ENGLISH

AC-172N-1790AN
INSTRUCTION MANUAL

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I. MACHINE OPERATION

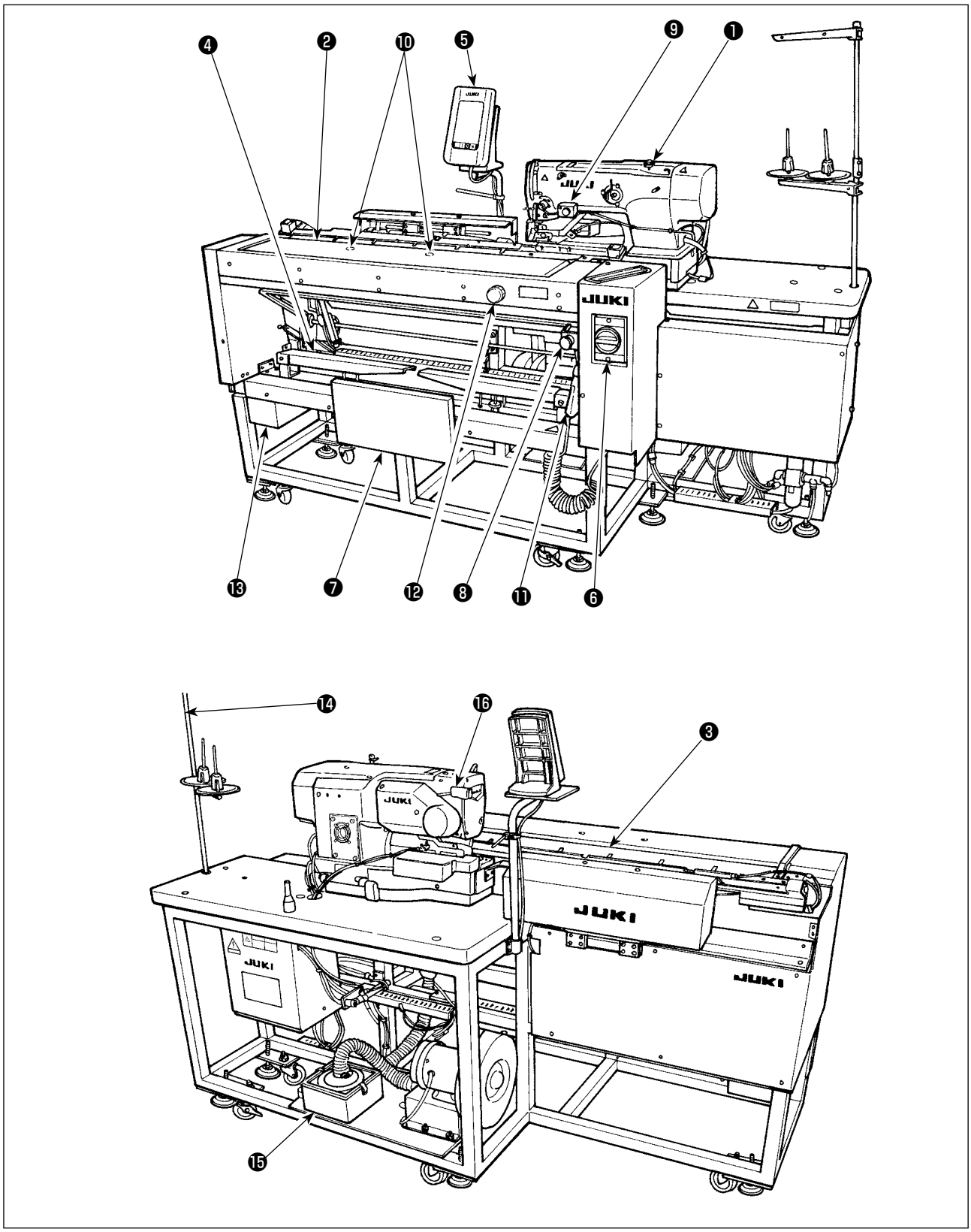
1. GENERAL

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

1-1. Features

1) The material feed mechanism allows the material to be fed quickly at accuratintervals.
2) The number of button holes and the amount of feed can be set and changed with ease by operating the touch 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 stacking.
4) The operator can set the next material to be sewn while the machine is still sewing, allowing the operator to have enough time 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 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 to the front to-center strips of ladies wear.
8) The machine has various modes while enable self-diagnosis when an error occurs.
9) It is also equipped with a workpiece detector mechanism which eliminates a sewing start error.

1-2. Configuration of the main parts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1-3. Operating precautions

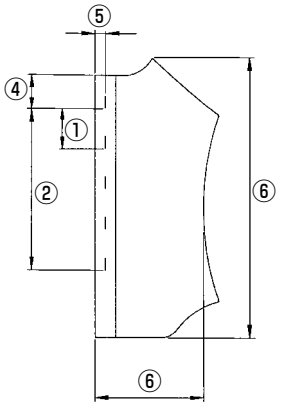
CAUTION:
To avoid malfunction and damage of the machine, confirm the following.

1. **Before you put the machine into operation for the first time after the set-up, clean it thoroughly.**
2. **This machine corresponds to the power supply voltage 200 to 240V.**
3. **Never use the machine in the state where the voltage type is different from the designated one.**
4. **Operate the machine with the air pressure set to 0.5Mpa.**

2. SPECIFICATIONS

■ Main unit

1	① Feed interval	:	0 to 610 (0. to 24”)
	② Overall feed amount	:	610 mm (24”)
	③ Number of buttonholes which can be sewn	:	1 to 20
	④ Distance from the top end of the garment body to the 1st buttonhole	:	0 to 140 mm (0 to 5.5”)
	⑤ Distance from the side end of the garment body to the buttonhole	:	7 to 21 mm (0.3 to 0.8 inch)
	⑥ Applicable garment size that can be sewn	:	Width 220 to 420 mm (8.7 to 16.5”) Length 400 to 880 mm (15.7 to 34.6”)
2	Number of patterns that can be stored in memory	:	20
3	Power supply	:	220 to 240V (Single phase) 200 to 240V (3-phase) (Rated voltage ± 10% or less) (Without voltage changeover)
4	Power source frequency	:	50/60 Hz
5	Power consumption	:	800 VA (supply voltage ± 10% or less)
6	Operating air pressure	:	0.5 MPa
7	Air consumption	:	240 Nl/ min . or less
8	Machine dimensions	:	Width 1,910mm Depth 850mm Table Height 920 mm
9	Weight	:	300 kg
10	Noise	:	- Equivalent continuous emission sound pressure level (L_{pA}) at the workstation: A-weighted value of 83.0dB; (Includes K_{pA}=2.5dB); according to ISO 10821 - C.6.3-ISO 11204 GR2 at 4000 sti/min. - Sound power level(L_{WA}); A-weighted value of 88.0dB; (Includes K_{WA} = 2.5dB); according to ISO 10821 - C.6.3-ISO 3744 GR2 at 4200 sti/min.



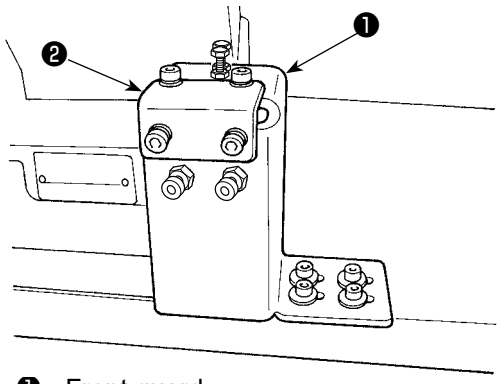
■ Sewing machine components

1	Machine head	:	LBH-1790ANS/ACH
2	Sewing speed	:	Max. 4,200 sti/min (Number of revolutions at the time of delivery : 3,600 sti/min)
3	Stitch length	:	Max. 25 mm X sewing width 4 mm
4	Size (knife size)	:	6.4 to 19.1 mm (1/4 to 3/4”)
5	Needle	:	DPx5 #11J to #14J
6	Lubricating oil	:	JUKI New Defrix Oil No.1
7	Number of stitches	:	0.2 to 2.5 mm

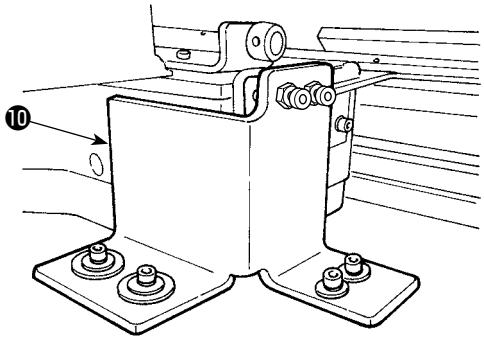
3. INSTALLATION

3-1. Removing the machine head fixing plate

The machine head fixing plate, which has been factory-installed on the sewing machine head at the time of delivery, should be removed.

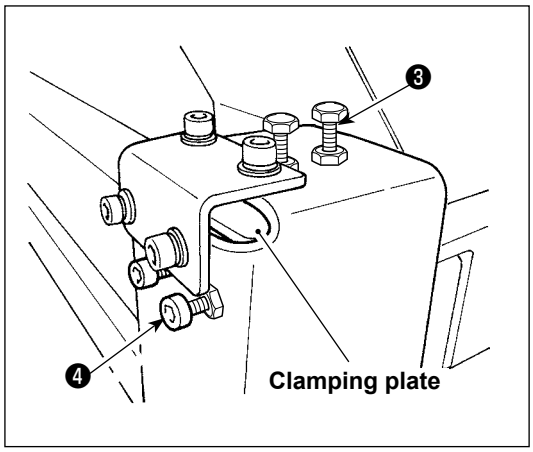


❶ Front guard
❷ Front auxiliary connecting plate for machine head

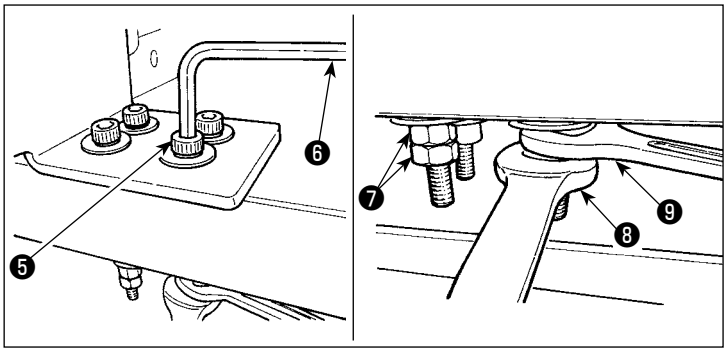


❿ Rear guard

[Removing the front guard]

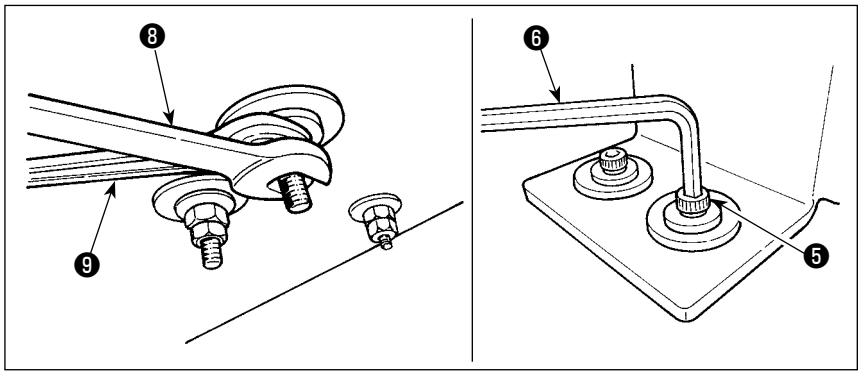


1) Loosen screws ❸ and ❹ . (It is not necessary to remove them.)
The clamping plate which clamps the sewing machine head is installed under the front guard. Be sure not to forget to remove the clamping plate.



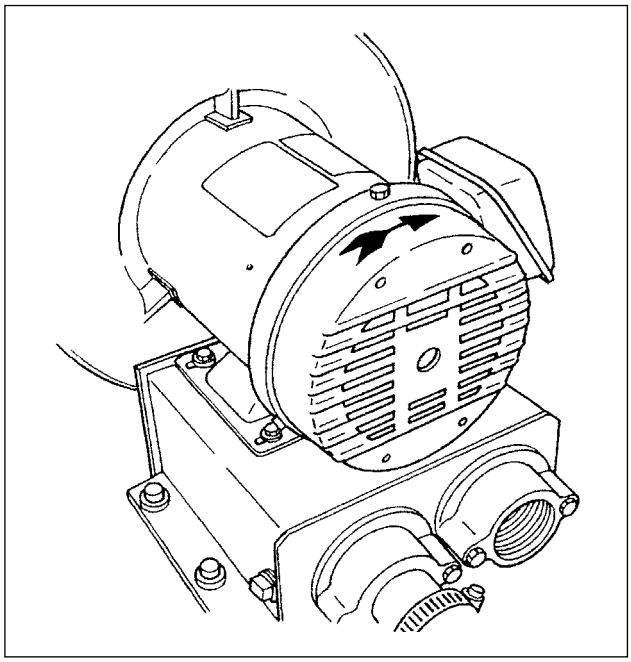
2) Remove screws ❺ which are used to secure the front guard and the table.
Fit spanners ❽ and ❾ respectively on bolt ❼ which are used to fix screw ❺ . Securing spanner ❾ , turn spanner ❽ clockwise. When one nut ❼ is removed, fix the remaining one with spanner ❾ . Fit hexagonal wrench key ❻ on screw ❺ and turn the screw clockwise.

[Removing the rear guard]



The removal procedure for the rear guard is same as that for the aforementioned front guard.

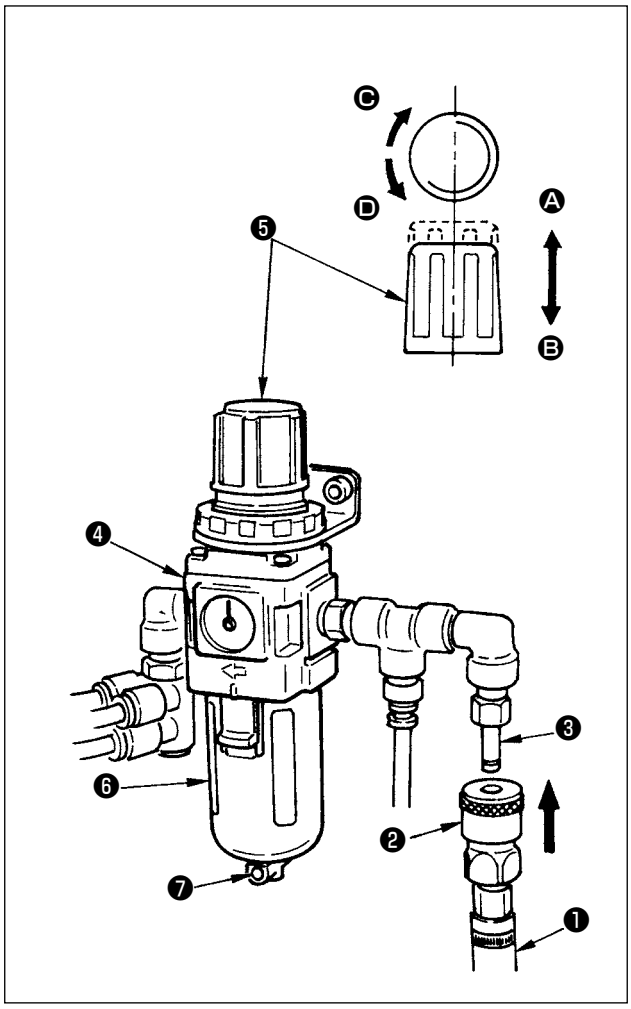
3-2. Connecting the power supply



1) Check to be sure that the power supply in use is 200 to 240 VAC.
2) First confirm that power switch in “OFF”, then connect the power cord to the power supply.
3) Turn the power ON. Check that the blower motor is rotating.

The sewing machine is not provided with a terminal block or the like for changing over the voltage. As long as the power supply in use is in the range of 200 to 240 VAC, the sewing machine can be directly connected to the power supply.

3-3. Installing the air hose

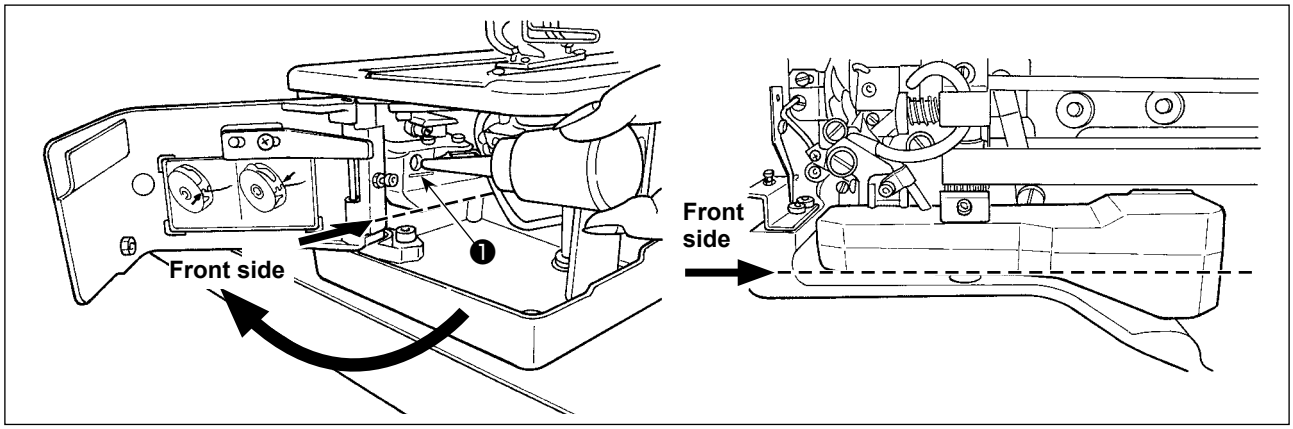


1) Insert air hose ❶ into one-touch joint ❷ supplied with this unit, and fix it using metal fittings or the like.
2) Insert one-touch joint ❷ into joint ❸ until it clicks.
3) Set the air pressure gauge to 0.5 MPa. To adjust, raise knob ❺ of regulator ❹ in direction Ⓐ, and turn knob ❺ clockwise (direction Ⓒ) to increase the air pressure, or turn the knob counter-clockwise (direction Ⓓ) to decrease the air pressure.
4) When the air pressure gauge has been set to 0.5 MPa press knob ❺ in direction Ⓑ until it clicks. The sound indicates that the gauge has locked.

When bottle ❻ is filled with water, be sure to drain off the water by removing one-touch joint ❷ from regulator ❹ , and by pressing drain button ❼ .
Drain off the water every time the machine is used , either before or after operation.

3-4. Lubrication

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.

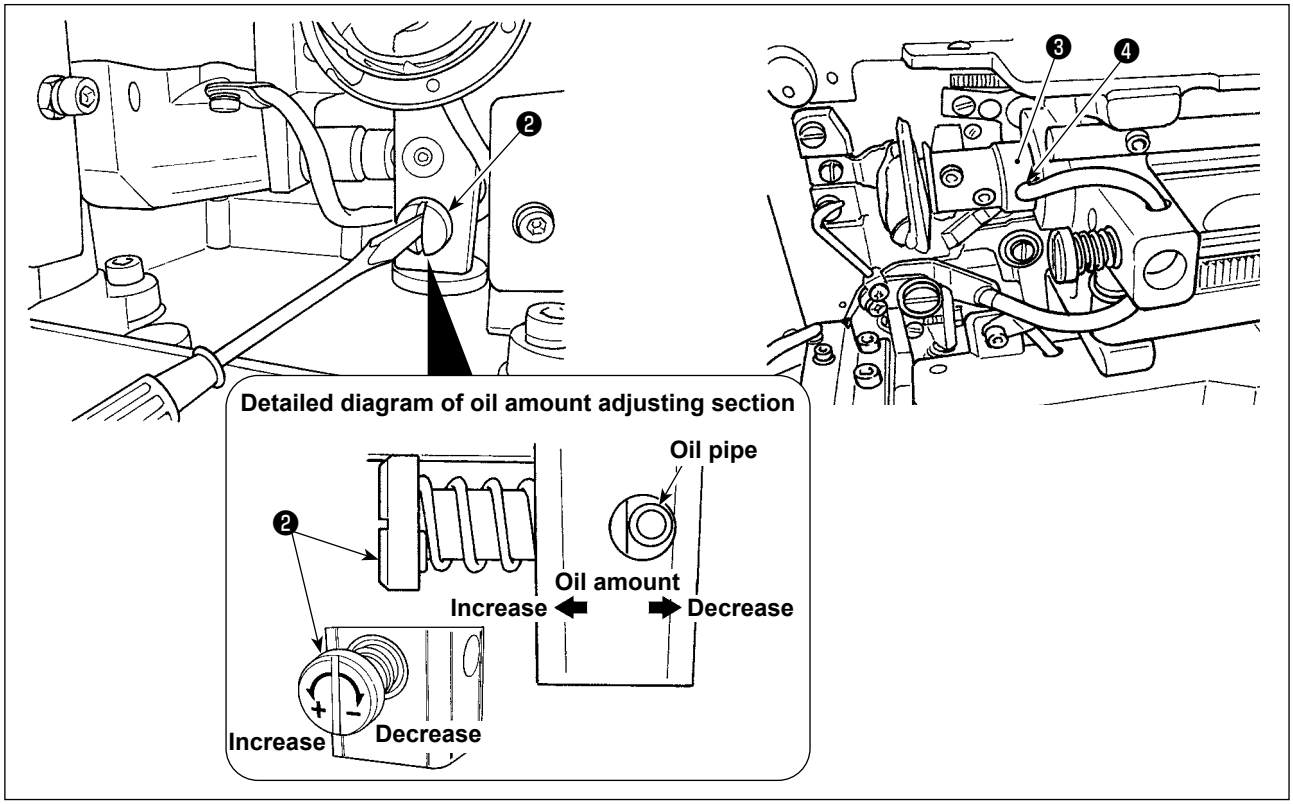


1) Lubricating oil to oiling tank

○ Fill the oiling tank with JUKI New Defrix Oil No.1 up to the level indicated by “MAX” ❶ .

When supplying oil to the oil tank through the lubricating hole, take care not to allow dust to enter the oil tank.

○ Supply oil in the case the oil cannot be visually observed from the front side of the oil tank.

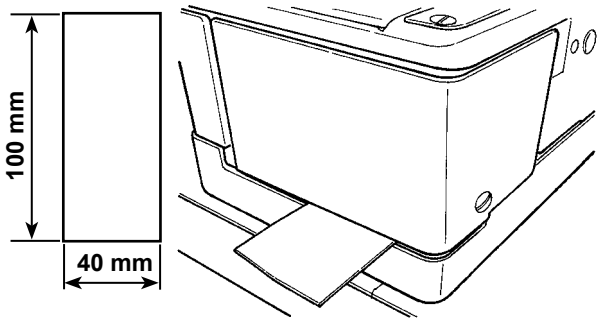


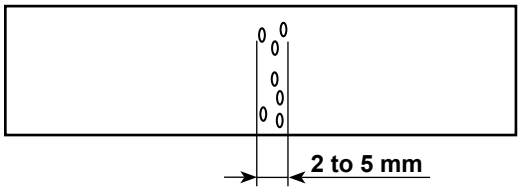
2) Adjusting the lubrication for the sewing hook

○ The amount of oil is adjusted with oil amount adjusting screw ❷ .

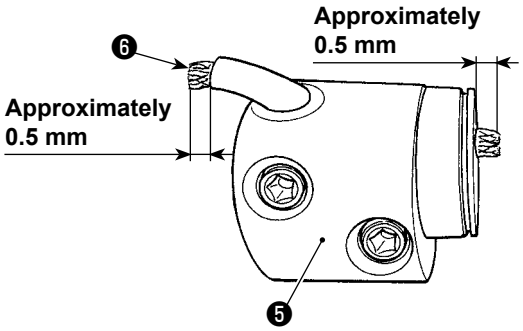
○ Amount of supplied oil is reduced when turning the screws ❷ clockwise.

○ When you first operate your sewing machine after set-up or after an extended period of disuse, remove the bobbin case and apply a few drops of oil to the hook race. In addition, apply a few drops oil from oiling hole ❹ in hook driving shaft front metal ❸ to soak the inside felt in oil.





*** The adequate oil quantity is achieved when the oil spots are made on paper within a range of 2 to 5 mm in width (oil spots should not be in the form of lines).**

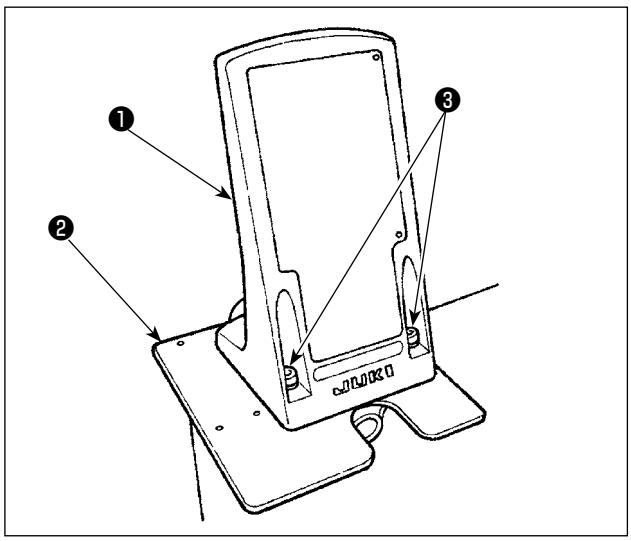


3) How to check the hook oil quantity

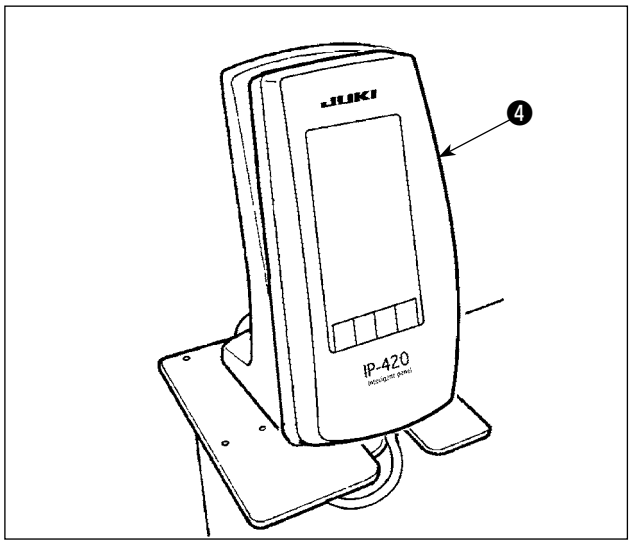
1. In preparation for checking the hook oil quantity, cut a sheet of paper to make a piece of paper size of which is approximately 40 mm x 100 mm.
2. After the adjustment of the oil quantity, start the sewing machine at a high speed (3,600 sti/min) by 100 times or more.
3. Insert the piece of paper prepared in Step 1 into the clearance provided between the hook cover and the bed base so that it is placed near the underside of the hook.
   As a guide, insert the paper until it comes in contact with the hook oil shield.
4. Supporting the paper with hand, run the sewing machine by five cycles using the standard pattern (3,600 sti/min) and check the splashing oil quantity.

In the case the oil quantity is too much even after the oil controlling screw is fully tightened, remove the hook shaft coupling ❺ and cut off the excess of oil wick ❻ .

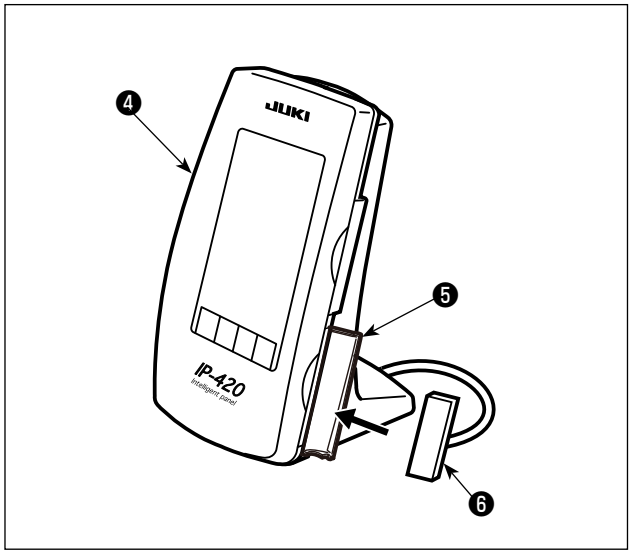
3-5. Installing the panel



1) Fix operation panel mounting plate ❶ on base plate ❷ . Use setscrews ❸ (M5 x 25) supplied with the unit.



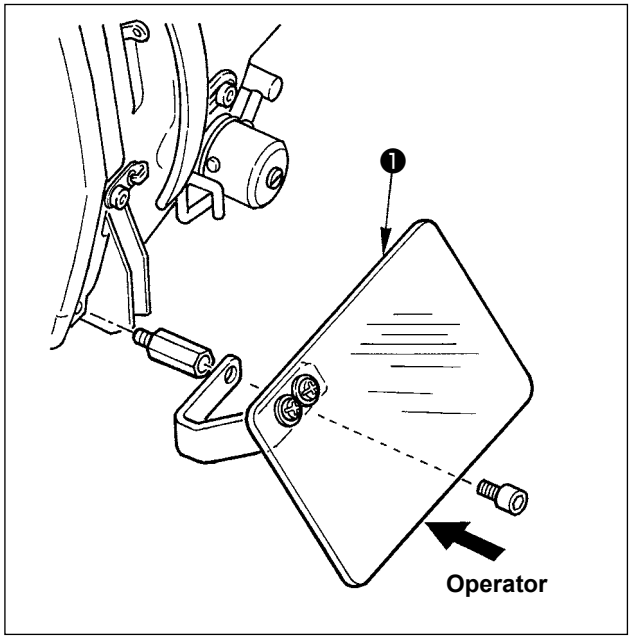
2) Install operation panel ❹ .



3) Open cover ❺ of operation panel ❹ . Connect secured panel cord ❻ to the support post.

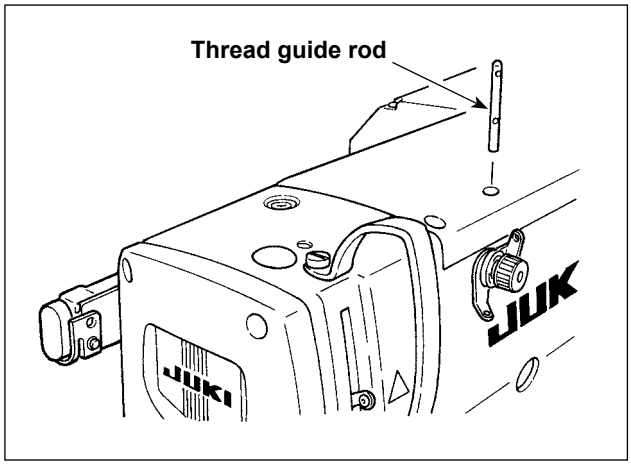
3-6. Installing the eye protection cover

WARNING :
Be sure to attach this cover to protect the eyes from the disperse of needle breakage.



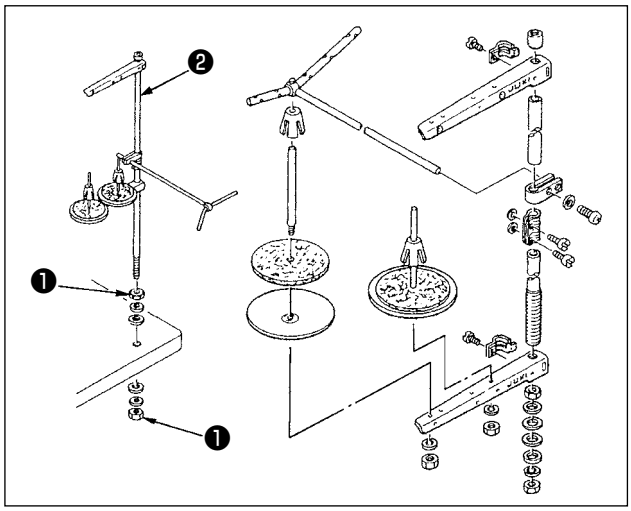
Be sure to install and use eye protection cover ❶ and use the sewing machine.

3-7. Installing the thread guide



Securely put the thread guide pin into the mounting hole in the top surface of the sewing machine in such a way that the two holes in the side face of the thread guide pin face toward you.

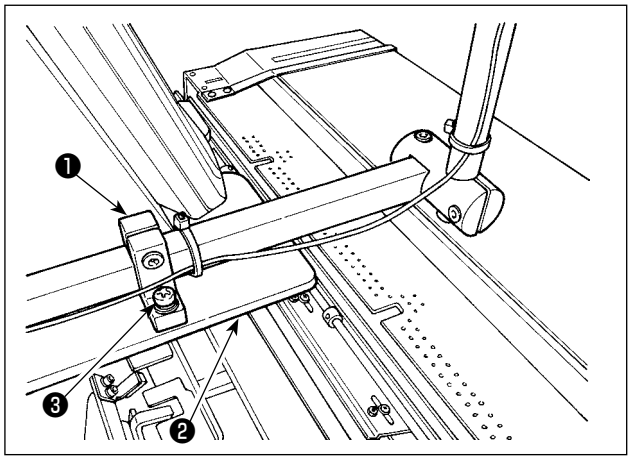
3-8. Installing the thread stand



1) Assemble the thread stand unit, and fix the assembly in the hole in the table as shown in the figure.
2) Tighten locknuts ❶ so that they securely hold the thread stand assembly.
3) In the case of ceiling wiring, pass the power cable through spool rest rod ❷ .

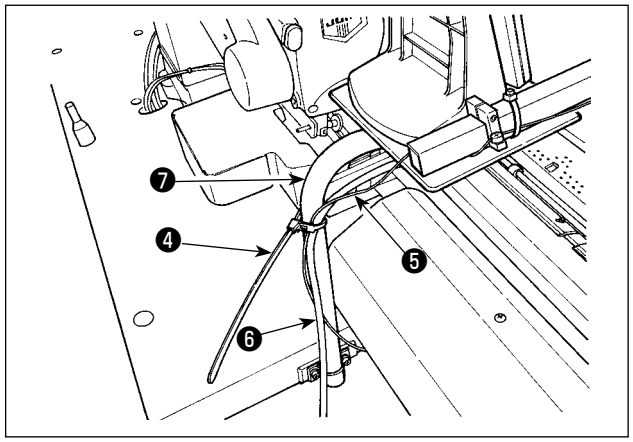
3-9. Installing the marking light

WARNING :
1. If the laser light directly enters the eye, eyesight trouble may be caused.
Do not look into the laser inlet/outlet.
2. Never perform installing/removing of the marking lamp with the power turning ON.
In addition, do not use the light other than marking.

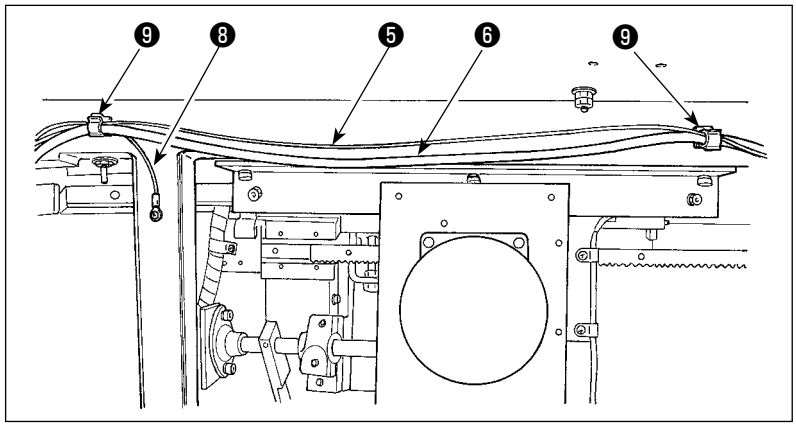


1) When installing the device, temporarily fix marking-light mounting base ❶ on base plate ❷ with setscrews ❸ (2 x M4) supplied with the unit.

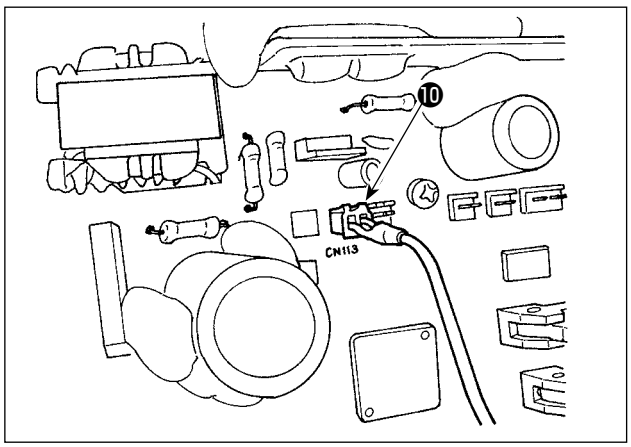
Marking light specifications
Class 2 laser product
Maximum output: 1mW
Wave length: 635nm (Red)
Safety standard
JIS C 6802:2014
IEC60825-1:2014



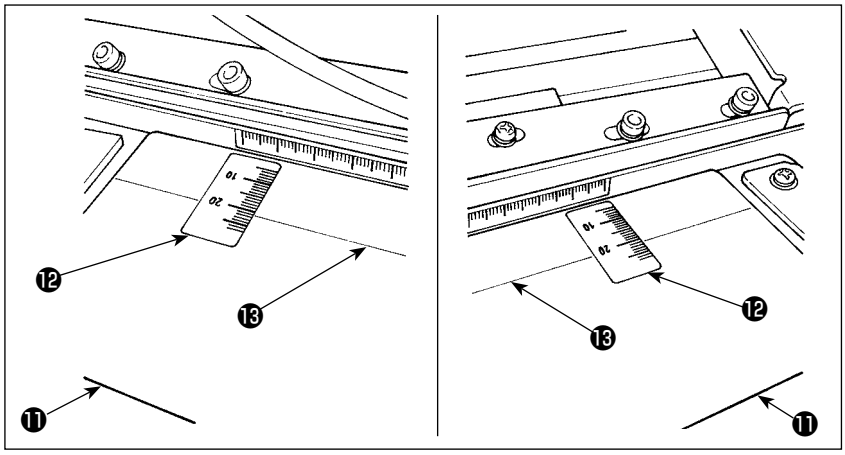
2) Secure marking-light cord ❺ and operation-panel cord ❻ on strut ❼ by means of cable clip band ❹ .



3) Fix marking-light cord ❺ together with operation-panel cord ❻ and grounding cord ❽ at two locations underside the cabinet with clamps ❾ .



4) Open the control box. Connect connector ❿ of the marking light to CN113.

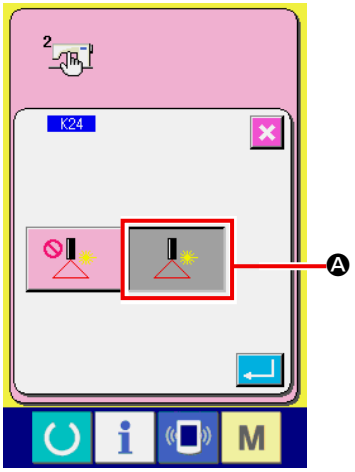


5) Adhere seal ⓬ on preset table ⓫ by affixing the right and left edges of the seal at right and left marking-off lines ⓭ on the table. The location of the seal to be adhered on the preset table can be found by aligning the scale "21" on the seal with marking-off line ⓭ on the table.

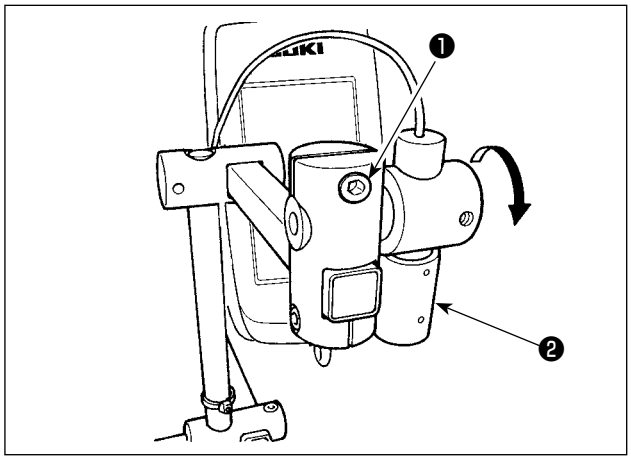
6) Turn on the power to the marking light. Then, move the entire device to align the light beams irradiated from the marking light with right and left marking-off lights ⓭ on preset table ⓫ . When the device is correctly positioned, securely tighten setscrews ❸ (2 x M4).

3-10. Adjusting the marking light

Refer to "II-3-1. Changing procedure of memory switch data" p.110 for the operation procedure of the memory switch.

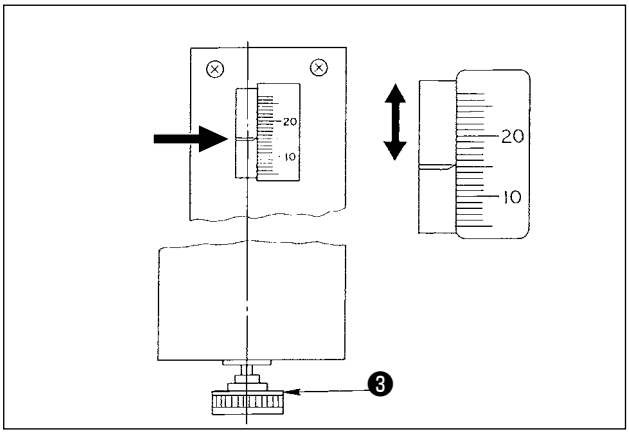


1) Turn the power ON. Set the memory switch K24 (Marking light setting) to the "Enable" Ⓐ.



* Setting procedure in the case the distance from the edge of placket material to the buttonhole is 15 mm

1) Loosen setscrews ❶ .
2) Turn marking light ❷ in the direction of the arrow to adjust the pointer to "15" of the seal adhered on the preset table so that the laser light from marking light ❷ irradiates the scale "15."
3) Tighten setscrews ❶ taking care not to allow the laser light to move out of adjustment.



4) Align the pointer of the preset table at the scale "15" on the seal by means of the preset adjustment handle ❸ . (See **"I-4-3. Adjusting the seam allowance" p.37** for the adjusting procedure.)

3-11. Installation and adjustment of the material edge detecting sensor (asm.)

This setting is only available under the men's garment mode. Be aware that the sewing machine carries out its normal operation even if the material edge detecting sensor is installed.

(1) Assembling the material edge detecting sensor

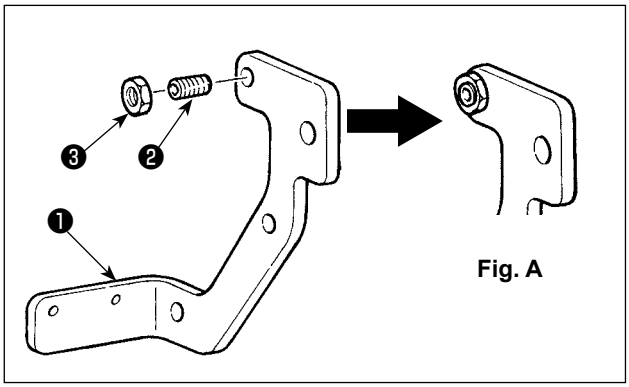
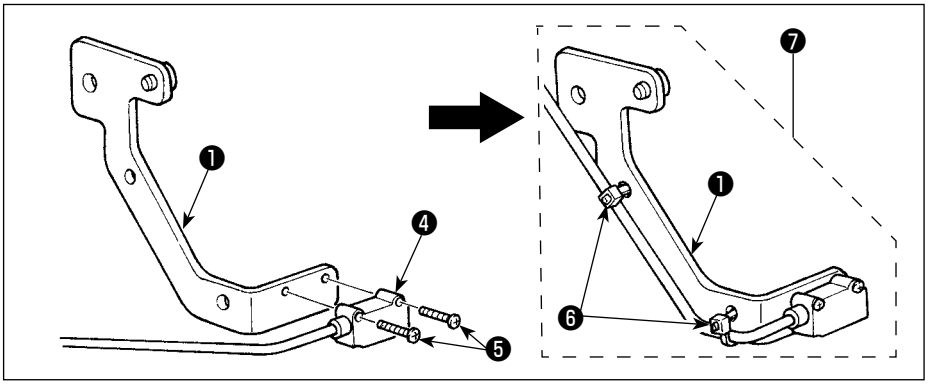


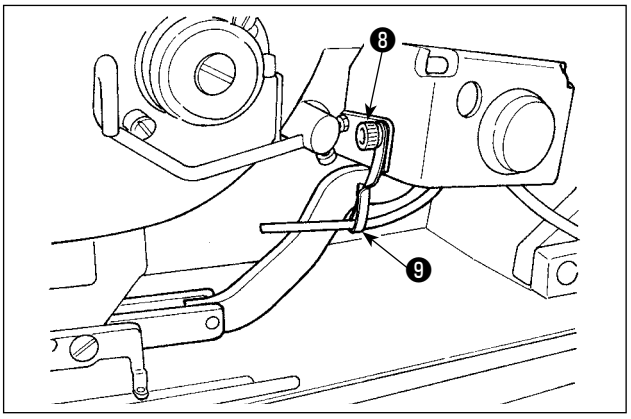
Fig. A

1) Put screw ❷ into the tapped hole in sensor mounting plate ❶ .
2) Fit nut ❸ on screw ❷ . Tighten the screw unit it is almost flush with the mounting plate, as shown in Fig. A, and secure with nut ❸ .



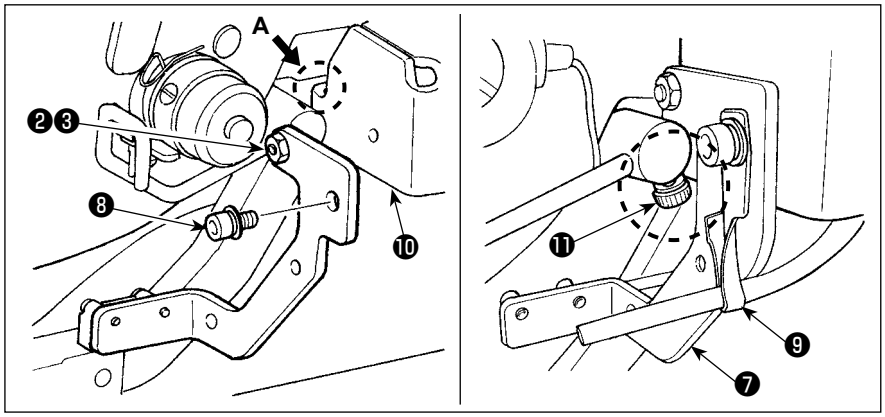
3) Install sensor ❹ on the mounting plate with screws ❺ .
4) Route the sensor cord along the holes in mounting plate ❶ . Secure the cord with cable clips ❻ at the holes to complete the assembly of material edge detecting sensor (asm.) ❼ .

(2) Installing the material edge detecting sensor on the machine head

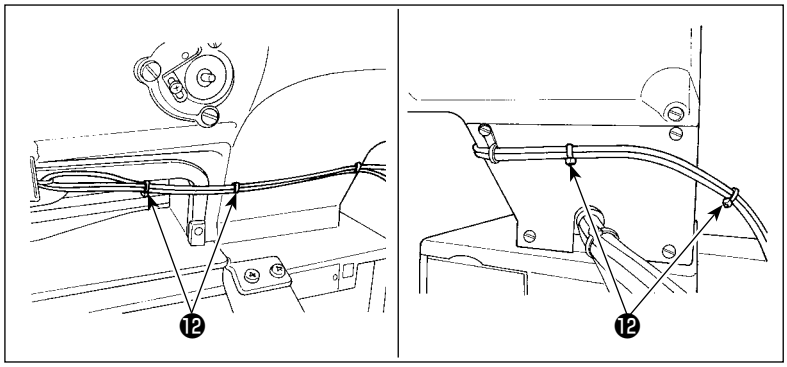


1) Loosen setscrew ❽ of the mounting bracket for the air blower to remove mounting bracket ❾ .
2) Put setscrew ❷❸ of material edge detecting sensor (asm.) ❼ on section A of hand switch mounting plate ❿ . Mount both material edge detecting sensor asm. ❼ and mounting bracket ❾ with air blower mounting bracket setscrew ❽.

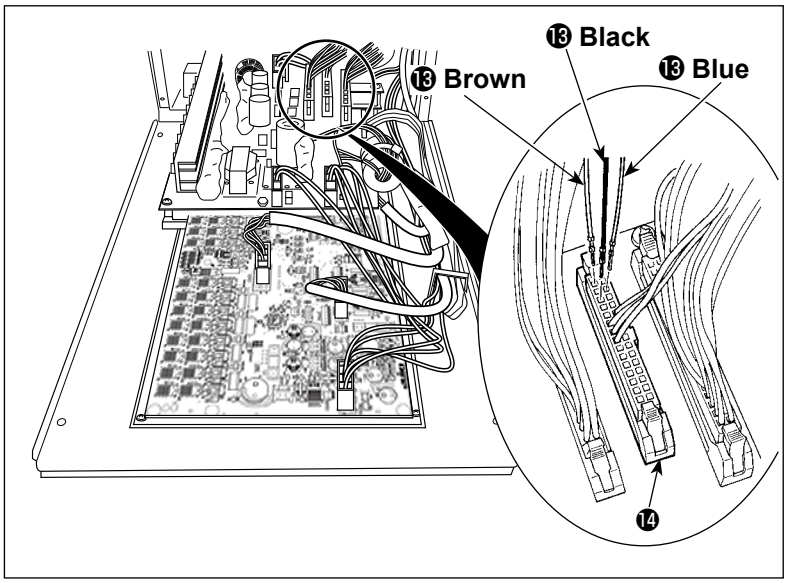
Be sure to check that the setscrew does not come in contact with hand spinner set-screw ⓫ .



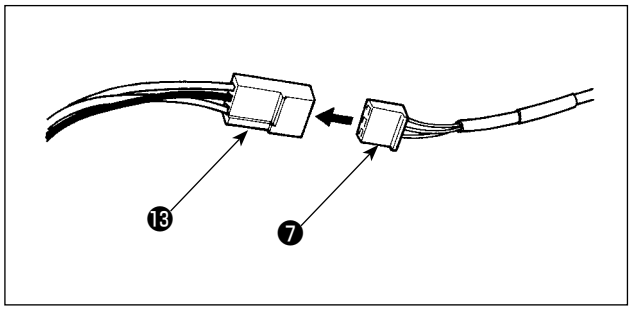
3) Turn around bracket ❾ so that the air hose faces the needle bar.



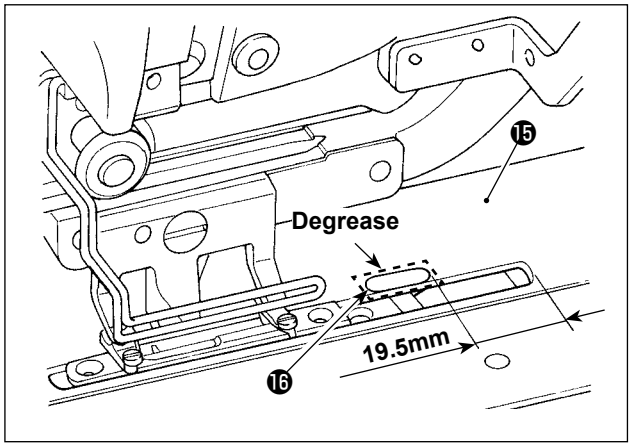
4) Secure material edge detecting sensor cord by means of cable clip ⓬ together with the hand-switch cord and the air hose.



5) Open the cover of the control box.
6) Connect brown cord (contact) of the material edge detecting sensor junction cord ⓭ to sensor junction cord B asm. ⓮ (CN105-30), black cord (contact) to sensor junction cord B asm. ⓮ (CN105-26) and blue cord (contact) to sensor junction cord B asm. ⓮ (CN105-27), respectively.



7) Insert material edge detecting sensor asm. cord ❼ into material edge detecting sensor junction cord ⓭ .

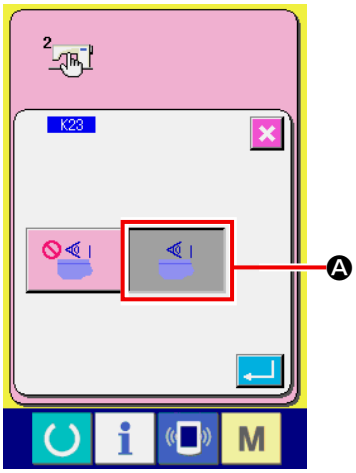


8) Degrease the top surface (at the location where reflective sheet ⓰ is to be affixed) of feed plate ⓯ .
9) Affix reflective sheet ⓰ on feed plate ⓯ aligning with the end face of the slot of the feed plate.

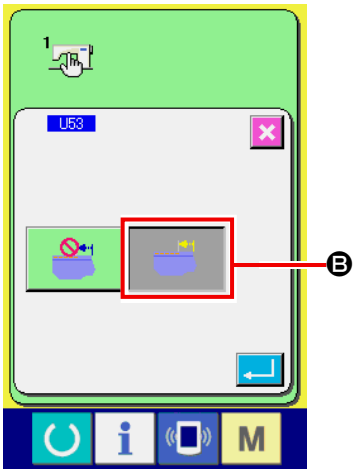
If the relevant part of the surface of feed plate ⓯ is not adequately degreased, reflective sheet ⓰ is likely to come unstuck.

(3) Adjusting the material edge detecting sensor

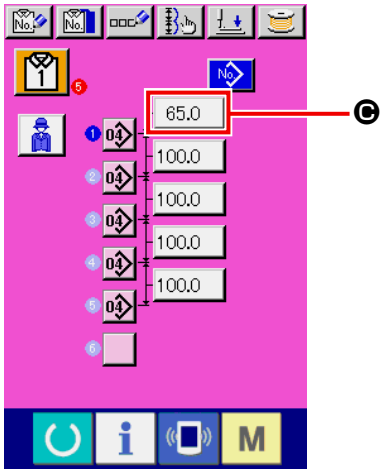
Refer to "II-3-1. Changing procedure of memory switch data" p.110 for the operation procedure of the memory switch.



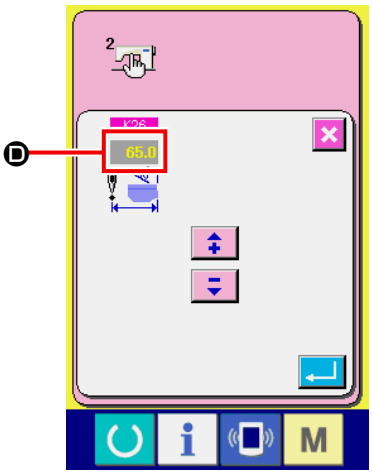
1) Turn the power ON. Set K23 (material edge detecting sensor setting) in "enable" Ⓐ.



2) Set U53 (jump functions setting) in "enable jump" Ⓑ.



3) Set the amount of feed from the material edge Ⓒ at 65 mm under the AC mode.
4) Press the ready key to bring the sewing machine into the sewing state. Then, place a piece of cloth of approximately A4-size(210mmx297mm) on the preset section.



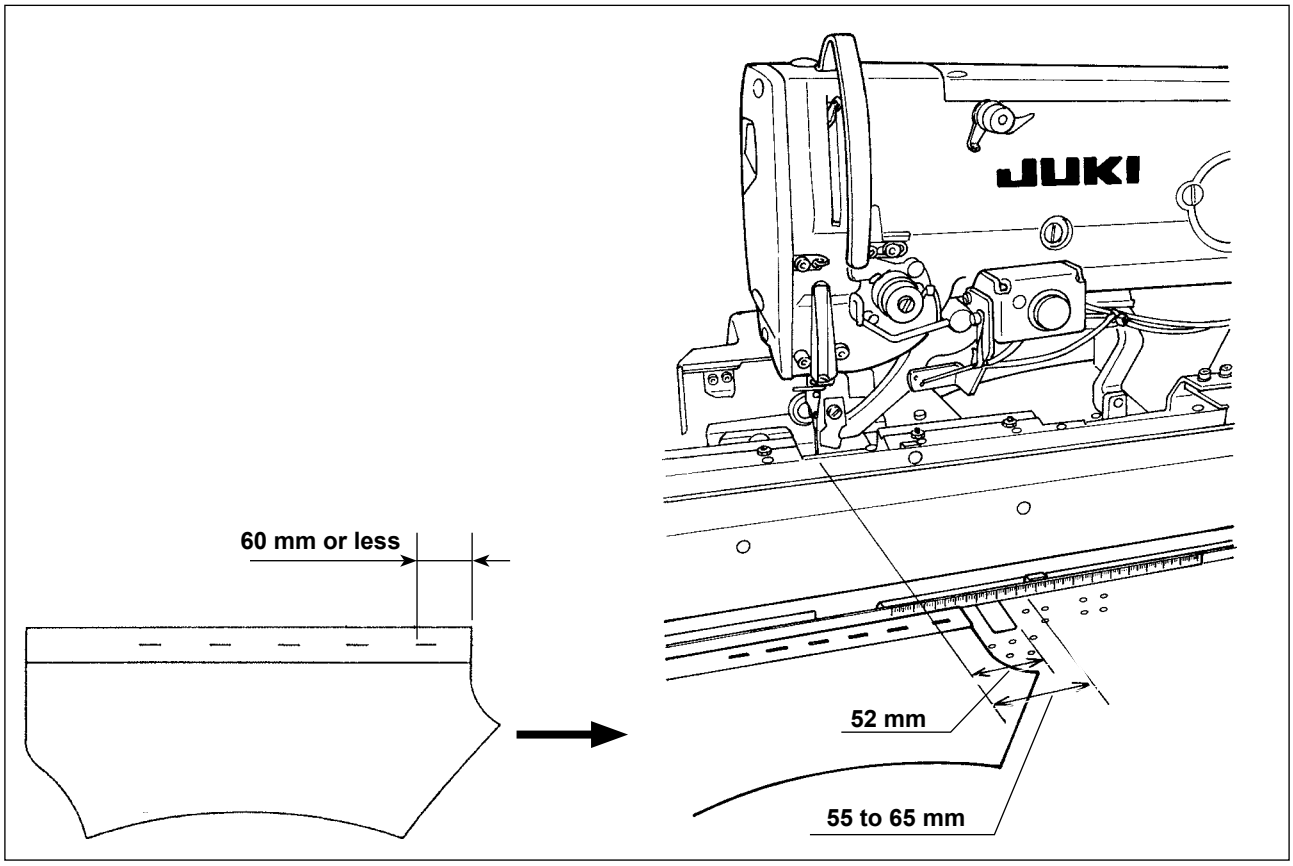
5) Actuate the preset device to start sewing.
6) Measure the distance Ⓓ from the material edge to the edge of a buttonhole. Enter the measured value in the field above the K26 pictograph. (Initial value is 65 mm.)
7) Now, the positioning of the sensor is completed. Enter the desired amount of feed in Ⓒ and measure the aforementioned distance for the purpose of confirmation.

[Precautions to be taken in setting]

It is recommended to place the material at the location that is 65 ± 5 mm from the center of needle as far as possible.

In the case you want to set the amount of feed from the material edge to the first buttonhole to 60 mm or less, in particular, place the material in the range of 60 and 65 mm from the center of needle.

Sewing cannot be carried out unless the material is placed near the notch in the preset table (52 mm away from the center of needle).

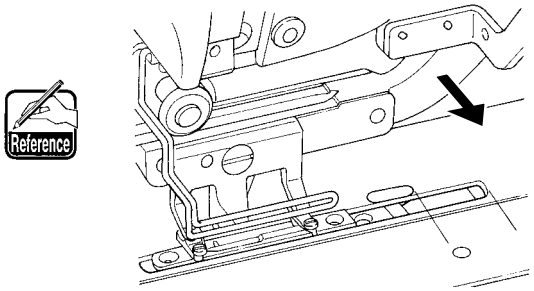


Example) In the case the amount of feed from the material edge to the first buttonhole is set at 50 mm and the material is placed at the location 75 mm away from the center of needle

After the material is delivered from the preset table to the carriage, the material edge is detected by the carriage: The carriage moves to the left by 10 mm (75 - 65).

To sew the first buttonhole: The carriage moves to the left by 15 mm (65 - 50).

In all, the carriage has to move to the left by 25 mm. However, the amount of travel of the carriage is limited to 20 mm at the maximum. As a result, an error occurs in the aforementioned case.

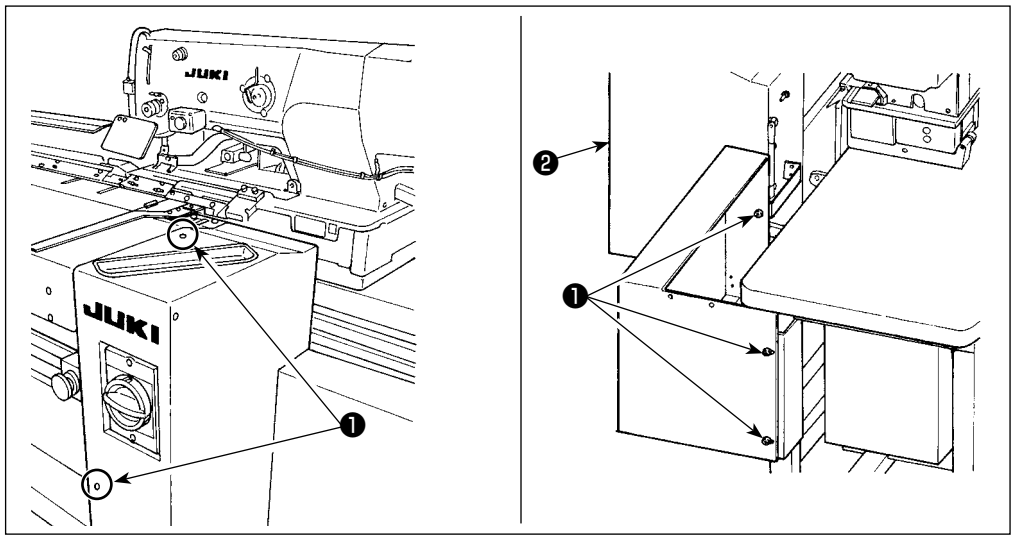


In the case the edge width (normally approximately 7 mm) is smaller, the sensor may not detect the material edge. In this case, adjust the position of the sensor to such a position (toward the operator) that it is able to detect the edge.

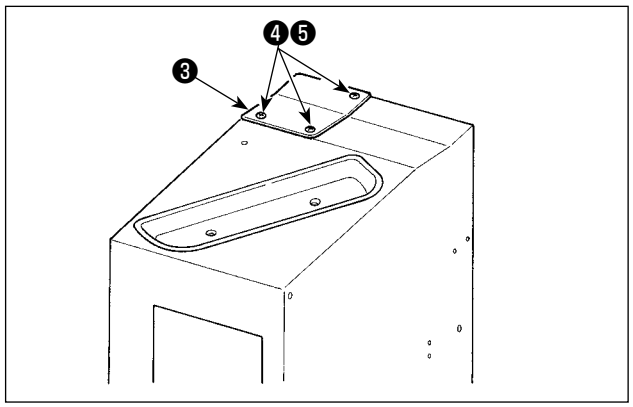
3-12. Assembly and adjustment of the auxiliary clamp

WARNING :
So as to prevent accident resulting from abrupt start of the sewing machine, be sure to turn the power OFF and discharge air before starting assembly and adjustment.

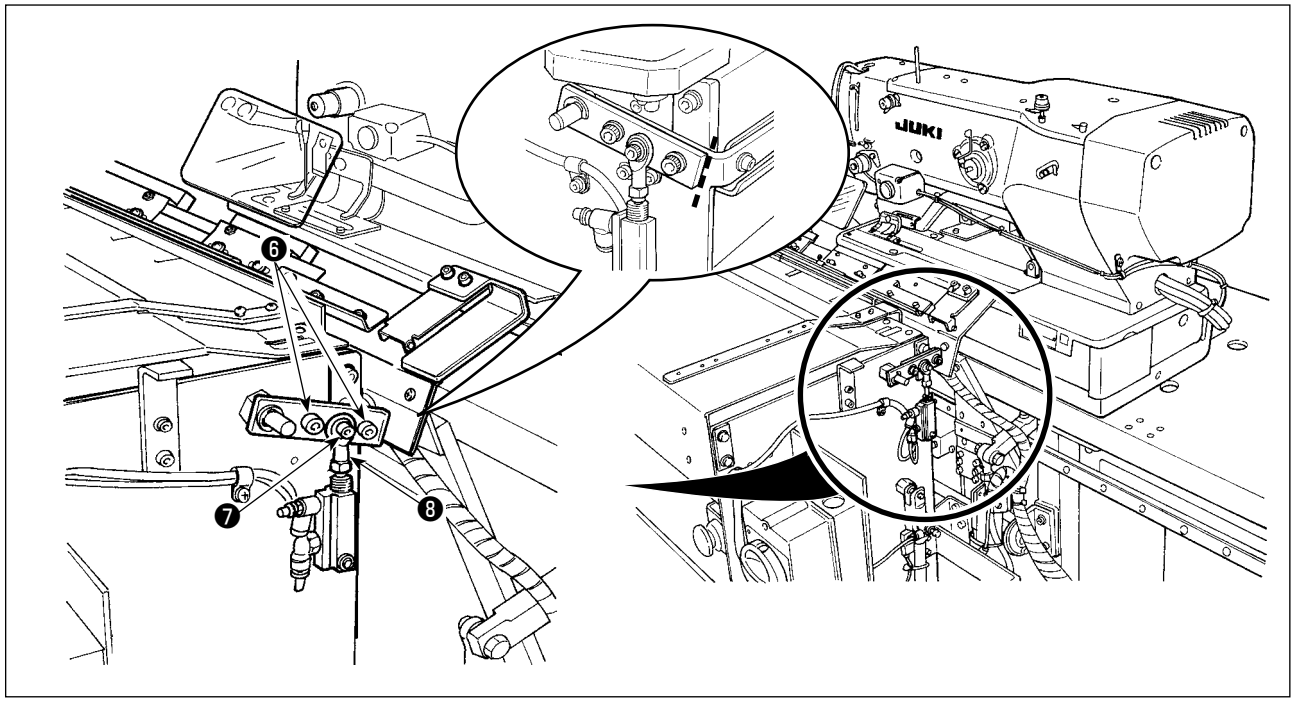
(1) Assembling the auxiliary clamp



1) Remove five screws ❶ to remove right cover ❷ .

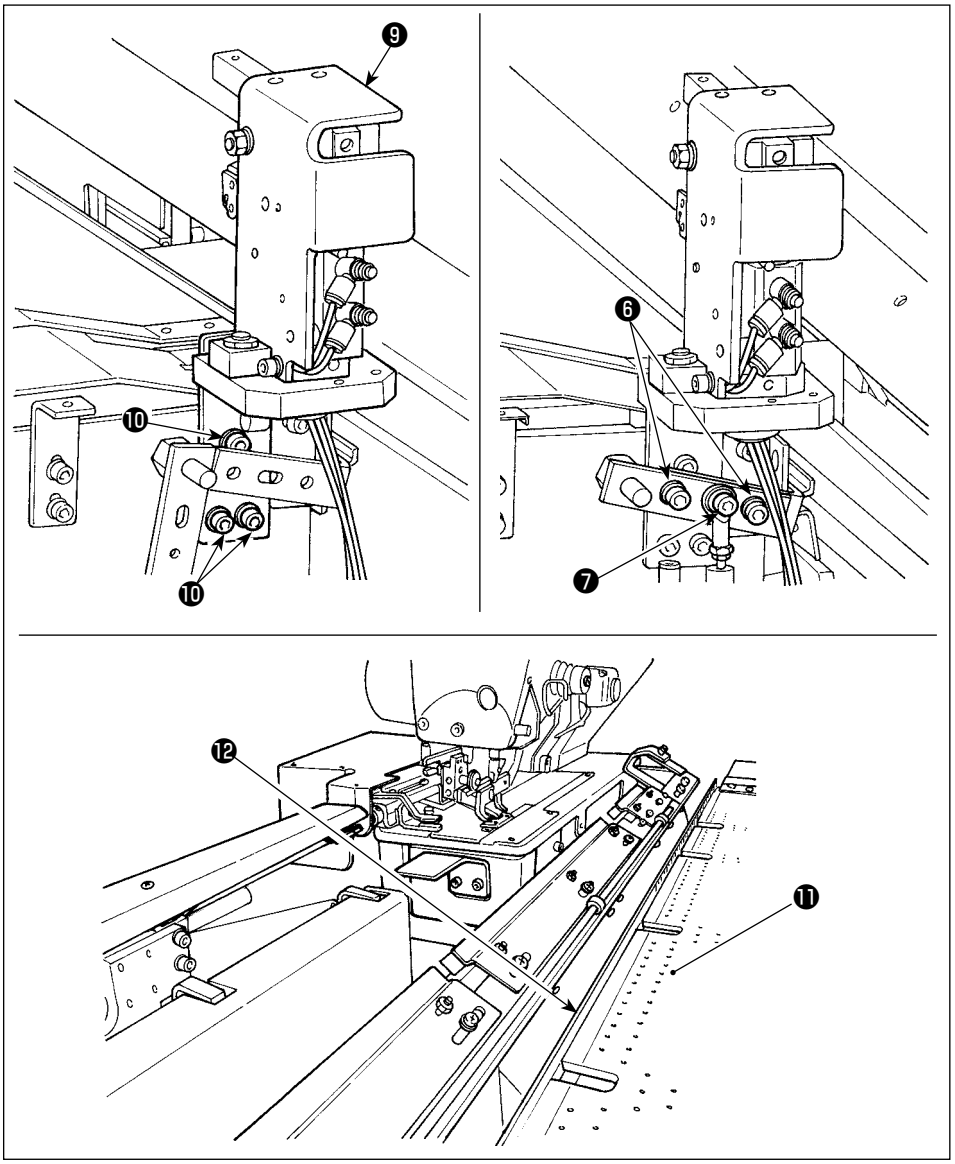


2) Remove three screws ❹ and three nuts ❺ (from the underside) to remove base plate ❸ .



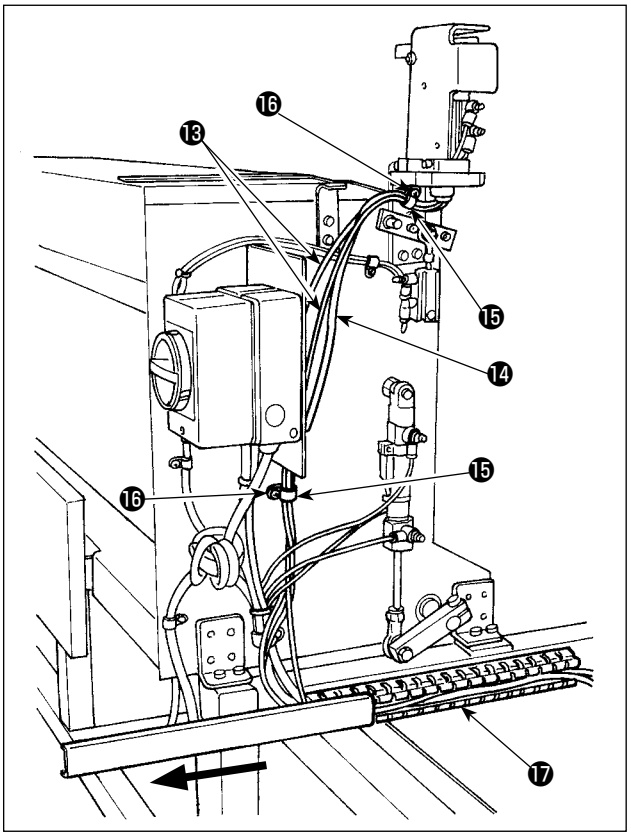
3) Write mark-off lines, with a pencil or the like, on the joining surfaces of parts to easily understand the installing position at the time of re-assembly, then remove screws ❻ and ❼ .

* There is a washer on the underside of rod end ❽ . Take care not to allow the washer to drop when removing screw ❼ .

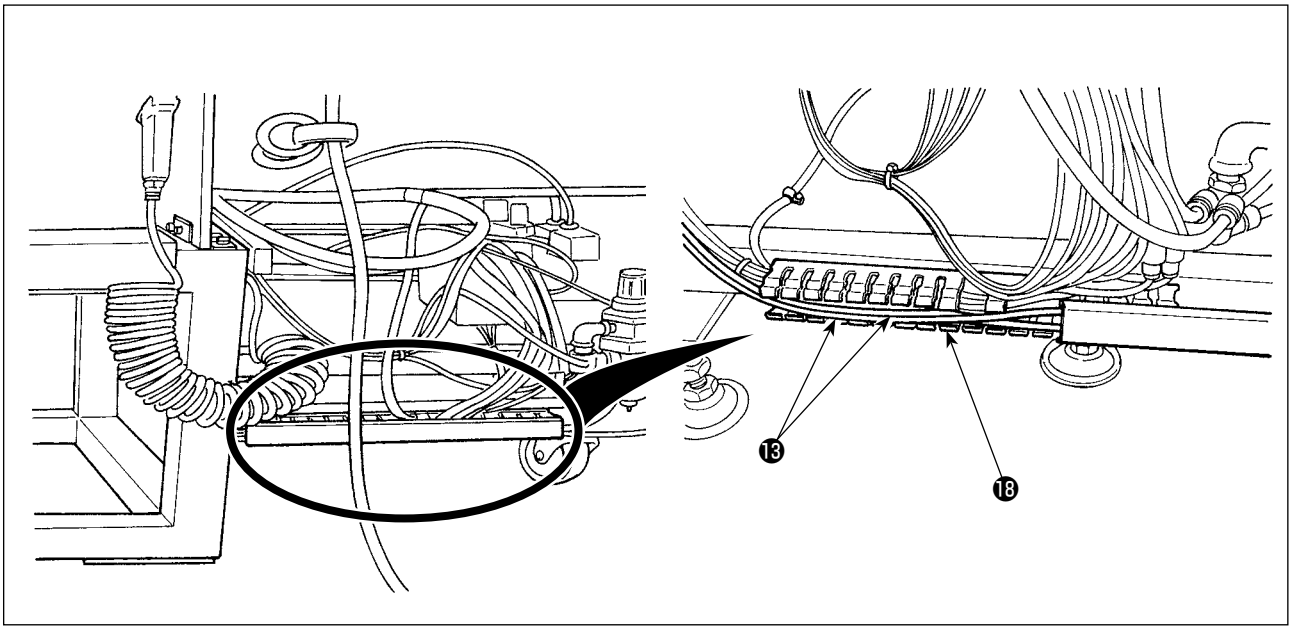


4) Fix auxiliary clamp asm. ❾ with three screws ❿ . Temporarily fix screws ❻ and ❼ and the washer, removed in step 3), with aligned with the mark-off lines.

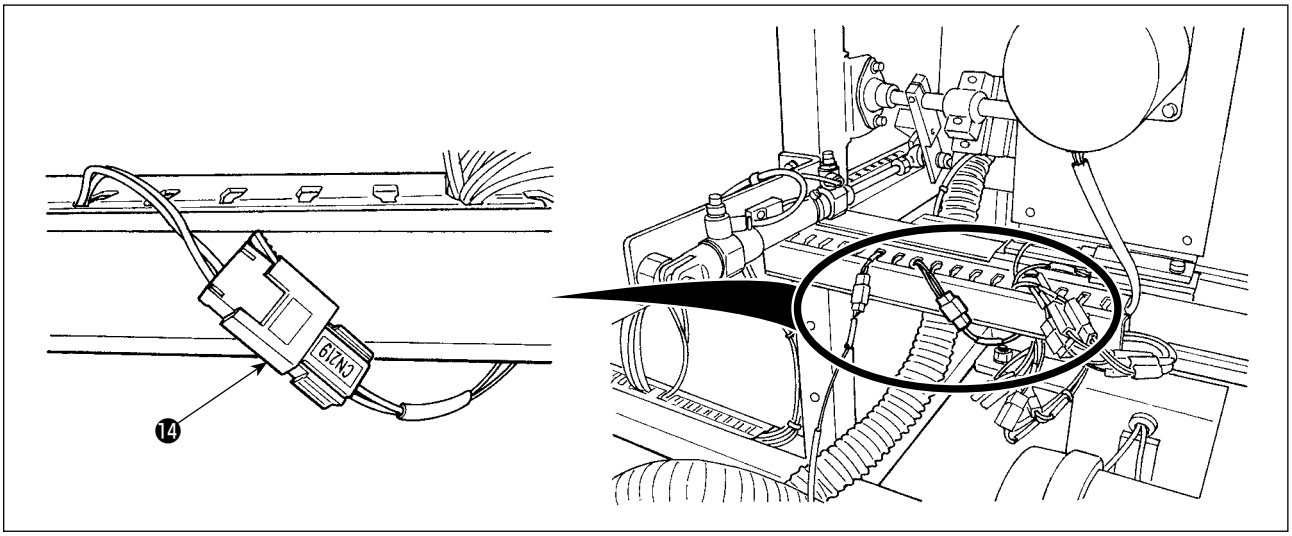
5) Supply air. Securely tighten screws ❻ and ❼ with setting plate support ⓬ pressed against preset table ⓫ .



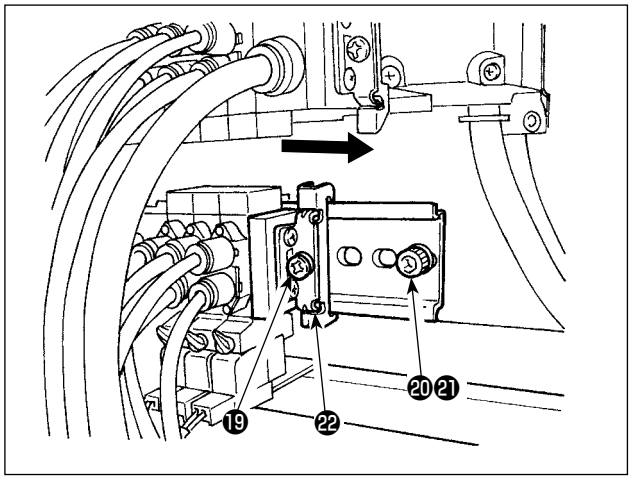
6) Bundle two air hoses ⓭ and switch cable ⓮ with clamp ⓯ . Tighten screw ⓰ . Then, slide the cover of duct ⓱ in the direction of the arrow. Place two air hoses ⓭ and switch cable ⓮ in the duct and close the cover of duct ⓱ .



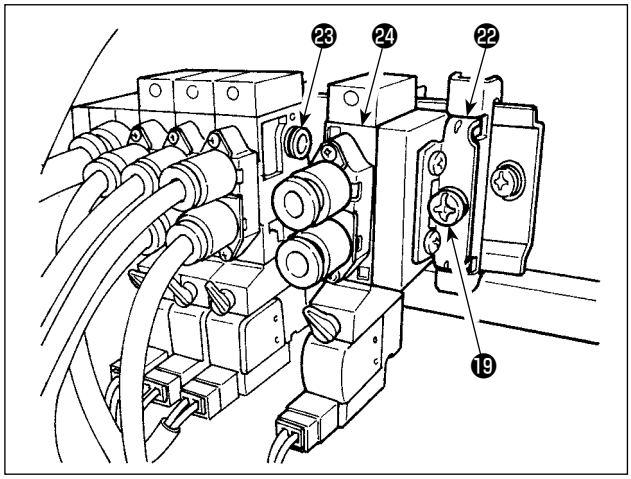
7) Slide the cover of duct ⓲ to place two air hoses ⓭ in the duct. Then, close the cover of duct ⓲ .



8) Replace switch cable ⓮ with the cable which is connected to "CN219."

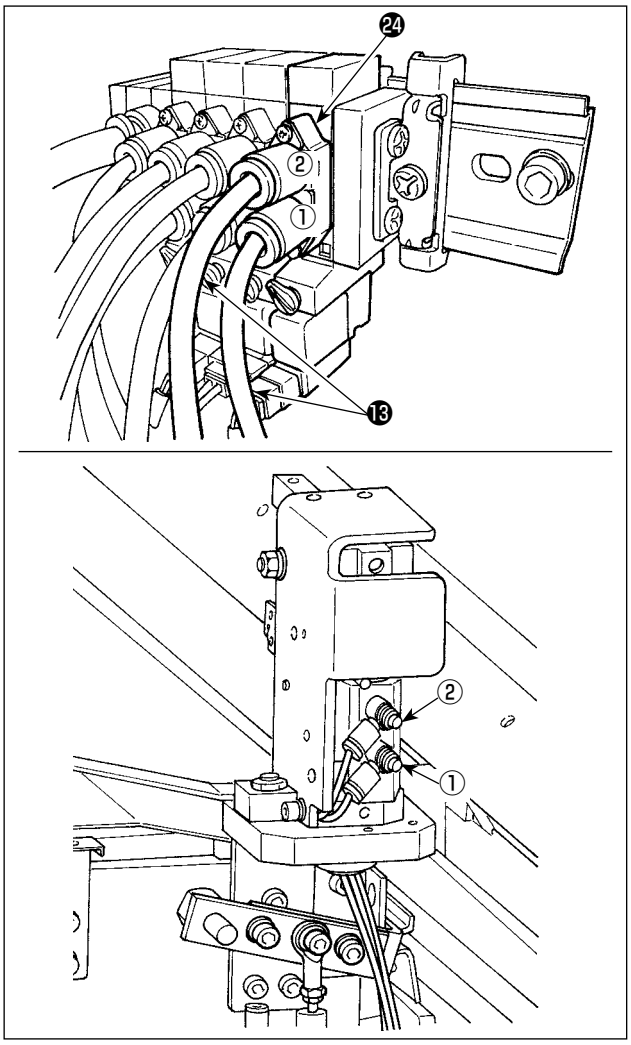


9) Discharge air. Remove screw ⓴ and nut ㉑ . Then, loosen screw ⓳ to slide end block ㉒ in the direction of the arrow until it comes off.



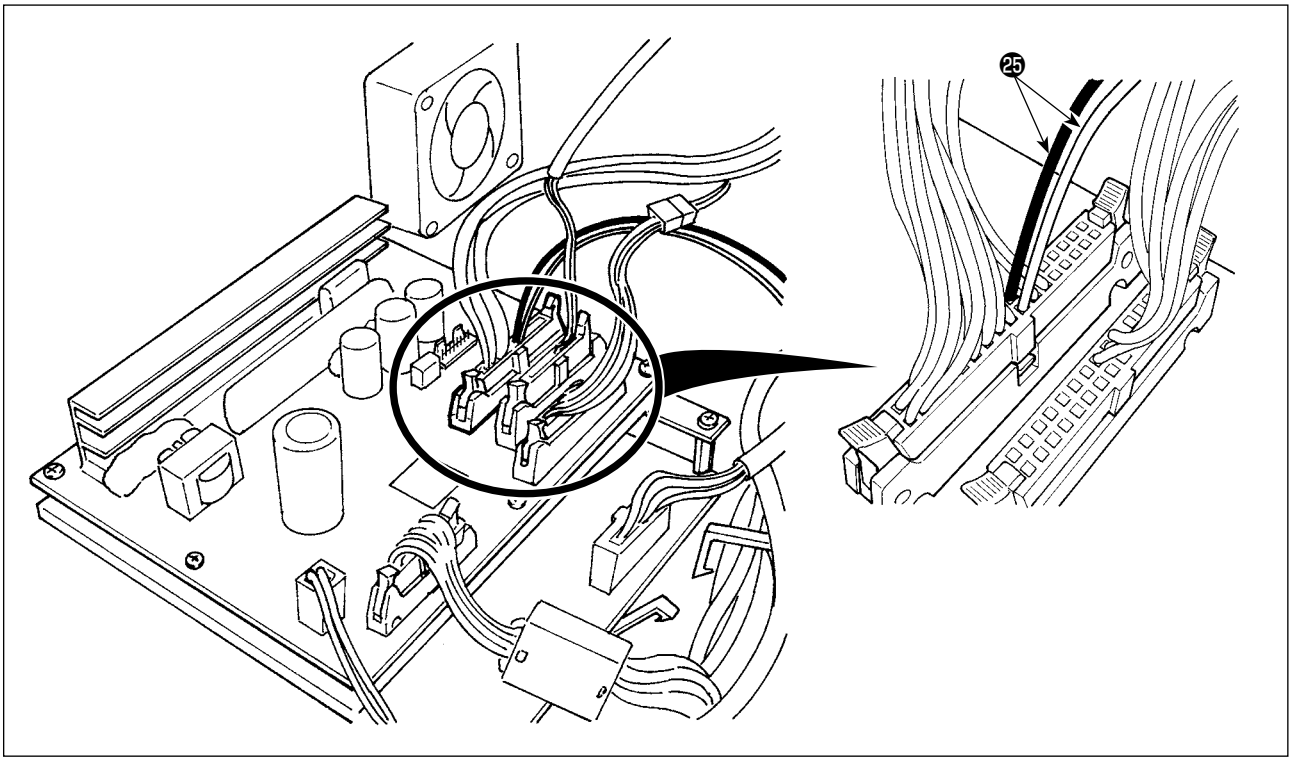
10) Install solenoid valve ㉔ and end block ㉒ by sliding them in the direction of the arrow.
At this time, check to be sure that end block ㉒ and solenoid valve ㉔ are respectively provided with three bushings ㉓ on one side.

Tighten screw ⓳ while shifting end block ㉒ in the direction of the arrow.



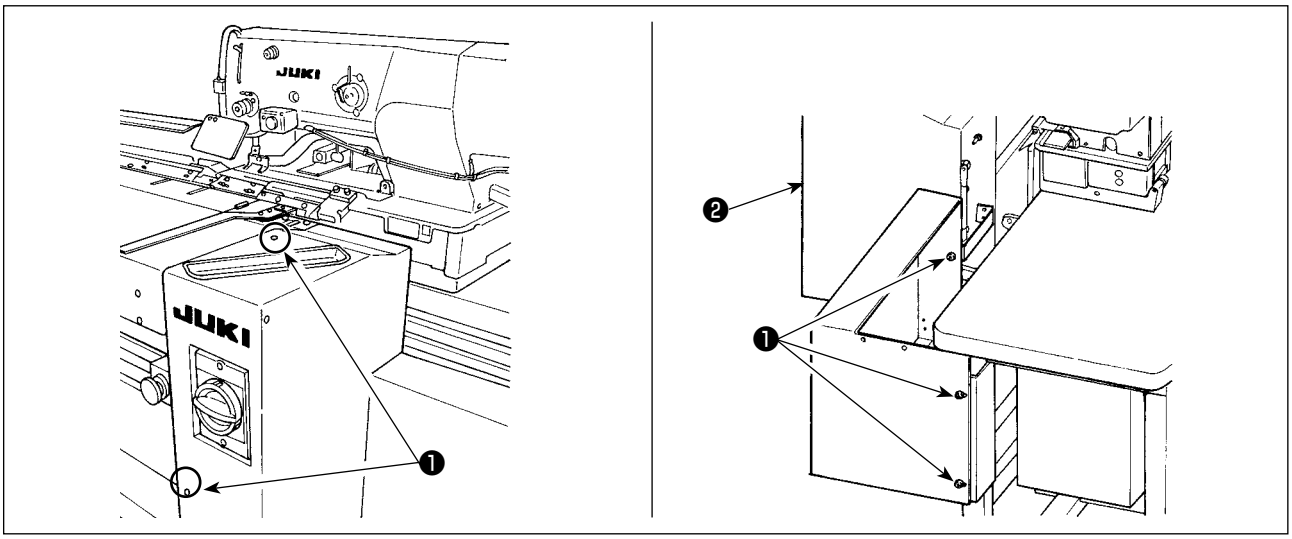
11) Tighten screw ⓴ and nut ㉑ . Connect two air hoses ⓭ to solenoid valve ㉔ while matching their label numbers ① and ② those of the corresponding bushings.

* Carefully check the mounting locations of air hoses ⓭ .

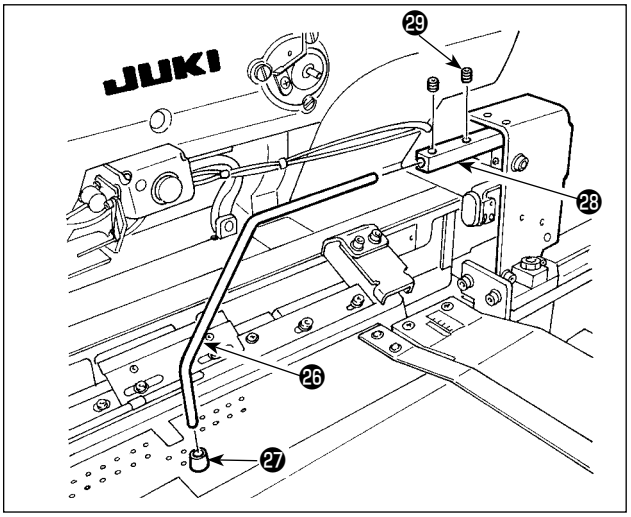


12) Open the control box. Connect solenoid valve cord ㉕ to the CN 106 connectors (red: 19-pin, black: 20-pin).

* Carefully check the wiring location of the red and black connectors.

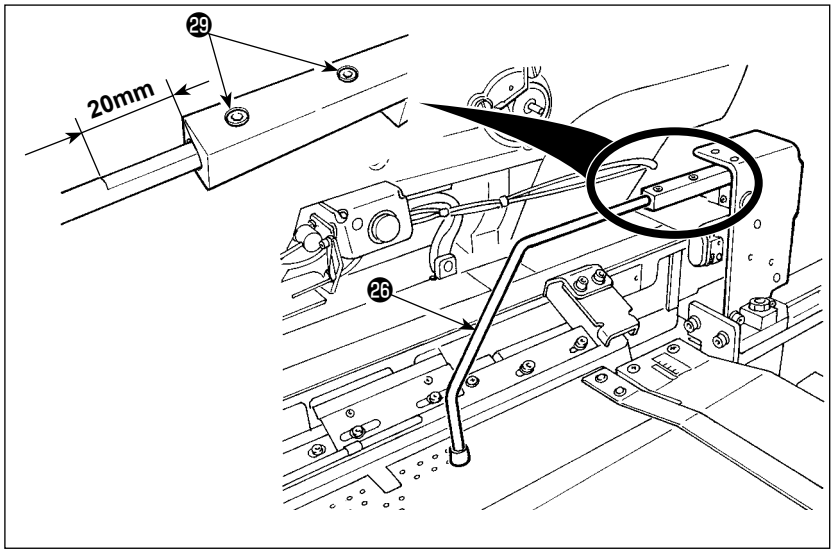


13) Install right cover ❷ and secure with screws ❶ .

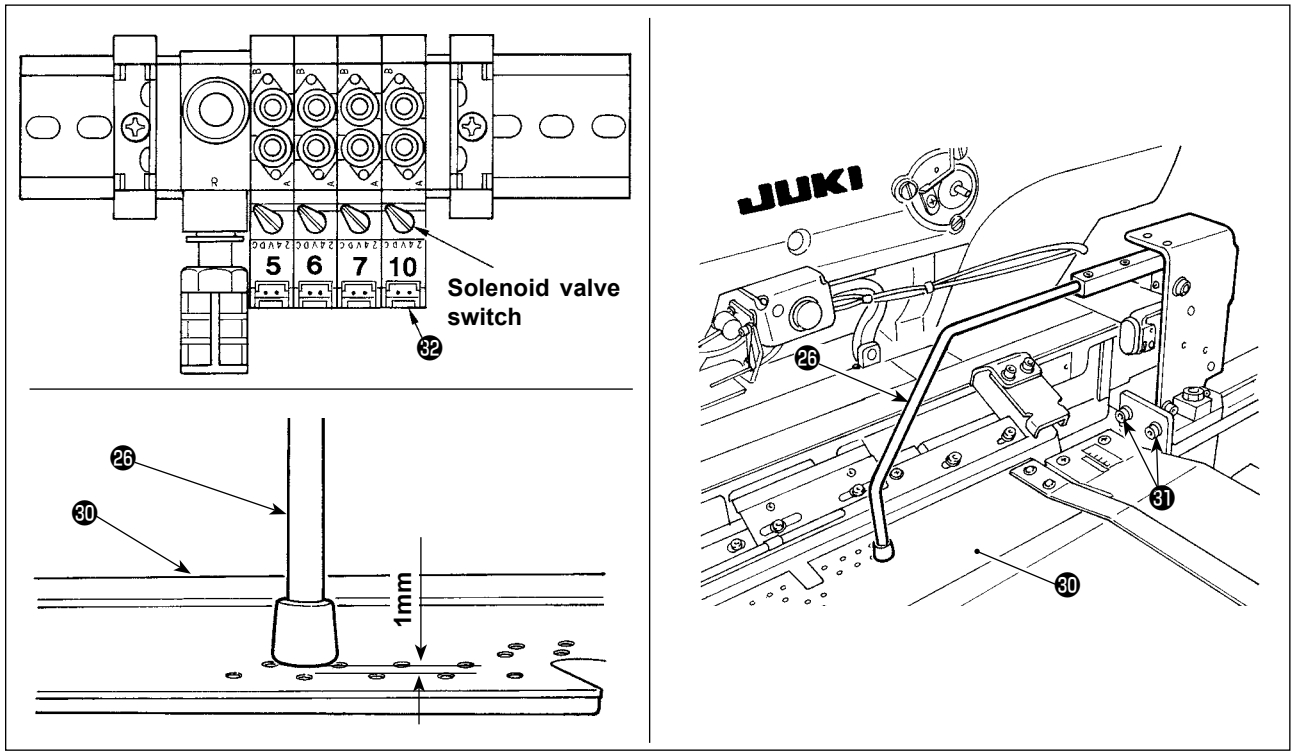


14) Fit material presser rubber cushion ㉗ on clamp ㉖ . (Fit the cushion to the side which has a shorter distance from the bent section to the end face.)

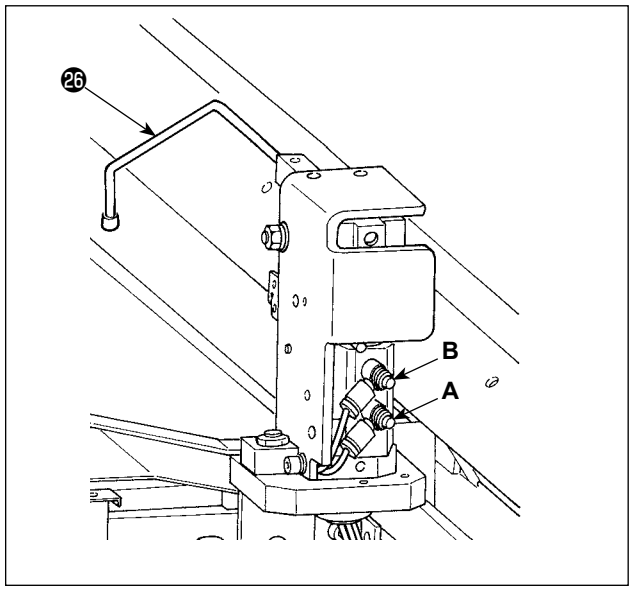
15) Insert clamp ㉖ into clamp block ㉘ and secure with two setscrews ㉙ . At this time, adjust so that setscrews ㉙ are brought to the location of the slot in the top surface of clamp ㉖ .



16) Tighten two setscrews ㉙ to leave a 10-mm long slot in the top surface of the clamp ㉖ . When the setscrews are tightened to leave a 20-mm long slot there, clamp ㉖ is positioned as shown in the figure.



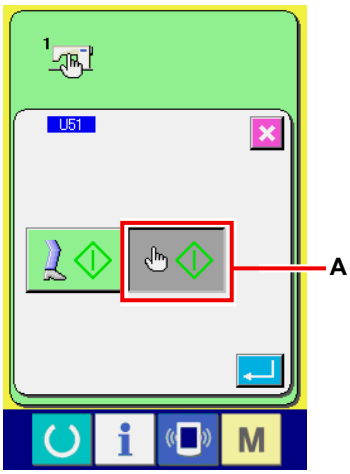
17) Turn ON the air source. Press solenoid valve switch ㉜ to lower clamp ㉖ . Loosen two screws ㉛ . Adjust the height of preset table ㉚ so that it sinks by 1 mm when clamp ㉖ comes down to its lower position.



18) If you want to change the lifting/lowering speed of clamp ㉖ , adjust speed controllers **A** and **B**.
To reduce the lowering speed of clamp ㉖ , tighten speed controller **B**.
To reduce the lifting speed of clamp ㉖ , tighten speed controller **A**.

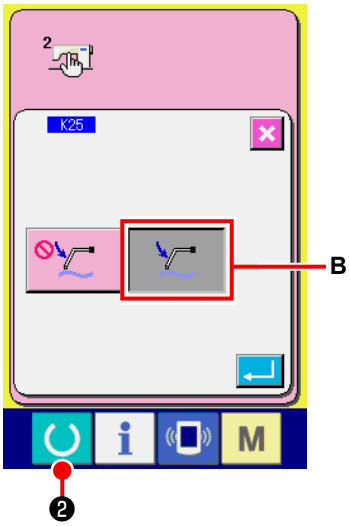
(2) Adjusting the auxiliary clamp

Refer to "II-3-1. Changing procedure of memory switch data" p.110 for the operation procedure of the memory switch.



① **Selecting the start switch**

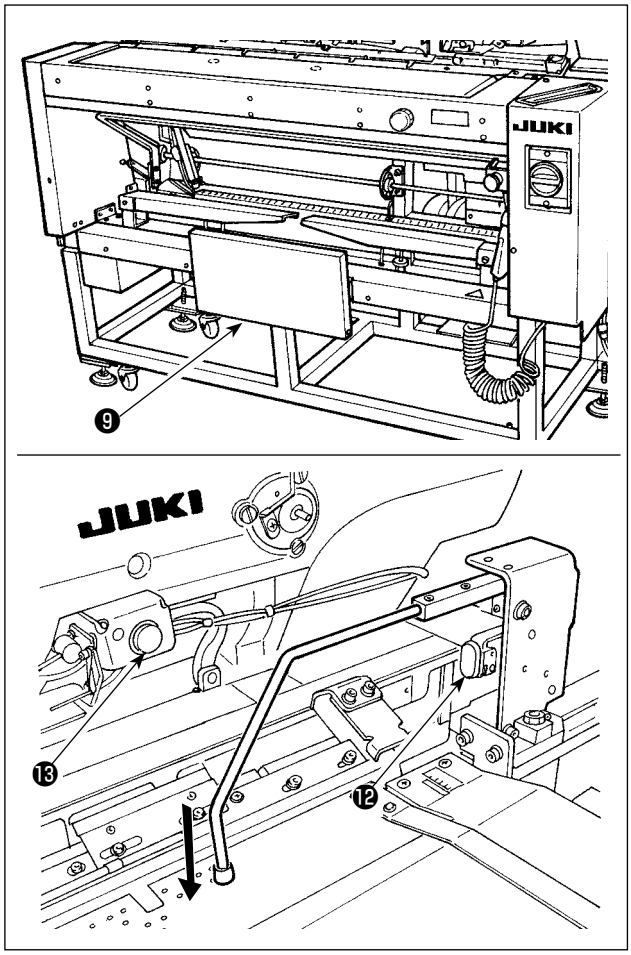
Set the memory switch U51 (Start switch selection) to the "Hand switch" **A**.



② Set the memory switch K25 (Auxiliary clamp selection) to the "Enable" **B**.

③ **Actuating the auxiliary clamp**

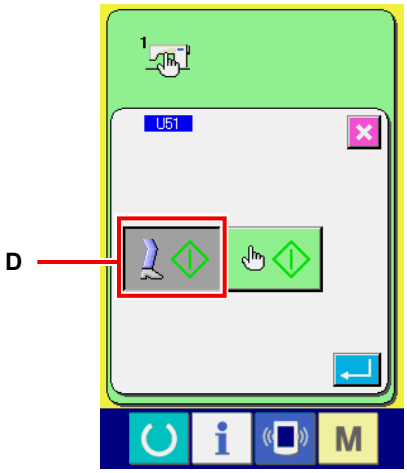
Press ready key ❷ to place the sewing machine into the sewing mode. (The state where the screen is in green)



When you press knee switch ❾ , the cloth suction device starts sucking the material and the auxiliary clamp comes down.
When you press knee switch ❾ again, the cloth suction device stops sucking the material and the auxiliary clamp goes up.
When you press hand switch ⓬ and release it, cloth suction lamp ⓭ lights up, the auxiliary clamp goes up and the preset table moves toward the machine head side.

* If you press knee switch ❾ while cloth suction lamp ⓭ stays on, delivery of the material is stopped and the preset table returns to its initial position.

[In the case the knee switch is set to be the start switch]

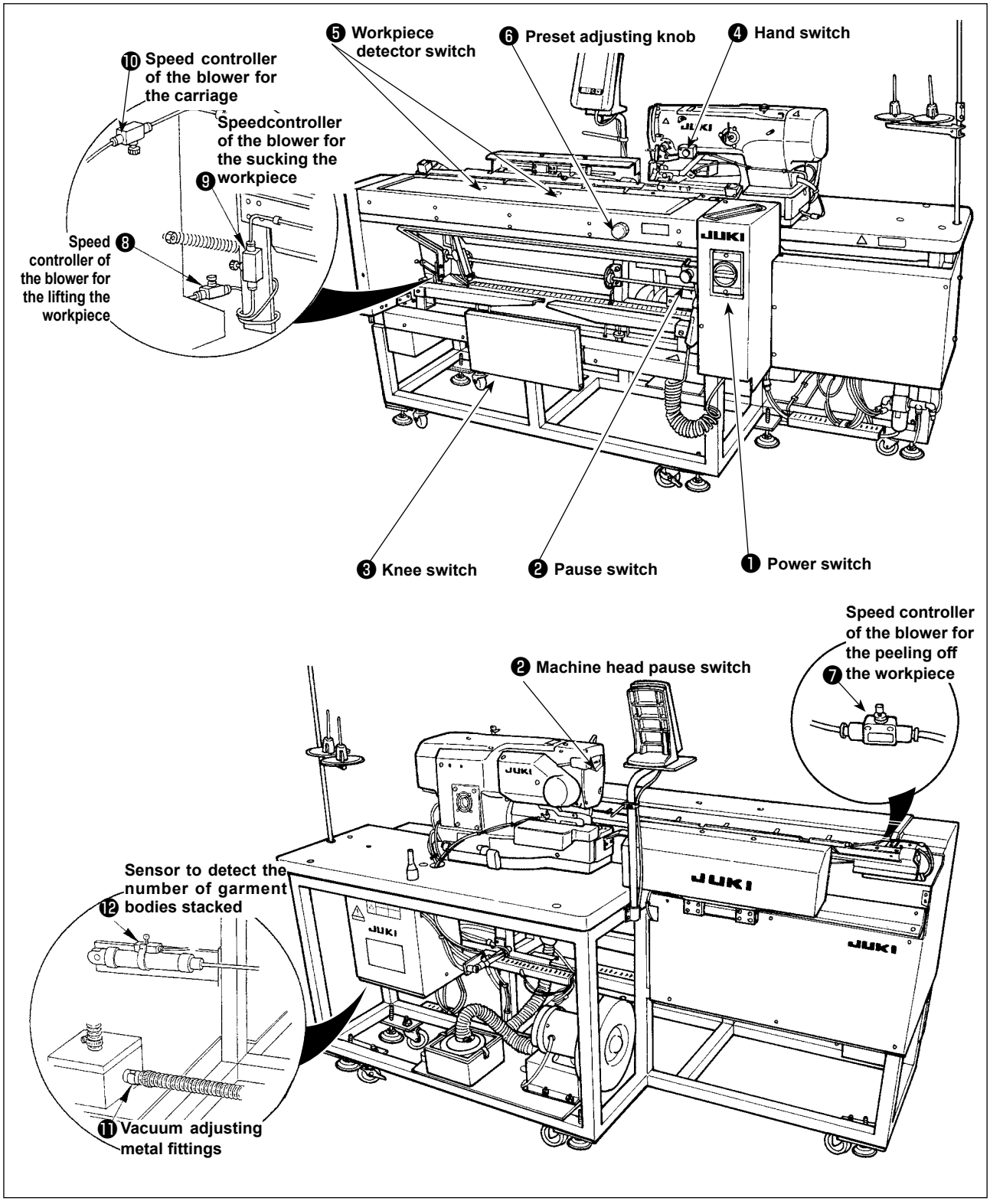


When you select item "U51" to select "knee switch" **D** as the start switch, the suction device keeps sucking the material and the auxiliary clamp keeps coming down to its lower position as long as you keep knee switch ❾ held pressed.
If you press hand switch ⓬ with knee switch ❾ held pressed, the suction device will stop sucking and, the auxiliary clamp will go up to return to the initial state. When you release knee switch ❾ , the auxiliary clamp goes up and the preset table moves toward the machine head side.

4. OPERATION AND ADJUSTMENT

WARNING:
Turn OFF the power before staring the work so as to prevent accidents caused by abrupt start of the sewing machine.

4-1. Operating switches and adjusting pneumatic components



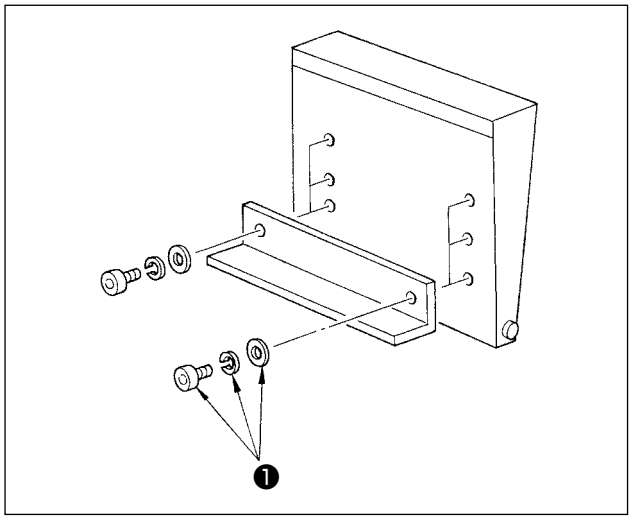
(1) Power switch

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

(2) Pause switch, Machine head pause switch

Use this switch to stop the machine from running.

(3) Knee switch



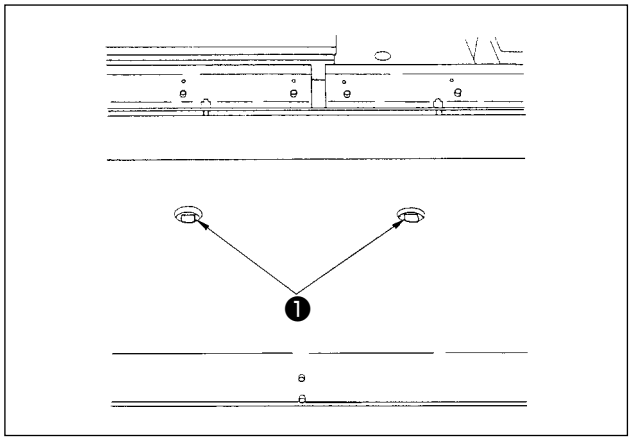
The height of the switch can be adjusted in the three stages. (It has been factory-adjusted to the middle stage at the time of delivery.) Loosen two screws ❶ in the reverse side of the knee switch, and fix the switch at a height where you can operate it with ease.
The switch is used as the start switch under the A mode, and is used as the preset cancel switch under the B mode.
Whether the knee switch or the hand switch is used as the start switch can be selected with the memory switch data U51.
(For the setting procedure of the selection of the start switch under A mode/B mode, refer to **"II-3-1. Changing procedure of memory switch data" p.110** .)

Caution **Be careful not to drop the knee switch when removing the screw.**

(4) Hand switch

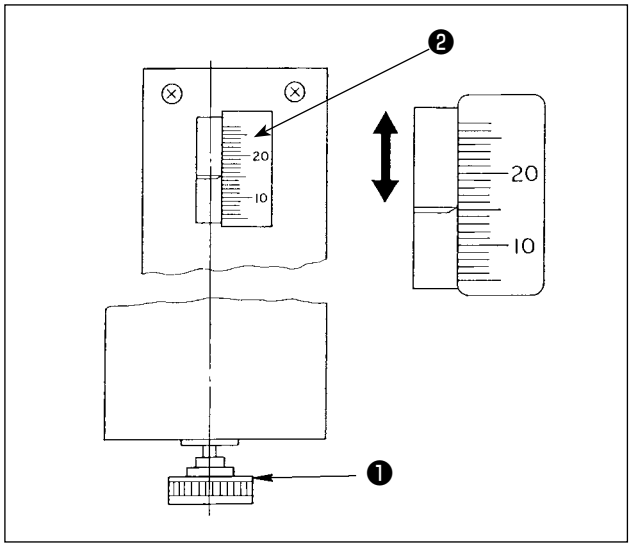
This switch is used as the start switch or the preset cancel switch.
(Refer to the aforementioned "Knee switch".)

(5) Workpiece detector switch



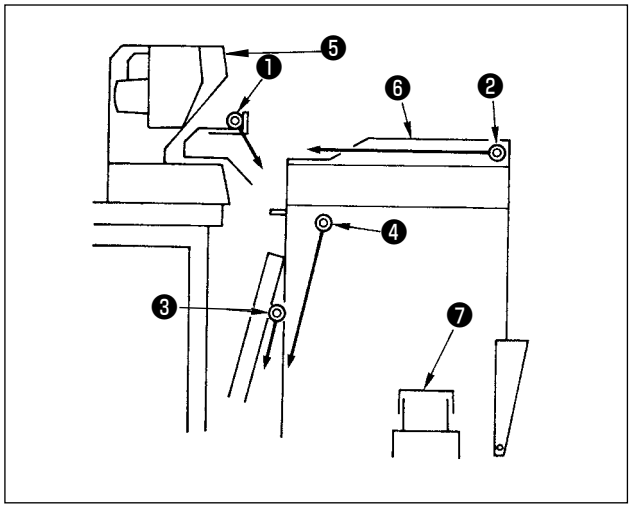
This switch prevents a malfunction when there is no workpiece set on the machine.
If either one of two detector switches ❶ detects a workpiece, the machine is actuated.
Take care not to place anything other than the sewing products or hands on detector switches ❶ .
If using a piece of light absorbing black material, the detector sensor may be inoperative. In this case, the detecting function can be inoperative by selecting the memory switch No U52.
(Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.)

(6) Preset adjusting knob



Use this knob to adjust the seam allowance.
Insert preset adjusting knob ❶ which is supplied in the tool box into the hole, and turn the knob to set the seam allowance to the value indicated by scale marker ❷ . (Refer to **"I-4-3. Adjusting the seam allowance" p.37**.)
After the adjustment, return knob ❶ to the tool box to prevent it from being lost.

(7) Adjusting the air blower



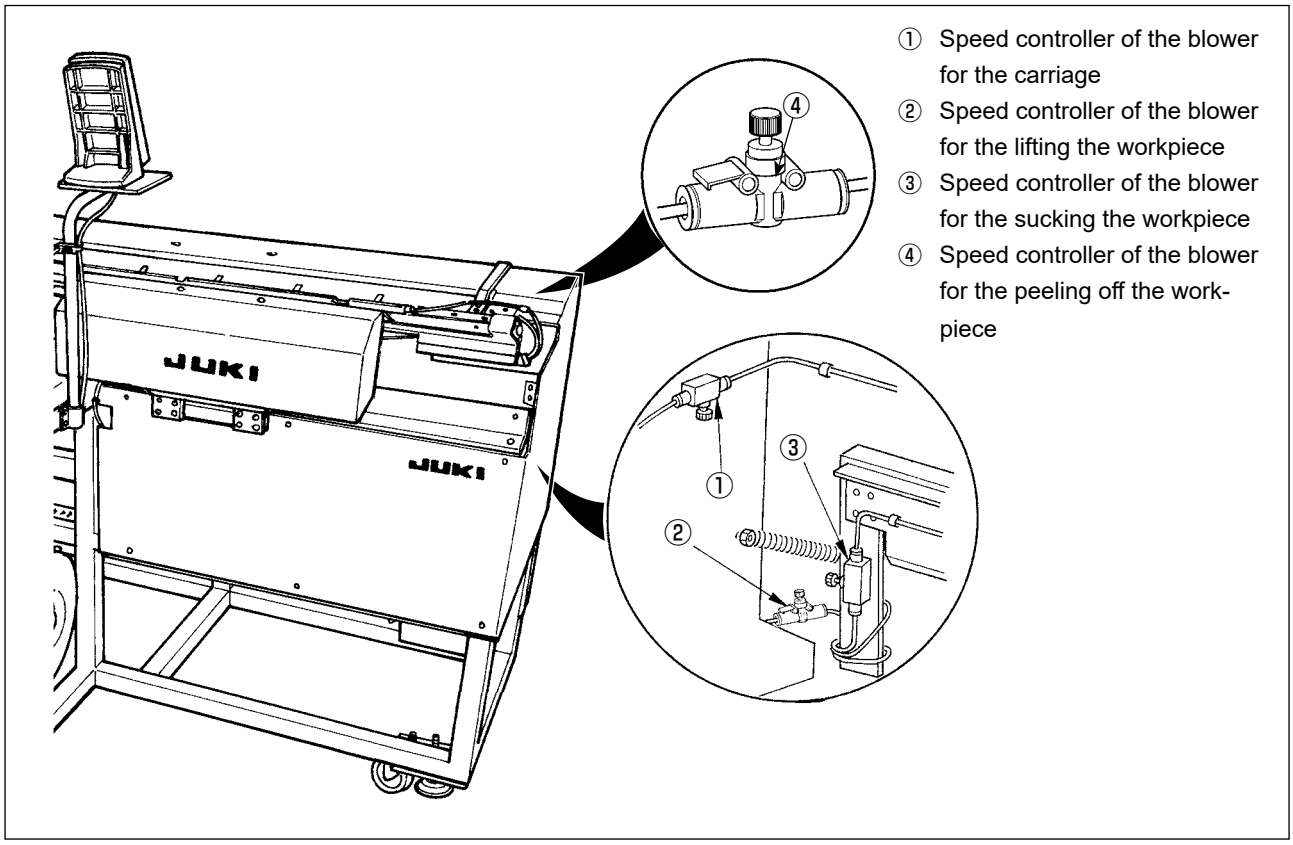
1) The air blower is provided with four blow pipes as illustrated in the figure on the left. The soled arrows show the air blowing direction of the respective pipes. The name and function of each components is as follows:

❶ Blower for the carriage
❷ Blower for lifting the workpiece
} To be used for bellowing down the workpiece

❸ Blower sucking the workpiece
❹ Blower peeling off the workpiece
} To be used for stacking the workpiece

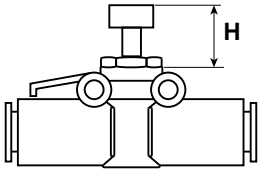
❺ Machine head
❻ Preset table
❼ Stacking board

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

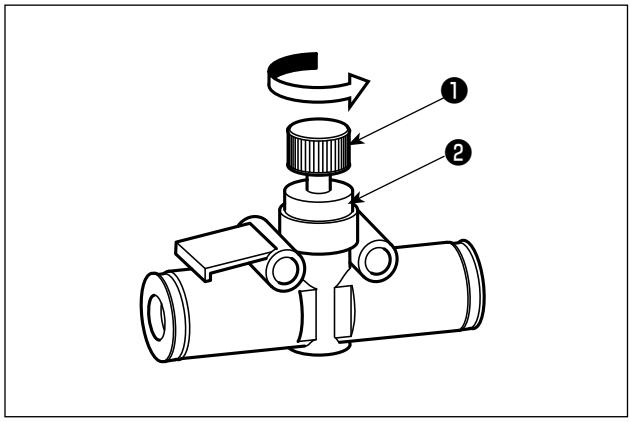


① Speed controller of the blower for the carriage
② Speed controller of the blower for the lifting the workpiece
③ Speed controller of the blower for the sucking the workpiece
④ Speed controller of the blower for the peeling off the workpiece

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)	Material Light weight small ↔ Heavy .Large
①	14 to 15	**Amount of air to be blown**
②	13 to 14	
③	14 to 15	**Decrease** ▬▬ **Increase**
④	13 to 14	

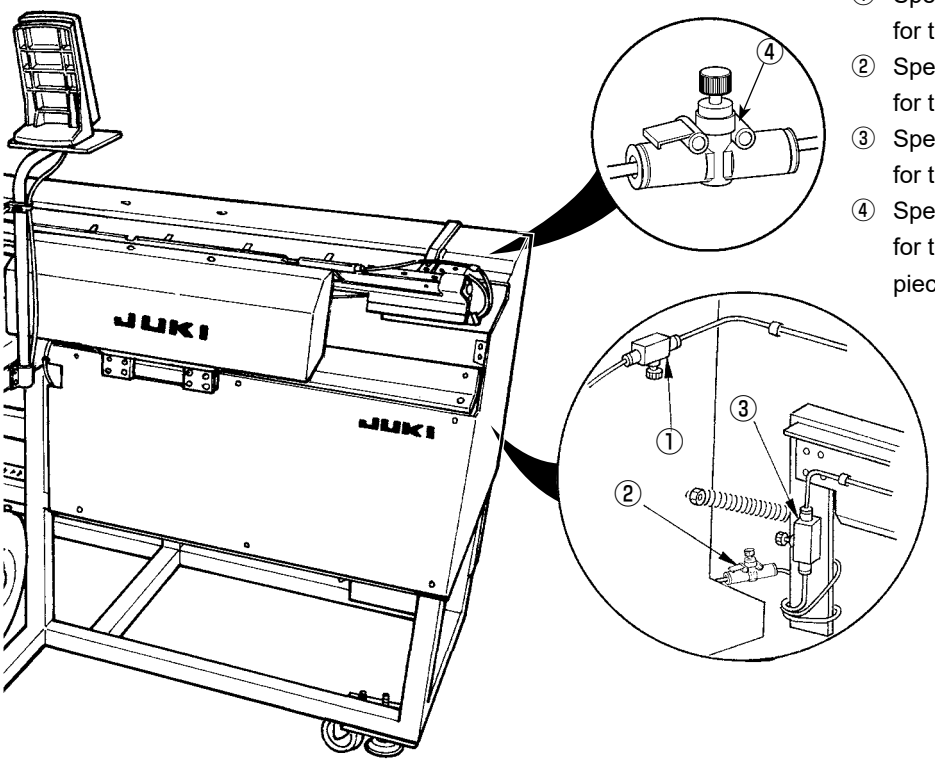


4) Turn knob ❶ of the speed controller in the direction of the arrow to increase the amount of air to be blown. After the adjustment, fix the knob at the adjusted position using locknut ❷ .

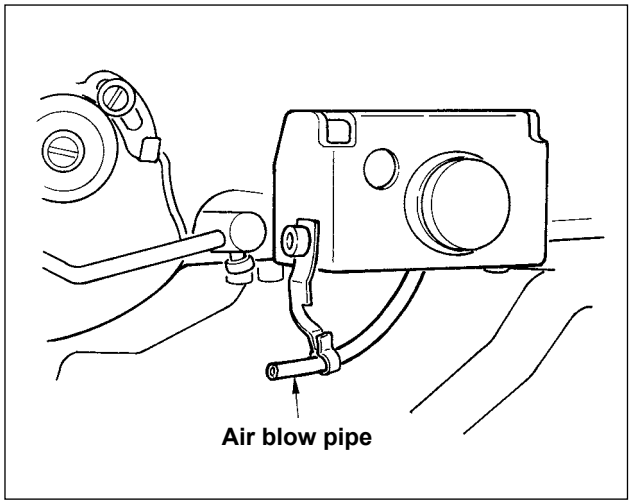
Adjusting the amount of air to be blow while the machine is in operation is very dangerous. Be sure to turn OFF the power to the machine before starting the adjustment.

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 ① first. If the workpiece cannot be easily blown down, gradually loosen speed controller ② to increase the amount of air to be blown properly. If sewing a light-weight material or floppy material, set speed controller ② to the value adjusted of air to be blown.

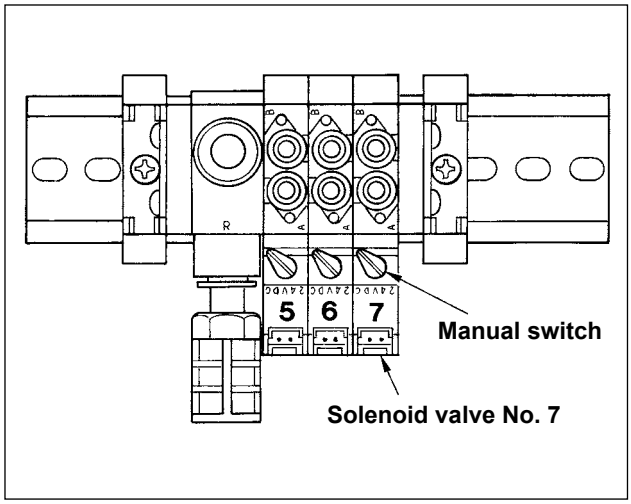
6) Adjusting the air blower for stacking the workpiece
If sewing a heavy-weight material or a large-size material, loosen speed controller ③ and ④ to increase the amount of air to be blown properly.
If sewing a light-weight material, set speed controller ③ to be the value adjusted at the time of delivery and tighten speed controller ④ to increase the amount of air to be blown.



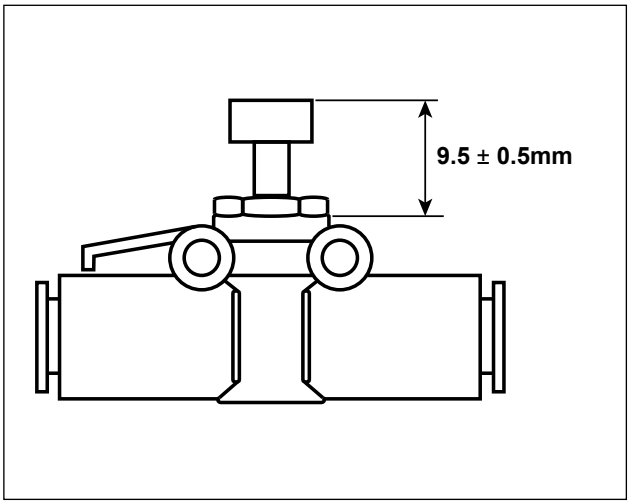
① Speed controller of the blower for the carriage
② Speed controller of the blower for the lifting the workpiece
③ Speed controller of the blower for the sucking the workpiece
④ Speed controller of the blower for the peeling off the workpiece



7) Adjusting the air blower for the needle bar
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. Adjust the air blower so that air blows as near as the machine arm jaw area.

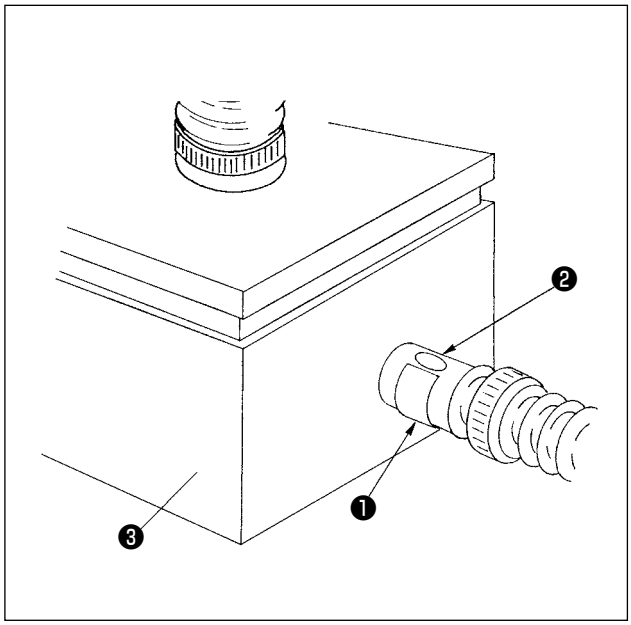


Press and turn the manual switch of solenoid valve No. 7 to check the motion. Strength of the air blow is adjusted with the speed controller. When the manual switch of solenoid valve No. 7 is pressed and turned, the pusher is actuated and simultaneously the needle bar air blower is actuated.
Return the manual switch after the adjustment since the manual switch is locked with it pressed and turned. Adjust the speed controller located on the black pipe branched from the yellow pipe connected from solenoid valve No. 7.



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

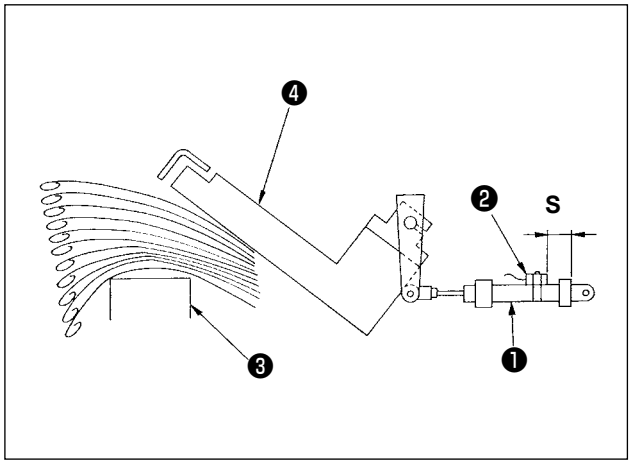
(8) Vacuum adjusting metal fittings



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 or a coarse texture, close the hole ❷.

To keep the appropriate suction force, clean the filter inside filter box ❸ at regular intervals. (Refer to "III-3-2. Cleaning the vacuum filter" p.189.)

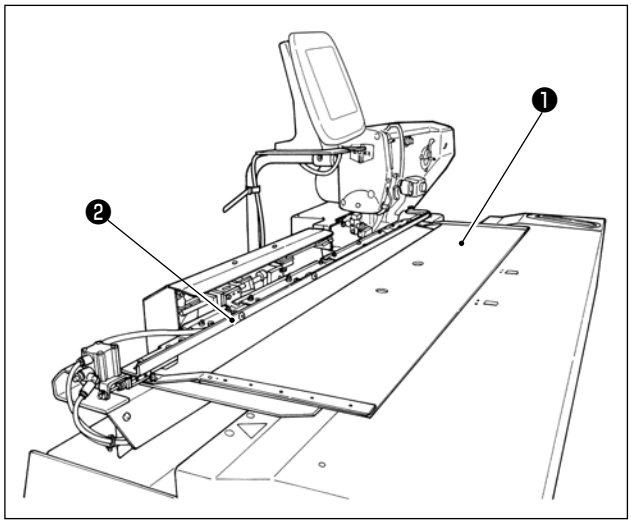
(9) Sensor to detect the number of garment bodies stacked



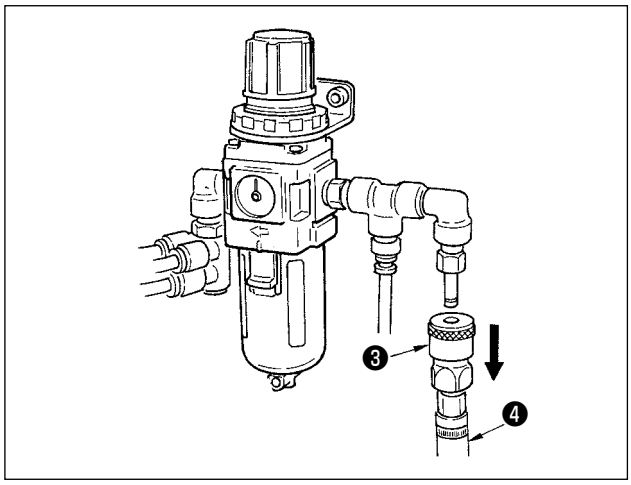
1) Sensor ❷ mounted on cylinder ❶ which driver pusher ❹ detects the thickness of garment bodies stacked on stacking board ❸ when actuating the stacker.
2) You can let the alarm occur at the time when the thickness of garment bodies stacked on the board reaches any desired value specified by change the position of sensor ❷ with a Phillips type screwdriver. (Distance **S** 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 alarm occur earlier.)

Note that the sewing machine does not stop operation when this alarm occurs.

(10) Measure to be taken in the case of power interruption during operation



If the electricity is cut off when material is being brought to the sewing position and preset board ❶ and carriage ❷ come in contact with each other, discharge air from the machine, slightly press preset board ❶ back ward, raise carriage ❷ by hand, and move preset board ❶ toward you to return it to its home position. Then, connect the air to the machine.

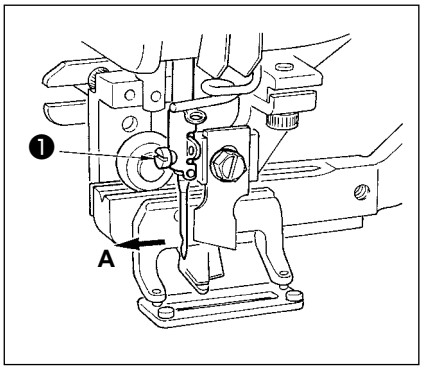


To discharge air from the unit, press one-touch joint ❸ in the direction of the arrow, and remove hose ❹. For the connecting procedure, refer to **"I-3-3. Installing the air hose" p.5**.

4-2. Operation of the sewing machine

(1) Inserting the needle

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.

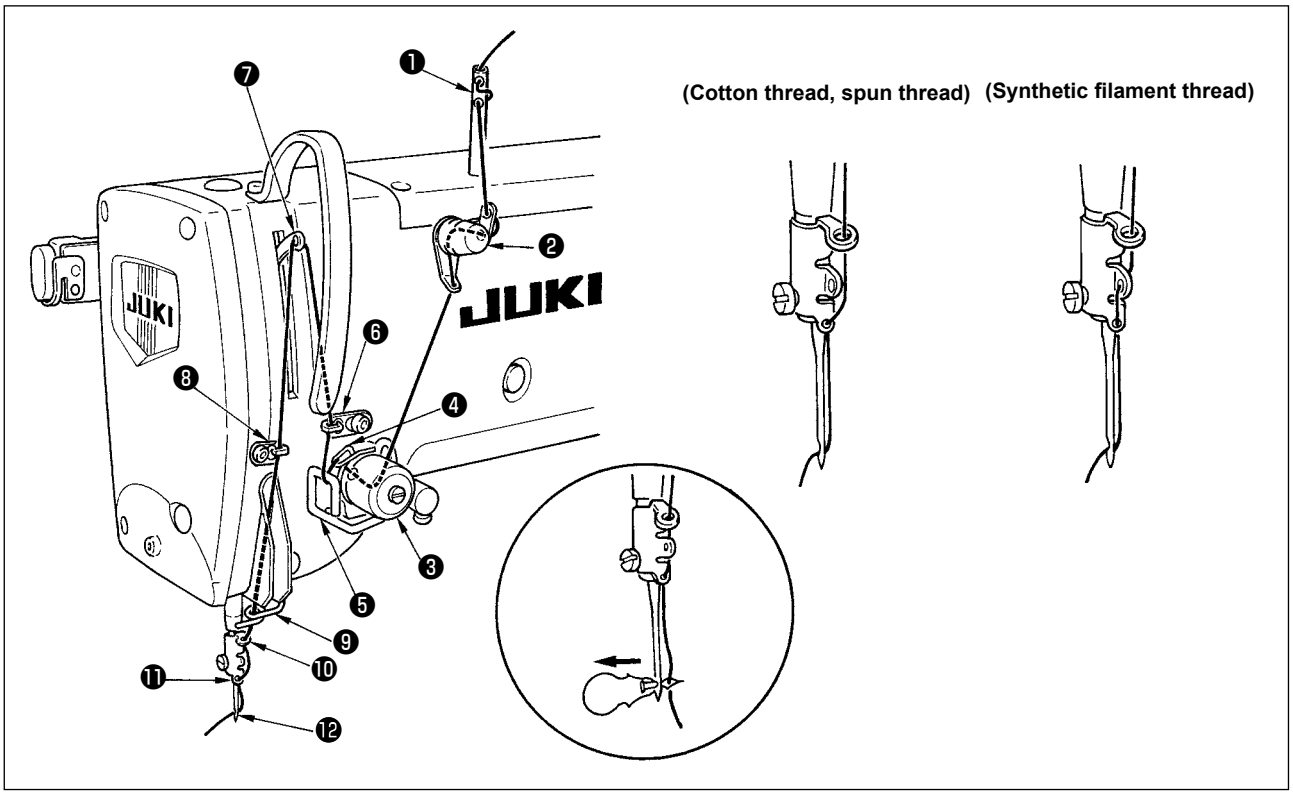


Hold needle with its recessed part facing toward the operator side A, insert the needle fully into the needle clamping hole, and tighten needle setscrew ❶ . Use a DPx5-(#11J, #14J).

When attaching the needle, turn OFF the power to the motor.

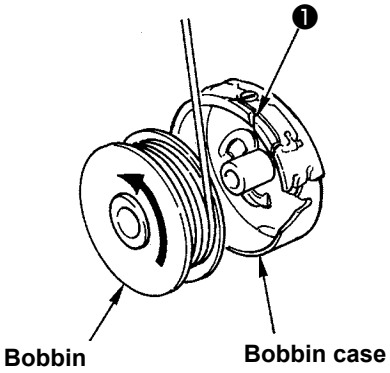
(2) Threading the needle-thread

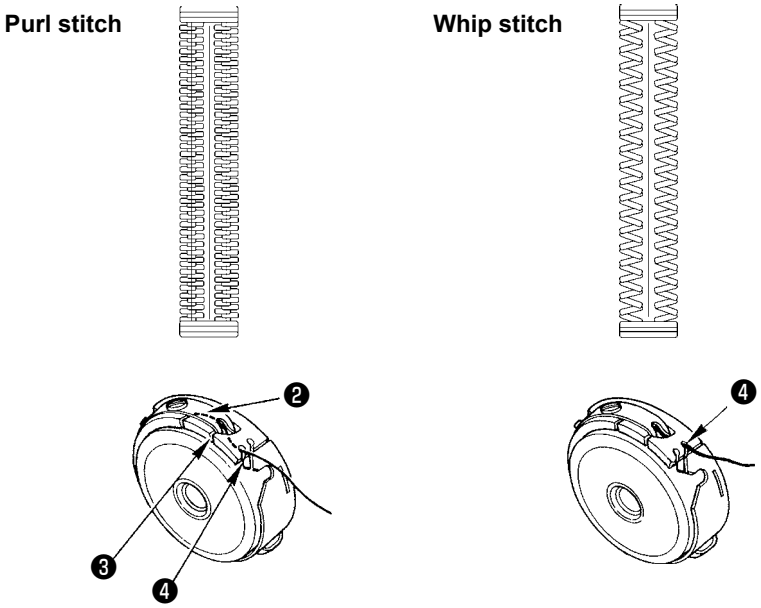
WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



Pass the needle thread in the order ❶ to ⓬ as shown in the figures.
The threading can be done easily by using the needle threader supplied with the machine.
Change the thread guide threading method according to the thread to be used.

(3) Threading the bobbin case

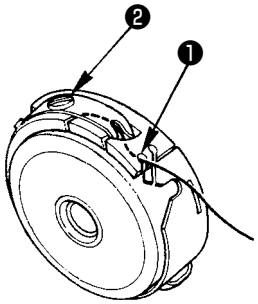




Rotating direction of bobbin and threading

1) Fit the bobbin so that it rotates in the direction of the arrow.
2) Pass the thread through thread slit ❶ , then through under the tension spring ❷ , again through thread slit ❸ , and pull the thread from ❹ .
3) Threading at ❹ for purl stitching is different from that for whip stitching. So, be careful.

(4) Adjusting the bobbin thread tension



Adjust the bobbin thread tension as given below when the bobbin thread is pulled up at the position where thread slit ❶ of bobbin case comes up.

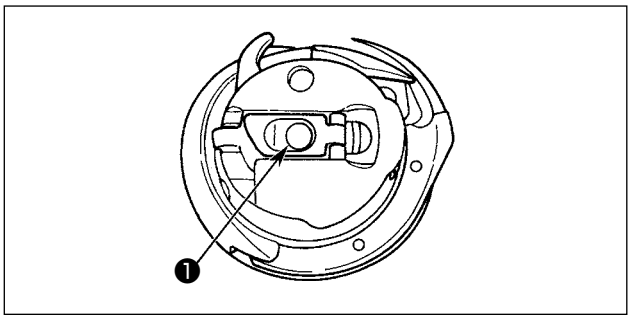
Purl stitch	0.05 to 0.15N	To such an extent that bobbin case quietly comes down when holding thread end coming from bobbin case and shaking it quietly up and down.
Whip stitch	0.15 to 0.3N	To such an extent that bobbin case barely comes down when holding thread end coming from bobbin case and shaking it somewhat strongly.

Turning tension adjust screw ❷ clockwise will increase bobbin thread tension, and turning it counterclockwise will decrease the tension.
Adjust the bobbin thread tension to lower for synthetic filament thread, and to higher for spun thread. The thread tension is higher by approximately 0.05N when the bobbin case is set to the hook since idle-prevention spring is provided.

When bobbin thread tension is adjusted, make sure of the needle thread tension setting of the memory switch. (Refer to "II-2-9. Changing needle thread tension" p.91.)

(5) Installation of bobbin case

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.

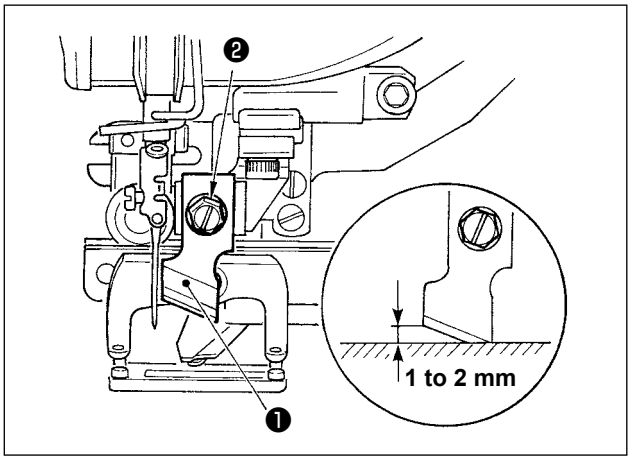


1) Lift up and hold bobbin case latch lever between two fingers.
2) Push the bobbin case into the hook so that it is supported by the hook shaft ❶ and then snap in the latch lever.
   Press the bobbin case until the predetermined position is reached, and it will click.

1. If the bobbin case is out of the predetermined position, it can jump out from the hook to cause the needle thread to tangle on the hook shaft. Check to be sure that the bobbin case is properly installed in the correct position.
2. There is a difference in the shape of bobbin case between the standard hook and the dry one. They have nothing in common with each other.

(6) Installing the knife

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



When replacing the knife with a new one, perform as follows.

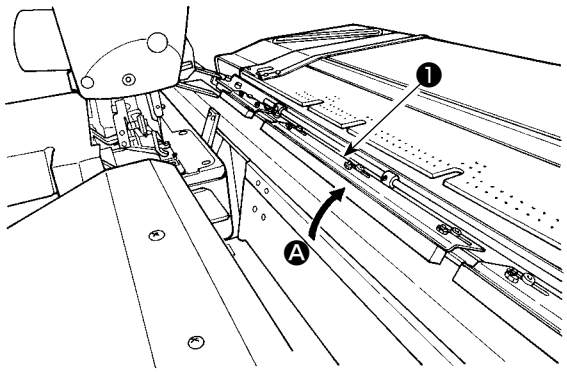
1) Knife ❶ can be easily removed together with the washer when removing knife retaining screw ❷ .
2) Adjust so that the knife, when lowered the knife bar by hand, is spaced 1 to 2 mm away from the top surface of the throat plate as illustrated in the sketch. Then, be sure to place the washer and tighten the knife retaining screw.

Inch → mm CONVERSION TABLE

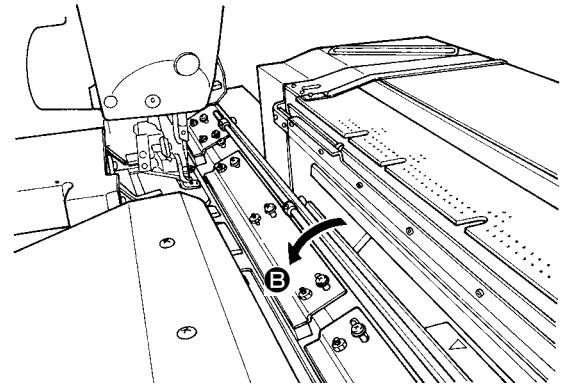
Knife size	Indication of mm
1/4	6.4
3/8	9.5
7/16	11.1
1/2	12.7
9/16	14.3
5/8	15.9
11/16	17.5
3/4	19.1
13/16	20.6
7/8	22.2
1	25.4
1 1/8	28.6
1 1/4	31.8

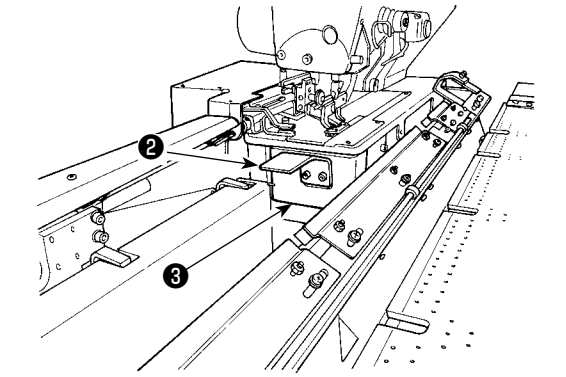
In case the cloth cutting knife on hand is indicated in inch, set the length of cloth cutting (knife size) in mm using the inch → mm conversion table on the left side.
Sewing data S02 is the length of cloth cutting.
Refer to **"II-2-7. Changing sewing data" p.81**.

(7) Removing and installing the bobbin case

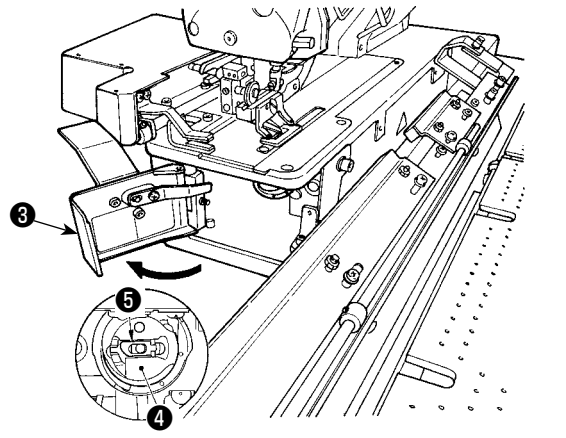


1) When the bobbin thread counter is set and the operation is performed automatically, and bobbin thread runs out, the next start is not performed. In this state, carriage table ❶ is tilted in the direction of Ⓐ, and it is simply performed to replace the bobbin. In addition, when thread breakage has occurred during sewing, perform replacing bobbin when carriage table ❶ is in the state of Ⓑ (state that the sewing machine is covered with the table).





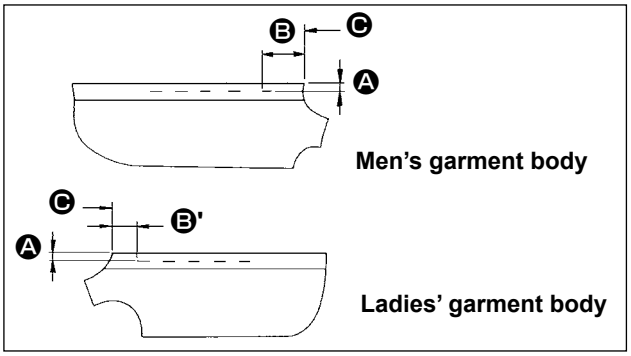
2) Holding knob ❷ open shuttle cover ❸ .



3) Raise and hold latch lever ❺ of bobbin case ❹ to take it out. (The bobbin in the bobbin case will not come off provided that the latch lever is raised and held.)
4) To load the bobbin case in the shuttle, put it onto the shuttle shaft until it will go no further, and snap on the latch lever of the bobbin case.
5) Close shuttle cover ❸ .

4-3. Adjusting the seam allowance

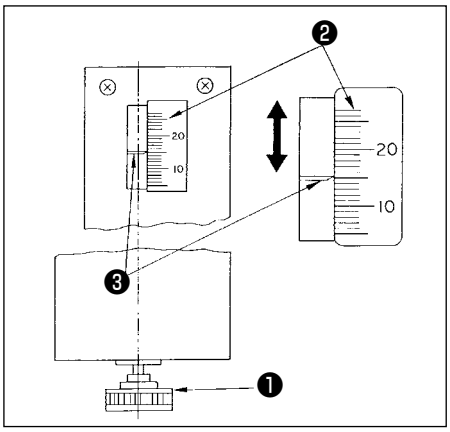
WARNING :
Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.



1) Adjust the seam allowance from the side end of the garment to the buttonhole (distance Ⓐ in the figure), and from the top end the garment to the 1st buttonhole (distance Ⓑ, Ⓑ' in the figure). The number of buttonholes and the intervals between the buttonhole can be adjusted using the panel switches.

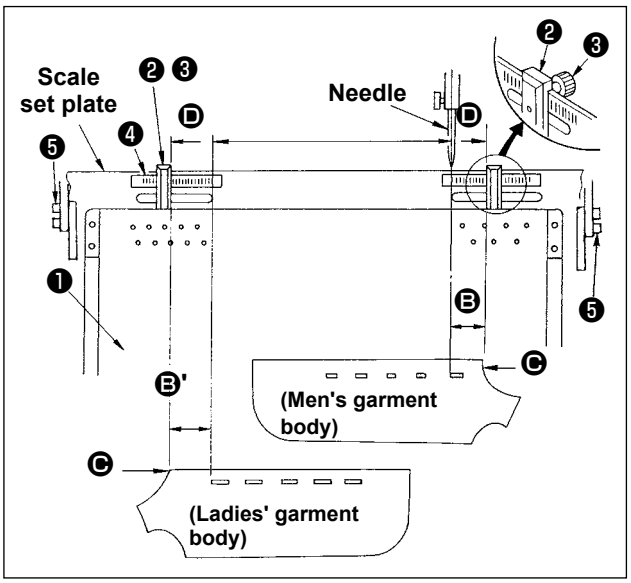
Be sure to make adjustment of the seam allowance after you have turned OFF the power switch.

■ Adjusting distance Ⓐ



1) Turning preset adjusting knob ❶ clockwise will decrease distance Ⓐ, or counter clockwise will increase it.
2) Read the required distance on scale ❷ and marker ❸ . Then turn the knob until it reaches the specified value.
3) Distance Ⓐ can be adjusted with the range from 7 to 21 mm.
4) When distance Ⓐ cannot be set to the value indicated on the scale, loosen the screws ❺ , which fix scale plate (the plate has a screw on both sides), and re-adjust the position of the scale plate properly. (Refer to the Fig. **"Adjustment of dimension Ⓑ."**)
5) After the adjustment, return the knob in the tool box to prevent it from being lost.

■ Adjusting distance Ⓑ



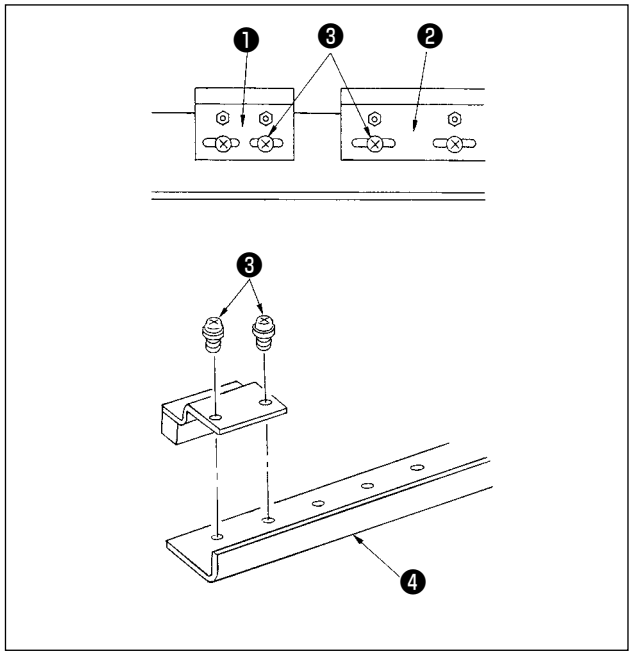
1) Loosen thumb screw ❸ of gauge ❷ on preset board ❶ , and move the board to the value set on scale ❹ .
2) Setting the material so that top end Ⓒ of the material comes inside Ⓓ of the marker will complete the positioning of the material. (When sewing ladies' wear, determine the position of the material using the scale marker on the left side of the preset board while following the same procedure as the above.)

1. **The line on the leftmost of the right-side scale is aligned with the center of the needle which corresponds to the sewing start position of the first buttonhole (the bottom end of the buttonhole) of garment body of men's wear.**
2. **The line on the rightmost side of the left-side scale corresponds to the sewing start position of the first buttonhole (the top end of the buttonhole) of garment body of ladies' wear.**
3. **For the changeover of men's wear / ladies' wear, refer to "II-1-11. Changeover of men's and ladies' wear." p.66.**
4. **For the setting procedure of the material, refer to "I-5. OPERATION" p.42.**

4-4. Adjusting the carriage clamp

WARNING:
Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

(1) Adjusting the position of the clamps

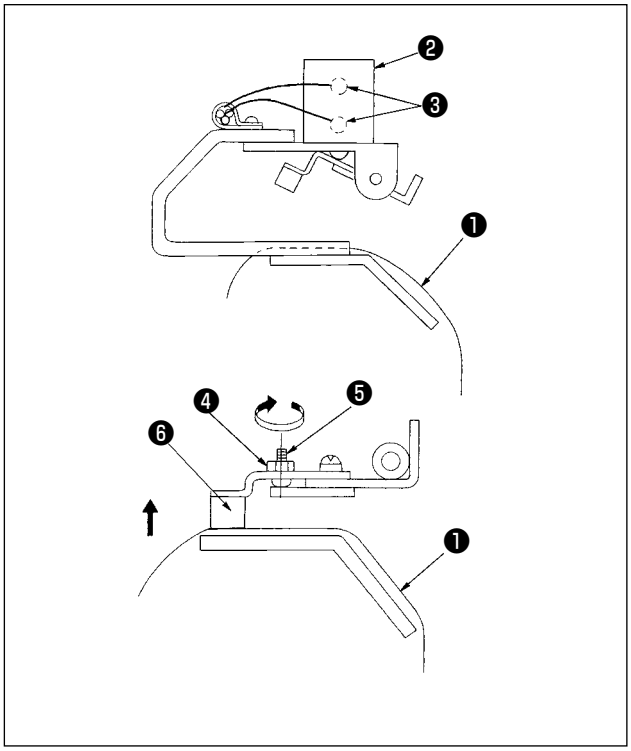


Adjust the position of the clamp only when you wish to eliminate a clearance between the clamps or you wish change the arrangement of the clamp.

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".**

(2) Adjusting the clamping force



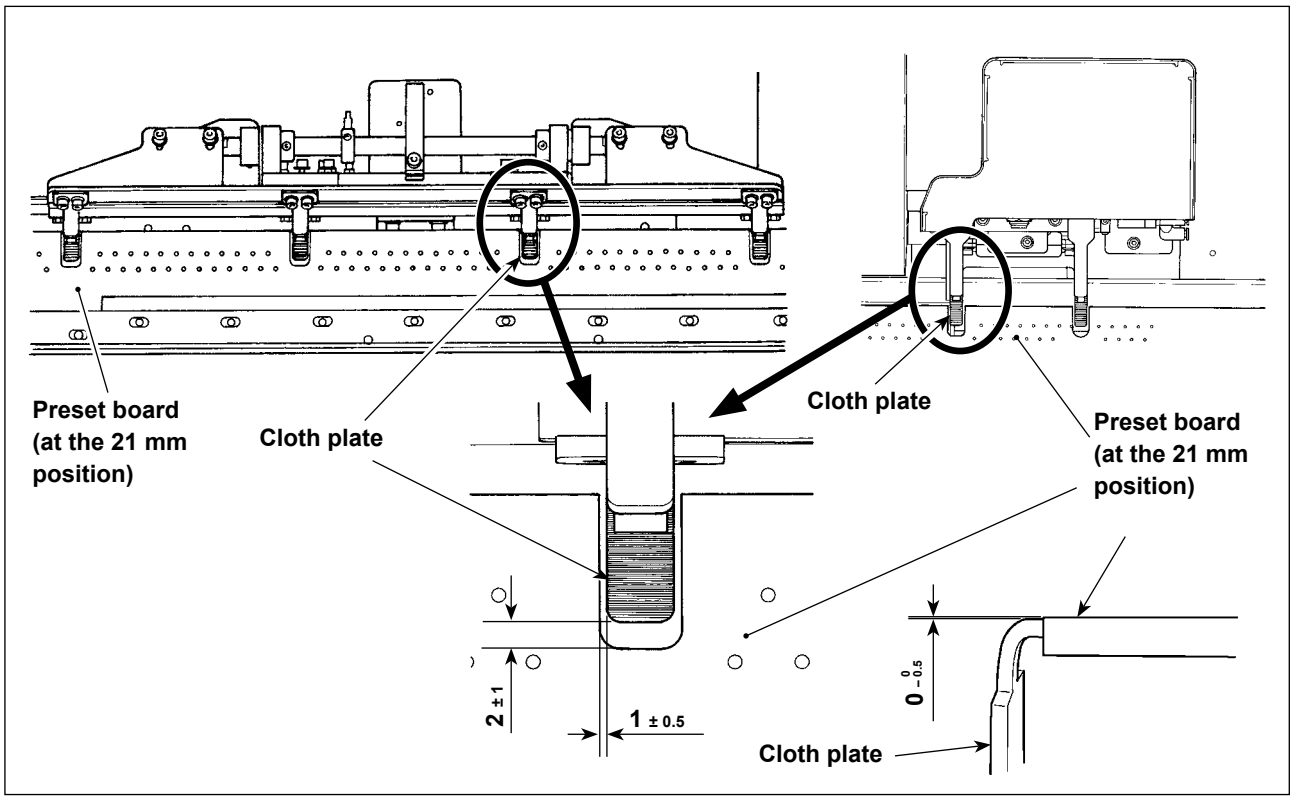
When adjusting the position of the clamps or replacing the clamp cushion, perform the adjustment below.

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.
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 and check that the clamping force of the clamps does not change.
5) Return the manual switch to its home position.

Caution **After the adjustment, be sure to return the manual switch to its home position.**

4-5. Adjusting the sub clamp

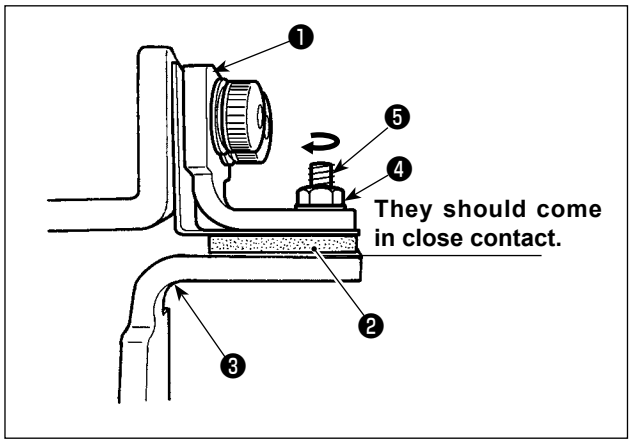
(1) Adjusting the cloth plate



Provide an equal lateral clearance between the preset board and the cloth plate. Provide a vertical clearance of 1 ± 0.5 mm or less between the preset board and the cloth plate. The longitudinal clearance between them should be 2 ± 1 mm when the preset board is placed at the 21 mm position.

For the height of the clamp catch plate, a distance of $0\ ^{0}_{-0.5}$ mm shall be provided between the clamp catch plate and the preset plate when they are flush with each other.

(2) Adjusting the presser plate

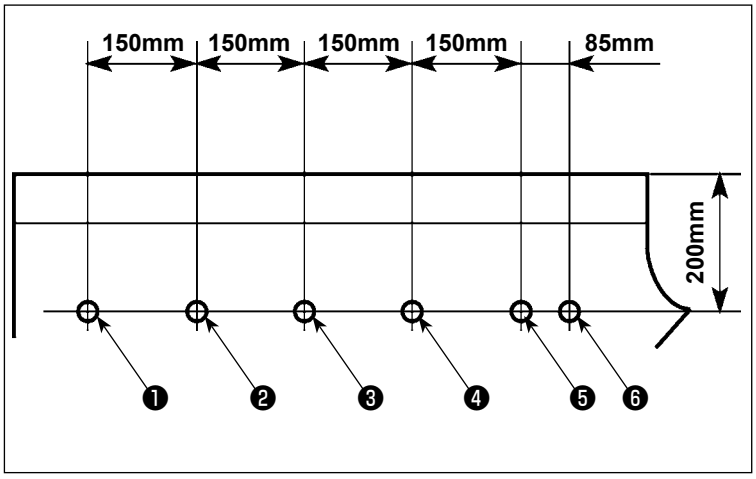


Adjust so that holder rubber ❷ comes in contact with cloth plate ❸ when presser plate ❶ is actuated.

Adjust the presser plate so that it clamps the material and that the pressures of all sub-clamp catch plates are equal.

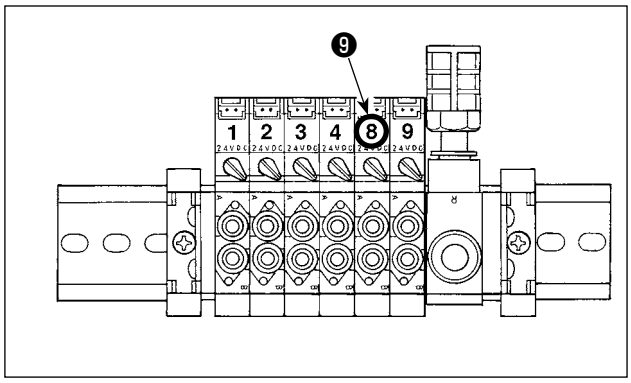
1) Loosen locknut ❹ . Turn adjusting screw ❺ in the direction of the arrow to increase the presser plate pressure.
2) Once the presser plate pressure is fixed, tighten the locknut and fix the adjusting screw.

(3) Adjusting the sub-clamp pressure

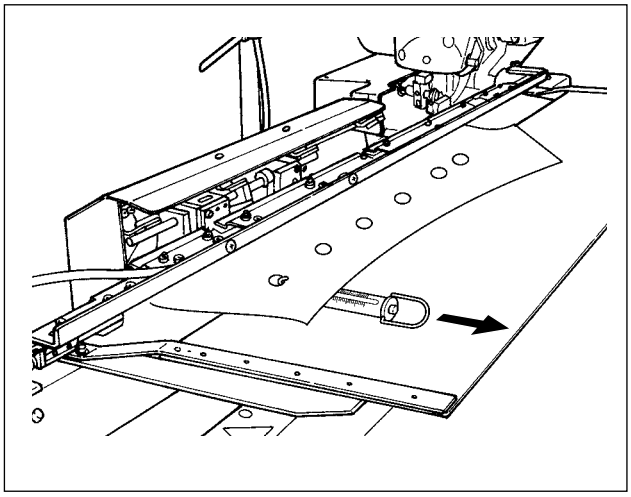


Measure the pressure of the sub-clamp and adjust it properly.

1) Drill holes ❶ to ❻ in a garment body according to the dimensions shown in the figure. Place the garment body on the sewing machine so that the six holes are on the same axes with the sub-clamps.
   Refer to **"1.4. Preparation of the device" in the Setup Manual** for how to adjust the adjuster.



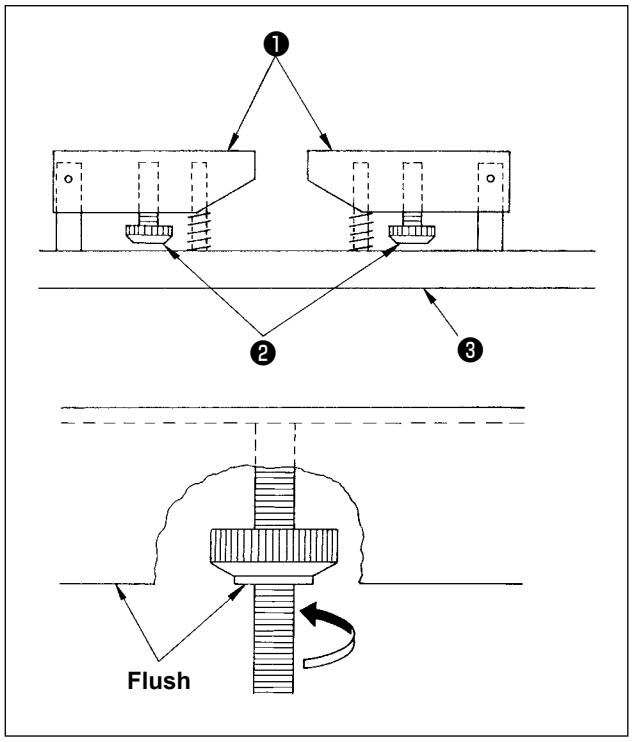
2) Press solenoid valve switch 8 ❾ to clamp the garment body with the sub-clamps.



3) While the sub-clamps are clamping the garment body, put a spring balance onto the garment body to measure the pressure applied by the sub-clamps when the garment body starts to be fed. (Standard value: 700 g - 1500 g)
4) Adjust the sub-clamp pressure referring to the (2) adjustment of the presser plate.

4-6. Adjusting the stacking board of the stacker

WARNING:
Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

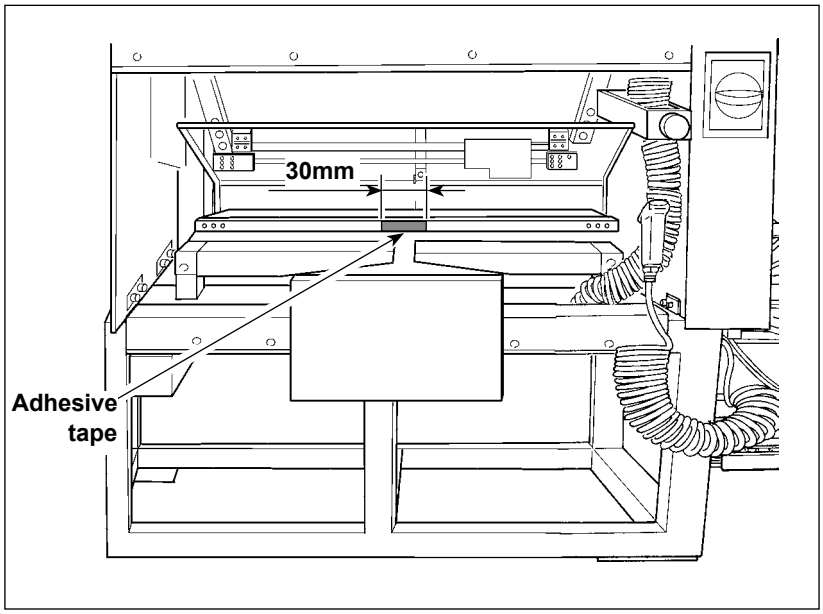


If sewing garment bodies with pockets, adjust the stacking board following the steps described below. This adjustment allows the stacker to stack approximately 140 pieces of garment bodies with pockets (material : T/C board cloth). (When sewing garment bodies without pockets, no adjustment is required.)

1) When sewing men's wear, loosen locknuts ❷ in the reverse side of stacking board ❶ on the right side, and raise the stacking board until the reverse side of the stacking board is flush with the reverse side of the locknut.
2) When sewing ladies' wear, loosen locknuts ❷ in the stacking 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 stacking board base ❸ and tighten them to the extent where stacking board ❶ is secured.)

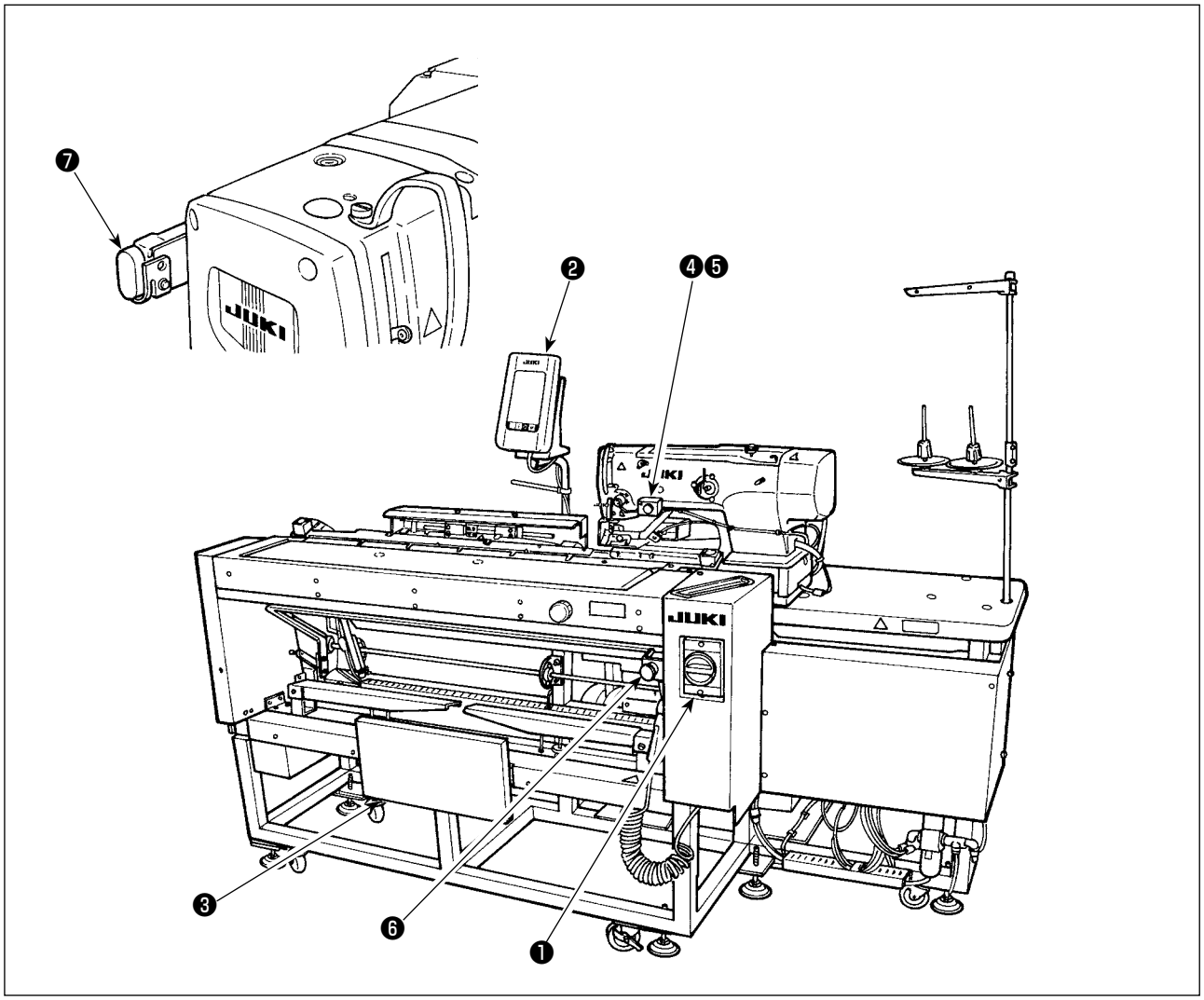
4-7. Preventive measure against the material dropping during stacking

WARNING:
Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.



If the material drops at the time of stacking, stick a piece of adhesive tape (30 mm) on the location shown in the figure at left.

5. OPERATION



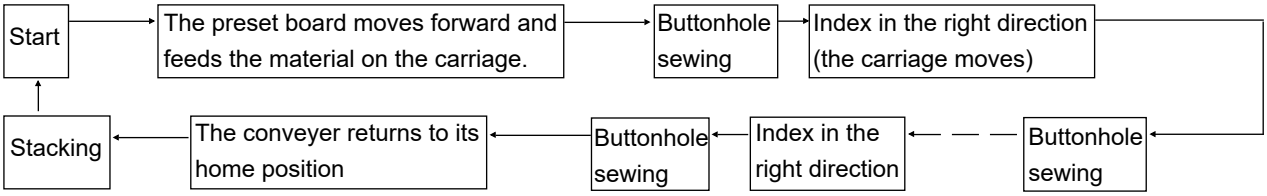
❶ Power switch
❷ Control panel
❸ Knee switch
❹ Hand switch
❺ Workpiece suction lamp
❻ Temporary stop switch
❼ Machine head pause switch

WARNING:

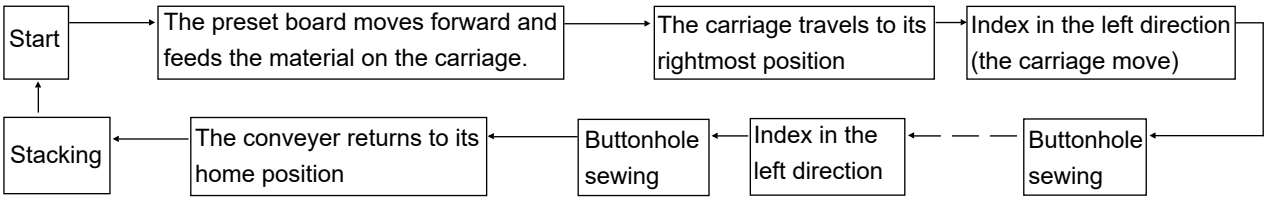
1. The machine can be started in two different methods ; A and B modes, by changing over the memory switch data U51. (Refer to "II-3-1. Changing procedure of memory switch data" p.110.)
2. The knee-switch is used as start switch under the A mode and the hand-switch is used under the B mode.
3. Under both A and B modes, the machine will start when releasing the start switch. Be sure to avoid placing your hand(s) under the work clamp check and the needle with the start switch held pressed.

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

[Series of the operation for men's wear]



[Series of operation for ladies' wear]



For the operating procedure of start and workpiece suction, operate in accordance with the type selected in "Start switch selection" of the memory switch data U51.

[Operating the A-mode (the knee switch is used to start sewing)]

1) Press READY key on the operation panel to make the ready ON state.(State that the screen is green)
2) Properly set the material on the preset board. (See the figure below.)
3) When knee switch ❸ is pressed, the material will be sucked (workpiece suction lamp ❺ lights up). When it released, the machine will start running.

* When the material is sucked (workpiece suction lamp ❺ lights up), press hand switch ❹ and the workpiece suction mechanism is released (workpiece suction lamp ❺ goes off). Then the start is released.

* If you repeat steps 2) and 3) during sewing the 1st workpiece, continuous operation can be performed.

[Operating the B-mode (the hands switch used to start sewing)]

1) Press READY key on the operation panel to make the ready ON state.(State that the screen is green)
2) Properly set the material on the preset board. (See the figure below.)
3) When knee switch ❸ is pressed, the material will be sucked and is held sucked even when it is released.
4) Press and release hand switch ❹ , the sewing machine starts sewing. (Workpiece suction lamp ❺ lights up.)

* If knee switch ❸ is pressed when the material is sucked, the workpiece suction is stopped.

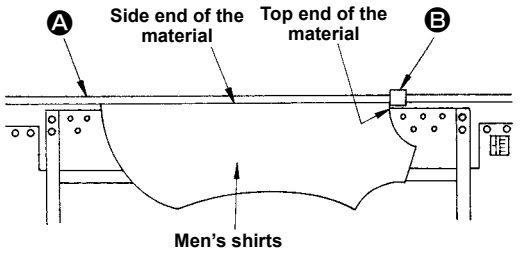
* If you repeat steps 2) to 4) while the first material is being sewing, the sewing machine is capable of performing continuous operation.

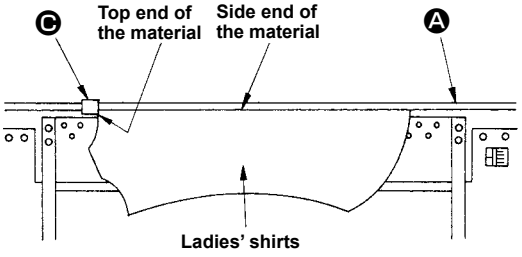
*** The mode has been factory-set to [A mode] at the time of shipment.**

The proper material setting

1) Men's shirts
Place the material so that there is no clearance between the side end of the material and presetting board Ⓐ, and align the top end of the material with marker Ⓑ.

2) Ladies' shirts
Place the material so that there is no clearance between the side end of the material and presetting board Ⓐ, and align the top end of the material with maker Ⓒ.

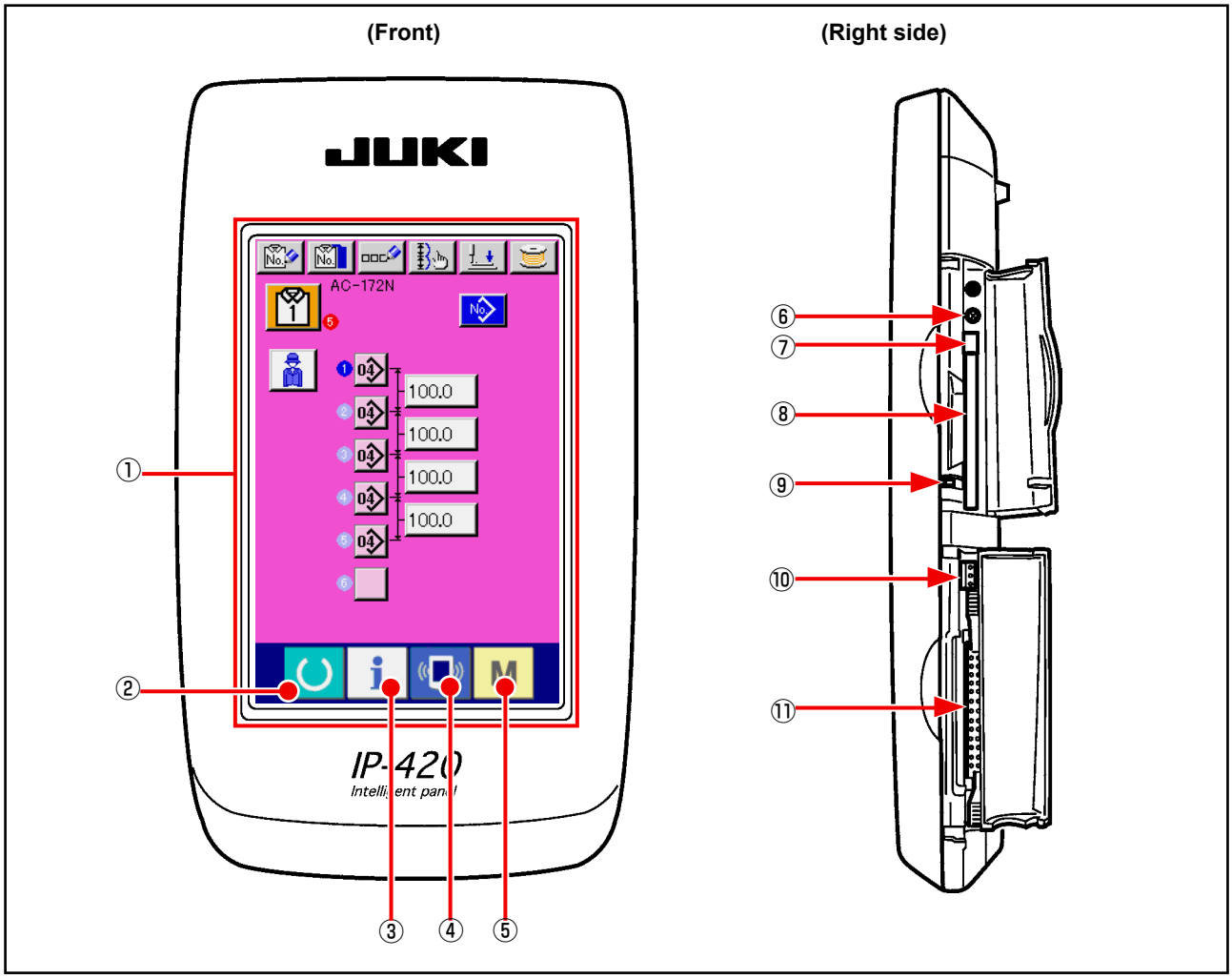




II. OPERATION SECTION (WITH REGARD TO THE PANEL)

1. WHEN USING IP-420

1-1. Name of each section of IP-420



① Touch panel·LCD display section

② READY key → Changeover of the data input screen and the sewing screen can be performed.

③ INFORMATION key → Changeover of the data input screen and the information screen can be performed.

④ COMMUNICATION key → Changeover of the data input screen and the communication screen can be performed.

⑤ MODE key → Changeover of the data input screen and the mode changeover screen which performs various detail settings can be performed.

⑥ Brightness control

⑦ CompactFlash (TM) eject button

⑧ CompactFlash (TM) slot

⑨ Cover detection switch

⑩ Connector for external switch

⑪ Connector for control-box connection

1-2. Buttons to be used in common

The buttons which perform common operations in each screen of IP-420 are as follows :

CANCEL button → This button closes the pop-up screen.
In case of the data change screen, the data being changed can be cancelled.

ENTER button → This button determines the changed data.

UP SCROLL button → This button scrolls the button or the display in the upward direction.

DOWN SCROLL button → This button scrolls the button or the display in the downward direction.

RESET button → This button performs the release of error.

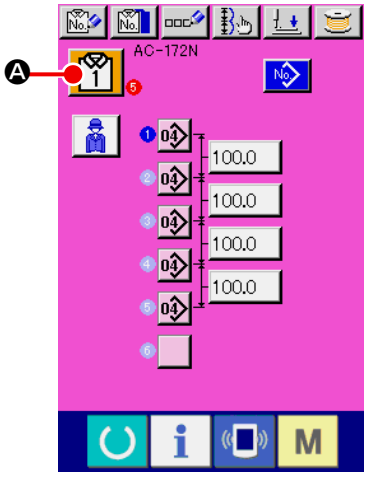
NUMERAL INPUT button → This button displays ten keys and input of numerals can be performed.

CHARACTER INPUT button → This button displays the character input screen.
→ Refer to **"II-1-12. Naming the pattern" p.67**.

RESSER LOWERING button → Presser is lowered, and the presser lowering screen is displayed. To lift presser, press presser lift button displayed in the presser lowering screen.

Bobbin winder button → Bobbin thread winding is performed.
→ Refer to **"II-1-7. Winding bobbin thread" p.55**.

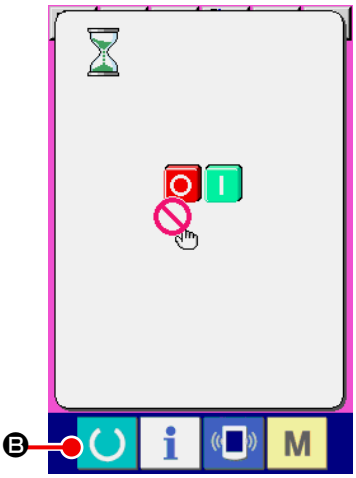
1-3. Basic operation of the sewing machine



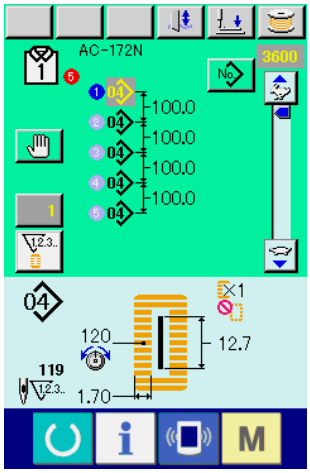
① **Turn ON the power switch.**
When the power is turned ON, the AC data input screen is displayed.

② **Select the pattern No. you desire to sew.**
When AC pattern selected button (Ⓐ) which is selected at present is pressed,selection of AC pattern No. can be performed. For the selecting procedure of AC pattern No, refer to **"II-1-5. Performing AC pattern selection" p.52**.

* For the details of this screen, refer to **(1) AC data input screen**.



③ **Set the sewing machine to sewing possible state.**
Press READY key (Ⓑ), and POWER OFF PROHIBITION screen is displayed. Make preparations for sewing while this screen is displayed. When the sewing is in a possible state, the back-light of LCD display changes to green color.



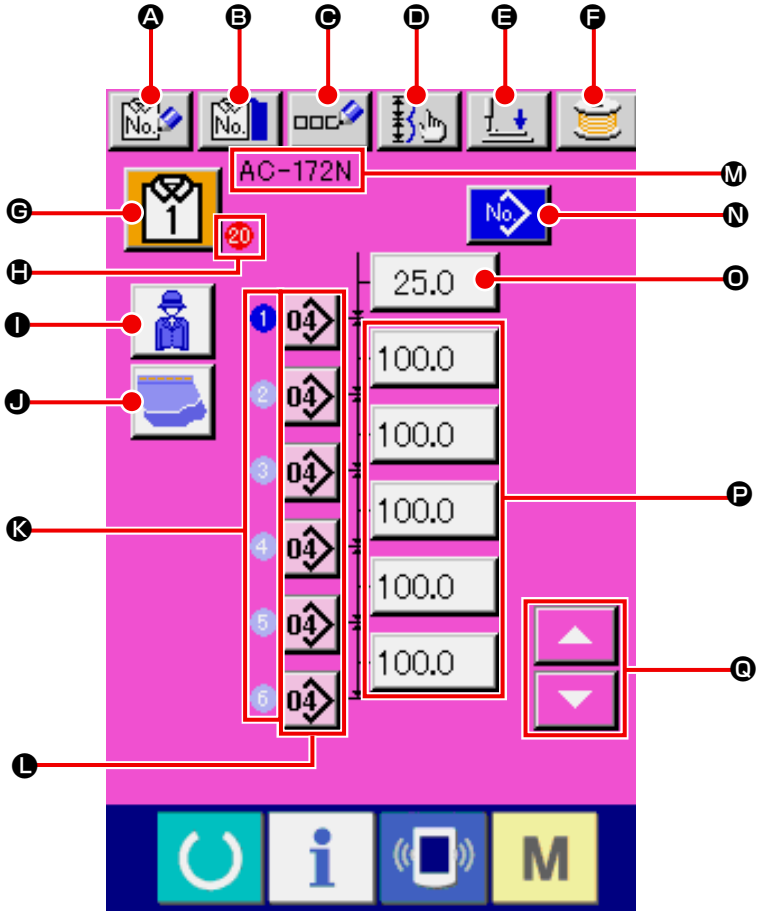
④ **Start sewing.**
Set the sewing product and press the knee switch or hand switch (switch set to the start switch).Then the sewing machine automatically starts and sewing starts.

* For the setting procedure of the start switch, refer to **"II-3-1. Changing procedure of memory switch data" p.110**.

* For the detailed explanation of this screen, see **(2) Automatic sewing screen**.

1-4. LCD display section under AC mode

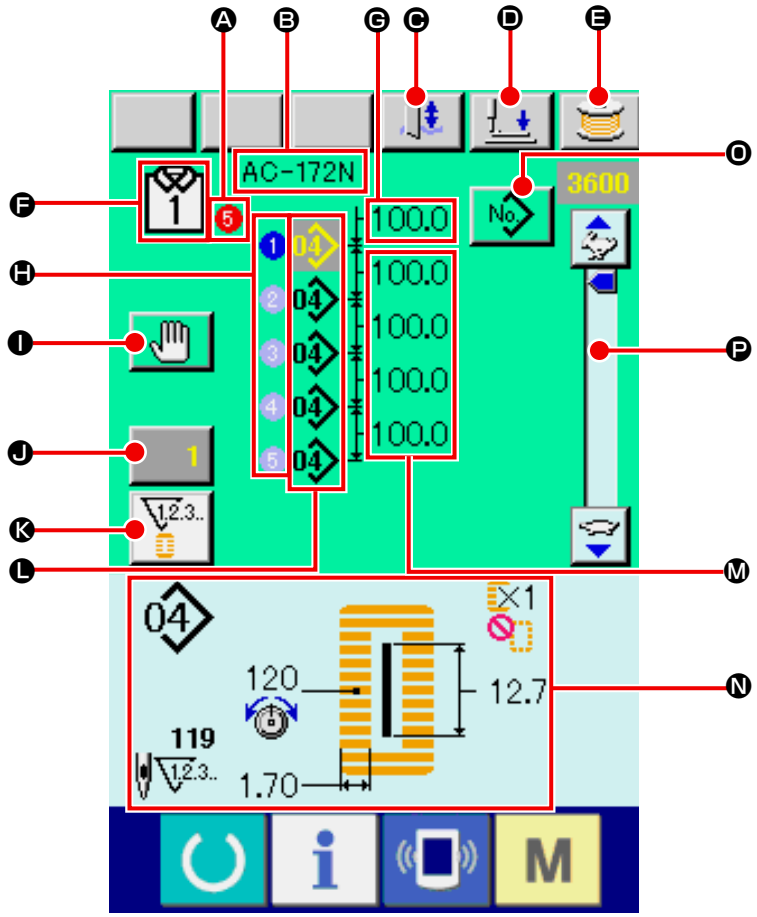
(1) AC data input screen



	Button and display	Description
Ⓐ	AC PATTERN NEW REGISTER button	AC pattern No. new register screen is displayed. →Refer to **"II-1-9. Performing new register of AC pattern." p.59**.
Ⓑ	AC PATTERN COPY button	AC pattern No. copy screen is displayed. →Refer to **"II-1-10. Copying AC pattern" p.65**.
Ⓒ	AC PATTERN NAME SETTING button	Sewing pattern name input screen is displayed. →Refer to **"II-1-12. Naming the pattern" p.67**.
Ⓓ	EQUAL INTERVAL INPUT button	Number of buttonholes input screen is displayed and AC pattern data being selected at present can be edited. →Refer to ⑥ **Input the number of buttonholes.** of **"II-1-9. Performing new register of AC pattern." p.59**.
Ⓔ	PRESSER DOWN button	Presser down screen is displayed and the needle moves to the right side. To raise the presser, press the presser up button displayd in the presser down screen. * When performing threading in this state, turn OFF the power before performing.
Ⓕ	BOBBIN WINDER button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55**.
Ⓖ	AC PATTERN SELECTION button	AC pattern No. being selected at present is displayed on this button and when this button is pressed, AC pattern No. selection screen is displayed. → Refer to **"II-1-5. Performing AC pattern selection" p.52**.

	Button and display	Description
ⓗ	NUMBER OF BUTTONHOLES REGISTERED	Number of buttonholes registered to AC pattern No. being selected at present is displayed.
ⓘ	MEN'S/LADIES' WEAR SELECTION button	Every time this button is pressed down, men's and ladies' wear can be changed over alternately. → Refer to **"II-1-11. Changeover of men's and ladies' wear." p.66**.
ⓙ	PAIR STACKING ON/OFF SELECTION button	Every time this button is pressed down, pair stacking ON/OFF can be changed over. This button is displayed only when the pair stacking use setting of memory switch data (level 1) U54 is ON. → Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.
ⓚ	SEWING ORDER display	Sewing order of the sewing data displayed on the right-hand side is displayed.
ⓛ	PATTERN BUTTONHOLE No. INPUT button	LBH sewing data No. registered to AC pattern being selected at present is displayed on this button and when this button is pressed, LBH sewing data No. can be changed.
ⓜ	AC PATTERN NAME display	Name registered to AC pattern No. being selected is displayed. → Refer to **"II-1-12. Naming the pattern" p.67**.
ⓝ	AC MODE AND LBH MODE CHANGEOVER button	When this button is pressed down, LBH data input screen is displayed and operation or setting of the single unit of the sewing machine is possible. → Refer to **"II-2. OPERATION OF THE SINGLE UNIT OF SEWING MACHINE AND SETTING PROCEDURE (LBH MODE)" p.69**.
ⓞ	JUMP FEED AMOUNT INPUT button	Inputted jump feed amount is displayed on the button. In addition, when the button is pressed down, the jump feed amount input screen is displayed and edit of data can be performed. This button is displayed only when with/without jump feed input selection of memory switch data (level 1) U53 is ON. → Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.
ⓟ	FEED AMOUNT INPUT button	When this button is pressed down, the feed amount input screen is displayed and edit of the data can be performed.
ⓠ	TURN PAGE button	Displayed only when 7 or more of the sewing patterns are registered and it is possible to observe the sewing data not displayed on the sewing screen.

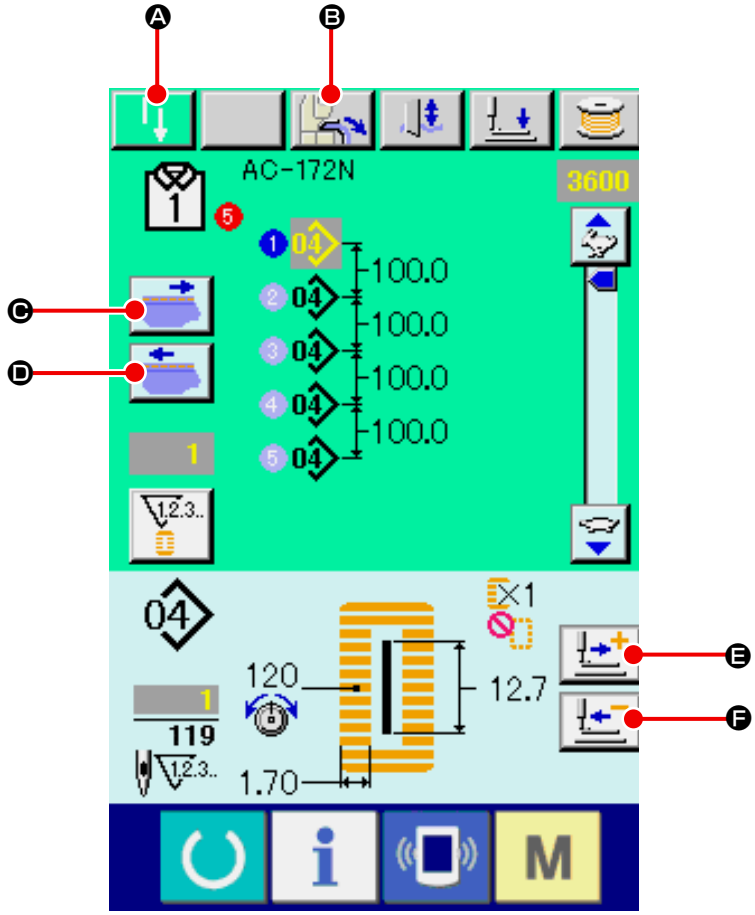
(2) Automatic sewing screen



	Button and display	Description
Ⓐ	NUMBER OF BUTTONHOLES REGISTERED	Number of buttonholes registered to AC pattern No. being selected at present is displayed.
Ⓑ	AC PATTERN NAME display	Name registered to AC pattern No. during sewing is displayed.
Ⓒ	KNIFE CANCEL button	Every time this button is pressed down, dropping of knife and non-dropping of knife can be changed over alternately.
Ⓓ	PRESSRER DOWN button	Presser can be lowered and the knife down screen is displayed. To raise the presser, press the presser up button displayed in the presser down screen. * When performing threading in this state, turn OFF the power before performing.
Ⓔ	BOBBIN WINDER button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55**.
Ⓕ	AC PATTERN No. display	AC pattern No. during sewing is displayed.
Ⓖ	JUMP FEED AMOUNT display	Only when jump feed is set, the amount is displayed.
Ⓗ	SEWING ORDER display	Sewing order of respective sewing patterns is displayed.
Ⓘ	MANUAL SEWING CHANGEOVER button	When this button is pressed down, the mode is changed to the manual sewing mode and the manual sewing screen is displayed. Note) Be careful since the pre-set is actuated.
Ⓙ	COUNTER display	Existing counter value is displayed. → Refer to **"II-1-8. Using counter" p.56**.

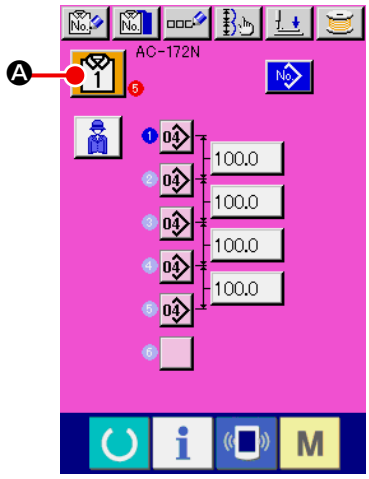
	Button and display	Description
ⓚ	COUNTER CHANGEOVER button	Every time this button is pressed down, sewing counter and No. of pcs. counter can be changed over.
ⓛ	PATTERN No. display	LBH sewing pattern No. registered to AC data is displayed.
ⓜ	FEED AMOUNT display	Feed amount is displayed.
ⓝ	CONTENTS OF PATTERN DURING SEWING (BUTTONHOLE) display	Sewing shape, cloth cutting length, width of left parallel section, thread tension, with/without double stitching, number of times of basting, number of stitches of LBH pattern No. being sewn at present are displayed.
ⓞ	AC MODE AND LBH MODE CHANGEOVER button	When this button is pressed down, the LBH independent sewing screen is displayed and independent sewing is possible.
ⓟ	SEWING SPEED variable resistor	The sewing speed of the sewing machine can be changed.

(3) Manual sewing screen



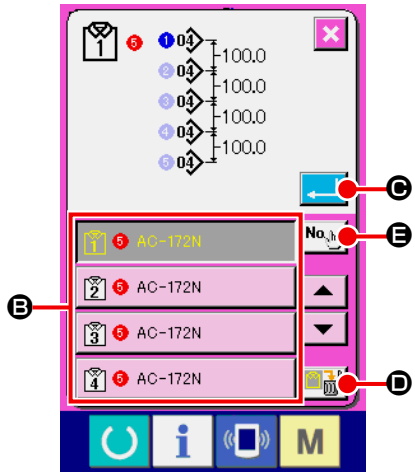
	Button and display	Description
Ⓐ	SEWING MACHINE START button	When the button is pressed down, sewing of LBH pattern data set to the step fed at Ⓒ or Ⓓ starts.
Ⓑ	CARRIAGE TILT/RAISE button	This button is displayed only when the carriage is located at the position of origin. Every time the button is pressed down, tilt of carriage and raise of carriage can be changed over alternately.
Ⓒ	CLOTH FEED, RIGHT button	In case of men's wear, carriage is returned to the previous LBH pattern data. In case of ladies' wear, carriage is advanced to the next LBH pattern data.
Ⓓ	CLOTH FEED, LEFT button	In case of men's wear, carriage is advanced to the next LBH pattern data. In case of ladies' wear, carriage is returned to the previous LBH pattern data.
Ⓔ	ONE STITCH FEED button	LBH pattern data set to the step fed at Ⓒ or Ⓓ is advanced by one stitch.
Ⓕ	ONE STITCH RETURN switch	LBH pattern data set to the step fed at Ⓒ or Ⓓ is returned by one stitch.

1-5. Performing AC pattern selection



① **Display the data input screen.**
Only in case of the AC data input screen (pink), AC pattern No. can be selected. In case of the sewing screen (green), press READY key and display the data input screen.

② **Call the AC pattern selection screen.**
When AC PATTERN SELECTION button (Ⓐ) is pressed down, the AC pattern selection screen is displayed.

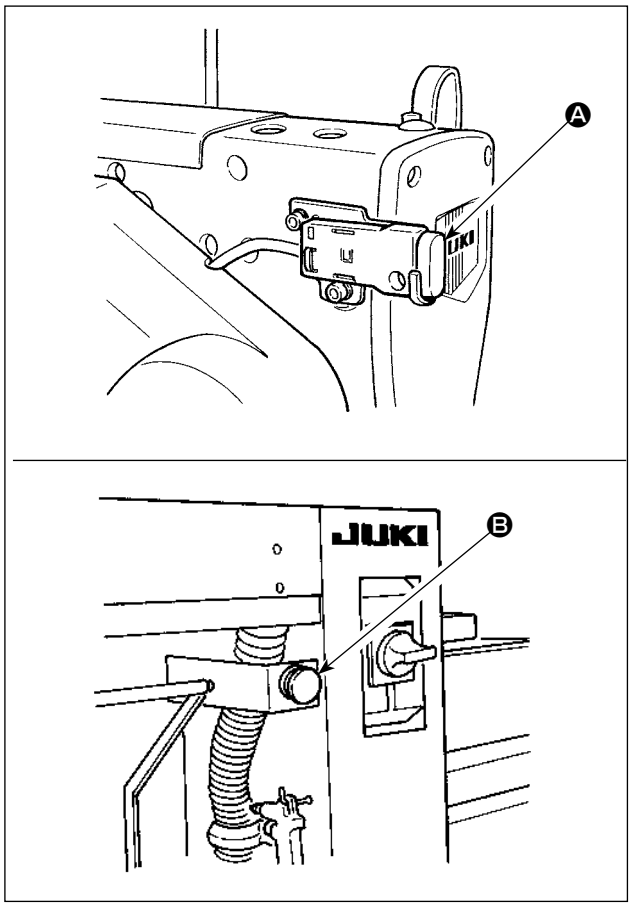


③ **Select the pattern No.**
Press AC pattern No. button (Ⓑ) you desire to select.
Instead of pressing the aforementioned button, the target pattern number can be directly entered by pressing pattern number input button (Ⓔ).

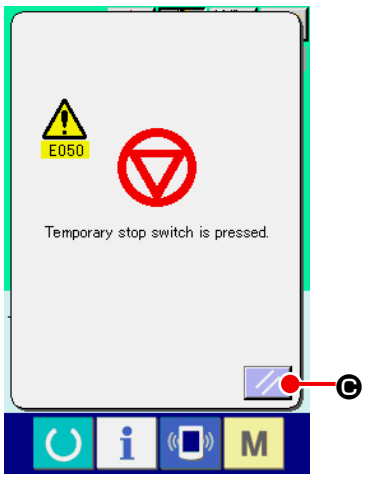
④ **Determine the pattern No.**
When ENTER button (Ⓒ) is pressed, the AC pattern No. selection screen is closed. Then the selection has been finished.

* When you desire to delete the registered AC pattern, press DELETE button (Ⓓ).
When you press the delete button, the confirmation screen is displayed. If you want to delete the pattern number, confirm the deletion by pressing enter button.

1-6. Performing re-sewing

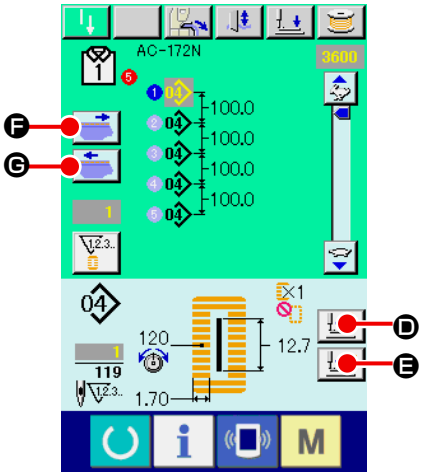


When temporary stop switch (Ⓐ) or (Ⓑ) is pressed during sewing under AC mode, the sewing machine interrupts sewing and stops. At this time, the error screen is displayed to inform that the temporary stop switch is pressed.



① **Release the error.**

Press RESET button (Ⓒ) to release the error. Then the manual sewing screen is automatically displayed.



② **Return the presser.**

Press BACKWARD button (Ⓓ), and the presser returns stitch by stitch. Press FORWARD key (Ⓔ), and the presser advances stitch by stitch. In addition, when CLOTH FEED, RIGHT button (Ⓕ) is pressed, sewing data returns by one, and when CLOTH FEED, LEFT button (Ⓖ) is pressed, sewing data advances by one.

Return the presser to the re-sewing position.

③ **Perform again the sewing work from the start.**

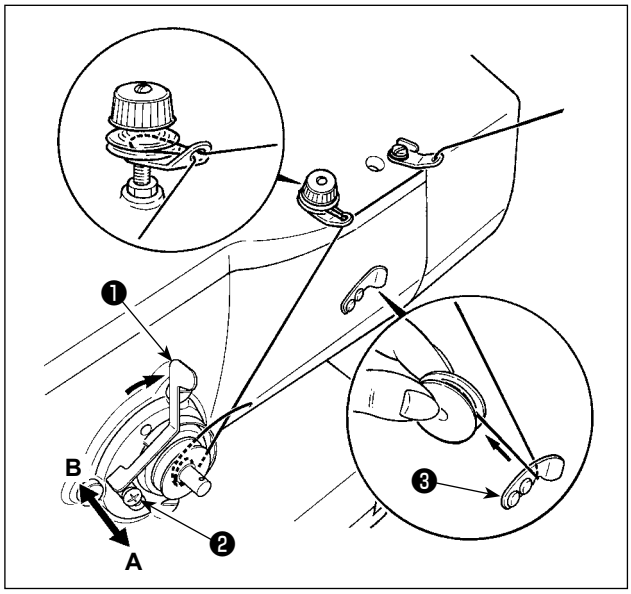
When the knee switch or hand switch (set to the start switch) is pressed, sewing starts again.

* For the setting procedure of the start switch, refer to **"II-3-1. Changing procedure of memory switch data" p.110**.

When taking out the cloth and performing re-sewing, advance the carriage up to the last with CLOTH FEED, RIGHT / CLOTH FEED, LEFT button (Ⓕ and Ⓖ).

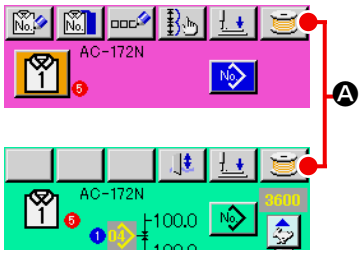
1-7. Winding bobbin thread

(1) Winding the bobbin



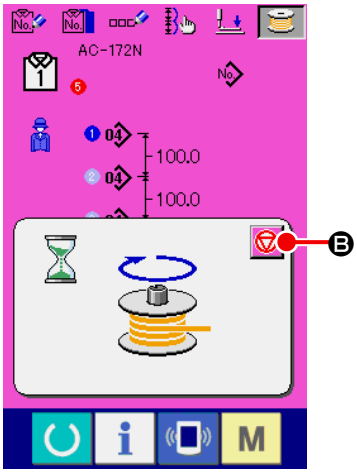
① **Set the bobbin.**

Fit a bobbin fully onto the bobbin winder shaft. Then push the bobbin thread guide in the direction of the arrow mark.



② **Display the bobbin winding screen.**

Press BOBBIN WINDER button (Ⓐ) in the AC data input screen (pink), the automatic sewing screen or manual sewing screen (green) and the bobbin winding screen is displayed.



③ **Start bobbin winding.**

When the switch set to the start switch is pressed with the knee switch or hand switch, the sewing machine rotates and starts winding bobbin thread.

④ **Stop the sewing machine.**

Press STOP button (Ⓑ) and the sewing machine stops and returns to the normal mode. Then remove the bobbin and cut bobbin thread with thread trimmer retaining plate ❸ .

In addition, the sewing machine stops even when the temporary stop switch is pressed. However, the error screen is displayed to inform that the temporary stop switch is pressed.

→ Refer to **"II-1-6. Performing re-sewing" p.53**. and **"II-2-4. Performing re-sewing under LBH mode" p.75**.

Remove needle thread from the thread take-up to needle before winding bobbin thread.

(2) Adjusting the amount to be wound on a bobbin.

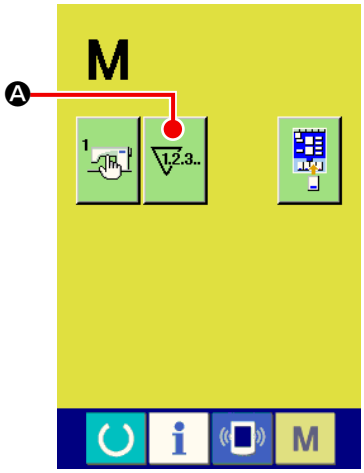
To adjust the winding amount of the bobbin thread, loosen setscrew ❷ and move the bobbin winding lever ❶ to the direction of **A** or **B**. Then, tighten setscrew ❷ .

To the direction of **A** : Decrease

To the direction of **B** : Increase

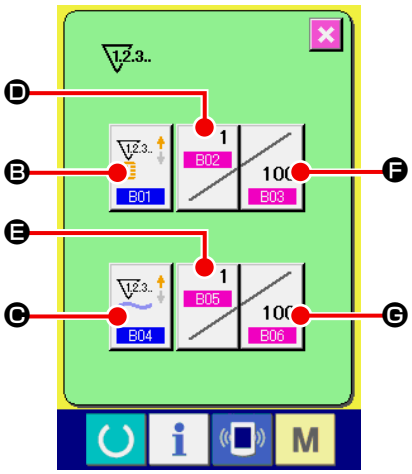
1-8. Using counter

(1) Setting procedure of the counter



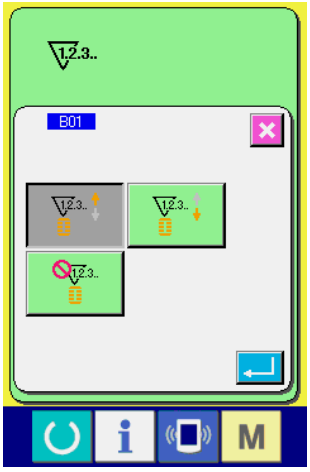
① **Display the counter setting screen.**

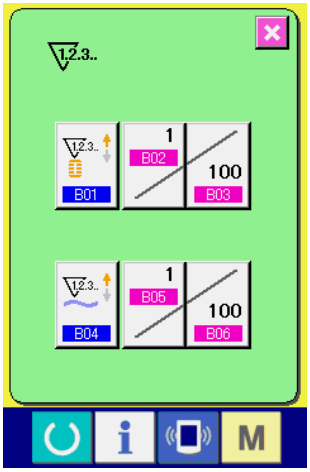
When MODE key M is pressed from the AC data input screen (pink), COUNTER SETTING button 1,2,3.. (Ⓐ) is displayed on the screen. When this button is pressed, the counter setting screen is displayed.



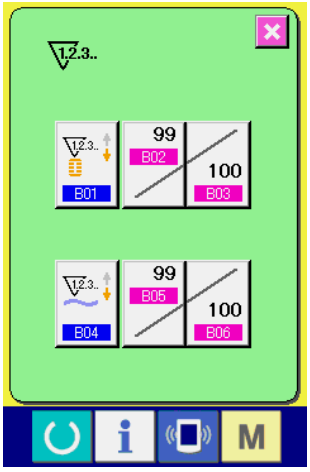
② **Selection of the kinds of counters.**

This sewing machine has two kinds of counters, i.e., sewing counter and No. of pcs. counter. Press SEWING COUNTER KIND SELECTION button 1,2,3.. B01 (Ⓑ) or NO. OF PCS. KIND SELECTION button 1,2,3.. B04 (Ⓒ) to display the counter kind selection screen. The kinds of respective counters can be set separately.

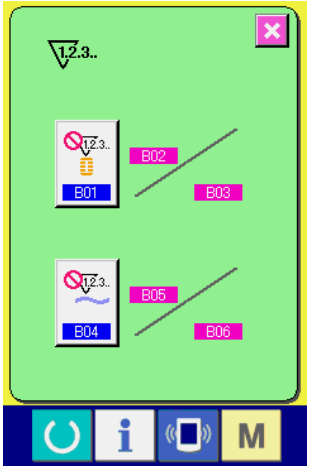




<Up counter screen>



<Down counter screen>



<Counter not used screen>

[Sewing counter]

UP counter :

Every time the sewing of one shape is performed, the existing value is plussed by one. When the existing value is equal to the set value, the count-up
screen is displayed.

DOWN counter :

Every time the sewing of one shape is performed, the existing value is minus by one. When the existing value is reached to "0", the count-up screen is displayed.

Counter not used

[No. of pcs. counter]

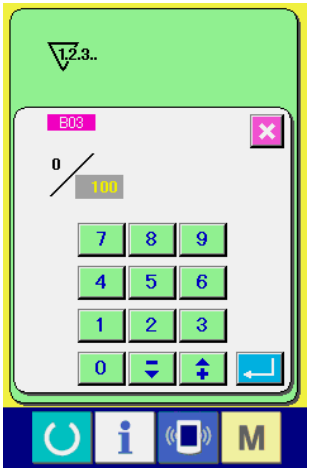
UP counter :

Every time the sewing of one AC data is performed, the existing value is pulsed by one.
When the existing value is equal to the set value, the count-up screen is displayed.

DOWN counter :

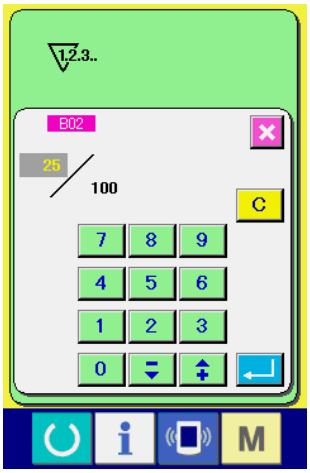
Every time the sewing of one AC data is performed, the existing value is minus by one. When the existing value is reached to "0", the count-up screen is displayed.

Counter not used



③ **Change of counter set value**

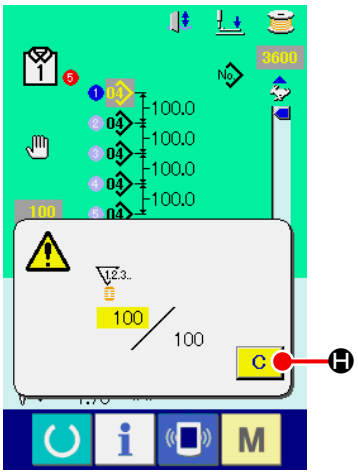
In case of the sewing counter, press button 9999 B03 (Ⓕ) and in case of the No. of pcs. counter, press button 9999 B06 (Ⓖ) and the set value input screen is displayed.
Here, input the set value.



④ **Change of counter existing value**

In case of the sewing counter, press button 4567 B02 (Ⓓ) and in case of the No. of pcs. counter, press button 4567 B02 (Ⓔ) and the existing value input screen is displayed.
Here, input the existing value.

(2) Count-up releasing procedure

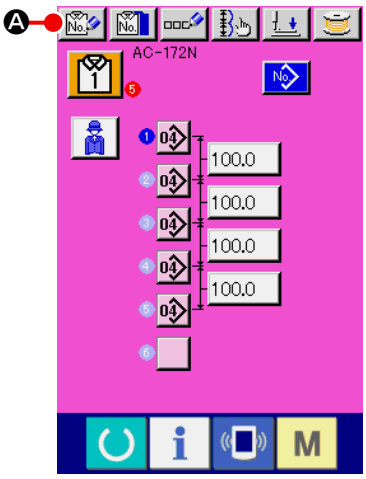


When count-up condition is reached during sewing work, the count-up screen is displayed. CLEAR button C (Ⓗ) to reset the counter and the screen returns to the sewing screen. Then the counter starts counting again.

1-9. Performing new register of AC pattern.

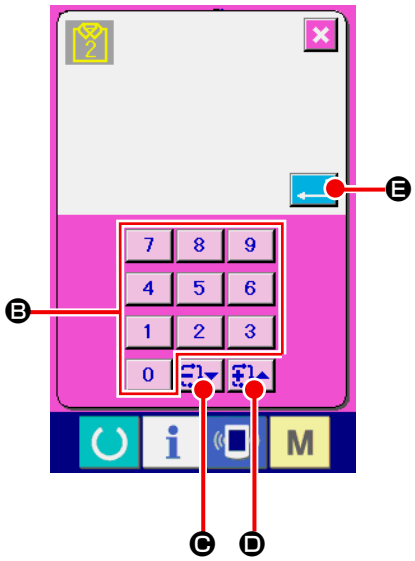
For the way of performing new register of AC pattern, there are the equal interval input to set the number of buttonholes and the interval of buttons, and the individual input to individually set the buttonholes one by one.

(1) Performing the equal interval input



① **Display the data input screen.**
Only in case of AC data input screen (pink), new register of the AC pattern can be performed.

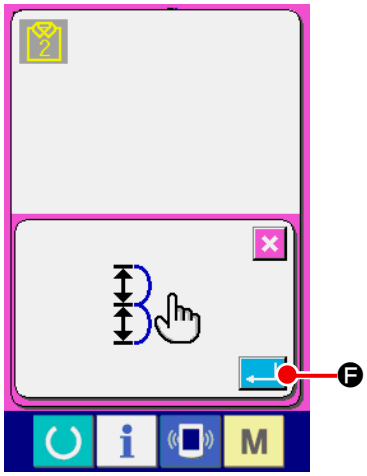
② **Call AC pattern new register screen.**
Press NEW AC REGISTER button (Ⓐ) and the AC pattern new register screen is displayed.



③ **Input the pattern No.**
Input AC pattern No. you desire to newly register with the ten keys (Ⓑ). When AC pattern No. which has been already registered is inputted, the sewing data which has been registered is displayed in the upper part of the screen. Select AC pattern No. which is not displayed and has not been registered. New register to AC pattern No. which has been already registered is prohibited. It is possible to retrieve AC pattern No. which has not been registered with the -/+ buttons (Ⓒ • Ⓓ).

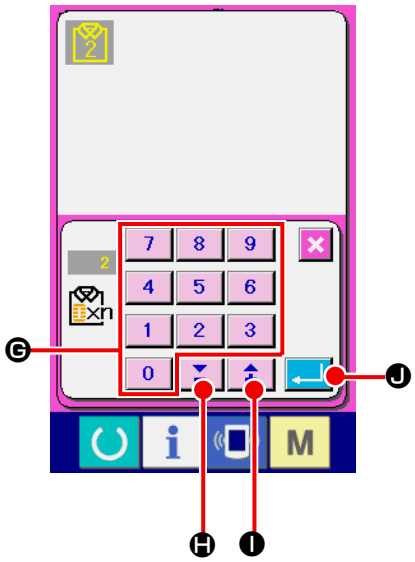
Reference **It is possible for AC patterns No. to use 20 patterns from 1 to 20.**

④ **Determine pattern No.**
Press ENTER button (Ⓔ) to determine the AC pattern No. to be newly registered and the equal interval input selection screen is displayed.



⑤ **Select the equal interval input.**

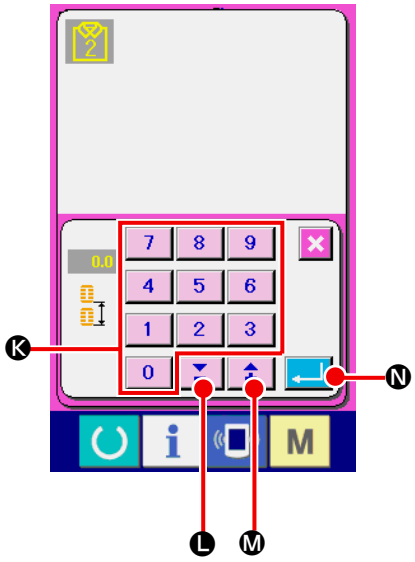
Press ENTER button (Ⓕ) to select the equal interval input, and the number of buttonholes input screen is displayed.



⑥ **Input the number of buttonholes.**

Input the number of buttonholes to continuously sew with the ten keys (Ⓖ). It is possible to input from -/+ buttons (Ⓗ • Ⓘ) as well.

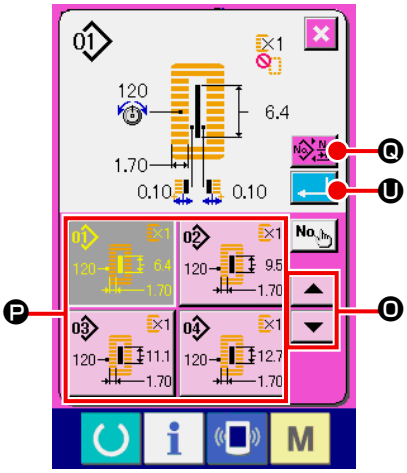
Press ENTER button (Ⓙ) to determine the number of buttonholes and the feed amount input screen is displayed.



⑦ **Input the feed amount.**

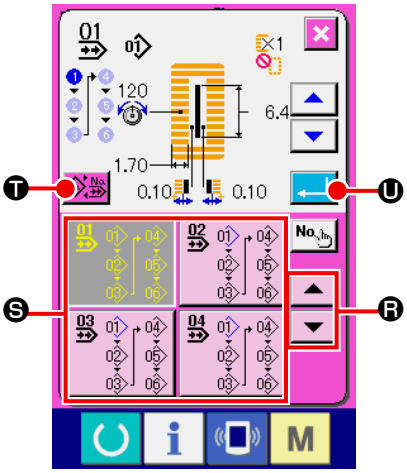
Input the feed amount with the ten keys (Ⓚ). It is possible to input from -/+ buttons (Ⓛ • Ⓜ).

Press ENTER button (Ⓝ) to determine the feed amount and the LBH pattern selection screen is displayed.



⑧ **Select LBH sewing pattern No.**

Press UP/DOWN SCROLL buttons (▲ ▼) (Ⓞ) and LBH sewing pattern No. buttons (Ⓟ) which have been registered are changed over by turns. LBH sewing pattern No. and the contents of the sewing data are displayed in the buttons.
Here, press the LBH sewing pattern No. you desire to select.
When INDEPENDANT SEWING/CONTINUOUS SEWING SELECTION CHANGEOVER button (Ⓠ) is pressed, the screen is changed over to the LBH continuous sewing pattern selection screen.



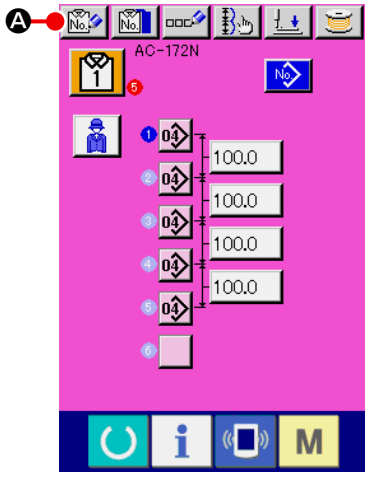
⑨ **Select the LBH continuous sewing pattern No.**

Press UP/DOWN SCROLL buttons (▲ ▼) (Ⓡ) and LBH continuous sewing pattern No. buttons (Ⓢ) which have been registered are changed over by turns. The contents of continuous sewing pattern are displayed in the buttons. Here, press the LBH continuous sewing pattern No. you desire to select.
When INDEPENDENT SEWING/CONTINUOUS SEWING SELECTION CHANGEOVER button (Ⓣ) is pressed, the screen is changed over to the LBH CONTINUOUS SEWING pattern selection screen.

⑩ **Determine pattern No.**

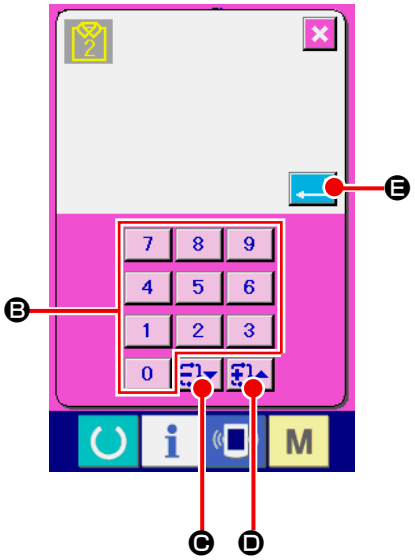
When ENTER button (Ⓤ) is pressed in the LBH pattern selection screen or LBH continuous sewing pattern selection screen, the data is determined and the selection has been finished.

(2) Performing the individual input.



① **Display the data input screen.**
Only in case of the data input screen (pink), new register of AC pattern can be performed.

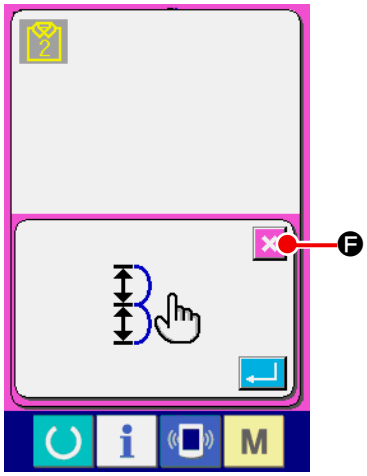
② **Call AC pattern new register screen.**
Press NEW AC REGISTER button (Ⓐ) and the AC pattern new register screen is displayed.



③ **Input pattern No.**
Input AC pattern No. you desire to newly register with the ten keys (Ⓑ). When AC pattern No. which has been already registered is inputted, the sewing data which has been registered is displayed in the upper part of the screen. Select AC pattern No. which is not displayed and has not been registered. New register to AC pattern No. which has been already registered is prohibited. It is possible to retrieve AC pattern No. which has not been registered with -/+ buttons (Ⓒ • Ⓓ).

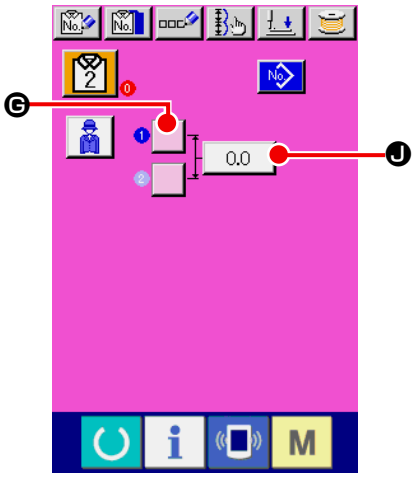
Caution **It is possible for AC patterns No. to use 20 patterns from 1 to 20.**

④ **Determine pattern No.**
Press ENTER button (Ⓔ) to determine AC pattern No. to be newly registered and the equal interval input selection screen is displayed.



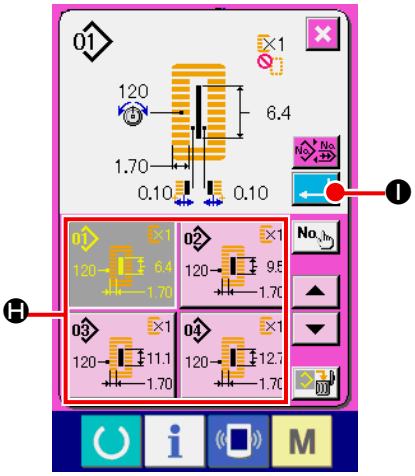
⑤ **Select the individual input.**

When CANCEL button (Ⓕ) is pressed, it means that the individual input is selected, and the AC data input screen is displayed.



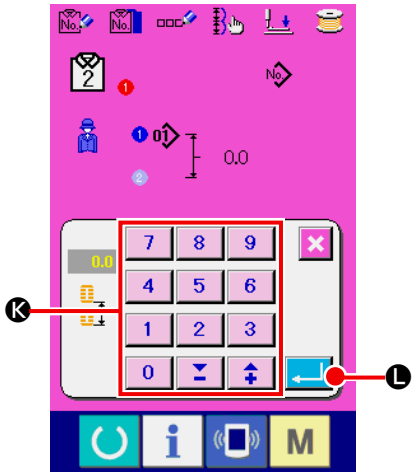
⑥ **Select LBH pattern No.**

When LBH PATTERN BUTTONHOLE No. INPUT button (Ⓖ) is pressed, the LBH pattern selection screen is displayed.



⑦ **Determine LBH pattern No.**

Press LBH pattern No. you desire to sew from among LBH pattern Nos. (Ⓗ) located at the bottom of LBH pattern No. selection screen. Press ENTER button (Ⓘ) to determine LBH pattern No. and the AC data input screen is displayed.



⑧ **Input the feed amount.**

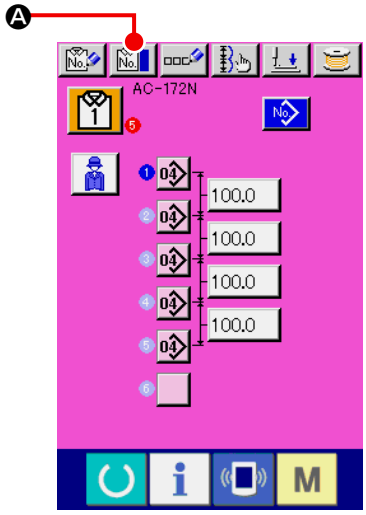
When FEED AMOUNT INPUT button 0.0 (J) is pressed from AC data input screen, the feed amount input screen is displayed. Input the feed amount from the ten keys (K). Press ENTER button (L) to determine the feed amount value and the AC data input screen is displayed.

⑨ **Register plural LBH pattern Nos.**

In order to register plural LBH pattern Nos. to the AC pattern data, repeat the operation of ⑥ through ⑧ .

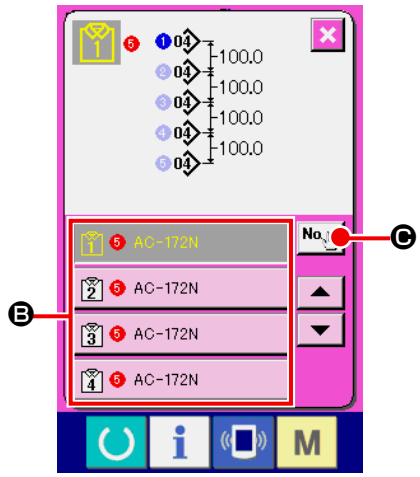
1-10. Copying AC pattern

The data of AC pattern No. which has been already registered can be copied to AC pattern No. which has not been registered.
Overwriting copy of the pattern is prohibited. When you desire to overwrite, perform it after deleting the pattern once.

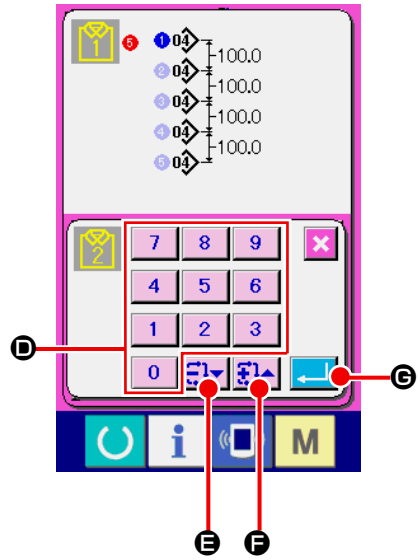


① **Display AC data input screen.**
Only in case of AC data input screen (pink), it is possible to copy AC pattern.

② **Call AC pattern copy source selection screen.**
When AC PATTERN COPY button (Ⓐ) is pressed, the AC pattern copy source selection screen is displayed.



③ **Select AC pattern No. of copy source.**
Select AC pattern No. of copy source from among AC pattern list buttons (Ⓑ).
Next, press COPY DESTINATION INPUT button (Ⓒ) and the AC pattern copy destination input screen is displayed.

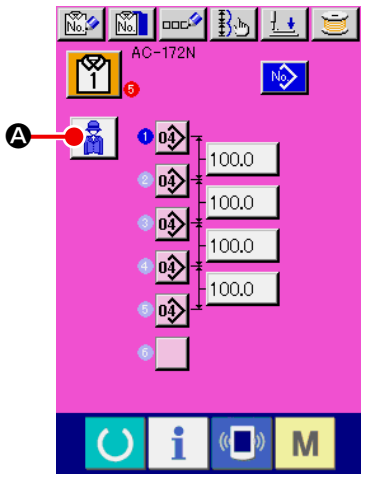


④ **Input AC pattern No. of copy destination.**
Input AC pattern No. of copy destination from the ten keys (Ⓓ). It is possible to retrieve the unused AC pattern No. with -/+ buttons (Ⓔ・Ⓕ).

⑤ **Start copying.**
When ENTER button (Ⓖ) is pressed, copying starts. After the completion of coping, the screen returns to the AC pattern copy selection screen while keeping the state that the copied AC pattern number is selected.

1-11. Changeover of men's and ladies' wear.

Perform changeover of men's and ladies' wear since men's and ladies' wear are different in the carriage direction of sewing products.



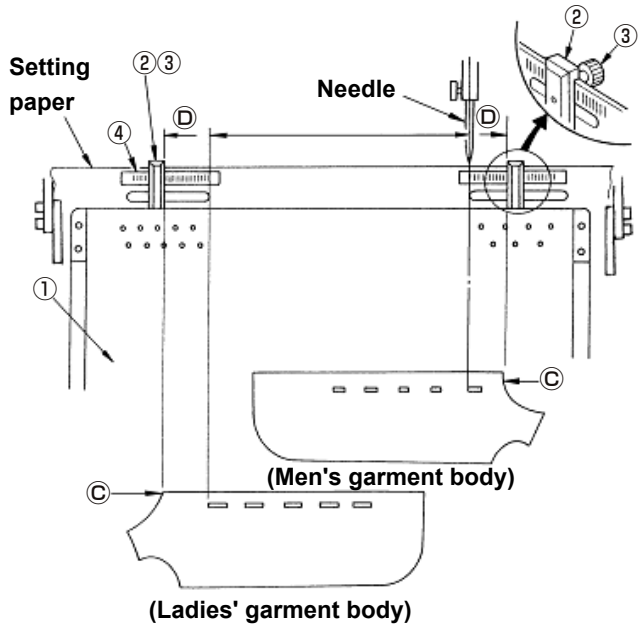
① **Display AC data input screen.**
Display the AC data input screen (pink) of AC pattern No. you desire to sew.

② **Perform changeover of men's and ladies' wear.**
When MEN'S/LADIES' WEAR SELECT button (Ⓐ) is pressed, changeover of men's and ladies' wear can be performed.

Men's wear :

Ladies' wear :

[Setting procedure of cloth]
In case of men's wear, the position where sewing products are preset is the sewing start position of the first sewing pattern. In case of ladies' wear, the place moved to the right-hand by 600 mm from the position where sewing products are preset is the sewing start position of the first sewing pattern. For both men's and ladies' wear, the sewing start position can be moved to the left-hand or right-hand by jump feed before sewing U53 .



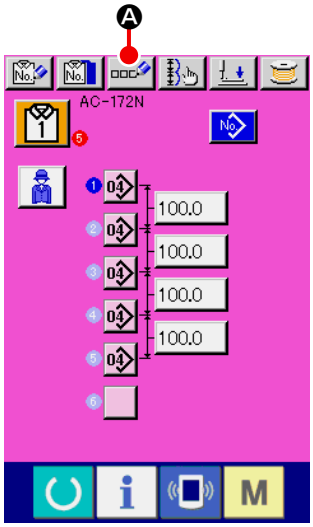
(Reference)

1) Loosen thumbscrew ③ of gauge ② of preset table ① , move to the set place of scale ④ and fix it.

2) Afterwards, adjust top end Ⓒ of cloth to inside Ⓓ of the pointer and set the cloth to position it. (For the ladies' wear, similarly adjust with the pointer and scale on the left side.)

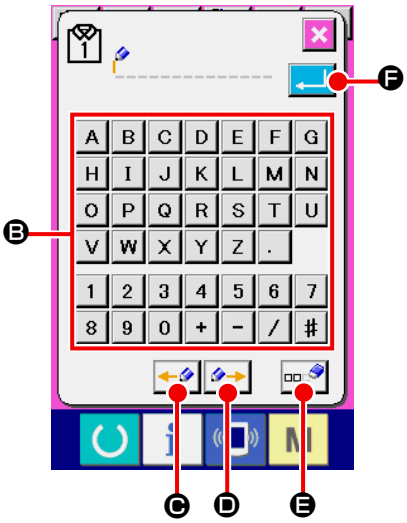
1-12. Naming the pattern

As many as 14 characters can be inputted in each AC pattern.



① **Display the AC data input screen.**
Only in case of the AC data input screen (pink), it is possible to input the name of pattern.

② **Call the character input screen.**
Press AC PATTERN NAME setting button (Ⓐ) and the character input screen is displayed.

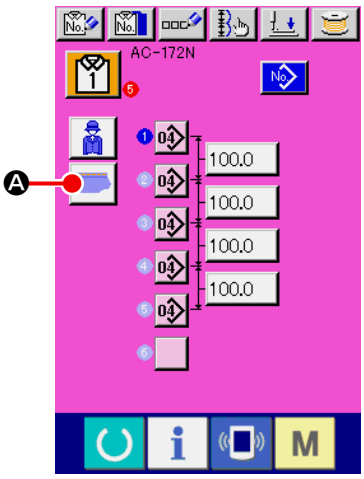


③ **Input the character.**
Press CHARACTER button (Ⓑ) you desire to input and the input of character can be performed.
As many as 14 characters of characters (A to Z and 0 to 9) and symbols (+, -, /, #, ,, .) can be inputted.
The cursor can travel with CURSOR LEFT TRAVEL button (Ⓒ) and CURSOR RIGHT TRAVEL button (Ⓓ).
In case of inputting between characters, the inputted character is inserted.
When you desire to delete the inputted character, adjust the cursor to the position of the character you desire to delete and press DELETE button (Ⓔ).

④ **Finish inputting the character.**
Press ENTER button (Ⓕ) and inputting the character is finished. After the finish, the inputted character is displayed on the upper part of the AC data input screen (pink).

1-13. Changing over the pair stack

The pair stack is the function for stacking the right and left garment bodies alternately.
When this function is used, the sewing machine performs buttonholing on one side of the garment body and stacking it without performing buttonholing on the other side of the garment body.
In the case the pair stack function is used, set the memory switch U54 "Pair stack" to the "Enable".



① **Displaying the AC data input screen**

Display the AC data input screen (pink) for the AC pattern number you want to sew.

② **Changing over the pair stack**

You can change over the setting of the pair stack function between the Enable / Disable by pressing pair stack ON / OFF button (Ⓐ).

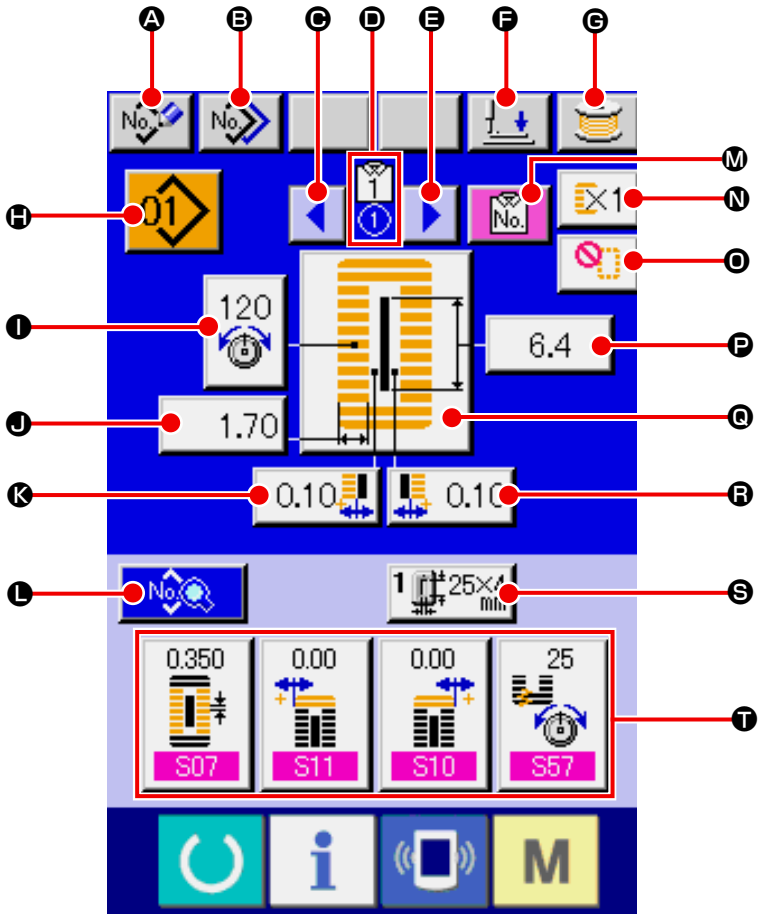
Normal mode :

Pair stack mode :

2. OPERATION OF THE SINGLE UNIT OF SEWING MACHINE AND SETTING PROCEDURE (LBH MODE)

2-1. LCD display section at the time of independent sewing

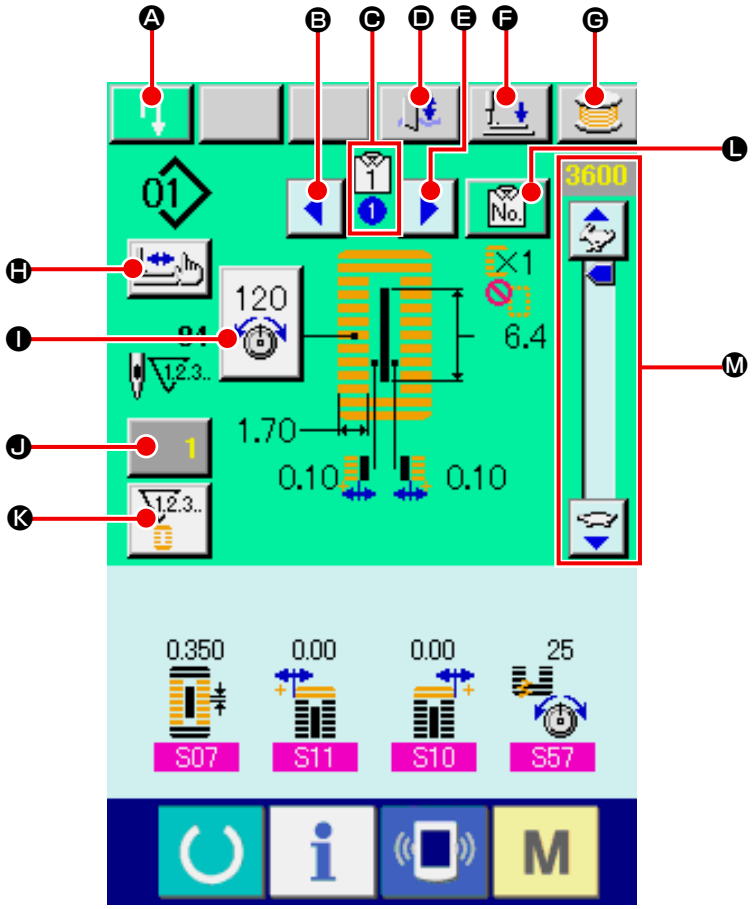
(1) LBH data input screen



	Button and display	Description
Ⓐ	LBH PATTERN NEW REGISTER button	LBH pattern No. new register screen is displayed. → Refer to **"II-2-5. Performing new register of LBH pattern" p.78**.
Ⓑ	LBH PATTERN COPY button	LBH sewing data copy screen is displayed. → Refer to **"II-2-11. Copying LBH sewing pattern" p.94**.
Ⓒ	LBH PATTERN DATA AUTOMATIC TURN button (to return)	LBH pattern data used in the AC pattern data being selected at present is automatically turned.
Ⓓ	AC PATTERN No. AND SEWING ORDER display	AC pattern No. being selected and sewing order are displayed. LBH pattern Nos. which are set in the displayed sewing order are in the state of selection.
Ⓔ	LBH PATTERN DATA AUTOMATIC TURN button (to advance)	LBH pattern data used in the AC pattern data being selected at present is automatically turned.
Ⓕ	PRESSER DOWN button	Presser down screen is displayed and the needle moves to the right side. To raise the presser, press the presser up button displayd in the presser down screen. * When performing threading in this state, turn OFF the power before performing.

	Button and display	Description
Ⓖ	BOBBIN WINDING button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55**.
Ⓗ	LBH PATTERN SELECION button	LBH pattern No. being selected at present is displayed on the button, and when the button is pressed, the LBH pattern No. change screen is displayed. → Refer to **"II-2-2. Performing LBH pattern No. selection" p.73**.
Ⓘ	NEEDLE THREAD TENSION SETTING button	Needle thread tension value which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the needle thread tension change screen is displayed. → Refer to **"II-2-9. Changing needle thread tension" p.91**.
Ⓙ	OVEREDGING WIDTH, LEFT SETTING button	Overedging width, left which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the overedging width, left change screen is displayed.
Ⓚ	KNIFE GROOVE WIDTH, LEFT SETTING button	Knife groove width, left which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the knife groove width, left change screen is displayed.
Ⓛ	SEWING DATA CHANGE button	Sewing data list screen is displayed. → Refer to **"II-2-7. Changing sewing data" p.81**.
Ⓜ	CHANGEOVER OF AC MODE AND LBH MODE button	When the button is pressed, AC data input screen is displayed, and operation and setting of AC can be performed.
Ⓝ	WITH/WITHOUT DOUBLE STITCHING SETTING button	With/without double stitching which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the with/without double stitching change screen is displayed.
Ⓞ	NUMBER OF TIMES OF BASTING SETTING button	Number of times of basting which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the number of times of basting change screen is displayed.
Ⓟ	CLOTH CUTTING LENGTH SETTING button	Cloth cutting length which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the cloth cutting length change screen is displayed.
Ⓠ	SEWING SHAPE SELECTION button	Sewing shape which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the sewing shape change screen is displayed. → Refer to **"II-2-3. Performing sewing shape selection" p.74**.
Ⓡ	KNIFE GROOVE WIDTH, RIGHT SETTING button	Knife groove width, right which is set to LBH pattern data being selected at present is displayed on the button, and when the button is pressed, the knife groove width, right change screen is displayed.
Ⓢ	PRESSER TYPE SELECTION button	Presser type being selected at present is displayed on the button, and when the button is pressed, the presser type change screen is displayed. → Refer to **"II-2-8. Inputting the presser type" p.89**.
Ⓣ	CUSTOMIZE button	Sewing data which are more frequently used can be laid out to four buttons. When the button is pressed, the laid-out sewing data change screen is displayed. → Refer to **"II-2-12. Registering sewing data to customize button" p.96.**

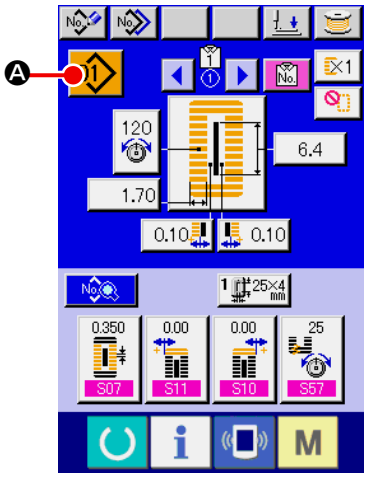
(2) Independent sewing screen



	Button and display	Description
Ⓐ	SEWING MACHINE START button	Sewing of the selected LBH pattern is started.
Ⓑ	LBH PATTERN DATA AUTOMATIC TURN button (to return)	LBH pattern data which is used in AC pattern data being selected at present is automatically turned.
Ⓒ	AC PATTERN AND SEWING ORDER display	AC pattern No. being selected and sewing order are displayed. LBH pattern Nos. which are set in the displayed sewing order is in the state of selection.
Ⓓ	KNIFE CANCEL button	Every time the button is pressed, dropping of knife and non-dropping of knife can be changed over alternately.
Ⓔ	LBH PATTERN DATA AUTOMATIC TURN button (to advance)	LBH pattern data which is used in AC pattern data being selected at present is automatically turned.
Ⓕ	PRESSER DOWN button	Presser can be lowered and the knife down screen is displayed. To raise the presser, press the presser up button displayed in the presser down screen. * When performing threading in this state, turn OFF the power before performing.
Ⓖ	BOBBIN WINDER button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55**.

	Button and display	Description
ⓗ	STEP STITCHING button	When the button is pressed, the screen of step stitching to check needle entry point and to perform re-sewing is displayed. → Refer to **"II-2-4. Performing re-sewing under LBH mode" p.75**.
ⓘ	NEEDLE THREAD TENSION button	Needle thread tension which is set to the pattern data during sewing is displayed, and when the button is pressed, the needle thread tension change screen is displayed. → Refer to **"II-2-9. Changing needle thread tension" p.91**
ⓙ	COUNTER VALUE CHANGE button	Existing counter value is displayed on the button, and when the button is pressed, the counter value change screen is displayed. → Refer to **"II-1-8. Using counter" p.56**.
ⓚ	COUNTER CHANGEOVER button	Display of sewing counter/No. of pcs. counter can be changed over. → Refer to **"II-1-8. Using counter" p.56**.
ⓛ	CHANGEOVER OF AC MODE AND LBH MODE button	When the button is pressed, the AC automatic sewing screen is displayed and automatic sewing can be performed.
ⓜ	SEWING SPEED variable resistor	Number of rotation of sewing machine can be changed.

2-2. Performing LBH pattern No. selection

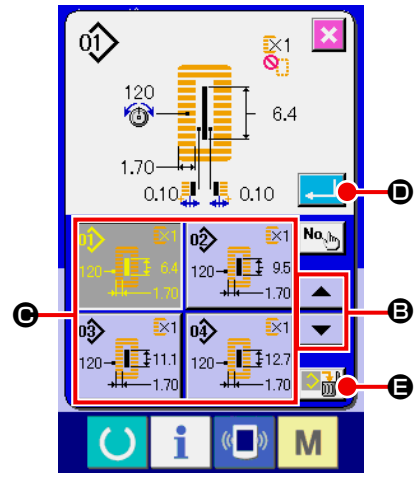


① **Display the LBH data input screen.**

Only in case of the LBH data input screen (blue), LBH pattern No. selection can be performed. In case of the sewing screen (green), press READY key and in case of the AC data input screen (pink), press CHANGEOVER OF AC MODE AND LBH MODE button to display the LBH data input screen.

② **Call the LBH pattern selection screen.**

When LBH PATTERN SELECTION button (Ⓐ) is pressed, the LBH pattern selection screen is displayed.



③ **Select the pattern No.**

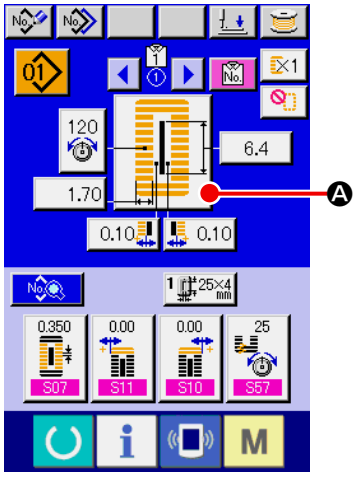
When UP or DOWN SCROLL button (Ⓑ) is pressed, LBH pattern No. buttons (Ⓒ) which have been registered are changed over in order. LBH pattern No. and the contents are displayed in the button. Here, press the LBH pattern No. button you desire to select.

④ **Determine the pattern No.**

Press ENTER button (Ⓓ), and the LBH pattern No. is determined. Then the selection has been finished.

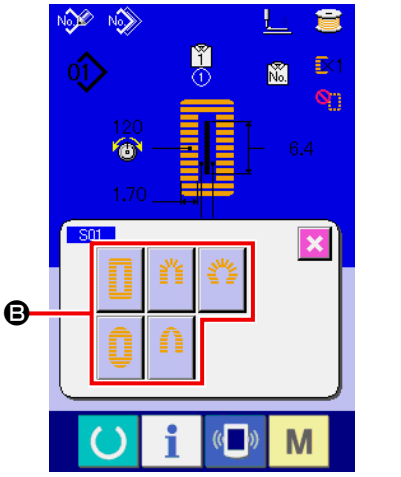
* When you desire to delete the registered LBH pattern, press DELETE button (Ⓔ).

2-3. Performing sewing shape selection

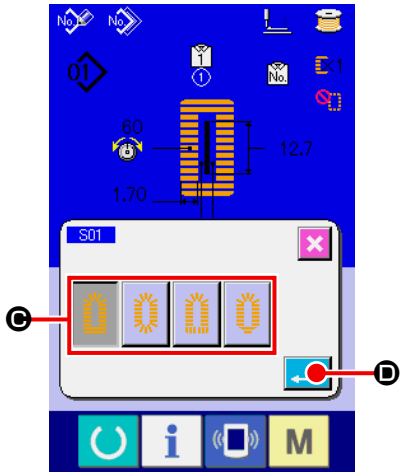


① **Display the LBH data input screen.**
Only in case of the LBH data input screen (blue), the selection of the sewing shape can be performed.

② **Call the sewing shape selection screen.**
Press SEWING SHAPE button (Ⓐ) and the sewing shape selection screen is displayed.



③ **Select the 1st bar-tacking section.**
Select the shape you desire to sew from among 5 kinds of the 1st bar-tacking shape buttons (Ⓑ). When it is selected, the total sewing shape in which the selected 1st bar-tacking is used is displayed.



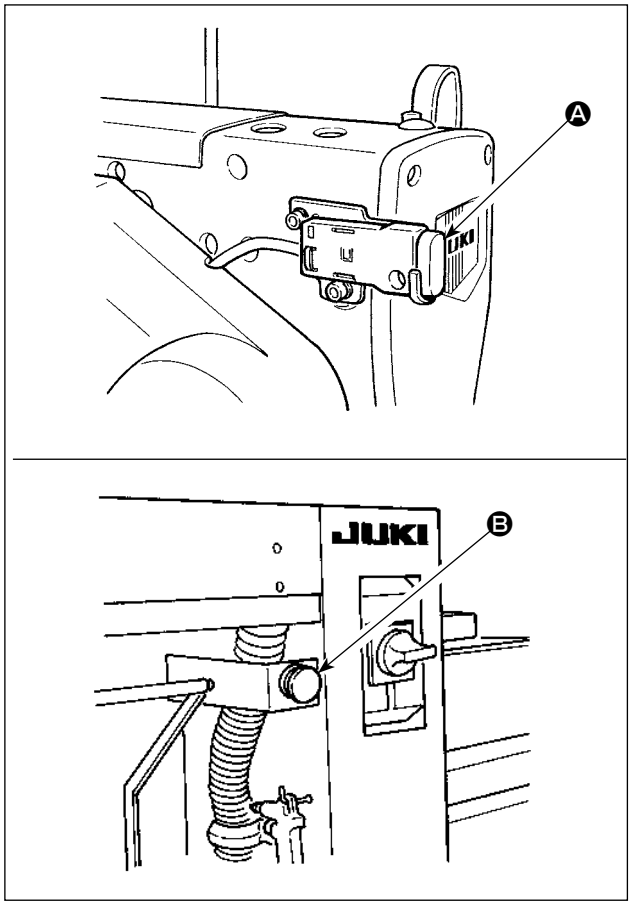
④ **Select the sewing shape.**
Select SEWING SHAPE button (Ⓒ) you desire to sew.

⑤ **Finish the sewing shape selection.**
Press ENTER button (Ⓓ) to finish the shape selection and the selected sewing shape is displayed in the LBH data input screen (blue).

Note) The number of sewing shapes to be displayed changes according to the level selected in the sewing shape selection level of memory switch data (level 2) K04 .

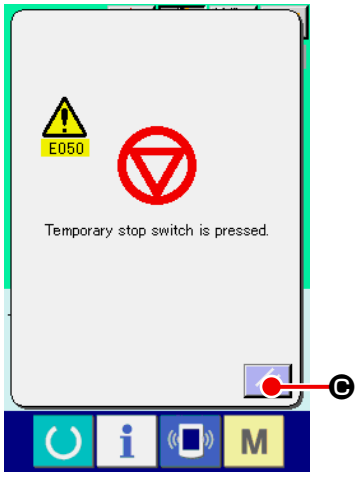
→ Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.

2-4. Performing re-sewing under LBH mode



When temporary stop switch (Ⓐ) or (Ⓑ) is pressed during sewing under LBH mode, the sewing machine interrupts sewing and stops. At this time, the error screen is displayed to inform that the temporary stop switch is pressed.

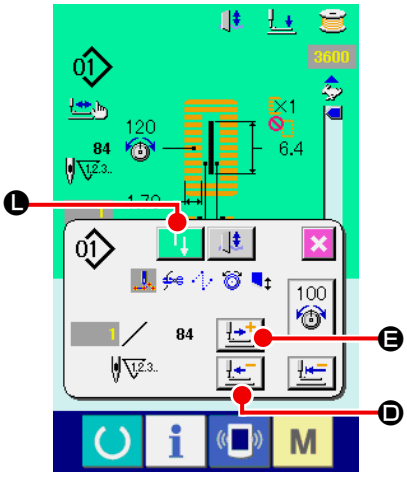
(1) To continue performing sewing from some point in sewing



① **Release the error.**

Press RESET button (Ⓒ) to release the error.

Then the step motion screen is displayed.



② **Return the presser.**

Press ONE STITCH RETURN button (Ⓓ), and the presser returns stitch by stitch.

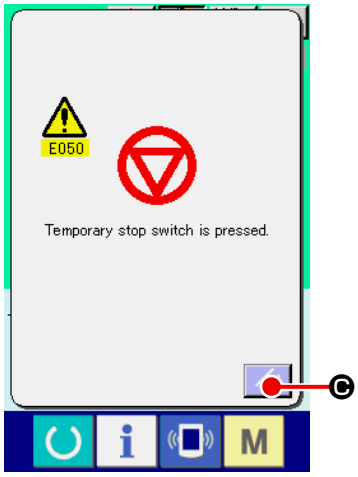
Press ONE STITCH FEED button (Ⓔ), and the presser advances stitch by stitch. Return the presser to the re-sewing position.

③ **Start sewing again.**

When the SEWING MACHINE START button (Ⓛ) is pressed, sewing starts again.

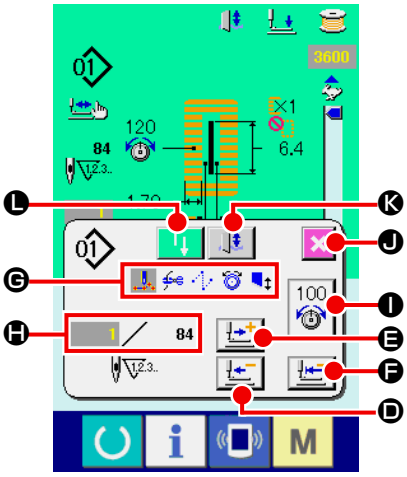
* For the setting procedure of the start switch, refer to **"II-3-1. Changing procedure of memory switch data" p.110**.

(2) To perform sewing from the start



① **Release the error.**

Press RESET button (Ⓒ) to release the error, Then the step motion screen is displayed.



② **Return the sewing product to the setting position.**

Press INITIAL POSITION TRAVEL button, (Ⓕ) and the presser returns to the sewing product setting position (start position).

Press CANCEL button (Ⓙ) to close the pop-up and the presser returns to the sewing product setting position (start position).

③ **Start the sewing.**

When you press sewing machine start button (Ⓛ), the sewing machine re-starts sewing.

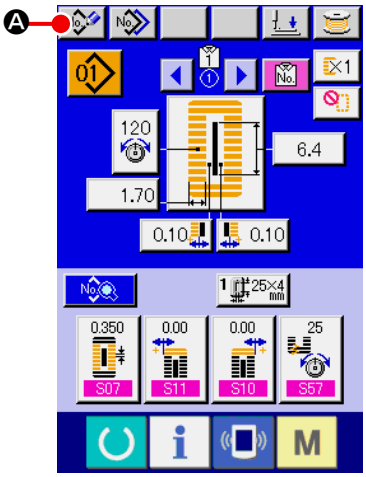
* In case of the continuous stitching, (Ⓕ) moves to the sewing start position of the shape during sewing and when it is pressed subsequently, it moves to the sewing start position of the previous shape.

* The existing sewing commands are shown in reverse video in section (Ⓖ). The kinds of commands are 5 kinds below.

: Sewing command
: Thread trimming command
: Thread trimming command
: Thread tension
: Knife drive

* The existing number of stitches/number of total stitches are displayed in section (Ⓗ).
* Thread tension value is displayed in section (Ⓘ). When thread tension command is inputted in the needle entry point by means of the external input device, the button is displayed and thread tension can be changed.
* Knife can be can celled with (Ⓚ).

2-5. Performing new register of LBH pattern

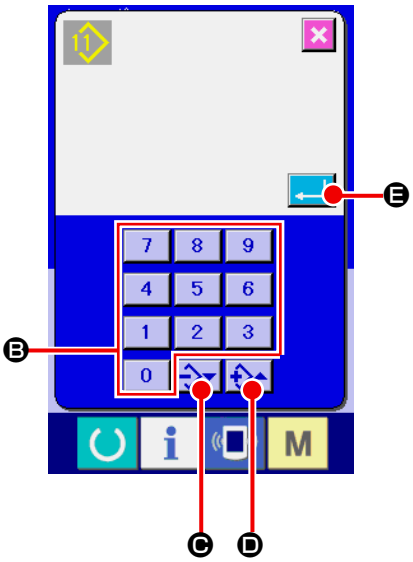


① **Display the LBH data input screen.**

Only in case of the LBH data input screen (blue), new register of the LBH pattern can be performed.

② **Call the LBH pattern new register screen.**

Press NEW LBH PATTERN REGISTER button (Ⓐ) and the LBH pattern new register screen is displayed.



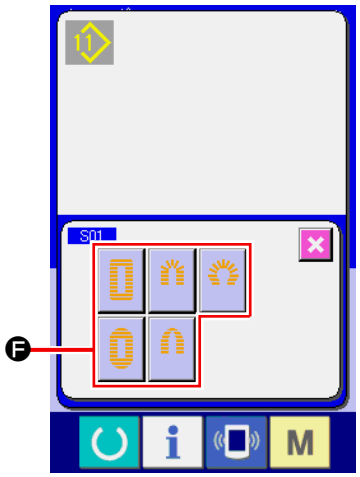
③ **Input the pattern No.**

Input the LBH pattern No. you desire to newly register with the ten keys (Ⓑ). When the LBH pattern No. which has been already registered is inputted, the sewing shape which has been registered is displayed in the upper part of the screen. Select the LBH pattern No. which is not displayed and has not been registered. New register to the LBH pattern No. which has been already registered is prohibited.

It is possible to retrieve the pattern No. which has not been registered with -/+ buttons (Ⓒ • Ⓓ).

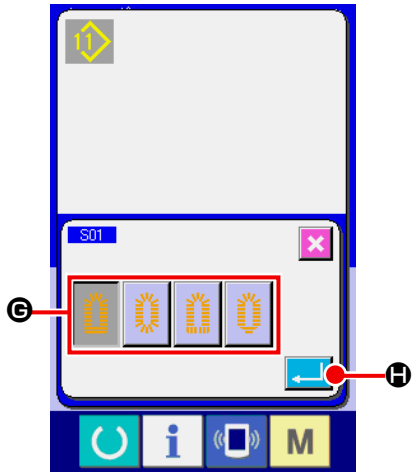
④ **Determine pattern No.**

Press ENTER button (Ⓔ) to determine the LBH pattern No. to be newly registered and the screen of 1st bar-tacking shape list is displayed.



⑤ **Select the 1st bar-tacking shape.**

Select the shape you desire to sew from among 5 kinds of the 1st bar-tacking shape buttons (Ⓕ). When it is selected, the total sewing shape in which the 1st bar-tacking shape is used is displayed.



⑥ **Select the sewing shape.**

Select SEWING SHAPE button (Ⓖ) you desire to sew.

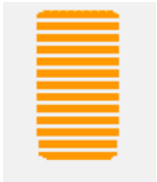
⑦ **Finish the selection of sewing shape.**

Press ENTER button (Ⓗ) to finish the selection of the shape. Then the sewing shape which has been selected is displayed in the LBH data input screen (blue). The initial value of sewing data is inputted according to the selected sewing shape.

Note) Number of sewing shapes to be displayed changes according to the level selected in the K04 sewing shape selection level of memory switch data (level 2).

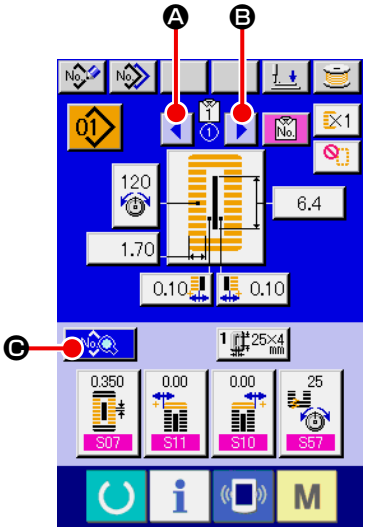
→ Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.

2-6. Sewing shape list

1) Square type	2) Round type	3) Radial square type	4) Radial type	5) Radial straight bar-tacking type
6) Radial taper bar-tacking type	7) Eyelet square type	8) Eyelet radial type	9) Eyelet straight bar-tacking type	10) Eyelet taper bar-tacking type
11) Semilunar type	12) Round square type	13) Semilunar square type	14) Semilunar straight bar-tacking type	15) Semilunar taper bar-tacking type
16) Eyelet semilunar type	17) Eyelet round type	18) Square radial type	19) Square semilunar type	20) Square round type
21) Square straight bar-tacking type	22) Square taper bar-tacking type	23) Radial semilunar type	24) Radial round type	25) Semilunar radial type
26) Semilunar round type	27) Bar-tacking 	28) Bar-tacking, right cut	29) Bar-tacking, left cut	30) Bar-tacking, center cut

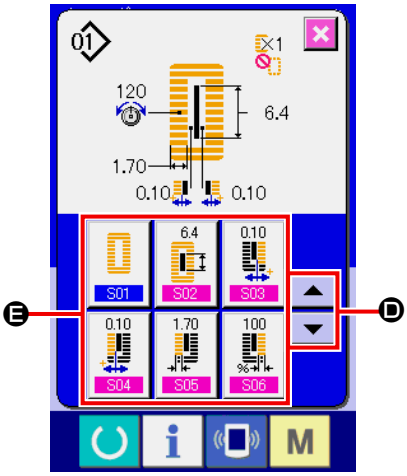
2-7. Changing sewing data

(1) Changing procedure of sewing data



① **Display the LBH data input screen.**
Only in case of the LBH data input screen (blue), change of the sewing data can be performed.

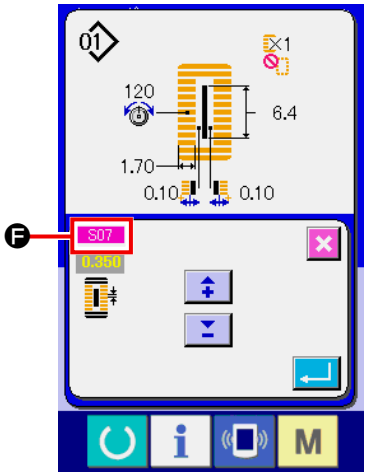
② **Select the LBH pattern data.**
When LBH PATTERN DATA AUTOMATIC TURN button (Ⓐ or Ⓑ) is pressed, LBH pattern Nos. which have been registered to AC pattern which is selected at present can be changed over in order.

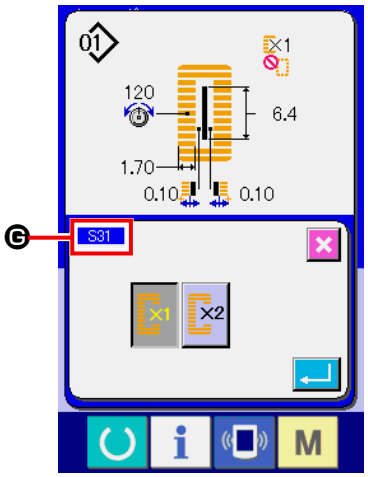


③ **Call the sewing data screen.**
Press SEWING DATA CHANGE button (Ⓒ) and the sewing data list screen is displayed.

④ **Select the sewing data to be changed.**
Press UP/DOWN SCROLL button (Ⓓ) and select SEWING DATA ITEM button (Ⓔ) you desire to change. Data item not used according to the shape and data item which is set to without function are not displayed. So, be careful.

→ Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**





⑤ **Change the data.**

For the sewing data, there are the data item to change the numeral and data item to select the pictograph. No. in pink color such as S02 (Ⓕ) is put on the data item to change the numeral and the set value can be changed with the +/- button which is displayed in the change screen. No. in blue color such as S20 (Ⓖ) is put on the data item to select the pictograph and the pictograph which is displayed in the change screen can be selected.

→ For the details of the sewing data, refer to **(2) Sewing data list** of **"II-2-7. Changing sewing data" p.81**.

(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 LBH pattern.

The sewing machine has been set in the state that the data which is necessary to set "With/ without edit" cannot be set at the time of your purchase. Change over the function to "With edit" if necessary for use.

→ Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

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 **"II-2-6. Sewing shape list" p.80** 1 to 30 * 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 **"II-3-2. Memory switch data list" p.112**.	1 to 30	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 **"II-3-2. Memory switch data list" p.112**.	3.0 to 119.6	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.	0.2 to 5.0	0.1mm	---

(Remarks)

1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

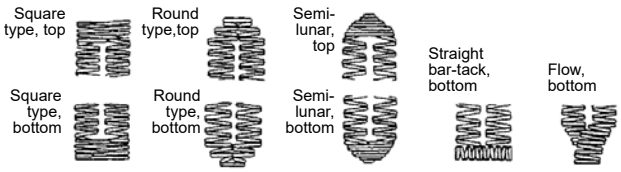
No.	Item	Setting range	Edit unit	Remarks
S09	**1st bar-tacking length** This item sets length of bar-tacking on the rear side. Square type, bottom Straight bar-tack, bottom Flow, bottom 	0.2 to 5.0	0.1mm	---
S10	**Compensation of bar-tacking width, right** This item adjusts left side outer shape of bar-tacking section in terms of overedging section. Both 1st and 2nd bar-tacking can be compensated. Square type, top Square type, bottom Straight bar-tack, bottom 	-1.00 to 1.00	0.05mm	---
S11	**Compensation of bar-tacking width, left** This item adjusts left side outer shape of bar-tacking 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	* 1
S16	**Eyelet width** This item sets crosswise 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 side length from the center of round type shape. 	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	* 1
S20	**Reinforcement of radial shape** This item sets with / without reinforcement stitching of radial shape. : With : Without	---	---	* 1, * 2

(Remarks)

1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

No.	Item	Setting range	Edit unit	Remarks
S21	**Pitch at bar-tacking section** This item sets sewing pitch of bar-tacking section. 	0.100 to 2.500	0.025mm	---
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. ×1 : Single stitching ×2 : Double stitching	---	---	---
S32	**Double stitching cross selection** This item selects overlapped stitching or cross stitching at the needle entry of parallel section when setting double stitching. : Overlapped 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 ×n : 1 to 9 times	0 to 9	1	* 3
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

(Remarks)

1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

No.	Item	Setting range	Edit unit	Remarks
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
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 2000	100 sti/min	* 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	---
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

(Remarks)

1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

No.	Item	Setting range	Edit unit	Remarks
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 of 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
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	---	---	---

(Remarks)

1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

No.	Item	Setting range	Edit unit	Remarks
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. number of revolutions 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 **"II-3-2. Memory switch data list" p.112**. 	400 to 4200	100 sti/min	---
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). 	0.10 to 10.00	0.05mm	---
S88	**Pitch of returning** This item sets sewing pitch of retuning 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). 	0.10 to 10.00	0.05mm	---
S90	**Presser foot pressure** This memory switch is used for setting the pressure of the presser foot to be applied for clamping the material. When the set value of this switch is set to 25, the presser foot pressure is approximately 4 kg. When the set value of this switch is set to 80, the presser foot pressure is approximately 10 kg. 	20 to 80	1	
S101	**Sewing speed at the first bartacking section** This memory switch is used for setting the sewing speed to be employed for sewing the first bartacking section of a square pattern shape. 	400 to 4200	100	*1, *2
S102	**Sewing speed at the second bartacking section** This memory switch is used for setting the sewing speed to be employed for sewing the second bartacking section of a square pattern shape. 	400 to 4200	100	*1, *2

(Remarks)

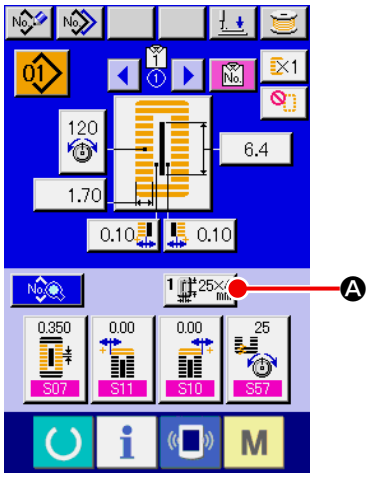
1 : Displayed according to the shape.

2 : Displayed when it is set to with edit.
Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

3 : Displayed when the function is selected.

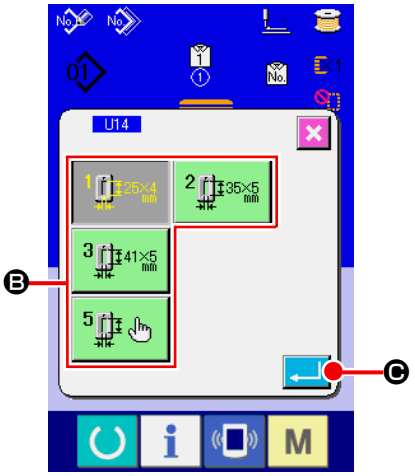
2-8. Inputting the work clamp type

(1) Setting procedure of the work clamp type



① **Display the LBH data input screen.**
Only in case of the LBH data input screen (blue), the contents of setting can be changed.

② **Call the work clamp type selection screen.**
Press WORK CLAMP TYPE SELECTION button (Ⓐ) and the work clamp type selection screen is displayed.



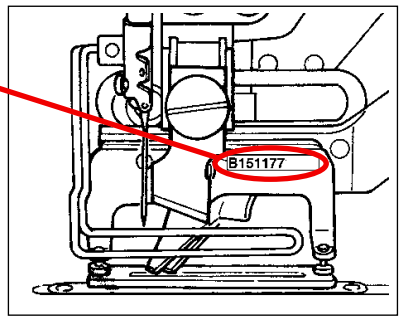
③ **Select the work clamp type.**
Press button (Ⓑ) of the work clamp type mounted on the sewing machine. The button pressed is shown in reverse video. Set the work clamp type referring to Table of presser type described later.

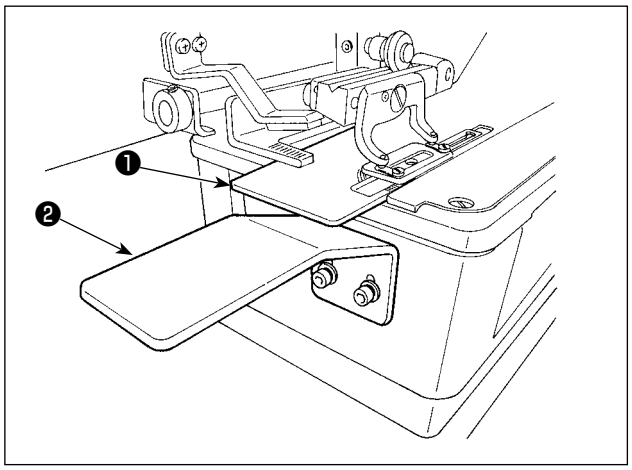
④ **Determine the work clamp type.**
Press ENTER button (Ⓒ) and the work clamp type change screen is closed. Then the change has been finished.

(2) Table of presser type

Make the number in the frame of engraved part number of presser foot correspond to the type of work clamp.

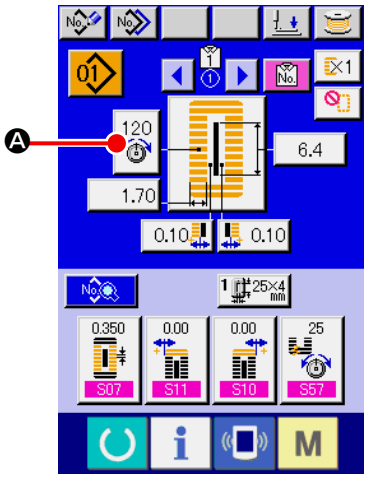
	Type	Part No. of presser foot
1 25×4 mm	Type 1	B1511771000 *
2 35×5 mm	Type 2	B1511772000 *
3 41×5 mm	Type 3	B1511773000 *
5	Type 5	-

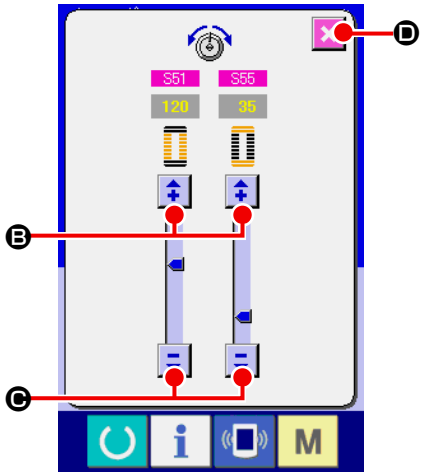




* Set type 5 when using the presser foot other than type 1 to 3 (including the case of sewing st itch width of 6mm). Change U15 Work clamp size width and U16 Work clamp size length of the memory switch (level 1) to adjust to the work clamp to be used.
  Refer to **"II-3-1. Changing procedure of memory switch data" p.110**.
* When using type 5 with stitch width of 6 mm or more and 41 mm or more in length, it is necessary to replace components such as presser arm, feed plate, etc.
* In the case the work clamp that is equal to or larger than the 1 Type is used, it will be necessary to adjust the height of sub table plate B ❷ in order to prevent the work clamp from coming in contact with feed plate ❶ and sub table plate B ❷ .

2-9. Changing needle thread tension





① **Display the LBH data input screen.**

Only in case of the LBH data input screen (blue), needle thread tension can be changed.

② **Call the needle thread tension change screen.**

Press NEEDLE THREAD TENSION button (Ⓐ) and the needle thread tension change screen is displayed.

③ **Change the needle thread tension.**

Needle thread tension at the parallel section and that at the bar-tacking section can be changed in the needle thread tension change screen. Change the tension value with UP button (Ⓑ) or DOWN button (Ⓒ) corresponding to the respective sections.

④ **Finish the change of needle thread tension.**

Press CANCEL button (Ⓓ) and the needle thread tension change screen is closed. Then the change has been finished.

* Number of items to be displayed on the needle thread tension change screen according to the sewing data with/without edit.

→ Refer to **"II-2-10. Setting procedure of sewing data with/without edit" p.93**.

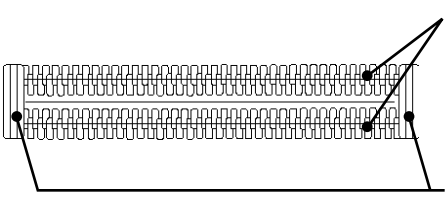
* For the tension other than that at parallel section and at bar-tacking section, refer to **"II-2-7. Changing sewing data" p.81**. and **"II-3-1. Changing procedure of memory switch data" p.110**.

Set value of tension at ① parallel section and ② bar-tacking section

		Set value on panel		
		⊖	Initial value	⊕
Purl stitch	① Parallel section tension	Crest is lowered.	120	Crest is raised.
	② Bar-tacking tension	Thread tension is decreased.	35	Thread tension is increased.
Whip stitch	① Parallel section tension	Thread tension is decreased.	60	Thread tension is increased.
	② Bar-tacking tension	Thread tension is decreased.	60	Thread tension is increased.

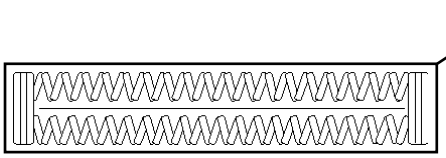
In case of the radial eyelet shape, set the bar-tacking tension first to approximately 120 and make the balance of stitches.

Purl stitch and Whip stitch



Purl stitch

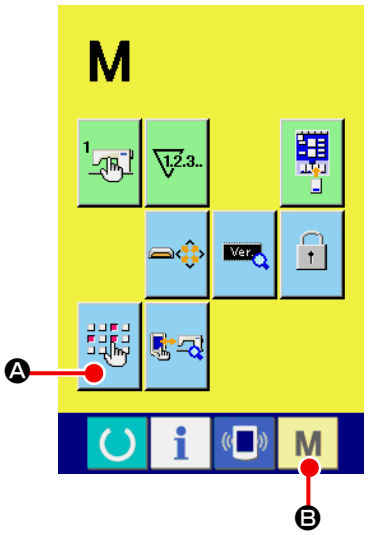
When applying higher tension to the needle thread to permit it to pass straight through fabric, the purl stitch is formed by the bobbin thread which is pulled over from both sides to the center line.



Whip stitch

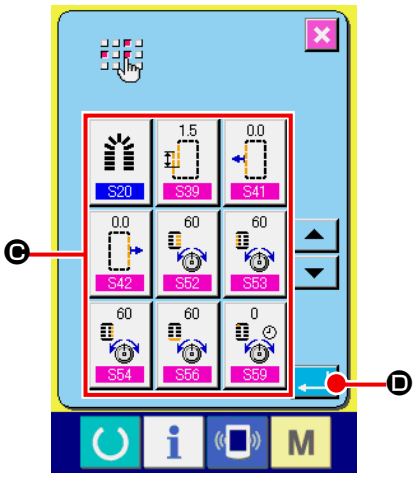
The whip stitch is formed in zigzag showing the needle thread only on top of fabric, and the bobbin thread on the bottom.

2-10. Setting procedure of sewing data with/without edit



① **Display the sewing data with/without edit setting screen.**

When continuing pressing M (Ⓑ) switch for three seconds, the sewing data with/without edit setting button (Ⓐ) is displayed on the screen. When this button is pressed, the sewing data with/without edit setting screen is displayed.



② **Select the sewing data with/without edit.**

The list of data item buttons (Ⓒ) which are possible to set the data with/without edit among the sewing data is displayed. When the button is pressed, reverse display/normal display changes over alternately. When you desire to set "With edit", set the reverse display. When you desire to set "Without edit", set the normal display.

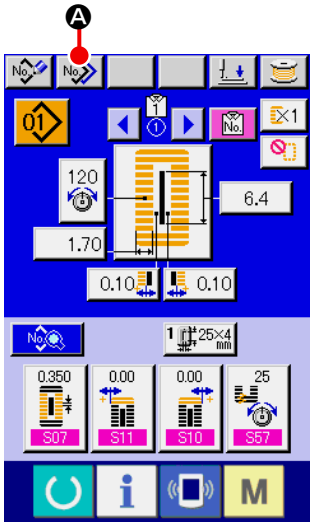
: Without edit : With edit

③ **Determine the sewing data with/without edit.**

When ENTER button (Ⓓ) is pressed, the state of with/without edit of the sewing data item which has been set is determined.

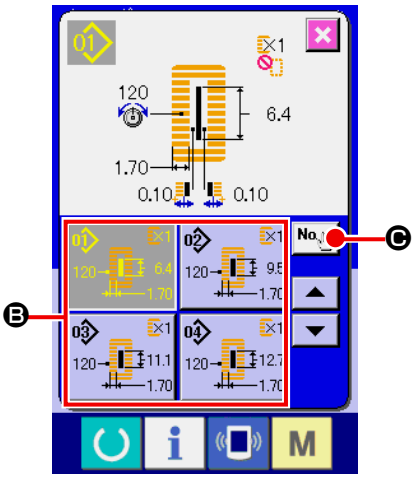
2-11. Copying LBH sewing pattern

The sewing data of LBH pattern No. which has been already registered can be copied to LBH pattern No. which has not been registered.
Overwriting copy of the pattern is prohibited. When you desire to overwrite, perform it after erasing the pattern once.

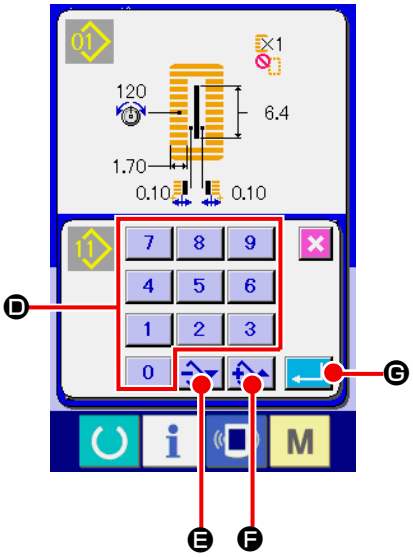


① **Display the LBH data input screen.**
Only in case of the LBH data input screen (blue), copying is possible. In case of the sewing screen (green), press READY key , and in case of the AC data input screen (pink), press CHANGEOVER OF AC MODE AND LBH MODE button to display the LBH data input screen.

② **Call the LBH pattern copy source selection screen.**
When LBH PATTERN COPY button (Ⓐ) is pressed, the LBH pattern copy source selection screen is displayed.



③ **Select the pattern No. of copy source.**
Select the LBH pattern No. of copy source from LBH PATTERN LIST buttons (Ⓑ).
Then press COPY DESTINATION INPUT button (Ⓒ) and the LBH pattern copy destination input screen is displayed.



④ **Input the pattern No. of copy destination.**

Input LBH pattern No. of copy destination with the ten keys (Ⓓ). It is possible to retrieve the LBH pattern No. which is not used with buttons (Ⓔ • Ⓕ).

⑤ **Start copying.**

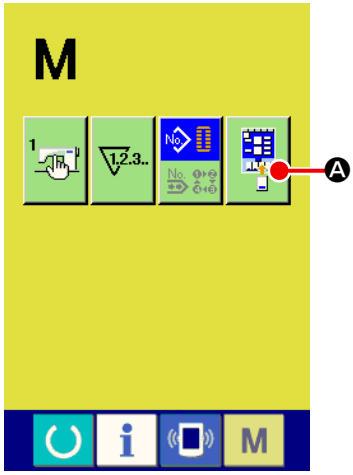
Press ENTER button (Ⓖ) and copying starts.

After the completion of copying, the screen returns to the LBH pattern copy source screen while keeping the state that the copied LBH pattern number is selected.

2-12. Registering sewing data to customize button

Register parameters which are frequently used to CUSTOMIZE button and use them. Screen of the change of parameters which have been registered can be displayed by press only CUSTOMIZE button in the LBH data input screen (blue).

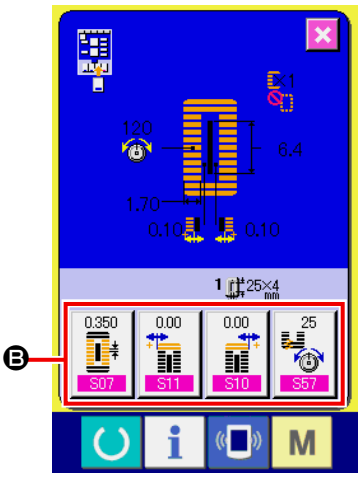
(1) How to register



① **Display the customize pattern register screen.**

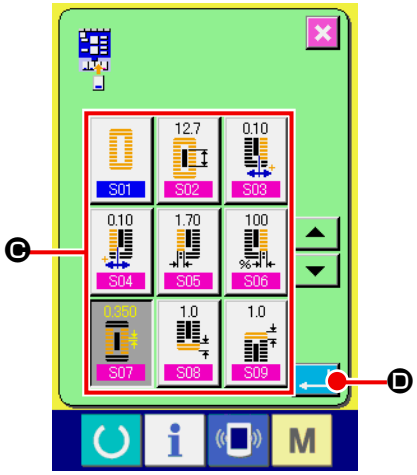
When M switch is pressed, the customize pattern register button (Ⓐ) is displayed on the screen.

When this button is pressed, the customize pattern register screen is displayed.



② **Select the button to be registered.**

The customize buttons can be registered up to four buttons. Four customize register buttons (Ⓑ) are displayed on the screen.
When the button located on the position you desire to register is pressed, the sewing data list screen is displayed.



③ **Select the sewing data to be registered.**
Select the sewing data you desire to register with the sewing data buttons (Ⓒ). When the selected button is pressed twice, the selection is released.

④ **Register to the customize button.**
When ENTER button (Ⓓ) is pressed, register to the customize button is finished and the customize button register screen is displayed. The registered sewing data is displayed on the customize button.

(2) Register state at the time of your purchase

The following sewing data have been registered in order from the left hand at the time of your purchase.

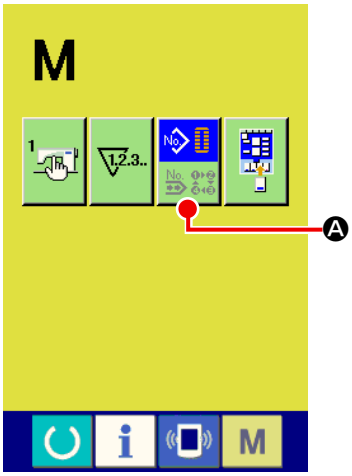
S07 Pitch at parallel section

S11 Compensation of bar-tacking width, left

S10 Compensation of bar-tacking width, right

S57 Setting of needle thread tension at the start of sewing

2-13. Changing sewing mode



① **Select the sewing mode.**

Press MODE key M from the LBH data input screen, and SEWING MODE SELECTION button (Ⓐ) is displayed. LBH

Press this button and changeover of independent sewing and continuous stitching can be performed.

Independent sewing button :

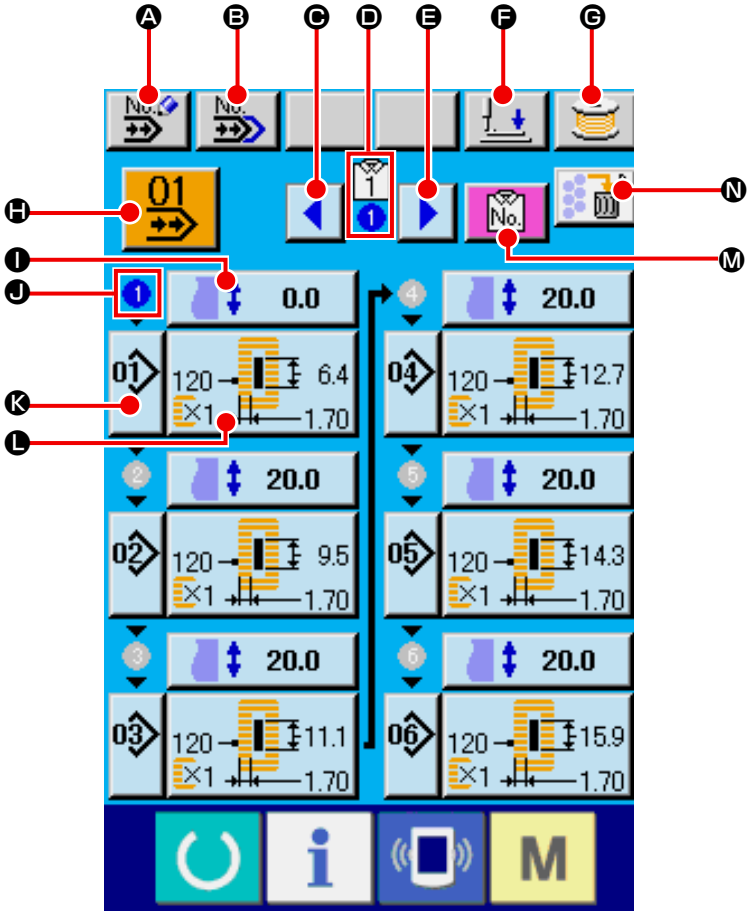
Continuous stitching button :

② **Determine the sewing mode.**

Press MODE key M after changing over the sewing mode. LBH data input screen of the selected sewing mode is displayed.

2-14. LCD display section at the time of continuous stitching

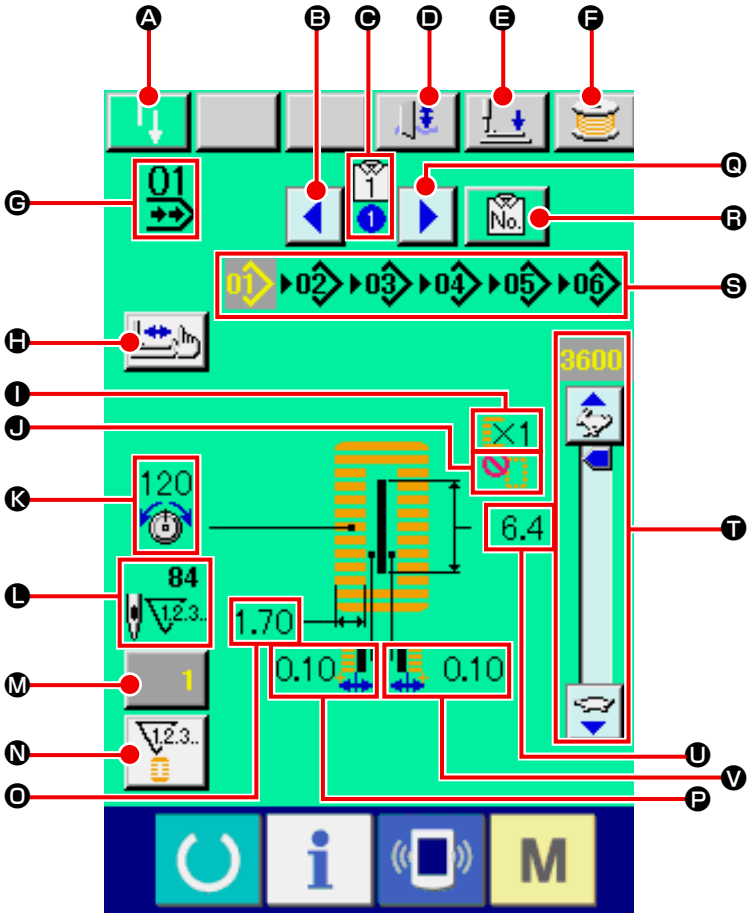
(1) LBH continuous stitching data input screen



	Button and display	Description
Ⓐ	LBH CONTINUOUS STITCHING DATA NEW REGISTER button	LBH continuous stitching data new register screen is displayed.
Ⓑ	LBH CONTINUOUS STITCHING DATA COPY button	LBH continuous stitching data copy screen is displayed.
Ⓒ	LBH PATTERN DATA AUTOMATIC TURN button (to return)	LBH pattern data which are used in AC pattern data being selected at present are automatically turned.
Ⓓ	AC PATTERN NO. AND SEWING ORDER display	AC pattern No. being selected and the present sewing order are displayed. LBH pattern Nos. which are set in the displayed sewing order are in the state of selection.
Ⓔ	LBH PATTERN DATA AUTOMATIC TURN button (to advance)	LBH pattern data which are used in AC pattern data being selected at present are automatically turned.
Ⓕ	PRESSER DOWN button	Presser down screen is displayed and the needle moves to the right side. To raise the presser, press the presser up button displayd in the presser down screen. * When performing threading in this state, turn OFF the power before performing.
Ⓖ	BOBBIN WINDER button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55.**

	Button and display	Description
ⓗ	LBH CONTINUOUS STITCHING DATA NO. SELECTION button	LBH continuous stitching data No. being selected at present is displayed in the button. When it is pressed, the LBH continuous stitching data No. selection screen is displayed.
ⓘ	FEED AMOUNT INPUT button	Cloth feed amount before sewing is displayed. When the button is pressed, feed amount input screen is displayed.
ⓙ	SEWING ORDER display	Sewing order of the inputted LBH pattern data is displayed.
ⓚ	LBH PATTERN NO. SELECTION button	LBH pattern No. which has been inputted is displayed. When the button is pressed, the LBH pattern No. list screen is displayed and LBH pattern No. selection can be performed.
ⓛ	SEWING DATA EDIT button	Sewing data information such as LBH pattern No., shape, cloth cutting length, etc. which have been inputted is displayed.
ⓜ	CHANGEOVER OF AC MODE AND LBH MODE button	When the button is pressed, the AC data input screen is displayed and operation and setting of AC can be performed.
ⓝ	ALL DELETE button	Contents inputted to LBH continuous stitching data being selected at present are deleted.

(2) LBH continuous stitching sewing screen



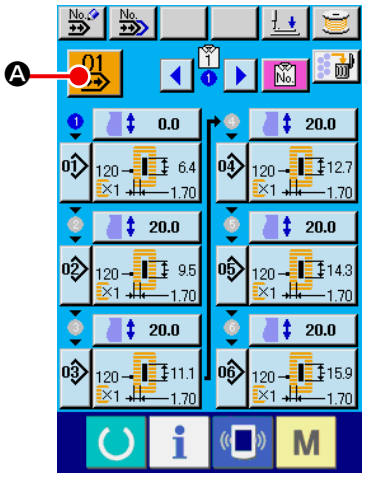
	Button and display	Description
Ⓐ	SEWING MACHINE START switch	Sewing of the selected LBH pattern is started.
Ⓑ	LBH PATTERN DATA AUTOMATIC TURN button (to return)	LBH pattern data which are used in AC pattern data being selected at present are automatically turned.
Ⓒ	AC PATTERN NO. AND SEWING ORDER display	AC pattern No. and the present sewing order are displayed.
Ⓓ	KNIFE CANCEL button	Every time the button is pressed, dropping/non-dropping knife is changed over alternately.
Ⓔ	PRESSER DOWN button	Presser can be lowered and the knife down screen is displayed. To raise the presser, press the presser up button displayed in the presser down screen. * When performing threading in this state, turn OFF the power before performing.
Ⓕ	BOBBIN WINER button	Bobbin thread can be wound. → Refer to **"II-1-7. Winding bobbin thread" p.55.**
Ⓖ	LBH CONTINUOUS STITCHING PATTERN NO. display	LBH continuous stitching data No. during sewing is displayed.
Ⓗ	STEP STITCHING button	When the button is pressed, the step stitching screen to check the needle entry point and to perform re-sewing is displayed. → Refer to **"II-2-4. Performing re-sewing under LBH mode" p.75**.

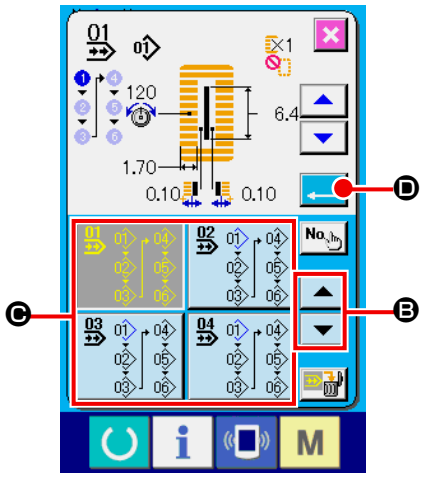
	Button and display	Description
Ⓘ	WITH/WITHOUT DOUBLE STITCHING display	With/without double stitching which is set to LBH pattern data during sewing is displayed.
Ⓙ	NUMBER OF TIMES OF BASTING display	Number of times of basting which is set to the LBH pattern data during sewing is displayed.
Ⓚ	NEEDLE THREAD TENSION display	Needle thread tension which is set to the LBH pattern data during sewing is displayed.
Ⓛ	NUMBER OF TOTAL STITCHES display	Number of total stitches of the LBH continuous stitching data during sewing is displayed.
Ⓜ	COUNTER VALUE CHANGE button	Existing counter value is displayed on this button. When the button is pressed, the counter value change screen is displayed. → Refer to **"II-1-8. Using counter" p.56**.
Ⓝ	COUNTER CHANGE OVER button	Display of sewing counter/No. of pcs. counter can be changed over. → Refer to **"II-1-8. Using counter" p.56**.
Ⓞ	OVEREDGING WIDTH, LEFT display	Overedging width, left which is set to the LBH pattern data during sewing is displayed.
Ⓟ	KNIFE GROOVE WIDTH, LEFT display	Knife groove width, left which is set to the LBH pattern data during sewing is displayed.
Ⓠ	LBH PATTERN DATA AUTOMATIC TURN button (to advance)	LBH pattern data which are used in AC pattern data being sewn at present are automatically turned.
Ⓡ	CHANGEOVER OF AC MODE AND LBH MODE button	When the button is pressed, the AC automatic sewing screen is displayed and automatic sewing can be performed.
Ⓢ	PATTERN NO. display	LBH pattern No. inputted to LBH continuous stitching data during sewing is displayed. LBH pattern No. being sewn at present is displayed in reverse video.
Ⓣ	SPEED variable resistor	Number of rotation of sewing machine can be changed. The number of rotation which is set is displayed.
Ⓤ	CLOTH CUTTING LENGTH display	Cloth cutting length which is set to the LBH pattern data during sewing is displayed.
Ⓥ	KNIFE GROOVE WIDTH, RIGHT display	Knife groove width, right which is set to the LBH pattern data during sewing is displayed.

2-15. Performing LBH continuous stitching

Change the sewing mode to the continuous stitching mode before performing setting.
→ Refer to **"II-2-13. Changing sewing mode" p.98**.

(1) Selection of LBH continuous stitching data





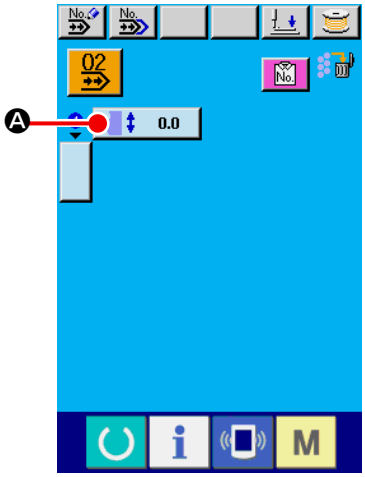
① **Display the LBH continuous stitching data input screen.**
Only in case of the LBH continuous stitching data input screen (light blue), it is possible to select LBH continuous stitching data No. In case of the sewing screen (green), press READY key and display the LBH continuous stitching data input screen (light blue).

② **Call the LBH continuous stitching data No. selection screen.**
When LBH CONTINUOUS STITCHING DATA NO. SELECTION button (Ⓐ) is pressed, the LBH continuous stitching data No. selection screen is displayed. LBH continuous stitching data No. selected at present and the contents are displayed in the upper part of the screen, and other LBH continuous stitching data No. buttons which have been registered are displayed in the lower part of the screen.

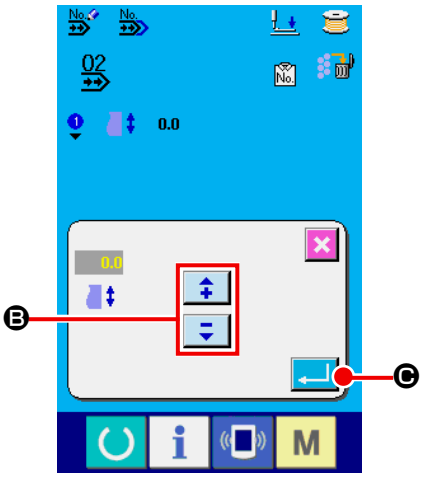
③ **Select the LBH continuous stitching data No.**
When UP or DOWN SCROLL button (Ⓑ) is pressed, the registered LBH continuous stitching data No. buttons changes over in order. Contents registered to the LBH continuous stitching data are displayed in the buttons. Here, press the LBH continuous stitching data button (Ⓒ) you desire to select.

④ **Determine the LBH continuous stitching data No.**
When ENTER button (Ⓓ) is pressed, the LBH continuous stitching data No. selection screen is closed and the selection has been finished.

(2) Editing procedure of the LBH continuous stitching data



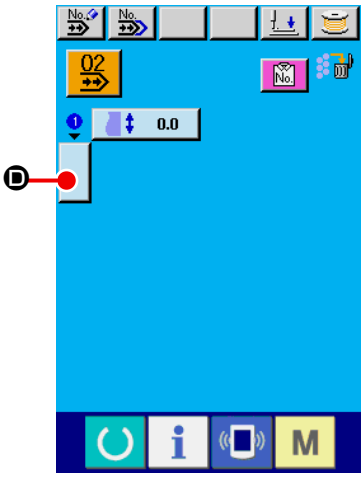
① **Display the LBH continuous stitching data input screen.**
Only in case of the LBH continuous stitching input screen (light blue), it is possible to change the continuous stitching data. In case of the sewing screen (green), press READY key and display the LBH continuous stitching data input screen (light blue).
After the screen is displayed, select the LBH continuous stitching data No. you desire to edit referring to **(1) Selection of LBH continuous stitching data**.
LBH continuous stitching data No. 1 only has been registered at the time of your purchase. However, LBH pattern No. has not been inputted and the screen is displayed as shown in the figure on the right side.



② **Display the feed amount input screen.**
When FEED AMOUNT button 0.0 (Ⓐ) is pressed, the feed amount input screen is displayed.

③ **Input the feed amount.**
Input the feed amount with plus/minus buttons (Ⓑ).
Input range changes according to the work clamp size which has been set.

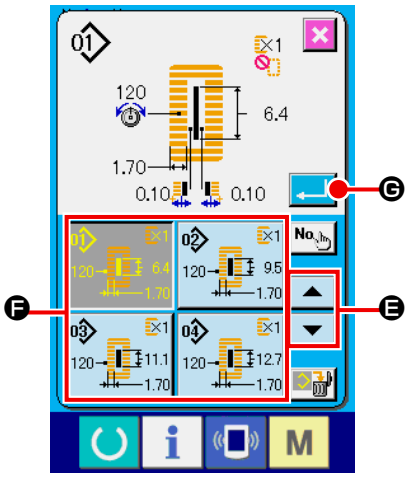
④ **Determine the feed amount.**
When ENTER button (Ⓒ) is pressed, the feed amount input screen is closed and input has been completed.



⑤ **Call the LBH pattern No. selection screen.**

Press button [ ] (Ⓓ) displayed under the sewing order display.

LBH pattern No. to sew first screen is displayed.

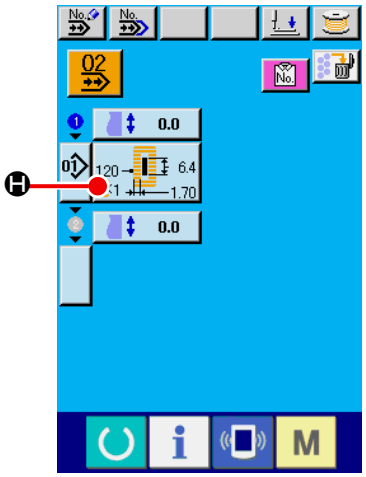


⑥ **Select the LBH pattern No.**

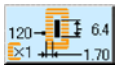
When UP or DOWN SCROLL button [▲][▼] (Ⓔ) is pressed, the registered LBH pattern No. buttons (Ⓕ) change over in order. Contents of sewing data are displayed in the buttons. Here, press the LBH pattern No. button you desire to select.

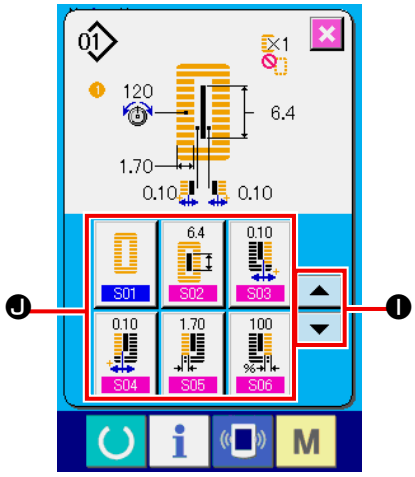
⑦ **Determine the LBH pattern No.**

When ENTER button [↵] (Ⓖ) is pressed, the LBH continuous stitcing data No. selection screen is closed and the selection has been finished.



⑧ **Edit the sewing data of LBH pattern inputted to LBH continuous stitching data.**

When the LBH pattern No. is selected, SEWING DATA button  (❽) displayed the contents of the sewing data inputted to the selected LBH pattern No. is displayed. When the button is pressed, the sewing data input screen is displayed.



⑨ **Select the sewing data to be changed.**

Press UP/DOWN SCROLL button (❶) and select the data item button (❾) you desire to change. Data items which are not used according to the shapes and those which have been set to "Without function" are not displayed. So, be careful.

⑩ **Change the data.**

There are data items to change numerals and those to select pictographs in the sewing data. No. in pink color such as S02 is put on the data items to change numerals and the set value can be changed with +/- button displayed in the change screen. No. in blue color such as S20 is put on the data items to select pictographs and the pictographs displayed in the change screen can be selected. For the details of the sewing data, refer to **"II-2-6. Sewing shape list" p.80**.

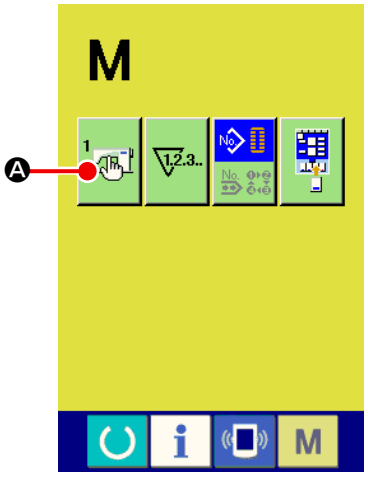
Repeat steps ② through ⑩ and edit the data.

* Now, input has been completed. However, for the continuous stitching, enter all data within the range of the work clamp size. When the data is outside the range, error is displayed. Be sure to correctly input the work clamp size.

→ Refer to **"II-2-8. Inputting the work clamp type" p.89**.

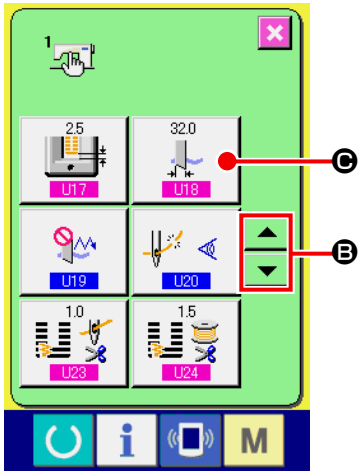
2-16. Explanation of plural motions of knife

This sewing machine can automatically actuate the knife plural times and sew a buttonhole larger than the size of knife by setting the size of knife attached from the operation panel. Set and use this function when sewing various sewing shapes without replacing the knife.



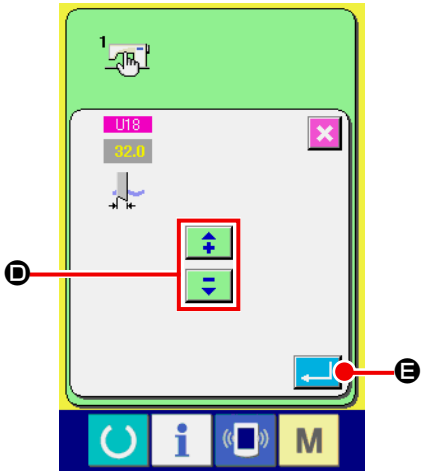
① **Display the memory switch list screen.**

When MODE key M is pressed, MEMORY SWITCH button (Ⓐ) is displayed on the screen. When this button is pressed, the memory switch list screen is displayed.



② **Select U18 Cloth cutting knife size button.**

Press UP/DOWN SCROLL button (Ⓑ) and select U18 Cloth cutting knife size button (Ⓒ). The cloth cutting knife size input screen is displayed.

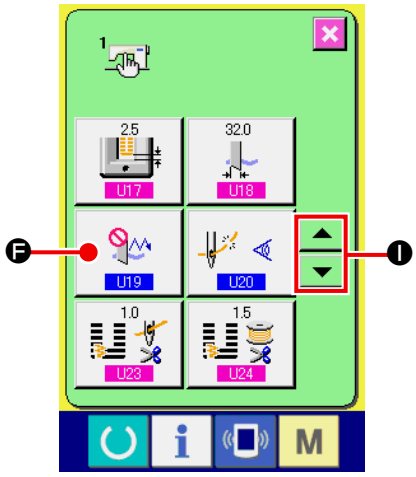


③ **Input the cloth cutting knife size.**

Press plus/minus buttons [▲][▼] (Ⓓ) and input the size of knife attached.

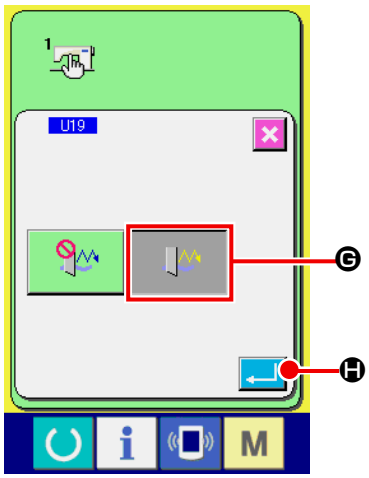
④ **Determine the cloth cutting knife size.**

When ENTER button [↵] (Ⓔ) is pressed, the cloth cutting knife size input screen is closed and the input has been completed. Then the screen returns to the memory switch list screen.



⑤ **Select U19 Function of plural motions of cloth cutting knife button.**

Press UP/DOWN SCROLL button and select U19 Function of plural motions of cloth cutting knife button [U19] (Ⓕ). The function of plural motions of cloth cutting knife selection screen is displayed.



⑥ **Make effective the function of plural motions of cloth cutting knife.**

Select the effective button (Ⓖ).

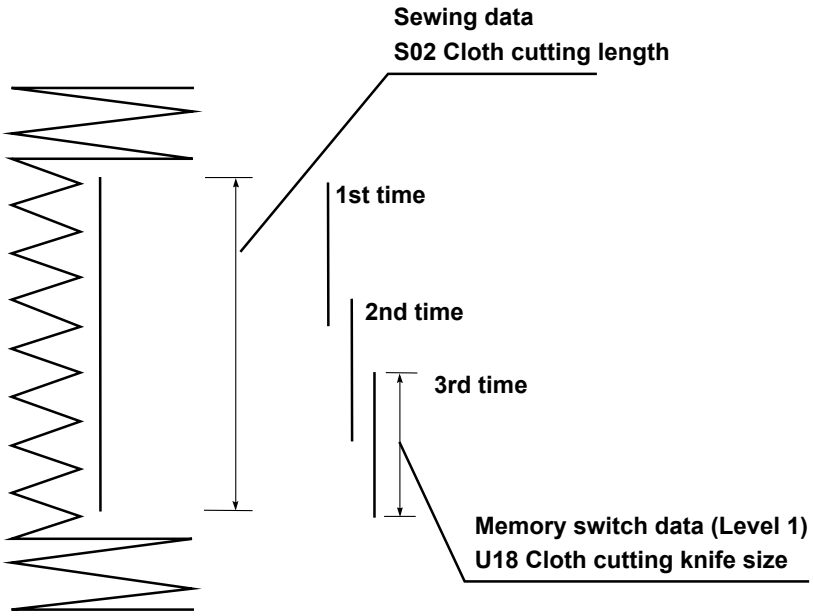
⑦ **Determine the function of plural motions of cloth cutting knife.**

When ENTER button [↵] (Ⓗ) is pressed, the function of plural motions of cloth cutting knife screen is closed and the selection of the function of plural motions of cloth cutting knife has been completed.
Then the screen returns to the memory switch list screen.

⑧ **Perform sewing.**

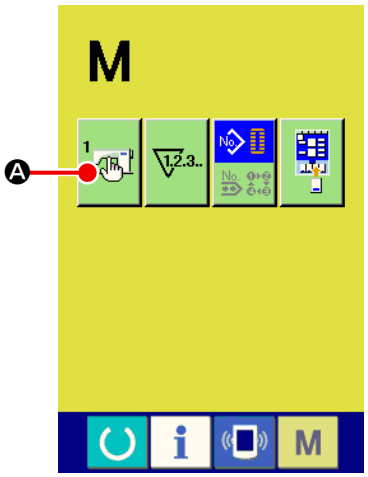
When READY switch is pressed, the sewing screen (green) is displayed. At this time, when S02 Cloth cut length is set to larger than U18 Cloth cutting knife size which has been set in step ②, the sewing machine automatically actuates plural motions of knife and performs sewing.

*** When you desire to sew the hole shape smaller than the size of knife attached, error 489 appears**



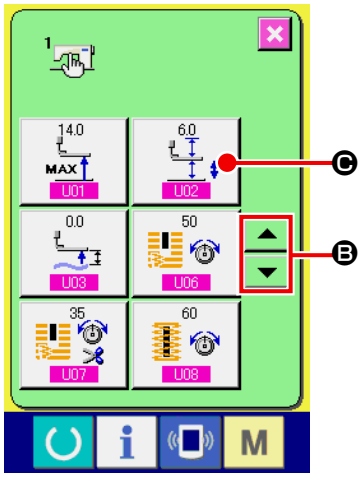
3. CHANGING MEMORY SWITCH DATA

3-1. Changing procedure of memory switch data



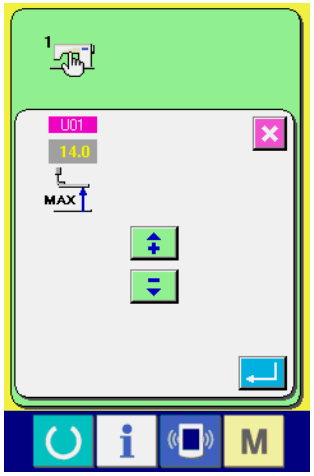
① **Display the memory switch data list screen.**

When MODE key M is pressed, MEMORY SWITCH button (Ⓐ) is displayed on the screen.



② **Select the memory switch button you desire to change.**

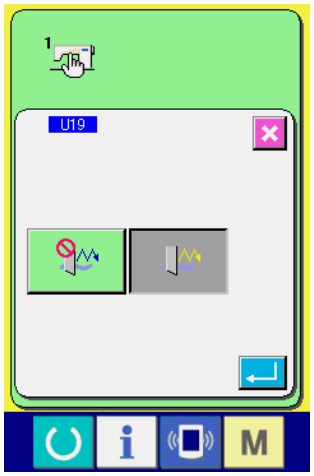
Press UP/DOWN SCROOL button (Ⓑ) and select the data item button (Ⓒ) you desire to change.



③ **Change the memory switch data.**

There are data items to change numerals and those to select pictographs in the memory switch data. No. in pink color such as U01 is put on the data items to change numerals and the set value can be changed with buttons displayed in the change screen. No. in blue color such as U19 is put on the data items to select pictographs and the pictographs displayed in the change screen can be selected.

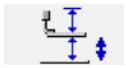
→ For the details of memory switch data, refer to **"II-3-2. Memory switch data list" p.112**.

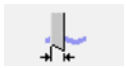
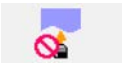


3-2. Memory switch data list

(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 display
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** 	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	100sti/min	800sti/min
U10	**Soft-start speed setting 2st stitch** 	400 to 4200	100sti/min	800sti/min
U11	**Soft-start speed setting 3st stitch** 	400 to 4200	100sti/min	2000sti/min
U12	**Soft-start speed setting 4st stitch** 	400 to 4200	100sti/min	3000sti/min
U13	**Soft-start speed setting 5st stitch** 	400 to 4200	100sti/min	4000sti/min
U14	**Kind of work clamp** Set the kind of the work clamp Refer to **"II-2-8. Inputting the work clamp type" p.89** 	---	---	Type 1
U15	**Work clamp size width (Type 5)** When type 5 of U14 Kind of work clamp is set, input the width of the presser. 	3.0 to 10.0	0.1mm	3.0mm
U16	**Work clamp size length (Type 5)** When type 5 of U14 Kind of work clamp is set, input the length of the presser. 	10.0 to 120.0	0.5mm	10.0mm

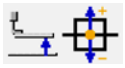
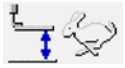
No.	Item	Setting range	Edit unit	Initial display
U17	**Sewing start position (Feed direction)** Sewing start position in terms of work clamp is set. Set this item when starting position is desired to be shifted due to overlapped section or the like.	2.5 to 110.0	0.1mm	2.5mm
U18	**Cloth cutting knife size** When U19 Function of plural motions of cloth cutting knife is set to Effective, 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 : Effective	---	---	Ineffective
U20	**Function of thread breakage detection Ineffective/effective** : Ineffective : Effective	---	---	Effective
U23	**Needle thread trimming release motion start distance** Distance from start of sewing to start of trimmer release motion of needle thread trimmer motor is inputted.	0 to 15.0	0.1mm	1.0mm
U24	**Bobbin thread trimming release motion start distance** Distance from start of sewing to start of trimmer release motion of bobbin thread trimmer motor 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
U51	**Selection of start switch** When knee switch is selected, perform start of presetting with knee switch and cancel of presetting is performed with hand switch. (A mode) When hand switch is selected, perform start of presetting with hand switch and cancel of presetting is performed with knee switch. (B mode) : Knee switch : Hand switch	---	---	Knee switch
U52	**Selection of use/non-use of cloth detection sensor** When "with cloth detection" is selected, start of presetting is not performed unless cloth is set on cloth detection sensor. When "without cloth detection" is selected, presetting is started even when cloth is not set on cloth detection sensor. : With cloth detection  : Without cloth detection	---	---	With cloth detection
U53	**Selection of jump feed function** When "with jump feed" is selected, jump feed amount can be inputted before the 1st sewing pattern. : Without jump feed : With jump feed	---	---	Without jump feed

No.	Item	Setting range	Edit unit	Initial display
U54	**Pair stacking use setting** When "with pair stacking selection" is selected, selection of effective/ineffective of pair stacking can be performed in input screen. : Without selection : With selection	---	---	Without selection

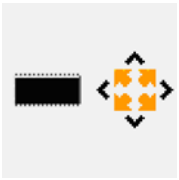
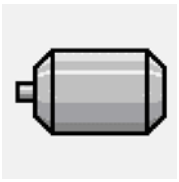
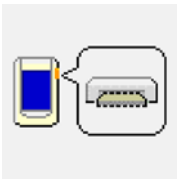
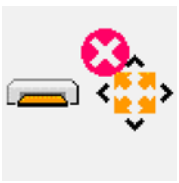
(2) Level 2

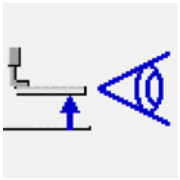
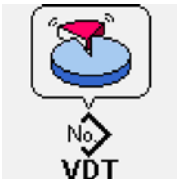
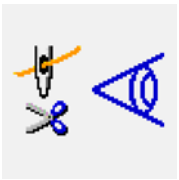
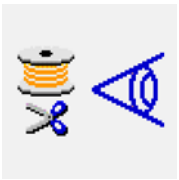
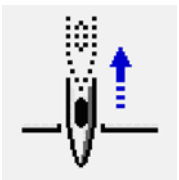
Memory switch data (level 2) can be edited when pressing MODE switch for as long as 6 seconds.

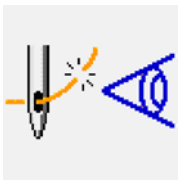
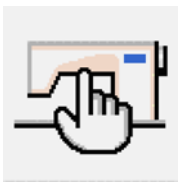
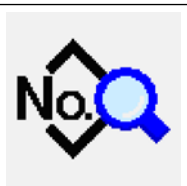
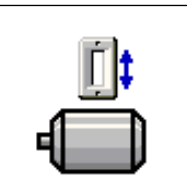
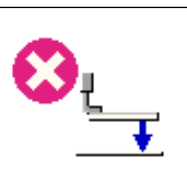
No.	Item	Setting range	Edit unit	Initial display
K03	**Function of prohibition of selection of kind of work clamp Permitted/Prohibited** Prohibition of change of U14 Kind of work clamp is set. : Change permitted : Change prohibited	---	---	Change permitted
K04	**Selection of machine type** Type of sewing machine head is set. : 12 shapes : 20 shapes : 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	3
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 sti/min. 	400 to 4200	100sti/min	3600sti/min
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. : Without : After end of cycle : After end of sewing	---	---	Without
K15	**Y-feed motor origin compensation** 	-120 to 400	1 pulse (0.025 mm)	0
K16	**Needle-rocking motor origin compensation** 	-10 to 10	1 pulse (0.05 mm)	0

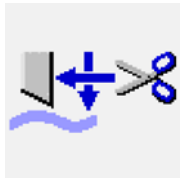
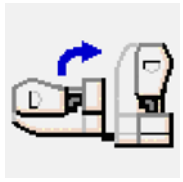
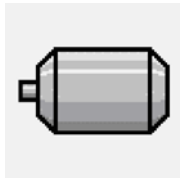
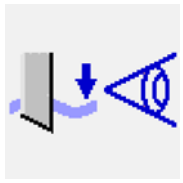
No.	Item	Setting range	Edit unit	Initial display
K17	**Presser lifter motor origin compensation** 	-100 to 10	1 pulse (0.05 mm)	0
K19	**Thread trimming on the way in continuous stitching Permitted/ Prohibited.** In case of prohibited, jump feed setting becomes invalid, and the registered pattern is sewn at the same position. Then multi-sewing is possible. : Permitted : Prohibit	---	---	Permitted
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 start of sewing.	1 to 15	1 pulse	8
K22	**Presser lifter speed selection** As set value is increased, presser lifting speed becomes faster. 	1 to 3	1	1
K23	**Material edge detecting sensor setting** :Material edge sensor is disabled : Material edge sensor is enabled	---	---	Material edge sensor is disabled
K24	**Marking light setting** : Marking light is disabled : Marking light is enabled	---	---	Laser marker is disabled
K25	**Auxiliary clamp setting** : Auxiliary clamp is disabled : Auxiliary clamp is enabled	---	---	Auxiliary clamp is disabled
K26	**Material edge detecting sensor positioning** Adjust the distance between the needle entry point and the location at which the material edge detecting sensor detects the material edge so that the jump amount equals to the set value.	30.0 to 100.0	0.1 (0.1mm)	65.0
K27	**Delay from the lift of the presser foot to the start of carrying**	0 to 1000	50 msec	0
K28	**Delay from the closing of the upper / lower clamps to the turning-off of the vacuum**	0 to 1000	50 msec	0
K30	**Work clamp error detecting position** E083 The height at which the work clamp height error is detected is set. * If it is set at zero (0), the error will not be detected.	0 to 10.0	0.1	3.0
K34	**Setting of the holding power of Y-feed motor** : Low : Medium : High	---	---	Low

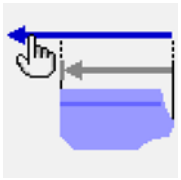
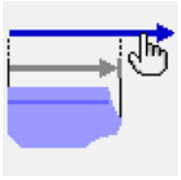
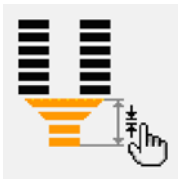
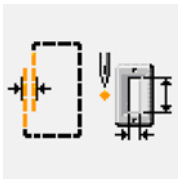
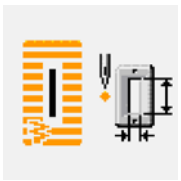
4. ERROR CODE LIST

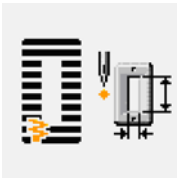
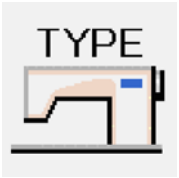
Error code		Description of error	How to recover	Place of recovery
E001		**Contact of initialization of EEP-ROM of MAIN CONTROL p.c.b.** When data is not written in EEP-ROM or data is broken, data is automatically initialized and the initialization is informed.	Turn OFF the power.	
E007		**Main shaft motor-lock** When large needle resistance sewing product is sewn	Turn OFF the power.	
E011		**External media not inserted** External media is not inserted.	Possible to re-enter after reset	
E012		**Read error** Data read from external media cannot be performed.	Possible to re-start after reset.	Previous screen
E013		**Write error** Data write from external media cannot be performed.	Possible to re-start after reset.	Previous screen
E014		**Write protect** External media is in the write prohibition state	Possible to re-start after reset.	Previous screen
E015		**Format error** Format cannot be performed.	Possible to re-start after reset.	Previous screen
E016		**External media capacity over** Capacity of external media is short.	Possible to re-start after reset.	Previous screen
E017		**EEP-ROM capacity over** Capacity of EEP-ROM is short.	Possible to re-start after reset.	Previous screen

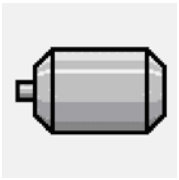
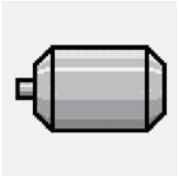
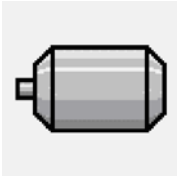
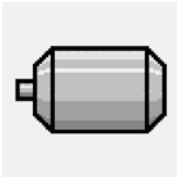
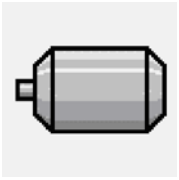
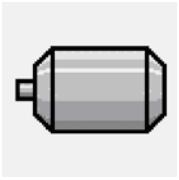
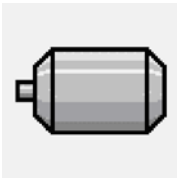
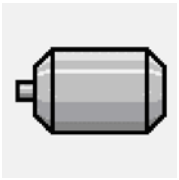
Error code		Description of error	How to recover	Place of recovery
E018		**Type of EEP-ROM is different.** When the mounted EEP-ROM is different in type.	Possible to re-start after reset.	Previous screen
E019		**File size over** File is too large.	Possible to re-start after reset.	Previous screen
E022		**File No. error** Designated file is not in server or Media.	Possible to re-start after reset.	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 reset.	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 reset.	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 reset.	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 reset.	Data input screen
E027		**Read error** Data read from server cannot be performed.	Possible to re-start after reset.	Previous screen
E028		**Write error** Data write from server cannot be performed.	Possible to re-start after reset.	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 reset.	Data input screen

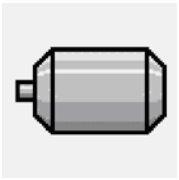
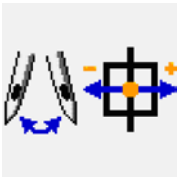
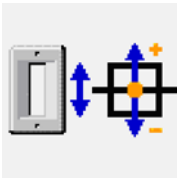
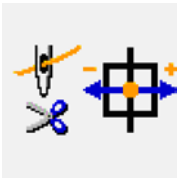
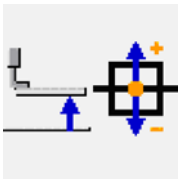
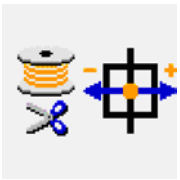
Error code		Description of error	How to recover	Place of recovery
E042		**Operation error** Operation of sewing data cannot be performed.	Possible to re-start after reset.	Data input screen
E043		**Enlarging error** Sewing pitch exceeds 5 mm.	Possible to re-start after reset.	Data input screen
E050		**Stop switch** When stop switch is pressed during machine running.	Possible to re-start after reset.	Step screen
E052		**Thread breakage detection error** When thread breakage has occurred during machine running.	Possible to re-start after reset.	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.	
E081		**Needle rocking motor out-of-step detection error** In the case the out-of-step of the X needle-rocking motor is detected.	Turn OFF the power.	
E082		**Feed motor out-of-step detection error** In the case the out-of-step of the Y feed motor is detected.	Turn OFF the power.	
E083		**Presser foot position error** In the case the presser foot height is excessively high at the time of starting sewing Adjust K023.	Turn OFF the power.	
E089		**When sewing products are stacked and passing** Remove sewing products.	Possible to re-start after reset.	Automatic sewing screen

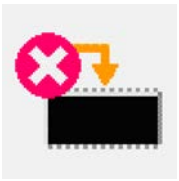
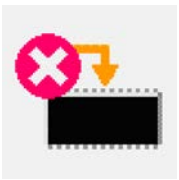
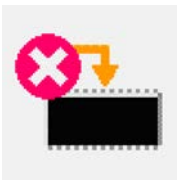
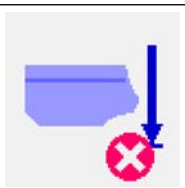
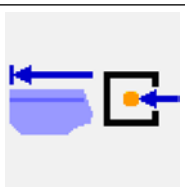
Error code		Description of error	How to recover	Place of recovery
E098		**Error caused by insufficient number of stitches required for thread trimming**	Possible to re-enter after pressing reset key.	Standard screen
E099		**Interference of knife lowering command with thread trimming motion** When inserting position of knife command is improper and knife command interferes with thread trimming motion in case of motion from external data.	Possible to re-start after reset.	Data input screen
E204		**Connection alert for the USB thumb drive which is used for sewing** When sewing has been carried out by 10 or more times with the USB thumb drive inserted in the USB port. (Warning is given, in the case it is determined that a continuous sewing pattern is being sewn after the sewing machine has performed sewing by 10 times continuously, when the sewing machine completes sewing of the pattern.)	Possible to re-sewing after pressing reset key.	Standard screen
E302		**Machine head tilting or the hook cover opening** When the detection signal is in the ON state	Possible to re-start after reset.	Previous screen
E303		**Main shaft semilunar plate sensor error** Semilunar plate of sewing machine motor is abnormal.	Turn OFF the power.	
E304		**Cloth cutting knife sensor error** When knife is held lowered or sensor is not OFF when knife is lowered.	Turn OFF the power.	
E401		**Copy disapproval error** When trying to perform copying to the pattern No. which has been registered. : In case of continuous stitching : In case of cycle stitching	Possible to re-start after pressing cancel button.	Pattern list screen
E402		**Pattern deletion error** When trying to perform deletion in case the remaining pattern No. which has been registered is only one. : In case of continuous stitching : In case of cycle stitching	Possible to re-start after pressing cancel button.	Pattern list screen
E410		**When sewing counter set value is smaller than the number of times of sewing of the sewing pattern which is selected at present.**	Possible to re-start after reset.	AC data input screen
E435	-	**Out-of-input-range error** In the case the numerical value you have entered with the numerical keypad exceeds the specified setting range	Possible to re-start after reset.	Previous screen

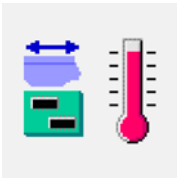
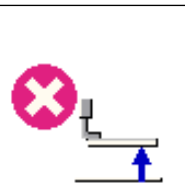
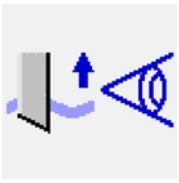
Error code		Description of error	How to recover	Place of recovery
E478		**Carriage movable range over error, left** Feed amount of sewing pattern is over the movable range of carriage (left side). set the jump feed amount and sewing length so that the left traveling amount of carriage is within 25 mm.	Possible to re-start after reset.	AC data input screen
E479		**Carriage movable range over error (right)** Feed amount of sewing pattern is over the movable range of carriage (right side). Set the jump feed amount and sewing length so that the right traveling amount of carriage is within 610 mm.	Possible to re-start after reset.	AC data input screen
E485		**Number of times of basting unsetting error** In the case the number of times of basting is not set (OFF) for "Basting+ Cloth cutting knife shape".	Possible to re-cover by reset.	(During individual sewing/ cycle sewing) Sewing data edit screen S34 Basting stitch (OFF/Number of times) (During continuous sewing) Standard screen
E486		**Eyelet knife length error** When the shape is not formed since the eyelet knife length is too short in case of eyelet shape.	Possible to re-start after reset.	Sewing data input screen S17
E487		**Eyelet shape length error** Eyelet shape length is too short to form the shape in case of eyelet shape.	Possible to re-start after reset.	Sewing data input screen S14
E488		**Flow bar-tacking compensation error** When bar-tacking length is too short to form the shape in case of flow bar-tacking shape.	Possible to re-start after reset.	Sewing data input screen S08
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-start after reset.	Sewing data input screen S02
E492		**Work clamp size over of basting** When stitching data of basting exceeds work clamp size.	Possible to re-start after reset.	Sewing data input screen S40
E493		**Work clamp size over of tie stitching at sewing end** When stitching data of tie stitching at sewing end exceeds work clamp size.	Possible to re-start after reset.	Sewing data input screen S67

Error code		Description of error	How to recover	Place of recovery
E494		**Work clamp size over of tie stitching at sewing start** When stitching data of tie stitching at sewing start exceeds work clamp size.	Possible to re-start after reset.	Sewing data input screen S64
E495		**Work clamp size error (Width direction : right only)** When stitching data exceeds the size of right only of width direction of work clamp.	Possible to re-start after reset.	Sewing data input screen S03 S06
E496		**Work clamp size error (Width direction : left only)** When stitching data exceeds the size of left only of width direction of work clamp.	Possible to re-start after reset.	Sewing data input screen
E497		**Work clamp size error (Length direction : front)** When stitching data exceeds the size of front of length direction of work clamp.	Possible to re-start after reset.	Sewing data input screen
E498		**Work clamp size error (Width direction : right and left)** When stitching data exceeds the size of both right and left of width direction of work clamp.	Possible to re-start after reset.	Sewing data input screen S05
E499		**Work clamp size error (Length direction : rear)** When stitching data exceeds the size of rear of length direction of work clamp.	Possible to re-start after reset.	Sewing data input screen S02
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.	Possible to re-write program after pressing down communication switch.	Communication screen
E704		**Nonagreement of system version** When version of system software is improper in case of initial communication.	Possible to re-write program after pressing down communication switch.	Communication screen
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 is defective.	Turn OFF the power.	

Error code		Description of error	How to recover	Place of recovery
E733		**Reverse rotation of main shaft motor** When sewing machine motor rotates in reverse direction.	Turn OFF the power.	
E798		**Needle throwing operation failure** In the case the needle throwing operation does not match the number of stitches	Turn OFF the power.	
E799		**Needle throwing operation failure** In the case the needle throwing operation does not match the number of stitches	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 voltage 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.	

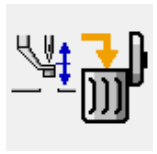
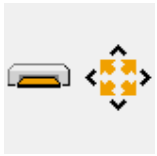
Error code		Description of error	How to recover	Place of recovery
E904		**Abnormality of solenoid power** When solenoid power of servo control p.c.b. fluctuates ± 15% or more.	Turn OFF the power.	
E905		**Abnormality of temperature of heat sink for servo control p.c.b.** When temperature of heat sink of servo control p.c.b. is 85°C or more.	Turn OFF the power.	
E907		**Zigzag width motor origin retrieval error** When origin sensor signal is not inputted at the time of origin retrieval motion.	Turn OFF the power.	
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.	
E912	-	**Sewing motor speed detection error** In the case the sewing machine motor malfunctions	Turn OFF the power.	
E915		**Abnormality of communication between operation panel and main CPU** When abnormality occurs in data communication.	Turn OFF the power.	
E916		**Abnormality of communication between main CPU and main shaft CPU** When abnormality occurs in data communication.	Turn OFF the power.	
E917		**Failure of communication between operation panel and personal computer** When abnormality occurs in data communication.	Turn OFF the power.	

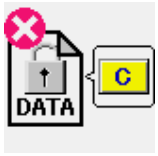
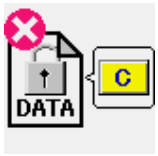
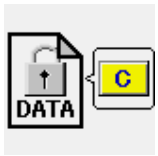
Error code		Description of error	How to recover	Place of recovery
E918		**Abnormality of temperature of heat sink for main control p.c.b.** When temperature of heat sink of main control p.c.b. is 85°C or more.	Turn OFF the power.	
E943		**Defectiveness of EEP-ROM of main control p.c.b.** When data writing 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		**Abnormality of F ROM.** When deletion or writing of F ROM is not performed at the time of downloading program.	Turn OFF the power.	
E983		**When carriage does not pass sensor even when three seconds or more have passed from command to move carriage to machine side.**	Turn OFF the power.	
E984		**When carriage does not pass sensor even when three seconds or more have passed from command to move carriage to preset side.**	Turn OFF the power.	
E985		**Preset is not advanced.** Preset is not advanced even when a specified period of time has passed from the preset advance command.	Turn OFF the power.	
E986		**Preset is not returned.** Preset is not returned even when a specified period of time has passed from the preset return command.	Turn OFF the power.	
E987		**Motion error of cloth sweeping bar** Cloth sweeping bar does not move to the predetermined position even when a specified period of time has passed from the cloth sweeping bar motion command.	Turn OFF the power.	
E988		**Carriage origin retrieval error** Pulses beyond the range are output at the time of carriage origin retrieval.	Turn OFF the power.	

Error code		Description of error	How to recover	Place of recovery
E989		**Carriage motor drive temperature error** Temperature of the carriage motor drive is abnormal.	Turn OFF the power.	
E998		**Presser deviation error** In the case the presser foot fails to go up when the pedal is released or when the sewing is finished. Turn the power OFF. Check whether the work clamp can be lifted/lowered manually. During the aforementioned check, be careful about the needle and the knife.	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.	Turn OFF the power.	

5. MESSAGE LIST

Message No.	Display	Display message	Description
M520		Erasing is performed. OK ?	**Erase confirmation of Users' pattern** Erase is performed. OK ?
M521		Erasing is performed. OK ?	**Erase confirmation of pattern button** Erase is performed. OK ?
M522		Erasing is performed. OK ?	**Erase confirmation cycle pattern** Erase is performed. OK ?
M523		Pattern data is not stored. Erasing is OK?	**Erase confirmation of backup data** Pattern data is not stored in memory. Erase is OK ?
M528		Overwriting is performed. OK ?	**Overwriting confirmation of users' pattern** Overwriting is performed. OK ?
M529		Overwriting is performed. OK ?	**Overwriting confirmation of media** Overwriting is performed. OK ?
M530		Overwriting is performed. OK ?	**Overwriting confirmation of vector data of panel/M3 data/sewing standard format data/simplified program data** Overwriting is performed. OK ?
M531		Overwriting is performed. OK ?	**Overwriting confirmation of vector data of media/M3 data/sewing standard format data/simplified program data** Overwriting is performed. OK ?
M532		Overwriting is performed. OK ?	**Overwriting confirmation of vector data on personal computer/M3 data/sewing standard format data/ simplified program data** Overwriting is performed. OK ?
M534		Overwriting is performed. OK ?	**Overwriting confirmation of adjustment data of media and all machine data** Overwriting is performed. OK ?

Message No.	Display	Display message	Description
M535		Overwriting is performed. OK ?	**Overwriting confirmation of adjustment data on personal computer and all machine data** Overwriting is performed. OK ?
M537		Deleting is performed. OK ?	**Deletion confirmation of thread tension command** Deleting is performed. OK ?
M538		Deleting is performed. OK ?	**Deletion confirmation of intermediate presser increase/ decrease value** Deleting is performed. OK ?
M542		Formatting is performed. OK ?	**Format confirmation** Formatting is performed. OK ?
M544		Data does not exist.	**Data corresponding to panel does not exist.** Data does not exist.
M545		Data does not exist.	**Data corresponding to media does not exist.** Data does not exist.
M546		Data does not exist.	**Data corresponding to personal computer does not exist.** Data does not exist.
M547		Overwriting cannot be performed since data exists.	**Overwriting prohibition on pattern data** Overwriting cannot be performed since data exists.
M548		Overwriting cannot be performed since data exists.	**Overwriting prohibition on media data** Overwriting cannot be performed since data exists.
M549		Overwriting cannot be performed since data exists.	**Overwriting prohibition on data on personal computer** Overwriting cannot be performed since data exists.
M550		There is back-up data of body input.	**Backup data information on main body input** There is back-up data of body input.

Message No.	Display	Display message	Description
M554		Key-lock customization data have been initialized.	**Customized data initialization notice** Customized key-lock data has been initialized.
M555		Key-lock customization data are broken. Initializing is OK?	**Customized data breakage** Customized key-lock data has broken. Initialization is performed. OK?
M556		Key-lock customization data are to be initialized. OK?	**Initialization confirmation of customized data** Customized key-lock data is initialized. OK?
M653		Formatting is performed.	**During formatting** Formatting is performed.
M669		Data is being read.	**During data reading** Data is being read.
M670		Data is being written.	**During data writing** Data is being written.
M671		Data is being converted.	**During data converting** Data is being converted.

6. USING COMMUNICATION FUNCTION

Communication function can download the sewing data created with other sewing machine. In addition, the function can upload the aforementioned data to the media or personal computer.
Media and USB port are prepared as the vehicle to communicate.

6-1. Handling possible data

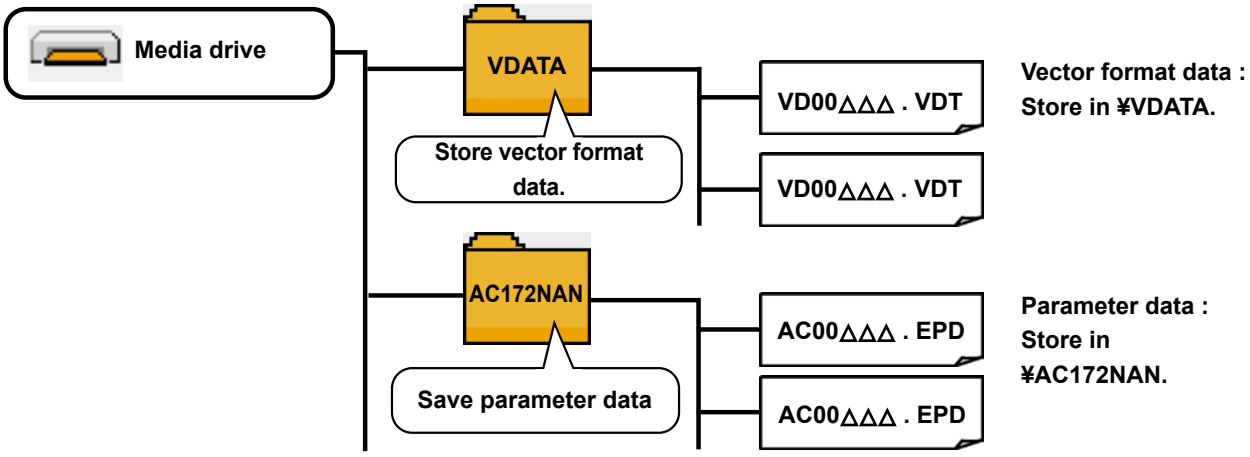
Handling possible sewing data are two kinds below. The respective data formats are as described below.

Data name		Extension	Description of data
Vector format data		VD00 ×××. VDT	Data of the needle entry point created with PM-1. Format of the data which can be used in common among JUKI sewing machines.
Parameter data		AC00 ×××. EPD	Format of the sewing data that is unique to the AC such as the stitch shape, cloth trimming length and overedging width

××× : file NO.

3) Folder structure of the media

Store each file in the directories below of the media.

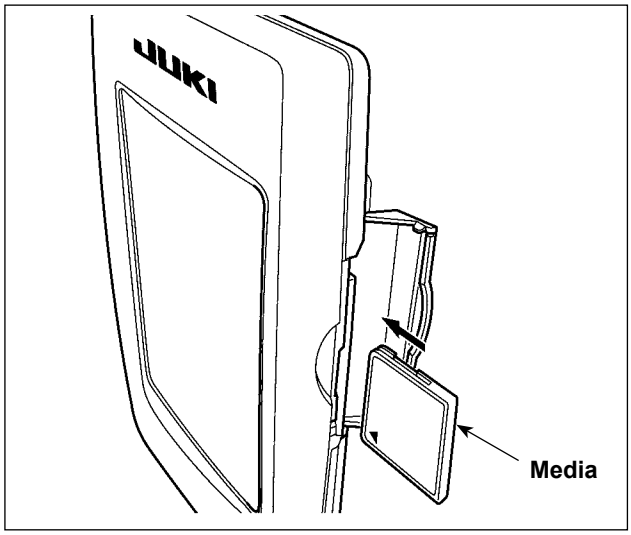


Data that are not stored in the directories above cannot be read. So, be careful.

6-2. Performing communication by using the media

(1) CompactFlash (TM)

■ **Inserting the CompactFlash (TM)**

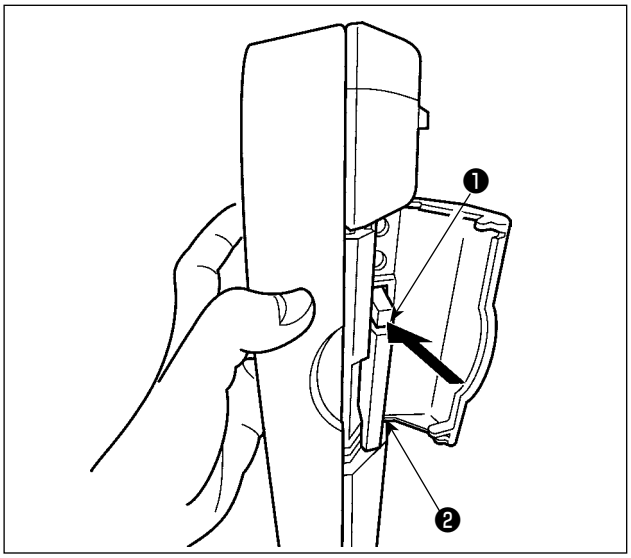


1) Turn the label side of the CompactFlash(TM) to this side (place the notch of the edge to the rear.) and insert the part that has a small hole into the panel.
2) After completion of setting of the media, close the cover. By closing the cover, it is possible to access. If the media and the cover come in contact with each other and the cover is not closed, check the following matters.
   - Check that the media is securely pressed until it goes no further.
   - Check that the inserting direction of the media is proper.

Caution

1. **When the inserting direction is wrong, panel or media may be damaged.**
2. **Do not insert any item other than the CompactFlash (TM).**
3. **The media slot in the IP-420 accommodates to the CompactFlash (TM) of 2 GB or less.**
4. **The media slot in the IP-420 supports the FAT16 which is the format of the CompactFlash (TM). FAT32 is not supported.**
5. **Be sure to use the CompactFlash (TM) which is formatted with IP-420. For the formatting procedure of the CompactFlash (TM), see "II-7. PERFORMING FORMATTING OF THE MEDIA" p.137.**

■ **Removing the CompactFlash (TM)**



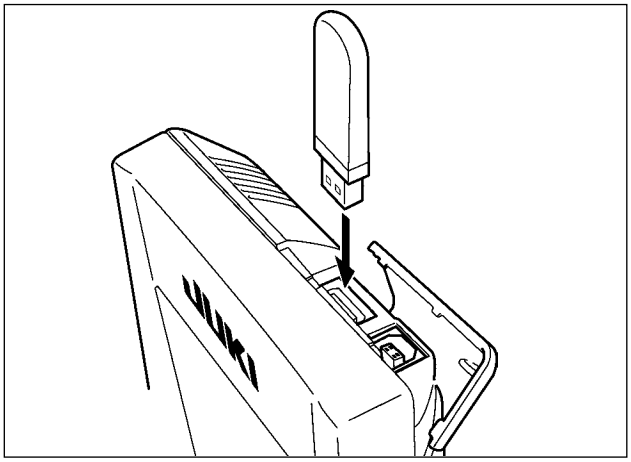
1) Hold the panel by hand, open the cover, and press the media ❷ removing lever ❶ . The media is eject.

When the lever ❶ is strongly pressed, the media ❷ may be broken by protruding and falling.

2) When the media ❷ is drawn out as it is, removing is completed.

(2) USB port

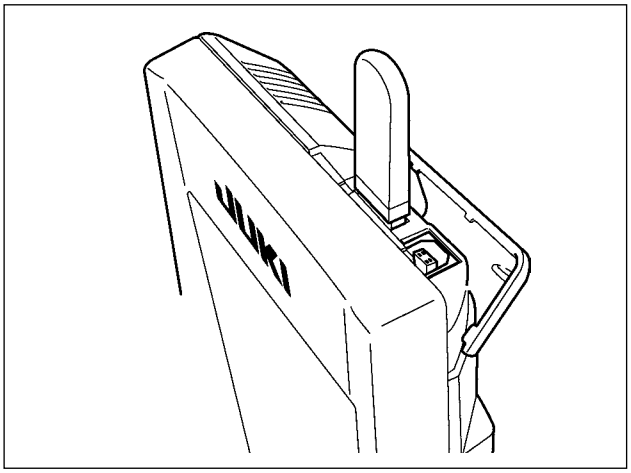
■ **Inserting a device into the USB port**



Slide the top cover and insert the USB device into the USB port. Then, copy data to be used from the USB device onto the main body.
After completion of copying the data, remove the USB device.

To protect the USB terminal, do not perform sewing by 10 times or more with the USB thumb drive connected to the sewing machine.

■ **Disconnecting a device from the USB port**



Remove the USB device. Put the cover back in place.

Cautions when using the media

- **Do not wet or touch it with wet hands. Fire or electric shock will be caused.**
- **Do not bend, or apply strong force or shock to it.**
- **Never perform disassembling or remodeling of it.**
- **Do not put the metal to the contact part of it. Data may be disappeared.**
- **Avoid storing or using it in the places below.**

  Place of high temperature or humidity / Place of dew condensation /
  Place with much dust / Place where static electricity or electrical noise is likely to occur

① Precautions to be taken when handling USB devices

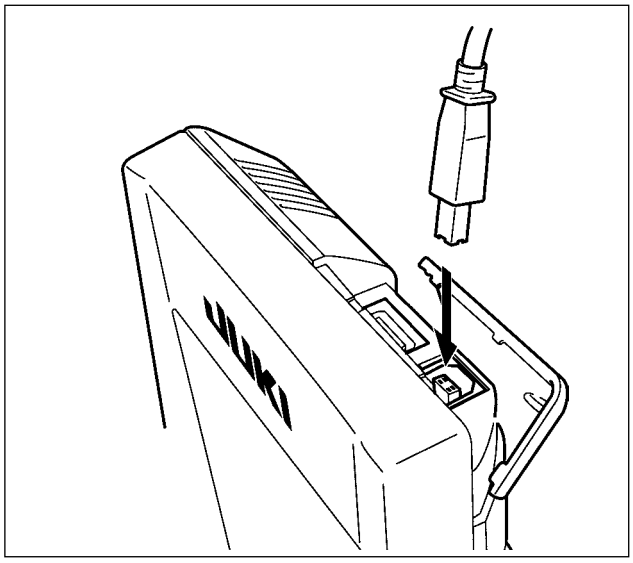
- Do not leave the USB device or USB cable connected to the USB port while the sewing machine is in operation. The machine vibration can damage the port section resulting in loss of data stored on the USB device or breakage of the USB device or sewing machine.
- Do not insert/remove a USB device during reading/writing a program or sewing data.
  It may cause data breakage or malfunction.
- When the storage space of a USB device is partitioned, only one partition is accessible.
- Some type of the USB device may not be properly recognized by this sewing machine.
- JUKI does not compensate for loss of data stored on the USB device caused by using it with this sewing machine.
- When the panel displays the communication screen or pattern data list, the USB drive is not recognized even if you insert a medium into the slot.
- For USB devices and media such as CF cards, only one device/medium should be basically connected/inserted to/into the sewing machine. When two or more devices/media are connected/inserted, the machine will only recognize one of them. Refer to the USB specifications.
- Insert the USB connector into the USB terminal on the IP panel until it will go no further.
- Do not turn the power OFF while the data on the USB flash drive is being accessed.

② USB specifications

- Conform to USB 1.1 standard
- Applicable devices *1 Storage devices such as USB memory, USB hub, FDD and card reader
- Not-applicable devices CD drive, DVD drive, MO drive, tape drive, etc.
- Format supported FD (floppy disk) FAT 12
  Others (USB memory, etc.), FAT 12, FAT 16, FAT 32
- Applicable medium size FD (floppy disk) 1.44MB, 720kB
  Others (USB memory, etc.), 4.1MB ~ (2TB)
- Recognition of drives For external devices such as a USB device, the device which is recognized first is accessed. However, when a medium is connected to the built-in media slot, the access to that medium will be given the highest priority. (Example: If a medium is inserted into the media slot even when the USB memory has already been connected to the USB port, the medium will be accessed.)
- Restriction on connection Max. 10 devices (When the number of storage devices connected to the sewing machine has exceeded the maximum number, the 11th storage device and beyond will not be recognized unless they are once disconnected and re-connected.)
- Consumption current The rated consumption current of the applicable USB devices is 500 mA at the maximum.

*1: JUKI does not guarantee operation of all applicable devices. Some device may not operate due to a compatibility problem.

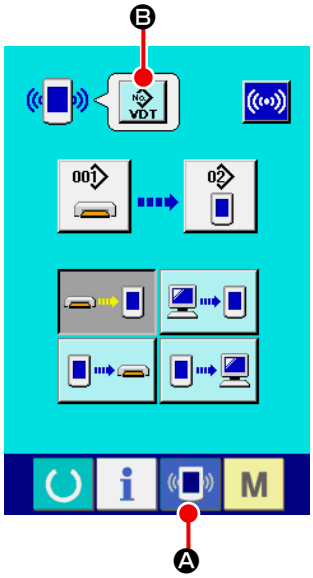
6-3. Performing communication by using USB



Data can be sent/received to/from a personal computer or the like, by means of a USB cable.

If the contact part becomes dirty, failure of contact will be caused. Do not touch by hand, and control so that dust, oil or other foreign material does not adhere to it. In addition, the inside element is damaged by static electricity or the like. So, be very careful when handling.

6-4. Take-in of the data

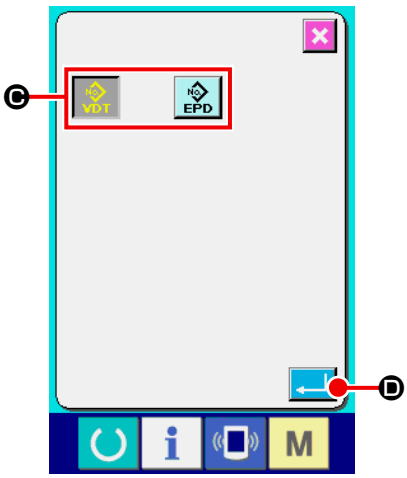


① **Display the communication screen.**

When communication switch (Ⓐ) of switch seat section is pressed in the data input screen, the communication screen is displayed.

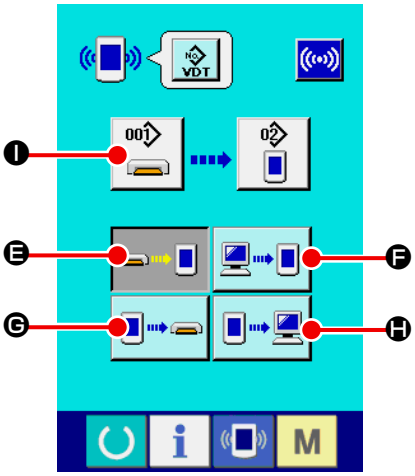
② **Select the kind of data.**

When data selection button (Ⓑ) is pressed, the data selection screen is displayed.
Select button (Ⓒ) of kind of data to be communicated. The selected button is displayed in reverse video.



③ **Determine the kind of data.**

When ENTER button (Ⓓ) is pressed, the kind of data selection screen is closed and the selection of the kind of data has been completed.



④ **Select the communication procedure.**

There are four communication procedures as described below.

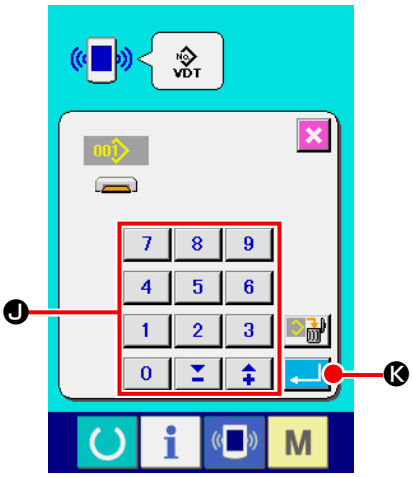
(Ⓔ) Writing data from media to panel

(Ⓕ) Writing data from personal computer (server) to panel

(Ⓖ) Writing data from panel to media

(Ⓗ) Writing data from panel to personal computer (server)

Select the button of communication procedure you desire.



⑤ **Select the data No.**

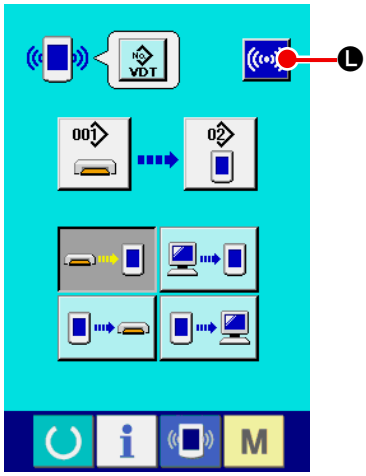
When (Ⓘ) is pressed, the writing file selection screen is displayed.

Input the file No. of the data you desire to write with the ten keys (Ⓙ) . For the file No., input the numerals of the part xxx of VD00xxx .vdt of the file name.

Designation of the pattern No. of writing destination can be performed in the same way. When the writing destination is the panel, pattern Nos. which have not been registered are displayed.

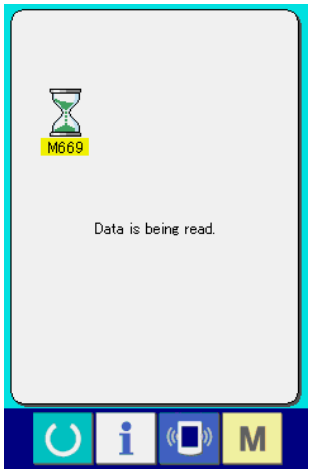
⑥ **Determine the data No.**

When ENTER button (Ⓚ) is pressed, the data No. selection screen is closed and the selection of the data No. has been completed.



⑦ **Start communication.**

When COMMUNICATION START button (Ⓛ) is pressed, the data communication starts.

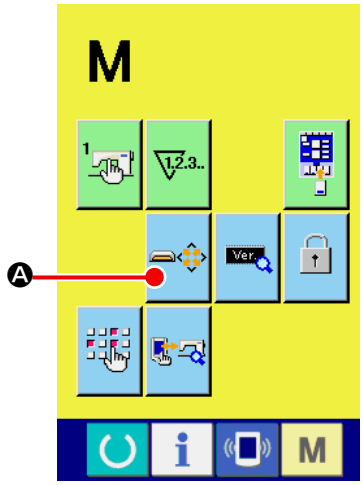


The during communication screen is displayed during communication and the screen returns to the communication screen after the end of communication.

Do not open the cover during reading the data. Data may not be read in.

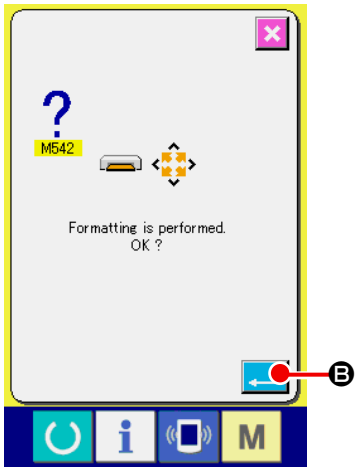
7. PERFORMING FORMATTING OF THE MEDIA

To re-format a medium, the IP-420 has to be used. The IP-420 is not able to read any medium which is formatted on a personal computer.



① **Display the media format screen.**

When M switch is held pressed for three seconds, MEDIA FORMAT button Ⓐ is displayed on the screen. When this button is pressed, the media format screen is displayed.



② **Start formatting of the media.**

Set the media you desire to format to the media slot, close the cover, press ENTER button Ⓑ and formatting starts. Save necessary data in the media to the other media before formatting. When formatting is performed, the inside data are deleted.

When two or more media are connected to the sewing machine, the medium to be formatted is determined by the predetermined priority order.

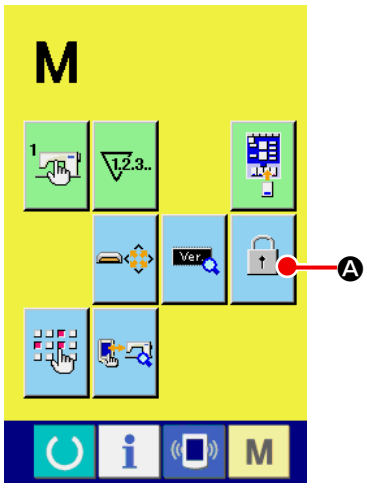
High ← Low

CF(TM) slot ← USB device 1 ← USB device 2 ← ....

When a CompactFlash (TM) is inserted in the CF(TM) slot, the CompactFlash (TM) will be formatted according to the priority order as shown above.

Refer to the USB specifications for the priority order of access.

8. PERFORMING KEY LOCK



① **Display the key lock screen.**

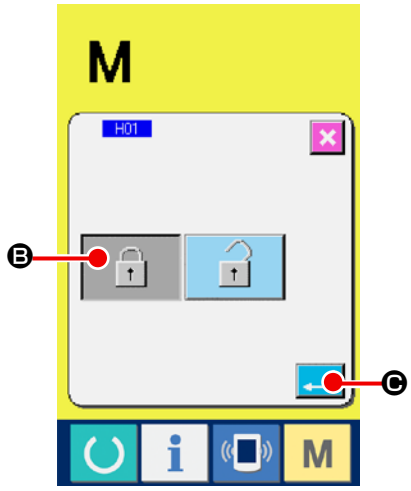
Press M key for three seconds, and the KEY LOCK button (Ⓐ) is displayed on the screen.

When this button is pressed down, the key lock screen is displayed.

The existing setting state is displayed on the KEY LOCK button.

: State that key lock is not set

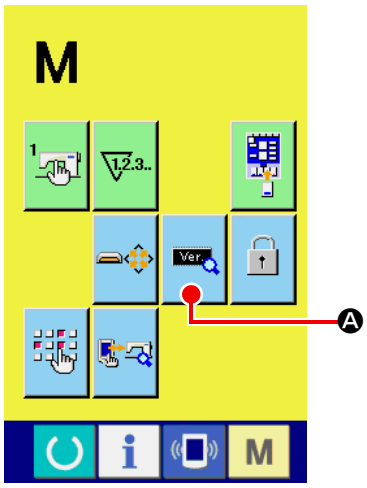
: State that key lock is set



② **Select and determine the key lock state.**

Select the key lock state button (Ⓑ) in the key lock setting screen, and press . Then the key lock setting screen is closed and the key lock state is set.

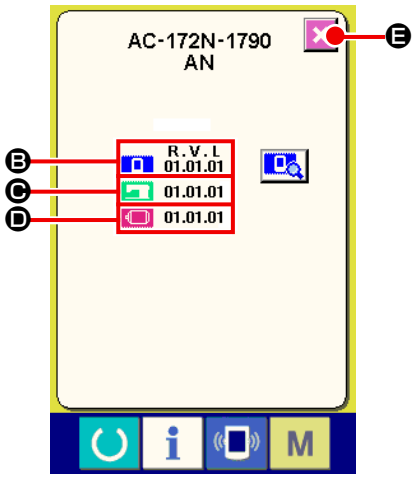
9. DISPLAYING VERSION INFORMATION



① **Display the version information screen.**

Press M key for three seconds, and the VERSION INFORMATION button Ver (Ⓐ) is displayed on the screen. When this button is pressed down, the version information screen is displayed.
The version information on the sewing machine you use is displayed on the version information scren, and it is possible to check it.

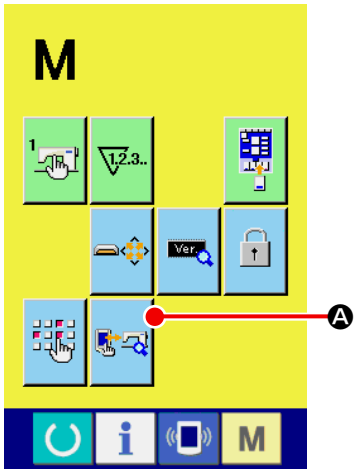
Ⓑ : Version information on panel program
Ⓒ : Version information on main program
Ⓓ : Version information on servo program



When CANCEL button (Ⓔ) is pressed, the version information screen is closed and the mode screen is displayed.

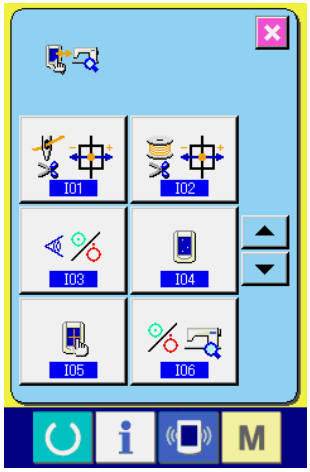
10. USING CHECK PROGRAM

10-1. Displaying the check program screen



Press M key for three seconds, and CHECK PROGRAM button (Ⓐ) is displayed on the screen.

When this button is pressed down, the check program screen is displayed.



There are nine check program items as described below.

I01 Needle thread trimmer origin adjustment
→ Refer to **"II-10-2. Performing needle thread trimmer origin adjustment" p.141**.

I02 Bobbin thread trimmer origin adjustment
→ Refer to **"II-10-3. Performing bobbin thread trimmer origin adjustment" p.142**.

I03 Sensor check
→ Refer to **"II-10-4 Performing sensor check" p.143**.

I04 LCD check
→ Refer to **"II-10-5. Performing LCD check" p.146**.

I05 Touch panel compensation
→ Refer to **"II-10-6. Performing touch panel compensation" p.147**.

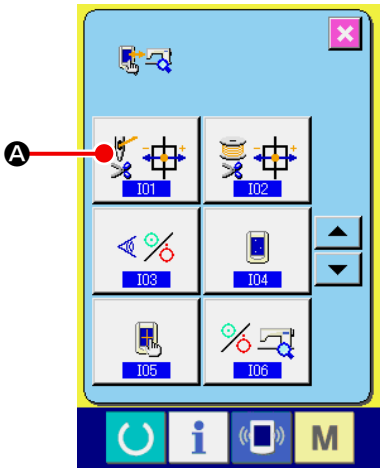
I06 Output check
→Refer to **"II-10-7. How to carry out the external output check" p.149**.

I07 Adjuster adjustment
→Refer to **"II-10-8. How to adjust the adjuster" p.151**.

I08 Cloth trimming knife motor origin adjustment
→Refer to **"II-10-9. How to adjust the cloth trimming knife motor origin" p.152**.

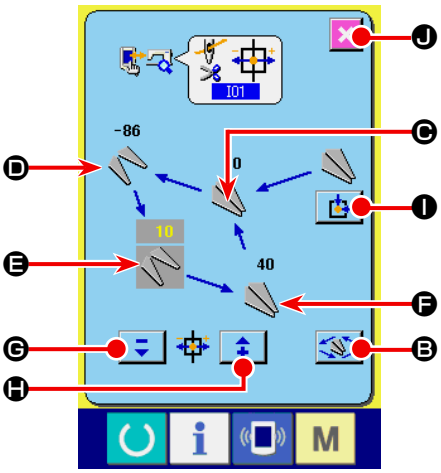
I09 Presser foot pressure correction
→Refer to **"II-10-10. How to correct the presser foot pressure" p.153**.
* Do not use this function since it is the function for manufacturing.

10-2. Performing needle thread trimmer origin adjustment



① **Display the needle thread trimmer origin adjustment screen.**

When NEEDLE THREAD TRIMMER ORIGIN ADJUSTMENT button (Ⓐ) on the check program screen is pressed, the needle thread trimmer origin adjustment screen is displayed.



② **Perform the needle thread trimmer origin adjustment.**

When OPERATION button (Ⓑ) is pressed, the needle thread trimmer is actuated to the positions below and the pictograph showing the position is displayed in gray.

Ⓒ : Thread holding position
(Initial value : 0 pulse)
Ⓓ : Release position (Initial value : -86 pulses)
Ⓔ : Waiting position (Initial value : 10 pulses)
Ⓕ : Thread trimming position
(Initial value : 40 pulses)

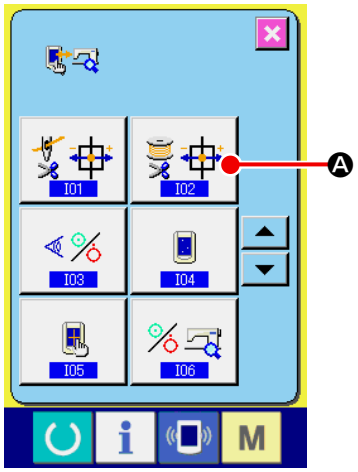
Data of the respective positions can be changed with - or + button or (Ⓖ or Ⓗ).

When ORIGIN RETRIEVAL button (Ⓘ) is pressed, the origin retrieval can be performed from any position.

When CANCEL button (Ⓙ) is pressed, the contents of change can be memorized in EEPROM of the machine head and the screen returns to the check program screen.

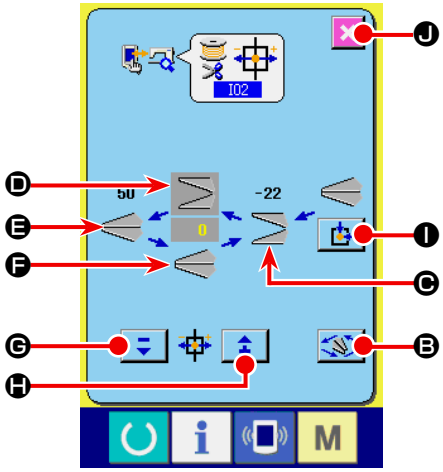
* For the details of adjustment, refer to the Engineer's Manual for LBH-1790AN.

10-3. Performing bobbin thread trimmer origin adjustment



① **Display the bobbin thread trimmer origin adjustment screen.**

When BOBBIN THREAD TRIMMER ORIGIN ADJUSTMENT button (Ⓐ) on the check program screen is pressed, the bobbin thread trimmer adjustment screen is displayed.



② **Perform the bobbin thread trimmer origin adjustment.**

When OPERATION button (Ⓑ) is pressed, the bobbin thread trimmer is actuated to the positions below and the pictograph showing the position is displayed in gray.

Ⓒ : Release position (Initial value : -22 pulses)
Ⓓ : Waiting position (Initial value : 0 pulse)
Ⓔ : Thread trimming position
(Initial value : 50 pulses)
Ⓕ : Thread holding position
(Initial value : 0 pulse)

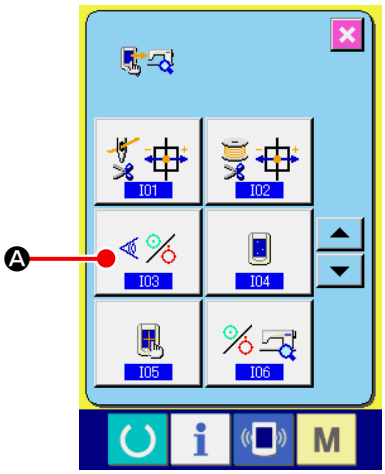
Data of the respective positions can be changed with - or + button or (Ⓖ or Ⓗ).

When ORIGIN RETRIEVAL button (Ⓘ) is pressed, the origin retrieval can be performed from any position.

When CANCEL button (Ⓙ) is pressed, the contents of change can be memorized in EEPROM of the machine head and the screen returns to the check program screen.

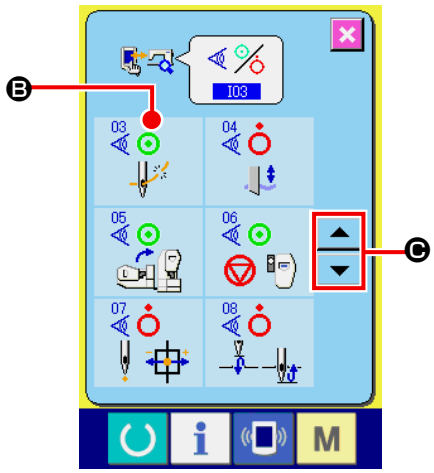
* For the details of adjustment, refer to the Engineer's Manual for LBH-1790AN.

10-4 Performing sensor check



① **Display the sensor check screen.**

When SENSOR CHECK button (Ⓐ) on the check program screen is pressed, the sensor check screen is displayed.



② **Perform the sensor check.**

Input status of the various sensors can be checked on the sensor check screen.

Input status of each sensor is displayed as (Ⓑ).

The display of ON status/OFF status is displayed as below.

: ON status

: OFF status

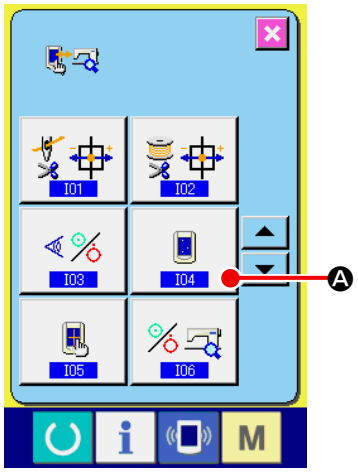
Press UP or DOWN button or (Ⓒ) and display the sensor which has been checked.

23 kinds of sensors below are displayed.

No.	Pictograph	Description of sensor	Remark
03		Thread breakage detection	
04		Cloth cutting knife sensor	* Not used for the AC-172N-1790AN
05		Machine head tilting / hook cover opening sensor	
06		Stop switch (Head side switch)	
07		Needle rocking sensor	* Not used for the AC-172N-1790AN
08		Sewing machine woodruff plate sensor	
09		Knee switch sensor	
10		Hand switch sensor	
11		Cloth detection sensor	
12		Carriage origin sensor	
13		Carriage retardation position sensor	
14		Preset forward sensor	
15		Preset backward sensor	
16		Preset between sensor	
17		Carriage tilt sensor	

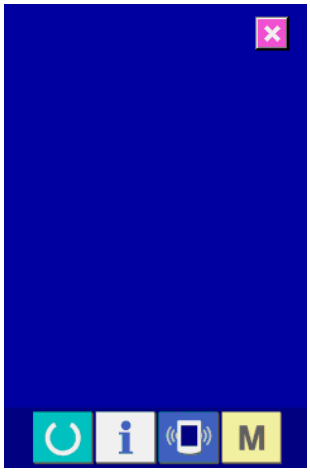
No.	Pictograph	Description of sensor	Remark
18		Cloth sweeping sensor	
19		No. of pcs. of stacking sensor	
20		Stop switch (AC main body side switch)	
21		Upper clamp lowering sensor	
22		Lower clamp lifting sensor	
23		Material edge sensor	

10-5. Performing LCD check



① **Display the LCD check screen.**

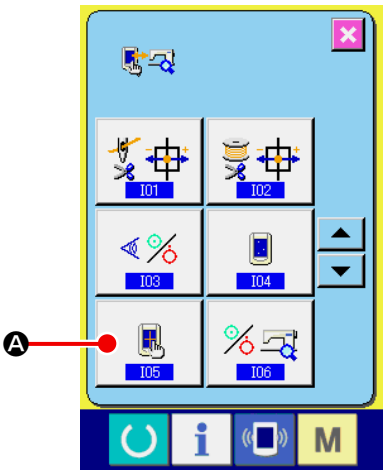
When LCD CHECK button (Ⓐ) on the check program screen is pressed, the LCD check screen is displayed.



② **Check whether any dot of LCD is omitted.**

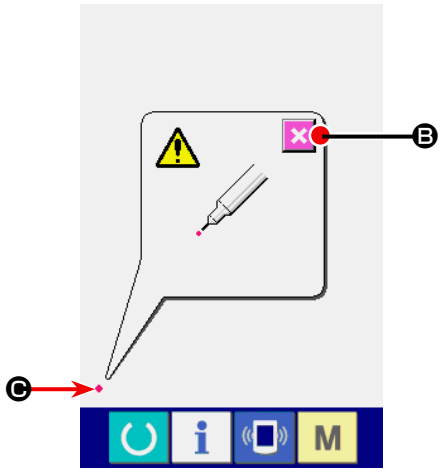
The screen of LCD check screen is displayed by one color only.
Check in this state whether any dot is omitted or not.
After checking, press a proper place on the screen.
The LCD check screen is closed and the check program screen is displayed

10-6. Performing touch panel compensation



① **Display the touch panel compensation screen.**

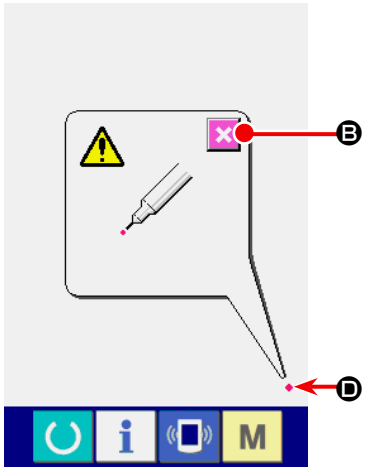
When TOUCH PANEL COMPENSATION button (Ⓐ) on the check program screen is pressed, the touch panel compensation screen is displayed.



② **Press the lower left position.**

Press red circle ● (Ⓒ) located at the lower left position on the screen.

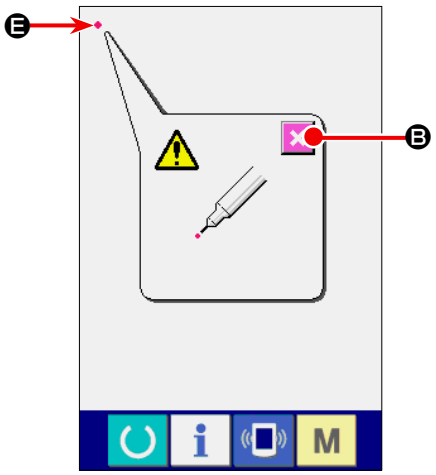
When finishing the compensation, press CANCEL button (Ⓑ).



③ **Press the lower right position.**

Press red circle ● (Ⓓ) located at the lower right position on the screen.

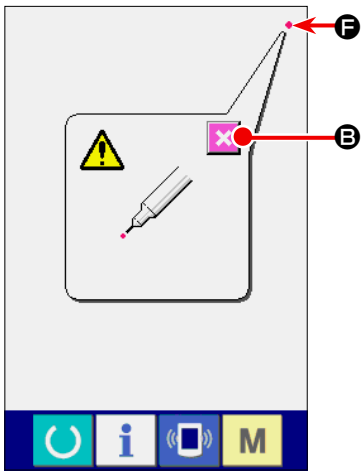
When finishing the compensation, press CANCEL button (Ⓑ).



④ **Press the upper left position.**

Press red circle (Ⓔ) located at the upper left position on the screen.

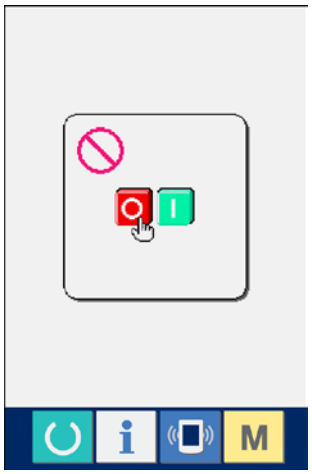
When finishing the compensation, press CANCEL button (Ⓑ).



⑤ **Press the upper right position.**

Press red circle (Ⓕ) located at the upper right position on the screen.

When finishing the compensation, press CANCEL button (Ⓑ).



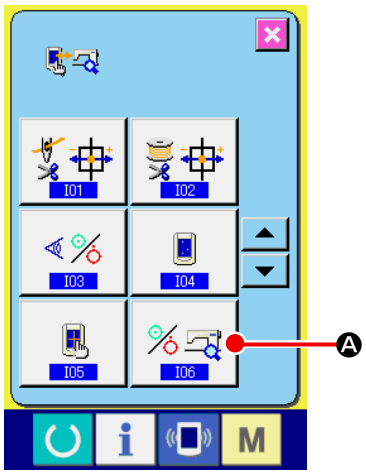
⑥ **Store the data.**

When 4 points have been pressed, the screen showing power-OFF prohibition is displayed since the compensation data are to be stored.

Do not turn OFF the power while this screen is being displayed. When the power is turned OFF, the compensated data are not stored.

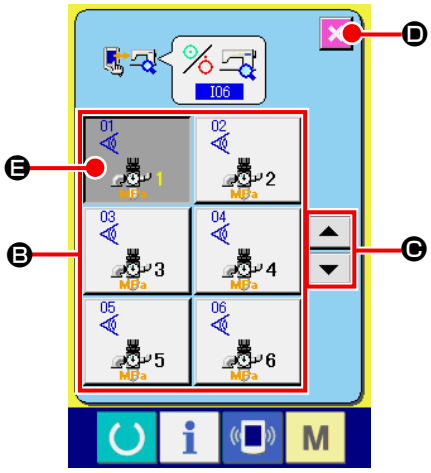
When storing is finished, the check program screen is automatically displayed.

10-7. How to carry out the external output check



① **Displaying the external output check screen**

When you press external output check button (Ⓐ) on the check program screen, the external output check screen is displayed.



② **Checking the output**

ON / OFF state of the external outputs can be checked on the external output check screen.

When you push the output ON / OFF button (Ⓑ), the status of the output is changed over between ON and OFF. The devices (such as the cylinder) corresponding to the output number operates when the status of the output is changed over.

The ON state of the output is displayed as shown in (Ⓔ). The ON state / OFF state of the output is displayed as shown below.

: ON state

: OFF state

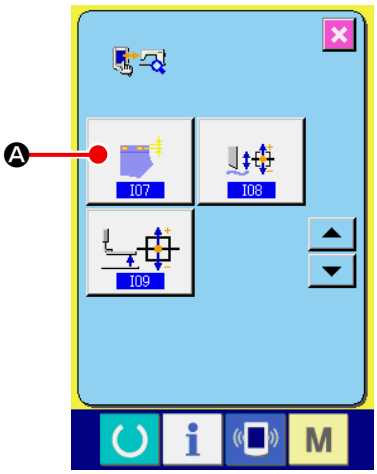
When you press UP / DOWN scroll button (Ⓒ), the output check item is changed over.

When you press cancel button (Ⓓ), the screen returns to the check program screen.

The 11 kinds of output signals are displayed as described below.

No.	Pictograph	Sensor description
01		Carriage tilting cylinder
02		Vacuum presser cylinder
03		Preset carry-in cylinder
04		Carriage cloth presser cylinder
05		Device-side sub clamp, lower
06		Device-side sub clamp, upper
07		Cloth dropping air blow cylinder
08		Material sweeping stacker cylinder
09		Pusher cylinder
10		Pusher tilting cylinder
11		Auxiliary clamp

10-8. How to adjust the adjuster

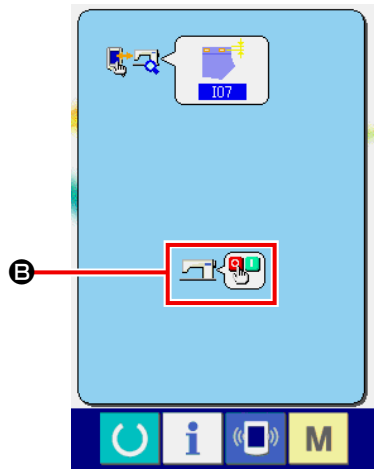


① **Displaying the adjuster adjustment screen**

When you press adjuster adjustment button (Ⓐ) on the check program, the adjuster adjustment screen is displayed.

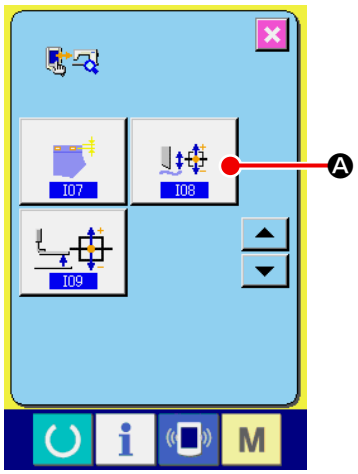
② **Adjusting the adjuster**

Refer to "1.4. Preparation of the device" in the Setup Manual for how to adjust the adjuster.



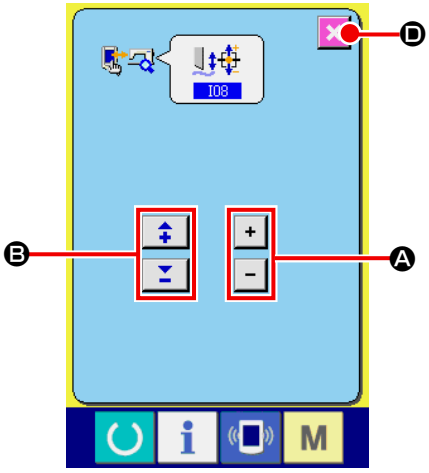
The sewing machine has to be re-started up after the completion of the adjustment of the adjuster. To enable re-starting the sewing machine, the power OFF symbol is displayed as showin in (Ⓑ).

10-9. How to adjust the cloth trimming knife motor origin



① **Displaying the cloth trimming motor origin adjustment screen**

When you press cloth trimming knife motor adjustment button (Ⓐ) on the check program screen, the cloth trimming knife motor adjustment screen is displayed.



② **Adjusting the cloth trimming knife motor origin**

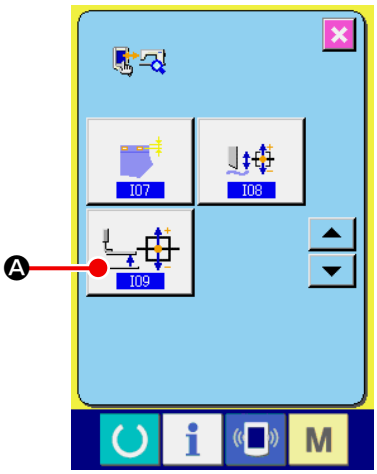
Change the number of cycles of the cloth trimming knife motor by pressing cycle number button (Ⓑ).

Change the number of pulses of the cloth trimming knife motor by pressing pulse number button (Ⓒ).

When you press cancel button (Ⓓ), the screen returns to the check program screen.

Refer to "3.-(5) Cloth trimming knife stroke adjustment and the initial position adjustment" in the Engineer's Manual for the LBH-1790A Series for details.

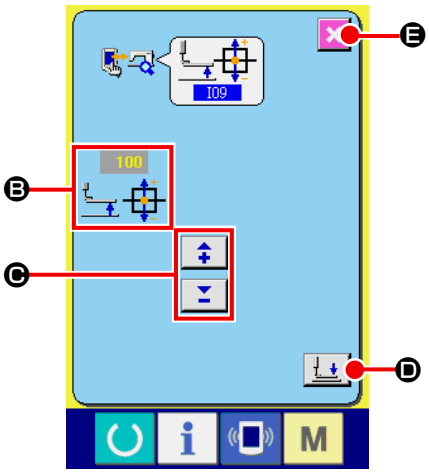
10-10. How to correct the presser foot pressure



* **Do not use this program since it is the program for manufacturing.**

① **Displaying the presser foot pressure correction mode screen**

When you press presser foot pressure adjustment button (Ⓐ) on the check program screen, the presser foot adjustment screen is displayed.



② **Correcting the presser foot pressure**

The presser foot pressure value is displayed as (Ⓑ).

Change the presser foot pressure value by pressing data change button (Ⓒ).

When you press presser foot UP / DOWN button (Ⓓ), the presser foot goes up / comes down.

When you press cancel button (Ⓔ), the screen returns to the check program screen.

11. INFORMATION FUNCTION

There are three functions below in the information function.

1) Oil replacement time, needle replacement time, cleaning time, etc. are designated and the warning notice is performed when the designated time has passed.

→ Refer to and **"II-11-1. Observing the maintenance and inspection information" p.155**. and **"II-11-2. Inputting the inspection time" p.157**

2) Speed can be checked at a glance and the target achieving consciousness as a line or group is increased as well by the function to display the target output and the actual output.

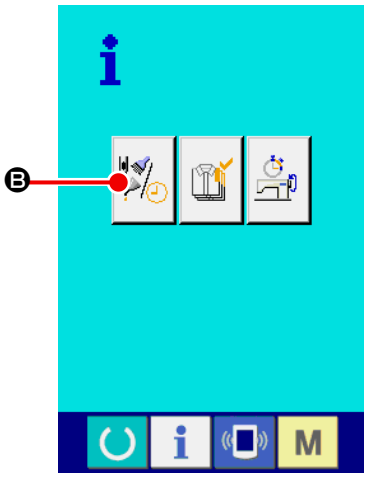
→ Refer to **"II-11-4. Observing the production control information" p.160** and **"II-11-5. Performing setting of the production control information" p.163**.

3) Information on machine working ratio, pitch time, machine time and machine speed can be displayed from the working state of the sewing machine.

→ Refer to **"II-11-6. Observing the working measurement information" p.166**.

In addition, information on plural sewing machines can be controlled by the server when this function is used by connecting SU-1 (sewing machine data server utility) with the sewing machines.

11-1. Observing the maintenance and inspection information



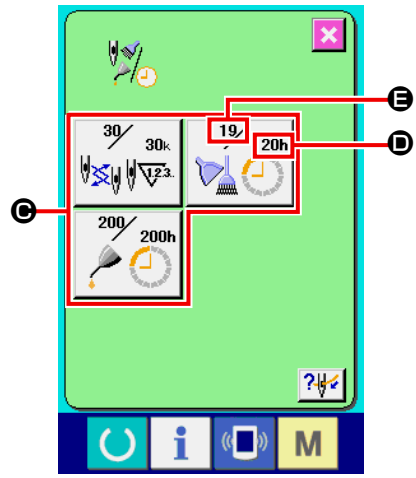
① **Display the information screen.**

When information key of the switch seat section is pressed in the AC data input screen or LBH data input screen, the information screen is displayed.

② **Display the maintenance and inspection information screen.**

Press maintenance and inspection information screen display button (Ⓑ) in the information screen.

Information on the following three items is displayed in the maintenance and inspection information screen.



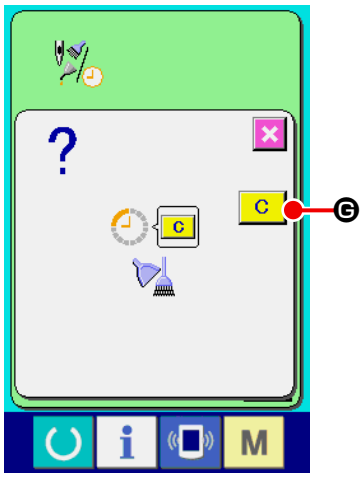
- Needle replacement :

  (1,000 stitches)

- Cleaning time (hour) :

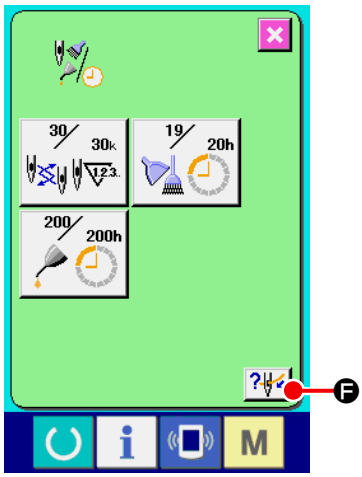
- Oil replacement time (hour) :

The interval to inform of the inspection for each item in button (Ⓒ) is displayed at (Ⓓ), and remaining time up to the replacement is displayed at (Ⓔ) In addition, remaining time up to the replacement can be cleared.



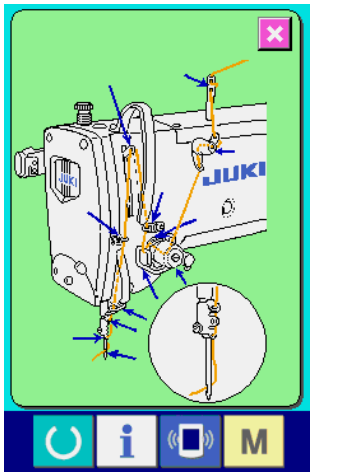
③ **Perform clearing remaining time up to the replacement.**

When button (Ⓔ) of the item you desire to clear is pressed, the time of replacement clear screen is displayed. When clear button C (Ⓔ) is pressed, the remaining time up to the replacement is cleared.

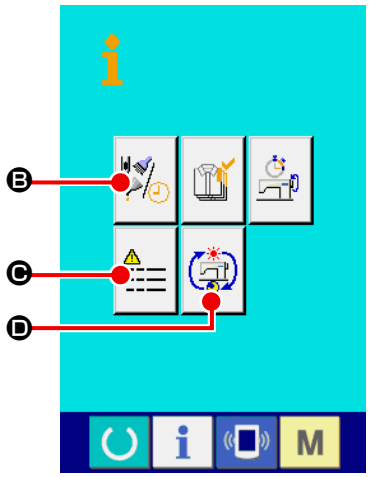


④ **Display the threading diagram.**

When threading button (Ⓕ) displayed in the maintenance and inspection screen is pressed, the needle thread threading diagram is displayed. Observe it when performing threading.



11-2. Inputting the inspection time



① **Display the information screen (maintenance personnel level).**

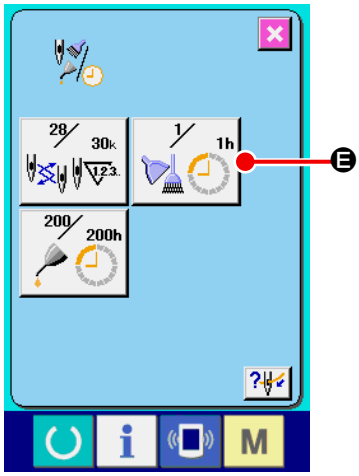
When information key of the switch seat section is pressed in the AC data input screen or LBH data input screen for approximately three seconds, information screen (maintenance level) is displayed.
In case of the maintenance personnel level, the pictograph located on the upper left side changes from blue to orange, and five buttons are displayed.

② **Display the maintenance and inspection information screen.**

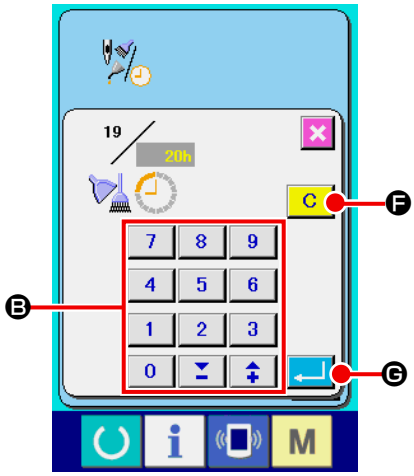
Press maintenance and inspection information screen display button (Ⓑ) in the information screen.

* For the details of ERROR RECORD SCREEN DISPLAY button (Ⓒ), refer to **"II-14-1. Display of error record" p.176**.

* For the details of CUMULATIVE WORKING INFORMATION SCREEN DISPLAY button (Ⓓ), refer to **"II-14-2. Display of the cumulative working information" p.178**.



The same information as that in the normal maintenance and inspection information screen is displayed in the maintenance and inspection information screen.
When button (Ⓔ) of the item you desire to change the inspection time is pressed, the inspection time input screen is displayed.

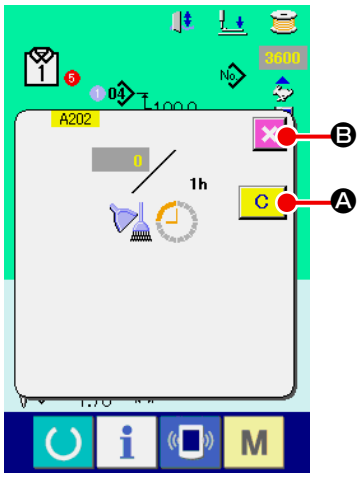


③ **Input the inspection time.**
Input the inspection time with ten key (Ⓑ).
When the inspection time is set to "0", the warning function stops.
When clear button C (Ⓕ) is pressed, the value returns to the initial value.
The initial values of the inspection time of respective items are as follows.

- Needle replacement : 0 (1,000 stitches)
- Cleaning time : 0 (hour)
- Oil replacement time : 200 (hour)

When ENTER button (Ⓖ) is pressed, the inputted value is determined.

11-3. Releasing procedure of the warning



When the designated inspection time is reached, the warning screen is displayed.

In case of clearing the inspection time, press CLEAR button C (Ⓐ). The inspection time is cleared and the pop-up is closed. In case of not clearing the inspection time, press CANCEL button (Ⓑ) and close the pop-up. Every time one sewing is completed, the warning screen is displayed until the inspection time is cleared.

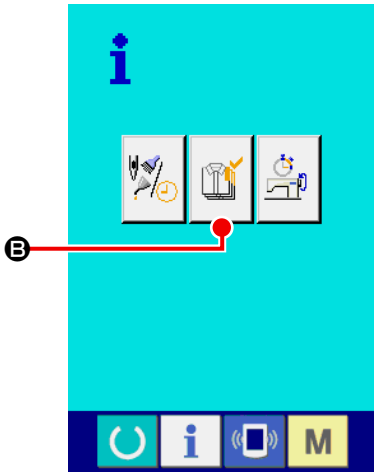
Warning Nos. of the respective items are as follows.

- Needle replacement : A201
- Cleaning time : A202
- Oil replacement time : A203

11-4. Observing the production control information

It is possible to designate the start, display the number of pieces of production from the start to the existing time, display the number of pieces of production target, etc. in the production control screen.
There are two kinds of display ways for the production control screen.

(1) When displaying from the information screen

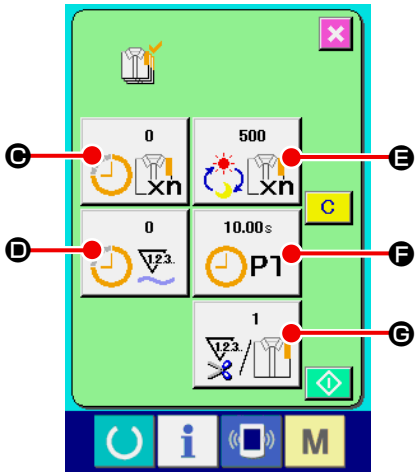


① **Display the information screen.**

When information key of the switch seat section is pressed in the data input screen, the information screen is displayed.

② **Display the production control screen.**

Press production control screen display button (Ⓑ) in the information screen. The production control screen is displayed.



Information on the following 5 items is displayed in the production control screen.

Ⓒ : Existing target value
Number of pieces of the target of products at the present time is automatically displayed.

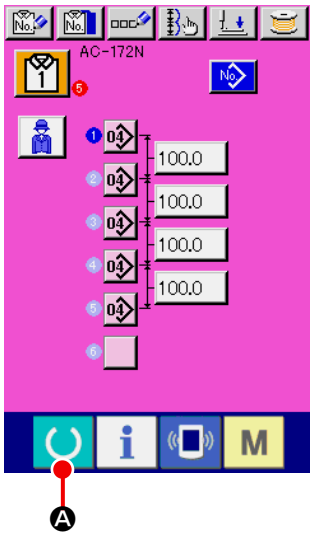
Ⓓ : Actual results value
Number of pieces of the sewn products is automatically displayed.

Ⓔ : Final target value
Number of pieces of the final target of products is displayed.
Input the number of pieces referring to **"II-11-5. Performing setting of the production control information" p.163**.

Ⓕ : Pitch time
Time (second) required for one process is displayed.
Input the time (unit : second) referring to **"II-11-5. Performing setting of the production control information" p.163**.

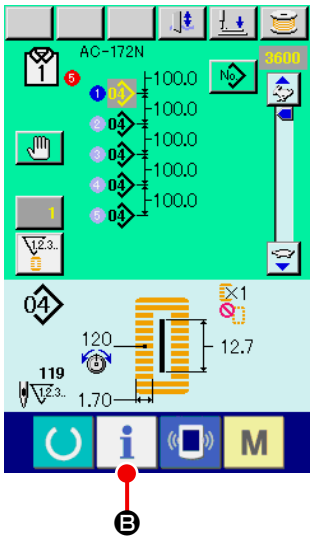
Ⓖ : Number of times of thread trimming
Number of times of thread trimming per process is displayed.
Input the number of times referring to **"II-11-5. Performing setting of the production control information" p.163**.

(2) When displaying from the sewing screen



① **Display the sewing screen.**

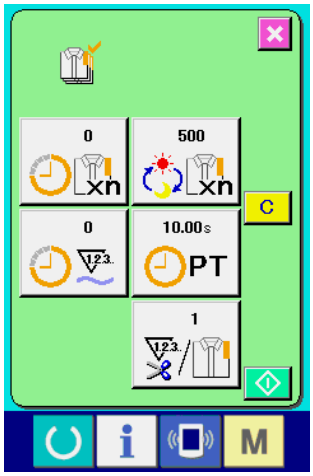
When READY key (Ⓐ) of the switch seat section is pressed in the data input screen, the sewing screen is displayed.



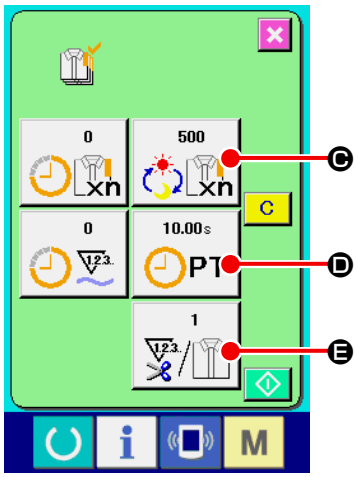
② **Display the production control screen.**

When information key (Ⓑ) of the switch seat section is pressed in the sewing screen, the production control screen is displayed.

The contents of display and the functions are common to **(1) When displaying from the information screen**.

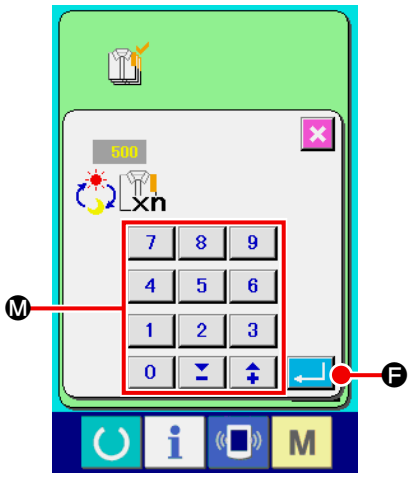


11-5. Performing setting of the production control information



① **Display the production control screen.**

Display the production control screen referring to **"II-11-4. Observing the production control information" p.160**.

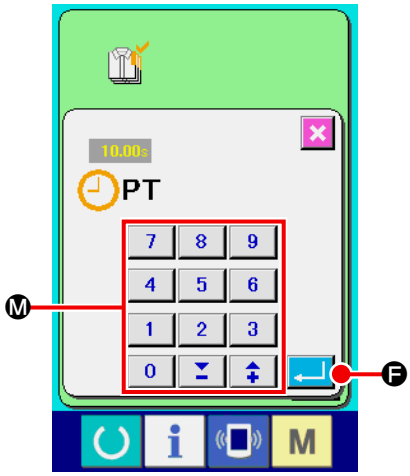


② **Input the final target value.**

First, input the number of pieces of the target of production in the process to which sewing is performed from now on. When final target value button (Ⓒ) is pressed, the final target value input screen is displayed.

Input the value you desire with ten keys or UP/DOWN buttons (Ⓜ).

After the input, press ENTER button (Ⓕ).



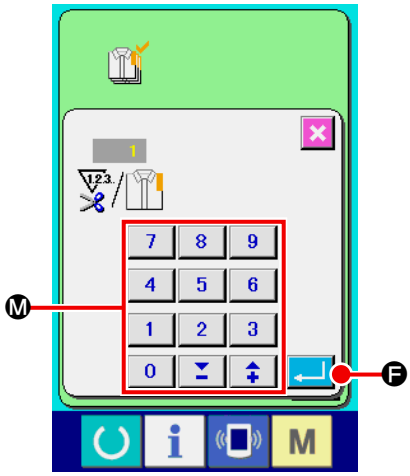
③ **Input the pitch time.**

Next, input the pitch time required for one process.

When pitch time button (Ⓓ) in the previous page is pressed, the pitch time input screen is displayed.

Input the value you desire with ten keys or UP/DOWN buttons (Ⓜ).

After the input, press ENTER button (Ⓕ) .



④ **Input the number of times of thread trimming.**

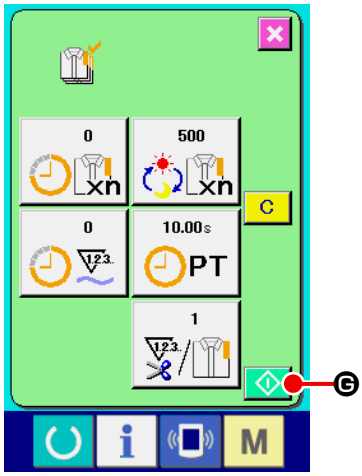
Next, input the number of times of thread trimming per process.

When number of times of thread trimming button (Ⓔ) in the previous page is pressed, the number of times of thread trimming input screen is displayed.

Input the value you desire with ten keys or UP/DOWN buttons (Ⓜ).

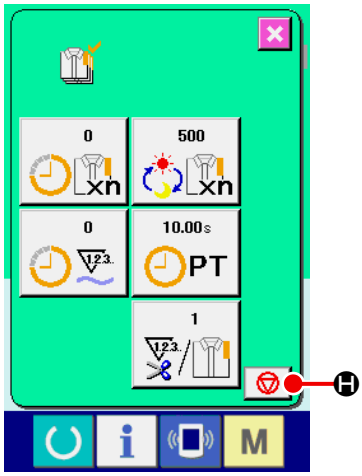
After the input, press ENTER button (Ⓕ) .

* When the input value is "0", count of the number of times of thread trimming is not performed. Use this function by connecting the external switch.



⑤ **Start the count of number of pieces of production.**

When START button (Ⓖ) is pressed, the count of number of pieces of production is started.



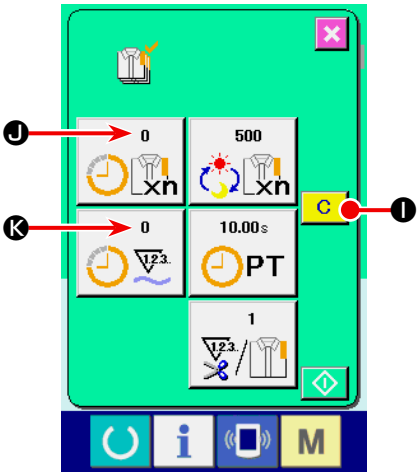
⑥ **Stop the count.**

Display the production control screen referring to **"II-11-4. Observing the production control information" p.160**.

When the count is being performed, STOP button (Ⓗ) is displayed. When STOP button (Ⓗ) is pressed, the count is stopped.

After the stop, START button is displayed at the position of STOP button. When continuing the count, press START button again.

The counted value is not cleared until CLEAR button is pressed.



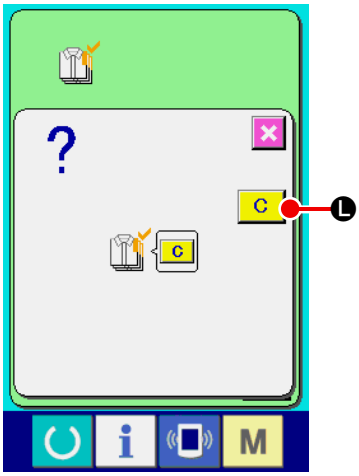
⑦ **Clear the counted value.**

When clearing the counted value, set the count to the stop state and press CLEAR button C (Ⓘ).

The value to be cleared is the present target value (Ⓛ) and actual results value (Ⓜ) only.

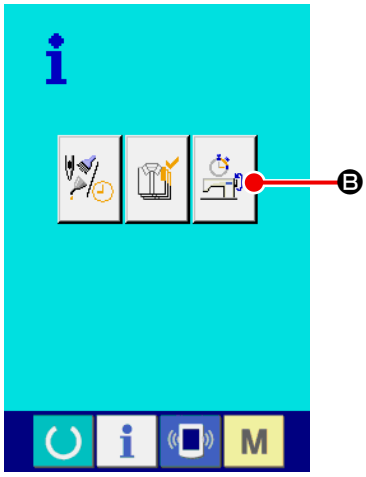
(Note : CLEAR button is displayed only in case of stop state.)

When CLEAR button C (Ⓘ) is pressed, the clear confirmation screen is displayed.



When CLEAR button C (Ⓛ) is pressed in the clear confirmation screen, the counted value is cleared.

11-6. Observing the working measurement information

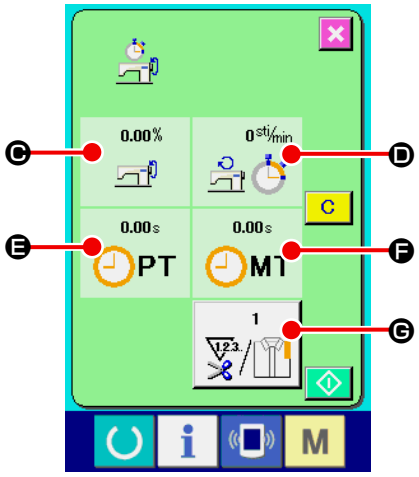


① **Display the information screen.**

When information key (Ⓐ) of the switch seat section is pressed in the data input screen, the information screen is displayed.

② **Display the working measurement screen.**

Press working measurement screen display button (Ⓑ) in the information screen. The working measurement screen is displayed.



Information on the following 5 items are displayed in the working measurement screen.

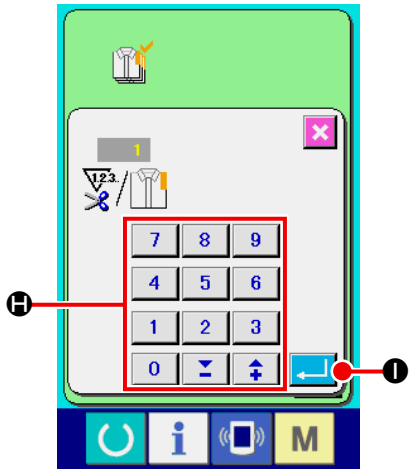
Ⓒ : The information is automatically displayed from the time of start of measuring the working ratio.

Ⓓ : The information is automatically displayed from the time of start of measuring the machine speed.

Ⓔ : The information is automatically displayed from the time of start of measuring the pitch time.

Ⓕ : The information is automatically displayed from the time of start of measuring the machine time.

Ⓖ : Number of times of thread trimming is displayed. Input the number of times referring to the next ③



③ **Input the number of times of thread trimming.**

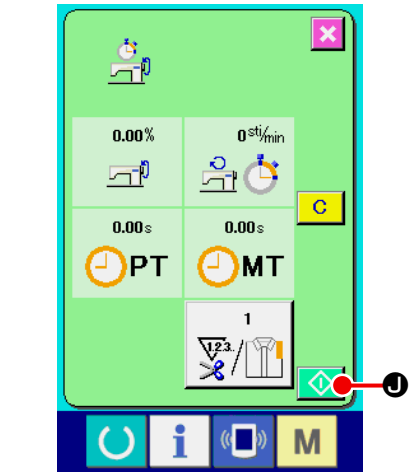
Next, input the number of times of thread trimming per process.

When number of times of thread trimming button (Ⓖ) in the previous page is pressed, the number of times of thread trimming input screen is displayed.

Input the value you desire with ten keys or UP/DOWN buttons (Ⓗ).

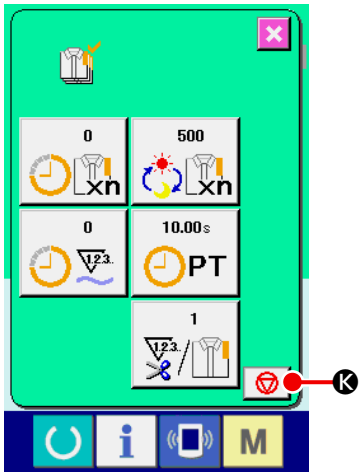
After the input, press ENTER button (Ⓘ) .

* When the input value is 0, count of the number of times of thread trimming is not performed. Use this function by connecting the external switch.



④ **Start the measurement.**

When START button (Ⓙ) is pressed, measurement of each data is started.



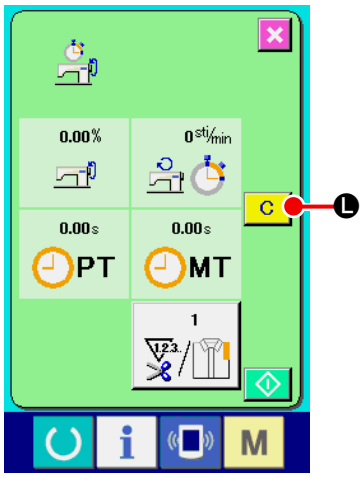
⑤ **Stop the count.**

Display the working measurement screen referring to ① and ② of **"II-11-6. Observing the working measurement information" p.166**.

STOP button (Ⓚ) is displayed when the measurement is being performed. When STOP button (Ⓚ) is pressed, the measurement is stopped.

After the stop, START button is displayed at the position of STOP button. To continue measuring, press START button again.

The measured value is not cleared until CLEAR button C is pressed.

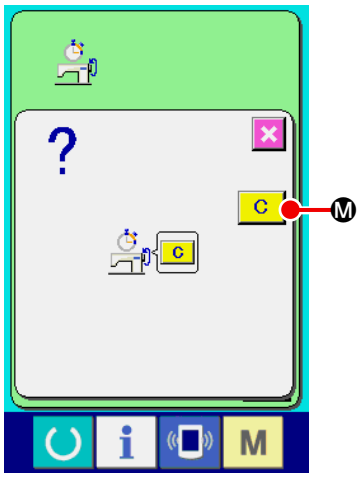


⑥ **Clear the counted value.**

When clearing the counted value, set the count to the stop state and press CLEAR button C (Ⓛ) .

(Note : CLEAR button is displayed in case of the stop state only.)

When CLEAR button C (Ⓛ) is pressed, the clear confirmation screen is displayed.

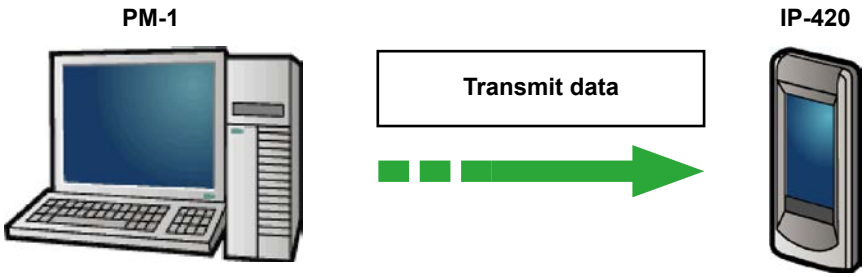


* When CLEAR button C (Ⓜ) is pressed in the clear confirmation screen, the counted value is cleared.

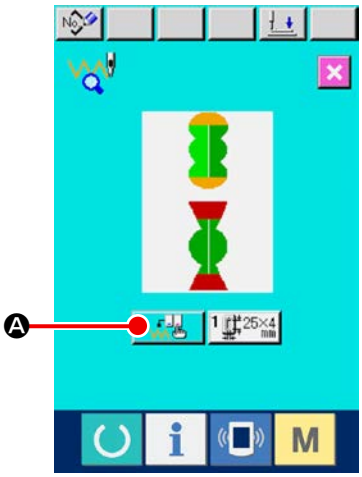
12. TRIAL SEWING FUNCTION

Data created with PM-1 (sewing data creation and edit software) can be sewn on trial by on-line connection of the personal computer with the sewing machine.

Connect the personal computer with IP-420 and transmit data to the sewing machine after creation of data with PM-1.
When IP-420 becomes the data input screen, automatically the trial sewing screen is displayed. For the operating procedure of PM-1, see HELP of PM-1 or the like.

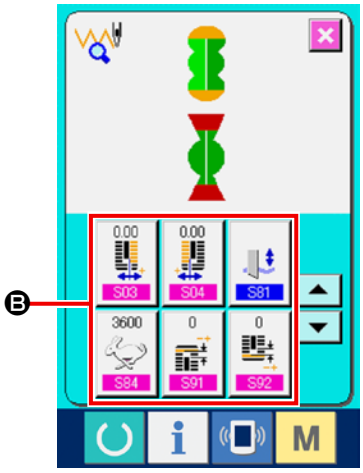


12-1. Performing trial sewing



① **Receive the trial sewing data from PM-1.**
When the trial sewing data (vector format data) is transmitted from PM-1, the screen on the right side is displayed, and the needle entry diagram of the transmitted data is displayed in the center of the screen. The display color of the needle entry diagram is different according to the thread tension value. When the number of stitches of the transmitted data is excessive, the needle entry diagram is not displayed.

② **Edit the vector parameter.**
Sewing can be performed by adding the vector parameter which can be set by the sewing machine to the vector format data transmitted from PM-1.
When sewing data setting button (Ⓐ) is pressed, the vector parameter edit screen is displayed. When setting is not performed, the vector parameter becomes the initial value.

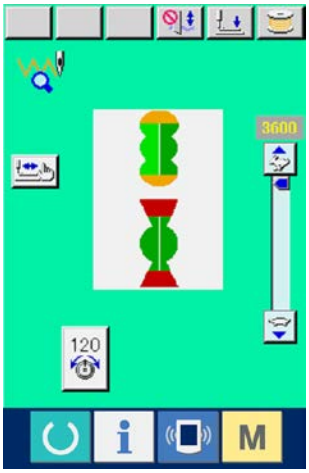


③ **Select the vector parameter to be changed.**

Press UP/DOWN scroll button and select the parameter item you desire to change.

④ **Change the data.**

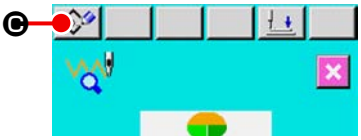
There are data item to change numerals and that to select pictographs in the sewing data. NO. in pink color such as S03 is put on the data item to change numerals and the set value can be changed with buttons displayed in the change screen. NO. in blue color such as S81 is put on the data item to select pictographs and the pictographs displayed in the change screen can be selected. For the details of sewing data, refer to **"II-12-2. Vector parameter list" p.172**.



⑤ **Perform trial sewing.**

When READY switch is pressed, the trial sewing screen is displayed.

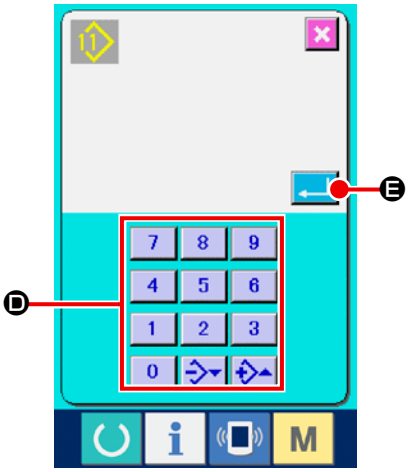
Trial sewing can be performed in this state.



⑥ **Register the data to the pattern.**

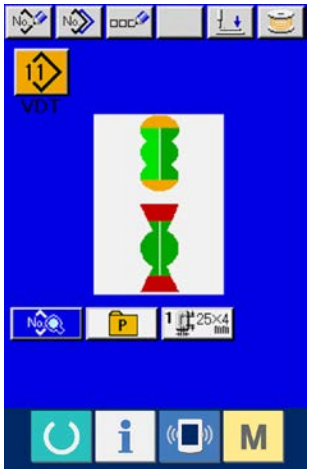
When the data which has been sewn on trial is registered to the panel, press REGISTER button (Ⓒ) displayed in the trial sewing screen, and the register screen is displayed.

Input the pattern No. you desire to register with ten keys (Ⓓ).



⑦ **Determine the register of the data.**

When ENTER button (Ⓔ) is pressed, the register screen is closed and the register has been completed.



⑧ **Display the data input screen.**

After completion of the register, automatically the data input screen is displayed.

12-2. Vector parameter list

No.	Item	Setting range	Edit unit	Initial display
S03	Knife groove width, right	-2.00 to 2.00	0.05mm	0
S04	Knife groove width, left	-2.00 to 2.00	0.05mm	0
S81	With/without knife	0 to 1	---	0
S84	Max. speed limitation	400 to 4200	100 sti/min	---
S91	1st clearance compensation	-9 to 9	1 stitch	0
S92	2nd clearance compensation	-9 to 9	1 stitch	0
S93	Increase/decrease ratio (X direction)	20 to 200	1%	100
S94	Increase/decrease ratio (Y direction)	20 to 200	1%	100
S95	ACTIVE tension reference value	0 to 200	1	0
S90	Presser foot pressure	20 to 80	1	25

12-3. Thread tension value display color list

Needle entry diagram to be displayed is different according to the thread tension value which is set to the needle entry point. The color displayed according to the thread tension is as described below.

Thread tension value	Display color
0 to 20	: Gray
21 to 40	: Purple
41 to 60	: Blue
61 to 80	: Light blue
81 to 100	: Green
101 to 120	: Yellow green
121 to 140	: Orange
141 to 160	: Red
161 to 180	: Pink
181 to 200	: Black

13. COMMUNICATION SCREEN OF MAINTENANCE PERSONNEL LEVEL

For the communication screen, the level which is normally used and the one which is used by the maintenance personnel are different in the kinds of data to be handled.

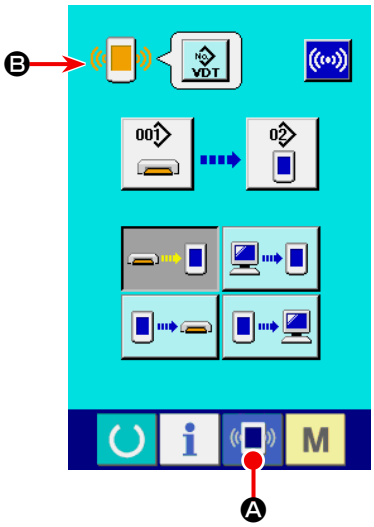
13-1. Data which are possible to be handled

In case of the maintenance personnel level, it is possible to use 5 different kinds of data in addition to the normal two kinds.

Data name		Extension	Description of data
Adjustment data		Model name+00×××.MSW Example) AC00001.MSW	Data of memory switches 1 and 2
All sewing machine data		Model name+00×××.MSP Example) AC00001.MSP	All data which are held by sewing machine
Panel program data		BP+RVL(6 digits).HED BP+RVL(6 digits).PXX BP+RVL(6 digits).IXX	Program data and display data of panel
Main program data		MA+RVL(6 digits).PRG	Program data of main
Servo program data		MT+RVL(6 digits).PRG	Program data of servo

×××: File No.

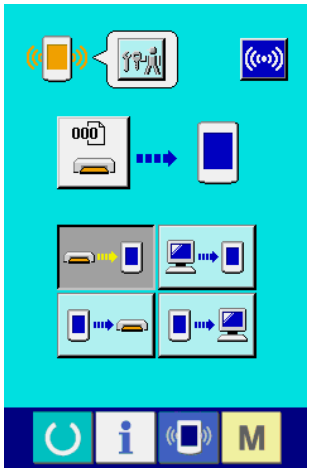
13-2. Displaying maintenance personnel level



① **Display the communication screen of the maintenance personnel level.**

When key (Ⓐ) is pressed as long as three seconds, the image located at the upper left position is changed to orange color (Ⓑ) and the communication screen of the maintenance personnel level is displayed.

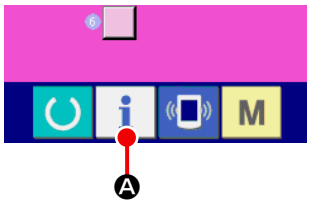
For the operating procedure, refer to **"II-6-4. Take-in of the data" p.134**.



* When the adjustment data or the all sewing machine data is selected, the display becomes as shown on the right-hand side and it is not necessary to specify No. on the panel side.

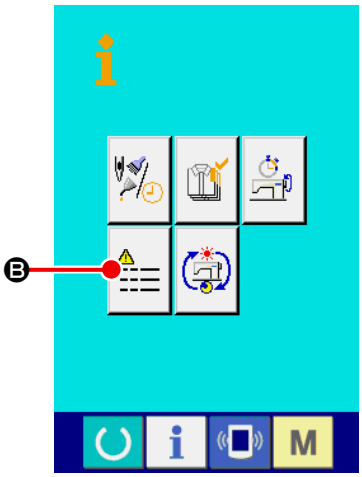
14. INFORMATION SCREEN OF THE MAINTENANCE PERSONNEL LEVEL

14-1. Display of error record



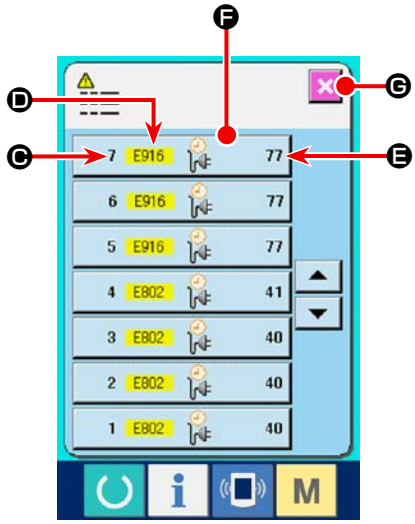
① **Display the information screen of the maintenance personnel level.**

When INFORMATION key (Ⓐ) of switch seat section is pressed for approximately three seconds in the data input screen, the information screen of the maintenance personnel level is displayed. In case of the maintenance personnel level, the pictograph located at the upper left position changes from blue color to orange color, and 5 buttons are displayed.



② **Display the error record screen.**

Press ERROR RECORD SCREEN DISPLAY button (Ⓑ) in the information screen. The error record screen is displayed.



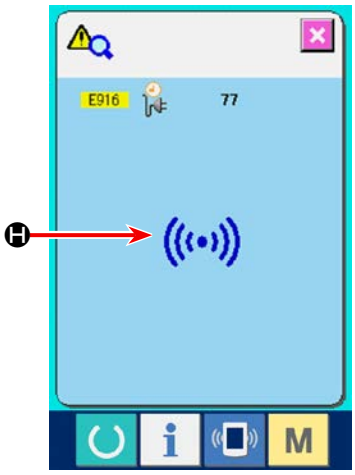
Error record of the sewing machine you use is displayed in the error record screen, and you can check the error.

C : Order that error has occurred.
D : Error code
E : Cumulative current-carrying time (hour) at the time of occurrence of error

When CANCEL button (Ⓖ) is pressed, the error record screen is closed and the information screen is displayed.

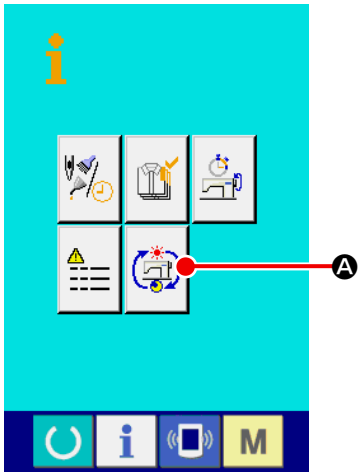
③ **Display the details of error.**

When you desire to know the details of error, press ERROR button 7 E916 77 (Ⓕ) you desire to know. The error detail screen is displayed.
Pictograph (Ⓗ) corresponding to the error code is displayed in the error detail screen.



→ Refer to **"II-4. ERROR CODE LIST" p.117**.

14-2. Display of the cumulative working information



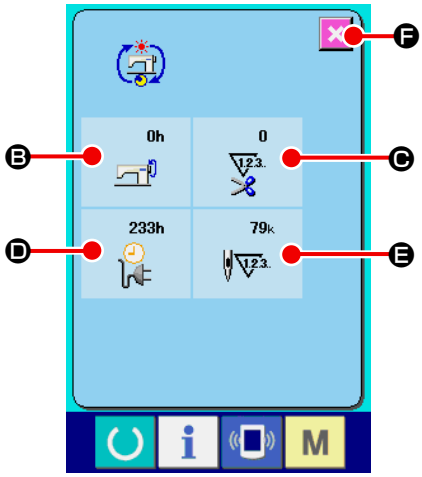
① **Display the information screen of the maintenance personnel level.**

When INFORMATION key [i] of switch seat section is pressed for approximately three seconds in the data input screen, the information screen of the maintenance personnel level is displayed. In case of the maintenance personnel level, the pictograph located at the upper left position changes from blue color to orange color, and 5 buttons are displayed.

② **Display the cumulative working information screen.**

Press CUMULATIVE WORKING INFORMATION SCREEN DISPLAY button [ ] (Ⓐ) of the information screen. The cumulative working information screen is displayed.

Information on the following 4 items are displayed in the cumulative working information screen.



Ⓑ : Cumulative working time (hour) of the sewing machine is displayed.

Ⓒ : Number of cumulative times of thread trimming is displayed.

Ⓓ : Cumulative current-carrying time (hour) of the sewing machine is displayed.

Ⓔ : Number of cumulative stitches is displayed.
(Unit : X1,000 stitches)

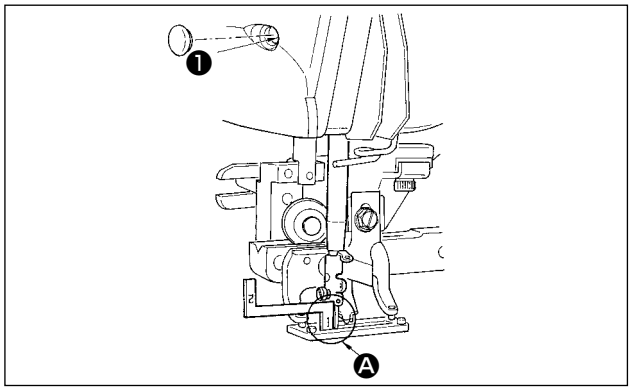
When CANCEL button [ ] (Ⓕ) is pressed, the cumulative working information screen is closed and the information screen is displayed.

III. MAINTENANCE OF SEWING MACHINE

1. MAINTENANCE

1-1. Adjusting the needle-to-hook relation

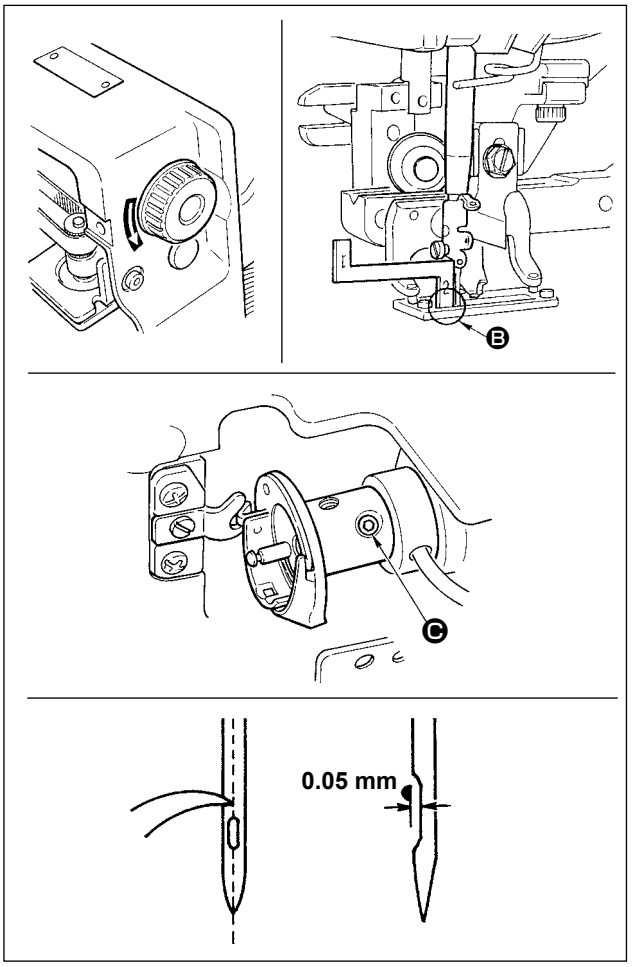
WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



Perform adjusting the needle-to-hook relation when the needle enters the center of the needle hole in the throat plate.

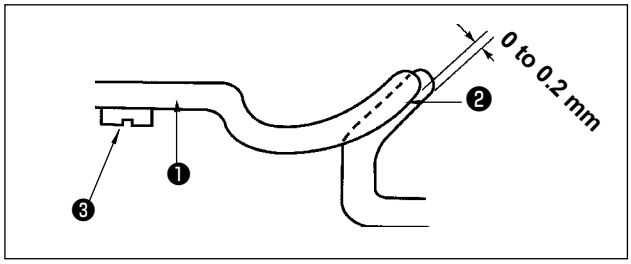
(1) Needle bar height

1) Bring down the needle bar to the lowest point.
2) Insert the part [1] Ⓐ of timing gauge into the gap between the bottom end of needle bar and throat plate, where the bottom end of the needle bar touches the top of the part [1] Ⓐ of the timing gauge.
3) Loosen needle bar connection screw ❶ , and adjust the height of the needle bar.



(2) Set the needle to hook relation in the following way

1) Rotate the hand pulley in the correct direction until the needle starts to go up from its lowest point.
2) Insert the part [2]Ⓑ of the timing gauge into the gap between the bottom end of the needle bar and the throat plate, where the bottom end of the needle bar touches the top of the part [2]Ⓑ of the timing gauge.
3) Loosen setscrew Ⓒ of the hook sleeve, and align blade point of the sewing hook with the center of needle hole. Make adjustment so that a clearance of approx. 0.05 mm is provided between the needle and the blade point of the hook.

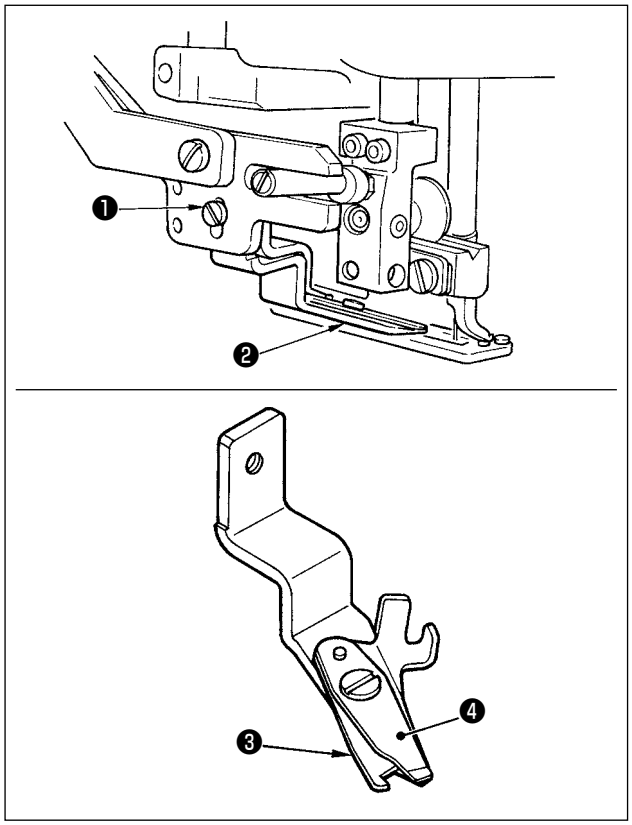


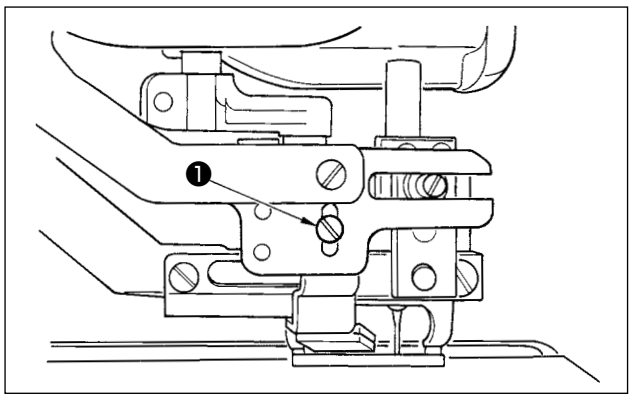
(3) Adjusting the bobbin case positioning stopper

Adjust with setscrew ❸ so that the contact of the top end of bobbin case positioning stopper ❶ and the end of inner hook ❷ is 0 to 0.2 mm.

1-2. Adjusting the needle thread trimmer

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.





■ Adjusting the thread grasping force of the needle thread trimmer

If the needle thread trimmer fails to provide consistent thread grasping force, the needle thread can slip off at the beginning of sewing.

1) If the thread grasping force of the needle thread trimmer has reduced, loosen setscrews ❶ and detach needle thread trimmer ❷ .
2) Slightly bend the top end of thread presser spring ❸ so that it comes in contact with thread trimming blade of upper knife ❹ over the length with no clearance and so that the needle thread trimmer securely holds the thread regardless of the position of the thread trimming blade at which the thread is trimmed.

■ Adjusting the height of the needle thread trimmer

To adjust the height of the needle thread trimmer, loosen setscrew ❶ . Set the height of trimmer as low as possible, provided that it does not touch work clamp check, in order to minimize the length of remaining thread on the needle after trimming.
Note that the work clamp check tilts when sewing a multi-layered portion of the material, attach the needle thread trimmer to slightly raise the installing position of the trimmer.

Caution
When replacing the needle thread trimmer, make sure that the trimmer normally works under the needle thread trimmer adjusting mode.

1-3. Adjusting the cloth presser pressure

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.

The cloth presser pressure should be set on a pattern-by-pattern basis.

1) Set the mode to the input mode.

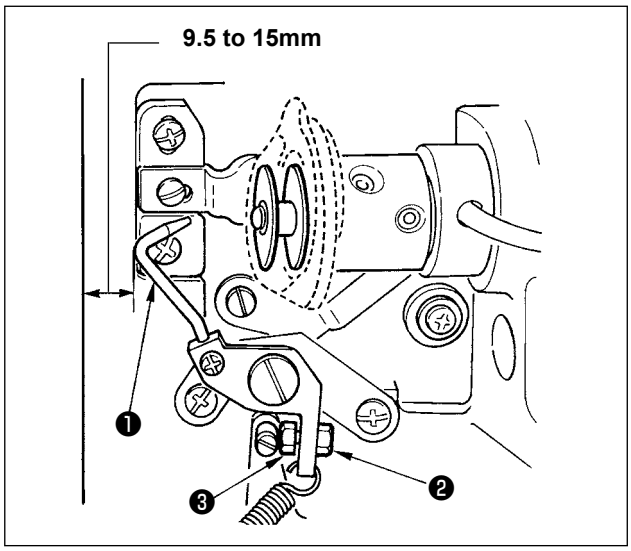
If the current mode is the sewing mode, press READY key to change over the mode to the input mode.

2) Invoke "S090 Presser foot pressure"

Select the memory switch S090 "Presser foot pressure" on the sewing data input screen.
The more the S090 set value is increased, the more the work clamp pressure is increased. Higher work clamp pressure helps prevent puckering during sewing.

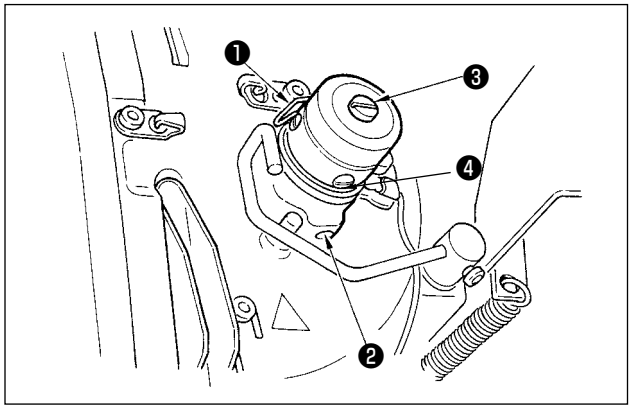
1-4. Adjustment of the bobbin presser unit

WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



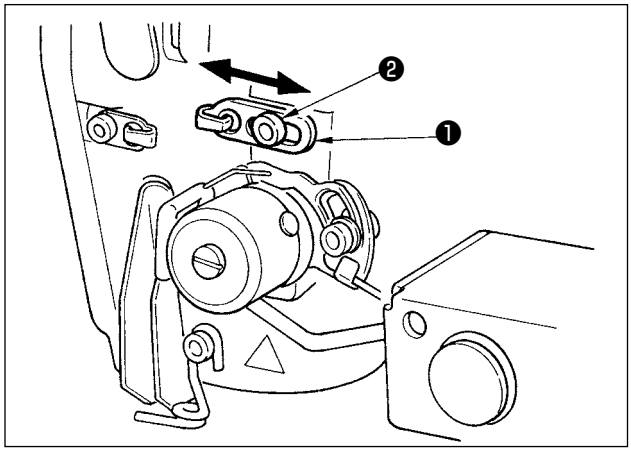
Loosen nut ❶ and adjust the position with stopper spring ❷ so that the distance from the front end of machine bed to bobbin presser ❸ is 9.5 to 15 mm when the sewing machine stops. Then tighten nut ❷.

1-5. Thread tension



■ **Thread take-up spring (purl stitch)**

1) The thread take-up amount of thread take-up spring ❶ is 8 to 10 mm, and the appropriate pressure at the start is approximately 0.06 to 0.1N.
2) To change the stroke of the thread take-up spring, loosen screw ❷ , insert a thin screw-driver into the slot of thread tension post ❸ , and turn it.
3) To change the pressure of the thread take-up spring, insert a thin screwdriver into the slot of thread tension post ❸ while screw ❷ is tightened, and turn it. Turning it clockwise will increase the pressure of the thread take-up spring.
   Turning it counterclockwise will decrease the pressure.

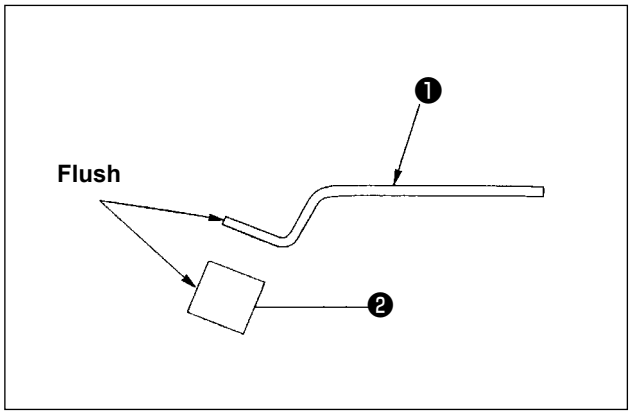


■ **Adjusting the thread take-up amount of the thread take-up lever**

The thread take-up amount of the thread take-up lever should be adjusted in accordance with the thickness of the sewing products so as to obtain well-tightened stitches.

a. For heavy-weight materials, loosen setscrew ❷ in thread guide ❶ , and move the thread guide to the left. The thread take-up amount of the thread take-up lever will be increased.
b. For light-weight materials, move thread guide ❶ to the right. The thread take-up amount of the thread take-up lever will be reduced.

1-6. Replacing the clamp cushion



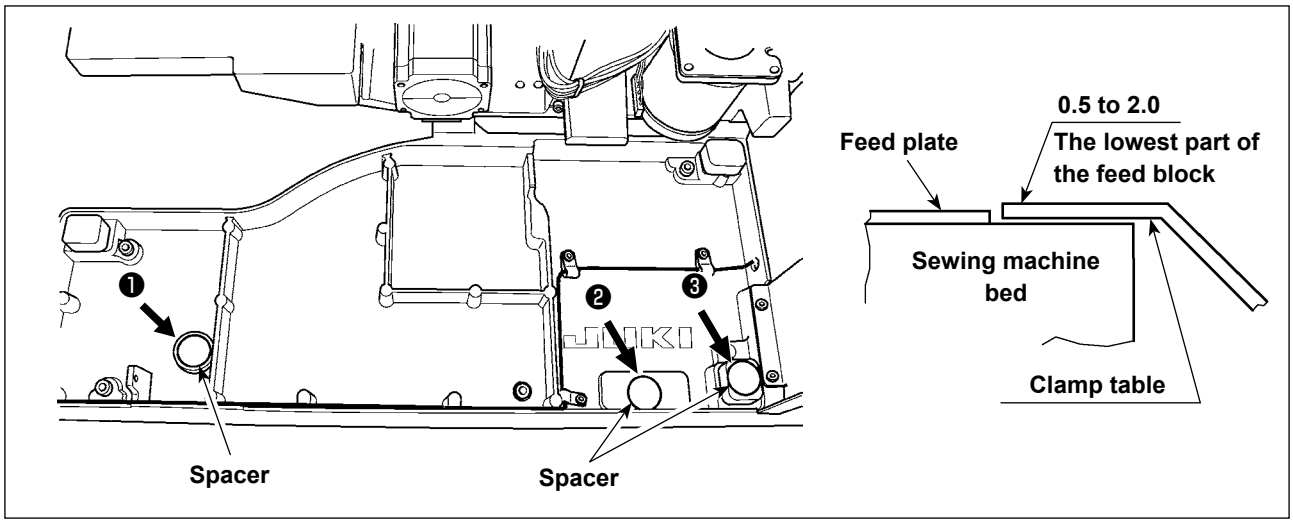
If the clamp cushion of the carriage has worn out or deformed, replace it with anew one in the following steps of procedure.

1) Remove worn out cushion from clamp ❶ ,and wipe the clamp surface cleanly.
2) Attach cushion ❷ supplied with the machine on clamp ❶ so that the cushion is positioned illustrated in the figure on the left.

Caution

After replacing the cushion, be sure to perform "I-4-4. Adjusting the carriage clamp" p.38.

1-7. Adjusting the machine head



If the machine head comes down from its normal position due to aged deterioration, the folded edge of the material and the seam (the edge) may not be properly aligned when placing the material position on the machine head.

If the space provided between the sewing machine bed and the feed block is 2.0 mm or more, place spacers (0.5 mm and 1.0 mm) at the places (❶ , ❷ and ❸) shown in the figure to adjust so that a difference in height between the machine bed and the feed block is 2.0 mm or less.

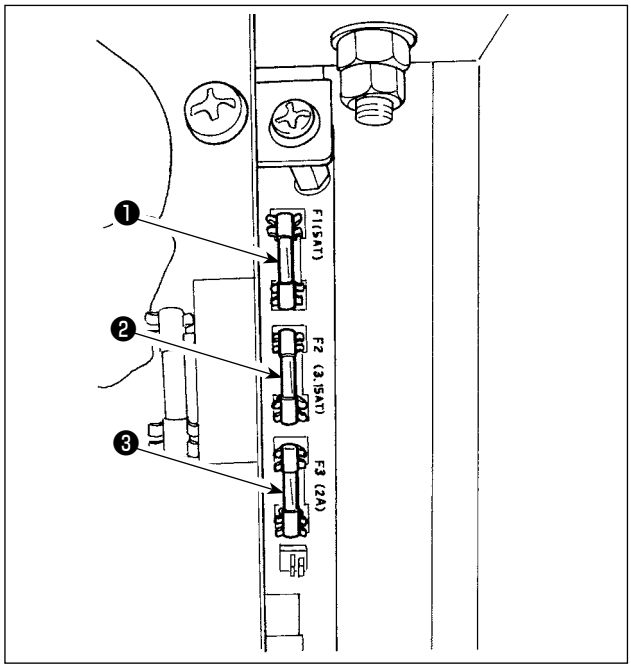
1-8. Replacing the fuse

DANGER :

1. To avoid electrical shock hazards, turn OFF the power and open the control box cover after about five minutes have passed.

2. Open the control box cover after turning OFF the power without fail. Then, replace with a new fuse with the specified capacity.

3. Open the cover. If any of the LEDs on the PCB is on, wait until the lighted LED goes out and replace the fuse with a new one. If you replace the fuse when any of the LEDs is on, you could get a shock. Never replace the fuse while any the LEDs is on for the sake of safety.



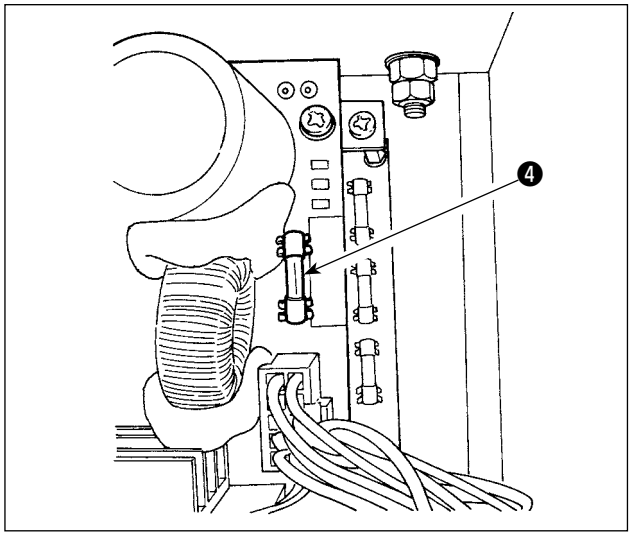
The machine uses the following nine fuses.

SDC circuit board

❶ For pulse motor and AT solenoid power supply protection
5A (time-lag fuse)

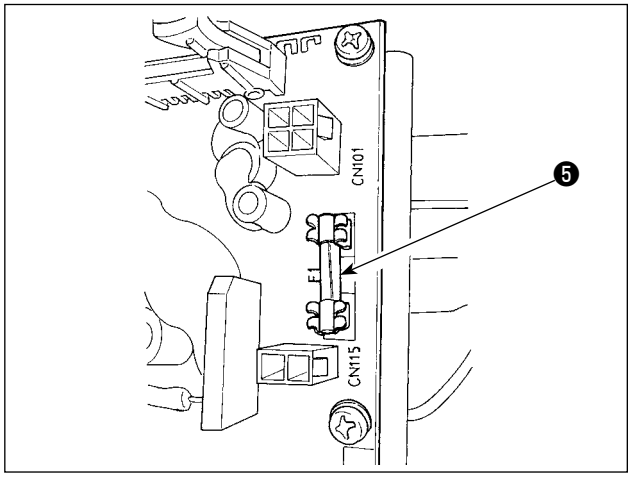
❷ For control power supply protection
3.15A (time-lag fuse)

❸ For control power supply protection
2A (fast-blow type fuse)



PWR circuit board

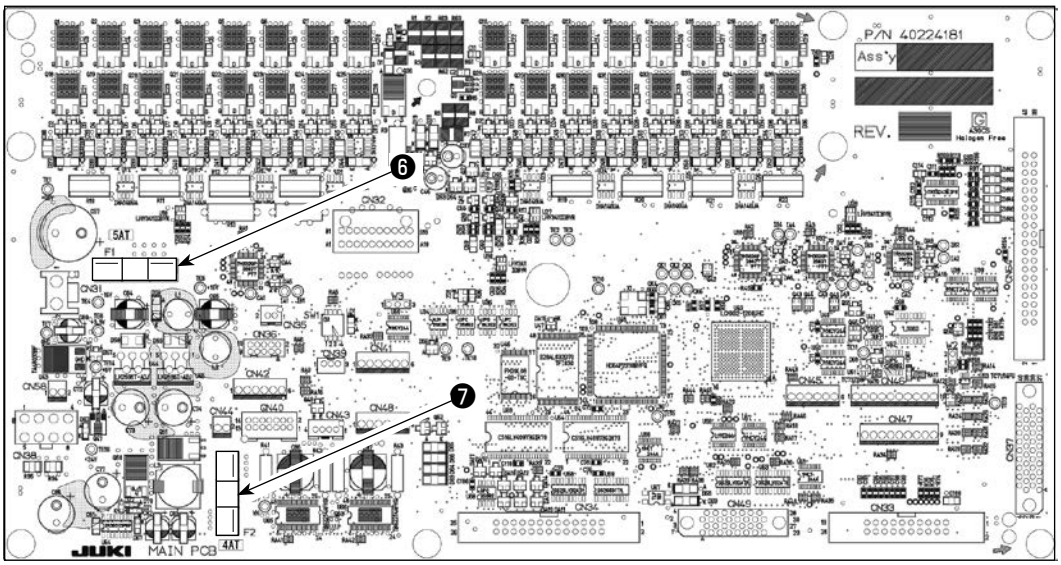
❹ For carriage pulse motor power supply protection
5A (time-lag fuse)



I/O circuit board

❺ For carriage pulse motor power supply protection
4A (time-lag fuse)

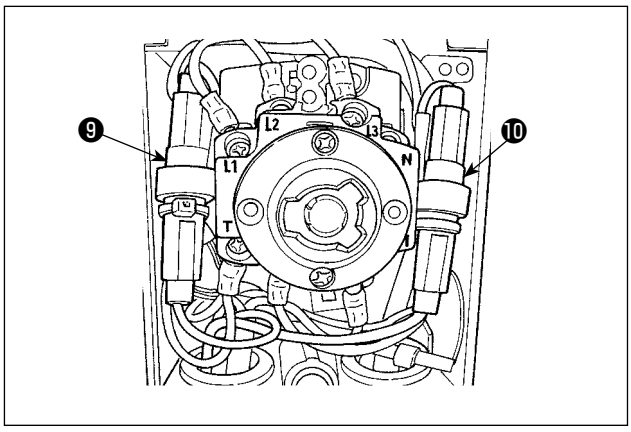
MAIN PCB



❻ : For protection of the power supply for the stepping motor and AT solenoid;
5A (time-lag fuse)

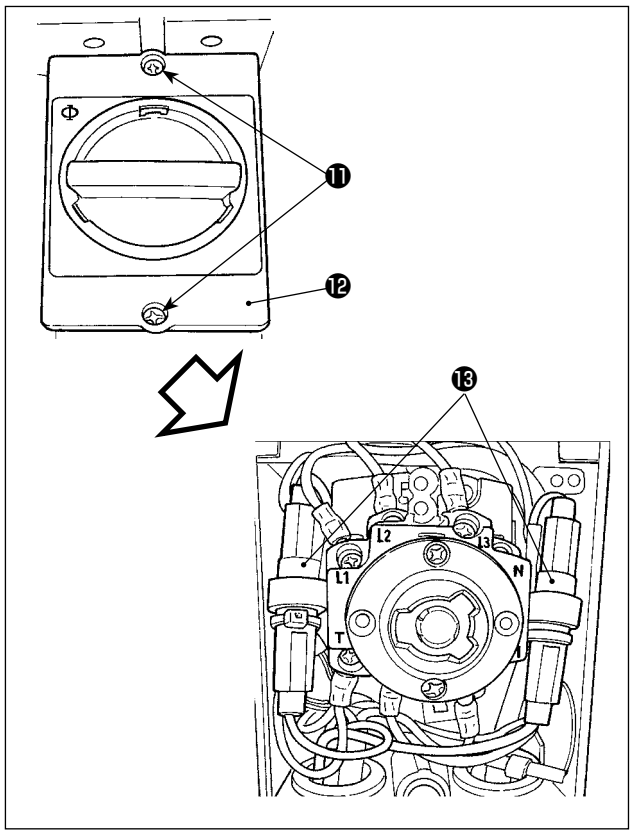
❼ : For protection of the power supply for the needle thread trimming motor and bobbin thread trimming motor;
4A (time-lag fuse)

Power switch



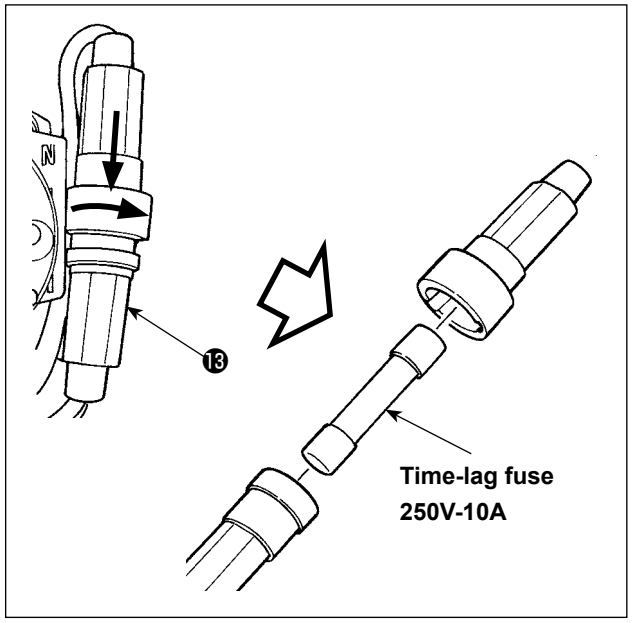
❾ : For protection of the power supply for the blower motor ;
10A (time-lag fuse)

❿ : For protection of the power supply for the blower motor ;
10A (time-lag fuse)

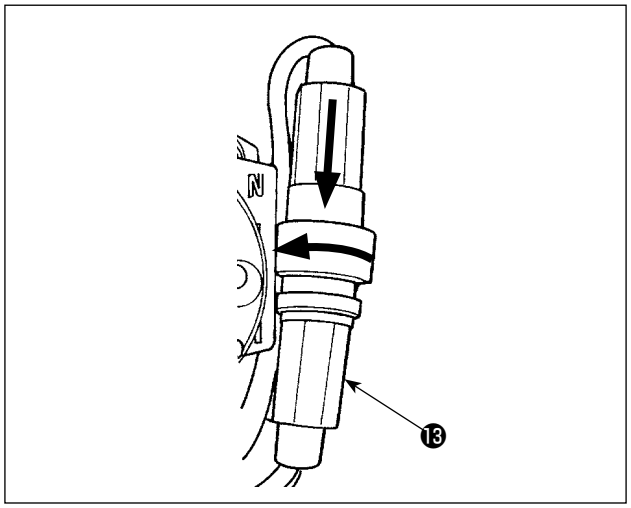


Replacing the fuse of blower motor

1) Loosen the power switch setscrews ⓫ , remove the power switch cover ⓬ .



2) If fuse case ⓭ of the blower motor is pushed and turned in the direction of the arrow, fuse case ⓭ will open.

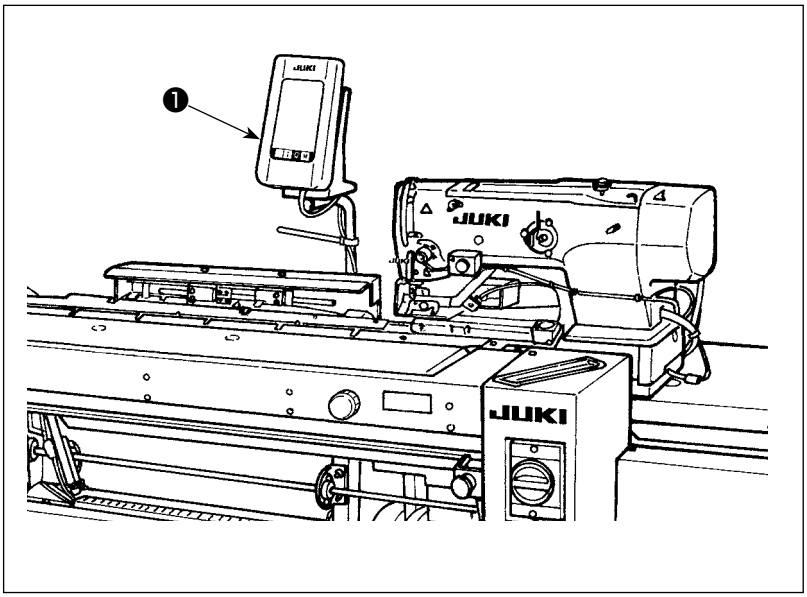


3) If the fuse has blown, exchange it.
Set the fuse case ⓭ and put in them each other.
If the fuse case is pushed and turned in the direction of the arrow, fuse case ⓭ will be locked.

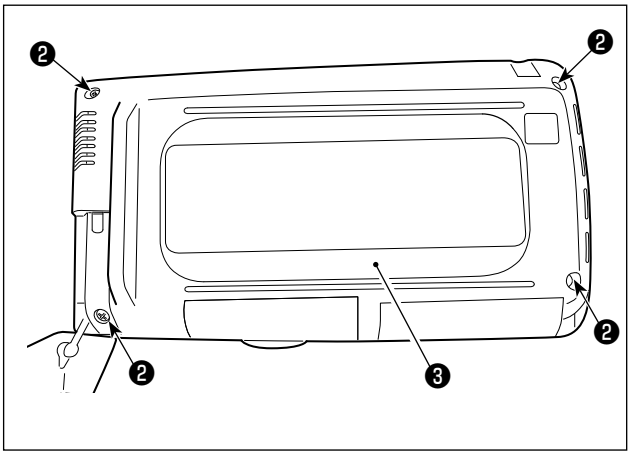
1-9. Disposal of batteries

The operation panel has a built-in battery to back up the memory even when the power to the operation panel is OFF.
Be sure to dispose of the battery following the local laws and regulations.

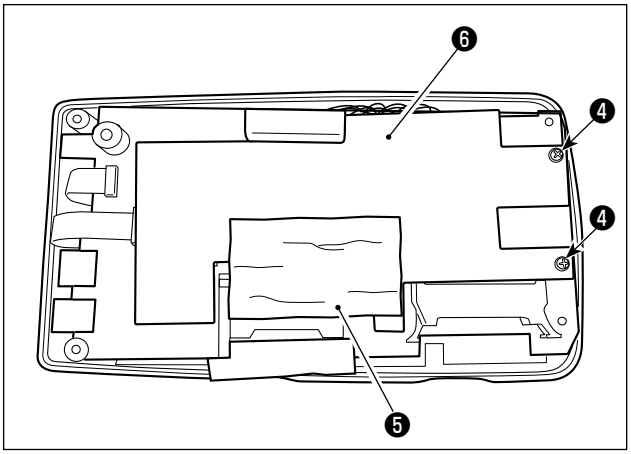
[How to remove the battery]



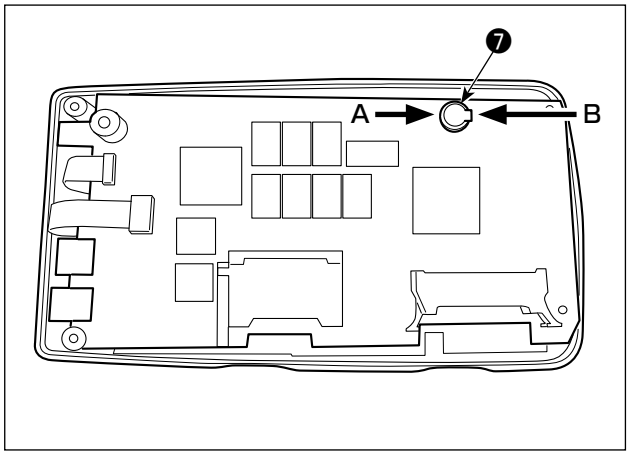
1) Remove panel ❶ from the main body of sewing machine.



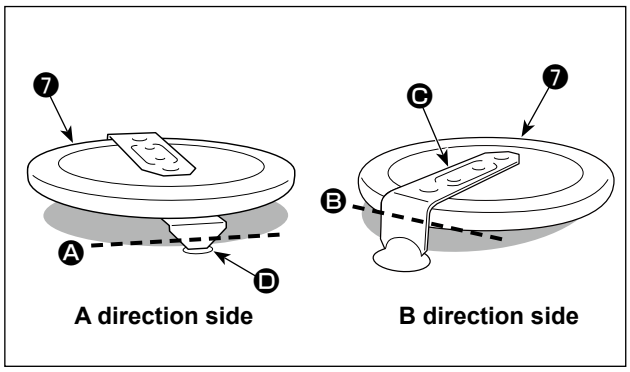
2) Loosen screw ❷ from the rear surface of the operation panel. Detach case ❸ .



3) Remove screws ❹ and remove copper foil tape ❺ . Detach shielding plate ❻ .



4) ❼ is the backup battery.
   Type number: VL1220/HFR

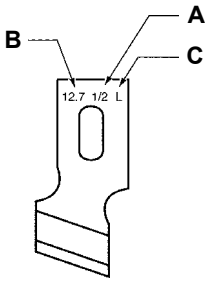


5) Cut metal plate Ⓓ that secures battery ❼ with nippers or the like at position Ⓐ.
6) Cut metal plate Ⓒ that secures battery ❼ with nippers or the like at position Ⓑ. Then, remove battery ❼ .

Carefully protect your fingers from being cut with the cut edge of the metal plate.

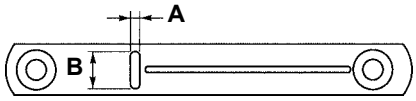
2. GAUGE COMPONENTS

■ Cloth cutting knife



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

■ Throat plate



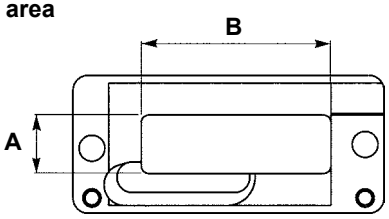
Stitch width / Type	5mm (Marking • AxB)
Standard (S)	40027553 (S5 • 1.4x6.2)
For knits (K)	40027554 (K5 • 1.2x6.2)

■ Work clamp

Stitch width 5 mm

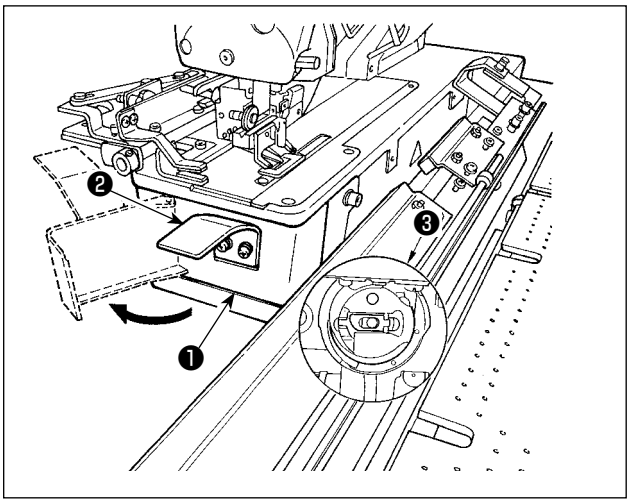
Size (AxB) / Type	1 (4x25)	2 (5x35)	3 (5x41)
Standard (S)	B1552781000A	B1552782000	B1552783000
For knits (K)	D1508771K00A	D1508772K00	D1508773K00

Sewing area



3. DAILY MAINTENANCE

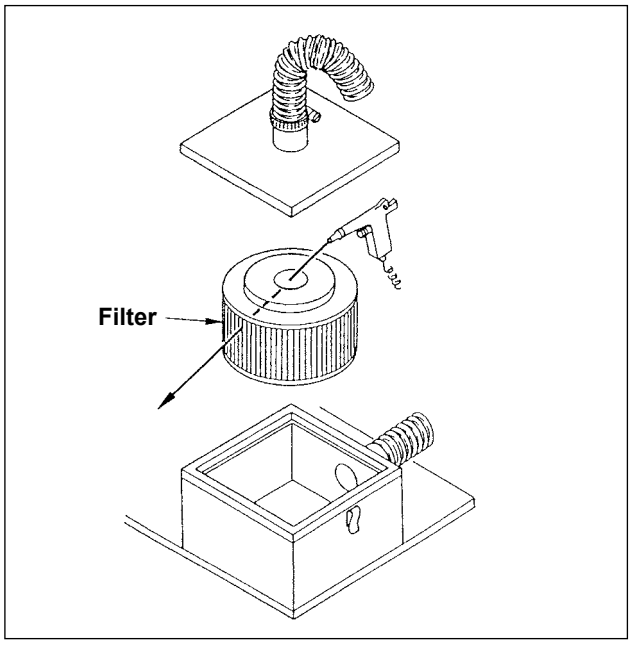
3-1. Removing dust near the bobbin case



Hold knob ❷ and open hook cover ❶ . Then remove dust (thread waste and cloth waste) near bobbin case ❸ .

If dust collects near the bobbin case, sewing is deteriorated.

3-2. Cleaning the vacuum filter



Clean the filter element inside the filter box once every 4 months.

1. **Blow air to the elements from inside toward out side.**
2. **If the is heavily clogged, replace it with a new one.**

4. 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.	91
	2. Pressure or stroke of thread take-up spring is too large.	○ Decrease the tension of thread take-up spring or decrease its stroke.	181
	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.	179
	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.	33
	7. Needle is too thin.	○ Replace the needle with a thicker one.	33
	8. Needle tip is damaged.	○ Replace the needle.	33
	9. Thread breaks when it is bent.	○ Do not pass the thread through the thread guide pin.	9
2. Needle thread slips off.	1. Needle thread trimmer opens too early.	○ Delay the opening timing of the needle thread trimmer.	180
	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.	86
	3. Threading needle thread is wrong.	○ Thread properly again.	33
	4. Speed at the start of sewing is too fast.	○ Set the soft-start function.	112
3. Wobbling at parallel section	1. Thread tension at parallel section is too low.	○ Increase the thread tension at parallel section.	91
	2. Bobbin thread tension is too high.	○ Decresase bobbin thread tension. (Purl stitching : 0.05 to 0.1N)	34
	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.	91
	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.	180
	3. Stroke of thread take-up spring is too large.	○ Decrease the stroke of thread take-up spring.	181
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.	91
	2. Bobbin thread tension is too high.	○ Decrease the bobbin thread tension. (0.05 to 0.1N)	34
	3. Number of stitches of radial shape is too many.	○ Decrease the number of stitches.	84
	4. Tension at the end of sewing is too low.	○ Increase tension at the end of sewing.	112
6. Stitches float.	1. Bobbin thread tension is too low.	○ Increase the bobbin thread tension.	34
	2. Bobbin thread comes off bobbin case.	○ Perform proper threading the bobbin case.	34
		○ Take care that the winding amount of bobbin thread is not excessive.	55
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.)	179
	3. Attaching needle is wrong.	○ Adjust again the direction, height, etc.	33
	4. Needle is bent.	○ Replace the needle.	33
	5. There is a burr or scratch on the blade point of hook.	○ Buff the blade top of hook. Or, replace the hook.	–

Troubles	Causes	Corrective measures	Page
8. Thread frays.	1. Number of stitches of tie stitching is too small. 2. Width of tie stitching is too wide.	○ Increase the number of stitches of tie stitching at the end of sewing. ○ Narrow the width of tie stitching at the end of sewing.	87 87
9. Length of needle thread remaining at the end of sewing is too long.	1. Width of tie stitching is too narrow. 2. Tension of tie stitching is too low.	○ Widen the width of tie stitching at the end of sewing. ○ Increase tension at the end of sewing.	87 112
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.	86
11. Knife drops even when needle thread is cut.	1. Check whether the thread breakage detector plate is properly adjusted.	○ Adjust the detector plate. (Refer to the Engineer's Manual.)	–
12. Needle breaks.	1. Check whether needle is bent. 2. Check whether needle comes in contact with the blade point of hook. 3. Check whether needle thread trimmer comes in contact with needle when it opens. 4. Check whether needle comes in the center of the needle hole of throat plate. 5. Needle stop position is too low and needle comes in contact with needle thread trimmer when it closes.	○ Replace the needle. ○ Adjust the needle-to-hook timing. ○ Adjust the installing position of needle thread trimmer. ○ Re-adjust the installing position of throat plate base.	33 179 180 –
13. Knife drops plural times.	1. Check whether the cloth cutting knife dropping is set to plural dropping.	○ Release the plural time setting.	107
14. Air blows from preset.	1. Blower motor is rotating in the reverse direction.	○ Change the direction of rotation of the motor.	–
15. Preset does not move even when start switch is pressed.	1. Cloth is not detected since it is coarse.	○ Release the cloth detection.	27
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.	28
17. Cloth slips when cloth is delivered from preset to carriage.	1. Vacuum force is excessively low. 2. Clamp force is excessively low.	○ Adjust the cloth suction force of the vacuum. ○ Adjust the clamp.	31 38

IV. INITIAL VALUE DATA FOR EACH SHAPE TABLE

No.	Item	Unit	Shape selection Level 1 (12 shapes)												Shape selection Level 2 (20 shapes)										Shape selection Level 3 (30 shapes)									
S001	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
S002	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
S003	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
S004	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
S005	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	–	–	–	–
S006	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	–	–	–	–
S007	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	–	–	–	–
S008	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	–	–	–	–	–	–	–	–
S009	1st bar-tacking length	mm	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.0	1.0	1.0	1.0	1.0	–	–	–	–	–	–	–	–
S010	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	–	–	–	–	–	–	–	–
S011	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	–	–	–	–	–	–	–	–
S012	Taper bar-tacking offset, left	mm	–	–	–	–	–	0.85	–	–	–	0.85	–	–	–	–	0.85	–	–	–	–	–	–	0.85	–	–	–	–	–	–	–	–
S013	Taper bar-tacking offset, right	mm	–	–	–	–	–	0.85	–	–	–	0.85	–	–	–	–	0.85	–	–	–	–	–	–	0.85	–	–	–	–	–	–	–	–
S014	Eyelet shape length	mm	–	–	–	–	–	–	2.0	2.0	2.0	2.0	–	–	–	–	–	2.0	2.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S015	Number of stitches of eyelet shape	Stitch	–	–	–	–	–	–	3	3	3	3	–	–	–	–	–	3	3	–	–	–	–	–	–	–	–	–	–	–	–	–
S016	Eyelet width	mm	–	–	–	–	–	–	1.0	1.0	1.0	1.0	–	–	–	–	–	1.0	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S017	Eyelet length	mm	–	–	–	–	–	–	3.0	3.0	3.0	3.0	–	–	–	–	–	3.0	3.0	–	–	–	–	–	–	–	–	–	–	–	–	–
S018	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	–	–	–	–
S019	Number of stitches of radial shape	Stitch	–	–	3	3	3	3	–	3	–	–	–	–	–	–	–	–	–	3	–	–	–	–	3	3	3	–	–	–	–	–
S020	Radial shape reinforcement (with/without)		–	–	Without	Without	Without	Without	–	Without	–	–	–	–	–	–	–	–	–	Without	–	–	–	–	Without	Without	Without	–	–	–	–	–
S021	Pitch at bar-tacking section	mm	0.30	0.30	0.30	–	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	–	–	–	–
S022	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
S023	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
S031	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
S032	Double stitching cross selection		<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	–	–	–	<
S033	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	–	–	–	–
S034	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	–
S035	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	–
S036	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	–
S037	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	–
S038	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	–
S039	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	–
S040	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	–
S041	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	–
S042	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	–
S044	Speed setting of basting	sti/min	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	–
S051	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
S052	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
S053	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	–	–	–	–
S054	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	–	–	–	–
S055	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	–	–	–	–
S056	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	–	–	–	–
S057	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
S058	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	---
S059	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	–	–	–	–
S060	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
S061	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	–	–	–	–
S062	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
S063	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
S064	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
S065	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
S066	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
S067	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
S068	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
S069	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
S070	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
S081	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
S083	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	–	–	–	–
S084	Max. speed limitation	sti/min	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
S086	Pitch of going	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.80	0.80	0.80	0.80
S087	Width of going	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.7	1.7	1.7	1.7
S088	Pitch of returning	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.80	0.80	0.80	0.80
S089	Width of returning	mm	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.7	1.7	1.7	1.7
S090	Presser foot pressure		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
S101	Sewing speed at the first bartacking section		3600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3600	3600	3600	3600	3600	–	–	–	–	–	–	–	–
S102	Sewing speed at the second bartacking section		3600	–	3600	–	–	–	3600	–	–	–	–	3600	3600	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–