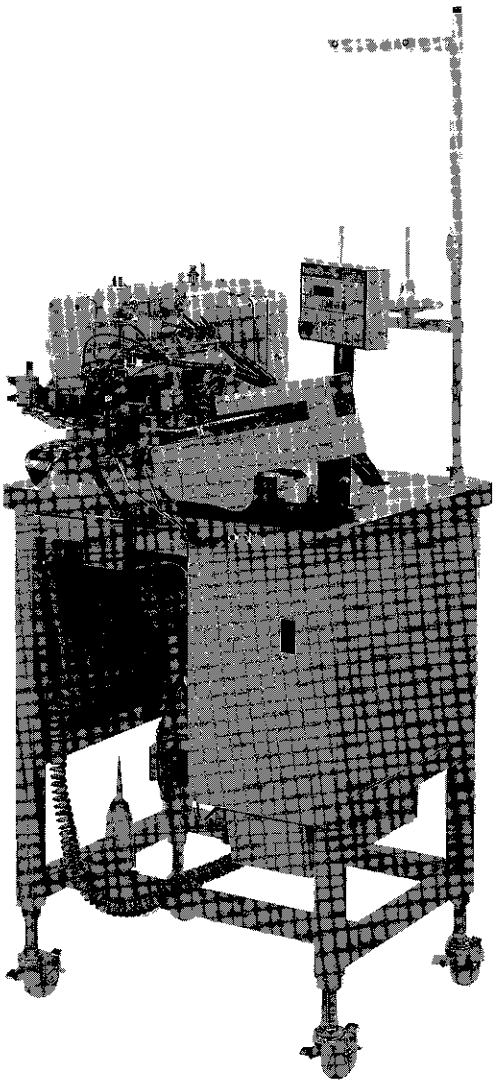
brother

SERVICE MANUAL
FOR
BAS-701

AUTOMATIC BELT LOOP SEWER



CONTENTS

1.ADJUSTMENT GUIDE

ADJUSTMENT PROCEDURES

1 Machine head adjustment procedures

☆ Of the adjustments related to the machine head, those adjustment items which are not connected with changing the size of the belt loop are given below.
☆ For the nature of the adjustments, please refer to the maincontents.

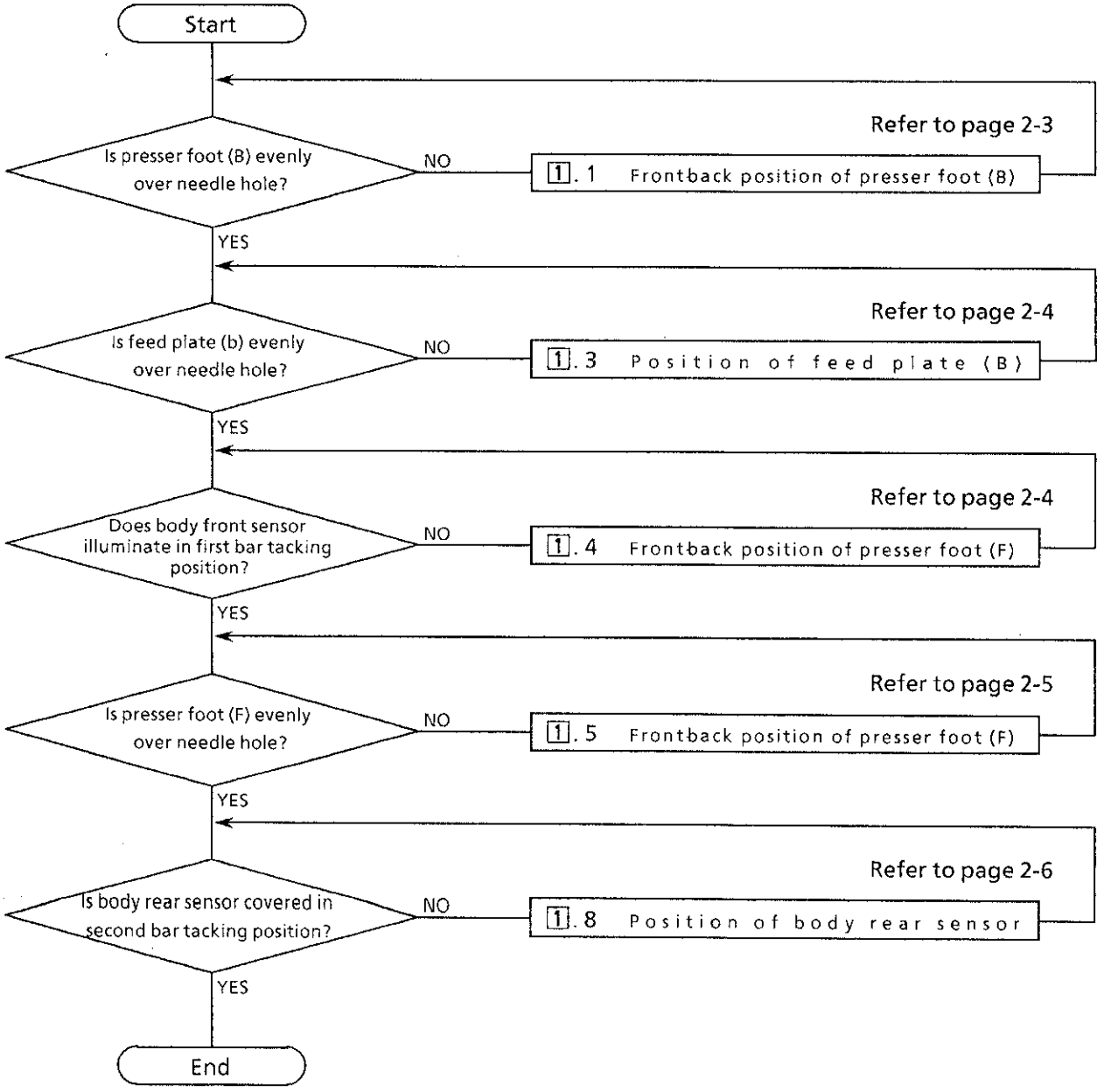
1.Items for which there are no adjustment procedures

☆ These adjustments can be carried out as isolated adjustments, and have no effect on other adjustments.

1) 1.2 Up-down adjustment of presser foot (B)…… Refer to page 2-3 * Gap between presser foot (B) and feed plate (B)
2) 1.6 Up-down adjustment of presser foot (F) …… Refer topage 2-5 * Gap between presser foot (F) and feed plate (F)
3) 1.10 Speed of body cylinder …… Refer to page 2-7. *Should move at high speed with no shocks
4) 2 Position of thread guide …… Refer to page 2-9. *Upper thread becomes straight
5) 3 Position of stop position sensor ……Refer to page2-9. * Shading when machine head is stopped
6) 4.1 Position of head fixed plate …… Refer to page 2-10. * No gap between head fixed plate and machine head

2.Items for which there are adjustment procedures

☆ These adjustments have an effect on other adjustments, so it is also necessary to check and adjust items that follow the itemthat was adjusted.



[2] Adjustment procedures for power unit

☆ Of the adjustments related to the power unit, those adjustment items which are not connected with changing the size of the belt loop are given below.

☆ For the nature of the adjustments, please refer to the main contents.

1.Items for which there are no adjustment procedures

☆ These adjustments can be carried out as isolated adjustments, and have no effect on other adjustments.

1) [1].1 Air unit pressure ... Refer to page 3-5. * 5~ 5.5kgf / cm^2

2) [1].2 Regulator pressure ... Refer to page 3-5. * 1kgf/cm^2

3) [3].4 Position of sprocket wheel cover ... Refer to page 3-8. * Should not touch sprocket wheel A

4) [3].5 Position of feed roller guide ... Refer to page 3-9. * Gap between feed roller guide and feed roller should be 1.2± 0.2mm

5) [3].6 Position of feed roller stopper ... Refer to page 3-9. * Gap between feed roller and channel base should be 0.5± 0.2mm

6) [3].7 Position of spring hook ... Refer to page 3-10. * Feed roller pressure should be 1.8 ± 0.2kg

7) [4].1 Movement and position of actuator ... Refer to page 3-10. * Should move smoothly and be aligned with center of channel

8) [5].10 Speed of knife rotation (F) and (B) cylinders ... Refer to page 3-17. * Should move at high speed with no shocks

9) [6].1 Movement of sub-guide ... Refer to page 3-18. * Should move smoothly

10) [6].8 Speed of sub-guide cylinder ... Refer to page 3-21. * Should move at high speed with no shocks

11) [7].1Movement and position of loop guide shaft ... Refer to page 3-22. * Should move smoothly, and gap between loop guide shaft and cylinder should be 0.5mm

12) [7].7 Speed of loop guide unit cylinder ... Refer to page 3-25. * Should move at high speed with no shocks

13) [8].1 Position of loop presser set plate ... Refer to page 3-26. * Should be aligned with cylinder rod and parallel to supporter plate

14) [10].1 Movement of slide base ... Refer to page 3-30. * Should move smoothly

15) [10].2 Position of shock absorber stopper ... Refer to page 3-30. * Gap between stopper and shock absorber should be 0.5mm

16) [10].3 Position of shock absorber body ... Refer to page 3-31. * Should be 12mm from slide shaft base

17) [10].4 Loop feed cylinder rod ... Refer to page 3-31. * Should move together with joint nut

18) [10].5 Position of loop rear sensor ... Refer to page3-32. * Should illuminate at retracted position

19) [10].7 Parallelism of supporter plate and needle plate... Refer to page 3-33. * Should be parallel

20) [10]. 11 Speed of loop feed cylinder ... Refer to page3-35. * Should move at high speed with no shocks

21) [10].12 Speed of unit up-down cylinder ... Refer to page 3-35. * Should move at high speed with no shocks

22) [11].2 Up-down movement of fold plates (F) and (B) ... Refer to page 3-36. * Should move smoothly

23) [11].3 Front-back movement of fold plates (F) and (B) ... Refer to page 3-37. * Should move smoothly

24) [11].6 Speed of fold plate up-down cylinder ... Refer to page 3-38. * Should move at high speed with no shocks

25) [12].1 Position of machine start cylinder ... Refer to page 3-39. * Chain tension should be appropriate

26) [12].2 Speed of machine start cylinder ... Refer to page 3-39. * Should move at high speed with no shocks

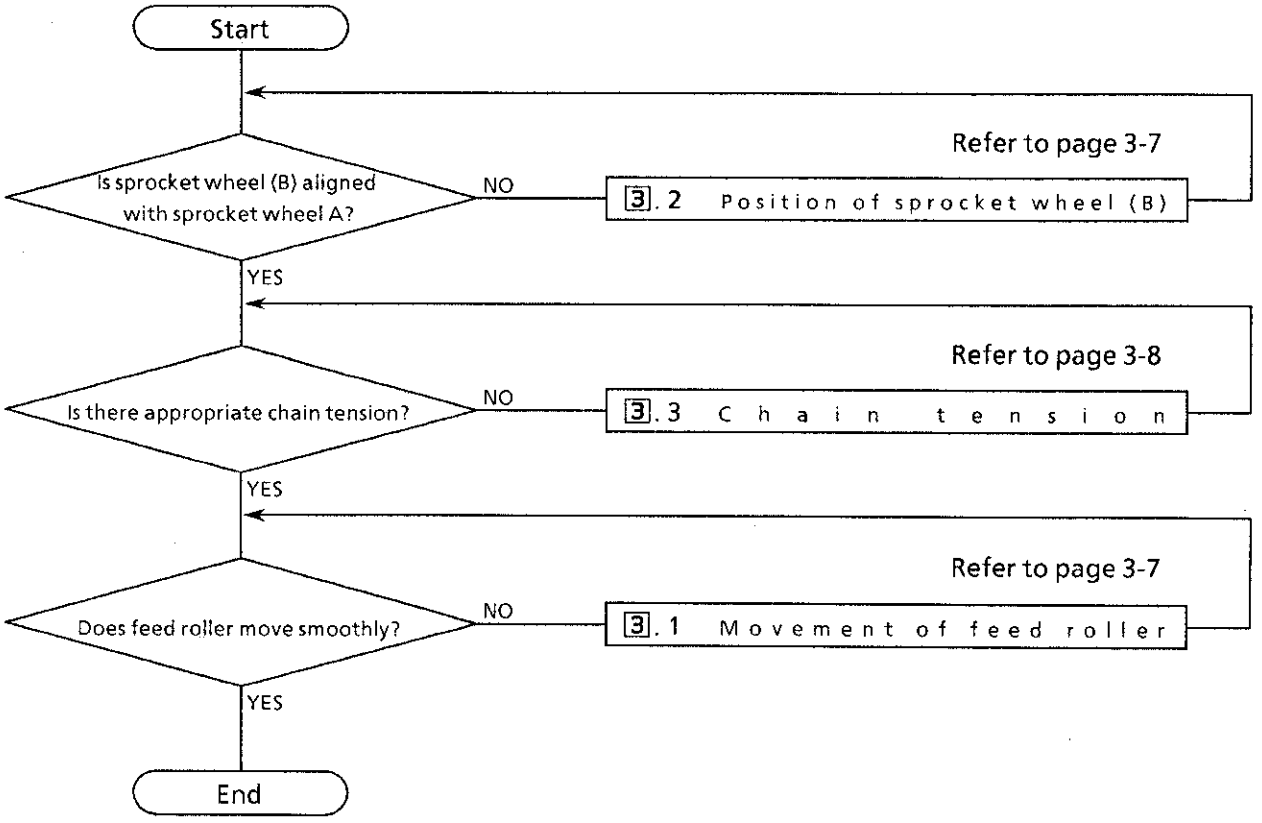
27) [14].2 Position of air blow ... Refer to page 3-42. * Should remove cuttings and joints

28) [14].4 Operation pressure of start switch ... Refer to page 3-43. * Should be as desired by operator

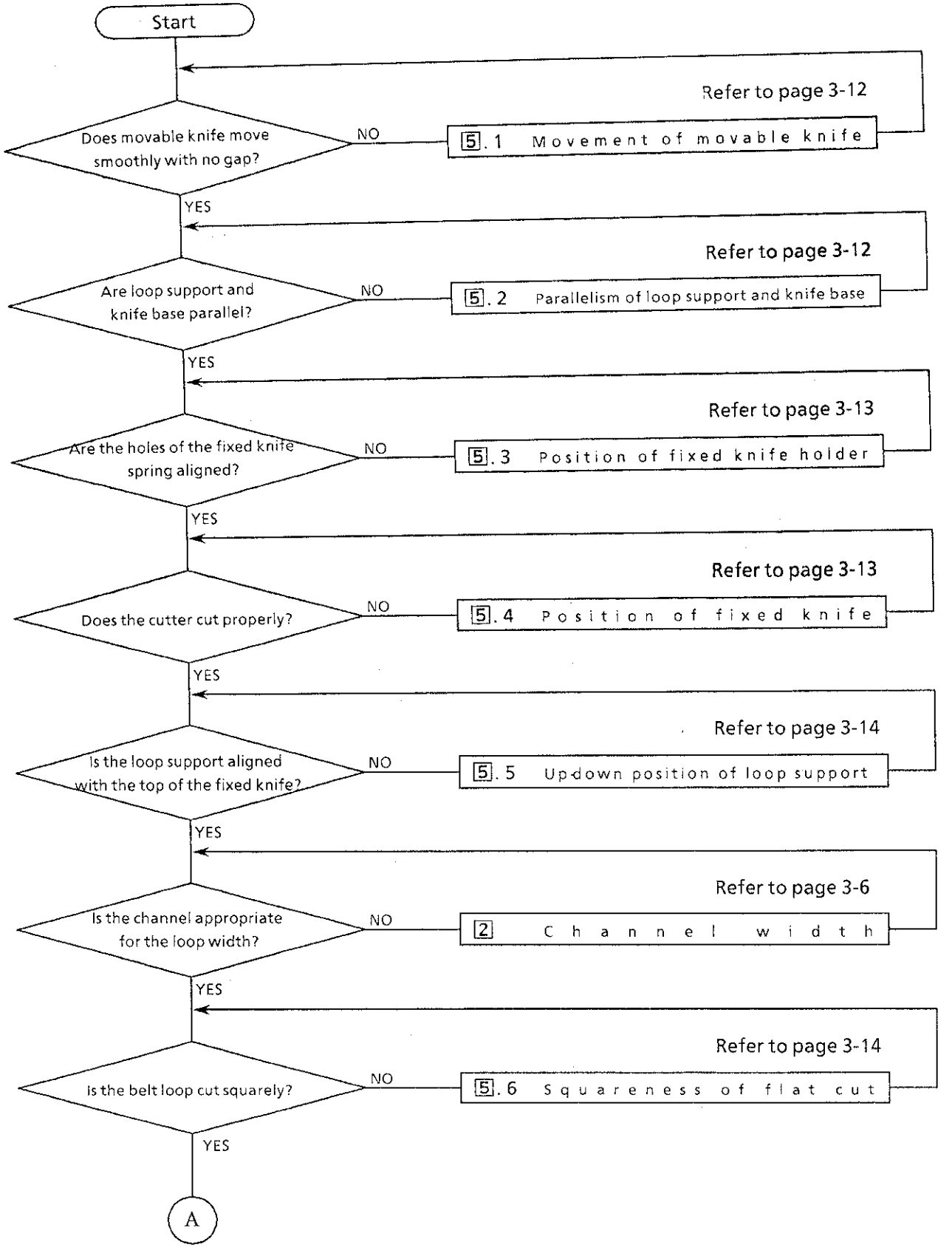
2.Items for which there are adjustment procedures

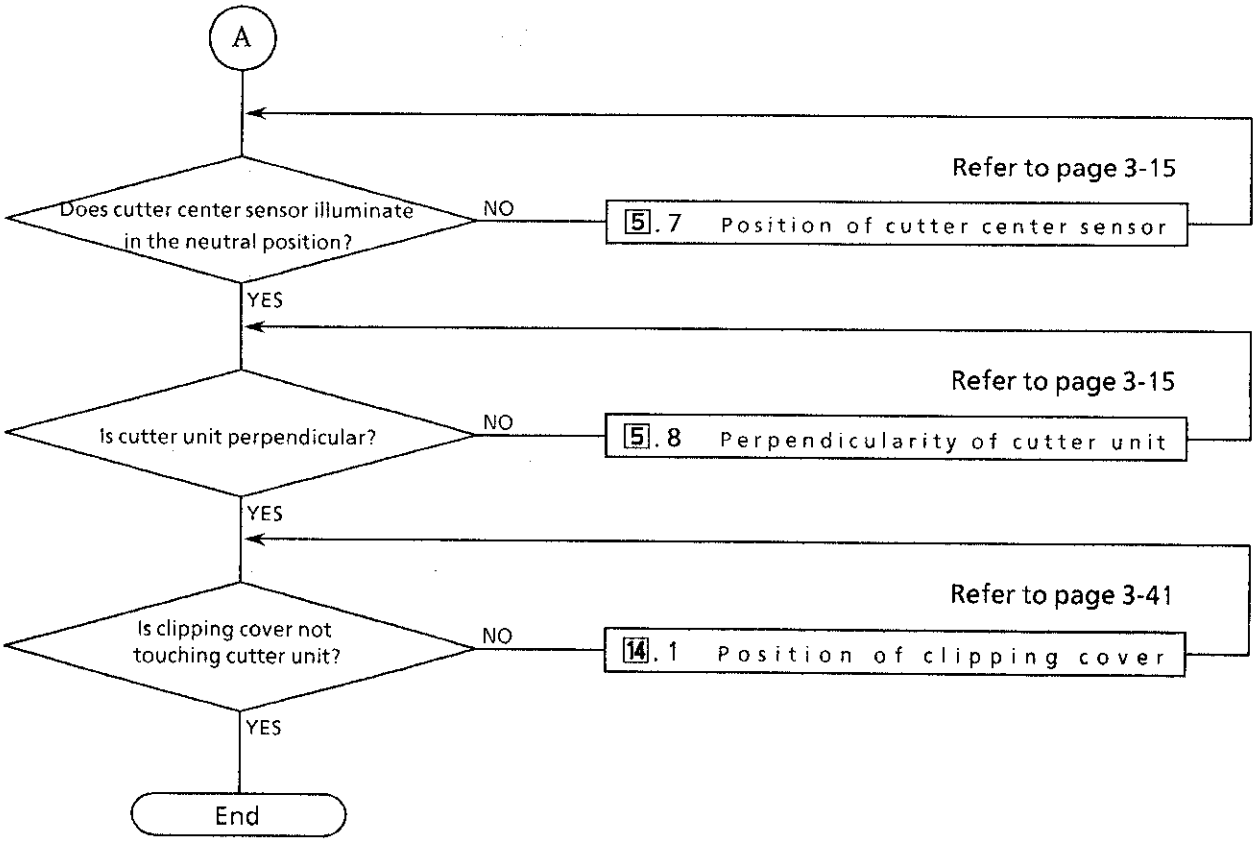
☆ These adjustments have an effect on other adjustments, so it is also necessary to check and adjust items that follow the item that was adjusted.

1) Belt loop feed mechanism



2)Cutter unit mechanism




A
Does cutter center sensor illuminate in the neutral position?
NO
Refer to page 3-15
5. 7 Position of cutter center sensor
YES
Is cutter unit perpendicular?
NO
Refer to page 3-15
5. 8 Perpendicularity of cutter unit
YES
Is clipping cover not touching cutter unit?
NO
Refer to page 3-41
14. 1 Position of clipping cover
YES
End

3 General adjustment procedures

☆ Of the adjustments related to the machine head and power unit, those adjustment items which are connected with changing the size of the belt loop and generally require adjustment are given below.
☆ For the nature of the adjustments, please refer to the main contents.
☆ Adjustments marked with * are for the machine head, and those without are for the power unit.

1.Items for which there are no adjustment procedures

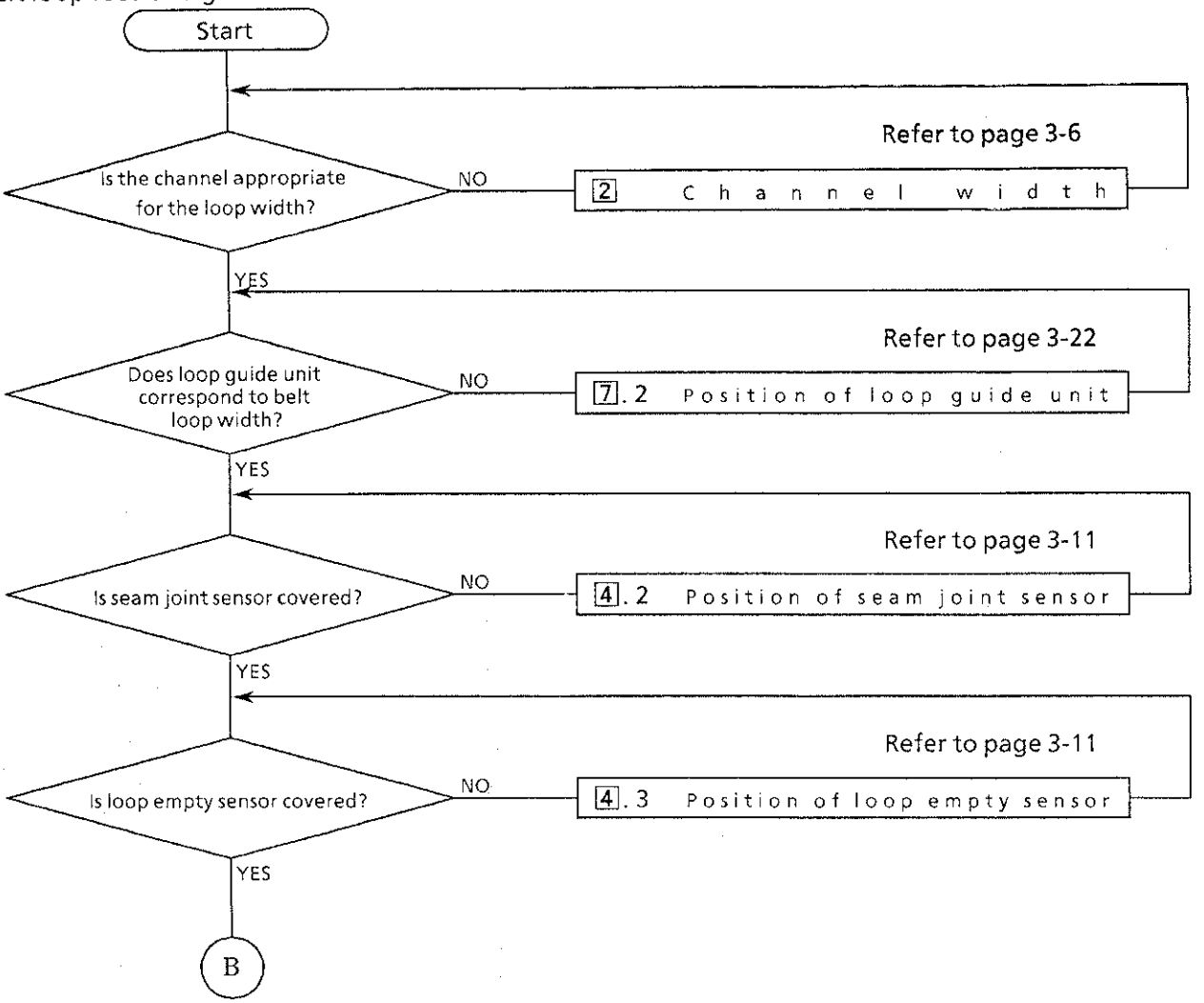
☆ These items are connected with gauge parts replacement resulting from changes in the size of the belt loop.

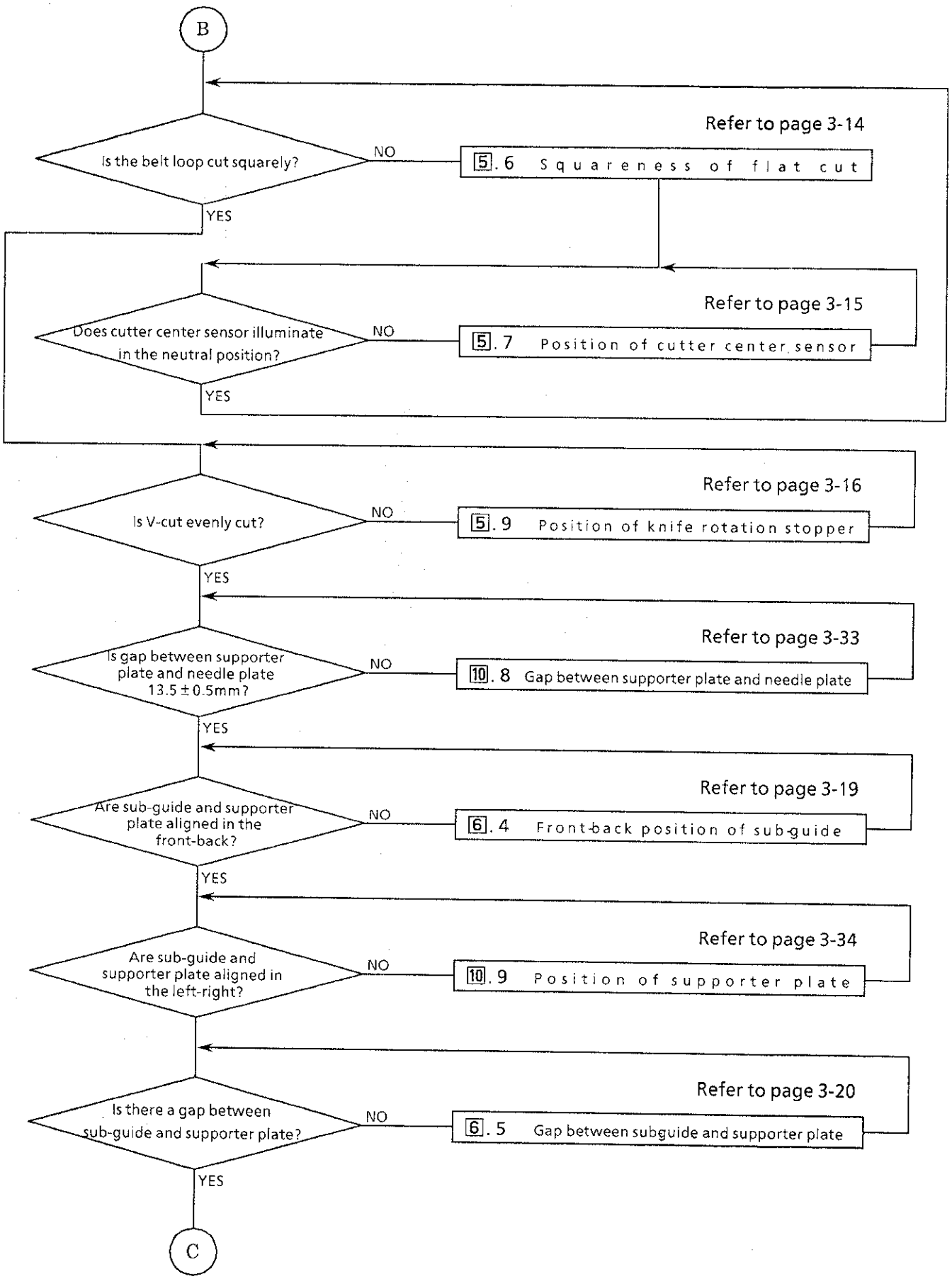
1) 6.2 Appropriate length of sub-guide ... Refer to page 3-18.
2) 6.3 Appropriate width of spacer ... Refer to page 3-19.
3) 6.6 Appropriate width of loop guide ... Refer to page 3-20.
4) 7.3 Appropriate width of loop guide lever ... Refer to page 3-23.
5) 7.8 Appropriate width and length of loop guide (U) ... Refer to page 3-25.
6) 8.2 Appropriate length of loop presser foot (F) ...Refer to page 3-27.
7) 9.1 Appropriate length of sensor set plate ... Refer to page 3-28.
8) 10.6 Appropriate width and length of supporter plate ... Refer to page 3-32.
9) 11.1 Appropriate width of fold plates (F) and (B) ... Refer to page 3-36.

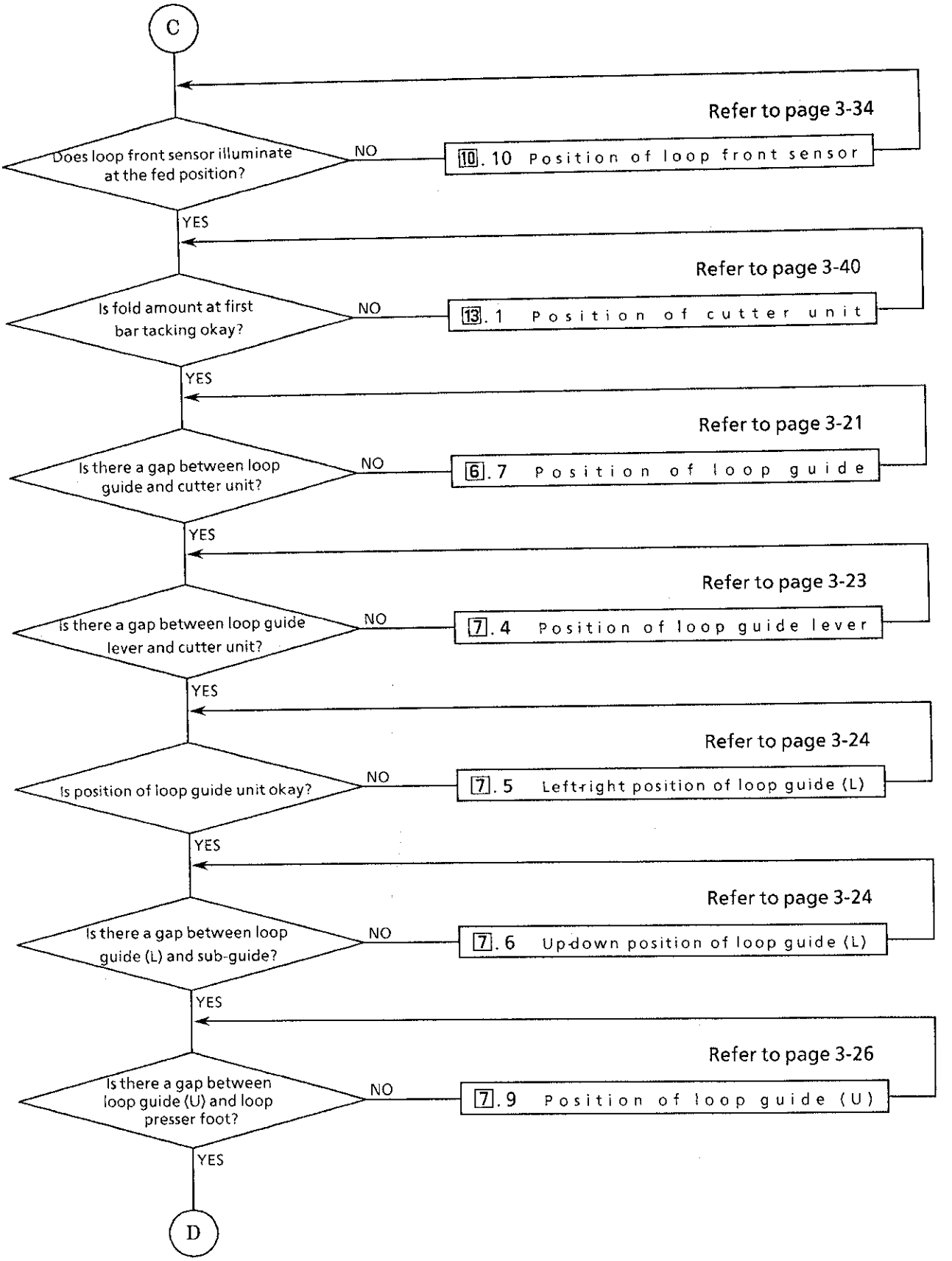
2.Items for which there are adjustment procedures

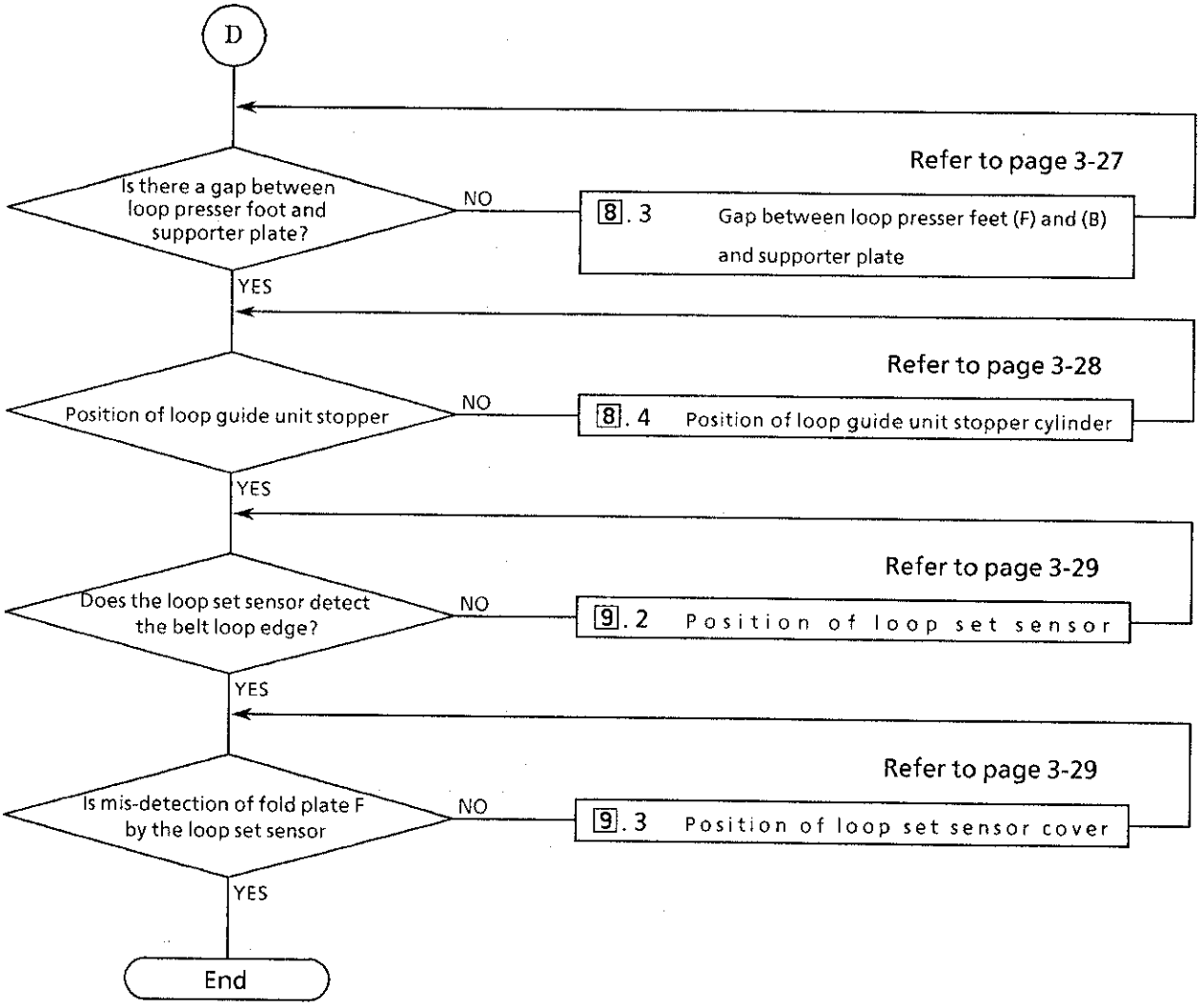
☆ These adjustments have an effect on other adjustments, so it is also necessary to check and adjust items that follow the item that was adjusted.

1) Belt loop feed and guide mechanism

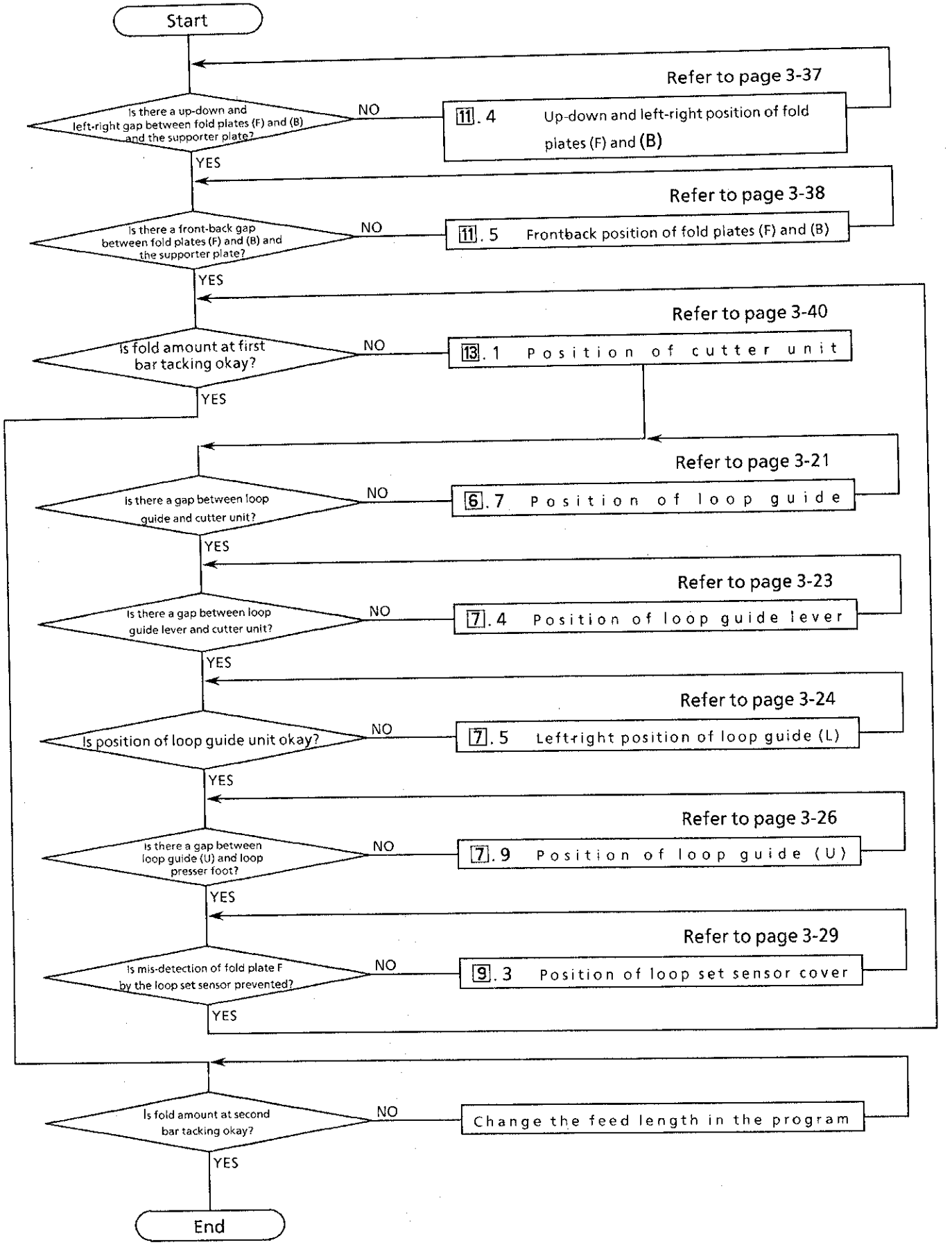



B
Is the belt loop cut squarely?
NO
Refer to page 3-14
5. 6 Squareness of flat cut
YES
Does cutter center sensor illuminate in the neutral position?
NO
Refer to page 3-15
5. 7 Position of cutter center sensor
YES
Is V-cut evenly cut?
NO
Refer to page 3-16
5. 9 Position of knife rotation stopper
YES
Is gap between supporter plate and needle plate 13.5 ± 0.5mm?
NO
Refer to page 3-33
10. 8 Gap between supporter plate and needle plate
YES
Are sub-guide and supporter plate aligned in the front-back?
NO
Refer to page 3-19
6. 4 Front-back position of sub-guide
YES
Are sub-guide and supporter plate aligned in the left-right?
NO
Refer to page 3-34
10. 9 Position of supporter plate
Is there a gap between sub-guide and supporter plate?
NO
Refer to page 3-20
6. 5 Gap between subguide and supporter plate
YES
C


C
Refer to page 3-34
Does loop front sensor illuminate at the fed position?
NO
10. 10 Position of loop front sensor
YES
Refer to page 3-40
Is fold amount at first bar tacking okay?
NO
13. 1 Position of cutter unit
YES
Refer to page 3-21
Is there a gap between loop guide and cutter unit?
NO
6. 7 Position of loop guide
YES
Refer to page 3-23
Is there a gap between loop guide lever and cutter unit?
NO
7. 4 Position of loop guide lever
YES
Refer to page 3-24
Is position of loop guide unit okay?
NO
7. 5 Left-right position of loop guide (L)
YES
Refer to page 3-24
Is there a gap between loop guide (L) and sub-guide?
NO
7. 6 Up-down position of loop guide (L)
YES
Refer to page 3-26
Is there a gap between loop guide (U) and loop presser foot?
NO
7. 9 Position of loop guide (U)
YES
D

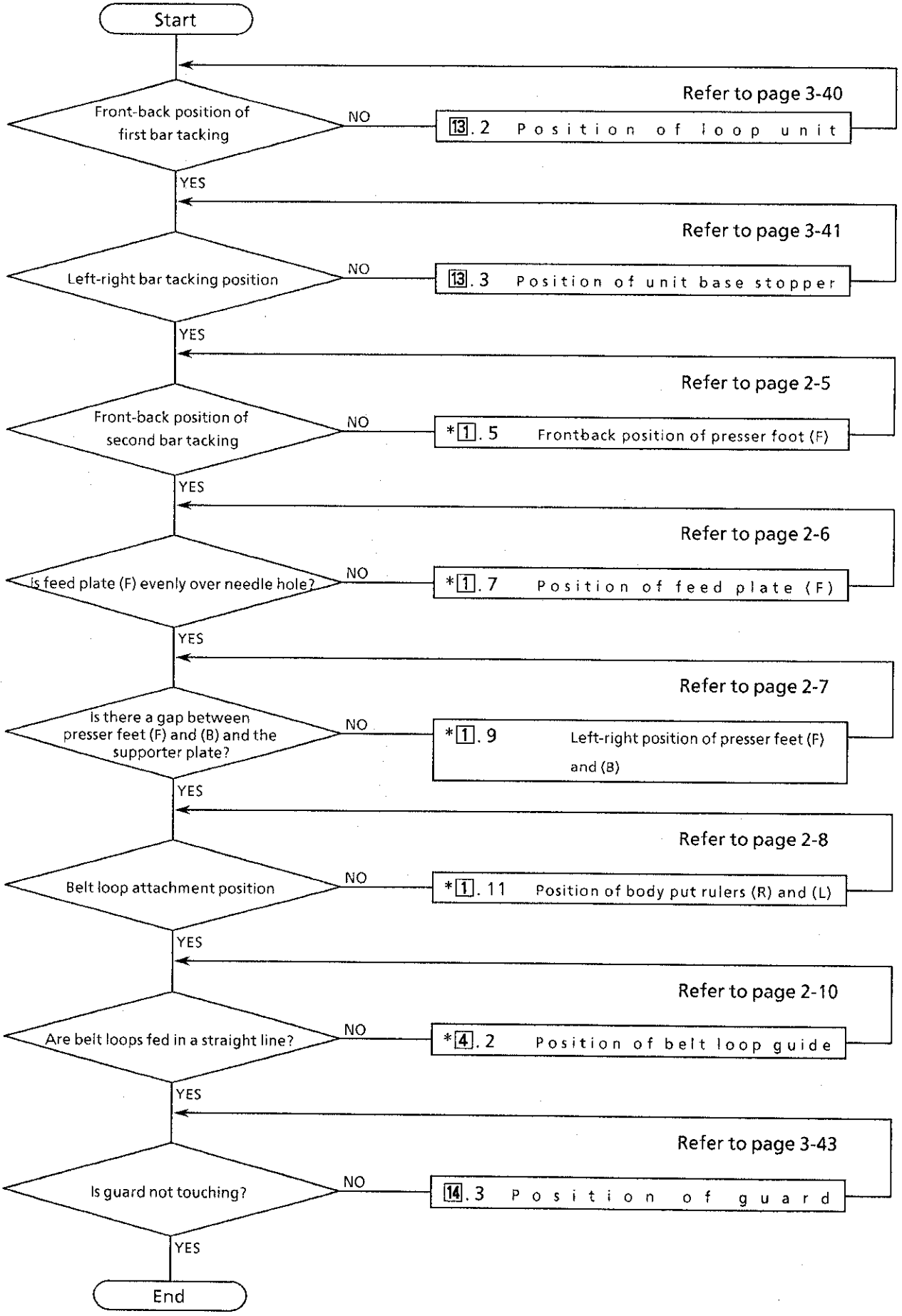

D
Is there a gap between loop presser foot and supporter plate?
NO
Refer to page 3-27
8. 3 Gap between loop presser feet (F) and (B) and supporter plate
YES
Position of loop guide unit stopper
NO
Refer to page 3-28
8. 4 Position of loop guide unit stopper cylinder
YES
Does the loop set sensor detect the belt loop edge?
NO
Refer to page 3-29
9. 2 Position of loop set sensor
YES
Is mis-detection of fold plate F by the loop set sensor
NO
Refer to page 3-29
9. 3 Position of loop set sensor cover
YES
End

2) Belt loop folder mechanism



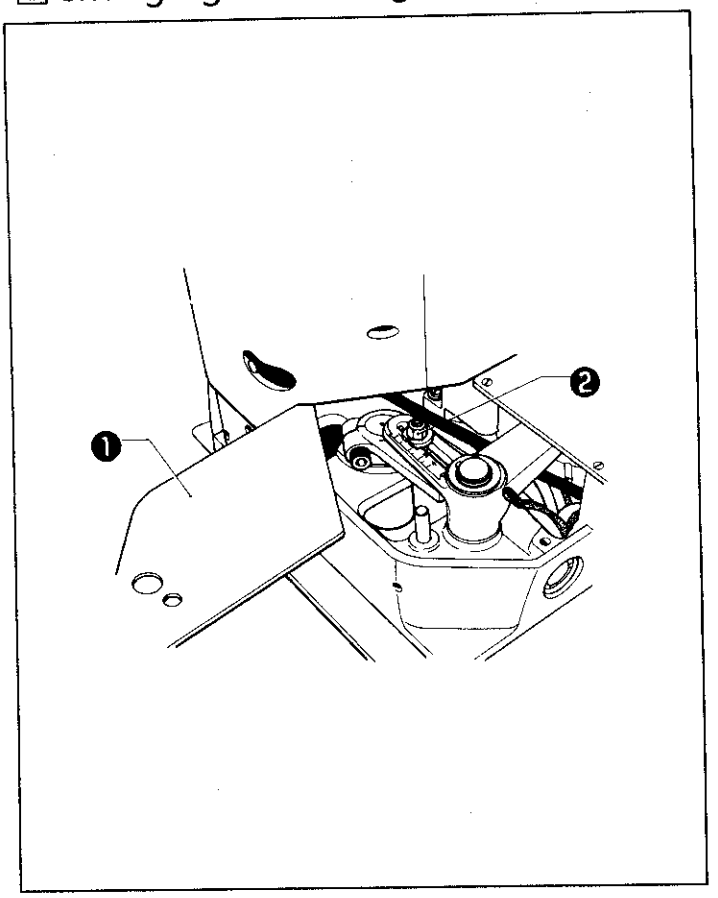
3) Belt loop attachment mechanism

Note: Adjustments marked with * are for the machine head.



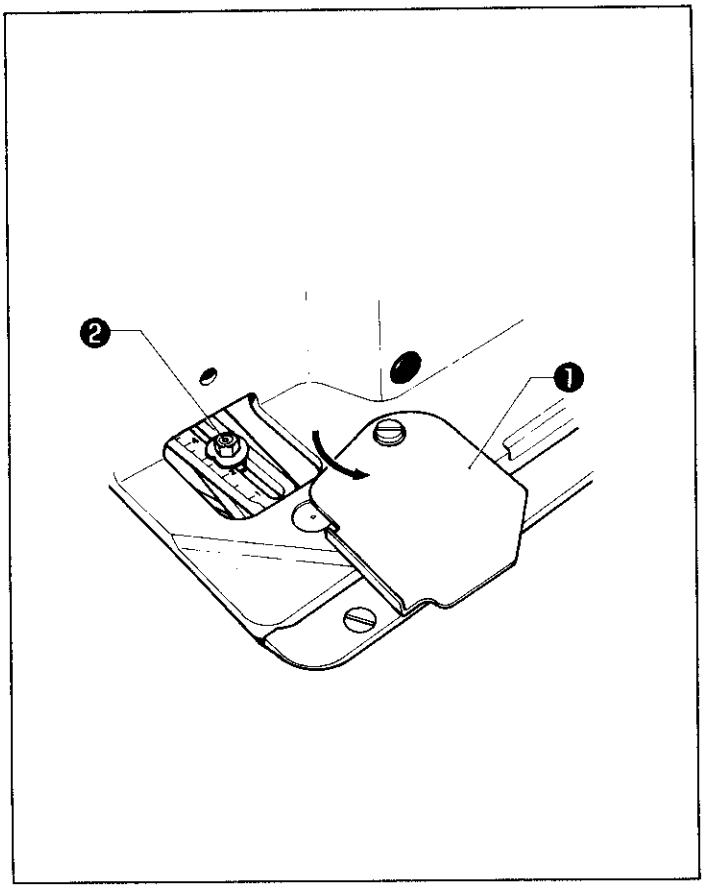
CHANGING SIZES

1 Changing stitch length



1.Bar tacking height

Open the cover ❶. Loosen the nut ❷, align the notch of the washer with the same numerals as those embossed on the feed cam, and then tighten the nut ❷.



2.Bar tacking width

Open the cover ❶. Loosen the nut ❷, align the notch of the washer with the same numerals as those embossed on the feed cam, and then tighten the nut ❷.

2 Changing finished belt loop length

☆ The reference for the finished length is the length of the supporter plate, but the finished width can vary depending on the thickness of the belt loop.

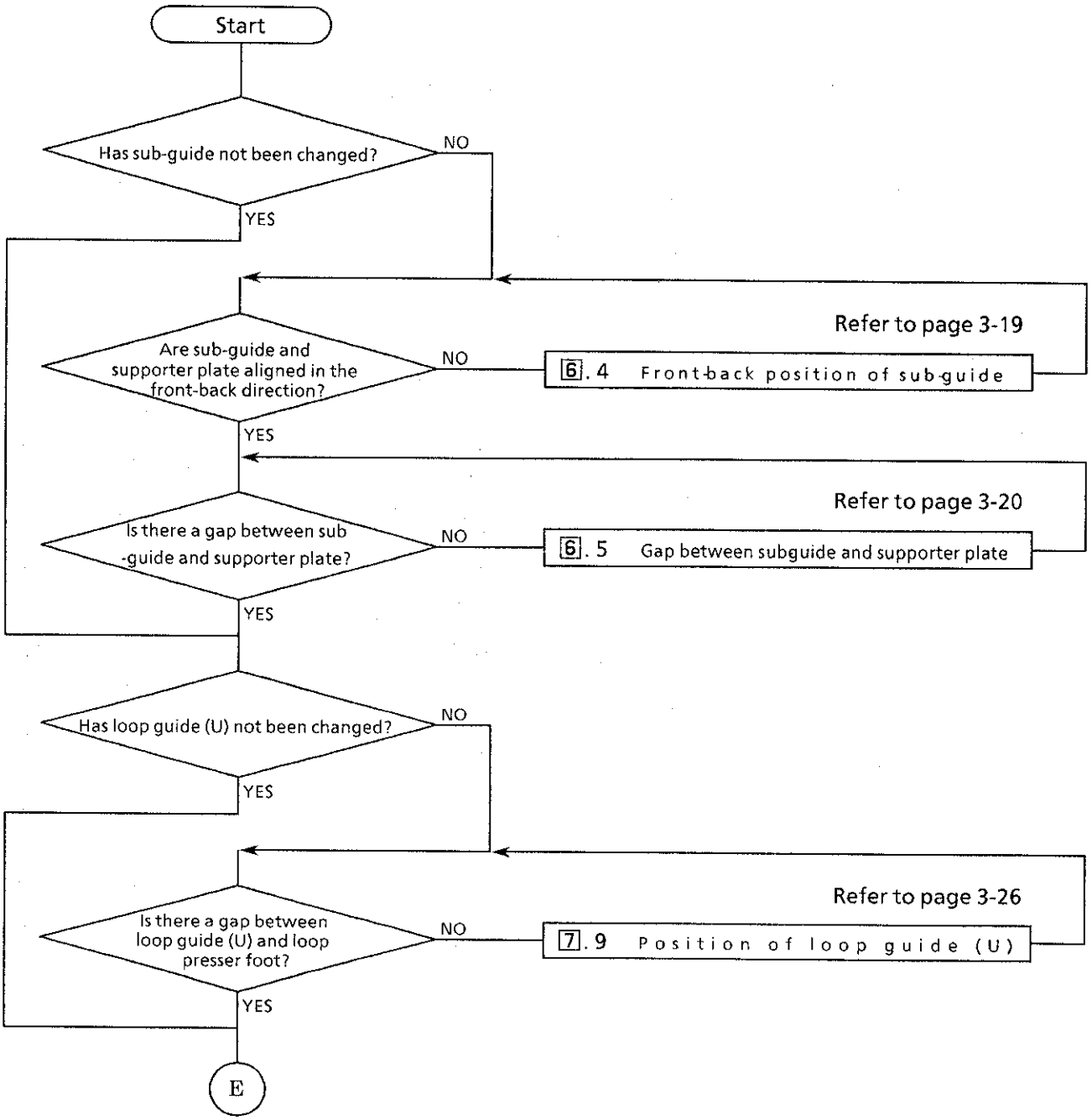
☆ The change in the length of the supporter plate should be as follows when the belt loop does not change: Change in supporter plate length = Change in finished length - Current finished length + Current supporter plate length

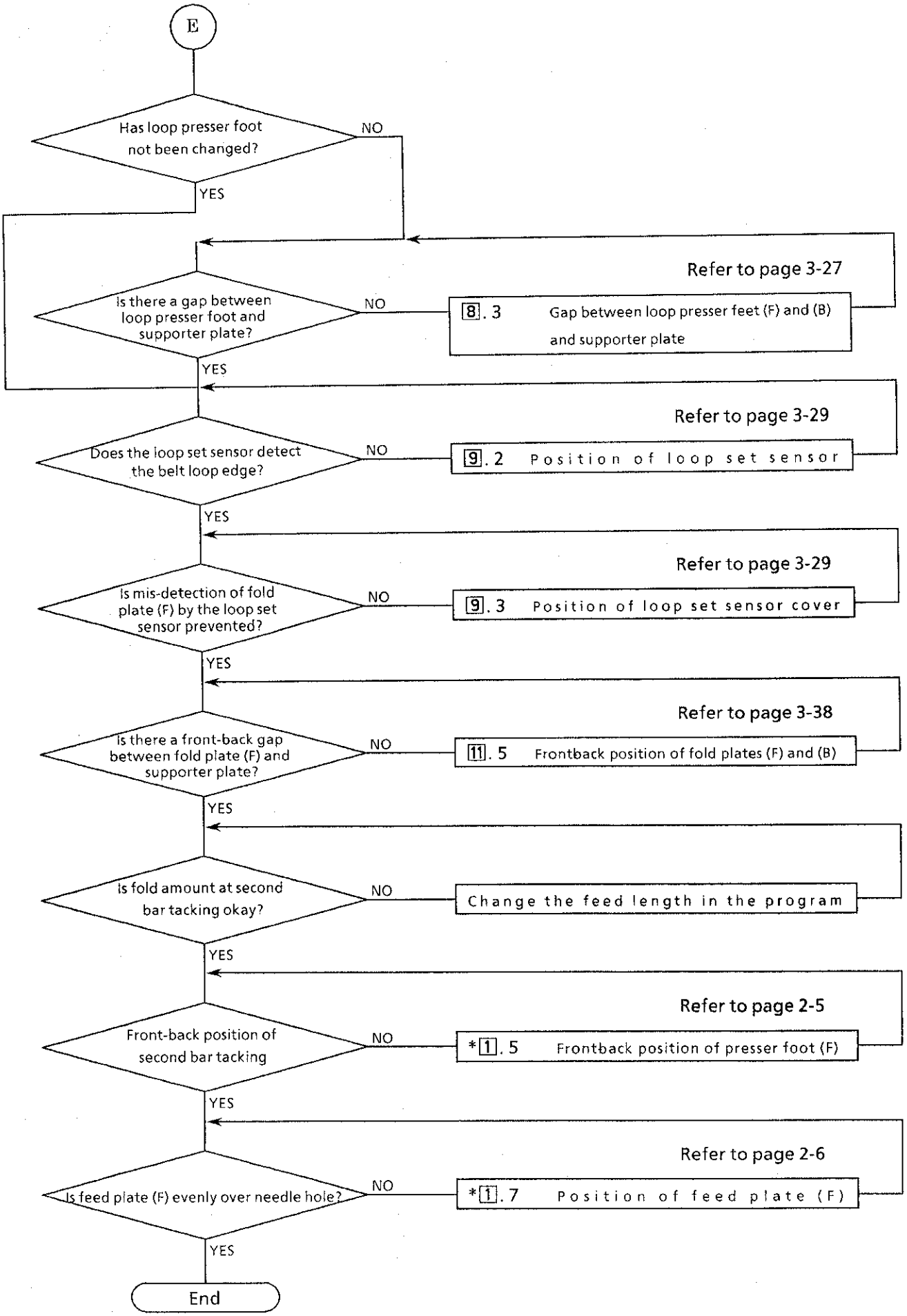
1.Replacement of gauge parts

1) 6.2 Appropriate length of sub-guide ... Refer to page 3-18.
2) 7.8 Appropriate width and length of loop guide (U) ... Refer to page 3-25.
3) 8.2 Appropriate length of loop presser foot (F) ... Refer to page 3-27.
4) 9.1 Appropriate length of sensor set plate ... Refer to page 3-28.
5) 10.6 Appropriate width and length of supporter plate ... Refer to page 3-32.

2.Adjustment procedure

Note: Adjustments marked with * are for the machine head.




E
Has loop presser foot not been changed?
NO
YES
Refer to page 3-27
Is there a gap between loop presser foot and supporter plate?
NO
8. 3 Gap between loop presser feet (F) and (B) and supporter plate
YES
Refer to page 3-29
Does the loop set sensor detect the belt loop edge?
NO
9. 2 Position of loop set sensor
YES
Refer to page 3-29
Is mis-detection of fold plate (F) by the loop set sensor prevented?
NO
9. 3 Position of loop set sensor cover
YES
Refer to page 3-38
Is there a front-back gap between fold plate (F) and supporter plate?
NO
11. 5 Frontback position of fold plates (F) and (B)
YES
Is fold amount at second bar tacking okay?
NO
Change the feed length in the program
YES
Refer to page 2-5
Front-back position of second bar tacking
NO
*1. 5 Frontback position of presser foot (F)
YES
Refer to page 2-6
Is feed plate (F) evenly over needle hole?
NO
*1. 7 Position of feed plate (F)
YES
End

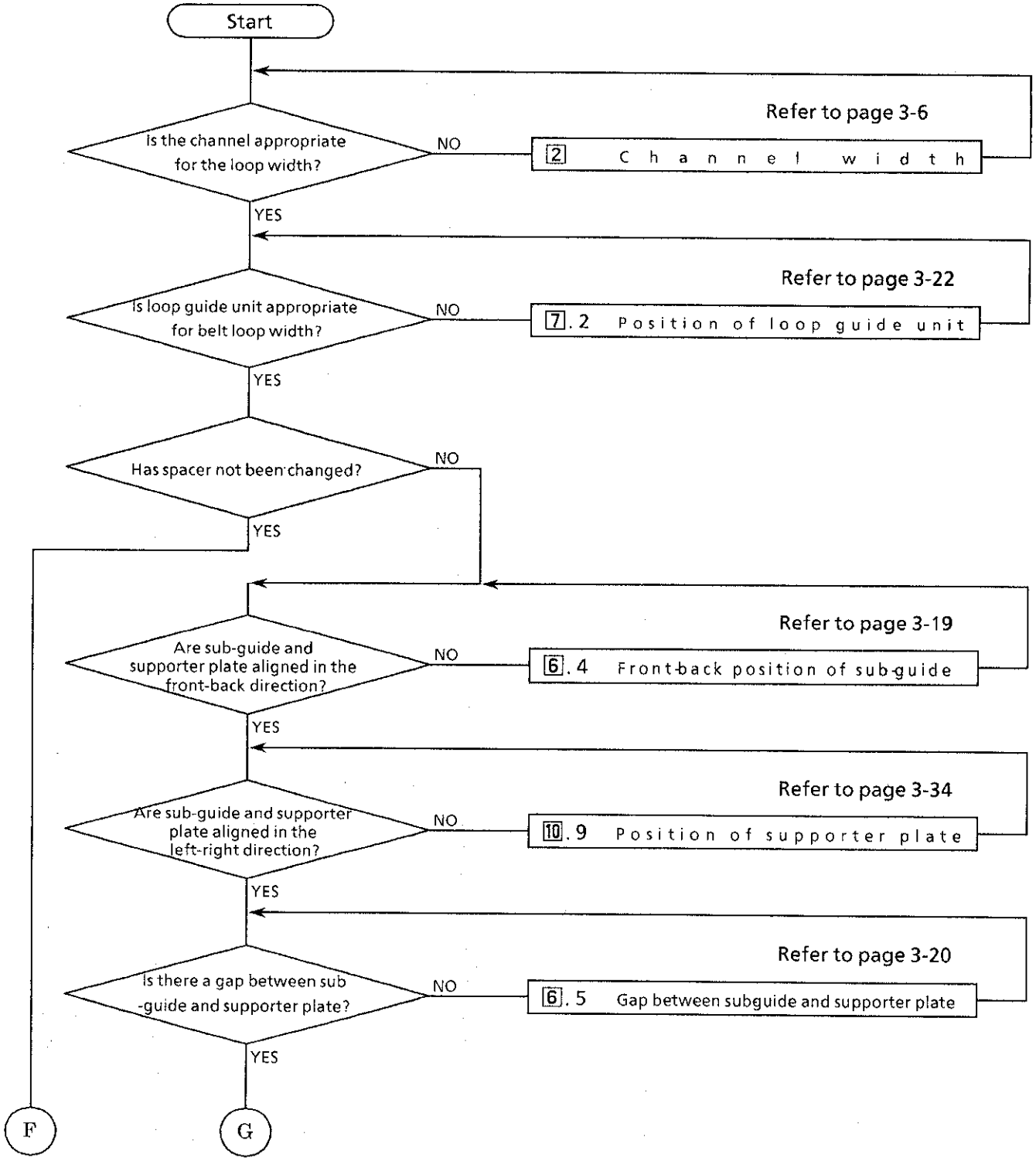
3 Changes in belt loop width

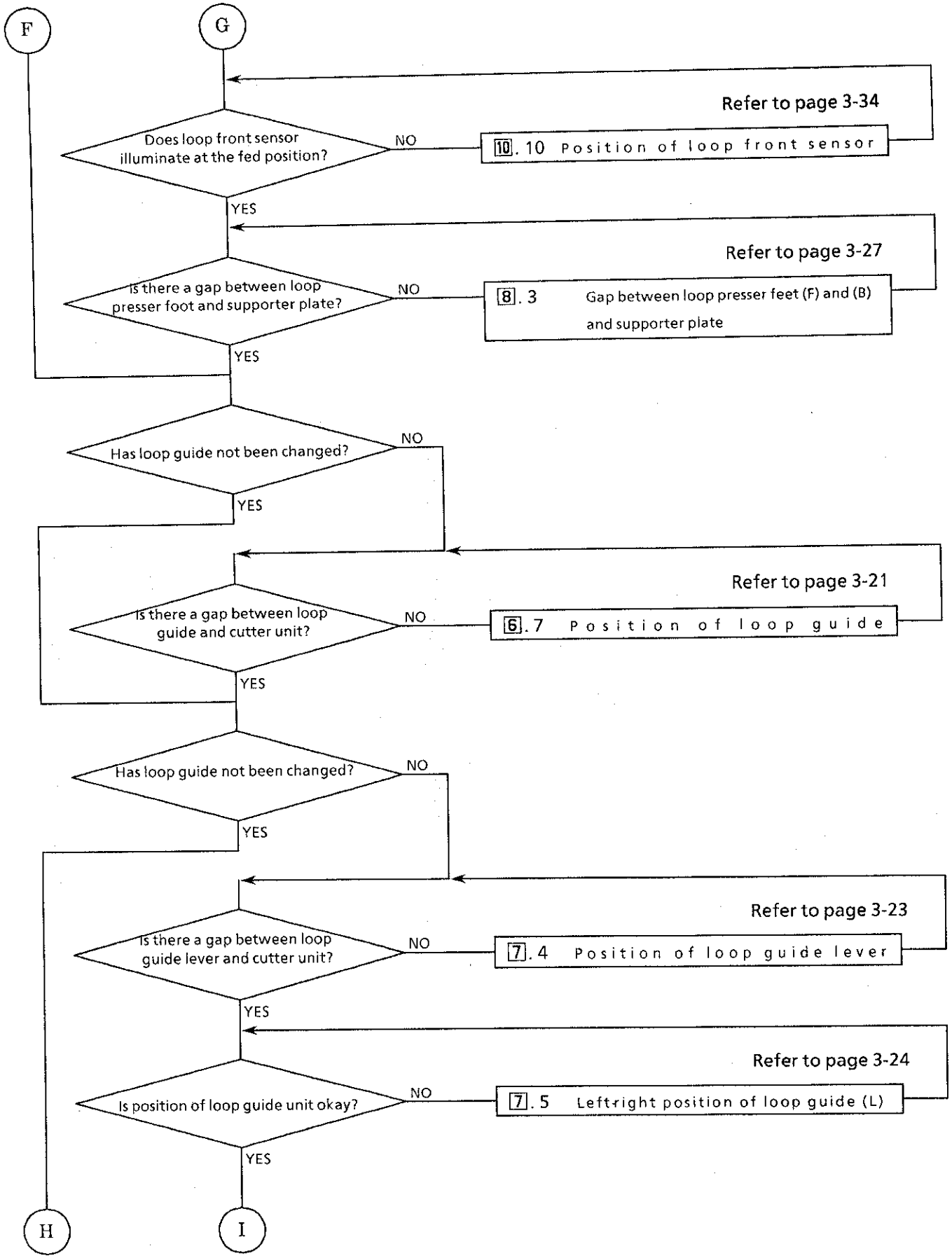
1.Replacement of gauge parts

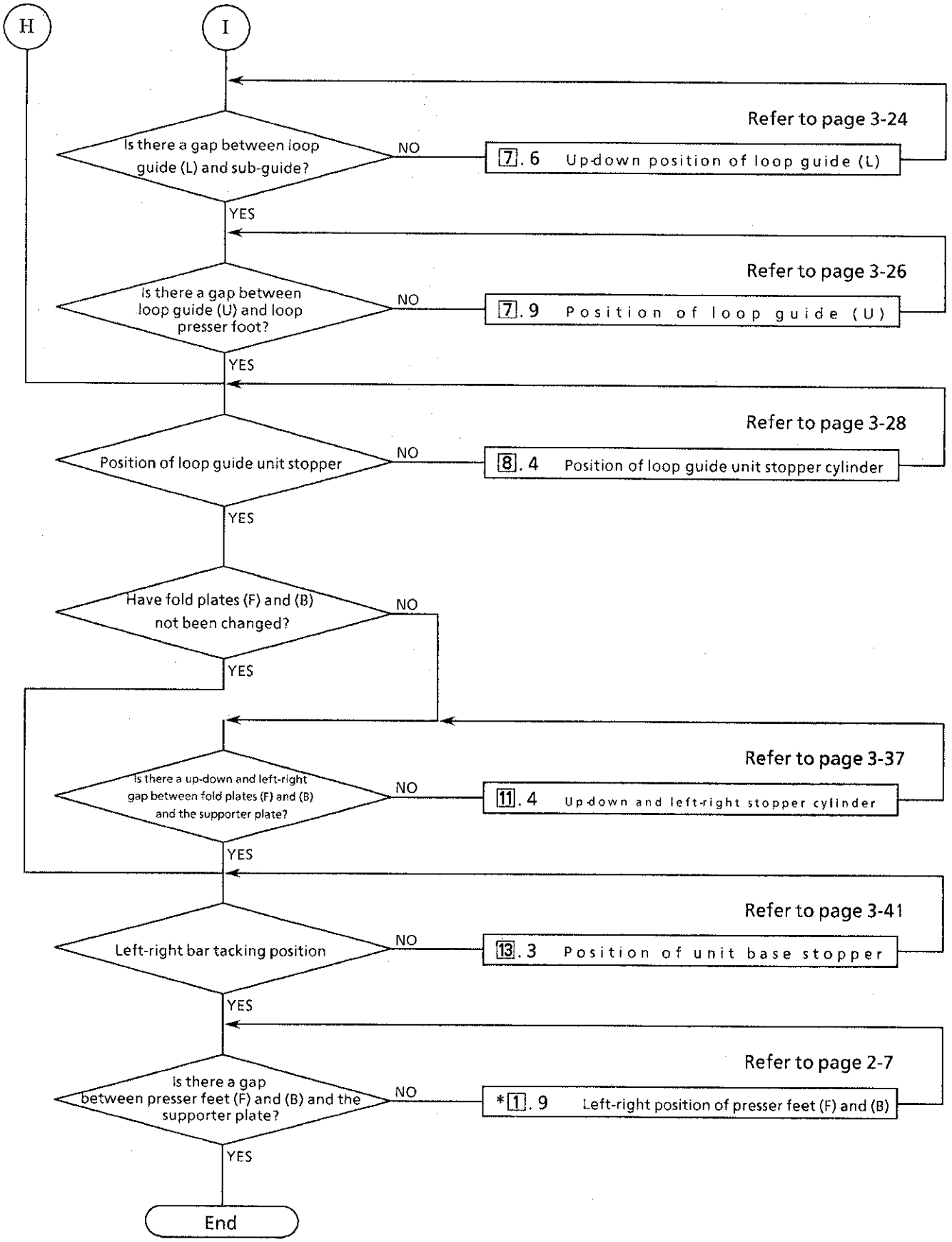
1) 6.3 Appropriate width of spacer ... Refer to page 3-19.
2) 6.6 Appropriate width of loop guide ... Refer to page 3-20.
3) 7.3 Appropriate width of loop guide lever ... Refer to page 3-23.
4) 7.8 Appropriate width and length of loop guide (U) ... Refer to page 3-25.
5) 10.6 Appropriate width and length of supporter plate ... Refer to page 3-32.
6) 11.1 Appropriate width of fold plates (F) and (B) ... Refer to page 3-36.

2.Adjustment procedure

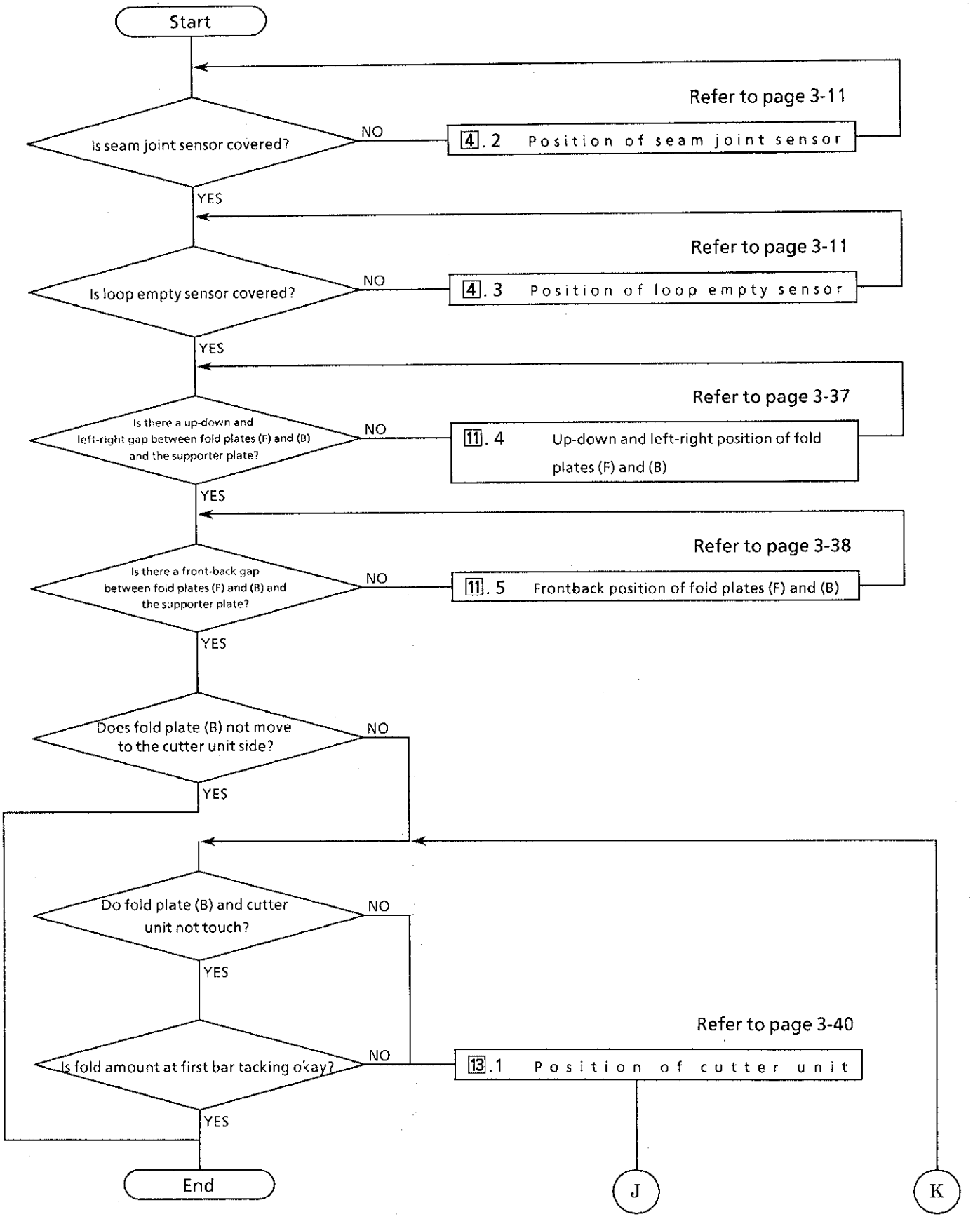
Note: Adjustments marked with * are for the machine head.

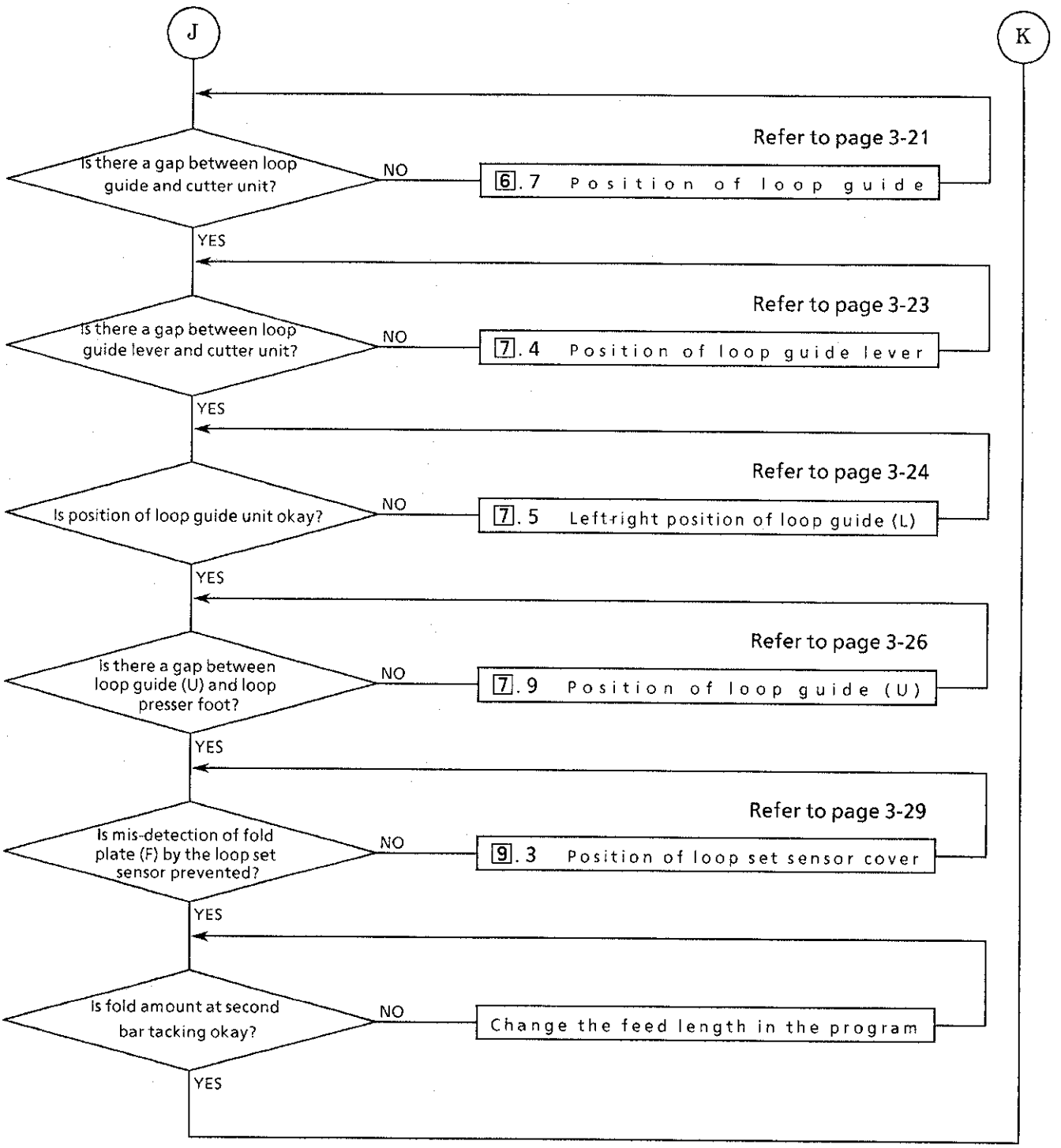



F
G
Refer to page 3-34
Does loop front sensor illuminate at the fed position?
NO
10. 10 Position of loop front sensor
YES
Refer to page 3-27
Is there a gap between loop presser foot and supporter plate?
NO
8. 3 Gap between loop presser feet (F) and (B) and supporter plate
YES
Has loop guide not been changed?
NO
YES
Refer to page 3-21
Is there a gap between loop guide and cutter unit?
NO
6. 7 Position of loop guide
YES
Has loop guide not been changed?
NO
YES
Refer to page 3-23
Is there a gap between loop guide lever and cutter unit?
NO
7. 4 Position of loop guide lever
YES
Refer to page 3-24
Is position of loop guide unit okay?
NO
7. 5 Left-right position of loop guide (L)
YES
H
I


H
I
Is there a gap between loop guide (L) and sub-guide?
NO
Refer to page 3-24
7. 6 Up-down position of loop guide (L)
YES
Is there a gap between loop guide (U) and loop presser foot?
NO
Refer to page 3-26
7. 9 Position of loop guide (U)
YES
Position of loop guide unit stopper
NO
Refer to page 3-28
8. 4 Position of loop guide unit stopper cylinder
YES
Have fold plates (F) and (B) not been changed?
NO
YES
Is there a up-down and left-right gap between fold plates (F) and (B) and the supporter plate?
NO
Refer to page 3-37
11. 4 Up-down and left-right stopper cylinder
YES
Left-right bar tacking position
NO
Refer to page 3-41
13. 3 Position of unit base stopper
YES
Is there a gap between presser feet (F) and (B) and the supporter plate?
NO
Refer to page 2-7
*1. 9 Left-right position of presser feet (F) and (B)
YES
End

4 Changes in belt loop thickness




J
K
Is there a gap between loop guide and cutter unit?
NO
Refer to page 3-21
6. 7 Position of loop guide
YES
Is there a gap between loop guide lever and cutter unit?
NO
Refer to page 3-23
7. 4 Position of loop guide lever
YES
Is position of loop guide unit okay?
NO
Refer to page 3-24
7. 5 Left-right position of loop guide (L)
YES
Is there a gap between loop guide (U) and loop presser foot?
NO
Refer to page 3-26
7. 9 Position of loop guide (U)
YES
Is mis-detection of fold plate (F) by the loop set sensor prevented?
NO
Refer to page 3-29
9. 3 Position of loop set sensor cover
YES
Is fold amount at second bar tacking okay?
NO
Change the feed length in the program
YES

ADJUSTMENT LOCATIONS REFERENCE CHART

- Malfunctions for which an error code is displayed are not included in this reference chart. Accordingly, if an error code is displayed, please refer to the section on error code display in P 4-15 Electrical Equipment.
- Malfunctions related to electrical equipment are not included in this reference chart. Please refer to the section on trouble diagnosis in P 4-37 Electrical Equipment.
- Basic malfunctions such as those related to screw tightening and air pressure are not included in this reference chart.
- If an adjustment is made according to this chart, refer to the adjustment procedures on page 1-1. Check if the adjustment that has been made affects other items, and adjust if necessary.
- Adjustments marked with * are for the machine head, and those without are for the power unit.

Problem	Cause	Adjustment	Page
Seam joint section of belt loop is attached	Seam joint sensor is not covered when seam joint is encountered.	[4].2 Position of seam joint sensor	3-11
	Actuator is touching seam joint sensor.	[4].1 Movement and position of actuator	3-10
Belt loop is present, but loop empty sensor lamp illuminates and material cannot be set.	Belt loop is present but loop empty sensor is not covered.	[4].3 Position of loop empty sensor	3-11
	Actuator is touching seam joint sensor.	[4].1 Movement and position of actuator	3-10
Belt loop is not cut.	Movement of movable knife is too large.	[5].1 Movement of movable knife	3-12
	Meshing of movable knife and fixed knife is poor.	[5].4 Position of fixed knife	3-13
Belt loop is not cut at a right angle.	Channel and cutter unit are not at a right angle	[2] Channel width [5].6 Squareness of flat cut	3-6 3-14
Center of belt loop V cut is not in middle of belt loop.	Channel and cutter unit are not positioned correctly.	[2] Channel width	3-6
	Cutter unit is not perpendicular.	[5].8 Perpendicularity of cutter unit	3-15
V-cutting of belt loop on first bar tacking side is not possible.	At the time of initial cutting, end of belt loop on supporter plate side does not return to cutter.	[5].2 Parallelism of loop support and knife base [5].5 Up-down position of loop support	3-12 3-14
Angle of belt loop V-cut is not correct.	Position of knife rotation stopper is not correct.	[5].9 Position of knife rotation stopper	3-16
	Speeds of knife rotation (F) and (B) cylinders are too slow.	[5].10 Speed of knife rotation (F) and (B) cylinders	3-17

Problem	Cause	Adjustment		Page
Angle of belt loop V-cut is not correct.	Speeds of sub-guide cylinder and loop guide unit cylinder are too slow and cylinders are touching the cutter unit.	[6].8 [7].7	Speed of sub-guide cylinder Speed of loop guide unit cylinder	3-21 3-25
Belt loop is not fed through.	Position of head loop guide is not correct.	*[4].2	Position of belt loop guide	2-10
	Channel width is too narrow.	[2]	Channel width	3-6
	Feed roller is not turning correctly.	[3].1 [3].2 [3].3	Movement of feed roller Position of sprocket wheel (B) Chain tension	3-7 3-7 3-8
	Gap between feed roller and channel is too big.	[3].6	Position of feed roller stopper	3-9
	Pressure of feed roller on belt loop is too weak.	[3].7	Position of spring hook	3-10
	Position of belt loop roller guide is too low,	[3].5	Position of feed roller guide	3-9
Belt loop is blocked and is not fed along top of supporter plate.	Position of loop support is too high.	[5].5	Up-down position of loop support	3-14
	Sub-guide does not move correctly and guide is too slow.	[6].1	Movement of sub-guide	3-18
	Speed of sub-guide cylinder is too slow and guide is too slow.	[6].8	Speed of sub-guide cylinder	3-21
	Welded section of sub-guide is not aligned with notch of supporter plate.	[6].4 [6].5 [10].9	Front-back position of sub-guide Gap between sub-guide and supporter plate Position of supporter plate	3-19 3-20 3-34
	Loop guide and supporter plate are not aligned.	[6].7	Position of loop guide	3-21
	Loop guide unit does not move correctly, and guide is too slow.	[7].1	Movement and position of loop guide shaft	3-22
	Speed of loop guide unit cylinder is too slow and guide is too slow.	[7].7	Speed of loop guide unit cylinder	3-25
	Position of loop guide unit is not correct, and combined width of it and supporter plate is too narrow.	[7].5 [8].4	Left-right position of loop guide (L) Position of loop guide unit stopper cylinder	3-24 3-28

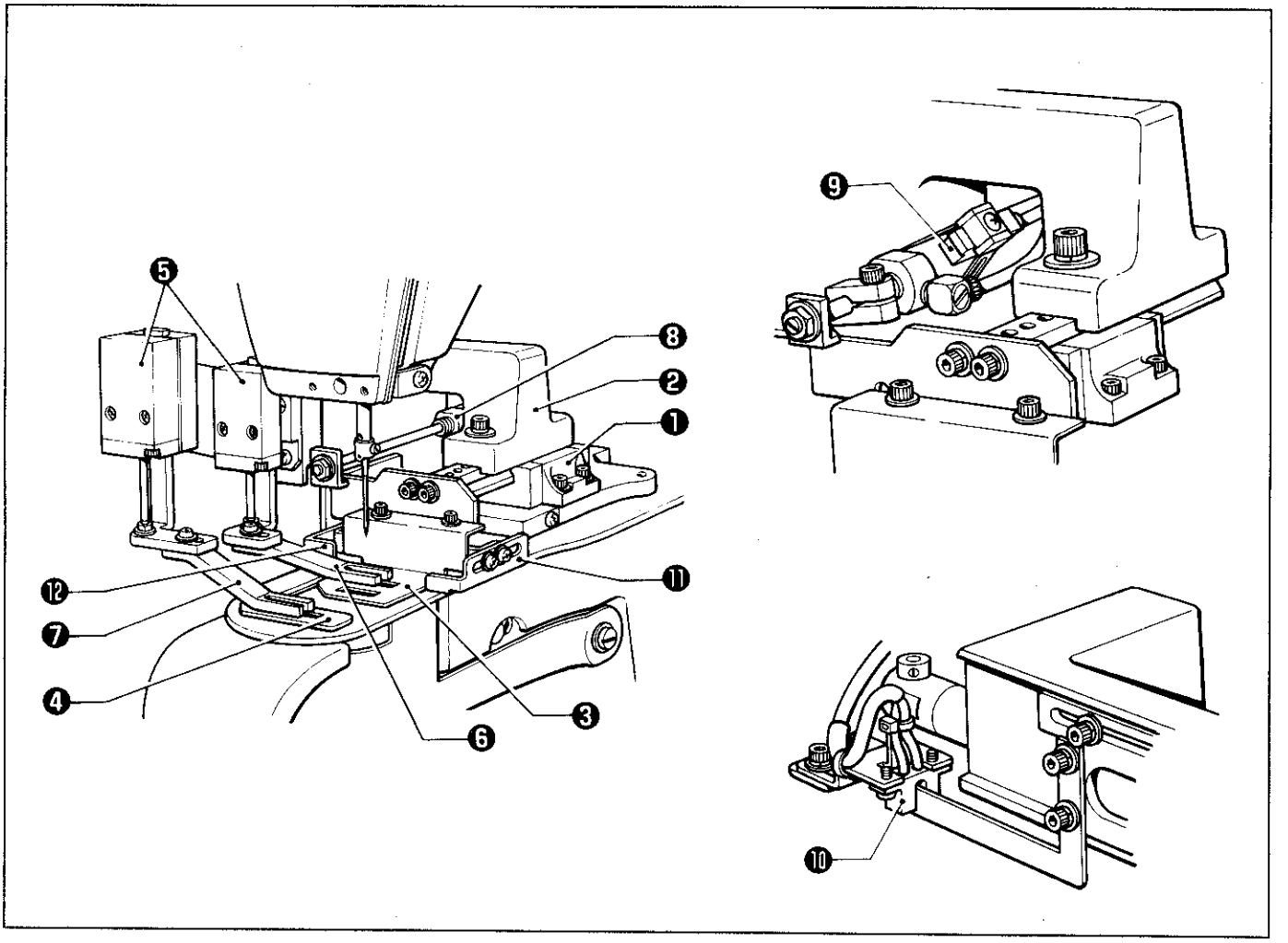
Problem	Cause	Adjustment	Page
Belt loop is blocked and is not fed along top of supporter	Guide position is not correct when compensating for looseness.	[7].4 Position of loop guide lever [7].6 Up-down position of loop guide (L) [7].9 Position of loop guide (U)	3-23 3-24 3-26
Belt loop is not folded on supporter plate.	Position of loop presser is too high.	[8].3 Gap between loop presser feet (F) and (B) and supporter plate	3-27
	Fold plates (F) and (B) do not move correctly.	[11].3 Front-back movement of fold plates (F) and (B)	3-37
	Fold plates (F) and (B) do not move up and down correctly, and lowering is too slow.	[11].2 Up-down movement of fold plates (F) and (B)	3-36
	Speed of fold plate up-down cylinder is too slow, and lowering is too slow.	[11].6 Speed of fold plate up-down cylinder	3-38
	Gap between fold plates (F) and (B) and the supporter plate is too narrow	[11].4 Up-down and left-right position of fold plates (F) and (B) [11].5 Front-back position of fold plates (F) and (B)	3-37 3-38
Belt loop is not guided along supporter plate.	Loop guide unit is too wide.	[7].2 Position of loop guide unit [7].5 Left-right position of loop guide (L)	3-22 3-24
	Position of loop presser is too low.	[8].3 Gap between loop presser feet (F) and (B) and supporter plate	3-27
Front-back position of first bar tacking is not correct.	Position of loop unit is not correct.	[13].2 Position of loop unit	3-40
Folding amount at first bar tacking is not correct.	Position of cutter unit is not correct.	[13].1 Position of cutter unit	3-40
Front-back position of second bar tacking is not correct.	Setting of body cylinder movement amount is not correct.	*[1].5 Front-back position of presser foot (F) *[1].7 Position of feed plate (F)	2-5 2-6
Folding amount at second bar tacking is not correct.	Setting of belt loop feed amount is not correct.	Change the feed length in the program	
Left-right position of bar tacking is not correct.	Position of unit base stopper is not correct.	[13].3 Position of unit base stopper	3-41
Folded section of belt loop sticks out. Left-right position of first bar tacking is not stable.	Gap between fold plates (F) and (B) and the supporter plate is too wide.	[11].4 Up-down and left-right position of fold plates (F) and (B) [11].5 Front-back position of fold plates (F) and (B)	3-37 3-38

Problem	Cause	Adjustment	Page
Folded section of belt loop sticks out. Left-right position of first bar tacking is not stable.	Slide base does not move correctly.	[10].1 Movement of slide base	3-30
	Position of loop front sensor is not correct, and lamp illuminates too quickly.	[10].10 Position of loop front sensor	3-34
	Supporter plate is not parallel to needle plate.	[10].7 Parallelism of supporter plate and needle plate	3-33
	Gaps between presser feet (F) and (B) and the supporter plate are too large.	*[1].9 Left-right position of presser feet (F) and (B)	2-7
	Presser foot (B) is not parallel to needle plate.	*[1].2 Up-down adjustment of presser foot (B)	2-3
	Gap between head fixed plate and machine head.	*[4]. Position of head fixed plate	2-10
	Gaps between presser feet (F) and (B) and feed plates (F) and (B) are too large.	*[1].2 Up-down position of presser foot (B) *[1].6 Up-down position of presser foot (F)	2-3 2-5
Skipped stitches, thread breakages and bent needles.	Position of presser foot (B) is not evenly over needle hole.	*[1].1 Front-back position of presser foot (B)	2-3
	Position of feed plate (B) is not evenly over needle hole.	*[1].3 Position of feed plate (B)	2-4
	Position of presser foot (F) is not evenly over needle hole.	*[1].5 Front-back position of presser foot (F)	2-5
	Position of feed plate (F) is not evenly over needle hole.	*[1].7 Position of feed plate (F)	2-6
	Position of body rear sensor is not correct, and covering of sensor is too quick.	*[1].8 Position of body rear sensor	2-6
	Gap between supporter plate and needle plate is too big, and belt loop is touching presser feet (F) and (B).	[10].8 Gap between supporter plate and needle plate	3-33
	Loop set sensor detects fold plate (F) by mistake, and sewing is carried out at an incorrect setting.	[9].3 Position of loop set sensor cover	3-29
Cycle time is too long, and productivity is not increased.	Speed of body cylinder is too slow.	*[1].10 Speed of body cylinder	2-7
	Pressure of machine start cylinder regulator is too high.	[1].2 Regulator pressure	3-5
	Speed of loop feed cylinder is too slow.	[10].11 Speed of loop feed cylinder	3-35

2.MACHINE HEAD

MECHANICAL DESCRIPTIONS

1 Presser arm mechanism



1) When the feed guide assembly moves forward and back due to the tack width mechanism and left and right due to the tack length mechanism, each movement is communicated to the LM guide ❶ and the presser arm ❷.

2) The fixed-type feed plate (B) ❸ and the movable-type feed plate (F) ❹ are attached to the LM guide ❶, and the fixed- type presser foot (B) ❻ and the movable-type presser foot (F) ❼ which move up and down by means of the presser foot cylinder ❺ are attached to the presser arm ❷.

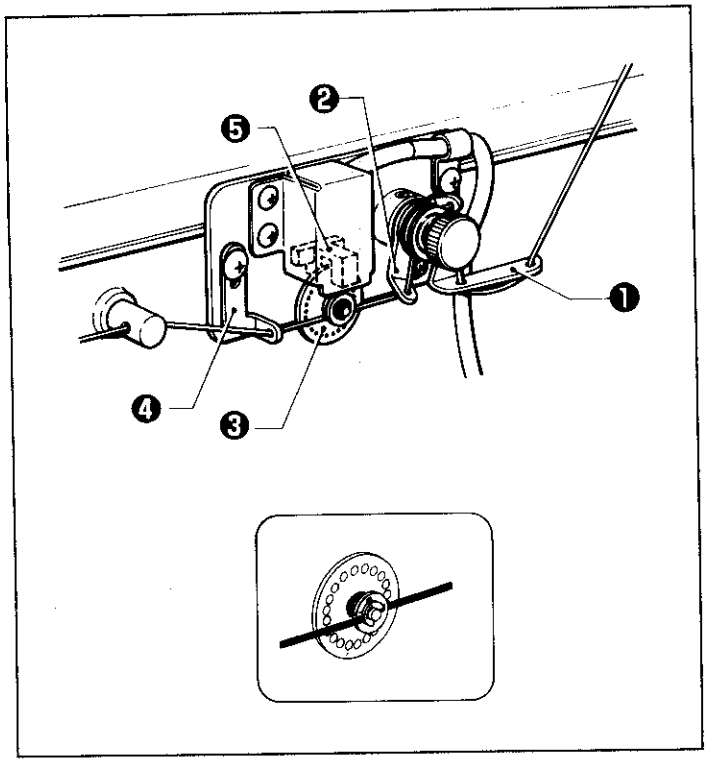
3) When the presser foot cylinder ❺ is lowered, the body material and the belt loop are held between feed plates (B) ❸ and (F) ❹ and presser feet (B) ❻ and (F) ❼.

4) The body material and belt loop which are being held move between the first and second bar tacking positions by means of the body cylinder ❽ attached to the feed guide assembly.

5) The body front sensor ❾ and body rear sensor ❿ act as switches to check the position of the first and second bar tacking.

6) The body put rulers (R) ⓫ and (L) ⓬ which are attached to feed plate (B) ❸ are used as guides for positioning the belt loop which is being attached to the body material.

[2] Thread breakage detection mechanism



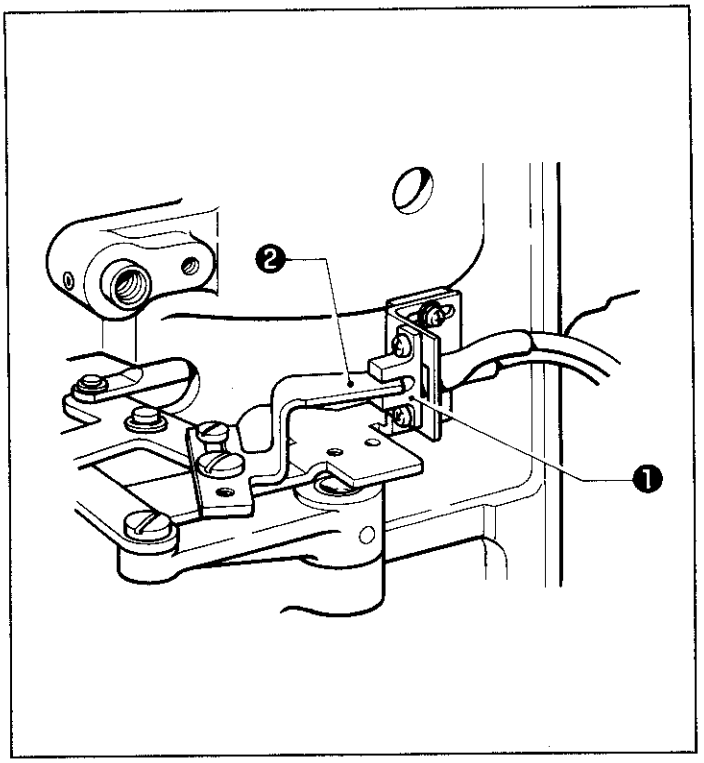
1) The upper thread passes through the thread hanger ❶, first thread guide ❷ (for thread tension adjustment), pulley ❸ and second thread guide ❹. In addition, it is wound once around the pulley ❸.

2) The pulley ❸ has holes around its entire circumference. These holes in the pulley ❸ are detected by the thread breakage sensor ❺, and the sensor generates corresponding ON-OFF signals and sends them to the control circuit board.

3) When all of the thread is consumed during sewing, the pulley ❸ turns and repeated ON and OFF signals are sent, but if there is a thread breakage, the pulley ❸ stops and a continuous ON or OFF signal is sent.

4) At the control circuit board, a judgement is made based on this signal as to whether a thread breakage has occurred or not.

[3] Stop position detection mechanism



1) When the sewing machine is stopped, the stop position sensor ❶ is covered by the thread presser clutch actuating lever ❷.

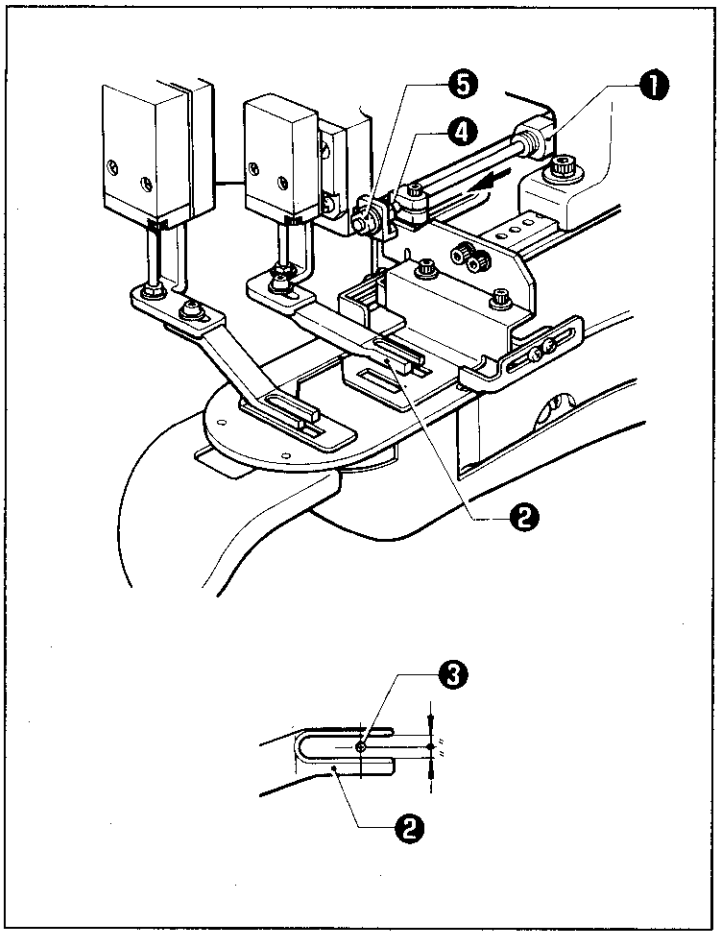
2) When the machine starts, the thread presser clutch actuating lever ❷ turns to uncover the stop position sensor ❶ that was previously covered.

3) While the machine is in operation, the sensor is uncovered, and when it stops, the sensor is again covered.

4) At the control circuit board, a judgement is made based on this signal as to whether the sewing machine is stopped or in operation.

ADJUSTMENT

1 Presser arm mechanism

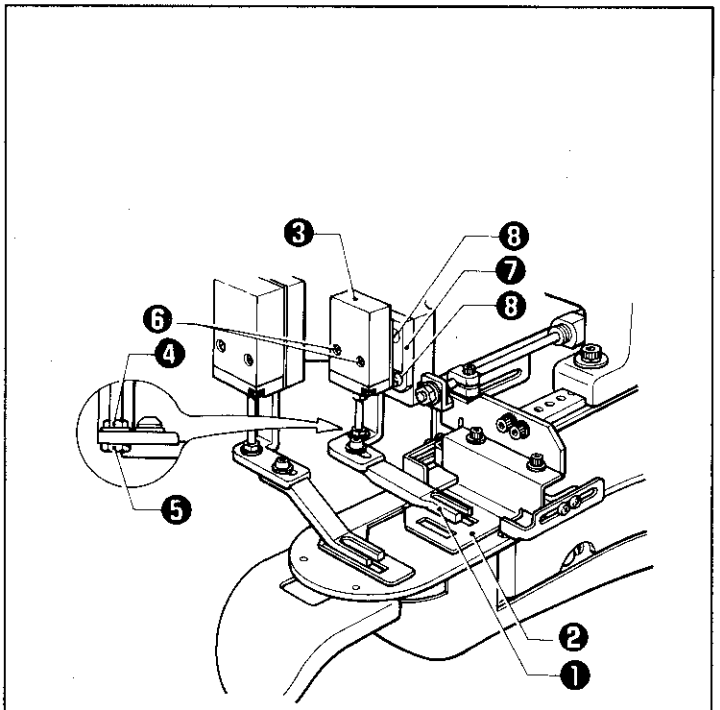


1.Front-back position of presser foot (B)

1) Loosen the nut ❹ of the body cylinder ❶ rod and turn the joint nut ❺ to adjust so that presser foot (B) ❷ is evenly over the needle hole ❸ when the body cylinder ❶ moves forward to bring presser foot (B) ❷ for the first bar tacking in line with the needle hole ❸.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the presser foot switch to "FRONT" and check that presser foot (B) ❷ lowers. If the presser foot switch is set to "FRONT" once more, presser foot (B) ❷ will be raised.

* If this adjustment is not made correctly, skipped stitches, thread breakages or bent needles may result.



2.Up-down adjustment of presser foot (B)

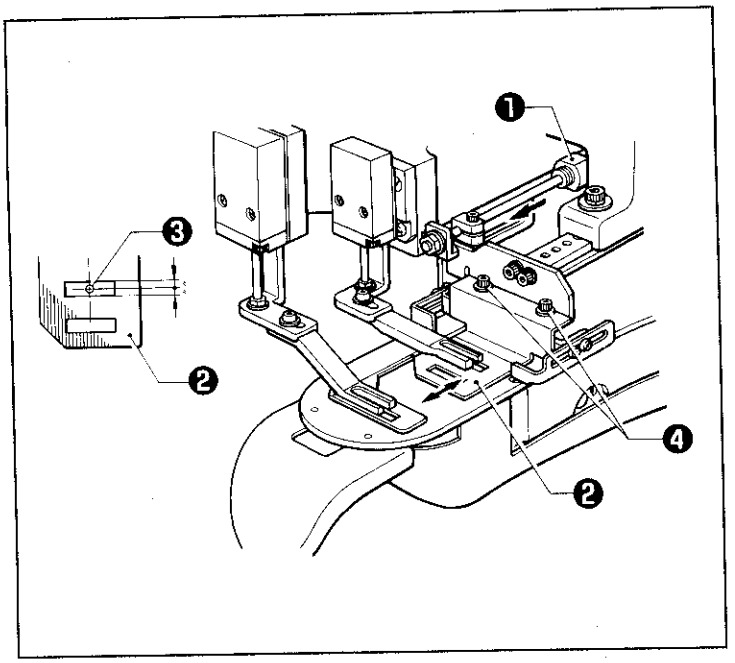
1) Adjust the position of presser foot (B) ❶ so that it is parallel to feed plate (B) ❷ without any gap between the two.

2) Loosen the nut ❹ of the presser foot (B) cylinder ❸ rod and turn the presser nut ❺ to adjust so that there is no gap.

3) Remove the two screws ❻ of presser foot (B) cylinder ❸ and loosen the two screws ❽ of the presser foot block ❼ to change the tilt of the presser foot block ❼ so that presser foot (B) ❶ and feed plate (B) ❷ are parallel.

4) Open the air cock, turn the power switch on, and while in MANUAL mode, set the presser foot switch to "FRONT" and check that presser foot (B) ❶ lowers. If the presser foot switch is set to "FRONT" once more, presser foot (B) ❶ will be raised.

* If this adjustment is not made correctly, defective attachment of belt loops may result.

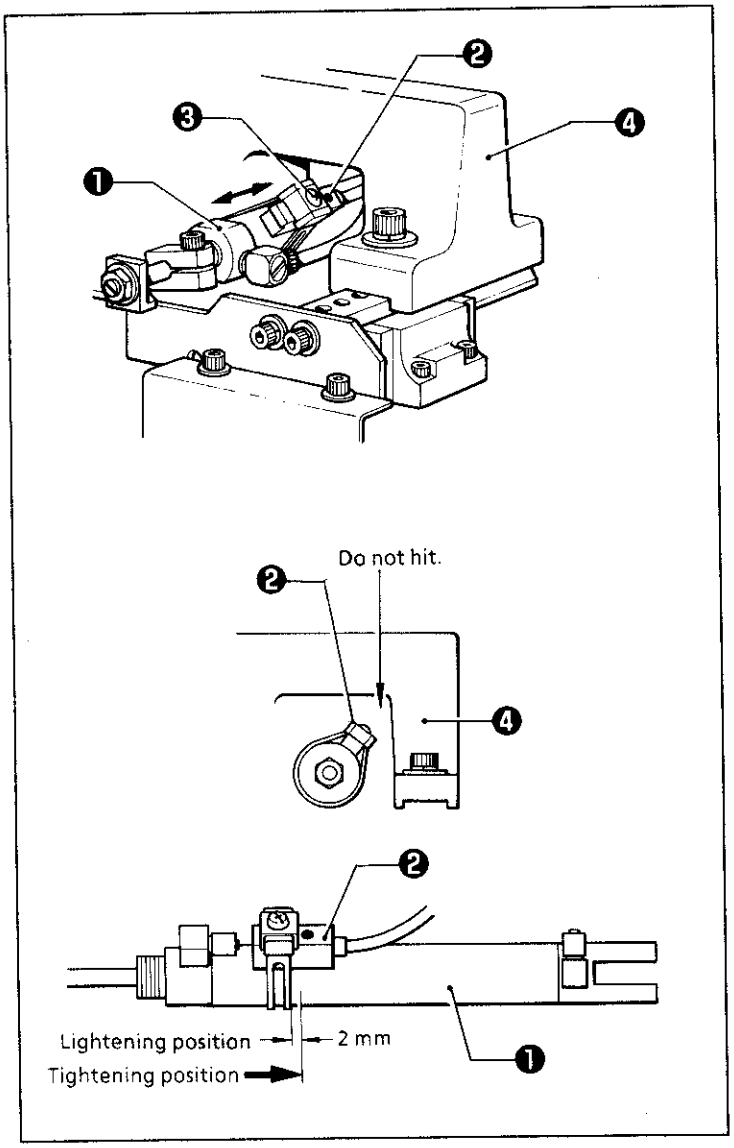


3.Position of feed plate (B)

1) Loosen the two bolts ❹ and move feed plate (B) ❷ to adjust so that it is evenly over the needle hole ❸ when the body cylinder ❶ moves forward to bring feed plate (B) ❷ for the first bar tacking in line with the needle hole ❸.

2) Open the air cock, turn the power switch on, and check the adjustment.

* If this adjustment is not made correctly, skipped stitches, thread breakages or bent needles may result.



4.Position of body front sensor

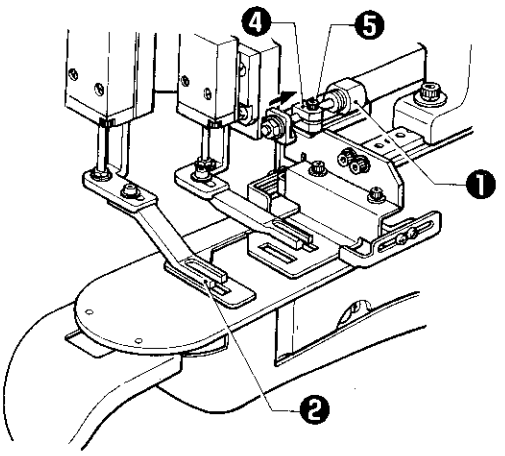
1) Close the air cock, bleed the air, and then turn the power switch on.

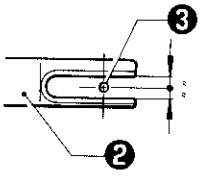
2) Loosen the screw ❸ and adjust the position of the body front sensor ❷ so that it illuminates when the body cylinder ❶ moves forward to the first bar tacking position, and switches off at other positions.

3) After the body front sensor ❷ illuminates, move it approximately 2mm towards the illuminated side, and then tighten it at a torque of about 3 kgfcm.

4) Move the body cylinder ❶ back and forward by hand to check that the body front sensor ❷ does not touch the presser arm ❹.

* If this adjustment is not made correctly, error codes E.-20 and E.-21 will be displayed.



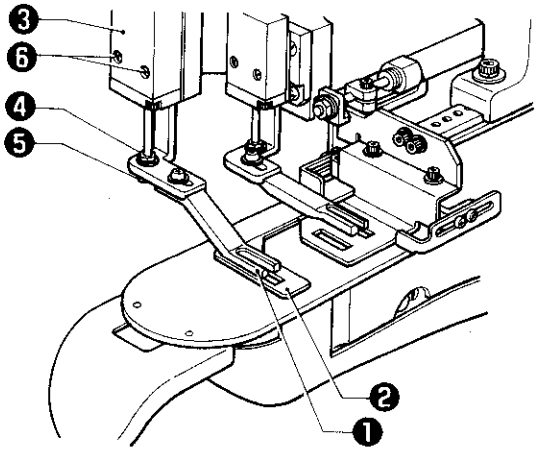


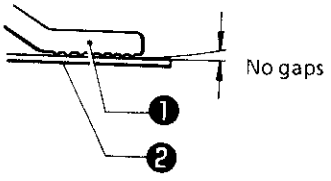
5.Front-back position of presser foot (F)

1) Close the air cock, bleed the air, and then retract the body cylinder ❶ by hand..

2) Loosen the screw ❺ on the cylinder stopper ❹ of the body cylinder ❶ and move the cylinder stopper ❹ to adjust so that presser foot (F) ❷ is evenly over the needle hole ❸ when the body cylinder ❶ is retracted and presser foot (F) ❷ for the second bar tacking is in line with the needle hole ❸.

* If this adjustment is not made correctly, skipped stitches, thread breakages or bent needles may result.





6.Up-down adjustment of presser foot (F)

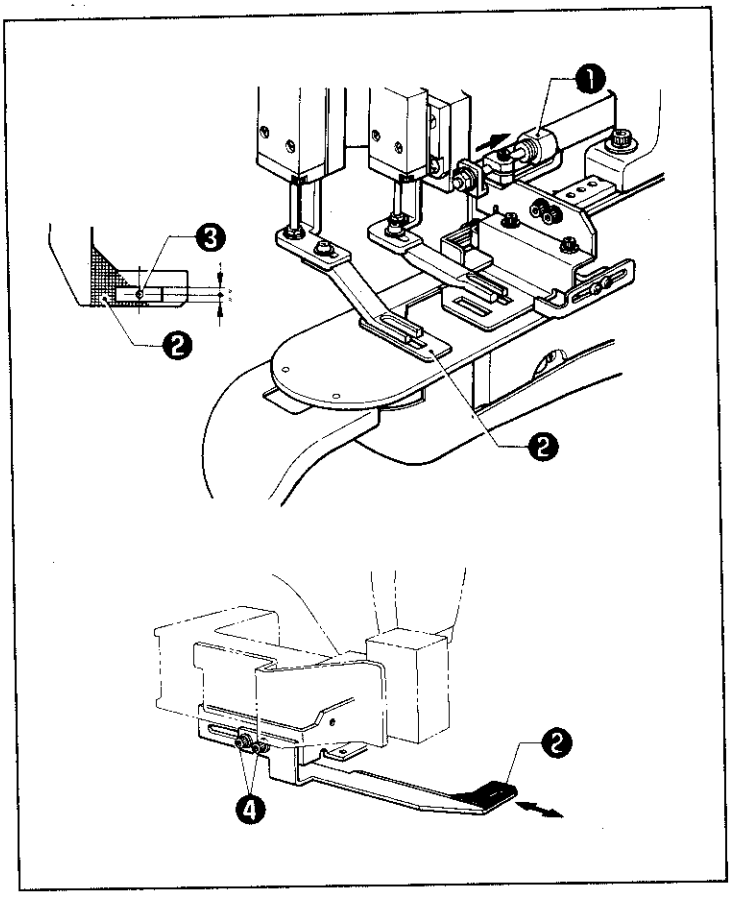
1) Adjust the position of presser foot (F) ❶ so that it is perpendicular to the presser foot (F) cylinder ❸ and so that there is no gap between presser foot (F) ❶ and feed plate (F) ❷.

2) Loosen the nut ❹ of the presser foot (F) cylinder ❸ rod and turn the presser nut ❺ to adjust so that there is no gap.

3) Remove the two screws ❻ of presser foot (F) cylinder ❸ and change the tilt of the presser foot (F) cylinder ❸ so it is perpendicular to presser foot (F) ❶.

4) Close the air cock, bleed the air, and then move presser foot (F) ❶ up and down by hand.

* If this adjustment is not made correctly, defective attachment of belt loops and uneven bar tacking stitches may result.

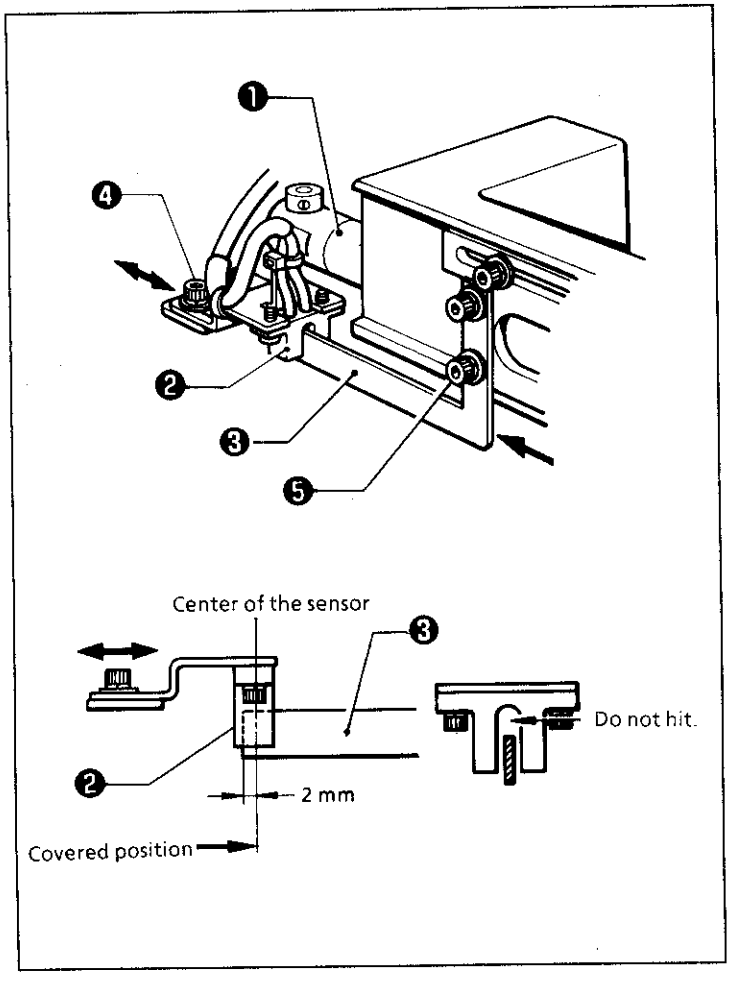


7.Position of feed plate (F)

1) Loosen the two bolts ❹ and move feed plate (F) ❷ to adjust so that feed plate (F) ❷ is evenly over the needle hole ❸ when the body cylinder ❶ is retracted and feed plate (F) ❷ for the second bar tacking is in line with the needle hole ❸.

2) Close the air cock, bleed the air, and then adjust by retracting the body cylinder ❶ by hand.

* If this adjustment is not made correctly, skipped stitches, thread breakages or bent needles may result.



8.Position of body rear sensor

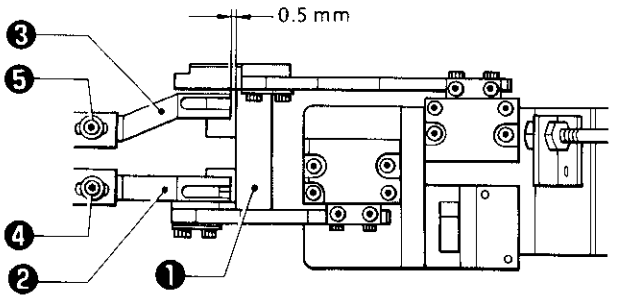
1) Loosen the two bolts ❹ and move the body rear sensor ❷ to adjust it so that it is covered by the presser foot rear dog ❸ when the body cylinder ❶ is retracted to the second bar tacking position, and is uncovered at other positions.

2) After the body rear sensor ❷ is covered, move it approximately 2mm towards the covered side and then tighten it.

3) Close the air cock, bleed the air, and then retract the body cylinder ❶ by hand to adjust.

4) Move the body cylinder ❶ back and forward by hand to check that the presser foot rear dog ❸ does not touch the body rear sensor ❷. If it touches the base, adjust by loosening the two screws ❺ of the presser foot rear dog ❸ and changing the tilt of the presser foot rear dog ❸.

* If this adjustment is not made correctly, error codes E.-22 and E.-23 will be displayed. If the body rear sensor ❷ is moved too far to the covered side, bent needles may result.

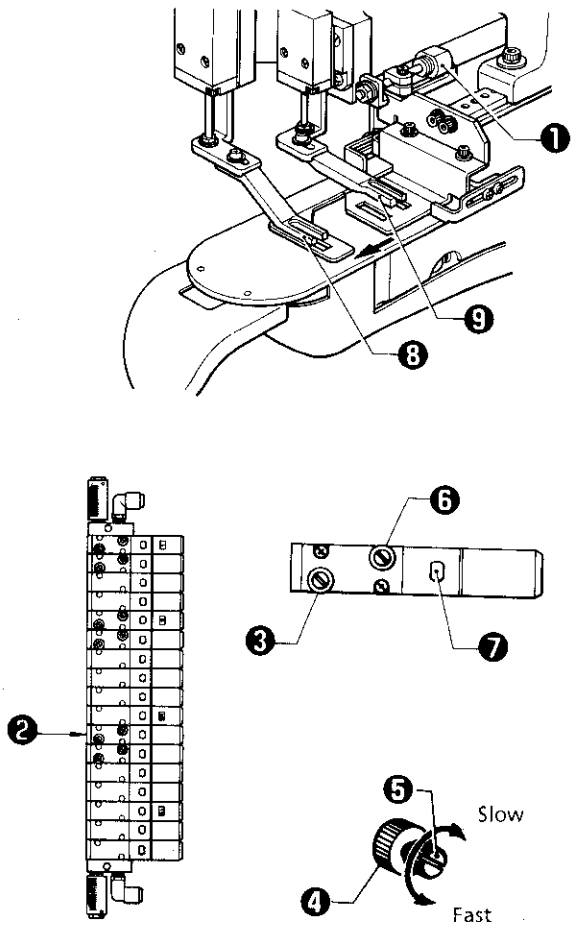


9.Left-right position of presser feet (B) and (F)

1) Loosen the screw ❹ of presser foot (F) ❷ and the screw ❺ of presser foot (B) ❸ and move presser foot (F) ❷ and presser foot (B) ❸ to adjust presser foot (F) ❷ for the second bar tacking and presser foot (B) ❸ for the first bar tacking so that there is a gap of approximately 0.5mm between the presser feet and the perpendicular surface of the supporter plate ❶ when the supporter plate ❶ is moved to the machine head side.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the LOOP switch to "SET" to set the belt loop in the supporter plate ❶. Next, press the EMERGENCY STOP switch once to check that the supporter plate ❶ moves to the machine head side. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❶.

* If this adjustment is not made correctly, defective attachment of belt loops may result.



10.Speed of body cylinder

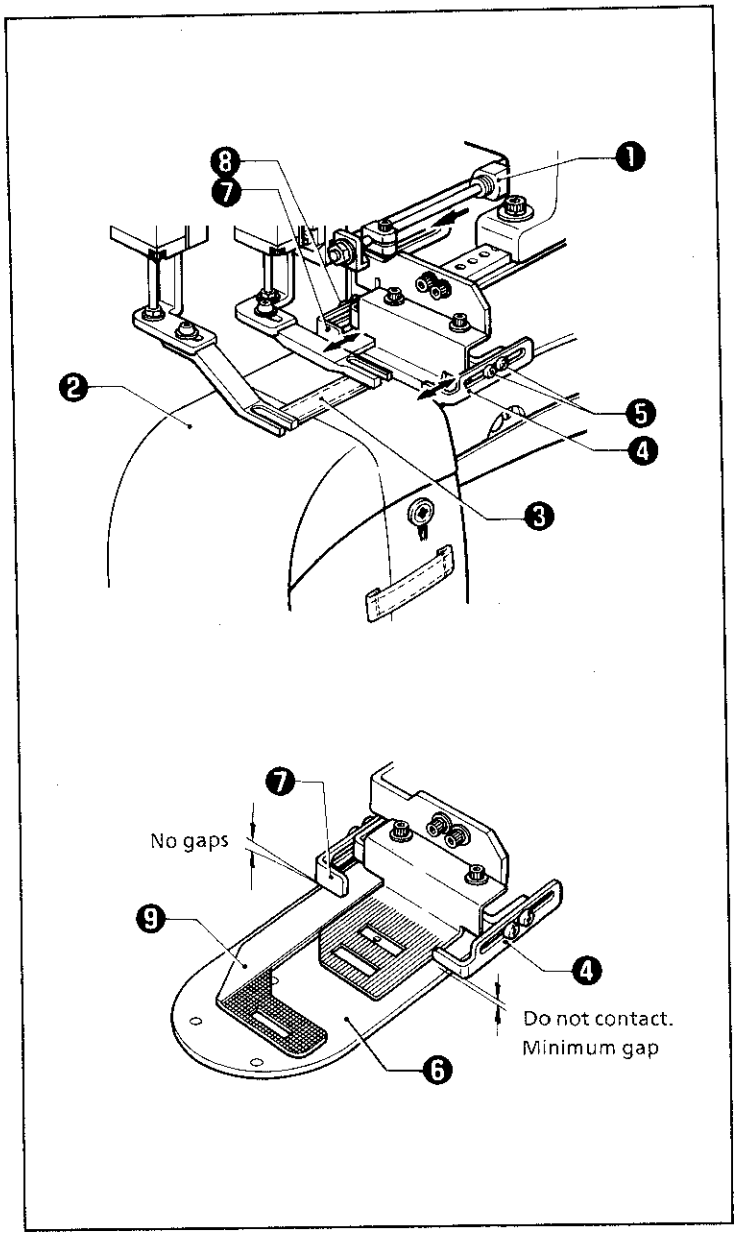
1) Adjust the speed at which the body cylinder ❶ moves from the second bar tacking position to the first bar tacking position so that it moves quickly with no shocks by means of the throttle valve ❸ of solenoid valve No.11 ❷.

2) Loosen the nut ❹ and turn the adjusting screw ❺ to adjust the throttle valve ❸, and then lock it with the nut ❹. If the nut ❹ is turned to the right, the speed becomes slower, and if turned to the left, the speed becomes faster.

3) Set the speed at which the body cylinder ❶ moves from the first bar tacking position to the second bar tacking position to the fastest speed by loosening the nut ❹ on the throttle valve ❻ of solenoid valve No.11 ❷, and then turning the adjusting screw ❺ to the left. Then lock with the nut ❹.

4) Open the air cock and adjust by pressing the check valve ❼ of solenoid valve No.11 ❷ to move the body cylinder ❶ forward and back. Always be sure to lower presser foot (F) ❽ and presser foot (B) ❾.

* If this adjustment is not made correctly and the speed is too slow, the cycle time will be too long.



11.Position of body put rulers (R) and (L)

1) Adjust the position and angle of the belt loop ❸ which is to be attached to the body material ❷ when the body cylinder ❶ moves forward to the first bar tacking position.

2) Loosen the two screws ❺ of body put ruler (R) ❹ and move body put ruler (R) ❹ to adjust.

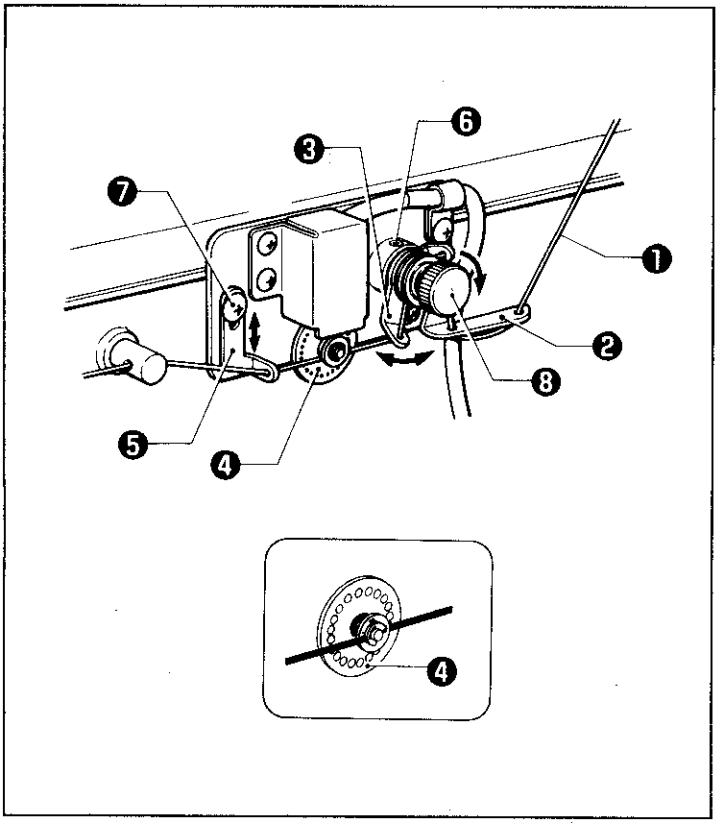
3) Check that the gap between body put ruler (R) ❹ and the needle plate ❻ is as small as possible without touching.

4) Loosen the two screws ❽ of body put ruler (L) ❼ and moving body put ruler (L) ❼ to adjust it.

5) Check that there is no gap between body put ruler (L) ❼ and feed plate (F) ❾.

* If this adjustment is not made correctly, defective attachment of belt loops may result.

2 Thread breakage detector mechanism



Position of thread guide

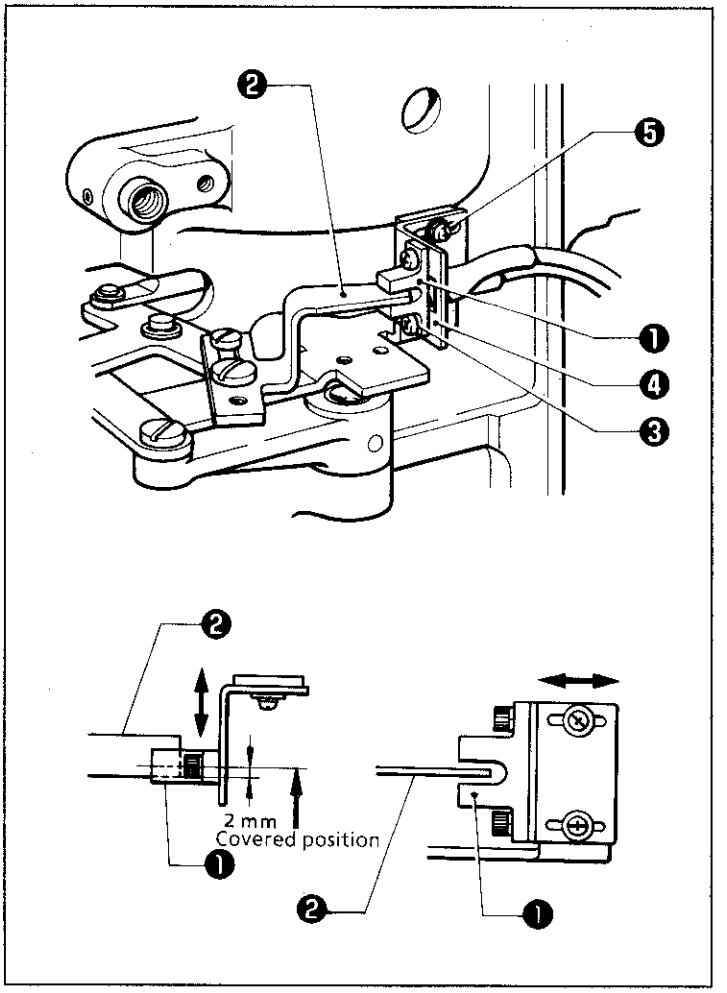
1) Thread the upper thread ❶ through the thread hanger ❷, first thread guide ❸ (for thread tension adjustment), pulley ❹ and second thread guide ❺, and wind it once around the pulley ❹.

2) Loosen the screw ❻ of the first thread guide ❸ and the screw ❼ of the second thread guide ❺ and turn the first thread guide ❸ or move the second thread guide ❺ up and down to adjust the upper thread ❶ so that it is basically perpendicular.

3) If the upper thread ❶ falls off the pulley ❹ during sewing, turn the screw ❽ of the first thread guide ❸ to the right to increase the thread tension.

* If this adjustment is not made correctly, the upper thread ❶ can easily fall off the pulley ❹ during sewing. Also, if the thread tension is too strong, thread breakages may occur.

3 Stop position detection mechanism



Position of stop position sensor

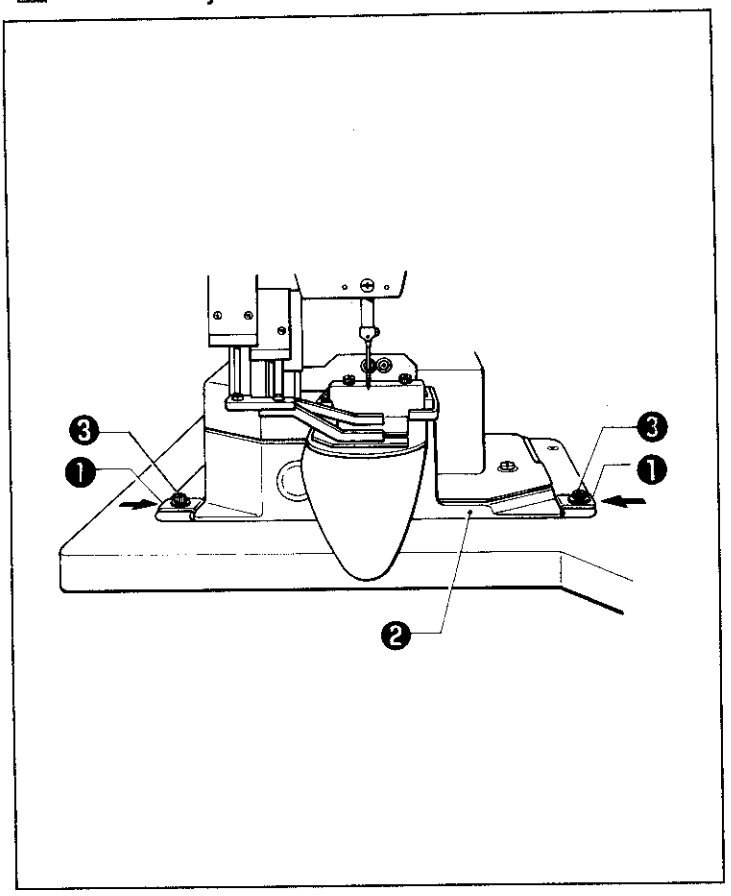
1) Loosen the two bolts ❸ of the stop position sensor ❶ and move the stop position sensor ❶ to adjust its position so that it is covered by the thread presser clutch actuating lever ❷ when the machine head is stopped, and uncovered while the machine head is moving.

2) After the stop position sensor ❶ is covered, move it approximately 2mm towards the covered side and then tighten it.

3) Loosen the two bolts ❺ on the sensor fixing plate ❹ and move the sensor fixing plate ❹ to adjust so that the thread presser clutch actuating lever ❷ does not touch the stop position sensor ❶.

* If this adjustment is not made correctly, error codes E.-40 and E.-41 will be displayed.

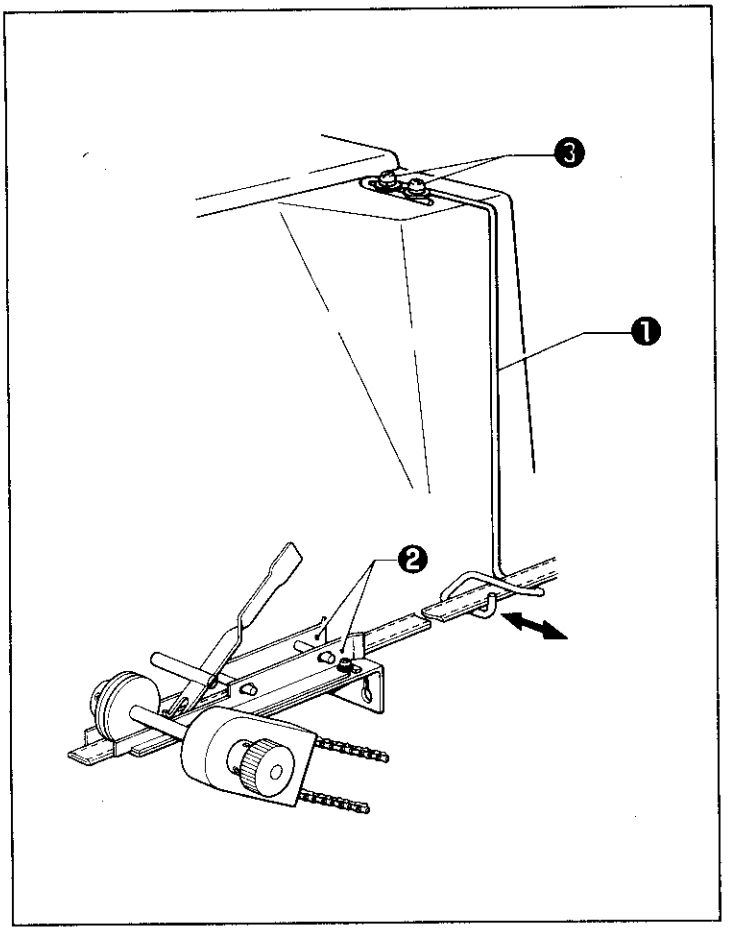
[4] Other adjustments



1.Position of head fixed plate

1) Loosen the screw ❸ of the head fixed plate ❶ and move the head fixed plate ❶ to adjust it so that it presses against the arm bed ❷ with no gap between them.

* If this adjustment is not made correctly, the loop unit may malfunction and defective attachment of belt loops may result.



2.Position of belt loop guide

1) Loosen the two screws ❸ and move the belt loop guide ❶ to adjust so that it is aligned with the channel ❷ and the belt loop is basically perpendicular when the belt loop guide ❶ is at the machine head side.

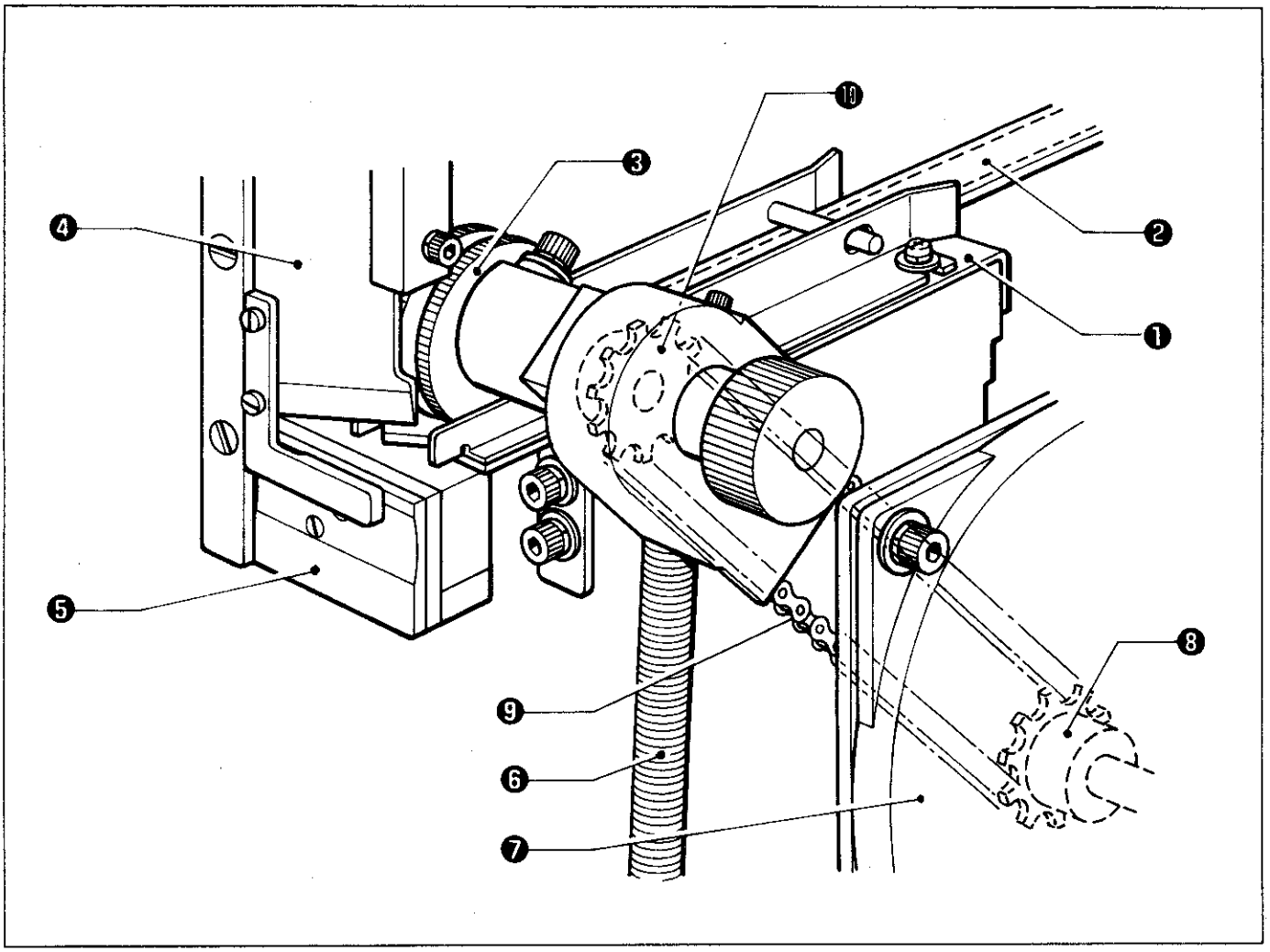
2) Move the loop unit to the machine head side to adjust.

* If this adjustment is not made correctly, defective feeding of belt loops may result.

3.POWER UNIT

MECHANICAL DESCRIPTIONS

1 Belt loop feed mechanism



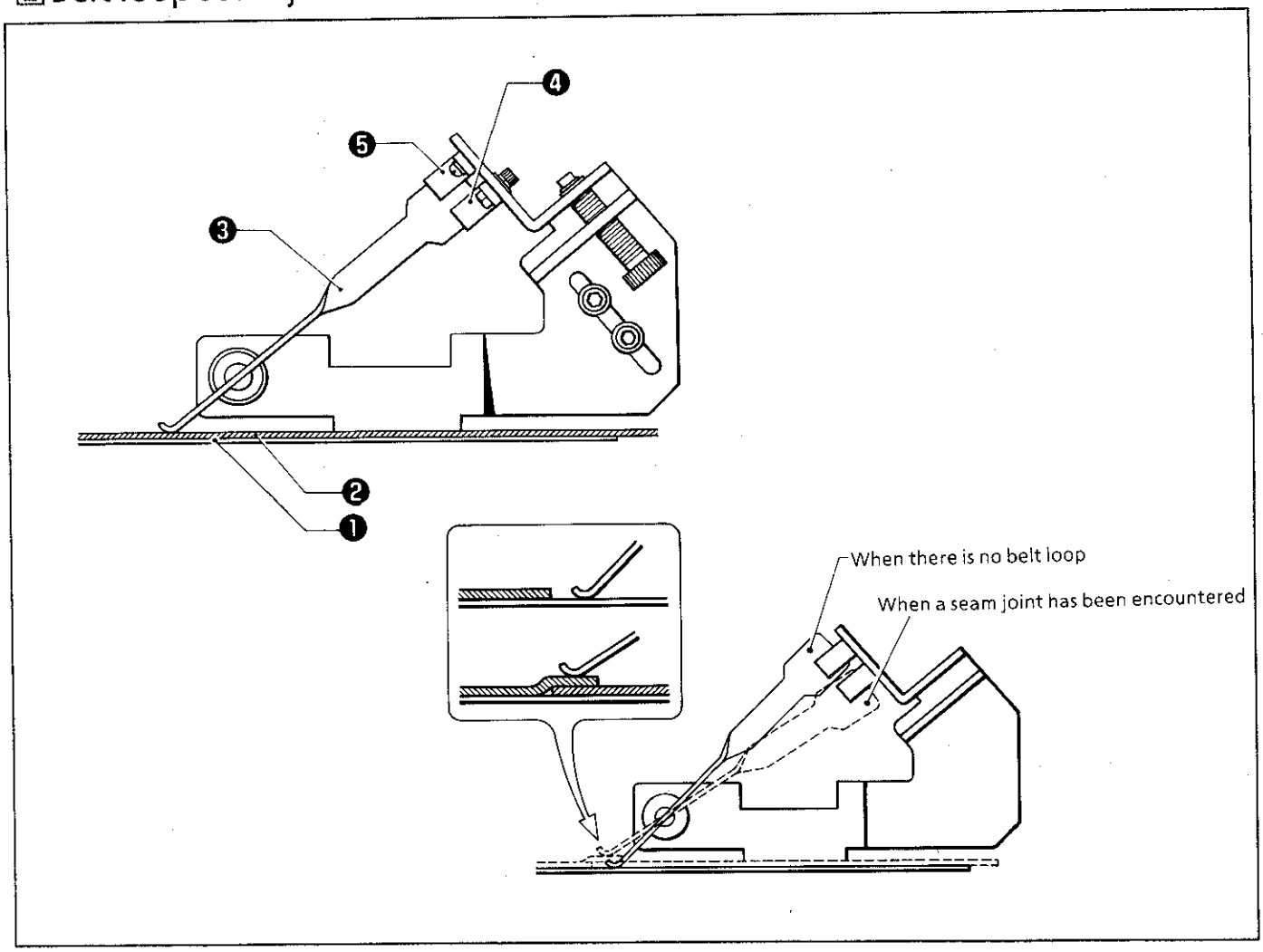
1) The belt loop ❷ threaded through the top of the channel ❶ is clamped between the feed roller ❸ and the channel ❶ and passes between the movable knife ❹ and the fixed knife ❺.

2) Pressure for clamping the belt loop ❷ is applied to the feed roller ❸ by means of the spring ❺, and this pressure is adjustable.

3) The pulse motor ❼ turns by an amount equivalent to the feed length of the belt loop ❷ to turn the feed roller ❸ via sprocket wheel B ❽, the chain ❾ and sprocket wheel A ❿, thereby feeding a fixed length of the belt loop.

4) The fed belt loop ❷ is cut by the movable knife ❹ and the fixed knife ❺.

2 Belt loop seam joint sensor mechanism

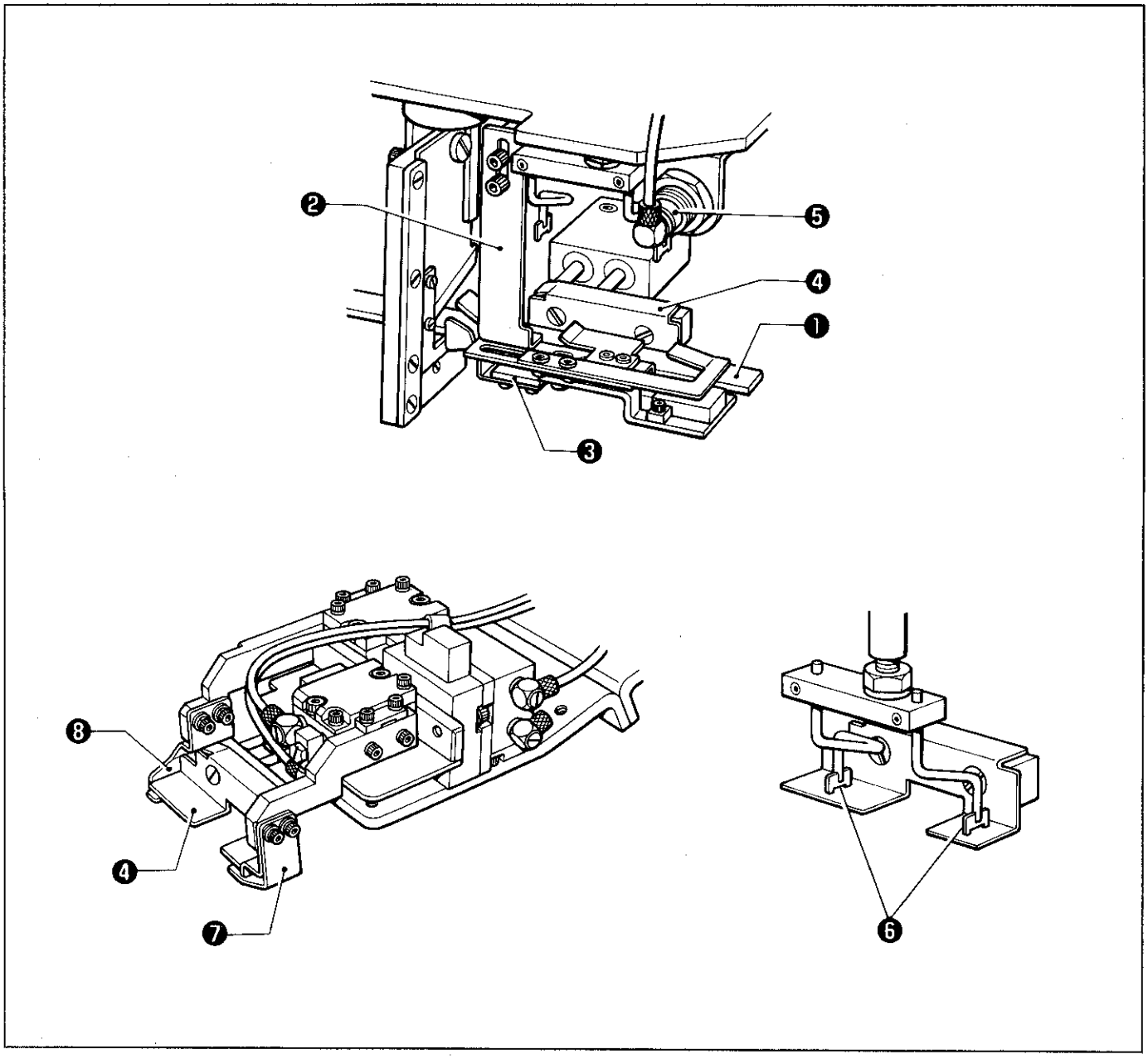


1) The belt loop ❷ threaded through the top of the channel ❶ is clamped between the actuator ❸ and the channel ❶ and then fed.

2) When the actuator ❸ moves in response to the thickness of the belt loop ❷, the actuator ❸ covers both the loop empty sensor ❹ and the seam joint sensor ❺ during normal loop feeding. Then, when the seam joint section of a belt loop ❷ is fed, the seam joint sensor ❺ is uncovered. When the belt loop ❷ is finished, the loop empty sensor ❹ is uncovered.

3) At the control circuit board, a judgement is made based on this signal as to whether belt loop ❷ supply is normal, a seam joint has been encountered, or there is no belt loop.

3 Belt loop folding mechanism

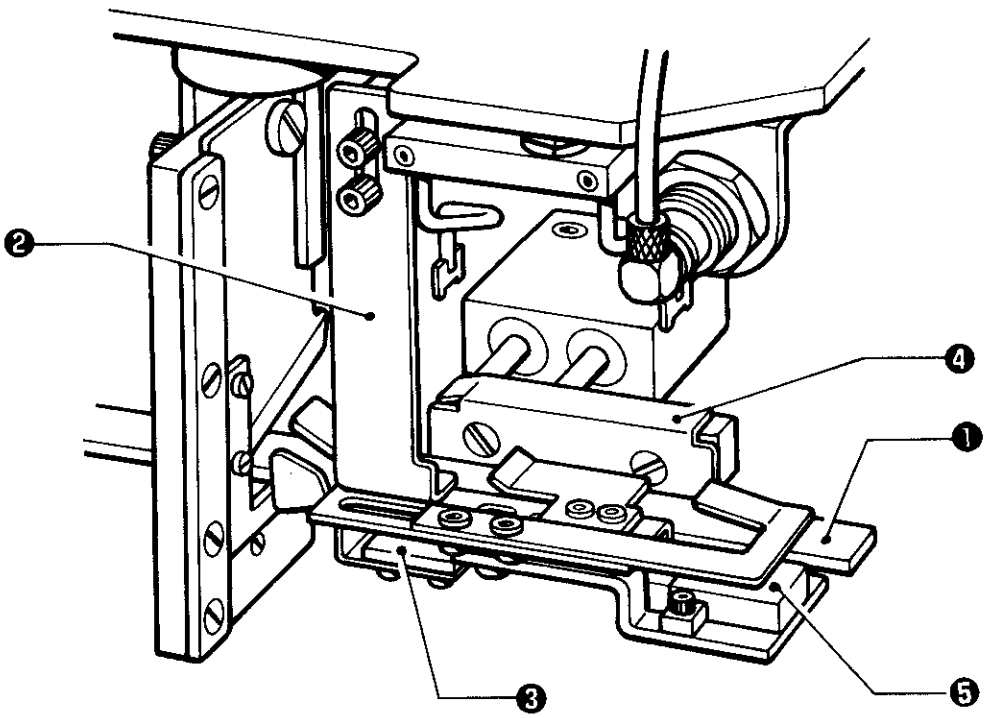


1) The belt loop fed mechanism feeds the belt loop ❶ to the supporter plate ❹ while it is guided by the upper loop guide ❷ and the lower loop guide ❸.

2) The belt loop ❶ is pressed onto the supporter plate ❹ by the loop guide unit stopper cylinder ❺ and is held by the loop presser feet ❻.

3) The cut belt loop ❶ is folded into the supporter plate ❹ by fold plate (F) ❼ and fold plate (B) ❽.

[4] Belt loop set detection mechanism



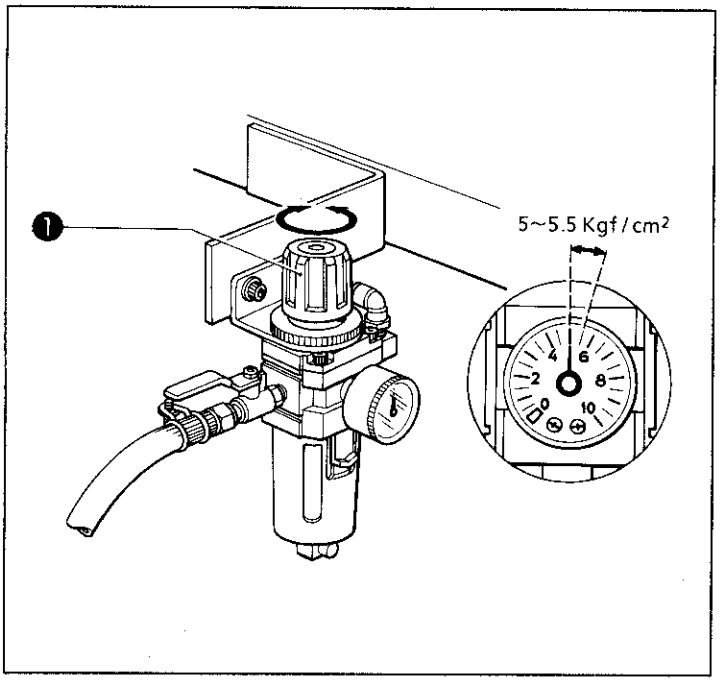
1) The belt loop fed mechanism feeds the belt loop ❶ to the supporter plate ❹ while it is guided by the upper loop guide ❷ and the lower loop guide ❸.

2) There is a loop set sensor ❺ on the lower loop guide ❸ which detects the edge of the belt loop ❶ that is fed along the top of the supporter plate ❹.

3) At the control circuit board, a judgement is made based on this signal as to whether the belt loop ❶ has been fed normally or not.

ADJUSTMENT

1 Air pressure mechanism

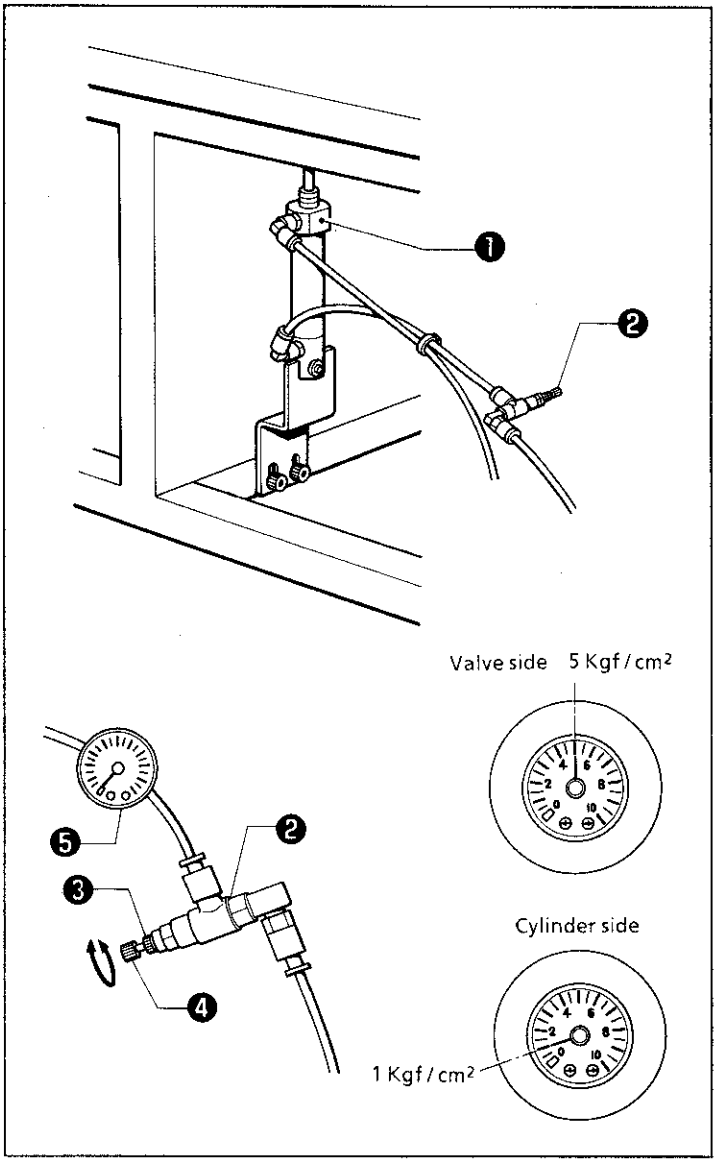


1.Air unit pressure

1) Lift the cap ❶ of the air unit upwards and turn the cap ❶ to adjust the air unit pressure so that it is 5~5.5 kgf/cm².

2) If the amount of air from the air blow for removing cuttings has been adjusted to a high setting, adjust the air unit pressure to a higher setting.

* If this adjustment is not made correctly and pressure is too low, error code E.-40 will be displayed.



2.Regulator pressure

1) Loosen the nut ❸ of the regulator ❷ on the machine start cylinder ❶ and turn the screw ❹ to adjust so that the regulator pressure is 1 kgf/cm² when the air unit pressure is 5 kgf/cm².

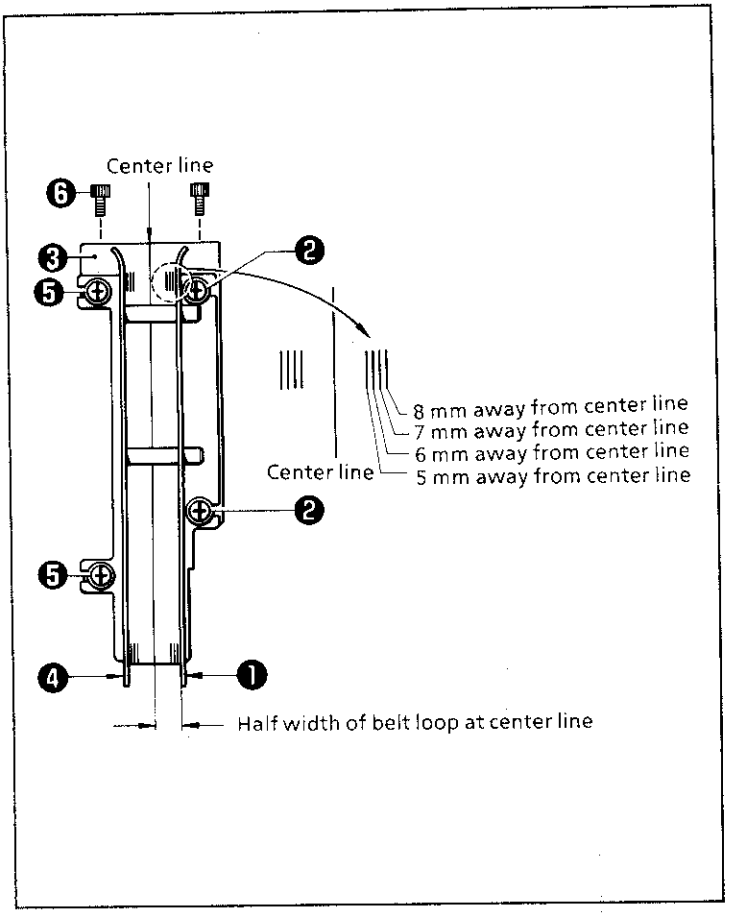
2) A pressure gauge is necessary for this adjustment. The adjustment has already been made when the machine is shipped, so never adjust if you have no pressure gauge.

3) Connect the pressure gauge ❺ between the regulator ❷ and the machine start sensor ❶ and make the adjustment.

* If this adjustment is not made correctly and pressure is too low, the starting speed of the machine start cylinder ❶ will be too fast and shocks will be large. Cylinder return will also be poor.

* If this adjustment is not made correctly and pressure is too high, the cycle time will be too long.

[2] Belt loop guide mechanism



Channel width

1) Adjust width the channel assembly to be as narrow as possible so that the seam joint sections of the belt loop still pass through smoothly.

2) Loosen the two screws ❷ and move the channel (F) ❶ to the desired position on the channel base ❸ to adjust so that the width of channel (F) ❶ is at the reference width and is half the width of the belt loop.

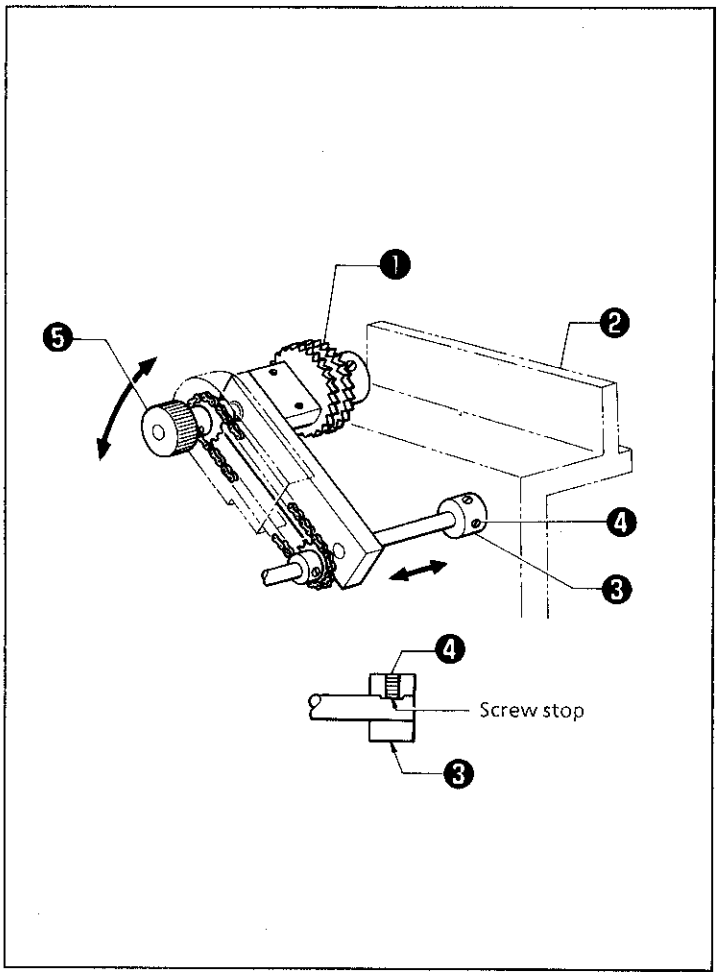
3) After adjusting channel (F) ❶, loosen the two screws ❺ and move channel (B) ❹ to adjust it so that the seam joint sections of the belt loop pass through smoothly.

4) Loosen the two bolts ❻ about 7 mm and remove the channel assembly to carry out adjustment. If only adjusting channel (B) ❹, it is not necessary to remove the channel assembly.

* If this adjustment is not made correctly and the width is too narrow, defective feeding of the belt will result. If it is too wide, bad centering of the V-cut will result.

5) Channel (F) ❶ is used as the reference, but if the V-cut is badly centered, ignore the scale on the channel base ❸, and instead adjust by moving channel (F) ❶ left or right.

3 Belt loop feed mechanism

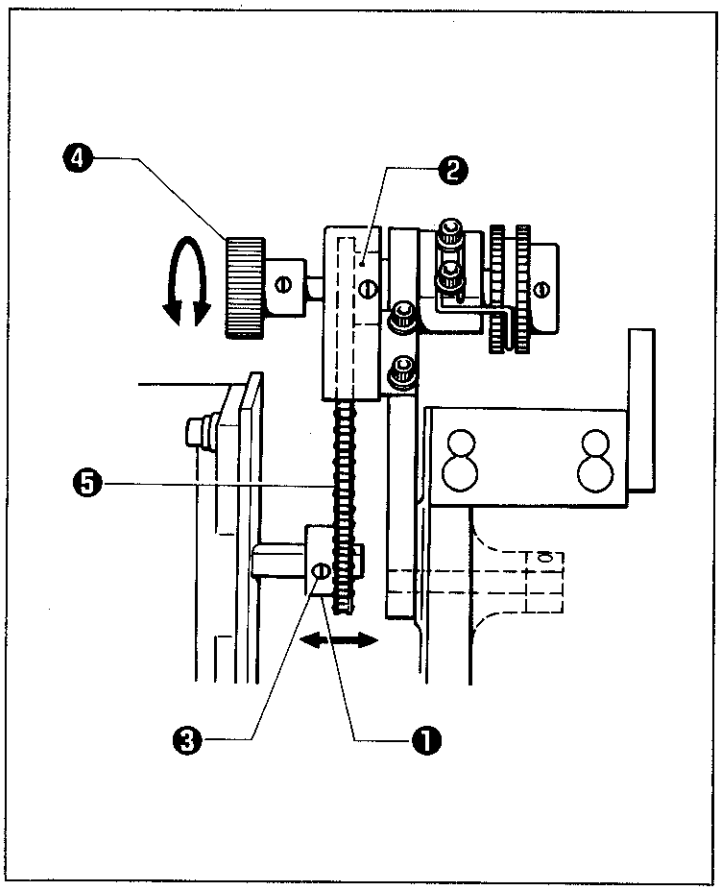


1.Movement of feed roller

1) Loosen the two screws ❹ and move the set collar ❸ to adjust so that the feed roller ❶ moves smoothly with no gap between it and the unit base ❷ and set collar ❸. Tighten the two screws ❹ from the screw stop side.

2) Move the knob ❺ up and down to check the movement.

* If this adjustment is not made correctly, defective feeding of the belt loop will result.

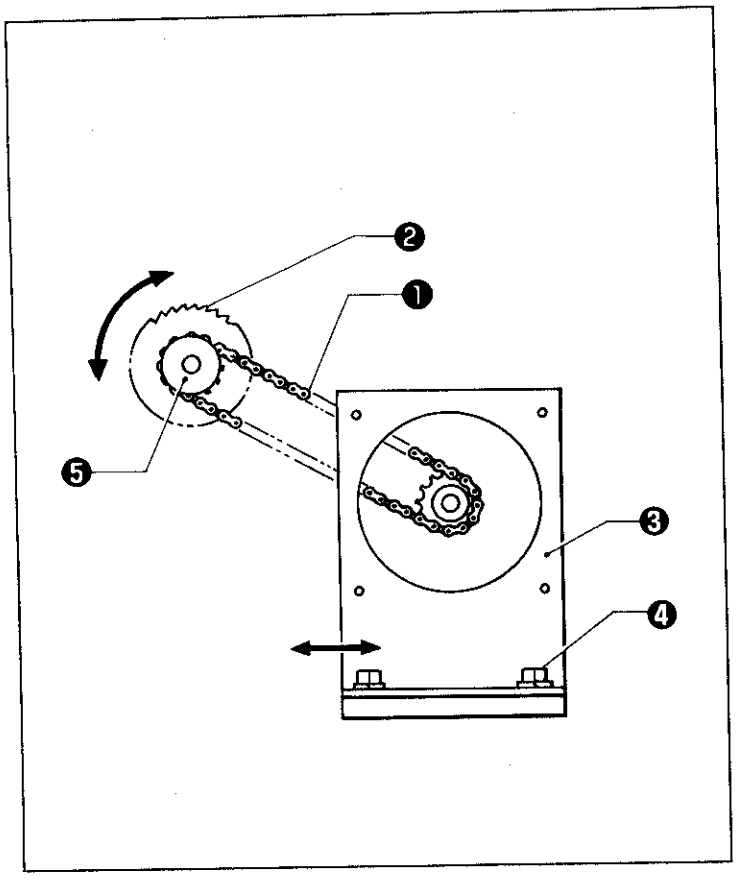


2.Position of sprocket wheel (B)

1) Loosen the two screws ❸ and move sprocket wheel (B) ❶ to adjust so that it is aligned with sprocket wheel (A) ❷. Tighten the two screws ❸ from the screw stop side.

2) Turn the knob ❹ to check the movement.

* If this adjustment is not made correctly, excessive wear of the chain ❺ will result.

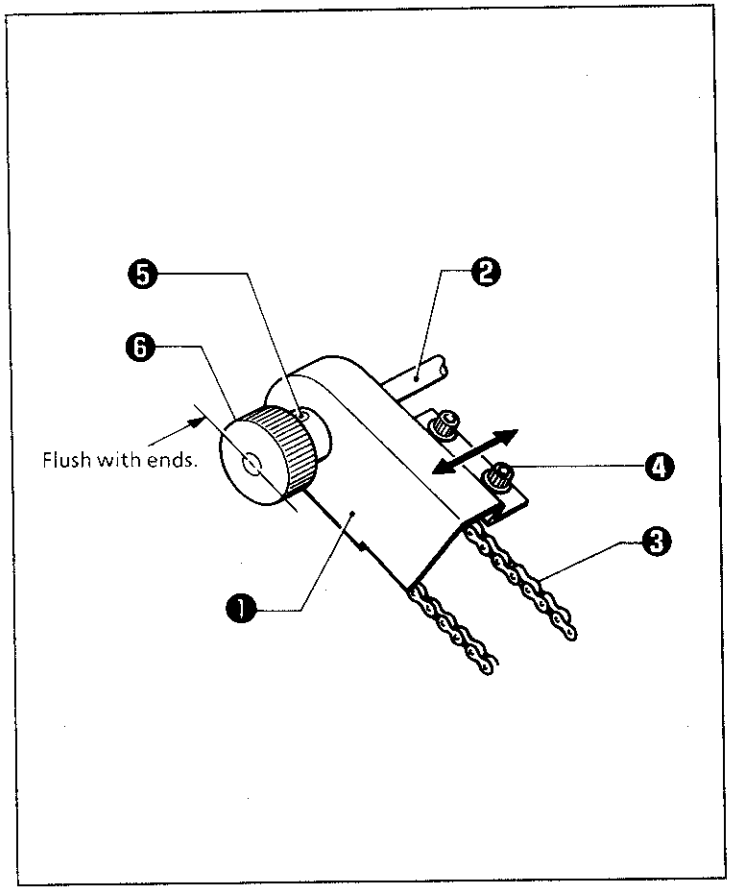


3.Chain tension

1) Loosen the two bolts ❹ of the motor bracket ❸ and move the motor bracket ❸ to adjust so that the tension of the chain ❶ does not interfere with the smooth turning of the feed roller ❷.

2) Move the knob ❺ up and down to check the movement.

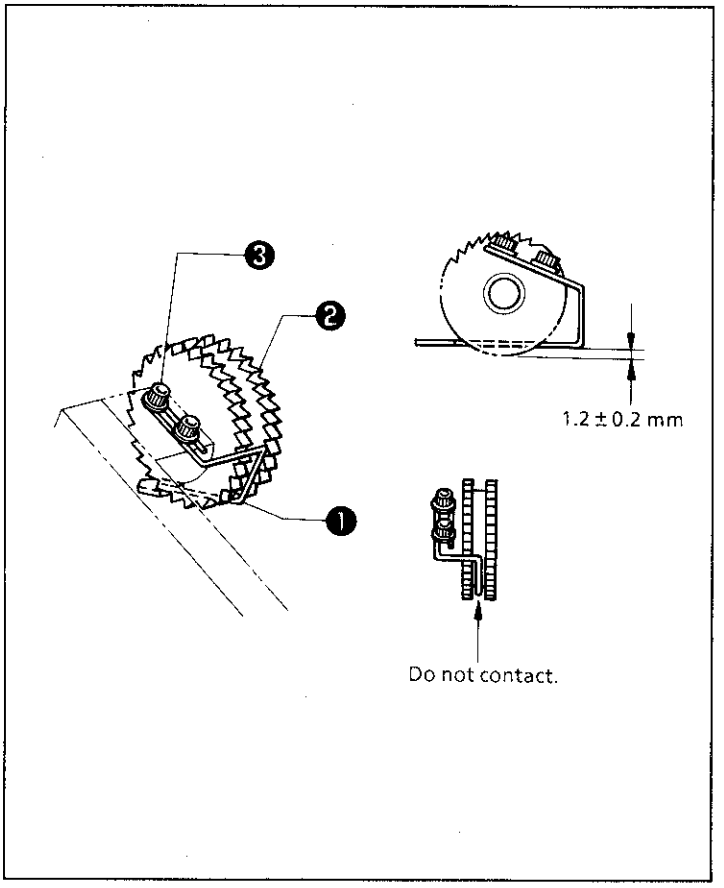
* If this adjustment is not made correctly, defective feeding of the belt loop will result.



4.Position of sprocket wheel cover

1) Loosen the two bolts ❹ and move the sprocket wheel cover ❶ to adjust so that it doesn't contact the roller shaft ❷ and the chain ❸.

2) When removing the sprocket wheel cover ❶, loosen the two screws ❺ and remove the knob ❻. Align the knob ❻ with the edge of the roller shaft ❷ and tighten the two screws ❺ from the screw stop side.

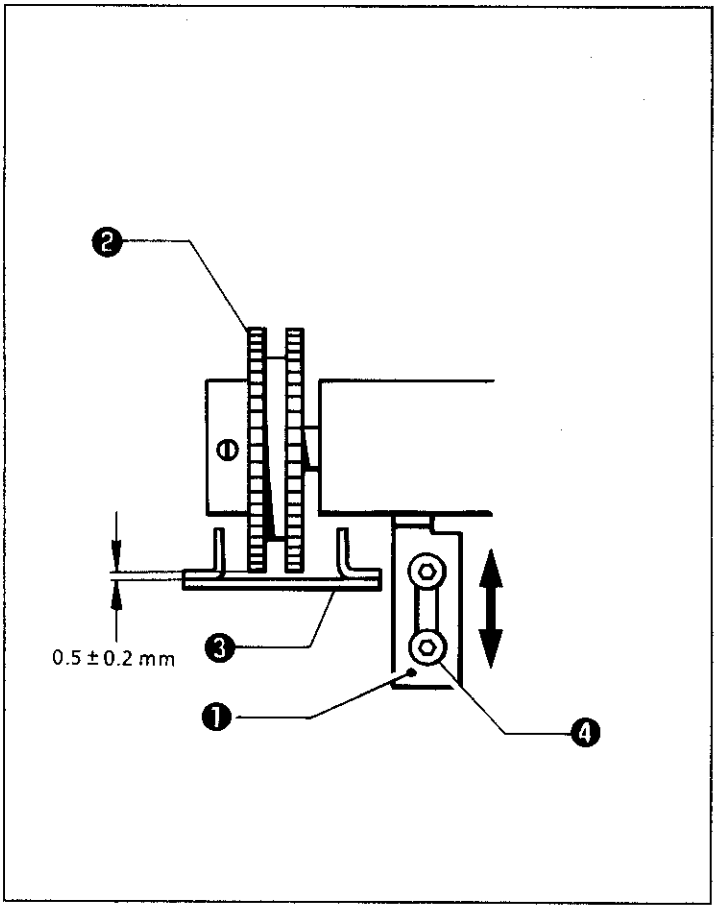


5.Position of feed roller guide

1) Loosen the two bolts ❸ and move the feed roller guide ❶ to adjust so that the lower surface of the feed roller guide ❶ is at a position 1.2 ± 0.2 mm from the gear teeth of the feed roller ❷.

2) Check to be sure that the feed roller guide ❶ does not contact the feed roller ❷.

* If this adjustment is not made correctly, defective feeding of the belt loop will result.

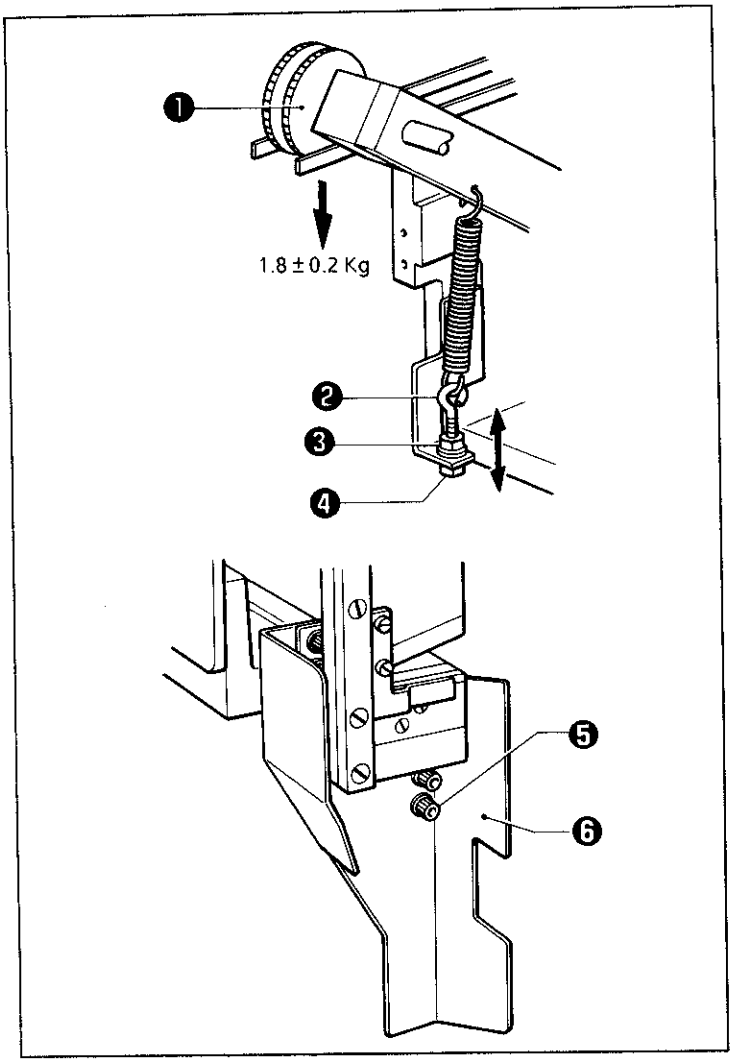


6.Position of feed roller stopper

1) Loosen the two bolts ❹ and move the feed roller stopper ❶ to adjust so that the gap between the feed roller ❷ and channel base ❸ is 0.5 ± 0.2 mm.

2) Check to be sure that the feed roller ❷ does not contact the channel base ❸.

* If this adjustment is not made correctly and the gap is too wide, defective feeding of the belt loop will result. If there is no gap, excessive wear of the channel base ❸ will result.



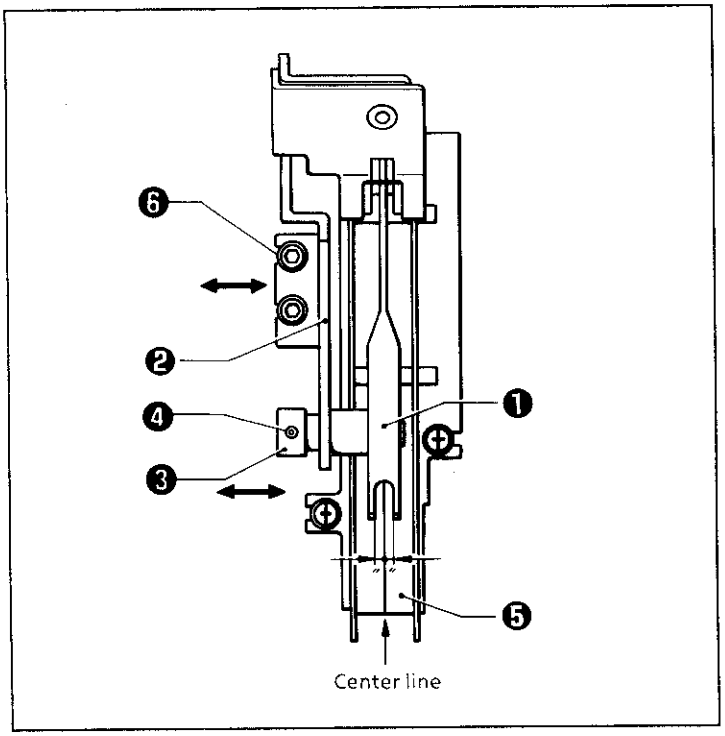
7.Position of spring hook

1) Loosen the nut ❸ of the spring hook ❷ and turn the nut ❹ to adjust so that the pressure of the feed roller ❶ on the belt loop is 1.8±0.2 kg.

2) Remove the two screws ❺ and the material cover ❻ to adjust.

* If this adjustment is not made correctly and the pressure is too weak, defective feeding the belt loop will result.

[4] Belt loop seam joint detection mechanism

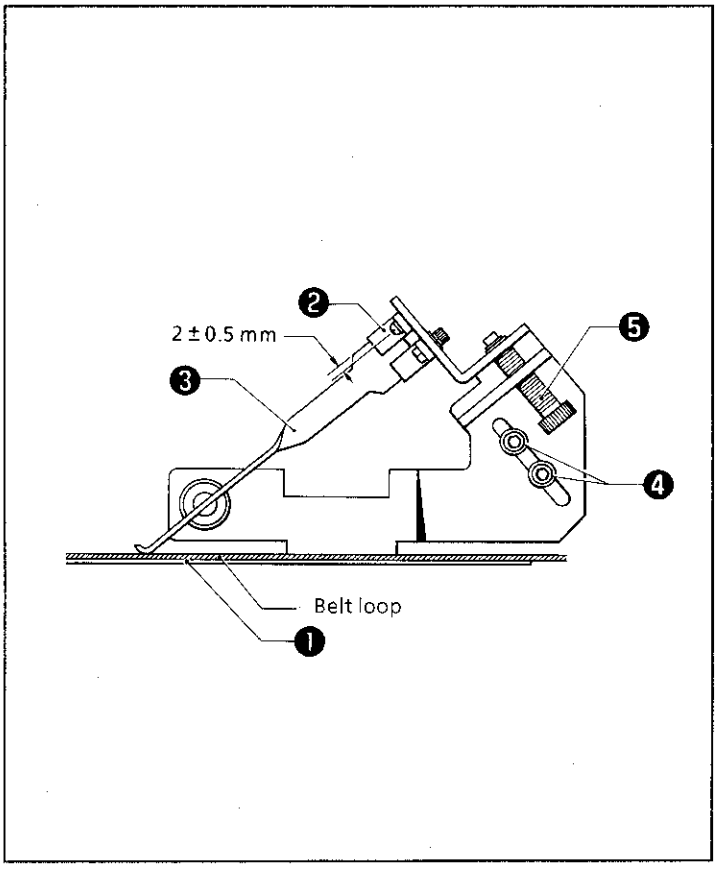


1.Movement and position of actuator

1) Loosen the two screws ❹ and move the set collar ❸ to adjust so that the actuator ❶ moves smoothly with no gap between the seam joint sensor bracket ❷ and set collar ❸. Tighten the two screws ❹ from the screw stop side.

2) Loosen the two screws ❺ and move the seam joint sensor bracket ❷ to adjust so that the tip of the actuator ❶ which touches the belt loop is aligned with the center line of the channel base ❺.

* If this adjustment is not made correctly, error code E.-50 will be displayed.



2.Position of seam joint sensor

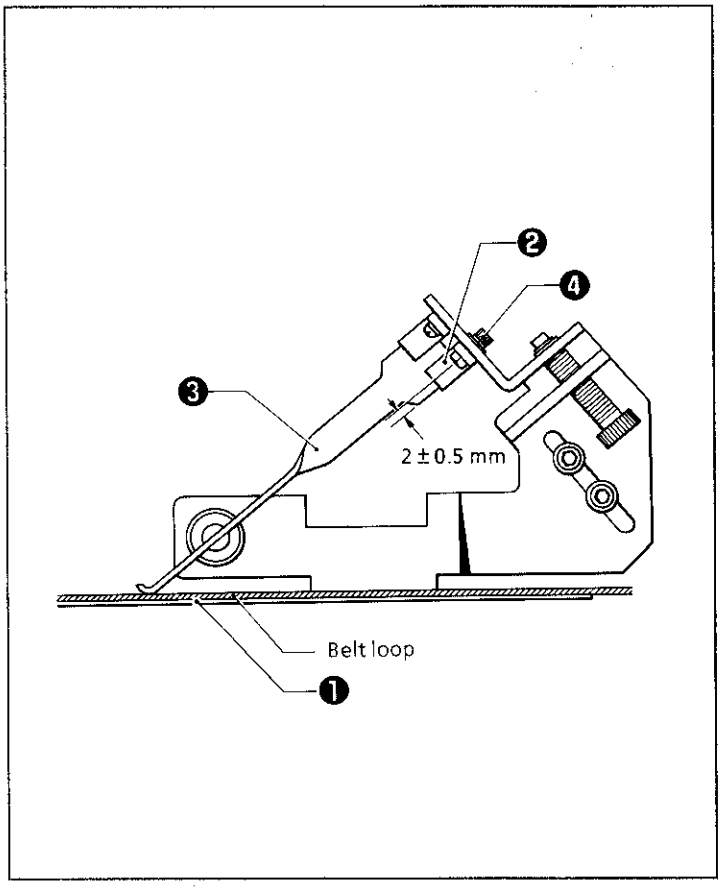
1) Loosen the two bolts ❹ and turn the adjust shaft ❺ to adjust so that the distance between the center of the seam joint sensor ❷ and the edge of the actuator ❸ is 2 ± 0.5 mm when the belt loop is threaded through the channel ❶.

2) Pass a belt loop with no seam joint section through to adjust.

3) Check to be sure that the actuator ❸ does not touch the seam joint sensor ❷, and then tighten the two screws ❹.

* If this adjustment is not made correctly, the seam joint section of the belt loop will be attached and error code E.-50 will be displayed.

* If the belt loop is thin, make the gap smaller than 2 ± 0.5 mm.



3.Position of loop empty sensor

1) Loosen the two screws ❹ and move the loop empty sensor ❷ to adjust so that the distance between the center of the loop empty sensor ❷ and the edge of the actuator ❸ is 2 ± 0.5 mm when the belt loop is threaded through the channel.

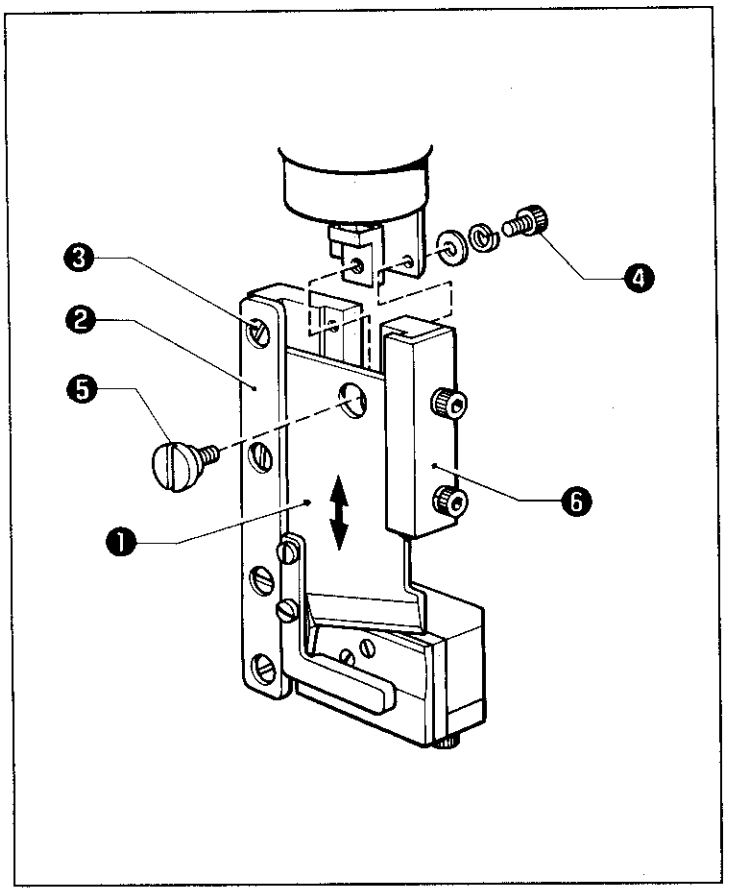
2) Pass a belt loop with no seam joint section through, and after adjusting the position of the seam joint sensor, carry out this adjustment.

3) Check to be sure that the actuator ❸ does not touch the loop empty sensor ❷.

* If this adjustment is not made correctly, feeding of the belt loop will not be possible.

* If the belt loop is thin, make the gap smaller than 2 ± 0.5 mm.

5 Belt loop cutting mechanism



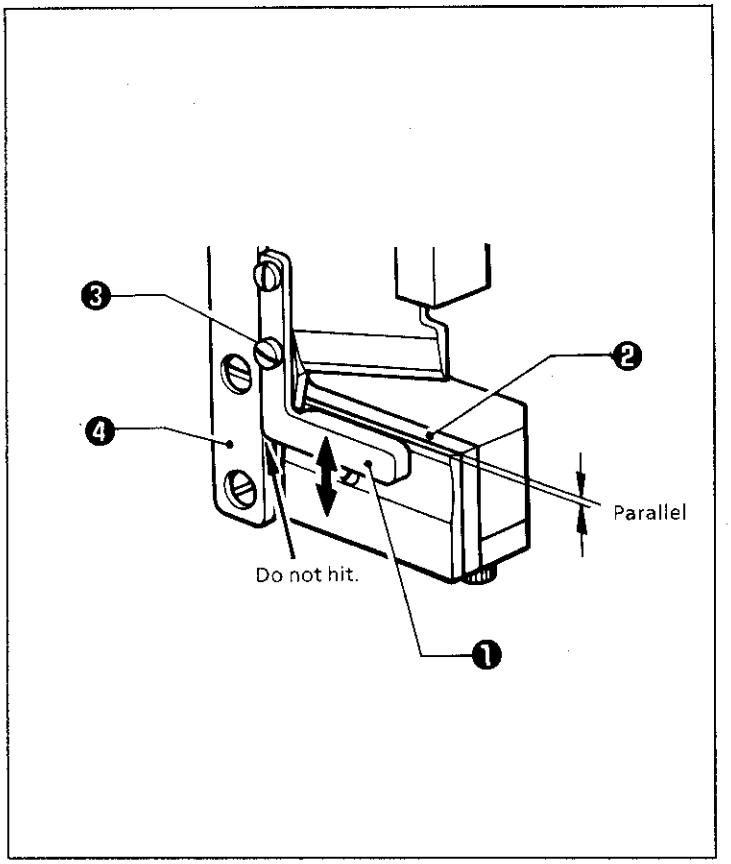
1.Movement of movable knife

1) Loosen the four screws ❸ and move the movable knife guide ❷ to adjust so that the movable knife ❶ moves up and down smoothly with no gap between the movable knife ❶ and the movable knife guide ❷.

2) Remove the two screws ❹ and the screw ❺, and remove the cutter unit ❻ to adjust.

3) Install the cutter unit ❻ so that it is nearly perpendicular.

* If this adjustment is not made correctly, defective cutting of the belt loop will result.

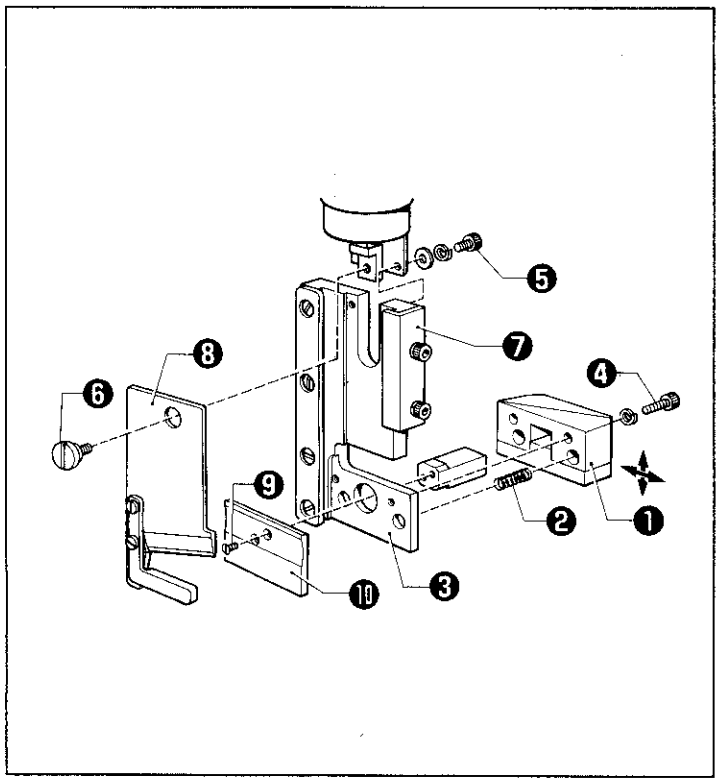


2.Parallelism of loop support and knife base

1) Loosen the two screws ❸ and move the loop support ❶ to adjust so that the loop support ❶ and the knife base ❷ are parallel.

2) Check to be sure that the loop support ❶ does not touch the movable knife guide ❹.

* If this adjustment is not made correctly, defective feeding of the belt loop will result.



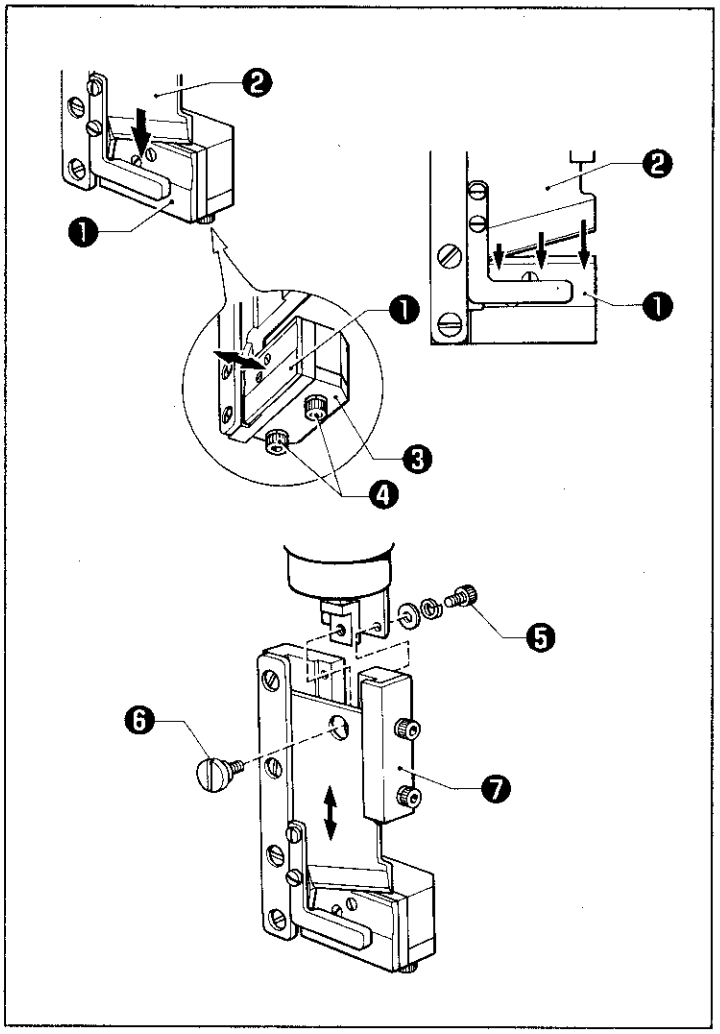
3.Position of fixed knife holder

1) Loosen the two bolts ❹ and move the fixed knife holder ❶ to adjust so that the two holes which the fixed knife springs ❷ of the fixed knife holder ❶ pass through are aligned with the holes of the knife base ❸.

2) Remove the two screws ❺ and the screw ❻ and remove the cutter unit ❼. Remove the movable knife ❽, loosen the two screws ❾, and then remove the fixed knife ❿ and fixed knife springs ❷ to carry out adjustment.

3) After this adjustment, adjust the position of the fixed knife ❿, and install the cutter unit ❼ so that it is nearly perpendicular.

* If this adjustment is not made correctly, the movement of the fixed knife springs ❿ will become poor and it will be difficult to adjust the position of the fixed knife ❿.



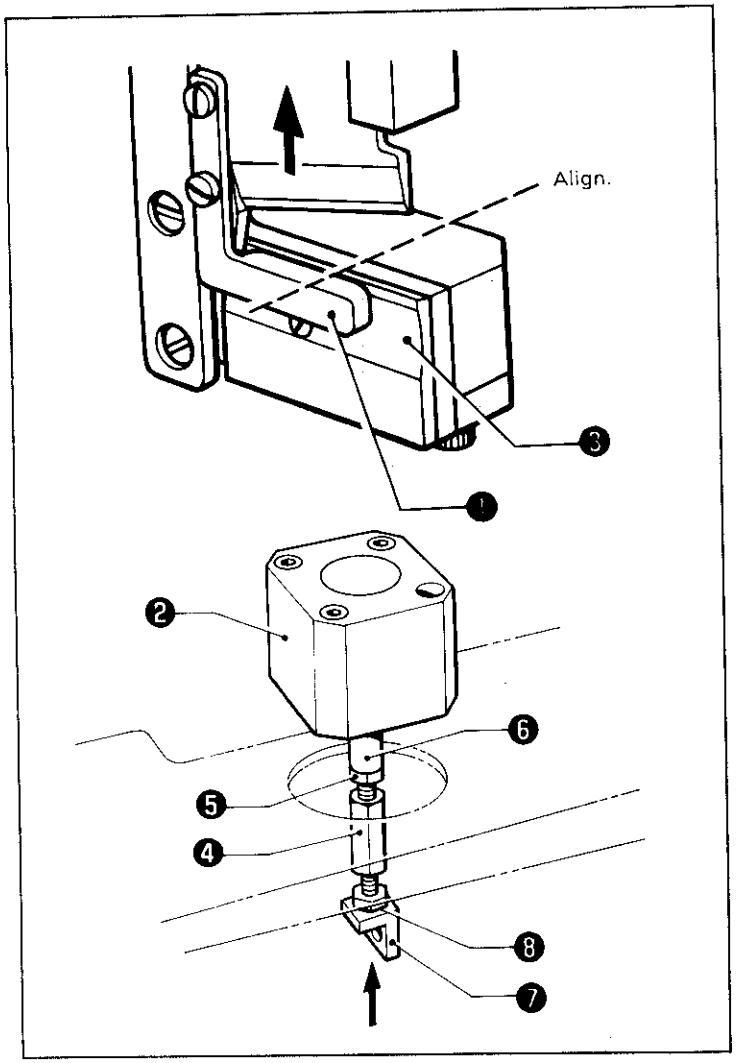
4.Position of fixed knife

1) Loosen the two bolts ❹ of the fixed knife support ❸ and adjust the position of the fixed knife ❶ so that it cuts the belt loop with no gap between the fixed knife ❶ and the movable knife ❷.

2) Remove the two screws ❺ and the screw ❻, and then remove the cutter unit to adjust, and check to be sure that the fixed knife can cut cotton or #80 spun yarn in any position.

3) Install the cutter unit so that it is nearly perpendicular.

* If this adjustment is not made correctly, defective cutting of the belt loop or excessive wear of the fixed knife ❶ and movable knife ❷ will result.



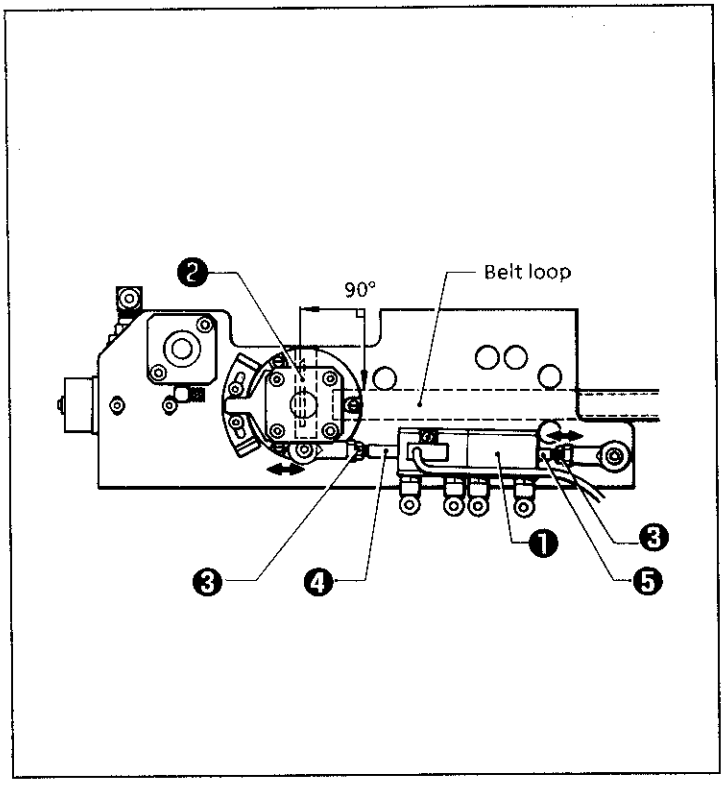
5.Up-down position of loop support

1) Loosen the nut ❺ of the connecting bar ❹ and turn the rod ❻ of the knife up-down cylinder ❷ to adjust so that the loop support ❶ is aligned with the top of the fixed knife ❸ when the knife up-down cylinder ❷ is raised.

2) Close the air cock, bleed the air, and carry out adjustment. Then, open the air cock and check the adjustment.

3) Carry out this adjustment from the cutter up-down cylinder ❷ side without loosening the nut ❽ of the knife joint ❼.

* If this adjustment is not made correctly and the position is too high, defective feeding of the belt loop will result. If it is too low, V-cutting mistakes will result.

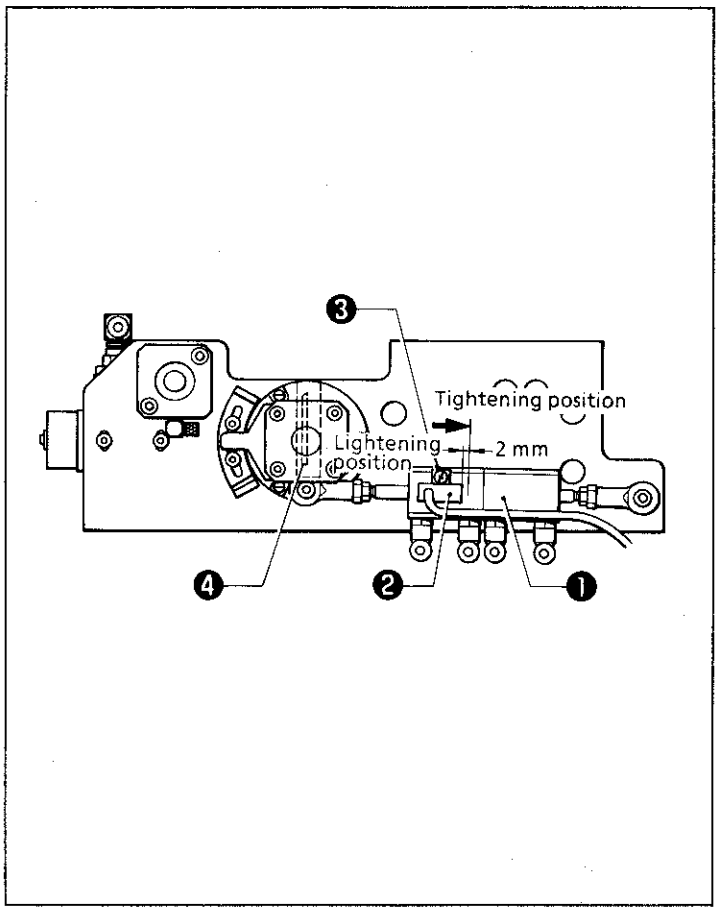


6.Squareness of flat cut

1) Loosen the two nuts ❸ and turn the rod ❹ of the knife rotation (F) cylinder and the rod ❺ of the knife rotation (B) cylinder to adjust so that the belt loop ❸ and fixed knife ❷ are perpendicular when the knife rotation (F) and (B) cylinders are in the center positions.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the LOOP switch to "SET". This will cause the belt loop to be cut, so check to be sure that the belt loop can be cut perpendicularly.

3) This adjustment should be made with DIP SW12 on the control circuit board set to OFF for flat cutting.



7.Position of cutter center sensor

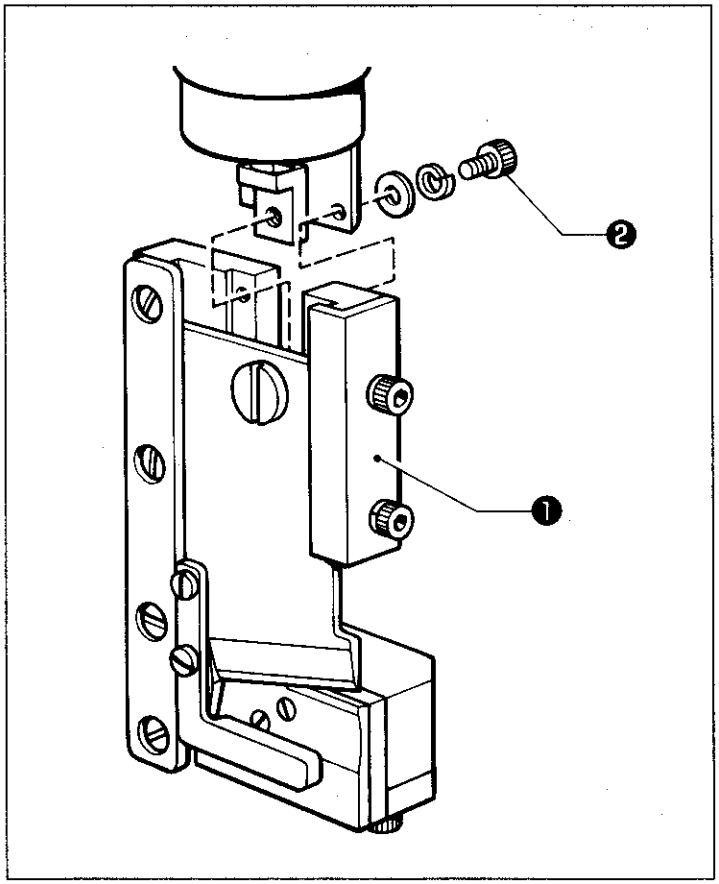
1) Loosen the screw ❸ and move the cutter center sensor ❷ to adjust it so that it illuminates when the knife rotation (F) and (B) cylinders ❶ are in the center position, and is switched off in other positions.

2) After the cutter center sensor ❷ illuminates, move it approximately 2 mm towards the illuminated side, and then tighten it at a torque of about 3 kgfcm.

3) Open the air cock, turn the power switch on, and carry out the adjustment.

4) Check to be sure that the harness of the cutter center sensor ❷ is not pulled when the cutter unit ❹ rotates.

* If this adjustment is not made correctly, error codes E.-30 and E.-31 will be displayed.

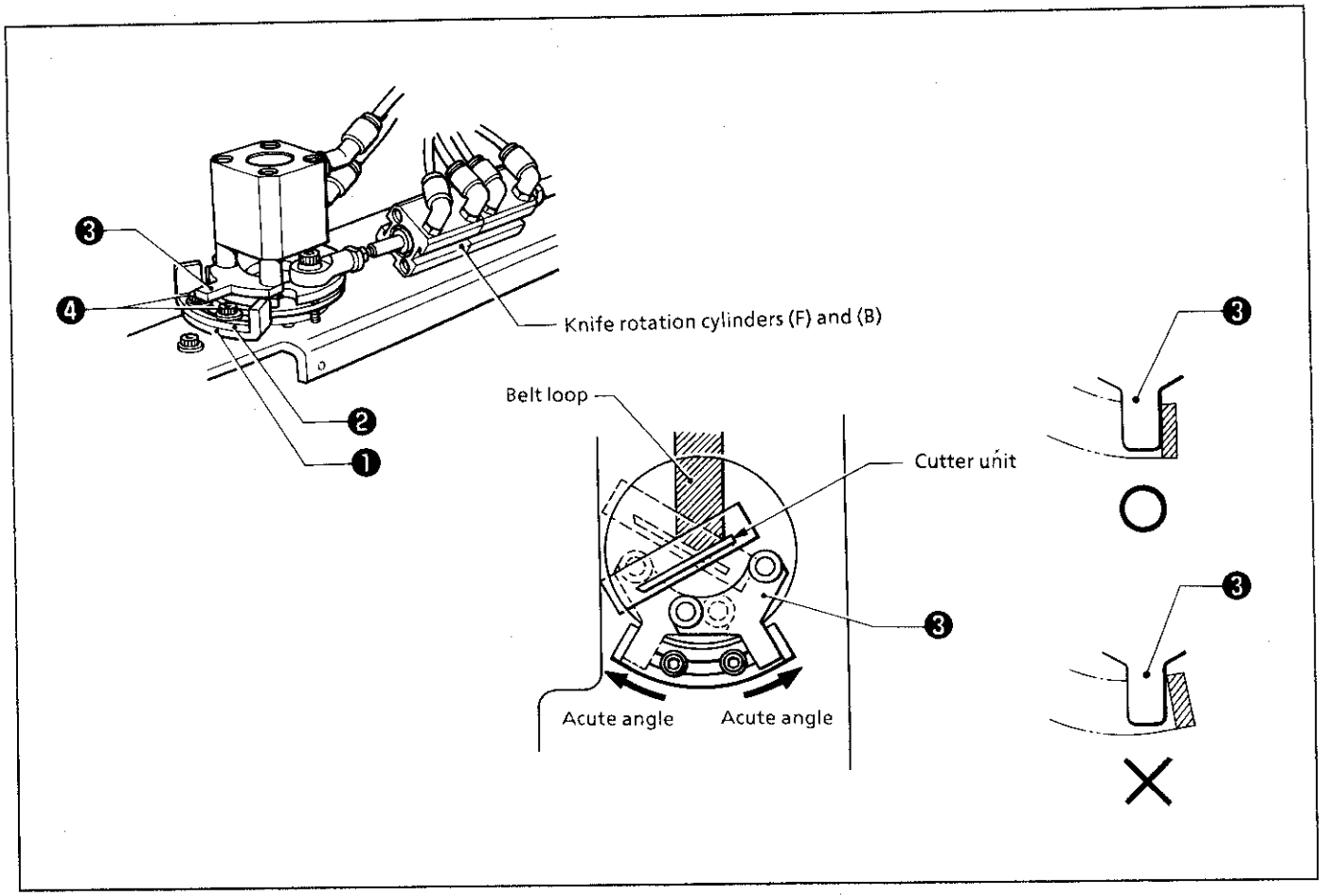


8.Perpendicularity of cutter unit

1) Loosen the two screws ❷ and move the cutter unit ❶ to adjust it so that it is nearly perpendicular.

2) Open the air cock, bleed the air, and carry out the adjustment.

* If this adjustment is not made correctly, bad centering of the V-cut will result.



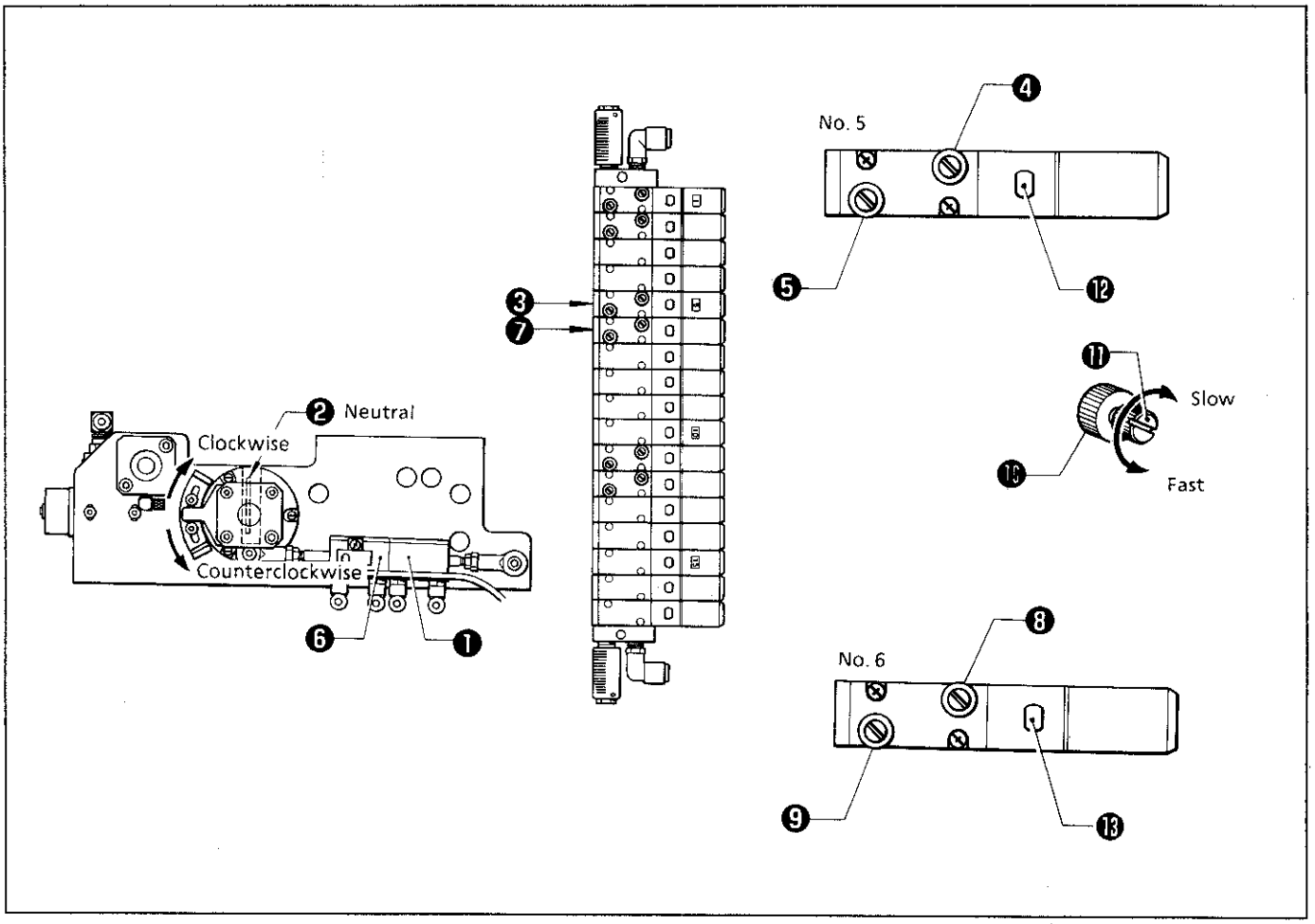
9.Position of knife rotation stopper

1) Loosen the two bolts ❹ and move the knife rotation stoppers (R) ❶ and (L) ❷ to adjust so that they are evenly touching the stopper holder ❸ and so that the left and right angles of the belt loop V-cut are symmetrical when the knife rotation cylinders (F) and (B) rotate.

2) Close the air cock, bleed the air, and carry out the adjustment.

3) Check to be sure that the stopper holder ❸ is touching the knife rotation stoppers (R) ❶ and (L) ❷ evenly and not at an angle.

* If this adjustment is not made correctly, a crooked V-cut angle will result.



10.Speed of knife rotation (F) and (B) cylinders

1) Adjust the speed at which the knife rotation (B) cylinder ❶ turns the cutter unit ❷ from the center to the right by means of throttle valve ❹ of solenoid valve No.5 ❸ , and adjust the return speed by means of throttle valve ❺ so that the speeds are fast with no shocks.

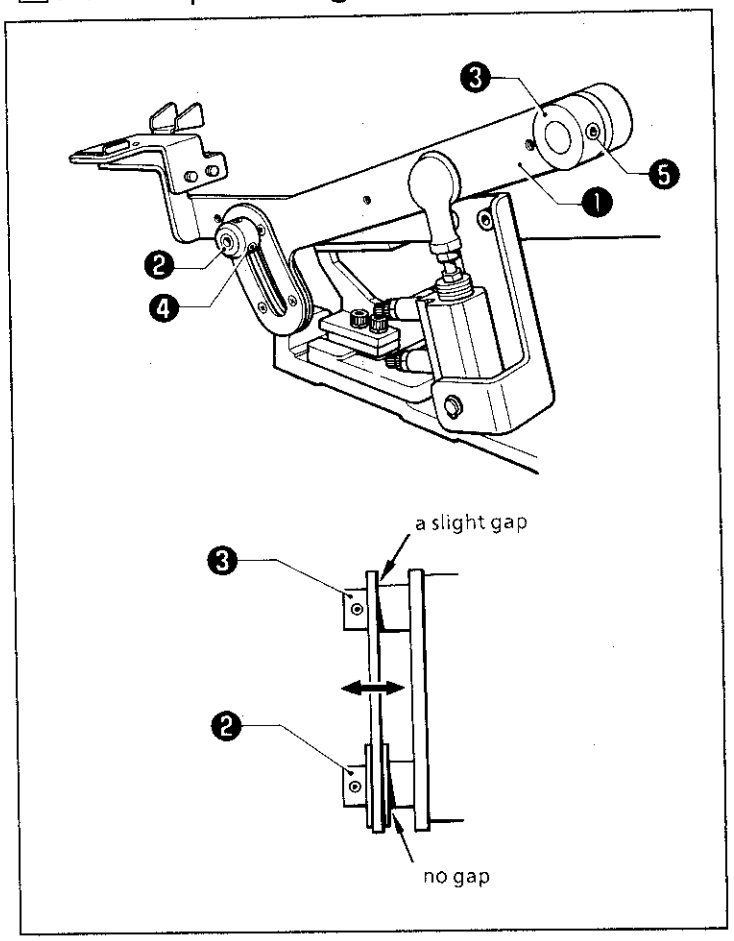
2) Adjust the speed at which the knife rotation (F) cylinder ❻ turns the cutter unit ❷ from the center to the left by means of throttle valve ❽ of solenoid valve No. 6 ❼ , and adjust the return speed by means of throttle valve ❾ so that the speeds are fast with no shocks.

3) Loosen the nut ⓫, turn the adjust screw ⓫ to adjust throttle valve ❹, and then lock with the nut ⓫ . If the adjust screw ⓫ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster. Throttle valves ❺, ❽ and ❾ are adjusted in the same way.

4) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch to start step motion. Then, press check valves ⓬ and ⓭ of solenoid valves No. 5 ❸ and No. 6 ❼ at the step before the step where the cutter rotates. Change to AUTO mode and press the EMERGENCY STOP switch once to return the cutter.

* If this adjustment is not made correctly, a defective V-cut angle will result.

6 Belt loop lower guide mechanism



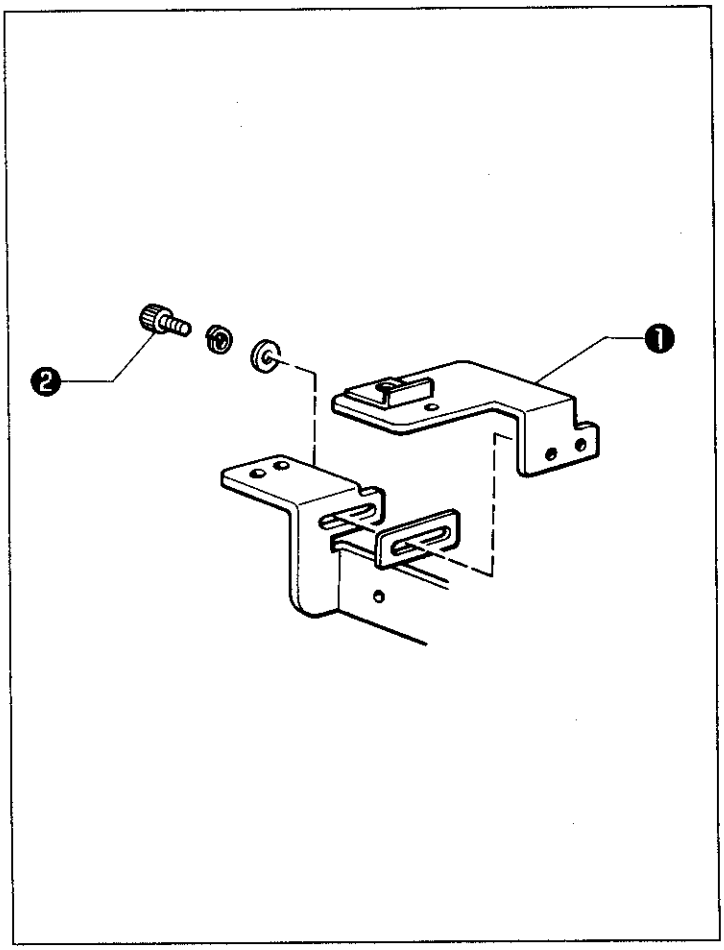
1.Movement of sub-guide

1) Loosen the two screws ❹ and the two screws ❺, and move set collar ❷ and set collar ❸ to adjust so that the loop guide arm ❶ moves smoothly with no gap between it and set collar ❷ and set collar ❸. Tighten the two screws ❹ and the two screws ❺ from the screw stop side.

2) Be particularly careful to adjust so that there is no gap at set collar ❷. If the movement of the loop guide arm ❶ is poor, adjust so that there is a slight gap at set collar ❸.

3) Close the air cock, bleed the air, and then move the loop guide arm ❶ up and down by hand to adjust.

* If this adjustment is not made correctly, defective guiding of the belt loop guide or problems caused by the loop guide and cutter unit touching during V-cutting will result.

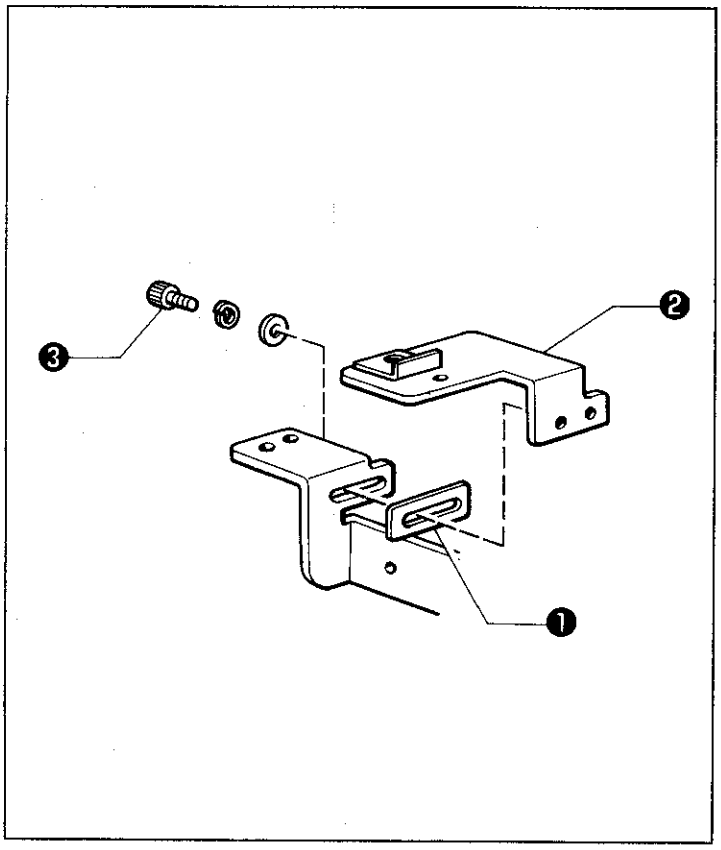


2.Appropriate length of sub-guide

1) The sub-guide ❶ used varies depending on the length of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❷ and replace the sub-guide ❶.

3) If the length of the supporter plate selected is close to 50 mm, use sub-guide (B).

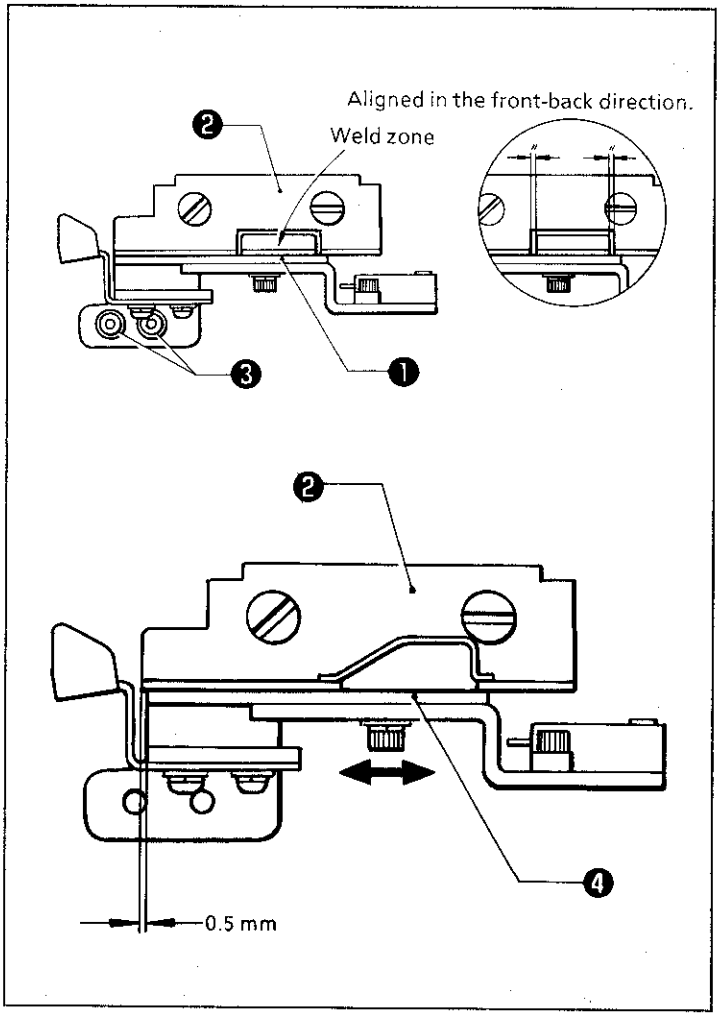


3.Appropriate width of spacer

1) The spacer ❶ used varies depending on the width of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❸ of the sub-guide ❷ and replace the spacer ❶.

* If the correct part is not used, the welded section of sub- guide (A) and the perpendicular surface of the supporter plate will not be aligned.



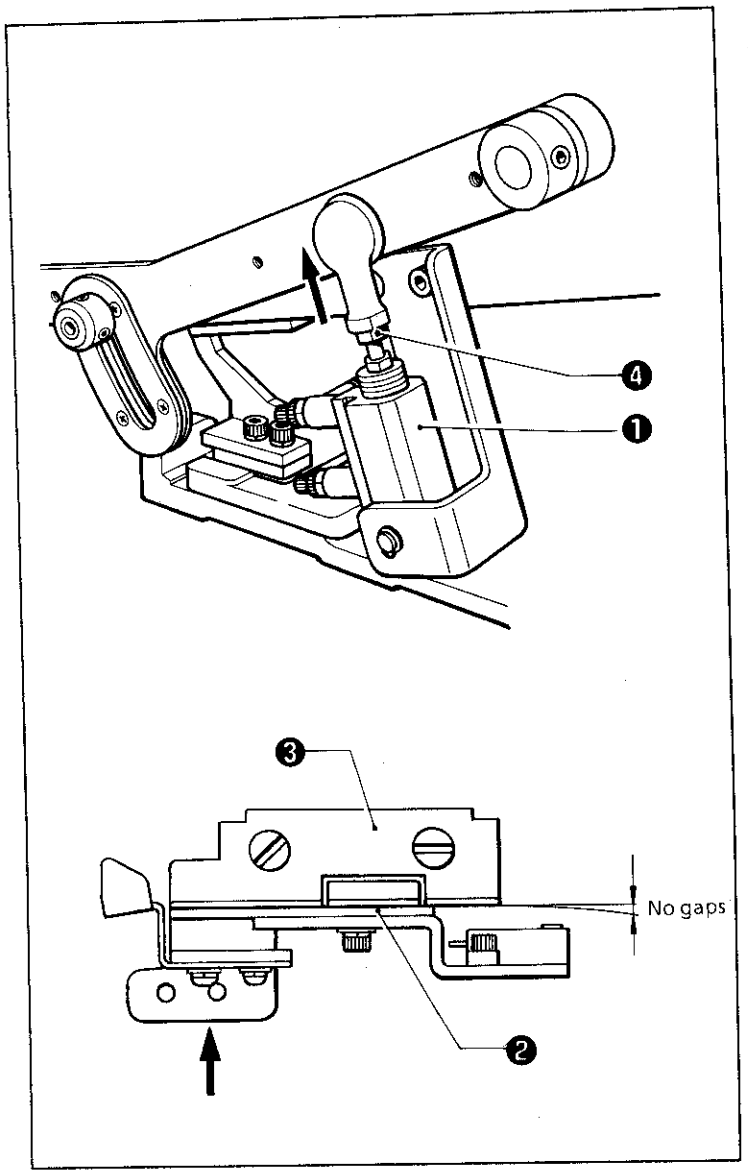
4.Front-back position of sub-guide

1) Loosen the two bolts ❸ and move the sub-guide ❶ to adjust so that the welded section of the sub-guide ❶ and the thread recesses of the supporter plate ❷ are aligned in the front-back direction and the sub-guide ❶ is parallel to the supporter plate ❷ when the sub-guide ❶ is raised to guide the supporter plate ❷.

2) If the sub-guide ❹ has no welded section, adjust the front-back position so that the gap between the sub-guide ❹ and the supporter plate ❷ is approximately 0.5 mm.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch once to adjust with the sub-guide ❶ guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the sub-guide ❶.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.

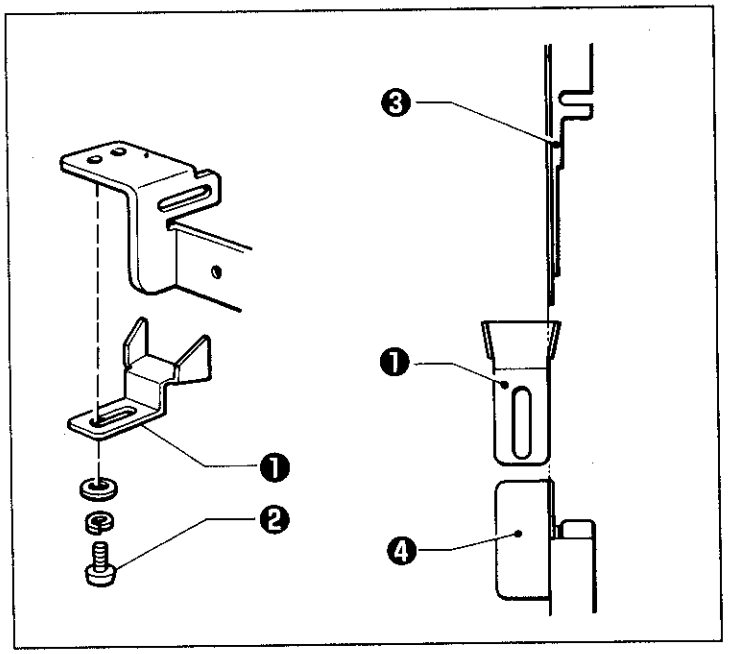


5.Gap between sub-guide and supporter plate

1) Loosen the nut ❹ of the sub-guide cylinder ❶ rod and turn the rod to adjust so that the belt loop is guided with no gap between the sub-guide ❷ and the supporter plate ❸ when the sub-guide cylinder ❶ is raised.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch once to adjust with the sub-guide ❷ guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the sub-guide ❷.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.

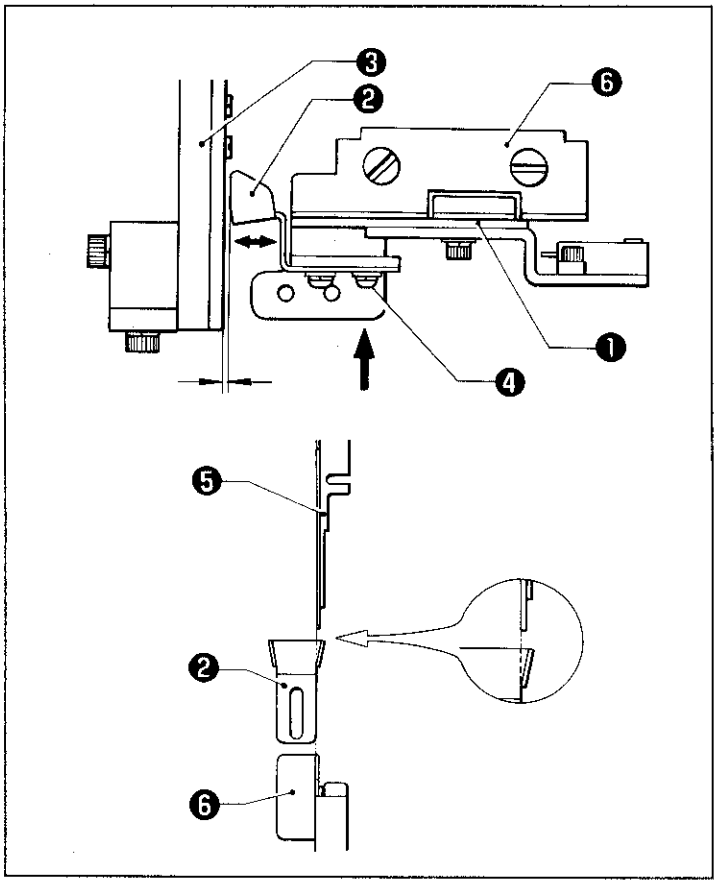


6.Appropriate width of loop guide

1) The loop guide ❶ used varies depending on the width of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❷ of the loop guide ❶ and replace the loop guide ❶.

* If the correct part is not used, the perpendicular surfaces of channel (F) ❸, the loop guide ❶ and the supporter plate ❹ will not be in a straight line.



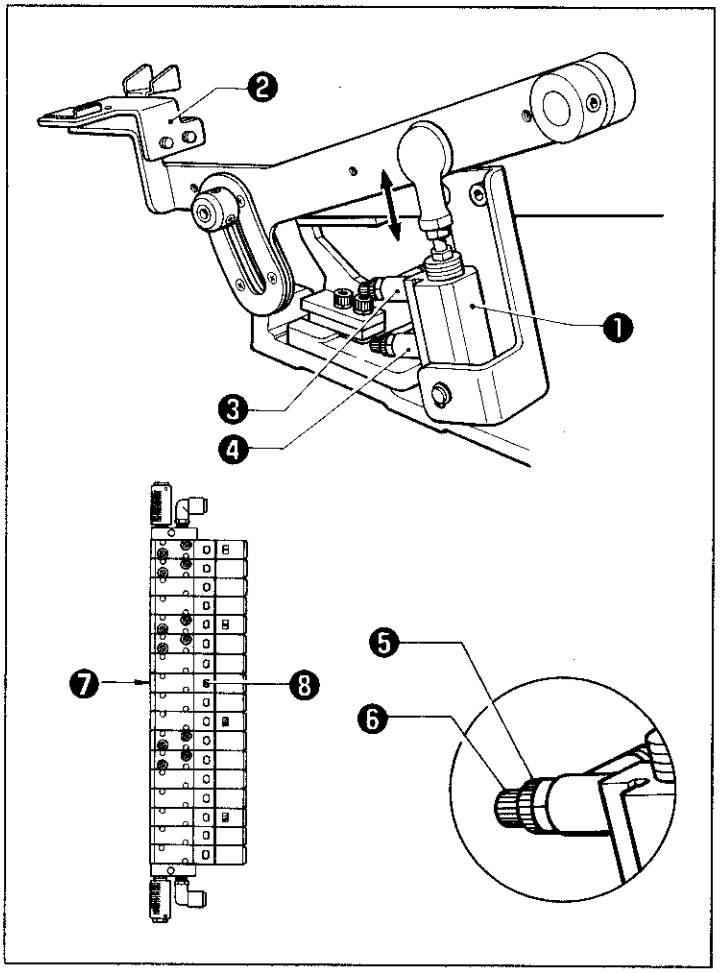
7.Position of loop guide

1) Loosen the two screws ❹ and move the loop guide ❷ to adjust so that there is a small gap between the loop guide ❷ and the cutter unit ❸ without their touching when the sub-guide ❶ is raised.

2) Check to be sure that the perpendicular surfaces of channel (F) ❺, the loop guide ❷ and the supporter plate ❻ are aligned. Be especially careful that the corner of the loop guide ❷ is not to the right of the perpendicular surface of the supporter plate ❻.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch once to adjust with the sub-guide ❶ guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the sub-guide ❶.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.



8.Speed of sub-guide cylinder

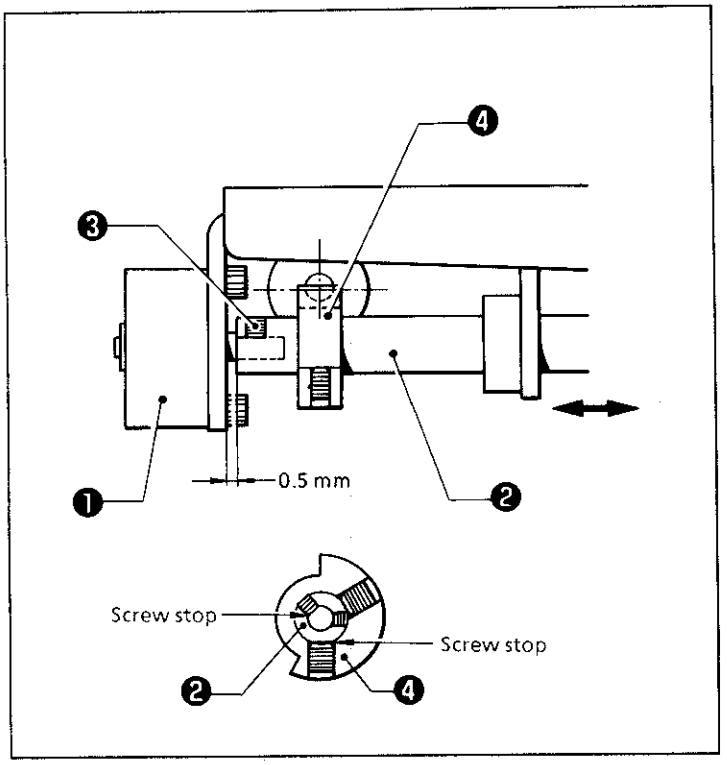
1) Adjust the speed at which the sub-guide cylinder ❶ raises the sub-guide ❷ by means of the throttle valve ❸ and adjust the lowering speed by means of the throttle valve ❹ so that the speeds are fast with no shocks.

2) Loosen the nut ❺ and turn the adjust screw ❻ to adjust the throttle valves ❸ and ❹, and lock them with the nut ❺. If the adjust screw ❻ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

3) Open the air cock, turn the power switch on, and push the check valve ❽ of solenoid valve No. 8 ❼, or while in MANUAL mode, press the EMERGENCY STOP switch once and then change to AUTO mode and press the EMERGENCY STOP switch once. Repeat this procedure to adjust.

* If this adjustment is not made correctly, defective guiding of the belt loop or problems caused by the loop guide and cutter unit touching during V-cutting will result.

7 Belt loop upper guide mechanism



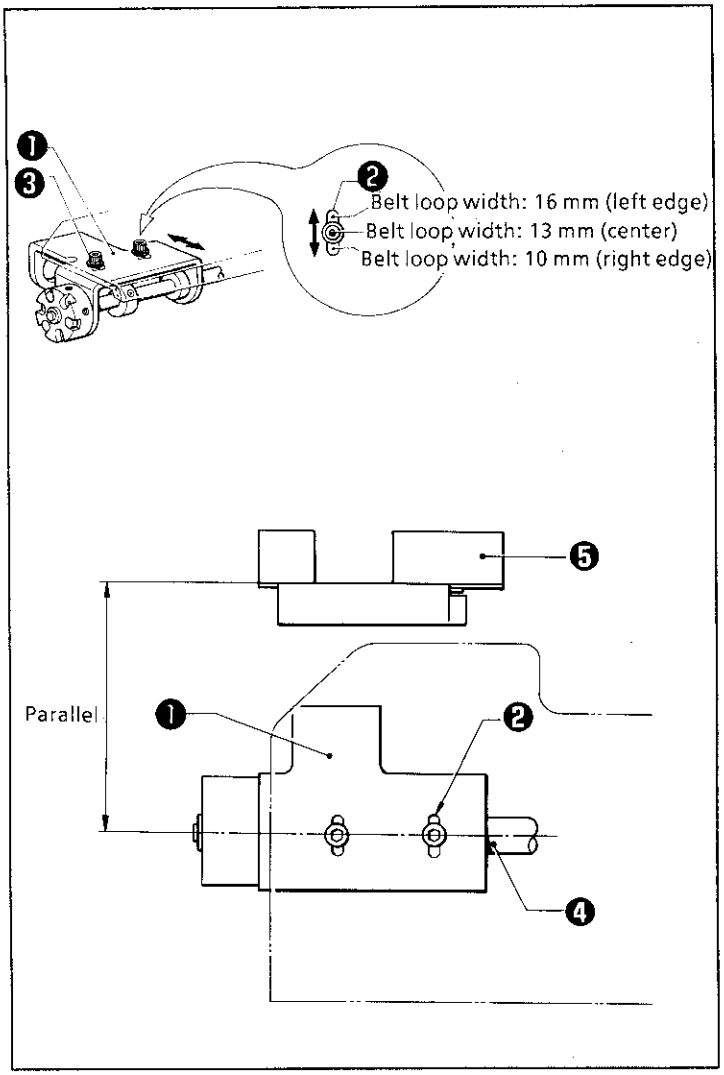
1.Movement and position of loop guide shaft

1) Loosen the two screws ❸ and move the loop guide shaft ❷ to adjust so that the gap between the loop guide unit cylinder ❶ and the loop guide shaft ❷ is approximately 0.5 mm. Tighten the two screws ❸ from the screw stop side.

2) Check to be sure that the loop guide shaft ❷ turns smoothly.

3) Install so that the positions of the screw stop of the loop guide unit cylinder ❶, the screw stop of the loop guide shaft ❷ and the loop guide stopper ❹ are as shown in the illustration.

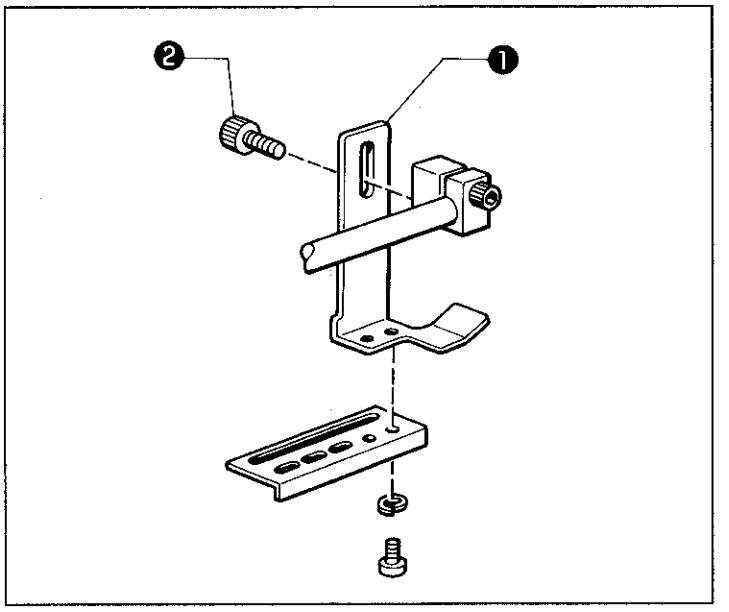
* If this adjustment is not made correctly, defective guiding of the belt loop will result.



2.Position of loop guide unit

1) Because the position of the loop guide unit ❶ should be such that the right edge of the oval hole ❷ is 10 mm, the center is 13 mm and the left edge is 16 mm away from the belt loop respectively, loosen the two screws ❸ and move the loop guide unit ❶ to adjust so that the position of the loop guide unit ❶ matches the position of the belt loop.

2) Tighten the loop guide unit ❶ at the same front and back position as the oval hole ❷ so that the loop guide shaft ❹ is parallel to the perpendicular surface of the supporter plate ❺.

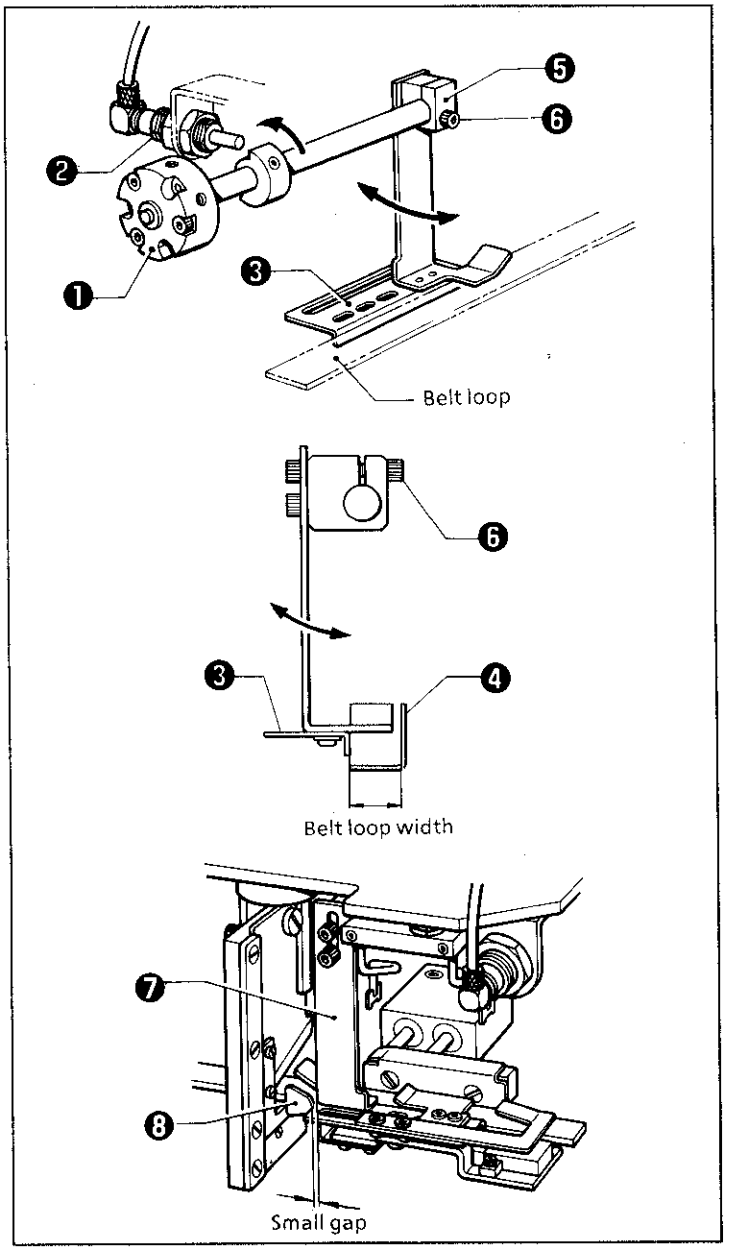


3.Appropriate width of loop guide lever

1) The loop guide lever ❶ used varies depending on the width of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❷ of the loop guide lever ❶ and replace the loop guide lever ❶.

* If the correct part is not used, defective guiding of the belt loop will result.



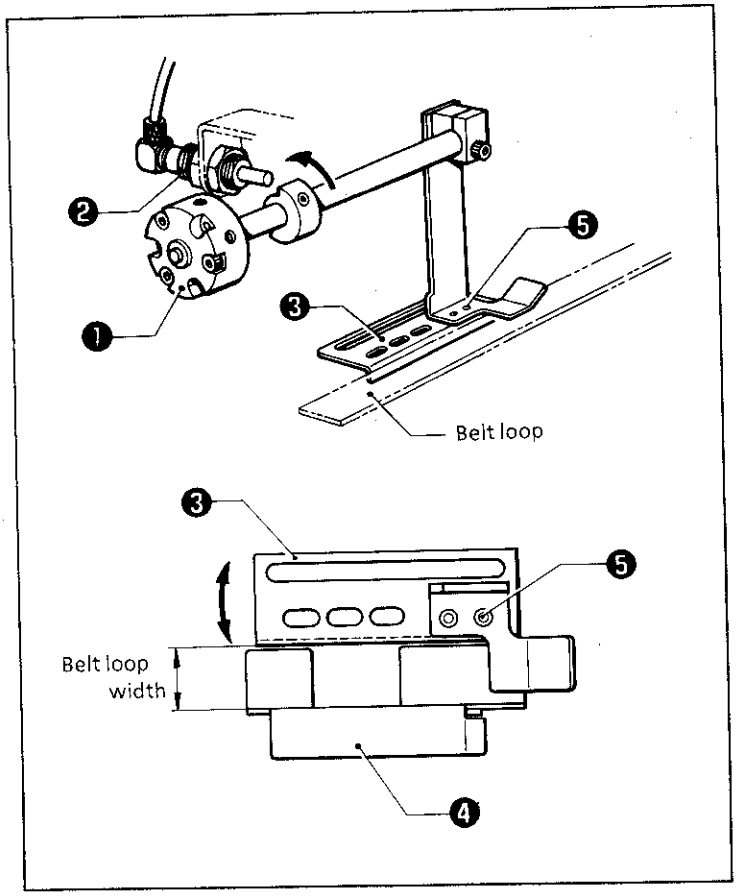
4.Position of loop guide lever

1) Loosen the bolt ❺ of the loop guide bracket ❺ and turn the loop guide bracket ❺ to adjust so that the distance between the perpendicular surface of loop guide (L) ❸ and the perpendicular surface of the supporter plate ❹ is the same as the width of the belt loop when the loop guide unit cylinder ❶ turns to the left and the loop guide unit stopper cylinder ❷ leaves the stop position and guides the belt loop.

2) Move the loop guide lever ❼ back and forth to adjust so that there is a small gap between it and the loop guide ❽ without their touching when the loop guide lever ❼ is installed in an almost perpendicular position.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch three times to adjust with the loop guide unit guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the loop guide unit.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.

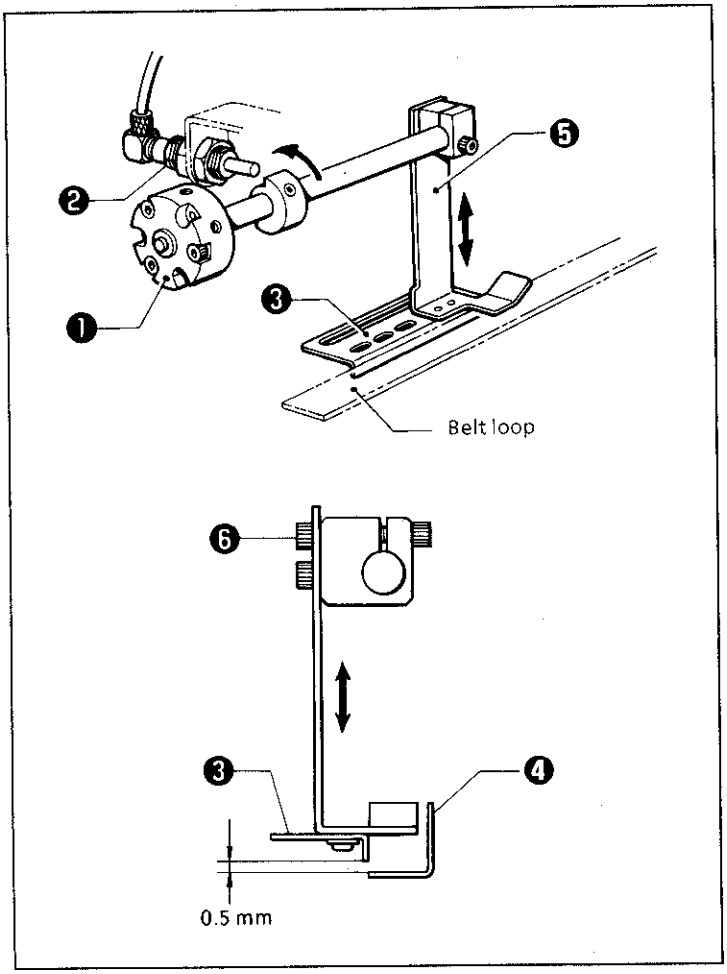


5.Left-right position of loop guide (L)

1) Loosen the two screws ❺ and move the loop guide (L) ❸ to adjust so that the distance between the perpendicular surface of loop guide (L) ❸ and the perpendicular surface of the supporter plate ❹ is the same as the width of the belt loop over the entire length of the loop guide (L) ❸ when the loop guide unit cylinder ❶ turns to the left and the loop guide unit stopper cylinder ❷ leaves the stop position and guides the belt loop. When adjusting the belt loop guide (L) ❸ to the belt loop width, adjustment of "4. Position of loop guide lever" should be carried out at the same time.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch three times to adjust with the loop guide unit guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the loop guide unit.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.

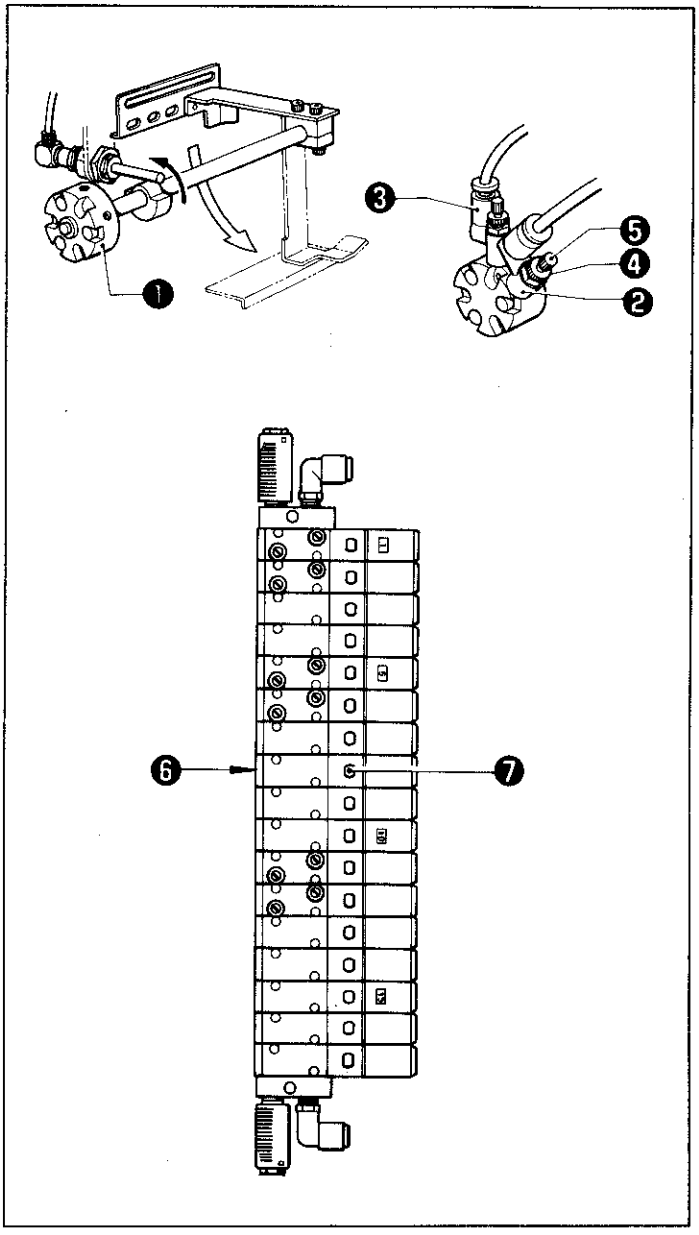


6.Up-down position of loop guide (L)

1) Loosen the two bolts ❻ of the loop guide lever ❺ and move the loop guide lever ❺ to adjust so that the gap between loop guide (L) ❸ and the supporter plate ❹ is approximately 0.5 mm over the entire length of loop guide (L) ❸ when the loop guide unit cylinder ❶ turns to the left and the loop guide unit stopper cylinder ❷ leaves the stop position and guides the belt loop.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch three times to adjust with the loop guide unit guiding the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to return the loop guide unit.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.



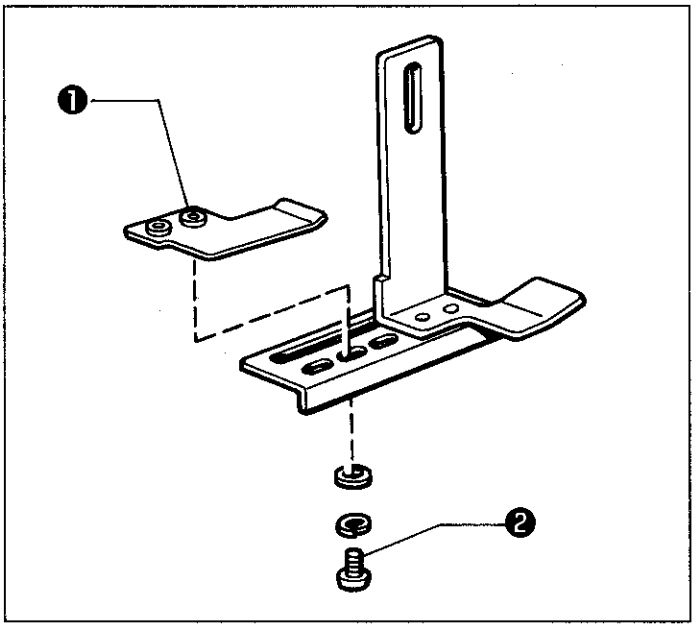
7.Speed of loop guide unit cylinder

1) Adjust the speed at which the loop guide unit cylinder ❶ turns to the left and guides the belt loop by means of the throttle valve ❷ and adjust the return speed by means of the throttle valve ❸ so that the speeds are fast with no shocks.

2) Loosen the nut ❹ and turn the adjust screw ❺ to adjust throttle valves ❷ and ❸, and lock them with the nut ❹. If the adjust screw ❺ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

3) Open the air cock, turn the power switch on, and push the check valve ❼ of solenoid valve No. 8 ❻, or while in MANUAL mode, press the EMERGENCY STOP switch once and then change to AUTO mode and press the EMERGENCY STOP switch once. Repeat this procedure to adjust.

* If this adjustment is not made correctly, defective guiding of the belt loop or problems caused by the loop guide and cutter unit touching during V-cutting will result.

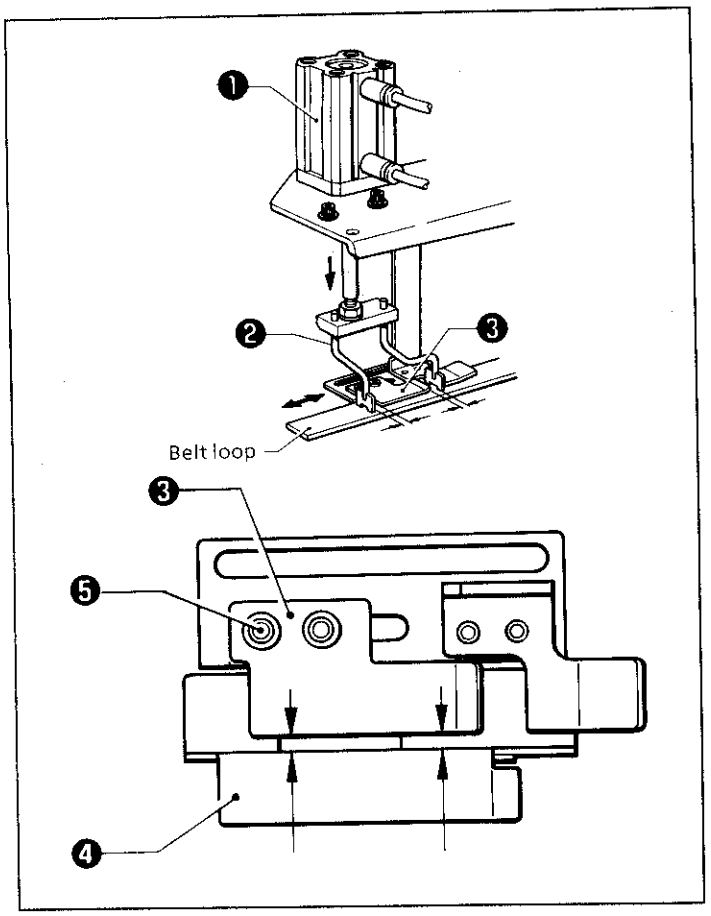


8.Appropriate width and length of loop guide (U)

1) The loop guide (U) ❶ used varies depending on the width and length of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❷ of the loop guide (U) ❶ and replace the loop guide (U) ❶.

* If the correct part is not used, defective setting and guiding of the belt loop will result.



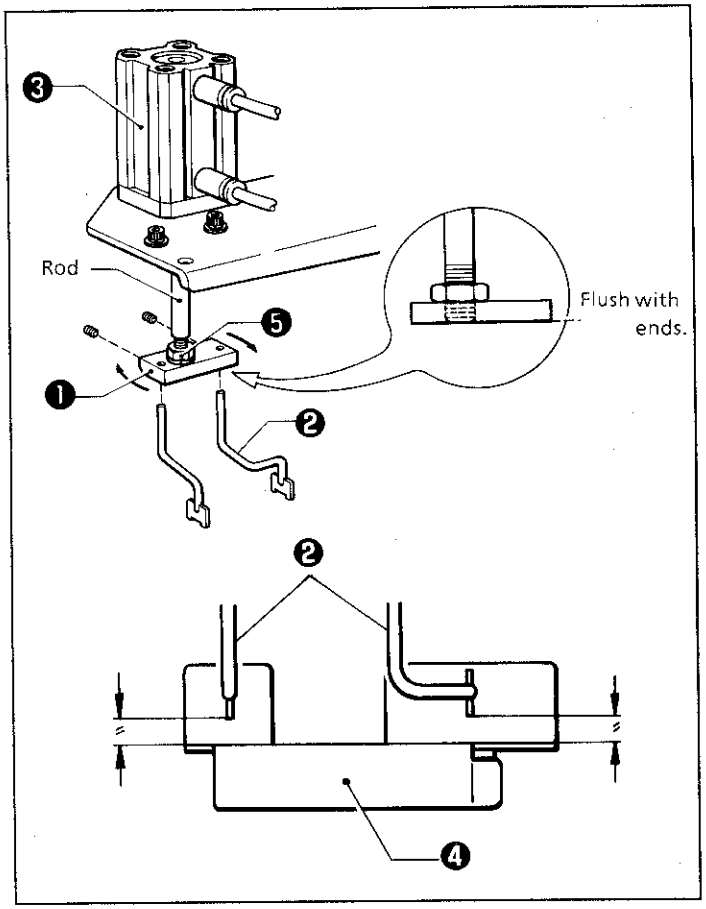
9.Position of loop guide (U)

1) Loosen the two screws ❺ and move loop guide (U) ❸ to adjust so that the gap between loop guide (U) ❸ and the perpendicular surface of the supporter plate ❹ is uniform and so that the gap between loop guide (U) ❸ and the loop presser feet ❷ is uniform without their touching when the machine is operating in MANUAL mode and the loop presser foot cylinder ❶ is lowered so that the loop presser feet ❷ are clamping the belt loop.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch four times to adjust with the loop presser feet ❷ clamping the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to release the belt loop.

* If this adjustment is not made correctly, defective guiding of the belt loop or problems caused by the loop presser feet and loop guide (U) touching will result.

[8] Belt loop guiding and clamping mechanism



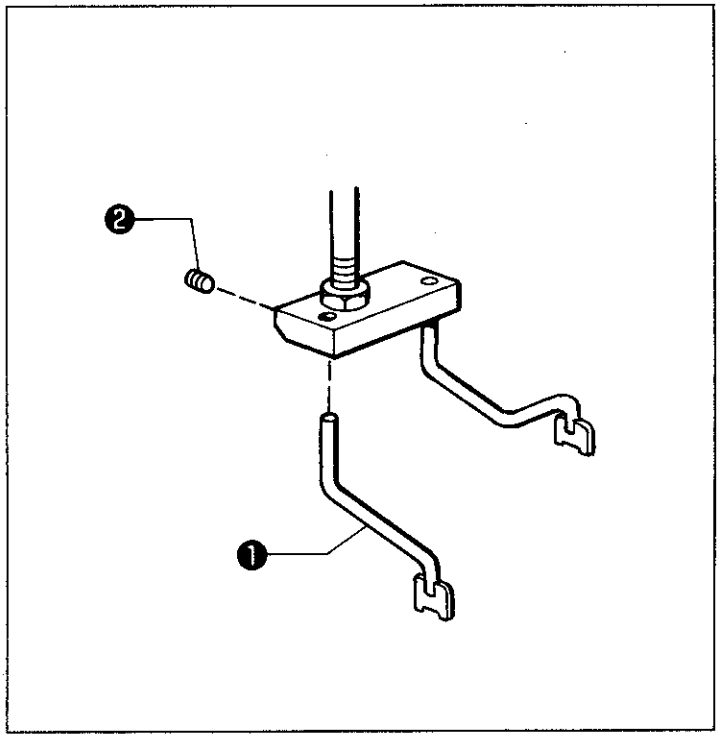
1.Position of loop presser set plate

1) Remove the loop presser feet ❷ and turn the loop presser set plate ❶ until the end of the rod of the loop presser foot cylinder ❸ is aligned with the surface of the loop presser set plate ❶. Then tighten the loop presser set plate ❶ and attach the loop presser feet ❷.

2) Turn the loop presser set plate ❶ to adjust so that the gap between the perpendicular surface of the supporter plate ❹ and the two loop presser feet ❷ is uniform when the machine is operating in MANUAL mode and the loop presser foot cylinder ❸ is lowered so that the loop presser feet ❷ are clamping the belt loop. After adjusting, lock with the nut ❺.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch four times to adjust with the loop presser feet ❷ clamping the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to release the belt loop.

* If this adjustment is not made correctly, defective clamping of the belt loop will result.

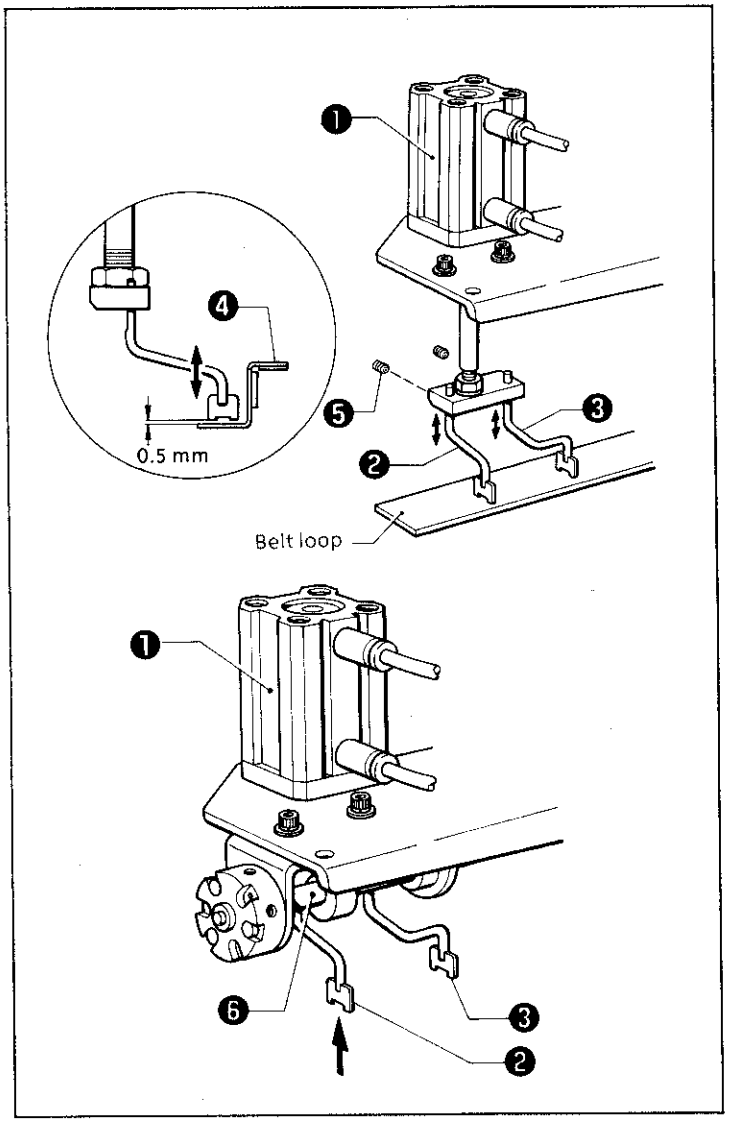


2.Appropriate length of loop presser foot (F)

1) The loop presser foot (F) ❶ used varies depending on the length of the belt loop. (Refer to the Parts Book.)

2) Loosen the screw ❷ of loop presser foot (F) ❶ and replace loop presser foot (F) ❶.

* If the correct part is not used, defective clamping of the belt loop will result.



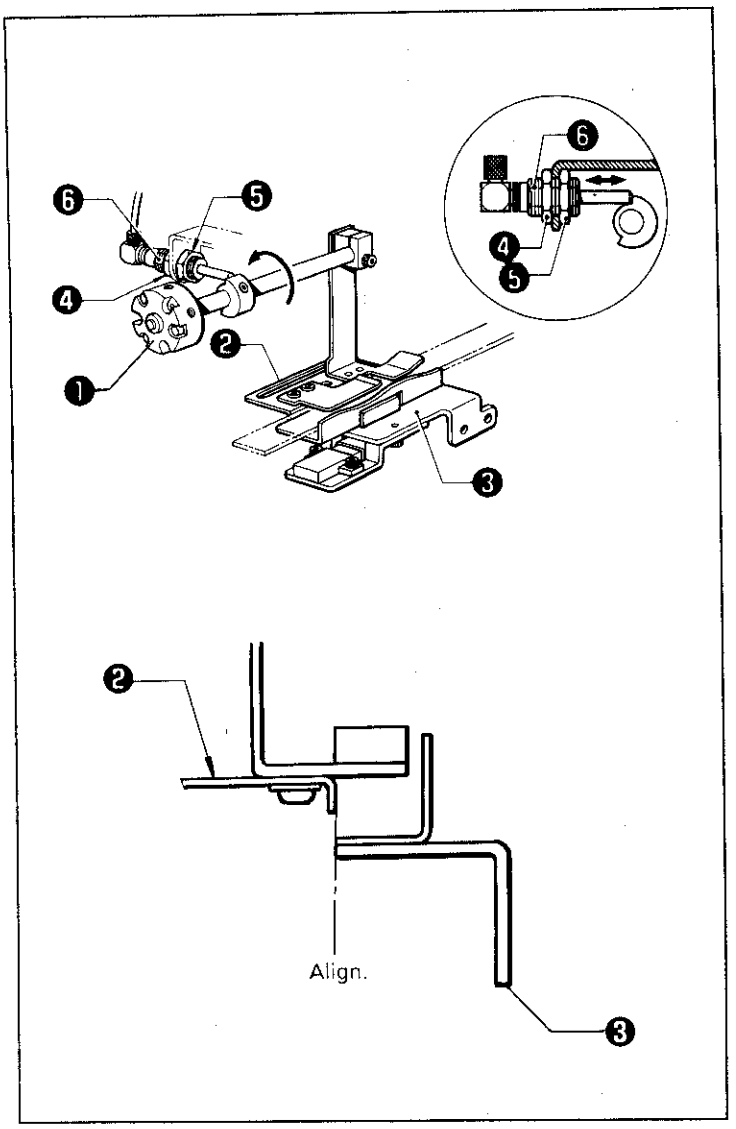
3.Gap between loop presser feet (F) and (B) and supporter plate

1) Loosen the two screws ❺ and move loop presser foot (F) ❷ and loop presser foot (B) ❸ up and down to adjust so that the gap between loop presser foot (F) ❷ and loop presser foot (B) ❸ and the supporter plate ❹ is approximately 0.5 mm when the machine is operating in MANUAL mode and the loop presser foot cylinder ❶ is lowered so that loop presser foot (F) ❷ and loop presser foot (B) ❸ are clamping the belt loop.

2) Check to be sure that loop presser foot (F) ❷ and loop presser foot (B) ❸ do not touch the loop guide shaft ❻ when the loop presser foot cylinder ❶ is raised.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch four times to adjust with the loop presser feet ❷ clamping the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to release the belt loop.

* If this adjustment is not made correctly, defective clamping of the belt loop will result.



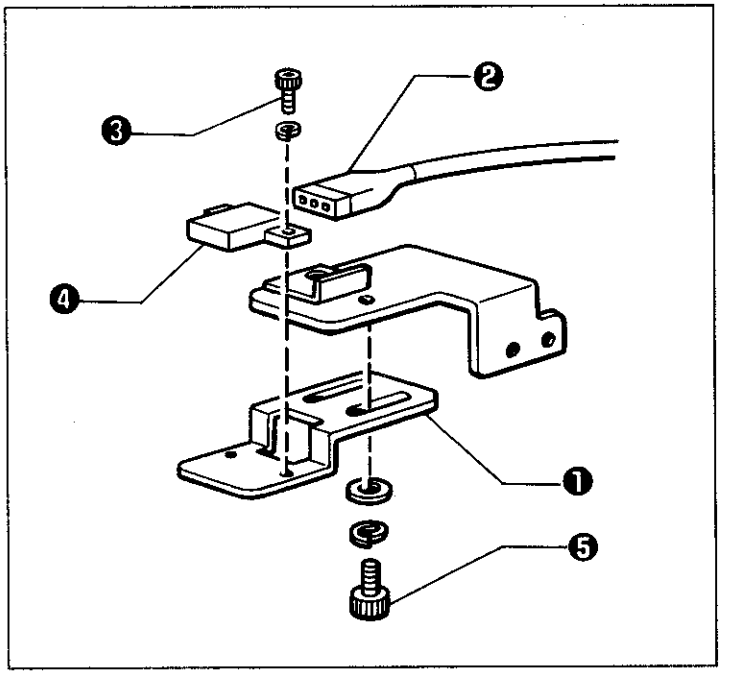
4.Position of loop guide unit stopper cylinder

1) Loosen the nut ❹ and turn the nut ❺ to adjust the position of the loop guide unit stopper cylinder ❻ so that the perpendicular surface of loop guide (L) ❷ and the edge of the sub-guide ❸ are aligned and so that the belt loop does not protrude when the loop guide unit cylinder ❶ turns to the left to guide the belt loop and the belt loop is fed.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch once to adjust when the loop guide unit cylinder ❶ has turned to the left. Change to AUTO mode and press the EMERGENCY STOP switch once to return the loop guide unit cylinder ❶.

* If this adjustment is not made correctly, defective guiding of the belt loop will result.

[9] Belt loop setting detection mechanism

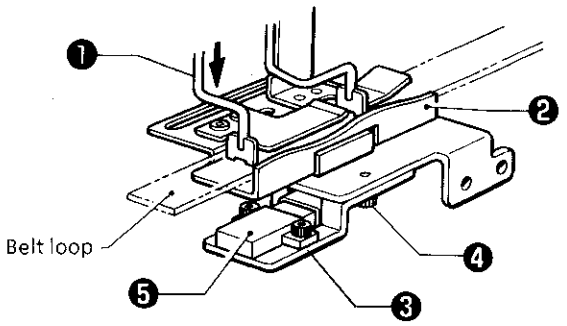


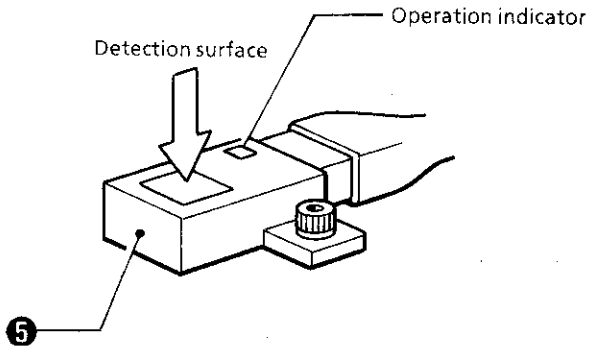
1.Appropriate length of sensor set plate

1) The sensor set plate ❶ used varies depending on the length of the belt loop. (Refer to the Parts Book.)

2) Disconnect the sensor connector ❷, remove the two screws ❸ and remove the loop set sensor ❹, and then remove the two bolts ❺ and replace the sensor set plate ❶.

* If the correct part is not used, a LOOP error will result.





2.Position of loop set sensor

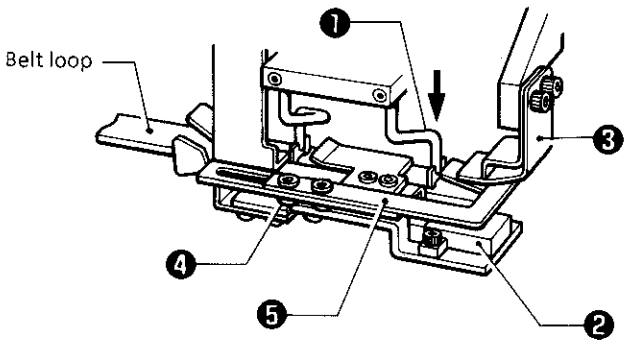
1) Loosen the two screws ❹ of the sensor set plate ❸ and move the loop set sensor ❺ to adjust so that the belt loop protruding from the supporter plate ❷ is detected when the machine is operating in MANUAL mode and the loop presser feet ❶ are clamping the belt loop. Select the position for tightening the two screws ❹ in accordance with the length of the belt loop.

2) Check to be sure that the operation indicator of the loop set sensor ❺ illuminates when a belt loop is detected, and is not illuminated when a belt loop is not detected.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch four times to adjust with the loop presser feet ❶ clamping the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to release the belt loop.

4) If there is dust on the detection surface of the loop set sensor ❺, belt loop detection mistakes will occur, so wipe the dust off with a soft cloth or your finger.

* If the correct part is not used, a LOOP error will result.



3.Position of loop set sensor cover

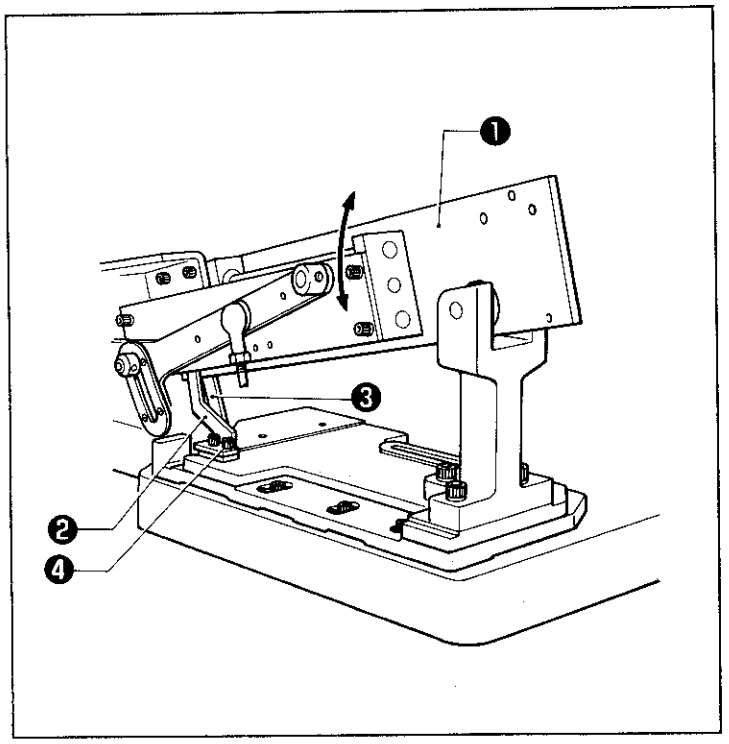
1) Loosen the two screws ❹ and move the loop set sensor cover ❺ to adjust so that the loop set sensor ❷ does not mistakenly detect fold plate (F) ❸ instead of the belt loop when the machine is operating in MANUAL mode and the loop presser feet ❶ are clamping the belt loop.

2) Check to be sure that the operation indicator of the loop set sensor ❷ switches off when the detected belt loop is removed.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch four times to adjust with the loop presser feet ❶ clamping the belt loop. Change to AUTO mode and press the EMERGENCY STOP switch once to release the belt loop.

* If this adjustment is not made correctly, sewing will not stop even if a belt loop setting error occurs.

⑩ Belt loop feed mechanism



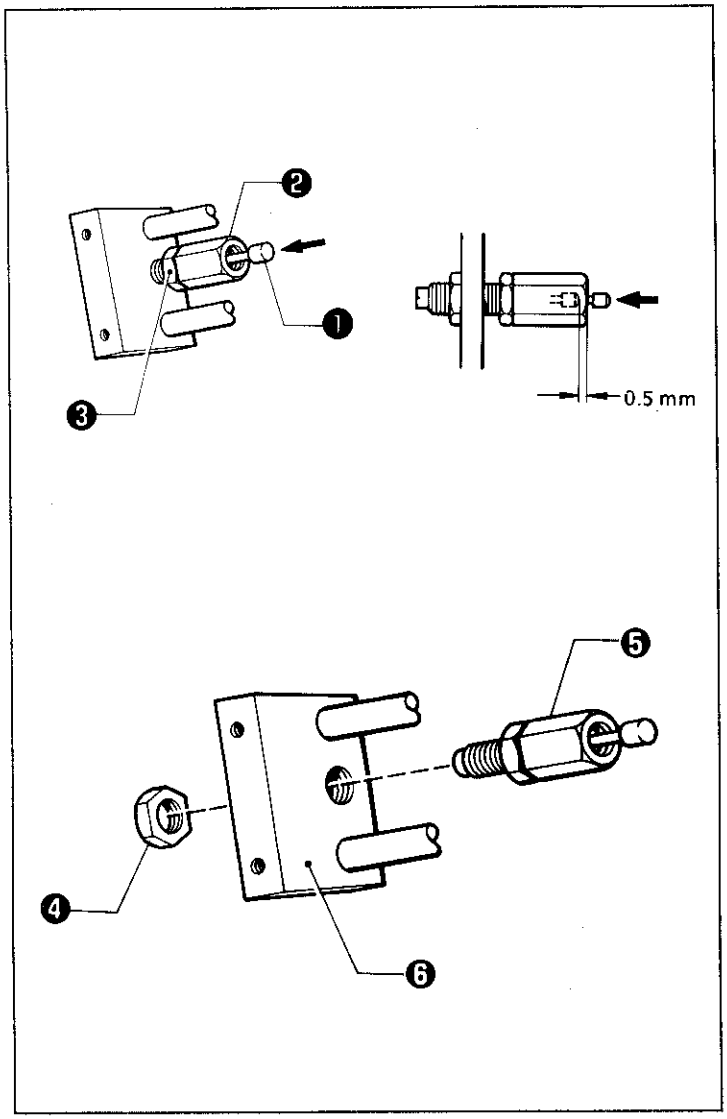
1.Movement of slide base

1) Loosen the two bolts ❹ and move base guides (F) ❷ and (B) ❸ to adjust so that the slide base ❶ moves smoothly with no gap between it and base guides (F) ❷ and (B) ❸.

2) Check to be sure that base guides (F) ❷ and (B) ❸ are not touching the slide base ❶ at one end.

3) Close the air cock, bleed the air, and then move the slide base ❶ up and down by hand to adjust.

* If this adjustment is not made correctly, defective attachment of the belt loop will result.

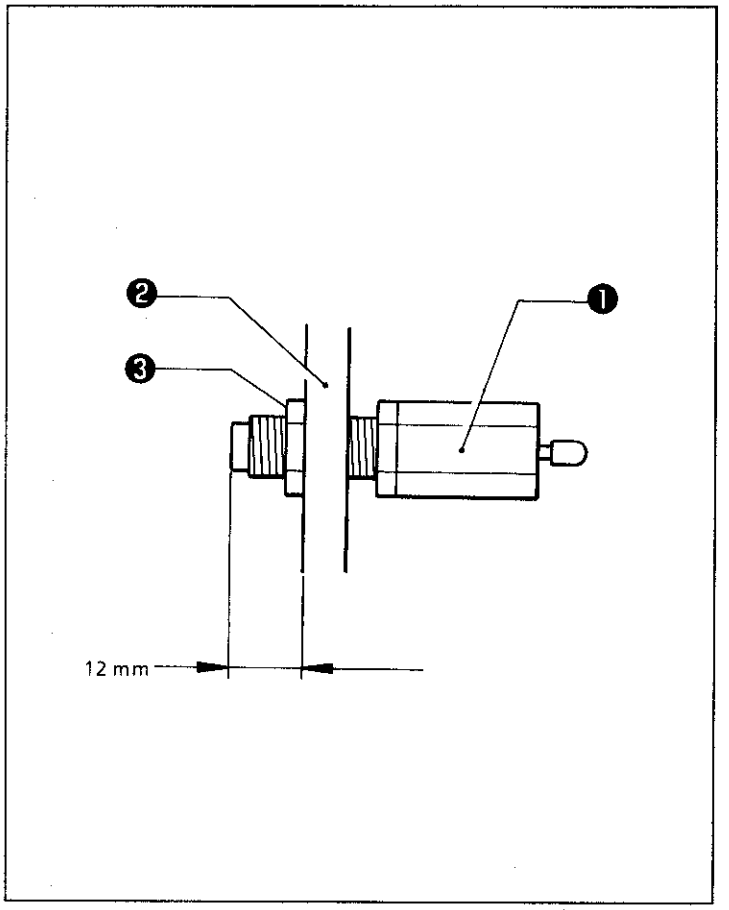


2.Position of shock absorber stopper

1) Loosen the nut ❸ and turn the stopper nut ❷ to adjust so that the end of the shock absorber ❶ is approximately 0.5 mm in from the edge of the stopper nut ❷ when it is pushed in.

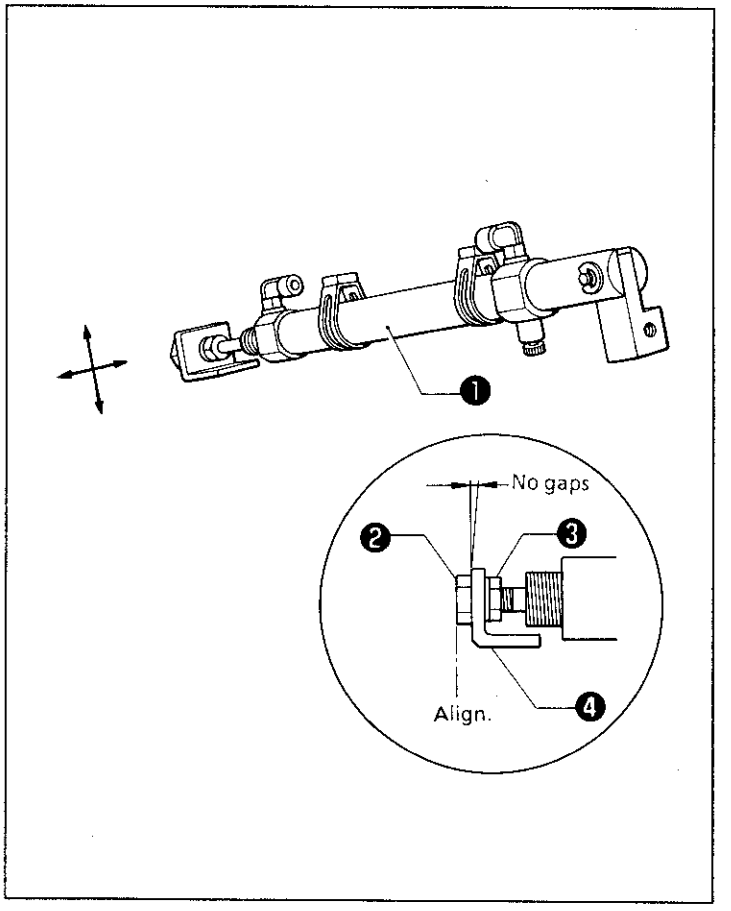
2) Remove the nut ❹ and remove the shock absorber body ❺ from the slide shaft base ❻ to adjust. After adjusting, lock with the nut ❸, adjust "3. Position of shock absorber body" and then install the shock absorber body ❺ to the slide shaft base ❻.

* If this adjustment is not made correctly, damage to the shock absorber ❶ or shocks during feeding of the belt loop will result.



3.Position of shock absorber body

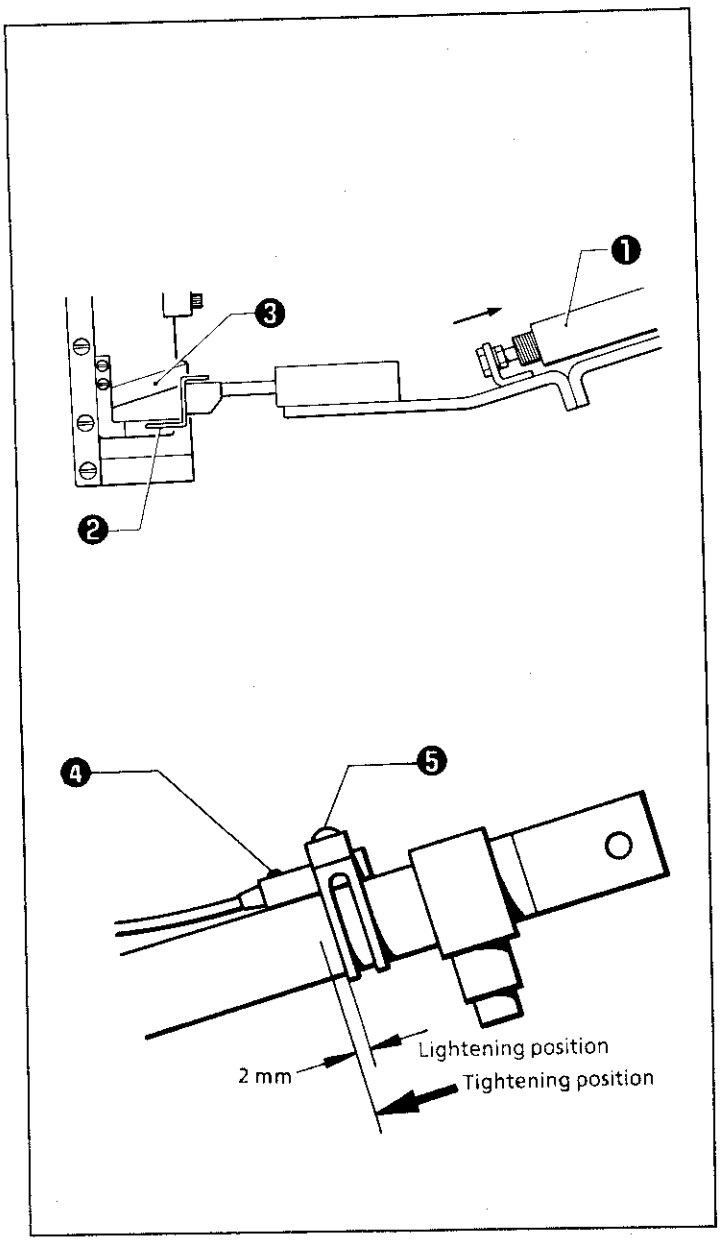
1) Loosen the nut ❸ and turn the shock absorber body ❶ to adjust so that the shock absorber body ❶ is approximately 12 mm from the slide shaft base ❷. After adjusting, lock with the nut ❸.



4.Loop feed cylinder rod

1) Loosen the nut ❸ and turn the joint nut ❷ to adjust so that the end of the loop feed cylinder ❶ rod is aligned with the surface of the joint nut ❷. After adjusting, lock with the nut ❸.

2) Check to be sure that there is no gap between the joint nut ❷ and the cylinder rod joint ❹ and that the end of the loop feed cylinder ❶ rod moves freely.



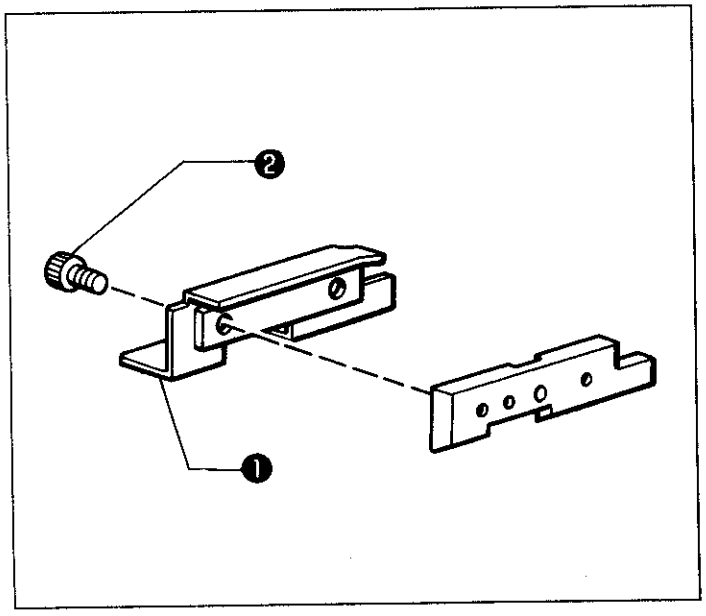
5.Position of loop rear sensor

1) Loosen the nut ❺ and move the loop rear sensor ❹ to adjust so that the loop rear sensor ❹ illuminates when the loop feed cylinder ❶ has returned and the supporter plate ❷ is at the cutter unit ❸ side, and is not illuminated other positions.

2) After the loop rear sensor ❹ illuminates, move it approximately 2 mm towards the illuminated side, and then tighten it at a torque of about 3 kgfcm.

3) Open the air cock, turn the power switch on and carry out the adjustment.

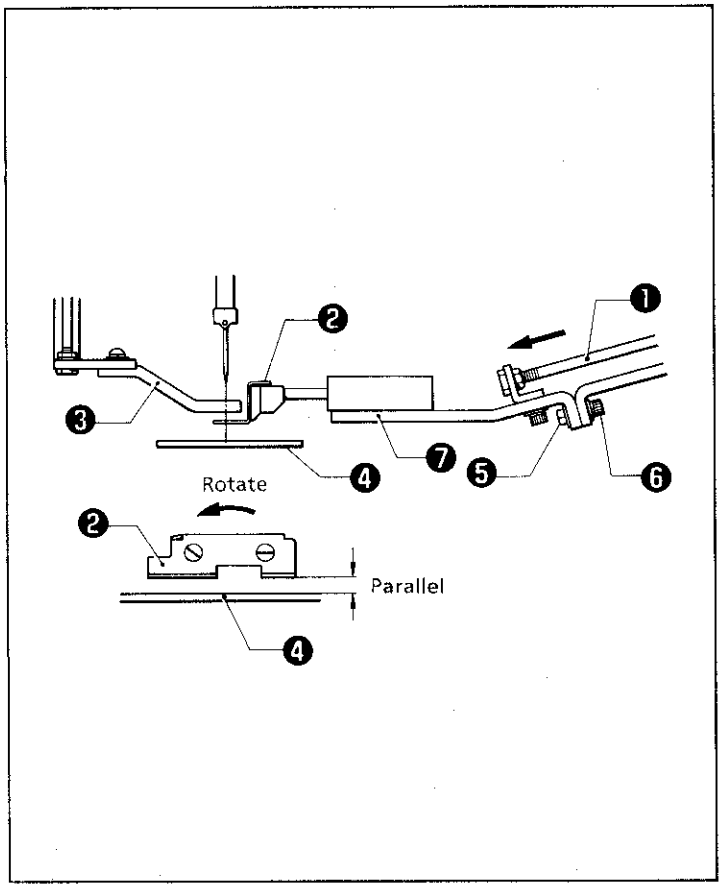
* If this adjustment is not made correctly, error codes E.-12 and E.-13 will be displayed.



6.Appropriate width and length of supporter plate

1) The supporter plate ❶ used varies depending on the width and length of the belt loop. (Refer to the Parts Book.)

2) Remove the two screws ❷ and replace the supporter plate ❶.



7.Parallelism of supporter plate and needle plate

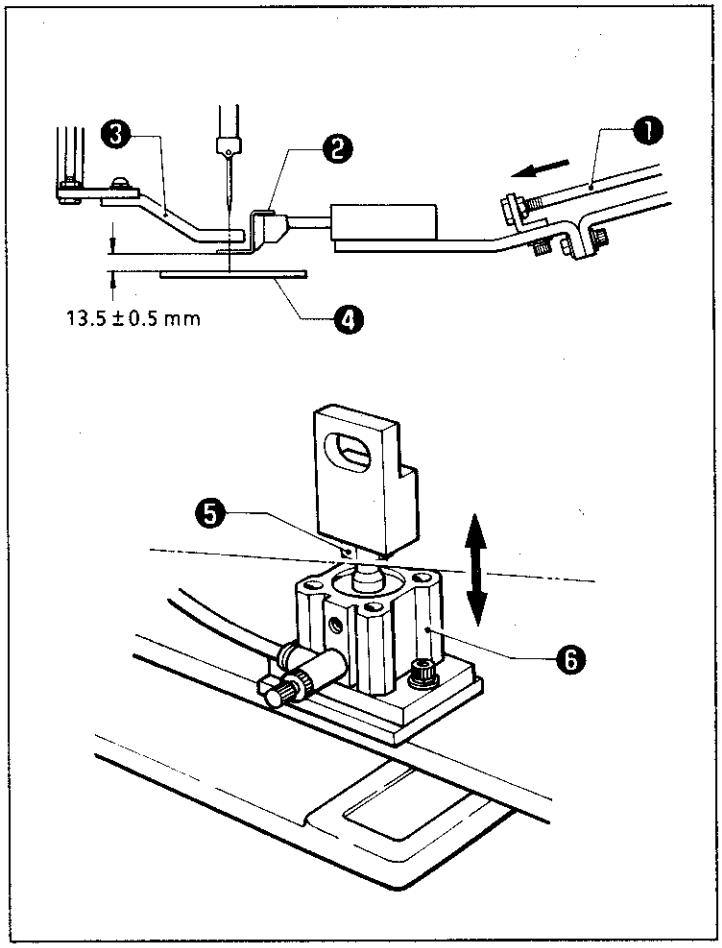
1) Check to be sure that the supporter plate ❷ and needle plate ❹ are parallel when the loop feed cylinder ❶ operates and the supporter plate ❷ is between the presser foot ❸ and the needle plate ❹. Turn the supporter plate ❷ towards the non-operation side to make it parallel.

2) Because the supporter plate ❷ and needle plate ❹ are parallel at the time of shipment, adjustment is generally not necessary.

3) If adjustment is necessary, loosen the two nuts ❺, loosen the two screws ❻ and tilt the feed plate base (L) ❼ to adjust. After adjusting, lock with the 2 nuts ❺.

4) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❷ below the presser foot ❸ to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❷.

* If this adjustment is not made correctly, defective attachment of the belt loop will result.

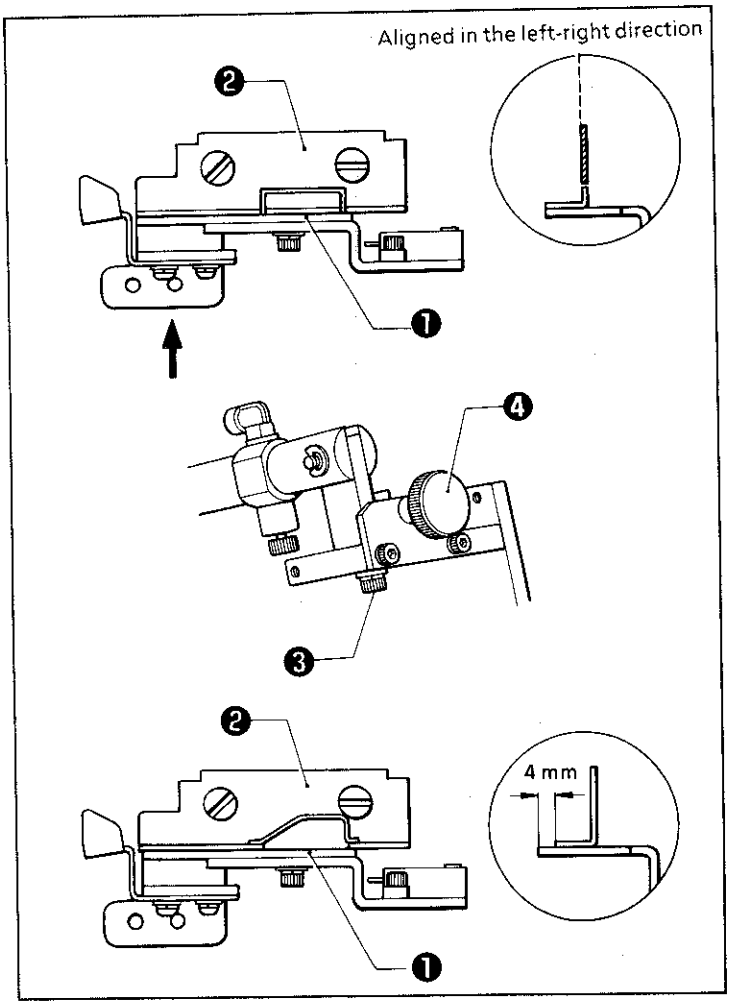


8.Gap between supporter plate and needle plate

1) Loosen the nut ❺ and turn the rod of the unit up-down cylinder ❻ to adjust so that there is a gap of 13.5 ± 0.5 mm between the supporter plate ❷ and the needle plate ❹ when the loop feed cylinder ❶ operates and the supporter plate ❷ is between the presser foot ❸ and the needle plate ❹. After adjusting, lock with the nut ❺.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❷ below the presser foot ❸ to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❷.

* If this adjustment is not made correctly, defectiveattachment of the belt loop or bent needles will result.



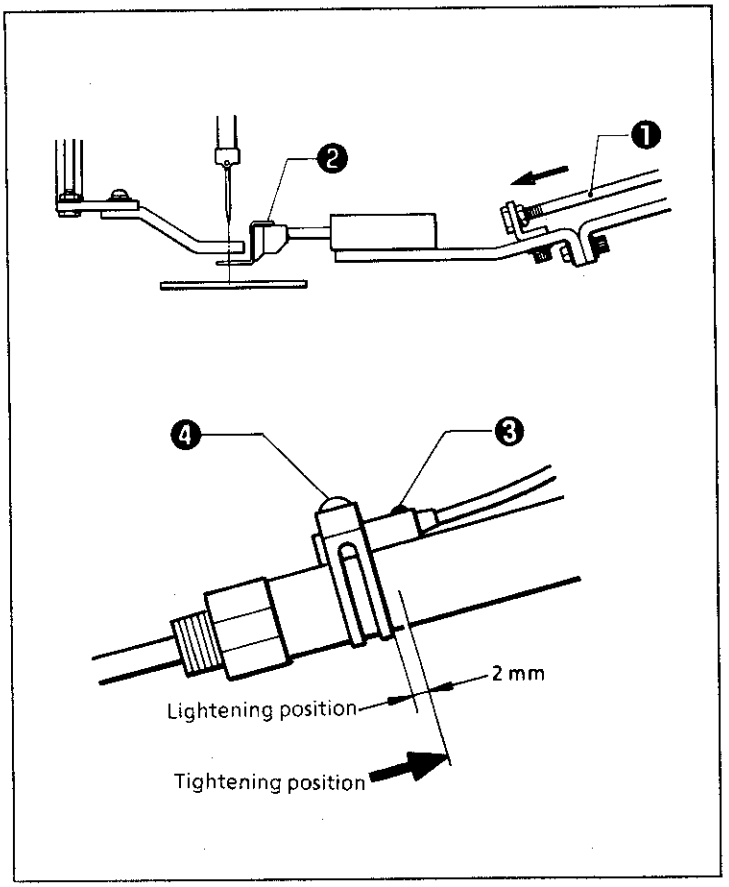
9.Position of supporter plate

1) Loosen the screw ❸ and turn the adjust screw ❹ to adjust the position of the loop feed cylinder so that the welded section of the sub-guide ❶ and the notched section of the supporter plate ❷ are aligned in the left-right direction when the sub-guide ❶ is raised to guide the supporter plate ❷. After adjusting, lock with the screw ❸.

2) If the sub-guide ❶ has no welded section, adjust so that the distance between the left edge of the sub-guide ❶ and the left edge of the supporter plate ❷ is approximately 4 mm when a 14 mm supporter plate ❷ is used.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch once to adjust with the sub-guide ❶ guiding the supporter plate ❷. Change to AUTO mode and press the EMERGENCY STOP switch once to return the sub- guide ❶.

* If this adjustment is not made correctly, defective V-cutting or defective feeding of the belt loop will result.



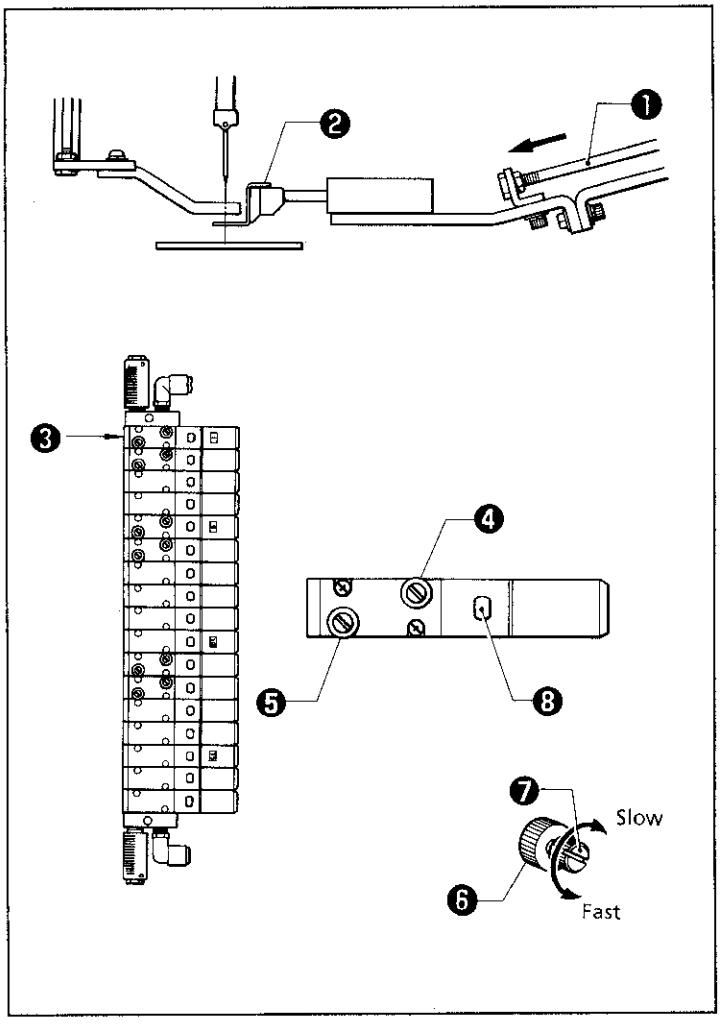
10.Position of loop front sensor

1) Loosen the screw ❹ and move the loop front sensor ❸ to adjust so that the loop front sensor ❸ illuminates when the loop feed cylinder ❶ operates and the supporter plate ❷ is at the machine side, and is not illuminated other positions.

2) After the loop front sensor ❸ illuminates, move it approximately 2 mm towards the illuminated side, and then tighten it at a torque of about 3 kgfcm.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❷ to the machine side to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❷.

* If this adjustment is not made correctly, error codes E.-10 and E.-11 will be displayed or defective attachment of the belt loop will result.



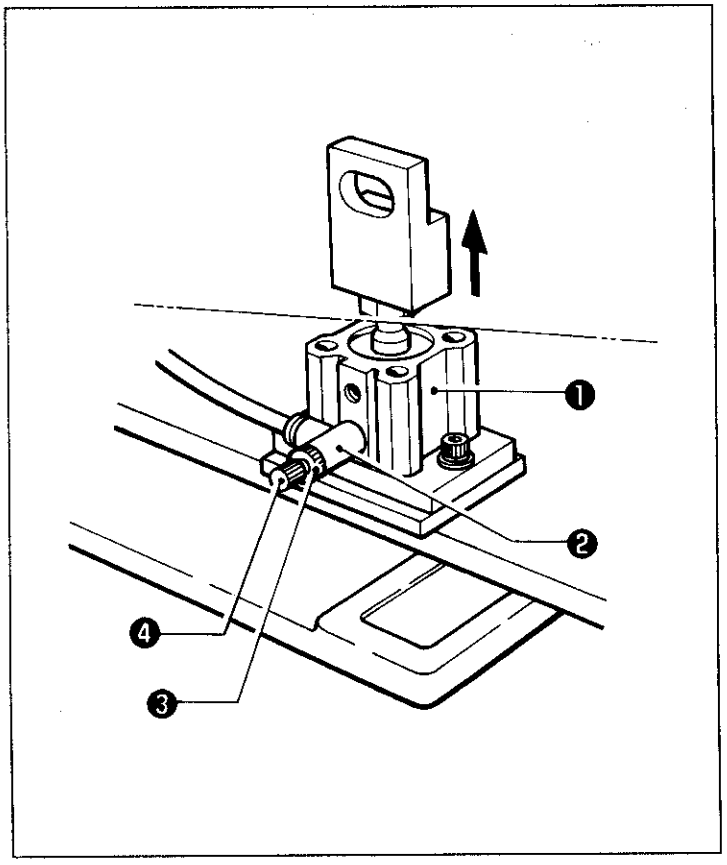
11.Speed of loop feed cylinder

1) Adjust the speed at which the supporter plate ❷ of the loop feed cylinder ❶ moves to the machine side by means of throttle valve ❹ of solenoid valve No. 13, and adjust the return speed by means of throttle valve ❺ so that the speeds are fast with no shocks.

2) Loosen the nut ❻ and turn the adjust screw ❼ to adjust throttle valves ❹ and ❺, and lock them with the nut ❻. If the adjust screw ❼ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and push the check valve ❽ of solenoid valve No. 1 ❸ to move the supporter plate ❷. Because error code E.-12 will be displayed during adjustment, turn the power supply off.

* If this adjustment is not made correctly and the speed is too slow, the cycle time will be too long.



12.Speed of unit up-down cylinder

1) Adjust the speed at which the unit up-down cylinder ❶ is raised by means of throttle valve ❷ so that the speed is fast with no shocks.

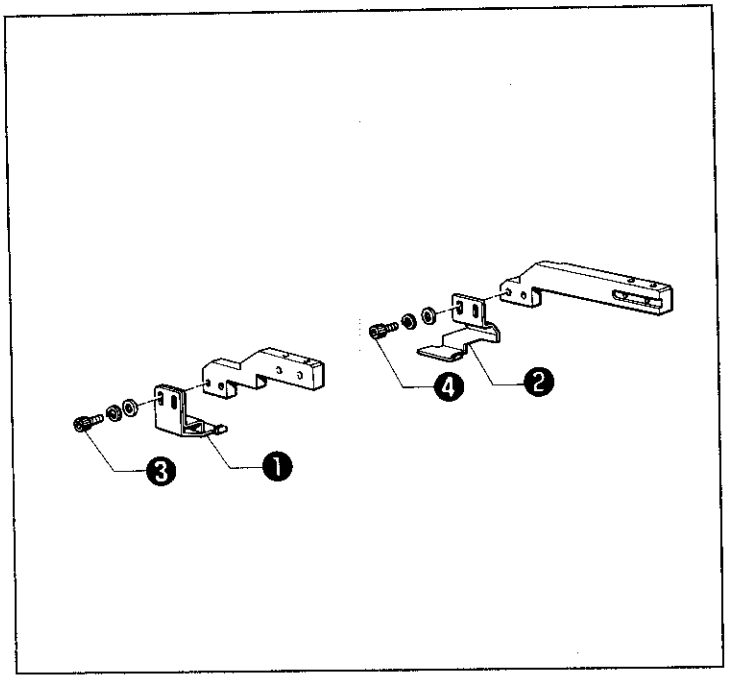
2) The speed at which the unit up-down cylinder ❶ is lowered cannot be adjusted.

3) Loosen the nut ❸ and turn the adjust screw ❹ to adjust throttle valve ❷, and lock it with the nut ❸. If the adjust screw ❹ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

4) Open the air cock and turn the power switch on and off repeatedly to adjust. Do not turn the power switch on and off too quickly at this time.

* If this adjustment is not made correctly, problems caused by fold plate (B) touching body put ruler (R) will result.

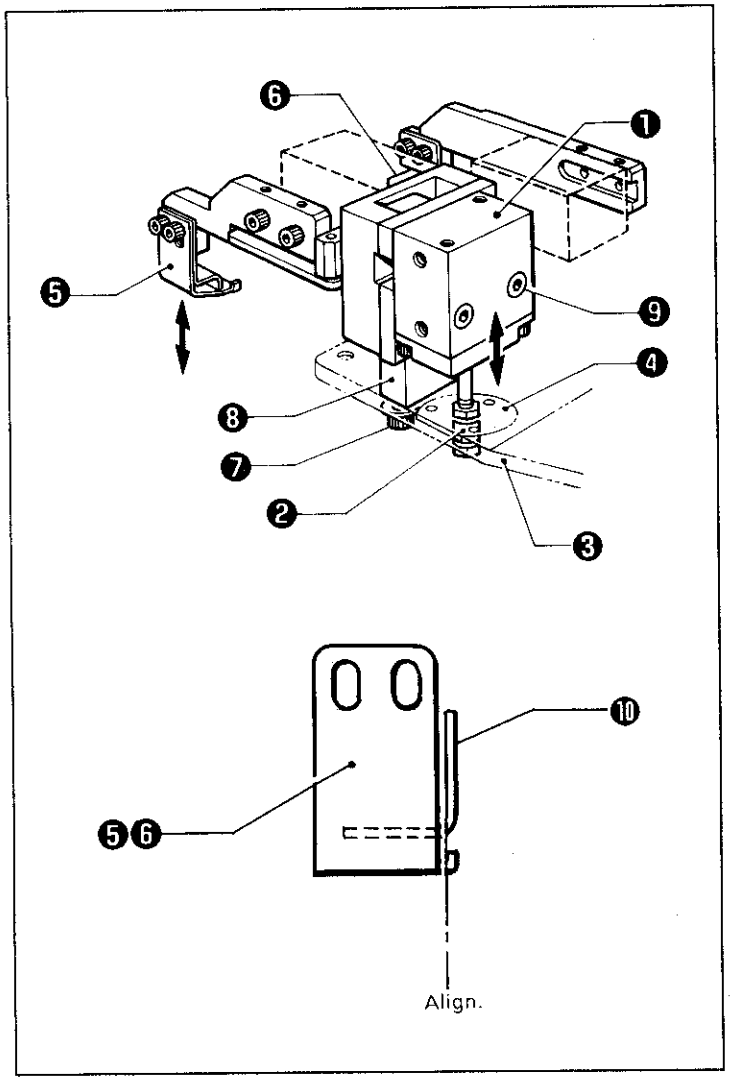
11 Belt loop folding mechanism



1.Appropriate width of fold plates (F) and (B)

1) The fold plates (F) ❶ and (B) ❷ used vary depending on the width of the belt loop. (Refer to the Parts Book.)

2) Remove the two bolts ❸ and replace fold plate (F) ❶. Remove the two bolts ❹ and replace fold plate (B) ❷.



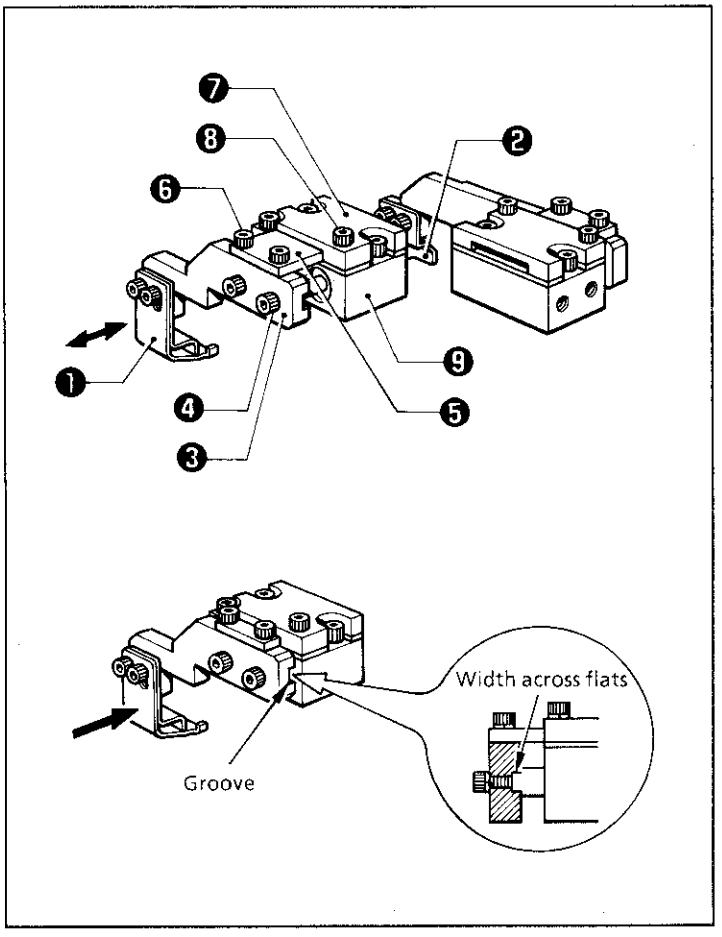
2.Up-down movement of fold plates (F) and (B)

1) Loosen the two bolts ❼ and move the block ❽ and then loosen the two bolts ❾ and move the fold plate up-down cylinder ❶ to adjust so that the fold plate collar ❷ of the fold plate up-down cylinder ❶ rod is concentric with the fold plate collar ❹ of fold plate (L) ❸ and fold plates (F) ❺ and (B) ❻ move up and down smoothly.

2) Close the air cock, bleed the air, and carry out the adjustment.

3) Adjust the block ❽ and check to be sure that the perpendicular surface of the supporter plate ❿ is aligned with the tabs on fold plates (F) ❺ and (B) ❻.

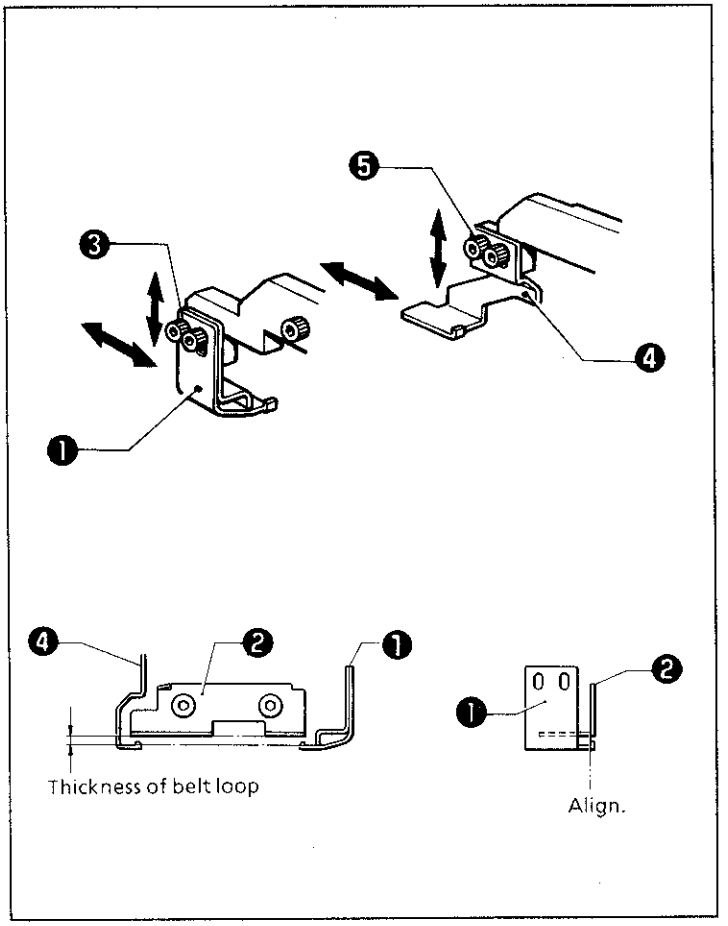
* If this adjustment is not made correctly, defective folding of the belt loop will result.



3.Front-back movement of fold plates (F) and (B)

1) Close the air cock, bleed the air, and then adjust so that fold plate (F) ❶ and (B) ❷ move forward and backward smoothly.
2) Loosen the two screws ❹ of fold plate support (F) ❸, and then loosen the two bolts ❻ of the fold plate guide ❺ and the two bolts ❽ of the fold plate hook ❼.
3) Align the widths of the two rod ends with the groove of fold plate support (F) ❸ while the fold plate (F) open-close cylinder ❾ is retracted, and then tighten the two screws ❹ of fold plate support (F) ❸.
4) Move fold plate support (F) ❸ forward and backward and tighten the two screws ❻ of the fold plate guide ❺ and the two screws ❽ of the fold plate hook ❼ so that fold plate support (F) ❸ still moves.
5) Adjust fold plate support (B) ❷ in the same way as given in steps 1), 2) and 3).
6) Move fold plates (F) ❶ and (B) ❷ forward and backward by hand and check to be sure that they move smoothly.

* If this adjustment is not made correctly, defective folding of the belt loop will result.



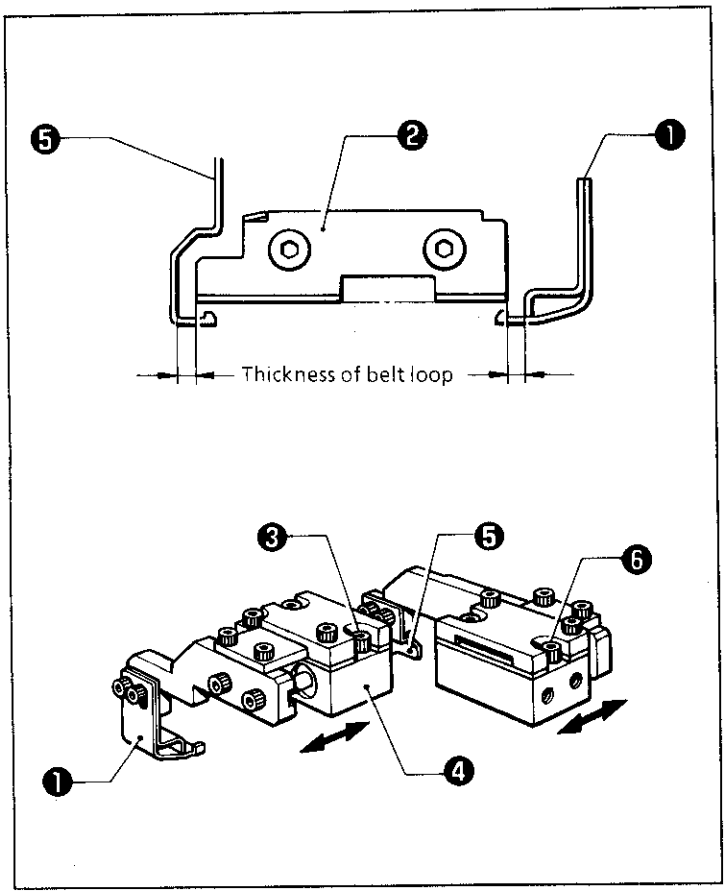
4.Up-down and left-right position of fold plates (F) and (B)

1) Loosen the two bolts ❸ and move fold plate (F) ❶ to adjust so that the gap between the supporter plate ❷ and fold plate (F) ❶ is even and about the thickness of the belt loop and so that the perpendicular surface of the supporter plate ❷ and the tab of fold plate (F) ❶ are aligned when the belt loop is folded into the supporter plate ❷ by fold plate (F) ❶.

2) Adjust fold plate support (B) ❹ in the same way by loosening the two bolts ❺.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side to adjust. Set the loop switch to the "RESET" side to return.

* If this adjustment is not made correctly, defective attachment of the belt loop will result.



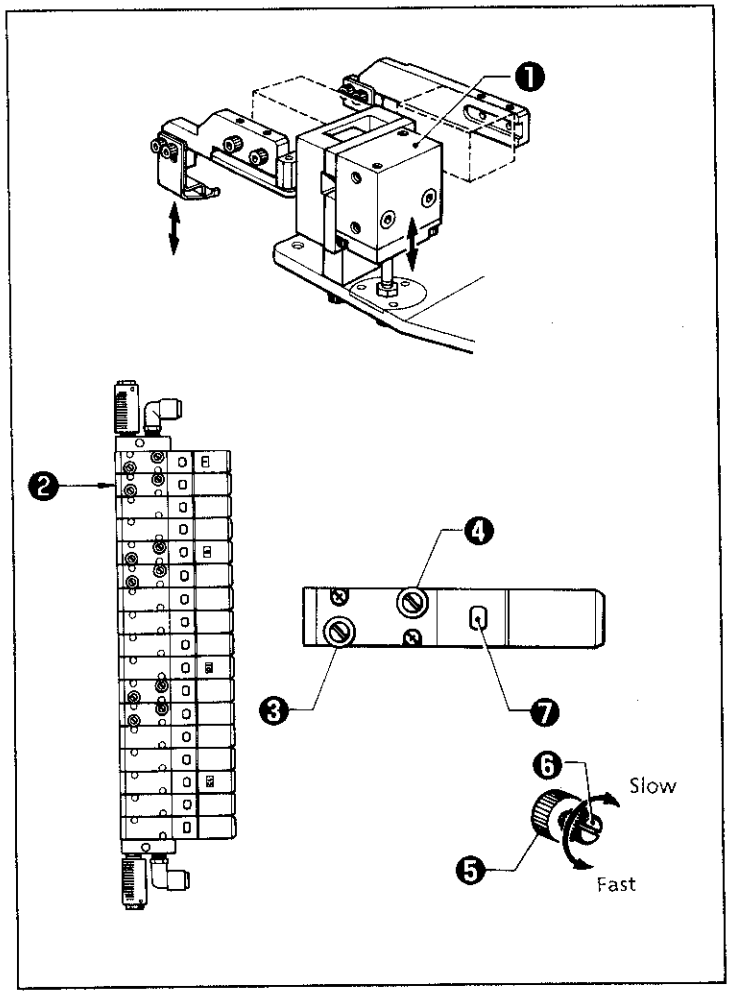
5.Front-back position of fold plates (F) and (B)

1) Loosen the two bolts ❸ and move the fold plate (F) open- close cylinder ❹ to adjust so that the gap between the supporter plate ❷ and fold plate (F) ❶ is even and about the thickness of the belt loop when the belt loop is folded into the supporter plate ❷ by fold plate (F) ❶.

2) Adjust fold plate support (B) ❺ in the same way by loosening the two bolts ❻.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❷ to the machine side. Then loosen the clamp lever and move the loop unit to the right to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❷.

* If this adjustment is not made correctly, defective



6.Speed of fold plate up-down cylinder

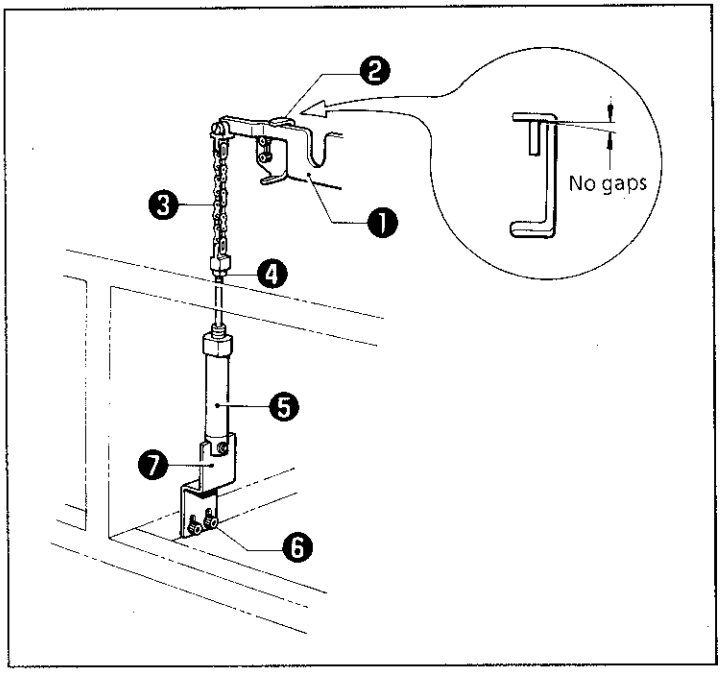
1) Adjust the speed at which the fold plate up-down cylinder ❶ is raised by means of throttle valve ❸ of solenoid valve No. 2 ❷, and adjust the speed at which it is lowered by means of throttle valve ❹ so that the speeds are fast with no shocks.

2) Loosen the nut ❺ and turn the adjust screw ❻ to adjust throttle valves ❸ and ❹, and lock them with the nut ❺. If the adjust screw ❹ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

3) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch to start step motion. Then, press check valves ❼ of solenoid valves No. 5 ❷ at the step before the step where the fold plate up-down cylinder ❶ is lowered, and move the fold plate up-down cylinder ❶ up or down to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the fold plate up-down cylinder ❶.

* If this adjustment is not made correctly, defective folding or defective attachment of the belt loop will result.

12 Machine start mechanism

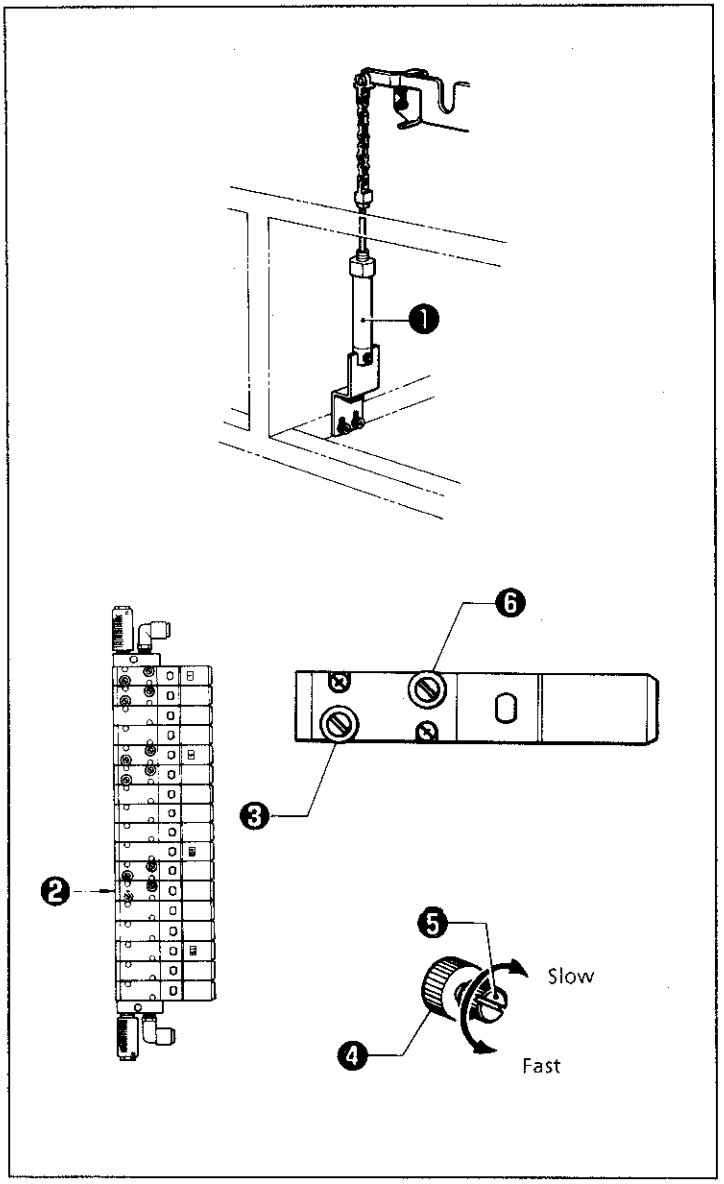


1.Position of machine start cylinder

1) Loosen the nut ❹ and turn the rod of the machine start cylinder ❺, or loosen the two bolts ❻ and move the cylinder base ❼ to adjust so that there is no gap between the starting lever plate ❶ and the starting lever stopper ❷ and the chain ❸ is tight when the machine head is stopped. Then lock with the nut ❹.

2) Open the air cock, turn the power switch off and carry out the adjustment.

* If this adjustment is not made correctly and there is too much slackness in the chain ❸, defective machine head starting will result. If the chain is too tight, defective stopping will result.



2.Speed of machine start cylinder

1) Adjust the speed at which the machine start cylinder ❶ returns after starting the machine head by means of throttle valve ❸ of solenoid valve No. 12 ❷ so that the speed is fast with no shocks.

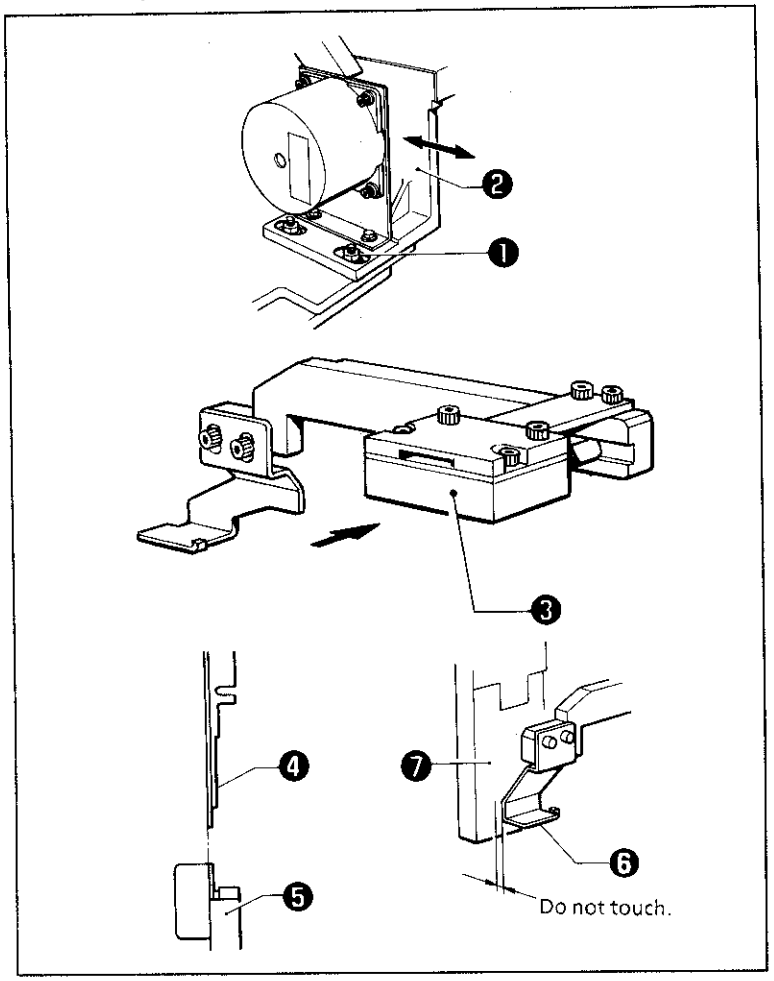
2) Loosen the nut ❹ and turn the adjust screw ❺ to adjust throttle valve ❸, and lock it with the nut ❹. If the adjust screw ❺ is turned to the right, the speed will become slower; if it is turned to the left, the speed will become faster.

3) Loosen the nut ❹ of throttle valve ❻ of solenoid valve No. 12 ❷ and turn the adjust screw ❺ to the left to set the speed at which the machine start cylinder ❶ starts the machine head to the fastest setting, and then lock it with the nut ❹.

4) Open the air cock, turn the power switch on, and while in MANUAL mode, insert material under the presser foot and press the START switch to start the machine, and carry out adjustment.

* If this adjustment is not made correctly and the speed is too slow, defective stopping will result.

13 Unit positioning mechanism



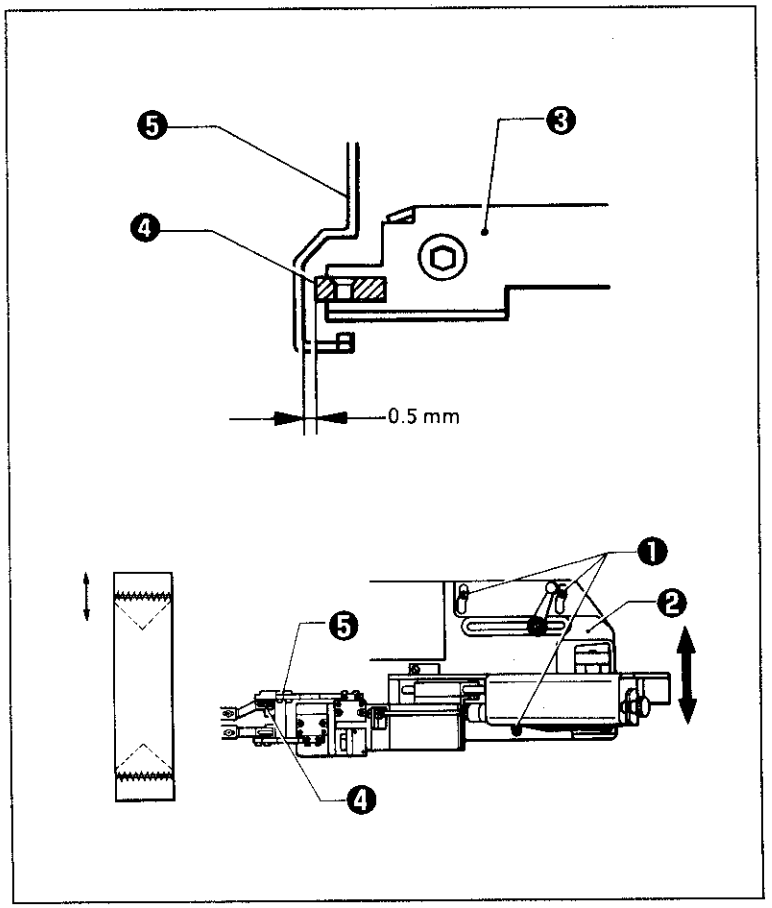
1.Position of cutter unit

1) Loosen the two nuts ❶ and move the loop unit ❷ to adjust so that the bar tacking position at the first bar tacking side of the belt loop is at the designated dimensions.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, press the EMERGENCY STOP switch to start step motion, and adjust at the step where the fold plate (B) open-close cylinder ❹ is open. Change to AUTO mode and press the EMERGENCY STOP switch once to return the fold plate (B) open-close cylinder ❶.

3) Check to be sure that channel (F) ❺ and the perpendicular surface of the supporter plate ❻ are aligned and that fold plate (B) ❼ is not touching the cutter unit ❽.

* If this adjustment is not made correctly, bad centering when V-cutting of the belt loop or defective feeding will result.

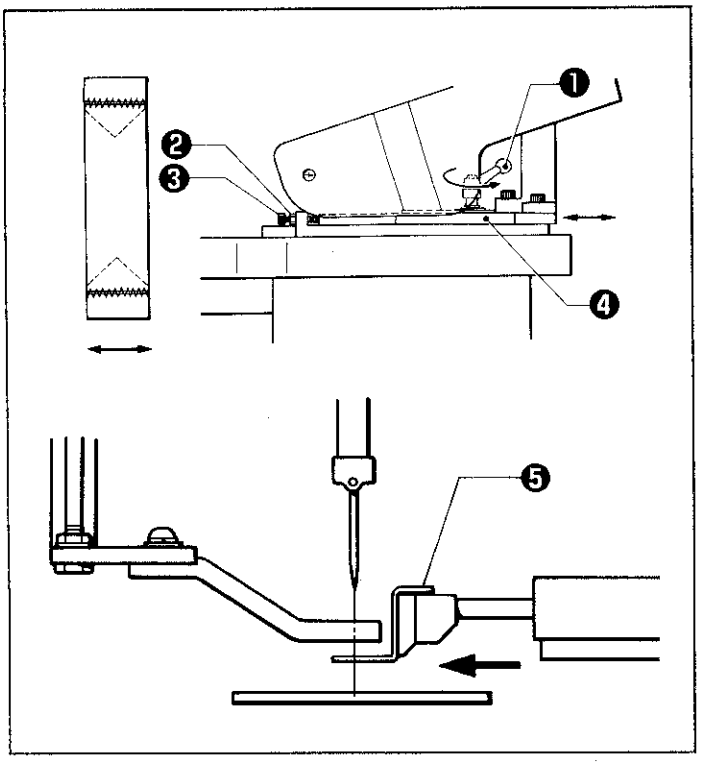


2.Position of loop unit

1) Loosen the three screws ❶ and move the loop unit ❷ to adjust so that the bar tacking position at the first bar tacking side of the belt loop is at the designated dimensions.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❸ to the machine side to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❸.

3) Adjust so that the gap between presser foot (B) ❹ and the inside of fold plate (B) ❺ is 0.5 mm or more.

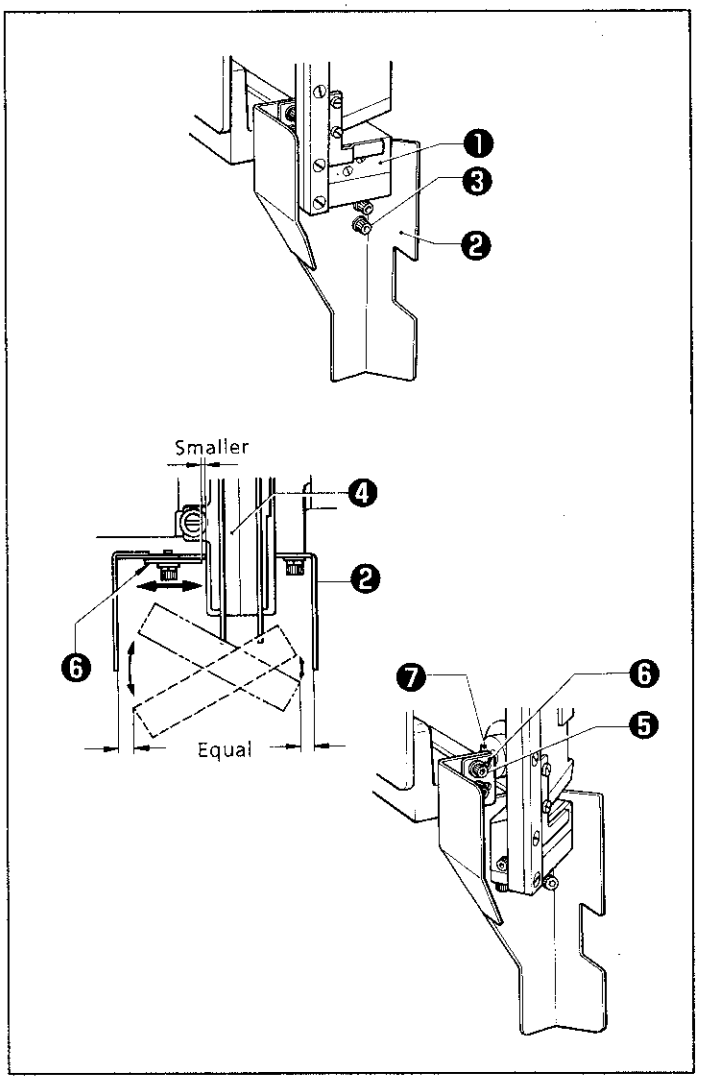


3.Position of unit base stopper

1) Loosen the clamp lever ❶, loosen the nut ❷ and turn the unit base stopper ❸ to adjust the position of the unit base ❹ so that the first bar tacking position of the belt loop is evenly distributed over the width of the belt loop.

2) Open the air cock, turn the power switch on, and while in MANUAL mode, set the loop switch to the "SET" side and press the EMERGENCY STOP switch once to move the supporter plate ❺ to the machine side to adjust. Change to AUTO mode and press the EMERGENCY STOP switch once to return the supporter plate ❺.

14 Other



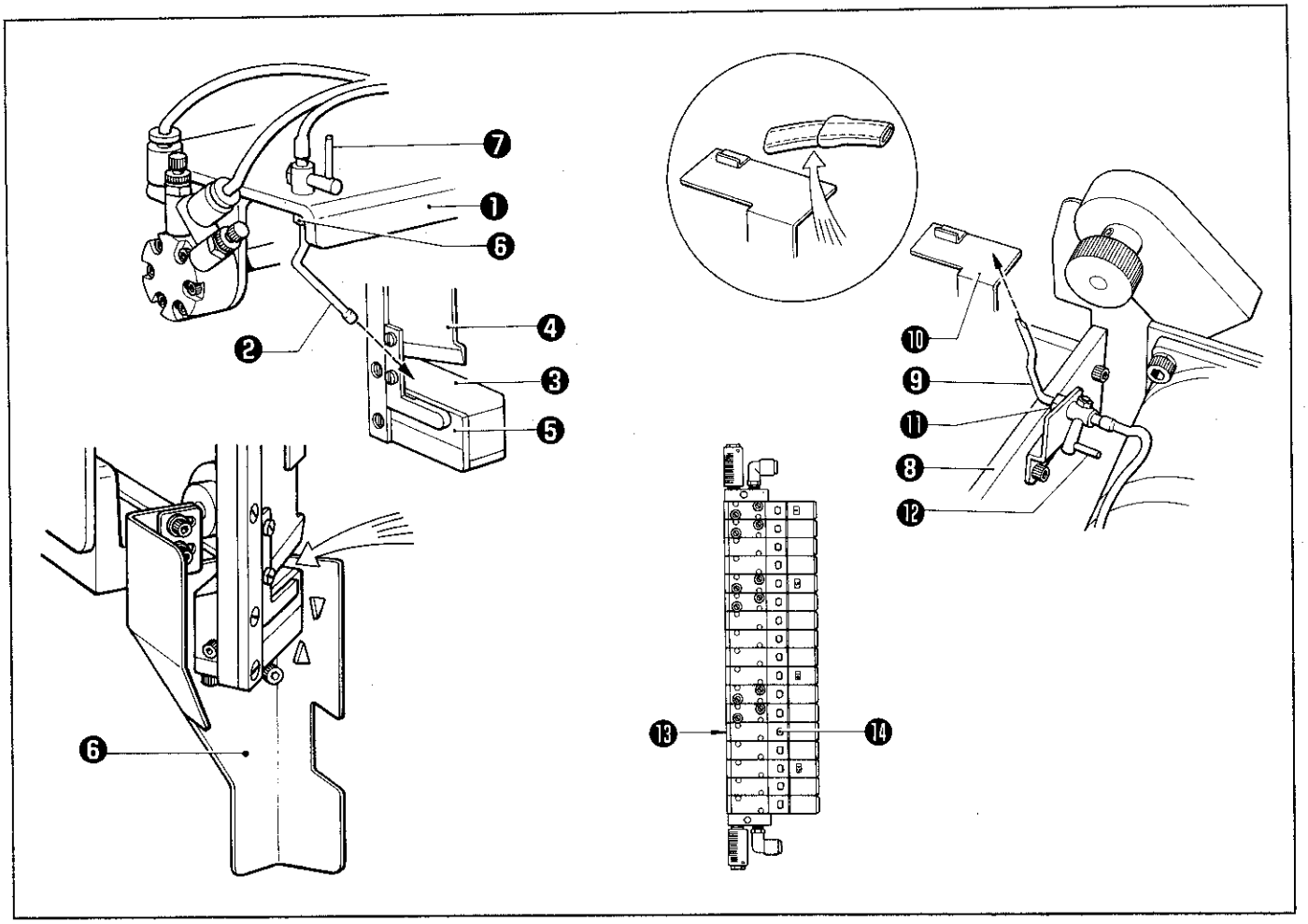
1.Position of clipping cover

1) Loosen the two bolts ❸ and move material cover (A) ❷ to adjust so that the cutter unit ❶ does not touch material cover (A) ❷ when the cutter unit ❶ turns during V-cutting.

2) Loosen the two bolts ❺ and move material cover (B) ❻ to adjust so that the clearance between the channel ❹ and material cover (B) is small.

3) Check to be sure that material cover (B) ❻ and the feed roller ❼ are not touching.

* If this adjustment is not made correctly, material cuttings will scatter widely at the feed roller ❼ side during V-cutting of the belt loop.



2.Position of air blow

1) Loosen the nut ❺ and move the air blow to adjust so that the air blowing direction of the air blow ❷ on the cutter unit base ❶ is between the movable knife ❹ and fixed knife ❺ of the cutter unit ❸.

2) Adjust the air amount of the air blow ❷ on the cutter unit base ❶ with the air adjustment lever ❼ to the smallest amount so that the material cuttings from V-cutting hit material cover (A) ❻ and drop down.

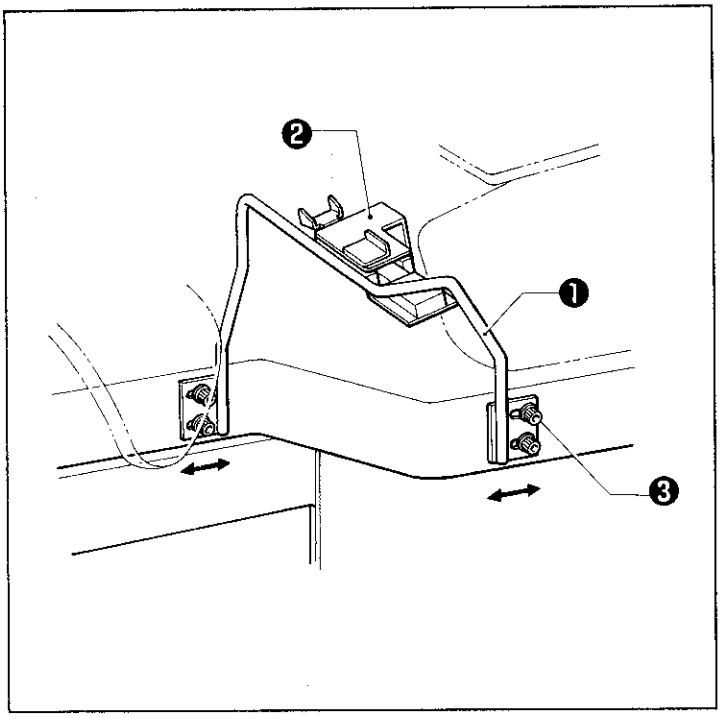
3) Loosen the nut ⓫ move the air blow ❾ to adjust so that the air blowing direction of the air blow ❾ on the slide base ❽ is towards the top of the sub-guide ❿.

4) Adjust the air amount of the air blow ❾ on the slide base ❽ with the air adjustment lever ⓬ to the smallest amount so that the seam joint sections of the removed belt loop drop down.

5) Open the air cock, turn the power switch on, press the check valve ⓮ of solenoid valve No. 13 ⓭ to blow air, and make the adjustment.

6) Check to be sure that air blows ❷ and ❾ do not touch any other parts.

* If these adjustments are not made correctly, the material cuttings or seam joint sections of the belt loop will remain on the loop unit and problems caused by their being attached to the material will result.

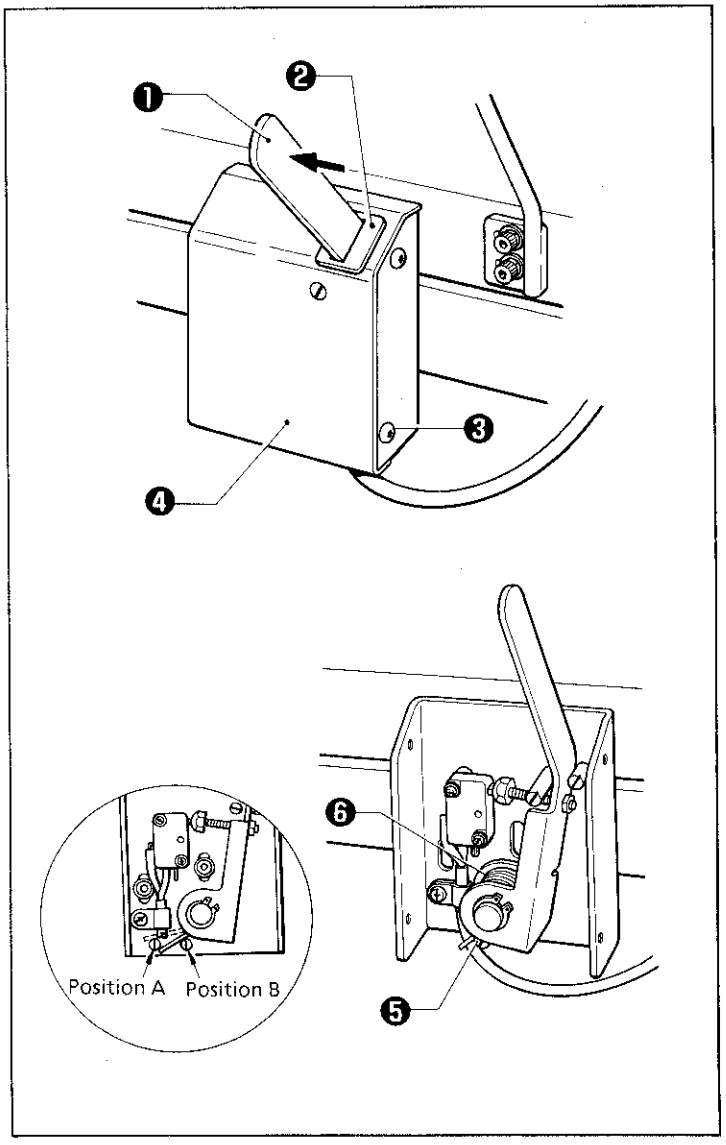


3.Position of guard

1) Loosen the four screws ❸ and move the guard ❶ to adjust so that the guard ❶ is close to the sub-guide ❷ without touching it.

2) Open the air cock, turn the power switch on and carry out the adjustment.

3) Check to be sure that the guard ❶ does not touch other parts.



4.Operation pressure of start switch

1) The operation pressure of the hand operation switch ❶ can be adjusted in two steps. At the time of shipment, the pressure is adjusted to weak.

2) Remove the switch cover ❷remove the four screws ❸, remove the switch cover ❹, and then remove the cantilever stopper ❺ to change the position.

* Because the tension of the switch lever spring ❻ is applied to the cantilever stopper ❺, be careful when removing.

* The operation pressure is strong at position (A), and it is weak at position (B).

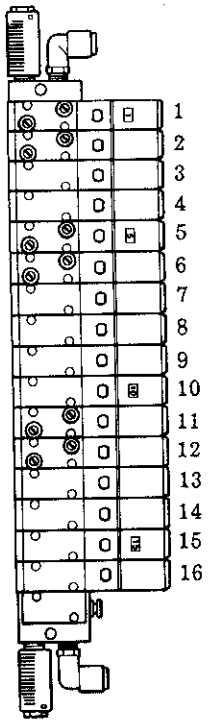
AIR PIPING

1 Solenoid valve layout

* The solenoid valves consist of old types and new types. In these service instructions, the new type are explained, so please refer to the following for comparisons with the old type.

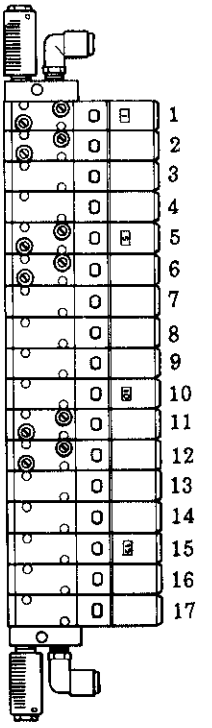
<New type>

Standard

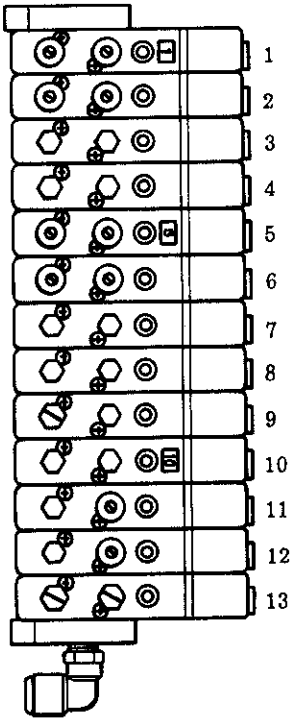


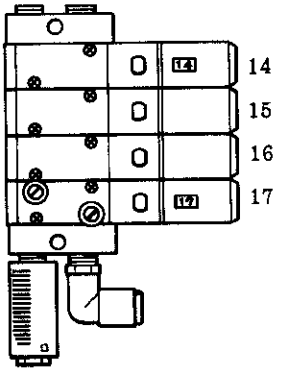
1 Belt loop feed
2 Fold plate up-down
3 Supporter plate
4 Fold plate (B) open-close
5 Knife rotation (B)
6 Knife rotation (F)
7 Knife up-down
8 Sub-guide
Loop-guide unit
9 Unit up-down
10 Presser foot
11 Body front-rear
12 Machine start
13 Air blow
14 Fold plate (F) open-close
15 Loop-guide unit stopper
16 Loop presser
17 Belt loop slackner (option)

With belt loop slackner (option)



<Old type>

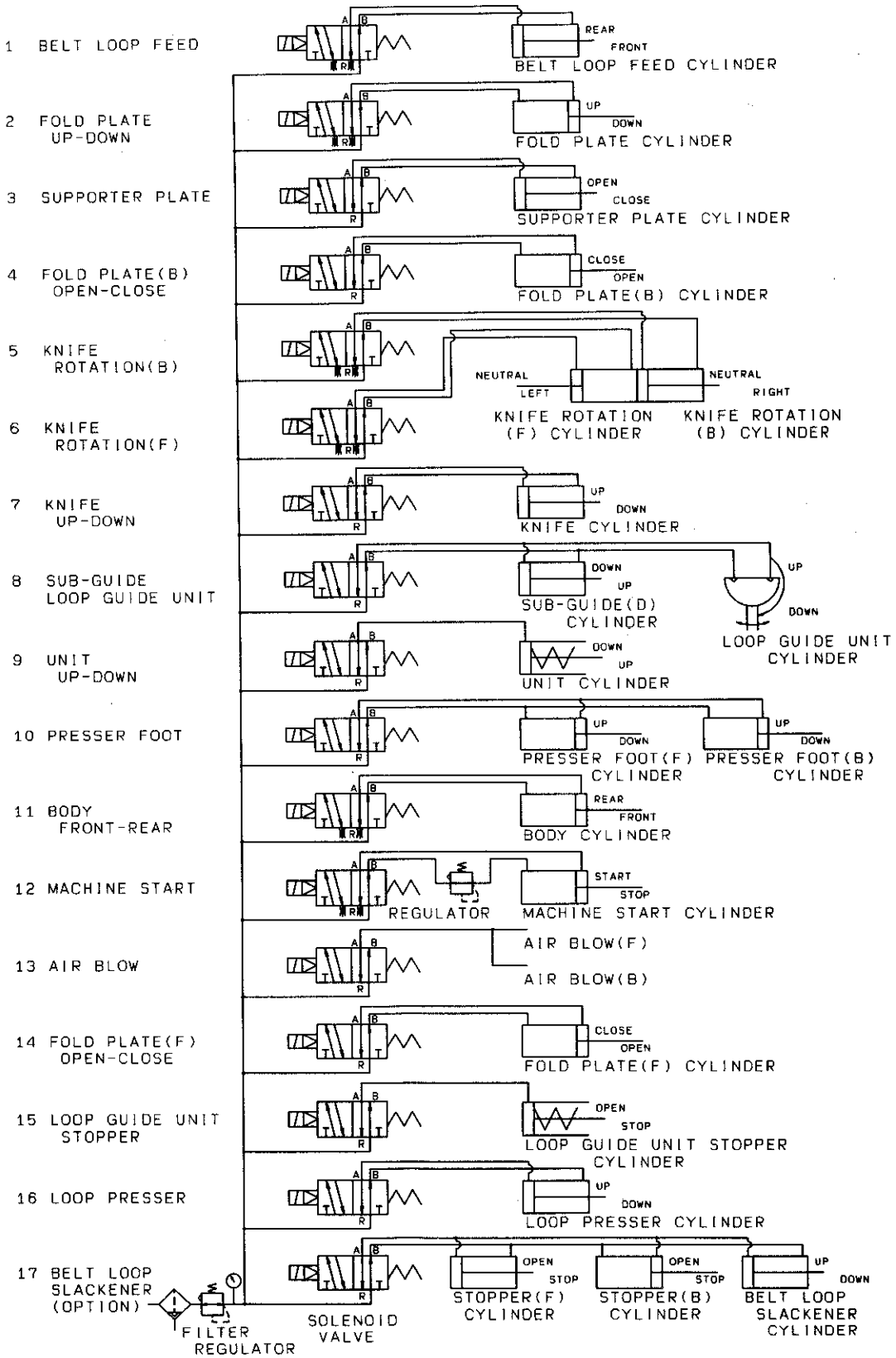




1 Belt loop feed
2 Fold plate up-down
3 Supporter plate
4 Fold plate (B) open-close
5 Knife rotation (B)
6 Knife rotation (F)
7 Knife up-down
8 Sub-guide
Loop-guide unit
9 Unit up-down
10 Presser foot
11 Body front-rear
12 Machine start
13 Air blow
14 Fold plate (F) open-close
15 Loop-guide unit stopper
16 Loop presser
17 Belt loop slackner (option)

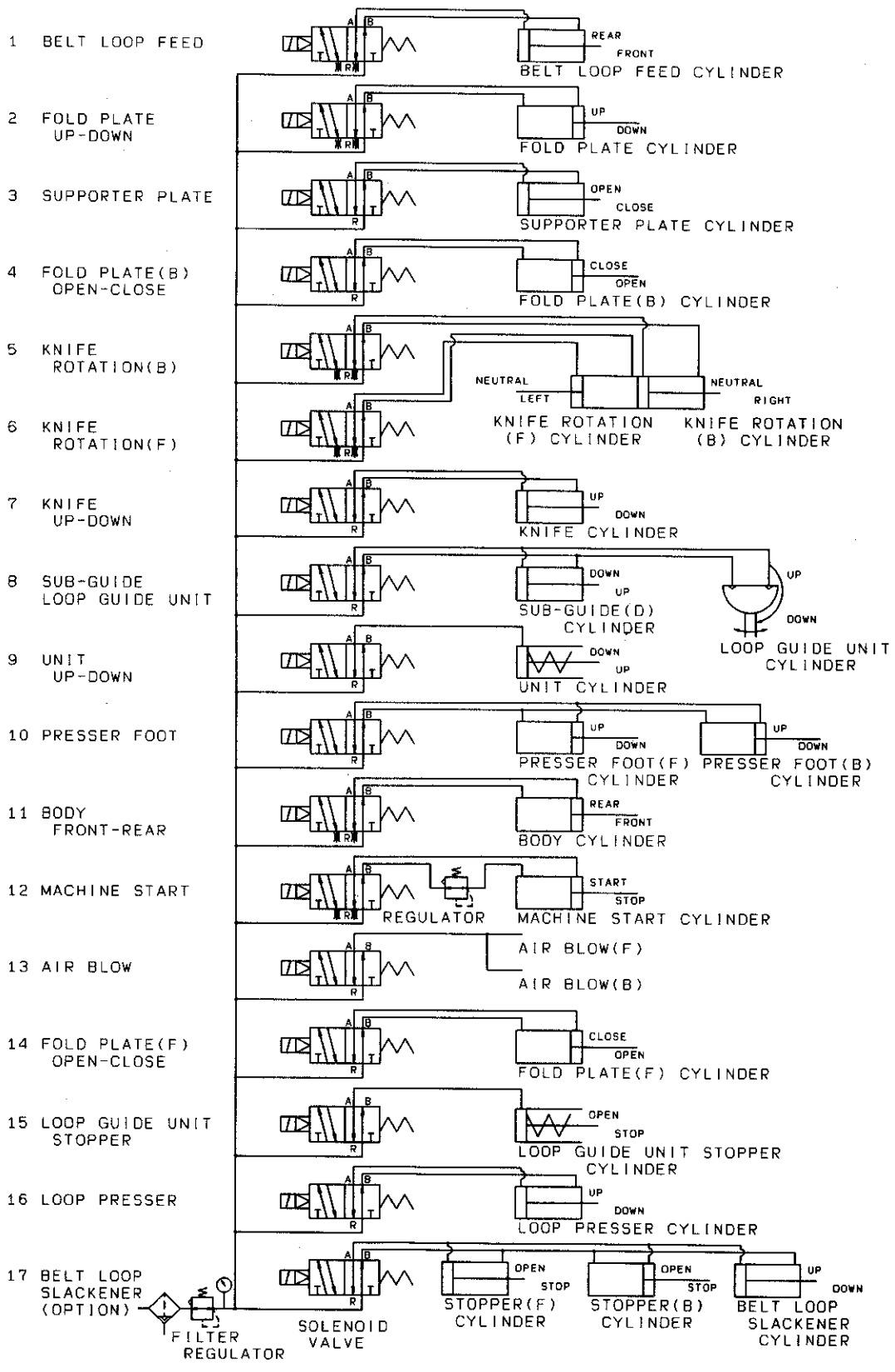
2 Air piping diagram

* This diagram is for the new type solenoid valves. In the old type solenoid valves 1-13, port A and B is reversed.



2 Air piping diagram

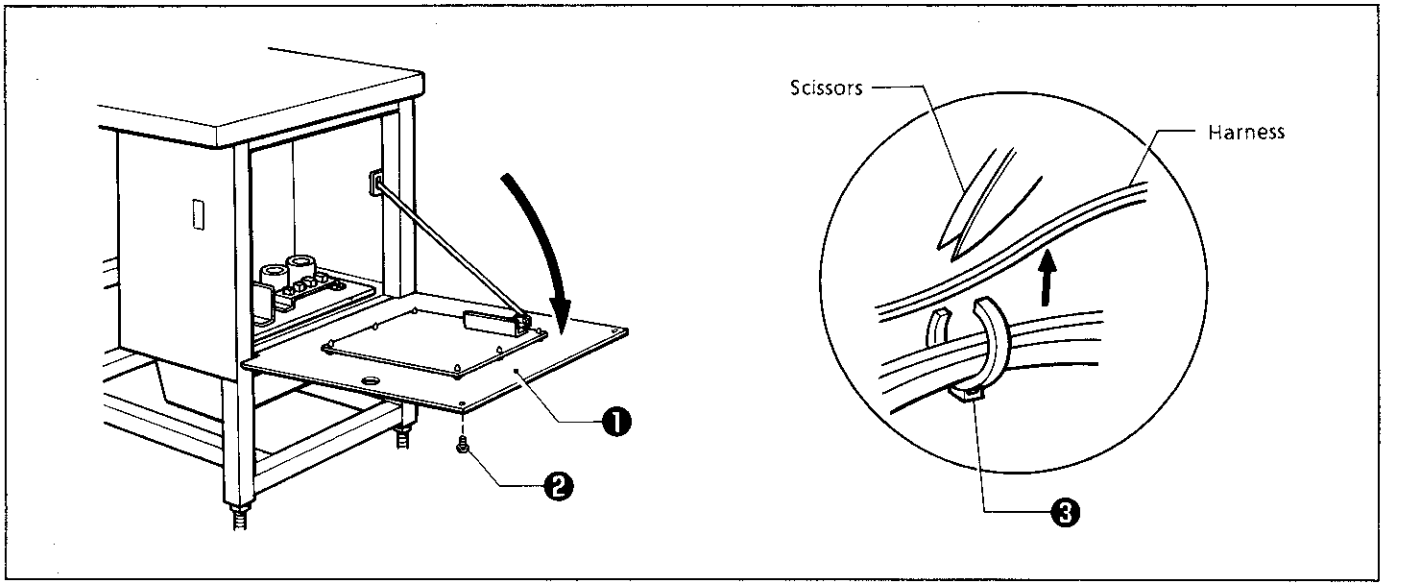
* This diagram is for the new type solenoid valves. In the old type solenoid valves 1-13, port A and B is reversed.



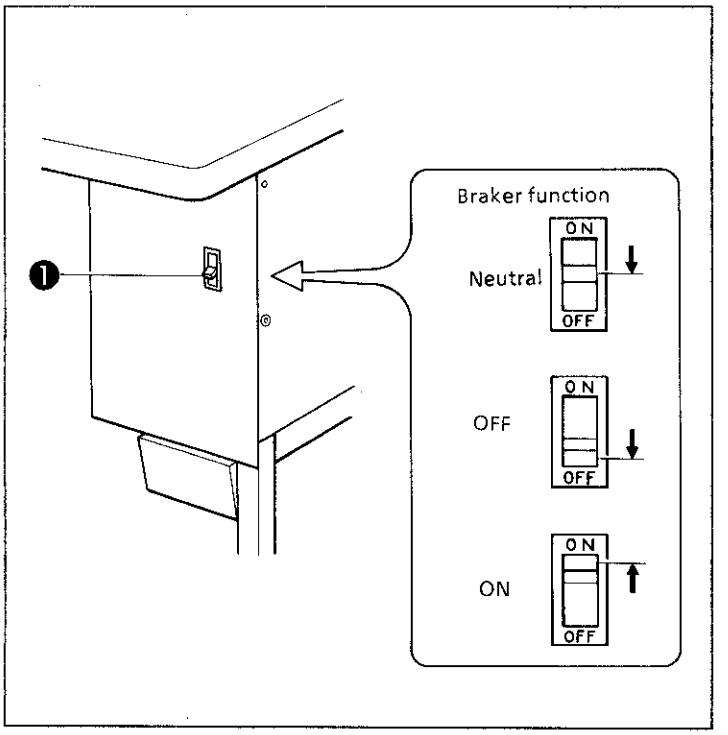
4.ELECTRICAL EQUIPMENT

REPLACEMENT

* Remove the two screws ❷ and open the side cover ❶.
* Cut the band ❸ with scissors or similar tool.



1 POWER switch

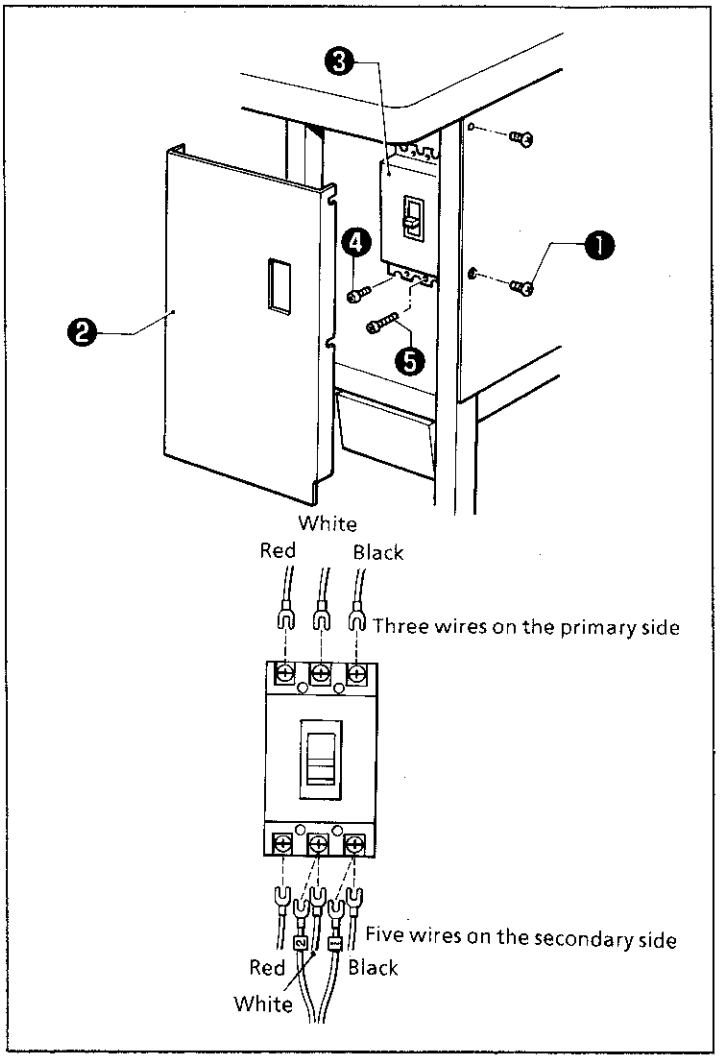


1. Explanation of POWER switch

1) The POWER switch ❶ turns the power supply of the machine on and off. If the POWER switch ❶ is at ON, the machine motor operates and current is supplied to the control circuit.

2) The POWER switch ❶ has a breaker function, so that if there is a short circuit or the machine motor seizes, the power supply is automatically cut off.
   * If the breaker function has activated, locate and remedy the cause of the short circuit or motor seizure.

3) When the breaker function is activated, the lever of the POWER switch ❶ moves to the position between ON and OFF. To set it back to ON, set it once to OFF and then set it back to ON.



2.Replacing the POWER switch

* When replacing the POWER switch ❸, always be sure to pull out the power cord.

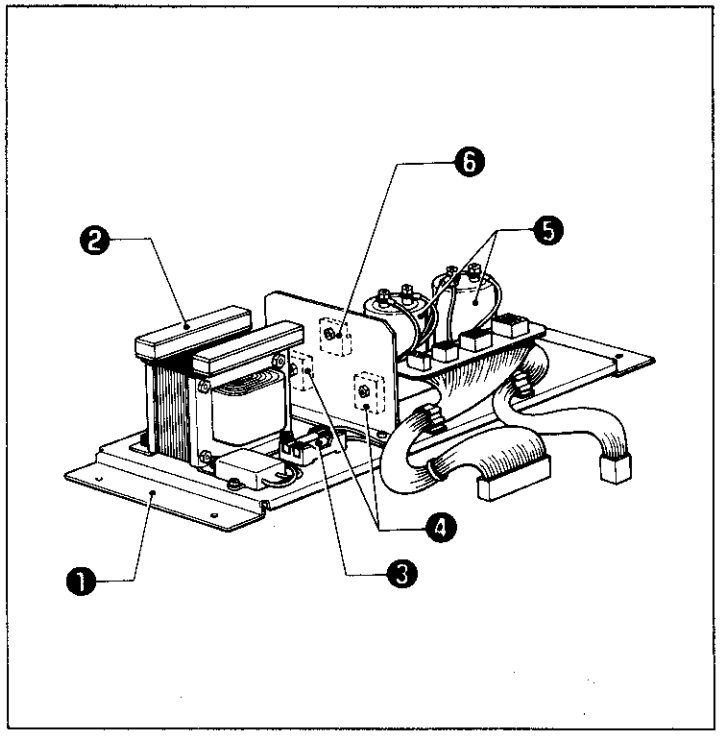
1) Loosen the four screws ❶ and remove the front cover ❷.

2) Loosen the six screws ❹ of the POWER switch ❸, and remove the three wires on the primary side and the five wires on the secondary side.

3) Remove the two screws ❺ and then remove and replace the POWER switch ❸.

* After replacing the POWER switch ❸, reconnect the wires in the positions they were in before replacement. If they are connected wrongly, the direction of motor operation may be reversed.

2 Power unit

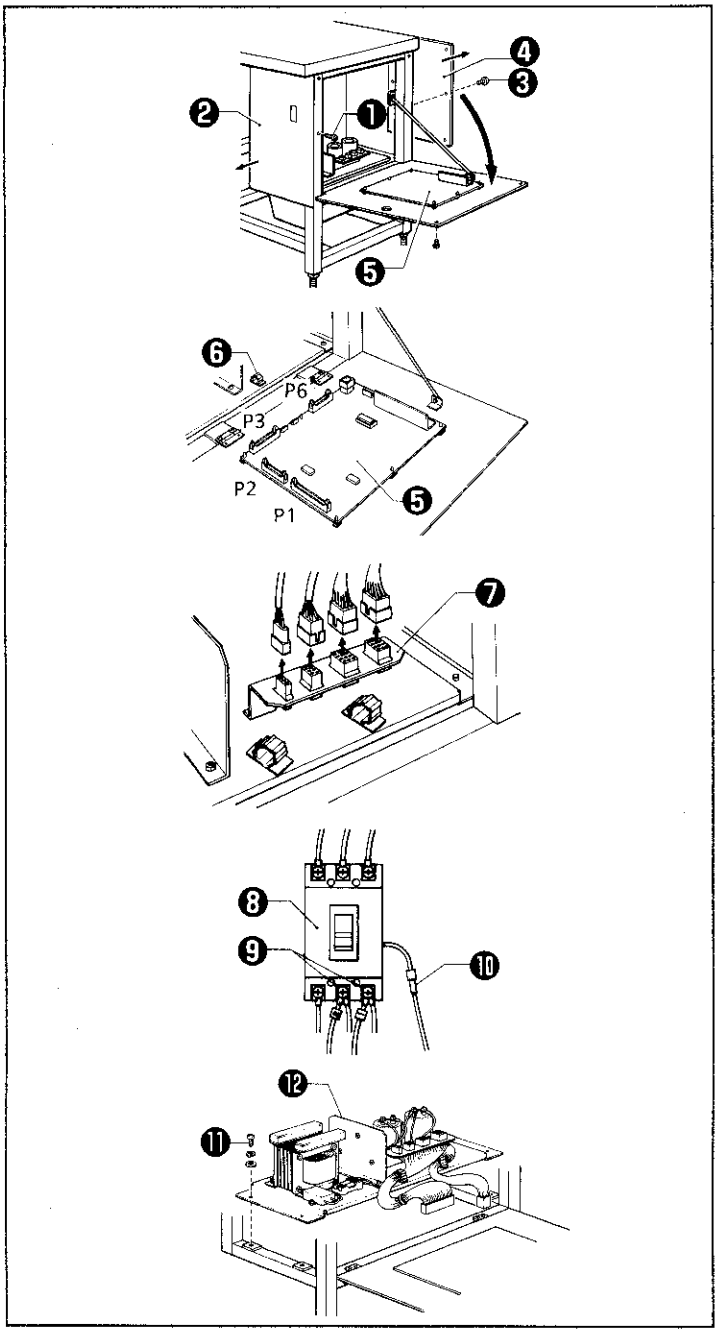


1.Explanation of POWER unit

1) The power unit ❶ operates on commercial voltages supplied through the power outlet.

2) The power unit ❶ consists of components such as a power transformer ❷, fuses ❸, a rectifier ❹, a capacitor ❺ and a regulator ❻.

3) The power unit ❶ produces 24V and 35V direct current for components such as the solenoid valves and loop feed pulse motor and 5V direct current for the IC's from the primary side, and supplies these to the main circuit board.



2.Replacing the power unit

1) Open the side cover, loosen the three screws ❶ and remove the front cover ❷, and then remove the six screws ❸ and the rear cover ❹.

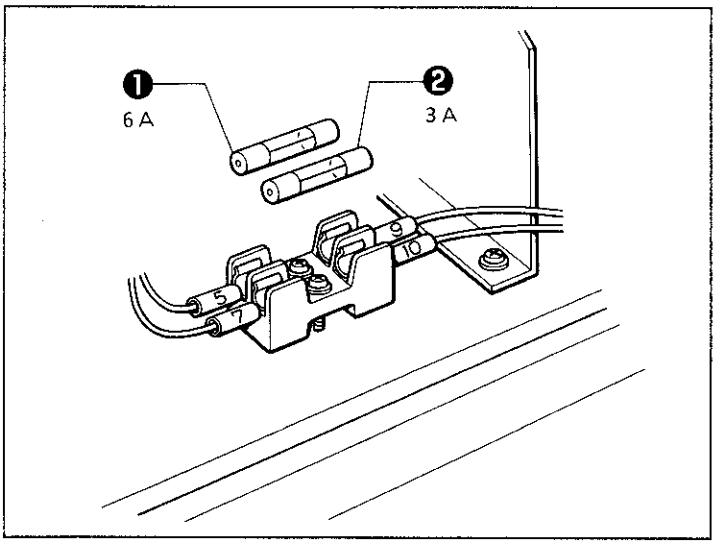
2) Disconnect the connector of the main circuit board ❺, and disconnect the harness from the cord clamp ❻.

3) Disconnect the connector of the relay circuit board ❼.

4) Loosen the two screws ❽ of the POWER switch ❾, and remove the harness and the connector ❿.

5) Remove the four screws ⓫ and then remove and replace the power unit ⓬.

* After replacing the power unit ⓬, reconnect the connectors in the positions they were in before replacement. Lock connectors P1, P2, P3 and P6.



3.Replacing the fuses

1) Open the side cover.

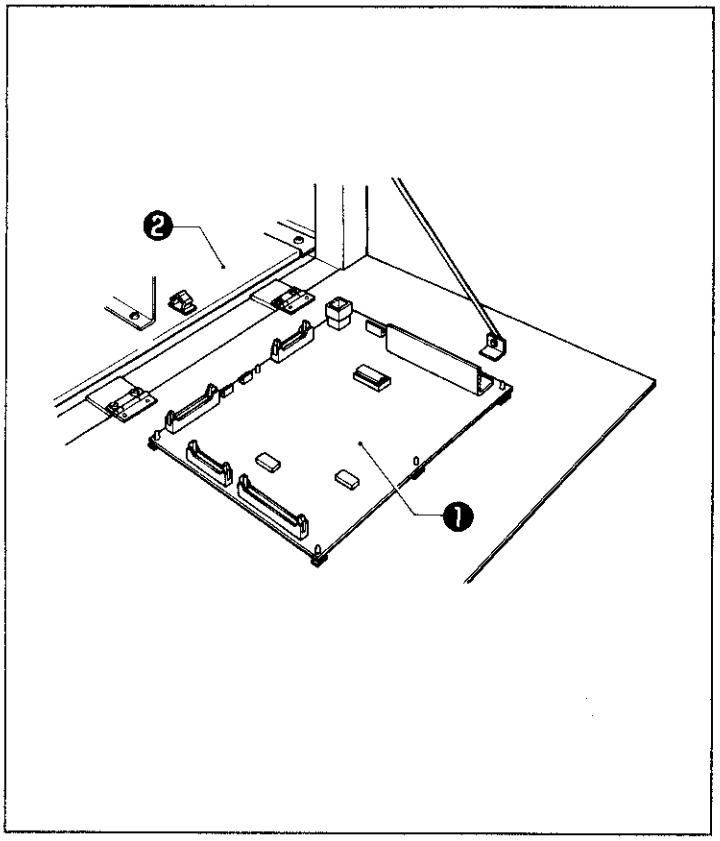
2) The fuses ❶ are 6 A fuses, and are used to protect the solenoid valves, loop feed pulse motor, and other components.

3) The fuses ❷ are 3 A fuses, and are used to protect the IC's.

* If a fuse is blown, locate and remedy the cause of the blown fuse and then replace the fuse with a new one.

* Do not mistake the rating of the fuses.

3 Main circuit board

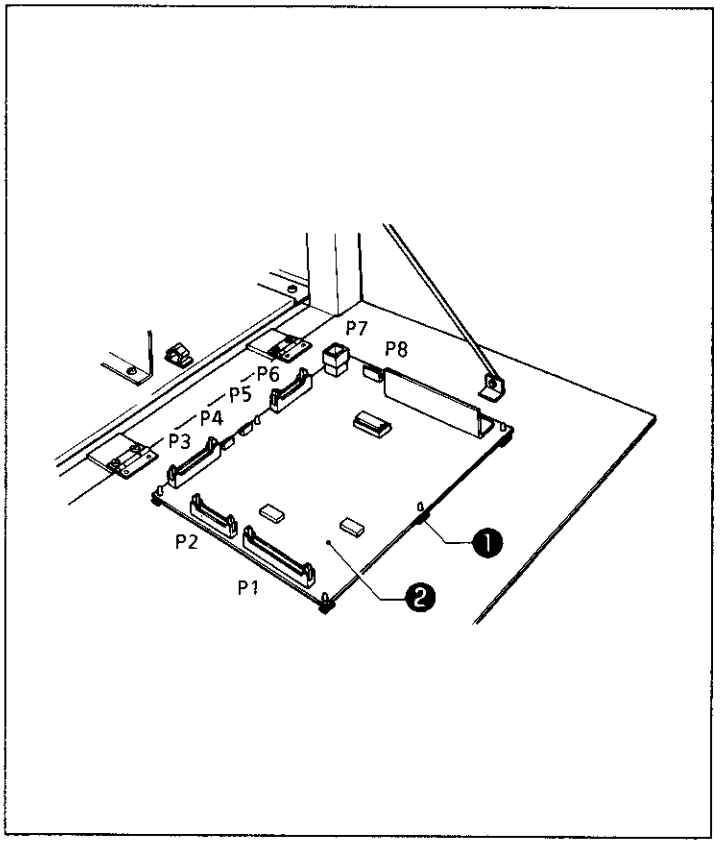


1.Explanation of main circuit board

1) The main circuit board ❶ operates by means of the power supplied from the power unit ❷.

2) The main circuit board ❶ consists of components such as the microprocessor circuit, pulse motor drive circuit and solenoid valve drive circuit.

3) For details on the connectors, refer to the control block diagram on page 4-63.



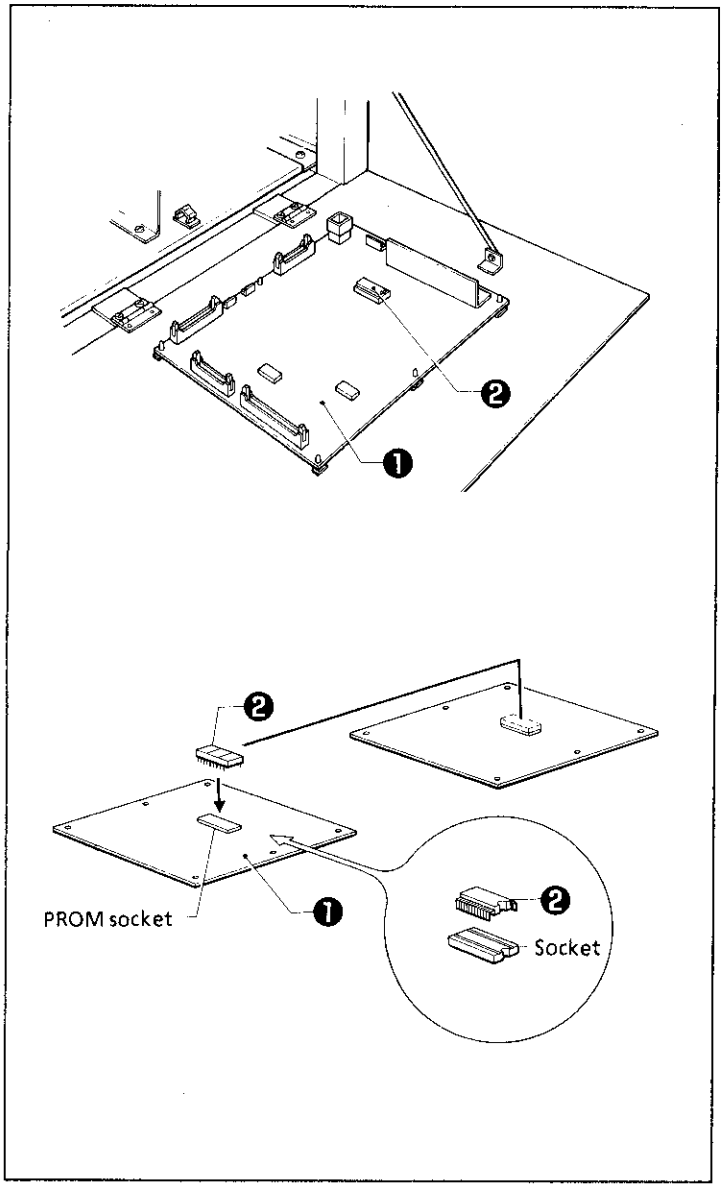
2.Replacing the main circuit board

1) Open the side cover.

2) Disconnect connectors P1~P8.

3) Remove the main circuit board ❷ from the six circuit board supports ❶ and replace the main circuit board ❷.

* After replacing the main circuit board ❷, reconnect the connectors in the positions they were in before replacement. Lock connectors P1, P2, P3 and P6.



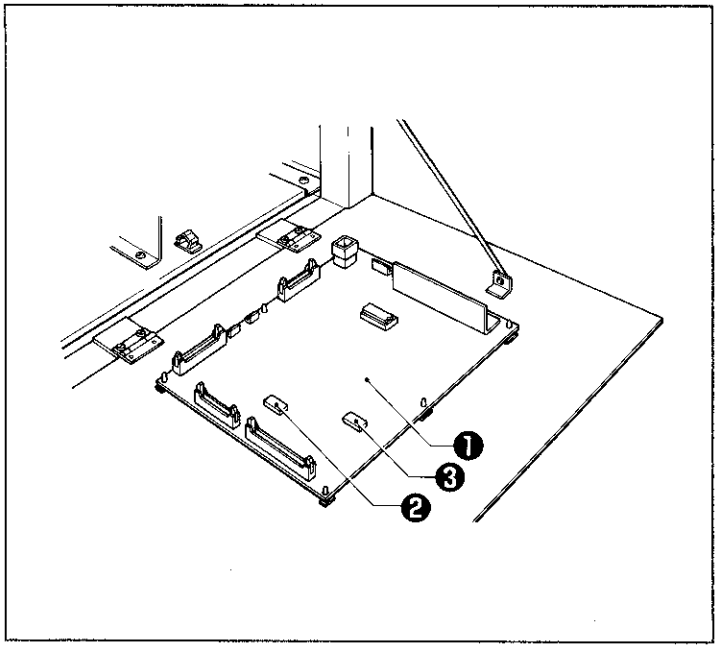
3.Main circuit board PROM

1) One removable-type PROM ❷ is used on the main circuit board ❶.

2) The accessory main circuit board ❶ is not fitted with a PROM ❷, so remove the PROM ❷ from the main circuit board ❶ that was replaced and install it to the PROM sockets on the replacement main circuit board.

* Take care that the pins do not become bent when removing and installing the PROM.

* If the PROM is installed in the wrong direction, the PROM will be damaged, so be careful to install it in the correct direction.



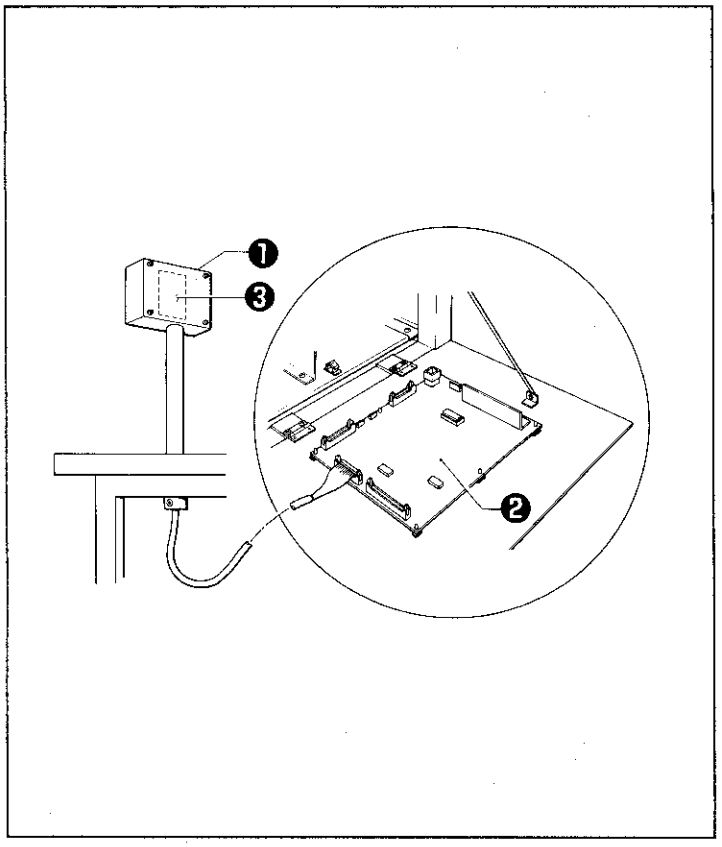
4.Main circuit board DIP switches

1) Two DIP switches, DIP switch No. 1 ❷ and DIP switch No. 2 ❸ are located on the main circuit board ❶.

2) Match the ON and OFF positions of the replacement main circuit board with those on the main circuit board ❶ that was replaced.

3) For details on the DIP switches, refer to the instruction manual.

4 Control panel

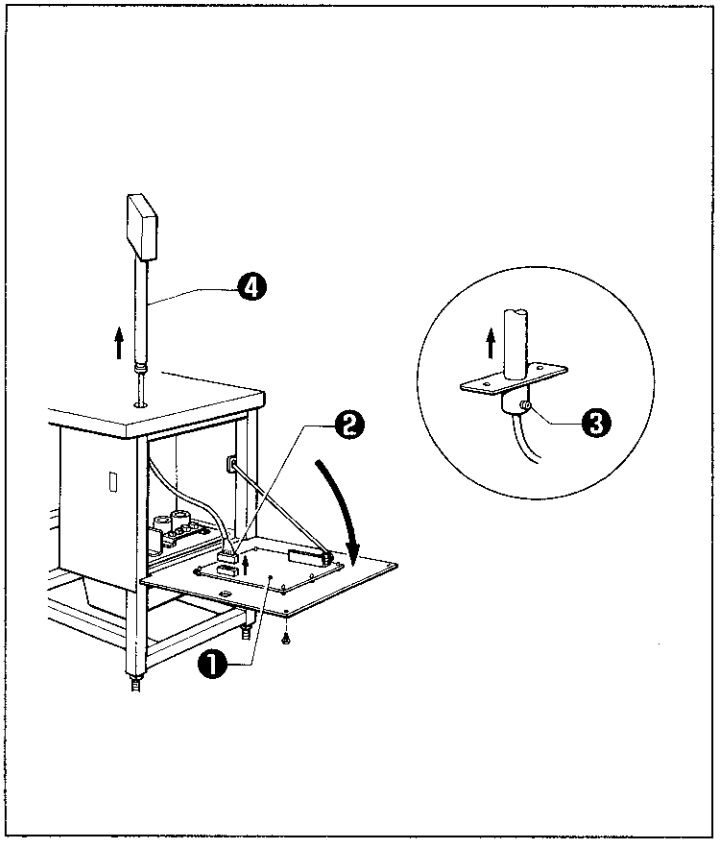


1.Explanation of control panel

1) The control panel ❶ is connected to the main circuit board ❷ and is used to control the sewing machine.

2) The control panel ❶ consists of components such as indicator lamps, a digital display and control switches.

3) There is a panel circuit board ❸ inside the control panel ❶. For details on the connectors of the panel circuit board, refer to the control block diagram on page 4-63.



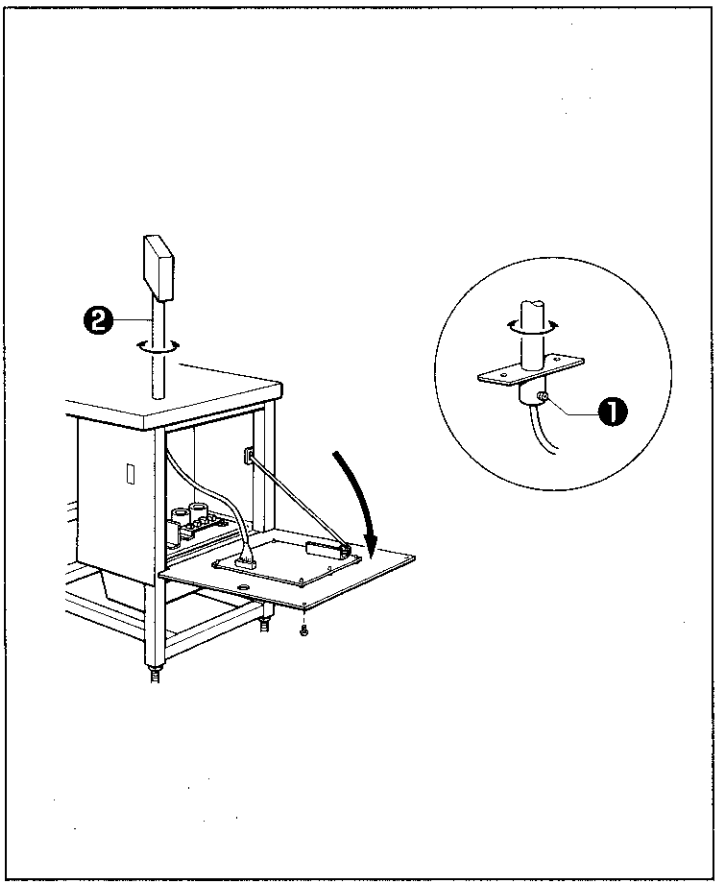
2.Replacing the control panel

1) Open the side cover.

2) Disconnect connector P2 ❷ from the main circuit board ❶.

3) Loosen the screw ❸ and lift up the control panel ❹ to remove and replace it.

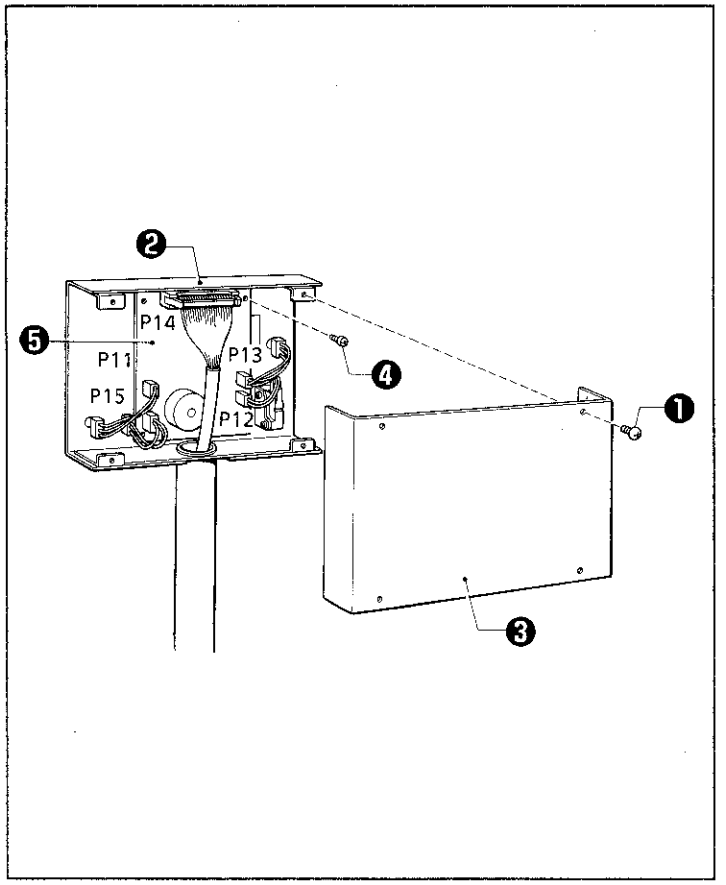
* After replacing the control panel ❹, reconnect the connector in the position it was in before replacement and lock it.



3.Direction of control panel

1) Open the side cover.

2) If the screw ❶ is loosened, the direction that the control panel ❷ faces can be changed.



4.Replacing the panel circuit board

1) Remove the four screws ❶ and remove the rear lid ❸ of the control panel ❷.

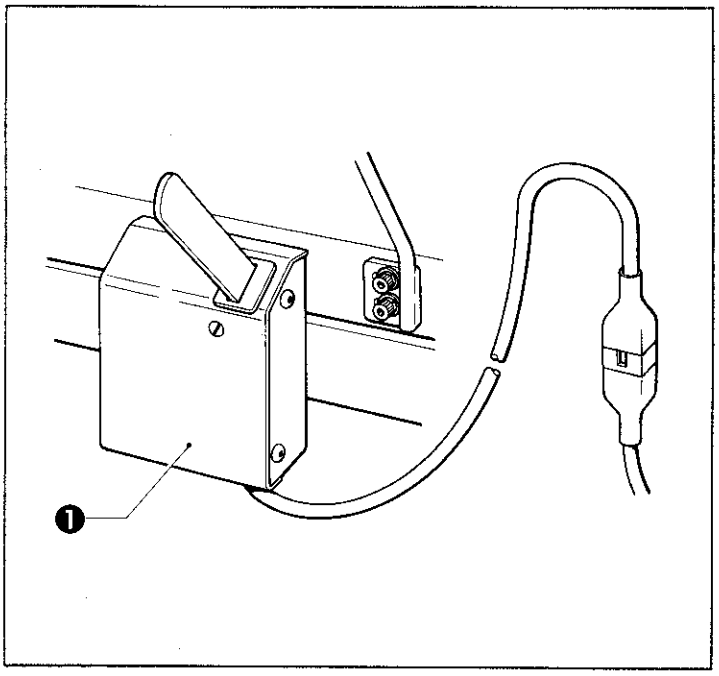
2) Disconnect connectors P11~P15.

3) Remove the four screws ❹ and then remove and replace the panel circuit board ❺.

* After replacing the panel circuit board ❺, reconnect the connectors in the positions they were in before replacement. Lock connector P14.

* Install the panel circuit board ❺ in a position so that the circuit board switches operate correctly.

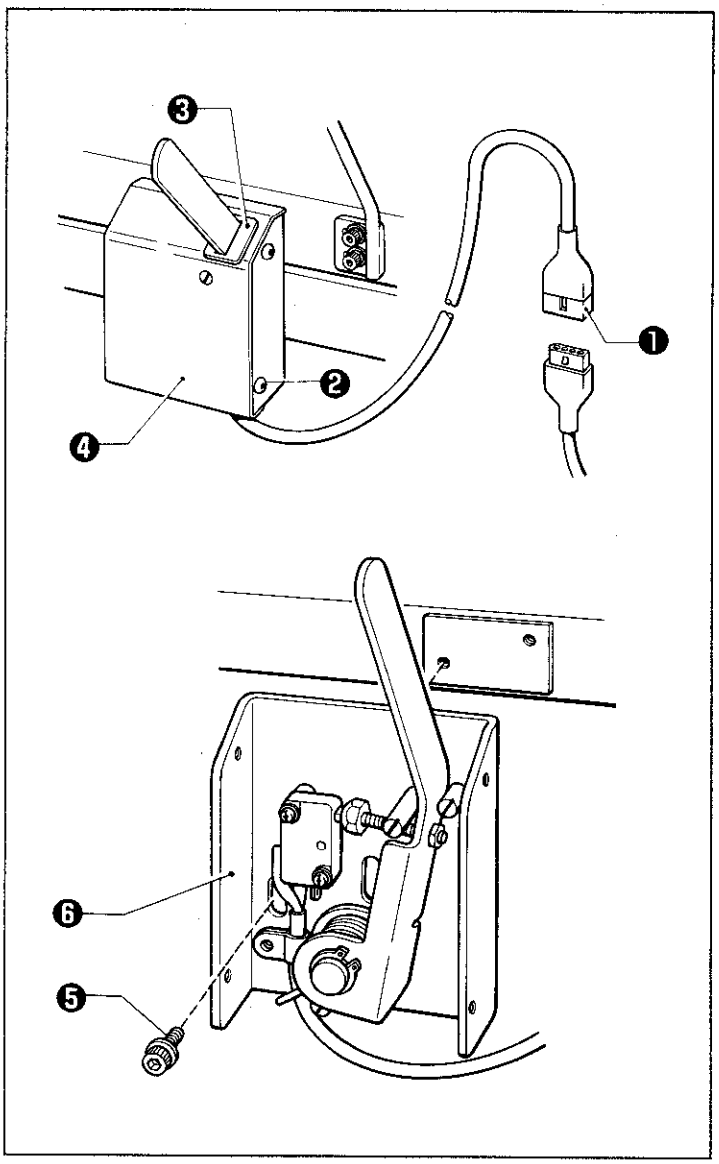
5 START switch



1.Explanation of START switch

1) The START switch ❶ is connected to the main circuit board and is used to operate the sewing machine.

2) The START switch ❶ consists of components such as a switch, operation lever and spring.

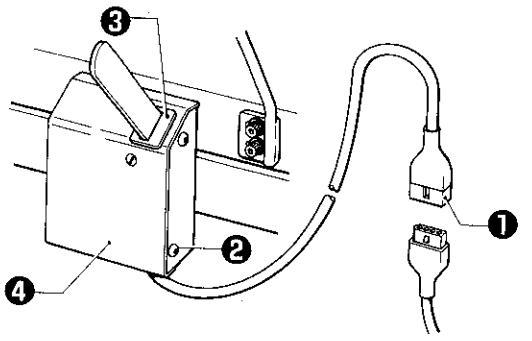


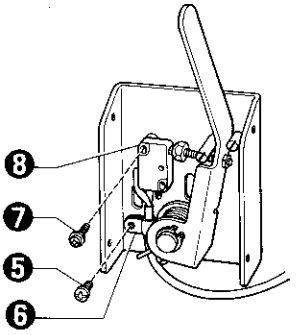
2.Replacing the START switch

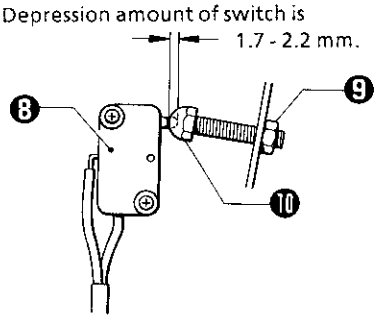
1) Disconnect the connector ❶.

2) Remove the four screws ❷ and remove the switch covers ❸ and ❹.

3) Remove the two screws ❺, and then remove and replace the START switch ❻.







3.Removing the switch

1) Disconnect the connector ❶.

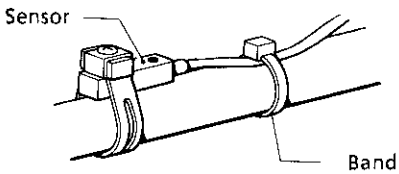
2) Remove the four screws ❷ and remove the switch covers ❸ and ❹.

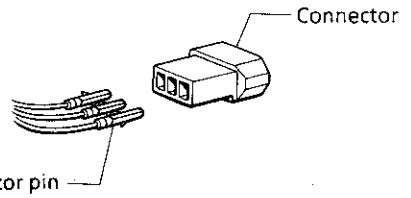
3) Remove the screw ❺, and then remove the cord holder ❻.

4) Remove the two screws ❼ and then remove and replace the switch ❽.

* Loosen the nut ❾ and turn the screw ❿ to adjust so that the depression amount of the switch ❽ is 1.7~2.2 mm, and then lock with the nut ❾.

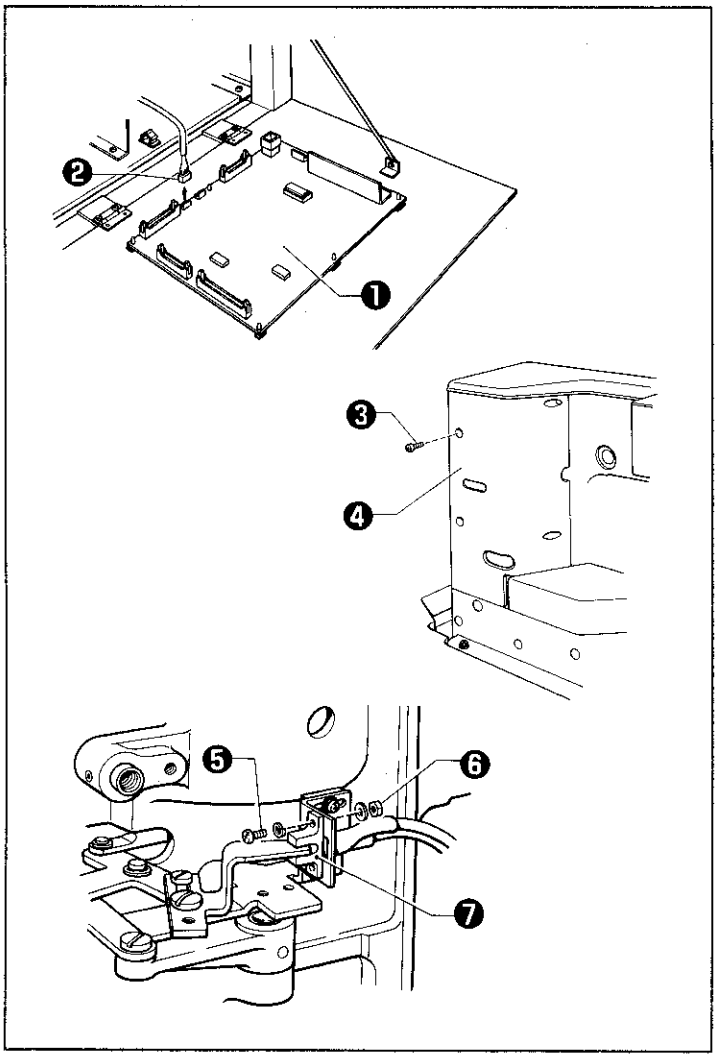
6 Replacing each of the sensors





* After replacing a sensor, bind the harnesses, being careful not to apply undue force to each of the sensors.

* Use the special tool when pulling out the connector pins.



1.Stop position sensor

1) Open the side cover.

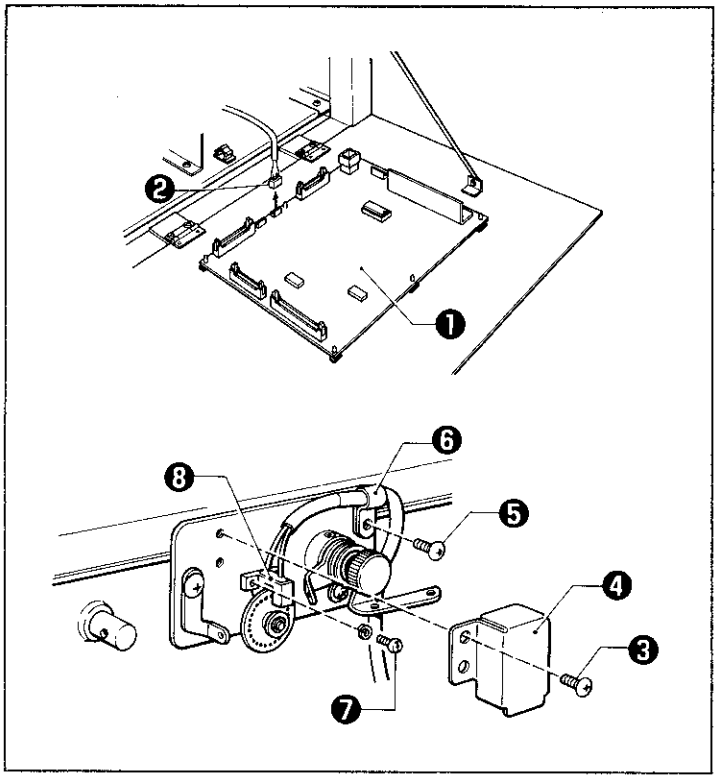
2) Disconnect connector P4 ❷ from the main circuit board ❶.

3) Cut the band and remove the harnesses from the binding wire.

4) Remove the four screws ❸ and remove the side cover ❹ of the machine head.

5) Remove the two screws ❺ and the nut ❻, and then remove and replace the stop position sensor ❼.

* For installation and adjustment, refer to " 3 Position of stop position sensor" on page 2-9.



2.Thread breakage sensor

1) Open the side cover.

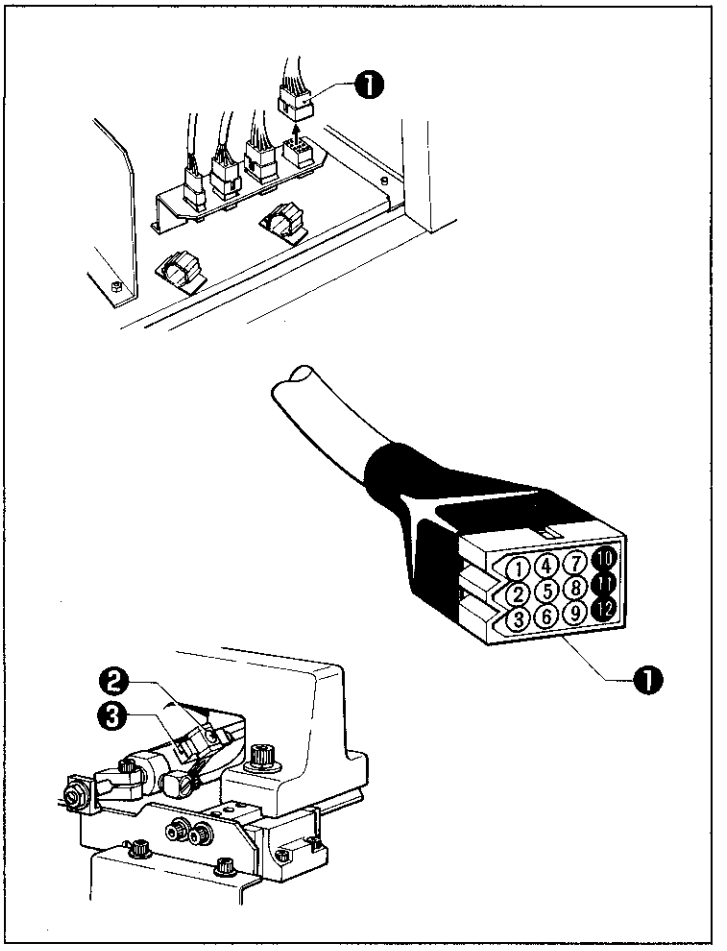
2) Disconnect connector P5 ❷ from the main circuit board ❶.

3) Cut the band and remove the harnesses from the binding wire.

4) Remove the two screws ❸ and remove the sensor cover ❹.

5) Remove the screw ❺ and then remove the cord holder ❻.

6) Remove the two screws ❼ and then remove and replace the thread breakage sensor ❽.



3.Body front sensor

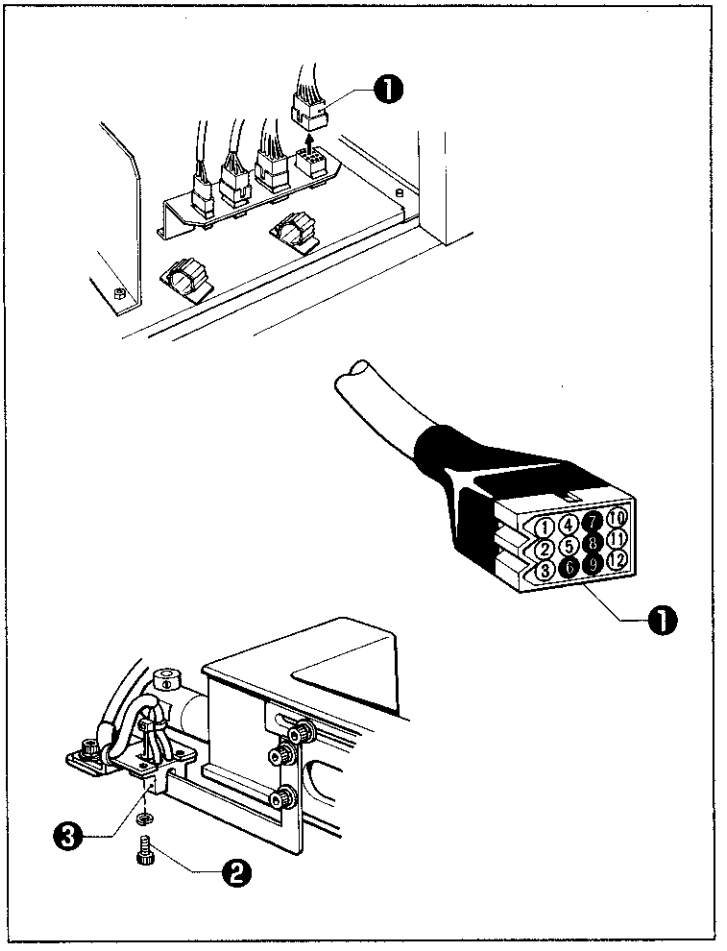
1) Open the side cover.

2) Disconnect the 12P connector ❶ and remove the three pins numbered 10, 11 and 12.

3) Cut the band and remove the harnesses from the binding wire.

4) Loosen the screw ❷ and then remove and replace the body front sensor ❸.

* For installation and adjustment, refer to " 1.4 Position of body front sensor" on page 2-4.



4.Body rear sensor

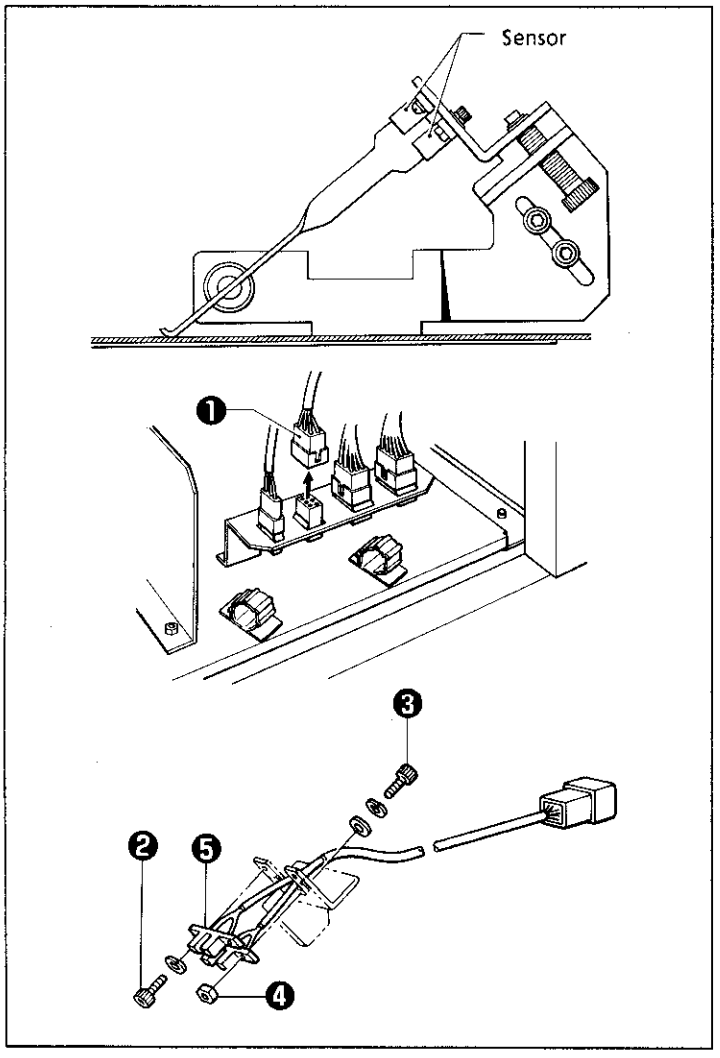
1) Open the side cover.

2) Disconnect the 12P connector ❶ and remove the four pins numbered 6, 7, 8 and 9.

3) Cut the band and remove the harnesses from the binding wire.

4) Remove the two screws ❷ and then remove and replace the body rear sensor ❸.

* For installation and adjustment, refer to " 1.8 Position of body rear sensor" on page 2-6.



5.Seam joint sensor

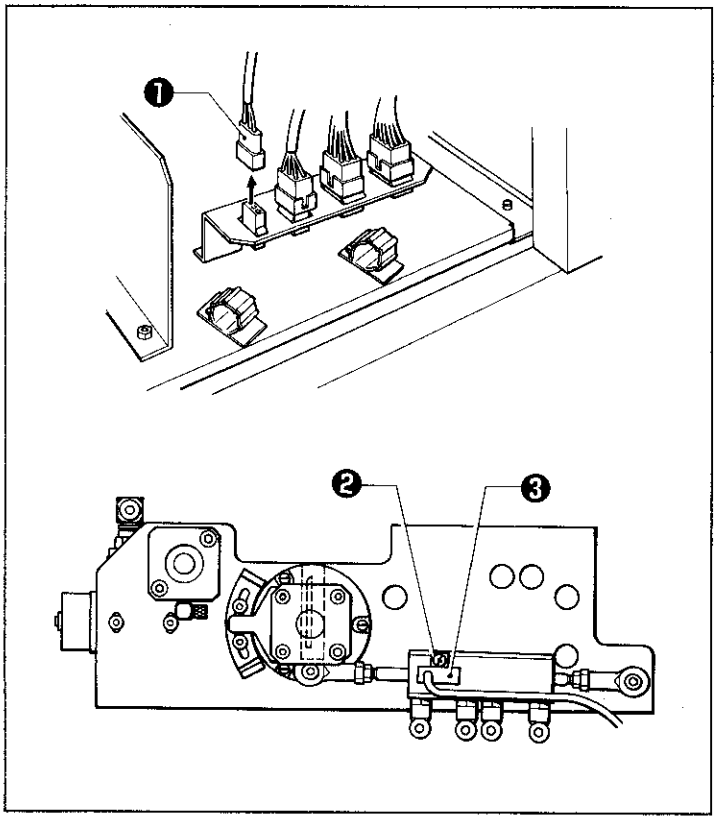
1) Open the side cover.

2) Disconnect the 6P connector ❶.

3) Cut the band and remove the harnesses from the binding wire.

4) Remove the two screws ❷ and ❸ and the nut ❹, and then remove and replace the seam joint sensor (including loop empty sensor) ❺.

* For installation and adjustment, refer to " [4].2 Position of seam joint sensor" and " [4].3 Position of loop empty sensor" on page 3-11.



6.Cutter center sensor

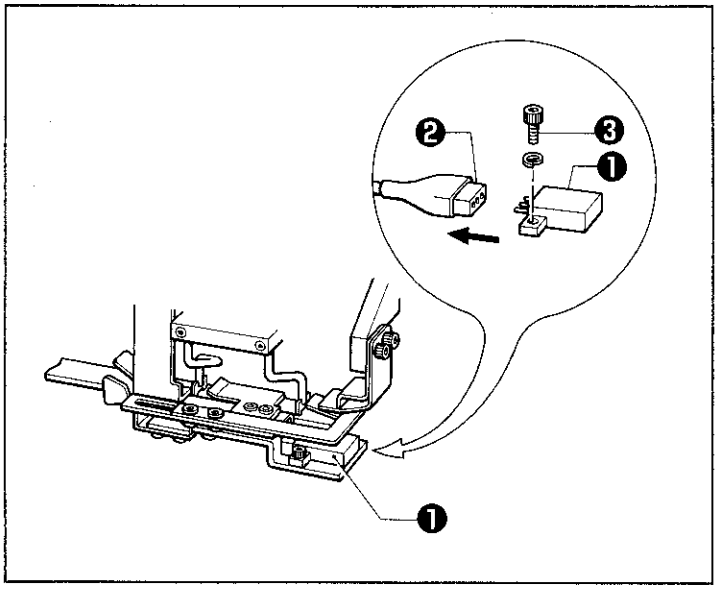
1) Open the side cover.

2) Disconnect the 3P connector ❶.

3) Cut the band and remove the harnesses from the binding wire.

4) Loosen the screw ❷ and then remove and replace the cutter center sensor ❸.

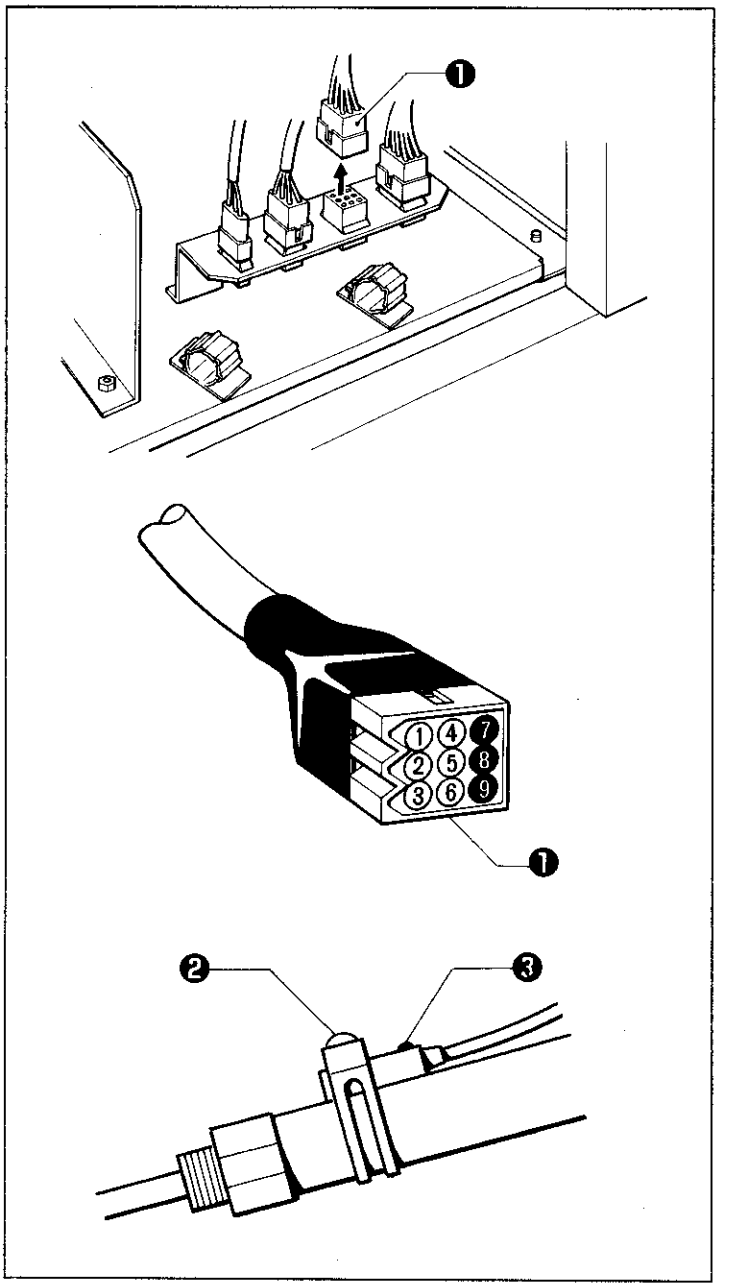
* For installation and adjustment, refer to " [5].7 Position of cutter center sensor" on page 3-15.



7.Loop set sensor

1) Disconnect the connector ❷ of the loop set sensor ❶.

2) Remove the two screws ❸ and then remove and replace the loop set sensor ❶.



8.Loop front sensor

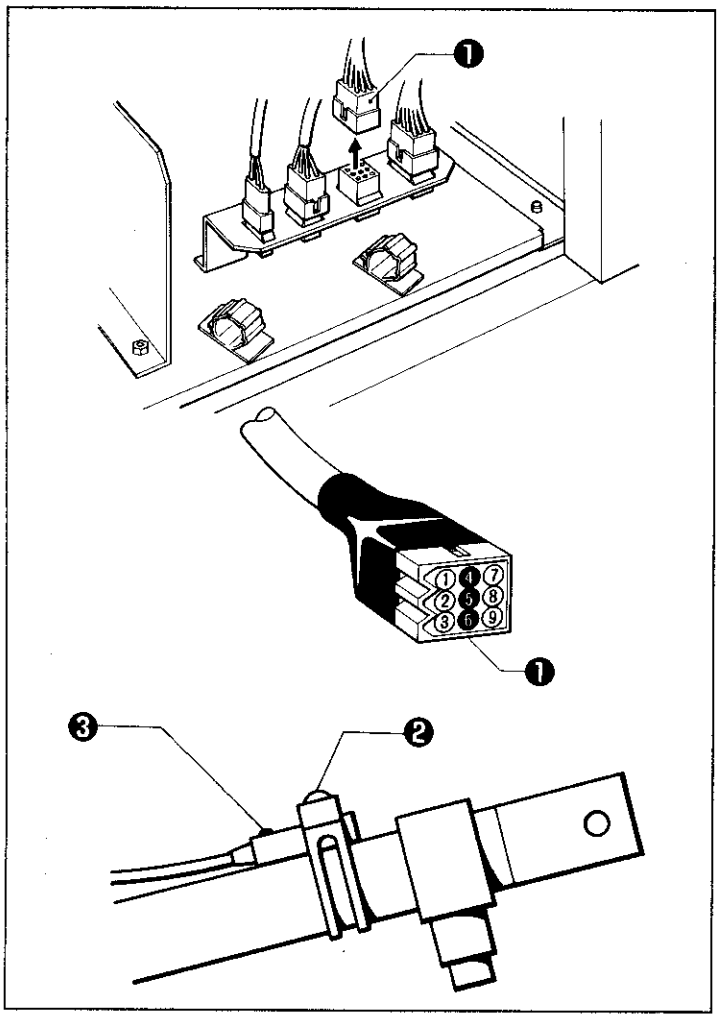
1) Open the side cover.

2) Disconnect the 9P connector ❶ and remove the four pins numbered 7, 8 and 9.

3) Cut the band and remove the harnesses from the binding wire.

4) Loosen the screw ❷ and then remove and replace the loop front sensor ❸.

* For installation and adjustment, refer to "[10].10 Position of loop front sensor" on page 3-34.



9.Loop rear sensor

1) Open the side cover.

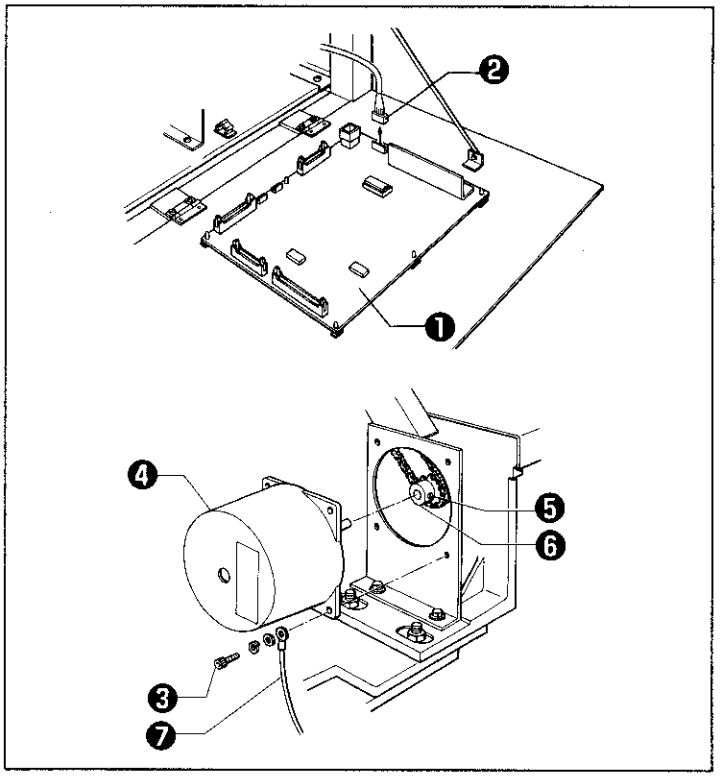
2) Disconnect the 9P connector ❶ and remove the four pins numbered 4, 5 and 6.

3) Cut the band and remove the harnesses from the binding wire.

4) Loosen the screw ❷ and then remove and replace the loop rear sensor ❸.

* For installation and adjustment, refer to "[10].5 Position of loop front sensor" on page 3-32.

[7] Replacing the pulse motor



1) Open the side cover.

2) Disconnect connector P8 ❷ from the main circuit board ❶.

3) Cut the band and remove the harnesses from the binding wire.

4) Remove the four screws ❸ and then remove and replace the pulse motor ❹.

5) Loosen the two screws ❺ and then remove and replace sprocket wheel (B) ❻.

6) When tightening the four screws ❸, tighten the earth wire ❼.

* For installation and adjustment, refer to "[3].2 Position of sprocket wheel (B)" on page 3-7 and "[3].3 Chain tension" on page 3-8.

ERROR CODE DISPLAY

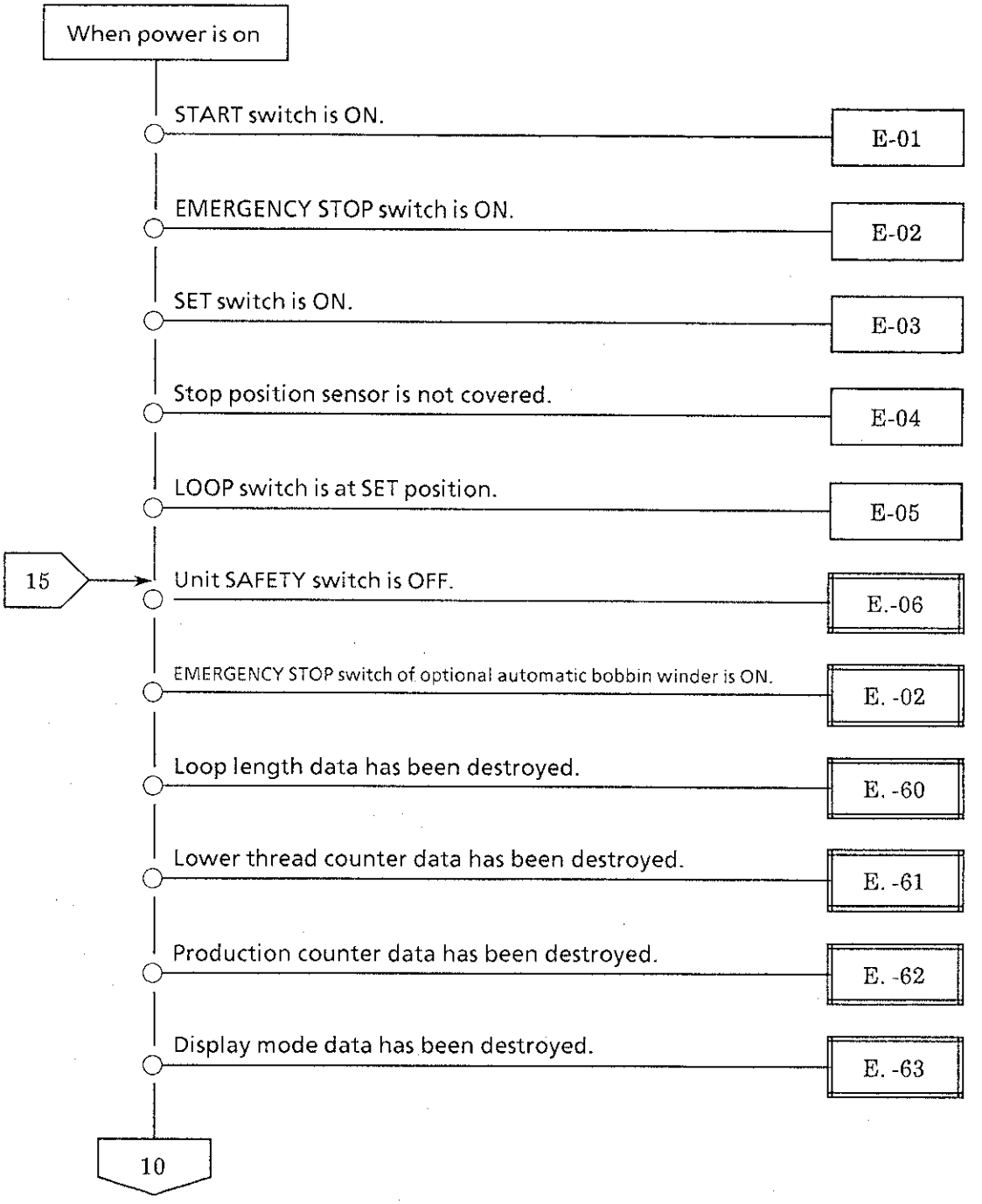
1 Error code reference chart

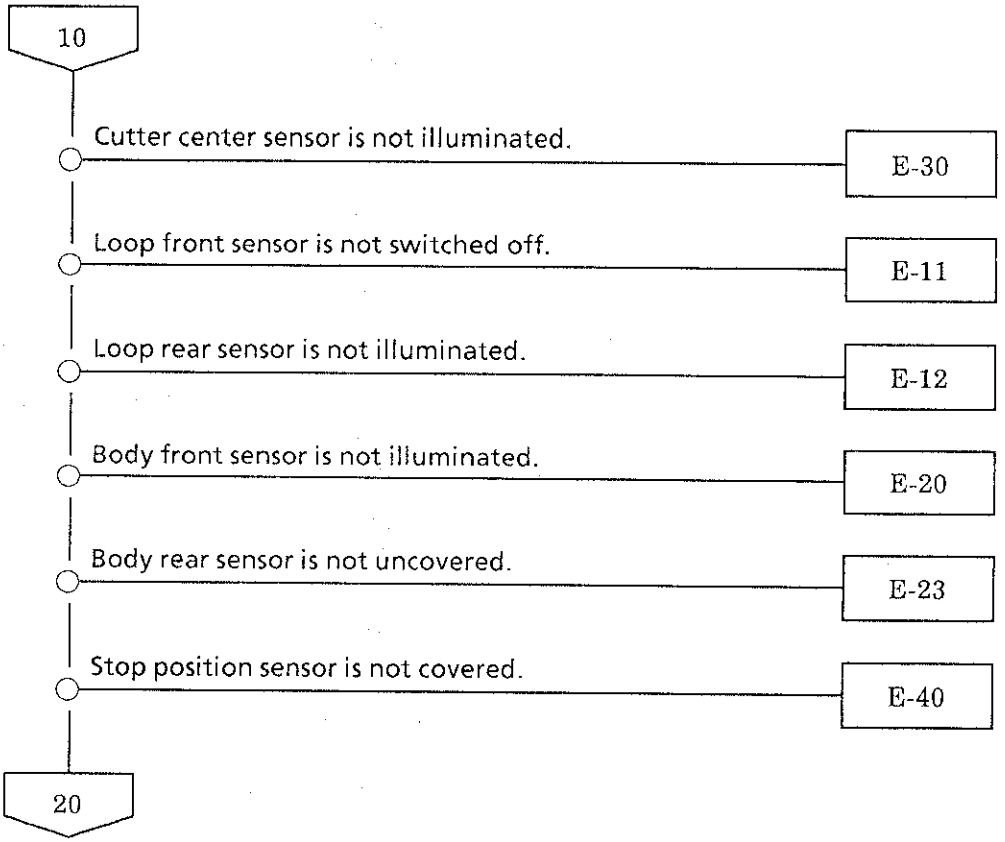
Error code	Contents
E.-00	EMERGENCY STOP switch on control panel was pressed during sewing.
E-01	START switch was pressed while power was being turned on.
E-02	EMERGENCY STOP switch of optional automatic bobbin winder was pressed.
E.-02	EMERGENCY STOP switch of optional automatic bobbin winder was pressed.
E-03	SET switch on control panel was pressed while power was being turned on.
E-04	Stop position sensor on machine head was not covered while power was being turned on.
E-05	LOOP switch on control panel was in the SET position while power was being turned on.
E.-06	Optional SAFETY switch was operating while unit was moving.
E-10	Loop front sensor is not illuminated even though loop feed cylinder is extending. (Note)
E-11	Loop front sensor is not switched off even though loop feed cylinder is retracting.
E-12	Loop rear sensor is not illuminated even though loop feed cylinder is retracting.
E-13	Loop rear sensor is not switched off even though loop feed cylinder is extending. (Note)
E-20	Body front sensor is not illuminated even though body cylinder is extending.
E-21	Body front sensor is not switched off even though body cylinder is retracting.
E-22	Body rear sensor is not covered even though body cylinder is retracting.
E-23	Body front sensor is not uncovered even though body cylinder is extending.
E-30	Cutter center sensor is not illuminated even though knife rotation (F) cylinder is at the center position.
E-31	Cutter center sensor is not switched off even though knife rotation (F) and (B) cylinders are in the turned position.
E-40	Stop position sensor is not covered even though machine head is stopped.
E-41	Stop position sensor is not uncovered even though machine head is moving.
E.-50	Seam joint sensor is not continuously covered when setting the belt loop.
E.-60	Belt loop length data stored on the main circuit board has been destroyed.
E.-61	Lower thread counter data stored on the main circuit board has been destroyed.
E.-62	Production counter data stored on the main circuit board has been destroyed.
E.-63	Display mode data stored on the main circuit board has been destroyed.
E.-80	Upper thread breakage has occurred during sewing.
LOOP	Loop set sensor does not illuminate when setting belt loop.

* E.-** and LOOP error codes can be reset without turning the power off. For details, refer to "Measures after an error code is displayed" on page xx.
* (Note) For error codes E.-10 and E.-13, bleed the air, return the loop feed cylinder by hand, and turn the power off. Then turn the air and power back on.

2 Error code display timing

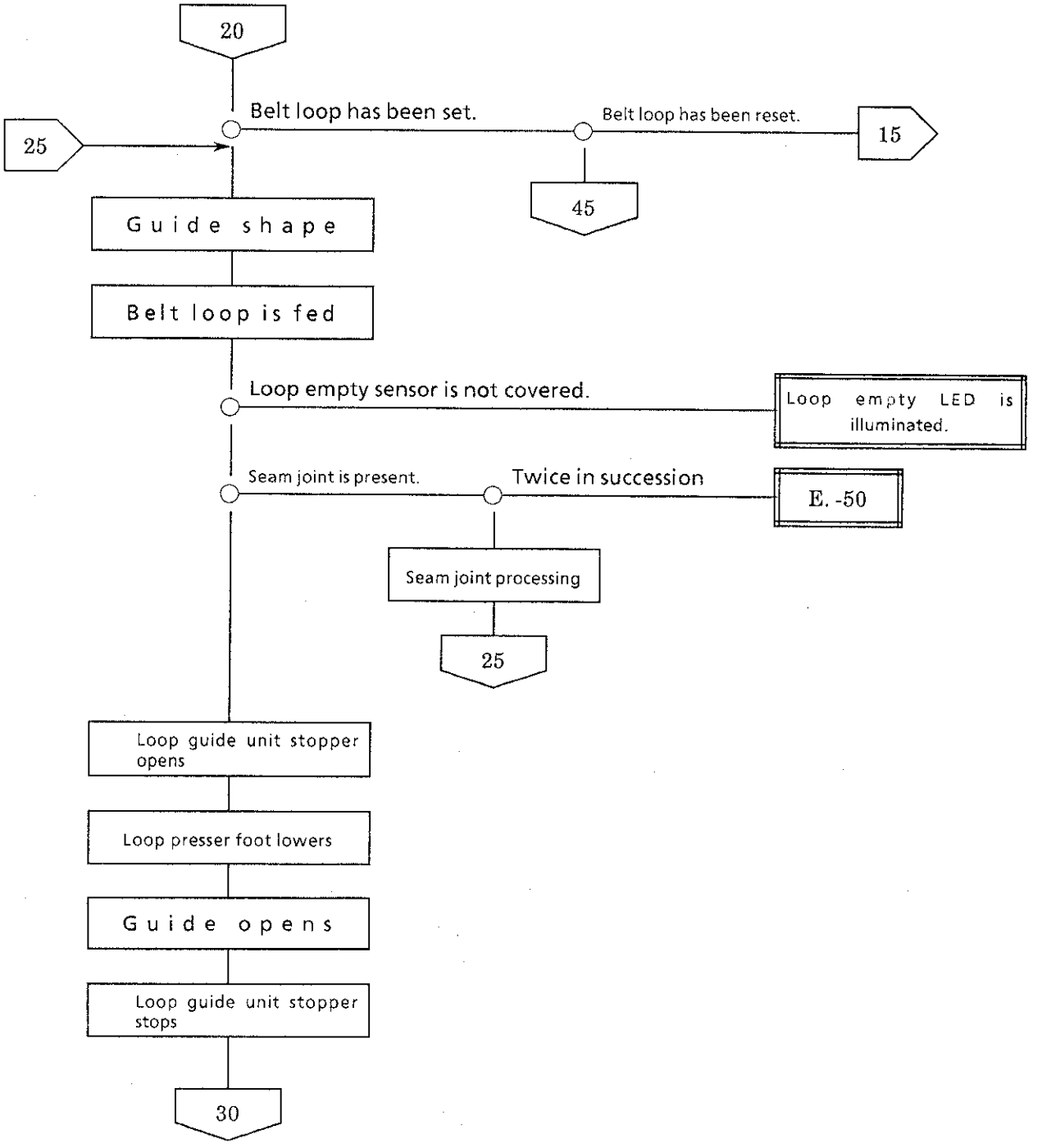
1.When power is on

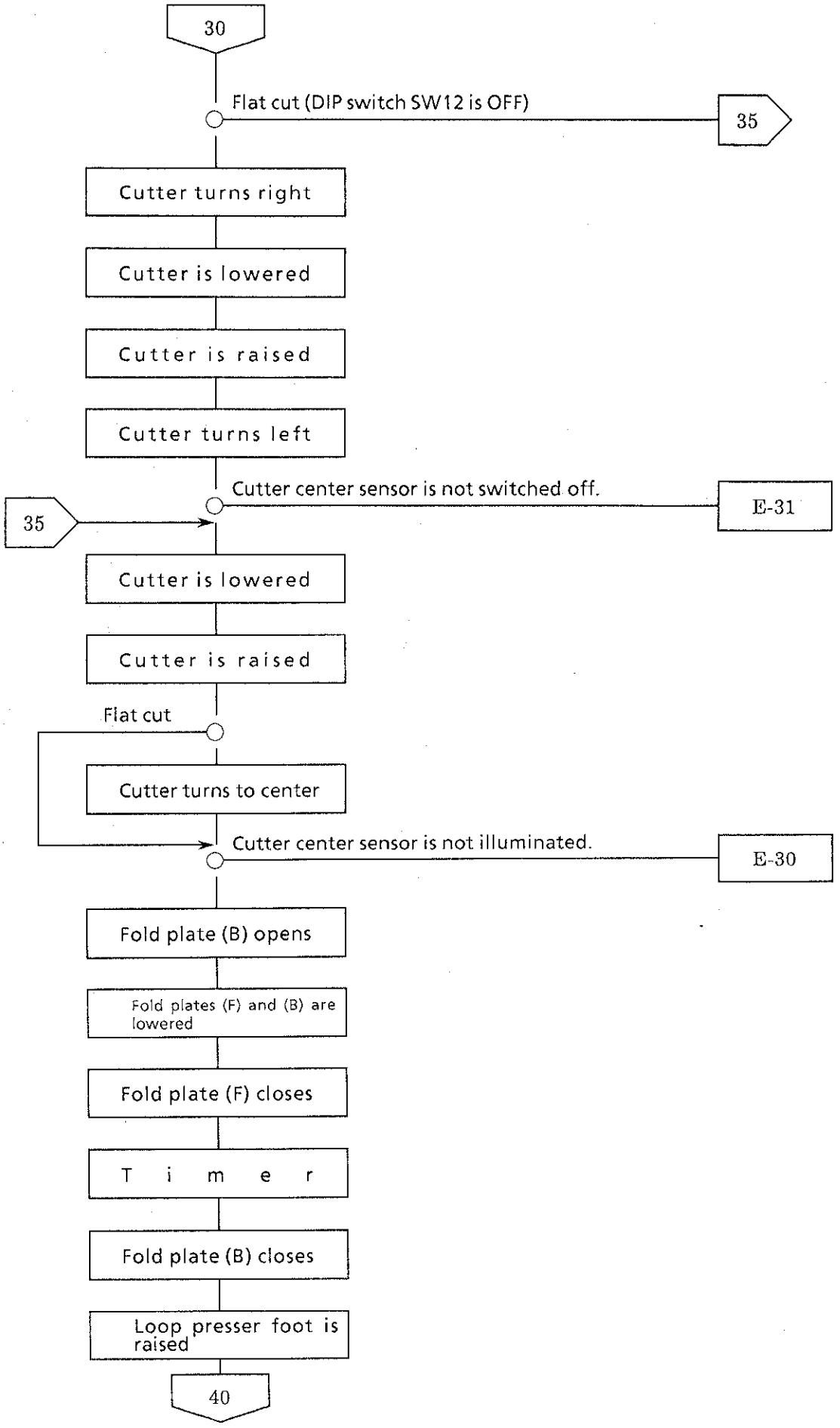


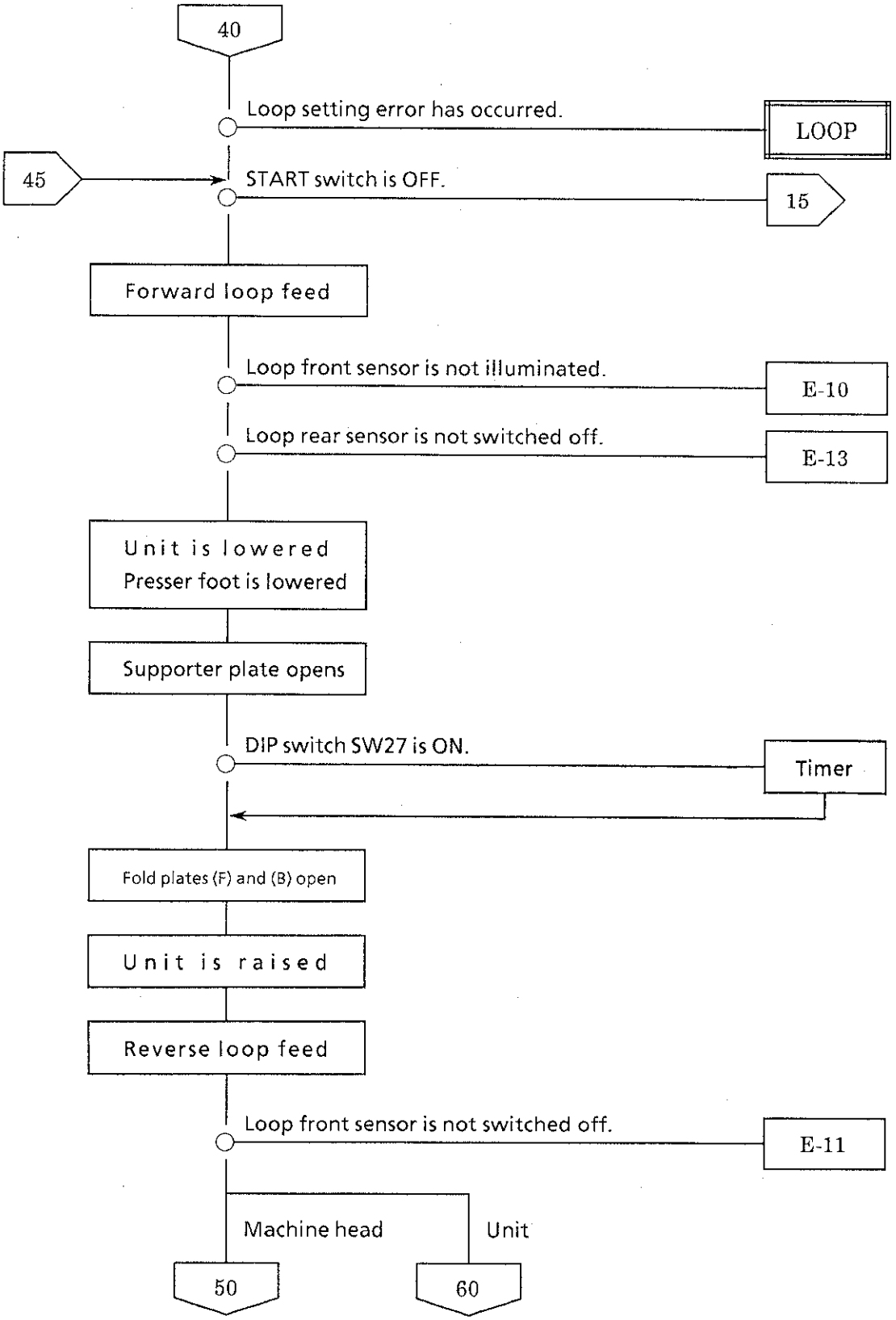

10
Cutter center sensor is not illuminated.
E-30
Loop front sensor is not switched off.
E-11
Loop rear sensor is not illuminated.
E-12
Body front sensor is not illuminated.
E-20
Body rear sensor is not uncovered.
E-23
Stop position sensor is not covered.
E-40
20

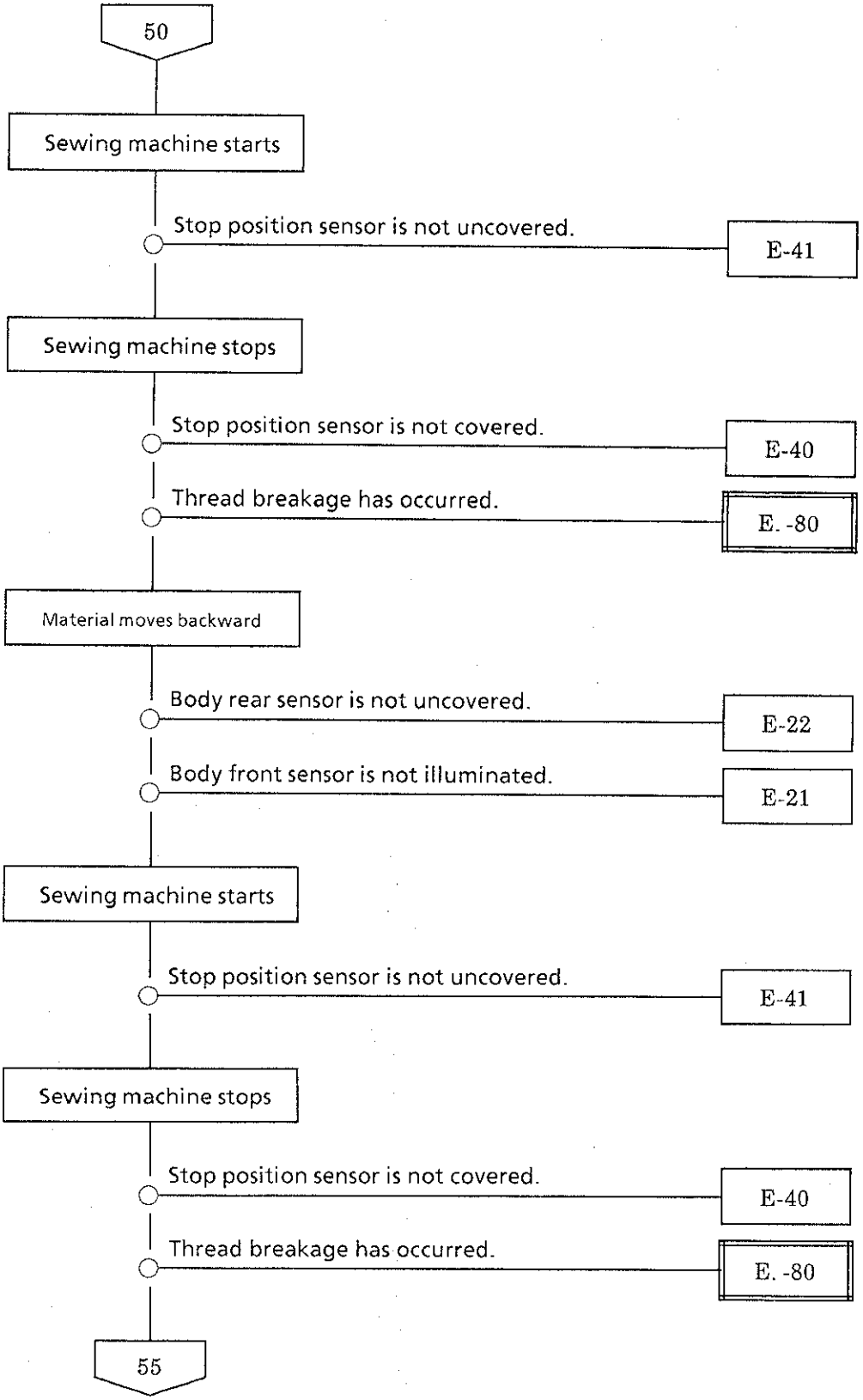
2.During automatic sewing

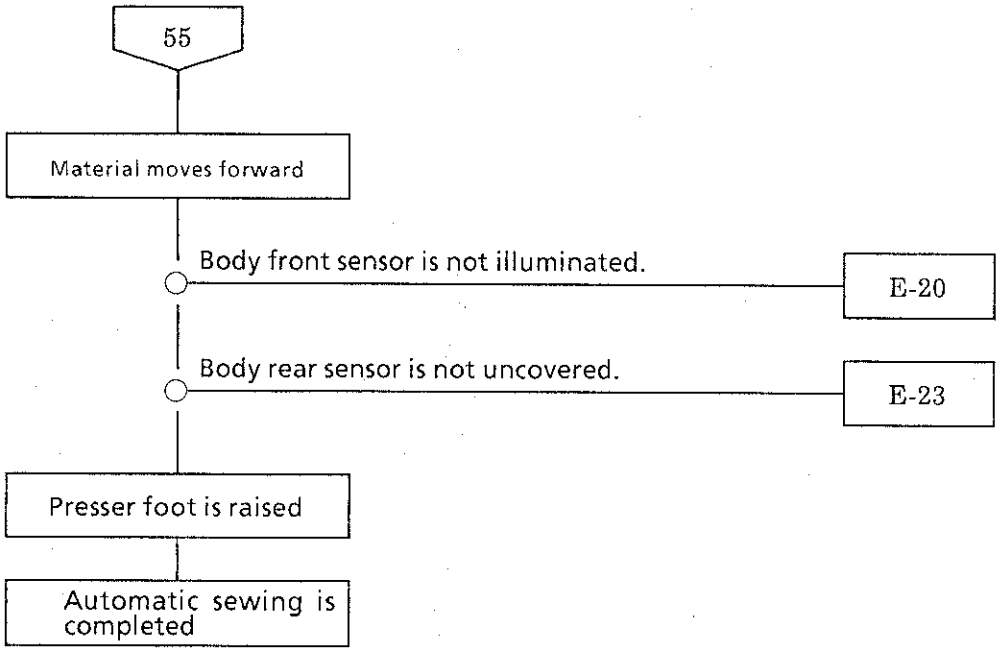
* The error codes displayed when the EMERGENCY STOP switch is pressed are displayed at each manual operation step when the START switch is pressed and sewing commences.

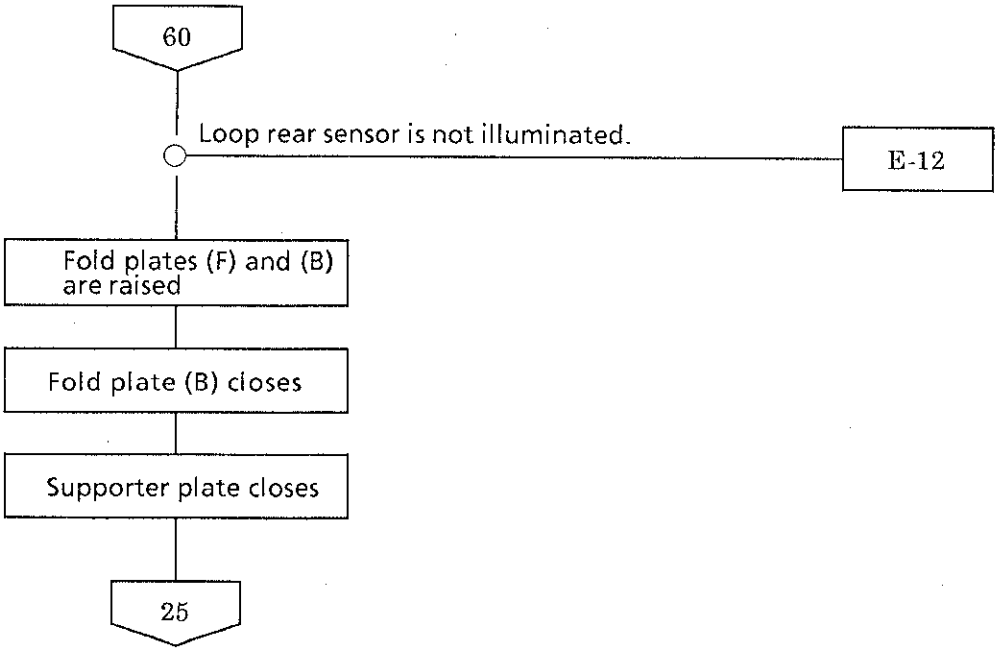



30
Flat cut (DIP switch SW12 is OFF)
35
Cutter turns right
Cutter is lowered
Cutter is raised
Cutter turns left
Cutter center sensor is not switched off.
E-31
35
Cutter is lowered
Cutter is raised
Flat cut
Cutter turns to center
Cutter center sensor is not illuminated.
E-30
Fold plate (B) opens
Fold plates (F) and (B) are lowered
Fold plate (F) closes
T i m e r
Fold plate (B) closes
Loop presser foot is raised
40

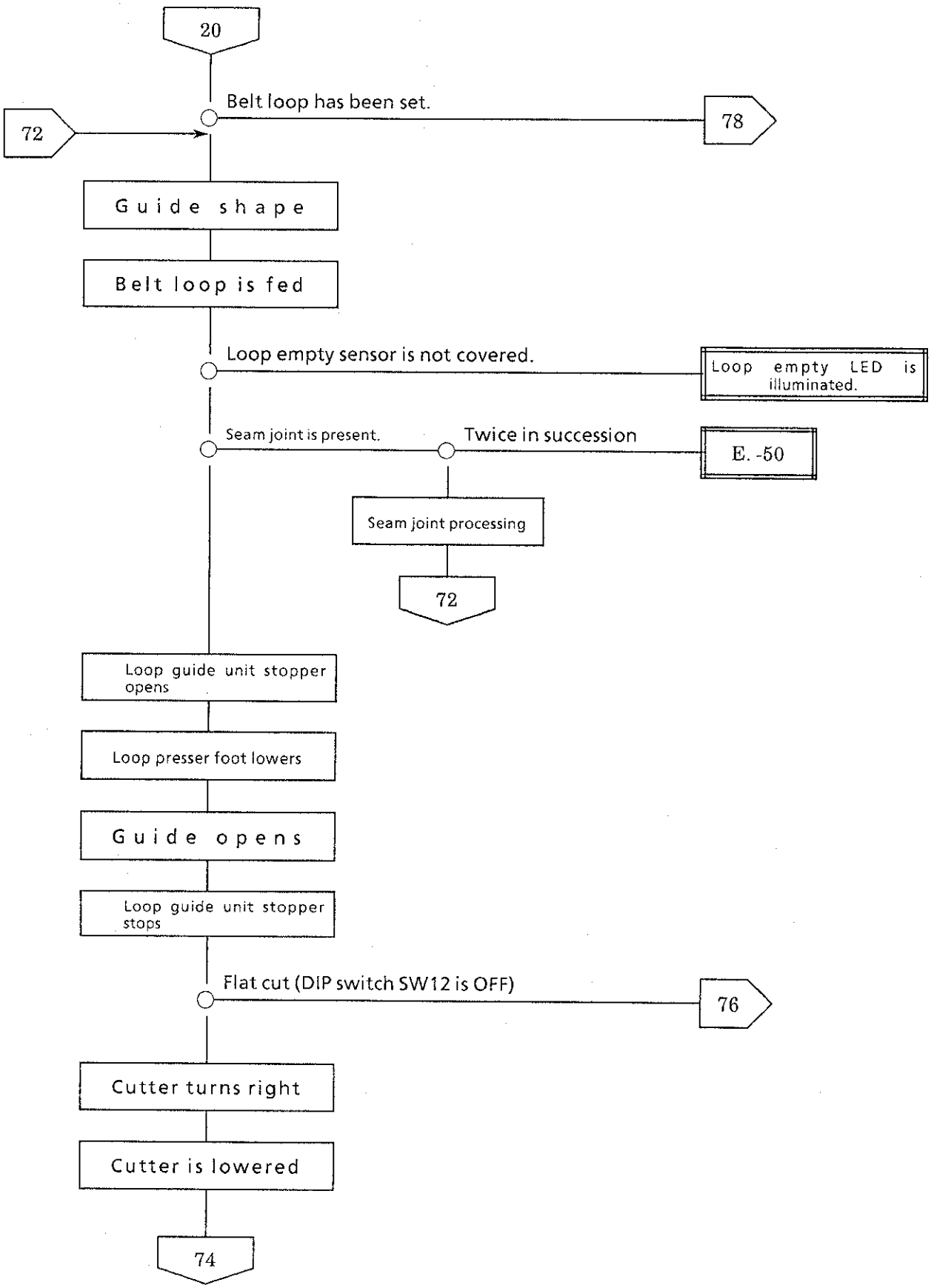

40
Loop setting error has occurred.
LOOP
45
START switch is OFF.
15
Forward loop feed
Loop front sensor is not illuminated.
E-10
Loop rear sensor is not switched off.
E-13
Unit is lowered
Presser foot is lowered
Supporter plate opens
DIP switch SW27 is ON.
Timer
Fold plates (F) and (B) open
Unit is raised
Reverse loop feed
Loop front sensor is not switched off.
E-11
Machine head
Unit
50
60

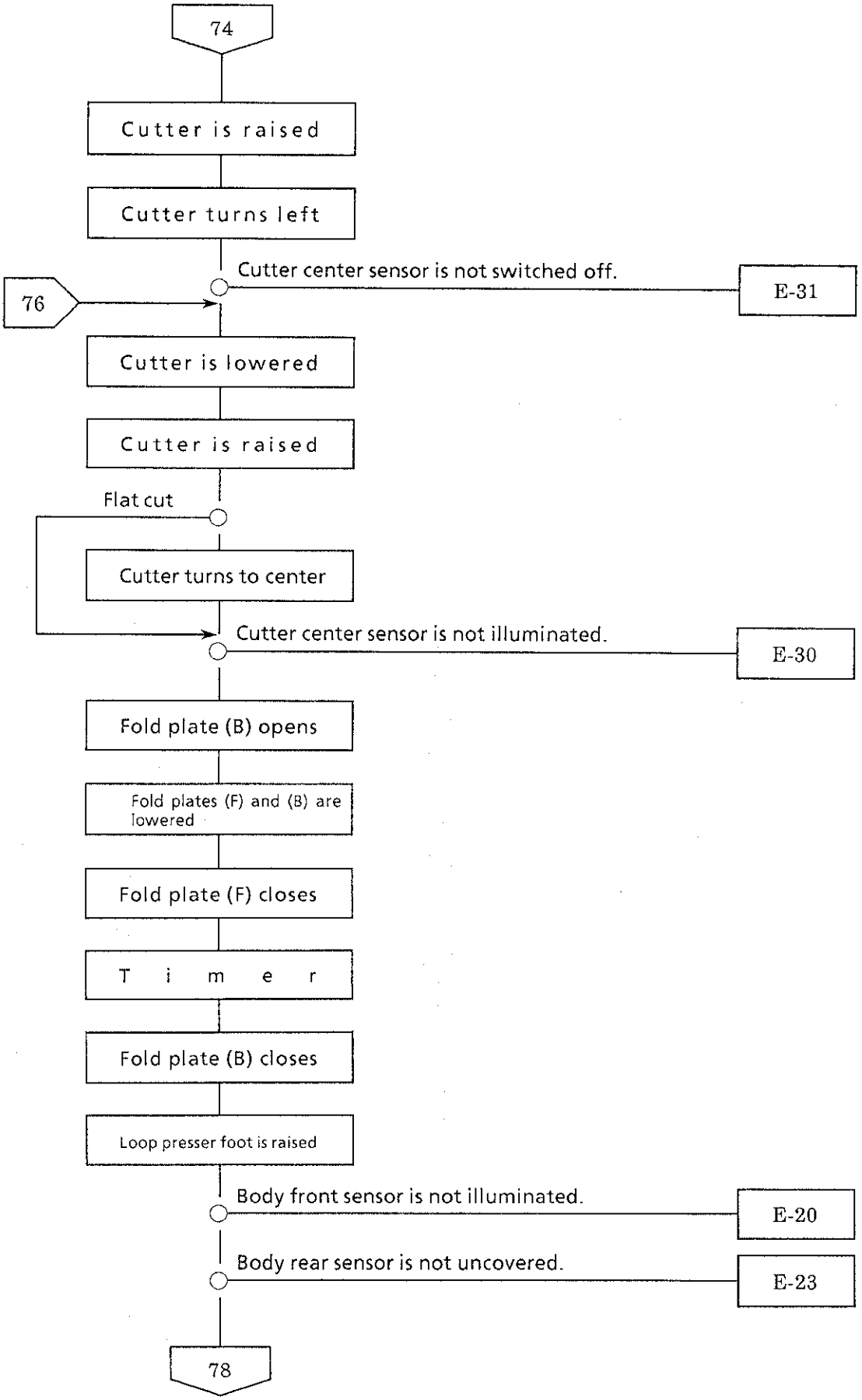

50
Sewing machine starts
Stop position sensor is not uncovered.
E-41
Sewing machine stops
Stop position sensor is not covered.
E-40
Thread breakage has occurred.
E. -80
Material moves backward
Body rear sensor is not uncovered.
E-22
Body front sensor is not illuminated.
E-21
Sewing machine starts
Stop position sensor is not uncovered.
E-41
Sewing machine stops
Stop position sensor is not covered.
E-40
Thread breakage has occurred.
E. -80
55

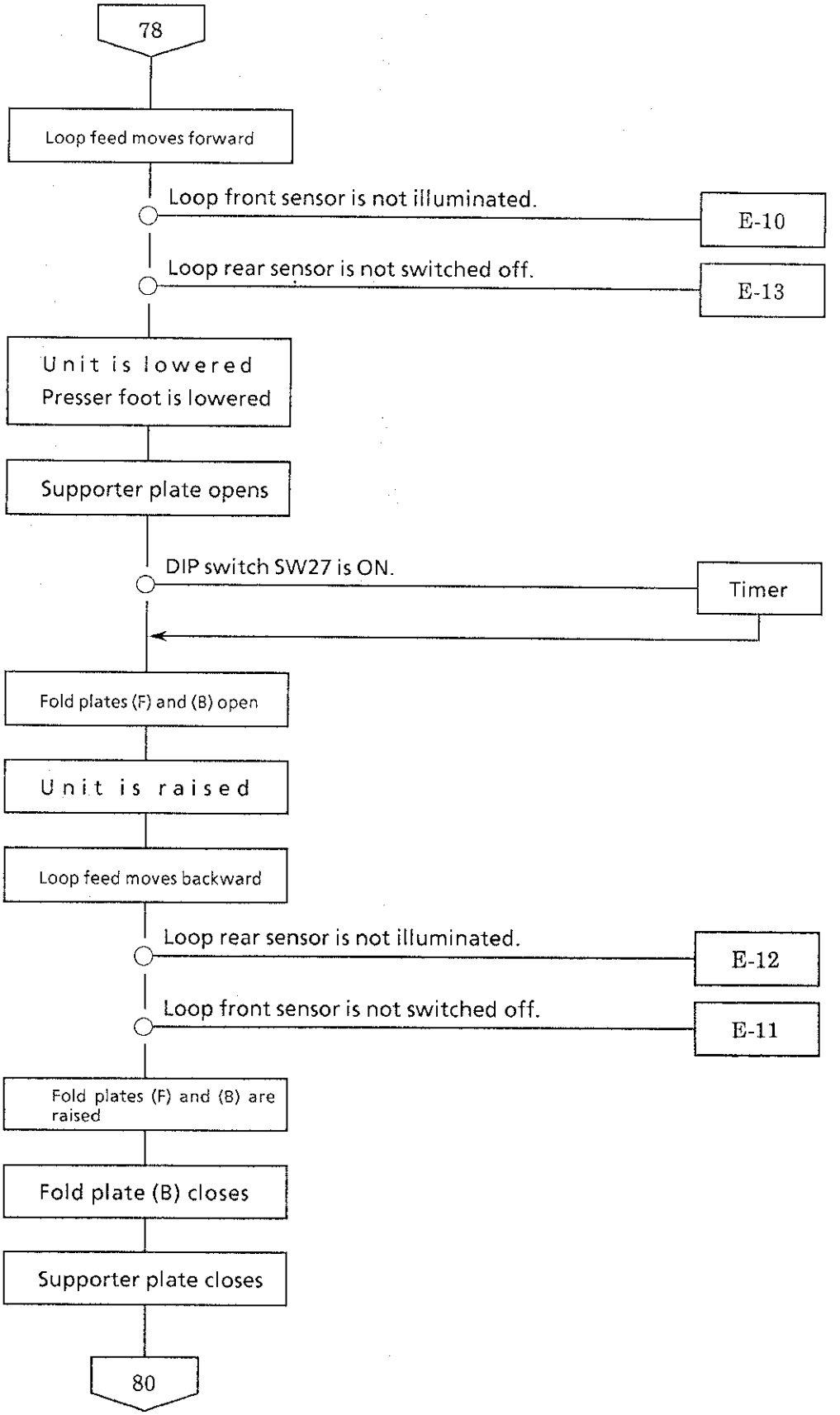

55
Material moves forward
Body front sensor is not illuminated.
E-20
Body rear sensor is not uncovered.
E-23
Presser foot is raised
Automatic sewing is completed

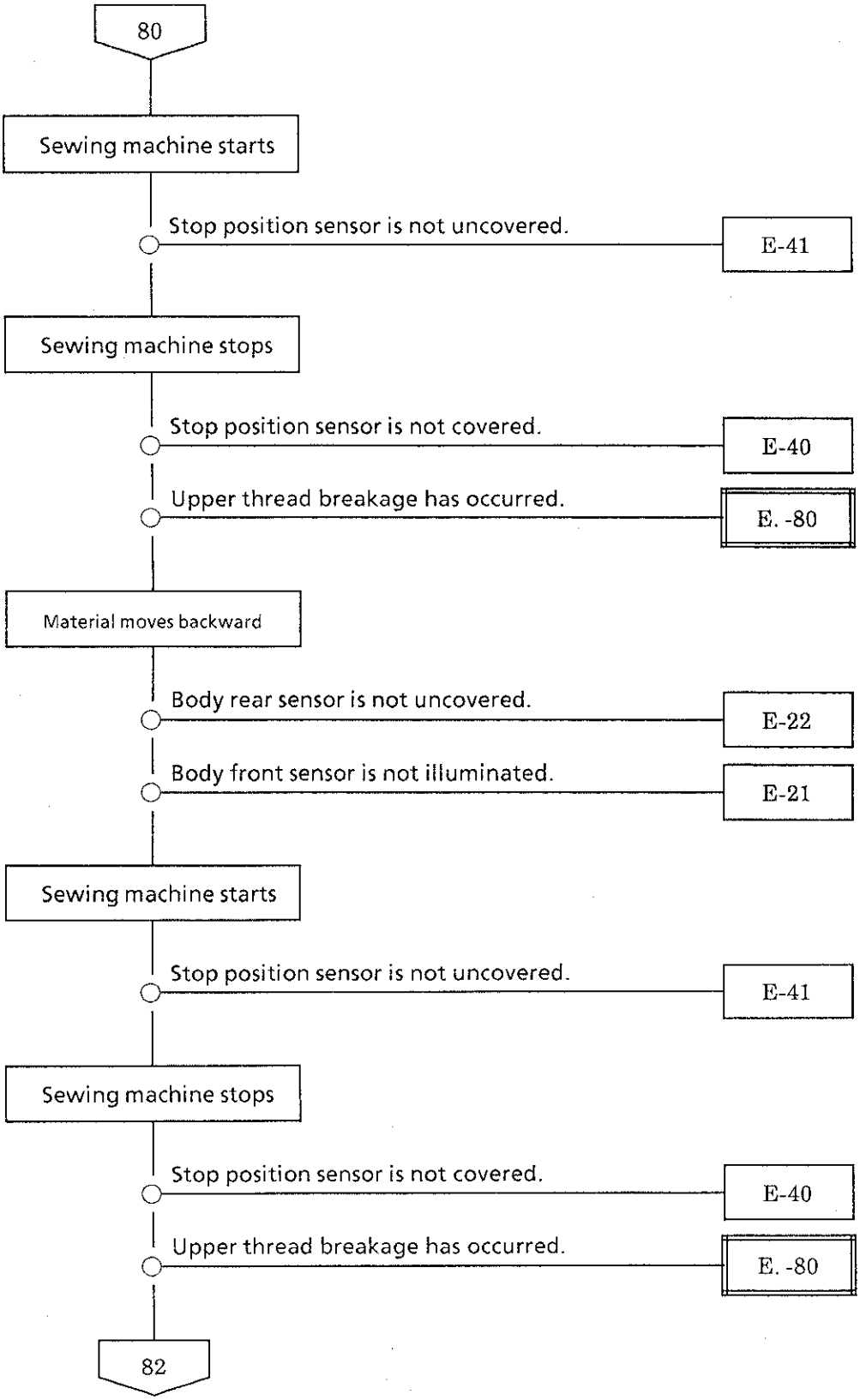

60
Loop rear sensor is not illuminated.
E-12
Fold plates (F) and (B) are raised
Fold plate (B) closes
Supporter plate closes
25

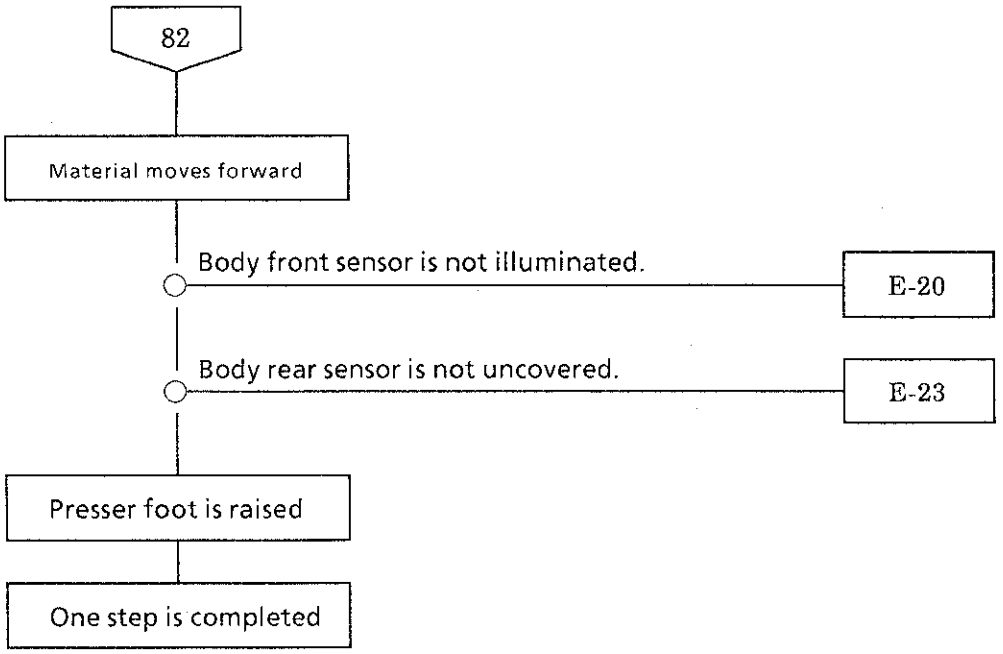
3.During step motion




74
Cutter is raised
Cutter turns left
Cutter center sensor is not switched off.
E-31
76
Cutter is lowered
Cutter is raised
Flat cut
Cutter turns to center
Cutter center sensor is not illuminated.
E-30
Fold plate (B) opens
Fold plates (F) and (B) are lowered
Fold plate (F) closes
T i m e r
Fold plate (B) closes
Loop presser foot is raised
Body front sensor is not illuminated.
E-20
Body rear sensor is not uncovered.
E-23
78

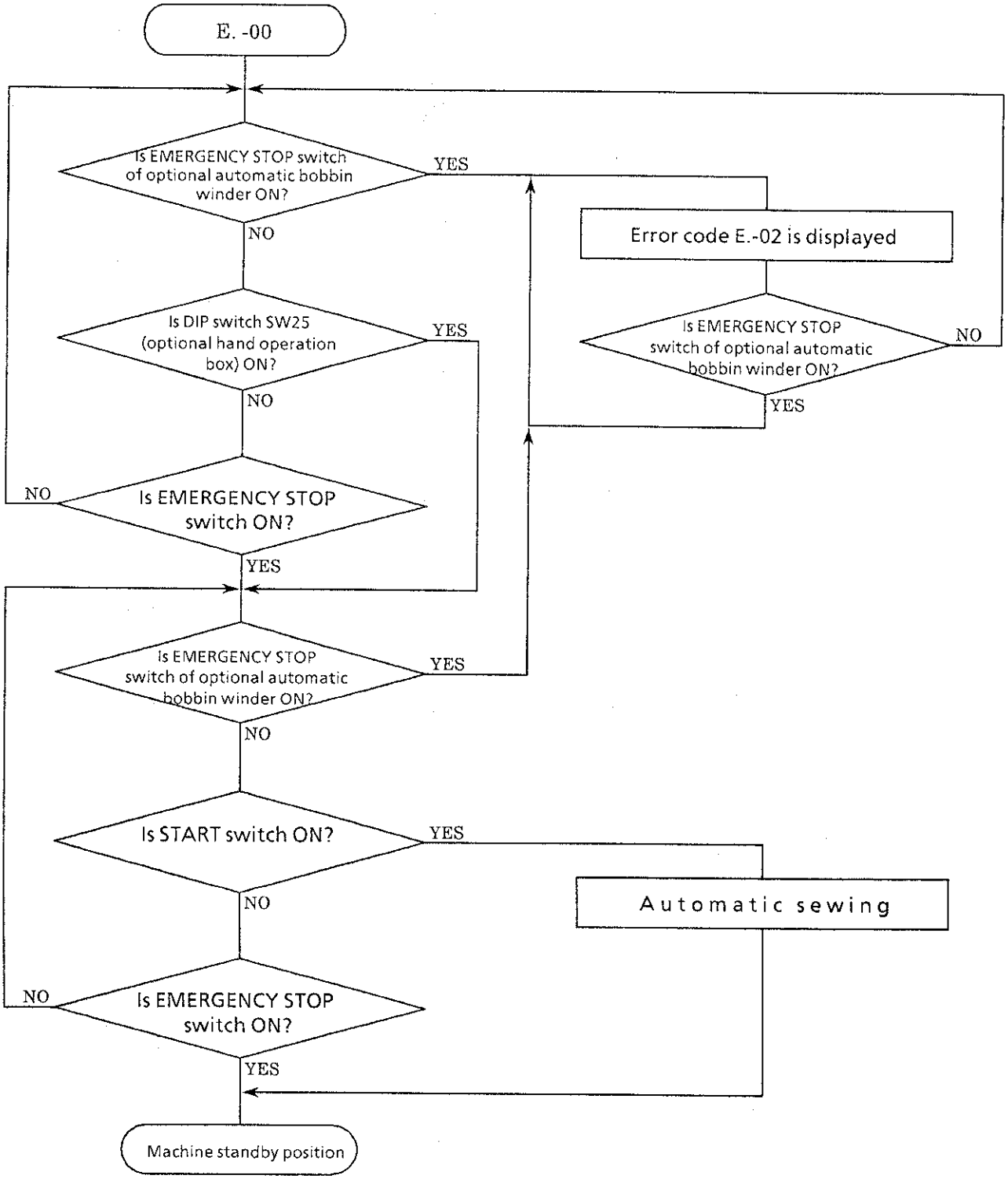

78
Loop feed moves forward
Loop front sensor is not illuminated.
E-10
Loop rear sensor is not switched off.
E-13
Unit is lowered
Presser foot is lowered
Supporter plate opens
DIP switch SW27 is ON.
Timer
Fold plates (F) and (B) open
Unit is raised
Loop feed moves backward
Loop rear sensor is not illuminated.
E-12
Loop front sensor is not switched off.
E-11
Fold plates (F) and (B) are raised
Fold plate (B) closes
Supporter plate closes
80


80
Sewing machine starts
Stop position sensor is not uncovered.
E-41
Sewing machine stops
Stop position sensor is not covered.
E-40
Upper thread breakage has occurred.
E. -80
Material moves backward
Body rear sensor is not uncovered.
E-22
Body front sensor is not illuminated.
E-21
Sewing machine starts
Stop position sensor is not uncovered.
E-41
Sewing machine stops
Stop position sensor is not covered.
E-40
Upper thread breakage has occurred.
E. -80
82

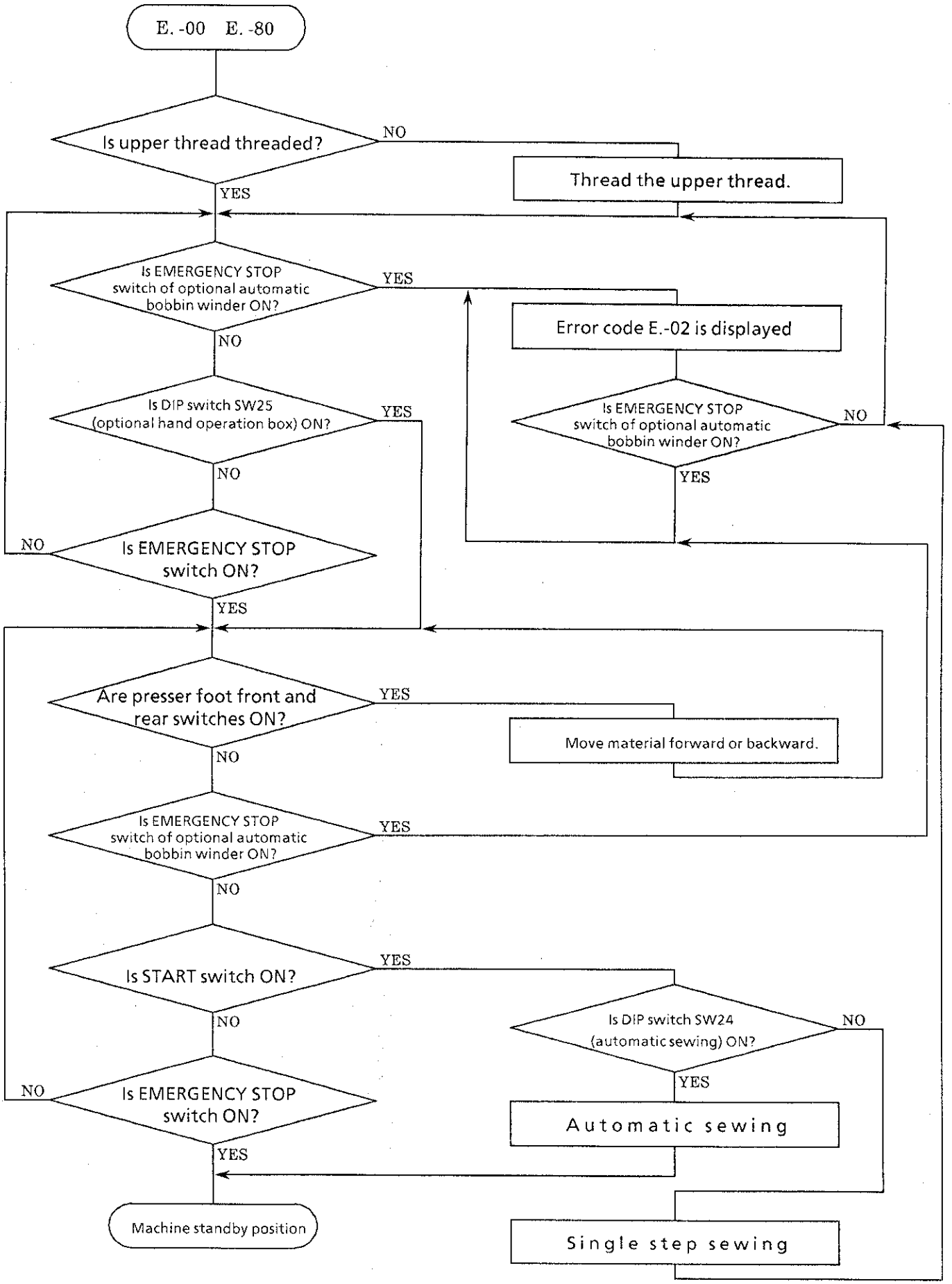

82
Material moves forward
Body front sensor is not illuminated.
E-20
Body rear sensor is not uncovered.
E-23
Presser foot is raised
One step is completed

3 Measures after an error code is displayed

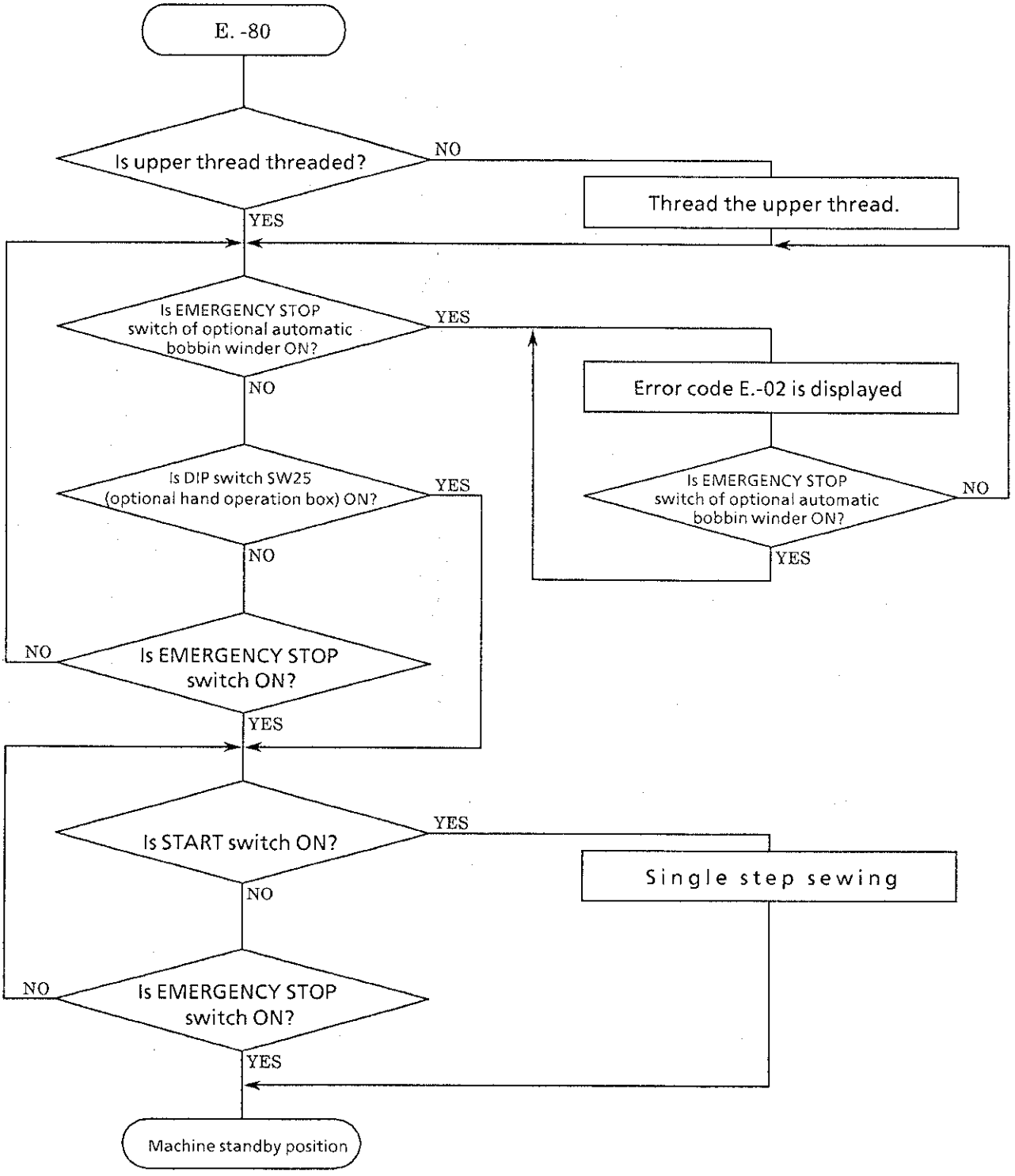
1.E. -00 (Before machine starts)



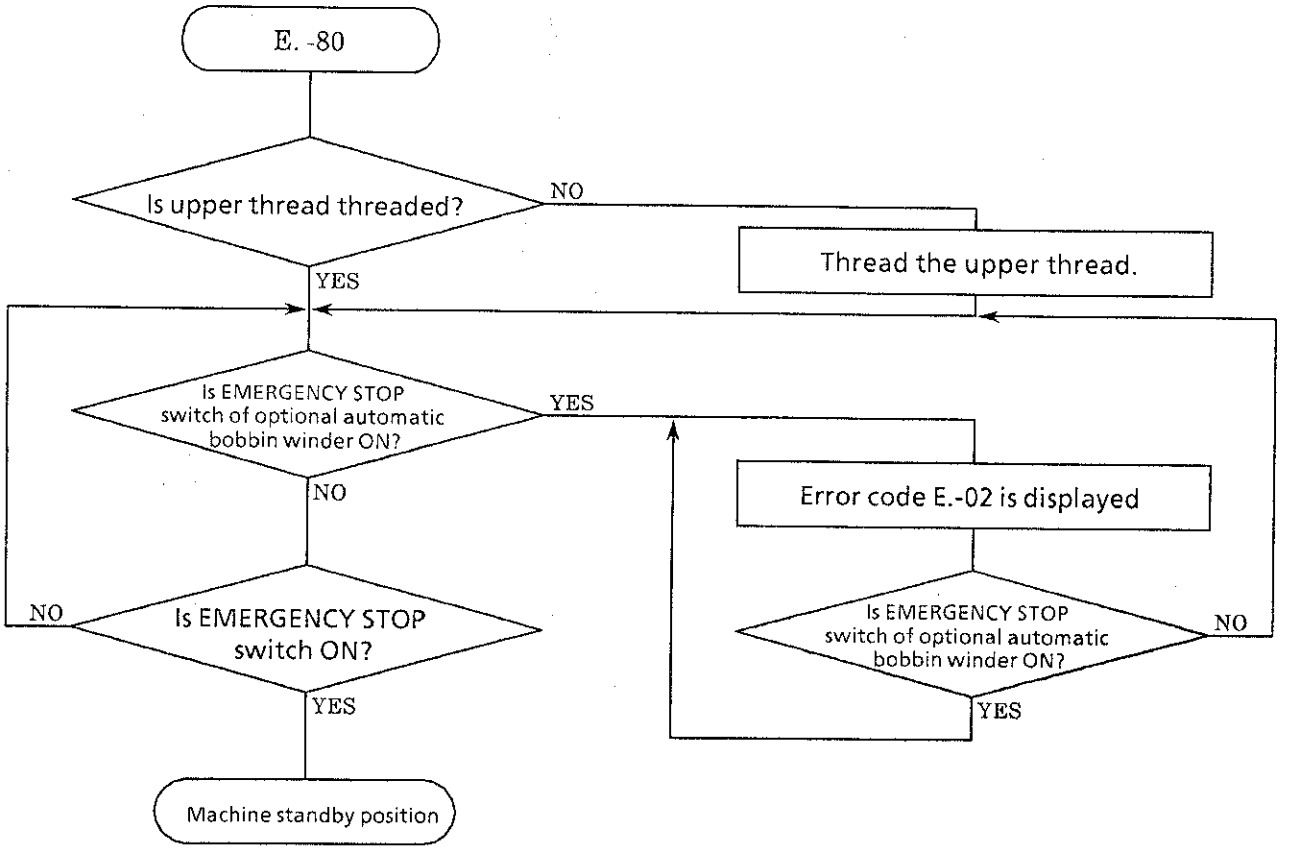
2.E.-00 (After machine has started) and E.-80 (Automatic sewing)



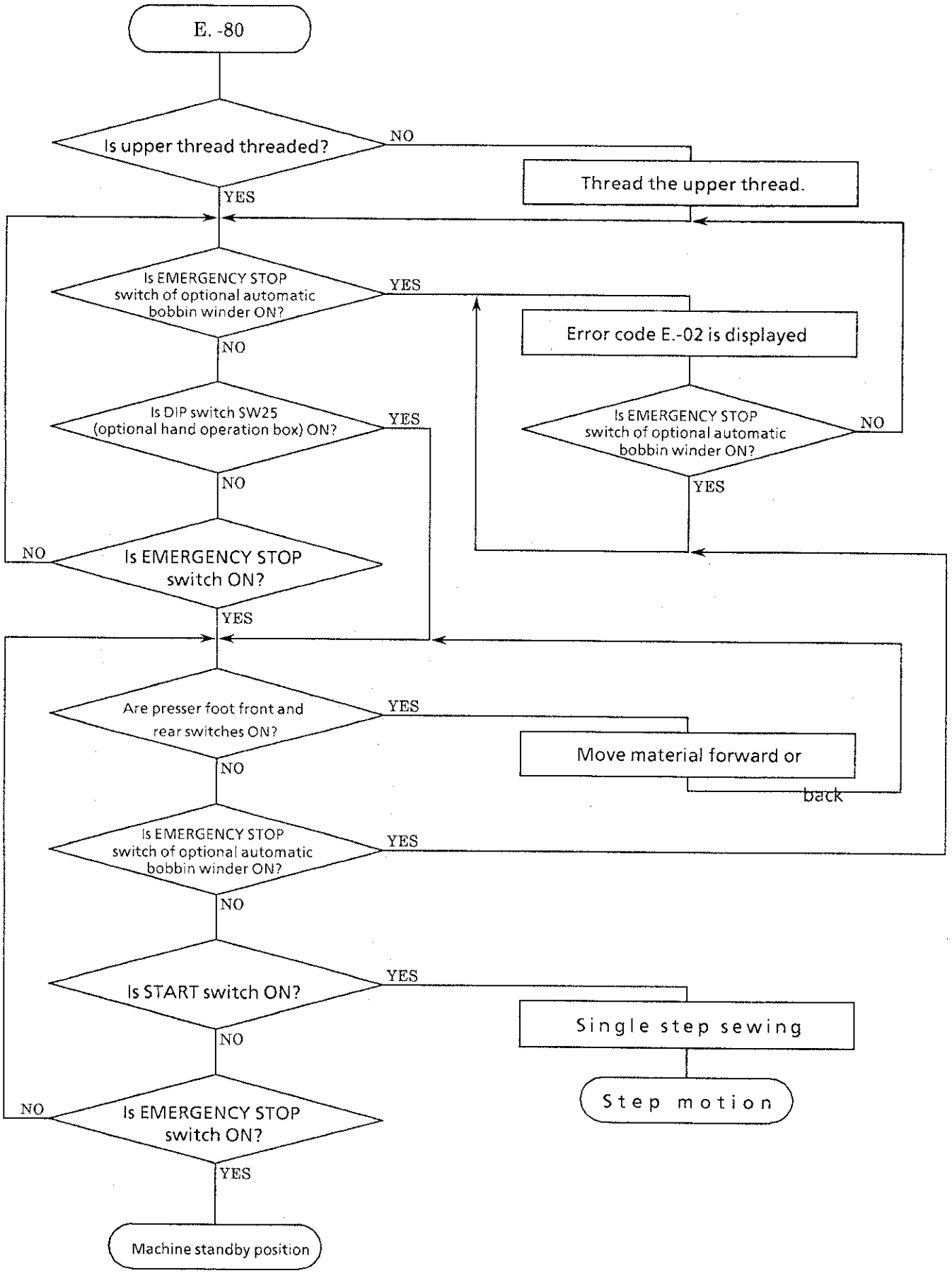
3.E. -80 (Re-sewing)



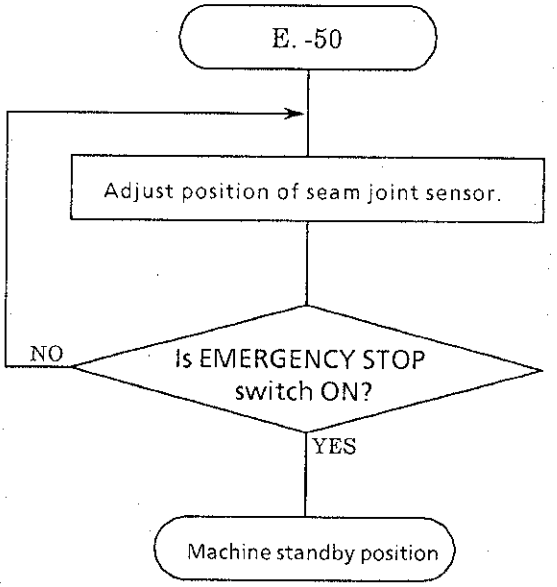
4.E. -80 (Test sewing)



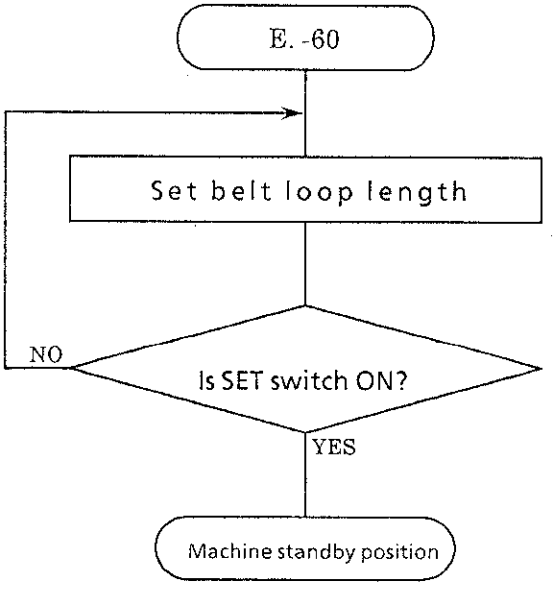
5.E. -80 (Step motion)



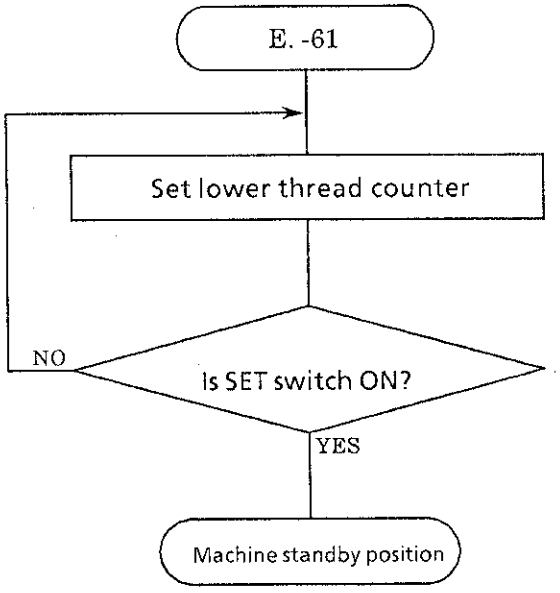
6.E. -50


E. -50
Adjust position of seam joint sensor.
NO
Is EMERGENCY STOP switch ON?
YES
Machine standby position

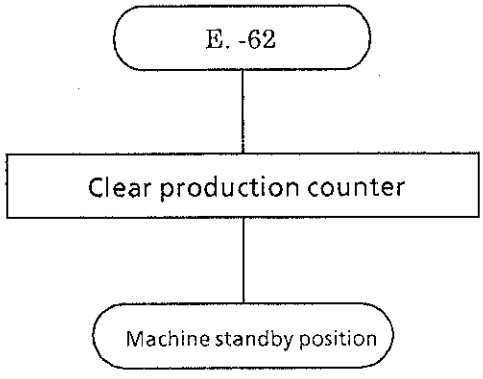
7.E. -60


E. -60
Set belt loop length
NO
Is SET switch ON?
YES
Machine standby position

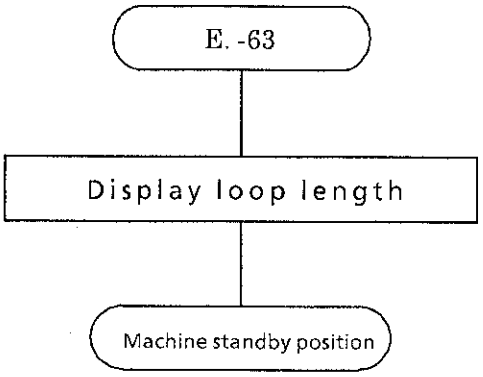
8.E. -61


E. -61
Set lower thread counter
NO
Is SET switch ON?
YES
Machine standby position

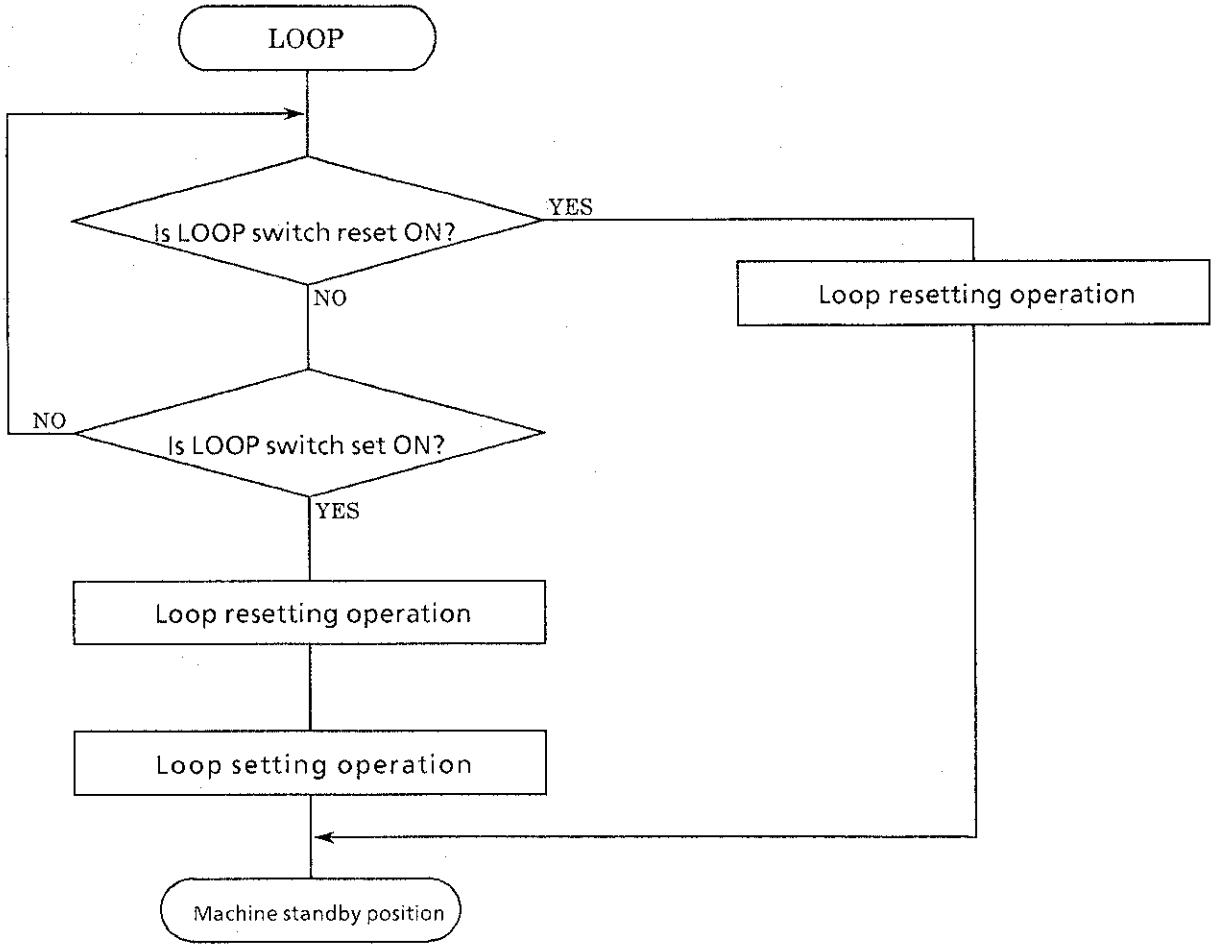
9.E. -62


E. -62
Clear production counter
Machine standby position

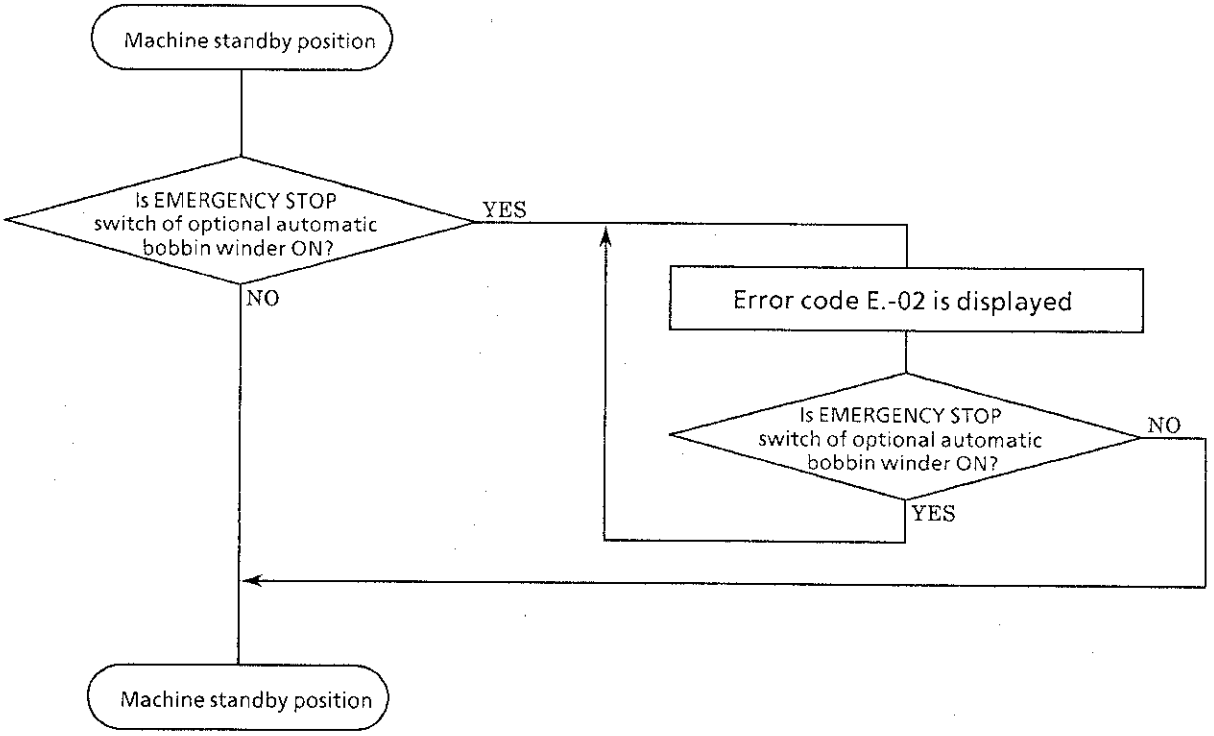
10.E. -63



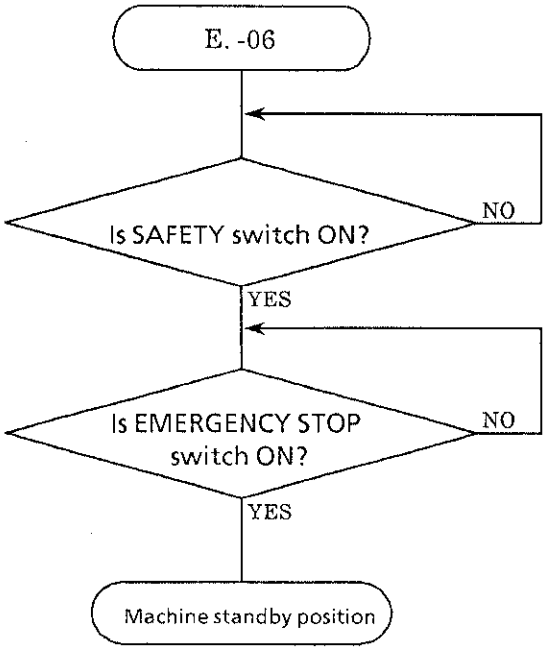
11.LOOP



12.E. -02 (Optional automatic bobbin winder)

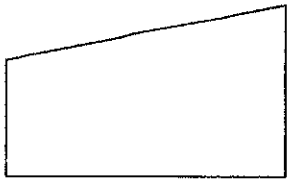


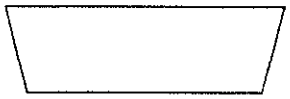
13.E. -06 (Optional SAFETY switch)

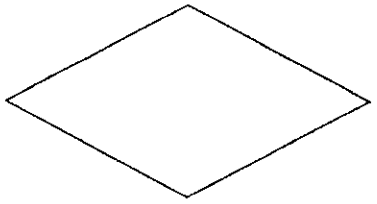


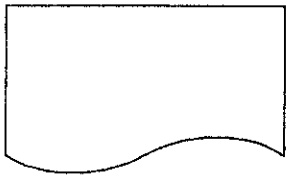
TROUBLESHOOTING

1 Meaning of the symbols

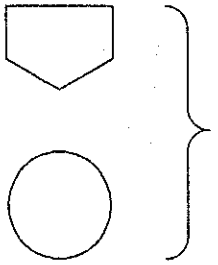
1.  Manual operation

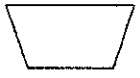
2.  Manual switch operation

3.  Decision

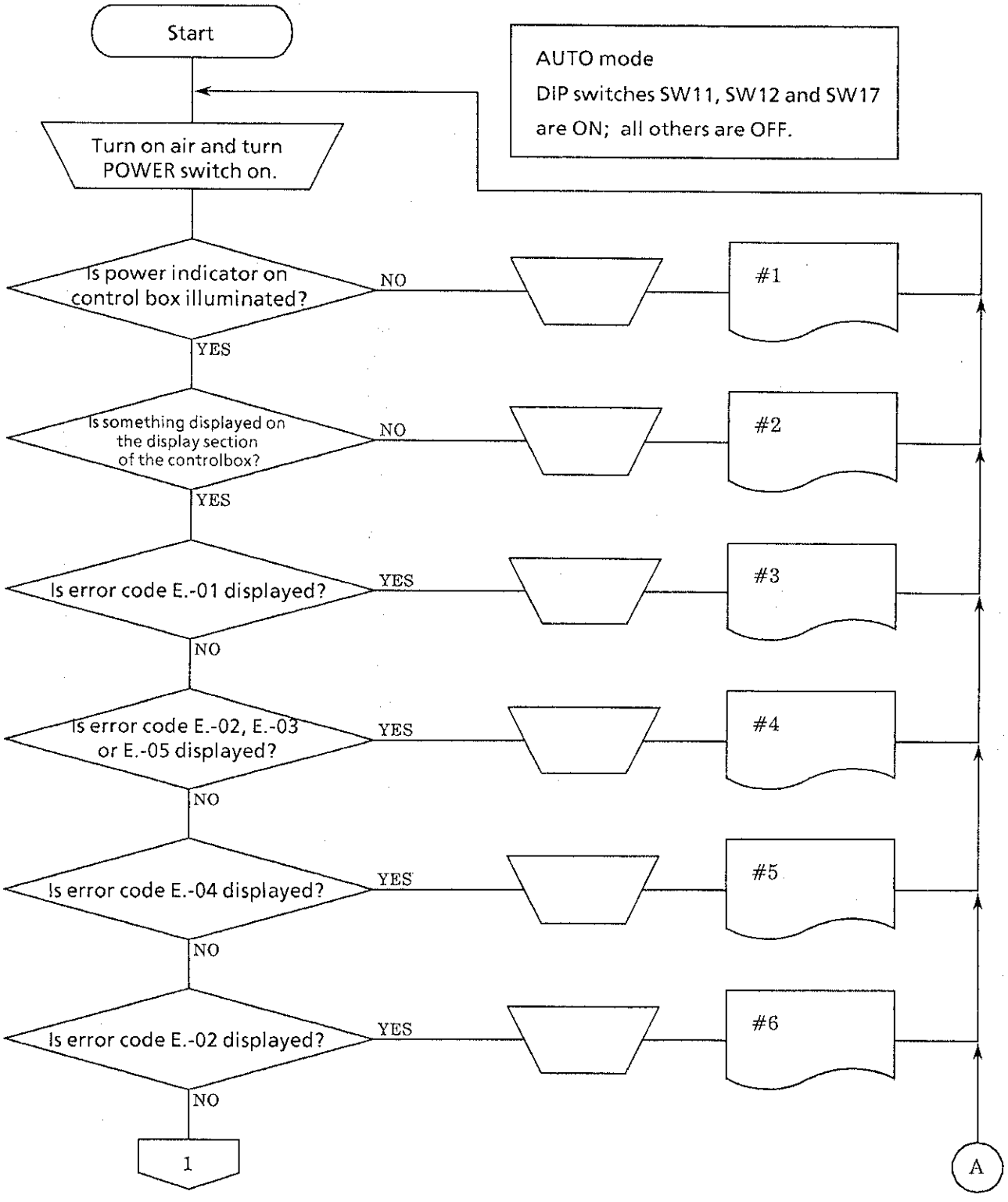
4.  Reference documents

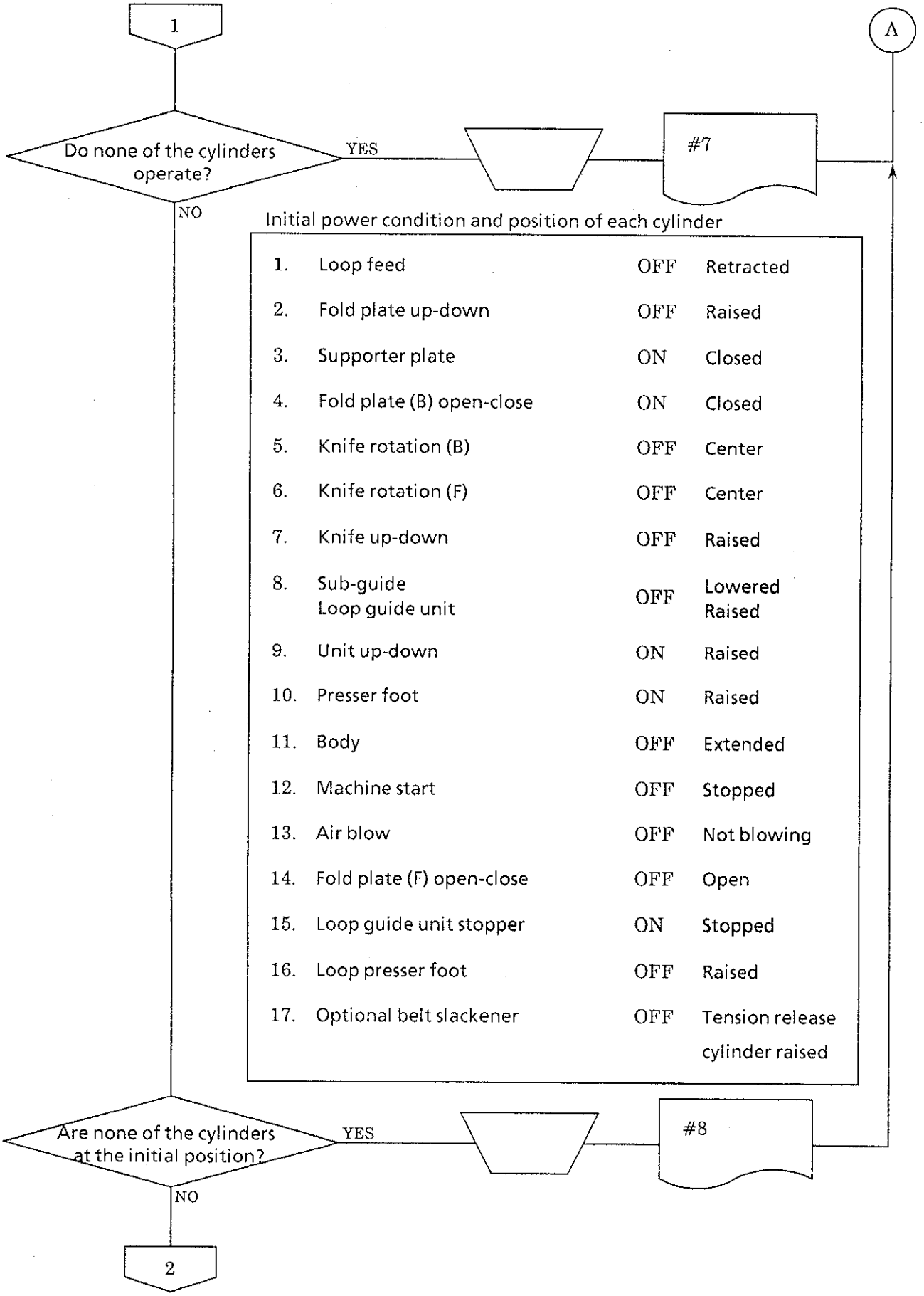
5.  Condition

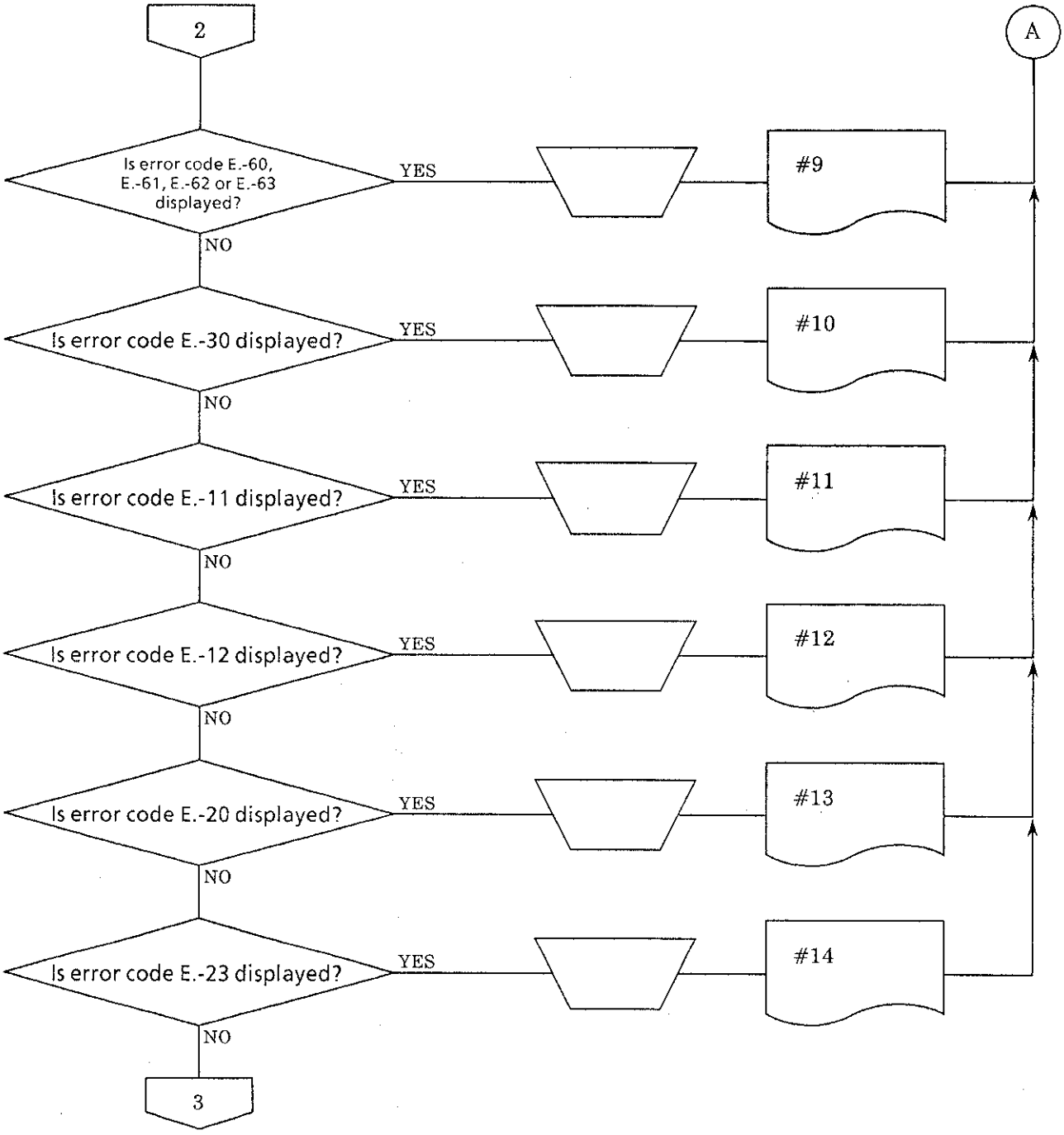
6.  Connectors

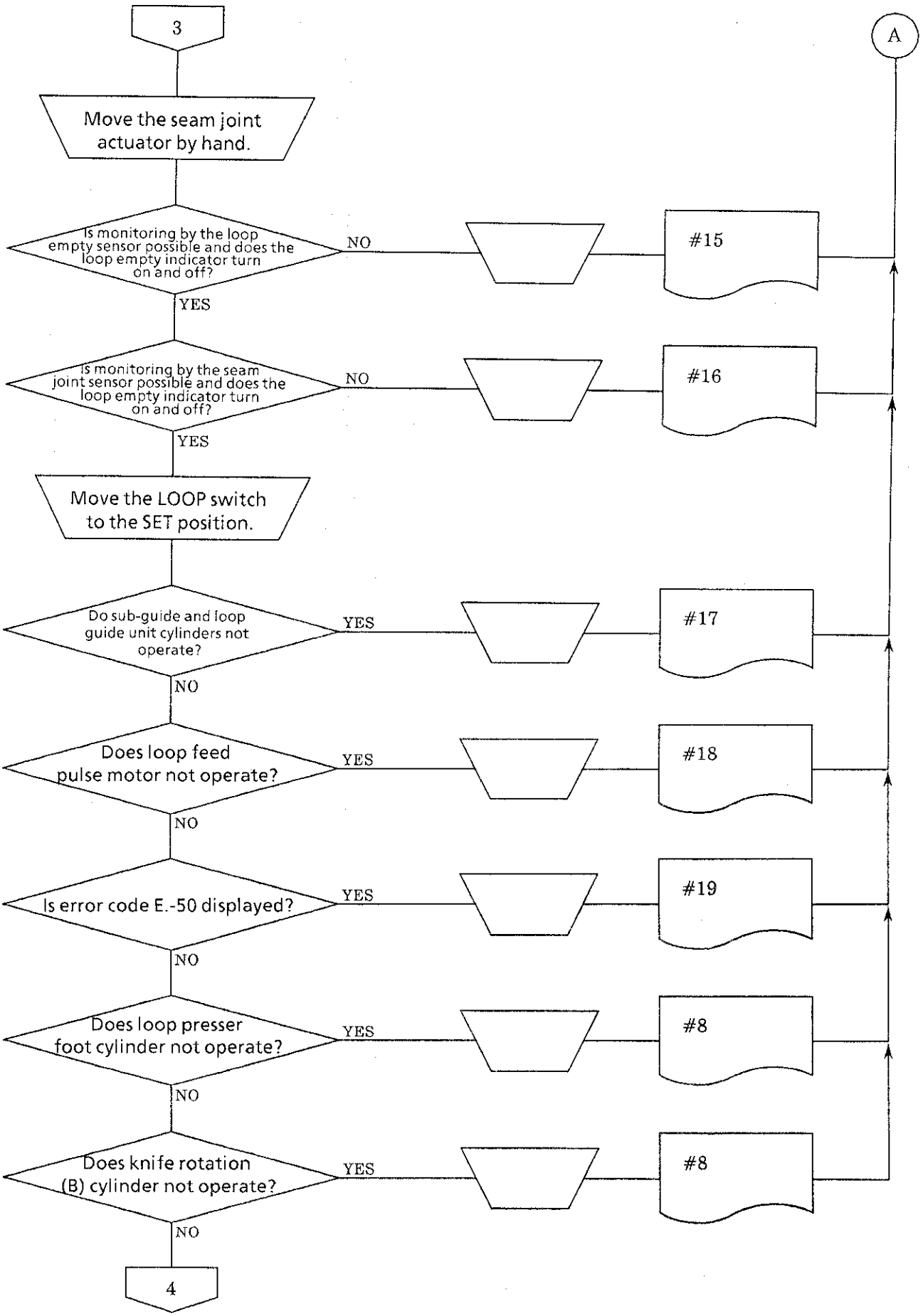
7.  POWER switch OFF

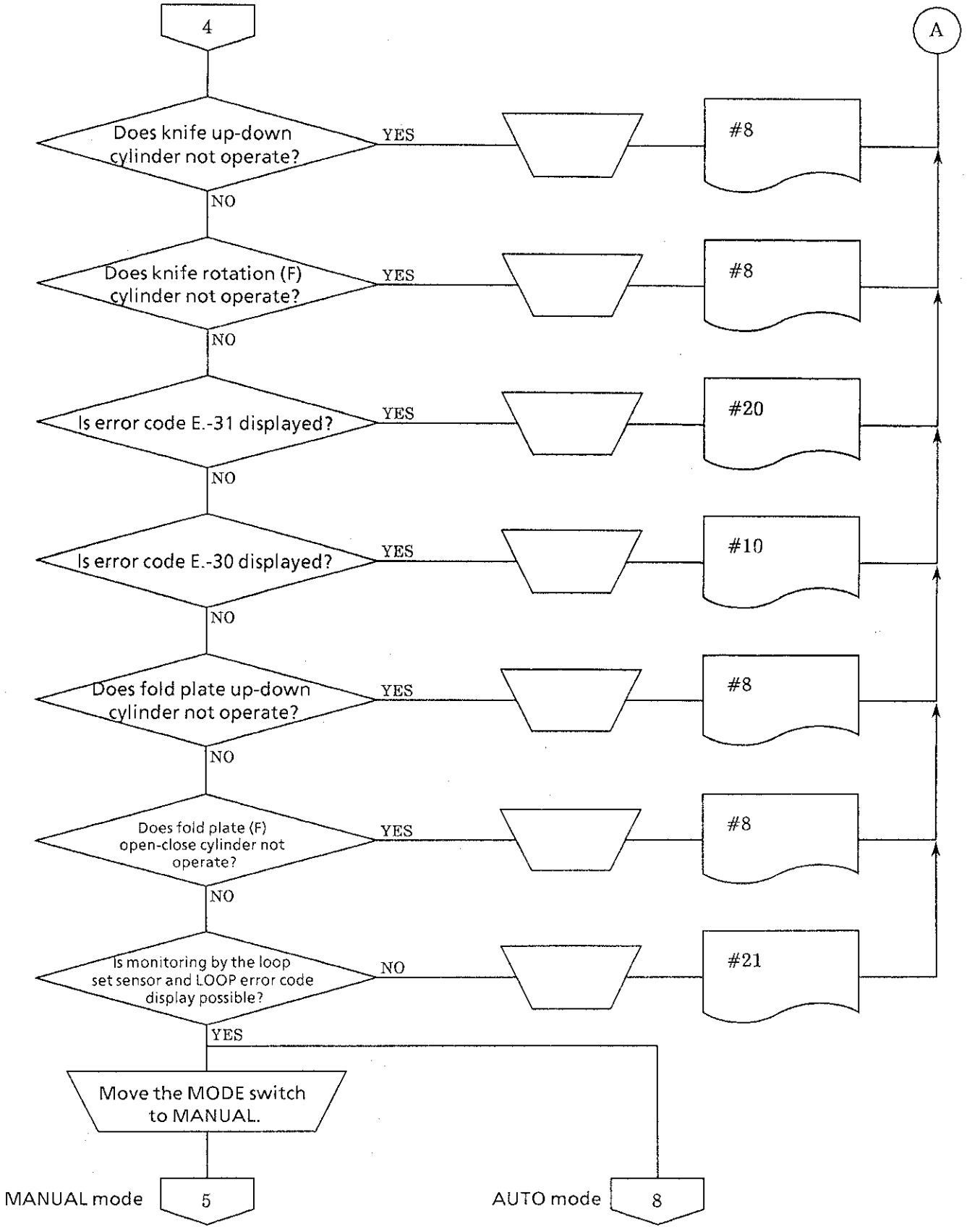
2 Troubleshooting flow chart

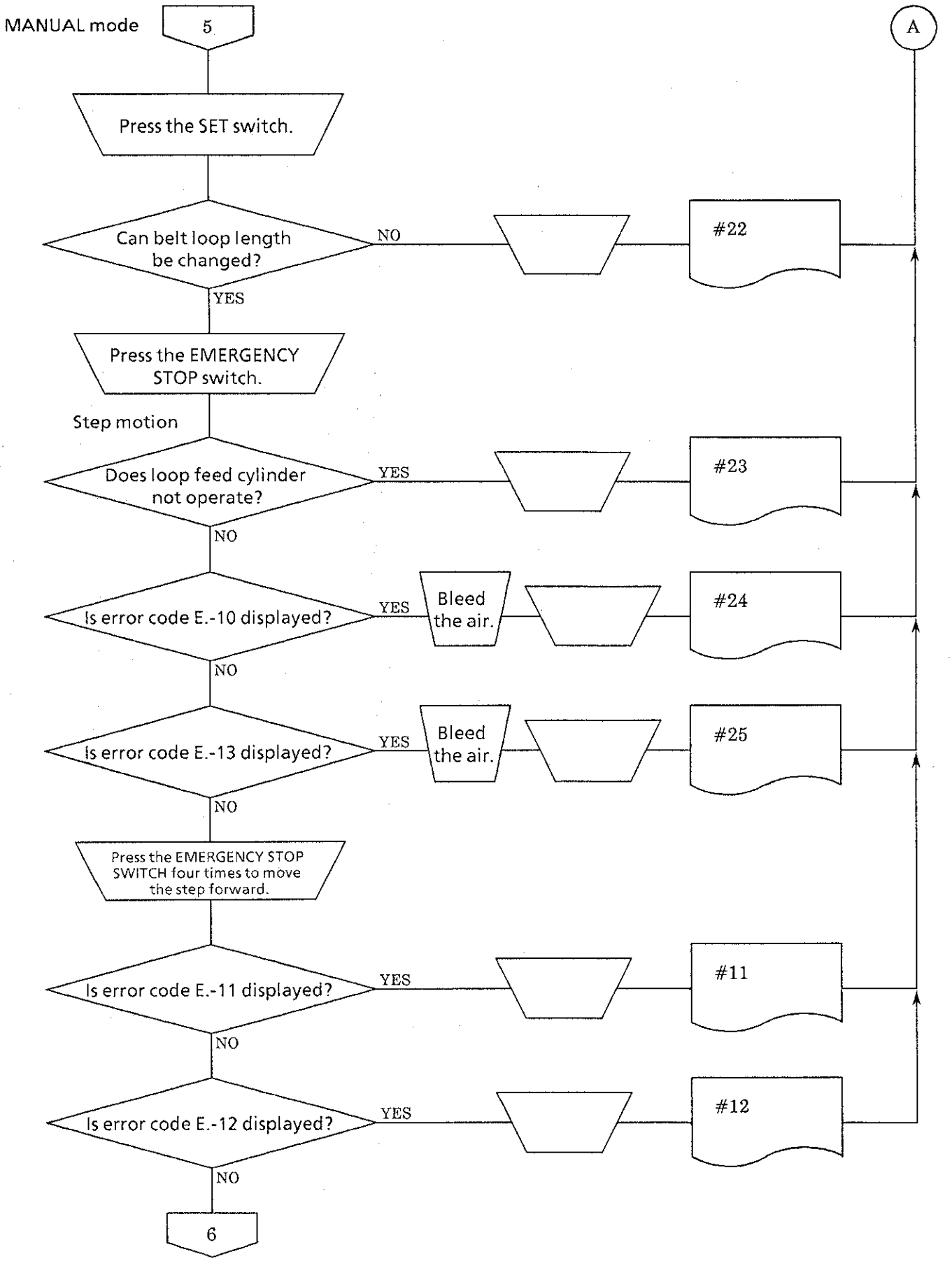



1
A
Do none of the cylinders operate?
YES
#7
NO
Initial power condition and position of each cylinder
1. Loop feed OFF Retracted
2. Fold plate up-down OFF Raised
3. Supporter plate ON Closed
4. Fold plate (B) open-close ON Closed
5. Knife rotation (B) OFF Center
6. Knife rotation (F) OFF Center
7. Knife up-down OFF Raised
8. Sub-guide OFF Lowered
Loop guide unit Raised
9. Unit up-down ON Raised
10. Presser foot ON Raised
11. Body OFF Extended
12. Machine start OFF Stopped
13. Air blow OFF Not blowing
14. Fold plate (F) open-close OFF Open
15. Loop guide unit stopper ON Stopped
16. Loop presser foot OFF Raised
17. Optional belt slackener OFF Tension release cylinder raised
Are none of the cylinders at the initial position?
YES
#8
NO
2

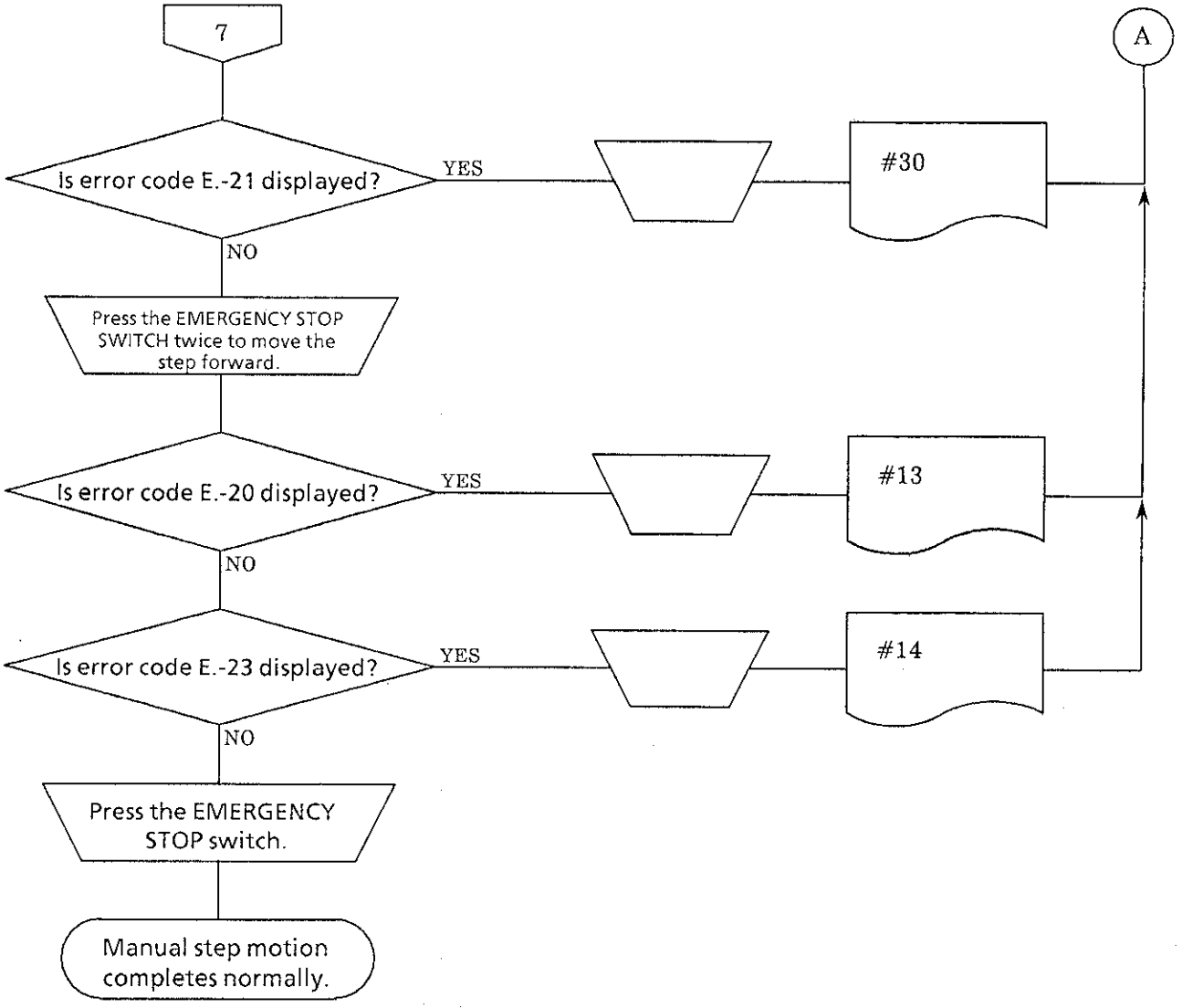

2
A
Is error code E.-60, E.-61, E.-62 or E.-63 displayed?
YES
#9
NO
Is error code E.-30 displayed?
YES
#10
NO
Is error code E.-11 displayed?
YES
#11
NO
Is error code E.-12 displayed?
YES
#12
NO
Is error code E.-20 displayed?
YES
#13
NO
Is error code E.-23 displayed?
YES
#14
NO
3

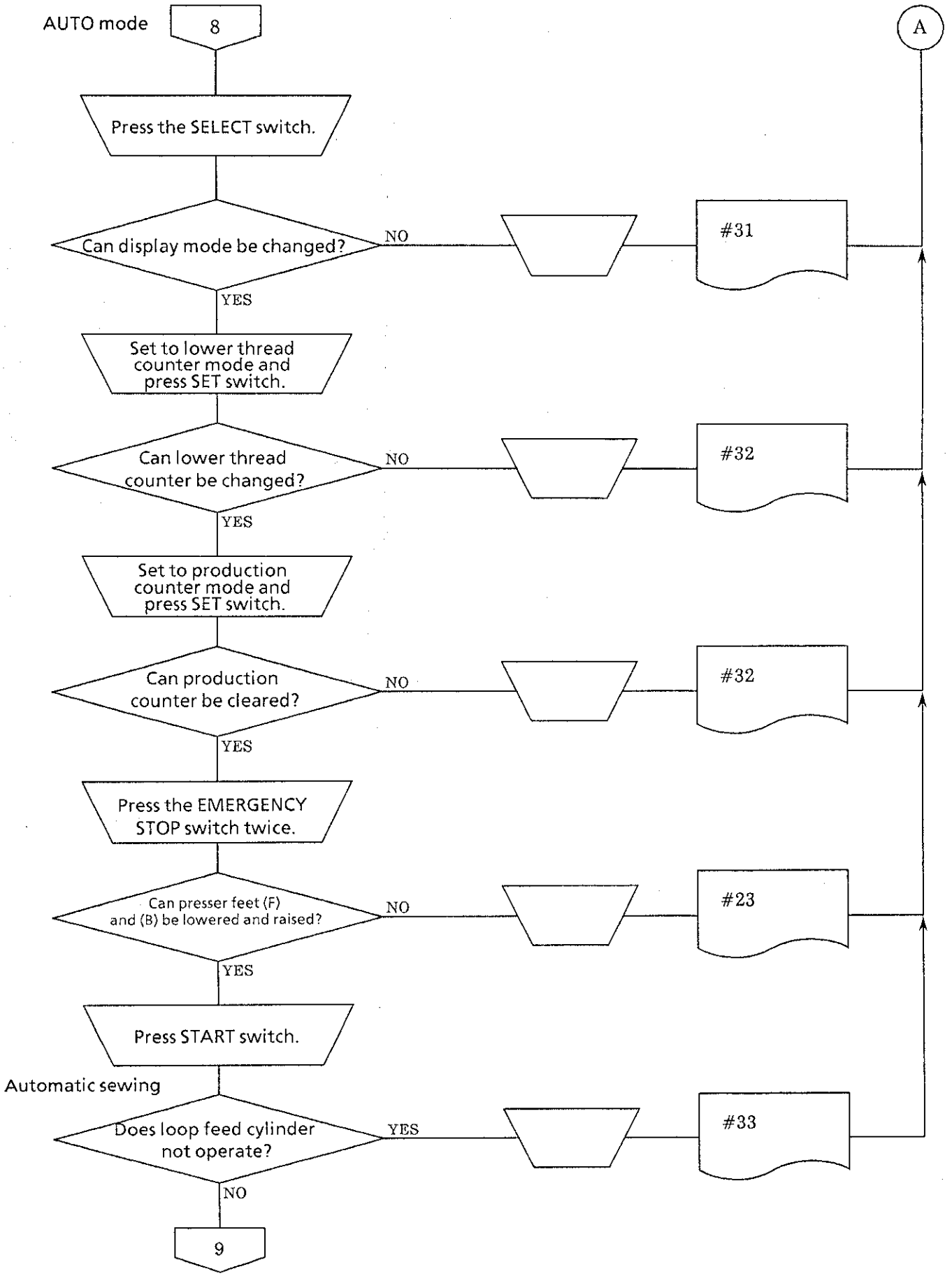

3
A
Move the seam joint actuator by hand.
Is monitoring by the loop empty sensor possible and does the loop empty indicator turn on and off?
NO
#15
YES
Is monitoring by the seam joint sensor possible and does the loop empty indicator turn on and off?
NO
#16
YES
Move the LOOP switch to the SET position.
Do sub-guide and loop guide unit cylinders not operate?
YES
#17
NO
Does loop feed pulse motor not operate?
YES
#18
NO
Is error code E.-50 displayed?
YES
#19
NO
Does loop presser foot cylinder not operate?
YES
#8
NO
Does knife rotation (B) cylinder not operate?
YES
#8
NO
4

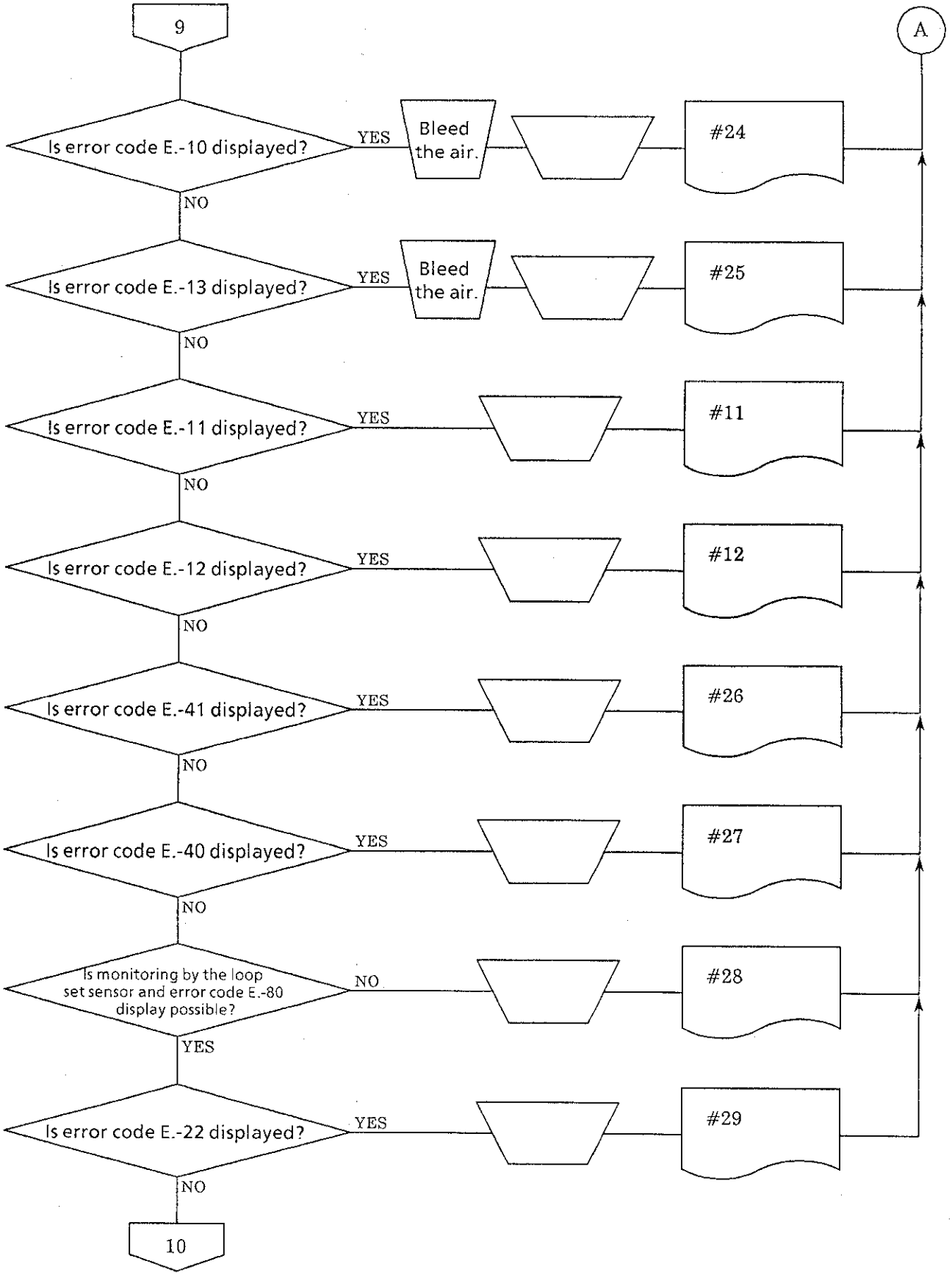

4
A
Does knife up-down cylinder not operate?
YES
#8
NO
Does knife rotation (F) cylinder not operate?
YES
#8
NO
Is error code E.-31 displayed?
YES
#20
NO
Is error code E.-30 displayed?
YES
#10
NO
Does fold plate up-down cylinder not operate?
YES
#8
NO
Does fold plate (F) open-close cylinder not operate?
YES
#8
NO
Is monitoring by the loop set sensor and LOOP error code display possible?
NO
#21
YES
Move the MODE switch to MANUAL.
MANUAL mode
5
AUTO mode
8

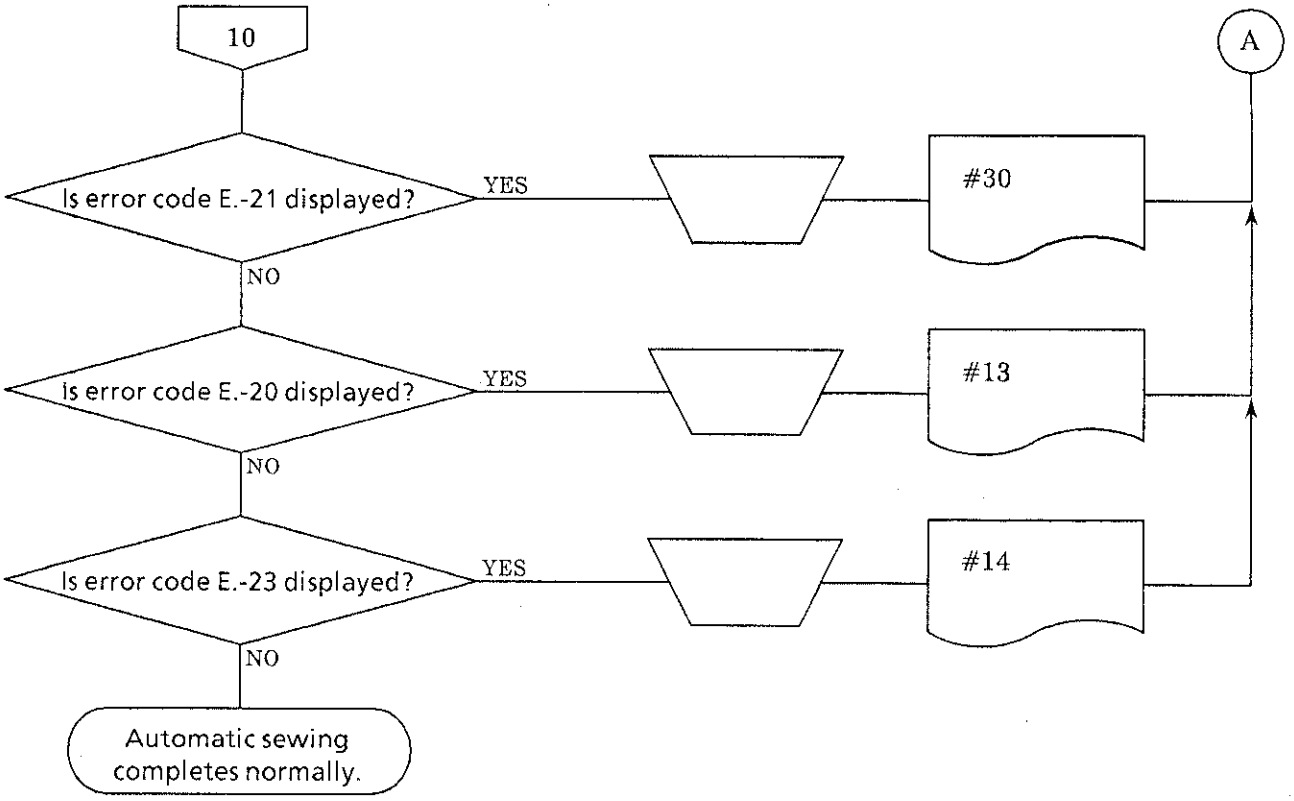

MANUAL mode
5
A
Press the SET switch.
Can belt loop length be changed?
NO
#22
YES
Press the EMERGENCY STOP switch.
Step motion
Does loop feed cylinder not operate?
YES
#23
NO
Is error code E.-10 displayed?
YES
Bleed the air.
#24
NO
Is error code E.-13 displayed?
YES
Bleed the air.
#25
NO
Press the EMERGENCY STOP SWITCH four times to move the step forward.
Is error code E.-11 displayed?
YES
#11
NO
Is error code E.-12 displayed?
YES
#12
NO
6


6
Press the EMERGENCY STOP SWITCH four times to move the step forward.
Does machine start cylinder not operate?
YES
#8
NO
Is error code E.-41 displayed?
YES
#26
NO
Is error code E.-40 displayed?
YES
#27
NO
Is monitoring by the thread breakage sensor and error code E.-80 display possible?
NO
#28
YES
Press the EMERGENCY STOP switch.
Does body cylinder not operate?
YES
#8
NO
Is error code E.-22 displayed?
YES
#29
NO
7
A


7
A
Is error code E.-21 displayed?
YES
#30
NO
Press the EMERGENCY STOP SWITCH twice to move the step forward.
Is error code E.-20 displayed?
YES
#13
NO
Is error code E.-23 displayed?
YES
#14
NO
Press the EMERGENCY STOP switch.
Manual step motion completes normally.


AUTO mode
8
A
Press the SELECT switch.
Can display mode be changed?
NO
#31
YES
Set to lower thread counter mode and press SET switch.
Can lower thread counter be changed?
NO
#32
YES
Set to production counter mode and press SET switch.
Can production counter be cleared?
NO
#32
YES
Press the EMERGENCY STOP switch twice.
Can presser feet (F) and (B) be lowered and raised?
NO
#23
YES
Press START switch.
Automatic sewing
Does loop feed cylinder not operate?
YES
#33
NO
9


9
A
Is error code E.-10 displayed?
YES
Bleed the air.
#24
NO
Is error code E.-13 displayed?
YES
Bleed the air.
#25
NO
Is error code E.-11 displayed?
YES
#11
NO
Is error code E.-12 displayed?
YES
#12
NO
Is error code E.-41 displayed?
YES
#26
NO
Is error code E.-40 displayed?
YES
#27
NO
Is monitoring by the loop set sensor and error code E.-80 display possible?
NO
#28
YES
Is error code E.-22 displayed?
YES
#29
NO
10


10
A
Is error code E.-21 displayed?
YES
#30
NO
Is error code E.-20 displayed?
YES
#13
NO
Is error code E.-23 displayed?
YES
#14
NO
Automatic sewing completes normally.

3 Remedy

* Always turn off the POWER switch before removing the power cord or disconnecting any connectors.
* When opening the cover of the main unit for inspection, be careful to avoid electric shocks and short circuits.
* When taking measurements with a circuit tester, refer to "Control block diagram" on page 4-63, and take note of the circuit tester range when measuring. When checking continuity, be sure to take the measurements with the POWER switched off.

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#1 Power indicator on control box is not illuminated.	1. No voltage supplied to POWER switch due to defective power cord connection, defective harness or defective POWER switch.	· Connection of power cord · Okay if machine motor operates · Measure voltage at POWER switch using a circuit tester. Okay if AC 200V.	Power harness (A) POWER switch Motor harness Machine motor	4-2
	2. No voltage supplied to power transformer due to defective harness connection or defective noise filter.	· Check to be sure that power transformer is connected to200V. · Measure voltage at power transformer using a circuit tester. Okay if AC 26V and AC 7V.	Power unit	4-3
	3. No voltage supplied to 33,000 μF electrolytic capacitor (close to power transformer) due to blown F2 fuse (3A) or defective rectifier.	· Blown F2 fuse (3A). · Measure voltage at 33,000 μ F electrolytic capacitor using a circuit tester. Okay if about DC 10V.	F2 fuse (2A) Power unit	4-3 4-3
	4. 5V not supplied to main circuit due to defective 5V regulator (3052V).	· Measure voltage at connector P7 of main circuit board. Okay if DC 5V.	Power unit	4-3
	5. 5V not supplied to main circuit due to defective connection of main circuit board connector P7 or P2 or panel connector P14.	· Connection of connectors P7, P2 and P14.		
#2 Numerals or error codes are not displayed on control panel display.	1. Program is not running due to defective installation of main circuit board PROM.	· No PROM. · PROM installed in wrong direction. · Bent PROM pins.	PROM	4-5
	2. Program is not running due to defective main circuit board.		Main circuit board	4-4
	3. Control panel does not operate due to defective control panel harness.	· Check for harness continuity using a circuit tester.	Control panel	4-6

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#3 Error code E.-01 is displayed.	1. START switch has been pressed to ON.	· Check depression amount of START switch.	Adjustment	4-9
	2. START switch is ON due to switch defect.	· Check for continuity in the START switch using a circuit tester.	START switch	4-9
#4 Error codes E.-02, E.-03 and E.-05 are displayed.	1. EMERGENCY STOP switch (E.-02) and SET switch (E.-03) have been pressed to ON.	· Check movement of EMERGENCY STOP switch or SET switch.		
	2. EMERGENCY STOP switch of optional hand operation box (E.- 02) and LOOP switch (E.- 05) have been pressed to ON.	· Check movement of EMERGENCY STOP switch and LOOP switch.		
	3. LOOP switch (E.- 05) is at SET position.	· Check movement of LOOP switch.		
	4. EMERGENCY STOP switch, SET switch or LOOP switch is ON due to switch defect.	· Check for continuity in the switches using a circuit tester.		
#5 Error code E.-04 is displayed.	1. Stop position sensor is not covered (sensor OFF).	· Check position of stop position sensor.	Adjustment	2-9
	2. Stop position sensor cannot be covered due to defective machine head stopping, belt slippage or defective machine motor.	· Adjust machine head. · Check belt. · Check machine motor connectors. · Measure continuity in the machine motor using a circuit tester. Okay if about 13Ωin all 3 phases.	Machine motor	
#6 Error code E.-02 is displayed.	1. EMERGENCY STOP switch of optional automatic bobbin winder has been pressed to ON.	· Check movement of EMERGENCY STOP switch. · Turn to the right to unlock.		
	2. EMERGENCY STOP switch of optional automatic bobbin winder is ON due to switch defect.	· Check for continuity in the EMERGENCY STOP switch using a circuit tester.		

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#7 None of the cylinders operate.	1. No voltage supplied to 10,000 μF electrolytic capacitor (further away from power transformer) due to blown F1 fuse (6A) or defective rectifier.	· Blown F1 fuse (6A) · Measure voltage at 10,000 μF electrolytic capacitor using a circuit tester. Okay if about DC 35V.	F1 fuse (6A) Power unit	4-3 4-3
	2. 24V and 35V not supplied to main circuit due to defective connection of main circuit board connector P7.	· Connection of connector P7.		
	3. Voltage not supplied to solenoid valves due to defective connection of main circuit board connector P6.	· Connection of connector P6.		
	4. Air not supplied.	· Open air cock and adjust air pressure to 5~5.5 kgf/cm^2.	Adjustment	3-5
#8 None of the cylinders are at the initial position.	1. Voltage not supplied to solenoid valve due to defective connection of connector or defective valve harness.	· Connection of each solenoid valve connector. · Check for continuity in the valve harness using a circuit tester.	Valve harness	
	2. Solenoid valves do not operate due to defective valves.	· Check by pushing check valve of solenoid valves. · Measure continuity of solenoid valves using a circuit tester. Okay if about 320Ω.	Solenoid valves	
	3. Incorrect air hose connection or air hoses are crushed or bent.	· Check air hose connections.		3-45
	4. Each cylinder does not move properly.	· Bleed the air and check the movement of each cylinder.	Adjustment	

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#9 Error codes E.-60, E.-61, E.-62 and E.-63 are displayed.	1. Voltage drop in memory backup capacitor of main circuit board due to long period of non-use, and loop length data (E.-60), lower thread counter data (E.-61), production counter data (E.-62) and display mode data (E.-63) have been destroyed.	· When error code E.-60 is displayed and "100" flashes, press the SET switch and set the belt loop length. · When error code E.-61 is displayed and "400" flashes, press the SET switch and set the lower thread counter. · When error code E.-62 is displayed, the production counter is automatically set to "0." · When error code E.-63 is displayed, loop length display mode is automatically set.		
	2. Before voltage in memory backup capacitor of main circuit board has returned to normal, the POWER switch has been turned to OFF and all data has been destroyed.	· Leave the POWER switch on for approximately 15 minutes so that the voltage returns to normal.		
	3. Memory backup is not possible due to defective main circuit board.		Main circuit board	4-4
#10 Error code E.-30 is displayed.	1. Cutter center sensor position is not correct and sensor indicator does not illuminate (sensor ON).	· Check position of cutter center sensor.	Adjustment	3-15
	2. Cutter center sensor indicator does not illuminate due to sensor defect, or illuminates but sensor does not turn ON.	· Measure the output voltage (OUT) of the cutter center sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Cutter center sensor	4-12
	3. Cutter center sensor does not operate due to defective connection of power unit 3P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 3P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
#11 Error code E.-11 is displayed.	1. Loop front sensor position is not correct and sensor indicator does not switch off (sensor OFF).	· Check position of loop rear sensor.	Adjustment	3-34
	2. Loop front sensor indicator does not switch off due to sensor defect, or switches off but sensor does not turn OFF.	· Measure the output voltage (OUT) of the loop front sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Loop front sensor	4-13

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#12 Error code E.-12 is displayed.	1. Loop rear sensor position is not correct and sensor indicator does not illuminate (sensor ON).	· Check position of loop rear sensor.	Adjustment	3-32
	2. Loop rear sensor indicator does not illuminate due to sensor defect, or illuminates but sensor does not turn ON.	· Measure the output voltage (OUT) of the loop rear sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Loop rear sensor	4-14
	3. Loop rear sensor does not operate due to defective connection of power unit 9P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 9P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
#13 Error code E.-20 is displayed.	1. Body front sensor position is not correct and sensor indicator does not illuminate (sensor ON).	· Check position of body front sensor.	Adjustment	2-4
	2. Body front sensor indicator does not illuminate due to sensor defect, or illuminates but sensor does not turn ON.	· Measure the output voltage (OUT) of the body front sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Body front sensor	4-11
	3. Body front sensor does not operate due to defective connection of power unit 12P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 12P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
#14 rror code E.-23 is displayed.	1. Body rear sensor position is not correct and sensor is not uncovered (sensor ON).	· Check position of body rear sensor.	Adjustment	2-6
	2. Dust is adhering to body rear sensor and sensor is not uncovered (sensor ON).	· Clean off dust.		
	3. Body rear sensor indicator is not uncovered (sensor ON) due to sensor defect.	· Measure the output voltage (OUT) of the body rear sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Body rear sensor	4-11
	4. Body rear sensor is not uncovered (sensor ON) due to defective connection of power unit 12P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 12P connector or connector P3. · Check for continuity in the harness using a circuit tester.		

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#15 Monitoring by the loop empty sensor is not possible. (Loop empty sensor indicator illuminates when sensor uncovered but doesn't switch off when sensor covered.)	1. Loop empty sensor position is not correct and monitoring is not possible.	· Check position of loop empty sensor.	Adjustment	3-11
	2. Dust is adhering to loop empty sensor, sensor is not uncovered and indicator does not illuminate.	· Clean off dust.		
	3. Monitoring is not possible due to defective loop empty sensor.	· Measure the output voltage (OUT) of the loop empty sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Loop empty sensor	4-12
	4. Loop empty sensor indicator does not illuminate and loop empty sensor is not uncovered due to defective connection of power unit 6P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 6P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
#16 Monitoring by the seam joint sensor is not possible. (Seam joint sensor indicator illuminates when sensor uncovered but doesn't switch off when sensor covered.)	1. Seam joint sensor position is not correct and monitoring is not possible.	· Check position of seam joint sensor.	Adjustment	3-11
	2. Dust is adhering to seam joint sensor, sensor is not uncovered and indicator does not illuminate.	· Clean off dust.		
	3. Monitoring is not possible due to defective seam joint sensor.	· Measure the output voltage (OUT) of the seam joint sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Seam joint sensor	4-12
	4. Seam joint sensor indicator does not illuminate due to defective connection of power unit 6P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 6P connector or connector P3. · Check for continuity in the harness using a circuit tester.		

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#17 Sub-guide cylinder and loop guide unit cylinder do not operate.	1. LOOP switch does not turn on and loop setting operation is not performed due to defective LOOP switch, defective connection of panel circuit board connector P11 or open harness.	· Connection of connector P11. · Check for continuity in the LOOP switch and harness using a circuit tester.	Control panel	4-6
	2. See #8.	See #8.	See #8.	
#18 Loop feed pulse motor does not operate.	1. Pulse motor does not operate due to defective connection of main circuit board connector P8.	· Connection of connector P8.		
	2. Pulse motor does not operate due to defective pulse motor or open harness.	· Measure continuity of pulse motor using a circuit tester. Okay if resistance of each coil is about 0.4Ω.	Pulse motor	4-14
	3. Pulse motor does not operate due to incorrect pulse motor wiring.	· Wiring of pulse motor.		
#19 Error code E.-50 is displayed.	1. Seam joint section of belt loop is too long and sensor is uncovered for two steps.	(Normal operation)		
	2. Seam joint sensor position is not correct and sensor is uncovered for two steps.	· Check position of seam joint sensor.	Adjustment	3-11
#20 Error code E.-31 is displayed.	1. Cutter center sensor position is not correct and sensor indicator does not switch off (sensor OFF).	· Check position of cutter center sensor.	Adjustment	3-15
	2. Cutter center sensor indicator does not illuminate due to sensor defect, or switches off but sensor does not turn OFF.	· Measure the output voltage (OUT) of the cutter center sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Cutter center sensor	4-12
	3. Knife rotation (F) cylinder does not operate and cutter center sensor indicator does not switch off (sensor OFF).	See #8.	See #8.	

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#21 Monitoring by the loop set sensor is not possible. (Monitoring of normal setting, where seam joint sensor indicator illuminates when belt loop is set, and mistaken setting, where indicator does not illuminate and LOOP is displayed, is not possible.)	1. LOOP not displayed because AUTO mode not active.	(Normal operation)		
	2. AUTO mode not active due to defective MODE switch, defective connection of panel circuit board connector P13 or open harness.	· Connection of connector P13. · Check for continuity in the MODE switch and harness using a circuit tester.	Control panel	4-6
	3. Loop set sensor position is not correct and monitoring is not possible.	· Check position of loop set sensor.	Adjustment	3-29
	4. Loop set sensor cover position is not correct and monitoring is not possible.	· Check position of loop set sensor cover.	Adjustment	3-29
	5. Dust is adhering to loop set sensor and monitoring is not possible.	· Clean off dust.		
	6. Monitoring is not possible due to defective loop set sensor.	· Measure the output voltage (OUT) of the loop set sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Loop set sensor	4-13
	7. Loop set sensor does not operate due to defective connection of power unit 9P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 9P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
#22 Belt loop length cannot be changed.	1. MANUAL mode not active due to defective MODE switch, defective connection of panel circuit board connector P13 or open harness.	· Connection of connector P13. · Check for continuity in the MODE switch and harness using a circuit tester.	Control panel	4-6
	2. Installation position of panel circuit board is not correct and switch does not turn ON and OFF.	· Position of panel circuit board.	Adjustment	4-7
	3. INPUT switch and SET switch do not turn ON and OFF due to defective switches.	· Check for continuity in the INPUT switch and SET switch using a circuit tester.	Panel circuit board	4-7

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#23 Loop feed cylinder does not operate.	1. EMERGENCY STOP switch does not turn on and step motion is not performed due to defective EMERGENCY STOP switch, defective connection of panel circuit board connector P12 or open harness.	· Connection of connector P12. · Check for continuity in the EMERGENCY STOP switch and harness using a circuit tester.	Control panel	4-6
	2. See #8.	See #8.	See #8.	
#24 Error code E.-10 is displayed.	1. Loop front sensor position is not correct and sensor indicator does not illuminate (sensor ON).	· Check position of loop front sensor.	Adjustment	3-34
	2. Loop front sensor indicator does not illuminate due to sensor defect, or illuminates but sensor does not turn ON.	· Measure the output voltage (OUT) of the loop front sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Loop front sensor	4-13
	3. Loop front sensor does not operate due to defective connection of power unit 9P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of 9P connector or connector P3. · Check for continuity in the harness using a circuit tester.		
	4. Supporter plate is touching presser foot (F) or (B) and loop front sensor cannot turn ON.	· Check position of presser feet (F) and (B). · Check position of loop unit.	Adjustment Adjustment	2-7 3-40
	5. Loop feed cylinder does not operate and loop front sensor indicator does not illuminate (sensor ON).	See #8.	See #8.	
#25 Error code E.-13 is displayed.	1. Loop rear sensor position is not correct and sensor indicator does not switch off (sensor OFF).	· Check position of loop rear sensor.	Adjustment	3-32
	2. Loop rear sensor indicator does not switch off due to sensor defect, or switches off but sensor does not turn OFF.	· Measure the output voltage (OUT) of the loop rear sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Loop rear sensor	4-14

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#26 Error code E.-41 is displayed.	1. Stop position sensor position is not correct and sensor is not uncovered (sensor ON).	· Check position of stop position sensor.	Adjustment	2-9
	2. Dust is adhering to stop position sensor and sensor is not uncovered (sensor ON).	· Clean off dust.		
	3. Stop position sensor indicator is not uncovered (sensor ON) due to sensor defect.	· Measure the output voltage (OUT) of the stop position sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Stop position sensor	4-10
	4. Stop position sensor is not uncovered (sensor ON) due to defective connection of main circuit board connector P4 or open harness.	· Connection of connector P4. · Check for continuity in the harness using a circuit tester.		
	5. Stop position sensor is not uncovered (sensor ON) due to low air pressure causing poor machine starting.	· Adjust air pressure to 5~5.5 kgf/cm^2.	Adjustment	3-5
	6. Stop position sensor is not uncovered (sensor ON) due to belt slippage or defective machine motor.	· Check belt. · Check machine motor connectors. · Measure continuity in the machine motor using a circuit tester. Okay if about 13Ωin all 3 phases.	Machine motor	
	7. Chain of machine start cylinder is too loose and machinehead starting is not possible.	· Check position of machine start cylinder.	Adjustment	3-39
	8. Machine start cylinder does not operate and machine head starting is not possible.	See #8.	See #8.	

Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#27 Error code E.-40 is displayed.	1. Chain of machine start cylinder is too tight, machine head does not stop and stop position is not covered (sensor OFF).	· Check position of machine start cylinder.	Adjustment	3-39
	2. Stop position sensor is not covered (sensor OFF) because of weak belt tension and defective machine head stopping.	· Check belt.		
	3. Stop position sensor is not covered (sensor OFF) because of weak regulator pressure and defective machine stopping.	· Check regulator pressure.	Adjustment	3-5
#28 Monitoring by the thread breakage sensor is not possible. (Error code E.-80 is not displayed even when thread breaks. Error code E.-80 is displayed even during normal sewing.)	1. Monitoring is not possible because DIP switch SW11 is not at ON.	(Normal operation) · Set DIP switch SW11 to ON.		
	2. Monitoring is not possible because thread is not wound onto pulley or tension is too weak and pulley doesn't turn.	· Wind thread onto pulley and check tension.	Adjustment	2-9
	3. Dust is adhering to thread breakage sensor and monitoring is not possible because sensor is not uncovered (sensor ON).	· Clean off dust.		
	4. Monitoring is not possible due to defective thread breakage sensor.	· Measure the output voltage (OUT) of the thread breakage sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Thread breakage sensor	4-10
	5. Monitoring is not possible because thread breakage sensor is not uncovered due to defective connection of main circuit board connector P5 or open harness.	· Connection of connector P5. · Check for continuity in the harness using a circuit tester.		

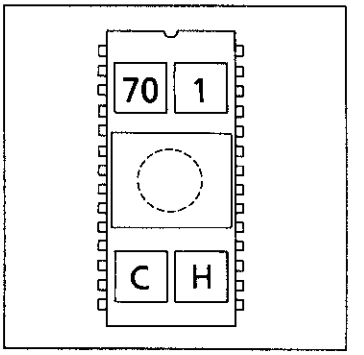
Problem	Cause	Inspection, repair or adjustment	Replacement part	P.
#29 Error code E.-22 is displayed.	1. Body rear sensor position is not correct and sensor is not covered (sensor OFF).	· Check position of body rear sensor.	Adjustment	2-6
	2. Body rear sensor indicator is not covered (sensor OFF) due to sensor defect.	· Measure the output voltage (OUT) of the body rear sensor using a circuit tester. Okay if DC 0.7V or less when covered and DC 5V when uncovered.	Body rear sensor	4-11
	3. Presser foot (F) position (cylinder stopper position) is not correct and body rear sensor is not covered (sensor OFF).	· Check front-back position of presser foot (F).	Adjustment	2-5
	4. Body front sensor is touching presser arm and body rear sensor is not covered (sensor OFF).	· Check position of body front sensor.	Adjustment	2-4
	5. Body cylinder is not retracted and body rear sensor is not covered (sensor OFF).	See #8.	See #8.	
#30 Error code E.-21 is displayed.	1. Body front sensor position is not correct and sensor indicator is not switched off (sensor OFF).	· Check position of body front sensor.	Adjustment	2-4
	2. Body front sensor indicator does not switch off due to sensor defect, or switches off but sensor does not turn OFF.	· Measure the output voltage (OUT) of the body front sensor using a circuit tester. Okay if DC 0.7V or less when indicator illuminated and DC 5V when switched off.	Body front sensor	4-11
#31 Display mode cannot be changed.	1. See #22.2.	See #22.2.	See #22.2.	
	2. SELECT switch does not turn ON and OFF due to defective switch.	· Check continuity of SELECT switch using a circuit tester.	Panel circuit board	4-7
#32 Lower thread counter cannot be changed.	1. See #22.2.	See #22.2.	See #22.2.	
	2. See #22.3.	See #22.3.	See #22.3.	
#33 Loop feed cylinder does not operate.	1. START switch does not turn ON and automatic sewing is not performed due to defective START switch, defective connection of relay 4P connector, defective connection of main circuit board connector P3 or open harness.	· Connection of relay 4P connector and connector P3. · Check for continuity in the START switch and harness using a circuit tester.	START switch	4-9
	2. Depression amount of START switch is not correct and switch does not turn ON.	· Check depression amount of START switch.	Adjustment	4-9
	3. See #8.	See #8.	See #8.	

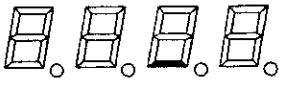
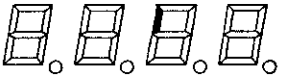
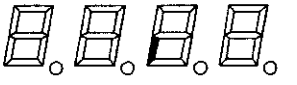
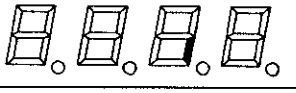
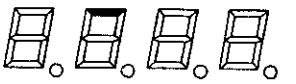
I/O CHECK PROM

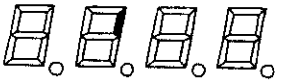
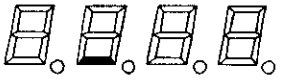
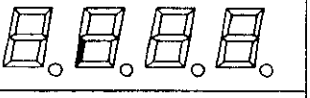
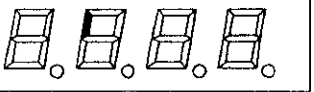
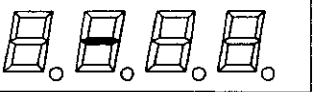
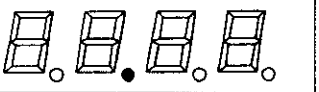
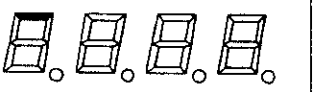
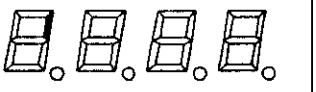
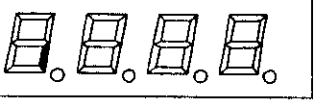
- The following procedure can be used to check if any of the switches are malfunctioning.

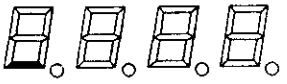
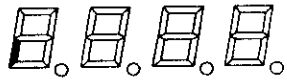
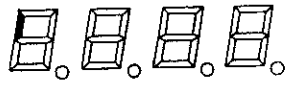
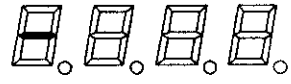
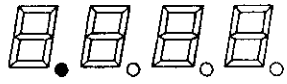
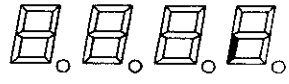
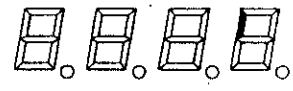
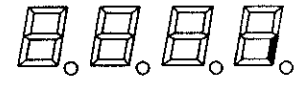
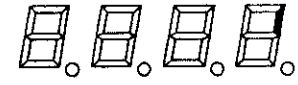
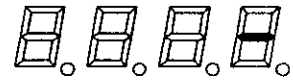
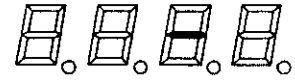
1) Turn the power off.
2) Replace the main circuit board PROM with the I/O check PROM.
3) Turn the power on.
4) Turn the switch to be checked on and off.

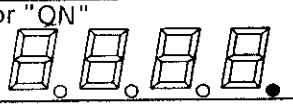
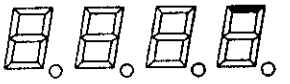
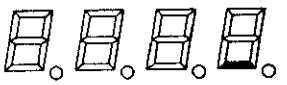
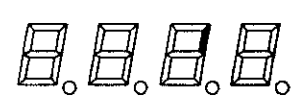
※ If the LED corresponding to a particular switch is not illuminated or if the buzzer does not sound, the switch is probably defective.

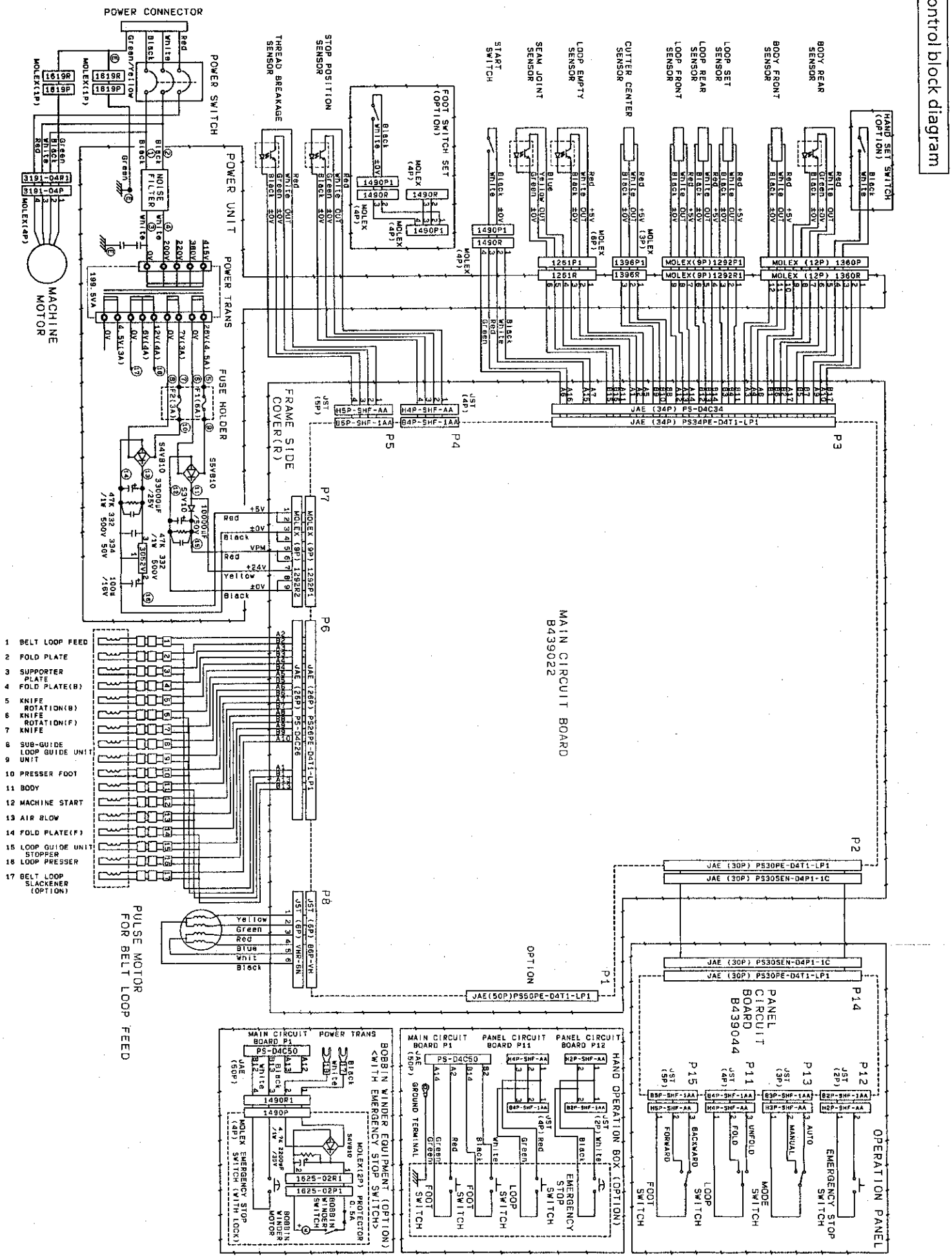


Switch	LED display or buzzer response
MODE switch	For "AUTO"  For "MANUAL" 
EMERGENCY STOP switch	EMERGENCY STOP indicator
INPUT switch x100 (left side)	Loop length indicator
INPUT switch x10 (center)	Lower thread counter indicator
INPUT switch x1 (right side)	Production counter indicator
SET switch	Trouble indicator
SELECT switch	Lower thread empty indicator
Presser foot switch	For "FRONT"  For "REAR" 
LOOP switch	For "SET"  For "RESET" 
START switch	Buzzer
DIP switch SW11	For "ON" 

Switch	LED display or buzzer response
DIP switch SW12	For "ON" 
DIP switch SW13	For "ON" 
DIP switch SW14	For "ON" 
DIP switch SW15	For "ON" 
DIP switch SW16	For "ON" 
DIP switch SW17	For "ON" 
DIP switch SW18	For "ON" 
DIP switch SW21	For "ON" 
DIP switch SW22	For "ON" 
DIP switch SW23	For "ON" 

Switch	LED display or buzzer response
DIP switch SW24	For "ON" 
DIP switch SW25	For "ON" 
DIP switch SW26	For "ON" 
DIP switch SW27	For "ON" 
DIP switch SW28	For "ON" 
Loop front sensor	For "ON" 
Loop rear sensor	For "ON" 
Body front sensor	For "ON" 
Body rear sensor	For "ON" 
Cutter center sensor	For "ON" 
Stop position sensor	For "ON" 
Seam joint sensor	Seam joint indicator

Switch	LED display or buzzer response
Loop empty sensor	Loop empty indicator
Thread breakage sensor	For "ON" 
Loop set sensor	
Foot switch (optional)	
Hand set switch (optional)	
EMERGENCY STOP switch (optional, automatic bobbin winder)	
EMERGENCY STOP switch (optional, hand operation box)	EMERGENCY STOP indicator
Presser foot switch (optional, hand operation box)	Loop length indicated
START switch (optional, hand operation box)	Buzzer
LOOP switch (optional, hand operation box)	


POWER CONNECTOR
POWER SWITCH
POWER UNIT
POWER TRANS
FUSE HOLDER
MACHINE MOTOR
NOISE FILTER
FRAME SIDE COVER(R)
MAIN CIRCUIT BOARD B439022
PULSE MOTOR FOR BELT LOOP FEED
OPTION
PANEL CIRCUIT BOARD B439044
OPERATION PANEL
HAND SET SWITCH (OPTION)
BODY REAR SENSOR
BODY FRONT SENSOR
LOOP SET SENSOR
LOOP REAR SENSOR
LOOP FRONT SENSOR
CUTTER CENTER SENSOR
LOOP EMPTY SENSOR
SEAM JOINT SENSOR
START SWITCH
FOOT SWITCH SET (OPTION)
STOP POSITION SENSOR
THREAD BREAKAGE SENSOR
1 BELT LOOP FEED
2 FOLD PLATE
3 SUPPORTER PLATE
4 FOLD PLATE(B)
5 KNIFE ROTATION(B)
6 KNIFE ROTATION(F)
7 KNIFE
8 SUB-GUIDE LOOP GUIDE UNIT
9 UNIT
10 PRESSER FOOT
11 BODY
12 MACHINE START
13 AIR BLOW
14 FOLD PLATE(F)
15 LOOP GUIDE UNIT STOPPER
16 LOOP PRESSER
17 BELT LOOP SLACKENER (OPTION)
BOBBIN WINDER EQUIPMENT (OPTION) <WITH EMERGENCY STOP SWITCH>
HAND OPERATION BOX (OPTION)
EMERGENCY STOP SWITCH
FOOT SWITCH
LOOP SWITCH
MODE SWITCH
BOBBIN WINDER MOTOR
BOBBIN WINDER SWITCH

BROTHER INDUSTRIES, LTD. NAGOYA, JAPAN

Printed in Japan 1992. 06. I2060585 H ①