ENGLISH

AE-200A
INSTRUCTION MANUAL

↩

CONTENTS

Ⅰ. CAUTIONS BEFORE OPERATION

Following items have to be checked every working day before the operation of the machine and before the start of work hours.

1. **Ascertain that the oil pan is filled with the predetermined amount of oil.**

2. **Never operate the machine unless the oil pan has been filled up with oil.**

3. **Ascertain that the pressure gauge indicates the designated air pressure of 0.5 MPa.**

    * (This is necessary particularly when the compressor is stopped for a lunch break or the like.)

    If the compressed air pressure is equal to or less than the designated value, troubles such as interference between the parts can occur. It is therefore necessary to carefully check the compressed air pressure.

4. **Check whether the needle thread/bobbin thread need to be replenished.**

5. **To perform sewing immediately after turning ON the power switch, perform trial stitching first, then proceed with sewing of actual products after the test sewing.**

6. **In order to prevent the sensor from showing a detecting failure, be sure to clean thread waste around the sensor using an air gun once or more times a day.**

Precautions for use

1. **For a wider material, fold the material toward you and sew it while putting your hand on it. If you don't guide the fabric by hand during sewing, the material may warp at the end of sewing.**

2. **When sewing some patterns, it is also necessary to put your hand on the material at the end of sewing.**

3. **Setscrew for the presser bar base**
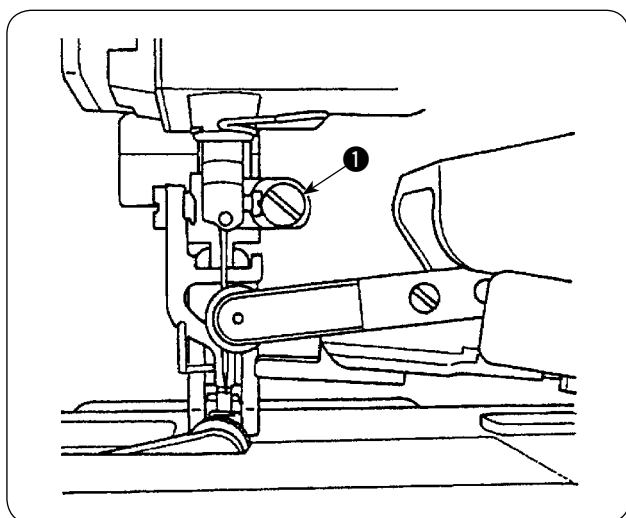
1) Never loosen setscrew ❶ in the presser bar base. If it is loosened, the walking foot movement timing will change from the correct one.
2) When it is really necessary to loosen setscrew ❶, it should be loosened when the walking foot comes down to contact the throat plate surface.

Ⅱ. CONFIGURATION OF THE MACHINE
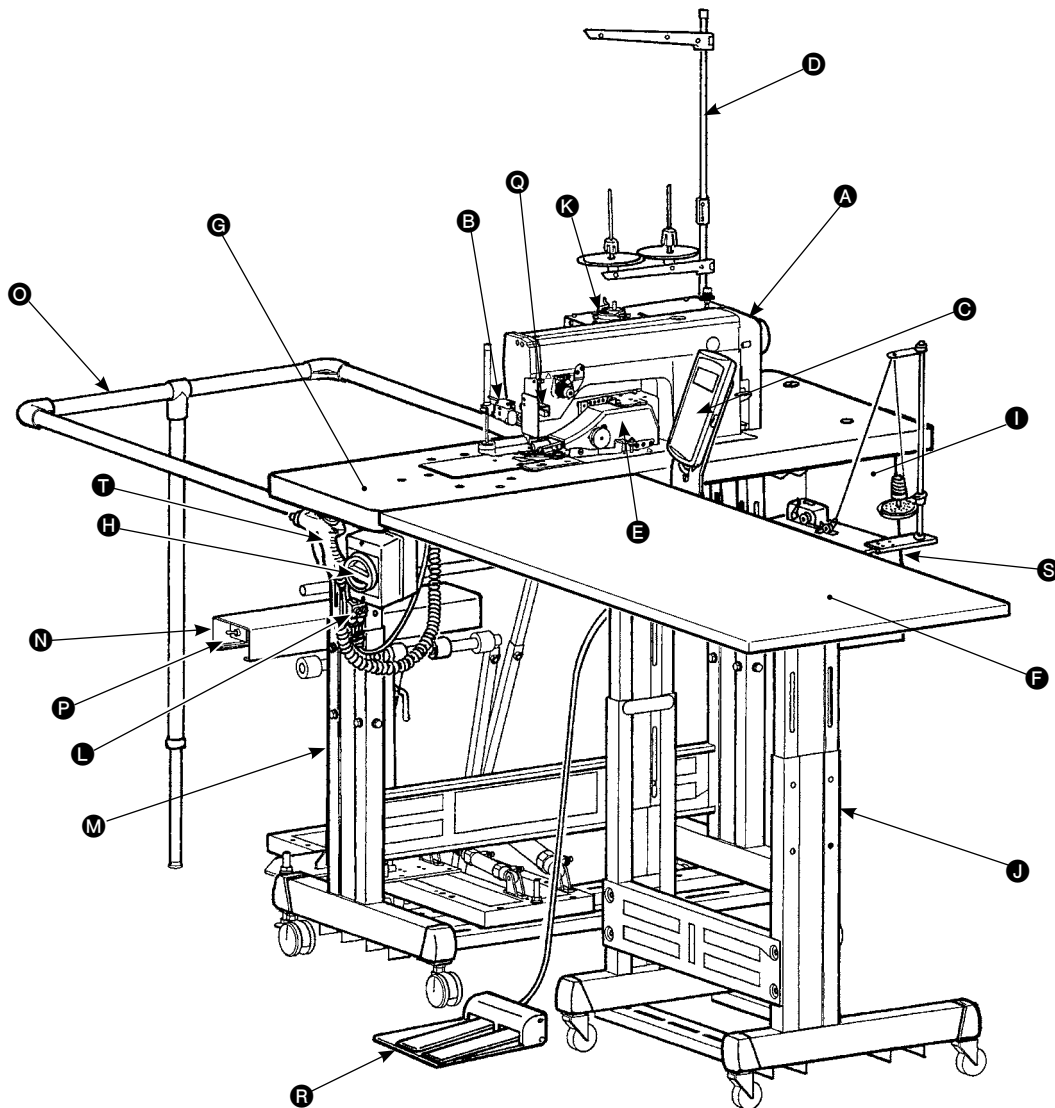
Ⓐ Machine head (DLU-5498N-7)
Ⓑ Start switch
Ⓒ Operation panel
Ⓓ Thread stand
Ⓔ Upper manipulator
Ⓕ Auxiliary table
Ⓖ Sewing machine table
Ⓗ Power switch
Ⓘ Control box
Ⓙ T stand

Ⓚ Bobbin winder
Ⓛ Air blow SC (Speed controller)
Ⓜ T stand
Ⓝ SS52 Stacker device (optional)
Ⓞ Safety bar (optional)
Ⓟ Air valve switch
Ⓠ Material end sensor
Ⓡ 2-pedal unit (optional)
Ⓢ Bobbin winder (optional)
Ⓣ Air gun

Ⅲ. OVERVIEW

This automatic machine consists of a bottom & variable top-feed, lockstitch machine with an automatic thread trimmer, auto-lifter, upper and lower manipulators which control the material end with accuracy, control box which controls the whole system, operation panel and auxiliary table.
(The sewing machine head is DLU-5498N-7 specifically developed for AE-200A.)
Stacker device (SS52), 2-pedal unit, bobbin winder and bobbin thread remaining amount detecting device are provided as options.

1. Features

1) Easy operation requiring no skill (Even an inexperienced operator is able to carry out work equivalent to that by a skilled operator.)
2) Increased efficiency is promised. (Re-arrangement of two pieces of fabric is required during manual work. This machine eliminates such a re-arrangement, thereby shortening the time required for sewing.)
3) High-quality is ensured to improve reliability. (The sewing machine sews the materials with a consistent seam allowance, thereby producing uniform products.)
4) The sewing machine permits the operator to operate it from its side face automatically or manually by means of the pedal either standing or sitting.
5) The 2-pedal unit ensures accurate placement of the material on the sewing machine.
6) Seam allowance can be set in the range of 1 and 30 mm.
7) Uneven material feed can be adjusted with ease.

2. Specifications

| 1	Speed of stitch	200 to 3,500 sti/min
2	Stitch length	0 to 4 mm
3	Top feed amount	8 mm (Max.)
4	Presser foot lift (max.)	10 mm (Air-driven)
5	Seam allowance	1 to 30 mm
6	Needle to be used	DBx1 #9 to #18 (Standard: #11), 134 #75 (JE type)
7	Sewing condition A) Curve sewing B) Material size C) Number of plies of materials	 100 mm R or more 1,500 (length) x 500 (width) or less 2 or 1
8	Power consumption	220VA
9	Power source	3-phase 200 to 240 V Single-phase 200 to 240 V
10	Table height	Adjustable between 820 to 1,020 mm (Standard: 917 mm)
11	Sewing machine dimensions	2,375 (length) x 1,200 (width) x 1,150 (height) (mm)
	Auxiliary table	Standard: 1,200 (length) x 550 (width) mm
12	Stacker	SS52 Workpiece constant-retaining type
13	2-pedal unit	Provided with the presser foot up/down switch and 2-step start switch; high/low speed changeover
14	Weight	135 kg (when all options are installed)
15	Noise	Declaration - Equivalent continuous emission sound pressure level (L_{PA}) at the workstation : A-weighted value of 80 dB; (Includes K_{PA} = 2.5 dB); according to ISO 10821- C.6.3 -ISO 11204 GR2, at sewing cycle: 4 s ON and 7 s OFF.

Ⅳ. INSTALLATION

1. Table height

⚠️ **CAUTION :**
Be sure not to lift the table by one worker but to lift it with four or more workers for supporting each of the four corners of the table when adjusting the table height.
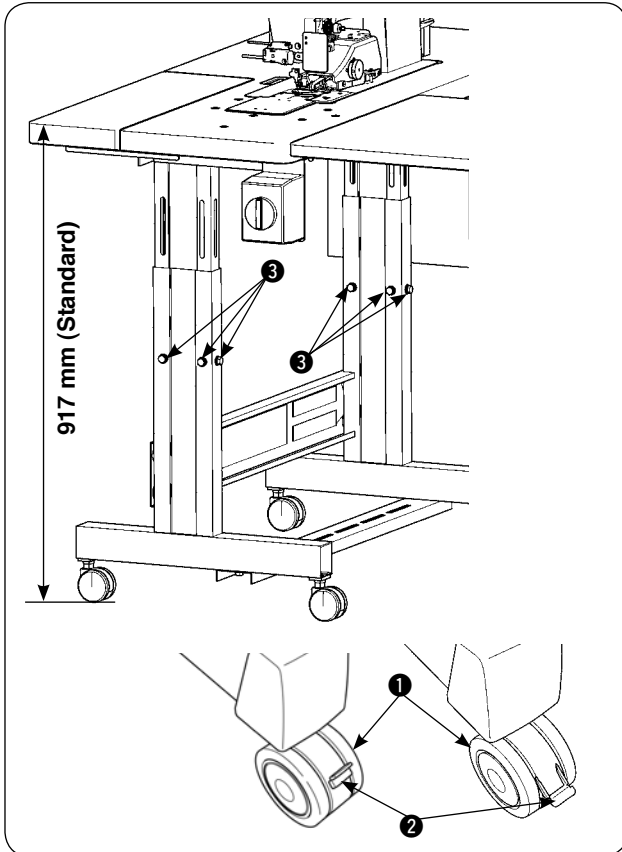
The table height can be adjusted in the range of 820 and 1,020 mm. The standard height is 917 mm.

1) Install the table stand on a flat place.
2) Casters ❶ are secured by lowering levers ❷.
3) Loosen six bolts ❸ mounted on the right and left legs of the table stand to adjust the table height.

[Table height of the auxiliary table]
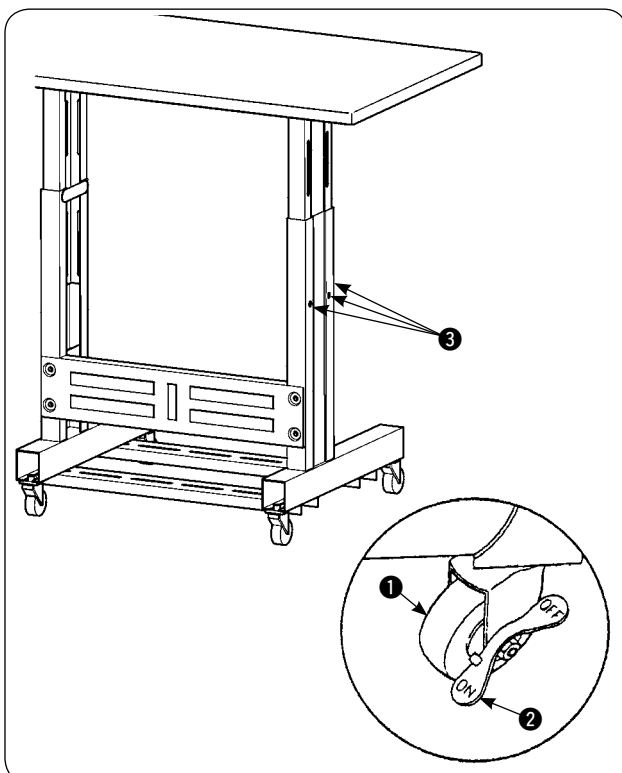
1) Install the table stand on a flat place.
2) Casters ❶ are secured by lowering the ON side of levers ❷.
3) Loosen six bolts ❸ mounted on the right and left legs of the table stand to adjust the table height.

2. Auxiliary table
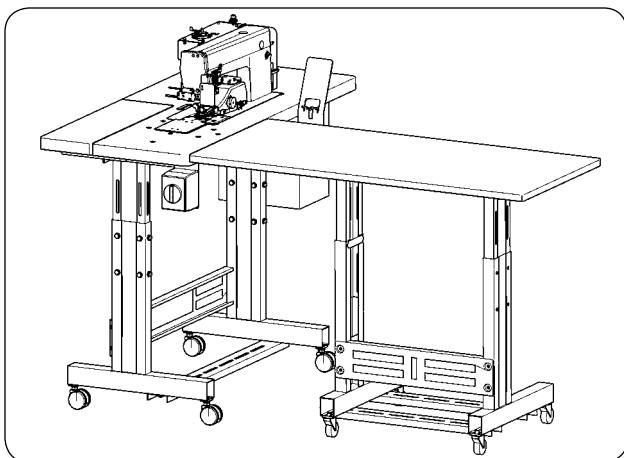
Adjust the auxiliary table height to the sewing machine table height.

3. Assembling the sewing machine table and auxiliary table
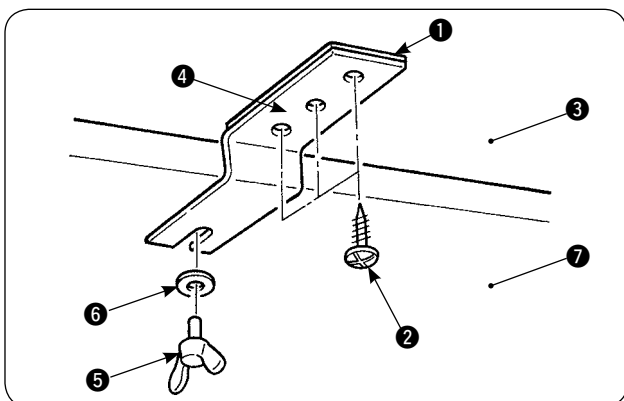
Fix spacer ❶ and auxiliary table joint bracket ❹ with three wood screws ❷ on auxiliary table ❸. Then, mount the joint bracket onto table ❼ with thumb screw ❺ and washer ❻.

4. Installing the operation panel mounting plate
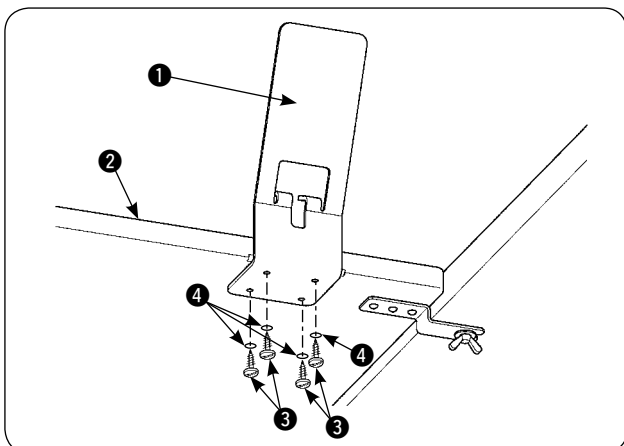
Install panel mounting plate ❶ on auxiliary table ❷ with four wood screws ❸ and four washers ❹.

5. Connecting the operation panel
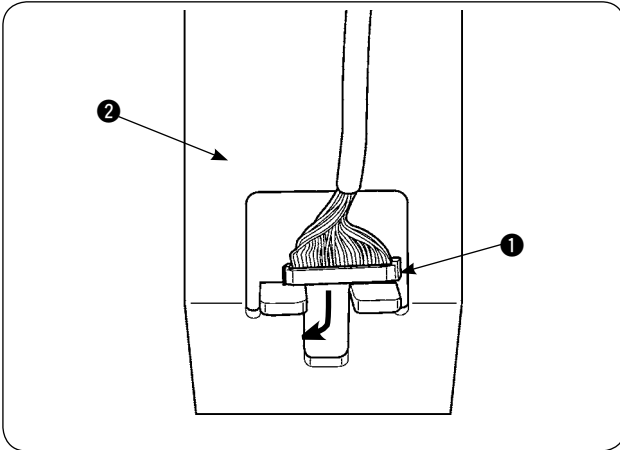
Pass operation panel cord plug ❶ through the hole in operation panel mounting plate ❷.
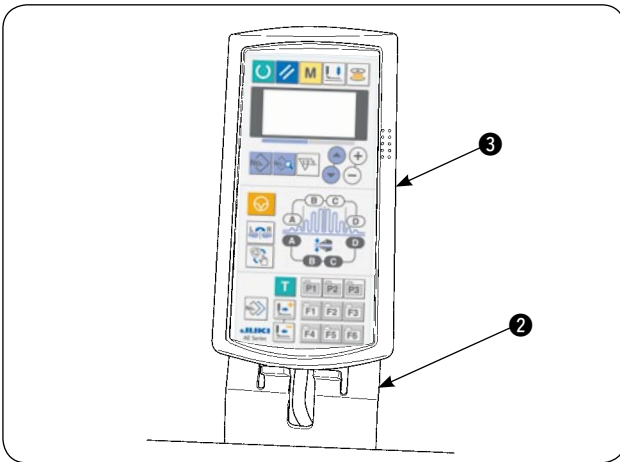
Place operation panel ❸ on operation panel mounting plate ❷.
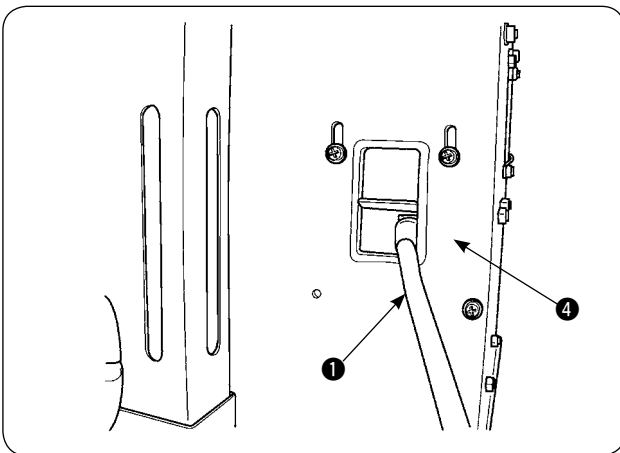
Pass operation panel cord plug ❶ through the cord through-hole in control box ❹.
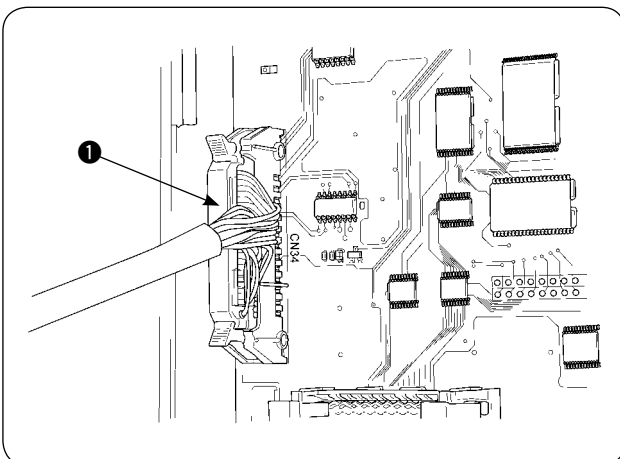
Open the cover of the control box. Insert operation panel cord plug ❶ into the main PCB connector CN34.

6. Lubrication
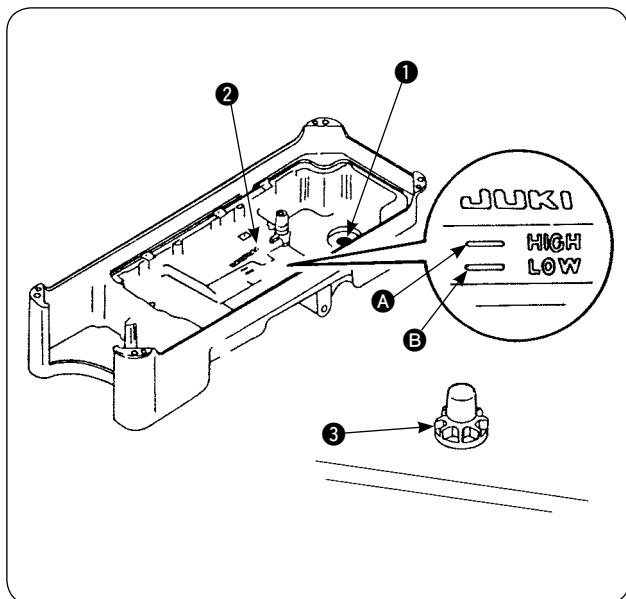
Before operating the sewing machine
1) Put magnet ❶ supplied with the unit in the waste oil screw section.
2) Fill oil pan ❷ with JUKI New Defrix Oil No. 1 until HIGH mark Ⓐ is reached.
3) When the oil level lowers below LOW mark Ⓑ, re-fill the oil pan with the specified oil.
4) When you operate the sewing machine after lubrication, you will see splashing of oil through oil sight window ❸ if the lubrication is normal.
5) Note that the amount of the splashing oil does not represent the amount of oil in the oil pan.

> **1. When operating a newly installed sewing machine or a machine which has not been used a long period, be sure to run the sewing machine for approximately 10 minutes for the purpose of break-in using the bobbin winding key mounted on the operation panel.**
> **2. Be sure to use JUKI's genuine oil. If any other oil is used, a trouble may be caused.**

7. Installing the thread stand
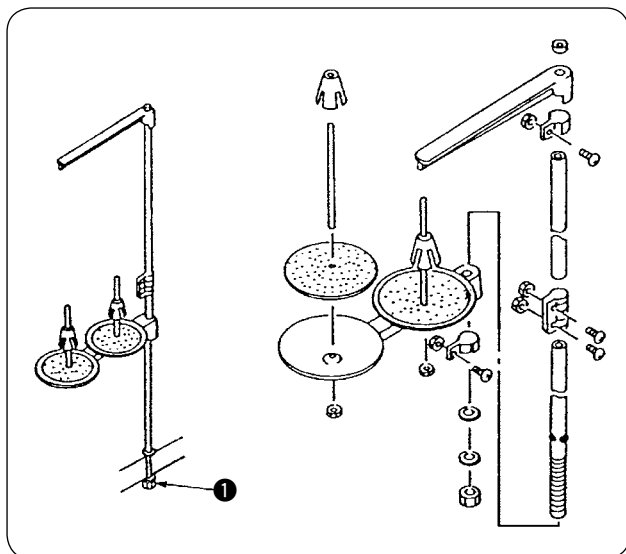
1) Assemble the thread stand unit. Then, insert the assembled thread stand into the hole in the table.
2) Tighten locknut ❶ to such an extent that the thread stand does not fluctuate.

8. Removing the covers
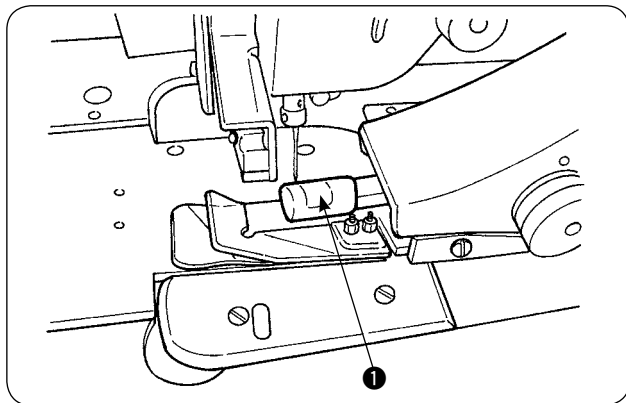
1) Remove upper manipulator roller cover ❶.
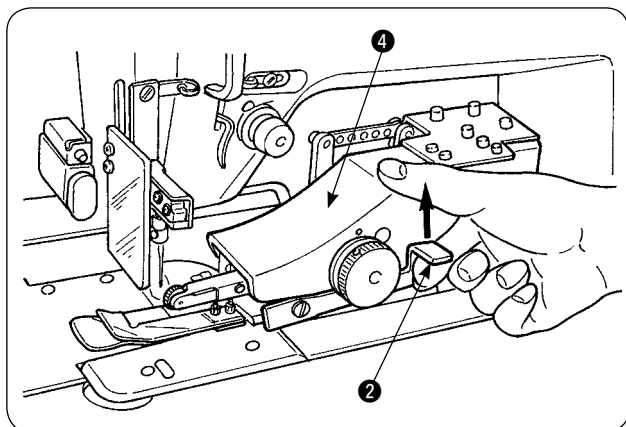
2) Putting your finger on lever ❷, lift the lever to release the upper manipulator ❹.
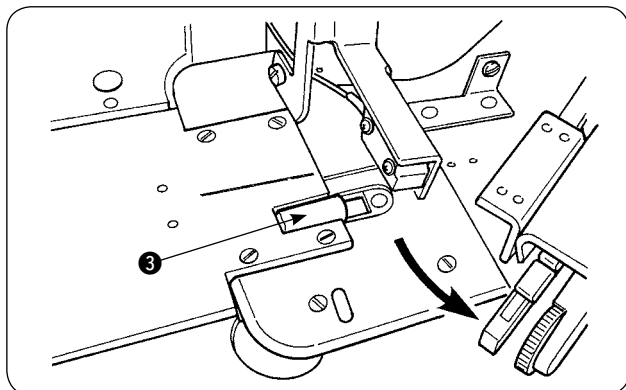
3) Rotate the upper manipulator to remove lower manipulator roller cover ❸.
   After the removal of the upper and lower manipulator roller covers, replace the upper manipulator ❹ back to its position.
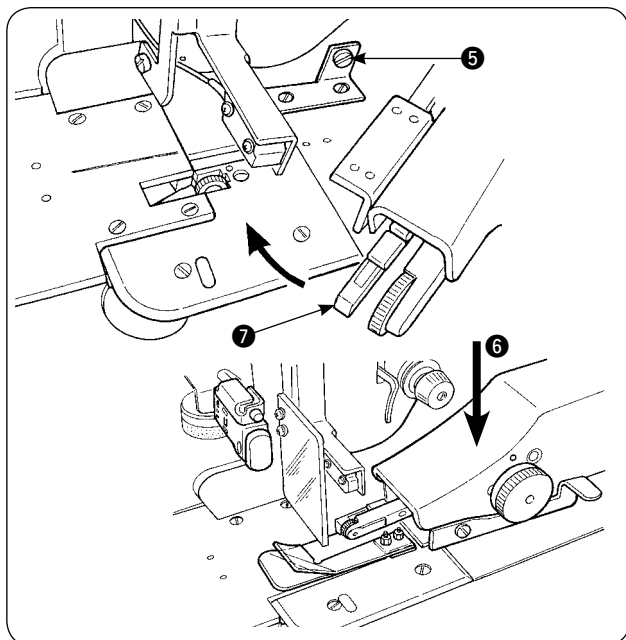
4) To rotate upper manipulator ❹ back to its home position, rotate upper manipulator ❹ until it comes in contact with stopper screw ❺, then press upper manipulator ❹ downward ❻.

> **⚠ Caution**
> **If you press the upper manipulator downward ❻ while rotating it, the underside of sensor ❼ can come in contact with the machine table and the top plate of the bed, resulting a failure.**

9. Threading the machine head
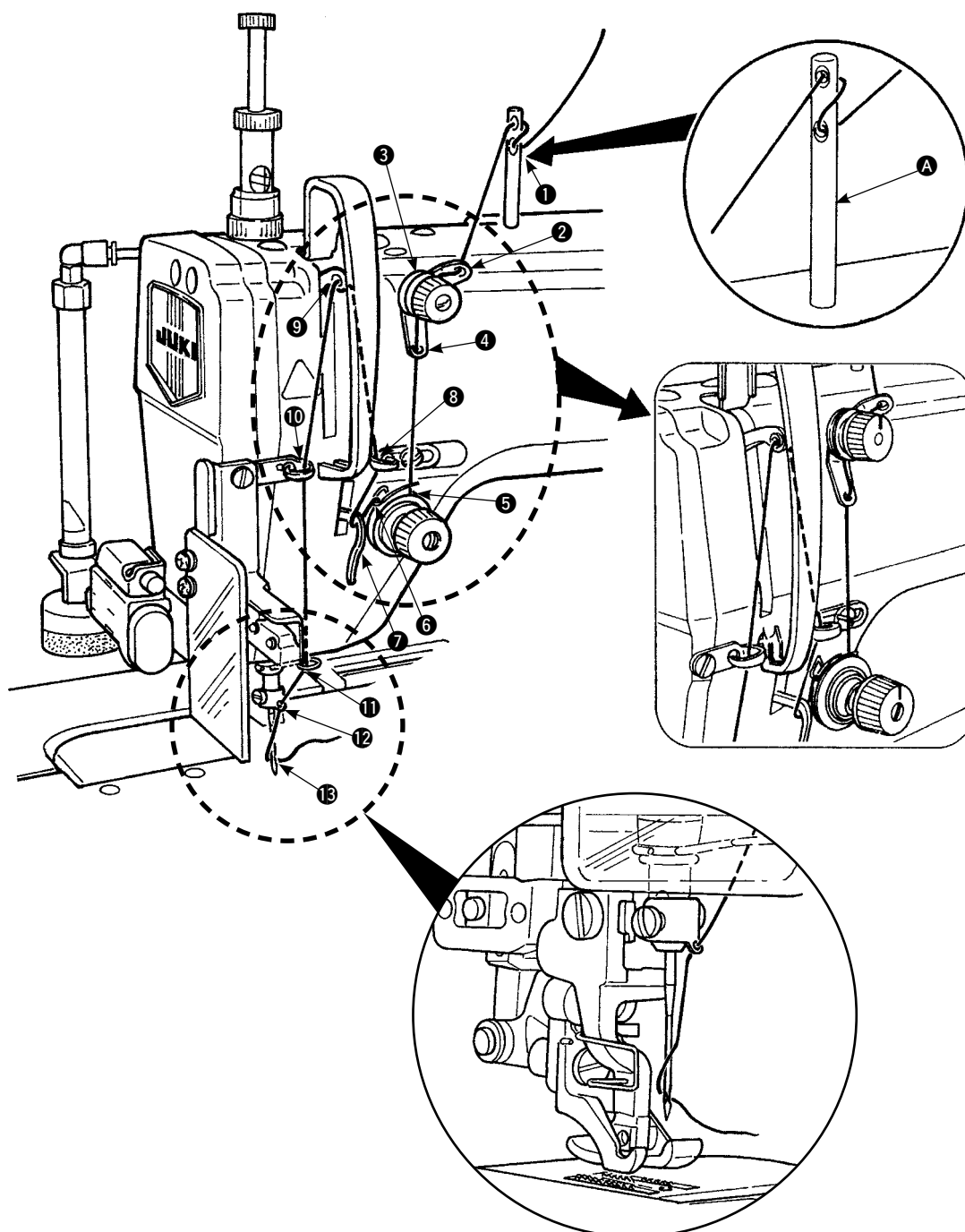
Thread the machine head in the order as illustrated in the figure.

Drive thread guide pin Ⓐ in the hole on the top surface of the machine arm before threading it.

10. Adjusting the stitch length

Bottom feed length

1) Turn stitch dial ❶ in the direction of the arrow until a desired numeral is aligned with marker dot Ⓐ on the machine arm.
2) The numerals are given in millimeters (mm).
3) To change the feed length from a larger value to a smaller value, turn stitch dial ❶ while pressing feed lever ❷ in the direction of the arrow.

Top feed length

Refer to **"Ⅵ-18. Correcting the bottom feed amount readout potentiometer" on page 64** for how to adjust the top feed length.

11. Fitting a needle

⚠ **CAUTION :**
To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine beforehand.
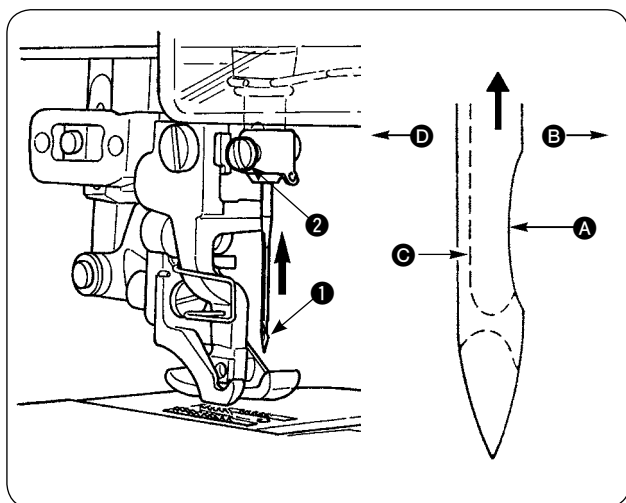
* Turn off the power to the motor.

Use DBx1 (DPx1 for the DP type sewing machine) needle.

1) Turn the handwheel to move the needle bar up to its highest position.
2) Loosen needle clamping screw ❷. Hold needle ❶ so that its scarf Ⓐ faces exactly to the right Ⓑ.
3) Insert the needle fully into the hole in the needle bar in the direction of the arrow until it goes no further.
4) Securely tighten needle clamping screw ❷.
5) Check to be sure that slot Ⓒ in the needle faces just left Ⓓ direction.

12. Loading the bobbin
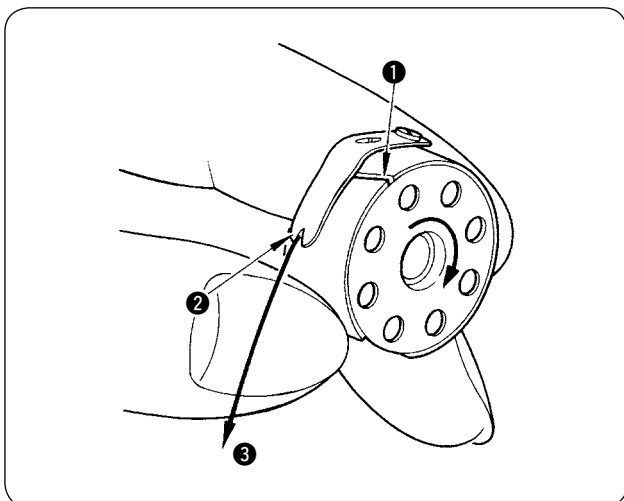
1) Holding the bobbin so that thread inside the bobbin spins clockwise, put it in the bobbin case.
2) Pass the thread through slot ❶ in the bobbin case. Draw the thread in toward thread opening ❷, and it will appear from thread opening ❷ through under the tension spring.
3) Check to be sure that the bobbin rotates in the direction of the arrow when drawing bobbin thread ❸.

13. Connecting and adjusting the air source

⚠️ **CAUTION :**
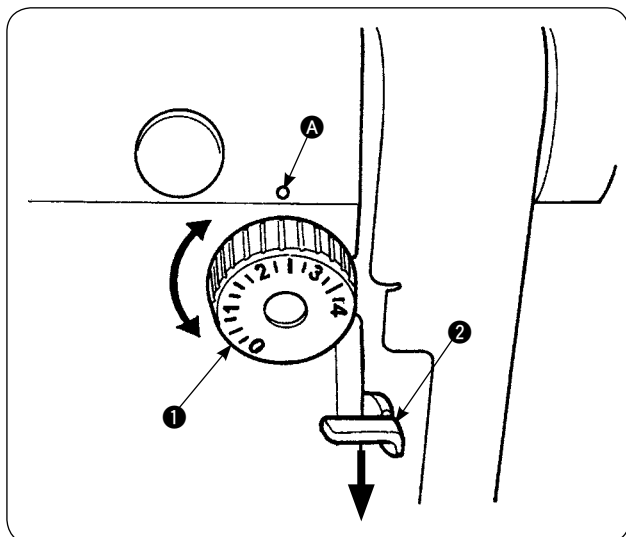**To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal.**
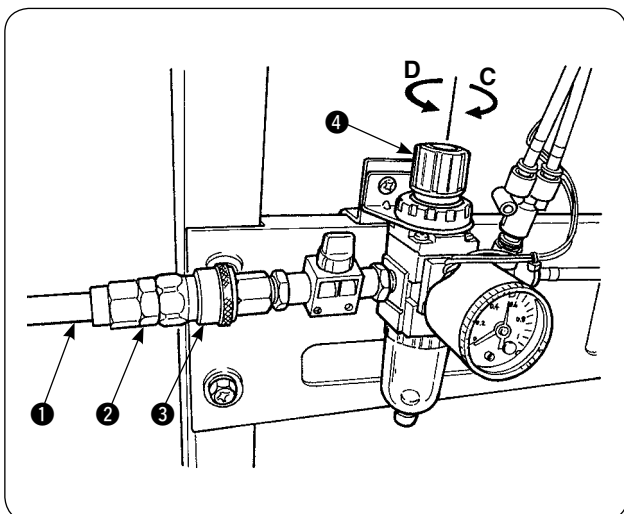
1) Insert air hose ❶ into one-touch utility joint ❷ supplied with the unit.
2) Insert one-touch utility joint ❷ into joint ❸ until it clicks.
3) Adjust the air pressure to 0.5 MPa (5 kgf/cm^2).
   If the pressure is inadequate, lift knob ❹ and turn it clockwise (in direction **C**).
   If the pressure is too high, turn the knob counterclockwise (in direction **D**).
   When the air presser is set at 0.5 MPa (5 kgf/cm^2), lower knob ❹ and fix it.

Ⅴ. INSTALLING THE OPTIONAL DEVICES

1. Installing the 2-pedal unit

⚠ **CAUTION :**
Be sure to turn off the power to the sewing machine before installation of the 2-pedal unit in order to protect the electric parts from being damaged.
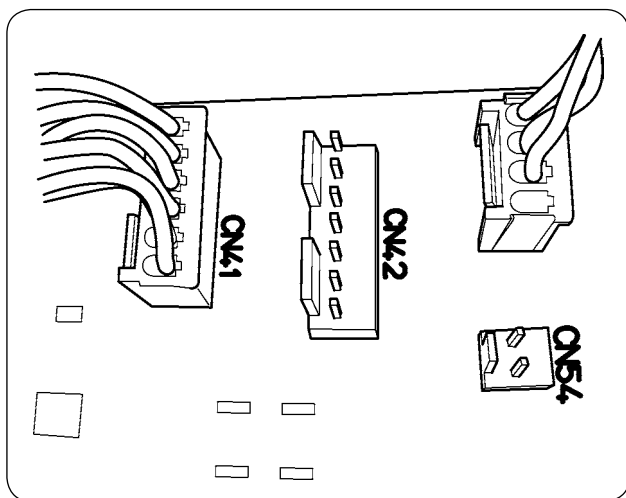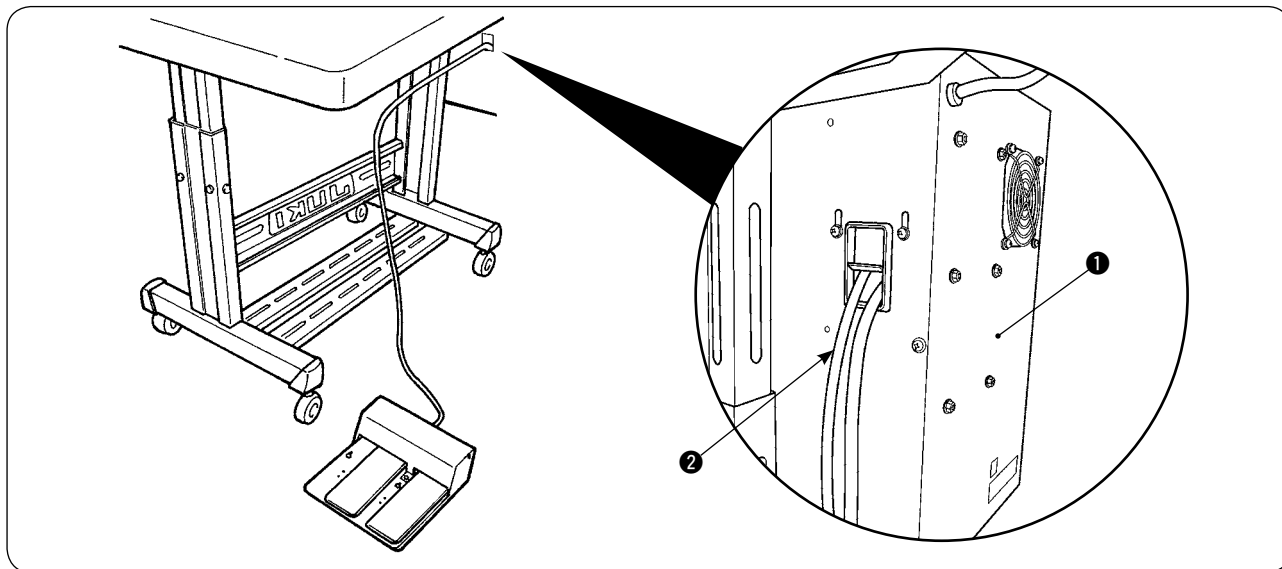
1) Pass 2-pedal unit cord ❷ through the cord through-hole in control box ❶.

2) Plug the 2-pedal unit to CN41 on the main PCB in the electrical box. Secure the ground wire on the underside of the electrical box with ground wire setscrew ❸.
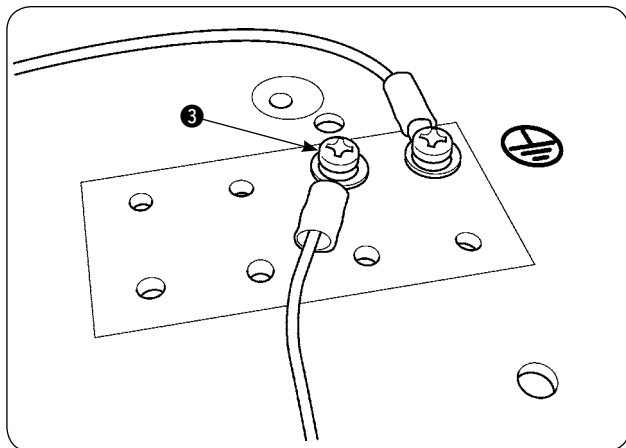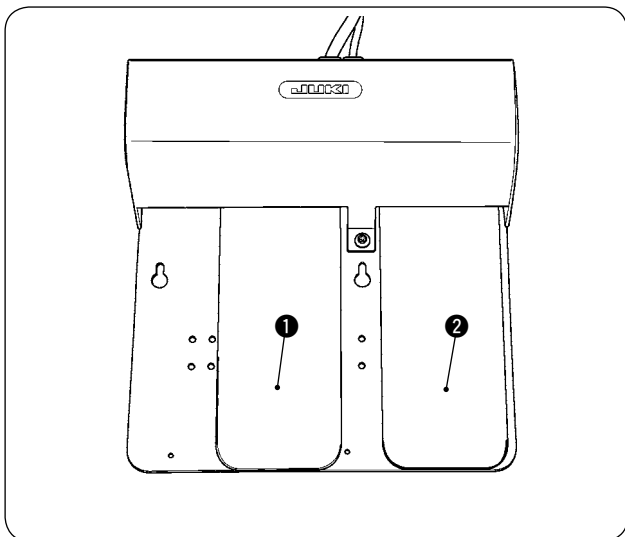
❶ Left pedal, 2-step pedal (manual start, pause)

1) Place the material on the machine under the manual start mode. The LED at the hand switch section flashes on and off. When you depress the pedal to the first step, the presser foot of the sewing machine comes down. When you depress the pedal to the second step with the presser foot of the sewing machine remained in the lowest position, the sewing machine starts running.

   When you depress the pedal to the fist step and release it with the presser foot of the sewing machine remained in the lowest position, the presser foot of the sewing machine goes up.

2) When you depress the pedal during sewing, the sewing machine pauses. When you depress the pedal again, the machine re-starts sewing.

❷ Right pedal (changeover of speed between high and low)

1) When you depress the pedal during sewing, the speed of stitch changes over from high speed to low speed.

2) When you depress the pedal during pause, the thread trimmer actuates to trim the thread and the sewing machine stops.

2. Installing the stacker

⚠ **CAUTION :**
Be sure to turn off the power to the sewing machine before installation of the 2-pedal unit in order to protect the electric parts from being damaged.

Stacker solenoid valve
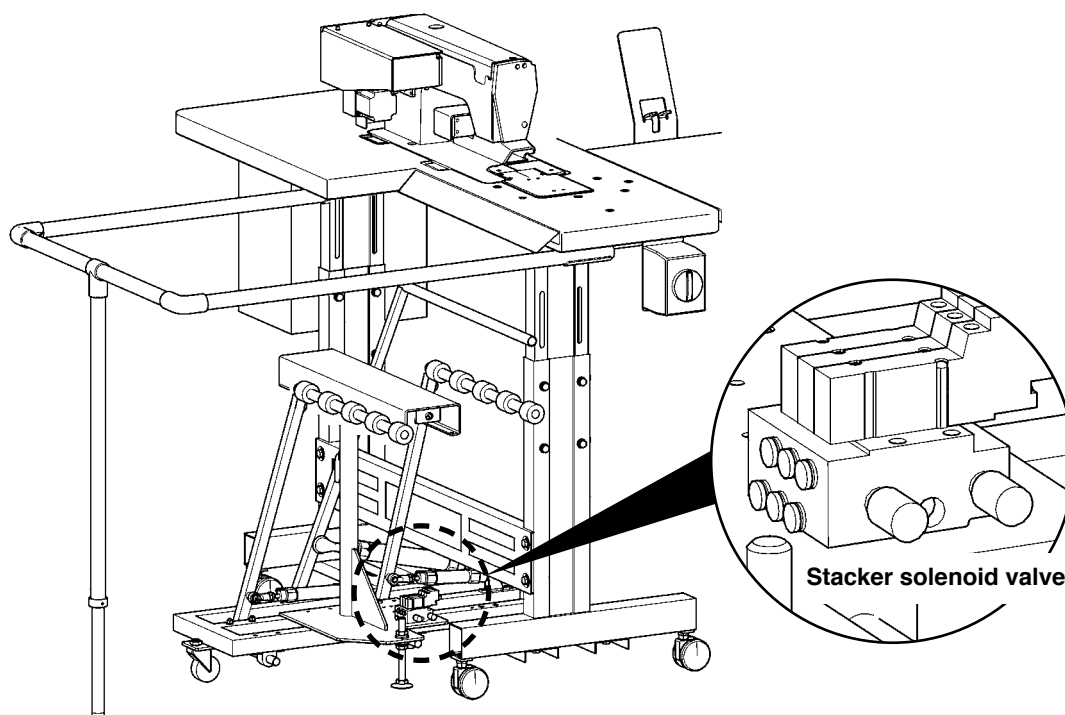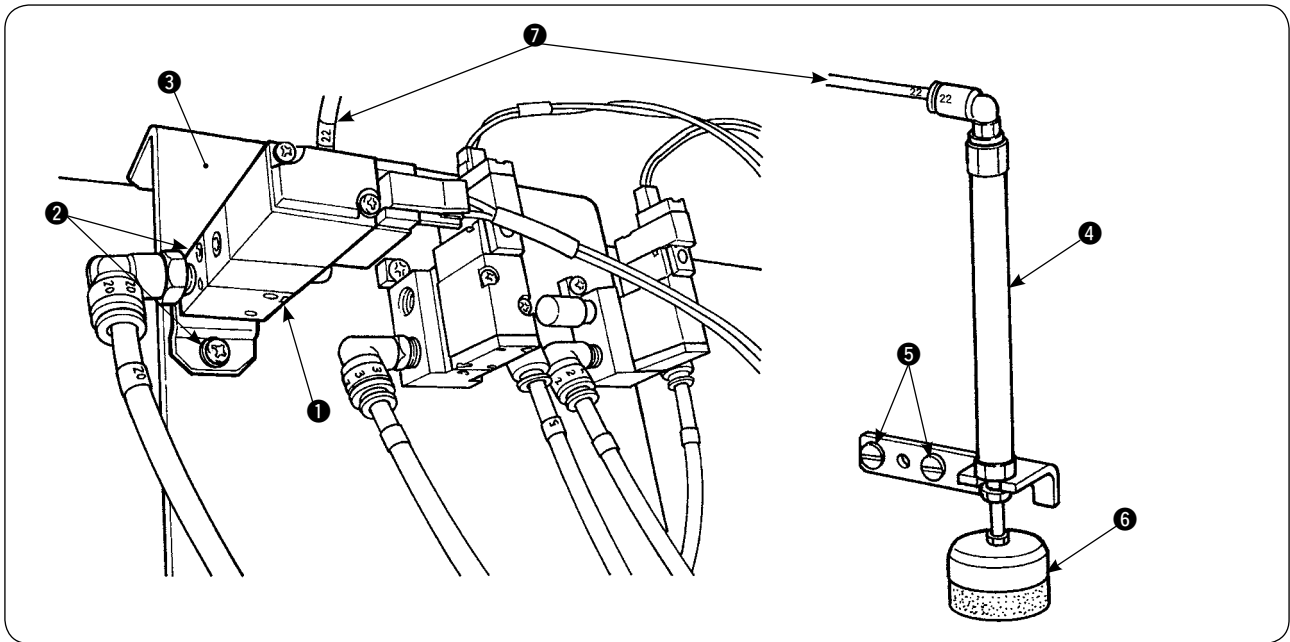
1) Install solenoid valve asm. ❶ on solenoid valve mounting plate ❸ with setscrews ❷.

2) Place material presser cylinder asm. ❹ on the side of the machine head with setscrews ❺. At this time, extend top end ❻ of the cylinder to make sure that the cylinder lightly holds the material.

3) Pass Φ4 air pipe ❼ of solenoid valve asm. through the hole in the table and connect to cylinder ❹.
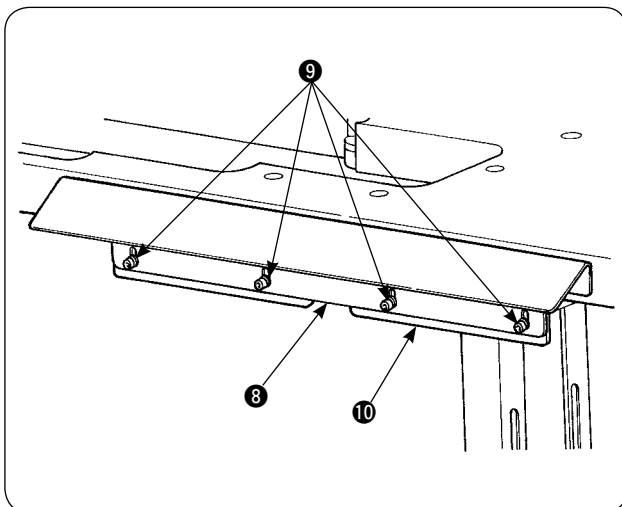
4) Place table bracket ❿ on support plate ❽ with screws ❾.
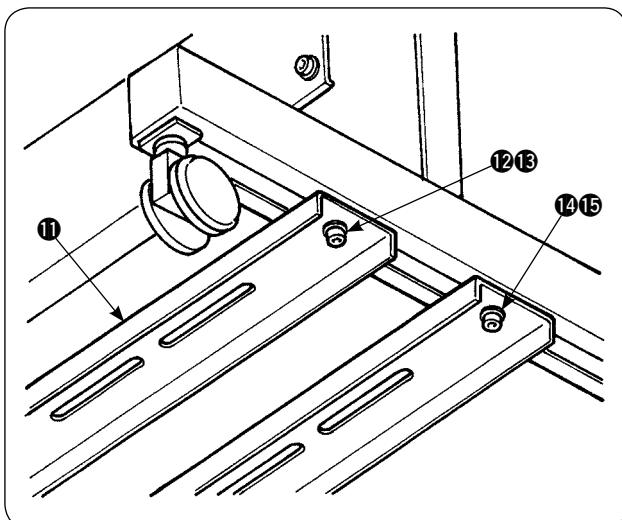
5) Temporarily place lower support strut ⓫ on the table stand with screw nuts ⓬ and ⓭. Then, loosen screw nuts ⓮ and ⓯.
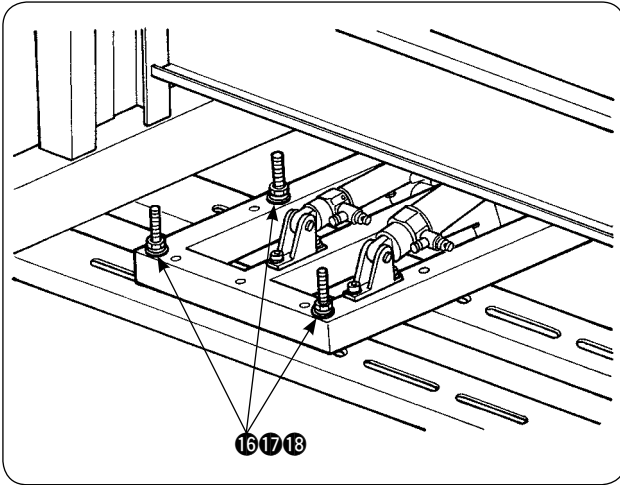
6) Secure the main body of the stacker on lower support strut ⓫ with screw washer nuts ⓰, ⓱ and ⓲.
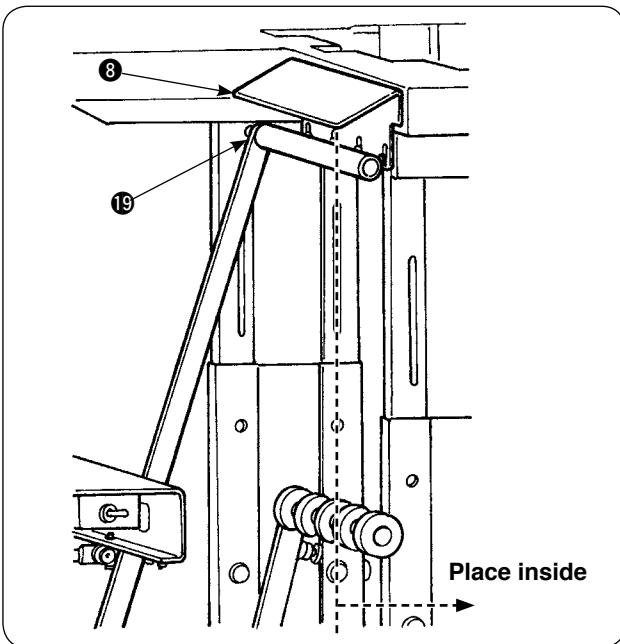
7) Move the main body of the stacker so that garment body wiper ⓳ is placed inside support plate ❽. Then, securely tighten ⓬ to ⓯ which have been temporarily tightened in step 5).

Place inside
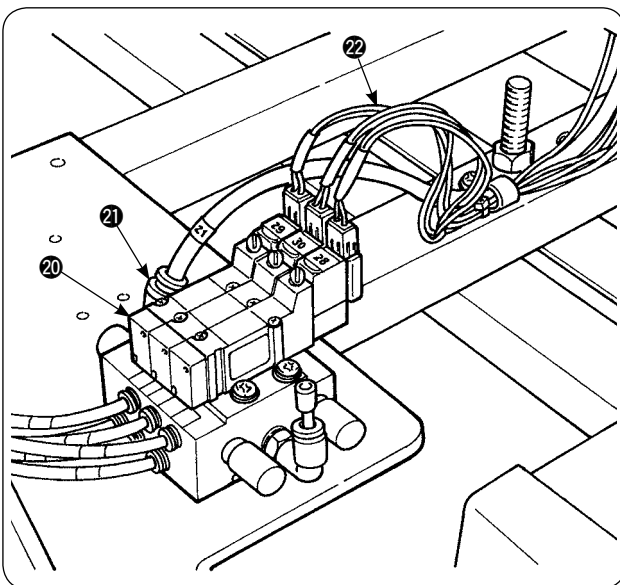
8) Branch the air pipe of the air gun. Connect the air pipe to Φ6 air coupling ㉑ coming from stacker solenoid valve ⓴. (See the air piping diagram.)
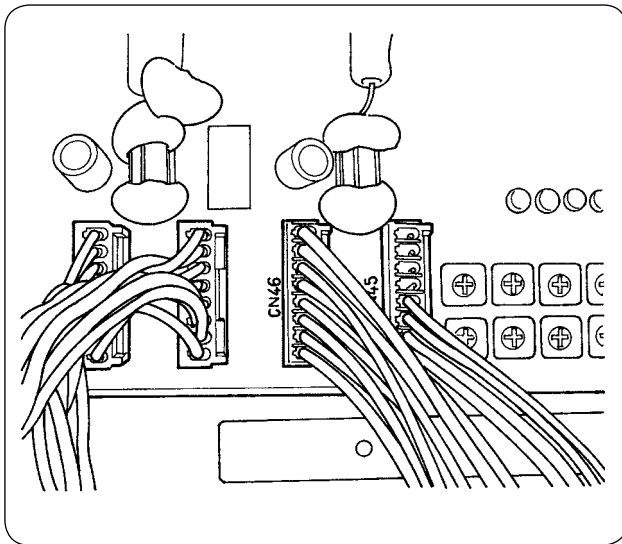
9) Connect the cable of stacker solenoid valve ㉒ to CN46 mounted inside the control box.

BOX side

PCB

Air piping diagram

Presser foot lifting solenoid valve

Presser foot lifting lever

Workpiece holder solenoid valve

Connect to 18

Workpiece holder

Stacker solenoid valve

Disconnect the pipe and connect to Y joint

Air gun
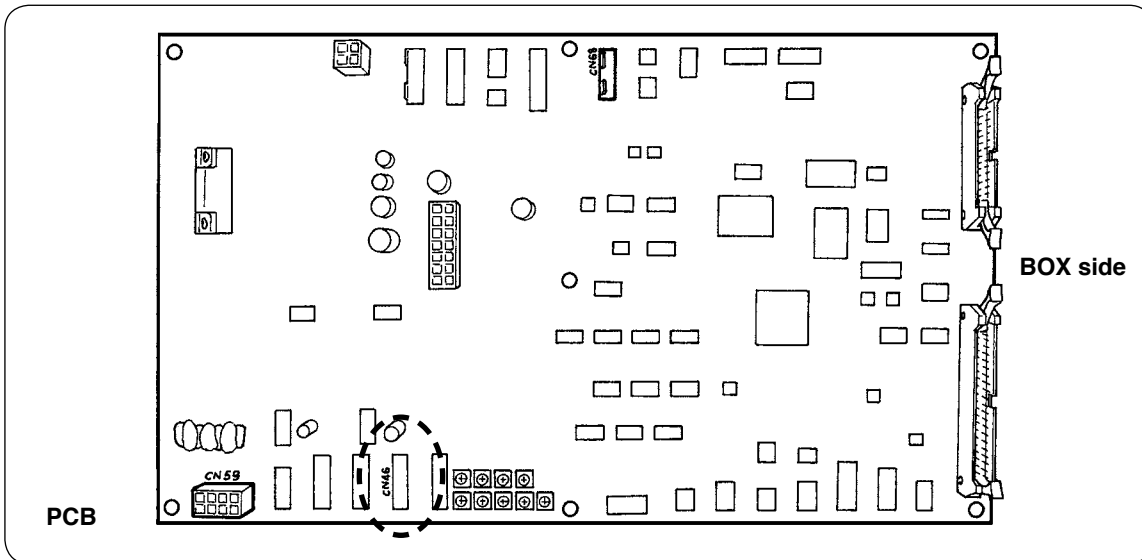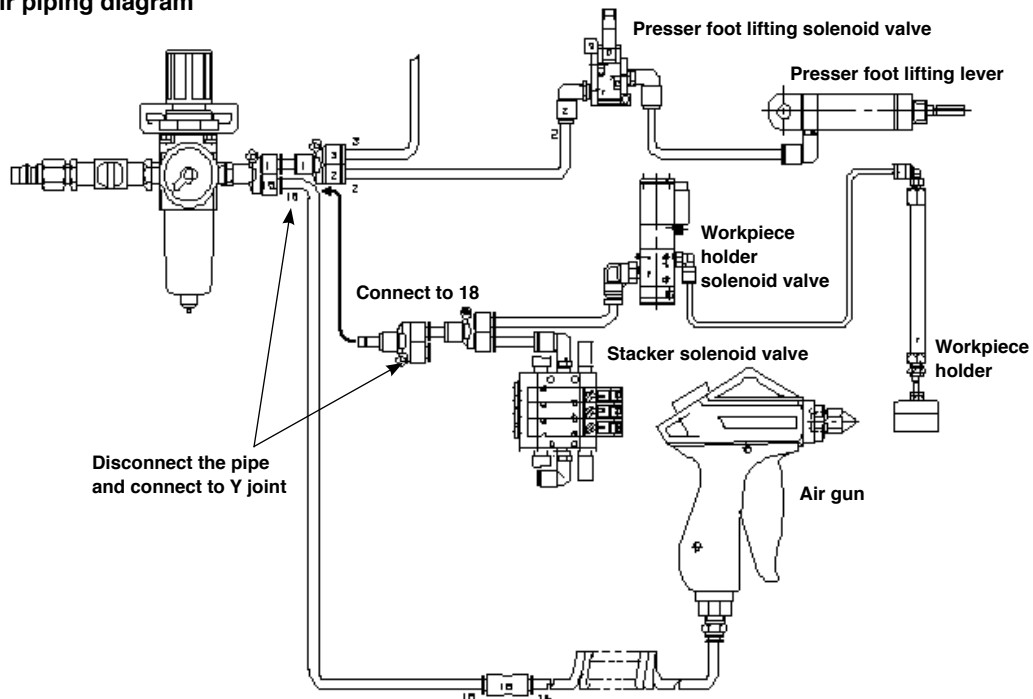
・ Adjusting the workpiece holder

> ⚠️ **CAUTION :**
> **To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal. In addition, take care not to allow your fingers to be caught under the stacker workpiece holder since it comes down.**
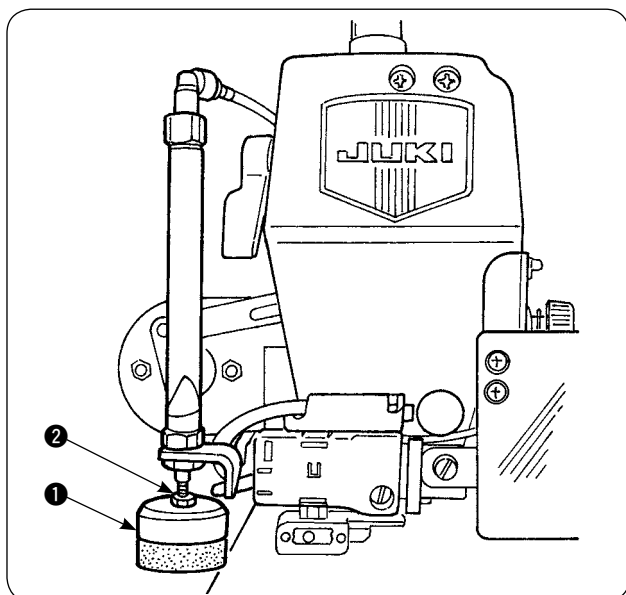
1) Adjust the pressure of workpiece holder ❶ to the standard value so that the workpiece holder lightly holds two plies of material and allows them to smoothly come off when the stacker cloth wiper bar actuates. (Clearance **A**)

2) To adjust the pressure, loosen workpiece holder locknut ❷ and turn the workpiece holder counterclockwise to decrease the pressure or clockwise to increase it.
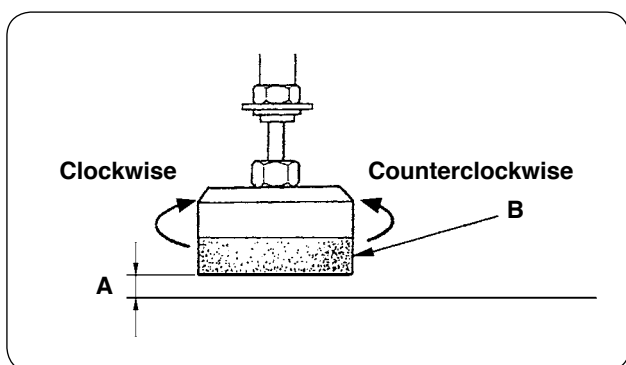
3) Sponge **B** is a consumable part. When it has worn out, replace it with a new one. (Part number: 18072603)

• Installing the stacker safety bar

⚠	**CAUTION :** **Be sure to securely mount parts and firmly tighten screws and bolts since parts may come off resulting in personal injury.**

Install the safety bar on the sewing machine table.
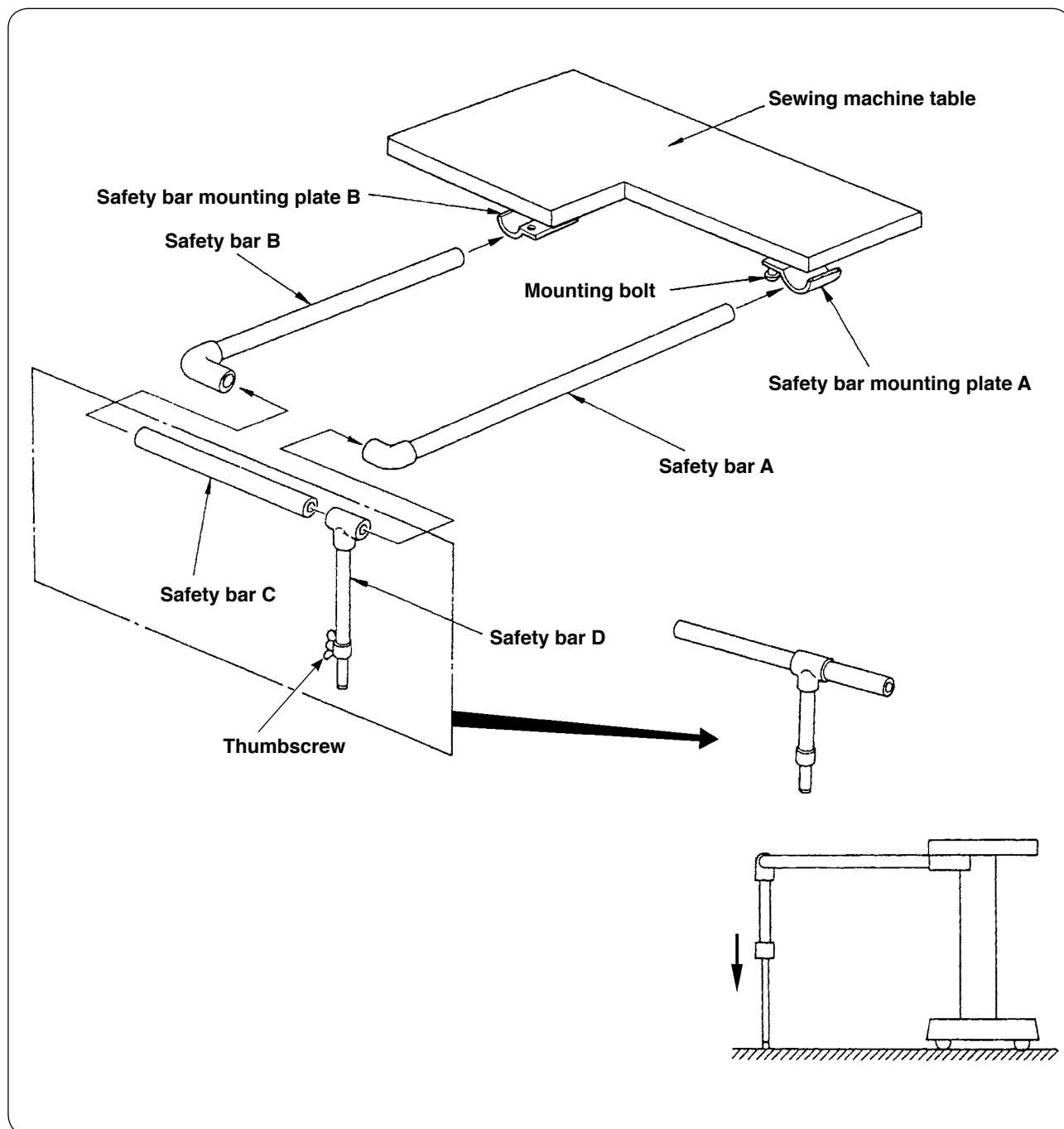
1) Loosen safety bar mounting plates A and B to such an extent that safety bars A and B can be inserted.
2) Combine the respective safety bars and insert them respectively into mounting plates A and B, then, secure with mounting bolts.
3) Bring safety bar D down to reach the floor surface and secure with the thumbscrew.

・Adjusting the stacker timing

ℓ **(Workpiece rear holder)**
≒ ℓ' **(Workpiece front holder)**

1) Adjust the stacker timing so that the workpieces are stacked symmetrically on the cloth receiving table with respect to the longitudinal direction of the workpiece so that the workpieces are stacked with stability.

Workpiece holder bar, front
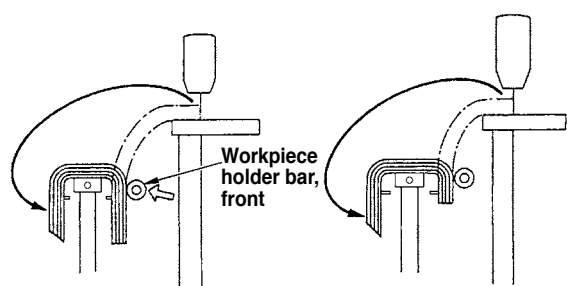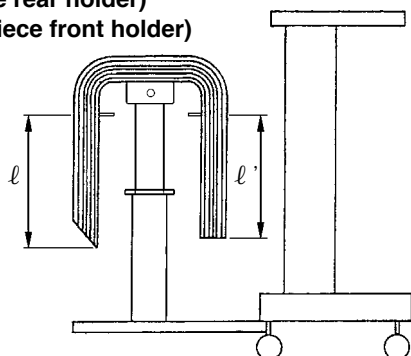
Length: 650mm   **Length: 500mm**

For shorter workpieces length of which is 650 mm or less, adjust the number of stitches on the operation panel so that the workpiece holder bar front actuates simultaneously with the sewing machine finishes sewing.

Operation panel setting procedure

① Bring the display on the LCD ❶ to the sewing ready state.

② Press READY key ❷ to change the display on LCD ❶.

③ Press DATA key ❸ to display [S01] start mode on LCD ❶.

– 19 –
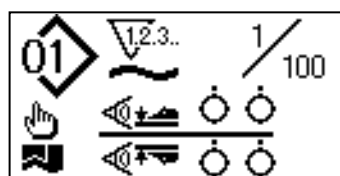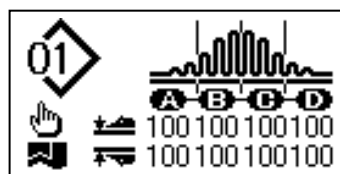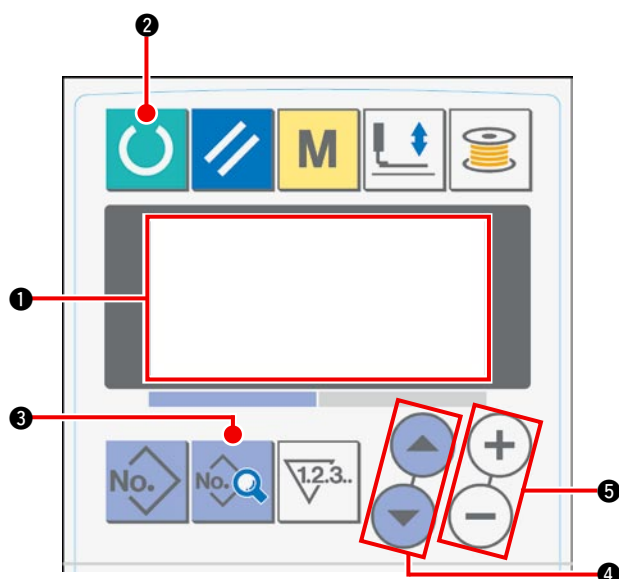
④ Press ITEM SELECT key ❹ to scroll sewing data until [S131] stacker operating position is selected. Press DATA CHANGE key ❺ to set number of stitches ❻ at which the workpiece holder bar, front is activated in accordance with the material length.
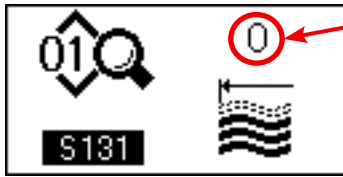
After completion of the setting procedure, press READY key ❷ to bring the operation panel to the set ready state, then run the sewing machine.
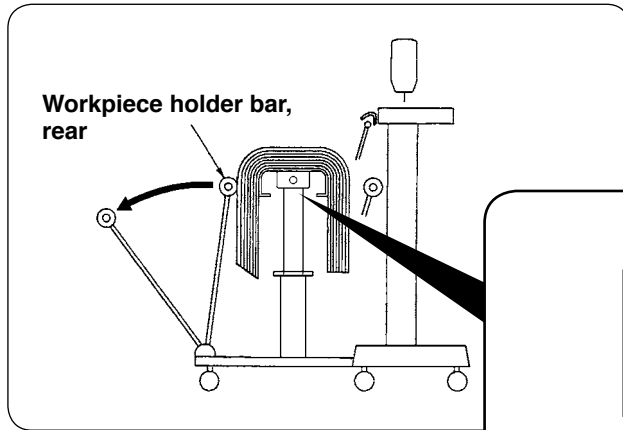
2) To take out the stacked workpieces, change over the air valve switch.
   After having taken out the workpieces, return the air valve switch to its previous position.

Workpiece holder bar, rear

Air valve switch

To release the workpiece holder bar

To set the workpiece holder bar
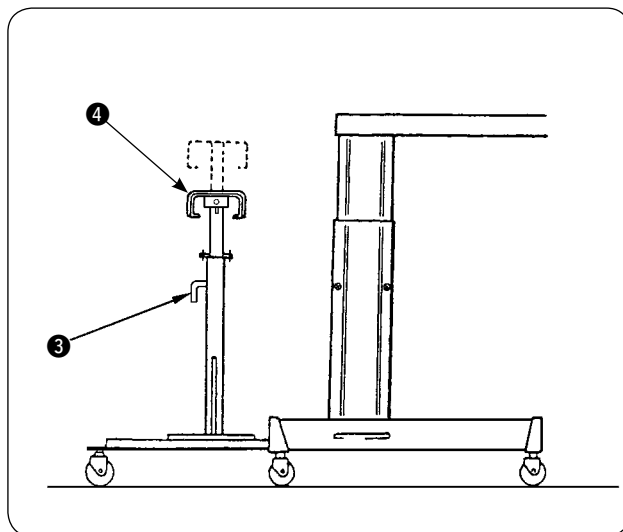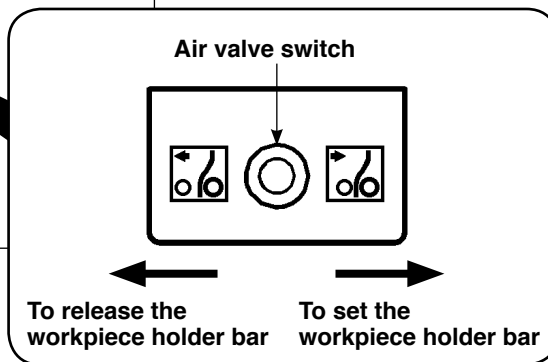
3) To increase the number of workpieces to be stacked on the cloth receiving table, change the position of the table.

   ① Remove split cotter pin ❶, pull out table check pin ❷, loosen handle ❸ and lower cloth receiving table ❹.
   ② Lower cloth receiving table ❹ to a desired height. Insert table check pin into hole ❺ in the cloth receiving table pipe, insert split cotter pin ❶ into table lock pin ❷, and secure with handle ❸.
   ③ Loosen bolts ❻ in the workpiece folder bars, front and rear, and align the bar rubber sections of those bars with the center of cloth receiving table ❹, and secure the workpiece holder bars by tightening bolts ❻.

Workpiece holder bar, rear

Workpiece holder bar, front
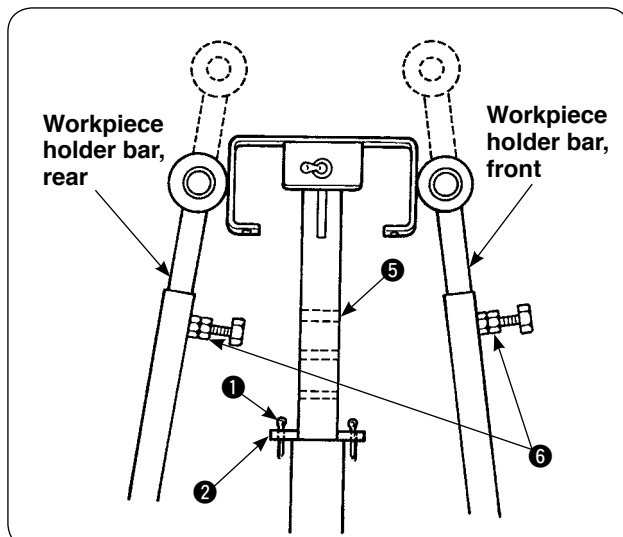
3. Installing and adjusting the bobbin winder

> **⚠ CAUTION :**
> **Securely fix parts by firmly tightening screws with a larger screwdriver and spanner since the parts may come off resulting in personal injury.**

(1) Assembling the bobbin winder
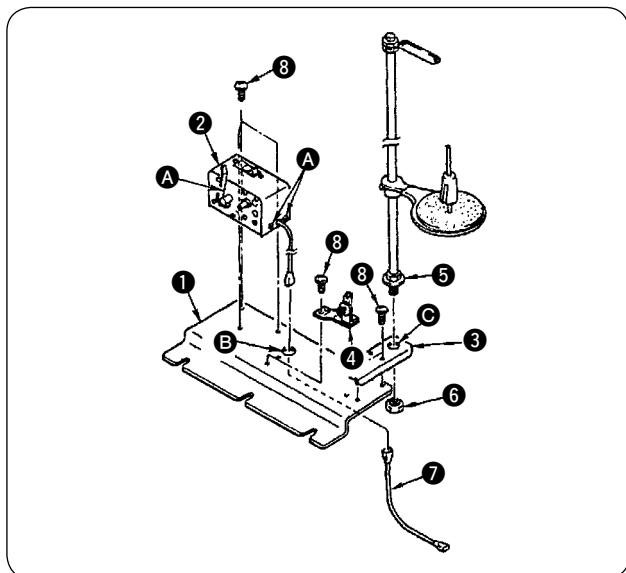
1) Fix bobbin winder ❷ on bobbin winder mounting plate ❶ with two setscrews ❽. In addition, pass the bundle wires of bobbin winder ❷ through hole Ⓑ in bobbin winder mounting plate ❶ and connect them to bobbin winder junction bundle wires ❼. Insert the other end of ❼ into CN61 on the main PCB.

2) Place thread stand mounting plate ❸ on bobbin winder mounting plate ❶ with four setscrews ❽. Mount thread stand asm. ❺ in hole Ⓒ in ❸ and secure with nut ❻.

3) Install tension regulator ❹ on bobbin winder mounting plate ❶ with two setscrews ❽.

(2) Installing and threading the bobbin winder
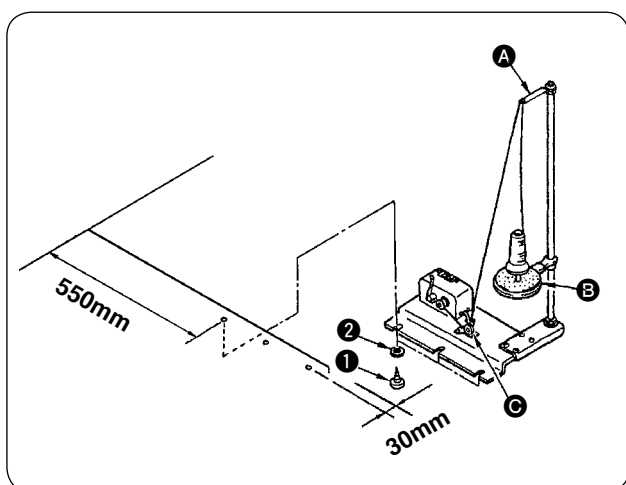
1) Install the bobbin winder on the auxiliary table with setscrews ❶ and ❷ so that the dimensions shown in the sketch at left are obtained.

2) Place thread on spool holder Ⓑ and pass it through take-up thread guide arm Ⓐ, then through tension regulator Ⓒ and wind on the bobbin.

3) Secure take-up thread guide arm Ⓐ and spool holder Ⓑ so that spool holder Ⓑ does not interfere with thread path when routing the thread from guide asm. Ⓐ to tension regulator Ⓒ.

(3) Winding and adjusting the bobbin

White engraved marker dot ❺
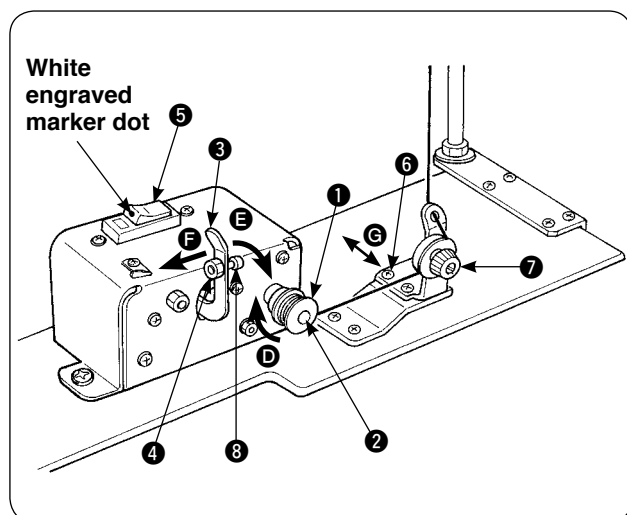
1) Fit bobbin ❶ over bobbin winder spindle ❷.
2) Wind thread on the bobbin by four or five turns in the direction of arrow ❻.
3) Bobbin winding starts by pressing bobbin winder stop latch ❸ against the bobbin (in the direction of arrow ❺) (breaker ❺ is in the ON state (where the white engraved marker dot is visible)) and automatically stops when the bobbin has been wound with a predetermined amount of thread (80 to 90 % of the outside diameter of the bobbin).
4) Loosen locknut ❹ of the bobbin winder stop latch boss and adjust the amount of thread to be wound on the bobbin by changing the position of bobbin winder stop latch boss ❽. (When the boss is moved in direction ❻, the amount of thread to be wound on the bobbin increases.) (The amount of thread to be wound on the bobbin increases by moving the latch in the direction of arrow ❻.)
5) Adjust the thread tension applied by the tension regulator, when winding the bobbin, to 0.4 N to 0.5 N by means of knob ❼.
6) Loosen screw ❻ and adjust the position of the tension regulator by moving it in direction ❻ (to the right or left) so that thread is wound round the center of bobbin.

> **Caution**
>
> 1. Even when breaker ❺ is in the ON state (where the white engraved marker dot is visible), the bobbin winder may fail to operate. In this case, the breaker is internally in the OFF state. The bobbin winder should be used after turning OFF and ON the breaker in order to avoid such a trouble.
> 2. Be sure to use JUKI's genuine bobbin and bobbin case.

4. Assembling the thread breakage detecting device and setting of the operation panel

⚠ **CAUTION :**
**Securely fix parts by firmly tightening screws with a larger screwdriver and spanner since the parts may come off resulting in personal injury.**
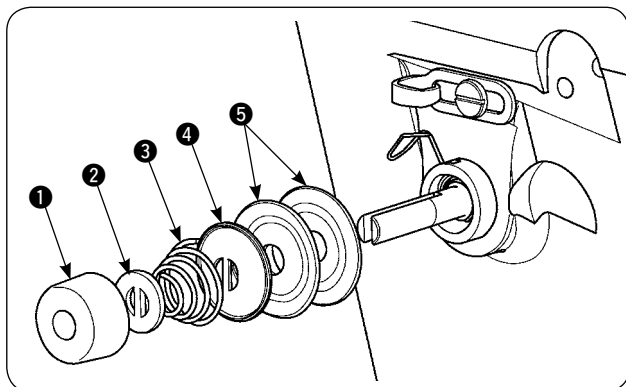
1) Loosen tension regulating nut ❶ of tension regulator asm. No. 2. Remove parts ❶ to ❺.
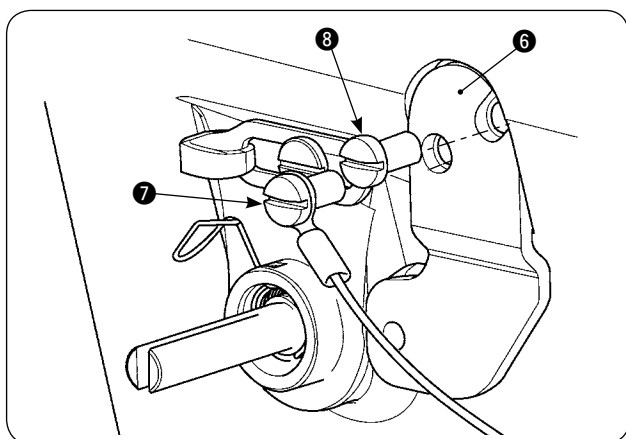
2) Place sensor plate mounting plate ❻ with screws ❼ and ❽.
Secure the ring crimp contact of the thread breakage detecting plate cable asm. also with screw ❼.
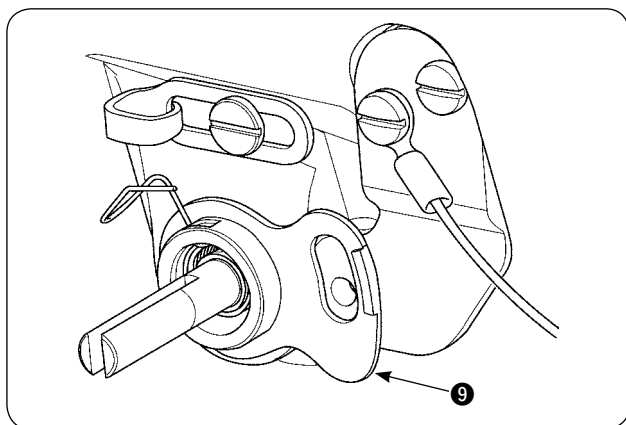
3) Put thread breakage detecting guide ❾ over thread tension spring to position as illustrated in the sketch at left.
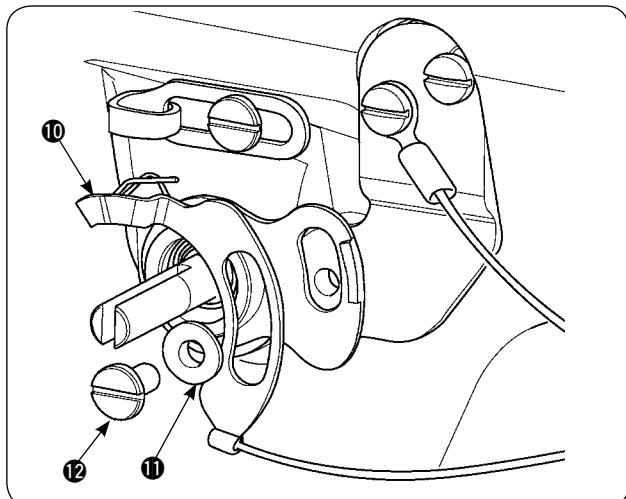
4) Temporarily secure thread breakage detecting plate cable asm. ❿ and thread breakage detecting plate guide bushing ⓫ with thread breakage detecting plate setscrew ⓬.
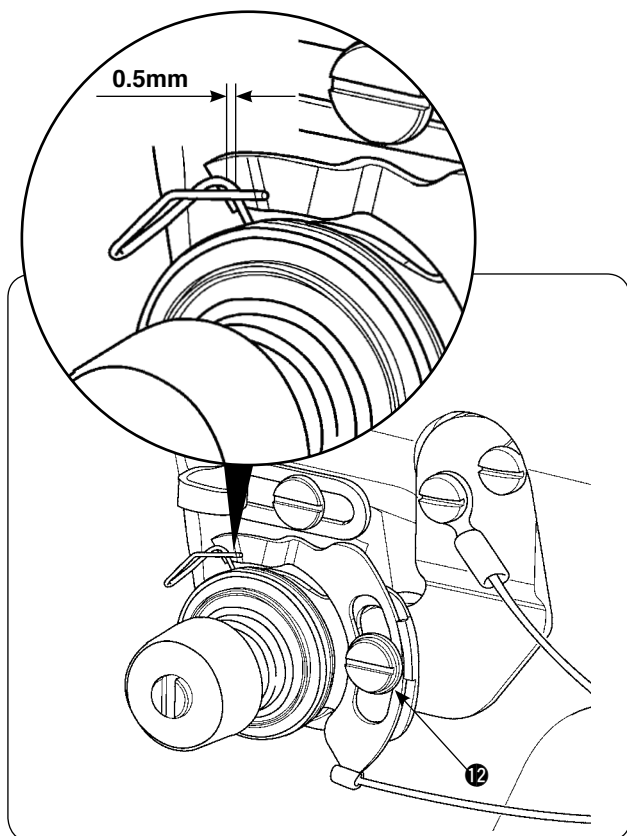
0.5mm

5) Re-assemble parts ❶ to ❺ which have been re-moved in step 1).

6) Turn the thread breakage detecting plate to the position where the pressing amount of the detecting plate against the thread take-up spring is 0.5 mm or less. Then, tighten screw ⓬.

Operation panel setting procedure

① Bring the display on the LCD ❶ to the sewing ready state.
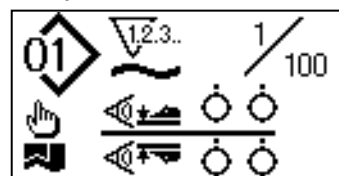
② Press READY key ❷ to change the display on LCD ❶.
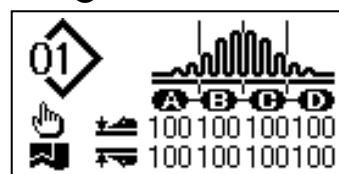
③ Press MODE key ❸ to call [U01] manipulator operation select on LCD ❶.

④ Press ITEM SELECT key ❹ to call [U23] thread breakage detecting operation selection on LCD ❶. Then, change over the setting to the device implementation using DATA CHANGE key ❺.
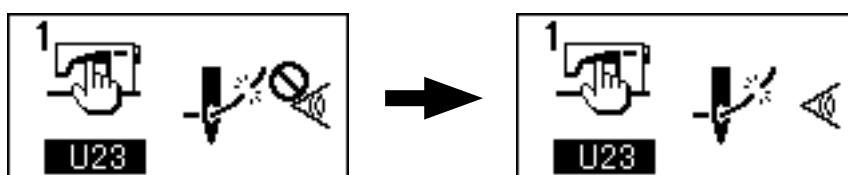
After completion of the setting procedure, press READY key ❷ to bring the operation panel to the set ready state, then run the sewing machine.
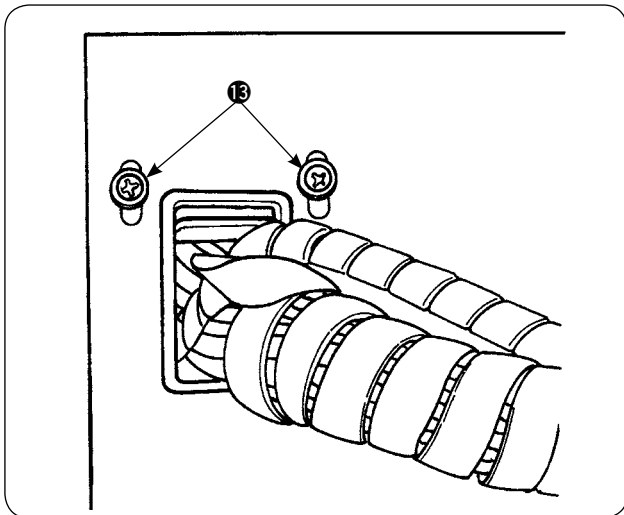
7) Loosen setscrews ⓭ in cord keep plate on the front cover of the electrical box. Raise the cord keep plate and pass the cord of thread breakage detecting plate cable asm. ❿ through the hole.
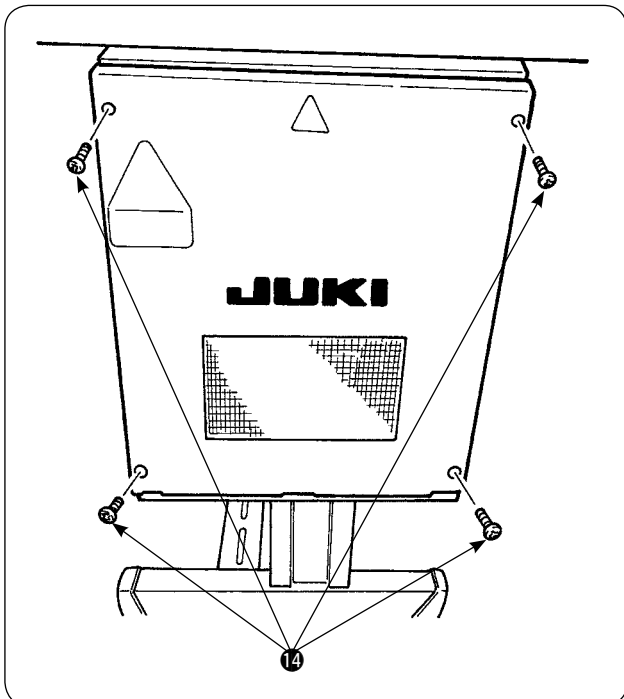
Remove four screws ⓮ which are used to secure the electrical box cover. Open the cover.

8) Insert the connector of thread breakage detecting plate cable asm. ❿ into CN60 (3P, yellow) on the main PCB inside the control box.

9) Secure the electrical box cover, lower the cord keep plate and secure the cover with the screws.

PCB

BOX side
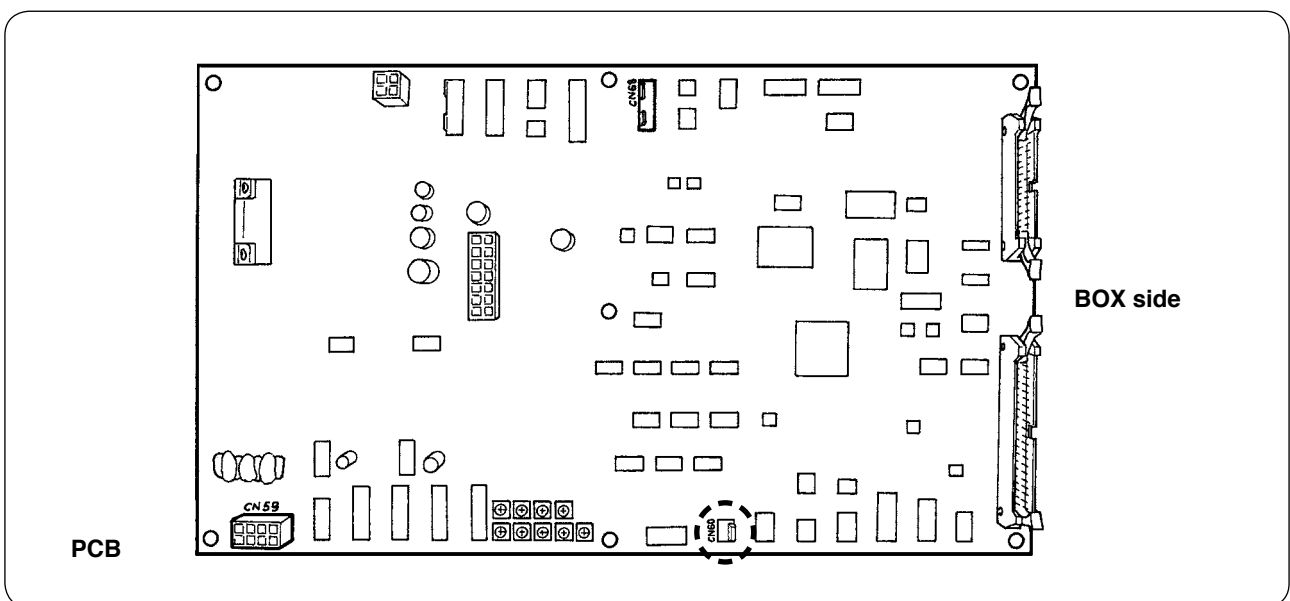
5. Installing the bobbin thread remaining amount detecting device

(1) Setting the bobbin thread remaining amount detection

Operator input screen

Bobbin thread remaining amount detection is effective

Bobbin thread remaining amount detection is ineffective

Screen displayed when setting the number of times of bobbin thread remaining amount detection
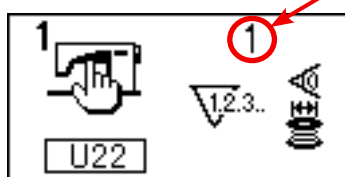
Set value

1) Press the **M** key to change over the screen to the operator input screen.

2) Press the ▲ key to change the data item from U01 to U21.

3) Set whether or not the bobbin thread remaining amount detection is effective by means of the ⊕ or ⊖ key.

4) Determine the number of times of bobbin thread remaining amount detection.
Press the ▲ key to change the data item U21 to U22.
(At this time, the data item cannot be changed to U22 if data item U21 is placed in ineffective.)

The value set in this section determines the number of time of bobbin thread remaining amount detection at which the bobbin thread runout warning message is displayed on the sewing machine panel (to prevent the sewing machine from proceeding to the next sewing).
If you think the bobbin thread still remains on the bobbin when the bobbin thread runout warning message is displayed, adjust by increasing the aforementioned number of times. Data setting range is 0 to 19.
When you set the number of times of bobbin thread remaining amount detection at 0, the bobbin thread remaining amount detection is temporarily placed in the OFF state.
If the bobbin thread remaining amount detection does not work, firstly check the set value for this data item.

(2) Adjusting procedure of the sensor position

Two sensors are used in the bobbin thread remaining amount detecting device. The device does not work properly unless those sensors are correctly positioned.
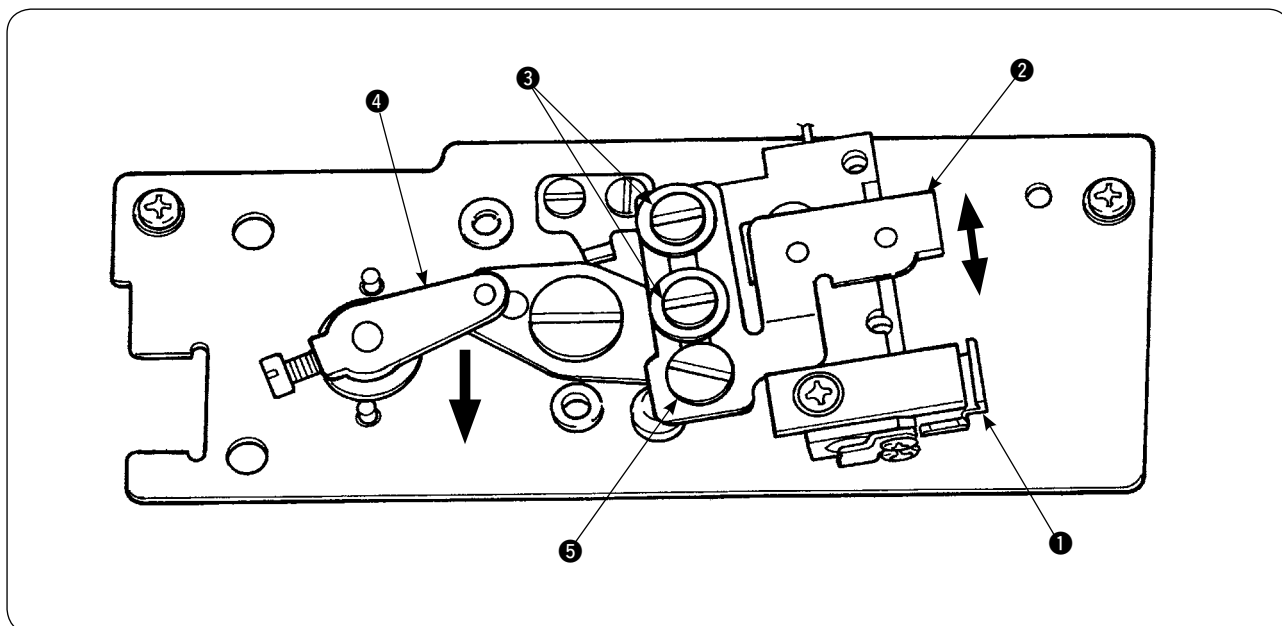
1. Home position sensor ❶
The one of the two sensors, which is located at the lower side of the device is the home position sensor ❶. Check to be sure that the light of the sensor goes out when the detecting rod hides in the hook and lights up when it comes back.

2. Detecting sensor ❷
Detecting sensor ❷, which is located at the upper side of the device, detects the remaining amount of bobbin thread. The remaining length of thread is changed by moving up or down the mounting position of the sensor. Be sure to adjust the position of the sensor according to the type of bobbin thread to be used and sewing length specified for the process.

1) Uniformly wind the bobbin thread to be actually used for sewing on the bobbin.
    The winding length of the thread is roughly as described below.
    Example) When the sewing length is 0.5 m:

0.5 m	×	5	+	1.5 m	=	4m
(Length of thread for each detection)		(Number of times of detection)		(Bobbin thread remaining length at the time of detection)		

2) Fit the bobbin in the bobbin case (exclusive). Put the bobbin case in the hook.
3) Slightly loosen two detecting sensor fixing screws ❸.
4) Turn eccentric pin ❺ to lower detecting sensor ❷ little by little from its highest position, while pressing down solenoid arm ❹ with one hand.
5) Lower detecting sensor ❷ until its monitor lamp lights up.
6) Carefully moving the solenoid arm up and down, check to be sure that the monitor lamp of detecting sensor ❷ flashes on and off.
7) The position at which the monitor lamp lights up and the position at which it goes out are not the same. It is therefore necessary to check the above at the former position.
8) Once the correct position of the sensor is found, securely tighten detecting sensor fixing screw ❸. At this time, carefully tighten the screw while preventing the sensor from being displaced.

(3) Installing the bobbin thread remaining amount detecting devices

Caution Be sure to install the driving device which has already been adjusted. If not, the sewing machine can fail.
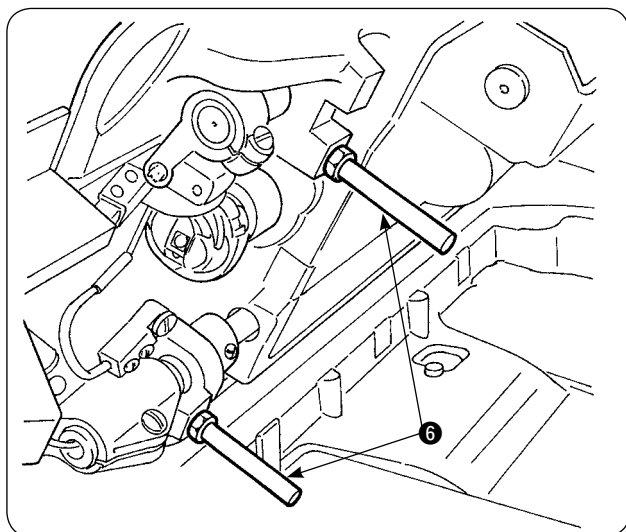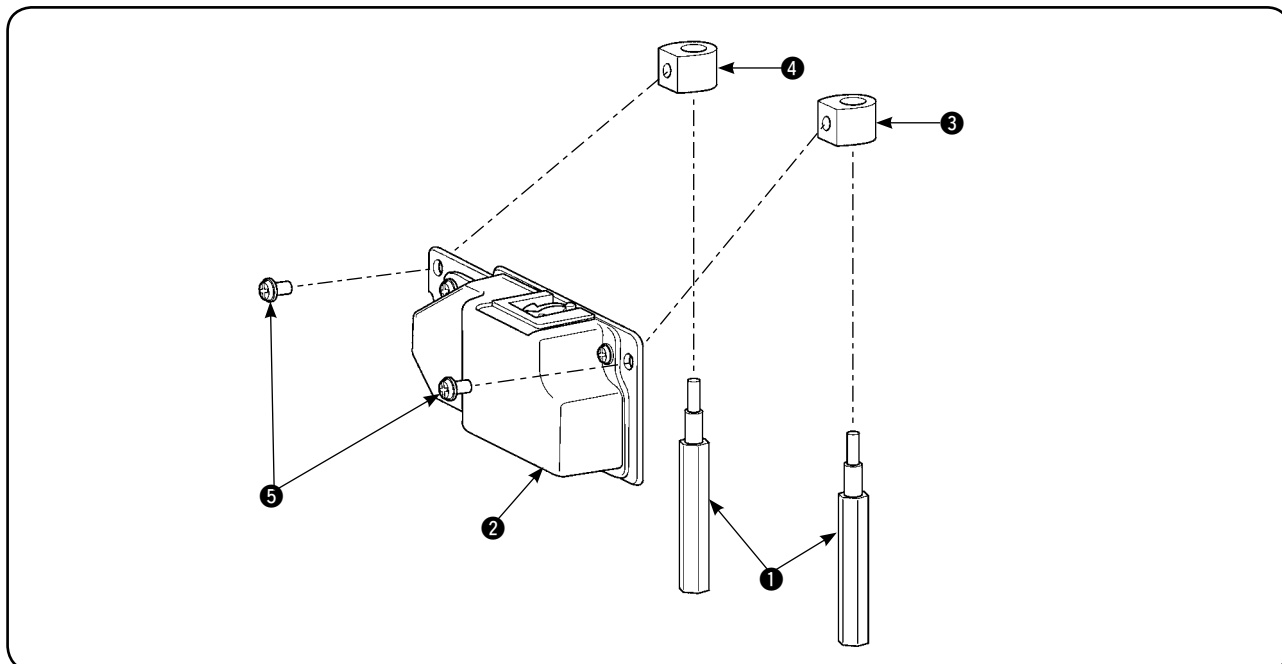
1) Remove two front bed struts ❻ from the sewing machine to which the bobbin thread remaining amount detecting device is to be installed.
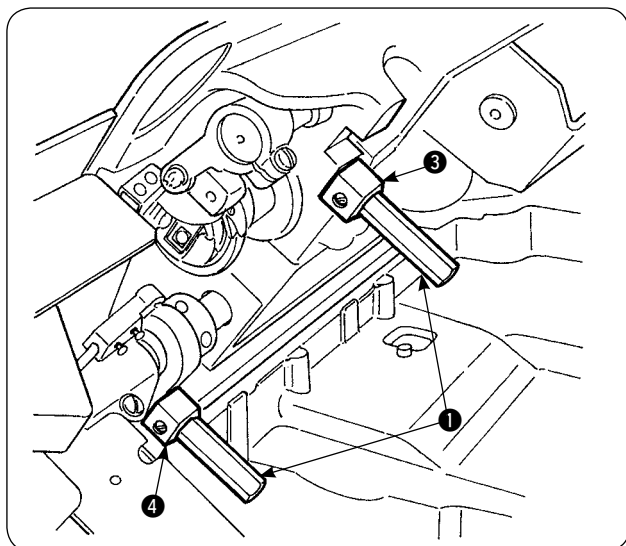
2) Install base plate stator ❸, ❹ to the bed with placed between bed struts ❶ supplied with the unit.

   There are two types of base plate stators ❸ and ❹, one for the left side and the other for the right side. Be sure to install them correctly.

Base plate stator for the left side (far side)	Area of flat section Small	
Base plate stator for the right side (Operator side)	Area of flat section Large	

– 28 –
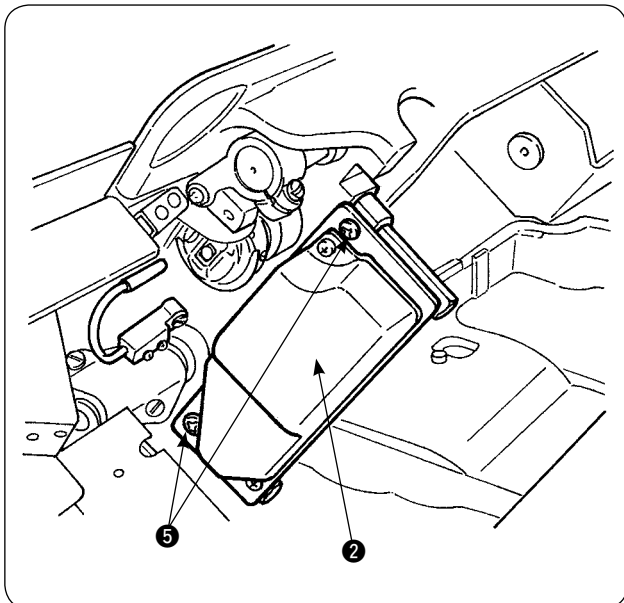
3) Secure driving device ❷ on right and left base plate stators ❸ and ❹ with screws ❺ supplied with the unit. At this time, carefully secure driving device ❷ so that the detecting rod correctly faces the center of inside of the hook.
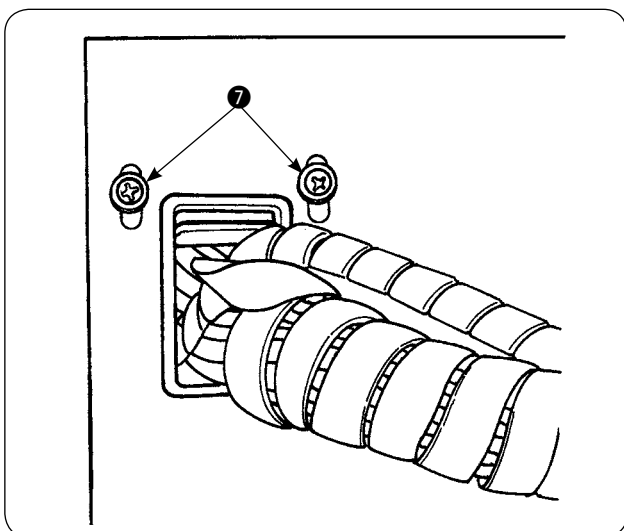
4) Loosen setscrews ❼ in the cord keep plate on the front cover of the control box and lift the cord keep plate. Pass the solenoid cord and sensor cord through the hole.
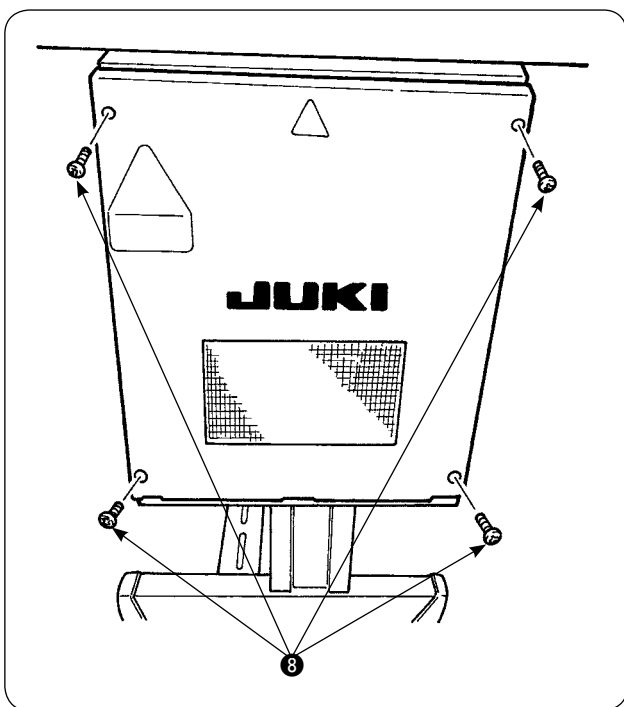
Remove four screws ❽ which are used to secure the electrical box cover. Open the cover.

BOX side

PCB

CN59

CN68

CN59

F – 1

CN58

Cord (black)

Cord (white)
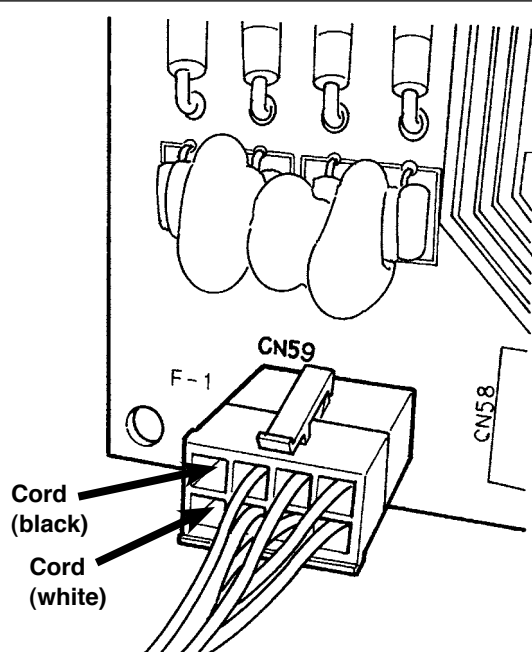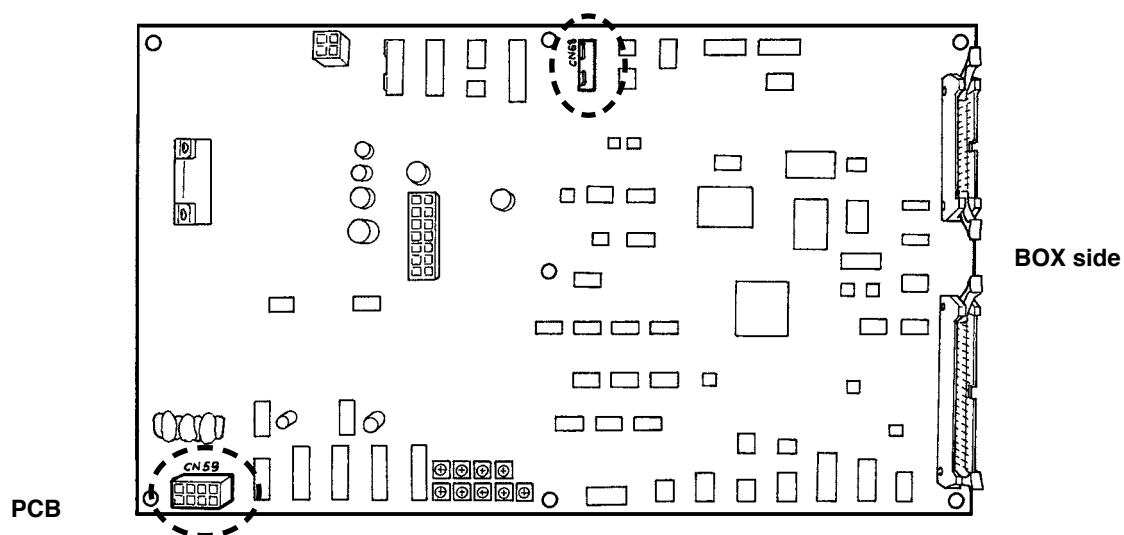
5) Insert the pins coming out from the solenoid into vacant receptacles of CN59 on the board. Insert the black pin into No. 8 and the white pin into No. 4.
Insert the sensor connector into CN68.

6) Close the electrical box cover. Clamp the cords coming out from the electrical box with the cord keep plate. Now, the installation of the bobbin thread remaining amount detecting sensor. Do not forget to tighten the screws in the cover.

7) Turn ON the power to the sewing machine. Set the bobbin thread remaining amount detection. (Refer to **"Ⅴ-5-(1) Setting the bobbin thread remaining amount detection" on page 26** for the setting procedure.)
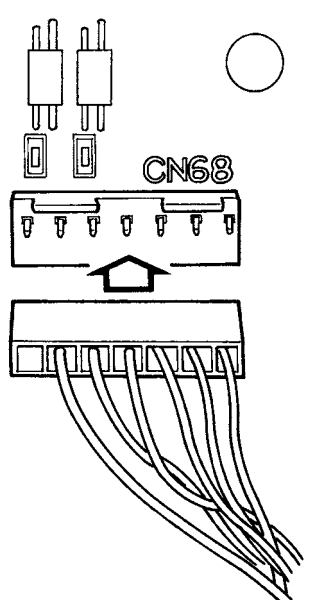
About errors

1. If the error display [E998] appears on the operation panel, turn OFF the power to the sewing machine once and check that the connectors are fully inserted into the board.

2. Remove the cover from the driving device for cleaning. In particular, the sensor and driving section should be carefully cleaned.

(4) Sewing

1) Set the bobbin thread remaining amount adjusting counter at "1." The counter value can be changed by means of $\oplus$ and $\ominus$ keys.

2) Start the normal sewing. (For test sewing, specify the sewing length which is same as that for actual process.)

3) The sewing machine continues sewing and the thread trimmer actuates again and again. Eventually the bobbin thread runs out and the detecting sensor detects the runout of bobbin thread. When the runout of bobbin thread is detected by the sensor, the value displayed on the counter changes from "1" to "-1" and the buzzer sounds.

4) At this time, observe the actual length of bobbin thread remaining on the bobbin and adjust the counter value appropriately.

5) The remaining length of bobbin thread when its runout has been detected by the sensor varies more or less even under the most favorable conditions. This variation is caused by the type of thread or sewing length. As a guide, the remaining length of bobbin thread varies by approximately three turns of thread around the bobbin.
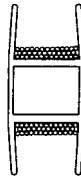   At this time, the length of thread is as shown in the following example.
   Adjust the counter so that bobbin thread remains by "a half of variation in length + 0.5 m."

[Example of thread length equivalent to three-turns of thread on the bobbin.]

	Spun thread #60, #80	Approximately 2.5 m for three turns around the bobbin
	Tetoron thread #60, #80	Approximately 3 m for three turns around the bobbin
	Spun thread, Tetoron thread #30	Approximately 2 m for three turns around the bobbin

6) If the counter value is increased by one, the remaining length of bobbin thread will be shortened by one sewing length.

7) Due to the aforementioned variation in the remaining length of bobbin thread, the bobbin thread may completely run out during sewing depending on the adjustment of the counter value. Adjust the counter to the set value which ensures that the bobbin thread will never run out during sewing in accordance with sewing conditions for each sewing process.

8) If the bobbin thread runs out during sewing even when the bobbin thread remaining amount adjustment counter at "1," or, to the contrary, if the remaining length of bobbin thread is still too long even when it is set at "19," the position of the detecting sensor has to be adjusted. (Refer to **"Ⅴ-5-(2) Adjusting procedure of the sensor position" on page 27** for the adjusting procedure.)
   In the case the bobbin thread runs out → Lower the position of the detecting sensor.
   In the case the remaining length of bobbin thread is too long → Raise the position of the detecting sensor.

(5) For proper operation of the bobbin thread remaining amount detecting device

This device mechanically detects the remaining amount of bobbin thread. Since the device performs detection after thread trimming, the remaining amount of bobbin thread varies by a certain degree. The variation in the remaining amount of bobbin thread can be minimized by paying attention to the following.

1. How the bobbin is wound with thread

The bobbin thread remaining amount detecting device detects the thread amount by directly touching the thread wound on the bobbin with its detecting rod. It is therefore important that the bobbin is uniformly wound with thread. In particular, carefully check how the thread is wound on the bobbin at the beginning of winding.
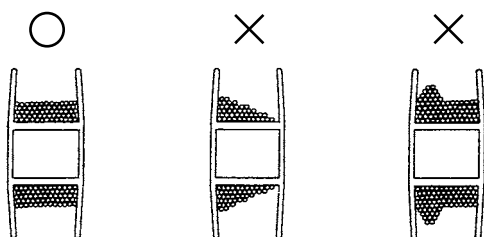
2. Sewing length

Since the device performs detection after thread trimming, the degree of variation in the remaining amount of bobbin thread differs according to the sewing length of one sewing operation.
In general, the shorter the sewing length of one sewing operation is set, the smaller the variation in the remaining amount of bobbin thread becomes small. In the case multiple processes are combined for sewing where the sewing length differs by process, the variation can become larger.

<Guide of variation>
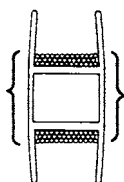
Length of thread when wound on the bobbin by three turns

Spun thread #60, #80	Approx. 2 to 2.5 m
Tetoron thread #60, #80	Approx. 3 m
Spun thread, Tetoron thread #30	Approx. 2 m

Ⅵ. HOW TO USE THE OPERATION PANEL

1. Explanation about switches on the operation panel
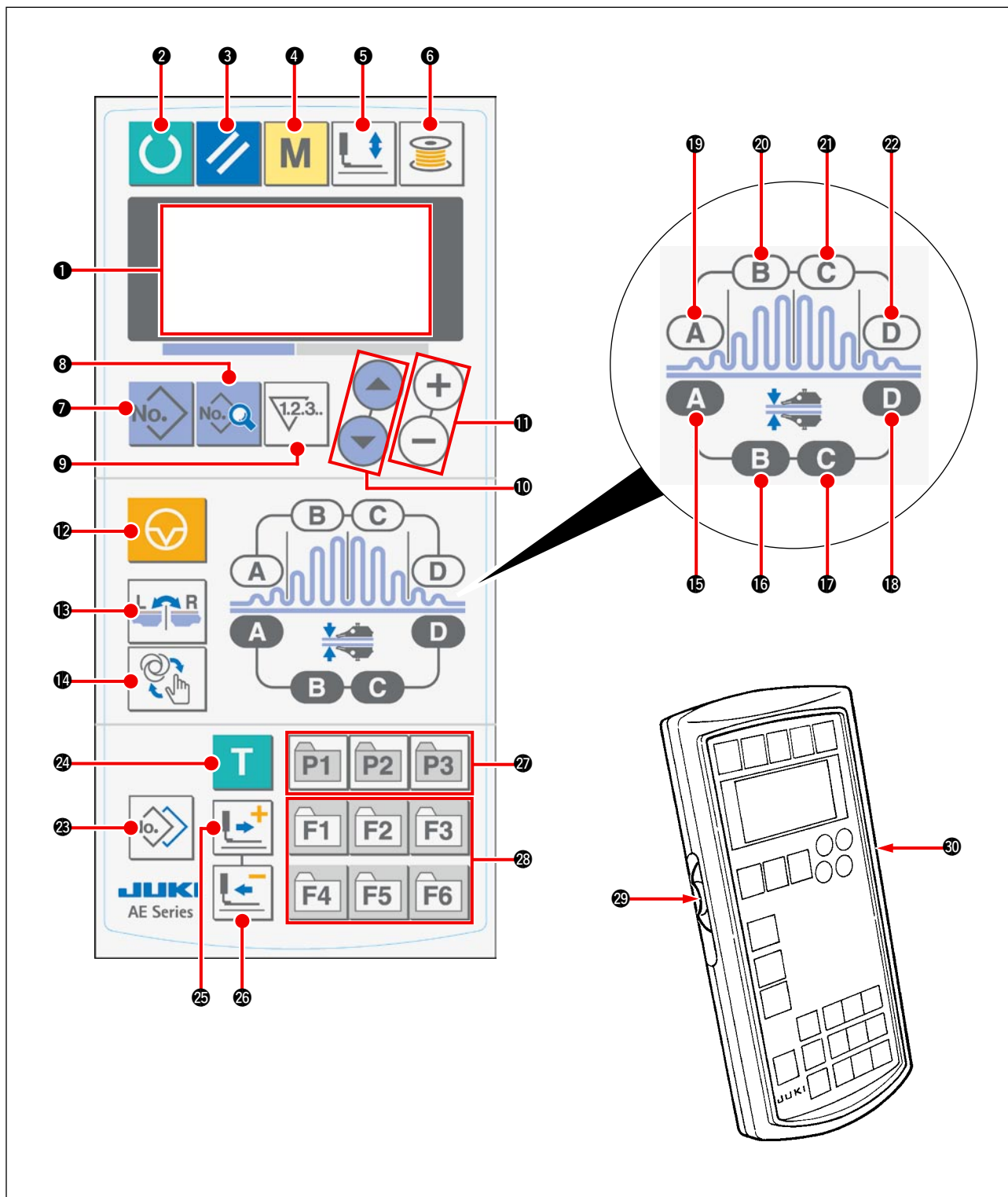
The operation panel has three different modes in accordance with the color of backlight.

Blue: Input mode ... The state where data can be changed

Green: Sewing mode .. The state where sewing is enabled

Yellow: Error state .. The state where an error has occurred

Symbol	Name	Function
❶	LCD display section	Various kinds of data such as pattern number and shape are displayed.
❷	READY key	To be pressed to start sewing Every time the READY key is pressed, the state is changed over between the "ready for sewing" state and the "data setting" state.
❸	RESET key	To be pressed to reset an error, move the feed to the initial position or to rest the counter
❹	MODE key	To be pressed to change data on the memory switch
❺	PRESSER FOOT key	To be pressed to lift/lower the presser foot
❻	BOBBIN WINDER key	To be pressed to wind a bobbin
❼	PATTERN No. key	To be used to select the pattern No. display
❽	DATA key	To be used to select the data display
❾	COUNTER key	To be used to select the counter display
❿	ITEM SELECT key	To be used to select the pattern No., data No., etc.
⓫	DATA CHANGE key	To be used to change various kinds of data
⓬	TEMPORARY STOP key	To be used to temporarily stop the operation
⓭	RIGHT/LEFT CHANGEOVER key	To be used, when copying data, to select whether or not the data is copied with right and left changed over
⓮	AUTO/MANUAL SELECT key	To be used to select the AUTO or MANUAL mode
⓯	MANIPULATOR SECTION A key	To be used to display manipulator items Every time the key is pressed, the setting item is changed.

Symbol	Name	Function
⓰	MANIPULATOR SECTION B key	To be used to display manipulator items Every time the key is pressed, the setting item is changed.
⓱	MANIPULATOR SECTION C key	To be used to display manipulator items Every time the key is pressed, the setting item is changed.
⓲	MANIPULATOR SECTION D key	To be used to display manipulator items Every time the key is pressed, the setting item is changed.
⓳	SHIRRING SECTION A key	To be used to display shirring items Every time the key is pressed, the setting item is changed.
⓴	SHIRRING SECTION B key	To be used to display shirring items Every time the key is pressed, the setting item is changed.
㉑	SHIRRING SECTION C key	To be used to display shirring items Every time the key is pressed, the setting item is changed.
㉒	SHIRRING SECTION D key	To be used to display shirring items Every time the key is pressed, the setting item is changed.
㉓	COPY key	To be pressed to copy a pattern
㉔	TEACHING key	To be pressed to perform teaching
㉕	FORWARD key	To be used to move the teaching section forward
㉖	BACKWARD key	To be used to move the teaching section backward
㉗	PATTERN REGISTRATION key	This is the shortcut key with which a pattern can be registered. It enables shortcut to a desired pattern setting display.
㉘	PARAMETER REGISTRATION key	This is the shortcut key with which a parameter can be registered. It enables shortcut to the setting display of a desired pattern, sewing parameter and adjustment data.
㉙	SPEED VARIABLE RESISTER	Speed of stitch is increased by moving this variable resister upward, or decreased by moving it downward.
㉚	VARIABLE RESISTOR for adjusting the LCD	Contrast of the screen can be adjusted.

2. Basic operation of the sewing machine

1) Turn ON the power switch.

2) Select the pattern No. you want to sew.

When the power to the sewing machine is turned ON, the currently selected pattern No. **B** flashes on and off on the operation panel. If you want to change the pattern No., press ITEM SELECT key ❿ to select a desired pattern No.

In the purchased state, pattern Nos. 1 to 3, described in **"Ⅵ-6. Changing the sewing data" on page 41** have been factory-registered. Select one from those 3 pattern Nos. (For a pattern which has not been registered, no number is displayed.)
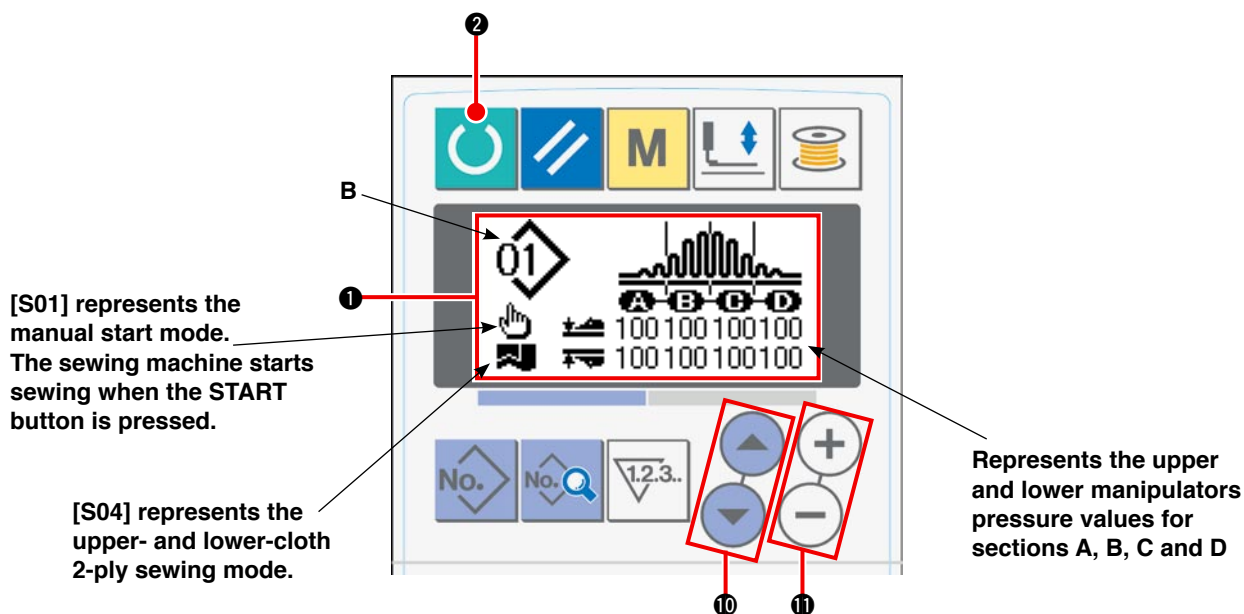
❷

B

❶

[S01] represents the manual start mode. The sewing machine starts sewing when the START button is pressed.

[S04] represents the upper- and lower-cloth 2-ply sewing mode.

Represents the upper and lower manipulators pressure values for sections A, B, C and D

❿   ⓫

[In the case of different setting]

[S01] represents the automatic start mode. Once the material is placed on the machine, the sewing machine automatically starts sewing when the preset time has elapsed. Be extremely careful when the automatic start mode is selected.

[S04] represents the 1-piece sewing mode.

When you press DATA CHANGE key ⓫ ⊕ ⊖ while the LCD ❶ gives the above display, the four-section display appears on the LCD.

Section display

Currently selected pattern No.

Number of stitches for section

Upper/lower manipulators pressure value

Upper shirring

– 35 –
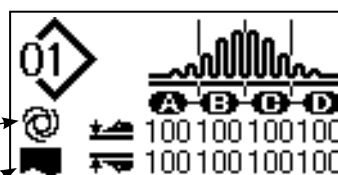
3) Bring the sewing machine into the sewing ready state.

When you press READY key ❷ , the backlight of LCD display ❶ changes from blue to green to enable sewing.

Counter display

Currently selected pattern No.

[S01] represents the manual start mode. The sewing machine starts sewing when the START button is pressed.

[S04] represents the upper- and lower-cloth 2-ply sewing mode.

The state where the upper manipulator, outer sensor does not detect a material

The state where upper manipulator, inner sensor does not detect a material

The state where the lower manipulator, outer sensor does not detect a material

The state where the lower manipulator, inner sensor does not detect a material

Display which appears when the sensor detects a material

The state where the sensor detects a material

[In the case of different setting]

[S01] represents the automatic start mode. Once the material is placed on the machine, the sewing machine automatically starts sewing when the preset time has elapsed. Be extremely careful when the automatic start mode is selected.

[S04] represents the 1-piece sewing mode.

When you press DATA CHANGE key ⓫ ⊕ ⊖ while the LCD ❶ gives the above display, the four-section display appears on the LCD.

The section being sewn is shown in reverse display.
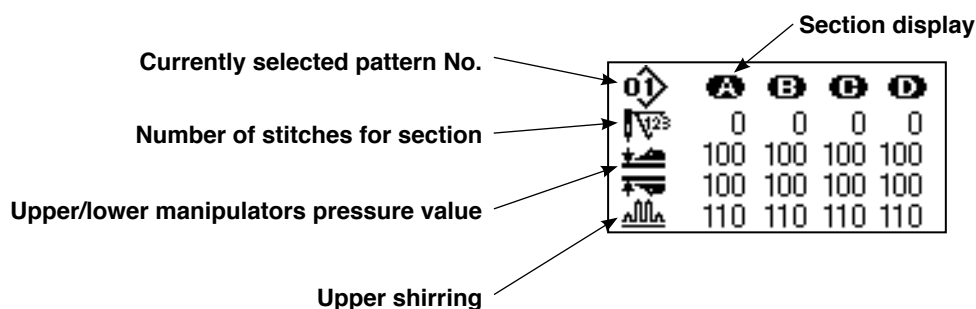
Currently selected pattern No.

Number of stitches for section

Upper/lower manipulators pressure value

Upper shirring

4) Start sewing.

Place the material under the presser foot. Press the start button. The sewing machine starts sewing.
* The optionally available pedal switch can be selected.

– 36 –

3. Selecting a pattern

(1) Selection on the pattern selection screen

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ [icon] to change over the mode to the input mode.

2) Call the pattern selection screen.

When you press PATTERN No. key ❼ [No.], currently selected pattern No. **B** flashes on and off.

3) Select a pattern.

When you press ITEM SELECT key ❿ [▲] [▼], registered patterns are displayed one after another. Now, select the pattern No. you want to sew.
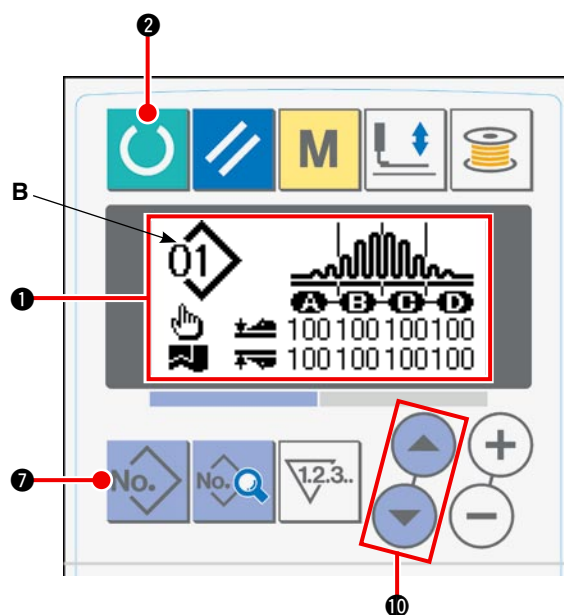
(2) Selection by means of the REGISTRATION key

This sewing machine permits registration of a desired pattern No. to the REGISTRATION switch. Once the pattern is registered to the switch, you can select the pattern only by pressing the switch. → Refer to .

4. Winding a bobbin

(1) Bobbin winding procedure

1) Set a bobbin.

Fit a bobbin over the bobbin winder spindle until it will go no further. Route thread as illustrated and wind thread on the bobbin. Then, press bobbin winding lever ① in the direction of the arrow.

2) Place the operation panel in the bobbin winding mode.

It is possible to place the operation panel in the bobbin winding mode by pressing BOBBIN WINDER key ❻ 🧵 either from the input mode or from the sewing mode. Bobbin winding screen **C** is displayed on the LCD.

3) Start winding the bobbin.

When you press the start switch, the sewing machine runs to start winding the bobbin.

4) Stop the sewing machine.

When the bobbin has been wound with a predetermined amount of thread, bobbin winding lever ① is released. Then, press BOBBIN WINDER key ❻ 🧵 or the start switch to stop the sewing machine. Then, remove the bobbin and cut the thread with thread trimmer retaining plate ③.

- When you press BOBBIN WINDER key ❻ 🧵, the sewing machine stops and returns to the normal mode.
- When you press the start switch, the sewing machine stops in the bobbin winding mode. It is recommended to use the start switch when you wind two or more bobbins continuously.
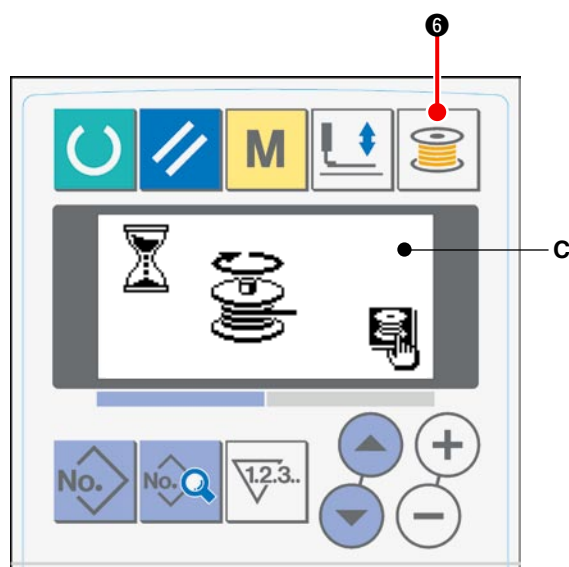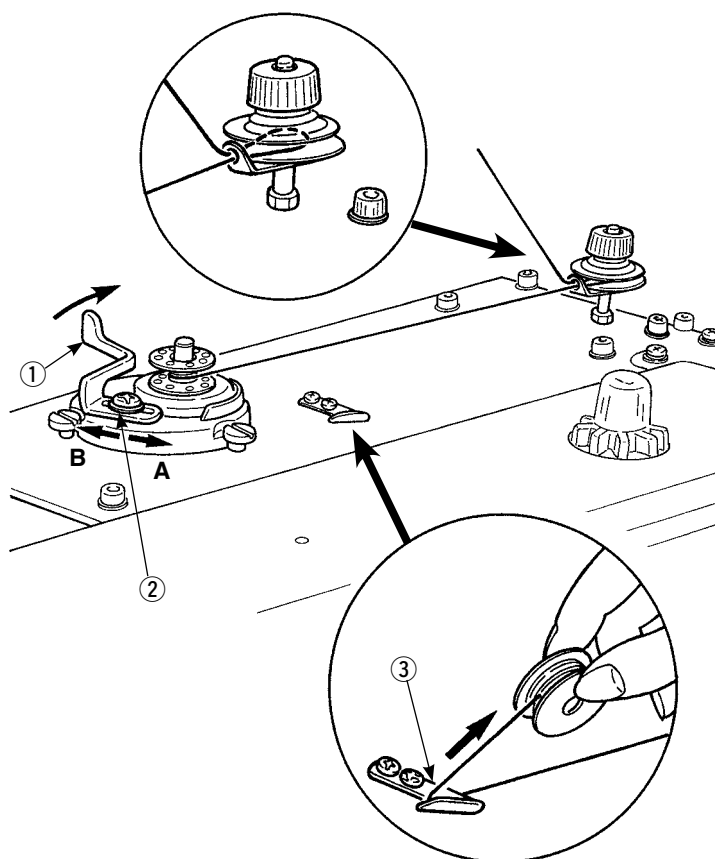
(2) Adjusting the bobbin thread amount

To adjust the amount of thread to be wound round a bobbin, loosen screw ②, move bobbin winding lever ① in direction **A** or **B** for adjustment, and tighten setscrew ②.

Direction **A**: The amount of bobbin thread is decreased.
Direction **B**: The amount of bobbin thread is increased.

– 38 –

(3) Adjusting the bobbin winder
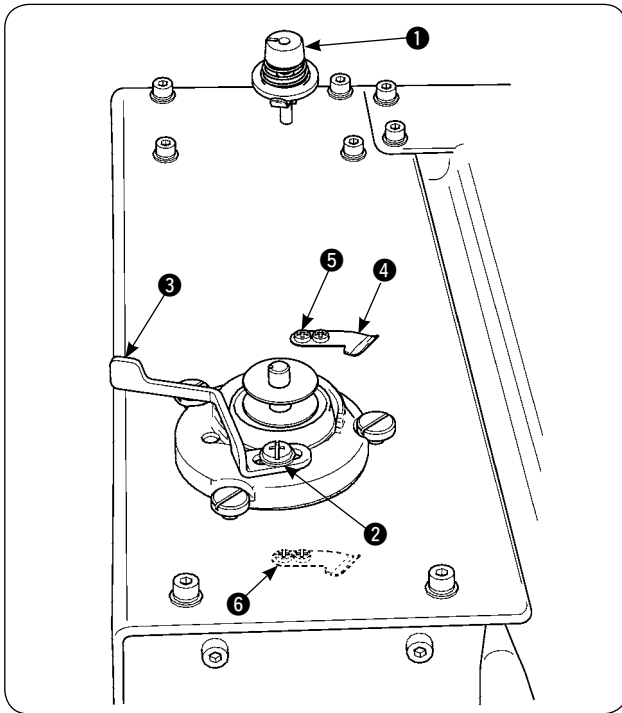
1) Adjust the take-up thread guide tension to 0.5 N to 0.8 N (maximum) by means of tension regulating knob ❶.

2) Loosen bobbin winder stop latch lever setscrew ❷ and adjust so that thread is wound uniformly round a bobbin by 80 to 90 % of its diameter and bobbin winding operation stops by moving bobbin winder stop latch lever ❸ to the right or left.

3) The bobbin winder can be used with the position of bobbin thread presser ❹ changed. To re-position the bobbin thread presser, remove bobbin thread presser setscrew ❺ and re-position it to the location of tap ❻.

> ⚠ Caution
> **If an excessive amount of thread wound round a bobbin, thread may wind on the bobbin winder spindle, causing a failure.**

5. Using the counter

(1) Setting procedure of the counter value

1) Call the counter setting screen.

When you press COUNTER key ❾ [1.2.3.] under the input mode, Counter screen **A** is displayed on the LCD to enable setting. A counter value can only be specified under the input mode (backlight of LCD display ❶ is blue). If the operation panel is under the sewing mode (backlight of LCD display ❶ is green), press READY key ❷ [○] to place the operation panel in the input mode.

2) Select the type of counter.

Press ITEM SELECT key ❿ [▲] [▼] to make Pictograph **B** which represents the type of counter flash on and off. Press DATA CHANGE key ⓫ [+] [−] to select a desired type of counter from those shown below.

3) Change the counter value.

Press ITEM SELECT key ❿ [▲] [▼] to make Counter set value **C** flash on and off. Press DATA CHANGE key ⓫ [+] [−] to enter a set value at which the counter stops counting.

4) Change the current value on the counter.

Press ITEM SELECT key ❿ [▲] [▼] to make Current value **D** flash on and off. Press REST key ❸ [//] to clear the current value being counted on the counter. It is also possible to edit the current value using DATA CHANGE key ⓫ [+] [−].

(2) Counter types

[1.2.3.↑] ① **No. of pcs. UP counter**

Every time one cycle or one continuous sewing is carried out, the current value on the counter increases. When the current value reaches the set value, the count-up screen is displayed.

[1.2.3.↓] ② **No. of pcs. DOWN counter**

Every time one cycle or one continuous sewing is carried out, the current value on the counter decreases. When the current value reaches 0 (zero), the count-up screen is displayed.

[🚫1.2.3.] ③ **Counter unused**

(3) Resetting procedure of the count up state

When the count-up condition is reached during sewing work, the entire count-up screen **E** flashes on and off. When you press RESET key ❸ [//], the counter is reset and returns to the sewing mode. Then, the counter starts counting again.

6. Changing the sewing data

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ [ ] to change over the mode to the input mode.

Currently selected pattern No.

Pictograph which represents data item

2) Call the sewing data edit screen.

When you press DATA key ❽ [No.Q], sewing data edit screen **A** for the currently selected pattern No. is displayed.

3) Select the sewing data to be changed.

Press ITEM SELECT key ❿ [▲] [▼] to select the target data item.

Data items that are not used due to the pattern shape and that have been disabled are skipped and are not displayed.

Data item No.

4) Change the data.

Sewing data consists of data items value for which are to be changed and those pictograph for which is to be selected. The data item value for which is to be changed is provided with an alphanumeric number such as ⌊ S03 ⌋. The value for the item can be changed by increasing/decreasing the set value using DATA CHANGE key ⓫ [+] [−].

The data items pictograph for which is to be changed is provided with an alphanumeric number such as [S01]. The pictograph for the item can be selected using DATA CHANGE key ⓫ [+] [−].

→ Refer to **"Ⅵ-8. Sewing data list" on page 43** for details of sewing data.

7. Using the initial value pattern

It is easy to program new sewing data by copying the initial value pattern.

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ [⏻] to change over the mode to the input mode.

2) Call the initial value pattern.

When you press PATTERN No. key ❼ [No.], pattern selection screen **A** is displayed. The currently selected pattern No. **B** flashes on and off. Select INITIAL VALUE PATTERN [⬦] by pressing ITEM SELECT key ❿ [▲][▼].
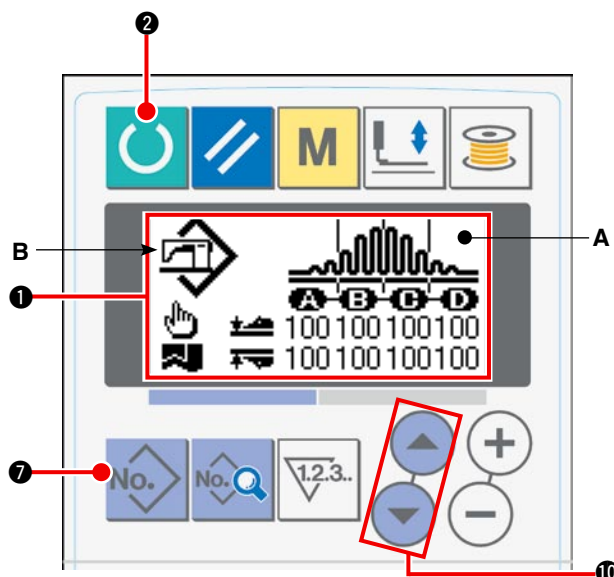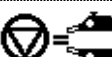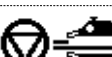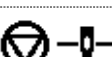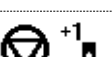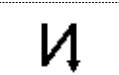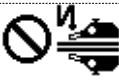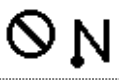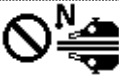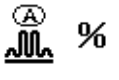
3) Copy the initial value pattern.
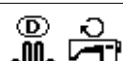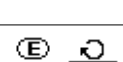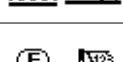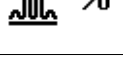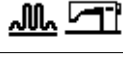
Copy the pattern selected in the aforementioned step to a normal pattern and use it.
Refer to **"Ⅵ-9. Copying a sewing pattern" on page 50** for the procedure for copying.
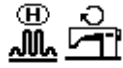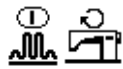
8. Sewing data list

No.	Item		Setting range	Unit	Initial value
S01	Start mode		–	–	Manual start
	Manual start		Selection		
	Auto start (Once the material is placed on the sewing machine, the machine starts sewing after a preset period of time.)				
S02	Automatic material alignment		–	–	With automatic material alignment
	Without automatic material alignment		Selection		
	With automatic material alignment				
S03	Sewing end time		0 to 200	msec	10
S04	Changeover of No. of plies		–	–	Upper and lower materials 2 plies sewing
	Upper and lower materials 2 plies sewing		Selection		
	1 piece sewing				
S05	Changeover of upper/lower position of presser foot at stop during sewing		–	–	Presser foot stops at lower position at stop during sewing
	Presser foot stops at lower position at stop during sewing		Selection		
	Presser foot stops at upper position at stop during sewing				
S06	Changeover of sewing end		–	–	Sewing ends when all materials move away from the manipulator
	Sewing ends when all materials move away from the manipulator		Selection		
	Sewing ends when 1 pc. of material moves away from the manipulator				
S10	Stop after total number of stitches		0 to 9999	Number of stitches	0
S11	Stop state after total number of stitches		–	–	Stop after thread trimming
	Stop after thread trimming		Selection		
	Stop with the needle down				
	Stop with the needle down and one stitch is additionally sewn				
S20	Upper scrape-out speed of manipulator		0 to 9	No unit	8
S21	Upper draw-in speed of manipulator		0 to 9	No unit	8
S22	Lower scrape-out speed of manipulator		0 to 9	No unit	8
S23	Lower draw-in speed of manipulator		0 to 9	No unit	8

No.	Item		Setting range	Unit	Initial value
S24	Cloth fluff detection level	◁ 🏴	0 to 10	No unit	0: Cloth fluff detection is not performed.
S25	Setting of manipulator-pressure intermittent-adjustment section		–	–	No setting of manipulator-pressure intermittent-adjustment section
	No setting of manipulator-pressure intermittent-adjustment section	🚫 🏴			
	A section setting	Ⓐ 🏴			
	B section setting	Ⓑ 🏴			
	C section setting	Ⓒ 🏴			
	D section setting	Ⓓ 🏴			
	E section setting	Ⓔ 🏴			
	F section setting	Ⓕ 🏴			
	G section setting	Ⓖ 🏴			
	H section setting	Ⓗ 🏴			
	I section setting	Ⓘ 🏴			
	J section setting	Ⓙ 🏴			
S26	Number of stitches for intermittent interval of upper manipulator pressure	🏴	0 to 10	Number of stitches	0 The initial value is not displayed when [S25] manipulator presser intermittent adjustment section setting is set to "No setting."
S27	Number of stitches for intermittent interval of lower manipulator pressure	🏴	0 to 10	Number of stitches	0 The initial value is not displayed when [S25] manipulator presser intermittent adjustment section setting is set to "No setting."
S28	A speed of machine (rabbit)	Ⓐ 🐇	200 to 3500	sti/min	3500
S29	B speed of machine (turtle)	Ⓑ 🐢	200 to 3500	sti/min	1500
S30	Sewing start - Selection of back tack		–	–	Without reverse feed stitching
	Without reverse feed stitching	🚫 И			
	With reverse feed stitching	И			

No.	Item		Setting range	Unit	Initial value
S31	Sewing start - Number of back tack stitches - A		0 to 15	Number of stitches	4 The initial value is not displayed when [S30] reverse feed stitching at the start of sewing is set to "Without reverse feed stitching."
S32	Sewing start - Number of back tack stitches - B		0 to 15	Number of stitches	4 The initial value is not displayed when [S30] reverse feed stitching at the start of sewing is set to "Without reverse feed stitching."
S33	Sewing start - State of back tack manipulator		–	–	Without manipulator
	Without manipulator				
	With manipulator				
S34	Sewing end - Selection of back tack		–	–	Without reverse feed stitching
	Without reverse feed stitching				
	With reverse feed stitching				
S35	Sewing end - Number of back tack stitches - C		0 to 15	Number of stitches	4 The initial value is not displayed when [S34] reverse feed stitching at the end of sewing is set to "Without reverse feed stitching."
S36	Sewing end - Number of back tack stitches - D		0 to 15	Number of stitches	4 The initial value is not displayed when [S34] reverse feed stitching at the end of sewing is set to "Without reverse feed stitching."
S37	Sewing end - State of back tack manipulator		–	–	Without manipulator
	Without manipulator				
	With manipulator				
S40	Section A - Shirring amount		0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S40	Section A - Shirring ratio		0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S41	Machine head section speed A		200 to 3500	sti/min	3500
S42	Shirring changeover position A (number of stitches)		0 to 9999	Number of stitches	0
S43	Section B - Shirring amount		0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.

No.	Item		Setting range	Unit	Initial value
S43	Section B - Shirring ratio	Ⓑ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S44	Machine head section speed B	Ⓑ	200 to 3500	sti/min	3500
S45	Shirring changeover position B (number of stitches)	Ⓑ	0 to 9999	Number of stitches	0
S46	Section C - Shirring amount	Ⓒ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S46	Section C - Shirring ratio	Ⓒ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S47	Machine head section speed C	Ⓒ	200 to 3500	sti/min	3500
S48	Shirring changeover position C (number of stitches)	Ⓒ	0 to 9999	Number of stitches	0
S49	Section D - Shirring amount	Ⓓ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S49	Section D - Shirring ratio	Ⓓ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S50	Machine head section speed D	Ⓓ	200 to 3500	sti/min	3500
S51	Shirring changeover position D (number of stitches)	Ⓓ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S52] to [S68] are not displayed.
S52	Section E - Shirring amount	Ⓔ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S52	Section E - Shirring ratio	Ⓔ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S53	Machine head section speed E	Ⓔ	200 to 3500	sti/min	
S54	Shirring changeover position E (number of stitches)	Ⓔ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S55] to [S68] are not displayed.
S55	Section F - Shirring amount	Ⓕ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S55	Section F - Shirring ratio	Ⓕ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S56	Machine head section speed F	Ⓕ	200 to 3500	sti/min	
S57	Shirring changeover position F (number of stitches)	Ⓕ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S58] to [S68] are not displayed.

No.	Item		Setting range	Unit	Initial value
S58	Section G - Shirring amount	ⓖ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S58	Section G - Shirring ratio	ⓖ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S59	Machine head section speed G	ⓖ	200 to 3500	sti/min	
S60	Shirring changeover position G (number of stitches)	ⓖ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S61] to [S68] are not displayed.
S61	Section H - Shirring amount	ⓗ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S61	Section H - Shirring ratio	ⓗ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S62	Machine head section speed H	ⓗ	200 to 3500	sti/min	
S63	Shirring changeover position H (number of stitches)	ⓗ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S64] to [S68] are not displayed.
S64	Section I - Shirring amount	ⓘ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S64	Section I - Shirring ratio	ⓘ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S65	Machine head section speed I	ⓘ	200 to 3500	sti/min	
S66	Shirring changeover position I (number of stitches)	ⓘ	0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S67] to [S68] are not displayed.
S67	Section J - Shirring amount	ⓙ mm	0 to 8.0	mm	2.4 Displayed when "absolute value display" is selected in [U06] Shirring display.
S67	Section J - Shirring ratio	ⓙ %	0 to 200	Percent	110 Displayed when "percentage display" is selected in [U06] Shirring display.
S80	Section A - Upper manipulator pressure	Ⓐ	0 to 200	No unit	100
S81	Section A - Lower manipulator pressure	Ⓐ	0 to 200	No unit	100
S82	Upper/lower manipulator pressure changeover position A (number of stitches)	Ⓐ	0 to 9999	Number of stitches	0
S83	Section B - Upper manipulator pressure	Ⓑ	0 to 200	No unit	100
S84	Section B - Lower manipulator pressure	Ⓑ	0 to 200	No unit	100

No.	Item		Setting range	Unit	Initial value
S85	Upper/lower manipulator pressure changeover position B (number of stitches)		0 to 9999	Number of stitches	0
S86	Section C - Upper manipulator pressure		0 to 200	No unit	100
S87	Section C - Lower manipulator pressure		0 to 200	No unit	100
S88	Upper/lower manipulator pressure changeover position C (number of stitches)		0 to 9999	Number of stitches	0
S89	Section D - Upper manipulator pressure		0 to 200	No unit	100
S90	Section D - Lower manipulator pressure		0 to 200	No unit	100
S91	Upper/lower manipulator pressure changeover position D (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S92] to [S108] are not displayed.
S92	Section E - Upper manipulator pressure		0 to 200	No unit	100
S93	Section E - Lower manipulator pressure		0 to 200	No unit	100
S94	Upper/lower manipulator pressure changeover position E (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S95] to [S108] are not displayed.
S95	Section F - Upper manipulator pressure		0 to 200	No unit	100
S96	Section F - Lower manipulator pressure		0 to 200	No unit	100
S97	Upper/lower manipulator pressure changeover position F (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S98] to [S108] are not displayed.
S98	Section G - Upper manipulator pressure		0 to 200	No unit	100
S99	Section G - Lower manipulator pressure		0 to 200	No unit	100
S100	Upper/lower manipulator pressure changeover position G (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S101] to [S108] are not displayed.
S101	Section H - Upper manipulator pressure		0 to 200	No unit	100
S102	Section H - Lower manipulator pressure		0 to 200	No unit	100
S103	Upper/lower manipulator pressure changeover position H (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S104] to [S108] are not displayed.

No.	Item		Setting range	Unit	Initial value
S104	Section I - Upper manipulator pressure		0 to 200	No unit	100
S105	Section I - Lower manipulator pressure		0 to 200	No unit	100
S106	Upper/lower manipulator pressure changeover position I (number of stitches)		0 to 9999	Number of stitches	0 When the number of stitches is set at 0 (zero), data items [S107] to [S108] are not displayed.
S107	Section J - Upper manipulator pressure		0 to 200	No unit	100
S108	Section J - Lower manipulator pressure		0 to 200	No unit	100
S120	Speed of stitch of the machine head after the detection of material end		200 to 3500	sti/min	1500
S130	Selection of stacker operation		–	–	Stop This item is not displayed when MEMORY switch [U10] is set to "Without stacker."
	Stop				
	Operate				
S131	Stacker operating position		0 to 999	No unit	0 This item is not displayed when MEMORY switch [U10] is set to "Without stacker."
S132	Selection of the number of times of stacker operation		1 to 10	No unit	1 This item is not displayed when MEMORY switch [U10] is set to "Without stacker."

9. Copying a sewing pattern

It is possible to data on the registered pattern No. can be copied to a pattern No. which is not used. Copying of a pattern by overwriting is prohibited. So, it is necessary to erase the unused pattern once and overwrite it with data on the registered pattern No.

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the back-

light is green, press READY key ❷ to change over the mode to the input mode.

2) Select the source pattern No. for copying.

Select a source pattern No. for copying on the pattern selection screen.

→ Refer to **"Ⅵ-3. Selecting a pattern" on page 37.**

If you want to newly program pattern data, it is helpful to copy the initial value pattern to a new pattern.

→ Refer to **"Ⅵ-7. Using the initial value pattern" on page 42.**

3) Call the copy screen.

When you press COPY key ㉓ , copy screen **A** is displayed.

4) Select a destination pattern No. for copying.

Pattern No. **B** which is not used flashes on and off. Press DATA CHANGE key ⓫ ⊕ ⊖ to select a destination pattern No. to which you want to copy the source data.

If you want to erase the pattern, select the recycle bin.

5) Start copying.

When you press READY key ❷ , copying starts. Two seconds later, the screen is restored to the input screen with the pattern No. which has been created by copying selected.

If you press RESET key ❸ , the screen is restored to the previous screen without performing data copying.

* Cycle data and continuous sewing data can also be copied in the same procedure.
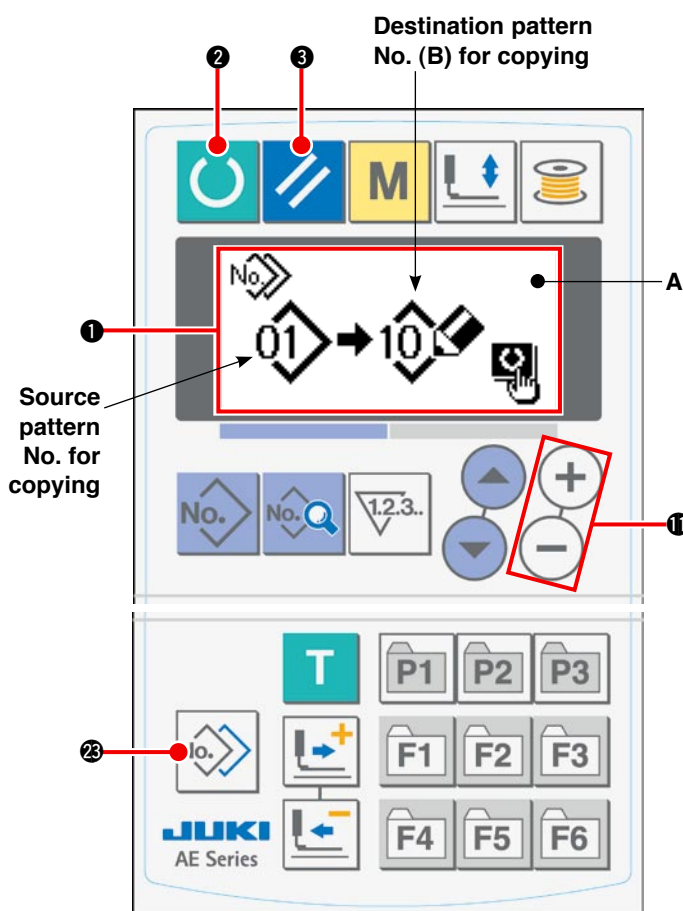
10. Using the PATTERN REGISTRATION key

It is recommended to register a frequently used pattern No. to the PATTERN REGISTRATION key. Once a pattern No. is registered, you can select the registered pattern only by pressing the PATTERN REGISTRATION key under the input mode.

(1) Registration procedure

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ 🔵 to change over the mode to the input mode.

2) Call the pattern registration screen.

When you keep pressing the key (P1 to P3) ㉗ P1 - P3 to which you want to register a pattern No. for three seconds, pattern registration screen **A** is displayed.

3) Select a pattern No.

Currently available pattern No. **B** flashes on and off. Select a pattern No. you want to register to the PATTERN REGISTRATION key by pressing ITEM SELECT key ❿ 🔼 🔽.
If you select the recycle bin 🗑, the registration can be reset.

4) Start registration.

When you press READY key ❷ 🔵, registration starts. Two seconds later, the screen is restored to the input screen.
If you press REST key ❸ //, the screen is restored to the previous screen without performing pattern registration.
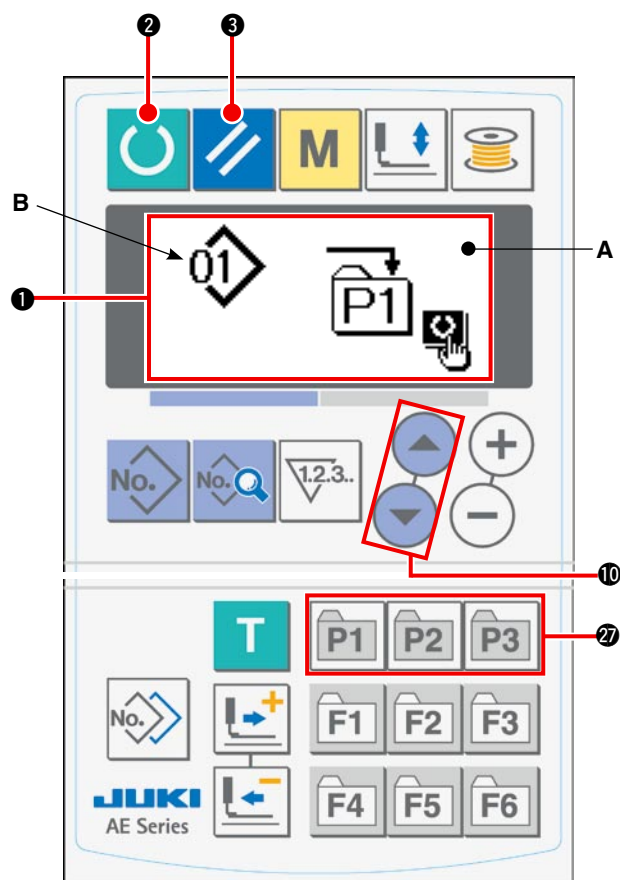
(2) State of registration at the time of purchase

REGISTRATION key	Registered pattern No.
P1	Pattern No.1
P2	Pattern No.2
P3	Pattern No.3

11. Using the PARAMETER REGISTRATION key

It is recommended to register a frequently used parameter to the PARAMETER REGISTRATION key.
Once a parameter is registered, you can select the registered parameter only by pressing the PARAMETER REGISTRATION key under the input mode.
Not only a parameter but also a pattern No. can be registered to the PARAMETER REGISTRATION key. This means that the key can be used in the similar way as that described in **"Ⅵ-10. Using the PATTERN REGIS-TRATION key" on page 51**.

(1) Registration procedure

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ to change over the mode to the input mode.

2) Call the parameter registration screen.

When you keep pressing the key (F1 to F6) ㉘ F1 - F6 to which you want to register a parameter for three seconds, parameter registration screen **A** is displayed.

3) Select a parameter.

Item **B** which can be registered to the PARAMETER REGISTRATION key flashes on and off. Select an item you want to register to the PARAMETER REGISTRATION key by pressing ITEM SELECT key ❿ .
Items which can be registered are sewing data, parameters and pattern Nos. of the memory switches (level 1).
If you select the recycle bin, the registration can be reset.

4) Start registration.

When you press READY key ❷ , registration starts. Two seconds later, the screen is restored to the input screen.
If you press RESET key ❸ , the screen is restored to the previous screen without performing pattern registration.
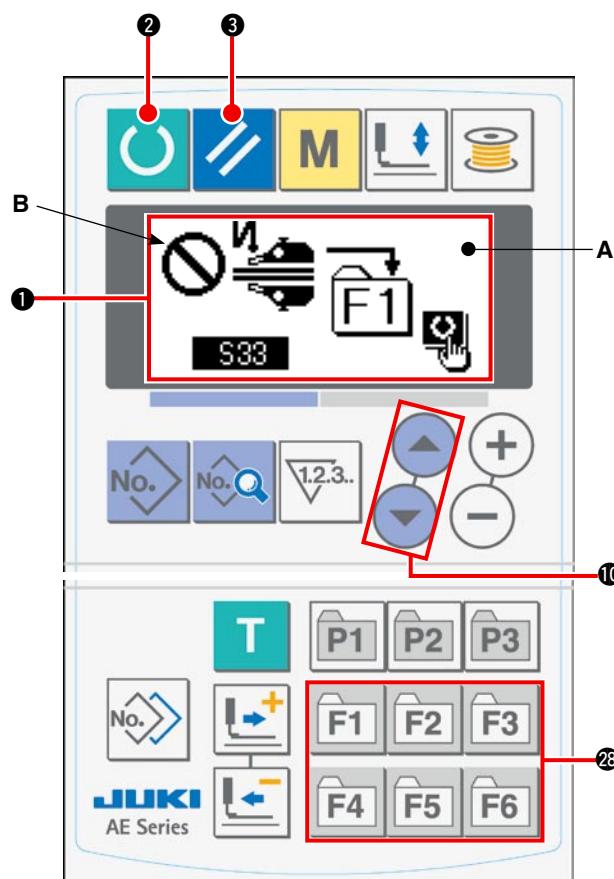
12. Performing the cycle sewing

This sewing machine is able to sew two or more pieces of sewing pattern data under the cycle mode in sequence. As many as 15 patterns can be input. Use the cycle sewing when sewing several different buttonholes in a sewing product. In addition, as many as 20 cycles can be registered. Copy sewing patterns where necessary.

→ Refer to **"Ⅵ-9. Copying the sewing pattern" on page 50**.

(1) Selection of cycle data

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ to change over the mode to the input mode.

2) Call the pattern selection screen.

When you press PATTERN No. key ❼, pattern selection screen **A** is displayed.
The currently selected pattern No. **B** flashes on and off.

3) Select cycle data.

When you press ITEM SELECT key ❿, the registered patterns are displayed one after another until the last registered pattern No. is reached. Then, the registered cycle data No. and continuous sewing data No. are displayed. Now, select the cycle data No. you want to sew.

4) Perform sewing.

When you press READY key ❷ in the state where the cycle data is selected, the backlight of LCD display ❶ changes to green to show that sewing is possible.
Only cycle data No. 1 has been factory-registered at the time of purchase, but no sewing pattern has been input to the cycle data. So, the sewing machine is not placed in the sewing ready state.
Input data referring to **"Ⅵ-12-(2) Editing procedure of the cycle sewing" on page 54**.
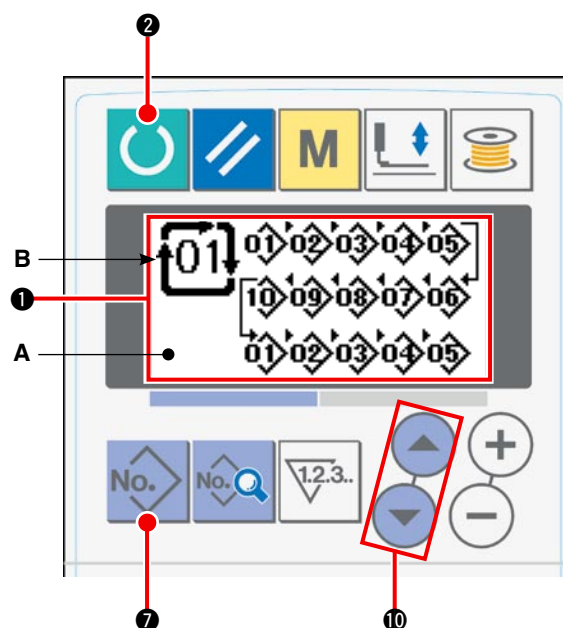
(2) Editing procedure of the cycle sewing

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ [icon] to change over the mode to the input mode.

2) Call the cycle data No. to be edited.

When you press PATTERN No. key ❼ [No.] to call the pattern selection screen, currently selected pattern No. **B** flashes on and off. When you press ITEM SELECT key ❿ [icons], the registered patterns are displayed one after another until the last pattern No. is reached. Then, the registered cycle data No. and continuous data No. are displayed. Now, select the cycle No. you want to sew.

3) Place the cycle data in edit state.

When you press DATA key ❽ [No.Q], the "cycle data under editing" display **C** appears and the pattern No. **D** which is sewn first flashes on and off. In this state, the data can be edited.

4) Select an edit point.

When you press ITEM SELECT key ❿ [icons], edit point moves in sequence while flashing on and off. When the edit point moves to the last piece of data, the add command pictograph [icon] is displayed.

5) Change the data on the selected edit point.

When you press DATA CHANGE key ⓫ [+][−], the data on the edit point can be changed. The registered pattern No. is displayed to permit selection.

When you press RESET key ❸ [icon], the pattern data on the edit point can be deleted. Repeat steps **4)** and **5)** to edit data.
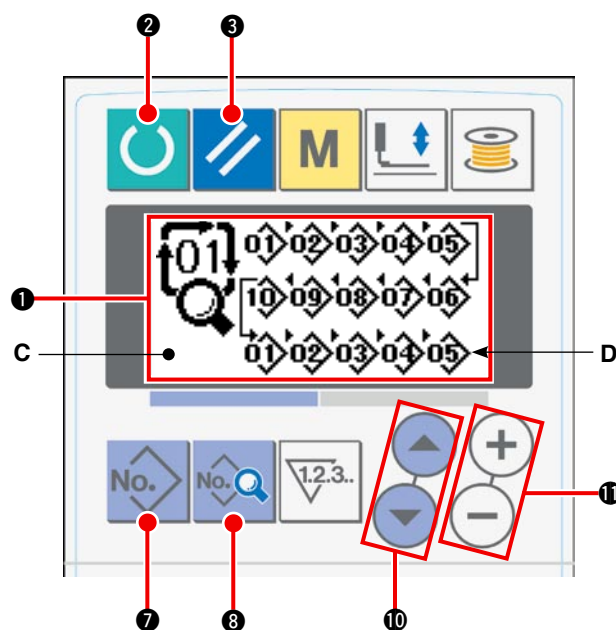
13. Changing the memory switch data

1) Place the operation panel in the input mode.

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷ ⟳ to change over the mode to the input mode.

2) Call the memory switch data edit screen.

When you press MODE key ❹ **M**, memory switch data (level 1) edit screen **A** is displayed. When you keep the key held pressed for three seconds more, memory switch data (level 2) edit screen **B** is displayed.

3) Select the memory switch data to be changed.

Press ITEM SELECT key ❿ to select the data item you want to change.

4) Change the data.

Memory switch data consists of data items value for which is to be changed and those pictograph for which is to be selected.

The data item value for which is to be changed is provided with an alphanumeric number such as **U01**. The value for the item can be changed by increasing/decreasing the set value using DATA CHANGE key ⓫ ⊕ ⊖.

The data item pictograph for which is to be changed is provided with an alphanumeric number such as **K01**. The pictograph for the item can be selected using DATA CHANGE key ⓫ ⊕ ⊖.

→ Refer to **"Ⅵ-14. List of memory switch data" (on page 56)** for details of the memory switch data.

A

Data item No.

Pictograph which represents the data item

Level 1

B

Level 2

– 55 –
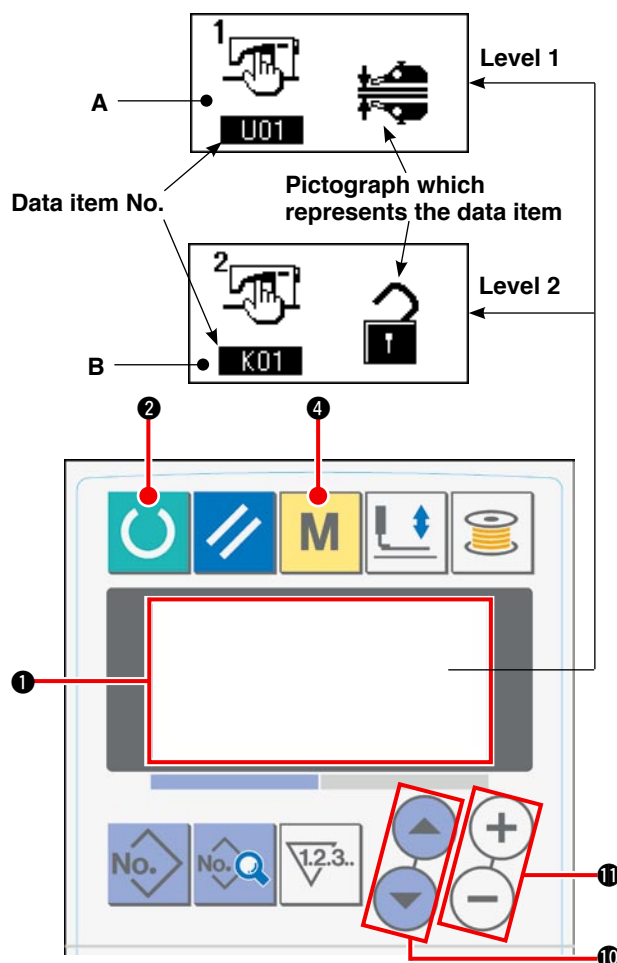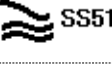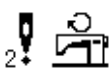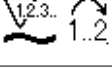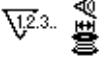
14. List of memory switch data

(1) Level 1

Memory switch data (Level 1) are the operation data shared by sewing machines. They are common to all sewing patterns.

No.	Item		Setting range	Unit	Initial value
U01	Selection of the manipulator operation		–	–	Manipulator is operative
	Manipulator is operative				
	Manipulator is inoperative				
U02	Selection of the operation at sewing end		–	–	Standard operation
	Standard operation Sewing machine finishes sewing regardless of the material end sensor				
	When no lower cloth remains on the sewing machine though the material end sensor is detecting the material, the sewing machine stops after thread trimming without sewing back tack stitches.				
U03	Selection of the material placement condition		–	–	The sensor assumes that the material is placed on the sewing machine only when the material is inserted under the sensor until it will go no further.
	The sensor assumes that the material is placed on the sewing machine only when the material is inserted under the sensor until it will go no further.				
	The sensor assumes that the material is placed on the sewing machine when the material is placed just before the sensor.				
U04	Selection of one piece sewing mode		–	–	Lower manipulator
	Lower manipulator (normal)				
	One piece of material is sewing using the upper manipulator.				
U05	Automatic starting time		100 to 500	msec	500
U06	Changeover of shirring display		–	–	Displayed in percent figures
	Absolute value display Shirring amount (mm) is displayed using sewing data items [S40, S43, S46, S49, S52, S55, S58, S61, S64 and S67]. The shirring amount does not change even if the bottom feed amount is changed by means of the dial.	mm			
	Percentage display (with respect to the bottom feed amount) Shirring ratio (%) is displayed using sewing data items [S40, S43, S46, S49, S52, S55, S58, S61, S64 and S67]. If the bottom feed amount is changed by means of the dial, the shirring amount will be automatically changed to the value corresponding to the preset ratio (%).	%			
U07	Selection of the material presser operation		–	–	The material presser operates.
	The material presser operates when the stacker operates.				
	The material presser operation is prohibited when the stacker operates.				

No.	Item		Setting range	Unit	Initial value
U10	Implementation/type of the stacker		–	–	Without stacker
	Without stacker	⊘≋			When "Without stacker" is selected, the sewing data items [S130], [S131] and [S132] are not displayed.
	Air stacker is implemented	≋ SS51			
	Standard bar stacker is implemented	≋			
U11	Stacker timer 1	≋🕐₁	0.0 to 9.9	0.1 sec	0.5 This item is not displayed when the stacker is set to "Without stacker."
U12	Stacker timer 2	≋🕐₂	0.0 to 9.9	0.1 sec	0.5 This item is not displayed when the stacker is set to "Without stacker."
U13	Stacker timer 3	≋🕐₃	0.0 to 9.9	0.1 sec	1.5 This item is not displayed when the stacker is set to "Without stacker."
U15	Soft start speed setting for the 1st stitch		200 to 3500	sti/min	800
U16	Soft start speed setting for the 2nd stitch		200 to 3500	sti/min	800
U17	Soft start speed setting for the 3rd stitch		200 to 3500	sti/min	2000
U18	Soft start speed setting for the 4th stitch		200 to 3500	sti/min	3000
U19	Soft start speed setting for the 5th stitch		200 to 3500	sti/min	3500
U20	Counter updating unit		1 to 30	No unit	1
U21	Selection of with/without the bobbin thread remaining amount detection		–	–	Without the bobbin thread remaining amount detecting device
	Without the bobbin thread remaining amount detecting device				
	The bobbin thread remaining amount detecting device is implemented.				
U22	Number of times of bobbin thread remaining amount detection		0 to 19	Number of times	1
U23	Selection of thread breakage detecting operation		–	–	Without the bobbin thread remaining amount detecting device
	Without the bobbin thread remaining amount detecting device				
	The bobbin thread remaining amount detecting device is implemented.				

No.	Item		Setting range	Unit	Initial value
U24	Lowering of needle at the material placement		–	–	Material placement with the needle lifted
	Material placement with the needle lifted				
	Material placement with the needle lowered (*1) If you press the START button before placement of the material on the sewing machine, the needle bar will come down.				
U25	Selection of section		–	–	Shirring amount section and manipulator pressure section are identical.
	Shirring amount section and manipulator pressure section are identical.				
	Shirring amount section and manipulator pressure section are separate.				

(*) It is possible to place the material on the sewing machine using the needle bar as reference with the needle bar lowered. Since the needle bar stops when it has passed its lowest point, adjust the upper position of the presser foot. (Refer to "Ⅷ-1. Adjusting the presser foot lifting lever" on page 79.) When you press the START button after having place the material on the sewing machine, the sewing machine starts sewing.

(2) Level 2

When the MODE switch is held pressed for three seconds, editing of data items categorized into Level 2 is enabled.

No.	Item		Setting range	Unit	Initial value
K01	Prohibition of change of parameter setting		–	–	Change is allowed
	Change is allowed				
	Change of sewing data and memory switch data is set to "prohibited."				
K02	Setting of max. limited speed		200 to 3500	sti/min	3500
K03	Correction of feed pitch motor origin		−10 to 10	–	0
K04	Waiting time for coming-down of the presser foot		0 to 100	msec	50
K05	Manipulator pressure upper correction value		−30 to 30	–	0
K06	Manipulator pressure lower correction value		−30 to 30	–	0
K07	Setting of manipulator sensor type		0 to 3	–	0
K08	Start of sewing - Machine head rotating speed for back tacking		200 to 1900	sti/min	800
K09	End of sewing - Machine head rotating speed for back tacking		200 to 1900	sti/min	800

No.	Item		Setting range	Unit	Initial value
K10	Number of correction stitches A for reverse-feed stitching at the start of sewing		0 to 5	Number of stitches	0
K11	Number of correction stitches B for reverse-feed stitching at the start of sewing		0 to 5	Number of stitches	0
K12	Number of correction stitches C for reverse-feed stitching at the end of sewing		0 to 5	Number of stitches	0
K13	Number of correction stitches D for reverse-feed stitching at the end of sewing		0 to 5	Number of stitches	0
K14	Correction angle A for back-tack solenoid output at the start of sewing		–36 to 36	×10 degrees	0
K15	Correction angle B for back-tack solenoid output at the start of sewing		–36 to 36	×10 degrees	0
K16	Correction angle D for back-tack solenoid output at the start of sewing		–36 to 36	×10 degrees	0
K17	Set value for the needle bar stopping position		–50 to 50	Degrees	0
K30	Correction of feed amount readout potentiometer correction [Explanation] Bottom feed amount set with the dial is read by recording the maximum position (potentiometer value) and minimum value of the feed amount.		–	–	–
K40	Adjustment mode for the main shaft motor belt replacement [Explanation] Since the main shaft motor is fixed at the 53-degrees position, the main shaft motor belt should be reinstalled after aligning the main shaft motor on the machine head side with the reference point position.		–	–	–

K50	Start of the sensor check mode
	
	  1: Upper cloth inner (material end) sensor
	  2: Upper cloth outer sensor
	  3: Lower cloth inner (material end) sensor
	  4: Lower cloth outer sensor
	  5: Start switch
	  6: Material detection sensor
	  7: Top feed pitch origin sensor
	  8: Machine head tilting switch
	  9: SDET sensor
	10: Starting pedal sensor 1 (Start)
	11: Starting pedal sensor 2 (Presser foot)
	12: Starting pedal sensor 3 (Machine head speed changeover)
	13: Bobbin thread remaining amount detection, origin
	14: Bobbin thread remaining amount detection, no thread
			–	–	–

15. Setting the upper shirring

The upper shirring amount can be selected with MEMORY switch "U06" between two different methods; i.e., "Specify the top feed amount" (indicated in mm) and "Specify the percentage with respect to the bottom feed amount" (indicated in %).

It is possible to divide the upper shirring section into as many as 10 sections and specify the shirring amount for the respective sections separately.
At the same time, the machine head speed can be set separately for those sections.

Example: In the case only one section of a seam is shirred shirring
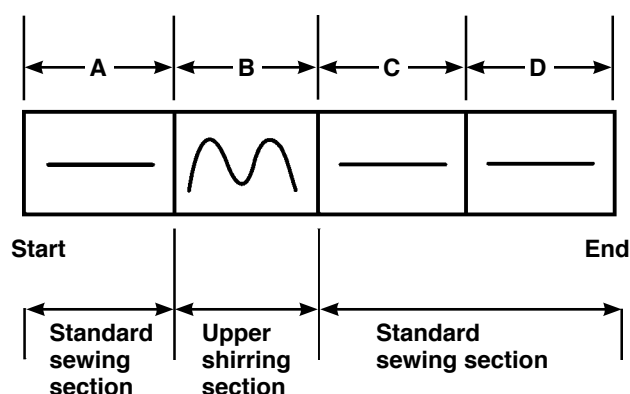
For the shirring amount, the "absolute value display" is to be selected in the data item "U06" and four sections A to D are to be used.

Number	Setting item	Set value	Remarks
S40	Section A - Shirring amount	2.5	Top feed amount should be set at 2.5 mm.
S41	Machine head section speed A	2500	The machine head speed should be set at 2,500 sti/min.
S42	Upper shirring changeover position A (the number of stitches)	40	40-stitches section
S43	Section B - Shirring amount	3.7	Top feed amount should be set at 3.7 mm.
S44	Machine head section speed B	2500	The machine head speed should be set at 2,500 sti/min.
S45	Upper shirring changeover position B (the number of stitches)	40	40-stitches section
S46	Section C - Shirring amount	2.5	Top feed amount should be set at 2.5 mm.
S47	Machine head section speed C	2500	The machine head speed should be set at 2,500 sti/min.
S48	Upper shirring changeover position C (the number of stitches)	20	20-stitches section
S49	Section D - Shirring amount	2.5	Top feed amount should be set at 2.5 mm.
S50	Machine head section speed D	3500	The machine head speed should be set at 3,500 sti/min.
S51	Upper shirring changeover position D (the number of stitches)	0	To the end

> ⚠ Caution
> When the upper shirring changeover position (the number of stitches) is set at "0," the upper shirring section continues to the end. The sewing machine does not move to the next section.

16. Setting the manipulator pressure

One seam can be divided into 10 upper/lower manipulator pressure section subsections at the maximum. The pressure value can be separately set for the respective sections.

Example: In the case one seam is sewn with the one same pressure

Number	Setting item	Set value	Remarks
S80	Section A - Upper manipulator pressure	85	The material is clamped with the pressure value 85.
S81	Section A - Lower manipulator pressure	98	The material is clamped with the pressure value 98.
S82	Manipulator pressure changeover position A (the number of stitches)	0	The section up to the end of sewing
S83	Section B - Upper manipulator pressure	xxx	Any value will do
S84	Section B - Lower manipulator pressure	xxx	Any value will do
S85	Manipulator pressure changeover position B (the number of stitches)	xxx	Any value will do
S86	Section C - Upper manipulator pressure	xxx	Any value will do
S87	Section C - Lower manipulator pressure	xxx	Any value will do
S88	Manipulator pressure changeover position C (the number of stitches)	xxx	Any value will do
S89	Section D - Upper manipulator pressure	xxx	Any value will do
S90	Section D - Lower manipulator pressure	xxx	Any value will do
S91	Manipulator pressure changeover position D (the number of stitches)	xxx	Any value will do

Caution When the manipulator changeover position (the number of stitches) at "0," the manipulator pressure section continues to the end. The sewing machine does not move to the next section.

Example: In the case one seam is divided into five sections and those section are respectively sewn with different pressure values.

Number	Setting item	Set value	Remarks
S80	Section A - Upper manipulator pressure	85	The material is clamped with the pressure value 85.
S81	Section A - Lower manipulator pressure	98	The material is clamped with the pressure value 98.
S82	Manipulator pressure changeover position A (the number of stitches)	10	10-stitches section
S83	Section B - Upper manipulator pressure	80	
S84	Section B - Lower manipulator pressure	90	
S85	Manipulator pressure changeover position B (the number of stitches)	10	10-stitches section
S86	Section C - Upper manipulator pressure	0	Manipulator is raised.
S87	Section C - Lower manipulator pressure	0	Manipulator is raised.
S88	Manipulator pressure changeover position C (the number of stitches)	5	5-stitches section
S89	Section D - Upper manipulator pressure	80	
S90	Section D - Lower manipulator pressure	90	
S91	Manipulator pressure changeover position D (the number of stitches)	30	30-stitches section
S92	Section E - Upper manipulator pressure	85	
S93	Section E - Lower manipulator pressure	98	
S94	Manipulator pressure changeover position E (the number of stitches)	0	Section up to the end of sewing

Caution When the manipulator changeover position D (the number of stitches) [S91] is set to some number of stitches (one or more), sections E [S92] to [S94] are displayed. When the manipulator changeover position (the number of stitches) at "0," the manipulator pressure section continues to the end. The sewing machine does not move to the next section.

17. Using the teaching

The teaching function is the function that enables checking of sewing by actually operating the sewing machine while changing the upper shirring amount and the upper/lower manipulator pressure.
The upper shirring amount and the upper/lower manipulator pressure according to which the sewing machine operated can be recorded on a section-by-section of the number of stitches basis.

1) **Place the operation panel in the input mode.**

Under the input mode where the backlight of LCD display ❶ is blue, the pattern changing is enabled. If the operation panel is placed under the sewing mode where the backlight is green, press READY key ❷

🔵 to change over the mode to the input mode.

2) **Select the target pattern number for teaching.**

Select the pattern No. to be used for teaching on the pattern selection screen.

3) **Enter the teaching mode.**

Press TEACHING key ㉔ 🟦T on the operation panel.

4) **Start teaching.**

The teaching screen shown below is displayed. The backlight of the LCD display is green.
The number of stitches for all sections is 0 (zero).
Data on the upper/lower manipulator pressure value and the upper shirring amount which have already been recorded for the pattern selected for teaching are displayed.
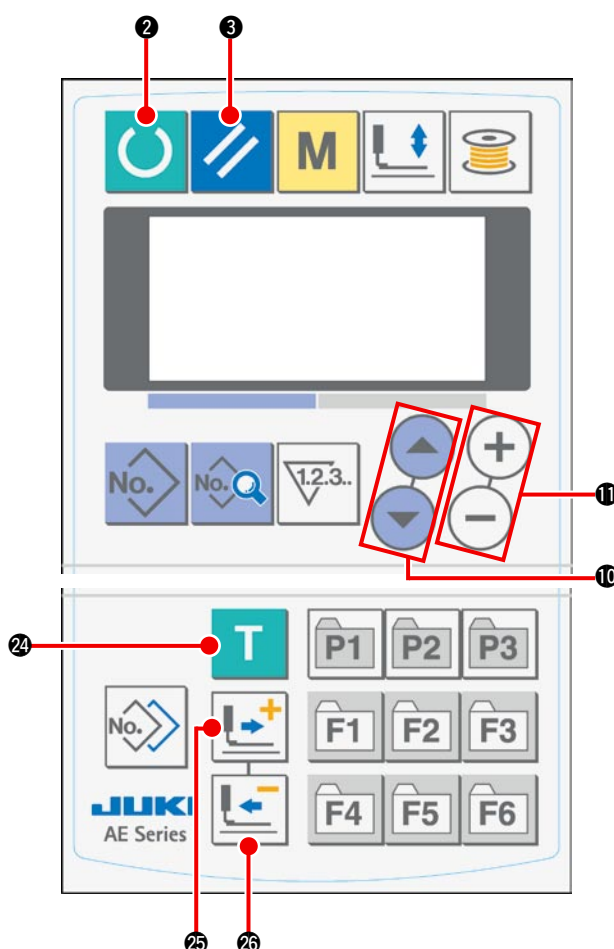
Teaching screen

The teaching section flashes on and off.
The teaching section can be moved using FORWARD key ㉕ 🟦 or BACKWARD key ㉖ 🟦 .

The absolute value display and the percentage display can be changed over by selecting the shirring amount display ▮U06▮ .

The selected point for changing flashes on and off.

Select the item that can be changed using ITEM SELECT ❿ 🔼🔽 .
The changeable items are the number of stitches, upper manipulator pressure value and upper shirring amount.

Change the value using DATA CHANGE key ⓫ ➕➖.

– 62 –

When you press the START button after having placed the material on the sewing machine, the machine head starts rotating and the number of stitches for the relevant section is added. When the sensor detects the material end to allow the sewing machine to finish sewing, the number of stitches for the relevant section is cleared to "0" (zero).

5) Finish teaching.

When you press READY key ❷ , the sewing machine stops after thread trimming and the upper/lower manipulator pressure value, upper shirring amount, the number of stitches for sections are recorded and the teaching is finished.

In the case the teaching is finished without the detection of the material end (teaching is finished by stopping the machine during sewing), the total number of stitches for sections [A] to [J] is set for the sewing parameter S10 (Stop after total number of stitches).

When you press RESET key ❸ , the sewing machine stops after thread trimming and the teaching can be finished after the disposal of set values.

18. Correcting the bottom feed amount readout potentiometer

A potentiometer is used to read the bottom feed amount of the machine head. This potentiometer requires correction so as to compare its readout value with the actual feed amount.

1. Calling the setting screen

The maintenance level parameter [K30] has to be displayed.

To call the screen, press READY key ❷.

2. Setting procedure
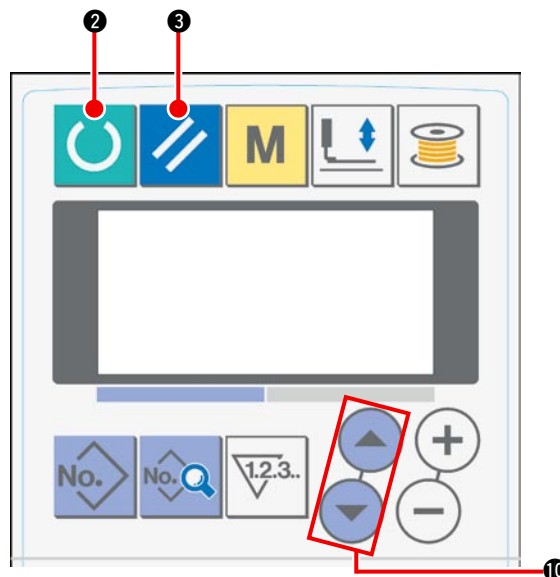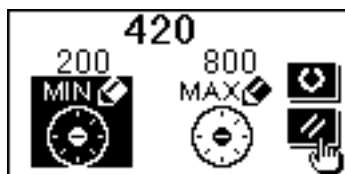
Select "MIN" or "MAX" using ITEM SELECT key ❿.

When "MIN" is selected .... Firstly, set the feed amount to "0" (zero) by turning bottom feed regulating dial.

Then, press READY key ❷ to record it.

When "MAX" is selected .... Firstly, set the feed amount to "4" (four) by turning bottom feed regulating dial.

Then, press READY key ❷ to record it.

3. Finishing the setting

You can exit from the setting screen by pressing RESET key ❸.

VII. HANDLING AND ADJUSTING THE PARTS

1. Adjusting the material slippage and manipulator pressure
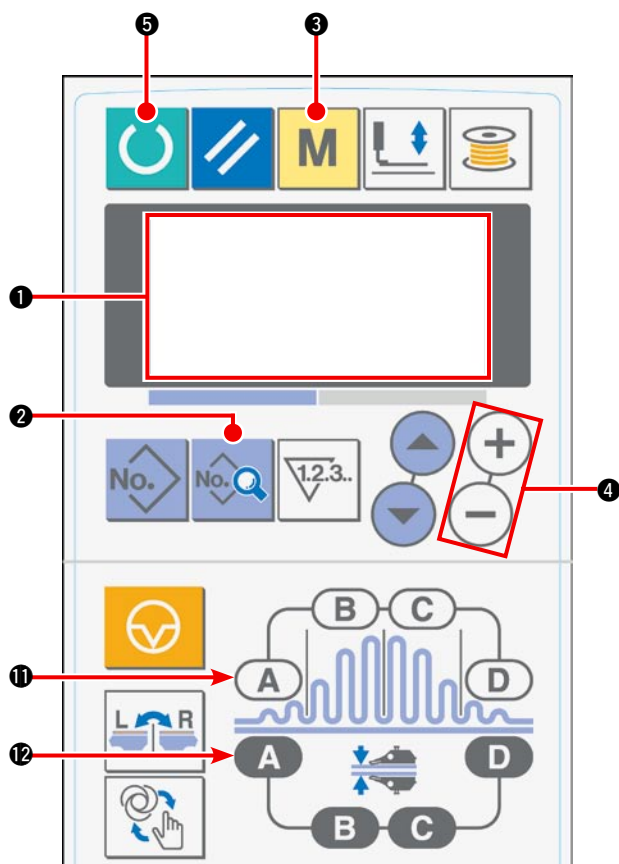
1) When you turn the power ON, the initial screen is displayed on LCD ❶.
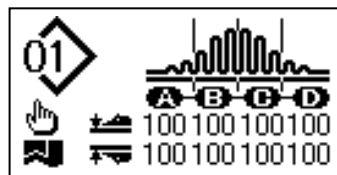
2) When you press DATA key ❷, [S01] start mode is displayed on LCD ❶.

3) Press MODE key ❸ to call [U01] manipulator operation select on LCD ❶.

4) Press the ⊕ key of DATA CHANGE key ❹ to stop the manipulator operation.

5) When you press READY key ❺, the following display appears on LCD ❶. Then the presser foot of the sewing machine goes up and LED ❻ flashes on and off.
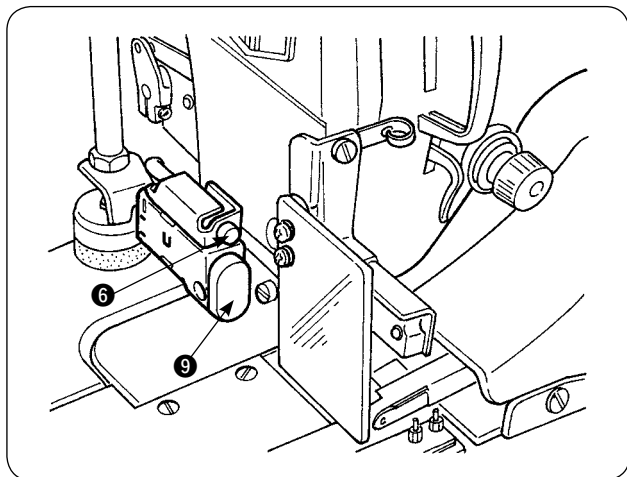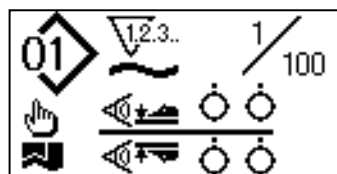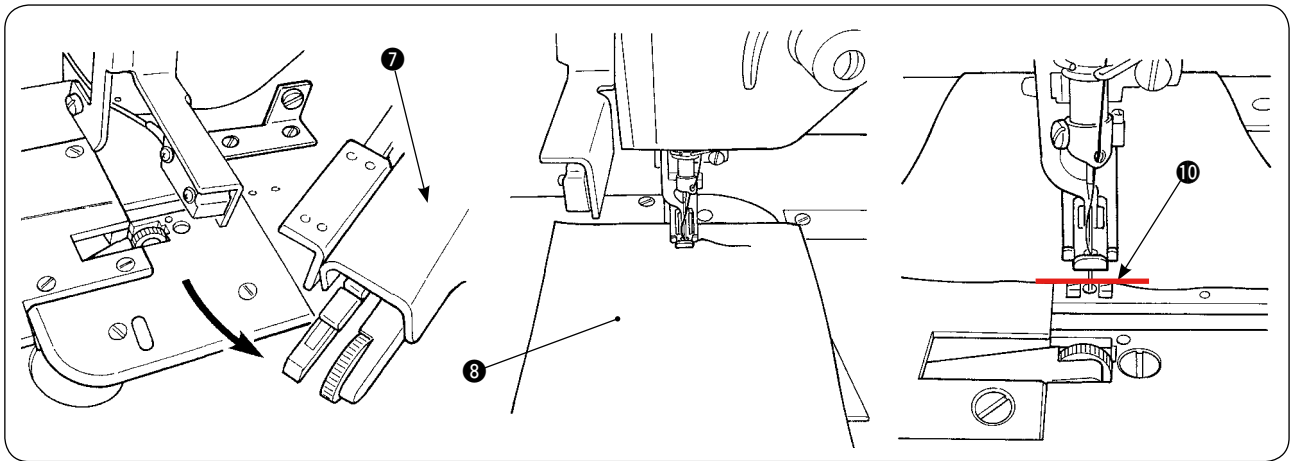
6) Rotate upper manipulator ❼ to enable adjustment without the manipulator.
After having adjusting the bottom feed length (refer to **"Ⅳ-10.Adjusting the stitch length" p.10** for the adjusting procedure), place two plies of material ❽ for trial stitching which have been cut into same dimensions under the presser foot of the sewing machine. Press START switch ❾ to start the sewing machine. Continue sewing until material end ❿ is reached. Then, re-press START switch ❾ to stop the sewing machine.
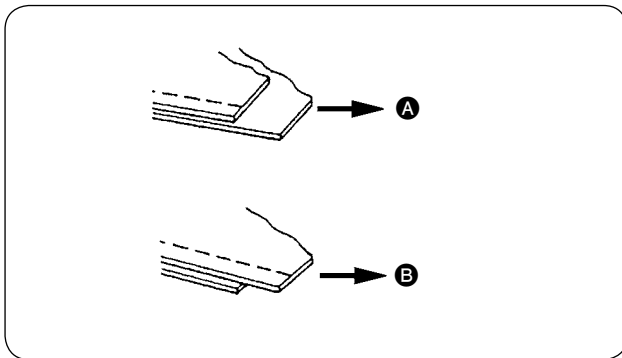
7) Adjust the shirring amount in accordance with the slippage between the two plies of material after trial stitching.
In the case of Ⓐ, select the sewing parameter [S40] "section A-shirring amount." Decrease the shirring amount.
In the case of Ⓑ, select the sewing parameter [S40] "section A-shirring amount." Increase the shirring amount.

[S40] Section A - Shirring ratio (displayed in percent figures)
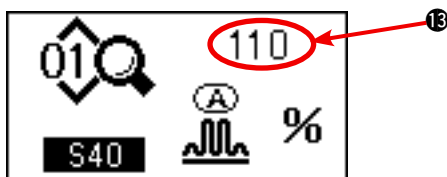
8) Operation for changing the shirring amount
In the state as described in 5), press SHIRRING SECTION A key ⑪ to select [S40]. If [S41] or [S42] is displayed by pressing SHIRRING SECTION A key ⑪, re-press the SHIRRING SECTION A key to select [S40].

After having selected [S40], change percentage value ⑬ using DATA CHANGE key ❹. Press READY key ❺ to carry out trial stitching again and re-adjust the slippage between the two plies of material. Repeat trial stitching and adjustment until the material ends of the two plies of material meet.
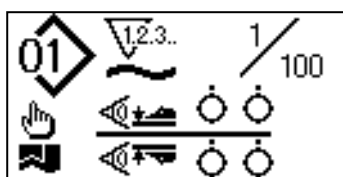
9) Adjusting the upper/lower manipulator pressure
After having adjusted the slippage between two plies of material, adjust the upper/lower manipulator pressure. When you press READY key ❺, the following display appears on LCD ❶. Then the presser foot of the sewing machine goes up and LED ❻ flashes on and off.
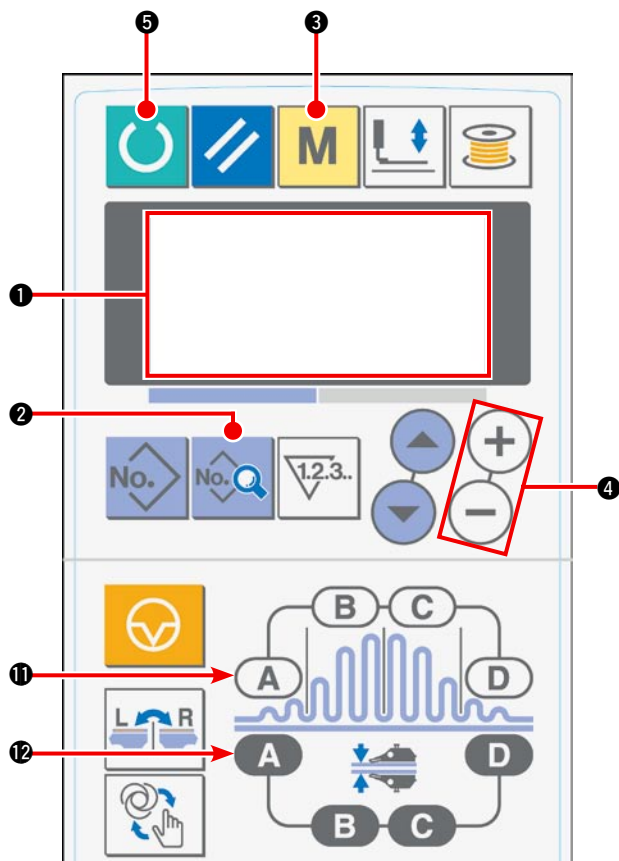
10) **Press READY key ❺** to call the initial screen on LCD ❶.
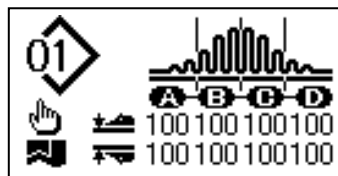
11) Press MODE key ❸ to call [U01] manipulator operation select on LCD ❶.

12) Press the ⊖ key of DATA CHANGE key ❹ to render the manipulator operation effective.

13) When you press READY key ❺, the following display appears on LCD ❶. Then the presser foot of the sewing machine goes up to allow the sewing machine to get ready for operation.
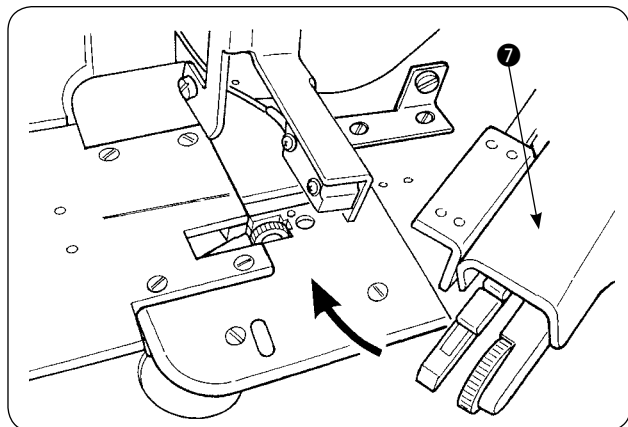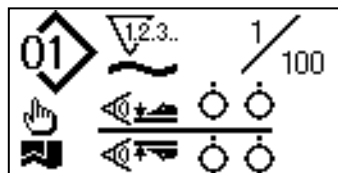
14) Rotate upper manipulator ❼ back to its home position.
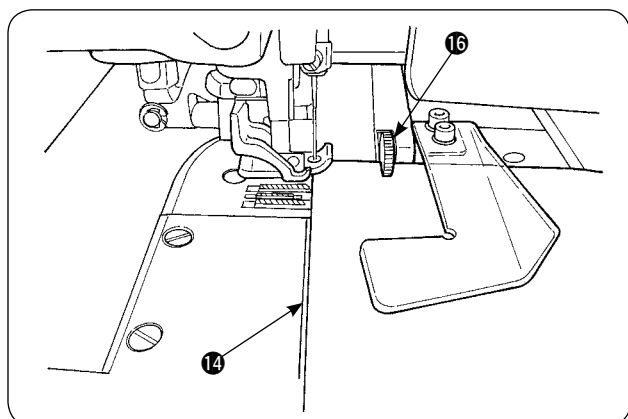
15) Place the materials on the cloth guide with the material ends aligned with material alignment line ⓮.

16) Once you have placed the materials on the sewing machine, the sensor display on LCD ❶ is brought in ON state ⑮ and LED ❻ flashes on and off. When you press START switch ❾, the sewing machine starts running while manipulators ⑯ work to align the material ends. When the sewing machine finishes sewing of the materials, the sewing machine automatically trims thread and stops.
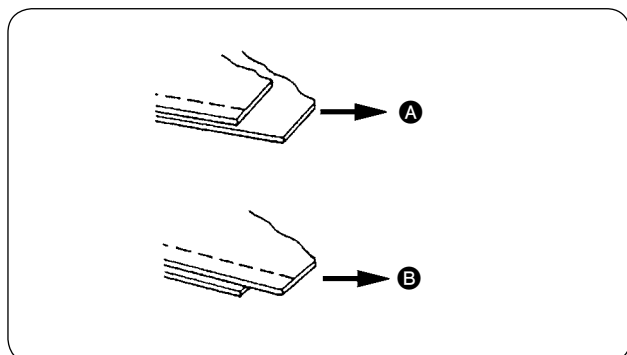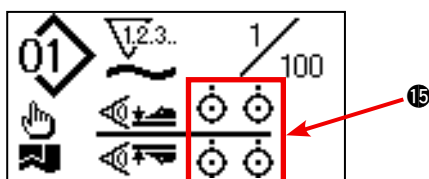
17) If the material ends are not aligned with each other at the end of sewing, change the upper/lower manipulator pressure to align the material ends at the end of sewing.
In the case of ❹, select sewing parameter [S80] section A - upper manipulator presser and decrease the upper manipulator pressure value.
In the case of ❺, select sewing parameter [S81] section B - lower manipulator presser and decrease the lower manipulator pressure.

> ⚠ Caution
> **If the manipulator pressure is excessively decreased, width of seam allowances will not be consistent.**

18) Operation for changing the upper manipulator pressure
Press MANIPULATOR PRESSURE SECTION A key ⑫ to select and call [S80] section A - upper manipulator pressure on LCD ❶.
Changing data on the upper manipulator pressure
After having selected [S80], change upper manipulator pressure value ⑰ using DATA CHANGE key ❹. Then, place the materials on the sewing machine and start the sewing machine to perform sewing.
When the sewing machine performs thread trimming at the end of sewing, upper manipulator presser value ⑰ is fixed.

19) Operation for changing the lower manipulator pressure
Press MANIPULATOR PRESSURE SECTION A key ⑫ to select and call [S81] section A - lower manipulator pressure on LCD ❶.
Changing data on the lower manipulator pressure
After having selected [S81], change lower manipulator pressure value ⑰ using DATA CHANGE key ❹. Then, place the materials on the sewing machine and start the sewing machine to perform sewing.
When the sewing machine performs thread trimming at the end of sewing, lower manipulator presser value ⑰ is fixed.

Recommended manipulator pressure (for linear patterns)

	Light-weight materials	Medium-weight materials	Heavy-weight materials
Upper manipulator pressure	65 - 85	90 - 110	120 - 130
Lower manipulator pressure	70 - 90	100 - 120	140 - 160

> ⚠ Caution
> **If the lower manipulator pressure is set to 65 when the bottom feed pitch is set at 2.5 mm or more, error [E499] will displayed to disable sewing.**

2. Material auxiliary feed air blow

(1) Material blowing air nozzles
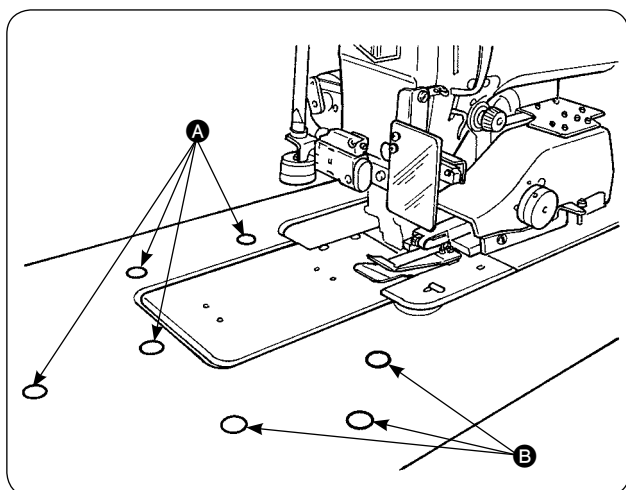
1) Air nozzles are provided at seven location on the table.
   Air nozzles Ⓐ are provided at four locations in front of the needle center and those Ⓑ are provided at three locations behind the needle center.
2) Adjust the speed controllers for Ⓐ and Ⓑ in accordance with the type of material, shape and size of the workpiece. (Refer to **(2) Adjusting the air blow-off pressure**.) Adjust the speed controllers to increase the air blow-off pressure for large and heavy workpieces or to decrease it for small and light ones.

(2) Adjusting the air blow-off pressure
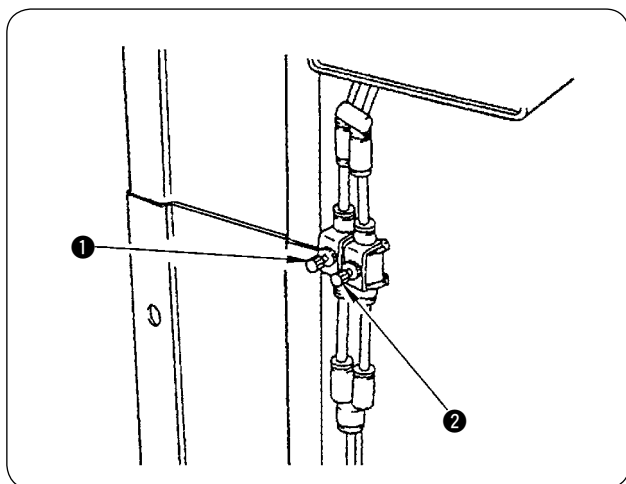
1) Adjust the air blow-off pressure by means of speed controllers ❶ and ❷.
2) Speed controller ❶ is used for adjusting the blow-off pressure of Ⓐ, and speed controller ❷ is used for adjusting the blow-off pressure of Ⓑ.

> ⚠ Caution **Do not move your face near the blow-off air outlet.**

3. Hand switch

⚠ **CAUTION :**
When you press the start switch, the presser foot of the sewing machine comes down. Be careful not to allow your fingers to be caught under the presser foot.
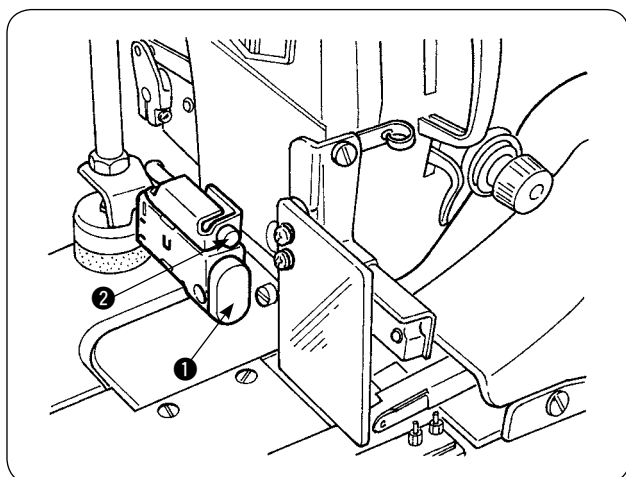
❶ **Start switch**
1) When the material is placed on the sewing machine under the manual start mode, LED ❷ flashes on and off.
   When you press the start switch in this state, the sewing machine starts running.
2) When you press the switch while the sewing machine is in operation, the sewing machine pauses. Another press on the switch re-starts the sewing machine.

4. Material end sensor
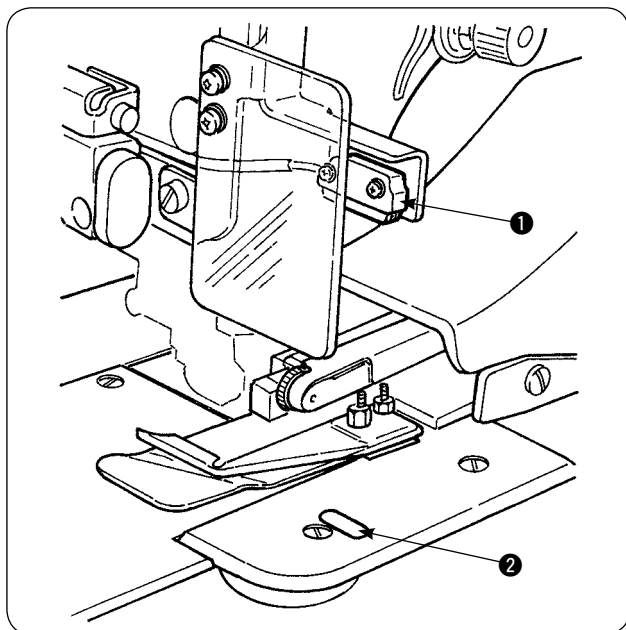
1) When material end sensor ❶ detects the end of material, the speed of stitch drops to 1,500 sti/min if the machine runs at 1,500 sti/min or more. (The factory-set value is 1,500 sti/min.)

2) When reflecting strip ❷ does not reflect light sufficiently, a malfunction can be caused. If any malfunction has occurred, replace the reflecting strip with a new one. (Part number: 40088020)

3) The initial value of the speed of stitch of the machine head after detection of the material end has been factory-set to 1,500 sti/min. However, it can be changed to 200 to 3,500 sti/min in accordance with process on the operation panel.

5. Adjusting the seam allowance
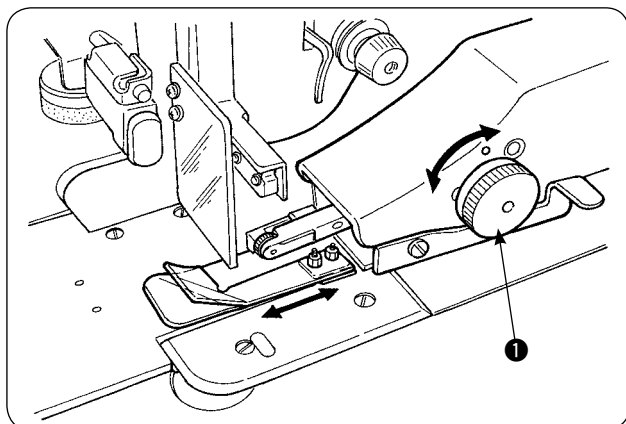
1) Seam allowance is changed by turning seam allowance adjusting knob ❶. It is adjustable from 1 mm to 30 mm.
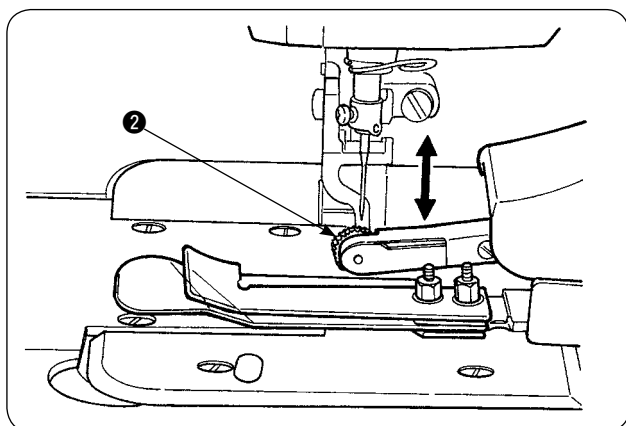
2) Check to be sure that swing arm ❷ smoothly moves up and down by pressing it with fingers.

6. Adjusting height of the upper manipulator roller
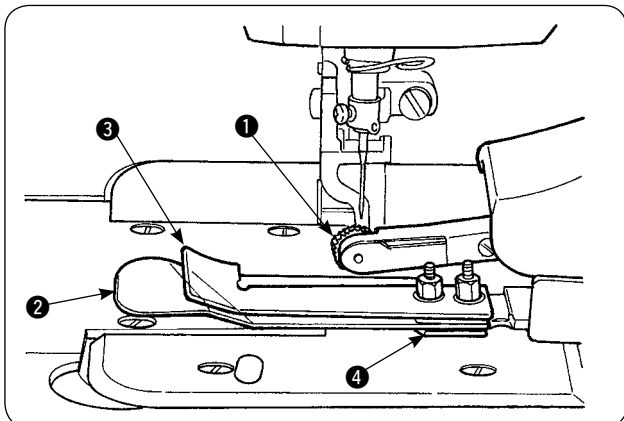
1) When you have replaced the sensor and cloth guide asm. ❹ (refer to pages 73 and 74 for how to replace them), it is necessary to adjust the clearance between roller ❶ and separation plate ❷.
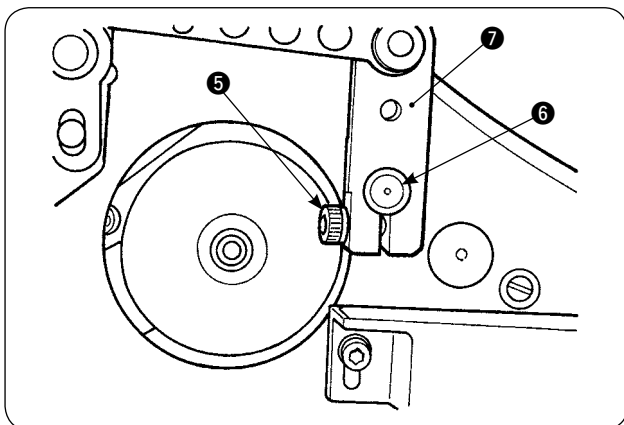
2) Loosen setscrew ❺ and move roller ❶ up and down to adjust so that the roller height matches cloth guide asm. ❹. It is necessary to adjust the height of roller ❶ so that its underside (out periphery) does not project from the bottom face of cloth guide ❸. Then, secure the roller with setscrew ❺.
Secure the roller with the end face of upper manipulator shaft ❻ aligned with the end face of manipulator driving arm ❼.

7. Pin tuck device S200 for AE-200A

> ⚠️ **CAUTION :**
> **To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal.**

(1) Specifications
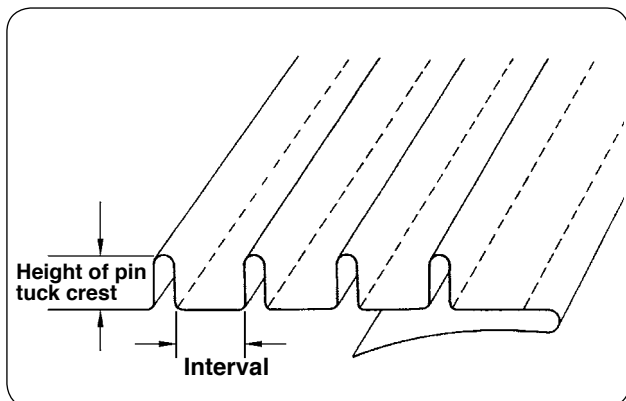
1. Pin tuck size
   Height of pin tuck crest: 1 to 30 mm
   Interval: 4 to 25 mm
   * The possible combination of specifications is "Height of crest + Interval = 50 mm" or less.
2. Speed of stitch: The best suited speed of stitch is 2,000 to 2,500 sti/min.

(2) Adhering a scale
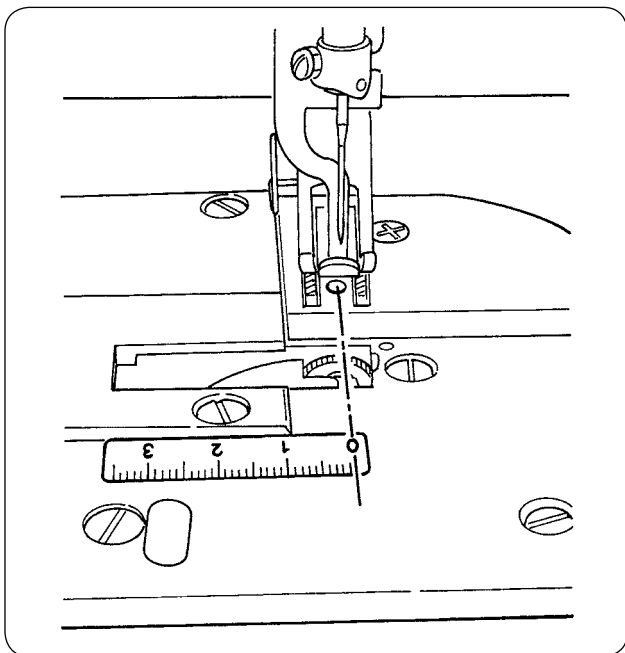
When the pink tuck device is retrofitted to the sewing machine, the scale label supplied with the unit should be adhered on the sewing machine.

Adhere the scale label on the sewing machine with its 0 (zero) position aligned with the needle entry line as illustrated in the sketch at left.

(3) Replacing the upper manipulator sensor and cloth guide
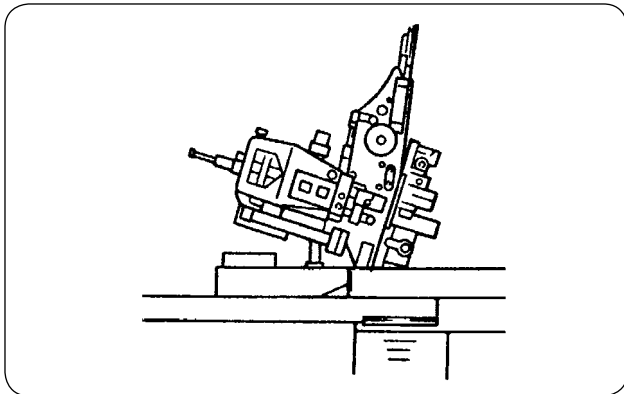
1) To replace the sensor, tilt the sewing machine and swing the upper manipulator.

> ⚠️ Caution
> **Be careful not to allow the upper manipulator to fall when you swing the upper manipulator.**
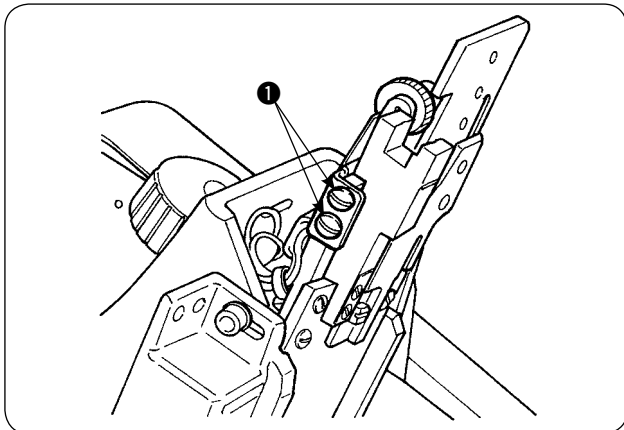
2) Remove two sensor holder setscrews ❶. Remove the sensor holder.
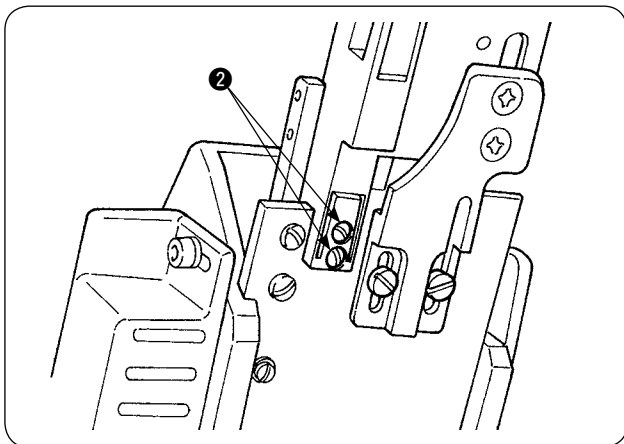
3) Remove two sensor setscrews ❷. Remove the sensor. Change the standard sensor with the exclusive pin tuck sensor (part number: 40084103).

> ⚠️ Caution
> **When securing the manipulator, adjust so that the sensor does not come in contact with the slots in the throat plate by means of two sensors ❷.**
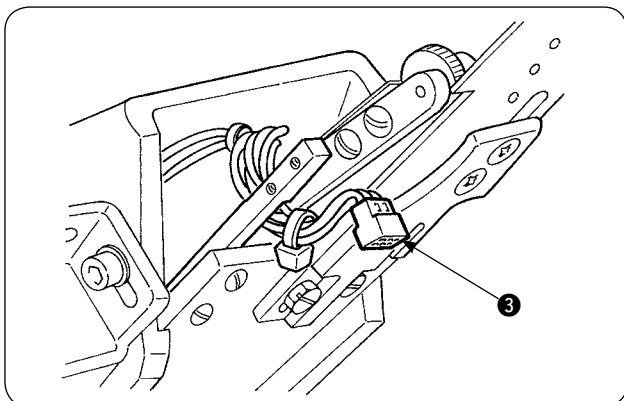
4) Remove sensor connector ❸ from the sensor. At this time, be sure to handle the connector section since it is very thin.

> ⚠️ Caution
> **When installing the sensor connector, carefully check the orientation of the connector. (Align with the connector mark.)**

– 73 –
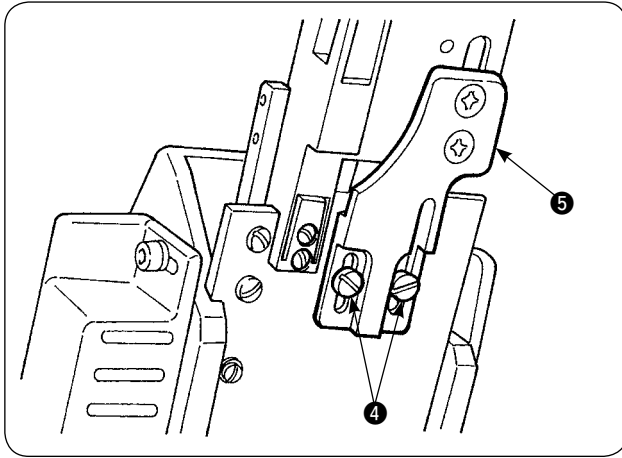
5) Remove two cloth guide setscrews ❹. Remove cloth guide ❺.
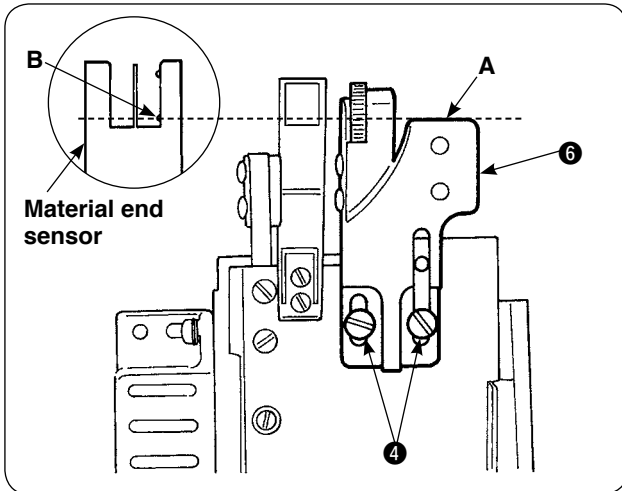
6) Install tucking ruler base plate ❻ with two cloth guide setscrews ❹.
Adjust tucking ruler base plate ❻ so that face **A** of tucking base plate ❻ is flush with section **B** of material end sensor **B**.

B

A

Material end sensor
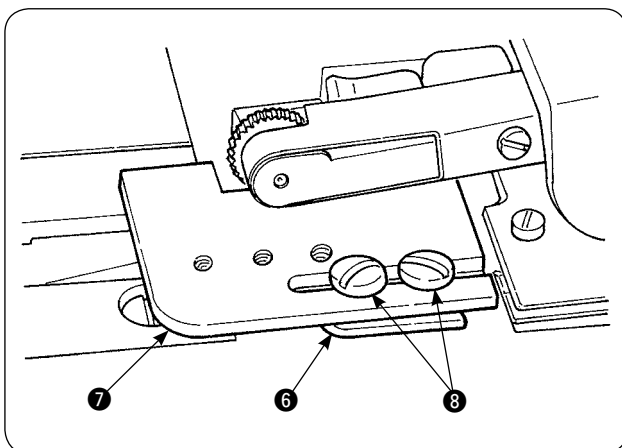
7) Mount tucking ruler ❼ on tucking ruler base plate ❻ with tucking ruler setscrews ❽.

(4) Installing the ruler

For the location of main-body ruler related parts, place the mounting base at the location shown in Fig. 1 and Fig. 2.

Fig. 1 Mounting location of the ruler with respect to widthwise direction

Amount of travel 55 mm ❶ **Loosen screw and the ruler can be moved rightward by 25 mm.**

Handle

See the enlarged view (Fig. 3).

A   B   ❷ **Space from the tucking width ruler: 0 to 0.5 mm**

Needle entry

❸ **30mm**

Main body of upper manipulator

❹ **Clearance where one ply of material used smoothly moves**
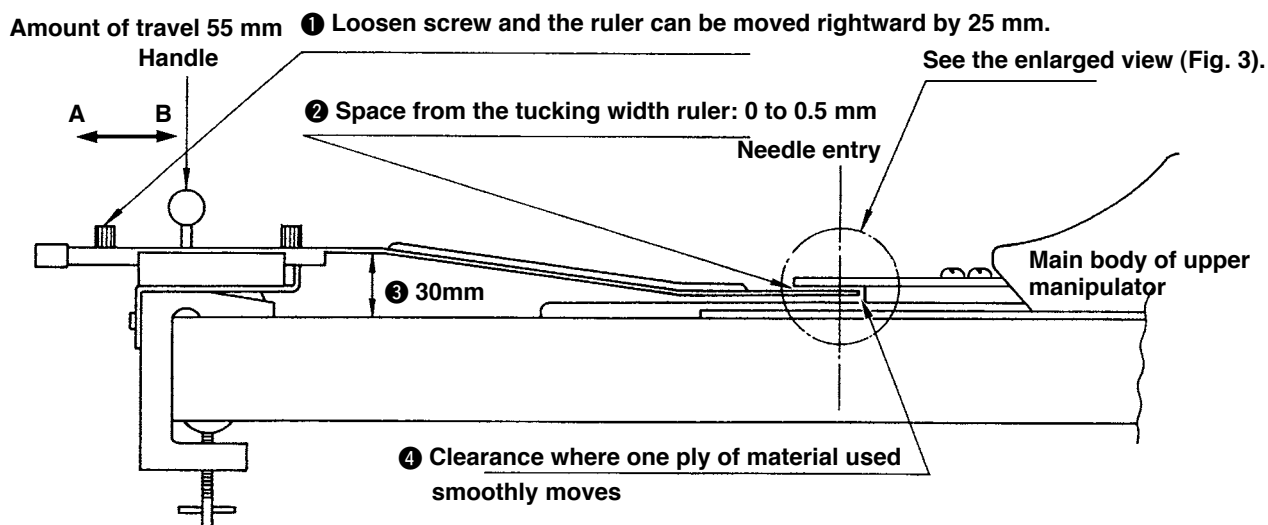
Install the mounting base on the leftmost table, and set the pin tuck ruler at the location which satisfies conditions ❷ and ❹.

Fig. 2 Mounting location of the ruler with respect to lengthwise direction

Pin tuck ruler

7mm

Slide rail

Place the ruler window at the location where the sensor's detecting section is visible.
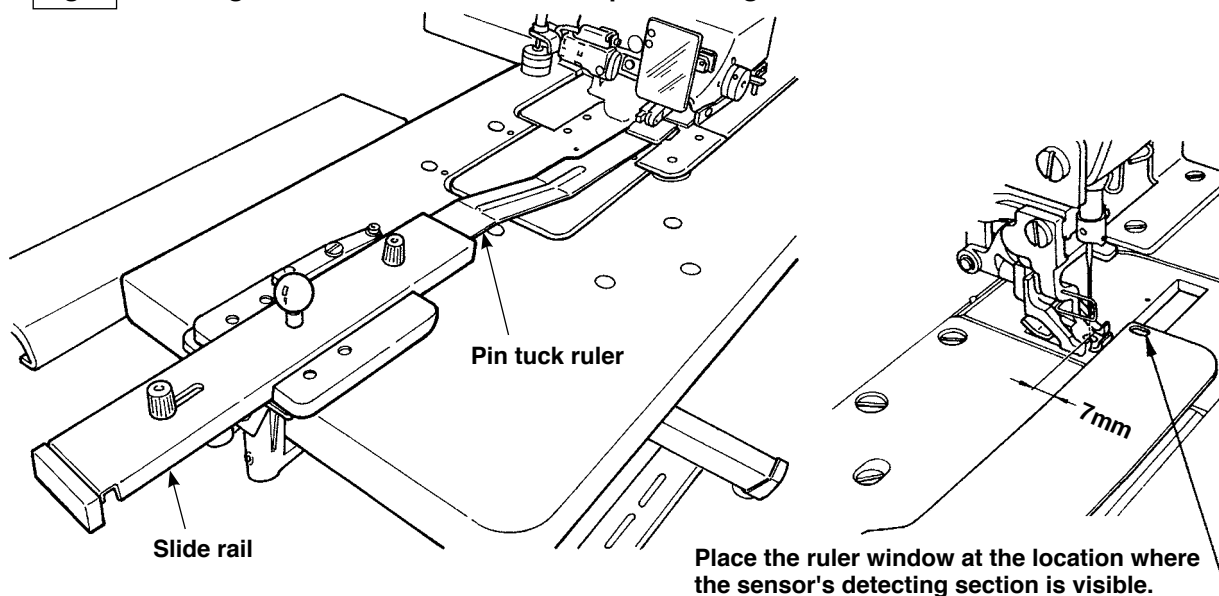
With respect to the face plate, install the mounting base on the machine table so that the front end of pin tuck ruler is spaced 7 mm from the needle entry (in parallel to the red line). At this time, place the ruler at the location where two sensor detecting sections under the base are visible.

Fig. 3 Sewing position

Ruler which determines the pin tuck height

Material

Left end face

Needle entry

5mm

Tucking width ruler
The ruler which determines the tucking width between crests

Provide a clearance through which the material smoothly passes

Manipulator

3mm
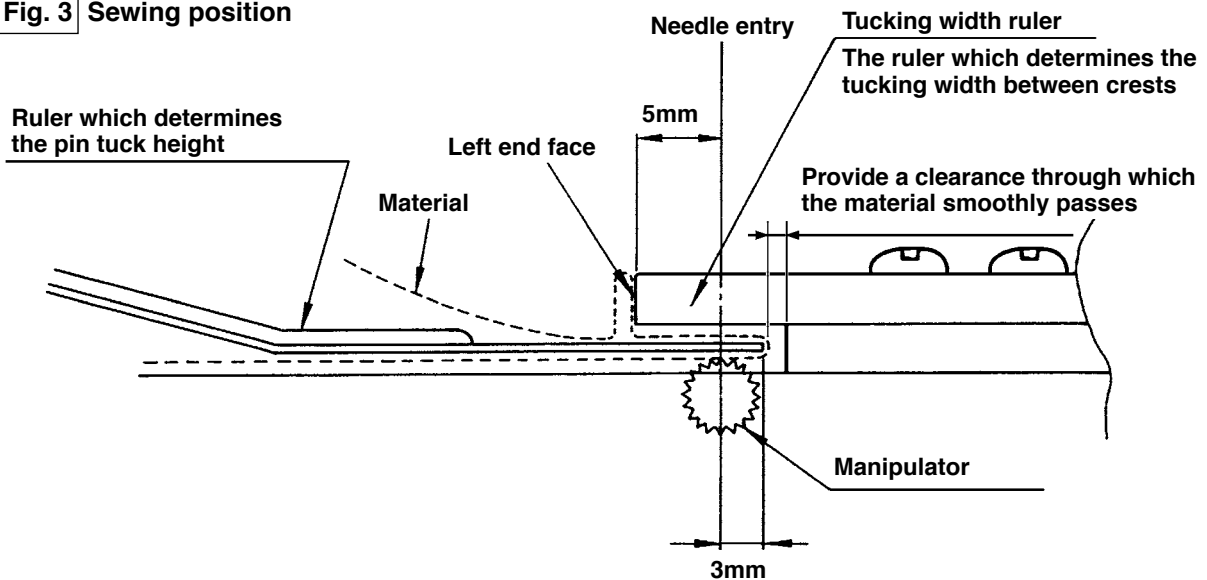
Fig. 4 Example of use

3mm

5mm
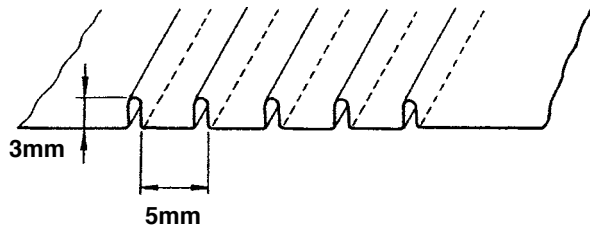
For sewing pin tucks of 5 mm in tucking width and 3 mm in height, the mounting location of the ruler is as illustrated in Fig. 3. The finished pin tucks are as illustrated in Fig. 4.

Fig. 5

Needle entry

Sew the first pin tuck with pressed against the tucking width ruler while guiding the material by hand.
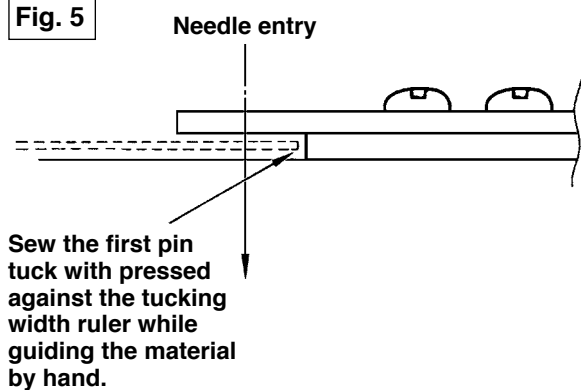
Sewing procedure

Select "without automatic material alignment" in [S02] "automatic material alignment" on the operation panel. Select "one piece sewing" in [S04] "changeover of No. of pieces to be sewn" [S04].

> **Caution**
> Sewing of the first pin tuck is most important since it is used as reference. Extremely careful when sewing the pin tuck. Note that the manipulator pressure should be set to a relatively lower value for sewing the first piece of material.

Operation panel setting procedure

① Bring the display on the LCD ❶ to the sewing ready state.
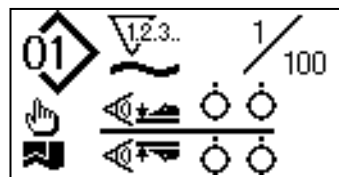
② Press READY key ❷ to change the display on LCD ❶.
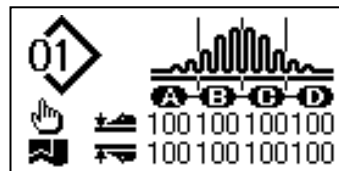
③ Press DATA key ❸ to display [S01] start mode on LCD ❶.

④ Press ITEM SELECT key ❹ to scroll the sewing data until [S02] automatic material alignment is selected. Select "Without automatic material alignment" using DATA CHANGE key ❺.
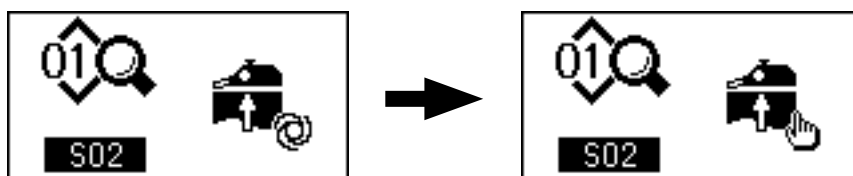
⑤ Press ITEM SELECT key ❹ to scroll the sewing data until [S04] changeover of No. of plies to be sewn is selected. Select "1-piece sewing" using DATA CHANGE key ❺.
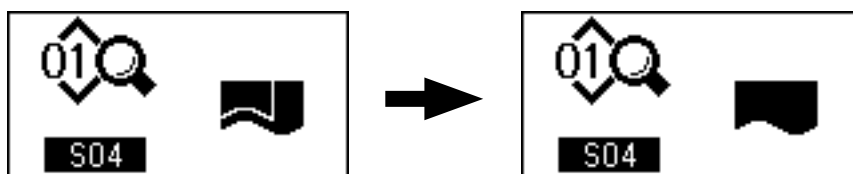
⑥ Press ITEM SELECT key ❹ to scroll the sewing data until [S22] manipulator lower rake-out speed is selected. Change the set value from 8 to 9 using DATA CHANGE key ❺.
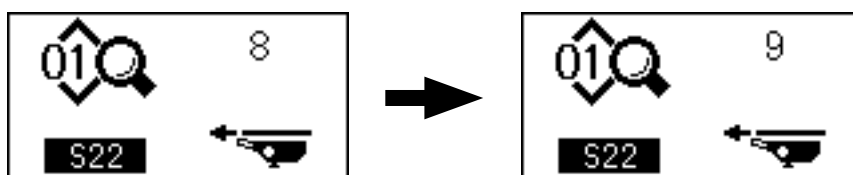
⑦ Press ITEM SELECT key ❹ to scroll the sewing data until [S23] manipulator lower rake-out speed is selected. Change the set value from 8 to 4 using DATA CHANGE key ❺.
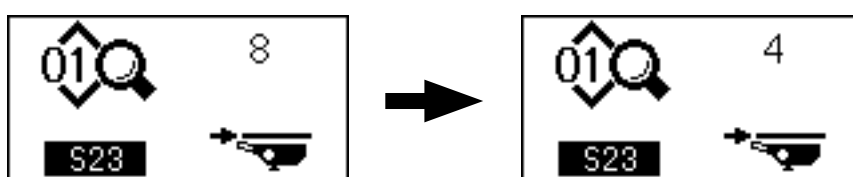
After completion of the setting procedure, press READY key ❷ to bring the operation panel to the set ready state, then run the sewing machine.

Fig. 6

Needle position

C

Lengthwise direction

D
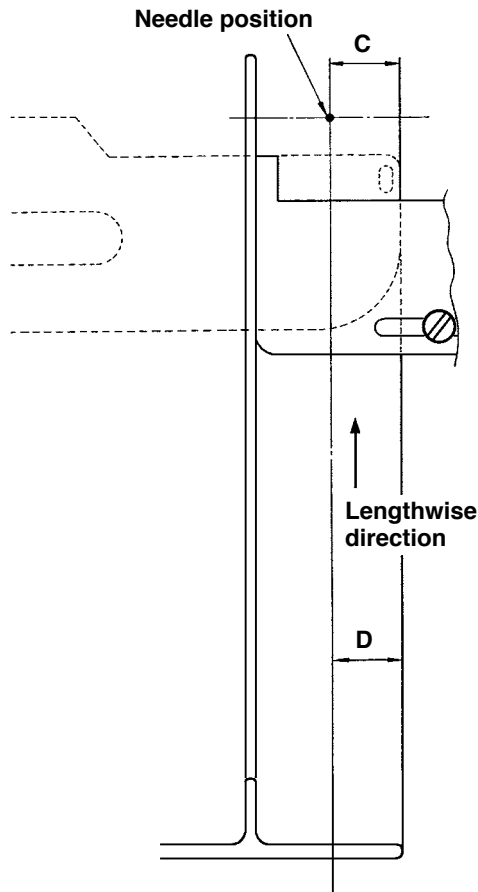
1) Draw the handle of the pin tuck ruler in direction **A** as shown in Fig. 1. When you have brought the ruler away from the material, fold the material into two (at the dotted line) as shown in Fig. 5 and sew the material with pressed against the guide. For the first piece of material, it is recommended to fold the material into two with an iron or the like beforehand to make a reference line to be used to fold it on the sewing machine.

2) Put the first piece of material onto the left end face of the tucking width ruler (see Fig. 3), move the handle in direction **B** in such a way as to insert the pin tuck ruler under the material (see Fig. 1), and secure the slide rail with the magnet (see Fig. 2). Place the top end of the material with respect to the direction of sewing at the needle entry position, press the start switch or depress the pedal to start sewing. It is recommended to guide the material with your right or left hand during sewing to achieve neat finish.

3) Set the lower manipulator pressure at 90 to 120 first. Then, adjust it in accordance with the material to be used. The best-suited speed of stitch is 2,000 to 2,500 sti/min.

4) If the crests of pin tucks warp, adjust the top feed amount.

5) The tucking width ruler comes in four different types, S, A, B, and C. The S type ruler is for pin tucks with a lower crest. The C type ruler is for pin tucks with a higher crest. Change the ruler according to the pin tuck specifications.

6) As shown in Fig. 1, the clearance provided between the pin tuck ruler and the tucking width ruler greatly affects the finish quality of pin tucks. When you place the material on the machine, be sure to check that the material moves smoothly. If the material does not move smoothly, bend the pin tuck ruler by hand to correct it appropriately.

7) For sewing conditions where pin tucks crest height **C** of which is more than 15 mm as shown in Fig. 6, set **D** section of the material firstly to the same width as **C** in the figure, then start sewing.

Ⅷ. ADJUSTING THE SEWING MACHINE

1. Adjusting the presser foot lifting lever
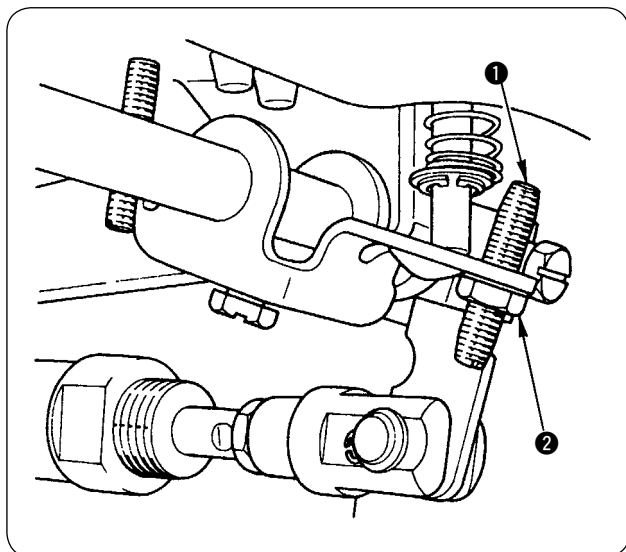
1) The maximum lift of the presser foot by means of the presser foot lifting lever is 10 mm.
2) The presser foot lift can be adjusted by means of presser foot lifting lever adjusting screw ❶.
3) To increase the presser foot lift, re-adjust it by loosening nut ❷ and adjusting screw ❶.

> **Caution**
>
> If you start the sewing machine with presser foot ❸ raised by presser foot lifting lever, the needle bar may hit against walking foot ❹. So, be careful.
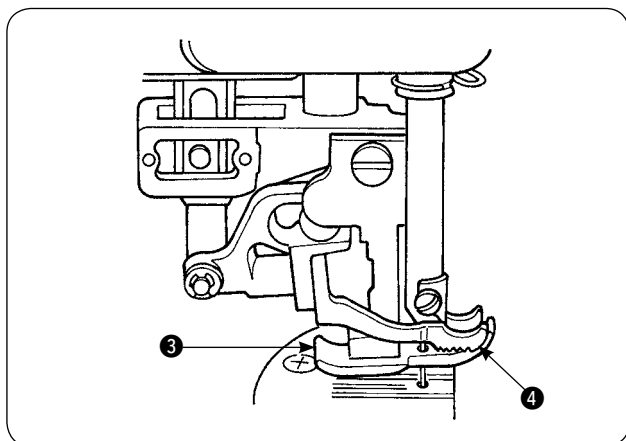
When you have changed the setting of [U25] to "Material placement with the needle lowered" as described in **"Ⅵ-14. [U24] Material placement with the needle lowered" on page 58**, lower the presser foot height by the presser foot lifting lever.

If it is not adjusted, the needle bar will come in contact with the presser foot and the walking foot when the needle bar comes down by pressing the START button. It is therefore necessary to adjust the presser foot height.

2. Thread tension
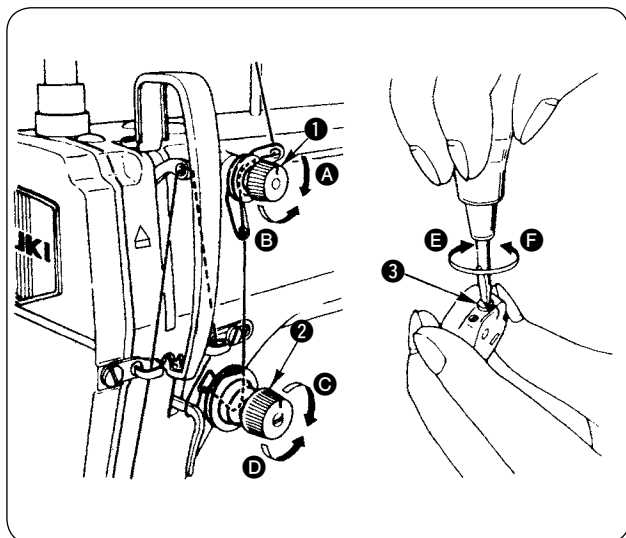
1. Adjusting the needle thread tension
1) The length of thread remaining at the needle after thread trimming is shortened by turning tension regulating nut No. 1 ❶ clockwise Ⓐ.
2) The aforementioned thread length is lengthened by turning the tension regulating nut No. 1 counterclockwise Ⓑ.
3) The needle thread tension is increased by turning tension regulating nut ❷ clockwise Ⓒ.
4) The tension is decreased by turning the tension regulating nut counterclockwise Ⓓ.

2. Adjusting the bobbin thread tension
1) The bobbin thread tension is increased by turning bobbin thread tension regulating spring ❸ clockwise Ⓔ.
2) The tension is decreased by turning the thread tension regulating spring counterclockwise Ⓕ.

3. Thread take-up spring
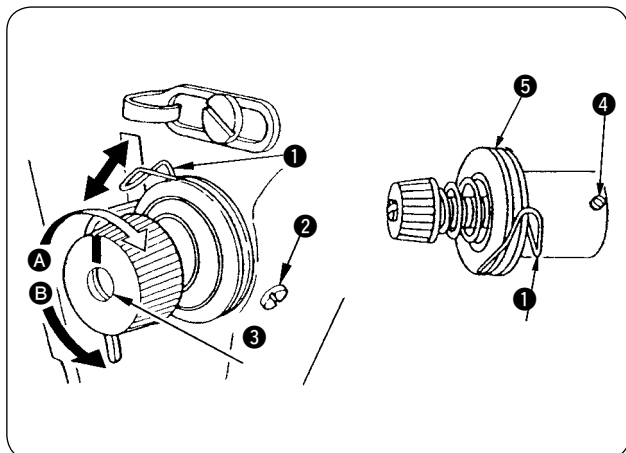
1. To change the stroke of thread take-up spring ❶
1) Loosen setscrew ❷ in the tension post socket.
2) The stroke is increased by turning tension post ❸ clockwise Ⓐ.
3) The stroke is decreased by turning the tension post counterclockwise Ⓑ.

2. To change the pressure of thread take-up spring ❶
1) Loosen setscrew ❷, and remove thread tension regulator (asm.) ❺.
2) Loosen setscrew ❹ in the tension post.
3) The pressure of the thread take-up spring is increased by turning tension post ❸ clockwise Ⓐ.
4) The tension is decreased by turning the thread tension regulating spring counterclockwise Ⓑ.

4. Presser foot lifting lever
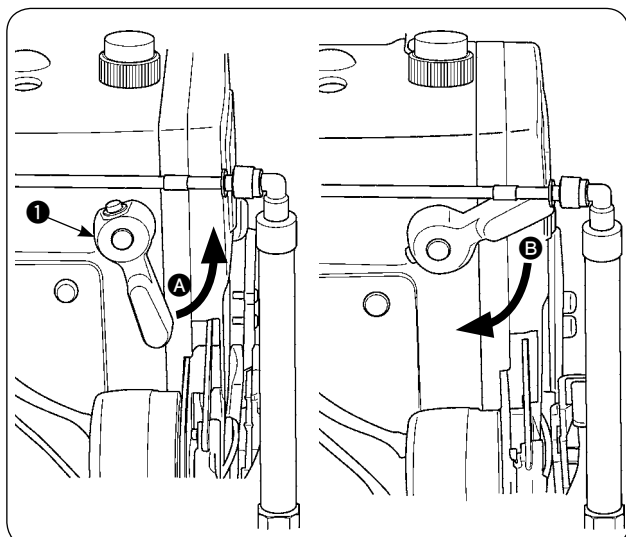
1) To stop the presser foot at the raised position, turn presser foot lifting lever ❶ in direction Ⓐ.
2) The presser foot goes up by 5 mm and stops. The presser foot returns to its home position by turning presser foot lifting lever downward in direction Ⓑ.
3) The presser foot can be raised up to approximately 10 mm by means of the presser foot lifting lever.

5. Adjusting the presser foot pressure

⚠ **CAUTION :**
To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine beforehand.
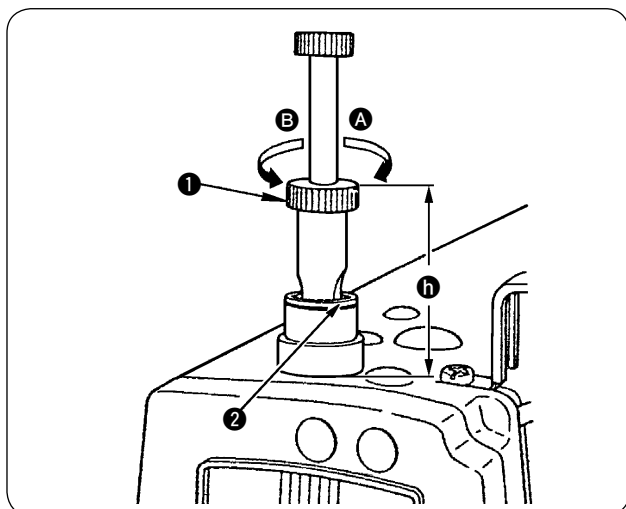
1) Loosen nut ❷. The pressure foot pressure is increased by turning presser spring regulator ❶ clockwise Ⓐ.
2) The tension is decreased by turning the tension regulating nut counterclockwise Ⓑ.
3) After the adjustment, tighten nut ❷.
4) For general fabric, standard height ❶ of the presser spring regulator is approximately 45 mm.

> **If the presser foot pressure and walking foot pressure are excessively high, the presser foot may fail to go up to its highest position when the auto-lifter is used.**

6. Adjusting the walking foot pressure

1) The walking foot pressure is increased by depressing walking foot pressure regulating knob ❶ and turning it clockwise, or decreased by turning it counterclockwise.
(Be sure to turn the walking foot pressure regulating stud with securely depressed.)

2) The standard pressure of the working foot is obtained when snap ring ❸ (silver) located inside the circular hole in the pressure regulator spring is aligned with the white line on pressure regulating nut ❷ when walking foot pressure regulating stud ❶ is depressed.

3) Adjust the walking foot pressure according to the type of material and process referring to the standard value obtained as described above.

> **If the walking foot pressure is excessive or the presser foot pressure is lower than the walking foot pressure, the presser foot may rise above the standard position. In this case, the presser foot may not provide adequate efficiency of feed or may damage the material. So be careful.**

7. Adjusting the thread take-up amount by thread take-up lever
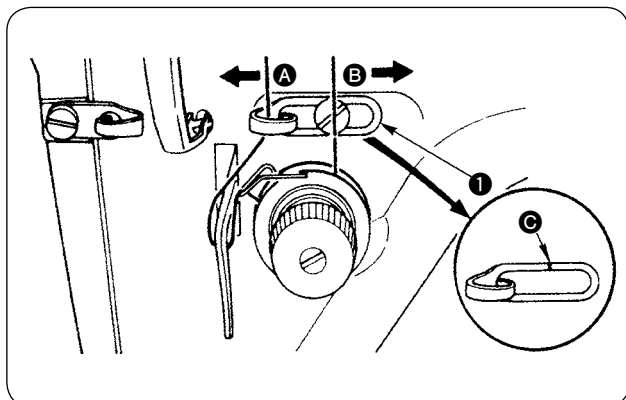
1) When sewing a heavy-weight material, increase the thread take-up amount by moving take-up thread guide ❶ leftward Ⓐ.

2) When sewing a light-weight material, decrease the thread take-up amount by moving take-up thread guide ❶ rightward Ⓑ.

3) The standard position of needle thread guide ❶ is obtained by aligning marker line Ⓒ with the center of the screw.

8. How to adjust the amount of oil (oil splashes) in the hook

⚠ **CAUTION :**
The hook rotates at a high speed since the oil amount is to be checked while the machine is in operation. Be extremely careful when you adjust the oil amount in order to protect against personal injury.

① **Oil amount (oil splashes) confirmation paper**

Approximately 25mm

Approximately 70 mm
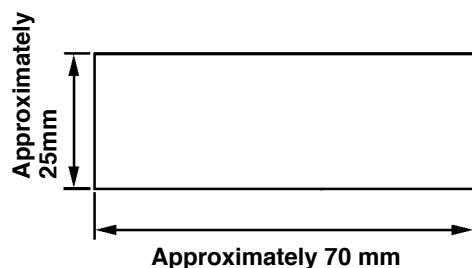
*Use any paper available regardless of the material.

② **Position to confirm the oil amount (oil splashes)**

Hook driving shaft front bushing

Hook

Bed

Approximately 3 to 10 mm

Oil splash confirmation paper

Oil reservoir

Closely fit the paper against the side face of the bed.
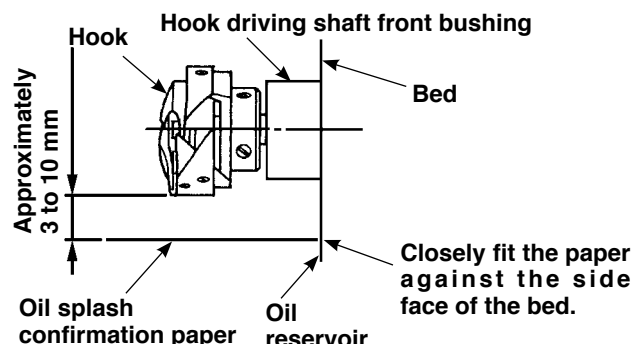
* Place the oil amount (oil splashes) confirmation paper under the hook.

⚠ **CAUTION :**
When checking the amount of oil (oil splashes) in the hook, be extremely careful not to allow your fingers to come in contact with the hook.
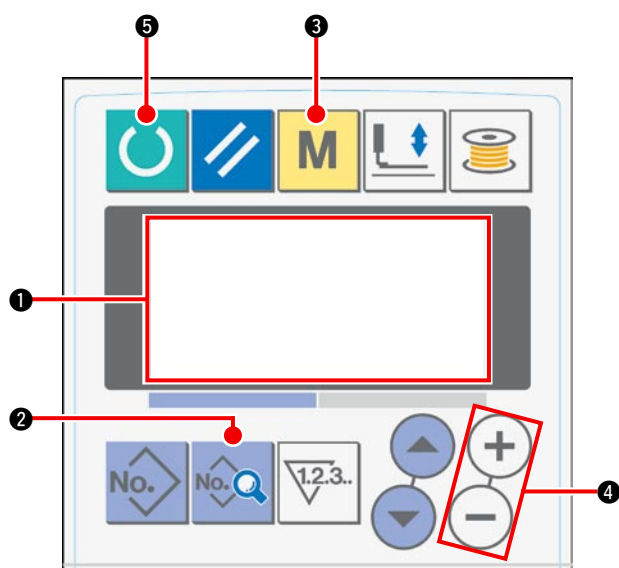
1) When you turn the power ON, the initial screen is displayed on LCD ❶.
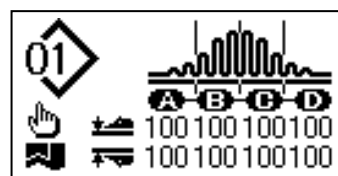
2) When you press DATA key ❷, [S01] start mode is displayed on LCD ❶.

3) Press MODE key ❸ to call [U01] manipulator operation select on LCD ❶.

4) Press the ⊕ key of DATA CHANGE key ❹ to stop the manipulator operation.

– 82 –
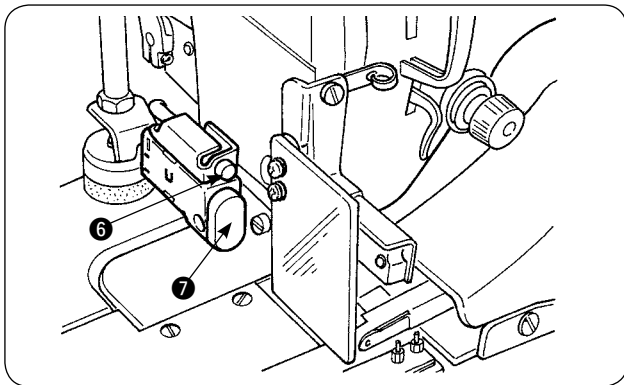
5) When you press READY key ❺, the following display appears on LCD ❶. Then the presser foot of the sewing machine goes up and LED ❻ flashes on and off.
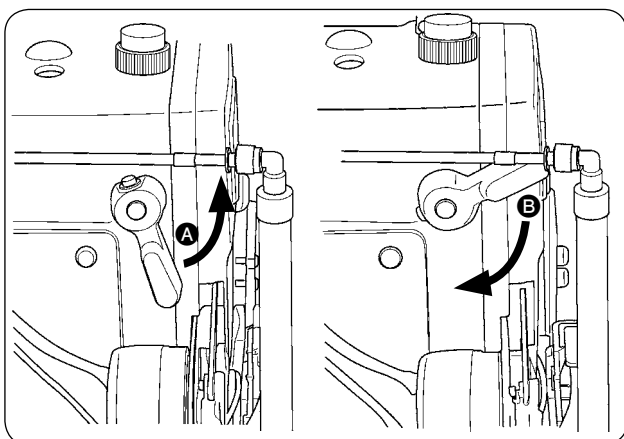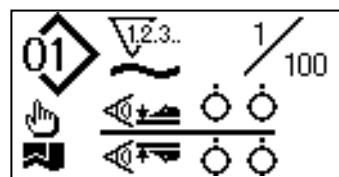
6) When you turn the presser foot lifting lever in direction Ⓐ and press START switch ❼, the presser foot of the sewing machine comes down and the sewing machine head starts rotating.

7) When you press START switch ❼ again after having checked the oil amount, the sewing machine head stops.

8) After completion of oil-amount checking, turn the presser foot lifting lever in direction Ⓑ to lower the presser foot of the sewing machine.

*   If the machine head is not sufficiently warm, idle the machine for approximately three minutes. (Moderate intermittent operation)
*   Place the oil amount (oil splashes) confirmation paper under the hook while the sewing machine is in operation.
*   Check to be sure that the oil level in the oil reservoir is between HIGH and LOW.
*   The length of time required for checking the oil amount (oil splashes) is five seconds. (Check the length of time with a watch.)

· **Sample showing the appropriate amount of oil**

Splashes of oil from the hook

Approximately 1mm

Appropriate amount of oil (small)

Splashes of oil from the hook

Approximately 2mm

Appropriate amount of oil (large)
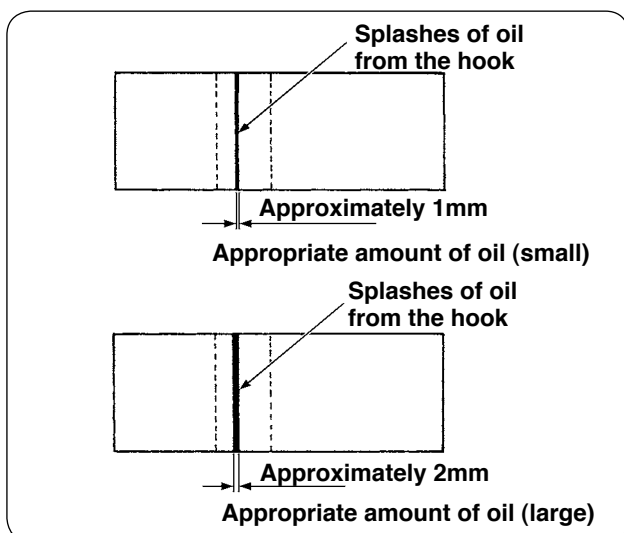
1) The appropriate amount of oil shown in the sample at left has to be finely adjusted to increase or decrease in accordance with the sewing process. Be extremely careful not to excessively increase or decrease the oil amount.
    · Excessively small amount of oil =
      The hook will be seized (the hook will be hot).
    · Excessively large amount of oil =
      The product will be stained with oil.
2) Check the oil amount (oil splashes) three times (with three sheets of paper). Adjust the oil amount so that it does not change among three times of checking.

· **Adjusting the amount of oil (oil splashes) in the hook**
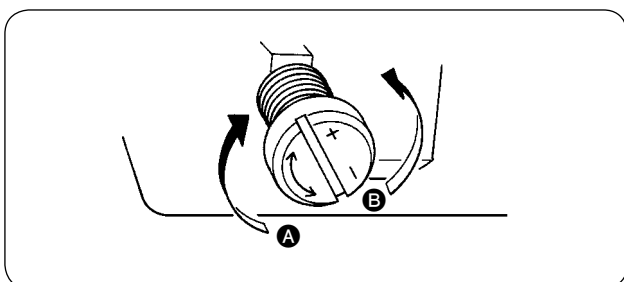
1) The oil amount (oil splashes) in the hook is increased by turning the oil amount adjustment screw mounted on the hook driving shaft front bushing in direction Ⓐ (toward "+"), or decreased by turning it in direction Ⓑ (toward "-").
2) After the adjustment of the oil amount in the hook with the oil amount adjustment screw, idle the sewing machine for approximately 30 seconds. Then, check the oil amount (oil splashes).

・Adjustment of the oil amount in the frame
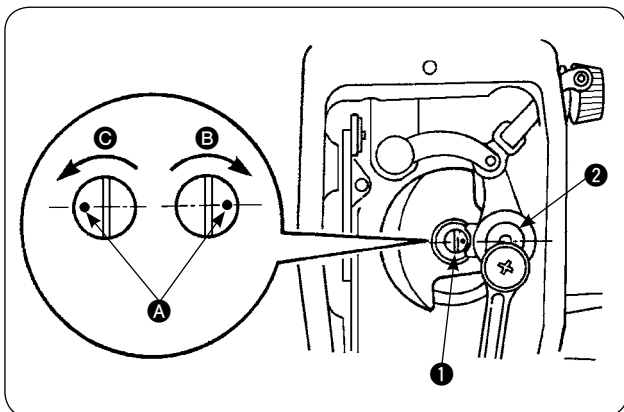
1) Adjust the amount of oil supplied to the thread take-up lever and needle bar crank section ❷ by turning oil amount adjust pin ❶.
2) The oil amount supplied is minimized when marker dot Ⓐ on the adjust pin is brought near needle bar crank ❷ by turning the adjust pin in direction Ⓑ.
3) The oil amount supplied is maximized when marker dot Ⓐ on the adjust pin is brought to the direct opposite position of needle bar crank ❷ by turning the adjust pin in direction Ⓒ.

9. Needle-to-hook relation
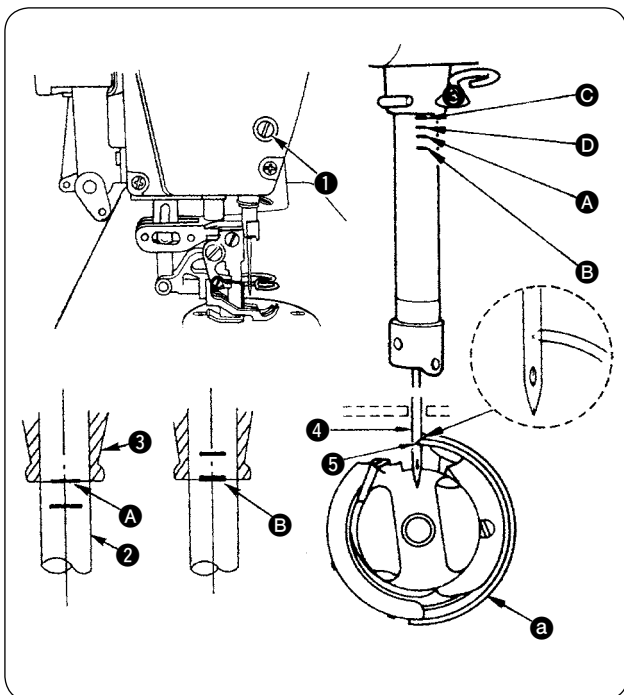
Adjust the timing between the needle and the hook as follows:

1) Turn the handwheel to bring the needle bar down to the lowest point of its stroke. Loosen needle bar connection setscrew ❶.
2) Determine the needle bar height.
   [For DB needle]
   Align marker line Ⓐ on needle bar ❷ with the bottom end of needle bar lower bushing ❸, and tighten needle bar connection setscrew ❶.
   [For DA needle]
   Align marker line Ⓒ on needle bar ❷ with the bottom end of needle bar lower bushing ❸, and tighten needle bar connection setscrew ❶.
3) Determine the mounting position of hook ⓐ.
   **[For DB needle]**
   Loosen three setscrews in the hook. Turn the handwheel to align marker line Ⓑ with the bottom end of needle bar lower bushing ❸ while needle bar ❷ is going up.
   [For DA needle]
   Loosen three setscrews in the hook. Turn the handwheel to align marker line Ⓓ with the bottom end of needle bar lower bushing ❸ while needle bar ❷ is going up.

4) In the aforementioned state, align hook blade point ❺ with the center of needle ❹. Adjust so that a clearance of 0.04 to 0.1 mm (reference value) is provided between the needle and hook, then securely tighten the hook setscrews.

⚠ **If the aforementioned clearance is smaller than the specified value, the hook blade point will be damaged. If the clearance is larger than the specified value, stitch skipping will result.**

* The part number of the hook used is 11038650 (standard) or 11141355 (JE). Replace the hook with a hook with the same part number when necessary.

10. Counter knife
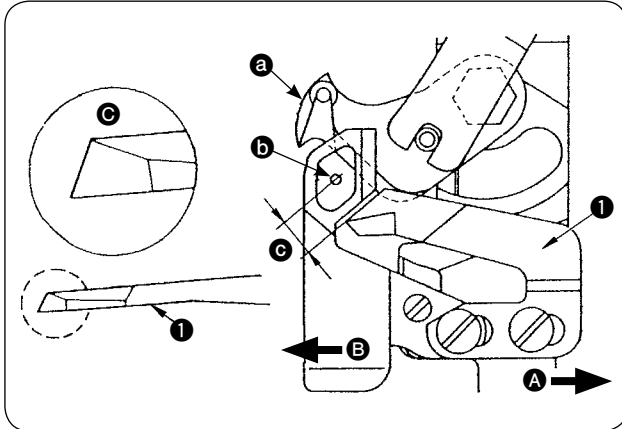
1) When the knife has become blunt, re-sharpen counter knife ❶ as illustrated in Fig. ⓒ and re-install it properly.

2) When the counter knife is moved rightward Ⓐ from the standard mounting position, the length of thread remaining after thread trimming becomes longer than the standard length by the length of move of the knife.

3) When the counter knife is moved leftward Ⓑ, the length of thread becomes shorter than the standard length by the length of move of the knife.

ⓐ Moving knife
ⓑ Center of needle
ⓒ Standard: 4.0 mm

11. Adjusting the feed timing
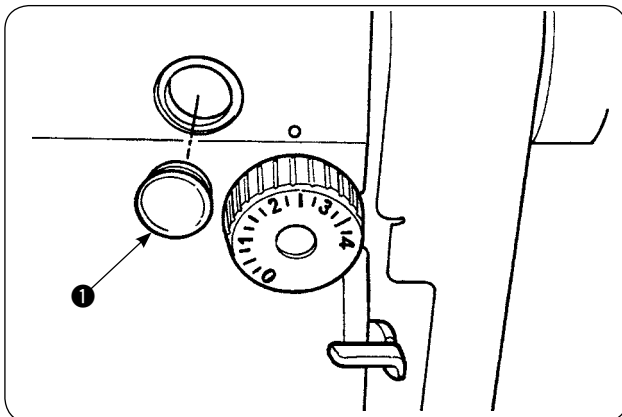
1) Remove rubber plug ❶ and carry out adjustment.

> **After completion of the adjustment, apply sealing agent to rubber plug ❶ and mount it back to its position.**

2) Loosen setscrews ❸ and ❹ in feed eccentric cam ❷ and move the feed eccentric cam in the direction of the arrow or the opposite direction of the arrow for adjustment. Then, securely tighten the setscrews.

3) To adjust to the standard timing, adjust so that the top face of the feed dog and top end of the needle eyelet are aligned with the top face of the throat plate when the feed dog comes down under the throat plate.

4) To advance the feed timing for the purpose of prevention of uneven material feed, move the feed eccentric cam in the direction of the arrow.

5) To retard the feed timing for the purpose of produce well-tensed seams, move the feed eccentric cam in the opposite direction of the arrow.

> **If the feed eccentric cam is excessively moved from the standard position, needle breakage will be caused.**

(Standard)

Needle
Feed dog   Throat plate

(Feed timing is advanced)

(Feed timing is retarded)

– 85 –

12. Inclination of the feed dog
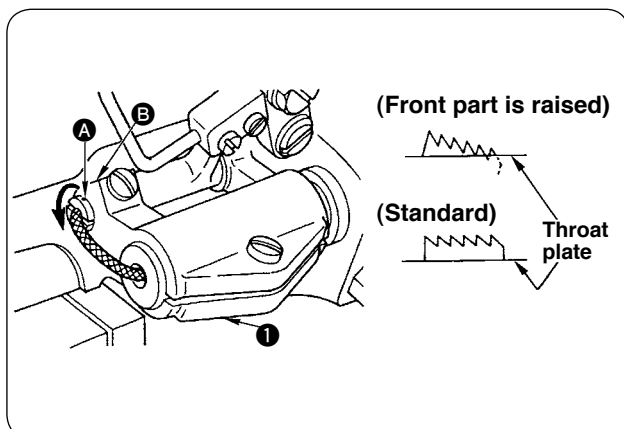
1) The standard inclination (horizontal) of the feed dog is obtained when marker dot **Ⓐ** on the feed bar shaft is aligned with section **Ⓑ** of feed bar base arm **❶**.

2) To adjust the inclination of the feed dog so that its front part is raised for the purpose of prevention of puckering, loosen the setscrew, insert a screwdriver into the feed bar shaft and turn the shaft in the direction of the arrow by 90 degrees of an angle.

3) To adjust the inclination of the feed dog so that its rear part is raised for the purpose of prevention of uneven material feed, turn the shaft in the opposite direction of the arrow by 90 degrees of an angle.

> **When you have adjusted the feed dog inclination, the feed dog height may change. So, be sure to re-check the feed dog height.**

13. Height of the feed dog
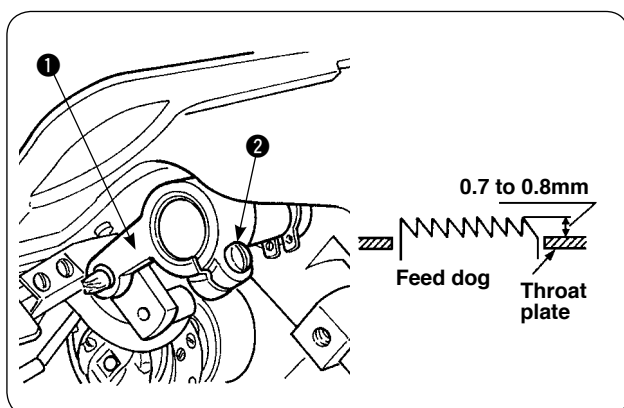
1) Jutting amount of the feed dog from the throat plate has been factory-adjusted to 0.7 to 0.8 mm at the time of delivery.

2) In the case of sewing a light-weight material, stitch gathering may result if the jutting amount of the feed dog is excessive.

3) To adjust the height of the feed dog
   ① Loosen clamping screw **❷** in feed driving arm **❶**.
   ② Adjust the feed dog height by moving the feed bar up or down.
   ③ Securely tighten clamping screw **❷**.

14. Lateral position of the feed dog

1) Adjust the lateral position of feed dog **❶** so that right and left clearances **A** between the feed dog **❶** and slots in throat plate **❷** are in parallel and equal by means of setscrews **❸** in the feed dog. After the adjustment, secure the feed dog by tightening the setscrews.

15. Precautions to be taken when correcting the longitudinal position of the walking foot

⚠️ **CAUTION :**
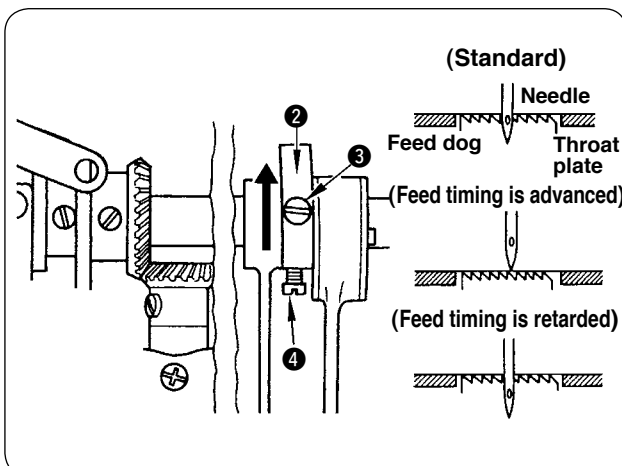**To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine beforehand.**
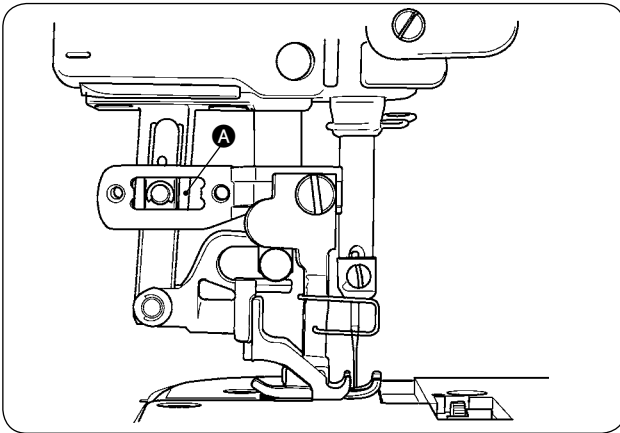
1) The standard lateral position of the walking foot is obtained when a clearance of 1 mm is provided in section Ⓐ by maximizing the top feed amount and bringing the walking foot to the front end position of its stroke. Adjust the longitudinal position of the walking foot so as to avoid abnormal noise or extra load while the sewing machine is in operation.

2) To operate the sewing machine with the longitudinal position of the walking foot slightly displaced, be sure to secure a clearance of 1 mm or more at sections Ⓐ and Ⓑ with the feed amount maximized.

IX. MAINTENANCE AND INSPECTION

1. Draining the filter regulator

⚠️ **CAUTION :**
To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal.
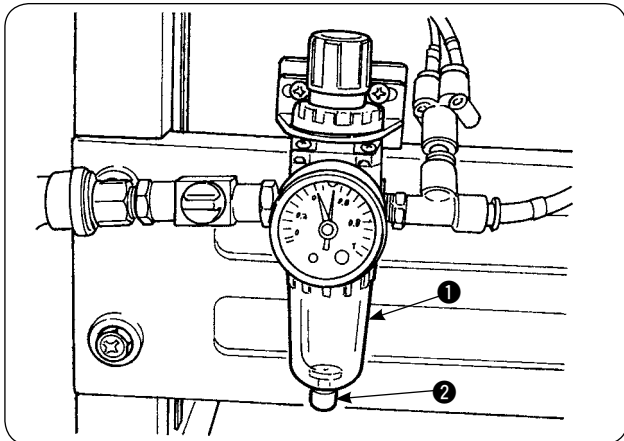
1) Drain regulator ❶ before using the sewing machine to expel water from the regulator. (Loosen knob ❷ to drain the regulator.)
2) Water content affects the pneumatically controlled components. So, be careful.
3) When the air pressure drops, the pressure gauge switch for regulator ❶ is activated to cause an error.
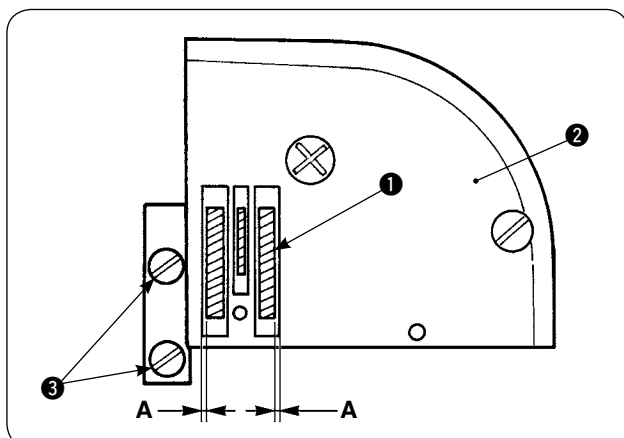
2. Cleaning the sensor

⚠️ **CAUTION :**
To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal.
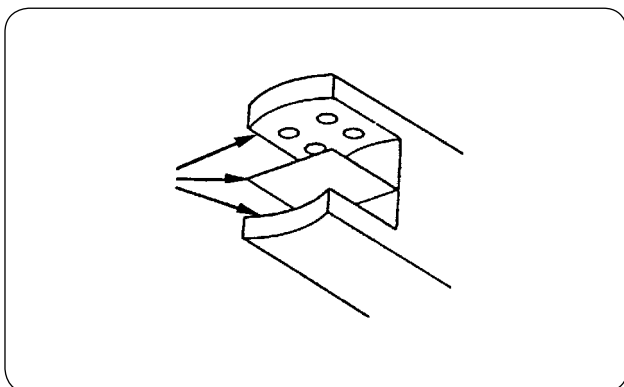
1) When sensor is stained with dust, malfunction will result. Blow away dust from the lens, slits, angular part at the back of the sensor, and reflecting plate with an air gun supplied with the unit.
2) When the sensor is stained with oil, dust will easily gather on the sensor. If the sensor is stained with oil by any possibility, remove it with benzine or the line immediately.

✋ **Carefully clean up the slit in the throat plate sensor in particular.**
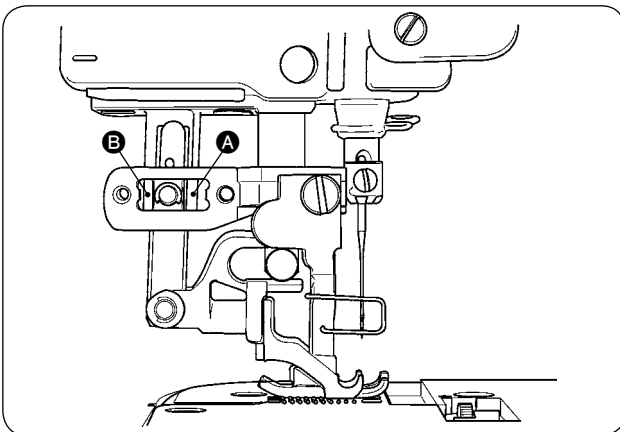
3. Lubricating the manipulator roller section

⚠️ **CAUTION :**
To avoid possible accident due to abrupt start of the sewing machine, turn off the power to the machine and make sure that the machine does not run even when you depress the start pedal.

Upper manipulator
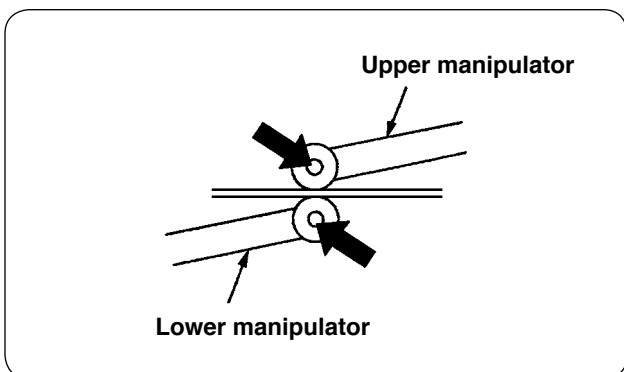
Lower manipulator

1) If the upper/lower manipulator shaft section generates abnormal noise, apply a little amount of grease on to the shaft section. (The sections shown with bold arrows in the illustration.)

4. Replacing the fuse

⚠️ **CAUTION :**
1. In order to prevent accidents caused by electrical shock, be sure to turn OFF the power to the sewing machine and wait for five minutes before opening the cover.
**2. Be sure to open the control box cover after having turned OFF the power switch, and replace the fuse with a new one of the designated capacity.**
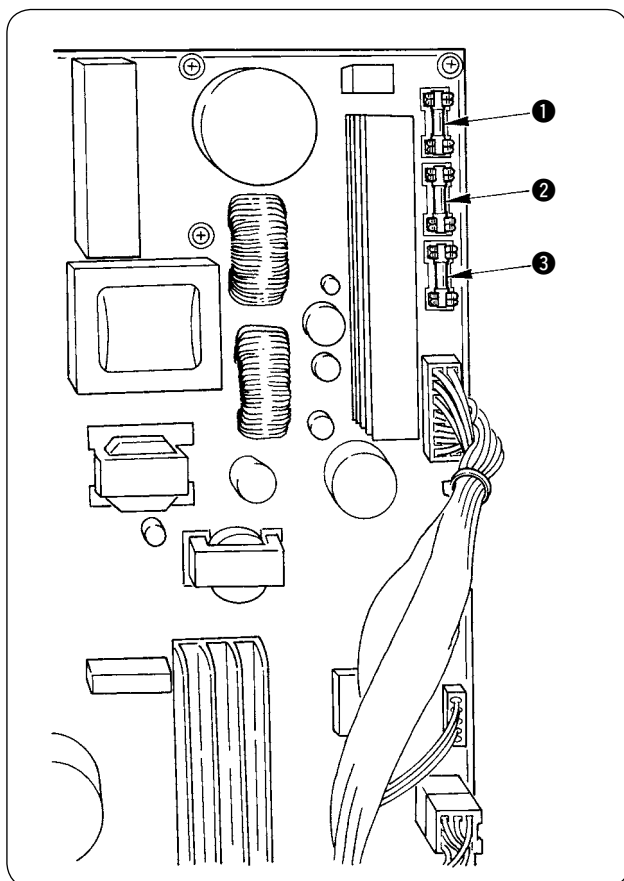
Use three fuses.

❶ For protection of the power to the stepping motor
5 A (Time lag fuse)
❷ For protection of the power to the solenoid and stepping motor
3.15 A (Time lag fuse)
❸ For protection of the power to the control box
2 A (Quick blowout type fuse)

5. List of optional parts for AE-200A

Part name	Part number
Pin tuck device	40088621
2-pedal unit	40084064
Bobbin thread remaining amount detecting device	40088623
Stacker device	40088624
Electric bobbin winding device	40088627
4/4 sensor for heavy-weight materials	40084101
4/4 cloth guide for heavy-weight materials	40088212
2/2 sensor for light-weight materials	40084102
2/2 cloth guide for light-weight materials	40088211
Thread breakage detecting device	40088632
Throat plate for light-weight materials	22881601
Feed dog for light-weight materials	22881700
Urethane upper feed dog	40088215
Cloth guide 4/4 for small curves	18076257
Cloth guide 4/2 for small curves	18076356
Cloth guide 2/2 for small curves	18076059
High-voltage transformer	40005422

6. Error code list

Error code	Pictograph	Description of error	How to recover	Screen restored by resetting
E001		**Notification of initialization of EEP-ROM on main control PCB** Notifies that the EEP-ROM has been automatically initialized since no data was written on the EEP-ROM or the data written on it was broken	Turn the power OFF	
E007		**Main shaft motor lock** When the material which gives a high resistance to needle has been sewn	Turn the power OFF	
E030		**Displacement of needle bar from upper position** When the needle fails to stop at its upper position even if you have tried to stop the sewing machine with its needle up at the startup of the sewing machine	Possible to re-start after reset	Standard screen
E031		**Air pressure drop**	Possible to re-start after reset	
E050		**Stop switch** When the stop switch has been pressed at the time of startup of the sewing machine	Possible to re-start after reset	Standard screen
E052		**Thread breakage detection** When the needle thread has broken	Possible to re-start after reset	
E061		**Memory switch data error** When the memory switch data is broken or revision update is necessary	Turn the power OFF	
E062		**Sewing data error** When the sewing data is broken or revision update is necessary	Turn the power OFF	
E072		**Motor lock error (during thread trimming)**	Turn the power OFF	
E302		**Machine head tilt confirmation** When the machine head tilt sensor in the OFF state	Possible to re-start after reset	Standard screen
E303		**Main shaft Z-phase sensor error** Abnormal Z-phase sensor for the encoder of the sewing machine motor	Turn the power OFF	
E499		**Faulty setting of lower manipulator pressure** When the bottom feed pitch is 2.5 mm or more, an error occurs if the lower manipulator pressure is set at 65 or less.	Possible to re-start after reset	Standard screen
E703		**Operation panel connection to unexpected sewing machine (model error)** When the model codes of the systems do not match during initial communication	Turn the power OFF	

Error code	Pictograph	Description of error	How to recover	Screen restored by resetting
E704	**Version** ◻◻◻	**System version disagreement** When the software versions of the systems software do not match during initial communication	Turn the power OFF	
E730		**Malfunction or open-phase of main shaft motor encoder** When the encoder of the sewing machine motor is abnormal	Turn the power OFF	
E731		**Faulty main shaft motor hole sensor or position sensor** When the hole sensor or the position sensor for the sewing machine motor is defective	Turn the power OFF	
E733		**Main shaft motor reverse rotation** When the sewing machine motor has rotated in the reverse direction	Turn the power OFF	
E801		**Open-phase of power source** When the input power source has an open phase	Turn the power OFF	
E802		**Instantaneous power interruption detection** When the input power source has been interrupted instantaneously	Turn the power OFF	
E811		**Over-voltage** When the input power source voltage has increased to 280 V or more	Turn the power OFF	
E813		**Low voltage** When the input power source voltage has decreased to 150 V or less	Turn the power OFF	
E901		**Abnormal main motor IPM** When the IPM of servo-control PCB is abnormal	Turn the power OFF	
E902		**Main shaft motor over-current** When an excessive current has flown in the sewing machine motor	Turn the power OFF	
E903		**Abnormal stepping-motor power source** When the power source of the stepping motor for servo control PCB fluctuates by ±15 % or more	Turn the power OFF	
E904		**Abnormal solenoid power source** When the power source of the solenoid for servo control PCB fluctuates by ±15 % or more	Turn the power OFF	
E915	((•))	**Abnormal communication between operation panel and main CPU** When difficulties in data communication have occurred	Turn the power OFF	
E916	((•))	**Abnormal communication between main CPU and main shaft CPU** When difficulties in data communication have occurred	Turn the power OFF	

Error code	Pictograph	Description of error	How to recover	Screen restored by resetting
E943		**Faulty EEP-ROM on main control PCB** When data cannot be written on the EEP-ROM	Turn the power OFF	
E946		**Faulty writing on serial EEP-ROM** When data cannot be written on the serial EEP-ROM	Possible to re-start after reset	
E998		**Bobbin thread remaining amount detecting device origin error**	Turn the power OFF	
E999		**Upper shirring origin error**	Possible to re-start after reset	

7. Setting data recording paper for AE-200A

		1	2	3	4	5	6	7	8	9	10
Name of sewing		Factory-delivered state	Factory-delivered state								
Pattern number		1	1	2	3						
Process (2-ply joining, pin tuck)		2-ply sewing	Pin tuck	2-ply sewing	2-ply sewing						
Product name											
Material type		Combed broadcloth	Combed broadcloth								
Needle thread; type and yarn count		Spun thread #60	Spun thread #60								
Bobbin thread; type and yarn count		Spun thread #60	Spun thread #60								
Needle; type and count		DB×1#11	DB×1#11								
Joining edge width (mm)		-	3×5mm								
Sewing machine stitch length		2.5mm	2.5mm								
Height of the presser spring regulating		45mm	45mm								
Walking foot regulating knob		53mm	53mm								
Function setting item											
Item	Description										
S20	Upper scrape-out speed of manipulator	8	8	8	8						
S21	Upper draw-in speed of manipulator	8	8	8	8						
S22	Lower scrape-out speed of manipulator	8	9	8	8						
S23	Lower draw-in speed of manipulator	8	4	8	8						
S24	Cloth fluff detection level			0	0						
S25	Setting of manipulator-pressure intermittent-adjustment section	No setting	No setting	No setting	No setting						
S26	Number of stitches for intermittent interval of upper manipulator pressure	-	-	-	-						
S27	Number of stitches for intermittent interval of lower manipulator pressure	-	-	-	-						
S28	A speed of machine (rabbit)	3500	2500	3500	3500						
S29	B speed of machine (turtle)	1500	1500	1500	1500						
S30	Sewing start - Selection of back tack	Without	Without	Without	Without						
S31	Sewing start - Number of back tack stitches - A	-	-	-	-						
S32	Sewing start - Number of back tack stitches - B	-	-	-	-						
S33	Sewing start - State of back tack manipulator	-	-	-	-						
S34	Sewing end - Selection of back tack	Without	Without	Without	Without						
S35	Sewing end - Number of back tack stitches - C	-	-	-	-						
S36	Sewing end - Number of back tack stitches - D	-	-	-	-						
S37	Sewing end - State of back tack manipulator	-	-	-	-						
S40	Section A - Shirring amount	-	-	-	-						
S40	Section A - Shirring ratio	110 to130	110	110	110						
S41	Machine head section speed A	3500	3500	3500	3500						
S42	Shirring changeover position A (number of stitches)	0	0	0	0						
S43	Section B - Shirring amount	-	-	-	-						
S43	Section B - Shirring ratio	-	-	-	-						
S44	Machine head section speed B	-	-	-	-						
S45	Shirring changeover position B (number of stitches)	-	-	-	-						
S46	Section C - Shirring amount	-	-	-	-						
S46	Section C - Shirring ratio	-	-	-	-						
S47	Machine head section speed C	-	-	-	-						
S48	Shirring changeover position C (number of stitches)	-	-	-	-						
S49	Section D - Shirring amount	-	-	-	-						
S49	Section D - Shirring ratio	-	-	-	-						
S50	Machine head section speed D	-	-	-	-						
S51	Shirring changeover position D (number of stitches)	-	-	-	-						
S80	Section A - Upper manipulator pressure	70 to 100	100	100	100						
S81	Section A - Lower manipulator pressure	100 to 130	100 to 130	100	100						
S82	Upper/lower manipulator pressure changeover position A (number of stitches)	0	0	0	0						
S83	Section B - Upper manipulator pressure	-	-	-	-						
S84	Section B - Lower manipulator pressure	-	-	-	-						
S85	Upper/lower manipulator pressure changeover position B (number of stitches)	-	-	-	-						
S86	Section C - Upper manipulator pressure	-	-	-	-						
S87	Section C - Lower manipulator pressure	-	-	-	-						
S88	Upper/lower manipulator pressure changeover position C (number of stitches)	-	-	-	-						
S89	Section D - Upper manipulator pressure	-	-	-	-						
S90	Section D - Lower manipulator pressure	-	-	-	-						
S91	Upper/lower manipulator pressure changeover position D (number of stitches)	-	-	-	-						
S130	Selection of stacker operation	Selections of specifications	Selections of specifications	-	-						
S131	Stacker operating position	-	-	-	-						
S132	Selection of the number of times of stacker operation	-	-	-	-						

CONTENTS