

# MITSUBISHI

# BMBL

## Mitsubishi Limiservo X B Series

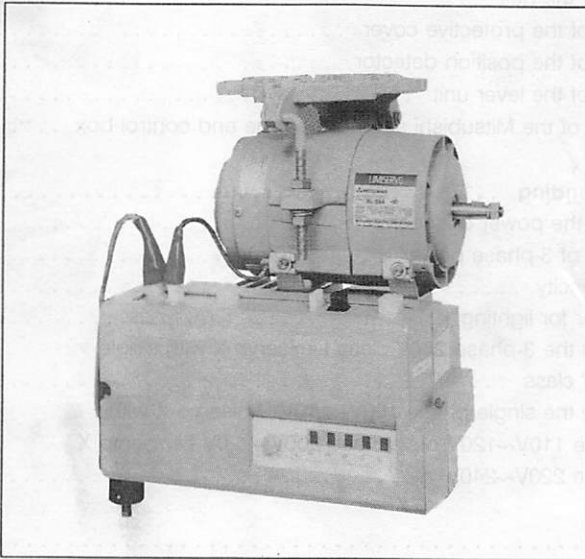
### INSTRUCTION MANUAL

Motor XL-554-10, XL-554-20

Control box XC-BMBL

---

**Induction type AC servo motor with automatic  
needle positioner**



Thank you for purchasing the Mitsubishi Limiservo X. Please read this manual thoroughly before use to ensure safe and proper use.

Please read the instruction manual for the machine head together with this manual.

# Contents

<b>1. Points of Caution</b> .....	<b>1</b>
<b>2. Names of Each Part</b> .....	<b>3</b>
<b>3. Accessories</b> .....	<b>5</b>
<b>4. Installation</b> .....	<b>6</b>
1. Installation of the motor .....	6
2. Installation of the control box .....	6
3. Installation of the pulley .....	6
4. Mounting of the belt .....	7
5. Installation of the protective cover .....	7
6. Installation of the position detector .....	8
7. Installation of the lever unit .....	8
8. Connection of the Mitsubishi sewing machine and control box .....	9
<b>5. Wire and Grounding</b> .....	<b>10</b>
1. Insertion of the power connector .....	10
2. Connection of 3-phase power .....	10
3. Current capacity .....	10
4. Lamp power for lighting .....	10
5. When using the 3-phase 200V class Limiservo X with single phase 200V class .....	11
6. When using the single phase 100V~110V Limiservo X with single phase 110V~120V or 3-phase 200V~220V Limiservo X with 3-phase 220V~240V .....	11
<b>6. Confirmation</b> .....	<b>12</b>
1. Before turning switches on .....	12
2. Turn on the power .....	13
<b>7. Adjustments</b> .....	<b>15</b>
1. Adjustment of stopping position .....	15
2. Adjustment of pedal toe down pressure, and heeling pressure .....	16
3. Adjustment of operation speed .....	16
4. Adjustment of operation speed when using the Mitsubishi thread trimming sewing machine .....	16

<b>8. Pedal Operation</b> .....	<b>17</b>
<b>9. Operation of the Operation Panel Keys</b> .....	<b>18</b>
1. Displays during normal mode and functions of each key .....	18
2. Selection of each mode .....	19
3. How to use the normal mode .....	22
No.1 To change the rotation direction .....	22
No.2 To change the needle position during stop .....	22
No.3 To start sewing with a slow start .....	23
No.4 To use as a standing work type sewing machine (to use an external switch) .....	23
No.5 To apply a weak brake during stopping .....	24
4. Displays and functions of each key in the tacking mode .....	25
5. Before operating the keys for the program mode .....	23
6. How to use the tacking mode .....	28
No.1 To set the no. of stitches for the start/end V tacking and start tacking retract to 4 stitches, and 3 stitches for the end tacking retract <b>[B]</b> + <b>[M]</b> .....	28
7. How to use the program mode <b>[P]</b> .....	30
No.1 To change the maximum speed (Ex. to change to 4500 rotations) <b>[H]</b> .....	30
No.2 To change the low speed (Ex. to change to 200 rotations) <b>[L]</b> ..	31
No.3 To change the needle lifting speed (Ex. to change to 180 rotations) <b>[T]</b> .....	32
No.4 To change the start tacking speed (Ex. to change to 1200 rotations) <b>[N]</b> .....	33
No.5 To change the end tacking speed (Ex. to change to 1500 rotations) <b>[V]</b> .....	34
No.6 To change the slow start speed (Ex. to change to 300 rotations) <b>[S]</b> .....	35
No.7 To change the number of stitches in slow start (Ex. to change to three stitches) <b>[SLN]</b> .....	36
No.8 To carry out low speed operation with external switch <b>[SOH]</b> + <b>[SO]</b> .....	37
No.9 To stitch with one needle with the external switch <b>[SOH]</b> + <b>[SO]</b> .	38

No.10	To confirm the position where the needle passed through the fabric and to raise the penetration strength of the first stitch with the external switch <b>S0H</b> + <b>S0</b> .....	39
No.11	To stop tacking with external switch <b>S0H</b> + <b>S0</b> .....	40
No.12	To bring the one shot function outside and use as the manual/automatic sewing selection switch for test stitching, etc. <b>S0H</b> + <b>SHM</b> .....	41
No.13	To carry out automatic operation (one shot operation) <b>SH</b> + <b>SHM</b> .....	42
No.14	To set the number of stitches to the needle UP position stop after detecting the fabric end with an optical sensor, etc. (Ex. to set to 10 stitches) <b>UES</b> + <b>PSU</b> .....	43
No.15	To set the number of stitches to the DOWN position stop after the fabric end is detected with the optical sensor, etc. (Ex. set to 10 stitches) <b>PS</b> + <b>PSD</b> .....	44
No.16	To delay set position detection (DOWN stop) with optical sensor, etc., and restart even when optical sensor, etc., operates <b>PS</b> + <b>PSN</b> .....	45
No.17	To execute emergency stop during sewing <b>UES</b> .....	46
No.18	To continue presser foot lifting after the needle is lifted <b>FUM</b> + <b>FU</b> .....	47
No.19	To continue presser foot lifting after the needle is lifted, and to lower the presser foot after the time set on the timer has passed <b>FUM</b> + <b>FU</b> .....	48
No.20	To stop presser foot lifting after lifting needle with the full heeling, needle lift signal (S2) <b>FL</b> .....	49
No.21	To not use automatic presser foot lifting (to stop presser foot lifting with light heeding) <b>S3L</b> .....	50
No.22	To protect when the thread trimming knife does not return <b>6TL</b> .....	51
No.23	To make a half-stitch with the backstitch switch <b>S7</b> .....	52
No.24	To lift the needle with the backstitch switch <b>S7</b> .....	53
No.25	When the tip of the needle is stuck in the thick fabric after .....	54
	thread trimming <b>RU</b> .....	
No.26	To operate the backstitch solenoid simultaneously with thread trimming <b>TB</b> .....	55

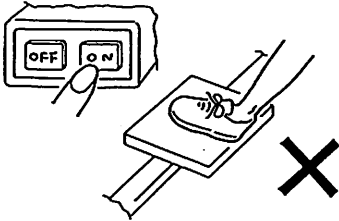
No.27	To use a sewing machine that does not have automatic thread trimming [S2R] + [IL] .....	56
No.28	To set for a different manufacturer's thread trimming sewing machine (Ex. to set to Brother Model B716) [TR] .....	57
No.29	To reverse run to the setting angle from the DOWN position with full heeling and needle lift signal (S2) [TR] .....	58
No.30	To drive the backstitch solenoid during stopping [S7] .....	59
No.31	To stop start tacking with the external switch [UES] .....	60
No.32	To stop end tacking with the external switch [PS] .....	61
8.	How to use the program mode [A] .....	62
No.1	To adjust the pedal toe down amount (Ex. to set value 55 to sew quickly at a high speed) [PDC] .....	62
No.2	To change the time for the sewing machine to reach the high speed (Ex. to set to 100ms with simple setting [h]) [AC] ...	63
No.3	To change the time for the sewing machine to stop (Ex. to set to 230ms with simple setting [L.] [DC] .....	64
No.4	When using a sewing machine with a large inertia [GA] .....	65
No.5	To operate the sewing machine without the detector when the detector is broken [NOS] .....	66
9.	How to use the program mode [B] .....	67
No.1	To change the presser foot holding strength (Ex. to set to 33% duty [LO]) [FUD] .....	67
No.2	To set the needle position stop angle just before the fabric looking from the UP position (Ex. to set to [70°].) [C8] .....	68
10.	How to use the program mode [C] .....	69
No.1	To output a needle cooler output to the sewing machine connector L output [NCL] .....	69
No.2	To fix the operation panel settings during normal mode and tacking mode [PSW] .....	70
11.	How to use the program mode [D] .....	71
No.1	To accurately align tacking (To set the stop time at each tacking corner to 100 milliseconds) [D1] + [CT] .....	71
No.2	To carry out continuous tack stitch (To set the W tacking forward and reverse to 10 stitches) [D2] + [B] + [M] .....	72
No.3	To align tacking when start/end tacking speed is less than 1000 rpm [BM] .....	74

No.4	To correct the no. of forward stitches during start tacking	<b>BT1</b>	. 75
No.5	To correct the no. of reverse stitches during start tacking	<b>BT2</b>	. 76
No.6	To correct the no. of reverse stitches during end tacking	<b>BT3</b>	. 77
No.7	To correct the no. of forward stitches during end tacking	<b>BT4</b>	. 78
12.	How to use the program mode	<b>E</b>	. 79
No.1	How to view the error code history	<b>1, 2, 3, 4</b>	. 79
No.2	To check the pedal operation signal or external operation signal	<b>S1, S2, S3, PD</b>	. 80
No.3	To check the motor and encoder signals	<b>ECA, ECB</b>	. 81
No.4	To check the position detector signal	<b>UP, DN, PG</b>	. 82
No.5	To check each signal	<b>F, 6TL, S7, VR</b>	. 83
No.6	To check the presser foot lifter, thread trimmer, wiper, backstitch and thread release output	<b>FUO, TO, WO, BO, LO</b>	. 84
13.	How to use the program mode	<b>R</b>	. 85
No.1	To return all settings to the factory settings	<b>RESET</b>	. 85
14.	How to use the program mode	<b>1</b>	. 86
No.1	To set the functions for the Mitsubishi thread trimming sewing machine in one step (For example, to set for the LS1-1180-B1T)	<b>180B</b>	. 86
15.	Table of program mode functions		. 88
	* Mitsubishi thread trimming machines simple setting values and motor pulley diameters		. 107
<b>10.</b>	<b>How to Use the Option Connector</b>		<b>108</b>
	1. Connector layout		108
	2. Description of input/output signals		109
	3. List of input signal functions		111
	4. To use as a standing work type sewing machine		112
<b>11.</b>	<b>Error Display</b>		<b>113</b>
<b>12.</b>	<b>Specifications</b>		<b>115</b>
	<b>Table of digital display</b>		<b>116</b>

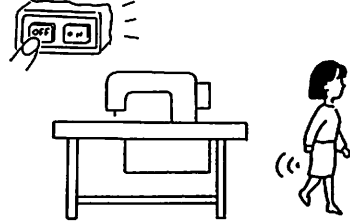
# 1. Points of Caution

## 1. Points of Caution

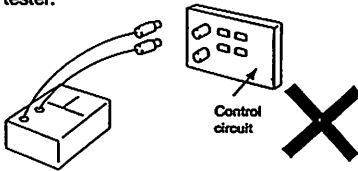
1. Please remove your foot from the pedal when turning the power ON.



2. Always turn the power OFF when leaving the machine.

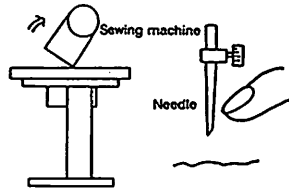


3. Do not inspect the control circuit with a tester.

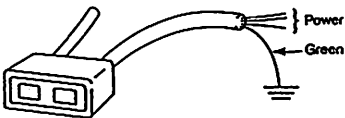


The semiconductor parts may be damaged when the tester's voltage is applied.

4. Always turn the power switch OFF before tilting the sewing machine head, replacing the needle, or threading the needle.

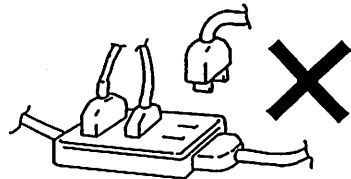


5. Always ground the machine.

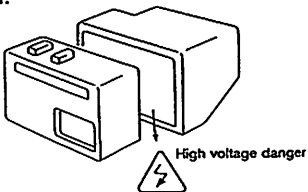


The 3-phase motor has a grounding wire (green). Always ground this.

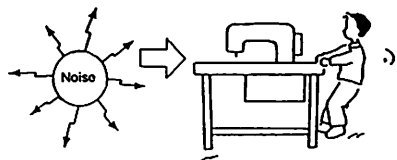
6. Do not use branched wiring when using the single-phase motor.



7. A high voltage is applied inside the machine, so wait 10 minutes after turning the power switch OFF before opening the cover.



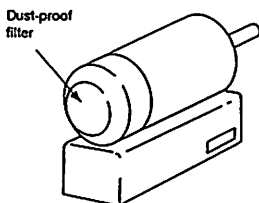
8. Use the machine away from sources of strong noise such as a high frequency welder.



## 1. Points of Caution

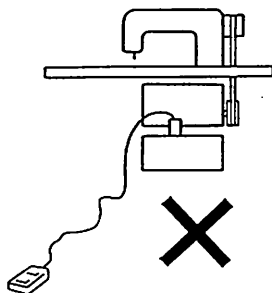
9. The brakes may not function when the power is turned OFF or when there is a power failure during sewing machine operation.
10. Match the connector shape and direction, and insert securely.
11. An optical method is used for the detector's detection element so take care not to let dust or oils get on the detection plate when removing the cover for adjustment, etc. If these do get on the plate, wipe off with a soft cloth and do not scratch the plate. Take care not to let oils enter between the detector discs.
12. When the position detector connector or the belt has come off or when the sewing machine is completely locked, the motor will be automatically turned OFF after a set time to prevent damage to the motor. (The motor may not turn OFF if the locking is not complete.) After the problem has been resolved, turn the power OFF and ON and normal operation will be possible. The same operation should be taken when the detector or wires are broken.

13. Remove the dust that has adhered on the motor's dust-proof filter once every two to three weeks.



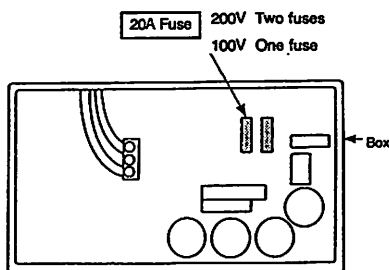
If the motor is run while the filter is clogged, the motor may overheat and affect the motor life.

14. When connecting the external switch to the option connector, etc., keep the signal wire as short as possible. If it is long, malfunctions may occur.

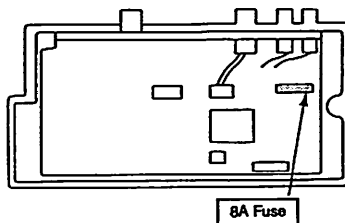


- Use a shield cable for the signal wire when possible.

15. If the fuse blows, remove the cause, and replace the blown fuse with one having the same capacity.



(Front view with cover removed.)



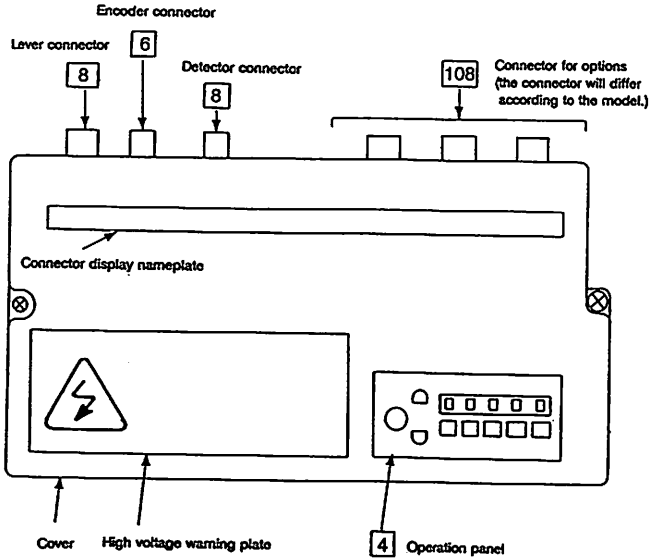
(View from back of cover)



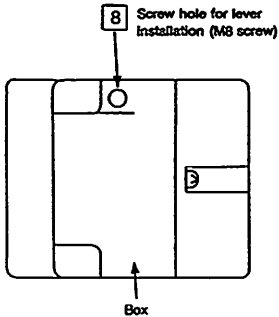
## 2. Names of Each Part

### 2. Names of Each Part

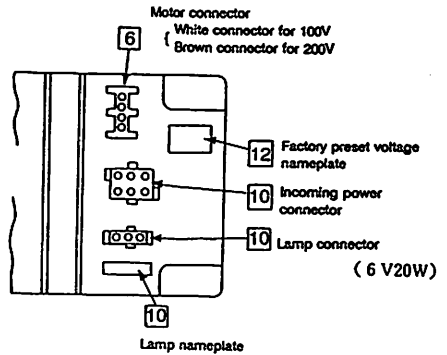
#### 1. Front



#### 2. Left



#### 3. Rear

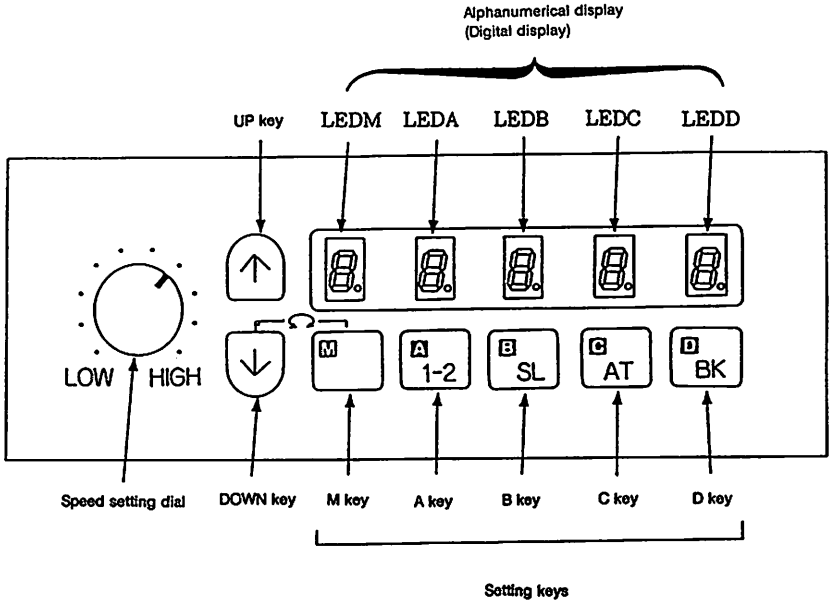


The boxed numerals refer to the reference pages.

## 2. Names of Each Part

### 4. Operation panel

Please refer to page 17 for details.



### 3. Accessories

---

#### 3. Accessories

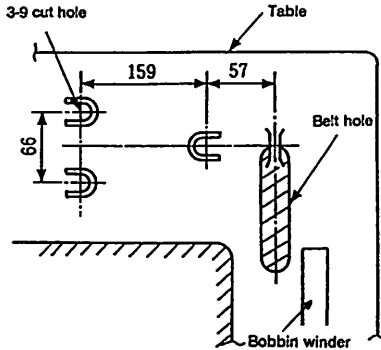
Pushbutton switch	One set	Allen key, plus/minus wood screws, polished washer	One set
Lever unit LK-CL-2X	One set	Connector set 15P, 12P, 6P, 4P	One set
Detector XC-KB-12P	One	Lamp connector	One set
Adapter set for detector	One set	Fuse 8A ... One 20A ... Two	One set
Stopper for detector	One set	Control box installation panel, installation screws	One set

\* Please note that the above accessories may not be enclosed depending on the ordered details or the sewing machine set. (The above accessories are for the standard type.)

## 4. Installation

### 4. Installation

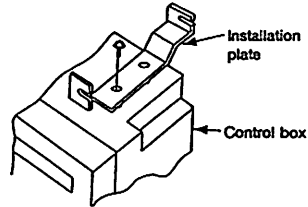
#### 1. Installation of the motor



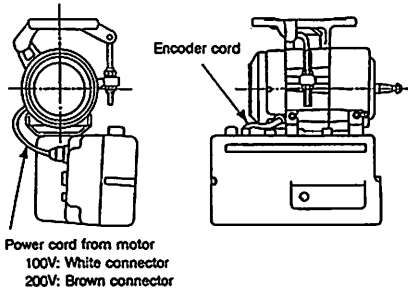
Using the hole opening pattern, open three 9mm holes on the table. Install the motor securely using the installation bolts, washers, spring washers and nuts. The pattern and installation bolts, etc., are included with the motor as accessories.

#### 2. Installation of the control box.

- (1) Install the two enclosed installation plates onto the control box.



- (2) Next, tighten the control box onto the motor.  
 (3) Insert the power cord from the motor into the connector on the back of the control box. Insert the encoder cord from the motor into the encoder connector on the front of the control box.

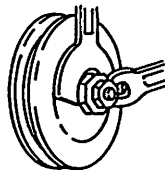


#### 3. Installation of the pulley

Securely tighten the pulley.

##### Caution

Incomplete tightening may cause malfunctions.



Select the correct pulley diameter to ensure complete use of the motor performance.

Selection of the motor pulley:

$$\text{Motor pulley outer diameter (mm)} = \frac{\text{Normal sewing machine speed}}{\text{Motor speed}} \times \text{Motor pulley diameter (effective diameter)} + 5 \text{ mm}$$

- \* The motor speed should be set at 3,600r/min. When the motor pulley diameter is selected with the above method and the pulley diameter is too small, select the minimum pulley in the range that the belt will not slip.

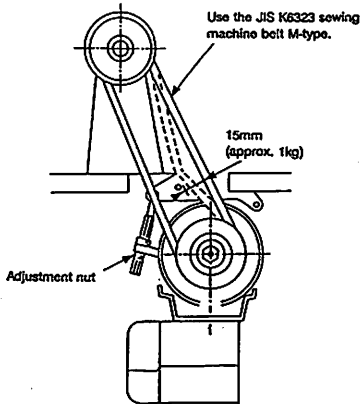
- \*\* Refer to page 107 for the pulley diameter to be used when using the Mitsubishi thread trimming sewing machine.



Select the correct pulley diameter.

## 4. Installation

### 4. Mounting of the belt



- (1) To adjust the belt tension, press down on the center of the belt with your hand, and turn the upper and lower nuts of the adjustment nut to increase or decrease the center height of the motor so that the belt dips approximately 15mm.

#### Caution

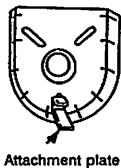
If the belt tension is too low, the medium and low speeds will be inconsistent, and the stopping precision will be poor. When too tight, the motor bearings will deteriorate.

### 5. Installation of the protective cover (with belt slip off prevention part)

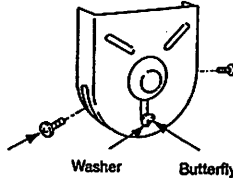
The protective cover is enclosed with the motor as an accessory.

View from back of protective cover

View from front of protective cover



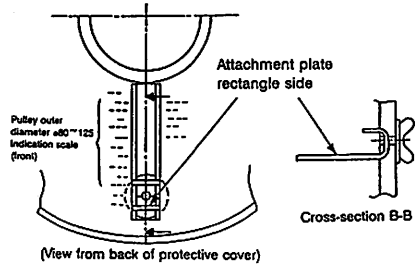
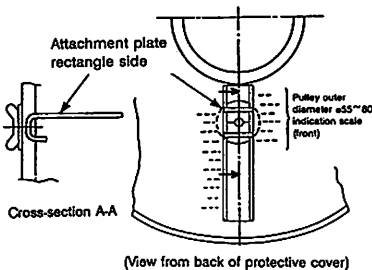
Protective cover installation screw



- Change the direction of the long and short side of the attachment plate according to the motor pulley outer diameter.

(a) For motor pulley outer diameter  $\phi 55 \sim \phi 80$

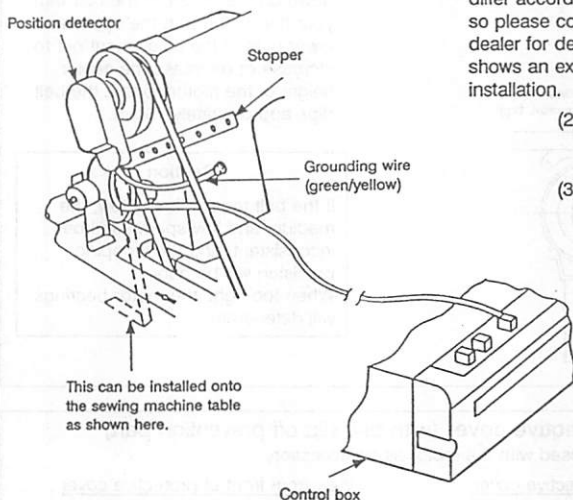
(b) For motor pulley outer diameter  $\phi 80 \sim \phi 125$



- Set the center of the washer to the pulley diameter indication scale and tighten the butterfly bolt.
- Confirm that the belt does not contact the attachment plate.

## 4. Installation

### 6. Installation of the position detector



(1) The installation of the position detector will differ according to the sewing machine model, so please consult with your sewing machine dealer for details. The diagram on the left shows an example of the position detector installation.

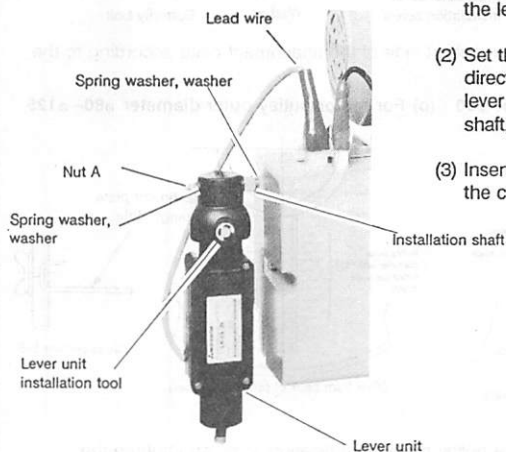
(2) Insert the connector from the position detector into the control box detector connector.

(3) To prevent malfunctions caused by static electricity, connect the grounding wires (green/yellow) from the position detector onto the sewing machine head.

#### Caution

This position detector has a grounding wire so it is exclusive for the B-series. This cannot be used with the conventional XC-A, LF-A and ZK-A Series or previous control boxes.

### 7. Installation of the lever unit



(1) Fix the installation shaft to the screw hole on the left side of the control box.

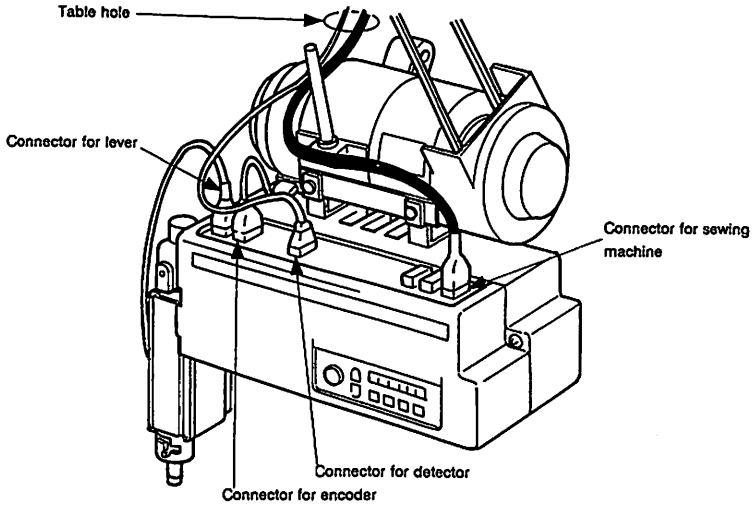
(2) Set the lever unit nameplate side in the same direction as the control box front, insert the lever unit installation tool into the installation shaft, and fix with nut A.

(3) Insert the connector from the lever unit into the control box lever connector.

## 4. Installation

### 8 Connection of the Mitsubishi sewing machine and control box.

Wire the units as shown below.



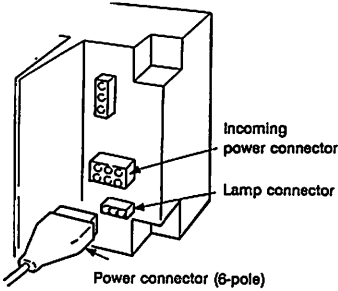
#### Caution

For safety, always turn the power switch OFF and wait for the panel display [E0] (displayed for approx. 10 seconds) before connecting or disconnecting the plugs. This [E0] display is not an error.

## 5. Wiring and Grounding

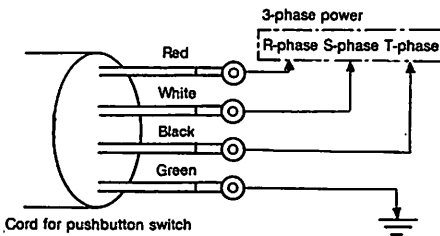
### 5. Wire and Grounding

#### 1. Insertion of the power connector



Confirm the connector form and insertion direction when inserting the power connector into the control box and insert completely.

#### 2. Connection of 3-phase power



- The motor rotation direction can be set with the procedure given on page 22.

#### 3. Current capacity

Use a fuse or complete breaker for the power.

Power	Recommended current capacity
Single phase 100~120V	15A
3 or single phase 200~240V	10A

#### Caution

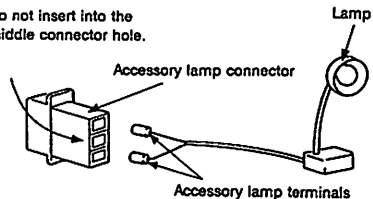
Parallel connection of the lamp and heating devices such as a feet warmer will overheat the load capacity, and may burn the transformer coil. Do not connect these in a parallel connection.

#### 4. Lamp power for lighting

The power (6V 15~20W) for the sewing machine light can be taken from the back of the control box.

Connect the lead wire for the lamp to the accessory lamp terminals, and insert the terminals into the enclosed lamp connector.

Do not insert into the middle connector hole.



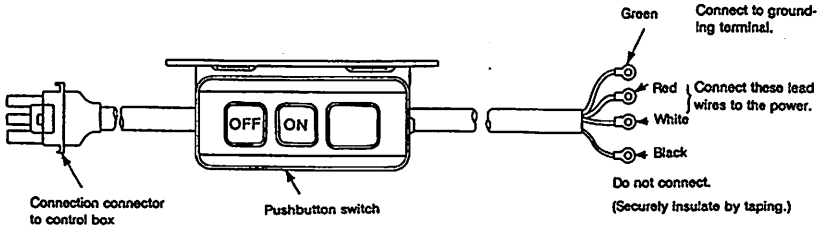
(The lamp fuse XC-CBF is available as an option for the lamp connection short-circuit protection.)



## 5. Wiring and Grounding

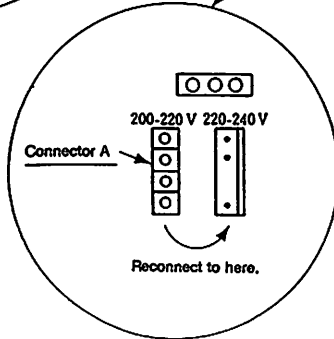
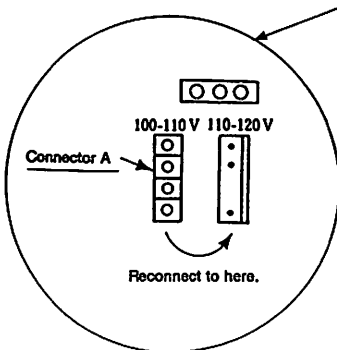
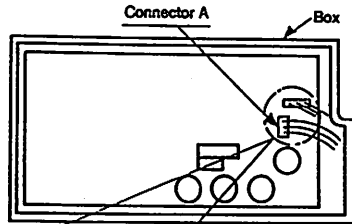
### 5. When using the 3-phase 200V class Limiservo X with single phase 200V class.

- Connect the "red" and "white" lead wires from the pushbutton switch to the power. The black wire is not used. Tape it with insulation tape, etc., to insulate securely. Always ground the green grounding wire.



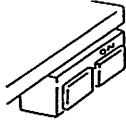
### 6. When using the single phase 100V~110V Limiservo X with single phase 110V~120V or 3-phase 200V~220V Limiservo X with 3-phase 220V~240V

- (1) Remove the cover.
- (2) Reconnect connector A on the box side PCB (printed circuit board) to the 110~120V/ 220~240V side.
- (3) Change the  $\circ$  display on the factory shipment voltage nameplate on the back of the box.



## 6. Confirmation

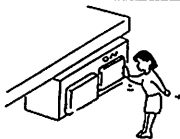
### 6. Confirmation



#### 1. Before turning switches on...

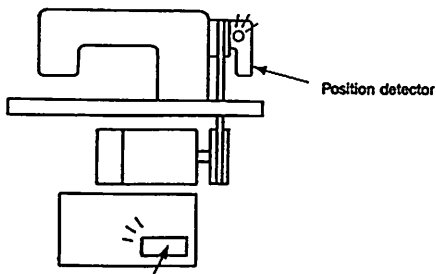
Places to confirm	Reference
(1) Is the power and capacity suitable?	Current capacity on page 10.
(2) Is the power voltage the same as the $\phi$ mark on the factory preset voltage nameplate (FACTORY SET VOLT.) on the back of the control box?	<p>The diagram shows a control box back panel with two voltage nameplates. The top nameplate is for '3 or 1 phase' and has two options: 200 - 220V and 220 - 240V. The bottom nameplate is for 'Single phase' and has two options: 100 - 110V and 110 - 120V. A circle symbol is present next to each option.</p>
(3) Are the connectors inserted correctly? <ul style="list-style-type: none"> <li>• Power connector from pushbutton switch</li> <li>• Motor connector</li> <li>• Motor encoder connector</li> <li>• Lever connector</li> <li>• Position detection connector</li> <li>• Lamp connector</li> <li>• Other connectors (options, presser foot lifter, etc.)</li> </ul>	} Installation of control box on page 6 Installation of lever unit on page 8 Installation of position detector on page 8 Lamp power on page 10
(4) Is the lead wire contacting the V belt?  	<p style="text-align: center;">—</p>
(5) Is the belt tension okay?	Mounting of the belt on page 7
(6) Are the pulley nuts securely tightened?	Installation of the pulley on page 6
(7) Can the sewing machine be rotated lightly by hand?  	<p style="text-align: center;">—</p>

## 6. Confirmation



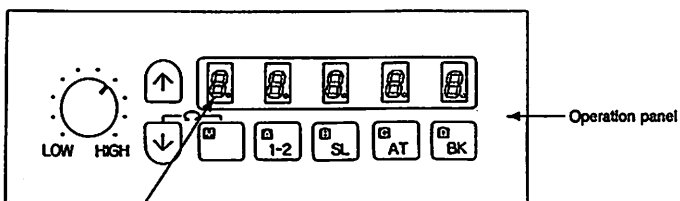
### 2. Turn on the power ...

(1) Does the position detector lamp light?



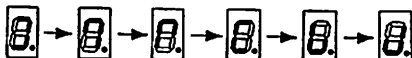
(2) Does the LED on the control box operation panel light?

(3) Is the sewing machine rotation direction correct?



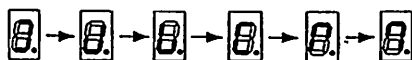
The sewing machine rotation direction is determined with the rotation direction of this LED.

- For left rotation

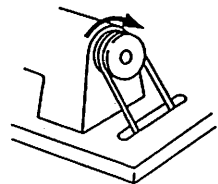
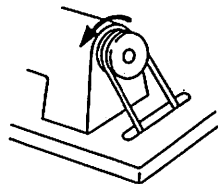


The sewing machine rotates to the left looking from the pulley side. The factory setting is left rotation.

- For right rotation



The sewing machine rotates to the right looking from the pulley side.

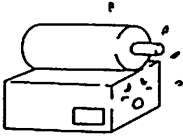


Refer to page 22 for the procedure for changing the rotation direction.

## 6. Confirmation

---

(4) Is there any heat, odors or abnormal sounds coming from the motor of control box?



Turn off the power if there is any heat, odors or abnormal sounds coming from the motor or control box. Contact your dealer immediately.

## 7. Adjustments

### 7. Adjustments

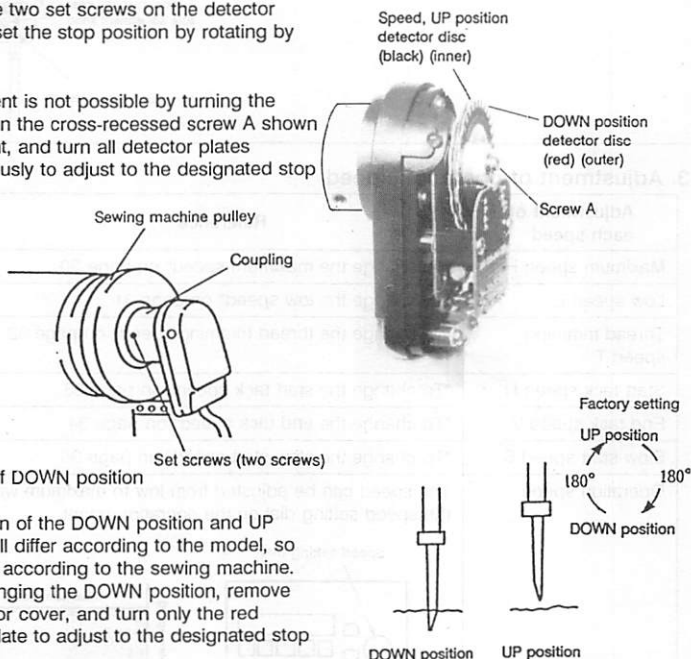
#### 1. Adjustment of stopping position

Adjust this position with the detector installed onto the sewing machine and while stopping at the UP and DOWN positions.

For safety, disconnect the connector for the sewing machine.

##### (1) Adjustment of UP position

- Loosen the two set screws on the detector joint, and set the stop position by rotating by hand.
- If adjustment is not possible by turning the joint, loosen the cross-recessed screw A shown on the right, and turn all detector plates simultaneously to adjust to the designated stop position.



##### (2) Adjustment of DOWN position

- The relation of the DOWN position and UP position will differ according to the model, so adjust this according to the sewing machine.
- When changing the DOWN position, remove the detector cover, and turn only the red detector plate to adjust to the designated stop position.

(The cross-recessed screw A does not need to be loosened at this time.)

- Always replace the cover after adjustment.

(The factory setting of the clearance from the DOWN position to UP position is approx. 180°.)

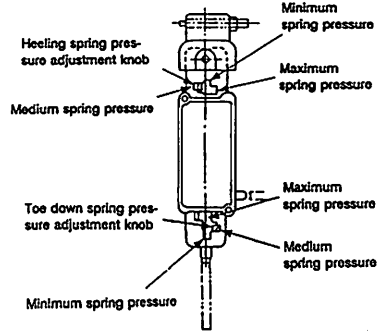
#### Caution

Refer to the sewing machine instruction manual when adjusting for use with the Mitsubishi sewing machine.

## 7. Adjustments

### 2. Adjustment of pedal toe down pressure, and heeling pressure

By changing the spring pressure adjustment knob on the lever unit, the spring pressure can be adjusted in three stages.



### 3. Adjustment of operation speed

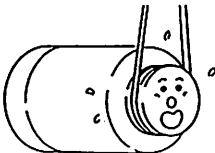
Adjustment of each speed	Reference	Factory setting (speed)
Maximum speed H	"To change the maximum speed" on page 30	4000
Low speed L	"To change the low speed" on page 31	250
Thread trimming speed T	"To change the thread trimming speed" on page 32	200
Start tack speed N	"To change the start tack speed" on page 33	1700
End tack speed V	"To change the end tack speed" on page 34	1700
Slow start speed S	"To change the slow start speed" on page 35	250
Operation speed	The speed can be adjusted from low to maximum with the position of the speed setting dial on the operation panel.	

Speed setting dial

Maximum speed

Low speed

Adjustment range with the speed setting dial



**Caution:**


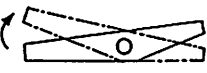
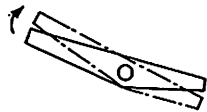
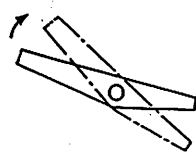
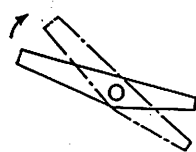
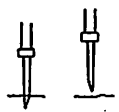
No matter how large the motor pulley diameter is, the speed will not rise higher than the maximum speed H and the speed set with the speed setting dial.

### 4. Adjustment of operation speed when using the Mitsubishi thread trimming sewing machine

Select the functions that correspond to the sewing machine model from the simple setting values for the Mitsubishi thread trimming sewing machine on page 87, and refer to the section "To set to Mitsubishi thread trimming sewing machine in one step" on page 86 to set.

## 8. Pedal Operation

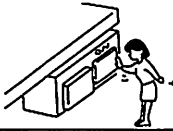
### 8. Pedal Operation

Pedal operation	Operation
 <p>Neutral - Toe down</p>	<p>The sewing machine will rotate at a speed that is relevant to the toe down amount.</p>
 <p>Toe down - Neutral</p>	<p><b>1 position setting</b> Needle UP position stop</p>
 <p>Neutral - Light heeling</p>	<p>Presser foot lifter operation</p>
 <p>Neutral - Full heeling</p>	<p><b>1 position setting</b> The motor rotates once, trims the thread, and then the presser foot rises.</p>
 <p>Neutral - Full heeling</p>	<p><b>2 position setting</b> The motor half-rotates from the DOWN position, trims the thread, and then the presser foot rises.</p>
	<p><b>Caution:</b> Refer to "Changing the needle position during stop" on page 22 for details on setting the 1 position and 2 position.</p>

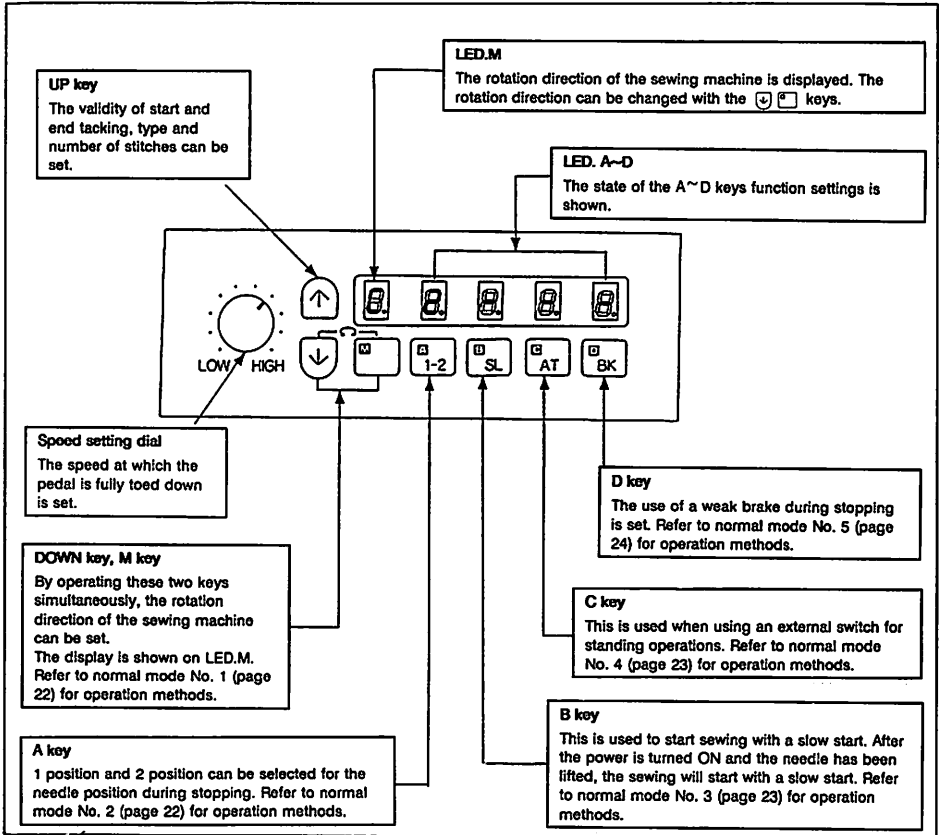
## 9. Operation of the Operation Panel Keys

### 9. Operation of the Operation Panel Keys

#### 1. Displays during normal mode and functions of each key



When the switch is turned ON, the rotation direction will display on the LED.M shown below. This state is called the Normal Mode, and the following keys can be operated.



#### Caution

The above keys can be operated only when the rotary display is shown on the LED.M.

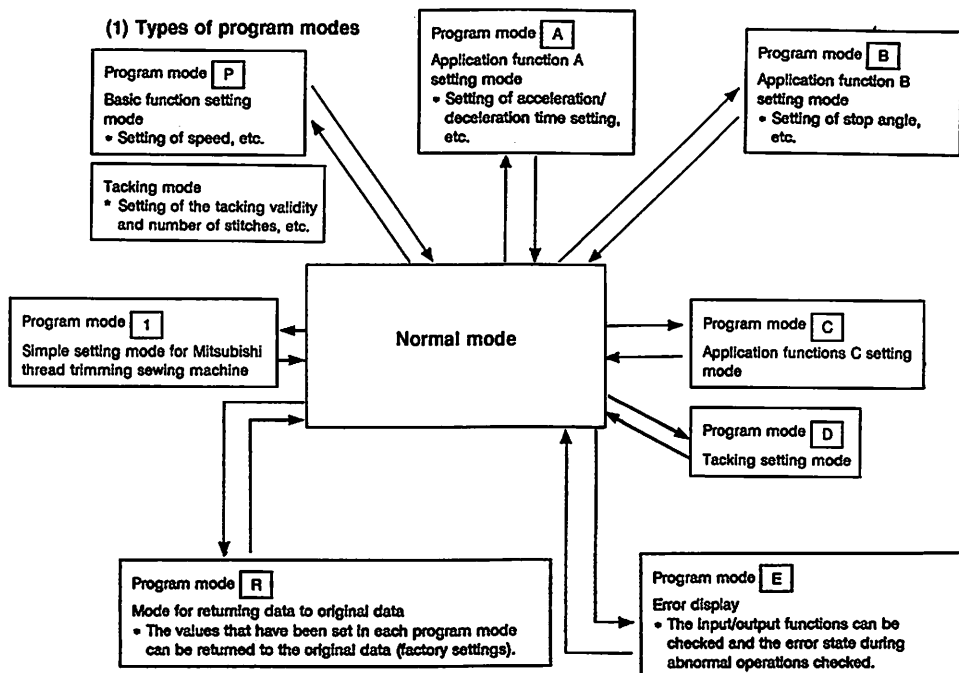


## 9. Operation of the Operation Panel Keys

### 2. Selection of each mode

The modes can be changed from the normal mode to various program modes and various basic functions and application functions set with this operation panel.

#### (1) Types of program modes



#### Caution

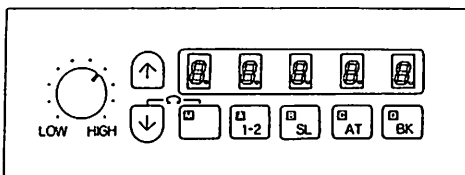
A different program mode cannot be entered from the program mode. To change the program mode, always return to the normal mode first.

#### (2) Program modes and models

Model	BMBL model	Model	BMBL model
Mode name		Mode name	
Normal mode	○	Program mode E	○
Tacking mode	○	Program mode R	○
Program mode P	○	Program mode 1	○
Program mode A	○		
Program mode B	○		
Program mode C	○		
Program mode D	○		

## 9. Operation of the Operation Panel Keys



### (3) Selection of tacking mode and each program mode from the normal mode



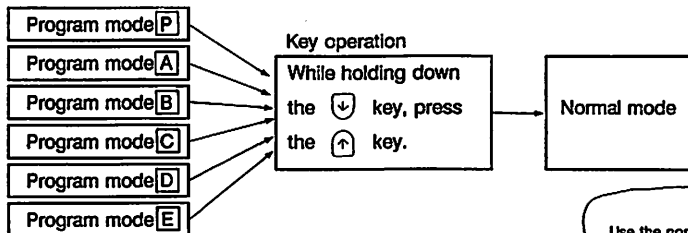
From normal mode to tacking mode and each program mode	Key operation	Digital display
Tacking mode	Press the  key	• The tacking setting mode is entered.
Program mode	While holding down the , press the  key for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  key for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  key for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  key for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  key for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  and  keys for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  and  keys for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.
Program mode	While holding down the , press the  and  keys for 2 seconds or more.	• The display will flicker. • Program mode  will be entered.

## 9. Operation of the Operation Panel Keys

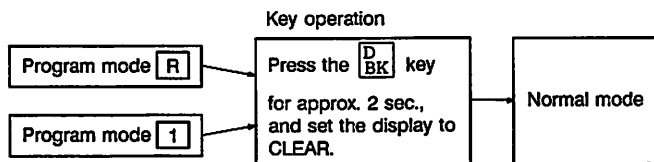
### (4) Selection of normal mode from tacking mode

Press the  key or  key once or twice. (Refer to page 25.)

### (5) Selection of normal mode from each program mode



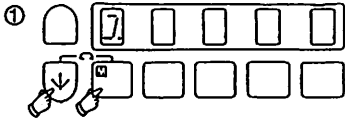
Use the normal mode to operate the sewing machine.



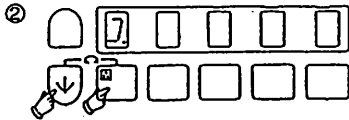
## 9. Operation of the Operation Panel Keys

### 3. How to use the normal mode

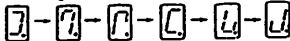
#### No. 1 To change the rotation direction



\* Set to [Right rotation].

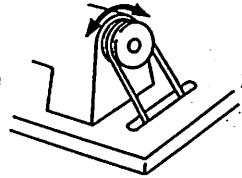


\* Set to [Left rotation].

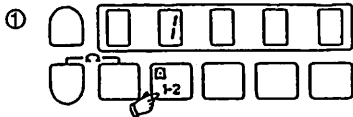


#### Description

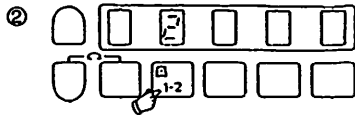
- A) The LED display will alternate the rotation direction each time the key is pressed while holding down the key.
- B) The rotation direction is that looking from the sewing machine pulley side.
- C) The factory setting is left rotation (counterclockwise rotation).



#### No. 2 To change the needle stop position



\* Set to [1 position].



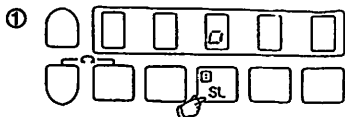
\* Set to [2 position].

#### Description

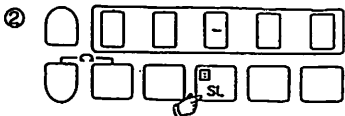
- A) The setting value will alternate between [1] and [2] with each press of the key.
- B) The factory setting is [2 position].

## 9. Operation of the Operation Panel Keys

### No. 3 To start sewing with a slow start



\* Set to [Slow start valid].

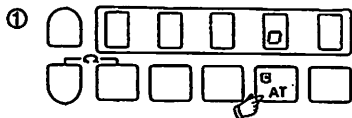


\* Set to [Slow start invalid].

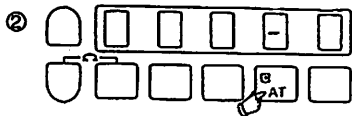
#### Description

- A) The setting value will alternate between [0] and [-] with each press of the  $\boxed{0}$  key.  
 B) The factory setting is [Slow start invalid].

### No. 4 To use as a standing work type sewing machine (to use an external switch)



\* Set to [Standing operation].



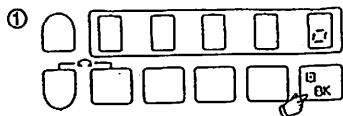
\* Set to [Sitting operation].

#### Description

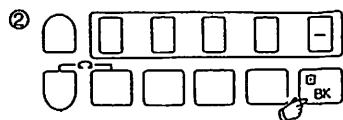
- A) This is equivalent to the conventional A switch and is used for high speed operation during standing operations.  
 B) The setting value will alternate between [0] and [-] with each press of the  $\boxed{0}$  key.  
 The factory setting is [Sitting operation].  
 C) When using the variable speed pedal, set the setting value to [-].

## 9. Operation of the Operation Panel Keys

### No. 5 To apply a weak brake during stopping



\* Set to [Weak brake valid].



\* Set to [Weak brake invalid].



The needle position does not move during stopping

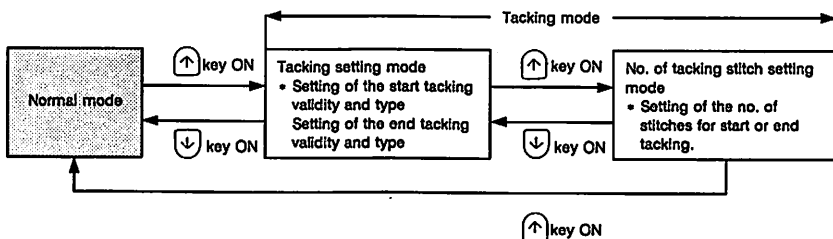
#### Description

- A) The setting value will alternate between [0] and [-] with each press of the **0 BK** key.
- B) The factory setting is [Weak brake invalid].
- C) Use this when the sewing machine needle is completely down when stopped.

## 9. Operation of the Operation Panel Keys

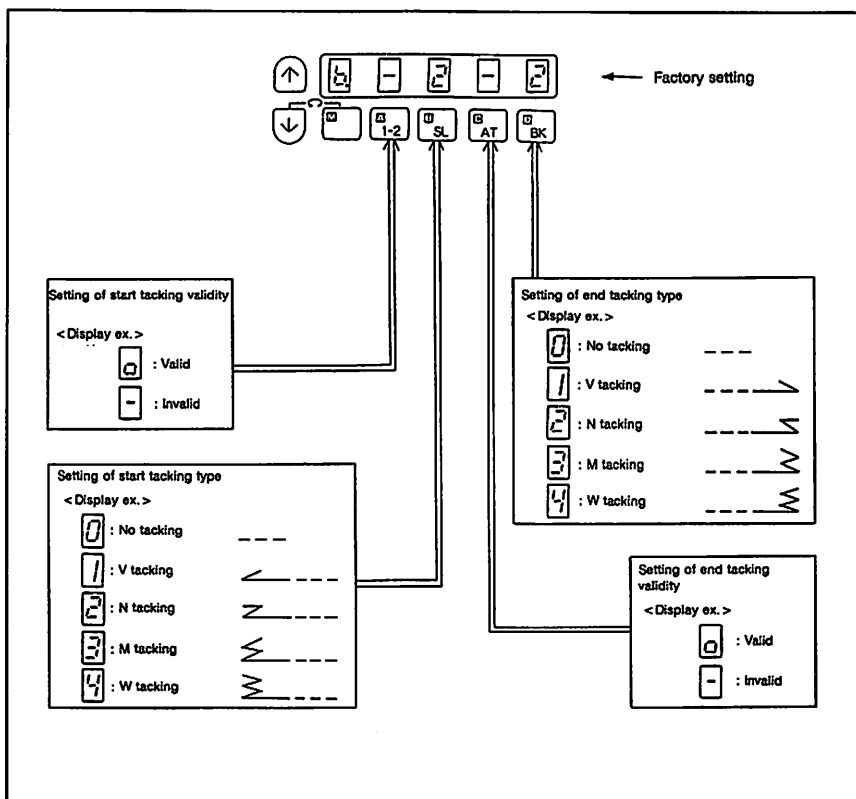
### 4. Displays and functions of each key in the tacking mode

#### (1) Types of tacking modes and key operations






#### (2) Tacking setting mode

When the key is turned ON, will display above the key, and the tacking setting mode will be entered. The validity and type of start and end tacking can be set here.



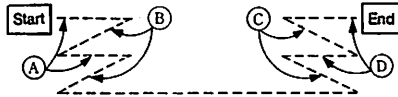
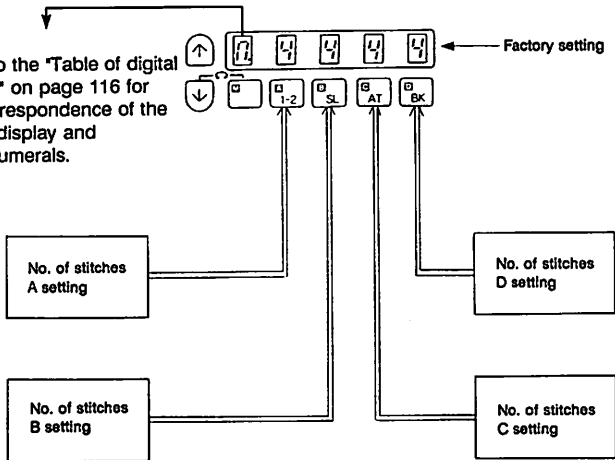
## 9. Operation of the Operation Panel Keys

### (3) No. of tacking stitches setting mode

When the  key is turned ON again,  will display on the  key indicator, and the no. of stitches can be set.

#### Caution

Refer to the "Table of digital display" on page 116 for the correspondence of the digital display and alphanumerals.



Each setting value can be changed from 0 to 9 stitches, A, B, C, D, E, F stitches

- A is 10 stitches
- B is 11 stitches
- C is 12 stitches
- D is 13 stitches
- E is 14 stitches
- F is 15 stitches

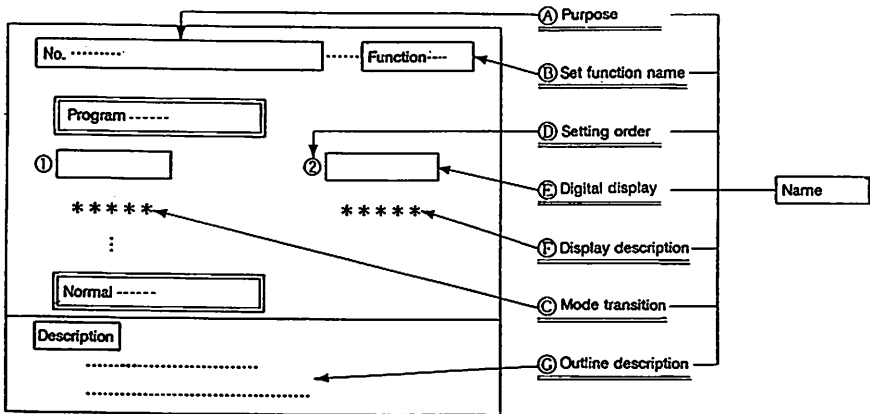




## 9. Operation of the Operation Panel Keys

### 5. Before operating the keys for the program mode

\* Following the next section, the following description method will be used.



#### Description of names

##### A) Purpose

- This selects what kind of operation the sewing machine makes.

##### B) Set function name

- The \*\* display in **\*\*** is the function name, and the \*\* display in  **(\*\*)** is the set value in the function. The function name and set value are separated with a period (.).  
(When one function is used  , when two are used  +  .)

##### C) Mode transition

- This is the LED display and display description displayed first when each program mode is entered.

##### D) Setting order

- Set in the order of numbers.

##### E) Digital display

- Press the key marked with the mark until the function name or setting value to be used is displayed on the LED.
- The function name and setting value will change with each press of the key marked with the mark.
- When setting the function setting with the key, if the LED display and the function setting to be set are the same, the key does not need to be pressed (reset).
- When setting two or more functions (purposes) in the same program mode, the second function (purpose) can be set consecutively after setting the first function (purpose). Press the key for consecutive setting.
- The function will advance with each press of the key and will return with the key.

##### F) Display description

- This is a description of the LED display contents of the functions set with the mark key.

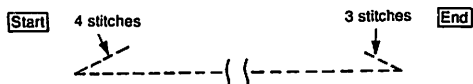
##### G) Outline description

- This is an outline guide of each condition when setting the functions.

## 9. Operation of the Operation Panel Keys

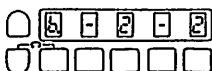
### 6. How to use the tacking mode

No.1 To set the no. of stitches for the start/end V tacking and start tacking retract to 4 stitches, and 3 stitches for the end tacking retract ..... Function setting **B** [0101] + **M** [0430]



Enter the tacking mode (  ) ← (This indicates the key operation. Refer to page 20.)

①



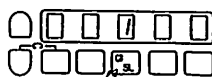
\* The tacking mode will be entered.

②



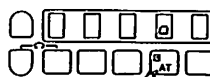
\* Set to [Start tacking valid].

③



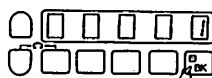
\* Set the start tacking setting to [V tacking].

④



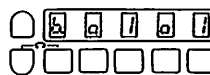
\* Set to [End tacking valid].

⑤



\* Set the end tacking setting to [V tacking].

⑥



\* Complete the tacking setting.

⑦



\* The no. of tacking stitches setting will be entered.

⑧



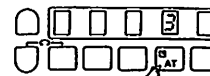
\* Set the no. of start tacking advance stitches to [0].

⑨



\* Set the no. of start tacking retract stitches to [4].

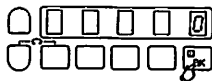
⑩



\* Set the no. of end tacking advance stitches to [0].

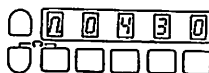
## 9. Operation of the Operation Panel Keys

⑪



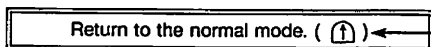
- \* Set the no. of end tacking retract stitches to [3].

⑫



- \* The no. of tacking stitches setting has been completed.

⑬



(This indicates the key operation. Refer to page 21.)

### Description

A) Refer to section "Displays and functions of each key in the tacking mode" on pages 25 and 26.

B) In the tacking setting mode, the following will occur.

- Selection of start tacking validity with  $\left[ \begin{smallmatrix} 0 \\ 1-2 \end{smallmatrix} \right]$  key.
- Selection of end tacking validity with  $\left[ \begin{smallmatrix} 0 \\ AT \end{smallmatrix} \right]$  key.

The setting value will alternate between [0] and [-] with each press of the key.

[0]: Start tacking or end tacking valid

[-]: Start tacking or end tacking invalid

(Both keys are set to [-]: invalid at shipment.)

- The pattern to start tacking is selected with the  $\left[ \begin{smallmatrix} 0 \\ SL \end{smallmatrix} \right]$  key.

The pattern to end tacking is selected with the  $\left[ \begin{smallmatrix} 0 \\ BK \end{smallmatrix} \right]$  key.

For both keys: [0]: No tacking

[1]: V tacking

[2]: N tacking

[3]: M tacking

[4]: W tacking

(Both keys are set to [N tacking] at shipment.)

C) In the no. of tacking stitches setting mode, the following occur.

Selection of the no. of start tacking forward stitches with the  $\left[ \begin{smallmatrix} 0 \\ 1-2 \end{smallmatrix} \right]$  key.

Selection of the no. of start tacking reverse stitches with the  $\left[ \begin{smallmatrix} 0 \\ SL \end{smallmatrix} \right]$  key.

Selection of the no. of end tacking reverse stitches with the  $\left[ \begin{smallmatrix} 0 \\ AT \end{smallmatrix} \right]$  key.

Selection of the no. of end tacking forward stitches with the  $\left[ \begin{smallmatrix} 0 \\ BK \end{smallmatrix} \right]$  key.

When each of the four keys are pressed, the setting value will change between 0 to 9 stitches, A, B, C, D, E, F stitches. A refers to 10 stitches, B to 11 stitches, C to 12 stitches, D to 13 stitches, E to 14 stitches, and F to 15 stitches. (The no. of all stitches is set to [4] at shipment.)

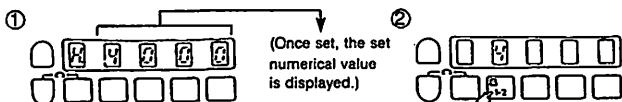
## 9. Operation of the Operation Panel Keys

### 7. How to use the program mode **P** (Refer to the Table of Program Mode Functions on pages 88 to 96.)

No.1 To change the maximum speed (Ex. to change to 4500 rotations)

..... Function setting **H** **4500**

Enter program mode **P** ( **↓** + **↑** ) ← (This indicates the key operation. Refer to page 20.)



\* Program mode **P** will be entered.

\* Set to [4].



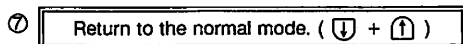
\* Set to [5].

\* Set to [0].



\* Set to [0].

\* The [H] function setting has been completed.



(This indicates the key operation. Refer to page 21.)

Page 88

(The page for reference in the functions table is shown.)

#### Description

A) The setting range of the maximum speed is 0 ~ 8999 rotations.

B) By pressing each of the **0<sub>1-2</sub>**, **0<sub>3</sub>**, **0<sub>AT</sub>**, **0<sub>EX</sub>** keys, the setting value will change between 0 ~ 9.  
(However, the **0<sub>1-2</sub>** key is only between 1 ~ 8.)

C) The factory setting is [4000 rotations].

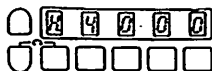
## 9. Operation of the Operation Panel Keys

No.2 To change the low speed (Ex. to change to 200 s/min)

..... Function setting L 200

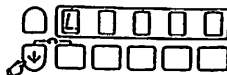
Enter program mode P ( ↓ + ↑ )

①



\* Program mode P will be entered.

②



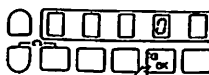
\* Set function to [L].

③



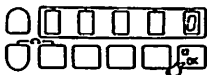
\* Set to [2].

④



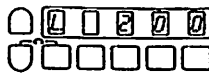
\* Set to [0].

⑤



\* Set to [0].

⑥



\* Complete the [L] function setting.

⑦

Return to the normal mode. ( ↓ + ↑ )

Page 88

### Description

- A) The setting range of the maximum speed is 0 ~ 499 rotations.
- B) By pressing each of the SL AT BK keys, the setting value will change between 0 ~ 9.  
(However, the SL key is only between 0 ~ 4.)
- C) The factory setting is [250 s/min].

## 9. Operation of the Operation Panel Keys

No.3 To change the thread trimming speed (Ex. to change to 180 rotations)

..... Function setting T 180

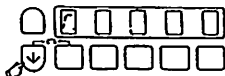
Enter program mode P ( ↓ + ↑ )

①



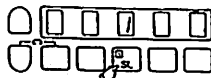
\* Program mode P will be entered.

②



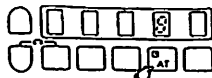
\* Set function to T.

③



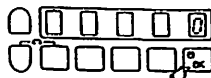
\* Set to 1.

④



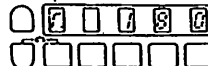
\* Set to 8.

⑤



\* Set to 0.

⑥



\* Complete the T function setting.

(Refer to the "Table of digital display" on page 116 for the correspondence of the digital display and alphanumerals.)

⑦

Return to the normal mode. ( ↓ + ↑ )

Page 88

### Description

- A) The setting range of the thread trimming speed is 0 ~ 499 rotations.
- B) By pressing each of the ↓, AT, BK keys, the setting value will change between 0 ~ 9.  
(However, the ↓ key is only between 0 ~ 4.)
- C) The factory setting is [200 s/min].

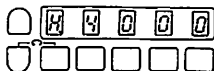
## 9. Operation of the Operation Panel Keys

No.4 To change the start tacking speed (Ex. to change to 1200 rotations)

..... Function setting **N** **1200**

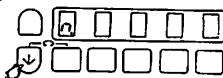
Enter program mode **P** ( **↓** + **↑** )

①



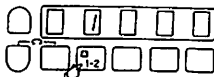
\* Program mode **P** will be entered.

②



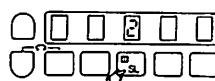
\* Set function to **[N]**.

③



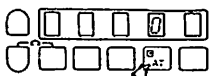
\* Set to **[1]**.

④



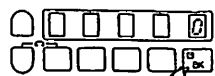
\* Set to **[2]**.

⑤



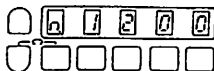
\* Set to **[1]**.

⑥



\* Set to **[2]**.

⑦



\* The **[N]** function setting has been completed.

⑧

Return to the normal mode. ( **↓** + **↑** )

Page 88

### Description

- The setting range of the start tacking speed is 0 ~ 2999 rotations.
- By pressing each of the **[1-2]** **[SL]** **[AT]** **[BK]** keys, the setting value will change between 0 ~ 9.  
(However, the **[1-2]** key is only between 0 ~ 2.)
- The factory setting is [1700 rotations].
- This is effective when aligning the start tacking.

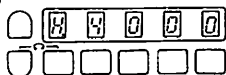
## 9. Operation of the Operation Panel Keys

**No.5 To change the end tacking speed (Ex. to change to 1500 rotations)**

..... Function setting V 1500

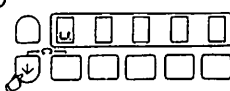
Enter program mode P ( ↓ + ↑ )

①



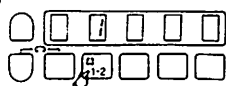
\* Program mode P will be entered.

②



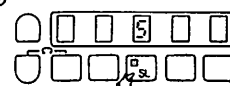
\* Set function to [V].

③



\* Set to [1].

④



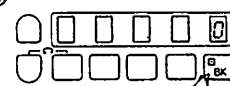
\* Set to [5].

⑤



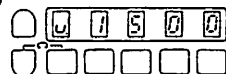
\* Set to [0].

⑥



\* Set to [0].

⑦



\* The [V] function setting has been completed.

⑧

Return to the normal mode. ( ↓ + ↑ )

Page 88

### Description

- A) The setting range of the end tacking speed is 0 ~ 2999 rotations.
- B) By pressing each of the 1-2 SL AT BK keys, the setting value will change between 0 ~ 9.  
(However, the 1-2 key is only between 0 ~ 2.)
- C) The factory setting is [1700 rotations].
- D) This is effective when aligning the end tacking.



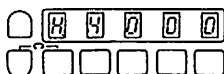
## 9. Operation of the Operation Panel Keys

### No.6 To change the slow start speed (Ex. to change to 300 rotations)

..... Function setting **S** **300**

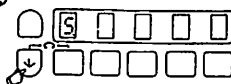
Enter program mode **P** ( **↓** + **↑** )

①



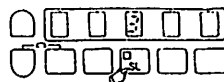
\* Program mode **P** will be entered.

②



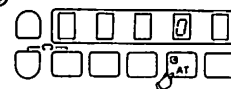
\* Set function to **[S]**.

③



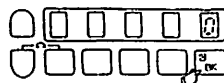
\* Set to **[3]**.

④



\* Set to **[0]**.

⑤



\* Set to **[0]**.

⑥



\* The **[S]** function setting has been completed.

⑦

Return to the normal mode. ( **↓** + **↑** )

Page 88

#### Description

- A) This is valid when the **SL** key in the normal mode is turned ON.
- B) The setting range of the speed is 0 ~ 2999 rotations.
- C) By pressing each of the **1-2**, **SL**, **AT**, **BK** keys, the setting value will change between 0 ~ 9.  
(However, the **1-2** key is only 0 ~ 2.)
- D) The factory setting is [250 rotations].

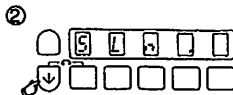
## 9. Operation of the Operation Panel Keys

No.7 To change the number of stitches in slow start (Ex. to change to three stitches)  
..... Function setting **SLN** **3**

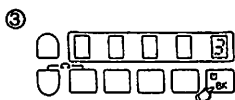
Enter program mode **P** ( **↓** + **↑** )



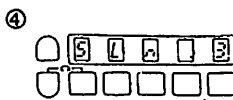
\* Program mode **P** will be entered.



\* Set function to **[SLN]**.



\* Set to **[3]**.



\* The **[SLN]** function setting has been completed.

⑤ Return to the normal mode. ( **↓** + **↑** )

Page 88

### Description

- A) This is valid when the **[S]** key in the normal mode is turned ON.
- B) The setting range of the number of stitches is 1 ~ 5 stitches.
- C) By pressing **[3]** key, the setting value will change between 1 ~ 5 stitches.
- D) The factory setting is **[2 stitches]**.

## 9. Operation of the Operation Panel Keys

**No.8 To carry out low speed operation with external switch**  
 ..... Function setting [SOH] [S0] + [S0] [0]

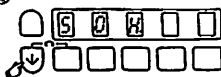
Enter program mode [P] ( ↓ + ↑ )

①



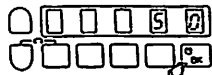
\* Program mode [P] will be entered.

②



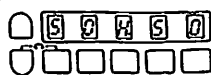
\* Set function to [SOH].

③



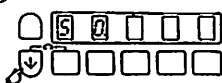
\* Set to [S0].

④



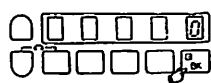
\* Complete the [SOH] function setting.

⑤



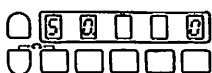
\* Press the ↓ key once, and set the function to [S0].

⑥



\* Set to [0].

⑦



\* The [S0] function setting has been completed.

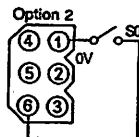
⑧

Return to the normal mode. ( ↓ + ↑ )

Page 88

### Description

- A) Set both the [SOH] and [S0] functions.
- B) The low speed operation will be valid with the switch [S0] connected to the No. 6 pin in the option 2 connector.
- C) Each time the [0] key is pressed in step 3, the set value will alternate between [S0] and [SH]. (The factory setting is [S0].)
- D) Each time the [0] key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [LIO], [BTL]. (The factory setting is [0].)



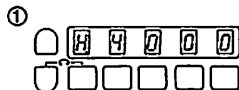
Note) When using this function, always return to the normal mode before starting operations.

## 9. Operation of the Operation Panel Keys

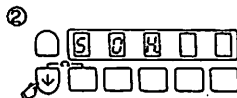
**No.9 To stitch with one needle with the external switch**

..... Function setting [S0H [S0] + [S0 [1]

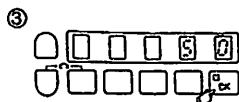
Enter program mode [P] ( [↓] + [↑] )



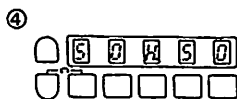
\* Program mode [P] will be entered.



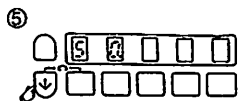
\* Set function to [S0H].



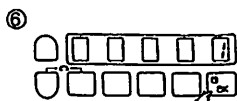
\* Set to [S0].



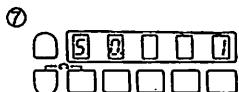
\* Complete the [S0H] function setting.



\* Press the [↓] key once, and set the function to [S0].



\* Set to [1].



\* The [S0] function setting has been completed.

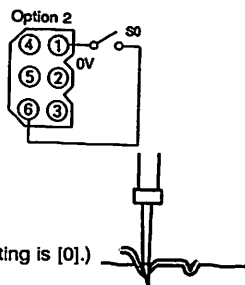
⑧ Return to the normal mode. ( [↓] + [↑] )

Page 88

### Description

- A) Set both the [S0H] and [S0] functions.
- B) The one needle stitching will be valid with the switch [S0] connected to the No. 6 pin in the option 2 connector.
- C) Each time the [P] key is pressed in step 3, the set value will alternate between [S0] and [SH]. (The factory setting is [S0].)
- D) Each time the [P] key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [LIO], [BTL]. (The factory setting is [0].)

Note) When using this function, always return to the normal mode before starting operations.



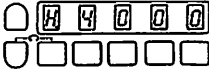
## 9. Operation of the Operation Panel Keys

**No.10 To confirm the position where the needle passed through the fabric and to raise the penetration strength of the first stitch with the external switch**

..... Function setting [SOH] [S0] + [S0] [BCR]

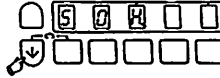
Enter program mode [P] ( ↓ + ↑ )

①



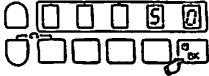
\* Program mode [P] will be entered.

②



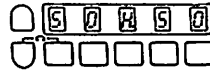
\* Set function to [SOH].

③



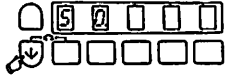
\* Set to [S0].

④



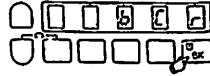
\* Complete the [SOH] function setting.

⑤



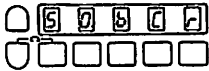
\* Press the ↓ key once, and set the function to [S0].

⑥



\* Set to [BCR].

⑦



\* The [S0] function setting has been completed.

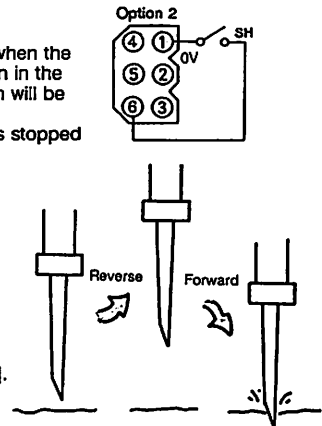
⑧

Return to the normal mode. ( ↓ + ↑ )

Page 89

### Description

- A) Set both the [SOH] and [S0] functions.  
 B) This is used to increase the penetration strength of the first stitch when the fabric is thick. Each time the switch [S0] connected to the No. 6 pin in the option 2 connector is turned ON, the (forward) - (reverse) operation will be repeated, and the needle will stop right above the fabric. However, when the operation signal is turned ON and the needle is stopped with forward operation, the sewing machine will operate forward after reversing once. When stopped with reverse operation, forward operation will start from that position.  
 \* The needle position stop angle is set with the needle position stop angle [C8] in the program mode B (page 68). (The factory setting is [60°].)  
 C) Each time the [ex] key is pressed in step 3, the set value will alternate between [S0] and [SH]. (The factory setting is [S0].)  
 D) Each time the [ex] key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [LJO], [BTL]. (The factory setting is [0].)  
 Note) When using this function, always return to the normal mode before starting operations.

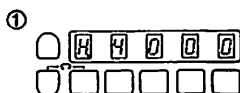


## 9. Operation of the Operation Panel Keys

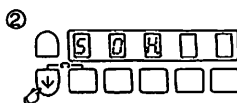
### No.11 To stop tacking with external switch

..... Function setting [S0H] [S0] + [S0] [BTL]

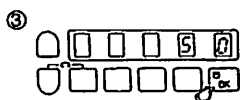
Enter program mode [P] ( ↓ + ↑ )



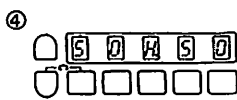
\* Program mode [P] will be entered.



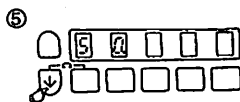
\* Set function to [S0H].



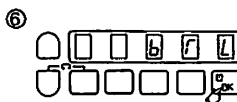
\* Set to [S0].



\* Complete the [S0H] function setting.



\* Press the ↓ key once, and set the function to [S0].



\* Set to [BTL].



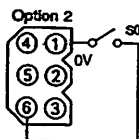
\* The [S0] function setting has been completed.

⑧ Return to the normal mode. ( ↓ + ↑ )

Page 89

#### Description

- Set both the [S0H] and [S0] functions.
- Tacking will be prohibited with the switch [SO] connected to the No. 6 pin in the option 2 connector.
- Each time the key is pressed in step 3, the set value will alternate between [S0] and [SH]. (The factory setting is [S0].)
- Each time the key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [LIO], [BTL], [LIO], [BTL]. (The factory setting is [0].)
- This can be used to prohibit thread trimming or backtacking during operation, or to prevent start/end tacking according to the fabric. (The next end tack can be prohibited by turning the switch ON-OFF once.)



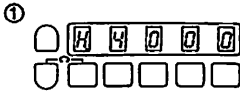
Note) When using this function, always return to the normal mode before starting operations.

## 9. Operation of the Operation Panel Keys

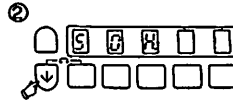
No.12 To bring the one shot function outside and use as the manual/automatic sewing selection switch for test stitching, etc.

..... Function setting [S0H] [SH] + [SHM] [SH]

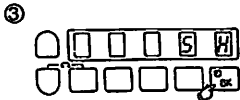
Enter program mode [P] ( ↓ + ↑ )



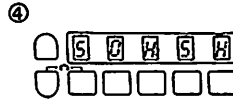
\* Program mode [P] will be entered.



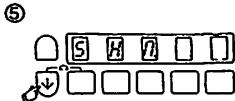
\* Set function to [S0H].



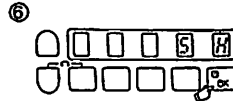
\* Set to [SH].



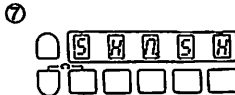
\* Complete the [S0H] function setting.



\* Press the ↓ key three times, and set the function to [SHM].



\* Set to [SH].



\* The [SHM] function setting has been completed.

⑧ Return to the normal mode. ( ↓ + ↑ )

Page 89

### Description

A) Set both the [S0H] and [SHM] functions.

B) Automatic sewing will be valid when the one shot signal [SH] connected to the No. 6 pin in the option 2 connector is turned ON, and manual sewing when the signal is turned OFF.

\* If either of the external operation signals (S1, S0, S4) is turned ON when the one shot signal SH is ON, the sewing machine will rotate at each commanded speed while ON.

When the external operation signal is turned OFF, the sewing machine will continue to operate at the speed set with the speed setting knob. (When the [C<sub>AT</sub>] key is ON in the normal mode.)

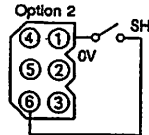
The operation can be stopped with the PSD, PSU or ES signal.

C) Each time the [C<sub>EX</sub>] key is pressed in step 3, the set value will alternate between [S0] and [SH]. (The factory setting is [S0].)

D) Each time the [C<sub>EX</sub>] key is pressed in step 6, the set value will change in order of [SH], [SS], [SA]. (The factory setting is [SH].)

\* The same operation as with No. 13 will occur when set to [SS]

Note) When using this function, always return to the normal mode before starting operations.

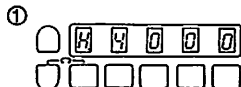


## 9. Operation of the Operation Panel Keys

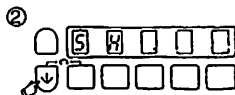
### No.13 To carry out automatic operation (one shot operation)

..... Function setting **[SH ON] + [SHM SS]**

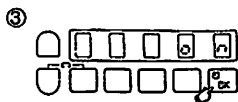
Enter program mode **[P]** (  $\downarrow$  +  $\uparrow$  )



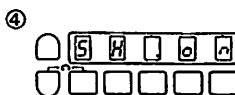
\* Program mode **[P]** will be entered.



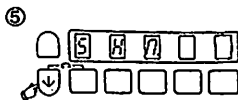
\* Set function to [SH].



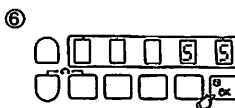
\* Set to [ON].



\* Complete the [SH] function setting.



\* Press the  $\downarrow$  key once, and set the function to [SHM].



\* Set to [SS].



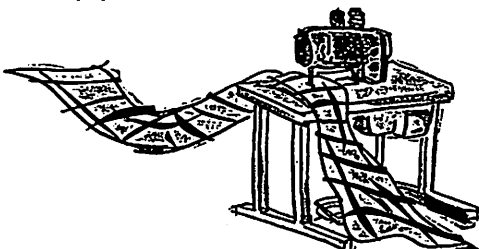
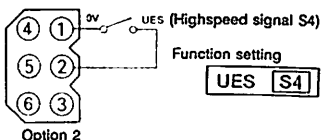
\* The [SHM] function setting has been completed.

⑧ Return to the normal mode. (  $\downarrow$  +  $\uparrow$  )

Page 89

### Description

- A) Set both the [SH] and [SHM] functions.
- B) When either of the external operation signals (S0, S1, S4) is turned ON, the sewing machine will rotate at each commanded speed. Even when the external operation signal is turned OFF, the operation will continue with each commanded speed. (When the  $\uparrow$  key is ON in the normal mode.) The operation can be stopped with PSD, PSU or ES signal. However, when the [SHM] function is set to [SA], the operation can be stopped by turning either of the external operation signals ON again. (Refer to SH operation mode in the P mode on page 89.)
- C) Each time the  $\uparrow$  key is pressed in step 3, the set value will alternate between [OF] and [ON]. (The factory setting is [OF].)
- D) Each time the  $\uparrow$  key is pressed in step 6, the set value will change in order of [SH], [SS], [SA]. (The factory setting is [SH].)
  - \* The same operation as No. 12 will occur when set to [SH].
- E) Connection example  
When using the high speed signal (S4) for the external operation signal.



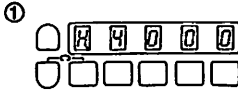


## 9. Operation of the Operation Panel Keys

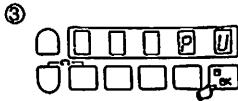
**No.14 To set the number of stitches to the needle UP position stop after detecting the fabric end with an optical sensor, etc. (Ex. to set to 10 stitches)**

..... Function setting **[UES [PU] + [PSU 10]**

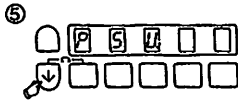
Enter program mode **[P] ( [↓] + [↑] )**



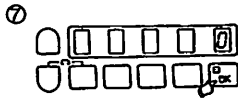
\* Program mode **[P]** will be entered.



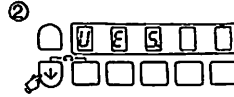
\* Set to **[PU]**.



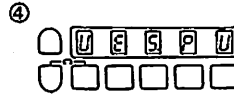
\* Press the **[↓]** key once, and set the function to **[PSU]**.



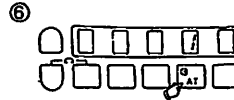
\* Set to **[0]**.



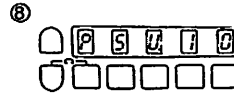
\* Set function to **[UES]**.



\* Complete the **[UES]** function setting.



\* Set to **[1]**.



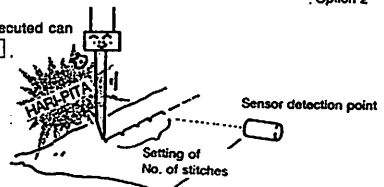
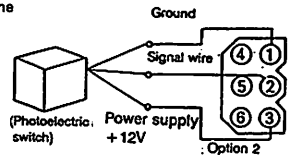
\* The **[PSU]** function setting has been completed.

⑨ **Return to the normal mode. ( [↓] + [↑] )**

Page 90, 92

### Description

- Set both the **[UES]** and **[PSU]** functions.
- When the needle UP position priority signal **PSU** connected to the No. 2 pin in the option 2 connector is contacted against the optical sensor, etc., and the optical sensor turns ON, the needle UP position stop will occur after 10 stitches are made and the thread is trimmed.
- Each time the **[BK]** key is pressed in step 3, the set value will change in order of **[PU][PD][ES][VD][V][S4][SB][EB]**. (The factory setting is **[PU]**.)  
The setting range of the number of stitches is 0 ~ 99 stitches.
- Each time the **[AT]** key in step 6 or **[BK]** key in step 7 is pressed, the set value will change between 0 ~ 9.
- The number of stitches before the needle UP position stop is executed can be set even when the function setting is **[PS [PU] + [PSU 10]**. However, the signal wire must be connected to the No. 4 pin in the option 2 connector.

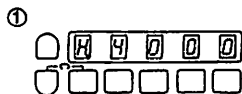


## 9. Operation of the Operation Panel Keys

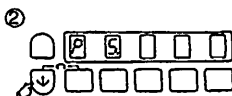
**No.15 To set the number of stitches to the DOWN position stop after the fabric end is detected with the optical sensor, etc. (Ex. set to 10 stitches)**

..... Function setting **PS [PD] + PSD [10]**

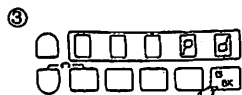
Enter program mode **P** ( **↓** + **↑** )



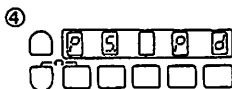
\* Program mode **P** will be entered.



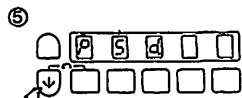
\* Set function to **[PS]**.



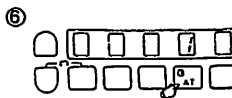
\* Set to **[PD]**.



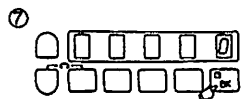
\* The **[PS]** function setting has been completed.



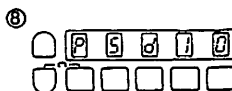
\* Press the **↓** key twice, and enter the **[PSD]** function.



\* Set to **[1]**.



\* Set to **[0]**.



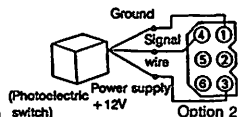
\* The **[PSD]** function setting has been completed.

⑨ Return to the normal mode. ( **↓** + **↑** )

Page 90, 92

### Description

- Set both the **[PS]** and **[PSD]** functions.
- When the needle DOWN position priority signal PSD of the No. 4 pin in the option 2 connector is connected to the optical sensor, etc., and the optical sensor turns ON, the needle DOWN position will stop after 10 stitches.
- Each time the **[OK]** key in step 3 is pressed, the set value will change between **[PU]**, **[PD]**, **[BCR]**, **[USR]**, **[S70]**, **[BTL]**, **[SB]**, and **[EB]**. (The factory setting is **[PD]**.) The setting range of the number of stitches is 0 ~ 99 stitches.
- The setting range of the number of stitches is 0 ~ 99 stitches.
- Each time the **[AT]** key in step 6, and the **[OK]** key in step 7 is pressed, the set value will change between 0 ~ 9.
- The number of stitches before the needle DOWN position stop is executed can be set even when the function setting is **[UES [PD]] + [PSD [10]]**. However, the signal wire must be connected to the No. 2 pin in the option 2 connector.

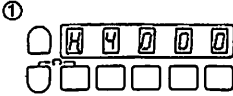


## 9. Operation of the Operation Panel Keys

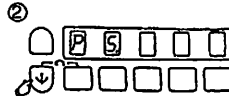
**No.16 To restart even if the optical sensor, etc., is activated after the set position is detected (DOWN stop) by the optical sensor, etc.**

..... Function setting **[PS [PD]] + [PSN [ON]]**

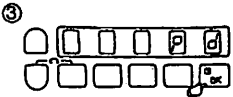
Enter program mode **[P] ( ↓ + ↑ )**



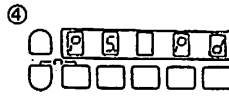
\* Program mode **[P]** will be entered.



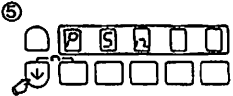
\* Set function to **[PS]**.



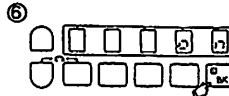
\* Set to **[PD]**.



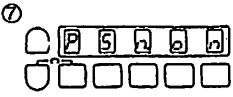
\* The **[PS]** function setting has been completed.



\* Press the **[↓]** key three times, and enter \* Set to **[ON]**. the **[PSN]** function.



\* Set to **[ON]**.



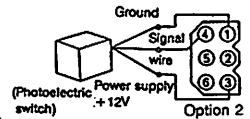
\* The **[PSN]** function setting has been completed.

⑧ Return to the normal mode. ( ↓ + ↑ )

Page 90, 92

### Description

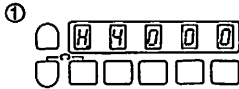
- Set both the **[PS]** and **[PSN]** functions.
- Operation can be restarted by toeing down the pedal or with the external operation signal (S0, S1) even when the needle DOWN position priority signal PSD connected to the No. 4 pin in the option 2 connector is connected to the optical sensor, etc., and the optical sensor turns ON.
- Each time the **[BCR]** key in step 3 is pressed, the set value will change between **[PU]**, **[PD]**, **[BCR]**, **[USRI]**, **[S70]**, **[BTL]**, **[SB]**, and **[EB]**. (The factory setting is **[PD]**.)  
The setting range of the number of stitches is 0 ~ 99 stitches.
- Each time the **[EB]** key in step 6 is pressed, the set value will alternate between **0F** ~ **ON**. (The factory setting is **[OF]**.)
- Restarting is possible even when the function setting is **[UES [PD]] + [PSN [ON]]**. However, the signal wire must be connected to the No. 2 pin in the option 2 connector.



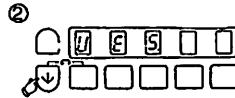
## 9. Operation of the Operation Panel Keys

**No.17 To execute emergency stop during sewing**  
 ..... Function setting [UES] [ES]

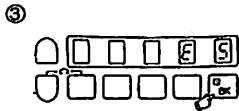
Enter program mode [P] ( ↓ + ↑ )



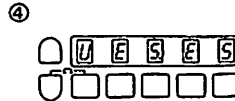
\* Program mode [P] will be entered.



\* Set function to [UES].



\* Set to [ES].




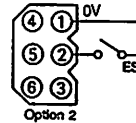
\* The [UES] function setting has been completed.

⑤ Return to the normal mode. ( ↓ + ↑ )

Page 90

### Description

- Connect the emergency stop signal ES to the No. 2 pin in the option 2 connector.
- Each time the  key is pressed, the set value will change in order of [PU][PD][ES][UD][V][S4][SB][EB]. (The factory setting is [PU].)
- The emergency stop function can be used even when the function setting is 6TLES. However, the switch must be connected to the No. 5 and 6 pins in the machine connector.



Note) When using this function, always return to the normal mode before starting operation.

## 9. Operation of the Operation Panel Keys

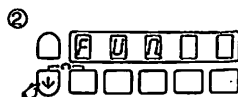
**No.18 To continue presser foot lifting after the thread trimming**

..... Function setting **FUM [ON]** + **FU [M]**

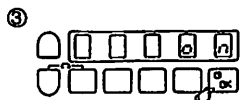
Enter program mode **P** ( + )



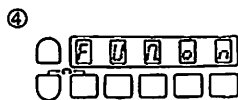
\* Program mode **P** will be entered.



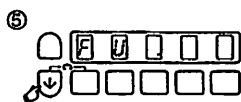
\* Set function to **[FUM]**.



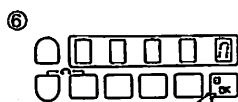
\* Set to **[ON]**.



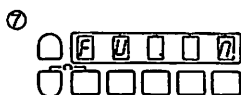
\* The **[FUM]** function setting has been completed.



\* Press the key once, and set the function to **[FU]**.



\* Set to **[M]**.



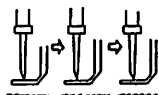
\* The **[FU]** function setting has been completed.

⑧ Return to the normal mode. ( + )

Page 92

### Description

- A) Set both the **[FUM]** and **[FU]** functions.
- B) Each time the key is pressed in step 3, the set value will alternate between **[OF]** and **[ON]**. (The factory setting is **[OF]**.)
- C) Each time the key is pressed in step 6, the set value will change in order of **[M]**, **[C]**, **[A]**, **[T]**. (The factory setting is **[M]**.)



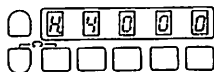
## 9. Operation of the Operation Panel Keys

**No.19 To continue presser foot lifting after the thread trimming, and to lower the presser foot after the time set on the timer has passed**

..... Function setting **FUM [ON]** + **FU [C]**

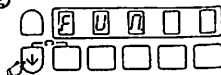
Enter program mode **P** (  $\downarrow$  +  $\uparrow$  )

①



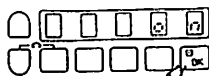
\* Program mode **P** will be entered.

②



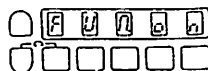
\* Set function to **[FUM]**.

③



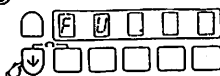
\* Set to **[ON]**.

④



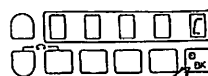
\* The **[FUM]** function setting has been completed.

⑤



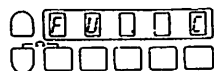
\* Press the  $\downarrow$  key once, and set the function to **[FU]**.

⑥



\* Set to **[C]**.

⑦



\* The **[FU]** function setting has been completed.

⑧

Return to the normal mode. (  $\downarrow$  +  $\uparrow$  )

Page 92

### Description

- Set both the **[FUM]** and **[FU]** functions.
- Each time the **[OK]** key is pressed in step 3, the set value will alternate between **[OF]** and **[ON]**.  
(The factory setting is **[OF]**.)
- Each time the **[OK]** key is pressed in step 6, the set value will change in order of **[M]**, **[C]**, **[A]**, **[T]**.  
(The factory setting is **[M]**.)
- The factory setting of the timer is 12 seconds.  
The timer time can be adjusted with the **FUM** timer setting **[FCT]** in the **B** mode on page 99.

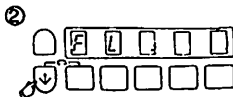
## 9. Operation of the Operation Panel Keys

No.20 To stop presser foot lifting after thread trimming with the full heeling, thread trimming signal (S2) ..... Function setting [FL] [ON]

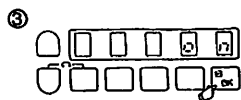
Enter program mode [P] ( ↓ + ↑ )



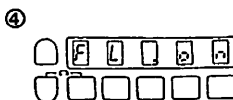
\* Program mode [P] will be entered.



\* Set function to [FL].



\* Set to [ON].



\* The [FL] function setting has been completed.

⑤ Return to the normal mode. ( ↓ + ↑ )

Page 92

### Description

- A) The presser foot lifting operation is carried out with the presser foot lifting signal F or with light heeling.
- B) Each time the  $\text{ON}$  key is pressed, the set value will alternate between [OF] and [ON]. (The factory setting is [OF].)

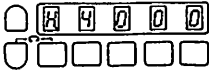
## 9. Operation of the Operation Panel Keys

**No.21 To not use automatic presser foot lifting (to stop presser foot lifting with light heeling)**

..... Function setting **S3L** **ON**

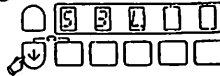
Enter program mode **P** ( **↓** + **↑** )

①



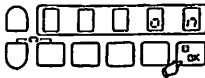
\* Program mode **P** will be entered.

②



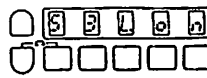
\* Set function to **[S3L]**.

③



\* Set to **[ON]**.

④



\* The **[S3L]** function setting has been completed.

⑤

Return to the normal mode. ( **↓** + **↑** )

Page 93

### Description

- A) The presser foot lifting operation is carried out with the presser foot lifting signal F or with full heeling.
- B) Each time the **ON** key is pressed, the set value will alternate between **[OF]** and **[ON]**. (The factory setting is **[OF]**.)



## 9. Operation of the Operation Panel Keys

**No.22 To protect when the thread trimming knife does not return**

..... Function setting **[6TL]** **[S6]**

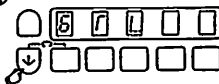
Enter program mode **[P]** ( + )

①



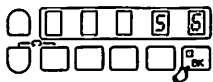
\* Program mode **[P]** will be entered.

②



\* Set function to **[6TL]**.

③



\* Set to **[S6]**.

④



\* The **[6TL]** function setting has been completed.

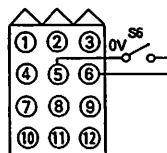
⑤

Return to the normal mode. ( + )

Page 93

### Description

- A) The thread trimming protection is validated with the switch **[S6]** connected to the sewing machine connector No. 6 pin.
- B) Each time the key is pressed in step 3, the setting will change in order of **[TL][S6][ES][UD][U][BC][I][LB]**. (The factory setting is **[TL]**.)



Sewing machine

Note) When using this function, always return to the normal mode before starting operation.

## 9. Operation of the Operation Panel Keys

**No.23 To make a half-stitch with the backstitch switch.**

..... Function setting **S7** **UDS**

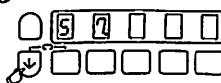
Enter program mode **P** ( **↓** + **↑** )

①



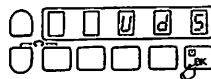
\* Program mode **P** will be entered.

②



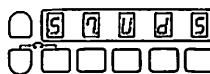
\* Set function to **[S7]**.

③



\* Set to **[UDS]**.

④



\* The **[S7]** function setting has been completed.

⑤

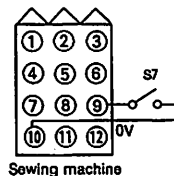
Return to the normal mode. ( **↓** + **↑** )

Page 94

### Description

- A) The half-stitch is validated with the switch **[S7]** connected to the sewing machine connector No. 10 pin.
- B) Each time the **[S7]** key is pressed in step 3, the setting will change in the order of **[0]**, **[UDS]**, **[US]**, **[BSL]**, **[UCR]**, and **[UBR]**. (The factory setting is **[0]**.)

Note) Always return to the normal mode before operating the sewing machine when using this function.

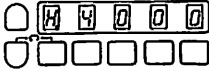


## 9. Operation of the Operation Panel Keys

**No.24 To lift the needle with the backsitch switch**  
 ..... Function setting **[S7]** **[US]**

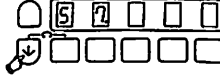
Enter program mode **[P]** ( **[↓]** + **[f]** )

①



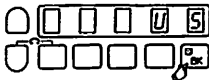
\* Program mode **[P]** will be entered.

②



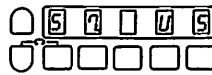
\* Set function to **[S7]**.

③



\* Set to **[US]**.

④



\* The **[S7]** function setting has been completed.

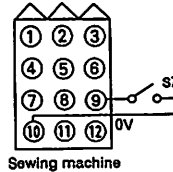
⑤

Return to the normal mode. ( **[↓]** + **[f]** )

Page 94

### Description

- A) The needle will stop at the UP position by the **[S7]** signal ON when stopped at the needle DOWN position with the switch **[S7]** connected to the sewing machine connector No. 10 pin.
- B) Each time the **[Pr.]** key is pressed in step 3, the setting will change in the order of **[0]**, **[UDS]**, **[US]**, **[BSL]**, **[UCR]**, and **[UBR]**. (The factory setting is **[0]**.)



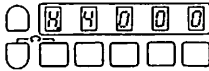
Note) Always return to the normal mode before operating the sewing machine when using this function.

## 9. Operation of the Operation Panel Keys

**No.25** When the tip of the needle is stuck in the thick fabric after thread trimming  
 ..... Function setting **[RU]** **[ON]**

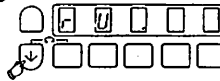
Enter program mode **[P]** ( + )

①



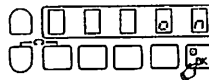
\* Program mode **[P]** will be entered.

②



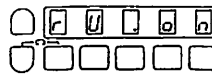
\* Set function to **[RU]**.

③



\* Set to **[ON]**.

④



\* The **[RU]** function setting has been completed.

⑤

Return to the normal mode. ( + )

Page 94

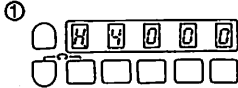
**Description**

- A) After trimming the thread, the motor is reverse run, and the needle will stop near the needle bar top dead center. The reverse run angle can be set with **[R8]**, and the setting range is 0 to 360° in two-degree intervals. (The factory setting is [30°].) **[R8]** can be set by pressing the key after completing the **[RU]** function setting in step 4.
- B) Each time the key is pressed in step 3, the setting will alternate between **[OF]** and **[ON]**. (The factory setting is **[OF]**.)

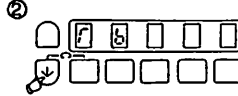
## 9. Operation of the Operation Panel Keys

**No.26 To operate the backstitch solenoid simultaneously with thread trimming**  
 ..... Function setting TB ON

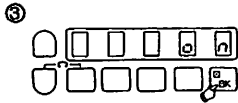
Enter program mode P ( ↓ + ↑ )



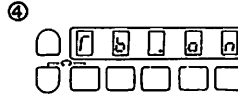
\* Program mode P will be entered.



\* Set function to TB.



\* Set to ON.



\* The TB function setting has been completed.

⑤ Return to the normal mode. ( ↓ + ↑ )

Page 94

**Description**

- A) This is effective for performing end tacking with V tacking or W tacking and then performing thread trimming.
- B) Each time the OK key is pressed in step 3, the setting will alternate between OF and ON.  
 (The factory setting is OF.)

## 9. Operation of the Operation Panel Keys

**No.27 To use a sewing machine that does not have automatic thread trimming**

..... Function setting **[S2R [OF]] + [IL [ON]]**

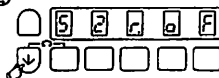
Enter program mode **[P]** ( **[↓]** + **[↑]** )

①



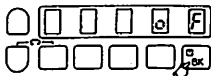
\* Program mode **[P]** will be entered.

②



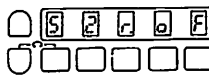
\* Set function to **[S2R]**.

③



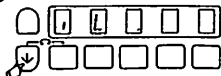
\* Set to **[OF]**.

④



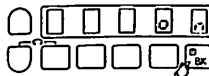
\* The **[S2R]** function setting has been completed.

⑤



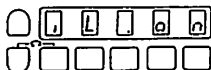
\* Press the **[↓]** key once, and set the function to **[IL]**.

⑥



\* Set to **[ON]**.

⑦



\* The **[IL]** function setting has been completed.

⑧ Return to the normal mode. ( **[↓]** + **[↑]** )

Page 95

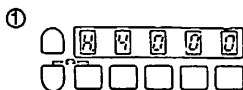
### Description

- A) Set both the **[S2R]** and **[IL]** functions.
- B) When **[S2R]** is set to **[OF]**, the motor will not rotate even with full heeling or the thread trimming signal **S2 ON** when the needle is stopped at the UP position. Only the presser foot will be lifted.
- C) When **[IL]** is set to **[ON]**, restarting operation will be possible in a moment even if the pedal is toed down right after full pedal heeling.
- D) Each time the **[↓]** key is pressed in step 3, the setting will alternate between **[OF]** and **[ON]**.  
(The factory setting is **[ON]**.)
- E) Each time the **[ON]** key is pressed in step 6, the setting will alternate between **[OF]** and **[ON]**.  
(The factory setting is **[OF]**.)

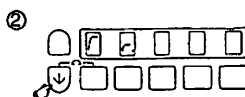
## 9. Operation of the Operation Panel Keys

**No.28 To set for a different manufacturer's thread trimming sewing machine**  
 (Ex. to set to Brother Model B716) ..... Function setting **TR** **B1**

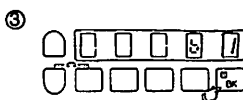
Enter program mode **P** ( **↓** + **↑** )



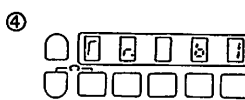
\* Program mode **P** will be entered.



\* Set function to **TR**.



\* Set to **B1**.



\* The **TR** function setting has been completed.

⑤ Return to the normal mode. ( **↓** + **↑** )

Page 95

### Description

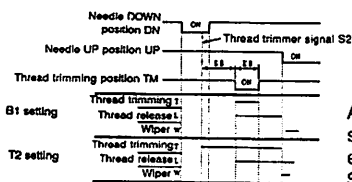
- A) Each time the **OK** key is pressed in step 3, the setting will change in the order of [M1], [B1], [D1], [J1], [N1], [P1], [P2], [P3], [P4], [S1], [S2], [T1], [T2], [PRG], and [RK]. (The factory setting is [M1].) Refer to the mode **P** thread trimming mode TR on page 95~96 for the setting values.
- B) When connecting this control box to a thread trimming sewing machine not manufactured by Mitsubishi, make sure that the sewing machine side solenoids or solenoid valve terminals and the solenoid output terminals on the sewing machine connector (refer to page 108) match accurately.

### Note

In this thread trimming mode TR, the thread trimming timing for other manufactures' thread trimming sewing machines can be set but the speed, etc., cannot be set. Set these separately.

### Note

When setting for the B1 (Brother), or T2 (Toyota) machines, refer to the following thread trimming timing. Follow the sewing machine adjustment procedures, and adjust the setting.

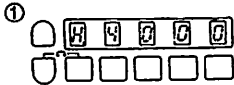


Adjust the thread trimming position TM signal's ON starting angle S8, and ON angle E8 with the B mode explained on page 100. (The factory setting is 50° for S8, and 90° for E8.)

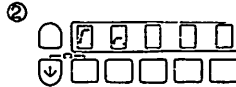
## 9. Operation of the Operation Panel Keys

No.29 To reverse run to the set angle from the DOWN position with full heeling or thread trimming signal (S2) ..... Function setting **TR** **[RK]**

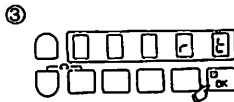
Enter program mode **P** ( **↓** + **↑** )



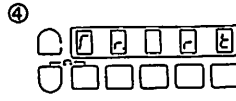
\* Program mode **P** will be entered.



\* Set function to **[TR]**.



\* Set to **[RK]**.



\* The **[TR]** function setting has been completed.

⑤ Return to the normal mode. ( **↓** + **↑** )

Page 96

### Description

- A) Each time the **[ex]** key is pressed in step 3, the setting will change in the order of [M1], [B1], [D1], [J1], [N1], [P1], [P2], [P3], [P4], [S1], [T1], [T2], [PRG], and [RK]. (The factory setting is [M1].)
- B) The set angle can be adjusted with the reverse run angle K8 from the DOWN position to the UP position in mode B.  
Consult with your sewing machine dealer for the adjustment of the set angle. (The factory setting is [76°].)
- C) This can be used in the blind stitch sewing machine.



## 9. Operation of the Operation Panel Keys

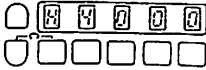
**No.30 To drive the backstitch solenoid during stopping**

..... Function setting

S7 [BSL]

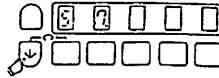
Enter program mode **P** ( ↓ + ↑ )

①



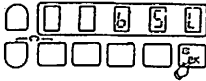
\* Program mode **P** will be entered.

②



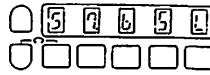
\* Set function to [S7].

③



\* Set to [BSL].

④



\* The [S7] function setting has been completed.

⑤

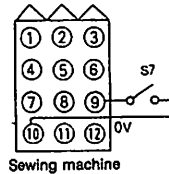
Return to the normal mode. ( ↓ + ↑ )

Page 94

### Description

A) The backstitch solenoid can be driven while the sewing machine is stopped by turning ON the switch [S7] connected to the sewing machine connector No.9 pin. The operation will be smooth when starting backstitching.

B) Each time the **Ex** key is pressed in step 3, the setting will change in the order of [0], [UDS], [US], [BSL], [UCR] and [UBR]. (The factory setting is [0].)



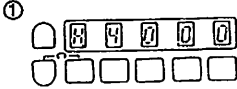
Note) Always return to the normal mode before starting the sewing machine in this mode.

## 9. Operation of the Operation Panel Keys

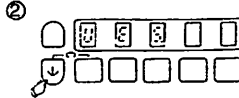
### No.31 To stop start tacking with the external switch

..... Function setting UES SB

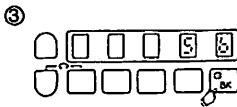
Enter program mode P ( ↓ + ↑ )



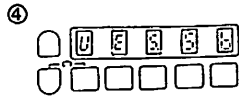
\* Program mode P will be entered.



\* Set function to UES.



\* Set to SB.



\* The UES function setting has been completed.

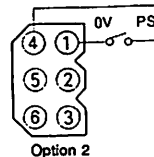
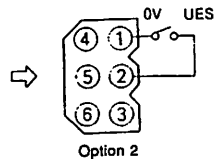
⑤ Return to the normal mode. ( ↓ + ↑ )

Page 90

### Description

- A) The validity of start tacking can be selected with the switch UES connected to the option connector No.2 pin.
- B) Refer to 'How to use the tacking mode' on page 28, and set to Start tacking. When the UES switch is OFF, start tacking will be valid, and when ON, it will be invalid. Use this to prohibit start tacking according to the material being stitched.
- C) Each time the BK key is pressed in step 3, the setting will change in the order of PU, PD, ES, UD, U, S4, SB and EB. (The factory setting is PU.)
- D) Start tacking can be prohibited in the same manner by setting the function to PS SB. Connect the switch to the option 2 connector No.4 pin in this case.

Note) Always return to the normal mode before starting the sewing machine in this mode.



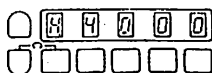
## 9. Operation of the Operation Panel Keys

### No.32 To stop end tacking with the external switch

..... Function setting PS EB

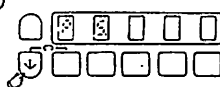
Enter program mode P ( ↓ + ↑ )

①



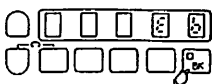
\* Program mode P will be entered.

②



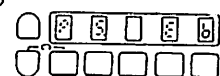
\* Set function to PS.

③



\* Set to EB.

④



\* The PS function setting has been completed.

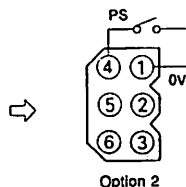
⑤

Return to the normal mode. ( ↓ + ↑ )

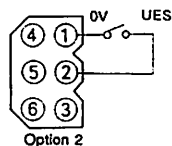
Page 91

### Description

- A) The validity of end tacking can be selected with the switch PS connected to the option connector No.4 pin.
- B) Refer to "How to use the tacking mode" on page 28, and set to [End tacking]. When the PS switch is OFF, end tacking will be valid, and when ON, it will be invalid. Use this to prohibit end tacking according to the material being stitched.
- C) Each time the OK key is pressed in step 3, the setting will change in the order of [PU], [PD], [BCR], [USR], [S70], [BTL], [SB] and [EB]. (The factory setting is [PD].)
- D) End tacking can be prohibited in the same manner by setting the function to UES EB.  
Connect the switch to the option 2 connector No.2 pin in this case.



Note) Always return to the normal mode before starting the sewing machine in this mode.



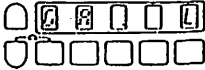


## 9. Operation of the Operation Panel Keys

**No.2 To change the time for the sewing machine to reach the high speed**  
 (Ex. to set to 100ms with simple setting [H]) ..... Function setting AC H

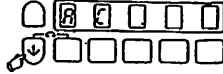
Enter program mode A ( ↓ + A )

①



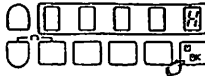
\* Program mode A will be entered.

②



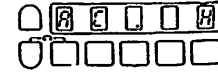
\* Set function to [AC].

③



\* Set to [H].

④



\* Complete the [AC] function setting.

⑤

Return to the normal mode. ( ↓ + ↑ )

Page 97

### Description

- A) The time for the sewing machine to reach the high speed after pedal toe down or external operation signal is input can be set easily.
- B) Each time the OK key is pressed, the set value will change in the order of [H], [M], [L], [—].  
 Set value [H] is 100ms, [M] is 140ms, [L] is 240ms, and [—] is the time set in [ACT]. (Refer to the acceleration time ACT in mode A on page 97.) (The factory setting is [M].)
- C) If the flickering of the fluorescent light is annoying, set to [L], and the flickering will be improved.

## 9. Operation of the Operation Panel Keys

**No.3 To change the time for the sewing machine to stop ..... Function setting** DC [L]  
 (Ex. to set to 230ms with simple setting [L].)

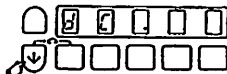
Enter program mode A ( ↓ + ↕ )

①



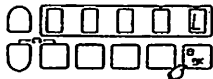
\* Program mode A will be entered.

②



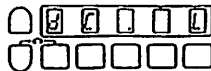
\* Set function to [DC].

③



\* Set to [L].

④



\* Complete the [DC] function setting.

⑤

Return to the normal mode. ( ↓ + ↕ )

Page 97, 98

### Description

- A) The deceleration time for the sewing machine to stop after entering neutral from pedal toe down or external operation signal is turned OFF can be set easily.
- B) Each time the [OK] key in step 3 is pressed, the set value will change in the order of [H], [M], [L], [-].  
 Set value [H] is 90ms, [M] is 160ms, [L] is 230ms, and [-] is the time set in [DCT].  
 (Refer to the deceleration time DCT in mode A on page 97.) (The factory setting is [M].)

## 9. Operation of the Operation Panel Keys

No.4 When using a sewing machine with a large inertia ..... Function setting [GA] [H]

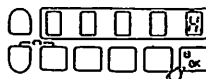
Enter program mode [A] ( [↓] + [↑] )

①



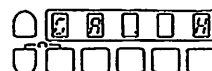
\* Program mode [A] will be entered.

②



\* Set function to [H].

③



\* Complete the [GA] function setting.

④

Return to the normal mode. ( [↓] + [↑] )

Page 96

### Description

- A) For a sewing machine with a relatively large inertia, set the gain to high [H], and for a relatively small inertia, set the gain to low [L]. If the sewing machine vibrates when stopping even if the gain is set to [L], set the gain to [LL].
- B) Each time the [GA] key is pressed, the set value will change in order of [H], [L], [LL]. (The factory setting is [L].)

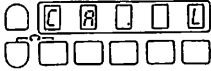
## 9. Operation of the Operation Panel Keys

**No.5 To operate the sewing machine without the detector when the detector is broken**

..... Function setting **[NOS] [ON]**

Enter program mode **[A]** ( **[↓]** + **[A.3]** )

①



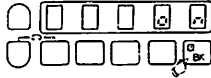
\* Program mode **[A]** will be entered.

②



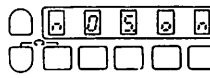
\* Set function to **[NOS]**.

③



\* Set to **[ON]**.

④



\* The **[NOS]** function setting has been completed.

⑥

Return to the normal mode. ( **[↓]** + **[↑]** )

Page 98

### Description

- A) Only variable operation will be possible. Set position stopping and thread trimming will not be possible.
- B) Each time the **[ON]** key is pressed, the setting will alternate between **[OF]** and **[ON]**. (The factory setting is **[OF]**.)



## 9. Operation of the Operation Panel Keys

### 9. How to use the program mode **[B]** (Refer to the Table of Program Mode Functions on pages 99 to 100.)

No.1 To change the presser foot holding strength (Ex. to set to 33% duty [LO])

..... Function setting **[FUD] [LO]**

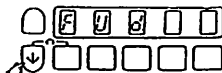
Enter program mode **[B]** ( **[↓]** + **[SL]** )

①



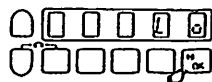
\* Program mode **[B]** will be entered.

②



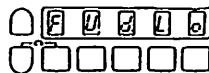
\* Set function to [FUD].

③



\* Set to [LO].

④



\* Complete the [FUD] function setting.

⑤

Return to the normal mode. ( **[↑]** + **[↑]** )

Page 99

#### Description

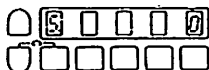
- A) The presser foot output voltage (semi-wave output duty) during the holding after the presser foot lift is output for 0.5 second is adjusted.
- B) Each time the **[OK]** key in step 3 is pressed, the set value will change in the order of [M1], [M2], [FL], [LO].  
 Set value [M1] is 4ms ON/OFF 50% duty; [M2] is 2ms ON/OFF 50% duty; [FL] is 100% duty (full wave); and [LO] is 2msON, 4msOFF 33% duty. (The factory setting is [M1].)

## 9. Operation of the Operation Panel Keys

**No.2 To set the needle position stop angle just before the fabric looking from the UP position (Ex. to set to [70].) ..... Function setting [C8] [70]**

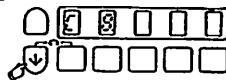
Enter program mode [B] ( [↓] + [B SL] )

①



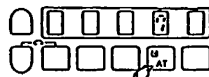
\* Program mode [B] will be entered.

②



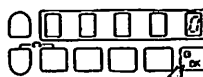
\* Set function to [C8].

③



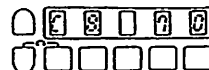
\* Set to [7].

④



\* Set to [0].

⑤



\* Complete the [C8] function setting.

⑥

Return to the normal mode. ( [↓] + [↑] )

Page 100

### Description

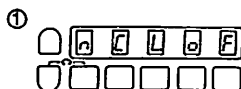
- A) When sewing thick fabrics, the set angle from the needle UP position is small, and when sewing thin fabrics, the set angle is large.
- B) As indicated in No. 10 for the program mode P, No.10 (page 39), this is valid only when the [S0] function is set to [BCR] and [BC].
- C) The range of the setting angle is 0 ~ 360° in 2° increments. (The factory setting is [60].)
- D) Each time the [AT] key in step 3 or [OK] key in step 4 is pressed, the set value will change between 0 ~ 9. (However, the [OK] key is only between 0 ~ 8 for every two settings.)  
Each time the [S] key is pressed, the set value will change between 0~3.

## 9. Operation of the Operation Panel Keys

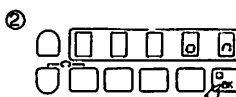
**10. How to use the program mode [C]** (Refer to the Table of Program Mode Functions on pages 100 to 101.)

**No.1 To output a needle cooler output to the sewing machine connector NCL output**  
 ..... Function setting NCL [ON]

Enter program mode [C] (  $\downarrow$  +  $\text{P}_{\text{st}}$  )



\* Program mode [C] will be entered.



\* Set function to [ON].



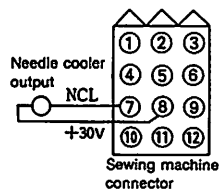
\* The [NCL] function setting has been completed.

④ Return to the normal mode. (  $\downarrow$  +  $\uparrow$  )

Page 100

### Description

- A) The needle cooler output will turn ON while the sewing machine is operating (also during thread trimming).
- B) Each time the a key is pressed, the setting will change in order of [OF][ON][SL]. (The factory setting is [OF].)
- C) If the S0 operation mode [LIO] in the P mode on page 89 is set, the solenoid output NCL will use the [LIO] setting as a priority.



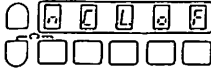
## 9. Operation of the Operation Panel Keys

**No.2 To fix the operation panel settings during normal mode and tacking mode**

..... Function setting PSW [ON]

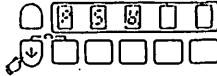
Enter program mode C ( ↓ + S<sub>AT</sub> )

①



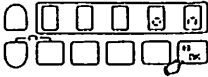
• Program mode C will be entered.

②



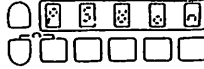
• Set function to [PSW].

③



• Set function to [ON].

④



• The [PSW] function setting has been completed.

⑤

Return to the normal mode. ( ↓ + ↑ )

Page 101

### Description

- A) The operation panel settings during the normal mode and tacking mode cannot be changed. However, the other program modes can be set.

## 9. Operation of the Operation Panel Keys

11. How to use the program mode **[D]** (Refer to the Table of Program Mode Functions on pages 101 to 103.)

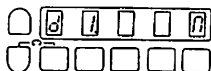
**No.1 To accurately align tacking**

(To set the stop time at each tacking corner to 100 milliseconds)

..... Function setting **[DI [CST]] + [CT [10]]**

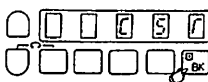
Enter program mode **[D]** ( **[↓]** + **[OK]** )

①



\* Program mode **[D]** will be entered.

②



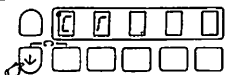
\* Set to **[CST]**.

③



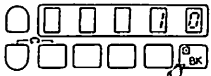
\* The **[D1]** function setting has been completed.

④



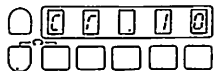
\* Set function to **[CT]**.

⑤



\* Set to **[10]**.

⑥



\* The **[CT]** function setting has been completed.

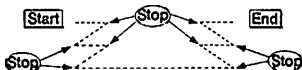
⑦

Return to the normal mode. ( **[↓]** + **[i]** )

Page 101, 102

### Description

- A) Set the type of start/end tacking and the no. of stitches before making the above setting. (Refer to page 25, 26.)  
 B) For example, to carry out W tacking, the unit will stop at each corner for 100 milliseconds.



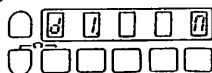
- C) Each time the **[OK]** key is pressed in step 3, the setting will change in the order of **[M]**, **[CST]**, and **[D]**. (The factory setting is **[M]**.)  
 D) The setting range of the stop time is 0 to 990 milliseconds in 10-millisecond intervals. The setting display 10 refers to 100 milliseconds, and 20 to 200 milliseconds. (The factory setting is 50 milliseconds.)  
 E) Each time the **[AT]** key is pressed in the step 6, the set value will change from 0 to 9, and each time the **[OK]** key is pressed, will change from 0 to 9.

## 9. Operation of the Operation Panel Keys

**No.2 To carry out continuous tack stitch (To set the W tacking forward and reverse to 10 stitches) ..... Function setting [D2 TRM] + Tacking mode [B [04\*\*]] + [M [AA\*\*]]**

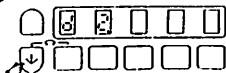
Enter program mode [D] ( [↓] + [BK] )

①



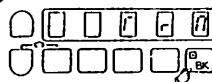
\* Program mode [D] will be entered.

②



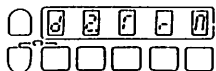
\* Set function to [D2].

③



\* Set to [TRM].

④

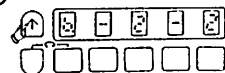


\* The [D2] function setting has been completed.

⑤

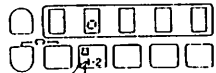
Return to the normal mode. ( [↓] + [↑] )

⑥



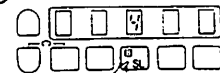
\* The tacking setting mode will be entered.

⑦



\* Set to [Start tacking valid].

⑧



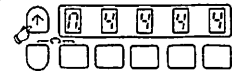
\* Set to [W tacking].

⑨



\* The tacking setting mode has been completed.

⑩



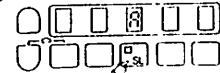
\* The no. of tacking stitches setting mode will be entered.

⑪



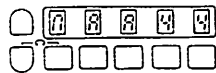
\* Set the no. of start tacking forward stitches to [A].

⑫



\* Set the no. of start tacking reverse stitches to [A].


⑬



\* Complete the no. of tacking stitches setting mode.

## 9. Operation of the Operation Panel Keys

14

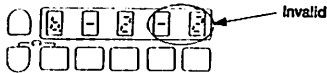
Return to the normal mode. (  )

Page 102

### Description

- A) The V tack, N tack, M tack and W tack types of tacking are available for continuous tack stitch. A maximum of 15 stitches can be set.
- B) The types of continuous tack stitch and no. of stitches is set with the setting for the start tacking. Therefore, even if the end tacking data is set in steps 9 or 13, the setting will be invalid.

(Ex.)



- C) Refer to pages 25 and 26 for setting the tacking in steps 6 to 13.

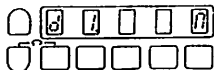
## 9. Operation of the Operation Panel Keys

**No.3 To align tacking when start/end tacking speed is less than 1000 rpm.**

..... Function setting **BM** **ON**

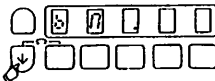
Enter program mode **D** ( **↓** + **Ⓛ** )

①



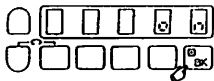
\* Program mode **D** will be entered.

②



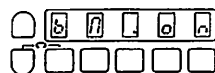
\* Set function to **[BM]**.

③



\* Set to **[ON]**.

④



\* The **[BM]** function setting has been completed.

⑤

Return to the normal mode. ( **↓** + **↑** )

Page 102

### Description

- A) Set function **BM** to **[ON]** when start/end tacking speed is less than 1000 rpm.  
Set function **BM** to **[OF]** when start/end tacking speed is 1000 rpm or higher.
- B) This **BM** function can be used for a rough tacking alignment of the start and end tacking.  
Refer to No.4 to No.7 on the following pages when finer adjustment of the no. of stitches is required.
- C) Each time the **Ⓛ** key is pressed, the setting will alternate between **[OF]** and **[ON]**. (The factory setting is **[OF]**.)

Note: This function can be used when a stop is not made at each corner when tacking.

Note: When the function setting **DI** **CST** is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting **BM** **ON** will be invalidated.

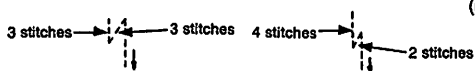


## 9. Operation of the Operation Panel Keys

### No.4 To correct the no. of forward stitches during start tacking

..... Function setting [BT1] [4]

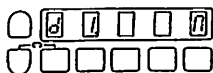
(Ex.) No. of start tacking set stitches      Actual no. of stitches



(Note) This no. of stitch correction can be used when a stop is not made at each corner when tacking.

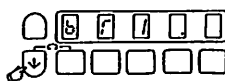
Enter program mode [D] ( [↓] + [P<sub>bk</sub>] )

①



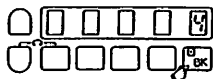
\* Program mode [D] will be entered.

②



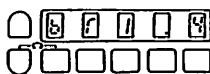
\* Set function to [BT1].

③



\* Set to [4].

④



\* The [BT1] function setting has been completed.

⑤

Return to the normal mode. ( [↓] + [↑] )

Page 102

### Description

- A) In the above example, the four stitches are used for the start forward tack. This is one stitch more than the no. of stitches set in the start tack setting, so reset it so that it is shorter. Set the no. of correction stitches to -1.  
The relation of the no. of correction stitches and setting value is shown below. Set the setting value to [4].
- B) With this setting, the forward section will be one stitch shorter, and the reverse section will be increased by one stitch to three stitches. The no. of stitches will be as set.
- C) Each time the [P<sub>bk</sub>] key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
- D) The relation of the no. of correction stitches and setting value is as shown below.

Relation of no. of correction stitches and setting value

Setting value	9	8	7	6	5	4	3	2	1	0	A	B	C	D	E	F
No. of correction stitches	-2¼	-2	-1¾	-6½	-1¼	-1	-¾	-½	-¼	0	+¼	+½	+¾	+1	+1¼	+1½

- E) The no. of correction stitches set in BT1 is common for the start tack, V tack, N tack, M tack, and W tack.
- F) The no. of stitches can be corrected easily by using this function and the start tack speed change (refer to page 33).

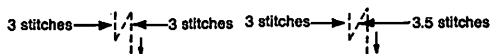
Note: When the function setting [DI] [CST.] is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting [BT1] [\*] will be invalidated.

## 9. Operation of the Operation Panel Keys

### No.5 To correct the no. of reverse stitches during start tacking

..... Function setting **BT2**

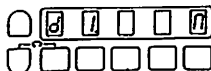
(Ex.) No. of start tacking set stitches      Actual no. of stitches



(Note) This no. of stitch correction can be used when a stop is not made at each corner when tacking.

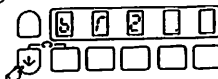
Enter program mode **D** (  +  )

①



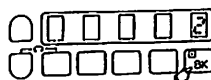
\* Program mode **D** will be entered.

②



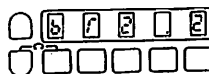
\* Set function to **[BT2]**.

③



\* Set to **[2]**.

④



\* The **[BT2]** function setting has been completed.

⑤

Return to the normal mode. (  +  )

Page 102

### Description

- In the above example, the 3.5 stitches are used for the start reverse tack. This is 0.5 stitch more than the no. of stitches set in the start tack setting, so reset it so that it is shorter. Set the no. of corrected stitches to -0.5. Set the setting value to [2]. (Refer to section D on page 75.)
- With this setting, the reverse section will be 0.5 stitch shorter, and will be the correct no. of stitches.
- Each time the  key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
- Refer to the table in section D on page 75 for the relation of the no. of correction stitches and setting value
- The no. of corrected stitches set in BT2 is common for the start tack, V tack, N tack, M tack, and W tack.
- The no. of stitches can be corrected easily by using this function and the start tack speed change (refer to page 33).

Note: When the function setting   is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting   will be invalidated.

## 9. Operation of the Operation Panel Keys

### No.6 To correct the no. of reverse stitches during end tacking

..... Function setting **BT3** **4**

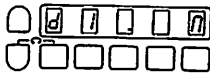
(Ex.) No. of end tacking set stitches    Actual no. of stitches



(Note) This no. of correction stitching can be used when a stop is not made at each corner when tacking.

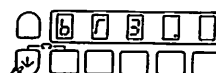
Enter program mode **D** ( **U** + **Ex** )

①



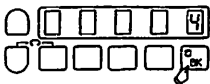
\* Program mode **D** will be entered.

②



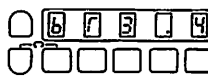
\* Set function to [BT3].

③



\* Set to [4].

④



\* The [BT3] function setting has been completed.

⑤

Return to the normal mode. ( **U** + **f** )

Page 102

### Description

- In the above example, the four stitches are used for the end reverse tack. This is one stitch more than the no. of stitches set in the end tack setting, so reset it so that it is shorter. Set the no. of corrected stitches to -1. Set the setting value to [4]. (Refer to section D on page 75.)
- With this setting, the reverse section will be one stitch shorter, and will be the correct no. of stitches.
- Each time the **Ex** key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
- Refer to the table in section D on page 75 for the relation of the no. of correction stitches and setting value.
- The no. of corrected stitches set in BT3 is common for the end tack, N tack, M tack, and W tack.
- The no. of stitches can be corrected easily by using this function on the end tack speed change (refer to page 34).

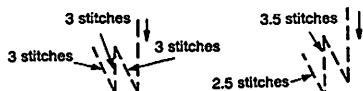
Note: When the function setting **D1** **CST** is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting **BT3** **\*** will be invalidated.

## 9. Operation of the Operation Panel Keys

### No.7 To correct the no. of forward stitches during end tacking

..... Function setting **BT4**

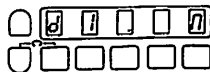
(Ex.) No. of end tacking set      Actual no. of stitches  
stitches



(Note) This no. of correction stitching can be used when a stop is not made at each corner when tacking.

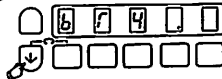
Enter program mode **D** (  +  )

①



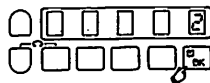
\* Program mode **D** will be entered.

②



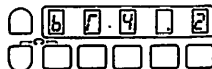
\* Set function to **[BT4]**.

③



\* Set to **[2]**.

④



\* The **[BT4]** function setting has been completed.

⑤

Return to the normal mode. (  +  )

Page 103

### Description

- In the above example, the 3.5 stitches are used for the end forward tack. This is 0.5 stitches more than the no. of stitches set in the end tack setting, so reset it so that it is shorter. Set the no. of corrected stitches to -0.5. Set the setting value to **[2]**. (Refer to section D on page 75.)
- With this setting, the forward section will be 0.5 stitch shorter, and the reverse section will increase by 0.5 to three stitches. This will be the correct no. of stitches.
- Each time the  key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
- Refer to the table in section D on page 75 for the relation of the no. of corrected stitches and setting value.
- The no. of corrected stitches set in BT4 is common for the end tack, M tack, and W tack.
- The no. of stitches can be corrected easily by using this function on the end tack speed change (refer to page 34).

Note: When the function setting   is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting   will be invalidated.

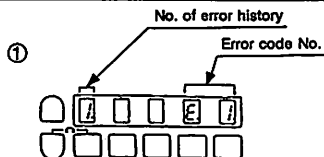
## 9. Operation of the Operation Panel Keys

### 12. How to use the program mode **E** (Refer to the Table of Program Mode Functions on pages 103 to 105.)

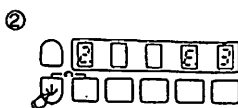
#### No.1 How to view the error code history

..... Function setting **1. E-** , **2. E-** , **3. E-** , **4. E-**

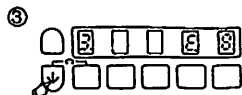
Enter program mode **E** ( **U** + **U** + **F2** )



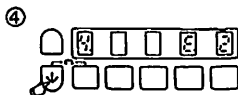
① \* The last error code is displayed.  
(Ex. error code E1 is displayed.)



② \* The second to last error code is displayed.  
(Ex. error code E3 is displayed.)



③ \* The third to last error code is displayed.  
(Ex. error code E8 is displayed.)



④ \* The fourth to last error code is displayed.  
(Ex. error code E2 is displayed.)

⑤ Return to the normal mode. ( **U** + **U** )

Page 103

#### Description

- A) The last to fourth to last errors can be viewed.
- B) Refer to page 113 and 114 for the error code.

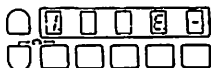
## 9. Operation of the Operation Panel Keys

### No.2 To check the pedal operation signal or external operation signal

..... Function setting [S1], [S2], [S3], [PD]

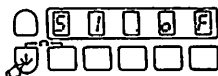
Enter program mode [E] ( [↓] + [↑] + [A] )

①



\* Program mode [E] will be entered.

② Check the pedal toe down or operation signal (S1).

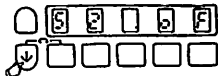


#### Description

If the display changes from [OF] to [ON] when the pedal toe down or operation signal (S1) is turned ON, the operation is normal.

\* Set function to [S1].

③ Check the pedal full heeling or thread trimming signal (S2).

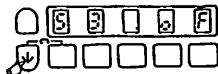


#### Description

If the display changes from [OF] to [ON] when the pedal full heeling or thread trimming signal (S2) is turned ON, the operation is normal.

\* Press the [↓] key once and set the function to [S2].

④ Check the pedal light heeling (S3).

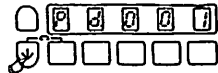


#### Description

If the display changes from [OF] to [ON] when the pedal light heeling (S3) is turned ON, the operation is normal.

\* Press the [↓] key once and set the function to [S3].

⑤ Check the variable voltage with the pedal toe down.



#### Description

If the numerical value that is equivalent to the pedal toe down amount changes from [000] to [3FF], the operation is normal.

\* Press the [↓] key once and set the function to [PD].

⑥ Return to the normal mode. ( [↓] + [↑] )

Page 103

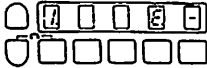
## 9. Operation of the Operation Panel Keys

### No.3 To check the motor and encoder signals

..... Function setting ECA, ECB

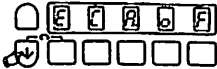
Enter program mode E ( ↓ + ↑ + A )

①



\* Program mode E will be entered.

② Check the encoder's A phase.

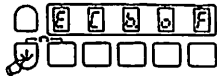


\* Set function to [ECA].  
[ON] or [OF] will be displayed on [ECA].

Description

If the display changes from [OF] - [ON] - [OF] repeatedly when the motor shaft is gradually rotated, the operation is normal.

③ Check the encoder's B phase.



\* Press the ↓ key once and set the function to [ECB].  
[ON] or [OF] will be displayed on [ECB].

Description

If the display changes from [OF] - [ON] - [OF] repeatedly when the motor shaft is gradually rotated, the operation is normal.

④ Return to the normal mode. ( ↓ + ↑ )

Page 103

## 9. Operation of the Operation Panel Keys

### No.4 To check the position detector signal

..... Function setting UP, DN, PG

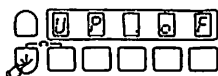
Enter program mode E ( ↓ + ↑ + F3 )

①



\* Program mode E will be entered.

② Check the UP position signal.

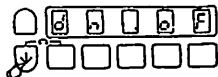


\* Set the function to [UP], [ON] or [OFF] will be displayed on [UP].

#### Description

If the display changes from [OF] - [ON] - [OF] repeatedly when the detector shaft is gradually rotated, the operation is normal.

③ Check the DOWN position signal.

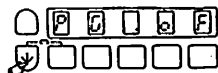


\* Press the ↓ key once and set the function to [DN].  
[ON] or [OFF] will be displayed on [DN].

#### Description

If the display changes from [OF] - [ON] - [OF] repeatedly when the detector shaft is gradually rotated, the operation is normal.

④ Check the pulse (PG) signal.



\* Press the ↓ key once and set the function to [PG].  
[ON] or [OFF] will be displayed on [PG].

#### Description

If the display changes from [OF] - [ON] - [OF] repeatedly when the detector shaft is gradually rotated, the operation is normal.

⑤ Return to the normal mode. ( ↓ + ↑ )

Page 104



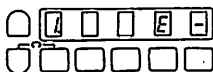
## 9. Operation of the Operation Panel Keys

### No.5 To check each signal

..... Function setting  ,  ,  ,

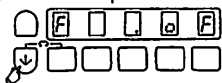
Enter program mode  (  +  +  )

①



\* Program mode  will be entered.

② Check the presser foot lifting signal (F).

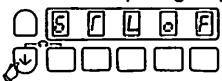


\* Set the function to .

#### Description

If the display changes from [OF] to [ON] when the presser foot lifting signal (F) is turned ON, the operation is normal.

③ Check the input signal (6TL).

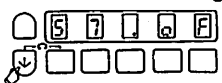


\* Press the  key once and set the function to .

#### Description

If the display changes from [OF] to [ON] when the input signal (6TL) is turned ON, the operation is normal.

④ Check the backstitching signal (S7).

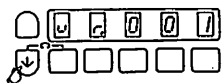


\* Press the  key once and set the function to .

#### Description

If the display changes from [OF] to [ON] when the backstitching signal (S7) is turned ON, the operation is normal.

⑤ Check the variable voltage with the speed setting dial.



\* Press the  key once and set the function to .

#### Description

If the numerical value that is equivalent to the change amount of the speed adjusting dial on the panel changes from [000] to [3FF], the operation is normal.

⑥ Return to the normal mode. (  +  )

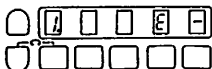
Page 104

## 9. Operation of the Operation Panel Keys

**No.6 To check the presser foot lifter, thread trimmer, wiper, backstitch and thread release output ..... Function setting** FUO, TO, WO, BO, LO

Enter program mode E ( U + ↑ + F2 )

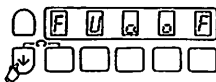
①



\* Program mode E will be entered.

**Note)** The sewing machine cannot be operated when this function is set.

② Check the presser foot lifter output (FU).

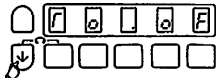


**Description**

The display will turn ON, and the presser foot lifter output will turn ON while the E<sub>EX</sub> key is pressed.

\* Set the function to [FUO].

③ Check the thread trimmer output (T).

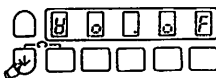


**Description**

The display will turn ON, and the thread trimmer output will turn ON while the E<sub>EX</sub> key is pressed.

\* Press the ↓ key once and set the function to [TO].

④ Check the wiper output (W).

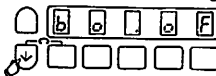


**Description**

The display will turn ON, and the wiper output will turn ON while the E<sub>EX</sub> key is pressed.

\* Press the ↓ key once and set the function to [WO].

⑤ Check the backstitching output (B).

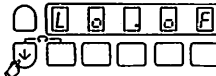


**Description**

The display will turn ON, and the backstitching output will turn ON while the E<sub>EX</sub> key is pressed.

\* Press the ↓ key once and set the function to [BO].

⑥ Check the solenoid output, (NCL).



**Description**

The display will turn ON, and the solenoid output (NCL) will turn ON while the E<sub>EX</sub> key is pressed.

\* Press the ↓ key once and set the function to [LO].

⑦

Return to the normal mode. ( ↓ + ↑ )

Page 105

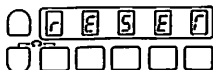
## 9. Operation of the Operation Panel Keys

### 13. How to use the program mode **R**

No.1 To return all settings to the factory settings ..... Function setting **RESET**

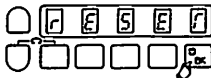
Enter program mode **R** ( **↓** + **□<sub>SL</sub>** + **□<sub>AT</sub>** )

①



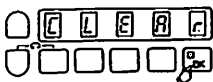
\* Program mode **R** will be entered.

②



\* [RESET] will flicker when the **□<sub>OK</sub>** key is pressed.

③



\* When the **□<sub>OK</sub>** key is held down (for two seconds), the display will change to [CLEAR].

④



\* When the **□<sub>OK</sub>** key is released, the normal mode will be entered.

Page 105

#### Description

- When the display changes to [CLEAR] all settings will be returned to the factory settings.
- To enter the normal mode from the [RESET] display, press the **↑** key while holding down the **↓** key. In this case, the settings will not be returned to the factory settings.

#### Caution

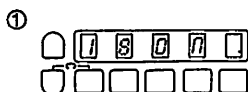
When this function is set, the contents of all settings to this point will be cleared, and will return to the factory settings. Please take care when using this.

## 9. Operation of the Operation Panel Keys

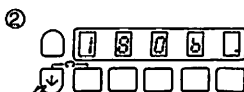
### 14. How to use the program mode 1

**No.1 To set the functions for the Mitsubishi thread trimming sewing machine in one step**  
 (For example, to set for the LS2-1180-B1T) ..... Function setting 180B

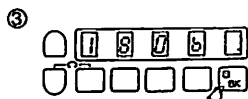
Enter program mode R ( U + F<sub>1-2</sub> + F<sub>3</sub> )



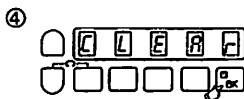
\* Program mode 1 will be entered.



\* Set function to [180B].



\* [180B] will flicker when OK is pressed.



\* [CLEAR] will be displayed when the OK key is pressed for approx. two seconds.



\* Press OK to return to the normal mode.

#### Description

- A) Select the model name that corresponds to the sewing machine model for the simple setting values for the Mitsubishi thread trimming sewing machine on the next page. Display [CLEAR] with the OK key, and the setting of the speed and functions will be carried out automatically for that model.
- B) To return to the normal mode from the [180B] display, press the ↑ key while holding down ↓. In this case, [180B] will not be set, and the last settings will be used.
- C) Each time the ↓ key is pressed in step 2, the model name will change in order from [180M], [180L], [180H], [180B] ... [630] and [180ME]. (The factory setting is [180M].)


#### Caution


Always perform the resetting procedure shown on the last page before setting the Mitsubishi thread trimming sewing machine in one step.

## 9. Operation of the Operation Panel Keys

Simple setting values for Mitsubishi thread trimming sewing machine


Factory setting .....

Each time the  key is pressed, the function names will display in the order of the ↓ arrow.



Each time the  key is pressed, the function names will display in the order of the ↑ arrow.


Model name	7-segment display	Sewing machine model
180M	180M.	LS2-1180-M1T(W)
180L	180L.	LS2-1180-L1T
180H	180H.	LS2-1180-H1T
180B	180b.	LS2-1180-B1T
180SR	180Sr.	LS2-1180-M1T-SR
210M	210M.	LS2-2210-M1T(W)
230M	230M.	LT2-2230-M1TW
230L	230L.	LT2-2230-L1T
230B	230b.	LT2-2230-B1T
250M	250M.	LT2-2250-M1TW
250A	250A.	LT2-2250-A1T
250B	250b.	LT2-2250-B1T
3370	3370.	LG2-3370-M1T
359	359.	DY-359-22BZ
3750	3750.	LY2-3750-B1T
410B	410b.	LU2-4410-B1T
430B	430b.	LU2-4430-B1T
630	630.	LX2-630-M1
180ME	180ME.	LS2-1180-M1T(W)



15. Table of Program Mode Functions

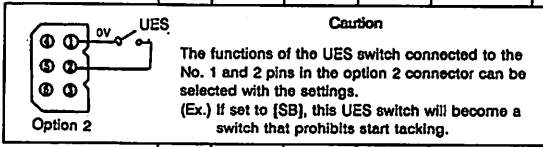
Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
P mode ↑ + ↓	Maximum speed	H	○	○	4000	s/min	0 ~ 8999	H.	....	The maximum speed can be set.	30
	Low speed	L	○	○	250	s/min	0 ~ 499	L.	...	The low speed can be set.	31
	Thread trimming	T	○	○	200	s/min	0 ~ 499	T.	...	The thread trimming speed to reach the needle UP position stop from the needle DOWN position during full healing or when thread trimmer signal (S2) is turned ON can be set.	32
	Start tacking speed	N	○	○	1700	s/min	0 ~ 2999	N.	....	The speed of start tacking can be set.	33
	End tacking speed	V	○	○	1700	s/min	0 ~ 2999	V.	....	The speed of end tacking can be set.	34
	Slow start speed	S	○	○	250	s/min	0 ~ 2999	S.	....	The slow start speed can be set.	35
	No. of slow start stitches	SLN	○	○	2	Stitches	1 ~ 5	SLN.	.	The No. of slow start stitches can be set. This is valid when the  key is ON in the normal mode.	36
	S0/SH input function setting	S0H	x	○	S0	-	-	S0H.	S0 SH	The option 2 connector No. 6 pin's low speed operation signal S0 or one shot signal SH can be selected.	37~41
	S0 operation mode	S0	x	○	0	-	-	S0.	0 1 rnd bc	The low speed run signal S0's operation mode is selected. This is valid when the input function setting S0H [S0] is set.	
										The motor runs at the speed set in the low speed setting L.	37
									The one stitch operation is carried out.	38	
									The motor rotates at the speed set in the low speed L, and will stop at random regardless of the needle position when stopped.	-	
									The needle is stopped just before the fabric to confirm the needle puncture position on the fabric. Each time the low speed operation signal S0 is turned ON, the forward run - reverse run operation will be repeated. Normal operation will start after the pedal is toed down or when the external operation signal (S1) is turned ON. The needle position stop angle can be adjusted with the needle position stop angle C8 in mode B on page 100.	-	

**Caution**  
**Operation validity**  
 ○ mark: The sewing machine can be operated in the function setting state.  
 X mark: The sewing machine cannot be operated in the function setting state. Operate the sewing machine after returning to the normal mode.



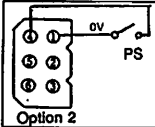
**Caution**  
 Each time the  key is pressed, the function name will be displayed in the order of this table (H, L, T ...)  
 Each time the  key is pressed, the function name will be displayed in the reverse order of this table (SON, SLN, ... H, TR ...)

Mode name	Function name	Operability	Function validity		Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
P mode ↑ + ↓								<b>BCr</b>	This is used to raise the penetration strength of the first stitch when the fabric is thick after confirming the puncture position. The S0 operation mode is the same as the [BC] setting. However, when the external run signal (S1) is turned ON and the needle is stopped with forward operation, the sewing machine will operate forward after reversing once. When stopped with reverse operation, forward operation will start from that position. The needle position stop angle is set with the needle position stop angle C8 in mode B.	39
								<b>USr</b>	The needle is lifted with reverse operation to the set angle. The set angle can be adjusted with the reverse run angle K8 from the DOWN position to the UP position in mode B. This is used in blind stitch sewing.	-
								<b>L10</b>	The following output can be obtained instead of the sewing machine connector No. 7 pin's thread release output L. During sewing machine operation or stop, the S0 of the option connector 2 No.6 pin turns ON, and the sewing machine connector No. 7 pin's output turns ON.	-
								<b>b7L</b>	The option connector 2 No. 6 pin S0 is turned ON, and start/end tacking is prohibited. This is used to prevent tacking when the thread is trimmed during stitching.	40
	One shot	SH	○	○	OF	-	-	<b>SH</b> ON OFF	The one shot function can be selected.	42
	SH operation mode	SHM	○	○	SH	-	-	<b>SHM</b>	The one shot SH operation mode is selected. This is valid when one shot SH is [ON].	-
								<b>SH</b>	When one of the external run signals (S0, S1, S4) is turned ON the sewing machine will rotate at the commanded speed while ON, and will continue operating even when the signal is turned OFF. However, the speed will be that commanded with the speed setting dial while OFF. (When the  key is turned ON in the normal mode.) Stops with PSD, PSU, or ES signal.	41
								<b>SS</b>	When one of the external run signals (S0, S1, S4) is turned ON, the sewing machine will rotate at the speed commanded with each signal even if the signal is turned OFF.	42
							<b>SR</b>	The same operation as when [SS] is set is included. When one of the external run signals (S0, S1, S4) is turned OFF - ON - OFF - ON - OFF, the sewing machine will stop at ① and will restart at ②. (Alternate operation).	-	

Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
P mode  + 	Operation mode of input signals UES	x	○	PU	-	-	UES.		The input functions of the No. 2 pin in the option 2 connector can be selected with the following settings.	-
								PU	The needle UP position priority stop signal PSU is activated. If the PSU signal is input during operation, the needle UP position stop will occur after the thread is trimmed.	43
								PD	The needle DOWN position priority stop signal PSD is activated. If the PSD signal is input during operation, the needle DOWN position stop will occur.	-
								ES	The emergency stop signal ES function is activated. If the ES signal is input during operation, all operation states will be released, and the sewing machine will stop immediately with the brake.	46
								UD	A half-stitch operation is executed.	-
								U	The needle lifting operation is activated. If the needle is at the UP position, the needle will not move.	-
								S4	The sewing machine will run at the maximum speed H set in page 88 regardless of the speed setting dial.	-
								S6	Start tacking is prohibited. This can be used when you do not want to carry out start tacking according to the fabric, even when start tacking is set with the tacking mode.	60
								E6	End tacking is prohibited. This can be used when you do not want to carry out end tacking according to the fabric even when end tacking is set with the tacking mode.	-
									Operation mode of input signals PS	x
								PU	The needle UP position priority stop signal PSU is activated. If the PSU signal is input during operation, the needle UP position stop will occur after the thread is trimmed.	-
								PD	The needle DOWN position priority stop signal PSD is activated. If the PSD signal is input during operation, the needle DOWN position stop will occur.	44, 45

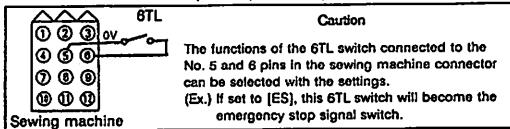




Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
P mode  + 	 <p style="text-align: center;"><b>Caution</b></p> <p>The functions of the PS switch connected to the No. 1 and 4 pins in the option 2 connector can be selected with the settings. (Ex.) If set to [S70], this PS switch will become the back stitch signal S7 switch.</p>										
								6Cr	This is the same as the BCR specifications on page 89. The needle is stopped just before the fabric to confirm the needle puncture position on the fabric. Each time the PS switch is turned ON, the forward run reverse run operation will be repeated. Forward operation will start after the pedal is toed down or when the external operation signal (S1) is turned ON. The needle position stop angle can be adjusted with the needle position stop angle C8 in mode B.	-	
									U5r	This is the same as the USR specifications on page 89. The needle is lifted with reverse operation of the set angle. The set angle can be adjusted with the reverse angle K8 from the DOWN position to the UP position in mode B. This is used in blind stitch sewing.	-
									S70	This is the same as the back stitch signal S7 (sewing machine connector No. 9 and 10 pins) on page 94. If the S7 signal turns ON during operation, back stitching will start. No operation will be made when the sewing machine is stopped.	-
									6rL	This is the same as the BTL functions on page 89. Both start and end tacking are prohibited. This is used to prevent the next tacking when trimming the thread during stitching.	-
									Sb	Start tacking is prohibited. This can be used when you do not want to carry out start tacking according to the fabric, even when start tacking is set with the tacking mode.	-
							Eb	End tacking is prohibited. This can be used when you do not want to carry out end tacking according to the fabric even when end tacking is set with the tacking mode.	61		

Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
P mode ↑ + ↓	No. of stitches after PSU input PSU	○	○	0	Stitches	0 ~ 99	PSU	**	The no. of stitches until stopping after the UP position priority stop signal PSU is input is set.	43	
	No. of stitches after PSD input PSD	○	○	0	Stitches	0 ~ 99	PSd	**	The no. of stitches until stopping after the DOWN position priority stop signal PSD is input is set.	44	
	Restart after PSD, PSU input PSN	○	○	OF	-	-	PS <sub>n</sub>	ON OF	After detecting the end of the fabric by a sensor with the PSU, PSD signals and stopping, restarting is possible with the pedal toe down or external run signal (SD, S1) even if the sensor does not detect the fabric (even if PSU, PSD signals are ON).	45	
	Presser foot lift momentary FUM	○	○	OF	-	-	FUN	ON OF	This is the momentary function of the presser foot lifting.	47, 48	
	FUM operation mode FU	○	○	M	-	-	FU		The operation mode of the presser foot lift momentary mode is selected. This is valid when the presser foot lift momentary FUM is set to [ON].		
									∩	After thread trimming with full heeling or the external thread trimmer signal S2, the presser foot lifting operation is continued.	47
									C	After thread trimming with full heeling or the external thread trimmer signal S2, the presser foot lifting operation is continued while the timer is on, and then the presser foot will lower. The timer time is set with the FUM timer setting FCT in mode B.	48
									A	The presser foot lifting operation is activated with full heeling, light heeling, or the external control signal ((S2, F) ON. Then, when the full heeling, light heeling or external control signal (S2, F) is turned ON, the presser foot will bring down, and when turned ON again, the presser foot will lift. (Alternate operation.)	-
									f	The timer operates in the same manner as the [C] setting. However, after the presser foot bring down, the same alternate operation as the [A] setting will occur.	-
		Cancel the presser foot lifting with full heeling FL	○	○	OF	-	-	FL	ON OF	The presser foot lifting operation after thread trimming with full heeling or the external thread trimmer signal S2 is prohibited. However, the presser foot lifting is carried out with the presser foot lifting signal F or light heeling.	49

Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
P mode	Cancel presser foot lifting with light heeling S3L	○	○	OF	—	—	S3L	on of	The presser foot lifting operation with light heeling is prohibited. The presser foot operation is carried out with full heeling or the presser foot lifting signal F.	50	
	Cancel of thread trimmer operation S2L	○	○	OF	—	—	S2L	on of	The thread trimming operation and subsequent presser foot lifting operation with full heeling or external thread trimmer signal S2 is prohibited.	—	
	Operation mode of input signal 6TL	6TL	×	○	○	—	—	6TL		The input functions of the No. 6 pin in the sewing machine connector can be selected with the following settings.	—
									TL	The thread release signal TL functions are activated. The thread trimming operation with full heeling of the pedal or with the thread trimming signal S2 is not performed, and instead needle UP position stop will occur.	—
									S6	The thread trimmer protection signal S6 functions are activated. If S6 turns ON during thread trimming, operation will not be possible until S6 turns OFF after thread trimming.	51
									ES	The emergency stop signal ES functions are activated. If the ES signal turns ON during operation, all operation states will be released, and the sewing machine will stop immediately with the brake.	—
									Ud	Half-stitch operation.	—
									U	The needle lift operation will occur. If the needle is at the needle UP position, the needle will not move.	—
									bc	This is the same as the BC specifications on page 88. The needle is stopped just before the fabric to confirm the needle puncture position on the fabric. Each time the 6TL switch is turned ON, the forward run reverse run operation will be repeated. Normal operation will start after the pedal is toed down or when the external operation signal (S1) is turned ON. The needle position stop angle can be adjusted with the needle position stop angle C8 in mode B.	—
									1	One-stitch operation.	—
0	The motor runs at the speed set in the low speed setting L.	—									



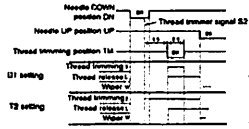







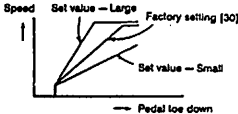
Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
P mode (↑) + (↓)	S7 operation mode	S7	x	○	0	—	—	S7.		The operation mode of back stitch signal S7 for the sewing machine connector No. 10 is determined. The following operations will occur when the sewing machine is stopped according to the setting.	—
								0		No operation.	—
								UdS		Half-stitch operation	—
								US		After stopping at the needle DOWN position, the needle will stop at the needle UP position with the back stitch signal S7 ON.	—
								bSL		The backstitch solenoid will operate with the backstitch signal S7 ON even when stopped.	59
								UCr		One-stitch operation	—
								Ubr		One-stitch operation while carrying out backstitch	—
	Reverse run needle lifting after thread trimming	RU	○	○	OF	—	—	rU.	op oF	The motor is reverse run after thread trimming, and the needle will stop near the needle bar top dead point.	54
	RU reverse run angle	R8	○	○	30	Degree	0 ~ 360	r8.	...	The reverse run angle from the UP position after thread trimming can be set for when the reverse run needle lifting after thread trimming RU is set to ON. The setting angle is in two degree intervals.	—
	Thread trimming with reverse feed	TB	○	○	OF	—	—	r6.	oN oF	The thread is trimmed with reverse feed by driving the backstitch solenoid simultaneously with the thread trimmer solenoid.	55

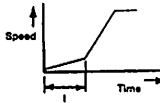
Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
P mode (↑) + (↓)	Full heeling, S2 signal operation mode S2R	○	○	ON	-	-	S2r.		The operation mode of full heeling or external thread trimmer signal S2 is selected. This is valid when cancel of thread trimmer operation S2L is set to [OF].	-
								on	With full heeling or the external thread trimmer signal S2 after the needle UP position stop, the motor will rotate once to trim the thread. Then the presser foot will lift. When stopped at the needle DOWN position, the motor will make a half-rotation and then the presser foot will lift.	-
								oF	The needle will remain at the UP position even when full heeling or external thread trimmer signal S2 is turned ON after stopping at the UP position. Only the pressor foot lifting operation will operate after this. When full heeling or external needle lifting signal S2 is input after the needle DOWN position stop, motor will make a half-rotation and trim the thread. Only the presser foot lifting operation will operate after this.	56
	Cancel of interlock after full pedal heeling IL	○	○	oF	-	-	IL.		This releases the restart operation prohibit command during thread trimming.	-
								on	Restart is possible for a designated time after the pedal toe down or external operation signal (S0, S1) is turned ON immediately after full pedal heeling. This is used with a sewing machine that does not have thread trimming.	-
								oF	Restart is not possible. Restart is possible if the pedal toe down or external run signal (S0, S1) is turned ON again after a set time is passed.	-
	Thread trimming mode TR	○	○	M1	-	-	fr.		The tread trimming timing for each manufacturer's thread trimming sewing machine can be set.	-
								nl	Mitsubishi, Toyota, Seiko, Yakumo, Brother (excluding those noted below)	-
								bl	Brother, Models: 705, 715, 716	57
dl								Dürkopp Adler, Model 270	-	
jl								Juki	-	
						nl	Not used	-		

**Caution**

The thread trimming timing for each thread trimming sewing machine can be set in the thread trimming mode TR, but the speed, etc., cannot be set. These must be set separately. When set to [DI], set the lifting output chopping duty FUD in the B mode to [LO] 33% duty.

Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
P mode  + 	<p><b>Note</b></p> <p>When setting for the B1 (Brother), or T2 (Toyota) machines, refer to the following thread trimming timing. Follow the sewing machine adjustment procedures, and adjust the setting.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Adjust the thread trimming position TM signal's ON starting angle S8, and ON angle E8 with the B mode explained on page 95. (The factory setting is 50° for S8, and 90° for E8.)</p> </div> </div>									
								P1	Puff, Models: 463, 900	-
								P2	Not used	-
								P3	Not used	-
								P4	Not used	-
								S1	Not used	-
								S2	Not used	-
								F1	Toyota, Model: AD158	-
								F2	Toyota, Model: AD3110	-
								PrG	For free setting of the thread trimming timing. Refer to the technical material for details.	-
							rE	The thread is trimmed by reverse running the motor at the set angle from the DOWN position with full healing or the thread trimmer signal S2. The set angle can be adjusted with the reverse run angle KB from the DOWN position to the UP position in mode B. This can be used for the blind stitch sewing machine.	58	
A mode  + 	Gain high/low selection	GA	O	O	L	-	-	CR.	The high/low gain can be set. Set with the following according to the sewing machine being used.	-
								H	Sewing machine with large inertia.	65
								L	Sewing machine will small inertia.	-
								LL	This is used when there is a slight vibration when stopping even when the gain is set to [L].	-
	Slow start operation mode	SLM	O	O	T	-	-	SLN.	The slow start operation mode is selected. This is valid when the [E] key is ON in the normal mode.	-
							F	Slow start operation will begin when the power is turned ON or when the first toe down after thread trimming, or the first external run signal (S0, S1) is turned ON.	-	
							R	Slow start operation will begin when the pedal is toed down or when the external run signal (S0, S1) is turned ON.	-	

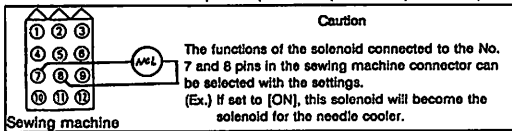
Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
A mode  + 	Slow start when power is turned ON SLP	○	○	OF	—	—	SLP.	ON OF	Slow start operation will begin when the pedal is toed down for the first time after turning the power ON, or when the first external run signal (S0, S1) is turned ON even if the  key is turned OFF in the normal mode.	—
	Pedal curve PDC	○	○	30	—	10 ~ 99	PdC.	..	The size of the curve of the speed changes for the pedal toe down amount can be set. The speed change curve will change from small to large according to the small → large of the set value.	62
										
	Acceleration time simple setting AC	○	○	M	—	—	AC.		The time for the sewing machine to reach the high speed after the pedal toe down or external run signal (S1) is input can be set easily.	—
								H M L	[H] : 100mS [M] : 140mS [L] : 240mS	63 — —
Acceleration time ACT	○	○	14	x10 Milliseconds	60 ~ 990	ACT.	..	[-] : The time set in the next acceleration time ACT is used.	—	
Deceleration time simple setting DC	○	○	M	—	—	dC.		The deceleration time for the sewing machine to stop after returning to neutral from pedal toe down or when the external run signal (S1) is turned OFF can be set easily.	—	
							H M	[H] : 90mS [M] : 160mS	— —	





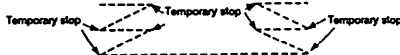
Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
A mode ↓ + A-2								L	[L] : 230mS	64	
								-	[ - ] : The time set in the next deceleration time DCT is used.	-	
	Deceleration time	DCT	○	○	16	x10 Milli-seconds	60 ~ 990	DCT.	**	The deceleration time for the sewing machine to stop after returning to neutral from pedal toe down or when the external run signal (S1) is turned OFF can be set. This is valid when the deceleration time simple setting DC is set to [-]. Normally use this at 350 milliseconds or less.	-
	Caution The factory setting 16 refers to 16x10 milliseconds = 160 milliseconds.										
	S-character cushion	SC	○	○	OF	-	-	SC.	ON OF	The speed change curve is accelerated slowly for the t time after pedal toe down or the external run signal (S1) is turned ON, and then the sewing machine accelerates rapidly and enters the high speed operation. This is effective when carrying out one stitch sewing with the external run signal (S1) when  key is set in the normal mode.	-
	S-character cushion time setting	SCT	○	○	7	x10 Milli-seconds	0 ~ 990	SCT.	**	The t time can set when S-character cushion is set to [ON].	-
	Full healing S2 signal operation mode when power is turned on or after thread trimming	S2M	○	○	FU	-	-	S2M.		The operation mode of the full healing or S2 signal when the power is turned on or after thread trimming is determined.	-
									FU	The presser foot lifting operation is entered.	-
									U	The needle lifting operation is entered.	-
		UF	The presser foot lifting operation after needle lifting is entered.	-							
Sewing machine shaft/motor shaft speed setting selection	PL	○	○	OF	-	-	PL.	ON OF	The speed setting is set so that the normal sewing machine shaft speed is constant, but by setting to [ON] the motor shaft rotation can be made constant. This is effective when the motor pulley diameter is small, the V belt slips and the sewing machine speed is unstable.	-	
No detector mode	NOS	○	○	OF	-	-	NOS	ON OF	Variable operation is possible when the detector has broken by setting to [ON] to invalidate the detector. The positioning stop and thread trimming operations will not be possible.	66	



Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
B mode ↓ + [B SL]	Sewing machine shaft speed display S	○	○	0	s/min	—	S.	****	The sewing machine shaft speed during operation is displayed. Display range 0 ~ 999s/min	—
	Motor max. speed MSP	○	○	36	x100 s/min	—	MSP.		The motor's maximum speed can be set.	—
								36	Set to [36]: 3600r/min	—
								40	Not used	—
	Timer setting for FUM operation mode FCT	○	○	12	Second	1 ~ 99	FCT.	**	The timer time for the presser foot output to turn ON and then turn OFF when the mode P FUM operation mode FU is set to [C], [T] can be set.	—
	Time to motor drive after presser foot lifter bring down FD	○	○	176	Milli-seconds	0 ~ 998	Fd.	***	The time for the motor to start driving after the presser foot output FU is turned OFF when pedal toe down or external run signal (S0, S1) ON during presser foot lifting can be set in 2 millisecond units.	—
	Delay time of presser foot signal S3 input SSD	○	○	10	x10 Milli-seconds	10 ~ 990	SSd.	**	The delay time for the presser foot output FU to turn ON when the light heel (lever signal presser foot lifting signal S3) is input before thread trimming can be set.	—
	Presser foot lifting output chopping duty FUD	○	○	M1	—	—	FUD.		The chopping output duty during holding after the presser foot output FU presser foot lifting operation can be set.	—
								01	Set to [M1]: 4ms ON/OFF 50% duty	—
								02	Set to [M2]: 2ms ON/OFF 50% duty	—
FL								Set to [FL]: 100% (full wave)	—	
						Lo	Set to [LO]: 2ms ON, 4ms OFF 33% duty	67		
Presser foot lifting output when power is turned ON PFU	○	○	ON	—	—	PFU.	on of	The presser foot lifting operation begins when power is turned ON. This is valid when the FUM in mode P is set to [ON]. When FU is set to [C] or [T], the presser foot will lift only while the timer is ON.	—	
Thread trimming validity at neutral pedal POS	○	○	OF	—	—	Pos.	on of	The needle will stop in the UP position after thread trimming during neutral after pedal toe down or when external run signal (S0, S1) is turned OFF.	—	
Operation when power is turned ON during 1 position setting P1P	○	○	OF	—	—	P1P.	on of	When 1 position is set with the [1] key in the normal mode, the needle will left to the UP position if not in the UP position when the power is turned ON.	—	

Mode name	Function name	Operability	Function validity		Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
B mode ↓ + [SL]	Operation when power is turned ON during 2 position setting P2P	○	○	OF	—	—	P2P.	ON OF	When 2 position is set with the [P2] key in the normal mode, the needle will lift to the UP position if not in the UP position when the power is turned ON.	—
	Weak brake mode BKM	○	○	E	—	—	btk.		The weak brake force can be set for when stopping the sewing machine when the [BK] key is turned ON in the normal mode.	—
								E	Set to [E]: Brake that allows manual rotation.	—
								H	Set to [H]: Strong brake	—
	Brake time BKT	○	○	14	x10 Milliseconds	0 ~ 990	btk.	..	The brake time for stopping the sewing machine can be set.	—
	Needle stop position before fabric C8	○	○	60	Degree	0 ~ 360	C8.	...	The needle stop position angle can be set just above the fabric looking from the UP position when [BC] and [BCR] are set in the SO operation mode of mode P.	68
	Needle DOWN position stop angle D8	○	○	28	Degree	10 ~ 50	d8.	..	The coasting angle at the needle DOWN position stop can be set.	—
	Needle UP position stop angle U8	○	○	14	Degree	10 ~ 50	u8.	..	The coasting angle at the needle UP position stop can be set.	—
	Reverse run angle from DOWN position to UP position K8	○	○	76	Degree	0 ~ 360	k8.	...	The reverse run angle from the DOWN position to the UP position can be set when the SO operation mode [USR] or reverse thread trimming mode operation mode TR[RK] is set in mode P.	—
	ON angle of virtual TM E8	○	○	90	Degree	0 ~ 360	e8.	...		—
ON start angle of virtual TM S8	○	○	50	Degree	0 ~ 360	s8.	...		—	
C mode ↓ + [CAT]	Solenoid output NCL	○	○	OF	—	—	nCL.		The output functions of the No. 7 pin in the sewing machine connector can be selected with the following settings.	—
								oF	The thread release output L is output.	—
								oN	The needle cooler output NLC is output. The output will turn ON during operation (including during thread trimming.)	69
								SL	After thread trimming, solenoid output L will be output for the number of stitches set in the no. of slow start stitches SLN in mode P (page 88). (This will be output regardless of the slow start [SL] key ON/OFF in the normal mode.)	—



Mode name	Function name	Operability	Function validity		Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
C mode  + 	Prohibit of simple setting mode for Mitsubishi thread trimming sewing machine MAC	○	○	OF	—	—	MAC	ON OFF	The simple setting mode (program mode 1) for the Mitsubishi thread trimming sewing machine cannot be entered.	—
	Prohibit of mode P thread trimming mode TR TRC	○	○	OF	—	—	TRC	ON OFF	The mode P thread trimming mode TR cannot be entered.	—
	Panel switch operation prohibition PSW	○	○	OF	—	—	PSW	ON OFF	The operation of the panel switches during the normal mode and tacking mode is prohibited. However, the setting of each program mode is possible.	70
D mode  + 	Operation mode during tacking D1	○	○	M	—	—	d1		The operation mode during tacking is determined.	—
								n	During start tacking, even if the pedal is returned to neutral or the external run signal (S1) is turned OFF, the stitching will continue to the last tack process, and then will stop. Stitching will continue in the same manner for end tacking, and the needle will be lifted after thread trimming.	—
								CSF	The sewing machine will stop for a set time at each tack corner even with pedal toe down or if the external run signal (S1) is ON. The stop time can be adjusted with [CT] of mode D on page 102.  This is used to accurately tack.	71
d	The tacking speed will change according to the pedal toe down amount only during start tacking. (the maximum speed is the start tacking speed N.) The sewing machine will stop if the pedal is returned to neutral or external signal turned OFF during start tacking.	—								



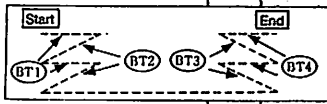



**Caution**

Set the start and end tack type, and number of stitches in the tacking mode before setting the functions in the D mode.

Mode name	Function name	Oper-ability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
D mode ↓ + [D] [X]	Operation mode during start tack completion D2							d2.  Con  SFP  r-n	The operation mode during the completion of start tack is determined.  If the pedal is toed down or the external run signals (S0, S1) are ON when start tacking is completed, the next straight line stitching will begin.  Even if the pedal is toed down or the external run signals (S1) turned ON when start tacking is completed, the sewing machine will stop. The next straight line stitching will start when the pedal is toed down for neutral again, or when the external run signals (S1) is turned OFF to ON.  The thread is trimmed when start tacking is completed. This is used for continuous tack stitch.	-  -  -  72
	Stop time at each corner during start and backtacking CT	○	○	5	×10 Milli-seconds	0 ~ 990	Cr.	..	The stop time at each corner during tacking can be set when [CST] in operation mode D1 is set.	71
	Tack alignment BM	○	○	OF	-	-	bn.	on of	The backstitch solenoid operation timing can be set to align the tacking. Set to [ON]: Tacking speed less than 1000 rotations Set to [OFF]: Tacking speed 1000 rotations or more	74
	No. of stitch compensation for start tacking alignment BT1	○	○	0	-	0 ~ F	bf1.	.	By finely adjusting the backstitch solenoid operation timing of start tacking from forward to reverse, the no. of stitches can be compensated. The relation of the setting value and no. of stitch compensation is as shown below.	75
	No. of stitch compensation for start tacking alignment BT2	○	○	0	-	0 ~ F	bf2.	.	By finely adjusting the backstitch solenoid operation timing of start tacking from reverse to forward, the no. of stitches can be compensated. The relation of the setting value and no. of stitch compensation is as shown below.	76
	No. of stitch compensation for end tacking alignment BT3	○	○	0	-	0 ~ F	bf3.	.	By finely adjusting the backstitch solenoid operation timing of end tacking from reverse to forward, the no. of stitches can be compensated. The relation of the setting value and no. of stitch compensation is as shown below.	77




**Caution**

If the operation mode during tacking D1 on page 101 is set to [CST], the tacking alignment functions BM, BT1, BT2, BT3 and BT4 will be invalid.

Mode name	Function name	Operability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page																																	
			XC-BMBL	XC-BMBL			Function name	Setting																																			
D mode  + 	No. of stitch compensation for end tacking alignment BT4  	○	○	0	-	0 ~ F	BT4	•	By finely adjusting the backstitch solenoid operation timing of end tacking from forward to reverse, the no. of stitches can be compensated. The relation of the setting value and no. of stitch compensation is as shown below.	78																																	
											(Relation of no. of compensated stitches and setting value) <table border="1" style="width:100%; text-align:center;"> <thead> <tr> <th>Setting value</th> <th>9</th> <th>8</th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>No. of compensated stitches</td> <td>-2¼</td> <td>-2</td> <td>-1¼</td> <td>-1½</td> <td>-1¼</td> <td>-1</td> <td>-¾</td> <td>-½</td> <td>-¼</td> <td>0</td> <td>+¼</td> <td>+½</td> <td>+¾</td> <td>+1</td> <td>+1¼</td> <td>+1½</td> </tr> </tbody> </table>										Setting value	9	8	7	6	5	4	3	2	1	0	A	B	C	D	E	F	No. of compensated stitches	-2¼	-2	-1¼	-1½	-1¼
Setting value	9	8	7	6	5	4	3	2	1	0	A	B	C	D	E	F																											
No. of compensated stitches	-2¼	-2	-1¼	-1½	-1¼	-1	-¾	-½	-¼	0	+¼	+½	+¾	+1	+1¼	+1½																											
E mode  +  + 	Error code	1	○	○	E-	-	-	1.	E	The last error code is displayed. Refer to page 113 for the error codes.	79																																
	Error code	2	○	○	E-	-	-	2.	E	The second to last code is displayed. Refer to page 113 for the error codes.	79																																
	Error code	3	○	○	E-	-	-	3.	E	The third to last code is displayed. Refer to page 113 for the error codes.	79																																
	Error code	4	○	○	E-	-	-	4.	E	The fourth to last code is displayed. Refer to page 113 for the error codes.	79																																
	Input display	S1	○	○	-	-	-	S1.	ON OF	The input status (ON/OFF) of the pedal toe down or external run signal S1 is displayed.	80																																
	Input display	S2	○	○	-	-	-	S2.	ON OF	The input state (ON/OFF) of the full pedal heeling or thread trimmer signal S2 is displayed.	80																																
	Input display	S3	○	○	-	-	-	S3.	ON OF	The input state (ON/OFF) of the light pedal heeling or presser foot lifting signal S3 is displayed.	80																																
	Input display	PD	○	○	-	-	-	PD.	...	The numerical value that is equivalent to the variable speed voltage VC with the pedal toe down is displayed. Display range: 000~3FF	80																																
Input display	ECA	○	○	-	-	-	ECA.	ON OF	The input status (ON/OFF) of the motor encoder A phase is displayed.	81																																	
Input display	ECB	○	○	-	-	-	ECB.	ON OF	The input status (ON/OFF) of the motor encoder B phase is displayed.	81																																	

Mode name	Function name	Operability	Function validity		Unit	Setting range	Digital display		Specification	Function setting example reference page	
			XC-BMBL	XC-BMBL			Function name	Setting			
E mode	Input display	UP	○	○	—	—	UP.	on of	The input status (ON/OFF) of the detector UP signal is displayed.	82	
	Input display	DN	○	○	—	—	dn.	on of	The input status (ON/OFF) of the detector DN signal is displayed.	82	
	Input display	PG	○	○	—	—	PG.	on of	The input status (ON/OFF) of the detector PG signal is displayed.	82	
	Input display	PUE	○	○	—	—	PUE.	on of	The input status (ON/OFF) of input signal UES.	—	
	Input display	PSD	○	○	—	—	PSd	on of	The input status (ON/OFF) of the input signal PS.	—	
	Input display	S0H	○	○	—	—	S0H.	on of	The input status (ON/OFF) of the low speed operation signal S0 or one shot signal SH is displayed.	—	
	Input display	F	○	○	—	—	F.	on of	The input status (ON/OFF) of the presser foot lifting signal F is displayed.	83	
	+	Input display	6TL	○	○	—	—	6TL.	on of	The input status (ON/OFF) of input signal 6TL is displayed.	83
	↓	Input display	S7	○	○	—	—	S7.	on of	The input status (ON/OFF) of the backstitch signal S7 is displayed.	83
	+	Input display	VR	○	○	—	—	vr.	...	The numerical value that is equivalent to the variable speed voltage VC with the speed setting dial on the panel is displayed. Display range: 000 ~ 3FF.	83
	A 1-1	Input display	CRS	○	○	ON/OFF	—	CrS.	on of	The status of the BA fuse for solenoid output protection is displayed. Normal status: Repeats ON-OFF-ON display.	—
		Presser foot lifter output	FUD	○	○	—	—	FUD.	on of	The output status (ON/OFF) of the presser foot lifting output FU is displayed.	—
		Thread trimmer output	TD	○	○	—	—	Td.	on of	The output status (ON/OFF) of the thread trimmer output T is displayed.	—
		Wiper output	WD	○	○	—	—	Wd.	on of	The output status (ON/OFF) of the wiper output W is displayed.	—
	Backstitch output	BD	○	○	—	—	bd.	on of	The output status (ON/OFF) of the backstitch output B is displayed.	—	
	Solenoid output	LD	○	○	—	—	Ld.	on of	The output status (ON/OFF) of the solenoid output NCL is displayed.	—	

Mode name	Function name	Operability	Function validity		Factory setting		Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL	Function name	Setting						
E mode ↑ + ↓ + A/12	Presser foot lifter output	FUO	x	○	—	—	—	—	FUo.	ON OFF	The output status (ON/OFF) of the presser foot output with the [P/BK] key ON/OFF is changed.	84
	Thread trimmer output	TQ	x	○	—	—	—	—	To.	ON OFF	The output status (ON/OFF) of the thread trimmer output T with the [P/BK] key ON/OFF is changed.	84
	Wiper output	WO	x	○	—	—	—	—	Wo.	ON OFF	The output status (ON/OFF) of the wiper output W with the [P/BK] key ON/OFF is changed.	84
	Backstitch output	BO	x	○	—	—	—	—	Bo.	ON OFF	The output status (ON/OFF) of the backstitch output B with the [P/BK] key ON/OFF is changed.	84
	Solenoid output	LO	x	○	—	—	—	—	Lo.	ON OFF	The output status (ON/OFF) of the solenoid output NCL with the [P/BK] key ON/OFF is changed.	84
	Output display	WT	○	○	05	Watt	—	—	Wf.	05	The motor's rated output value is displayed. [05] refers to 550W.	—
	Voltage display	VL	○	○	10/20	Volt	—	—	vL.	10 20	The rated input voltage value in the control box is displayed. [10] refers to 100V class, [20] to 200V class.	—
	Model display	TP	○	○	BMB	—	—	—	rP.		The control box model name is displayed.	—
	Data version No.	DV	○	○	...	—	—	—	dv.	...	The data version No. (3-digit alpha-numeral) of the EEPROM is displayed.	—
	Software version No.	RV	○	○	...	—	—	—	rv.	...	The version No. (3-digit alpha-numeral) of the software is displayed.	—
R mode ↓ + [SL] + [AT]	Reset	RESET	x	○	—	—	—	—	rESET.		The EEPROM data is returned to the EEPROM back up state. This is used to return the function settings to the factory settings.	85

Mode name	Function name	Oper-ability	Function validity	Factory setting	Unit	Setting range	Digital display		Specification	Function setting example reference page
			XC-BMBL	XC-BMBL			Function name	Setting		
1 mode  +  + 	Simple setting for thread trimming sewing machine	x	○	180M	—	—			Refer to the simple setting values for the Mitsubishi thread trimming sewing machine shown on the next page for details.	86
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p><b>Caution</b></p> <p>Always reset before performing the simplified setting.</p> </div>										



\* Mitsubishi thread trimming machines simple setting values and motor pulley diameters

Simple setting values for the Mitsubishi thread trimming sewing machine											Motor pulley diameter (mm)
Function	Digital display	Model	Setting speed					Function setting			
			High speed	Low speed	Thread trim- ming speed	Start tack speed	End tack speed	D-mode tack alignment	Normal mode key	A-mode gain selection	
			H	L	T	N	V	BM		GA	
180M	180M	LS2-1180-M1T(W)	4000	250	200	1700	1700	OFF	OFF	L	85
180L	180L	LS2-1180-L1T	4000	250	200	1700	1700	OFF	OFF	L	
180H	180H	LS2-1180-H1T	3000	250	200	1200	1200	OFF	OFF	L	65
180B	180B	LS2-1180-B1T	3000	250	200	1200	1200	OFF	OFF	L	
180SR	180SR	LS2-1180-M1T-SR	4300	250	200	1700	1700	OFF	OFF	L	100
210M	210M	LS2-2210-M1T(W)	4000	250	200	1700	1700	OFF	OFF	L	85
230M	230M	LT2-2230-M1TW	3700	250	175	1200	1200	OFF	OFF	H	
230L	230L	LT2-2230-L1T	3700	250	175	1200	1200	OFF	OFF	H	
230B	230B	LT2-2230-B1T	3000	250	175	1200	1200	OFF	OFF	H	65
250M	250M	LT2-2250-M1TW	3000	250	175	1200	1200	OFF	OFF	H	
250A	250A	LT2-2250-A1T	3000	250	175	1200	1200	OFF	OFF	H	
250B	250B	LT2-2250-B1T	3000	250	175	1200	1200	OFF	OFF	H	
3370	3370	LG2-3370-M1T	4000	250	200	1700	1700	OFF	OFF	L	85
359	359	DY-359-22BZ	2000	250	200	700	700	ON	OFF	L	50
3750	3750	LY2-3750-B1T	2000	250	200	700	700	ON	OFF	L	
410B	410B	LU2-4410-B1T	2000	250	175	700	700	ON	OFF	H	
430B	430B	LU2-4430-B1T	2000	250	175	700	700	ON	OFF	H	
630	630	LX2-630-M1	800	280	160	500	500	ON	ON	L	
180ME	180ME	LS2-1180-M1T(W)	5000	250	200	1700	1700	OFF	OFF	H	

Note: The factory settings are [180M].

The effective diameter of the sewing machine pulley is 70mm.

When simple settings are performed with the above table, the following functions will be forcibly set to OFF regardless of the sewing machine model (sewing machine name) type.

- P mode: interlock release after full healing of the pedal.
- A mode: sewing machine axis/motor axis speed setting selection PL

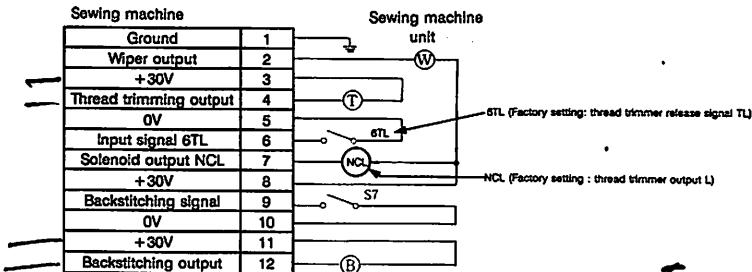
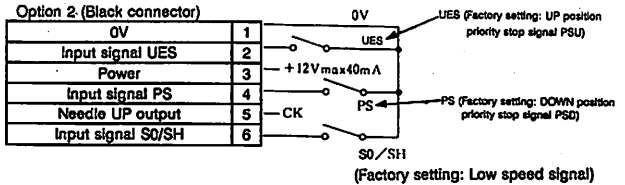
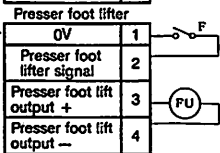
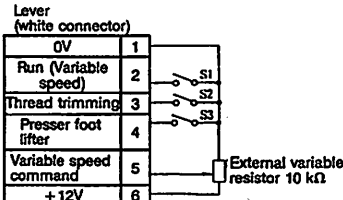
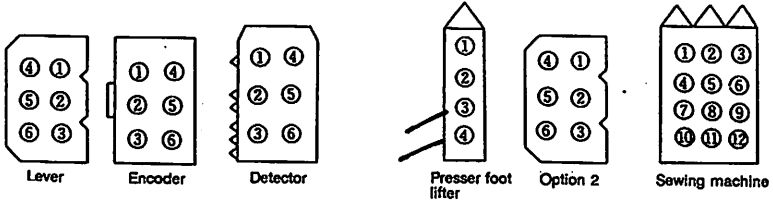
# 10. How to Use the Option Connector

## 10. How to Use the Option Connector

Various operations are possible by adding external signals to the option connector. A current of approximately 1.5mA flows through the switches used for the input signal, so please use a switch for minute currents.

### 1. Connector layout

#### (1) XC-BMBL



12 grey solenoid white with green plug = foot  
 9 blue backstitching  
 8 yellow +v  
 4 brown trim

## 10. How to Use the Option Connector

### 2. Description of input/output signals

	Input/output signal name	Model	Specifications
		XC-BMBL	
Lever connector	Operation signal S1	○	Equivalent to full pedal toe down. The motor runs at the speed set with the speed setting dial or external rheostat. (The variable speed command VC signal or normal mode <span style="border: 1px solid black; padding: 0 2px;">P</span> <sub>At</sub> key setting is necessary.)
	Thread trimming signal S2	○	Equivalent to full pedal heeling. After the thread is trimmed, needle stopped at UP position, and wiper operated with the S2 signal ON, the automatic presser foot lifting operation is executed while the signal is ON.
	Presser foot lifter signal S3	—	Equivalent to light pedal heeling. Presser foot lifting operation is executed with S3 signal ON.
	Variable speed command VC	○	This is the input for external speed command. By applying the variable speed command voltage (0~11V), the speed that is relative to the voltage is obtained.
	Constant voltage power supply +12V	○	This is the power for the variable speed command. A DC12V (MAX40mA) is output.
Option 2 connector	Input signal UES	○	The input function can be set with UES in mode <span style="border: 1px solid black; padding: 0 2px;">P</span> on page 90. The factory setting is the needle UP position priority stop signal PSU. (The digital display is PU.)
	Rated voltage power +12V	○	A DC12V (MAX40mA) is output. This can be used as the power source for the photoelectric switches in the amplifier.
	Input signal PS	○	The input functions can be set with PS in mode <span style="border: 1px solid black; padding: 0 2px;">P</span> on page 90. The factory setting is the needle DOWN position priority stop signal PSD. (The digital display is PD.)
	Needle UP position output CK	○	The UP position signal is output. This can be used as the signal for the stitch count, etc. The output voltage is DC12V/5V. The factory setting is 12V. Refer to the Technical Information for details.
	Input signal S0/SH	○	When mode <span style="border: 1px solid black; padding: 0 2px;">P</span> S0/SH input function is set to S0: The functions set in the S0 function mode on page 88 of mode <span style="border: 1px solid black; padding: 0 2px;">P</span> are executed.  When mode <span style="border: 1px solid black; padding: 0 2px;">P</span> S0/SH input function is set to SH: The one shot signal SH is executed. When used in an automated machine, this can be used as the manual/automatic selection switch for test stitching, etc.

## 10. How to Use the Option Connector

	Input/output signal name	Model		Specifications
		XC-BMBL		
Presser foot lifter connector	Presser foot lifter signal F	○		When the F signal is turned ON during sewing machine stop, the presser foot lifter will operate with the automatic presser foot lifter.
	Presser foot lifter output FU	○		The presser foot lifter operation is carried out.
Sewing machine connector	Thread trimming output T	○		If the pedal is fully heeled after completing stitching, the thread trimmer (thread release) will operate with the thread trimming signal S2, and the wiper will operate after the needle rises to the UP position. The output functions of the solenoid output NCL can be set with NCL in mode <span style="border: 1px solid black; padding: 0 2px;">C</span> on page 100. The factory setting is the thread release output L. (The digital display is OF.)
	Wiper output W	○		
	Solenoid output NCL	○		
	Backstitching output B	○		
	Input signal 6TL	○		The input function can be set with 6TL on page 93. The factory setting is the thread trimming release signal TL.
	Backstitching switch S7	○		Reverse feed will be executed when the S7 signal is turned ON during sewing machine operation. The operations set in the S7 operation mode in the mode <span style="border: 1px solid black; padding: 0 2px;">P</span> on page 94 will be executed when the sewing machine is stopped.

## 10. How to Use the Option Connector

### 3. List of input signal functions

Signal name	Set value	Input signal				
		Digital display	SO	UES	PS	6TL
Low speed signal	0	0	0*	—	—	0
One stitch signal	1	1	0	—	—	0
Random stop signal	RND	<i>rnd</i>	0	—	—	—
Fabric puncture position confirmation signal	BC	<i>bC</i>	0	—	—	0
Fabric puncture position confirmation signal (for thick fabric)	BCR	<i>bCr</i>	0	—	0	—
Reverse needle lift signal	USR	<i>USr</i>	0	—	0	—
Signal for solenoid output NCL	LIO	<i>Lio</i>	0	—	—	—
Backtacking prohibit signal	BTL	<i>bFL</i>	0	—	0	—
Needle UP position priority stop signal	PSU	PU	—	0*	0	—
Needle DOWN position priority stop signal	PSD	PD	—	0	0*	—
Emergency stop signal	ES	ES	—	0	—	0
Half-stitch signal	UD	<i>Ud</i>	—	0	—	0
Needle lifting signal	U	U	—	0	—	0
Maximum speed signal	S4	<i>S4</i>	—	0	—	—
Start tacking prohibit signal	SB	<i>Sb</i>	—	0	0	—
End tacking prohibit signal	EB	<i>Eb</i>	—	0	0	—
Back stitch signal	S70	<i>S70</i>	—	—	0	—
Thread trimmer release signal	TL	TL	—	—	—	0*
Thread trimmer protection signal	S6	<i>S6</i>	—	—	—	0

Note) The \* values are the factory settings of each input signal.

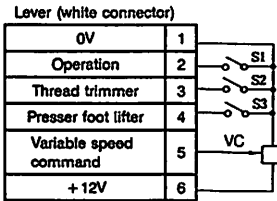
## 10. How to Use the Option Connector

### 4. To use as a standing work type sewing machine

The sewing machine can be used as a standing work type sewing machine with the four connections below using the lever connector. However, take special care to the intrusion of noise, and use the shortest wiring possible.

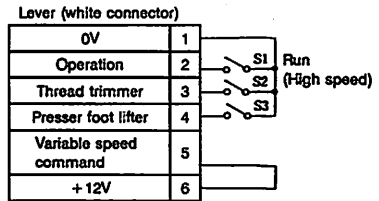
(1) When operating with an external rheostat  
Lever (white connector)

(Normal mode  $\begin{matrix} C \\ A \\ T \end{matrix}$  key is set to OFF)



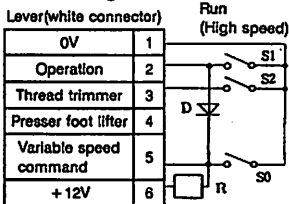
(2) For operating with a high speed  
Lever (white connector)

(Normal mode  $\begin{matrix} C \\ A \\ T \end{matrix}$  key is set to OFF)



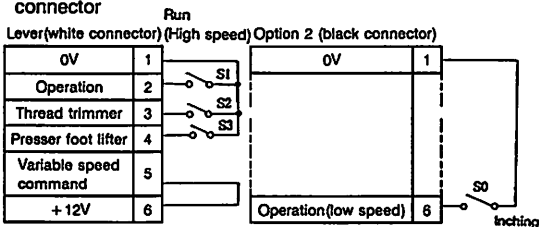
(3) When operating with high speed and inching (Normal mode  $\begin{matrix} C \\ A \\ T \end{matrix}$  key is set to OFF)

(a) When using the lever connector



D: Equivalent to IS953 (NEC)  
(VR ≥ 30V, IF ≥ 30mA)  
R: 1kΩ 1/2w or higher

(b) When using the lever connector and option connector



• Set the No. 8 function in mode  $\begin{matrix} P \\ \end{matrix}$  on page 37 before starting inching.

## 11. Error Display

### 11. Error Display

When the control box detects an error, the error code is flickered on the operation panel display. Confirm the error code, and investigate with the following table.

Error code	Probable cause	Inspection
E1	<ul style="list-style-type: none"> <li>• Is the wire to the motor short-circuited?</li> <li>• Is the sewing machine load torque too high?</li> </ul>	<p>Check the motor wiring.</p> <p>Check the sewing machine.</p>
E2	<ul style="list-style-type: none"> <li>• Is the power voltage too high?</li> <li>• Is the sewing machine inertia too high?</li> </ul>	<p>Check the power voltage.</p> <p>Lengthen the deceleration time. (Refer to No. 3 in mode <b>A</b> on page 64.)</p>
E3	<ul style="list-style-type: none"> <li>• Is the connector to the motor encoder securely inserted?</li> <li>• Are the signals from the motor encoder correct?</li> <li>• Is the sewing machine locked?</li> <li>• Is the motor locked?</li> </ul>	<p>Check the connector insertion.</p> <p>Check the encoder signals. (Refer to No. 3 in mode <b>E</b> on page 81.)</p> <p>Check the sewing machine.</p> <p>Check the motor.</p>
E4	<ul style="list-style-type: none"> <li>• Is the motor connector securely inserted?</li> </ul>	<p>Check the motor connector insertion.</p>
E8	<ul style="list-style-type: none"> <li>• Is the position detector connector securely inserted?</li> <li>• Are the signals from the detector correct? (UP/DOWN signal interruption)</li> </ul>	<p>Check the detector connector insertion.</p> <p>Check the detector UP/DOWN signals. (Refer to No. 4 in mode <b>E</b> on page 82.)</p>
E9	<ul style="list-style-type: none"> <li>• Is the solenoid wiring short-circuited?</li> <li>• Solenoid defect (coil defect)</li> </ul>	<p>Check the solenoid wiring.</p> <p>Replace the solenoid.</p>
E0	<ul style="list-style-type: none"> <li>• 8A fuse in control box blown.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: E0 will display for approximately 10 seconds after the power is turned OFF, but this is not an error.</p> </div>	<p>Replace the 8A fuse.</p>

## 11. Error Display

Others	Probable cause	Inspection
The sewing machine does not run when the pedal is pressed.	<ul style="list-style-type: none"> <li>• Is the lever unit connector securely inserted?</li> <li>• Are the operation signals (S1) from the lever unit correct?</li> </ul>	<p>Check the lever unit connector insertion.</p> <p>Check the S1 signal. (Refer to No. 2 in mode <b>[E]</b> on page 80.)</p>
The sewing machine does not run at the high speed.	<ul style="list-style-type: none"> <li>• Is the speed setting dial set in the low to medium range?</li> <li>• Is the variable speed voltage from the speed setting dial set low?</li> <li>• Is the variable speed voltage with the pedal toe down low?</li> <li>• Is the <b>[C<sub>AT</sub>]</b> key turned ON when the external switch is used?</li> <li>• Is the motor pulley diameter too small?</li> </ul>	<p>Turn to the right fully.</p> <p>Check the variable speed voltage. (Refer to mode <b>[E]</b> No.5 on page 83.)</p> <p>Check the variable speed voltage. (Refer to No. 2 in mode <b>[E]</b> on page 80.)</p> <p>Turn the <b>[C<sub>AT</sub>]</b> key ON. (Refer to No. 4 in the normal mode on page 23.)</p> <p>Check the motor pulley diameter. (Refer to item 3 on page 6.)</p>
The thread is not trimmed even with heeling.	<ul style="list-style-type: none"> <li>• Is the thread trimming signal (S2) from the lever unit correct?</li> <li>• Is the thread trimmer operation release S2L ON?</li> </ul>	<p>Check signal S2. (Refer to No. 2 in mode <b>[E]</b> on page 80.)</p> <p>Set S2L to OFF. (Refer to cancel of thread trimmer operation S2L in mode <b>[P]</b> on page 93.)</p>
The presser foot lifter output does not operate.	<ul style="list-style-type: none"> <li>• Is the light heeling signal (S3) or thread trimming signal (S2) from the lever unit correct?</li> <li>• Is the presser foot lift signal (F) correct?</li> <li>• Is the presser foot output (FU) correct?</li> </ul>	<p>Check signals S2 and S3. (Refer to No. 2 in mode <b>[E]</b> on page 80.)</p> <p>Check signal F. (Refer to No.5 in mode <b>[E]</b> on page 83.)</p> <p>Check FU output. (Refer to No. 6 in mode <b>[E]</b> on page 84.)</p>



## 12. Specifications

### 12. Specifications

Specifications		Power	100V single phase 50/60 Hz	200V single phase, 3-phase 50/60 Hz	
Motor	Model name		XL-554-10	XL-554-20	
	Voltage (V)		100 ~ 120	200 ~ 240	
	Rated output (W)		550		
	Rated speed (r/min)		3,000		
	Rated torque (N.m)		1.76 (0.18 Kgm)		
Control box	Model name	Generalpurpose automatic thread trimmer (XC-BMBL model)	XC-BMBL-10-05	XC-BMBL-20-05	
	Voltage (V)		100-110/110-120	200-220/220-240	
	Speed control range	With sewing machine shaft (S/min)		70 ~ 4000 (MAX8999)	
		With motor shaft (r/min)		50 ~ 3600	
	Solenoid voltage		DC 30V		
	Lamp voltage		6V 15 ~ 20W		

Specifications	Model
	XC-BMBL
Lever unit	LK-CL-2X

Specifications	Model
	XC-BMBL
Detector	XC-KB-12P

Solenoid Specifications <sup>1</sup>	Presser foot lifter FU	Thread trimming output T	Wiper output W	Thread release output L	Backstitching output B
Resistivity	10 (continuous rating) or more	5 (short rating) or more	5 (short rating) or more	5 (short rating) or more	5 (short rating) or more

## 12. Specifications

**Table of digital display**

Numeral	0	1	2	3	4	5	6	7	8	9
Digital display										
Characters	A	B	C	D	E	F	G	H	I	J
Digital display										
Characters	K	L	M	N (n)	O (o)	P	Q	R (r)	S	T
Digital display							\			
Characters	U	V (v)	W	X	Y	Z				
Digital display				\		\				