JUKI®

SC-510

ENGINEER'S MANUAL

40025322
No.E364-00

PREFACE

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

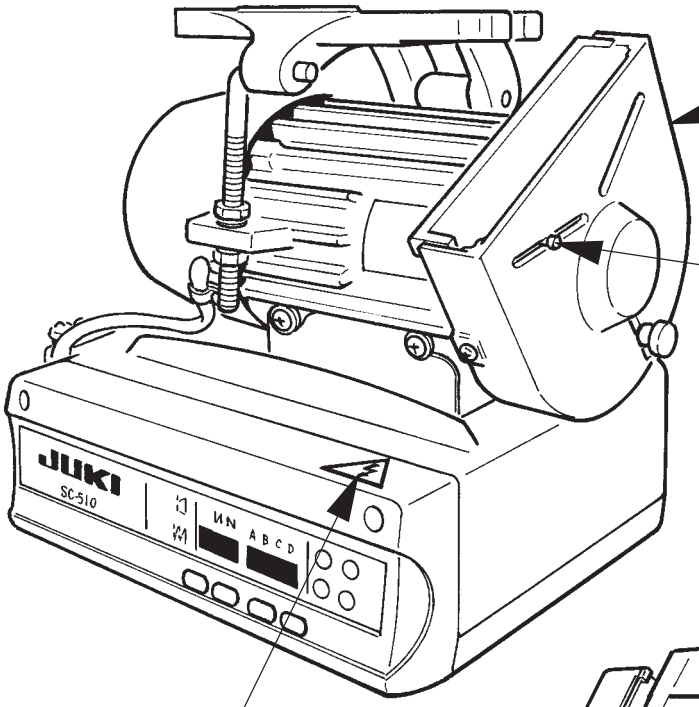
The Instruction Manual for these machines intended for the maintenance personnel and operators at an apparel factory contains operating instructions in detail. And this manual describes "Standard Adjustment", Adjustment Procedures", "Results of Improper Adjustment", and other important information which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

It is advisable to use the relevant Instruction Manual and Parts List together with this Engineer's Manual when carrying out the 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.

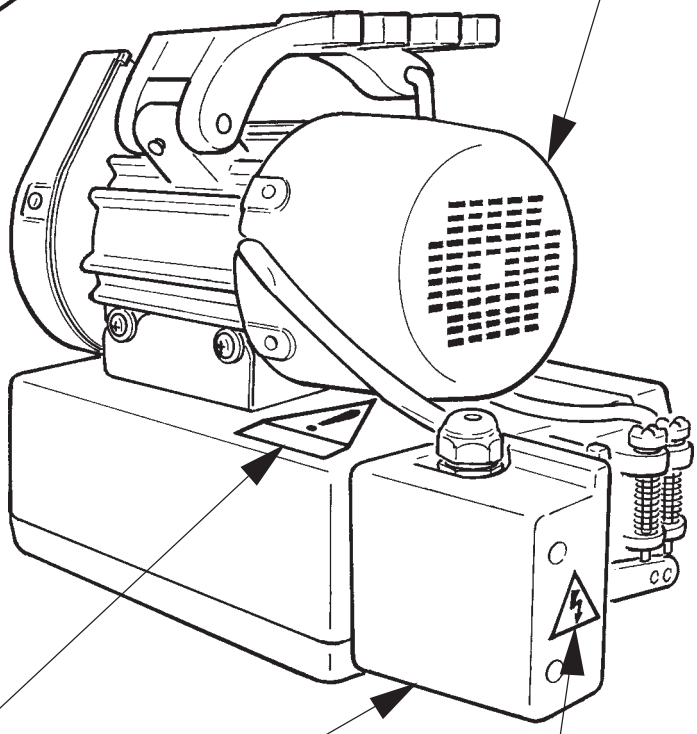


Motor pulley cover
Cover to prevent motor pulley and V belt from coming in contact with each other.

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

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	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
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

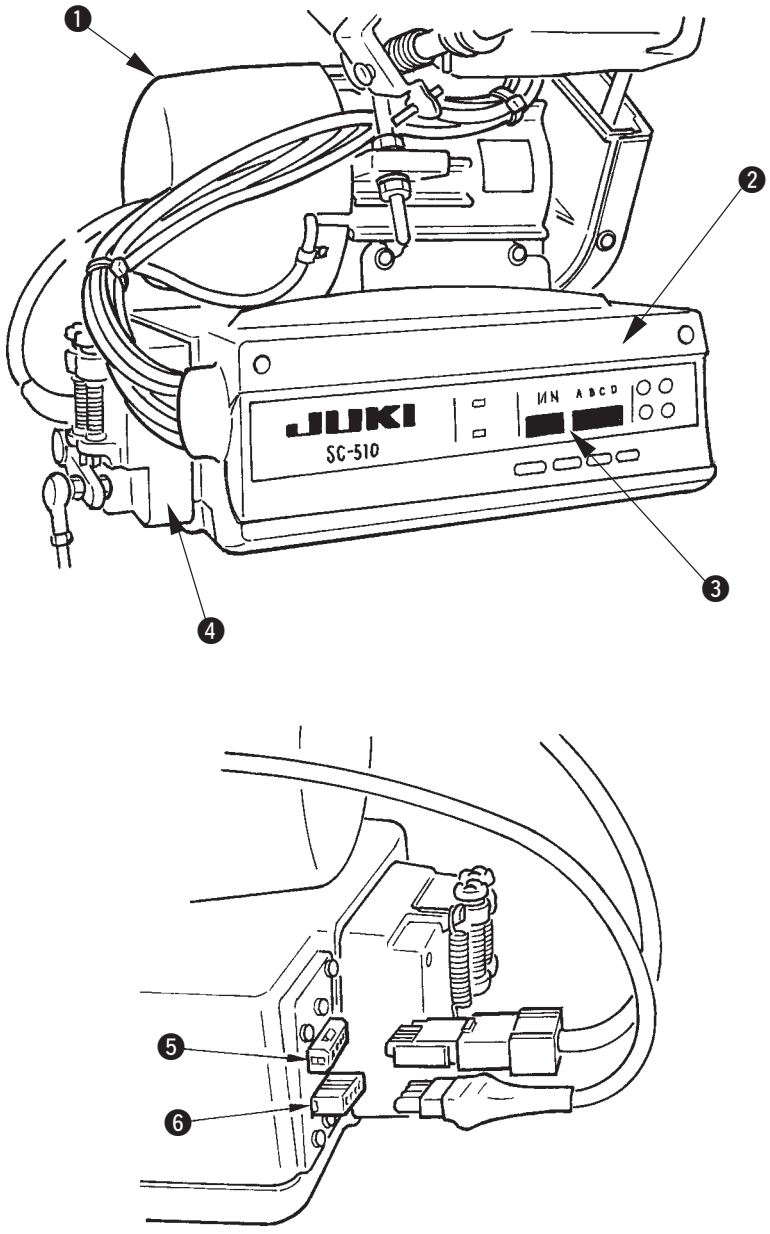
2. OUTLINE

(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

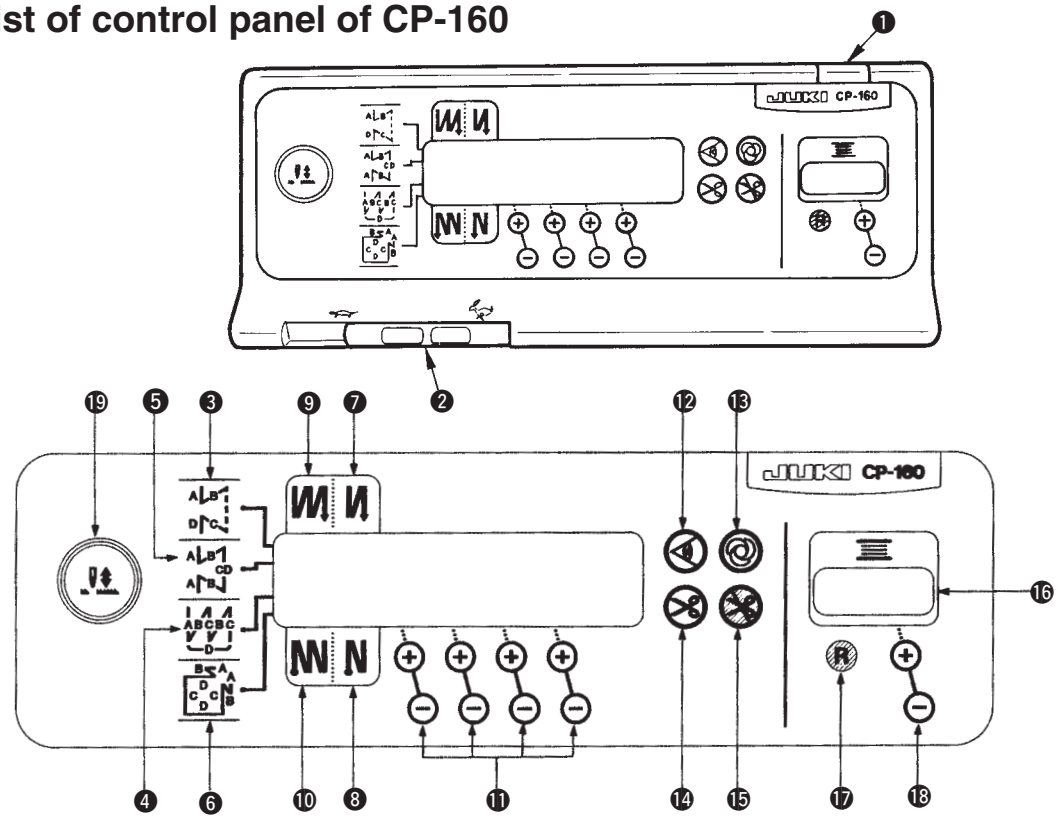
(1) SC-510/M51



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.

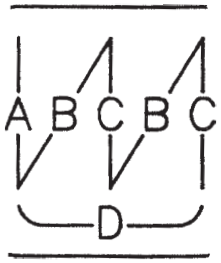
No	Description
❶	**Power indication LED :** Lights up when the power switch is turned ON.
❷	**Max. speed limit variable resister :** Maximum speed is limited when this resister is moved in the left direction (🐢).
❸	**Reverse stitching pattern switch :** Used for specifying the reverse stitching pattern to be sewn.
❹	**Overlapped stitching pattern switch :** Used for specifying the overlapped stitching pattern to be sewn.
❺	**Constand 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

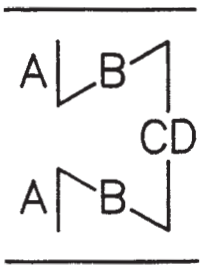
When the sewing machine performs the free stitching operation, the machine performs the reverse stitching operation at the start and end of sewing.
The reverse stitching operation can set the ON and OFF settings. Furthermore, single and double reverse stitching patterns can be selected.
Setting of number 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



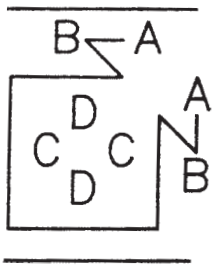
The sewing machine repeats the normal stitching and reverse stitching by the predetermined time, and performs the line bartacking. Then, the machine makes the thread trimmer actuate and stop to complete the overlapped stitching procedure.
Change of the number of stitches or the number of times of repetition 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

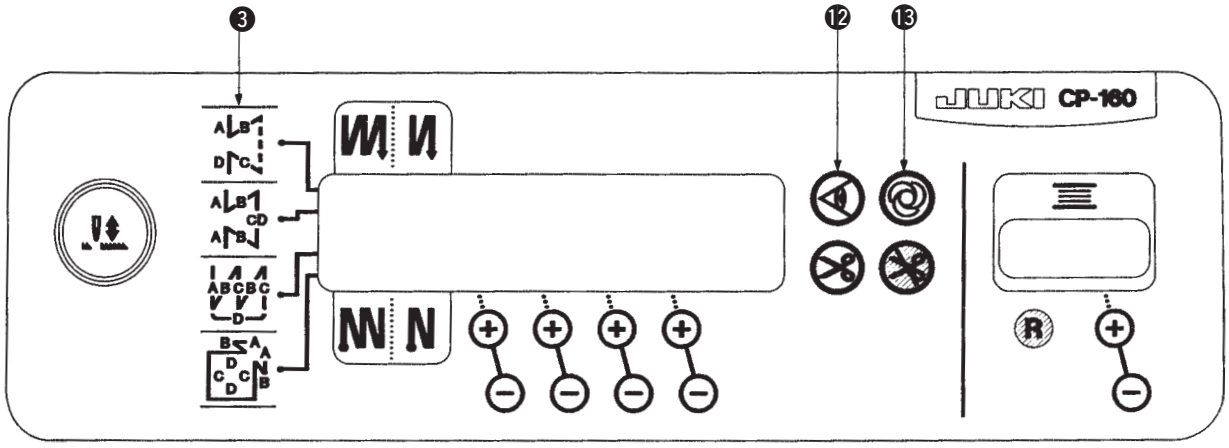


There are 4 operation steps in the process of constant-dimension stitching pattern. At each operation step the sewing machine automatically stops after sewing the predetermined number of stitches. At this time, if the touch-back switch is operated, the sewing machine runs at a low speed (stitch compensation 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 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.

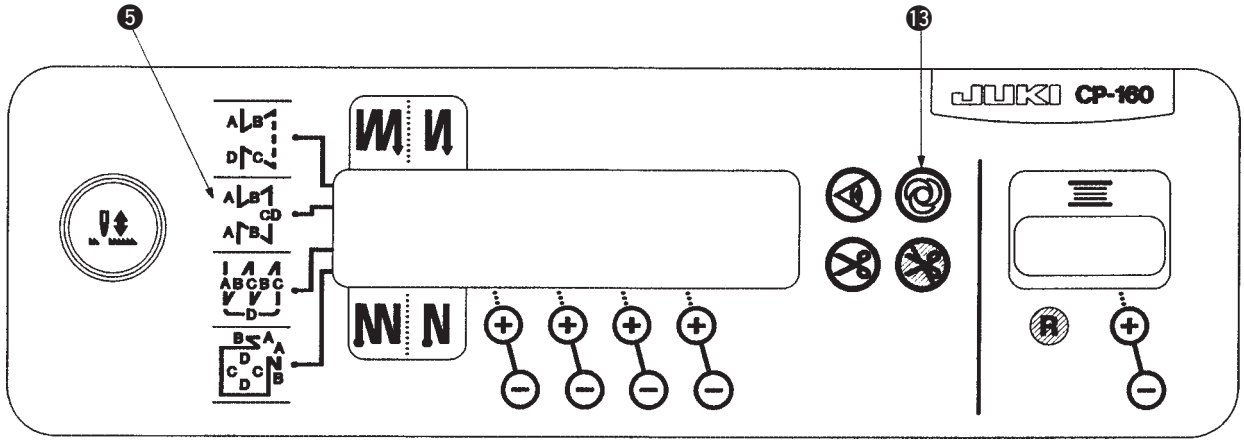


(Caution) 1. Number of rotations of the automatic one-shot stitchig can be changed by the function setting (No. 38).

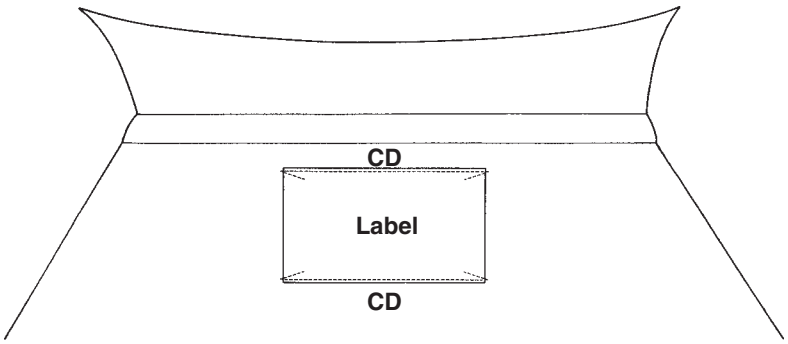
2. It is necessary to set the material end sensor input of the function code : 9 to the input port by using the function of the optional input/output function selection (Function setting No. 12).

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.



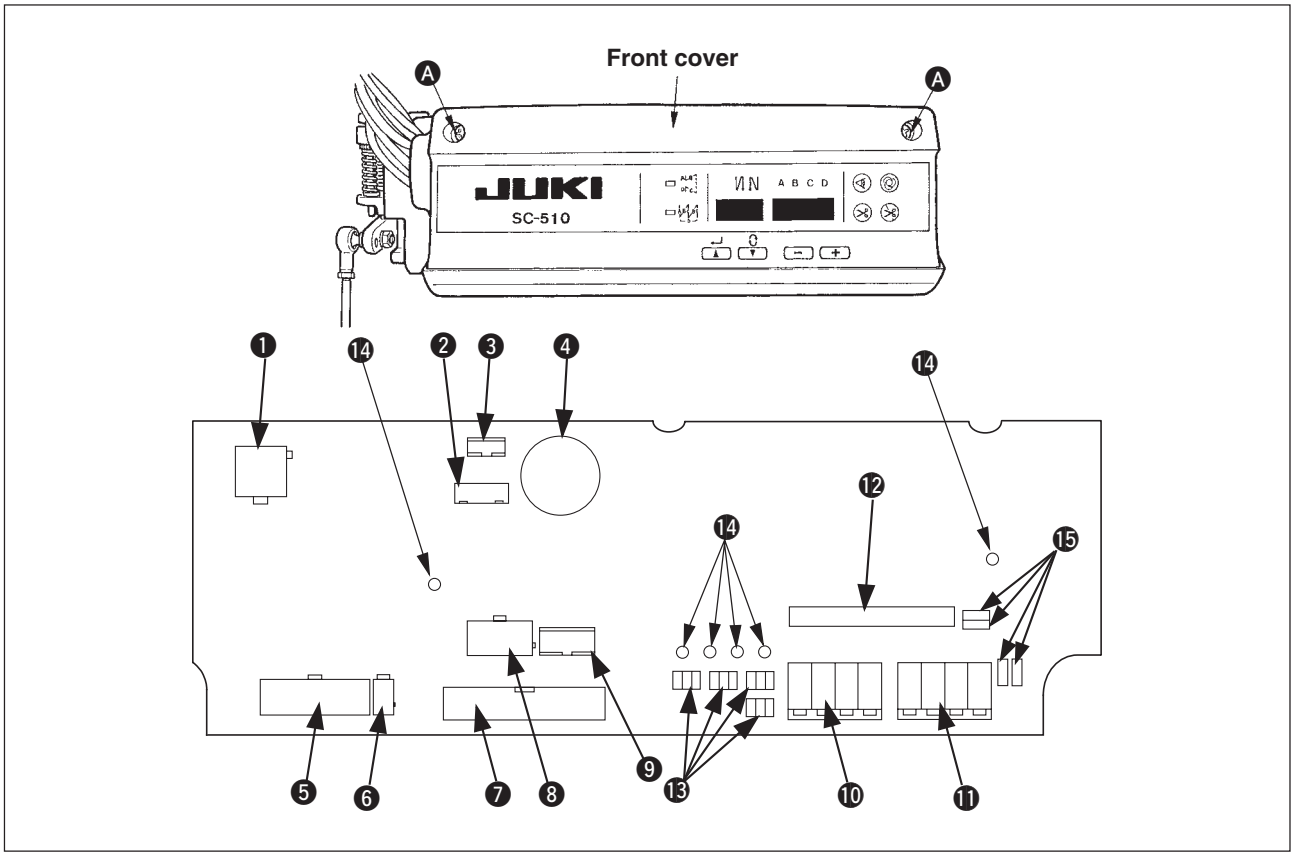
5. CONTROL BOX (SC-510)

(1) Arrangement of connectors

WARNING :

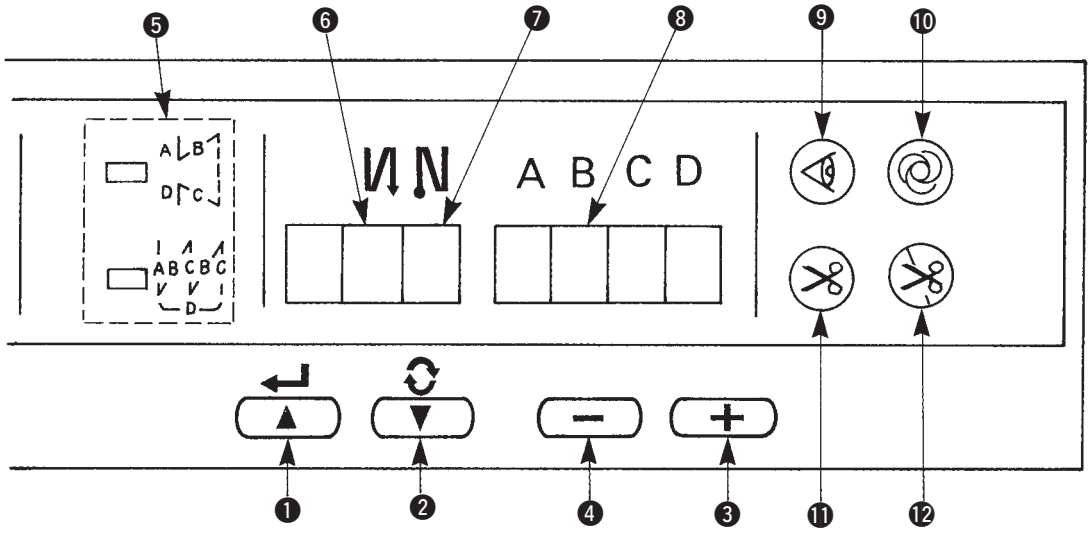
- **To prevent personal injury caused by abrupt start of the sewing machine, carry out the work after turning OFF the power switch and a lapse of 5 minutes or more.**
- **To prevent damage of device caused by maloperation and wrong specifications, be sure to connect all the corresponding connectors to the specified places.**
- **To prevent personal injury caused by maloperation, 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

(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 / " 1 " Reverse stitching display/ " 11 " Double reverse stitching display

❼ REVERSE STITCHING AT END display : Rendered effective when reverse stitching pattern is selected.
" - " Without reverse stitching display / " 1 " Reverse stitching display/ " 11 " 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

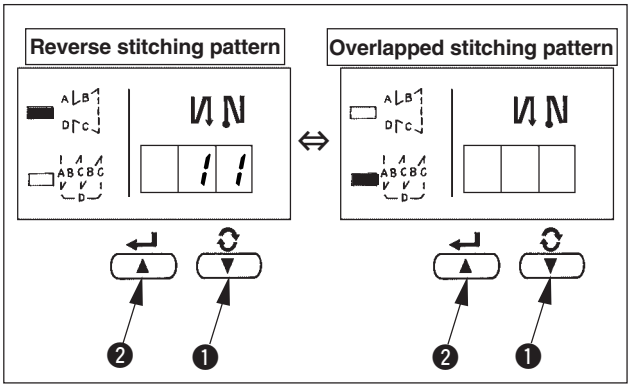
Operating procedure of the sewing pattern

1. Reverse stitching pattern

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

Reverse stitching patterns that can be set

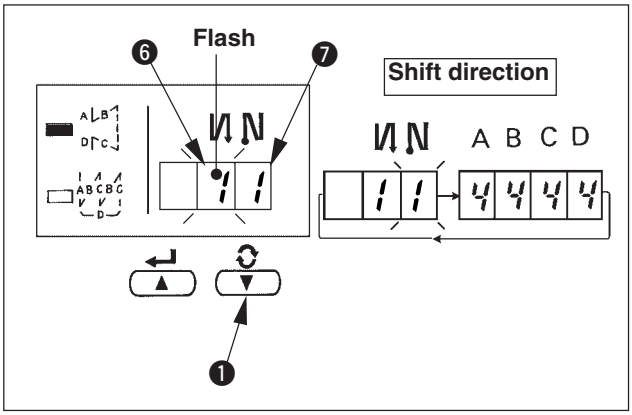
Reverse stitching at start display	-	1	-	1	11	-	11	1	11
Sewing pattern		A B	D C	A B D C	A A B B	D D C C	A A B B D D C C	A B D D C C	A A B B D C
Reverse stitching at end display	-	-	1	1	-	11	11	11	1



[Setting procedure of the reverse stitching]

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

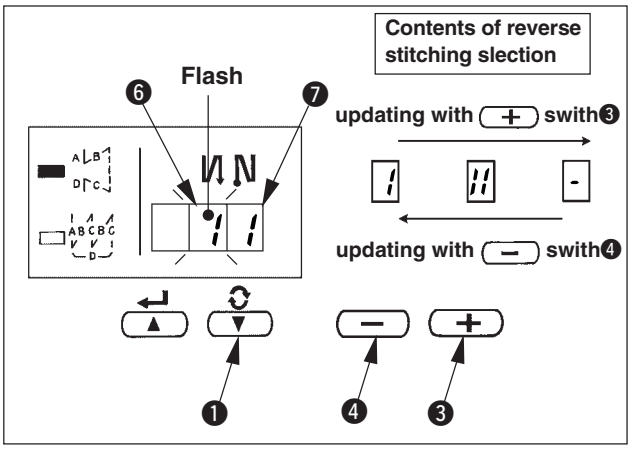
(Every time ↵ / (▲) switch ❷ is pressed, reverse stitching pattern/overlapped stitching pattern change over alternately.)



(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.



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

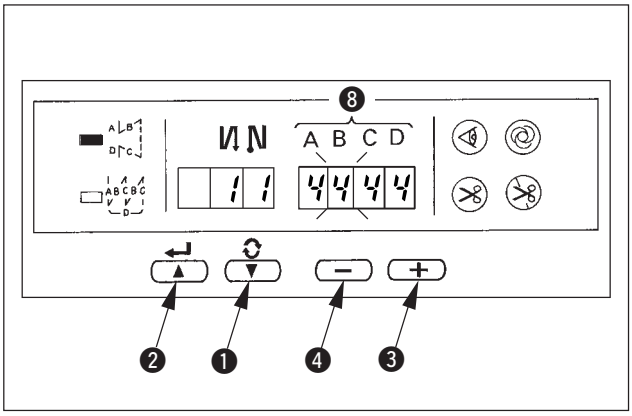
Reverse stitching patterns and displays are as follows.

1 : Reverse stitching

11 : Double reverse stitching

- : Without reverse stitching

(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).



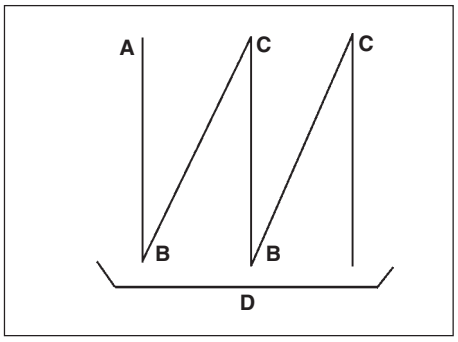
(5) Press ↻ / ▼ switch ❶ to make number of stitches display ❽ flash on and off, and set the number of stitches for the respective processes of the stitching.

(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.



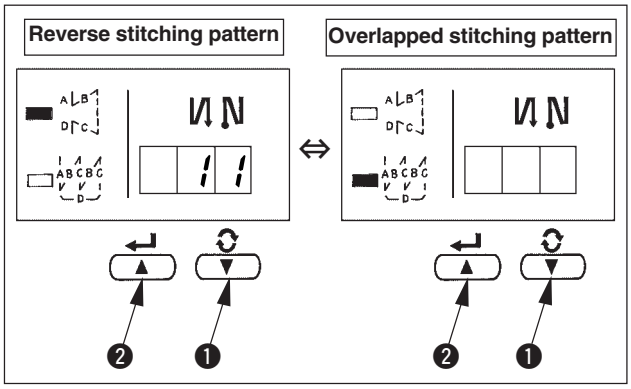
A : Number of stitches of normal stitching setting
0 to 15 stitches

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.



[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.)

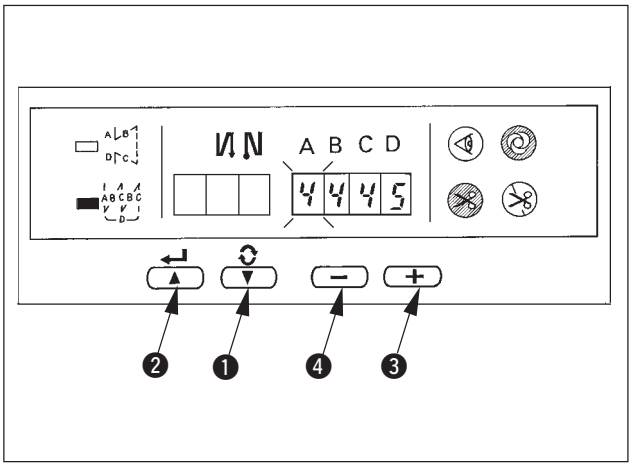
(2) The number of stitches for process A becomes in flashing state.

(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.

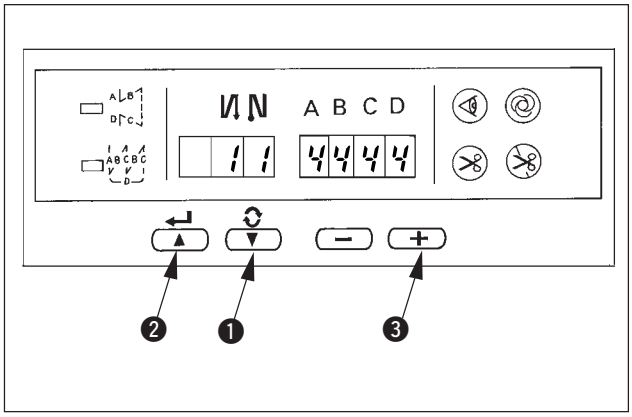
(5) When the setting of all processes has been completed, press ↵ / ▲ switch ❷ to determine the contents of the setting. (Flashing stops.)

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



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.

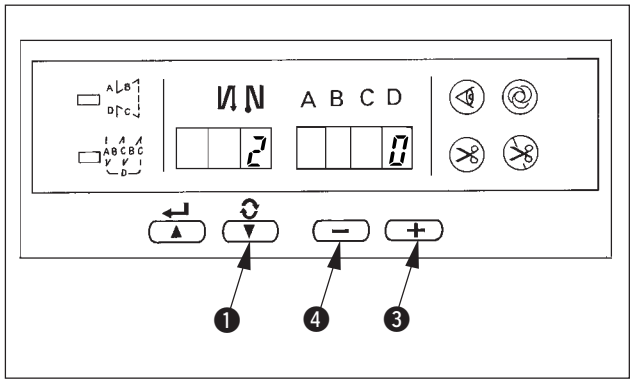


[Moving procedure to the function setting mode]

(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.



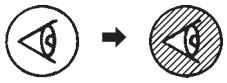
1) Material end sensor function setting (Function setting No. 2)

It is rendered effective when connecting the optional material end sensor.

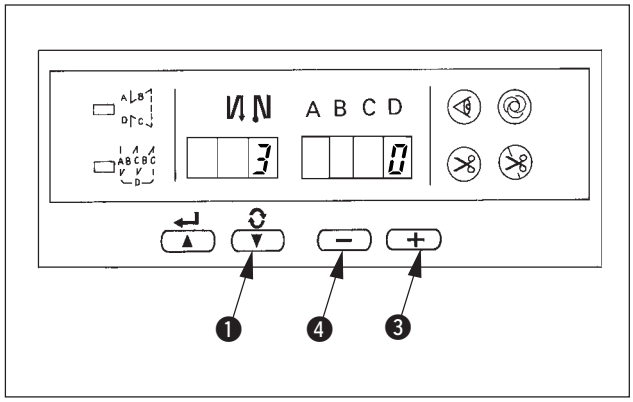
It is possible to change the set value with + switch ❸ or − switch ❹

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.



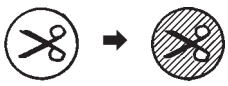
2) Thread trimming operation after material end stop setting (Function setting No. 3)

Press ↻ / ▼ switch ❶ to advance to the function setting No. 3.

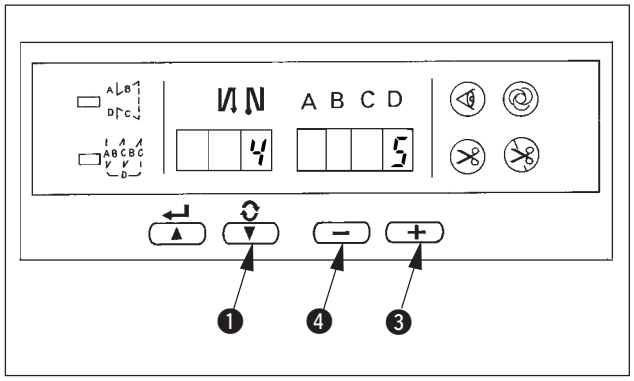
It is possible to change the set value with + switch ❸ or − switch ❹.

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.



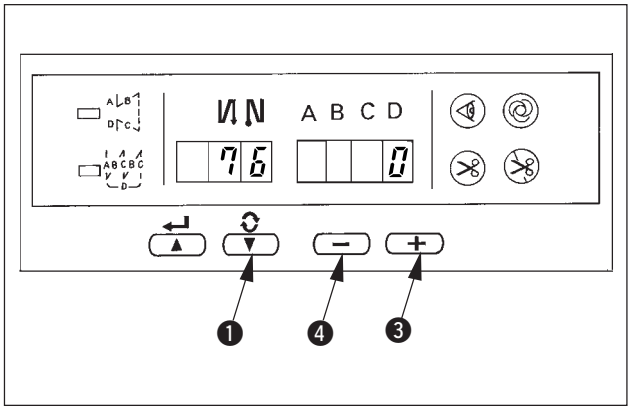
3) Number of stitches to stop the sewing machine after detection of material end setting (Function setting No. 4)

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.

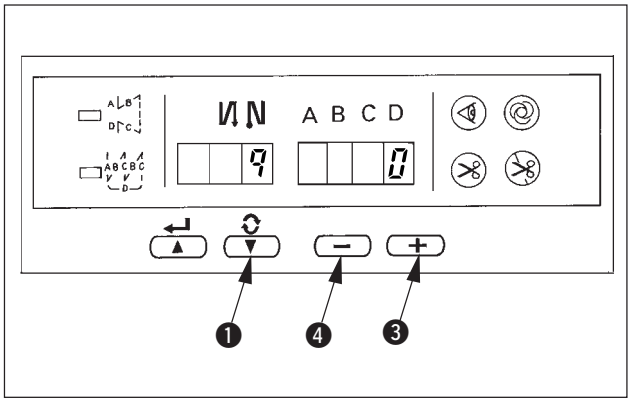
0 : Pedal designated speed is prior.

1 : Automatic operation

(Caution) 1. It is rendered effective when the material end sensor function is set. It is not possible to prohibit the one-shot 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 one-shot 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.

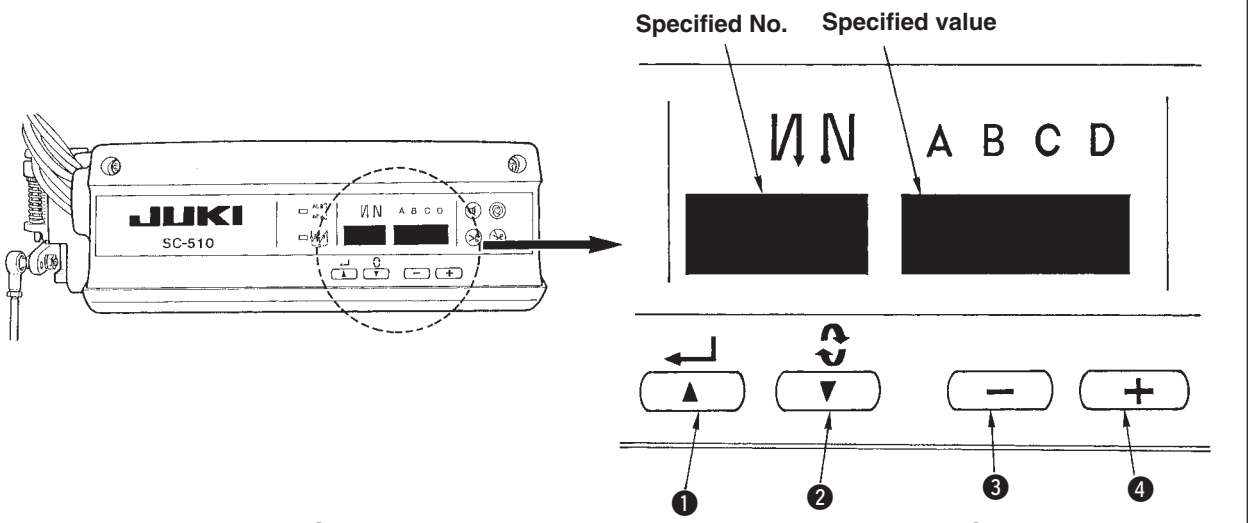
0 : Thread trimming is effective.

1 : Thread trimming is prohibited.

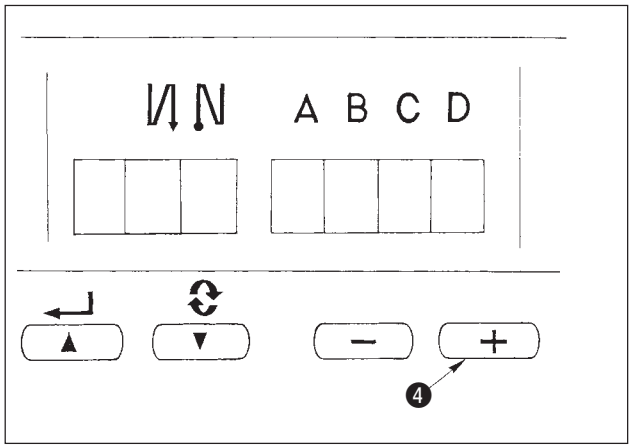
When "1" is selected, the thread trimming prohibition display lights up when the mode is returned to the normal one.

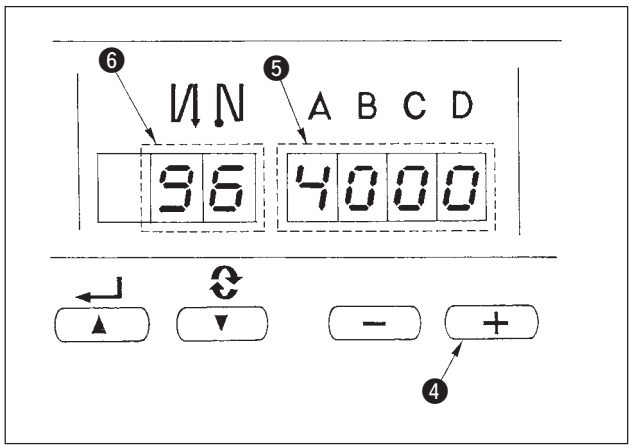
(3) Setting for functions of SC-510

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



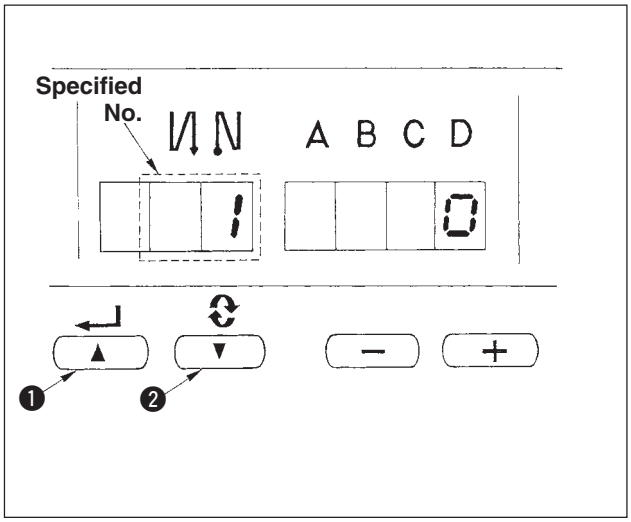
(Caution) 1. Do not perform switch operations other than those described in the following explanations.
2. Be sure to re-turn the power switch ON after one second or more has passed. If the power is turned ON immediately after turning it OFF, the sewing machine may not work normally. In this case, turn ON the power again.





[How to change over to the function setting modo]

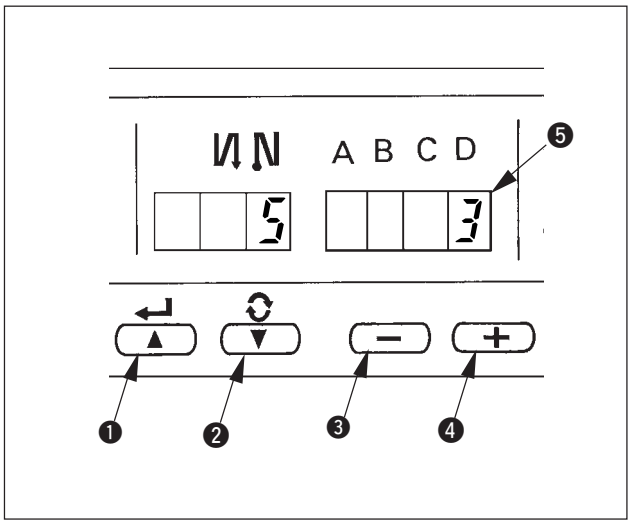
1. Changing over to the user's mode
   (1) Turn OFF the power to the unit.
   (2) Pressing switch ❹, turn ON the power to the unit.
2. Changing over to the service mode
   (1) Turn OFF the power to the unit.
   (2) Pressing switch ❹, turn ON the power to the unit.
   (3) Keep pressing switch ❹ for three 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)

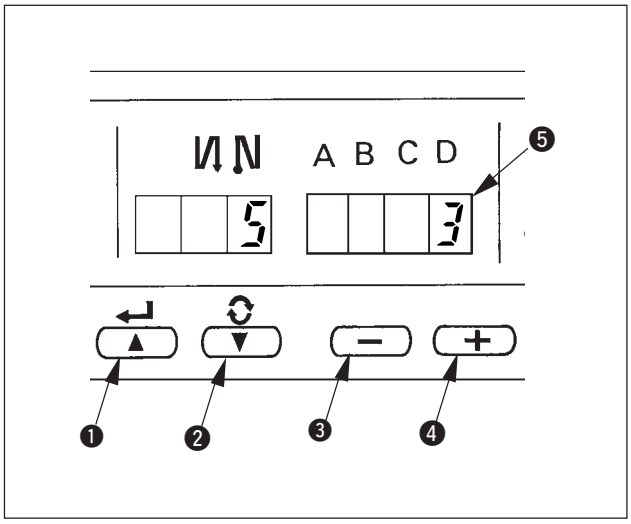
1. **When switch ❶ (switch ❷) is held pressing, the setting No. will return (will advance) continuously.**
2. **When the setting No. is advanced (returned), the contents which are before by one (after by one) will be determined. So, be careful when changing the contents (up/down switch is touched).**



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 vaue 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.**

(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	20
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	20
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	20
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	20
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	20
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	20
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 3,000 (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	20
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	20
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	20
12	Optional input/ output setting	Changeover of optional switch.	U		1 2 0	21
13	Function of prohibiting start of the sewing machine by bobbin thread 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.	U	0/1	1 4 1	24
15	Function of reverse feed stitching switch	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	24
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	24

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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
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	24
20	Alternate 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	24
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	24
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	25
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	25
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	25
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	25
30	Function of reverse feed stitching on the way	Function of reverse feed stitching on the way 0 : Function of reverse stitching on the way is not operative. 1 : Function of reverse feed stitching on the way is operative.	U	0/1	3 0 0	26
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	26
32	Effective condition 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	26
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	26
* 35	Number of rotation at a low speed	Lowest speed by pedal	U	150 to 250 (rpm)	3 5 2 0 0	
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	27
37	Number of	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	20
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	27
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 (0.1 mm)	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 (0.1 mm)	4 0 6 0	

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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
	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)	41 – 21	
*	42	Starting position of lowering presser foot	Starting position of lowering presser foot Stroke from the neutral position	U	8 to 50 (0.1 mm)	42 10	
*	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 (0.1 mm)	43 – 51	
*	44	Pedal stroke for reaching the maximum number of rotation	Position where the sewing machin reaches its highest sewing speed from pedal neutral position (Pedal stroke)	U	10 to 150 (0.1 mm)	44 150	
*	45	Compensation of neutral point of the pedal	Compensation value of the pedal sensor	U	–15 to 15	45 0	
*	46	Auto-lifter selecting function	Auto-lifter selection 0 : Solenoid drive system 1 : Pneumatic drive system	S	0/1	46 0	27
	47	Holding time of lifting auto-lifter	Limitation time of waiting for lifting solenoid type auto-lifter device	U	10 to 600 (second)	47 60	27
*	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 (0.1 mm)	48 - 35	
	50	Pedal presser lifting function	PFL type of pedal type is set 0 : OFF 1 : ON	S	0/1	50 0	27
	51	Compensation of solenoid-on timing 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˚)	51 10	27
	52	Compensation of solenoid-off timing 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˚)	52 16	28
	53	Compensation of solenoid-off timing 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˚)	53 18	28
	54	Motor pulley effective diameter	Effective diameter of pulley to be used for motor is set.	S	50 to 140 5 (mm)	54 500	28
	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	55 1	28
	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	56 0	28
	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	57 0	28
	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	58 0	29

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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
59	Function of Auto/ Manual change-over 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	59 ... 1	29
60	Function of stop immediately after reverse feed stitching 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	60 ... 0	29
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)	61 ... 500	29
63	Tie stitch adjustment function	Stop time of respective corners of start, end and overlapped stitching is set.	S	0 to 1000 (ms)	63 ... 10	29
64	Change-over speed of EBT (end back tack)	Initial speed when starting reverse feed stitching at the sewing end	U	0 to 250 (rpm)	64 ... 180	
65	Selection of thread trimmer and additional device 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		65 ... Fun	30
66	Simplified program setting	Setting of simplified program is performed.	S		66 ... Pro_	33
67	Auto hemmer control changeover	Selection of auto hemmer control is performed. 0 : Control 1 1 : Control 2	S	0/1	67 ... 0	33
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	68 ... 0	33
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	69 ... 0	33
70	Number of stitches of invalid material end sensor of auto hemmer control	Number of stitches which makes invalid material end sensor detection with auto hemmer control is set.	S	0 to 500 (0.5stitches)	70 ... 0	33
72	Clutch motor function	Clutch motor control type is selected. 0 : OFF 1 : ON	S	0/1	72 ... 0	33
73	Retry function	This function is used when needle cannot pierce materials . 0 : Normal 1 :Retry function is provided.	U	0/1	73 ... 1	34
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	74 ... 1	34
* 75	Rotating direction of motor	Normal rotating direction of motor 0 : Clockwise 1 : Counterclockwise	U	0/1	75 ... 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	76 ... 0	34
* 84	Presser lifter solenoid initial motion suction time	Suction motion time of presser lifter solenoid 50 to 500 ms	U	50 to 500 (ms)	84 ... 250	
85	Reverse feed stitching at the end of sewing start time	Holding time of start speed of reverse feed stitching at the end of sewing is set.	S	0 to 250 10 (ms)	85 ... 10	34

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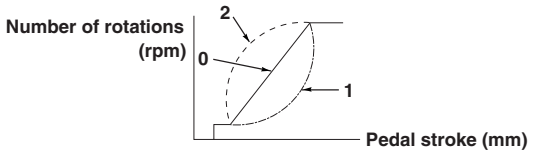
However, contents of function setting are subject to change for improvement of function and performance without notice.

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

	No.	Item	Description	Start level	Setting range	Indication of function setting	Ref. page
	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	34
	87	Function of pedal curve selection	Pedal curve is selected. (Improving pedal inching operation)  	U	0/1/2	□ 8 7 □ □ □ 0	34
*	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	35
*	91	Function of prohibiting compensation operation after turning handwheel 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	35
	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	35
	94	Test display mode	Display function of input data is set. 0 : OFF 1 : ON	S	0/1	□ 9 4 □ □ □ 0	35
	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	35

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(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.

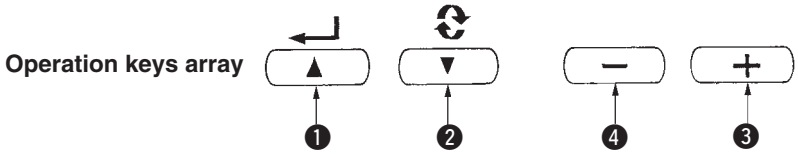
(Caution) If the stop position of the needle bar is set to the highest position, the thread trimming action will be taken after the needle bar comes down once to the lowest position.

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)



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.

12 OPT_	
900 _End	
	in__
	ouT_

901	[When "in" is selected]
↕ Optional input 1 to 8 are displayed.	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.)
908	
911	[When "ouT" is selected]
↕ Optional output 1 to 8 are displayed.	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.)
918	

(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**

12 OPT_	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).
900 in__	2. Select the item of "in" with keys ❸ and ❹.
901 _noP	3. Select the port of 901 with key ❷.
901 _TSW	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.
901 L__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.
↕	
H__4	
902 _noP	7. Determine the aforementioned function with key ❷.
⋮	
900 __in	8. Finish the optional input with key ❷.
_End	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

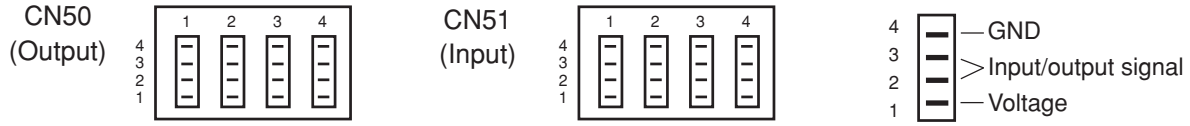
Function code	Abbreviation	Function item	Remarks
0	nop	No function	(Standard setting)
1	HS	Needle up / down compensating stitching	Every time the switch is pressed, normal feed stitching by half stitch is performed. (Same operation as that of up / down compensating stitching switch on the panel.)
2	bHS	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 during DOWN 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.

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.

*** 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.



Input connector

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

(Caution) Note that the input voltage should not exceed +5V.

Output connector

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

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

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 control panel. Refer to the explanation of the control panel.

	1	4					1

0 : off Sewing counting function is inoperative.
(Indication on the CP-160 contorl panel will go out as well.)
1 : on Sewing counting function is operative.

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

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 DLdial 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 Function of reverse feed stitching on the way is selected.

□ 3 0 □ □ □ 0

0 : off Normal back-tack function

1 : on Function of reverse feed stitching on the way

Function setting No. 31 Number of stitches performing reverse feed stitching is set.

□ 3 1 □ □ □ 4

Setting range

0 to 19 stitches

Function setting No. 32 Effective condition of reverse feed stitching on the way

□ 3 2 □ □ □ 0

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 regradless 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.

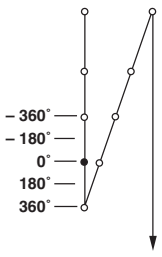
㉕ **Compensation of timing of the solenoid for reverse feed stitching (Function setting No. 51 to 53)**

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 sitches of compensation
– 36	– 360˚	– 1
– 18	– 180˚	– 0.5
0	0˚	0
18	180˚	0.5
36	360˚	1

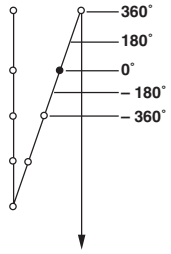


*** When the point before 1 stitch is regarded as 0˚, compensation is possible by 360˚ (1 stitch) in front and in the rear.**

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˚>

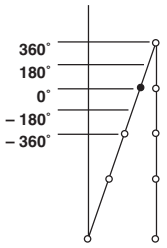
Set value	Compensation angle	Number of sitches of compensation
– 36	– 360˚	– 1
– 18	– 180˚	– 0.5
0	0˚	0
18	180˚	0.5
36	360˚	1



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 sitches 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

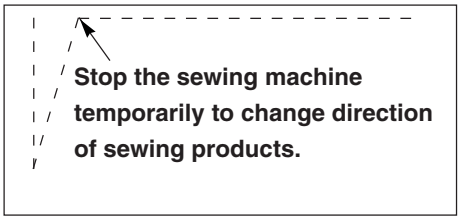
0 : Manu The speed is indicated by the pedal operation.
1 : Auto Automatic stitching at the specified speed

(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



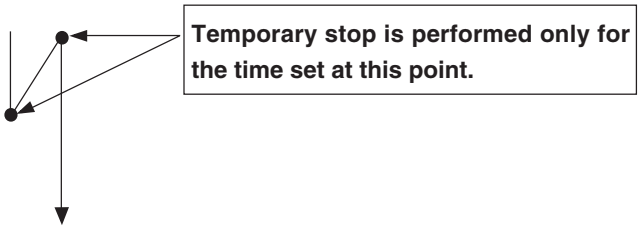
㉝ **Bobbin thread remaining amount detection air blow output time (Function setting No. 61)**
Air blow output time is set when bobbin thread remaining amount detection device is used.

□ 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

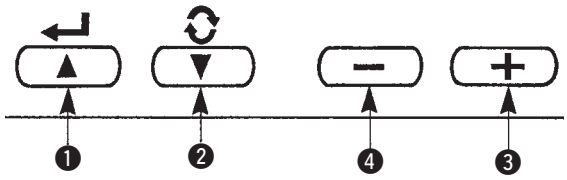
0 : Invalid
Setting range 0 to 1000 [mS]



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



Setting item is selected by operating ❸ and ❹.

LED 3-digit display		
F	U	n

LED 4-digit display				
E	n	d		End of setting (Setting returns to the normal function setting.)
T	r	M		Selection 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		
T	r.	0

LED 4-digit display				Applicable model	Remarks
	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	

(Caution) Contents of thread trimming function can be automatically set as well at the time of the function 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		
U	1.	0

LED 4-digit display				Description of device setting	Remarks
	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)	➡ Ⓔ

*** 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		
U	2.	0

LED 4-digit display				Description of device setting	Remarks
	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)	➡ Ⓙ

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

F U n U T 1 □

	Parameter setting									
	LED 3-digit display			LED 4-digit display				Description of device setting	Remarks
➡ Ⓐ	U	1.	1	A.	1	8	5	Thread rack remaining thread output OFF angle setting	185fl : from Up position off
➡ Ⓑ	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
➡ Ⓒ	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
➡ Ⓓ	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	Number of stitches of cutter motion waiting at the end of sewing setting	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
➡ Ⓔ	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	Number of stitches of cutter motion waiting at the end of sewing setting	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 n U T 2 □

	Parameter setting									
	LED 3-digit display			LED 4-digit display				Description of device setting	Remarks
➡ Ⓕ	U	2.	1	A.	1	8	5	Thread rack remaining thread output OFF angle setting	185fl : from Up position off
➡ Ⓖ	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
➡ Ⓗ	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
➡ Ⓘ	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	Number of stitches of cutter motion waiting at the end of sewing setting	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
➡ Ⓙ	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	Number of stitches of cutter motion waiting at the end of sewing setting	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

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 : ON • 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 piereced 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

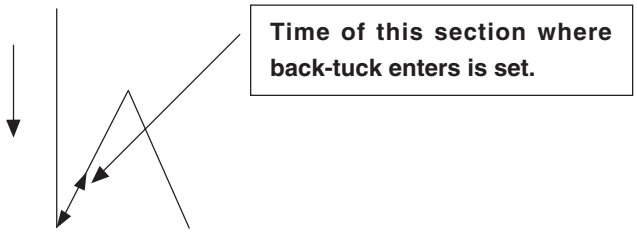
㊺ **Reverse feed stitching at the end of sewing start time (Function setting No. 85)**

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.



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]

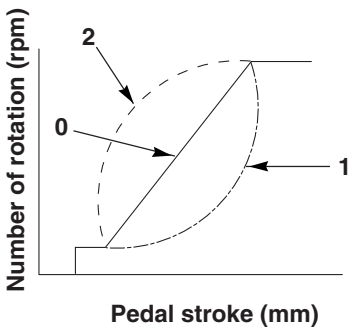
㊼ **Function of pedal curve selection (Function setting No. 87)**

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.



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

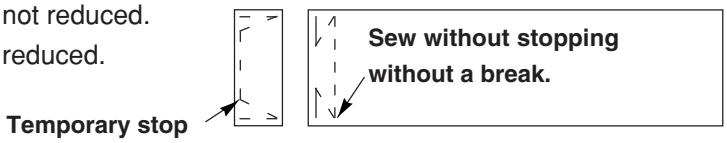
Whether valid or invalid of function to automatically return to UP stop position immediately after turning ON the power can be set.

□ 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.



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.

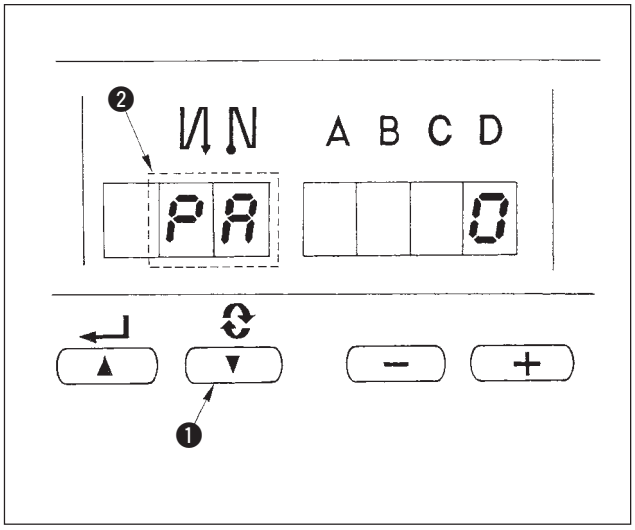
52 **Setting of max. number of rotation of the sewing machine head (Function setting No. 96)**

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 :



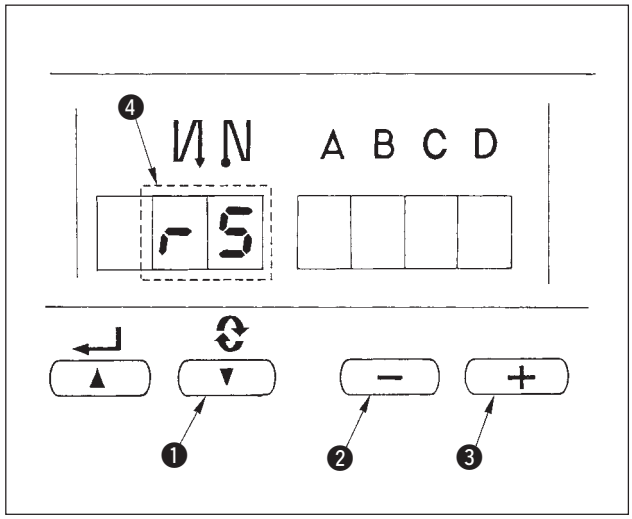
(1) Pressing switch ❶, turn ON the power switch.

(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.**

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**

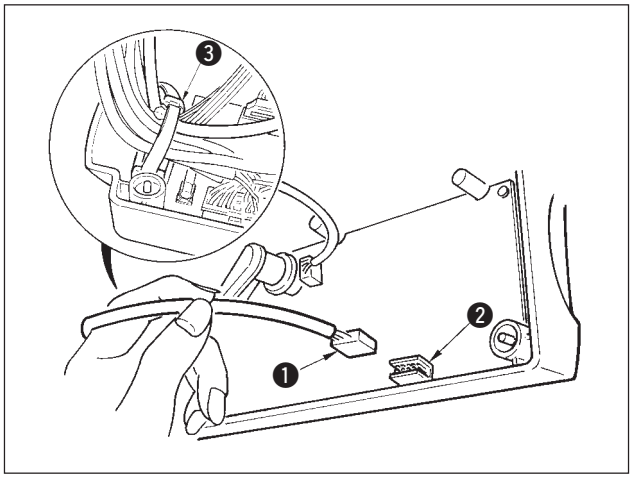
0 : Function is same as conventional KFL type.
1 : Function is same as conventional PFL type.

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

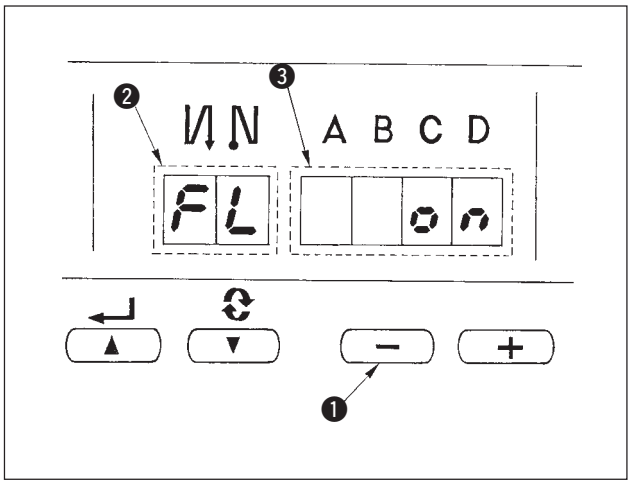
(1) Connection of the pedal of standing-work machine



1) Connect the connector of PK70 ❶ to connector ❷ (CN39 : 12P) of SC-500.
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

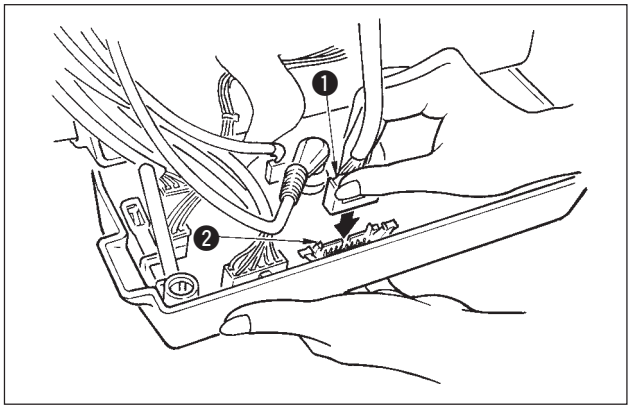


When the auto-lifter device (AK) is attached, this function makes the function of auto-lifter work.

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 auto-lifter does not work.
   FL ON : Auto-lifter device becomes effective.
   FL OFF : Auto-lifter function does not work.
   (Standard at the time of delivery)
   (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.

(3) Connecting procedure of CP-160



1) Exclusive connectors are prepared for connection of the connector for CP-160.
2) aying 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.

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 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

	Applicable wire			
Wire mount plug 4-pole product No.	AWG No.	Nominal sectional area mm SQ.	Finished outer diameter ø mm	Cover color
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.

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

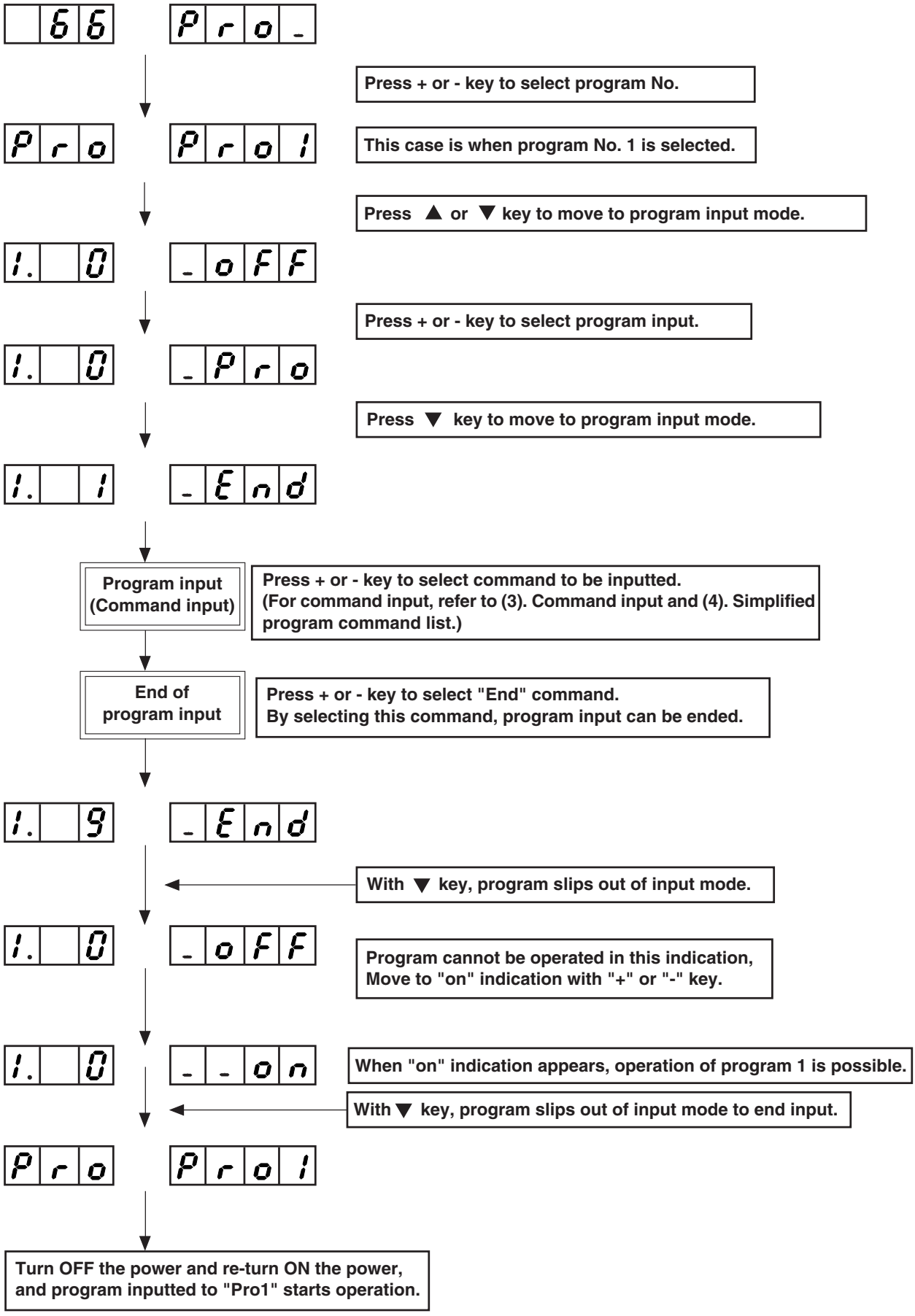
Indication	Function	Remarks
_oFF	Stops program operation.	Possible to select only when 3-digit LED indication is *.0
_on	Makes valid program operation.	Possible to select only when 3-digit LED indication is *.0
CHE_	Can confirm contents of program.	Possible to select only when 3-digit LED indication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

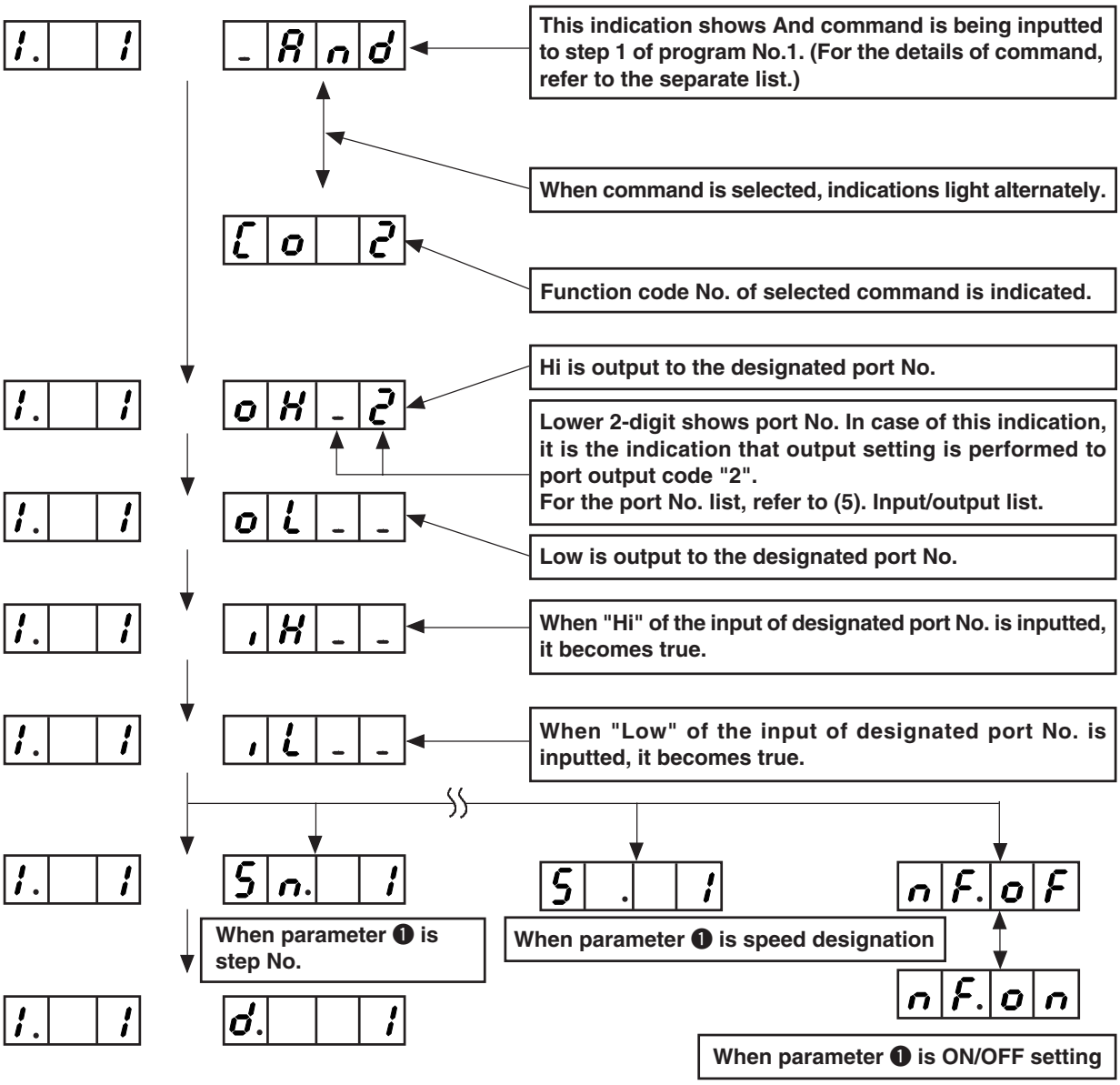


(3) Command input

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



(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
1	0	End	Completion	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
2	1	DELy	Delay	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
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)
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)
5	4	STiA	Number of stitches 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)
6	5	STio	Number of stitches 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)
7	6	JUMP	Jump repeat counter	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Jump (Sn.)
8	7	SPEd	Rotation speed command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Speed (S.)
9	8	LiMi	Speed limitation command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Speed limitation (S.)
10	9	LinH	Lswinh command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	on/off information (on/off)
11	10	TrM	Thread trimming command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
12	11	TinH	Tswinh command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	on/off information (on/off)

Setting range	Parameter ②	Setting range	Remarks
—	Invalid	—	Initial value
—	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.
1 to 20	Delay time (d.)	0 : Waiting input until condition is completed 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.
1 to 20	Delay time (d.)	0 : Waiting input until condition is completed 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.
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.
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.
1 to 20	Repeat count 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.**
0 to 999 (X10rpm)	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.
0 to 999 (X10rpm)	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.
on/off	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	LSW (depress front part of pedal command) is delayed. 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.
—	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.
on/off	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	Thread trimming output is delayed. 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
13	12	UP	UP stop command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
14	13	HS	Needle up/down command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
15	14	rSW	Rsw command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
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)
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)
18	17	SToP	Stop command	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Invalid
19	18	bT	BTsw command (Reverse feed stitching output)	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	on/off information (on/off)
20	19	FL	FLsw command (Presser lifting output)	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	on/off information (on/off)
21	20	rEST	Program reset	Valid	oH.1 to 17 oL.1 to 17	Invalid	—	Program No. (Sn)

Setting range	Parameter ②	Setting range	Remarks
—	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.
—	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	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.
—	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	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.
1 to 20	Angle (A.)	0 : Without delay 1 to 359 º	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.)
1 to 20	Angle (A.)	0 : Without delay 1 to 359 º	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.)
—	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	Stop command is output and step moves to next one. When time is set, step moves to next one after lapse of set time.
on/off	Delay time (d.)	0 : Without delay 1 to 999 X 1mS	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.
on/off	Delay time (d.)	0 : Invalid 1 to 999 X 1mS	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.
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-0	CN51-1	2	
2	opi1	Optional input-1	CN51-1	3	
3	opi2	Optional input-2	CN51-2	2	
4	opi3	Optional input-3	CN51-2	3	
5	opi4	Optional input-4	CN51-3	2	
6	opi5	Optional input-5	CN51-3	3	
7	opi6	Optional input-6	CN51-4	2	
8	opi7	Optional input-7	CN51-4	3	
9	opo0	Input of optional output-0	—	—	Output signal of optional output-0 can be internally inputted.
10	opo1	Input of optional output-1	—	—	Output signal of optional output-1 can be internally inputted.
11	opo2	Input of optional output-2	—	—	Output signal of optional output-2 can be internally inputted.
12	opo3	Input of optional output-3	—	—	Output signal of optional output-3 can be internally inputted.
13	opo4	Input of optional output-4	—	—	Output signal of optional output-4 can be internally inputted.
14	opo5	Input of optional output-5	—	—	Output signal of optional output-5 can be internally inputted.
15	opo6	Input of optional output-6	—	—	Output signal of optional output-6 can be internally inputted.
16	opo7	Input of optional output-7	—	—	Output signal of optional output-7 can be internally inputted.
17	TRMD	Thread trimming 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:CP-Panel	CP panel needle up/down switch input	CN38	13	
26	LSSW	Low speed switch input	CN39	2	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	—	
31	DOWN	DOWN key input	Operation panel	—	
32	SET+	SET +key input	Operation panel	—	
33	SET-	SET -key input	Operation panel	—	
34	TSW	Thread trimmer switch input	CN39		Standing work type
35	FLSW	Presser lifter switch input			
36	FLSW	Presser lifter switch input	CN39		Standing work type
37	HSSW	High speed switch input	CN39		Standing work type
38	opi8	Optional input-8	CN123-1	2	Extension p.c.b. (IPOP p.c.b.) CN123
39	opi9	Optional input-9	CN123-1	3	Extension p.c.b. (IPOP p.c.b.) CN123
40	opi10	Optional input-10	CN123-2	2	Extension p.c.b. (IPOP p.c.b.) CN123
41	opi11	Optional input-11	CN123-2	3	Extension p.c.b. (IPOP p.c.b.) CN123
42	opi12	Optional input-12	CN123-3	2	Extension p.c.b. (IPOP p.c.b.) CN123
43	opi13	Optional input-13	CN123-3	3	Extension p.c.b. (IPOP p.c.b.) CN123
44	opi14	Optional input-14	CN123-4	2	Extension p.c.b. (IPOP p.c.b.) CN123
45	opi15	Optional input-15	CN123-4	3	Extension p.c.b. (IPOP p.c.b.) CN123
46	opo8	Input of optional output-8	—	—	Output signal of optional output-8 can be internally inputted.
47	opo9	Input of optional output-9	—	—	Output signal of optional output-9 can be internally inputted.
48	opo10	Input of optional output-10	—	—	Output signal of optional output-10 can be internally inputted.
49	opo11	Input of optional output-11	—	—	Output signal of optional output-11 can be internally inputted.

Input list

Port input code	Signal name	Function	Connector No. and pin No. on p.c.b.	Pin No.	Remarks
50	opo12	Input of optional output-12	—	—	Output signal of optional output-12 can be internally inputted.
51	opo13	Input of optional output-13	—	—	Output signal of optional output-13 can be internally inputted.
52	opo14	Input of optional output-14	—	—	Output signal of optional output-14 can be internally inputted.
53	opo15	Input of optional output-15	—	—	Output signal of optional output-15 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-0	CN50-1	2	
2	opo1	Optional output-1	CN50-1	3	
3	opo2	Optional output-2	CN50-2	2	
4	opo3	Optional output-3	CN50-2	3	
5	opo4	Optional output-4	CN50-3	2	
6	opo5	Optional output-5	CN50-3	3	
7	opo6	Optional output-6	CN50-4	2	
8	opo7	Optional output-7	CN50-4	3	
9	BZ	Buzzer output	—	—	
10	opo8	Optional output-8	CN124-1	2	Extension p.c.b. (IPOP p.c.b.) CN124
11	opo9	Optional output-9	CN124-1	3	Extension p.c.b. (IPOP p.c.b.) CN124
12	opo10	Optional output-10	CN124-2	2	Extension p.c.b. (IPOP p.c.b.) CN124
13	opo11	Optional output-11	CN124-2	3	Extension p.c.b. (IPOP p.c.b.) CN124
14	opo12	Optional output-12	CN124-3	2	Extension p.c.b. (IPOP p.c.b.) CN124
15	opo13	Optional output-13	CN124-3	3	Extension p.c.b. (IPOP p.c.b.) CN124
16	opo14	Optional output-14	CN124-4	2	Extension p.c.b. (IPOP p.c.b.) CN124
17	opo15	Optional output-15	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.	7-segment display No.	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			

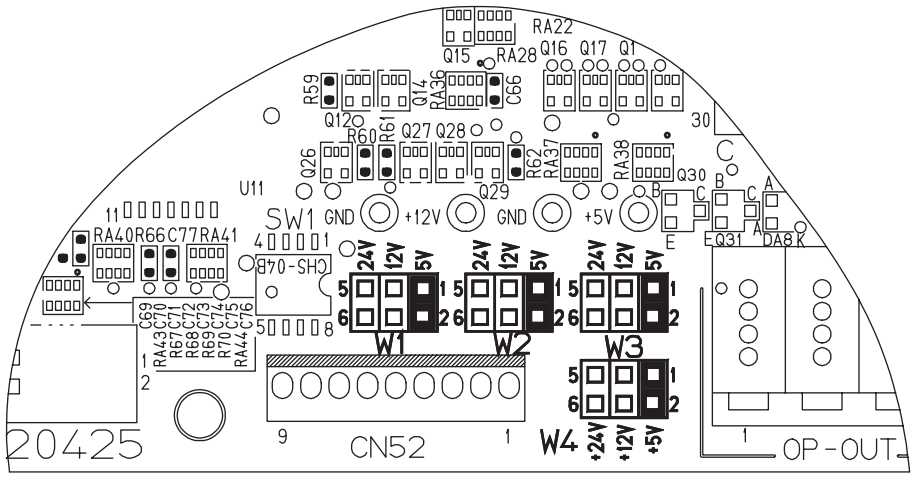
2. Output connector

Connector No.	Pin No.	7-segment display No.	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



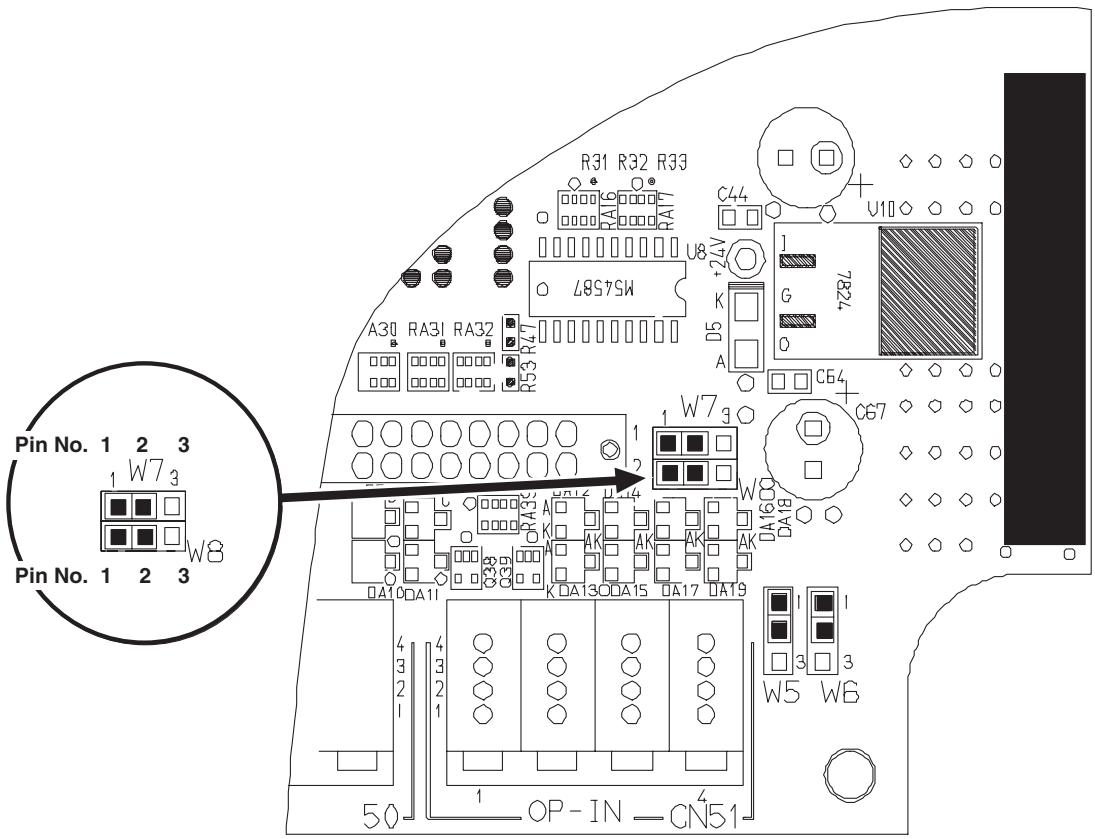
Explanation of input changeover jumper switch

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 4Pin	
	2-3	Analog input of +5V (2)	CN51-4 4Pin	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.

3. 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.

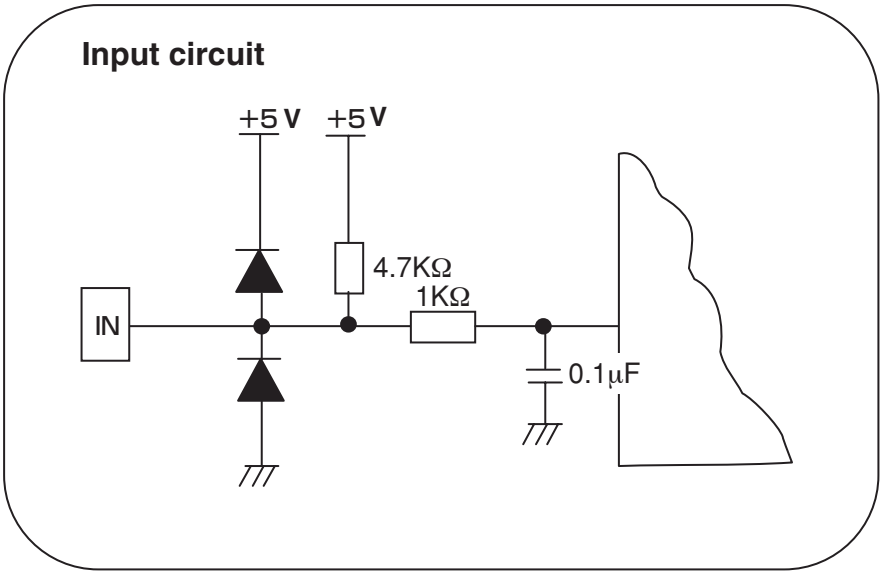
4. Output connector

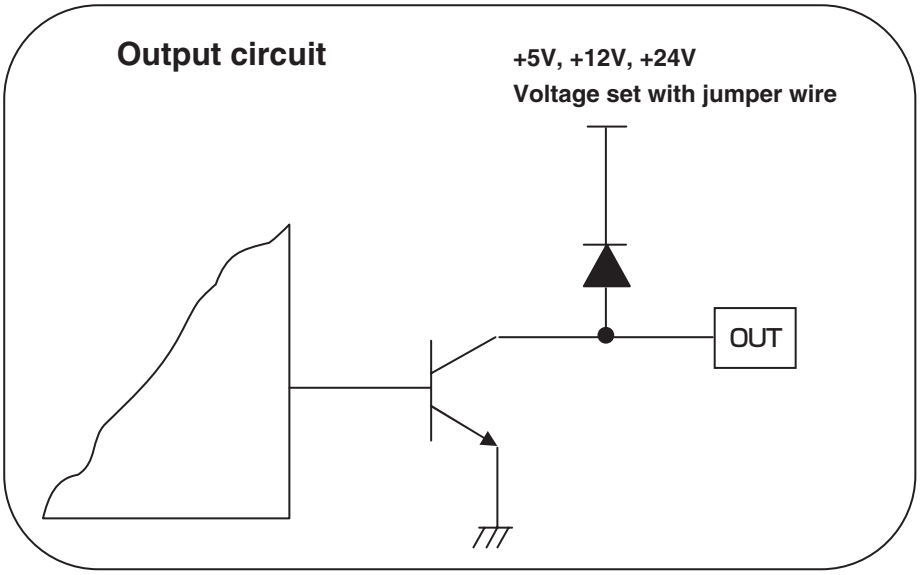
This optional output can be connected to solenoid valves of +5V, +12V and +24V, output to PLC, LED for display, etc.

Connector No.	Pin No.	Port output 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.

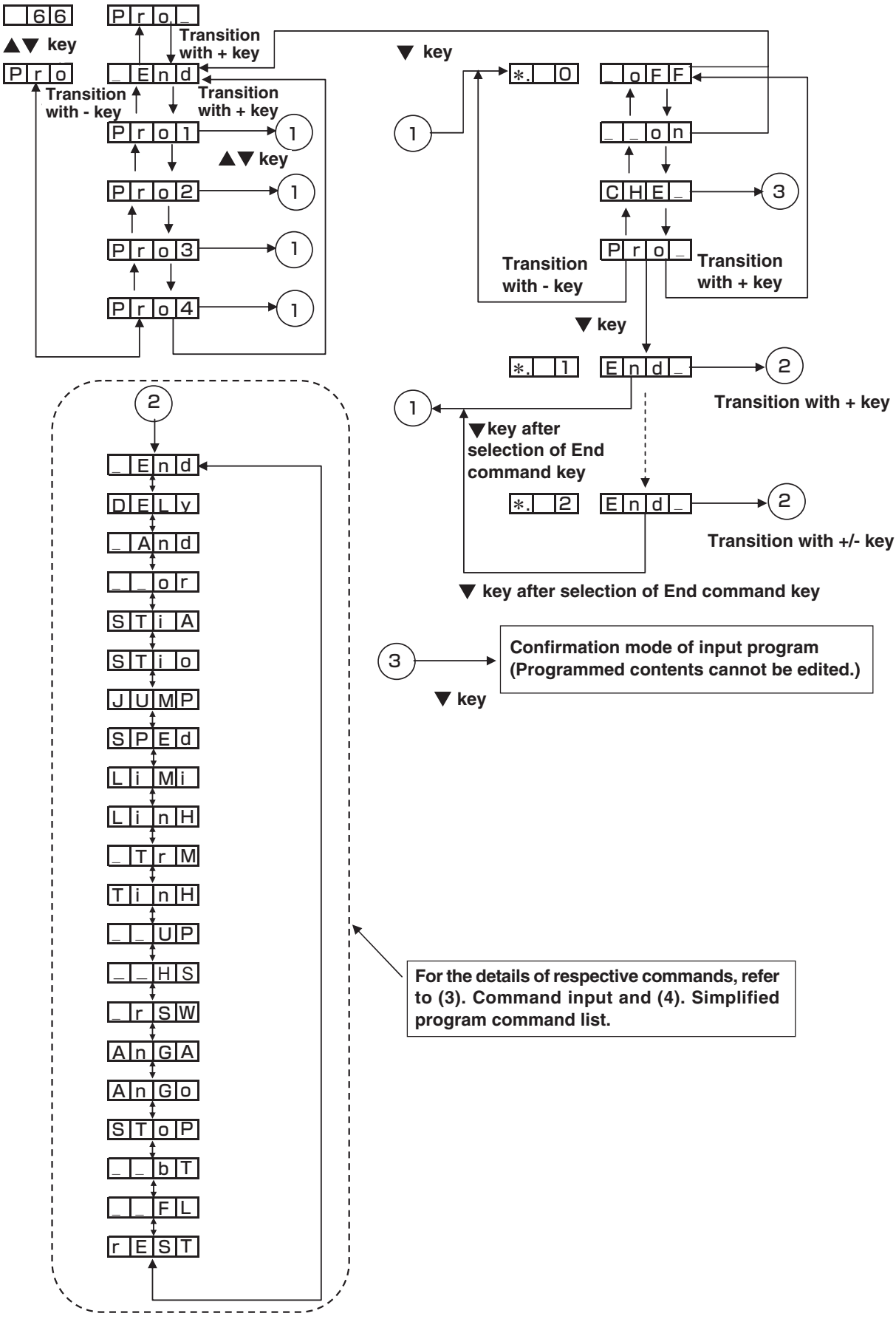
5. Input/output circuit





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

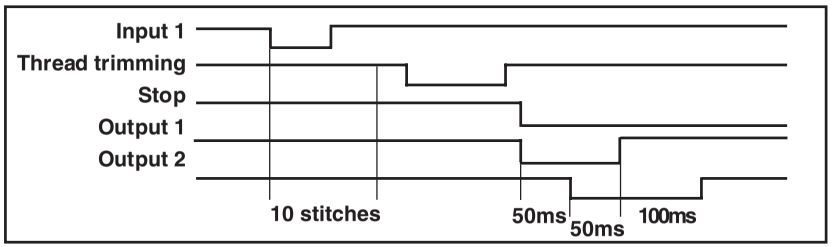
Transition (sequence) of respective input modes is as shown below.



<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:opo0,10:opo1,11:opo2,12: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 : 1 ms unit Speed : 10 rpm 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			On edge of input is detected. Initialization of output
2	And		iL.1			
3	StiA				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			Stop confirmation
7	DELy	oL.1			d.50	Delay : 50 ms Output 1 : On
8	DELy	oL.2			d.50	Delay : 50 ms Output 2 : On
9	DELy	oH.1			d.100	Delay : 100 ms Output 1 : Off
10	SToP	oH.2				Thread trimming command release Output 2 : Off
11	Linh			nf.off		Lswinh : off (Release of prohibition of pedal depressing)
12	JUMP			Sn.1		Repeating aforementioned control.
13	End					
14						
15						
16						
17						
18						
19						
20						

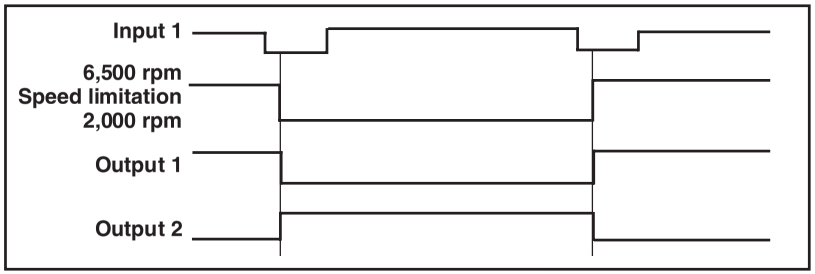
<Program sample Ⅰ>
Optional input 1 is On, automatic thread trimming is performed after 10 stitches of number of stitches count, and stop.
After stop, 100 ms of optional output 1 is output.
And, 150 ms is output to optional output 2 after a lapse of 50 ms after stop.



<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:opo0,10:opo1,11:opo2,12: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 : 1 ms unit Speed : 10 rpm 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			On edge of input is detected. Output 2 : On
2	And		iH.1	Sn.4	d.20	On delay : 20 ms (Chatter protection)
3	JUMP			Sn.2		On waiting
4	LiMi			S.200		2,000 rpm speed limitation (10 rpm unit)
5	And	oH.2,oL.1	iH.1			On edge of input is detected. Output 1 : On
6	And		iH.1	Sn.8	d.20	On delay : 20 ms (Chatter protection)
7	JUMP			Sn.6		On waiting
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.



Simplified program sheet

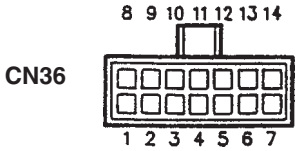
Step	End,DELy,And,or, STiA,Stio,JUMP, SPEd,,LiMi,LinH, TrM,TinH,UP,HS, rSW,AnGA,AnGo, SToP,bT,FL,rEST	1:opo0,2:opo1,3:opo2, 4:opo3,5:opo4,6:opo5, 7:opo6,8:opo7,9:BZ	1:opi0,2:opi1,3:opi2,4:opi3,5:opi4,6:opi5,7:opi6, 8:opi7,9:opo0,10:opo1,11:opo2,12:opo3,13:opo4, 14:opo5,15:opo6,16:opo7,17:TRMD,18:WPD, 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 : 1 ms unit Speed : 10 rpm 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						

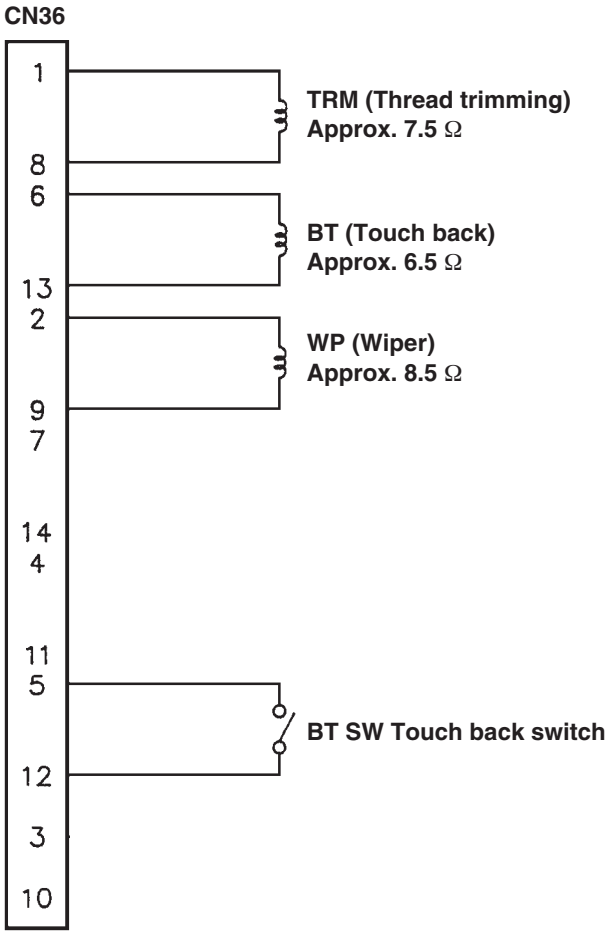
10. CONNECTOR CONNECTION DIAGRAM

(1) Solenoid for machine head

Layout of CN36 pins

Name of signal	Pin No.
TRMD	1
TRM COM	8
BTD	6
BTD COM	13
WPD	2
WPD COM	9
SUB BTD	7
SUB COM	14
OP_IN (FL SW)	3
FLSW	4
BTSW	5
BTSW RTN	12
GND	11
FG	10

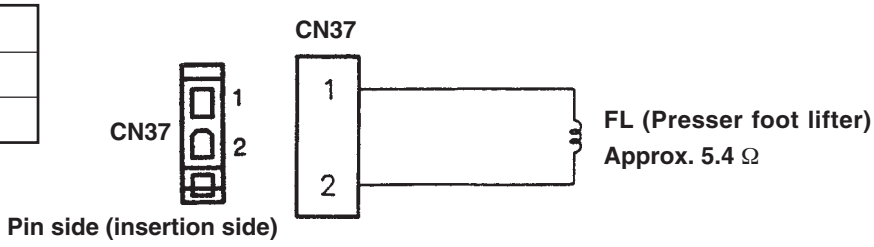




(2) Solenoid Connector for lifting presser foot

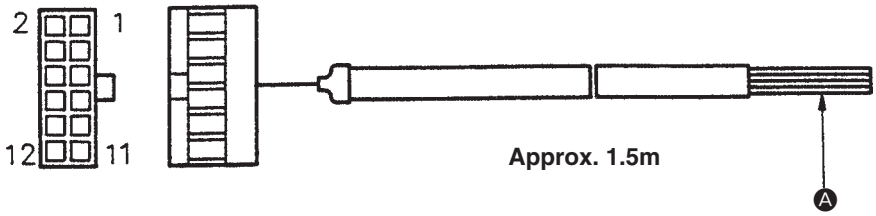
Layout of CN37 pins

Name of signal	Pin No.
FLD	1
FL COM	2

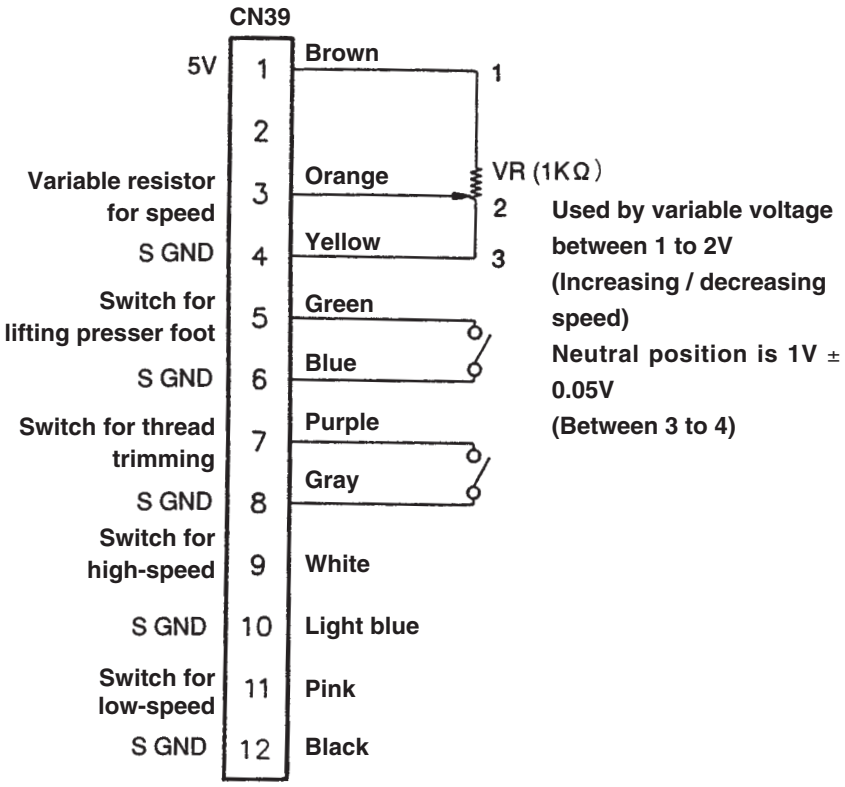


(3) Optional cord

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



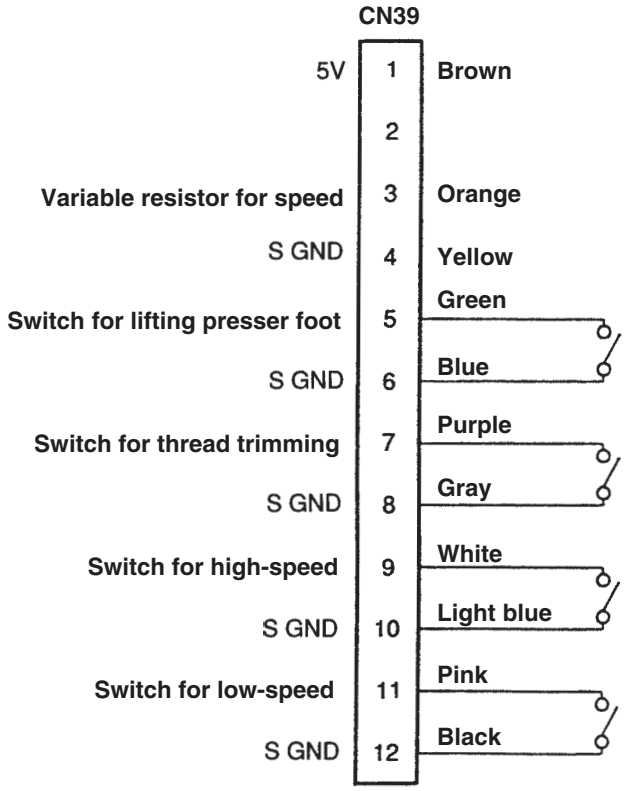
1) Wiring diagram of variable pedal PK-70 and -71



○ 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

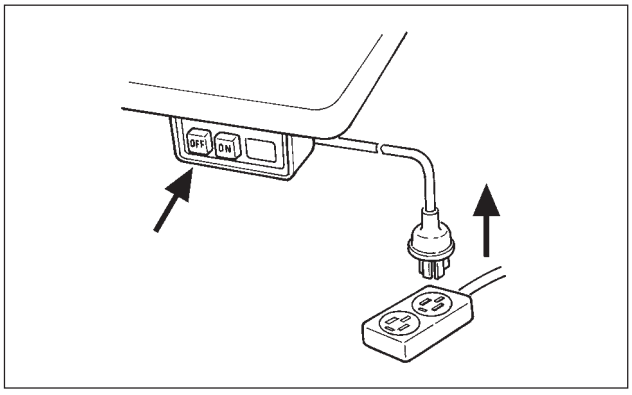


(Caution) When decreasing the speed of the high-speed SW, use the max. speed limitation variable resistor on the panel.

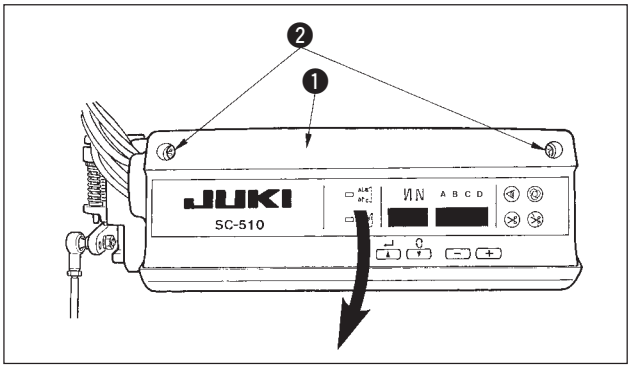
11. MAINTENANCE

(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.



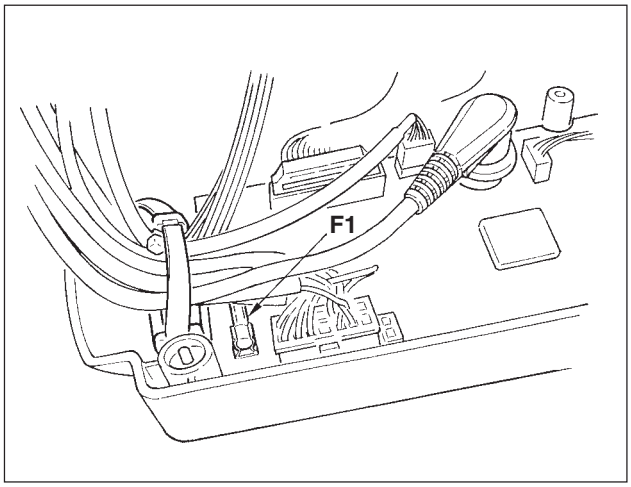
1) Press the OFF button of the power switch to turn OFF the power after confirming that the sewing machine has stopped.
2) Draw out the power cord coming from the power plug socket after confirming that the power switch is turned OFF. Perform the work of step 3) after confirming that the power has been 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.

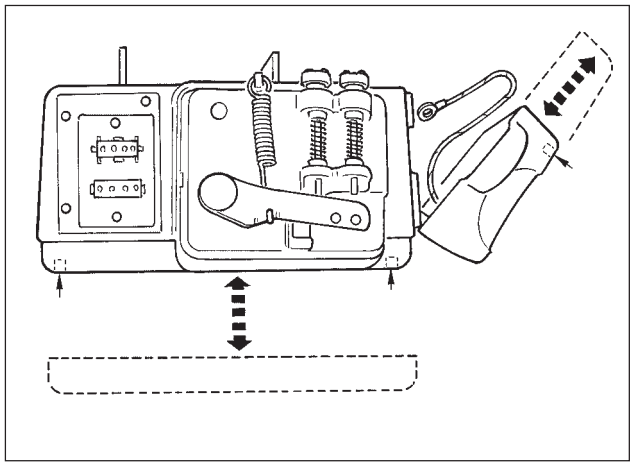
(Caution) Be sure to open / close the front cover ❶ with your hands.

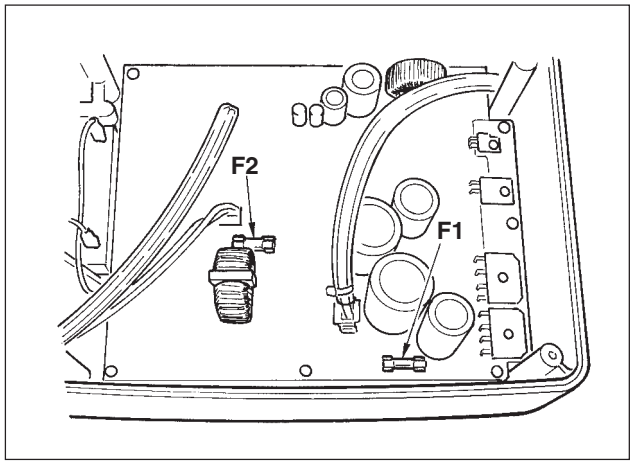
[Replacing F1 fuse on CTL circuit board (solenoid protection fuse)]



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.

(2) Changing procedure between 100V to 120V and 200V to 240V

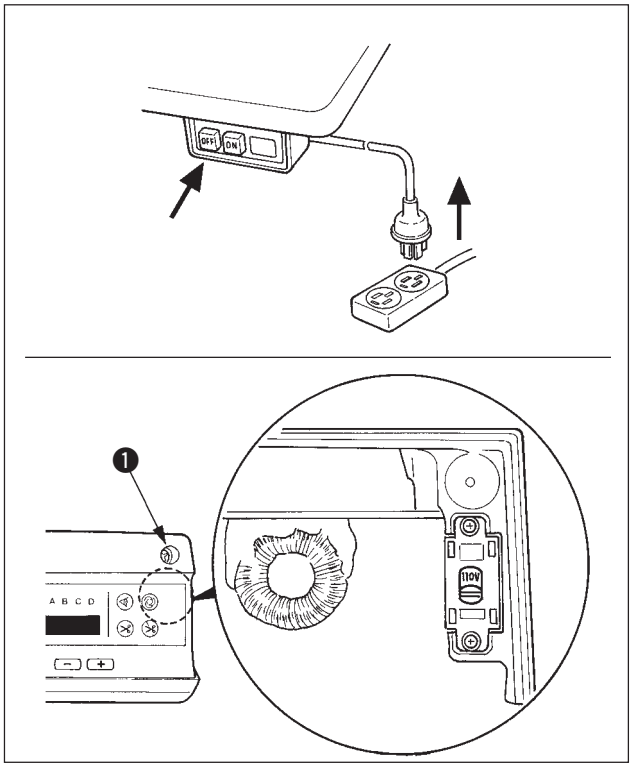
(Possible only for the voltage changeover type)

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.



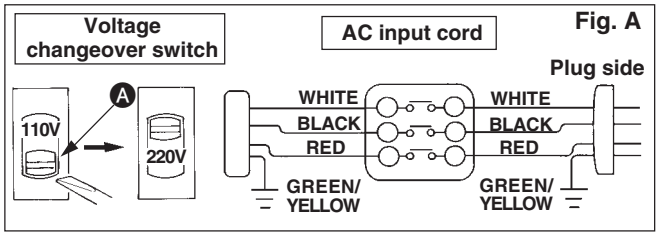


Fig. A

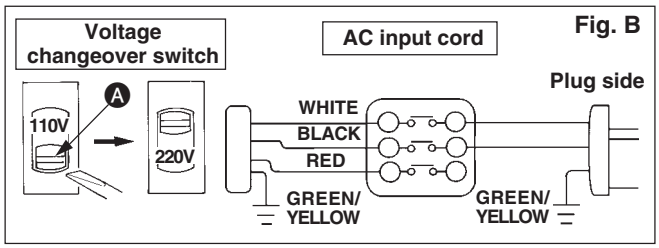


Fig. B

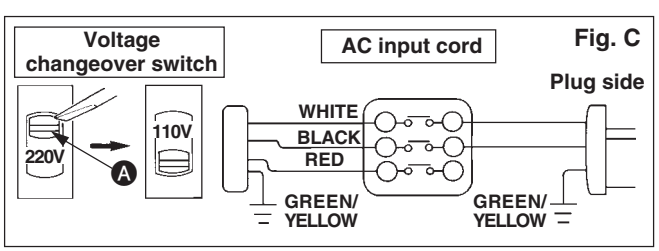


Fig. C

(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 Ⓐ 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 Ⓐ 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 Ⓐ 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.

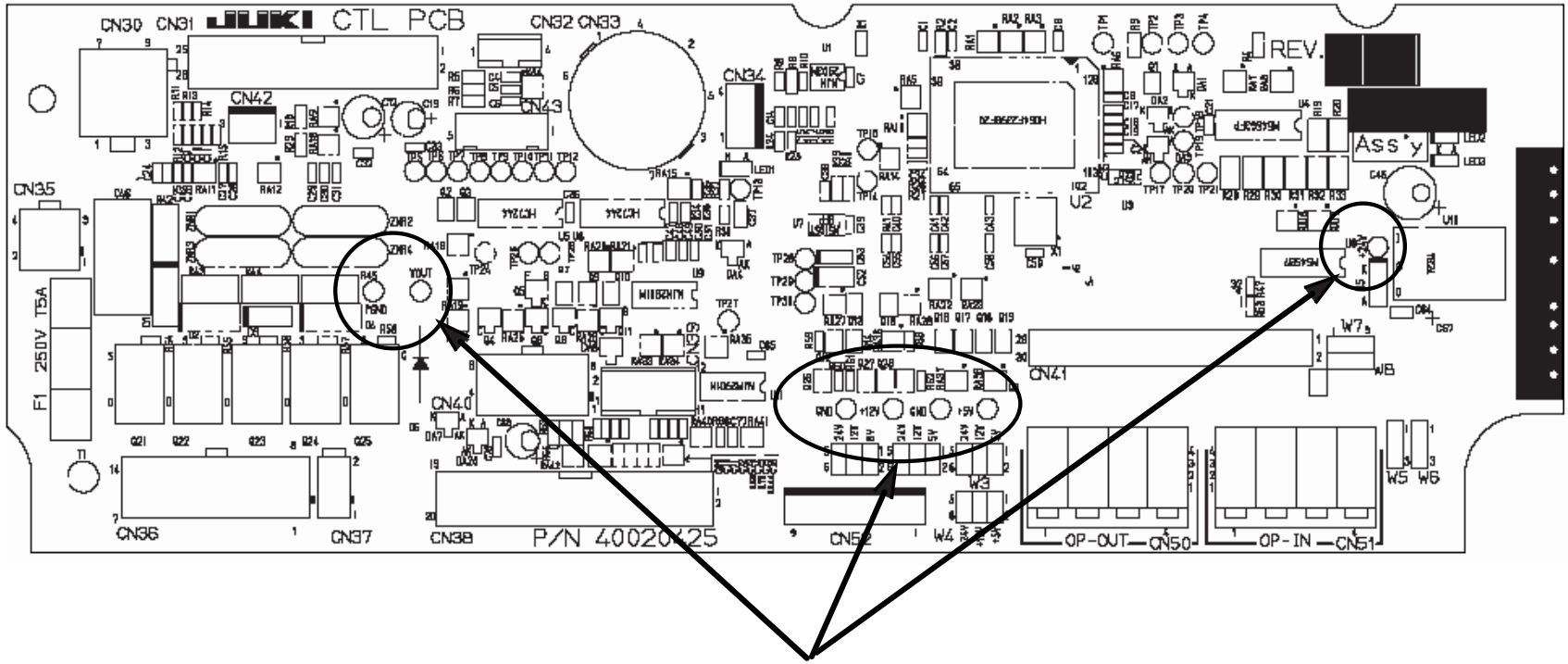
(3) Control voltage check terminal of CTL circuit board

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

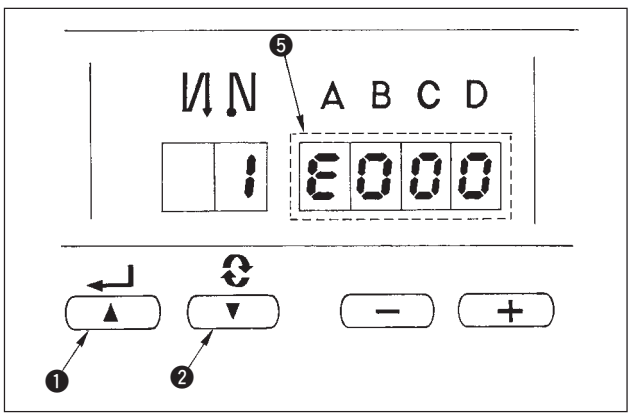


12. ERROR CODES

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.

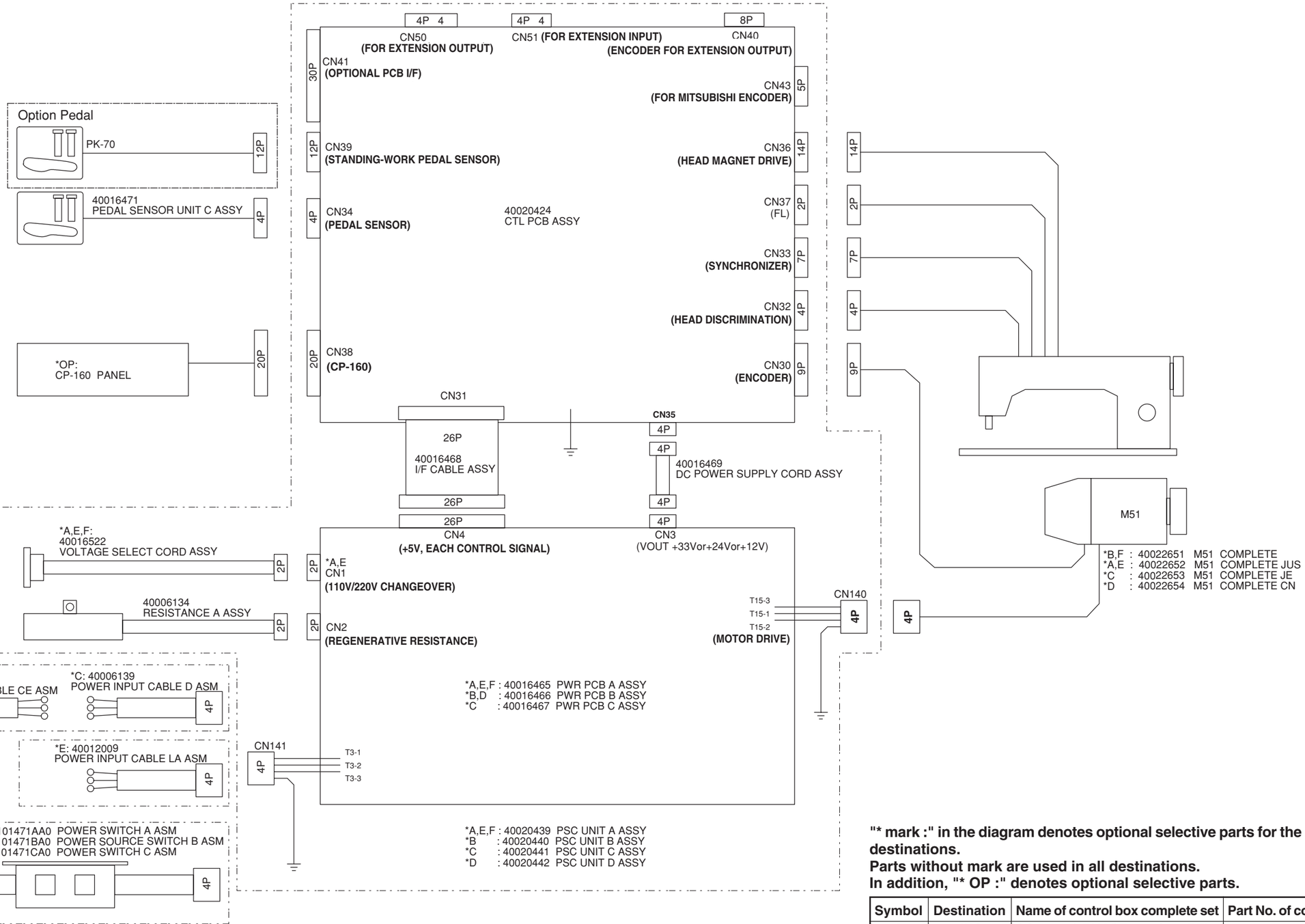
(Caution) 1. When operating switch ❶, one before the existing error code is displayed.
2. When operating switch ❷, one after the existing error code is displayed.

(1) Error code list

No.	Description of error detected	Cause of occurrence expected	Items to be checked
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. • When the synchronizer has broken.	• Check the synchronizer connector (CN33,CN43) for loose connection and disconnection. • Check whether the synchronizer cord has broken since the cord is caught in the machine head.
E004	Synchronizer lower position sensor failure		
E005	Synchronizer upper position sensor failure		
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.
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.
E730	Encoder failure	• When the motor signal is not properly inputted.	• Check the motor signal connector (CN30) for loose connection and disconnection. • Check whether the motor signal cord has broken since the cord is caught in the machine head.
E731	Motor hole sensor failure		
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.
E924	Motor driver failure	• Motor driver has broken.	

MEMO

13. BLOCK DIAGRAM



"* 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

<REFERENCE> TABLE OF DIGITAL DISPLAY

Table of digital display

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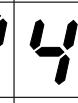
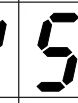
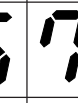
Digital display										
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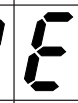
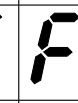
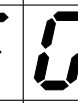
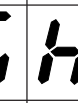
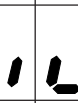
Digital display										
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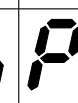
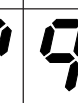
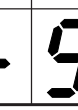
Digital display										
Numeral	U	V	W	X	Y	Z				
Digital display										

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Please do not hesitate to contact our distributors or agents in your area for further information when necessary.

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

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