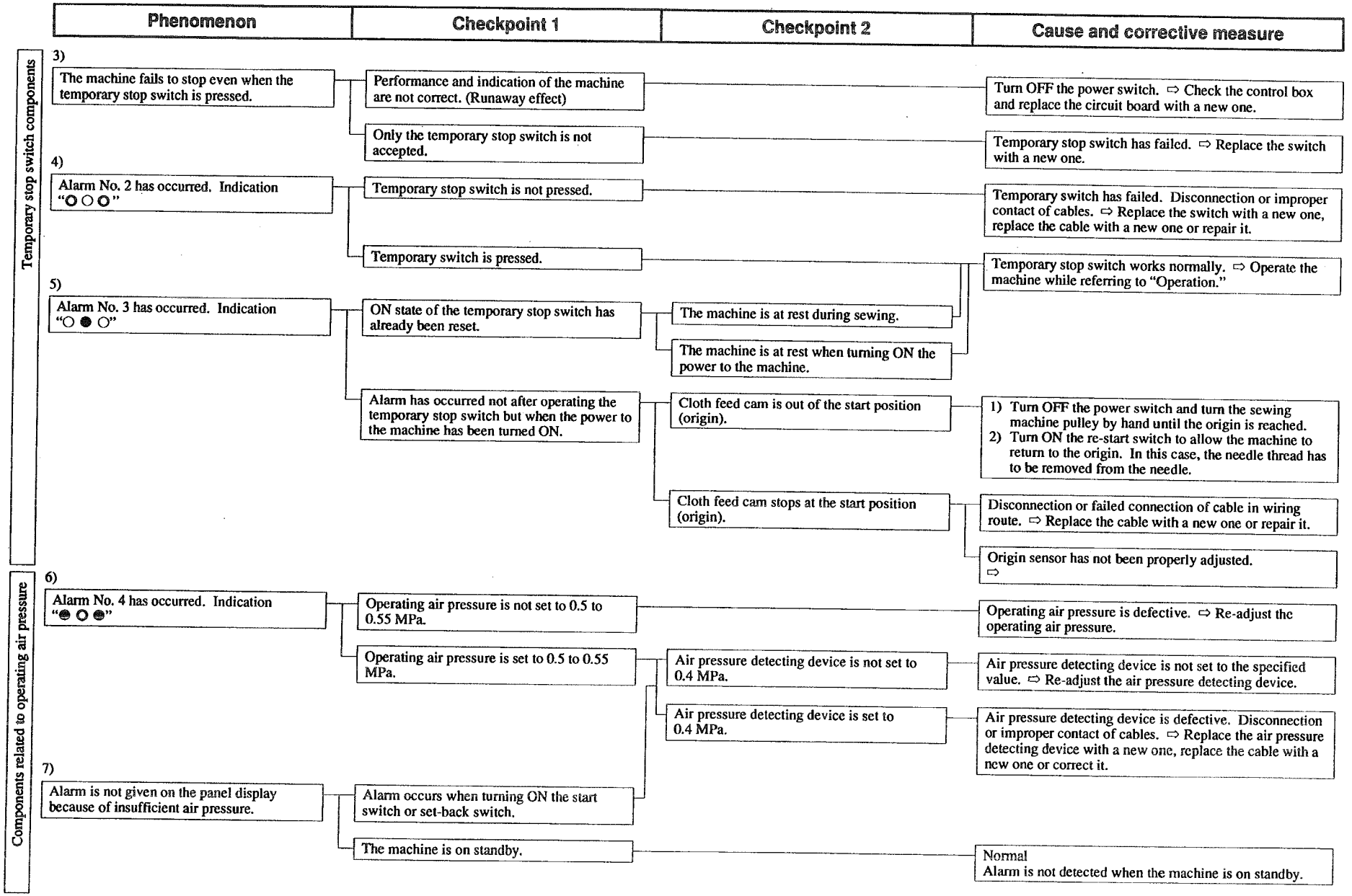
Phenomenon	Cause	Corrective measure
Dog-eared portion of approximately 1 mm A  Left-hand side of belt-loop is dog-eared.	(1) Belt-loop shifter excessively presses the side of belt-loop. (2) Folding shaft excessively protrudes.	(1) Move the belt-loop shifter to the left and adjust the distance between the side face of the belt-loop support and the belt-loop shifter to the belt-loop width. (2) Move the folding shaft to the right so that it recedes. Loosen the rod nut at the leftmost end of the 3-step cylinder and turn the rod (1/4 revolution of the rod corresponds to 0.2 mm). (3) If the folding position is not effectively improved by lowering the butting face of the folding shaft fork by 0.3 to 0.5 mm from the side face of the belt-loop support, move the belt-loop tension releasing rod by approximately 0.5 mm steps to the left.
B  Right-hand side of belt-loop is dog-eared.	(1) Distance between the belt-loop shifter and the side face of the belt-loop support is larger than the belt-loop width. (2) Folding shaft excessively recedes. (3) Belt-loop tension releasing rod excessively extrudes to the left.	(1) Move the belt-loop shifter 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. Refer to corrective measure (2) against A for adjusting procedure. (3) Move the belt-loop tension releasing rod to the left.
C  (Rear) (Front) Dog-eared portions on the front and rear of belt-loop are alternately oriented.	(1) Distance between the belt-loop shifter and the side face of the belt-loop support 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 belt-loop shifter 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. Perform this adjustment by loosening the attaching screw in the folding shaft vertical motion fulcrum metal fitting. (3) Perform the adjustment same as those described in (1) and (2). If the dog-eared portion of belt-loop is not adjusted equal to or smaller than the admissible dimension, take the below-mentioned procedure for adjustment.
	1) Return the belt-loop shifter, folding shaft and belt-loop tension releasing rod to the reference position. 2) Move the belt-loop tension releasing rod to the left by 0.5 to 1 mm. 3) Move the belt-loop shifter slightly (within 0.5 mm) to the left from the reference position. 4) Move the front and rear folding shafts backward by 0.2 to 0.4 mm toward the right. (Corrective measure (2) against A) 5) Sew belt-loops. If failure B appears, slightly move the front and rear folding shaft forward to the left. (Increase/decrease the moving amount of the folding shafts while visually checking the dog-eared portion of belt-loop.)	

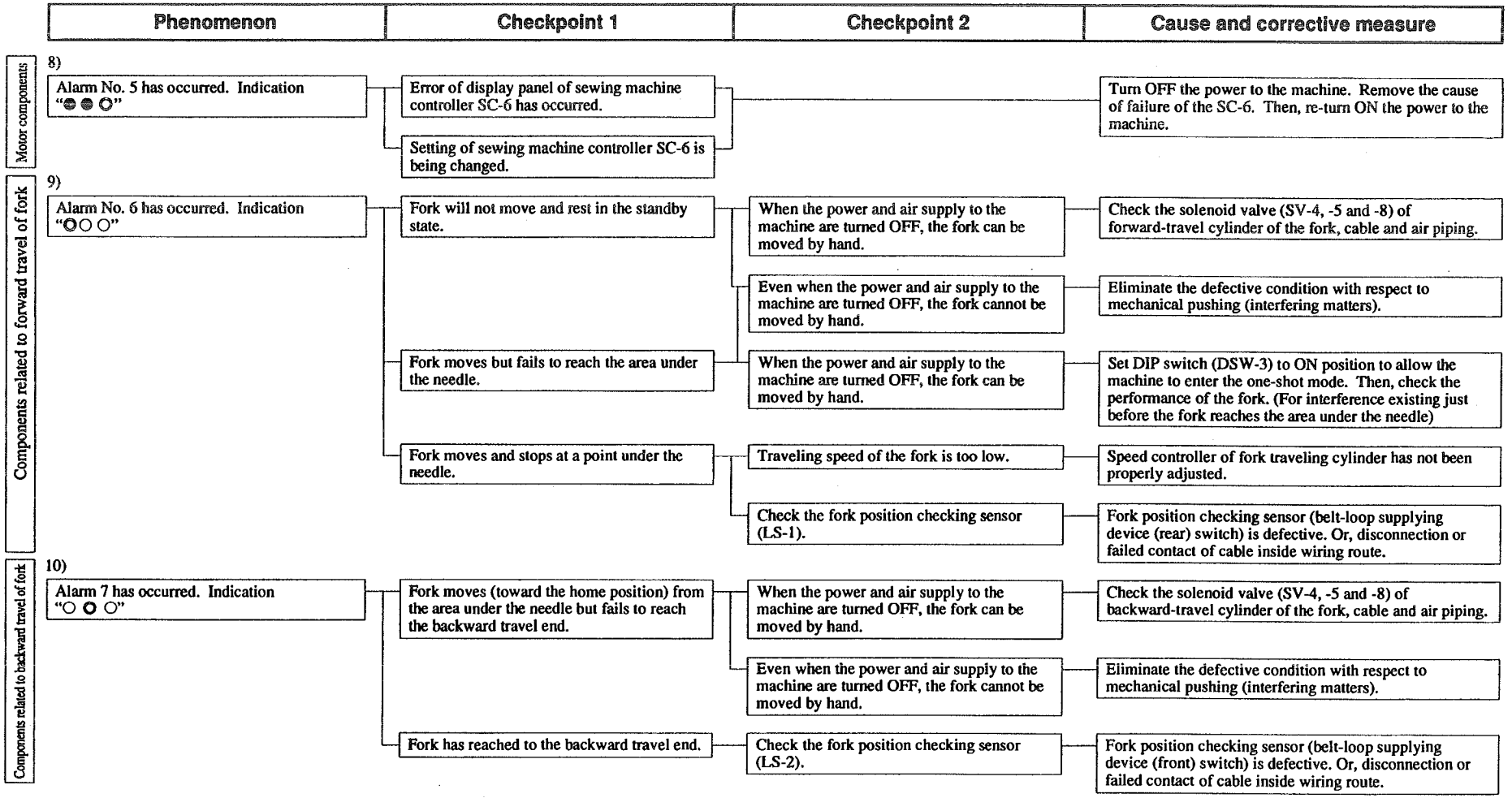
	Phenomenon	Cause	Corrective measure
Dog-eared portion of 2 mm or more	D  For belt-loops that are heavy in weight with an interlining and seem to be considerably stiff * Belt-loop greatly tilt to the right. * Belt-loop tension releasing amount is smaller than expected, leading to longer folding length.	(1) Pressure of the loop folding cylinder is insufficient.	(1) Turn the 3-port pressure reducing knob of SV-3 clockwise to increase the pressure. (The pressure reducing value has been factory-adjusted to 0.35 to 0.4 MPa at the time of delivery.)
	E  When heavy-weight belt-loops are sued and belt-tension releasing amount is set to a large value * Belt-loop largely tilts to the right. * Belt-loop is placed normally in the standby position.	(1) When supplying belt-loops, the belt-loops come in contact with the sole of the work clamp foot and moves away from the correct position.	(1)-1 Cheek whether the lifting amount of the presser foot is insufficient (smaller than 22 mm above the top surface of the throat plate). If the lifting amount of the work clamp foot is smaller than the standard value, correct it. (1)-2 Slightly decrease the height of the folding shaft. (Adjust the height of the device.)
	F  * Belt-loop greatly tilts to the left.	(1) Presser foot fails to move smoothly. The trouble occurs because the presser foot fails to fully descend when the folding metal plate completely comes out of the belt-loop.	(1) Expel air from the machine. Raise/lower the presser foot by hand to check its move-ment. If the attaching section of the presser foot cylinder jars, correct it.
Miscellaneous	G  Heavy-weight and stiff belt-loops * Dimension a is not uniform. It often excessively increases.	(1) Belt-loop horizontal support spring (leaf spring) is improperly position. **Caution) If failure G is made when using extra heavy-weight belt-loops with an interlining, the aforementioned adjustment is necessary. However, it is not necessary because no problem will result as long as the clearance shown in the figure above is equal to or more than the belt-loop thickness when using light-weight belt-loops or soft belt-loops. So, adjust the related components as illustrated above to adapt to heaviest-weight belt-loop to be used, no further adjustment will be necessary in some cases.**	(1) Adjust the position of the spring as illustrated below. 

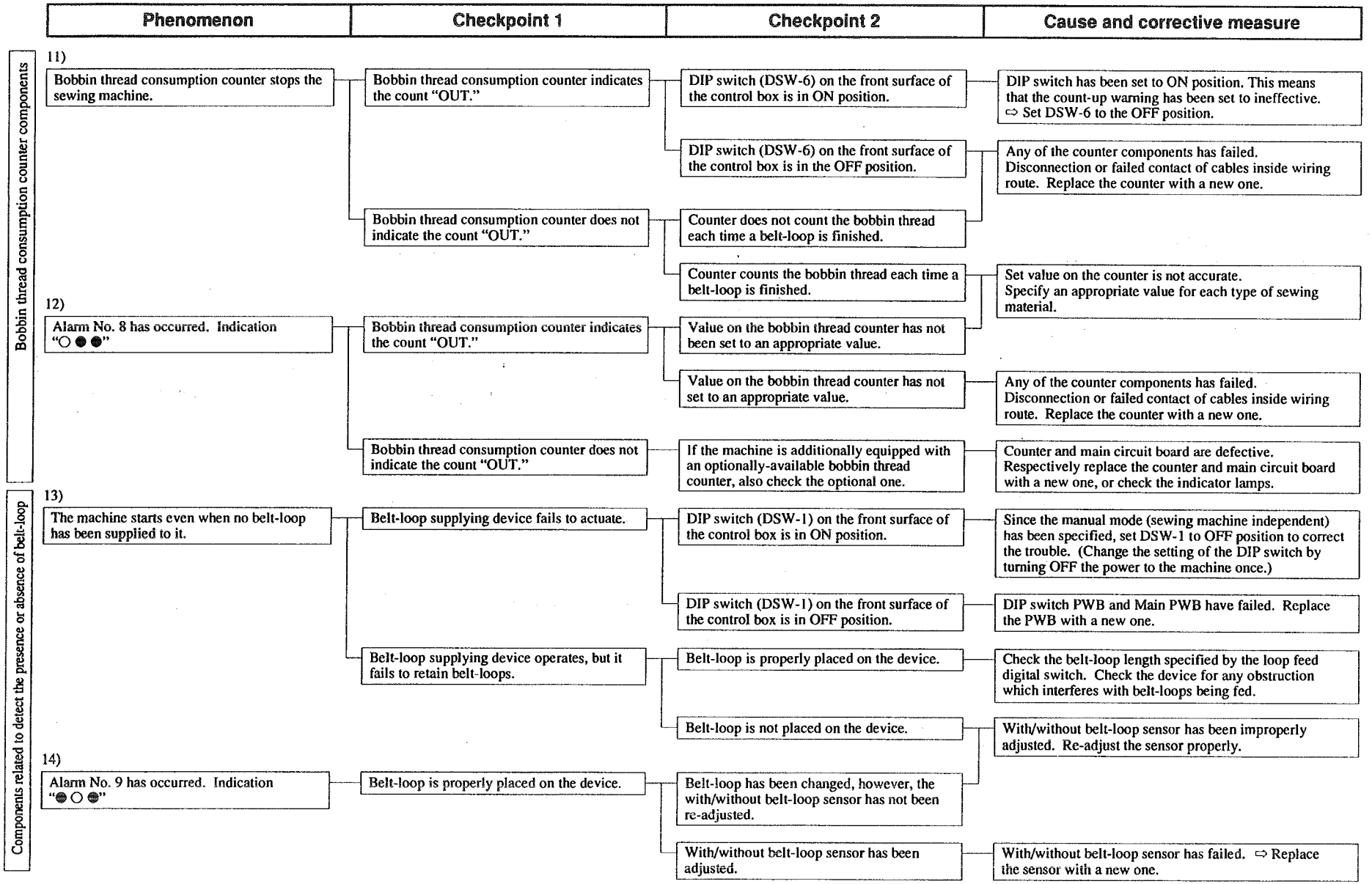
(3) Electrical components

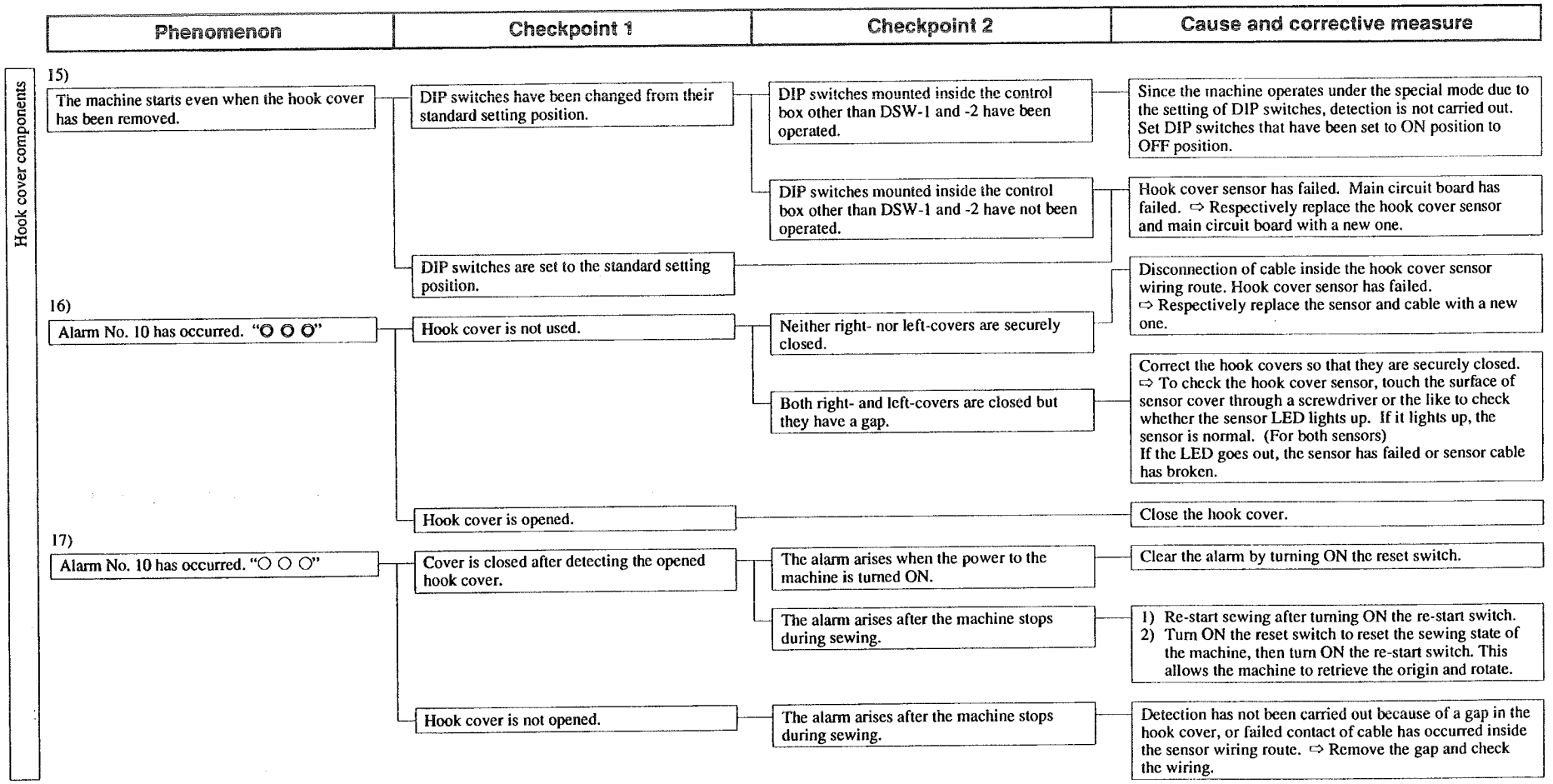
(● in the table below indicates that the indicator lamp goes out, ○ indicates that it lights up and ◎ indicates that it flashes on and off.)

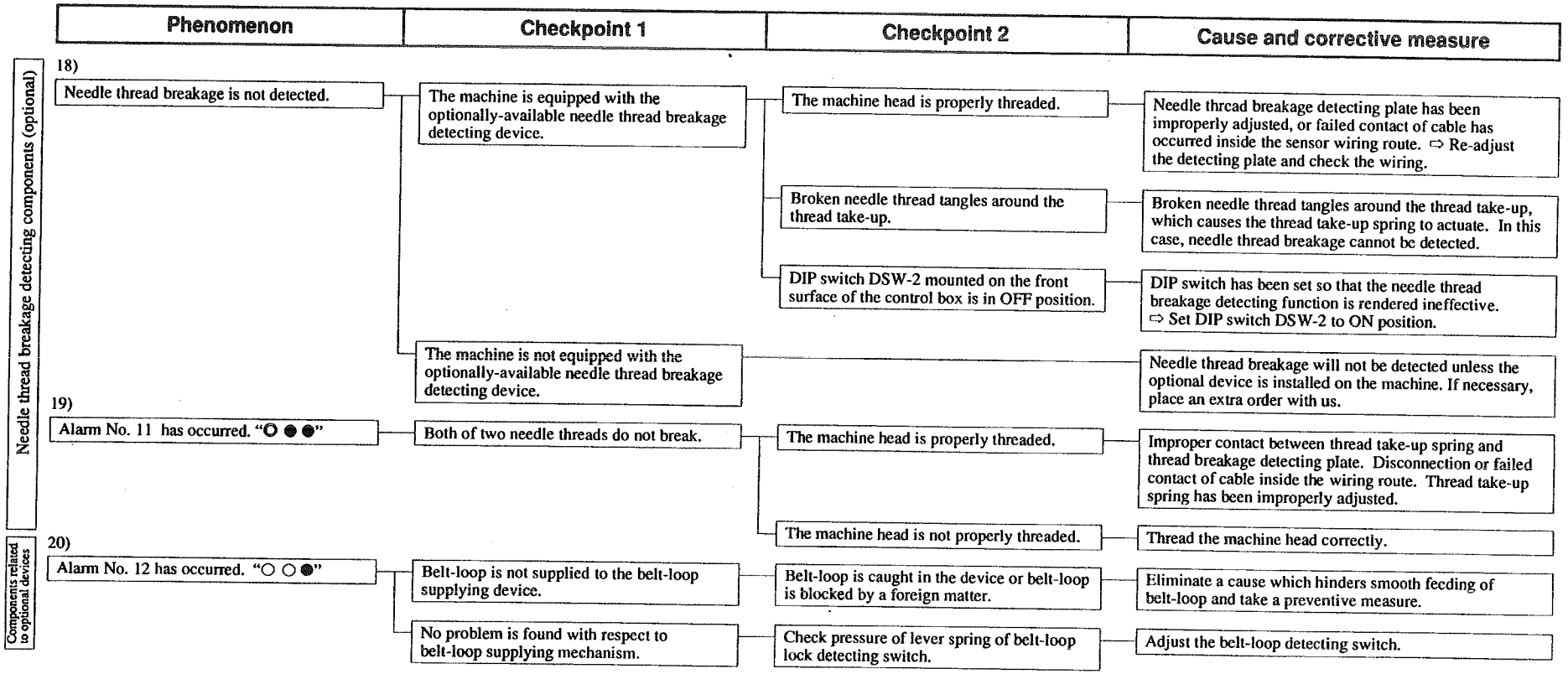



Phenomenon
Checkpoint 1
Checkpoint 2
Cause and corrective measure
Temporary stop switch components
Components related to operating air pressure
3)
The machine fails to stop even when the temporary stop switch is pressed.
Performance and indication of the machine are not correct. (Runaway effect)
Turn OFF the power switch. ⇨ Check the control box and replace the circuit board with a new one.
Only the temporary stop switch is not accepted.
Temporary stop switch has failed. ⇨ Replace the switch with a new one.
4)
Alarm No. 2 has occurred. Indication "○ ○ ○"
Temporary stop switch is not pressed.
Temporary switch has failed. Disconnection or improper contact of cables. ⇨ Replace the switch with a new one, replace the cable with a new one or repair it.
Temporary switch is pressed.
Temporary stop switch works normally. ⇨ Operate the machine while referring to "Operation."
5)
Alarm No. 3 has occurred. Indication "○ ● ○"
ON state of the temporary stop switch has already been reset.
The machine is at rest during sewing.
The machine is at rest when turning ON the power to the machine.
Alarm has occurred not after operating the temporary stop switch but when the power to the machine has been turned ON.
Cloth feed cam is out of the start position (origin).
1) Turn OFF the power switch and turn the sewing machine pulley by hand until the origin is reached.
2) Turn ON the re-start switch to allow the machine to return to the origin. In this case, the needle thread has to be removed from the needle.
Cloth feed cam stops at the start position (origin).
Disconnection or failed connection of cable in wiring route. ⇨ Replace the cable with a new one or repair it.
Origin sensor has not been properly adjusted. ⇨
6)
Alarm No. 4 has occurred. Indication "● ○ ●"
Operating air pressure is not set to 0.5 to 0.55 MPa.
Operating air pressure is defective. ⇨ Re-adjust the operating air pressure.
Operating air pressure is set to 0.5 to 0.55 MPa.
Air pressure detecting device is not set to 0.4 MPa.
Air pressure detecting device is not set to the specified value. ⇨ Re-adjust the air pressure detecting device.
Air pressure detecting device is set to 0.4 MPa.
Air pressure detecting device is defective. Disconnection or improper contact of cables. ⇨ Replace the air pressure detecting device with a new one, replace the cable with a new one or correct it.
7)
Alarm is not given on the panel display because of insufficient air pressure.
Alarm occurs when turning ON the start switch or set-back switch.
The machine is on standby.
Normal
Alarm is not detected when the machine is on standby.


Phenomenon
Checkpoint 1
Checkpoint 2
Cause and corrective measure
Motor components
8)
Alarm No. 5 has occurred. Indication "● ● ○"
Error of display panel of sewing machine controller SC-6 has occurred.
Setting of sewing machine controller SC-6 is being changed.
Turn OFF the power to the machine. Remove the cause of failure of the SC-6. Then, re-turn ON the power to the machine.
Components related to forward travel of fork
9)
Alarm No. 6 has occurred. Indication "○ ○ ○"
Fork will not move and rest in the standby state.
When the power and air supply to the machine are turned OFF, the fork can be moved by hand.
Check the solenoid valve (SV-4, -5 and -8) of forward-travel cylinder of the fork, cable and air piping.
Even when the power and air supply to the machine are turned OFF, the fork cannot be moved by hand.
Eliminate the defective condition with respect to mechanical pushing (interfering matters).
Fork moves but fails to reach the area under the needle.
When the power and air supply to the machine are turned OFF, the fork can be moved by hand.
Set DIP switch (DSW-3) to ON position to allow the machine to enter the one-shot mode. Then, check the performance of the fork. (For interference existing just before the fork reaches the area under the needle)
Fork moves and stops at a point under the needle.
Traveling speed of the fork is too low.
Speed controller of fork traveling cylinder has not been properly adjusted.
Check the fork position checking sensor (LS-1).
Fork position checking sensor (belt-loop supplying device (rear) switch) is defective. Or, disconnection or failed contact of cable inside wiring route.
Components related to backward travel of fork
10)
Alarm 7 has occurred. Indication "○ ○ ○"
Fork moves (toward the home position) from the area under the needle but fails to reach the backward travel end.
When the power and air supply to the machine are turned OFF, the fork can be moved by hand.
Check the solenoid valve (SV-4, -5 and -8) of backward-travel cylinder of the fork, cable and air piping.
Even when the power and air supply to the machine are turned OFF, the fork cannot be moved by hand.
Eliminate the defective condition with respect to mechanical pushing (interfering matters).
Fork has reached to the backward travel end.
Check the fork position checking sensor (LS-2).
Fork position checking sensor (belt-loop supplying device (front) switch) is defective. Or, disconnection or failed contact of cable inside wiring route.

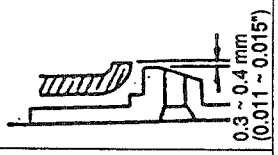

Phenomenon
Checkpoint 1
Checkpoint 2
Cause and corrective measure
Bobbin thread consumption counter components
Components related to detect the presence or absence of belt-loop
11)
Bobbin thread consumption counter stops the sewing machine.
Bobbin thread consumption counter indicates the count "OUT."
DIP switch (DSW-6) on the front surface of the control box is in ON position.
DIP switch has been set to ON position. This means that the count-up warning has been set to ineffective. ⇨ Set DSW-6 to the OFF position.
DIP switch (DSW-6) on the front surface of the control box is in the OFF position.
Any of the counter components has failed. Disconnection or failed contact of cables inside wiring route. Replace the counter with a new one.
Bobbin thread consumption counter does not indicate the count "OUT."
Counter does not count the bobbin thread each time a belt-loop is finished.
Counter counts the bobbin thread each time a belt-loop is finished.
Set value on the counter is not accurate. Specify an appropriate value for each type of sewing material.
12)
Alarm No. 8 has occurred. Indication "○ ● ●"
Bobbin thread consumption counter indicates the count "OUT."
Value on the bobbin thread counter has not been set to an appropriate value.
Value on the bobbin thread counter has not set to an appropriate value.
Any of the counter components has failed. Disconnection or failed contact of cables inside wiring route. Replace the counter with a new one.
Bobbin thread consumption counter does not indicate the count "OUT."
If the machine is additionally equipped with an optionally-available bobbin thread counter, also check the optional one.
Counter and main circuit board are defective. Respectively replace the counter and main circuit board with a new one, or check the indicator lamps.
13)
The machine starts even when no belt-loop has been supplied to it.
Belt-loop supplying device fails to actuate.
DIP switch (DSW-1) on the front surface of the control box is in ON position.
Since the manual mode (sewing machine independent) has been specified, set DSW-1 to OFF position to correct the trouble. (Change the setting of the DIP switch by turning OFF the power to the machine once.)
DIP switch (DSW-1) on the front surface of the control box is in OFF position.
DIP switch PWB and Main PWB have failed. Replace the PWB with a new one.
Belt-loop supplying device operates, but it fails to retain belt-loops.
Belt-loop is properly placed on the device.
Check the belt-loop length specified by the loop feed digital switch. Check the device for any obstruction which interferes with belt-loops being fed.
Belt-loop is not placed on the device.
With/without belt-loop sensor has been improperly adjusted. Re-adjust the sensor properly.
14)
Alarm No. 9 has occurred. Indication "● ○ ●"
Belt-loop is properly placed on the device.
Belt-loop has been changed, however, the with/without belt-loop sensor has not been re-adjusted.
With/without belt-loop sensor has been adjusted.
With/without belt-loop sensor has failed. ⇨ Replace the sensor with a new one.


Phenomenon
Checkpoint 1
Checkpoint 2
Cause and corrective measure
Hook cover components
15)
The machine starts even when the hook cover has been removed.
DIP switches have been changed from their standard setting position.
DIP switches mounted inside the control box other than DSW-1 and -2 have been operated.
Since the machine operates under the special mode due to the setting of DIP switches, detection is not carried out. Set DIP switches that have been set to ON position to OFF position.
DIP switches mounted inside the control box other than DSW-1 and -2 have not been operated.
Hook cover sensor has failed. Main circuit board has failed. ⇨ Respectively replace the hook cover sensor and main circuit board with a new one.
DIP switches are set to the standard setting position.
Disconnection of cable inside the hook cover sensor wiring route. Hook cover sensor has failed. ⇨ Respectively replace the sensor and cable with a new one.
16)
Alarm No. 10 has occurred. "O O O"
Hook cover is not used.
Neither right- nor left-covers are securely closed.
Correct the hook covers so that they are securely closed. ⇨ To check the hook cover sensor, touch the surface of sensor cover through a screwdriver or the like to check whether the sensor LED lights up. If it lights up, the sensor is normal. (For both sensors) If the LED goes out, the sensor has failed or sensor cable has broken.
Both right- and left-covers are closed but they have a gap.
Hook cover is opened.
Close the hook cover.
17)
Alarm No. 10 has occurred. "O O O"
Cover is closed after detecting the opened hook cover.
The alarm arises when the power to the machine is turned ON.
Clear the alarm by turning ON the reset switch.
The alarm arises after the machine stops during sewing.
1) Re-start sewing after turning ON the re-start switch.
2) Turn ON the reset switch to reset the sewing state of the machine, then turn ON the re-start switch. This allows the machine to retrieve the origin and rotate.
Hook cover is not opened.
The alarm arises after the machine stops during sewing.
Detection has not been carried out because of a gap in the hook cover, or failed contact of cable has occurred inside the sensor wiring route. ⇨ Remove the gap and check the wiring.


Phenomenon
Checkpoint 1
Checkpoint 2
Cause and corrective measure
Needle thread breakage detecting components (optional)
18)
Needle thread breakage is not detected.
The machine is equipped with the optionally-available needle thread breakage detecting device.
The machine head is properly threaded.
Needle thread breakage detecting plate has been improperly adjusted, or failed contact of cable has occurred inside the sensor wiring route. ⇨ Re-adjust the detecting plate and check the wiring.
Broken needle thread tangles around the thread take-up.
Broken needle thread tangles around the thread take-up, which causes the thread take-up spring to actuate. In this case, needle thread breakage cannot be detected.
DIP switch DSW-2 mounted on the front surface of the control box is in OFF position.
DIP switch has been set so that the needle thread breakage detecting function is rendered ineffective. ⇨ Set DIP switch DSW-2 to ON position.
The machine is not equipped with the optionally-available needle thread breakage detecting device.
Needle thread breakage will not be detected unless the optional device is installed on the machine. If necessary, place an extra order with us.
19)
Alarm No. 11 has occurred. "○ ● ●"
Both of two needle threads do not break.
The machine head is properly threaded.
Improper contact between thread take-up spring and thread breakage detecting plate. Disconnection or failed contact of cable inside the wiring route. Thread take-up spring has been improperly adjusted.
The machine head is not properly threaded.
Thread the machine head correctly.
Components related to optional devices
20)
Alarm No. 12 has occurred. "○ ○ ●"
Belt-loop is not supplied to the belt-loop supplying device.
Belt-loop is caught in the device or belt-loop is blocked by a foreign matter.
Eliminate a cause which hinders smooth feeding of belt-loop and take a preventive measure.
No problem is found with respect to belt-loop supplying mechanism.
Check pressure of lever spring of belt-loop lock detecting switch.
Adjust the belt-loop detecting switch.

17. EXPENDABLE PARTS

(1) General expendable parts

Part No.	Description	Caution in installation
	Needle	
13876305	Shuttle	Check that the clearance of 0.5 to 0.7 mm is provided between the shuttle and the shuttle driver. If not, correct it in accordance with the pertinent "Standard Adjustment."
13881255	Moving knife (on the machine head)	
B2424210000	Counter knife (on the machine head)	Perform adjustment to provide a 0.3 to 0.4 mmdifference in level between the counter knife blade and the needle hole guide. 
13882501	Needle hole guide	Replace this part if its needle hole has been scratched or grown bigger in diameter. Whenever installing a new needle hole guide, check the height of the moving and counter knife.
13883004	Thread take-up spring	
13884002 13760707	Tension release pin	
G5167154000	Lower folding metal	
G5168154000	Upper folding metal for the belt-loop width of 4 mm	
G5169154000	Upper folding metal for the belt-loop width of 2.6 mm	
G5551103000	Moving knife	
G5503103000	Counter knife	

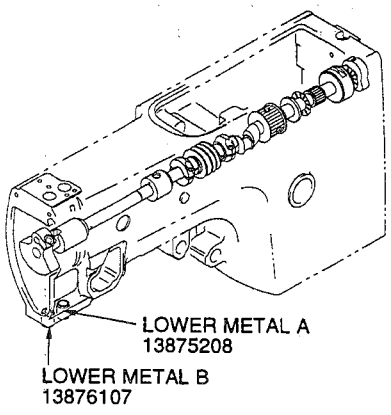
(2) Parts likely to be lost or damaged during repair

Part No.	Description	Caution in installation
B2549280000	Balls (seven) for feed bracket	Apply grease to these balls to prevent them from falling when installing them.
SS1060210TP	Needle hole guide setscrews (two)	

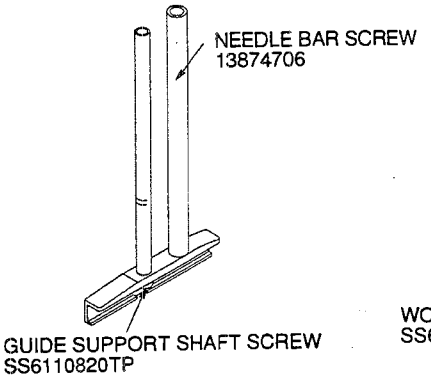
18. PARTS TO BE APPLIED WITH LOCKTITE PAINT

This machine starts and stops with an impactive force.
Portion in which screws are likely to loosen, therefore, are fixed by applying LOCKTITE paint.
When any of these portions is disassembled, be sure to clean the glued points with thinner and then dry them up completely.
Then apply LOCK-TITE paint onto the specified points, and assemble the components. At this time, extra care should be taken not to adhere LOCKTITE paint onto the shank of hinge screw or the like.
If any of the parts that are applied with LOCKTITE cannot be removed, heat the LOCKTITE-applied section using a blowtorch or the like. This will help remove it with ease.

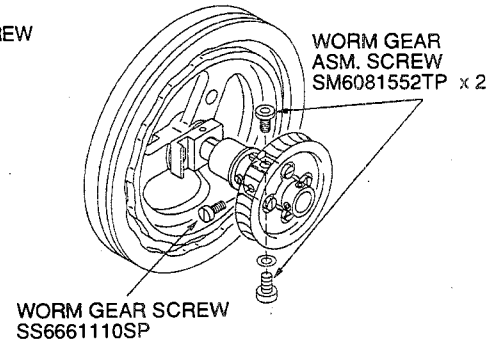
1) MAIN SHAFT COMPONENTS



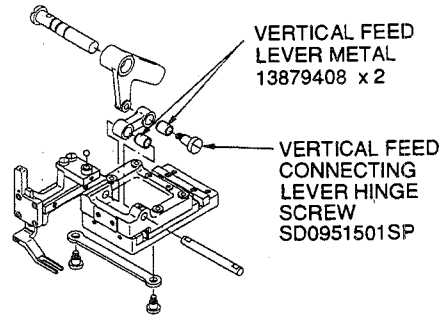
2) NEEDLE BAR COMPONENTS



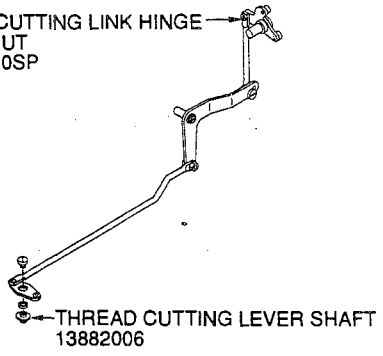
3) CLOTH FEED CAM COMPONENTS



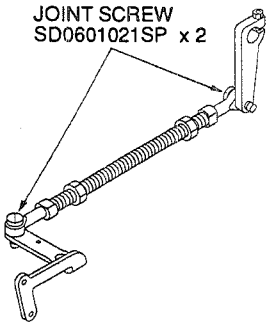
4) FEED MECHANISM COMPONENTS



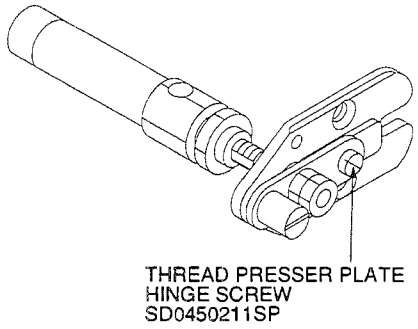
5) THREAD TRIMMER COMPONENTS



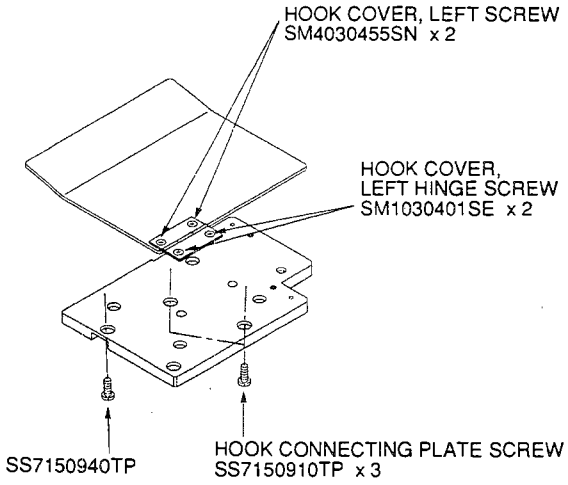
6) TENSION RELEASING COMPONENTS



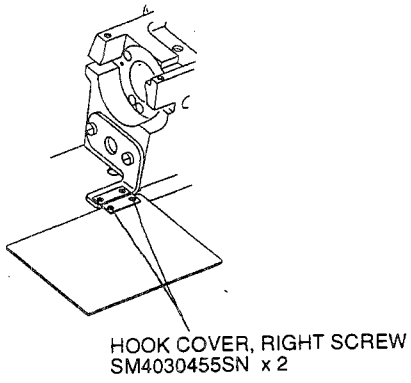
7) THREAD PRESSER COMPONENTS



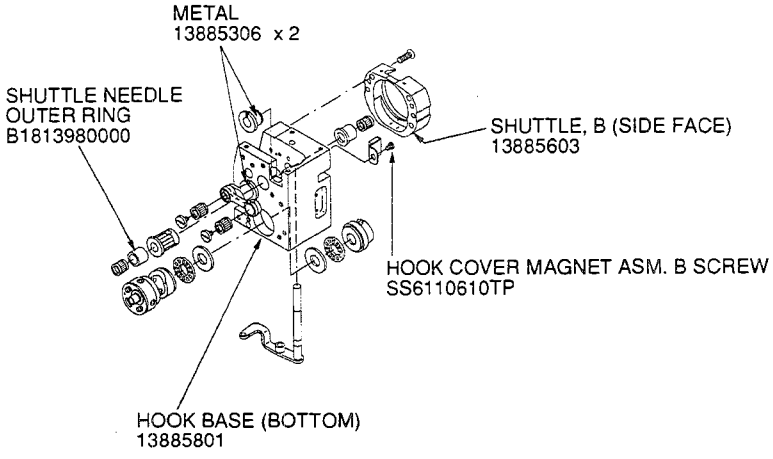
8) HOOK COVER, LEFT COMPONENTS



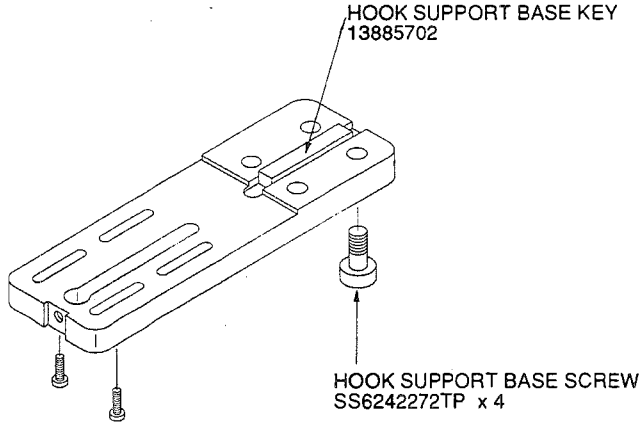
9) HOOK COVER, RIGHT COMPONENTS



10) HOOK BASE COMPONENTS (1)



11) HOOK BASE COMPONENTS (2)



19. PORTIONS TO WHICH GREASE IS TO BE APPLED

Apply grease onto the parts which need grease when disassembling them or performing regular maintenance works.

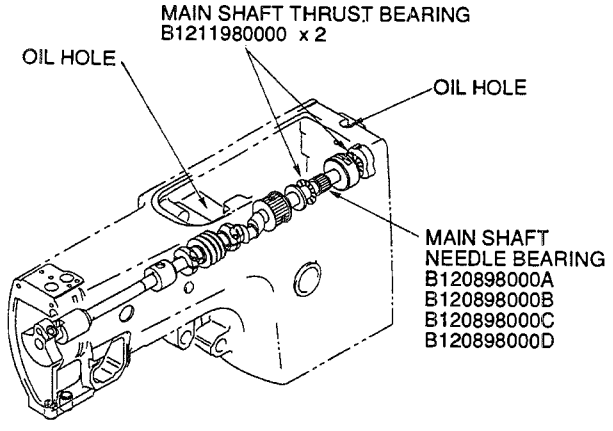
1. Grease to be used

Lithium type consistency No. 2

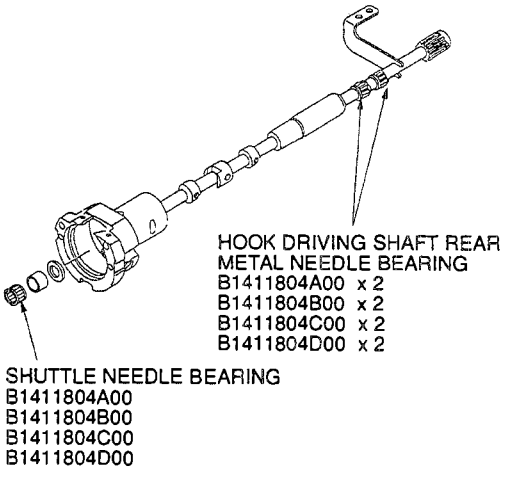
Manufacturer	Name of product
Esso	Lithen 2, Beacon 2
Shell	Clvania 2

2. Parts to be applied with grease

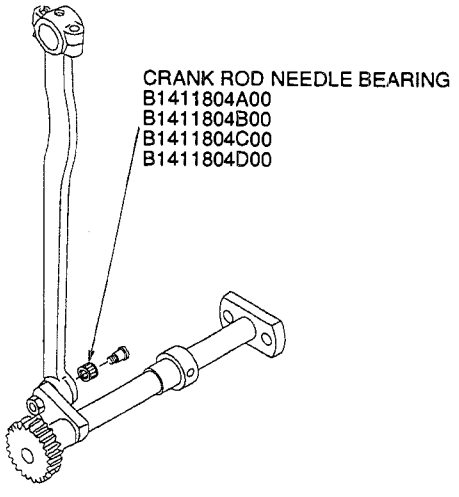
1) MAIN SHAFT COMPONENTS



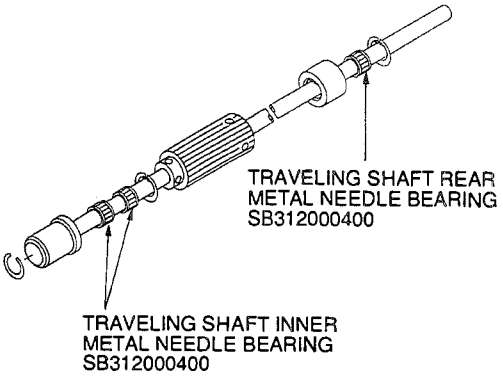
2) HOOK DRIVING SHAFT COMPONENTS



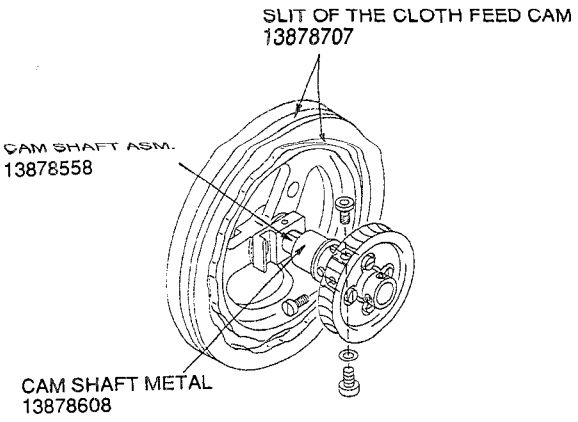
3) LARGE PENDULUM COMPONENTS



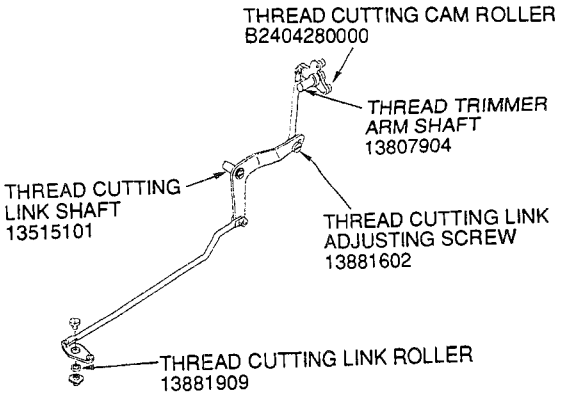
4) TRAVELING SHAFT COMPONENTS



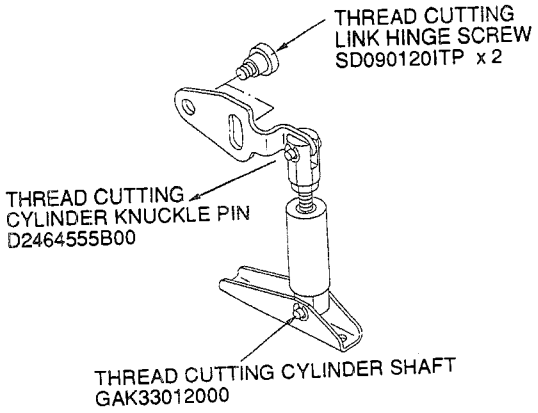
5) CLOTH FEED CAM COMPONENTS



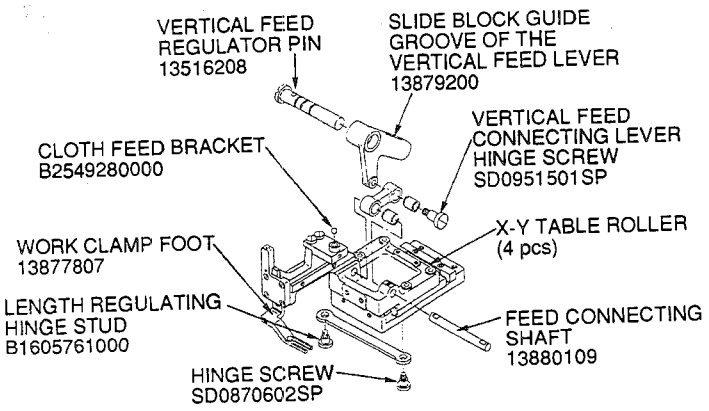
6) THREAD TRIMMER COMPONENTS (1)



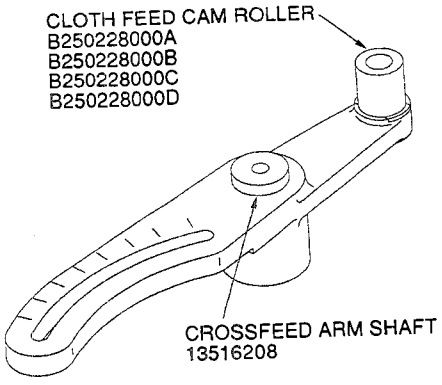
7) THREAD TRIMMER COMPONENTS (2)



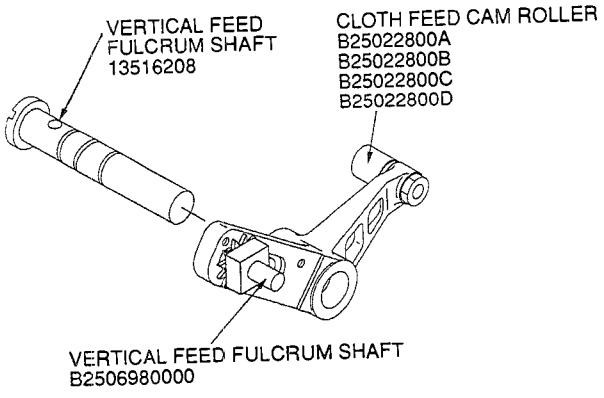
8) FEED MECHANISM COMPONENTS (1)



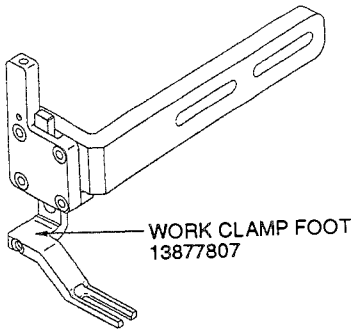
9) FEED MECHANISM COMPONENTS (2)



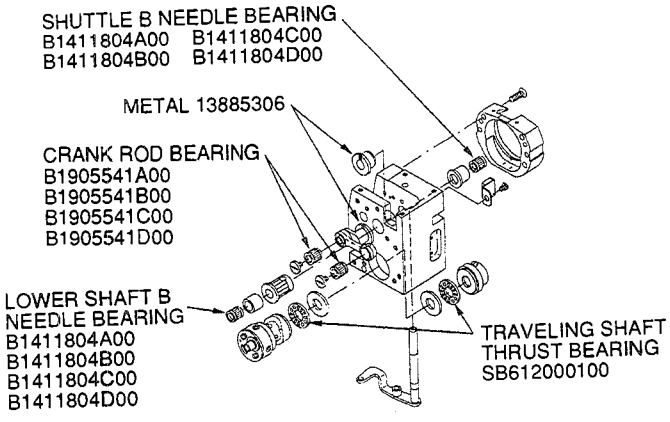
10) FEED MECHANISM COMPONENTS (3)



11) FEED MECHANISM COMPONENTS (4)



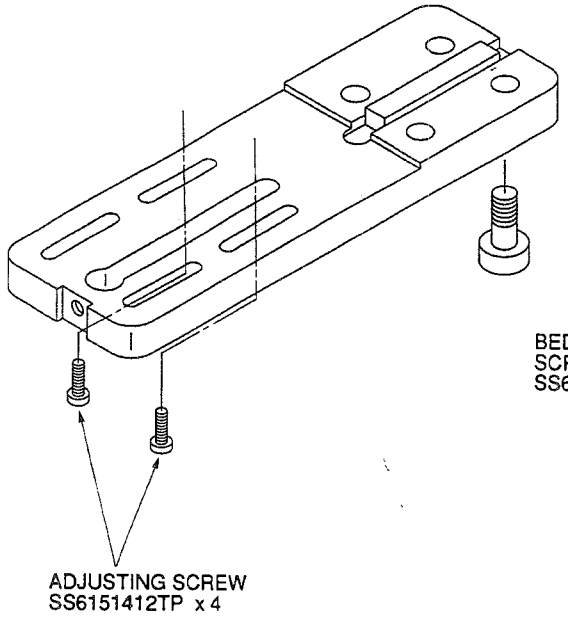
12) HOOK BASE COMPONENTS



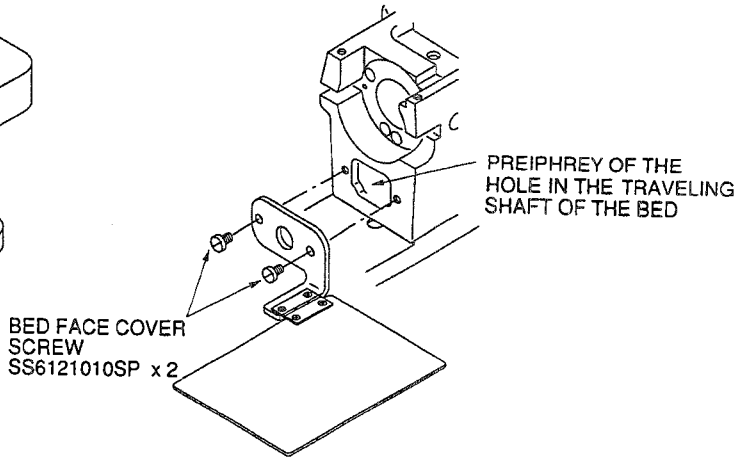
20. PARTS THAT ARE APPLIED WITH SEALING COMPOUND

This machine has parts that are fixed by applying sealing compound so as to prevent leakage of oil. Whenever any of these parts is removed, clear the existing sealing compound from the part. Then apply commercially available sealing compound and attach the part in place.

1) HOOK BASE COMPONENTS



2) HOOK COVER, RIGHT COMPONENTS



21. OPTIONS

Name	Function
1. Belt delivering device	It is an auxiliary belt loop supplying device which works to supply a belt loop tape to the stepping-motor-driven belt loop tape supplying device and control the tension on the feed section of the stepping motor.
2. Cloth chip suction device	It works to collect cloth chips produced when cutting loops.
3. Belt tension releasing device (fullness device)	It works to distribute the ease of fabric in order to create a fullness in loops.
4. Needle cooler	It is driven during sewing and blows air to cool the needle(s).
5. Bobbin thread counter	The counter counts the number of finished pieces of loops one by one and displays it.