

ENGLISH

**LH-4500C Series / SC-956
INSTRUCTION MANUAL**

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1. SPECIFICATIONS

1-1. Specifications of the sewing machine head

Thread trimming specification (Standard equipment for multi-layered part detection sensor) :

LH-45△8C-F△F7NB

Type of machine head		Needle thread clamp type	
7	1.8-fold capacity hook, without corner stitching function	N	With
8	1.8-fold capacity hook, with corner stitching function	Thread trimming specification	
		7	With
		Needle gauge specification	
		F	6.4 mm(1/4 inch)
		Seam specification	
		G	For jeans and heavy-weight materials
		F	For attaching tape to foundation
		S	Medium-weight materials

	LH-4578C-FGF7NB	LH-4588C-FGF7NB	LH-4578C-FSF7NB	LH-4588C-FSF7NB
Max. sewing speed	Stitch length 0 to 5.0 : 3,000 sti/min Stitch length 5.1 to 6.0 : 2,500 sti/min Stitch length 6.1 to 7.0 : 2,000 sti/min		Stitch length 0 to 5.0 : 3,000 sti/min	
Stitch length	7 mm		5 mm	
Presser foot pressure control	Electronic control			
Needle *1	DP×5 #16 to #23		DP×5 #9 to #16	
Applicable count of thread	#30 to #3 (#3 to #5, supported as an option)		#80 to #30	
Counts of thread that can be trimmed	#30 to #3 (#3 to #5, supported as an option)		#80 to #30	
Separately driven needle bar mechanism	Without	With	Without	With
Motor	AC servo motor			
Lubricating oil	JUKI NEW DEFRIX OIL No. 1 or JUKI CORPORATION GENUINE OIL 7			
Number of patterns	Sewing pattern 99 patterns For the polygonal shape sewing, as many as 10 patterns can be registered.) Cycle sewing pattern 9 patterns Custom-pitch pattern 20 patterns Condensation custom pattern 9 patterns			
Noise	- Equivalent continuous emission sound pressure level (L _{pA}) at the workstation: A-weighted value of 79 dBA ; (Includes K _{pA} = 2.5 dBA) ; according to ISO 10821- C.6.2 -ISO 11204 GR2 at 2,000 sti/min. - Equivalent continuous emission sound pressure level (L _{pA}) at the workstation: A-weighted value of 84 dBA ; (Includes K _{pA} = 2.5 dBA) ; according to ISO 10821- C.6.2 -ISO 11204 GR2 at 2,800 sti/min.			

*1 : Needle used depends on the destination.

Specification without thread trimming :

LH-45 8C-F F0 B Δ

Type of machine head	
7	1.8-fold capacity hook, without corner stitching function

Multi-layered part detection sensor	
Space	Without
S	Provided with a multi-layered part detection sensor

Needle thread clamp type	
0	Without

Needle gauge specification	
F	6.4 mm(1/4 inch)

Seam specification	
F	For attaching tape to foundation
S	Medium-weight materials

	LH-4578C-FFF0B / LH-4578C-FFF0BS	LH-4588C-FSF0BS
Max. sewing speed	3,000 sti/min	
Stitch length	4 mm	5 mm
Presser foot pressure control	Electronic control	
Needle *1	DP×5 #9 to #16	
Applicable count of thread	#80 to #30	
Separately driven needle bar mechanism	Without	
Motor	AC servo motor	
Lubricating oil	JUKI NEW DEFRIX OIL No. 1 or JUKI CORPORATION GENUINE OIL 7	
Number of patterns	Sewing pattern 99 patterns For the polygonal shape sewing, as many as 10 patterns can be registered.) Cycle sewing pattern 9 patterns Custom-pitch pattern 20 patterns Condensation custom pattern 9 patterns	
Noise	- Equivalent continuous emission sound pressure level (L _{pA}) at the workstation: A-weighted value of 79 dBA ; (Includes K _{pA} = 2.5 dBA) ; according to ISO 10821- C.6.2 -ISO 11204 GR2 at 2,000 sti/min.	

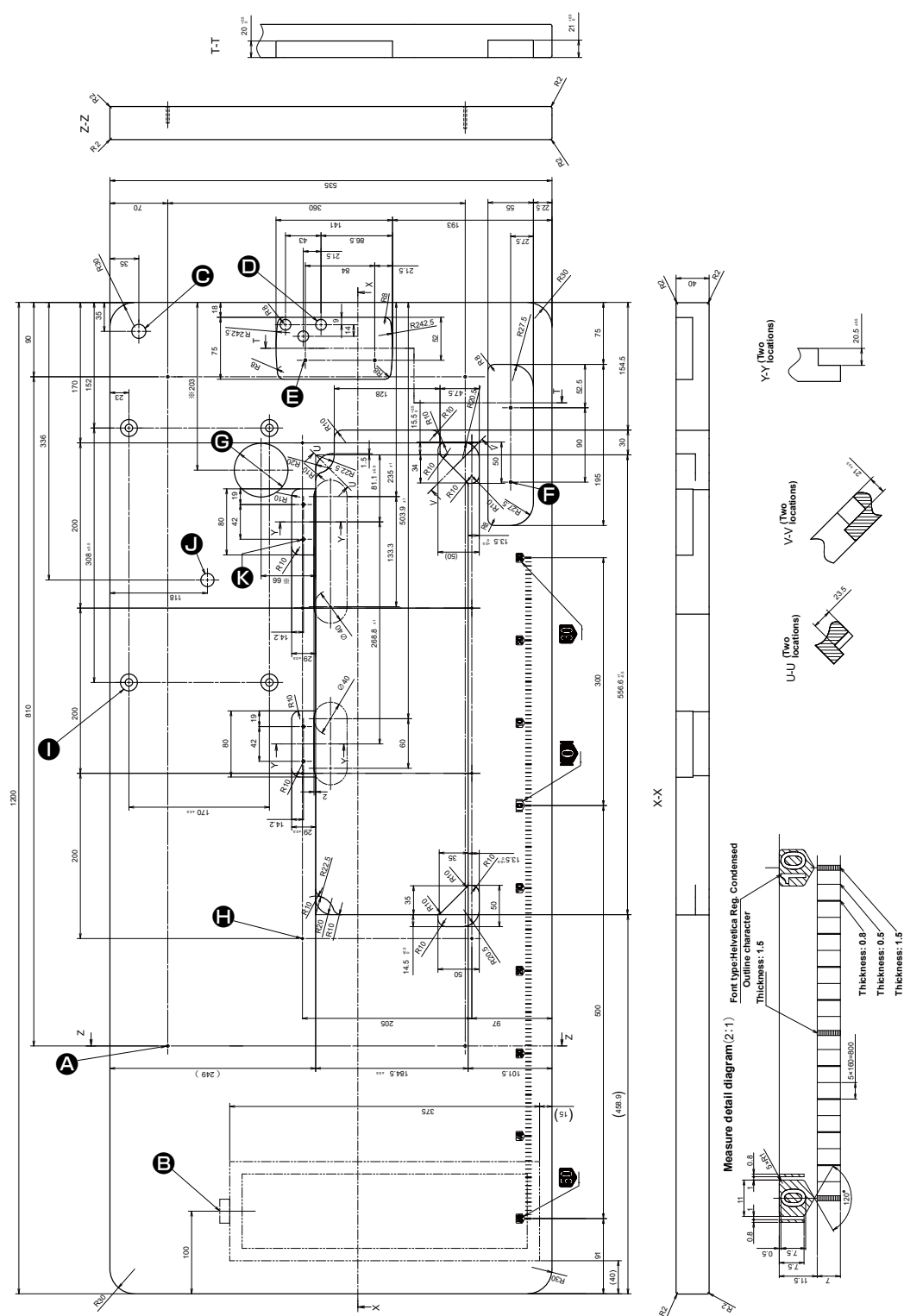
***1 : Needle used depends on the destination.**

1-2. Specifications of the control box

Model	SC-956B			
Besleme gerilimi	Single phase 100 to 120V	3-phase 200 to 240V	Single phase 220 to 240V	Single phase 220 to 240V CE
Frekans	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Çalışma ortamı	Temperature : 0 to 35°C Humidity : 90% or less	Temperature : 0 to 35°C Humidity : 90% or less	Temperature : 0 to 35°C Humidity : 90% or less	Temperature : 0 to 35°C Humidity : 90% or less
Giriş	600VA	600VA	600VA	600VA

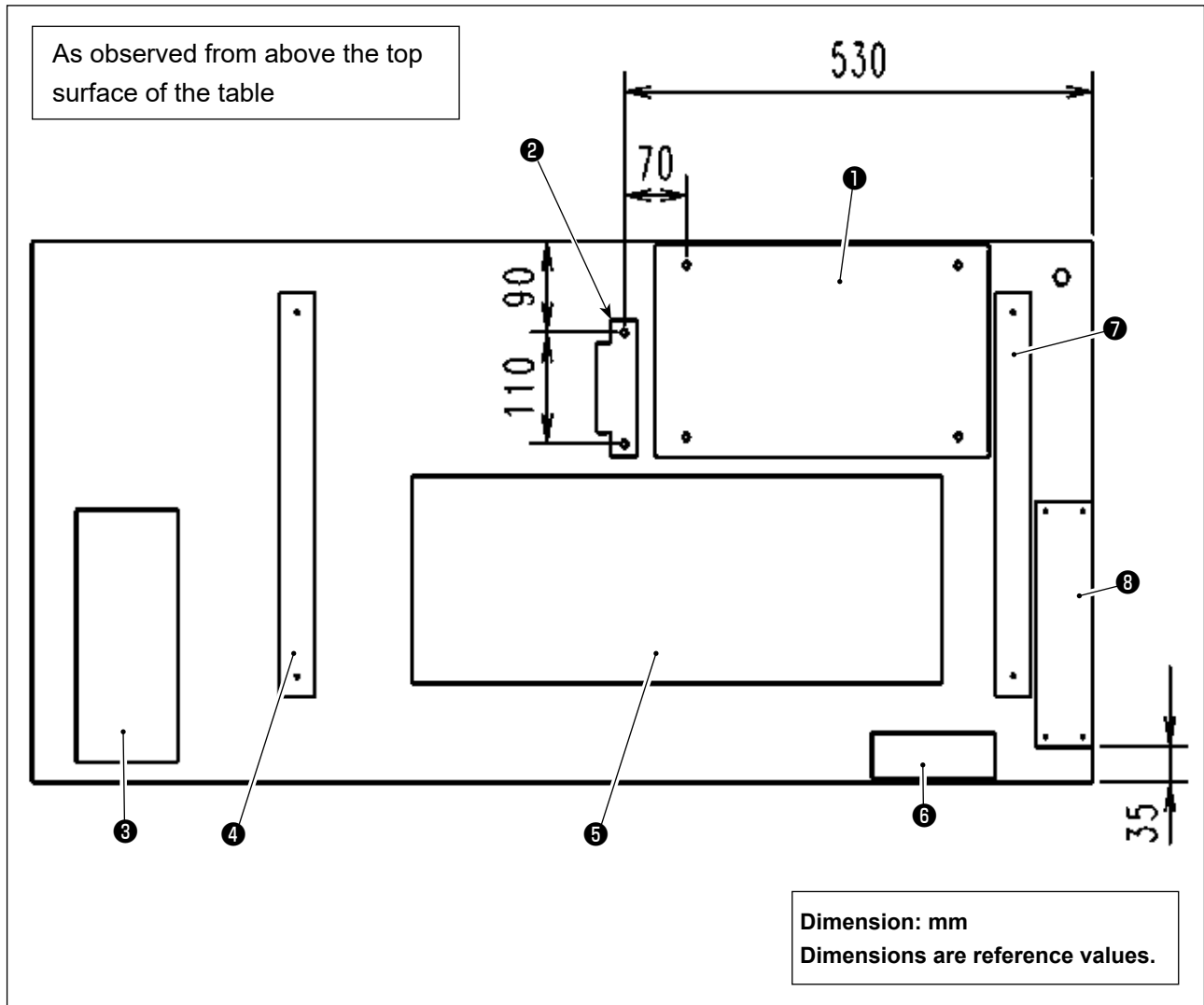
2. INSTALLATION

2-1. Drawing of table



- A** 4× $\phi 3.4$ on the bottom surface, depth 20 (Drill a hole at the time of set-up.)
 - B** Installing position of drawer stopper (on the reverse side)
 - C** $\phi 17$ drilled hole
 - D** 3× $\phi 13$ drilled hole
 - E** 2× $\phi 3.5$, depth 10
 - F** 2× $\phi 3.5$, depth 10
 - G** $\phi 65$ drilled hole
 - H** 8× $\phi 2.7$, depth 6
 - I** 4×9 drilled, 20.5 depth, countersunk depth 17
 - J** $\phi 16$, depth 25
 - K** 4× $\phi 3.5$, depth 10
- Note : ① If you want to cover the holes **I** (4 places), please use HX00326000D (sold separately).
 ② Table part number 40306044

2-2. Mounting position of the devices

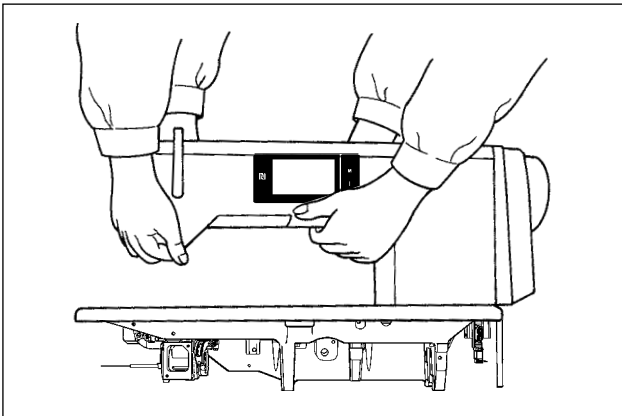


- ① Electrical box
- ② Pedal sensor
- ③ Drawer
- ④ Table stand (left)
- ⑤ Oil pan
- ⑥ Power switch
- ⑦ Table stand (right)
- ⑧ Reactor box (*)

* ⑧ : Only for the EU type models

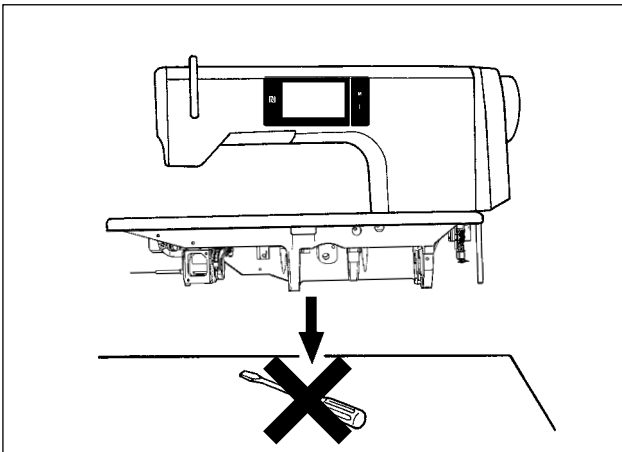
2-3. Cautions when setting up the sewing machine

Thank you very much for the purchase of JUKI Industrial Sewing Machine this time. Make sure of items 2-1 through 2-17 before operating to use this sewing machine with ease.



[How to carry the sewing machine]

Carry the sewing machine while holding the machine arm with two persons as shown in the figure.



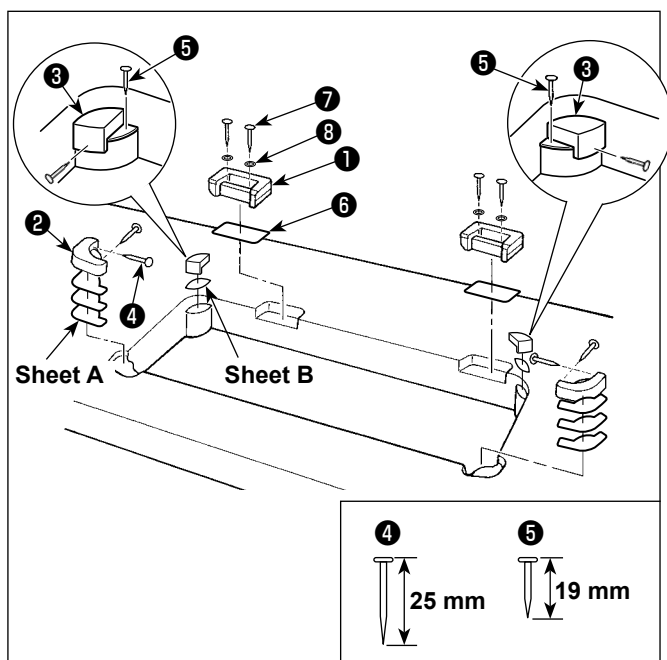
[Caution when placing the sewing machine]

Place the sewing machine on a horizontal and plane place when placing it and do not place any protruding thing such as a screwdriver or the like.

1. Never hold the handwheel since it rotates.
2. Be sure to handle the sewing machine with two persons or more since the sewing machine weighs 55 kg or more.



2-4. Installation of the sewing machine



- 1) Attaching the hinge seats and the support rubbers of the machine head
Fix accessory hinge seat **1** supplied with the unit on the table with wood screw **7** and washer **8** while placing sheet plate **6** between the hinge seat and the table as shown in the figure.

Fix machine head support rubbers **2** and **3** on the table with nails while putting sheets **A** (standard: 3 pieces) and sheet **B** (standard: 1 piece) under the machine head support rubbers.

Use nail **5** for sheet **B** and nail **4** for sheets **A**.

There are two different machine head support rubbers **3**; i.e., the rubber for the right and that for the left. Be sure to check the types of the support rubbers before fixing them.

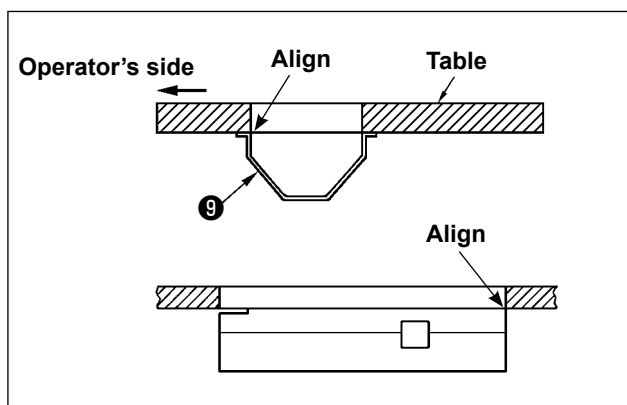
Sheet A (eight pieces) and sheet B (four pieces) are supplied with the machine as accessories.



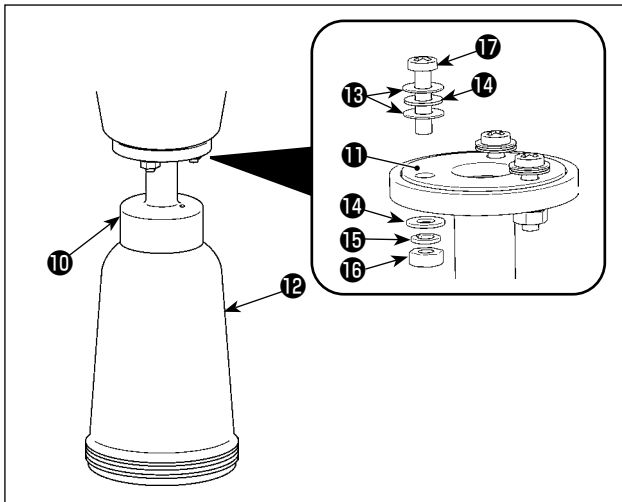
For the sheet A, three sheets are to be used as standard for each mounting position. For the sheet B, one sheet is to be used as standard. (The state shown in the left figure) The sheets A and B are used for adjusting the height of the top surface of the bed. Use one more sheet to increase the height, or use only one sheet to decrease it.



Be sure to use a short nail **5** for sheet B. If long nail **4** is used, the nail tip can penetrate the table giving rise to a risk of injury.



- 2) Attaching the oil pan
Fix the oil pan **9** supplied with the machine on the table by tightening ten wood screws.



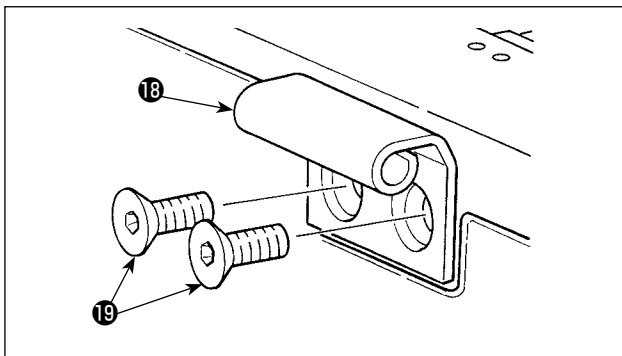
3) Installing the oil bottle

Put oil seal **11** over accessory oil remover **10** and secure them with screw **17** and nut **16**.



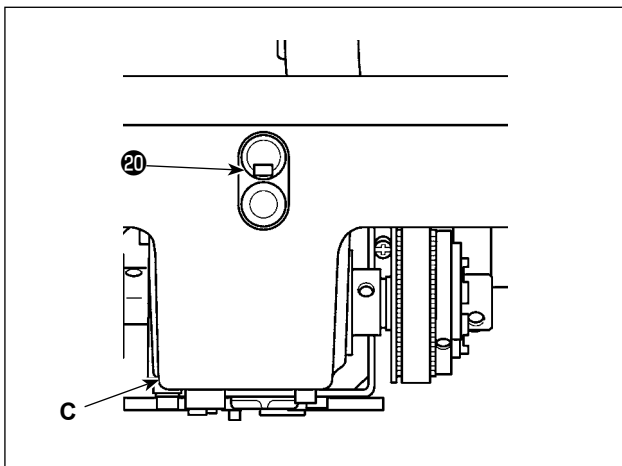
At this time, placing a washer between two packing washers **13**, attach them to the screw. Then, tighten screw **17** together with washer **14**, spring washer **15** and nut **16** as shown in the figure on the left. (At three locations)

Put oil bottle **12** into oil remover **10** by hand.



4) Install hinge **18** on the bed with screw **19**.

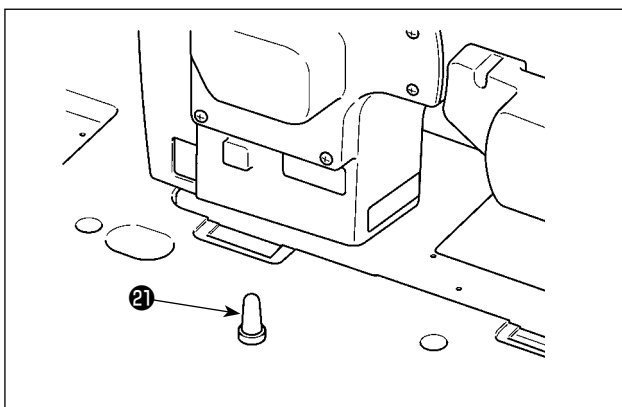
Engage the hinge with the rubber hinge of the table. Then, place the machine head on the machine head support rubber.



5) Detach air vent cap **20** from the bed.



1. If the sewing machine runs without removing air vent cap **20**, oil may leak from feed box unit C.
2. In the case of transporting the sewing machine with its head detached from the table, it is necessary to attach air vent cap **20** to the bed.

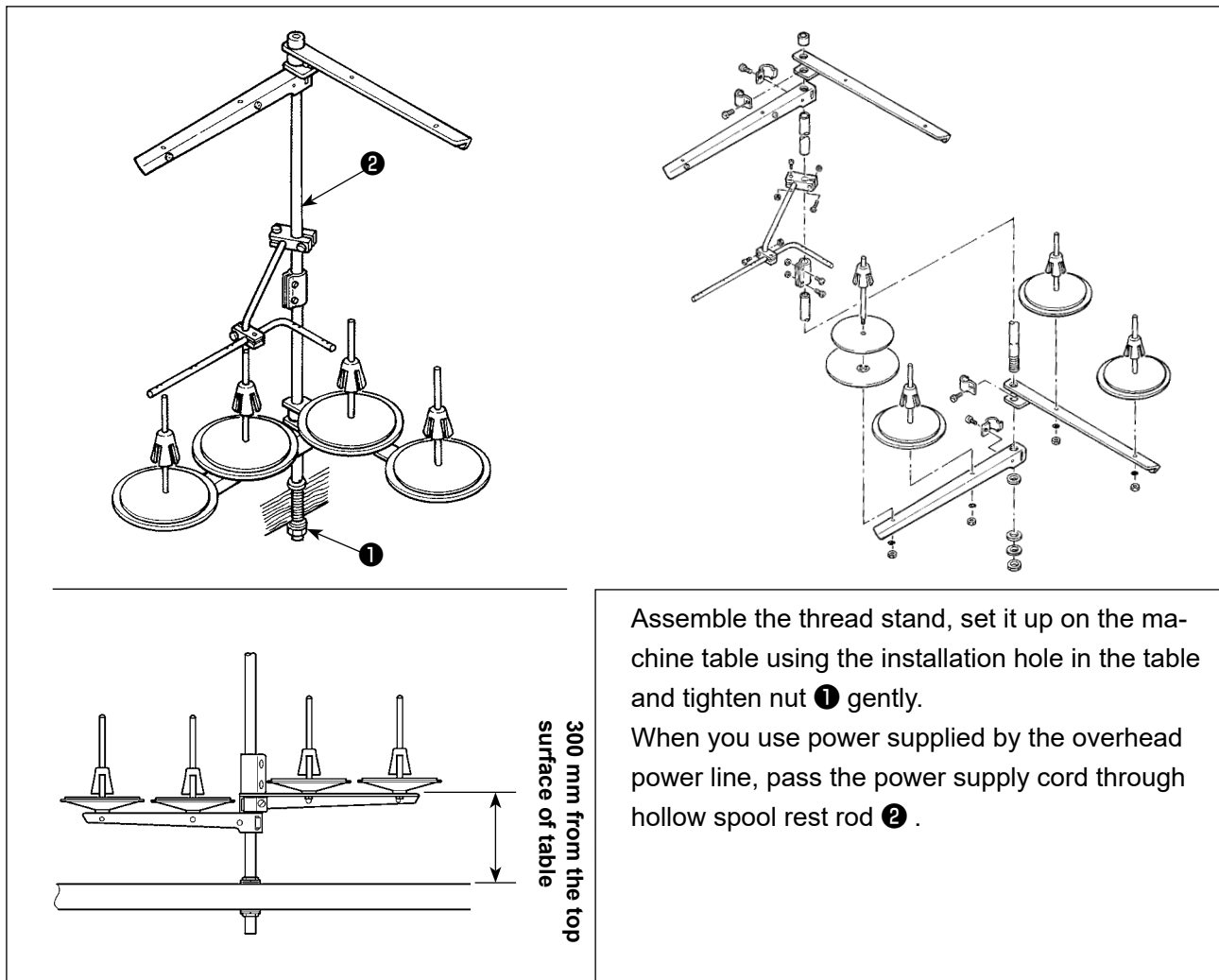


6) Securely install machine head support bar **21** to the table until its rib portion is pressed against the table.



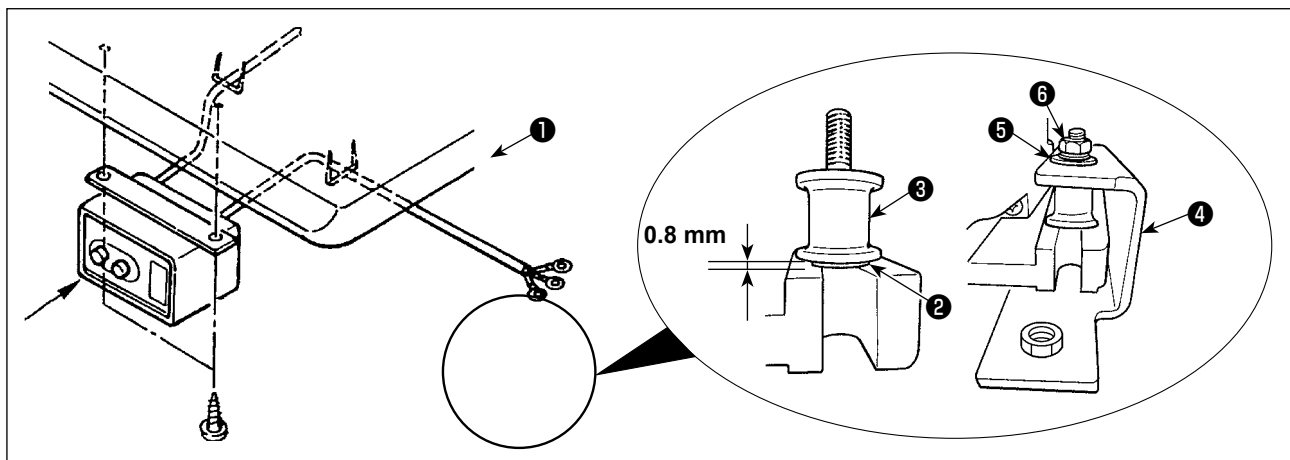
If it is inevitable to carry out work with the machine head support bar removed for the purpose of maintenance or repair, such a work must be carried out by two or more workers. In addition, if the machine head is tilted more than necessary, oil may leak from the oil tank or oil inlet. To prevent the oil leakage, be sure to remove oil before tilting the machine head.

2-5. Installing the thread stand



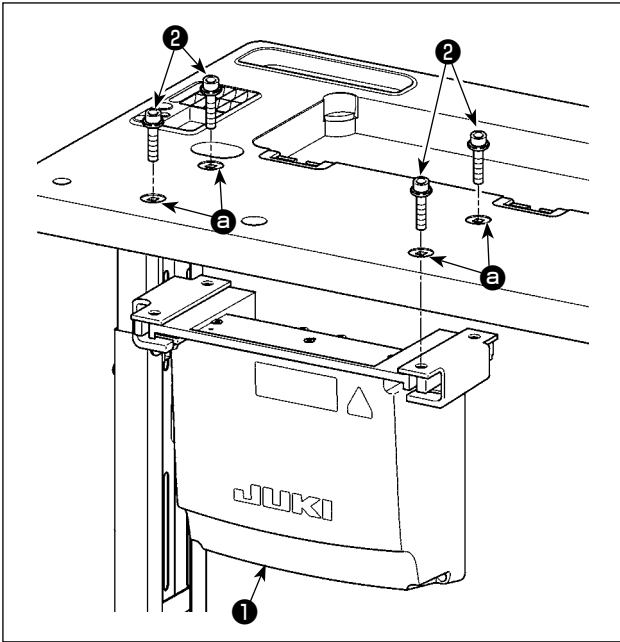
2-6. Installing the control box

2-6-1. Preparing for installation of the control box



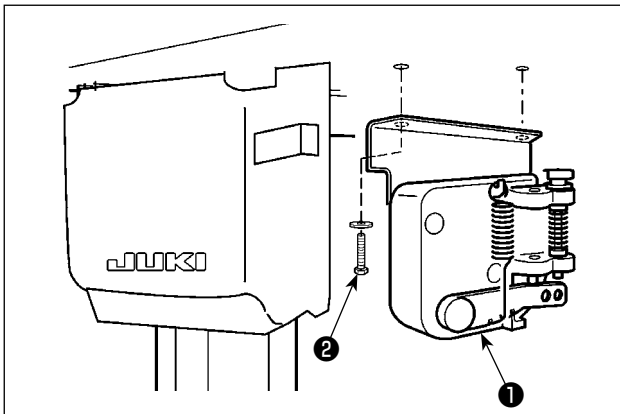
- 1) Secure toothed washer ② and vibration-proof rubber ③ to control box ①. (At four locations)
* Tighten the toothed washer until it protrudes the control box surface by 0.8 mm.
- 2) Secure control box mounting plate ④ to the control box with plain washers ⑤ and nuts ⑥. (At four locations)
* Secure the mounting plate by fitting the screws against the U-groove in the mounting plate.

2-6-2. Installing the electrical box



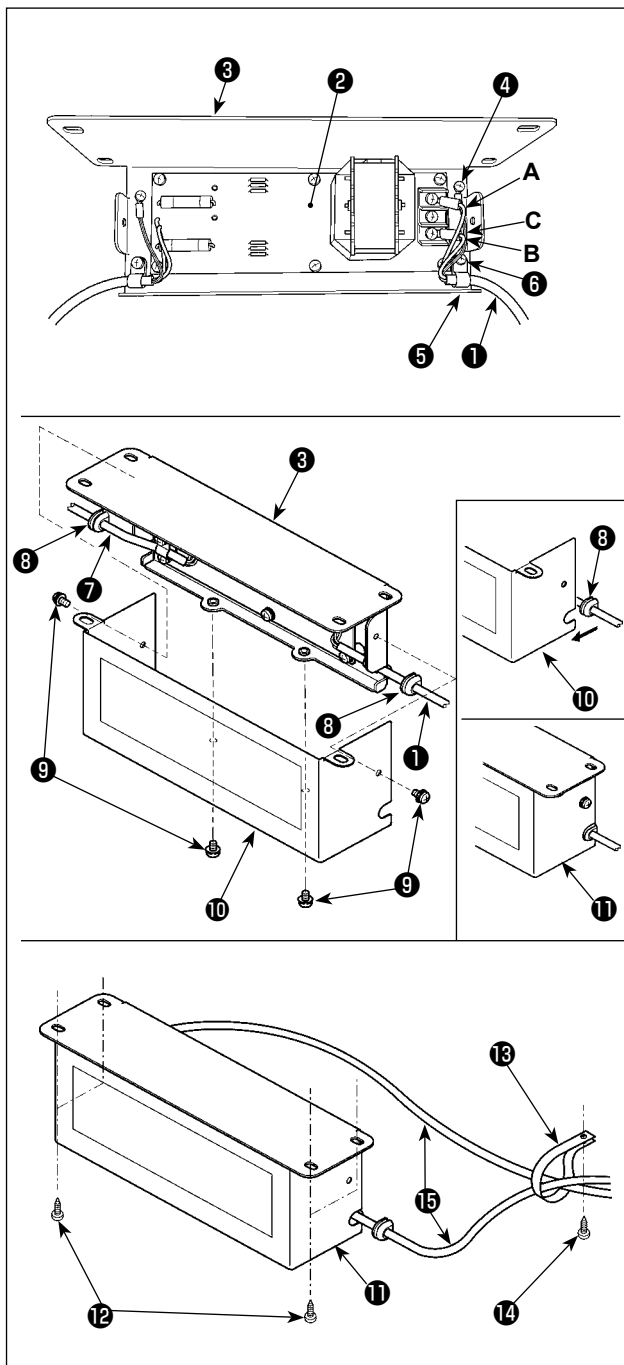
Install electrical box **1** to the table by fixing four accessory bolts **2** , which are supplied with the electrical box, in holes **a** in the table.

2-7. Installing the pedal sensor



Secure pedal sensor **1** to the table with two plain washers and two wood screws **2** both of which are supplied with the electrical box.

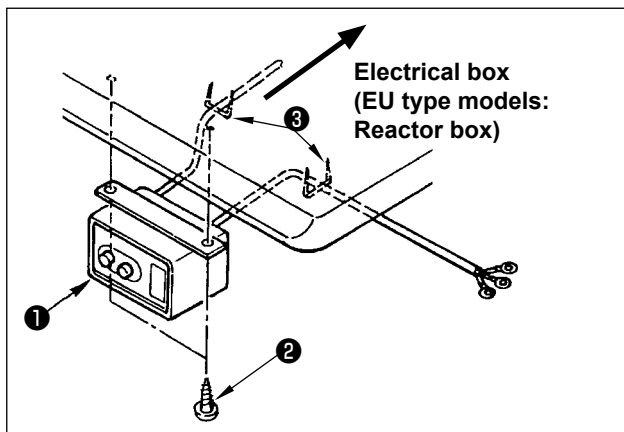
2-8. Installing the reactor box (Only for the EU type models)



- 1) Attach the terminals of power cord ❶ coming from the electrical box to reactor box PCB asm. ❷ and reactor box mounting plate ❸ . Connect brown wire **A** to the first connector and blue wire **B** to the third connector respectively from the top of terminal block on the reactor box PCB asm. using screws. Connect green/yellow wire **C** to reactor box mounting plate ❸ with earth setscrew ❹ .
- 2) Attach cable clip ❺ to the power cord coming from the electrical box. Then, attach the power cord together with the cable clip to reactor box mounting plate ❸ with cable clip setscrew ❻ .
- 3) Attach cord bushes ❽ to input/output cables ❶ and ❷ of the reactor box. Attach both bushes in the same manner.
- 4) Attach reactor box cover ❿ to reactor box mounting plate ❸ with four reactor-box cover setscrews ❾ .
At this time, fix cord bushes ❽ attached to input/output cables ❶ and ❷ in the concave section on reactor ❿ box cover to eliminate a gap between reactor box ❾ and cover ❿ .
- 5) Secure reactor box ❾ to the undersurface of table with four accessory wood screws ❿ .
- 6) Secure two cables ❶ coming from reactor box ❾ to the table with accessory cable clip ❶ and wood screw ❶ .

2-9. Connecting the power switch cable

2-9-1. Installing the power switch



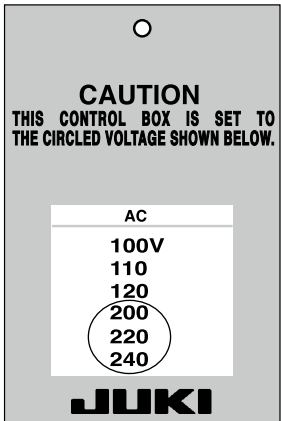
Fix power switch ❶ under the machine table with wood screws ❷ .

Fix the cable with staples ❸ supplied with the machine as accessories in accordance with the forms of use.

2-9-2. Connecting the power source cord

Voltage specifications at the time of delivery from the factory are indicated on the voltage indication seal. Connect the cord in accordance with the specifications.

Power indication tag



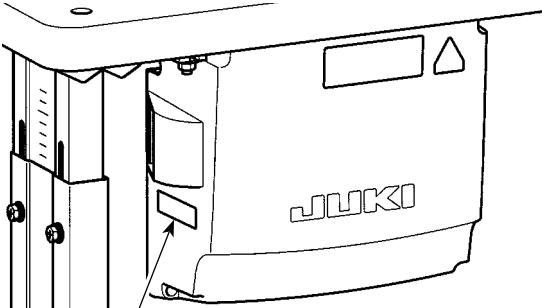
CAUTION
THIS CONTROL BOX IS SET TO THE CIRCLED VOLTAGE SHOWN BELOW.

AC
100V
110
120
200
220
240

JUKI

Caution

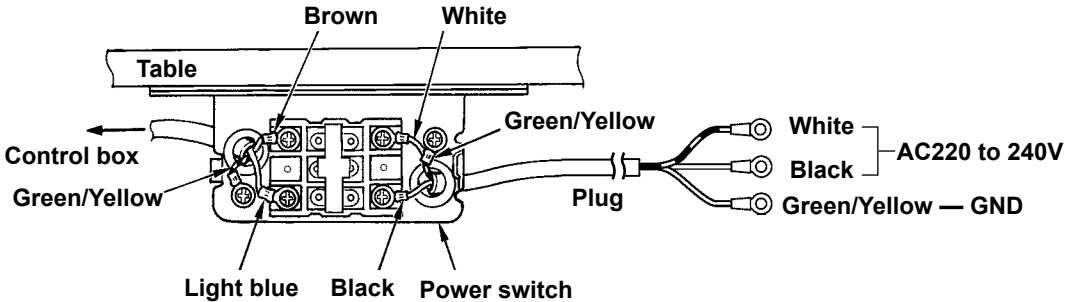
Never use under the wrong voltage and phase.



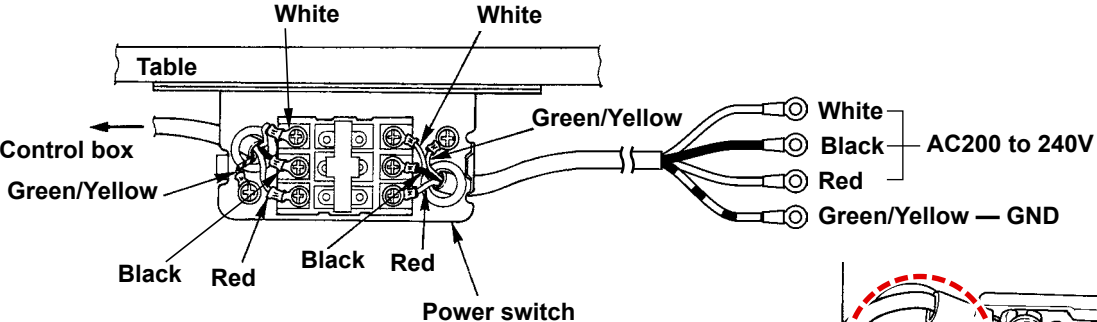
Rating plate

(For example : In the case of 200V)

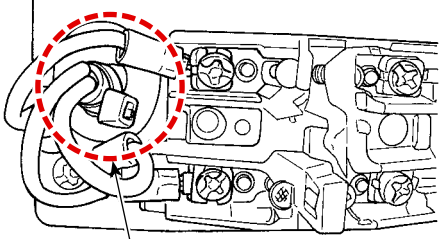
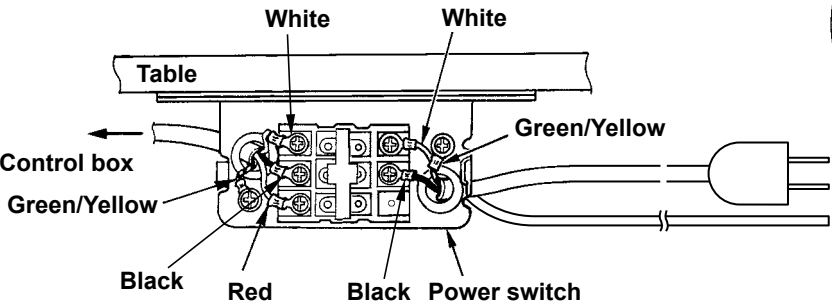
- Connecting single phase 220 to 240V



- Connecting 3-phase 200 to 240V



- Connecting single phase 100 to 120V



After screwing the cable to the power switch, bind the cable sheath portion with an accessory clip band inside the power switch.

2-10. Installing the accessory ring core (Only for the EU type models)

2-10-1. Installing the accessory ring core supplied with the electrical box

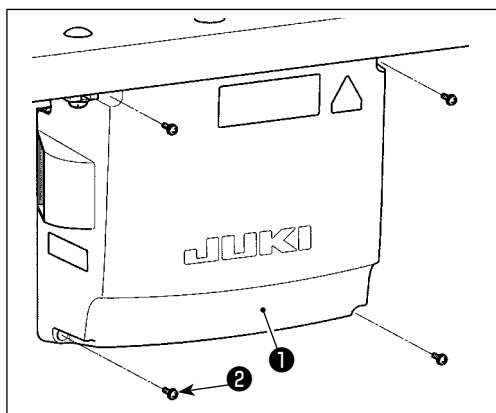
Refer to accessory manual for "Installing the accessory ring core" supplied with the electrical box for how to install the ring core.

2-11. Connecting the cords

DANGER :



1. To prevent personal injuries caused by electric shock hazards or abrupt start of the sewing machine, carry out the work after turning OFF the power switch and a lapse of 5 minutes or more.
2. To prevent accidents caused by unaccustomed work or electric shock, request the electric expert or engineer of our dealers when adjusting the electrical components.



- 1) Secure pedal sensor ① on the table using accessory plain washers and wood screws ② (two each) supplied with the control box.
- 2) Connect the respective cords to the corresponding connectors of CTL PCB, PWR PCB and SUB-D PCB. (Fig. 1)



Take care not to incorrectly connect the connectors CN21.

- 3) Fix the ground wire ④ on position A of the control box with a screw. (Fig. 2)

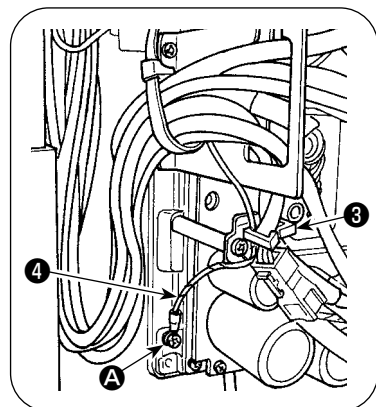
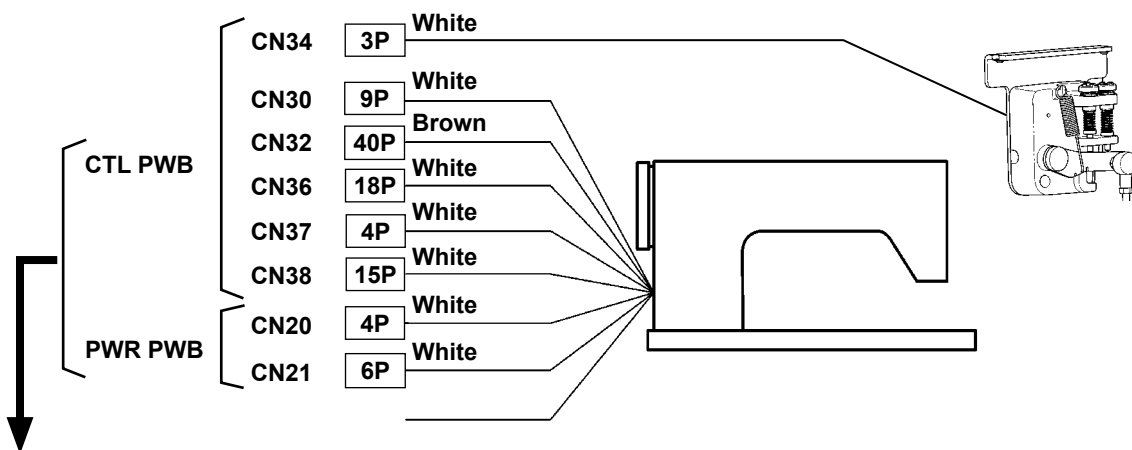


Fig. 2

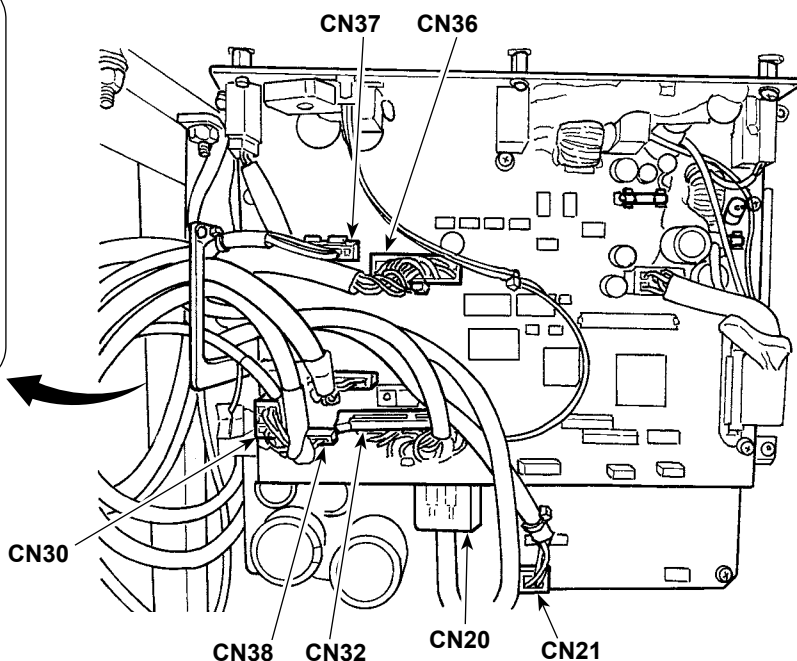


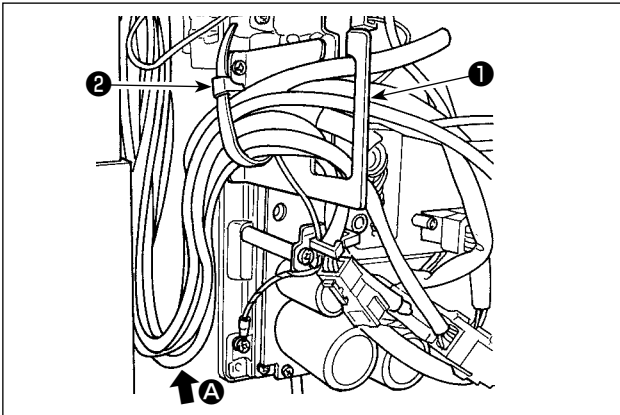
Fig. 1

2-12. Handling the cords

DANGER :



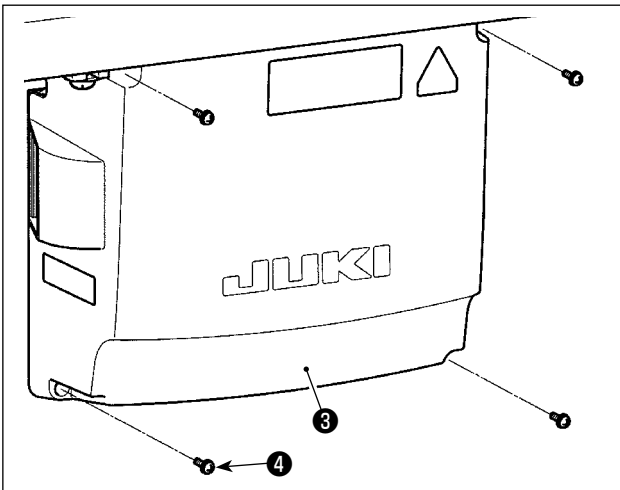
1. To prevent personal injuries caused by electric shock hazards or abrupt start of the sewing machine, carry out the work after turning OFF the power switch and a lapse of 5 minutes or more.
2. To prevent accidents caused by unaccustomed work or electric shock, request the electric expert or engineer of our dealers when adjusting the electrical components.



- 1) Bring the cords under the table into the control box.
- 2) Put the cord brought into the control box through cord exit plate ① and fix cable clip band ②.



Arrange the cord so that it is not tensed or hitched even when the machine head is tilted. (See A section.)



- 3) Install control box cover ③ with four set-screws ④.



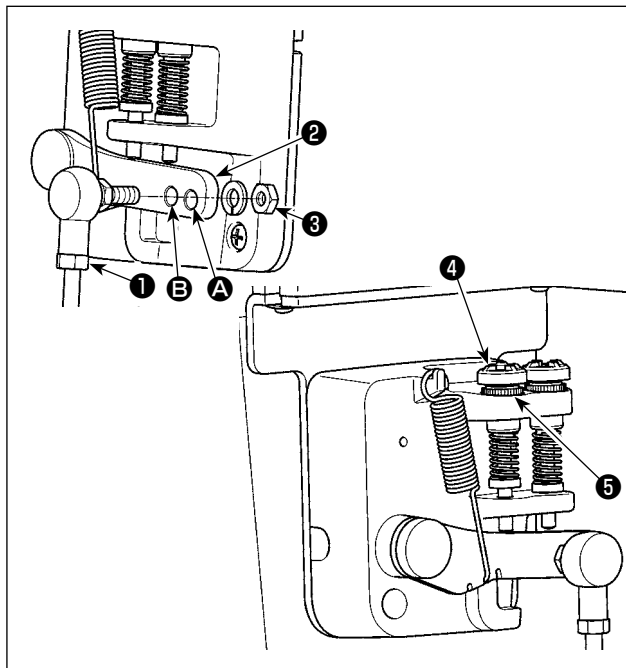
For the purpose of preventing the cord breakage, take care not to allow the cords to be caught between the control box and control box cover ③ when attaching the latter.

2-13. Attaching the connecting rod



WARNING :

To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and a lapse of 5 minutes or more.



- 1) Fix connecting rod ① to installing hole ⑤ of pedal lever ② with nut ③ .
- 2) Installing connecting rod ① to installing hole ⑤ will lengthen the pedal depressing stroke, and the pedal operation at a medium speed will be easier.
- 3) The pressure increases as you turn reverse depressing regulator screw ④ in, and decreases as you turn the screw out.

1. If the screw is excessively loosened, the spring will come off. Loosen the screw to such an extent that the top of the screw can be observed from the case.



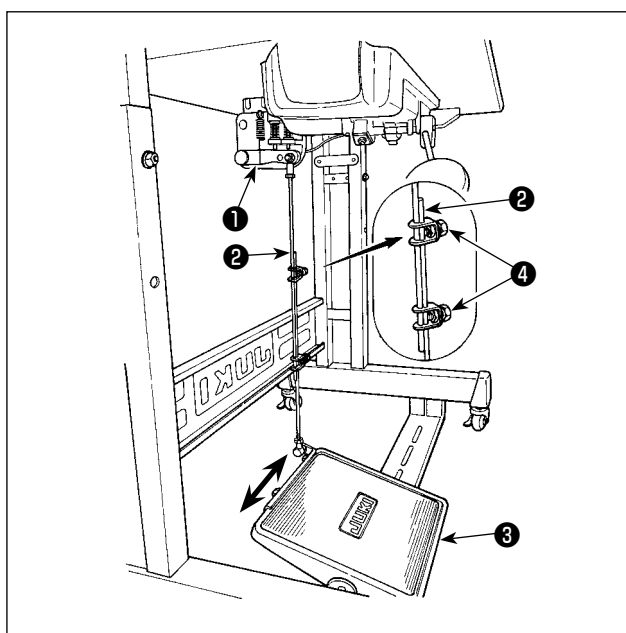
2. Whenever you have adjusted the screw, be sure to secure the screw by tightening metal nut ⑤ to prevent the screw from loosening.

2-14. Adjustment of the pedal



WARNING :

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



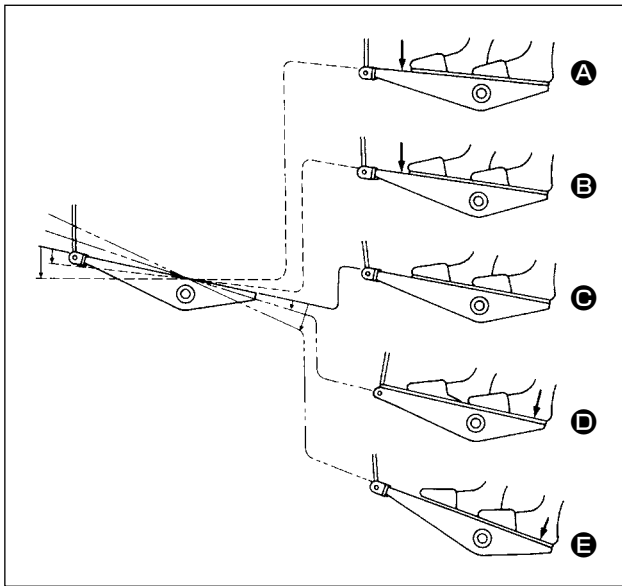
2-14-1. Installing the connecting rod

Move pedal ③ to the right or left as illustrated by the arrows so that motor control lever ① and connecting rod ② are straightened.

2-14-2. Adjusting the pedal angle

- 1) The pedal tilt can be freely adjusted by changing the length of the connecting rod ② .
- 2) Loosen adjust screw ④ , and adjust the length of connecting rod ② .

2-15. Pedal operation



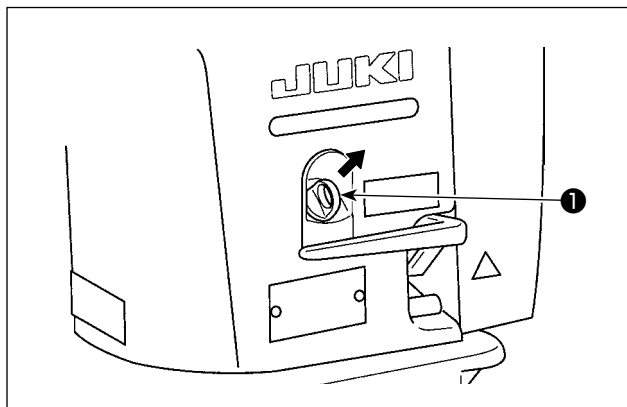
- 1) The machine runs at low sewing speed when you lightly depress the front part of the pedal. **B**
- 2) The machine runs at high sewing speed when you further depress the front part of the pedal. **A** (If the automatic reverse feed stitching has been preset, the machine runs at high speed after it completes reverse feed stitching.)
- 3) The machine stops (with its needle up or down) when you reset the pedal to its original position. **C**
- 4) Presser lifting operation **D** is performed by lightly depressing the back part of pedal.
- 5) Thread trimming **E** is performed by further depressing the back part of pedal.
 - When starting sewing from the state that the presser foot has been lifted with the Auto-lifter and you depress the back part of the pedal, the presser foot only comes down.
 - If you reset the pedal to its neutral position during the automatic reverse feed stitching at seam start, the machine stops after it completes the reverse feed stitching.
 - The machine will perform normal thread trimming even if you depress the back part of the pedal immediately following high or low speed sewing.
 - The machine will completely perform thread trimming even if you reset the pedal to its neutral position immediately after the machine started thread trimming action.

2-16. Lubrication

WARNING :



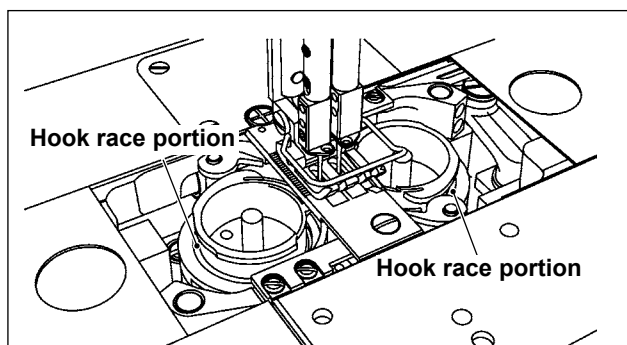
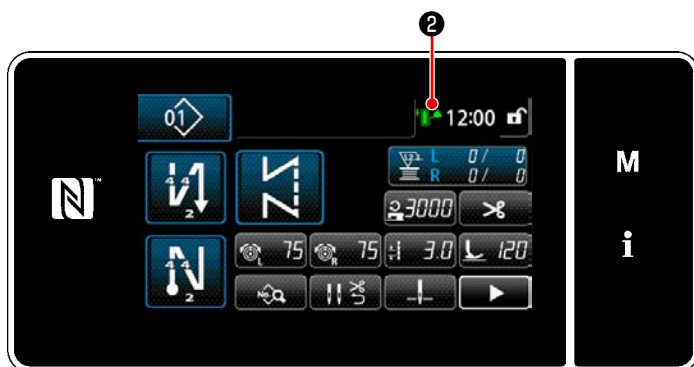
1. Do not connect the power plug until the lubrication has been completed so as to prevent accidents due to abrupt start of the sewing machine.
2. To prevent the occurrence of an inflammation or rash, immediately wash the related portions if oil adheres to your eyes or other parts of your body.
3. If oil is mistakenly swallowed, diarrhea or vomiting may occur. Put oil in a place where children cannot reach.



2-16-1. Supplying oil to the oil tank

Pour oil for lubricating the hook into the oil tank before putting the sewing machine into use.

- 1) Remove oil inlet cap ❶. Pour JUKI New Defrix Oil No. 1 (part number: MDFRX1600C0) or JUKI CORPORATION GENUINE OIL 7 (part number: 40102087) into the oil tank using the accessory oiler.
- 2) Supply the oil until oil amount mark ❷ at the upper right on the operation panel turns green.
Be aware that, if an excessive amount of oil is put in the oil tank, oil may leak from the air vent of the oil tank, or adequate lubrication may not be performed. In addition, be aware that the oil may overflow the oil inlet if the oil is swiftly poured into the oil tank.
- 3) Add oil to the oil tank when oil amount mark ❷ at the upper right on the operation panel turns red while you are operating the sewing machine.



2-16-2. Lubricating the hook race portion

Lubricate the race portions of the hooks (right and left) of a new sewing machine or after leaving the sewing machine unused for a long time, with a few drops of oil.



1. When using a new sewing machine for the first time or using the sewing machine which has not been used for a long time, run in the sewing machine at a sewing speed of 1,000 sti/min or less and check the oil quantity in the hook before use.
2. For the oil for hook lubrication, purchase JUKI NEW DEFRIX OIL No. 1 (Part No. : MD-FRX1600C0) or JUKI MACHINE OIL #7 (Part No. : MML007600CA).
3. Be sure to lubricate clean oil.
4. Do not operate the sewing machine with oil inlet cap ❶ left detached. Do not detach oil inlet cap ❶ except for feeding oil. Also be careful not to lose the oil inlet cap.
5. Oil amount mark ❷ changes its color to three different colors.
Red: Oil amount is insufficient / White: Normal range / Green: Full

2-17. How to use the operation panel (Basic explanation)

2-17-1. Selection of the language (operation to be done at first)

Select the language to be displayed on the operation panel when you turn ON the power to your sewing machine for the first time after the purchase. Note that, if you turn the power OFF without selecting the language, the language selection screen will be displayed every time you turn ON the power to the sewing machine.

① Turning ON the power switch



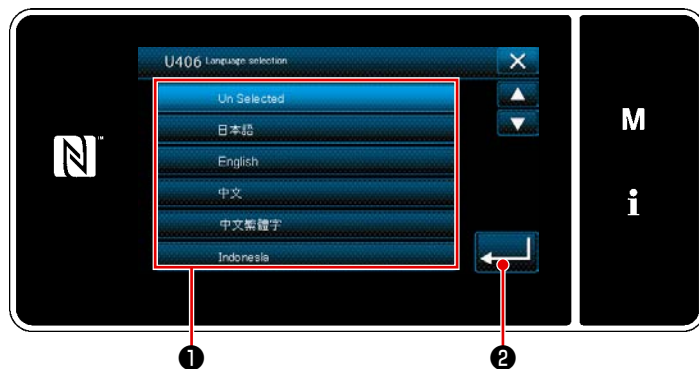
Be aware that the needle bar may move automatically, according to the settings of the sewing machine, when the power is turned ON.



<Welcome screen>

Firstly, the welcome screen is displayed on the panel. Then, the language selection screen is displayed.

② Selecting the language



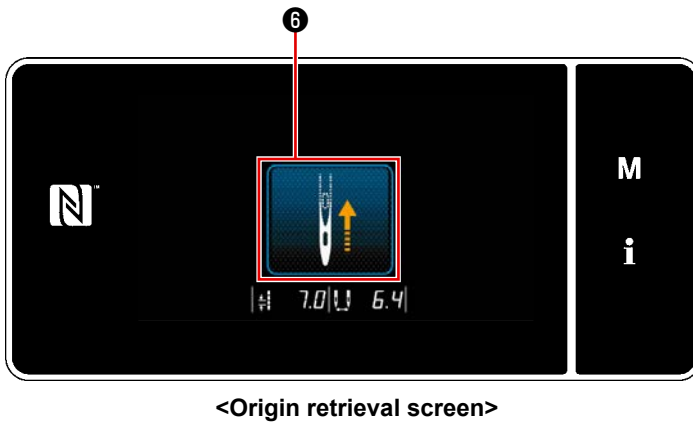
<Language selection screen>

Select the language you want to use and press corresponding language button ①.

Then, press  ②. This determines the language to be displayed on the panel.

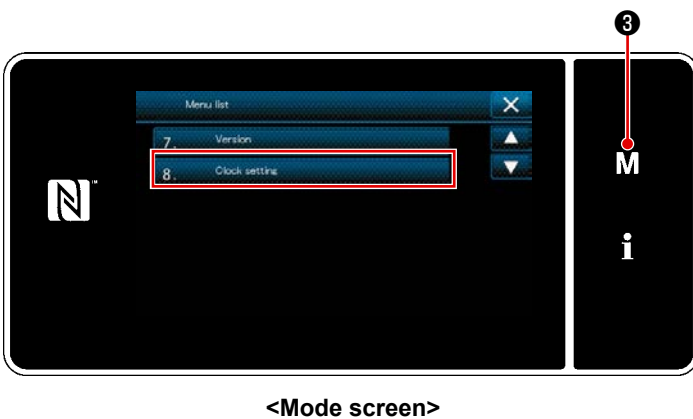
The language to be displayed on the operation panel can be changed using the memory switch U406. Refer to **"5-5. List of memory switch data" p.79** for details.

③ Retrieval of the origin

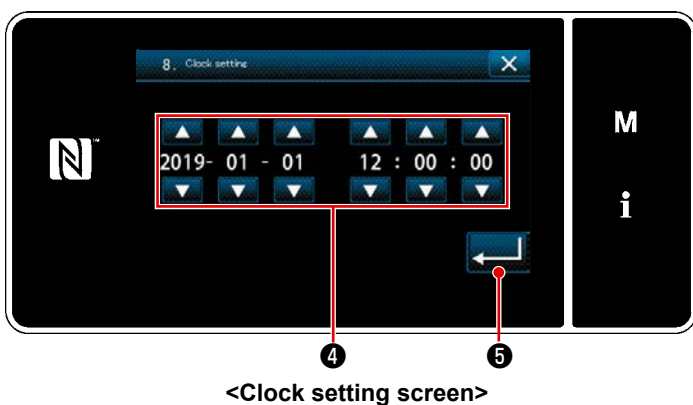


Press **6** to bring the origin retrieval needle bar to its upper position.

④ Setting the clock



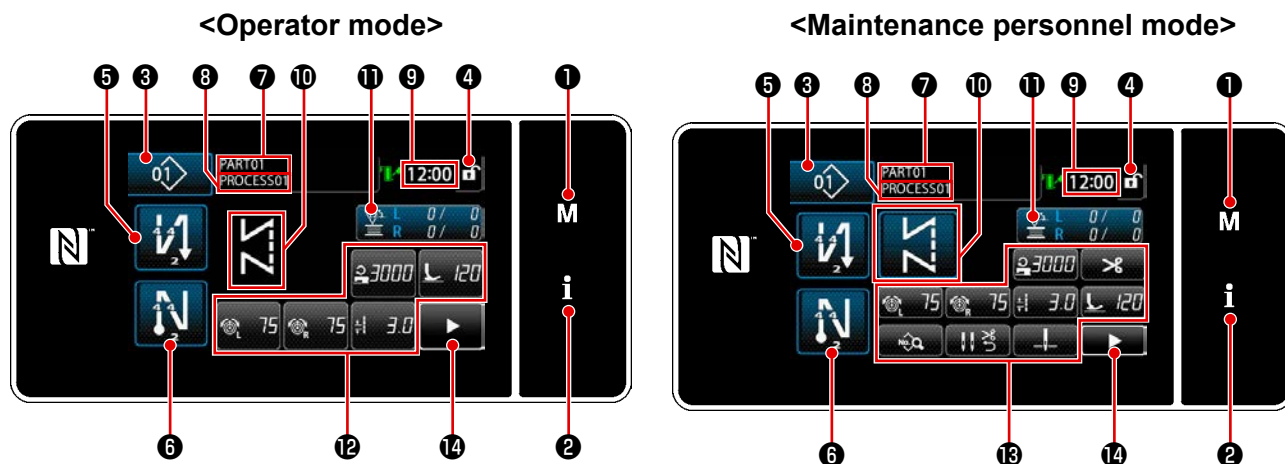
- 1) Press **M** **3** .
The "mode screen" is displayed.
- 2) Select the "8. Clock setting".
The "clock setting screen" is displayed.



- 3) Enter year/month/day/hour/minute/second with  **4** .
The time entered is displayed in 24-hour notation.
- 4) Press  **5** to confirm the clock setting. Then, the current screen returns to the previous screen.

2-17-2. Names and functions of the panel keys

- * Changeover between the operator mode and the maintenance personnel mode is carried out by pressing **M** ① and **i** ② simultaneously.



	Switch/display	Description
①	Mode key	This switch is used for displaying the menu screen.
②	Information key	This switch is used for displaying the information screen.
③	Sewing pattern No. button	This switch is used for displaying the number of the sewing pattern.
④	Simplified screen lock button	This button is used for displaying the simplified lock status of the screen on it. Locked:  Unlocked: 
⑤	Sewing-start reverse-feed stitch button	This switch is used for changing the ON/OFF status of the reverse feed stitching at the beginning of sewing. When reverse feed stitching at the beginning of sewing is placed in the OFF state,  mark is displayed at the upper left of the button.
⑥	Sewing-end reverse-feed stitch button	This switch is used for changing the ON/OFF status of reverse feed stitching at the end of sewing. When reverse feed stitching at the end of sewing is placed in the OFF state,  mark is displayed at the upper left of the button.
⑦	Part number	In the case the part number/process display is selected with U404, the part number is displayed. In the case the comment display is selected, the comment is displayed.
⑧	Process/comment	In the case the part number/process display is selected with U404, the process is displayed. In the case the comment display is selected, the comment is displayed.
⑨	Clock display	The time set on the sewing machine is displayed in this field in 24-hour system.
⑩	Sewing pattern display	The selected sewing pattern is displayed in this field.

	Switch/display	Description
⑪	Customization button 1	A selected function can be allocated to and registered with this button. Initially, the sewing counter has been factory-allocate and -registered.
⑫	Customization buttons 2 - 7	A selected function can be allocated to and registered with this button.
⑬	Customization buttons 2 - 11	A selected function can be allocated to and registered with this button.
⑭	Second sewing screen button	The second sewing screen is displayed.

* Confirmation of data

To change the pattern number, select the pattern you want to use first.

Then, confirm your selection by pressing .

For the setting items of the Memory switch or sewing pattern, change the target data and press  to confirm the change.

After the setting data on the number of stitches of reverse-feed stitching or the number of stitches of multi-layer stitching has been changed, the changed setting data is confirmed by pressing .



<Sewing screen>

When  ① is pressed on the sewing screen, the "second sewing screen" is displayed.

On the "Second sewing screen", the corner stitching function is set. Refer to "**6-1. Corner stitching function**" p.91 for details. (This function is only available on the sewing machine provided with the separately-driven needle bar changeover mechanism.)



<Second sewing screen>

Enter settings as desired on this screen. Then, return the screen to the sewing screen by pressing  ②.

2-17-3. Basic operation

① Turning ON the power switch



When you turn ON the power switch, the welcome screen is displayed.

② Selecting a sewing pattern



<Sewing screen (Operator mode)>

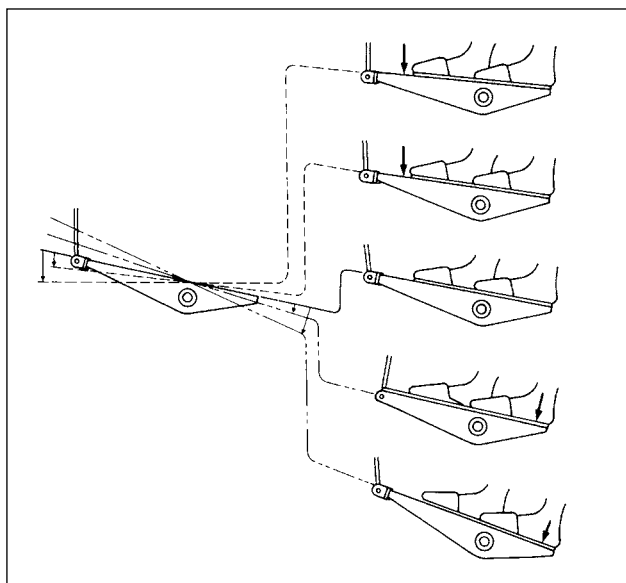


<Sewing screen (Maintenance personnel mode)>

The sewing screen is displayed.

- Select a sewing pattern.
Refer to **"5-2. Sewing patterns" p.43** for details.
- Configure settings of each function which is assigned according to **"9-10. Key customization" p.174**.
- Set up functions for the selected sewing pattern. (* Only for the maintenance personnel mode)
Refer to **"5-2-5. Editing the sewing patterns" p.53** for **"5-2-6. List of pattern functions" p.57** for details.

③ Starting sewing



When you depress the pedal, the sewing machine starts sewing.

Refer to **"2-15. Pedal operation" p.15**.

3. PREPARATION BEFORE SEWING

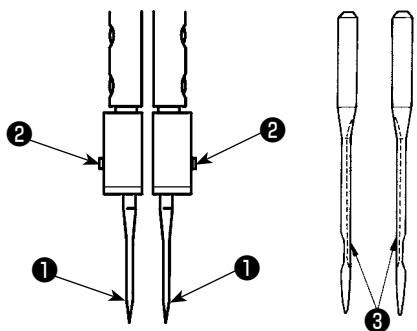
3-1. Attaching the needle



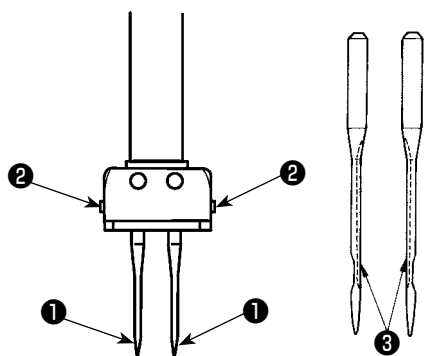
WARNING :

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

LH-4588C



LH-4578C



Switch "off" the motor.

Use DP×5(134) needles.

- 1) Turn the handwheel until the needle bar has come up to the highest point of its stroke.
- 2) Loosen needle clamp screws ② and pick up two needles ① in the way that their grooves ③ are facing outwards.
- 3) Insert the needles into the needle clamp as far as they will go.
- 4) Tighten needle clamp screws ② firmly.



When replacing the needle, check the clearance provided between the needle and the blade point of hook. (Refer to "8-1. Needle-to-hook relation" p.109 and "8-3. Adjusting the hook needle guard" p.114 .)

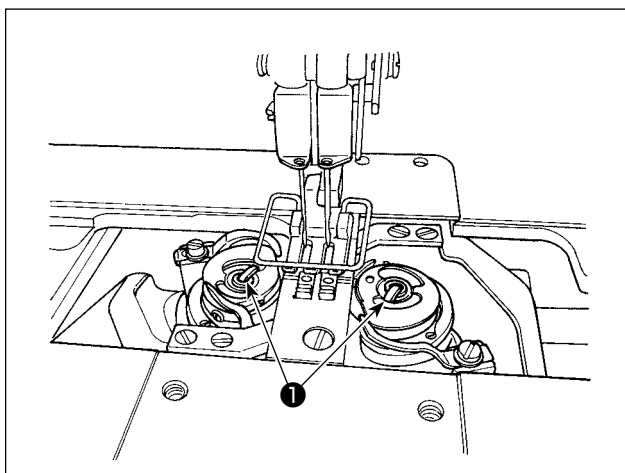
If there is no clearance, the needle and the hook will be damaged.

3-2. Attaching and removing the bobbin



WARNING :

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



- 1) Lift latch ① and take out the bobbin case and the bobbin together.
- 2) Hold the bobbin case by latch raised, put it into the shaft in the hook correctly and release the latch.

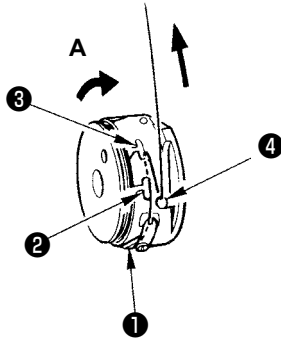
3-3. Installing the bobbin



WARNING :

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

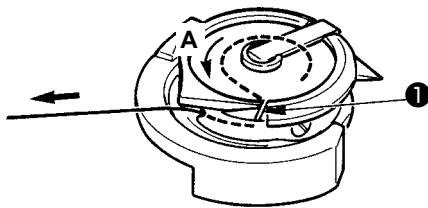
LH-4588C-7



[In the case of LH-4588C-7]

- 1) Set a bobbin to the bobbin case so that the bobbin turns in the direction of arrow mark **A**.
- 2) Pass the thread through thread slit **1** in the bobbin case and draw the thread and pull the thread so that it passes under the tension spring.
- 3) Pass thread through another thread slit **2** then, pass it through thread slit **3** on the bobbin case from the inside.
- 4) Put the thread on bobbin threads slack preventer spring **4**.

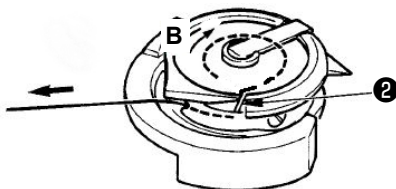
LH-4578C-7



[In the case of LH-4578C-7]

- 1) Set a bobbin to the bobbin case so that the bobbin turns in the direction of arrow mark **A**.
- 2) Pass the thread through threading slit **1** of the hook. Then, keep drawing the thread and through under the tension spring.

LH-45780B

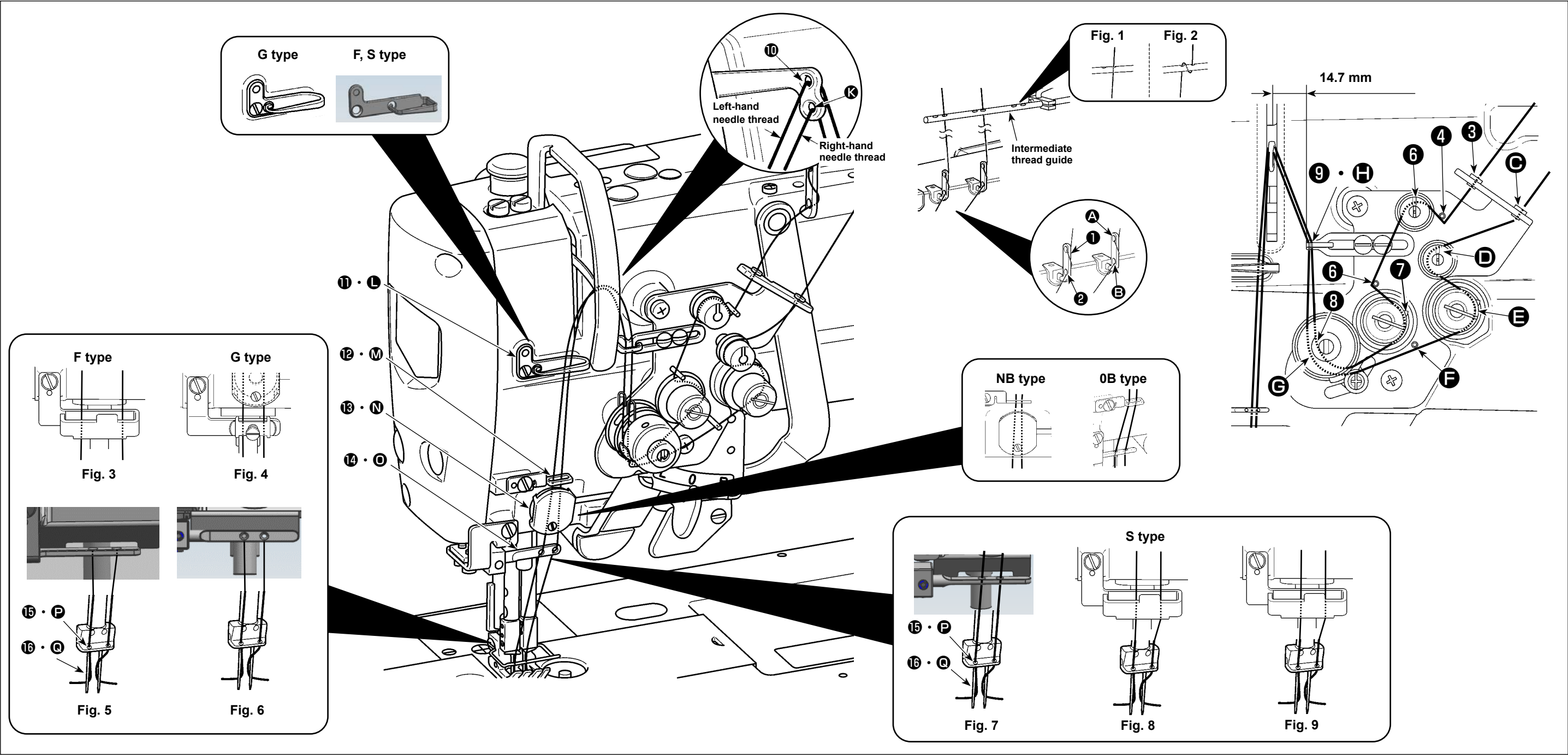


[In the case of LH-4578C0B]

- 1) Set a bobbin to the bobbin case so that the bobbin turns in the direction of arrow mark **B**.
- 2) Pass the thread through threading slit **2** of the hook. Then, keep drawing the thread and through under the tension spring.

3-4. Threading the machine head

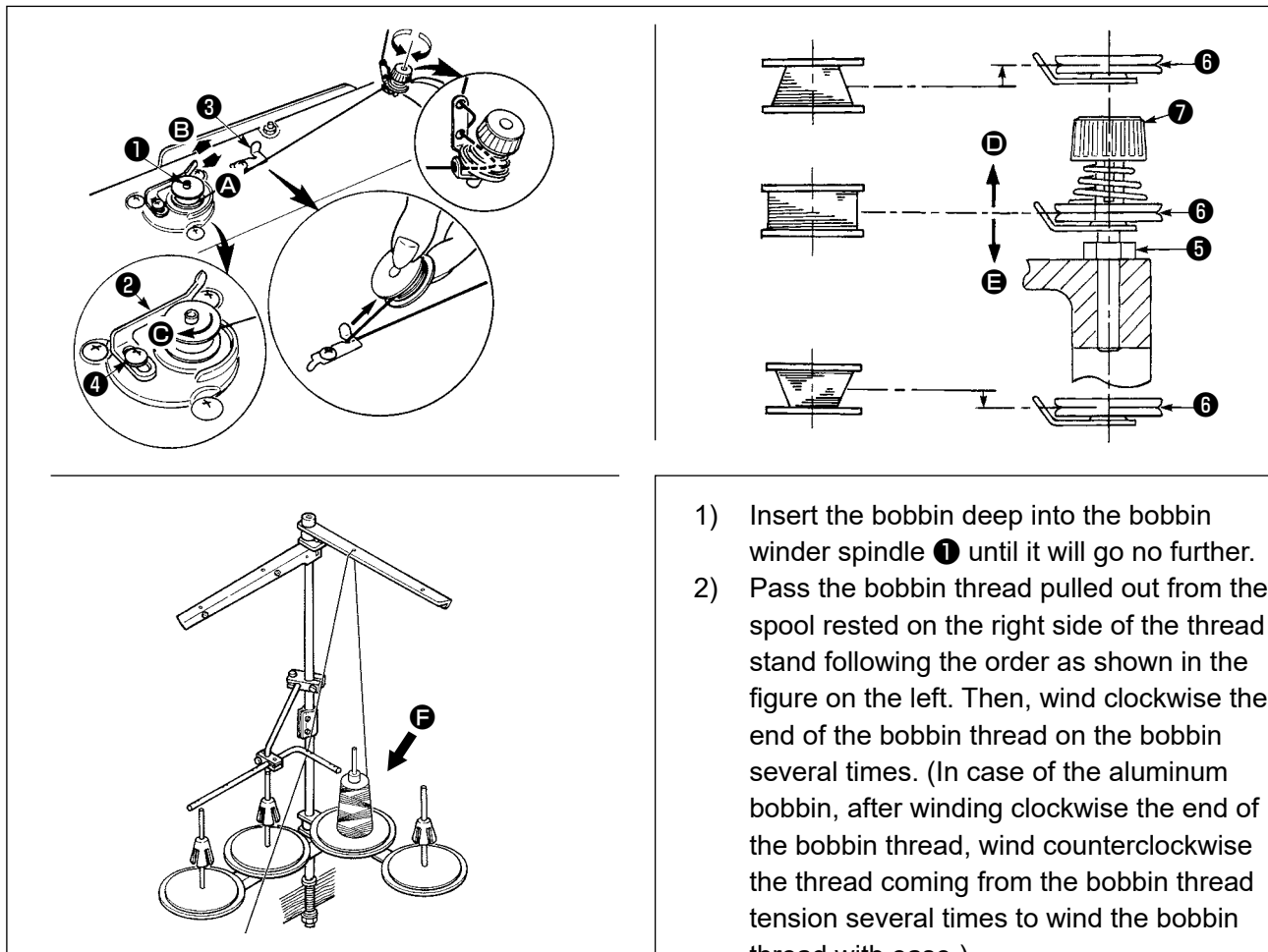
WARNING :
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



Thread the machine head following the order as illustrated in the figure.
Pass the left-hand needle thread, toward the machine head, in the order of ❶ to ❶❷ . Pass the right-hand needle thread in the order of ❶ to ❶.

-
- When you want to perform jumping, use the felt thread guide (Fig. 3) for the F type models, throat plate presser (Fig. 4) for the G type models and the felt thread guide (Fig. 8 or Fig. 9) for the S type models.
 - See Fig. 1 for polyester spun thread or Fig. 2 for filament thread.
 - Be sure to pass the thread through the thread guide for the NB type models.
 - Carefully check how to thread thread guides (❶ , ❶).
 - (G type) See Fig 7 in the case of using thick thread of #3 to #30.
 - (S type) See Fig. 7 for polyester spun thread, Fig. 8 for thick filament thread of #50 or thicker and filament thread of around #50, or Fig. 9 for thin filament thread of #50 or thinner.
 - At the time of shipment: See Fig. 6 for the G type models, Fig. 5 for the F type models, or Fig. 7 for S type models.

3-5. Winding the bobbin thread



- 1) Insert the bobbin deep into the bobbin winder spindle ① until it will go no further.
- 2) Pass the bobbin thread pulled out from the spool rested on the right side of the thread stand following the order as shown in the figure on the left. Then, wind clockwise the end of the bobbin thread on the bobbin several times. (In case of the aluminum bobbin, after winding clockwise the end of the bobbin thread, wind counterclockwise the thread coming from the bobbin thread tension several times to wind the bobbin thread with ease.)
- 3) Press the bobbin winding lever ② in the direction of ① and start the sewing machine. The bobbin rotates in the direction of ③ and the bobbin thread is wound up. The bobbin winder spindle ① automatically as soon as the winding is finished.
- 4) Remove the bobbin and cut the bobbin thread with the thread cut retainer ③.
- 5) When adjusting the winding amount of the bobbin thread, loosen setscrew ④ and move bobbin winding lever ② to the direction of ① or ②. Then tighten setscrew ④.
 - To the direction of ① : Decrease
 - To the direction of ② : Increase
- 6) When the bobbin is not evenly wound with thread, loosen nut ⑤ and adjust the height of bobbin winder tension disk ⑥.
 - It is the standard that the center of the bobbin is as high as the center of thread tension disk ⑥.
 - Adjust the position of thread tension disk ⑥ to the direction of ④ when the winding amount of the bobbin thread on the lower part of the bobbin is excessive and to the direction ⑤ when the winding amount of the bobbin thread on the upper part of the bobbin is excessive.
 After the adjustment, tighten nut ⑤.
- 7) To adjust the tension of the bobbin winder, turn the thread tension nut ⑦.



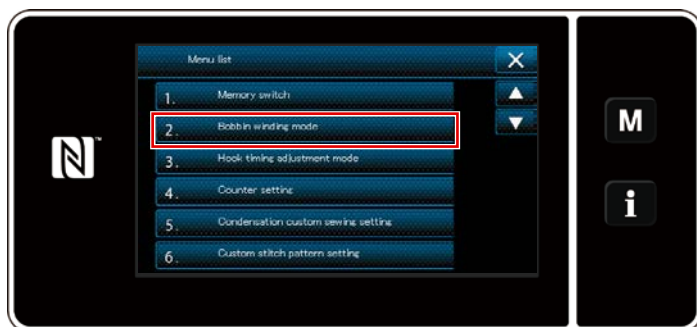
1. When winding the bobbin thread, start the winding in the state that the thread between the bobbin and thread tension disk ⑥ is tense.
2. When winding the bobbin thread in the state that sewing is not performed, remove the needle thread from the thread path of thread take-up and remove the bobbin from the hook.
3. There is the possibility that the thread pulled out from the thread stand is loosened due to the influence (direction) of the wind and may be entangled in the handwheel. Be careful of the direction of the wind.
4. Slackened part of the thread can get tangled on the pulley. It is recommended, in order to avoid the above-stated trouble, to wind the bobbin on the ③ side which is located far from the motor.

[Bobbin winding mode]

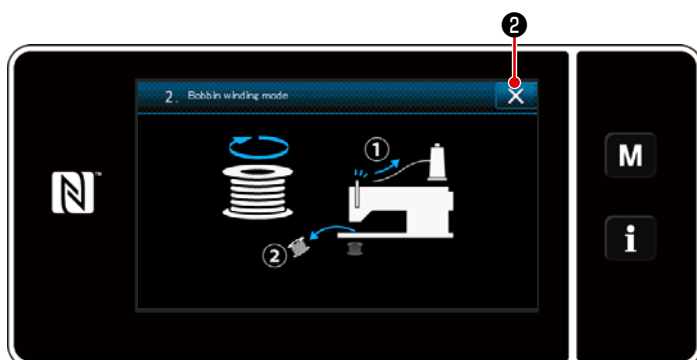
To wind a bobbin only or to check the oil quantity in the hook, the bobbin winding mode should be used. Depress the pedal to start winding a bobbin.



1) Display the mode screen by pressing



2) Select the "2. Bobbin winding mode".



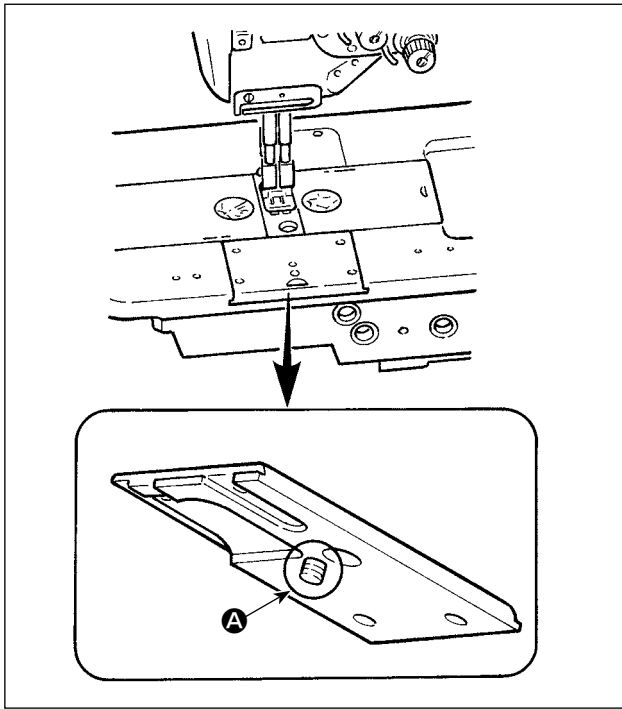
3) The sewing machine mode is changed over to the "Bobbin winding mode". The sewing machine runs with its presser foot up when the pedal is depressed. In this state, a bobbin can be wound. The sewing machine runs only as long as the pedal is depressed.

When  ② is pressed, the sewing machine exits from the "Bobbin winding mode".



1. When winding the bobbin thread, start the winding in the state that the thread between the bobbin and thread tension disk ⑥ is tense.
2. Remove the needle thread from the thread path of thread take-up and remove the bobbin from the hook.
3. There is the possibility that the thread pulled out from the thread stand is loosened due to the influence (direction) of the wind and may be entangled in the handwheel. Be careful of the direction of the wind.
4. The speed of the sewing machine under the bobbin winding mode is equal to the one which has been set for the machine head.

3-6. Installing the attachment



Be careful that screw **A** does not protrude in the rear of the bed slide when fixing the attachment to the bed slide with the screw.

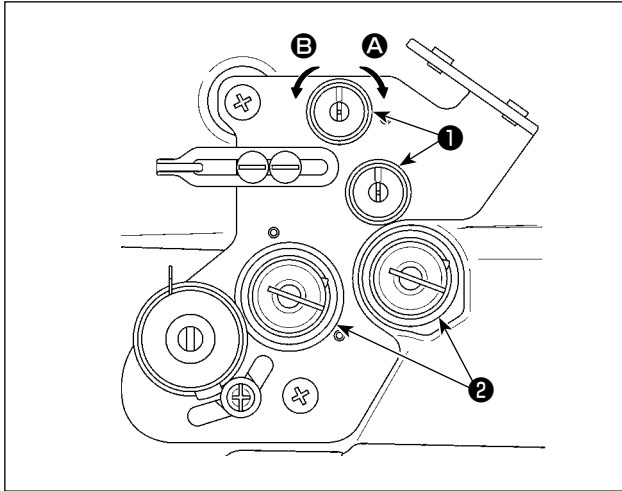


When it protrudes as shown in the figure, the screw interferes with other components and break-down will be caused.

4. ADJUSTING THE SEWING MACHINE

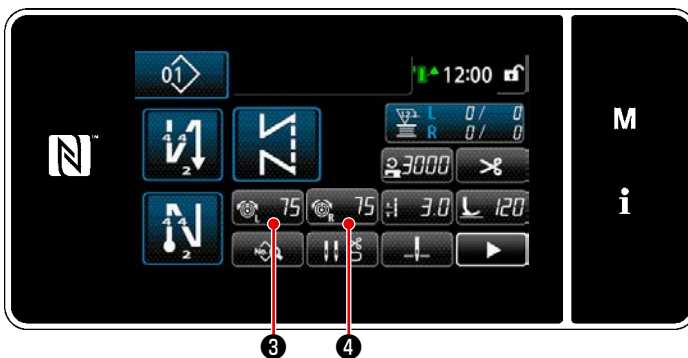
4-1. Thread tension

4-1-1. Adjusting the tension of thread tension controller No. 1



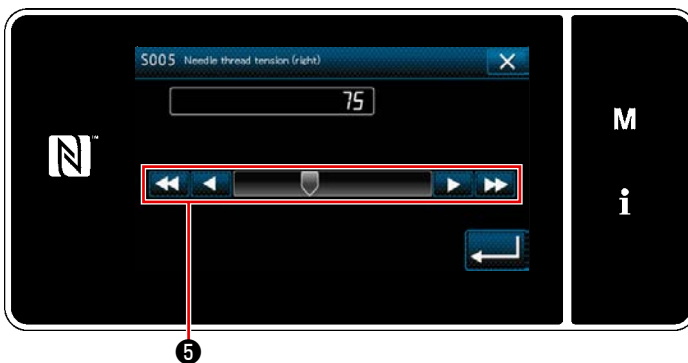
Turn thread tension nut No. 1 ① clockwise ① to shorten the length of thread remaining on the top of needle after thread trimming. Turn the nut counterclockwise ② to lengthen it.

4-1-2. Adjusting the needle thread tension (Active tension)



Active tension ② permits setting of the needle thread tension on the operation panel according to each sewing condition. In addition, the data can be stored in memory.

- 1) In the case of setting the needle thread tension, the needle thread tension input screen is displayed by pressing  ③ for the needle thread tension, left, or by pressing  ④ for the needle thread tension, right.



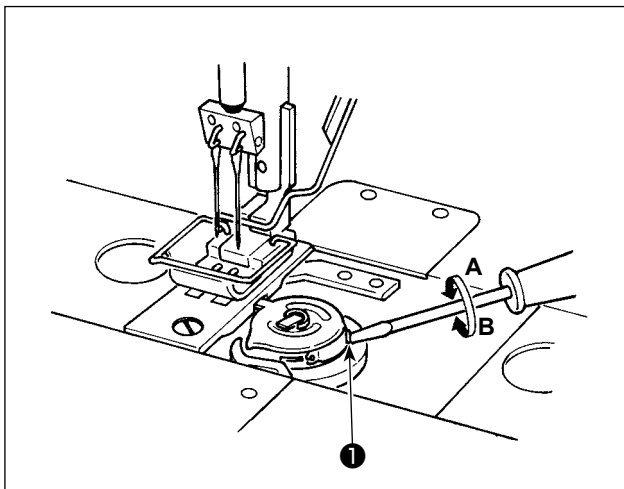
- 2) Change the needle thread tension by pressing ⑤.
- 3) There is a setting range of 0 to 200. When the set value is increased, the tension becomes higher.
 - * In the case of the standard shipment, the needle thread tension is factory-adjusted as follows (reference values):
 - G type : 3N when the set value is 75 (core spun #20)
 - F,S type : 1.5N when the set value is 100 (spun #60)
 - * Set values of the needle thread tensions (left) (right) may differ due to adjustment of thread tension according to the result of actual sewing.

4-1-3. Adjusting the bobbin thread tension

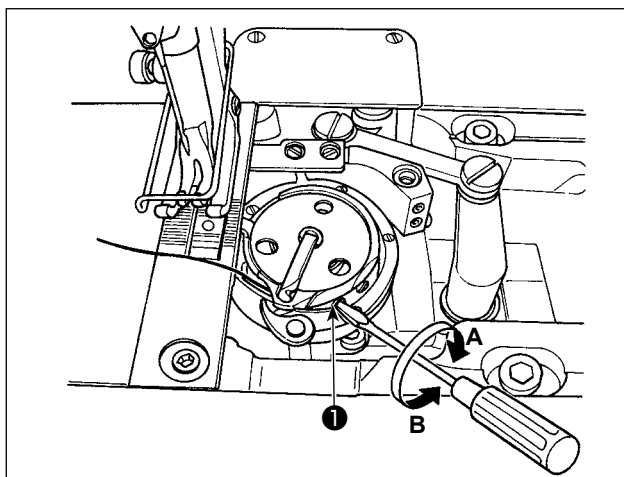


WARNING :

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



The bobbin thread tension is increased by turning bobbin thread tension screw ❶ clockwise **A**, or is decreased by turning it counterclockwise **B**.

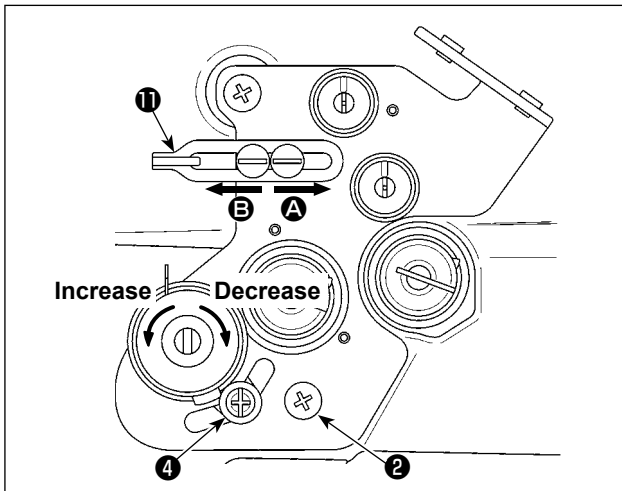


4-2. Adjusting the thread take-up spring and the thread take-up stroke



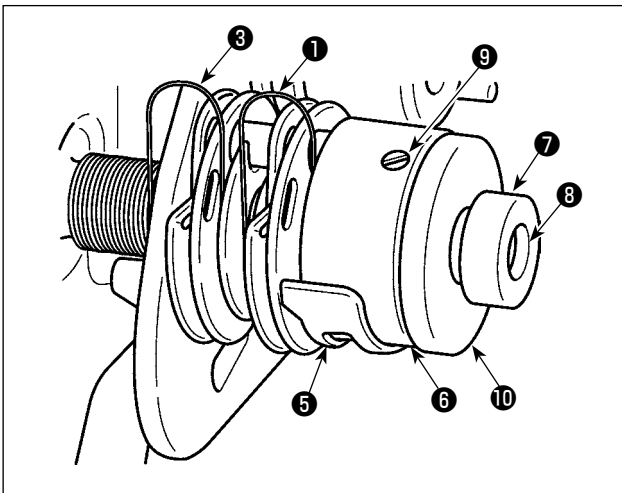
WARNING :

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



[When you want to change the stroke of the thread take-up spring]

- 1) Loosen screw 2 and adjust thread take-up spring, left 3 by moving the latter along the slot.
- 2) Loosen screw 4 and adjust thread take-up spring, right 1 by moving thread take-up spring adjusting plate 5 along thread take-up spring base 6.



[When you want to change the tension of the thread take-up spring]

- 1) To change the strength of thread take-up spring, left 3, loosen nut 7 and turn spring shaft 8 counterclockwise to increase the spring strength or clockwise to decrease it. Secure the thread take-up spring, left by tightening nut 7.
- 2) To change the strength of thread take-up spring, right 1, loosen screw 9 and turn nut 10 counterclockwise to increase the spring strength or clockwise to decrease it. Secure the thread take-up spring, right by tightening screw 9.

[Adjusting the thread take-up stroke]

The length of thread pulled out by the thread take-up is decreased by moving thread guide 11 to the right (in direction A) or is increased by moving it to the left (in direction B).

4-3. Presser foot (Active presser device)

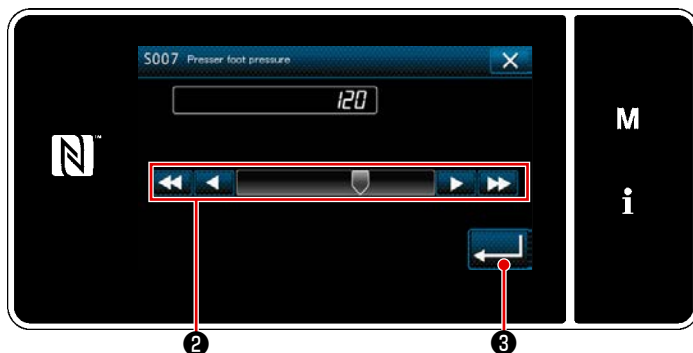


WARNING :

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



If the power to the sewing machine is turned ON while the material, etc. is placed under the presser foot, the presser stepping motor will generate a specific sound during origin retrieval. It should be noted that this phenomenon is not a fault.



4-3-1. Presser foot pressure

The presser foot pressure is displayed in section **A** on the panel. (Example of display : 120)

[How to change]

- 1) Display the presser foot pressure entry screen by pressing  **1**.
- 2) Change the presser foot pressure as desired by pressing **2**. (Range of input values on the panel is from -20 to 200.)
* Refer to the following for a rough indication of the input value on the panel and the presser foot pressure.
- 3) Confirm your entry by pressing  **3**.
Then, the sewing screen is displayed.

Input value on the panel	Presser foot pressure (reference)		
	G type	F type	S type
0	Approx. 19N (1.9kg)	Approx. 15N (1.5kg)	Approx. 18N (1.8kg)
G type : 120 F type : 90 S type : 60 (Factory-setting at the time of shipment)	Approx. 39N (3.9kg)	Approx. 20N (2kg)	Approx. 30N (3kg)



1. To avoid personal injury, never put your fingers under the presser foot.
2. Be aware that the presser foot pressure varies when the presser foot or the throat plate is changed.

4-3-2. Micro-lifter function

Sewing while lifting the presser foot by very small amount is enabled by inputting a negative value on the panel.

- * Refer to the table shown below for a rough indication of the relation among the value input on the panel, the presser foot height and the presser foot pressure.

Input value on the panel	Presser foot height	Presser foot pressure (reference)		
		G type	F type	S type
0	0mm	Approx. 19N(1.9kg)	Approx. 15N (1.5kg)	Approx. 18N (1.8kg)
-20	Approx 5mm			

- *1 The presser foot height 0 mm means the state the sole of presser foot comes in contact with the top surface of throat plate.
- *2 The presser foot pressure varies when the presser foot or the throat plate is changed.
- *3 Range of input values on the panel is from -20 to 200.

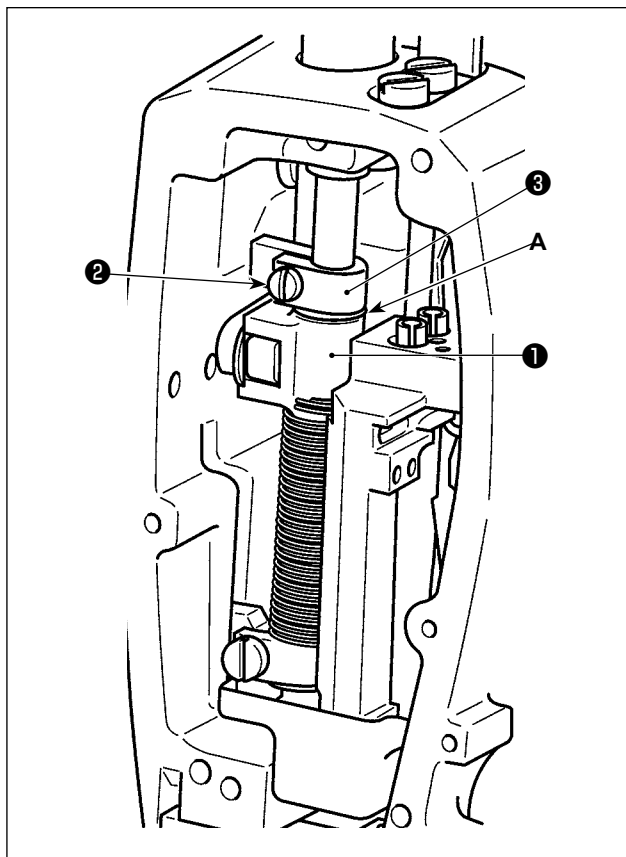


1. Be sure to input a positive value on the operation panel in the case the micro-lifter function is not used. If not, the presser foot is slightly raised and the feed dog is unable to provide a sufficient efficiency of feed.
2. In the case of using the micro-lifter function, the efficiency of feed is likely to be insufficient. To achieve the sufficient efficiency of feed, reduce the sewing speed or help feed the material by hand.

4-3-3. Changing the initial value of the presser foot pressure

If you want to change the initial value of the presser foot pressure, the initial pressure can be changed by changing the installation position of presser bar position bracket (upper) ❶.

Where necessary, adjust the initial value of the presser foot pressure according to the sewing process.



[How to adjust]

- 1) Turn the power to the sewing machine OFF.
- 2) Detach the face plate.
- 3) Loosen presser bar position bracket (upper) clamp screw ❷. Adjust the vertical position of the presser bar position bracket (upper) ❶ in reference to marker line A on presser bar ❸.

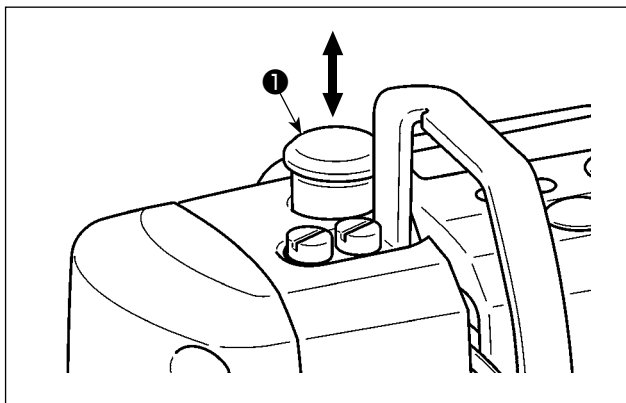
* Tighten presser bar position bracket (upper) clamp screw ❷. Attach the face plate.



Be aware that, for the F, S type sewing machine, the presser foot lifter stroke has to be decreased in the case the position of presser bar positioning bracket (upper) ❶ is lifted by 5 mm or more.

Position of presser bar position bracket (upper) ❶ with respect to marker line dot A on presser bar ❸	Presser foot pressure (reference)		
	G type	F type	S type
8 mm above		Approx. 0 N (0 kg)	
6.5 mm above			Approx. 0 N (0 kg)
5 mm above	Approx. 0 N (0 kg)		
0 (just beneath the marker line) (Factory-setting at the time of shipment)	Approx. 19N (1.9 kg)	Approx. 15N (1.5 kg)	Approx. 18N (1.8 kg)
1 mm below	Approx. 23 N (2.3 kg)	Approx. 16.5N (1.65 kg)	Approx. 20.5N (2.05 kg)

4-3-4. Manual lifting of the presser foot



When the power to the sewing machine is in the OFF state, the presser foot can be lifted / lowered by moving presser bar cap ❶ up or down by hand. Carry out this procedure for changing the gauge or adjusting the needle entry area.

4-4. Adjusting the stitch length



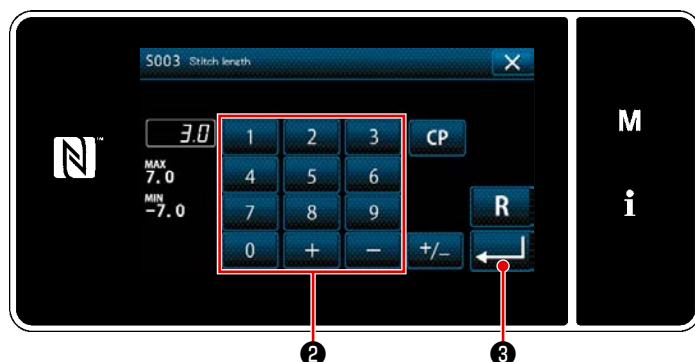
1. There may be the cases where the feed amount of the operation panel and the actual sewing pitch are different from each other in case of the use in the state other than the standard delivery or material used. Compensate the pitch in accordance with the sewing product.
2. Be aware that interference between the throat plate and feed dog can occur depending on the gauge used. Be sure to check the clearance in the gauge to be used. (The clearance must be 0.5 mm or more.)
3. When you have changed the stitch length, feed dog height or feed timing, run the sewing machine at a low speed to make sure that the gauge does not interfere with the changed part.



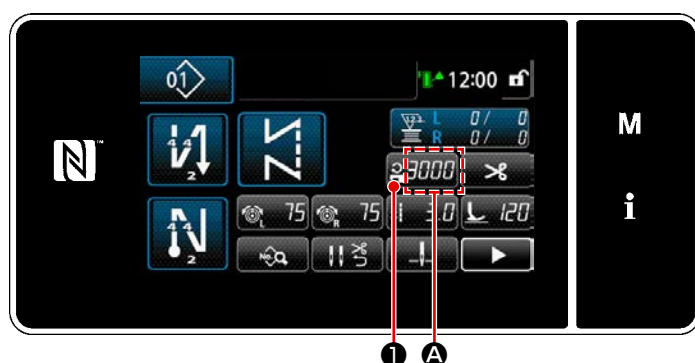
Stitch length is displayed in section **A** on the panel. (Example of display : 3.0 mm)

[How to adjust]

- 1) When  **1** is pressed, the stitch length input screen is displayed.
- 2) Change the stitch length by pressing numeric keypad **2** .(Input unit: 0.1 mm)
- 3) Confirm your entry by pressing  **3** . Then, the sewing screen is displayed.



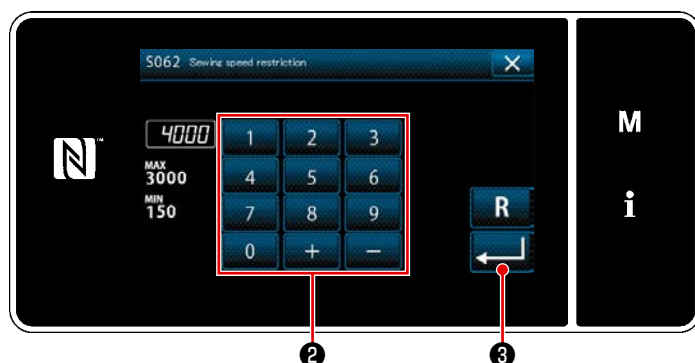
4-5. Changing the sewing speed



The sewing speed is displayed in section **A** on the panel. (Example of display : 3,000 sti/min)

[How to change]

- 1) Display the sewing speed entry screen by pressing  **1** .
- 2) Change the sewing speed as desired by pressing ten keys **2** .
- 3) Confirm your entry by pressing  **3** . Then, the sewing screen is displayed.

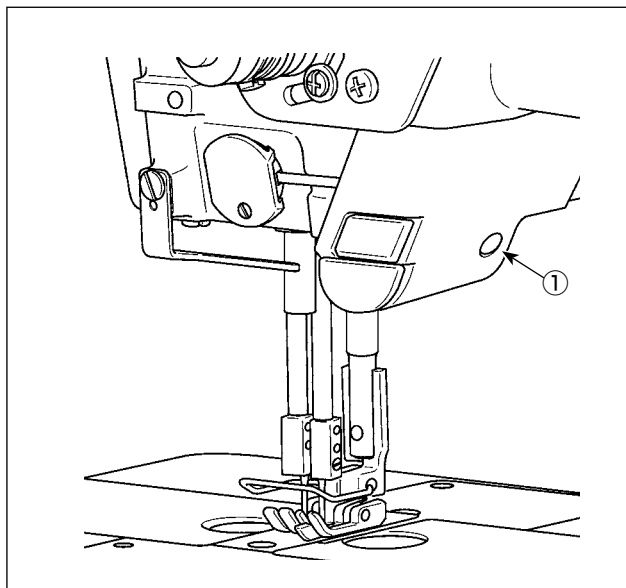


4-6. LED hand light



WARNING :

In order to protect against personal injury due to unexpected start of the sewing machine, never bring hands near the needle entry area or place foot on the pedal during the adjustment of intensity of the LED.



* **This LED is intended to improve operability of the sewing machine and is not intended for maintenance.**

The sewing machine is provided as standard with an LED light which illuminates the needle entry area.

Intensity adjustment and turn-off of the light is carried out by pressing switch ①. Every time the switch is pressed, the light is adjusted in intensity in six steps and is turned off in turn.

[Change of intensity]

1 ⇒ ... 5 ⇒ 6 ⇒ 1
Bright ⇒ ... Dim ⇒ Off ⇒ Bright

In this way, every time the switch ① is pressed, the hand lamp status is changed in repetition.

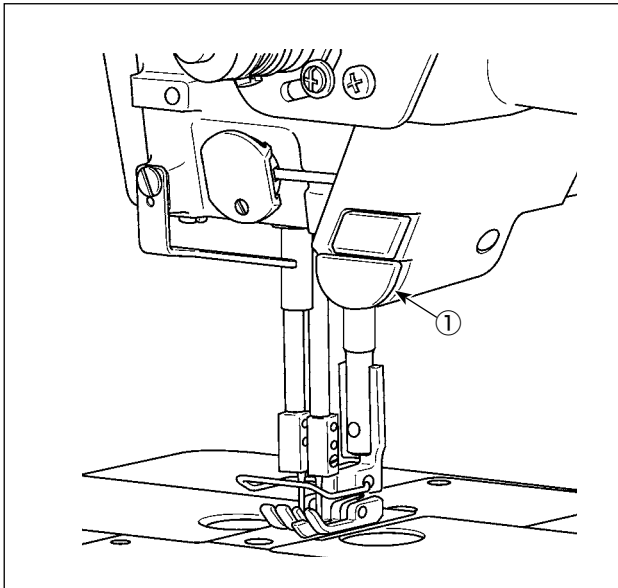
[Change in color of the LED light]

- 1) When switch ① is held pressed for three seconds, the sewing machine enters the light color changeover mode. The light color can be changed over in 12 stages by pressing ①.

1 ⇒ ... 6 ⇒ 7 ⇒ ... 12 ⇒ 1
White 50 %, yellow 50 % ⇒ ... Yellow 100 % ⇒ White 100 % ⇒ ... White 60 %, yellow 40 % ⇒ White 50 %, yellow 50 %

- 2) If the sewing machine is not operated for three seconds under the light color changeover mode, the light color changeover mode will be automatically terminated.

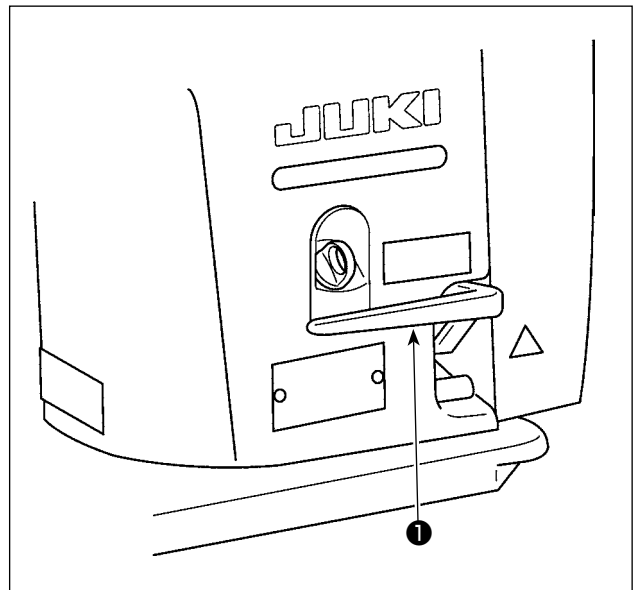
4-7. Reverse feed stitching



[One-touch type reverse feed stitching mechanism]

The one-touch type reverse feed switch ① is pressed, the machine performs reverse feed stitching.

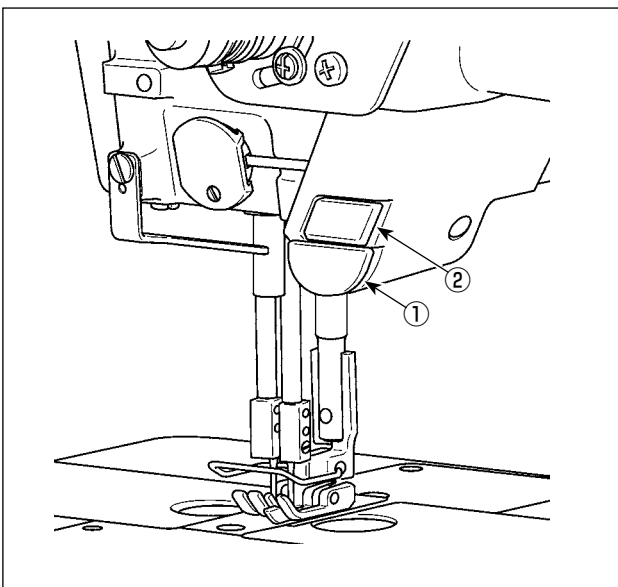
The machine resumes normal feed stitching the moment the switch lever is released.



[Reverse feed stitching by means of the reverse feed lever]

Length of the seam sewn by feeding the material in the normal or reverse direction of feed can be controlled by operating reverse feed lever ① .

4-8. Custom switch



Various kinds of operations can be carried out by operating machine head switch ① and hand switch ② .

- * Various kinds of operations can be allocated to machine head switch ① .

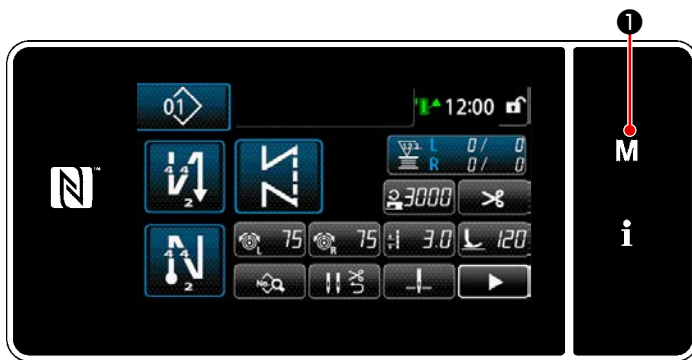
The initial values are as described below:

Hand switch ② :

One-touch type changeover switch

Machine head switch ① :

Reverse feed stitching switch



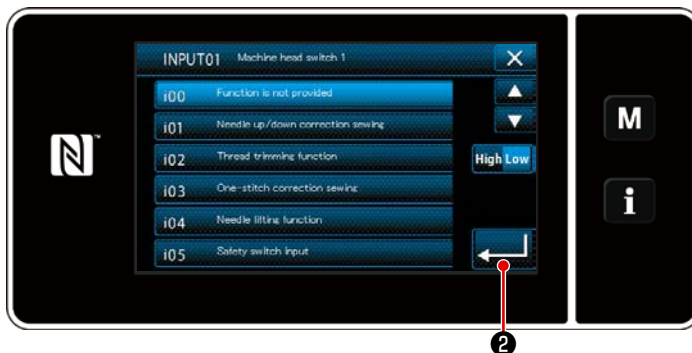
- 1) Keep **M** ① held pressed for three second.
The "mode screen" is displayed.



- 2) Select the "13. Hand switch setting".



- 3) Select the switch to be set.

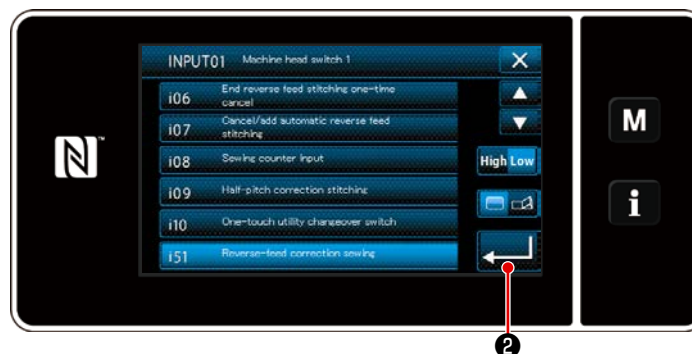


- 4) Select the function item to be assigned to the switch. Then, select the input signal status (**High** / **Low**).

In the case the function item i51 or beyond is selected, the operation to be carried out when the button is pressed is set.

 : Function is enabled while the button is held pressed.

 : Enable/disable of the function is changed over by pressing the button.



- 5) Press  ② .

[Description of operations of the custom switch]

	Function item
i00	Without option input function
i01	Needle up / down correction stitch
i02	Thread trimming function
i03	1-stitch correction stitch
i04	Needle lifting function
i05	Safety switch input
i06	Function for cancelling reverse feed stitching once at the end of sewing
i07	Cancellation / addition of automatic reverse feed stitching
i08	Sewing counter input
i09	Half-pitch correction stitch
i10	One-touch type changeover switch

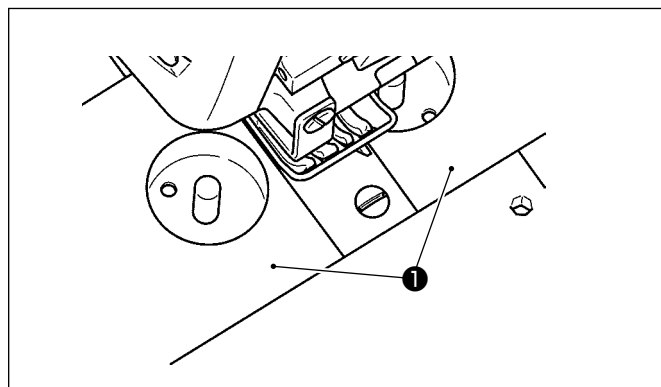
	Function item
i51	Reverse-feed correction stitch
i52	Presser foot lifting function
i53	Function for cancelling reverse feed stitching at the beginning of sewing
i54	Function for prohibiting depress on the front part of pedal
i55	Function for prohibiting thread trimming output
i56	Low-speed command input
i57	High-speed command input
i58	Reverse feed stitching switch input
i59	Sewing limit for the soft-start sewing
i60	One-shot stitching speed command
i61	Reverse-feed one-shot stitching speed command



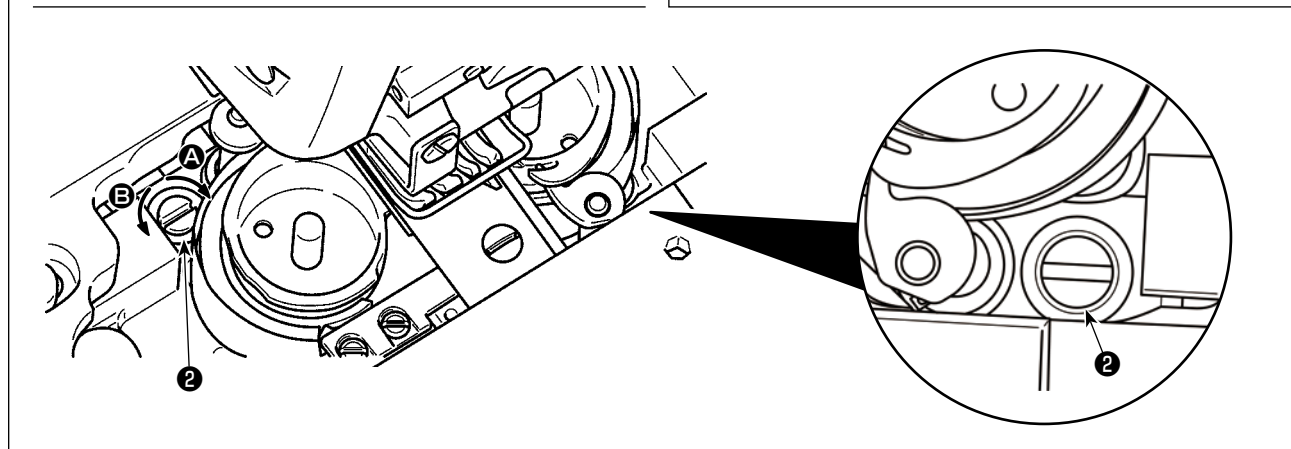
Refer to the Engineer's Manual for the detailed explanation of the functions.

4-9. Adjusting the amount of oil (oil splashes) in the hook

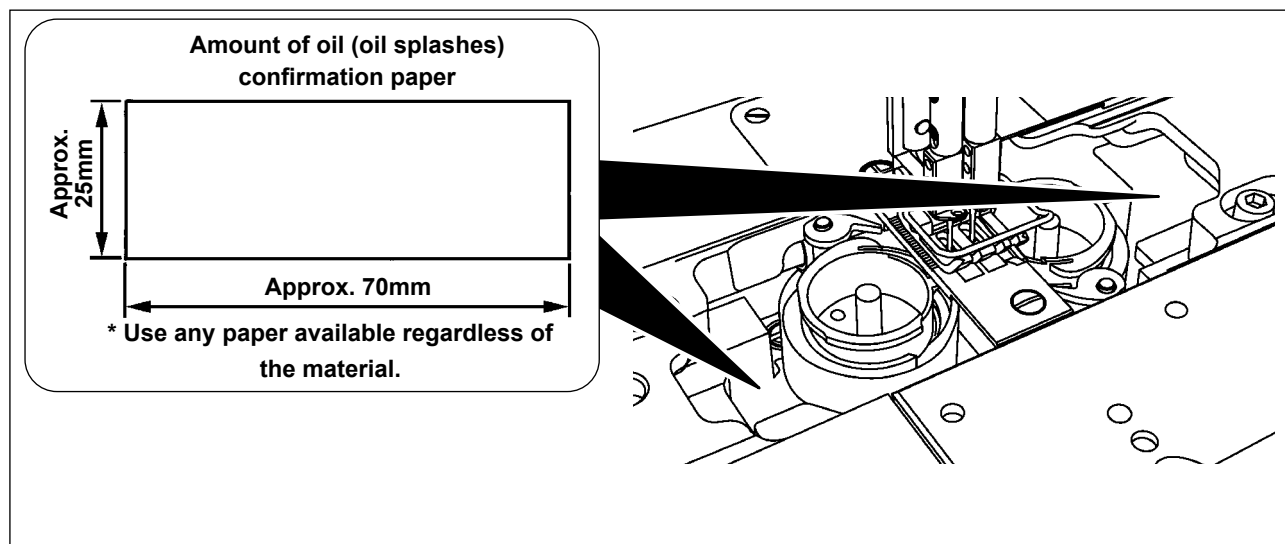
4-9-1. Adjusting the amount of oil in the hook



- 1) Detach bed slides (right and left) ❶ .
- 2) The amount of oil in the hook is decreased by turning screw ❷ clockwise **A** or is increased by turning it counterclockwise **B**.



4-9-2. How to confirm the amount of oil (oil splashes)



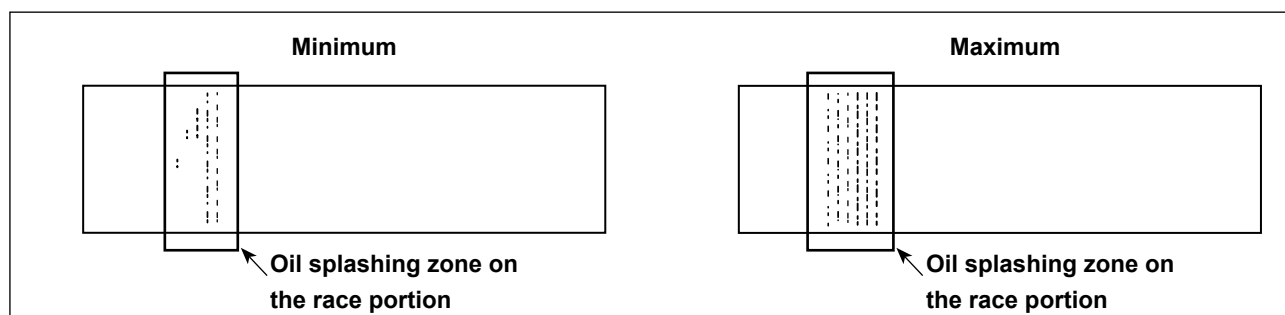
* In the case of measuring the oil quantity in the hook, measure it under the "Bobbin winding mode".

Refer to ["3-5. Winding the bobbin thread \[Bobbin winding mode\]" p.26](#) for the bobbin winding mode.

* When carrying out the procedure described below in 2), confirm the state that the needle thread from the thread take-up lever to the needle and the bobbin thread are removed, the presser foot is lifted and the slide plate is removed. At this time, take extreme caution not to allow your fingers to come in contact with the hook.

- 1) If the machine has not been sufficiently warmed up for operation, make the machine run idle for approximately five minutes. (Moderate intermittent operation)
- 2) Place the amount of oil (oil splashes) confirmation paper under the hook while the sewing machine is in operation.
- 3) Confirm that oil exists in the oil tank.
- 4) Confirmation of the amount of oil should be completed in five seconds. (Check the period of time with a watch.)

4-9-3. Sample showing the appropriate amount of oil



- 1) The state given in the figure above shows the appropriate amount of oil (oil splashes). It is necessary to finely adjust the amount of oil in accordance with the sewing processes. However, do not excessively increase/decrease the amount of oil in the hook. (If the amount of oil is too small, the hook will be seized (the hook will be hot). If the amount of oil is too much, the sewing product may be stained with oil.)
- 2) Check the oil amount (oil splashes) three times (on the three sheets of paper), and adjust so that it should not change.

5. HOW TO USE THE OPERATION PANEL

5-1. Explanation of the sewing screen (when selecting a sewing pattern)

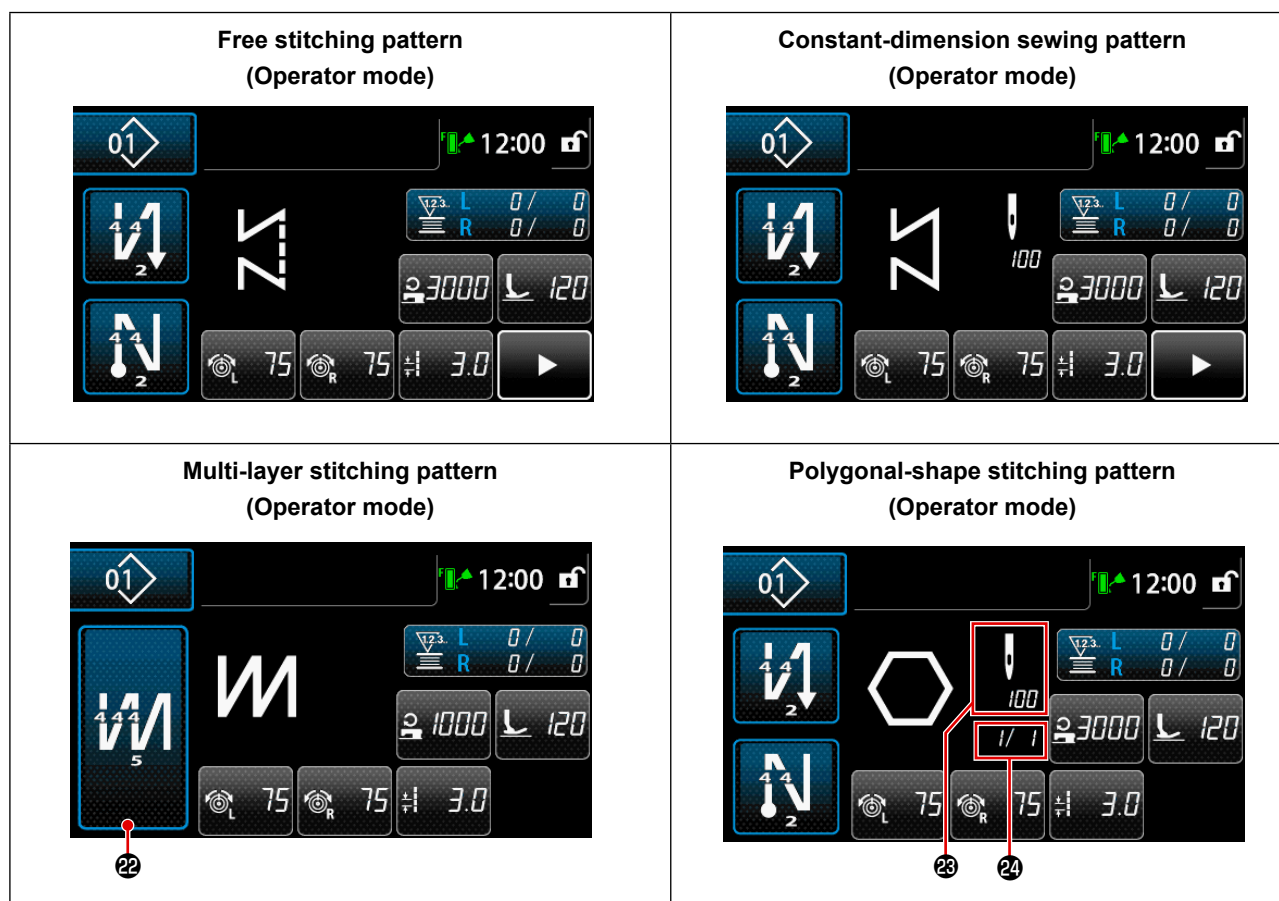
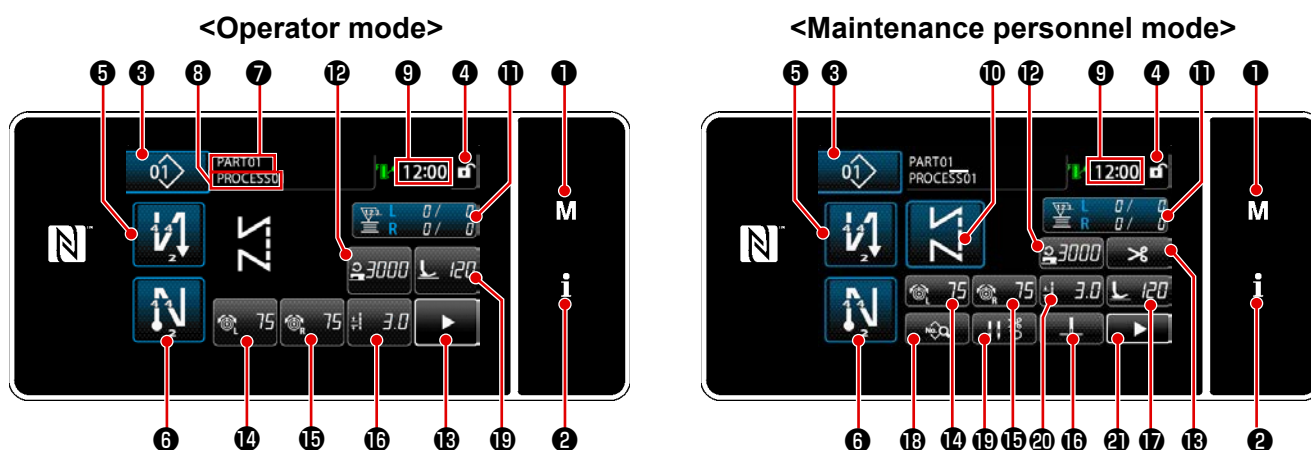
On the sewing screen, the shape and set values of the currently-sewn sewing pattern are displayed. The display and button operation differ according to the selected sewing pattern.

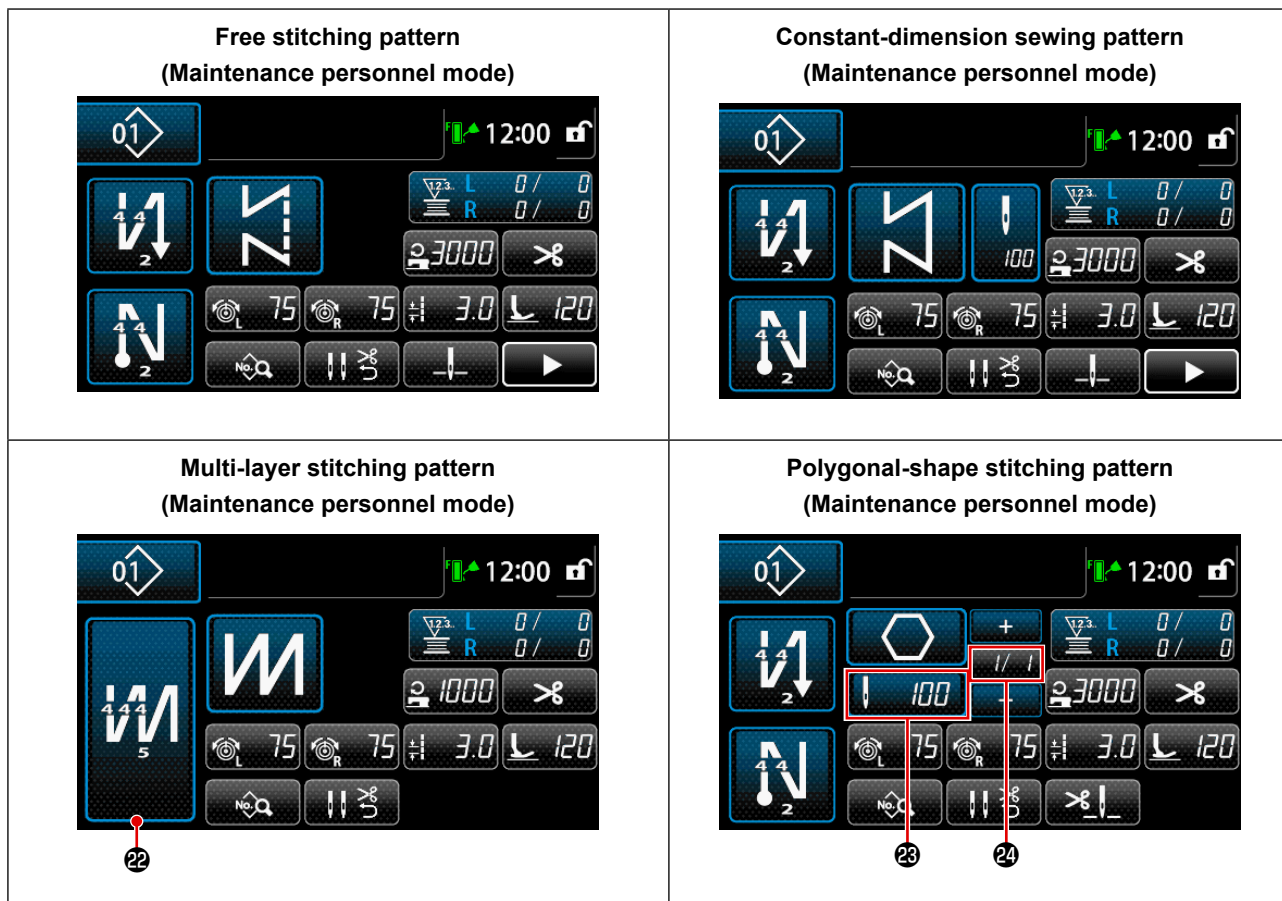
There are two different screen display modes; i.e., <Operator mode> and <Maintenance personnel mode>.

The mode can be changed over between the operator mode and the maintenance personnel mode by simultaneously pressing **M** ① and **i** ②.

(1) Sewing screen (when selecting a sewing pattern)

Sewing pattern can be selected with **N** ⑩. Five different sewing patterns are available as described below.





	Switch/display	Description
❶	Mode key	This switch is used for displaying the menu screen. The mode is changed over between the operator mode and maintenance personnel mode by pressing the Mode key and the Information key simultaneously.
❷	Information key	This switch is used for displaying the information screen. The mode is changed over between the operator mode and maintenance personnel mode by pressing the Information key and the Mode key simultaneously.
❸	Sewing pattern No. button	Sewing pattern list screen is displayed. The currently-selected sewing pattern number is displayed on this button.
❹	Simplified screen lock button	This is button is used for changing over the operation status of buttons displayed on the screen between enable and disable. This button is used for displaying the simplified lock status of the screen on it. Locked:  Unlocked:  Once the button operation is locked using the simplified screen lock button, operation of the buttons displayed on the screen, excluding this button will be disabled.

	Switch/display	Description
⑤	Sewing-start re-verse-feed stitch button	This switch is used for changing the ON/OFF status of the reverse feed stitching at the beginning of sewing. When reverse feed stitching at the beginning of sewing is placed in the OFF state,  mark is displayed at the upper left of the button. The reverse feed stitching (at start) edit screen is displayed by keeping this key held pressed for one second. → This button is displayed for free stitching, constant-dimension sewing or polygonal-shape stitching.
⑥	Sewing-end re-verse-feed stitch button	This switch is used for changing the ON/OFF status of reverse feed stitching at the end of sewing. When reverse feed stitching at the end of sewing is placed in the OFF state,  mark is displayed at the upper left of the button. The reverse feed stitching (at end) edit screen is displayed by keeping this key held pressed for one second. → This button is displayed for free stitching, constant-dimension sewing or polygonal-shape stitching.
⑦	Part number	The part number is displayed in this field.
⑧	Process/comment	Depending on the setting of memory switch U404, the process or comment is displayed in this field.
⑨	Clock display	The time set on the sewing machine is displayed in this field in 24-hour system.
⑩ *	Sewing shape button	Selected sewing pattern is displayed on this screen. Four different sewing patterns are available, i.e., free stitching pattern, constant-dimension sewing pattern, multi-layer stitching pattern and polygonal-shape stitching pattern. The shape selection screen is displayed by pressing this button.
⑪	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Bobbin thread / sewing counter". Refer to "5-2-6. List of pattern functions" p.57.
⑫	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Sewing speed". Refer to "5-2-6. List of pattern functions" p.57.
⑬	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Thread trimming". Refer to "5-2-6. List of pattern functions" p.57.
⑭	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Needle thread tension, left". Refer to "5-2-6. List of pattern functions" p.57.
⑮	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Needle thread tension, right". Refer to "5-2-6. List of pattern functions" p.57.

	Switch/display	Description
16	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Stitch length". Refer to "5-2-6. List of pattern functions" p.57 .
17※	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Presser foot pressure". Refer to "5-2-6. List of pattern functions" p.57 .
18※	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Sewing data list". Refer to "5-2-6. List of pattern functions" p.57 .
19	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Thread presser". Refer to "5-2-6. List of pattern functions" p.57 .
20※	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "Stop position of needle bar". Refer to "5-2-6. List of pattern functions" p.57 .
21※	Customization button	A selected function can be allocated to and registered with this button. This button has been initially set to the "2nd sewing screen button". Refer to "5-2-6. List of pattern functions" p.57 .
22	Multi-layer stitching button	The overlapped sewing setting screen is displayed. Refer to "5-2-6. List of pattern functions" p.57 . → This button is displayed when multi-layer stitching is selected.
23	Number of stitches	This button is used for displaying the number of stitches of constant-dimension sewing or the number of stitches registered for each step of polygonal-shape stitching. → This button is displayed when constant-dimension sewing or polygonal-shape stitching is selected.
24	Display of the number of steps of a polygonal-shape stitching pattern	This button is displayed when constant-dimension sewing or polygonal-shape stitching is selected (1 to 30). → This button is displayed when polygonal-shape stitching is selected.

* Only in the case the maintenance personnel mode is selected.

5-2. Sewing patterns

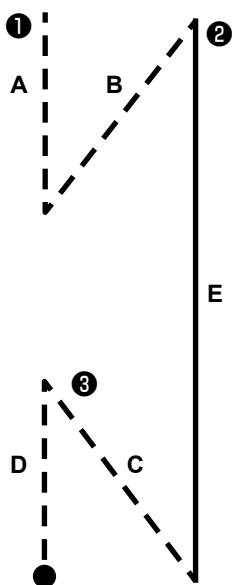
Patterns which are frequently sewn can be registered as sewing patterns.

Once the patterns are registered as sewing patterns, the desired sewing pattern can be called up only by selecting its sewing pattern number.

As many as 99 different patterns can be registered as sewing patterns.

5-2-1. Sewing pattern configuration

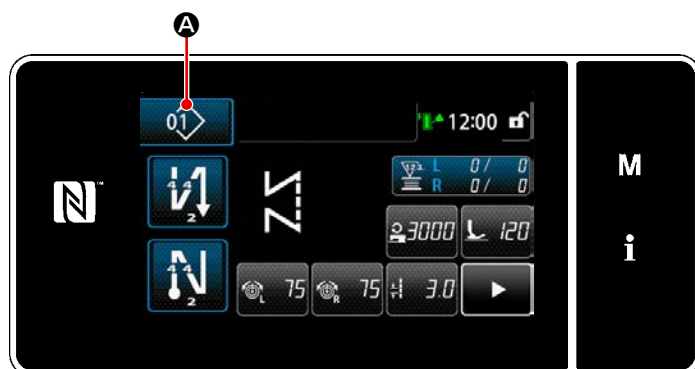
One sewing pattern consists of four elements, i.e., reverse feed stitching (at start), main stitching, reverse feed stitching (at end) and pattern function.



Pattern No. 1 - No. 200	
①	Reverse feed stitching (at start) section Refer to "5-2-3. Reverse feed stitching (at start) pattern" p.46.
②	Main stitching section • Free stitching • Constant-dimension sewing • Multi-layer stitching • Polygonal-shape stitching Refer to "5-2-5. Editing the sewing patterns" p.53 and "9-2. Setting up the polygonal-shape stitching" p.140.
③	Reverse feed stitching (at end) section Refer to "5-2-4. Reverse feed stitching (at end) pattern" p.52.
④	Pattern function Refer to "5-2-5. Editing the sewing patterns" p.53.

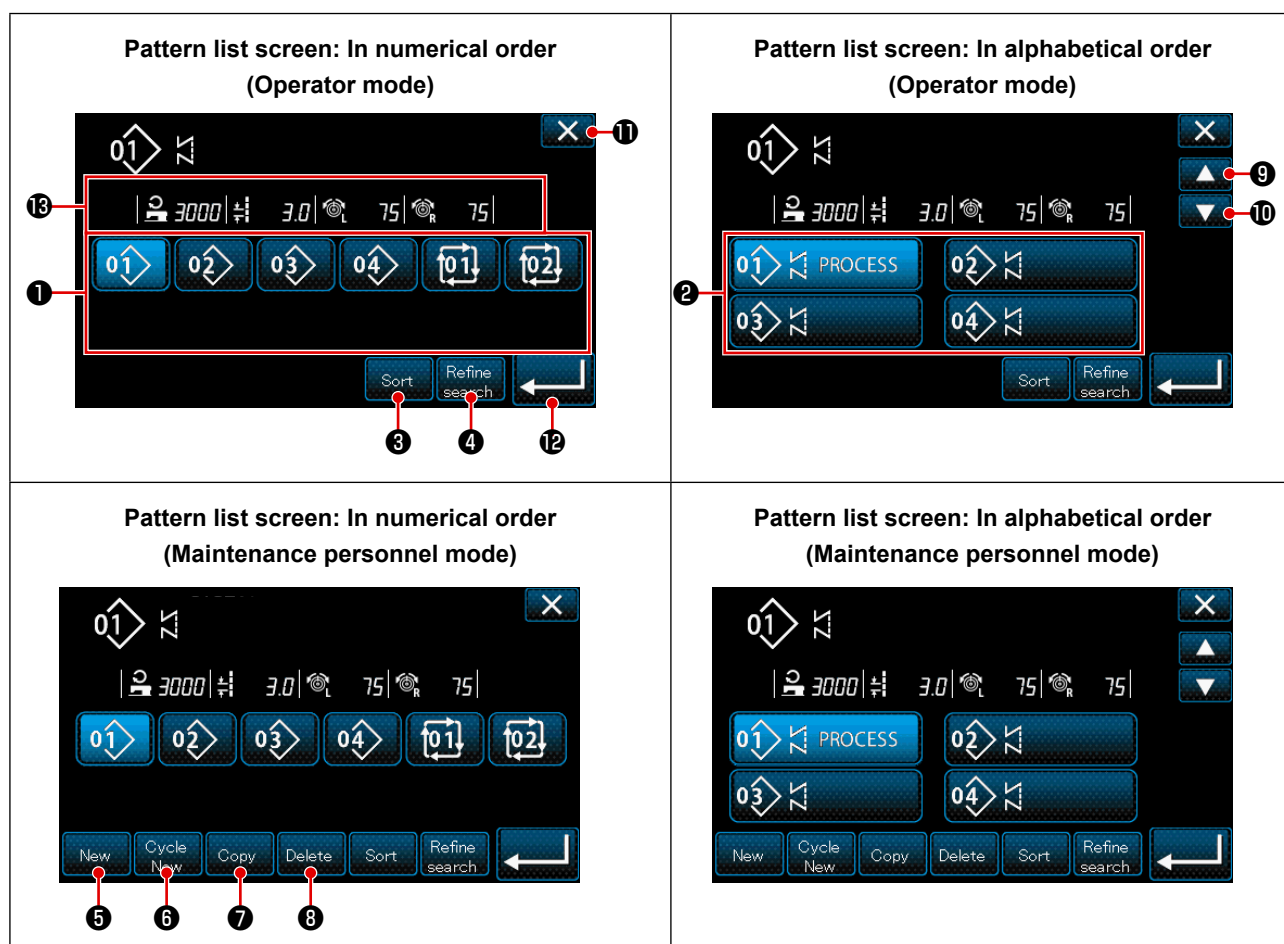
5-2-2. List of sewing patterns

The list of stored sewing patterns are displayed on the screen. Under the maintenance personnel mode, sewing patterns can be created, copied and deleted.



<Sewing screen (Operator mode)>

Press **01** **A** on the sewing screen of each mode.
The sewing pattern number list screen is displayed.



	Name	Function
❶	Pattern No. button	This button is used for displaying numbers of the registered sewing patterns and cycle patterns. (Cycle pattern numbers that are not registered are not displayed.) When this button is pressed, the sewing pattern is put into the selected state. Display range: Sewing pattern numbers 1 to 99 and cycle patterns 1 to 9.
❷	Pattern number (in the order of registration of characters) button	Sewing pattern is displayed and the pattern is put into the selected state by pressing this button.
❸	Sorting button	This button is used for sorting the registered patterns in the order of sewing pattern number, process, part number or comment. Pattern No. display range: Sewing pattern numbers 1 to 99 and cycle patterns 1 to 9. Registration of characters display range: Sewing pattern numbers 1 to 99.
❹	Refining button	This button is used for displaying the refiner setting screen.
❺	New sewing pattern creation button	This button is used for creating a new sewing pattern. Refer to "9-1-1. Creation of a new pattern" p.136. * This button is only displayed under the maintenance personnel mode.
❻	New cycle pattern creation button	This button is used for creating a new cycle pattern. Refer to "9-3. Cycle pattern" p.149. * This button is only displayed under the maintenance personnel mode.
❼	Pattern copy button	This button is used for copying a sewing pattern or cycle pattern and registering the copied pattern with new number. Refer to "9-1-2. Copying a pattern" p.138. * This button is only displayed under the maintenance personnel mode.
❽	Pattern delete button	This button is used for displaying the pattern deletion confirmation message. In the case there is only one registered pattern, the pattern cannot be deleted. * This button is only displayed under the maintenance personnel mode.
❾	Scroll (up) button	This button is used for displaying the previous page.
❿	Scroll (down) button	This button is used for displaying the next page.
⓫	Close button	This button is used for cancelling the selected pattern and displaying the sewing screen.
⓬	Enter button	This button is used for confirming the selected pattern and displaying the sewing screen.
⓭	Display of pattern data being selected	This button is used for displaying data on the pattern that is being selected.

5-2-3. Reverse feed stitching (at start) pattern

A stitch shape of the reverse feed stitching (at start) is set by following the steps of procedure described below.

(1) Enabling the reverse feed stitching (at start) pattern



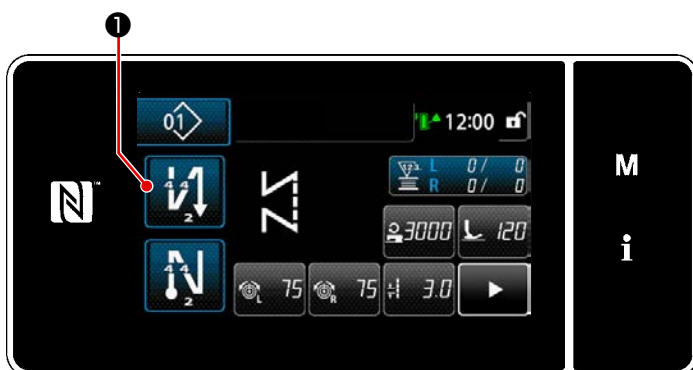
The sewing-start reverse feed stitching pattern can be operated when the sewing-start reverse feed stitching function is placed in the ON state (no mark is not displayed).

If this function is placed in the OFF state, press the sewing start reverse feed stitch button to switch off (no mark display) to enable the sewing-start reverse feed stitching function.

(2) Changing the number of stitches and pitch of reverse feed stitching (at start) pattern

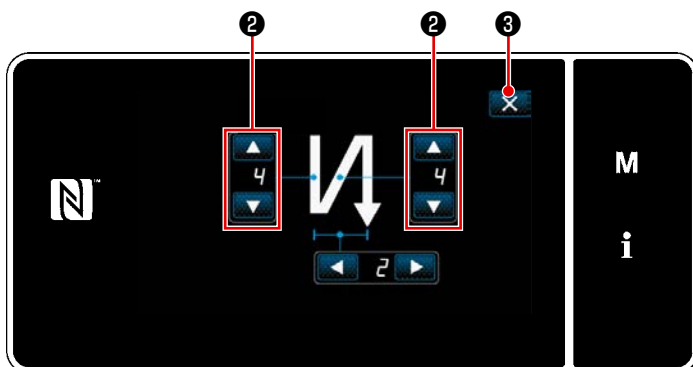
◆ In the case of operator mode

① Displaying the edit screen for reverse feed stitching (at start)



Keep  ① held pressed for one second. The reverse feed stitching (at start) edit screen is displayed.

② Setting the number of stitches and the number of repetitions of reverse feed stitching at the beginning of sewing



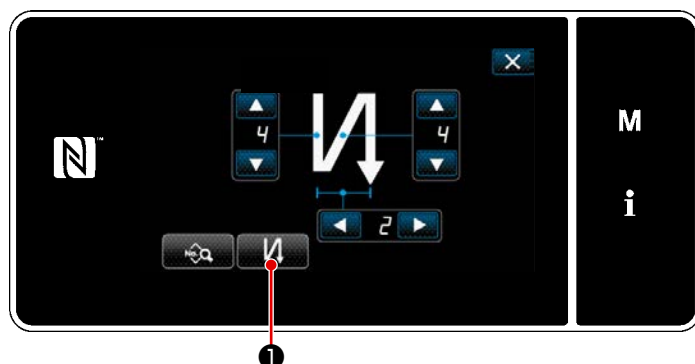
Change the number of reverse feed stitches with  ②.

The value you have entered is confirmed by pressing  ③. Then, the sewing screen is displayed.

<Edit screen for reverse feed stitching
(start) (operator mode)>

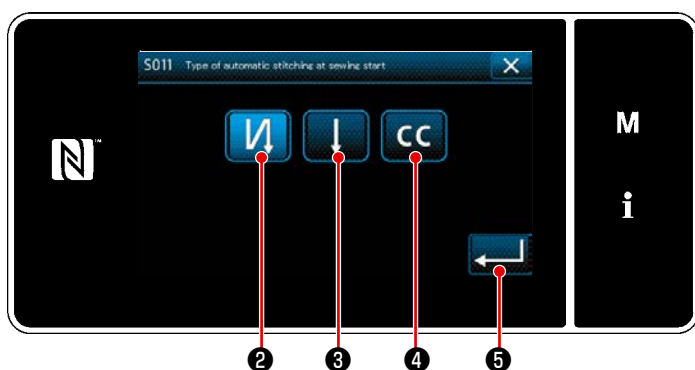
◆In the case of maintenance personnel mode

① Selecting the type of reverse feed stitching at the beginning of sewing



<Sewing-start reverse-feed stitching screen
(maintenance personnel mode)>

- 1) Display the sewing-start reverse-feed stitching edit screen. Refer to the case of the operator mode.
- 2) Press  ① to display the reverse feed stitching type input screen. Select one of the reverse feed stitching patterns to be used at the beginning of sewing:



<Type of reverse-feed stitching input screen
(maintenance personnel mode)>

- 3) Select one of the reverse feed stitching patterns to be used at the beginning of sewing:

Reverse feed stitch  ②

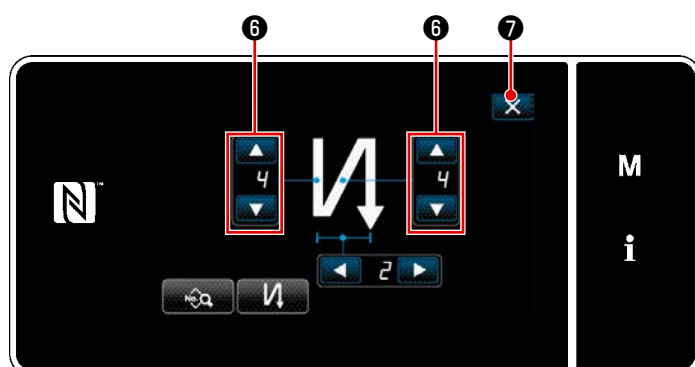
Condensation stitch  ③

Condensation custom stitch  ④

When you press  ⑤, the operation you have carried out is confirmed and the screen returns to the "Sewing screen".

② Setting the shape of reverse feed stitch at the beginning of sewing

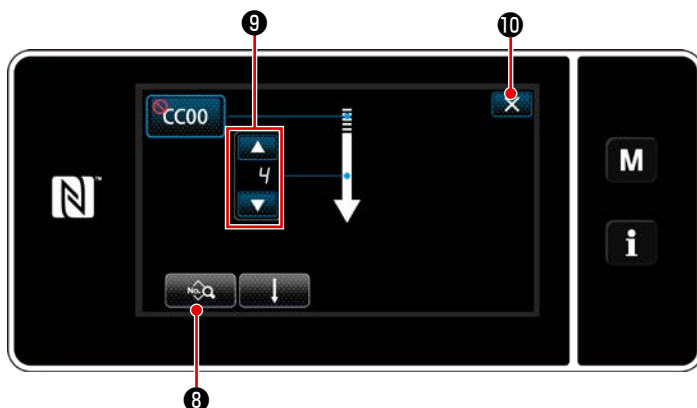
- In the case reverse feed stitching  ② is selected



Change the number of reverse feed stitches with  ⑥.

The value you have entered is confirmed by pressing  ⑦. Then, the sewing screen is displayed.

- In the case of selecting condensation stitch  ③

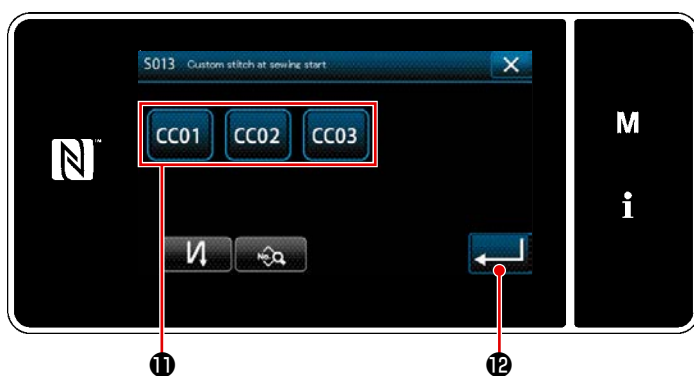


The stitch length, etc. can be set with  ⑧.

Change the number of condensation stitches with  ⑨.

The value you have entered is confirmed by pressing  ⑩. Then, the sewing screen is displayed.

- In the case of selecting condensation custom stitch  ④

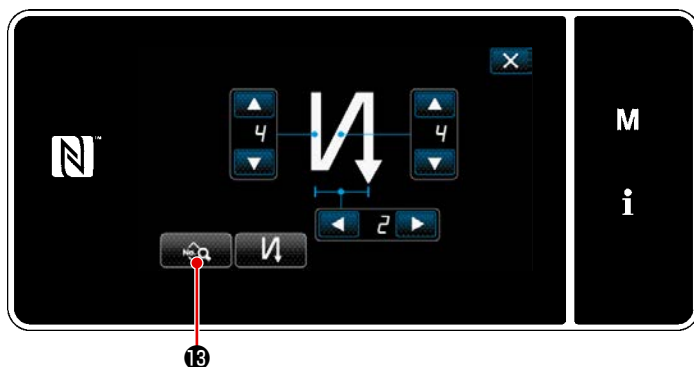


1) Press button ⑪ to select the condensation custom.

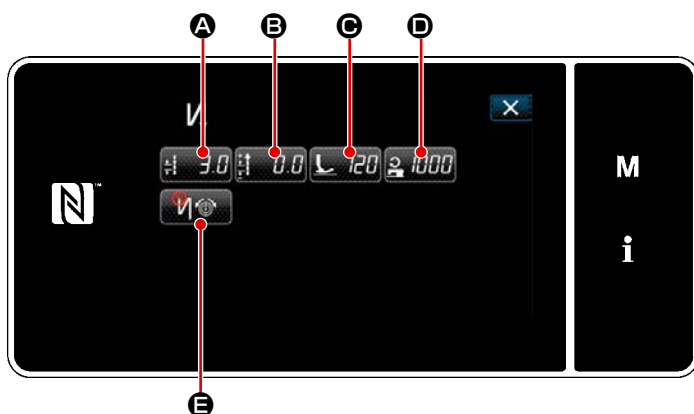
2) Press  ⑫ to confirm the aforementioned operation and return the current screen to the sewing-start reverse-feed stitching screen.

* Refer to **"9-5. Condensation custom pattern" p.162** for details of the condensation custom stitching.

③ Editing the data on reverse feed stitching at the beginning of sewing

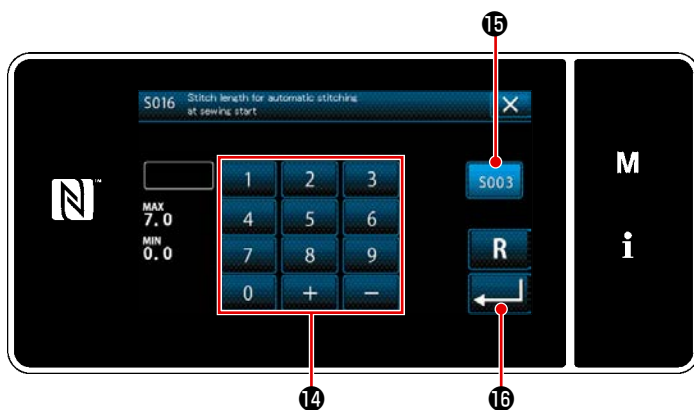


- 1) When  **13** is pressed on the sewing-start reverse feed stitching screen, the "sewing-start reverse feed stitching data edit screen" is displayed.



<Sewing-start reverse feed stitching data edit screen>

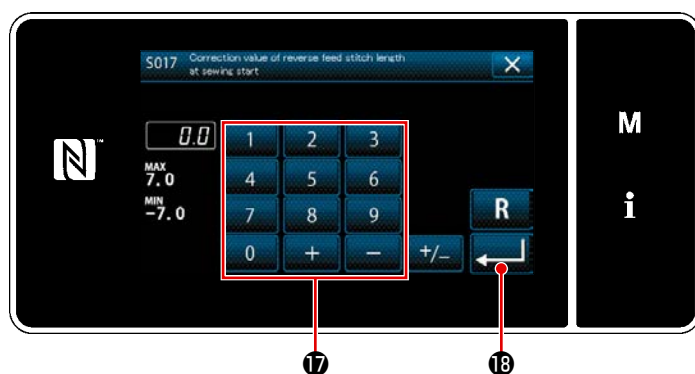
• Inputting the stitch length (A)



<Stitch length input screen>

- 1) When  **A** is pressed, the stitch length input screen is displayed.
- 2) When  **15** is pressed, the stitch length can be entered.
- 3) Input the stitch length with numeric keypad **14**.
 - * In the case **15** is selected, the stitch length will be the one employed for normal feed stitching section.
- 4) When  **16** is pressed, the value you have input is confirmed and the screen returns to the "sewing-start reverse feed stitching data edit screen".

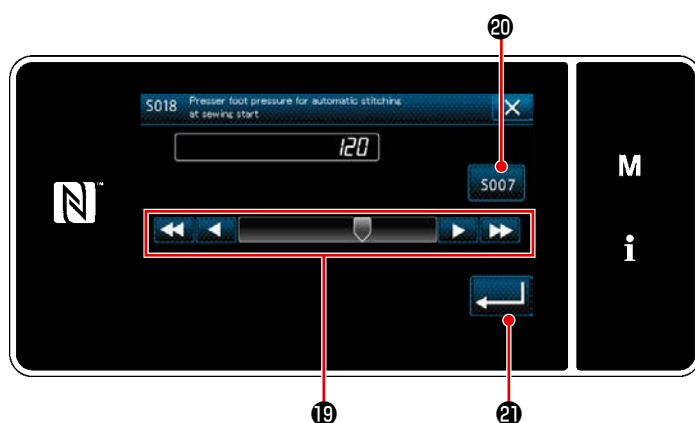
- Inputting the correction value for reverse-feed stitch length (㊸)



<Reverse-feed stitch length correction value input screen>

- 1) When is pressed, the reverse-feed stitch length correction value input screen is displayed.
- 2) Input a correction value with numeric keypad 17.
- 3) When is pressed, the value you have input is confirmed and the screen returns to the "sewing-start reverse feed stitching data edit screen".

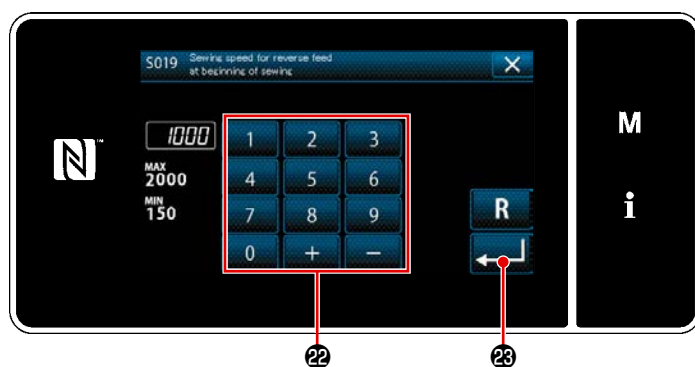
- Inputting the presser foot pressure (㊹)



<Presser foot pressure input screen>

- 1) Press . Then, the presser foot pressure input screen is displayed.
- 2) Input a presser foot pressure with button 19.
 - * In the case 20 is selected, the pressure foot pressure you input will be the pressure which is employed for the normal feed stitching section.
- 3) When is pressed, the value you have input is confirmed and the screen returns to the "sewing-start reverse feed stitching data edit screen".

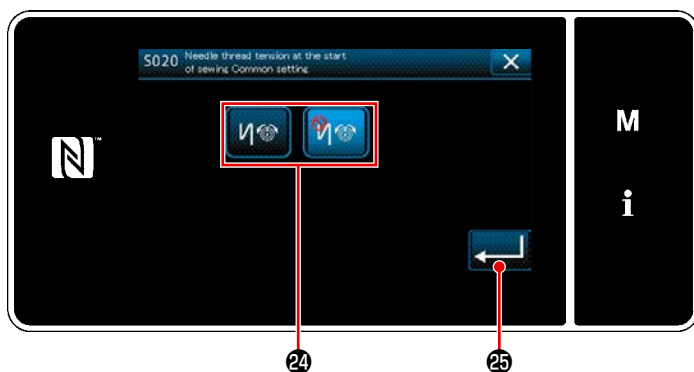
- Inputting the sewing speed (㊺)



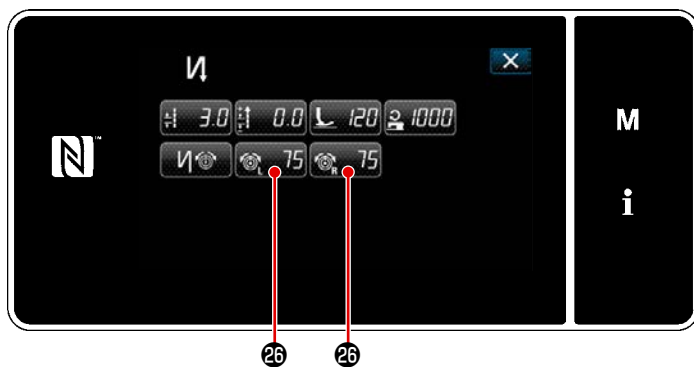
<Sewing speed input screen>

- 1) When is pressed, the sewing speed input screen is displayed.
- 2) Input a sewing speed with numeric keypad 22.
- 3) When is pressed, the value you have input is confirmed and the screen returns to the "sewing-start reverse feed stitching data edit screen".

• Setting the needle thread tension function (E)



<Needle thread tension function selection screen>



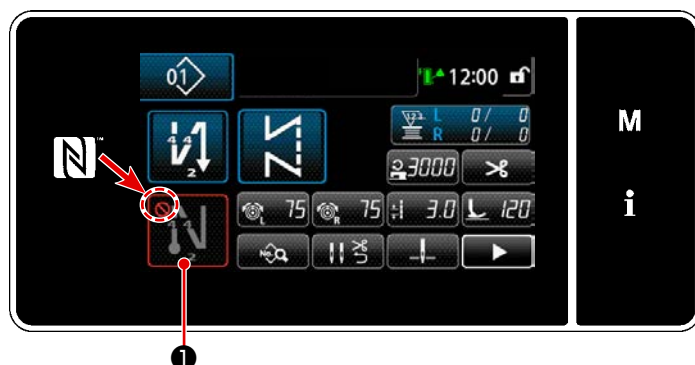
- 1)  E is pressed, the needle thread tension function selection screen is displayed.
- 2) Select the status (enable/disable) of the needle thread tension function with button 24 .
- 3)  25 is pressed, the value you have input is confirmed and the screen returns to the "sewing-start reverse feed stitching data edit screen".

* In the case  (disable) is selected in the aforementioned item number 2, needle thread tension edit button   26 is displayed on the sewing-start reverse feed stitching data edit screen.

5-2-4. Reverse feed stitching (at end) pattern

A stitch shape of reverse feed stitching (at end) is set by following the steps of procedure described below.

(1) Enabling the reverse feed stitching (at end) pattern



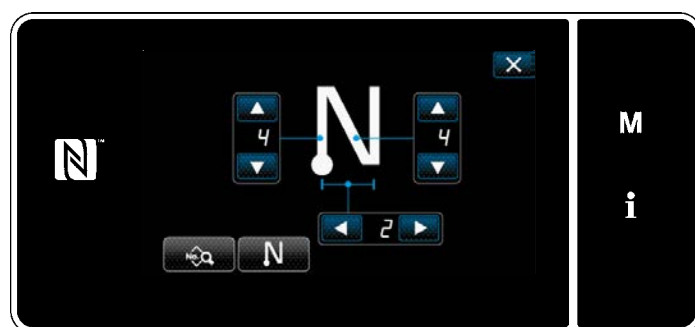
The sewing-end reverse feed stitching pattern can be operated when the sewing-end reverse feed stitching function is placed in the ON state (no mark is not displayed). If this function is placed in the OFF state press the sewing end reverse feed stitch button to switch off no mark display to enable the sewing-end reverse feed stitching function.

(2) Changing the number of stitches and pitch of reverse feed stitching (at end) pattern

① Displaying the edit screen for reverse feed stitching (at end)



Keep  ① held pressed for one second. The reverse feed stitching (at end) edit screen is displayed.



<Sewing-end reverse feed stitching edit screen>

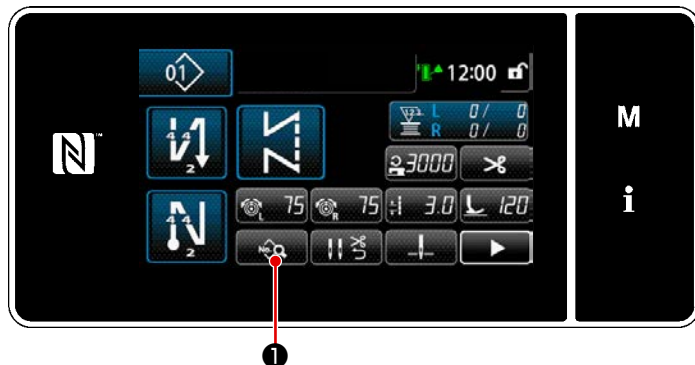
* From the next item number and beyond, set the function items in the same manner as the functions for sewing-start reverse feed stitching. (Refer to ["5-2-3. Reverse feed stitching \(at start\) pattern" p.46.](#))

5-2-5. Editing the sewing patterns

(1) Edit method (in the case free stitching, constant-dimension sewing or multi-layer stitching is selected)

* In the case polygonal-shape stitching is selected, Refer to **"9-2. Setting up the polygonal-shape stitching" p.140.**

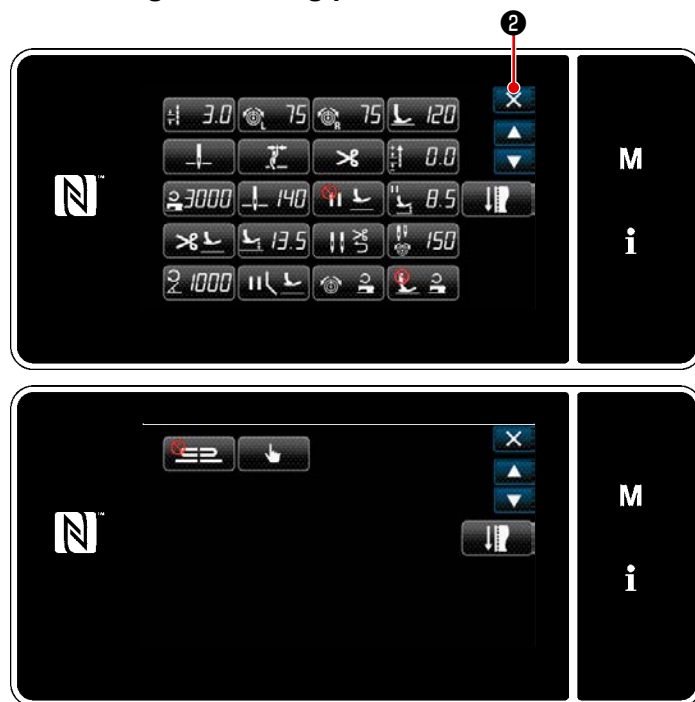
① Displaying the sewing data edit screen



<Sewing screen (Maintenance personnel mode)>

Press  ① on the sewing screen under the maintenance personnel mode.

② Editing the sewing pattern



<Sewing data edit screen>

On this screen, the pattern functions can be edited separately.

Refer to **"5-2-6. List of pattern functions" p.57** for the function items that can be edited.

Change the respective items and press



to confirm the change.

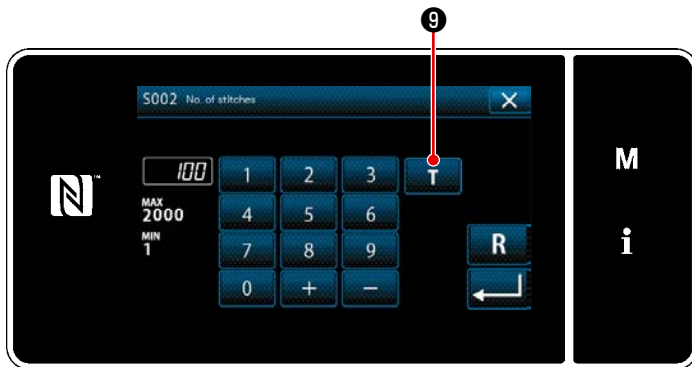
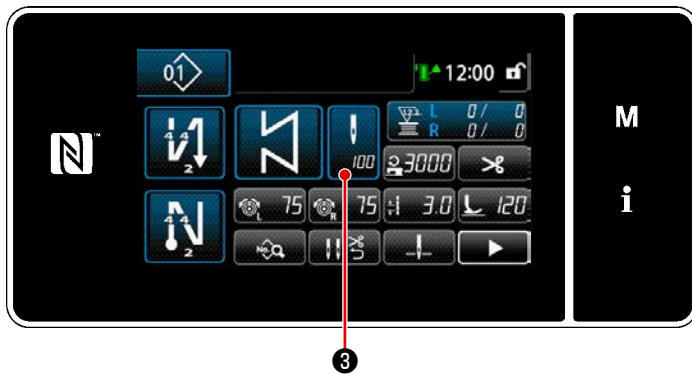
Press  ② to display the sewing screen.

③ Performing sewing using the edited sewing pattern

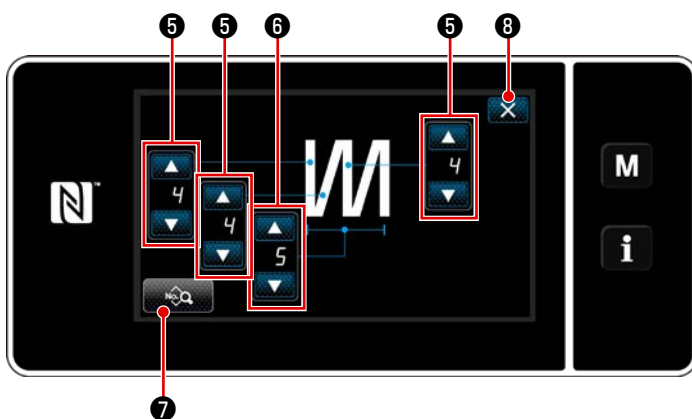
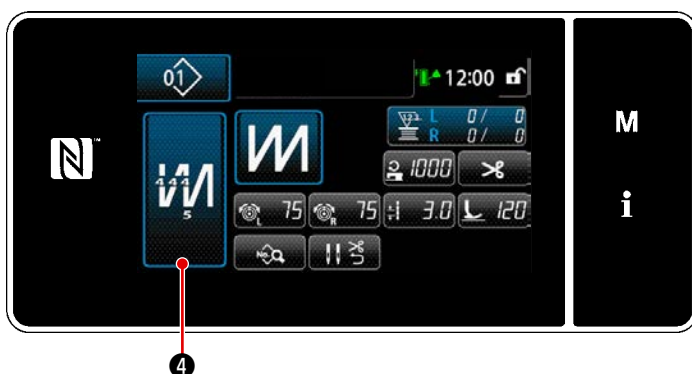


<Sewing screen>

Data you have changed is displayed on the screen.



<Number of stitches input screen>



<Multi-layer stitching edit screen>

* In the case a constant-dimension sewing pattern is selected, the number of stitches input screen is displayed by

pressing  ③ at the time of setting the number of stitches. (Only in the case the number of stitches can be changed)

When  ⑨ is pressed, the teaching function is turned ON.

Refer to **"5-2-7. Teaching function"** p.65 for the teaching function.

* When  ④ is pressed while an overlapped stitching pattern is selected, the "Overlapped stitching edit screen" is displayed.

- 1) Set the number of stitches with  ⑤.
- 2) Set the number of times of double reverse feed stitching with  ⑥.
- 3) Multi-layered sewing data can be edited by pressing  ⑦.
- 4) Press  ⑧ to confirm the set value and return the current screen to the sewing screen.

(2) Sewing adjustment mode

Sewing performance can be checked using the sewing conditions you have changed before finalizing the sewing conditions.



<Sewing screen (Maintenance personnel mode)>

- 1) Press ① on the sewing screen under the maintenance personnel mode.
The "sewing data edit screen" is displayed.



<Sewing data edit screen>

- 2) Change the sewing conditions with ②. Then, check the sewing performance.

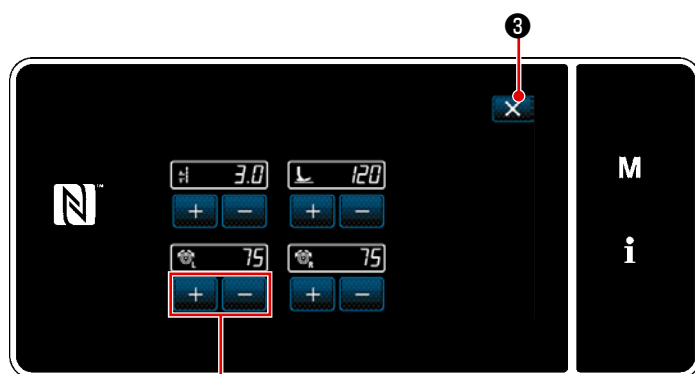
Below-stated sewing conditions can be adjusted.

3.0 : Stitch length

120 : Presser foot pressure

75 : Needle thread tension (left)

75 : Needle thread tension (right)



<Sewing adjustment mode screen>

- 3) When ③ is pressed after thread trimming, the sewing machine terminates the operation and the screen returns to the sewing data edit screen.

(3) Adjusting the lower stop position



WARNING :

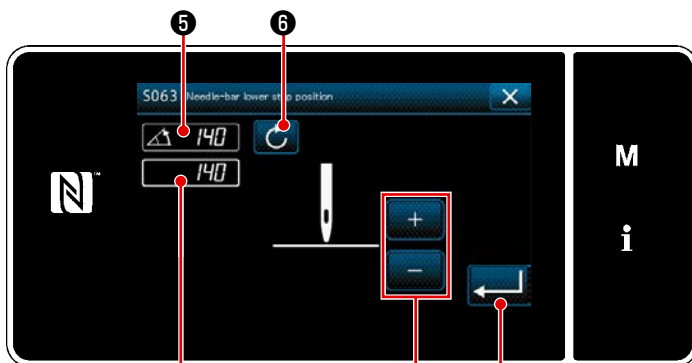
The needle bar moves during adjustment of this item. Be careful not to place your fingers under the needle.



<Sewing screen (Maintenance personnel mode)>



<Sewing data edit screen>



<Needle bar lower stop position setting screen>

- 1) Press  ① on the sewing screen under the maintenance personnel mode.

The "sewing data edit screen" is displayed.

- 2) Press  ②.

The "needle bar lower stop position setting screen" is displayed.

- 3) Adjust the lower stop position of the needle bar following two different adjustment procedures described below.

[Adjustment with the + / - key]

Adjust the needle bar position with



③. (Value shown in display ④ will change accordingly.)

[Adjustment with the main-shaft angle]

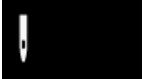
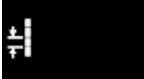
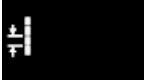
Adjust the position of the needle bar by turning the main shaft. (The value on display portion ⑤ will change.)

Press  ⑥ to reflect the adjustment value to ④.

- 4) The operation is confirmed by pressing  ⑦. Then, the screen returns to the "sewing data edit screen".

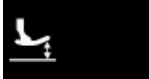
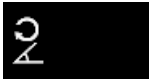
5-2-6. List of pattern functions

(1) Setting items under the pattern sewing mode

Data No.	Item name	Unit of change	Input range			
S001	Shape		Free 	Constant dimension 	Multi-layered 	Polygonal shape 
S002	Number of stitches	1stitch	—	 1 to 2000	1 to 15	—
S003	Stitch length	0.1mm	 -4.0 to 4.0 (LH-4578C-0B) -7.0 to 7.0 (LH-4578C-7, LH-4588C-7)			—
S004	Needle thread tension (left)	1	 0 to 200			—
S005	Needle thread tension (right)	1	 0 to 200			—
S007	Presser foot pressure	1	 -20 to 200			—
S010	Stitch ON/OFF at the beginning of sewing		ON / OFF		—	ON / OFF
S011	Shape of reverse feed stitching at the beginning of sewing		 : Reverse feed stitching  : Condensation  : Condensation custom		—	 : Reverse feed stitching  : Condensation  : Condensation custom
S013	Custom stitching at the beginning of sewing		Condensation custom No.1 to 9		—	Condensation custom No.1 to 9
S016	Stitch length at the beginning of sewing	0.1mm	 0.0 - 4.0 / Common setting S003 0.0 to 7.0 / Common setting S003 (LH-4578C-7, LH-4588C-7)			0.0 to 4.0 / Common setting S205 (LH-4578C-0B) 0.0 to 7.0 / Common setting S205 (LH-4578C-7, LH-4588C-7)
S017	Correction value of stitch length or reverse feed stitching at the beginning of sewing	0.1mm	 -4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)			-4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)

Data No.	Item name	Unit of change	Input range		
S018	Presser foot pressure at the beginning of sewing	1	 -20 to 200 / Common setting S007	—	-20 to 200 / Common setting S209
S019	Reverse feed stitching speed at the beginning of sewing	10sti/min	 150 to 2000		
S020	Needle thread tension at the beginning of sewing; common setting		 : OFF  : ON	—	 : OFF  : ON
S021	Needle thread tension, left at the beginning of sewing	1	 0 to 200	—	0 to 200
S022	Needle thread tension, right at the beginning of sewing	1	 0 to 200	—	0 to 200
S031	Shape of reverse feed stitching at the end of sewing		 : Reverse feed stitching  : Condensation  : Condensation custom	—	 : Reverse feed stitching  : Condensation  : Condensation custom
S033	Custom stitching at the end of sewing		Condensation custom No.1 to 9	—	Condensation custom No.1 to 9
S036	Stitch length at the end of sewing	0.1mm	 0.0 to 4.0/ Common setting S003 (LH-4578C-0B) 0.0 to 7.0/ Common setting S003 (LH-4578C-7, LH-4588C-7)	—	0.0 to 4.0/ Common setting S205 (LH-4578C-0B) 0.0 to 7.0/ Common setting S205 (LH-4578C-7, LH-4588C-7)
S037	Correction value of stitch length or reverse feed stitching at the end of sewing	0.1mm	 -4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)	—	-4.0 to 4.0 (LH-4578C-0B) -7.0 to 7.0 (LH-4578C-7, LH-4588C-7)
S038	Presser foot pressure at the end of sewing	1	 -20 to 200 / Common setting S007	—	-20 to 200 / Common setting S209
S039	Reverse feed stitching speed at the end of sewing	50sti/min	 150 to 2000	—	150 to 2000

Data No.	Item name	Unit of change	Input range		
S040	Needle thread tension at the end of sewing; common setting		 : OFF  : ON	—	 : OFF  : ON
S041	Needle thread tension, left at the end of sewing	1	 0 to 200	—	0 to 200
S042	Needle thread tension, right at the end of sewing	1	 0 to 200	—	0 to 200
S050	Needle bar stop position		 : Stop with the needle up  : Stop with the needle down	—	—
S051	Thread pressure ON/OFF		 : OFF	 : ON	
S052	Thread trimmer ON/OFF		 : OFF	 : ON	
S053	One shot		—	 : OFF  : ON	—
S054	When the preset number of stitches is reached, automatic thread trimming is conducted simultaneously		—	 : OFF  : ON	 : OFF  : ON
S058	Multi-layered section sensor ON/OFF		 : OFF  : ON	—	—
S059	Sensor value to turn ON the multi-layered section changeover function	1	 1000 to 3000	—	—
S060	Sensor value to turn OFF the multi-layered section changeover function	1	 1000 to 3000	—	—

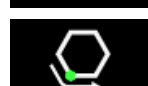
Data No.	Item name	Unit of change	Input range		
S061	Reverse-feed stitch length correction value	0.1mm		-4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)	
S062	Sewing speed limit	10sti/min		150 to U096	—
S063	Needle bar: Lower stop position	1deg		100 to 300	—
S065	Presser foot lifting during intermediate stop		 : OFF  : ON	—	—
S066	Presser foot lifting height during intermediate stop	0.1mm		0.0 to 8.5	—
S067	Presser foot lifting after thread trimming		 : OFF  : ON	—	—
S068	Presser foot lifting height after thread trimming	0.1mm		0.0 to 13.5	—
S069	Automatic reset of both needles after thread trimming		 : OFF  : ON	—	—
S070	Needle thread tension when the needle bar stops at the midpoint of angular stitching			0 to 200	—
S071	Sewing speed limit for angular stitching	10sti/min		150 to 1500	150 to 1500
S072	Presser foot lifting at the midpoint stop during angular stitching		 : OFF  : ON	—	—
S073	Single side length correction of angle 1	0.1mm		-5.0 to 5.0	—
S074	Single side length correction of angle 2	0.1mm		-5.0 to 5.0	—
S075	Single side length correction of angle 3	0.1mm		-5.0 to 5.0	—
S076	Single side length correction of angle 4	0.1mm		-5.0 to 5.0	—
S077	Single side length correction of angle 5	0.1mm		-5.0 to 5.0	—
S078	Single side length correction of angle 6	0.1 mm		-5.0 to 5.0	—

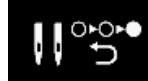
Data No.	Item name	Unit of change	Input range		
S080	Type of angle patterns		 : No setting  : Single angle  : Pocket sewing  : 3 continuous angles  : 4 continuous angles  : 5 continuous angles  : 6 continuous angles	—	—
S081	Angle 1	1deg	30 to 175	—	—
S082	Angle 2	1deg	30 to 175	—	—
S083	Angle 3	1deg	30 to 175	—	—
S084	Angle 4	1deg	30 to 175	—	—
S085	Angle 5	1deg	30 to 175	—	—
S087	Stitch length when running on multi-layered portion (*1)	0.1mm	 -4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)	—	—
S088	Number of stitches when running on multi-layered portion (*1)	1stitch	0 to 20	—	—
S090	Presser foot pressure when running on multi-layered portion (*1)		-20 to 200 / Common setting S007	—	—
S092	Needle thread (left) tension when running on multi-layered portion (*1)		0 to 200 / Common setting S004	—	—
S093	Needle thread (right) tension when running on multi-layered portion (*1)		0 to 200 / Common setting S005	—	—
S096	Stitch length when sewing multi-layered portion (*1)	0.1mm	-4.0 to 4.0/ Common setting S003 (LH-4578C-0B) -7.0 to 7.0/ Common setting S003 (LH-4578C-7, LH-4588C-7)	—	—
S098	Presser foot pressure when sewing on multi-layered portion (*1)		-20 to 200 / Common setting S007	—	—
S100	Sewing speed when sewing multi-layered portion (*1)	10sti/min	150 to 3000 / Common setting S062	—	—
S102	Needle thread (left) tension when sewing multi-layered portion (*1)		0 to 200 / Common setting S004	—	—
S103	Needle thread (right) tension when sewing multi-layered portion (*1)		0 to 200 / Common setting S005		—
S104	Number of OFF stitches when changing over multi-layered portion (*1)	1stitch	0 to 200		
S105	Sewing speed limit at the time of one-touch type changeover	10sti/min	150 to 3000 / Common setting S062	—	—

Data No.	Item name	Unit of change	Input range		
S106	Stitch length at the time of one-touch type changeover	0.1mm	-4.0 to 4.0/ Common setting S003 (LH-4578C-0B) -7.0 to 7.0/ Common setting S003 (LH-4578C-7, LH-4588C-7)	—	—
S107	Needle thread tension at the time of one-touch type changeover (left)		0 to 200 / Common setting S004	—	—
S108	Needle thread tension at the time of one-touch type changeover (right)		0 to 200 / Common setting S005	—	—
S109	Presser foot pressure at the time of one-touch type changeover		-20 to 200 / Common setting S007	—	—
S110	Number of stitches to be sewn before turning OFF the change-over at the time of one-touch type changeover		0 to 200	—	—
S112	Tension correction speed chart		1 to 4		
S113	Needle thread tension correction		 : OFF	 : Correction according to the sewing speed.	
			 : Correction according to the remaining amount of bobbin thread	 : Correction according to both the sewing speed and the remaining amount of bobbin thread	
S114	Presser foot pressure correction		 : OFF	 : ON	
S181	Angle 1 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—
S182	Angle 2 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—
S183	Angle 3 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—
S184	Angle 4 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—
S185	Angle 5 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—
S186	Angle 6 Needle thread tension of the needle bar during midpoint stop of angular stitching		0 to 200	—	—

* The function marked with an asterisk (*) cannot be selected on the sewing machine which is not provided with the multi-layered portion detection function (LH-4578C-0B).

(2) Setting items for the polygonal-shape stitching steps

Data No.	Item name	Unit of change	Input range			
Step 01						
S201	Step changeover		 Number of stitches	 One-touch switch	 Multi-layered part	 Separately-driven needle bar sensor
S203	Sensor value to change over the step	1	—	—	 1000 to 3000	—
S204	Number of stitches (seam length in mm)	1stitch	 1 to 2000	—	—	 1 to 2000
S205	Stitch length (the number of stitches per inch, the number of stitches per 3 cm)	0.1mm	 -4.0 to 4.0(LH-4578C-0B) -7.0 to 7.0(LH-4578C-7, LH-4588C-7)			
S206	Needle thread tension (left)		 0 to 200			
S207	Needle thread tension (right)		 0 to 200			
S209	Presser foot pressure		 -20 to 200			
S211	Needle bar stop position at the time of pause		 : Stop with the needle up  : Stop with the needle down			
S212	Presser foot lifting during intermediate stop		 : OFF  : ON			
S213	Presser foot lifting during intermediate stop	0.1mm	 0.0 to 20.0			
S214	Needle bar stop position at the time of stop		 : Stop with the needle up  : Stop with the needle down  : Thread trimming  : Continuity			
S215	Stop and presser foot lifting		 : OFF  : ON			

Data No.	Item name	Unit of change	Input range
S216	Lifting height of presser foot when the sewing machine stops	0.1mm	 0.0 to 20.0
S217	One shot		 : OFF  : ON
S219	Sewing speed	10sti/min	 150 to 3000
S220	Automatic return of both needles under the step feed mode		 : OFF  : ON
Step 02			
:			
Step 30			

* Setting items and the input range are same as those of step 01.

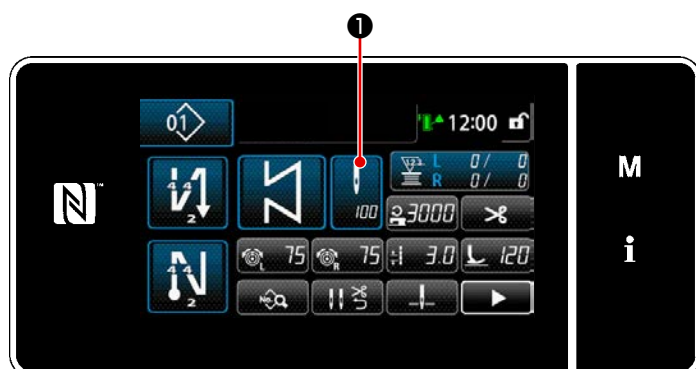
* Step numbers can be set to Step 30.

5-2-7. Teaching function

This is the function that enables entry of the number of stitches of a sewing pattern using the actual number of stitches sewn.

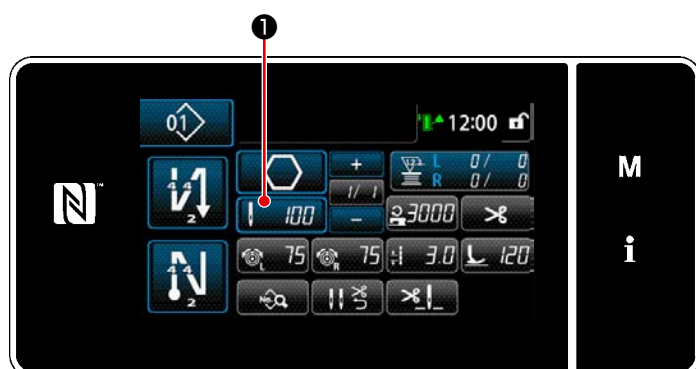
This function screen can be displayed from the sewing data edit screen.

- * The teaching function can be used in the case the "constant-dimension sewing" or "polygonal-shape stitching" is selected.



<Sewing screen (constant-dimension sewing) (Maintenance personnel mode)>

Press ❶ on the sewing data list screen. Then, the number of stitches input screen is displayed.



<Sewing screen (polygonal-shape stitching) (Maintenance personnel mode)>

(1) How to set (constant-dimension sewing)



<Number of stitches input screen>

❶ Turning ON the teaching function

Press **T** ❷ to turn ON the teaching function.

❷ Starting teaching

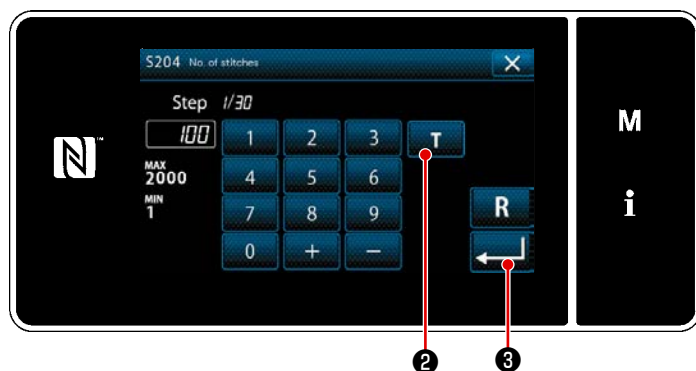
The input value is set to 0 (zero). Then, depress the pedal to perform sewing until the desired position is reached. The teaching function counts the number of stitches sewn by the sewing machine during the aforementioned operation.

❸ Confirming the data entered under the teaching mode

Confirm the content of teaching by carrying out thread trimming.

The screen returns to the "Sewing screen (constant dimension sewing) (Maintenance personnel mode)".

(2) How to set (polygonal-shape stitching)



<Number of stitches input screen>

- ① **Turning ON the teaching function**
Press **T** ② to turn ON the teaching function.
 - ② **Starting teaching**
The input value is set to 0 (zero). Carry out sewing until the needle entry position at which you want to finish sewing by depressing the pedal. Then, count the number of stitches sewn using the teaching function.
 - ③ **Confirming the teaching content**
Confirm the content of teaching by carrying out thread trimming.
The screen returns to the "Sewing screen (polygonal shape stitching) (Maintenance personnel mode)".
- * Refer to **"9-2-1. Editing a polygonal-shape stitching pattern" p.140** for how to carry out teaching continuously while advancing the steps.

5-2-8. One-touch utility changeover function

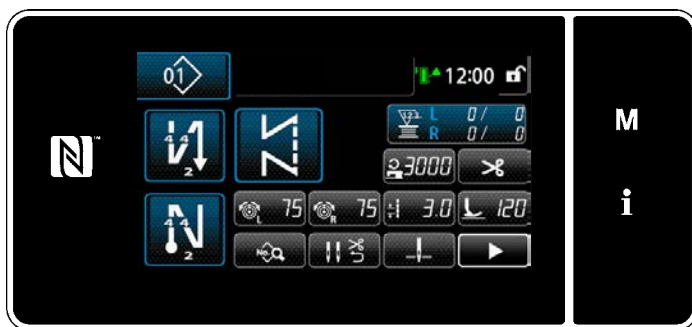
In the case the one-touch changeover function is assigned to the custom switch, the stitch length, sewing speed, etc. can be changed over by pressing the custom switch.

- * The one-touch function has been factory-allocated to the machine head switch 1 at the time of shipment.

Data that is changed over with the one-touch changeover function

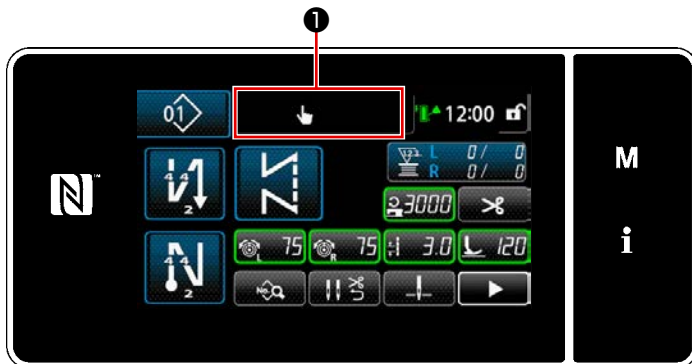
- Sewing speed
- Stitch length
- Needle thread tension

Refer to **"4-8. Custom switch" p.35.**



While the one-touch type changeover function is being used, the target data is displayed in the green frame as shown in the figure on the lower left, and the one-touch changeover function icon is displayed in ❶.

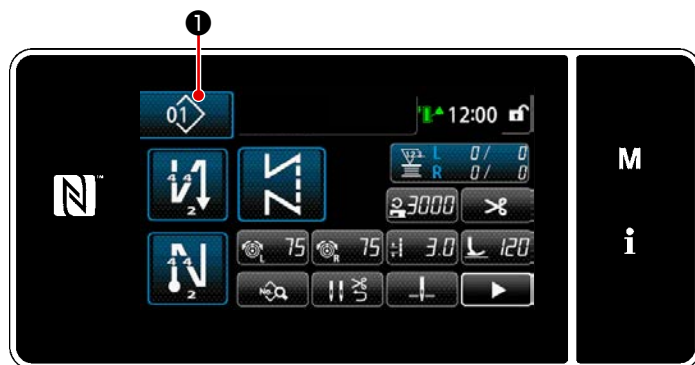
While the one-touch changeover function is being used



5-2-9. Registration of a new sewing pattern

A newly-created sewing pattern is registered by following the steps of procedure described below.

① Selecting the new-pattern creating function

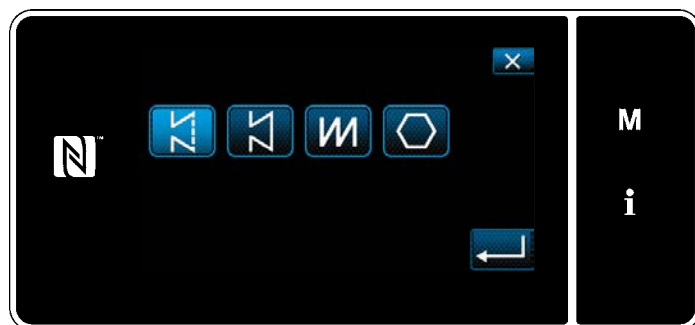


- 1) Press  ① to display the "sewing pattern management screen".



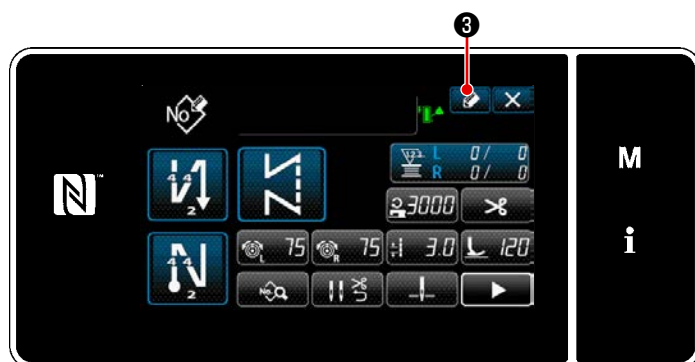
- 2) Press  ②.

②
<Sewing pattern management screen>

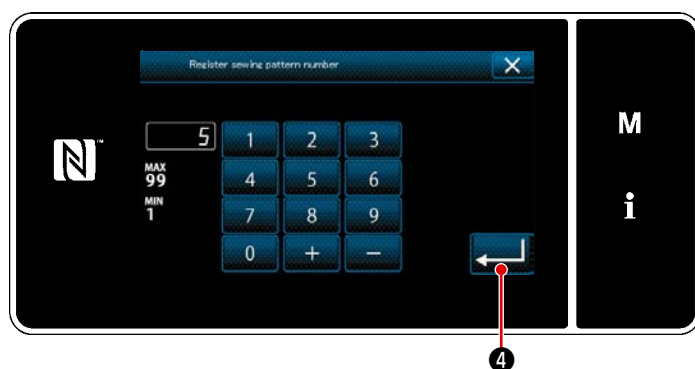


- 3) Select a sewing pattern (free stitching, constant-dimension sewing, overlapped stitching or polygonal-shape stitching).

② Confirming the data on the created sewing pattern

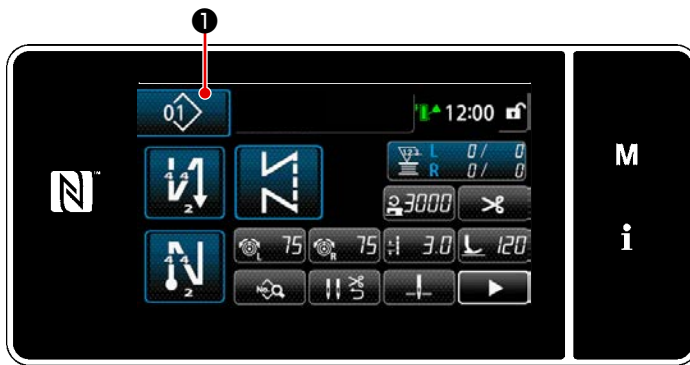


- 1) Press  ③ to display the sewing pattern No. registration.

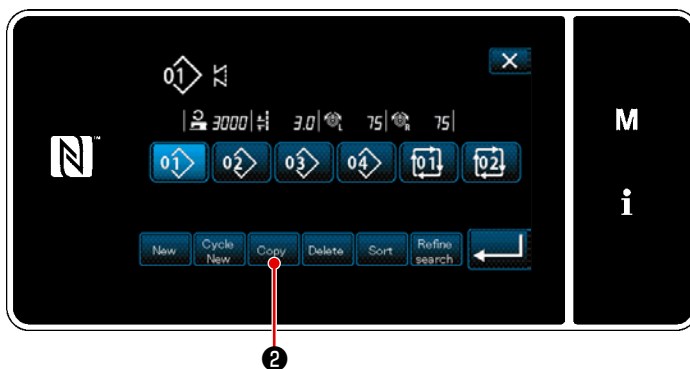


- 2) Enter the pattern number to be registered using the numeric keypad.
- 3) Press  ④ to confirm the pattern number you have entered.
The "sewing pattern management screen" is displayed.

5-2-10. Copying a pattern

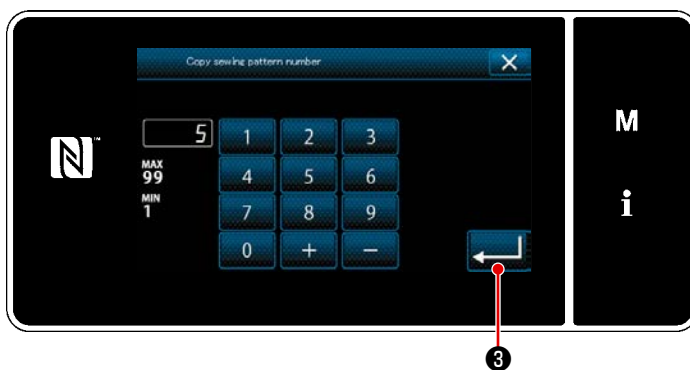


- 1) Press  ① to display the "sewing pattern management screen".



- 2) Press  ②.

<Sewing pattern management screen>

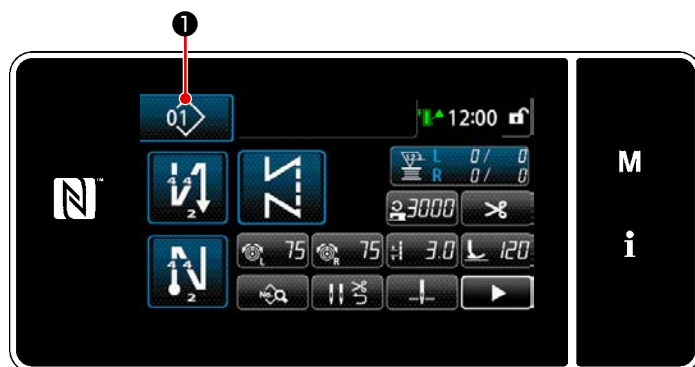


- 3) Input a copy pattern number with the numeric keypad.
- 4) Press  ③ to confirm the pattern number you have entered.
The "sewing pattern management screen" is displayed.

5-2-11. Narrow-down function

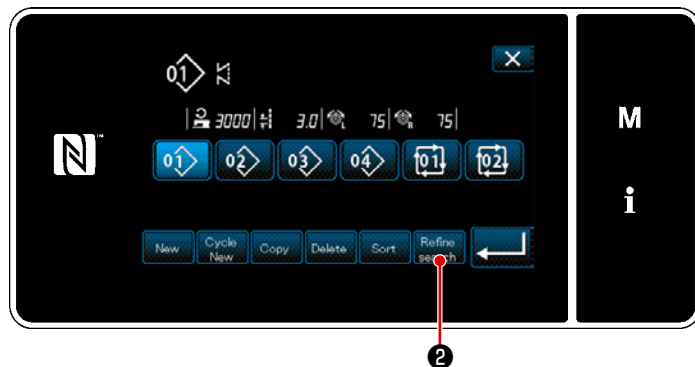
It is possible to select and display sewing pattern(s) which include target characters from the sewing patterns stored in memory by entering the target characters such as the product number, process or comment. This function can be used both under the operator mode and maintenance personnel mode.

① Selecting the new-pattern creating function



<Sewing screen (Maintenance personnel mode)>

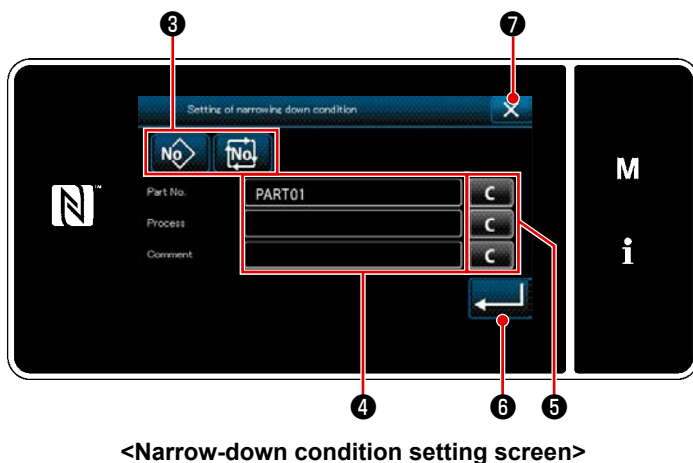
- 1) Press  ① to display the "sewing pattern management screen".



<Sewing pattern management screen>

- 2) Press  ② .

② Select the target pattern to be narrowed down



- 1) Select sewing patterns from which a desired pattern is narrowed down using button   ③ .
 - 2) The character input screen is displayed by pressing ④ .
It is possible to enter a character(s) which is to be used for narrow-down operation with the character string button.
 - 3) The entered characters are erased by pressing button  ⑤ .
 - 4) The "Sewing pattern management screen" containing only the patterns which include the entered character(s) are displayed by pressing  ⑥ .
 - 5) Narrow-down operation is not carried out by pressing  ⑦ . Then, the "Sewing pattern management screen" is displayed.
- * In the case characters are entered for two or more items on the narrow-down condition setting screen, only the patterns which satisfy all the entered conditions are displayed. For cycle sewing patterns, a comment is only used as the narrow-down condition.

5-3. Counter function

This function counts sewing in the predetermined unit and gives a visible alarm on the screen when the preset value is reached.

5-3-1. Displaying the sewing screen under the counter display mode



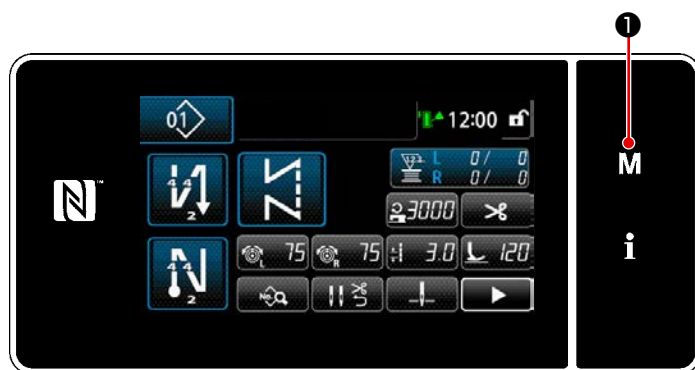
Four different types of counters are available; bobbin thread counter (left), bobbin thread counter (right), sewing counter, pitch time counter.

5-3-2. Types of the counter

	Bobbin thread counter (left) The bobbin thread counter adds one to its current value every time the sewing machine sews 10 stitches. When the preset value is reached, the count-completion screen is displayed. * Refer to "5-3-4. How to reset the count-completion state" p.77.
	Bobbin thread counter (right) The bobbin thread counter adds one to its current value every time the sewing machine sews 10 stitches. When the preset value is reached, the count-completion screen is displayed. * Refer to "5-3-4. How to reset the count-completion state" p.77.
	Sewing counter The sewing counter adds one to its current value every time one stitch shape is sewn. When the preset value is reached, the count-completion screen is displayed. * Refer to "5-3-4. How to reset the count-completion state" p.77.
	Pitch time counter The pitch time counter adds one to its current value every time one stitch shape is sewn. When the type of counter is set to the pitch time counter,  is displayed on the counter setting screen (Refer to "5-3-3. How to set the counter" p.74). When the period of time set with  is reached, the counter adds "1 (one)" to the target value (unit: sec).

5-3-3. How to set the counter

① Selecting the counter setting



1) Display the mode screen by pressing

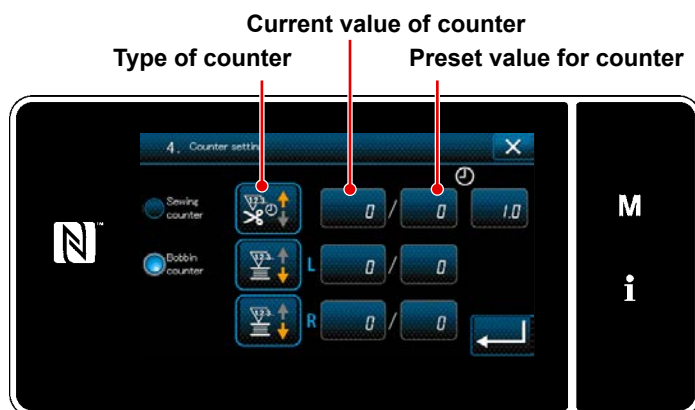


2) Select the "4. Counter setting".

<Mode screen>

② Setting the type of counter, current value of counter and preset value for counter

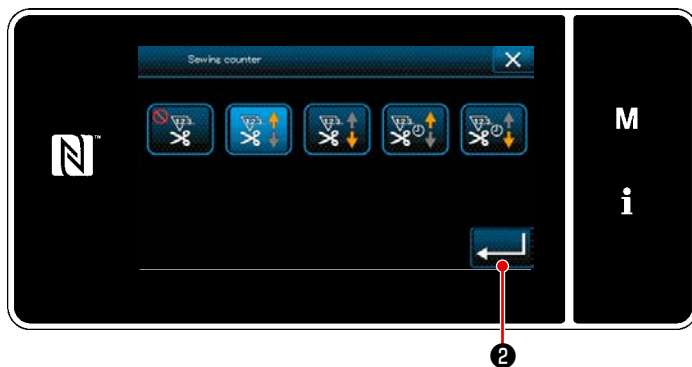
The sewing counter and the bobbin counter should be set following the same procedure.



1) The counter setting screen is displayed to enable setting.

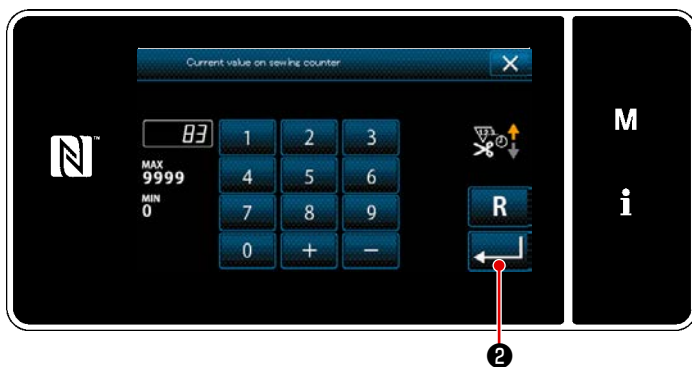
2) Press the button of the desired item. Then, the change screen corresponding to that item is displayed.

<Counter setting screen>



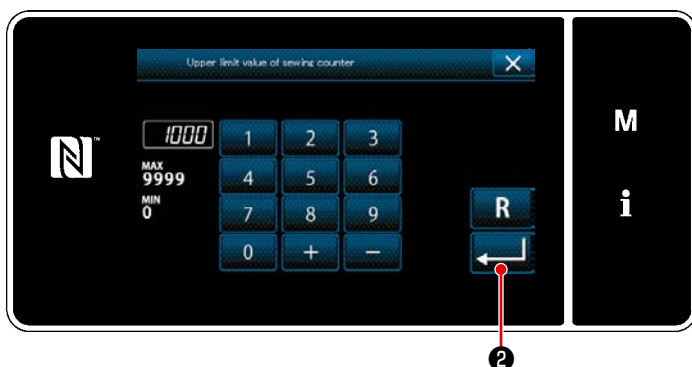
<Counter type screen>

- 1) Select the desired type of counter.
- 2) Press  ② to confirm the type of counter you have selected.



<Current counter value screen>

- 1) Select the current counter value.
- 2) Enter with the numeric keypad.
- 3) Press  ② to confirm the type of counter you have selected.



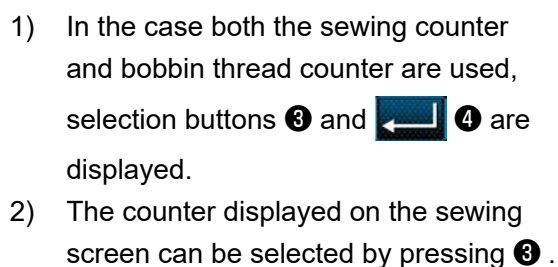
<Counter set value screen>

- 1) Select the counter set value.
- 2) Enter with the numeric keypad.
- 3) Press  ② to confirm the type of counter you have selected.

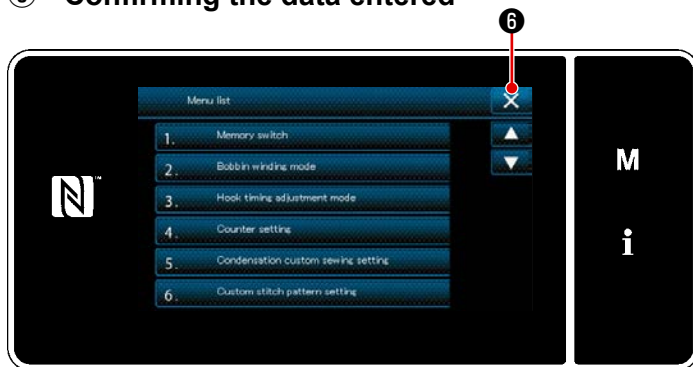
Bobbin thread counter (left) • (right)	
	UP counter (adding method): The bobbin thread counter adds one to its current value every time the sewing machine sews 10 stitches. When the current value reaches the preset value, the count-completion screen is displayed.
	DOWN counter (subtracting method): The bobbin thread counter subtracts one from its current value every time the sewing machine sews 10 stitches. When the current value becomes 0 (zero), the count-completion screen is displayed.
—	Disuse of counter: The bobbin thread counter counts nothing even when the sewing machine performs sewing. The count-completion screen is, therefore, not displayed.

Sewing counter	
	UP counter (adding method): The counter adds one to its current value every time the sewing machine sews one stitch shape. When the current value reaches the preset value, the count-completion screen is displayed.
	DOWN counter (subtracting method): The counter subtracts one from its current value every time the sewing machine sews one stitch shape. When the current value becomes 0 (zero), the count-completion screen is displayed.
—	Disuse of counter: The sewing counter counts nothing even when the sewing machine performs sewing. The count-completion screen is, therefore, not displayed.

Pitch time counter	
	UP counter (adding method): The counter adds one to its current value every time the sewing machine sews one stitch shape.
	DOWN counter (subtracting method): The counter subtracts one from its current value every time the sewing machine sews one stitch shape.
—	Disuse of counter: The sewing counter counts nothing even when the sewing machine performs sewing. The count-completion screen is, therefore, not displayed.



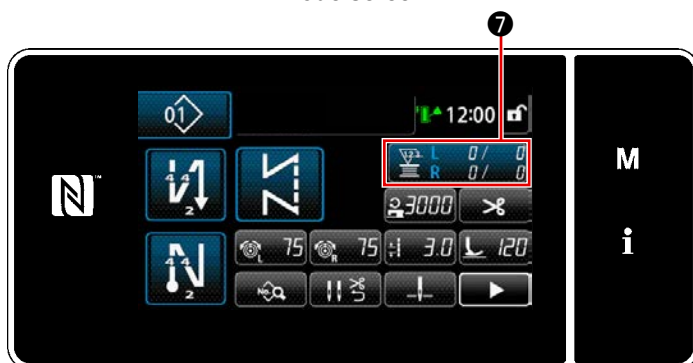
③ Confirming the data entered



<Mode screen>

Confirm the counter content. Then, press  ④ (or  ⑤ if  ④ is not displayed) to return the screen to the mode screen.

When close button  ⑥ is pressed on the mode screen, the screen returns to the sewing screen.

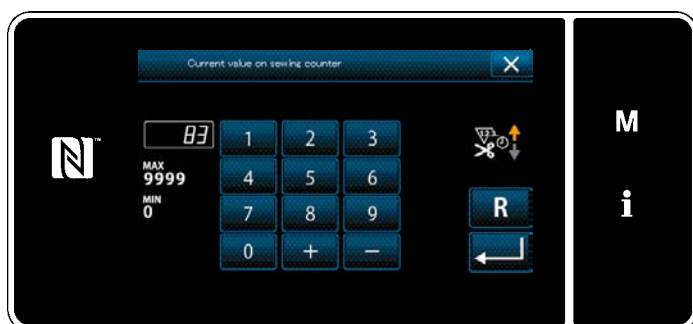


<Sewing screen>

When the screen returns to the sewing screen, the content of the counter you have selected is displayed on customize button

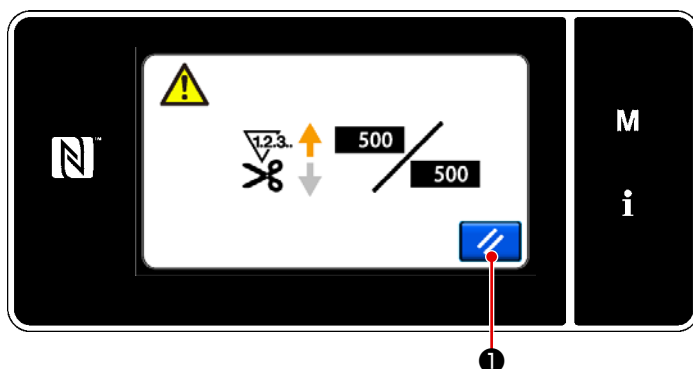


When customize button  ⑦ is pressed, the counter current-value screen is displayed.



<Current counter value screen>

5-3-4. How to reset the count-completion state

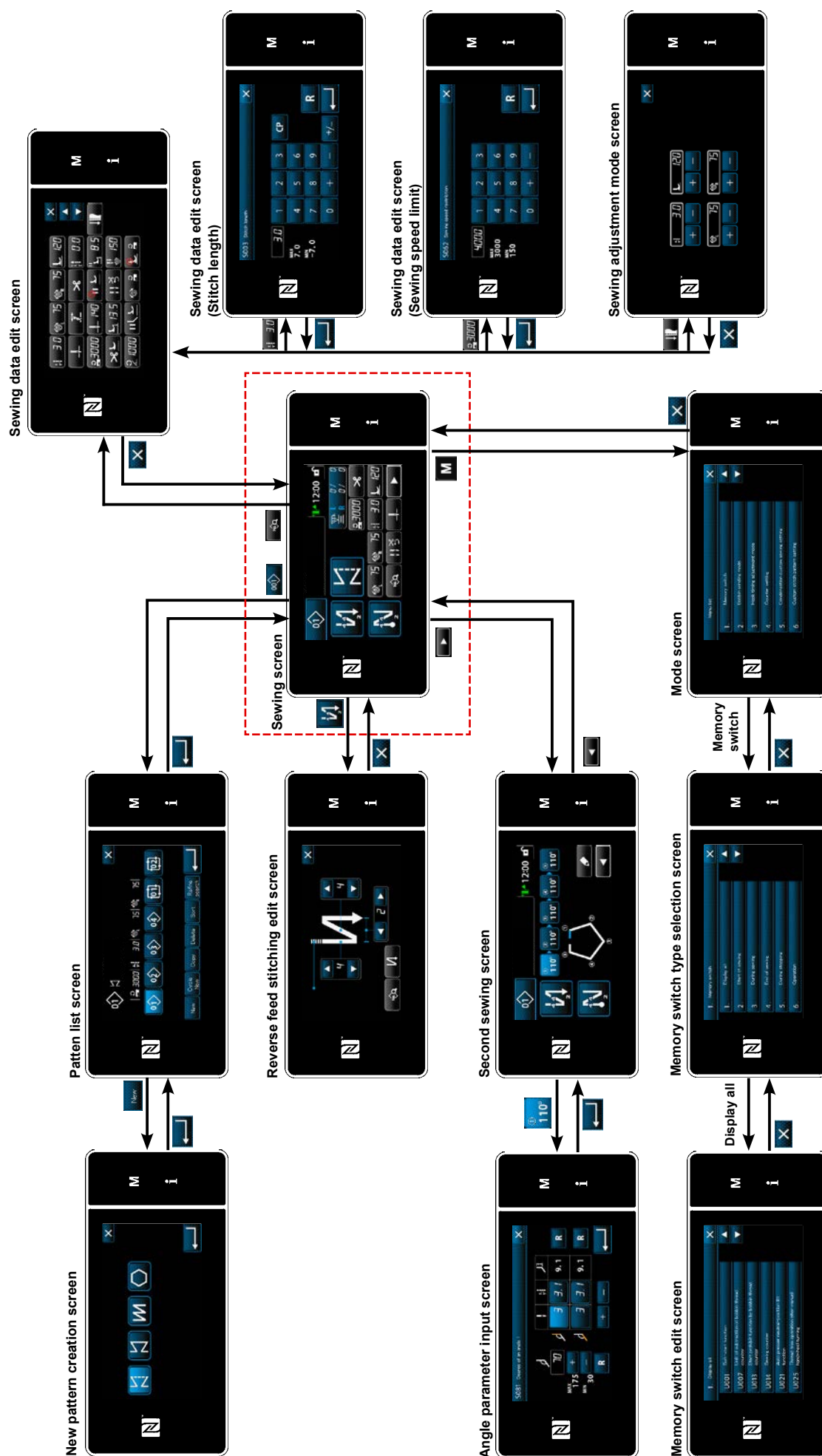


<Count-completion screen>

When the predetermined conditions are satisfied during sewing, the count-completion screen is displayed.

The counter is reset by pressing  ①. Then, the mode is returned to the sewing mode. In this mode, the counter starts counting again.

5-4. Simplified chart of panel displays



5-5. List of memory switch data

No.	Item	Setting range	Unit
U001	Soft-start function The initial value differs with the machine head. (0: OFF)	0 to 9	Stitch
U007	Bobbin thread count-down unit 0: 10 stitches / 1: 15 stitches / 2: 20 stitches	0 to 2	Stitch
U013	Bobbin thread count stop function 0: Sewing machine start prohibition function is disabled even when the counter completes counting (negative value). 1: When the counter completes counting, the sewing machine start after thread trimming is prohibited. 2: When the counter completes counting, the sewing machine temporarily stops and the start of sewing machine after thread trimming is prohibited. * Note that the prohibition function is disabled in the case the initial value of counter is 0 (zero).	0 to 2	-
U014	Sewing count function 1: Automatic sewing counter / 2: Sewing counter switch input	1 to 2	-
U021	Presser foot lift when the pedal is in its neutral position 0: Disabled / 1: Enabled / 2: Enabled only when the presser foot is at its lower position / 3: Alternating vertical movement by depressing the back part of pedal	0 to 3	-
U025	Operation after manual turning (thread trimming) This memory switch is used for setting the thread trimmer operation after the sewing machine has moved from its upper/lower stop position by manual turning of handwheel. 0: Permitted / 1: Prohibited	0 to 1	-
U030	Middle-of-sewing reverse feed stitching function Midpoint-of-sewing reverse feed stitching function is set. 0: Without the midpoint-of-sewing reverse feed stitching function / 1: With the midpoint-of-sewing reverse feed stitching function	0 to 1	-
U031	Number of stitches of middle-of-sewing reverse feed stitching Number of midpoint-of-sewing reverse feed stitches is set.	1 to 19	Stitch
U032	Condition of enabling middle-of-sewing reverse feed stitching while sewing machine is at rest Midpoint-of-sewing reverse feed stitching function enable condition 0: Disabled when the swing machine is at rest / 1: Enabled when the sewing machine is at rest	0 to 1	-
U033	Thread trimming activated by middle-of-sewing reverse feed stitching Thread trimming function after the completion of midpoint-of-sewing reverse feed stitching is set. 0: Without automatic thread trimming function / 1: With automatic thread trimming function	0 to 1	-
U035	Minimum speed of the pedal The initial value varies with the machine head.	150 to 250	sti/min
U036	Thread trimming sewing speed The initial value varies with the machine head.	100 to 250	sti/min

No.	Item	Setting range	Unit
U037	Speed during soft start The number of revolutions set with this memory switch is given precedence even if it is lower than the lowest speed by pedal. The initial value varies with the machine head. (0:OFF) One needle: 170 sti/min Two needles: 200 sti/min	100 to 3500	sti/min
U038	Speed during one-shot stitching The maximum number of revolutions during soft start differs with the machine head.	100 to 3500	sti/min
U039	Start position of rotation Set start position from neutral pedal position. (Pedal Stroke)	10 to 1000	-
U040	Start position of acceleration Set accelerating position from neutral pedal position. (Pedal Stroke)	10 to 1000	-
U041	Start position of lifting of presser foot Set work clamp lift position from neutral pedal position. (Pedal Stroke)	-500 to -10	-
U042	Start position of lowering of presser foot Set work clamp fall position from neutral pedal position. (Pedal Stroke)	10 to 500	-
U043	Start position of thread trimming Set thread trimming starting position from neutral pedal position. (Pedal Stroke)	-1000 to -100	-
U044	Position that maximum sewing speed is reached Set maximum speed reaching position from neutral pedal position. (Pedal Stroke)	10 to 15000	-
U045	Pedal neutral-position correction value Set neutral position of pedal sensor.	-150 to 150	-
U047	Presser-foot lift finishing position The position to which the presser foot goes up when the back part of the pedal is depressed to its first step. (1st-step spring position)	-1000 to -100	-
U048	Function of lifting the presser foot by depressing the pedal Whether or not the presser-foot lifting operation is carried out by depressing the back part of pedal is set. 0: No operation / 1: Operation	0 to 1	-
U049	Presser foot lowering time Time to lower the presser foot is set.	0 to 500	ms
U051	Correction of turning-ON of reverse feed stitching (at start)	-50 to 50	Degree
U052	Correction of turning-OFF of reverse feed stitching (at start)	-50 to 50	Degree
U053	Correction of turning-OFF of reverse feed stitching (at end)	-50 to 50	Degree
U054	Standby time until the presser foot starts going up Time to be elapsed from the moment the pedal is depressed to the 1st step to the moment the presser foot starts going up.	0 to 200	ms
U056	Reverse-rotation needle-up after thread trimming The initial value differs with the machine head. 0: Reverse-rotation needle-up is not performed / 1: Reverse-rotation needle-up is performed	0 to 1	-

No.	Item	Setting range	Unit
U058	Needle bar home position retaining function The retaining function retains the needle bar at upper or lower stop position. The initial value varies with the machine head. 0: Disabled / 1: Enabled; Weak retaining force / 2: Enabled; Medium retaining force / 3: Enabled; Strong retaining force	0 to 3	-
U059	Selection of reverse feed stitching (at start) operation 0: By manually operating the pedal, etc. / 1: According to the preset reverse feed sewing speed	0 to 1	-
U060	Stop after reverse feed stitching (at start) The stop function stops the sewing machine temporarily regardless of the operating status of the pedal. 0: OFF / 1: ON	0 to 1	-
U063	Selection of synchronous operation of the lever and needle bar after thread trimming This memory switch is used for selecting the sewing machine operation to be performed when the conversion lever is moved. 0: OFF The sewing machine does not run when the conversion lever is moved. 1: ON When the conversion lever is moved after the completion of thread trimming, the sewing machine automatically changes its direction of sewing to the reverse direction and performs sewing until the needle bar changeover position is reached. Then, the sewing machine returns to its needle-up stop position. * Be aware that, if the conversion lever is operated while the presser foot is going up, the sewing machine will operate when the presser foot comes down.	0 to 1	
U064	Sewing speed at the start of reverse feed stitching (at end)	150 to 1000	sti/min
U068	Presser foot lifting operation changeover The presser foot lifting operation when depressing the back part of pedal is changed over. 0: 2-step operation / 1: Manual operation depending on the pedal stroke when the back part of pedal is depressed	0 to 1	-
U087	Pedal acceleration characteristic 0: Standard / -1 to -10: Low-frequency low acceleration / 1 to 10: Low-frequency high acceleration	-10 to 10	-
U089	Needle bar stop position when the power is turned ON 0: Upper stop position/ 1: Reverse-rotation needle up position	0 to 1	-
U092	Speed reducing function for reverse feed stitching at beginning of sewing Speed reduction function after the completion of start reverse feed stitching is set. 0: Speed is not reduced. / 1: Speed is reduced	0 to 1	-
U093	Needle up/down correction switch adding function Needle up/down correction switch operation after the power-ON or after thread trimming is set. 0: Normal / 1: One-stitch correction after thread trimming	0 to 1	-
U096	Maximum sewing speed The initial value differs with the machine head.	150 to 3500	sti/min

No.	Item	Setting range	Unit
U120	Main shaft reference angle correction The main shaft reference signal angle (0 degree) is corrected with the value set using this memory switch.	-60 to 60	Degree
U121	Upper position angle correction The position at which the sewing machine stops with its needle up is corrected.	-15 to 15	Degree
U133	Tension correction (Bobbin thread remaining amount) 0: Function is not provided / 1: Thread tension is adjusted according to the bobbin thread remaining amount	0 to 1	
U150	Automatic knee lifter function 0: Function is not provided 1: Automatic knee lifter function is provided	0 to 1	
U151	Adjustment of operation starting position of the automatic knee lifter This memory switch is used for correcting the position at which the presser foot is operated with the knee lifter.	-1000 to 1000	
U152	Adjustment the maximum position of automatic knee lifter This memory switch is used for correcting the knee lifter position at which the presser foot height is maximized.	-200 to 1000	
U160	Automatic presser foot pressure adjustment ON/OFF The presser foot height is automatically adjusted depending on the material thickness. 0: OFF / 1: ON	0 to 1	
U164	Pedal input high-speed switch function 0: Normal pedal / 1: To be used as the high-speed switch	0 to 1	-
U169	Threshold of difference in re-adjustment of the number of stitches to be sewn with single needle This memory switch is used for limiting the increase ratio of stitch length with respect to the initial stitch length when calculating the stitch length at the angular portion during angular stitching.	100 to 150	
U170	Automatic starting function of the sewing machine for corner stitching When you operate the conversion lever, this function works to start the sewing machine to automatically sew the inside-corner number of stitches. 0: Enable / 1: Disable	0 to 1	-
U173	Thread presser ON-keeping time Time during which the thread presser is kept in ON state.	1 to 60	Second
U182	Sewing counter stopping function 0: The sewing machine does not stop even when the sewing counter completes counting. 1: When the counter completes counting, the sewing machine start after thread trimming is prohibited. * Note that the prohibition function is disabled in the case the initial value of counter is 0 (zero).	0 to 1	-
U183	Number of times of thread trimming for sewing counter	1 to 20	-
U194	Thread tension changeover setting when lifting the presser foot 0: OFF / 1: Normally ON / 2: Only after thread trimming / 3: Only during the immediate stop	0 to 3	-
U195	Thread tension when lifting the presser foot (right)	0 to 200	-

No.	Item	Setting range	Unit
U196	Thread tension when lifting the presser foot (left)	0 to 200	-
U199	Pedal giving priority to sewing machine for standing work The switch which is given priority when the pedal is used for sewing machine for standing work is set. 0: Start switch is given priority / 1: Start switch is not given priority	0 to 1	-
U201	Bobbin thread remaining amount at the start of thread tension correction.	0 to 100	
U202	Thread correction amount at the time the bobbin thread remaining amount is minimized.	50 to 200	
U273	Start enable/disable setting when lifting the presser foot Enable/disable of input for starting the sewing machine after lowering the presser foot which is placed in its upper position is changed over. 0: Enable / 1: Disable	0 to 1	-
U286	Thread presser, sewing speed This memory switch is used for setting the sewing speed when operating the thread presser.	100 to 3000	sti/min
U288	Thread presser, ON angle This memory switch is used for setting the angle at which the thread presser is placed in ON at the beginning of sewing.	180 to 290	Degree
U289	Thread clamp OFF angle The degree of an angle of the main shaft at which the thread clamp is turned OFF at the beginning of sewing is set.	210 to 359	Degree
U290	Thread presser, AK operating time This memory switch is used for setting the time during which the AK device is in the ON state when the thread presser operates.	0 to 50	ms
U293	Thread presser, sewing speed resetting angle This memory switch is used for setting the angle at which the thread presser sewing speed is reset. * This setting is enabled when the thread presser operates.	0 to 720	Degree
U294	Thread presser, initial suction time The low-current time during the initial state of suction for the thread clamp.	0 to 200	ms
U295	Angle of thread floating prevention output during angular stitching This memory switch is used for setting the angle threshold for determining of change in needle-bar stop output at the time of angular stitching.	30 to 175	Degree
U318	Correction of reverse-feed lever operation starting position	-40 to 40	
U319	Correction of position at which the operation of reverse-feed lever is maximized	-40 to 40	
U400	Panel operation mode This memory switch is used for specifying the mode of the sewing screen that is displayed at the time of startup. 0: Maintenance personnel mode / 1: Operator mode	0 to 1	-
U401	Input unit of stitch length 0: Stitch length (mm) / 1: Number of stitches per inch / 2: Number of stitches in 3 cm	0 to 2	-
U402	Automatic lock time The sewing machine is automatically locked in the case the operation panel is not operated for a predetermined period of time.	0 to 300	Second

No.	Item	Setting range	Unit
U403	Auto-OFF of back light Back light of the panel is automatically turned off in the case the operation panel is not operated for a certain period of time.	0 to 20	-
U404	Selection of part number and process / comment display This memory switch is used for specifying either the part number/process is displayed or comment is displayed on the sewing screen. 0: Part number/process / 1: Comment	0 to 1	-
U406	Language selection 0: Not yet selected / 1: Japanese / 2: English / 3: Simplified Chinese / 4: Traditional Chinese / 5: German / 6: Spanish / 7: French / 8: Indonesian / 9: Italian / 10: Khmer / 11: Korean / 12: Portuguese / 13: Turkish / 14: Vietnamese / 15: Bengali / 16: Russian / 17: Arabic / 18: Additional language edit mode	0 to 18	-
U407	Operating sound of panel 0: OFF / 1: ON	0 to 1	-
U410	Input unit of the number of stitches Unit of seam length to be used when entering the seam length in a sewing pattern data such as in the case of the constant dimension sewing is set. 0: Number of stitches / 1: Length (mm)	0 to 1	-

5-6. List of errors

Error code	Description of error	Cause	Item to be checked
E000	Execution of data initialization (This is not an error.)	- The existing control box has been removed and a new one is mounted. - In the case the initialization operation is executed.	This is not a failure.
E007	Motor overload	- In the case the machine head is locked. - In the case of sewing extra-heavy weight material that exceeds the guaranteed material thickness. - In the case the motor fails to rotate. - In the case of the motor or driver failure.	- Check whether the pulley is entangled with thread. - Check whether the motor output connector (4P) has loosened. - Check whether the motor can be turned smoothly by hand.
E009	Overtime of solenoid energization	In the case the length of solenoid energizing time has exceeded the assumed one.	
E011	Media is not inserted	In the case no media is inserted.	Turn the power OFF and check for a media.
E012	Read error	In the case data stored on the media cannot be read.	Turn the power OFF and check for a media.
E013	Write error	In the case data cannot be written on the media.	Turn the power OFF and check for a media.
E014	Write protect	In the case the media is placed in the write-prohibition state.	Turn the power OFF and check for a media.
E015	Format error	In the case formatting of the media cannot be carried out.	Turn the power OFF and check for a media.
E016	External media over-capacity	In the case the capacity of media is not enough.	Turn the power OFF and check for a media.
E019	File size over	In the case of attempting to read the custom pitch data or condensation custom data which exceeds the maximum permissible data size into the memory of sewing machine from the USB thumb drive.	Turn the power OFF and check the USB thumb drive.
E022	File undetected	In the case of attempting to read a file which is not stored in the USB thumb drive into the operation panel.	
E024	Continuous sewing time is exceeded		
E032	File compatibility error	In the case the file is not compatible.	Turn the power OFF and check for a media.
E071	Slip-off of the motor connector	In the case the motor connector has slipped off.	Check for looseness and slip-off of the motor output connector.
E072	Motor overload when the thread trimmer operates	Same as E007.	Same as E007.
E079	Overload operation error	Load applied to the main shaft motor is excessively large.	
E204	USB insertion	In the case the sewing machine is started up without removing the USB thumb drive.	Remove the USB thumb drive.

Error code	Description of error	Cause	Item to be checked
E205	ISS buffer capacity runout warning	• Buffer for storing ISS data will soon be filled to its capacity. If the buffer is used continuously, the stored data will be automatically erased on FIFO basis.	• Output the ISS data.
E220	Warning against shortage of grease	• When the predetermined number of stitches is reached.	• Add grease to the specified points of sewing machine and reset the error.
E221	Grease-shortage error	• In the case the sewing machine cannot continue sewing since the predetermined number of stitches is reached.	• Add grease to the specified points of sewing machine and reset the error.
E302	Head-tilt detection error (When the safety switch operates)	• In the case the Tilt detection switch is turned ON when the power to the sewing machine remains ON.	• Check whether the machine head is tilted before turning OFF the power switch (The sewing machine operation is prohibited for the sake of safety.)
E303	Meniscus sensor error	• In the case the meniscus sensor signal cannot be detected.	• Check for a break in the motor encoder connector.
E402	Deletion disabled error	• In the case of attempting to delete the pattern which is used in a cycle pattern. • In the case of attempting to delete the custom pitch or condensation custom which is used in a pattern.	
E407	Wrong password	• In the case the password entered is wrong.	
E408	Shortage of number of password characters	• In the case the number of password characters entered is not enough.	
E411	Polygonal stitching pattern registration disabled error	• In the case of attempting to create eleven or more polygonal stitching patterns.	
E412	Custom pitch unregistered error	• In the case the custom pitch number is faulty.	
E413	Condensation custom unregistered error	• In the case the condensation custom number is faulty.	
E414	File name duplication error	• In the case of file name that already exists.	
E417	Keylock reset error	• In the case the keylock could not be released.	
E499	Simplified program fault		
E704	Data failure (system-version mismatch)	• In the case the system version does not match the machine head setting.	• Re-write the system version to the applicable one.
E706	Operation panel fault		
E707	NAND flash memory format error	• The NAND flash memory is not formatted.	
E708	NAND flash memory access error	• The NAND flash memory is not accessible.	
E730	Encoder fault		

Error code	Description of error	Cause	Item to be checked
E731	Motor hole sensor fault	In the case the motor signal is not input properly.	- Check whether the motor signal connector has loosened or slipped off. - Check whether the motor signal cord has broken by being caught under the machine head. - Check whether the insertion direction of the motor encoder connector is correct.
E733	Reverse rotation of motor	When the motor runs at a speed of 500 sti/min. or more, the motor runs in the reverse direction of the indicated direction of rotation.	- Check whether the main shaft motor encoder wire connection is correct. - Check whether the main shaft motor wire connection for power is correct.
E750	Sewing machine stops	In the case the optional-input safety switch is pressed.	
E811	Over-voltage	- In the case a voltage that is equal to or more than the guaranteed voltage is input. - In the case a voltage of 200 V is applied though the voltage is set to 100 V. - In the case a voltage of 220 V is input to the box of "JA: 120 V". - In the case a voltage of 400 V is applied to the box of "CE: 230 V".	- Check whether the supply voltage of "rated supply voltage ± 10 % or more" is applied. - Check whether the 100 V/200 V change-over connector is set correctly. In the above-described cases, the power PCB has broken.
E813	Low voltage		
E815	Regenerative resistor is not connected	In the case the regenerative resistor is not connected.	Check whether the regenerative resistor is connected to the regenerative resistor connector (CN11).
E900	Main shaft motor IPM overcurrent protection	Maloperation of the main shaft motor.	
E901	Main shaft motor IPM overload		
E903	85-V power supply fault	In the case the 85-V voltage is not properly output.	- Check whether the stepping motor is faulty. - Check the F2 fuse.
E904	24-V power supply fault	In the case the 24-V voltage is not properly output.	
E910	The presser motor origin retrieval error	In the case the presser motor has failed to return to its origin.	- Check whether the presser setting is correct (memory switch No. 23). - Check whether the presser motor origin has been correctly adjusted.
E912	Main shaft motor speed detection error		
E915	Failure of communication with operation panel	In the case communication with the operation panel cannot be carried out.	
E918	Main shaft temperature error	In the case the temperature of the CTL PCB is excessively high.	
E922	Main shaft control failure	In the case the main shaft motor is out of control.	
E924	Motor driver fault	In the case the motor driver has broken.	
E946	Machine-head EEPROM write error	In the case the machine head PCB is not correctly connected.	Check whether CN32 has loosened or come off.

Error code	Description of error	Cause	Item to be checked
E955	Electric current sensor error	• Main motor shaft failure. • Electric current sensor failure.	• Check whether the main shaft motor has short-circuited.
E961	Pitch motor deviation error	• In the case the pitch motor fails to operate because of an excessive load.	• Check whether the pitch motor runs smoothly.
E962	Presser motor deviation error	• In the case the presser fails to operate because of an excessive load.	• Check whether the presser motor runs smoothly.
E963	IPM temperature error	• In the case the temperature of the CTL PCB is excessively high.	
E965	Pitch motor temperature error	• In the case the pitch motor is applied with an excessive load.	• Check whether the pitch motor runs smoothly.
E971	Pitch motor IPM overcurrent protection	• Pitch motor maloperation.	
E972	Pitch motor overload	• In the case the pitch motor is applied with an excessive load.	• Check whether the pitch motor runs smoothly.
E975	Presser motor IPM over-current protection	• Presser motor maloperation.	
E976	Presser motor overload	• In the case the presser motor is applied with an excessive load.	• Check whether the presser motor runs smoothly.
E977	CPU fault	• In the case of a program fault.	
E978	Network communication fault	• In the case the data received from the network is damaged.	
E985	Pitch motor return-to-origin error	• In the case the pitch motor has failed to return to its origin.	• Check whether the origin of the pitch motor has been adjusted properly.
E986	Both needles reset error	• Both needles have not been reset	• Whether the solenoid operates smoothly without hitches.
E987	Needle bar position sensor detection error	• Both needles position could not be detected.	• Check the detection sensor.
E999	Main software rewriting	• In the case of rewriting the main software.	• It is not an error.

5-7. Memory switch data

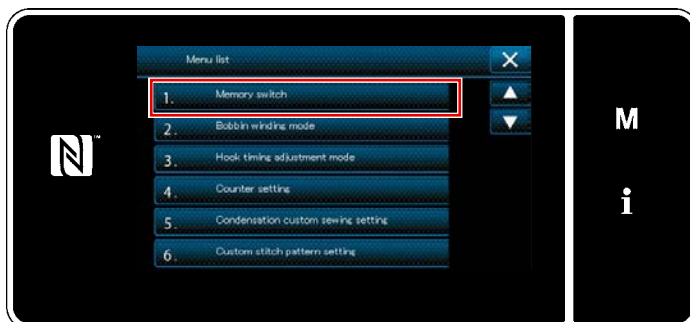
The memory switch data is the sewing machine operation data which commonly affects all sewing patterns and cycle patterns.

① Selecting the category of the memory switch data



<Sewing screen>

- 1) Press **M** ① on the sewing screen to display the "mode screen".



<Mode screen>

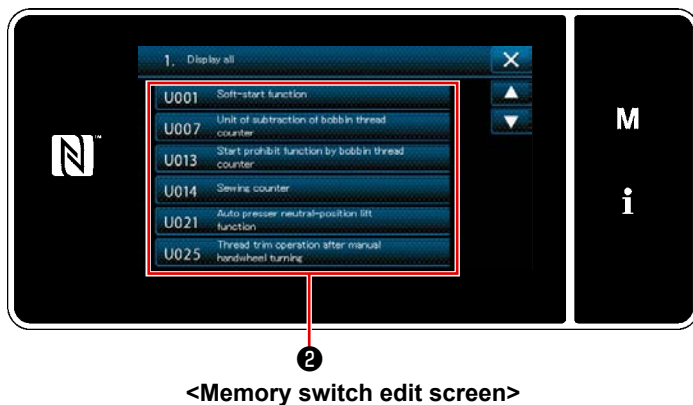
- 2) Select the "1. Memory switch".
The "memory switch type selection screen" is displayed.



<Memory switch type selection screen>

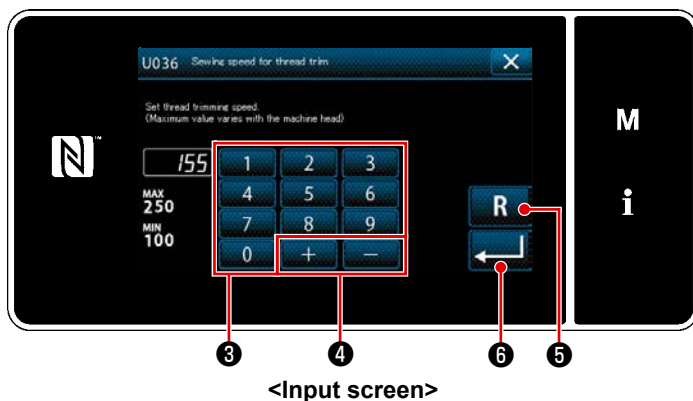
- 3) Select the "1. Display all".
The "memory switch edit screen" is displayed.
* In the case any item other than "1. Display all" is selected, only the memory switch which corresponds to the selected item is displayed on the memory switch edit screen.

② Setting the memory switch



Select an item to edit from the memory switch list. Press button ②.

③ Confirming the data entered



- 1) Enter a set value with numeric keypad ③ and  ④.
- 2) When  ⑤ is pressed, the value returns to the value before input.
When  ⑤ is held pressed for one second, the value returns to the initial value.
- 3) Press  ⑥ to confirm the setting.
The "memory switch edit screen" is displayed.

6. MAJOR NEW FUNCTIONS

6-1. Corner stitching function

To use the corner stitching function, it is only necessary to input the stitch length and the angle of the corner portion of material. Then, the sewing machine automatically calculates the single needle stitching condition to be met for sewing the corner portion (stitch length and the number of stitches), sews the corner portion with the specified number of stitches using the single needle, stops sewing, lifts the presser foot and resets the automatic single needle stitching mode.

① How to set for the corner stitching



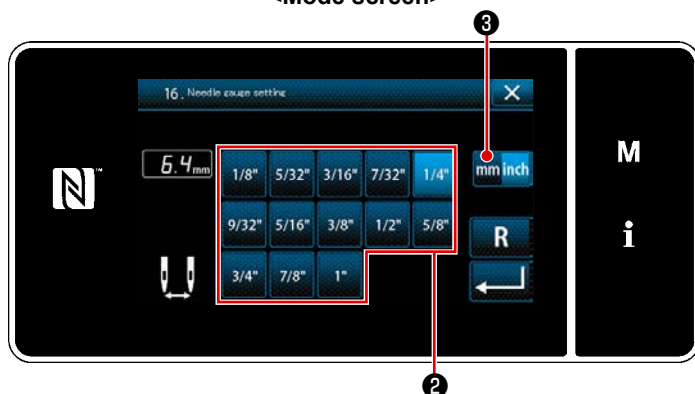
<Sewing screen>

- 1) Press **M** ① on the sewing screen to display the "mode screen".



<Mode screen>

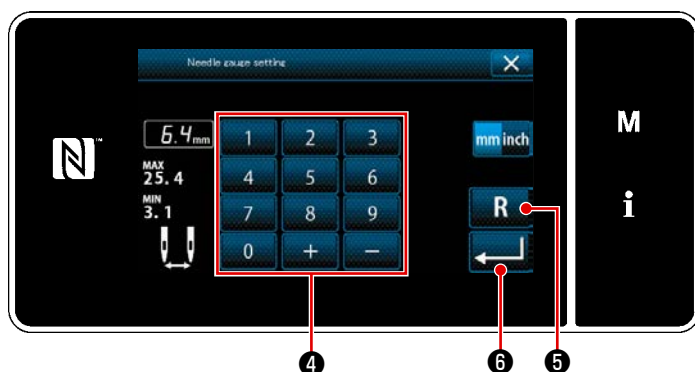
- 2) Select "16. Needle gauge setting". The "Needle gauge setting screen" is displayed.



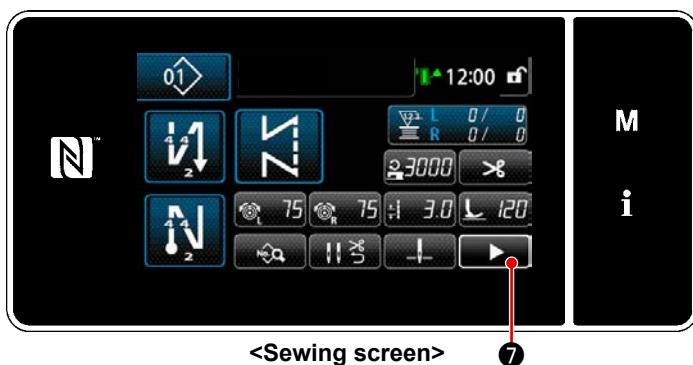
<Needle gauge setting screen>

- 3) Select needle gauge (inch) ②
Or, press **mm inch** ③ to change over the display and enter the needle gauge (mm) with numeric keypad.

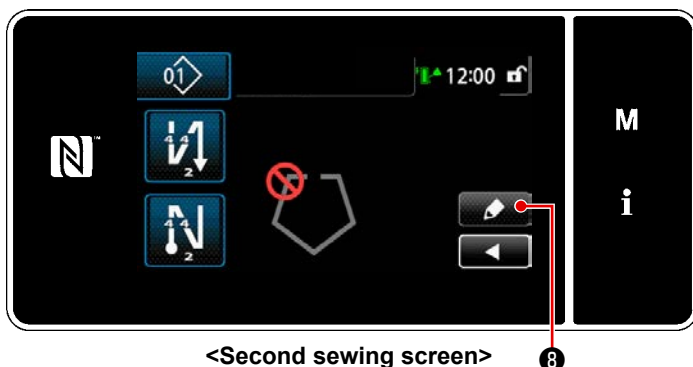
* When you press **R** ⑤, the value you have entered is reset to the initial value (1/4"=6.4mm).



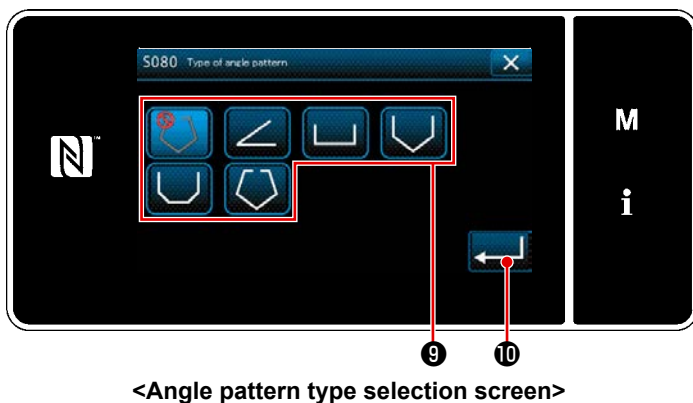
- 4) When you press **←** ⑥, the value you have entered is confirmed, and the screen returns to the mode screen.



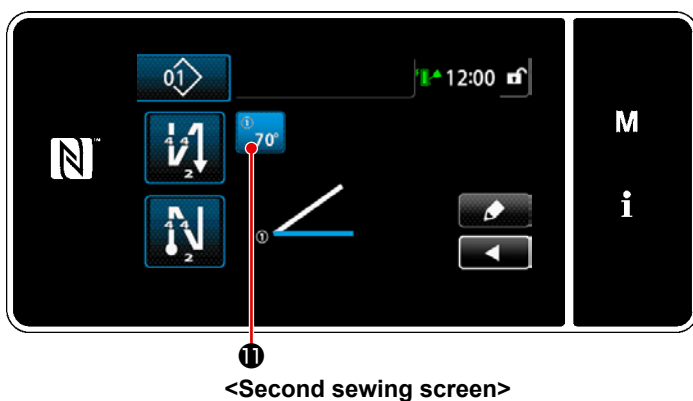
- 5) Press 7 on the sewing screen.
The "2nd sewing screen" is displayed.



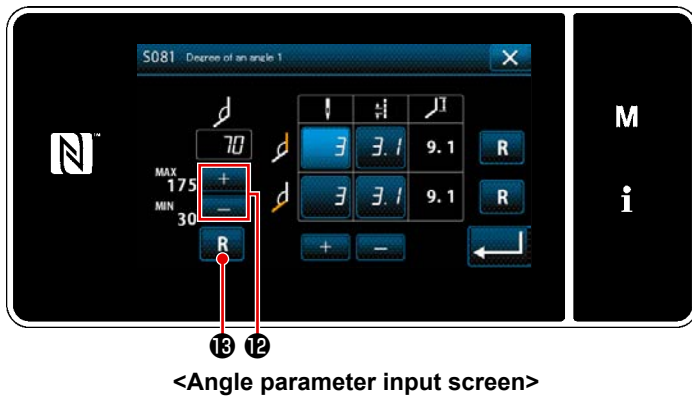
- 6) Press 8 .
The "Angle pattern type selection screen" is displayed.



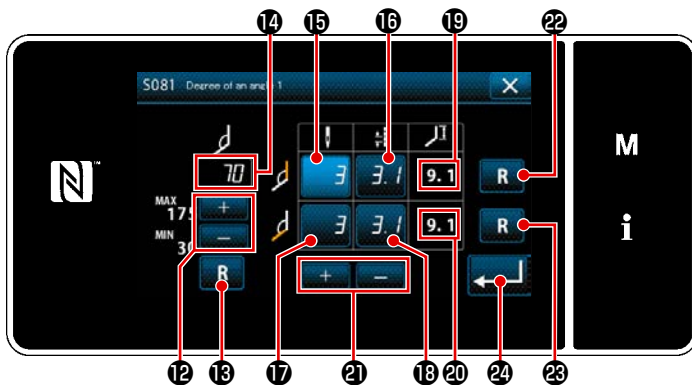
- 7) Select angle pattern 9 .
8) When you press 10 , the operation you have carried out is confirmed and the screen returns to the "2nd sewing screen".



- 9) Press 11 on the 2nd sewing screen.
The "Angle parameter input screen" is displayed.



- 10) Enter an angle 14 by pressing  12 .
 (Input the value in increments of 5 °)
 * When you press  13 , the value you have entered is reset to the initial value.



- 11) When you input degree of angle 14 , the single-needle sewing condition to be satisfied to enable sewing of the entered angle (number of stitches 15 and stitch length 16 for sewing the inside curve, and number of stitches 17 and stitch length 18 for sewing outside curve) are automatically calculated based on "S003 Stitch length" and "Needle gauge setting". For 19 and 20 , the reference values for the length of portion to be sewn with the single needle using the separately-driven needle bar function.

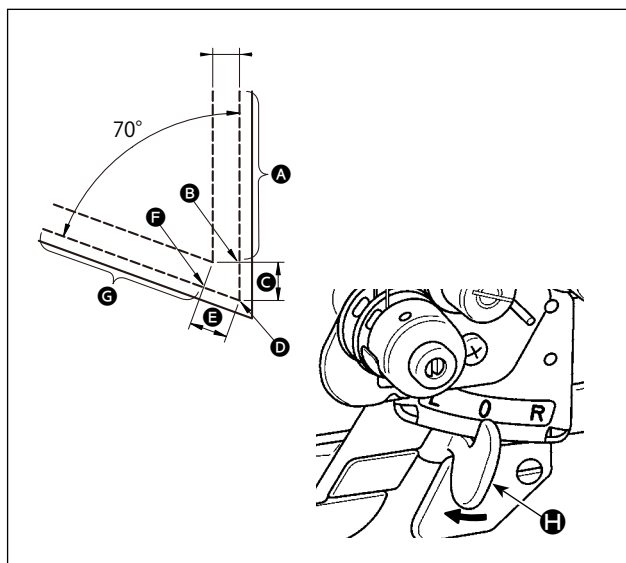
- 12) The number of stitches and stitch length can be separately corrected. Push the button 15 , 16 , 17 or 18 that corresponds to the target setting item you want to change to select it. Enter your desired value by pressing   21 .

The correction values for inside curve sewing and for outside curve sewing are respectively initialized by pressing the  22 and  23 .

- 13) When you press  24 , the value you have entered is confirmed and the screen returns to the "2nd sewing screen".

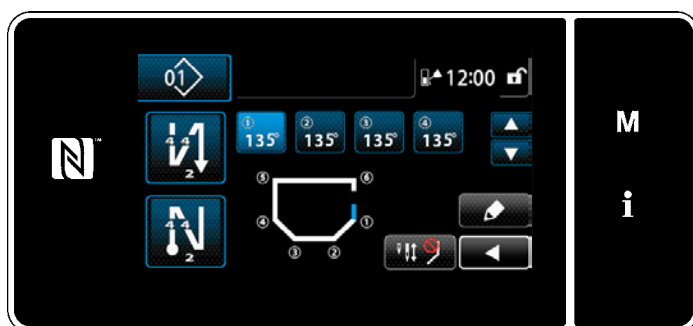
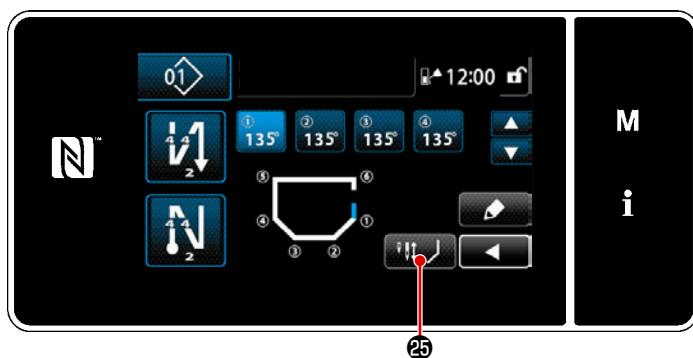
② Performing the corner stitching

A sewing pattern is indicated in the example in the aforementioned figure.



- A 2-needle sewing
- ↓
- B After the sewing machine has stopped, move separately-driven needle bar changeover lever **H** to the L position.
- ↓
- C Carry out sewing with the single needle, right, under sewing condition **15**.
- ↓
- D The presser foot automatically goes up after the sewing machine has finished sewing of the number of stitches set with **16**
- ↓
- E Turn the material (by 70 °).
- ↓
- F Carry out sewing with the single needle, right, under sewing condition **17**.
- ↓
- G The separately-driven needle bar function is reset after the sewing machine has finished sewing of the number of stitches set with **18**
- ↓
- H 2-needle sewing

③ Sewing of corner stitches



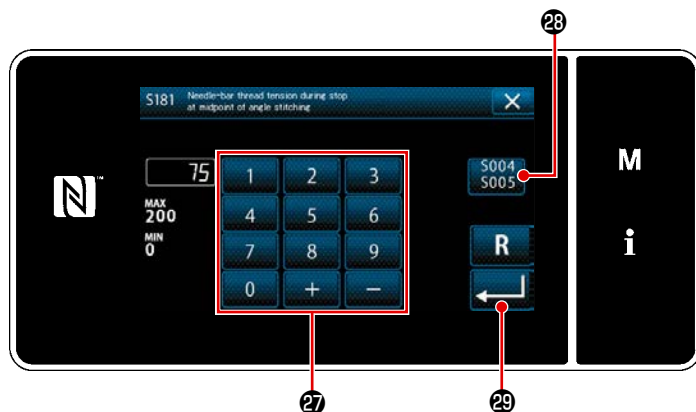
When you press corner stitching temporary disabling button  **25**, the display changes to  to indicate that the corner stitching function is temporarily disabled. When the button display is , the sewing machine will not start corner stitching even if you operate the separately-driven needle bar changeover lever. Use this function when you want to carry out sewing with the single needle in the case of re-sewing, etc. This function is reset by pressing the corner stitching temporary disabling button  again or by carrying out thread trimming. Operation of the corner stitching temporary disabling button  is accepted only when both needles are used for sewing.

④ Setting the needle thread tension of the needle bar while the sewing machine stops during corner stitching

It is possible to set the needle thread tension of the inactive needle bar during corner stitching, on a corner-by-corner basis. This is the function for increasing the needle thread tension, thereby preventing the thread from rising above the material when sewing the corner portion of the material.



- 1) Display the "Angle parameter input screen" for the corner of material you want to set.
- 2) When you press needle thread tension setting button  26 on the "Angle parameter input screen", the "Needle thread tension input screen for the inactive needle bar during corner stitching" is displayed.



- 3) Reset common setting usage  28 then input a needle thread tension of the inactive needle bar with numeric keypad 27 .
 - * In the case common setting usage button 28 is selected  , the needle thread tension set value employed for the sewing with both needles will also be used as the set value of the needle thread tension of the inactive needle bar during corner stitching.
- 4) When you press  29 , the value you have entered is confirmed and the screen returns to the "Angle parameter input screen".

6-2. Correcting the needle thread tension according to the remaining amount of thread wound on the bobbin

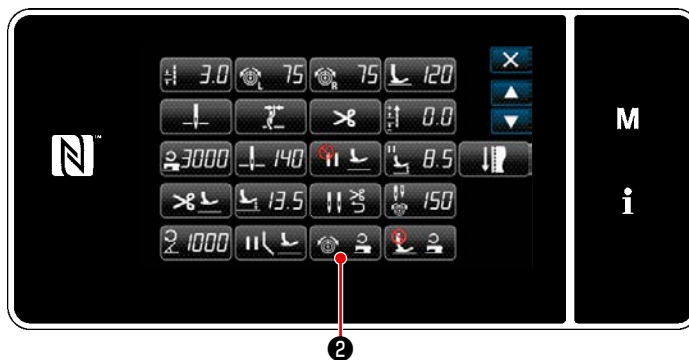
The needle thread tension can be corrected according to the bobbin thread remaining amount.

The needle thread tension can also be set on the operation panel. The needle thread tension data is stored in memory.



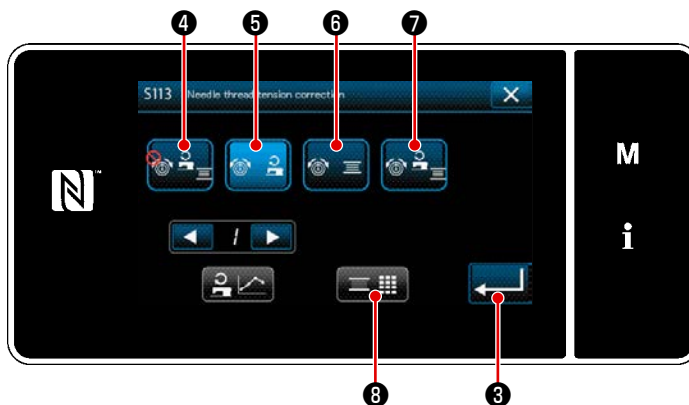
<Sewing screen (Maintenance personnel mode)>

- 1) Press  **1** on the sewing screen under the maintenance personnel mode.
The "sewing data edit screen" is displayed.



<Sewing data edit screen>

- 2) Press  **2** .
The "Needle thread tension correction screen" is displayed.



<Needle thread tension correction screen>

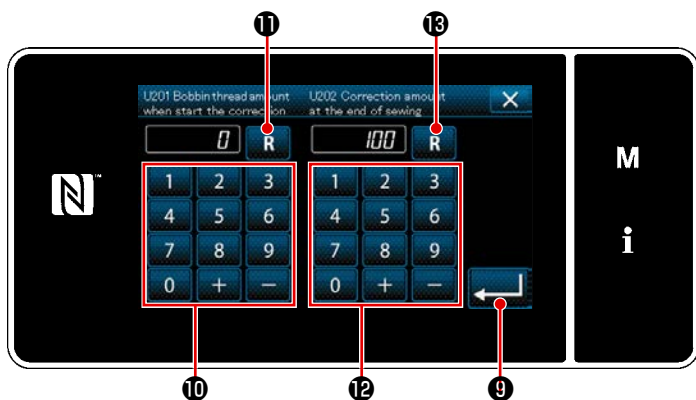
- 3) Select the thread tension correction method you want to use from the four methods described below:

-  **4** Not use
-  **5** Sewing speed (initial setting)
-  **6** Bobbin thread remaining amount
-  **7** Both (the sewing speed and the bobbin thread remaining amount)

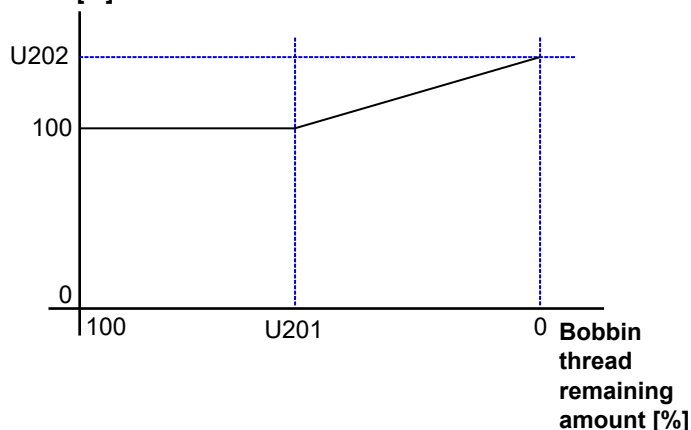
Refer to **"6-3. Tension correction (with respect to sewing speed)"p.98** for the sewing speed.

- 4) When you want to change the tension correction data (with respect to the bobbin thread remaining amount), press  **8** .

*  **3** , the content you have entered is confirmed and the screen is returned to the "Sewing data edit screen".



Tension correction amount [%]



- 5) Set "U201 Bobbin thread remaining amount for starting correction" with numeric keypad **10**.

Using the aforementioned set value, determine the remaining amount of bobbin thread indicated on the bobbin counter for starting the needle thread correction.

Refer to **"5-3. Counter function"**

p.73 for how to set the bobbin counter.

The set value can be reset to the initial value of 0 by pressing **R 11**.

- 6) Set "U202 Final correction amount" with numeric keypad **12**.

Using the aforementioned set value, determine the correction ratio of the needle thread tension.

The set value can be reset to the initial value of 100 by pressing **R 13**.

- 7) When **9** is pressed, the entered value is confirmed and the screen is returned to the "S079 Needle thread tension correction screen".

* Refer to the figure on the left for the relation between "U201 Bobbin thread remaining amount for starting correction" and "U202 Final correction amount".

6-3. Tension correction (with respect to sewing speed)

The needle thread tension can be corrected according to the sewing speed.

The needle thread tension can also be set on the operation panel. The needle thread tension data is stored in memory.



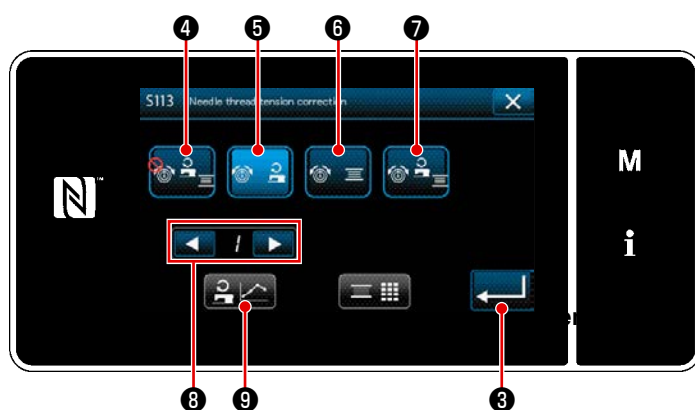
<Sewing screen (Maintenance personnel mode)>

- 1) Press  ① on the sewing screen under the maintenance personnel mode.
The "sewing data edit screen" is displayed.



<Sewing data edit screen>

- 2) Press  ② .
The "Needle thread tension correction screen" is displayed.

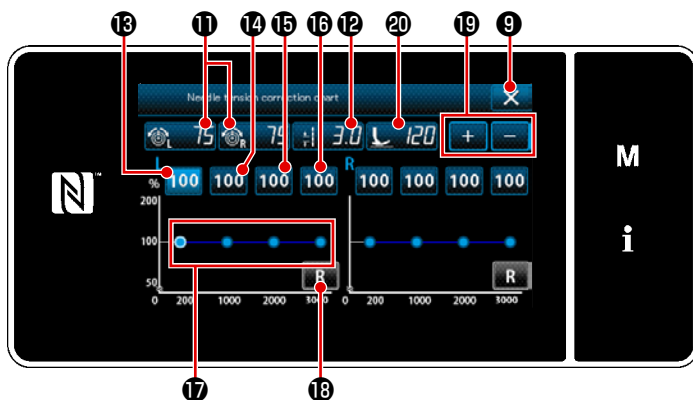


- 3) Select the thread tension correction method you want to use from the four methods described below:
 -  ④ Not use
 -  ⑤ Sewing speed (initial setting)
 -  ⑥ Bobbin thread remaining amount
 -  ⑦ Both (the sewing speed and the bobbin thread remaining amount)

Refer to **"6-2. Correcting the needle thread tension according to the remaining amount of thread wound on the bobbin"** p.96 for the bobbin thread remaining amount.

- 4) When you want to edit the thread tension correction data (sewing speed), select the number of chart you want to store in memory from the chart numbers 1 - 4 with  ⑧ , then press  ⑨ .

* When you press  ③ , the content you have entered is confirmed and the screen is returned to the "Sewing data edit screen".



- 5) The values of needle thread tensions (right and left) 11, stitch length 12 and presser foot pressure 20 can be increased / decreased with 19.

* The needle thread tension, stitch length and presser foot pressure you have set in this clause of this Instruction Manual are reflected in the current sewing pattern data.

- 6) Correction value [%] to be employed when maximum sewing speed at 200 sti/min can be set by pressing 13. This value can be increased / decreased with 19.

When the pedal is depressed to select 13, it is possible to perform sewing at the maximum sewing speed of 200 sti/min using the sewing conditions; needle thread tensions (right and left) 11, stitch length 12 and presser foot pressure 20.

- 7) Correction value [%] to be employed when maximum sewing speed at 1000 sti/min can be set by pressing 14.

As in the case of 6), the sewing machine is able to perform sewing at the maximum sewing speed of 1000 sti/min.

- 8) When 15 is selected, the correction value [%] to be employed when maximum sewing speed at 2000 sti/min can be set.

As in the case of 6), the sewing machine is able to perform sewing at the maximum sewing speed 2000 sti/min.

- 9) When 16 is selected, a correction value [%] for sewing speedset with U044 "Max. sewing speed position" can be set.

As in the case of 6), the sewing machine is able to perform sewing at the maximum sewing speed set with U044 "Max. sewing speed position".

- 10) The aforementioned result of settings can be checked on thread tension chart 17.

- 11) Set values 13 through 16 can be reset to the initial value of 100 by pressing 18.

- 12) 9 is disabled during sewing. After the completion of thread trimming, it becomes enabled and can be pressed to return the screen to the "S079 Needle thread tension correction screen".

6-4. Correcting the presser foot pressure according to the sewing speed

The presser foot pressure can be corrected according to the sewing speed.

The needle thread tension can also be set on the operation panel. The needle thread tension data is stored in memory.



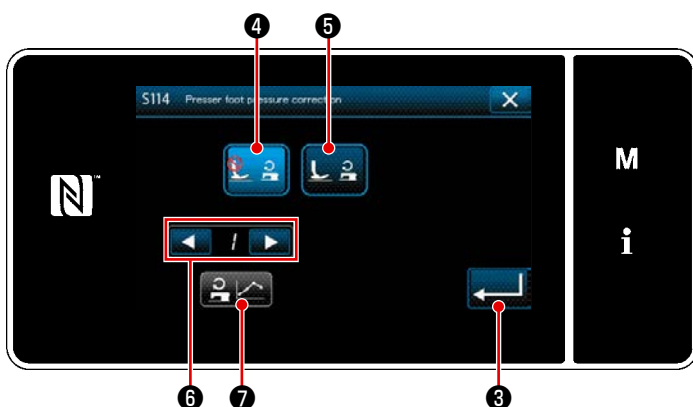
<Sewing screen (Maintenance personnel mode)>

- 1) Press  ① on the sewing screen under the maintenance personnel mode.
The "sewing data edit screen" is displayed.



<Sewing data edit screen>

- 2) Press  ② .
The "Presser foot pressure correction screen" is displayed.



<Presser foot pressure correction screen>

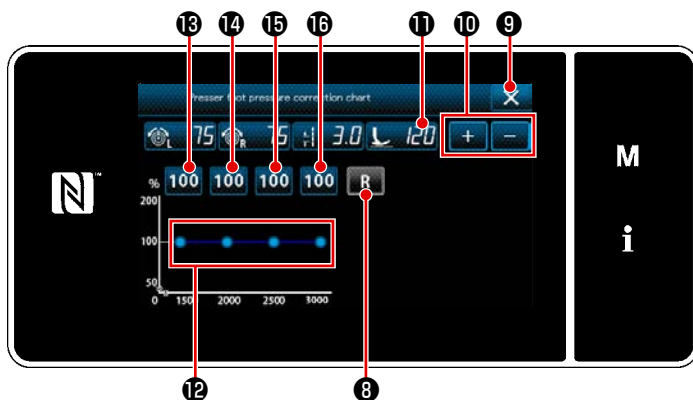
- 3) Select ON/OFF of the presser foot pressure correction using the sewing speed.

 ④ : OFF

 ⑤ : ON

- 4) To edit the presser foot pressure correction data, select the chart number you want to store in memory from among 1 to 4 with  /  ⑥ and press  ⑦ .

* When you press  ③ , the content you have entered is confirmed and the screen is returned to the "Sewing data edit screen".



5) The set value of presser foot pressure 120 11 can be increased / decreased with 10 .

* The needle thread tension, stitch length and presser foot pressure you have set in this clause of this Instruction Manual are reflected in the current sewing pattern data.

- 6) Set correction value [%] of each sewing speed by pressing 13 to 16 . The value can be increased / decreased with 10 .
- 7) The result of the aforementioned setting procedure can be confirmed on presser foot pressure chart 12 .
- 8) Set values 13 through 16 can be reset to the initial value of 100 by pressing 8 .
- 9) When you press 9 after the completion of thread trimming, the screen returns to the "Automatic presser foot pressure correction setting screen".

7. CARE

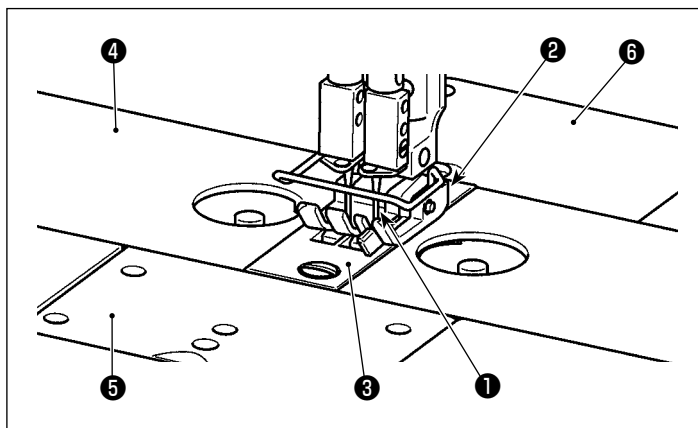
Perform the maintenance below every day for longer use of your machine.

7-1. Cleaning

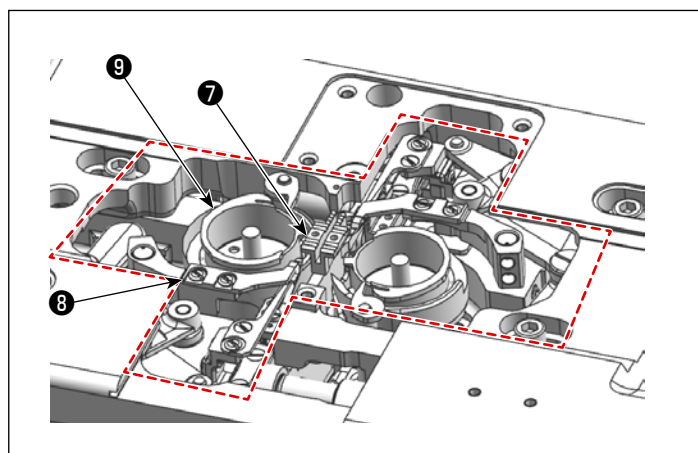


WARNING :

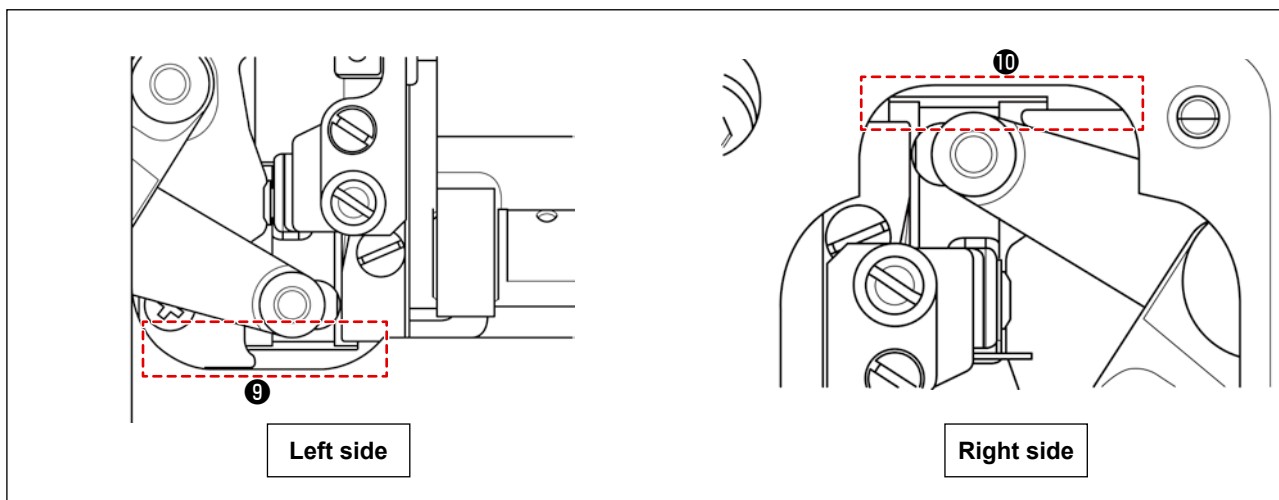
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.



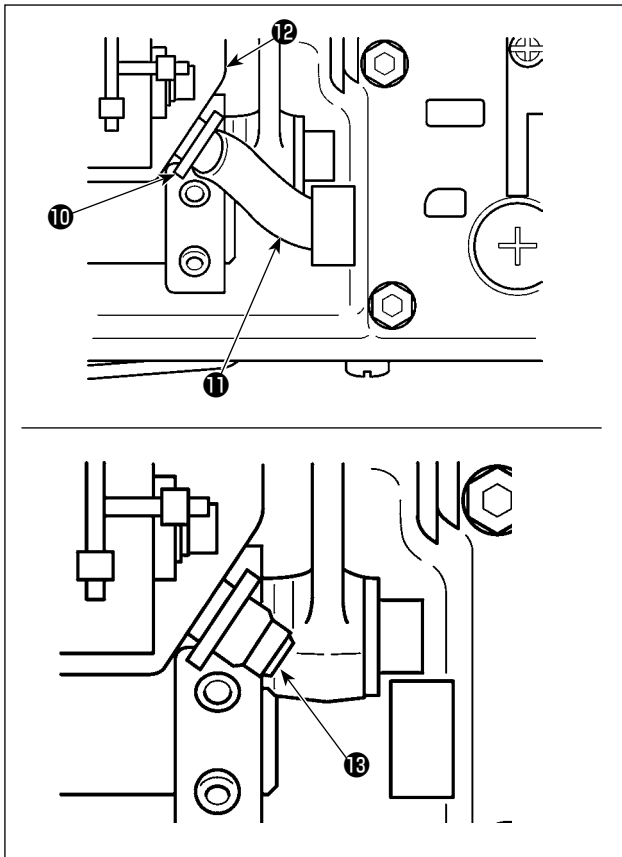
- 1) Detach needle ① , presser foot ② , throat plate ③ , bed slides ④ (two pieces), attachment plate ⑤ and rear cover ⑥ .



- 2) Remove dust accumulated on feed dog ⑦ and thread trimmer unit ⑧ portion with a soft brush or a piece of cloth. Wipe hook ⑨ clean with a piece of soft cloth and check that the hook has no scratches on its surface.



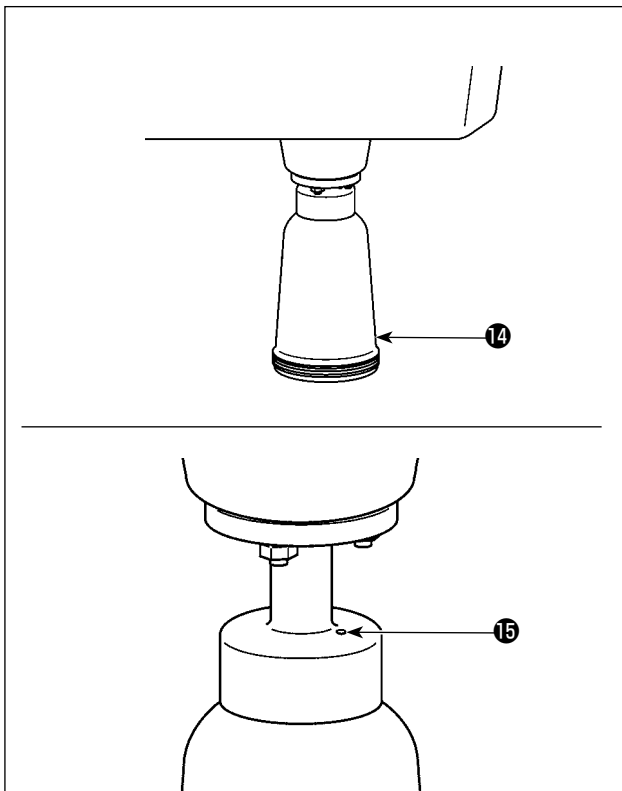
- 3) Remove dust accumulated in grooves ⑨ and ⑩ between the backward end position of the moving knife and the bed with a pair of tweezers or small tool in the downward direction. Check to make sure that the moving knife can move smoothly to its backward end.



- 3) Tilt the machine head. Detach pipe holder ⑩ .
Draw out lubricating tube ⑪ from oil tank ⑫ .
Remove dust from around oil filter ⑬ .



Oil remaining in the oil tank may leak after drawing out the lubricating tube.



- 4) While leaving the machine head tilted, discharge the oil remaining in the oil pan into oil bottle ⑭ . At this time, remove thread waste and dust from the relevant parts.

* Periodically discharge the oil from oil bottle ⑭ .
(As a guide, approximately once a week)



Before tilting or raising the machine head, be sure to check that there is no pointed objects such as a screwdriver.



1. If the oil in the oil bottle is not discarded for a long time, the oil bottle is filled with oil and eventually overflows from air vent ⑮ in the oil remover, resulting in leakage of oil.
2. Clean the oil pan to remove the oil and dust remaining in it approximately once a month.

7-2. Applying grease



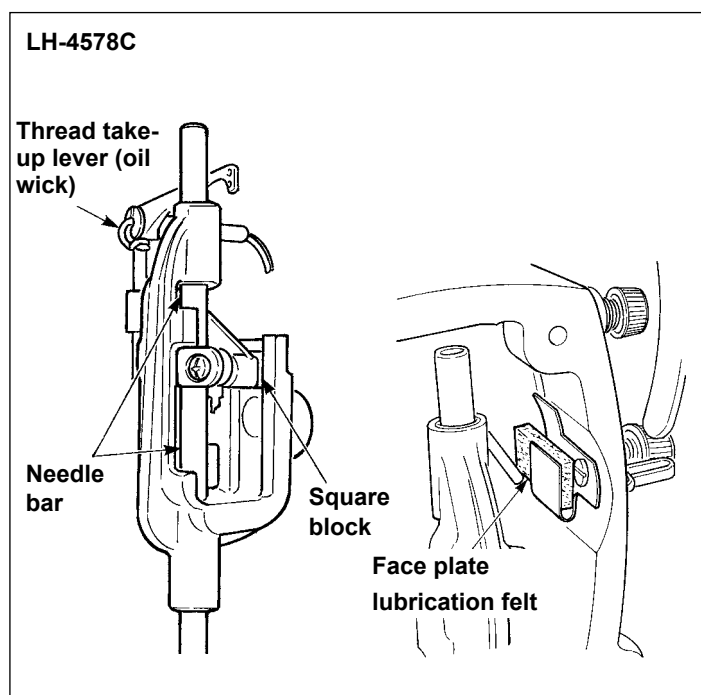
WARNING :

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

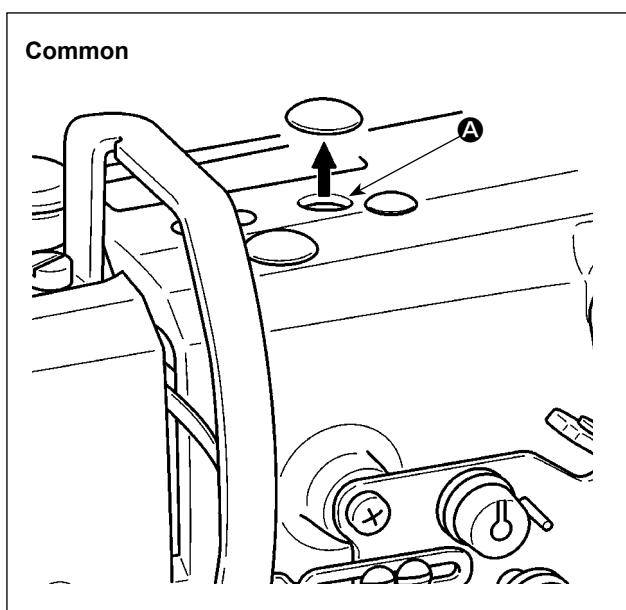
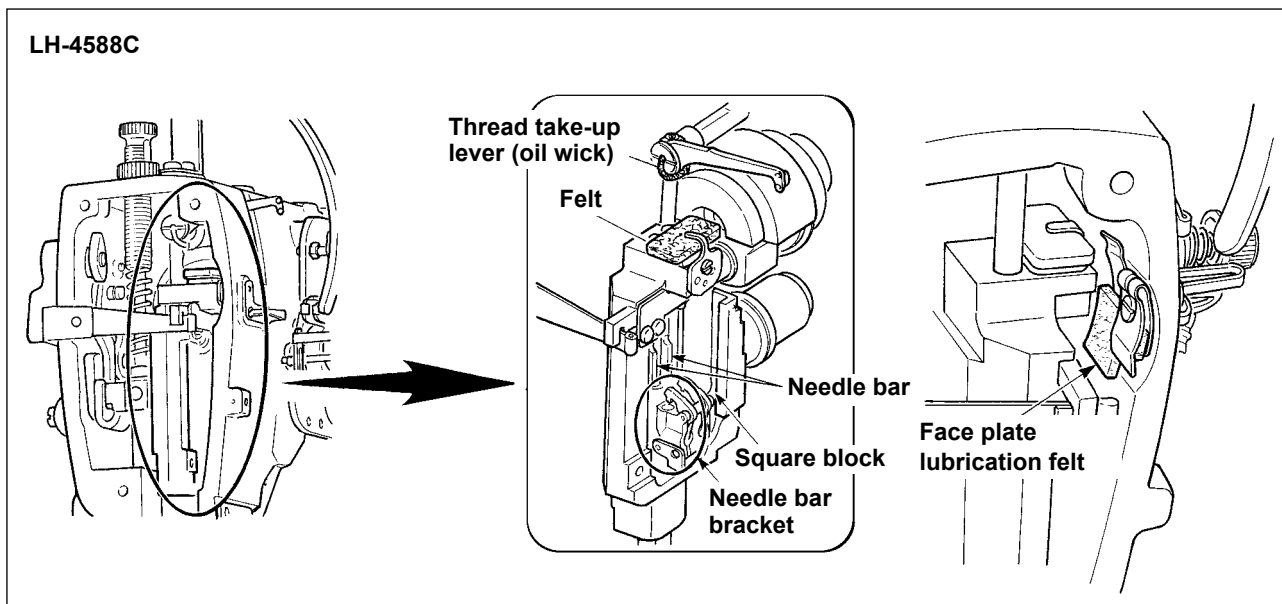


1. When the machine needs replenishment of grease, an alarm sounds. Once the alarm sounds, replenish grease. In the case the sewing machine is used under harsh environment, it is recommended to replenish grease periodically once a year for ensuring effective greasing.
2. Do not apply oil to the sections which are lubricated with grease.
3. Be aware that grease can leak from the thread take-up cover and needle bar if the amount of grease is excessive.
4. Be sure to use GREASE N (part number: 40224439) for the needle bar frame shaft part. For other parts, use JUKI GREASE A TUBE (part number: 40006323) that is supplied with the sewing machine head.

7-2-1. Applying grease to the needle bar and thread take-up lever

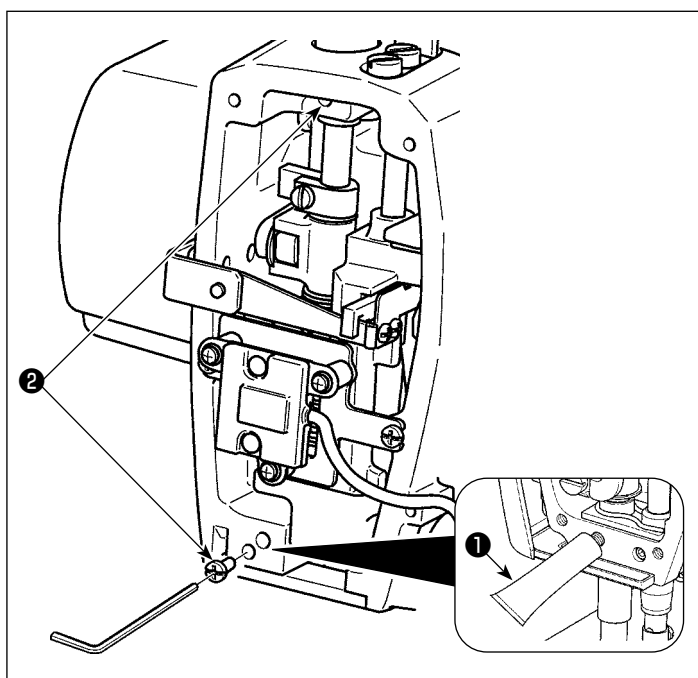


- 1) Remove the face plate.
- 2) Apply grease to the needle bar, slide block, lubricating felt and thread take-up lever.



- 3) Remove the rubber cap, take out the felt in **A**, pour new grease in the hole, and put the felt to which grease has been soaked after removing old grease adhered to the inside of the hole and the felt. Further, pour grease above the felt and cover it with the rubber cap.

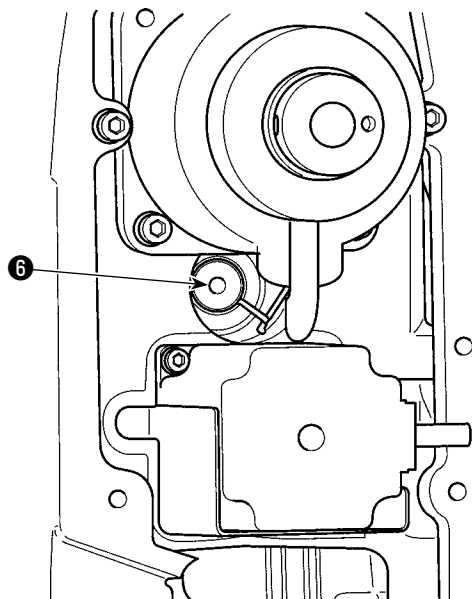
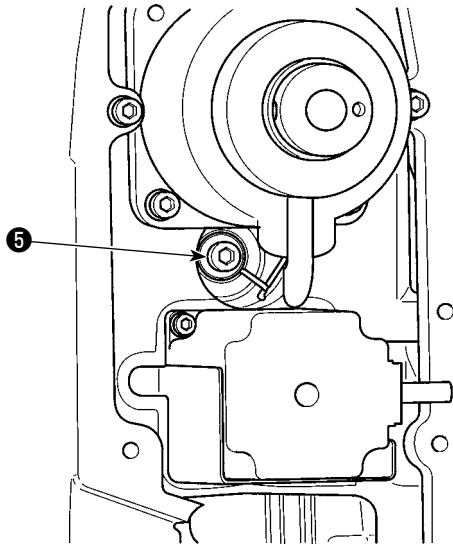
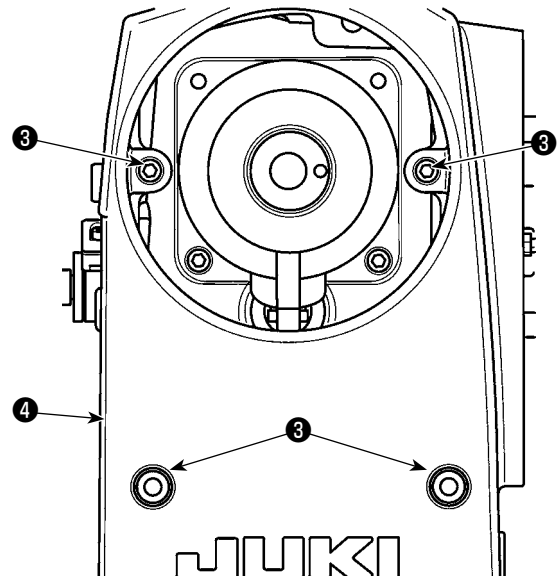
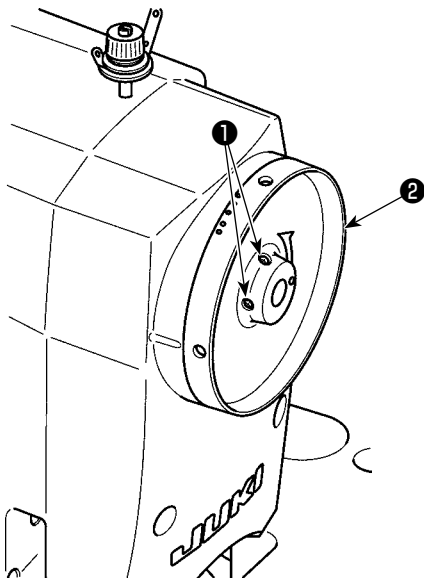
7-2-2. Applying grease to the presser bar bushing



- 1) Remove presser bar bushing lubrication screw **2** with a hexagon wrench.
- 2) Detach the cap of exclusive grease **1**. Put its tip into the oil hole to add exclusive grease **1**. At this time, add the grease until it overflows.
- 3) Push in overflowing exclusive grease **1** with lubrication screw **2**.
- 4) Wipe off the excess of exclusive grease **1** (from around the lubrication screw).

7-2-3. Applying grease to the rear part of the needle bar frame shaft

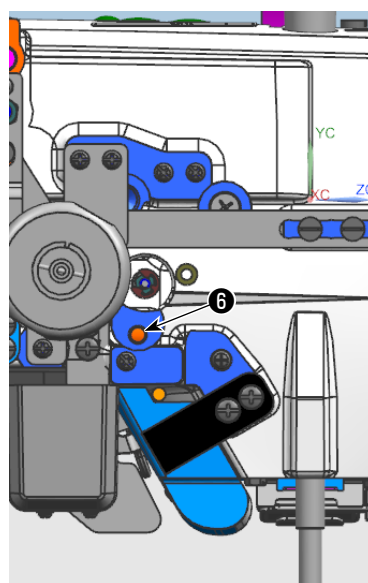
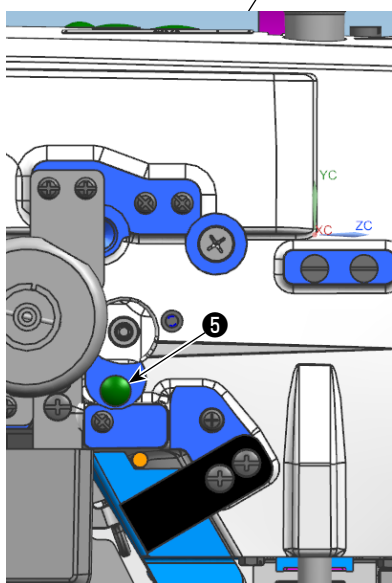
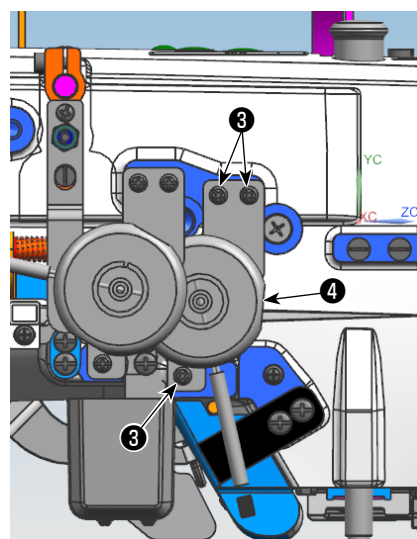
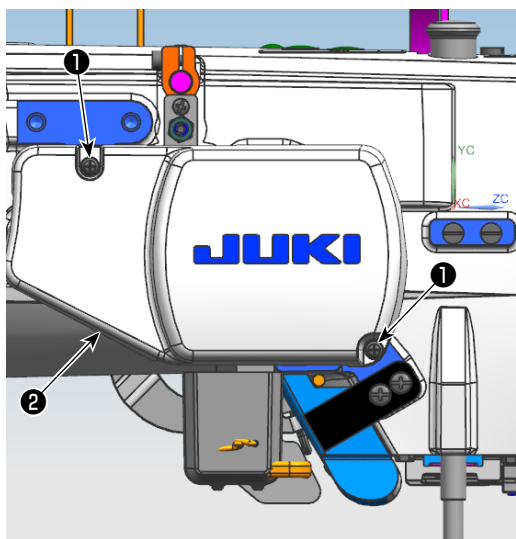
* Use GREASE N (part number: 40224439).



- 1) Loosen handwheel fixing screws ❶ to detach handwheel ❷ .
- 2) Loosen motor cover fixing screws ❸ to detach motor cover ❹ .
- 3) Remove screw ❺ with a hexagon wrench.
- 4) Add GREASE N into grease hole ❻ in the rear part of the needle bar frame shaft with a syringe.

7-2-4. Applying grease to the front metal of the needle bar frame shaft

* Use GREASE N (part number: 40224439).



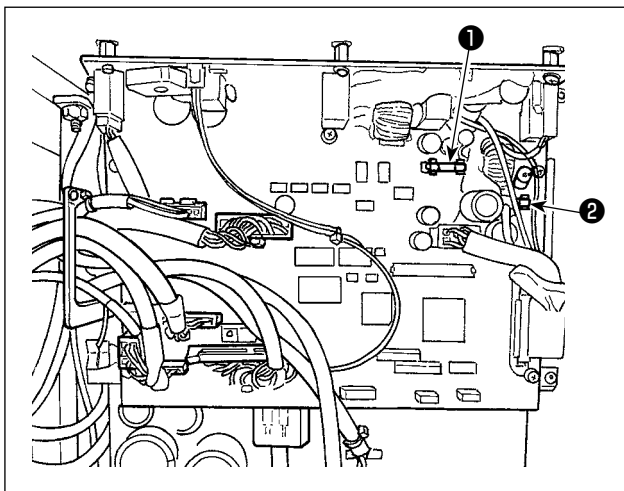
- 1) Loosen the two fixing screws ❶ and remove AT cover ❷ .
- 2) Loosen the three fixing screws ❸ and remove right AT solenoid assembly ❹ .
- 3) Remove cap ❺ and insert a tube with an outer diameter of $\Phi 5$ mm and a length of at least 60 mm fully into hole ❻ .
Using a syringe, inject grease through the tube and replenish the front metal with GREASE N.
- 4) Install cap ❺ , right AT solenoid assembly ❹ , and AT cover ❷ in the reverse order of removal.

7-3. Replacing the fuse

DANGER :



1. To avoid electrical shock hazards, turn OFF the power and open the control box cover after about five minutes have passed.
2. Open the control box cover after turning OFF the power without fail. Then, replace with a new fuse with the specified capacity.



The machine uses the following two fuse.
Both are the same fuses.

CTL PCB

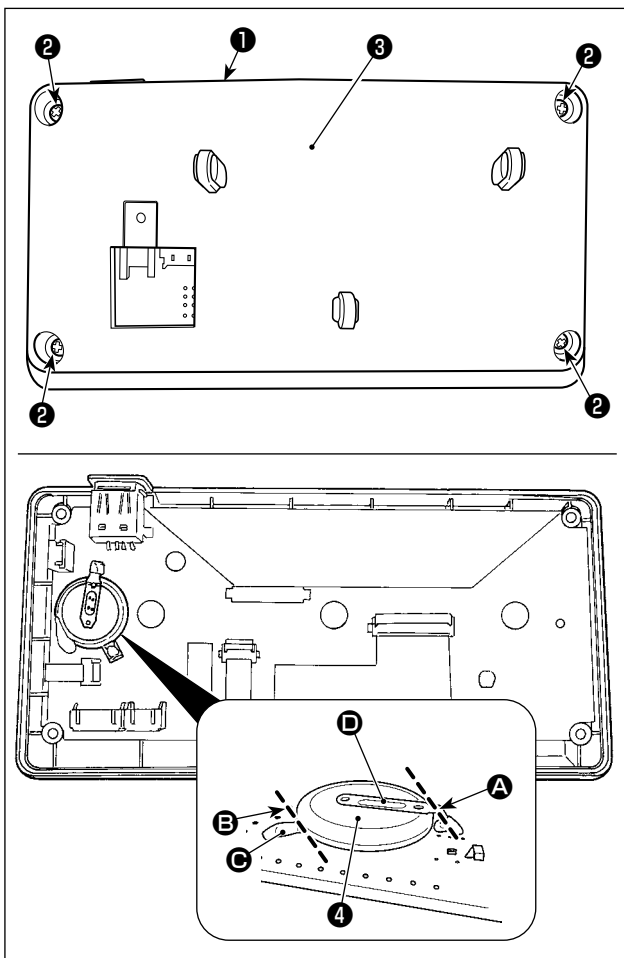
- ① For 85V power supply protection
5A (time-lag fuse)
- ② For 24V power supply protection
5A (time-lag fuse)

7-4. Disposal of batteries



The operation panel has a built-in battery in order to operate the clock even when the power is turned OFF. Be sure to dispose of the battery following the local laws and regulations.

[How to remove the battery]



- 1) Remove panel ① from the main body of sewing machine.
- 2) Loosen screw ② from the rear surface of the operation panel. Detach case ③ .
- 3) ④ is the battery for clock.
Type number: ML2020/F1AK
- 4) Cut metal plate ① that secures battery ④ with nippers or the like at position ①A.
- 5) Cut metal plate ① that secures battery ④ with nippers or the like at position ①B. Then, remove battery ④ .



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

8. ADJUSTMENT OF THE MACHINE HEAD (APPLICATION)

8-1. Needle-to-hook relation

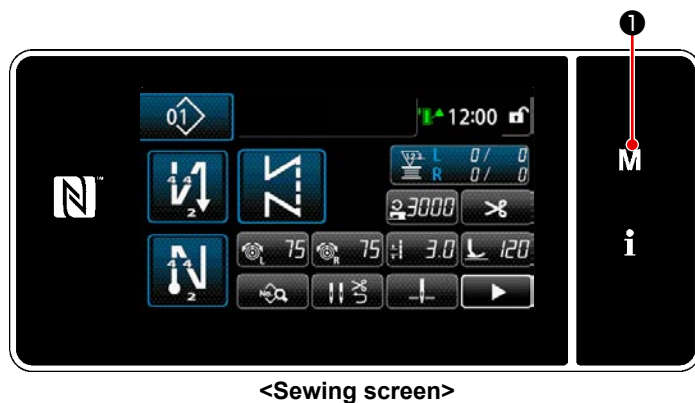
WARNING :



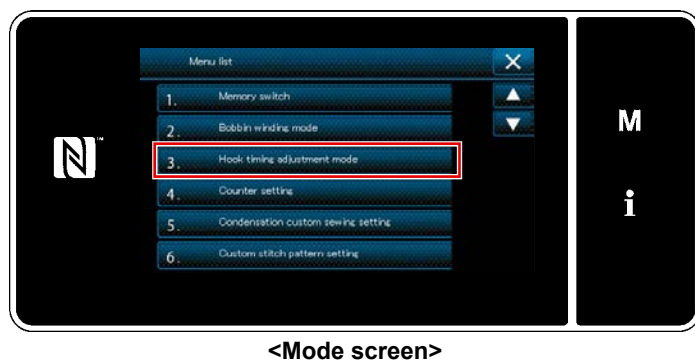
To protect against possible personal injury due to abrupt start of the sewing machine, be sure to change over the operation mode to the "hook timing adjustment mode".
The presser foot automatically goes up when changing over the operation mode to the "hook timing adjustment mode". Also remember that the presser foot comes down when the "Hook timing adjustment mode" is terminated. Be sure carry out the operation while keeping your hands, etc. away from the presser foot.

[Hook timing adjustment mode]

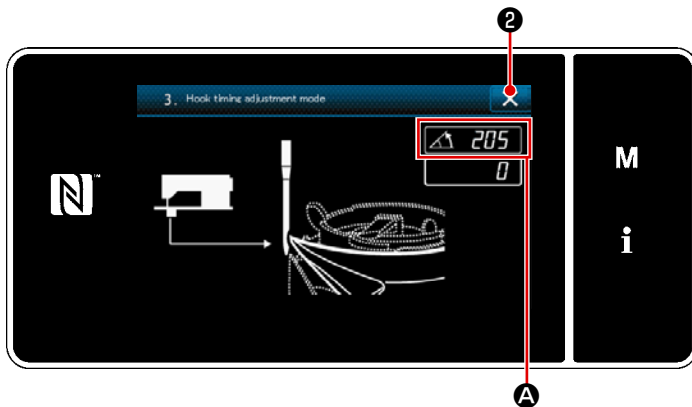
The hook timing adjustment is used when adjusting the needle-to-hook timing, etc.



- 1) Keep **M** ① held pressed for three seconds.
The "mode screen" is displayed.



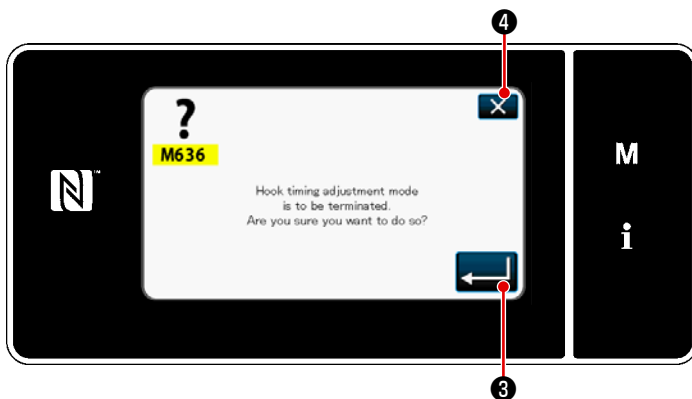
- 2) Select "3. Hook timing adjustment mode".



<Hook timing adjustment mode screen>

- 3) The sewing machine is changed over to the "hook timing adjustment mode". The presser foot goes up. In this state, the needle bar position can be adjusted by turning the main shaft by hand. The current position of needle bar is displayed at section **A**.

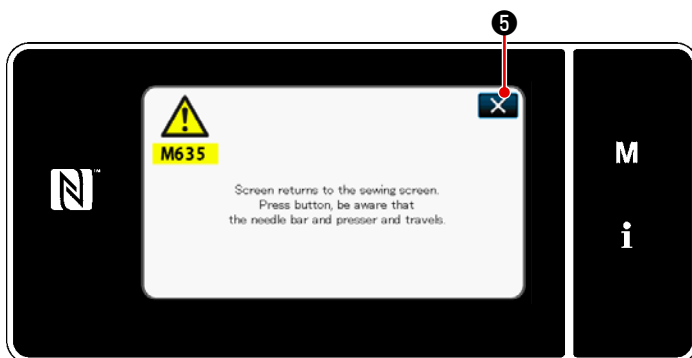
When  **2** is pressed, the screen returns to the hook timing adjustment termination confirmation screen.



<Hook timing adjustment mode termination confirmation screen>

- 4) When  **3** is pressed, the sewing screen returning confirmation screen is displayed.

* When  **4** is pressed, the screen returns to the hook timing adjustment mode confirmation screen.

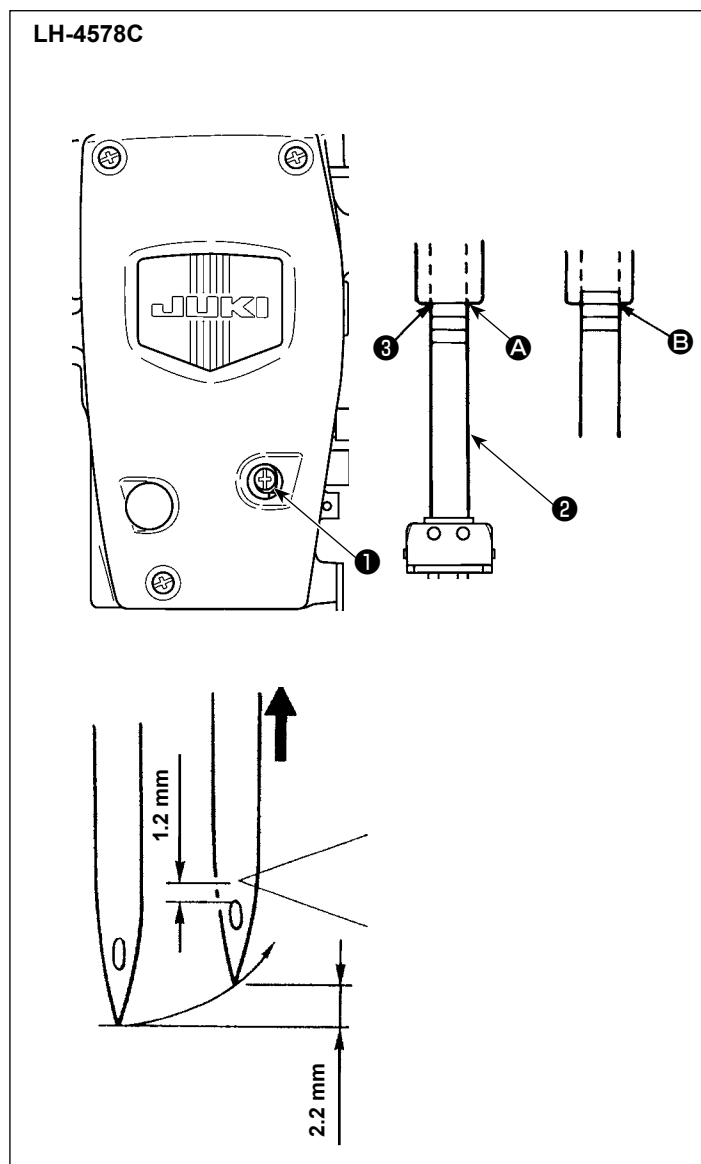


<Sewing screen returning confirmation screen>

- 5) When  **5** is pressed, the screen returns to the "Hook timing adjustment mode".

Be aware that, if you press  **5, the needle bar and presser foot will move.**

8-2. Adjusting the timing between the needle and the blade point of hook



• Adjust the relation between the needle and the hook as described below:

- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) Adjust the stitch pitch to 2.5 for the F and S type models or 3.0 for the G type models.
- 3) Turn the handwheel to bring the needle bar to its lowest point. Loosen needle bar connecting stud clamping screw ①.
- 4) Determine the needle bar height. Two upper marker lines are for the DP × 5 (134) needle and two lower ones are for the DP × 17 (135 × 17) needle.

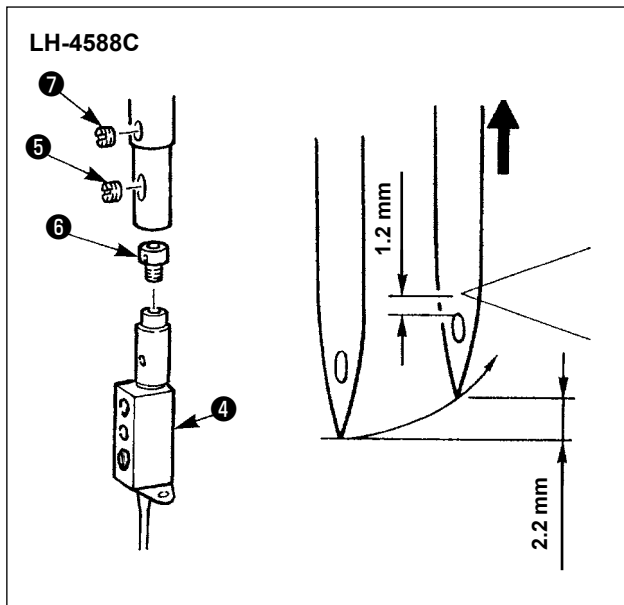
[How to adjust the timing between the needle and the blade point of hook when DP × 5 (134) needle is used]

Align the uppermost marker line A with the lower end of needle bar frame ③. Tighten needle bar connecting stud clamping screw ①.

At this time, the needle bar goes up 2.2 mm from its lowest point (to align 2nd marker line B with the lower end of needle bar frame ③), the blade point of hook aligns with the center of needle, and the upper end of needle eyelet is spaced 1.2 mm from the blade point of hook.

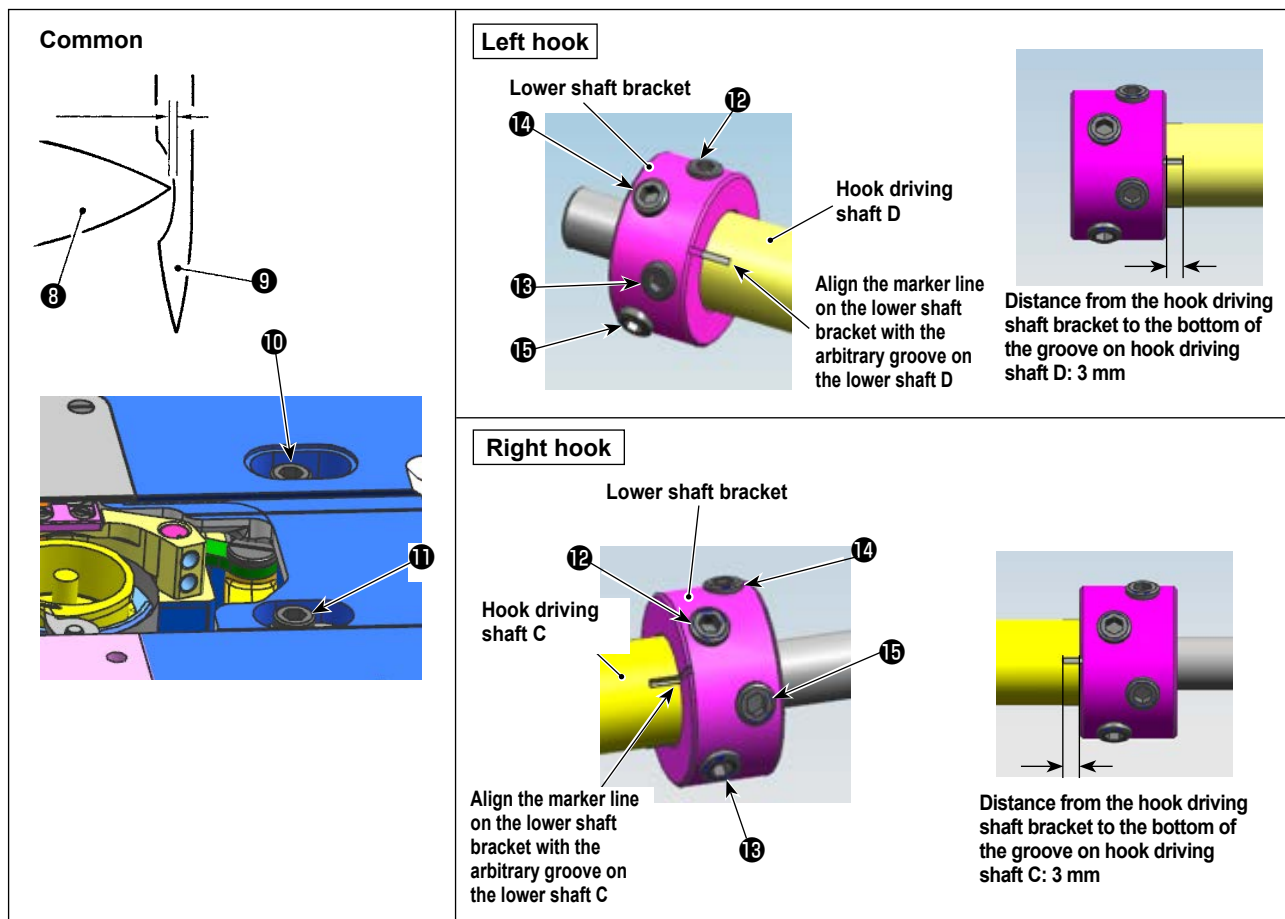
[How to adjust the timing between the needle and the blade point of hook when DP × 17(135 × 17) needle is used]

In this case, carry out the same procedure as in the case of [How to adjust the timing between the needle and the blade point of hook in the case of the DP × 5 (134) needle], using the two lower marker lines.



• **Adjust the relation between the needle and the hook as described below:**

- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) Adjust the stitch pitch to 3.0 for the G type models or 2.5 for the S type models. Standard adjustment is obtained when the needle bar goes up 2.2 mm from its lowest point (at this time, the lower marker line on the needle bar is aligned with the lower end of needle bar frame), the blade point of hook aligns with the center of needle and the upper end of needle eyelet is spaced 1.2 mm from the blade point of hook.
- 3) If the standard value cannot be obtained, remove needle clamp screw ⑤, rotate needle clamp ④ by one turn (adjustment amount: 0.6 mm). Or, remove spring shoe setscrew ⑦ and rotate spring shoe ⑥ a half-turn (adjustment amount: 0.3 mm)



• Determining the hook position

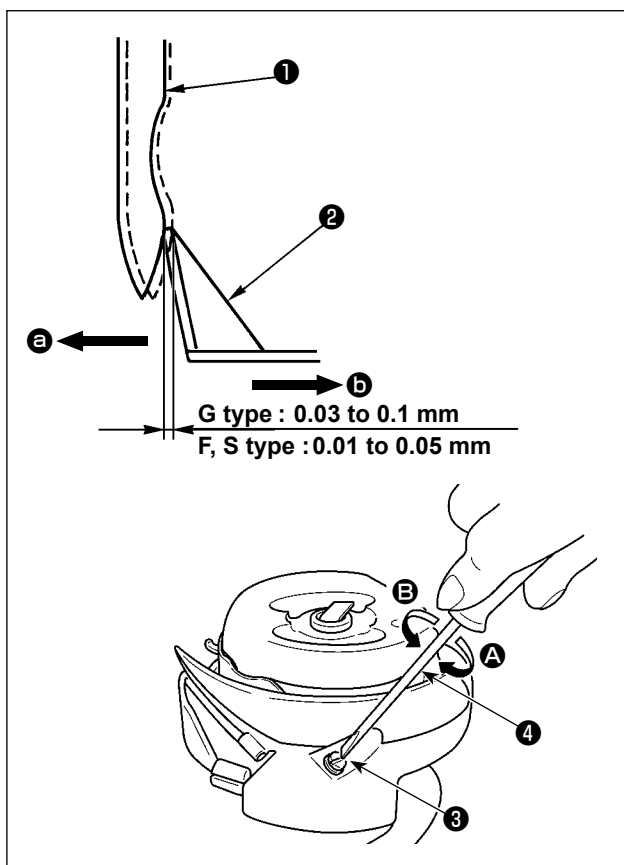
- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) Loosen hook driving shaft saddle setscrews **10****11** on the top surface of the bed. Loosen fixing screws of the lower shaft bracket in the order of **15** → **14** → **13** → **12**.
Turn the handwheel counterclockwise to lift the needle bar by 2.2 mm from its lowest point.
(The needle bar goes up by 2.2 mm when the display of the angle of rotation of the main shaft is 205°.)
- 3) In the state as described in 2), align blade point **8** of the hook with the center of needle **9**. Finely adjust the position of the hook driving shaft saddle to the right and left so that a clearance (0.01 to 0.05 mm for the F and S types or 0.03 to 0.1 mm for the G type) is provided between the blade point of the hook and the needle. Then, secure the hook with setscrews **10****11**.
Align the marker line on the hook driving shaft bracket with the desired groove on hook driving shaft C/D. With the hook driving shaft bracket moved to a position 3 mm away from the bottom of the groove on hook driving shaft C/D, tighten the fixing screws in the order of **12**, **13**, **14**, **15**, **12**, and **13**.
The tightening torque is $65 \pm 5 \text{ kgf} \cdot \text{cm}$. (Check to make sure that the fixing screws of the lower shaft bracket are firmly tightened.)
At this time, the distance from the blade point of hook and the upper end of needle eyelet becomes 1.2 mm.



The lifting amount of the needle bar, 2.2 mm, and the scooping position of the blade point of the hook, 1.2 mm, are reference values.

The values can be finely adjusted in accordance with material and thread conditions.

8-3. Adjusting the hook needle guard



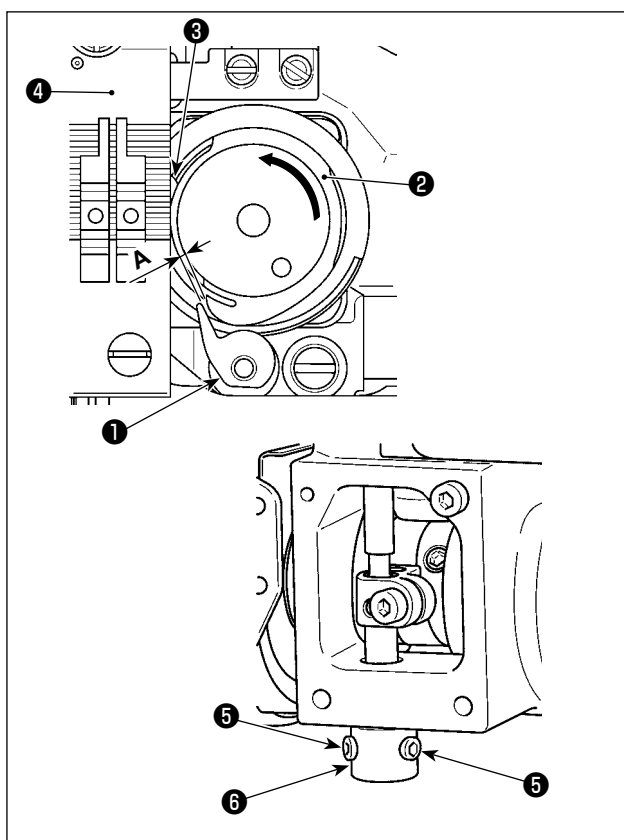
After you have changed the hook, check the position of the needle guard.

In the standard position, hook needle guard ② comes in contact with the side face of needle ① and as a result, the needle warps by 0.03 to 0.1 mm for the G type model, or 0.01 to 0.05 mm for the F and S type model.

If the aforementioned state is not achieved, adjust needle guard adjustment screw ③ with slotted screwdriver ④.

- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) In the case of bending the hook needle guard in direction ⑤, turn needle guard adjustment screw in direction ①.
- 3) In the case of bending the hook needle guard in direction ⑥, turn needle guard adjustment screw in direction ②.
- 4) Lastly, adjust the clearance provided between the needle and the hook.

8-4. Adjusting the bobbin case opening lever



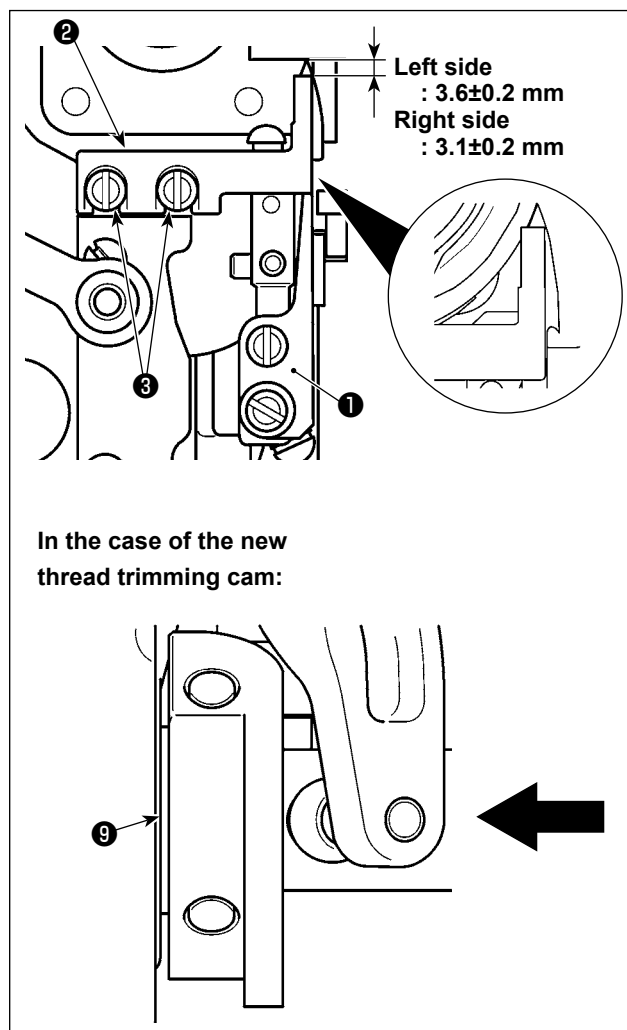
- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) Turn the handwheel in the normal direction of rotation to bring bobbin case opening lever ① to the position that is closest to shuttle body ②.
- 3) Turn shuttle body ② in the direction of the arrow until stopper ③ is pressed against the slit in throat plate ④.
- 4) Loosen setscrew ⑤ of the opener sleeve. Adjust the clearance provided between the opener and projecting portion ① of shuttle body to 0.3 to 0.4 mm for the G type model, or 0.2 to 0.3 mm for the F and S type model. Tighten setscrew ⑤ while pressing opener ① downward and pressing opener sleeve ⑥ upward.

8-5. Adjusting the position of counter knife, knife pressure and clamp pressure



WARNING :

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



[Adjustment of the position of the counter knife]

G type (old thread trimming cam) :

Adjust so that a distance of as below is provided from the tip of moving knife ① to counter knife ② when moving knife ① is at its backward end. Then, secure the counter knife by tighten screws ③ .

S type / G type (new thread trimming cam) :

Lower the needle bar to its lower dead point. Push the moving knife driving roller until it comes in contact with thread trimming cam ⑨ . Adjust so that the blow-stated distance is provided from the tip of moving knife ① to counter knife ② . Then, tighten screws ③ to secure the counter knife.

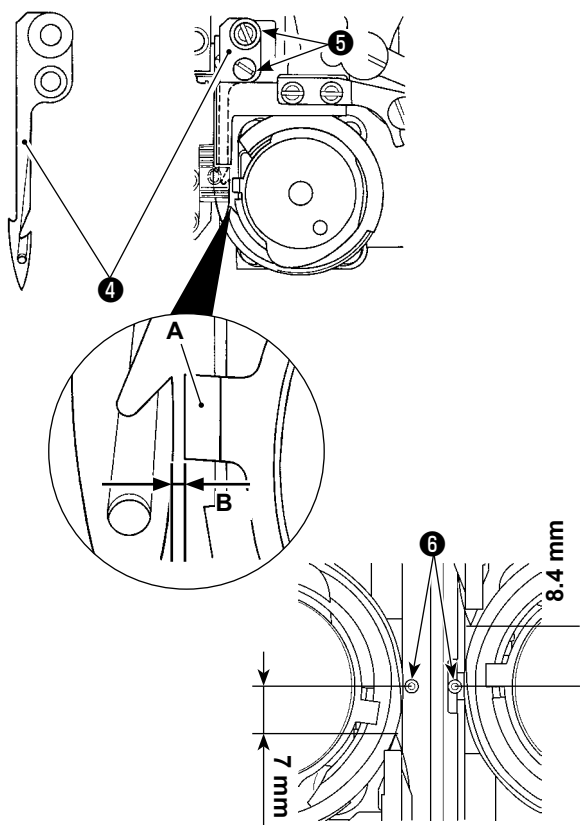
Left side : 3.6 ± 0.2 mm

Right side : 3.1 ± 0.2 mm

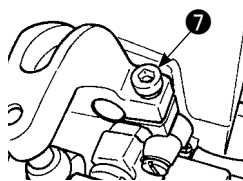
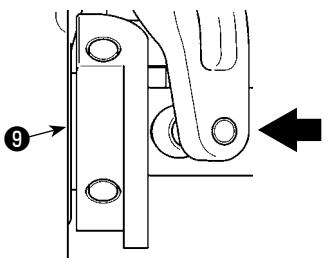
Adjust the position of the counter knife taking care that the side face of counter knife ② does not jut from the side face of moving knife ① .



In addition, the counter knife should totally cover the cutting edge of the moving knife when the counter knife and moving knife blades mesh with each other.



In the case of the new thread trimming cam:



A Old Left thread trimming cam



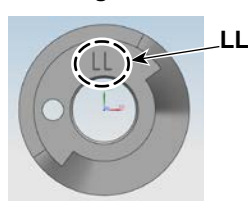
L

B Old Right thread trimming cam



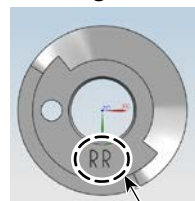
R

C New Left thread trimming cam



LL

D New Right thread trimming cam



RR

[Adjustment of the position of the moving knife]

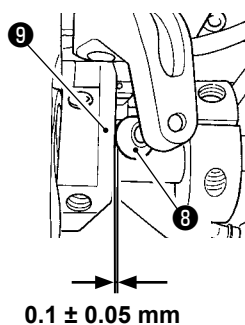
- 1) Adjust the clearance **B** provided between the stopper **A** and moving knife **4** to 0.1 to 0.2 mm for the LH-4588C, or to 0.7 to 0.8 mm for the LH-4578C. Then, secure the moving knife by tightening screws **5**.
- 2) G type (old thread trimming cam) :
Adjust so that distances of 7 mm (left) and 8.4 mm (right) are provided between the tip of moving knife **4** and the center of needle **6** when the moving knife is at its backward end (the moving knife is in the standby state). Then, secure the moving knife by tightening screw **7**.

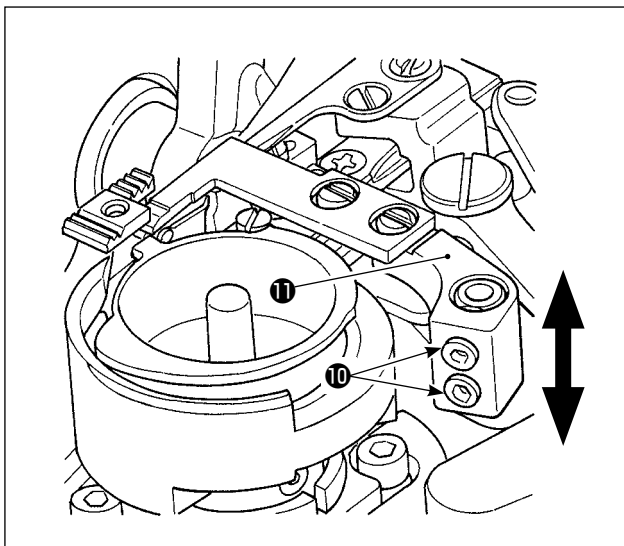
S type / G type (new thread trimming cam) :
Adjust the stitch pitch to "0" (zero). Lower the needle bar to its lower dead point. Push the moving knife driving roller until it comes in contact with thread trimming cam **9**. Adjust the distance from the tip of moving knife **4** to the center of needle **6** (to 7mm for the left needle, and to 8.4 mm for the right needle). Then, tighten screw **7** to secure the moving knife.

When the moving knife has reached its backward end, thread trimming cam **9** is brought to the position at which a clearance of 0.1 ± 0.05 mm is provided between thread trimming roller **8** and thread trimming cam **9**.

New and old thread trimming cam classification **A** to **D** (they differ in the engraved mark)

* For the new thread trimming cam, the engraved marker is visible when the cam is installed on the machine head. For the old thread trimming cam, it is not visible.



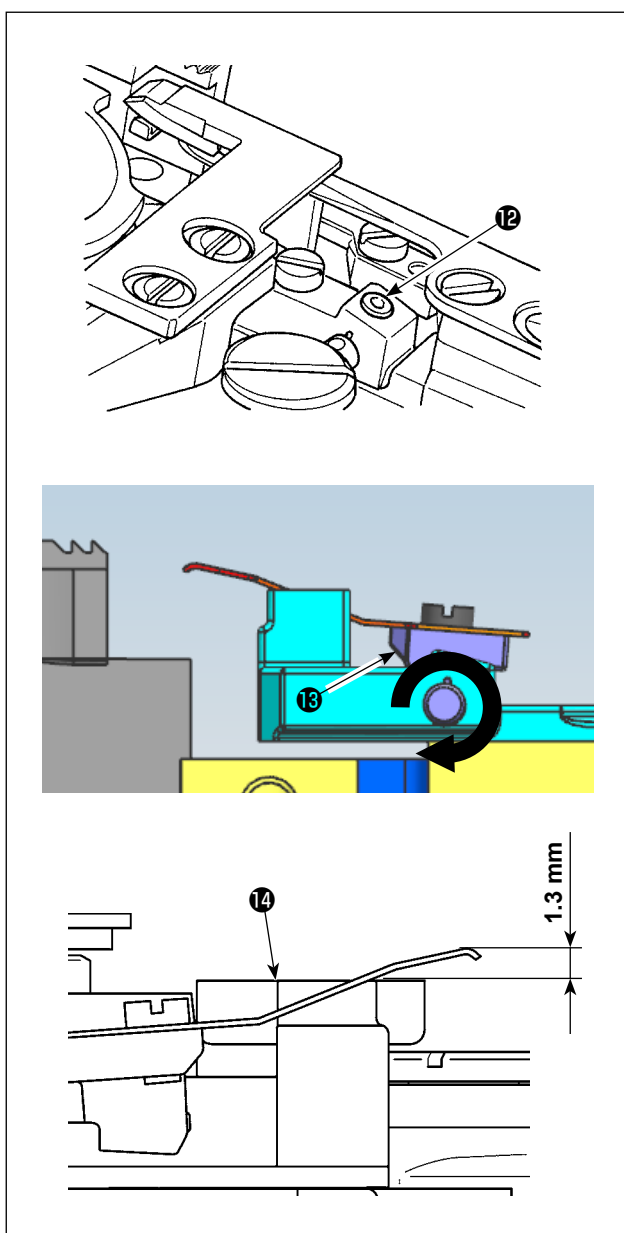


[Adjustment of the knife pressure]

Loosen screws ⑩ . Adjust the knife pressure by moving counter knife arm ⑪ up or down.



After the thread is changed to another thread of different count, the clamp spring pressure may need to be re-adjusted in some cases.



[Adjustment of the bobbin thread clamp pressure]

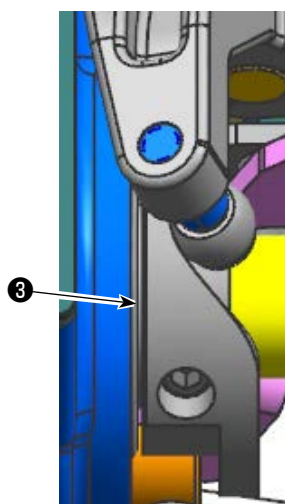
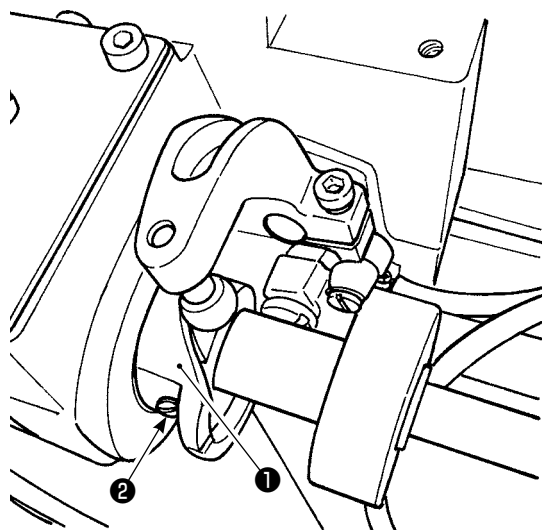
Loosen screw ⑫ . Adjust the clamp pressure by turning clamp arm ⑬ in the direction of the arrow. Adjust so that the tip of clamp is positioned 1.3 mm higher than moving knife base ⑭ .

8-6. Adjusting the thread trimming cam timing

WARNING :

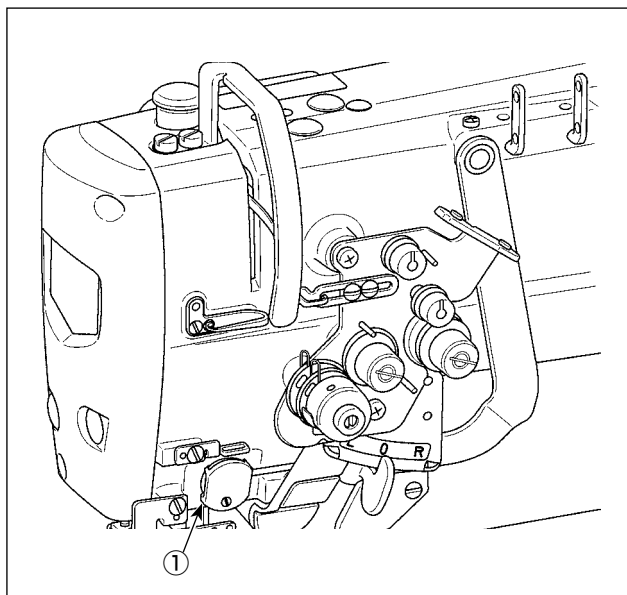


To protect against possible personal injury due to abrupt start of the sewing machine, be sure to change over the operation mode to the "hook timing adjustment mode". The presser foot automatically goes up when changing over the operation mode to the "hook timing adjustment mode". Also remember that the presser foot comes down when the "Hook timing adjustment mode" is terminated. Be sure carry out the operation while keeping your hands, etc. away from the presser foot.



- 1) Place the sewing machine in the hook timing adjustment mode.
- 2) Set the angle to the following values.
 - G type (old thread trimming cam) :
 $281^{\circ} \pm 5^{\circ}$ for both of the right and left thread trimming cams
 - S type / G type (new thread trimming cam) :
Left thread trimming cam: $264^{\circ} \pm 5^{\circ}$ / Right thread trimming cam: $262^{\circ} \pm 5^{\circ}$Refer to **"8-5. Adjusting the position of counter knife, knife pressure and clamp pressure" p.115** for how to distinguish between the new and old thread trimming cams
- 3) Push thread trimming cam ① in the direction of the arrow until washer ③ comes in contact with the bearing. Tighten thread trimming cam setscrew ② to secure thread trimming cam ①.

8-7. Adjusting the thread clamp device (* excluding the 0B type model)



As same as the conventional wiper device, the thread clamp device is able to roll in the needle thread on the wrong side of material.

[Features]

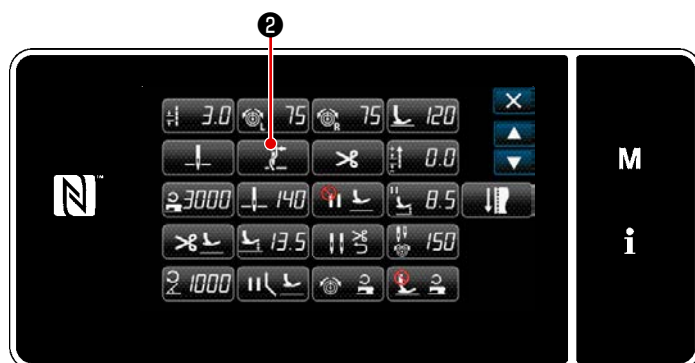
So-called "bird's nest phenomenon" which occurs on the wrong side of material can be reduced by using thread clamp device ① and condensation stitching in combination.

- * Operability around the needle entry area is improved.
- * Applicability of many different attachments intended for the needle entry area is improved.



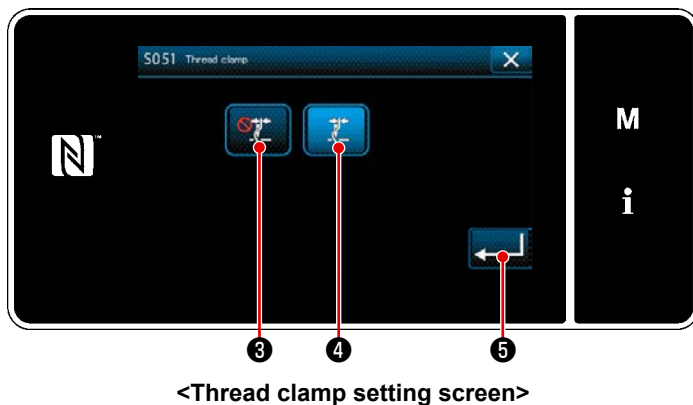
<Sewing screen (Maintenance personnel mode)>

- 1) Press  ① on the sewing screen under the maintenance personnel mode.
The "sewing data edit screen" is displayed.



<Sewing data edit screen>

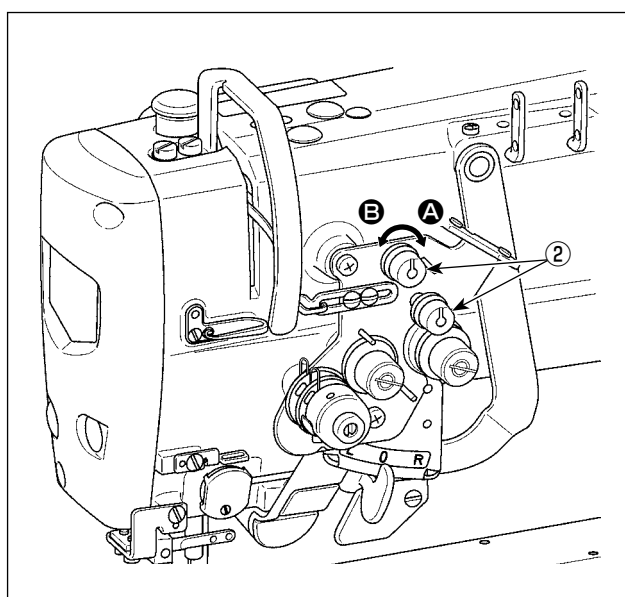
- 2) Press  ② .
The "Thread clamp setting screen" is displayed.



3) Press  ③ or  ④ .

( ④ will be placed in ON.)

4) Press  ⑤ to confirm the setting.
The "sewing data edit screen" is displayed.



[Adjusting the remaining length of needle thread]

Adjust the length of thread remaining at the needle by turning thread tension control nut No. ② .

- 1) Turn thread tension No. 1 nut ② clockwise (in direction **A**), to shorten the thread length remaining on the needle after thread trimming or counterclockwise (in direction **B**), to lengthen the thread length.



So-called "bird's nest phenomenon" is reduced by shortening the length of needle thread remaining at the needle. In this case, however, the needle thread is likely to slip off the needle eyelet. To reduce slip-off of the needle thread, sewing speed at the beginning of sewing should be reduced.

[Memory switch]

- U286 Thread clamp sewing speed: Decrease (the factory-set value: 250 sti/min)
- U293 Thread clamp sewing speed reset angle: Retard (the factory-set value: 460 °)

No.	Item	Setting range	Unit
U286	Thread clamp sewing speed: This memory switch is used to set the sewing speed when operating the thread clamp.	100 to 3000	sti/min
U293	Thread clamp sewing speed reset angle: This memory switch is used to set the angle at which the thread clamp sewing speed is reset. * This set angle is in effect when the thread clamp operates.	0 to 720	Degree

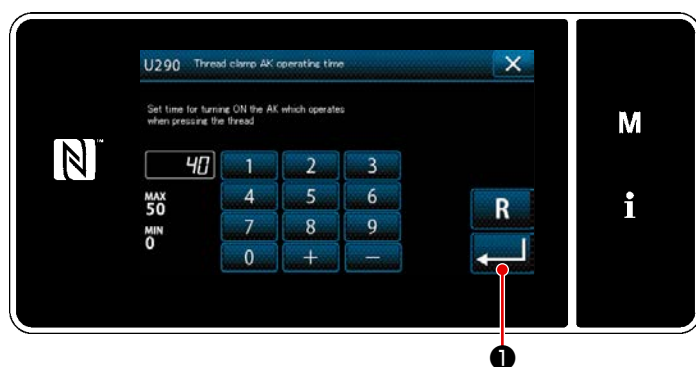
[Response to problems occurring at the beginning of sewing]

- In the case needle thread breakage occurs when using a thin thread or fragile thread
- In the case needle thread is not tucked on the wrong side of material
- In the case needle thread breakage occurs when starting sewing from the material end (such as sewing the material with needle thread tucked on the undersurface of material)

In the case any of the aforementioned problems occurs, the assist function which reduces the presser foot pressure at the beginning sewing can be set by using the active presser lifting device.

- * In the case the assist function is not used, adjustment should be carried out to allow the needle thread placed between the presser foot and the material to smoothly come out from between them by decreasing the presser foot pressure.

Adjust the presser foot pressure and the sewing speed appropriately to prevent insufficient feed efficiency due to jumping or other faults of the presser foot. Confirm the adjustment result by actually sewing the material.



[How to set the active-presser assist function]

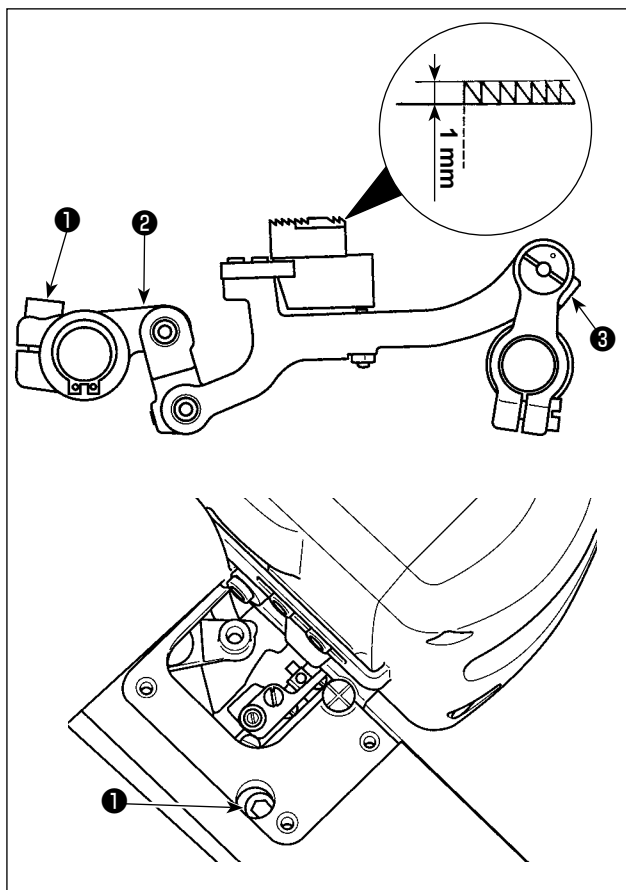
- 1) Enter the presser foot lift setting time with "U290".
- 2) Press  ① to confirm the entered value.

Factory-set value : 40



1. The amount of uplift of the presser foot above the throat plate varies according to the material thickness of the item to be sewn and the presser foot pressure. Be sure to check the actual condition before starting sewing.
2. If the adjustment value of the operating time of the AK-154 is increased while the presser foot pressure is high, the operating noise will become larger. Adjust the adjustment value of the operating time of the AK-154 and the pressure foot pressure while visually checking the needle thread.

8-8. Adjusting the height and inclination of the feed dog

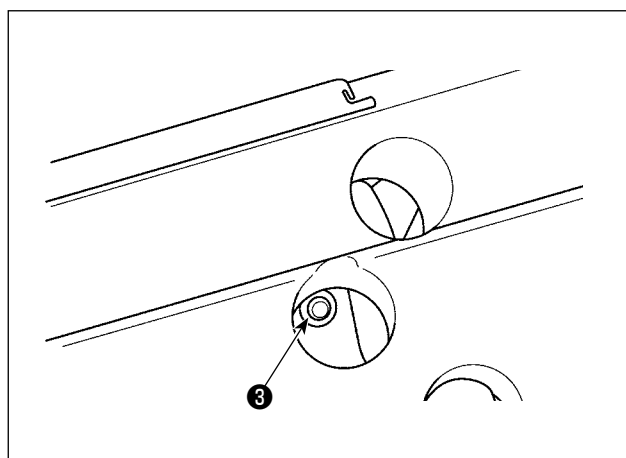


- 1) Adjusting the height of the feed dog
Loosen setscrew ❶ of the feed driving arm. Adjust the feed dog height by turning feed driving arm ❷.

The standard height of the feed dog is 1.1 mm for the G type model, or 1.0 mm for the F and S type model, at its highest point above the throat plate.

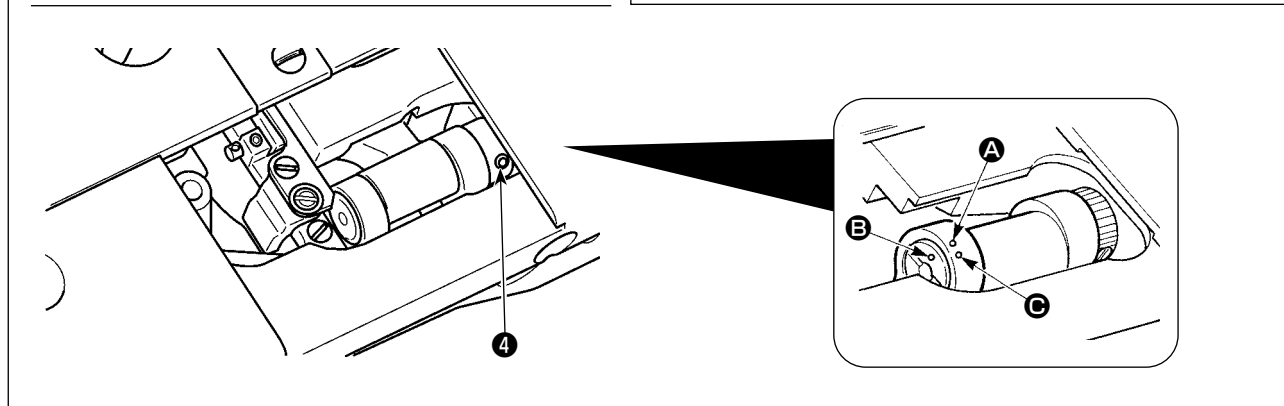


Be sure to set the stitch pitch to the minimum value on the operation panel before starting adjustment.

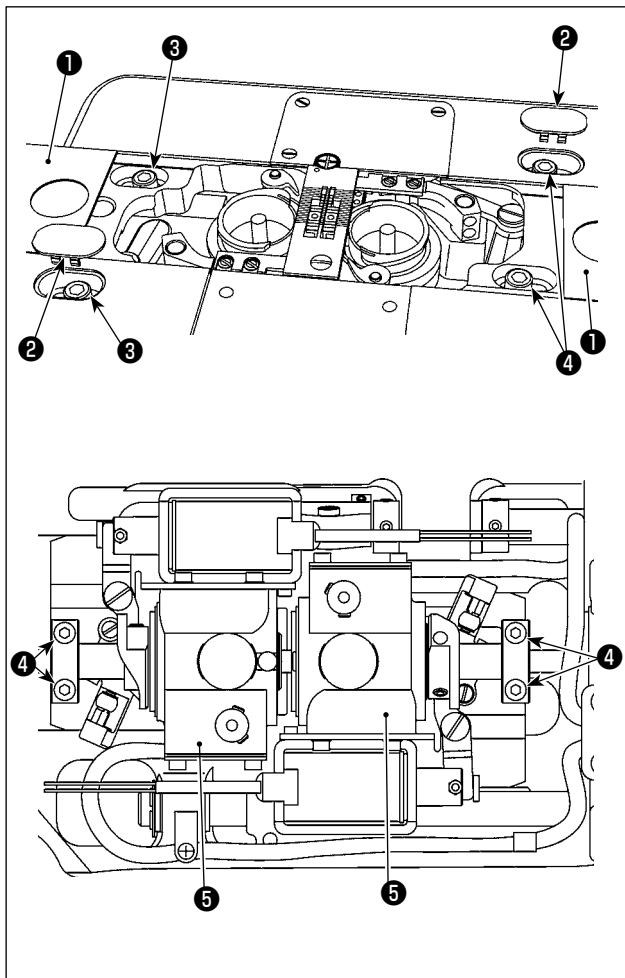


- 2) Inclination of the feed dog
Loosen setscrew ❸ of the feed bar shaft. Adjust the inclination of the feed dog by turning knurled portion ❹.

The standard inclination is obtained when marker dot **A** on the feed bar arm is aligned with marker dot **B** on the feed bar shaft. (Marker dot **C** is not used.)



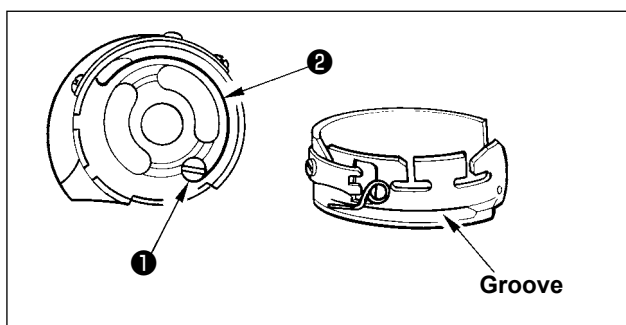
8-9. Replacing the gauge



• Moving the hook driving shaft base when changing the gauge

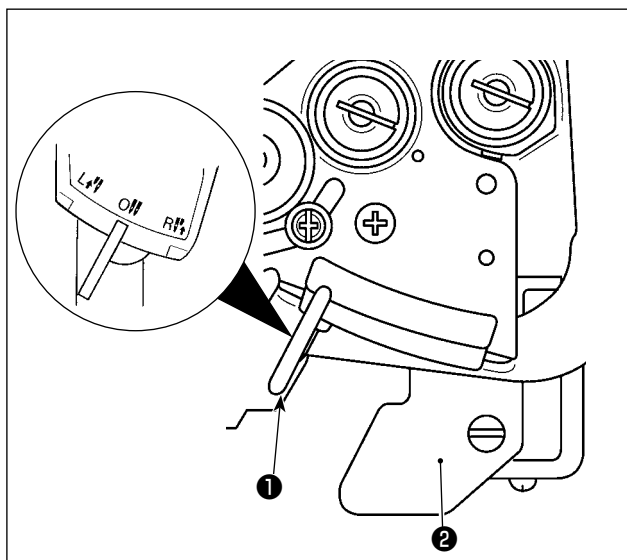
- 1) Remove slide plate asm (side) ① and cap ② .
Loosen hook driving shaft base setscrew ③ .
- 2) Loosen setscrews ④ of the lower shaft set collar. Move hook driving shaft base ⑤ .
- 3) Adjust the clearance provided between the needle and the blade point of hook appropriately. (Refer to "**8-2. Adjusting the timing between the needle and the blade point of hook**" p.111 .)
- 4) Tighten hook driving shaft base setscrew ③ .
- 5) Tighten setscrews ④ of the lower shaft set collar.
- 6) Attach slide plate asm (side) ① and cap ② .

8-10. Replacing the bobbin thread slack prevention spring (LH-4588C)



- 1) Loosen screw ① and remove bobbin thread slack preventer spring ② from the groove on the bobbin case.
- 2) Fit bobbin thread slack preventer spring ② which replaces the removed spring in the bobbin case through the groove.
- 3) Fix bobbin thread slack preventer spring ② in the bobbin case by tighten screw ① . At this time, carefully check the operating range and tension of the spring.

8-11. Stop of the needle bar and the turning angle of corner stitching (LH-4588C-7)

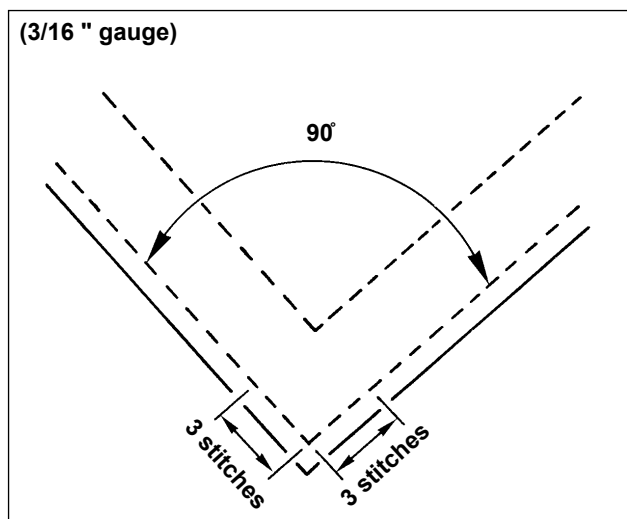


• Stopping the needle bar

When conversion lever **①** is moved to L position, the left needle bar stops. When it is moved to R position, the right needle bar stops.

• To return the operation mode to the 2-needle operation mode

Press conversion fixing lever **②**. Conversion lever **①** returns to the 0 (zero) position to bring the sewing machine back to the 2-needle sewing mode.



• Relation between the bending angle and the stitch pitch

To carry out the corner stitching with accuracy, determine the stitch pitch against the "Quick reference chart according to gauge". It is however recommended to finally determine the stitch pitch by actually carrying out the corner stitching.

(Example)

To determine the number of stitches to sew a corner portion of material with a bending angle of 90° and stitch pitch of 1.6 mm using a 3/16" gauge, follow the cells along the row of heading "angle 90°" to the right on the "Quick reference chart according to gauge" to find the cell "1.6". Then, follow the cells along the column "1.6" upward to find the cell "3". Then, you will find the number of stitches is "3".



- In the case of turning angle of 40 degrees or less, thread may remain on the wrong side of material due to inadequate thread take-up amount of the bobbin thread slack prevention spring.
- Before carrying out the separately-driven needle bar changeover operation, stop the sewing machine once.
(The sewing machine failure can be caused by carrying out the separately-driven needle bar changeover operation while the sewing machine is running at a speed of 1000 sti/min or more.)
- If the sewing machine is used, with one of its two needles disabled, in substitution of the 1-needle sewing machine, the sewing machine may fail. If you want to carry out sewing work using one needle of the sewing machine, it is necessary to remove one of its two needles and enable both needle bars to operate.

8-12. Active-presser multi-layered section detection function (* excluding the LH-4578CFFF0B model)

8-12-1. Multi-layered section detection function

The multi-layered portion detection function detects a multi-layered portion of material. With this function, the sewing machine automatically changes over the sewing parameter to the one for sewing multi-layered portion of material and performs sewing. The multi-layered section detection setting can be stored in memory on a pattern-by-pattern basis.

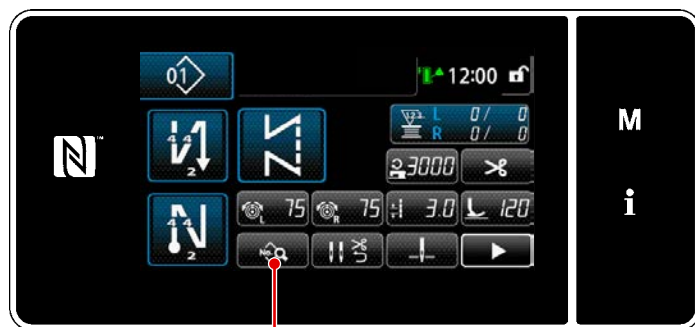
Detectable material thickness : Max.10 mm

Detection resolution : 0.1mm

- * Multi-layered section of material that is less than 2 mm in thickness is likely to be affected by the feed dog height. Stable detection, therefore, cannot be carried out. It is not possible to detect two or more multi-layered sections thickness of which are different. In such cases, one-touch changeover function or the polygonal-shape stitching function by means of the hand switch should be used.



If the presser foot rests on a multi-layered part of material when turning the power ON, the multi-layered part detection may fail to be turned ON.



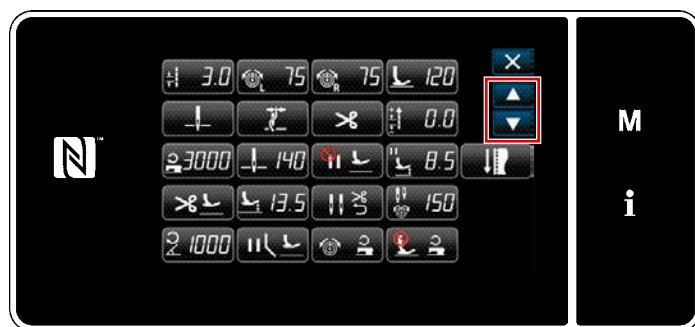
1
<Sewing screen>

[In order to detect a multi-layered section]

1. Select enable/disable of the multi-layered section detection function.

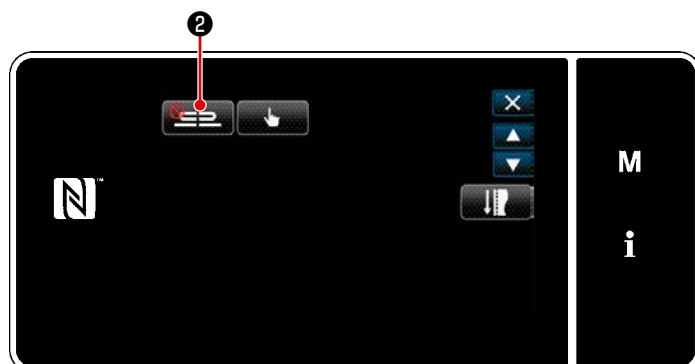
- 1) Press  ①.

The "sewing data edit screen" is displayed.

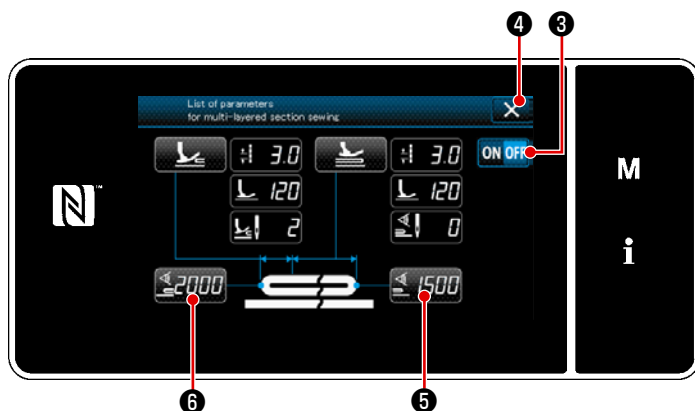


- 2) Press  to proceed to the next page. Then, press  ②.

The "Multi-layered portion sewing parameter list screen" is displayed.



2
<Sewing data edit screen>



<Multi-layered portion sewing parameter list screen>

- 4) Select enable/disable of the multi-layered part detection by pressing **ON OFF** ③.
- 5) **X** ④ to confirm the setting. Then, the sewing data edit screen is displayed. Set the "threshold" for ON/OFF of the multi-layered section detection.
 - * For the purpose of the multi-layered section detection function, the word "threshold" means the value at which the multi-layered section sensor reacts.

MAX : 3000

MIN : 1000

2. Set a "threshold" for the multi-layered section detection.

- 1) Press **2000** ⑥.

"Multi-layered section changeover function ON sensor value screen" is displayed.

(For the "threshold" for turning OFF the multi-layered section changeover function, press **1500** ⑤ and set the threshold in the same manner as described below.)



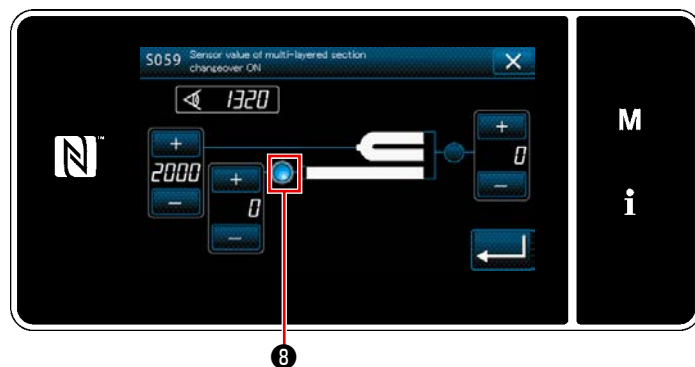
<Multi-layered section changeover function ON sensor value screen>

- 2) Press **T** ⑦.

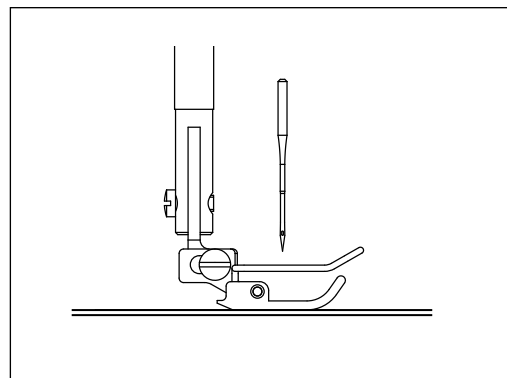
"Multi-layered section changeover function ON sensor value teaching screen" is displayed.

- 3) Place the normal section of material under the presser foot, and press ⑧.

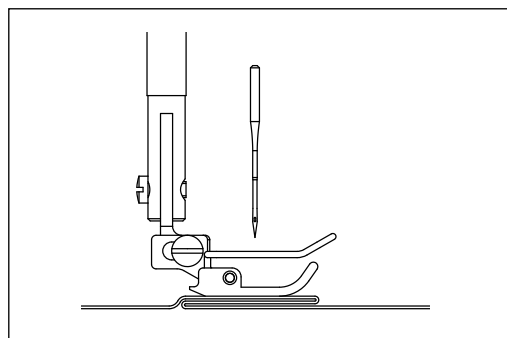
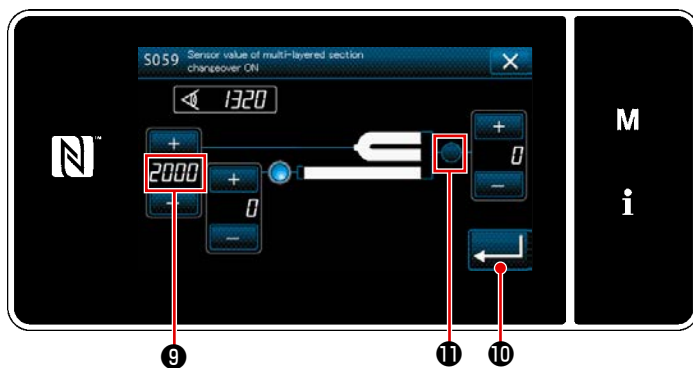
Lift the presser foot by depressing the back part of pedal.



<Multi-layered section changeover function ON sensor value teaching screen>



- 4) Place the multi-layered section of material under the presser foot, and press **11**.



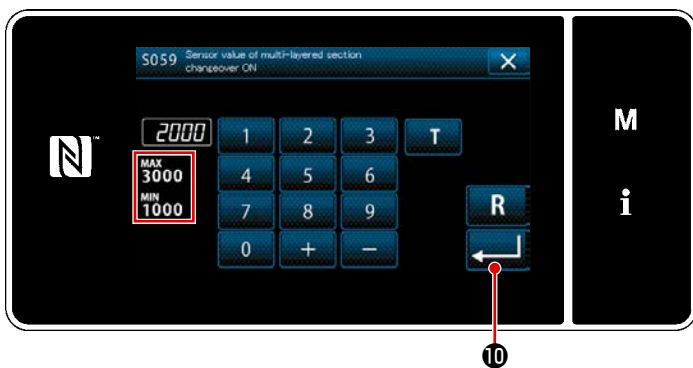
<Multi-layered section changeover function ON sensor value teaching screen>

The value of **9** is automatically calculated, and that value becomes the "threshold" for the multi-layered section detection. The value is adjustable with **+** **-** according to the sewing item.



If the "threshold" is decreased, the multi-layered section can be detected earlier. Be aware that, excessively decreased threshold can cause a faulty detection.

Press **10** is pressed, the "multi-layered section changeover function ON sensor value screen" is displayed.



<Multi-layered section changeover function ON sensor value screen>

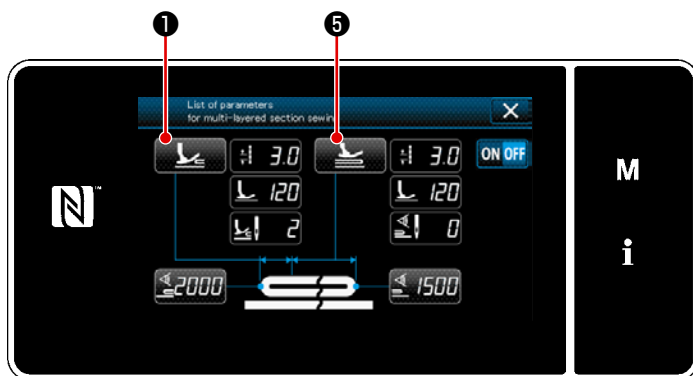
Check that the "threshold" you have set is entered. Then, press **10** again to confirm the setting. Note that the "threshold" can be directly entered or corrected on this screen.

MAX : 3000

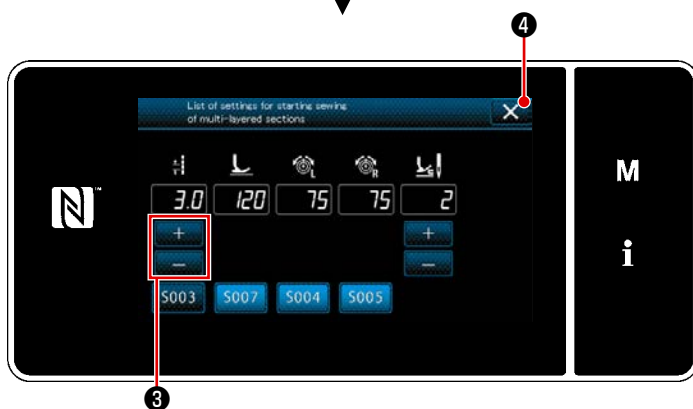
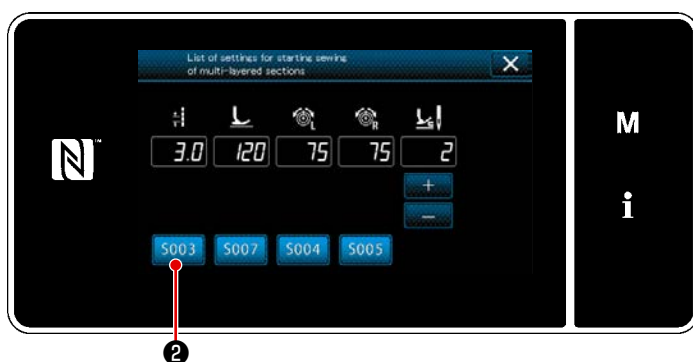
MIN : 1000



The initial value of "threshold" for the multi-layered section detection is a rough indication. The threshold should be finely adjusted according to the actual sewing conditions such as the item to be sewn.



<Multi-layered portion sewing parameter list screen>



<Multi-layered portion run-on setting list screen>

3. Setting the sewing parameters to be used when a multi-layered portion of material is detected

- 1) Press  ①.

The "Multi-layered portion run-on setting list screen" is displayed.

- 2) Setting the sewing parameters to be used when the sewing machine running on a multi-layered portion of material.



: Stitch length



: Presser foot pressure



: Needle thread tension (left)



: Needle thread tension (right)



: Number of stitches to be sewn before running on the multi-layered portion of material

- 3) Stitch length can be input by pressing  ②.

Enter the stitch length with  ③.

- 4) Similarly, input the presser foot pressure, needle thread tension (left) and needle thread tension (right).

- 3) When you press  ④, the values you have entered are confirmed and the screen returns to the "Multi-layered portion sewing parameter list screen".

* Refer to **"8-12-2. Setting the multi-layered portion changeover timing according to the number of stitches"** p.130 for the number of stitches to be sewn before running on the multi-layered portion of material.



<Multi-layered portion (top) setting list screen>

6) Press  5 .

The "Multi-layered portion (top) setting list screen" is displayed.

7) Taking the similar steps of procedure as 3), set the sewing parameters for perform sewing on the top of multi-layered portion.

 : Stitch length

 : Presser foot pressure

 : Sewing speed

 : Needle thread tension (left)

 : Needle thread tension (right)

 : Number of stitches for the multi-layered section changeover function OFF

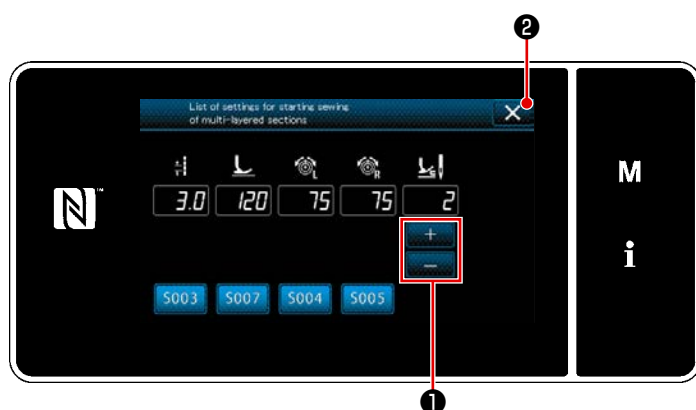
* Refer to **"8-12-2. Setting the multi-layered portion changeover timing according to the number of stitches" p.130** for the number of stitches for the multi-layered section changeover function ON.

8-12-2. Setting the multi-layered portion changeover timing according to the number of stitches

If the sensor value drops below the "multi-layered section changeover function OFF threshold" setting, while the multi-layered section detection is enabled, the sewing parameter automatically returns to the previous one which is used before turning ON the multi-layered section changeover function.

The aforementioned changeover timing can be changed by setting the number of stitches.

Note that if the sensor value drops below the "multi-layered section changeover function OFF threshold" setting for the multi-layered section detection even within the range of the number of stitches setting, the sewing parameter returns to the previous one which is used before turning ON the multi-layered section changeover function.



<Multi-layered portion run-on setting list screen>

[How to set]

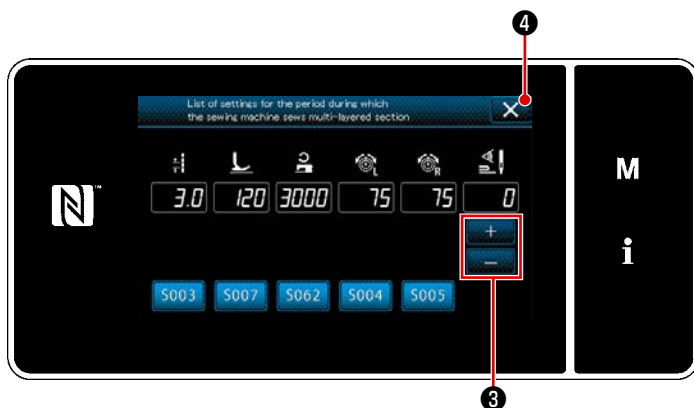
- 1) Press  ① set the number of stitches to be sewn before carrying out changeover on the "Multi-layered portion run-on setting list screen".

Factory-set value at the time of delivery : 2

Setting range : 0 to 20

- * If this value is set to 0 (zero), the multi-layered section changeover ON function by the number of stitches will be disabled.

- 2) When you press  ②, the values you have entered are confirmed and the screen returns to the "Multi-layered portion sewing parameter list screen".



<Multi-layered portion (top) setting list screen>

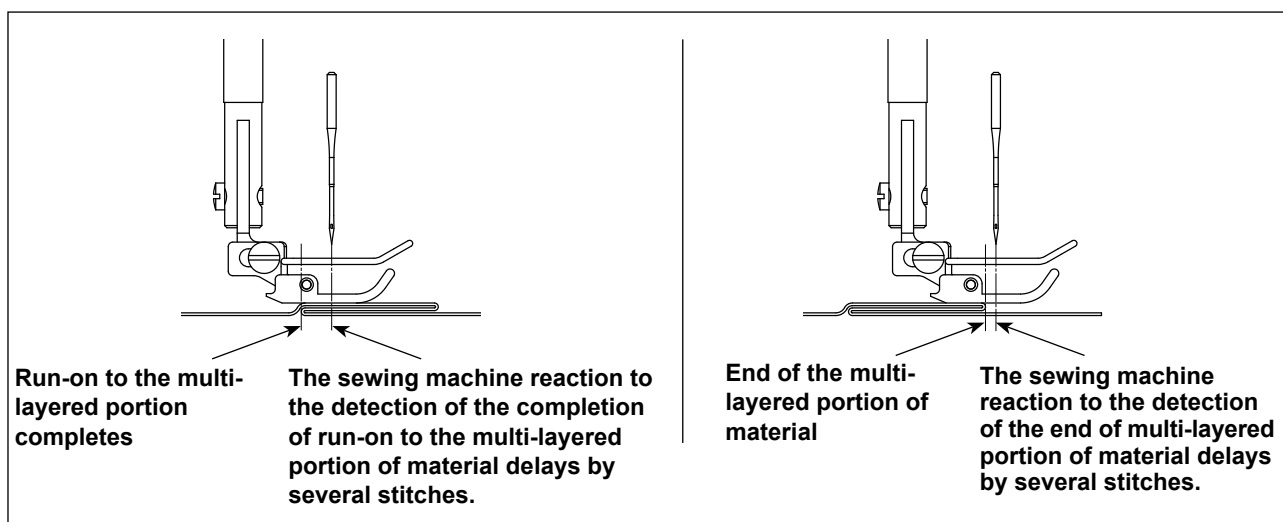
- 3) Similarly, set the number of stitches to be sewn before carrying out changeover by pressing  **3** on the "Multi-layered portion (top) setting list screen".

Factory-set value at the time of delivery : 0
(Number of stitches is not set)

Setting range : 0 to 200

- * When the number of stitches for changeover" is set to 0 (zero), the changeover function according to the number of stitches is turned OFF.

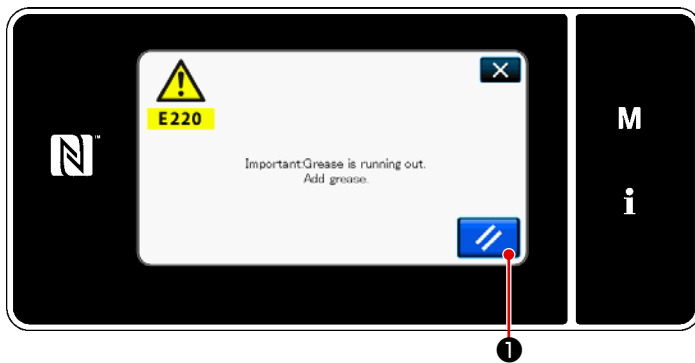
- 4) When you press  **4**, the values you have entered are confirmed and the screen returns to the "Multi-layered portion sewing parameter list screen".



When the sewing machine completely runs on the multi-layered portion of material, the multi-layered portion detection device detects it and the sewing parameter automatically returns to that for the top of multi-layered portion of material. When the sewing machine steps off the multi-layered portion of material, the multi-layered portion detection device detects it and the sewing parameter automatically returns to that for the flat portion of material. In both cases, the sewing machine reaction may delay according to the sewing conditions.

The aforementioned delay can be prevented by setting the number of stitches for changing over the multi-layered portion of material.

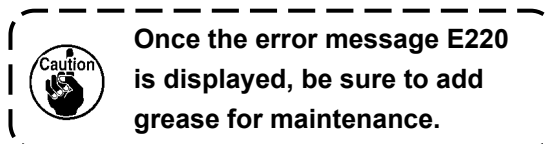
8-13. Grease shortage alarm



8-13-1. Regarding the grease shortage alarm

When the time of maintenance of grease approaches, the error message "E220 Warning against shortage of grease" is displayed.

This error is reset by pressing  ①. In this state, the sewing machine can be continuously used for a certain period of time.



- * Refer to **"8-13-3. Regarding K118 error resetting procedure" p.133** in the case of carrying out error resetting (K118).

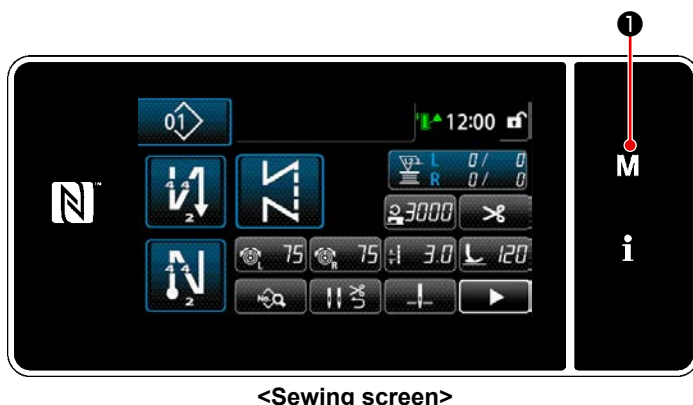


8-13-2. E221 Grease-shortage error

If the error message "E220" is not reset, the error message "E221 Grease-shortage error" will be displayed.

In this case, the sewing machine operation is disabled. Be sure to add grease and carry out error resetting (K118).

- * Refer to **"8-13-3. Regarding K118 error resetting procedure" p.133** in the case of carrying out error resetting (K118).



<Sewing screen>



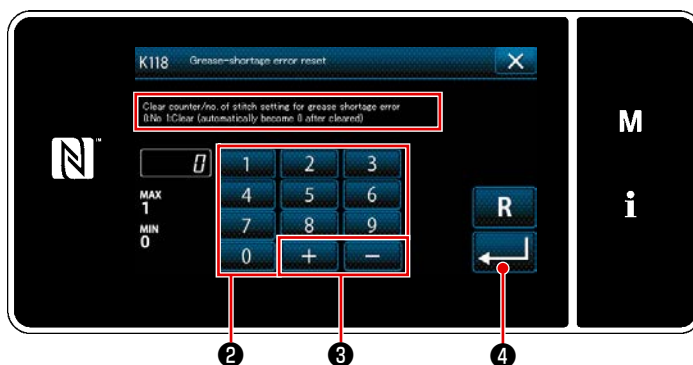
<Mode screen>



<Memory switch type selection screen>



<Memory switch edit screen>



<Grease-shortage error reset screen>

8-13-3. Regarding K118 error resetting procedure

- 1) Keep **M** **1** held pressed for three seconds.

The "mode screen" is displayed.

- 2) Select the "1. Memory switch".
The "memory switch type selection screen" is displayed.

- 3) Select the "1. Display all".
The "memory switch edit screen" is displayed.

- 4) Select the "K118 Grease-shortage error reset".
The "Grease-shortage error reset screen" is displayed.

- 5) Set the set value to "1" using numeric keypad **2** and **+** **3**. Press **Enter** **4** to confirm the setting.

This resets the error to bring the sewing machine back to the normal operation. The sewing machine can run normally until the next maintenance period is reached.

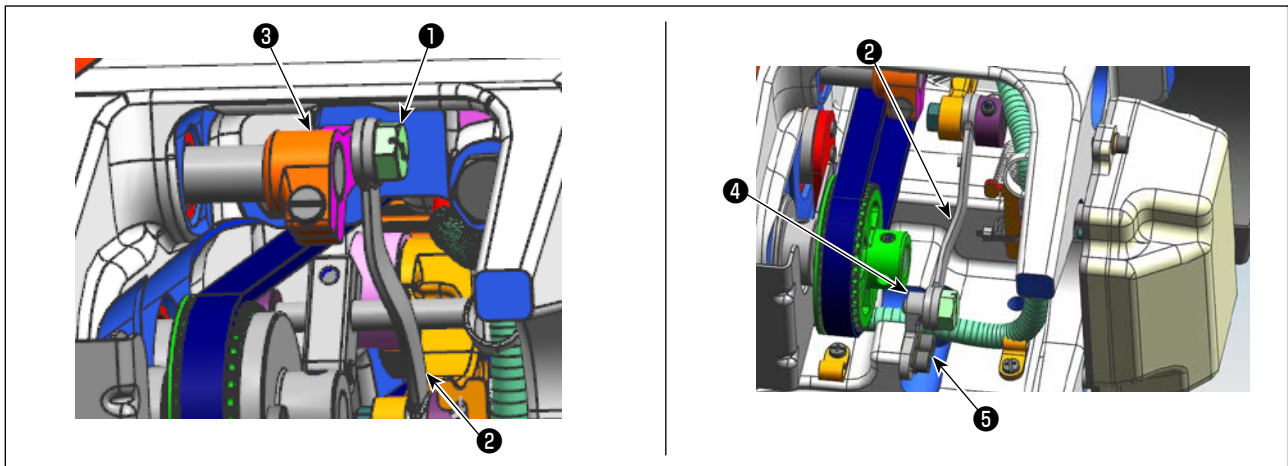
8-14. Changeover of the feed system between the bottom feed to the needle feed and the relevant adjustment (only for the models of sewing machines without thread trimmer)



WARNING :

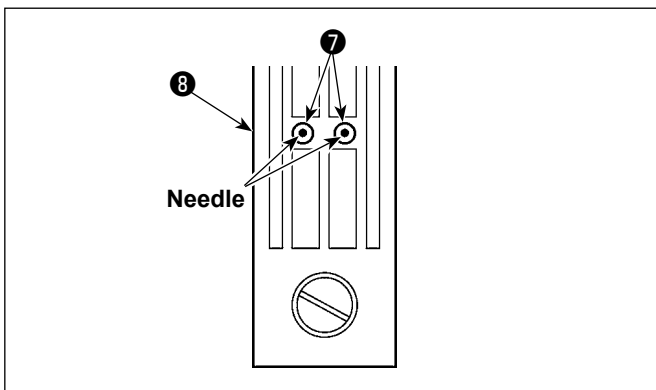
To protect against possible personal injury due to abrupt start of the machine, be sure to start the following work after turning the power off and ascertaining that the motor is at rest.

8-14-1. How to change over the feed system to the bottom feed and the relevant adjustment

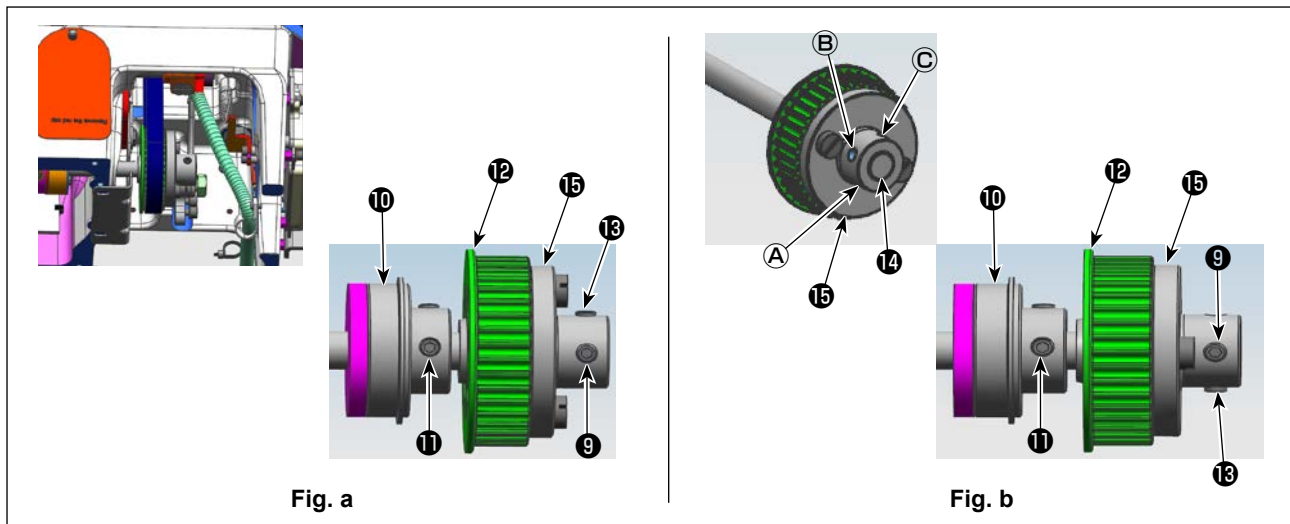


1) Detach hinge screw ① .

Move the needle bar frame driving rod from needle bar frame driving rod arm ③ to needle rocking rod fixed base ④ . Then, tighten hinge screw ① to secure the needle bar frame driving rod.



- 2) Replace the feed dog and throat plate with those for the bottom feed. Then, adjust the position of needle rocking rod fixed base ④ so that the center of the respective needles is aligned with needle holes ⑦ in throat plate ⑧ . Then, tighten setscrew ⑤ . Then, replace the presser foot with that for the bottom feed.



- 3) Loosen setscrews ⑨ and ⑬ (at two locations) of sprocket ⑫ . Loosen setscrews ⑬ and ⑨ in the written order. At this time, detach screw No. 1 ⑨ that is fitted in tapped hole ① and put it in tapped hole ③ on the opposite side of the sprocket (turn the sprocket by 180 degrees of an angle). (Fig. a) Turn the pulley by 180 degrees of an angle without turning the hook driving shaft to make the right end face of sprocket bushing ⑮ with the right end face of hook driving shaft ⑭ . Then, align the flat portion of the hook driving shaft with tapped hole ③ in sprocket ⑫ . Then, tighten setscrew ⑨ to secure the sprocket.
- Screw No. 1 ⑪ of rear bearing ⑩ of the hook driving shaft is aligned with the flat portion of the hook driving shaft. Use this positional relation for reference. (Fig. b)

8-14-2. How to change over the feed system to the needle feed and the relevant adjustment

This procedure is the reverse of the procedure described in ["8-14-1. How to change over the feed system to the bottom feed and the relevant adjustment" p.134](#) .

Loosen hinge screw ① . Move the needle bar frame driving rod from needle rocking rod fixed base ④ to needle bar frame driving rod arm ③ . Then, tighten hinge screw ① to secure the needle bar frame driving rod.

Replace the feed dog, throat plate and the presser foot with those for the needle feed.

Loosen setscrews ⑨ and ⑬ (at two locations) of sprocket ⑫ . Loosen setscrews ⑬ and ⑨ in the written order. At this time, detach screw No. 1 ⑨ that is fitted in tapped hole ③ and put it in tapped hole ① on the opposite side of the sprocket (turn the sprocket by 180 degrees of an angle). (Fig. b)

Turn the pulley by 180 degrees of an angle without turning the hook driving shaft to make the right end face of sprocket bushing ⑮ with the right end face of hook driving shaft ⑭ . Then, align the flat portion of the hook driving shaft with tapped hole ① in sprocket ⑫ . Then, tighten setscrew ⑨ to secure the sprocket.

Screw No. 1 ⑪ of rear bearing ⑩ of the hook driving shaft is aligned with the flat portion of the hook driving shaft. Use this positional relation for reference. (Fig. a)

Then, tighten screw No. 2 ⑬ that is fitted in tapped hole ② of sprocket ⑫ .

9. HOW TO USE THE OPERATION PANEL (APPLICATION)

9-1. Management of sewing patterns

9-1-1. Creation of a new pattern

A newly-created sewing pattern is registered by following the steps of procedure described below.

* This operation is to be carried out under the maintenance personnel mode.

① Selecting the new-pattern creating function



<Sewing screen (Maintenance personnel mode)>

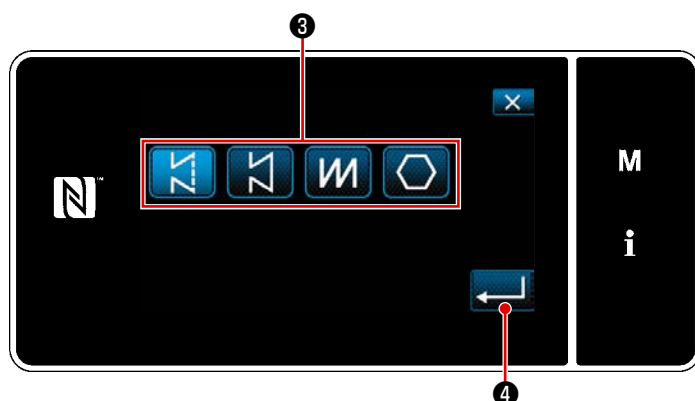
- 1) Press  ① on the sewing screen under the maintenance personnel mode.
The "sewing pattern number list screen" is displayed.



②
<Sewing pattern number list screen>

- 2) Press  ② .
The "new pattern creation screen" is displayed.

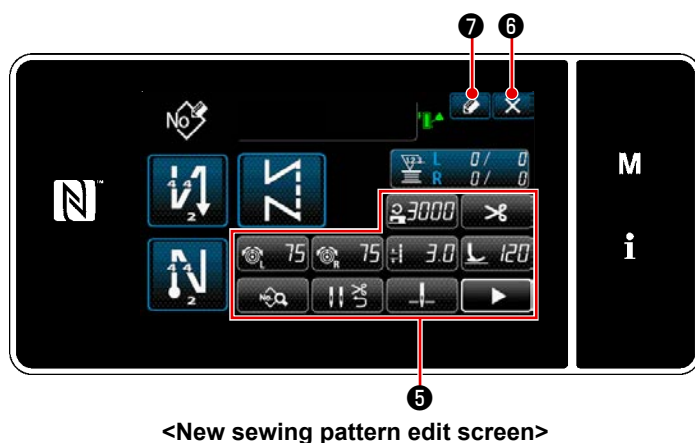
② Setting the sewing shape of a sewing pattern



④
<New pattern creation screen>

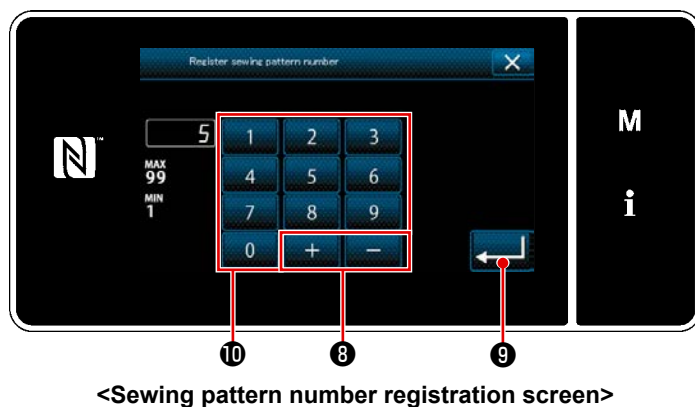
- 1) Select the stitch shape by pressing stitch shape button ③ .
- 2)  ④ to confirm the setting.
The "new sewing pattern edit screen" is displayed.

③ Setting the pattern function



- 1) Set the pattern function using buttons **5**. Refer to **"5-2. Sewing patterns" p.43**.
- 2) Press **7**.
The "sewing pattern number registration screen" is displayed.
Press **6** to display the data discard confirmation screen.

④ Entering a pattern number and registering the pattern



- 1) Enter the sewing pattern number to be registered using numeric keypad **10**.
An unassigned registration number that is closest to the entered value in the plus/minus direction is displayed by pressing **8**.
- 2) The created pattern is registered by pressing **9**. Then, the current screen returns to the "sewing pattern number list screen". In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

9-1-2. Copying a pattern

The selected pattern (sewing pattern and cycle pattern) can be copied to any other pattern of the specified number.

* This operation is to be carried out under the maintenance personnel mode.

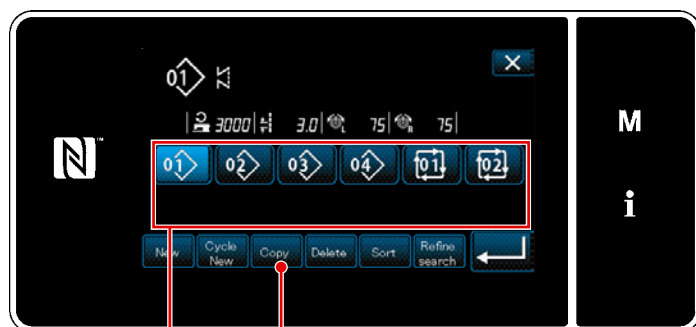
Explanation is given below using copying of a sewing pattern as an example.

① Selecting the sewing pattern copy function



<Sewing screen (Maintenance personnel mode)>

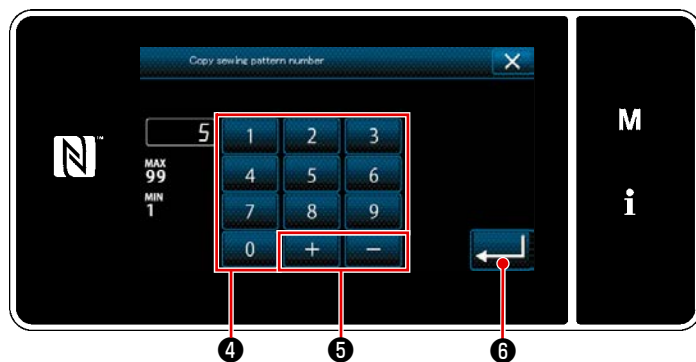
- 1) Press  ① on the sewing screen under the maintenance personnel mode.
The "sewing pattern number list screen" is displayed.



<Sewing pattern number list screen>

- 2) Select the copy source pattern number from list ②.
- 3) Press  ③.
The "sewing pattern number copy screen" is displayed.

② Select the copy destination pattern number



<Sewing pattern number copy screen>

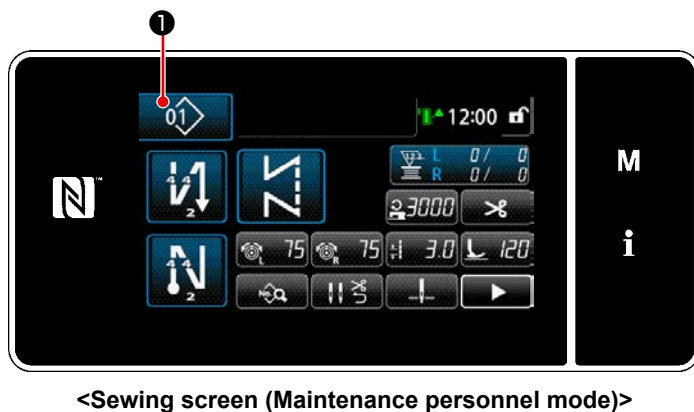
- 1) Enter the sewing pattern number to be registered using numeric keypad ④.
An unassigned registration number that is closest to the entered value in the plus/minus direction is displayed by pressing  ⑤.
- 2) The created pattern is registered by pressing  ⑥. Then, the current screen returns to the "sewing pattern number list screen". In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

9-1-3. Deleting a pattern

This section describes how to delete the selected pattern (sewing pattern, cycle sewing pattern).

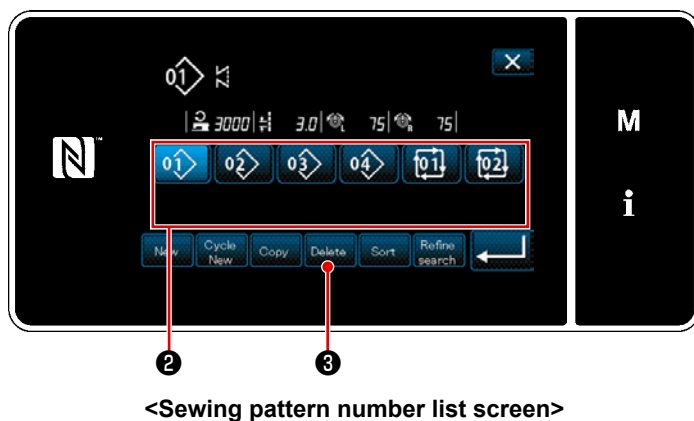
* This operation is to be carried out under the maintenance personnel mode.

① Selecting the sewing pattern deletion function

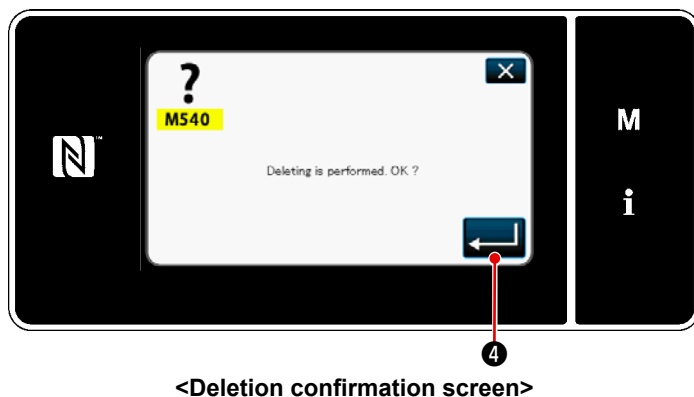


Press  ① on the sewing screen under the maintenance personnel mode. The "sewing pattern number list screen" is displayed.

② Selecting the sewing pattern and deleting it



- 1) Select pattern number to delete from list ② .
- 2) Press  ③ .
The "deletion confirmation screen" is displayed.



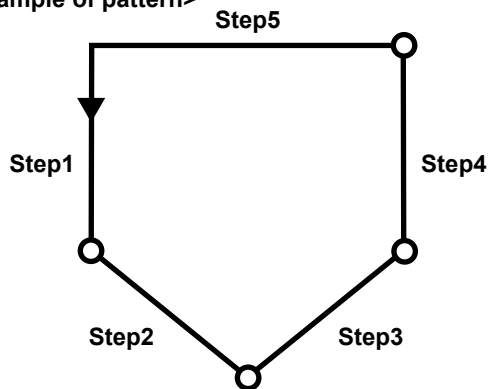
- 3) The pattern is deleted by pressing  ④ .

9-2. Setting up the polygonal-shape stitching

A polygonal-shape stitching pattern consists of as many as 30 steps of straight stitching. Sewing condition can be separately set for each step.

- * **This operation is to be carried out under the maintenance personnel mode.**

<Example of pattern>



9-2-1. Editing a polygonal-shape stitching pattern

This section describes how to change the number of steps and step-by-step conditions of a polygonal-shape stitching pattern.

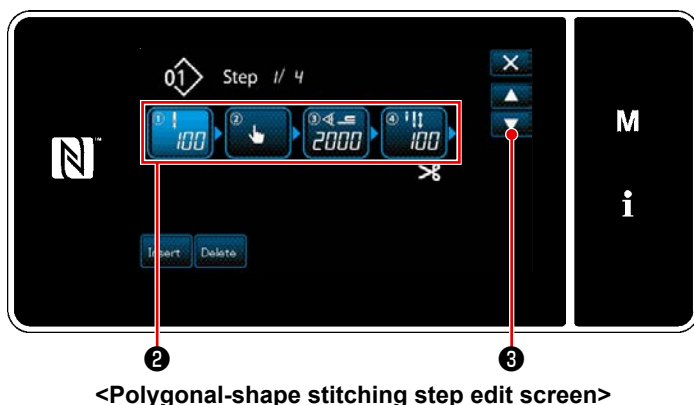
- ① **Displaying the sewing screen (maintenance personnel mode) for the polygonal-shape stitching pattern**



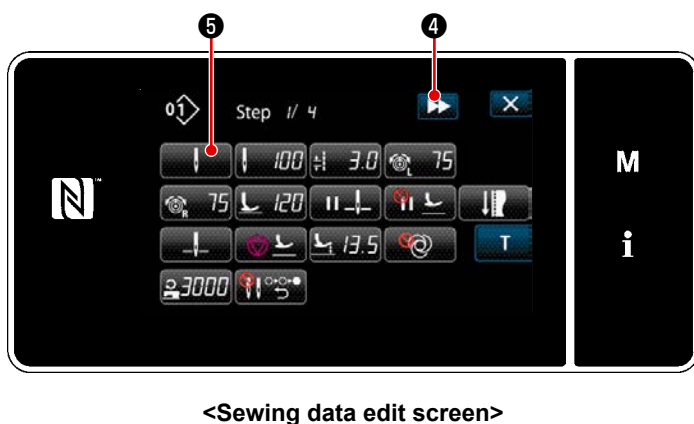
<Sewing screen (Maintenance personnel mode)>

Press **I/ I** ① on the sewing screen under the maintenance personnel mode.
The "polygonal-shape stitching step edit screen" is displayed.

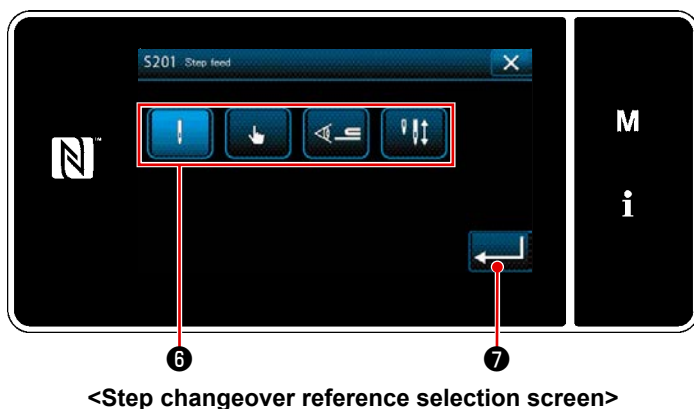
② Editing the number of stitches of polygonal shape stitching and the step changeover condition to be satisfied by a new step



- 1) Step changeover condition is displayed in ②. Press ② to place the number of stitches in the selected state. The screen returns to the previous one or advances to the next one with ③.



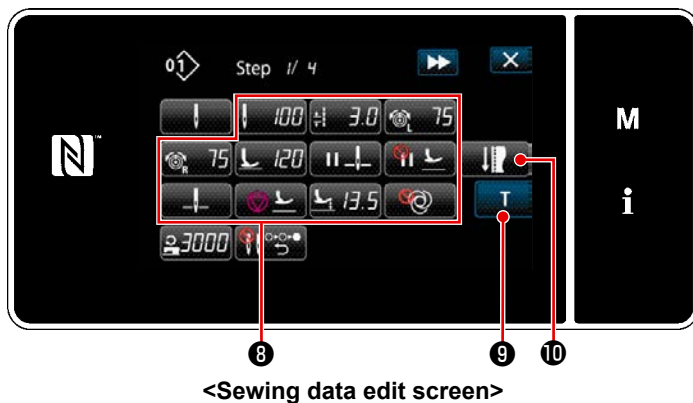
- 2) When the selected step is pressed again, the "sewing data edit screen" is displayed. When ④ is pressed, the "sewing data edit screen" for the next step is displayed. When ⑤ is pressed, the "step changeover reference selection screen" is displayed.



- 3) Selecting step changeover reference ⑥.
- : Number of stitches
 - : One-touch changeover
 - : Multi-layered section detection
 - : Separately-driven needle bar changeover

* In the case of the "separately driven needle bar changeover", the sewing machine automatically stops when the set number of stitches have been sewn. However, the step does not proceed. The step proceeds to the next step when you operate the separately driven needle bar changeover lever to change over to the separately driven needle bar operation mode. In the case the sewing machine re-starts sewing after automatic stop, it carries out free stitching operation.

- 4) When ⑦ is pressed, the operation is confirmed. Then, the screen returns to the "sewing data edit screen".



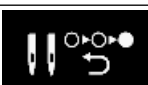
5) Setting other sewing data ⑧ .

The type of sewing data displayed on the "sewing data edit screen" changes according to the step changeover reference selected in the aforementioned item number 3. (See the table shown below.)



The presser lifter operates after thread trimming according to the setting of the final step.

		Step changeover reference			
		Number of stitches 	Hand switch 	Multi-layered part detection 	Separately-driven needle bar sensor 
	Step changeover sensor value	×	×	○	×
	Number of stitches (Stitch length mm)	○	×	×	○
	Stitch length	○	○	○	○
	Needle thread tension (left)	○	○	○	○
	Needle thread tension (right)	○	○	○	○
	Presser foot pressure	○	○	○	○
	Intermediate stop - Needle bar stop position	○	○	○	○
	Intermediate stop - Presser foot lifting	○	○	○	○
	Intermediate stop - Presser foot lifting height	○	○	○	○
	Stop - Needle bar position	○	○	○	○

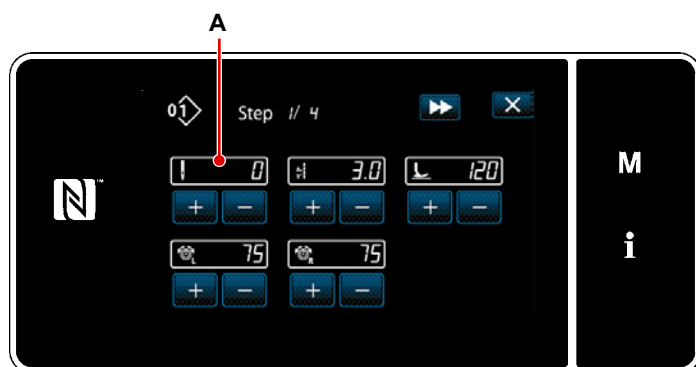
		Step changeover reference			
		Number of stitches 	Hand switch 	Multi-layered part detection 	Separately-driven needle bar sensor 
	Stop - Presser foot lifting	○	○	○	○
	Stop - Presser foot lifting height	○	○	○	○
	One shot	○	○	○	○
	Sewing speed limit	○	○	○	○
	Automatic return to both-needle operation mode in the case of step feed	○	○	○	○



<Sewing adjustment mode screen>

- 6) When  ⑩ is pressed, the "sewing adjustment mode screen" is displayed.

To set the sewing data under the sewing adjustment mode, Refer to "[5-2-5. Editing the sewing patterns \(2\) Sewing adjustment mode](#)" p.55 .

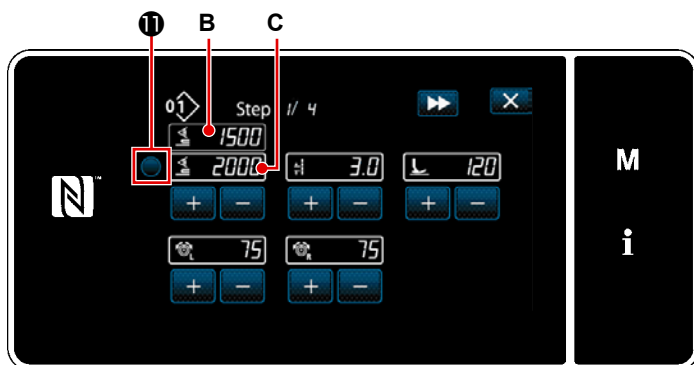


<Teaching input screen (in the case the step changeover basis is the number of stitches or the separately-driven needle bar changeover)>

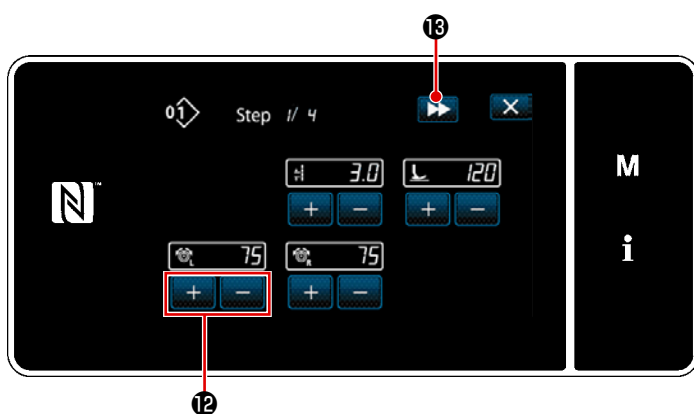
- 7) When  ⑨ is pressed, the "teaching input screen" is displayed.

In the case the step changeover basis is the number of stitches or the separately-driven needle bar changeover, the input value **A** of the number of stitches becomes 0 (zero).

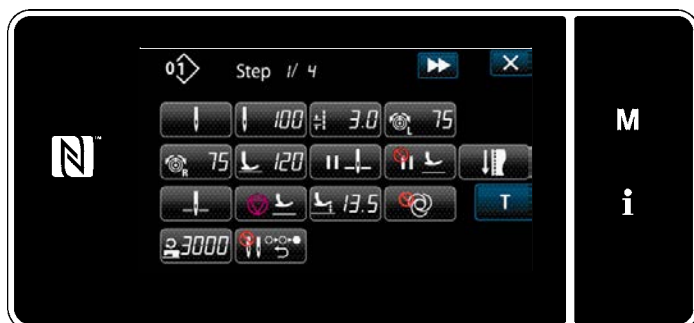
Depress the pedal to run the sewing machine. Count the number of stitches the sewing machine produces until it stops.



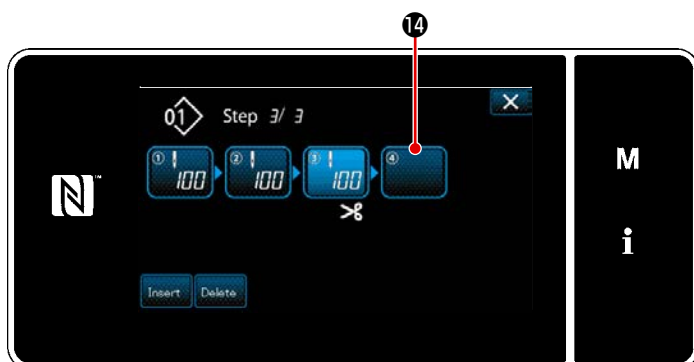
<Teaching input screen (In the case the step changeover basis is the detection of a multi-layered portion of material)>



<Teaching input screen (In the case the step changeover basis is one-touch type changeover)>



<Sewing data edit screen>



Or, in the case the step changeover basis is the detection of a multi-layered portion of material, the multi-layered portion detection sensor value **B** is entered to the step changeover sensor value **C** by pressing **11**.

Change other sewing conditions with

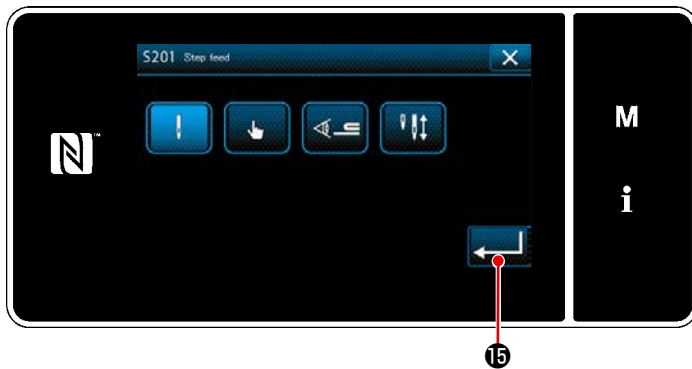


- **3.0** : Stitch length
- **120** : Presser foot pressure
- **75** : Needle thread tension (left)
- **75** : Needle thread tension (right)

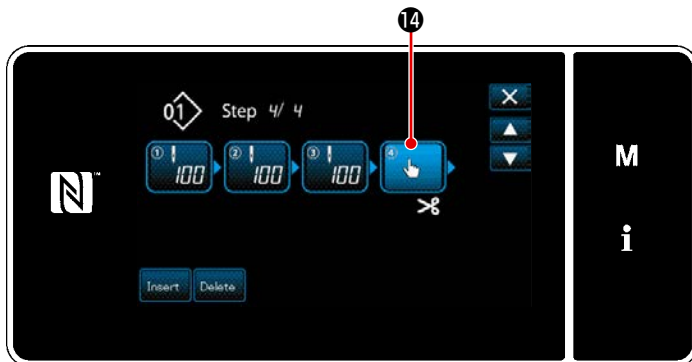
When **13** is pressed, the step is changed over to the next one.

Confirm the teaching data you have entered by carrying out thread trimming. Then, the screen returns to the "Sewing data edit screen" which reflects the sewing condition you have changed.

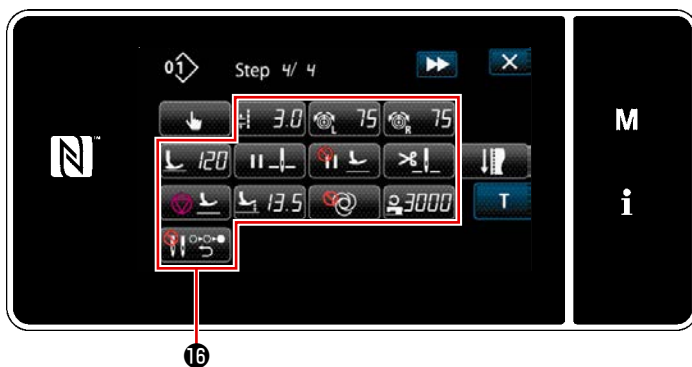
- 8) In the case additional registration of a step to the sewing pattern is possible, step **14** that is not yet set will be displayed at the rightmost field.



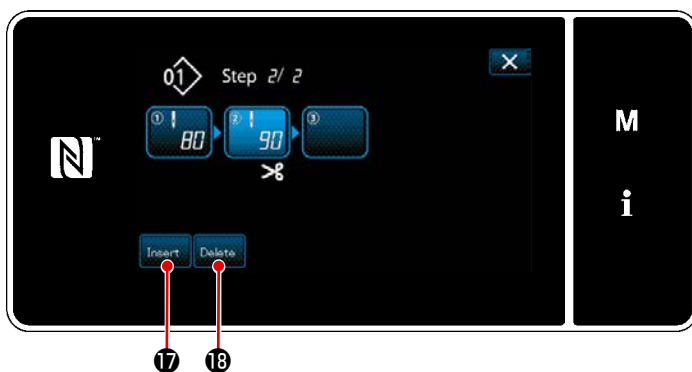
<Step changeover reference selection screen>



<Polygonal shape stitching step edit screen>



<Sewing data edit screen>



9) When displayed step 14 is pressed, the "step changeover reference selection screen" is displayed. Select the step changeover reference in the same manner as aforementioned item number 3.

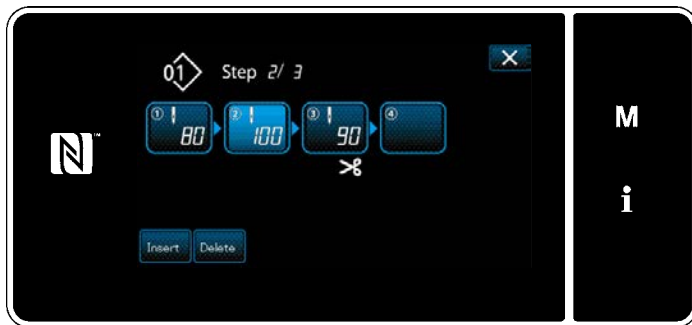
10) When 15 is pressed, the operation is confirmed. Then, the screen returns to the "polygonal shape stitching step edit screen".

11) When step 14 is pressed again, the "sewing data edit screen" is displayed. Select the step changeover reference in the same manner as aforementioned item number 3.

12) Set other sewing data 16 in the same manner as item number 5.

13) When Insert 17 is pressed, a step containing 100 stitches is inserted immediately before the selected step. When the inserted step field button is pressed, the "sewing data edit screen" is displayed. In the same manner as described above, select the step changeover reference and set the sewing data.

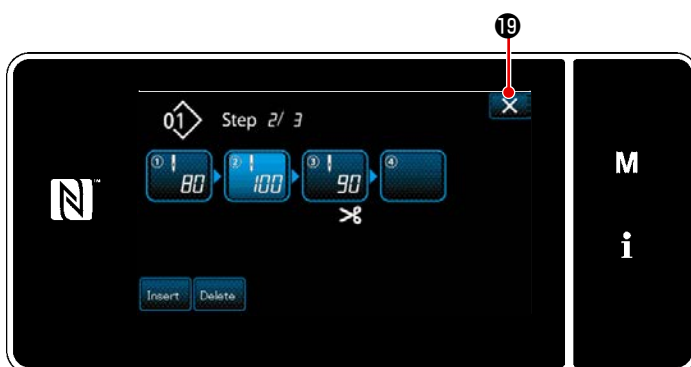
* In the case the maximum number of steps have already been registered Insert 17 is not displayed.



14) When **Delete** 18 is pressed, the selected step is deleted.

* In the case only one step has been registered, **Delete** 18 is not displayed.

③ Confirming the data on the created sewing pattern



The operation is completed by pressing **X** 19. Then, the current screen returns to the sewing screen under the maintenance personnel mode.

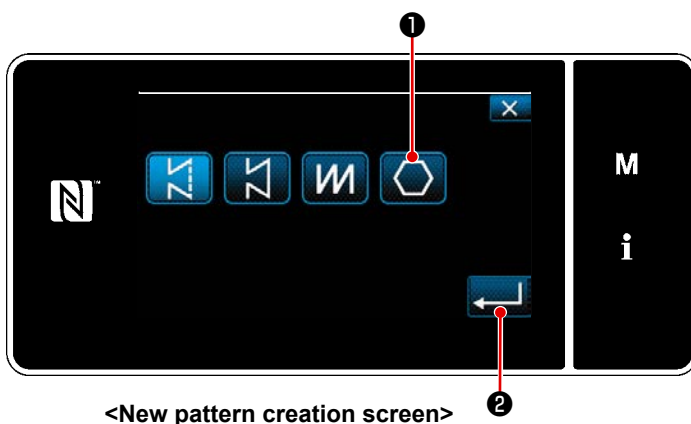
<Polygonal-shape stitching step edit screen>

9-2-2. Creating a new polygonal-shape stitching pattern

① Selecting the new-pattern creating function

Display the "new sewing pattern creation screen" Refer to ① in ["9-1-1. Creation of a new pattern"p.136](#).

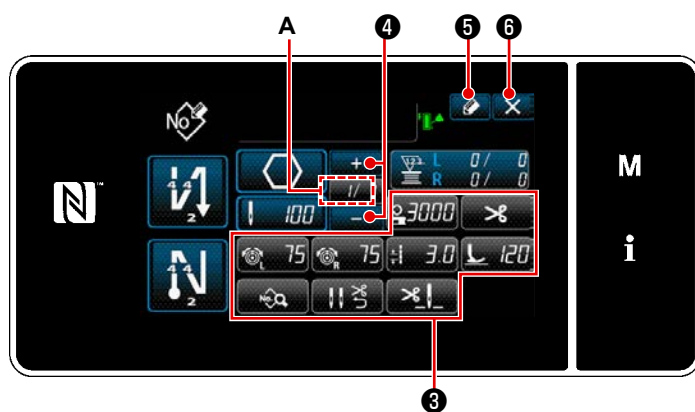
② Creating a polygonal shape stitching pattern



<New pattern creation screen>

Refer to ② in ["9-1-1. Creation of a new pattern"p.136](#), select polygonal-shape stitching pattern **Hexagon** 1 on the sewing pattern selection screen. Then, press **Left/Right Arrow** 2. The "new sewing pattern edit screen" is displayed.

③ Setting the pattern function on a step-by-step basis

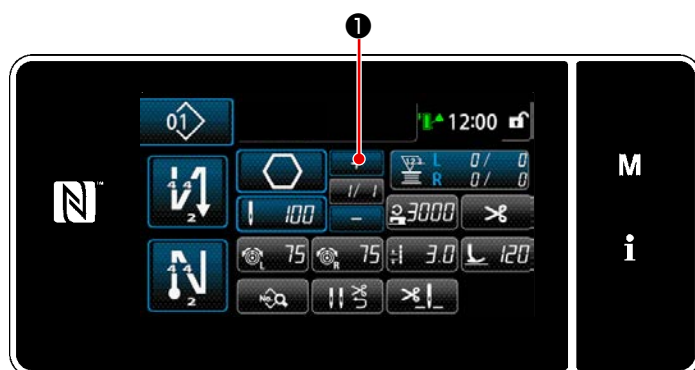


<New sewing pattern edit screen>

- 1) Set the pattern function with buttons ③ on a step-by-step basis. Refer to **"5-2. Sewing patterns" p.43**.
- 2) The total number of steps you have set is displayed on the right of section **A**. The current step is displayed on the left of section **A**. The current step can be changed with  ④.
- 3) Press  ⑤.
The "sewing pattern number registration screen" is displayed.
Press  ⑥ to display the data discard confirmation screen.
Steps of procedure to be taken after the aforementioned step are same as steps ③ to ④ in **"9-1-1. Creation of a new pattern" p.136**.

9-2-3. Setting the step from which polygonal-shape stitching is started

In the case it is necessary to re-sew a pattern from the middle of the pattern after the occurrence of troubles such as thread breakage, it is possible to re-start sewing from an arbitrary step of the pattern.

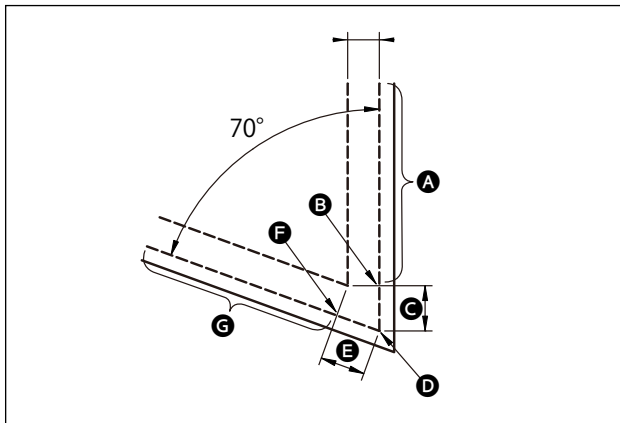


<Sewing screen (Polygonal-shape stitching pattern)>

The current step can be changed by pressing  ① on the sewing screen for polygonal-shape stitching pattern.

9-2-4. How to carry out the corner stitching using a polygonal-shape stitching pattern

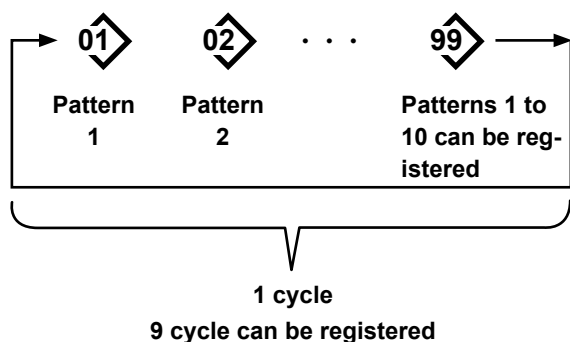
If a polygonal-shape stitching pattern is used, the angular stitching can be carried out by setting the number of stitches and the stitch length as desired.



In the case of carrying out the corner stitching at the angular portion as illustrated in the figure, set the steps as described in the table shown below.

Step	Step 1 (portion A)	Step 2 (portion C)	Step 3 (portion E)	Step 4 (portion G)
S201 Step change-over	Separate-ly-driven needle bar change-over	Number of stitches	Number of stitches	Separate-ly-driven needle bar changeover
S204 Number of stitches	13	3	3	13
S205 Stitch length	3.0mm	3.1mm	3.1mm	3.0mm
S212 Midpoint stop and the presser foot lift		ON		
S214 Position of needle bars when the sewing machine stops	Lower	Lower	Continuous	Lower
S220 Automatic return to both-needle operation	OFF	OFF	ON	OFF
Explanation	When "S201 Step changeover" is set to the "separately-driven needle bar changeover", the sewing machine automatically stops after it has sewn the number of stitches set with "S204 Number of stitches", and it carries out free stitching. The step proceeds by operating the separately-driven needle bar changeover lever to place the sewing machine in the single-needle sewing state.	It is possible to set the automatic lift of the presser foot to ON / OFF when the sewing machine stops at the corner portion of material, by setting "S212 Midpoint stop and presser foot lift".	When "S214 Position of needle bars when the sewing machine stops" to "Continuous", the sewing machine proceeds to the next step without stopping after the completion of sewing of the number of stitches set with "S204 Number of stitches". When "S220 Automatic return to both-needle operation" is set to ON, the operation mode automatically returns the both-needle operation mode every time the step proceeds.	In the case the number of corner portions of material is increased, steps should be added by combining the steps 1 to 3.

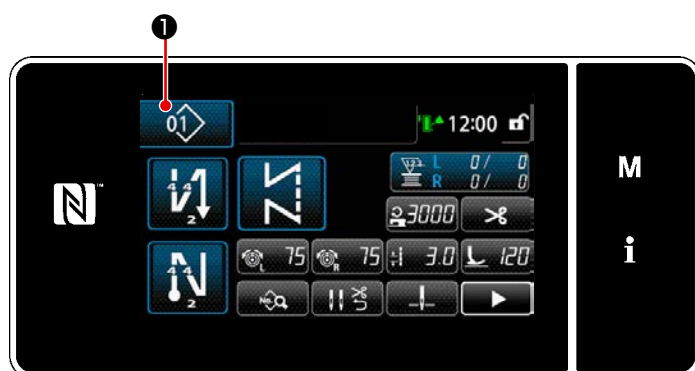
9-3. Cycle pattern



It is possible to combine several different sewing patterns as one cycle pattern for sewing. As many as 10 patterns can be input in one cycle pattern. This function is helpful in the case several different patterns are regularly repeated in a product sewing process.

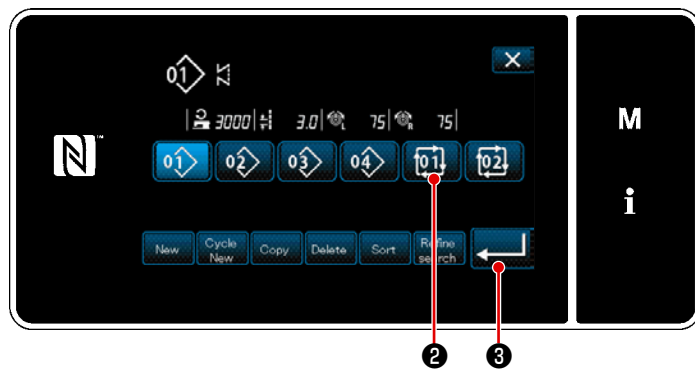
As many as 9 cycle patterns can be registered. Copy the cycle pattern when necessary.

9-3-1. Selecting the cycle pattern



<Sewing screen (Sewing patterns)>

- 1) Press **01** **1** on each sewing screen.



<Sewing pattern number management screen (in numerical order)>

- 2) The "Sewing pattern number management screen (in numerical order)" is displayed. Cycle pattern(s) is displayed after the registered sewing patterns. Press a desired cycle sewing data number button **101** **2**. Press **←** **3** to confirm the setting. The "cycle sewing screen" is displayed.

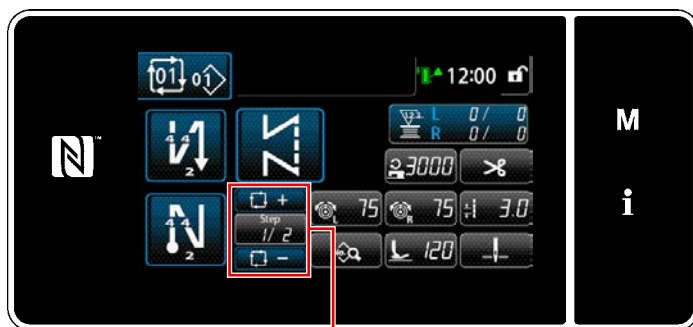


<Sewing screen (Cycle pattern)>

- 3) Sewing of the selected cycle pattern is enabled.

9-3-2. Editing cycle sewing data

① Displaying the sewing screen (cycle pattern) for cycle pattern



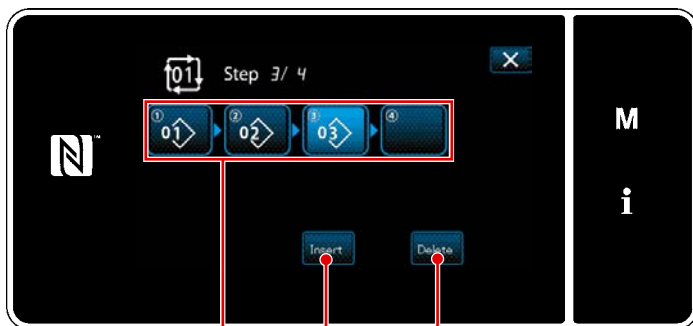
<Sewing screen (Cycle pattern)>

Press Step key  ① on each sewing

screen.

The "cycle sewing step edit screen" is displayed.

② Setting a cycle sewing pattern



<Cycle sewing step edit screen>

- 1) Sewing pattern numbers (10 numbers at the maximum) which have registered are displayed in ②.

Press ② to confirm the selection.

- 2) In the case a step can be additionally registered to a sewing pattern, a step which is not yet set is displayed in the last field.

When the step which is not yet set is pressed, the "cycle registration pattern selection screen (in the numerical order)" is displayed.

- 3) Select the pattern you want to register from ⑤.

Press  ⑥ to confirm the setting.

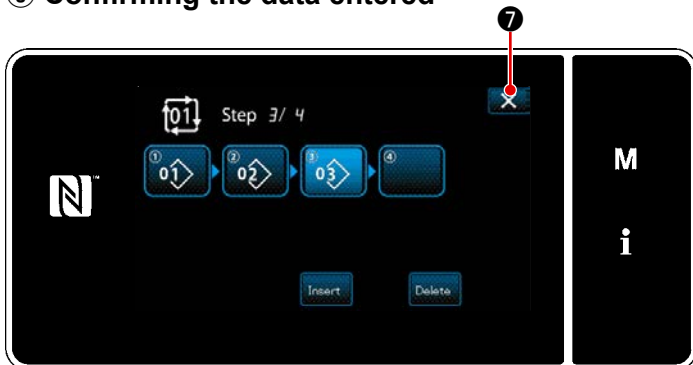
- 4) Press  ③ while selecting a step. Then, the "registered cycle pattern selection screen (In numerical order)" is displayed.

Insert a pattern ahead of the selected step.

- 5) The pattern is deleted by pressing

 ④.

③ Confirming the data entered



<Cycle sewing step edit screen>

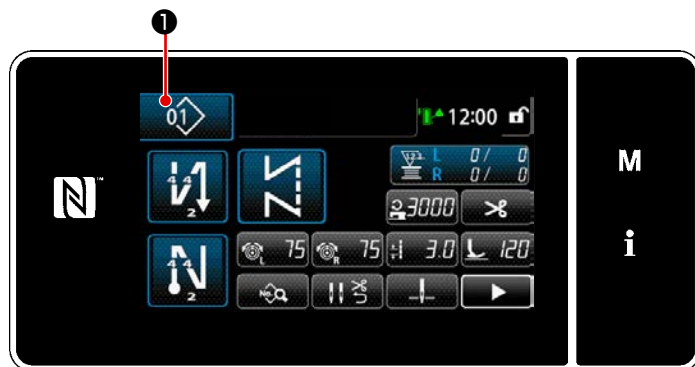
Press  ⑦ to complete the operation.

Then, the current screen returns to the sewing screen for cycle sewing.

9-3-3. Creating a new cycle pattern

* This operation is to be carried out under the maintenance personnel mode.

① Selecting the new cycle pattern creating function



<Sewing screen (Maintenance personnel mode)>

- 1) Press  ① on the sewing screen under the maintenance personnel mode.

The "Sewing pattern number management screen (in numerical order)" is displayed.

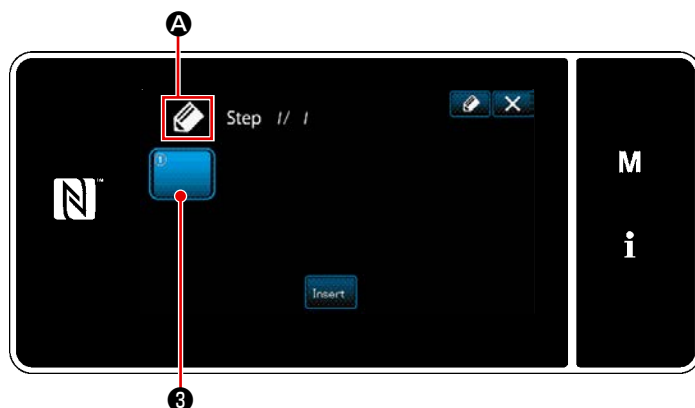


<Sewing pattern number management screen (in numerical order)>

- 2) Press  ②.

The "New cycle sewing pattern edit screen" is displayed.

② Registering a pattern in new cycle sewing data

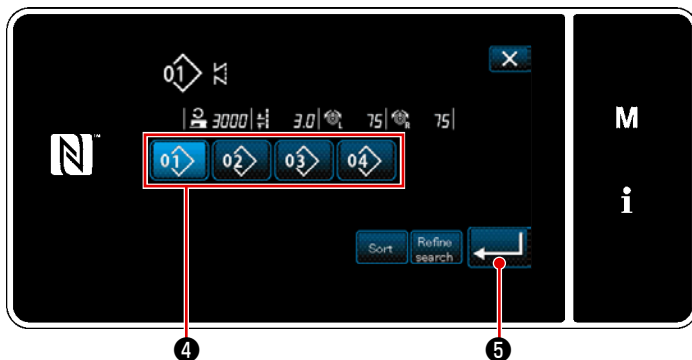


<New cycle sewing pattern edit screen>

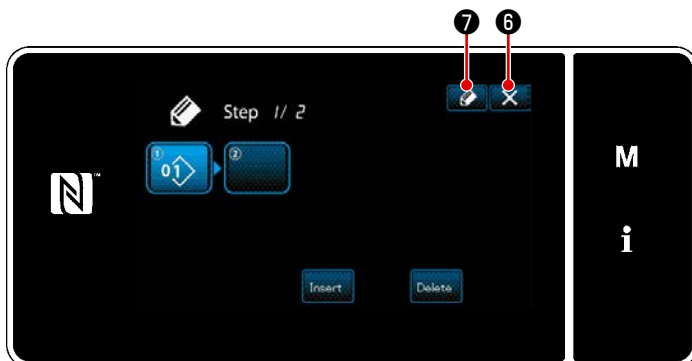
- 1)  ① which indicates that a new pattern is being created is displayed on the screen.

- 2) Press  ③.

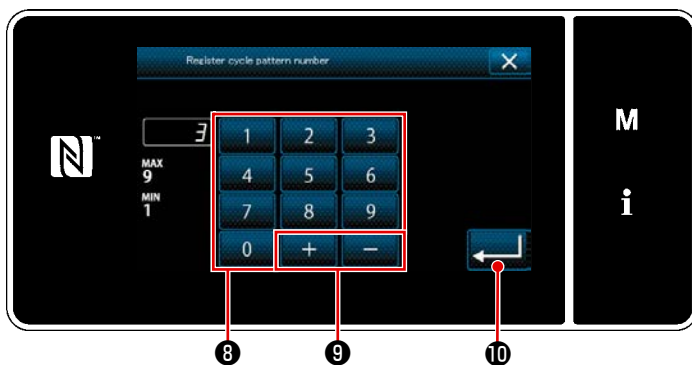
The "Registered cycle pattern selection screen (In numerical order)" is displayed.



<Registered cycle pattern selection screen
(In numerical order)>



<Cycle sewing pattern edit screen>



<Cycle sewing pattern number registration screen>

3) Press Pattern No. ④ you want to create.

4) When  ⑤ is pressed, the operation is confirmed. Then, the screen returns to the "new cycle sewing pattern edit screen".

5) The selected pattern is added to cycle sewing data with  suffixed.

Create the cycle sewing data by repeating steps 2) to 5).

6) Press  ⑥ to display the data discard confirmation screen.

7) When  ⑦ is pressed, the "cycle sewing pattern number registration screen" is displayed.

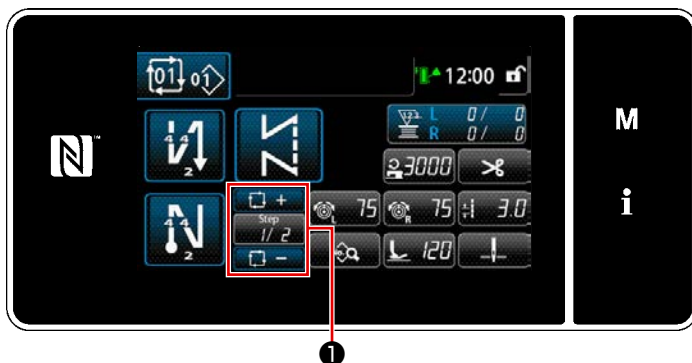
8) Enter the sewing pattern number to be registered using numeric keypad ⑧ . An unassigned registration number that is closest to the entered value in the plus/minus direction is displayed by pressing  ⑨ .

9) The created pattern is registered by pressing  ⑩ .

Then, the current screen returns to the "sewing pattern number list screen". In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

9-3-4. Setting the step from which cycle sewing pattern is started

In the case it is necessary to re-sew a cycle sewing pattern from the middle of the cycle sewing pattern after the occurrence of troubles such as thread breakage, it is possible to re-start sewing from an arbitrary step of the cycle sewing pattern.

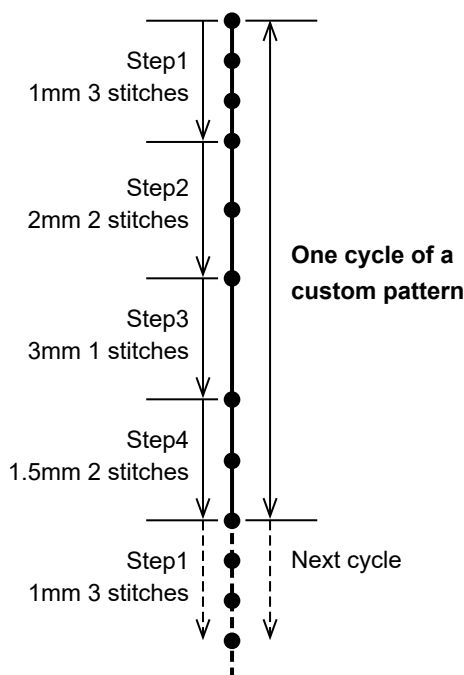


<Sewing screen (Cycle pattern)>

Sewing step can be selected with +/- key of



9-4. Custom patterns



<Figure: Example of the custom pattern>

It is possible to register 20 patterns consisting of groups of two or more different stitches as custom patterns. Each group can contain 10 steps at the maximum. As many as 100 stitches of the same stitch length can be set in one step.

* **This operation is to be carried out under the maintenance personnel mode.**



1. With some combinations of stitch length, direction of feed and sewing speed, the sewing machine may fail to finish a sewing pattern exactly according to the settings.
2. Needle cannot be entered to the same needle entry point when the stitch length is set to 0.0 mm.

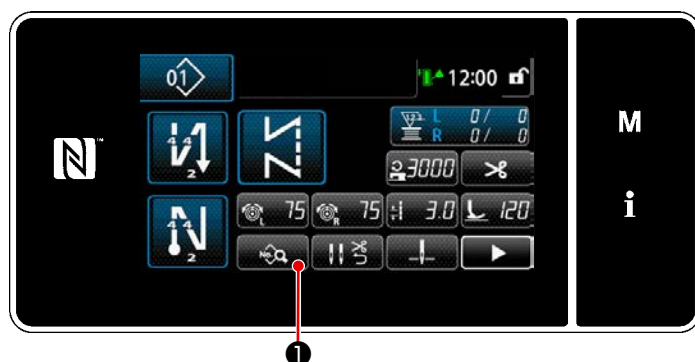
9-4-1. Selecting the custom pattern

Custom patterns that you have created can be selected.

The custom patterns can be used for pattern sewing, reverse feed stitching at the beginning of sewing and reverse feed stitching at the end of sewing.

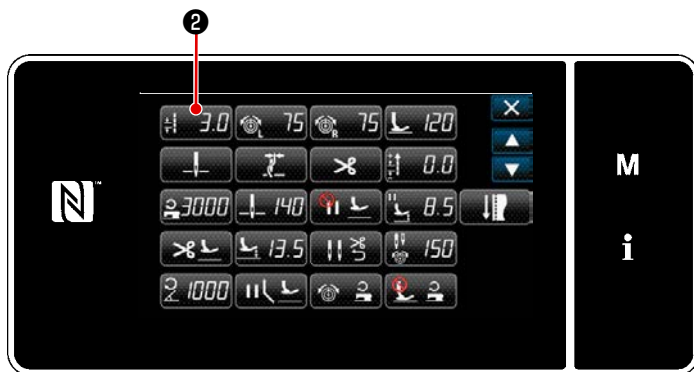
In this paragraph, a custom pattern is applied to a sewing pattern as an example.

① Displaying the stitch length input screen



<Sewing screen (Maintenance personnel mode)>

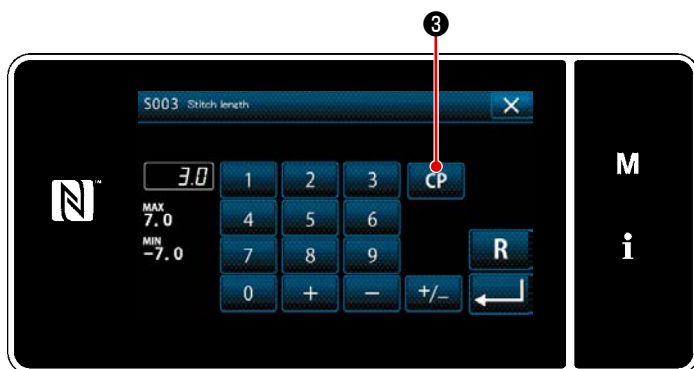
- 1) Press  ① on the sewing screen under the maintenance personnel mode. The "sewing data edit screen" is displayed.



<Sewing data edit screen>

2) Press  3.0 **2** .

The "stitch length input screen" is displayed.

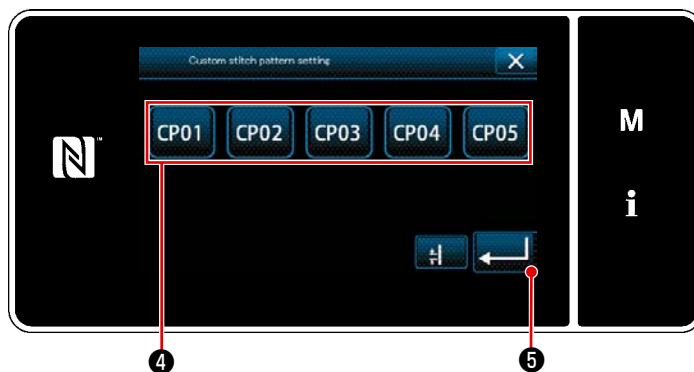


<Stitch length input screen>

3) If there are registered custom patterns  **3** will be displayed.

When  **3** is pressed, the "Custom pattern setting screen" is displayed.

② Selecting a custom pattern



<Custom pattern setting screen>

Registered custom stitch pattern(s) is displayed.

Press  **4** .

Press  **5** to confirm the setting. Return the current screen to the sewing screen (maintenance personnel mode).

9-4-2. Creating a new custom pattern

A new custom pitch pattern creation procedure is described as follows using < Figure: Example of the custom pitch > as an example.

① Selecting the "custom pattern setting" on the mode screen



<Mode screen>

- 1) Press **M** ①.

The "mode screen" is displayed.

- 2) Select the "6. Custom stitch pattern setting".

The "Custom pattern list screen" is displayed.

② Selecting the new custom pattern creation function



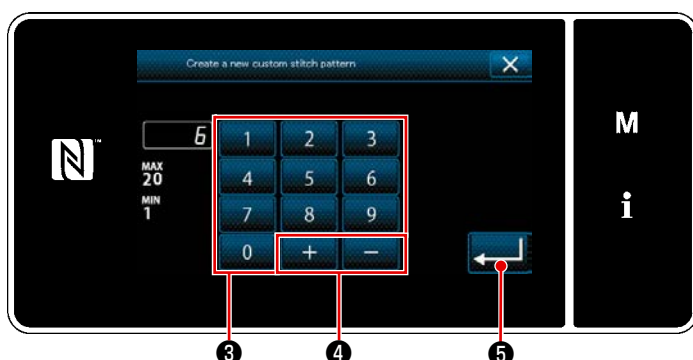
<Custom pattern list screen>

Registered custom stitch pattern(s) is displayed.

- Press **New** ②.

The "New custom pattern creation number input screen" is displayed.

③ Inputting the custom pattern number



<New custom pattern creation number input screen>

- 1) Input the custom pattern number with numeric keypad ③.

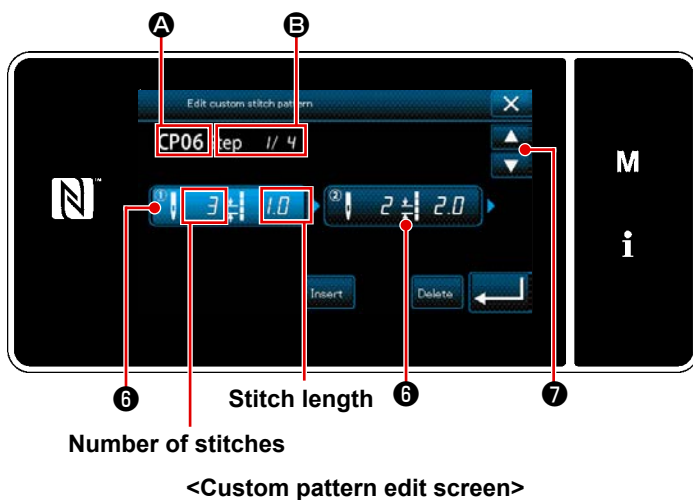
An unassigned registration number that is closest to the entered value in the plus/minus direction is displayed by pressing **+** **-** ④.

- 2) Press **Enter** ⑤.

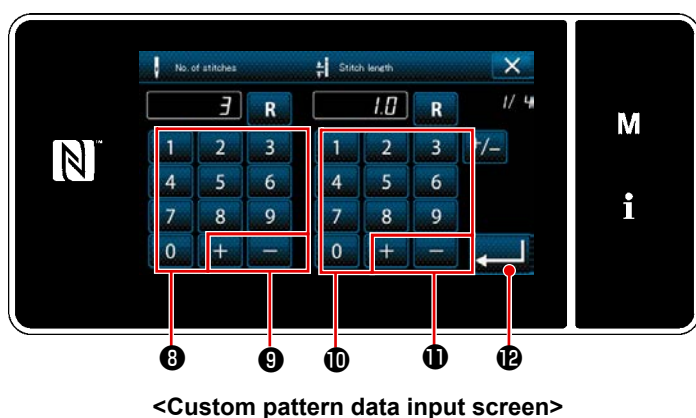
The "Custom pattern edit screen" is displayed.

In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

④ Creating a custom pattern



- 1) When **6** is pressed, the pressed step is in the selected state.
- 2) Selected custom pattern number is displayed in **A**, and the step number that is being edited and the number of all steps are displayed in **B**.
- 3) The "number of stitches" and "stitch length" of the step are displayed in **6**. When **6** is pressed, it is in the selected state. Previous pattern number screen or next pattern number screen will be displayed by pressing  **7**.
- 4) When **6** is pressed while the step is in the selected state, the "Custom pattern data input screen" is displayed.



1. In the case of setting the number of stitches

In this paragraph, an example of entry of a custom pattern shown in < Figure: Example of custom pattern > as an example.

The number of stitches can be input in the range of 1 and 100.

Set the number of stitches for step 1 to 3 with numeric keypad **8** for the number of stitches and  **9**.

Press  **12** to confirm the setting.

2. In the case of setting the stitch length

Possible input range is same as that of "S003 Stitch length".

Set the stitch length for step 1 to 1.0 mm using numeric keypad **10** and  **11**.

Press  **12** to confirm the setting.

3. Carry out the following setting in the similar manner.

The number of stitches for step 2: 2 stitches

Stitch length for step 2: 2.0 mm

The number of stitches for step 3: 1 stitch

Stitch length for step 3: 3.0 mm

The number of stitches for step 4: 2 stitches

Stitch length for step 4: 1.5 mm

⑤ Confirming the numeric value



<Custom pattern edit screen>

After the completion of editing, press  **13** .



<Custom pattern list screen>

Custom pattern value is edited following the steps of procedure described below.

9-4-3. Editing the custom pattern

① Selecting the custom pattern edit function



<Custom pattern edit screen>

Display the "Custom pattern list screen"
Refer to ["9-4-2. Creating a new custom pattern"p.156](#).

② Editing the custom pattern value

Editing the custom pattern value.

Refer to ["9-4-2. Creating a new custom pattern"p.156](#) for the explanation of screen.

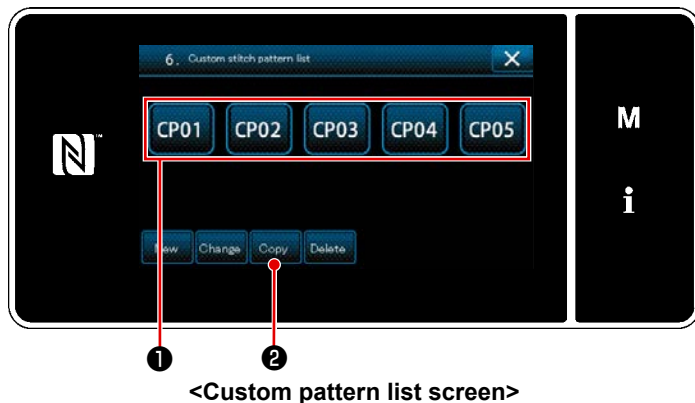
- 1) In the case of setting the number of stitches
The number of stitches can be input in the range from 1 to 100.
Change the number of stitches for step 1 using the numeric keypad and  for the number of stitches.
Press  to confirm the setting.
- 2) In the case of setting the stitch length
Possible input range is same as that of "S003 Stitch length".
Change the stitch length for step 1 using the numeric keypad and  for the stitch length.
Press  to confirm the setting.
- 3) Change the settings for each step in the same manner as described above.

Steps of procedure to be taken after the aforementioned step are same as those described in ["9-4-2. Creating a new custom pattern"p.156](#).

9-4-4. Copying and deleting the custom pattern

(1) Copying the custom pattern

① Displaying the custom pattern list screen



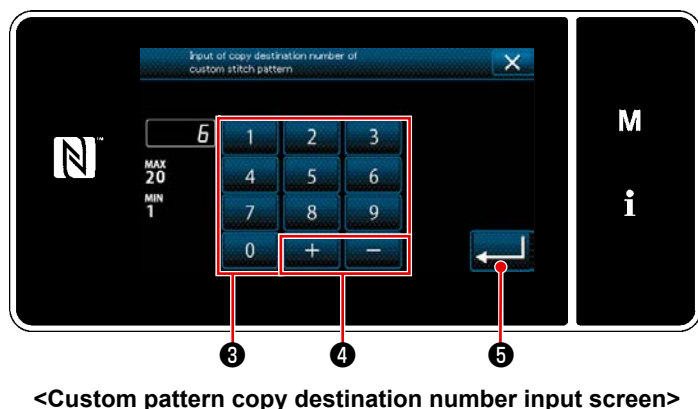
1) Display the "Custom pattern list screen"
Refer to ["9-4-2. Creating a new custom pattern"p.156.](#)

2) Press **CP01** ① of the copy source to put it in the selected state.

3) Press **Copy** ② .

The "custom pattern copy destination number input screen" is displayed.

② Inputting the custom pattern number



1) Enter the number of destination pattern for copying with numeric keypad ③ and

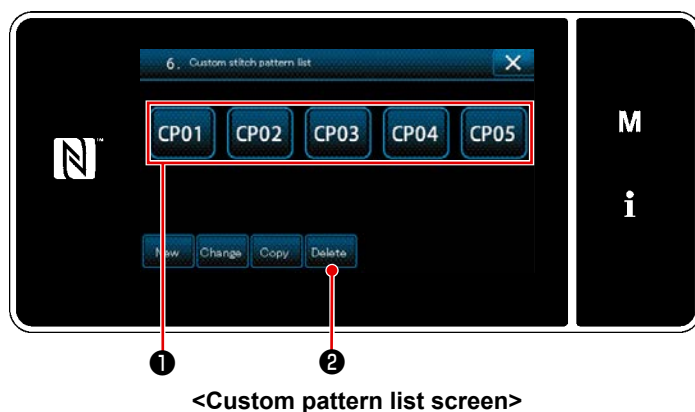
+ **-** ④ .

Press **Enter** ⑤ .

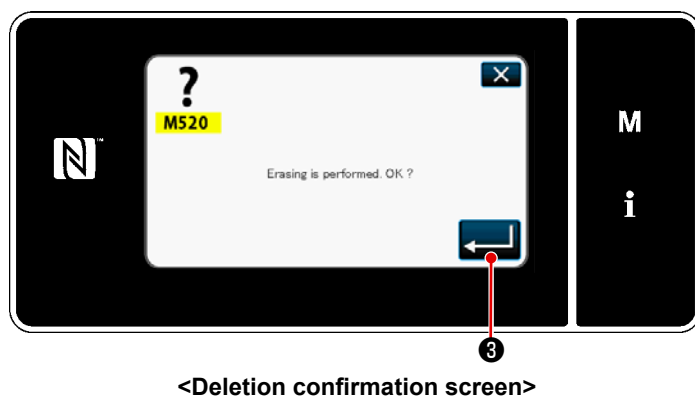
The copied pattern is registered and the screen returns to the "Custom pattern list screen".

In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

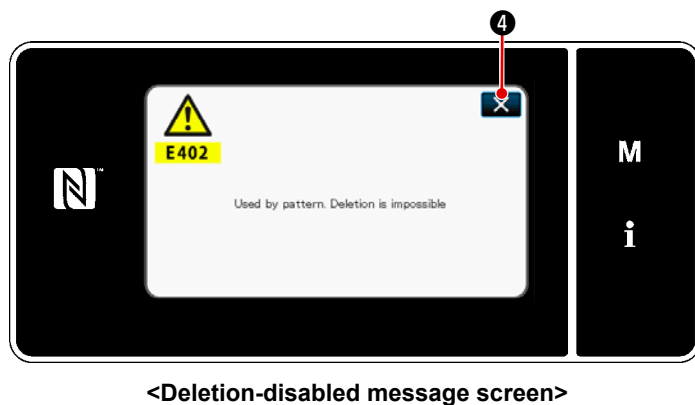
(2) Deleting a custom pattern



- 1) Display the "Custom pattern list screen"
Refer to **"9-4-2. Creating a new custom pattern"** p.156.
- 2) Press **CP01** ① to put the custom pitch to be deleted in the selected state.

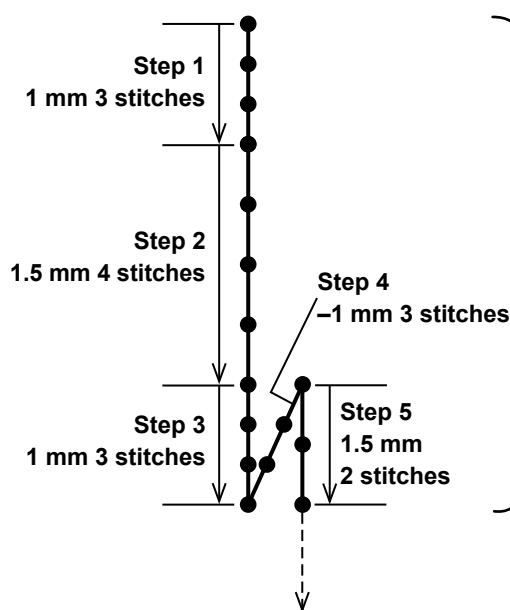


- 3) Press **Delete** ② .
If the custom pattern can be deleted, the "Deletion confirmation screen" will be displayed.
When you press **←** ③ , the operation you have carried out is confirmed and the screen returns to the custom pattern list screen.



- 4) If the custom pattern cannot be deleted (if the custom pattern is used in a standard sewing pattern), the "Deletion-disabled message screen" will be displayed.
When **X** ④ is pressed, the screen returns to the custom pattern screen.

9-5. Condensation custom pattern



<Figure: Example of the condensation custom>

Condensation stitches can be sewn while specifying needle entry points as desired, by setting a condensation custom. As many as 20 steps can be created in one pattern. The maximum number of patterns that can be registered is nine.

Condensation custom pattern



1. With some combinations of stitch length, direction of feed and sewing speed, the sewing machine may fail to finish a sewing pattern exactly according to the settings.
2. Needle cannot be entered to the same needle entry point when the stitch length is set to 0.0 mm.

9-5-1. Selecting the condensation custom

Select condensation custom pattern Refer to **"5-2-3. (2) ◆In the case of maintenance personnel mode" p.47.**

The condensation custom pattern for reverse-feed stitching at the end of sewing can be set in the similar manner.

9-5-2. Creating a new condensation custom

A new condensation custom pattern creation procedure is described as follows using <Figure: Example of the condensation custom> as an example.

① Selecting the condensation custom pattern setting on the mode screen



<Mode screen>

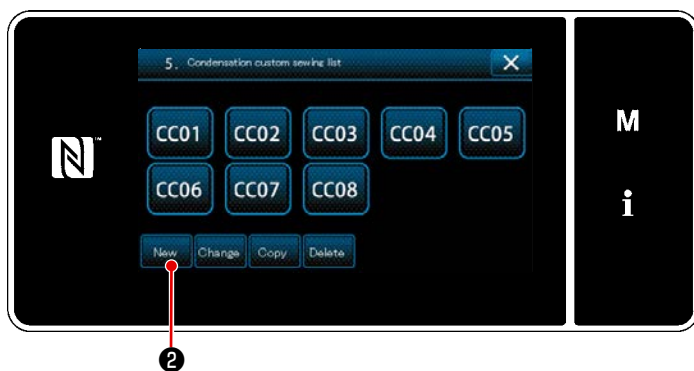
- 1) Press **M** ①.

The "mode screen" is displayed.

- 2) Select the "5. Condensation custom sewing setting".

The "condensation custom pattern list screen" is displayed.

② Selecting the new condensation custom creating function



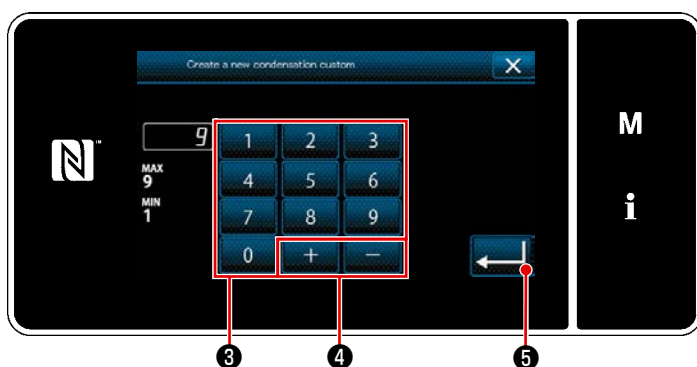
<Condensation custom pattern list screen>

- 1) Registered condensation custom patterns are displayed on the screen.

Press  ②.

The "new condensation custom pattern creation pattern number input screen" is displayed.

③ Inputting the condensation custom number



<New condensation custom pattern creation pattern number input screen>

- 1) Enter the pattern number with numeric keypad ③.

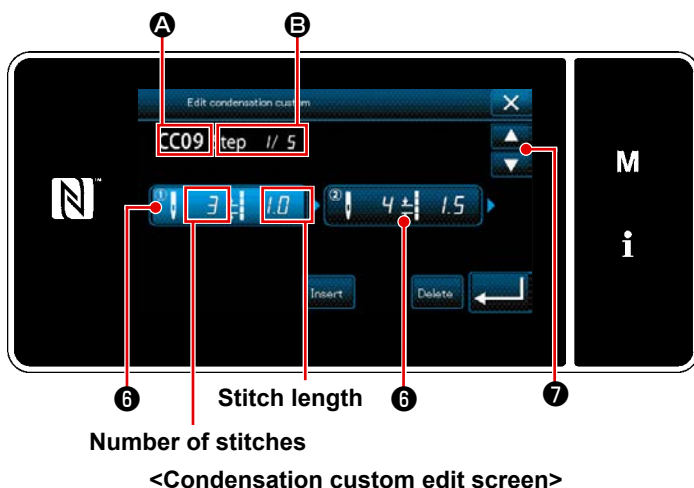
An unassigned registration number that is closest to the entered value in the plus/minus direction is displayed by pressing  ④.

- 2) Press  ⑤.

The "condensation custom edit screen" is displayed.

In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

④ Creating a condensation custom



Number of stitches

<Condensation custom edit screen>

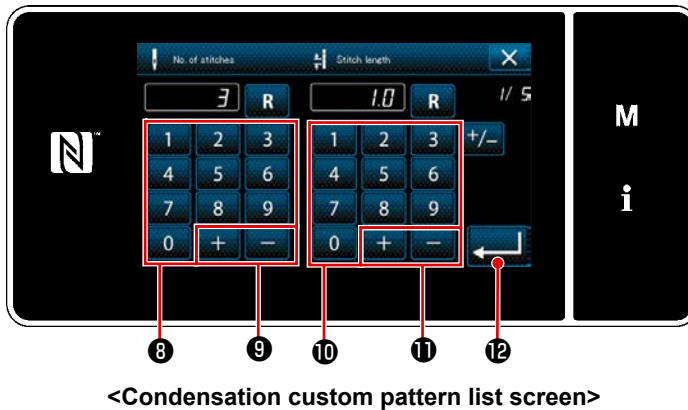
- 1) Press ⑥ to put the step you have pressed in the selected state.
- 2) The selected condensation custom number is displayed in A and the step number which is being edited, and the total number of steps are displayed in B.

- 3) The "number of stitches" and "stitch length" for the step are displayed in ⑥. Press ⑥ to put the displayed data in the selected state.

Previous step number screen or the next step number screen is displayed

with  ⑦.

- 4) "Condensation custom data input screen" is displayed by pressing ⑥ while the step is being selected.



1. In the case of setting the number of stitches
Condensation custom pattern input procedure is described as follows using < Figure: Example of the condensation custom pattern > as an example.
The number of stitches can be input in the range from 1 to 100.
Set the number of stitches for step 1 to 3 with numeric keypad 8 + - 9 .
Press 12 to confirm the setting.

2. In the case of setting the stitch length
Possible input range is same as that of "S003 Stitch length".
Set the stitch length for step 1 to 1.0 mm using numeric keypad 10 and + - 11 .
Press 12 to confirm the setting.

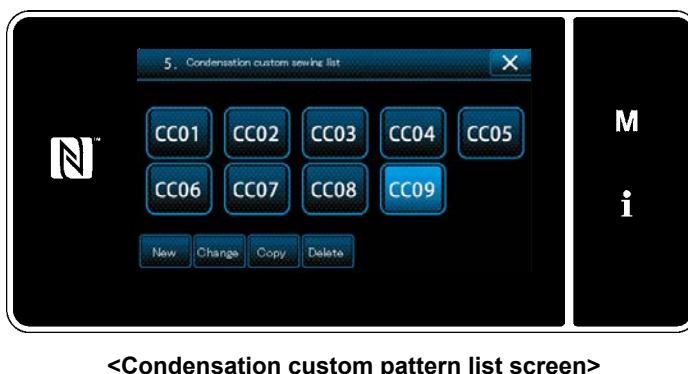
A negative number of stitches can also be set. In this case, the direction of feed is reverse direction.

3. Carry out the following setting in the similar manner.
The number of stitches for step 2: 4 stitches
Stitch length for step 2: 1.5 mm
The number of stitches for step 3: 3 stitches
Stitch length for step 3: 1.0 mm
The number of stitches for step 4: 3 stitches
Stitch length for step 4: -1.0 mm
The number of stitches for step 5: 2 stitches
Stitch length for step 5: 1.5 mm

⑤ Confirming the numeric value



Press 12 to confirm the setting.



The condensation custom list screen is displayed with the condensation custom number you have created added.

9-5-3. Condensation custom edit function

① Selecting the condensation custom edit function



<Condensation custom edit screen>

Display the "Condensation custom pattern list screen" Refer to **"9-5-2. Creating a new condensation custom"p.162.**

② Editing the condensation custom value

In this section, procedure for editing the condensation custom value is described.

Refer to **"9-5-2. Creating a new condensation custom"p.162** for the explanation of screen.

- 1) In the case of setting the number of stitches

The number of stitches can be input in the range from 1 to 100.

Change the number of stitches for step 1 using the numeric keypad and   or the number of stitches.

Press  to confirm the setting.

- 2) In the case of setting the stitch length

Possible input range is same as that of "S003 Stitch length".

Change the stitch length for step 1 using the numeric keypad and   the stitch length.

Press  to confirm the setting.

* A negative number of stitches can also be set. In this case, the direction of feed is reverse direction.

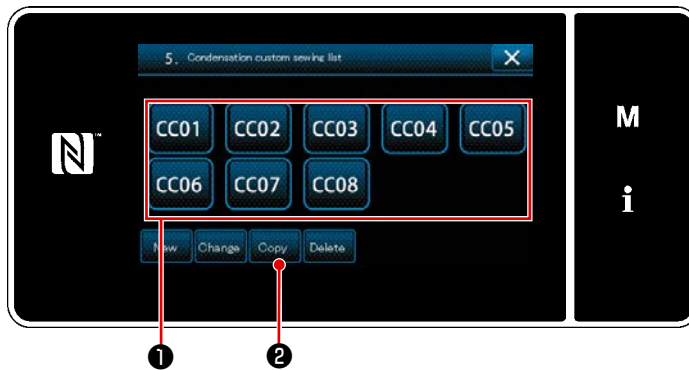
- 3) Change the settings for each step in the same manner as described above.

Steps of procedure to be taken after the aforementioned step are same as those described in **"9-5-2. Creating a new condensation custom"p.162.**

9-5-4. Copying/deleting a condensation custom

(1) Copying a condensation custom

① Displaying the condensation custom pattern list screen

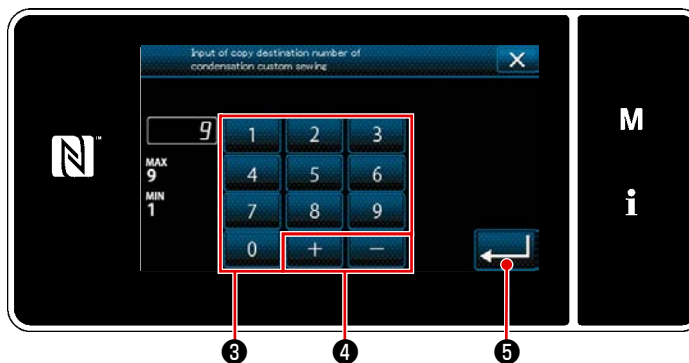


<Condensation custom pattern list screen>

- 1) Display the "condensation custom pattern list screen" Refer to **"9-5-2. Creating a new condensation custom"p.162.**
- 2) Press **CC01** ① of the copy source to put it in the selected state.
- 3) Press **Copy** ② .

The "condensation custom copy destination number input screen" is displayed.

② Inputting the condensation custom pattern number



<Condensation-custom pattern copy destination number input screen>

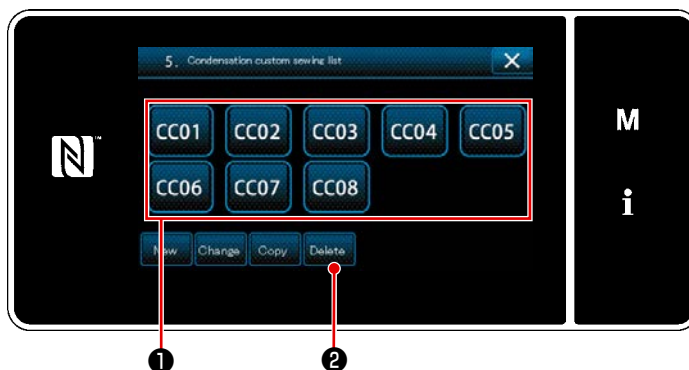
- 1) Enter the number of destination pattern for copying with numeric keypad ③ and **+** ④ .

- 2) Press **Enter** ⑤ .

Copied pattern is registered and the screen returns to the "Condensation custom pattern list screen".

In the case the entered number has already been registered, the prompt message for overwrite confirmation is displayed.

(2) Deleting a condensation custom



<Condensation custom pattern list screen>

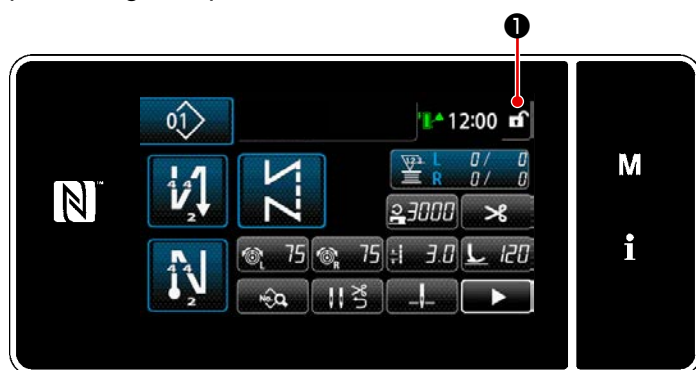
- 1) Display the "condensation custom pattern list screen" Refer to **"9-5-2. Creating a new condensation custom"p.162.**
- 2) Press **CC01** ① to put the custom pitch to be deleted in the selected state.
- 3) Press **Delete** ② .

The "deletion confirmation screen" is displayed.

Press **Enter** to confirm the setting.

9-6. Simple lock of the screen

Once the simple lock is enabled, operation of the buttons displayed on the screen is disabled, thereby preventing maloperation.



<Sewing screen>

Simple lock is activated by keeping  ① held pressed for one second on the sewing screen.

Pictograph display ① will be as shown below:

 : Simple lock is enabled

 : Simple lock is disabled

* It is possible to set so that the simplified lock is automatically activated according to the elapsed time. (With memory switch U402)

Refer to ["5-5. List of memory switch data"p.79](#) for details.

9-7. Version information



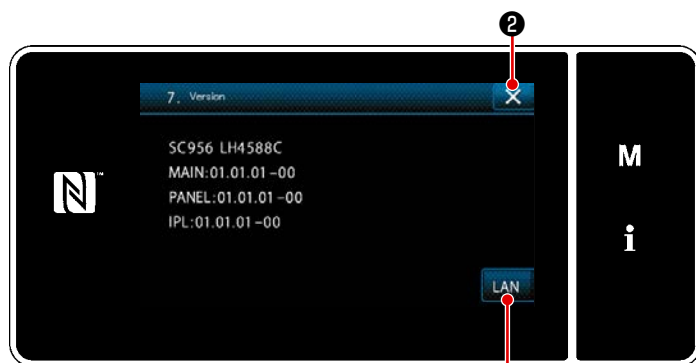
<Mode screen>

1) Press  ①.

The "mode screen" is displayed.

2) Select the "7. Version".

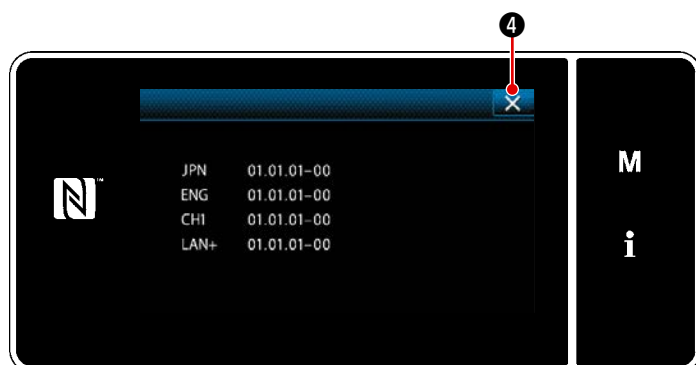
The "version information screen" is displayed.



<Version information screen>

3) The screen returns to the previous screen by pressing  ②.

When  ③ is pressed, the "communication version information screen" is displayed.



<Communication version information screen>

4) When  ④ is pressed on the "communication version information screen", the screen returns to the "version information screen".

9-8. Adjustment of brightness of the LED panel

Screen brightness of the LED panel can be changed.

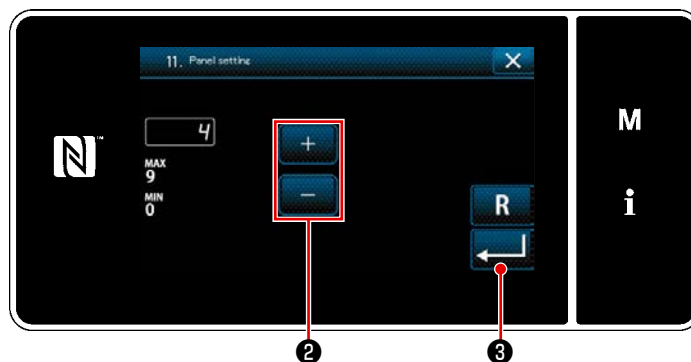


<Mode screen>

- 1) Keep **M** ① held pressed for three second.

The "mode screen" is displayed.

- 2) Select the "11. Panel setting".
The "operation panel setting screen" is displayed.



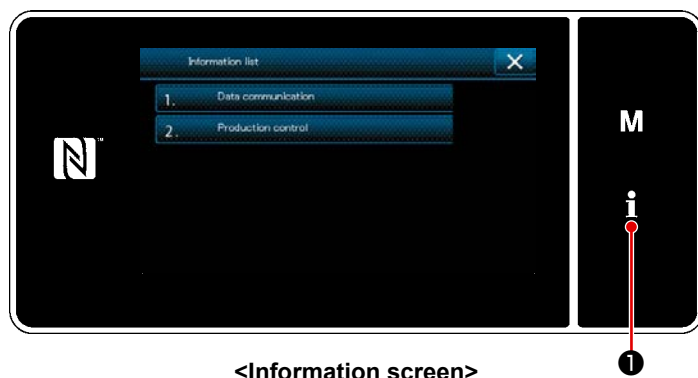
<Operation panel setting screen>

- 3) Brightness of the operation panel is

adjustable with  ② .

- 4) Press  ③ to confirm the setting.
Return the "mode screen".

9-9. Information



Press  ①.

The "information screen" is displayed.

Data communication and production management are carried out on the information screen.

9-9-1. Data communication

Data can be input/output by means of a USB thumb drive.

Data that can be handled on the information screen is as follows:

Data name	Extension	Description of data
Sewing data	LH00xxx.EPD (xxx:001 to 999)	Model-specific sewing data format of the sewing pattern shape, number of stitches, etc. created on the sewing machine.
Custom pattern data	VD00xxx.VDT (xxx:001 to 999)	The data format that can be operated in common between JUKI sewing machines.
Condensation custom data	VD00XXX.VDT (xxx:001 to 999)	The data format that can be operated in common between JUKI sewing machines.

(1) Communication method

① Selecting the data format used for communication



<Information screen>

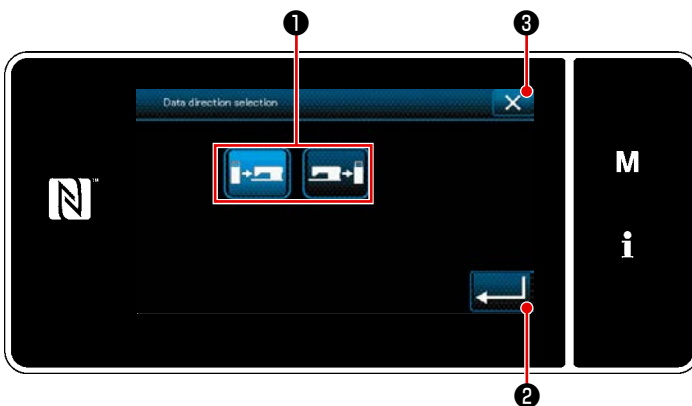
- 1) Select "1. Data communication" on the "information screen".
The "data communication list screen" is displayed.



<Data communication list screen>

- 2) Select the transmitting/receiving data format and press the selected data format button.
For example, select "1. EPD data transmission/reception".
The "data direction selection screen" is displayed.

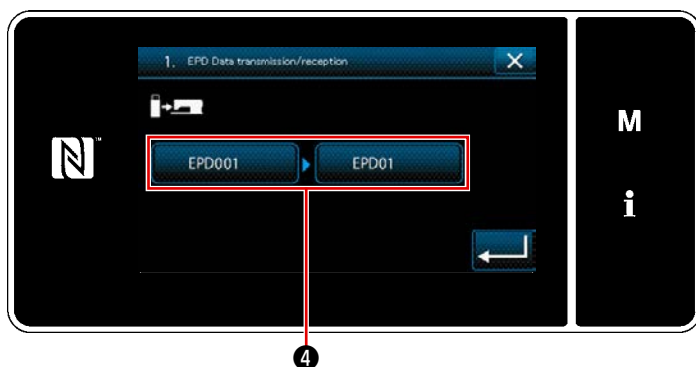
② Selecting the communication direction



<Data direction selection screen>

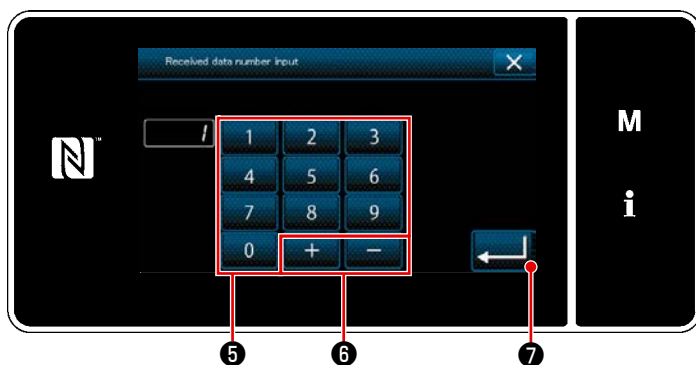
- Select the communication direction. Press button ① to put the communication direction in the selected state.
- Press  ② to confirm the setting.
- The "data transmission/receipt preparation screen" is displayed.
- Cancel the operation with  ③. The current screen returns to the previous screen.

③ Setting the data number and starting communication



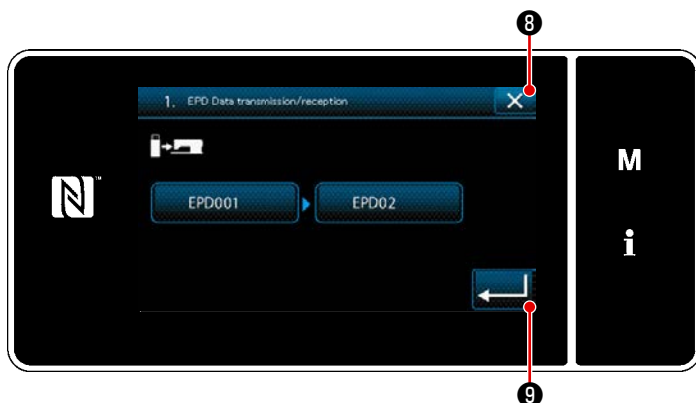
<Data transmission/receipt preparation screen>

- 1) Press data number button ④ .
The "data number input screen" is displayed.



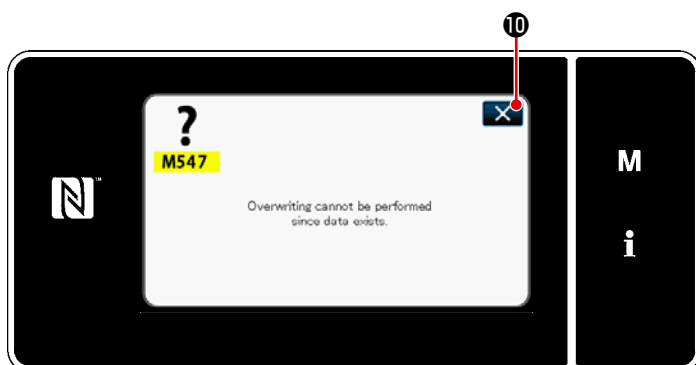
<Data number input screen>

- 2) Enter the source/destination data number with numeric keypad ⑤ and  ⑥ .
Press  ⑦ to confirm the setting.
The "data transmission/receipt preparation screen" is displayed.



<Data transmission/receipt preparation screen>

- 3) Confirm the numeric value with  ⑨ to start communication.
"During communication" screen is displayed while the communication is being carried out.
Cancel the operation with  ⑩ .



<Overwrite-disabled message screen>

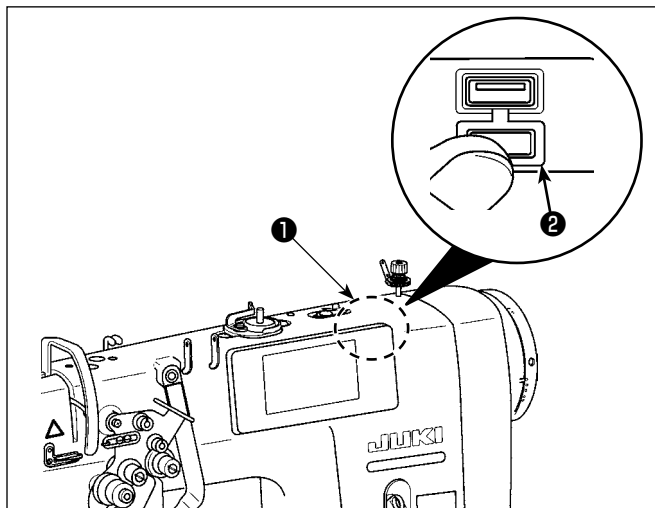
- * If the pattern number you have input has already been registered in the receiving side, the "Overwrite-disabled message screen" will be displayed.
When  ⑩ is pressed, the screen returns to the data transmitting / receiving preparation screen.

9-9-2. USB

Sewing data, custom pattern data and condensation custom data can be copied on a commercially-available USB thumb drive.

Refer to "**9-9-1. Data communication**"p.169 for details of how to copy the sewing data on a USB thumb drive.

① Position of the USB connector



[USB thumb drive insertion position]

The USB connector is provided on top ① of the operation panel.

To use a USB thumb drive, remove connector cover ② and insert the USB thumb drive into the USB connector.

- * In the case a USB thumb drive is not used, the USB connector should be protected with connector cover ② without exceptions.

If dust or the like enters the USB connector, a failure can be caused.

② Precautions to be taken when handling USB devices

- Do not connect to the USB connection terminal other than the USB memory.
It may cause failure.
- Do not leave the USB device or USB cable connected to the USB port while the sewing machine is in operation. The machine vibration can damage the port section resulting in loss of data stored on the USB device or breakage of the USB device or sewing machine.
- Do not insert/remove a USB device during reading a program or sewing data.
It may cause data breakage or malfunction.
- When the storage space of a USB device is partitioned, only one partition is accessible.
- Never forcefully insert a USB thumb drive into the USB connector while carefully checking the orientation of the USB thumb drive. Forceful insertion of the USB thumb drive can cause failure.
- JUKI does not compensate for loss of data stored on the USB device caused by using it with this sewing machine.
- In principle, connect only one USB thumb drive to the operation panel. When two or more devices/media are connected/inserted, the machine will only recognize one of them. Refer to the USB specifications.
- Do not turn the power OFF while the data on the USB flash drive is being accessed.

③ USB specifications

- Conform to USB 1.1 standard
- Applicable devices *1..... USB memory
- Format supported FAT 12, FAT 16, FAT 32
- Applicable medium size .. 4.1MB to 2TB
- Consumption current The rated consumption current of the applicable USB devices is 500 mA at the maximum.

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

9-9-3. NFC

The operation panel supports NFC (Near Field Communication).

Sewing data, maintenance information or the like can be viewed, edited, copied, etc., on an Android terminal (such as tablet and smartphone) on which JUKI application for Android "JUKI Smart App" has been installed, by means of the NFC communication function.

Refer to the Instruction Manual for JUKI Smart App for details of JUKI application for Android "JUKI Smart App".

① Position of the NFC antenna



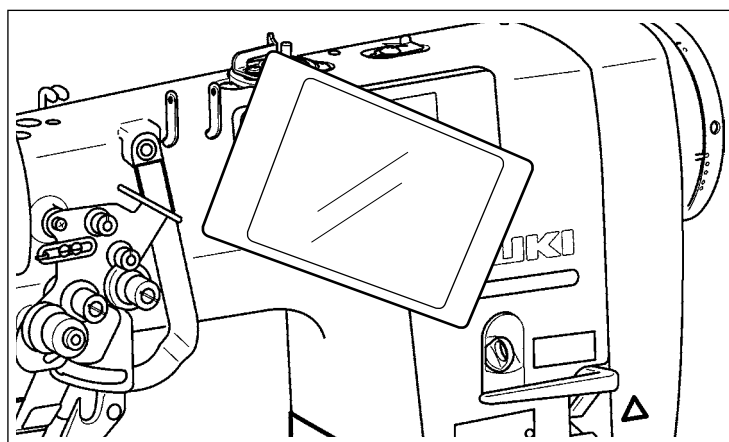
<Fig.1>

[Position of the NFC antenna]

To conduct the NFC (near field communication) between the sewing machine and the tablet or smartphone, bring the tablet or smartphone to NFC mark ❶ on the operation panel as illustrated in Fig. 2, and hold it there until the data is displayed.

- * If the NFC communication has failed, error message will be displayed on the tablet/smartphone screen.

When the error message is displayed on the screen, carry out the NFC communication again.



<Fig.2>

② Precautions to be taken when handling NFC

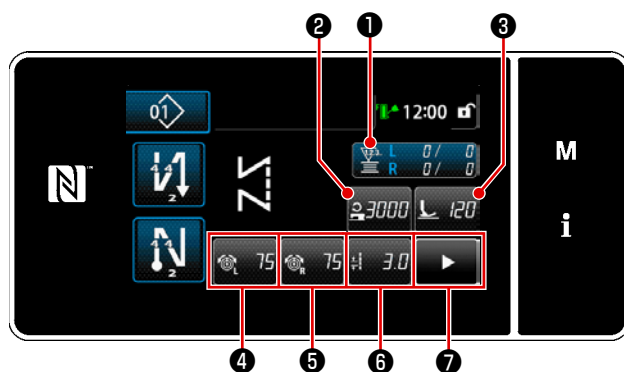
- The position of the NFC antenna varies according to the tablet/smartphone used. Be sure to read the instruction manual of your device before using the NFC communication function.
- To use the NFC communication function, place the NFC communication function setting in "Enable" while Refer to the instruction manual for your tablet/smartphone.
- If you use the NFC while the main body of sewing machine is being started, a malfunction can occur.

9-10. Key customization

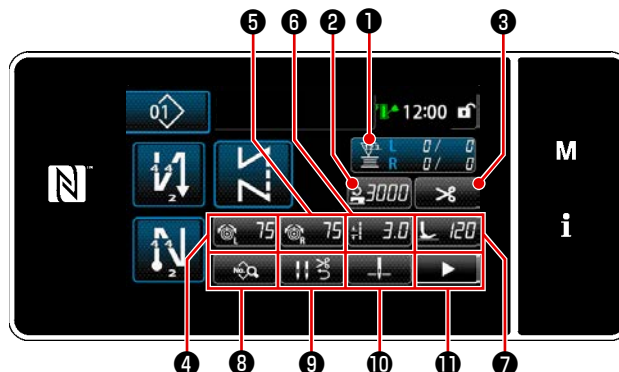
It is possible to register a desired function to a key to customize the peel key arrays. Functions that can be assigned to panel keys are as described below.

The key to which no function is assigned is displayed in blank.

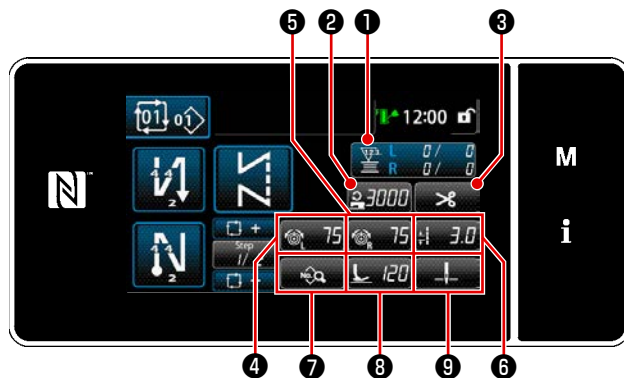
9-10-1. Assignable data



<Sewing screen (Operator mode)>



<Sewing screen (Maintenance personnel mode)>



<Sewing screen (Cycle mode)>

	Initial value			Assignable data
	Operator mode	Maintenance personnel mode	Cycle mode	
①	Counter	Counter	Counter	Sewing pattern data Sewing pattern number Cycle pattern number Memory switch One-touch changeover Bobbin winding Sewing adjustment Counter Function is not provided
②	Sewing speed	Sewing speed	Sewing speed	Sewing pattern data Sewing pattern number Cycle pattern number Memory switch One-touch changeover Bobbin winding Sewing adjustment Function is not provided
③	Presser foot pressure	Thread trimming	Thread trimming	
④	Needle thread tension (left)	Needle thread tension (left)	Needle thread tension (left)	
⑤	Needle thread tension (right)	Needle thread tension (right)	Needle thread tension (right)	
⑥	Stitch length	Stitch length	Stitch length	
⑦	Thread trimming	Presser foot pressure	Sewing data list	
⑧		Sewing data list	Presser foot pressure	
⑨		Thread pressure	Needle bar stop position	
⑩		Needle bar stop position		
⑪		2nd sewing screen		

9-10-2. How to assign a function to a key

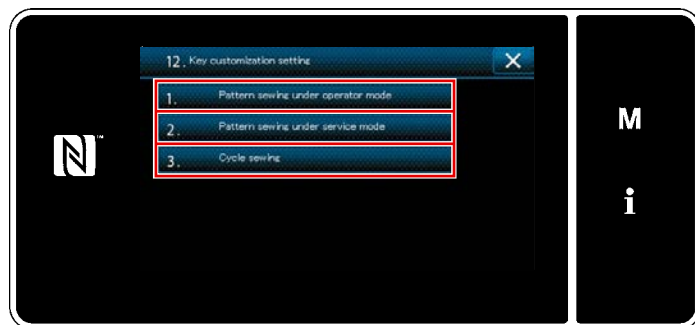
① Displaying the key customization mode list screen



<Mode screen>

- 1) Keep **M** ① held pressed for three second.
The "mode screen" is displayed.
- 2) Select the "12. Key customization setting".
The "key customization mode list screen" is displayed.

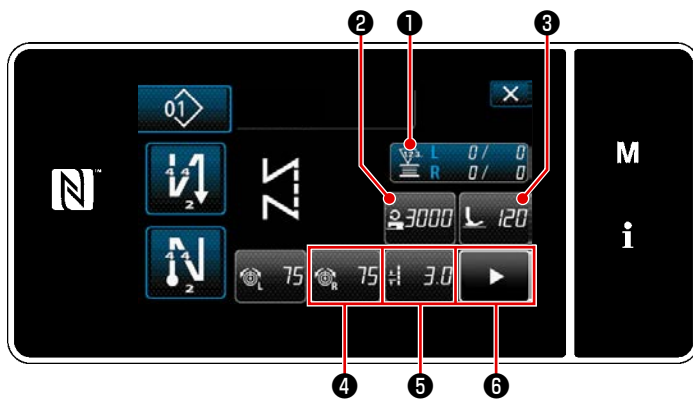
② Setting the key customization



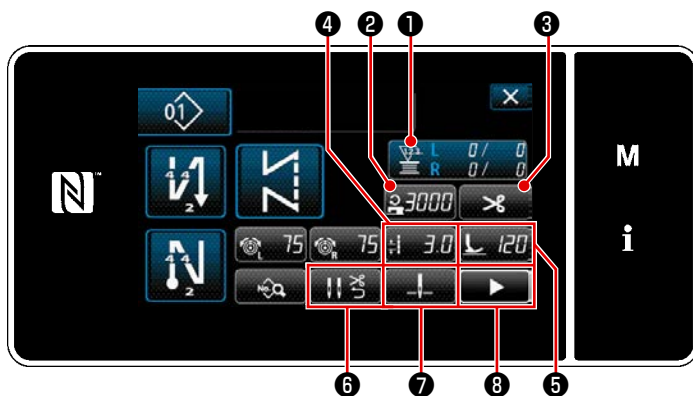
<Key customization mode list screen>

- 1) Select "1. Pattern sewing under operator mode". Then, "key customization assignment screen (operator mode)" is displayed.
- 2) Select "2. Pattern sewing under service mode". Then, "key customization assignment screen (Maintenance personnel mode)" is displayed.
- 3) Select "3. Cycle sewing". Then, "key customization assignment screen (Cycle mode)" is displayed.

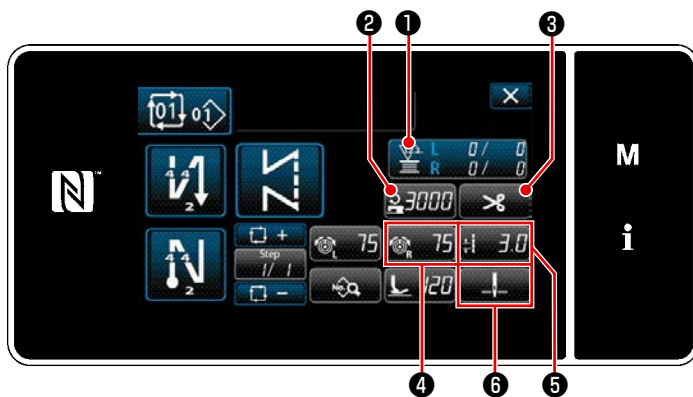
③ Selecting a function to be assigned



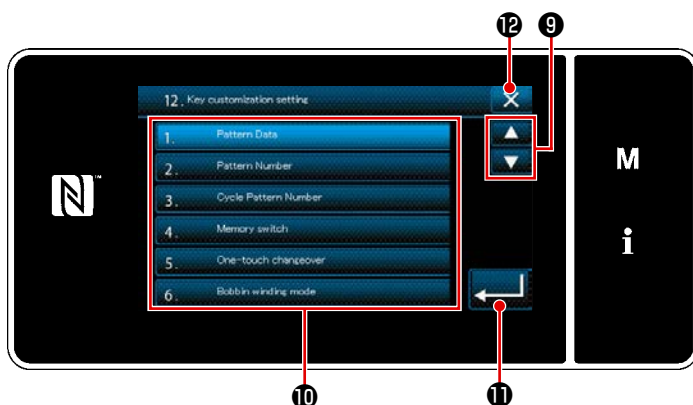
<Key customization assignment screen (Operator mode)>



<Key customization assignment screen
(Maintenance personnel mode)>



<Key customization assignment screen (Cycle mode)>



<Key customization assignment screen>

When one of the buttons ② to ⑧ (② to ⑥ for the operator mode or cycle mode), the "Key customization selection screen" is displayed.

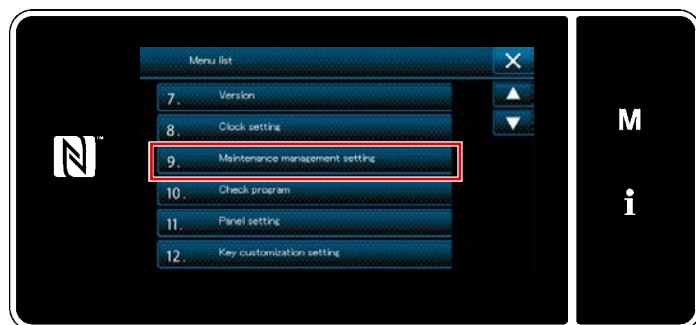
- 1) Press  ⑨ to select the function.
Then, press the target function button ⑩ to allocate the function to ② to ⑧ (② to ⑥ for the operator mode or cycle mode).
- 2) The counter button is respectively displayed by pressing ① .
- 3) Press  ⑪ to confirm the setting.
Cancel the operation with  ⑫ . The current screen returns to the previous screen.

9-11. Maintenance management function

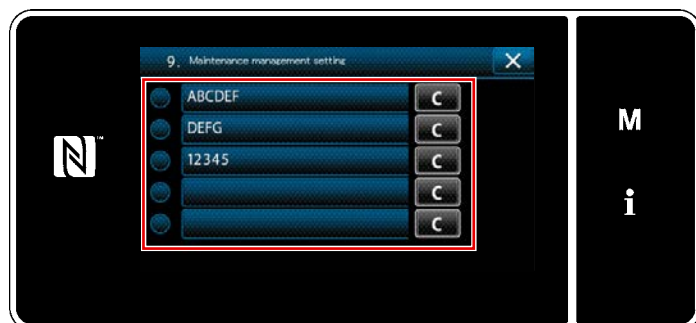
When the set value for the counter is reached, this function gives a warning on the screen. As many as five different set values can be registered for warning.



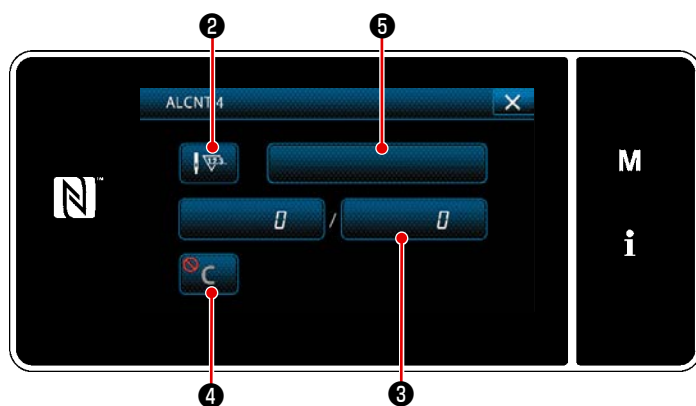
- 1) Keep **M** **1** held pressed for three second.
The "mode screen" is displayed.



- 2) Select "9. Maintenance management setting".

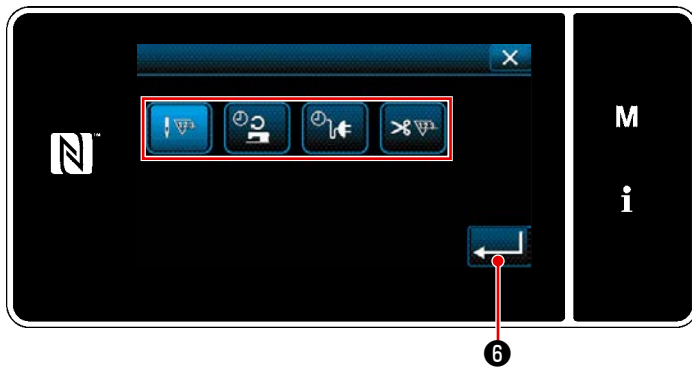


- 3) When the counter for which the set value for warning is selected, the "warning counter setting screen" is displayed.



- 4) When **23** **2** is pressed, the "warning counter type selection screen" is displayed.

<Warning counter setting screen>



<Warning counter type selection screen>

- 5) Select the setting condition of the warning counter.



: Number of stitches (Unit: 1000 stitches)



: Operating time (Unit: Hours)

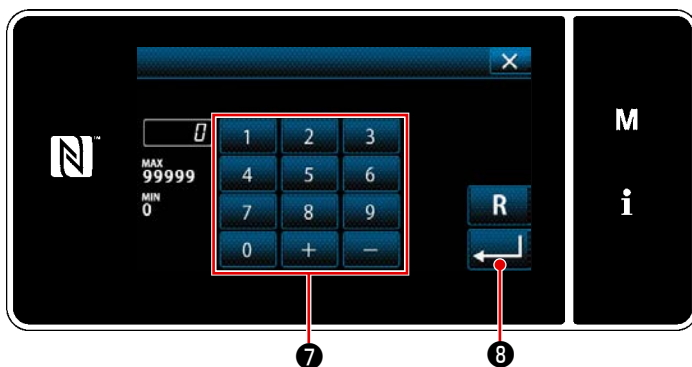


: Energizing time (Unit: Hours)



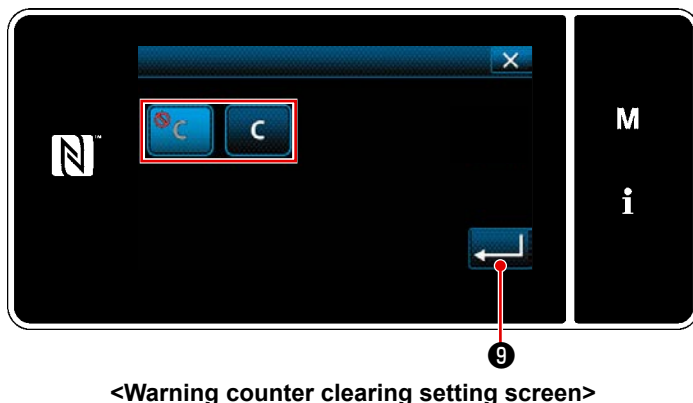
: Number of times of thread trimming (Unit: Number of times)

- 6) When  6 is pressed, the operation is confirmed. Then, the screen returns to the "warning counter setting screen".



<Warning counter set value input screen>

- 7) When 3 on the "warning counter setting screen" is pressed, the "warning counter set value input screen" is displayed.
- 8) Input the warning counter set value with numeric keypad 7 .
- 9) When  8 is pressed, the operation is confirmed. Then, the screen returns to the "warning counter setting screen".



<Warning counter clearing setting screen>

- 10) When ④ on the "warning counter setting screen" is pressed, the "warning counter clearing setting screen" is displayed.
- 11) Select enable/disable of the warning counter clearing displayed on the warning screen.

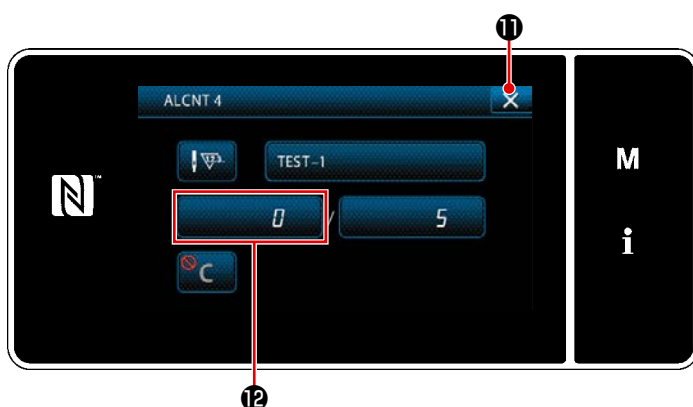
 : Disable (Current-value clear key is not displayed on the warning screen)

 : Enable (Current-value clear key is displayed on the warning screen)

- 12) When  ⑨ is pressed, the operation is confirmed. Then, the screen returns to the "warning counter setting screen".

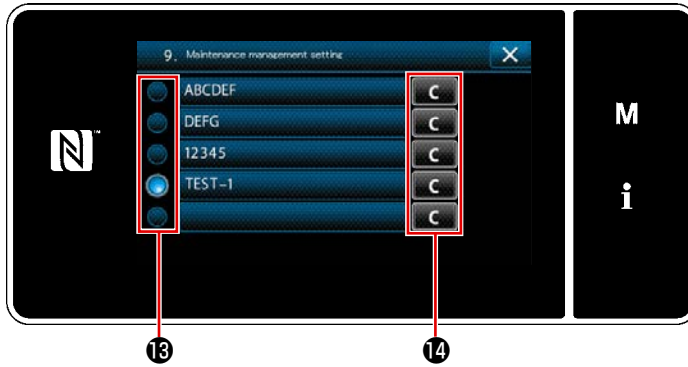


- 13) When ⑤ on the "warning counter setting screen" is pressed, the "keyboard" is displayed.
- 14) Enter a name of the warning counter.
- 15) When  ⑩ is pressed, the operation is confirmed. Then, the screen returns to the "warning counter setting screen".



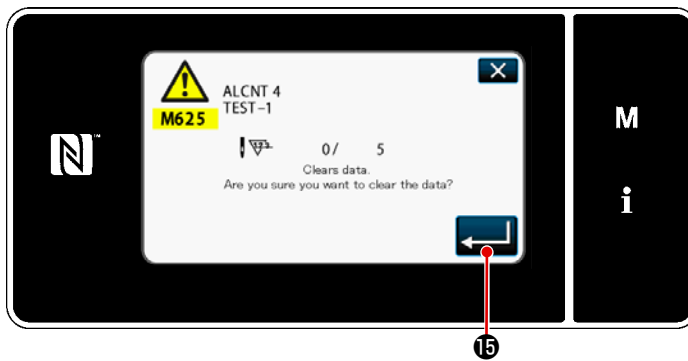
- 16) When  ⑪ is pressed, the operation is confirmed. Then, the screen returns to the "maintenance management setting screen".

* When the sewing machine performs sewing after the warning counter has been set, number of counts is displayed in ⑫ .

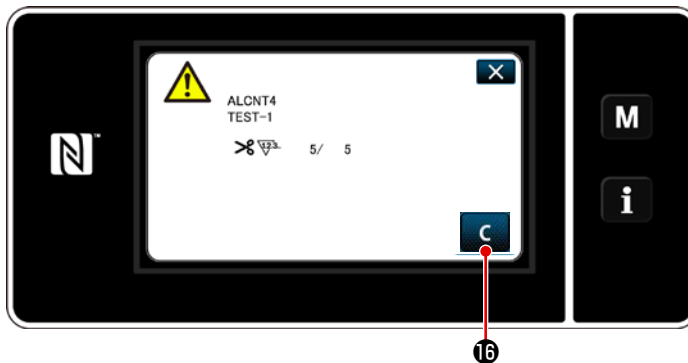


17) The warning counter selected with a checkmark 13 in is enabled.

18) When the relevant "C" button in 14 is pressed, the number of counts displayed in the corresponding counter field can be cleared.



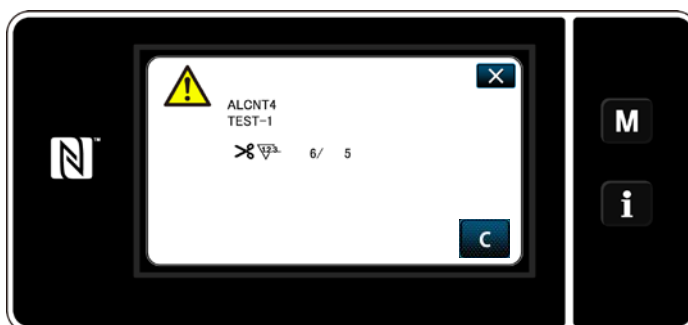
19) When 15 is pressed, the operation is confirmed. Then, the screen returns to the "maintenance management screen".



20) When the preset number of counts for the counter is reached, the warning screen is displayed.

21) Clear the number of counts by pressing 16.

* If (disable) is selected in item number 10), 16 will not be displayed.



22) If the number of counts of the counter is not cleared, the warning screen will be displayed again at the time of next count.

10. QUICK REFERENCE CHART ACCORDING TO STITCH PITCH GAUGE (CONVERSION TABLE OF "1 PITCH/MM")

1/8" (3.17 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40		4.4	2.9	2.2	1.7	1.5			
50		3.4	2.3	1.7					
60		2.7	1.8						
70	4.5	2.3	1.5						
80	3.8	1.9							
90	3.2	1.6							
100	2.6								

5/32" (3.96 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40			3.6	2.7	2.2	1.8	1.6		
50		4.2	2.8	2.1	1.7				
60		3.4	2.3	1.7					
70		2.8	1.9						
80	4.7	2.4	1.6						
90	4.0	2.0							
100	3.3	1.7							

3/16" (4.76 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40				3.3	2.6	2.2	1.9	1.6	1.5
50			3.4	2.6	2.0	1.7	1.5		
60			2.7	2.1	1.6	1.4			
70		3.4	2.3	1.7	1.4				
80		2.8	1.9	1.4					
90	4.8	2.4	1.6						
100	4.0	2.0							

7/32" (5.56 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40			5.1	3.8	3.1	2.5	2.2	1.9	1.7
50			4.0	3.0	2.4	2.0	1.7	1.5	
60		4.8	3.2	2.4	1.9	1.6			
70		4.6	2.6	2.0	1.6				
80		3.3	2.2	1.9	1.4				
90	5.6	2.8	1.9	1.4					
100	4.7	2.3	1.6						

1/4" (6.35 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40				4.4	3.5	2.9	2.5	2.2	2.0
50			4.6	3.4	2.8	2.3	2.0	1.7	1.6
60			3.7	2.8	2.2	1.9	1.6		
70		4.6	3.1	2.3	1.9	1.6			
80		3.8	2.6	1.9	1.6				
90		3.2	2.2	1.6					
100		2.7	1.8						

9/32" (7.14 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40				4.9	3.9	3.3	2.8	2.5	2.2
50			5.1	3.8	3.1	2.6	2.2	1.9	1.7
60			4.1	3.1	2.5	2.1	1.8	1.5	
70		5.1	3.4	2.5	2.0	1.7	1.5		
80		4.3	2.8	2.1	1.7	1.4			
90		3.6	2.4	1.8	1.4				
100		3.0	2.0	1.5					

5/16" (6.35 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40					4.4	3.7	3.2	2.8	2.5
50				4.3	3.4	2.9	2.5	2.2	1.9
60			4.6	3.5	2.8	2.3	2.0	1.7	1.5
70			3.8	2.9	2.3	1.9	1.7	1.5	
80		4.8	3.2	2.4	1.9	1.6			
90		4.0	2.7	2.0	1.6				
100		3.4	2.6	1.7					

3/8" (9.52 mm)

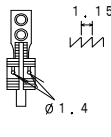
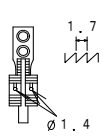
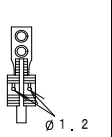
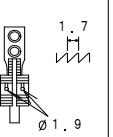
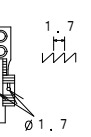
Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40						4.4	3.7	3.3	2.9
50					4.1	3.4	2.9	2.6	2.3
60				4.1	3.3	2.7	2.4	2.1	1.8
70			4.5	3.4	2.7	2.3	1.9	1.7	
80			3.8	2.8	2.3	1.9	1.6		
90		4.8	3.2	2.4	1.9	1.6			
100		4.0	2.7	2.0	1.6				

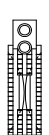
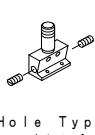
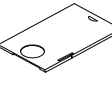
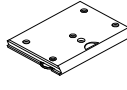
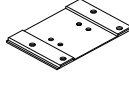
1/2" (12.7 mm)

Number of stitches \ Angle	1	2	3	4	5	6	7	8	9
40						5.8	5.0	4.4	3.9
50					5.5	4.5	3.9	3.4	3.0
60				5.5	4.4	3.7	3.1	2.8	2.4
70				4.5	3.6	3.0	2.6	2.3	2.0
80			5.1	3.8	3.1	2.5	2.2	1.9	1.7
90			4.2	3.2	2.5	2.1	1.8	1.6	1.4
100		5.3	3.6	2.7	2.1	1.8	1.5	1.3	

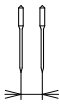
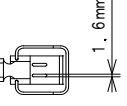
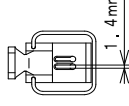
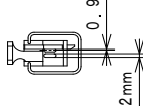
11. GAUGE PARTS LIST

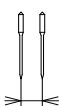
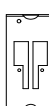
[LH-4578C F type] (1)

Needle gauge size 針 幅			Feed Dog 送 り 歯											
Code コード*			 1.15 Option オフ' ション Ø1.4		 1.7 Ø1.4		 Ø1.2		 1.7 Ø1.9		 1.7 Ø1.7			
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.		
B	1/8	3.2	1	402-32780	7	402-32781	13	400-33715		—		—		
C	5/32	4.0		—		—	14	400-33716	26	226-30206	43	400-25784		
D	3/16	4.8	2	400-35884	8	400-33564	15	400-33718	27	226-30404	44	400-25785		
E	7/32	5.6	3	400-35885	9	400-33565		—	28	226-30503	45	400-25786		
F	1/4	6.4	4	400-35886	10	400-33566	16	400-33720	29	226-30602	46	400-25787		
G	9/32	7.1	5	400-35887	11	400-33567	17	400-33722	30	226-30800	47	400-25788		
H	5/16	7.9	6	400-35888	12	400-33568	18	400-33723	31	226-30909	48	400-25789		
K	3/8	9.5		—		—	19	400-33724	32	226-31006	49	400-25790		
W	7/16	11.1		—		—		—	33	226-31105	50	400-25791		
L	1/2	12.7		—		—	20	400-33727	34	226-31303	51	400-25792		
M	5/8	15.9		—		—		—	35	226-31402	52	400-25793		
N	3/4	19.1		—		—	21	400-33729	36	226-31501	53	400-25794		
P	7/8	22.2		—		—	22	400-33731	37	226-31709	54	400-25795		
Q	1	25.4		—		—	23	400-33732	38	226-31808	55	400-25796		
R	1-1/8	28.6		—		—	24	400-33733	39	226-31907	56	400-25797		
S	1-1/4	31.8		—		—	25	400-33734	40	226-32004	57	400-25798		
T	1-3/8	34.9		—		—		—	41	226-32103	58	400-25799		
U	1-1/2	38.1		—		—		—	42	226-32202	59	400-25800		
Stitch spec. 縫 仕 様	A						★							
	F		★				★							
	S										★			
	下送り													

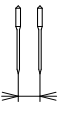
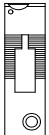
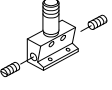
Needle gauge size 針 幅			Feed dog (Lower feed) 送り歯 (下送り)				Needle clamp asm. 針留組		Sliding plate asm. 滑り板組		Sliding plate asm. (Front) 滑り板 (前) 組			
Code コード*							 Hole Type 穴タイプ*							
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	60	232-05107		—	67	101-47650						
C	5/32	4.0		—		—	68	101-47759						
D	3/16	4.8	61	232-05305		—	69	101-47858						
E	7/32	5.6		—		—	70	101-47957						
F	1/4	6.4	62	232-05503		—	71	101-48054	85	402-20206				
G	9/32	7.1		—		—	72	101-48153						
H	5/16	7.9		—		—	73	101-48252						
K	3/8	9.5		—		—	74	101-48351						
W	7/16	11.1		—		—	75	101-48450						
L	1/2	12.7		—	63	400-62249	76	101-48559			89	400-42874	90	232-06709
M	5/8	15.9		—		—	77	101-48658	86	402-22670				
N	3/4	19.1		—	64	400-62251	78	101-48757						
P	7/8	22.2		—	65	400-62252	79	101-48856						
Q	1	25.4		—	66	400-62253	80	101-48955	87	402-22671				
R	1-1/8	28.6		—		—	81	101-49052						
S	1-1/4	31.8		—		—	82	101-49151						
T	1-3/8	34.9		—		—	83	101-49250	88	402-22672				
U	1-1/2	38.1		—		—	84	101-49359						
Stitch spec. 縫 仕 様	A						★				★		★	
	F								★		★		★	
	S													
	下送り		★											

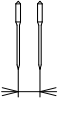
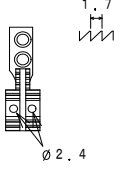
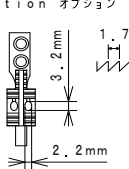
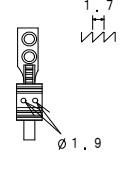
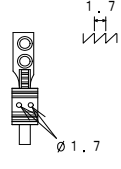
[LH-4578C F type] (2)

Needle gauge size 針 幅			Presser foot asm. 押え (組)								Swivel guide Presser asm. スィブルガイド押え (組)	
Code コード			Tip-divided 移動式先割れ				Lower feed 下送り					
			No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	1	400-35896	19	226-37656	32	103-91852	39	226-27152	45	226-47051
C	5/32	4.0	2	400-35897	20	226-37755		—		—		—
D	3/16	4.8	3	226-40353	21	226-37854	33	103-92058	40	226-27350	46	226-47150
E	7/32	5.6	4	226-40452		—		—	41	226-27459	47	226-47259
F	1/4	6.4	5	226-40551	22	226-38050	34	103-92256	42	226-27558	48	226-47358
G	9/32	7.1	6	226-40759	23	226-38258		—	43	226-27657	49	226-47457
H	5/16	7.9	7	226-40858	24	226-38357		—	44	226-27756	50	226-47556
K	3/8	9.5	8	226-40957	25	226-38456		—		—		—
W	7/16	11.1	9	226-41054		—		—		—		—
L	1/2	12.7	10	226-41252	26	226-38753	35	103-92751		—		—
M	5/8	15.9	11	226-41351		—		—		—		—
N	3/4	19.1	12	226-41450	27	226-38951	36	103-93056		—		—
P	7/8	22.2	13	226-41658	28	226-39157	37	228-44450		—		—
Q	1	25.4	14	226-41757	29	226-39256	38	228-44559		—		—
R	1-1/8	28.6	15	226-41856	30	226-39355		—		—		—
S	1-1/4	31.8	16	226-41955	31	226-39454		—		—		—
T	1-3/8	34.9	17	226-42052		—		—		—		—
U	1-1/2	38.1	18	226-42151		—		—		—		—
Stitch spec. 縫 仕 様	A				★							
	F								★		★ (テープ付け)	
	S		★									
	下送り						★					

Needle gauge size 針 幅			Throat plate (with Taping) 針板 (テープ付)		Throat plate 針板							
Code コード							Lower feed 下送り				Lower feed 下送り	
							No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	51	402-32772	58	22-25107	76	228-45200		—		—
C	5/32	4.0	52	402-32773	59	226-25206		—		—		—
D	3/16	4.8	53	402-32774	60	226-25305	77	228-45408		—		—
E	7/32	5.6	54	402-32775	61	226-25404		—		—		—
F	1/4	6.4	55	402-21496	62	226-25503	78	228-45606		—		—
G	9/32	7.1	56	402-32776	63	226-25602		—		—		—
H	5/16	7.9	57	402-32777	64	226-25701		—		—		—
K	3/8	9.5		—	65	226-25800		—		—		—
W	7/16	11.1		—	66	226-25909		—		—		—
L	1/2	12.7		—	67	226-26006		—	79	400-62254		—
M	5/8	15.9		—	68	226-26105		—		—		—
N	3/4	19.1		—	69	226-26204		—	80	400-62256		—
P	7/8	22.2		—	70	226-26303		—	81	400-62257		—
Q	1	25.4		—	71	226-26402		—	82	400-62258		—
R	1-1/8	28.6		—	72	226-26501		—		—		—
S	1-1/4	31.8		—	73	226-26600		—		—		—
T	1-3/8	34.9		—	74	226-26709		—		—		—
U	1-1/2	38.1		—	75	226-26808		—		—		—
Stitch spec. 縫 仕 様	A				★							
	F		★		★							
	S											
	下送り						★		★			

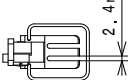
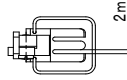
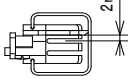
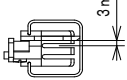
[LH-4578C-7] (1)

Needle gauge size 針 幅			Throat plate 針板				Needle clamp asm. 針留組	
Code コード							 Hole Type 穴タイプ	
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	1	402-32755	17	400-35881	33	101-47650
C	5/32	4.0	2	402-32756	18	400-25485	34	101-47759
D	3/16	4.8	3	402-32757	19	400-25490	35	101-47858
E	7/32	5.6	4	402-32758	20	400-25491	36	101-47957
F	1/4	6.4	5	402-20201	21	400-25492	37	101-48054
G	9/32	7.1	6	402-32759	22	400-25493	38	101-48153
H	5/16	7.9	7	402-32760	23	400-25494	39	101-48252
K	3/8	9.5	8	402-32761	24	400-25495	40	101-48351
W	7/16	11.1	9	402-32762	25	400-25496	41	101-48450
L	1/2	12.7	10	402-32763	26	400-25498	42	101-48559
M	5/8	15.9	11	402-32764	27	400-25499	43	101-48658
N	3/4	19.1	12	402-32765	28	400-25500	44	101-48757
P	7/8	22.2	13	402-32766	29	400-25502	45	101-48856
Q	1	25.4	14	402-32767	30	400-25503	46	101-48955
R	1-1/8	28.6	15	402-32768	31	400-25504	47	101-49052
S	1-1/4	31.8	16	402-32769	32	400-25505	48	101-49151
T	1-3/8	34.9		—		—	49	101-49250
U	1-1/2	38.1		—		—	50	101-49359
Stitch spec. 縫 仕 様	S				★			
	G		★				★	

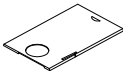
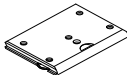
Needle gauge size 針 幅			Feed Dog 送り 歯							
Code コード			 1.7 2.4		 Option オプション 3.2mm 2.2mm 1.7		 1.7 1.9		 1.7 1.7	
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2		—	65	402-32778	81	400-61270	96	400-35890
C	5/32	4.0	51	402-32779		—	82	400-61271	97	400-25817
D	3/16	4.8	52	400-35891	66	400-25831	83	400-61272	98	400-25818
E	7/32	5.6	53	400-50009	67	400-25832	84	400-61273	99	400-25819
F	1/4	6.4	54	400-35892	68	400-25833	85	400-61274		—
					69 ※	402-20209				
G	9/32	7.1	55	400-50010	70	400-25834	86	400-61275	100	400-25820
H	5/16	7.9	56	400-50011	71	400-25835	87	400-61276	101	400-25821
K	3/8	9.5	57	400-35893	72	400-25836	88	400-61277	102	400-25822
W	7/16	11.1		—	73	400-25837		—	103	400-25823
L	1/2	12.7	58	400-35894	74	400-25838	89	400-61278	104	400-25824
M	5/8	15.9	59	400-71912	75	400-25839	90	400-61279	105	400-25825
N	3/4	19.1	60	400-35895	76	400-25840	91	400-61280	106	400-25826
P	7/8	22.2	61	400-71913	77	400-25841	92	400-61281	107	400-25827
Q	1	25.4	62	400-71914	78	400-25842	93	400-61282	108	400-25828
R	1-1/8	28.6	63	400-71915	79	400-25843	94	400-61283	109	400-25829
S	1-1/4	31.8	64	400-71916	80	400-25844	95	400-61284	110	400-25830
T	1-3/8	34.9		—		—		—		—
U	1-1/2	38.1		—		—		—		—
Stitch spec. 縫 仕 様	S				★		★		★	
	G		★		★				★	

The ※ mark is an optional gauge for 3# thread.
※マークは3#糸のオプションゲージです。

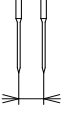
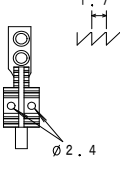
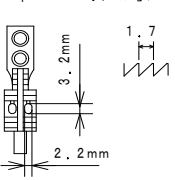
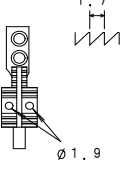
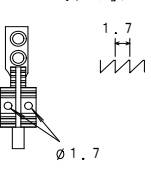
[LH-4578C-7] (2)

Needle gauge size 針 幅			Presser foot asm. 押え (組)				Swivel guide Presser asm. スィブルガイド押え (組)			
Code コード			Tip-divided 移動式先割れ 		Tip-divided 移動式先割れ 		コバ 2mm 		コバ 3mm 	
			No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2		—	16	400-35896	34	402-29469		—
C	5/32	4.0	1	400-71909	17	400-35897		—		—
D	3/16	4.8	2	228-16557	18	226-40353	35	402-29461	38	400-95293
E	7/32	5.6	3	228-16656	19	226-40452		—		—
F	1/4	6.4	4	228-16755	20	226-40551	36	402-29459	39	400-94776
G	9/32	7.1	5	228-16854	21	226-40759	37	※ 402-20207		—
H	5/16	7.9	6	228-16953	22	226-40858		—		—
K	3/8	9.5	7	228-17050	23	226-40957		—		—
W	7/16	11.1	8	400-33941	24	226-41054		—		—
L	1/2	12.7	9	228-17159	25	226-41252		—		—
M	5/8	15.9	10	400-33945	26	226-41351		—		—
N	3/4	19.1	11	400-33947	27	226-41450		—		—
P	7/8	22.2	12	400-33949	28	226-41658		—		—
Q	1	25.4	13	400-33951	29	226-41757		—		—
R	1-1/8	28.6	14	400-33953	30	226-41856		—		—
S	1-1/4	31.8	15	400-33955	31	226-41955		—		—
T	1-3/8	34.9		—	32	226-42052		—		—
U	1-1/2	38.1		—	33	226-42151		—		—
Stitch spec. 縫 仕 様	S				★					
	G		★				★		★	

The ※ mark is an optional gauge for 3# thread.
※マークは3#糸のオプションゲージです。

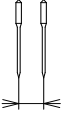
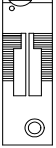
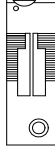
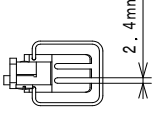
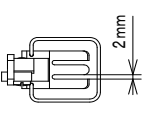
Needle gauge size 針 幅			Sliding plate asm. 滑り板組		Sliding plate asm. (Front) 滑り板 (前) 組		
Code コード							
	inch	mm	No.	Part No.	No.	Part No.	
B	1/8	3.2	40	402-20206	44	400-42880	
C	5/32	4.0					
D	3/16	4.8					
E	7/32	5.6					
F	1/4	6.4					
G	9/32	7.1					
H	5/16	7.9					
K	3/8	9.5					
W	7/16	11.1					
L	1/2	12.7	41	402-22670			
M	5/8	15.9					
N	3/4	19.1					
P	7/8	22.2	42	402-22671			
Q	1	25.4					
R	1-1/8	28.6	43	402-22672			
S	1-1/4	31.8					
T	1-3/8	34.9		—			
U	1-1/2	38.1		—			
Stitch spec. 縫 仕 様	S		★		★		
	G						

[LH-4588C-7] (1)

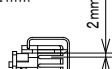
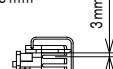
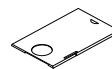
Needle gauge size 針 幅			Feed dog 送り 歯							
Code コード*					Option オフ・ション 				Option オフ・ション 	
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2		—	13	402-32778	26	400-61270	39	400-35890
C	5/32	4.0	1	402-32779		—	27	400-61271	40	400-25817
D	3/16	4.8	2	400-35891	14	400-25831	28	400-61272	41	400-25818
E	7/32	5.6	3	400-50009	15	400-25832	29	400-61273	42	400-25819
F	1/4	6.4	4	400-35892	16	400-25833	30	400-61274	43	400-26715
					17	※ 402-20209				
G	9/32	7.1	5	400-50010	18	400-25834	31	400-61275	44	400-25820
H	5/16	7.9	6	400-50011	19	400-25835	32	400-61276	45	400-25821
K	3/8	9.5	7	400-35893	20	400-25836	33	400-61277	46	400-25822
L	1/2	12.7	8	400-35984	21	400-25838	34	400-61278	47	400-25824
M	5/8	15.9	9	400-71912	22	400-25839	35	400-61279	48	400-25825
N	3/4	19.1	10	400-35895	23	400-25840	36	400-61280	49	400-25826
P	7/8	22.2	11	400-71913	24	400-25841	37	400-61281	50	400-25827
Q	1	25.4	12	400-71914	25	400-25842	38	400-61282	51	400-25828
Stitch spec. 縫 仕 様	S						★		★	
	G		★		★					

The ※ mark is an optional gauge for 3# thread.

※マークは3#糸のオプションゲージです。

Needle gauge size 針 幅			Throat plate 針 板				Presset foot asm. 押 え (組)			
Code コード*							Tip-divided 移動式先割れ 		Tip-divided 移動式先割れ 	
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	52	402-32755	65	400-35881	78	400-35896	91	400-35896
C	5/32	4.0	53	402-32756	66	400-25485	79	400-71909	92	400-35897
D	3/16	4.8	54	402-32757	67	400-25490	80	228-16557	93	226-40353
E	7/32	5.6	55	402-32758	68	400-25491	81	228-16656	94	226-40452
F	1/4	6.4	56	402-20201	69	400-25492	82	228-16755	95	226-40551
G	9/32	7.1	57	402-32759	70	400-25493	83	228-16854	96	226-40759
H	5/16	7.9	58	402-32760	71	400-25494	84	228-16953	97	226-40858
K	3/8	9.5	59	402-32761	72	400-25495	85	228-17050	98	226-40957
L	1/2	12.7	60	402-32763	73	400-25498	86	228-17159	99	226-41252
M	5/8	15.9	61	402-32764	74	400-25499	87	400-33945	100	226-41351
N	3/4	19.1	62	402-32765	75	400-25500	88	400-33947	101	226-41450
P	7/8	22.2	63	402-32766	76	400-25502	89	400-33949	102	226-41658
Q	1	25.4	64	402-32767	77	400-25503	90	400-33951	103	226-41757
Stitch spec. 縫 仕 様	S				★				★	
	G		★				★			

[LH-4588C-7] (2)

Needle gauge size 針 幅			Swivel guide Presser asm. スイフ' ルカ' イト' 押え (組)				Sliding plate asm. (Left) 滑り板 (左) 組		Sliding plate asm. (Front) 滑り板 (前) 組		
Code コード'			コバ2mm 		コバ3mm 						
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.	
B	1/8	3.2	1	402-29469		—	7	402-20206	10	400-42880	
C	5/32	4.0		—		—					
D	3/16	4.8	2	402-29461	5	400-95293					
E	7/32	5.6		—		—					
F	1/4	6.4	3	402-29459	6	400-94776					
			4	※ 402-20207							
G	9/32	7.1		—		—					
H	5/16	7.9		—		—					
K	3/8	9.5		—		—					
L	1/2	12.7		—		—					
M	5/8	15.9		—		—	8	402-22670			
N	3/4	19.1		—		—					
P	7/8	22.2		—		—	9	402-22671			
Q	1	25.4		—		—					
Stitch spec. 縫 仕 様	S						★		★		
	G		★		★		★		★		

The ※ mark is an optional gauge for 3# thread.
※マークは3#糸のオプションゲージです。

Needle gauge size 針 幅			Needle clamp asm. (for DP5) 針 留 組 (DP5用)				Needle clamp asm. (for DP17) 針 留 組 (DP17用)			
Code コード'			Needle clamp asm. (Left) 針 留 (左) 組  (Hole Type 穴タイプ')		Needle clamp asm. (Right) 針 留 (右) 組  (Hole Type 穴タイプ')		Needle clamp asm. (Left) 針 留 (左) 組  Option オフ' ション		Needle clamp asm. (Right) 針 留 (右) 組  Option オフ' ション	
	inch	mm	No.	Part No.	No.	Part No.	No.	Part No.	No.	Part No.
B	1/8	3.2	11	B1402-528-BA0-A	24	B1402-528-BA0-A	37	B1402-526-BA0-A	49	B1402-526-BA0-A
C	5/32	4.0	12	B1402-528-CA0-A	25	B1402-528-CA0-A	28	B1402-526-CA0-A	50	B1402-526-CA0-A
D	3/16	4.8	13	B1402-528-DAL-A	26	B1402-528-DAR-A	39	B1402-526-DAL-A	51	B1402-526-DAR-A
E	7/32	5.6	14	B1402-528-EAL	27	B1402-528-EAR	40	102-28559	52	102-28567
F	1/4	6.4	15	B1402-528-FAL-A	28	B1402-528-FAR-A	41	B1402-526-FAL-A	53	B1402-526-FAR-A
G	9/32	7.1	16	B1402-528-GAL	29	B1402-528-GAR	42	B1402-526-GAL-A	54	B1402-526-GAR-A
H	5/16	7.9	17	B1402-528-HAL-A	30	B1402-528-HAR-A	43	B1402-526-HAL-A	55	B1402-526-HAR-A
K	3/8	9.5	18	B1402-528-KAL-A	31	B1402-528-KAR-A	44	B1402-526-KAL-A	56	B1402-526-KAR-A
L	1/2	12.7	19	B1402-528-LAL	32	B1402-528-LAR	45	B1402-526-LAL-A	57	B1402-526-LAR-A
M	5/8	15.9	20	B1402-528-MAL	33	B1402-528-MAR	46	102-28856	58	102-28864
N	3/4	19.1	21	B1402-528-NAL	34	B1402-528-NAR	47	102-28955	59	102-28963
P	7/8	22.2	22	B1402-528-PAL	35	B1402-528-PAR		—		—
Q	1	25.4	23	B1402-528-QAL	36	B1402-528-QAR	48	102-29151	60	102-29169
Stitch spec. 縫 仕 様	S		★		★		★		★	
	G									

12. CAUSES AND CORRECTIVE MEASURES FOR PHENOMENA IN SEWING

Phenomenon	Cause	Corrective measures
1. Thread break-age (Thread frays or is worn out.) (Needle thread trails 2 to 3 cm from the wrong side of the fabric.) (Bobbin thread comes out of the bobbin.)	① Thread path, needle point, hook blade point or bobbin case resting groove on the throat plate has sharp edges or burrs. ② Needle thread tension is too high. ③ Bobbin case opening lever provides an excessive clearance at the bobbin case. ④ Needle comes in contact with the blade point of hook. ⑤ Amount of oil in the hook is too small. ⑥ Needle thread tension is too low. ⑦ Thread take-up spring works excessively or the stroke of the spring is too small. ⑧ Timing between the needle and the hook is excessively advanced or retarded. ⑨ Thread untwines. ⑩ Uniform thread loops cannot be formed when making chain-off thread. ⑪ Bobbin is wound with excessive amount of thread. (In particular, filament thread)	○ Remove the sharp edges or burrs on the blade point of hook using a fine emery paper. Buff up the bobbin case resting groove on the throat plate. ○ Decrease the needle thread tension. ○ Decrease the clearance provided between the bobbin case opening lever and the bobbin. Refer to "8-4. Adjusting the bobbin case opening lever" p.114. ○ Refer to "8-1. Needle-to-hook relation" p.109. ○ Adjust the amount of oil in the hook properly. Refer to "4-9-1. Adjusting the amount of oil in the hook" p.37. ○ Increase the needle thread tension. Refer to "8-1. Needle-to-hook relation" p.109. ○ Decrease the tension of the spring and increase the stroke of the spring. ○ Refer to "8-1. Needle-to-hook relation" p.109. ○ Wind the thread on the needle.  ○ Use the thread guide equipped with felt pad. ○ Use the optional needle clamp wire. ○ Wind the bobbin with thread by 80 % of its capacity.
2. Stitch skipping	① Clearance between the needle and the hook blade point is too great. ② Timing between the needle and the hook is excessively advanced or retarded. ③ Pressure of the presser foot is too low. ④ When the needle thread slips out of the rotary disc. ⑤ Improper type of needle is used. ⑥ Synthetic thread or thin thread is used. ⑦ Stitch skipping occurs at the beginning of sewing. ⑧ Stitch skips when sewing multilayered parts of the material. ⑨ Stitch skipping occurs when the material thickness changes, i.e., from a two-ply part to a multi-layered part and vice versa.	○ Refer to "8-1. Needle-to-hook relation" p.109. ○ Refer to "8-1. Needle-to-hook relation" p.109. ○ Tighten the presser spring regulator. ○ Refer to "8-1. Needle-to-hook relation" p.109. ○ Replace the needle with one which is thicker than the current needle by one count. ○ Wind the thread on the needle. ○ Use the optional needle clamp wire. ○ Run the sewing machine under the soft start mode by 2 to 3 stitches from the sewing start. ○ Use the needle thread guide and precisely adjust the hook timing. ○ Move the presser foot toward the operator. At this time, be careful not to allow the presser foot to come in contact with the needle.

Phenomenon	Cause	Corrective measures
3. Loose stitches	① Bobbin thread does not pass through the forked end of the tension spring on the bobbin case. ② Thread path has rough surface. ③ Bobbin fails to move smoothly. ④ Bobbin case opening lever provides too much clearance at the bobbin. ⑤ Bobbin thread tension is too low. ⑥ Bobbin has been wound too tightly. ⑦ The presser foot does not securely press the multi-layered section of the material. ⑧ Needle eyelet is too small for thickness of thread, preventing smooth take-up motion of the thread take-up lever. ⑨ With respect to tensing of thick thread, neither needle thread tension nor bobbin thread tension can be increased, resulting in production of isolated idling loops. ⑩ Isolated idling loops are produced during the reverse feed stitching. ⑪ For the S type models, the resistance of the thread path is small when tightening filament thread. As a result, isolated idling loops are likely to be produced. ⑫ For the S type models, the cotton thread has poor slipperiness. As a result, isolated idling loops are likely to be produced.	○ Thread the bobbin case correctly. ○ Remove rough parts with a fine emery paper or buff it up. ○ Replace the bobbin or hook with a new one. ○ Refer to "8-4. Adjusting the bobbin case opening lever" p.114. ○ Adjust the bobbin thread tension. ○ Decrease the tension applied to the bobbin winder. ○ Change presser foot with the hinging presser (B1524512FBE). (The presser foot with large front and rear elevation angles is pRefer to rable.) ○ Retard the hook timing by 2 to 3 degrees. ○ Use the needle thread take-up eyelet. ○ Use the needle thread presser. ○ Use the bobbin thread tension spring t0.3 (2261 2808). ○ Retard the hook timing. ○ Adjust the orientation of the hole in the thread guide (lower) so that it is perpendicular to the thread. (Same as the G type models) ○ Adjust the thread guide on the thread tension plate to the right (Reference: shift 1 mm to the right), and increase the thread take-up spring stroke (Reference: 10 mm).
4. Thread trimming failure	① The position of the moving knife is not correct. ② Bobbin thread cannot be trimmed by dropping the thread trimmer.	○ Refer to "8-5. Adjusting the position of counter knife, knife pressure and clamp pressure [Adjustment of the position of the moving knife]" p.116. ○ Use the feed dog with thicker teeth (2 mm). ○ Retard the thread trimming cam timing by 5°.
5. Amount of idling is excessively large.	① The counter knife pressure is inadequate. ② Backlash between the bobbin and the bobbin case is excessively large. ③ The idling prevention spring does not work adequately. ④ The idling prevention sheet is not placed. ⑤ Thread trimming speed is too high.	○ Increase the knife pressure. Refer to "8-5. Adjusting the position of counter knife, knife pressure and clamp pressure [Adjustment of the knife pressure]" p.117. ○ Re-select the bobbin and the bobbin case. ○ Increase the spring pressure. ○ Place the sheet in position. ○ Decrease the thread trimming speed.

Phenomenon	Cause	Corrective measures
6. Clamp failure	① The clamp pressure has adjusted to an excessively high or low value. ② The clamp pressure works excessively, resulting permanent set in fatigue of the clamp plate clamp spring. ③ The bobbin thread slips off due to the bobbin thread slack prevention spring of the cap hook. ④ Due to difference in thread count number between the needle thread and bobbin thread, they excessively tangle with each other at the time of thread trimming. ⑤ The feed dog height is too low.	○ Increase or decrease the clamp pressure. Refer to "8-5. Adjusting the position of counter knife, knife pressure and clamp pressure [Adjustment of the bobbin thread clamp pressure]" p.117. ○ Change the clamp plate clamp spring with a new one. ○ Remove the bobbin thread slack prevention spring. ○ Use the optional clamp style cap hook. ○ Increase the tension applied by the tension controller No. 1. ○ Retard the timing of the thread trimming cam. ○ Increase the feed dog height.
7. Isolated idling loops during intermittent sewing with thick thread (Core spun yarn #8)	① Needle thread tension is inadequate when sewing at a low speed. ② Amount of movement of the thread take-up spring is inadequate. ③ Thick thread at the let needle fails to come off the hook smoothly.	○ Increase the AT correction value for the left needle at a low speed (200 - 1,000 sti/min) by 150 % or more. Refer to "6-3. Tension correction (with respect to sewing speed)" p.98. ○ Increase the amount of movement of the thread take-up spring. ○ Adjust the timing at which the left-thread is scooped by the left hook to the point that is 16 mm $\pm$ 0.15 mm above the lower point of needle bar.
8. Loose extra-thick thread stitches (Core spun yarn #3)	① The thread is too thick and the thread transfer of the hook is poor.	○ Use the OP hook (40260052).