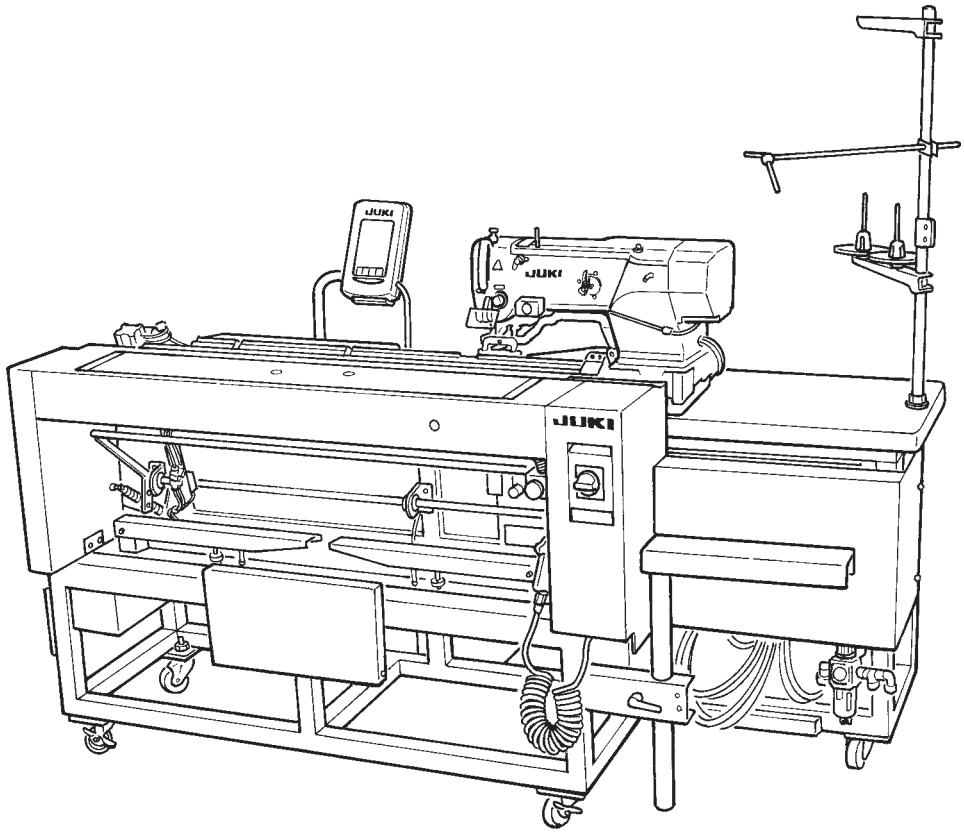
JUKI®

1-Needle, Lockstitch Automatic buttonholing Machine

ACF-172-1790

ENGINEER'S MANUAL



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PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the machine.

The Instruction Manual for these machines intended for the maintenance personnel and operators at an apparel factory contains operating instructions in detail. And this manual describes "Standard Adjustment", "Adjustment Procedures", "Results of Improper Adjustment", and other important information which are not covered by the Instruction Manual.

It is advisable to use the relevant Instruction Manual and Parts List together with this Engineer's Manual when carrying out the maintenance of these machines. Further, refer to Engineer's Manual, Instruction Manual and Parts List for LBH-1790 series.

In addition, for the motor for the sewing machine with thread trimmer, refer to the separate Instruction Manual or Engineer's Manual for the motor. And for the control panel, refer to the Instruction Manual for the control panel.

This manual gives the "Standard Adjustment" on the former page under which the most basic adjustment value is described, and on the latter page "Results of Improper Adjustment" under which stitching errors and troubles arising from mechanical failures are described together with the "Adjustment Procedures".

CONTENTS

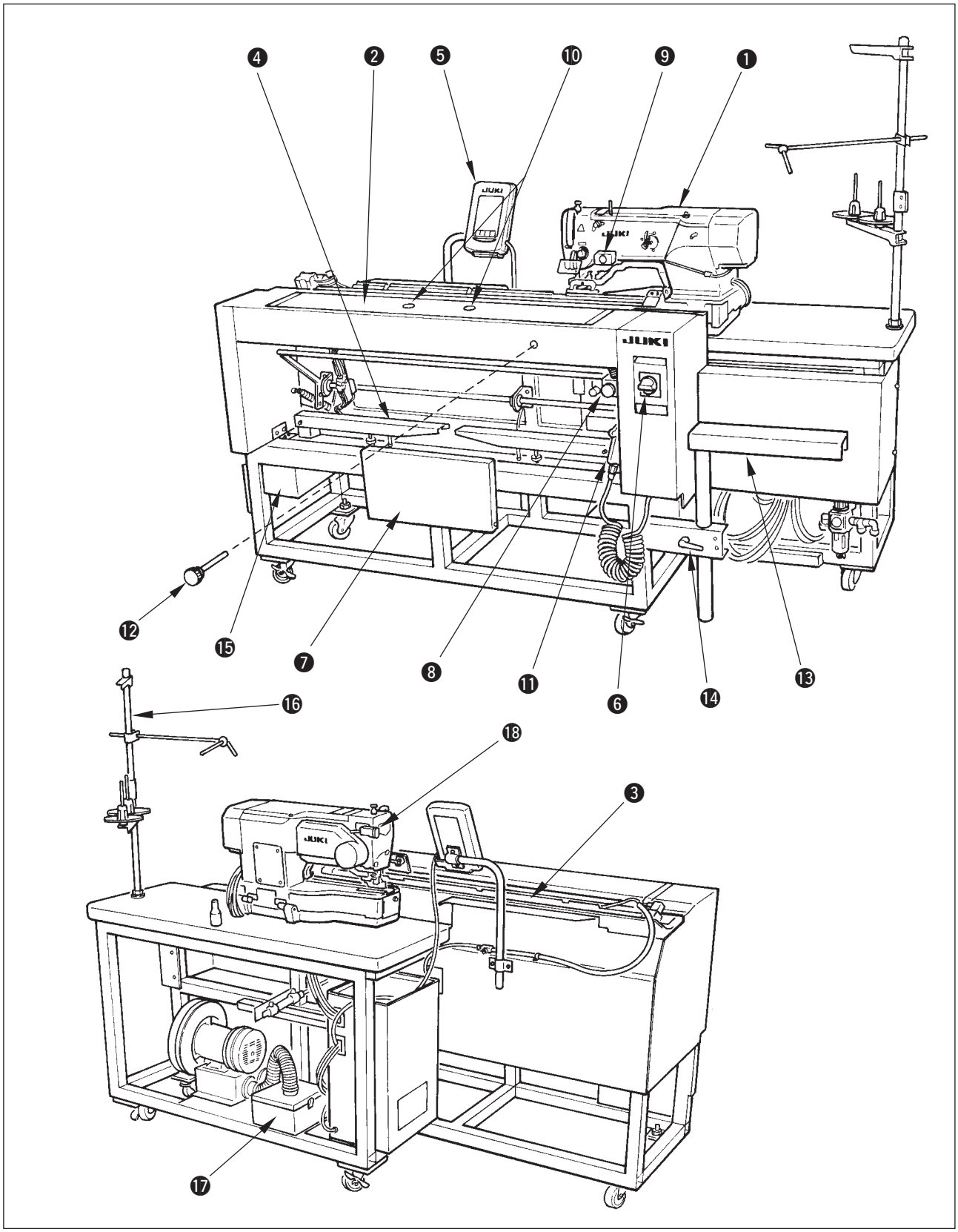
1. GENERAL

Mainly consisting of a sewing machine, preset board, carriage, stacker, the ACF-172-1790 indexer is designed to automatically carry out a series of operations starting sewing button on the front top-center strips of men's shirts, etc. and ending with stacking of workpieces.

(1) Features

1. The material feed mechanism allows the material to be fed quickly at accuratintervals.
2. The number of buttonholes or the feed to the sewing amount can be easily set or changed with the keys on the control panel. Twenty different patterns can be stored in memory, which enables the operator to quickly respond to the frequent setup changes.
3. The material is automatically fed to sewing position after it has been placed on the setting position. The machine automatically performs a series of operations, including sewing, thread trimming and staking.
4. The operator can set the next material to be sewn while the machine is still sewing, allowing the operator to have enough to attend on several machines.
5. Thanks to the presetting mechanism, it is possible for the operator to attend on four machines without causing one of them to stand idle or for the operator himself/herself to become idle when two pieces of garment body are set on.
6. The clamping mechanism clamps the material securely without allowing any slippage during the sewing operation from inserting to stacking.
7. Buttonholes can be sewn also from the front to center strips of ladies' garment body as well as gentlemen's.
8. Sewing speed can be freely set by means of the panel variable resistor.
9. The machine is equipped with various error modes and performs self-diagnosis.
10. It is also equipped with a workpiece detector mechanism which eliminates a sewing start error.
11. The amount of finished products stacked on the stacker can be detected.

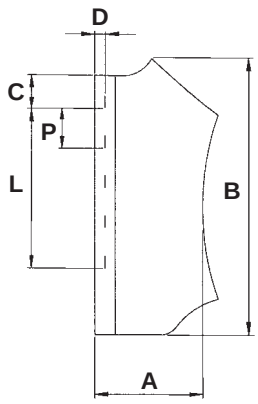
(2) Configuration of the main parts



❶ Sewing machine head
❷ Preset board
❸ Carriage
❹ Stacker
❺ Control panel
❻ Power switch
❼ Knee switch
❽ Pause switch
❾ Hand switch
❿ Workpiece detector switch
⓫ Air gun
⓬ Preset adjusting knob (supplied with the machine in the accessory box)
⓭ Cloth palate
⓮ Handle of the cloth plate
⓯ Tool box
⓰ Thread stand
⓱ Filter box
⓲ Machine head pause switch

2. SPECIFICATIONS

No.	Item	Specifications
1	Model name	Computer-controlled high-speed buttonholing indexer
2	Model	ACF-172-1790
3	Machine used	3LBH-1790S (ACH exclusive head)
4	Sewing speed	4Max. 4,200 rpm, Standard ; 3,600 rpm, When dry-hook is used : max. 3,300 rpm
5	Knife size	6.4 to 19.1 mm (1/4 to 3/4")
6	Lift of work clamp check	Max. 14 mm
7	Sewing dimension	Standard : Width 4 mm X length 25 mm, (Max. width 6 mm X length 120 mm by replacing parts)
8	Needle	DP X 5 #11J to #14J
9	Applicable garment that can be sewn	T/C broadcloth, wool (with top-center plait, 2-fold, 3-fold, 2-piece superimposed feed)
10	Lubricating oil	Hook lubrication : JUKI New Defrix Oil No. 1 (equivalent to ISO VG7) Not necessary when using dry-hook
11	Pitch	0.2 to 2.5 mm
12	Applicable garment size that can be sewn	Width A : 220 to 420 mm (8.7 to 16.5") Length B : 400 to 880 mm (15.7 to 34.6")
13	Distance from the top end of the garment body to the 1st buttonhole	C : 0 to max. 140 mm (0 to max. 5.5") (140 mm (5.5") or more is possible by means of jump feed function)
14	Distance from the side end of the garment body to the buttonhole	D : 7 to 21 mm (0.3 to 0.8")
15	Feed interval	P : 0 to 610 mm (0 to 24") Unequal length possible (possible to set in 0.1 mm unit)
16	Overall feed amount	L : 610 mm (24") (Possible to set in 0.1 mm unit)
17	Number of buttonholes which can be sewn	1 to 20 pcs. (1 pc. independent sewing)
18	Material feed system	Rack and pinion drive by stepping motor
19	Feeding direction	Right-hand direction (for men's), Left-hand direction (for ladies')
20	Number of patterns that can be stored in memory	20 patterns
21	Operating air pressure	0.5MPa (5kg/cm^2)
22	Air consumption	240NL/min or less
23	Machine size	Width 1,910 mm (75.2") X depth 850 mm (33.5") X table height 920 mm (36.2")
24	Weight	300Kg
25	Control box type	MC-545
26	Power supply	200, 220, 230V, 240V, 3-phase (domestic/export) / single phase (general export)
27	Power source frequency	50/60Hz
28	Power consumption	1000VA
29	Stepping motor control	Constant-current system, 5-phase, material feed by 0.1 mm/pulse
30	Presetting unit	Provided
31	Garment body stacker	Provided
32	Pair stacking	Possible

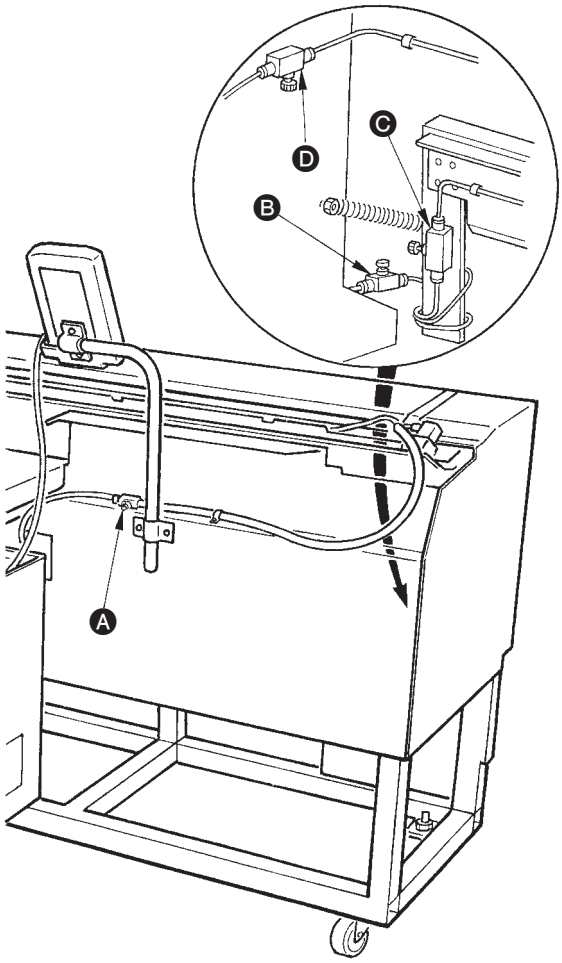


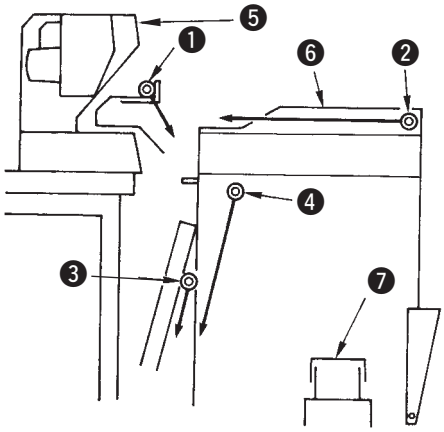
3. ADJUSTMENT OF EACH MAIN COMPONENT

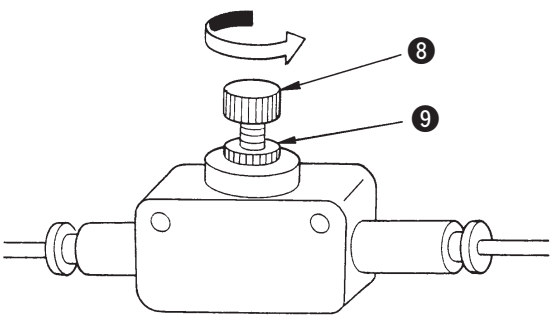
(1) Adjustment of the pneumatic components

Standard Adjustment

1) Adjusting the air blower







Adjustment Procedures	Results of Improper Adjustment

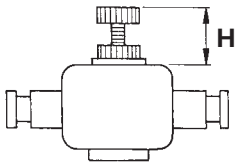
1. The air blower is provided with four blow pipes as illustrated in the figure on the left. The arrows of full line show the air blowing direction of the respective pipes. The name and function of each components are as follows :

Blower for the carriage ❶ ┐ To be used for bellowing down the workpiece
Blower for lifting the workpiece ❷ ┘
Blower sucking the workpiece ❸ ┐ To be used for stacking the workpiece
Blower peeling off the workpiece ❹ ┘
Machine head ❺
Presetting table ❻
Stacking board ❼

2. The speed controllers are used to adjust the air blow of air blow pipes ❶ to ❹ as illustrated in the figure on the left

Speed controller of the blower for the carriage Ⓐ
Speed controller of the blower for lifting the workpiece Ⓑ
Speed controller of the blower for sucking the workpiece Ⓒ
Speed controller of the blower for peeling off the workpiece Ⓓ

3. Table of relationship between the adjustment values of the speed controllers at the time of delivery and the thickness of the material.



No.	H(mm)	Light weight small ⇔ Heavy .Large
Ⓐ	14 ~ 15	Amount of air to be blown
Ⓑ	13 ~ 14	
Ⓒ	14 ~ 15	Decrease ◀ ▶ Increase
Ⓓ	13 ~ 14	

4. Turn knob ❽ of the speed controller in the direction of the arrow to increase the amount of air to be blown. After the adjustment, fix the knob at the adjusted position using locknut ❾.

(Caution) Adjusting the amount of air to be blown while the machine is in operation is very dangerous. Be sure to turn OFF the power to the machine.

5. Adjusting the air blower for blowing down the workpiece

If sewing a heavy-weight material or a large-size material, fully open speed controller Ⓐ first. If the workpiece cannot be easily blown down, gradually loosen speed controller Ⓑ to increase the amount of air to be blown properly.

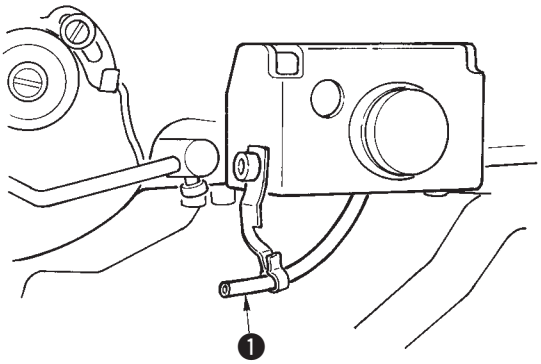
If sewing a light-weight material or floppy material, set speed controller Ⓑ to the value adjusted at the time of delivery and tighten speed controller Ⓐ to decrease the amount of air to be blown.

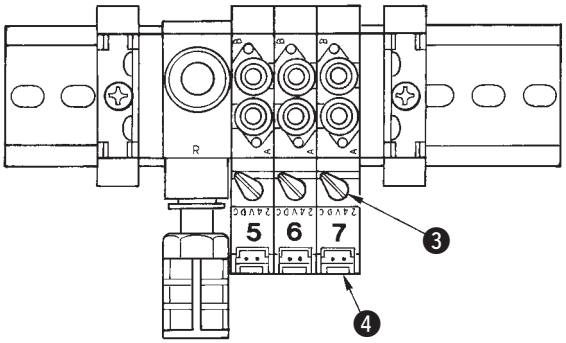
6. Adjusting the air blower for stacking the workpiece

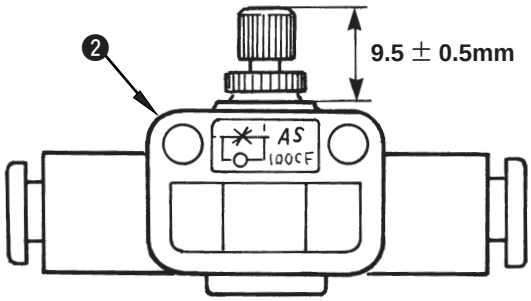
If sewing a heavy-weight material or a large-size material, loosen speed controllers Ⓒ and Ⓓ to increase the amount of air to be blown properly.

If sewing a light-weight material, set speed controller Ⓒ to the value at the time of delivery and tighten speed controller Ⓓ to decrease the amount of air to be blown.

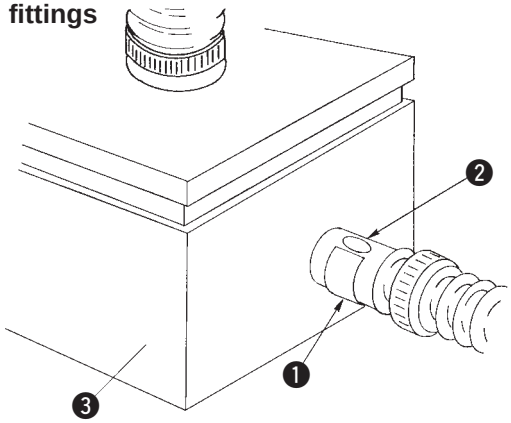
2) Adjusting the air blower for the needle bar



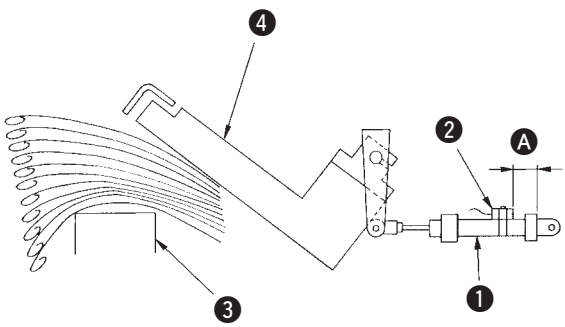




3) Vacuum adjusting metal fittings



4) Sensor to detect the number of garment bodies stacked



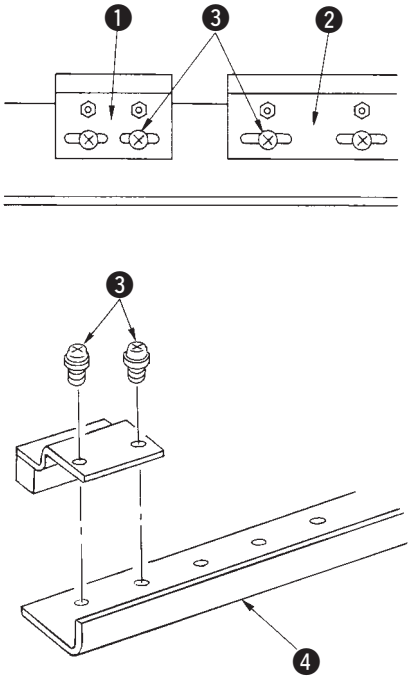
Adjustment Procedures	Results of Improper Adjustment
1. When dust collected on the needle bar area falls and is caught in the seams, adjust the direction and strength of the air blower.The air blower blows dust away and prevents dust from falling under needle. For the direction of the air blower, correct the installation of the pipe ❶. Adjust the air blower so that air blows as near as the machine arm jaw area. 2. Press and turn the manual switch ❸ of solenoid valve No. 7 to check the motion.Strength of the air blow is adjusted with the speed controller ❷. When the manual switch ❸ of solenoid valve No. 7 ❹ is pressed and turned, the pusher is actuated and simultaneously the needle bar air blower is actuated. Return the manual switch ❸ after the adjustment since the manual switch is locked with it pressed and turned.Adjust the speed controller ❷ located on the black pipe branched from the yellow pipe connected from solenoid valve No. 7 ❹. 3. Air blow is actuated during machine operation when continuously performing sewing. Take care not to excessively increase the amount of air to be blown so that the sewing is not affected. Standard adjustment value : 9.5 ± 0.5 mm	
1. They are used to adjust the vacuum suction force of the preset board for sucking the workpiece. Adjustment is carried out by turning metal fitting ❶. For the normal operation, ❷ in the metal fitting should not be closed. If sewing a large-size material should not be closed. 2. If sewing a large-size material or a coarse texture, close the hole ❷. **(Caution) To keep the appropriate suction force, clean the filter inside filter box ❸ at regular intervals. (Refer to "6-8. Cleaning the vacuum filter" of Instruction Manual.)**	
1. Sensor ❷ mounted on cylinder ❶ which driver pusher ❹ detects the thickness of garment bodied stacked on stacking board ❸ when actuating the stacker. 2. You can let the error (E089) occur at the time when the thickness of garment bodies stacked on the board reaches any desired value specified by changing the position of sensor ❷ with a Phillips type screwdriver. (Distance Ⓐ has been factory-adjusted to 40 mm at the time of delivery. The value is equivalent to the height reached when stacking approximately 120 to 140 garment bodies made of T/C broadcloth. Moving sensor ❷ to the right will make the error occur earlier.) **(Caution) Note that the sewing machine does not stop operation when this error occurs.**	

(2) Adjusting the carriage lamp

Standard Adjustment

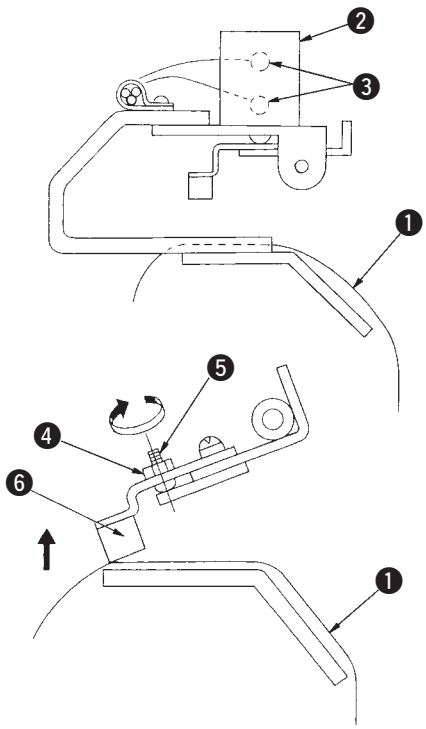
1) Adjusting the position of the clamps

Adjust the position of the clamp only when you wish to eliminate a clearance between the clamps or you wish change the arrangement of the clamp.



2) Adjusting the clamping force

When adjusting the position of the clamps or replacing the clamp cushion ❻, perform the adjustment below.

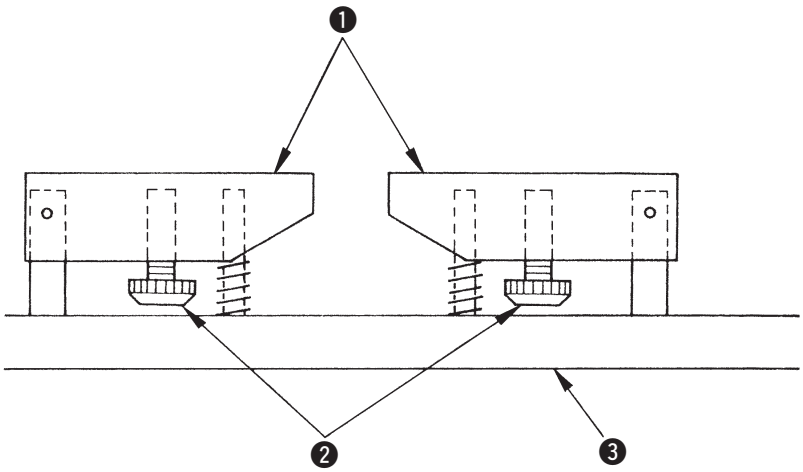


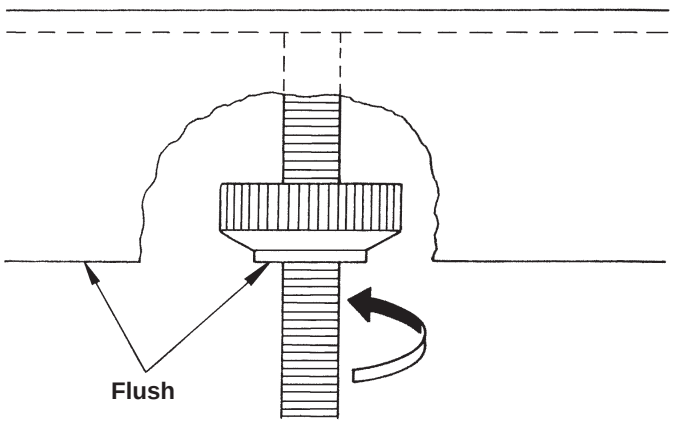
Adjustment Procedures	Results of Improper Adjustment
1. If you wish to eliminate a clearance between the clamps, loosen screws ❸ either in clamps (small) ❶ or in clamp (large) ❷, and move the relevant one. Then tighten screws ❸. 2. If you wish to change the arrangement of clamp (small) ❶ and clamp (large) ❷, remove screws ❸, and re-position the clamps as you wish. Then fix the clamps wish the screws. (The clamps can be attached to any of the installation holes in mounting base ❹.) **(Caution) Whenever you perform this adjust the clamping force of the clamps referring to "2) Adjusting the clamping force".e to turn OFF the power to the machine.**	
1. Place workpiece ❶ on the carriage as illustrated in the figure, press and turn the manual switch on solenid valve ❸ to actuate the clamp cylinder ❷. 2. Loosen locknut ❹ and turn adjustment screw ❺ in the direction of the arrow. Then clamp cushion ❻ will be raised. 3. Adjust up or down the height of the clamp on the left first and that on the right next, so that they uniformly clamp workpiece ❶ over the length. 4. Finally, tighten the locknut ❹ and check that the clamping force of the clamps do not change. 5. Return the manual switch of solenoid valve ❸ to its home position. **(Caution) After the adjustment, be sure to return the manual switch to its home position.**	

(3) Adjusting the stacking board of the stacker

Standard Adjustment

1. If sewing garment bodies with pockets, adjust the stacking board following the steps, adjust the stacking board following the steps described below. This adjustment allows the stacker to stack approximately 140 pieces of garment bodies with pockets (material : T/C board cloth). (When sewing garment bodies without pockets, no adjustment is required.)

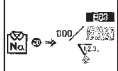


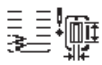


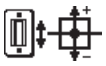
Adjustment Procedures	Results of Improper Adjustment
1. When sewing men's wear, loosen locknuts ❷ in the reverse side of staking board ❶ on the right side, and raise the stacking board until the reverse side of the stacking board ❶ is flush with the reverse side of the locknut ❷. 2. When sewing ladies' wear, loosen locknuts ❷ in the staking board on the left side as in the case of men's wear. (When sewing garment bodies without pockets, lower locknuts ❷ until they reach staking board base ❸ and tighten them to the extent where stacking board ❶ is secured.)	

4. ERROR CODE LIST

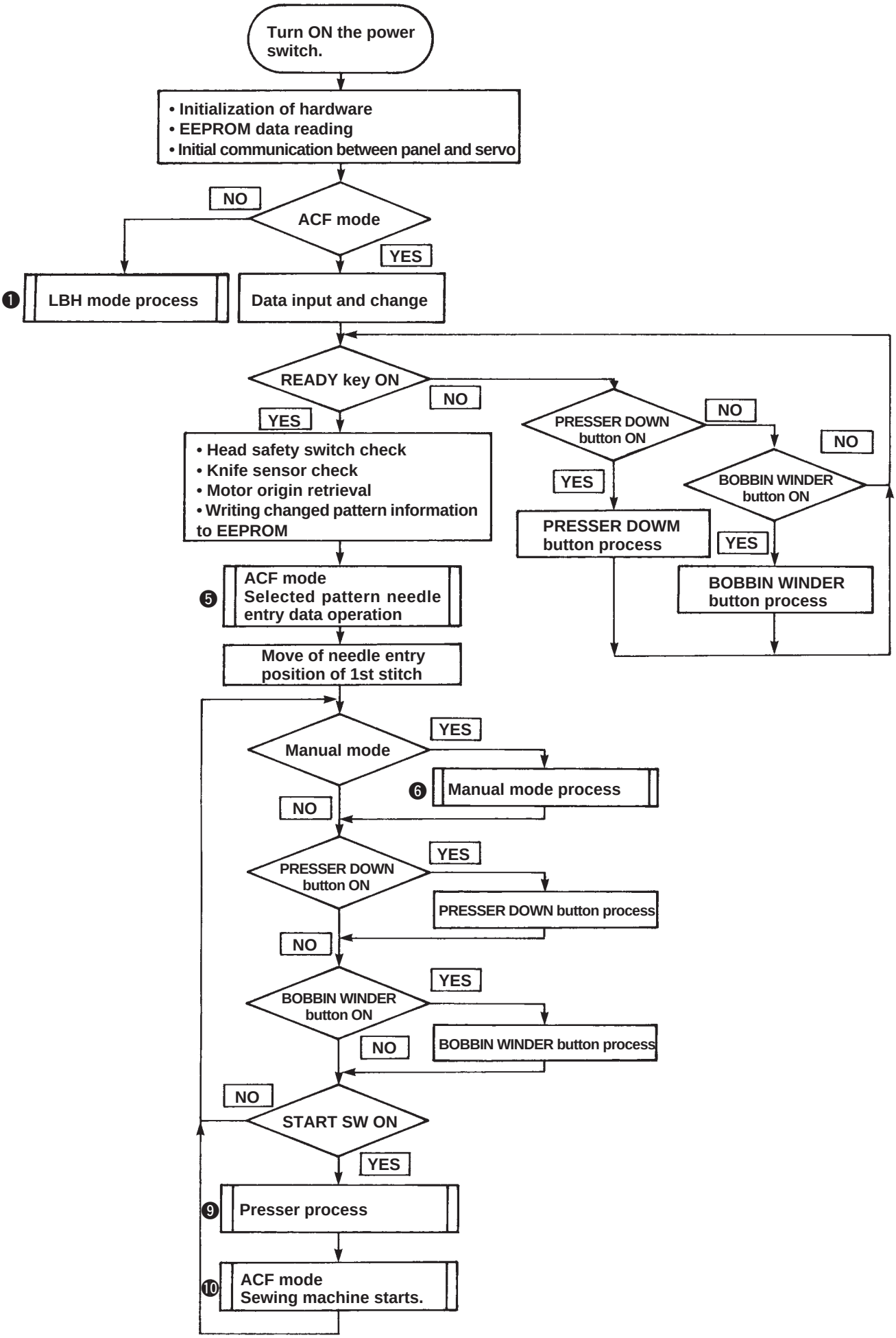
Error code	Display	Description	How to recover	Place of recovery
E001		**Contact of initialization of EEP-ROM of MAIN CONTROL p.c.b.** When data is not written in EEP-ROM or data is broken, initialization of the data is automatically informed.	Turn OFF the power.	
E007		**Main shaft motor-lock** When large needle resistance sewing product is sewn	Turn OFF the power.	
E011		**External media not inserted** External media is not inserted.	Re-enter after pressing reset key.	
E012		**Read error** Data read from external media is not possible.	Possible to re-start after pressing reset key.	Previous screen
E013		**Write error** Data write from external media is not possible.	Possible to re-start after pressing reset key.	Previous screen
E014		**Write protect** External media is in the state of write prohibited.	Possible to re-start after pressing reset key.	Previous screen
E015		**Format error** Formatting is not possible.	Possible to re-start after pressing reset key.	Previous screen
E016		**External media capacity over** Capacity of external media is short.	Possible to re-start after pressing reset key.	Previous screen
E017		**EEP-ROM capacity over** Capacity of EEP-ROM is short.	Possible to re-start after pressing reset key.	Previous screen
E018		**Type of EEP-ROM is wrong.** When the type of mounted EEP-ROM is wrong	Turn OFF the power.	Previous screen
E019		**File size over** File is too big.	Possible to re-start after pressing reset key.	Previous screen
E022		**File No. error** There is no specified file in server or smart media.	Possible to re-start after pressing reset key.	Previous screen
E023		**Detection of step-out of presser lifting motor** When step-out of motor is detected at the time when presser lifting motor passes origin sensor or starts operation.	Possible to re-start after pressing reset key.	Data input screen
E024		**Pattern data size over** When sewing cannot be performed since total size of continuous stitching data or size of downloaded data is too large.	Possible to re-start after pressing reset key.	Data input screen
E025		**Detection of step-out of needle thread trimmer motor** When step-out of motor is detected at the time when needle thread trimmer motor passes origin sensor or starts operation.	Possible to re-start after pressing reset key.	Data input screen
E026		**Detection of step-out of bobbin thread trimmer motor** When step-out of motor is detected at the time when bobbin thread trimmer motor passes origin sensor or starts operation.	Possible to re-start after pressing reset key.	Data input screen
E027		**Read error** Data read from server is not possible.	Possible to re-start after pressing reset key.	Previous screen
E028		**Write error** Writing of data from server is not possible.	Possible to re-start after pressing reset key.	Previous screen
E029		**Smart media slot error** Smart media slot lid is open.	Possible to re-start after pressing reset key.	Previous screen
E030		**Needle bar upper position failure** When needle does not stop at UP position even with needle UP operation at the time of starting sewing machine.	Possible to re-start after pressing reset key.	Data input screen
E042		**Operation error** Operation of sewing data is not possible.	Possible to re-start after pressing reset key.	Data input screen

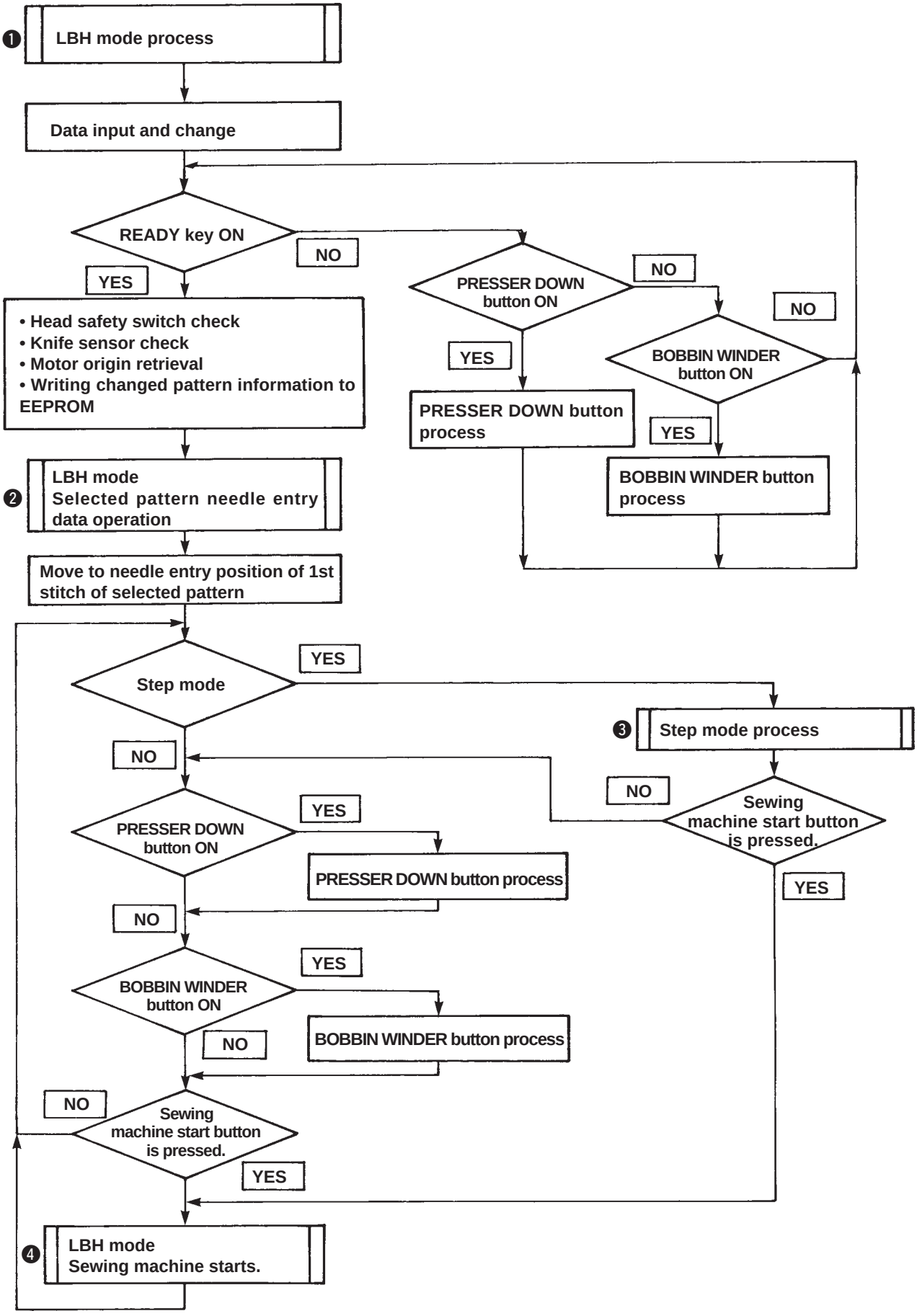
Error code	Display	Description	How to recover	Place of recovery
E043		**Enlargement error** Sewing pitch exceeds 5 mm.	Possible to re-start after pressing reset key.	Data input screen
E050		**Stop switch** When stop switch is pressed during machine running.	Possible to re-start after pressing reset key.	Step screen
E052		**Thread breakage detection error** When thread breakage has occurred during machine running.	Possible to re-start after pressing reset key.	Step screen.
E061		**Memory switch data error** When memory switch data is broken or revision is old.	Turn OFF the power.	
E062		**Sewing data error** When sewing data is broken or revision is old.	Turn OFF the power.	
E089		**Sewing product stacking error** When sewing products are excessively stacked, remove the sewing products.	Possible to re-start after pressing reset key.	Automatic sewing screen
E099		**Interference of knife lowering command with thread trimming motion** When inserting position of knife command is improper and knife command interferes with thread trimming motion in case of motion by data from external input device.	Possible to re-start after pressing reset key.	Data input screen
E302		**Confirmation of tilt of machine head** When tilt of machine head sensor is OFF.	Possible to re-start after pressing reset key.	Data input screen
E303		**Z phase sensor error of main shaft motor** Z phase sensor of sewing machine motorencoder is abnormal.	Turn OFF the power.	
E304		**Cloth cutting knife sensor error** When sensor is not OFF while knife is lowered.	Turn OFF the power.	
E401		**Copy impossible error** When copying to registered pattern No.  : In case of continuous sewing	Possible to re-start after pressing cancel button.	Pattern list screen
E402		**Pattern deletion error** In case of deleting pattern when the registerd patten is only one.  : In case of continuous sewing	Possible to re-start after pressing cancel button.	Pattern list screen
E410		**Sewing counter set value error** When the sewing counter set value is smaller than the sewing numbers of sewing pattern being selected at present.	Possible to re-start after pressing reset key.	ACF data input screen
E478		**Beyond moving range of carriage error, left** Feed amount of sewing pattern is over the operating range of carriage (left side).	Possible to re-start after pressing reset key.	ACF data input screen
E479		**Beyond moving range of carriage error, right** Feed amount of sewing pattern is over the operating range of carriage (right side).	Possible to re-start after pressing reset key.	ACF data input screen
E486		**Eyelet knife length error** Eyelet knife length is too short to form the shape in case of eyelet shape.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S17] Eyelet knife length
E487		**Eyelet shape length error** Eyelet shape length is too short to form the shape in case of eyelet shape.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S14] Eyelet shape length
E488		**Taper bar-tacking compensation error** When bar-tacking length is too short to form the shape in case of taper bar-tacking shape.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S08] 2nd bar-tacking length
E489		**Knife size error (at the time of plural motions of knife)** When knife size is larger than cloth cutting knife size.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S02] Cloth cut length
E492		**Presser size over of basting** When stitching data of basting exceeds presser size.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S40] Basting needle entry compensation
E493		**Presser size over of tie stitching at sewing end** When stitching data of tie stitching at sewing end exceeds presser size.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S67] Tie stitching at sewing end width

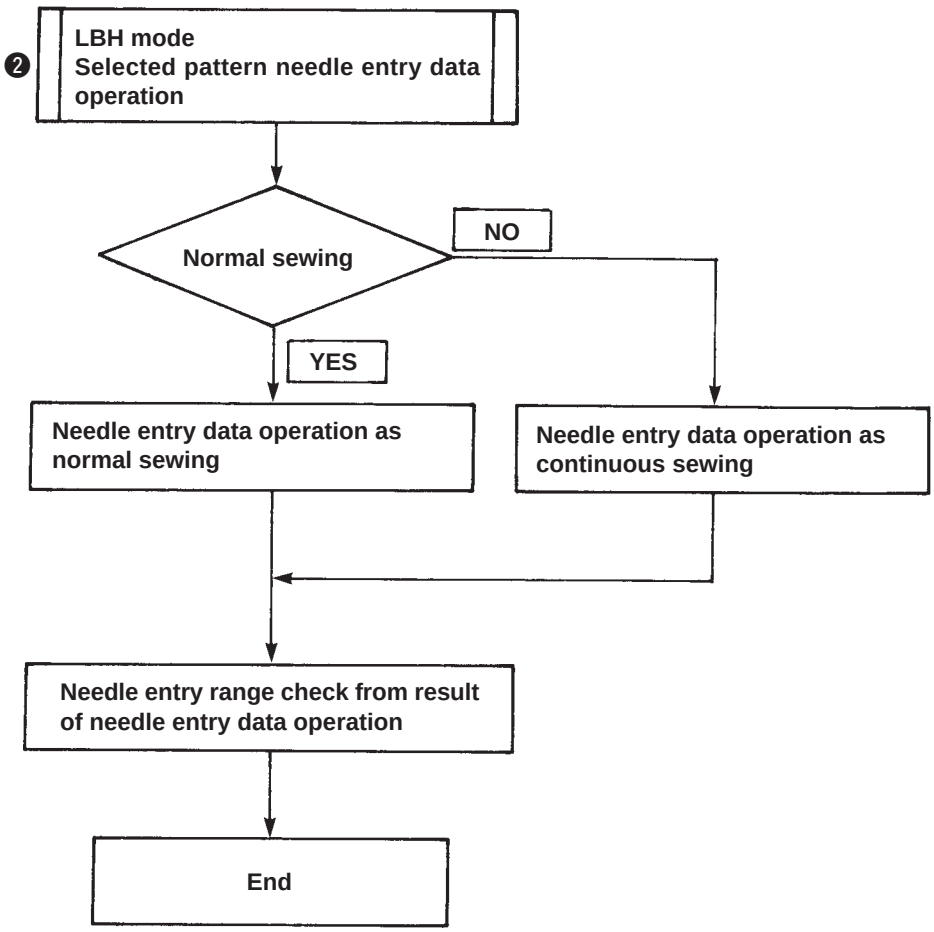
Error code	Display	Description	How to recover	Place of recovery
E494		**Presser size over of tie stitching at sewing start** When stitching data of tie stitching at sewing start exceeds presser size.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S64] Tie stitching at sewing start width
E495		**Presser size error (Width direction : right only)** When stitching data exceeds the size of right only of width direction of presser.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S03] Knife groove width, right or [S06] Ratio of right and left shapes
E496		**Presser size error (Width direction : left only)** When stitching data exceeds the size of left only of width direction of presser.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S04] Knife groove width, left or [S06] Ratio of right and left shapes
E497		**Presser size error (Length direction : front)** When stitching data exceeds the size of front of length direction of presser.	Possible to re-enter after pressing reset key.	Standard screen
E498		**Presser size error (Width direction : right and left)** When stitching data exceeds the size of both right and left of width direction of presser.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S05] Overedging width, left
E499		**Presser size error (Length direction : rear)** When stitching data exceeds the size of rear of length direction of presser.	Possible to re-enter after pressing reset key.	Sewing data edit screen [S02] Cloth cut length
E703		**Panel is connected to the machine other than supposed. (Machine type error)** When machine type code of system is improper in case of initial communication.	Turn OFF the power.	
E704		**Nonagreement of system version** When version of system software is improper in case of initial communication.	Turn OFF the power.	
E730		**Main shaft motor encoder defectiveness or phase-out** When encoder of sewing machine motor is abnormal.	Turn OFF the power.	
E731		**Main motor hole sensor defectiveness or position sensor defectiveness** When hole sensor or position sensor of sewing machine motor is defective.	Turn OFF the power.	
E733		**Reverse rotation of main shaft motor** When sewing machine motor rotates in reverse direction.	Turn OFF the power	
E801		**Phase-lack of power** When phase-lack of input power occurs.	Turn OFF the power.	
E802		**Power instantaneous cut detection** When input power is instantaneously OFF.	Turn OFF the power.	
E811		**Overvoltage** When input power is 280V or more.	Turn OFF the power.	
E813		**Low voltage** When input voltage is 150V or less.	Turn OFF the power.	
E901		**Abnormality of main shaft motor IPM** When IPM of servo control p.c.b. is abnormal.	Turn OFF the power.	
E902		**Overcurrent of main shaft motor** When current flows excessively to sewing machine motor.	Turn OFF the power.	
E903		**Abnormality of stepping motor power** When stepping motor power of servo control p.c.b. fluctuates ±15% or more.	Turn OFF the power.	
E904		**Abnormality of solenoid power** When solenoid power of servo control p.c.b. fluctuates ±15% or more.	Turn OFF the power.	
E905		**Abnormality of temperature of heat sink for servo control p.c.b.** When temperature of heat sink of servo control p.c.b. is 85˚C or more.	Turn OFF the power	
E907		**Stitch width motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power.	

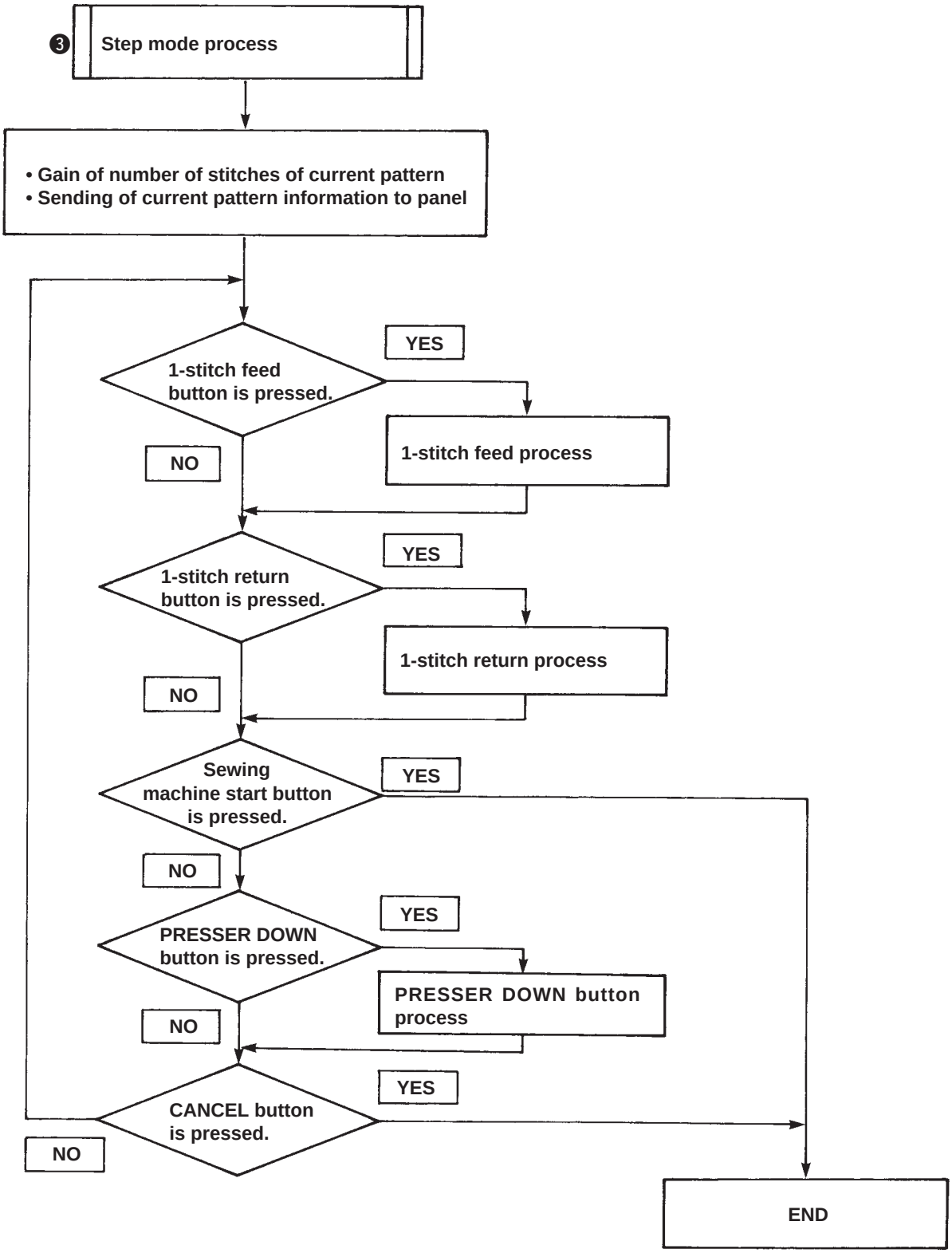
Error code	Display	Description	How to recover	Place of recovery
E908		**Y feed motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power	
E909		**Needle thread trimmer motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power.	
E910		**Presser motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power	
E911		**Bobbin thread trimmer motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power.	
E915		**Abnormality of communication between operation panel and main CPU** When abnormality occurs in communication.	Turn OFF the power	
E916		**Abnormality of communication between main CPU and main shaft CPU** When abnormality occurs in communication.	Turn OFF the power.	
E917		**Communication between operation panel and personal computer is impossible.** When abnormality occurs in data communication.	Turn OFF the power	
E918		**Abnormality of temperature of heat sink for main control p.c.b.** When temperature of heat sink of main control p.c.b. is 85flC or more.	Turn OFF the power	
E943		**Defectiveness of EEP-ROM of main control p.c.b** When data writing to EEP-ROM is not performed.	Turn OFF the power.	
E946		**Defectiveness of writing to EEP-ROM of head relay p.c.b.** When data writing to EEP-ROM is not performed.	Turn OFF the power	
E948		**F-ROM abnormality** In case deletion or writing of F-ROM is not possible when downloading program.	Turn OFF the power	
E983		**Carriage rise error** When carriage does not pass sensor after three seconds or more have passed from command to move it to sewing machine side.	Turn OFF the power	
E984		**Carriage tilt error** When carriage does not pass sensor after three seconds or more have passed from command to move it to sewing machine side.	Turn OFF the power	
E985		**Preset has not advanced.** Preset does not advance after a period of settled time has passed from the preset advance command.	Turn OFF the power	
E986		**Preset has not returned.** Preset does not return after a period of settled time has passed from the preset return command.	Turn OFF the power	
E987		**Cloth sweeping bar motion error** Cloth sweeping bar does not move to the specified position even after a period of settled time has passed from the cloth sweeping bar motion command.	Turn OFF the power	
E988		**Carriage origin retrieval eror** Pulses over the range have been output at the time of carriage origin retrieval.	Turn OFF the power	
E989		**Carriage motor driver section temperature error** Temperature of carriage motor drive is abnormal.	Turn OFF the power	
E999		**When cloth cutting knife does not return** • When cloth cutting knife does not return after the lapse of predetermined time. • When sensor is not turned ON while cloth cutting knife is raising (at the time of waiting).	Turn OFF the power	

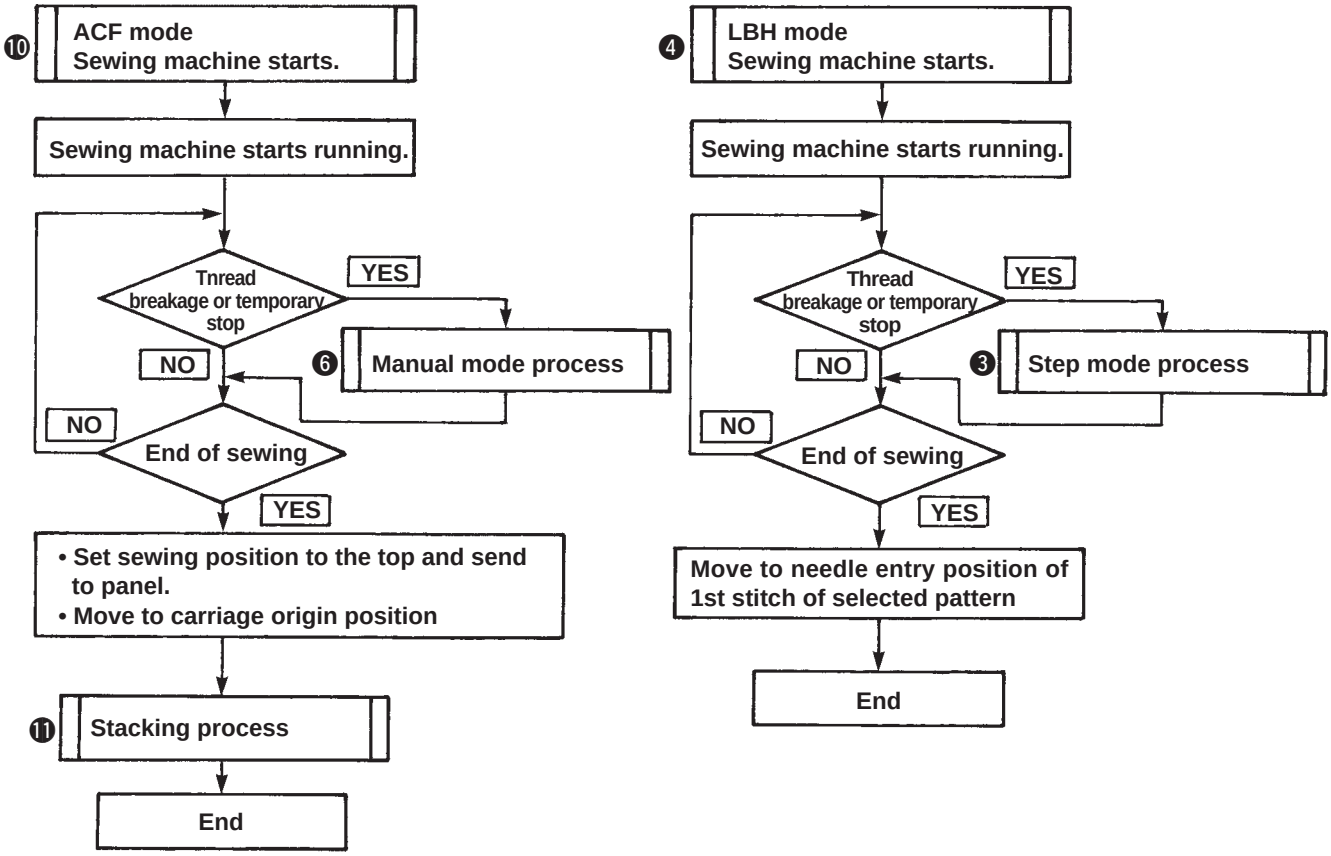
5. OPERATION FLOW CHART

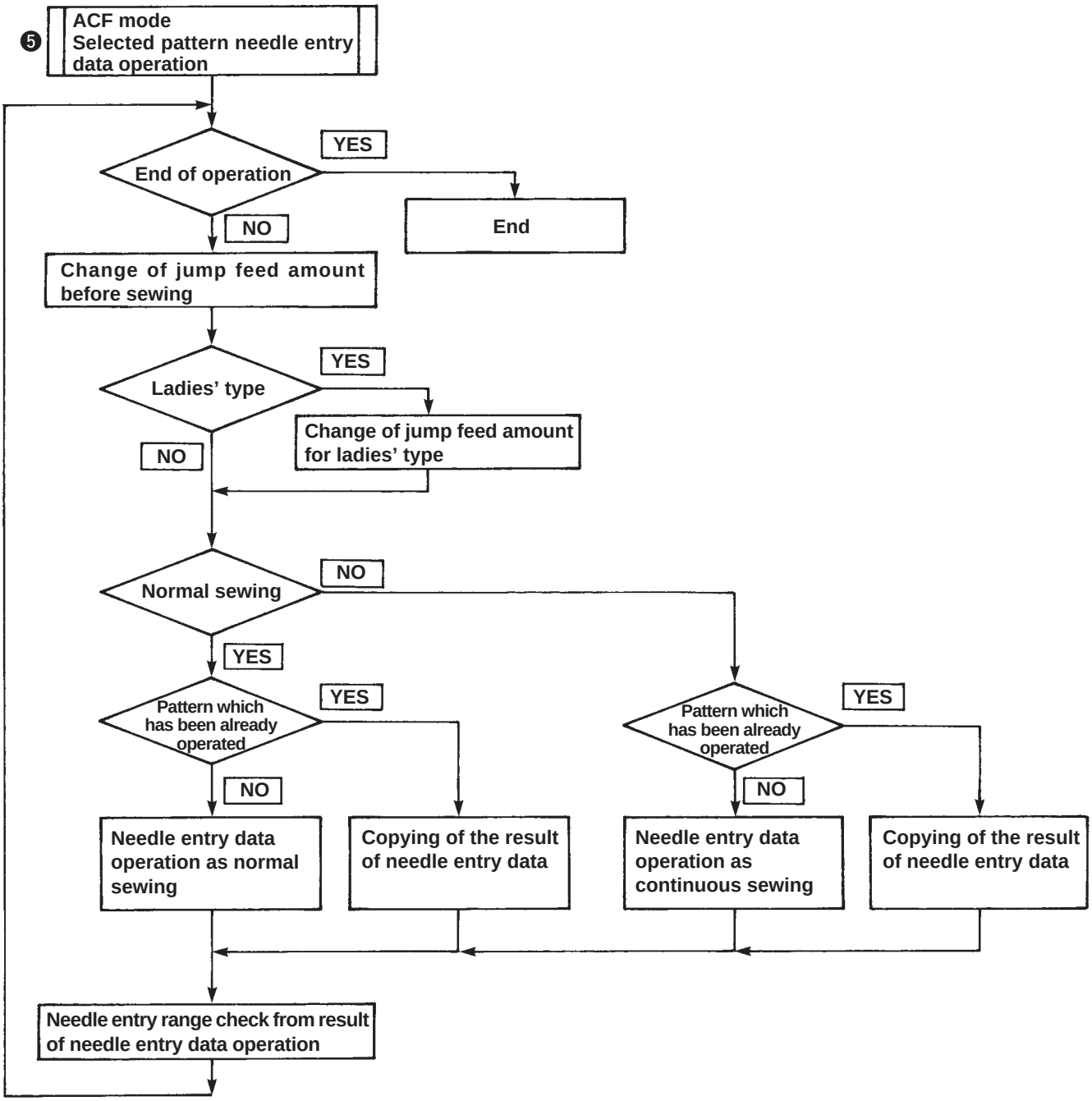


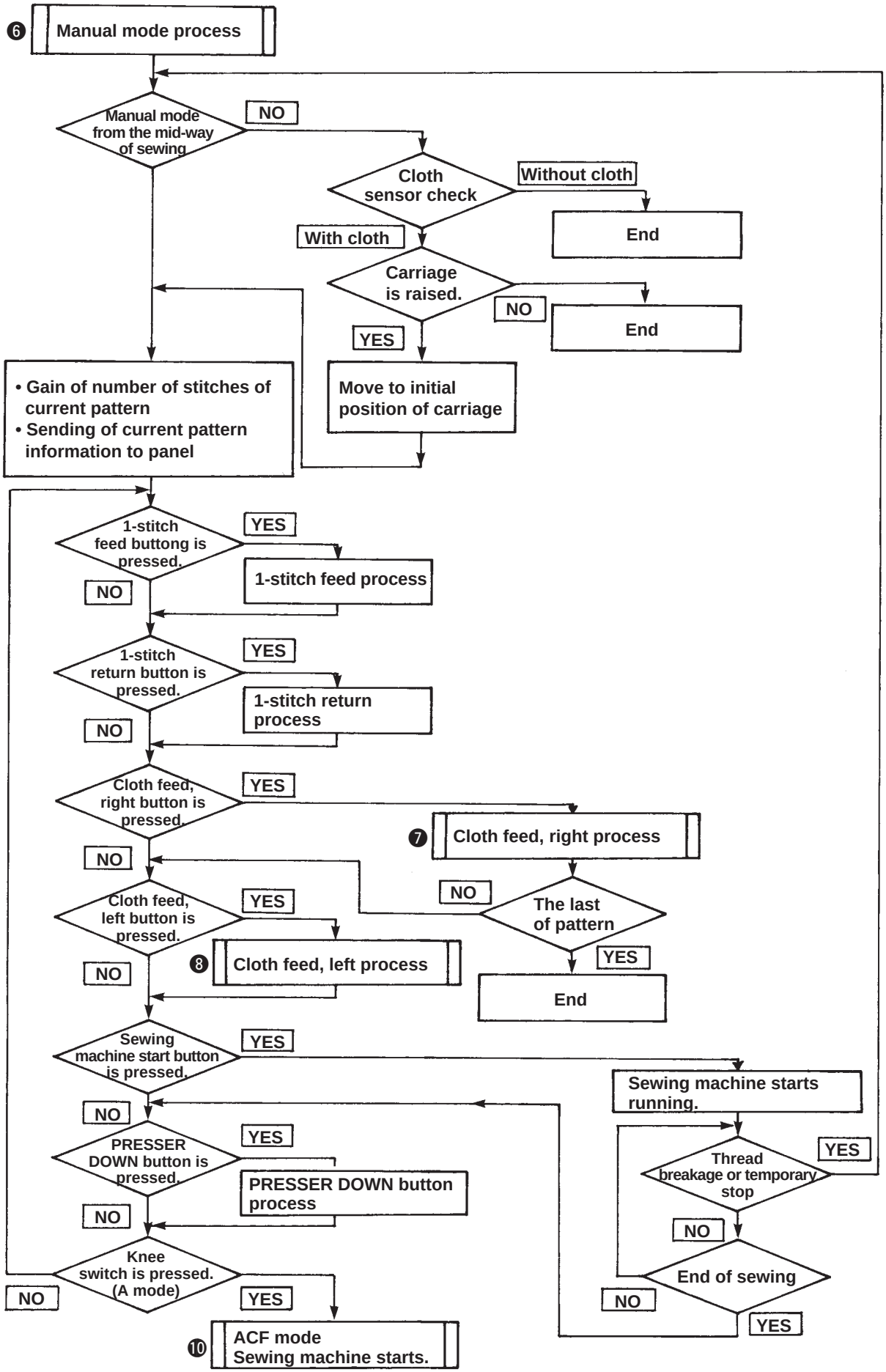


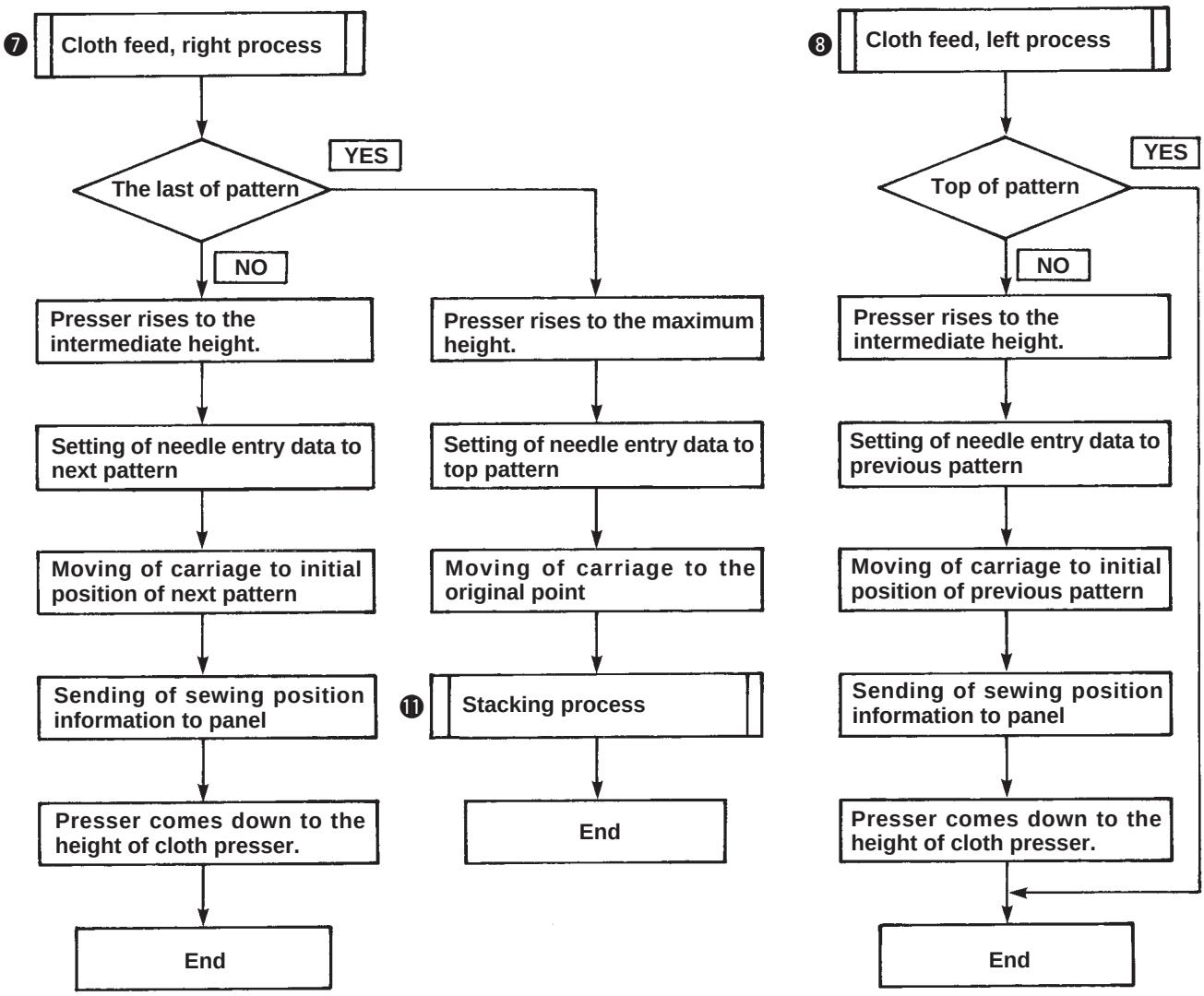


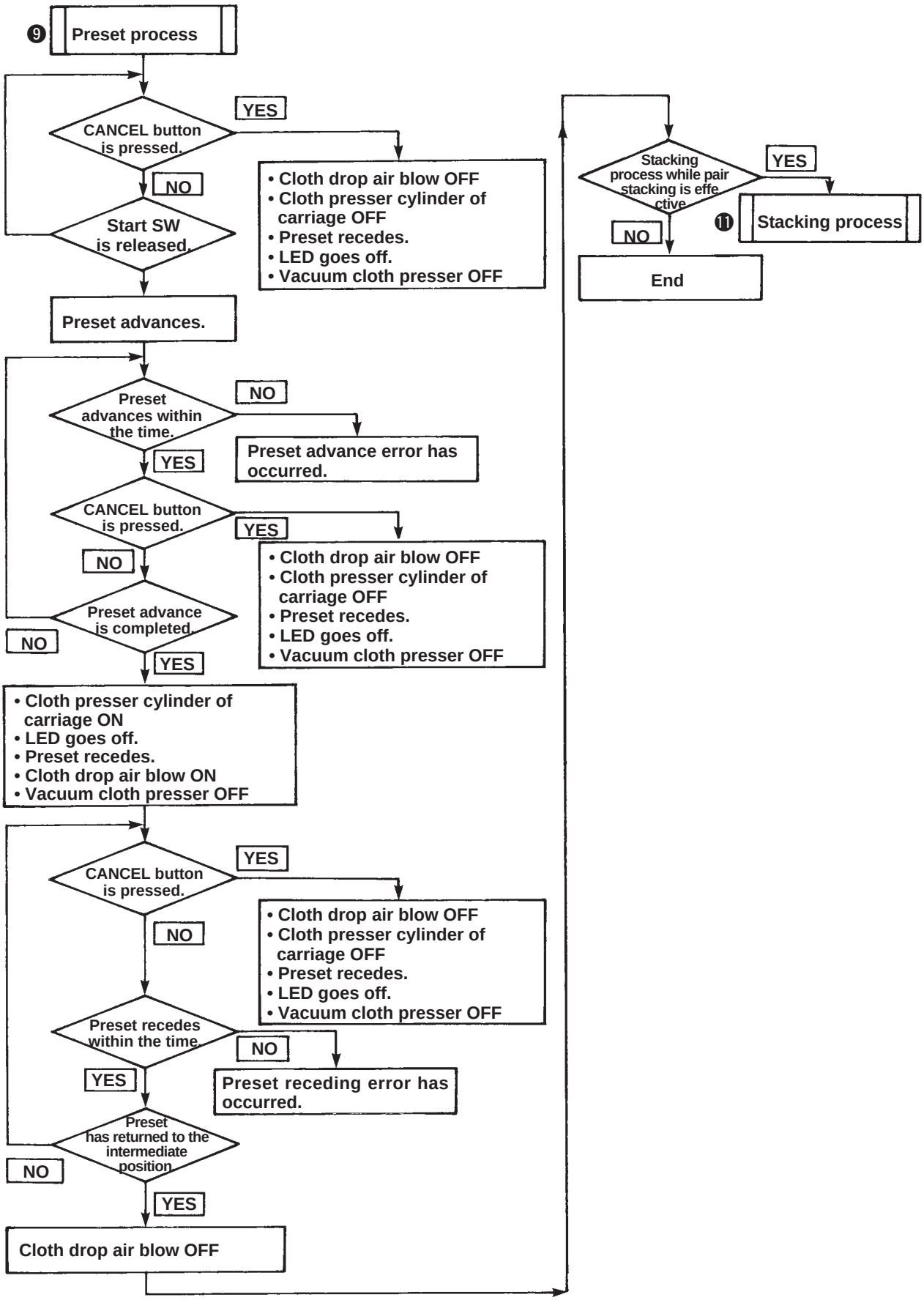


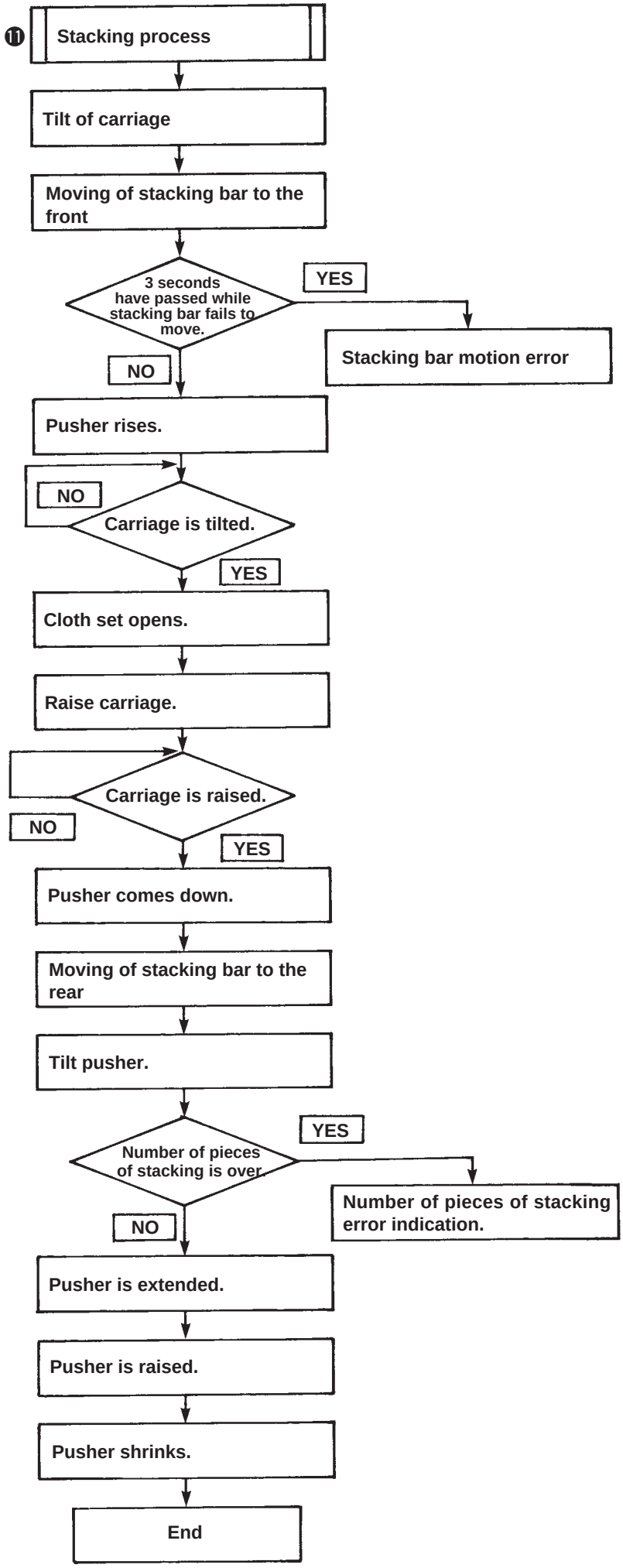












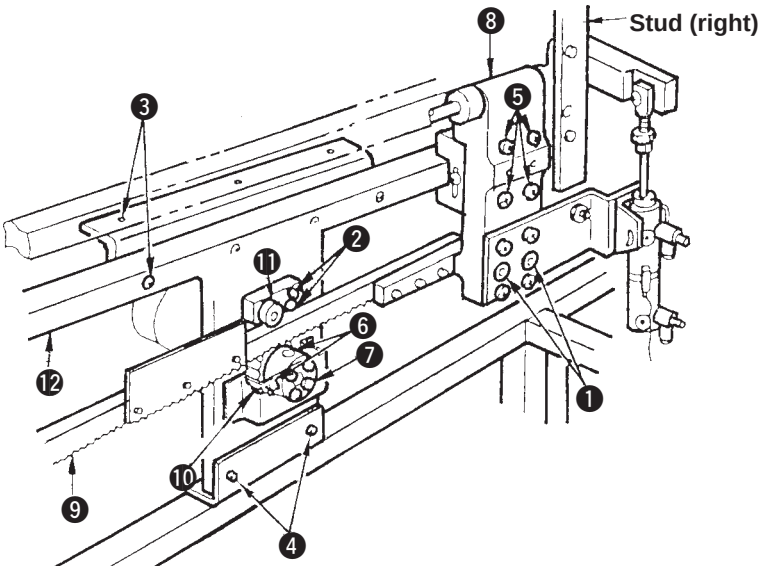
6. STANDARD ADJUSTMENT

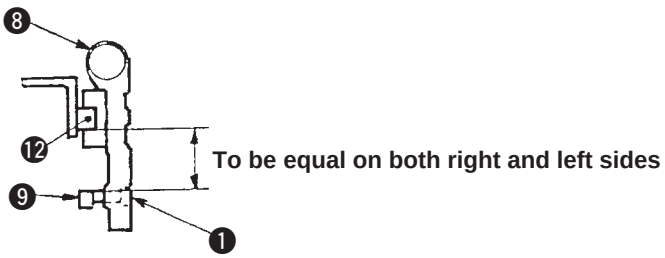
(1) Carriage components

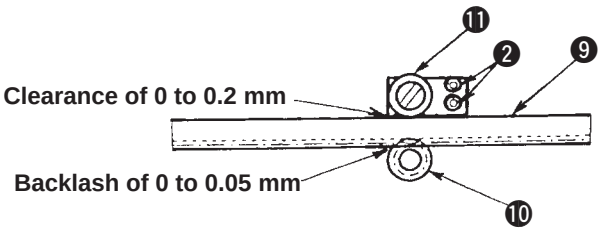
Standard Adjustment

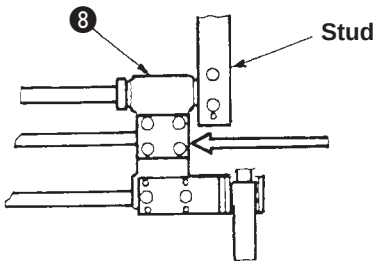
1) Carriage drive components

* (1) For the adjustment of the sewing machine components, refer to Engineer' Manual for LBH-1790 series.
  (2) Be sure to cut off air and turn OFF the power during performing adjustment.



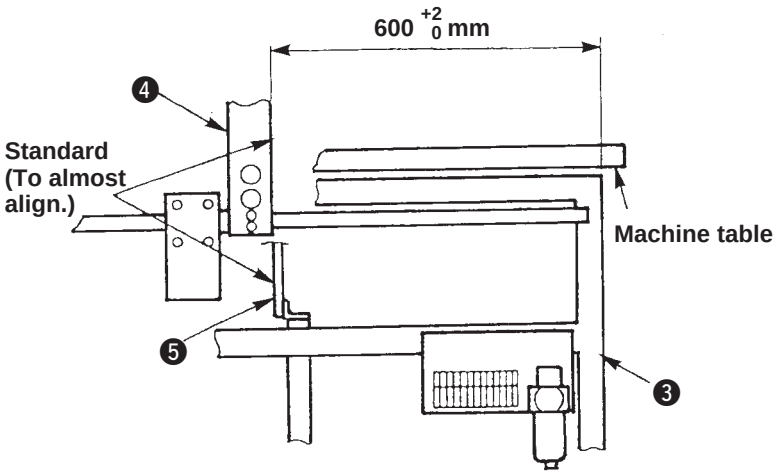


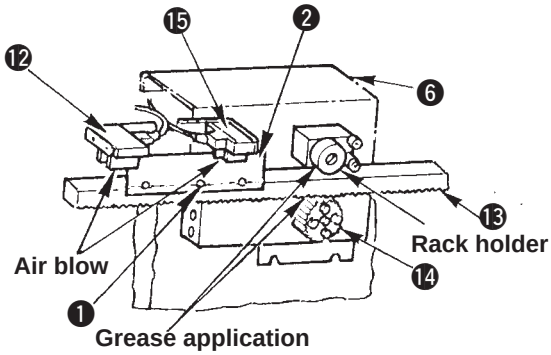


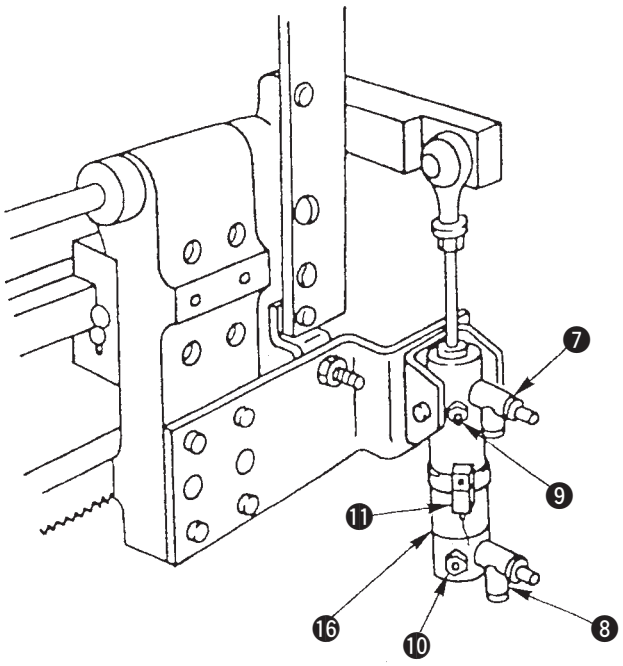


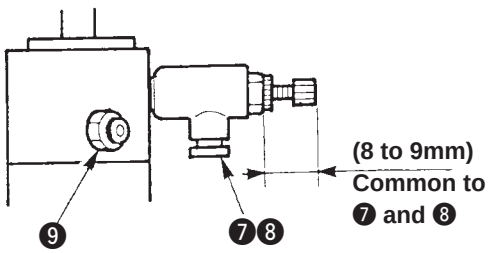
Adjustment Procedures	Results of Improper Adjustment
1. Adjust the backlash between rack ❾ and pinion gear ❿ to 0 to 0.05 mm and that between rack ❾ and rack holder ⓫ to 0 to 0.2 mm. 2. For the adjustment, first loosen screws ❷ fixing the rack holder ⓫. Next, loosen screws ❶ (together with right/left carriages ❽) fixing carriages ❽ and the rack, move the height of rack ❾ up and down to adjust so that the clearance between the rack and carriage rail ⓬ is equal on both right and left sides. 3. Next, fix setscrews ❷ in the state that rack holder ⓫ is placed on rack ❾. 4. After the aforementioned adjustment is completed, check that the starting load of carriage section is 20N (2kgf) or less at the both ends and the center of all strokes when pressing the arrow mark section in the illustration. When the starting load is heavy, re-check the clearance of rack holder ⓫. **(Caution) 1. When the backlash between rack ❾ and pinion gear ❿ and the clearance between rack ❾ and rack holder ⓫ are tightly adjusted, feed trouble occurs due to step-out of stepping motor. When feed trouble occurs, check whether two setscrews ❻ and four setscrews ❼ are loosened as well.** **2. Never loosen setscrews ❸ in the carriage rail, setscrews ❹ in the stepping motor plate and setscrews ❺ in the carriage since sewing accuracy and the life of machine are deteriorated.**	

2) Carriage origin position components



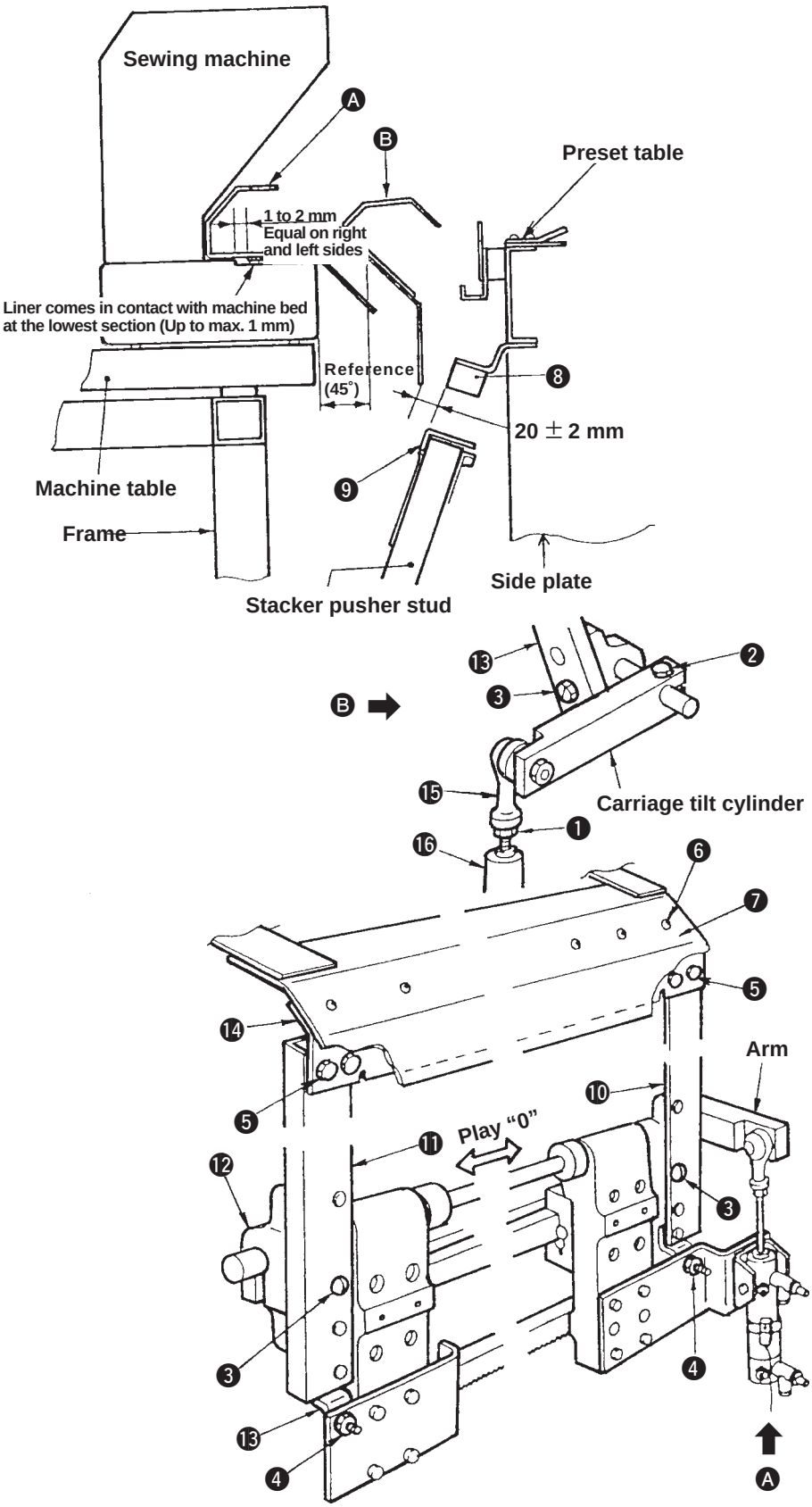






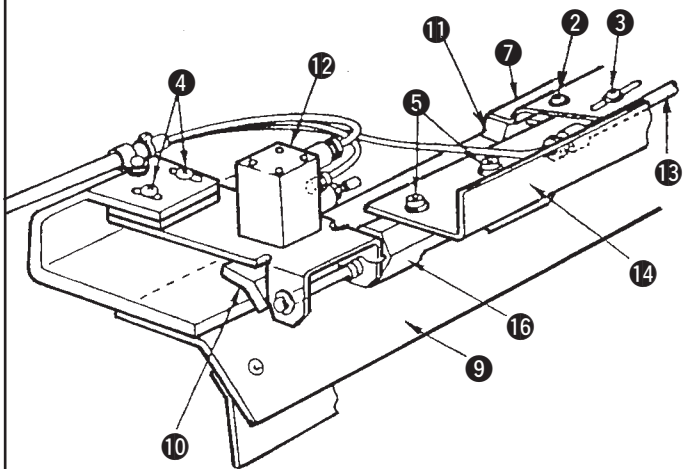
Adjustment Procedures	Results of Improper Adjustment
1. When READY key is ON after turning ON the power, the carriage stops after performing origin retrieval. The position is 600 $^{+2}_{0}$ mm from the right end of frame ❸ to stud (right) ❹. (The standard is the position where the right end of stud (right) ❹ almost aligns with the inside face of side plate (right) ❺.) 2. Perform the adjustment by loosening three screws ❶ fixing the origin retrieval plate ❷. **(Caution) 1. When the origin position is 600 mm or less, and the stroke of carriage fully moves, the carriage interferes with the right cover ❻.** **2. When the origin retrieval is not possible or the origin position is unstable, clean the origin switch since there is a possibility that the slit in the origin switch ⓬ is clogged with cotton dust, oil or the like.** **3. Apply grease once a half year to carriage feed rack ⓭, pinion gear ⓮ and carriage unit.** **Use grease of ESSO LISTAN 2 or lithium grease (equivalent to penetration No. 2 and base oil viscosity 95 mm”2"/s (40˚)** **4. Blow air over the slit section of origin switch ⓬ and reduction switch ⓯, and remove dust every four months.** 3. Perform the speed adjustment of tilt/raise of carriage with speed controllers ❼ and ❽ of carriage tilt cylinder ⓰. In addition, the shock adjustment at stroke end is performed with air cushion needles ❾ and ❿. Cylinder sensor ⓫ works when the carriage is raised. 4. Set the height of both screws of speed controllers ❼ and ❽ to the range of 8 to 9 mm. The height to be aimed is 8.7 mm. When making the speed excessively slow (height of the screws is 8 mm or less), malfunction of stacking or the like occurs. Adjust it to a fast speed if possible. In addition, the shock at stroke end is adjusted with air cushion needles ❾ and ❿. Position to be aimed is the position where upper side aircushion needle ❾ is returned by 45˚ from the position where it is fully screwed to the end and needle ❿ is returned by 15˚ from the position where it is fully screwed to the end. However, Adjust so that there is no shock at the stroke end and the carriage smoothly stops. 5. Cylinder sensor ⓫ position should be the medium position of the range where the lamp lights up when the carriage is raised.	

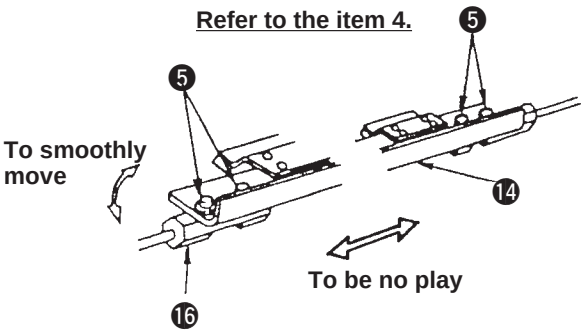
3) Carriage clamp table components

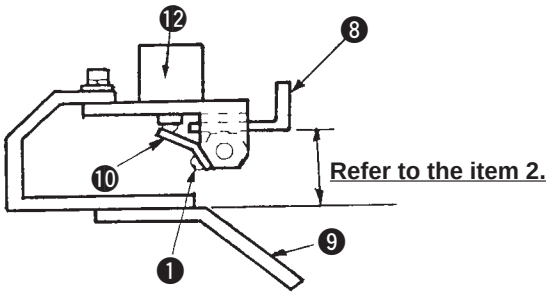


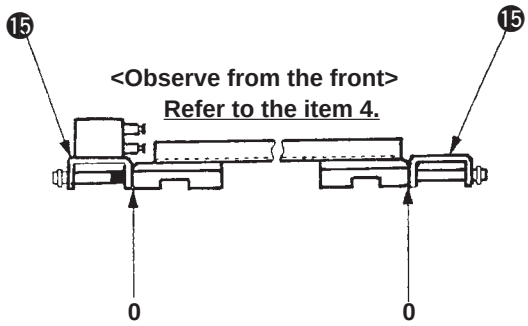
Adjustment Procedures	Results of Improper Adjustment
1. When clamp table ❼ is in the raised state Ⓐ, adjust so that in all strokes, the clearance between the edge of clamp table ❼ and the step section of machine bed is 1 to 2 mm, and in the vertical direction, the height that the liner of the rear face of clamp table ❼ comes in contact with the machine bed at the lowest section (clearance of 1 mm or less at maximum section). When clamp table ❼ is in the tilted state Ⓑ, the clearance between the edge of lower side of clamp table and the cloth presser cushion ❽ is 20 ± 2 mm. (It is the standard that the cloth presser cushion ❽ comes to the nearest position in the range where the pusher ❾ does not interfere with it even when the pusher ❾ goes up at the time of stacking.) 2. Perform adjustment in the order of Ⓑ and Ⓐ. In the tilted state Ⓑ, in case 20 ± 2 mm is corrected by fine adjustment, Loosen nut ❶ of the cylinder ⓰ rod end ⓯ and adjust screwing amount. (Three screw threads have to be screwed.) In case of more than three screw threads, perform the adjustment with clamp bolt ❷ in the arm. Also, when there is a difference between stud (right) ⓾ and (left) ⓫, adjust with clamp bolt ❸ in the stud installing base ⓬. When loosening clamp bolt ❸ in the stud installing base ⓬, be careful that there is no play in the thrust direction of stud ⓭. In the raised state Ⓐ, perform adjustment of the clearance of 1 to 2 mm between the edge of clamp table and the step section of machine bed with stud stopper ⓭ adjustment screws ❹ (on right and left sides). When screwing the screw ❺, the clamp table tilts. Perform adjustment in the vertical direction with setscrews ❺ in the clamp table holder ⓮ and for the partial adjustment, perform with setscrews ❻ in the clamp table. **(Caution) 1. Be sure to check or adjust the clamp table ❼ components in the order of the numbers.** **2. When the clamp table ❼ is raised and the clearance between the clamp table and the machine bed section is not 1 to 2 mm equally on both right and left sides, the front end accuracy is influenced. So, be careful.** **3. When adjusting the inclination of the clamp table ❼ with clamp bolt ❸ in the stud installing base ⓬ and there is a play in the thrust direction, the cloth feed accuracy is influenced. So, be careful.**	

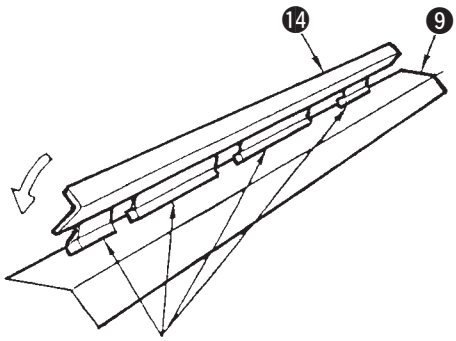
4) Carriage clamp components (Including the blower)

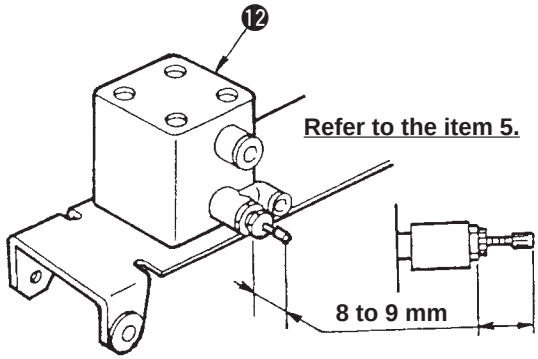


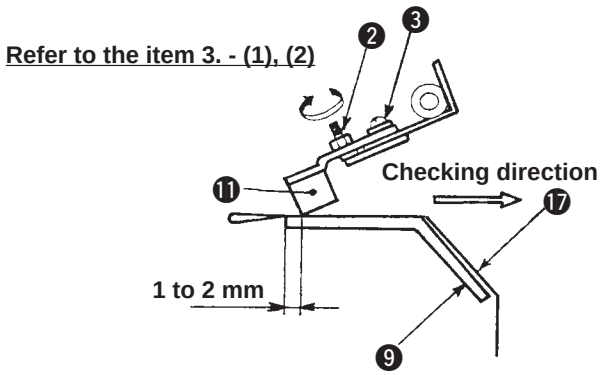


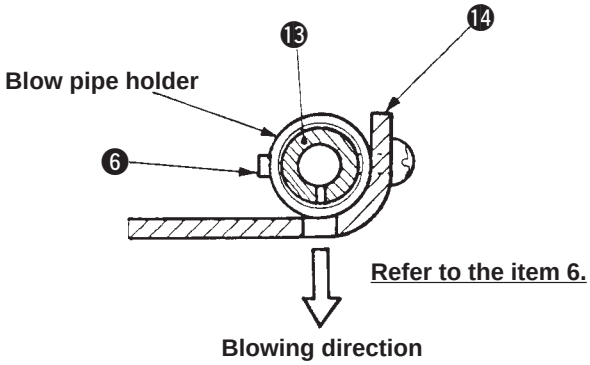










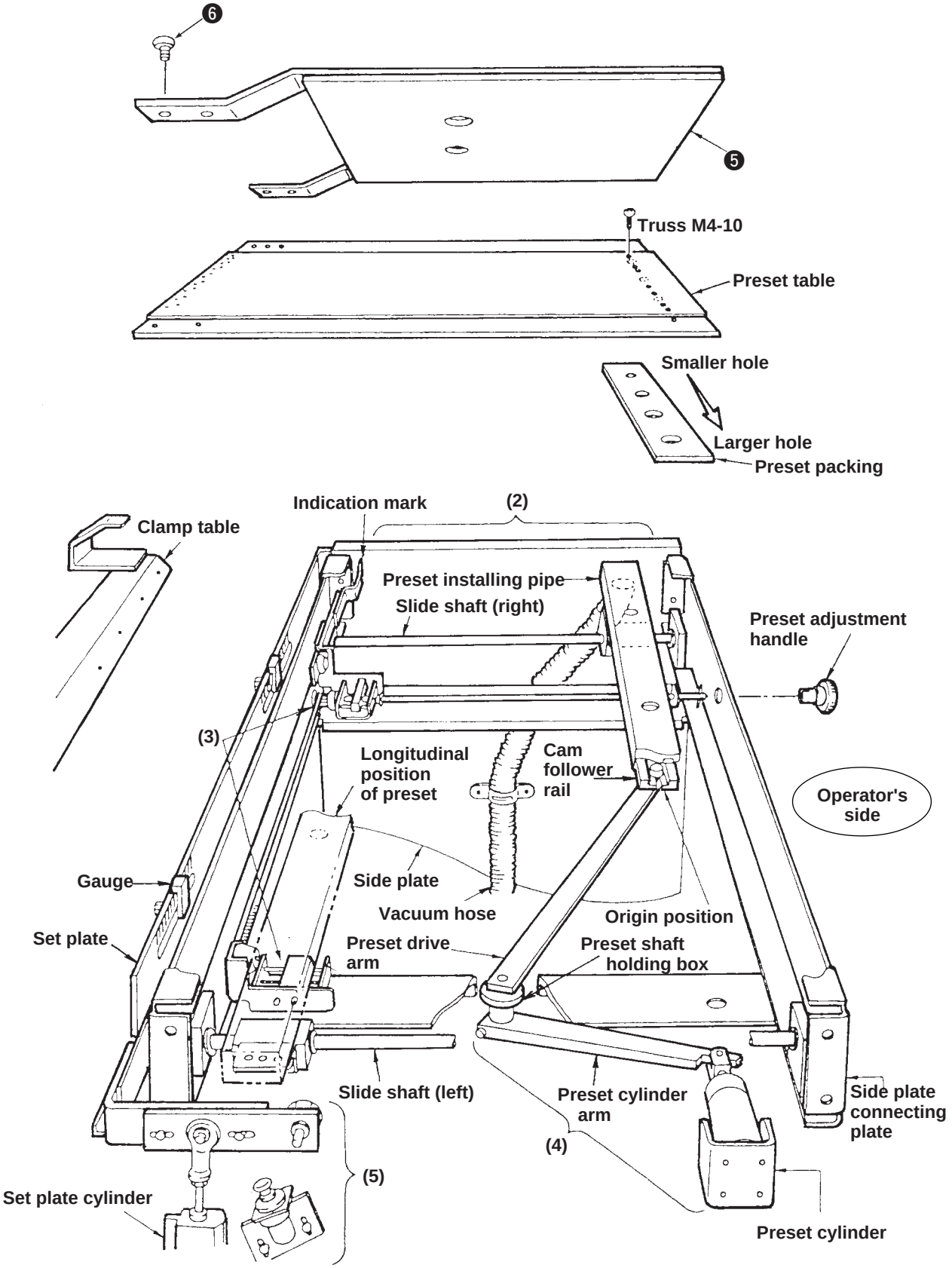


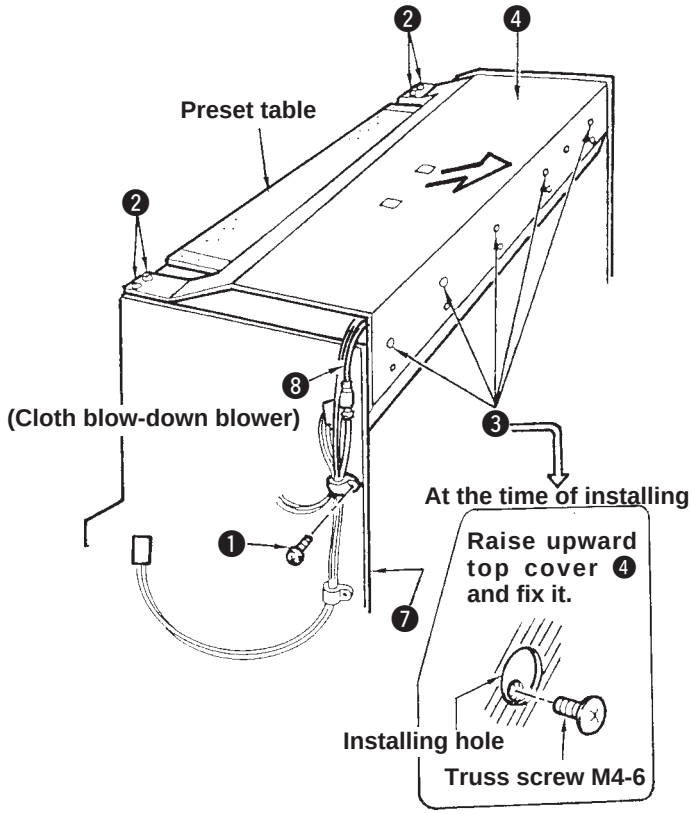
Adjustment Procedures	Results of Improper Adjustment
1. Adjustment of the clamp ❼ is performed in the state that the clamp ❼ is released, that the clamp is set, and for the motion of the clamp ❼. **(Caution) When the adjustment of clamp ❼ components is improper, front end accuracy and feed direction accuracy are unstable. So, carefully perform the adjustment.** 2. When the clamp ❼ is released, the top surface of clamp installing base ❽ is almost parallel or slightly front-down to the top surface of clamp table ❾. For the adjustment, loosen two screws ❶ fixing the clamp shaft arm ❿, move the clamp shaft arm ❿ and adjust it to the position where it is parallel or slightly front-down to the clamp table. **(Caution) When the clamp installing base is slightly in front-up state, proper clamp force cannot be obtained.** 3. The state that the clamp is set is as below. (1) There is no clearance between cushion ⓫ of clamp installing base ⓮ and the top surface of clamp table ❾, and the pressing pressure is uniform when the manual switch of solenoid value No.3 is changed over and a piece of cloth is clamped. Perform the adjustment with clamp adjustment screw ❷. Turn it in the direction of the arrow mark and the clamp ❼ is raised. (2) Contact position of the cushion ⓫ is the position where it is drawn by 1 to 2 mm from the end of clamp table ❾. Each adjustment is performed with the play section in the slot width direction after loosening clamp set screw ❸. Perform the whole adjustment with screws ❹ fixing the clamp unit (4 pcs. in total on right and left sides). **(Caution) 1. When the adjustment of (1) and (2) is improper, the front end accuracy is greatly influenced.** **2. When the pressing position of the cushion ⓫ is as near as the front side end, move to this side the cushion together with the unit so as to clamp a piece of cloth.** 4. Adjust the clamp ❼ so that there is no play in the thrust direction and it smoothly rocks. Perform the adjustment by loosening screws ❺ in the clamp installing base ⓮ and moving the clamp shaft ⓰. At this time, be careful that the clearance between clamp shaft holding plate ⓯ and the shaft end should be "0". **(Caution) 1. When there is a play in the thrust direction, cloth feed accuracy is deteriorated.** **2. When the motion that the clamp ❼ returns is improper, cloth ⓱ is caught in the cushion when presetting and delivery trouble occurs.** 5. Set the height of speed controller of clamp cylinder ⓬ to 8 to 9 mm. **(Caution) When speed is too fast, front end accuracy slip occurs, and the speed is too slow, preset delivery is not performed.** 6. Adjust the blowing direction of the blow-down blow pipe ⓭ to the direction as shown in the illustration after loosening setscrew ❻. **(Caution) For the adjustment of speed controller of carriage blow-down blower, refer to the 3.-(1) adjustment of air components.**	

(2) Preset components

Standard Adjustment

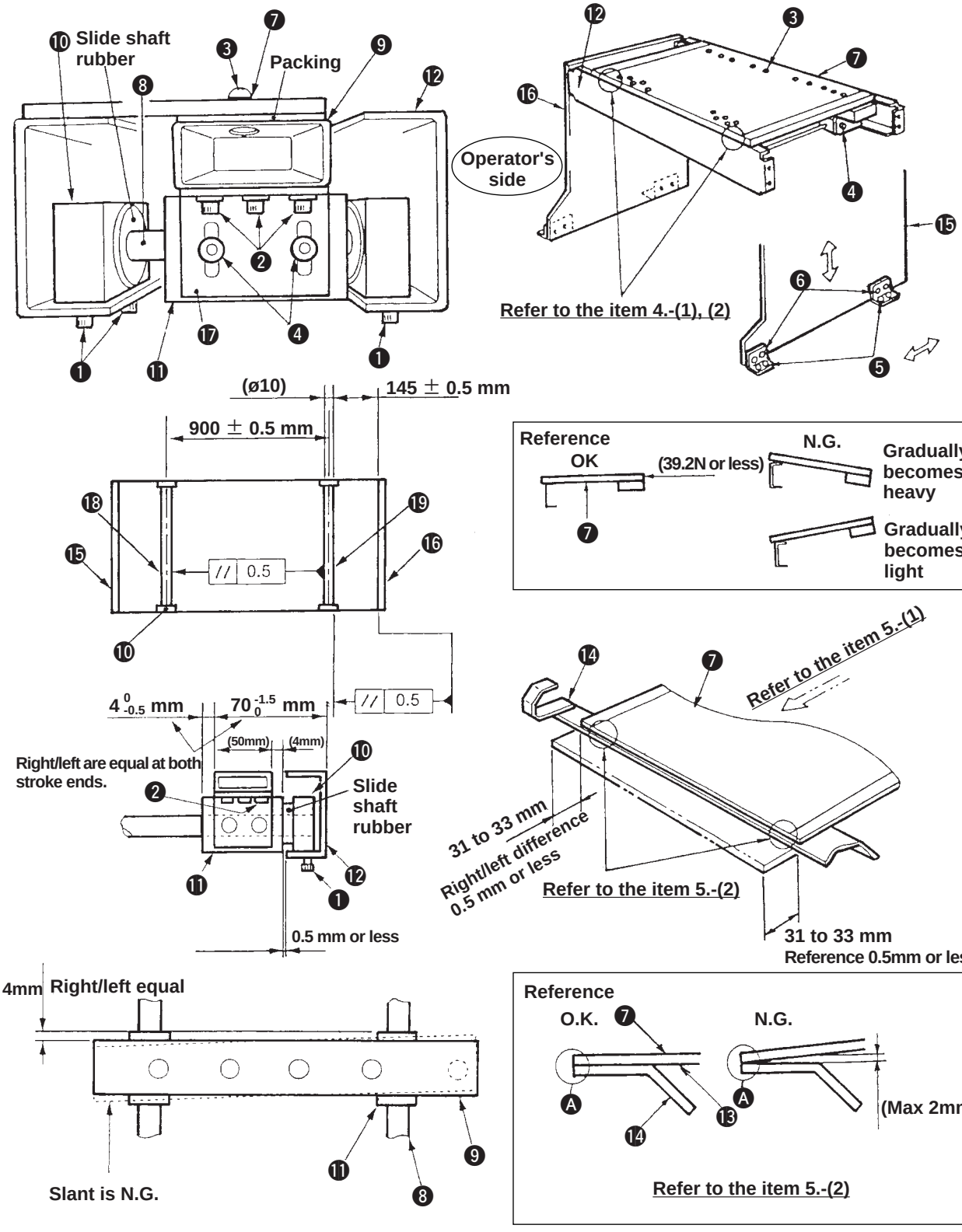
1) Configuration



Adjustment Procedures	Results of Improper Adjustment
1. Removing/installing procedure of the top cover  **(Caution) 1. Be sure to perform the adjustment of the preset components after adjusting and checking of 6.(1) Carriage components. When the adjustment of carriage components is not complete, accuracy after finish of sewing is not obtained however hard you adjust the preset components.** **2. Execute the adjustment and checking of preset components following the order below.** Adjustment of the preset components is four places below. (2) Slide components (3) Stopper components (4) Drive components (5) Set plate components To adjust the respective mechanism, remove auxiliary preset table ❺ (4 pcs, pan head screw M4-5 ❻) and remove top cover ❹. It is possible to adjust when disassembling is performed up to the state of configuration of 1). Perform disassembling/installing as shown in the illustration. 1. Remove clip setscrew ❶ of side plate (left) ❼, and remove the connector of cloth detection switch cord and ø6 air tube ❽ at the union section. 2. Remove four top cover setscrews ❷. Then remove five setscrews ❸. 3. Quietly remove top cover ❹ to the upper slant direction of this side. When installing it, first, put setscrews ❸ after temporarily tightening setscrews ❷ and raise upward top cover ❹ and fix it. Do not forget to connect ø6 air tube ❽ and the sensor connector after fixing top cover ❹.	

2) Preset slide components (including installing the preset table)

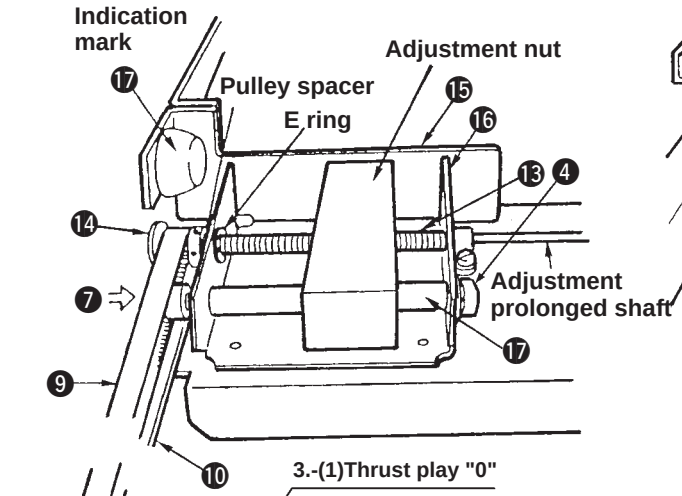
<Name of each components>

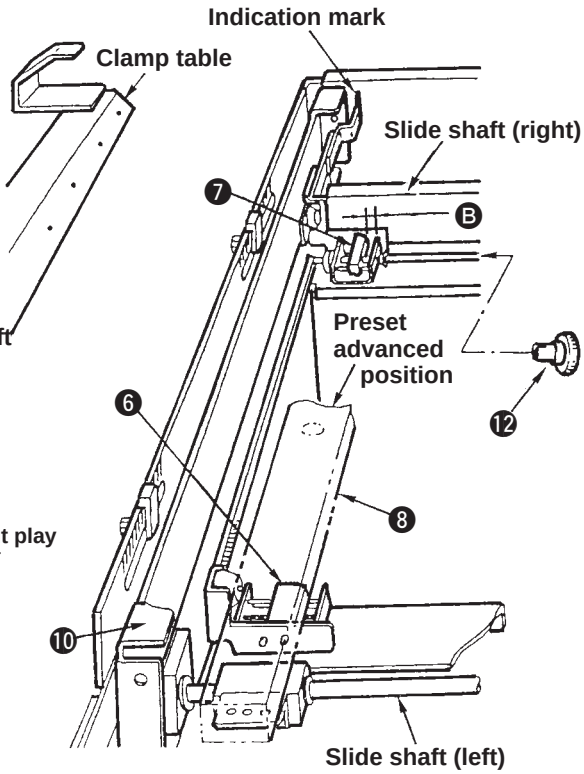


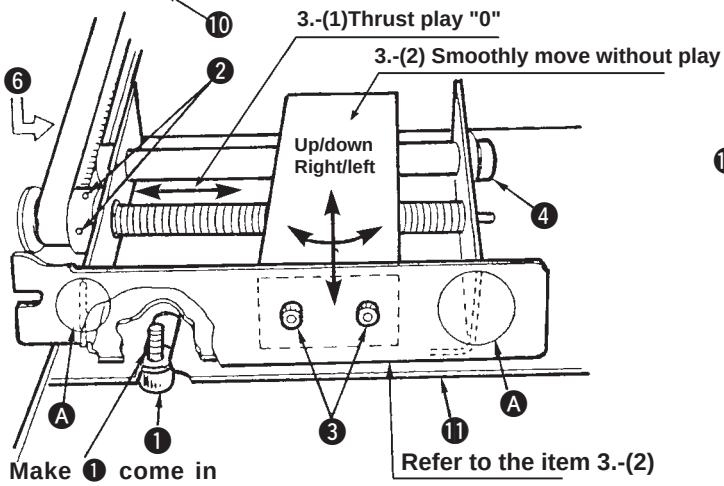
Adjustment Procedures	Results of Improper Adjustment
1. Remove preset table ❼ and perform adjustment of parallel of slide shaft ❽, preset installing pipe ❾, etc. as the points mentioned below. **(Caution) 1. Slide shaft holders ❿ (4 places in total) have been factory-adjusted at the time of delivery. However, do not loosen shaft holder setscrews ❶ in any case other than the case where the accuracy of 2. is improper.** **In addition, start the adjustment of preset stopper after positioning it to the extreme rear place.** 2. Installing position and parallel of slide shaft ❽ are as shown in the illustration. Only when there is a slip, loosen ❶ and adjust. At this time, be careful that slide shaft holding box ⓫ does not come in contact with the bottom side of side plate connecting plate ⓬ at the stroke ends of returning side and going side, and tighten setscrews ❶. **(Caution) 1. When parallel between slide shaft (left) ⓲ and (right) ⓳, and side plate (left) ⓯ and (right) ⓰ are improper, one-side worn-out of slide ball bearing (ball bush) and shaft itself occurs.** **2. When slide shaft holding box ⓫ interferes with side plate connecting plate ⓬, a metallic noise occurs during operation.** 3. Set the preset installing pipe ❾ to the position where it is moved back by 4 mm to slide shaft holding box ⓫. Dimension between the edge of the pipe and side plate connecting plate ⓬ is 70 $^{-1.5}_{0}$ mm within 0.5 of right and left differences. It is common to the returning and going sides. Perform the adjustment with the looseness of installing hole of preset installing pipe setscrews ❷ (3 pcs. each on both sides). **(Caution) When parallel of pipe installation and that of dimension of 70 $^{-1.5}_{0}$ are improper, the front end accuracy before finish of sewing cannot be obtained.** 4. Install preset table ❼ so that it aligns with the edge of side plate connecting plate ⓬ in the longitudinal direction (1) and so that the height is the position where liner ⓭ pasted on the bottom surface of preset table ❼ comes in contact with side plate connecting plate ⓬ in the vertical direction (2). (Max. clearance in the vertical direction is 1 mm.) (1) Loosen setscrews ❸ in preset table ❼ and align the front end with the connecting plate ⓬ with the looseness of installing hole in the longitudinal direction. It is easy to adjust by standing a scale. (2) Loosen shaft holding box setscrew ❹ and adjust within the range of slot in the height direction. First, temporarily tighten the setscrew at the position where the rear face liner ⓭ and the connecting plate ⓬ come in contact with each other at both ends of the preset table ❼, and fix it after checking that the pressing force (39.2N or less) does not change even when the preset plate is moved back to the extreme rear. When the pressing force changes, adjust by tilting the installation of the shaft holding box support ⓱. 5. After the adjustment of installation of preset table ❼ in terms of side plate connecting plate ⓬, perform the adjustment in terms of clamp table ⓮. (It is the premise that the carriage components adjustment is completed.) (1) Set the preset table to the position of 31 to 33 mm (within 0.5 mm or less in right/left differences) from the end of clamp table ⓮ when preset table ❼ is fully moved in the longitudinal direction. For the adjustment, loosen side plate support setscrews ❺ and move the table to the right and left together with the side plate. (2) Clearance between the face of liner ⓭ of section Ⓐ and the surface of clamp table ⓮ should be "0" and up to max. 1 mm at the lowest place when preset table ❼ align with the end of clamp table ⓮ in the vertical direction. Perform the adjustment by loosening side plate setscrews ❻ and move the table up and down together with the side plates ⓯ and ⓰. **(Caution) Carefully perform the adjustment of 4. and 5. since the front end accuracy (especially at the time of delivery) is greatly influenced.**	○ The max. clearance at secction Ⓐ should be up to 1mm. If the clearance is more, slipping occurs at the time of delivery.

3) Preset stopper components

<Name of each component>

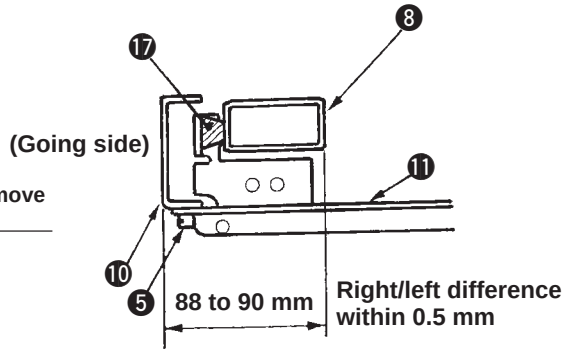




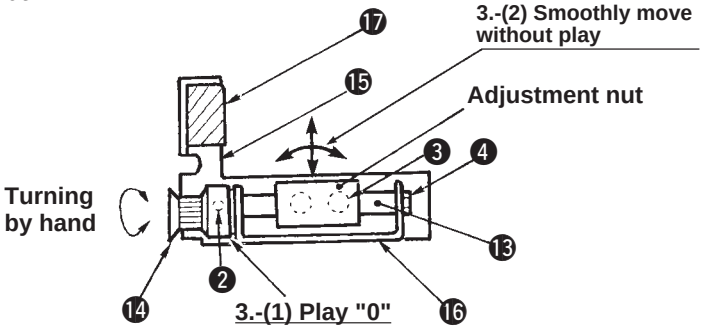


Make ❶ come in contact with the extreme rear of slot width.

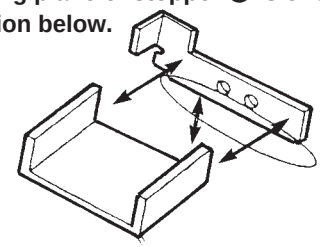
Refer to the item 3.-(2)



Refer to the item 4.



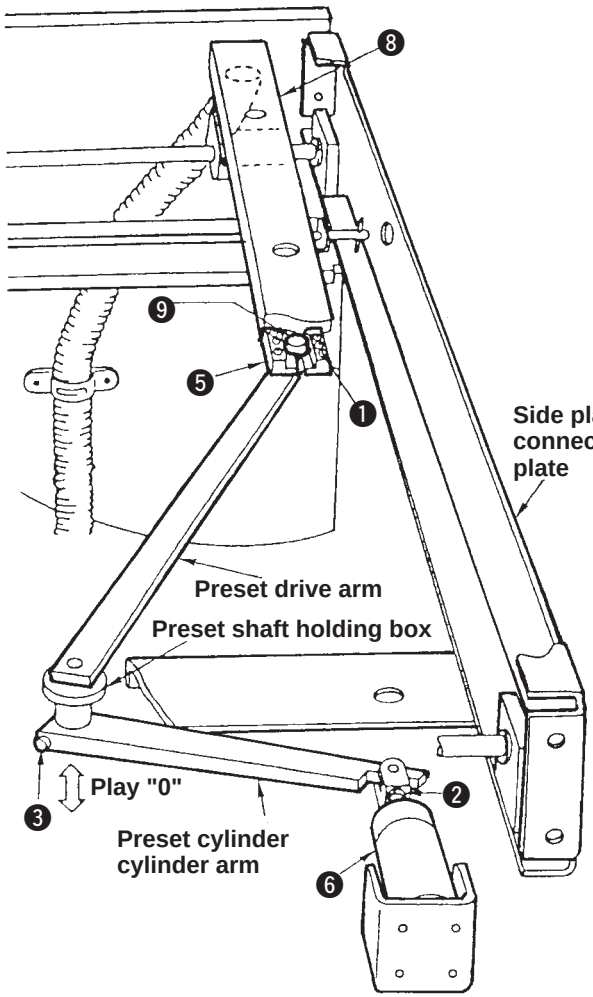
Point : Sliding plane of stopper ⓯ is one place of ◯ mark in the illustration below.

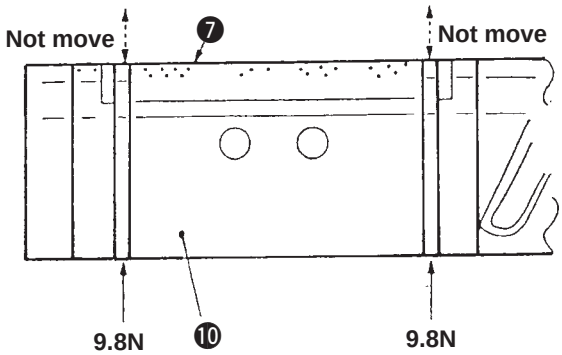


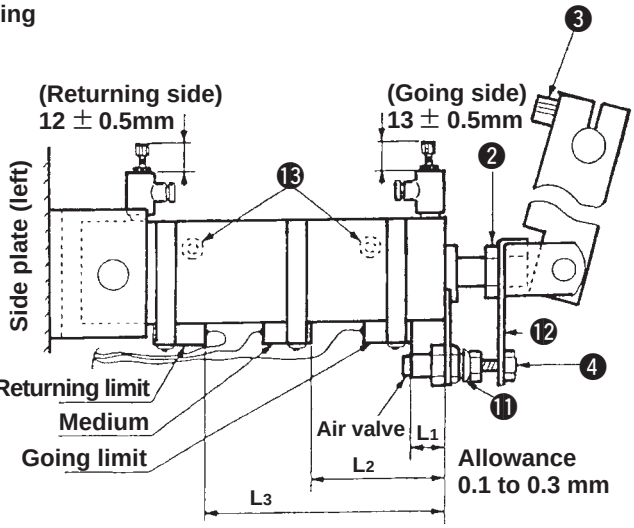
Adjustment Procedures	Results of Improper Adjustment
1. At step 2), adjustment of moving the preset table up to stroke end was performed. In this item, however, perform the check and adjustment of the front end stop position for practice. Front end stop procedure is performed by fitting preset installing pipe ❽ to stopper sections (left ❻ and right ❼) to position the stopper. Remove the preset table and adjust as follows. 2. Set the tension of adjustment belt ❾ to such an extent that the belt surface of the lower side does not come in contact with side plate connecting plate ❿. Perform the adjustment by loosening stopper unit (left) ❻. Loosen four screws ❶ fixing stopper unit (left) ❻ and adjust within the range of slot of shaft holder installing base ⓫. When tightening the screws ❶, put them to the front as much as the looseness of slot (shown in the illustration). **(Caution) When adjustment belt ❾ is excessively tense, turning adjustment handle ⓬ becomes heavy. When the belt is excessively loosened, the handle does not turn, the right and left stopper positions slip, and the front end accuracy trouble occurs.** 3. Check that the stopper ⓯ smoothly moves without play in the vertical and lateral directions when adjustment shaft ⓭ is turned. (1) First, check that installation in terms of the shaft of adjustment pulley ⓮ has no play in the thrust direction. Adjust the play by loosening pulley setscrews ❷ and tightening the screws while pressing adjustment pulley ⓮ and adjustment shaft ⓭. (2) Next, when the adjustment shaft ⓭ is turned and stopper ⓯ wavers up and down, loosen stopper setscrews ❸ and fix stopper ⓯ at the position where it does not come in one-side contact with shaft holder installing base ⓫. When it wavers right and left, loosen screw ❹ fixing nut guide ⓱ and fix stopper ⓯ at the position where it equally comes in contact with two places of section Ⓐ of adjustment shaft holder ⓰. **(Caution) When there is a play, front end accuracy trouble and indication mark follow-up trouble occur.** 4. Turn adjustment shaft ⓭ to bring the position of stopper ⓯ to the front. When pressing the center of preset installing pipe ❽ and making it come in contact with stopper rubber ⓱ on both sides, the dimension between preset installing pipe ❽ and side plate connecting plate ❿ is 88 to 90 mm within 0.5 mm of right and left differences. Adjustment is performed with stopper unit (left) ❻. (Loosen pulley setscrews ❷ in stopper unit (left) ❻, and make the shaft run idle to obtain the parallel to stopper unit (right) ❼. (Be sure to perform the adjustment after setting the position of stopper ⓯ to this side.) Explanation based on the concrete example is described below. (1) When right side is 88 mm and left side is 90 mm (When clearance Ⓑ of nut bearing of stopper unit (right) ❼ is 2 mm, do nothing, and when it is not, turn preset adjustment handle ⓬ to set Ⓑ to 2 mm.) Loosen pulley setscrew ❷ in stopper unit (left) ❻, turn preset adjustment handle ⓬, and move stopper unit (right) ❼ only to this side. Fix pulley setscrew ❷ in stopper unit (left) ❻ at the position where the parallel between pipe ❽ and side plate connecting plate ❿ is within 0.5 mm. (2) When right side is 90 mm and left side is 88 mm Turn preset adjustment handle ⓬ to set the right side to the position of 88 mm. Loosen pulley setscrew ❷ in stopper unit (left) ❻, turn preset adjustment handle ⓬, and move stopper unit (right) only to this side. Fix pulley setscrew ❷ in stopper unit (left) ❻ at the position where the parallel between preset installing pipe ❽ and side plate connecting plate ❿ is within 0.5 mm. **(Caution) When fixing pulley setscrew ❷, be careful that there is no thrust play between adjustment shaft ⓭ and adjustment pulley ⓮.** 5. Turn adjustment shaft ⓭ to bring the position of stopper ⓯ to the medium position, and check that parallel between preset installing pipe ❽ and side plate connecting plate ❿ is within 0.5 mm. **(Caution) 1. Stopper section influences the front end accuracy. Carefully adjust the motion and parallel.** **2. When loosening shaft holder installing base setscrew ❺, the position of stopper ⓯ slips. So, never loosen the screw.**	

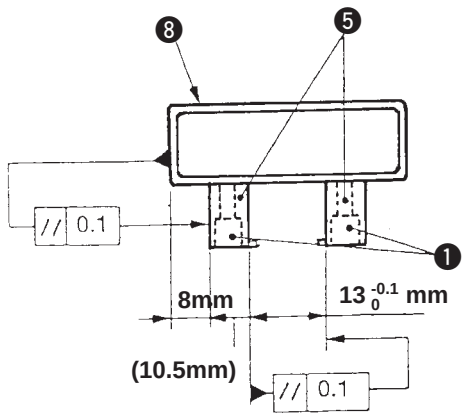
4) Preset drive components

<Name of each component>









Preset cylinder sensor position

L	Dimension (mm)	Position	Conditions
L1	(27)	Preset going limit (PRE. FF)	LED should light up at front end distance of 7 to 21 mm.
L2	(46)	Preset medium (PRE. MM)	Almost in the center of the range where LED lights up when preset table comes out from clamp table.
L3	(72)	Preset returning limit (PRE. RR)	Almost in the center of the range where LED lights up at the position where preset table returns

Adjustment Procedures	Results of Improper Adjustment

1. Check cam follower section and preset cylinder section for the drive components.
   Detection of the position of preset table ❼ is performed with three cylinder sensors attached to preset cylinder ❻.
   For the installing position, refer to 5. The state in function, position trouble and breakdown of each sensor is as described below.

	Returning limit switch (PRE. RR)	Medium switch (PRE. MM)	Going limit switch (PRE. FF)
Function	Detects that preset table is at origin position.	Detects sewing machine start timing after delivery of cloth.	Detects that preset table comes out to carriage side.
Abnormal state	Error E986 when preset does not return.	Sewing machine does not start even when cloth is delivered. Error does not appear.	Error E985 when preset does not move to carriage side.

(Caution) Be sure to turn OFF the power when the aforementioned abnormal state occurs, and perform adjustment of 5. after removing cloth. After the adjustment, check by manual operation.

2. Installing position of cam follower rail ❺ in terms of preset installing pipe ❽ is 8 mm from the edge of preset installing pipe ❽ and the interval of cam follower rail ❺ is $13^{-0.1}_{0}$ mm. Parallel should be within 0.1 mm respectively. Loosen rail setscrews ❶ and perform the adjustment with the looseness of installing hole.

(Caution) 1. When the interval of cam follower rail ❺ is large, looseness between the rail and cam follower ❾ becomes large. As a result, one-side worn-out will be caused.
2. Periodically clean the rail surface and apply grease.

3. Connect air and the preset table should not move even when a load of 9.8N is applied to both ends of preset auxiliary table ❿ when preset table ❼ is at the origin. In addition, when the preset stopper is set to the extreme rear and making preset table ❼ full stroke, the slide shaft support and slide shaft holder, both right and left, should come in contact with each other. Fine adjustment is possible with cylinder rod nut ❷. However, set the number of screw threads to be caught in terms of the knuckle up to three threads or more. The adjustment can be performed by loosening preset cylinder arm clamp bolt ❸ as well. When adjusting with the clamp section, be careful that there is no play in the thrust direction at the time of tightening. After the adjustment, adjust with stopper bolt/nut ❹ attached to valve dog ⓬ so that the stroke allowance of air valve actuater ⓫ is 0.1 to 0.3 mm.

(Caution) 1. When cylinder thrust is not applied at stroke end on both returning and going sides, the front end accuracy is influenced.
2. Set plate does not go up when the stroke allowance of air valve ⓮ is 0.3 mm or more.

4. Adjust the motion speed of preset cylinder ❻ with speed controller. Set the height of speed controller within the range as shown in the illustration. Shock at the stroke end is performed with air cushion needle ⓭. Set air cushion needle ⓭ to the position where it is returned by 1/2 turn from the fully screwed position. However, adjust the returning amount in accordance with the conditions.

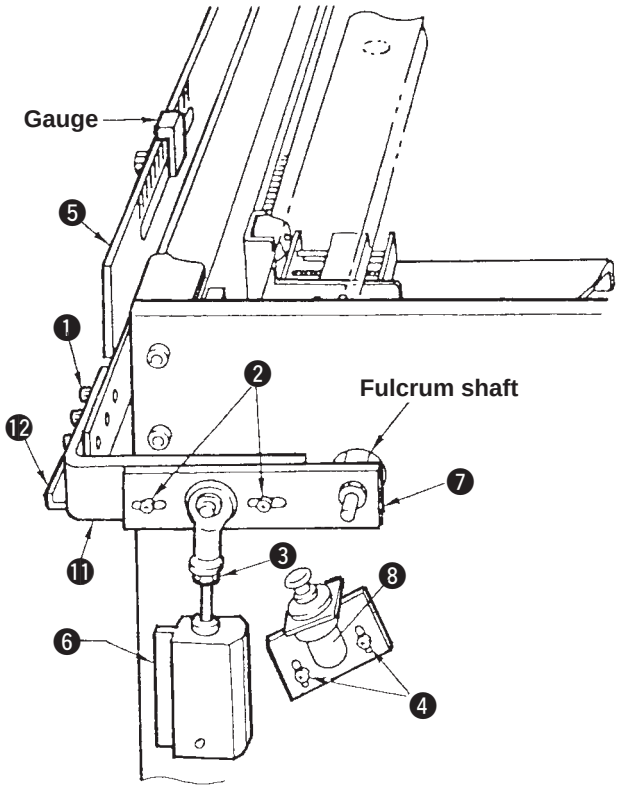
(Caution) When making the air cushion needle ⓭ on the going side work excessively, preset stroke is not obtained. So, be careful.

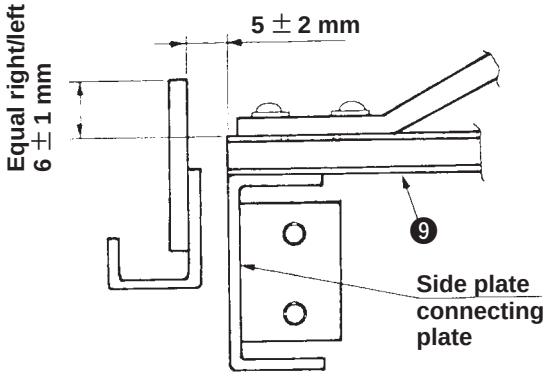
5. Sensor position of the preset cylinder is as shown in the table above.
   Perform adjustment by drawing tube (red color) on the going side of preset cylinder speed controller in the state of turning ON the power, moving preset table ❼ by hand and performing positioning. After the adjustment, be sure to connect the tube after returning preset table ❼ by hand.

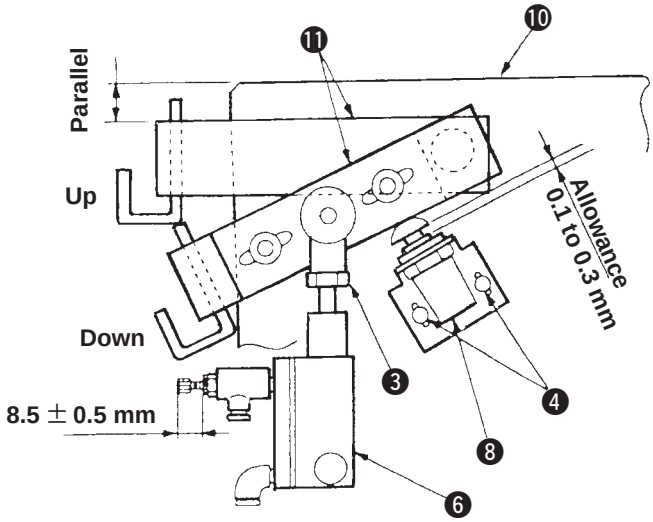
Standard Adjustment

5) Set plate components

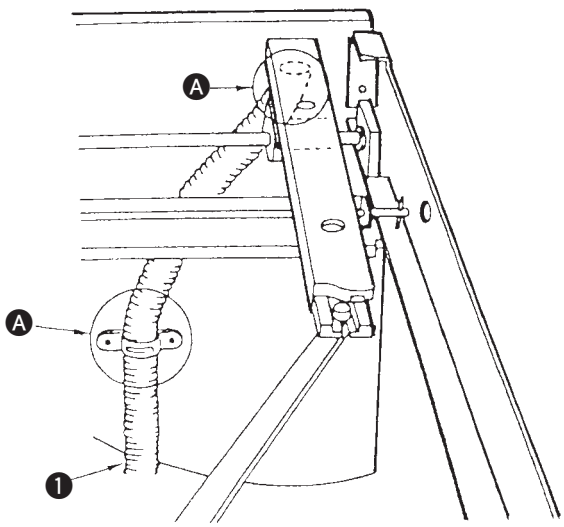
<Name of each component>







6) Preset components and others

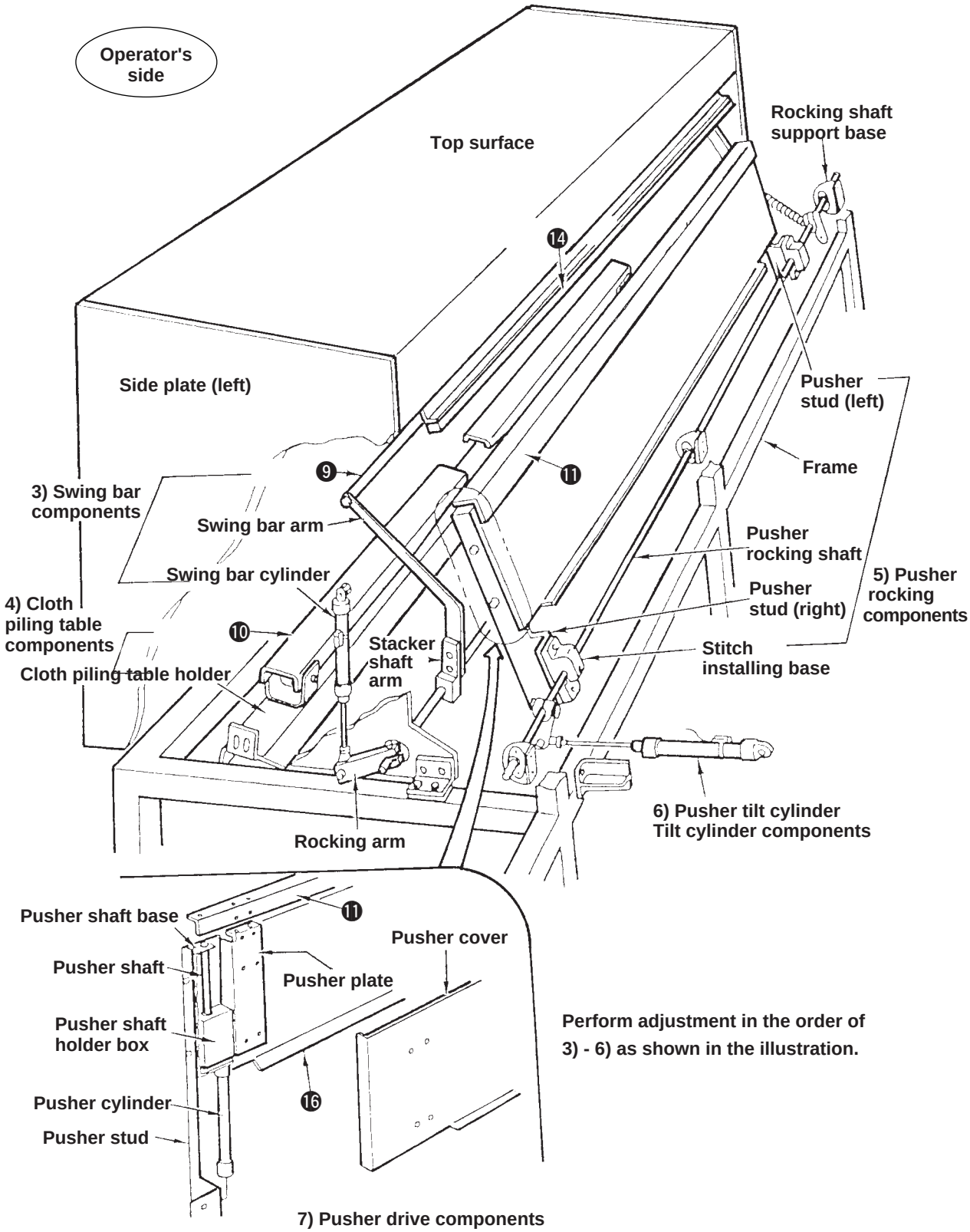


Adjustment Procedures	Results of Improper Adjustment
1. Cylinder to move set plate ❺ is connected with the preset cylinder through the air circuit, and both cylinders are driven by one solenoid valve. When the solenoid valve is changed over, first air enters to set plate cylinder ❻ and the set plate comes down. Set plate fulcrum arm ❼ presses air valve ❽ and air is supplied to the preset cylinder. Then preset table ❾ advances. When preset table ❾ returns, the valve dog of item 4)-3 of the previous page presses air valve ❽ and air is supplied to set plate cylinder ❻. Then set plate ❺ goes up. **(Caution) When air valve ❽ on set plate cylinder ❻ side is not fully pressed, preset table ❾ does not work. Similarly, when air valve ❽ on preset cylinder side is not fully pressed, preset plate ❺ does not work. However, be sure to take the allowance of 0.1 to 0.3 mm of actuater stroke when air valve ❽ is pressed. The adjustment is performed with adjustment screw ❹.** 2. Set the position with preset table ❾ when set plate ❺ goes up to 6 ± 1 mm in the vertical direction and 5 ± 2 mm in the longitudinal direction. Adjustment in the vertical direction is performed with set plate support ⓬ setscrews ❶ and that in the longitudinal direction is performed with set plate fulcrum arm setscrews ❷. 3. When set plate ❺ goes up, set plate arm ⓫ and the top surface of side plate ⓾ should be positioned almost parallel. Adjustment is performed by loosening cylinder rod nut ❸. 4. Adjust the going-up speed of set plate ❺ to height 8.5 ± 0.5 mm with the speed controller. **(Caution) When the going-up speed is set to excessively high, set plate ❺ at the time of going-up vibrates and the next cloth cannot be set at once. Also, the durability is deteriorated.**	
1. ACF-172 employs vacuum type preset system. Be sure to clean the filter. 2. When there is any crack in vacuum hose ❶ (especially section Ⓐ), immediately replace it since the suction pressure is decreased and the front end accuracy is deteriorated.	

(3) Stacker components

Standard Adjustment

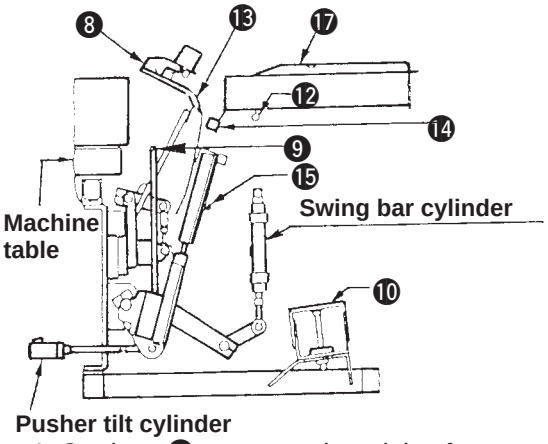
1) Configuration



Perform adjustment in the order of 3) - 6) as shown in the illustration.

Adjustment Procedures	Results of Improper Adjustment

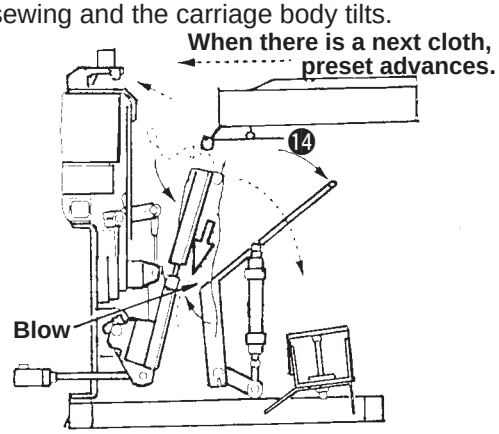
2) Motion order

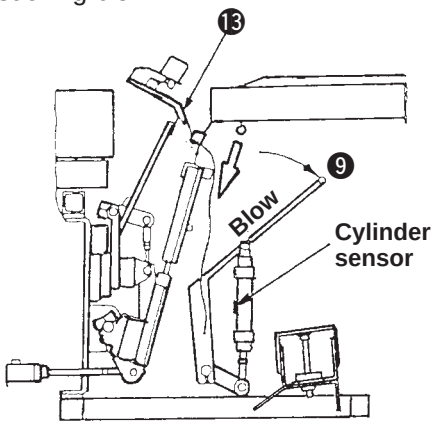


(The illustration is observed from the left-hand side of the device.)
Motion is in the order of 1. to 5.
Refer to 3. (1) for the adjustment of peeling-off blow and sucking blow.

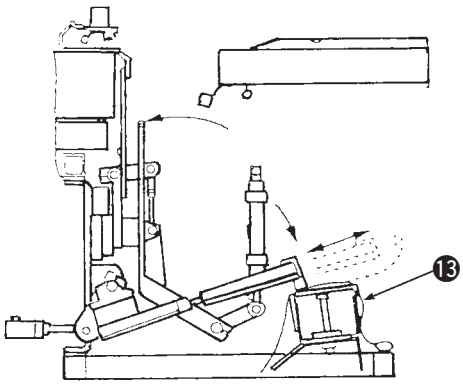
Operator's side

1. Carriage ❽ returns to the origin after completion of sewing and the carriage body tilts.

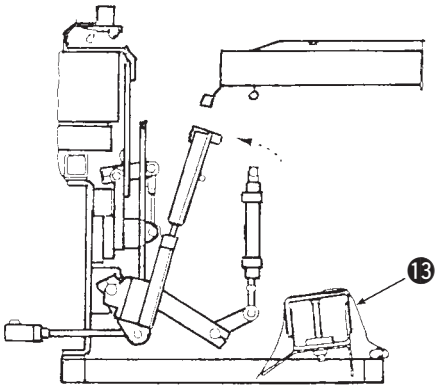




2. When the carriage body tilts, simultaneously, swing bar ❾ works and cloth is swept to cloth piling table ❿ side.
Cylinder sensor detects while swing bar ❾ works and pusher ⓫ goes up. Pusher ⓫ interlocks with peeling-off blow ⓬ and cloth ⓭ is separated from swing bar ❾.



3. Pusher ⓫ goes up, after pressing cloth ⓭ between the pusher and cloth presser cushion ⓮, turns carriage ❽ clamp OFF and the carriage body rises. (When the next cloth is preset, the preset starts.) When pusher ⓫ comes down, cloth ⓭ hangs on both sides. Next, pusher ⓫ tilts. Suction blow ⓯ is interlocked and sucks cloth ⓭ to pusher stay ⓰.

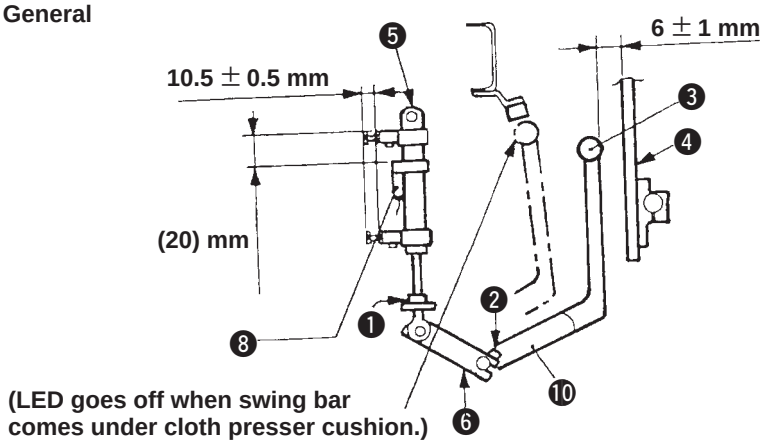


4. Pusher ⓫ tilts while cloth ⓭ is being sucked to pusher stay ⓰, and cloth ⓭ is pressed between the pusher and cloth pile table ⓾.
Making pusher ⓫ in and out, cloths ⓭ are piled up on cloth piling table ⓾. Also, swing bar ❾ returns to the carriage body side when pusher ⓫ starts tilting.
(When the next cloth ⓭ is preset, the delivery is just performed and preset table ⓱ is on the way of returning.)

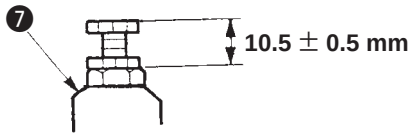
5. Pusher ⓫ rises and is in the waiting state.

3) Swing bar components

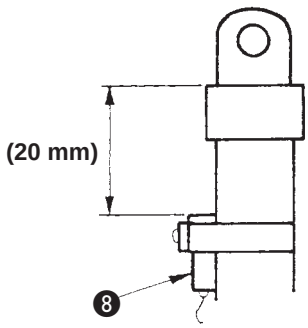
1. General



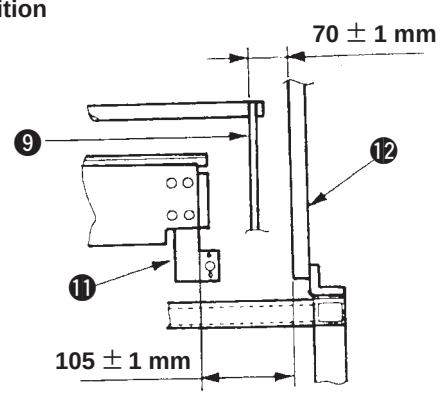
2. Speed controller



3. Sensor



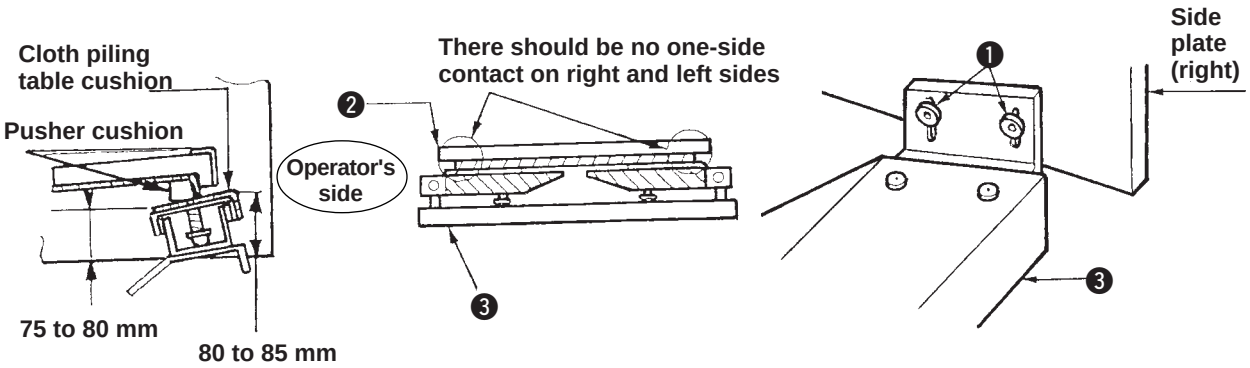
4. Front installing position



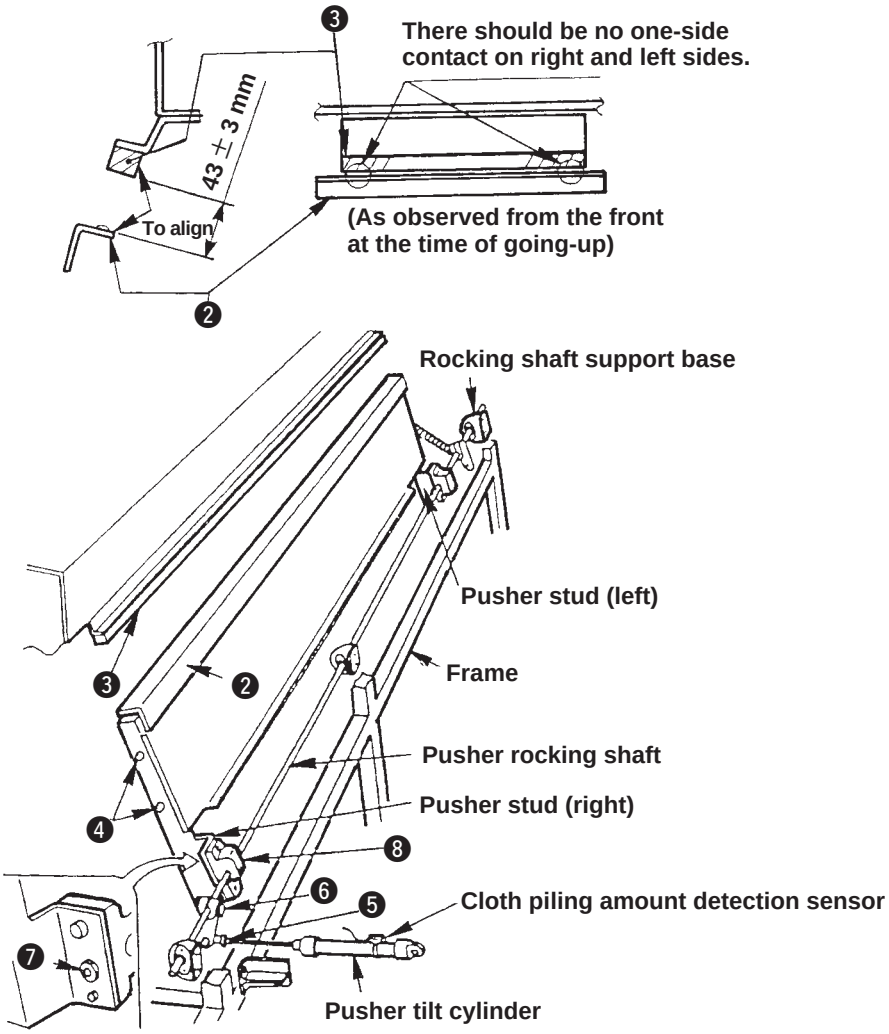
Adjustment Procedures	Results of Improper Adjustment
1. When swing bar ❸ is on the carriage body side, the clearance between the bar and stud ❹ is 6 ± 1 mm. Perform fine adjustment with cylinder rod nut ❶. (However, the number of thread to be caught on the rod end should be three threads or more.) Loosen rocking arm bracket ❷ to perform more adjustment. When the right and left differences are ±1 mm or more, adjust with right and left stacker shaft arm brackets ❿ section. After the adjustment, check that the top end of rocking arm ❻ does not interfere with the frame at the position where cylinder ❺ fully comes out. 2. Adjust the motion speed of swing bar ❸ with speed controller ❼. Height of speed controller is 10.5 ± 0.5 mm. **(Caution) When the speed is set to excessively high, reading of the sensor ❽ is not possible. When the speed is set to excessively low, the pusher interferes with the swing bar.** 3. Set the sensor ❽ position to temporary dimension of 20 mm, and adjust sensor ❽ LED lights up when swing bar ❸ is placed extremely rear. 4. Installing position of swing bar arm ❾ in terms of the side plate (right) ⓬ of is 70 ± 1 mm. Loosen stacker shaft arm ❿ bracket and move the upper shaft to the right and left to perform the adjustment. Installing position of pusher stud ⓫ in terms of side plate (right) ⓬ is 105 ± 1 mm. Loosen the stud installing base bracket to perform the adjustment.	

Standard Adjustment

4) Cloth piling table components



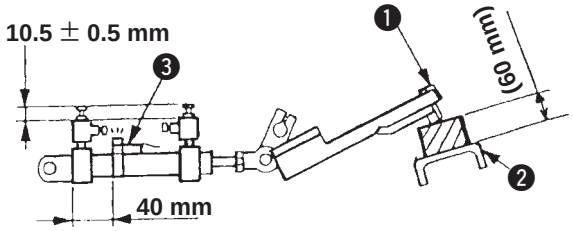
5) Pusher rocking components



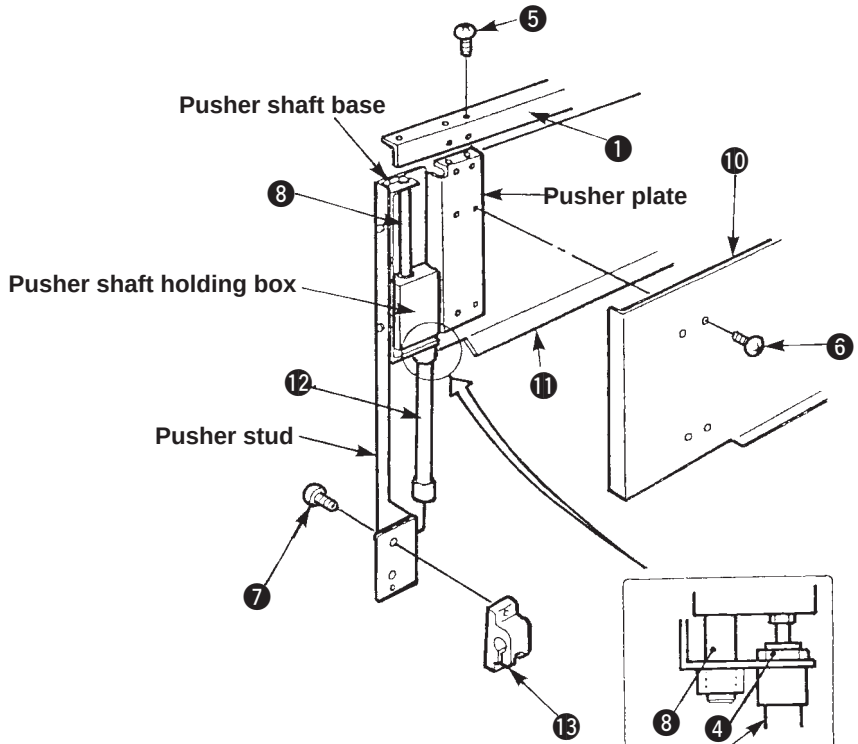
Adjustment Procedures	Results of Improper Adjustment
1. Installing position of the cloth piling table in terms of the side plate is 80 to 85 mm on the operator's side and 75 to 80 mm on the rear side. 2. When pusher ❷ tilts, check that there is no one-side contact on both right and left sides. 3. Perform adjustment with cloth piling table holder ❸ setscrews ❶ (2 pcs. each on right and left sides). 4. When adjustment is not possible since there is a lateral twist on pusher ❷ side, refer to 5) Pusher rocking components. **(Caution) When pusher ❷ tilts, and there is one-side contact on the right and left of the cloth piling table, it is not possible to neatly perform stacking.**	
1. Clearance between pusher ❷ and cloth presser cushion ❸ is 43 ± 3 mm at the time of waiting Loosen screws ❹ on the pusher stud side to adjust. 2. Angle to which pusher ❷ rises at the time of waiting is the position where the cushion aligns with the edge. When there is a lateral twist on the pusher, loosen stud installing base bracket screw ❼ to adjust. Loosen cylinder rod end nut ❺ for the fine adjustment of the whole. (Number of threads to be caught on the rod end should be three threads or more.) Loosen stacker shaft arm bracket bolt/nut ❻ to perform the correction more than fine adjustment. After the adjustment, when making pusher ❷ rise, check that there is no one-side contact on both right and left sides between the pusher and cloth presser cushion ❸. **(Caution) 1. When the angle to which pusher ❷ rises is excessively tilted, the top-center plait section comes out to the switch side at the time of stacking. When the angle excessively rises, the clamp table interferes with pusher ❷ when delivering cloth from the carriage body and a metallic noise occurs.** **2. After the adjustment, be sure to check the additional tightening to securely connect stud installing base ❽ and the bracket section of stacker shaft arm.**	

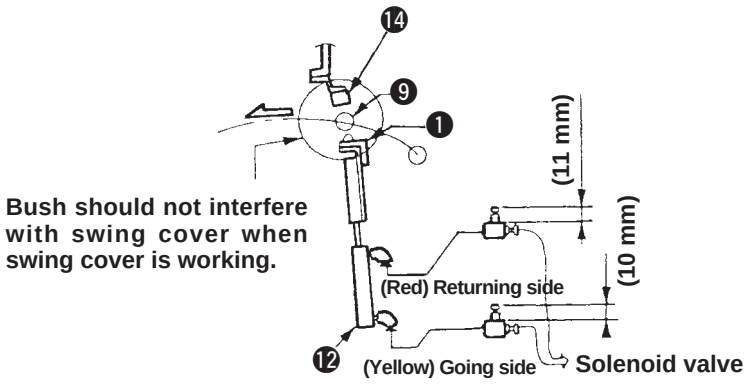
Standard Adjustment

6) Cylinder tilt components



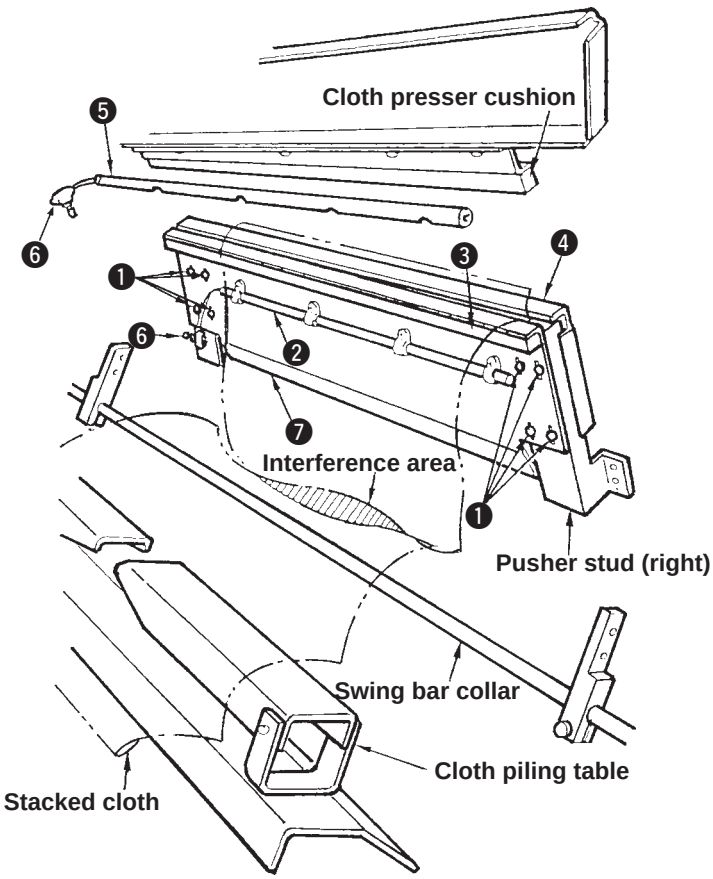
7) Pusher drive components





Adjustment Procedures	Results of Improper Adjustment
1. Adjust the speed of tilt/rise speed of pusher ❶ with the speed controller of cylinder. Height of the speed controller is 10.5 ± 0.5 mm. **(Caution) 1. When the tilt speed is excessively low, cloth is swept before reaching cloth piling table ❷ and stacking trouble occurs.** **2. When the rise speed is excessively high, the pusher ❶ rises before it has fully come down and it interferes with the cloth presser cushion.** 2. Cloth piling amount detection sensor ❸ detects when a block of about 60 mm is placed on cloth piling table ❷. (In case of T/C broadcloth, equivalent to the stacked thickness of approximately 120 to 140 pieces). When you desire to sound the cloth piling alarm earlier, move backward the cloth piling amount detection sensor ❸ position (40 mm setting at the time of delivery).	
1. It is necessary to have the smoothness for the pusher ❶ to such an extent that it fully comes down by its own weight when the pusher comes down. Adjustment is performed with the installing position of pusher cylinder ⓬, assembled state of pusher cover ⓾, pusher stay ⓫ and pusher ❶, and installing of stud installing base ⓭. (1) For adjusting the installing position of the pusher cylinder ⓬, loosen nut ❹ and fix the cylinder at the position where it smoothly moves at all strokes. (2) Loosen the respective setscrews ❺ and ❻ to perform the adjustment pusher cover ⓾, pusher stay ⓫ and the pusher ❶. However, when they are fixed in such a shape as rhomb, they become tight. So, be careful. (3) When disassembling and adjusting this item, it is easy to remove setscrew ❼ and remove together with the unit from the device. When installing, be careful that the unit is not deformed in the rhomb shape. 2. Adjust up/down motion speed of the pusher ❶ with the speed controller on the way of piping. Down speed is set to slower than up speed, and the speed controller is of the exhaust throttle type. The height of respective speed controller is the dimensions as shown in the illustration. **(Caution) 1. When up/down motion of pusher ❶ is not smooth, one-side worn-out of pusher ❽ occurs.** **2. When up speed of pusher ❶ is set to excessively high, the pusher interferes with swing bar ❾. On the contrary, it is set to excessively low, delivery of cloth from the carriage is not performed and the cloth drops.** **3. When down speed of pusher is set to excessively high, cloth drops from pusher ❶. On the contrary, it is set to excessively low, the pusher ❶ interferes with the cloth presser cushion ⓮ on the way of rising after stacking.**	

8) Stacker components and others



Adjustment Procedures	Results of Improper Adjustment
1. When cloth is delivered from the carriage section and the cloth drops, execute the special adjustment below. (In case the garment body width is approximately 220 mm.) (1) Loosen pusher stay setscrews ❶ of 4 pcs. each on right and left sides, lower the pusher stay to the bottom position within the range of slot. Then fix it with the screws. (2) Remove four clips which are fixing suction blower ❷, change the direction, make the blow pipe come near to cushion ❸, and fix it. At this time, be careful that the direction of blower becomes the angle which blows the top of bend at the lower section of pusher stay ❼. (3) For the adjustment of blow, refer to 3.-(1). 2. When the cloth size is near to the max. dimension of the specifications, the stacked cloth and the mounted cloth on pusher ❹ interfere with each other, and the side section is rolled, execute the special adjustment below. (1) Fully open speed controllers ❻ of both suction blower ❷ and peeling-off blower ❺. (2) When the adjustment in the above step (1) is not effective, connect both speed controllers ❻ in the reverse direction. **(Caution)1. Direction of the blower greatly affects the stacking. check that the direction is the normal blowing direction of 3. - (1).** **2. Suction blower ❷ blows, interlocking with pusher ❹ when the pusher tilts. However, when a noise occurs, tighten speed controllers ❻ to the lowest limit where the cloth goes along pusher stay ❼.**	

7. PANEL

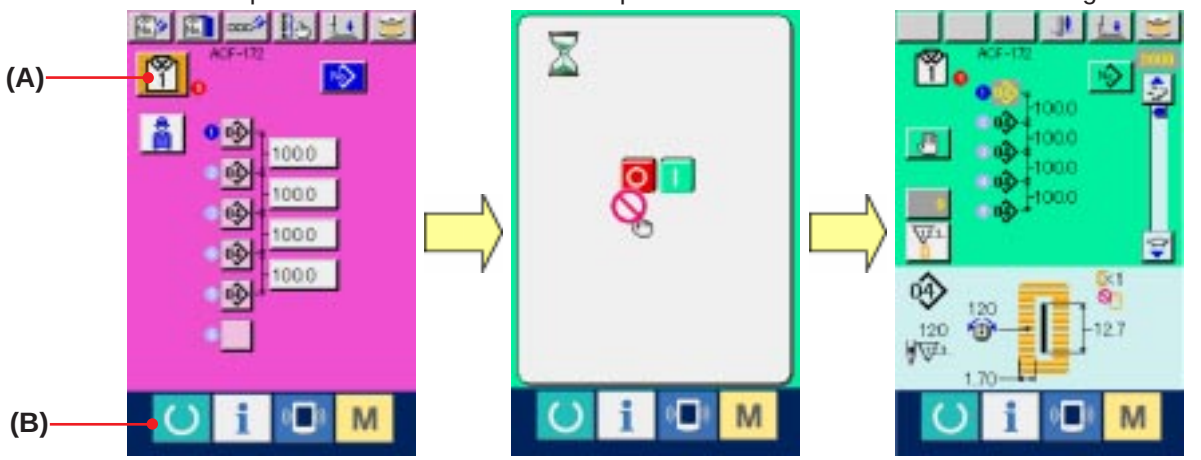
(1) PANEL BASIC OPERATION

1. Performing sewing

Operation	Panel display and the description
1. Turn ON the power switch.	Data input screen is displayed.
2. Confirm the pattern No.	Confirm No. of ACF PATTERN SELECTION button (A).
3. Press READY key.	Press READY key (B). →Automatic sewing screen appears.
4. Start sewing.	Set the sewing products and press knee switch or hand switch.

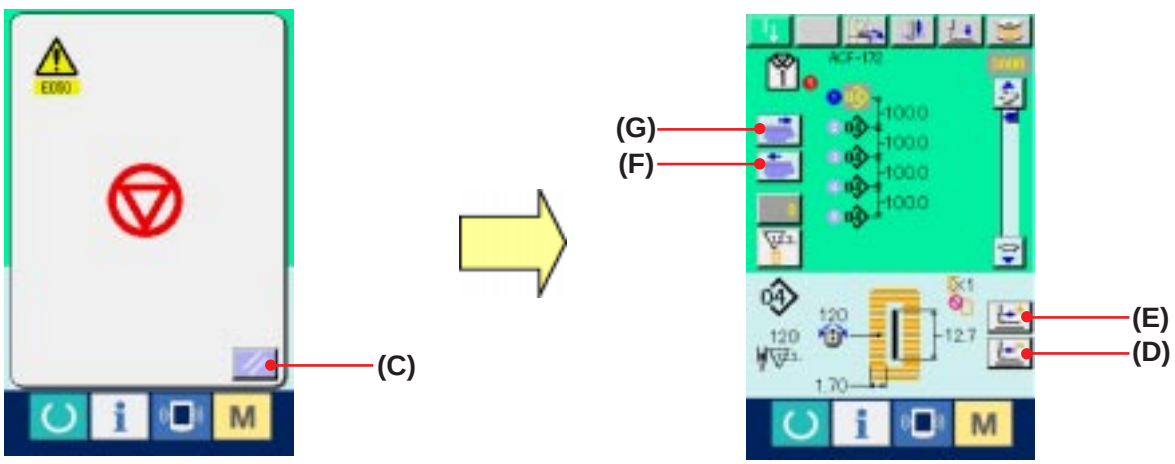
(Caution) Be sure to read safety instructions before using.

<Data input screen> <Power OFF prohibition screen> <Automatic sewing screen>



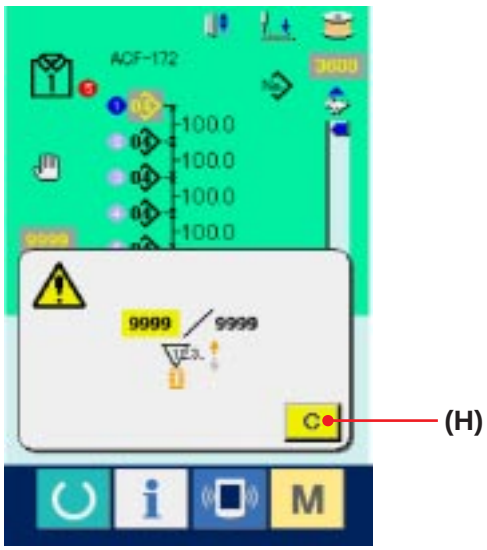
2. Performing re-sewing from some stop point in sewing

Operation	Panel display and description
1. Stop switch is pressed during starting of sewing machine.	Sewing machine stops and error is displayed.
2. Release the error.	Press RESET button (C) to release the error.
3. Return stitching.	button (D) → returns stitch by stitch. button (E) → advances stitch by stitch. button (F) → feeds cloth to the left. button (G) → feeds cloth to the right.
4. Re-start sewing.	Set the sewing products and press knee switch or hand switch.



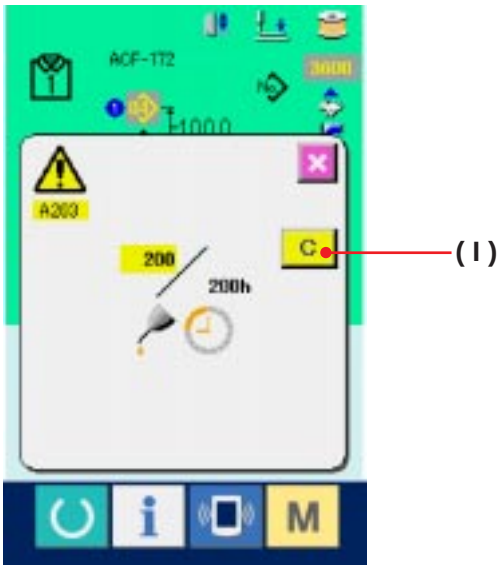
3. When bobbin thread runs out and count-up screen is displayed

Operation	Panel display and description
1. Press CLEAR button.	Press CLEAR button C (H) in the count-up screen.
2. Replace bobbin with a new one.	(Caution) Turn OFF the power and replace the bobbin after confirming that motor has stopped.



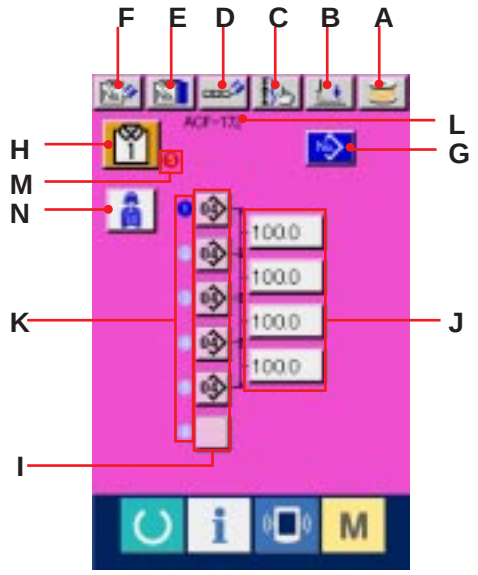
4. When warning screen of oil replacement is displayed

Operation	Panel display and description
1. Warning screen is displayed.	The screen is displayed when the designated oil replacement time is reached.
2. Clear the warning time.	Press CLEAR button C (I).
3. Lubricate the sewing machine to fill the need.	(Caution) Turn OFF the power and lubricate after confirming that motor has stopped.



(2) TABLE OF OPERATION BUTTON AND DISPLAY

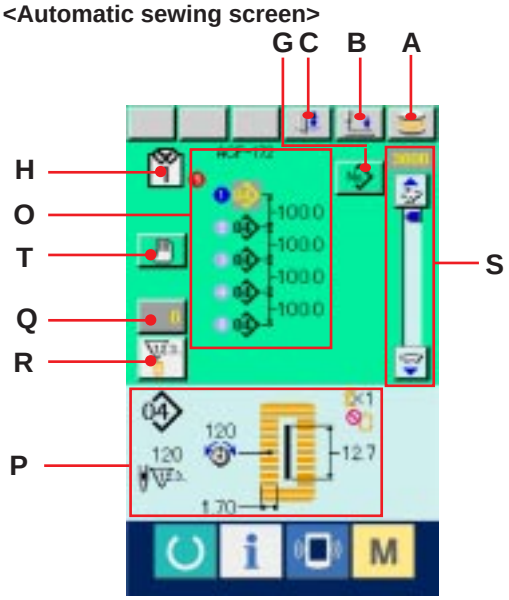
<Data input screen>



*** For the detailed explanation, refer to the Instruction Manual.**

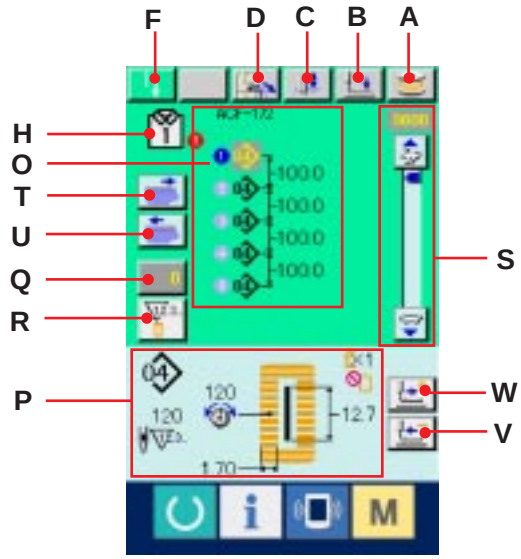
A	BOBBIN WINDING button
B	PRESSER DOWN button
C	EQUAL INTERVAL INPUT button
D	ACF PATTERN NAME SETTING button
E	ACF PATTERN COPY button
F	ACF PATTERN NEW REGISTER button
G	CHANGEOVER OF ACF MODE AND LBH MODE button
H	ACF PATTERN SELECTION button
I	PATTERN (BUTTONHOLE) NO. INPUT button
J	FEED AMOUNT INPUT button
K	SEWING ORDER display
L	ACF PATTERN NAME display
M	NUMBER OF REGISTER BUTTONHOLES display
N	MEN'S/LADIES' WEAR SELECTION button

<Automatic sewing screen>



A	BOBBIN WINDING button
B	PRESSER DOWN button
C	KNIFE CANCEL button
G	CHANGEOVER OF ACF MODE AND LBH MODE button
H	ACF PATTERN NO. display
O	ACF PATTERN CONTENTS display
P	CONTENTS OF PATTERN (BUTTONHOLE) DURING SEWING display
Q	COUNTER display
R	COUNTER CHANGEOVER button
S	SEWING SPEED variable resistor
T	MANUAL SEWING CHANGEOVER button

<Manual sewing screen>



A	BOBBIN WINDING button
B	PRESSER DOWN button
C	KNIFE CANCEL button
D	CARRIAGE TILT/LIFT button
F	SEWING MACHINE START button
H	ACF PATTERN NO. display
O	ACF PATTERN CONTENTS display
P	CONTENTS OF PATTERN (BUTTONHOLE) DURING SEWING display
Q	COUNTER display
R	COUNTER CHANGEOVER button
S	SEWING SPEED variable resistor
T	CLOTH FEED, RIGHT button
U	CLOTH FEED, LEFT button
V	ONE STITCH RETURN button
W	ONE STITCH FEED button

8. VARIOUS DATA LIST

(1) Initial value data for each shape table

No.	Item	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
			Shape selection Level 1 (12 shapes)												Shape selection Level 2 (20 shapes)										Shape selection Level 3 (30 shapes)									
S01	Sewing shape		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
S02	Cloth cutting length	mm	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	13.0	19.1	19.1	19.1
S03	Knife groove width, right	mm	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	–	–	0.10	0.10
S04	Knife groove width, left	mm	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	–	0.10	–	0.10
S05	Overedging width, left	mm	1.70	1.70	1.70	1.70	1.70	1.70	1.4	1.4	1.4	1.4	1.70	1.70	1.70	1.70	1.70	1.4	1.4	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	–	–	–	–
S06	Left/right shape ratio (right side in terms of left side)	%	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	–	–	–	–
S07	Pitch at parallel section	mm	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	–	–	–	–
S08	2nd bar-tacking length	mm	1.0	–	1.0	–	1.5	3.0	1.0	–	1.5	3.0	–	1.0	1.0	1.5	3.0	–	–	–	–	–	1.5	3.0	–	–	–	–	–	–	–	–
S09	1st bar-tacking length	mm	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0	1.0	1.0	1.0	1.0	–	–	–	–	–	–	–	–
S10	Bar-tacking width, right compensation	mm	0.0	–	0.0	–	0.0	–	0.0	–	0.0	–	–	0.0	0.0	0.0	–	–	–	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–	–	–	–
S11	Bar-tacking width, left compensation	mm	0.0	–	0.0	–	0.0	–	0.0	–	0.0	–	–	0.0	0.0	0.0	–	–	–	0.0	0.0	0.0	0.0	0.0	–	–	–	–	–	–	–	–
S12	Flow bar-tacking offset, left	mm	–	–	–	–	–	0.85	–	–	–	0.85	–	–	–	–	0.85	–	–	–	–	–	–	0.85	–	–	–	–	–	–	–	–
S13	Flow bar-tacking offset, right	mm	–	–	–	–	–	0.85	–	–	–	0.85	–	–	–	–	0.85	–	–	–	–	–	–	0.85	–	–	–	–	–	–	–	–
S14	Eyelet shape length	mm	–	–	–	–	–	–	2.0	2.0	2.0	2.0	–	–	–	–	–	2.0	2.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S15	Number of stitches of eyelet shape	Stitch	–	–	–	–	–	–	3	3	3	3	–	–	–	–	–	3	3	–	–	–	–	–	–	–	–	–	–	–	–	–
S16	Eyelet width	mm	–	–	–	–	–	–	1.0	1.0	1.0	1.0	–	–	–	–	–	1.0	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S17	Eyelet length	mm	–	–	–	–	–	–	3.0	3.0	3.0	3.0	–	–	–	–	–	3.0	3.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S18	Round type shape length	mm	–	2.0	2.0	2.0	2.0	2.0	–	2.0	–	–	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	–	–	2.0	2.0	2.0	2.0	–	–	–	–
S19	Number of stitches of radial shape	Stitch	–	–	3	3	3	3	–	3	–	–	–	–	–	–	–	–	–	3	–	–	–	–	3	3	3	–	–	–	–	–
S20	Radial shape reinforcement (with/without)		–	–	Without	Without	Without	Without	–	Without	–	–	–	–	–	–	–	–	–	Without	–	–	–	–	Without	Without	Without	–	–	–	–	–
S21	Pitch at bar-tacking section	mm	0.30	0.30	0.30	Å[	0.30	0.30	0.30	–	0.30	0.30	0.25	0.30	0.25	0.25	0.25	0.25	0.30	0.30	0.25	0.30	0.30	0.30	0.25	0.30	0.25	0.25	–	–	–	–
S22	1st clearance	mm	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5.	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	–	2.0	2.0	2.0
S23	2nd clearance	mm	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	–	2.0	2.0	2.0
S31	1/2 stitching		Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	Single	–	–	–	Single
S32	Double stitching cross selection		<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	–	–	–	<
S33	Double stitching width compensation	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	–	–	–
S34	Number of times of basting	Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	2	–
S35	Pitch of basting	mm	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	–
S36	Rolling length of basting	mm	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	–
S37	Rolling pitch of basting	mm	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	–
S38	Rolling width of basting	mm	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	–
S39	Compensation before/after needle entry of basting	mm	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	–
S40	Compensation left/right needle entry of basting	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–
S41	Compensation of left side position of basting	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–
S42	Compensation of right side position of basting	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–
S44	Speed setting of basting	rpm	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	–
S45	Sewing together function (without/with)		Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	–	–	–	–
S46	Width of sewing together	mm	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	–	–	–	–
S47	Pitch of sewing together	mm	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	–	–	–	–
S51	Left parallel section tension		120	60	120	120	120	120	60	60	60	60	60	60	60	60	60	60	60	120	60	60	60	60	60	60	60	60	60	60	60	60
S52	Right parallel section tension		120	60	120	120	120	120	60	60	60	60	60	60	60	60	60	60	60	120	60	60	60	60	60	60	60	60	60	60	60	60
S53	Left parallel section tension (1st cycle of double stitching)		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	–	–	–	–
S54	Right parallel section tension (1st cycle of double stitching)		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	–	–	–	–
S55	1st bar-tacking section tension		35	60	120	35	35	35	60	60	60	60	60	60	60	60	60	60	60	30	60	60	60	60	60	60	60	60	–	–	–	–
S56	2nd bar-tacking section tension		35	60	35	35	35	35	60	60	60	60	60	60	60	60	60	60	60	120	60	60	60	60	60	60	60	60	–	–	–	–
S57	Setting of needle thread tension at sewing start		25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
S58	Setting of needle thread tension of basting		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	---
S59	ACT timing adjustment at 1st bar-tacking start	Stitch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	–	–	–	–
S60	ACT timing adjustment at the start of right overedging	Stitch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S61	ACT timing adjustment at 2nd bar-tacking start	Stitch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	–	–	–	–
S62	Number of stitches of tie stitching at the start of sewing	Stitch	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
S63	Sewing pitch of tie stitching at the start of sewing		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S64	Tie stitching width at sewing start	mm	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
S65	Lengthwise compensation of tie stitching at the start of sewing	mm	0.0	1.5	0.0	1.5	0.0	0.0	0.0	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	1.5	1.5	1.5	1.5	1.5	0.0	0.0	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0
S66	Crosswise compensation of tie stitching at the start of sewing	mm	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S67	Tie stitching width at sewing end	mm	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
S68	Number of stitches of tie stitching at sewing end	Stitch	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
S69	Lengthwise compensation of tie stitching at the end of sewing	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
S70	Crosswise compensation of tie stitching at the end of sewing	mm	0.9	0.9	0.9	0.9	0.0	0.7	0.9	0.9	0.0	0.7	0.9	0.9	0.9	0.0	0.7	0.9	0.9	0.9	0.9	0.9	0.0	0.7	0.9	0.9	0.9	0.9	0.0	0.0	0.0	0.0
S81	Knife motion (With/without)		With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	With	–	With	With	With
S83	Knife at 1st cycle of double stitching (Without/with)		Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	Without	–	–	–	–
S84	Max. speed limitation	rpm	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
S86	Pitch of going	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.80	0.80	0.80	0.80
S87	Width of going	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.7	1.7	1.7	1.7
S88	Pitch of returning	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.80	0.80	0.80	0.80
S89	Width of returning	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.7	1.7	1.7	1.7

(2) Sewing data list

☆Sewing data are those that can be inputted to 99 LBH patterns from LBH pattern 1 to 99 and can be inputted to each pattern. The sewing machine has been set in the state that the data which is necessary to set "With/without edit" cannot be selected at the time of your purchase. Change over the function to "With edit" if necessary for the use.

➡ Refer to the method of setting sewing data with/without edit of the Instruction Manual.

No.	Item	Setting range	Edit unit	Remarks
S01	**Sewing shape** This item selects the shape from among the sewing shapes of 30 different kinds which the sewing machine has.  **Refer to 2. Standard sewing shape list.** * Only 12 kinds of standard sewing shapes can be selected at the time of your purchase. When increasing the kinds of shapes, perform setting of K04 Sewing shape selection level$ of memory switch data. → Refer to **8.-(3) Memory switch list.**	1 to 30 (30 shapes)	1	–
S02	**Cloth cut length** This item sets the length of cloth that is cut by cloth cutting knife. However, in case of bar-tack shape (Nos. 27, 28, 29, and 30 of S01), sewing length is set.  By making effective **U19 Function of plural motions of cloth cutting knife** of memory switch data, make the plural motions of knife by the knife size set in the item **U18 Cloth cutting knife size**, and the sewing product is cut. → Refer to **8.-(3) Memory switch list.**	3.0 to 120.0	0.1mm	–
S03	**Knife groove width, right** This item sets the clearance between cloth cutting knife and right parallel section. 	-2.00 to 2.00	0.05mm	–
S04	**Knife groove width , left** This item sets the clearance between cloth cutting knife and left parallel section. 	-2.00 to 2.00	0.05mm	–
S05	**Overedging width, left** This item sets the overedging width of left parallel section. 	0.10 to 5.00	0.05mm	–
S06	**Ratio of right and left shapes** This item sets enlargement/reduction ratio of right side shape making the knife position as the center. 	50 to 150	1%	–
S07	**Pitch at parallel section** This item sets sewing pitch of left and right parallel sections. 	0.200 to 2.500	0.025mm	–
S08	**2nd bar-tacking length** This item sets length of bar-tacking on the front side. **Bottom of square type**  **Bottom of straight bar-tacking**  **Bottom of flow**  	0.2 to 5.0	0.1mm	–
S09	**1st bar-tacking length** This item sets length of bar-tacking on the rear side. **Top of square type**  	0.2 to 5.0	0.1mm	–

*** 1 : Displayed according to the shape**

*** 2 : Displayed when it is set to with edit. Refer to the method of setting sewing data with/without edit of Instruction Manual.**

*** 3 : Displayed when the function is selected.**

No.	Item	Setting range	Edit unit	Remarks
S10	**Compensation of bar-tacking width, right** This item adjusts right side outer shape of bar-tacking section in terms of overedging section.  Top of square type  Bottom of square type  Bottom of straight bar-tacking 	-1.00 to 1.00	0.05mm	–
S11	**Compensation of bar-tacking width, left** This item adjusts left side outer shape of bar-tacking section in terms of overedging section. 	-1.00 to 1.00	0.05mm	–
S12	**Flow bar-tacking offset, left** This item sets length to form bar-tacking section of flow bar-tacking shape. 	0.00 to 3.00	0.05mm	***1**
S13	**Flow bar-tacking offset, right** This item sets length to form bar-tacking section of flow bar-tacking shape. 	0.00 to 3.00	0.05mm	***1**
S14	**Eyelet shape length** This item sets upper side length from center of eyelet of eyelet shape. 	1.0 to 10.0	0.1mm	***1**
S15	**Number of stitches of eyelet shape** This item sets number of stitches in the upper 90˚ of eyelet shape. 	1 to 8	1 stitch	***1**
S16	**Eyelet width** This item sets crossuise size of the inside of eyelet shape. Actual needle entry point is the dimension to which **S04 Knife groove width, left** is added. 	1.0 to 10.0	0.1mm	***1**
S17	**Eyelet length** This item sets lengthwise size of the inside of eyelet shape. 	1.0 to 10.0	0.1mm	***1**
S18	**Round type shape length** This item sets upper length from the center of round type shape.  Top of round type  Top of Radial type  Top of semilunar type  Bottom of round type  Bottom of radial type  Bottom of semilunar type 	1.0 to 5.0	0.1mm	***1**
S19	**Number of stitches of radial shape** This item sets number of stitches in the upper 90˚ of radial shape. 	1 to 8	1 stitch	***1**
S20	**Reinforcement of radial shape** This item sets with/without reinforcement stitching of radial shape.  : With  : Without	–	–	***1, *2**
S21	**Pitch at bar-tacking section** This item sets sewing pitch of bar-tacking section.  Top of square type  Top of round type  Top of semilunar type  Bottom of straight bar-tacking  Bottom of flow bar-tacking  Bottom of square type  Bottom of round type  Bottom of semilunar type 	0.200 to 2.500	0.025mm	–

NO.	Item	Setting range	Edit unit	Remarks
S22	**1st clearance** This item sets the clearance between 1st bar-tacking and knife groove. This item is applied to all shapes. 	0.0 to 4.0	0.1mm	–
S23	**2nd clearance** This item sets the clearance between 2nd bar-tacking and knife groove.This item is applied to all shapes. 	0.0 to 4.0	0.1mm	–
S31	**Single/double stitching** This item selects single or double stitching.  **Single stitching**  **Double stitching**	–	–	–
S32	**Double stitching cross selection** This item selects overlapping stitching or cross stitching at the needle entry of parallel section when setting double stitching.  **: Double stitching**   **: Cross stitching** 	–	–	***3**
S33	**Compensation of double stitching width** This item sets amount to narrow overedging width of 1st cycle when setting double stitching. 	0.0 to 2.0	0.1mm	***3**
S34	**Number of times of basting** This item sets number of times of basting.  **: Without basting**  **: With basting (Setting of number of times)**	0 to 9	1 time	–
S35	**Basting pitch** This item sets pitch at the time of performing basting. 	1.0 to 5.0	0.1mm	***3**
S36	**Rolling length of basting** This item sets rolling length of needle thread when performing basting. 	2.0 to 20.0	0.1mm	***3**
S37	**Rolling pitch of basting** This item sets rolling pitch of needle thread when performing basting. 	0.2 to 5.0	0.1mm	***3**
S38	**Rolling width of basting** This item sets rolling width of needle thread when performing basting. 	0.0 to 4.0	0.1mm	***3**
S39	**Lengthwise compensation of needle entry of basting** This item sets the amount to move needle entry position back and forth when performing basting more than two cycles. 	0.0 to 2.5	0.1mm	***2, *3**
S40	**Crosswise compensation of needle entry of basting** This item sets the amount to move needle entry position to the right or left when performing basting more than two cycles. 	0.0 to 1.0	0.1mm	***3**
S41	**Compensation of left side position of basting** This item sets the amount to move the sewing reference position of basting from the center of left overedging to the right or left. 	-2.0 to 2.0	0.1mm	***2, *3**

NO.	Item	Setting range	Edit unit	Remarks
S42	**Compensation of right side position of basting** This item sets the amount to move the sewing reference position of basting from the center of right overedging to the right or left. 	-2.0 to 2.0	0.1mm	***2, *3**
S44	**Speed setting of basting** This item sets speed of basting. 	400 to 4200	100rpm	***3**
S45	**Sewing together function** This item selects the function when performing sewing together first.  : **Without sewing together**  : **With sewing together** When "With sewing together" is selected : Sewing is performed in the order of sewing together → basting → normal sewing.	–	–	–
S46	**Width of sewing together** This item sets sewing width when performing sewing together. 	1.0 to 10.0	0.1mm	***2, *3**
S47	**Pitch of sewing together** This item sets sewing pitch when performing sewing together. 	0.2 to 5.0	0.1mm	***2, *3**
S51	**Left parallel section tension** This item sets needle thread tension at left parallel section. 	0 to 200	1	–
S52	**Right parallel section tension** This item sets needle thread tension at right parallel section. 	0 to 200	1	***2**
S53	**Left parallel section tension (1st cycle of double stitching)** This item sets needle thread tension at left parallel section of 1st cycle at the time of double stitching. 	0 to 200	1	***2, *3**
S54	**Right parallel section tension (1st cycle of double stitching)** This item sets needle thread tension at right parallel section of 1st cycle at the time of double stitching. 	0 to 200	1	***2, *3**
S55	**Tension at 1st bar-tacking section** This item sets needle thread tension at 1st bar-tacking section. 	0 to 200	1	–
S56	**Tension at 2nd bar-tacking section** This item sets needle thread tension at 2nd bar-tacking section. 	0 to 200	1	***2**
S57	**Setting of needle thread tension at the start of sewing** This item sets needle thread tension of tie stitching at the start of sewing. 	0 to 200	1	–

*** 2 : Displayed when it is set to with edit. Refer to. Method of setting sewing data with/without edit (Instruction Manual).**

*** 3 : Displayed when the function is selected.**

NO.	Item	Setting range	Edit unit	Remarks
S58	**Setting of needle thread tension of basting** This item sets needle thread tension of basting. 	0 to 200	1	***3**
S59	**ACT timing adjustment at the start of 1st bar-tacking** This item adjusts needle thread tension output start timing at 1st bar-tacking section. 	-5 to 5	1 stitch	***2**
S60	**ACT timing adjustment at the start of right overedging** This item adjusts needle thread tension output start timing at right overedging section. 	-5 to 5	1 stitch	***2**
S61	**ACT timing adjustment at the start of 2nd bar-tacking** This item adjusts needle thread tension output start timing at 2nd bar-tacking section. 	-5 to 5	1 stitch	***2**
S62	**Number of stitches of tie stitching at the start of sewing** This item sets number of stitches of tie stitching at the start of sewing. 	0 to 8	1 stitch	–
S63	**Sewing pitch of tie stitching at the start of sewing** This item sets sewing pitch pf tie stitching at the start of sewing. 	0.00 to 0.70	0.05mm	***2**
S64	**Tie stitching width at the start of sewing** This item sets tie stitching width at the start of sewing. 	0.0 to 3.0	0.1mm	–
S65	**Lengthwise compensation of tie stitching at the start of sewing** This item sets start position of tie stitching in lengthwise direction at the start of sewing. 	0.0 to 5.0	0.1mm	***2**
S66	**Crosswise compensation of tie stitching at the start of sewing** This item sets start position of tie stitching in crosswise direction at the start of sewing. 	0.0 to 2.0	0.1mm	***2**
S67	**Tie stitching width at the end of sewing** This item sets tie stitching width at the end of sewing. 	0.1 to 1.5	0.1mm	–
S68	**Number of stitches of tie stitching at the end of sewing** This item sets number of stitches of tie stitching at the end of sewing. 	0 to 8	1 stitch	–
S69	**Lengthwise compensation of tie stitching at the end of sewing** This item sets start position of tie stitching in lengthwise direction at the end of sewing. 	0.0 to 5.0	0.1mm	***2**

*** 2 : Displayed when it is set to with edit. Refer to. Method of setting sewing data with/without edit (Instruction Manual).**

*** 3 : Displayed when the function is selected.**

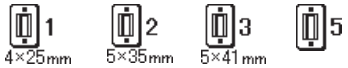
NO	Item	Setting range	Edit unit	Remarks
S70	**Crosswise compensation of tie stitching at the end of sewing** This item sets start position of tie stitching in crosswise direction at the end of sewing. 	0.0 to 2.0	0.1mm	***2**
S81	**Knife motion** This item sets "With/without motion" of normal cloth cutting knife.  : **Normal knife motion OFF**  : **Normal knife motion ON**	–	–	–
S83	**Knife motion at 1st cycle of double stitching** This item sets "With/without motion" of cloth cutting knife at 1st cycle when double stitching is performed.  : **Normal knife motion OFF**  : **Normal knife motion ON**	–	–	***2, *3**
S84	**Maximum speed limitation** This item sets max. speed limitation of the sewing machine. The maximum value of data edit is equal to the number of revolutions of **K07 Maximum speed limitation** of the memory switch data. → Refer to **8.-(2) Memory switch list** 	400 to 4200	100rpm	–
S86	**Pitch of going** This item sets sewing pitch of going side of bar-tacking shape (Shape Nos. 27, 28, 29 and 30 of S01). 	0.200 to 2.500	0.025mm	–
S87	**Width of going** This item sets width of going side of bar-tacking shape (Shape Nos. 27, 28, 29 and 30 of S01). 	0.1 to 3.0	0.05mm	–
S88	**Pitch of returning** This item sets sewing pitch of returning side of bar-tacking shape (Shape Nos. 27, 28, 29 and 30 of S01). 	0.200 to 2.500	0.025mm	–
S89	**Width of returning** This item sets width of returning side of bar-tacking shape (Shape Nos. 27, 28, 29 and 30 of S01). 	0.1 to 3.0	0.05mm	–

*** 1 : Displayed according to the shape**
*** 2 : Displayed when it is set to with edit. Refer to. Method of setting sewing data with/without edit (Instruction Manual).**
*** 3 : Displayed when the function is selected.**

(3) Memory switch data list

1) Level 1

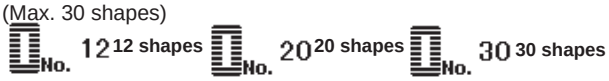
☆ Memory switch data (level 1) are the motion data that the sewing machine has in common and the data that operate on all sewing patterns in common.

No.	Item	Setting range	Edit unit	Initial value
U01	**Presser lifter maximum position** Height of maximum position of pedal operation is set. 	0 to 14.0	0.1mm	14.0mm
U02	**Presser lifter intermediate position** Height of intermediate position of pedal operation is set. 	0 to 14.0	0.1mm	6.0mm
U03	**Presser lifter cloth setting position** Height of cloth setting position of pedal operation is set. 	0 to 14.0	0.1mm	0.0mm
U06	**Needle thread tension at sewing end setting** 	0 to 200	1	50
U07	**Needle thread tension at thread trimming setting** 	0 to 200	1	35
U08	**Needle thread tension of basting for sewing together setting** 	0 to 200	1	60
U09	**Soft-start speed setting 1st stitch** 	400 to 4200	100rpm	800rpm
U10	**Soft-start speed setting 2nd stitch** 	400 to 4200	100rpm	800rpm
U11	**Soft-start speed setting 3rd stitch** 	400 to 4200	100rpm	2000rpm
U12	**Soft-start speed setting 4th stitch** 	400 to 4200	100rpm	3000rpm
U13	**Soft-start speed setting 5th stitch** 	400 to 4200	100rpm	4000rpm
U14	**Kind of presser** Set the kind of the presser. → **7.- (4) Inputting the presser type** (Refer to Instruction Manual.) 	–	–	Type 1
U15	**Presser size width** When type 5 of U14 Kind of presser is set, input the width of the presser. 	3.0 to 10.0	0.1mm	3.0mm
U16	**Presser size length** When type 5 of U14 Kind of presser is set, input the length of the presser. 	10.0 to 120.0	0.5mm	10.0mm
U17	**Sewing start position (Feed direction)** Sewing start position in terms of presser is set. Set this item when starting position is desired to be shifted due to overlapped section or the like. 	2.5 to 110.0	0.1mm	2.5mm
U18	**Cloth cutting knife size** Input knife size used. 	3.0 to 32.0	0.1mm	32.0mm
U19	**Function of plural motions of cloth cutting knife Ineffective/effective** 	–	–	Ineffective
U20	**Function of thread breakage detection Ineffective/effective** 	–	–	Effective

No.	Item	Setting range	Edit unit	Initial value
U23	**Needle thread trimming motion start distance** Distance from the start of sewing to the start of needle thread trimmer release motion is inputted. 	0 to 15.0	0.1mm	1.0mm
U24	**Bobbin thread trimming motion start distance** Distance from the start of sewing to the start of bobbin thread trimmer release motion is inputted. 	0 to 15.0	0.1mm	1.5mm
U25	**Counter updating unit** Unit to update sewing counter is set. 	1 to 30	1	1
U26	**Total number of stitches Non-display/Display**  **Non-display**  **Display**	–	–	Non-display
U51	**Start switch selection** When knee switch is selected, start of preset is performed with knee switch and preset is cancelled with hand switch. (A mode) When hand switch is selected, start of preset is performed with hand switch and preset is cancelled with knee switch. (B mode)  **Knee switch**  **Hand switch**	–	–	Knee switch
U52	**Use of with/without cloth detection selection** When with cloth detection is selected, start of preset is not performed unless cloth is set on the cloth detection sensor. When without cloth detection is selected, start of preset is performed even when cloth is not set on the cloth detection sensor.  **With cloth detection**  **Without cloth detection**	–	–	With cloth detection
U53	**Jump feed function selection** When with jump feed is selected, it is possible to input jump feed amount before the first sewing pattern of the input screen.  **Without jump feed**  **With jump feed**	–	–	Without jump feed
U54	**Use of pair stacking setting** When with pair stacking selection is selected, selection of pair stacking effective/ineffective can be performed in the input screen.  **Without selection**  **With selection**	–	–	Without selection

2) Level 2

☆ Press [M] key for six seconds and it is possible to edit.

NO.	Item	Setting range	Edit unit	Initial value
K03	**Function of prohibition of selection of kind of presser Permitted/Prohibited** Prohibition of change of U14 Kind of presser is set.  Change permitted  Change prohibited	–	–	Change permitted
K04	**Sewing shape selection level** Number of sewing shapes which can be sewn can be increased. (Max. 30 shapes) 	–	–	12 shapes
K05	**Cloth cutting knife power** Output power of cloth cutting knife is set. 0 : Min. power → 3 : Max. power 	0 to 3	1	1
K06	**Selection of machine type** Type of sewing machine head is set. 0 : Standard type 1 : Dry head type 	0 to 1	1	0 (Standard type)
K07	**Max. speed limitation speed setting** Max. speed of sewing machine can be limited. When K06 Selection of machine type is set to dry head type, max. speed is automatically limited to 3,300 rpm. 	400 to 4200	100rpm	3600 rpm
K08	**Compensation of unsteady needle thread tension** Output value of needle thread tension is wholly offset and compensated. 	-30 to 30	1	0
K09	**Output time of needle thread tension changed value** When data related to needle thread tension is changed, the changed value is output as long as the set-up time.  Without output  Output of set-up time	0 to 20	1s	Without output
K10	**Function of origin retrieval each time** Origin retrieval is performed after completion of sewing or completion of cycle.  Without  After end of sewing  After end of cycle	–	–	Without
K12	**Knife solenoid lowering time setting** 	25 to 100	5ms	35
K13	**Knife solenoid lifting time setting** 	5 to 100	5ms	15
K14	**Knife cylinder lowering time (Optional)** 	5 to 300	5ms	70
K15	**Y-feed motor origin compensation** 	-120 to 400	1 pulse (0.025mm)	0
K16	**Needle-rocking motor origin compensation** 	-10 to 10	1 pulse (0.05mm)	0
K17	**Presser lifter motor origin compensation** 	-100 to 10	1 pulse (0.05mm)	0

No.	Item	Setting range	Edit unit	Initial value
K19	**Thread trimming on the way in continuous stitching Permitted/Prohibited**  **Permitted**  **Prohibited**	–	–	Permitted
K20	**Cloth cutting knife return power** This item sets output power at the time of returning the cloth cutting knife. 0 : Min. power → 3 : Max. power 	0 to 3	1	0
K21	**Release amount of bobbin thread trimmer at the start of sewing** This item sets the amount of releasing the bobbin thread trimmer at the statrt of sewing. 	1 to 15	1 pulse	8
K22	**Presser lifter speed selection** When set value is increased, presser lifting speed is increased. 	1 to 3	1	1

9. ELECTRICAL COMPONENTS

(1) Initialization of the data

Sewing data, pattern No., etc. can be returned to the state at the time of your purchase by initializing data ROM.

When initialization is performed, all data such as added pattern, vector data downloaded from smart media, etc. that are created by the customers are deleted. So, be careful.

However, maintenance and inspection information (oil replacing time, needle replacing time, cleaning time, etc.) is not initialized.

Initializing procedure

Simultaneously working three functions below, turn ON the power switch.

① Knee switch ON (pressed state).

② Head pause switch ON (pressed state).

③ Detach the thread breakage detection spring from the detection plate (state that thread is not broken).

The normal initial screen is displayed for a while after the start of initialization. Then E001 (data ROM initialization completion display) appears. Turn OFF the power.

Initialization is completed with the procedure above.

(2) Adaptation to the high voltage

200 to 240V and 3-phase 200 to 240V power voltage.

When using this machine with 3-phase 380 to 440V power voltage or the like, prepare the externally installed transformer separately and reduce the voltage.

Specifications of transformer for reducing voltage

Item	Description
Number of phases	3-phase or single phase
Primary input voltage	Set to power voltage used.
Secondary output voltage	220AC (200 to 240V possible)
Output capacity	1kVA or more

In addition, the machine is equipped with 3-phase blower motor for 3-phase type and single phase blower motor for single phase type respectively.

For the machine equipped with 3-phase blower motor, be sure to use 3-phase transformer for reducing voltage.

(3) DIP switches

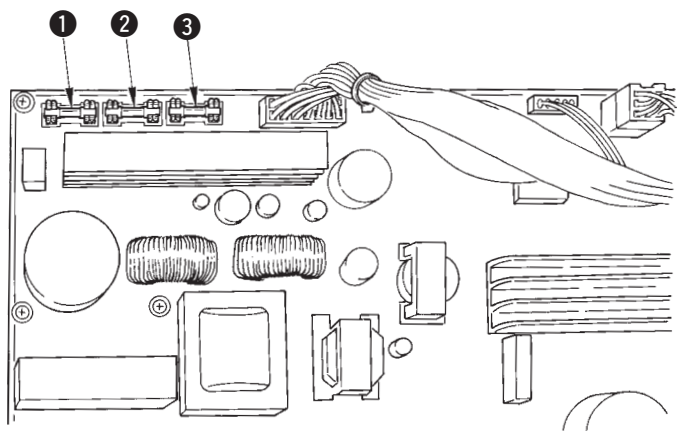
Be sure to keep DIP switches mounted on the respective printed circuit boards in the state of delivery (all OFF).

(4) Fuse list

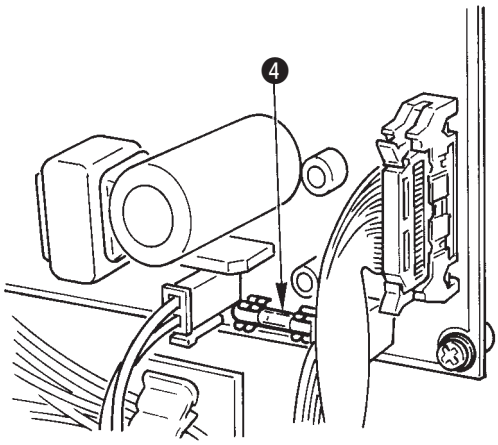
Fuse list mounted on the respective printed circuit boards in the control box is shown in the table below.

No.	Location	Kind	JUKI Part No.	Remarks
❶	SDC p.c.b. F1	250V/5A time-lag fuse ø5.2 X L20	HF0013050P0	For stepping motor/knife solenoid power (+48V) protection Mounted on the fuse clip 1 pc. is packed together as accessories.
❷	SDC p.c.b. F2	250V/3.15A time-lag fuse ø5.2 X L20	HF00130315S	For stepping motor/tension solenoid power (+33V) protection Mounted on the fuse clip 1 pc. is packed together as accessories.
❸	SDC p.c.b. F3	250V/2A fast-blow type fuse ø5.2 X L20	HF003000200	For LCD/fan motor power (+24V) protection Mounted on the fuse clip 1 pc. is packed together as accessories.
	SDC p.c.b. F4	250A/4A time-lag fuse ø5.2 X L20	HF0089040P0	For switching power primary circuit protection Fixed on p.c.b. by soldering
	SDC p.c.b F5	250V/4A time-lag fuse ø5.2 X L20	HF0089040P0	For switching power primary circuit protection Fixed on p.c.b. by soldering
	FLT p.c.b. F1	250V/20A time-lag fuse ø6.35 X L30	HF006802000	For AC input protection Fixed on p.c.b. by soldering
	FLT p.c.b. F2	250V/20A time-lag fuse ø6.35 X L30	HF006802000	For AC input protection Fixed on p.c.b. by soldering
	FLT p.c.b. F3 (FLT-T p.c.b. only)	250V/20A time-lag fuse ø6.35 X L30	HF006802000	For AC input protection Fixed on p.c.b. by soldering
❹	I/O p.c.b. F1	250V/4A time-lag fuse ø5.2 X L20	HF0013040P0	For carriage motor power protection Mounted on the fuse clip 1 pc. is packed together as accessories.

SDC p.c.b.

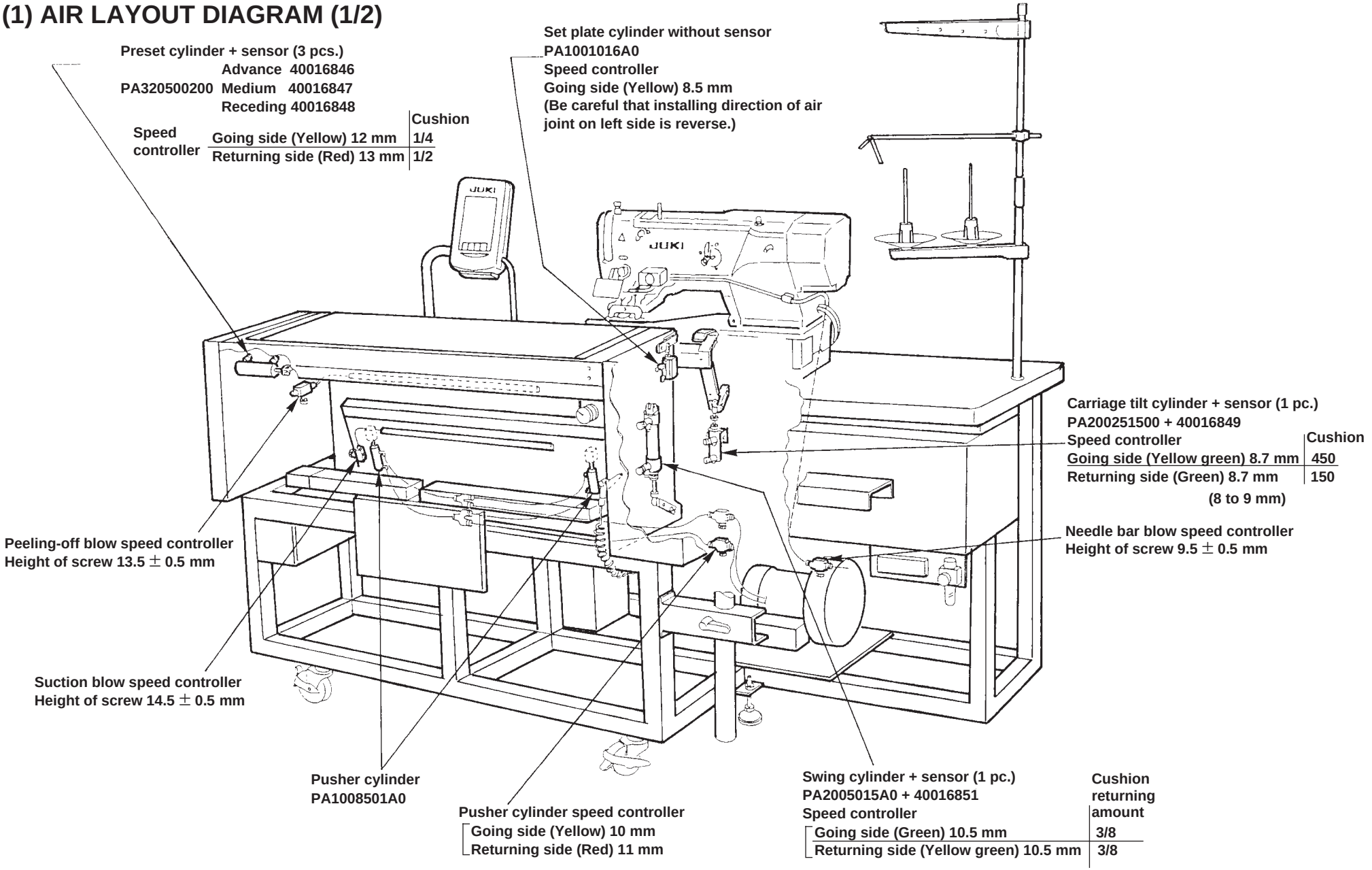


I/O p.c.b.

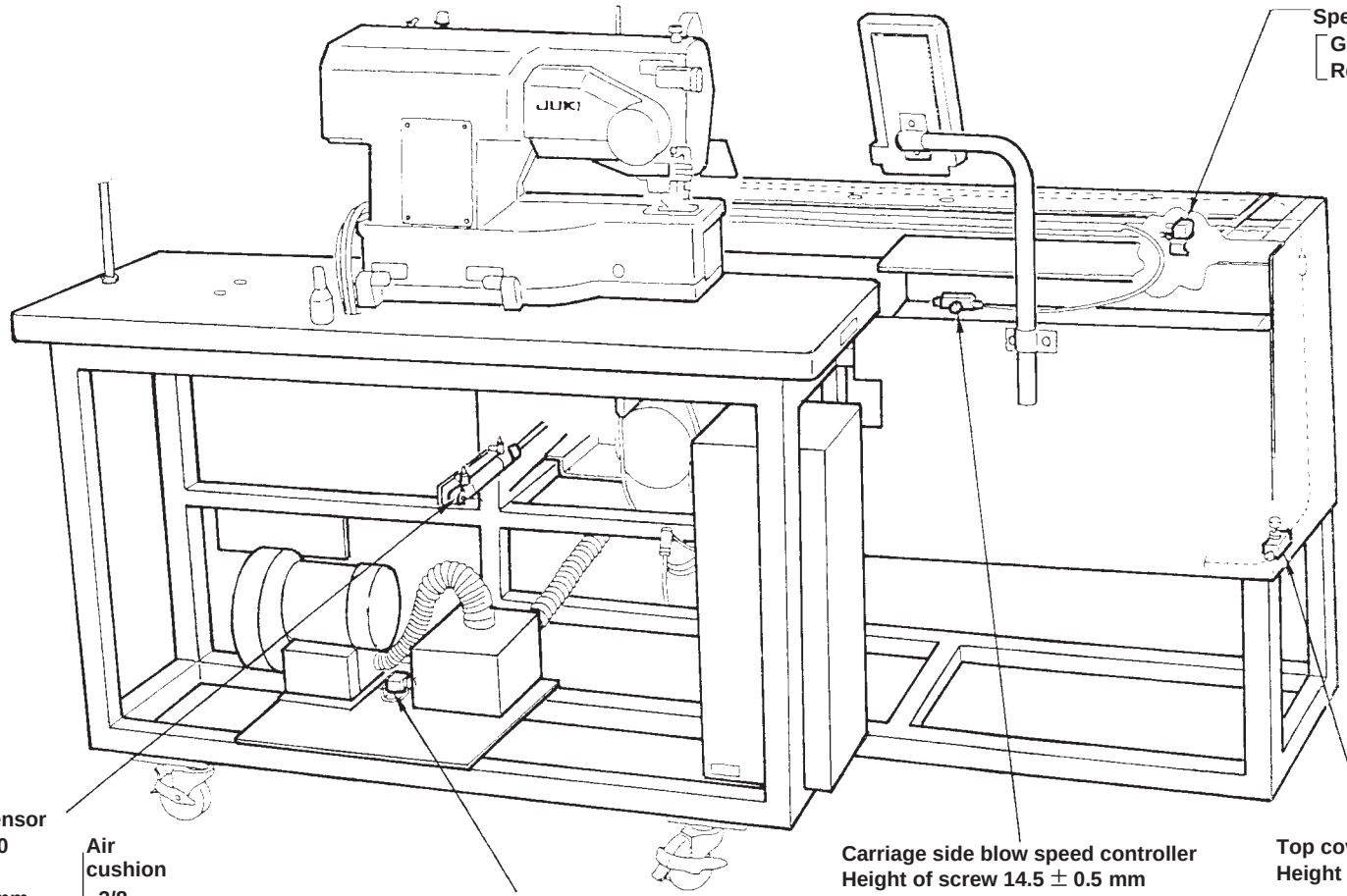


10. MAINTENANCE AND INSPECTION

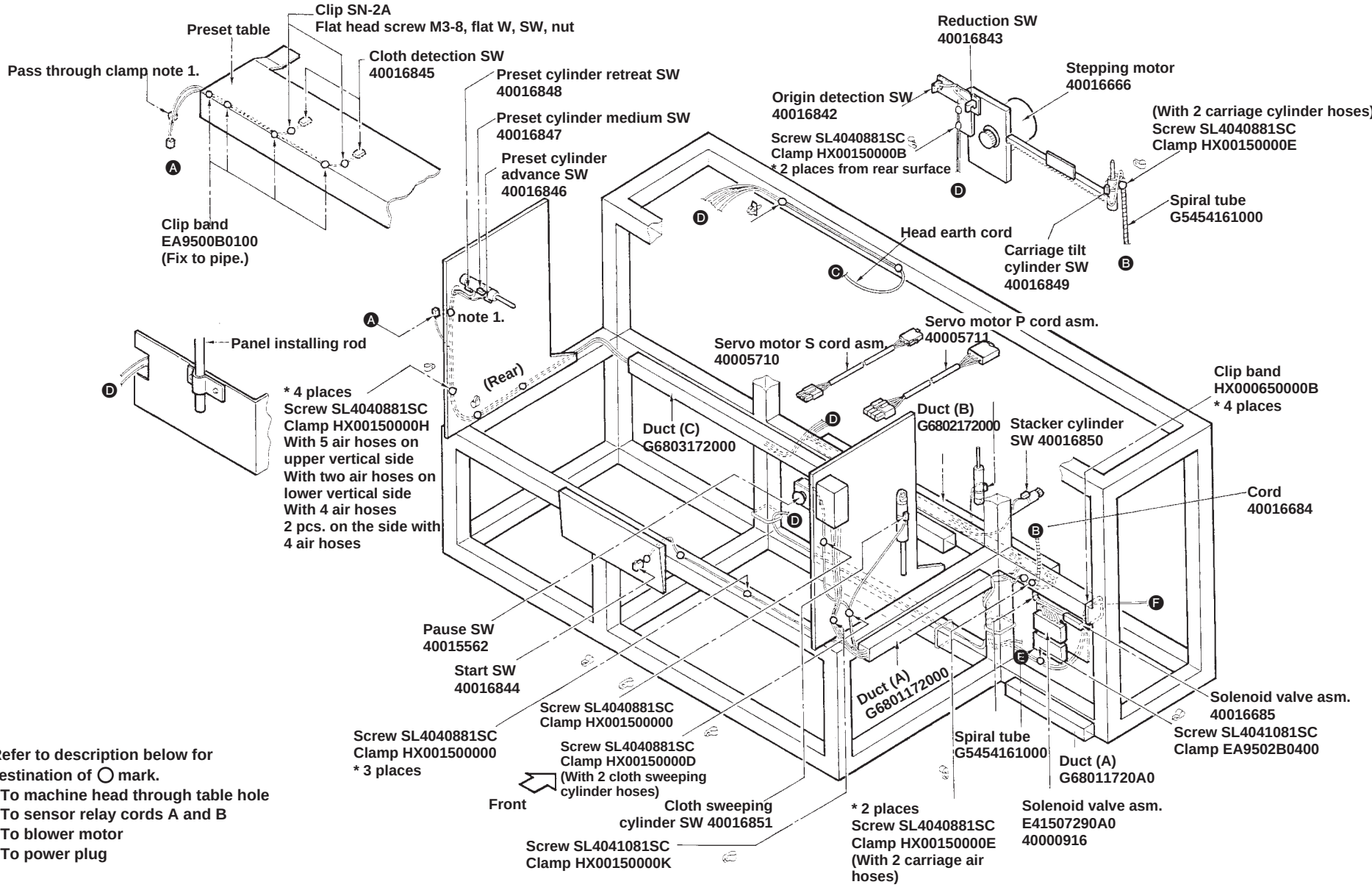
(1) AIR LAYOUT DIAGRAM (1/2)



AIR LAYOUT DIAGRAM (2/2)



(2) SENSOR LAYOUT DIAGRAM



* Refer to description below for destination of ◯ mark.
- Ⓒ To machine head through table hole
- Ⓓ To sensor relay cords A and B
- Ⓔ To blower motor
- Ⓕ To power plug

11. TROUBLES AND CORRECTIVE MEASURES

(For the trouble and corrective measures other than those described below, refer to the ERROR CODE LIST in Engineer's Manual or Instruction Manual (CD) for LBH-1790 series.)

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
1. Display fails to appear on the operarion panel.	1-1) DC power is not supplied.	1)-A AC power is not supplied.	Check whether the power comes to the power switch.
		1)-B Power is not supplied to FLT p.c.b.	Check whether AC voltage comes between 4 and 5 pins of CN1 of FLT p.c.b. When it does not come, check the connection of power switch.
		1)-C Power is not supplied to SDC p.c.b.	Check whether DC280V comes between 1 and 3 pins of CN17 of SDC p.c.b. When it does not come, check the connection with FLT p.c.b. If the connection has no problem, replace FLT p.c.b.
		1)-D Power is not supplied to MAIN p.c.b.	Check whether DC5V comes between 7 and 14 pins of CN31 and DC24V between 5 and 12 pins. If they do not come, check the connection with SDC p.c.b. If the connection has no problem, rteplace SDC p.c.b.
		1)-E Power is not supplied to operation panel.	Check whether cable from operation panel is connected to CN34 of MAIN p.c.b. If the connection has no problem, replace MAIN p.c.b.
	1-2) Micro computer of operation panel fails to work.	2)-A DIP switch setting of PANEL p.c.b. is improper.	Check whether SW2 of operation panel is set to 1-ON and 2-OFF.
		2)-B Breakdown of PANEL p.c.b.	Turn ON the power and press panel key. If there is no buzzer sound, PANEL p.c.b. is broken down.
	1-3) Connector of LCD is disconnected.		Check the connection of CN105 of PANEL p.c.b.
	1-4) Breakdown of PANEL p.c.b. or breakdown of LCD.		When the above check is OK, breakdown of PANEL p.c.b. or breakdown of LCD.
2. Back-light of operation panel fails to light up.	2-1) Connector of back-light is disconnected, or wire is broken.		Check the connection of CN108 of PANEL p.c.b.
	2-2) Breakdown of inverter of PANEL p.c.b.		When the above check is OK, inverter U22 of PANEL p.c.b. is broken down.
3. Key of operation panel fails to work.	3-1) Signal is not transmitted.	1)-A Connector of touch panel is disconnected.	Check whether CN109 of PANEL p.c.b. is connected or wire is broken down.
		1)-B Breakdown of touch panel	When the specific key only fails to work, touch panel is broken down.
4. Knee switch fails to work.	4-1) Signal is not properly transmitted.	1)-A Connector of sensor relay cord A asm. is disconnected, or wire is broken down.	Check the connection of relay connector CN217 and CN104 of I/O p.c.b., or whether wire is broken down. Refer to "Device sensor circuit diagram".
		1)-B Breakdown of switch	Check with tester whether switch turns ON/OFF properly.
		1)-C Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
5. Hand switch fails to work.	5-1) Signal is not properly transmitted.	1)-A Connector of sensor relay cord A asm. is disconnected, or wire is broken down.	Check the connection of CN219 of relay connector and CN104 of I/O p.c.b., or whether wire is broken down.
		1)-b Breakdown of switch	Check with tester whether switch turns ON/OFF properly.
		1)-C Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.
6. Cloth detection sensor fails to work.	6-1) Signal is not properly transmitted.	1)-A Connector of relay cord A asm. is disconnected or wire is broken down.	Check the connection of CN221 of relay connector and CN104 of I/O p.c.b., or whether wire is broken down.
		1)-B Breakdown of sensor or breaking of wire	Place a reflecting object on the sensor and check that the lamp of sensor works ON/OFF. Lamp is located on the front side of sensor surface. If it fails to work ON/OFF, the sensor is broken down or wire is broken down at connector section.
		1)-C Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.
7. Pause switch fails to work.	7-1) Signal is not properly transmitted.	1)-A Connector of sensor relay cord A asm. is disconnected or wire is broken down.	Check the connection of CN218 of relay connector and CN104 of I/O p.c.b. or whether wire is broken down. Refer to "Device sensor circuit diagram".
		1)-B Breakdown of switch or breaking of wire	Check calking of the terminal at switch section. Check with tester ON/OFF of switch.
		1)-C Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.
8. Air cylinders or blowers of cloth suction, carriage clamp, pusher tilt, cloth blow, etc. fails to work properly. *** For preset table, cloth sweep bar and carriage rise, refer to the items E984 to 987.**	8-1) Air cylinder or solenoid valve fails to work properly.	1)-A Connector of solenoid valve cord asm. is disconnected or wire is broken down.	Check the connection of connector referring to (8) "Solenoid valve circuit diagram". • Solenoid valve 2 .... Cloth suction • Solenoid valve 3 .... Carriage clamp • Solenoid valve 4 .... Pusher up/down • Solenoid valve 7 .... Pusher • Single solenoid valve .... Cloth blow
		1)-B Air pressure is too low or air is not supplied.	Check whether air pressure is 0.5MPa.
		1)-C Speed controller is excessively tightened.	Adjust speed controller.
		1)-D Breakdown of solenoid valve	Check whether internal solenoid working noise occurs. Or, turn ON solenoid valve with the manual switch.
		1)-E Breakdown of air cylinder	Remove quick joint, move the moving part to and fro by hand, and check whether cylinder is abnormal. If the moving part fails to work smoothly, cylinder is broken down.
		1)-F Adjustment of air cushion of air cylinder is improper.	Adjust the air cushion of air cylinder. For the adjustment value, refer to the adjustment of each mechanism section.
		1)-G Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
9. Error E011 External media not inserted error repeatedly occurs.	9-1) Smart media cannot be detected.	1)-A Terminal of smart media or connector terminal of panel is dirty.	Perform cleaning of terminal of smart media, or cleaning of connector terminal of panel by air.
		1)-B Smart media is inserted on the other side.	Properly insert the smart media.
		1)-C Breakdown of smart media	Try with another smart media and smart media is broken down if there is no problem. Use a new formatted smart media.
		1)-D Damage of connector terminal of panel or breakdown of PANEL p.c.b.	When the above check is OK, PANEL p.c.b. is broken down.
10 Error E012 to 016 Error related to external media repeatedly occurs.	10-1) Smart media is abnormal.		Check whether write-protect seal is pasted on smart media, capacity is OK (try after decreasing size), etc.
	10-2) Proper access to smart media is not performed.	2)-A Terminal of smart media or connector terminal of panel is dirty.	Perform cleaning of terminal of smart media, or cleaning of connector terminal of panel by air.
		2)-B Breakdown of smart media	Try with another smart media and smart media is broken down if the re is no problem. Use a new formatted smart media.
		2)-C Damage of connector terminal of panel or breakdown of PANEL p.c.b.	When the above check is OK, PANEL p.c.b. is broken down.
11. Error E017 EEPROM capacity over error repeatedly occurs.	11-1) Capacity of EEPROM is short.		Check whether capacity is OK. Try after decreasing the data size. In case of vector data created with PM-1, be careful since the capacity is increased.
	11-2) EEPROM cannot perform reading/writing.	2)-A Breakdown of EEPROM	Replace EEPROM.
12. Error E018 EEPROM type error repeatedly occurs.	12-1) EEPROM cannot perform reading/writing.	1)-A Type setting of EEPROM is improper.	Check the jumper for EEPROM type setting. Refer to "Changing data ROM" in Engineer's Manual for LBH-1790 series. 128K byte is equipped as standard for this machine.
		1)-B Breakdown of EEPROM	Replace EEPROM.
13. Error E019 File size over error repeatedly occurs.	13-1) Size of vector data downloading from smart media is too big.		Try after decreasing data size such as decreasing number of stitchings or the like. in case of vector data created with PM-1, be careful since the capacity is increased.
14. Error E022 File No. error repeatedly occurs.	14-1) Reading of the file of specified pattern No. cannot be performed.	1)-A There is no file of specified pattern No. on smart media or server computer.	Select pattern No. existing on smart media or server computer.
15. Error E023 Presser lifting motor step-out detection error repeatedly occurs.	15-1) Edge of sensor detecting plate is not properly detected.	1)-A There is abnormality of heavy load or the like of mechanism section.	Check mechanism section whether there is any especial place of heavy load, screw is loosened, etc.
16. Error E024 Pattern data size over error repeatedly occurs.	16-1) Memory (RAM) capacity of MAIN p.c.b. is over.		Decrease data amount (number of holes, number of stitches, etc.) and try.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
17. Error E027 to 028 Error related to the communication with server repeatedly occurs.	17-1) Communication data between operation panel and server computer is abnormal.	1)-A Cable noise between operation panel and server computer is on the data.	Improve the communiatio environment. Check whether there is any noise source or cable is too long.
18. Error E029 Smart media slot lid release error repeatedly occurs.	18-1) Click of smart media slot lid is deformed or broken.		Check whether there is any abnormal part on the click.
	18-2) Detection swith fails to work.	2)-A Breakdown of the switch or breakdown of PANEL p.c.b.	When the above check is OK, switch is broken down or PANEL p.c.b. is broken down.
19. Error E042 Operation error repeatedly occurs.	19-1) Sewing data is broken due to some cause.		Initialize the data and check. Refer to "Initialization of the data".
20. Error E043 Enlargement error repeatedly occurs.	20-1) Max. feed pitch exceeds 5 mm.	1)-A Set value of enlarge/reduction (S94) in Y direction is improper.	Make S94 small so that max. pitch is 5 mm or less. Refer to "3-3-2 Vector parameter list" in Instruction Manual (Machine operation).
21. Error E050 Error occurs even when stop switch is not pressed.	21-1) Signal is not properly transmitted.	1)-A Connection with relay cord is disconnected. Or, connector of INT p.c.b. is disconnected.	Check the wiring in machine head. Check whether relay cord CN96 of stop switch is disconnected. Or, check the connection of CN75 of INT p.c.b.
		1)-B Breaking of wire of MAIN-INT cord B asm.	Check whether there is any breaking of wire in MAIN-INT cord B asm. Refer to "Connection circuit diagram between control box and head" ∞ in Engineer's Manual for LBH-1790 series.
		1)-C Breakdown of stop switch	Check whether there is any braking of wire of terminal, or switch works ON/OFF.
	21-2) Breakdown of MAIN p.c.b.		When the above check is OK, MAIN p.c.b. is broken down.
22. E052 Thread breakage detection error repeatedly occurs.	22-1) Signal is not properly transmitted.	1)-A Connector of INT p.c.b. is disconnected.	Check the connection of CN76 of INT p.c.b.
		1)-B Breaking of wire of MAIN-INT cord B asm.	Check whether there is any breaking of wire in MAIN p.c.b. cord B asm. Refer to "Connection circuit diagram between control box and head".
		1)-C Thread breakage detection plate comes in contact with frame.	Check whether thread breakage detection plate comes in contact with the frame at thread tension section.
	22-2) Breakdown of MAIN p.c.b. or INT p.c.b.		When the above check is OK, MAIN p.c.b. or INT p.c.b. is broken down.
23. Error E401 Copy impossible error repeatedly occurs.	23-1) Copying is tried to pattern No. which has been already registered.		Select pattern No. which is not registered and perform copying.
24. Error E402 Pattern deletion error repeatedly occurs.	24-1) Pattern which cannot be deleted is tried to delete.		Deletion of pattern data is not possible in case of the description below. • The pattern is used in the continuous sewing data • The pattern is used in the cycle sewing. • Pattern which has been registered is only one.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
25. Error E478 to 479 Beyond carriage movable range error repeatedly occurs.	25-1) Sewing data is improper.	1)-A Carriage exceeds movable range (610 mm (right end) from left end (origin)) with the inputted sewing data.	In case of the description below, data that carriage exceeds the left end is inputted. • (In case of men's wear), buttonhole length (knife size) is large. • (In case of start of sewing of men's wear), there is the continuous sewing. In addition, in case of the description below, data that carriage exceeds the right end is inputted. • (In case of ladies' wear), buttonhole length (knife size) is large. • (In case of start of sewing of ladies' wear), there is the continuous sewing.
26. Error E917 Communication error between operation panel and personal computer repeatedly occurs.	26-1) Communication has been performed in the state that the cable between operation panel and server computer is not connected.	1)-A Cable not properly connected, or wire is broken.	Check the connection of cable. Cable used is of reverse type (cross type).
27. Error E948 EROM error occurs.	27-1) Program cannot be written in the built-in flash memory of operation panel.		Breakdown of PANEL p.c.b.
28. Error E983 to 984 Carriage rise error repeatedly occurs.	28-1) Cylinder sensor cannot be detected.	1-A) There is an abnormality such as a heavy load of mechanism section (air cylinder) or the like.	Check mechanism section whether there is any especial place of a heavy load, any jar, any interference, etc.
		1)-B Installing position of cylinder sensor is not proper.	Check that sensor is set to the position where it works ON in the state that carriage is raised.
		1)-C Breakdown of cylinder sensor or breakdown of air cylinder	Check that lamp of sensor works ON/OFF when raising or tilting carriage. If it does not work ON/OFF, sensor is broken or air cylinder is broken.
	28-2) Cylinder sensor signal is not transmitted up to IC of I/O p.c.b.	2)-A Connector of sensor relay cord A asm. is disconnected or wire is broken.	Check the connection of relay connector CN216 and CN104 of I/O p.c.b. In addition, check whether wire is broken. Refer to " Device sensor circuit diagram".
		2)-B Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken down.
	28-3) Air cylinder fails to work properly.	3)-A Connector of solenoid valve cord asm. is disconnected, or wire is broken.	Check the connection of connector of solenoid valve 6 and CN106 of I/O p.c.b.
		3)-B Air pressure is too low or air is not supplied.	Check that air pressure is 5MPa.
		3)-C Speed controller is excessively tightened.	Adjust speed controller.
		3)-D Breakdown of solenoid valve	Check that working noise of inside solenoid occurs.
		3)-E Breakdown of air cylinder	Move carriage to and fro by hand and check whether there is an abnormality. If it does not move smoothly, cylinder is broken.
		3)-F Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
29. Error E985 to 986 Preset advance/retreat error repeatedly occurs.	29-1) Cylinder sensor cannot be detected.	1)-A There is an abnormality such as a heavy load of mechanism section (air cylinder) or the like.	Check mechanism section whether there is any especial place of a heavy load, any jar, any interference, etc.
		1)-B Installing position of cylinder sensor is not proper.	Check whether each sensor is set to the position where it works ON within the movable range of preset table. There are three sensors. Check ON of each sensor at most advanced position, medium position and most receded position.
		1)-C Breakdown of cylinder sensor or breakdown of air cylinder	Check that lamp of each sensor works ON/OFF when preset table is moved to and fro by hand. If it does not work ON/OFF, sensor is broken or air cylinder is broken.
	29-2) Cylinder sensor signal is not transmitted up to IC of I/O p.c.b.	2)-A Connector of sensor relay cord A asm. is disconnected or wire is broken.	Check the connection of relay connectors CN213, 214 and 215, and CN104 of I/O p.c.b.. In addition, check whether there is any breaking of the wire. Refer to "Device sensor circuit diagram".
		2)-B Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
	29-3) Air cylinder fails to work properly.	3)-A Connector of solenoid valve cord asm. is disconnected or wire is broken.	Check the connection of connector of solenoid valve 1 and CN106 of I/O p.c.b.. In addition check whether there is any breaking of the wire. Refer to "Device sensor circuit diagram".
		3)-B Air pressure is low or air is not supplied.	Check that air pressure is 5MPa.
		3)-C Speed controller is excessively tightened.	Adjust speed controller.
		3)-D Breakdown of solenoid valve	Check that working noise of inside solenoid occurs.
		3)-E Breakdown of air cylinder	Move preset table to and fro by hand and check whether cylinder is abnormal. If it does not move smoothly, cylinder is broken.
		3)-F Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
30. Error E987 Cloth sweeping bar motion error repeatedly occurs.	30-1) Cylinder sensor cannot be detected.	1)-A There is an abnormality such as a heavy load of mechanism section (air cylinder) or the like.	Check mechanism section whether there is any especial place of a heavy load, any interference, etc.
		1)-B Installing position of cylinder sensor is not proper.	Check whether sensor is set to the position where it works ON at the middle position of movable range of cloth sweeping bar.
		1)-C Breakdown of cylinder sensor or breakdown of air cylinder	Check that lamp of sensor works ON/OFF when cloth sweeping bar is moved to and fro by hand. If it fails to work ON/OFF, sensor is broken or air cylinder is broken.

To the next page

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
From the previous oage			
	30-2) Cylinder sensor signal is not tramsmitted up to IC of I/O p.c.b.	2)-A Connector of sensor relay cord B asm. is disconnected, or wire is broken.	Check the connection of relay connector CN222 and CN105 of I/O p.c.b. In addition, check whether there is any breaking of the wire. Refer to "Device sensor circuit diagram".
		2)-B Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
	30-3) Air cylinder fails to work properly.	3)-A Connector of solenoid valve cord asm. is disconnected, or wire is broken.	Check the connection of connector of solenoid valve 5 and CN106 of I/O p.c.b. In addition, check whether there is any breaking of the wire. Refer to "Solenoid valve circuit diagram".
		3)-B Air pressure is low, or air is not supplied.	Check that air pressure is 5MPa.
		3)-C Speed controller is excessively tightened.	Adjust speed controller.
		3)-D Breakdown of solenoid valve	Check whether working noise of inside solenoid occurs.
		3)-E Breakdown of air cylinder	Move cloth sweeping bar to and fro by hand and check whether cylinder is abnormal. If it fails to move smoothly, cylinder is broken.
		3)-F Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
31. Error E988 Carriage origin retrieval error repeatedly occurs.	31-1) Sencor cannot detect edge of origin detection plate.	1)-A There is an abnormality such as a heavy load of mechanism section or the like.	Check mechanism section whether there is any especial place of a heavy load, any loose screw, etc.
		1)-B Sensor is broken, or wire is broken.	Shade sensor slit and check that lamp of sensor works ON/OFF. If it fails to work ON/OFF, sensor is broken or wire of connector section is broken.
	31-2) Sensor signal is not transmitted up to IC of I/O p.c.b.	2)-A Connector of sensor relay cord A asm. is disconnected, or wire is broken.	Check the connection of relay connectors CN211 and CN212, and CN104 of I/O p.c.b. In addition, check whether there is any breaking of the wire. Refer to "Device sensor circuit diagram",
		2)-B Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
	31-3) Motor fails to rotate properly.	3)-A Connector of I/O p.c.b. is disconnected.	Check the connection of CN107 of I/O p.c.b.
		3)-B Power is not supplied to I/O p.c.b.	Check the connection of CN101 and 115 of I/O p.c.b.
		3)-C Breakdown of motor	Remove CN107 of I/O p.c.b. and move carriage by hand to check. If there is any feeling of scratch or the like, motor is broken.
		3)-D Motor lead is broken.	Remove CN107 of I/O p.c.b. and check the resistance value between respective pins. Refer to "Carriage motor circuit diagram".
		3)-E Breakdown of I/O p.c.b.	When the above check is OK, I/O p.c.b. is broken.
32. Error E989 Carriage motor drive p.c.b. temperature error repeatedly occurs.	32-1) Heat sink temperature of I/O p.c.b. is 85ßC or higher.	1)-A Heat sink is not cooled.	Check whether control box is cooled. Check the clog of suction port, fan, etc.
	32-2) Breakdown of I/O p.c.b.		When the above check is OK, I/O p.c.b. is broken.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
33. Stacking is not performed.	33-1) Cloth is not piled on pusher unit.	1)-A Clamp table is not fully tilted.	Increase the tilting speed of carriage rise cylinder.
		1)-B Swing bar fails to work and cloth is not swept.	Adjust the cloth sweeping speed of swing bar cylinder.
			Tighten the rocking arm bracket clamping section.
		1)-C Pusher fails to work and fails to press cloth.	Increase the rising speed of pusher cylinder.
			Check pusher cylinder sensor.
		1)-D When carriage rises up, cloth cannot be brought back	Adjust so that clamp smoothly returns.
			Increase the speed on rising side of carriage rise cylinder.
		1)-E Pusher comes in one-side contact with cloth presser cushion.	Adjust parallel condition of pusher.
		1)-F When pusher comes down, cloth drops.	Decrease the lowering speed of pusher.
			Lower the position of pusher stay.
			Adjust the angle where unit rises.
			Check whether cloth size is within the specifications.
		1)-G Cloth is twisted with swing bar.	Increase peeling-off blow.
			Check the motion of pusher.
			Check whether cloth size is within the specifications.
	33-2) Stacking cannot be performed from pusher unit to cloth piling table.	2)-A Pusher unit fails to tilt.	Check cylinder or solenoid valve.
			Check the motion of solenoid valve unit while pusher is held raised.
		2)-B Pusher has come out before the unit comes in contact with cloth piling table.	Increase the tilt speed of pusher tilt cylinder.
		2)-C When pusher comes down, cloth drops.	Adjust the blowing direction of suction blower to the proper position.
			Move upward the installing position of suction blower.
			Loosen speed controller of suction blower and increase blowing.
			Adjust the whole unit and cylinder speed so that pusher can fully return.
		2)-D Unit interferes with swing bar when it tilts.	Increase the speed when the lowering speed of pusher is slow.
			Decrease the speed when the return speed of swing bar is fast.

TROUBLE	CAUSE (1)	CAUSE (2)	CORRECTIVE MEASURES
34. Stacked state is dirty.	34-1) Pusher unit is slanted in the carried state.	1)-A When carriage rises, cloth is returned.	Adjust so that cloth presser cushion presses cloth uniformly on right and left sides.
			Increase the carriage rise speed.
			Check so that release motion of carriage clamp becomes smooth.
		1)-B Cloth is not sucked with suction blow.	Adjust the suction blow.
	34-2) Pusher unit is slanted when stacking on the cloth piling table.	2)-A Pusher does not uniformly press on cloth piling table.	Adjust the parallelism of cloth piling table.
			Adjust the distortion of pusher unit.
		(In case of garment body with pocket, when stacking is performed up to approximately 120 to 140 pcs., the pocket side slightly comes out to this side.)	In case of garment body without pocket, loosen locknut and use the cloth piling table.
35. Noise occurs at the time of stacking.	35-1) Noise occurs when carriage tilts.	1)-A Pusher and clamp table interfere with each other.	Adjust the positions of pusher unit and clamp table.
	35-2) Noise occurs when pusher unit tilts.	2)-A Pusher and swing bar interfere with each other.	Adjust the lowering speed of pusher and the returning speed of swing bar.
		2)-B Suction blow is too strong and garment body flops.	Decrease suction blow.

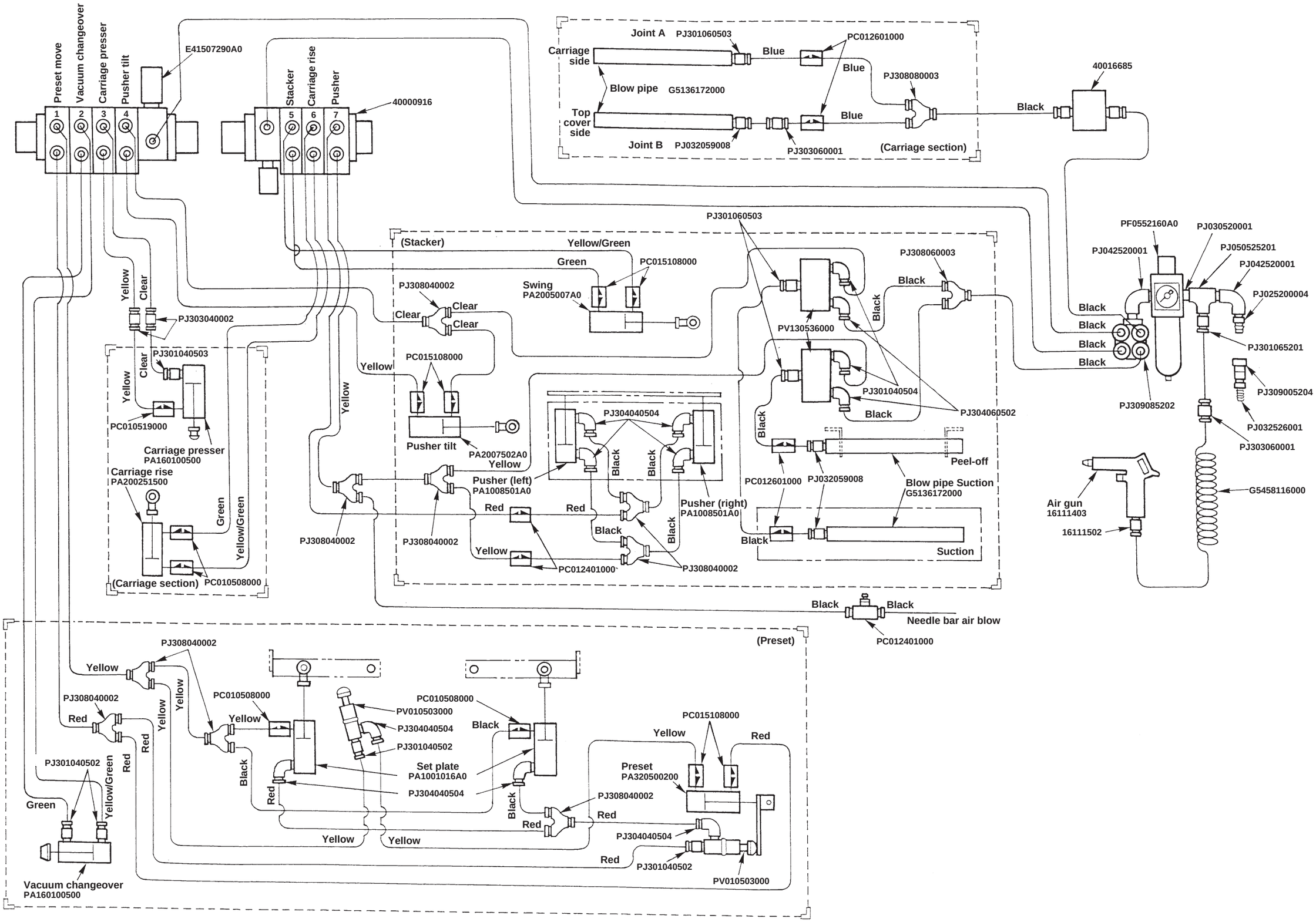
*** For the troubles of the sewing machine head, refer to the Engineer's Manual for LBH-1790 Series.**

(1) TROUBLES AND CORRECTIVE MEASURES

Troubles	Causes	Corrective measures	Page
1. Needle thread breakage	1. Thread tension at parallel section is too high.	Decrease the thread tension at parallel section.	PANEL OPERATION 2-9
	2. Pressure or stroke of thread take-up spring is too large.	Decrease the tension of thread take-up spring or decrease its stroke.	MACHINE OPERATION 6-5
	3. There is a burr or scratch on the blade point of hook.	Buff the blade point of hook. Or, replace the hook.	-
	4. Hook timing is not proper.	Adjust again the hook timing with timing gauge.	MACHINE OPERATION 6-1
	5. There is a scratch on the thread path.	Polish the thread path with sand paper and buff it.	-
	6. Attaching needle is wrong.	Adjust again the direction, height, etc.	MACHINE OPERATION 4-2(1)
	7. Needle is too thin.	Replace the needle with a thicker one.	-
	8. Needle tip is damaged.	Replace the needle.	-
2. Needle thread slips off.	1. Needle thread trimmer opens too early.	Delay the opening timing of the needle thread trimmer.	MACHINE OPERATION 6-2
	2. Whip stitching is not formed at the start of sewing.(Tension at the start of sewing is too high.)	Decrease tension at the start of sewing.(Sewing data S57)	PANEL OPERATION 2-7
	3. Threading needle thread is wrong.	Thread properly again.	MACHINE OPERATION 4-2(2)
	4. Speed at the start of sewing is too fast.	Set the soft-start function.(Memory switch data U09 to U13)	PANEL OPERATION 2-17
3. Wobbling at parallel section	1. Thread tension at parallel section is too low.	Increase the thread tension at parallel section.	PANEL OPERATION 2-9
	2. Bobbin thread tension is too high.	Decresase bobbin thread tension. (Purl stitching : 0.05 to 0.1N)	MACHINE OPERATION 4-2(4)
	3. Pre-tension is too low.	Increase pre-tension.	-
4. Wobbling at the start of sewing	1. Thread tension at parallel section is too low.	Increase the thread tension at parallel section.	PANEL OPERATION 2-9
	2. Position of needle thread trimmer is too high.	Lower the needle thread trimmer to such an extent that it does not come in contact with the presser.	MACHINE OPERATION 6-2
	3. Stroke of thread take-up spring is too large.	Decrease the stroke of thread take-up spring.	MACHINE OPERATION 6-5
5. Needle thread appears on the wrong side of material at bar-tacking section in dumpling condition.	1. Bar-tacking thread tension is too low.	Increase the bar-tacking thread tension.	PANEL OPERATION 2-9
	2. Bobbin thread tension is too high.	Decresase the bobbin thread tension. (0.05 to 0.1N)	MACHINE OPERATION 4-2(4)
	3. Number of stitches of radial shape is too many.	Decrease the number of stitches. (Sewing data S19)	PANEL OPERATION 2-7
	4. Tension at the end of sewing is too low.	Increase tension at the end of sewing. (Memory switch data U06)	PANEL OPERATION 2-17
6. Stitches float.	1. Bobbin thread tension is too low.	Increase the bobbin thread tension.	MACHINE OPERATION 4-2(2)
	2. Bobbin thread comes off bobbin case.	Perform proper threading the bobbin case.	MACHINE OPERATION 4-2(3)
		Take care that the winding amount of bobbin thread is not excessive.	PANEL OPERATION 1-6

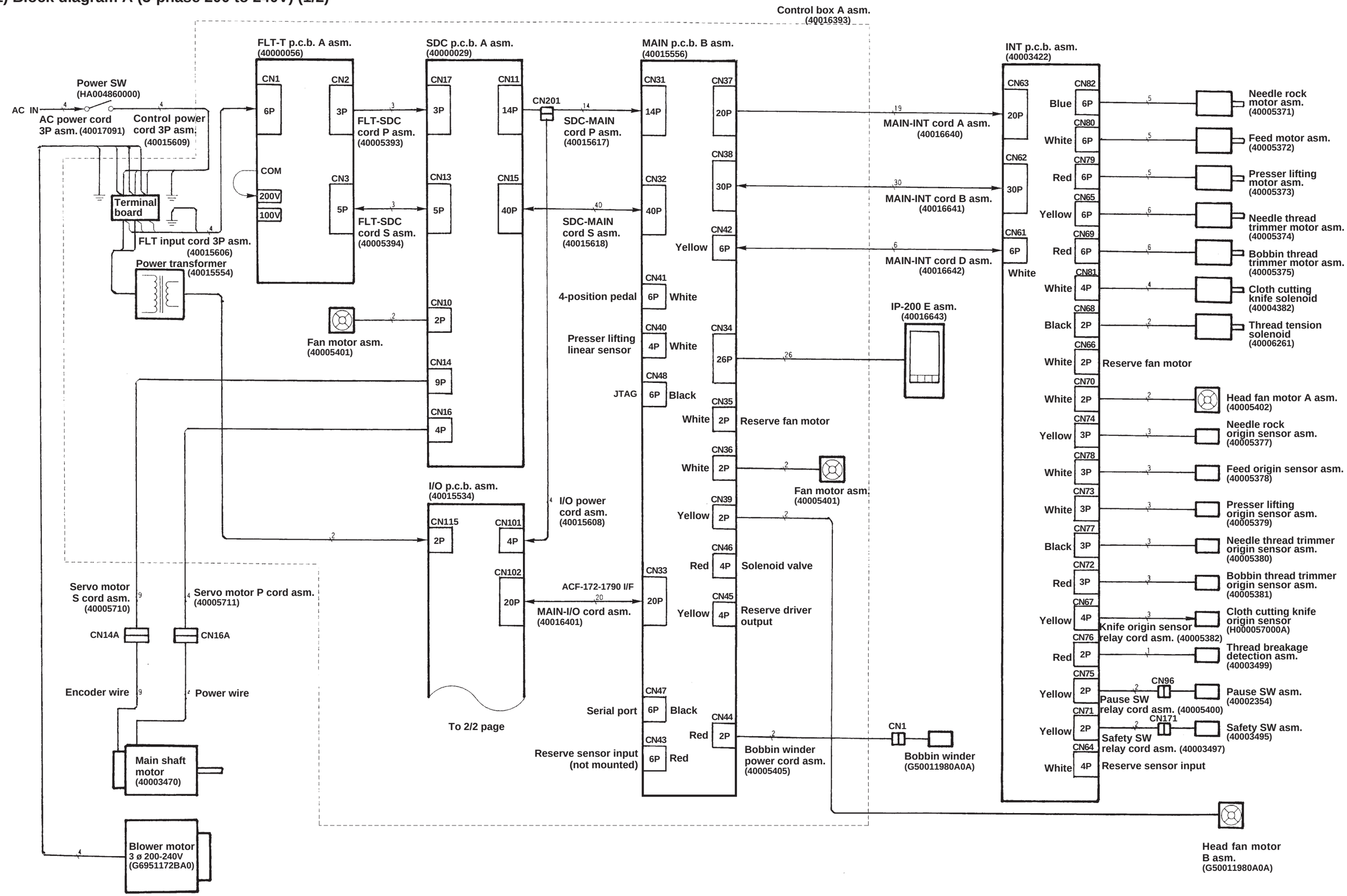
Troubles	Causes	Corrective measures	Page
7. Stitch skipping	1. Button hole is small in terms of the size of presser.	Replace the presser with a smaller one.	-
	2. Material flops because of light-weight.	Delay the hook-to-needle timing. (Lower the needle bar by 0.5 mm.)	MACHINE OPERATION 6-1
	3. Attaching needle is wrong.	Adjust again the direction, height, etc.	MACHINE OPERATION 4-2(1)
	4. Needle is bent.	Replace the needle.	-
	5. There is a burr or scratch on the blade point of hook.	Buff the blade top of hook. Or, replace the hook.	-
8. Thread frays.	1. Number of stitches of tie stitching is too small.	Increase the number of stitches of tie stitching at the end of sewing.(Sewing data S68)	PANEL OPERATION 2-7
	2. Width of tie stitching is too wide.	Narrow the width of tie stitching at the end of sewing.(Sewing data S67)	PANEL OPERATION 2-7
9. Length of needle thread remaining at the end of sewing is too long.	1. Width of tie stitching is too narrow.	Widen the width of tie stitching at the end of sewing.(Sewing data S67)	PANEL OPERATION 2-7
	2. Tension of tie stitching is too low.	Increase tension at the end of sewing.(Memory switch data U06)	PANEL OPERATION 2-17
10. Needle thread breaks at the start of sewing, or the wrong side of seam is dirty.	1. Tension at the start of sewing is too low.	Increase tension at the start of sewing.(Memory switch data S57)	PANEL OPERATION 2-17
11. Knife drops even when needle thread is cut.	1. Thread breakage detection plate is improperly adjusted.	Adjust the detector plate. (Refer to 3.-(13) the Engineer's Manual.)	-
12. Needle breaks.	1. Needle is bent.	Replace the needle.	MACHINE OPERATION 4-2(1)
	2. Needle comes in contact with the blade point of hook.	Adjust the needle-to-hook timing.	MACHINE OPERATION 6-1
	3. Needle thread trimmer comes in contact with needle when it opens.	Adjust the installing position of needle thread trimmer.	MACHINE OPERATION 6-2
	4. Needle does not come to the center of the needle hole of throat plate.	Re-adjust the installing position of throat plate base.	-
	5. Needle stop position is low and the needle comes in contact with the needle thread trimmer when it closes.		
13. Knife drops plural times.	1. Cloth cutting knife is not set to the plural times motion setting.	Release the plural time setting.	MACHINE OPERATION 2-16
14. Air blows from preset.	1. Blower motor is rotating in the reverse direction.	Change the direction of rotation of the motor.	MACHINE OPERATION 3-3
15. Preset does not move even when start switch is pressed.	1. Cloth is not detected since it is coarse.	Release the cloth detection.(Memory switch data U52)	-
16. Cloth is folded when cloth is delivered from preset to carriage.	1. Air blow is excessively high or low.	Adjust the air blow. Clean the air filter.	MACHINE OPERATION 4-1(7)
17. Cloth slips when cloth is delivered from preset to carriage.	1. Vacuum force is excessively low.	Adjust the cloth suction force of the vacuum.	- MACHINE OPERATION 4-1(8)
	2. Clamp force is excessively low.	Adjust the clamp.	MACHINE OPERATION 4-4

12. AIR PRESSURE PIPING DIAGRAM

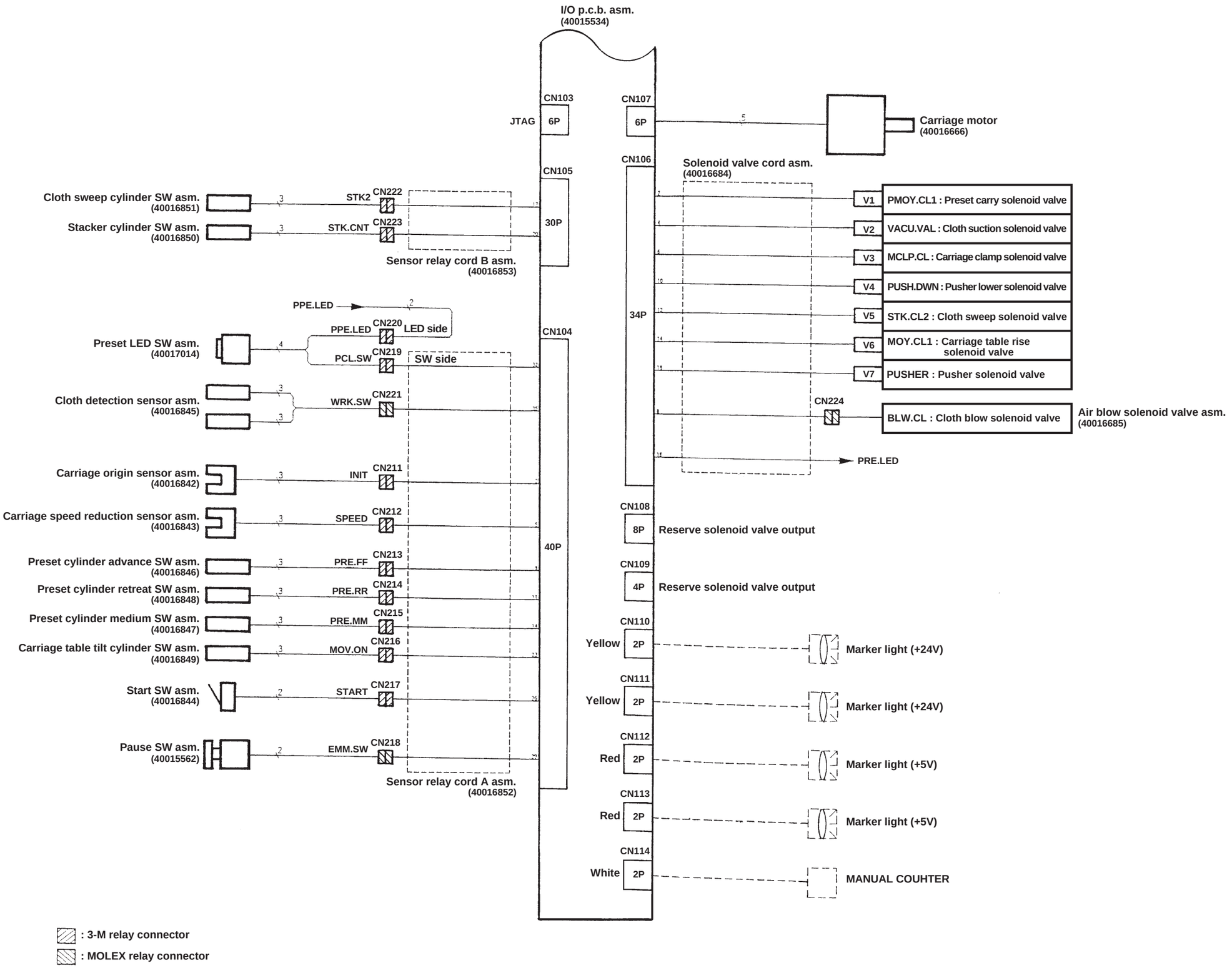


13. CIRCUIT DIAGRAM (REFER TO CIRCUIT DIAGRAM OF ENGINEER'S MANUAL FOR LBH-1790 SERIES AS WELL.)

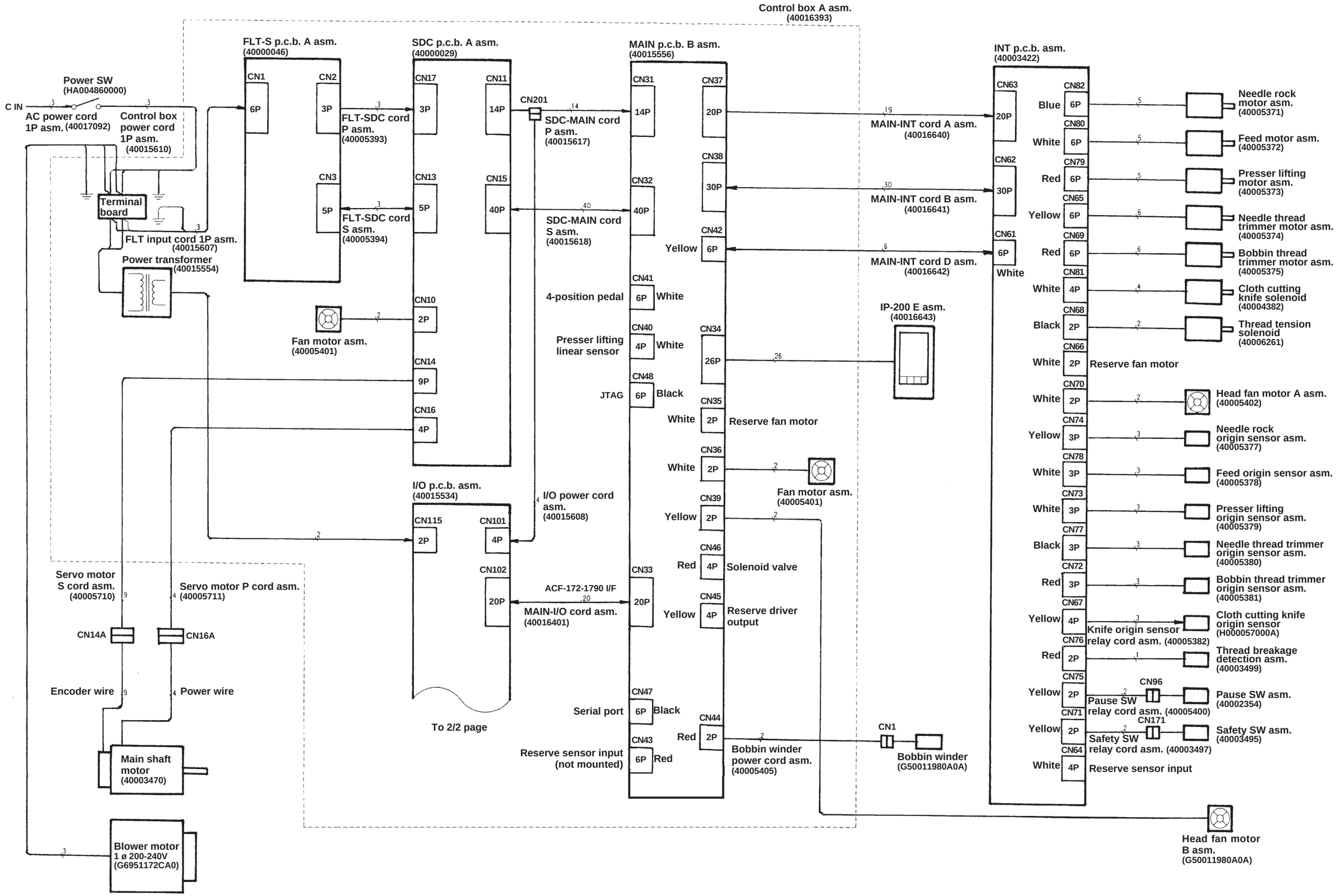
(1) Block diagram A (3-phase 200 to 240V) (1/2)



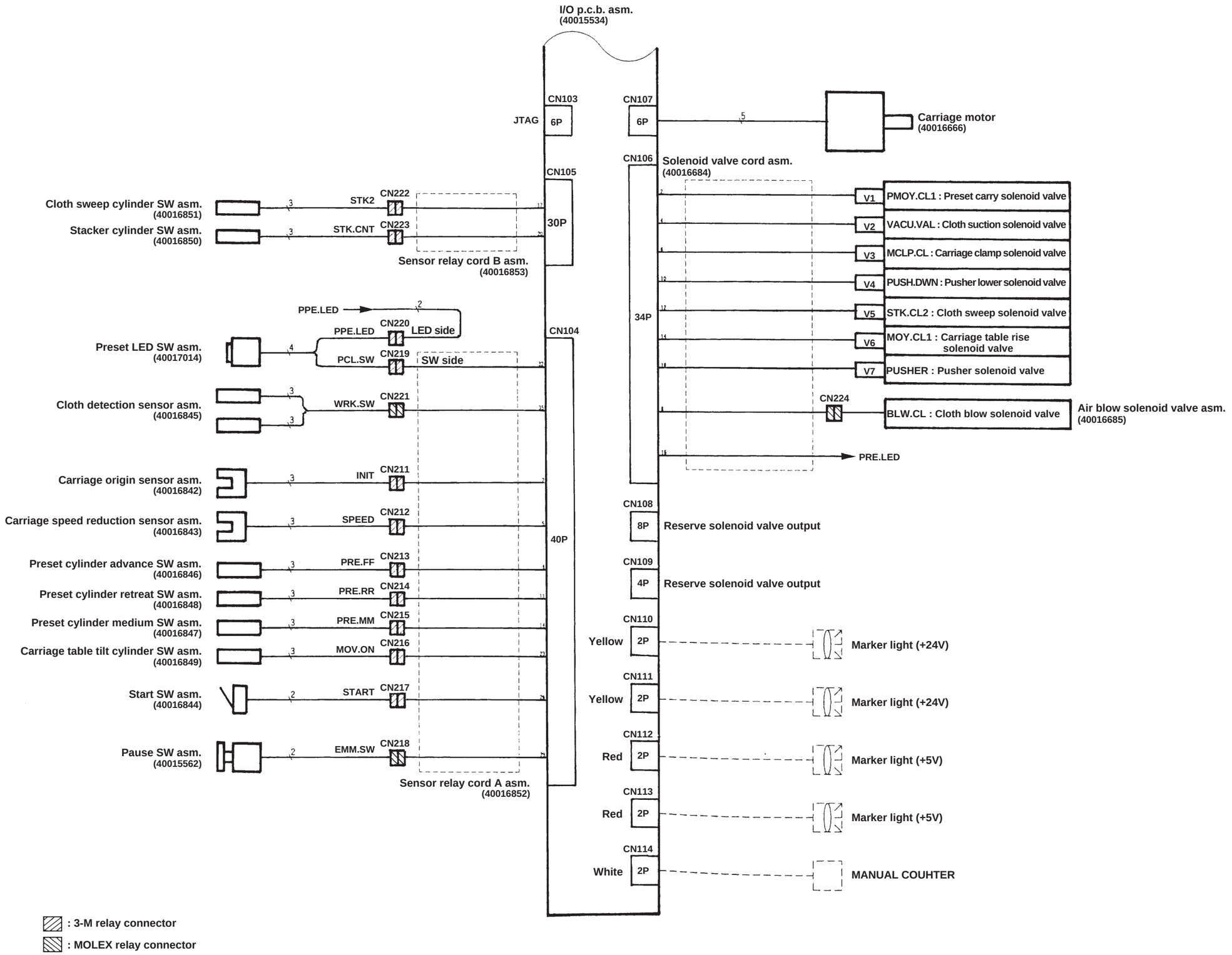
(1) Block diagram A (3-phase 200 to 240V) (2/2)



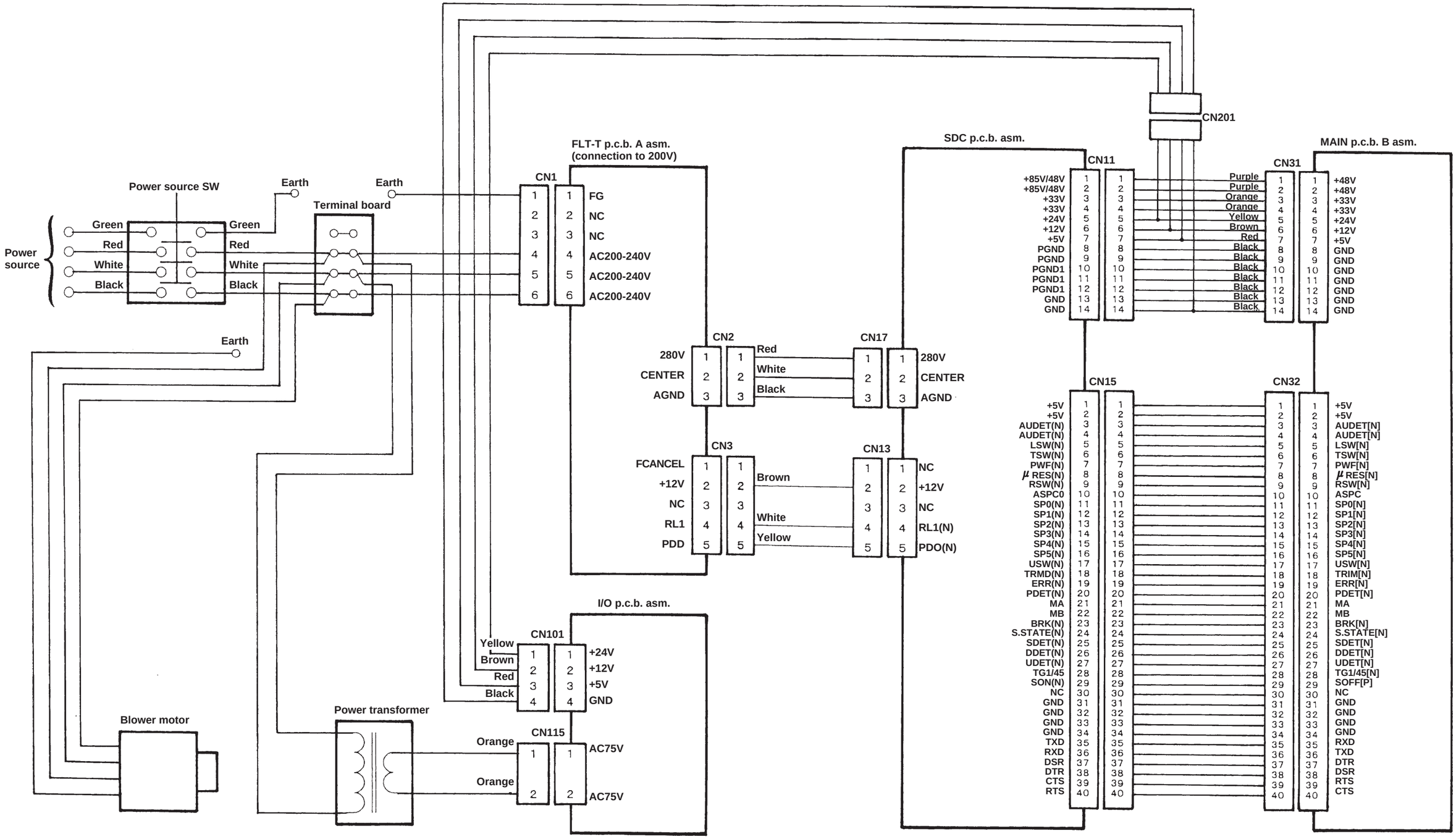
(2) Block diagram B (Single phase 200 to 240V) (1/2)



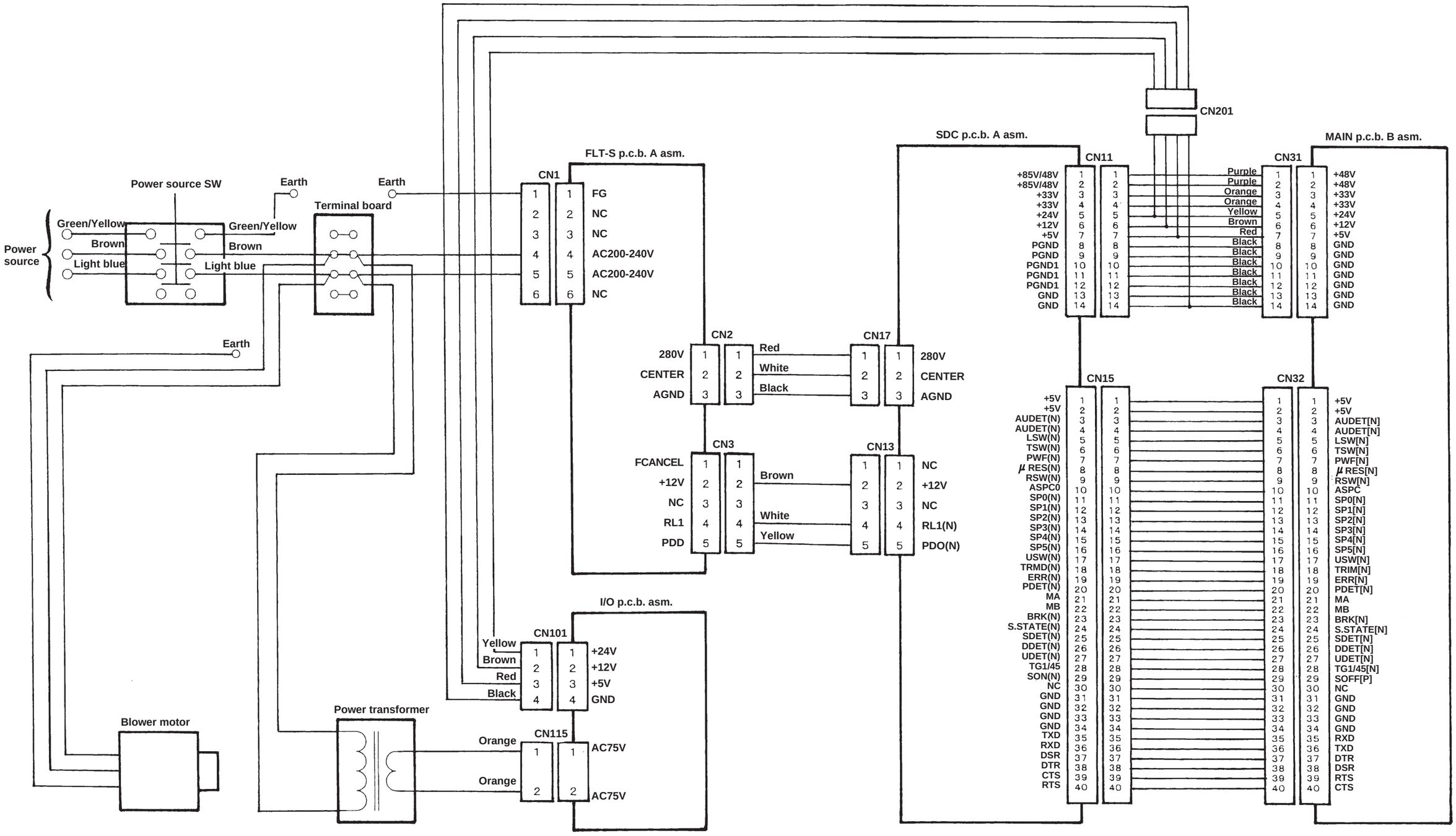
(2) Block diagram B (Single phase 200 to 240V) (2/2)



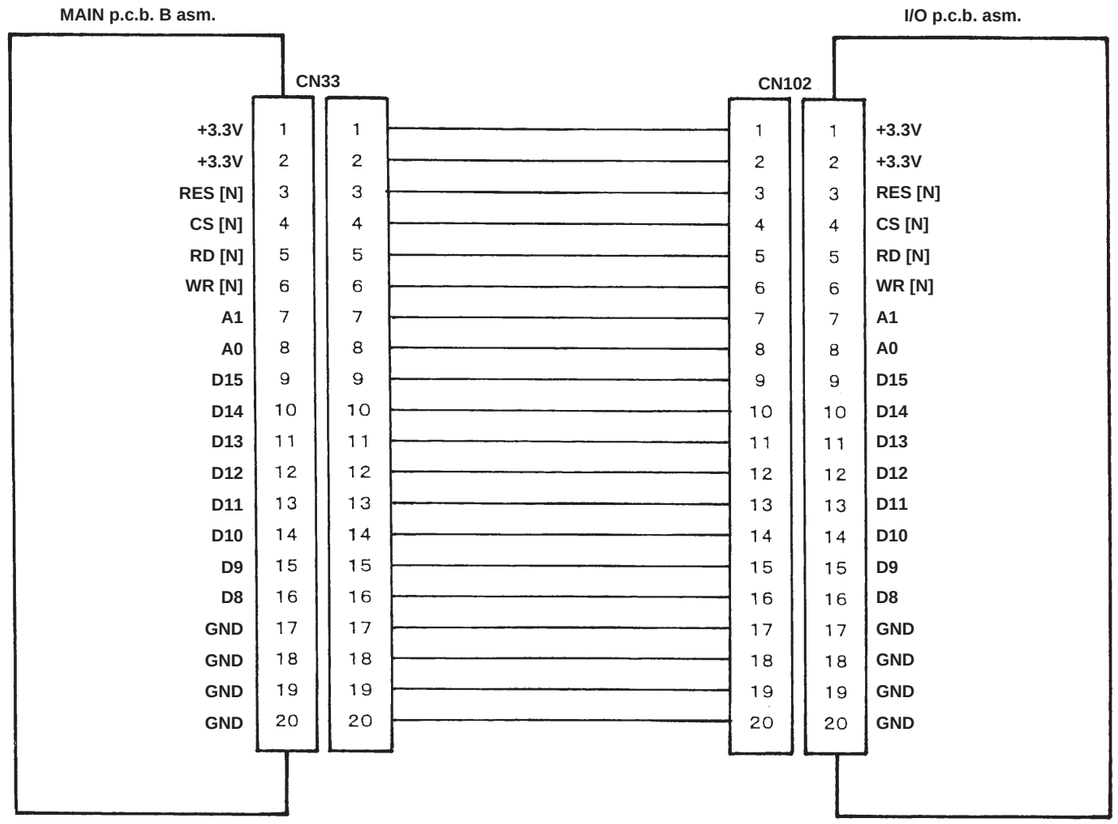
(3) Power circuit diagram (3-phase 200 to 240V)



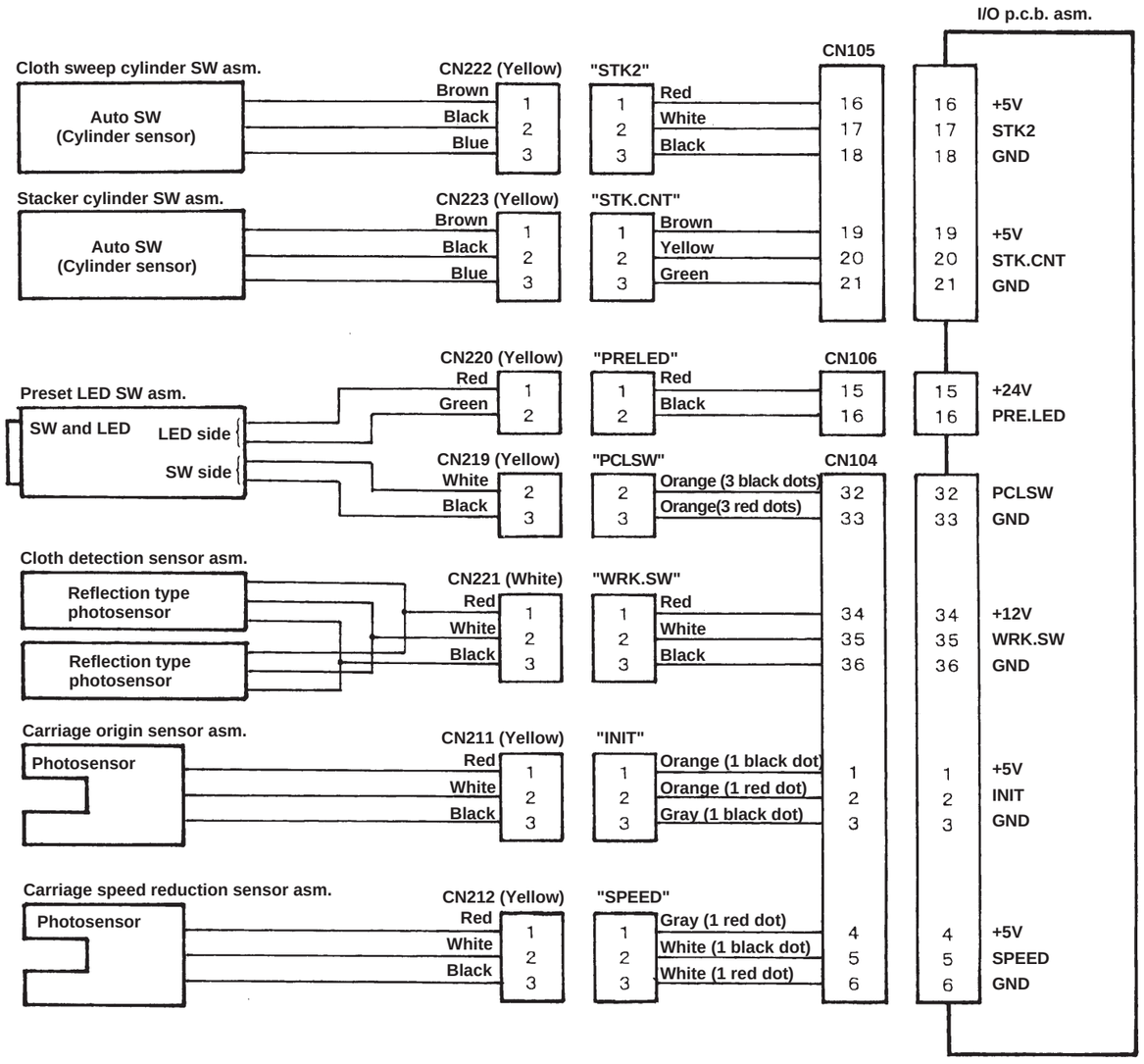
(4) Power circuit diagram (single phase 200 to 240V)

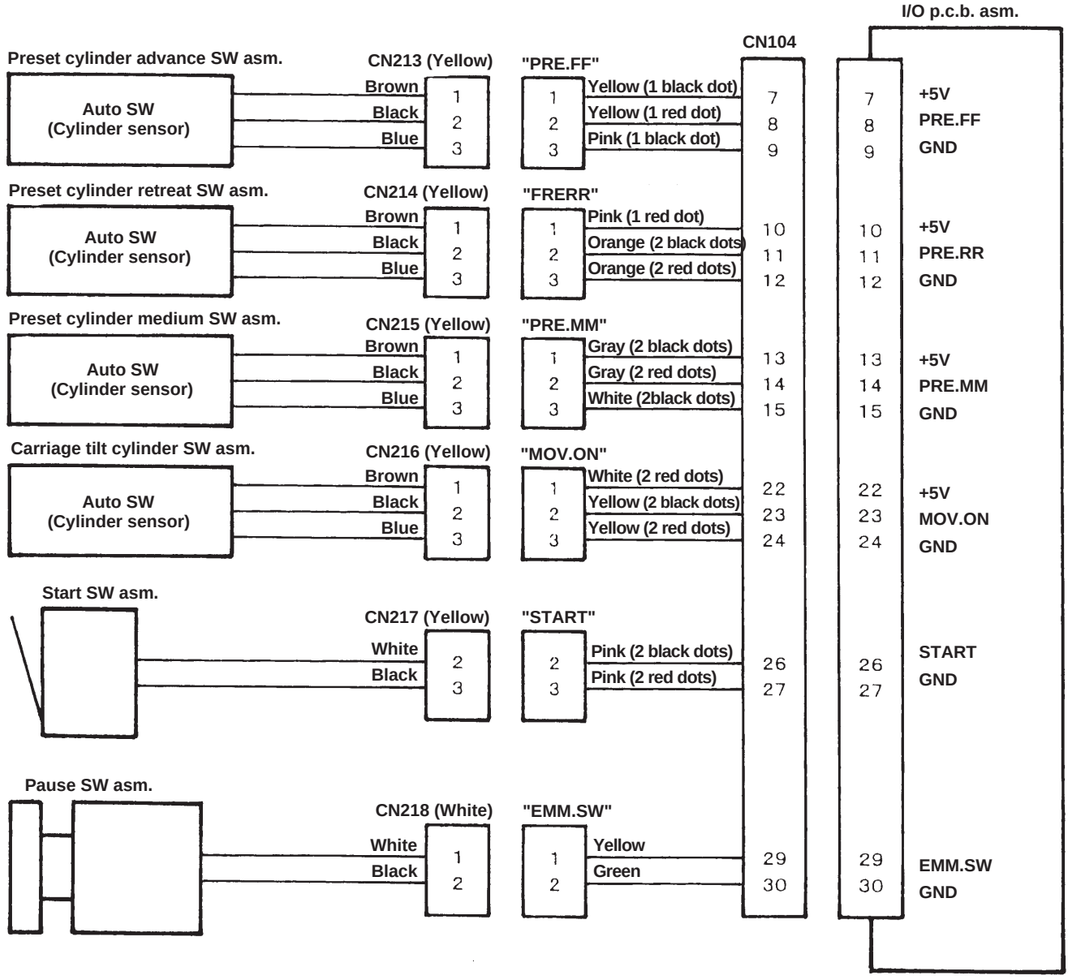


(5) Connection circuit diagram between MAIN p.c.b. and I/O p.c.b.

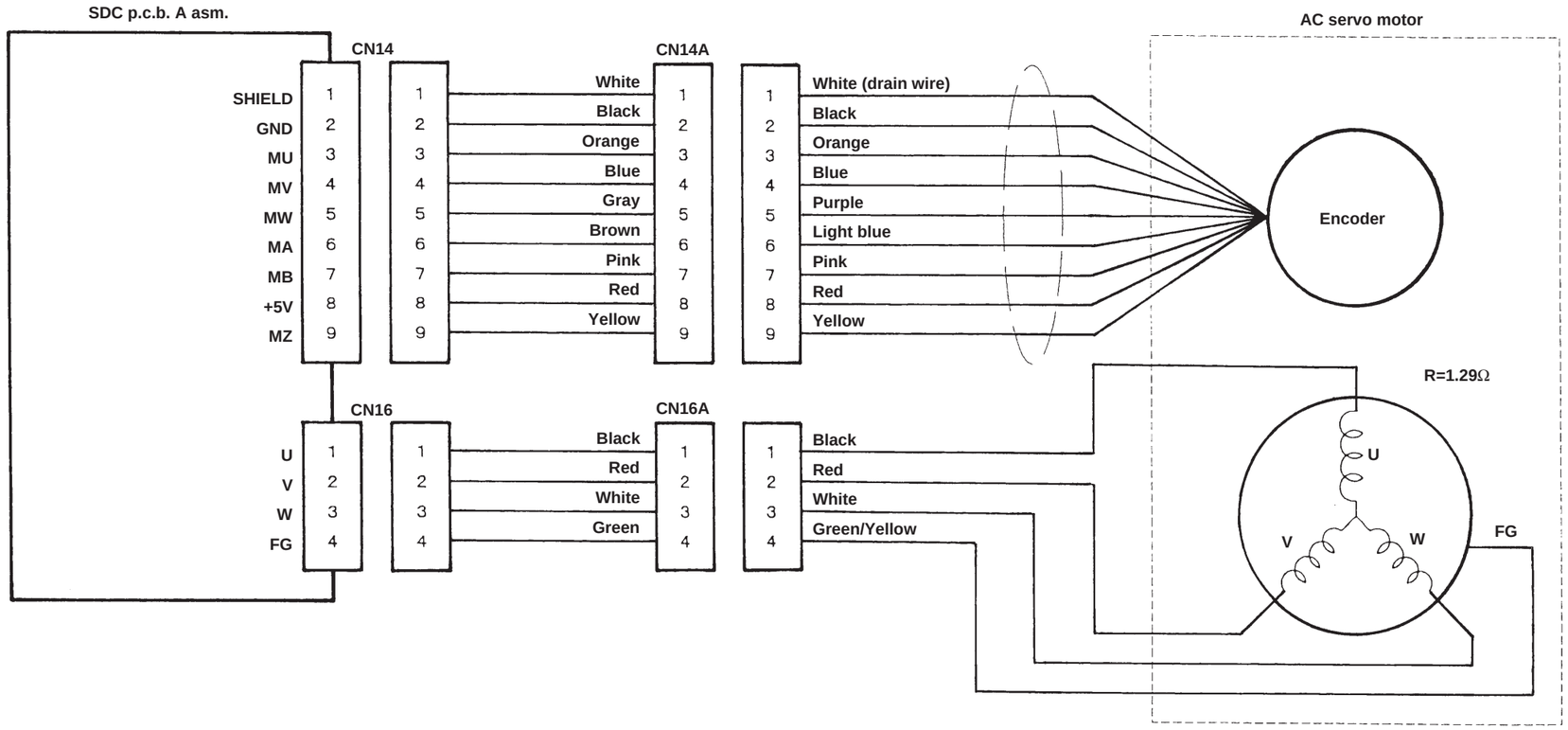


(6) Device sensor circuit diagram

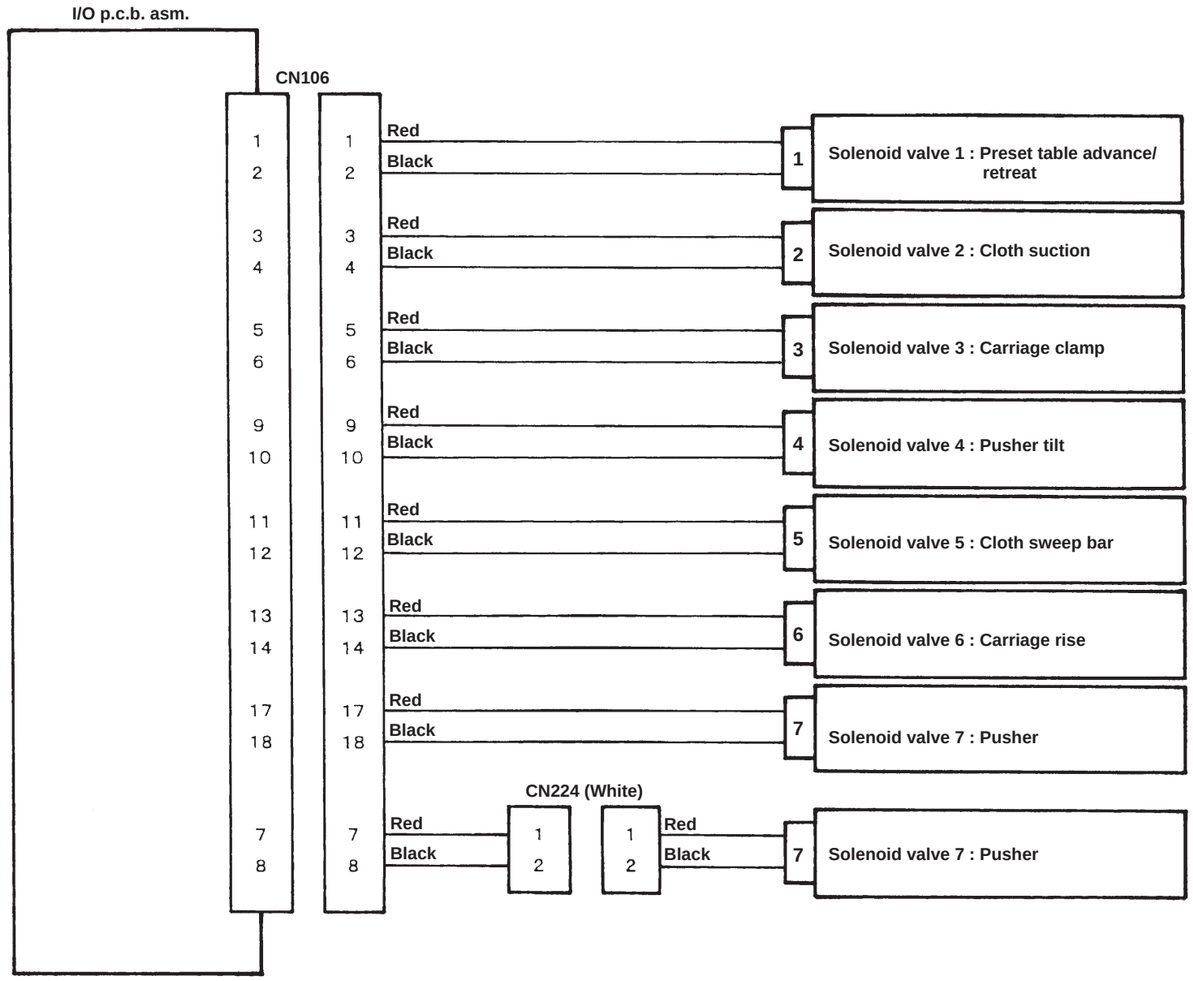




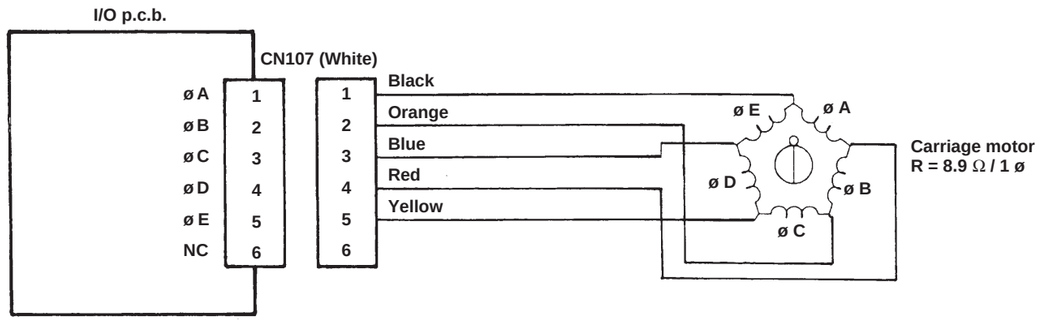
(7) Servo motor circuit diagram



(8) Solenoid valve circuit diagram



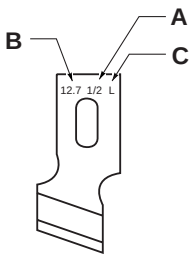
(9) Carriage motor circuit diagram



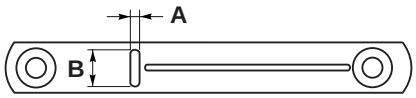
14. GAUGE COMPONENTS

(1) Cloth cutting knife

No.	A : Knife size (inch)	B : Knife size (mm)	C : Mark	D : Part No.
1	1/4	6.4	F	B2702047F00
2	3/8	9.5	K	B2702047K00A
3	7/16	11.1	I	B2702047I00
4	1/2	12.7	L	B2702047L00A
5	9/16	14.3	V	B2702047V00
6	5/8	15.9	M	B2702047M00A
7	11/16	17.5	A	B2702047A00
8	3/4	19.1	N	B2702047N00
9	7/8	22.2	P	B2702047P00
10	1	25.4	Q	B2702047Q00A
11	1-1/4	31.8	S	B2702047S00A



(2) Throat plate



Type \ Stitch width	5 mm (AxB) (mm)	6 mm (AxB) (mm)	Remarks
Standard : S (Part No.)	(40004350) S5 (1.4x6.2)	(40004351) S6 (1.4x7.4)	
For knits : K (Part No.)	(40004352) K5 (1.2x6.2)	(40004353) K6 (1.2x7.4)	

(3) Presser

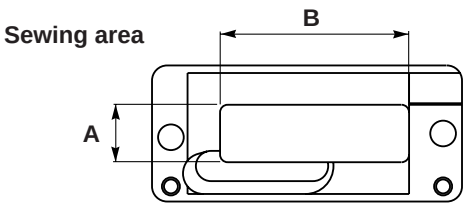
○ Stitch width 5 mm

◎ : Mounted on machine

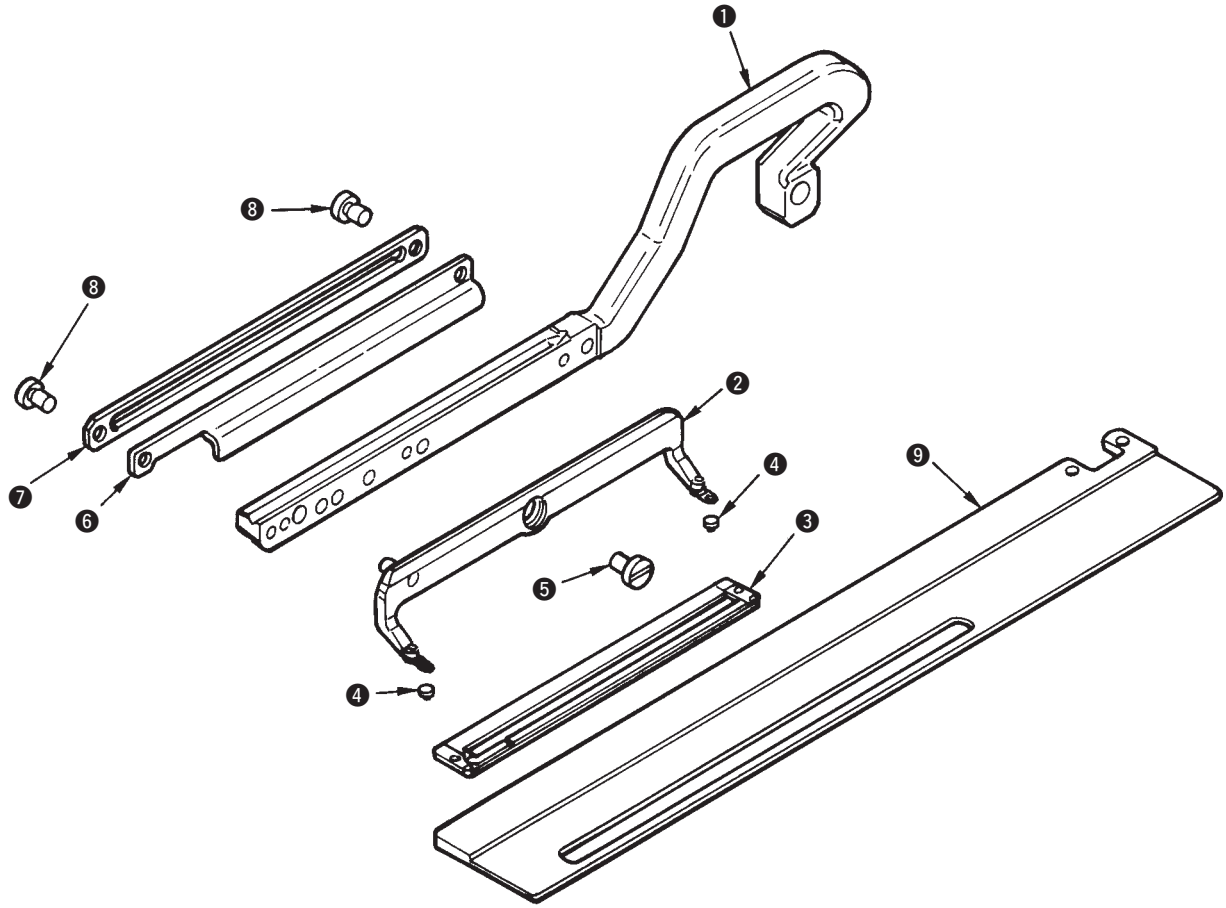
Type \ Size (A X B)	1 : (4x25) (mm)	Remarks	2 : (5x35) (mm)	Remarks	3 : (5x41) (mm)	Remarks
Standard : S (Part No.)	B1552781000A	◎	B1552782000		B1552783000	
For knits : K (Part No.)	D1508771K00A		D1508772K00		D1508773K00	

○ Stitch width 6 mm

Type \ Size (A X B)	3 : (6x41) (mm)
Standard : S (Part No.)	14524409



15. 120 mm WORK CLAMP (5 X 120 mm)



No.	Part No.	Name of part	Q'ty
1	40006335	Work clamp arm 120	1
2	40008645	Work clamp foot (asm.) 120	1
3	40008658	Work clamp 120	1
4	SS6060210SP	Work clamp setscrew 120	2
5	SD0790203SP	Work clamp foot hinge screw 120	1
6	40006341	UTT close cam 120	1
7	40006342	Work clamp lifting plate 120	1
8	SM6050800SP	Work clamp lifting plate setscrew 120	2
9	40014871	Feed plate ACF 120	1

(1) Setting when 120 mm work clamp (presser) is used

(For the details, refer to the Instruction Manual.)

1. The max. sewing length from the origin of the carriage is 25 mm. When performing sewing beyond 25 mm, input the jump feed at the start of sewing. For the input of the jump feed, refer to "1-3-1. ACF data input screen" of "1-3. LCD display section under ACF mode" of PANEL OPERATION.

2. When performing the continuous stitching, if the total length of the continuous stitching pattern exceeds 25 mm, input the jump feed at the start of sewing. For the input of the jump feed, refer to "1-3-1. ACF data input screen" of "1-3. LCD display section under ACF mode" of PANEL OPERATION. It is effective to set the jump feed on the 1st button side (right side of the work clamp) in case of men's wear, and on the 1st button side (left side of the work clamp) in case of ladies' wear.

3. Example of setting
   (1) When, in case of men's wear, buttonhole interval is 100 mm and number of buttonholes is 6

      1) SETTING OF LBH PATTERN (For the details, refer to "2-14-1. LBH continuous stitching data input screen" of "2-14. LCD display section at the time of continuous stitching of PANEL OPERATION".)
      2) Jump feed at the start of sewing : 100 mm
      3) Feed amount up to the 2nd buttonhole : -100 mm
      4) SETTING OF ACF PATTERN (For the details, refer to "1-3-1. ACF data input screen" of "1-3. LCD display section" of under ACF mode of PANEL OPERATION").
      5) Number of buttonholes to be sewn : 3
      6) Buttonhole interval : 200 mm

   (2) When, in case of ladies's wear, buttonhole interval is 100 mm and number of buttonholes is 6

      1) SETTING OF LBH PATTERN (For the details, refer to "2-14-1. LBH continuous stitching data input screen" of "2-14. LCD display section at the time of continuous stitching of PANEL OPERATION".
      2) Jump feed at the start of sewing : without
      3) Feed amount up to the 2nd buttonhole : 100 mm
      4) SETTING OF ACF PATTERN (For the details, refer to "1-3-1. ACF data input screen" of "1-3. LCD display section under ACF mode of PANEL OPERATION".)
      5) Number of buttonholes to be sewn : 3
      6) Buttonhole interval : 200 mm

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

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