JUKI®

SC-510

ENGINEER'S MANUAL

PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the machine.
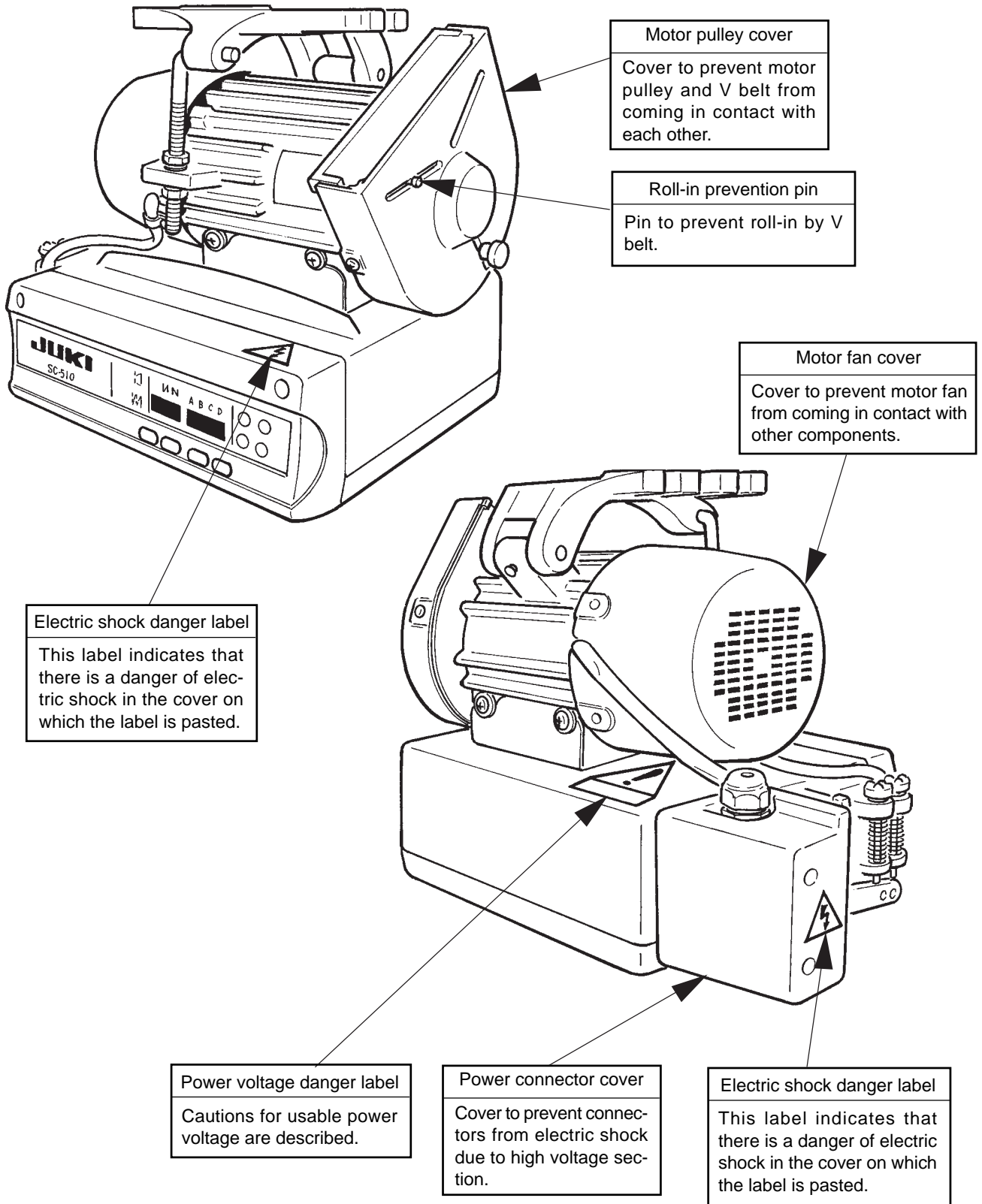
The Instruction Manual for these machines intended for the maintenance personnel and operators at an apparel factory contains operating instructions in detail. And this manual describes "Standard Adjustment", Adjustment Procedures", "Results of Improper Adjustment", and other important information which are not covered in the Instruction Manual.

It is advisable to use the instruction Manuals and Parts Lists for SC-510/M51, IP-100E/SC-510, and CP-160C together with this Engineer's Manual when performing maintenance of these machines.

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

SAFETY DEVICE

Safety devices described below vary in accordance with the destination and specifications.

Motor pulley cover

Cover to prevent motor pulley and V belt from coming in contact with each other.

Roll-in prevention pin

Pin to prevent roll-in by V belt.

Motor fan cover

Cover to prevent motor fan from coming in contact with other components.

Electric shock danger label

This label indicates that there is a danger of electric shock in the cover on which the label is pasted.

Power voltage danger label

Cautions for usable power voltage are described.

Power connector cover

Cover to prevent connectors from electric shock due to high voltage section.

Electric shock danger label

This label indicates that there is a danger of electric shock in the cover on which the label is pasted.

CONTENTS

MEMO

1. SPECIFICATIONS

(1) SC-510/M51

No.	Item	Specifications		
1	Supply voltage	Single phase 100 to 120V	3-phase 200 to 240V	Single phase 200 to 240V
2	Frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
3	Operating temperature range	Temperature : 0 to 40°C	Temperature : 0 to 40°C	Temperature : 0 to 40°C
4	Operating humidity range	Humidity : 90% or less	Humidity : 90% or less	Humidity : 90% or less
5	Power consumption	425VA	425VA	425VA
6	Number of input ports	8	8	8
7	Number of output ports	8	8	8
8	Number of programs	4	4	4
9	Number of steps	20 steps/1 program	20 steps/1 program	20 steps/1 program
10	Program input operation panel (optional)	Control box or operation panel (optional)	Control box or operation panel (optional)	Control box or operation panel (optional)
11	Operation panel (optional)	CP-160C	CP-160C	CP-160C
		IP-100E	IP-100E	IP-100E

(Caution) **1. Indication of the power consumption is the mean power consumption when LU-1520N-7 is mounted in accordance with the operating conditions JUKI specifies.The power consumption changes in accordance with the operating conditions and the mounted machine head. So, be careful.**
2. Instantaneous maximum power consumption may become 1.5 times or more than the mean power consumption.

(2) Extension p.c.b. * (packed together with IP-100E)

| No.	Item	Specifications
1	Panel connection port	IP-100E connection port
2	Number of input ports	8
3	Number of output ports	8
4	Memory medium	Smart media
5	Program input	IP-100E

2. OUTLINE

(1) Features

1) Voltage changeover function of single phase 100 to 120V/3-phase 200 to 240V is provided. (Adapting to a part of specifications only)
   The control box with voltage changeover function can be used either for single phase 100 to 120V or for 3-phase 200 to 240V by replacing the power cord up to the power switch and setting the voltage changeover connector inside the control box.
2) By connecting the operation panel, CP-160 to the control box as standard, function and operability are further improved.
3) SC-510 main unit only has the programming function and it is possible for SC-510 main unit only to program various input/output such as start, stop, etc. of the sewing machine by means of the external equipments or external input/output signals by using the optional input/output terminals.
4) Version-up of the program of SC-510 main unit and extension of input/output terminals can be performed by using the optional IP-100 and the extension p.c.b.
5) Reliability is further improved by employment of the switching power method which is strong against the voltage fluctuation and strengthening of the protective circuit.
6) High-torque servo motor M51 of 750 W output is employed and a wide range adaptability from general materials to extra heavy-weight materials can be displayed.
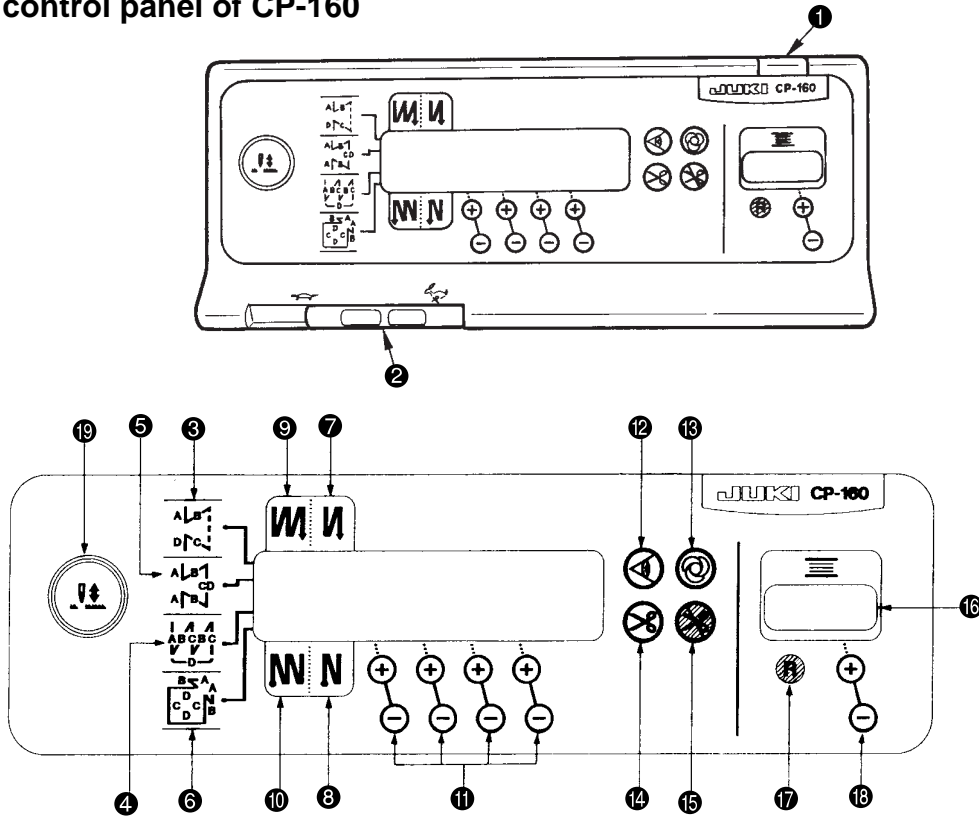
3. CONFIGURATION

(1) SC-510/M51
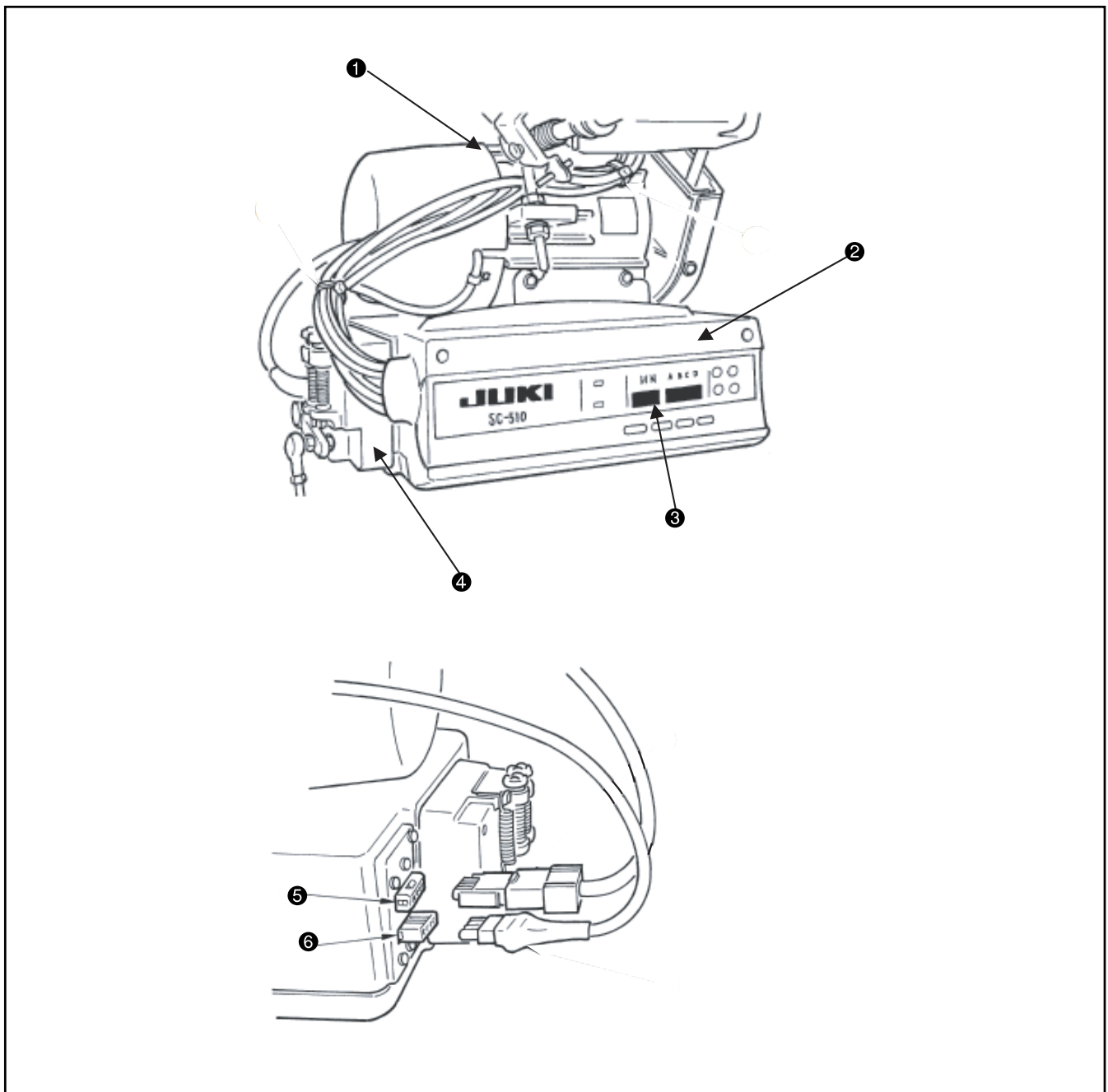
❶ : M51 (AC servo motor)

❷ : Front cover

❸ : Operation panel

❹ : Pedal unit

❺ : Power connector

❻ : Motor connector

4. EXPLANATION OF OPTIONAL CONTROL PANEL

(1) List of control panel of CP-160

1) For the connecting destination of the connector, refer to the item (3) of 7. CONNECTING PROCEDURE WITH JUKI OPTIONAL DEVICES.
2) By connecting of CP-160, all displays of standard operation panel of SC-510 go off.
   However, error code No. is displayed only at the time of occurrence of error.

NO.	Description
❶	**Power indication LED :** Lights up when the power switch is turned ON.
❷	**Max. speed limit variable resister :** Maximum speed is limited when this resister is moved in the left direction (➤).
❸	**Reverse stitching pattern switch :** Used for specifying the reverse stitching pattern to be sewn.
❹	**Overlapped stitching pattern switch :** Used for specifying the overlapped stitching pattern to be sewn.
❺	**Constant dimension stitching pattern switch :** Used for specifying the constant dimension stitching pattern to be sewn.
❻	**Rectangular stitching pattern switch :** Used for specifying the rectangular stitching pattern to be sewn.
❼	**Automatic reverse stitching at the start of sewing switch :** Used for turning ON / OFF the automatic reverse stitching at the start of sewing.
❽	**Automatic reverse stitching at the end of sewing switch :** Used for turning ON / OFF the automatic reverse stitching at the end of sewing.
❾	**Automatic double reverse stitching at the start of sewing switch :** Used for turning ON / OFF the automatic double reverse stitching at the start of sewing.
❿	**Automatic double reverse stitching at the end of sewing switch :** Used for turning ON / OFF the automatic double reverse stitching at the end of sewing.
⓫	**Switches for setting the number of stitches :** Used for setting the number of stitches to be sewn in processes A through D.
⓬	**Material edge sensor ON / OFF switch :** Rendered effective when the material edge sensor is installed on the machine. Used for selecting whether or not the material sensor is used during sewing.
⓭	**One-shot automatic stitching switch :** Start the sewing machine with this switch, and the sewing machine will run automatically until the material edge is detected or the end of the set number of stitches is reached.
⓮	**Automatic thread trimming switch :** When the material edge is detected, the machine will perform thread trimming even when keeping depressing the front part of the pedal.
⓯	**Thread trimming prohibition switch :** Used for prohibiting thread trimming at any occasion.
⓰	**Bobbin thread counter :** Indicates the amount of bobbin thread while counting it by subtracting from the set value. When the bobbin thread remaining amount detecting device is installed on the machine, the counter indicates the number of times of detecting.
⓱	**Bobbin counter reset switch :** Used for returning the value shown on the bobbin thread counter to the initial value.
⓲	**Bobbin thread amount setting switch :** Used for setting the amount of bobbin thread.
⓳	**Needle up/down compensating switch :** Used when performing needle up / down compensating stitching.

## (2) Explanation of control panel CP-160

1) Reverse stitching pattern
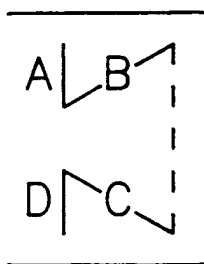
When the sewing machine performs the free stitching operation, the machine performs the reverse stitching operation at the start and end of sewing.
The reverse stitching operation can set the ON and OFF settings.
Furthermore, single and double reverse stitching patterns can be selected. Setting of number of stitches or other settings can be performed by operating the control panel.
A, B, C and D = 0 to 19 stitches

### 2) Overlapped stitching pattern
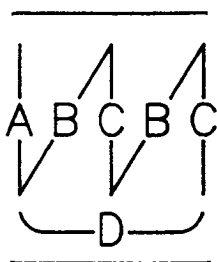
The sewing machine repeats the normal stitching and reverse stitching by the predetermined time, and performs the line bartacking. Then, the machine makes the thread trimmer actuate and stop to complete the overlapped stitching procedure.
Change of the number of stitches or the number of times of repetition can be performed by operating the control panel.
A, B and C = 0 to 19 stitches
D = 0 to 9 times

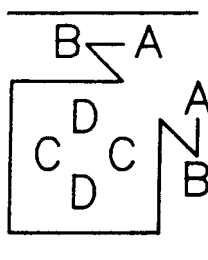### 3) Constant-dimension stitching pattern
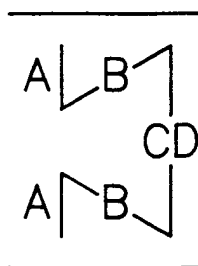
The free stitching process in the reverse stitching pattern becomes the set value of the number of stitches. The sewing machine will automatically stop (automatically perform thread trimming if the automatic thread trimming is selected.) after the machine finishes the predetermined number of stitches in the process of CD.
If the automatic thread trimming is not selected, operate the touch-back switch after the machine has automatically stopped. Then, the machine runs at a low speed (stitch compensation operation). Also, if the pedal is returned to its neutral position and depressed its front part again, the sewing can be continued regardless of the setting of number of stitches. Setting of number of stitches or selection of automatic thread trimming can be performed by operating the control panel.
A and B = 0 to 19 stitches CD = 0 to 500 stitches

### 4) Rectangular stitching pattern

There are 4 operation steps in the process of constant-dimension stitching pattern. At each operation step the sewing machine automatically stops after sewing the predetermined number of stitches. At this time, if the touch-back switch is operated, the sewing machine runs at a low speed (stitch compensation operation). Also, in case of the last operation step, if the pedal is returned to its neutral position and depressed its front part again, the sewing can be continued regardless of the setting of number of stitches. However, if the automatic thread trimming is set, the machine will perform thread trimming. Setting of number of stitches or selection of automatic thread trimming can be performed by operating the control panel.
A and B = 0 to 19 stitches C and D = 0 to 99 stitches

(3) Example of application

1) When the CP-160 is used together with the material end sensor (ED : optional), it can be used as a small edge-controller.

(Method) Adjust the position to ᴅᶠᶜ mark ❸ of the CP-160, turn ON material end sensor ON/OFF switch ⓬ of the CP-160, and turn ON Ⓠ mark ⓭ of the automatic one-shot stitching.

(Caution) 1. **Number of rotations of the automatic one-shot stitching can be changed by the function setting (No. 38).**
2. **It is necessary to set the material end sensor input of the function code : 9 to the input port by using the function of the optional input/output function selection (Function setting No. 12).**

2) Label attaching is performed by the automatic one-shot stitching with the CP-160

(Method) Select mark ❺ on the CP-160, and turn ON Ⓠ mark ⓭ of the automatic one-shot stitching.

(Explanation) Number of stitches at the section CD can be set up to 500 stitches. If the stitch length is 2 mm, it is possible to sew approximately 1,000 mm (1 m).

This function can perform the automatic one-shot stitching without using the material end sensor (ED : optional). Therefore, the sewing machine performs the sewing to the last according to the sewing pattern even if the label is not located at the end of material when the pedal is depressed once.
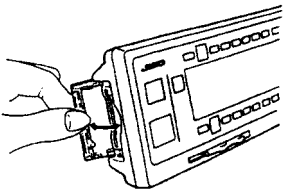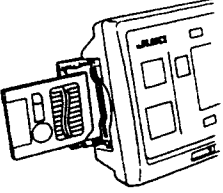
(4) IP-100E operation panel

Refer to the instruction manual of IP-100E/SC-510 for further information.
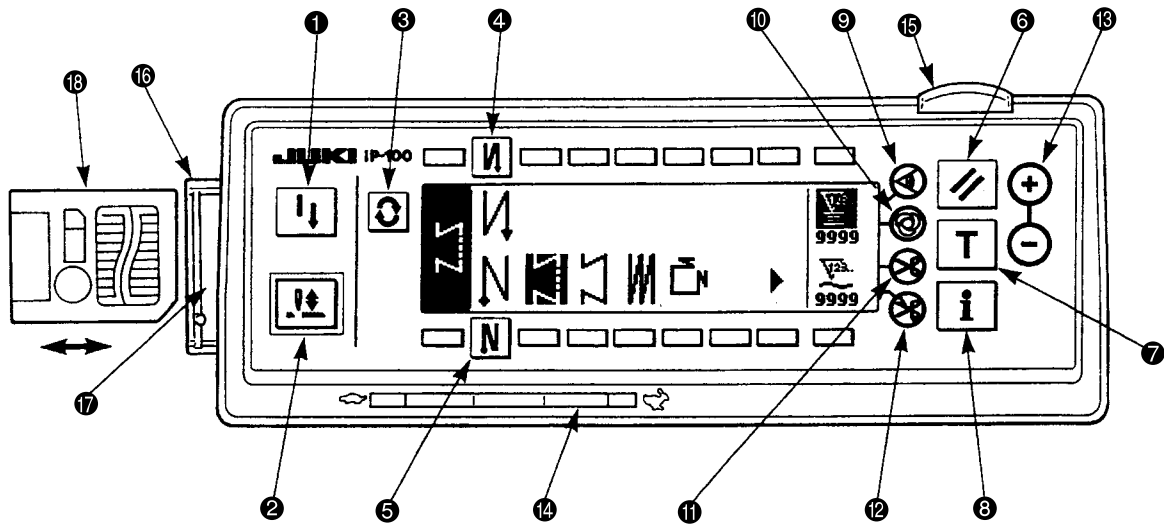

❶ Re-sewing switch

❷ Needle up/down compensating switch

❸ Screen changeover switch

❹ With/without reverse feed stitch
   at sewing start switch

❺ With/without reverse feed stitch
   at sewing end switch

❻ Reset switch

❼ Teaching switch

❽ Information switch

❾ Material edge sensor switch

❿ One-shot stitching switch

⓫ With/without automatic thread
   trimmer switch

⓬ Thread trimming prohibiting switch

⓭ Counter value setting switch

⓮ Max. speed limitation variable resistor

⓯ Power display lamp

⓰ Smart media cover

⓱ Smart media slot
   (Smart media inserting opening)

⓲ Smart media
   (Optional :
   Part No.HX005750000)

❶ Re-sewing switch		Unused
❷ Needle up/down compensating switch		This is the switch to perform needle up/down compensating stitching. (Needle up/down compensating stitching and one stitch compensating stitching can be changed over with function setting No.22.)
❸ Screen changeover switch		This is the switch to change over the screen.
❹ With/without reverse feed stitch at sewing start switch		This is the switch to turn ON/OFF automatic reverse feed stitch at sewing start. * This switch cannot be used with the sewing machine which is not provided with automatic reverse feed stitching device.
❺ With/without reverse feed stitch at sewing end switch		This is the switch to turn ON/OFF automatic reverse feed stitch at sewing end. * This switch cannot be used with the sewing machine which is not provided with automatic reverse feed stitching device.
❻ Reset switch		This is the switch to make the value of bobbin thread counter or sewing counter the set value.

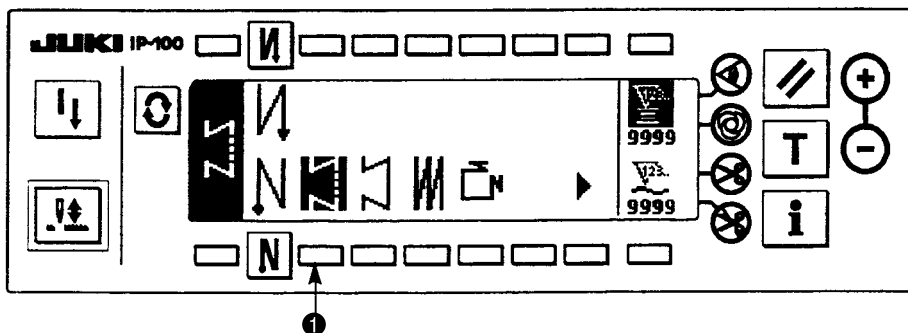| ❼	Teaching switch	$\boxed{\mathbf{T}}$	Unused
❽	Information switch	$\boxed{\mathbf{i}}$	This is the switch to perform various function settings.
❾	Material edge sensor switch		Rendered effective when the material edge sensor is installed on the machine. Used for selecting whether or not the material edge sensor is used during sewing.
❿	One-shot stitching switch		When this switch is set to effective, the sewing machine automatically operates up to the specified number of stitches.
⓫	With/without automatic thread trimmer switch		When this switch is set to effective, the sewing machine automatically performs thread trimming when the specified number of stitches has been completed.
⓬	Thread trimming prohibiting switch		This switch prohibits all thread trimmings. * This switch cannot be used with the sewing machine which is not provided with the automatic thread trimming device.
⓭	Counter value setting switch		This is the switch to set the value of bobbin thread counter of No. of pcs. counter.
⓮	Max. speed limitation variable resistor		When moving the resistor in the left direction, max. speed is limited.
⓯	Power display lamp		This lamp lights up when the power switch is turned ON.
⓰	Smart media cover		This is the cover for smart media inserting opening. To open the cover, place your finger on the notch located on the side of the cover as shown in the figure and push the cover in the direction of left slanting rear. * There are some functions that are not able to be operated with the cover opened. Do not close the cover unless smart media is completely inserted.
⓱	Smart media slot (Smart media inserting opening)		To set smart media, insert smart media into smart media slot and push it until it is almost hidden. To remove smart media, push it further again and it protrudes to the position where it can be held between your fingers. Now, draw it out. *Be very careful of the inserting direction of smart media.

(5) How to operate sewing patterns with IP-100E

1. Free stitching pattern

⎘ ❷	OFF	ON	OFF	ON
Sewing pattern		A / B		A / B, C D
Ⓝ ❸	OFF	OFF	ON	ON

Press ⟳ to display the pattern list screen.

1) Press switch ❶ to select the free stitching pattern, and the screen is automatically changed over to the number of stitches of free stitching setting screen to display the number of stitches which has been already set.
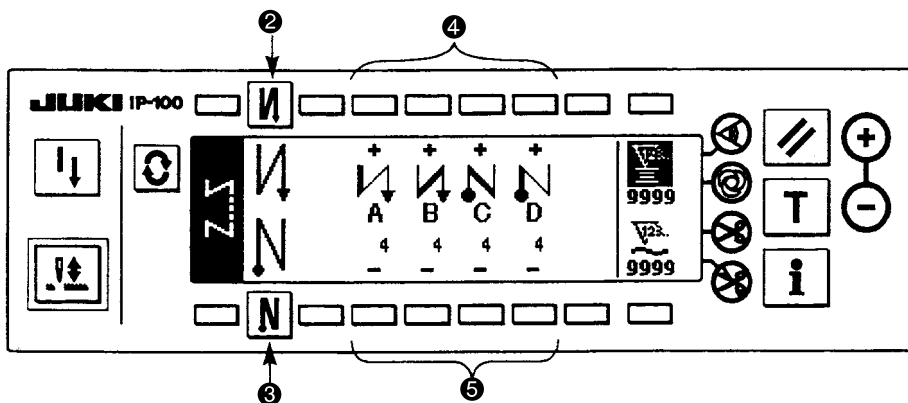
2) When changing the number of stitches, change it with switches ❹ and ❺ for setting the number of stitches A through D.
(The range of the number of stitches that can be changed : 0 to 99 stitches)

3) Press switch ❷ to set the reverse stitching at the start of sewing.

No setting   Reverse stitching   Double reverse stitching
          at the start of sewing   at the start of sewing

4) Press switch ❸ to set the reverse stitching at the end of sewing.

No setting   Reverse stitching   Double reverse stitching
          at the end of sewing   at the end of sewing
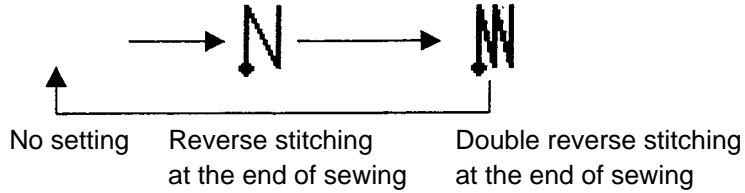
2. Constant dimension stitching pattern

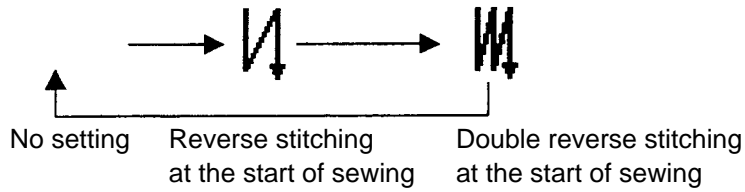| ❷	OFF	ON	OFF	ON
Sewing pattern	CD	A B CD	CD B A	A B CD B A
❸	OFF	OFF	ON	ON

Press ⟳ to display the pattern list screen.
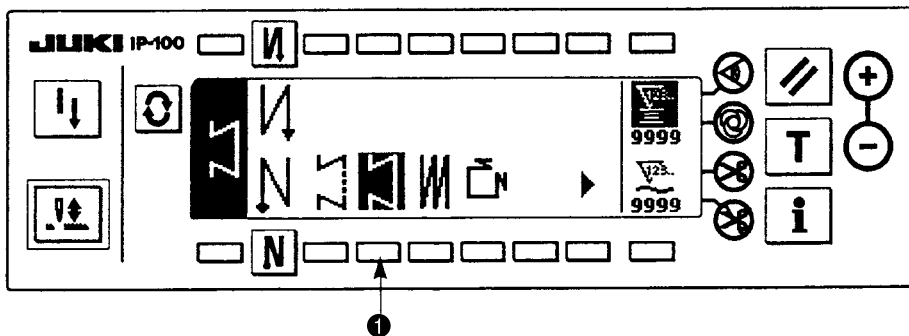
1) Press switch ❶ to select the constant dimension stitching pattern, and the screen is automatically changed over to the number of stitches of constant dimension stitching setting screen to display the number of stitches which has been already set.

2) When changing the number of stitches of the reverse stitching, change it with switches ❹ and ❺ for setting the number of stitches of A and B.
   In addition, when changing the number of stitches of the constant dimension stitching, change it with switches ❻ and ❼ for setting the number of stitches of C D.
   (The range of the number of stitches that can be changed : A and B = 0 to 19 stitches, C D = 0 to 500 stitches)

3) Press switch ❷ to set the reverse stitching at the start of sewing.

| No setting | Reverse stitching at the start of sewing | Double reverse stitching at the start of sewing |

4) Press switch ❸ to set the reverse stitching at the end of sewing.
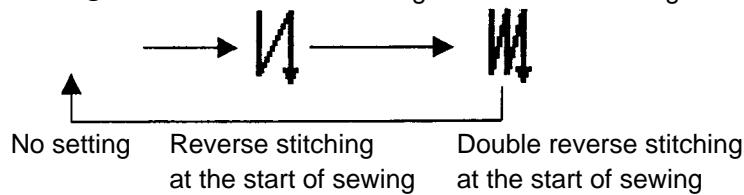
| No setting | Reverse stitching at the end of sewing | Double reverse stitching at the end of sewing |
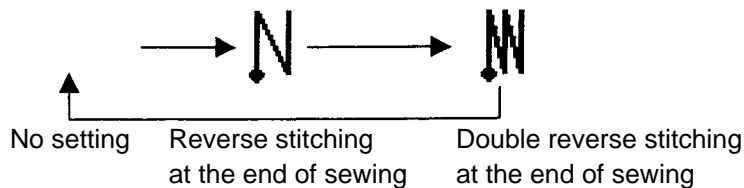
5) When automatic thread trimming switch ❽ is selected, thread trimming is automatically performed after processes C D have been completed. (When setting the reverse stitching at the end of sewing, thread trimming is automatically performed after the reverse stitching at the end of sewing has been completed)
   When automatic thread trimming switch ❽ is not selected, press the touch-back switch after processes C D have been completed, and the sewing machine rotates at low speed. (Compensation stitching operation)
   In addition, when the pedal is returned to the neutral position and the front part of it is depressed again, the sewing can be continued regardless of the setting of the number of stitches.

6) When thread trimming prohibiting switch ❾ is selected, the sewing machine will stop with the needle up without performing thread trimming.

7) When one-shot automatic stitching switch ❿ is selected, automatic sewing is performed at the set speed without a break by depressing the front part of the pedal.

3. Overlapped stitching pattern
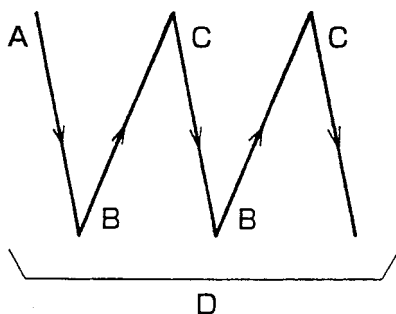
Press 🔄 to display the pattern list screen.
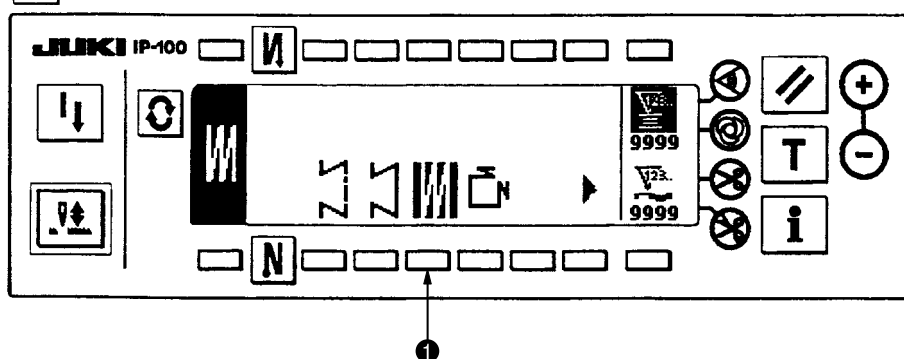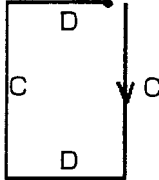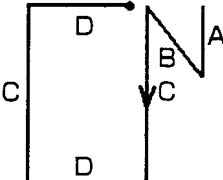
❶

1) Press switch ❶ to select the overlapped stitching pattern, and the screen is automatically changed over to the number of stitches of overlapped stitching setting screen to display the number of stitches which has already been set.
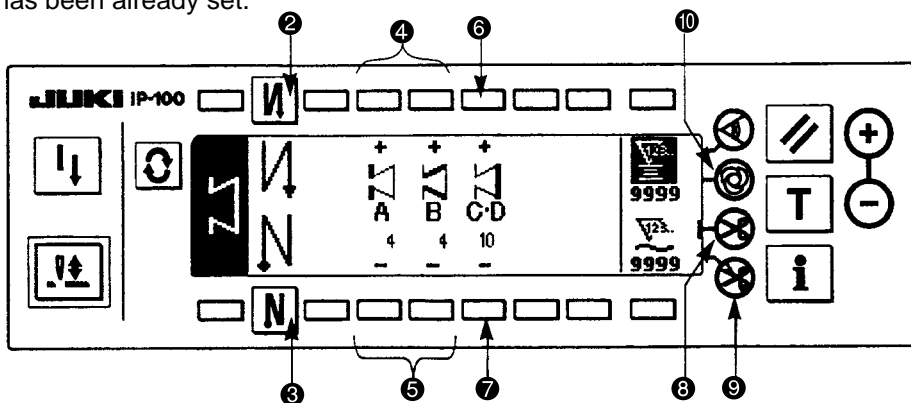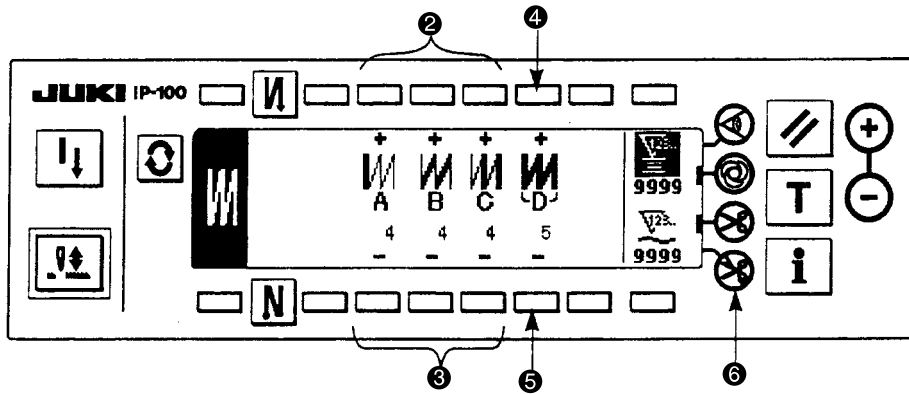
2) When changing the number of stitches, change it with switches ❷ and ❸ for setting the number of stitches for processes A through C. To change the number of times of the whole processes, change it with switches ❹ and ❺ for setting the number of processes D.
(The range of the number of stitches A,B and C that can be changed : 0 to 19 stitches. The range of the number of processes D that can be changed : 0 to 9 times)

3) Depress the front part of the pedal once, and the sewing machine will repeat the normal stitching and reverse stitching as many as the number of specified times. Then the sewing machine will automatically make the thread trimmer actuate and will stop to complete the overlapped stitching procedure. (The one-shot automatic stitching cannot be turned OFF.)

4) When thread trimming prohibiting function ❻ is selected, the machine will stop with the needle up upon completion of the overlapped stitching procedure without performing thread trimming.

4. Square stitching pattern

❷	OFF	ON	OFF	ON
Sewing pattern				
❸	OFF	OFF	ON	ON

Press to display the pattern list screen.

1) Press switch ❶ to select the square stitching pattern, and the screen is automatically changed over to the number of stitches of square stitching setting screen to display the number of stitches which has been already set.
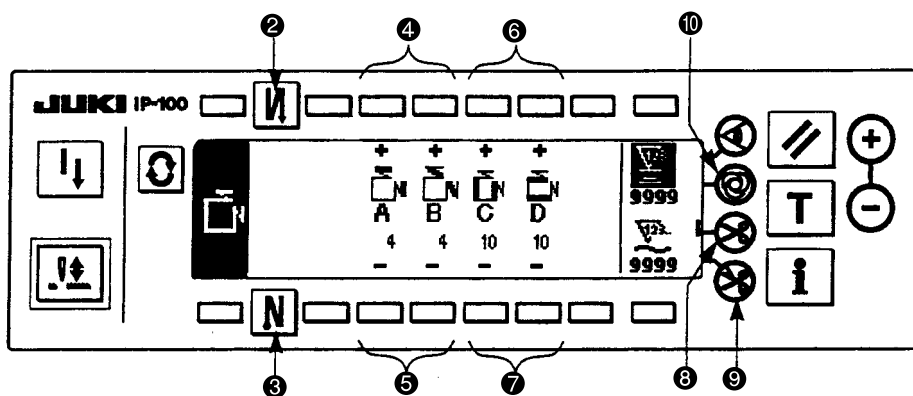
2) When changing the number of stitches of reverse stitching, change it with switches ❹ and ❺ for setting the number of stitches of A and B.

In addition, when changing the number of stitches of square stitching, change it with switches ❻ and ❼ for setting the number of stitches of C and D.

(The range of the number of stitches that can be changed : A and B = 0 to 19 stitches, C and D = 0 to 99 stitches)

3) Press switch ❷ to set the reverse stitching at the start of sewing.

No setting   Reverse stitching   Double reverse stitching
               at the start of sewing   at the start of sewing

4) Press switch ❸ to set the reverse stitching at the end of sewing.
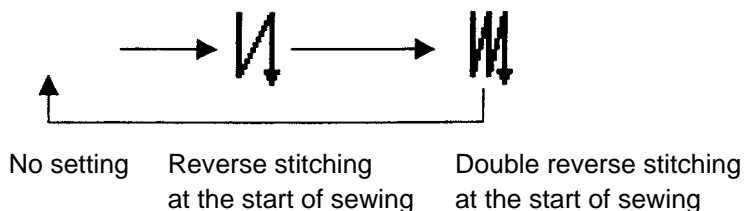
No setting   Reverse stitching   Double reverse stitching
               at the end of sewing   at the end of sewing
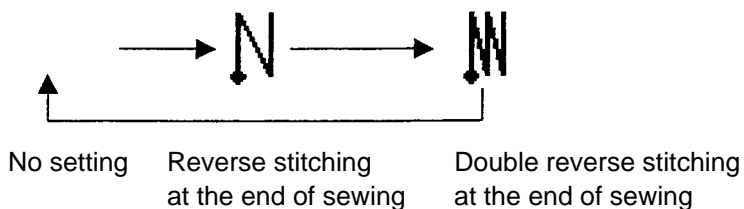
5) The sewing machine automatically stops after completion of the process at processes C and D. At this time, the sewing machine rotates at low speed when the touch-back switch is pressed (compensation stitching operation). In addition, when the pedal is returned to the neutral position and the front part of it is depressed again, the sewing can be continued regardless of the setting of the number of stitches.

6) When automatic thread trimming switch ❽ is selected, thread trimming is automatically performed after completion of the last process. (When the reverse feed stitching at the end of sewing is set, the reverse feed stitching at the end of sewing becomes the last process, and automatic thread trimming is performed after completion of the process.)

7) When thread trimming prohibiting switch ❾ is selected, the sewing machine will stop with the needle up without performing thread trimming.

8) When one-shot automatic stitching switch ❿ is selected, automatic sewing is performed at the set speed without a break by depressing the front part of pedal at processes C and D.
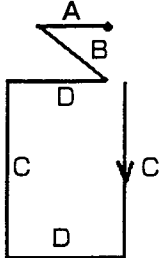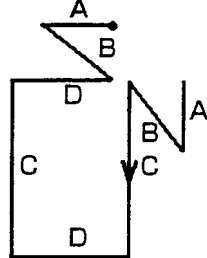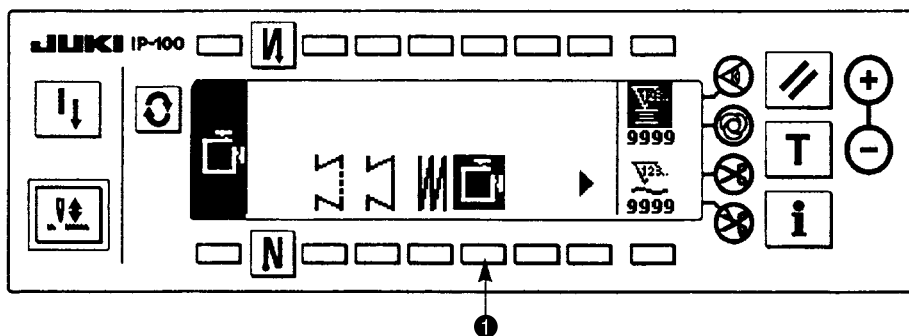
9) When the sewing machine is provided with auto-lifter, the presser foot automatically goes up after completion of the process at processes C and D.

(6) IP-100E information mode

In the information mode, you can specify, check, and edit various data and also perform other operations. The information mode consists of the operator level and maintenance personnel level. Refer to the instruction manual of IP-100E/SC-510 for the operator level.

[Maintenance personnel level]
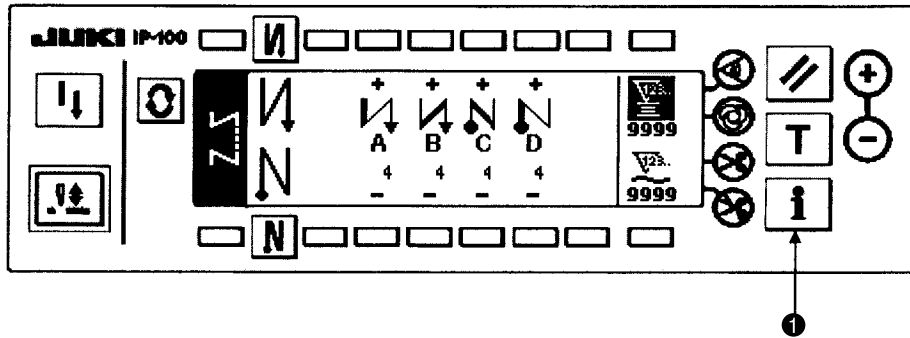
1) Turn ON the power.
2) Press the switch ❶ for 3 seconds to call the information screen.

■ Information screen (Maintenance personnel level)
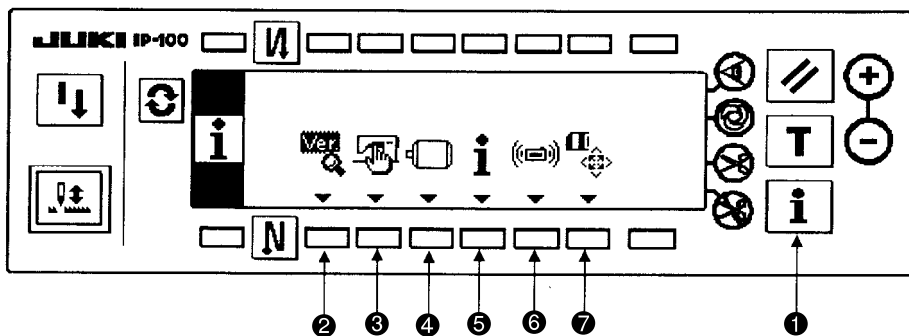
1) Press the respective switches to display the screens of the respective functions. (Press the switch ❸, ❹, ❺, or ❻ for 3 seconds for corresponding operation.)
   Press switch ❶ to end the information mode, and the screen returns to that before the information mode.

    ❷ Version display .... **1. Refer to the version function.**
    ❸ Sewing common setting .... **2. Refer to the sewing common data function.**
    ❹ Function setting .... **Refer to the instruction manual for IP-100E/SC-510.**
    ❺ Sewing management setting .... **3. Refer to the sewing management information.**
    ❻ Data communication .... **4. Refer to the communication function.**
    ❼ SM format (Smart media) .... **5. Refer to the SM format function.**

  (Caution) **When the smart media format is executed, all data which have been currently recorded will disappear. Be careful not to use the format for any other than the initialization of the smart media.**

1) Version function

This function allows you to view the version of each component such as operation panel [IP-100E], IPOP board [SC-510 expansion], and CTL board [SC-510 main body].

■ Version display screen

[Standard setting]

(Contents)

R　V　L

01 — 01 — 01　　00

　　　　　　　　　Others

　　　　　　　Level

　　　　　Version

　　　Revision

CPU type
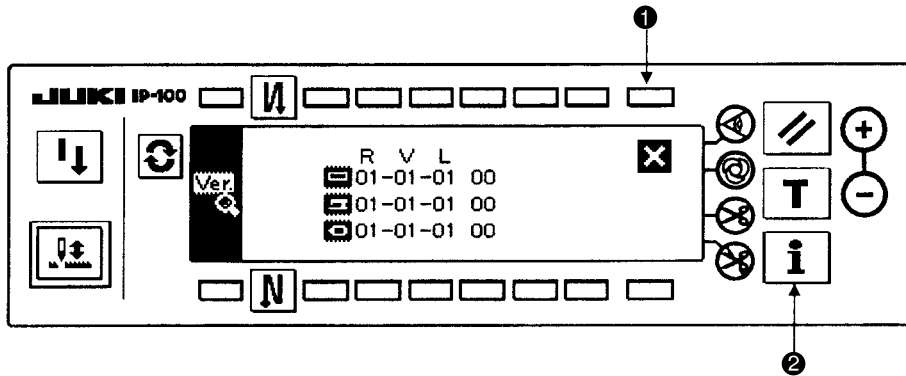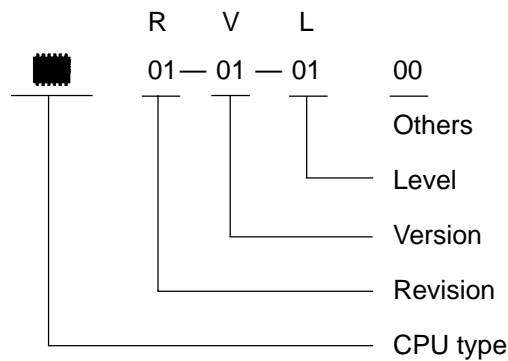
: Operation panel program (IP-100E)

: IPOP program (SC-510 expansion [IPOP board])

: Servomotor program (SC-510 main body [CTL board])

1. After checking a version, you can return to the last screen by pressing the switch ❶. If you press the switch ❷, the information mode ends and the screen before the information mode screen appears again.

2. Sewing common data function

This function allows you to display, specify, and manage various sewing data relating to simplified program, optional input/output, thread trimmer, additional device 1, and additional device 2, and others.

■ Sewing common data screen (Maintenance personnel level)
1. Press the respective switches to display the screens of the respective functions.
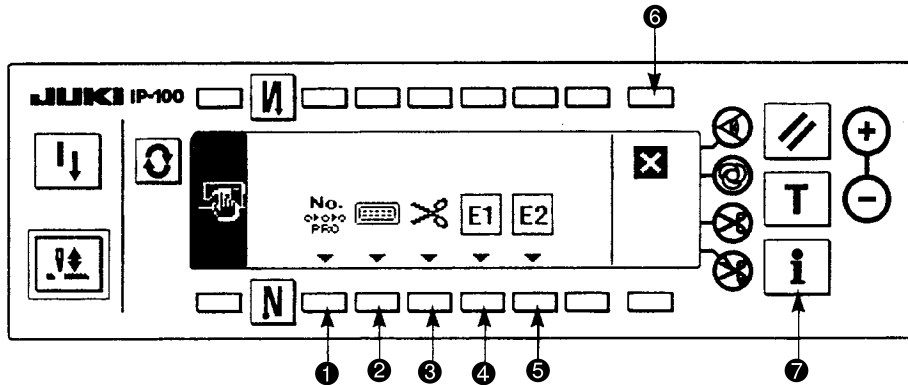
❶ Simplified program edit ....**(1) Refer to the simplified program function.**
❷ Optional input / output setting ....**(2) Refer to the optional input / output function.**
❸ Thread trimmer device display ....**(3) Tread trimmer device function (Refer to the instruction manual for IP-100E/SC-510.)**
❹ Additional device 1 setting ....**(4) Additional device function (Refer to the instruction manual for IP-100E/SC-510.)**
❺ Additional device 2 setting ....**(4) Additional device function (Refer to the instruction manual for IP-100E/SC-510.)**

2. Press switch ❻ to return to the information screen (maintenance personnel level), and press switch ❼ to end the information mode. Then the screen returns to that before the information mode.

(1) Simplified program function
This is the function to create the simplified program which takes in the various internal signals and the signal from the outside (connector), and can control the output of special signals to the outside (connector) and the complicated motion of the sewing machine with SC-510 main unit only without using the exclusive input device or the like.

■ Simplified program edit the 1st screen
[Program command "END" : standard setting]
1) Press switches ❶ and ❷ to select programs (No.1 to 4).
2) Press switches ❸ and ❹ to select steps (No.1 to 20).When the program command selected with switches ❺ and ❻ is "END", the step No. becomes the last step and it is not possible to proceed to the next step No.
3) Press switches ❺ and ❻ to select program commands (function code No. 0 to 20).
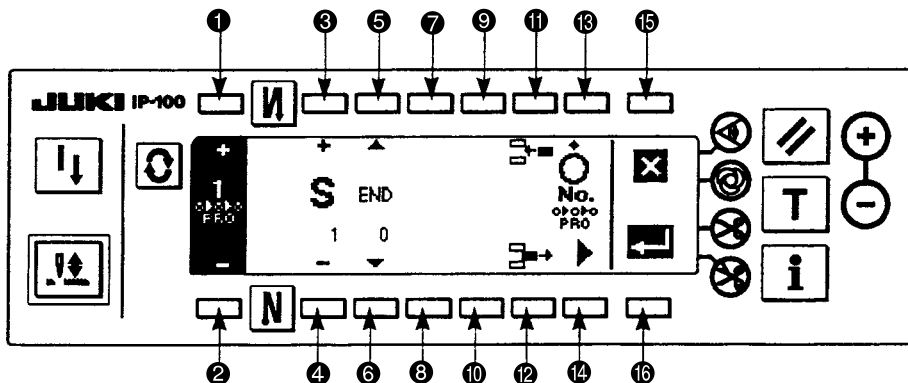
4) Press switches ❼ and ❽ to set parameter 1. Contents of parameter 1 may differ or not exist depending on the selected program command.
5) Press switches ❾ and ❿ to set parameter 2. Contents of parameter 2 may differ or not exist depending on the selected program command.
6) Press switch ⓮ to display the simplified program edit the 2nd screen.

■ Simplified program edit the 2nd screen
[Program command "END" : standard setting]
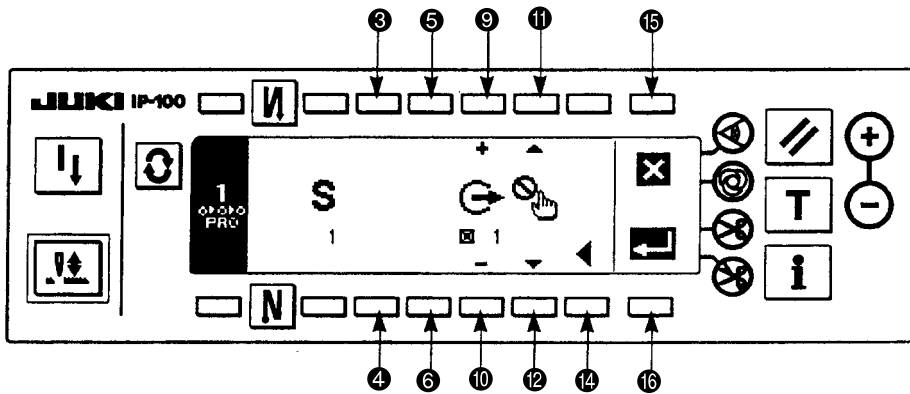
7) Press switches ❸ and ❹ to select input ports (No. 1 to 53). Input port may not exist depending on the selected program command.
8) Press switches ❺ and ❻ to select input state of the selected input port (Low : true when inputting Low, High : true when inputting High). Input logic of the input port may not exist depending on the selected program command.

   * Selection of plural input ports (No. 1 to 53) and the accompanied input state is possible.

9) Press switches ❼ and ❽ to select output ports (No. 1 to 17).
10) Press switches ❾ and ❿ to select output state of the selected output port (Low : Low output when true, High : High output when true). Output state can be set with plural output ports.

   * Selection of plural output ports (No. 1 to 17) and the accompanied output state is possible.

11) Press switch ⓮ to display the simplified program edit the 1st screen.

■ Simplified program edit the 1st screen
[Program command "END" : standard setting]
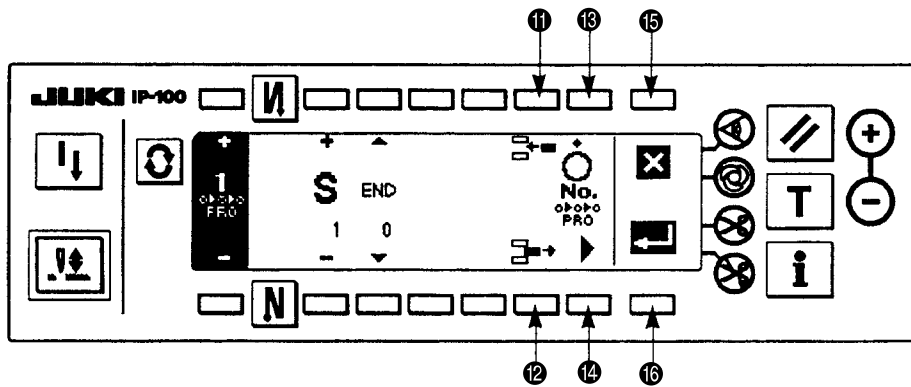
12) Repeat the procedure from 2) through 11) for editing the next step. After completion of editing, press the switch
❸ to enable the program. (The illustration on the previous page shows the state of program off. The display
changes to the illustration below and the program becomes enabled when the switch ❸ is pressed.)

Program on   Program off

13) When switch ❻ is pressed to store this program in memory and end the editing, display the screen of the
illustration below. When switch ❺ is pressed, all contents of the edit up to that time are invalidated and the state
returns to that before edit.
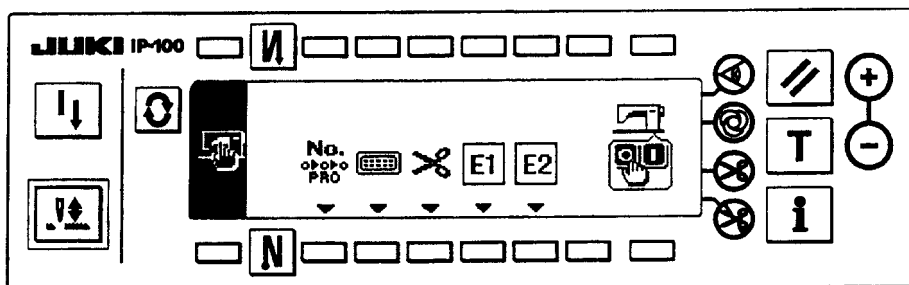
14) Lastly, turn OFF the power switch. This simplified program works when the power switch is turned ON again.

- Inserting procedure of the step
  When switch ⓫ is pressed, a step (program command "DELY" is set) is newly inserted after the displayed step,
  and the display is changed over to that of the step.

- Deleting procedure of the stop
  When switch ⓬ is pressed, the displayed step is deleted, the next step is advanced, and the display is changed
  over to that of the step.

- Effective simplified program No. display at the time of sewing
  Simplified program No. which has been set effective is displayed in the frame of dotted line of the illustration
  below in the normal sewing screen or the like, and which simplified program No. is working can be confirmed.
  The illustration below shows the display when all of No. 1 to 4 are set effective. Simplified program No. which
  has been set invalidate is not displayed

MEMO
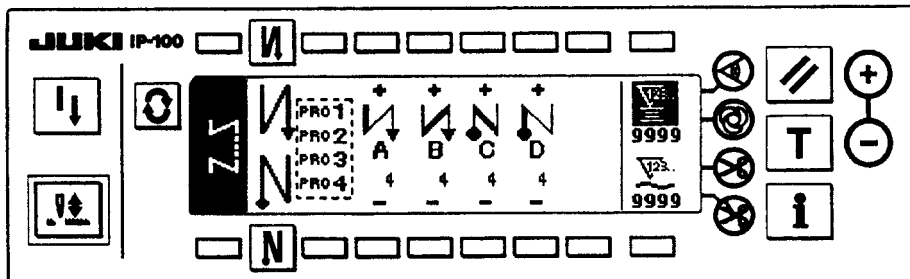
[Program command list]

Command display Function code No.	Command name	Parameter 1		Parameter 2		Input port		Output port		Description of command
		Display	Setting range	Display	Setting range	Display	Setting range	Display	Setting range	
END 0	Completion	—	—	—	—	—	—	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	End of program (initial setting)
DELY 1	Delay	—	—	(hand icon) 0 to 999	(Delay time) 0 : Command invalid 1 to 999 : msec	—	—	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	To next step after lapse of delay time
AND 2	AND conditional branch	SNo. 1 to 20	(Skip destination step No.) 1 to 20 : Step No.	(hand icon) 0 to 999	(Delay time) 0 : Waiting input until completion of condition 1 to 999 : msec	⊡ 1 to 53	🚫 : No setting High : H input Low : L input	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Moves to next step when all conditions specified in the input setting are completed (AND input). Jumps to the step set at skip destination step No. when input conditions are not completed and delay time has lapsed.
OR 3	OR conditional branch	SNo. 1 to 20	(Skip destination step No.) 1 to 20 : Step No.	(hand icon) 0 to 999	(Delay time) 0 : Waiting input until completion of condition 1 to 999 : msec	⊡ 1 to 53	🚫 : No setting High : H input Low : L input	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Moves to next step when any of conditions specified at input setting is completed (OR input). Jumps to the step set at skip destination step No. when input conditions are not completed and delay time has lapsed.
STIA 4	Number of stitches AND conditional branch	SNo. 1 to 20	(Skip destination step No.) 1 to 20 : Step No.	(123 icon) 0 to 999	(Number of stitches) 0 : Command invalid 1 to 999 : msec	⊡ 1 to 53	🚫 : No setting High : H input Low : L input	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Jumps to the step specified at skip destination step No. when all input setting conditions are completed within the set value of number of stitches setting (AND input), and moves to next step after number of stitches has finished.
STIO 5	Number of stitches OR conditional branch	SNo. 1 to 20	(Skip destination step No.) 1 to 20 : Step No.	(123 icon) 0 to 999	(Number of stitches) 0 : Command invalid 1 to 999 : msec	⊡ 1 to 53	🚫 : No setting High : H input Low : L input	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Jumps to the step specified at skip destination step No. when any of input setting conditions is completed within the set value of number of stitches setting (OR input), and moves to next step after number of stitches has finished.
JUMP 6	Jump repeat counter	SNo. 1 to 20	(Jump) 1 to 20 : Step No.	(123 icon) 0 to 999	(Repeat count value) 0 : Infinite 1 to 999 : Time	—	—	⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Repeats between the specified steps at jump until repeat count value is over. Loops infinitely at set value 0. **(Caution) Do not perform the nest input of this command.**
SPED 7	Rotation speed command	(speed icon) 0 to 999	(Speed) 0 to 999 : X10	(hand icon) 0 to 999	(Delay time) 0 : Delay time invalid 1 to 999 : msec	—	—	⟲ ⊠ 1 to 17	🚫 : No setting High : H output Low : L output	Speed of the swing machine can be set. The machine runs at the set speed within the set delay time, and the speed command is released after lapse of delay time. Minimum number of revolutions does not become less than the set value of function setting No.35 Minimum number of revolutions of pedal. Also, maximum number of revolutions does not become more then the set value.

*State setting of input ports (No.1 to 53) and output ports (No.1 to 17) can be individually performed. Refer to 9.-(5) Simplified program information input setting code list and connector location list for the input/output port numbers.

Command display Function code No.	Command name	Parameter 1 Display	Parameter 1 Setting range	Parameter 2 Display	Parameter 2 Setting range	Input port Display	Input port Setting range	Output port Display	Output port Setting range	Description of command
LIMI 8	Speed limitation command	(0 to 999)	(Limitation speed) 0 to 999 : X 10 rpm	(0 to 999)	(Delay time) 0 : Delay time invalid 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	Max. speed limitation value of the sewing machine can be set. The set speed limitation works within the set delay time and speed limitation command is released after lapse of delay time. Minimum number of revolutions does not become less than the set value of function setting No.35 Minimum number of revolutions of pedal. Also, max. number of revolutions does not become more than the set value of function setting No. 96 Max. number of revolutions.
LINH 9	Lswinh command	or (0 to 999)	(on/off information) : on : off	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	LSW (depressing front part of pedal) is prohibited. Command is executed without delay time at delay time 0. For others, LSW is invalid within the set delay time, and input of LSW is effective after setting delay time.
TRM 10	Thread trimming command	—	—	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	Thread trimming operation is prohibited. Command is invalid at delay time 0. For others, thread trimming command is output within the set delay time.
TINH 11	Tswinh command	or (0 to 999)	(on/off information) : on : off	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	Thread trimming output is performed. Command is executed without delay time at delay time 0. For others, thread trimming delay command is output within the set delay time, and released after lapse of delay time.
UP 12	Up stop command	—	—	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	Up position stop command (speed specified with other command is neglected.) Command is executed without delay time at delay time 0. For others, UP position stop command is effective within the set delay time, and command is invalid after lapse of delay time.
HS 13	Needle up/ down command	—	—	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	When command is executes, if the needle is in DOWN position, it rotates to UP position in the normal rotation, and vice versa. Speed specified with other command is neglected. Command is executed without delay time at delay time 0. For others, command is effective within the set delay time, and command is invalid after lapse of delay time.
RSW 14	Rsw command	—	—	(0 to 999)	(Delay time) 0 : No delay 1 to 999 : msec	—	—	(1 to 17)	: No setting High : H output Low : L output	Reverse revolution to lift needle command When command is executed, the machine is braked in the reverse rotation from the angle set with function setting No. 19. Command is executed without delay time at delay time 0. For others, command is effective within the set delay time, and command is invalid after lapse of delay time.
ANGA 15	Analog AND conditional branch	SNo. (1 to 20)	(Skip destination setup No.) 1 to 20 : Setup No.	(0 to 359)	(Angle) 0 to 359 : Degree	(1 to 53)	: No setting High : H input Low : L input	(1 to 17)	: No setting High : H output Low : L output	Step moves to the next step after progress of set angle, and moves to skip destination step No. when all input conditions are completed (AND input). (Reference angle is the angle which is off from UP position.)
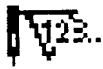
*State setting of input ports (No.1 to 53) and output ports (No.1 to 17) can be individually performed. Refer to 9.-(5) Simplified program information input setting code list and connector location list for the input/output port numbers.

Command display Function code No.	Command name	Parameter 1		Parameter 2		Input port		Output port		Description of command
		Display	Setting range	Display	Setting range	Display	Setting range	Display	Setting range	
ANGO 16	Angle OR conditional branch	**S**No. 1 to 20	(Skip destination step No.) 1 to 20 : Step No.	∠° 0 to 359	(Angle) 0 to 359 : Degree	⊕ **I** 1 to 53	: No setting **High** : H input **Low** : L input	⊖ ⊠ 1 to 17	: No setting **High** : H output **Low** : L output	Step moves to the next step after progress of set angle, and moves to skip destination step No. when any of input conditions is completed (OR input). (Reference angle is the angle which is off from UP position.)
STOP 17	Stop command	—	—	✋ 0 to 999	(Delay ti mme) 0 : No delay 1 to 999 : msec	—	—	⊖ ⊠ 1 to 17	: No setting **High** : H output **Low** : L output	Stop command is output, and step moves to the next step. When time is set, step moves to the next step after lapse of set time.
BT 18	BTsw command (Reverse stitching command	⊙ or ⊙̇	(on/off information) ⊙ : on ⊙̇ : off	✋ 0 to 999	(Delay time) 0 : No delay 1 to 999 : msec	—	—	⊖ ⊠ 1 to 17	: No setting **High** : H output **Low** : L output	On/off of reverse stitching switch is set. Command is executed without delay time at delay time 0. For other set values, reverse stitching switch is turned off after lapse of back-tuck output "on" time during set time.
FL 19	FLsw command (Presser lifter output)	⊙ or ⊙̇	(on/off information) ⊙ : on ⊙̇ : off	✋ 0 to 999	(Delay time) 0 : Invalid 1 to 999 : msec	—	—	⊖ ⊠ 1 to 17	: No setting **High** : H output **Low** : L output	On/off of presser lifter switch command is set. Command is executed without delay time at delay time 0. For other set values, presser lifter switch is turned "off" after lapse of presser lifter output "on" time during set time.
REST 20	Program reset	**No.** ○⫶○ PRO 1 to 4	(Program No.) 1 to 4 : Simplified program No.	⊙ or ⊙̇	(on/off information) ⊙ : on ⊙̇ : off	—	—	⊖ ⊠ 1 to 17	: No setting **High** : H output **Low** : L output	Initialization of the step of specified program No. The step of specified program is forcibly returned to the fist step. Initialization of step can be performed to each program.

*State setting of input ports (No. 1 to 53) and output ports (No. 1 to 17) can be individually performed. Refer to 9.-(5) Simplified program information input setting code list and connector location list for the input/output port numbers.

MEMO

[Simplified program sample I]

Step No.	Command function code No.	Parameter 1 Setting	Parameter 2 Setting	Input port Setting	Output port Setting	Remark
S 1	AND 2	$No. 1	✋ 0	⊶ High I 1	⊷ High ⊡ 1 ⊷ High ⊡ 2	Detection of input on edge, initialization of output
S 2	AND 2	$No. 2	✋ 0	⊶ Low I 1	No setting	
S 3	STIA 4	$No. 3	123.. 10	No setting	No setting	10 stitch count
S 4	LINH 9	⊙	✋ 0	—	No setting	Lswinh: on (No pedaling)
S 5	TRM 10	—	✋ 0	—	No setting	Tread trimming command
S 6	AND 2	$No. 6	✋ 0	⊶ Low I 24	No setting	Stop confirmation

Step No.	Command function code No.	Parameter 1 Setting	Parameter 2 Setting	Input port Setting	Output port Setting	Remark
S 7	DELY 1	—	(hand) 50	—	(output) Low □ 1	Delay: 50 ms, output 1: on
S 8	DELY 1	—	(hand) 50	—	(output) Low □ 2	Delay: 50 ms, output 2: on
S 9	DELY 1	—	(hand) 100	—	(output) High □ 1	Delay: 100 ms, output 1: off
S 10	STOP 17	—	(hand) 0	—	(output) High □ 2	Cancellation of thread trimming command, output 2: off
S 11	LINH 9	(ring)	(hand) 0	—	No setting	Lswinh: off (Cancellation of no pedaling)
S 12	JUMP 6	SNo. 1	(123..) 0	—	No setting	Repeat
S 13	END 0	—	—	—	No setting	

<Simplified program sample I>
This program enables optional input 1, trims the thread automatically after 10 stitches counted, and stops the machine. The program also enables optional output 1 for 100 ms immediately after machine stop and enables optional output 2 for 150 ms after 50 ms from machine stop.

Input 1

Thread trimming

Stop

Output 1

Output 2

10 stitches

50ms 50ms 100ms
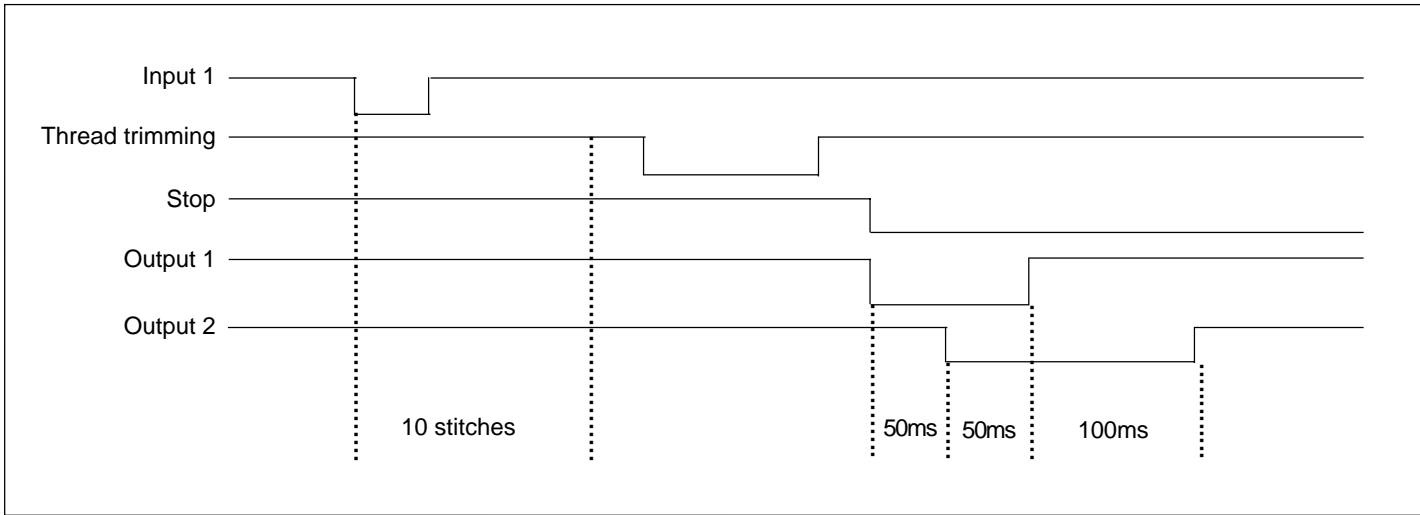
[Simplified program sample II]

Step No.	Command function code No.	Parameter 1 Setting	Parameter 2 Setting	Input port Setting	Output port Setting	Remark
S 1	AND 2	SNo. 1	(hand) 0	High ▪I 1	High ▫O 1 / Low ▫O 2	Detection of input on edge, output 2: on
S 2	AND 2	SNo. 4	(hand) 20	High ▪I 1	No setting	on delay: 20 ms (chatter protection)
S 3	JUMP 6	SNo. 2	(rotation 123.) 0	—	No setting	on waiting
S 4	LIMI 8	(machine) 200	(hand) 0	—	No setting	Speed limit at 2000 rpm (in steps of 10 rpm)
S 5	AND 2	SNo. 5	(hand) 0	High ▪I 1	Low ▫O 1 / High ▫O 2	Detection of input on edge, output 1: on

Step No.	Command function code No.	Parameter 1 Setting	Parameter 2 Setting	Input port Setting	Output port Setting	Remark
S 6	AND 2	SNo. 8	20	High I 1	No setting	on delay: 20 ms (chatter protection)
S 7	JUMP 6	SNo. 6	0	—	No setting	on waiting
S 8	LIMI 8	650	0	—	No setting	Speed limit cancellation: 6500 rpm (in steps of 10 rpm)
S 9	JUMP 6	SNo. 1	0	—	No setting	Repeat
S 10	END 0	—	—	—	No setting	

<Simplified program sample II>
This program imposes the speed limit of 2000 rpm at the ON edge of optional input 1 and cancels he speed limit at the ON edge of second input 1.
The program enables optional output 1 during speed limit imposed and enables output 2 during speed limit cancelled.

Input 1

Speed limit at
6500 rpm
2000 rpm
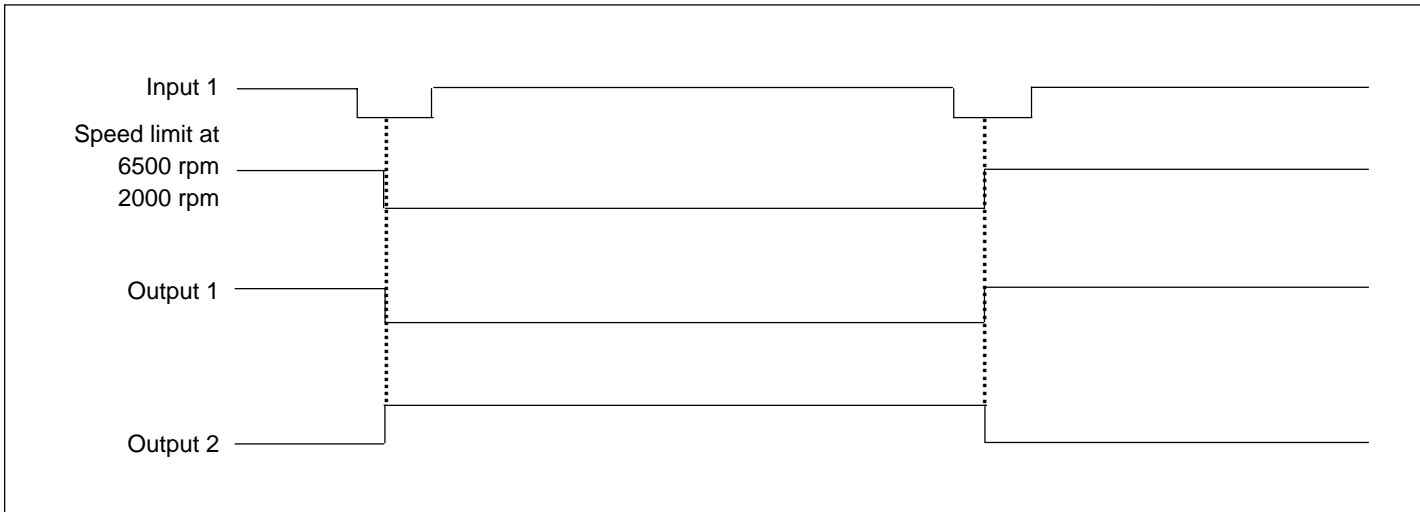
Output 1

Output 2

(2) Optional input/output functions
Assignment of various functions to the input connector (CN51) and output connector (CN50) on the CTL board allows you to perform signal transmission of the functions assigned to the connectors and control simple operations of the sewing machine.

■ **Optional input/output setting screen**
[Standard setting]
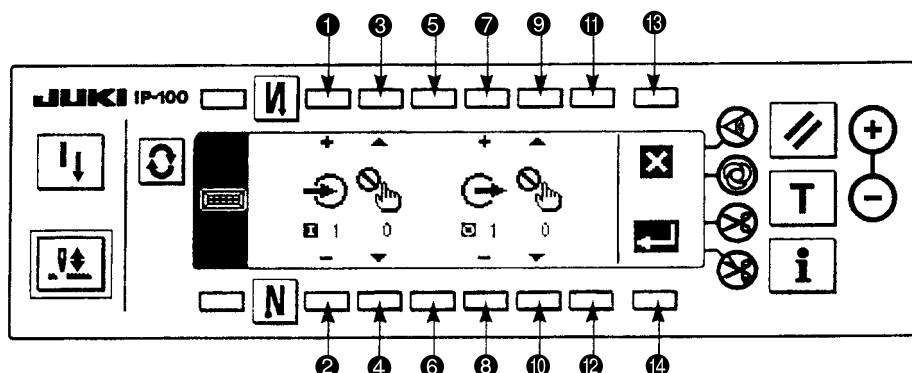
• When setting the function to input connector (CN51)
1) Press switches ❶ and ❷ ,and select optional input (No. 1 to 8) corresponding to pin No. of input connector.
2) Press switches ❸ and ❹ ,and select input function (function code No. 0 to 22).
3) Press switches ❺ and ❻ ,and select input state (Low : true when Low is inputted, High : true when High is inputted) of the selected input function. When no function setting (function code No. 0) is selected, selection of input state does not exist.
 * Selection of plural optional inputs (No. 1 to 8) and the accompanied input state is possible. However, when the same input function is set to plural optional inputs, optional input No., the number of which is smaller, becomes effective and that, the number of which is larger, becomes invalid and fails to work.

(Caution) **It is not possible to set the function to input connector (CN123) on the extension circuit board (IPOP circuit board).**

• When setting the function to output connector (CN50)
4) Press switches ❼ and ❽ ,and select optional output (No. 1 to 8) corresponding to pin No. of output connector.
5) Press switches ❾ and ❿ ,and select output function (function code No. 0 to 11).
6) Press switches ⓫ and ⓬ ,and select output state (Low : Low is output at the time of true, High : High is output at the time of true) of the selected output function. When no function setting (function cord No. 0) is selected, selection of output state does not exist.
 * Selection of plural optional outputs and the accompanied output state is possible. However, when the same output function is set to plural optional outputs, optional output No., the number of which is smaller, becomes effective and that, the number of which is larger, becomes invalid and fails to work.
 * When the output function selected at optional output (No. 1 to 8) is solenoid output function (TRM, BT, WP or FL), the optional output becomes effective, and the function corresponding to connectors for sewing machine (CN36 and 37) becomes invalid.

(Caution) **It is not possible to set the function to output connector (CN124) on the extension circuit board (IPOP circuit board).**

7) Press switch ⓮ to store the setting in memory and end. Then the screen as shown in the illustration below is displayed. When switch ⓭ is pressed, all contents of the setting up to that time are invalidated, and the state returns to that before setting.
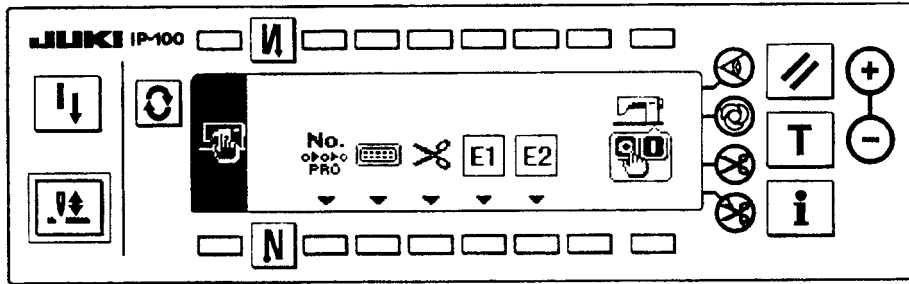
8) Lastly, turn OFF the power switch. This optional input/output function works by turning ON the power switch again.

[Input function list]
The following chart shows available input functions. Use this chart after referring to "Setting procedure of optional power and setting procedure of jumper for input changeover".

(Caution) For assigning the input function to the input connector, CN51, use +5 V or less voltage for the function signal transmitting to the optional input terminal.   Failure to observe this may cause damage to the board.

Function display Function code No.	Function name	Input state setting	Description of function
0	No function setting	—	(Standard setting state)
1	Needle up/down compensating stitching	Low High : L input : H input	Every time switch is pressed, as many as half stitch is fed in normal direction. (Same motion as that of needle up/down compensating stitching switch of the operation panel.)
2	Back compensating stitching	Low High : L input : H input	Reverse stitching at low speed is performed while switch is held pressed. (Effective only when constant-dimension stitching is selected with the operation panel.)
3	Function of cancel of once of reverse stitching at end	Low High : L input : H input	Depressing the back part of the pedal after pressing the switch cancels reverse feed stitching once.
4	Thread trimming function	Low High : L input : H input	The function works as thread trimming switch.
5	Presser lifter function	Low High : L input : H input	The function works as presser lifter switch.
6	One stitch compensating stitching	Low High : L input : H input	Every time switch is pressed, one stitch sewing motion is executed.
7	Function of cancel of reverse stitching at start	Low High : L input : H input	Invalid/effective can be alternately changed over by operating optional switch.
8	Function of lifting presser lifter when pedal is in neutral position	Low High : L input : H input	Every time switch is pressed, function of automatically lifting/not lifting presser lifter when pedal is in neutral position can be selected.
9	Material end sensor input	Low High : L input : H input	This function works as input signal of material end sensor.
10	Function of prohibition of pressing front part of pedal	Low High : L input : H input	This function prohibits rotation by means of pedal.

Function display Function code No.	Function name	Input state setting	Description of function
✂ 11	Function of prohibition of thread trimming output	**Low** : L input **High** : H input	This function prohibits thread trimming output.
🐖 12	Low speed command input	**Low** : L input **High** : H input	This function works as low speed switch for standing machine.
🐇 13	High speed command input	**Low** : L input **High** : H input	This function works as high speed switch for standing machine.
14	Needle lift function	**Low** : L input **High** : H input	When switch is pressed during DOWN stop, UP stop motion is performed.
15	Function of reverse revolution to lift needle	**Low** : L input **High** : H input	When switch is pressed during DOWN stop, reverse revolution is performed and the machine is braked at the specified angle.
16	Safety switch input	**Low** : L input **High** : H input	This function prohibits rotation.
17	Thread trimmer knife sensor input	**Low** : L input **High** : H input	This function works as input signal of thread trimmer knife sensor.
18	Cancel/addition of automatic reverse stitching switch input	**Low** : L input **High** : H input	Every time switch is pressed, this function performs cancel or addition of reverse stitching at start or end.
19	Alternate vertical movement amount change panel switch input	**Low** : L input **High** : H input	Every time switch is pressed, this function performs alternate vertical movement amount change output.
20	Alternate vertical movement amount change knee switch input	**Low** : L input **High** : H input	While switch is held pressed, this function performs alternate vertical movement amount change output.
21	2-pitch alternate input	**Low** : L input **High** : H input	Every time switch is pressed, this function inverses 2-pitch change output.
22	2-pitch momentary switch	**Low** : L input **High** : H input	While switch is held pressed, this function performs 2-pitch change output.

[Output function list]
The following chart shows available input functions. Use this chart after referring to "Setting procedure of optional power and setting procedure of jumper for input changeover".

(Caution) **For assigning the output function to the output connector, CN50, apply a voltage equal to or less than that specified for W1 and W2 (jumper for power supply voltage) to the optional output terminal. Failure to observe this may cause damage to the board.**

Function display Function code No.	Function name	Output state setting	Description of function
0	No function setting	—	(Standard setting state)
1	Thread trimming output	Low : L output High : H output	This function outputs thread trimming signal. (When this function is selected, function corresponding to connectors for sewing machine (CN36, CN37) becomes invalid.)
2	Wiper output	Low : L output High : H output	This function outputs wiper signal. (When this function is selected, function corresponding to connectors for sewing machine (CN36, CN37) becomes invalid.)
3	Tension release output	Low : L output High : H output	This function outputs tension release signal. (When this function is selected, function corresponding to connectors for sewing machine (CN36, CN37) becomes invalid.)
4	Presser lifter output	Low : L output High : H output	This function outputs presser lifter signal. (When this function is selected, function corresponding to connectors for sewing machine (CN36, CN37) becomes invalid.)
5	Reverse stitching output	Low : L output High : H output	This function outputs reverse stitching signal. (When this function is selected, function corresponding to connectors for sewing machine (CN36, CN37) becomes invalid.)
6	Reverse stitching at end once cancel monitor output	Low : L output High : H output	This function outputs reverse stitching at end once cancel function state.
7	Reverse stitching at start/end cancel monitor output	Low : L output High : H output	This function outputs reverse stitching at start and/or end cancel function state.
8	Cancel/addition of automatic reverse stitching switch monitor output	Low : L output High : H output	This function outputs cancel/addition of automatic reverse stitching switch input state.
9	Alternate vertical movement amount change (monitor) output	Low : L output High : H output	This function outputs alternate vertical movement amount change signal.
10	Sewing machine stop state output	Low : L output High : H output	This function outputs sewing machine stop state.
11	2-pitch (monitor) output	Low : L output High : H output	This function outputs 2-pitch signal.

(3) Thread trimming device function

This is the function to confirm the thread trimming device mounted on the sewing machine.
Refer to the instruction manual of IP-100E/SC-510 for further information.

(4) Additional device function

This is the function to select and set the types of additional devices such as threader, auto-hemmer, tape cutter, etc. which are interlocked with the sewing machine.

3. Sewing management information.

This function displays, sets, and controls all kinds of management information including maintenance, production management, operating measurement, operating status, error history.

1. The illustration below appears. The switches ❸, ❹, and ❺ appear when the level 1 operation [normal switch pressing] is performed, and the switches ❻ and ❼ appear when the level 2 operation [3-second switch pressing] is performed.
To return to the previous screen, press the switch ❶. To exit from information mode and return to the screen previous to the information mode, press the switch ❷.

■ **Sewing management information screen**
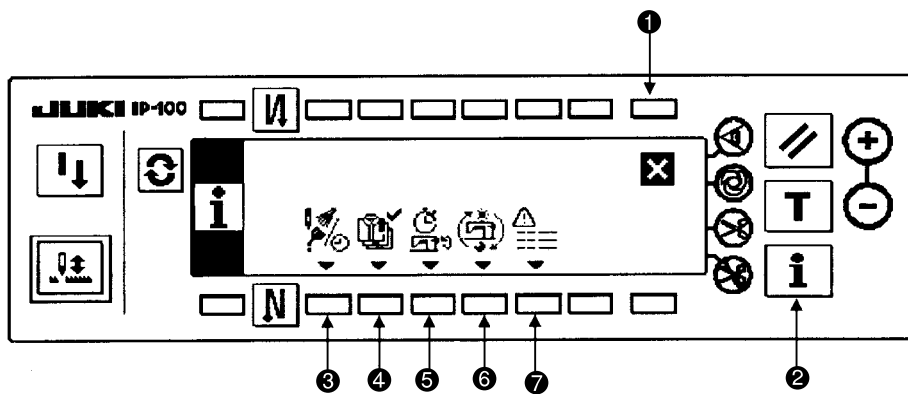
2. Press each switch to call up corresponding function screen.
   ❸ Maintenance setting ....**Refer to the instruction manual for IP-100E/SC-510.**
   ❹ Production management setting ....**Refer to the instruction manual for IP-100E/SC-510.**
   ❺ Operating measurement setting ....**Refer to the instruction manual for IP-100E/SC-510.**
   ❻ Operating status display ....● **Refer to the Operating status function.**
   ❼ Error history display ....● **Refer to the Error history function.**

● **Operating status function**
This function displays the operating status of the sewing machine including each operating time, energization time, thread trim count, and total stitches.

■ **Operating status screen**
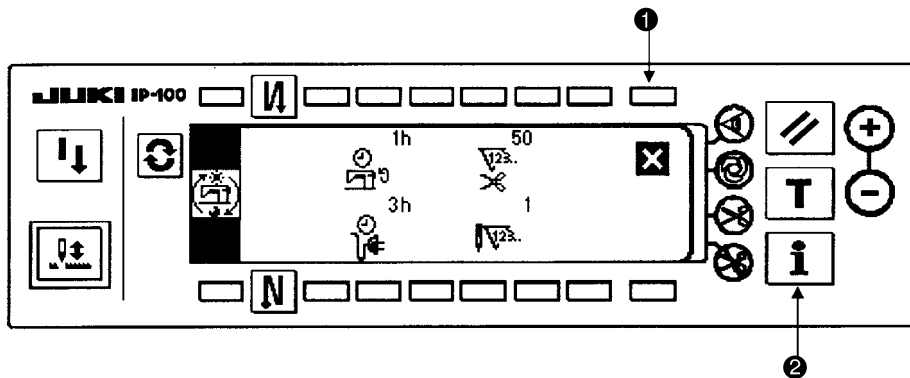
(Contents)

 : Operation time (Unit : h)

 : Energization time (Unit : h)

 : Thread trim count (Unit : Number of counts)

 : Stitche count (Unit : in 1,000 stitches)

1. Press the switch ❶ to return to the previous screen after viewing the operating status of the sewing machine. To exit from the information mode and return to the screen previous to the information mode, press the switch ❷.

● **Error history function**

This function display error occurrence information (error No., error duration, etc.) of the sewing machine.

■ **Error historu screen**
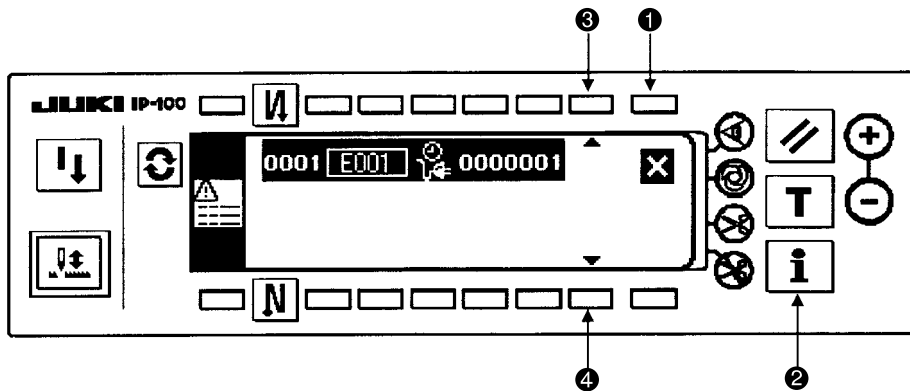
(Contents)

History No. Error No.   Error duration (Unit : h) [Energization time]

1. Press the switch ❶ to return to the previous screen after viewing the occurrence information (latest error highlighted and top listed) of the sewing machine. If two or more errors occur at the same time, press the switch ❸ or ❹ to scroll the list up or down respectively. Up to approximately 100 errors (depending on memory capacity) can be saved in the error history in reverse chronological order.
   To exit from the information mode and return to the screen previous to the information mode, press the switch ❷.
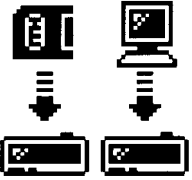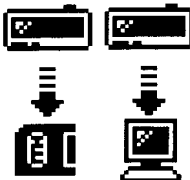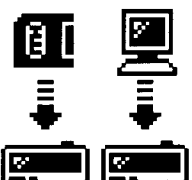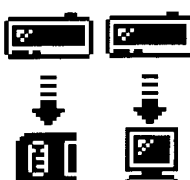
4) Communication function

This function establishes data communication between SU-1 (sewing machine data server utility) or SmartMedia and the operation panel.

Uploading simplified programs (No. 1 to 4 at once) from SC-510 to SmartMedia and downloading them from SmartMedia to SC-510 provide you with the availability of simplified programs with more than one sewing machine.

Communication function chart

Data type	Download	Upload	File extension	Remark
EPD — All simplified programs (No. 1 to 4 at once) (Parameter type)			EPD	(Standard setting) Files are parameter formatted (EPD). Be aware that old data is overwritten with new data at downloading (all simplified programs of No. 1 to 4 at once).
DATA — All sewing machine data			MSP	Various settings and management information data
Operation panel / IPOP (expansion) / Servomotor — Various control program data		—	PRG	

: Operation panel (IP-100E)

: SmartMedia

: SU-1 (sewing machine data server utility)

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■ Communication configuration screen
[Standard setting]
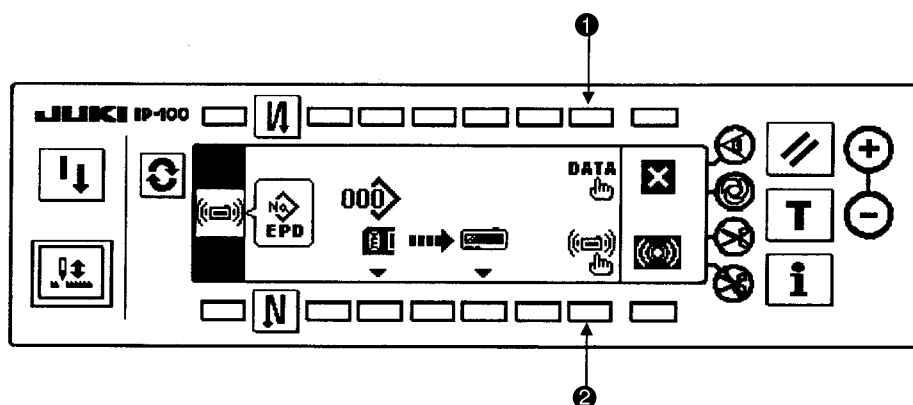
1. Press the switch ❶ to call up the data selection screen.

■ Data selection screen
[Standard setting]
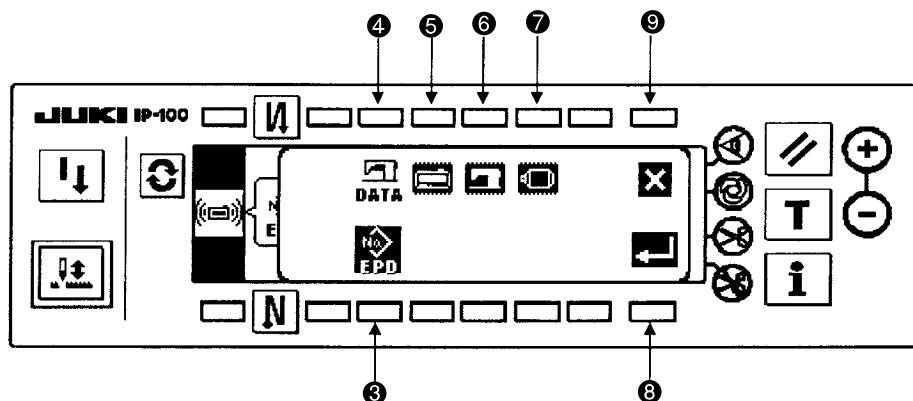
2. The illustration above indicates that parameter formatted data (EPD) is selected. (highlighted)
   Press the switch corresponding to your selected data type.
   - ❸ Parameter formatted data (EPD) .... All simplified program data (No. 1 to 4)
   - ❹ All sewing machine data (MSP) .... Various settings and management information data
   - ❺ Operation panel program (PRG) .... Operation panel control software (IP-100E)
   - ❻ IPOP program (PRG) .... IPOP control software (SC-510 expansion [IPOP board])
   - ❼ Servomotor program (PRG) .... Sewing machine control software (SC-510 main body [CTL board])

3. Press the switch ❽ to save the selected contents and call up the previous screen. To delete the selected contents and call up the previous screen, press the switch ❾.

4. Press the switch ❷ to call up the communication method selection screen.

■ **Communication method selection screen**
[Standard setting]
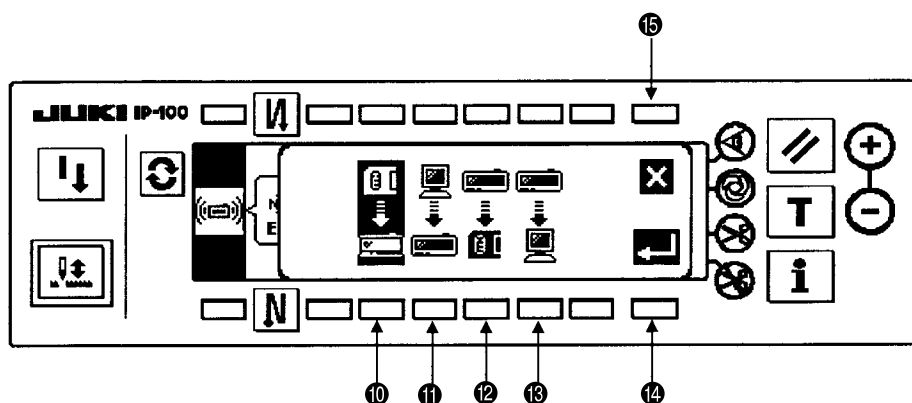
5. The illustration above indicates that the method where data is transmitted from SmartMedia to the operation panel is selected. (highlighted)
Press the switch corresponding to your selected data transmission method.

   ❿ SmartMedia   ⇒   Operation panel

   ⓫ SU-1   ⇒   Operation panel

   ⓬ Operation panel   ⇒   SmartMedia

   ⓭ Operation panel   ⇒   SU-1

6. Press the switch ⓮ to save the selected contents and call up the previous screen. To delete the selected contents and call up the previous screen, press the switch ⓯.

■ **Communication configuration screen**

The displayed contents vary depending on settings.
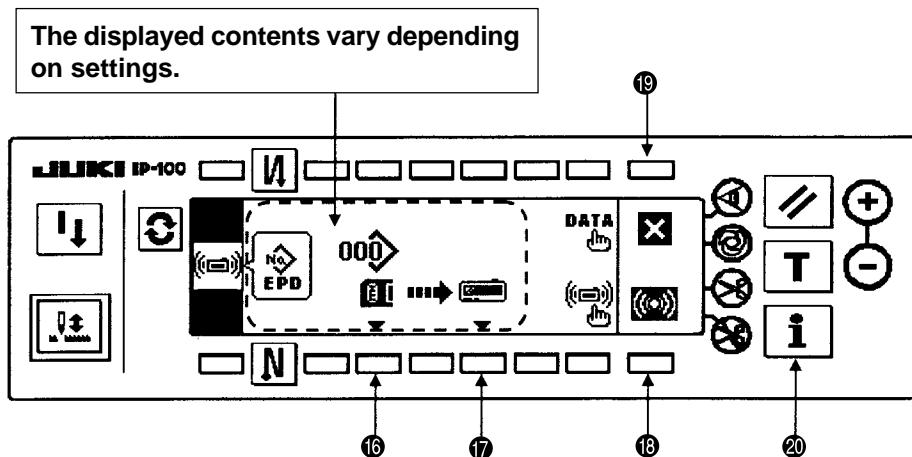
7. Press the switch ⑯ or ⑰ to select or specify the data number. The displayed contents and operations vary depending on data type and communication method.

8. Press the switch ⑱ after completion of all settings to start communication. During communication, an hourglass appears for parameter formatted data and all sewing machine data, and a percentage (%) bar graph appears for program data.

Hourglass

0%   10%   100%

Percentage (%) bar graph

9. To upload parameter formatted data after communication, return to the communication configuration screen. When the display indicates you to turn off the power, do as indicated.

Power OFF indication

(Caution) Never turn off the power during communication. If you turn off the power during communication for any reason, follow the procedure again.

[1] Upload of simplified program data

Uploading simplified programs (No. 1 to 4 at once) from SC-510 to SmartMedia provides you with the availability of simplified programs with more than one sewing machine.

The following explains how to copy simplified programs (No. 1 to 4 at once) as data file No. 5 (parameter formatted data (EPD)) into a SmartMedia card.

1) Select "parameter formatted data (EPD)" on the data selection screen and select "operation panel" ⇒ "SmartMedia" on the communication method selection screen to call up the screen below.

■ **Communication configuration screen**
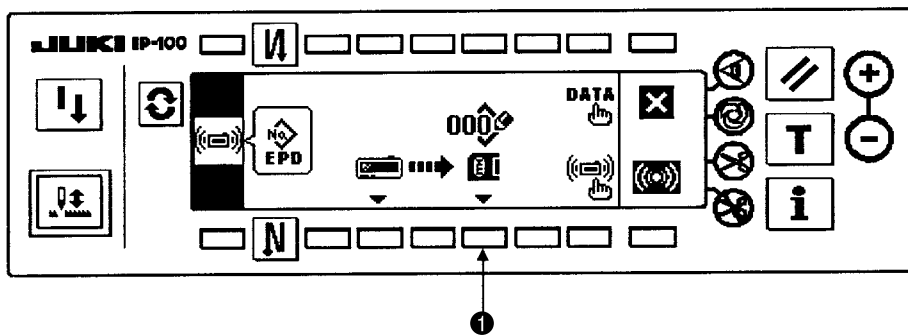
2) Press the switch ❶ to call up the data file No. entry screen.

■ **Data file No. entry screen**
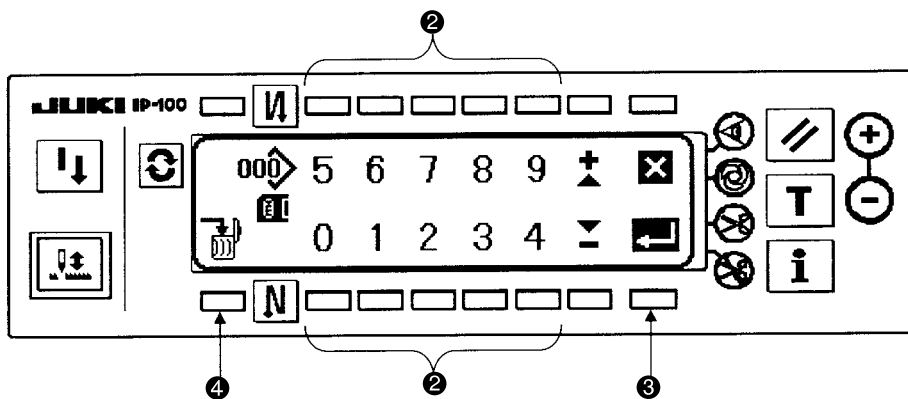
3) Press the switch ❷ to enter a data file number. Entered number appears at ⟩ . After number entry, press the switch ❸ to return to the communication configuration screen.

4) When there is a data file with a number that is the same number entered into SmartMedia, the screen for confirming data file overwriting appears as shown below. To permit overwriting, press the switch ❺ to return to the communication configuration screen. To prohibit overwriting, press the switch ❻ to return to the data file No. entry screen.

■ **Screen for confirming data file overwriting**
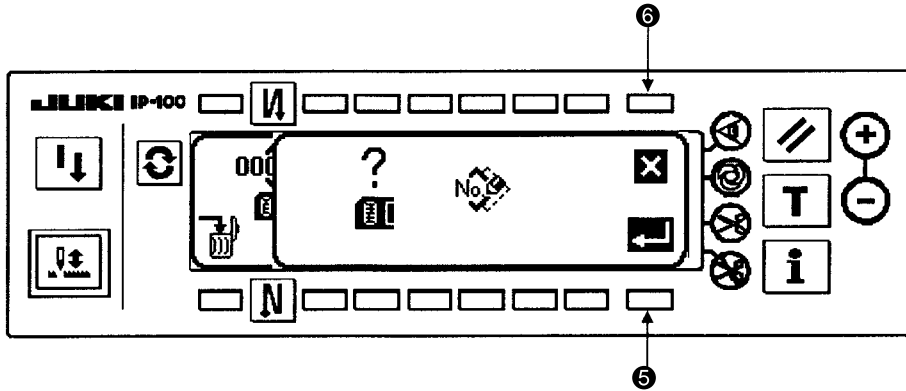
5) To delete a data file in SmartMedia, press the switch ❹ after entry of the data file number to call up the screen for confirming data file deleting as shown below.

■ **Screen for confirming data file deleting**
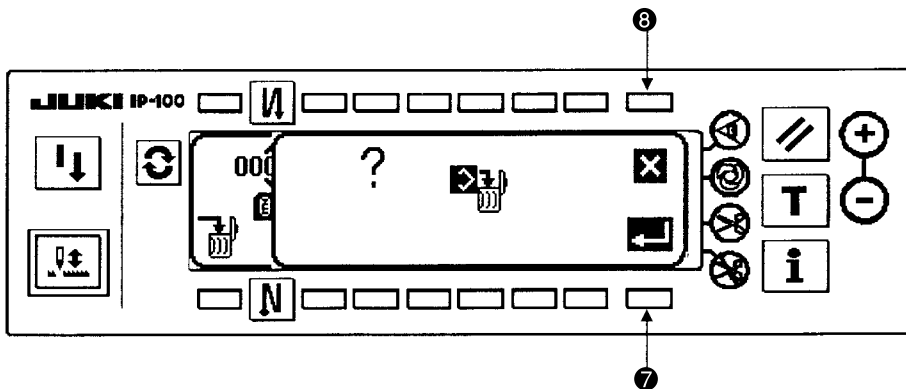
6) Press the switch ❼ to delete entered data file number and return to the data file No. entry screen. To stop deleting and return to the data file No. entry screen, press the switch ❽.

7) For example, the illustration below shows the communication configuration screen with data file No. 5 entered.

■ **Communication configuration screen**
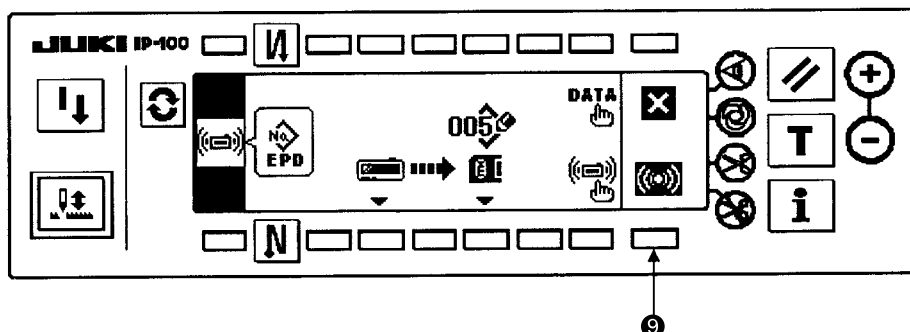
8) After all settings, press the switch ❾ to start uploading data into SmartMedia. The illustration below appears during uploading.
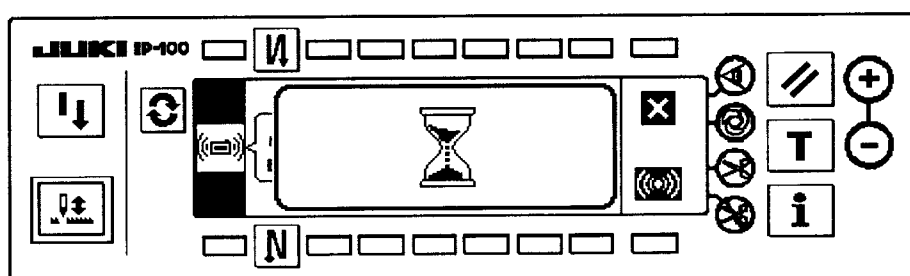
9) When the hourglass disappears and the communication configuration screen appears, uploading is completed.

[2] Download of simplified program data

Downloading simplified programs (No. 1 to 4 at once) from SmartMedia to SC-510 provides you with the availability of simplified programs with more than one sewing machine.

The following explains how to copy simplified programs (No. 1 to 4 at once) for data file No. 5 (parameter formatted data (EPD)) into a SC-510.

1) Select "parameter formatted data (EPD)" on the data selection screen and select "SmartMedia" ⇒ "operation panel" on the communication method selection screen to call up the screen below.

■ **Communication configuration screen**

2) Press the switch ❶ to call up the data file No. entry screen.

■ **Data file No. entry screen**

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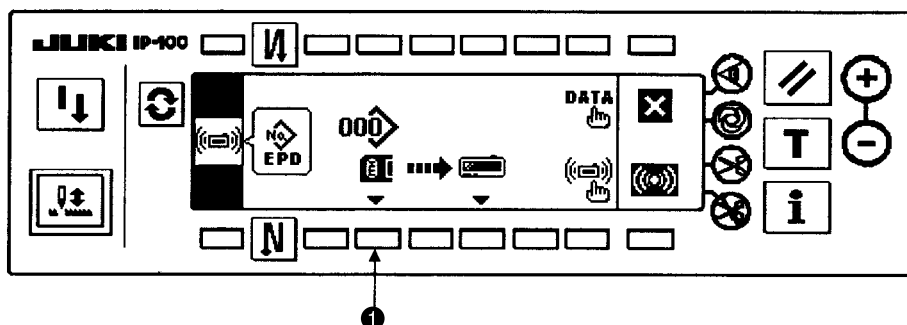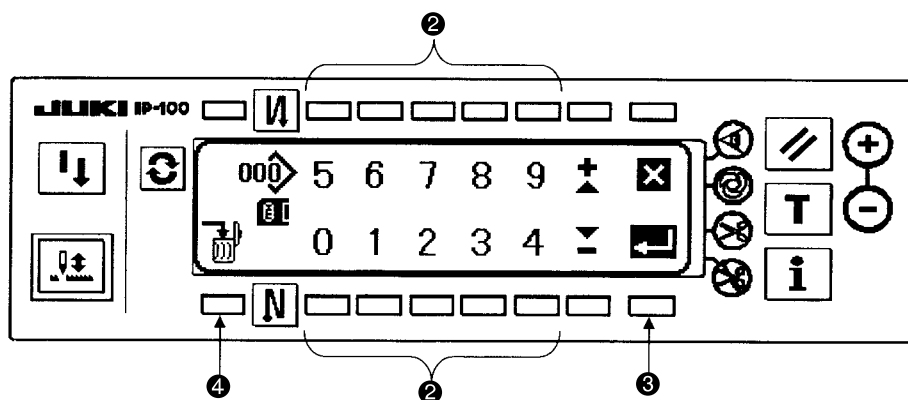
3) Press the switch ❷ to enter a data file number. Entered number appears at 〉. After number entry, press the switch ❸ to return to the communication configuration screen.
To delete a data file in SmartMedia, press the switch ❹ after entry of the data file number to call up the screen for confirming data file deleting as shown below.

■ **Screen for confirming data file deleting**
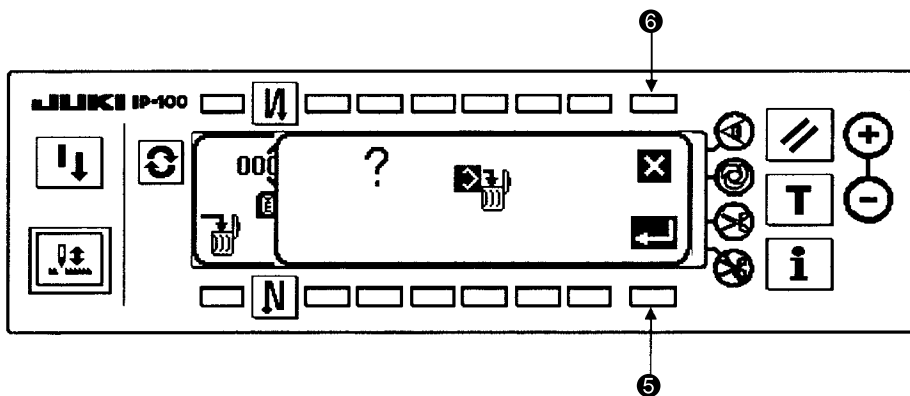
4) Press the switch ❺ to delete entered data file number and return to the data file No. entry screen. To stop deleting and return to the data file No. entry screen, press the switch ❻.
5) For example, the illustration below shows the communication configuration screen with data file No. 5 entered.
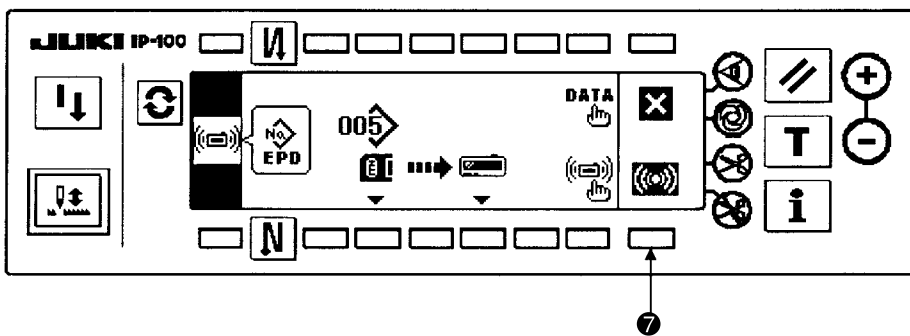
6) After all settings, press the switch ❼ to start downloading data into SC-510. The illustration on the previous page appears during downloading.
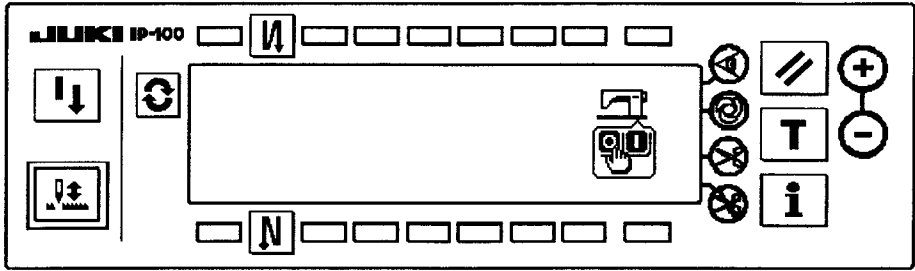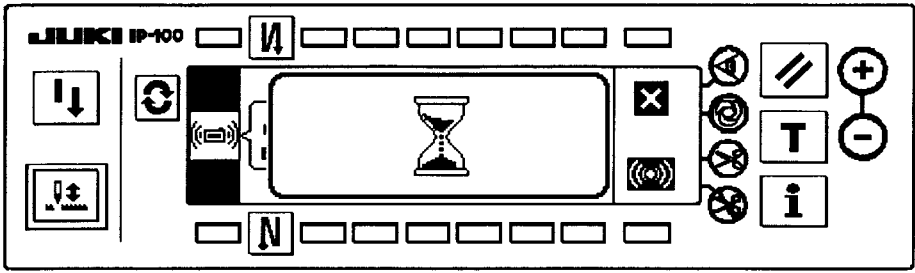
7) When the hourglass disappears and the display indicates you to turn off the power, uploading is completed. Then, turn off the power.

5. SM format function

Perform formatting of the smart media.

The media formatted with the personal computer or the like may not be used.

When using the media with IP-100E, be sure to perform formatting with IP-100E

■ Smart media format confirmation screen
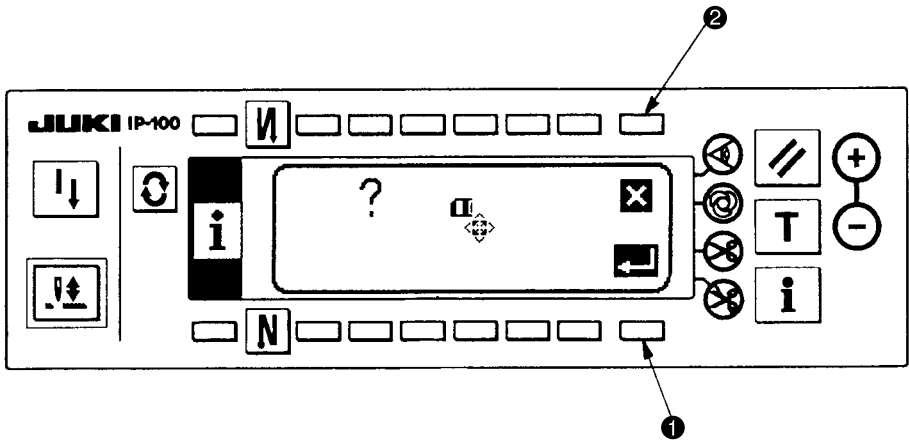
❶ : Formatting is performed.

Confirm again whether formatting can be performed before pressing the switch

❷ : The screen return to the information screen.

(Caution) **When formatting is performed, all data stored in the smart media are deleted. Take the backup of necessary data beforehand.**

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(7) Software upgrade

To upgrade the control program for the control box (SC-510), follow the procedure below. Upgrade operation for the extension board (IPOP board) and operation panel (IP-100E) is performed in the same manner.

1) First, create the folders configured as shown below in a SmartMedia card and store each control program file (* PRG) in them.

SmartMedia

```
         P R O G
                  S C 5 1 0
                             MT******. PRG
                             I P******. PRG
                             MA******. PRG
```
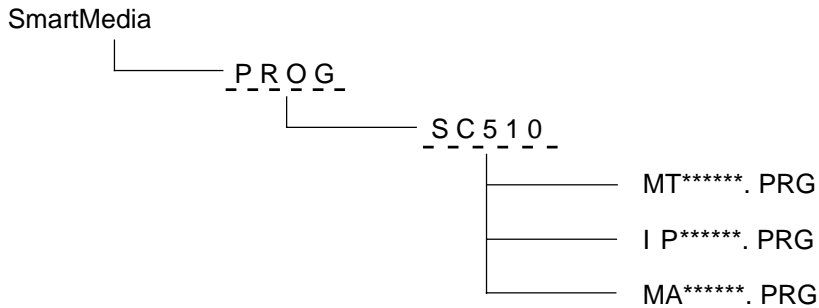
MT******. PRG   : Servomotor (SC-510 main body CTL board)
I P******. PRG   : Operation panel (IP-100E)
MA******. PRG   : IPOP (SC-510 expansion IPOP board)
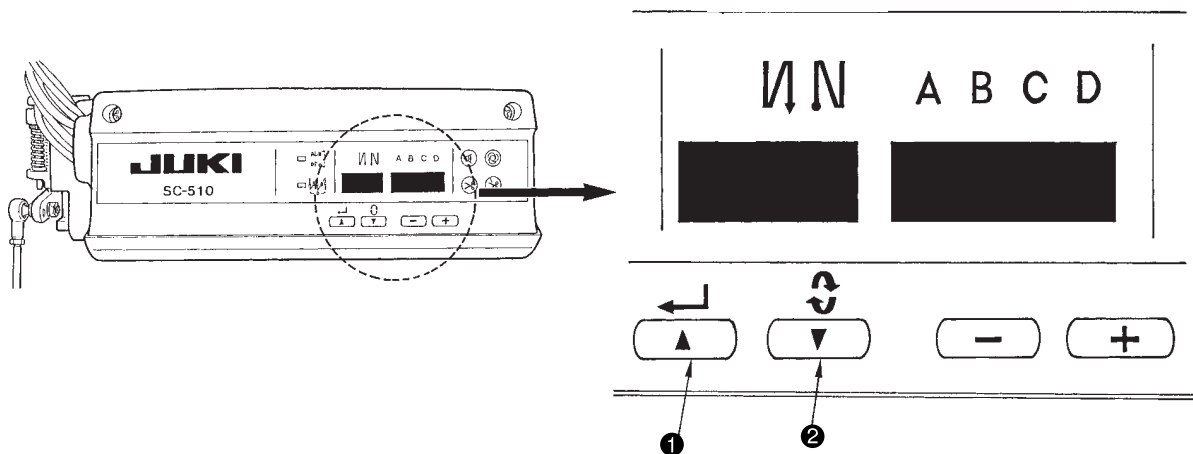
2) Turn on the power while pressing the switches ❶ (▲) and ❷ (▼) on the front panel of the control box simultaneously, and LED 3 circled with dotted line blinks. If LED3 does not blink, try the operation again.

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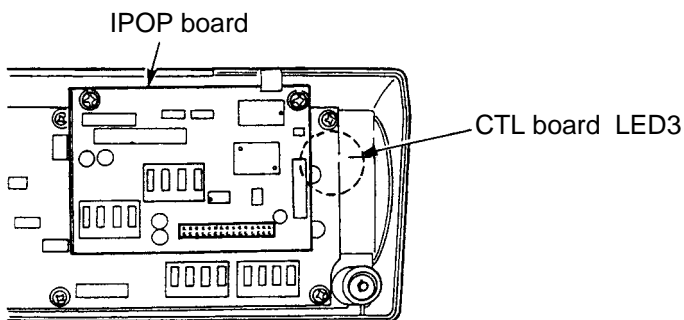
3) The IP-100E operation panel displays the screen as shown below with a beep sound. However, the values of R-V-L may vary.
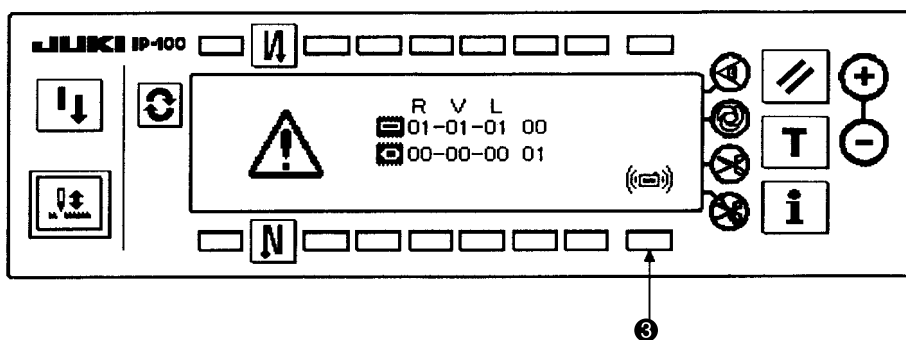
4) Press the switch ❸ to call up the screen as shown below. The operation panel is selected in the state of screen opening (operation panel highlighted). Press the switch ❹ to select the servomotor (SC-510 main body [CTL board]) (servomotor highlighted).
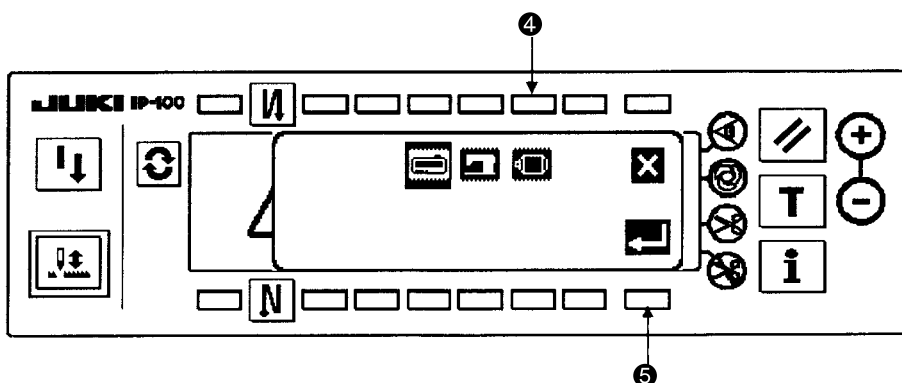
 : Operation panel (IP-100E)

 : IPOP (SC-510 expansion [IPOP board])

 : Servomotor (SC-510 main body [CTL board])

5) After selection, press the switch ❺ to close the pop-up screen and the screen below appears. (When a Smart Media card is not loaded, "E011" error is indicated. In such a case, turn off the power and load a Smart Media card.) Press the switch ❻ to select a software version (R-V-L) of the servomotor (SC-510 main body [CTL boar[) to be updated.
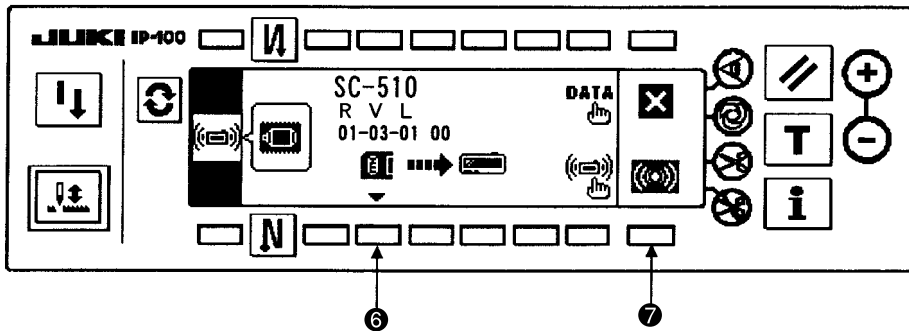
6) After selection, press the switch ❼ to start communication (update). A percentage (%) bar graph appears to indicate how much updating is completed. When the graph indicates 100%, communication is fully completed and the display that indicated you to turn off the power appears

0%	10%	100%
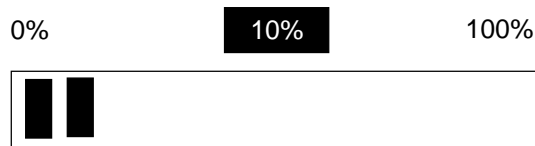
Percentage (%) bar graph

Power OFF indication

7) When the display indicates you to turn off the power, do as indicated.

The procedure above completes the updating operation. To start operation with updated software, turn on the power again.
To update operation panel (IP-100E) or IPOP (SC-510 expansion [IPOP board]), the procedure is the same, but replace the target in the steps 4) and 5).

(Caution) **Never turn off the power during commnucation. In case that you turn off the power during commnunication for any reason under the process of updating the servomotor (SC-510 main body [CTL board]) or IPOP (SC-510 expansion [IPOP board]), the screen used in the step 3) appears by turning on the power Follow the procedure threafter again. When it happens under the process of updating the operation panel)IP-100E), operation panel (IP-100E) software is automatically) selected by turning on the power. Then, press the information $\boxed{\mathbf{i}}$ switch to start communicaton.**

5. CONTROL BOX (SC-510)

(1) Arrangement of connectors

⚠️ **WARNING :**
- **To prevent personal injury caused by abrupt start of the sewing machine, carry out the work after turning OFF the power switch and a lapse of 5 minutes or more.**
- **To prevent damage of device caused by mal-operation and wrong specifications, be sure to connect all the corresponding connectors to the specified places.**
- **To prevent personal injury caused by mal-operation, be sure to lock the connector with lock.**
- **As for the details of handling respective devices, read carefully the Instruction Manuals supplied with the devices before handling the devices.**

Following connectors are prepared when loosening the front cover fixing screws **Ⓐ** of SC-510 and opening the cover. Connect the machine head connectors to the positions corresponding to each other so as to fit the devices mounted on the machine head.
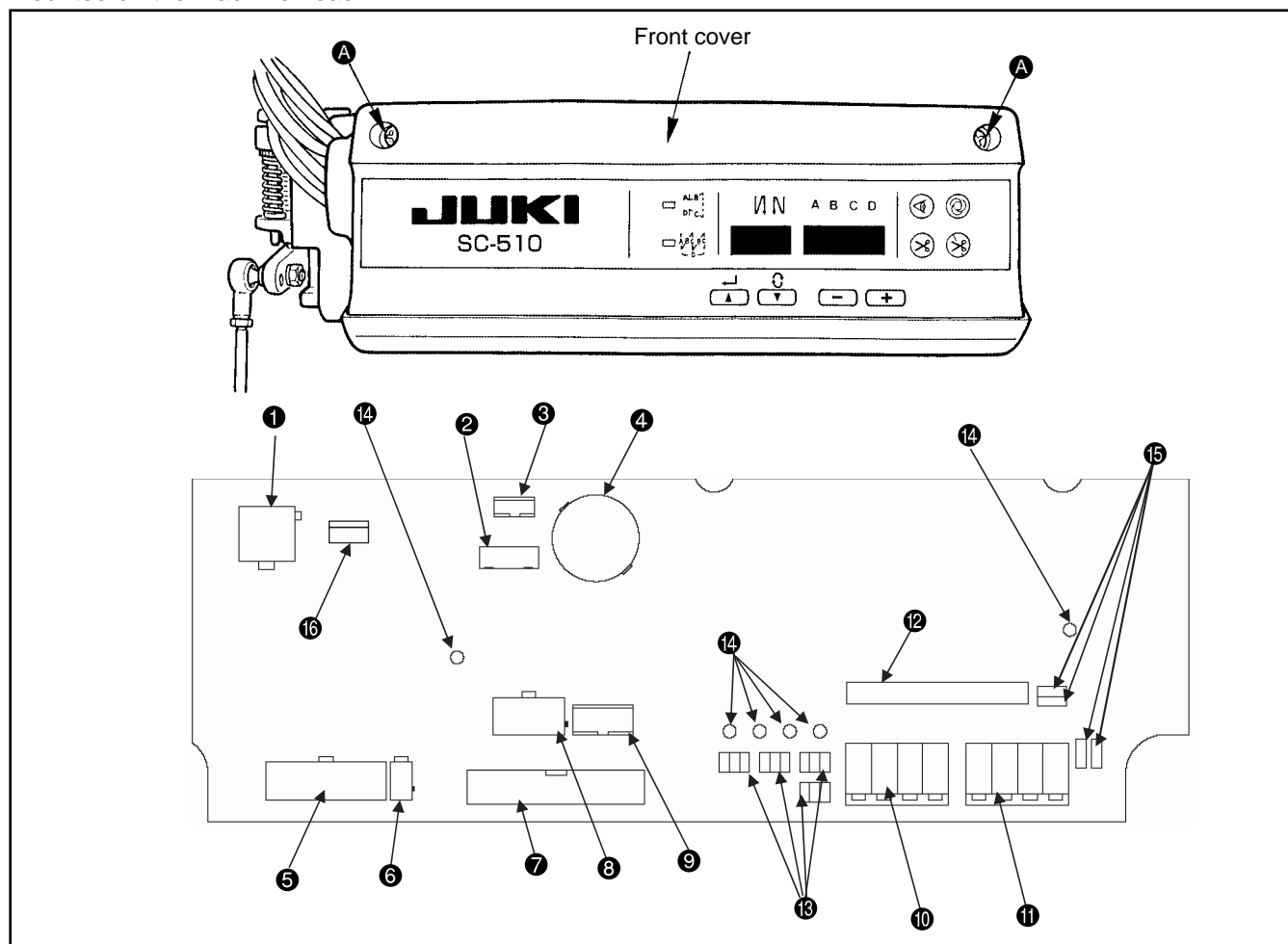
❶ CN30   Motor signal connector
❷ CN43   Needle bar position detector connector (+12V type)
❸ CN32   Machine head connector
❹ CN33   Needle bar position detector connector (+5V type)
❺ CN36   Machine head solenoid connector
❻ CN37   Presser foot lifter solenoid connector
❼ CN38   CP-160 panel connector
❽ CN40   Signal for extension output connector
❾ CN39   Pedal for standing work connector (PK-70 and the like can be used.)
❿ CN50   Optional output connector
⓫ CN51   Optional input connector
⓬ CN41   Connector for extension p.c.b.
⓭ W1, W2,
    W3, W4   Optional jumper pins for changeover of input/output of power source
⓮ Check pins for measuring power voltage of +5V, +12V, +24V, VOUT, and GND
⓯ W5 to W8 Jumpers for optional input changeover
⓰ CN42   Safety switch input

(2) How to use the standard operation panel
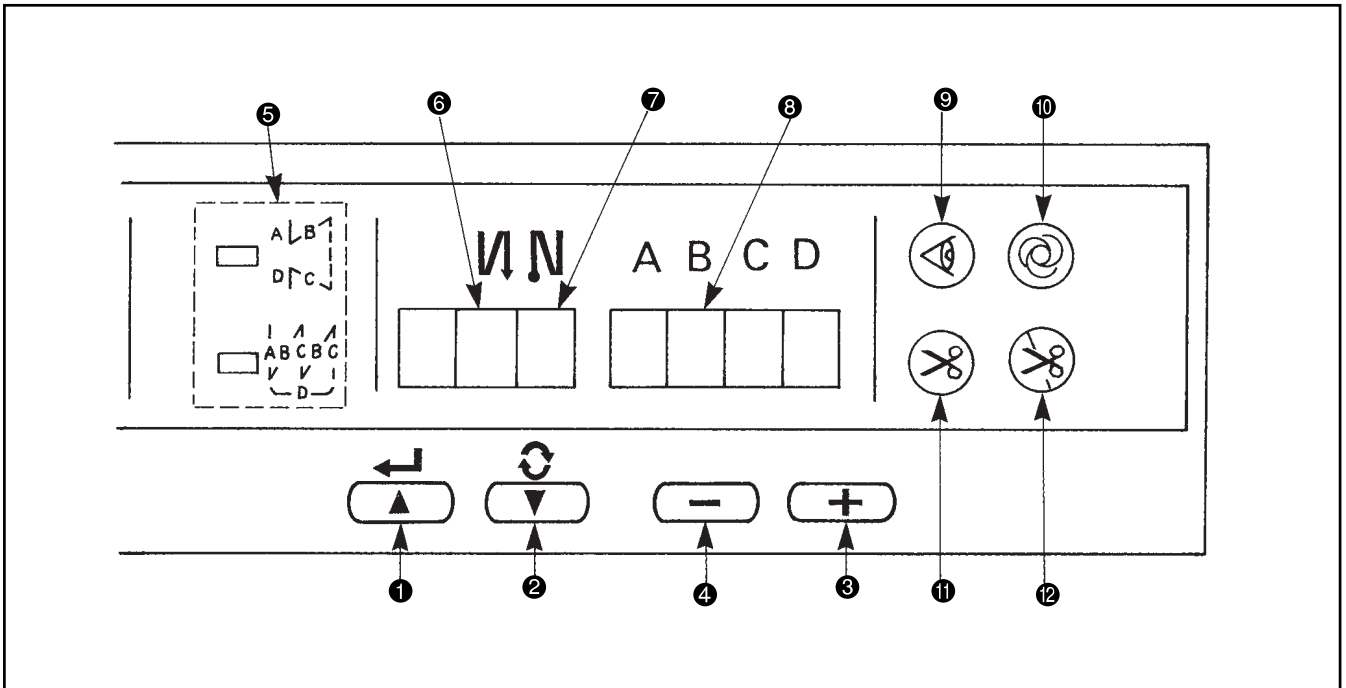
❶ ↵ / (▲) switch : Used for determining the contents of setting.
When this switch is pressed, flashing stops and the contents of setting are determined.

❷ ↻ / (▼) switch : Used for changing the contents of setting.
When this switch is pressed, changeable positions flash on and off.
By pressing the switch, flashing position shifts in the right direction.

❸ (+) switch : Used for changing the contents of the selected display (flashing section).When this switch is pressed, the contents of the display increase.

❹ (−) switch : Used for changing the contents of the selected display (flashing section).
When this switch is pressed, the contents of the display decrease.

❺ PATTERN SELECTION display : The selected pattern is displayed.

❻ REVERSE STITCHING AT START display : Rendered effective when reverse stitching pattern is selected.
" - " Without reverse stitching display / " ╎ " Reverse stitching display/
" ╏╎ " Double reverse stitching display

❼ REVERSE STITCHING AT END display : Rendered effective when reverse stitching pattern is selected.
" - " Without reverse stitching display / " ╎ " Reverse stitching display/
" ╏╎ " Double reverse stitching display

❽ NUMBER OF STITCHES display : Number of stitches of reverse stitching or overlapped stitching is displayed.

❾ MATERIAL EDGE SENSOR display : Lights up when the material edge sensor setting is selected.
Function setting No. 2

❿ ONE-SHOT AUTOMATIC STITCHING display : Lights up when the one-shot automatic stitching is selected.
Function setting No. 76

⓫ AUTOMATIC THREAD TRIMMING display : Lights up when the automatic thread trimming by depressing the front part of the pedal is selected.
Function setting No. 3

⓬ THREAD TRIMMING PROHIBITION display : Lights up when the thread trimming prohibition is selected.
Function setting No. 9

Operating procedure of the sewing pattern

1. Reverse stitching pattern

    Reverse stitching patterns below can be set by using the operation panel.

Reverse stitching patterns that can be set

Reverse stitching at start display									
Sewing pattern									
Reverse stitching at end display									
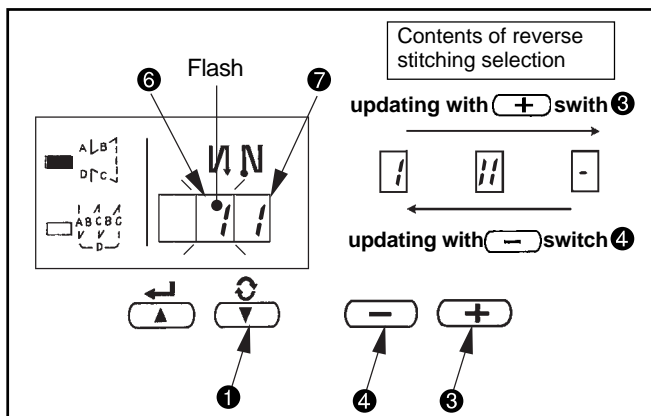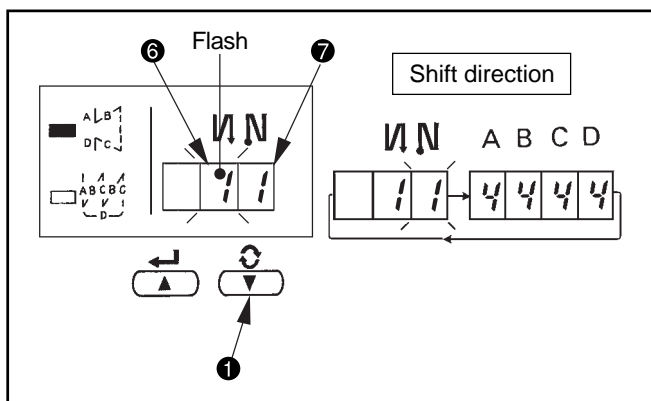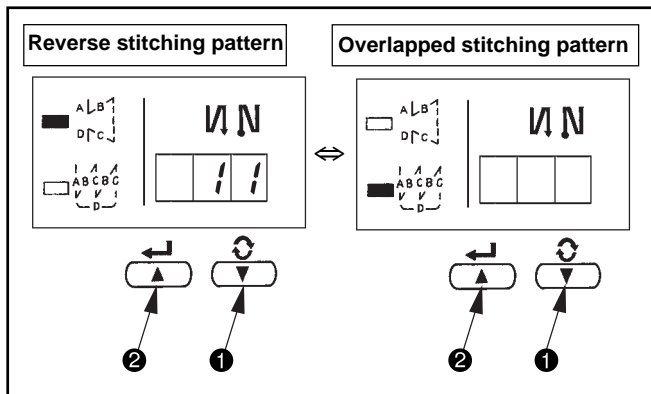
[Setting procedure of the reverse stitching]

(1) Hold pressing ⟳ / (▼) switch ❶, and press ⏎ / (▲) switch ❷ to select the reverse stitching pattern.

   (Every time ⏎ / (▲) switch ❷ is pressed, reverse stitching pattern/overlapped stitching pattern change over alternately.)

Reverse stitching pattern / **Overlapped stitching pattern**

(2) Press ⟳/(▼) switch ❶ to make reverse stitching at start display ❻ flash on and off.

   Every time ⟳ / (▼) switch ❶ is pressed, the flashing position shifts in the right direction.

(Caution) The sewing machine does not start in the flashing state.

Flash ❻ ❼

Shift direction

(3) Press (＋) switch ❸ or (－) switch ❹ and select the reverse stitching pattern.

   Reverse stitching patterns and displays are as follows.

   | : Reverse stitching

   || : Double reverse stitching

   - : Without reverse stitching

Flash ❻ ❼

Contents of reverse stitching selection

updating with (＋) swith ❸

updating with (－) switch ❹

(4) Press ⟳/(▼) switch ❶ to make reverse stitching at end display ❼ flash on and off, and set the pattern in the same way as step (3).

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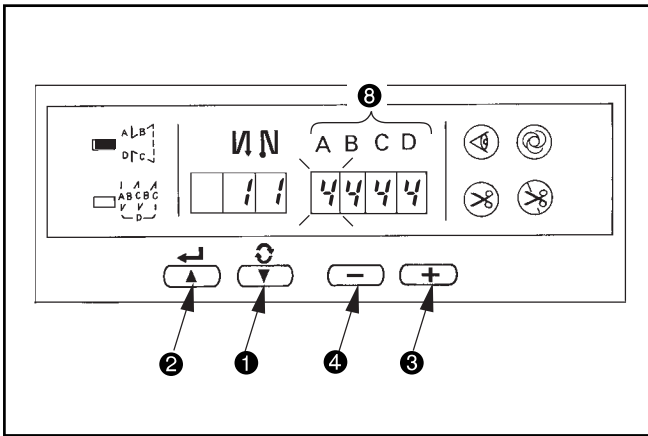
(5) Press ⟳ / (▼) switch ❶ to make number of stitches display ❽ flash on and off, and set the number of stitches for the respective processes of the stitching.

(6) Press (＋) switch ❸ or (－) switch ❹ to change the number of stitches.
The number of stitches can be changed up to as many as 15 stitches for the A, B, C, and D processes respectively.
However, displays are as follows.
10 stitches = A, 11 stitches = b, 12 stitches = c, 13 stitches = d, 14 stitches =E and 15 stitches = F

(7) When the setting of all items has been completed, press ↵ / (▲) switch ❷ to determine the contents of the setting. (Flashing stops.)

2. Overlapped stitching pattern

Overlapped stitching patterns below can be set by using the operation panel.
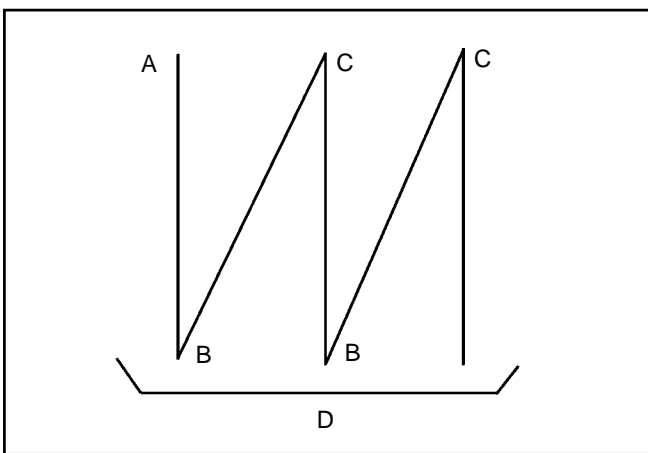
A : Number of stitches of normal stitching setting
0 to 15 stitches

B : Number of stitches of reverse stitching setting
0 to 15 stitches

C : Number of stitches of normal stitching setting
0 to 15 stitches

D : Number of times of repetition
0 to 9 times

(Caution) When process D is set to 5 times, the sewing is repeated as A → B →C → B → C.

Reverse stitching pattern   Overlapped stitching pattern
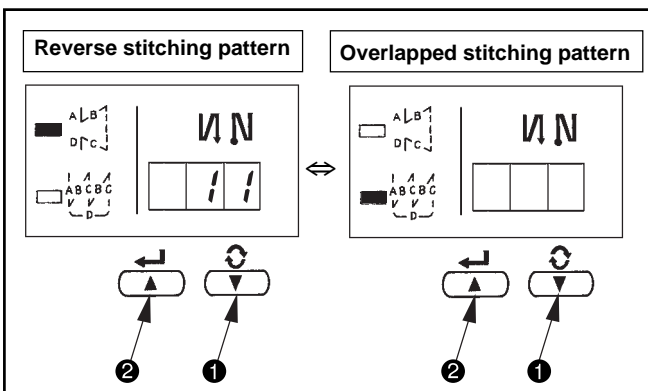
[Setting procedure of the overlapped stitching]

(1) Hold pressing ⟳ / (▼) switch❶, and press ↵ / (▲) switch ❷ to select the overlapped stitching pattern.
(Every time ↵ / (▲) switch ❷ is pressed, reverse stitching pattern/overlapped stitching pattern change over alternately.)

(2) The number of stitches for process A becomes in flashing state.

(3) Every time ⟳ / (▼) switch ❶ is pressed, the flashing position shifts in the right direction and the display of the process where setting can be changed flashes on and off.

(4) Press (＋) switch ❸ or (－) switch ❹ to change the number of stitches.

(5) When the setting of all processes has been completed, press ↵ / (▲) switch ❷ to determine the contents of the setting. (Flashing stops.)

(Caution) When the overlapped stitching is selected, the automatic operation display flashes on and off. It is not possible to release the automatic operation.

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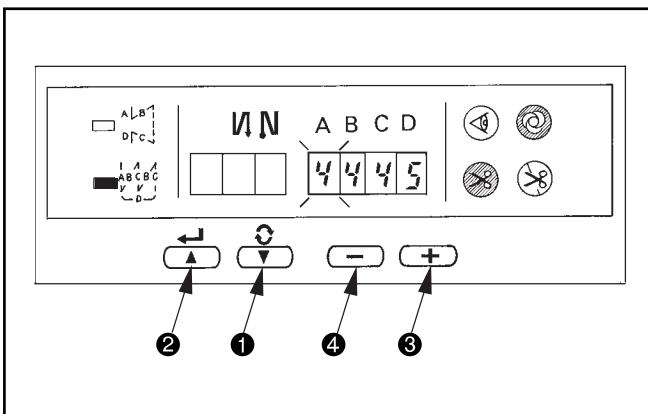
3. Special setting

For material end sensor function, automatic thread trimming function, one-shot automatic stitching function and thread trimming prohibition function which are displayed in the front panel, it is possible to change the set value by directly moving to the function setting mode while the power is turned ON in addition to the normal function setting procedure.
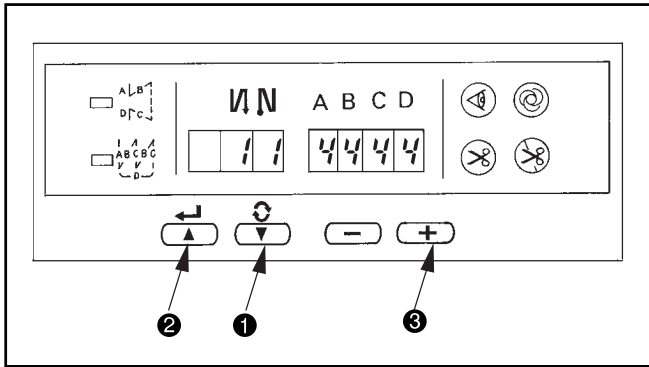
[Moving procedure to the function setting mode]

(1) Hold pressing ↻ / (▼) switch ❶, and press (＋) switch ❸ to move to the function setting mode.

(Caution) Function setting No. 2 is displayed immediately after the changeover.

(2) When returning to the normal mode, press ↵ / (▲) switch ❷ and determine the contents of the setting.
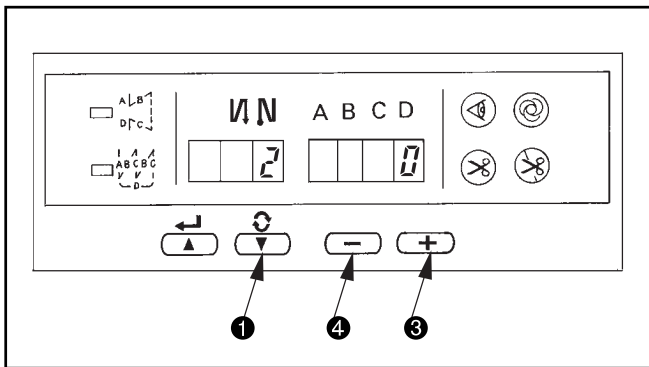
1) Material end sensor function setting (Function setting No. 2)
It is rendered effective when connecting the optional material end sensor.
It is possible to change the set value with (＋) switch ❸ or (—) switch ❹.
- 0 : Material end sensor function is prohibited.
- 1 : Material end sensor function is effective.
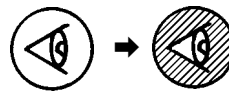
When "1" is selected, material end sensor display lights up when the mode has returned to the normal one.
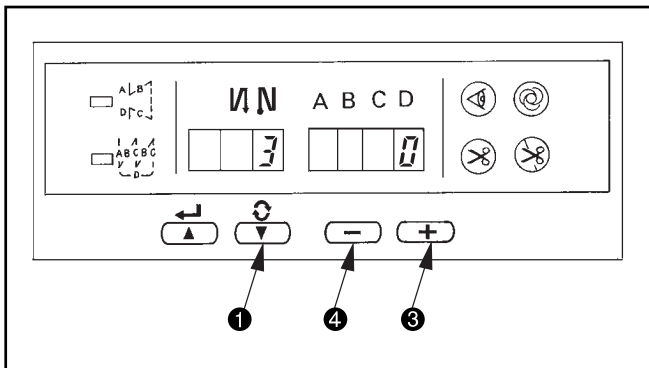
2) Thread trimming operation after material end stop setting (Function setting No. 3)
Press ↻ / (▼) switch ❶ to advance to the function setting No. 3.
It is possible to change the set value with (＋) switch ❸ or (—) switch ❹.
- 0 : Material end stop
- 1 : Automatic thread trimming after detection of material end
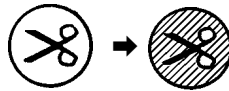
When "1" is selected, the automatic thread trimming display lights up when the mode is returned to the normal one.
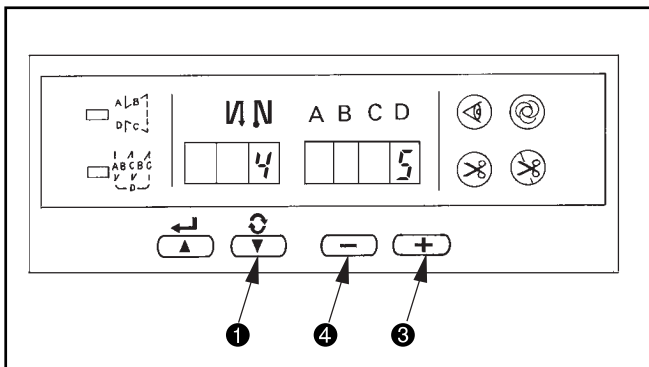
3) Number of stitches to stop the sewing machine after detection of material end setting (Function setting No. 4)
Press ↻ / (▼) switch ❶ to advance to the function setting No. 4.
It is possible to change the set value with (＋) switch ❸ or (—) switch ❹.
Specified number of stitches : 0 to 19 stitches

(Caution) When the specified number of stitches is insufficient, there is a case where the sewing machine cannot stop within the specified number of stitches depending on the speed of rotation of the sewing machine.
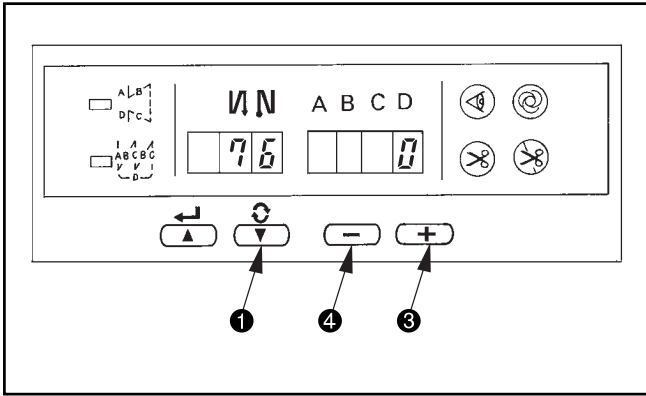
4) One-shot automatic stitching setting function (Function setting No. 76)

Press ⟳ / ▼ switch ❶ to advance to the function setting No. 76.

It is possible to change the set value with + switch ❸ or − switch ❹.

   0 : Pedal designated speed is prior.

   1 : Automatic operation

(Caution) 1. It is rendered effective when the material end sensor function is set.
          It is not possible to prohibit the oneshot operation at the time of the overlapped stitching operation.

       2. Speed of rotation is the speed set at the function setting No. 38.
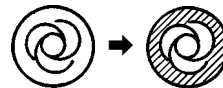
 When "1" is selected, the oneshot automatic stitching display lights up when the mode is returned to the normal one.
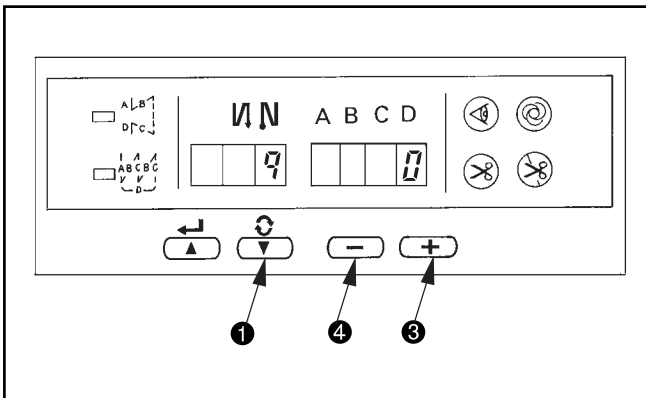
5) Thread trimming prohibition function setting (Function setting No. 9)

Thread trimming operation at normal stitching and overlapped stitching can be prohibited by selecting the thread trimming prohibition.

Press ⟳ / ▼ switch ❶ to advance to the function setting No. 9.

It is possible to change the set value with + switch ❸ or − switch ❹.

   0 : Thread trimming is effective.

   1 : Thread trimming is prohibited.
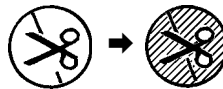
 When "1" is selected, the thread trimming prohibition display lights up when the mode is returned to the normal one.

(3) Setting for functions of SC-510

Functions can be selected and specified by means of the four setting switches and light emitting diode located inside the front cover of the SC-510.

There are two modes of the user's level (indicated as U) and the service level (indicated as S) in the function setting modes.

How to change over to the function setting mode

Specified No.   Specified value

❶ **Switch for entering specified value changed and updating setting No. in DOWN direction (SET–)**
❷ **Switch for entering specified value changed and updating setting No. in UP direction (SET+)**

❸ **Down switch (DOWN)**
❹ **Up switch (UP)**
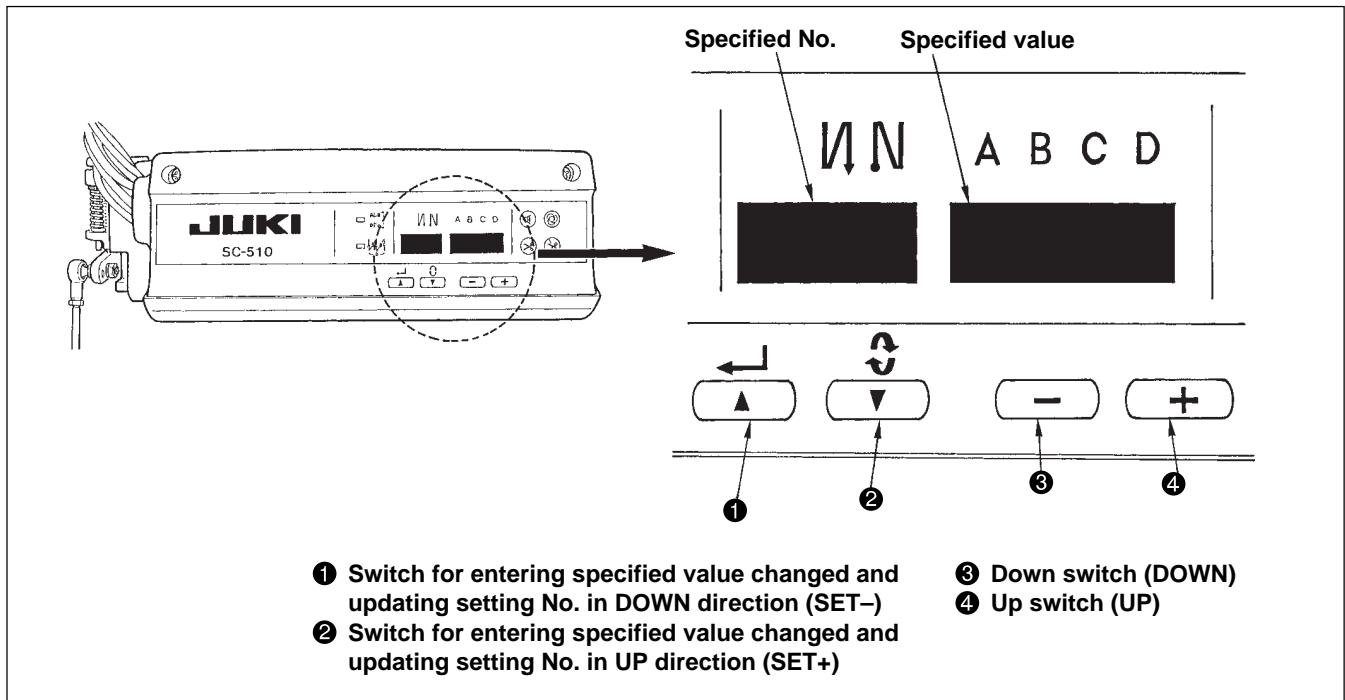
(Caution) 1. Do not perform switch operations other than those described in the following explanations.
2. Be sure to re-turn the power switch ON after one second or more has passed. If the power is turned ON immediately after turning it OFF, the sewing machine may not work normally.
In this case, turn ON the power again.
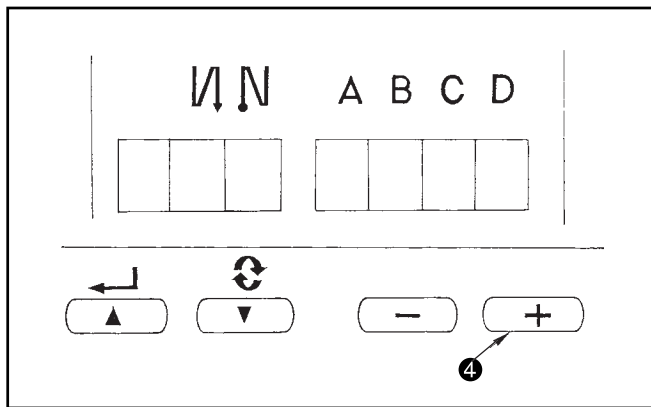
[How to change over to the function setting mode]
1. Changing over to the user's mode
   (1) Turn OFF the power to the unit.
   (2) Pressing switch ❹, turn ON the power to the unit.
2. Changing over to the service mode
   (1) Turn OFF the power to the unit.
   (2) Pressing switch ❹, turn ON the power to the unit.
   (3) Keep pressing switch ❹ for three seconds even when the indication is shown on the display.
   (4) The service mode starts when the buzzer has sounded two times.

3. Indication ❺, ❻ will be shown on the display. (If the indication fails to change, re-perform the procedures (1) and (2).
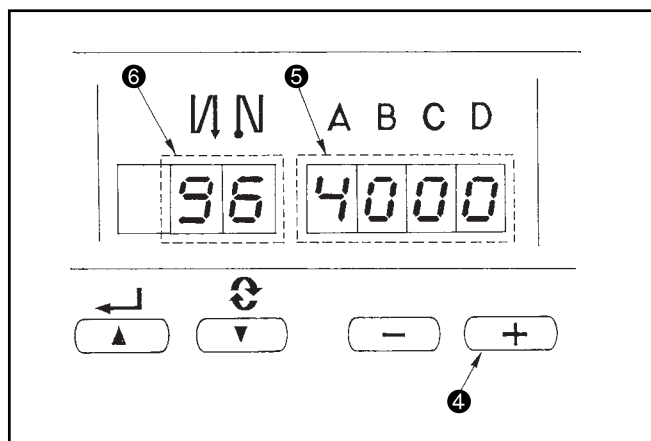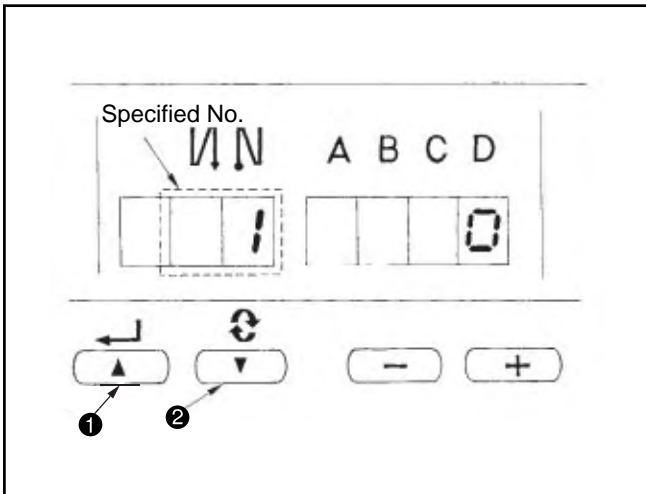
4. When you want to advance the setting No., press switch ❷ to advance the setting No.
   When you want to return the setting No., press switch ❶ to return the setting No.

(Caution)
  1. **When switch ❶ (switch ❷) is held pressing, the setting No. will return (will advance) continuously.**
  2. **When the setting No. is advanced (returned), the contents which are before by one (after by one) will be determined.**
     So, be careful when changing the contents (up/down switch is touched).
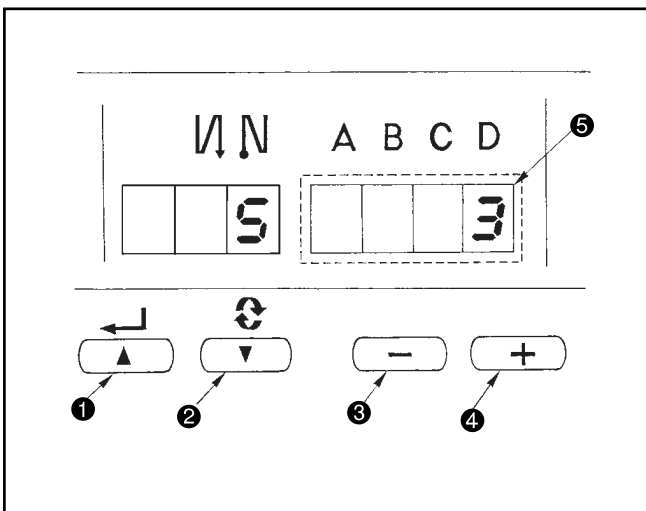
EXAMPLE) CHANGING THE FLICKER REDUCING FUNCTION (SETTING No. 5)
Press switch ❷ five times to set the setting No. to "5". Existing set value is displayed in LED ❺. (Standard is "0".) Press switch ❹ three times to change to "3".

(Caution) Keep pressing switch ❹ or switch ❸, and the setting value can be changed continuously.
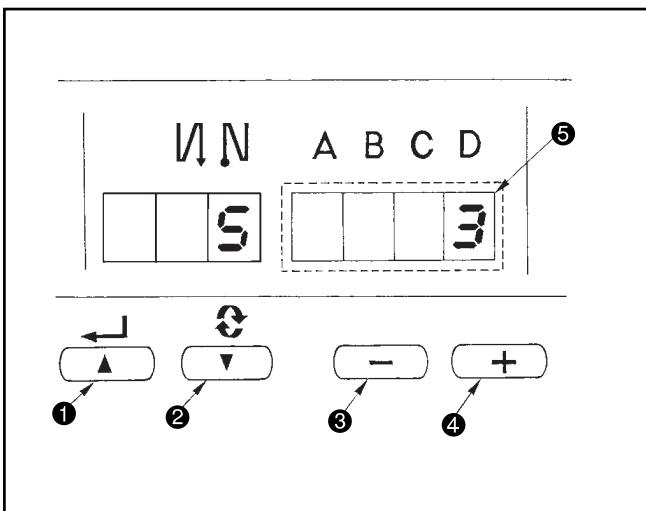
5. When the change has been completed, press switch ❶ or ❷ to specify the changed value.

(Caution)
  1. **When turning OFF the power before performing this work, the contents which have been changed are not updated.**
  2. **Press switch ❶, and screen display will change to the contents of the setting No. which is before by one.**
  3. **Press switch ❷, and screen display will change to the contents of next setting No. After completing the operation, turn OFF the power and turn ON the power again to return to the normal operation.**

After completing the operation, turn OFF the power and turn ON the power again to return to the normal

* **When simultaneously pressing (—) switch ❸ and (+) switch ❹, the value returns to the initial value.**

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(4) Function setting list (Start level ; U : User's mode, S : Service mode)

No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
1	Soft start function	The number of stitches to be sewn at a low speed when the soft-start function is used at the start of sewing. 0 : Soft-start function is not operative.	U	0 to 9 (Stitches)	□ □ 1 □ □ □ 0	64
2	Material end sensor function	Material end sensor function (used in case of without panel). 0 : Material end detection function is not operative. 1 : After detecting material end, the specified number of stitches (No. 4) will be sewn, and the sewing machine will stop.	U	0/1	□ □ 2 □ □ □ 0	64
3	Thread trimming function by material end sensor	Thread trimming function by material end sensor (used in case of without panel). 0 : Automatic thread trimming function after detection of material end is not operative. 1 : After detecting material end, the specified number of stitches (No. 4) will be sewn, and the sewing machine will stop and perform automatic thread trimming.	U	0/1	□ □ 3 □ □ □ 0	64
4	Number of stitches for material end sensor	Number of stitches for material end sensor (used in case of without panel). Number of stitches from detection of material end to stop of the sewing machine.	U	0 to 19 (Stitches)	□ □ 4 □ □ □ 5	64
5	Flicker reducing function	Flicker reducing function (If the hand lamp flickers). 0 : Flicker reducing function is not operative. 1 : Less effective / 3 : Highly effective	U	0 to 3	□ □ 5 □ □ □ 0	64
6	Bobbin thread counting function	Bobbin thread counting function 0 : Bobbin thread counting function is not operative. 1 : Bobbin thread counting function is operative.	U	0/1	□ □ 6 □ □ □ 1	64
7	Unit of bobbin thread counting down	Unit of bobbin thread counting down 0 : Count/10 stitches 1 : Count/15 stitches 2 : Count/20 stitches	U	0 to 2	□ □ 7 □ □ □ 0	
* 8	Number of rotation of reverse feed stitching	Sewing speed of reverse feed stitching	U	150 to 3000 (rpm)	□ □ 8 1 9 0 0	
9	Thread trimming prohibiting function	Thread trimming prohibiting function (used in case of without panel). 0 : Thread trimming prohibiting function is not operative. 1 : Thread trimming is prohibited. (Output of solenoid is prohibited. : Thread trimmer and wiper)	U	0/1	□ □ 9 □ □ □ 0	64
10	Setting of needle bar stop position when the sewing machine stops.	Position of needle bar is specified when the sewing machine stops. 0 : Predetermined lowest position 1 : Predetermined highest position	U	0/1	□ 1 0 □ □ □ 0	64
11	Click sound of key switch mounted on PSC	Click sound of key switch mounted on PSC is specified. 0 : Click is not operative. 1 : Click is operative.	U	0/1	□ 1 1 □ □ □ 1	64
12	Optional input/ output setting	Changeover of optional switch.	U		□ 1 2 □ □ □ 0	65
13	Function of prohibiting start of the sewing machine by bobbin threas counter	Function of prohibiting start of the sewing machine by bobbin thread counting 0 : When counting is out (-1 or less) Function of prohibiting start of the sewing machine is not operative. 1 : When counting is out (-1 or less) Function of prohibiting start of the sewing machine after thread trimming is operative. 2 : When counting is out (-1 or less), the sewing machine stops once. Function of prohibiting start of the sewing machine after thread trimming is operative.	U	0 to 2	□ 1 3 □ □ □ 0	
14	Sewing counter	Counting function of sewing (number of completion of process) 0 : Sewing counter function is not operative. 1 : Sewing counter function is operative. (for every thread trimming) 2: Sewing counter SW input function is operative. (IP-100)	U	0 to 2	□ 1 4 □ □ □ 1	68

∗ **Do not change the set values with asterisk (*) mark as they are functions for maintenance. If the standard set value set at the time of delivery is changed, it is in danger of causing the machine to be broken or the performance to be deteriorated.**
(Descriptions of setting in this list are the standard values at the time of delivery.)
However, contents of function setting are subject to change for improvement of function and performance without notice.

(Start level ; U : User's mode, S : Service mode)

No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
15	Function of reverse feed stitching swotch	Function of reverse feed stitching switch is set. 0 : Normal BTsw 1 : Level input wrapper control and presser synchronizing control 2 : Level input wrapper control 3 : Alternate input wrapper control	S	0 to 3	☐ 1 5 ☐ ☐ ☐ 0	68
18	Function of alternate vertical amount input	Function of alternate vertical dial of LU series is selected. 0 : Invalid 1 : Analog input (analog optional input) 2 : Digital input (digital input 2 input)		0/1/2	☐ 1 8 ☐ ☐ ☐ 0	68
19	Reversing brake start angle	Stop brake start angle of reverse revolution to lift needle input (Rsw) is set. 0 : UP detection missed	S	0 to 359 (degree)	☐ 1 9 ☐ 3 5 9	68
20	Altemate vertical amount output delay time	Output start delay time of alternate presser output signal of LH series is set.	S	0 to 500 (ms)	☐ 2 0 ☐ ☐ 1 0	68
21	Function of neutral presser lifting	Function of lifting presser foot when the pedal is in neutral position. 0 : Function of neutral automatic presser lifting is not operative. 1 : Selection of function of neutral presser lifting.	U	0/1	☐ 2 1 ☐ ☐ ☐ 0	68
22	Function of changeover of compensating switch on the operation panel function	Function of needle up/down compensating switch on the operation panel can be changed. 0 : Needle up/down compensation 1 : One stitch compensation	U	0/1	☐ 2 2 ☐ ☐ ☐ 0	68
24	Function of input of presser for standing work	Motion of switch for presser of pedal for standing work is set. 0 : Normal presser motion (FLsw) 1 : Alternate motion of input of normal presser 2 : Alternate vertical switch (DLsw) function 3 : Alternate motion of alternate vertical switch (DLsw) 4 : Level input wrapper control and presser synchronizing control 5 : Level input wrapper control 6 : Alternate input wrapper control	U	0 to 6	☐ 2 4 ☐ ☐ ☐ 2	69
25	Thread trimming motion condition	This function sets the thread trimming motion after DOWN position has been off by turning handwheel by hand. 0 : Thread trimming after turning handwheel by hand is permitted. 1 : Thread trimming after turning handwheel by hand is prohibited.	U	0/1	☐ 2 5 ☐ ☐ ☐ 1	69
29	Suction time of the first start of the back solenoid	This function sets the suction motion time of the back-tack solenoid. 50 ms to 500 ms	U	50 to 500 (ms)	☐ 2 9 ☐ 2 5 0	69
30	Function of reverse feed stitching on the way	Function of reverse feed stitching on the way 0 : Function of reverse feed stitching on the way is not operative. 1 : Function of reverse feed stitching on the way is operative.	U	0/1	☐ 3 0 ☐ ☐ ☐ 0	69
31	Number of stitches of reverse feed stitching on the way	Number of stitches of reverse feed stitching on the way.	U	0 to 19 (Stitches)	☐ 3 1 ☐ ☐ ☐ 4	69
32	Effective condtion of reverse feed stitching on the way when the sewing machine is stopping.	Effective condition of reverse feed stitching on the way 0 : Function is not operative when the sewing machine stops. 1 : Function is operative when the sewing machine stops.	U	0/1	☐ 3 2 ☐ ☐ ☐ 0	69
33	Thread trimming function by reverse feed stitching on the way	Thread trimming function by reverse feed stitching on the way 0 : Automatic thread trimming function after completion of reverse feed stitching on the way is not operative. 1 : Automatic thread trimming after completion of reverse feed stitching on the way is performed.	U	0/1	☐ 3 3 ☐ ☐ ☐ 0	69
* 35	Number of rotation at a low speed	Lowest speed by pedal	U	150 to 250 (rpm)	☐ 3 5 ☐ 2 0 0	

∗ **Do not change the set values with asterisk (*) mark as they are functions for maintenance. If the standard set value set at the time of delivery is changed, it is in danger of causing the machine to be broken or the performance to be deteriorated.**
(Descriptions of setting in this list are the standard values at the time of delivery.)
However, contents of function setting are subject to change for improvement of function and performance without notice.

(Start level ; U : User's mode, S : Service mode)

No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
36	Number of rotation of thread trimming	20 Number of rotation at the time of thread trimming is set. (This setting is prior even when number of rotation is lower than the lowest speed by pedal of No. 35.)	S	100 to 250 5 (rpm)	3 6 ☐ 1 0 0	70
37	Number of rotation of soft start	Sewing speed at the start of sewing (soft-start)(The max. value depends on the number of rotation of the sewing machine head.)	U	100 to MAX (rpm)	3 7 ☐ 8 0 0	64
38	One-shot speed	One-shot speed (The max. value depends on the number of rotation of the sewing machine head.)	U	150 to MAX (rpm)	3 8 2 5 0 0	70
39	Pedal stroke at the start of rotation	Position where the sewing machine starts rotating from pedal neutral position (Pedal stroke)	U	10 to 50 (0.1mm)	3 9 ☐ ☐ 3 0	
40	Low speed section of pedal	Position where the sewing machine starts accelerating from pedal neutral position (Pedal stroke)	U	10 to 100 (0.1mm)	4 0 ☐ ☐ 6 0	
41	Starting position of lifting presser foot by pedal	Position where the cloth presser starts lifting from pedal neutral position (Pedal stroke)	U	-60 to -10 (0.1mm)j	4 1 – ☐ 2 1	
* 42	Sarting position of lowening presser foot	Starting position of lowering presser foot Stroke from the neutral position	U	8 to 50 (0.1mm)	4 2 ☐ ☐ 1 0	
* 43	Pedal stroke 2 for starting thread trimming	Position 2 where the thread trimming starts from pedal neutral position (When the function of lifting presser foot by pedal is provided.) (Pedal stroke)	U	-60 to -10 (0.1mm)	4 3 – ☐ 5 1	
* 44	Pedal stroke for reaching the maximum number of rotation	Position where the sewing machine reaches its highest sewing speed from pedal neutral position (Pedal stroke)	U	10 to 150 (0.1mm)	4 4 ☐ 1 5 0	
* 45	Compensation of neutral point of the pedal	Compensation value of the pedal sensor	U	-15 to 15	4 5 ☐ ☐ ☐ 0	
* 46	Auto-lifter slecting function	Auto-lifter selection 0 : Solenoid drive system 1 : Pneumatic drive system	S	0/1	4 6 ☐ ☐ ☐ 0	70
47	Holding time of lifting auto-lifter	Limitation time of waiting for lifting solenoid type auto-lifter device	U	10 to 600	4 7 ☐ ☐ 6 0	71
* 48	Pedal stroke 1 for starting thread trimming	Position where thread trimming starts from pedal neutral position (Standard pedal) (Pedal stroke)	U	-60 to -10 (0.1mm)	4 8 – ☐ 3 5	
49	Foot lifter lowering time	Foot lifter's lowering time since depressing the pedal	U	0 to 250	4 9 ☐ 1 4 0	(ms)
50	Pedal presser lifting function	PFL type of pedal type is set 0 : OFF 1 : ON	S	0/1	5 0 ☐ ☐ ☐ 0	71
51	Compensation of solenoid-on trimming of reverse feed stitching at the start of sewing	Compensation of starting the solenoid for reverse feed stitching when reverse feed stitching at the start of sewing is performed.	U	-36 to 36 (10°)	5 1 ☐ ☐ 1 0	71
52	Compensation of solenoid-off trimming of reverse feed stitching at the start of sewing	Compensation of releasing the solenoid for reverse feed stitching when reverse feed stitching at the start of sewing is performed.	U	-36 to 36 (10°)	5 2 ☐ ☐ 1 6	71
53	Compensation of solenoid-off trimming of reverse feed stitching at the end of sewing	Compensation of releasing the solenoid for reverse feed stitching when reverse feed stitching at the end of sewing is performed.	U	-36 to 36 (10°)	5 3 ☐ ☐ 1 8	71

※ **Do not change the set values with asterisk (*) mark as they are functions for maintenance. If the standard set value set at the time of delivery is changed, it is in danger of causing the machine to be broken or the performance to be deteriorated. (Descriptions of setting in this list are the standard values at the time of delivery.) However, contents of function setting are subject to change for improvement of function and performance without notice.**

(Start level ; U : User's mode, S : Service mode)

No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
54	Motor pulley effective diameter	Effective diameter of pulley to be used for motor is set.	S	50.0 to 140.0 5 (mm)j	`☐ 5 4 ☐ 5 0 0`	72
55	Foot lift after thread trimming	Function of lifting presser foot at the time of (after) thread trimming 0 : Not provided with the function of lifting presser foot after thread trimming 1 : Provided with the function of lifting presser foot automatically after thread trimming	U	0/1	`☐ 5 5 ☐ ☐ ☐ 1`	72
56	Bobbin thread remaining amount detection function	Function of reverse revolution to lift the needle at the time of (after) thread trimming 0 : Not provided with the function of reverse revolution to lift the needle after thread trimming 1 : Provided with the function of reverse revolution to lift the needle after thread trimming	U	0/1	`☐ 5 6 ☐ ☐ ☐ 0`	72
57	Function of bobbin thread remaining amount detection	Function of bobbin thread remaining amount detection device is set. 0 : Invalid 1 to : Valid function is selected.	S	0 to	`☐ 5 7 ☐ ☐ ☐ 0`	72
58	Function of holding predetermined upper/lower position of the needle bar	Function of holding predetermined upper/lower position of the needle bar 0 : Not provided with the function of holding predetermined upper/lower position of the needle bar 1 : Provided with the function of holding predetermined upper/ lower position of the needle bar (holding force is weak.) 2 : Provided with the function of holding predetermined upper/ lower position of the needle bar (holding force is medium.) 3 : Provided with the function of holding predetermined upper/ lower position of the needle bar (holding force is strong.)	U	0 to 3	`☐ 5 8 ☐ ☐ ☐ 0`	72
59	Function of Auto/Manual changeover of reverse feed stitching at the start of sewing	This function can specify the sewing speed of reverse feed stitching at the start of sewing. 0 : The speed will depend on the manual operation by pedal, etc. 1 : The speed will depend on the specified reverse feed stitching speed (No. 8).	U	0/1	`☐ 5 9 ☐ ☐ ☐ 1`	73
60	Function of stop immediately after reverse feed atitching at the start of sewing	Function at the time of completion of reverse feed stitching at the start of sewing 0 : Not provided with the function of temporary stop of the sewing machine at the time of completion of reverse feed stitching at the start of sewing 1 : Provided with the function of temporary stop of the sewing machine at the time of completion of reverse feed stitching at the start of sewing.	U	0/1	`☐ 6 0 ☐ ☐ ☐ 0`	73
61	Bobbin thread remaining amount detection air blow output time	Air blow output time when thread trimming with bobbin thread remaining amount detection device is set.	S	0 to 2000 (ms)	`☐ 6 1 ☐ 5 0 0`	73
63	Tie stitch adjustment function	Stop time of respective corners of start, end and overlapped stitching is set.	S	0 to 1000 (ms)	`☐ 6 3 ☐ ☐ 1 0`	73
64	Change-over speed of EBT (end bak tack)	Initial speed when starting reverse feed stitching at the sewing end	U	0 to 250 (rpm)	`☐ 6 4 ☐ ☐ 1 8 0`	
65	Selection of thread trimmer and additional deveice function	Selection of thread trimmer or additional device (UT or the like) TrM : Thread trimming function UT1 : Additional device 1 UT2 : Additional device 2	S		`☐ 6 5 ☐ F U n`	73
66	Simplified program setting	Setting of simplified program is performed.	S		`☐ 6 6 P r o ☐`	77
67	Auto hemmer control changeover	Selection of auto hemmer control is performed. 0 : Control 1 1 : Control 2	S	0/1	`☐ 6 7 ☐ ☐ ☐ 0`	77

* (for row 67)

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(Start level ; U : User's mode, S : Service mode)

No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
68	Prohibition of start with material end sensor of auto hemmer control	Start of sewing machine is prohibited at the time of auto hemmer control without cloth 0 : Invalid 1 : Prohibited	S	0/1	☐ 6 8 ☐ ☐ ☐ 0	77
69	Selection of speed control method after detection of material end sensor of auto hemmer control	Speed after detection of material end sensor of auto hemmer control is set. 0 : Depressing amount of pedal 1 : Set speed (motion at the set speed of No. 38)	S	0/1	☐ 6 9 ☐ ☐ ☐ 0	77
70	Number of stitches of invalid material end sensor auto hemmer control	Number of stitches which makes invalid material end sensor detection with auto hemmer control is set.	S	0 to 500 (0.5 stitches)	☐ 7 0 ☐ ☐ ☐ 0	77
72	Clutch motor function	Clutch motor control type is selected. 0 : OFF 1 : ON	S	0/1	☐ 7 2 ☐ ☐ ☐ 0	77
73	Retry function	This function is used when needle cannot pierce materials . 0 : Normal 1 : Retry function is provided.	U	0/1	☐ 7 3 ☐ ☐ ☐ 1	78
74	With/without MF thread trimming device	This function sets with or without the MF thread trimming device 0 : Without 1 : With	U	0/1	☐ 7 4 ☐ ☐ ☐ 1	78
∗ 75	Rotating derection of motor	Normal rotating direction of motor 0 : Clockwise 1 : Counterclockwise	U	0/1	☐ 7 5 ☐ ☐ ☐ 1	
76	One-shot function up to end of material	One-shot automatic stitching up to end of material is performed. (Used in case of without panel) 0 : Without one-shot function 1 : With one-shot function	U	0/1	☐ 7 6 ☐ ☐ ☐ 0	78
∗ 84	Presser lifter solenoid initial motion suction time	Suction motion time of presser lifter solenoid 50 to 500 ms	U	50 to 500 (ms)	☐ 8 4 ☐ 2 5 0	
85	Reverse feed stitching at the end of sewing start time	Holding time of start speed of reverse feed stitching at the endo of sewing is set.	S	0 to 250 10 (ms)	☐ 8 5 ☐ ☐ 1 0	78
86	Waiting time of start of reverse revolution to lift needle	Delay time from UP stop to start of reverse revolution at the time of control of reverse revolution to lift needle is set.	S	0 to 250 10 (ms)	☐ 8 6 ☐ ☐ 1 0	78
87	Function of pedal curve selection	Pedal curve is selected. (Improving pedal inching operation) Number of rotations (rpm) Pedal stroke (mm)	U	0/1/2	☐ 8 7 ☐ ☐ ☐ 0	78
∗ 89	Tension release function	It is effective in combination with the machine head provided with tension release function. 0 : Tension release function is ineffective. 1 : Tension release function is effective.	U	0/1	☐ 8 9 ☐ ☐ ☐ 0	
90	Initial UP stop position move function	Automatic UP stop function is set immediately after turning ON the power. 0 : OFF 1 : ON	S	0/1	☐ 9 0 ☐ ☐ ☐ 0	78

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(Descriptions of setting in this list are the standard values at the time of delivery.)
However, contents of function setting are subject to change for improvement of function and performance without notice.

(Start level ; U : User's mode, S : Service mode)

	No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
*	91	Function prohibiting compensation operation after turning handwhwwl by hand	Function of compensating stitching when turning handwheel by hand at the time of completion of constant-dimension stitching 0 : Function of compensating stitching is effective. 1 : Function of compensating stitching is prohibited.	U	0/1	9 1 □□□ 1	
	92	Function of reducing speed of reverse feed stitching at the start of sewing	Function to reduce speed at the time of completion of reverse feed stitching at the start of sewing. 0 : Speed is not reduced. 1 : Speed is reduced.	U	0/1	9 2 □□□ 0	79
	93	Function added to needle up/down compensating switch	Operation of needle up/down compensating switch is changed after turning ON the power or thread trimming. 0 : Normal (needle up/down compensating stitching only) 1 : One stitch compensating stitching is performed only when aforementioned changeover is made. (Upper stop / upper stop)	U	0/1	9 3 □□□ 0	79
	94	Test display mode	Display function of input data is set. 0 : OFF 1 : ON	S	0/1	9 4 □□□ 0	79
	95	Selection of the sewing machine head	This function sets the machine head used. For the details, refer to the data, which are separately described on the sheet of Selecting procedure of the machine head with SC-510 (40027864).	S		9 5 □□□□	
	96	Setting of max. number of rotation of the sewing machine head	Max. number of rotation of the sewing machine head can be set. * Setting varies in accordance with resistance pack to be connected.	U	150 to MAX (rpm)	9 6 4 0 0 0	79
	100	2-pitch output during reverse stitching at start/end of sewing	You can enable or disable 2-pitch output during reverse stitching at the start/end of sewing. 0: Disabled 1: Enabled	U	0/1	1 0 0 □□□ 0	
	101	2-pitch inverse output during alternate vertical output	You can enable or disable 2-pitch inverse output in response to alternate vertical output. 0: Disabled 1: Enabled	U	0/1	1 0 1 □□□ 0	

＊ **Do not change the set values with asterisk (*) mark as they are functions for maintenance. If the standard set value set at the time of delivery is changed, it is in danger of causing the machine to be broken or the performance to be deteriorated.**
(Descriptions of setting in this list are the standard values at the time of delivery.)
However, contents of function setting are subject to change for improvement of function and performance without notice.

(5)Detailed explanation of selection of functions

① **Selection of the soft-start function (Function setting No. 1)**

The needle thread may fail to interlace with the bobbin thread at the start of sewing when the stitching pitch (stitch length) is small or a thick needle is used. To solve such problem, this function (called "soft-start") is used to limit the sewing speed, thereby assuring successful formation of the starting stitches.

		1				0

0 : The function is not selected.

1 to 9 :   The number of stitches to be sewn under the soft-start mode.

The sewing speed limited by the soft-start function can be changed. **(Function setting No. 37)**

	3	7		8	0	0

Data setting range

100 to MAX rpm <50 rpm>

② **Material end sensor (ED : optional) function (Function setting No. 2 to 4)**

This function is possible when the material end sensor (ED) is attached.

As for the details, refer to the instruction manual for the material end sensor.

(Caution) Setting will be invalid when the material end sensor is not attached, or CP-160 is connected.

③ **Flicker reducing function (Function setting No. 5)**

The function reduces flickering of the hand lamp at the start of sewing. The higher the set value increases, the more effective the function will work.

		5				0

Setting range

0 to 3

0 : Flicker reducing function does not work. to 3 : Flickering is effectively reduced.

(Caution) The more effective the flicker reducing function works (the more the set value is made), the lower the start-up speed of the sewing machine will become.

④ **Bobbin thread counting function (Function setting No. 6)**

When the control panel (CP-160) is used, the function subtracts from the predetermined value and indicates the used amount of bobbin thread.

For the details, refer to the instruction manual for the control panel.

(Caution) If "0" is set, the LCD indication on the control panel will go out and the bobbin thread counting function will be invalid.

⑤ **Thread trimming prohibiting function (Function setting No. 9)**

This function turns OFF thread trimming solenoid output and wiper solenoid output when thread trimming is actuated. [If the control panel (CP-160) is used with the sewing machine, this function will work in accordance with the function setting on the control panel.]

By this function, separate sewing material can be spliced and sewn without trimming thread.

		9				0

0 : off Thread trimming is operative. (thread can be trimmed).

1 : on Thread trimming is inoperative. (thread can not be trimmed).

⑥ **Setting of the needle bar stop position when the sewing machine stops (Function setting No. 10)**

The position of the needle bar when the pedal is in its neutral position is specified.

	1	0				0

0 : Down The needle bar stops in the lowest position of its stroke.

1 : Up   The needle bar stops in the highest position of its stroke.

(Caution) If the stop position of the needle bar is set to the highest position, the thread trimming action will be taken after the needle bar comes down once to the lowest position.

⑦ **Sound of click of the key switch mounted on the PSC box (Function setting No. 11)**

This function selects whether the sound is effective or ineffective when operating the four key switches mounted on the PSC box.

	1	1				1

0 : off The sound of click is ineffective.

1 : on The sound of click is effective.

⑧ **Selection of the optional input/output function (Function setting No. 12)**
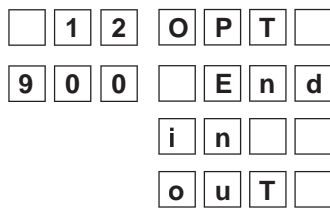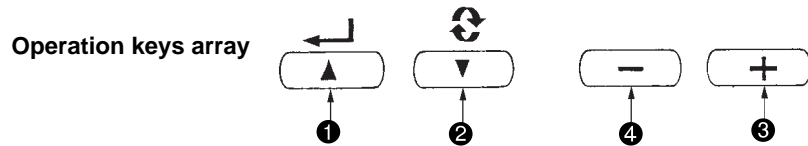
Operation keys array

↵	↻	−	+
▲	▼		
❶	❷	❹	❸

	1	2	O	P	T	
9	0	0		E	n	d
			i	n		
			o	u	T	

1. Select function No. 12 with the operating procedures described in the item of how to change over the function setting mode (1) to (4).
   Select the items of "End", "in" and "ouT" with keys ❸ and ❹.

9	0	1		*	*	*

Optional input 1 to 8 are displayed

9	0	8
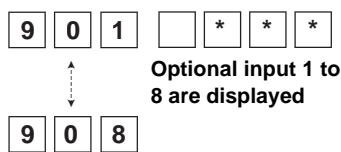
[When "in" is selected]
The port Nos. are displayed in the left 3 digits. Designate the input port with key ❶ or ❷. Designate the function of input port with key ❸ or ❹.
The function code and the abbreviation are alternately displayed in the 4-digit LED.(For the relation between signal input No. and connector pin array, refer to the separate list.)

9	1	1		*	*	*

Optional input 1 to 8 are displayed

9	1	8
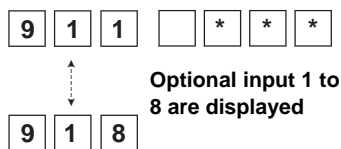
[When "ouT" is selected]
The port Nos. are displayed in the left 3 digits. Designate the output port with key ❶ or ❷. Designate the function of output port with key ❸ or ❹.
The function code and the abbreviation are alternately displayed in the 4-digit LED. (For the relation between signal input No. and connector pin array, refer to the separate list.)

(Caution)   Note that the voltage used in output function should not exceed the voltage set with W1 and W2.

***** **Example) Setting the thread trimming function to the optional input port 1**
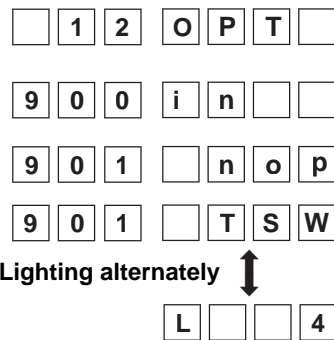
		1	2	O	P	T	

1. Select function No. 12 with the operating procedures described in the item of how to change over the function setting mode (1) to (4).

9	0	0	i	n		

2. Select the item of "in" with keys ❸ and ❹.

9	0	1		n	o	p

3. Select the port of 901 with key ❷.

9	0	1		T	S	W

4. Select the thread trimming function, "TSW" with keys ❸ and ❹.

Lighting alternately ↕

L			4

5. Determine the thread trimming function, "TSW" with key ❷.

9	0	1	L			4

↕

H			4
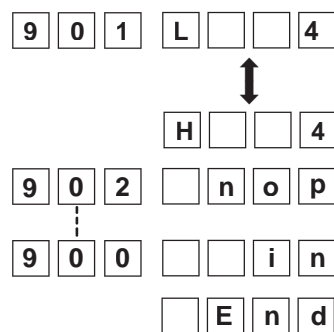
6. Set ACTIVE of the signal with keys ❸ and ❹.
   Set the display to "L" when the signal is "Low" and performing thread trimming, and set the display to "H" when the signal is "High" and performing thread trimming.

9	0	2		n	o	p

7. Determine the aforementioned function with key ❷.

9	0	0			i	n

8. Finish the optional input with key ❷.

	E	n	d

9. Select the item of "End" with keys ❸ and ❹ to return to the function setting mode.

***** **For the other optional function, it is possible to program simple input/output sequence control.**

Input function list

Function code	Abbreviation	Function item	Remarks
0	nop	No function	(Standard setting)
1	HS	Needle up / down compensating stitching	Every time the switch is pressed, normal feed stitching by half stitch is performed. (Same operation as that of up / down compensating stitching switch on the panel.)
2	bHS	Back compensating stitching	Reverse feed stitching is performed at low speed while the switch is held pressing. (It is effective only when constant dimension sewing pattern is selected with the CP-160.)
3	Ebt	Function of canceling once reverse feed stitching at the end of sewing	By depressing the back part of the pedal after pressing the switch, operation of reverse feed stitching is canceled once.
4	TSW	Thread trimming function	This function is actuated as the thread trimming switch.
5	FL	Presser foot lifting function	This function is actuated as the foot lifter switch.
6	oHS	One stitch compensating stitching	Every time the switch is pressed, one stitch stitching operation is executed.
7	SEbt	Function of cancel of reverse feed stitching at start/end	By operating the optional switch, ineffective/effective can be alternately changed over.
8	PnFL	Presser lifting function when pedal is neutral	Every time the switch is pressed, the function whether automatically lifting the presser foot when the pedal is neutral or not can be selected.
9	Ed	Material edge sensor input	This function works as the input signal of material edge sensor.
10	LinH	Function of prohibiting depressing front part of pedal	Rotation by pedal is prohibited.
11	TinH	Function of prohibiting thread trimming output	Output of thread trimming is prohibited.
12	LSSW	Low speed command input	This function works as low speed switch for standing sewing machine.
13	HSSW	High speed command input	This function works as high speed switch for standing sewing machine.
14	USW	Needle lifting function	UP stop motion is performed when switch is pressed duringDOWN stop.
15	rSW	Reverse revolution to lift needle function	Brake stop motion by reverse revolution is performed at specified angle when switch is pressed during DOWN stop
16	SFSW	Safety switch input	Rotation is prohibited.
17	MES	Thread trimmer knife sensor input	This function works as input signal of thread trimmer knife sensor.
18	AUbT	Cancel of automatic reverse feed stitching/input of addition switch	Every time the switch is pressed, cancel or addition of reverse feed stitching at start or end is performed.
19	vErT	Alternate vertical amount change panel switch input	Every time the switch is pressed, alternate vertical amount change output is inversed.
20	vSW	Alternate vertical amount change knee switch input	Alternate vertical amount change output is performed as long as the switch is pressed.
21	2PiT	2-pitch alternate input	Two-pitch output is reversed every time the SW is pressed.
22	2PSW	2-pitch momentary switch input	Two-pitch output is enabled during the SW is pressed.
23	0SSW	One-shot speed command switch input	The one-shot speed command is enabled during SW is pressed.

Output function list

Function code	Abbreviation	Function item	Remarks
0	nop	No function	(Standard setting) *
1	TrM	Thread trimming output	Output of thread trimming signal *
2	WP	Thread wiper output	Output of thread wiper signal *
3	TL	Thread release output	Output of thread release signal *
4	FL	Presser lifter output	Output of presser lifting signal *
5	bT	Reverse feed stitching output	Output of reverse feed stitching signal *
6	Ebt	EBT cancel monitor output	State of one time cancel of reverse feed stitching at end function is output.
7	SEbt	Reverse feed stitching at start/ end cancel monitor output	State of cancel of reverse feed stitching at start/end is output.
8	AUbt	Automatic reverse feed stitching cancel/addition monitor output	State of cancel or addition of automatic reverse feed stitching is output.
9	vErT	Alternate vertical amount change (monitor) output	Output of alternate vertical amount change signal
10	SSTA	Sewing machine stop state output	Sewing machine stop state is output.
11	2PiT	2-pich output	2-pitch signal output is enabled.

* Magnet output does not work when they are used as optional.
(Caution) Note that the voltage used in output function should not exceed the voltage set with W1 and W2.

CN50 (Output) 1 2 3 4 4 3 2 1

CN51 (Input) 1 2 3 4 4 3 2 1

4 — GND
3 — Input/output signal
2
1 — Voltage
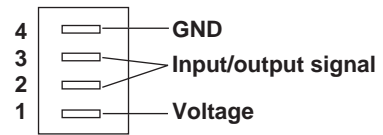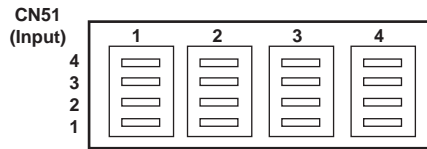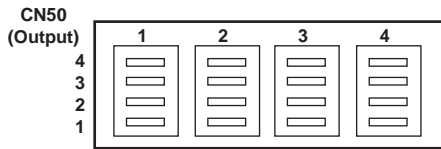
Input connector

Connector No.	Pin No.	7-segment disply No.	Function	Jumper for power voltage setting
CN51-1	1	Vcc4 *1	Power voltage selected with W4	W4 Vcc4 selects +5V, +12V and +24V with the setting of W4. "+5 V" is selected at shipment.
	2	901	Optional input 1	
	3	902	Optional input 2	
	4	–	GND	
CN51-2	1	Vcc4 *1	Power voltage selected with W4	
	2	903	Optional input 3	
	3	904	Optional input 4	
	4	–	GND	
CN51-3	1	Vcc3 *1	Power voltage selected with W3	W3 Vcc3 selects +5V, +12V and +24V with the setting of W3. "+5 V" is selected at shipment.
	2	905	Optional input 5	
	3	906	Optional input 6	
	4	–	GND	
CN51-4	1	Vcc3 *1	Power voltage selected with W3	
	2	907	Optional input 7	
	3	908	Optional input 8	
	4	–	GND	

(Caution) 1. Note that the input voltage should not exceed +5V.
2. *1 is not displayed on the 7 segment LED.

Output connector

Connector No.	Pin No.	7-segment disply No.	Function	Jumper for power voltage setting
CN50-1	1	Vcc1 *1	Power voltage selected with W1	W1 Vcc1 selects +5V, +12V and +24V with the setting of W1. "+5 V" is selected at shipment.
	2	911	Optional output 1	
	3	912	Optional output 2	
	4	–	GND	
CN50-2	1	Vcc1 *1	Power voltage selected with W4	
	2	913	Optional output 3	
	3	914	Optional output 4	
	4	–	GND	
CN50-3	1	Vcc2 *1	Power voltage selected with W2	W2 Vcc2 selects +5V, +12V and +24V with the setting of W2. "+5 V" is selected at shipment.
	2	915	Optional output 5	
	3	916	Optional output 6	
	4	–	GND	
CN50-4	1	Vcc2 *1	Power voltage selected with W2	
	2	917	Optional output 7	
	3	918	Optional output 8	
	4	–	GND	

(Caution) 1. Note that the voltage used in output function should not exceed the voltage set with W1 and W2.
2. *1 is not displayed on the 7 segment LED.

⑨ **Sewing counting function (Function setting No. 14)**

The function counts up every time thread trimming is completed and counts the number of completion of the sewing process.

This can be realized together with the CP-160 (IP-100) control panel. Refer to the explanation of the control panel.

| | 1 | 4 | | | | 1 |

0 : off   Sewing counting function is inoperative.

1 : on   Sewing counter function is operative (for every thread trimming)

2 : on   External sewing counter SW input (IP-100)

⑩ **Function of reverse feed stitching switch (Function setting No. 15)**

Function of reverse feed stitching switch is selected.

| | 1 | 5 | | | | 0 |

0 : Reverse feed stitching function of normal operation used with lockstitch machine, and the like

1 : Level input wrapper control and presser synchronizing control

2 : Level input wrapper control

3 : Alternate input wrapper control

⑪ **Alternate vertical amount input function (Function setting No. 18)**

Function of alternate vertical dial of LU series is selected.

| | 1 | 8 | | | | 0 |

0 : Function not selected

1 : Analog input (Analog input of DL dial from optional input connector CN51 4-2 pin is possible. It corresponds with DL dial of LU-22* series.)

2 : Digital input (DL dial input function of digital input from optional input connector CN51 4-1 and 4-2 pins is possible. It corresponds with DL dial of LU-15* series.

⑫ **Reversing brake start angle (Function setting No. 19)**

Brake start angle of function of reverse revolution to lift needle after thread trimming can be set. Set value sets the angle from position of UP detection missed.

| | 1 | 9 | | | 3 | 5 | 9 |

0 : Invalid (Brake works from position of UP detection missed.)

Setting range 1 to 359 [degree]

1 to 359 : Brake works after rotating up to the set angle.

As to angle :   Angle here means that the angle is that of direction of the normal rotation from missing of UP detection when the sewing machine rotates in the normal direction.

⑬ **Alternate vertical amount output delay time (Function setting No. 20)**

Delay time from pressing alternate vertical presser switch of LU series to outputting of alternate vertical output signal is set.

| | 2 | 0 | | | | 1 | 0 |

Setting range : 0 to 500 [mS]

⑭ **Neutral automatic presser lifting function (with AK device only) (Function setting No. 21)**

This function can automatically lift the presser foot when the pedal is in the neutral position.

Automatic lifting time of the pedal depends on the automatic lifting time after thread trimming and when the presser foot is automatically lowered, it is automatically lifted at the second neutral position after it has come off the neutral position once.

| | 2 | 1 | | | | | 0 |

0 : off Function of neutral automatic presser lifting is not operative.

1 : on Selection of function of neutral automatic presser lifting

⑮ **Function of changeover of compensating switch on the operation panel function (Function setting No. 22)**

Function of compensation switch on the operation panel of CP-160 can be changed over to needle up / down compensating stitching or one stitch compensating stitching.

| | 2 | 2 | | | | | 0 |

0 : Needle up / down compensating stitching

1 : One stitch compensating stitching

⑯ Function of input of presser for standing work (Function setting No. 24)

Motion of presser lifting pedal when pedal for standing work is used can be set.

☐ 2 4 ☐ ☐ 2

0 : Normal presser lifting motion (Presser goes up only when presser lifting pedal is depressed.)
1 : Normal presser lifting motion (When presser lifting pedal is depressed, presser goes up, and it is held up even when it is released. When presser lifting pedal is depressed again, presser comes down.
2 : In case of LU with DL device, function is same as that of alternate vertical switch.
(Alternate vertical amount becomes maximum only when pedal is depressed.)
3 : In case of LU with DL device, function is same as that of alternate vertical switch.
(Alternate vertical amount is held as maximum by depressing pedal, and alternate vertical amount returns to the setting by depressing pedal again.)
4 : Level input wrapper control and presser synchronizing control
5 : Level input wrapper control
6 : Alternate input wrapper control

⑰ Thread trimming motion condition (Function setting No. 25)

This function makes the thread trimming motion ineffective when depressing the back part of the pedal after DOWN detection position has been off by turning handwheel by hand or the like.

☐ 2 5 ☐ ☐ 1

0 : Thread trimming motion is effective.
1 : Thread trimming motion is prohibited.

⑱ Setting of the suction time of the back-tack solenoid (Function setting No. 29)

This function can change the suction time of the back-tack solenoid.
It is effective to decrease the value when the heat is high.
**(Caution) When the value is excessively decreased, failure of motion or defective pitch will follow.
Be careful when changing the value.**

☐ 2 9 ☐ 2 5 0

Setting range : 50 to 500 ms <10 / ms>

⑲ Function of reverse feed stitching on the way (Function setting Nos. 30 to 33)

Functions of the limit of number of stitches and thread trimming command can be added to the touch back switch on the sewing machine head.

Function setting No. 30

☐ 3 0 ☐ ☐ 0

Function of reverse feed stitching on the way is selected.

0 : off   Normal back-tack function
1 : on   Function of reverse feed stitching on the way

Function setting No. 31

☐ 3 1 ☐ ☐ 4

Number of stitches performing reverse feed stitching is set.

Setting range
0 to 19 stitches

Function setting No. 32

☐ 3 2 ☐ ☐ 0

Effective condition of reverse feed stitching on the way

0 : off   Inoperative when the sewing machine stops.
(Reverse feed stitching on the way functions only when the sewing machine is running.)
1 : on   Operative when the sewing machine stops.
(Reverse feed stitching on the way functions both when the sewing machine is running and stops.)

(Caution) Either condition is operative when the sewing machine is running.

Function setting No. 33 Thread trimming is performed when reverse feed stitching on the way is completed.

☐ 3 3 ☐ ☐ 0

0 : off   Without thread trimming
1 : on   Thread trimming is executed.

Actions under each setting state

Application	Function setting			Output function
	No. 30	No. 32	No. 33	
①	0	0 or 1	0 or 1	It works as normal touch-back switch.
②	1	0	0	When operating touch-back switch at the time of depressing front part of the pedal, reverse feed stitching as many as the number of stitches specified by the function setting No. 31 can be performed.
③	1	1	0	When operating touch-back switch at the time of either stop of the sewing machine or depressing front part of the pedal, reverse feed stitching as many as the number of stitches specified by the function setting No. 31 can be performed.
④	1	0	1	When operating touch-back switch at the time of depressing front part of the pedal, automatic thread trimming is performed after reverse feed stitching as many as the number of stitches specified by the function setting No. 31 has been performed.
⑤	1	1	1	When operating touch-back switch at the time of either stop of the sewing machine or depressing front part of the pedal, automatic thread trimming is performed after reverse feed stitching as many as the number of stitches specified by the function setting No. 31 has been performed.

① Used as the normal reverse feed stitching touch-back switch.
② Used for reinforcing seam (press sewing) of the pleats. (It works only when the sewing machine is running.)
③ Used for reinforcing seam (press sewing) of the pleats.
  (It works either when the sewing machine stops or when the sewing machine is running.)
④ Used as starting switch for reverse feed stitching at the sewing end.
  (Used as the substitute for thread trimming by depressing back part of the pedal. It works only when the sewing machine is running. It is especially effective when the sewing machine is used as the standing-work machine.)
⑤ Used as starting switch for reverse feed stitching at the sewing end.
  (Used as the substitute for thread trimming by depressing back part of the pedal. It works either when the sewing machine stops or when the sewing machine is running. It is especially effective when the sewing machine is used as the standing-work machine.)

⑳ **Number of rotations of thread trimming (Function setting No. 36)**

Number of rotations of sewing machine at the time of thread trimming is set.

`3 6    1 0 0`   Setting range 100 to 250 rpm

㉑ **Number of rotation of one-shot stitching (Function setting No. 38)**

This function can set, by the pedal operation of one time, the sewing speed of one-shot stitching when the sewing machine continues stitching until completing the number of stitches specified or detecting the material end.

`3 8   2 5 0 0`   Setting range
150 to MAX. rpm. <50 / rpm>

(Caution) 1. Setting of one-shot stitching is made by the operation panel of the CP-160, or the function setting No. 76.
2. The max. number of rotation of one-shot stitching is limited by the model of the sewing machine head.

㉒ **Presser lifting function at the time of turning ON the power (Function setting No. 46)**

Whether making presser go up or making it come down at the time of turning ON the power can be set.

`4 6       0`   0 : Presser does not go up immediately after turning ON the power.
1 : Presser goes up immediately after turning ON the power.

㉓ **Holding time of lifting presser foot (Function setting No. 47)**

Solenoid type presser foot lifter (No. 46 0) can adjust the holding time control of lifting presser foot.
This function automatically lowers the presser foot when the time set with the setting No. 47 has passed after lifting the presser foot.
When the pneumatic type presser foot lifter (No. 46 1) is selected, the holding time control of lifting presser foot is limitless regardless of the set value.

| | 4 | 7 | | | 6 | 0 | Setting range
10 to 600 sec <10 / sec>

㉔ **Pedal presser lifting function (Function setting No. 50)**

Pedal type setting can be changed. Selection of conventional PFL and KFL types can be performed.

| | 5 | 0 | | | | 0 | 0 : Function is same as conventional KFL type.
1 : Function is same as conventional PFL type.

Set value 1 : PFL is the standard. For PFL type in the standard state, the amount of depressing back part of pedal to make thread trimming motion is large (position of thread trimming motion is deep) since there is an auto-lifter section.
For this reason, if you feel that the work is hard, setting to KFL type is recommended.
By setting to KFL type, thread trimming motion is performed at a shallow position when depressing the back part of pedal.

㉕ **Compensation of timing of the solenoid for reverse feed stitching (Function setting No. 51 to 53)**

When the normal and reverse feed stitches are not uniform under the automatic reverse feed stitching action, this function can change the ON / OFF timing of the solenoid for back tack and compensate the timing.

① Compensation of on-timing of solenoid for reverse feed stitching at the start of sewing (Function setting No. 51)

On-timing of solenoid for reverse feed stitching at the start of sewing can be compensated by the unit of angle.

| | 5 | 1 | | | | 1 | 0 | Adjusting range
− 36 to 36 <1 / 10°>

Set value	Compensation angle	Number of stitches of compensation
−36	−360°	−1
−18	−180°	−0.5
0	0°	0
18	180°	0.5
36	360°	1

-360°
-180°
0°
180°
360°
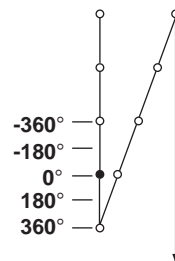
* **When the point before 1 stitch is regarded as 0°, compensation is possible by 360° (1 stitch) in front and in the rear.**

② Compensation of off-timing of solenoid for reverse feed stitching at the start of sewing (Function setting No. 52)

Off-timing of solenoid for reverse feed stitching at the start of sewing can be compensated by the unit of angle.

| | 5 | 2 | | | 1 | 6 | Adjusting range
− 36 to 36 <1 / 10°>

Set value	Compensation angle	Number of stitches of compensation
−36	−360°	−1
−18	−180°	−0.5
0	0°	0
18	180°	0.5
36	360°	1

360°
180°
0°
-180°
-360°
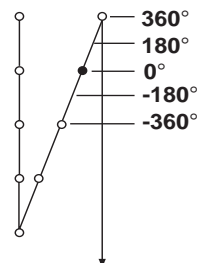
③ Compensation of off-timing of solenoid for reverse feed stitching at the end of sewing (Function setting No. 53)

Off-timing of solenoid for reverse feed stitching at the start of sewing can be compensated by the unit of angle.

| 5 | 3 | | | 1 | 8 |

Adjusting range
– 36 to 36 <1 / 10°>

Set value	Compensation angle	Number of stitches of compensation
–36	–360°	–1
–18	–180°	–0.5
0	0°	0
18	180°	0.5
36	360°	1
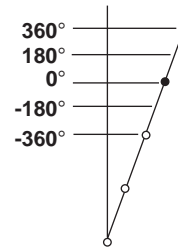
㉖ **Motor pulley effective diameter (Function setting No. 54)**

Effective diameter of pulley to be used for motor is inputted.

| 5 | 4 | | 5 | 0 | 0 |

Setting value 50 to 140 [mm]

(Caution) Be sure to set the proper value since troubles such as missing of proper sewing speed or decreasing of torque occurs unless the effective diameter of motor pulley is properly set.

㉗ **Foot lift function after thread trimming (Function setting No. 55)**

This function can automatically lift the presser foot after thread trimming. This function is effective only when it is used in combination with the AK device.

| 5 | 5 | | | | 1 |

0 : off　Function of automatically lifting the presser foot is not provided.
(Presser foot does not automatically go up after thread trimming.)
1 : on　Function of automatically lifting the presser foot is provided.
(Presser foot automatically goes up after thread trimming.)

㉘ **Reverse revolution to lift the needle after thread trimming (Function setting No. 56)**

This function is used to make the sewing machine rotate in the reverse direction after thread trimming to lift the needle bar almost to highest position. Use this function when the needle appears under the presser foot and it is likely to make scratches on the sewing products of heavy-weight material or the like.

| 5 | 6 | | | | 0 |

0 : off　Function of making the sewing machine rotate in the reverse direction to lift the needle after thread trimming is not provided.
1 : on　Function of making the sewing machine rotate in the reverse direction to lift the needle after thread trimming is provided.

(Caution) The needle bar is raised, by rotating the machine in the reverse direction, almost to the highest dead point. This may result in slip-off of the needle thread. It is therefore necessary to adjust the length of thread remaining after thread trimming properly.

㉙ **Function of bobbin thread remaining amount detection (Function setting No. 57)**

Function of bobbin thread remaining amount detection is set when bobbin thread remaining amount detection device is used.

| 5 | 7 | | | | 0 |

0　: Invalid
1 to : Valid (For the details, refer to the Instruction Manual for the device.)

㉚ **Function of holding predetermined upper / lower position of the needle bar (Function setting No. 58)**

When the needle bar is in the upper position or in the lower position, this function holds the needle bar by applying a brake slightly.

| 5 | 8 | | | | 0 |

0 : off　Function of holding predetermined upper/lower position of the needle bar is ineffective.
1 : on　Function of holding predetermined upper/lower position of the needle bar is effective.
2 : on　Function of holding predetermined upper/lower position of the needle bar is ineffective.
3 : on　Function of holding predetermined upper/lower position of the needle bar is effective.

㉛ **Change-over function of AUTO / Pedal for sewing speed of the reverse feed stitching at the start of sewing (Function setting No. 59)**
This function selects whether the reverse feed stitching at the start of sewing is performed without a break at the speed set by the function setting No. 8 or the stitching is performed at the speed by the pedal operation.

| | 5 | 9 | | | | 1 |

0 : Manu   The speed is indicated by the pedal operation.
1 : Auto   Automatic stitching at the specified speed

(Caution) 1. The max. sewing speed of the reverse feed stitching at the start of sewing is limited to the speed set by the function setting No. 8 regardless of the pedal.
2. When "0" is selected, stitches of reverse feed stitching may not match those of normal feed stitching.

㉜ **Function of stop immediately after the reverse feed stitching at the start of sewing (Function setting No. 60)**
This function temporarily stops the sewing machine even when keeping depressing the front part of the pedal at the time of completion of process of reverse feed stitching at the start of sewing.
It is used when sewing a short length by reverse feed stitching at the start of sewing.

| | 6 | 0 | | | | 0 |

0 : Not provided with the function of temporary stop of the sewing machine immediately after the reverse feed stitching at the start of sewing
1 : Provided with the function of temporary stop of the sewing machine immediately after the reverse feed stitching at the start of sewing

Stp the sewing machine temporarily to change dirextion of sewing products.

㉝ **Bobbin thread remaining amount detection air blow output time (Function setting No. 61)**
Air blow output time is set when bobbin thread remaining amount detection device is used.

| | 6 | 1 | | 5 | 0 | 0 |

Setting range 0 to 2000 [mS]

㉞ **Tie stitch adjustment function (Function setting No. 63)**
Temporary stop time can be set at the respective corners of start, end and overlapped stitching at the time of setting reverse feed stitching and overlapped stitching.

| | 6 | 3 | | | 1 | 0 |

0 : Invalid
Setting range 0 to 1000 [mS]

Temporary stop performed only for the time set at this point.

㉟ **Selection of thread trimmer and additional device (Function setting No.65)**
Thread trimming control corresponding to the machine head is selected. When additional device is mounted, device function is set.

| | 6 | 5 | | F | U | n |

❶ ▲   ❷ ▼   ❹ −   ❸ +

Setting item is selected by operating ❸ and ❹.

LED 3-digit display			LED 4-digit display			
F	U	N	E	n	d	End of setting (Setting returns to the normal function setting.)
			T	r	M	Slection of thread trimmer function
			U	T	1	Setting of additional device 1 function
			U	T	2	Setting of additional device 2 function

Setting item is determined by operating ❶ and ❷.

```
┌─┬─┬─┬─┬─┬─┬─┐
│F│U│n│T│r│M│ │
└─┴─┴─┴─┴─┴─┴─┘
```

TrM : This is setting when using thread trimmer mechanism built in the machine head. Models for which this
setting is possible are as described below.

LED 3-digit display			LED 4-digit display				Applicable model	Remarks
T	r.	0		n	o	P	Setting invalid	
			L	1	5	1	Machine head of LU-151** series	
			L	U	2	2	Machine head of LU-22** series	
			L	1	5	2	Machine head of LU-152* series	
			d	6	3	9	DLN-6390	
			L	U	1	2	LU-2212	

**(Caution) Contents of thread trimming function can be automatically set as well at the time of the func-
tion setting. Therefore, it is not necessary to set the function normally.**

Contents of selection of thread trimmer and additional device, and list of parameter setting

---

```
┌─┬─┬─┬─┬─┬─┐
│F│U│n│U│T│1│ │
└─┴─┴─┴─┴─┴─┘
```

UT1 : It is possible to set the model installed with device such as thread trimming device, cutter, etc. as the
additional device to the machine head.

Device setting

LED 3-digit display			LED 4-digit display				Description of device setting	Remarks
U	1.	0		n	o	P	Setting invalid	
			W	i	n	d	LU Thread rack device selection	➡Ⓐ
			A	H	1	0	MF Auto hemmer device selection	➡Ⓑ
			S	S	1	0	MF Short stitch device selection	➡Ⓒ
			T	C	0	1	Tape cutter device selection (solenoid type)	➡Ⓓ
			T	C	0	2	Tape cutter device selection (solenoid valve type)	➡Ⓔ
			T	C	0	3	Fast action tape cutter selection	➡Ⓕ
			L	B	0	1	Back latch selection	➡Ⓖ

* For the detailed setting contents, refer to the another sheet (Ⓐ to Ⓔ) on next page.

```
┌─┬─┬─┬─┬─┬─┐
│F│U│n│U│T│2│ │
└─┴─┴─┴─┴─┴─┘
```

UT2 : Same function as UT1

Device setting

LED 3-digit display			LED 4-digit display				Description of device setting	Remarks
U	2.	0		n	o	P	Setting invalid	
			W	i	n	d	LU Thread rack device selection	➡Ⓗ
			A	H	1	0	MF Auto hemmer device selection	➡Ⓘ
			S	S	1	0	MF Short stitch device selection	➡Ⓙ
			T	C	0	1	Tape cutter device selection (solenoid type)	➡Ⓚ
			T	C	0	2	Tape cutter device selection (solenoid valve type)	➡Ⓛ
			T	C	0	3	Fast action tape cutter selection	➡Ⓜ
			L	B	0	1	Back latch selection	➡Ⓝ

* For the detailed setting contents, refer to the another sheet (Ⓕ to Ⓙ) on next page.

F U n U T 1

Parameter setting

Marker	LED 3-digit display	LED 4digit display	Description of device setting	Remarks
➡A	U 1. 1	A. 1 8 5	Thread rack remaining thread output OFF angle setting	185fl : from Up position off
➡B	U 1. 1	C. 3 0	Number of stitches of condensation start waiting setting	30 stitches
	U 1. 2	C. 1 0	Number of stitches of condensation setting	10 stitches
	U 1. 3	C. 2	Normal number of stitches setting	2 stitches
➡C	U 1. 1	C. 1 0	Number of stitches of short stitch	10 stitches
	U 1. 2	C. 2	Normal number of stitches setting	2 stitches
➡D	U 1. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 1. 2	d. 5 0	Cutter motion time at the start setting	50 ms
	U 1. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 1. 4	C. 0	Number of stitches of cutter motion waiting at the end of sewing setting	0 stitch
	U 1. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡E	U 1. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 1. 2	d. 5 0	Cutter motion time at the start setting	50ms
	U 1. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 1. 4	C. 0	Number of stitches of dust collection output stop waiting	0 stitch
	U 1. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡F	U 1. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 1. 2	d. 5 0	Cutter motion time at the start setting	50ms
	U 1. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 1. 4	C. 0	Number of stitches of cutter motion waiting at the end of sewing setting	0 stitch
	U 1. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡G	U 1. 1	C. 1	Setting of stitch count of thread release at the start of sewing	1 stitch
	U 1. 2	C. 4	Setting of stitch count of thread release waiting at the end of sewing	4 stitch
	U 1. 3	C. 4 0	Setting of stitch count of thread release at the end of sewing	40 stitch

F U n U T 2

Parameter setting

Marker	LED 3-digit display	LED 4digit display	Description of device setting	Remarks
➡H	U 2. 1	A. 1 8 5	Thread rack remaining thread output OFF angle setting	185fl : from Up position off
➡I	U 2. 1	C. 3 0	Number of stitches of condensation start waiting setting	30 stitches
	U 2. 2	C. 1 0	Number of stitches of condensation setting	10 stitches
	U 2. 3	C. 2	Normal number of stitches setting	2 stitches
➡J	U 2. 1	C. 1 0	Number of stitches of short stitch	10 stitches
	U 2. 2	C. 2	Normal number of stitches setting	2 stitches
➡K	U 2. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 2. 2	d. 5 0	Cutter motion time at the start setting	50 ms
	U 2. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 2. 4	C. 0	Number of stitches of cutter motion waiting at the end of sewing setting	0 stitch
	U 2. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡L	U 2. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 2. 2	d. 5 0	Cutter motion time at the start setting	50ms
	U 2. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 2. 4	C. 0	Number of stitches of cutter motion waiting at the end of sewing setting	0 stitch
	U 2. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡M	U 2. 1	C. 5	Number of stitches of cutter motion waiting at the start of sewing setting	5 stitches
	U 2. 2	d. 5 0	Cutter motion time at the start setting	50ms
	U 2. 3	C. 2 5	Setting of stitch count of dust collection output stop waiting	25 stitches
	U 2. 4	C. 0	Number of stitches of dust collection output stop waiting	0 stitch
	U 2. 5	d. 5 0	Cutter motion time at the end setting	50 ms
➡N	U 2. 1	C. 1	Setting of stitch count of thread release at the start of sewing	1 stitch
	U 2. 2	C. 4	Setting of stitch count of thread release waiting at the end of sewing	4 stitch
	U 2. 3	C. 4 0	Setting of stitch count of thread release at the end of sewing	40 stitch

When MF, MO, DLN, or MH is selected for the head of the sewing machine and the additional thread trimmer function is selected in function setting No. 65, parameters for each additional device are changeable without starting the memory switch function.

1. Turn on the power. (You will view the contents shown in this illustration during operation.)
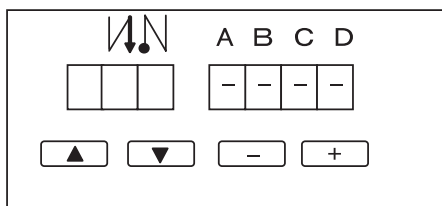
"" - "" is added under A, B, C, and D indications.

2. Calling up setting mode
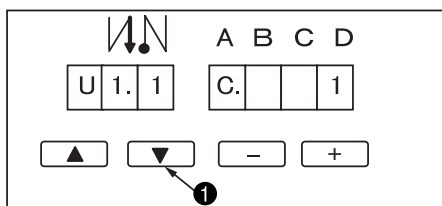
❶ Press the "▼" switch.
The screen shown in the left illustration appears and the stitch counts (C display) in each process are displayed.
(Caution) The sewing machine is disabled during these contents are displayed.

3. Increase in stitch count (time)
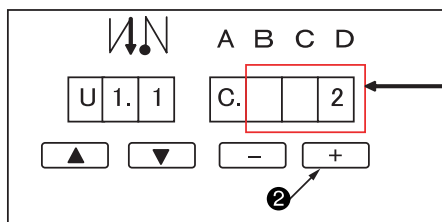
Increase in stitch count
0-999 stitches
❷ Press the "+" switch.
The stitch count to be set increases in response to switch pressing.
The repeat function is also available.

4. Decrease in stitch count (time)
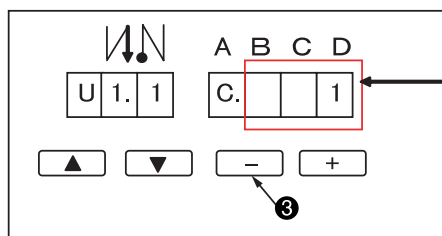
Decrease in stitch count
❸ Press the "-" switch.
The stitch count to be set decreases in response to switch pressing.
The repeat function is also available.

5. Progress to next step
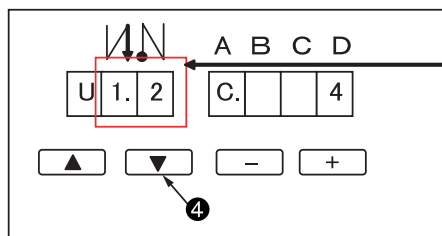
Step forward
U1.1 → U1.2 → U1.3
❹ Press the "▼" switch.
The process progresses to the next in response to switch pressing.

6. Determination of contents
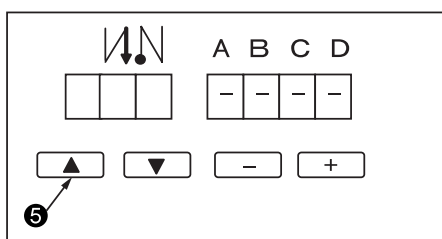
Determination of settings
❺ Press the "▲" switch.
Pressing the switch provide you with determination of the changed contents and the regular screen appears.
In case that you turn off the power during setting change, the existing settings are not updated to the changed settings.
The pedal operation and other operations become enabled when the regular screen appears.

㊱ **Simplified program setting (Function setting No. 66)**
Valid/invalid of motion of simplified program, and input, change, etc, of program are set.

| | 6 | 6 | P | r | o | |

For the details, refer to "(2) of 9. How to use the simplified program function".

㊲ **Auto hemmer control changeover (Function setting No. 67)**
Auto hemmer control used with MF is selected.

| | 6 | 7 | | | | 0 |

0 : Control 1
1 : Control 2

Contents of setting list

	Control 1	Control 2	Remarks
At the time of turning ON the power	• Air blow : OFF • Hemmer guide : OFF • Presser lifter : ON (lifting)	• Air blow : OFF • Hemmer guide : OFF • Presser lifter : ON (lifting)	
Depressing the back part of pedal (When it is shallowly depressed)	• Presser lifter comes down by depressing pedal • Air blow : ON • Hemmer guide : OFF Aforementioned motions are alternately repeated by shallowly depressing the back part of pedal.	• Air blow : ON • Hemmer guide : ON • Presser lifter : ON (lifting) • When pedal is returned to neutral position, air blow and presser lifter are OFF (lowering). • Hemmer guide is not OFF until overlapped section sensor detects after making hemmer guide output once ON.	

㊳ **Prohibition of start with material end sensor of auto hemmer control (Function setting No. 68)**
Setting whether starting sewing machine or not with material end sensor of auto hemmer control used with MF is performed.

| | 6 | 8 | | | | 0 |

0 : Invalid (Sewing machine is started regardless of detection of material end sensor.)
1 : Valid (Sewing machine is not started in case of detection of material end sensor.)

㊴ **Selection of speed control method after detection of material end sensor of auto hemmer control (Function setting No. 69)**
Setting whether by manual or automatic the speed control after detection of material end sensor of auto hemmer control used with MF is possible.

| | 6 | 9 | | | | 0 |

0 : Pedal depressing amount
1 : Setting speed (Motion with setting speed of function setting No. 38)

㊵ **Number of stitches of invalid material end sensor of auto hemmer control (Function setting No. 70)**
Setting of number of stitches which makes invalid detection of material end sensor of auto hemmer control used with MF can be set.

| | 7 | 0 | | | | 0 |

0 : Invalid
Setting range 1 to 500 [Unit : 0.5 stitch]

㊶ **Clutch motor function (Function setting No. 72)**
This function makes valid the function which performs same motion as clutch motor.

| | 7 | 2 | | | | 0 |

0 : Invalid
1 : Valid

When this function is set to valid, UP/DOWN stop function by synchronizer or the like attached after set-up of the machine does not work, and only rotation stop motion by depressing pedal works.

㊷ **Retry function (Function setting No. 73)**

When the retry function is used, if the sewing material is thick and not pierced with needle, this function makes the needle pierce in the material with ease.

| | 7 | 3 | | | | 1 |

0 : Normal

1 : Retry function is provided.

㊸ **With/without MF thread trimming device (Function setting No. 74)**

This function sets with or without the MF thread trimming device (UT-25, etc.).

| | 7 | 4 | | | | 1 |

0 : Without device

1 : With device (Initial value)

㊹ **One-shot function up to material end (Function setting No. 76)**

This function can perform the one-shot automatic stitching up to the end of material in combination with the material end sensor when the operation panel is not connected.

| | 7 | 6 | | | | 0 |

0 : Without one-shot function

1 : With one-shot function

㊺ **Reverse feed stitching at the end of sewing start time (Function setting No. 85)**

Time to run the machine at specified speed to gain back-tuck solenoid response time when moving from end of normal sewing to reverse feed stitching is set.

| | 8 | 5 | | | 1 | 0 |

0 : Invalid

Setting range 1 to 250 [mS]

Time to maintain setting No. 64 (number of rotations of start of reverse feed stitching at the end) immediately after entering back-tuck is set as shown in the right-hand figure.

> **Time of this section where back-tuck enters is set**

㊻ **Waiting time of start of reverse revolution to lift needle (Function setting No. 86)**

Delay time from UP stop position to start of reverse revolution can be set.

| | 8 | 6 | | | 1 | 0 |

0 : Invalid

Setting range 1 to 250 [mS]

㊼ **Function of pedal curve selection (Function setting No. 87)**

This function can perform the selection of the curve of number of rotation of the sewing machine against the depressing amount of the pedal.

Change to this function when you feel that inching operation is hard or that pedal response is slow.

| | 8 | 7 | | | | 0 |

0 : Number of rotation of the sewing machine in terms of the depressing amount of the pedal increases linearly.

1 : Reaction to intermediate speed in terms of the depressing amount of the pedal is delayed.

2 : Reaction to intermediate speed in terms of the depressing amount of the pedal is advanced.

Number of rotstion (rpm)

Pedal sroke (mm)

㊽ **Initial UP stop position move function (Function setting No. 90)**

Whether valid or invalid of function to automatically return to UP stop position immediately after turning ON the power can be set.

| | 9 | 0 | | | | 0 |

0 : Invalid

1 : Valid

㊾ Function of reducing speed of reverse feed stitching at the start of sewing (Function setting No. 92)

Function to reduce speed at the time of completion of reverse feed stitching at the start of sewing : Normal use depending on the pedal condition (Speed is acceralated to the highest without a break.)

This function is used when temporary stop is used properly. (Cuff and cuff attaching)

| | 9 | 2 | | | | 0 |

0 : Speed is not reduced.

1 : Speed is reduced.

Sew without stopping without a break.

Temporary stop

㊿ Function added to the needle up / down compensating switch (Function setting No. 93)

One stitch operation can be performed only when the needle up / down compensating switch is pressed at the time of upper stop immediately after turning ON the power switch or upper stop immediately after thread trimming.

| | 9 | 3 | | | | 0 |

0 : Normal (Only needle up / down compensating stitching operation)

1 : One stitch compensating stitching operation (upper stop / upper stop) is performed only when aforementioned changeover is made.

51 Test display mode (Function setting No. 94)

Display of input signal can be displayed on 7-segment LED of operation panel.

| | 9 | 4 | | | | 0 |

0 : Invalid

1 : Valid

(Caution) Basically this function is that for maintenance. Be sure to make this function invalid for the normal use.

52 Setting of max. number of rotation of the sewing machine head (Function setting No. 96)

This function can set the max. number of rotation of the sewing machine head you desire to use.

Upper limit of the set value varies in accordance with the sewing machine head to be connected.

| | 9 | 6 | 4 | 0 | 0 | 0 |

150 to Max. [rpm] <50 / rpm>

(6) Automatic compensation of neutral point of the pedal sensor

Whenever the pedal sensor, spring, etc. are replaced, be sure to perform following operation :

(1) Pressing switch ❶, turn ON the power switch.
(2) Indication on the screen will be as illustrated in ❷. At this time, the value indicated in the 7 segments of four figures is the compensation value.

(Caution) **At this time, the pedal sensor does not work properly if the pedal is depressed. Do not place the foot or any object on the pedal. Warning sound "peeps" and the compensation value is not displayed.**

(3) Turn OFF the power switch, and turn ON the power switch again to return to the normal mode.

(7) Initialization of the setting data
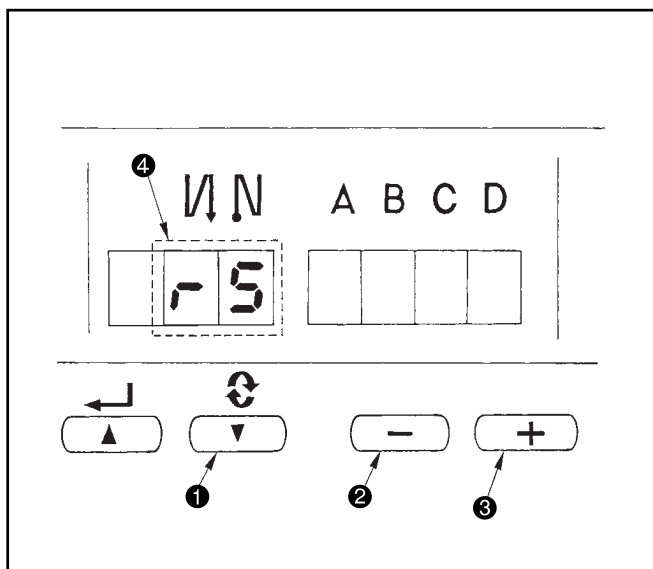
All contents of function setting of SC-510 can be returned to the standard set values.

(1) Pressing all switches ❶, ❷ and ❸, turn ON the power switch.
(2) LED displays indication ❹ with the sound "peep", and initialization starts.
(3) The buzzer sounds after approximately one second (single sound three times, "peep", "peep", and "peep"), and the setting data returns to the standard setting value.

(Caution) **Do not turn OFF the power on the way of initializing operation. Program of the main unit may be broken.**

(4) Turn OFF the power switch, and turn ON the power switch again to return to the normal mode.

(Caution) **1.** **When this operation is performed, the neutral compensation value of the pedal sensor becomes "0". Accordingly, be sure to execute the operation of automatic pedal sensor neutral compensation before using the sewing machine. (Refer to the aforementioned (6).)**
2. **Even when this operation is performed, the sewing data set by the operation panel cannot be initialized.**

(8) How to select sewing machine head

1. Setting procedure of the machine head
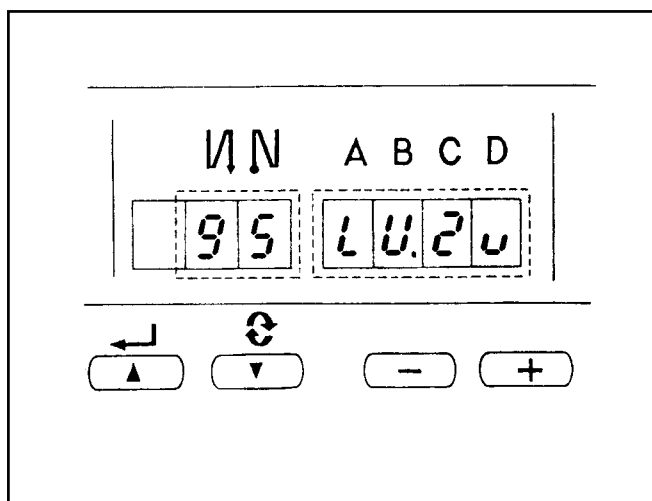
1) Refer to "Ⅲ-3 Setting for functions of SC-510" in the INSTRUCTION MANUAL for SC-510, and call the function setting No. 95.
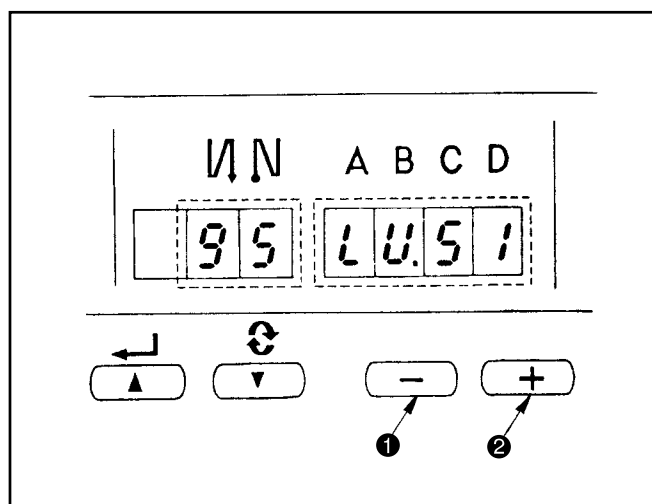
2) The type of machine head can be selected by pressing switch ❶ (switch ❷).
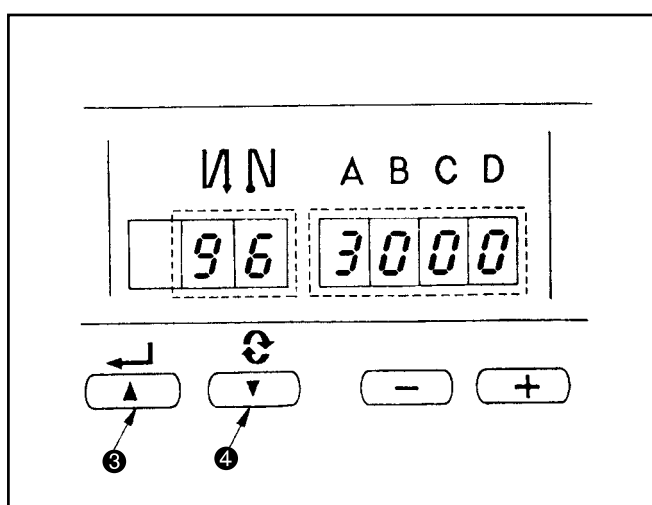
3) After determining the type of machine head, by pressing switch ❸ (switch ❹), the step proceeds to 96 or 94, and the display automatically changes to the contents of the setting corresponding with the type of machine head.

(Caution) When the type of machine head is changed, the contents which have been changed before return to the standard set values.

2.Machine head list

No.	Machine head	Type	Contents of display	Number of revolution at the time of delivery (rpm)	Max. number of revolutions (rpm)
1	MF-7823/UT25, MF-77**/UT**	MF	*MF*	4500	6500
2	MO**	MO. 1	*MO.1*	4000	5500
3	MO**	MO. 2	*MO.2*	7000	8000
4	DU-141H	du. 14	*dU.14*	2000	2000
5	LU-2210 (VR type)	LU. 2v	*LU.2u*	3500	4000
6	DSU-14*	dsu	*dSU*	2000	2000
7	DSC-24*	dsc. 0	*dSC.0*	2200	2200
8	LZH-1290	LZH	*LZH*	2000	2000
9	PLC1660/1610	PL. 66	*PL.66*	2000	2000
10	DNU-1541-7	dnU. 5	*dnU.5*	3000	3000
11	LS-1342-7	LS. 13	*LS.13*	2500	2500
12	LU-1510N-7	LU. 51	*LU.51*	3000	3000
13	LU-1560N-7	LU. 56	*LU.56*	2500	2500
14	LU-1520N-7	LU. 52	*LU.52*	3000	3000
15	DLN-6390	DLn	*dLn*	4500	5000
16	MH-48*	MH. 81	*MH.81*	5500	5500
17	MH-48*	MH. 82	*MH.82*	4500	4500
18	MH-1410	MH. 14	*MH.14*	4000	5000
19	LU-2216 (VR type)	LU. 26	*LU.26*	3000	3000
20	LU-22*0 (Special)	LU. 20	*LU.20*	3500	4000
21	LU-2212	LU. 12	*LU.12*	3500	3500

* Machine head set at the time of delivery

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6. CHANGING PROCEDURE OF THE PEDAL TYPE

1. Standard state of the pedal type of SC-510 is PFL type.
2. Amount of depressing the back part of pedal to actuate thread trimmer is large (thread trimming position is deep) since there is an auto-lifter section in case of PFL type of the standard state.
3. For this reason, when you feel that the work is hard, we recommend that you change over to KFL type with the memory switch.
    By setting to KFL type, when depressing the back part of pedal, thread trimming motion is performed at a shallow position.

    For changing procedure, follow (3) Setting for functions of SC-510, and change according to the description below.

㉔ Pedal presser lifting function (Function setting No. 50)

Pedal type setting can be changed. Selection of conventional PFL and KFL types can be selected.

| | **5** | **0** | | | | **0** |

0 : Function is same as conventional KFL type.
1 : Function is same as conventional PFL type.

Set value 1 : PFL is the standard. Amount of depressing the back part of pedal to actuate thread trimmer is large (thread trimming position is deep) since there is an auto-lifter section in case of PFL type of the standard state. By setting to KFL type, when depressing the back part of pedal, thread trimming motion is performed at a shallow position.

7. CONNECTING PROCEDURE WITH JUKI OPTIONAL DEVICE

(1) Connection of the pedal of standing-work machine
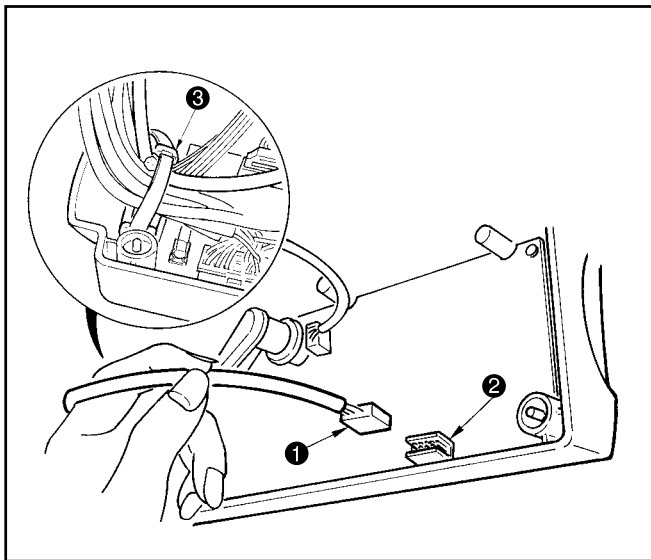
1) Connect the connector of PK70 ❶ to connector ❷ (CN39 : 12P) of SC-510.
2) Tighten the cord of PK70 together with other cords with cable clip band ❸ attached to the side of the box after passing it through the cable clamp.

(Caution) Be sure to turn OFF the power before connecting the connector.

(2) Setting of the auto lifter function
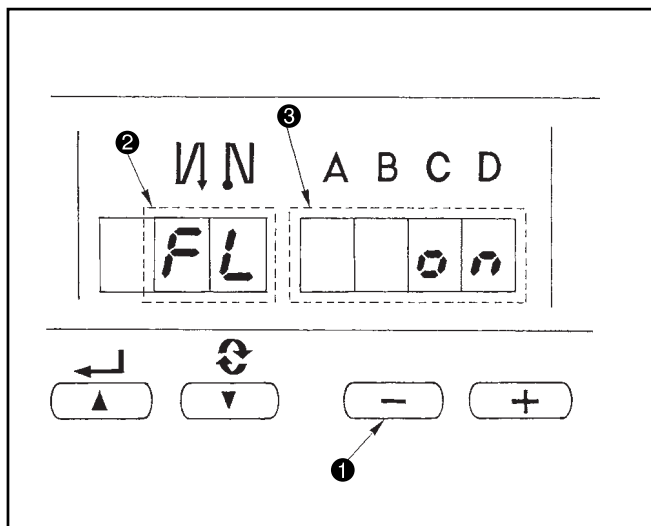
When the auto-lifter device (AK) is attached, thisfunction makes the function of auto-lifter work.

1) Turn ON the power switch while pressing switch ❶ inside the control box.
2) LED display is turned to ❷, ❸ (FL ON) with "beep", and the function of auto-lifter becomes effective.
3) Turn OFF the power switch, and turn ON the power switch again to return to the normal mode.
4) Repeat the operation 1) to 3), and LED display is turned to (FL OFF). Then, the function of autolifter does not work.

   FL ON : Auto-lifter device becomes effective.

   FL OFF : Auto-lifter function does not work.

   (Similarly, the presser foot is not automatically lifted when programmed stitching is completed.)

**(Caution) 1. To perform re-turning ON of the power, be sure to perform after the time of one second or more has passed.
(If ON / OFF operation of the power is performed quickly, setting may be not changed over well.)**
2. Auto-lifter is not actuated unless this function is properly selected.
3. When "FL ON" is selected without installing the auto-lifter device, starting is momentarily delayed at the start of sewing. In addition, be sure to select "FL OFF" when the auto-lifter is not installed since the touch-back switch may not work.
4. Refer to "14. INPUT/OUTPUT CHART" for machine standard setting shipment.

(3) Connecting procedure of CP-160
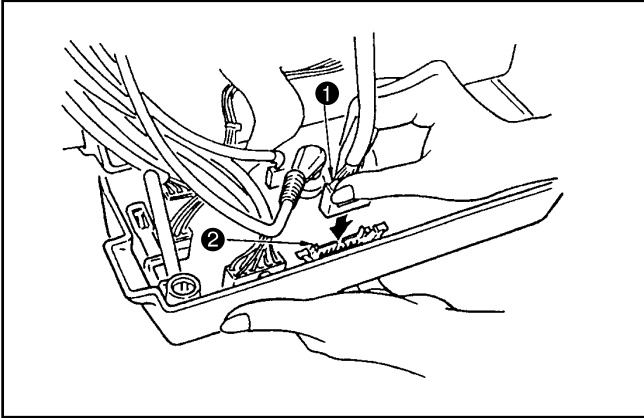
1) Exclusive connectors are prepared for connection of the connector for CP-160.
2) Paying attention to the orientation of the connector ❶, connect it to connector ❷ (CN38) located on the circuit board. After connecting, securely lock the connector.

(4) Installation IPOP circuit board
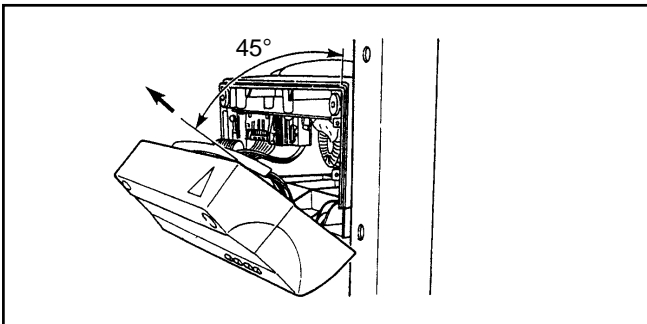
1) Loosen two screws in the front cover of control box and open the front cover
2) Remove connectors and ground wire of the circuit board attached to the front cover/
3) Place the front cover at an angle of approximate 45°, draw it in the direction of arrow, and remove it from the box main unit.
(Caution) Do not draw the front cover forcibly since there is the possibility that the click of front cover is broken.
4) Securely insert CN41 of IPOP circuit board supplied as accessories to white connector CN41 on the front cover circuit board from the upper side.
5) Fix IPOP circuit board with two screws ❶ supplied as accessories.
6) Place the front cover at an angle of approximate 45°, attach it to the box main unit, and attach connectors and ground wire which have been removed in step 2).
(Caution) When removing IPOP circuit board, turn OFF the power and remove it after 5 minutes or more have passed.
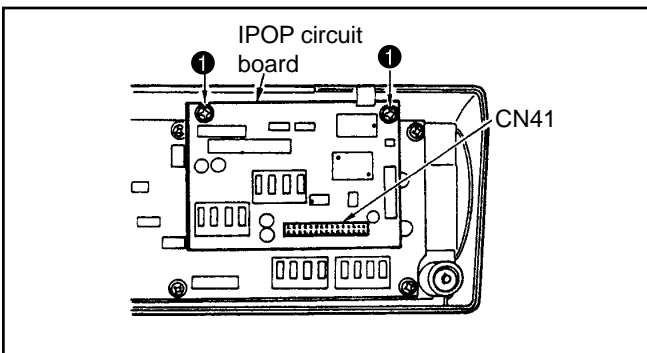
(5) Installation of IP-100E
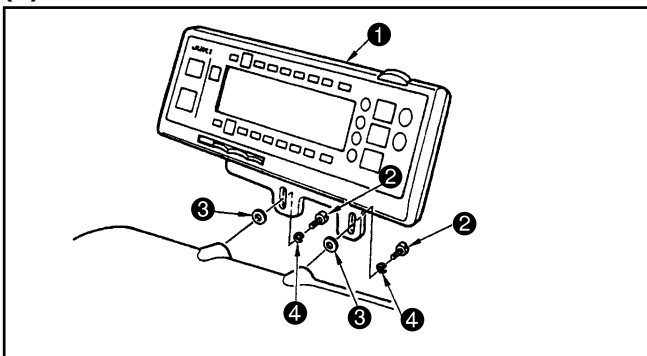
1) Install operation panel ❶ on the machines head using screws ❷, washers ❸ and spring washers ❹ supplied as accessories.
(Caution) Do not disassemble the operation panel to prevent it from breakage.
2) Set the panel cord same as the other machine head cords, insert it to CN121 of the control box, and lock it.
3) Put it together with other machine head cords and bundle them with clip band ❺.
4) Close the front cover and tighten two screws, while taking care not to put the cords in the front cover.
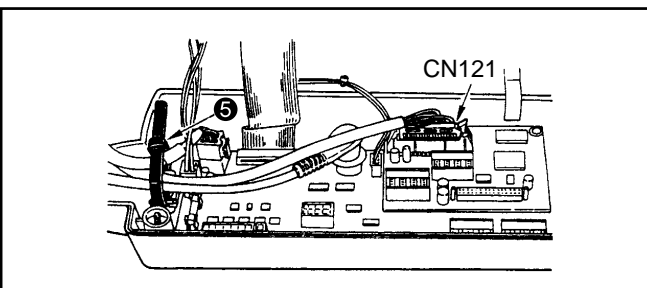
8. EXTERNAL INPUT/OUTPUT CONNECTOR (SIGNAL CONNECTOR FOR EXTENSION)

(1) Encoder output connector (CN40)

CN40 pin No.	Signal name	Description	Electric spec.
1	UDET (N)	"LOW" is output when upper position angle from synchronizer is reached.	+5V 100mA
2	DDET (N)	"LOW" is output when lower position angle from synchronizer is reached.	+5V 100mA
3	N. C		
4	MA	The A phase pulse from servo motor encoder encoder is output.	+5V 100mA
5	MB	The B phase pulse from servo motor encoder is output. (Pulse of the phase A which is delayed by 90° is output.)	+5V 100mA
6	M_ERROR	"LOW" is output when the sewing machine has stopped by error.	+5V 100mA
7	+5V	For electric power +5V	
8	GND		

(2) Optional input/output connectors (CN50 and CN51)

Optional input/output of input 8 and output 8 can be used as standard by user's program input. In addition, it is possible to optionally select the respective powers of +5V, +12V and +24V by changing the setting of jumper plug.

For the details, refer to 9. HOW TO USE THE SIMPLIFIED PROGRAM FUNCTION.

[Data]

When using for connection of optional connectors, we recommend that you use the plug of format below.
Manufacturers' name : SUMITOMO 3M
Product name : Mini-clamp wire mount plug
There are kinds as shown below according to the wires used.

Applicable wire list

Wire mount plug 4-pole product No.	Applicable wire			Cover color
	AWG No.	Nominal sectional area mm SQ.	Finished outer diameter ø mm	
37104-3101-000FL	24-26	0.14-0.3 or less	0.8 - 1.0	Red
37104-3122-000FL	24-26	0.14-0.3 or less	1.0 - 1.2	Yellow
37104-3163-000FL	24-26	0.14-0.3 or less	1.2 - 1.6	Orange
37104-2124-000FL	20-22	0.3 or more -0.5	1.0 - 1.2	Green
37104-2165-000FL	20-22	0.3 or more -0.5	1.2 - 1.6	Blue
37104-2206-000FL	20-22	0.3 or more -0.5	1.6 - 2.0	Gray

(Caution) Mini clamp wire mount plug is the registered trademark of SUMITOMO 3M company.

(3) Setting between IPOP board input/output connectors and jumper

[IPOP board] 'expansion board : option)
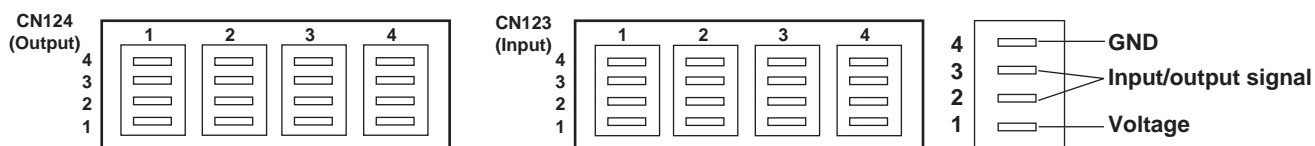
1. Input connector (CN123)

Connector No.	Pin No.	Function	Jumper for power voltage setting
CN123-1	1	Power voltage selected with **W1**	**W1** You can select from among +5, +12, and +24 V at W1 setting for supply voltage. "+5 V" is selected at shipment.
	2	Optional input **9**	
	3	Optional input **10**	
	4	GND	
CN123-2	1	Power voltage selected with **W1**	
	2	Optional input **11**	
	3	Optional input **12**	
	4	GND	
CN123-3	1	Power voltage selected with **W2**	**W2** You can select from among +5, +12, and +24 V at W2 setting for supply voltage. "+5 V" is selected at shipment.
	2	Optional input **13**	
	3	Optional input **14**	
	4	GND	
CN123-4	1	Power voltage selected with **W2**	
	2	Optional input **15**	
	3	Optional input **16**	
	4	GND	

(Caution) Set function signal to input to optional input terminal of input connector to +5V (voltage) or less. When the input signal exceeds +5 or more, there is the possibility that breakage or deterioration of circuit board occurs.

2. Output connector (CN124)

Connector No.	Pin No.	Function	Jumper for power voltage setting
CN124-1	1	Power voltage selected with **W3**	**W3** You can select from among +5, +12, and +24 V at W3 setting for supply voltage. "+5 V" is selected at shipment.
	2	Optional output **9**	
	3	Optional output **10**	
	4	GND	
CN124-2	1	Power voltage selected with **W3**	
	2	Optional output **11**	
	3	Optional output **12**	
	4	GND	
CN124-3	1	Power voltage selected with **W4**	**W4** You can select from among +5, +12, and +24 V at W4 setting for supply voltage. "+5 V" is selected at shipment.
	2	Optional output **13**	
	3	Optional output **14**	
	4	GND	
CN124-4	1	Power voltage selected with **W4**	
	2	Optional output **15**	
	3	Optional output **16**	
	4	GND	

(Caution) **Do not apply voltage exceeding the value set with W3 and W4 (jumpers for power voltage) to the optional output terminal of output connector. When voltage exceeding the setting is applied, there is the possibility that breakage or deterioration of circuit board occurs. So, be careful.**

3. Jumper arrangement for switching optional power supply
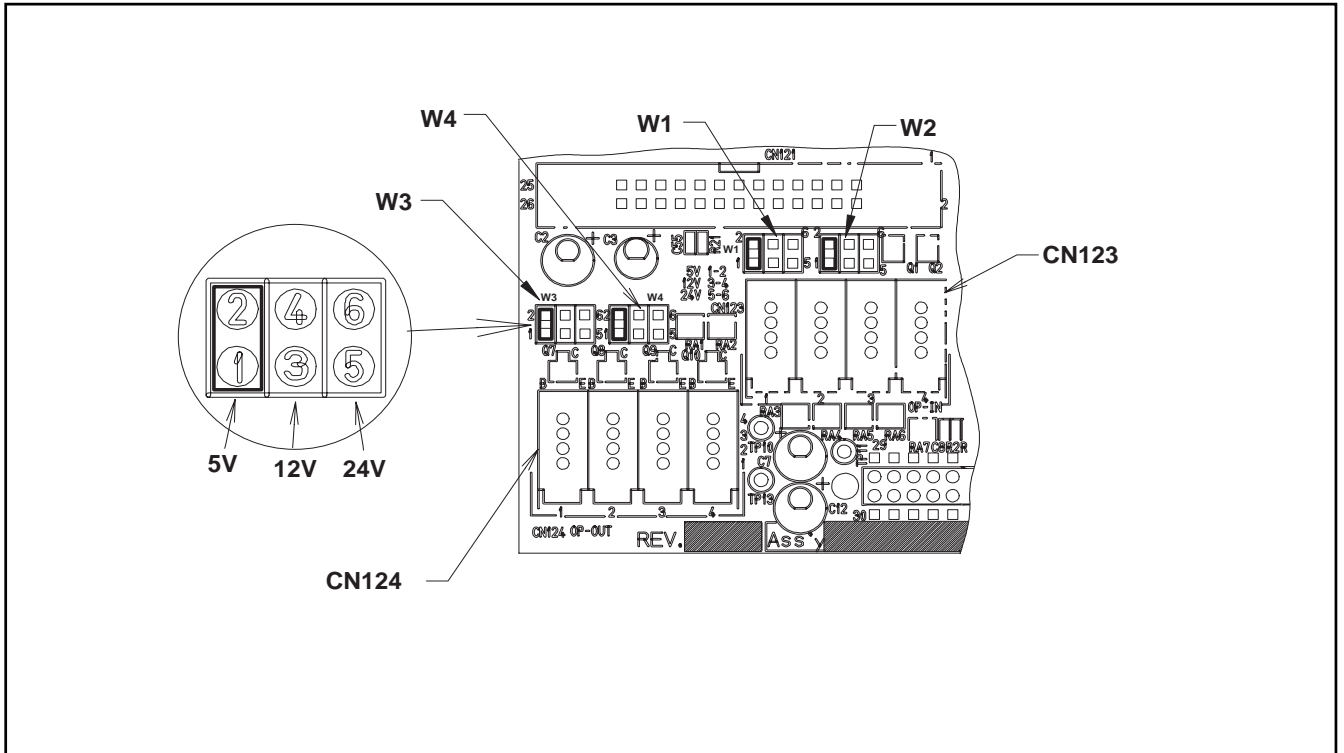
4. Explanation of input changeover jumper switch

It is possible to change 2 inputs among the optional inputs by changing the setting of jumpers W5 toW6.

Input connector No.	Pin No.	Jumper No.	Jumper pin No.	Input signal selection
CN123-4	2	W5	1—2	+5V Digital input
			2—3	+5V Analog input
	3	W6	1—2	+5V Digital input
			2—3	+5V Analog input

(Caution) For the analog input, it cannot be used with the user's setting such as simplified program, memory switch, etc.

Position of optional input changeover jumper wire and pin arrangement.
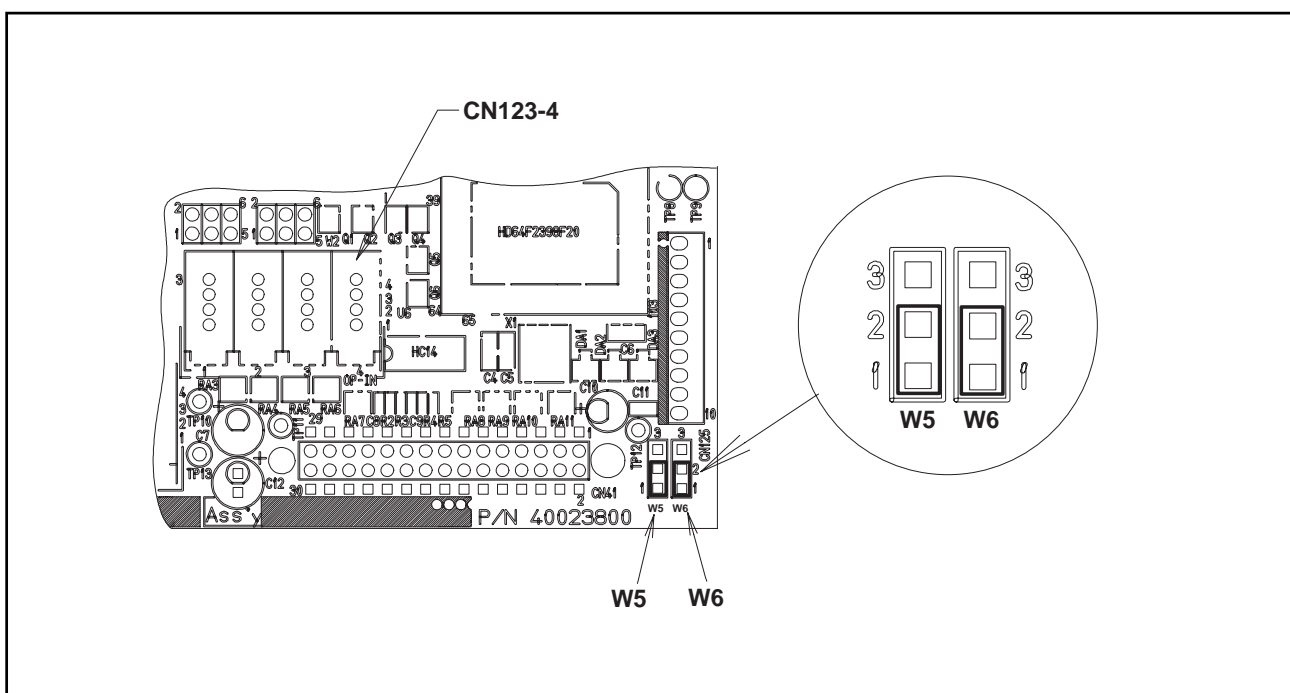
(4) How to crimp the optional connector
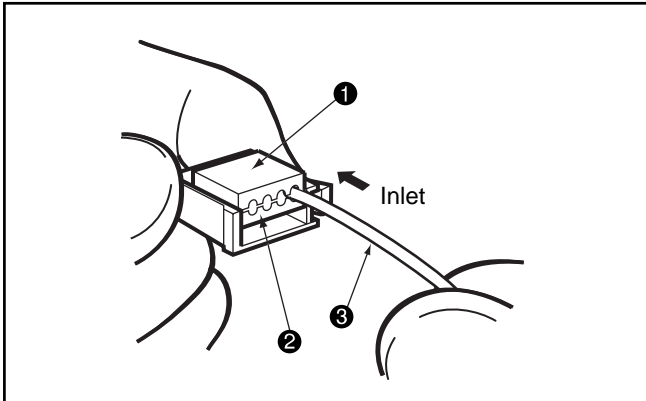
1. Cable insertion

(1) After checking the pin number, insert the cable ❸ into the inlet between the top cover ❶ and base cover ❷.

Inlet
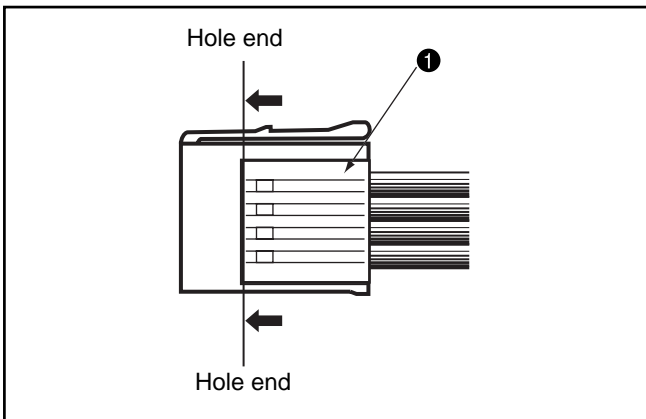
(2) Observe the cable coming to the hole end (to the line in the illustration) from above of the top cover ❶.

Hole end

Hole end
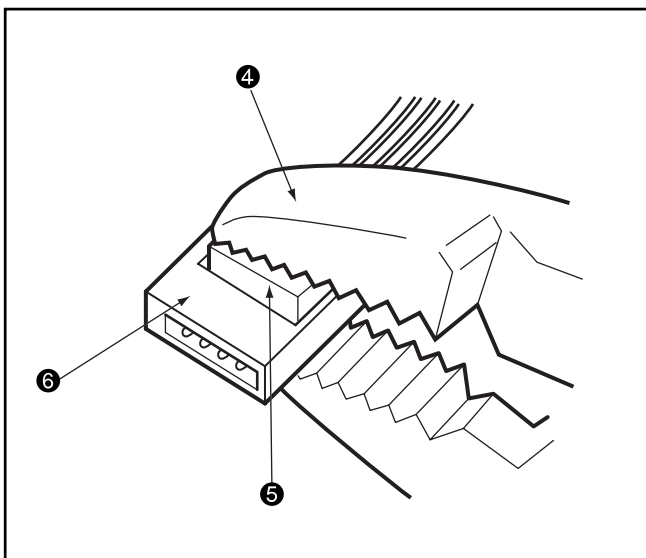
2. Crimp

Crimp the cover ❺ and the body ❻ together with pliers ❹.
  * Pliers should be lateral to the cable direction as shown in the illustration.

Side view

Rear view

Wrong (1)
Insufficient cover
❺ crimping

Wrong (2)
Latch unhooked

Push the point marked with the arrow.
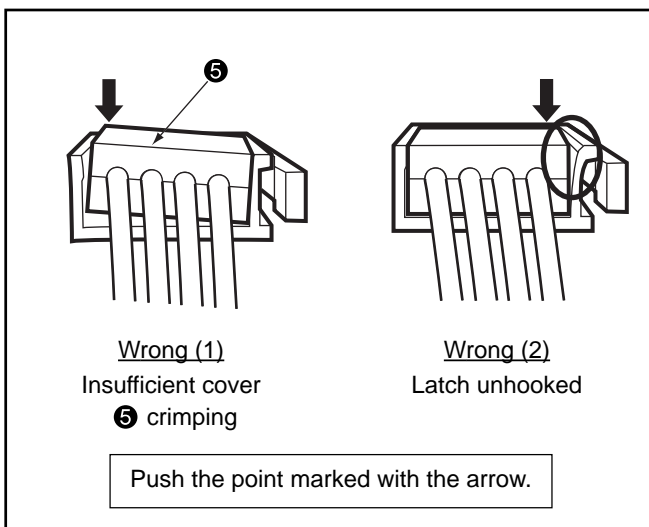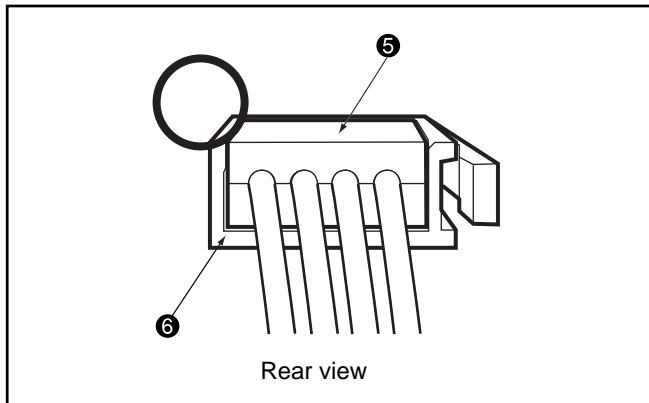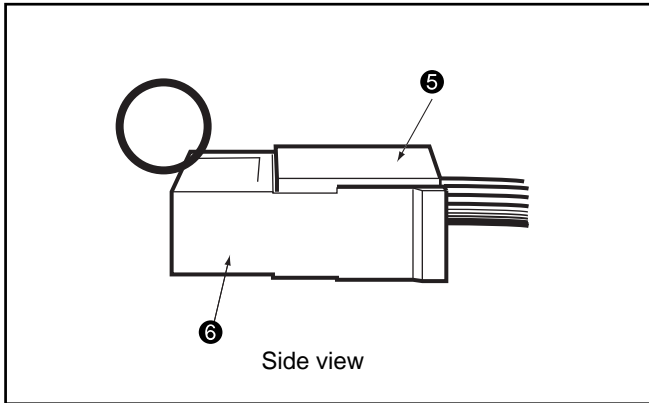
3. Check

Make sure that the cover ❺ is mounted in parallel with the body ❻ and there is no gap between the body ❻ and the cover ❺ by visual check from side and rear angle of the connector.

9. HOW TO USE THE SIMPLIFIED PROGRAM FUNCTION

(1) Simplified program function

SC-510 does not use the exclusive input device or the like and has the function that can create the simplified programs which take in the signals from the outside, output the signals to the outside, and control the sewing machine head by SC-510 main unit only.

1. Specifications

1) It is possible to simultaneously perform the operation of four programs.
2) It is possible to input 20 steps per program.
3) It is possible to perform the cross operation among four programs.

2. Indication and function

1) Indication when the simplified program is selected

Indication	Function	Remarks
Pro_	**Indicates program selection mode.**	
_End	**Ends program input function.**	
Pro1	**Selects program 1.**	
Pro2	**Selects program 2.**	
Pro3	**Selects program 3.**	
Pro4	**Selects program 4.**	

Indication	Function	Remarks
66	**Setting function No.**	
Pro	**Indication of program input mode.**	

2) Indication when the program is selected

Indication	Function	Remarks
_oFF	**Stops program operation.**	Possible to select only when 3-digit LED indication is *.0
_on	**Makes valid program operation.**	Possible to select only when 3-digit LED indication is *.0
CHE_	**Can confirm contents of program.**	Possible to select only when 3-digit LED indication is *.0
Pro_	**Starts input mode of program.**	Possible to select only when 3-digit LED indication is *.0

Indication	Function	Remarks
0	**Operation mode selection**	**Refer to the aforementioned list.**
1 to 20	**Program step No.**	

Indication	Function	Remarks
1	**Inputting program 1.**	
2	**Inputting program 2.**	
3	**Inputting program 3.**	
4	**Inputting program 4.**	

(2) Sequence of start and input

Start the setting mode and select function No. 66 in accordance with "Setting for functions of SC-510".

When No. 66 is selected, indication below appears.

```
 66      Pro_
```

↓

Press + or - key to select program No.

```
Pro      Pro1
```

This case is when program No. 1 is selected.

↓

Press ▲ or ▼ key to move to program input mode.

```
1. 0     _oFF
```

↓

Press + or - key to select program input.

```
1. 0     _Pro
```

↓

Press ▼ key to move to program input mode.

```
1. 1     _End
```

↓

| Program input (Command input) | Press + or - key to select command to be inputted. (For command input, refer to (3). Command input and (4). Simplified program command list.) |

↓

| End of program input | Press + or - key to select "End" command. By selecting this command, program input can be ended. |

↓

```
1. 9     _End
```

↓

With ▼ key, program slips out of input mode.

```
1. 0     _oFF
```

Program cannot be operated in this indication, Move to "on" indication with "+" or "-" key.

↓

```
1. 0     __on
```

When "on" indication appears, operation of program 1 is possible.

With ▼ key, program slips out of input mode to end input.

↓

```
Pro      Pro1
```

↓

Turn OFF the power and re-turn ON the power, and program inputted to "Pro1" starts operation.

(3) Command input

Indications and inputting procedure at the time of command input are explained below.

Input the program command to each step at the time of step input after selection of program, the transition (sequence) below is the transition (sequence) for 1 (one) command.
Contents of display and input items are explained below.

1. Transition (sequence) at the time of command input

```
 1.    1        _ A n d  ◄──── This indication shows And command is being inputted
                               to step 1 of program No.1. (For the details of command,
                               refer to the separate list.)

                        ◄──── When command is selected, indications light alternately.

                 [ o  2  ◄──── Function code No. of selected command is indicated.

                               Hi is output to the designated port No.
 1.    1         o H _ 2  ◄────
                               Lower 2-digit shows port No. In case of this indication,
                               it is the indication that output setting is performed to
                               port output code "2".
                               For the port No. list, refer to (5). Input/output list.

 1.    1         o L _ _  ◄──── Low is output to the designated port No.

 1.    1         , H _ _  ◄──── When "Hi" of the input of designated port No. is inputted,
                               it becomes true.

 1.    1         , L _ _  ◄──── When "Low" of the input of designated port No. is
                               inputted, it becomes true.


 1.    1      5 n.  1      5 .  1          n F. o F
              When parameter ① is   When parameter ① is speed designation
              step No.
 1.    1      d.    1                        n F. o n
                                          When parameter ① is ON/OFF setting
```

MEMO

(4) Simplified program command list

The list below is that of command and parameter used in the simplified program function.

No.	Function code	Abbreviation	Command	Output setting	Setting range	Input setting	Setting range	Parameter ①	Setting range	Parameter ②	Setting range	Remarks
1	0	End	Completion	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Invalid	—	Initial value
2	1	DELy	Delay	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Delay time (d).	0 : 1 to 999 X 1 mS	In case set value is "0", command is invalid. In case of other set value, step moves to next one after lapse of delay.
3	2	And	AND conditional branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	iH. 1 to 53 iL. 1 to 53	Skip destination No. (Sn)	1 to 20	Delay time (d.)	0 : Waiting input until condition is compleed 1 to 999 X 1 mS	When all conditions designated in input setting are completed (AND input), step moves to next one. When input conditions are not completed and delay time passed, step jumps to that set in skip destination step No.
4	3	or	OR conditional branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	ih. 1 to 53 iL. 1 to 53	Skip destination No. (Sn)	1 to 20	Delay time (d.)	0 : Waiting input unti condition is compleed 1 to 999 X 1 mS	When either one of conditions designated in input setting is completed (OR input), step moves to next one. When input conditions are not completed and delay time passed, step jumps to that set in skip destination step No.
5	4	STiA	Number of stitches AND conditonal branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	ih. 1 to 53 iL. 1 to 53	Skip destination No. (Sn)	1 to 20	Number of stitches (C.)	0 : Command invalid (1 to 999 stitches)	When all input setting conditions are completed within set value of number of stitches setting (ANDinput), step jumps to that designated in skip destination step No. and moves to next step after lapse of number of stitches.
6	5	STio	Number of stitches OR conditonal branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	ih. 1 to 53 iL. 1 to 53	Skip destination No. (Sn)	1 to 20	Number of stitches (C.)	0 : Command invalid (1 to 999 stitches)	When either one of input setting conditions is completed within set value of number of stitches setting, step jumps to that designated in skip destination step No. and moves to next step after lapse of number of stitches.
7	6	JUMP	Jump repeat counter	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Jump (Sn.)	1 to 20	Repeat vount value (r.)	0 : Immense (1 to 999 times)	Repeat is performed between steps designated in jump until repeat count value is over. looping is performed immensely when set value is "0". **(Caution) Do not perform nest input of this command.**
8	7	SPEd	Rotation speed command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Speed (S.)	0 to 999 (X 10rpm)	Delay time (d.)	0 : Delay time invalid 0 to 999 X 1mS	Sewing machine speed can be set. It runs at set speed within set delay time, and speed command is released after lapse of delay time. Number of rotation at a lowest speed does not become less than set value of function setting No. 35 Lowest speed by pedal. In addition, maximum speed does not become more than set value of function setting No. 96 Maximum number of rotation.
9	8	LiMi	Speed limitation command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Speed limitation (S.)	0 to 999 (X 10rpm)	Delay time (d.)	0 : Delay time invalid 0 to 999 X 1mS	Maximum speed limitation value of sewing machine can be set. Set speed limitation works within set delay time and speed limitation command is released after lapse of delay time. Number of rotation at slowest speed does not become less than set value of function setting No. 35 Lowest speed by pedal. In addition, maximum speed does not become more than set value of function setting No. 96 Maximum number of rotation.
10	9	LinH	Lswinh command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	on/off information (on/off)	on/off	Delay time (d.)	0 : Wihout delay 1 to 999 X 1mS	This command disables LSW (command of depressing the front part pf the panel) Command is executed without delay time with delay time "0". For others, LSW is invalid within set delay time and input of LSW is valid after setting delay time.
11	10	TrM	Thread trimming command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid		Delay time (d.)	0 : Without delay 1 to 999 X 1mS	Thread trimming motion is performed. Command is executed without delay time with delay time "0". For others, thread trimming command is performed within set delay time.
12	11	TinH	Tswinh command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	on/off information (on/off)	on/off	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	This command disables thread trimming output (command of depressing the back part of the pedal). Command is executed without delay time with delay time "0". For others, thread trimming delay command is performed within set delay time and command is released after lapse of delay time.

No.	Function code	Abbreviation	Command	Output setting	Setting range	Input setting	Setting range	Parameter ①	Setting range	Parameter ②	Setting range	Remarks
13	12	Up	US stop command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	UP position stop command (speed designated with other command is neglected.) Command is executed without delay time with delay time "0". For others, UP position stop command is valid within set delay time and command is invalid after lapse of delay time.
14	13	HS	Needle up/down command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Delay time (d).	0 : Without delay 1 to 999 X 1 mS	When command is executed, sewing machine rotates normally, and needle goes to UP position when it is in DOWN position and vice versa. Even if there is speed limitation with other command, it is neglected. Command is executed without delay time with delay time "0". For others, command is valid within set delay time and command is invalid after lapse of delay time.
15	14	rSW	Rsw command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Delay time (d.)	0 : Without delay 1 to 999 X 1 mS	When reverse rotation command is executed, sewing machine brakes by reverse rotation from angle set in function setting No. 19 and stops. Command is executed without delay time with delay time "0". For others, command is valid within set delay time and command is invalid after lapse of delay time.
16	15	AnGA	Angle AND conditional branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	iH. 1 to 53 iL. 1 to 53	Skip destination step No. (Sn)	1 to 20	Angle (A.)	0 : Without delay 1 to 359°	Step moves to next one after lapse of set angle, and when all input conditions are completed (AND input), step moves to skip destination step No. (Angle reference is angle from UP position miss.)
17	16	AnGo	Angle OR conditional branch	Valid	oH. 1 to 17 oL. 1 to 17	Valid	iH. 1 to 53 iL. 1 to 53	Skip destination step No. (Sn)	1 to 20	Angle (A.)	0 : Without delay 1 to 359°	Step moves to next one after lapse of set angle, and when either one of input conditions is completed (OR input), step moves to skip destination step No. (Angle reference is angle from UP position miss.)
18	17	SToP	Stop command	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Invalid	—	Delay time (d.)	0 : Without delay 1 to 999 X 1 mS	Stop command is output and step moves to next one. When time is set, step moves to next one after lapse of set time.
19	18	bT	BTsw command (Reverse feed stitching output)	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	on/off information (on/off)	on/off	Delay time (d.)	0 : Without delay 1 to 999 X 1 mS	On/off of reverse feed stitching switch is set. Command is executed without delay time with delay time "0". For other set value, command is executed after lapse of back-tack output "on" time during set time.
20	19	FL	FLsw command (Presser lifting output)	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	on/off information (on/off)	on/off	Delay time (d.)	0 : Invalid 1 to 999 X 1 mS	On/off of presser lifting switch command is set. Command is executed without delay time with delay time "0". For other set value, presser lifting output "off" is executed after lapse of presser lifting output "on" time during set time.
21	20	rEST	Program reset	Valid	oH. 1 to 17 oL. 1 to 17	Invalid	—	Program No. (Sn)	1 to 4	Invalid	—	Initialization of step of designated program No. Step of designated program is compulsorily returned to the first step.

(5) Simplified program information input setting code list and connector location list

List below is the list of port input code indicated in 7-segment LED at the time of input, connector No. and pin No. on p.c.b., pin assignment, function, etc.

Input list

Port input code	Signal name	Function	Connector No. and pin No. on p.c.b.	Pin No.	Remarks
0		Invalid			Input is made invalid.
1	opi0	Optional input-1	CN51-1	2	
2	opi1	Optional input-2	CN51-1	3	
3	opi2	Optional input-3	CN51-2	2	
4	opi3	Optional input-4	CN51-2	3	
5	opi4	Optional input-5	CN51-3	2	
6	opi5	Optional input-6	CN51-3	3	
7	opi6	Optional input-7	CN51-4	2	
8	opi7	Optional input-8	CN51-4	3	
9	opo0	Input of optional output-1	—	—	Output signal of optional output-1 can be internally inputted.
10	opo1	Input of optional output-2	—	—	Output signal of optional output-2 can be internally inputted.
11	opo2	Input of optional output-3	—	—	Output signal of optional output-3 can be internally inputted.
12	opo3	Input of optional output-4	—	—	Output signal of optional output-4 can be internally inputted.
13	opo4	Input of optional output-5	—	—	Output signal of optional output-5 can be internally inputted.
14	opo5	Input of optional output-6	—	—	Output signal of optional output-6 can be internally inputted.
15	opo6	Input of optional output-7	—	—	Output signal of optional output-7 can be internally inputted.
16	opo7	Input of optional output-8	—	—	Output signal of optional output-8 can be internally inputted.
17	TRMD	Thread trimmer output	CN36	1	
18	WPD	Wiper output	CN36	2	
19	TLSUBD	Tension release output	CN36	7	
20	BRD	Reverse feed stitching output	CN36	6	
21	FLD	Presser lifting output	CN37	1	
22	BZ	Buzzer output	—	—	
23	M_ERR	Machine error output	CN40	6	
24	S.STATE	Stop state output	—	—	
25	HSTSW	Needle up/down compensating switch input	CN38	13	CP-160 (operation panel)
26	LSSW	Low speed switch input	CN39	11	Standing work type
27	BTSW	Reverse feed stitching switch input	CN36	5	
28	UDET	UP position input	CN33	6	
29	DDET	DOWN position input	CN33	1	
30	UP	UP key input	Operation panel	—	Front cover
31	DOWN	DOWN key input	Operation panel	—	Front cover
32	SET+	SET +key input	Operation panel	—	Front cover
33	SET–	SET -key input	Operation panel	—	Front cover
34	TSW	Thread trimmer switch input	CN39	7	Standing work type
35	FLSW	Presser lifter switch input	CN36	4	
36	FLSW	Presser lifter switch input	CN39	5	Standing work type
37	HSSW	High speed switch input	CN39	9	Standing work type
38	opi8	Optional input-9	CN123-1	2	Extension p.c.b. (IPOP p.c.b.) CN123
39	opi9	Optional input-10	CN123-1	3	Extension p.c.b. (IPOP p.c.b.) CN123
40	opi10	Optional input-11	CN123-2	2	Extension p.c.b. (IPOP p.c.b.) CN123
41	opi11	Optional input-12	CN123-2	3	Extension p.c.b. (IPOP p.c.b.) CN123
42	opi12	Optional input-13	CN123-3	2	Extension p.c.b. (IPOP p.c.b.) CN123
43	opi13	Optional input-14	CN123-3	3	Extension p.c.b. (IPOP p.c.b.) CN123
44	opi14	Optional input-15	CN123-4	2	Extension p.c.b. (IPOP p.c.b.) CN123
45	opi15	Optional input-16	CN123-4	3	Extension p.c.b. (IPOP p.c.b.) CN123
46	opo8	Input of optional output-9	—	—	Output signal of optional output-9 can be internally inputted.
47	opo9	Input of optional output-10	—	—	Output signal of optional output-10 can be internally inputted.
48	opo10	Input of optional output-11	—	—	Output signal of optional output-11 can be internally inputted.
49	opo11	Input of optional output-12	—	—	Output signal of optional output-12 can be internally inputted.
50	opo12	Input of optional output-13	—	—	Output signal of optional output-13 can be internally inputted.
51	opo13	Input of optional output-14	—	—	Output signal of optional output-14 can be internally inputted.
52	opo14	Input of optional output-15	—	—	Output signal of optional output-15 can be internally inputted.
53	opo15	Input of optional output-16	—	—	Output signal of optional output-16 can be internally inputted.

(Caution) 1. **Port input codes 38 to 45 can be used only when IPOP p.c.b. is mounted.**
2. **Operation of port input codes 9 to 16, and 46 to 53 is the function that can use as the signal in the program where output can be internally used as input signal when optional output written in the function is used.**

Output list

Port output code	Signal name	Function	Connector No. and pin No. on p.c.b.	Pin No.	Remarks
0	—				Output is made invalid.
1	opo0	Optional output-1	CN50-1	2	
2	opo1	Optional output-2	CN50-1	3	
3	opo2	Optional output-3	CN50-2	2	
4	opo3	Optional output-4	CN50-2	3	
5	opo4	Optional output-5	CN50-3	2	
6	opo5	Optional output-6	CN50-3	3	
7	opo6	Optional output-7	CN50-4	2	
8	opo7	Optional output-8	CN50-4	3	
9	BZ	Buzzer output	—	—	
10	opo8	Optional output-9	CN124-1	2	Extension p.c.b. (IPOP p.c.b.) CN124
11	opo9	Optional output-10	CN124-1	3	Extension p.c.b. (IPOP p.c.b.) CN124
12	opo10	Optional output-11	CN124-2	2	Extension p.c.b. (IPOP p.c.b.) CN124
13	opo11	Optional output-12	CN124-2	3	Extension p.c.b. (IPOP p.c.b.) CN124
14	opo12	Optional output-13	CN124-3	2	Extension p.c.b. (IPOP p.c.b.) CN124
15	opo13	Optional output-14	CN124-3	3	Extension p.c.b. (IPOP p.c.b.) CN124
16	opo14	Optional output-15	CN124-4	2	Extension p.c.b. (IPOP p.c.b.) CN124
17	opo15	Optional output-16	CN124-4	3	Extension p.c.b. (IPOP p.c.b.) CN124

(Caution) 1. Port output codes 10 to 17 can be used only when IPOP p.c.b. is mounted.

(6) Setting procedure of optional power and setting procedure of jumper for input changeover

Lists below are those of setting procedure of power voltage of optional connectors.

By setting respective jumper wires, +5V, +12V and +24V can be used.

* +5V has been set at the time of delivery from factory.

1. Input connector

Connector No.	Pin No.	Setting voltage	Function	Jumper for optional power selection		
				+5V	+12V	+24V
CN51-1	1	Vcc4	Power voltage selected with W4	W4 1-2	W4 3-4	W4 5-6
	4	—	GND			
CN51-2	1	Vcc4	Power voltage selected with W4			
	4	—	GND			
CN51-3	1	Vcc3	Power voltage selected with W3	W3 1-2	W3 3-4	W3 5-6
	4	—	GND			
CN51-4	1	Vcc3	Power voltage selected with W3			
	4	—	GND			

2. Output connector

Connector No.	Pin No.	Setting voltage	Function	Jumper for optional power selection		
				+5V	+12V	+24V
CN50-1	1	Vcc1	Power voltage selected with W1	W1 1-2	W1 3-4	W1 5-6
	4	—	GND			
CN50-2	1	Vcc1	Power voltage selected with W1			
	4	—	GND			
CN50-3	1	Vcc2	Power voltage selected with W2	W2 1-2	W2 3-4	W2 5-6
	4	—	GND			
CN50-4	1	Vcc2	Power voltage selected with W2			
	4	—	GND			

Caution when using optional power

1) Note that the power for optional is 0.6A in total when IPOP p.c.b. is not used, and that the power for optional should not exceed 0.4A when IPOP p.c.b. is mounted.

3. Layout diagram of jumper for optional changeover of power
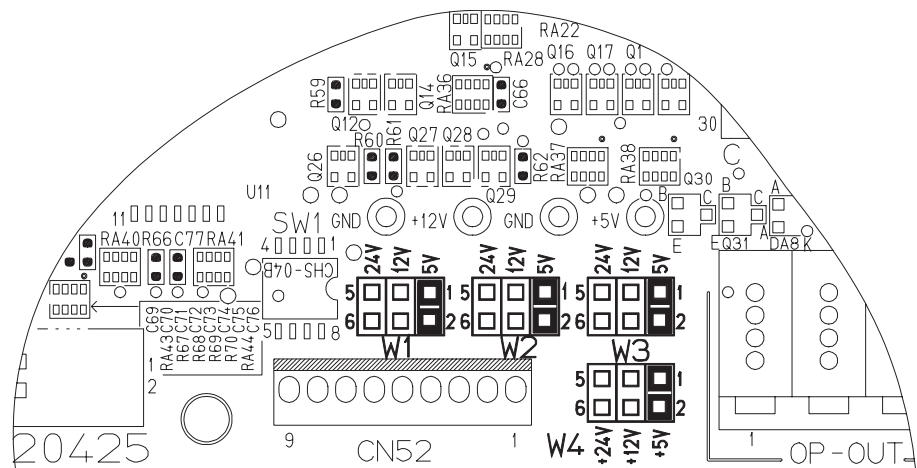
Explanation of input changeover jumper switch

It is possible to change 4 inputs among the optional inputs by changing the setting of jumpers W5 to W8.

Jumper No.	Pin No.	Signal	Input connector	Remarks
W5	1-2	Digital input of +5V	CN51-4 3Pin	
	2-3	Analog input of +5V (1)	CN51-4 3Pin	This input becomes analog signal input. (Caution 1.)
W6	1-2	Digital input of +5V	CN51-4 2Pin	
	2-3	Analog input of +5V (2)	CN51-4 2Pin	This input becomes analog signal input. (Caution 1.)
W7	1-2	Digital input of +5V	CN51-3 2Pin	
	2-3	Digital input of +5V	CN36 3Pin	
W8	1-2	Digital input of +5V	CN36 3Pin	
	2-3	Digital input of +5V	CN42 2Pin	

(Caution) 1. For the analog input, it cannot be used with the user's setting such as simplified program, memory switch, etc.

Position of optional input changeover jumper wire and pin arrangement
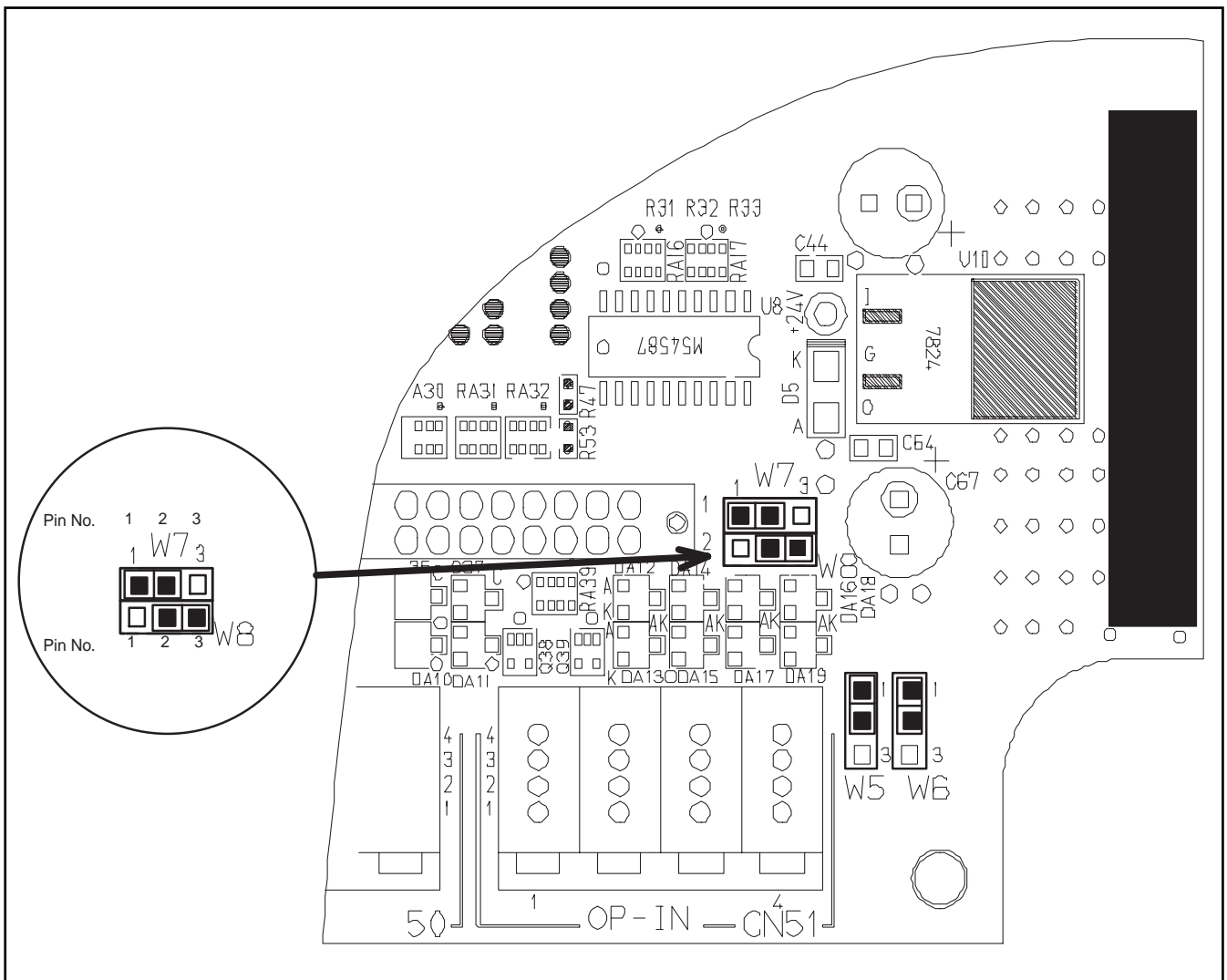
Signal system pin assignment of optional input/output connectors
List below is the list showing the relation between connector for optional and port input/output code.
Be sure to keep the items of caution for use.

4. Input connector
This optional input can be connected to transistor output of PLC, relay output, open collector output, push button switch, etc.

Connector No.	Pin No.	Port input code	Function
CN51-1	1	—	Power voltage selected with W4
	2	1	Optional input 1
	3	2	Optional input 2
	4	—	GND
CN51-2	1	—	Power voltage selected with W4
	2	3	Optional input 3
	3	4	Optional input 4
	4	—	GND
CN51-3	1	—	Power voltage selected with W3
	2	5	Optional input 5
	3	6	Optional input 6
	4	—	GND
CN51-4	1	—	Power voltage selected with W3
	2	7	Optional input 7
	3	8	Optional input 8
	4	—	GND

(Caution) 1. **Note that the input voltage should not exceed +5V.**
2. **"+5 V" is selected at shipment.**

5. Output connector
This optional output can be connected to solenoid valves of +5V, +12V and +24V, output to PLC, LED for display, etc.

Connector No.	Pin No.	Port input code	Function
CN50-1	1	—	Power voltage selected with W1
	2	1	Optional output 1
	3	2	Optional output 2
	4	—	GND
CN50-2	1	—	Power voltage selected with W1
	2	3	Optional output 3
	3	4	Optional output 4
	4	—	GND
CN50-3	1	—	Power voltage selected with W2
	2	5	Optional output 5
	3	6	Optional output 6
	4	—	GND
CN50-4	1	—	Power voltage selected with W2
	2	7	Optional output 7
	3	8	Optional output 8
	4	—	GND

(Caution) 1. **Set the current which can be driven to 0.4A per circuit or less.**
2. **In case of driving with external power, use the power voltage which does not exceed the voltage set with W1 or W2.**
3. **With this output circuit, actuator of large counter electromotive force such as magnet cannot be driven.**
4. **When using actuator such as magnet and the like, use output of CN36.**
5. **"+5 V" is selected at shipment.**

6. Input/output circuit

Input circuit

+5V +5V

IN

4.7KΩ

1KΩ

0.1μF

Output circuit

+5V, +12V, +24V
voltage set with jumper wire

OUT

I<0.4A

(7) Transition (sequence) diagram of No. 66 simplified program function

Transition (sequence) of respective input modes is as shown below.

Confirmation mode of input program
(Programmed contents cannot be edited.)

For the details of respective commands, refer to (3). Command input and (4). Simplified program command list.

<Program sample I >

Step	End, DELy, And, or, STiA, Stio, JUMP, SPEd, LiMi, LinH, TrM, TinH, UP, HS, rSW, AnGA, AnGo, SToP, bT, FL, rEST	1: opo0, 2:opo1, 3:opo2, 4:opo3, 5:opo4, 6:opo5, 7:opo6, 8:opo7, 9:BZ	1:opi0, 2:opi1, 3:opi2, 4:opi3, 5:opi4, 6:opi5, 7:opi6, 8:opi7, 9:opi0, 10:opi1, 11:opi2, 12:opo3, 13:opo4, 14:opo5, 15:opo6, 16:opo7, 17:TRMD, 18:WPD, 19:TLSUBD, 20:BTD, 21:FLD, 22:BZ, 23:M_ERR, 24:S.STATE, 25:HstSW:CP-Panel, 26: LSSW, 27:BTSW, 28:UDET, 29:DDET, 30:UP, 31:DOWN, 32:SET+, 33:SET-	Pn. Program No. Sn. Step No. S. Speed nf. on/off	d. Delay time r. Repeat counter C. Number of stitches A. Angle	Number of stitches : 1 stitch unit Time: 1ms unit Speed: 10rpm unit Angle: 1 degree unit
No.	Co. command	oH. oL. output information	iH. iL. input information	Parameter ①	Parameter ②	Remarks
1	And	oH.1, 2	iH.1	Sn.1		On edge of input is detected. Initialization of output
2	And		iL.1	Sn.2		
3	StiA			Sn.3	C.10	Count of 10 stitches
4	Linh			nf.on		Lswinh:on (Prohibition of pedal depressing)
5	TrM					Thread trimming command
6	And		iL.24	Sn.6		Stop confirmation
7	DELy	oL.1			d.50	Delay :50ms Output 1 : On
8	DELy	oL.2			d.50	Delay :50ms Output 2 : On
9	DELy	oH.1			d.100	Delay :100ms Output 1 : Off
10	SToP	oH.2				Thread trimming command release Output 2 : Off
11	Linh			nf.of		Lswinh:off (Replace of Prohibition of pedal depressing)
12	JUMP			Sn.1		Repeating aforementioned control.
13	End					
14						
15						
16						
17						
18						
19						
20						

<Program sample I >
Optional input 1 is On, automatic thread trimming is performed after 10 stitches of number of stitches count, and stop.
After stop, 100 ms of optional output 1 is output.
And, 150 ms is output to optional output 2 after a lapse of 50 ms after stop.

Input 1
Thread trimming
Stop
Output 1
Output 2

10 stitches   50ms 50ms 100ms

<Program sample II >

Step	End, DELy, And, or, STiA, Stio, JUMP, SPEd, LiMi, LinH, TrM, TinH, UP, HS, rSW, AnGA, AnGo, SToP, bT, FL, rEST	1: opo0, 2:opo1, 3:opo2, 4:opo3, 5:opo4, 6:opo5, 7:opo6, 8:opo7, 9:BZ	1:opi0, 2:opi1, 3:opi2, 4:opi3, 5:opi4, 6:opi5, 7:opi6, 8:opi7, 9:opi0, 10:opi1, 11:opi2, 12:opo3, 13:opo4, 14:opo5, 15:opo6, 16:opo7, 17:TRMD, 18:WPD, 19:TLSUBD, 20:BTD, 21:FLD, 22:BZ, 23:M_ERR, 24:S.STATE, 25:HstSW:CP-Panel, 26: LSSW, 27:BTSW, 28:UDET, 29:DDET, 30:UP, 31:DOWN, 32:SET+, 33:SET-	Pn. Program No. Sn. Step No. S. Speed nf. on/off	d. Delay time r. Repeat counter C. Number of stitches A. Angle	Number of stitches : 1 stitch unit Time: 1ms unit Speed: 10rpm unit Angle: 1 degree unit
No.	Co. command	oH. oL. output information	iH. iL. input information	Parameter ①	Parameter ②	Remarks
1	And	oH.1, oL. 2	iH.1	Sn.1		On edge of input is detected. Output 2 : On
2	And		iH.1	Sn.4	d.20	On delay :20ms (Chatter protection)
3	JUMP			Sn.2		On waiting
4	LiMi			S.200		2000rpm speed limitation (10 rpm unit)
5	And	oH.2, oL.1	iH.1	Sn.5		On edge of input is detected. Output 1 : On
6	And		iH.1	Sn.8	d.20	On delay :20ms (Chatter protection)
7	JUMP			Sn.6		On wating
8	LiMi			S.650		Release of speed limitation :6,500 rpm (10 rpm unit)
9	JUMP			Sn.1		Repeating aforementioned control.
10	End					
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

<Program sample II >
Optional input 1 is On edge, and make speed limitation 2,000 rpm. Release speed limitation after making On edge of input 1 again.
Make optional output 1 On during limiting speed, and make output 2 On during release.

Input 1

6,500 rpm
Speed limitation
2,000 rpm

Output 1

Output 2

Simplified program sheet

Step	End, DELy, And, or, STiA, Stio, JUMP, SPEd, LiMi, LinH, TrM, TinH, UP, HS, rSW, AnGA, AnGo, SToP, bT, FL, rEST	1: opo0, 2:opo1, 3:opo2, 4:opo3, 5:opo4, 6:opo5, 7:opo6, 8:opo7, 9:BZ	1:opi0, 2:opi1, 3:opi2, 4:opi3, 5:opi4, 6:opi5, 7:opi6, 8:opi7, 9:opi0, 10:opi1, 11:opi2, 12:opo3, 13:opo4, 14:opo5, 15:opo6, 16:opo7, 17:TRMD, 18:WPD, 19:TLSUBD, 20:BTD, 21:FLD, 22:BZ, 23:M_ERR, 24:S.STATE, 25:HstSW:CP-Panel, 26: LSSW, 27:BTSW, 28:UDET, 29:DDET, 30:UP, 31:DOWN, 32:SET+, 33:SET-	Pn. Program No. Sn. Step No. S. Speed nf. on/off	d. Delay r. Repeat C. Number of stitches A. Angle	Number of stitches : 1 stitch unit Time: 1ms unit Speed: 10rpm unit Angle: 1 degree unit
No.	Co. command	oH. oL. output information	iH. iL. input information	Parameter ①	Parameter ②	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

10. CONNECTOR CONNECTION DIAGRAM

(1) Solenoid for machine head

Layout of CN36 pins

Name of signal	Pin NO.
TRMD	1
TRMCOM	8
BTD	6
BTDCOM	13
WPD	2
WPDCOM	9
SUB BTD	7
SUBCOM	14
OP_IN (FLSW)	3
FLSW	4
BTSW	5
BTSWRTN	12
GND	11
FG	10

CN36

8 9 10 11 12 13 14

1 2 3 4 5 6 7

CN36

1 — TRM (Thread trimming) Approx. 7.5Ω
8

6 — BT (Touch back) Approx. 6.5Ω
13

2 — WP (Wiper) Approx. 8.5Ω
9

7

14

4

11

5 — BT SW Touch back switch

12

3

10
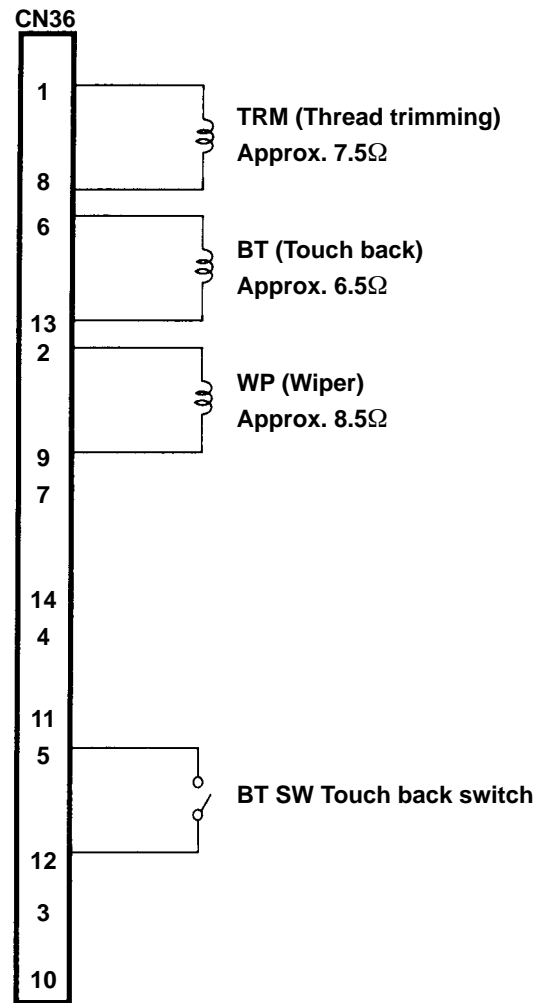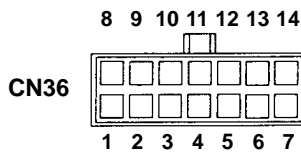
(2) Solenoid Connector for lifting presser foot

Layout of CN37 pins

Name of signal	Pin NO.
FLD	1
FL COM	2

CN37

1

2

Pin side (insertion side)

CN37

1

2 — FL (Presser foot lifter) Approx. 5.4Ω
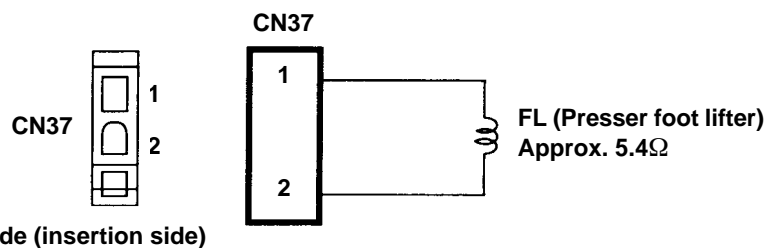
(Caution) 1. Because the FL (foot lifter) output connector of CN37 varies with the specifications of the machine head, refer to "14. INPUT/OUTPUT CHART" for details.

(Caution) 2. Because the connector of CN36 and CN37 may operate as air output (+24V) depending on the specifications of the machine head, refer to "14. INPUT/OUTPUT CHART" for derails.

(3) Optional cord

Relay cord A asm. for the standing sewing machine (Part No. M9701351AA0)

```
2 ┌─────┐ 1
  │□□□□□│
  │□□□□□│
  │□□□□□│
12 └─────┘ 11
```

Approx. 15.m

Ⓐ
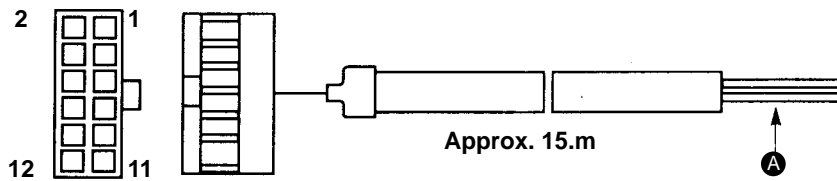
1) Wiring diagram of variable pedal PK-70 and -71

CN39

5V	1	Brown	
	2		1
			VR (1kΩ)
Variable resistor for speed	3	Orange	2 Used by variable voltage between 1 to 2V
S GND	4	Yellow	3 (Increasing / decreasing speed)
Switch for lifting presser foot	5	Green	Neutral position is 1V ± 0.05V
S GND	6	Blue	(Between 3 to 4)
Switch for thread trimming	7	Purple	
S GND	8	Gray	
Switch for high-speed	9	White	
S GND	10	Light blue	
Switch for low-speed	11	Pink	
S GND	12	Black	
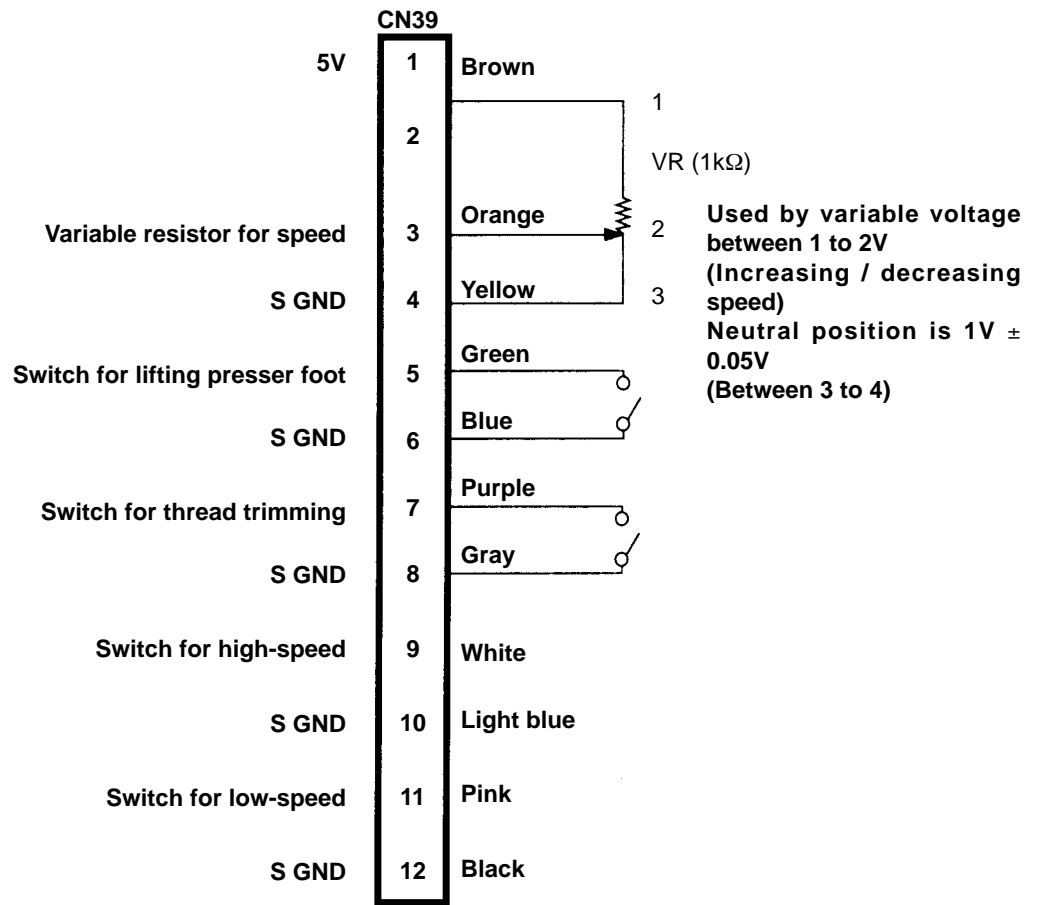
o Power section Ⓐ which is separated by respective signals with different colors comes out from the relay cord A asm. for the standing sewing machine. Connect switches and variable resistor for speed in accordance with the wiring diagram.

(Caution) Be sure to turn OFF the power before connecting the connector.

2) Wiring diagram of fixing max. speed

CN39

	Pin	Color
5V	1	Brown
	2	
Variable resistor for speed	3	Orange
S GND	4	Yellow
Switch for lifting presser foot	5	Green
S GND	6	Blue
Switch for thread trimming	7	Purple
S GND	8	Gray
Switch for high-speed	9	White
S GND	10	Light blue
Switch for low-speed	11	Pink
S GND	12	Black
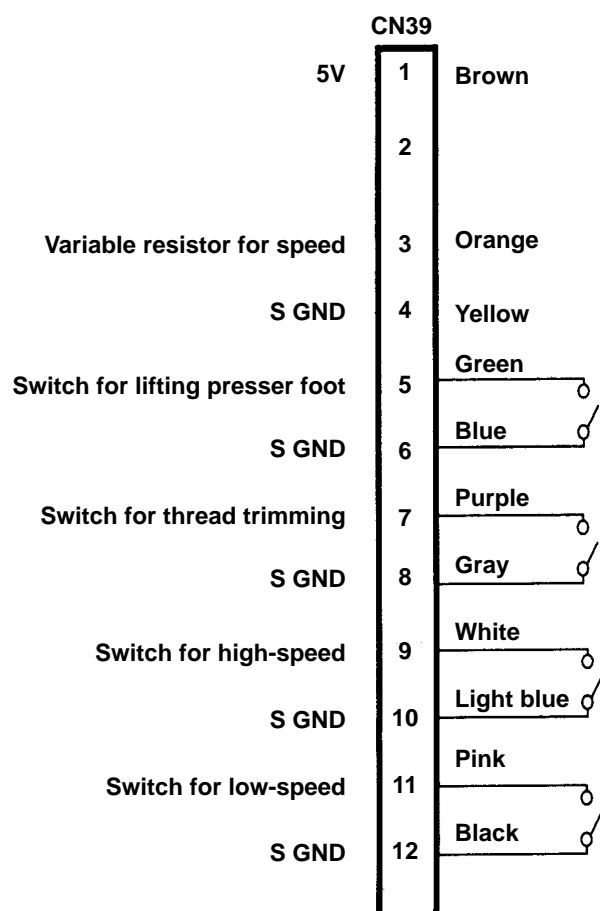
(Caution) **When decreasing the speed of the high-speed SW, use the max. speed limitation variable resistor on the panel.**

11. MAINTENANCE

(1) Replacing the fuse

WARNING :
To prevent personal injuries caused by electric shock hazards or abrupt start of the sewing machine, remove the cover after turning OFF the power switch and a lapse of 5 minutes or more. To prevent personal injuries, when a fuse has blown out, be sure to replace it with a new one with the same capacity after turning OFF the power switch and removing the cause of the blown-out of the fuse.
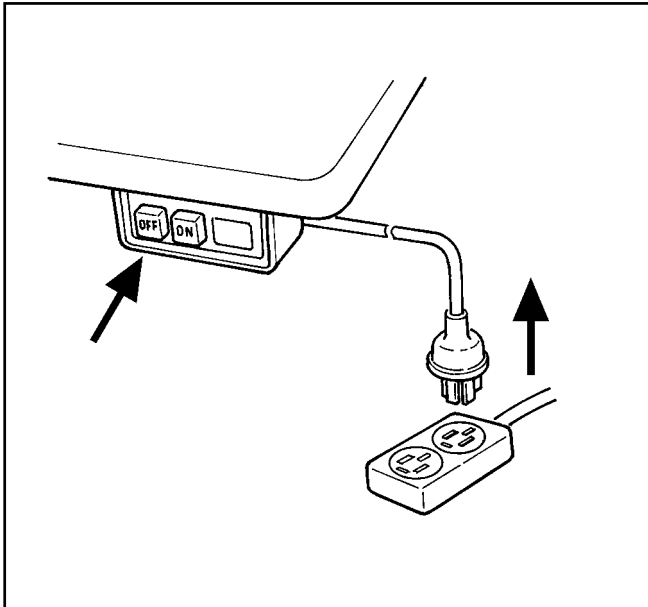
1) Press the OFF button of the power switch to turn OFF the power after confirming that the sewing machine has stopped.
2) Draw out the power cord coming from the power plug socket after confirming that the power switch is turned OFF. Perform the work of step 3) after confirming that the power has been cut and it has passed for 5 minutes or more.
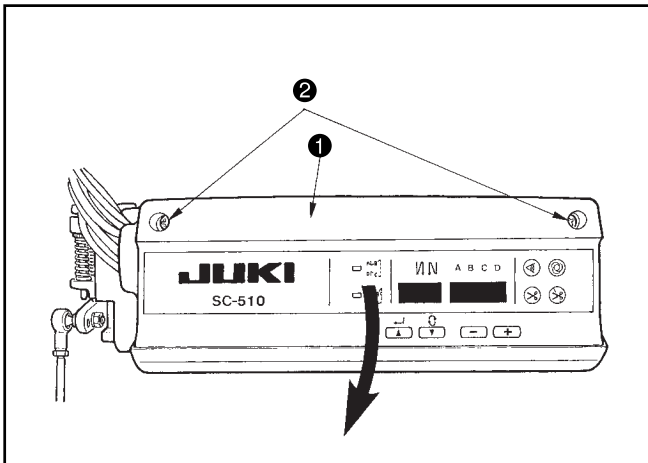
3) Loosen setscrew ❷ in front cover ❶.
4) Pressing the side of front cover ❶ in the direction of the arrow, open the front cover ❶ toward you.
(Caution) Be sure to open / close the front cover ❶ with your hands.

[Replacing F1 fuse on CTL circuit board (solenoid protection fuse)]
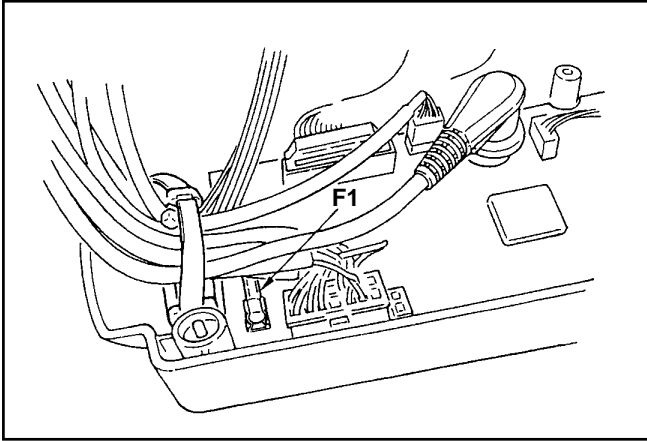
1) Loosen two setscrews in the front cover and open the cover after checking that the power has been turned OFF.
2) Replace 5A F1 fuse on CTL circuit board with a fuse of the same capacity supplied as accessories.
3) Close the front cover as before and fix it with the setscrews while paying attention to pinching of the cords.

[Replacing F1 fuse on PWR circuit board (power circuit protection fuse)]
[Replacing F2 fuse on PWR circuit board (regenerative resistance protection fuse)]
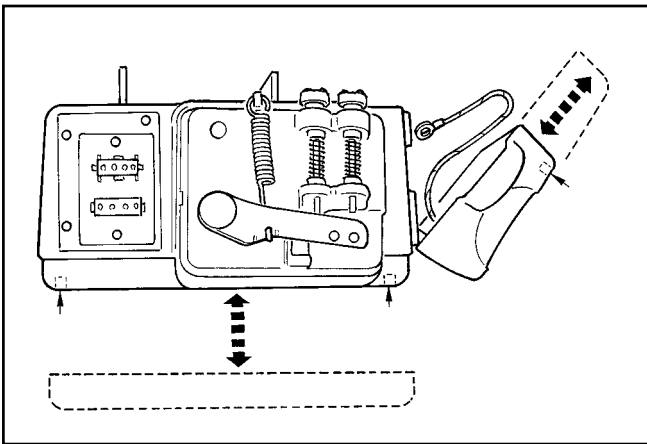
1) Loosen two setscrews in the front cover and open the cover after checking that the power has been turned OFF.
2) Remove connectors CN30, CN32, CN33, CN36, CN37 and CN38 and remove the setscrew attached to the ground wire of CTL circuit board. (Connector Nos. depend on the specifications.)
3) Draw up the front cover obliquely at the position where the front cover is obliquely tilted by approximately 45 degrees, and remove the cover.
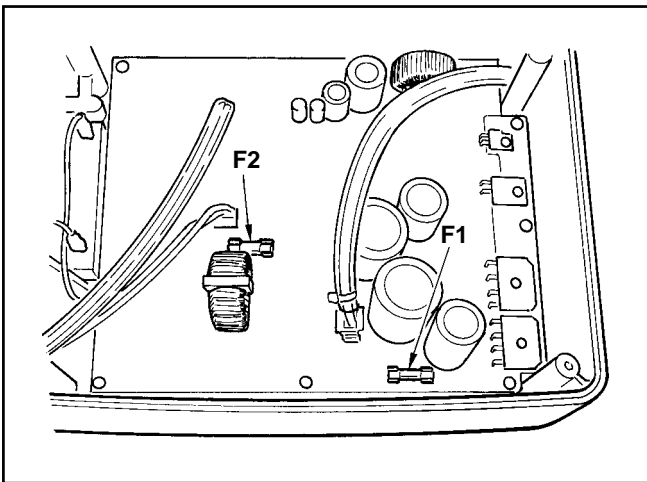
4) Remove four setscrews in the bottom cover and remove the bottom cover.
5) Replace 3.15A F1 fuse or 2A F2 fuse on PWR circuit board with a fuse of the same capacity supplied as accessories.
6) Fix the bottom cover as before with the setscrews, and press the front cover to the bottom cover from the position where the front cover is obliquely tilted by approximately 45 degrees for assembling.
7) Attach the connectors and the ground wire which have been removed.
8) Close the front cover as before and fix it with the setscrews while paying attention to pinching of the cords.

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(2) Changing procedure between 100V to 120V and 200V to 240V (Possible only for the voltage changeover type)

WARNING :
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. To prevent accidents caused by unaccustomed work or electric shock, request the electric expert or engineer of our dealers when adjusting the electrical components.

Voltage can be changed between single phase 100 to 120V and single phase/3-phase 200 to 240V by changing over the voltage changeover switch.

(Caution) The voltage changeover switch is on the inside of the control box. When changing the setting, be sure to open the front cover after turning OFF the power switch and a lapse of 5 minutes or more. In addition, if the changing procedure is mistaken, the control box is damaged. So, be very careful.
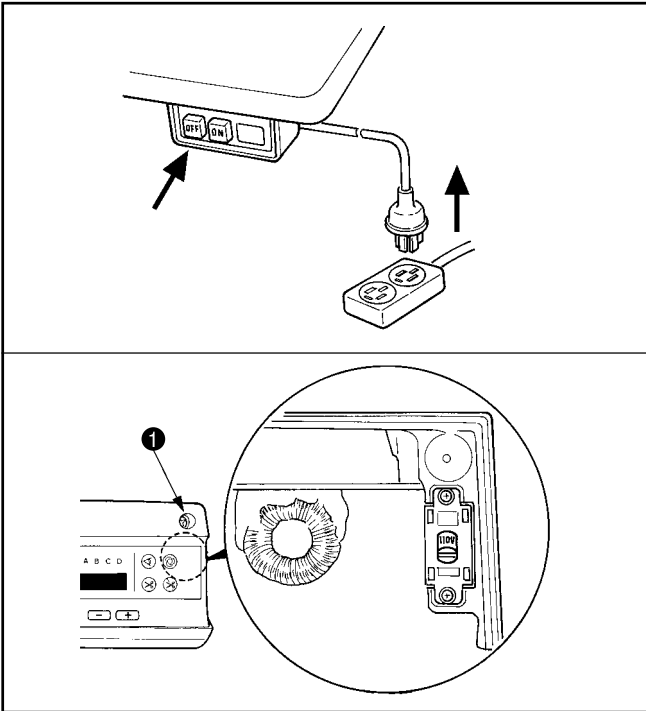
(1) Turn OFF the power with the power switch after checking that the sewing machine has stopped.

(2) Draw out the power cord from the power receptacle after checking that the power switch has been turned OFF. Then wait for 5 minutes or more.

(3) Remove two screws ❶ fixing the front cover and slowly open the front cover.

(4) hanging procedure of the power voltage

(Caution) When the voltage of the power changeover switch and that of the AC input cord are wrong, the control box is damaged. Be sure to check the indication of the changeover switch and the input power voltage for use.

1) When using with 3-phase 200 to 240V
- Put a screwdriver or the like to the slit section ❹ of the changeover switch and push up the switch. (Indication of the voltage of switch is 220V.)
- Connect the crimp style terminal of AC input cord to the power plug as shown in the figure A.

2) When using with single phase 200 to 240V
- Put a screwdriver or the like to the slit section ❹ of the changeover switch and push up the switch. (Indication of the voltage of switch is 220V.)
- Connect the crimp style terminal of AC input cord to the power plug as shown in the figure B.

3) When using with single phase 100 to 120V
- Put a screwdriver or the like to the slit section ❹ of the changeover switch and push down the switch. (Indication of the voltage of switch is 110V.)
- Connect the crimp style terminal of AC input cord to the power plug as shown in the figure C.

(Caution) Be very careful that the components are not damaged by the top end of the screwdriver.

(5) Check again that the change has been performed without fail before closing the front cover.

(6) Close the front cover and tighten two screws ❶ while being very careful that the cord is not caught by the cover.

Voltage chnageover switch   AC input cord   Fig. A

110V → 220V — WHITE / BLACK / RED — Plug side — WHITE / BLACK / RED — GREEN/YELLOW — GREEN/YELLOW

Voltage chnageover switch   AC input cord   Fig. B

110V → 220V — WHITE / BLACK / RED — Plug side — GREEN/YELLOW — GREEN/YELLOW

Voltage chnageover switch   AC input cord   Fig. C

220V → 110V — WHITE / BLACK / RED — Plug side — GREEN/YELLOW — GREEN/YELLOW
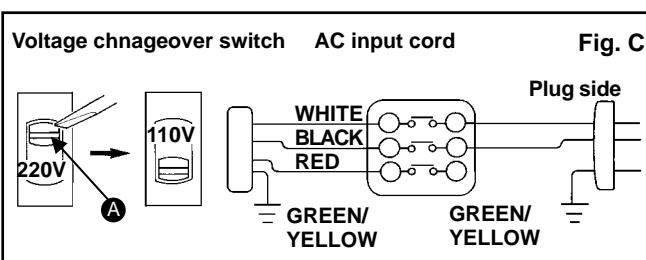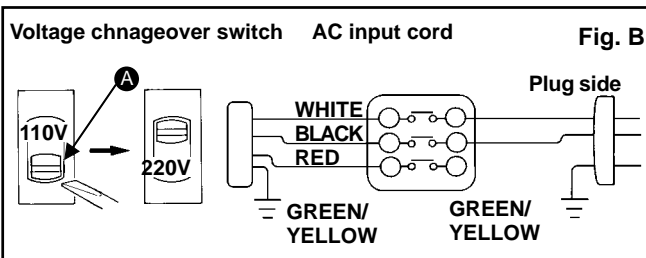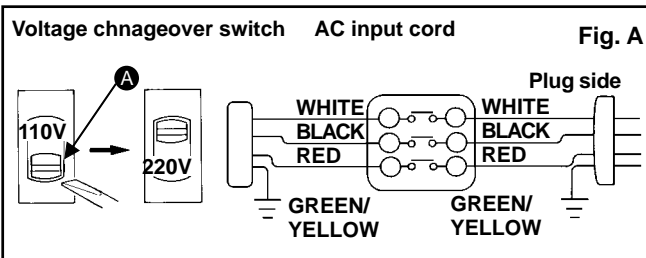
(3) Control voltage check terminal of CTL circuit board

Appearance of CTL circuit board assembled inside the front panel of SC-510 is as shown below.

Confirmation of each voltage whether it is abnormal can be performed since the control voltage check terminals are set.

> **DANGER:**
> There is the possibility of the electric shock since the work is performed with the power ON.
> Do not perform the work by any person other than the technicians who have electrical knowledge.

Check terminal	Power main use	Nominal voltage	Remarks
+5V	Circuit control	+5V	
+12V	CP panel control , For optional electric power		
+24V	For optional electric power		
VOUT	For +33V/+24V solenoid drive	+33V/+24V	Voltage varies in accordance with control state.
GND	Ground for control circuit	0V	
PGND	Ground for control circuit	0V	

Appearance of CTL circuit board
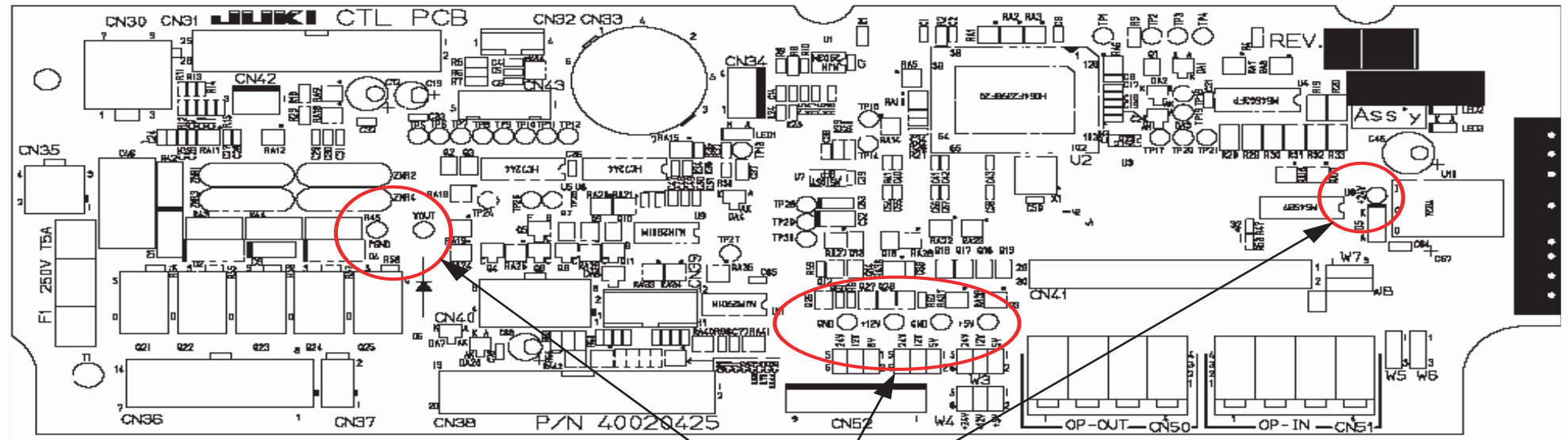
Voltage check terminal

12. ERROR CODES

In case of the following, check again before you judge the case as trouble.

Phenomenon	Cause	Corrective measure
When tilting the sewing machine, the buzzer beeps and the sewing machine cannot be operated.	When tilting the sewing machine without turning OFF the power switch, Action given on the left side is taken for safety sake.	Tilt the sewing machine after turning OFF the power.
Solenoids for thread trimming, reverse feed, wiper, etc. fail to work. Hand lamp does not light up.	When the fuse for solenoid power protection has blown out.	Check the fuse for solenoid power protection.
Even when depressing the pedal immediately after turning ON the power, the sewing machine does not run. When depressing the pedal after depressing the back part of pedal once, the sewing machine runs.	Neutral position of the pedal has varied. (Neutral position may be shifted when changing spring pressure of the pedal or the like.)	Execute the automatic neutral correction function of the pedal sensor.
The sewing machine does not stop even when the pedal is returned to its neutral position.		
Stop position of the sewing machine varies (irregular).	When tightening the screw in the handwheel is forgotten at the time of adjustment of needle stop position.	Securely tighten the screw in the handwheel.
Presser foot does not go up even when auto-lifter device is attached.	Auto-lifter function is OFF.	Select "FL ON" by auto-lifter function selection.
	Pedal system is set to KFL system.	Change the jumper to PFL setting to lift the presser foot by depressing the back part of the pedal.
	Cord of auto-lifter device is not connected to connector (CN37).	Connect the cord properly.
Touch-back switch fails to work.	Presser foot is going up by auto-liter device.	Operate the switch after the presser foot lowered.
	Auto-lifter device is not attached. However, auto-lifter function is ON.	Select "FL OFF" when auto-lifter device is not attached.
UP position move fails to work when all lamps on the panel light up.	The mode is in the function setting mode. The switch on the CTL p.c.b. is pressed by the bound cords and the aforementioned mode resulted.	Remove the front cover, and arrange the cords by the regular binding procedure described in the Instruction Manual.
Sewing machine fails to run.	Motor output cord (4P) is disconnected.	Connect the cord properly.
	Connector (CN30) of motor signal cord is disconnected.	Connect the cord properly.

In addition, there are the following error codes in this device. These error codes interlock (or limit function) and inform the problem so that the problem is not enlarged when any problem is discovered. When you request our service, please confirm the error codes.
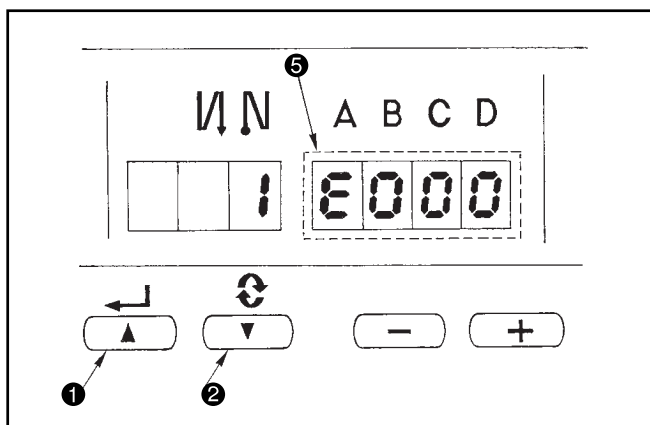
Checking procedure of the error code
1) Pressing switch ❶ in the control box, turn ON the power switch.
2) LED becomes display ❺ with the sound of "peep" and the latest error code is displayed.
3) Confirmation of the contents of previous error can be performed by operating switches ❶ or ❷.
(Caution) 1. When operating switch ❶, one before the existing error code is displayed.
2. When operating switch ❷, one after the existing error code is displayed.

(1) Error code list

	No.	Description of error detected	Cause of occurrence expected	Items to be checked
*		SmartMedia cover open	• The SmartMedia slot is open	• Close the cover of the slot
	E000	Execution of data initialization (This is not the error.)	• When the machine head is changed. • When the initialization operation is executed	
	E003	Disconnection of synchronizer connector	• When position detection signal is not input from the sewing machine head synchronizer.	• Check the synchronizer connector (CN33, CN43) for loose connection and disconnection.
	E004	Synchronizer lower position sensor failure	• When the synchronizer has broken.	• Check whether the synchronizer cord has broken
	E005	Synchronizer upper position sensor failure		since the cord is caught in the machine head.
	E007	Overload of motor	• When the machine head is locked. • When sewing extra-heavy material beyond the guarantee of the machine head. • When the motor does not run. • Motor or driver is broken.	• Check whether the thread has been entangled in the motor pulley. • Check the motor output connector (4P) for loose connection and disconnection. • Check whether there is any holdup when turning the motor by hand.
	E008	Machine head connector failure(Resistance pack)	• When the machine head connector is not properly read.	• Check the machine head connector (CN32) for loose connection and disconnection.
*	E011	A SmartMedia card uninserted	• A SmartMedia card has not been inserted.	• Turn OFF the power.
*	E012	Read error	• Data on a SmartMedia card cannot be read.	• Turn OFF the power.
*	E013	Write error	• Data cannot be written into a SmartMedia card.	• Turn OFF the power.
*	E014	Write protection	• The SmartMedia is write-protected.	• Turn OFF the power.
*	E015	Format error	• The SmartMedia is unformattable.	• Turn OFF the power.
*	E016	Beyond external media capacity	• Short of SmartMedia capacity	• Turn OFF the power.
*	E019	Beyond file size	• The file is too large.	• Turn OFF the power.
*	E032	File compatibility error	• The file is not compatible.	• Turn OFF the power.
	E302	Tilt detection (MF : thread trimmer knife sensor) (At the time of safety switch operation)	• When tilt detection switch is inputted with the power ON. • Position of thread trimmer knife is improper.	• Check whether machine head is tilted without turning OFF the power switch (operation of sewing machine is prohibited for safety). • Check whether tilt detection switch cord is caught in the machine. • Check whether tilt detection switch lever is caught in the machine.
	E331	Tape cutter (TC03) Cutter sensor simultaneously enabled	• Defective cutter sensor	• Is air pressure appropriate?
	E332	Tape cutter (TC03) Cutter sensor simultaneously disabled	• Defective assembly	• Is air pressure appropriate?
	E499	Simplified program data error	• Command parameter data is out of the range.	• Enter the simplified program again. • Disable the simplified prgram.
	E704	Type error of simplified program or sewing machine data	• Adifferent type is entered for the program or data.	• Turn off the power.
	E730	Encoder failure	• When the motor signal is not properly inputted.	• Check the motor signal connector (CN30) for loose connection and disconnection.
	E731	Motor hole sensor failure		• Check whether the motor signal cord has broken since the cord is caught in the machine head.
	E733	Motor reverse rotation	The motor rotates at the speed of more than 500rpm in a direction opposite to that of indication.	• Encoder wiring of the main shaft motor is wrong. • Power wiring of the main shaft motor is wrong.

(Caution) Items marked with * are applicable only to IP-100E.

No.	Description of error detected	Cause of occurrence expected	Items to be checked
E811	Overvoltage	• When voltage higher than guaranteed one is inputted. • When 220V has been inputted at 110V setting • 400V is applied to the box of 220V (230V).	• Check whether the applied power voltage is higher than the rated voltage + (plus) 10% or more. • Check whether 110V/220V changeover switch is improperly set. • In the aforementioned cases, POWER p.c.b is broken.
E813	Low voltage	• When voltage lower than guaranteed one is inputted. • When 110V has been inputted at 220V setting. • 110V is applied to the box of 220V. • Inner circuit is broken by the applied overvoltage	• Check whether the voltage is lower than the rated voltage – (minus) 10% or less. • Check whether 110V/220V changeover switch is improperly set. • Check whether fuse or regenerative resistance is broken.
E906	Operation panel transmission failure	• Disconnection of operation panel cord • Operation panel has broken.	• Check the operation panel connector (CN38) for loose connection and disconnection. • Check whether the operation panel cord has broken since the cord is caught in the machine head.
* E915	Communication error (between operation panel and IPOP (expansion) board)	• Cord of operation panel disconnected • Operation panel damaged • IPOP board poorly connected or damaged	• Make sure that the operation panel connector (CN121) is secured. • Make sure that there is no damage to the cord due to being caught by the top of the operation panel. • Make sure that the IPOP board and the connector are secured.
* E916	Communication error (between IPOP (expansion) board and CTL (front cover) board)	• IPOP board poorly connected or damaged	• Make sure that the IPOP board and the connector are secured.
E924	Motor driver failure	• Motor driver has broken.	
E942	EEPROM error	• Data unwritable into EEPROM	• Turn off the power.

(Caution) Items marked with * are applicable only to IP-100E.

(2) IP-100E operation panel display

(Reference) Error is informed by means of the panel display and control box buzzer.

Three different kinds of screens of the panel display screen appear due to the difference of the procedures.
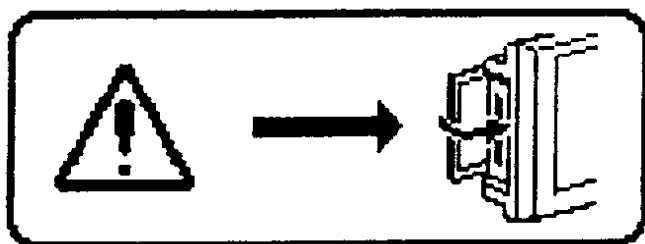
1) Error screen disappears when the operator removes the cause.

   Example) Cover of the slot of smart media is open. Close the cover.
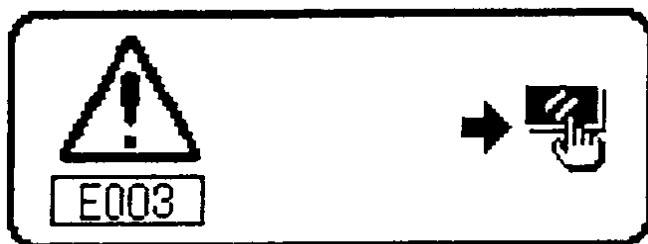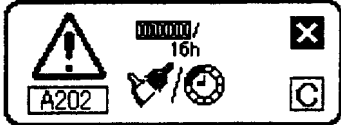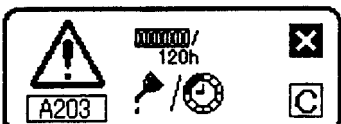
2) Press the reset switch, and remove the cause of error after erasing the error screen.
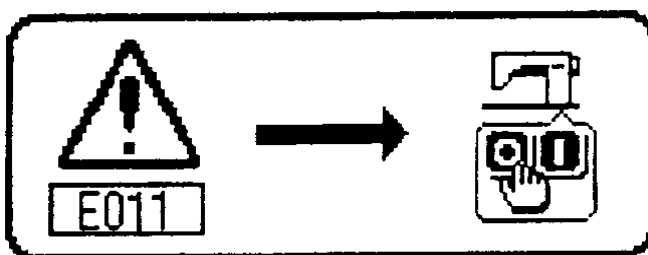
3) Remove the cause of error after turning OFF the power.

[Warning list (Error display in panel)]

No	Contents and display of warning	Corrective measure	Remarks
A201	Replacement of needle warning	• Press ✖ to close warning screen, and perform replacement of needle. Then clear the value in the clear screen. • Press C to clear the value, and perform replacement of needle.	Refer to the sewing management information in the instruction manual for IP100E/SC-510.
A202	Cleaning warning	• Press ✖ to close warning screen, and perform cleaning. Then clear the value in the clear screen. • Press C to clear the value, and perform cleaning.	Refer to the sewing management information in the instruction manual for IP100E/SC-510.
A203	Replacement of oil warning	• Press ✖ to close warning screen, and perform replacement of oil. Then clear the value in the clear screen. • Press C to clear the value, and perform replacement of oil.	Refer to the sewing management information in the instruction manual for IP100E/SC-510.

<REFERENCE> TABLE OF DIGITAL DISPLAY

Table of digital display

Numeral	0	1	2	3	4	5	6	7	8	9
Digital display	0	1	2	3	4	5	6	7	8	9
Numeral	A	B	C	D	E	F	G	H	I	J
Digital display	A	b	C	d	E	F	G	H	i	J
Numeral	K	L	M	N	O	P	Q	R	S	T
Digital display	t	L	M	n	o	P	q	r	S	r
Numeral	U	V	W	X	Y	Z				
Digital display	U	u	W	II	Y	Z				

13. BLOCK DIAGRAM

(Caution) CN36 and CN37 vary with the specifications of the machine head.
Refer to "14. INPUT/OUTPUT CHART" for details.

IP-100E/SC-510 IPOP UNIT
(40024959 Option)

| CN123 OP_IN | CN124 OP_OUT |

IP-100E — 26P — 26P CN121 — IPOP_PCB_A_ASSY — 30P CN41

Option Pedal

PK-70 — 12P

40016471 PEDAL SENSOR UNIT C ASSY — 4P

*OP: CP-160 PANEL — 20P

CN50 (FOR EXTENSION OUTPUT) — 4P 4
CN51 (FOR EXTENSION INPUT) — 4P 4
CN42 (SAFETY SW) — 3P
CN40 (ENCODER FOR EXTENSION OUTPUT) — 8P

CN41 (OPTONAL PCB I/F) — 30P

CN43 (FOR MITSUBISHI ENCODER) — 5P

CN39 (STANDING-WORK PEDAL SENSOR) — 12P

(Caution) CN36 (HEAD MAGNET DRIVE) — 14P — 14P

CN34 (PEDAL SENSOR) — 4P

40020424 CTL PCB ASSY

(Caution) CN37 (FL) — 2P — 2P

CN33 (SYNCHRONIZER) — 7P — 7P

CN32 (HEAD DISCRIMINATION) — 4P — 4P

CN38 (CP-160) — 20P

CN30 (ENCODER) — 9P — 9P

CN31
26P
40016468 I/F CABLE ASSY
26P

CN35 — 4P
4P
40016469 DC POWER SUPPLY CORD ASSY
4P

26P
CN4 (+5V, EACH CONTROL SIGNAL)

4P
CN3 (VOUT +33Vor+24Vor+12V)

M51

*B,F : 40022651 M51 COMPLETE
*A,E : 40022652 M51 COMPLETE JUS
*C : 40022653 M51 COMPLETE JE
*D : 40022654 M51 COMPLETE CN

*A,E,F: 40016522 VOLTAGE SELECT CORD ASSY — 2P

*A,E CN1 (110V/220V CHANGEOVER) — 2P

40006134 RESISTANCE A ASSY — 2P

CN2 (REGENERATIVE RESISTANCE) — 2P

T15-3
T15-1
T15-2

CN140 — 4P — 4P

(MOTOR DRIVE)

*C: M6102461DAA POWER INPUT CABLE CE ASM
*C: 40006139 POWER INPUT CABLE D ASM — 4P

*A,E,F : 40016465 PWR PCB A ASSY
*B,D : 40016466 PWR PCB B ASSY
*C : 40016467 PWR PCB C ASSY

*E: 40012009 POWER INPUT CABLE LA ASM — 4P

CN141 — 4P
T3-1
T3-2
T3-3

*A : M6101471AA0 POWER SWITCH A ASM
*F : M6101471BA0 POWER SOURCE SWITCH B ASM
*B,D : M6101471CA0 POWER SWITCH C ASM
— 4P

*A,E,F : 40020439 PSC UNIT A ASSY
*B : 40020440 PSC UNIT B ASSY
*C : 40020441 PSC UNIT C ASSY
*D : 40020442 PSC UNIT D ASSY

"* mark :" in the diagram denotes optional selective parts for the respective destinations.
Parts without mark are used in all destinations.
In addition, **"* OP :"** denotes optional selective parts.

Symbol	Destination	Name of control box complete set	Part No. of complete set
A	JUS	SC510 1/3PHASE 120/240 PFL	40020398
B	JS	SC510 1PHASE 200-240 PFL	40020400
C	JE	SC510 1PHASE 230 PFL CE	40020402
D	CN	SC510 1PHASE 220 PFL CN	40020401
E	JUS	SC510 1PHASE 100-120 PFL LA	40020399
F	JP	SC510 1PHASE 100 PFL	40022621

14. INPUT/OUTPUT CHART

Head/device	Contents	Speed at shipment (rpm) [95]	Max. speed (rpm) [96]	Motor pulley diameter (O.D.)	Thread trimming (TrM)	Additional 1 (UT1)	Additional 2 (UT2)	TRM (CN36 1-8)	WP (CN36 2-9)	6 (CN36 7-14)	BT (CN36 6-13)	BTSW (CN37 5-12)	FLSW (CN37 4-11)	FL (1-2)	OP_O0	OP_O1	OP_O2	OP_O3	OP_O4	OP_O5	OP_O6	OP_O7	OP_I0	OP_I1	OP_I2	OP_I3	OP_I4	OP_I5	OP_I6	OP_I7
MF	MF	4500	6500	120				TRM	WP	Dust collection: 24 Caution) 2		Cutter SW	FLSW	FL														Knife sensor		
MO Caution1)	Mo.1	4000	5500	125			(LB)	TRM	WP(LB)	Dust collection: 24 Caution) 2	(TL)	Cutter SW	FLSW	(FL)									(SEN)							
MO Caution1)	Mo.2	7000	8000	125			(LB)	TRM	WP(LB)	Dust collection: 24 Caution) 2	(TL)	Cutter SW	FLSW	(FL)									(SEN)							
DU-141H	dU.14	2000	2000	80				TRM		TL	BT	BTSW	FLSW	FL																
LU-2210	LU.2v	3500	4000	90	LU22			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT				
DSU-145	dSU	2000	2000	80				TRM		TL	BT	BTSW	FLSW	FL																
DSC-245	dSC.0	2200	2200	80				TRM		TL	BT	BTSW	FLSW	FL																
LZH-1290	LZH	2000	2000	80				TRM	WP	TL	BT	BTSW	FLSW	FL																
PLC-1660	PL.66	2000	2000	80				TRM		TL	BT	BTSW	FLSW	FL																
DNU-1541	dnU.5	3000	3000	85				TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT			DL digital	DL digital
LS-1342	LS.13	2500	2500	80				TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT			DL digital	DL digital
LU-1510	LU.51	3000	3000	85	L151			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT			DL digital	DL digital
LU-1560	LU.56	2500	2500	85	L151			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT			DL digital	DL digital
LU-1520	LU.52	3000	3000	85	L152	Wind		TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT	Condensation	Thread rack				USW	AUbT	vErT	2PiT		Thread rack	DL digital	DL digital
DLN-6390	dLn	4500	5000	105	d639			TRM	WP:24 Caution) 2	TL	Wrapper: 24 Caution) 2	BTSW	Wrapper control	(FL:24) Caution) 2	SSTA:H															
MH-48*	MH.81	5500	5500	125				TRM	WP	TL		Cutter SW	FLSW	(FL)																
MH-48*	MH.82	4500	4500	110				TRM	WP	TL		Cutter SW	FLSW	(FL)																
MH-1410	MH.14	4000	5000	100						Dust collection: 24 Caution) 2		Cutter SW	FLSW	FL:24 Caution) 2																
LU-2216	LU.26	3000	3000	75	LU22			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT				DL analog
LU-22*0	LU.20	3500	4000	90	LU22			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT				DL analog
LU-2212	LU.12	3500	3500	90	LU12			TRM		TL		BTSW	FLSW	FL	bT	vErT	2PiT						USW	AUbT	vErT	2PiT				DL analog

Caution 1) When LB is set to additional device 1, UT1, with MO as a head of the sewing machine, input/output data is marked with (**) shown in the chart.

1) TRM: Thread trimming output
2) WP: Wiper output
3) TL: Thread release output
4) BT: Back tack output
5) BTSW: Back tack switch
6) FLSW: Foot lifter switch
7) FL: Foot lifter (enabled at shipment)
8) (FL): Foot lifter (disabled at shipment)

Caution 2) * : +24V drive

This can be used as a needle cooler output for DLN-6390.

9) bT: Back tack output
10) vErT: DL alternate vertical amount LED
11) 2PiT: 2-pitch output
12) SSTA:H stop state Hi output

13) USW: needle lifting input
14) AUbT: Automatic back tack
15) vErT: Alternate lift amount input
16) 2PiT: 2-pitch input

Head/device	Contents	CN50-1,2 power supply setting W1	CN50-3,4 power supply setting W2	CN51-1,2 power supply setting W3	CN51-3,4 power supply setting W4	Optional analog input and digital input W5	Optional analog input and digital input W6	Input switching between CN36 and CN51 W7	Switching between CN42 and OP input W8
MF	MF	—	—	+12V (3-4)	—	—	—	—	2-3
MO Caution1)	Mo.1	—	—	+24V(5-6) Caution 3)	—	—	—	—	
MO Caution1)	Mo.2	—	—	+24V(5-6) Caution 3)	—	—	—	—	
DU-141H	dU.14	+24V(5-6)	+24V(5-6)		—	—	—	—	
LU-2210	LU.2v	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	2-3	1-2	1-2	1-2
DSU-145	dSU	+24V(5-6)	+24V(5-6)	—	—	—	—	—	—
DSC-245	dSC.0	+24V(5-6)	+24V(5-6)	—	—	—	—	—	—
LZH-1290	LZH	+24V(5-6)	+24V(5-6)	—	—	—	—	—	—
PLC-1660	PL.66	+24V(5-6)	+24V(5-6)	—	—	—	—	—	—
DNU-1541	dnU.5	+24V(5-6)	+24V(5-6)	—	—	—	—	1-2	1-2
LS-1342	LS.13	+24V(5-6)	+24V(5-6)	—	—	—	—	1-2	1-2
LU-1510	LU.51	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	1-2	1-2	1-2	1-2
LU-1560	LU.56	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	1-2	1-2	1-2	1-2
LU-1520	LU.52	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	1-2	1-2	1-2	1-2
DLN-6390	dLn	—	—	—	—	—	—	—	—
MH-48*	MH.81	—	—	—	—	—	—	—	—
MH-48*	MH.82	—	—	—	—	—	—	—	—
MH-1410	MH.14	—	—	—	—	—	—	—	—
LU-2216	LU.26	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	2-3	1-2	1-2	1-2
LU-22*0	LU.20	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	2-3	1-2	1-2	1-2
LU-2212	LU.12	+24V(5-6)	+24V(5-6)	+12V(3-4)	+12V(3-4)	2-3	1-2	1-2	1-2

Caution 3) This needs to be set when selecting the additional device LB.

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