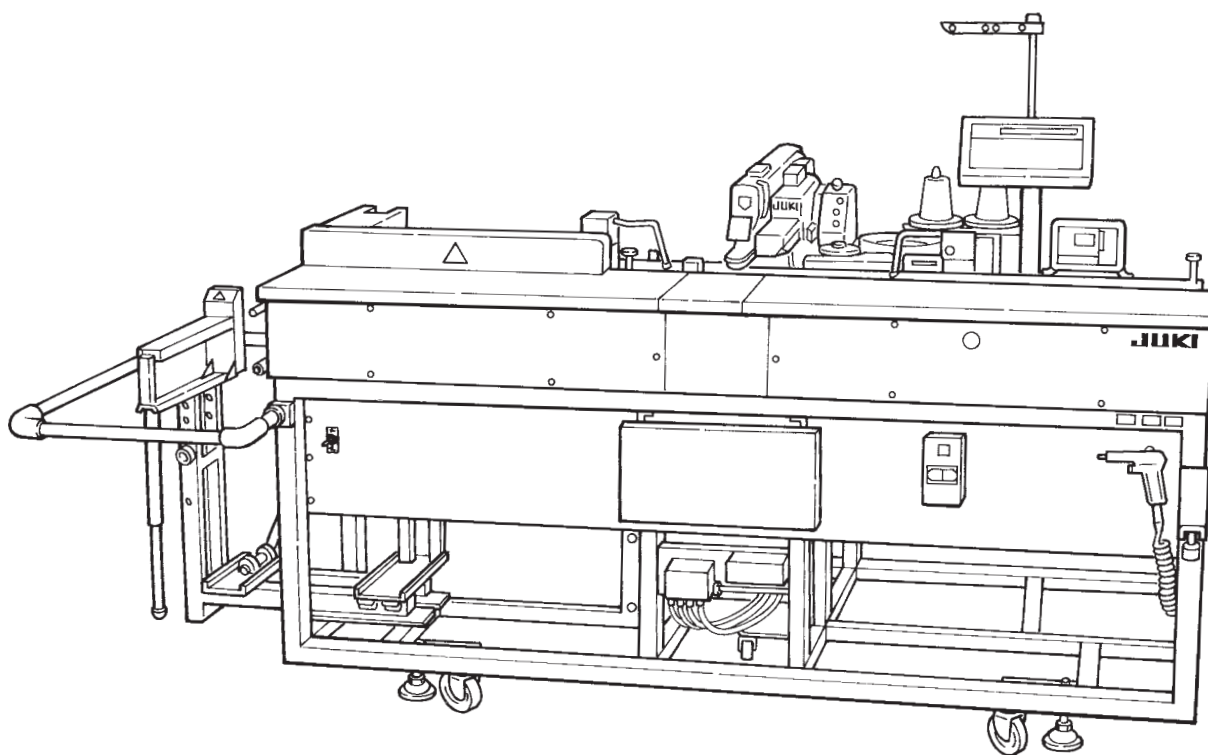


Button Attaching Indexer

ACF-164-1903

ENGINEER'S MANUAL



PREFACE

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

All personnel engaged in repair of ACF-164-1903 are required to carefully read Section 2 "Standard Adjustment" which contains important information on the maintenance of ACF-164-1903.

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

It is advisable to use "ACF-164-1903 Parts Book" together with this Engineer's Manual.

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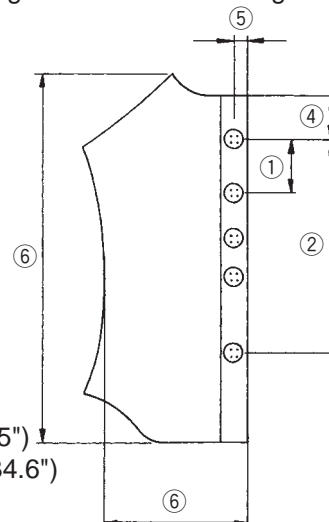
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1. SPECIFICATIONS

(1) Main unit

- | | |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| ① Feed interval | : 25 to 650 mm (1 to 25.6") |
| ② Overall feed amount | : 650 mm (25.6")
(When the machine is set to the long-sized material sewing mode : 1,200 mm) |
| ③ Number of buttons which can be sewn | : 1 to 20 pcs. (the machine is set to the independent sewing mode when sewing only one button on the material.) |
| ④ Distance from the top end of the garment body to the 1st button | : 40 to 140 mm (1.6 to 5.5")
(20 mm or more : when the special order part is used.) |
| ⑤ Distance from the side end of the garment body to the button | : 12 to 25 mm (0.5 to 1") |
| ⑥ Applicable garment sizes that can be sewn (standard) | : { Width 220 to 420 mm (8.7 to 16.5")
Length 400 to 880 mm (15.7 to 34.6") |
| ⑦ Number of patterns that can be stored in memory | : 20 |
| ⑧ Power supply | : 200V (3-phase) (Rated voltage $\pm 10\%$) |
| ⑨ Power source frequency | : 50/60 Hz |
| ⑩ Power consumption | : 600 VA (Rated voltage $\pm 10\%$) |
| ⑪ Operating air pressure | : 0.5 MPa |
| ⑫ Air consumption | : 20 NI/min. or less |
| ⑬ Machine dimensions | : { Width 1,860 mm
Depth 970 mm
Height 1,250 mm |
| ⑭ Weight | : 220 kg |



(2) Button sewing machine

- | | |
|--------------------------------------------|------------------------------------------------------------------------------------------------------|
| ① Machine head | : LK-1903 (exclusive machine head) |
| ② Sewing speed | : Normal 2,300 rpm
Max. 2,700 rpm [only when using the Z165 (for small button) and cotton thread] |
| ③ Needle | : DP x 17 #14 |
| ④ Buttons | : Kind : Flat buttons (2-holed, 4-holed) |
| ⑤ Lifting amount of button clamp jaw lever | : 11 mm |
| ⑥ Number of standard patterns | : 33 |

			Standard		Optional	
			For small buttons		For medium-size buttons	
Outer diameter of buttons to be sewn (mm)			ø10 to ø15		ø12 to ø18	
Sewing size (mm)	Length		0 to 3.5		0 to 4.5	
	Width		0 to 3.5		0 to 4.5	
Button clamp jaw lever	Thickness (mm)		2.2	Engraved mark	2.7	Engraved mark
			MAZ165070B0	H	MAZ166070B0	J
	Part No.	Right				
			MAZ167140A0		MAZ168140A0	
		Left				
Needle hole guide			MAZ15601000		MAZ15601000	
Feed plate			MAZ15502000		MAZ15602000	

(3) Button feeder

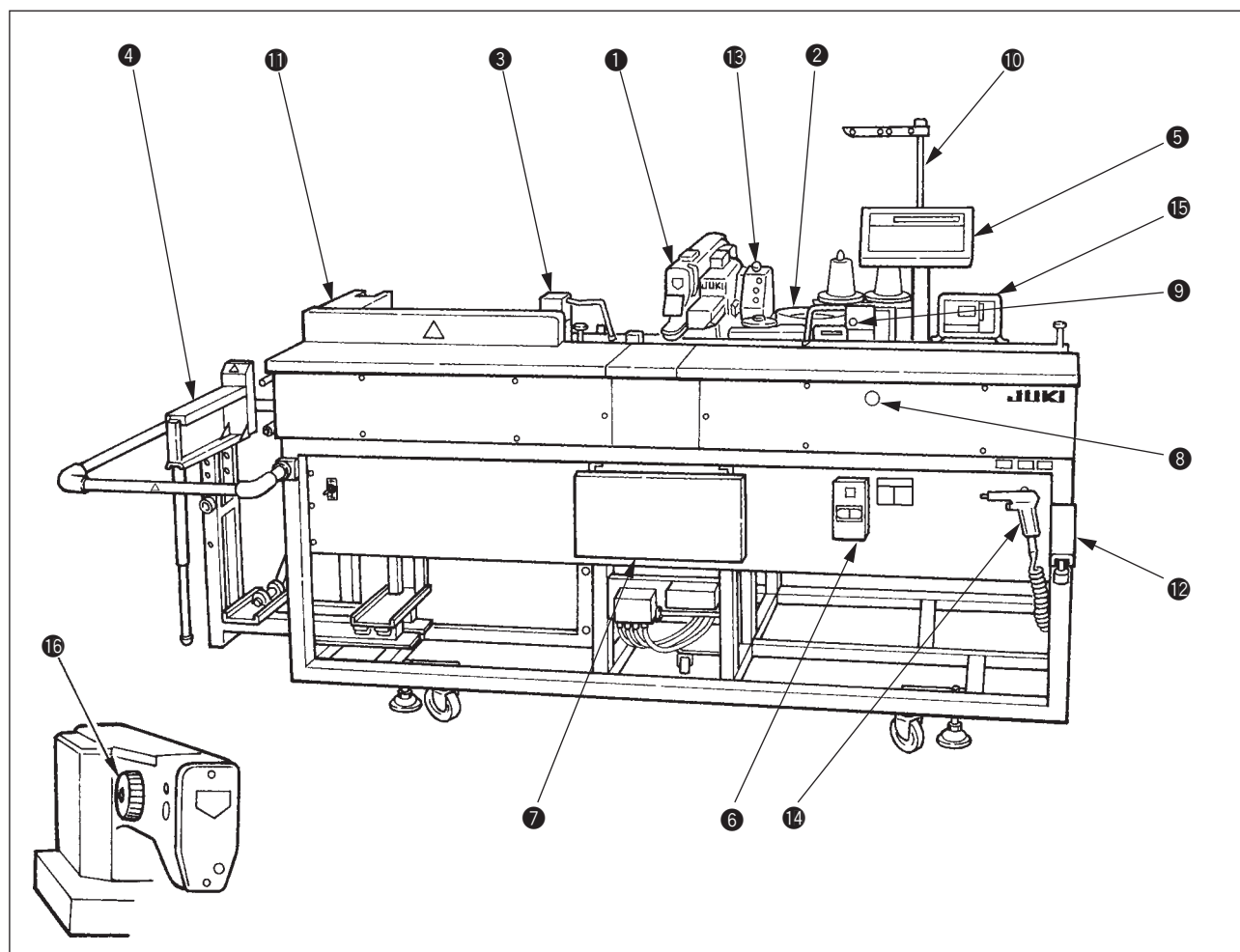
- ① Discrimination of buttons to be fed : By vibration system using the piezoelectric feeder
- ② Button setting method : Buttons are loaded from the rear section of device
- ③ Individual button feed : By index method
- ④ Detection of a failure : Provided with three detectors
 - The first detector detects a button at the section where the button is correctly positioned.
 - The second detector checks whether the button is correctly inserted in the carrier pin.
 - The third detector detects a button at the button clamp jaw lever.
- ⑤ Driving source for the feeder : DC motor (24 Vdc)
- ⑥ Function of sewing buttons without cross-over stitch : Provided
- ⑦ Automatic button discharging function : Provided
- ⑧ Independent operation of the sewing machine : Possible
- ⑨ Time required to feed a button : 0.5 sec./pc.

Noise: Workplace-related noise at sewing speed

$n = 2,300 \text{ min}^{-1}$: L_{PA} 84 dB(A)

Noise measurement according to DIN 45635-48-B-1.

2. CONFIGURATION OF THE MAIN PARTS



- | | | |
|------------------------------|-------------------------|---------------------------------|
| ① Sewing machine head | ⑥ Power switch | ⑪ Conveyor |
| ② Button feeder | ⑦ Knee switch | ⑫ Cloth plate |
| ③ Work clamp (carriage unit) | ⑧ Emergency stop switch | ⑬ Operation panel of the feeder |
| ④ Stacker | ⑨ Hand switch | ⑭ Air gun |
| ⑤ Operation panel of ACF | ⑩ Thread stand | ⑮ Operation box of LK |
| | | ⑯ Hand pulley |



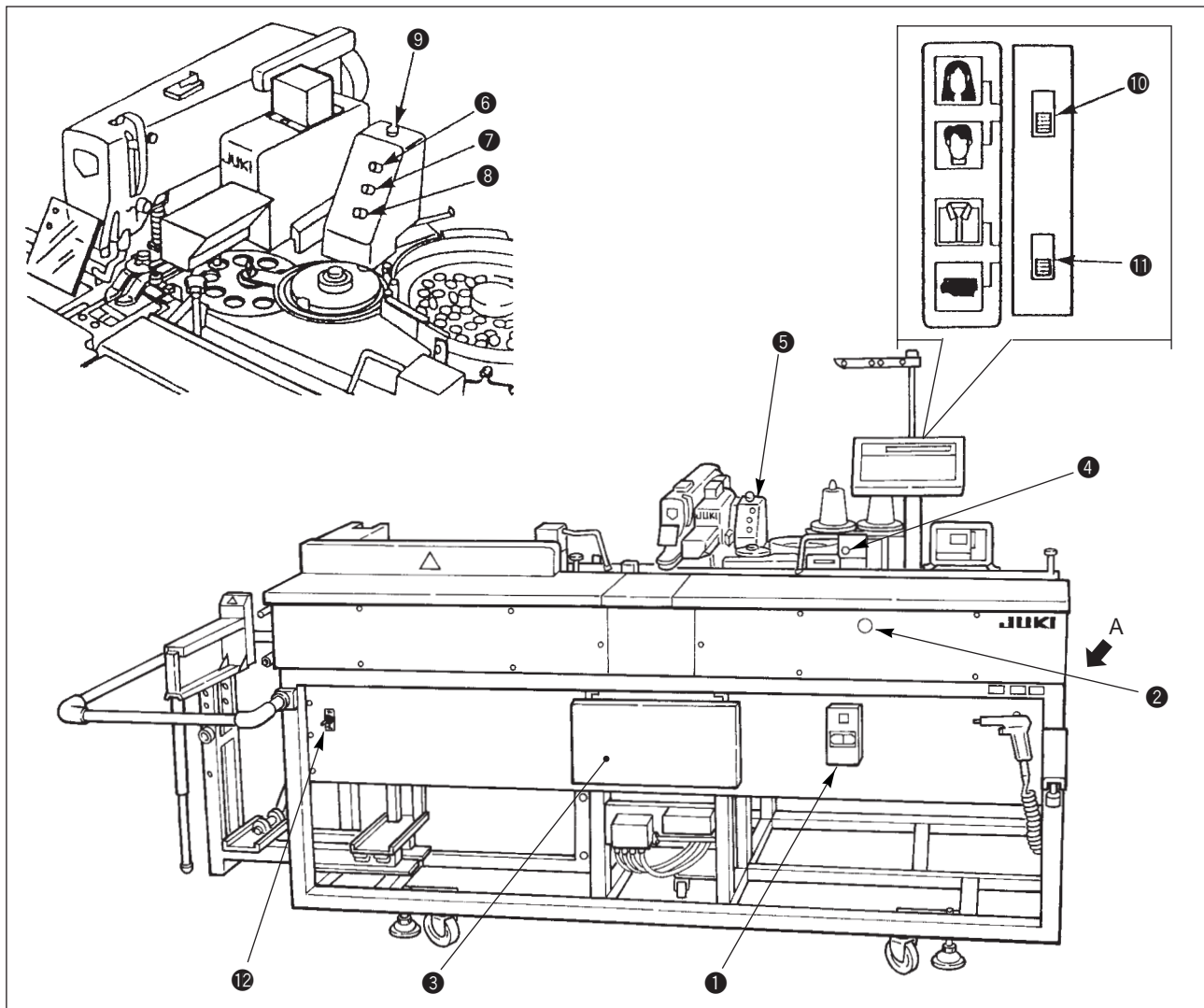
CAUTION :

To avoid malfunction and damage of the machine, confirm the following :

1. Before you put the machine into operation for the first time after the set-up, clean it thoroughly. Remove all dust gathering during transportation and oil it well.
2. Confirm that the voltage has been correctly set.
Confirm that the power plug has been properly connected to the power supply.
3. Never use the machine in the state where the voltage type is different from the designated one.
4. The sewing machine has been completely adjusted at the time of delivery. For caution's sake, however, turn ON the power switch after releasing the stop-motion and turning the handwheel by hand when operating the machine for the first time.
5. Operate the machine with the air pressure set to 0.5 MPa (5 kgf/cm²).

3. NAME OF EACH PART AND PREPARATION FOR TRIAL RUN

(1) Operating switches



① Power switch

Use this switch to turn ON/OFF the power to the unit.

(If installing the optionally available MC-6, use independent power for the MC-16 that is located on section A on the right-hand side of the main unit.)

② Emergency stop switch

Use this switch to stop the machine from running.

③ Knee switch

This switch is used as the start switch.

④ Hand switch

This switch is used as the work clamp release switch.

⑤ Feeder switch

⑥ Button feeder switch

Used to supply buttons to the button clamp jaw lever.

⑦ Set-up switch

This switch is used for operating the spinner oscillating arm under the step-operation mode. The spinner oscillating arm performs step operation as long as the switch is held pressed.

⑧ Button discharging switch

This switch is used to discharge buttons in the index unit.

⑨ Feeder breaker

This is the breaker for the spinner oscillating arm motor and index unit motor. This breaker can be reset by pressing.

⑩ Men's / Ladies mode selective switch

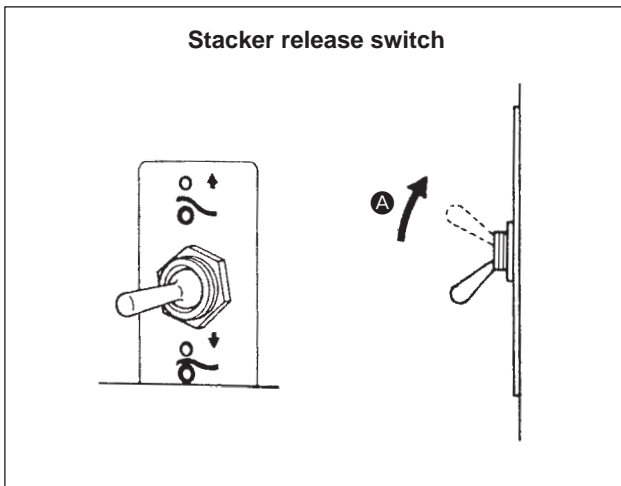
Used to change modes when sewing men's or ladies' wear.

⑪ Body of the garment / finished garment mode selective switch

Used to change modes when sewing garments using the finished workpiece table (Optional : G55101640A0).

⑫ Stacker release switch

This switch is used when sewing garments using the second presser (Optional : G55141640A0).

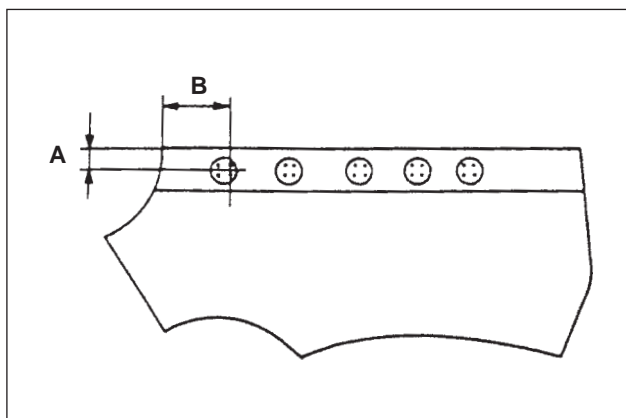


This switch is used for taking out the materials from the stacker after the predetermined number of pieces of finished material has been stacked. Lift lever in the direction of arrow **A** , and the second presser will move away from the stacking board to allow the operator to take out the materials from the stacker.

(Caution) Do not take out the workpieces while the stacker is in operation. Doing so is very dangerous.

(2) Adjusting the seam allowance

- ① In the case of sewing garment bodies of men's wear (set Men's/Ladies' mode selective switch ⑩ mounted on the right-hand side of the operation panel to its lower side.) (See p.4.)

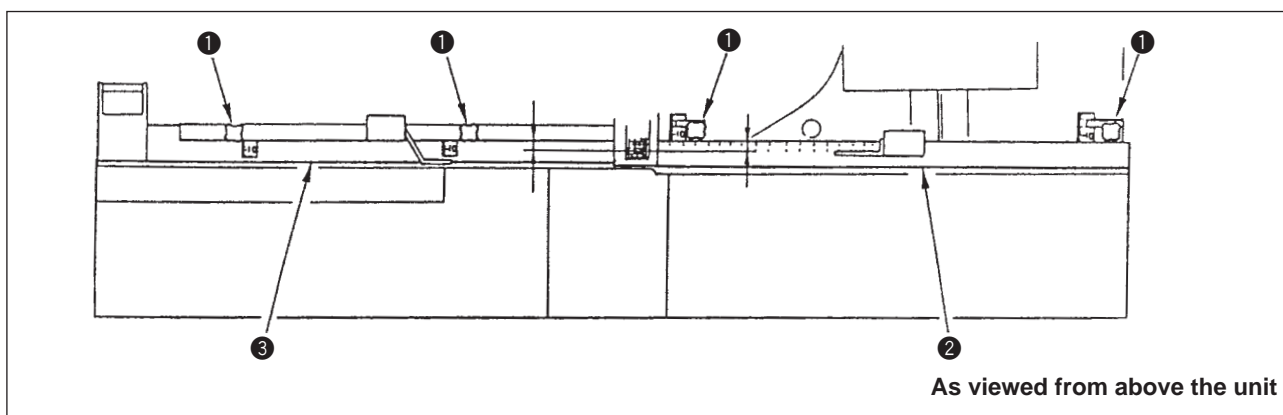


- 1) Adjust the seam allowance from the side end of the garment to the button (distance A in the figure), and from the top end of the garment to the 1st button (distance B in the figure.)

(Caution) Be sure to make adjustment of the seam allowance after you have turned OFF the power switch.

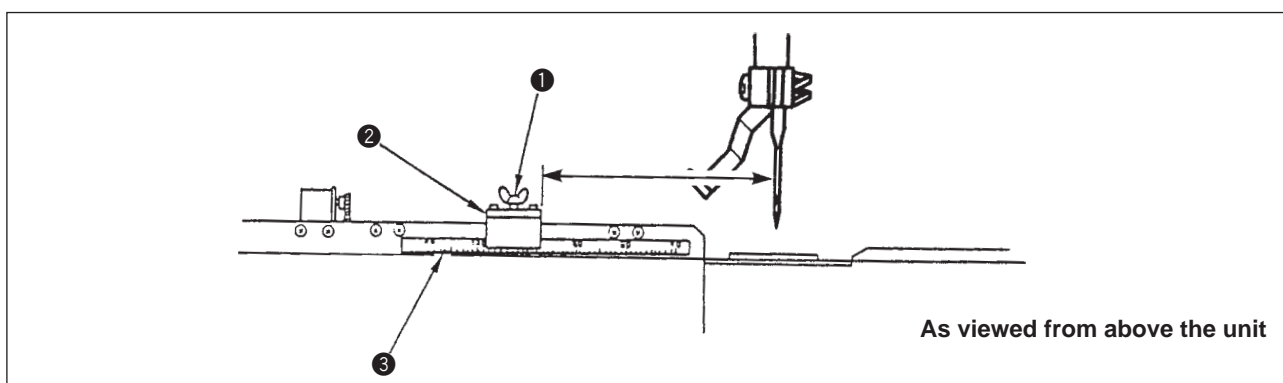
- 2) The number of buttons and the intervals between the buttons can be adjusted using the panel switches. (Refer to "Inputting the sewing data" on page 28.)

○ Adjusting distance A



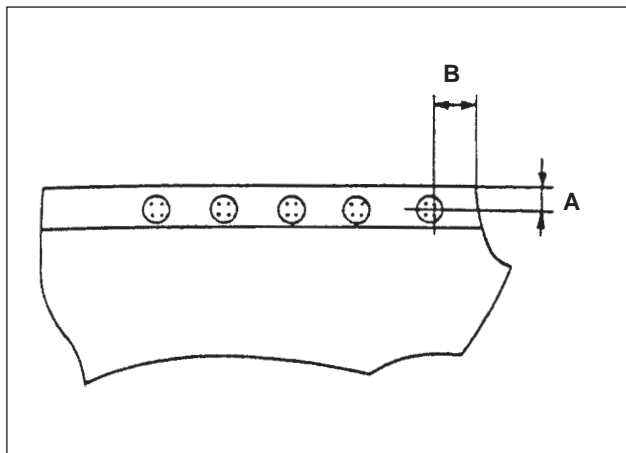
Loosen screws ① in setting plates, right ② and left ③. Shift the respective setting plates to the desired values and tighten the screws.

○ Adjusting distance B



Loosen thumbscrew ①, and shift gauge ② to the right or left until desired scale value ③ is reached. Then tighten the thumbscrew.

- ② In the case of sewing garment bodies of ladies' wear (set Men's/Ladies' mode selective switch ⑩ mounted on the right-hand side of the operation panel to its upper side.) (See p.4.)



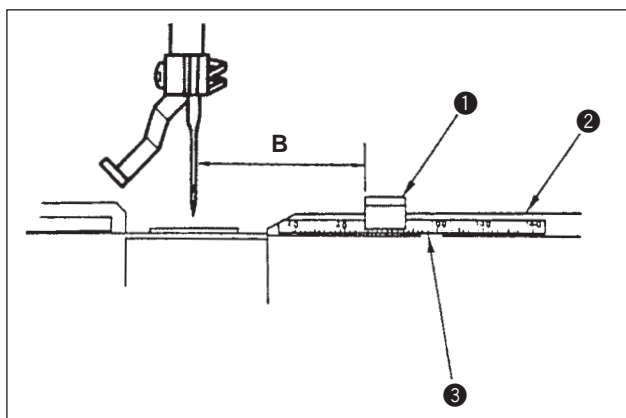
- 1) Adjust the seam allowance from the side end of the garment to the button (distance A in the figure), and from the top end of the garment to the 1st button (distance B in the figure).

The number of buttons and the intervals between the buttons can be adjusted using the panel switches. (Refer to "Inputting the sewing data" on page 28.)

(Caution) Be sure to make adjustment of the seam allowance after you have turned OFF the power switch.

- 2) Adjust dimension A for ladies' wear should be adjusted following the same procedure as that for men's wear.

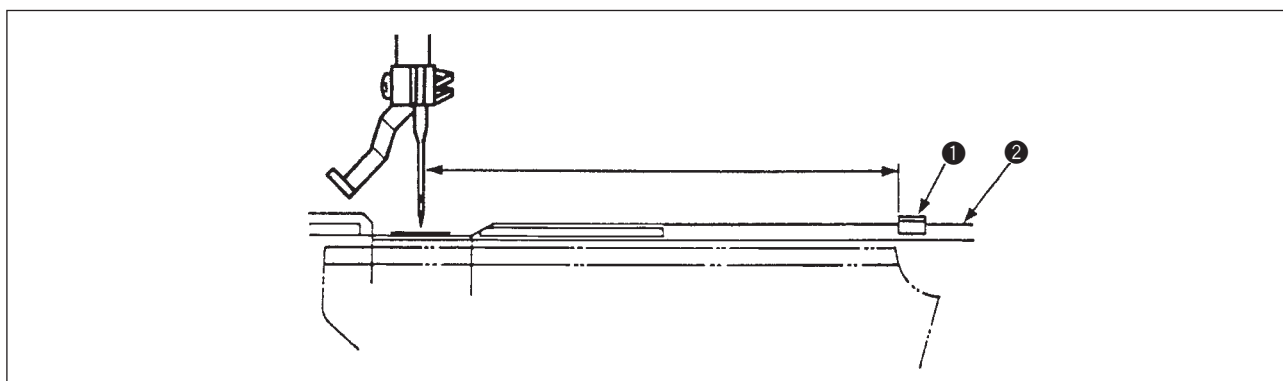
○ Adjusting distance B



Insert gauge ① for ladies' wear supplied with the machine into setting plate, right ②. Then shift the setting plate to the right or left according to scale value ③ desired.

○ Dimension B can also be adjusted in the following procedure.

(Caution) In this case, perform the adjustment after changing over the operation mode from the ladies' wear sewing mode to the men's wear sewing mode.

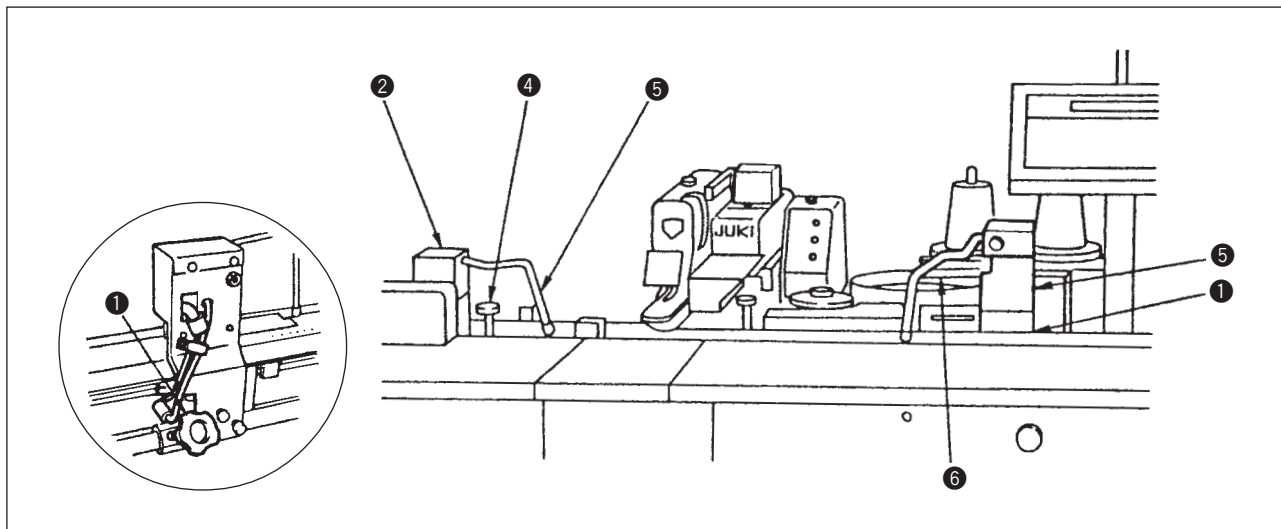


Move gauge ① for ladies' wear supplied with the machine toward the right-hand side of setting plate, right ②. Then sewing is carried out in the order from the button that is closest to the bottom edge of the garment body toward the first button at the top.

(3) Adjusting the position of the work clamp

The position of the work clamp of this unit can be adjusted as desired according to the size of garment to be sewn.

① For garment bodies of men's wear



Loosen knob ④ and shift left-hand side work clamp ② to its leftmost position. Then tighten the knob so that the left-hand side work clamp is fixed at that position. Then loosen knob ① and adjust the position of right-hand side work clamp ⑤ according to the length of the workpiece to be sewn.

(Caution) When making adjustment, be sure that work clamp (right) ⑥ is positioned in the right side of the last button and the distance between them is 40 mm or more. If work clamp (right) ⑥ is not positioned as stated above, the Error (E52) may occur when the machine runs under the automatic operation mode.

② For garment bodies of ladies' wear

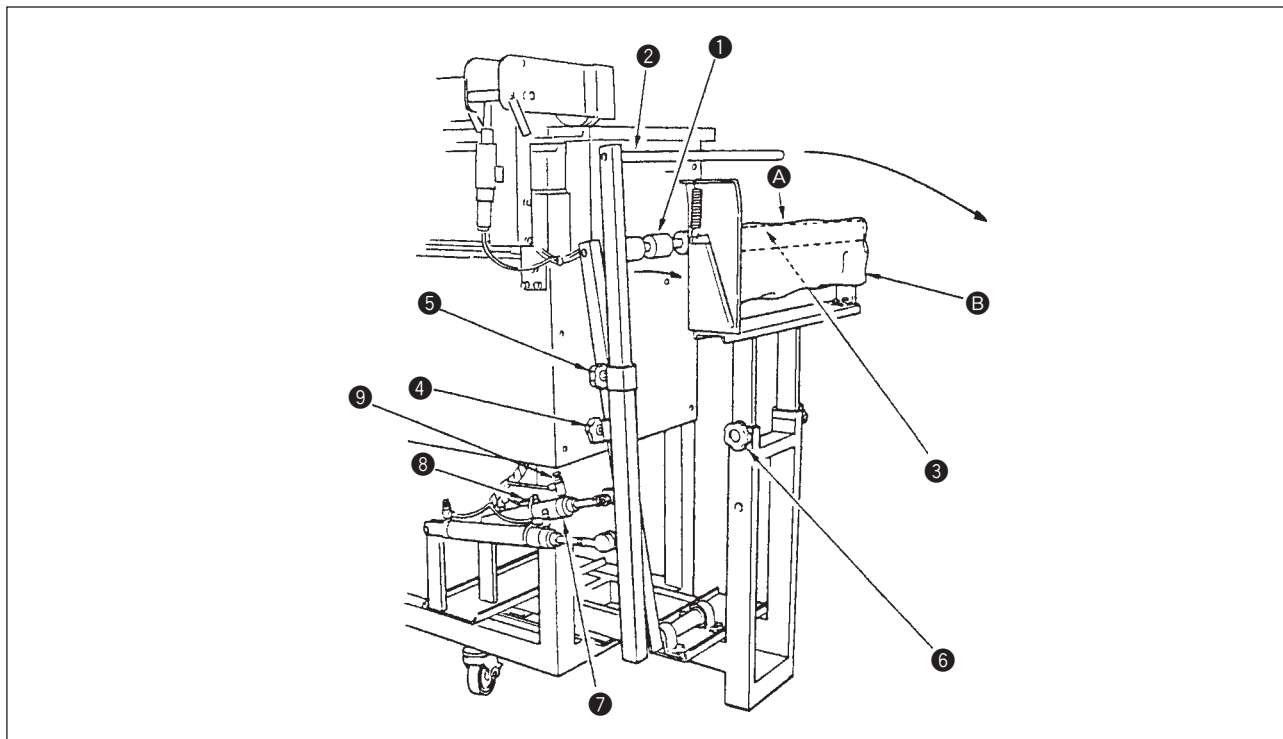
Loosen knob ① and shift left-hand side work clamp ⑤ to its rightmost position. Then tighten the knob so that the work clamp is fixed at that position. Then adjust the position of left-hand side work clamp ② according to the length of the workpiece to be sewn.

(Caution) When making adjustment, be sure that work clamp (left) ③ is positioned in the left side of the last button and the distance between them is 40 mm or more. If work clamp (left) ③ is not positioned as stated above, the Error (E52) may occur when the machine runs in the automatic operation mode.

This device is equipped with a conveyor on its left-hand side. This may prevent you from setting garment bodies of ladies' wear in place on the machine with ease. In this case, you can attach buttons of the garment from its bottom by using the jump function (see p.31.) and the men's wear sewing mode in combination.

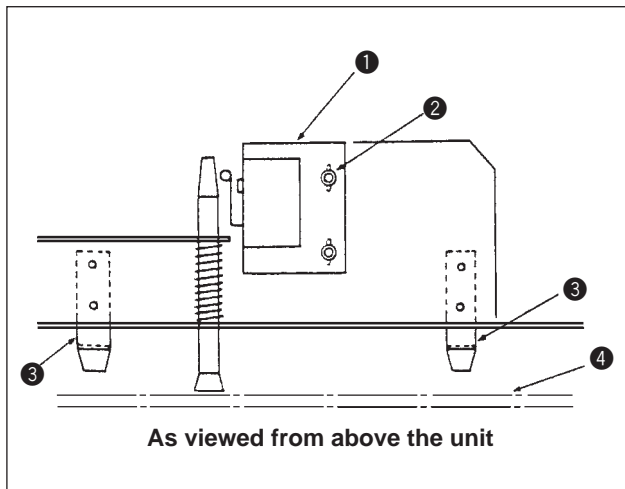
(4) Adjusting the stacker

(Caution) The stacker provided for this device automatically computes the timing to stack the garment regardless of its size and attacks the garments on the stacking board as long as its dimensions are about 180 mm wide or more and 1,000 mm long or shorter. (The stacker does not actuate under the long-material mode or the finished garment mode). Approximately 140 garment bodies (material: T/C broad cloth) with a folded top center plait can be stacked.



- 1) If the garment bodies are stacked on stacking board 3 with its side A shortened, loosen fixing knob 6 and raise stacking board 3. The stacker can also be adjusted by tightening speed controller 9 (turning speed controller clockwise) of work clamp cylinder 7.
At this time, loosen fixing knob 4, and adjust so that work clamp 1 contacts with the center of stacking board 3. Then confirm that swing bar 2 does not come in contact with stacking board 3. (If the bar comes in contact with the board, loosen fixing knob 5, and adjust the height of the stacking board properly.)
- 2) If the garment bodies are stacked on stacking board 3 with its side B shortened, lower stacking board 3.
- 3) The machine is designed to detect the quantity of garments stacked on the stacker using sensor 8 mounted on work clamp cylinder 7. You can make the alarm occur when the quantity of the stacked garment reaches the desired volume predetermined only adjusting the position of sensor 8 appropriately. (Even when the alarm occurs, the machine will not stop running.)

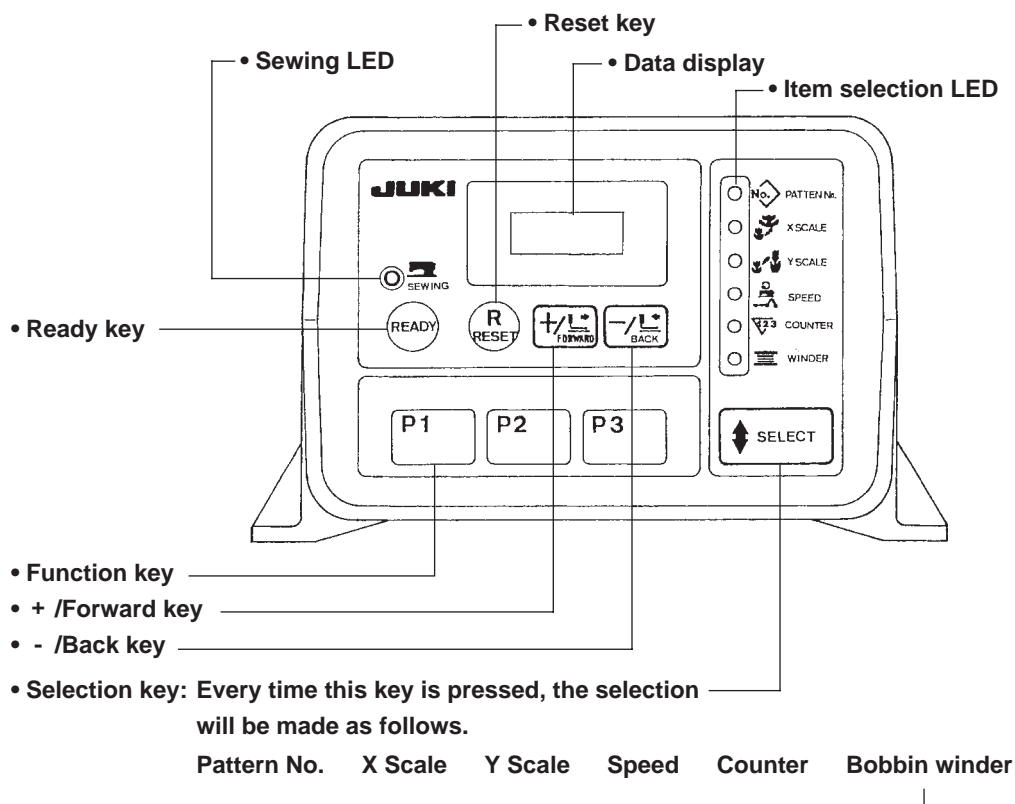
(5) Adjusting the knee switch



- 1) Loosen screw 2 in the switch fixing plate 1, and adjust the stroke of the knee switch.
- 2) Now, confirm that presser plate 4 stops when stopper 3 is reached without fail.

4. OPERATION OF LK

(1) NAMES ON THE operation BOX OF LK



(2) HOW TO OPERATE THE operation BOX OF LK

1) Setting the item data

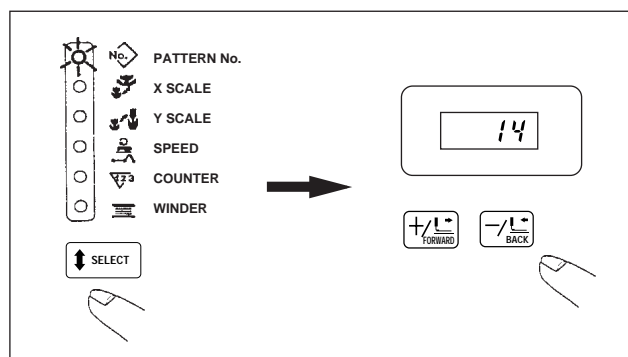
Set each item following the procedure described below.



① Turn ON the power switch.

Pattern No. of the item selection lights up, and the pattern No. is indicated on the data display.
(Pattern No. 1 has been set at the time of delivery.)

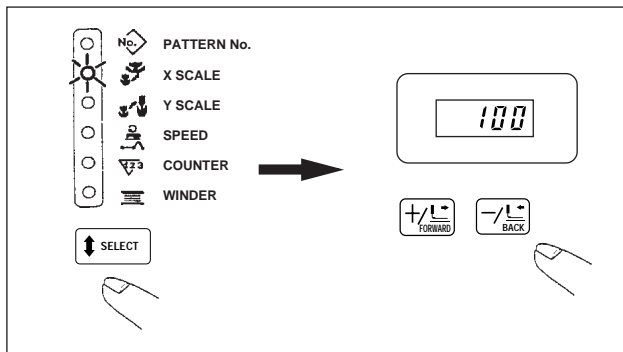
② Setting of the pattern No.






- 1) Press the key to indicate the item "PATTERN No.".
- 2) Press the or key to indicate "14" on the screen.
(Pattern No. is set to 14.)

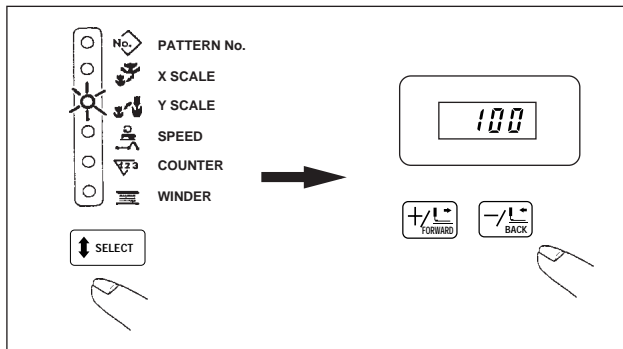
(Caution) For the pattern No. refer to the table of the standard sewing patterns (p.12).




③ Setting of the X scale



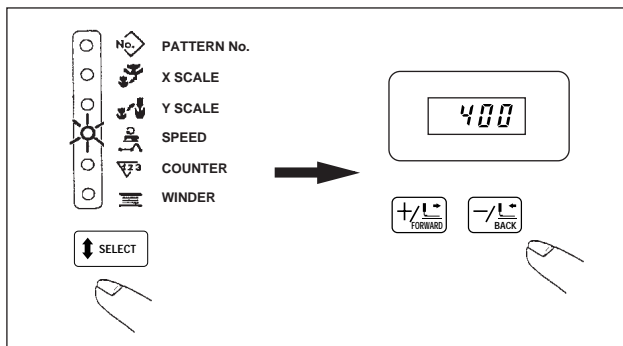
- 1) Press the  key to indicate the item "X SCALE".
- 2) Press the  or  key to set the scale in the range of 20% to 200%.




④ Setting of the Y scale



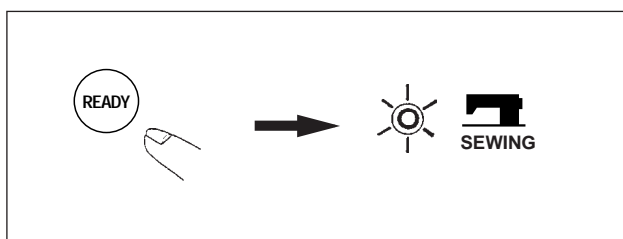
- 1) Press the  key to indicate the item "Y SCALE".
- 2) Press the  or  key to set the scale in the range of 20% to 200%.


⑤ Setting of the max. speed limitation




- 1) Press the  key to indicate the item "SPEED".
- 2) Press the  or  key to indicate "400" on the screen. (Setting of 400 rpm)

⑥ Finish of setting




































- 1) Press the  key.
- 2) After the work clamp feet have moved and gone up, the sewing LED lights up, and the sewing is ready.

* If the  key is pressed, you can make sure of the set values of the respective items again.

(Caution) Use the sewing machine after checking the pattern No. If the Ready switch is pressed while the pattern No. "0" is being displayed (state at the time of delivery), Error "E-1" is displayed. At this time, perform re-setting of the pattern No.

TABLE OF THE STANDARD SEWING PATTERNS

Pattern No.	Stitch shape	Number of threads (thread)	Standard sewing size X (mm)	Standard sewing size Y (mm)	Pattern No.	Stitch shape	Number of threads (thread)	Standard sewing size X (mm)	Standard sewing size Y (mm)
1 (34)		6-6	3.4	3.4	18 (44)		6	3.4	0
2 (35)		8-8			19 (45)		8		
3		10-10			20		10		
4		12-12			21		12		
5 (36)		6-6			22		16		
6 (37)		8-8			23 (46)		6	0	3.4
7		10-10			24		10		
8		12-12			25		12		
9 (38)		6-6			26 (47)		6-6	3.4	3.4
10 (39)		8-8			27		10-10		
11		10-10			28 (48)		6-6		
12 (40)		6-6			29		10-10		
13 (41)		8-8			30 (49)		5-5-5	2.9	2.5
14		10-10			31		8-8-8		
15 (42)		6-6			32 (50)		5-5-5		
16 (43)		8-8			33		8-8-8		
17		10-10							

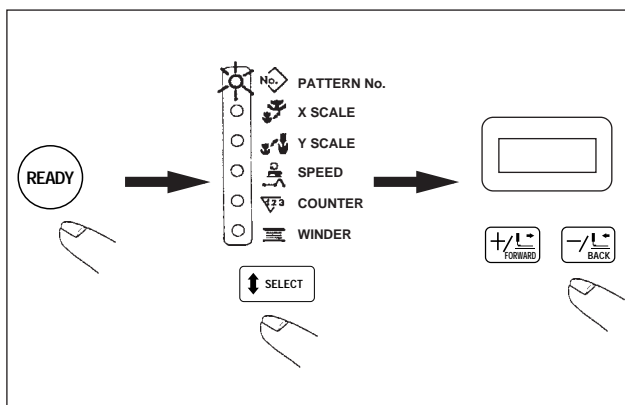
* The standard sewing sizes of X and Y are when the enlargement/reduction rate is 100%.

* Use (34) to (50) when the button hole is small (ø1.5 mm or less).

Table of X/Y scales in terms of the sewing width

X, Y (mm)	2.4	2.6	2.8	3.0	3.2	3.4	3.6	4.0	4.3	4.5	4.7	5.2	5.6	6.0	6.2	6.4
%	71	76	82	88	94	100	106	118	126	132	138	153	165	176	182	188

2) Changing to the other sewing pattern



- ① Press the **READY** key. (The sewing LED will go off.)
- ② Press the **SELECT** key to indicate the item "PATTERN No."
- ③ Set the items ② through ⑥ of 1) setting the item data, and move to the step of "5) Checking the contour of a sewing pattern".

3) Performing sewing using the function keys (**P1**, **P2** and **P3** keys)

If the patterns (No. 1 to 99) which have been already registered are registered in P1 to P7, the pattern calling can be made by one-touch without performing the selection by the pattern No. scrolling.

* When selecting P4, P5, P6 or P7, the selection can be made by the combination of **P1** to **P3** keys.

- | | |
|-------------------------------|-------------------------------------------------------------------------|
| P1 : Press the P1 key. | P4 : Simultaneously press the P1 and P2 keys. |
| P2 : Press the P2 key. | P5 : Simultaneously press the P1 and P3 keys. |
| P3 : Press the P3 key. | P6 : Simultaneously press the P2 and P3 keys. |
| | P7 : Simultaneously press the P1 , P2 and P3 keys. |

① Registration to the function key

Setting example : Register the following setting to the P1.

Pattern No. 3, X Scale rate : 50%, Y Scale rate : 80%, Max. sewing speed limitation : 2,000 rpm

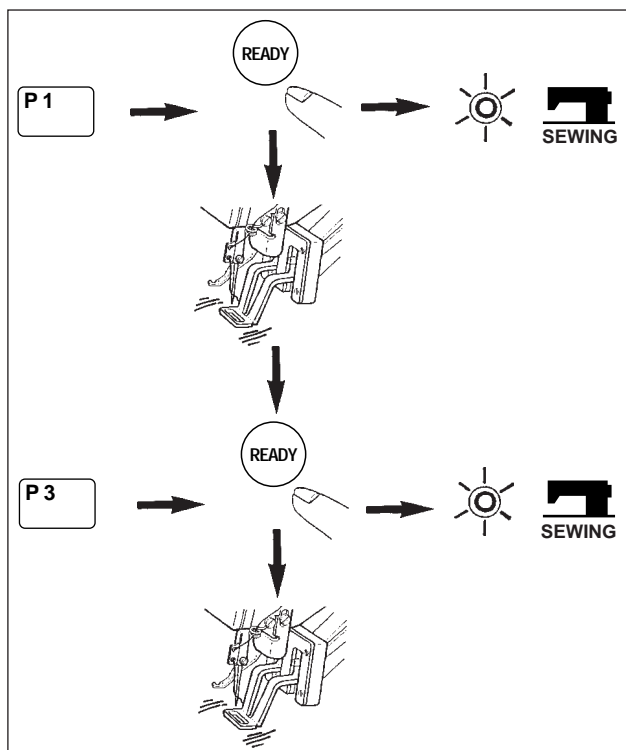
- 1) Pressing the **SELECT** key, turn ON the power switch. ⇒
- 2) Press the **P1** key. ⇒
- 3) Press the **SELECT** key to indicate the PATTERN No.
Set the pattern No. to Pattern No. "3" using the **+/L** or **-/L** key. ⇒
- 4) Press the **SELECT** key, and set X scale rate to 50%, Y Scale rate to 80% and Max. sewing speed limitation to 2,000 rpm using the **+/L** or **-/L** key.
- 5) Press the **READY** key to finalize the registration. ⇒

* If you desire to register in P2 to P7, select P2 to P7 in combination of **P1** to **P3** keys at the step 2), and perform the steps 3) to 5).

- 6) When the registration has been completed, turn OFF the power switch, and again turn ON the power switch. Then the sewing machine can be used as usual.

② Sewing operation

Operation example : After performing sewing with the contents of the registered P1, perform sewing with the contents of P3.



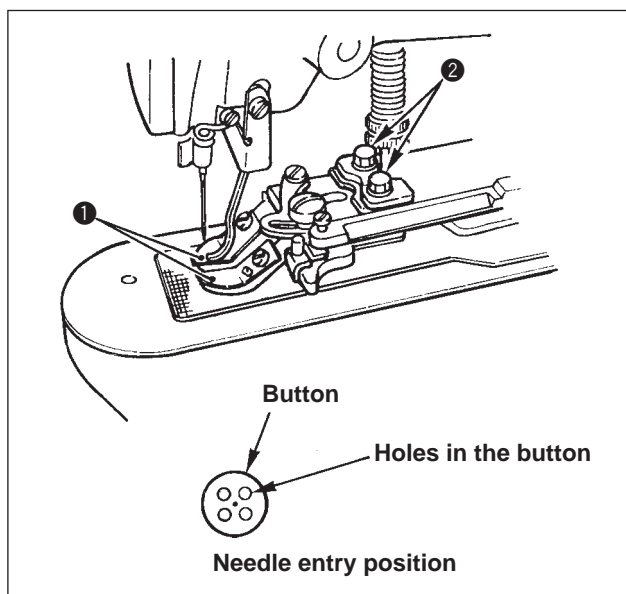
- 1) Turn ON the power switch.
- 2) Press the **P1** key.
- 3) Press the **READY** key, and when the sewing LED lights up, the work clamp foot goes up after it has moved.
- 4) Check the contour of the sewing pattern.
(Refer to the item "Checking the contour of a sewing pattern".)
- 5) If the contour of the sewing pattern is acceptable, the sewing can be made.
- 6) After the completion of sewing, press the **P3** key. Then the work clamp foot will move to the sewing start point after the origin retrieval. The P keys can operate the pattern change by one-touch even when the sewing LED is lighting up.)
- 7) Perform the above items 4) and 5).

* The P1 to P7 keys can be indicated on the display when selecting the pattern by pressing the **+/L** or **-/R** key.

0 to 99 P1 to P7

P1 to P7 which have not been registered are not indicated.

4) Adjusting the position of the button clamps

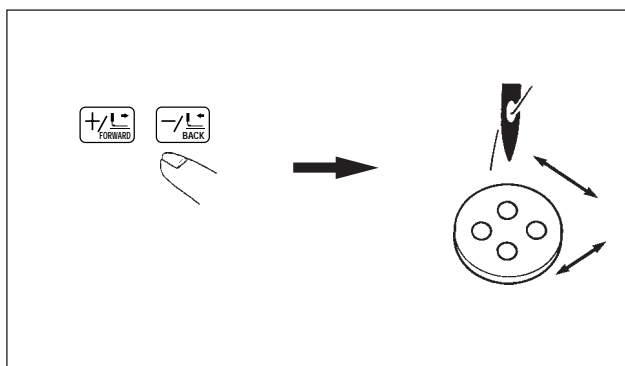


- 1) Set the mode to "Independent operation" mode (P.35) with the operation panel of ACF.
- 2) Press the button feeding switch (P.4) on the BR control box, and place a button in button clamps ①.
- 3) When the knee switch (P.4) is turned ON, button clamps ① come down.
- 4) Holding the knee switch ON, turn the hand pulley until the digital display on the LK control box becomes E3.
- 5) Release the knee from the knee switch.
- 6) Further turn the hand pulley to lower the needle and confirm that the center of the needle is in the center of the button.

(Caution) If the needle is returned to the up-stop position when turning the hand pulley, E3 of the digital display on the LK control box will disappear, and the button clamps ① will go up.

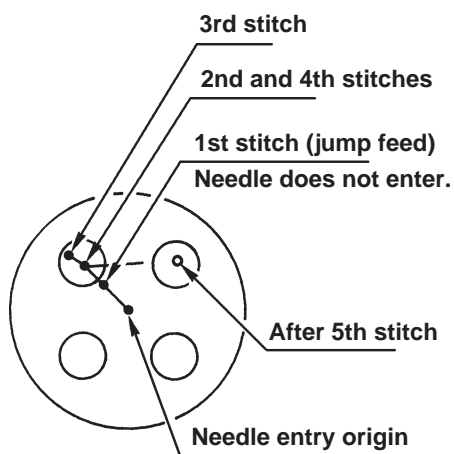
- 7) When the center of the needle is not in the center of the button, loosen setscrews ② in the button clamp unit and adjust so that the center of the needle is in the center of the button.
- 8) After the adjustment, turn the hand pulley to return the needle to its up-stop position. Then E3 of the digital display goes out and the button clamps ① go up.
- 9) Press again the button feeding button on the BR control box, place a button again and perform the step of checking the contour of a sewing pattern (P.15). Then confirm that the needle surely enters the hole in the button.

5) Checking the contour of a sewing pattern



Details of the sewing pattern at the sewing start

- 1st stitch is a jump stitch and the needle does not enter.
- 2nd, 3rd and 4th stitches are tie stitches. Needle enters in the same button hole.



- 1) Set the mode to "Independent operation" mode with the operation panel of ACF. (P.35)
- 2) Press the button feeding switch (P.4) on the BR control box, and place a button in button clamps ❶. (See P.14.)
- 3) When the knee switch (P.4) is turned ON, button clamps ❶ come down. (See P.14.)
- 4) Holding the knee switch ON, press the key on the LK control box, and the button clamps move by one stitch

If the key is pressed even one time, the button clamps do not go up even when the knee is released from the knee switch.

In addition, After the key has been pressed, the key becomes effective as well.

- 5) Turn the hand pulley to lower the needle and confirm that the needle enters the hole of the button.

(Caution) When the hand pulley is turned, E3 of the digital display on the LK control box is displayed. When the E3 is displayed, and keys are ineffective. To make and keys effective, turn the hand pulley, raise the needle up to its up-stop position and make E3 go out.

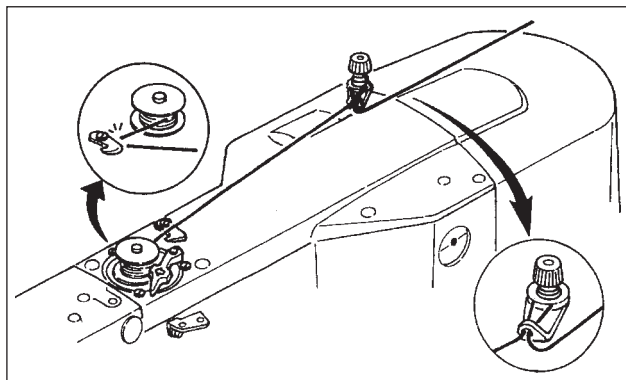
- 6) After confirmation of the needle entry position, press the key on the LK control box. The button clamps return to the origin and go up.

(Caution) At this time, if E3 is displayed, the key becomes ineffective. To make the key effective, turn the hand pulley, raise the needle up to its up-stop position and make E3 go out.

- * Buttons cannot be fed during confirmation of the needle entry position. When feeding the buttons again, press the key to return the button clamps to the origin.

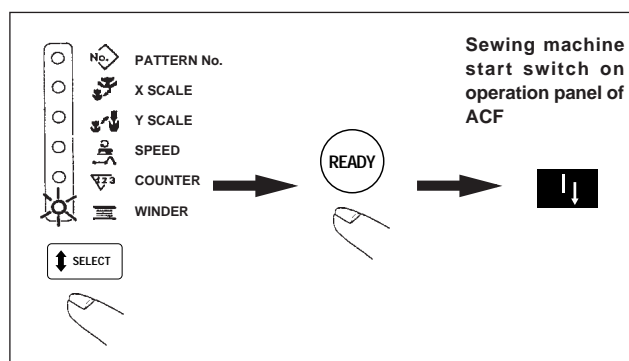
(3) Winding the bobbin thread

1) To wind a bobbin while the sewing machine is performing sewing



Thread the bobbin winder and wind the bobbin thread onto the bobbin as illustrated in the figure.

2) To wind a bobbin independently



- 1) Pull out the thread from the needle.
- 2) Winding a bobbin is performed at the position of the origin of the sewing machine. Be sure to remove the button from the button clamps.
- 3) Set the operation panel of ACF to "Independent operation" mode. (P.35)
- 4) Press **READY** key on the control box of LK to make the sewing LED go out.
- 5) Select "WINDER" with the **SELECT** key on the control box of LK.
- 6) Press again **READY** key to light the sewing LED. At this time, a display as shown below is indicated on the operation panel of ACF.

* * * * * BOBBIN WINDING MODE * * * * *

LK BOBBIN SW OFF

- 7) Press the sewing machine start switch **I↓** on the operation panel of ACF. Then the sewing machine rotates and bobbin thread winding is started.
- 8) To stop the operation, press again the sewing machine start switch **I↓** on the operation panel of ACF or press any key on the control box of LK.
- 9) To return to the normal sewing, press again **READY** key on the control box of LK, select the item other than "WINDER" with **SELECT** key and press again **READY** key to light the sewing LED.
- 10) At this time, a display as shown below is indicated on the operation panel of ACF. Then press **R** switch on the operation panel of ACF.

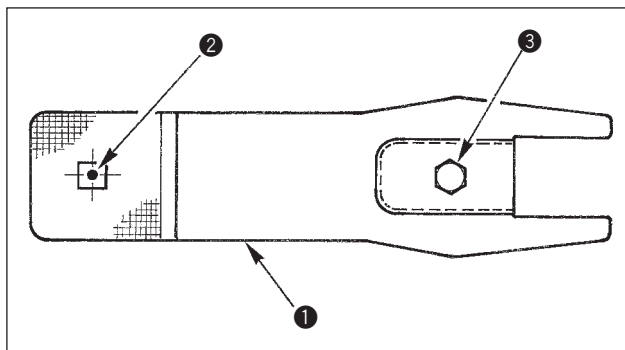
14 * * * * * LK NOT READY * * * * *

LK CHECK RESET START

- * Sewing machine start switch **I↓** does not work for two seconds after stop of bobbin winding operation.
- * Buttons cannot be fed during bobbin winding operation.
- * When the operating method of operation panel of ACF is "Automatic operation" (P.34) or "Manual operation" (P.35), the sewing machine start switch **I↓** does not work even when performing the aforementioned operations of steps 4), 5) and 6). Perform the operations of steps 9) and 10) once to set the operating method of the operation panel of ACF to "Independent operation" mode (P.35), and perform the operations of the aforementioned steps 4), 5) and 6).

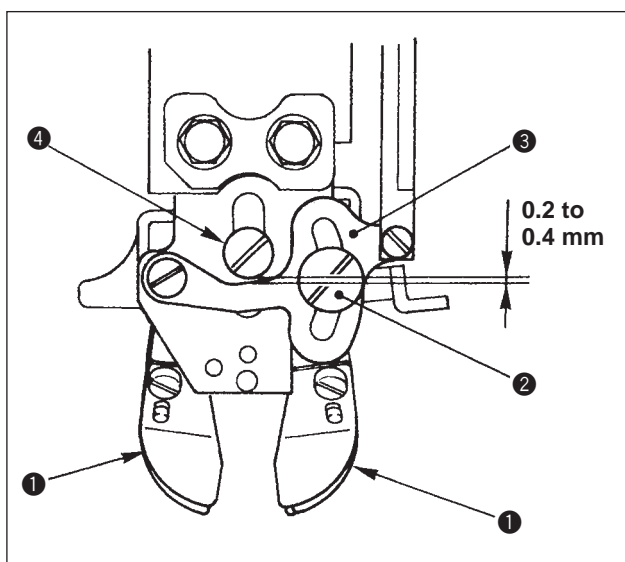
5. ADJUSTMENT OF COMPONENTS OF LK

(1) Adjusting the feed plate



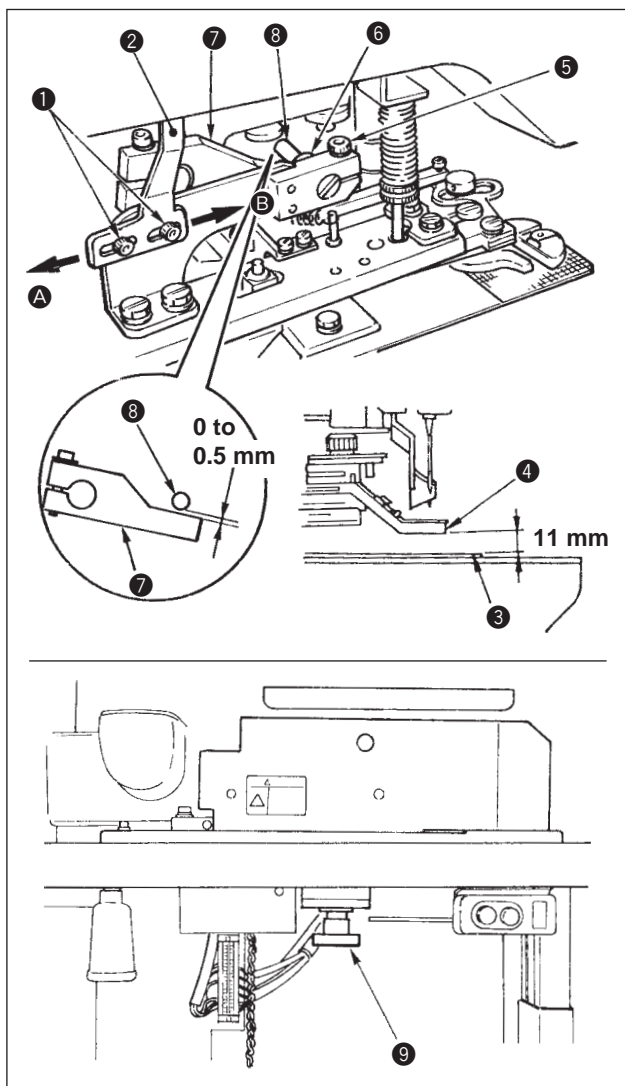
- 1) Select the pattern No. 99 using the operation panel.
- 2) Press the [READY] key on the operation panel. Then the button clamp unit will travel to the position of the origin and go up.
- 3) Press again the [READY] key to make the sewing LED go out.
- 4) Adjust feed plate ① by loosening screw ③ so that needle hole guide ② comes to the center of the recessed part of feed plate ①.

(2) Adjusting the button clamp jaw lever



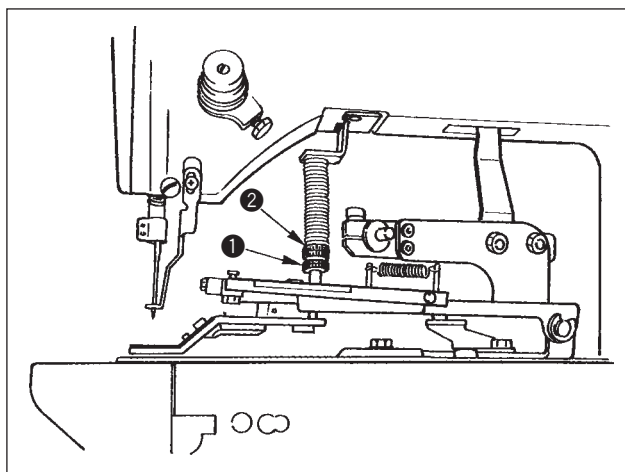
Bring the machine to its stop-motion state. Then lift button clamps ①. Loosen screw ② in the button clamp jaw lever and adjust so that a clearance of 0.2 to 0.4 mm is provided between button clamp jaw ③ and hinge screw ④ when placing a button in between button clamps ①.

(3) Adjusting the lifting amount of the button clamp



- 1) Select the pattern No. 99 using the operation panel.
- 2) Press the [READY] key on the operation panel.
Then the button clamp unit will go up and come to the position of the origin.
- 3) Press again the [READY] key to make the sewing LED go out.
- 4) Loosen two screws ①, and move work clamp foot lifting plate ② back and forth in the direction of arrow to adjust so that the top end of button clamp ④ is 11 mm above throat plate ③.
Move work clamp foot lifting plate ② in direction A to decrease the lifting amount, and move it in direction B to increase the lifting amount.
After the adjustment, securely tighten screws ①.
- 5) Turn knob ⑨ of the spinner oscillating arm motor on the unit side, and when work clamp lifting arm ⑦ has stopped its lifting once, loosen screw ⑤ and turn work clamp hook ⑥ to adjust so that a clearance of 0 to 0.5 mm is provided between roller ⑧ and work clamp lifting arm ⑦.
- 6) After the adjustment, check that the buttons are securely supplied.

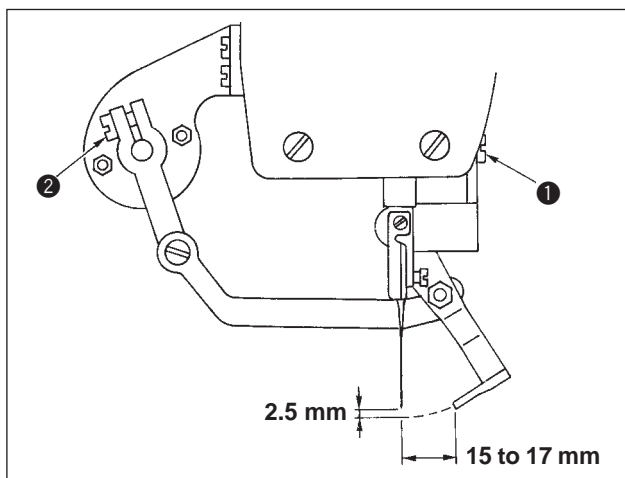
(4) Adjustment of the pressure of the button clamp unit



The pressure of the button clamp unit should be minimized as long as the material does not warp during sewing.

Loosen adjusting screw ① and turn adjusting screw ② to obtain the aforementioned pressure.

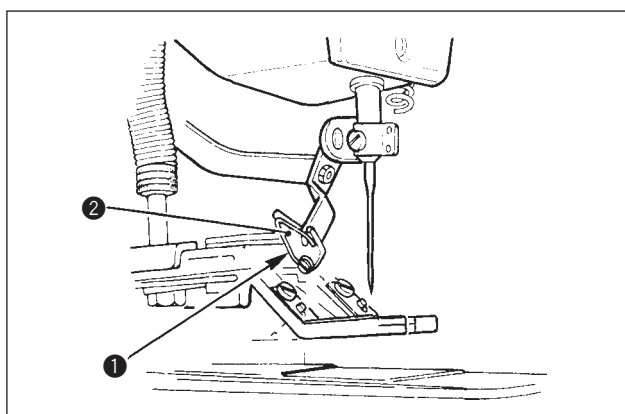
(5) Adjustment of the wiper



- 1) Loosen screw ❶ to adjust so that a clearance of 2.5 mm or more is provided between the wiper and the needle.
- 2) Loosen screw ❷ to adjust so that a distance of 15 to 17 mm is provided between the end face of the wiper and the center of the needle. After the adjustment, securely tighten the screw.

(Caution) The position of the needle is where the sewing machine has stopped at the end of sewing.

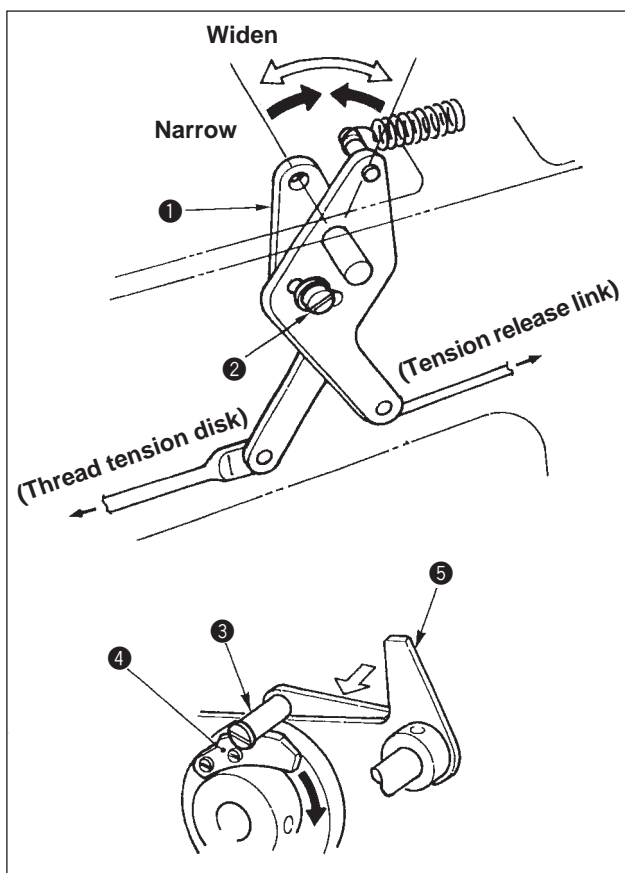
(6) Adjustment of the wiper spring



Wiper spring ❶ retains the needle thread after thread trimming in between wiper ❷ and the wiper spring. Correct properly the tension of wiper spring ❶ so that the tension at that time becomes 0.2 to 0.3 N (a little higher tension than that of the bobbin thread coming out of the bobbin case).

(Caution) If the retaining of the needle thread is excessive, the thread may protrude from the upper side of the button.

(7) Adjusting the rising amount of the thread tension disk



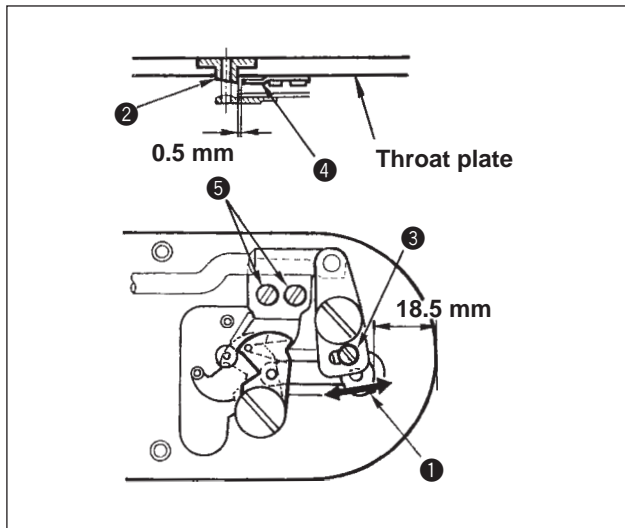
- 1) Remove the top cover. Make sure that tension release pin ③ rides on tension release notch ④.
- 2) If the pin does not ride on the notch, push cam follower ⑤ by hand to the ⇨ direction, and rotate the main shaft in the correct direction to make a state as illustrated in the figure.
- 3) Under the state as illustrated in the figure, loosen setscrew ② in the tension release adjusting arm. By moving tension release adjusting arm ① to the left or right, the rising amount of the thread tension disk will change.

S type : 0.6 to 0.8 mm

H type : 0.8 to 1.0 mm

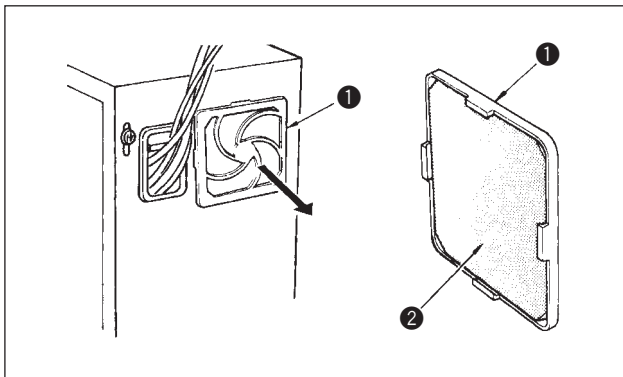
(Caution) If the rising amount is insufficient, the length of the remaining thread after thread trimming will be not stable. If the rising amount is excessive, after releasing the rising of the thread tension disk, the disk closing will be defective.

(8) The moving knife and counter knife



- 1) Loosen adjusting screw ③ so that a clearance of 18.5 mm is provided between the front end of the throat plate and the top end of thread trimmer lever, small ①. To adjust, move the moving knife in the direction of arrow.
- 2) Loosen setscrews ⑤ so that a clearance of 0.5 mm is provided between needle hole guide ② and counter knife ④. To adjust, move the counter knife.

(9) Cleaning the filter

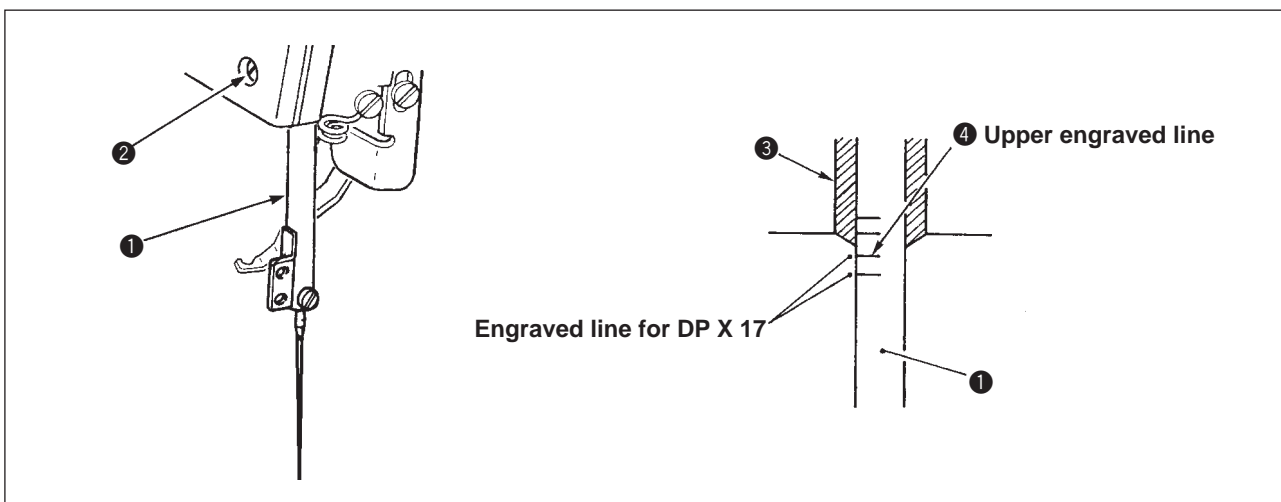


Clean filter ② of the control box fan once every week.

(Caution) The sewing machine may stop to protect it from overheating when the sewing is continued in the state that the filter clogs with dust.

- 1) Pull screen kit ① in the direction of arrow to remove it.
- 2) Wash filter ② under running water.
- 3) Reinstall filter ② and screen kit ①.

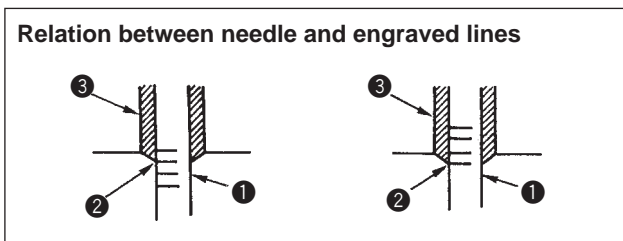
(10) Adjusting the height of the needle bar



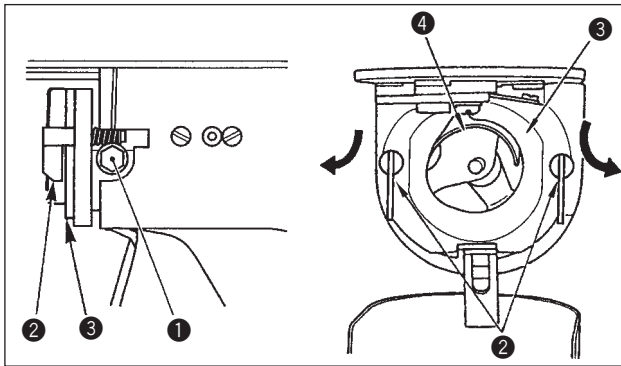
Bring needle bar ① to the lowest position of its stroke. Loosen needle bar connection screw ② and adjust so that upper marker line ④ engraved on the needle bar aligns with the bottom end of needle bar bushing, lower ③.

(Caution) After the adjustment, make sure that there is no uneven torque.

(11) Adjusting the needle-to-hook relation

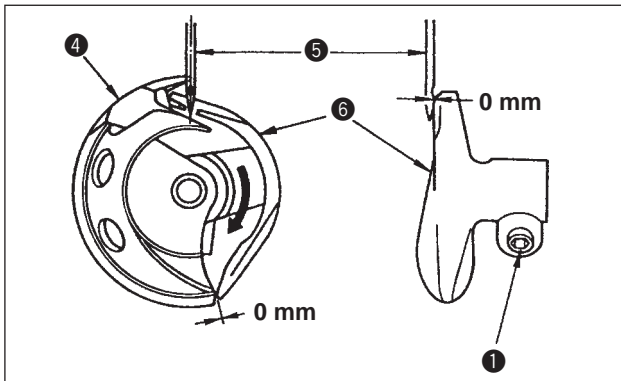


- 1) Turn the handwheel by hand. When needle bar ① has gone up, adjust so that lower marker line ② engraved on the needle bar aligns with the bottom end of the needle bar bushing, lower.

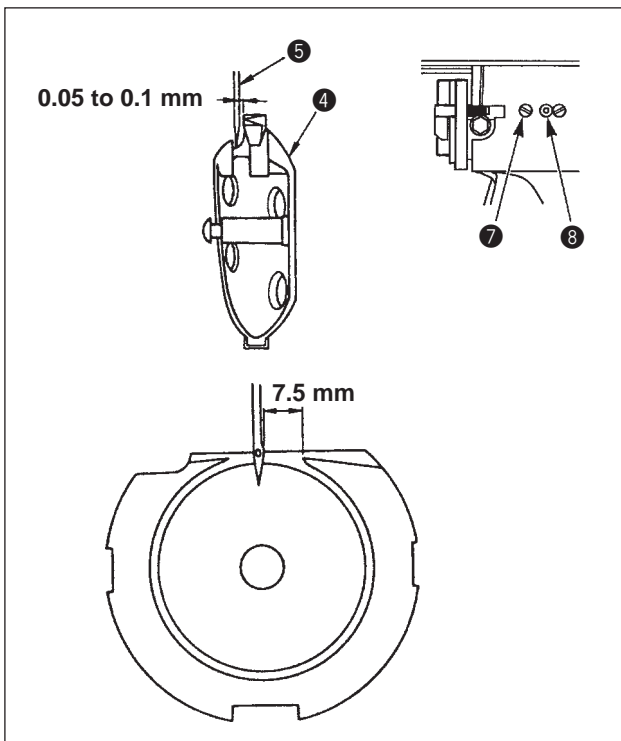


- 2) Loosen setscrew ❶ in the driver. Open inner hook presser hooks ❷ to the right and left, and remove inner hook presser.

(Caution) At this time, be careful not to make inner hook ❹ come off and fall.





- 3) Adjust so that the blade point of inner hook ❹ aligns with the center of needle ❺, and that a clearance of "0" mm is provided between the front end of the driver and the needle as the front end face of driver ❻ receives the needle to prevent the needle from being bent. Then tighten setscrew ❶ of the driver.

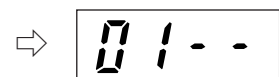


- 4) Loosen setscrew ❷ of the shuttle, and adjust the longitudinal position of the shuttle. To do this adjustment, turn shuttle race adjusting shaft ❸ clockwise or counterclockwise to provide a 0.05 to 0.1 mm clearance between needle ❺ and the blade point of inner hook ❹.
- 5) After adjusting the longitudinal position of the shuttle, further adjust to provide a 7.5 mm clearance between the needle and the shuttle by adjusting the rotating direction. Then tighten setscrew ❷ of the shuttle.

(12) How to use the memory switch

1) Starting the memory switch



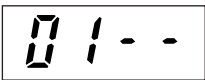





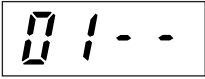
Pressing  key and  key, turn ON the power switch. The display gives the indication of the memory switch and the sewing machine operation can be changed.



2) Example of the memory switch setting

① Setting of max. sewing speed limitation

Example of setting : Setting the max. sewing speed limitation to 1,800 rpm.

- 1) After the memory switch has started, press the  or  key to indicate "01--" on the display. 
- 2) Press the  key to light up the sewing LED. 
- 3) Indicate "1800" using the  key. 
- 4) After setting, register using the  key. 

② Setting the soft start speed at the sewing start



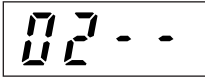

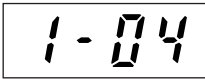

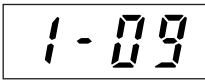

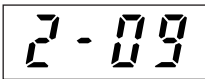

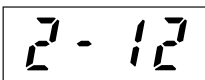

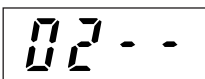
The speed of the first stitch to the fifth stitch at the sewing start can be changed in a unit of 100 rpm.

Unit [rpm]

	State when delivered	Setting range
1st stitch	400	400 to 900
2nd stitch	900	400 to 2,700
3rd stitch	2,300	400 to 2,700
4th stitch	2,300	400 to 2,700
5th stitch	2,300	400 to 2,700



(Caution) For the max. sewing speed, the memory switch No. 01 (setting the upper limit of sewing speed) has priority.

Example of setting : The speed is changed as follows : 1st stitch 400 900 rpm, 2nd stitch 900 1,200 rpm


- 1) After the memory switch has started, press the  or  key to indicate "02--" on the display. 
- 2) Press the  key to light up the sewing LED.
(The 1st stitch, 400 rpm. will be indicated.) 
- 3) Press the  key to indicate "1-09".
(900 rpm is set.) 
- 4) Press the  key.
(The 2nd stitch, 900 rpm, will be indicated.) 
- 5) Press the  key to indicate "2-12".
(1,200 rpm is set.) 
- 6) After setting, register using the  key. 

③ Setting whether the calling of the pattern data is operative or not

By making inoperative the calling of the unnecessary pattern, this setting prevents the different pattern from calling by mistake. Also, it is possible to call and use the necessary pattern.

- 1) After the memory switch has started, press the  or  key to indicate "03 - -" on the display.

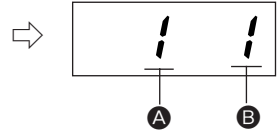



- 2) Press the  key to light up the sewing LED.

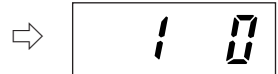
Indication on **A** section : 0 : Pattern No.


Indication on **B** section : 0 : Calling is inoperative.

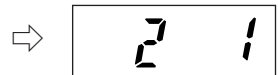
1 : Calling is operative.




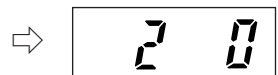
- 3) Press the  key to make the indication on **B** "1" "0".



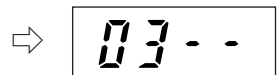
- 4) Press the  key to make the indication on **A** "1" "2".




- 5) Press the  key to make the indication on **B** "1" "0".





- 6) After setting, register using the  key.




(Caution) After operating the step 2), if the  key is pressed, the setting will return to the state when the machine was delivered.


3) Setting the counter operation

Example of setting : The production counter (adding counter) can be changed to the bobbin thread counter (subtracting counter).

- 1) After the memory switch has started, press the  or  key to indicate "05 - 0" on the display.

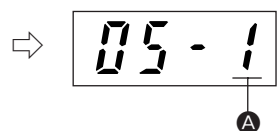


- 2) Press the  key to light up the sewing LED.

- 3) Press the  key to indicate "05 - 1".

Indication on **A** section : 0 : Production counter

1 : Bobbin thread counter



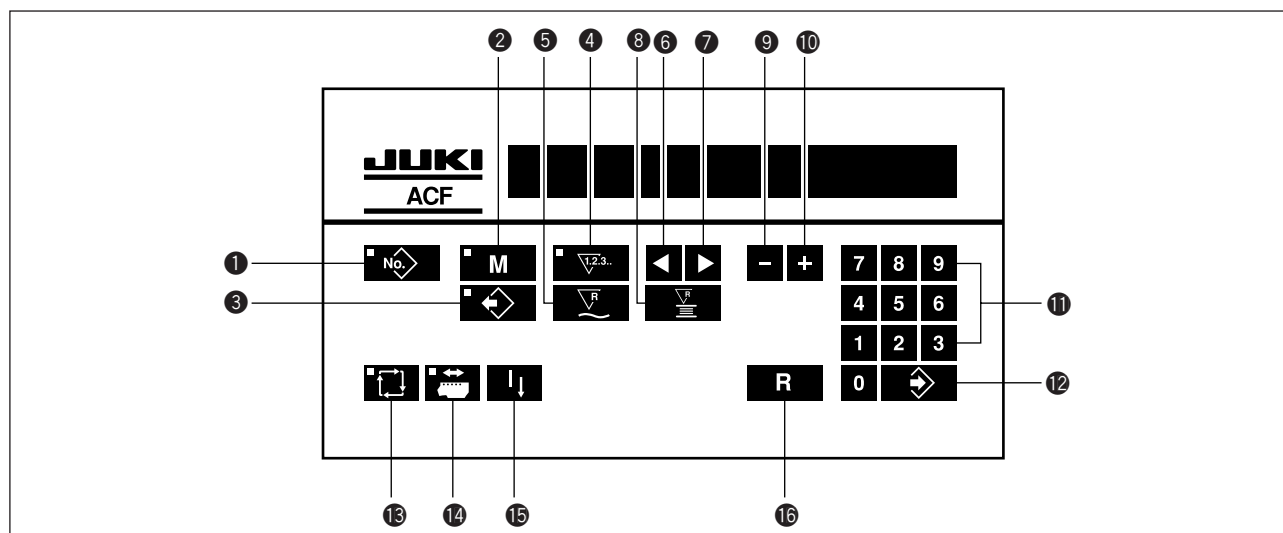
- 4) After setting, register using the  key.

4) Table of functions of the memory switch

No.	Function	Setting range	State when delivered
01	Setting of the max. sewing speed limitation (in a unit of 100 rpm)	400 to 2,700 rpm	2,300 rpm
02	Starting speed of 1st to 5th stitch at the sewing start is set in a unit of 100 rpm.	1st stitch : 400 to 900 2nd stitch : 400 to 2,700 3rd stitch : 400 to 2,700 4th stitch : 400 to 2,700 5th stitch : 400 to 2,700	400 rpm 900 rpm 2,300 rpm 2,300 rpm 2,300 rpm
03	This function sets whether or not the calling of the standard 30 pattern data is acceptable (Interference of the needle with the aork clamp feet can be prevented prohibiting the calling of the sewing pattern which is large than the work clamp feet).	Pattern Nos. 1 to 33 can be individually set. 0 : Calling not accepted 1 : Calling accepted	
04	This function sets whether or not the display and change of X/Y scale rate and max. sewing speed are acceptable. (Prevention of maloperation)	0 : Effective 1 : Ineffective	0
05	Setting of the counter operation Production counter : Adding counter Bobbin thread counter : Subtracting counter	0 : Adding 1 : Subtracting	0
06	This function sets the needle bar stop position. Under the upper dead point stop mode, the machine rotates in the reverse direction from the upper stop position and returns to the needle bar upper dead point. Then it stops.	0 : Upper position stop (53°) 1 : Upper dead point stop (0°)	0
07	Do not change the setting of Nos. 07 to 99.		0
08			0
09			0
10			0
11			0
12			0
13			1
14			0
15			0
16			0
17			1
18			0
19			0
20			0
21			0
99			8

6. OPERATION OF ACF

(1) Explanation of the operation panel of ACF



Switch No.	Panel indication	Switch name	Function and operation
①		Memory No. selector switch	Used to select the memory number.
②		Sewing data input switch	Used to input the data for the number of buttons or button intervals.
③		Sewing data check switch	Used to check the data for the number of buttons or button intervals.
④		Counter setting switch	Used to input numbers for the shirt counter.
⑤		Shirt counter clear switch	Used to clear the numbers counted on the shirt counter.
⑥		Back switch	Used to return the current screen display or to shift the carriage to the left under the manual operation mode.
⑦		Forward switch	Used to forward the current screen display or to shift the carriage to the right under the manual operation mode.
⑧		Bobbin counter reset switch	Used to reset the number shown on the bobbin counter to the initial value (set value).
⑨		Minus (reduction) switch	Used to reduce numbers when inputting data.
⑩		Plus (addition) switch	Used to add numbers when inputting data.
⑪		Number switch (numeric keys)	Used to specify numbers when inputting data.
⑫		Entry key	Used to enter numeric data.
⑬		Automatic operation selecting switch	Used to select automatic operation.
⑭		Carriage travel switch	Used to move the carriage in the manual operation mode or independent operation mode.
⑮		Sewing machine start switch	Used to actuate the sewing machine independently.
⑯		Reset switch	Used to clear an error message on the display, and reset the machine.

(2) Preparation before operation

Be sure to check the following before turning ON the power switch.

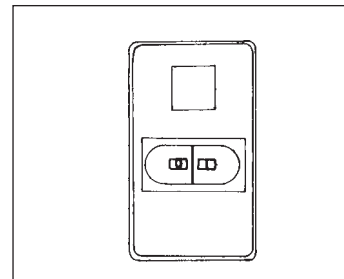
- 1) The machine is supplied with an adequate amount of machine oil.
- 2) The power connector is properly connected and the voltage is correct.
- 3) The connectors are connected.
- 4) The operating air blower is connected and the operating air pressure is correct.
- 5) The machine rotates in the correct direction.
- 6) The "Function setting" described on pages 42 to 45 have been made properly.
- 7) The sewing machine is in the state of stop-motion.

<Turning ON the power>

Turn ON the power switch. (Refer to the figure on the right.)

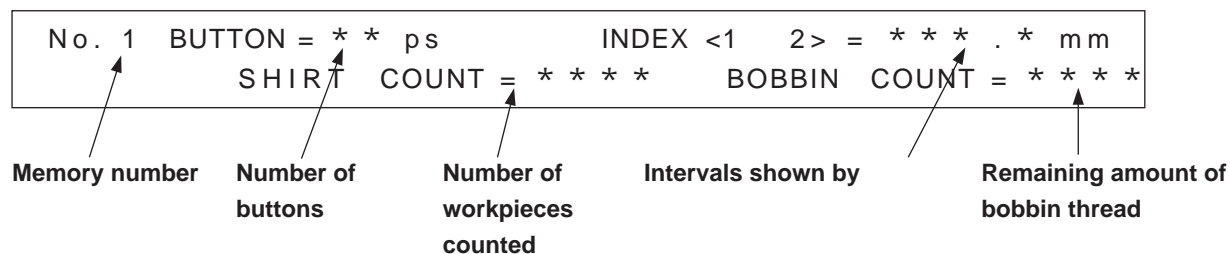
After the work clamp goes up, the carriage is raised to start retrieving the origin.

When retrieving the origin, the following message will be indicated on the display screen, and pressing any other switch except the emergency stop switch will not be possible.



* The origin of carriage is the sewing start position of the first button.

When the origin is reached, the standard indication of the memory numbers indicated before the power was turned off will appear on the display screen.



The asterisks (*) on the display screen show the spaces where the specified numbers required for the sewing operation are to be inputted.

(Caution) When an error message is indicated on the display screen (the display screen is in red), the machine will not retrieve the origin until the error is released (the error mode is released). Refer to the pages 36 to 41 as to how to clear the error.

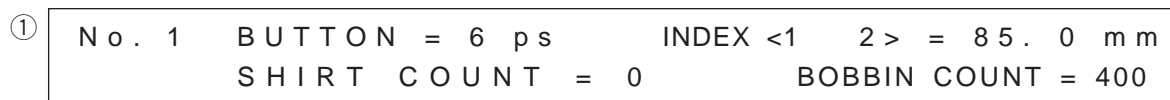
Upon completion of the above procedures, "Inputting and confirming data" or "Operation" can be performed. However, these operations using the panel switches are possible only when the following conditions are satisfied.

- The machine is ready to run in the automatic operation mode or in the independent operation mode. (Refer to pages 34 to 35 for automatic operation and independent operation.)
- The standard indication appears on the display screen. (No error message is indicated on the screen.)

(3) Inputting and confirming data

1) Memory number selection

Used to call up the sewing pattern data stored in a memory number except that on the display screen. (Example) How to select memory No. "2"




Press so that the LED lights up. ()



Input the desired memory number (2).

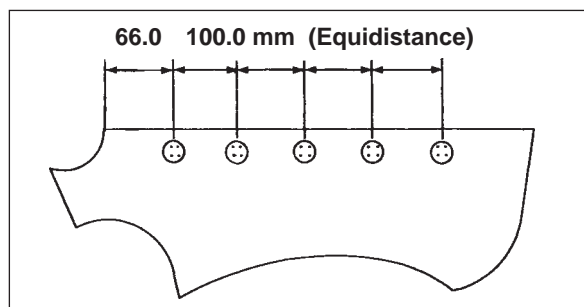


The details of specified pattern No. "2" are indicated.

+ Increase the number specified.	R Return to the previous number.
- Reduce the number specified	 No. Delete the input data.

If a number except one of the above is specified, the error message shown below will be indicated for three seconds, and then the screen display will return to give indication ②.

(Example)	○ Number of buttons	5
	○ Button intervals	100.0 mm
	○ Cross-over stitch	Provided
	○ Distance for jump	66.0 mm
	○ The designated number under which is to be stored	No. 2



5 

- 6 6 0 

1 0 0 0 ➡

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[Shortened operation]

When the buttons are sewn in the equal interval, you only input steps of procedure from ①, ② and ④. Steps ⑤ to ⑦ are omitted to enable the shortened input operation.

④' No. 1 DATA INPUT
BUTTON = 5 p s INDEX < 1 5 > = 400.0 m m

Input the distance from the first buttonhole to the 5th one (400.0 mm).

4 0 0 0

The button intervals can be specified in 0.1 mm increments. If you know that seam shrinkage will occur because of the material used, be sure to input the distance data properly adjusted to allow for the shrinkage.

⑤ No. 1 DATA INPUT
BUTTON = 5 p s INDEX < 2 3 > = 100.0 m m

Input the distance (100.0 mm) between the 2nd and the 3rd button.

1 0 0 0

⑥ No. 1 DATA INPUT
BUTTON = 5 p s INDEX < 3 4 > = 100.0 m m

Input the distance (100.0 mm) between the 3rd and the 4th button.

1 0 0 0

⑦ No. 1 DATA INPUT
BUTTON = 5 p s INDEX < 4 5 > = 100.0 m m

Input the distance (100.0 mm) between the 4th and the 5th button.

1 0 0 0

• Input data in the area bounded by a dotted line will be shown only for the “long material mode”. (Refer to page 43 for how to set the mode.)

⑧ No. 1 DATA INPUT
RETURN BUTTON No. = 4

Input the button number “4” to specify the position to return the carriage to its origin.

4

⑨ No. 1 DATA INPUT
STACK MODE = AUTO

Select the mode which allows the stacker timing to be automatically determined.

- or +

AUTO = The mode under which the cloth sensor automatically determines the stacker timing.

MANUAL = The mode under which requires the operator to input the stacker timing through the operation panel.

Most kinds of materials can be automatically stacked. However, if using the material (e.g., black materials, light-weight materials, etc.) which cannot be detected by the sensor, set the mode to the “MANUAL” and input the desired value for stacker timing through the operation panel.

If the cloth sensor is incapable of detecting the material used, input data described in ⑨' instead of that in ⑨. This will allow you to specify the stacker timing.

⑨' No. 1 DATA INPUT
STACK MODE = MANUAL

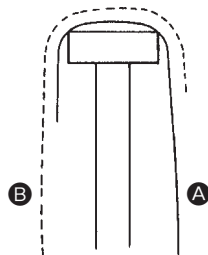
Select the mode to allow you to input the data on the stacker timing through the operation panel.

- or + 

⑩ No. 1 DATA INPUT
STACKER TIMING = 10

Specify the value for the stacker timing "10".

[As observed from the operator's side]



1 0 

You can specify the value for the stacker timing from 1 through 20.


Decrease the value for the stacker timing if the top center plait is stacked as A (solid line), or increase the value if it is stacked as B (broken line).

* Confirm that the setting of the frequency (50/60Hz) are correct (Refer to page 43.)

- Input data in the area bounded by a dotted line will be shown only for the "pair stacking mode". (Refer to page 44 for how to set the mode.)

⑪ No. 1 DATA INPUT
PAIR STACKING = ON

Specify the pair stacking mode. Once the stacker is set to this mode, the machine repeats the steps of "normal button sewing" and of "stacking only in the written order."

- or +  (ON = With pair stacking, OFF = Without pair stacking)

How to operate the pair stacking feature

- ① Carry out the steps of procedure for the normal button sewing.
- ② Set the material in place on the sewing machine as in the case of the normal button sewing.
- ③ Press the Start switch, and release it. Then the material will be clamped and fed without being sewn, and it will be stacked.


From step ④ and beyond, steps ① through ③ will be repeated.

⑫ No. SELECT
MEMORY No. = 2

Input the memory number (2) under which the data is to be stored.

2 

⑬ No. 2 BUTTON = 5 p s INDEX <1 2 > = 100 . 0 mm

The details of the previous data under the memory number designated in step ⑫ will flash on and off. Press  again when the newly input data is to be stored instead of the previous data. (If other data is to be inputted, press **R** to return the display screen to step ⑫.)

⑭

N o . 2 B U T T O N = 5 p s I N D E X < 1 2 > = 1 0 0 . 0 m m
C R O S S S H I R T C O U N T = 0 B O B B I N C O U N T = 4 0 0

The newly input data is stored under memory switch number "2". This completes the input procedure. (The previous data remains stored under memory number "1".)

* The following switches are valid when inputting data.

The number specified is increased.

The number specified is reduced.

The previous indication display is restored.

The indication display is scrolled forward.

The previous number is restored.

The input data is deleted.

- (Caution)**
1. The number of buttons that can be specified in step ② is from "2" through "20". If you input any number except these, the corresponding error message will appear on the display screen for three seconds. If this occurs, specify the correct number of buttons. A single button can be sewn only when the machine is in the manual operation mode or independent operation mode. (See page 35.)
 2. When the total sum of each button interval specified in step ③ through ⑦ is not within the range of 25.0 mm to 650.0 mm, the same error message as stated above will appear on the screen. However, for the long-material mode, when the total sum of each button interval is not within the range of 25.0 mm to 1,200.0 mm, the error message will appear.
 3. If the button number specified in step ⑧ indicating the position to return the carriage to its origin exceeds the number of buttons specified in step ② or is set to "1", the same error message will be shown on the display screen.
 4. If the total sum of the feed amount up to the button number specified in step ⑧ indicating the position to return the carriage to its origin exceeds 650 mm, the same error message will appear on the display screen.
 5. If a number except "1 through 20" is specified for the value for stacker timing in step ⑩, the same error message as stated above will be shown on the display screen.
 6. If a number except "1 through 20" is specified in step ⑫, the same error message as stated above will be shown on the display screen.

Error indication on the display screen



3) Checking the sewing data

The details of the sewing data stored under the designated memory number are shown on the display screen.

(At this time, the data input is not possible.)

(Example) Machine operation to check the details of the data stored in memory in "2. Input of the sewing data"

①

N o . 2 B U T T O N = 5 p s I N D E X < 1 2 > = 1 0 0 . 0 m m
C R O S S S H I R T C O U N T = 0 B O B B I N C O U N T = 4 0 0

Press so that the sewing LED lights up. ()

- Input data in the area bounded by a dotted line will be shown only for the "jump function" or "long-material mode". (Refer to page 60 for how to set the mode.)

②

J U M P = 6 6 . 0 m m
R E T U R N B U T T O N N o . = 4

The distance for jump and the button number indicating the position to make the carriage return to its origin are shown on the display screen.

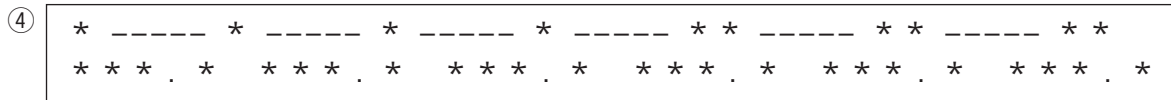


③

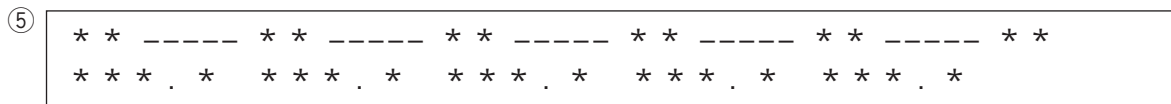
B U T N (p s) 1 2 3 4 5 *
I N D X (m m) 100.0 100.0 100.0 100.0 * * * . *

The intervals from the first button to the 6th button are shown on the display screen.

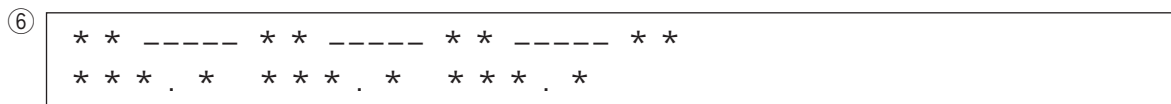




The intervals from the 6th button to the 12th button are shown on the display screen.



The intervals from 12th button to the 17th button are shown on the display screen.



The intervals from the 17th button to the 20th button are shown on the display screen.



With/without pair stacking is shown on the display screen only when the machine is set to the “pair stacking mode”. (ON = With pair stacking, OFF = Without pair stacking)



This indication shows that the mode under which the cloth sensor automatically determines the stacker timing has been specified.

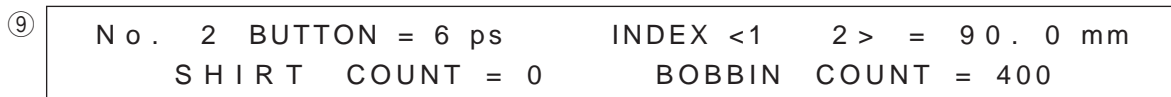


If the stacker timing is set to the manual mode, the indication given in step 8') will be shown on the display screen instead of that given in step 8)



This indication tells you that the mode under which requires the operator to input the stacker timing through the operation panel has been specified.

This indication also tells you that the stacker timing has been set to “10”.



The display screen returns to the standard screen.

(Caution) The following switches are valid when checking the details of data.



The previous indication display is restored.



The entered data is canceled.

4) Counter settings

Specify the initial values for the shirt counter and bobbin thread counter.

Shirt counter : The counter adds one (1) to the value after one shirt is finished.

Bobbin thread counter : The counter subtracts one (1) from the value after one button is finished.

(Example) The initial value for the shirt counter : 0 (The counter starts counting from the 1st shirt finished.)

The initial value for the bobbin thread counter : 400 (400 buttons can be sewn. Under the automatic operation, the machine finishes 80 pieces of shirt each of which has five buttons and then automatically stops. If sewing six buttons on each of shirt, the machine finishes 66 pieces of shirt (6 buttons x 66 = 396 buttons) and automatically stops with the button thread to sew four buttons remained.)

①	No. 1	BUTTON = 5 ps	INDEX <1	2> = 100.0 mm
		SHIRT COUNT = 0		BOBBIN COUNT = 450

Press  so that the LED lights up. ()

②

• • • • • • • • • • • • • • • •	DATA	INPUT	• • • • • • • • • • • • • • • •
		SHIRT	COUNTER = 0

Input the initial value for the shirt counter.

0 

③

• • • • • • • • • • • • • •	DATA	INPUT	• • • • • • • • • •
		BOBBIN	COUNTER = 400

Input the initial value for the bobbin counter.

400 

④ No. 1 BUTTON = 5 ps INDEX <1 2> = 100.0 mm
SHIRT COUNT = 0 BOBBIN COUNT = 400

This completes the data input for the counter settings.

* The following switch operations are valid when inputting data.

- +** Increase the number specified.


R Return to the previous number.


- Decrease the number specified.


 M Delete the input data.

◀ The previous indication display is restored. () Delete the input data.

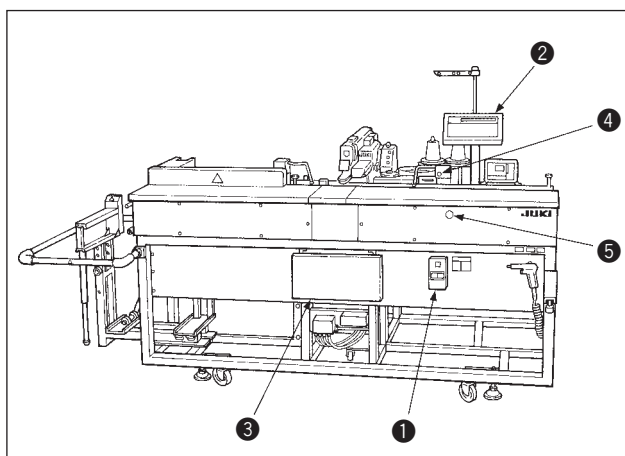
 The indication display is scrolled forward.

Note that if any of these switches is pressed when the data for the bobbin thread counter in step ③ is being inputted, the initial value for the shirt counter in step ② is entered. Consequently, if you wish to change only the shirt counter, be sure to press the ( $\nabla 2.3..$) switch before step ③ as stated above.

* The initial value “0” for the shirt counter can be set by pressing the  switch (only when the machine is waiting for the next operation).

* The initial value (set value) for the bobbin thread counter can be restored by pressing the  switch (only when the machine is waiting for the next operation).

(4) Operation

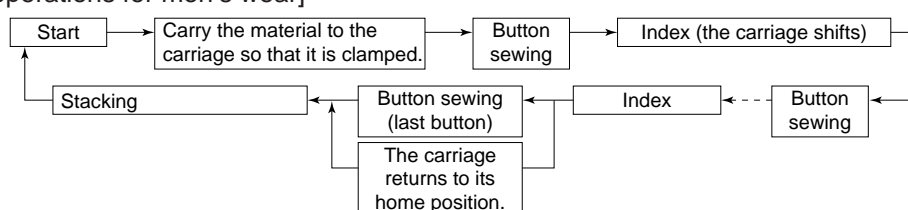


- ① Power switch
- ② Operation panel
- ③ Knee switch
- ④ Hand switch
- ⑤ Emergency stop switch

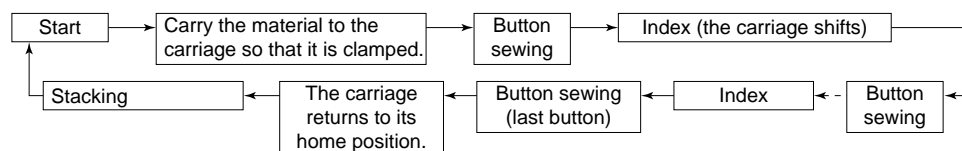
1) Automatic operation

When the start switch is pressed, the following series of operation will be performed automatically.

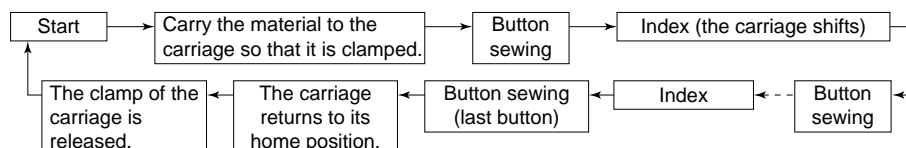
[Series of operations for men's wear]



[Series of operations for ladies' wear]



[Series of operations for finished product]



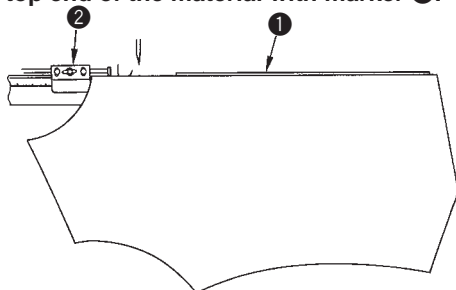
[How to operate]

- ① Operate the and switches on the operation panel so that the LED on the left-hand side lights up. (LED : ON LED : OFF)
 - ② Properly set the material on the carriage.
 - ③ Press knee switch ③, and the work clamp feet at both ends of material come down. Release the knee switch, then the sewing machine starts sewing.
- * If you press hand switch ④ before the knee switch has been released, the work clamp feet at the both ends of material go up and the sewing machine is released from its starting state.

The proper material setting

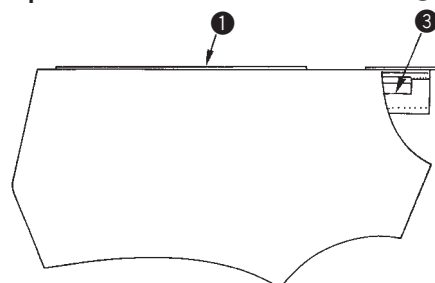
1) Men's shirts (See P.6.)

Place the material so that there is no clearance between the side end of material and the pressing board ①, and align the top end of the material with marker ②.



2) For ladies' shirt (See P.7.)





Place the material so that there is no clearance between the side end of material and the pressing board ①, and align the top end of the material with marker ③.



2) Manual operation

Use the manual operation mode to perform each step of operation manually for jump sewing, etc.

[How to operate]

- 1) Press the  and  switches on the operation panel so that both LED's light up. (Both light up.  )
- 2) Set the material, following the same procedure as that for the automatic operation mode.
- 3) Depress the knee switch, and the work clamp feet come down.

Use the following switches described below to go on the next step of operations to be carried out.



: The carriage travels to the left in a single step.

- ① When sewing a men's shirt body, the material is stacked after the carriage has reached its leftmost position and the carriage will return to its origin.
- ② When sewing a finished product of men's wear, the carriage will finally return to its origin and the clamp on the carriage will be released.



: The carriage travels to the right in a single step.

- ① When sewing a ladies' shirt body, the carriage will finally return to its origin and then the material will be stacked.
- ② When sewing a finished product of ladies' wear, the carriage will finally return to its origin and the clamp on the carriage will be released.



: The sewing machine is actuated.





Knee switch : The operation mode changes from manual to automatic during sewing by depressing the knee switch.

- * If the operation mode is changed from manual to automatic during sewing, the machine performs a series of operation in the order of sewing machine actuation to the button sewing index . Be careful not to sew two buttons at the same position.

3) Independent operation

Use the independent operation mode to perform each operation step independently for trial sewing or checking the travel of the carriage.

[Operation]

- Operate switches  and  so that both LED's go out. (LED OFF  )
Now, each operation step can be performed independently using the switches described below.




: The carriage travels to the left when the carriage has been adjusted for men's wear or it travels to the right when it has been adjusted for the ladies's wear in a single step.
(Finally, the carriage returns to the origin.)



: The sewing machine is actuated.

Example) Trial sewing

- ① Place the workpiece for trial sewing under the work clamp.
- ② Press  to actuate the sewing machine.

4) Emergency stop

When the emergency stop switch is pressed during operating, the following message will be shown on the display screen.

* * * * * E M E R G E N C Y S T O P * * * * *
C H E C K R E S E T S T A R T

The operation process when the emergency stop switch is pressed determines when and how the operation is stopped or how the emergency stop is released.

- ① When the emergency stop switch is pressed after the knee switch has been pressed and the work clamp has lowered, the work clamp will go up and stop in its highest position.
Press **R** switch, and the indication on the screen will return to the standard display.
- ② When the emergency stop switch is pressed when sewing a button, the sewing machine stops after the button sewing is finished.
Press the **R** switch, and the machine operation mode will automatically change to the manual.
- ③ When the emergency stop switch is pressed when the carriage is moving (indexing), the sewing machine stops as soon as the switch is pressed.
Press the **R** switch, and the carriage will automatically return to the sewing start position of the 1st button and the machine operation mode will be changed to the manual operation mode.
- ④ When the emergency stop switch is pressed when the last button(in men's garment bod) is being sewn or when the carriage is returning to the origin upon completion of button sewing, the sewing machine stops as soon as the switch is pressed.
Press the **R** switch, and the carriage will automatically return to the sewing start position of the 1st button and the machine operation mode will be changed to the manual operation mode.

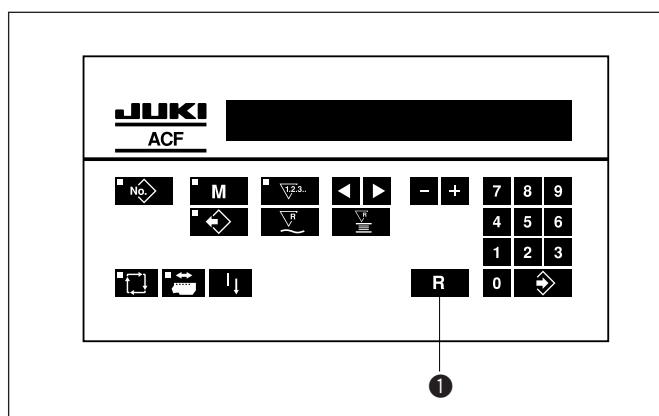
5) Error message and the reset procedure

- ① 0 1 * * * * * N E E D L E T H R E A D S T I T C H E R R O R * * * * *
S T I T C H C H E C K R E S E T S T A R T

Cause : If the needle thread breaks or needle thread stitch error occurs, the above error message will be shown on the display screen.

How to reset : Re-thread the needle, and press **R** switch ①.

(Caution) Do not press the reset switch before threading the machine head.



- ② 0 2 * * * * * B O B B I N T H R E A D E R R O R * * * * *
B O B B I N C H A N G E R E S E T S T A R T

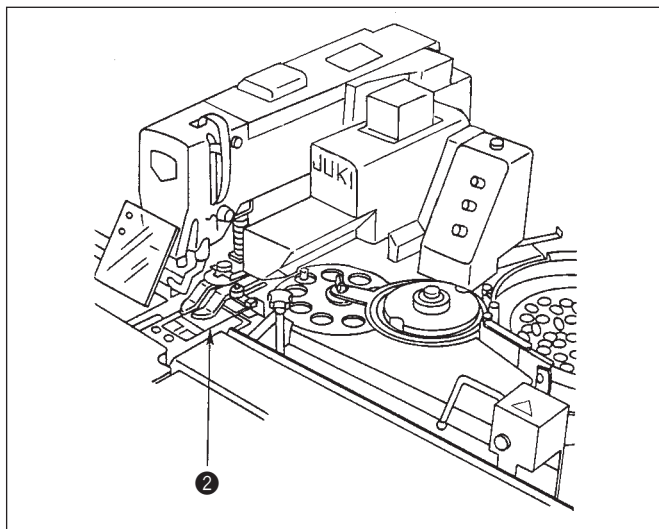
Cause : If the remaining amount of bobbin thread is not enough (when the bobbin counter indicates "0" or the remaining amount of bobbin thread is too short to finish one piece of garment), the above error message will be shown on the display screen.

How to reset : Under the automatic operation mode, replace the bobbin, and press **R** switch .

③ 04 * * * * * WORK CLAMP POSITION ERROR * * * * *
WORK CLAMP CHECK RESER START

Cause : If the work clamp of the sewing machine is not raised, the above message will be shown on the display screen.

How to reset : Lift work clamp ② by hand and press the **R** switch on the operation panel of ACF.



④ 09 * * * * * RAM BACK UP ERROR * * * * *
RESET DATA INPUT

Cause : If the data stored in RAM has been deleted, the above message will be shown on the display screen.

How to reset : Press the **R** switch on the operation panel of ACF, and re-input the data.

⑤ 10 * * * * * INDEX DATA ERROR * * * * *
RESET DATA INPUT

Cause : If the input data is not correct, the above message will be shown on the display screen, when the machine is started in the automatic mode or manual mode.

How to reset : Press the **R** switch on the operation panel of ACF, and re-input the data.

⑥ 11 * * * * * START SWITCH ON ERROR * * * * *
START SWITCH OFF RESET START

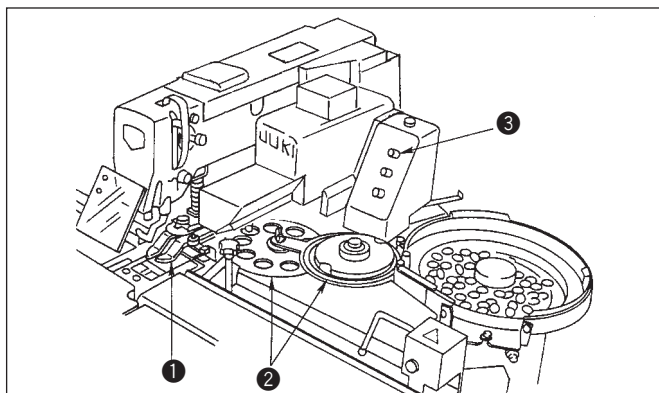
Cause : If the start switch is pressed when the power is ON, the above message will be shown on the display screen.

How to reset : Release the start switch (knee switch or hand switch), and press the **R** switch on the operation panel of ACF.

⑦ 13 * * * * * BUTTON FEED ERROR * * * * *
LOADER SWITCH ON RESET START

Cause : If the button is not fed to button clamp jaw lever ①, the above message will be shown on the display screen.

How to reset : Press button feeding switch ③ after you have confirmed that the buttons are fed to index unit ②.



⑧ 14 * * * * * LK NOT READY * * * * *
LK CHECK RESET START

Cause : If an error occurs in the operation box of LK, the above message will be shown on the display screen.

Also, in addition to the above error, the message will be shown on the display screen when the sewing LED is gone out by pressing the ready key on the control box of LK.

How to reset : Release the error of LK, and press the **R** switch on the operation panel of ACF.

⑨ 15 * * * * * BOBBIN WINDING MODE * * * * *
LK BOBBIN SW OFF RESET

Cause : If "WINDER" is selected by the control box of LK in the "automatic operation" or "manual operation" mode, the message will be shown on the display screen.

How to reset : Release the selection of "WINDER" of the control box of LK and presss the **R** switch on the operation panel of ACF.

⑩ 50 * * * * * STEPPING MOTOR DRIVER ERROR * * * * *
POWER OFF CHECK

Cause : If the stepping motor driver inside the control box is out of order, the above message will be shown on the display screen.

How to reset : Turn OFF the power switch, and check the connection of the respective connectors.

⑪ 51 * * * * * AIR PRESSURE ERROR * * * * *
POWER OFF CHECK

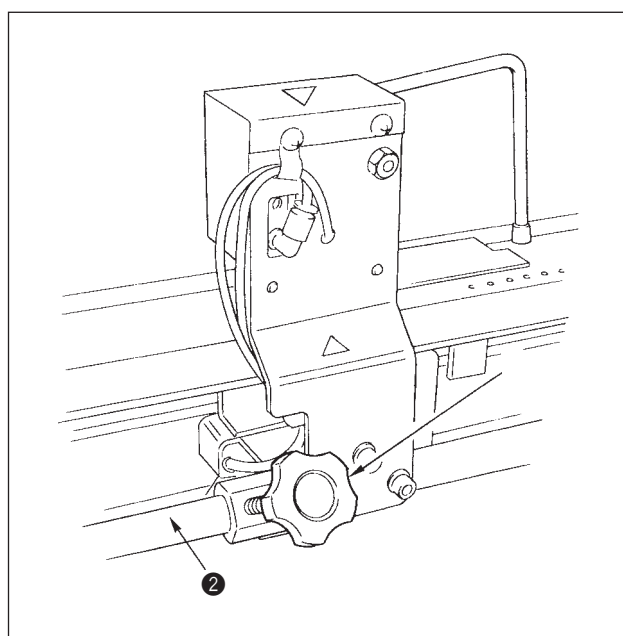
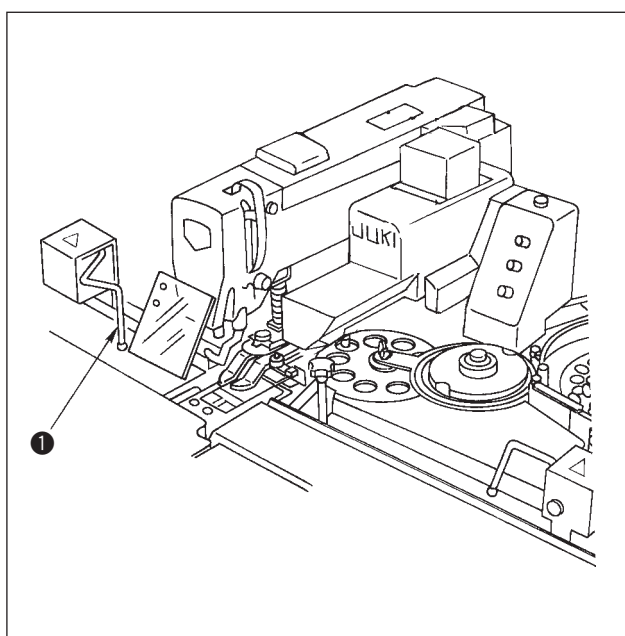
Cause : If the operating air pressure is insufficient for the machine to operate, the above message will be shown on the display screen.

How to reset : Turn OFF the power switch, and properly adjust the operating air pressure.

⑫ 52 * * * * * CLAMP POSITION ERROR * * * * *
POWER OFF CHECK

Cause : If carriage clamp ❶ is likely to hit against the sewing machine, the above message will be shown on the display screen.

How to reset : Tuen OFF the power to the sewing machine. Then move carriage ❷ by hand or by using carriage clamp position adjusting screw ❸ so that carriage clamp ❶ is carried away from the sewing machine.

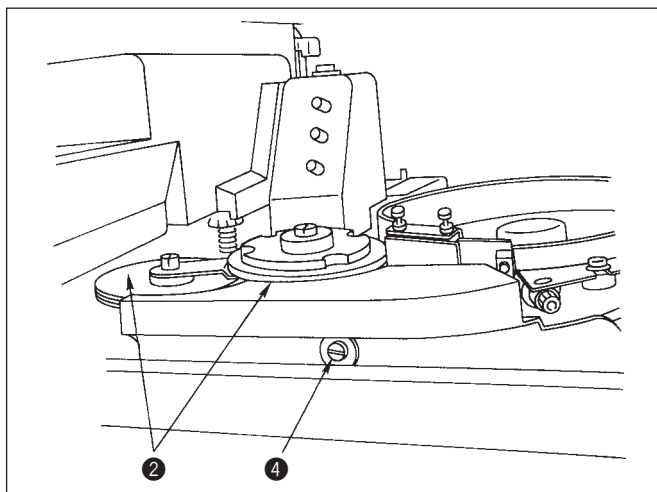


⑬

54 * * * * * BUTTON INDEX ERROR * * * * *
POWER OFF CHECK

Cause : If the button index motor is energized for a period of time longer than the predetermined time, the above message will be shown on the display screen.

How to reset : Turn OFF the power switch, and check button index unit ② for any clogged button. Give two clockwise turns to manual screw ④ using a screwdriver after you have confirmed that ② would not turn any further.



⑭

55 * * * * * SEWING MACHINE ERROR * * * * *
POWER OFF CHECK

Cause : If an error occurs in LK machine after sewing has started, the above message will be shown on the display screen.

Also, if the sewing continues for 20 seconds or more, the message will be shown.

Consequently, this message may be shown after 20 seconds from the start of sewing.

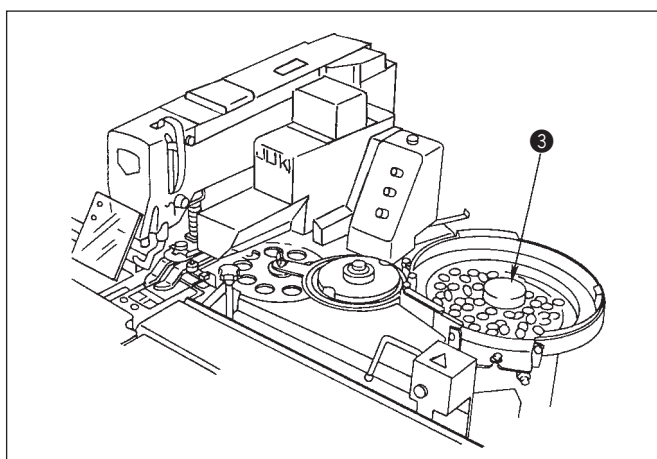
How to reset : Turn OFF the power switch, and check the state of the LK machine.

⑮

56 * * * * * BUTTON SENSING OVER ERROR * * * * *
CHECK RESET START

Cause : If a button is not detected after the index unit has continuously performed the button sensing (indexing the button and detecting the existence of button) by ten times or more, the above message will be shown on the display screen.

How to reset : Check parts feeder ③ for its correct performance, and adjust so that buttons are fed to the index unit properly.

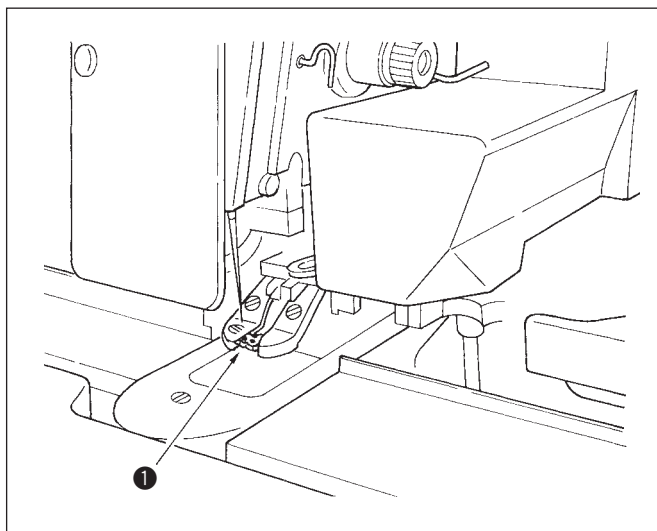


①⑥

57 * * * * * BUTTON SET ERROR * * * * *
CHECK RESET START

Cause : If the button cannot be set on the spinner oscillating arm even after the fine positioning of button has been performed twice, the above message will be shown on the display screen.

How to reset : Check button carrier pin ① of the spinner oscillating arm for any clogged button.

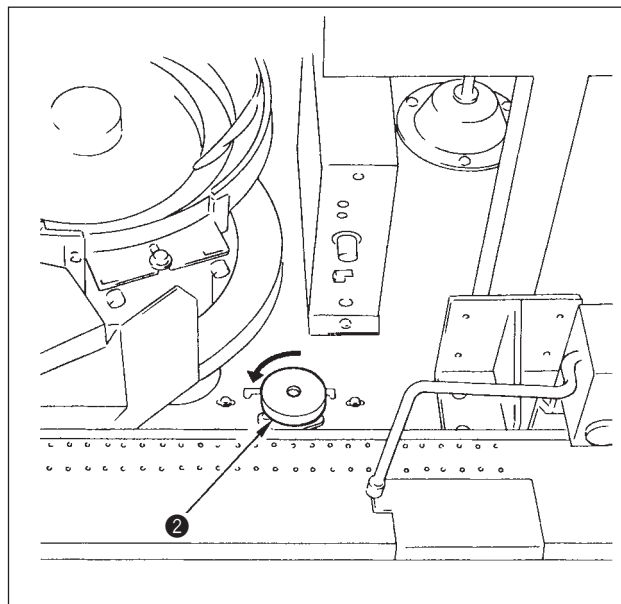
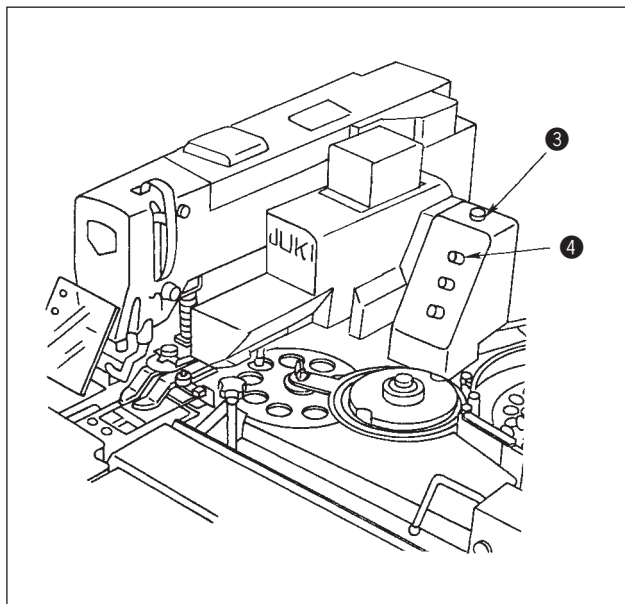


①⑦

58 * * * * * REVOLUTION ARM ERROR * * * * *
POWER OFF CHECK

Cause : If the spinner oscillating arm motor is energized for a period of time longer than the predetermined time or it is not in its origin, the above message will be shown on the display screen.

How to reset : Turn OFF the power switch. Then turn manual rotating shaft ② and check the clogged button. (The normal rotational direction is the direction of arrow.) If breaker ③ is not in its set position, press the push-button to set breaker ③. If the arm is not in its origin, press button feeding switch ④.



⑮ 100 * * * * * INIT SW ERROR * * * * *
INIT SW CHECK

Cause : This error message will be shown if the origin detect switch dose not work properly.

How to reset : Check the origin detector switch.

(Refer to pages 46 to 48 for adjustment.)

⑯ 101 * * * * * SPEED SW ERROR * * * * *
SPEED SW CHECK

Cause : This error message will be shown if the speed reduction detector switch reduction detector switch dose not work properly.

How to reset : Adjust the installation position of the decreasing speed detector switch or replace it.

(Refer to pages 46 to 48 for adjustment.)

⑰ 102 * * * * * SELECT SW ERROR * * * * *
SELECT SW CHECK

Cause : This message will be shown if the selector switch dose not work properly.

How to reset : Adjust the installation position of the decreasing speed detector switch or replace it.

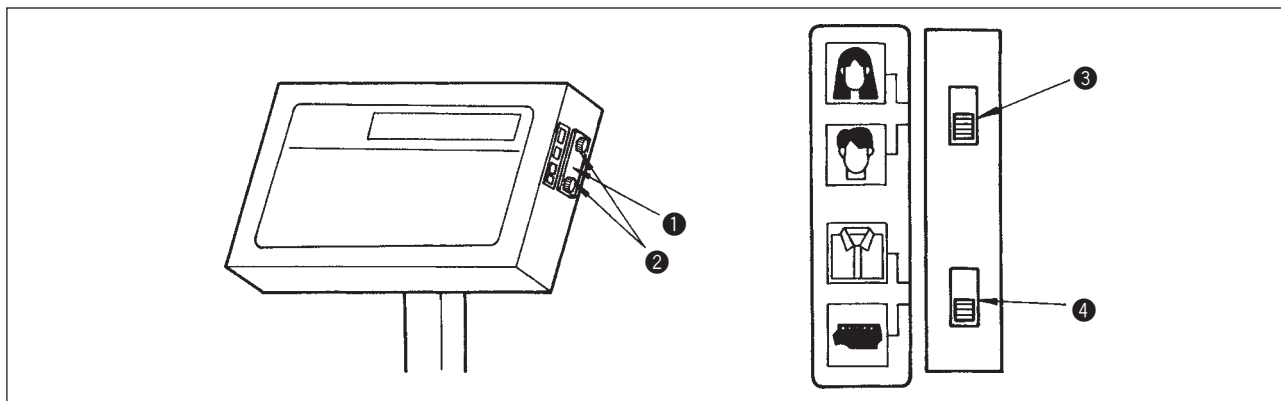
(Refer to pages 46 to 48 for adjustment.)

7. SWITCHES INSIDE THE PANEL BOX AND THE CONTROL BOX

(1) Inside the panel box

1) Mode selection for men's wear and ladies' wear

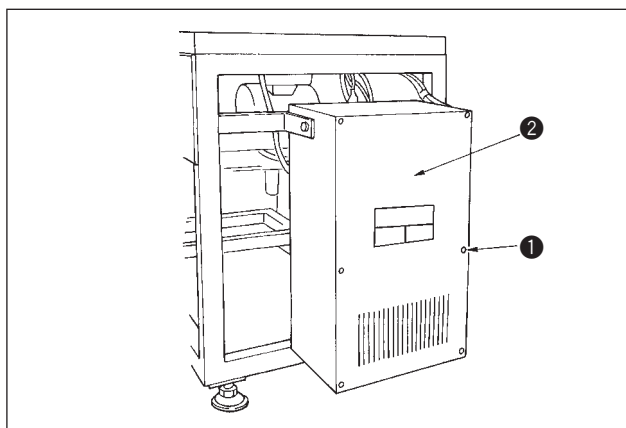
Loosen screws ② and open switch cover ① mounted on the right side face of operation panel. Set selector switch ③ to its lower side to sew men's wear or to its upper side to sew ladies' wear. (Before you change the setting of this switch, be sure to turn OFF the power to the sewing machine.)



2) Mode selection for shirt body and finished product

Loosen screws ② and open switch cover ① mounted on the right side face of operation panel. Set selector switch ④ to its lower side to sew shirt bodies or to its upper side to sew finished products. When the switch is set to the finished product sewing mode, be sure to operate the sewing machine using an auxiliary feed plate (optional). (Before you change the setting of this switch, be sure to turn OFF the power to the sewing machine.)

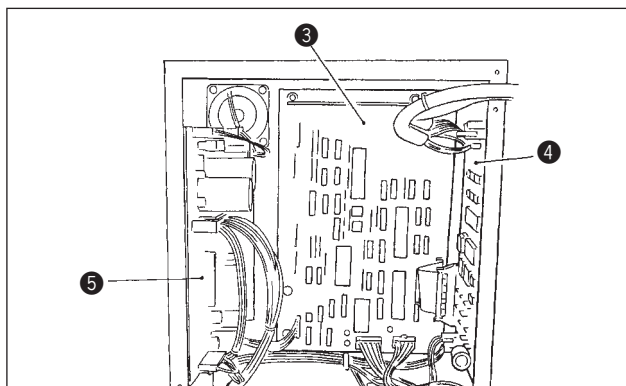
(2) Inside the control box



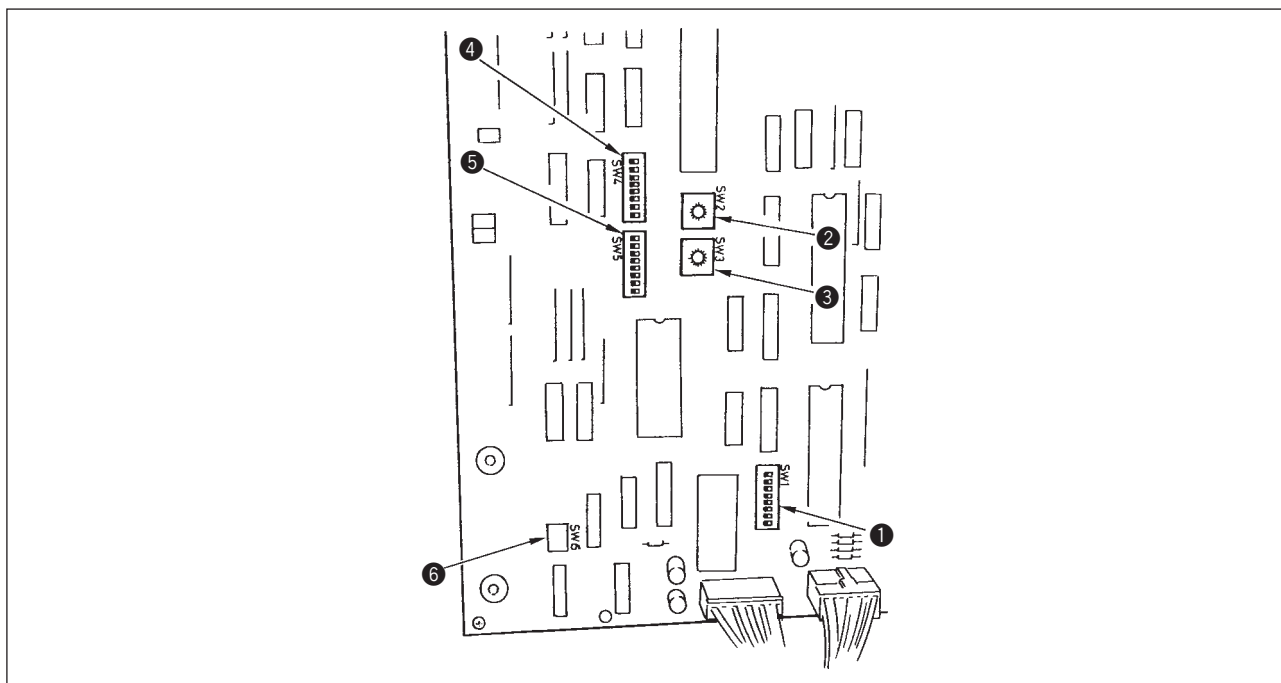
Remove six screws ① of the control box under the table, and open cover ②. Then you may switch over the functions using the switches mounted on I/O circuit board ③ and CPU circuit board ④.

Note that the switches and variable resistors mounted on POWER circuit board ⑤ of the ACF-164-1903 are inoperative.

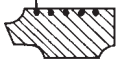
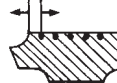


(Caution) Be sure to change over the setting of the switches after turning OFF the power to the machine.









① Switches on I/O circuit board ③ (Refer to “(2) Inside the control box” on p.42.)

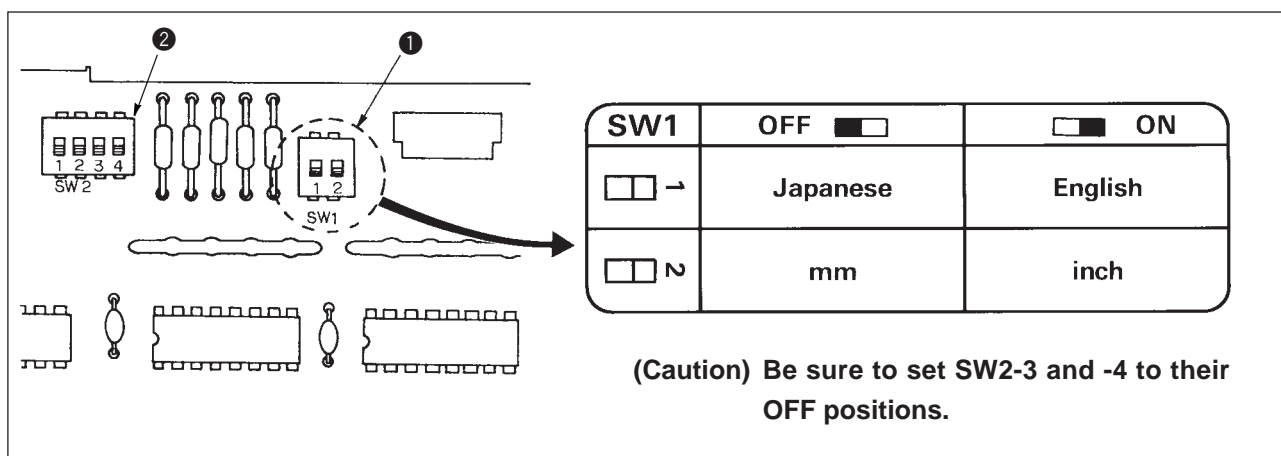


(Caution) Set the SW1-1 and -8, SW4-5 through -8, and SW5-4 through -8 to their OFF positions, and set the SW1-2 and -3, and SW4-1 and -2 to their ON positions.

Switch No.	Switch name	Description of function
①	SW1-4	<p>This switch is used to set the jump function.</p>  (OFF) : The jump function cannot be specified.  (ON) : The jump function can be specified. <p>(This switch has been set to its OFF position at the time of delivery.)</p>
	SW1-5	<p>This switch is used to set the long-material mode.</p>  (OFF) : The long-material mode cannot be specified.  (ON) : The long-material; mode can be specified. <p>(This switch has been set to its OFF position at the time of delivery.)</p>
	SW1-6	<p>This switch is used to specify the frequency of power source (50 Hz or 60 Hz).</p> <p>50 Hz (OFF) : For the 50 Hz zone</p> <p>60 Hz (ON) : 60 Hz zone</p> <p>(This switch has been set to 50Hz/60Hz according to the destination of the machine.)</p>

①	SW1-7	This switch is used for setting the pair-stacking function. <div> (OFF) : The pair stacking mode cannot be selected.  (ON) : The pair stacking mode can be selected. (This switch has been set to its OFF position at the time of delivery.)</div>																																																							
	SW2	This switch is used to set the length of time from the actuation of the button positioner (triple pawl) to the detection of the button. (The aforementioned length of time has been factory-set to “5” at the time of delivery.)																																																							
③	SW3	This switch is used to set the length of time from the completion of index of a button to the time when the actuation of the button positioner (triple pawl) becomes possible. (The aforementioned length of time has been factory-set to “1” at the time of delivery.)																																																							
④	SW4-3	This switch is used to set the function of detecting a button fed on the button clamp jaw lever. <div> (ON) : The aforementioned button detecting function does not work.  (OFF) : The aforementioned button detecting function works. (This switch has been set to its OFF position at the time of delivery.)</div>																																																							
	SW4-4	This switch is used to set the function of detecting a button fed on the index unit. <div> (ON) : The aforementioned button detecting function does not work.  (OFF) : The aforementioned button detecting function works. (The switch has been factory-set to its OFF position at the time of delivery.)</div>																																																							
<table><tr><th colspan="3">SW4-</th><th colspan="2"></th><th rowspan="10">Expected control by timer</th></tr><tr><th>5</th><th>6</th><th>7</th><th colspan="2"></th></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>Waiting time of the spinner oscillating arm</td><td>290ms (Standard value)</td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>Ditto</td><td>190ms</td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>Ditto</td><td>390ms</td></tr><tr><td>OFF</td><td>ON</td><td>ON</td><td>Ditto</td><td>490ms</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>Ditto</td><td>590ms</td></tr><tr><td>ON</td><td>OFF</td><td>ON</td><td>Ditto</td><td>690ms</td></tr><tr><td>ON</td><td>ON</td><td>OFF</td><td colspan="2">Fine positioning completion detection control (Fine positioning completion switch is necessary.)</td></tr><tr><td>ON</td><td>ON</td><td>ON</td><td colspan="2">Both positioning and fine positioning detection control</td></tr></table>							SW4-					Expected control by timer	5	6	7			OFF	OFF	OFF	Waiting time of the spinner oscillating arm	290ms (Standard value)	OFF	OFF	ON	Ditto	190ms	OFF	ON	OFF	Ditto	390ms	OFF	ON	ON	Ditto	490ms	ON	OFF	OFF	Ditto	590ms	ON	OFF	ON	Ditto	690ms	ON	ON	OFF	Fine positioning completion detection control (Fine positioning completion switch is necessary.)		ON	ON	ON	Both positioning and fine positioning detection control	
SW4-					Expected control by timer																																																				
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OFF	OFF	OFF	Waiting time of the spinner oscillating arm	290ms (Standard value)																																																					
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OFF	ON	OFF	Ditto	390ms																																																					
OFF	ON	ON	Ditto	490ms																																																					
ON	OFF	OFF	Ditto	590ms																																																					
ON	OFF	ON	Ditto	690ms																																																					
ON	ON	OFF	Fine positioning completion detection control (Fine positioning completion switch is necessary.)																																																						
ON	ON	ON	Both positioning and fine positioning detection control																																																						

② Switches on CPU circuit board ④ (Refer to “(2) Inside the control box” on p.42.)

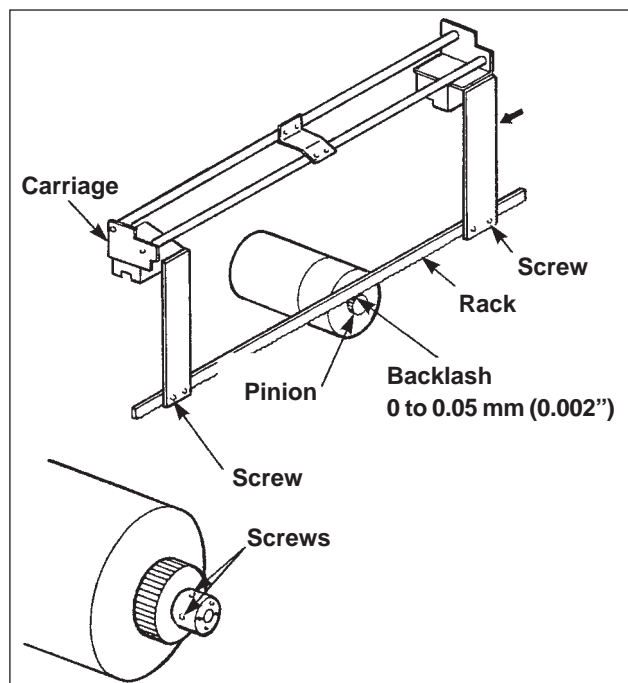


Switch No.	Switch name	Description of function
①	SW1-1	<p>This switch is used to switch over the characters indicated on the display screen from/to Japanese/English.</p> <p>Japanese (OFF) : The characters are indicated in Japanese.</p> <p>English (ON) : The characters are indicated in English.</p> <p>(This switch is set to its ON position at the time of delivery.)</p>
	SW1-2	<p>This switch is used to switch over the unit of length for the distance setting from/to mm/inches.</p> <p>mm (OFF) : The length is set in mm.</p> <p>inch (ON) : The length is set in inches.</p> <p>(Caution) After switching over between mm and inches, all previously stored data will be cleared once the power switch is turned ON.</p> <p>(This switch is set to its OFF position at the time of delivery.)</p>
②	SW2-1	<p>This switch is used to change over the automatic repeated operation of the sewing machine.</p> <p>■ (OFF) : The sewing machine operates under the normal operation mode.</p> <p>□ (ON) : The sewing machine operates under the automatic repeated operation mode.</p> <p>(This switch has been set to its OFF position at the time of delivery.)</p>
	SW2-2	<p>This switch is used to change over the failure diagnostic feature.</p> <p>■ (OFF) : The sewing machine operates under the normal operation mode.</p> <p>□ (ON) : The sewing machine operates under the failure diagnostic mode. (Set the DIP SW4-8, mounted on the I/O circuit board, also to its ON position.)</p> <p>(This switch has been set to its OFF position at the time of delivery.)</p>

8. ADJUSTMENT OF UNIT

(1) CARRIAGE UNIT

1) Adjusting the driving section of the carriage



- 1) Loosen the attaching screw and adjust so that a backlash of 0 to 0.05 mm is provided between the rack and the pinion gear over the length.
- 2) After the completion of the aforementioned adjustment, measure the starting load of the carriage. Press the section marked with the arrow in the figure and measure the starting load at the start, intermediate position and the end of the entire stroke. As long as the starting load of 2 kgf or less is provided at all the aforementioned positions, no trouble will result.

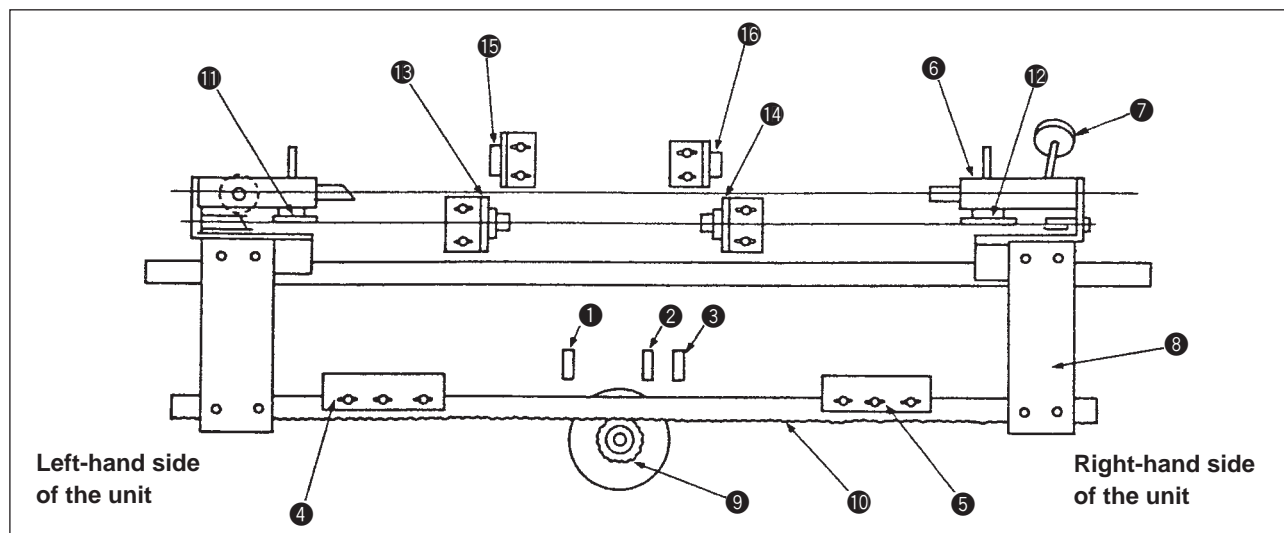
(Caution) If the backlash between the rack and the pinion is not properly adjusted, step-out of the stepping motor or failure of feeding may result.

- 3) Confirm that the two screw in the gear presser are securely tightened. (Tighten either screw in the flat part on the motor shaft.)

2) Adjusting position of origin and the presser switch of the carriage switch

Adjust the sewing machine both in the men's wear sewing mode and the ladies' wear sewing mode. Be sure to mode slide bearings (right and left) ⑥ to both ends of the carriage and fix them with slide bearing knob ⑦ before starting the adjustment.

Names of each adjusting area

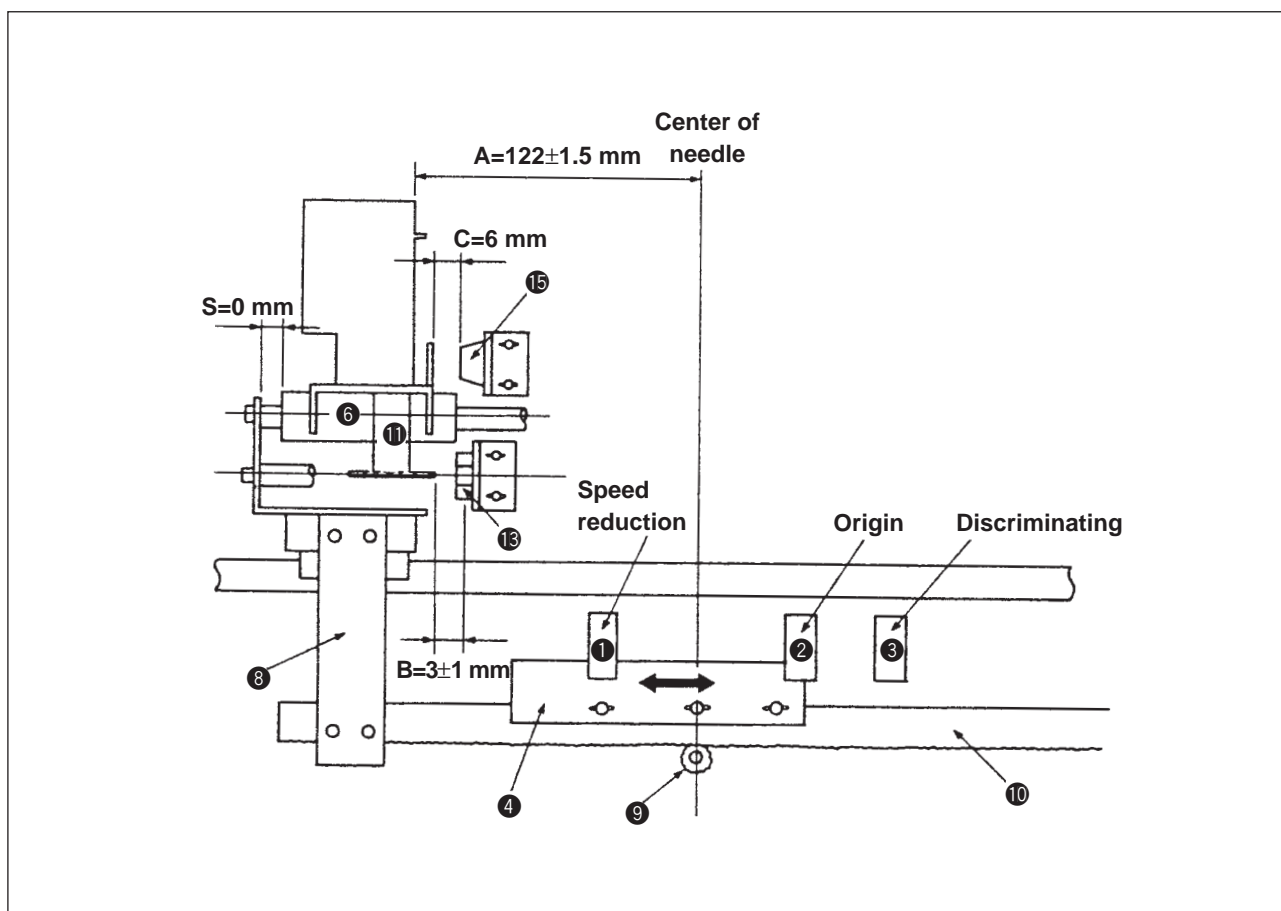


- | | | | |
|-------------------------------------------|---------------------------------------------|----------------------------------------------|-------------------------------------|
| ① Photo sensor 1 | ⑤ Origin detecting plate (for ladies' wear) | ⑨ Pinion gear | ⑬ Presser switch (for men's wear) |
| ② Photo sensor 2 | ⑥ Slide bracket | ⑩ Rack | ⑭ Presser switch (for ladies' wear) |
| ③ Discriminating sensor | ⑦ Slide bearing knob | ⑪ Presser detecting plate (for men's wear) | ⑮ Stopper (for men's wear) |
| ④ Origin detecting plate (for men's wear) | ⑧ Carriage | ⑫ Presser detecting plate (for ladies' wear) | ⑯ Stopper (for ladies' wear) |

(Caution) Functions of photoelectric sensors ① and ② change over as shown in the table below under the men's wear sewing mode and the ladies' wear sewing mode.

Sensor No.	①	②
Mode		
Men's	Speed reduction sensor	Origin sensor
Ladies'	Origin sensor	Speed reduction sensor

① Adjusting the men's mode



- 1) When turning ON the power switch under the men's sewing mode, carriage ⑧ should retrieve the origin and stop at the position as shown in the figure.

To adjust dimension A to 122 ± 1.5 mm ($4.803'' \pm 0.059''$), loosen the screw in origin detecting plate ④ and move the plate in the direction of the arrow until the specified dimension is provided. (If origin detecting plate ④ is moved to the right, dimension A will be larger than 122 mm ($4.803''$). If the plate is moved to the left, dimension A will be smaller than 122 mm ($4.803''$). When dimension A is properly adjusted, dimension B will be 3 ± 1 mm ($0.118'' \pm 0.039''$) and dimension C will be 6 mm ($0.236''$).)

- 2) To check the result of the aforementioned adjustment, turn OFF the power to the machine once, move carriage ⑧ by hand to the left by 20 to 30 mm ($0.787''$ to $1.181''$), loosen the knob of slide bearing ⑥ and set dimension S to 4 mm ($0.157''$).

Now, turn ON the power to the machine, and the error message "CLAMP POSITION ERROR" will be shown on the display after the machine starts retrieving the origin.

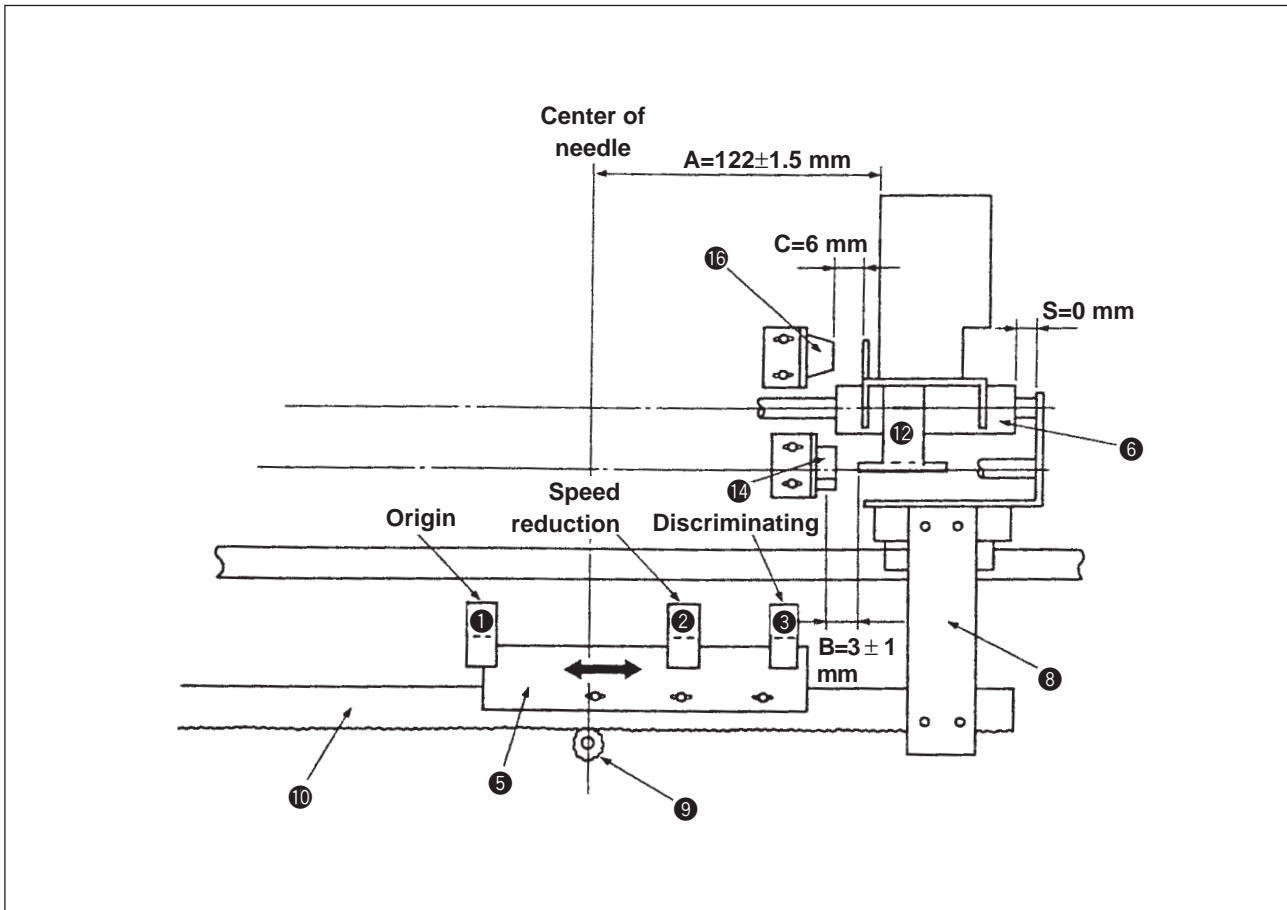
If the sewing machine fails to stop while indicating the above-stated error message, move presser switch ⑬ to the left and re-turn ON the power to the machine. If the sewing machine, this time, stops while indicating the error message, adjust the position of stopper ⑮.

- 3) Turn OFF the power to the machine and set dimension S to 2 mm ($0.079''$). As long as no error is indicated in this state, the sewing machine is correctly adjusted under the men's wear sewing mode.

After the completion of checking procedure steps 2) and 3), be sure to move slide bearing ⑥ to the left and set dimension S to 0 mm. Now, fix the slide bearing.

This completes the adjustment of the origin, presser switch and stopper under the men's wear sewing mode.

② Adjusting the ladies' mode



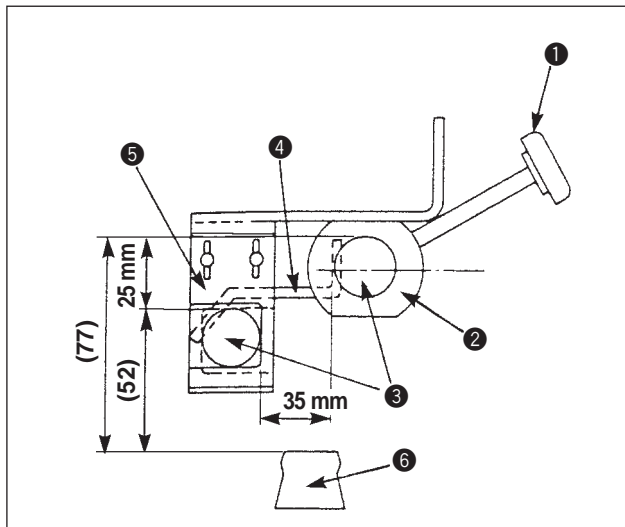
- 1) Change over the sewing mode from the men's wear sewing mode to the ladies' wear sewing mode and turn ON the power to the machine, carriage ⑧ should retrieve the origin and stop at the position shown in the figure.

As same as in the case if the men's wear sewing mode, adjust first dimension A. If origin detecting plate ⑤ is moved to the left, dimension A will be larger than 122 mm. If the plate is moved to the right, dimension A will be smaller than 122 mm.

- 2) Adjust the machine under the ladies' wear sewing mode following the procedure taken under the men's wear sewing mode.

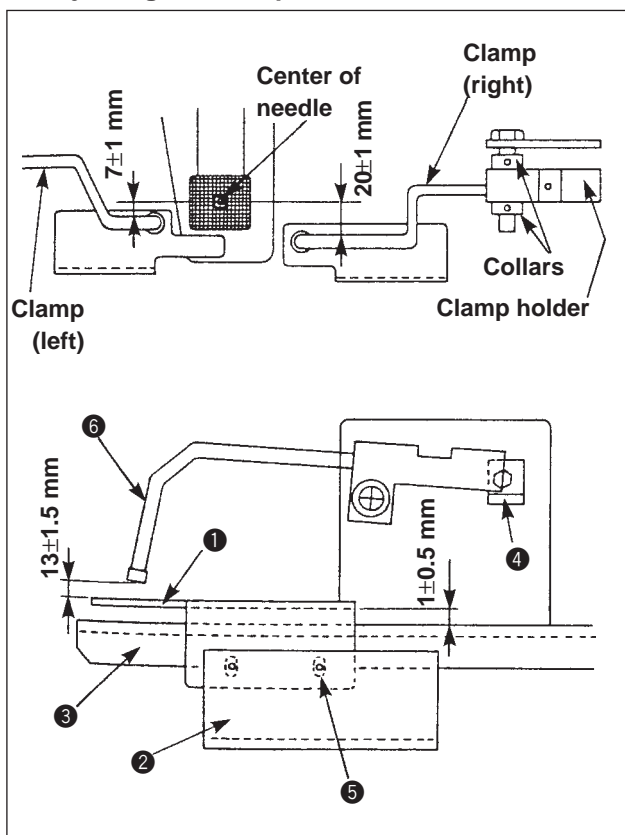
③ Adjusting the work clamp unit

1. Adjusting slide bearing



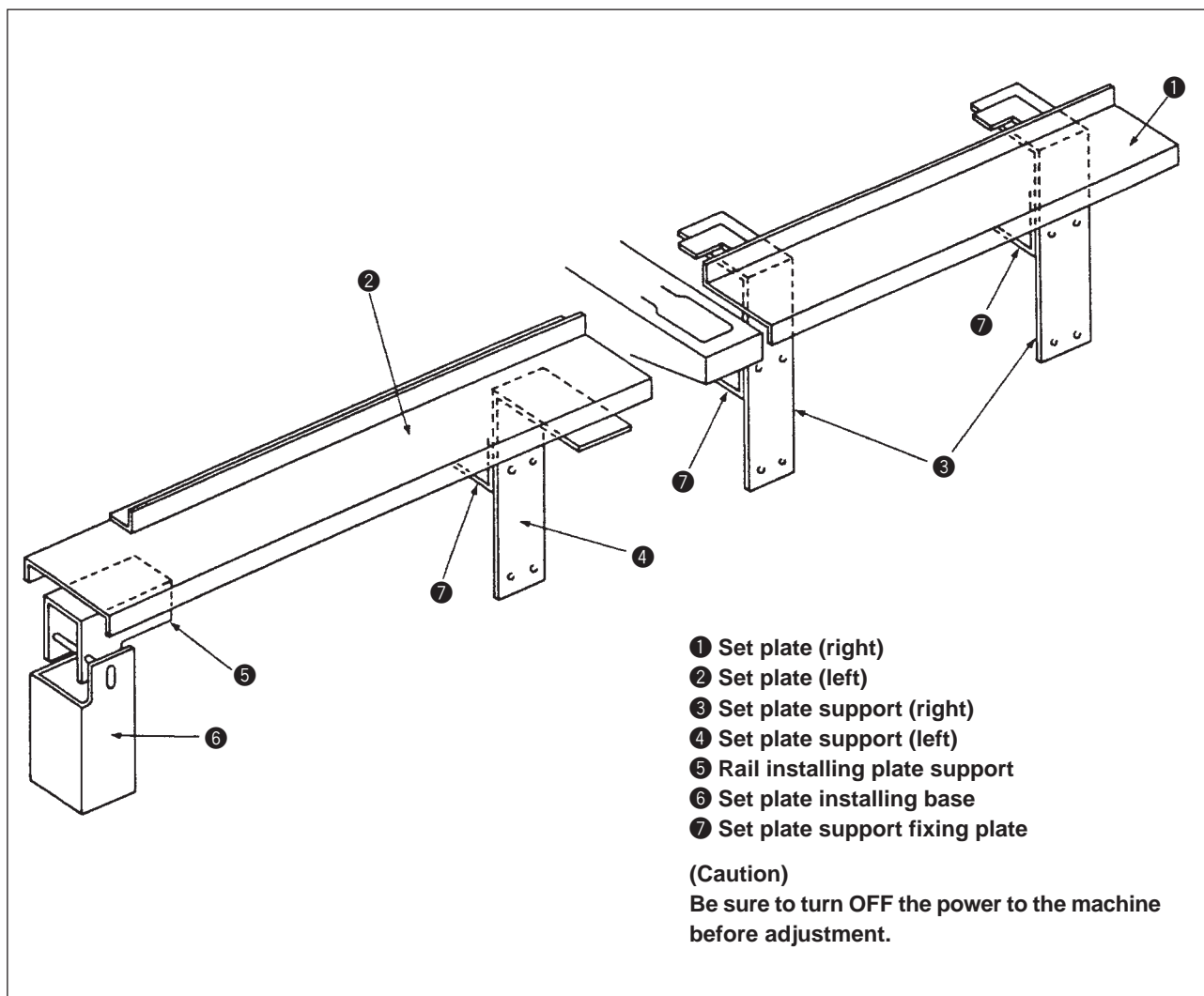
- 1) Loosen knob ①, and move slide bearings (left, right) ② to check for their smooth movement.
- 2) Adjust so that the respective distances of 25 mm (0.984") and 35 mm (1.378") are provided between slide shafts ③. The distances may change after installing slide shaft connecting plate ④. However, confirm the correct distances are provided between the slide shafts after tightening slide shaft connecting plate ④ at both ends and centers of slide shafts ③. (⑥ in the figure indicates the carriage rail.)
- 3) Eliminate a play at slide bearing ② by adjusting slide shaft holder ⑤.

2. Adjusting the clamps

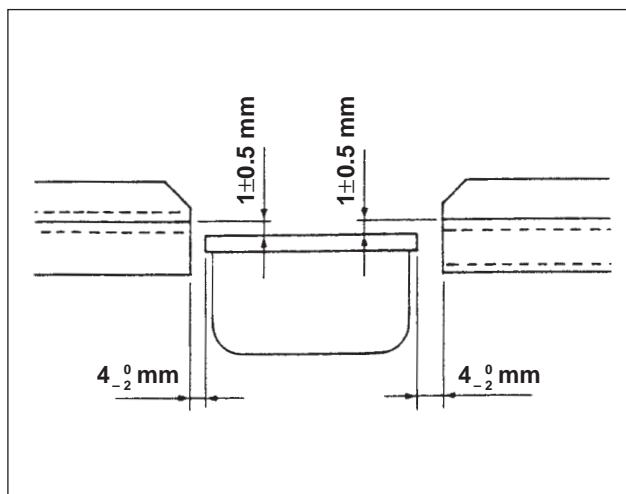


- 1) To adjust the position of the clamps (right and left), loosen the screws in the collars and adjust the position of the clamp holders so that a clearance of 20 ± 1 mm is provided between the clamp (right) and the center of needle and a clearance of 7 ± 1 mm is provided between the clamp (left) and the center of needle.
- 2) Adjust the height of clamps (right, left) after confirming that a clearance of 1 ± 0.5 mm is provided between clamp receiving plates ① (Carry out the adjustment after loosening screw ⑤.) Adjust the height of clamps by moving clamp holder receiving plate ④ up or down so that a clearance of 13 ± 1.5 mm is provided between clamps ⑥ (right, left) and clamp receiving plates ① (right, left).

④ Adjusting the set plate



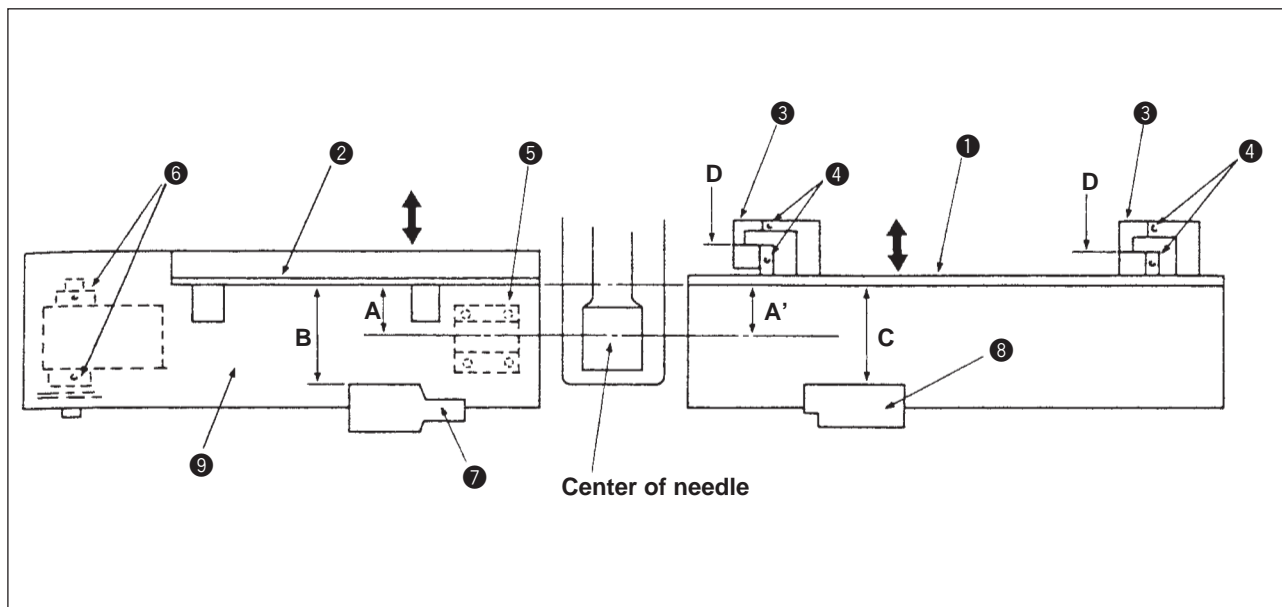
1. Adjusting the height of the set plate



Loosen screws in set plate support fixing plate ⑦ and set plates support (right and left) ③ and ④, and adjust the height of the set plates to $1 \pm 0.5 \text{ mm}$ above the top surface of the throat plate by moving set plate support (right and left) ③ and ④ and rail installing plate support ⑤ up or down.

Then check that the specified height of $1 \pm 0.5 \text{ mm}$ is provided at both ends and center of the respective set plates.

2. Adjusting the position of the scale on the set plates



1) Adjusting the gauge (left)

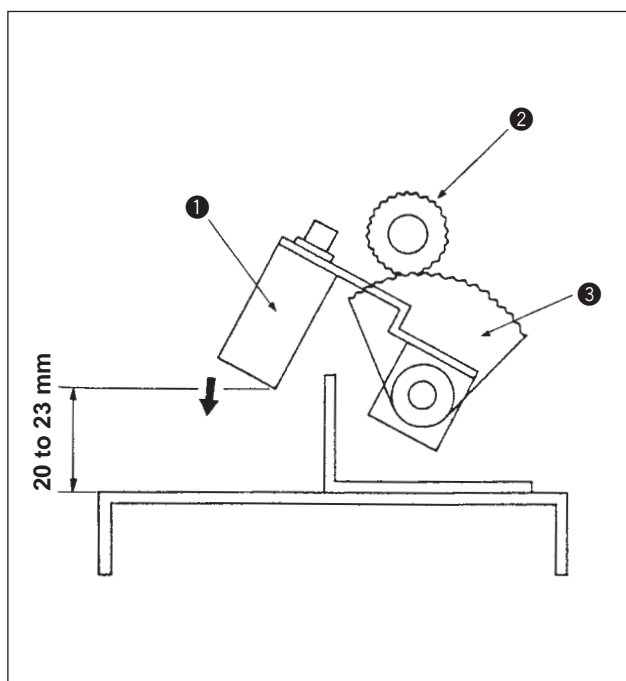
Confirm that dimension A provided from the center of the needle to gauge (left) ② is equal to the value shown on the scales on both sides. If the value shown on the respective scales is different from dimension A, loosen first screw ⑤ and the screws in collars ⑥, and move set plate (left) ⑨ in the direction of the arrow until the scales are correctly positioned. At this time, use the rightmost end of set plate (left) ⑨ as reference and adjust the leftmost end to it.

(It is recommended to adjust distance B provided between gauge (left) ② and clamp support plate (left) ⑦ equally at both ends when the clamp support plate (left) ⑦ moves laterally.)

2) Adjusting the gauge (right)

After the completion of the adjustment of the gauge (left), adjust the position of gauge (right) ① so that "A" equals to A". Then fix the gauge (It is recommended to fit a straight ruler or the like against the gauge surface.) Then, loosen screws ④ in scale plates ③, and adjust so that the value read at section D equals to A. Move clamp support plate (right) ⑧ to the right and left and measure dimension C at the rightmost end and the leftmost end of the travel so as to confirm that equal adjustment value is provided both at the rightmost end and the leftmost end of gauge (right) ①.

3. Adjusting the gauge

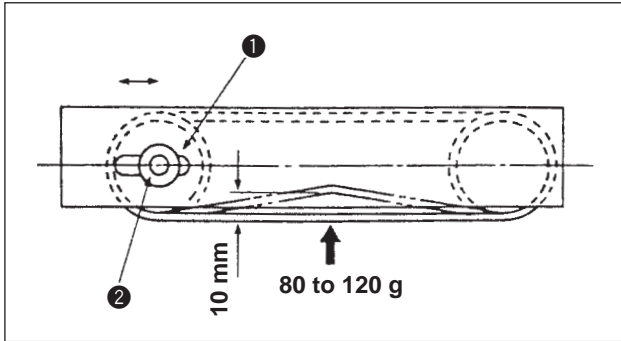


1) Normally, the height of gauge ① should be adjusted to 20 to 23 mm (0.78" to 0.906") when the gauge is raised. To adjust the height of the gauge, change the engagement between driving gear ② and driven gear ③.

2) Only the speed at which the gauge comes down is controlled. The speed controller for controlling the controlled. The speed controller for controlling the speed is mounted on the solenoid valve (the fourth solenoid valve as counted from the leftmost one.) To adjust the speed, open/close the speed controller.

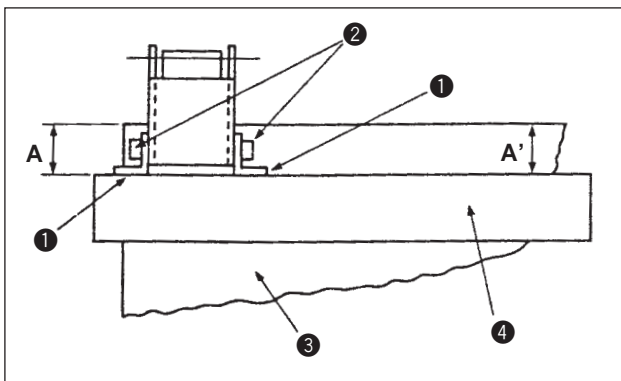
⑤ Adjusting the conveyor unit

1. Adjusting the belt tension



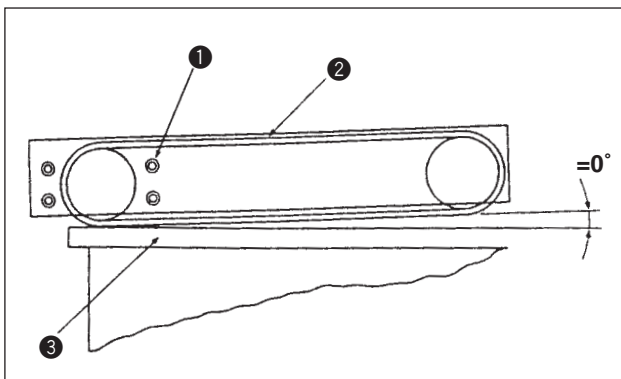
Loosen M10 nut ②, and adjust the belt tension by moving idler pulley ① in the direction of the arrow. Adjust the belt tension to allow the belt to slack by 10 mm when a load of 80 to 120 g is applied to the belt.

2. Adjusting the longitudinal inclination of the conveyor



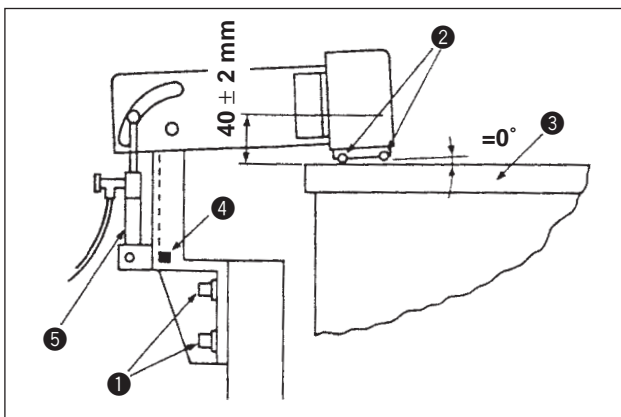
Loosen screws ② in motor bracket installing plate ① and adjust so that the difference between dimensions A and A' between table (left) ③ and conveyor frame ④ does not exceed 2 mm.

3. Adjusting the lateral inclination of the conveyor



Loosen screw ①, and adjust so that belt ② inclines by an angle of 0° at the position where the belt comes in contact with table (left) ③ when the conveyor comes down with its dead weight. (Lower conveyor, loosen the screw and re-tighten it. This can sufficiently adjust the inclination of the belt.)

4. Adjusting the vertical inclination of the conveyor



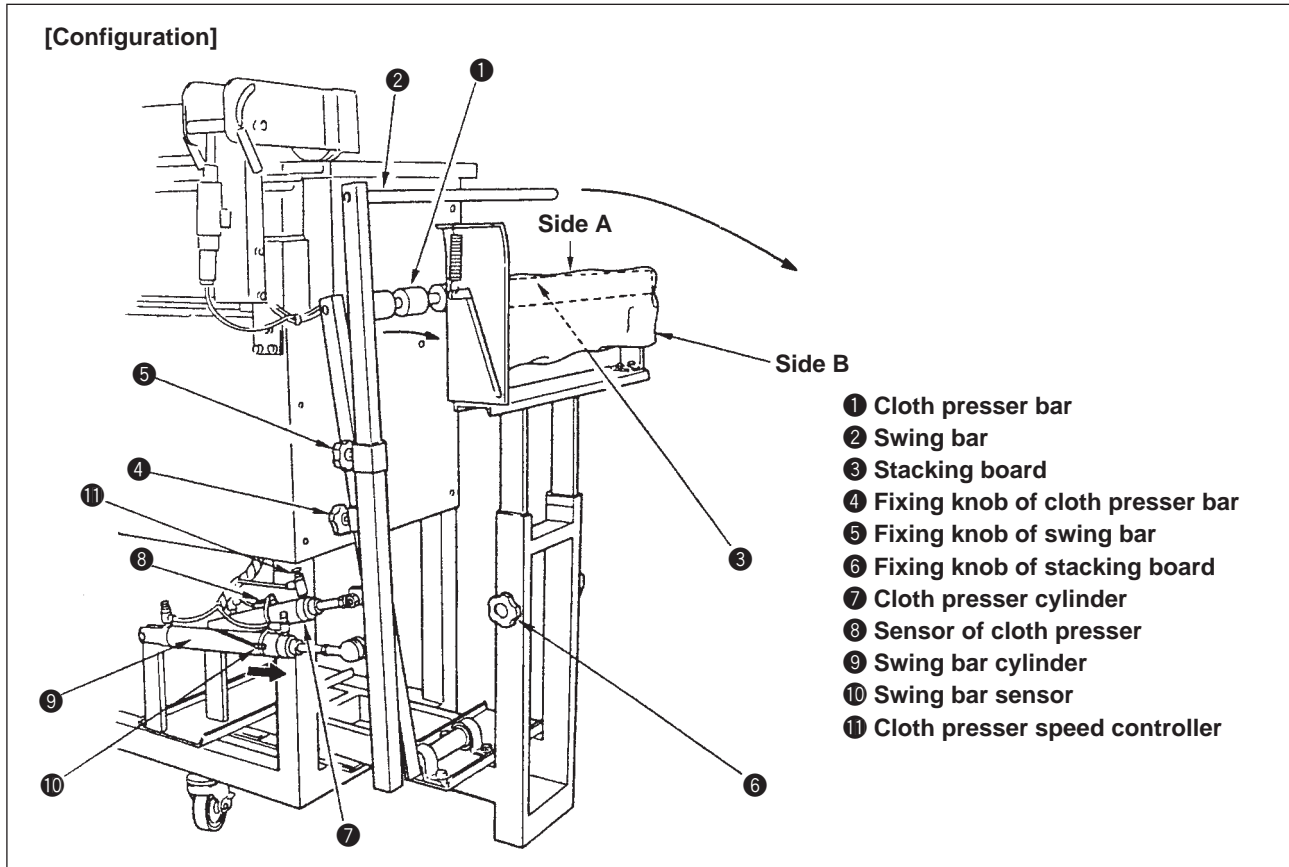
Loosen screws ①, and adjust so that belt ② inclines by an angle of 0° at the position where the belt comes in contact with table (left) ③ when the conveyor comes down with its dead weight.

5. Adjusting the height of the conveyor when it is raised

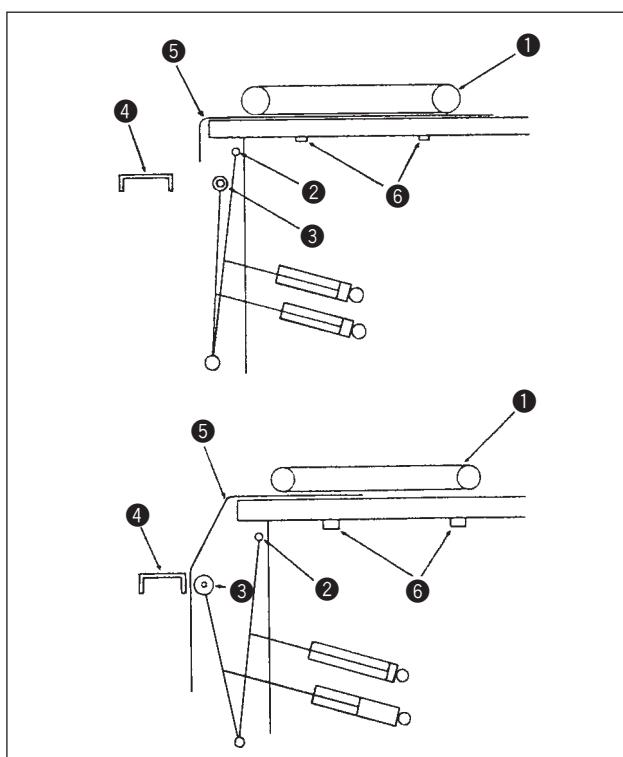
When the conveyor is raised, belt ② should be 40 ± 2 mm above table (left) ③. To adjust the height of the conveyor, loosen screw ④ and move cylinder ⑤ up or down.

⑥ Adjusting the stacker

(Caution) The stacker provided for this device automatically computes the timing to stack the garment regardless of its size and attacks the garments on the stacking board as long as its dimensions are about 180 mm wide or more and 1,000 mm long or shorter. (The stacker does not actuate under the long-material mode or the finished garment mode). Approximately 140 garment bodies (material: T/C broad cloth) with a folded top center plait can be stacked.

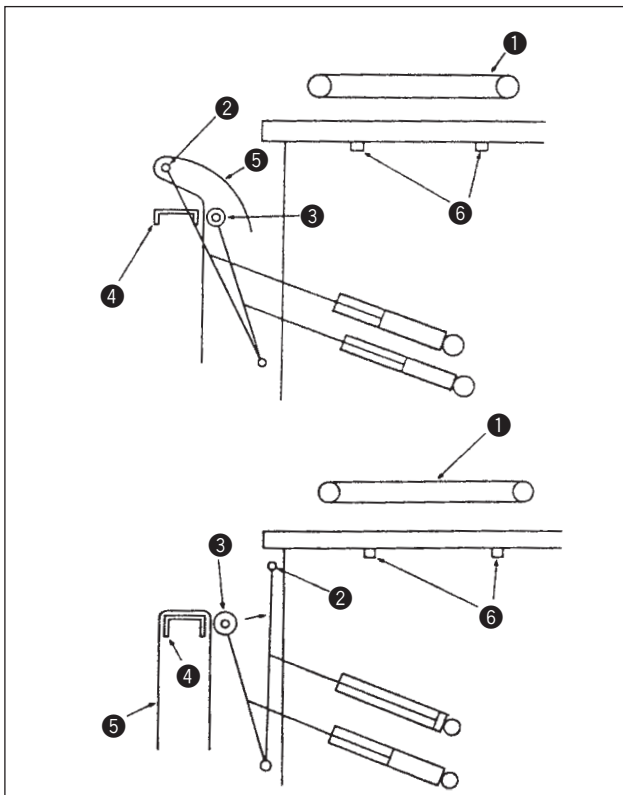


1. Performance



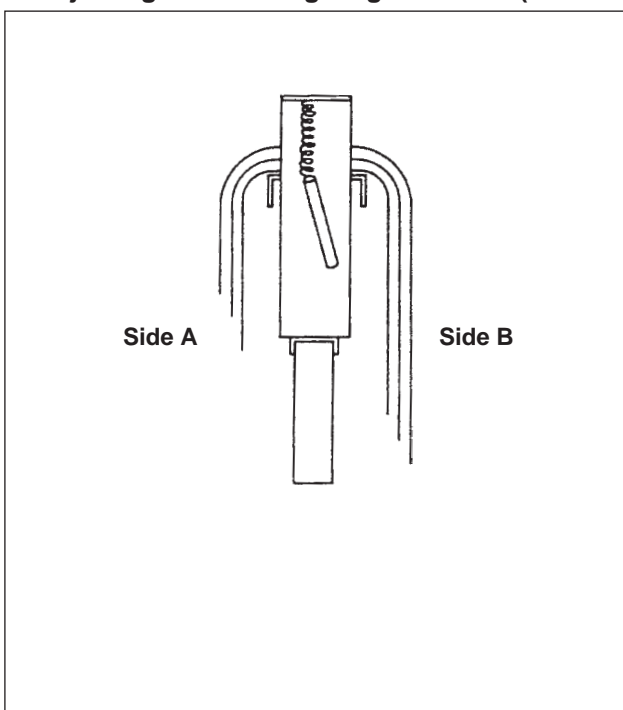
- 1) Length of cloth ⑤ fed by conveyor ① is automatically measured by material edge sensor ⑥.
- 2) At the same time when conveyor ① stops, one dangling end of cloth ⑤ is pressed against stacking board ④ by cloth presser bar ③.

- ① Conveyor
- ② Swing bar
- ③ Cloth presser bar
- ④ Stacking board
- ⑤ Cloth
- ⑥ Material edge sensor



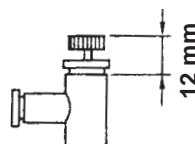
- 3) At the same time when conveyor ① goes up, swing bar ② spreads the other end of cloth ⑤. This will stack the cloth on stacking board ④.
- 4) After stacking cloth ⑤, swing bar ② returns to the home position. Then, cloth presser bar ③ returns to the home position.

2. Adjusting the stacking length of cloth (See the configuration on page 53.)



If the cloth on A side is shorter (longer) than the cloth on side B, perform the following adjustment.

- 1) Loosen fixing knob ⑥ of the stacking board, and raise (lower) stacking board ③.
- 2) Turn speed controller ⑪ of cloth presser cylinder ⑦ clockwise (counterclockwise) to decrease (increase) the speed.



(The height of the speed controller has been factory-adjusted to 12 mm at the time of delivery.)

(Caution) If the speed is unnecessarily increased, the stacker will generate an impact noise and durability of the stacker will be shortened. So, it is recommended not to increase the speed excessively. If the garment body to be stacked is short, raise stacking board ③ and cloth presser bar ①.

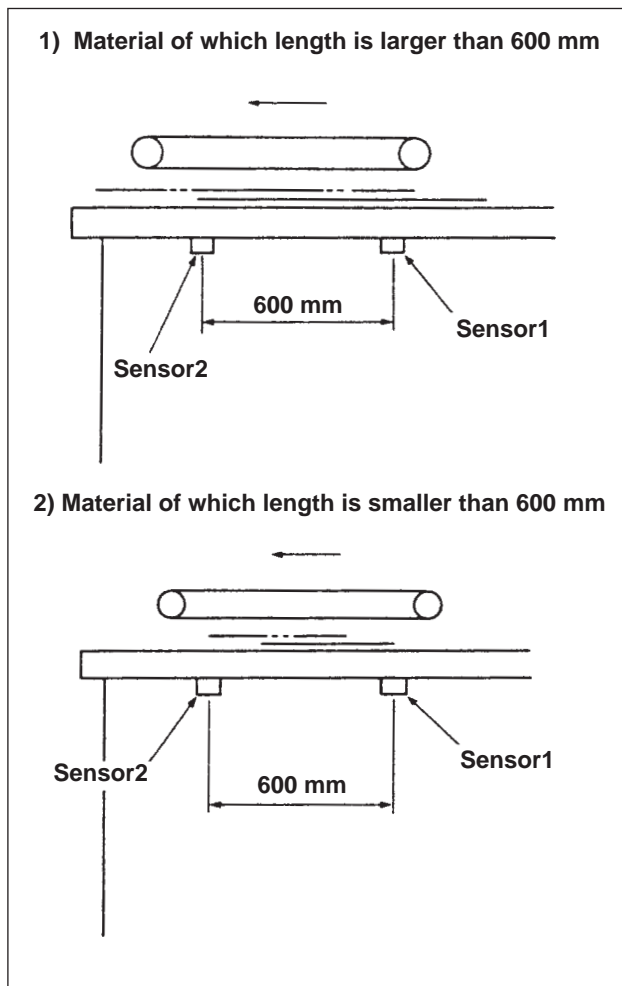
3. Adjusting the position of the sensor (See the configuration on page 53)

- 1) If cloth presser sensor ⑧ is set at the position where the indicator lamp of the sensor lights up when cloth presser bar ① moves toward stacking board ③, the sensor produces an alarm sound. In this case, the sensor detects the stacking amount of garment bodies on the stacking board and produces an alarm sound only, and the device does not stop.

(Caution) The sensor does not produce an alarm sound immediately after the sensor detects the stacking amount of garment bodies. The alarm occurs when the sewing machine sews the next garment body.

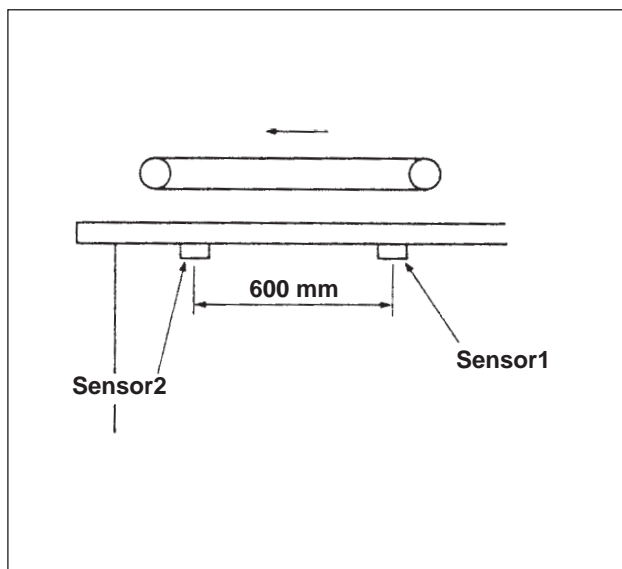
- 2) Swing bar sensor ⑩ detects swing bar ② that has moved in the direction of the arrow. The sensor determines the returning timing of the swing bar by detecting the aforementioned state of the swing bar. Consequently, it is necessary to adjust the stroke of swing bar ② by changing the position of the sensor. (Adjust the sensor of long materials are to be used. Moving the sensor in the direction of the arrow will lengthen the stroke of the swing bar. In this case, however, be sure to confirm that the indicator lamp of swing bar sensor ⑩ lights up.)

4. Operating timing of the stacker under the automatic stacking mode



- 1) For materials of which length is larger than 600 mm. While the material is being fed in the direction of the arrow, the length of time required from the time when the front end of the material passes sensor 2 (solid line) to the time when the rear end of the material passes sensor 1 (two-dot chain line) is measured. The material length is calculated based on the aforementioned length of time measured.
- 2) For materials of which length is smaller than 600 mm. While the material is being fed in the direction of the arrow, the length of time required from the time when the rear end of the material passes sensor 1 (solid line) to the time when the front end of the material passes sensor 2 (two-dot chain line) is measured. The material length is calculated based on the aforementioned length of time measured.
- 3) The length of time during which the conveyor rotates should be specified in accordance with the material length calculated in the aforementioned steps 1) and 2). When the conveyor stops rotating, the cloth presser bar actuates.

5. Operating timing of the stacker under the manual stacking mode



Length of time during which the conveyor rotates (a value on the timer) is specified regardless of the material length.

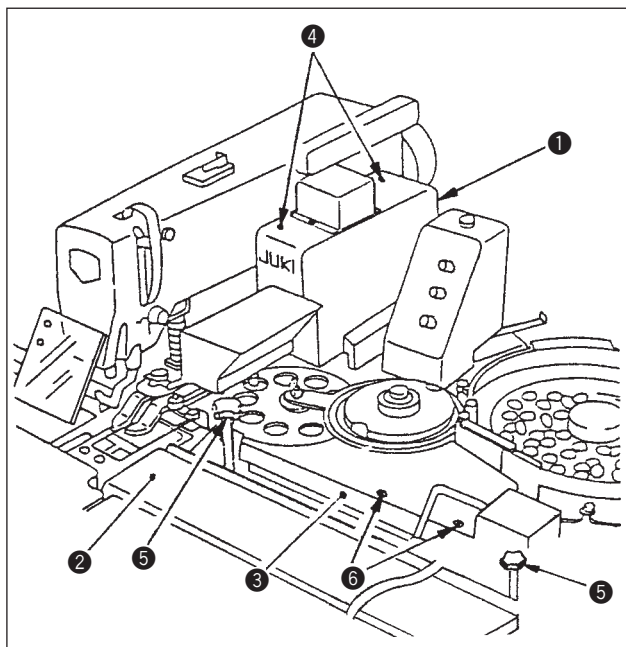
After the conveyor stops rotating, the cloth presser bar actuates.

A value on the timer can be set to any of twenty steps ranging from level 1 (0.6 sec.) to level 20 (2.1 sec.). It is specified on the operation panel.

(Operate the stacker under the manual stacking mode if long materials are to be used or light-weight materials or black-coloured materials that cannot be detected by the sensor are to be used.)

(2) Button feeder components

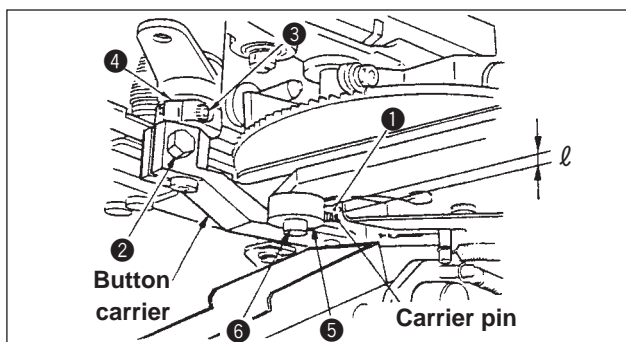
1) Removing the covers



Before adjusting the button feeder components, remove top cover ①, set plate ② and front cover ③. Remove screws ④, ⑤ and ⑥.

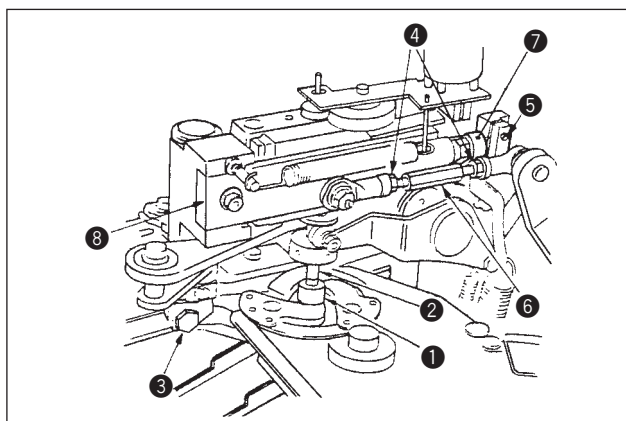
2) Adjusting carrier pin

1. Adjusting the clearance between the carrier pin and the shutter plate



Loosen screws ② and ③. Adjust clearance l provided between the carrier pin and shutter plate ①, by turning adjusting stopper ④, to 0.1 to 0.3 mm. At this time, fit the button carrier against adjusting stopper ④ with no clearance between them. Then, tighten screw ③ to fix adjusting stopper ④ in position.

2. Centering the carrier pin



Remove the work attachment from rotary rod ②. Insert the carrier pin into centering ring ①. (At this time, the shutter plate should be kept open.)

(Caution) Whenever the centering ring is used, set it with its smaller diameter side up.

1) Adjusting the center of the carrier pin in the lateral direction. Loosen screw ③ to allow the button carrier to swing in the right or left as desired. Then move the button carrier until the position where rotary rod ② smoothly enters centering ring ① is found.

Tighten screw ③ so that the button carrier is secured at that position. Now, press eccentric cam (1.-⑤) against the button carrier, and tighten screw shown in (1.-⑥) while carefully preventing the button carrier from moving from the secured position.

2) Centering the carrier pin in longitudinal direction

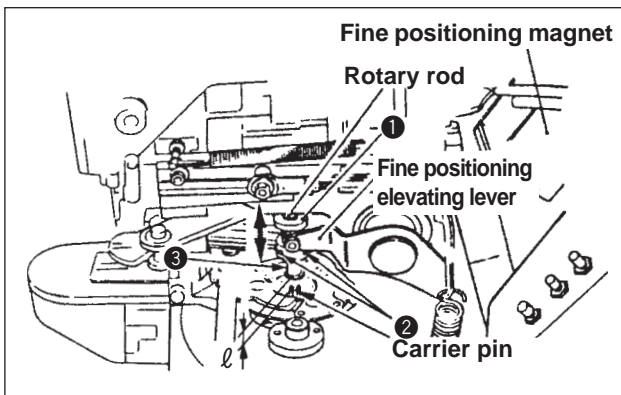
If the carrier pin cannot be properly centered by following the procedure 1), keep screw ③ loosened and perform the following adjustment. Loosen two locknuts ④ (the left-handed screw is located in front of the locknut) in the end of the rod. Loosen screw ⑤, and move urethane rubber ⑦ from the end face away from the LM guide ⑧. Move connecting rod ⑥ until rotary rod ② is brought to the position where it smoothly enters centering ring ①. Then press the urethane rubber ⑦ against the LM guide ⑧ so as to eliminate a longitudinal play. Confirm that the carrier pin is correctly centered then tighten nut ④ so that connecting rod ⑥ does not rotate any longer. Then tighten screw ⑤. After the carrier pin has been fixed with respect to its longitudinal position, the carrier pin should be laterally positioned and fixed in its cause. It is, therefore, necessary to re-center the carrier pin both in the lateral and longitudinal direction.

* The urethane rubber ⑦ is excessively pressed against the LM guide ⑧. The excessive contact between the urethane rubber and the LM guide can be corrected by providing a small clearance between them.

(Caution) Perform the aforementioned adjustment only when it is necessary. If necessary, be sure to confirm the following points.

- ① The spinner oscillating arm does not have any longitudinal play when it is in its origin.
- ② The spinner oscillating arm is correctly centered when it is in its origin.
- ③ The spinner oscillating arm actuates and the button is set on the button clamp jaw lever.
- ④ The center of the button clamp jaw lever should be aligned with the center of the button carrier. If not, refer to “6) Centering the button clamp jaw lever and the button carrier” on p. 60.

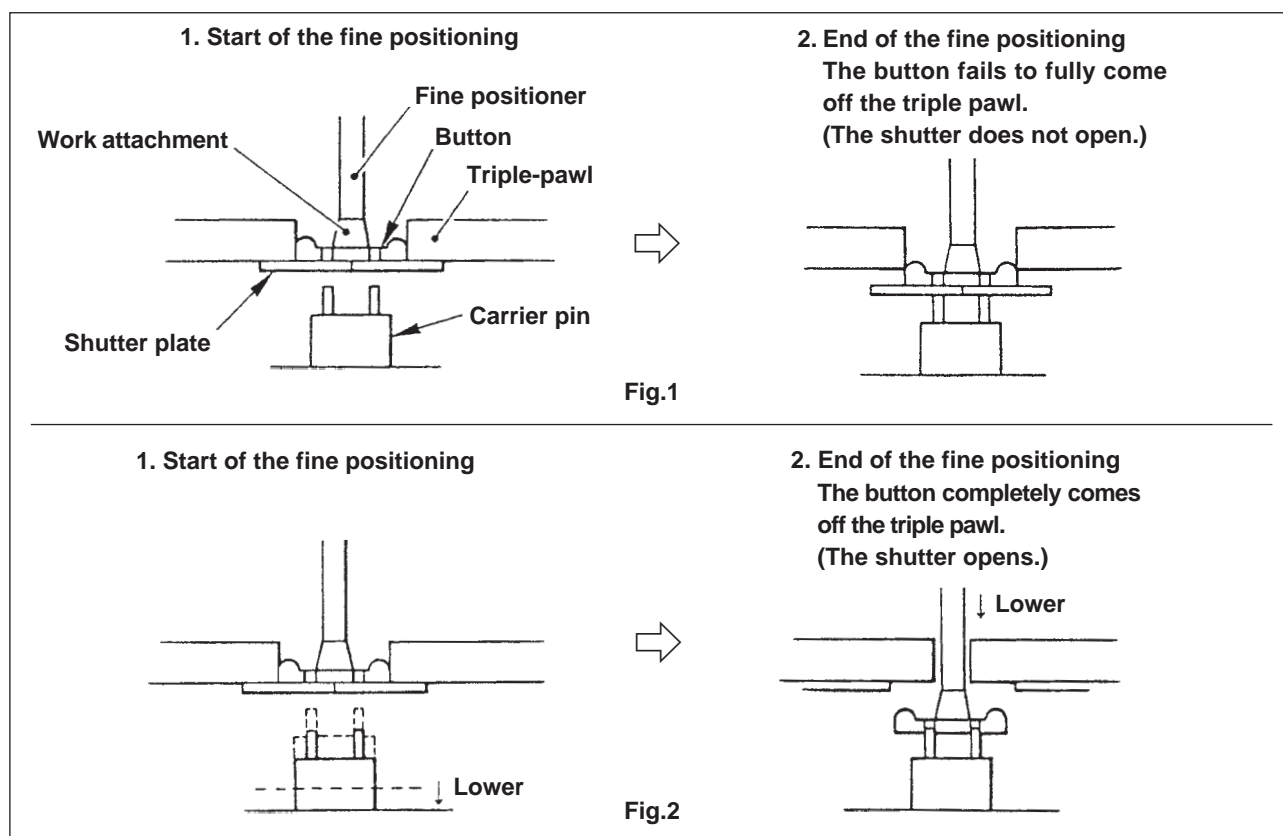
3. Adjusting the clearance provided between the work attachment and the carrier pin



Draw the iron core of the fine positioning magnet until the work attachment ③ is carried to its lowest position. Now, loosen screws ②, and adjust the screw so that clearance ℓ of 0.1 mm or less is provided between the work attachment ③ and the carrier pin as long as the work attachment ③ does not come in contact with the carrier pin. In this state, tighten screws ② while maintaining the relation between vertical hook ① and the rotary rod.

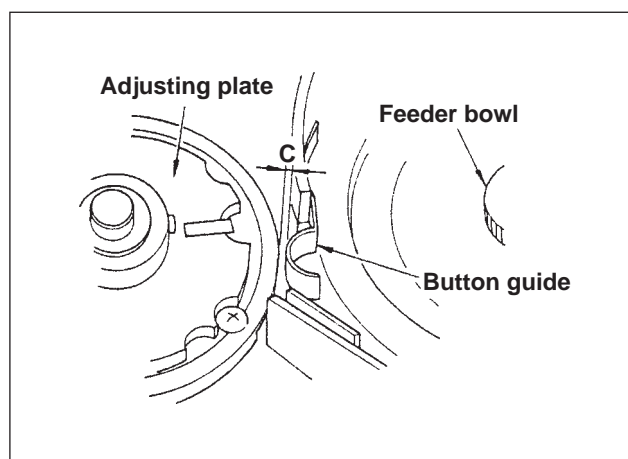
(Caution) Open the shutter plate, and adjust the clearance between the work attachment ③ and the carrier pin.

4. Adjusting the fine positioner when using a button which has a large recess at the center



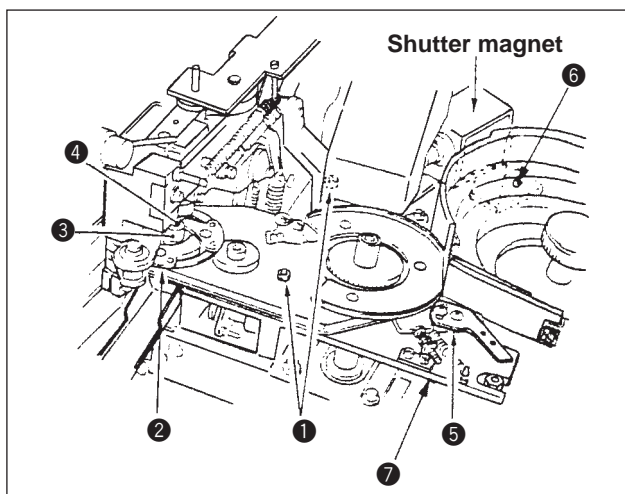
Normally, the fine positioning completion switch opens the shutter plate after the button has been set on the carrier pin. When using a button which has a large recess at the center, however, the edge of the button cannot come off the triple-pawl. As a result, the shutter cannot open due to the mechanism of the fine positioning completion switch, and the button cannot be fed to the carrier pin. (Fig.1)

In this case, lower the carrier pin and the work attachment to allow the button to completely come off the triple-pawl. (Fig.2) At this time, be sure to adjust the clearance between the work attachment and the carrier pin to the value same as that provided between the work attachment and the carrier pin when they are normally positioned (See p. 57.). Adjust the button clamp jaw lever in accordance with the button height. [Refer to " 8) Adjusting the height of the button clamp" on page 61.]



Adjust clearance C provided between the button guide and the adjusting plate, by bending the button guide, to 2 ± 0.5 mm.

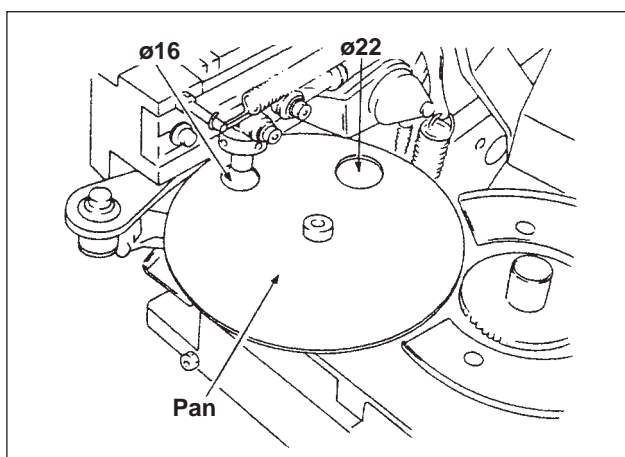
3) Centering the positioning unit



- 1) Loosen bolts ① and check bolt ⑥ of the shutter magnet support plate.
- 2) Fit centering ring ③ in the center of triple-pawl ②. Draw out triple-pawl dog ⑤ to allow centering ring ③ to be fitted in place. Move the index base plate ⑦ until a position where the rotary rod ④ (with the work attachment removed) smoothly enters centering ring ③ is reached.
- 3) After the positioning unit is correctly centered, tighten bolts ① and ⑥.

(Caution) Be sure to check again that the positioning unit has been properly after tightening bolts ①.

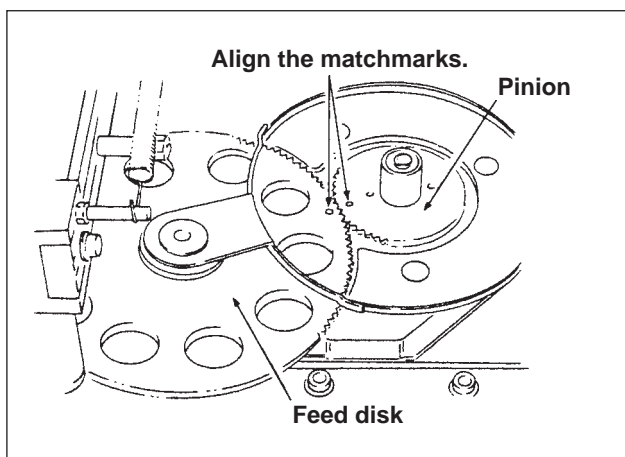
4) Replacing and positioning the feed disk



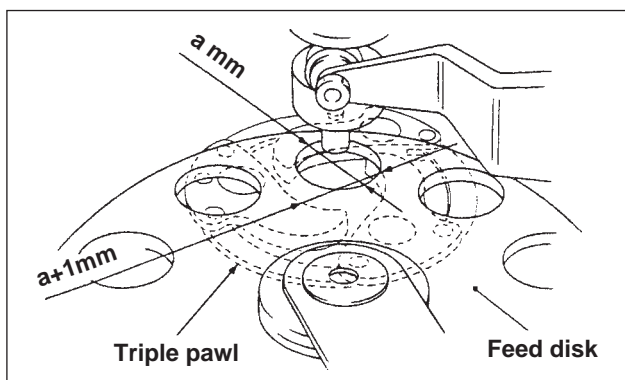
1) Pan

Use the feed disk (standard) of $\varnothing 16$ for buttons of which size is $\varnothing 10$ to $\varnothing 15$. When buttons of which size is $\varnothing 16$ to $\varnothing 18$ are used, use the feed disk (optional) of $\varnothing 22$. In this case, adjust the pan located under the feed disk according to the diameter of the hole in the feed disk. The pan has two holes, one is $\varnothing 16$ and the other is $\varnothing 22$. Bring the hole of $\varnothing 16$ for the feed disk of $\varnothing 16$ or the hole of $\varnothing 22$ for the feed disk of $\varnothing 22$ this size of the pan in terms of the direction of rotation of the feed disk by turning over the pan.

* Turn over the pan, and buttons of which size is $\varnothing 22$ can also be used.

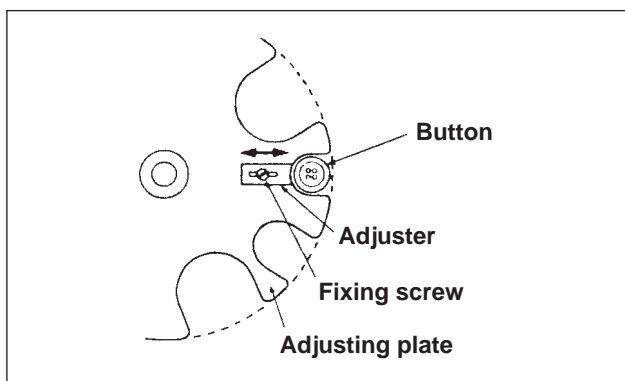
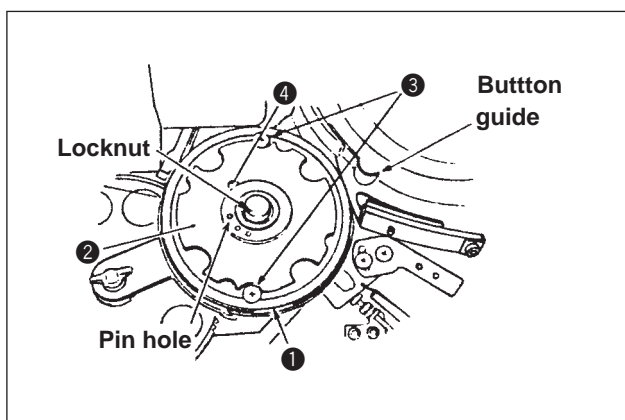


- 2) To position the feed disk, check first that the pinion is in its origin. Then adjust the position of the feed disk so that the matchmark on the feed disk aligns with the matchmark on the pinion (countersinking). At this time, align the hole in the pan with the hole in the feed disk on the triple pawl.



- 3) Take the value obtained by adding 1 mm to the buttonhole diameter in the feed disk used as criterion of the initial diameter of the triple pawl. Adjust the initial diameter of the triple pawl using the positioning stopper bolt.

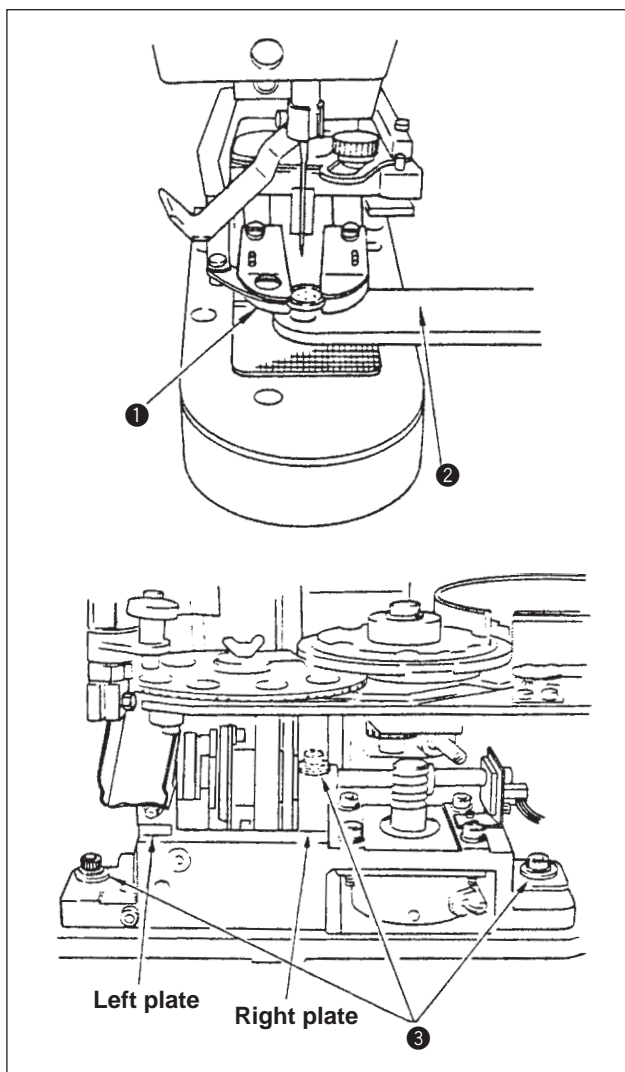
5) Adjusting the feed disk of the index unit



- 1) Confirm that the index unit is in its origin. Then loosen the locknut, and remove the adjusting plate.
- 2) Loosen screws ③ and screw ④, and remove frame ① and the adjusting plate ②.
- 3) Select one hole from among three holes with different diameters (ø18, ø16 and ø12) in the feed disk, and finely adjust the hole selected to the buttons to be used using the adjuster. Adjust the feed disk so that the periphery of the button is flush with the periphery of the feed disk.
- 4) Adjust the clearance into which the button is placed allow only one button to go through it. Once the adjusting plate is correctly positioned, fix it by tightening the screw ④.
- 5) Shut the button feeding hole in the feed disk which is not used for the sewing with frame ①, and fix the frame with screws ③.
- 6) Install the feed disk which has been properly adjusted on the feeder. At this time, be careful to set the feed disk so that the button hole in it to be used meets the outlet of the feeder bowl. Then, tighten the locknut.

(Caution) Adjusting plate ② is fragile. So, take care not to excessively tighten the screw in the adjusting plate.

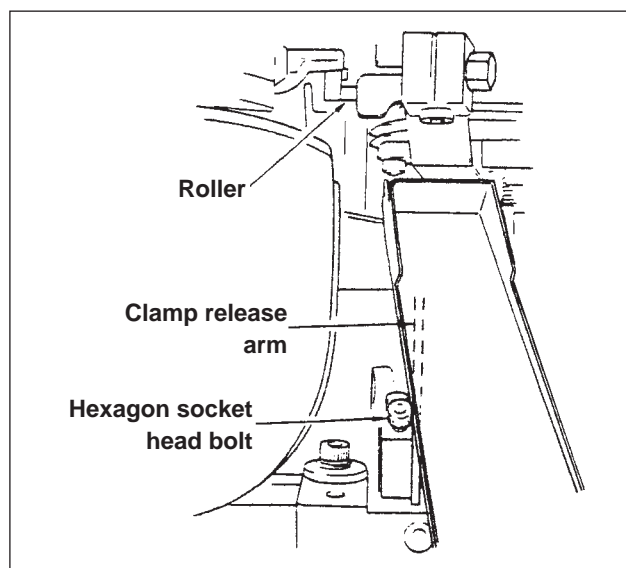
6) Centering the button clamp jaw lever and the button carrier



- 1) Tilt the machine head.
- 2) Loosen three locking bolts ③ in the main body frame and bolts ⑥ ("(2)-2)-1 setscrew ⑥ (p.56)".
- 3) Raise the machine head. Turn the manual rotating shaft until carrier ② on which the button is placed is brought to its front end position.
- 4) Move the main body from until the button in carrier ② meets the button clamp jaw lever.
- 5) Once the button clamp jaw lever has been properly positioned, return carrier ② to its origin and tilt the machine again. Then, tighten bolts ③ and ⑥.
- 6) Raise the machine head, and confirm again that the button clamp jaw lever is correctly positioned by turning the manual rotating shaft by hand.

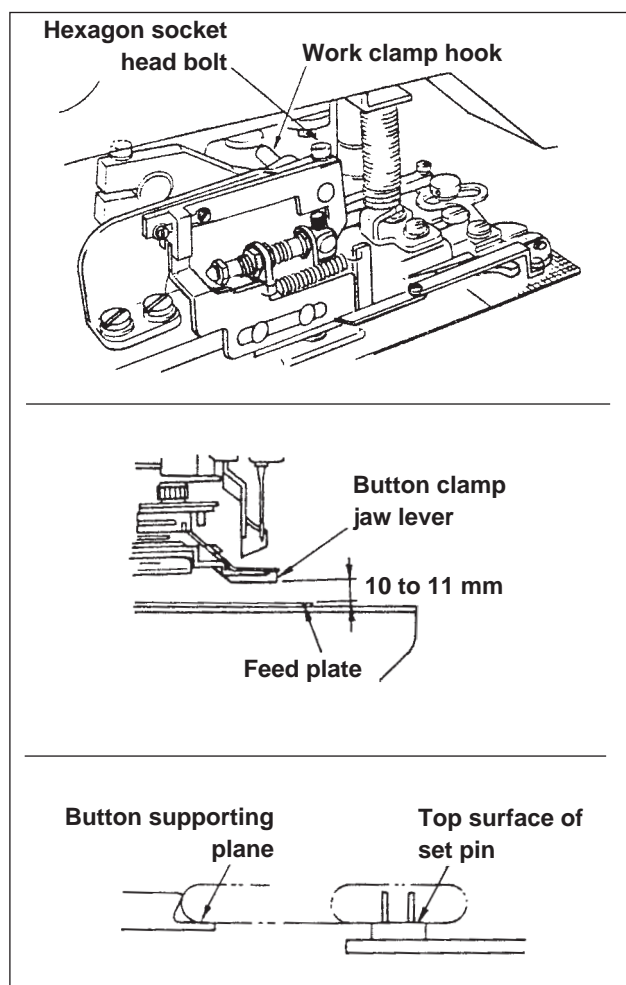
(Caution) This adjustment should be carried out after the adjustment (2)-2)-2 (P.56) has been completed.

7) Adjusting the opening amount of the button clamp jaw levers



This sewing machine has been designed to make the button clamp jaw levers automatically open to release the finished button at the very moment when the button has been sewing on the material. The opening amount of the button clamp jaw levers to release the button can be adjusted. Manually turn the manual rotating shaft, and the clamp release arm will move and button clamp jaw lever will open. Adjust the position of the clamp release arm by loosening the hexagon socket head bolt so that a clearance of 1 to 2 mm is provided between the button and the button clamp jaw lever when pressing the roller away from you until it will go no further. After the adjustment, tighten the hexagon socket head bolt. If the clamp jaw lever from the sewing start, the button clamping force will be insufficient resulting in button setting failure or needle breakage. On the other hand, if the clamp release arm is positioned too far from the button clamp jaw lever, the finished button may not be automatically released from the button clamp jaw lever. So be careful.

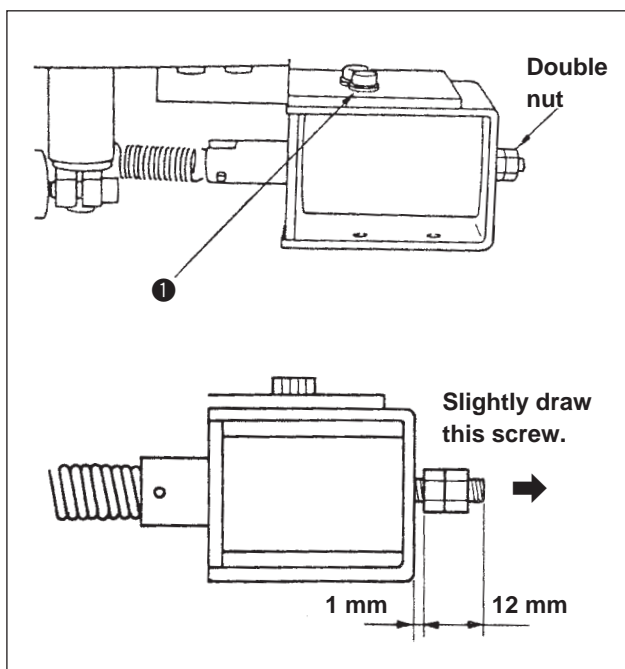
8) Adjusting the height of the button clamp



When the sewing machine is in its stop-motion state and the button feeder runs idle, the standard distance of 11 mm should be provided between the button face of the button clamp jaw lever and the top surface of the feed plate of the sewing machine.

Loosen the hexagon socket head bolt, and turn the work clamp vertical hook which is an eccentric shaft until the button clamp is correctly positioned. Then tighten the bolt. The standard height of the button clamp is 11 mm as stated above. And, in principle, the button supporting plane should be flush with the top surface of the set pin. It would be better to slightly adjust the height of the button to be used. The button should not be placed in the button clamp jaw lever without fail.

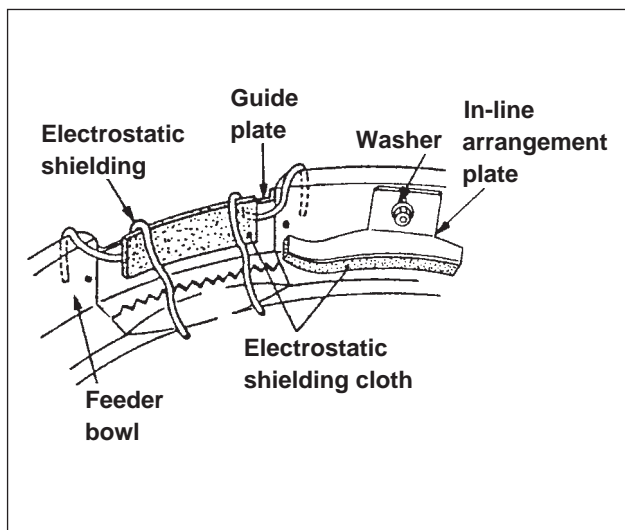
9) Adjusting the output level of the positioning solenoid



If the output level of the positioning solenoid is excessive, the clamped button may be raised or broken. On the other hand, if the output level of the solenoid is inadequate, the button may fail to be clamped. It is, therefore, necessary to adjust the output level of the solenoid properly. Loosen the M4 double nut located at the rear of the solenoid, and adjust the protruding amount of the male screw properly so that an adequate output level of the positioning solenoid is provided. The standard protruding amount of the male screw is 12 mm (0.472"). At this time, position the magnet so that an approximately 1 mm (0.039") play is provided for the spring attached at the top of the iron core of the solenoid. If the spring does not have a play, loosen screw ①, and make the adjustment properly.

(Caution) When performing the aforementioned adjustment, the triple-pawl of the $\varnothing 16$ feed disk should be opened.

10) How to use an electrostatic shielding cloth

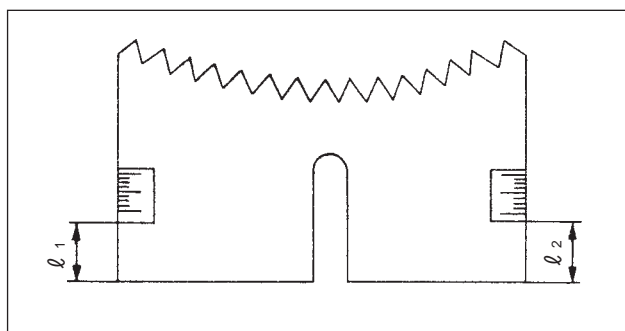


Static electricity may impair smooth feeding of buttons. In this case, stick electrostatic shielding cloths and electrostatic string supplied with the machine on the button feeding components with double-sided adhesive tape as shown in the figure. (When adhering the cloth, and string is on the in-line arrangement plate, cut them into an appropriate size with a pair of scissors or the like. If the in-line arrangement plate is adhered with the electrostatic shielding cloths and string, the plate should be cleaned up periodically since smooth feeding of buttons may be impaired by thread waste that is likely to gather on the plate.)

(Caution)

1. A clearance of 1 to 2 mm should be provided between buttons and electrostatic shielding cloth to prevent the cloth from coming in direct contact with buttons.
2. If the adjusting range of the vertical position of the in-line arrangement plate is limited by the thickness of buttons to be sewn, remove the washer.

11) How to use the separation plate (supplied with the machine)



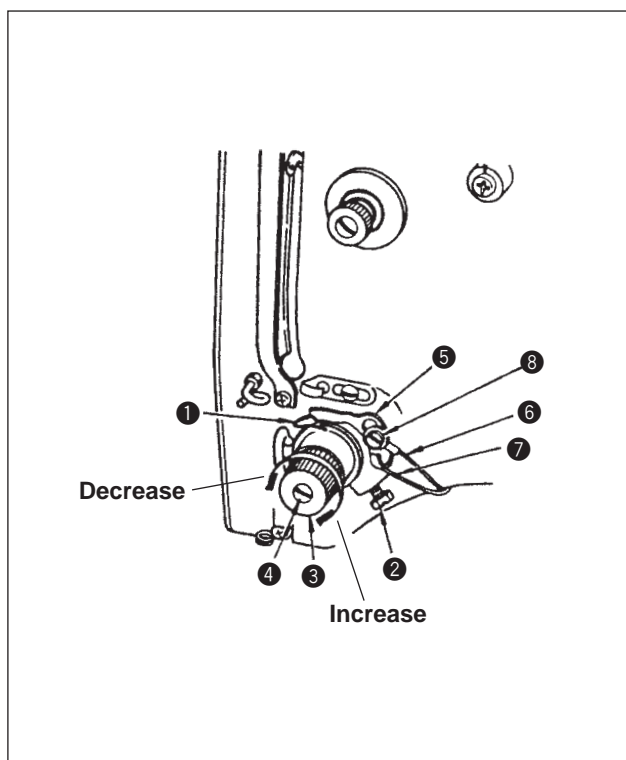
The separation plate supplied with the machine is not adhered with a scale marker sheet. So, adhere the scale marker sheets on the plate. At this time, adjust the position of the sheets so that they do not come in contact with buttons when the feeder bowl is used. If buttons come in contact with the scale marker sheets, they may fail to be sorted normally.

Determine dimensions l_1 and l_2 in the figure as desired as long as they satisfy the requirement described above.

(3) Detecting mechanism and its adjustment

1) Adjusting the thread breakage detector (THR)

The detector detects thread breakage by checking whether the thread tension is applied to the take-up spring when the detector receives the up-position signal from the main shaft.



1. Adjusting the thread take-up spring

The standard stroke of thread take-up spring ① is 6 pull the thread at the starting point is 20 through 40 g. To adjust the stroke of the thread take-up spring, loosen set screw ②, and turn tension controller assembly ③ clockwise to increase the stroke or counterclockwise to decrease it. To adjust the tension of the thread take-up spring, insert the blade of a flat-bit screwdriver into the groove in tension post ④, and turn it clockwise to increase the tension or counterclockwise to decrease it.

(Caution) Decrease the tension of the thread take-up spring for a synthetic fiber thread.

Now, loosen setscrew ⑧, and adjust so that detector plate ⑤ comes in contact with thread take-up spring ① without fail.

Finally, confirm that detector plate cable ⑦ is insulated by grounding wire ⑥ when the thread take-up spring starts pulling the thread to apply appropriate tension to the thread.

2) Adjusting the fine positioner mechanism

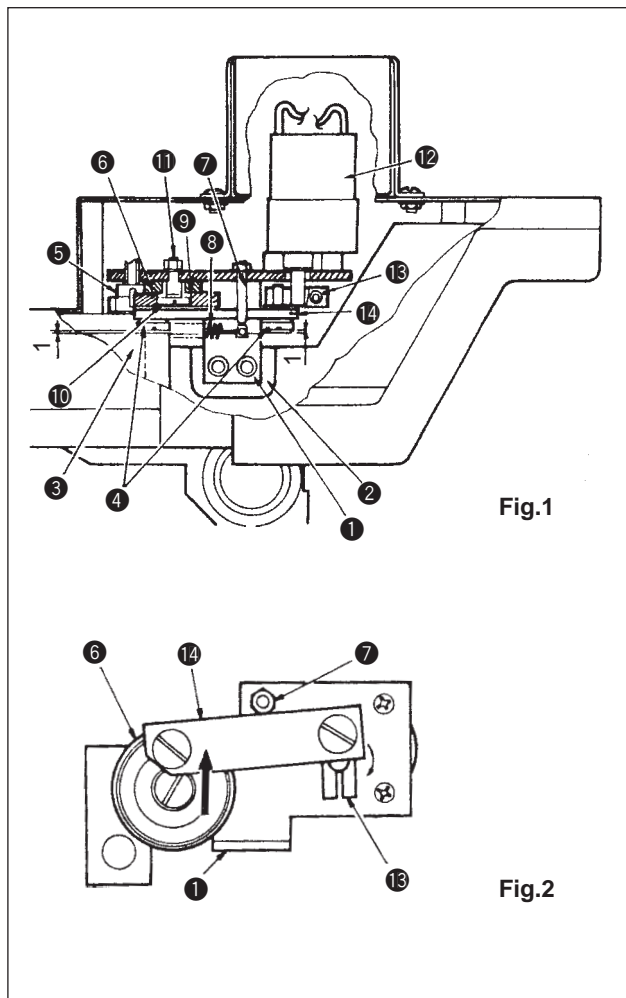
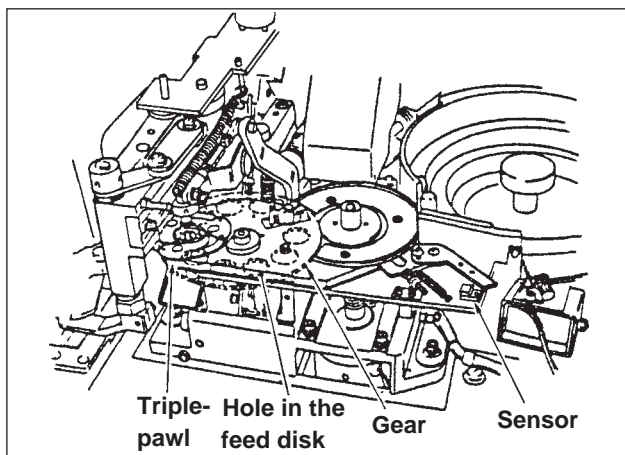


Fig.1

Fig.2

- 1) Attach fine positioning motor ⑫ to rod driving arm ⑬ so that fine positioning link ⑭ smoothly moves without interfering with rod gear B ⑥. When fitting fine positioning motor ⑫ in rod driving arm ⑬, attach hinge screws ④ which join fine positioning link ⑭ and fine position bracket ⑦. If the hinge screw is attached to the opposite side, fine positioning link ⑭ will interfere with fine positioning motor bracket ① and fail to actuate. (See Fig.2)
- 2) When attaching fine positioning rod gear B ⑥ to fine positioning motor bracket ①, position fine positioning rod gear B ⑥ so that it can be rotated smoothly by hand and deflects by 0.5 mm (0.020") or less at the top end of the gear teeth. (Adjust the position of the fine positioning rod gear B ⑥ with hinge screw . Then fix the hinge screw with out ⑪.)
- 3) Attach fine positioning motor bracket ① to main body frame ② so that a clearance of 1 mm (0.039") is provided between LM guide ③ and hinge screws ④ and a backlash of 1.5 mm (0.059") or less is provided between fine positioning rod gear B ⑥.
- 4) After the fine positioning motor bracket has been attached to the main body frame, manually move the manual rotating shaft to check the clearance provided between LM guide ② and hinge screws ④. Fix spring suspension to spinner oscillating arm returning spring ⑧ and LM guide ③.

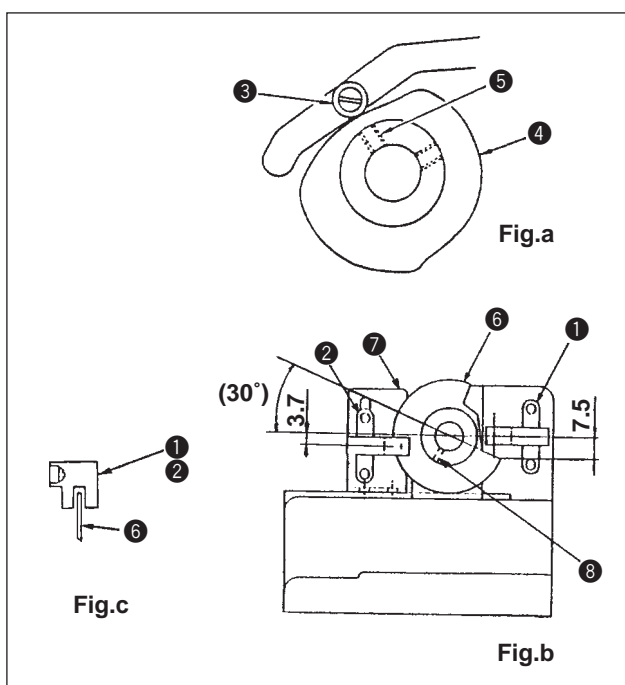
3) Button detecting mechanism at the positioner



A button is detected at the button positioner.

If a button is detected by the sensor, the machine starts fine-positioning of the button. If no button is detected, the machine repeats index until the sensor detects a button by means of the gear. However, no button is detected after having continuously tried indexing a button ten times, the machine terminates indexing and the alarm indicator on the operation panel repeats flashing on and off. Now, press the manual operation switch, and the machine will re-start indexing until the sensor detects a button.

4) Spinner oscillating arm origin switch (A.ORG) and spinner oscillating arm forward switch (AFRT) (The switches are different from those mounted on the BR10. So be careful.)



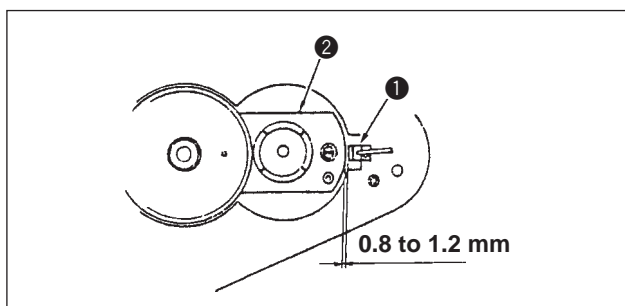
Spinner oscillating arm origin switch ① (hereinafter called "A.ORG") and spinner oscillating arm forward switch ② (hereinafter called AFRT) each of which is equipped with a photo-micro sensor (PM-T53B) are sensors to detect the origin of the cam shaft.

Adjust cam follower ③ for the button clamp jaw lever so that it is located above attaching screw ⑤ in two-stepped cam ④ by turning the manual rotating shaft, as illustrated in Fig.a. Fix AFRT ② at the lowest position of the slot in metal fitting A ⑦ of the spinner oscillating arm.

At this time, note that sensor dog ⑥ should come to the center of the sensor as shown in Fig.c.

(Caution) Notch of the shape of sensor dog ⑥ is different from that of sensor dog for BR20.

5) Adjusting the index origin switch (IORG)



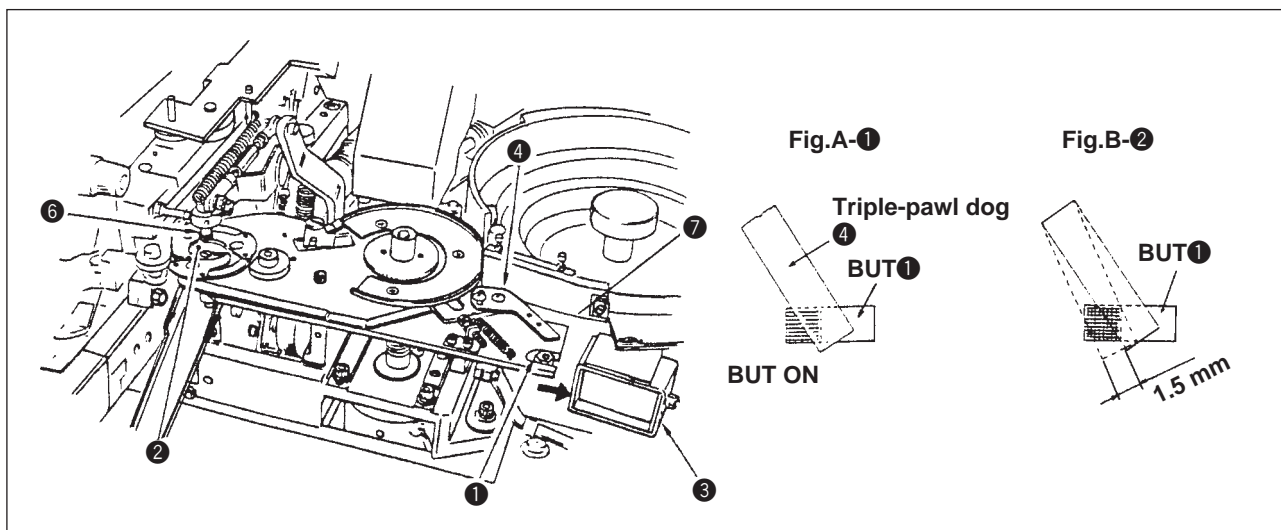
Index origin switch ① (hereinafter called IORG) which incorporates a proximity sensor (GXL-8F) is a sensor to detect the stop of feeding of the feed disk.

Adjust the clearance between the periphery of Zeneva wheel ② and the detecting plane of the IORG to 0.8 to 1.2 mm (0.013" to 0.047")

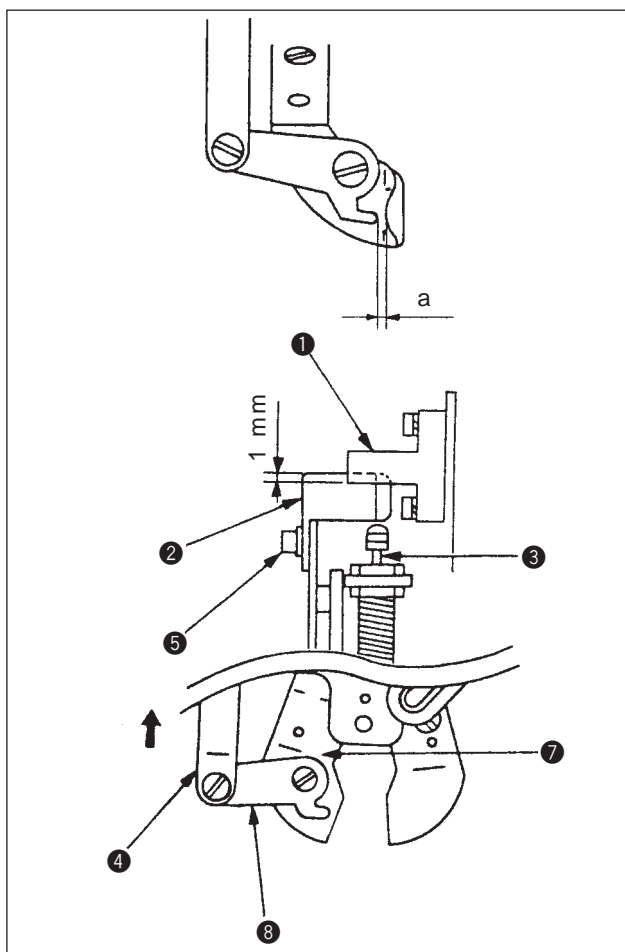
6) Adjusting the button positioning detection switch (BUT)

Button positioning detection switch ❶ (hereinafter called BUT) which incorporates a proximity sensor (GXL-8F) is a sensor to detect whether a button exists in the positioner ❷ when actuating the positioner (triple pawl). (It turns OFF when a button exists in the positioner or turns ON when it does not detect any button there.)

Draw the iron core of positioning solenoid ❸ when there is no button in positioner ❷, and the triple pawl will be closed. In this state, loosen the fixing screw of triple-pawl dog ❹, and move triple-pawl dog until BUT which has been in the OFF state turns ON. Then further move the triple pawl dog forward from the aforementioned position (Fig. A- ❶) by 1.5 mm (0.059") (Fig. B- ❷), and tighten the fixing screw of the triple-pawl dog. Then, confirm that BUT turns OFF when the triple-pawl clamps a $\varnothing 10$ mm (0.394") button. Also confirm that BUT turns ON when the triple pawl is closed after taking out the button from it.



7) Adjusting the button detecting switch and cylinder

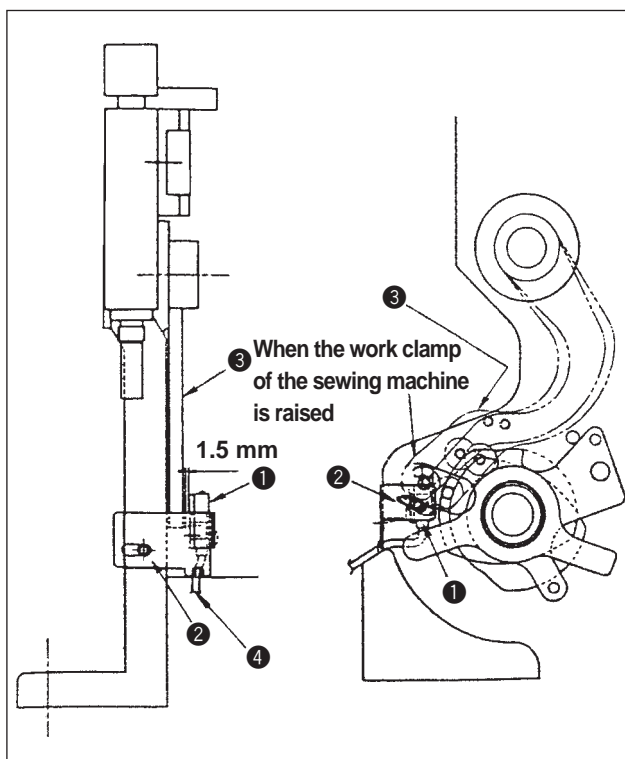


- 1) Adjust first the operating air pressure to 0.5 MPa (5 kgf/cm².)

Loosen cylinder nut ❹ and adjust the position of the cylinder so that clearance (a) provided between button clamp jaw lever (left) ❷ and detecting lever ❸ is minimized with the power to the machine turned OFF (the cylinder is fully extended).

- 2) Set the operating air pressure to 0 MPa (0 kgf/cm²) and retract cylinder ❸. (The cylinder automatically returns to its retracted position by means of the spring.) Now, loosen screw ❺ and adjust so that a clearance of 1 mm is provided between sensor ❶ and the end face of detecting plate ❷.

8) Adjusting the work clamp lift detecting switch

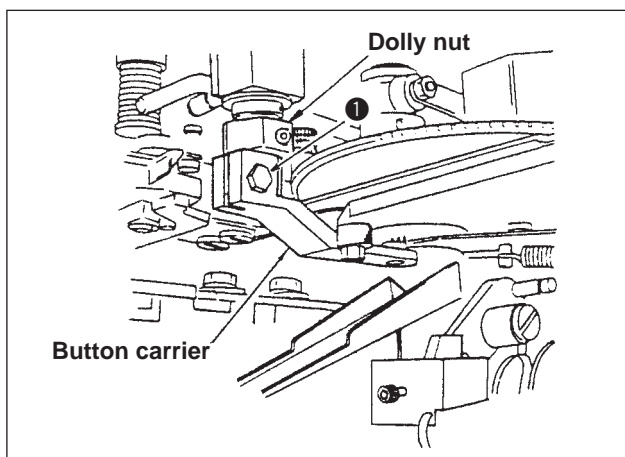


- 1) Adjust metal fitting ② so that a clearance of 1.5 mm (0.059") is provided between work clamp lift detecting switch ① and vertical lever ③.
- 2) Then, fix switch ① at the position where the LED lights up when the work clamp is raised by turning the manual rotating shaft.
- 3) Confirm that the LED lights up when the work clamp is lowered.

(Caution) Be sure to pass switch cord ④ through the □ section of metal fittings ②.

(4) Replacing the components and positioning them

1) Replacing the button carrier and positioning it

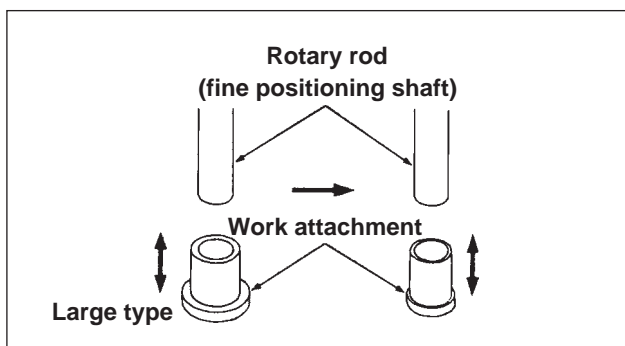


To replace the button carriers, remove first the fixing knob of the set plate (right).

Loosen screw ① and remove the button carrier. Replace the button carrier with another button carrier with a proper center-to-center distance. Fit the selected button carrier to the eccentric cam stopper, and simultaneously make the top face of the carrier come in contact with the dolly nut. Now, fix the button carrier at that position.

(Caution) The above-stated positioning procedure should be carried out with the sewing machine set to the origin.

2) Replacing the work attachment

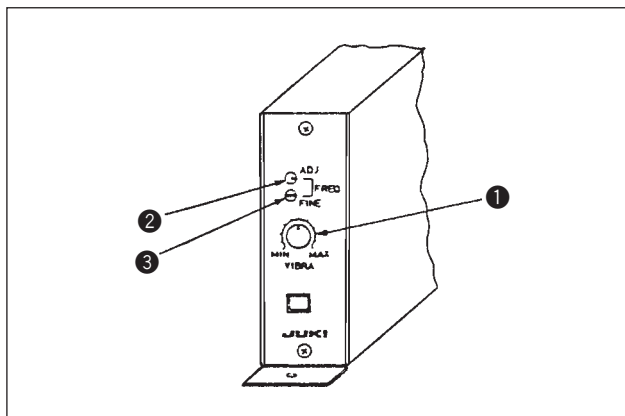


Remove the work attachment currently attached to the sewing machine from the rotary rod. Then attach the work attachment of another type to the machine. At this time, be sure to confirm that the work attachment securely fits in the position.

This should be confirmed in the case of replacing any other components in the normal operation of the sewing machine.

3) Adjusting the parts feeder

1. Operation of the operation panel

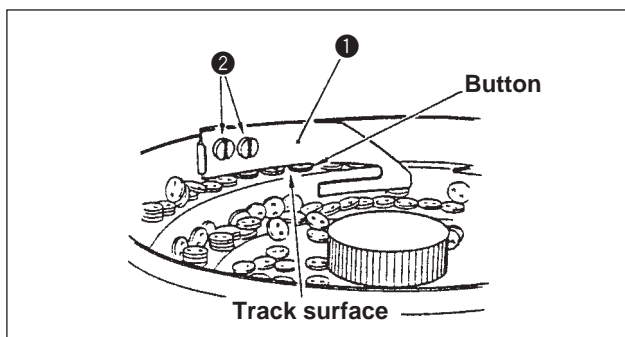


- 1) Turn ON the power to the parts feeder.
- 2) Set variable resistor ① to the middle of the graduation.
- 3) If the feeder does not vibrate adequately, turn sensitivity sensitivity adjustment variable resistor ② until it reaches the position to allow the feeder to vibrate most. Then turn sensitivity adjustment variable resistor ③ and make a fine adjustment so that vibration of the feeder is maximized.
- 4) Adjust the flow of buttons using the parts feeder adjusting variable resistor ①.

(Caution) Sensitivity adjusting variable resistor ② is very delicate. It is recommended to place buttons with flat bottom in the feeder bowl, and adjust the flow of buttons while checking the actual flow of the buttons. This will allow you to adjust the flow of buttons with ease.

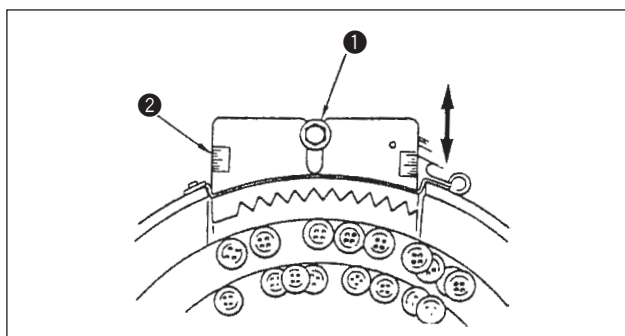
4) Adjusting the attachments in the feeder bowl

1. Guide plate



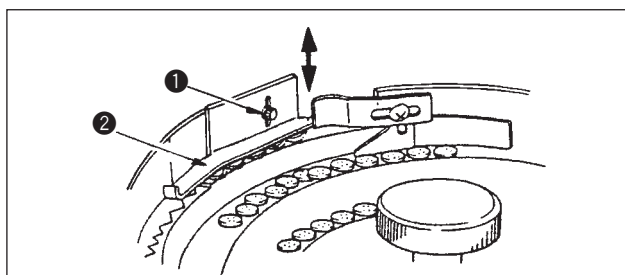
The appropriate clearance between the button top face and the guide plate ① is approximately 0.7 mm. Loosen screws ②, and move guide plate ① up and down to adjust the clearance appropriately.

2. Separation plate



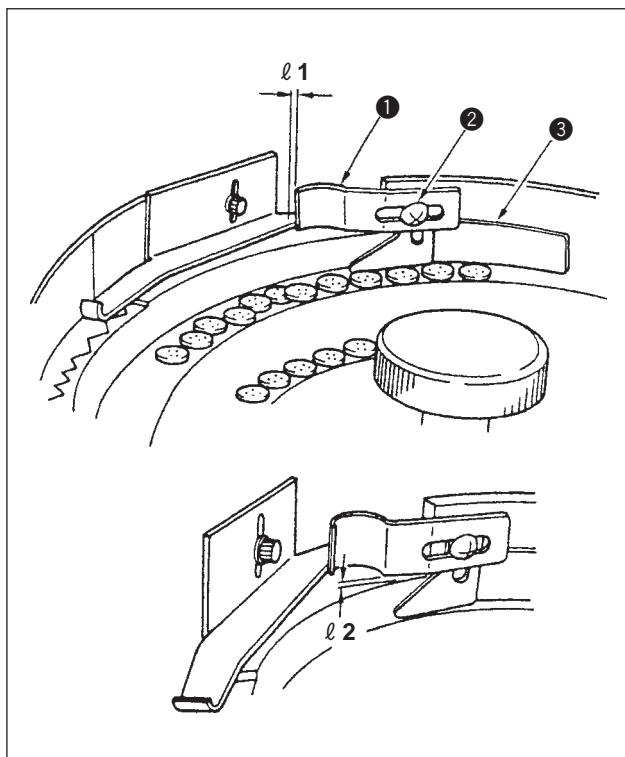
The separation plate sorts the right-sided buttons from the wrong-sided buttons and feeds only the right-side buttons to the index unit. Loosen bolt ①, and move separation plate ② back and forth until it is correctly positioned. Now, fix the plate with bolt ①. The separation plate comes in three different sizes, i.e., large, medium and small. Select one from among them in accordance with the size of buttons to be used.

3. In-line arrangement plate



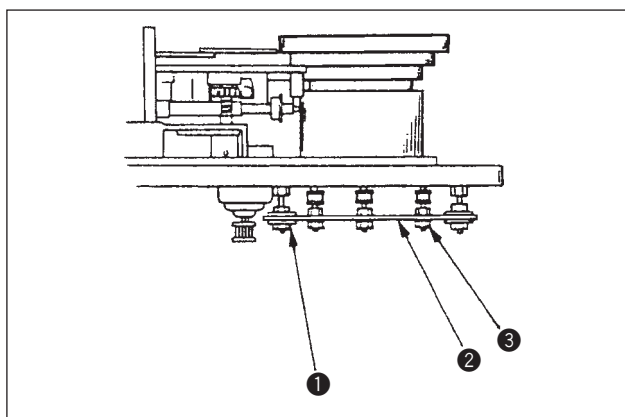
This plate prevents buttons which have passed the separation plate from piling up. The appropriate clearance between in-line arrangement plate ② and the top face of a button is approximately 0.7 mm. Loosen bolt ①, and move the in-line arrangement plate ② up and down to adjust the clearance to the correct value.

4. Button guide



Appropriate clearance $l\ 1$ between the button guide ① and the button is approximately 3 to 4 mm (0.118" to 0.157"). Loosen screw ②, and adjust the clearance to the correct value. A clearance which is larger than the value twice as thick as a button by approximately 0.7 mm should be provided between overflow prevention plate ③ and the button. Loosen screw ②, and adjust the clearance to the correct value. Appropriate clearance $l\ 2$ between lower surface of the button guide and the track surface of the feeder bowl is 0.3 to 0.5 mm (0.012" to 0.020").

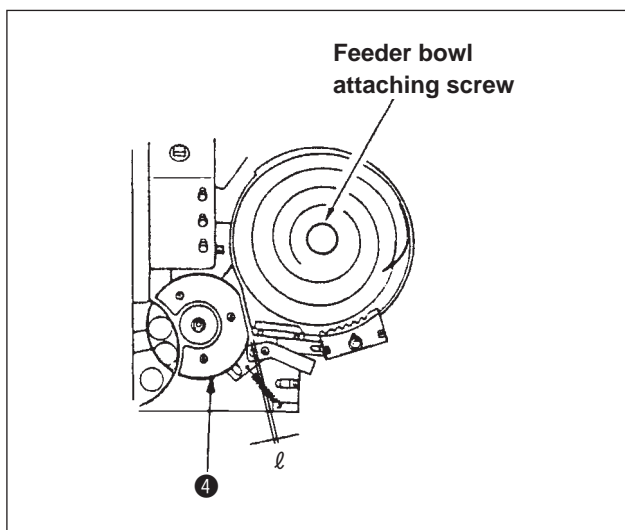
5. Adjusting the height of the feeder bowl



Loosen six locknuts ① of feeder base ②, and adjust height difference l between the outlet for buttons and the disk to 0.5 mm (0.020") or less while the disc is positioned higher than the outlet for buttons. (At this time, never adjust ③.)

If an excessive difference in height is provided, two buttons may enter the notch of the feed plate with overlapped. So be careful.

6. Adjusting the position of the feeder bowl

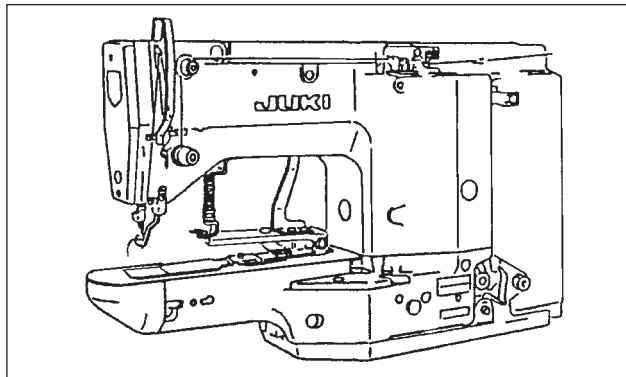


Adjust clearance l between the feeder bowl and the disk ④ to approximately 1 to 1.5 mm (0.039" to 0.059"). Loosen nut ① (above figure) and move the entire unit of the parts feeder until it is properly positioned. The position of the feeder bowl can be finely adjusted by loosening the feeder bowl attaching screw and changing the position of the feeder bowl.

9. MAINTENANCE INSPECTION

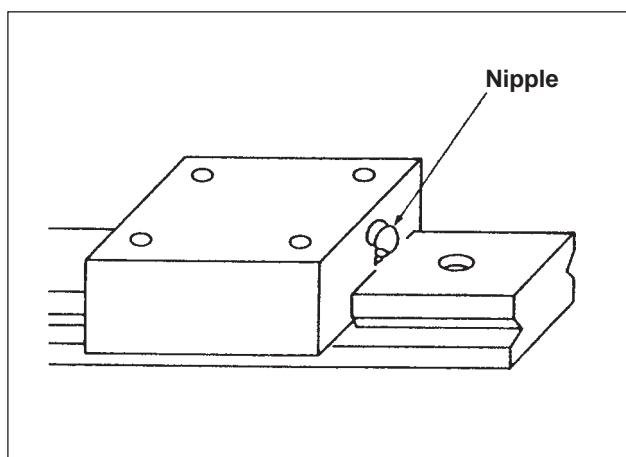
For maximum performance of this machine, be sure to perform periodic maintenance and inspection as shown below.

(1) Maintenance and inspection of the sewing machine components



Dirts and dust accumulated on the components described below may adversely affect the sewing capabilities and performance of the sewing machine. So, be sure to clean them after operation is finished.

- 1) Blow dust off the photo sensor slit area with the air gun.
- 2) Remove the fibrous wastes or dust from the contact plane of the electrode of thread breakage detector with a dry rag.
- 3) Apply lithium system soap group grease No.2 onto the nipples (located on the both side of the carriage unit) of the LM guide that is used for feeding the carriage unit once every two or three months.



(2) Maintenance and inspection of electrical components

Inspect periodically each joints for loose connector, etc., caused by vibration of the machine, etc. (Also check each power plug for lifting and screws for looseness.)

(3) Diagnostic feature

Input signals of the sensor or output signals of valves can be checked on the operation panel. Use this feature troubleshooting at the time of maintenance.

1. Details of inspection

- 1) Checking the liquid crystal display (LCD) of the operation panel
- 2) Checking the input signals.
- 3) Checking the output signals.


2. Preparations for operation

- ① Turn OFF the power to the machine, and set the DIP switches in the control box as described below.
 - DSW4-8 in the I/O circuit board ON
 - DSW2-2 in the CPU circuit board ON

* When carrying out "2) Checking the input signals" remove the operating air supply from the machine and the connector (P61) of the stepping motor from the rear face of the control box.

1) Checking the liquid crystal display (LCD) on the operation panel

① Turn ON the power to the machine, and the following screen will appear on the LCD of the operation panel.

② Press the ENTRY key , and the sewing machine will enter the LCD check mode. Now, the indications will change at intervals of five seconds in the following order.


* Check the LCD components for failure. If the indicated frame on the screen breaks in part, replace the panel circuit board with a new one.

2) Checking the input signals

* Turn OFF the power to the machine and remove the operating air supply to the machine and the connector (P61) of the stepping motor connector from the rear face of the control box.

① Turn ON the power to the machine, and the “LCD CHECK” will be shown on the liquid crystal display (LCD) on the operation panel.

② Press the RIGHTWARD key once, and the indication shown on the LCD will change to the following one.

③ Press the ENTRY key , and the sewing machine will enter the input signal check mode. Now, the frame corresponding to each switch is shown with “0” or “1”.

* Refer to the next page for the corresponding table.

④ Manually actuate the switches and sensors corresponding to the LCDs to check that the LCD indication changes from “0” to “1” or “1” to “0”.

< Switches on the operation panel-LCD frame Corresponding No. >

⑤ Press the RESET key **R**, and the LCD restores screen ②.


LCD NO.	Name of input signal			LCD NO.	Name of input signal		
1	Numeric key		SW ON 1	41	mm/inch DSW	SW ON	1
2	Numeric key		SW ON 1	42			
3	Numeric key		SW ON 1	43			
4	Numeric key		SW ON 1	44	Used for diagnosis		
5	Numeric key		SW ON 1	45	Normal/aging DSW	SW ON	0
6	Numeric key		SW ON 1	46	A/B type DSW	SW ON	0
7	Numeric key		SW ON 1	47	MBLK DSW	SW ON	0
8	Numeric key		SW ON 1	48	Cross-over SW DSW	SW ON	0
9	Numeric key		SW ON 1	49	Front end input DSW	SW ON	0
10	Numeric key		SW ON 1	50	Long-material DSW	SW ON	0
11	Plus SW		SW ON 1	51	50/60 Hz DSW	SW ON	0
12	Minus SW		SW ON 1	52	Pair-stacker DSW	SW ON	0
13	Back SW		SW ON 1	53	Used for diagnosis		
14	Forward SW		SW ON 1	54	–		
15	–			55	Carriage origin detector	shielded	1
16	Entry switch			56	Carriage speed decreasing detector	shielded	1
17	Memory No. selector SW		SW ON 1	57	Carriage discrimination detector	shielded	1
18	Hiding key (under the)		SW ON 1	58	Stacked No. of pcs. detector	Lights up	0
19	Sewing data input SW		SW ON 1	59	Swing bar detector	Lights up	0
20	Sewing data check SW		SW ON 1	60	Carriage clamp position detector	shielded	0
21	Counter setting SW		SW ON 1	61	Material edge detector (left)	shielded	0
22	Shirt counter clear SW		SW ON 1	62	Material edge detector (right)	shielded	0
23	Hiding key (under the and)		SW ON 1	63	–		
24	Bobbin counter reset SW		SW ON 1	64	–		
25	Automatic operation selecting switch		SW ON 1	65	–		
26	Sewing machine start SW		SW ON 1	66	–		
27	Hiding key (right, right and right of the)		SW ON 1	67	Spinner oscillating arm forward detector	Forward	1
28	Hiding key (right and right of the)		SW ON 1	68	Manual button feeding SW	SW ON	1
29	Carriage travel SW		SW ON 1	69	Step-operation SW	SW ON	1
30	Hiding key (right of the)		SW ON 1	70	Button discharging SW	SW ON	1
31	–			71	Stop-motion detector	Stop-motion	1
32	Men's mode/ladies' mode change-over SW		ladies' mode 1	72	Button detector	shielded	0
33	Garment body/finished product change-over SW		Finished product 1	73	Button positioning detector	Lights up	1
34	Sewing machine start SW		SW ON 0	74	Detection of button detector	Lights up	1
35	Emergency stop SW		SW ON 0	75	Spinner oscillating arm origin detector	Origin	1
36	Carriage clamp release SW		SW ON 0	76	Indexer origin detector	Origin	0
37	Compressed air detector	Compressed air is supplied	0	77	–		
38	Alarm output		SW ON 0	78	Sewing failure detector	Contact	1
39	–			79	Needle-up position detector	Upper position	1
40	Japanese/English	DSW	SW ON 1	80	Work clamp lift detector	Lift1	

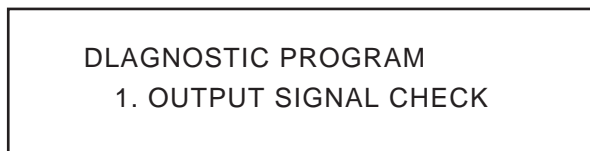
3) Checking the output signals


Performance of the valves and motors can be checked by making them operate independently for a predetermined period of time using the switches on the operation panel.

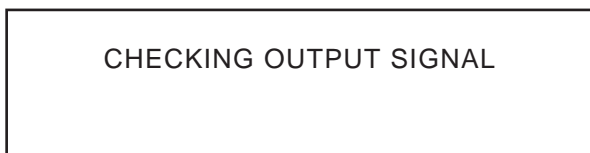
* Turn OFF the power to the machine, connect the operating air supply to the machine and connect the connector of the stepping motor on the rear face of the control box.

① Turn ON the power to the machine, and the indication "LCD CHECK" will appear on the liquid crystal display (LCD) of the operation panel.

② Press the Forward key  twice, and the indication on the LCD of the operation panel will change to the following screen.





























③ Press the ENTRY key , and the machine will enter the output signal check mode. The following screen will appear on the LCD of the operation panel.



④ Actuate the cylinders and stepping motor by pressing the respective switches on the corresponding table on the next page to check the cylinders and stepping motor for correct performance.

(Caution) When checking outputs related to the machine head, the machine will run at a high speed or the peripheral components will operate. So, keep your hands away from the components near the machine head.

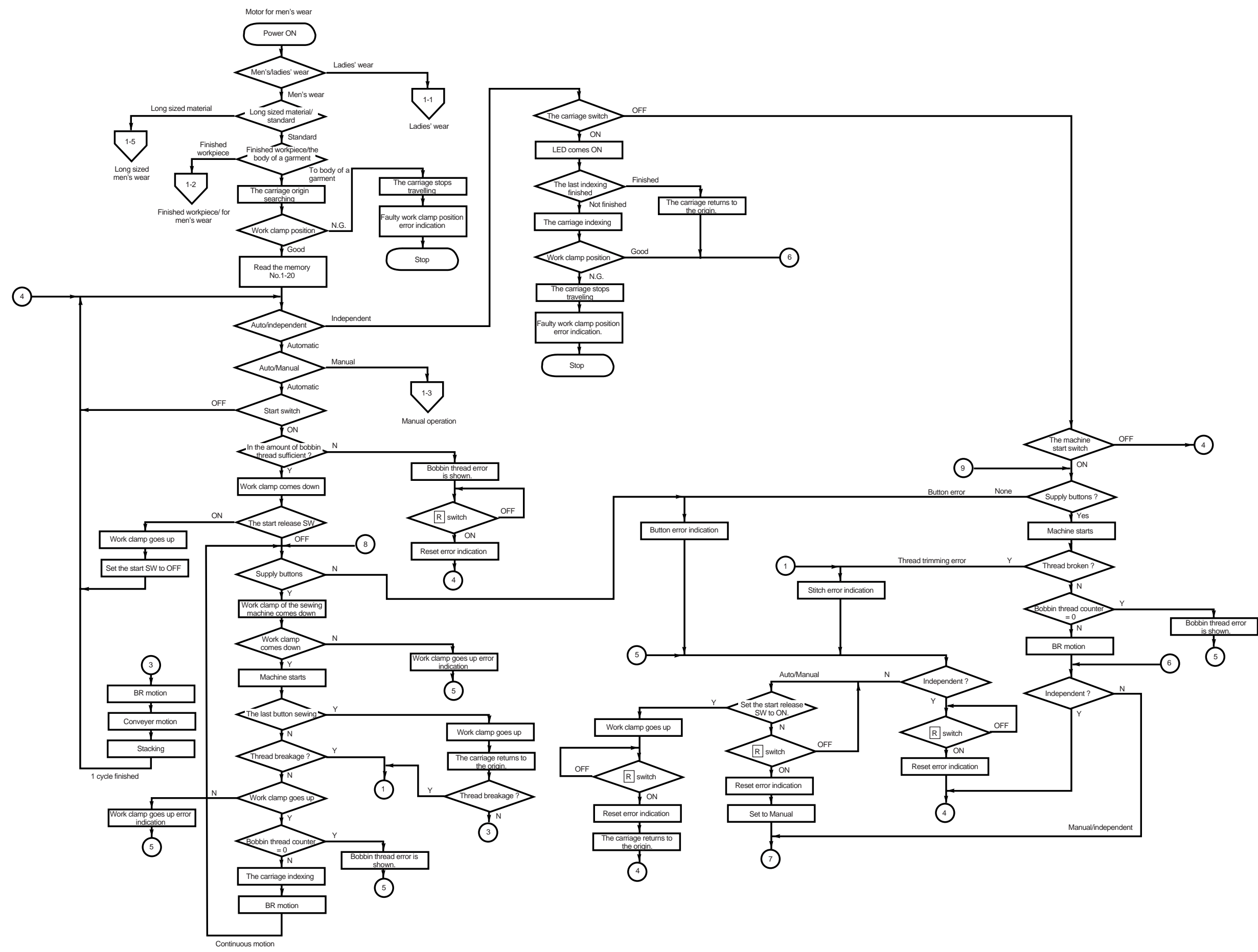
⑤ Press the RESET key , and screen ② will be restored on the LCD.

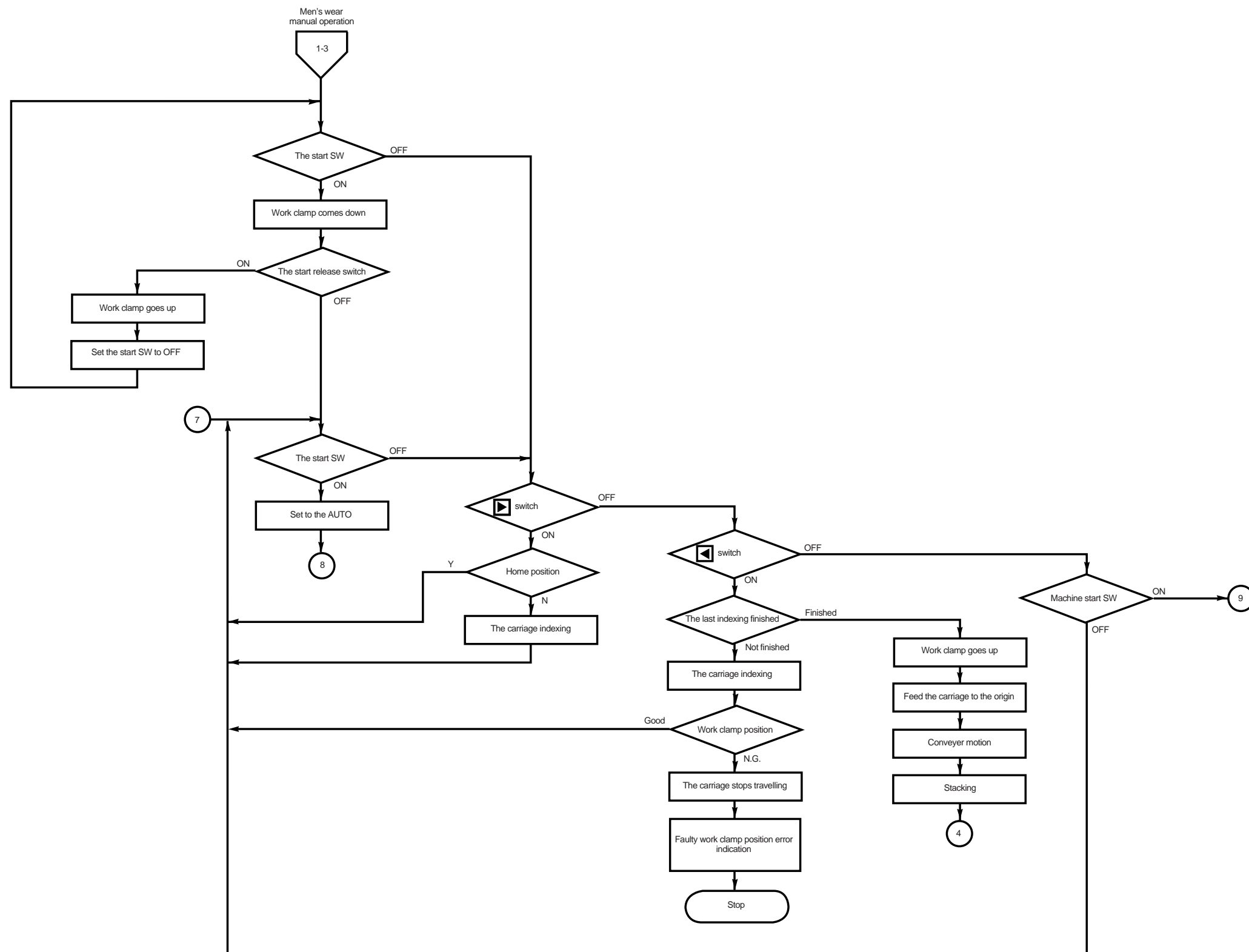
Switch on the operation panel	Output signal	ON state of switches
	Memory No. selector LED	The LED of the memory No. selector switch on the operation panel lights up.
	Sewing data input LED	The LED of the sewing data input switch on the operation panel lights up.
	Sewing data check LED	The LED if the sewing data check switch on the operation panel lights up.
	Counter set LED	The LED of the counter setting switch on the operation panel lights up.
	Conveyor shift cylinder	The conveyor comes down.
	Stacker cloth presser cylinder	The cloth presser of stacker actuates.
	Swing bar stacker cylinder	Swing bar of stacker actuate.
	Conveyor motor	The conveyor motor rotates.
	Material edge gauge cylinder	Material edge gauge comes down.
	Carriage clamp cylinder	The carriage clamp comes down.
	Used as the entry key for diagnosis	
	Automatic operation selector LED	The LED of the automatic operation selector switch on the operation panel lights up.
	Carriage travel LED	The LED of the carriage travel switch on the operation panel lights up.
	Work clamp check lowering cylinder	The work clamp check of the sewing machine comes down.
	Used to restore the previous screen for the diagnostic feature	
	BR positioning solenoid	The positioning solenoid actuates.
	BR shutter solenoid	The shutter solenoid actuates.
	BR fine positioner lowering solenoid	The fine positioner lowering solenoid actuates.
		
	Sewing machine starting cylinder	The starting cylinder actuates and the sewing machine rotates. * Caution
	BR fine positioning motor	The motor of the fine positioner rotates.
	BR index motor	The motor of the indexer rotates until the next feeding hole is reached.
	BR spinner oscillating arm motor	The spinner oscillating arm feeds a button.
	BR parts feeder	The parts feeder vibrates.
	BR button detecting cylinder	The button detecting cylinder actuates.

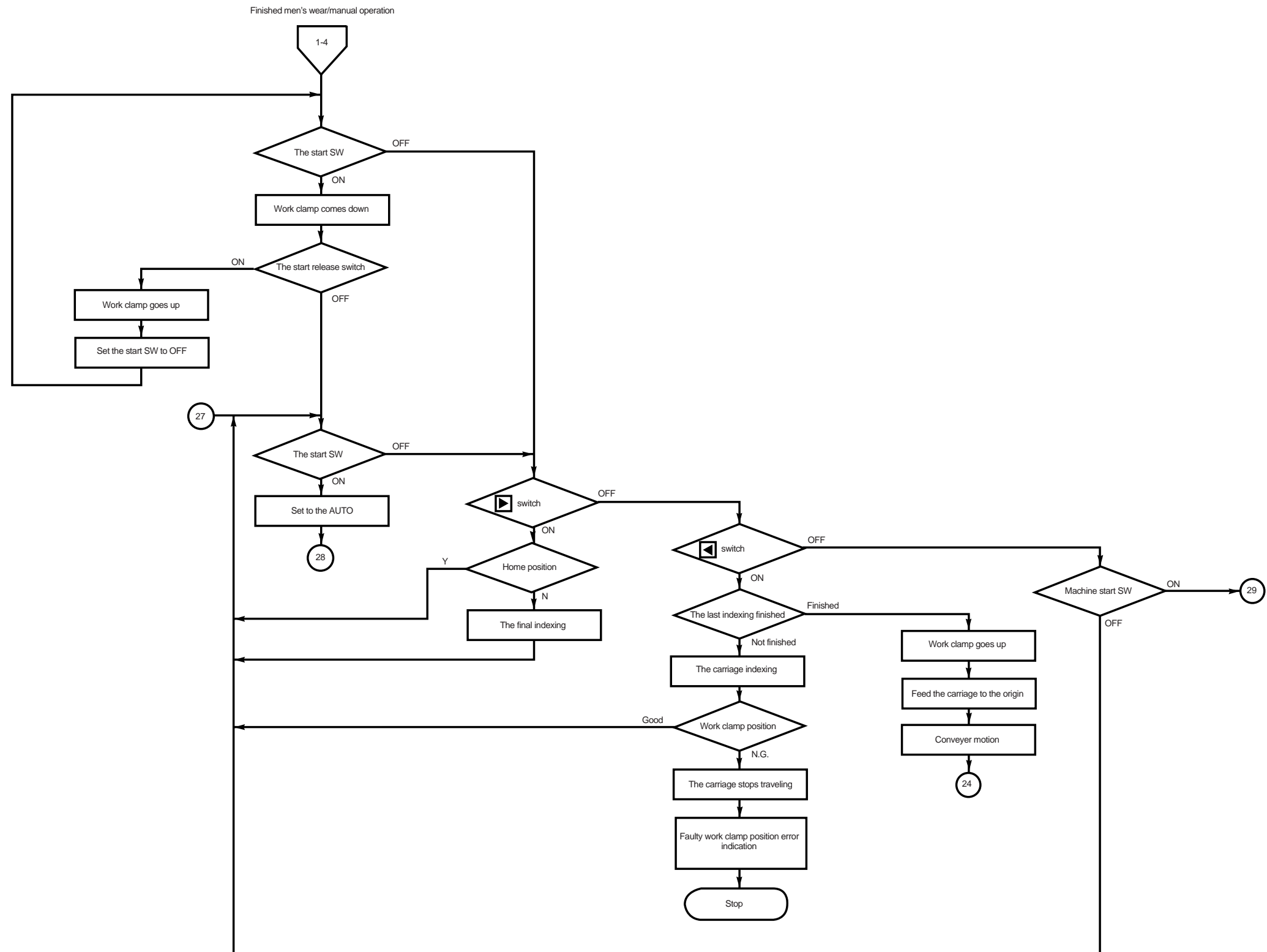
* **Caution** When checking outputs related to the machine head, the machine will run at a high speed or the peripheral components will operate. So, keep your hands away from the components near the machine head.

A blank page with rounded corners and horizontal ruling lines. The page is white with a thin black border. There are 20 horizontal lines spaced evenly down the page, starting from the top margin and ending at the bottom margin. The lines are thin and black.

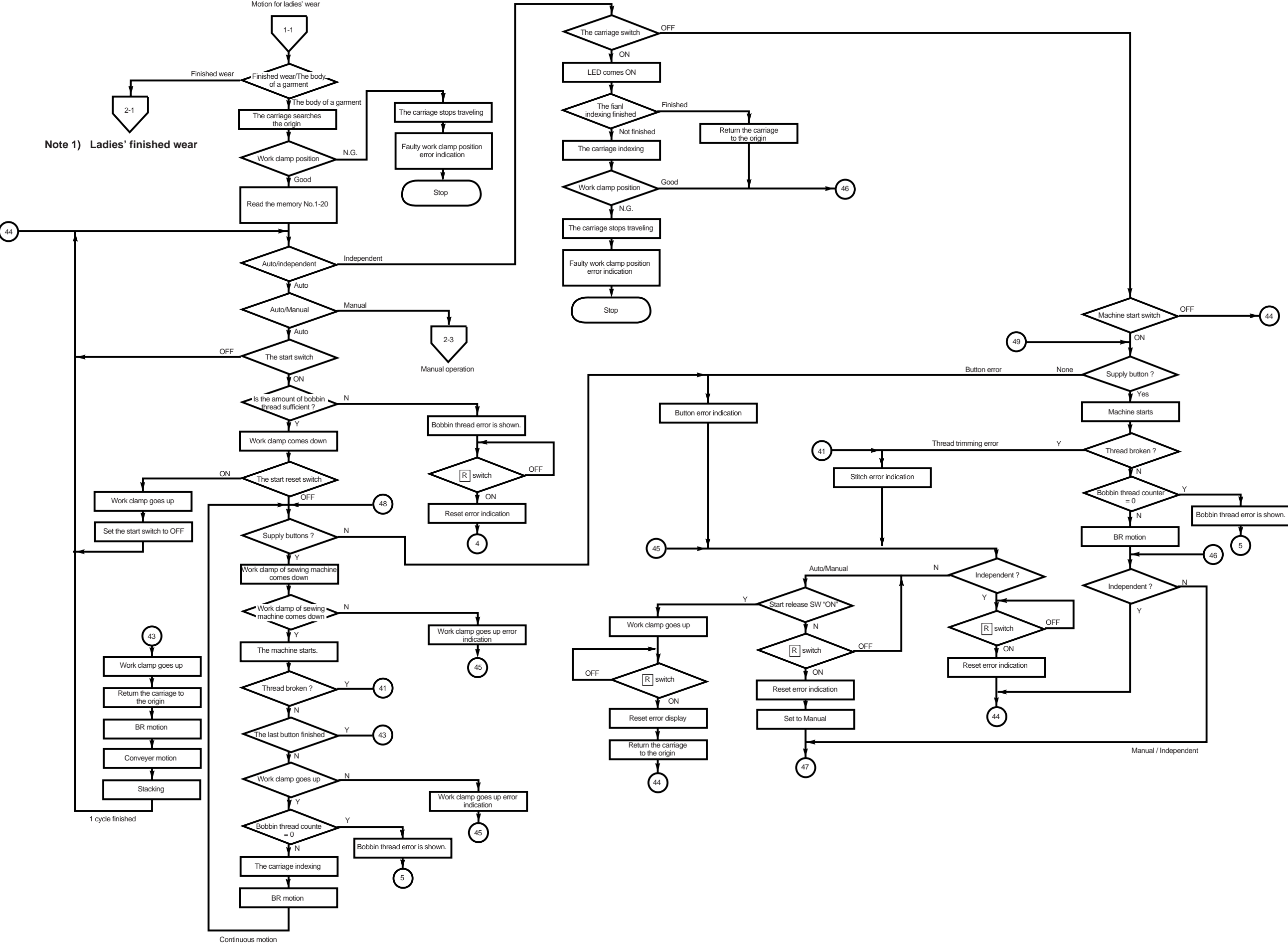
10. PERFORMANCE FLOW CHART

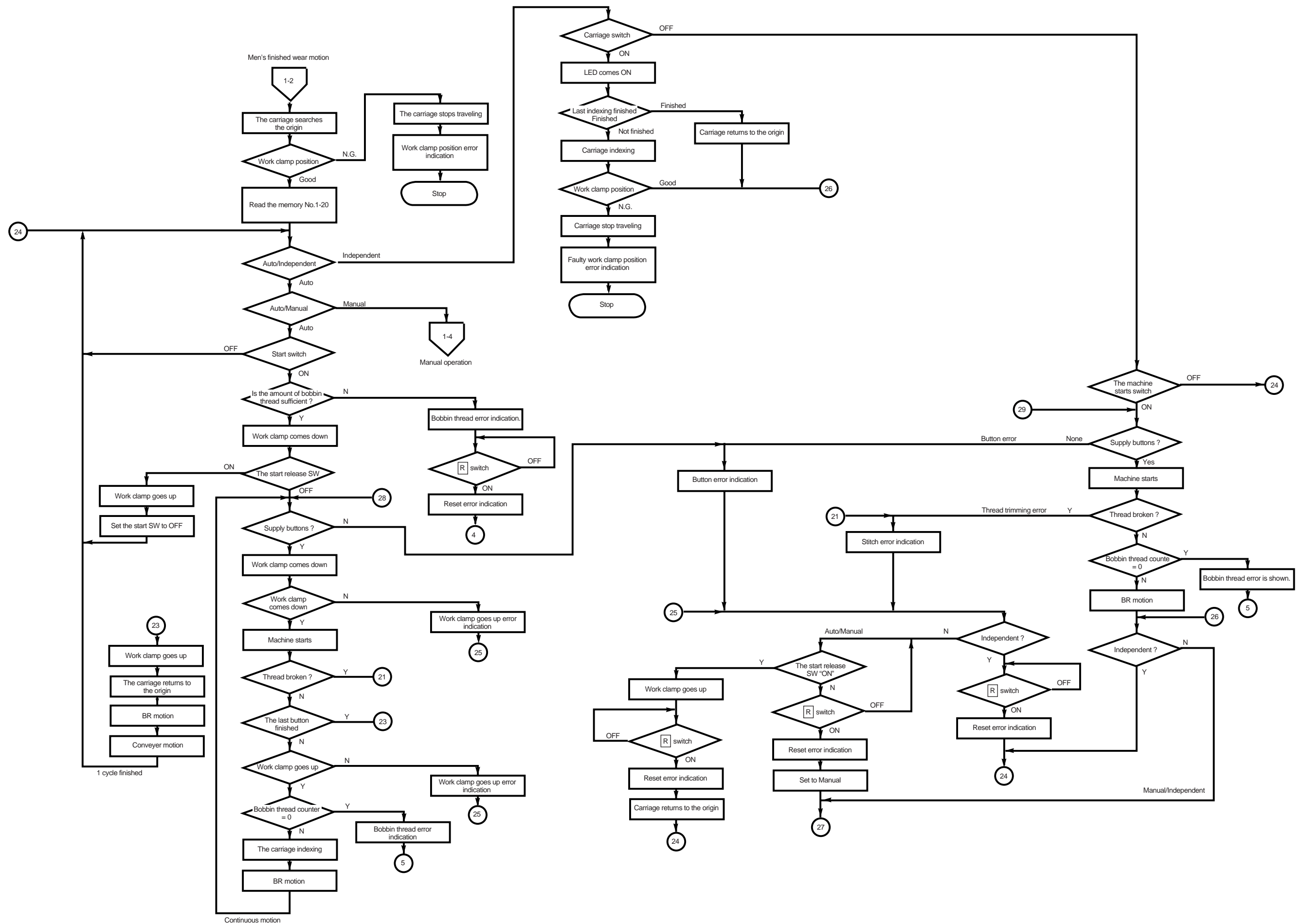


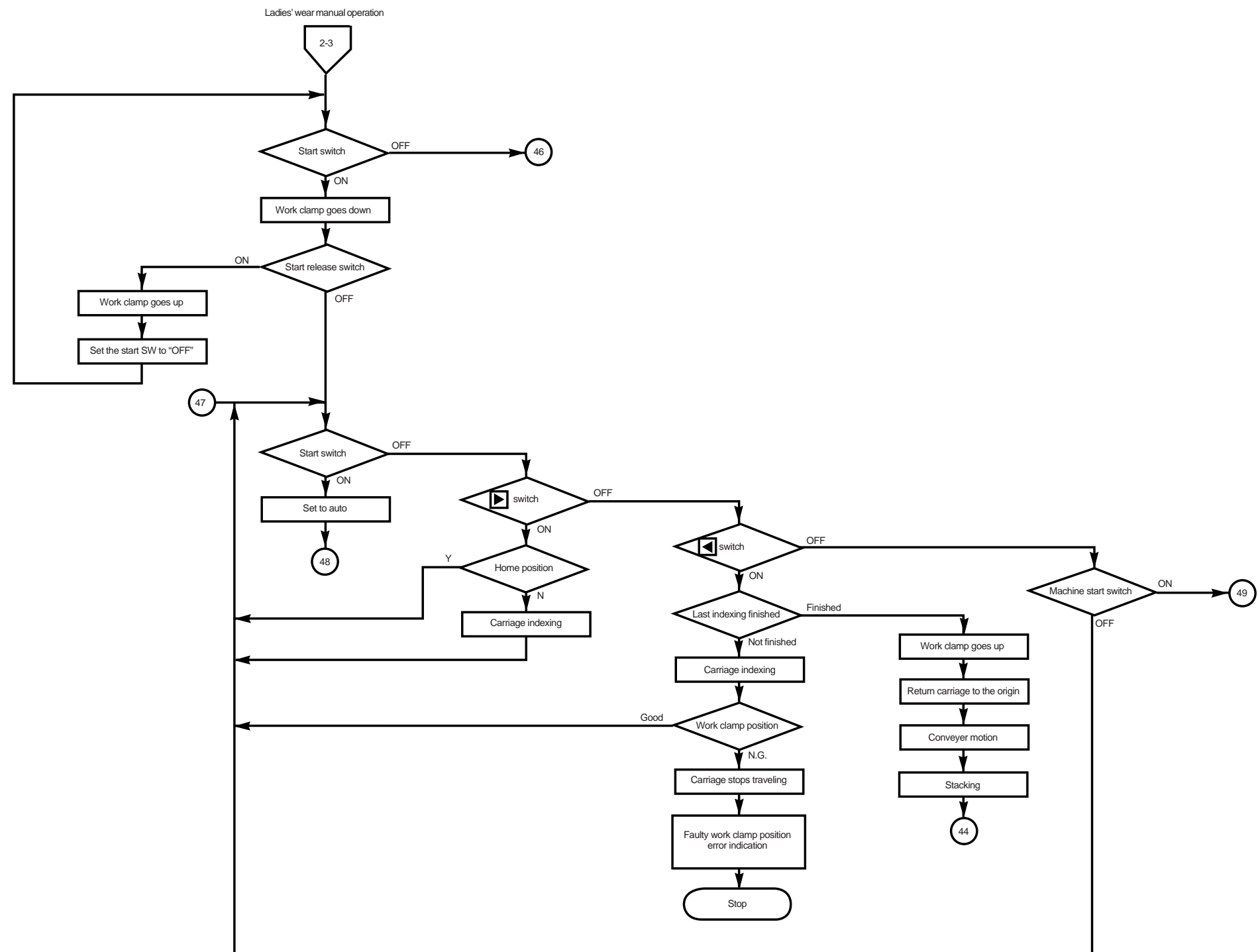


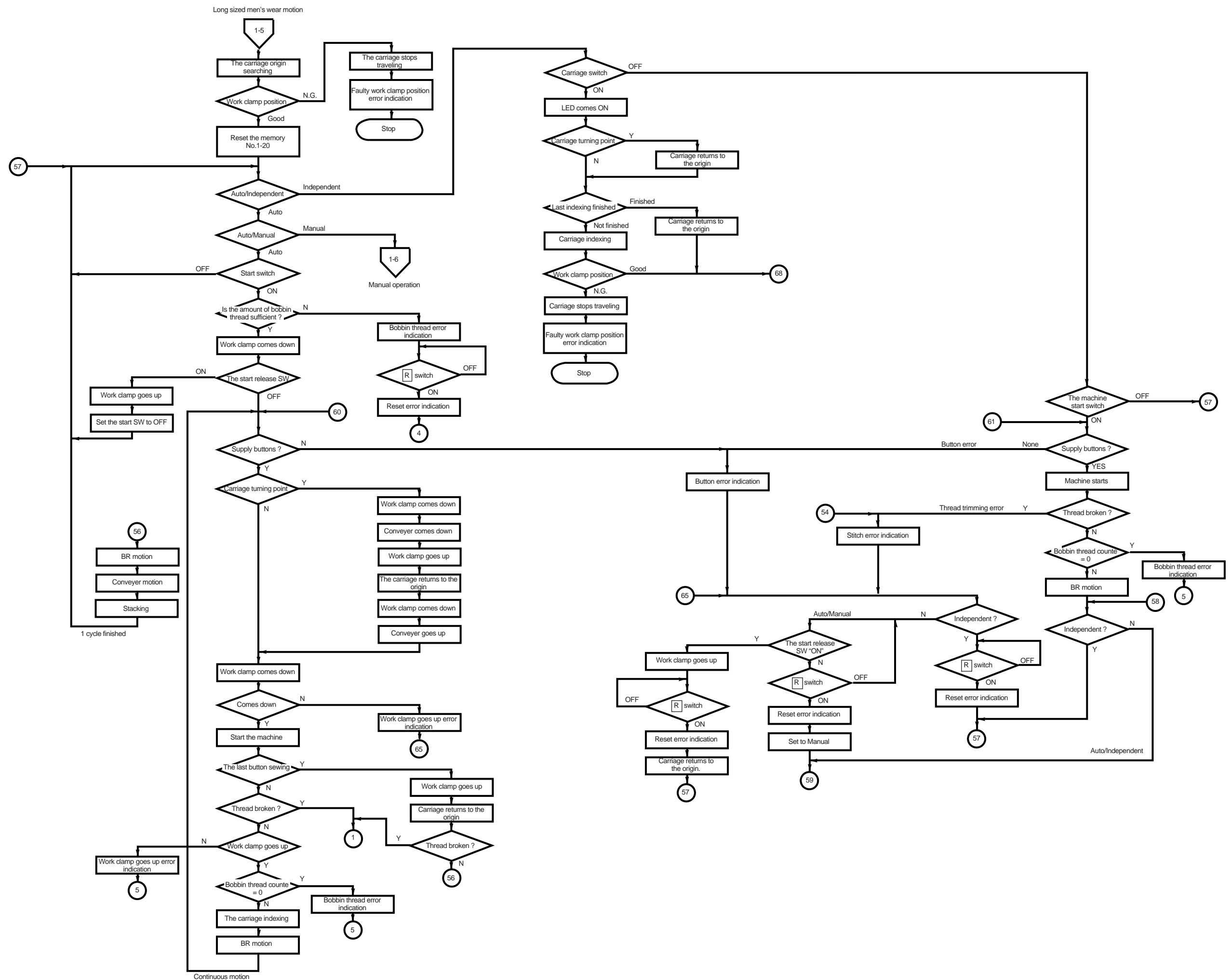


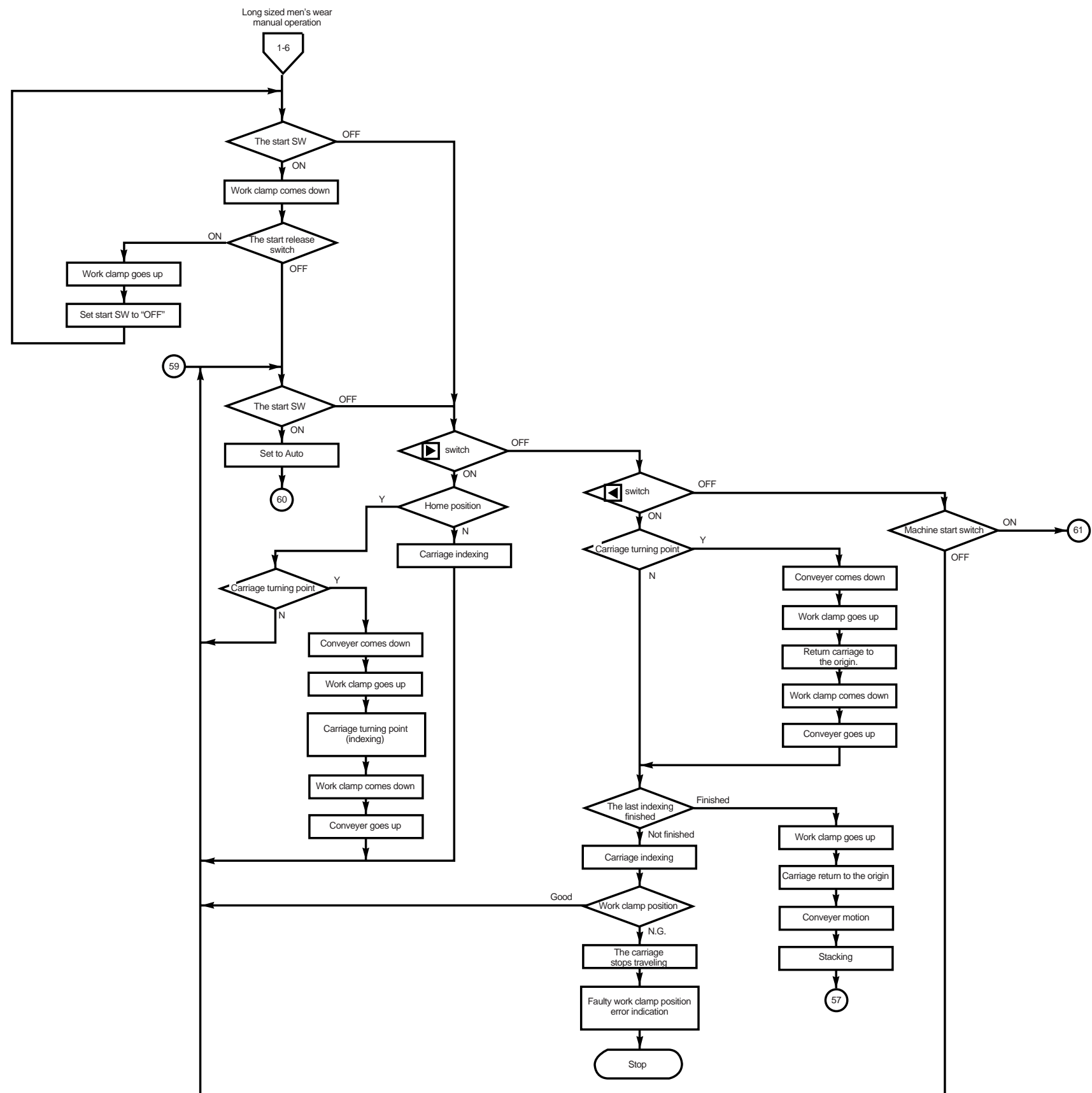
Note 1) The motion for ladies' finished wear and that for men's are identical except for the motion of the carriage, where motions on the left side and right side are reversed.



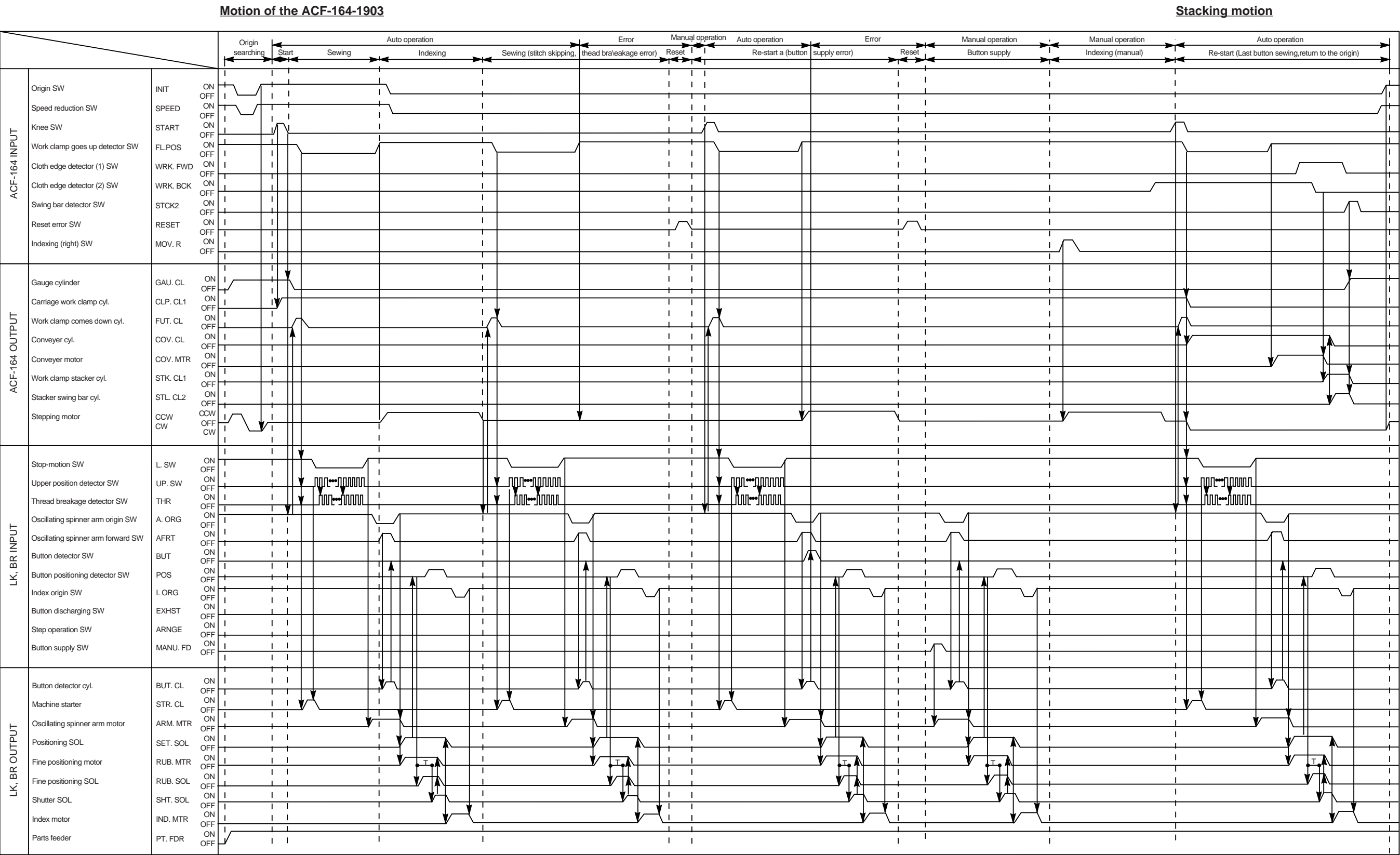






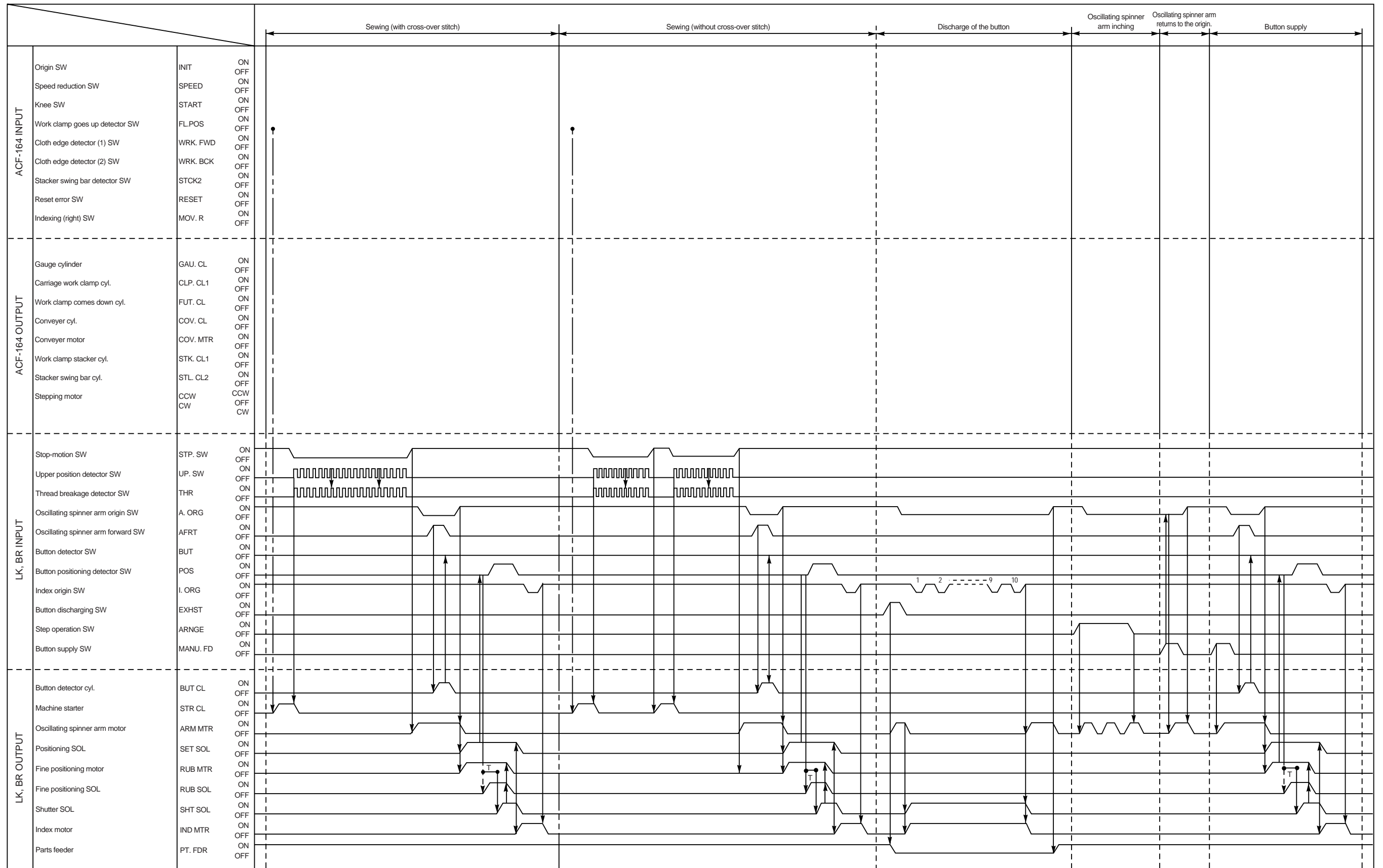


11. SEQUENCE CHART



T : Indicates the value on the timer

Motion of the LK-1903/BR21

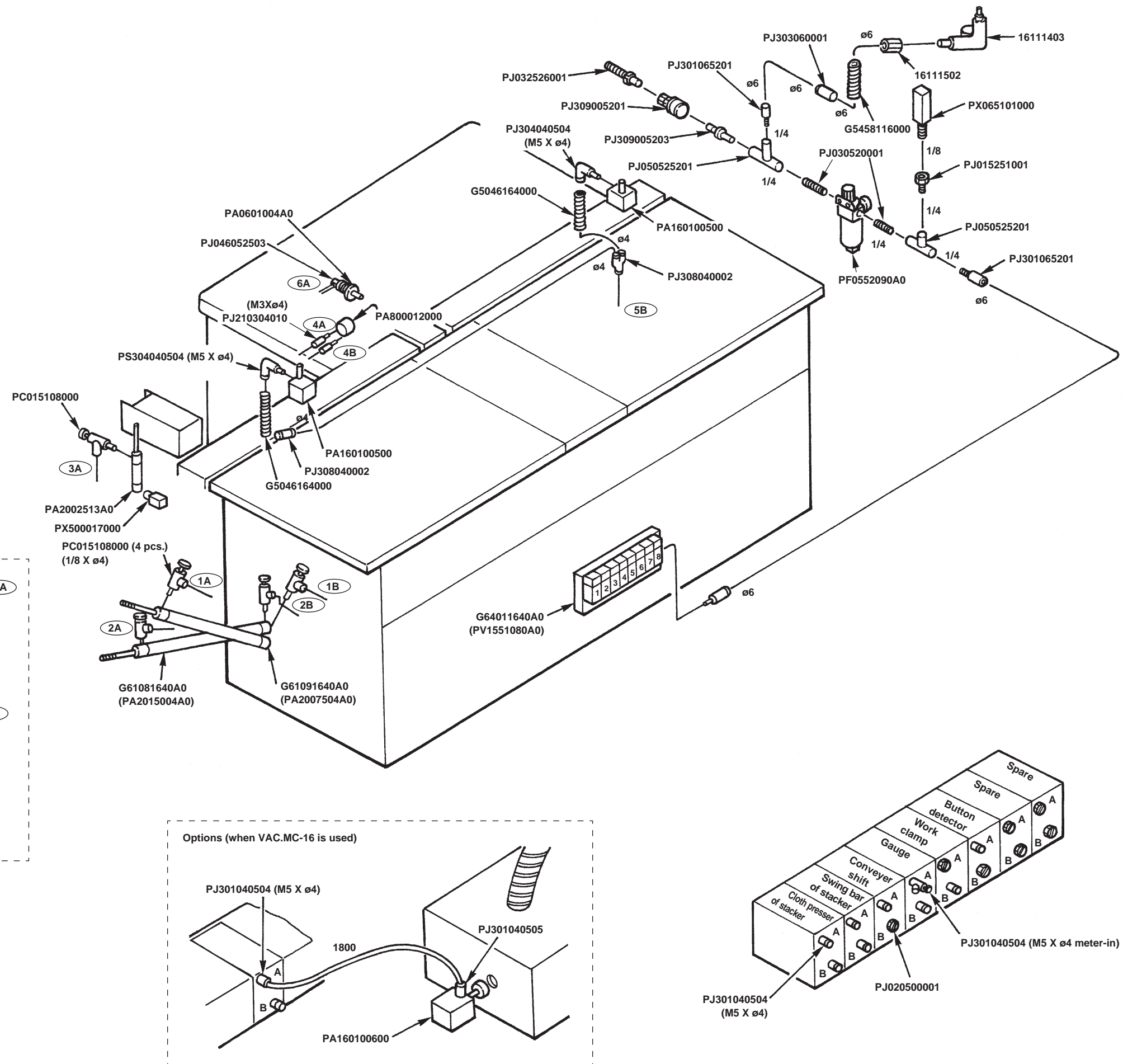
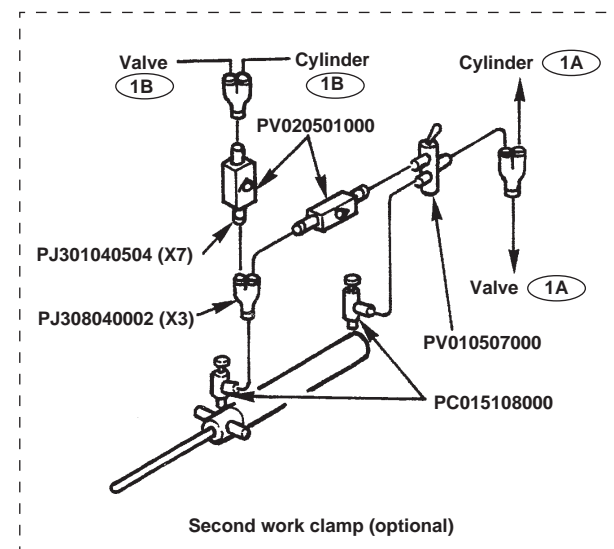


T : Indicate the value on the timer.

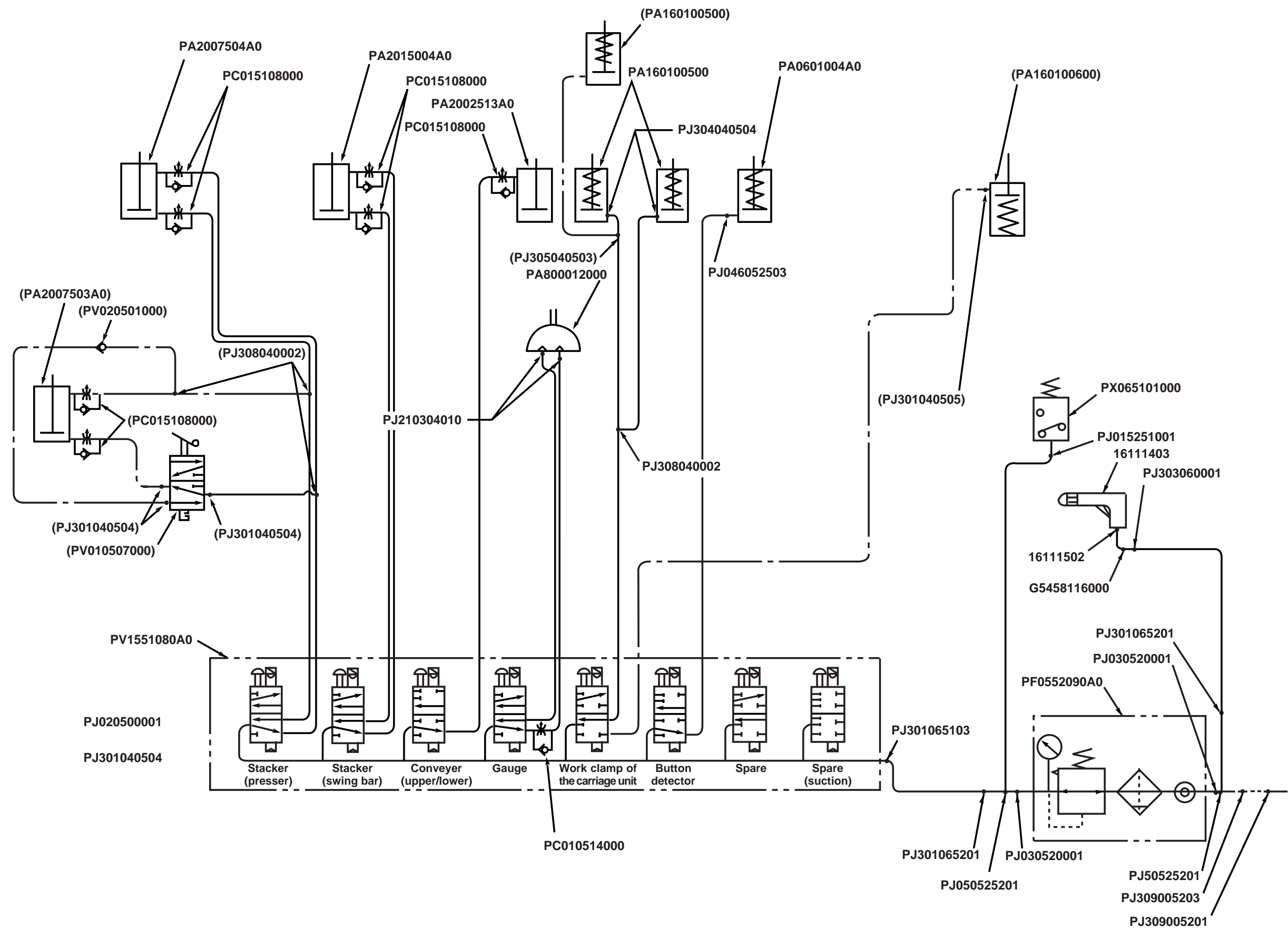
12. AIR PIPING

1. Piping components for ACF-164

1A	Green	1400
1B	Yellowish green	1300
2A	Red	1400
2B	Yellow	1300
3A	Blue	2000
3B	—	
4A	Yellow	2700
4B	Yellowish green	2700
5A	—	
5B	Green	1400
6A	Black	1600
6B	—	



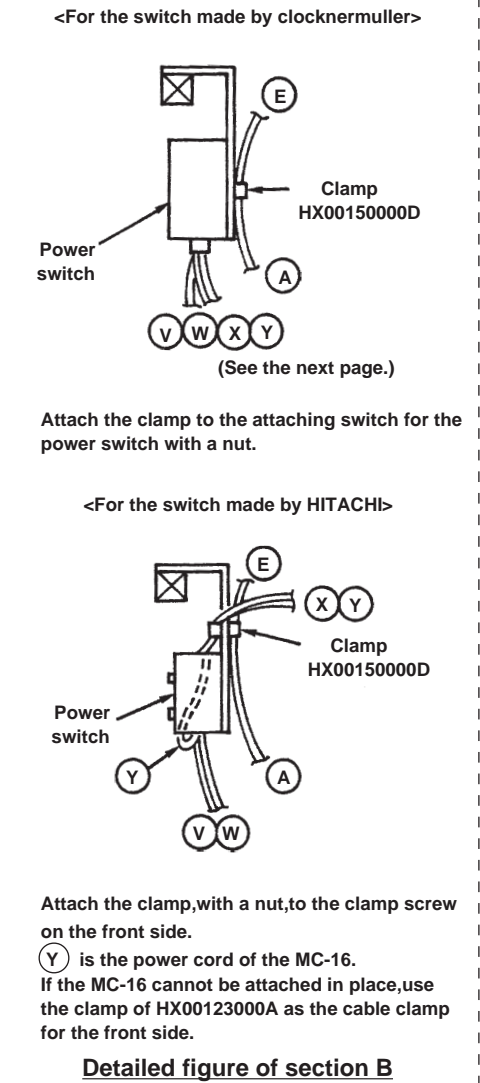
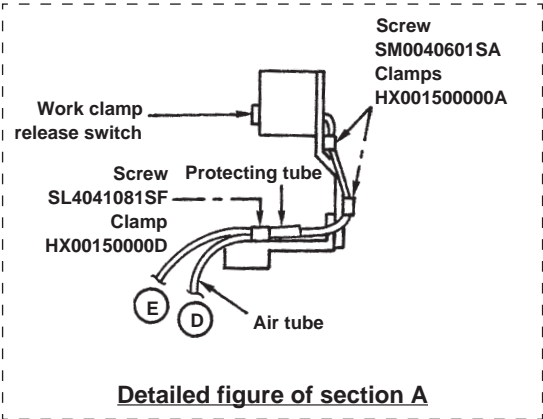
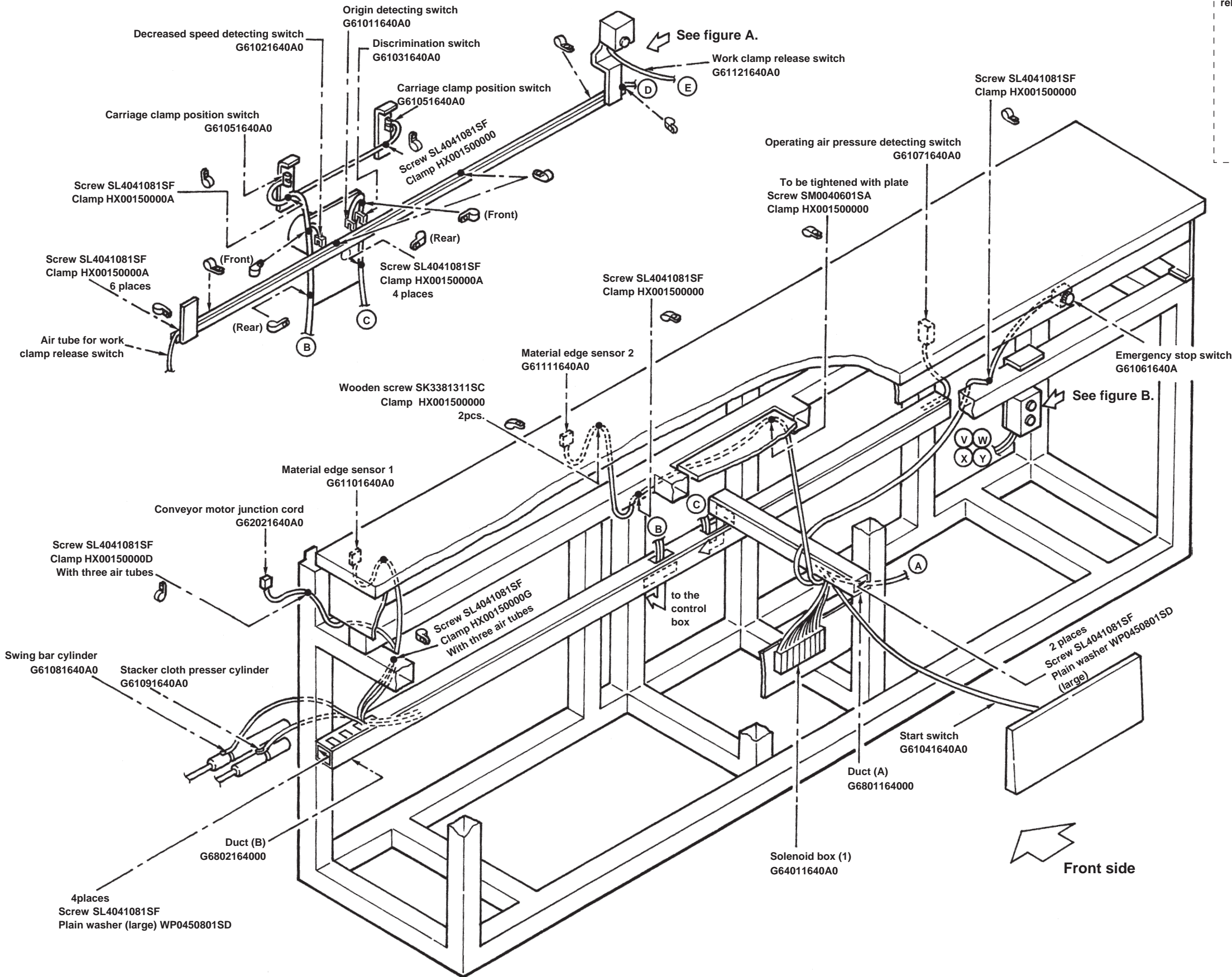
2. Air piping drawing



Caution) 1. The part No. with parentheses () is optional.

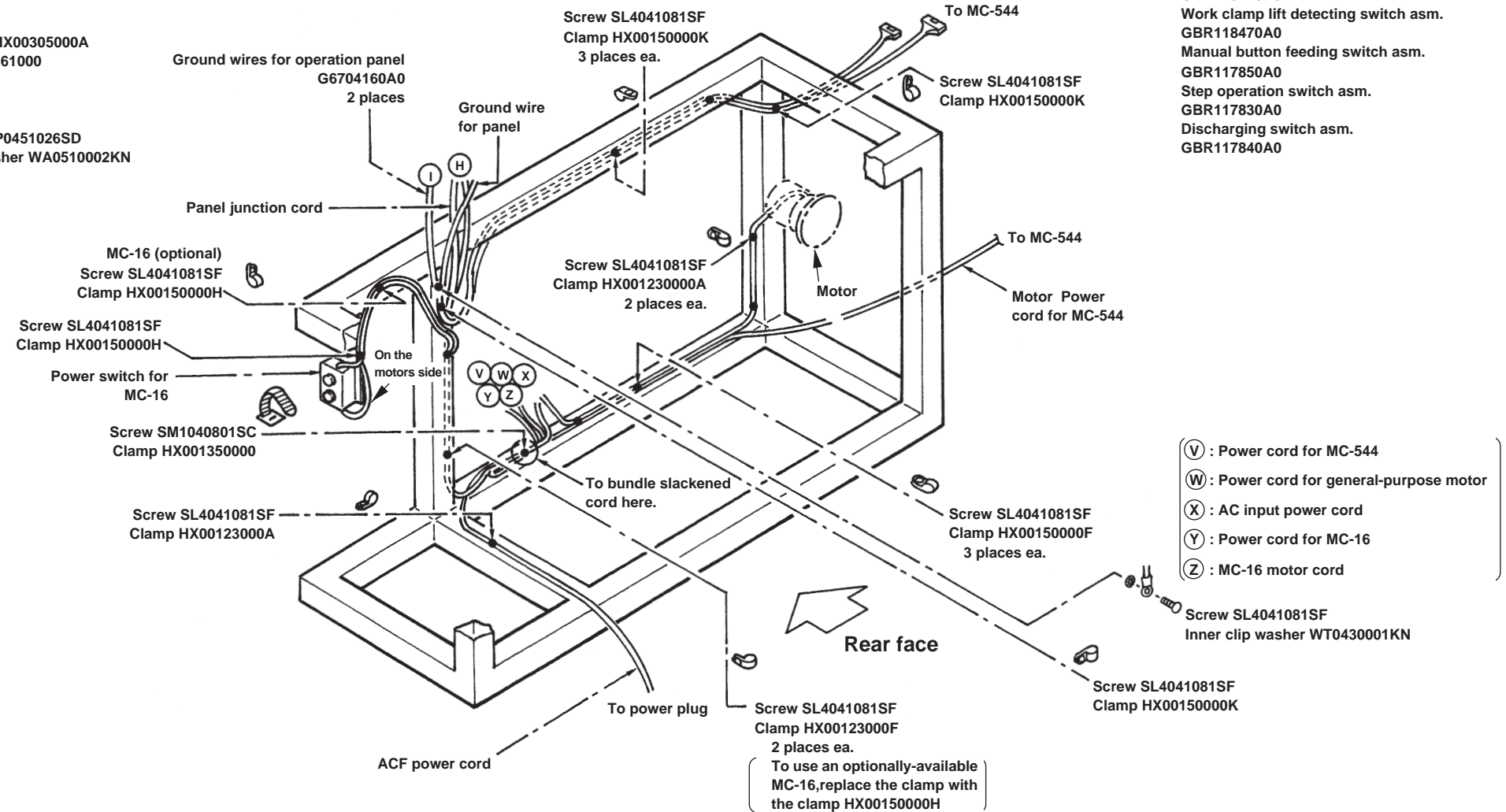
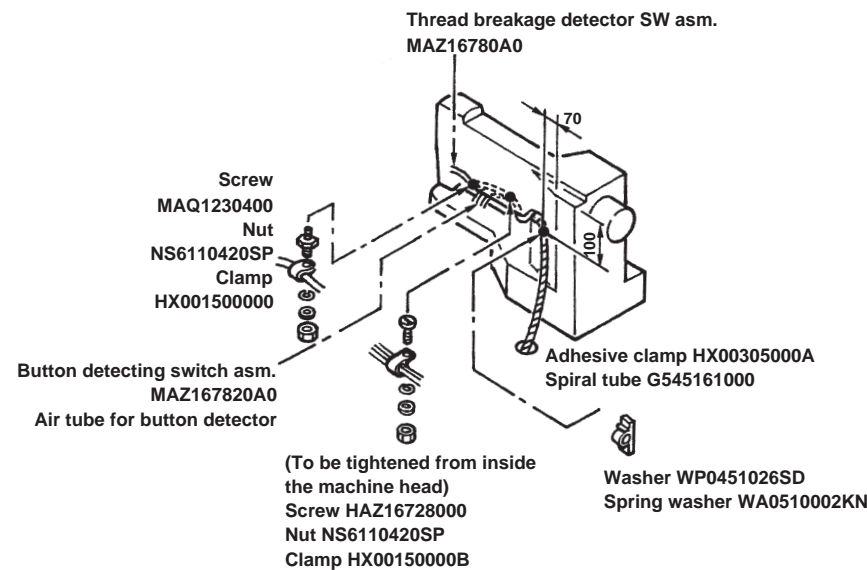
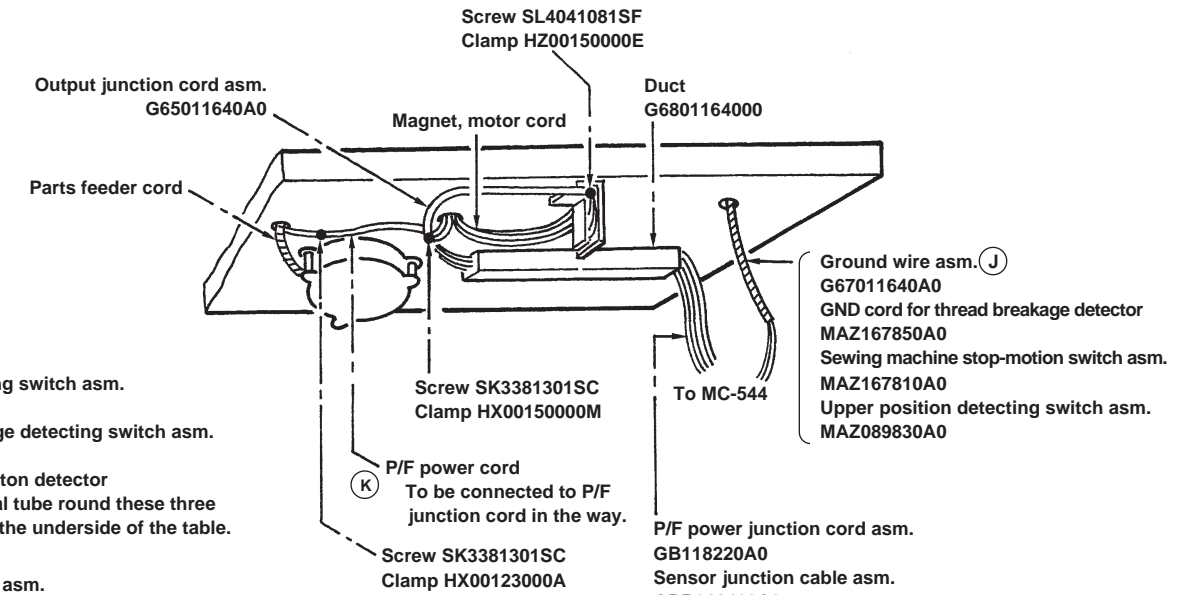
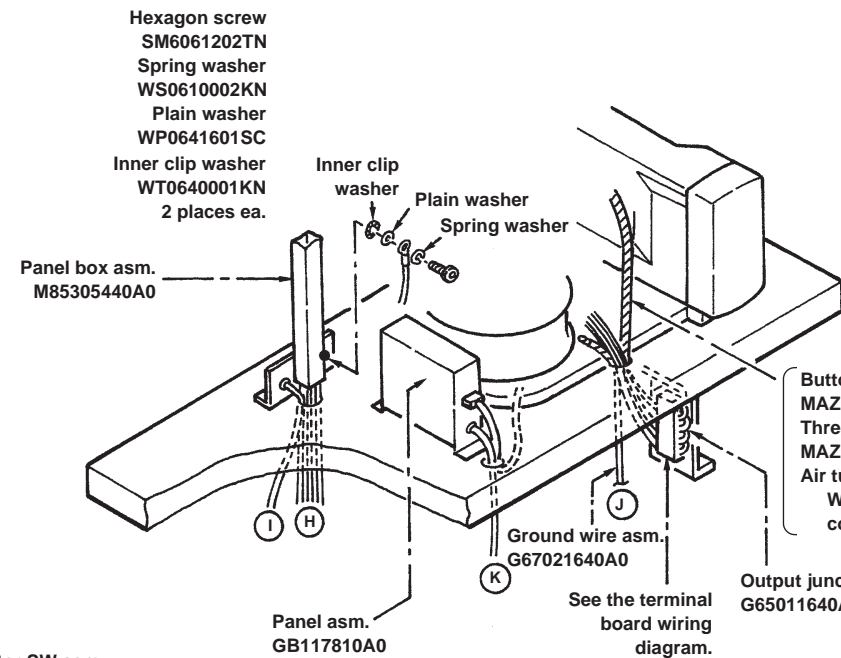
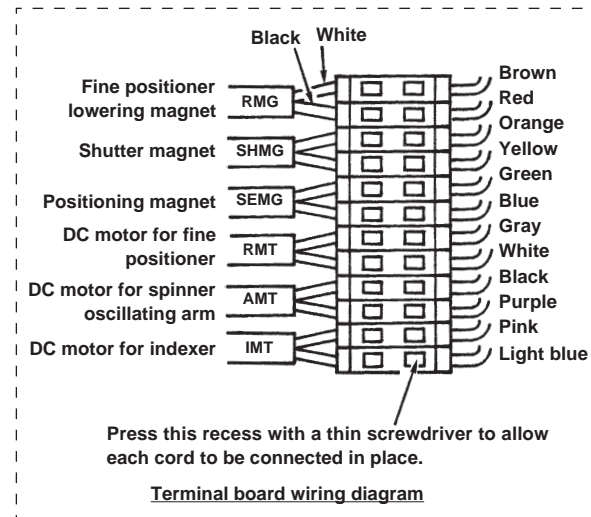
13. WIRING COMPONENTS

1. Wiring the frame (large) components



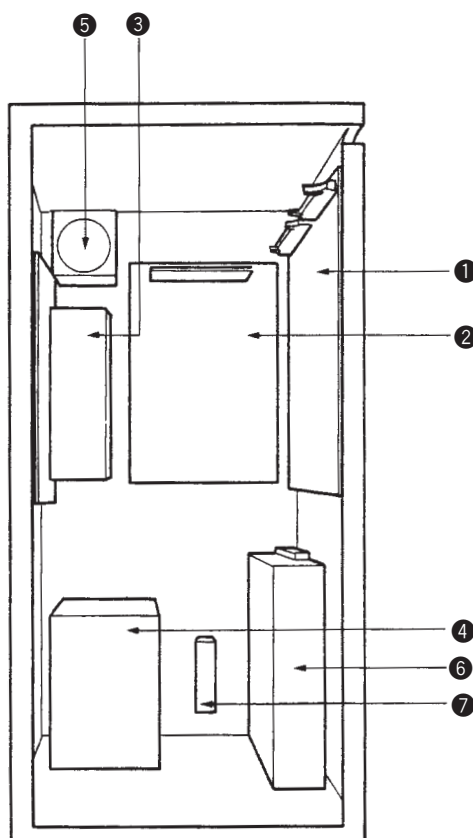
Caution) The mark  in the figure indicates the direction of the clamp.

2. Wiring the frame (small) components



14. CONFIGURATION (ELECTRICAL UNIT)

(1) Components of control box and its function



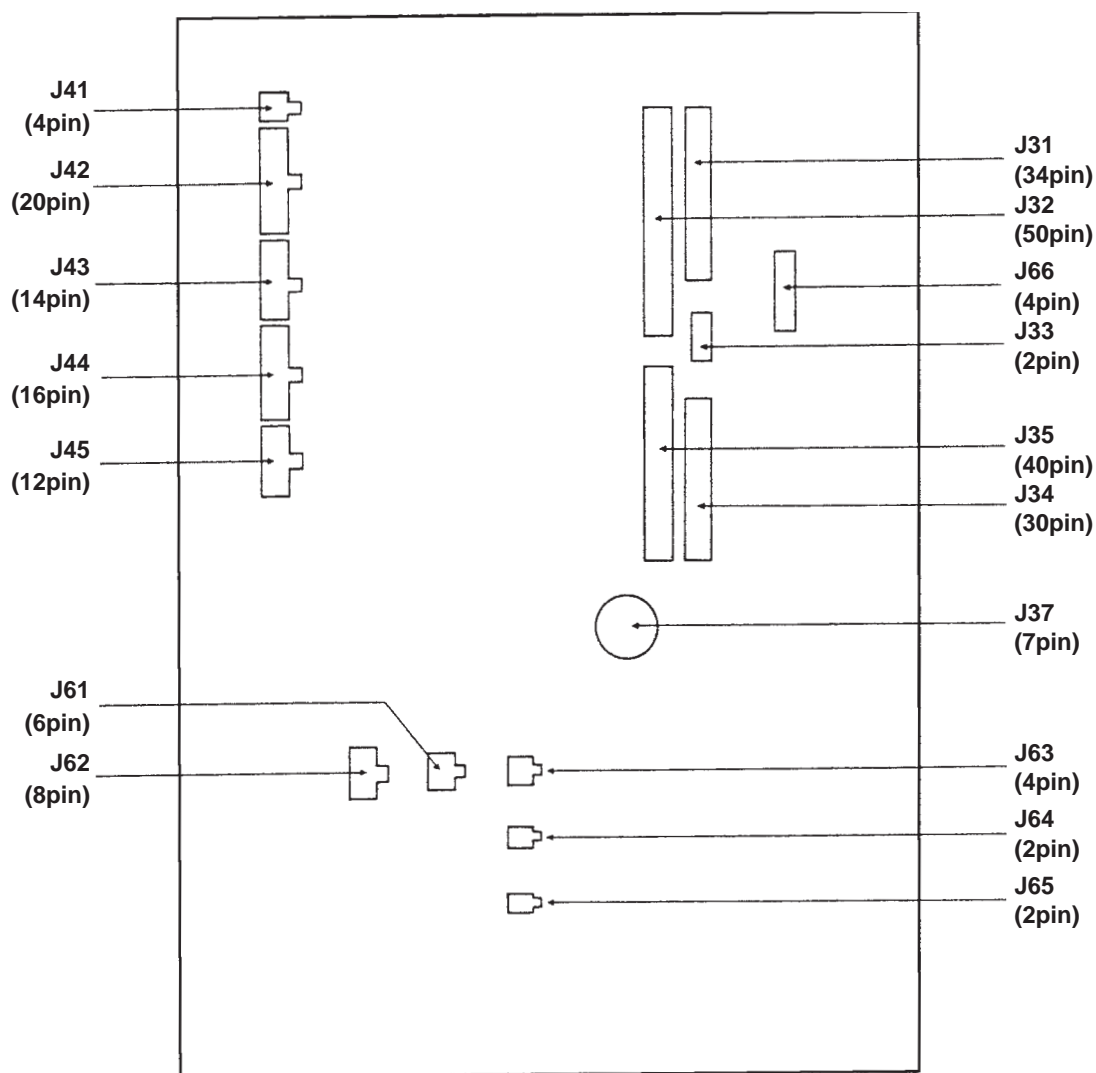
- ① CPU circuit board : Use to control all the equipment of the panel.
- ② I/O circuit board : Used to input/output the signals of the machine head or button feeder control, each sensor or each valve.
- ③ Power circuit board : Used to rectify 7.5,20,24 and 26 Vac output from the transformer and convert them to 5 VDC, +12 VDC, -12 VDC, 24 VDC and 34 VDC.
- ④ Transformer : Used to convert input voltage to each voltage.
- ⑤ DC fan : Used to blow off the internal air to prevent each unit from generating heat.
- ⑥ Stepping motor driver : Used to drive the stepping motor by the exciting signal from the CPU.
- ⑦ Terminal block : Used to relay AC input codes and the transformer.

Table of ACF circuit board asm.

	ACF172	ACF164-1851	ACF164-373	ACF164-1903	ACF286
POWER circuit board asm.	M86035440A0	M8603544AA0			
CPU circuit board whole asm.	M8601543CA0 ROM:058,059	M8601543BA0 ROM:043	M8601543BA0 ROM:043	M8601543EA0 ROM:135	M8601543DA0 ROM:110,111
I/O circuit board whole asm.	M8602544BA0 ROM:060	M8602544AA0A ROM:044	M8602544AA0A ROM:044	M8602544DA0 ROM:134	M8602544CA0 ROM:109

1. **POWER circuit board of ACF172 can be used for 164 and 286. (The reverse is not possible.)**
2. **Part No. (CPU circuit board asm.) of CPU circuit board whole asm. without ROM is common to M86015430A0.**
3. **Part No. (I/O circuit board asm.) of I/O circuit board whole asm. without ROM is common to M86025440A0.**

(2) Connector and its functions of the control box



< Input >

- J31 (34 pin) : Each sensor signal of the machine and the BR body is entered.
- J32 (50 pin) : Each sensor signal of the machine and the BR body is entered.
- J34 (30 pin) : Not used.
- J35 (40 pin) : The sensor signal of the indexer is entered.
- J37 (7 pin) : Not used.

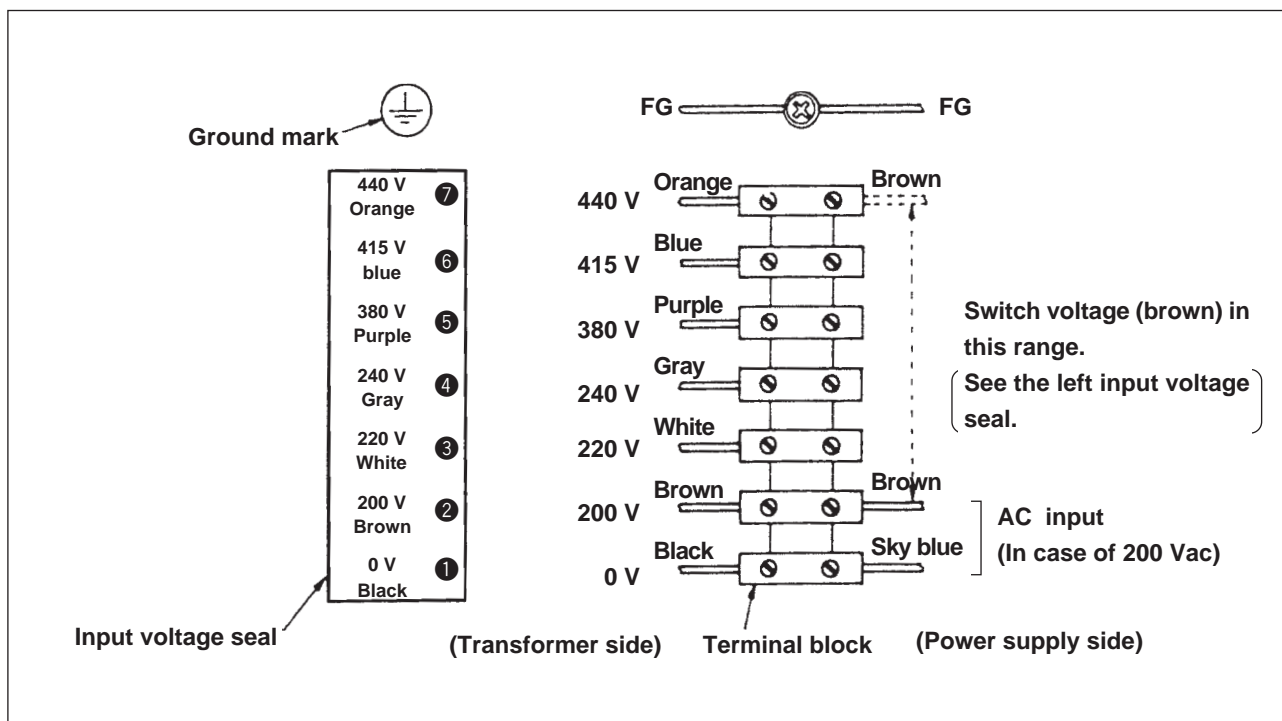
< Output >

- J41 (4 pin) : A control signal is output to the feeder for oscillating.
- J42 (20 pin) : A signal is output to the magnet, motor and valve for driving the machine head and the BR body.
- J43 (14 pin) : A signal is output to the valve for driving the machine head.
- J44 (16 pin) : A signal is output to the valve for driving the indexer.
- J45 (12 pin) : Not used.
- J33 (2 pin) : A signal is output external counter (optional).
- J61 (6 pin) : A signal is output to the stepping motor.
- J62 (8 pin) : The power (100 VAC) is supplied to the feeder. A signal is output to the motor for driving the conveyer.
- J63 (4 pin) : Not used.
- J64 (2 pin) : 4.5 VAC is supplied to the marking light (optional).
- J65 (2 pin) : 4.5 VAC is supplied to the marking light (optional).
- J66 (4 pin) : Not used.

(3) Power voltage

When a failure occurs, first check the power voltage.

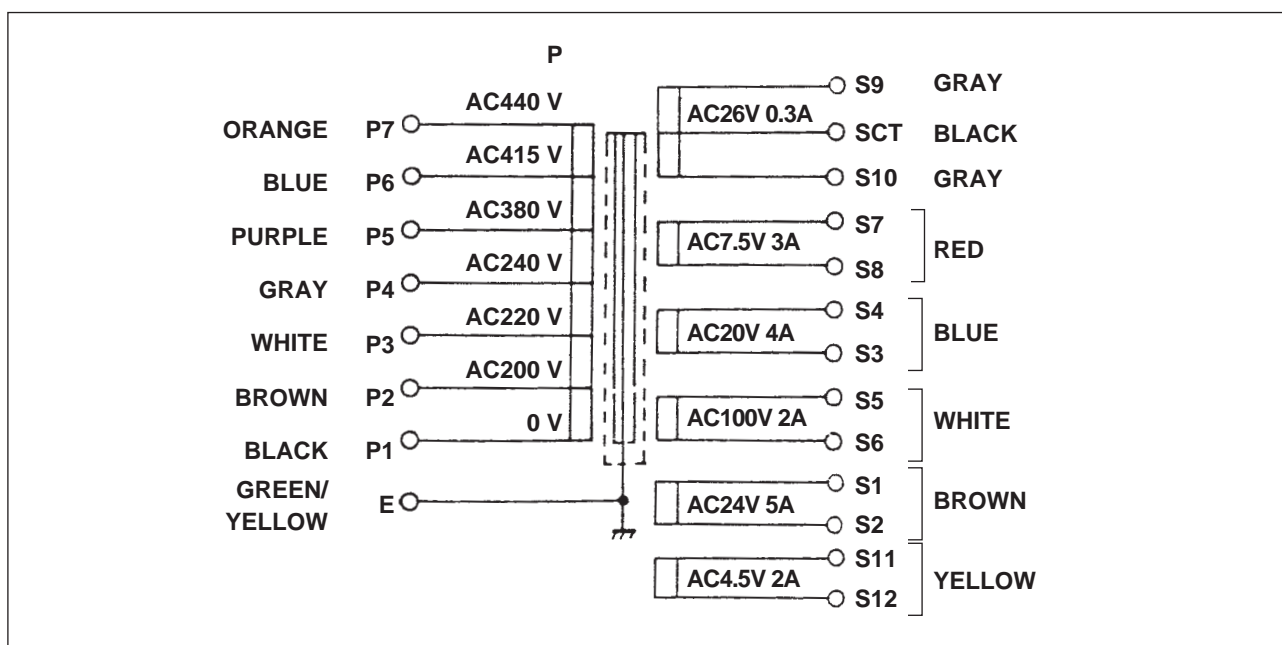
1) Connecting the power voltage to the input voltage of the transformer (on the left of the terminal block.)



2) Secondary output voltage of the transformer (AC)

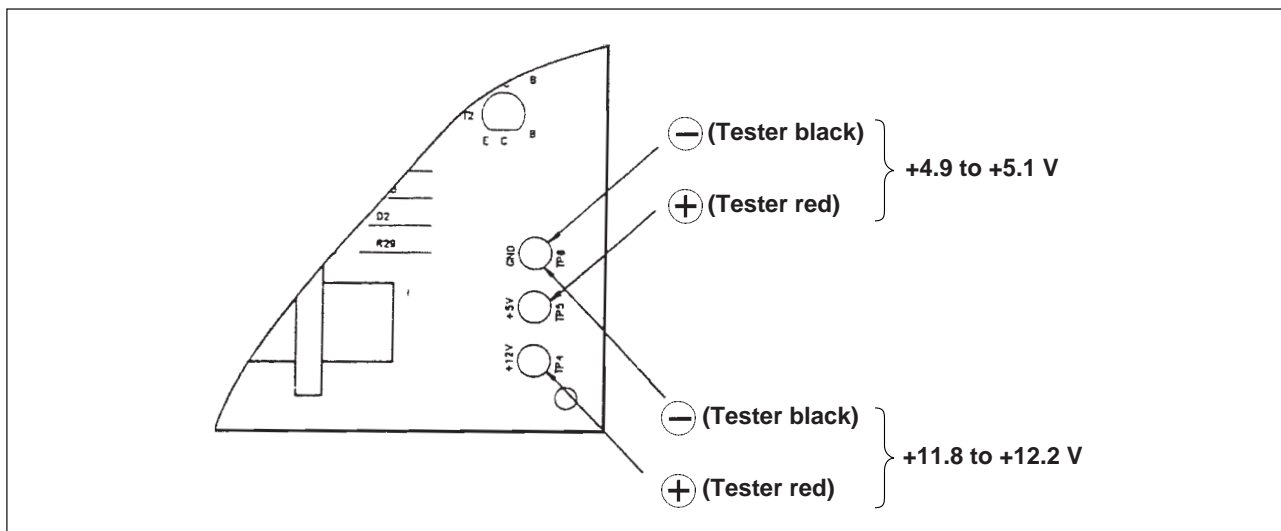
Caution) Take care not to allow short circuit of the terminal.

100 VAC (white-white)	Approx. 20 VAC	Remove 100 VAC of the stepping motor driver and measure it.
20 VAC (blue-blue)	Approx. 20 VAC	Remove connector P5 with the power circuit board and measure it.
7.5 VAC (red-red)	Approx. 7.5 VAC	Remove connector P5 with the power circuit board and measure it.
26 VAC (gray-gray)	Approx. 26 VAC	Remove connector P4 with the power circuit board and measure it.
24 VAC (brown-brown)	Approx. 24 VAC	Remove connector P5 with the power circuit board and measure it.
4.5 VAC (yellow-yellow)	Approx. 4.5 VAC	Use connector J64 or J64 and measure it.

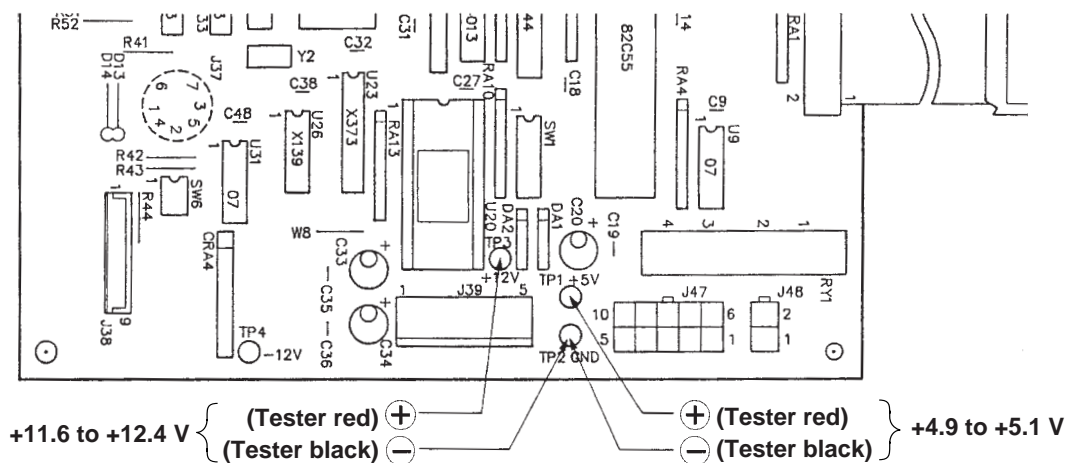


(4) Measuring the DC power voltage

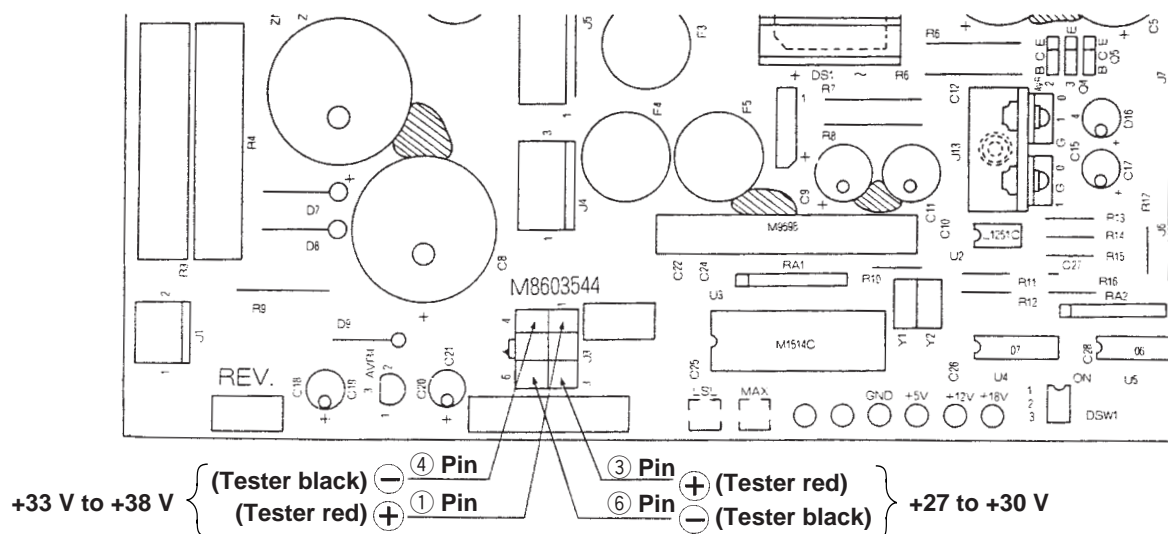
1) CPU circuit board



2) I/O circuit board

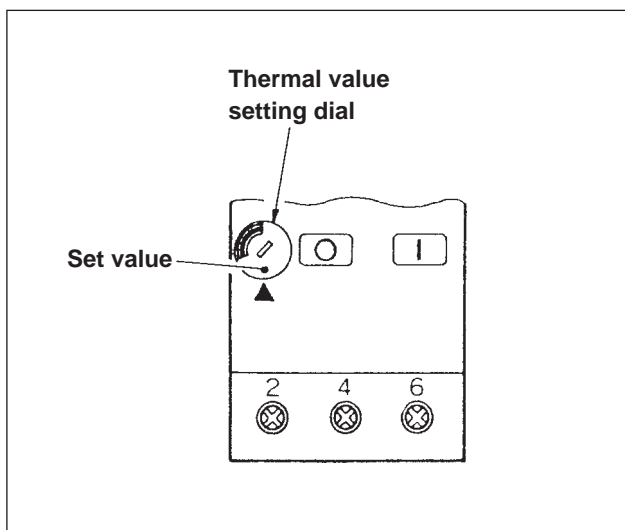


3) Power circuit board



(5) Changing the thermal values inside the switch box

Remove the switch box cover, turn the dial and adjust figures (thermal values) to .



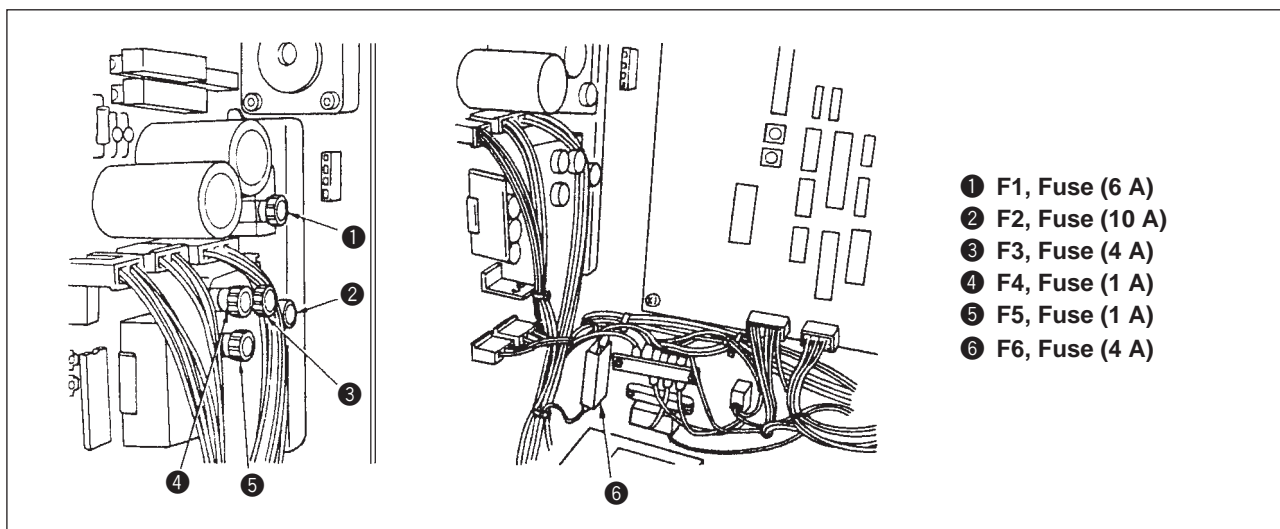
NO.	Voltage	Destination	Phase	Thermal set value
1	380 V 415 V 440 V	Export	3ø	2.4 A
2	220 V	U.S.A.	3ø	4 A
3	380 V	Germany	3ø	2.4 A
4	415 V	U.K.	3ø	2.4 A

(6) Replacing fuses

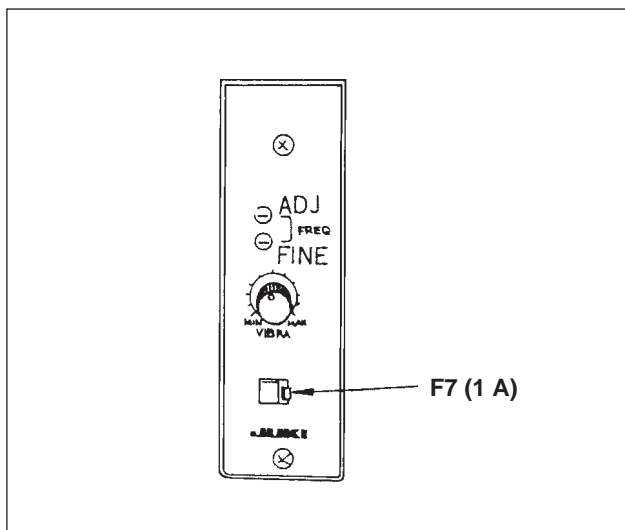
Use a fuse having the specified capacity

< MC-544 >

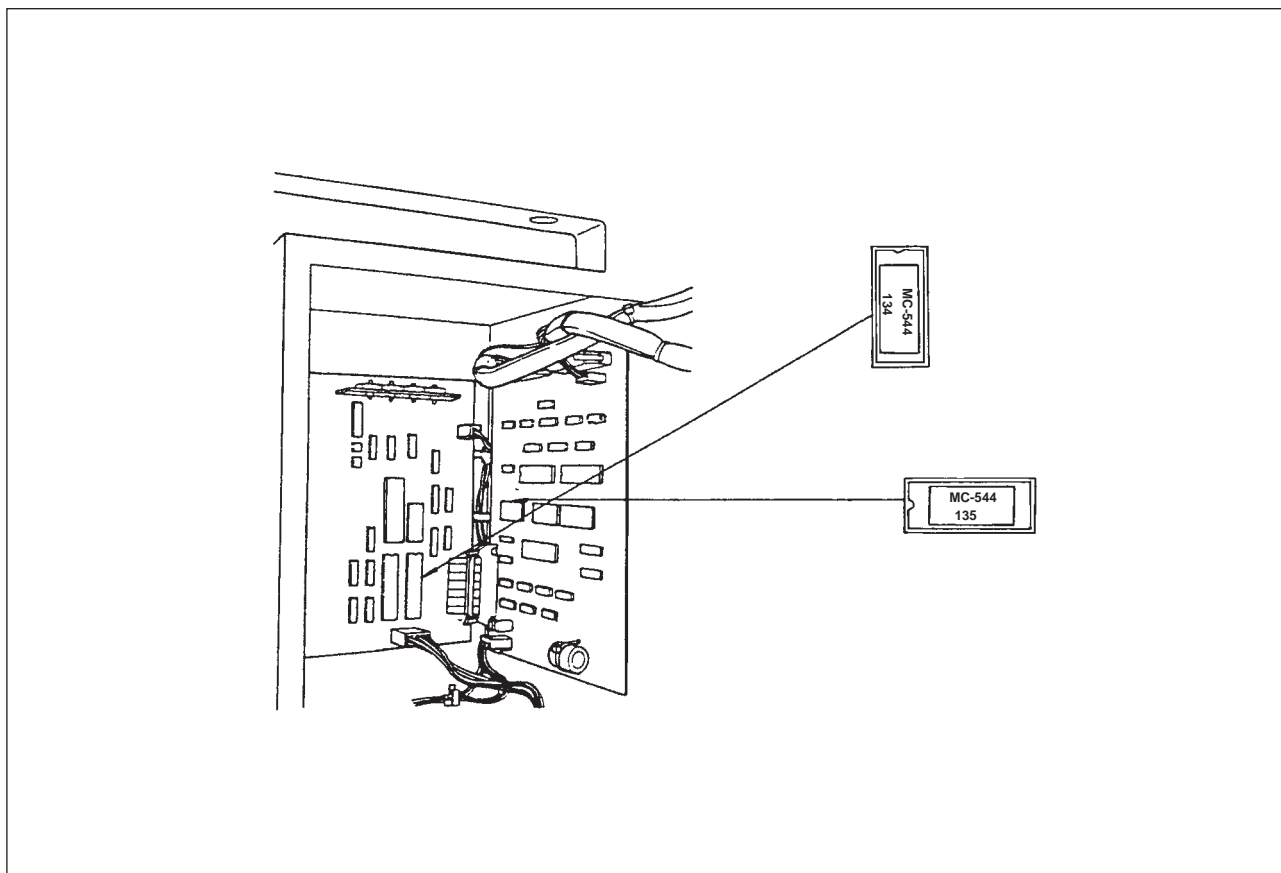
Remove the control box cover for MC-544



< BR >



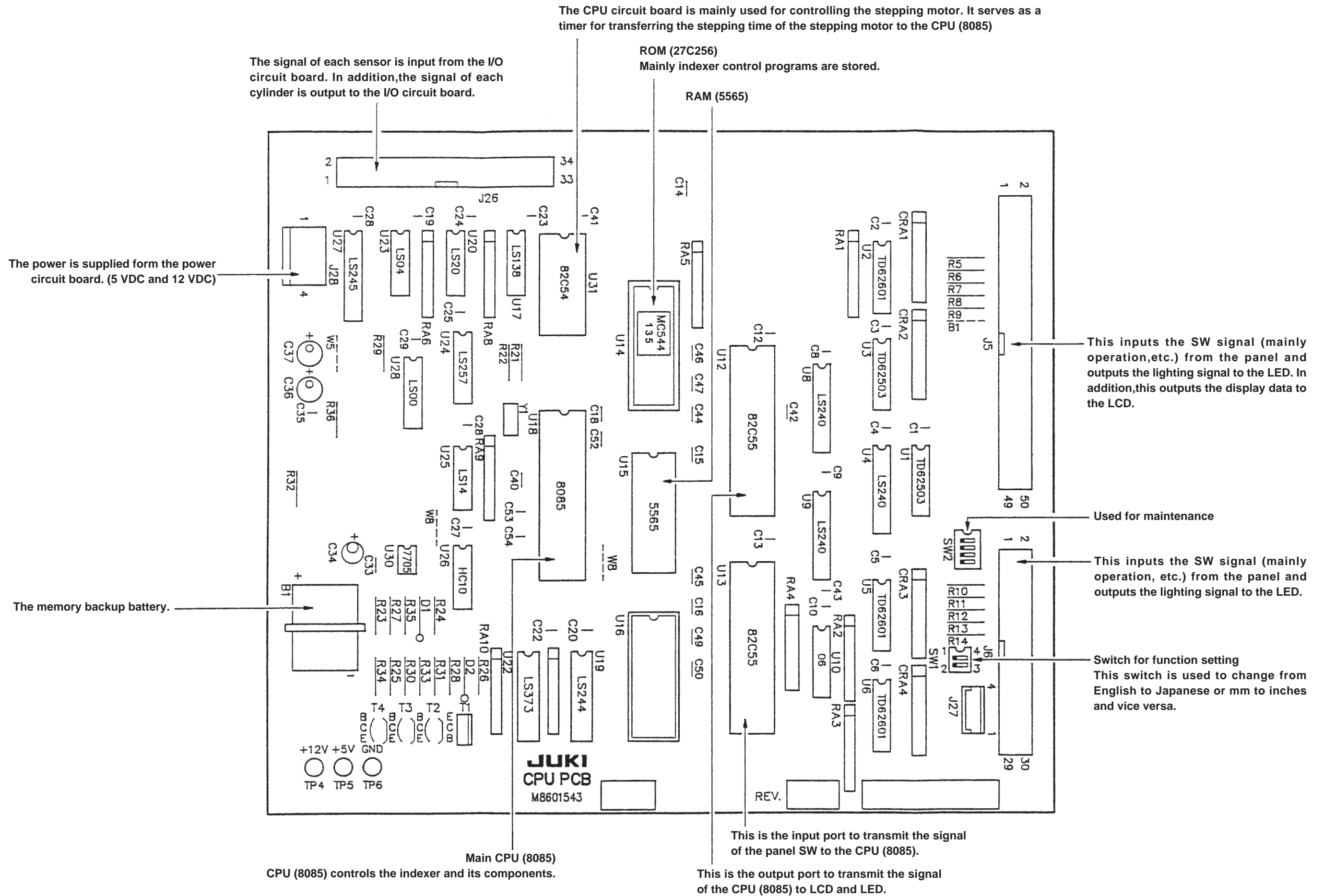
(7) Replacing the P-ROMs for data



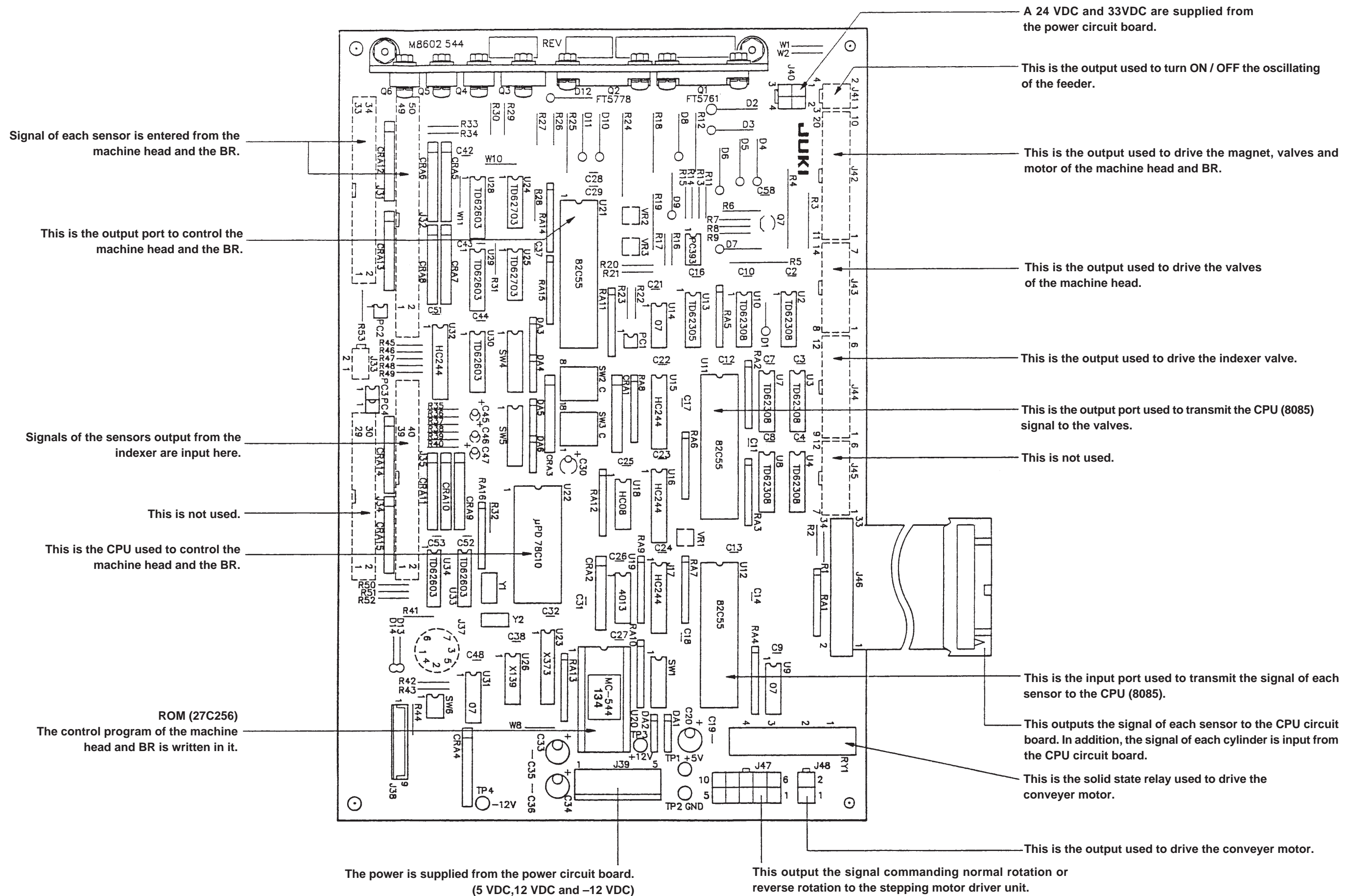
Turn OFF the power and replace the P-ROMs.

When mounting the P-ROMs, take care of the correct position and direction of them. In addition, the English characters with an asterisk (*) in each P-ROMs indicate REV.No. (Revision Number).

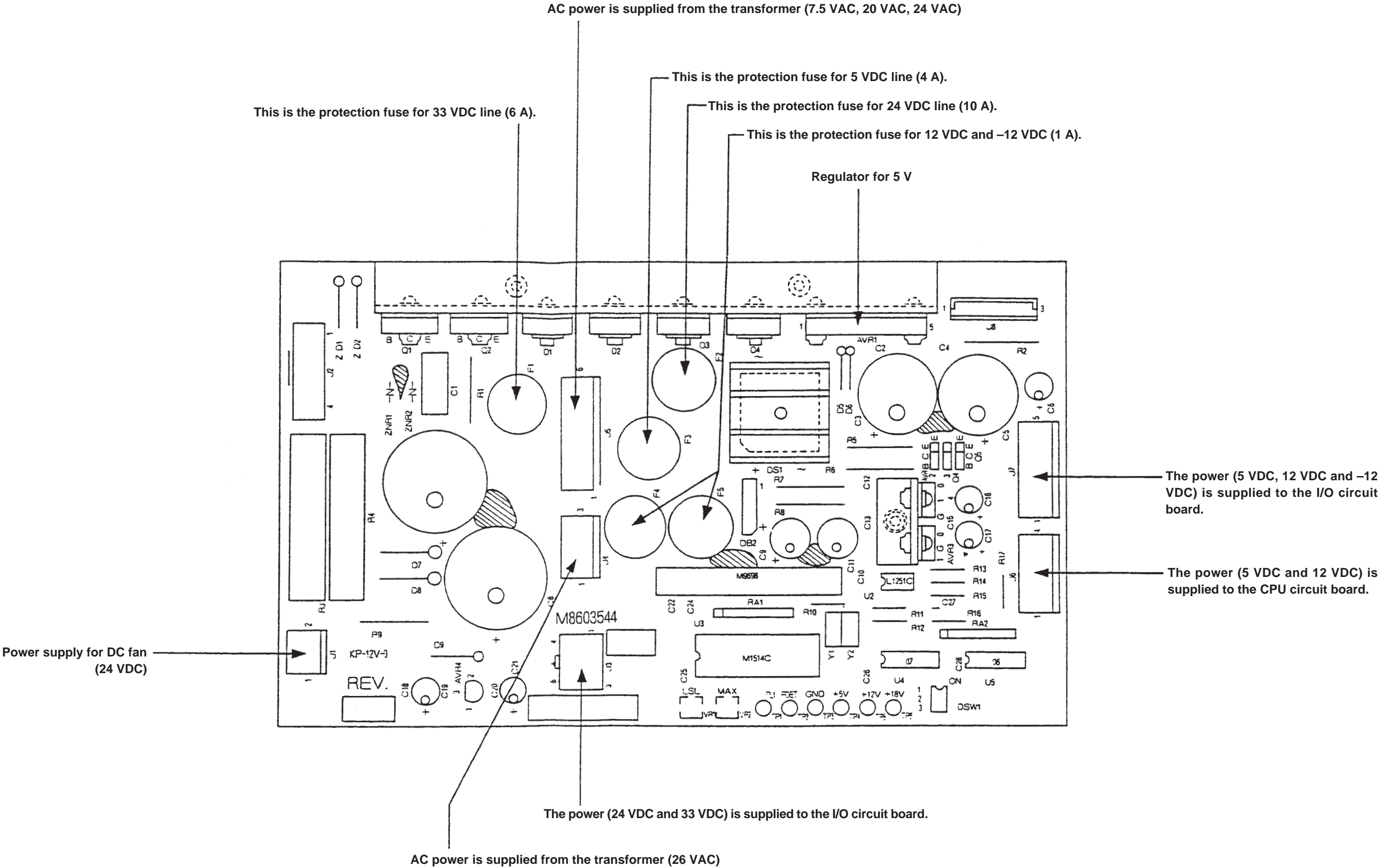
(8) CPU circuit board



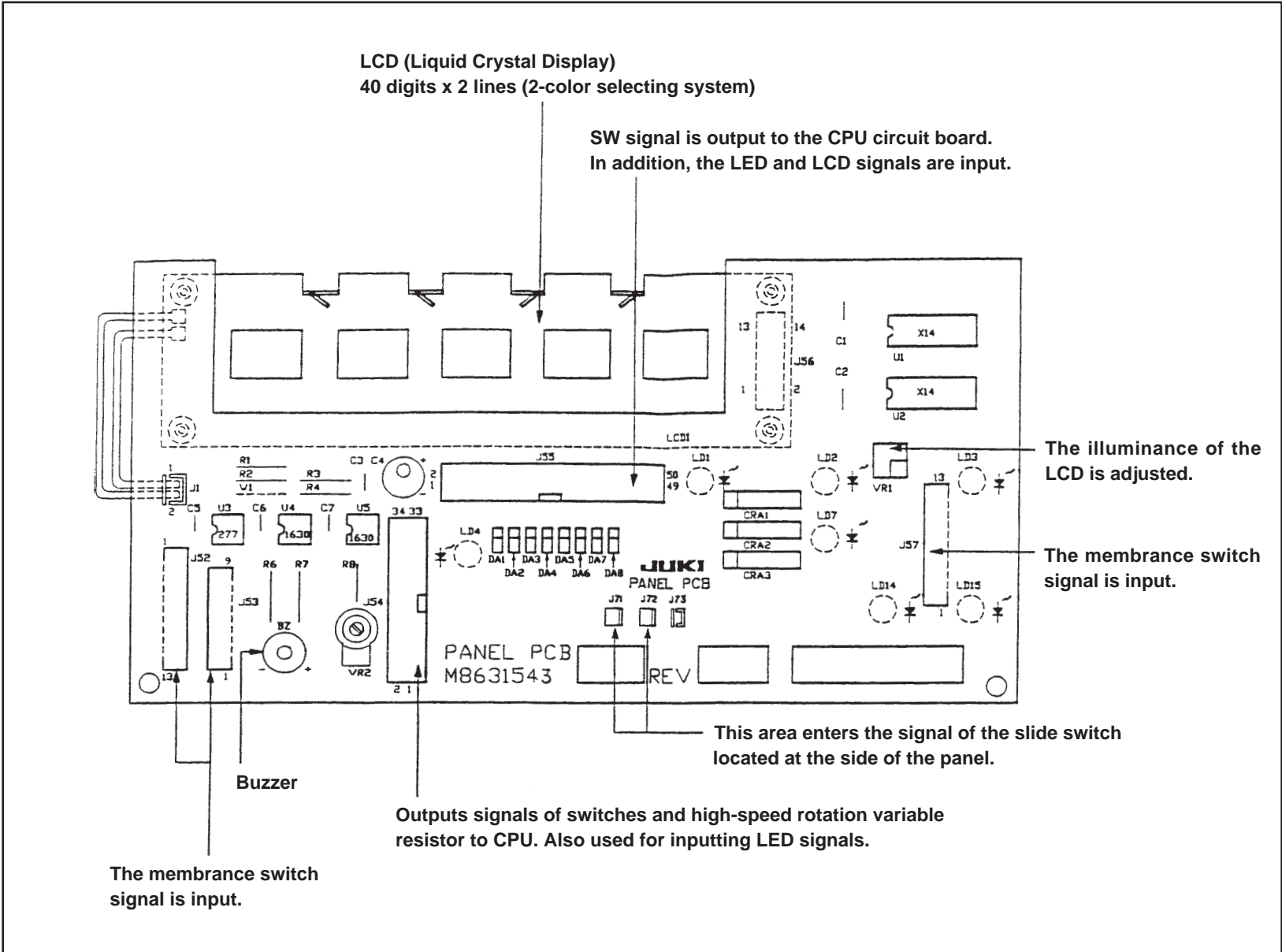
(9) I/O circuit board



(10) Power circuit board

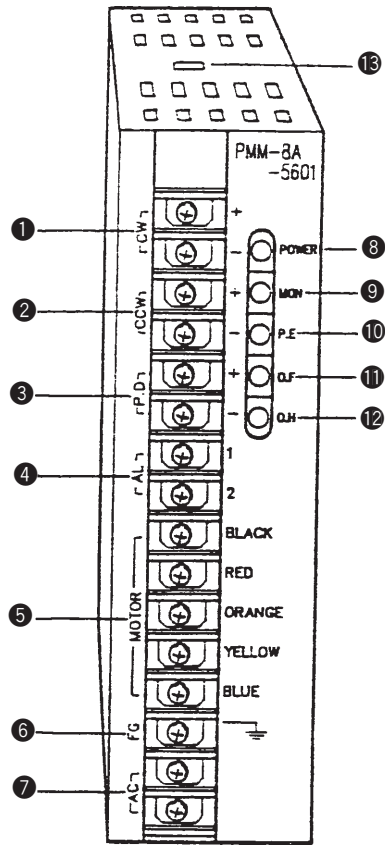


(11) Panel circuit board

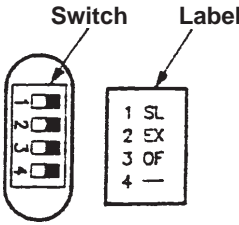


- ① CW pulse input signal
Inputs a signal to make the motor rotate clockwise (CW).
- ② CCW pulse input signal
Inputs a signal to make the motor rotate counterclockwise (CCW).
- ③ Power-down input signal (PD)
If "H" level is input, the exciting current to the motor will be cut off.
- ④ Alarm output signal (AL)
If the protection network inside the driver actuates, an alarm signal will be transferred outside.
- ⑤ Motor drive output (MOTOR)
This output feeds the electric current to the motor.
- ⑥ Frame ground output (FG)
Connected to the frame ground of the control box.
- ⑦ 100 Vac input (AC)
Supplies the power supply of 100 Vac \pm 10 % (50 / 60 Hz) to the machine.
- ⑧ Power supply indicating LED (POWER, green)
Lights when the 100 Vac is supplied to the machine.
- ⑨ Phase origin monitor indicating LED (MON, green)
Lights up when the exciting phase is in the origin (the state at the time of turning ON the power to the machine). Under the HALF step mode (0.36°/pulse), the LED lights up once every 20 pulse.

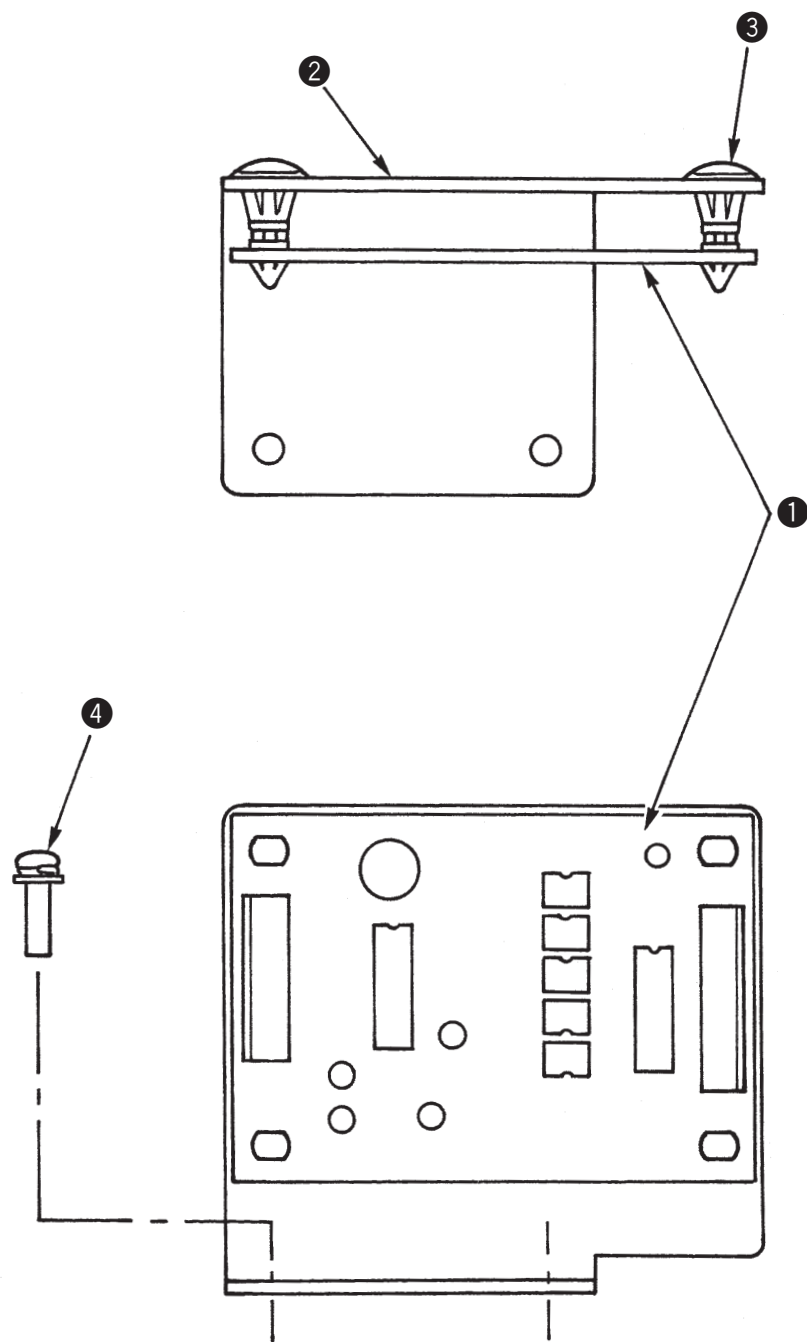
(12) Functions of the stepping motor driver



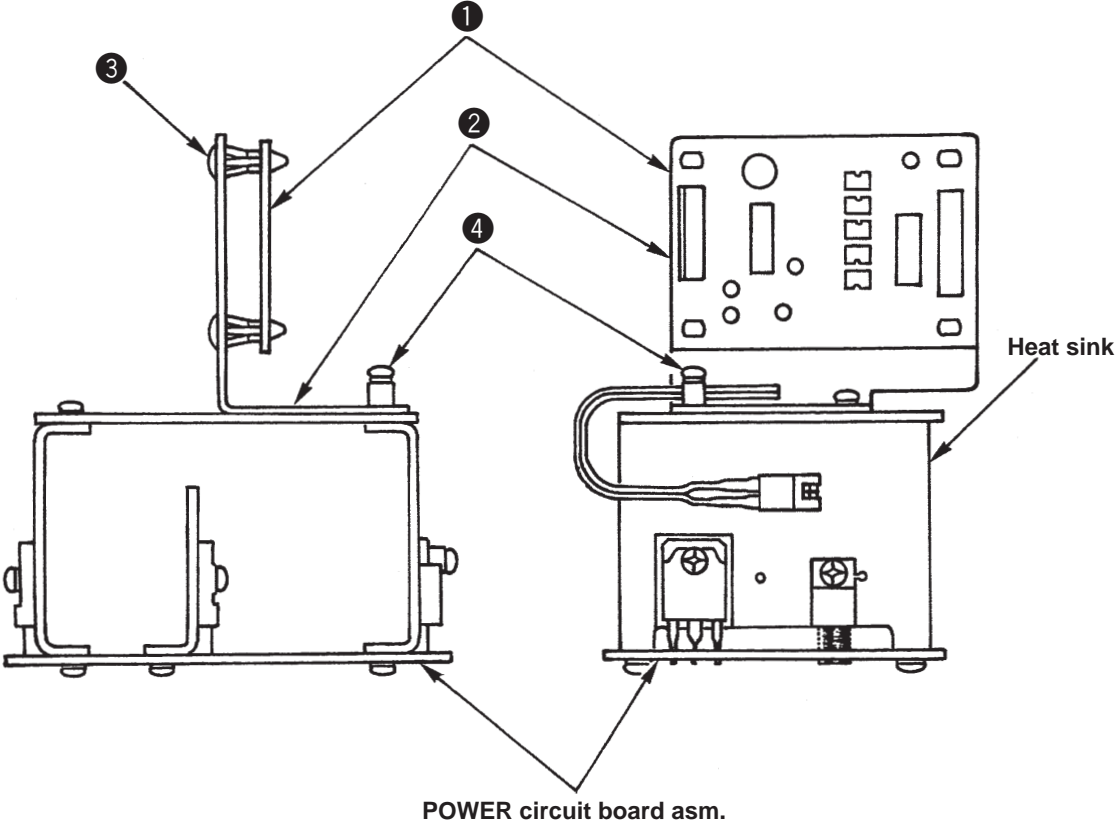
- ⑩ Supply voltage drop indicating LED (P.E, red)
If the 100 Vac power supply drops to 85 Vac or lower, the protection network will actuate to cut off the electric current to the motor coil. In this case, the LED lights up.
- ⑪ Abnormal input indicating LED (O.F, red)
If a pulse of 1000 KPPS or more is input under the HALF step mode (0.36°/pulse), the protection network will actuate to cut off the electric current to the motor coil. In this case, the LED lights up.
- ⑫ Overheat display LED (O.H, red)
If the temperature inside the driver, including the ambient temperature, rises to 80°C or more, the protection network will actuate to cut off the electric current to the motor coil. In this case, the LED lights up.
- ⑬ DIP switches
These switches are used for changing over the exciting method and automatic-current down. For the ACF model of sewing machine, all of these switches should be set to the ON position. (See the figure.)



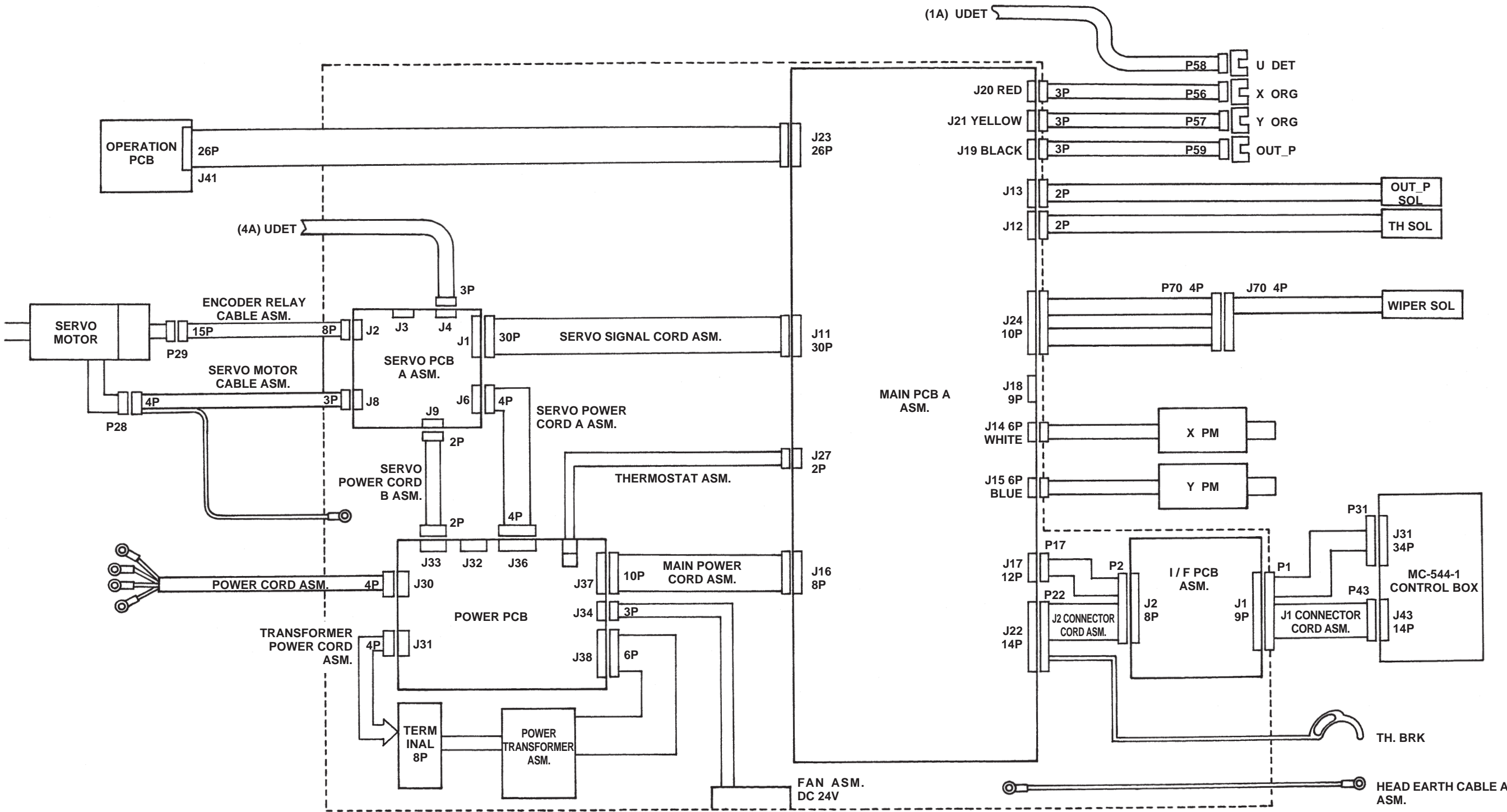
(13) I / F circuit board whole asm.



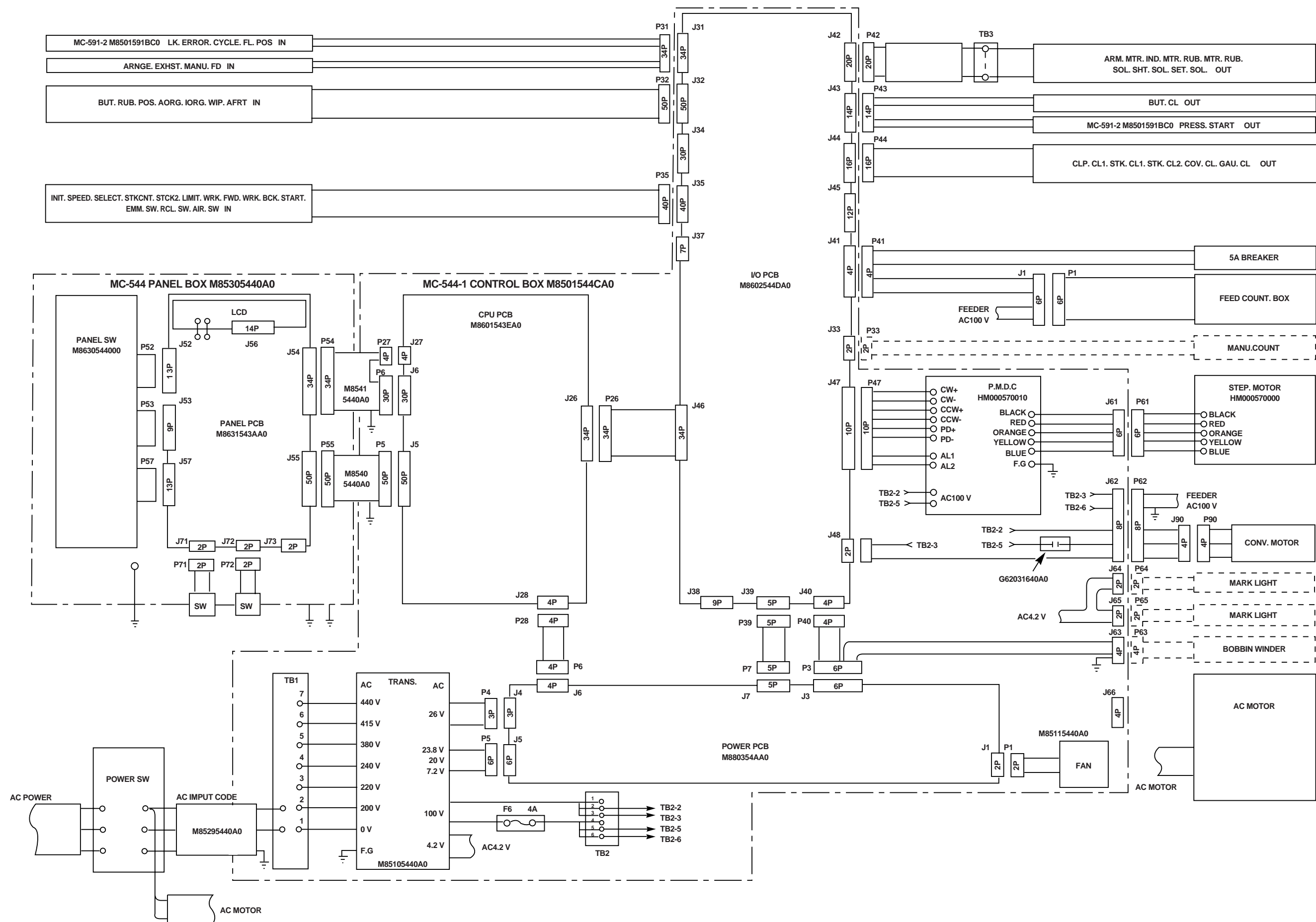
NO	Part No.	Name of part	Q'ty	Remarks
①	M86515910A0	I / F circuit board asm.	1	
②	M1001591000	Circuit board installing plate	1	
③	HX00269000B	Locking card spacer	4	
④	SL4031281SF	Installing plate attaching screw	1	



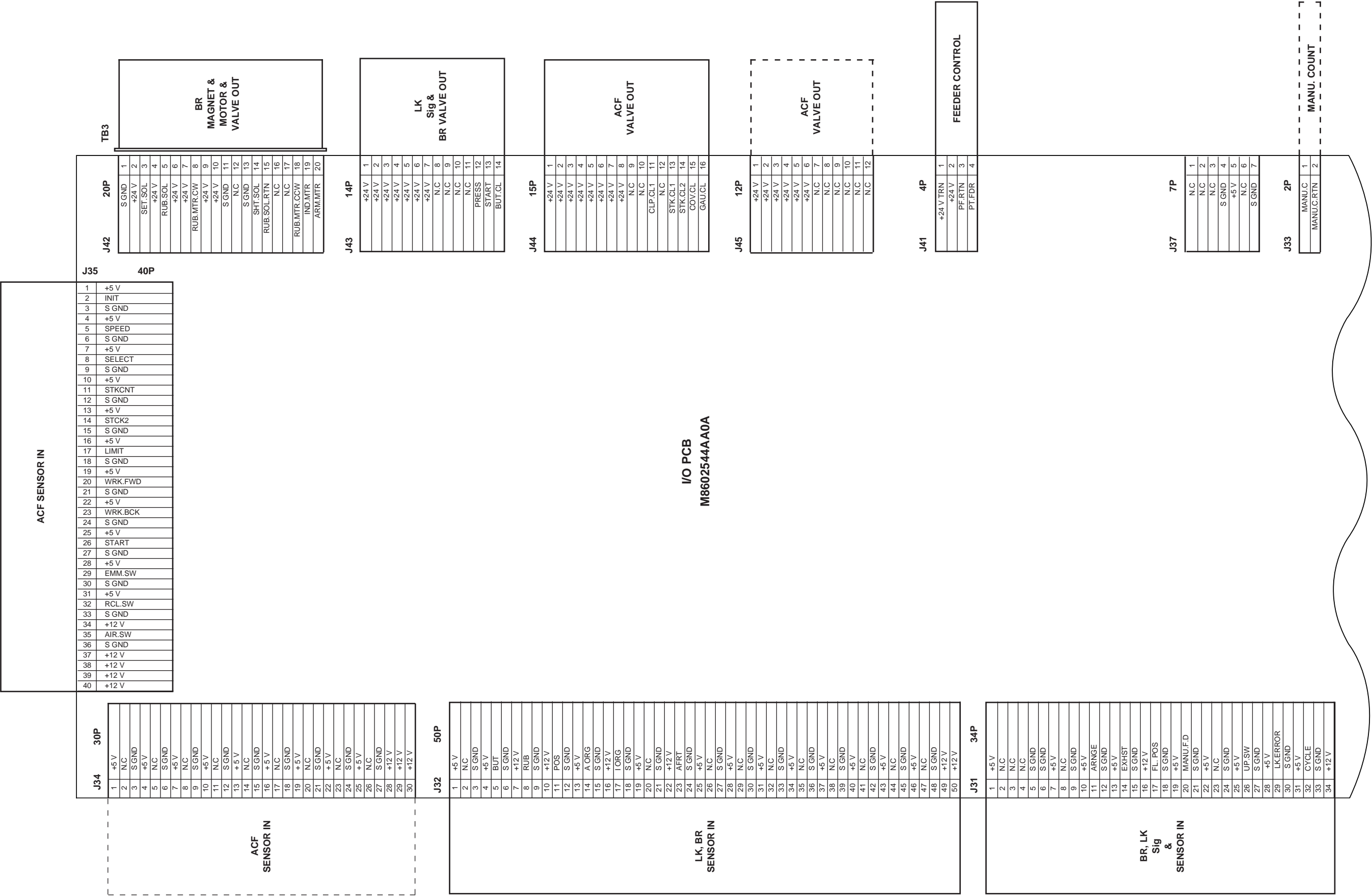
15. BLOCK DIAGRAM



16. BLOCK DIAGRAM



17. WIRING DIAGRAM (1/3)



LK, BR
SENSOR IN

J32

50P

1

+5 V

2

NC

3

S GND

4

+5 V

5

BUT

6

S GND

7

+12 V

8

RUB

9

S GND

10

+12 V

11

POS

12

S GND

13

+5 V

14

A ORG

15

S GND

16

+12 V

17

LOG

18

S GND

19

+5 V

20

NC

21

S GND

22

+12 V

23

AFRT

24

S GND

25

+5 V

26

NC

27

S GND

28

+5 V

29

NC

30

S GND

31

+5 V

32

NC

33

S GND

34

+5 V

35

NC

36

S GND

37

+5 V

38

NC

39

S GND

40

+5 V

41

NC

42

S GND

43

+5 V

44

NC

45

S GND

46

+5 V

47

NC

48

S GND

49

+12 V

50

+12 V

BR, LK
Sig
&
SENSOR IN

J31

34P

1

+5 V

2

NC

3

NC

4

NC

5

S GND

6

S GND

7

+5 V

8

NC

9

S GND

10

+5 V

11

ARNGE

12

S GND

13

+5 V

14

EXHST

15

S GND

16

+12 V

17

FL. POS

18

S GND

19

+5 V

20

MANU.F.D

21

S GND

22

+5 V

23

NC

24

S GND

25

+5 V

26

UP.SW

27

S GND

28

+5 V

29

LK.ERROR

30

S GND

31

+5 V

32

CYCLE

33

S GND

34

+12 V

BR
MAGNET &
MOTOR &
VALVE OUT

J42

20P

1

S GND

2

+24 V

3

SET.SOL

4

+24 V

5

RUB.SOL

6

+24 V

7

+24 V

8

RUB.MTR.CW

9

+24 V

10

+24 V

11

S GND

12

NC

13

S GND

14

SHT.SOL

15

RUB.SOL.RTN

16

NC

17

NC

18

RUB.MTR.CCW

19

IND.MTR

20

ARM.MTR

J43

14P

1

+24 V

2

+24 V

3

+24 V

4

+24 V

5

+24 V

6

+24 V

7

+24 V

8

NC

9

NC

10

NC

11

NC

12

PRESS

13

START

14

BUT.CL

J44

15P

1

+24 V

2

+24 V

3

+24 V

4

+24 V

5

+24 V

6

+24 V

7

+24 V

8

+24 V

9

+24 V

10

NC

11

NC

12

NC

13

STK.CL1

14

STK.CL2

15

COV.CL

16

GAU.CL

J45

12P

1

+24 V

2

+24 V

3

+24 V

4

+24 V

5

+24 V

6

+24 V

7

NC

8

NC

9

NC

10

NC

11

NC

12

NC

J41

4P

1

+24 V TRN

2

+24 V

3

PF.RTN

4

PT.FDR

J37

7P

1

NC

2

NC

3

NC

4

S GND

5

+5 V

6

NC

7

S GND

J33

2P

1

MANUC

2

MANU.C.RTN

ACF VALVE OUT

J41

4P

1

+24 V TRN

2

+24 V

3

PF.RTN

4

PT.FDR

ACF VALVE OUT

J45

12P

1

+24 V

2

+24 V

3

+24 V

4

+24 V

5

+24 V

6

+24 V

7

NC

8

NC

9

NC

10

NC

11

NC

12

NC

FEEDER CONTROL

J41

4P

1

+24 V TRN

2

+24 V

3

PF.RTN

4

PT.FDR

MANU. COUNT

J33

2P

1

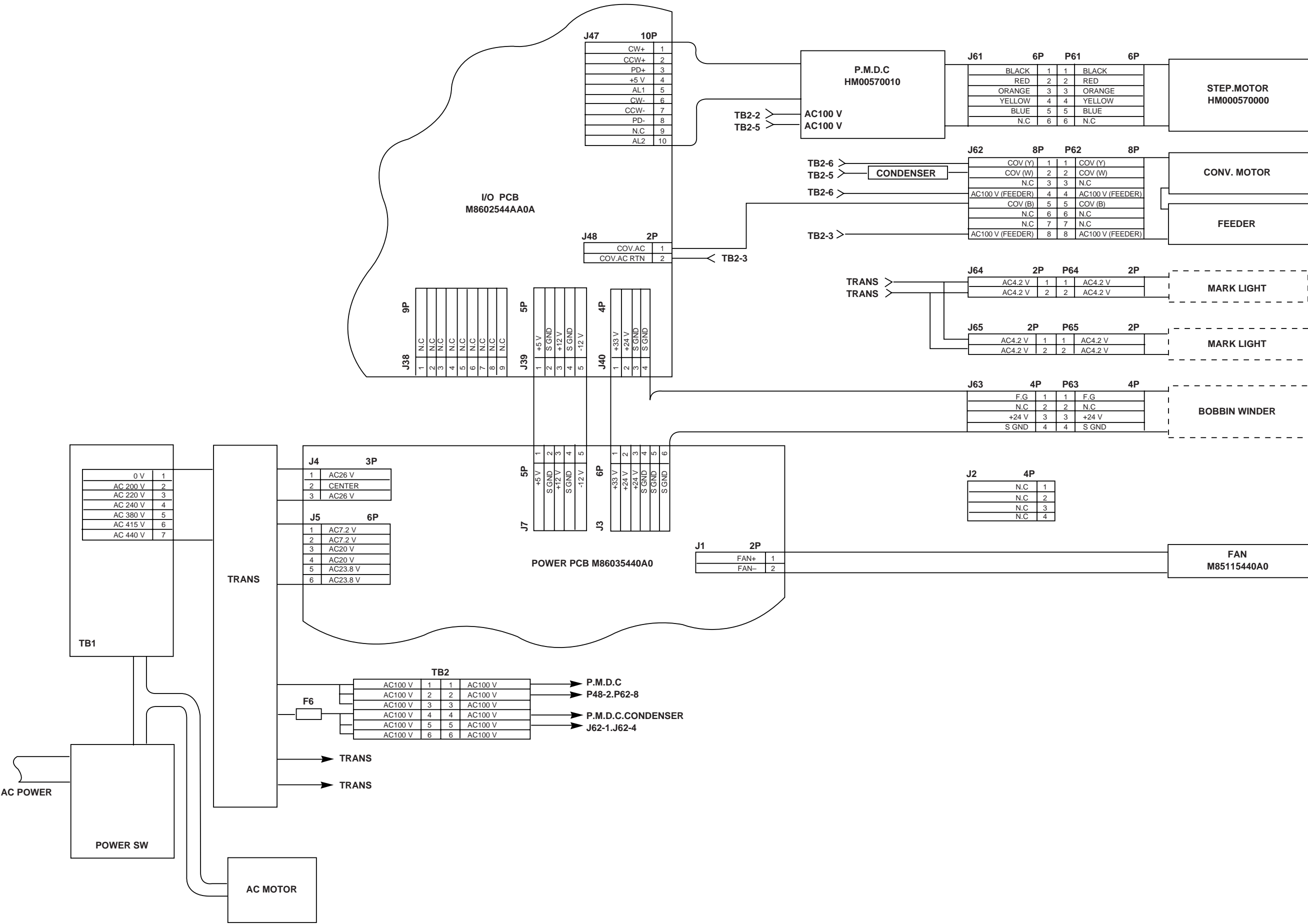
MANUC

2

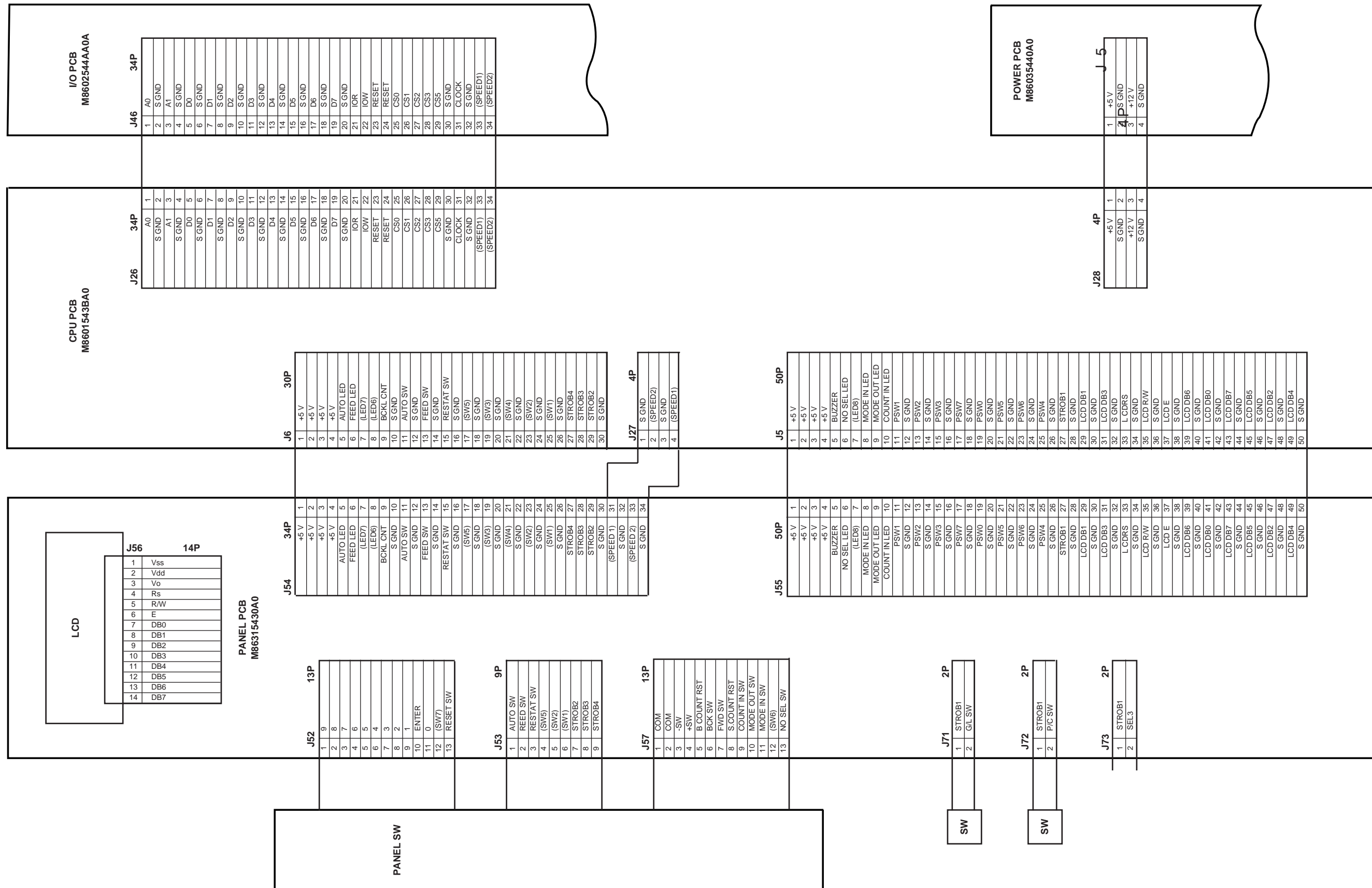
MANU.C.RTN

I/O PCB
M8602544AA0A

WIRING DIAGRAM (2/3)

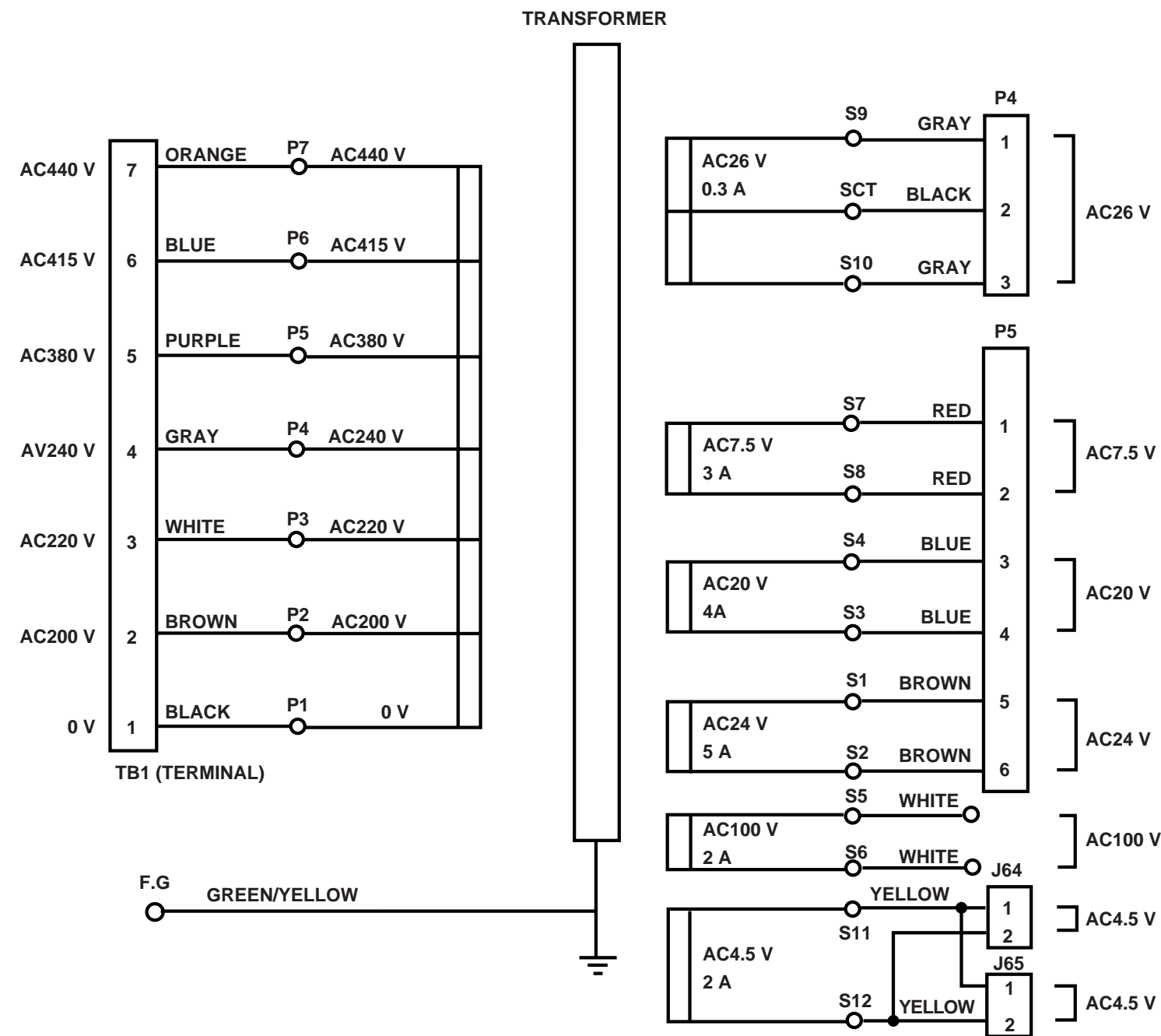


WIRING DIAGRAM (3/3)

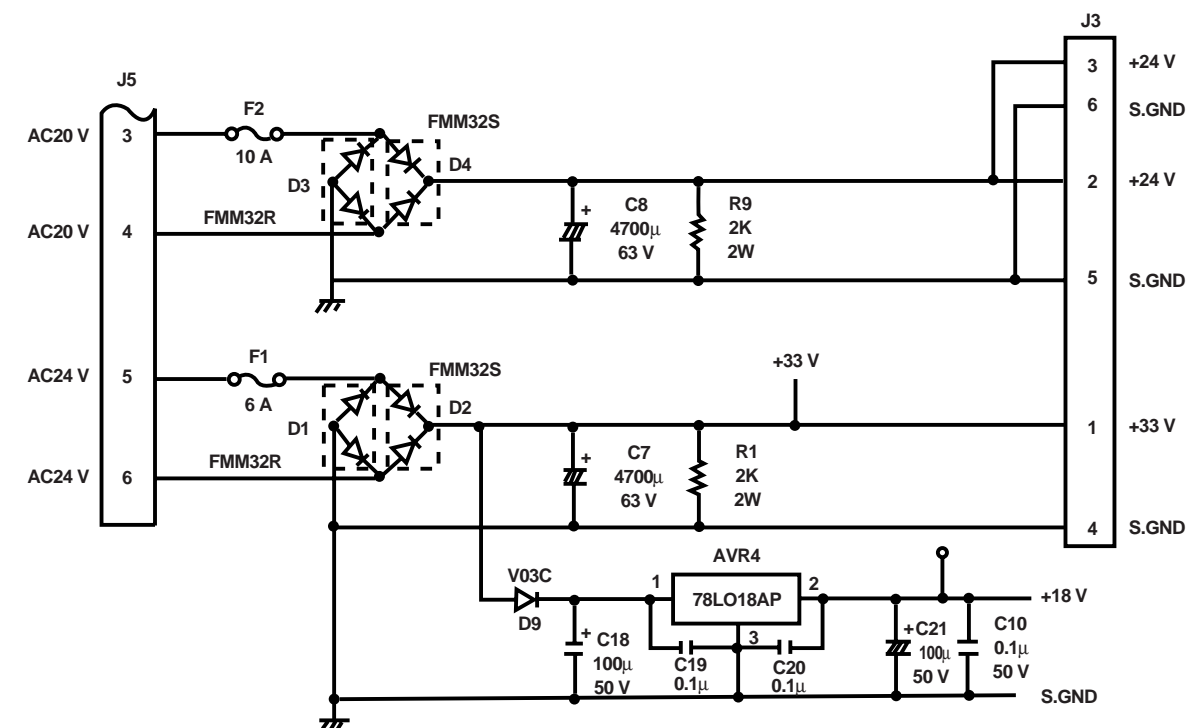
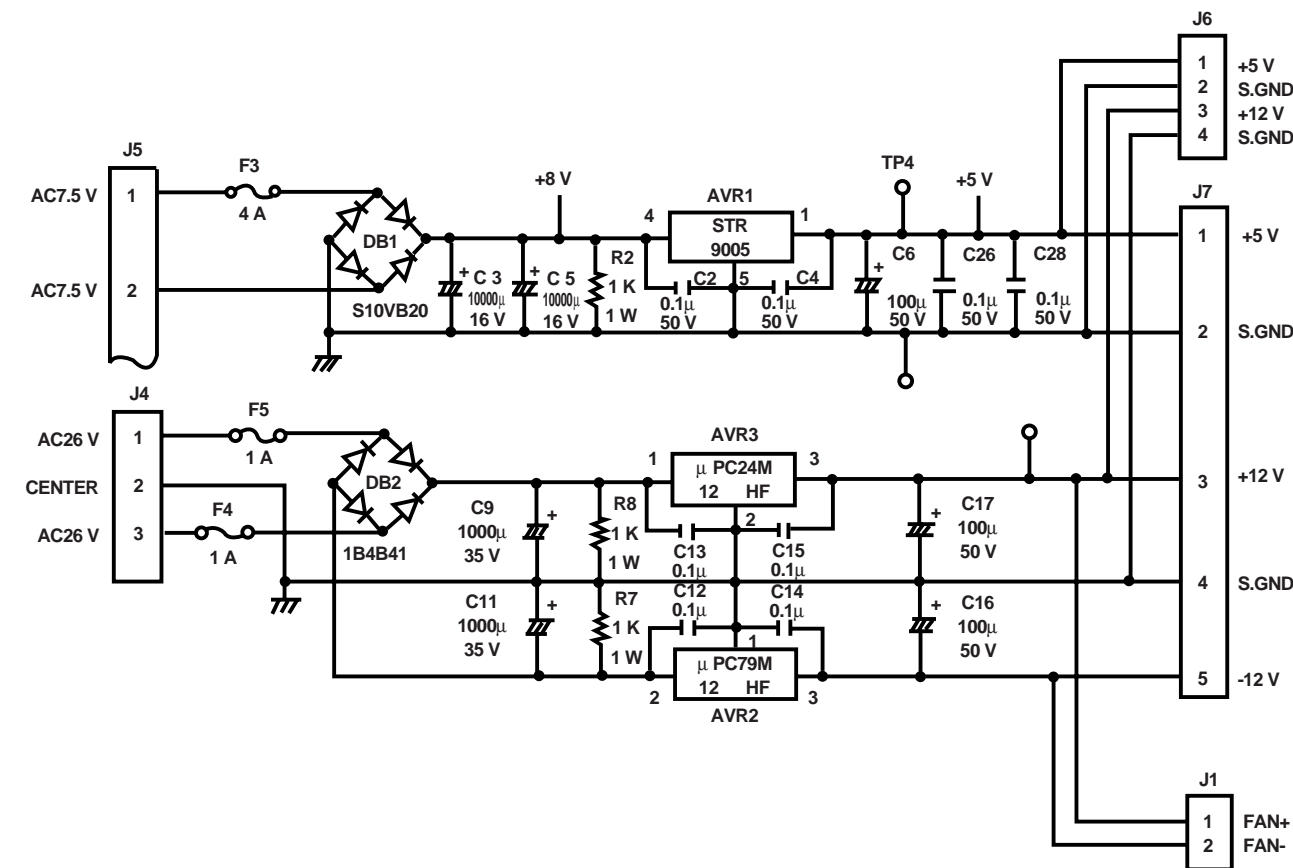


18. CIRCUIT DIAGRAM

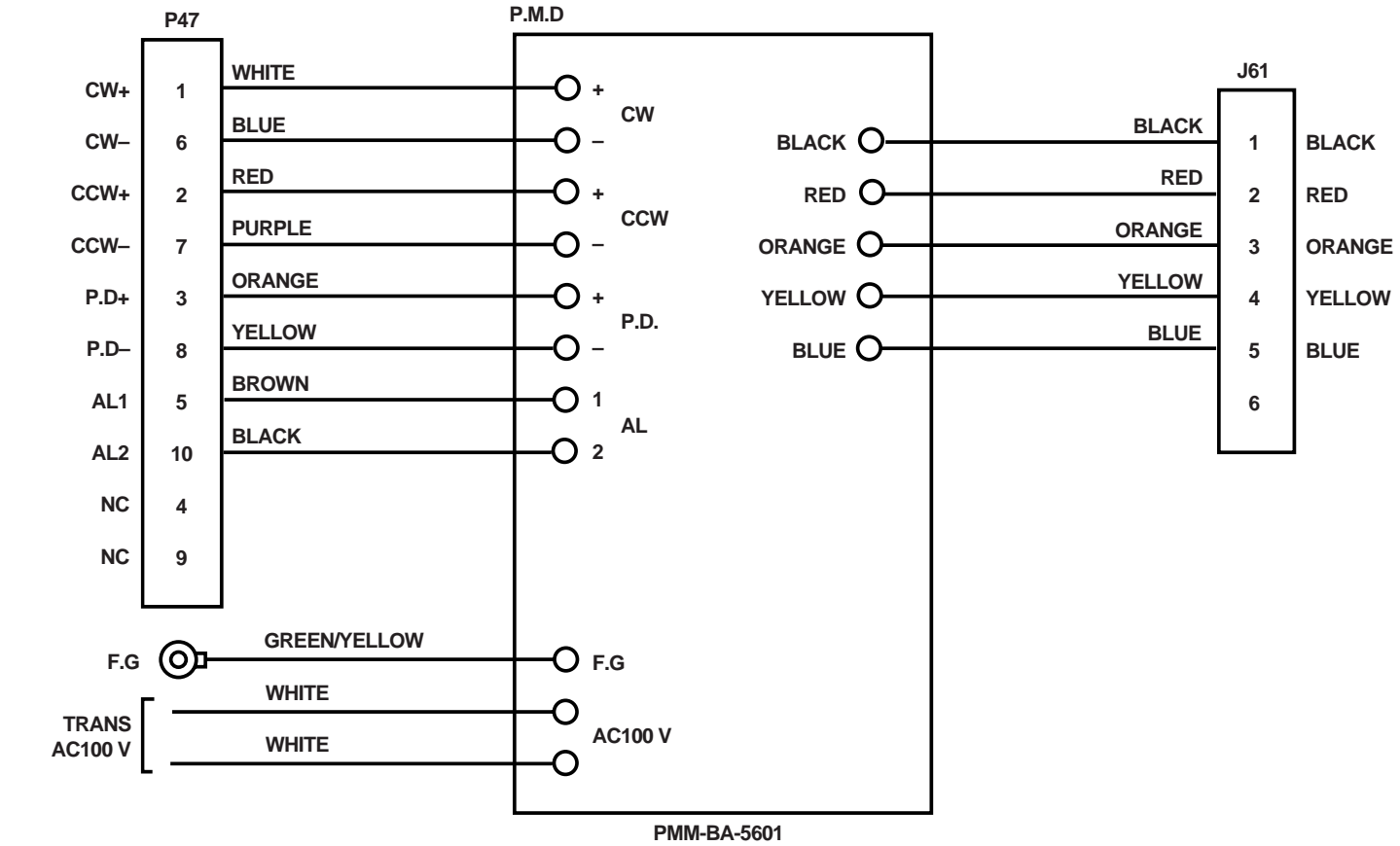
(1) Transformer (ass'y)



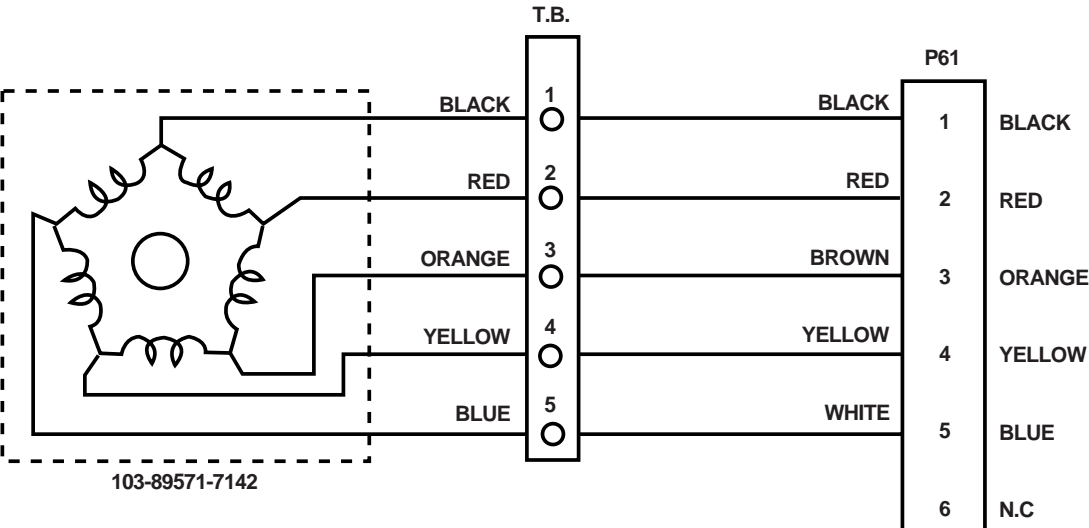
(2) Power circuit board (ass'y) circuit diagram



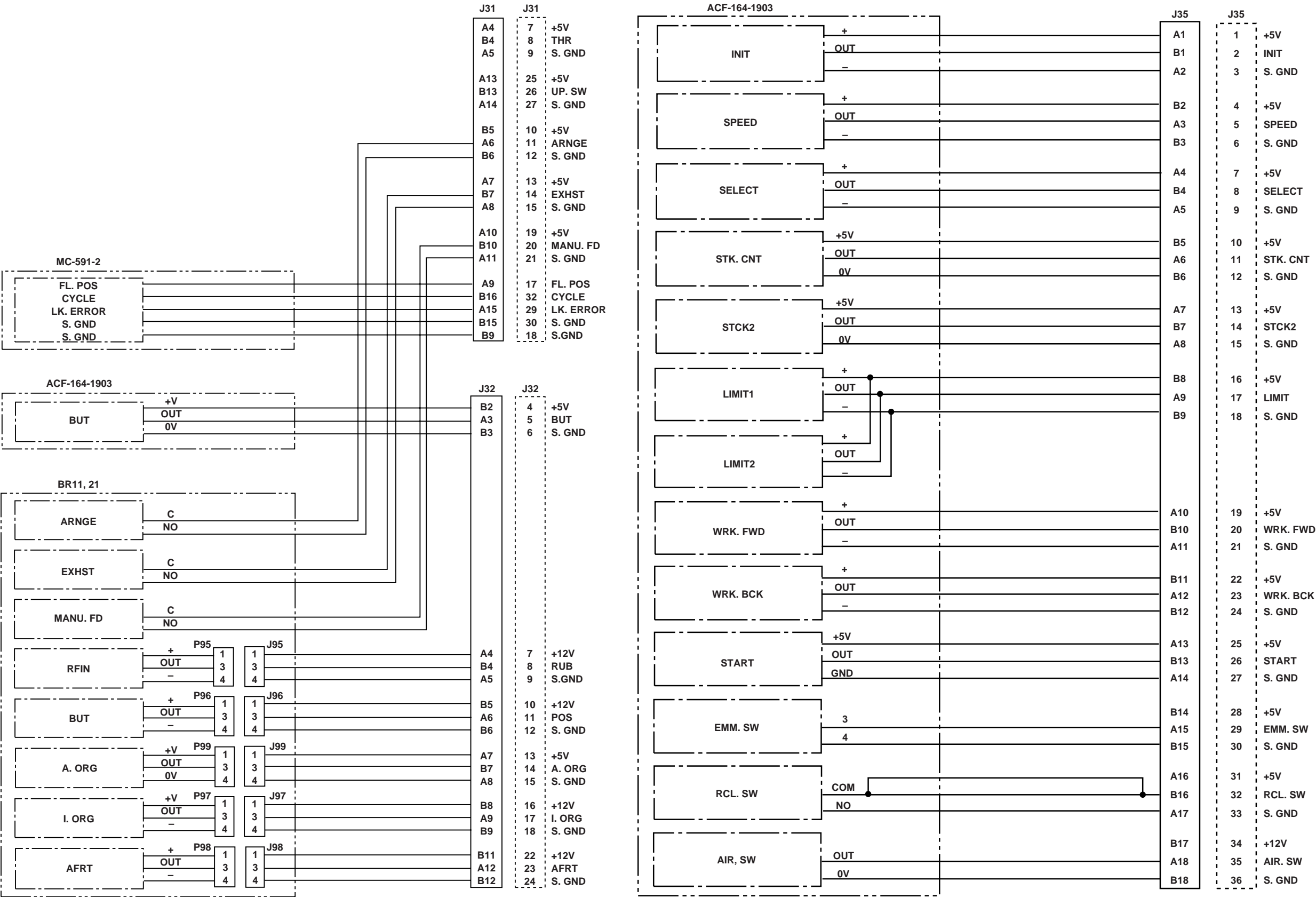
(3) Circuit diagram of the stepping motor driver (ass'y)



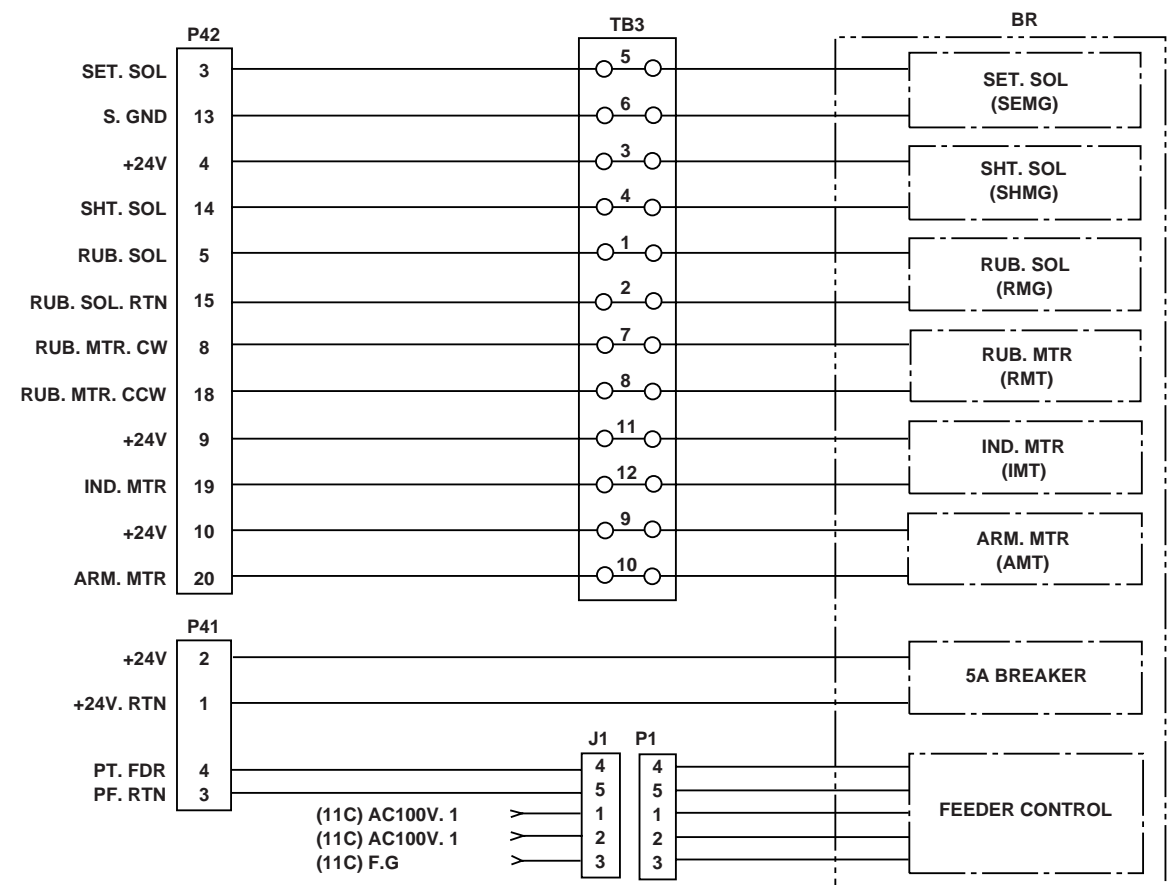
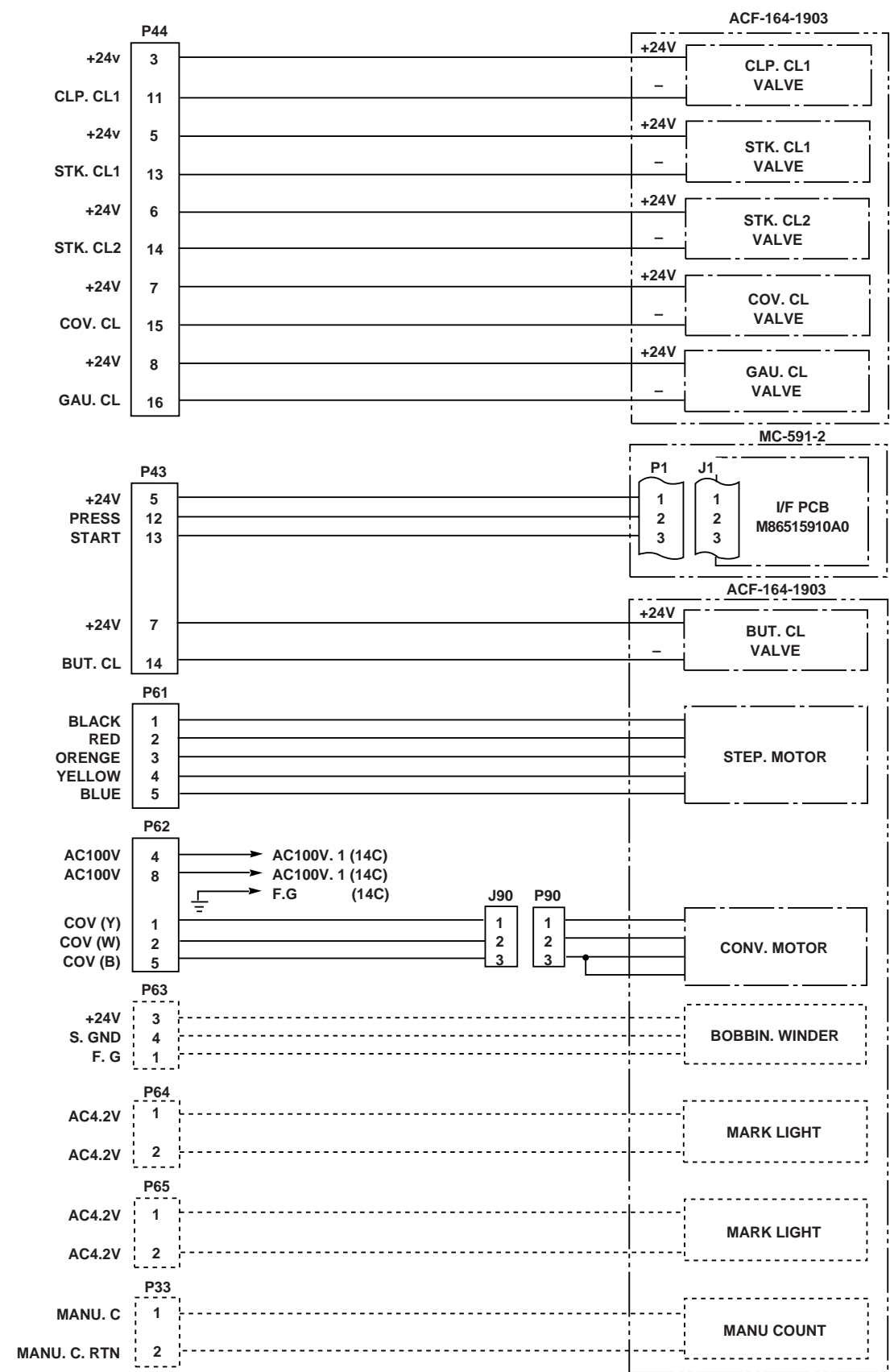
(4) Circuit diagram of the stepping motor (ass'y)



(5) Circuit diagram of the indexer switch



(6) Output circuit board diaram



19. TROUBLES AND CORRECTIVE MEASURES

Trouble (Phenomenon)	Cause	Corrective measure
1. Thread slips off the needle at the sewing start. Or, the machine starts sewing a button from an intermediate step of button sewing procedure.	<ul style="list-style-type: none"> ① Length of needle thread remaining in the needle is too short. ② The material flops. ③ The wiper does not press the thread. 	<ul style="list-style-type: none"> ○ Decrease the tension of the tension controller No. 1. ○ Adjust the disk rising amount of the tension controller No. 2. ○ Use a needle hole guide with a higher boss. ○ Use a button clamp of which lever plate is thinner than the current one. ○ Correct the wiper spring.
2. Needle breakage frequently occurs.	<ul style="list-style-type: none"> ① The needle hits the edge of holes in the button. ② The boss of the needle hole guide comes in contact with the recessed part of the feed plate. ③ The needle used is too thin. 	<ul style="list-style-type: none"> ○ Adjust the position of the button clamp jaw lever so that the needle enters the exact center of the holes in the button. ○ Adjust the position of the feed plate so that it does not come in contact with the boss of the needle hole guide. If the sewing size is larger for the feed plate used, replace it with the feed plate for medium-size buttons or for large buttons. ○ Change the needle count in accordance with the sewing product or the holes in the button.
3. The finished state of the wrong side of the material is extremely poor.	<ul style="list-style-type: none"> ① Length of needle thread remaining in the needle is too long. ② The thread catching force of the wiper is excessive. ③ If sewing a button of which wrong side is round-shaped, the stitches on the wrong side of the material are entangled to make a lump of thread. 	<ul style="list-style-type: none"> ○ Increase the tension of the tension controller No. 1. ○ Adjust the disk rising timing of the tension controller No. 2. ○ Decrease the pressure of the wiper spring. ○ Replace the current button clamp with another one of which lever plate is thicker than the current one.
4. The button is not sewn at the correct position.	<ul style="list-style-type: none"> ① The button is not secured in the correct sewing position. ② The leaf spring of the button clamp excessively works. ③ When using a button of which wrong side is round-shaped, the thread enters the space between the bottom face of the button and the top face of the boss of the needle hole guide. As a result, the button is not fed smoothly. 	<ul style="list-style-type: none"> ○ Improve the actuation of the button clamp. ○ Correct the button clamp jaw lever spring so that it increases the retaining force for the button. ○ Correct the leaf spring so that it does not excessively work. ○ Replace the current button clamp with another one of which lever plate is thicker than the current one.

20. TROUBLES AND CORRECTIVE MEASUTRES

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
(1) Machine has been powered up.			
Machine cannot be powered up.	Power cord has been unplugged.		Plug the machine in.
	Defective setting of thermal values in switch box.	The set value is inadequate.	Open the switch box and the value suitable for the specifications.
Character display fails to be indicated on the panel.	Faulty +5 V power supply to the CPU circuit board.		Connect the connector J28.
		Connector (J28) on the CPU circuit board has been disconnected.	
		Connectors (J5 and J6) on the power circuit board has been disconnected.	Connectors the connectors J5 and J6.
		Faulty 7.5 Vac power supply to the power circuit board.	Check the connection of the terminal board and the AC input power voltage.
			Check for the output voltage (7.5 Vac) of the transformer. If the output voltage is not supplied to the power circuit board, replace the transformer.
		Faulty (F3:4A) on the power circuit board has blown.	Replace the fuse.
		Defective power circuit board.	Replace the power circuit board.
		Connectors (J5 and J6) on the CPU circuit board have been disconnected.	Connect the connectors J5 and J6.
		Connectors (J54 and J55) on the panel circuit board have been disconnected.	Connect the connectors J54 and J55.
		Power cords for LCD (red cord and black cord) have been disconnected.	Connect the cords.
			Load 135 (27C256) on U14
		U14 has been loaded with its pin facing toward the opposite direction.	Replace P-ROM with a new one and load it taking care of the direction.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
The cylinders (all) do not move even the power has been turned ON. (The gauge does not move.)	The operating air is not supplied to the unit.		Check for input/output of air to the series of 8 valves.
	Faulty supply of +24 V or the signal to the valve.	Connectors J42, J43 and J44 mounted on the back of the control box have been removed.	Connect the connectors J42, J43 and J44.
	Faulty +24 V power supply to the I/O circuit board.	Connector (J40) on the I/O circuit board has been disconnected.	Connect the connector J40.
		Connector (J3) on the power circuit board has been disconnected.	Connect the connector J3.
		Fuse (F2:10 A) on the power circuit board has blown.	Replace the fuse.
		Defective power circuit board.	Replace the power circuit board.
	Faulty +5 V power supply to the I/O circuit board.	Connector (J39) on the I/O circuit board has been disconnected.	Connect the connector J39.
		Connectors (J5 and J7) on the power circuit board have been disconnected.	Connect the connectors J5 and J7.
		Faulty 7.5 Vac power supply to the power circuit board.	Check the connection of the terminal board and AC input power voltage.
			Check for the output voltage (7.5 Vac) of the transformer. If the voltage is not supplied from the transformer, replace the transformer.
		Fuse (F3:4 A) on the power circuit board has blown.	Replace the fuse.
		Defective power circuit board.	Replace the power circuit board.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
Error message "04 Work clamp position error" is displayed.	Work clamp is in its down condition.		Raise the work clamp with hand.
			Push the loader start P.B. switch.
	The work clamp lift detecting switch has been improperly adjusted.		Adjust the switch properly.
	The work clamp lift detecting switch fails to work.		Replace the switch.
	Wiring of the work clamp lift detecting switch is improper.		Check the wiring of the switch.
With powered ON, the following error messages are displayed. With <input type="checkbox"/> switch pushed, error displays cannot be reset.			
1) "51 Air pressure error" is displayed.	Connector J39 at the I/O circuit board comes out of position.		Connect the J39.
	Operating air is not supplied to the unit.		Connect the joint of air supply and adjust pressure to 0.5 MPa (5 kgf/cm ²).
	Set value of the air detector switch is too high.		Decrease the set value. Adjust pressure to 0.3 MPa (3 kgf/cm ²).
	I/O circuit board is equipped with the pin of the P-ROM (U20) with reverse direction.		Replace the P-ROM with a new one and mount it checking for its correct direction.
	J35 at the rear of the control box is disconnected.		Connect the J35.
		The work clamp comes in contact with the machine.	Change the position of the work clamp.
2) "52 Clamp position error." is displayed.	Work clamp position is not proper.		
	Work clamp switch of the carriage is in ON position when powered ON.		Turn OFF the power and move the carriage to the center side from the origin.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
3) "55 Stop motion position error." is displayed.	Stop-motion switch of the sewing machine is defective.		Replace the stop-motion switch with a new one.
	J32 at the rear of the control box comes out of position.		Connect the J32.
	Machine is not in its stop-motion position.		Turn the pulley until stop-motion position is reached.
	Stop-motion switch is not in ON position with the machine is in its stop-motion position.		Re-adjust switch position.
4) "09 RAM back up error." (If this occurs frequently.)	The stored data in RAM is erased.	The battery has exhausted.	Replace the battery (BT) in the CPU circuit board.
		Defective data back-up circuitry.	Replace the CPU circuit board.
5) "11 Start switch on error."	The start switch is kept pressed.		Release your hand or knee from the switch, and turn ON the power to the machine.
		The mechanical adjustment has not been completed.	Adjust the stroke of the switch and the work clamp.
		Defective switch.	Replace switch.
6) "50 Stepping motor driver error."	The signal from the stepping motor driver fails to be sent to CPU circuit board.	Connector (J26) on CPU circuit board has been disconnected.	Connect the connector J26.
		Stepping motor driver error.	Check for the 100 Vac of the power voltage, or input power voltage.
	Stepping motor driver has received an abnormal input.	The required power voltage 100 Vac has dropped to 85 Vac or less.	Check the DC fan. (Refer to " (8) Others" trouble in faulty rise of temperature.)
		Either the internal temperature or ambient temperature of the stepping motor driver has risen to 80 C or more.	
		Stepping motor driver has received an abnormal input.	Replace the P-ROM (U14) on CPU circuit board.
		Faulty stepping motor driver.	Replace the CPU circuit board. Replace the I/O circuit board. Replace the stepping motor driver.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
7) Motor of the indexer keeps on rotating.	<div>The origin switch of the indexer fails to work.</div> <div>The motor of the indexer is defective.</div> <div>The I/O circuit board is defective.</div>	<div>Connectors P32 and 97 have come off.</div>	<div>If the connectors are securely connected ,replace the switch with a new one.</div> <div>Replace the motor with a new one.</div> <div>Replace the I/O circuit board with a new one.</div>
(2) Search the origin			
After the power has been turned ON, the carriage fails to search the origin. (If the error message "50 Stepping motor driver error" is shown on the panel display, refer to the item (1) 6).	<div>Pinion gear is loosened.</div> <div>The stepping motor fails to run.</div>	<div>Fuse (F6:4 A) has been blown.</div> <div>Connector (J47) on I/O circuit board has been disconnected.</div> <div>Connector (J61) mounted on the back of the control box has been disconnected.</div> <div>Defective stepping motor driver.</div> <div>Defective stepping motor.</div>	<div>Re-tighten pinion gear screw.</div> <div>Replace the fuse with a new one.</div> <div>Connect the connector J47.</div> <div>Connect the connector J61.</div> <div>Replace the stepping motor driver.</div> <div>Replace the stepping motor.</div>
During the search for the origin, carriage fails to move steadily.	<div>Mechanical accuracy has not attained.</div> <div>Faulty driving components of the stepping motor.</div> <div>Rack/pinion gear screw is loosened.</div>	<div>Defective stepping motor.Excessive backlash among the stepping motor, pinion gear and the carriage rack.</div> <div>Faulty stepping motor.</div> <div>Faulty stepping motor driver.</div>	<div>Adjust the backlash appropriately.</div> <div>Replace the stepping motor.</div> <div>Replace the stepping motor driver.</div> <div>Check each screws tightening are for security.</div>

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
In the men's mode The machine stops after its carriage has moved 100 mm (3.937") and the error message "101 SPEED SW ERROR" is displayed. In the ladies' mode The carriage fails to move to the origin and stops.	The speed decreasing detector switch (SPEED SW) is not activated.	The sensor window has collected moisture.	Blow air to the slit of the sensor, or clean the window with a piece of dry cloth.
		Defective sensor.	Replace the sensor.
		Position of the origin detecting plate has not been adjusted.	Adjust the position of the origin detecting plate so that it reaches on the slit.
In the ladies' mode The carriage stops after it has moved 100 mm (3.937") and the error message "100 INIT SW ERROR" is displayed. In the men's mode The carriage fails to move to the origin and stops.	The origin detector switch (INIT SW) is not activated.	The sensor window has collected moisture.	Blow air to the slit of the sensor, or clean the window with a piece of dry cloth.
		Defective sensor.	Replace the sensor.
		Position of the origin detecting plate has not been adjusted.	Adjust the position of the origin detecting plate so that it reaches on the slit.
The carriage unit moves, and "52 CLAMP POSITION ERROR" is indicated on the display.	Defective position of the work clamp	Work clamp switch of the carriage is turned ON when the carriage is in its origin.	Re-adjust the position of the switch.
		The position of the sensor is out of the detecting range.	Turn "ON" the power switch after bringing the carriage unit to its center position.
		The sensor is defective.	Adjust the position of the sensor.
	The origin sensor (INIT SW) and discrimination sensor (SELECT SW) do not work.	The sensor is defective.	Replace the sensor.
		The position of the origin detecting plate has not been adjusted.	Adjust the origin detecting plate so that it reaches the slit.
		The men's wear sewing mode/ladies' wear sewing mode is not properly specified.	Properly set the change-over switch on the side face of the panel, and re-turn ON the power to the machine.
"102 SELECT SW ERROR" is indicated on the display.	The discrimination switch (SELECT SW) does not work.	Window of the sensor has collected moisture.	Blow air to the slit of the sensor. Or, wipe the sensor window with a piece of dry cloth.
		The sensor is defective.	Replace the sensor.
		The position of the origin detecting plate has not been adjusted.	Adjust it so that the origin detecting plate reaches the slit.

TROUBLE	CAUSE (1)		CAUSE (2)	CORRECTIVE MEASURES
(3) Panel operation				
Panel input is impossible. (Switches are not valid.)	Signal from membrane switch fails to be input to panel circuit board.		Connectors J52,J53 and J57 on the panel circuit board have been disconnected.	Connect the connectors J52,J53 and J57.
	Signal from panel circuit board has not been input to CPU circuit board.		Connectors J5 and J6 on the CPU circuit board, or J54 and J55 on the panel circuit board have been disconnected.	Connect the connectors J5 and J6 or J54 and J55.
	Search for the origin has not been completed.			Refer to the troubles in " (2) search the origin"
The ladies' or finished wear mode cannot be activated.	The slide switch of the operation panel does not work.		The J71 and J72 of the panel circuit board come out of position.	Connect J71 and J72.
	The slide switch failure.			Replace the slide switch with a new one.
	The switch for ladies' mode and the finished product switch have been connected reversely.			Connect the switch for ladies' to J71 and that for finished wear to J72.
The button feed switch fails to work.	Faulty +24 V power supply to the I/O circuit board.	Breaker has dropped.		Reset the breaker.
		Connector (J40) on the I/O circuit board has come off.		Securely connect the connector J40.
		Connectors (J5 and J3) on the power circuit board asm. have come off.		Connect the connector J5 and J3.
		Fuse (F2:10 A) of the power circuit board asm. has blown.		Replace the fuse with a new one.
		The power circuit board asm. is defective.		Replace the power circuit board asm. with a new one.
		Connector J42 located on the come off.		Securely connect the connector J42.
	Motor of the spinner oscillating arm fails to work.	The motor of the spinner oscillating arm is defective.		Replace the motor with a new one.
		The breaker on the operation panel has been cut off.		Press the push-button of the breaker.
				Replace the switch.
	The switch is defective.			Inspect the worm components and cam components.
	The manual rotating shaft cannot be operated smoothly.		The cam shaft components are locked.	

TROUBLE	CAUSE (1)		CAUSE (2)	CORRECTIVE MEASURES
(4) Start	The work clamp does not come down.	Knee switch (START SW) fails to work.	The switch stroke has not been adjusted.	Adjust the switch stroke.
	The machine fails to start.		Defective switch.	Replace the switch.
	The machine cannot be released from the "start" state.	Hand switch (PCL SW) fails to work.	Defective switch.	Replace the switch.
		The work clamp cylinder does not work.	The J44 at the back of the control box comes out of position.	Connect the J44.
			Value failure.	Check the resistance value that is developed between 3 and 11 of the connector P44.
	The button center and the size of material edge fail to meet the scale.	The related components of the machine have not been adjusted.	Operating air pressure is too low.	Adjust the operating air pressure to 0.5 MPa (5 kgf/cm ²).
			The guiding mark fails to meet the numeric value on the scale.	Adjust the position of the guiding mark.
The distance from the material edge to the first button and to the last button fails to accord. (not parallel)	The equipment has not been adjusted yet.	The left and right sizes of the set plate and clamp table are not equal.		Loosen screw and adjust the set plate.
			The work pieces are not set on the machine with properly arranged.	Set the material properly.
	The work clamp force of the carriage is insufficient.	The clamp spring pressure is too high.		Adjust the spring pressure properly.
			The compressed air pressure is too low.	Adjust the compressed air pressure to 0.5 MPa (5 kgf/cm ²).
		The work clamp components fluctuate.	The slide bearing knob has loosened.	Tighten the slide bearing, left or the slide bearing knob, right.
			The slide shaft support has been improperly adjusted.	Adjust the slide shaft support

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
(5) Button sewing In the automatic operation mode, the sewing machine fails to start. In the independent operation mode, the sewing machine fails to start. Two seconds later, "51 AIR PRESSURE ERROR" is indicated on the display.		Connector J42 on the back face of the control box has been disconnected.	Connect the connector J42.
		The compressed air pressure is too low.	Adjust the compressed air pressure to 0.5 MPa (5 kgf/cm ²).
Although a button is supplied, "13 BUTTON FEED ERROR" is displayed and the machine stops.	The button detector sensor fails to work.	The position of the sensor is not in the detectable range.	Adjust the position of the sensor.
		The sensor is defective.	Replace the sensor.
		The detecting lever does not shield the sensor.	Adjust the position of the lever.
		The link returning spring has come off.	Attach the link returning spring in position.
	The button detector cylinder fails to work.	The operating air pressure is too low.	Adjust the operating air pressure to 0.5 MPa (5 kgf/cm ²).
		Defective cylinder.	Replace the cylinder.
		Defective valve.	Check the resistance value that is developed between 7 and 14 of the connector P43.
		The spinner oscillating arm forward positioning sensor is defective.	Replace the sensor.
	The button detecting timing is defective.	Out of the limit of time to be used to detect a button.	Adjust the position of the spinner oscillating arm forward positioning switch.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
Although a button is not supplied, the machine fails to display "error message", and the machine goes to the next step without displaying error message.	SW4-3 on the I/O circuit board has been set to its ON position.		Set the SW4-3 on the I/O circuit board to its OFF position.
	Button detective sensor fails to work.	The sensor is outside of the detectable range.	Adjust the position of the sensor properly.
		The sensor is defective.	Replace the sensor with a new one.
		The shielded plate fails to shield the light.	Adjust the position of the lever.
During automatic operation, the machine stops with its work clamp down after sewing is finished and it fails to start the next step.	Voltage of +24 V is not supplied to the I/O circuit board.	The link returning spring has come off.	Attach the link returning spring in place.
		The connector (J40) of the I/O circuit board comes out of position.	Connect the J40.
		Connector (J3 and J5) on the power circuit board has been disconnected.	Connect the connector J3 and J5.
		Fuse (F2:10 A) on the power circuit board has blown.	Replace the fuse.
	Motor of the spinner oscillating arm fails to move.	The power circuit board is defective.	Replace the power circuit board.
		Connector J42 on the back face of the control box has been disconnected.	Connect the connector J42.
		The motor of the spinner oscillating arm is defective.	Check the connector P42 10 to 20 for continuity.
		Fuse (F2:10 A) on the power circuit board asm. has blown.	Replace the fuse.
	The stop-motion switch fails to work normally.	The stroke of the switch has not been adjusted.	Adjust the stroke.
		Failure of the switch.	Replace the switch with a new one.
The button fails to come off at the sewing end.	The clamp jaw lever opening is not adjusted.	When the button clamp jaw lever opens to the maximum, no clearance exist at button-to-button clamp jaw lever.	Adjust the clamp release arm. Adjust the opening of the button clamp jaw lever.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
After the machine has sewn the 1st button, "52 CLAMP POSITION ERROR" is displayed.	The work clamp position switch of the carriage is in ON position at its origin.		Adjust the switch
After the button has been sewn, "01 NEEDLE THREAD STITCH ERROR" is displayed although the needle thread is not trimmed.	<p>The thread breakage detector keeps on outputting a signal.</p> <p>The thread take-up spring has not been adjusted.</p> <p>Electrode has not been perfectly insulated.</p>	<p>The thread take-up spring is not threaded.</p> <p>The clearance provided between the thread take-up spring and the electrode is insufficient.</p> <p>The tension of the thread take-up spring is too high.</p>	<p>Thread the thread take-up spring.</p> <p>Move the electrode away from the thread take-up spring to allow the thread take-up spring to move by a large amount. (6 to 8 mm)</p> <p>Decrease the tension of the thread take-up spring.</p> <p>Insulate the electrode and assemble it properly.</p>
Stitch failure error is not shown on the panel even when the needle thread has broken.	<p>SW4-1 on the I/O circuit board has been set to its ON position.</p> <p>The thread take-up spring has not been adjusted.</p> <p>Thread breakage detecting signal is not output.</p>	<p>The stroke of the thread take-up spring is too large.</p> <p>Tension of the thread take-up spring and the electrode is observed.</p> <p>Poor contact between the thread take-up spring and the electrode is observed.</p>	<p>Set the SW4-1 on the I/O circuit board to its OFF position.</p> <p>Bring the electrode to the thread take-up spring to decrease the amount of stroke of the thread take-up spring. (6 to 8 mm)</p> <p>Adjust the load applied by the spring to 20 to 40 gf.</p> <p>Adjust the position of the electrode.</p> <p>Clean up the contact point of the electrode.</p>

TROUBLE	CAUSE (1)		CAUSE (2)	CORRECTIVE MEASURES
(6) Moving the carriage				
In the men's mode When the carriage returns to the origin, the error message "100 INIT SW ERROR". is displayed on the panel.	Speed decreasing detecting switch (SPEED SW) fails to work. Origin detecting switch (INIT SW) fails to work.	The sensor window has collected moisture. Defective sensor. Position of the origin detecting plate has not been adjusted.	Blow air to the slit of the sensor, or clean the window with a piece of dry cloth. Replace the sensor. Adjust the position of the origin detecting plate to that it reaches on to the slit.	
In the ladies' mode When the carriage returns to the origin, the error message "101 INIT SW ERROR." is displayed on the panel.	Speed decreasing detecting switch (SPEED SW) fails to work. Origin detecting switch (INIT SW) fails to work.	The sensor window has collected moisture. Defective sensor. Position of the origin detecting plate has not been adjusted.	Blow air to the slit of the sensor, or clean the window with a piece of dry cloth. Replace the sensor. Adjust the position of the origin detecting plate so that it reaches on to the slit.	
When the carriage returns to the origin, the error message "52 CLAMP POSITION ERROR" is displayed on the panel.	Origin detecting switch (INIT SW) fails to work. Speed decreasing detecting switch (SPEED SW) fails to work.	Defective sensor. Position of the origin detecting plate has not been adjusted.	Replace the sensor. Adjust the position of the origin detecting plate to that it reached on to the slit.	
Excessive error in button intervals.	Mechanical accuracy has not attained.	Excessive backlash among the stepping motor, pinion and the carriage rack. The screw of the stepping motor pinion is loosened. Faulty stepping motor. Faulty stepping motor driver.	Adjust the backlash appropriately. Re-tighten the screw to the set tightening torque. Replace the stepping motor. Replace the stepping motor driver.	
The material slips when the carriage travels.	Neither the needle thread nor the bobbin thread are not cut sharp.	The knife has not been adjusted or broken.	Adjust the knife or replace the knife with a new one.	

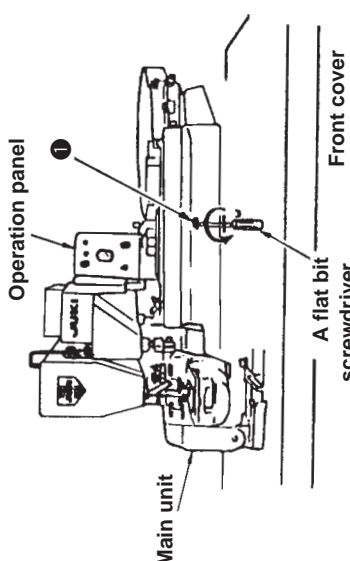
TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
(7) Stacking			
Finished material fails to be stacked.	Stacking bar fails to work.	The operating air pressure is too low.	Adjust the operating air pressure to 0.5 MPa (5 kgf/cm ²).
		Set value of the speed controller is excessively decreased.	Adjust the set value of the speed controller.
		Defective cylinder.	Replace the cylinder.
		Defective valve.	Check the resistance value that is developed between 5 and 13 of the connector P44.
The swing bar fails to work.	The sensor of the swing bar cylinder fails to work. The swing bar cylinder does not work.	The position of the sensor is out of the detectable range.	Adjust the position of the sensor.
		The operating air pressure is too low.	Adjust the operating air pressure to 0.5 MPa (5 kgf/cm ²).
		Defective cylinder.	Replace the cylinder.
		Defective valve.	Check the resistance value that is developed between 6 and 14 of the connector P44.
The finished materials are not stacked neatly on the stacker.	The stacked materials are likely to be pulled back. The cloth presser bar does not work.	The speed of the swing bar is too high.	Adjust the speed controller.
		The stroke of the cylinder is too short.	Adjust the position of the cylinder sensor of the swing bar.
		The cloth presser bar and the stacking board have been loosely fitted with each other.	Adjust so that the cloth presser bar and the stacking board are closely fitted with each other.
		The compressed air pressure is too low.	Adjust the compressed air pressure to 0.5 MPa (5 kgf/cm ²).

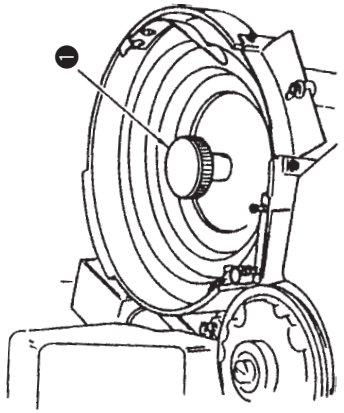
TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
The finished materials cannot be stacked uniformly over the width.	The speed of the cloth presser bar is too low. (too high)		Adjust the speed of the cloth presser bar properly.
	The material edge detecting sensor fails to detect the material.	The material edge detecting sensor is defective.	Replace the sensor with a new one.
		The material edge detecting sensor fails to detect the type of the material.	Specify the set value on the sensor under the manual stack mode.
	The frequency (50/60 Hz) for the machine has not been set to the correct one.		Set the frequency to the correct one using the SW1-6 on the I/O circuit board.
The buzzer fails to sound even when the predetermined number of workpieces to be stacked has been reached.	The stacked quantity detector switch fails to work.	The position of the sensor is out of the detectable range.	Adjust the position of the sensor.
		Defective sensor.	Replace the sensor.
(8) Others			
Inner temperature of the control box is too high.	DC fan fails to run.	Connector (J1 and J4) on the power circuit board has been disconnected.	Connect the connector J1 and J4.
		Faulty 26 Vac power supply to the power circuit board.	Check the output voltage (26 Vac) of the transformer. If the 26 Vac fails to be output, replace the transformer.
		Fuse (F4, F5:1A) of the power circuit board has blown.	Replace the fuse.
		Defective power circuit board.	Replace the power circuit board.
	Air blows by the DC fan is blown in the opposite direction.	The air blows from outside of the box to inside of it.	Change the air blowing direction from inside to outside of the control box.
		Dust has accumulated in the cover on the MC-544 box.	Clean the filter.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
(9) BR Button fail to be set on the carrier pin.	Centers of the rotary rod is not aligned with that of the carrier pin.		Align the center of the rotary rod with the center of the carrier pin.
	Centers of the rotary rod is not aligned with that of the positioning unit.		Align the center of the rotary rod with the center of the positioner.
	(Defective position of the sensor for confirming the button is fitted on the carrier pin.)		(Adjust the position of the sensor.)
	The button cannot be turned due to inadequate gripping force of the work attachment (soiled with oil or the like.)		Replace the work attachment with a new one.
	Clearance between the shutter plate and the carrier pin is too large.		Wipe out the gripping face of the work attachment.
	Tips of the pins on the carrier pin are not uniform.		Adjust the height of the carrier pin.
	Center-to-center distance of the holes in button used and that of the pins on the carrier pin are not equal.		Apply a carrier pin whose pin tips are uniform.
	Height of the work attachment is defective.		Use a carrier pin with pins of which center-to-center distance is equal with that of the holes in button used.
	Button retaining force of triple pawl is too strong.		Re-adjust the height of the work attachment.
	Shutter plate is not opened or inadequately opened.		Check whether the output level of the positioning solenoid is adequate.
	Fine positioner fails to rotate.		Check the shutter plate for smooth motion. Check whether the shutter plate is opened as wide as 22 mm (0.866") at the maximum.
		The fine positioner shaft is locked.	Inspect the bushings and gears. If any of them has been locked, the motor may also be defective. So they should be inspected.
			Adjust the position of the normal-/reverse-rotation mechanism of the fine positioner.
		Faulty +24 V supply to the motor of the fine positioner.	Measure the voltage of the terminal board. If +24 V is not supplied, replace the I/O circuit board with a new one. If it is supplied, replace the motor with a new one.

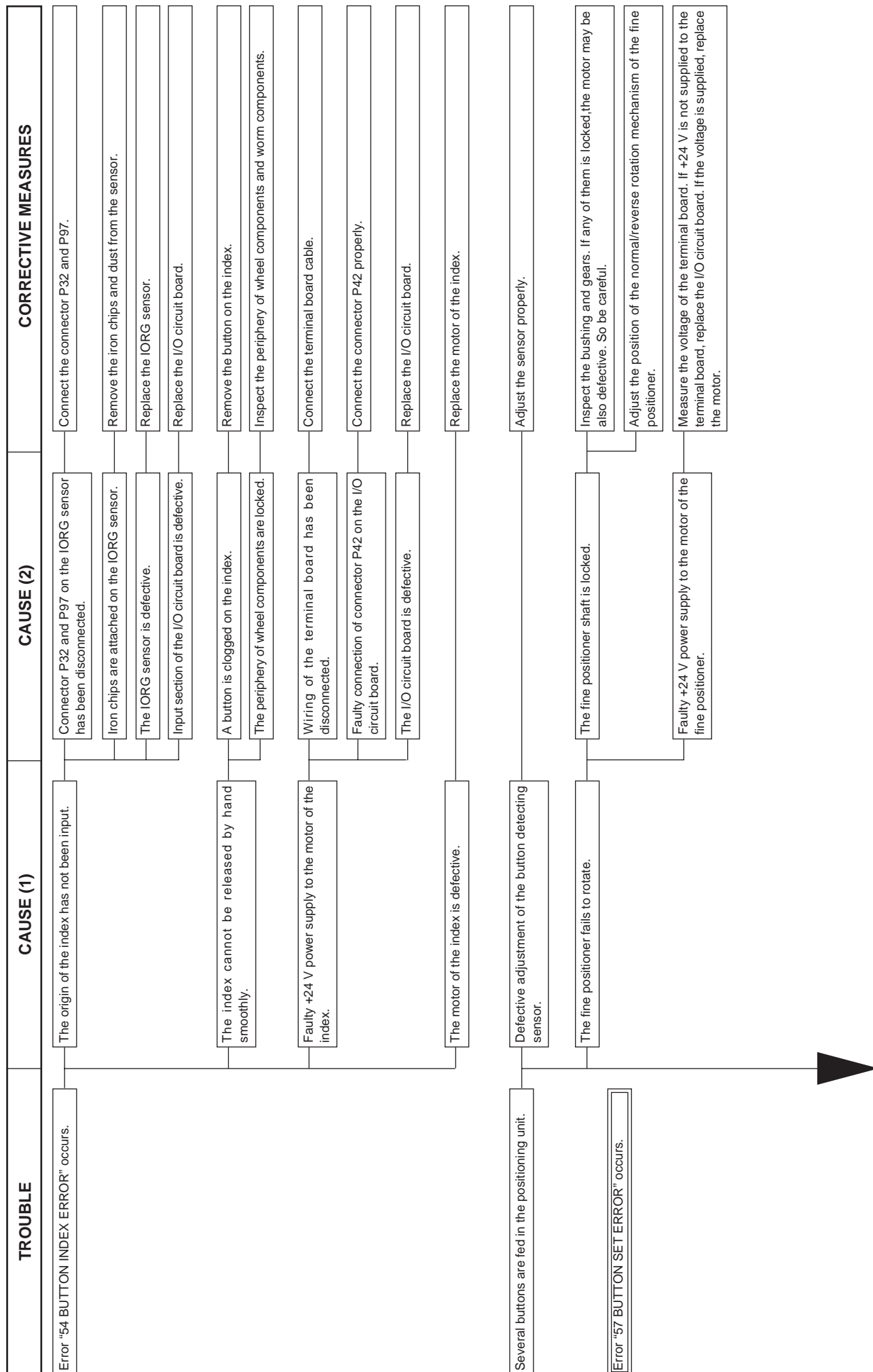


TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
	The fine positioner shaft fails to come down.	The fine positioner shaft fails to move smoothly.	Check the fine positioner shaft.
		The magnet of the fine positioner fails to provide sufficient magnetic attraction.	Turn the variable resistor (VR2) on the I/O circuit board slightly clockwise.
			Adjust the position of the magnet so that the iron core of the fine positioner lowering magnet is in line with the fine positioner lifting link.
		Faulty +24 V supply to the fine positioner lowering magnet.	Measure the voltage of the terminal board. If +24 V is not supplied, replace the I/O circuit board with a new one. If it is supplied, replace the motor with a new one.
The button is not finely positioned even when the button is placed at the triple-pawl section. Fine positioning is performed with no button at the triple-pawl section.	The triple-pawl dog is improperly positioned. As a result, the sensor fails to detect a button.		Adjust the position of triple-pawl dog properly.
Two pieces of button may enter the notch in the feed disk.	Height difference between the feed disk and the outlet of the parts feeder is excessive.		Lower the parts feeder.
	The clearance in the adjusting plate is too large for the thickness of button used.		Adjust the clearance in accordance with the button thickness.
	Diameter of the notch is too large for the diameter of button used.		Select the notch suited to the button diameter.
The button is rejected when it is fed from the carrier to the button clamp jaw lever.	The carrier and the button clamp jaw lever are not flush with each other.		Flush the carrier with the button clamp jaw lever.
	The opening amount of the button clamp jaw lever is not appropriate to the button used.		Adjust the opening amount according to the button used.
	Center of the carrier is not aligned with that of the button clamp jaw lever.		Center the carrier and the button clamp jaw lever.
The button is attached to the work attachment.	The work attachment is worn out.		Replace the work attachment with a new one.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
The button is raised when it is clamped by the triple-pawl at the button positioning unit.	The work attachment is worn out.		Replace the work attachment with a new one.
Triple-pawl fails to clamp the button at the button positioning unit.	The speed at which the triple-pawl moves is too high and the solenoid output is too large.		Adjust the position of the solenoid.
Button is caught in between the feed plate and the parts feeder.	The output level of the solenoid is too low to actuate the triple-pawl.		Adjust the position of the parts feeder.
	The distance from the feed disk to the parts feeder is too large.		Slightly lift the parts feeder.
	The button is not smoothly carried to the feed disk.		Adjust the position of the button guide.
	The button guide is improperly positioned.		Slightly lift the button guide.
	The clearance between the button guide and the track surface of the parts feeder is too small.		Turn the variable resistor on the operation panel of the parts feeder clockwise to increase the button feeding speed.
	The button feeding speed is inadequate.		
Corrective measures to be taken when a button is jammed.	<p>When a button is jammed, insert a screwdriver into hole ❶ in the top of the front cover and turn it counterclockwise.</p> 		

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
Buttons in the parts feeder are not smoothly run.	Screw which fixed the feeder bowl loosens.		<p data-bbox="226 533 252 743">Slightly tighten screw ①.</p> 
	Defective position of the sensitivity adjustment variable resistor.		Adjust the position of the sensitivity adjustment variable resistor.
	Feeder bowl comes in contact with some component, thereby preventing the feeder bowl from properly vibrating.		Position the feeder bowl at the position where it does not come in contact with any component.
Button from the feeder bowl does not enter the feed disk.	Defective position of the feeder bowl.		Adjust the position of the feeder bowl.
	Defective position of the button guide.		Adjust the position of the button guide.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
Error "58 REVOLUTION ARM ERROR" occurs.	Faulty +24 V power supply to the I/O circuit board.	Breaker has dropped.	Reset the breaker
		Faulty 20 Vac power supply to the power circuit board.	Check the transformer for output voltage (20 Vac). If no voltage is output, replace the transformer.
		The power circuit board is defective.	Replace the power circuit board.
	The origin of the spinner oscillating arm has not been input.	Connector P32 and P99 on the I/O circuit board has been disconnected.	Connect the connector P32 and P99.
		The light emitting and receiving window of the A.ORG sensor is stained.	Clean up the light emitting and receiving window of the A.ORG sensor.
		A. ORG sensor is defective.	Replace the A.ORG sensor.
		Input section of the I/O circuit board is defective.	Replace the I/O circuit board.
	The manual handle cannot be smoothly operated.	The cam shaft components are locked.	Inspect the worm components and cam components.
	Faulty +24 V power supply to the motor of the spinner oscillating arm.	Connector P42 on the I/O circuit board is defective.	Connect the connector P42.
		Wiring of the terminal has disconnected.	Join the terminal cable.
		The I/O circuit board is defective.	Replace the I/O circuit board.
	The motor of the spinner oscillating arm is defective.		Replace the motor of the spinner oscillating arm.



TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
	The fine positioner fails to come down.	<p>The fine positioner shaft fails to move smoothly.</p> <p>Fine positioning magnet force is insufficient.</p> <p>Faulty +24 V power supply to the fine positioner lowering magnet.</p>	<p>Check the fine positioner shaft.</p> <p>Turn the variable resistor (VR2) mounted on the I/O circuit board clockwise by a little.</p> <p>Adjust the position of the magnet so that the iron core of the fine positioner lowering magnet is in line with the fine positioner lifting link.</p> <p>Measure the voltage of the terminal board. If +24 V is not supplied to the terminal board, replace the I/O circuit board. If the voltage is supplied, replace the magnet.</p>
When there is no button in the positioning unit.	<p>The positioning unit fails to work.</p> <p>The button detecting sensor remains in its OFF state.</p>	<p>The stroke of the positioning magnet has been improperly adjusted.</p> <p>Faulty +24 V power supply to the positioning magnet.</p> <p>The positioning sensor has been improperly adjusted.</p> <p>Connector P 32 and P96 has been disconnected.</p> <p>The positioning sensor is defective.</p> <p>The I/O circuit board is defective.</p>	<p>Adjust the stroke of the magnet properly.</p> <p>Measure the voltage of the terminal board. If +24 V is not supplied to the terminal board, replace the I/O circuit board. If the voltage is supplied, replace the magnet.</p> <p>Adjust the positioning sensor. The sensor should turn OFF when a button is placed in the positioning unit, or turn ON when a button is not placed in it.</p> <p>Connect the connector P32 and P96.</p> <p>Replace the positioning sensor.</p> <p>Replace the I/O circuit board.</p>
When there is a button in the positioning unit.	The positioning unit fails to work.		Take the corrective measures same as those taken when no button is placed in the positioning unit.
Error"57 BUTTON SET ERROR" occurs when turning ON the power to the machine or when the fine positioner is not defective.	A button is clogged between the triple-pawl and the shutter.		Remove the button clogged.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
The parts feeder fails to work.	Fuse 1A on the parts feeder panel has blown.		Replace the fuse.
	Faulty 100 Vac power supply to the parts feeder controller.	Connector P1 has been disconnected.	Connect the connector P1.
	No control signal.	The I/O circuit board is defective.	Check the transformer for the output voltage (100 Vac). If no voltage is output, replace the transformer. Open the rear cover of the parts feeder controller, and short-circuit terminals 1 and 2. If the parts feeder controller operates, replace the I/O circuit board and return the wiring to the normal state. If the parts feeder controller fails to operate, replace the controller.
(10) A button cracks.			
Button cracks before it is fed to the button clamp jaw lever.	The lowering pressure of the fine positioner is too high.	The magnet of the fine positioner fails to provide excessive magnetic attraction.	Turn the variable resistor (VR2) on the I/O circuit board slightly counterclockwise.
	Center of the rotary rod is not correctly aligned with the center of the carrier pin.		Properly align the center of the rotary rod and the center of the carrier pin.
	Center of the rotary rod is not aligned with the center of the positioning unit.		Properly align the center of the rotary rod and the center of the positioning unit.
	Center-to-center distance of hole in the button to be used is different from the center-to-center distance of pins of the carrier pin.		Use the carrier pin whose pins provides the correct center-to-center distance.
	Button retaining force of the triple-pawl is excessive.		Check the output of the positioning solenoid.
	Shutter plate is not opened at all, or opened to an insufficient extent.		Check that the shutter plate moves smoothly and it opens by 22 mm (0.866") at the maximum.
	The opening amount of the button clamp jaw lever has not been properly adjusted.		Adjust the opening amount of the button clamp jaw lever properly.
	The height of the button clamp jaw lever has not been properly adjusted.		Adjust the height of the button clamp jaw lever properly.

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