MITSUBISHI

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.
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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.

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.

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.

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.

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

- Use a shield cable for the signal wire when possible.
2. Names of Each Part

1. Front

- Encoder connector
- Lever connector
- Detector connector
- Connector for options (the connector will differ according to the model.)
- Connector display nameplate
- Cover
- High voltage warning plate
- Operation panel

2. Left

- Screw hole for lever installation (M8 screw)
- Box

3. Rear

- Motor connector
  - White connector for 100V
  - Brown connector for 200V
- Factory preset voltage nameplate
- Incoming power connector
- Lamp connector
  - (6 V/20W)
- Lamp nameplate

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

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

* 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

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.

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:

Motor pulley outer diameter (mm) = \frac{\text{Normal sewing machine speed} \times \text{Motor speed}}{\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.

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.
4. Installation

4. Mounting of the belt

Use the JIS K6323 sewing machine belt M-type. (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

- 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 φ55～φ80  (b) For motor pulley outer diameter φ80～φ125

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.
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.
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

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

Ground the green wire to the grounding terminal. Consult with an electrician for the grounding wires.

- 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.

<table>
<thead>
<tr>
<th>Power</th>
<th>Recommended current capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single phase 100~120V</td>
<td>15A</td>
</tr>
<tr>
<td>3 or single phase 200~240V</td>
<td>10A</td>
</tr>
</tbody>
</table>

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.)

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.
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 display on the factory shipment voltage nameplate on the back of the box.
6. Confirmation

1. Before turning switches on...

<table>
<thead>
<tr>
<th>Places to confirm</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Is the power and capacity suitable?</td>
<td>Current capacity on page 10.</td>
</tr>
<tr>
<td>(2) Is the power voltage the same as the o mark on the factory preset voltage nameplate (FACTORY SET VOLT.) on the back of the control box?</td>
<td>![Diagram of power voltage options]</td>
</tr>
<tr>
<td>(3) Are the connectors inserted correctly?</td>
<td>![Diagram of connectors]</td>
</tr>
<tr>
<td>• Power connector from pushbutton switch</td>
<td>Installation of control box on page 6</td>
</tr>
<tr>
<td>• Motor connector</td>
<td>Installation of lever unit on page 8</td>
</tr>
<tr>
<td>• Motor encoder connector</td>
<td>Installation of position detector on page 8</td>
</tr>
<tr>
<td>• Lever connector</td>
<td>Lamp power on page 10</td>
</tr>
<tr>
<td>• Position detection connector</td>
<td></td>
</tr>
<tr>
<td>• Lamp connector</td>
<td></td>
</tr>
<tr>
<td>• Other connectors (options, presser foot lifter, etc.)</td>
<td></td>
</tr>
<tr>
<td>(4) Is the lead wire contacting the V belt?</td>
<td></td>
</tr>
<tr>
<td>(5) Is the belt tension okay?</td>
<td>Mounting of the belt on page 7</td>
</tr>
<tr>
<td>(6) Are the pulley nuts securely tightened?</td>
<td>Installation of the pulley on page 6</td>
</tr>
<tr>
<td>(7) Can the sewing machine be rotated lightly by hand?</td>
<td></td>
</tr>
</tbody>
</table>
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

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.

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

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

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

<table>
<thead>
<tr>
<th>Pedal operation</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral - Toe down</td>
<td>The sewing machine will rotate at a speed that is relevant to the toe down amount.</td>
</tr>
</tbody>
</table>
| Toe down - Neutral       | 1 position setting
                          | Needle UP position stop                                                  |
|                          | 2 position setting
                          | Needle DOWN position stop                                                |
| Neutral - Light heeling  | Presser foot lifter operation                                            |
|                          | 1 position setting
                          | The motor rotates once, trims the thread, and then the presser foot rises. |
|                          | 2 position setting
                          | The motor half-rotates from the DOWN position, trims the thread, and then the presser foot rises. |

Caution:
Refer to "Changing the needle position during stop" on page 22 for details on setting the 1 position and 2 position.
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.

- UP key
  The validity of start and end tacking, type and number of stitches can be set.

- LOW key
  The speed at which the pedal is fully toed down is set.

- DOWN key, M key
  By operating these two keys simultaneously, the rotation direction of the sewing machine can be set. The display is shown on LED.M. Refer to normal mode No. 1 (page 22) for operation methods.

- A key
  Position 1 and position 2 position can be selected for the needle position during stopping. Refer to normal mode No. 2 (page 22) for operation methods.

- B key
  This is used to start sewing with a slow start. After the power is turned ON and the needle has been lifted, the sewing will start with a slow start. Refer to normal mode No. 3 (page 23) for operation methods.

- C key
  This is used when using an external switch for standing operations. Refer to normal mode No. 4 (page 23) for operation methods.

- D key
  The use of a weak brake during stopping is set. Refer to normal mode No. 5 (page 24) for operation methods.

- LED.M
  The rotation direction of the sewing machine is displayed. The rotation direction can be changed with the P~| keys.

- LED. A~D
  The state of the A~D keys function settings is shown.

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

- **Program mode P**
  - Basic function setting mode
  - Setting of speed, etc.

- **Program mode A**
  - Application function A setting mode
  - Setting of acceleration/deceleration time setting, etc.

- **Program mode B**
  - Application function B setting mode
  - Setting of stop angle, etc.

- **Program mode C**
  - Application functions C setting mode

- **Program mode D**
  - Tacking setting mode

- **Program mode E**
  - Error display
  - The input/output functions can be checked and the error state during abnormal operations checked.

- **Program mode R**
  - Mode for returning data to original data
  - The values that have been set in each program mode can be returned to the original data (factory settings).

- **Program mode I**
  - Simple setting mode for Mitsubishi thread trimming sewing machine

**Normal mode**

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

<table>
<thead>
<tr>
<th>Mode name</th>
<th>BMBL model</th>
<th>Mode name</th>
<th>BMBL model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal mode</td>
<td>O</td>
<td>Program mode E</td>
<td>O</td>
</tr>
<tr>
<td>Tacking mode</td>
<td>O</td>
<td>Program mode R</td>
<td>O</td>
</tr>
<tr>
<td>Program mode P</td>
<td>O</td>
<td>Program mode I</td>
<td>O</td>
</tr>
<tr>
<td>Program mode A</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program mode B</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program mode C</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program mode D</td>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. Operation of the Operation Panel Keys

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

<table>
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<th>Key operation</th>
<th>Digital display</th>
<th>Description</th>
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<td>Tacking mode</td>
<td>Press the key</td>
<td><img src="image" alt="Digital display" /></td>
<td>The tacking setting mode is entered.</td>
</tr>
<tr>
<td>Program mode P</td>
<td>While holding down the key, press the key for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode A</td>
<td>While holding down the key, press the key for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode B</td>
<td>While holding down the key, press the key for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode C</td>
<td>While holding down the key, press the key for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode D</td>
<td>While holding down the key, press the key for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode E</td>
<td>While holding down the key, press the key and keys for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode R</td>
<td>While holding down the key, press the key and keys for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
<tr>
<td>Program mode 1</td>
<td>While holding down the key, press the key and keys for 2 seconds or more.</td>
<td><img src="image" alt="Digital display" /></td>
<td>The display will flicker.</td>
</tr>
</tbody>
</table>
9. Operation of the Operation Panel Keys

(4) Selection of normal mode from tacking mode
Press the \( \uparrow \) key or \( \downarrow \) key once or twice. (Refer to page 25.)

(5) Selection of normal mode from each program mode

Program mode \( P \)

Program mode \( A \)

Program mode \( B \)

Program mode \( C \)

Program mode \( D \)

Program mode \( E \)

Key operation
While holding down the \( \downarrow \) key, press the \( \uparrow \) key.

Normal mode

Use the normal mode to operate the sewing machine.

Program mode \( R \)

Program mode \( 1 \)

Key operation
Press the \( \text{BK} \) key for approx. 2 sec., and set the display to CLEAR.

Normal mode
3. How to use the normal mode

No. 1 To change the rotation direction

1. Set to [Right rotation].
1→1→1→1→1→1

2. Set to [Left rotation].
1→1→1→1→1→1

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

1. Set to [1 position].
1→1→1→1→1→1

2. Set to [2 position].
1→1→1→1→1→1

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

1. Set to [Slow start valid].

2. Set to [Slow start invalid].

Description
A) The setting value will alternate between [0] and [—] with each press of the SL 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)

1. Set to [Standing operation].

2. 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 AT 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

1. Set to [Weak brake valid].

2. Set to [Weak brake invalid].

Description

A) The setting value will alternate between [0] and [—] with each press of the [OK] 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

- Normal mode
- Tacking setting mode
- Tacking mode
- No. of tacking stitch setting mode

(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.

- Setting of start tacking validity
  - <Display ex.>
  - 0: Valid
  - : Invalid

- Setting of start tacking type
  - <Display ex.>
  - : No tacking
  - : V tacking
  - : N tacking
  - : M tacking
  - : W tacking

- Setting of end tacking validity
  - <Display ex.>
  - 0: Valid
  - : Invalid

- Setting of end tacking type
  - <Display ex.>
  - : No tacking
  - : V tacking
  - : N tacking
  - : M tacking
  - : W tacking
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 6 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 °°°°°°°°°°°°, etc.)

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

| Function setting | Start | 4 stitches | End | 3 stitches |

Enter the tacking mode (1) (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

1. Set the no. of end tacking retract stitches to [3].

2. The no. of tacking stitches setting has been completed.

3. Return to the normal mode. (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 [0] key.
- Selection of end tacking validity with [AT] 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 [SL] key.
- The pattern to end tacking is selected with the [BK] 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 [1-2] key.
Selection of the no. of start tacking reverse stitches with the [SL] key.
Selection of the no. of end tacking reverse stitches with the [AT] key.
Selection of the no. of end tacking forward stitches with the [BK] 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] ( [↑] + [↓] )

(Once set, the set numerical value is displayed.)

Program mode [P] will be entered.

Set to [4].

Set to [5].

Set to [0].

The [H] function setting has been completed.

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

Description

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

B) By pressing each of the [1] [2] [3] [4] [5] keys, the setting value will change between 0 ~ 9.

(However, the [0] 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 (U + I)

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. (U + I)

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)

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

1. Program mode \( P \) will be entered.

2. Set function to \([T]\).

3. Set to \([1]\).

4. Set to \([8]\).  
   (Refer to the "Table of digital display" on page 116 for the correspondence of the digital display and alphanumerals.)

5. Set to \([0]\).

6. Complete the \([T]\) function setting.

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

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Description

A) The setting range of the thread trimming speed is 0 ~ 499 rotations.

B) By pressing each of the \( \leftarrow \) \( \rightarrow \) \( \uparrow \) \( \downarrow \) keys, the setting value will change between 0 ~ 9.  
   (However, the \( \leftarrow \) \( \rightarrow \) \( \uparrow \) \( \downarrow \) key is only between 0 ~ 4.)

C) The factory setting is \( [200 \text{ s/min}] \).
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 \[ P \ (1 + 1) \]

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.

Description

A) The setting range of the start tacking speed is \( 0 \sim 2999 \) rotations.
B) By pressing each of the \( 0_{1,2} \), \( 0_9 \), \( 0_{AT} \), \( 0_{OK} \) keys, the setting value will change between \( 0 \sim 9 \).
   (However, the \( 0_{1,2} \) key is only between \( 0 \sim 2 \).)
C) The factory setting is \[ 1700 \) rotations\].
D) 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. Return to the normal mode. ( + )

7. The [V] function setting has been completed.

Description:

A) The setting range of the end tacking speed is 0 ~ 2999 rotations.

B) By pressing each of the [ ] keys, the setting value will change between 0 ~ 9.
   (However, the [ ] 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. ( + )

Description

A) This is valid when the [F3] 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 [G1, G2, G3, G4, G5] keys, the setting value will change between 0 ~ 9.

(However, the [G2] 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] (1 + 1)

1

- Program mode [P] will be entered.

2

- Set function to [SLN].

3

- Set to [3].

4

- The [SLN] function setting has been completed.

5

Return to the normal mode. (1 + 1)

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Description

A) This is valid when the [P] key in the normal mode is turned ON.
B) The setting range of the number of stitches is 1 ~ 5 stitches.
C) By pressing [P], 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] + [SO] + [S]

Enter program mode  \( \text{P ( } + 1 \)  \\

1. \( \text{R A S O D 0} \)
   \( \text{S S S S S} \)
   • Program mode \( \text{P} \) will be entered.

2. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • Set function to [SOH].

3. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • Set to [S].

4. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • Complete the [SOH] function setting.

5. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • Press the 1 key once, and set the function to [S].

6. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • Set to [0].

7. \( \text{S S S S S} \)
   \( \text{S S S S S} \)
   • The [S] function setting has been completed.

Description

A) Set both the [SOH] and [S] functions.
B) The low speed operation will be valid with the switch [S] connected to the No. 6 pin in the option 2 connector.
C) Each time the 6 key is pressed in step 3, the set value will alternate between [S] and [SH]. (The factory setting is [S].)
D) Each time the 6 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.9 To stitch with one needle with the external switch

Function setting

Enter program mode

1. Program mode will be entered.

3. Set to [SO].

5. Press the key once, and set the function to [SO].

7. The [SO] function setting has been completed.

2. Set function to [SOH].

4. Complete the [SOH] function setting.

6. Set to [1].

8. Return to the normal mode.

Description

A) Set both the [SOH] and [SO] functions.

B) The one needle stitching will be valid with the switch [SO] connected to the No. 6 pin in the option 2 connector.

C) Each time the key pressed in step 3, the set value will alternate between [SO] and [SH]. (The factory setting is [SO].)

D) Each time the key pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [UO], [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] [SO] + [SO] [BCR]

Enter program mode (CD + (U)

1. Program mode [P] will be entered.

2. Set function to [SOH].

3. Set to [SO].

4. Press the 1 key once, and set the function to [SO].

5. Complete the [SOH] function setting.

6. Set to [BCR].

7. The [SO] function setting has been completed.

8. Return to the normal mode. (CD + 0)

Description

A) Set both the [SOH] and [SO] functions.
B) This is used to increase the penetration strength of the first stitch when the fabric is thick. Each time the switch [SO] 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.
C) Each time the 9 key is pressed in step 3, the set value will alternate between [SO] and [SH]. (The factory setting is [SO].)
D) Each time the 9 key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [UO], [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 [SOH SO] + [SO BTL]

Enter program mode \[P\] ( \[U\] + \[I\] )

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

2. Set function to [SOH].

3. Set to [SO].

4. Complete the [SOH] function setting.

5. Press the \[U\] key once, and set the function to [SO].

6. Set to [BTL].

7. The [SO] function setting has been completed.

8. Return to the normal mode. ( \[U\] + \[I\] )

Description

A) Set both the [SOH] and [SO] functions.
B) Tacking will be prohibited with the switch [SO] connected to the No. 6 pin in the option 2 connector.
C) Each time the \[U\] key is pressed in step 3, the set value will alternate between [SO] and [SH]. (The factory setting is [SO].)
D) Each time the \[U\] key is pressed in step 6, the set value will change in order of [0], [1], [RND], [BC], [BCR], [USR], [LOC], [BTL], [LO], [BTL]. (The factory setting is [0].)
E) 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 \([SOH \ [SH] + SHM \ [SH]]\)

Enter program mode \(P \ ((\ 1 + 1)\)

1. 
   \[\ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 0 \]

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

3. 
   \[\ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 0 \]

   * Set to \([SH]\).

5. 
   \[\ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 0 \]

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

7. 
   \[\ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 0 \]

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

Description

A) Set both the \([SOH]\) 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 \(\uparrow\) key is ON in the normal mode.) The operation can be stopped with the PSD, PSU or ES signal.
C) Each time the \(\downarrow\) key is pressed in step 3, the set value will alternate between \([SO]\) and \([SH]\).
   (The factory setting is \([SO]\).)
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 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] (U + 1)

1. Press the U key once, and set the function to [SH].

2. Program mode P will be entered.

3. Set to [ON].


5. Press the D key once, and set the function to [SHM].

6. Set to [SS].

7. The [SHM] function setting has been completed.

8. Return to the normal mode. (U + 1)

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 U 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 U key is pressed in step 3, the set value will alternate between [OF] and [ON]. (The factory setting is [OF].)

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

E) The same operation as No. 12 will occur when set to [SH].

F) Connection example When using the high speed signal (S4) for the external operation signal.

Option 2
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 + U + 1)

1. Program mode will be entered.

2. Set function to [UES].

3. Set to [PU].

4. Complete the [UES] function setting.

5. Press the 1 key once, and set the function to [PSU].

6. Set to [1].

7. Set to [0].

8. The [PSU] function setting has been completed.

Description

A) Set both the [UES] and [PSU] functions.

B) 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.

C) Each time the [PS] key is pressed in step 3, the set value will change in order of [PU] [PS] [PD] [ES] [VD] [V] [S4] [S6] [EB]. (The factory setting is [PU].)

D) The setting range of the number of stitches is 0 ~ 99 stitches.

E) Each time the 1 key in step 6 or 0 key in step 7 is pressed, the set value will change between 0 ~ 9.

F) 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

Enter program mode [P] (1 + 1)

- Set to [PD].

- Set function to [PS].

- Press the [ ] key twice, and enter the [PSD] function.

- Set to [1].

- The [PS] function setting has been completed.

- The [PSD] function setting has been completed.

- Return to the normal mode. (1 + 1)

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Description

A) Set both the [PS] and [PSD] functions.
B) 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.
C) Each time the [PU] key in step 3 is pressed, the set value will change between [PU], [PD], [BCR], [USR], [S70], [S71], and [E8]. (The factory setting is [PD].)
D) The setting range of the number of stitches is 0 ~ 99 stitches.
E) Each time the [ ] key in step 6, and the [ ] key in step 7 is pressed, the set value will change between 0 ~ 9.
F) The number of stitches before the needle DOWN position stop is executed can be set even when the function setting is [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] (↓ + 1)

1. Program mode [P] will be entered.
2. Set function to [PS].
3. Set to [PD].
4. The [PS] function setting has been completed.
5. Press the ↓ key three times, and enter the [PSN] function.
6. Set to [ON].
7. The [PSN] function setting has been completed.
8. Return to the normal mode. (↓ + 1)

Description

A) Set both the [PS] and [PSN] functions.
B) 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.
C) Each time the [↓] key in step 3 is pressed, the set value will change between [PU], [PD], [BCA], [USR], [S70], [BTL], [S6], and [EB]. (The factory setting is [PD].)
D) The setting range of the number of stitches is 0 ~ 99 stitches.
E) Each time the [↓] key in step 6 is pressed, the set value will alternate between OF ~ ON. (The factory setting is [OF].)
F) Restarting is possible even when the function setting is USES 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 ( U + 1 )

1

[PU][PD][ES][UD][V][S4][SB][EB]

* Program mode P will be entered.

2

[UES][ES]

* Set function to [UES].

3

[UES][ES]

* Set to [ES].

4

[UES][ES][ES]

* The [UES] function setting has been completed.

5

Return to the normal mode. ( U + 1 )

Page 90

Description

A) Connect the emergency stop signal ES to the No. 2 pin in the option 2 connector.

B) 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].)

C) 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 (↑ + ↓)

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 ↓ key once, and set the function to [FU].

6. Set to [M].

7. The [FU] function setting has been completed.

8. Return to the normal mode. (↑ + ↓)

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] ( + )

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 [↓] key once, and set the function to [FU].

6. Set to [C].

7. The [FU] function setting has been completed.

Description

A) Set both the [FUM] and [FU] functions.

B) Each time the [OK] key is pressed in step 3, the set value will alternate between [OF] and [ON]. (The factory setting is [OF].)

C) 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].)

D) 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]

<table>
<thead>
<tr>
<th>Enter program mode</th>
<th>(P (U + T)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>• Program mode [P] will be entered.</td>
<td>• Set function to [FL].</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>• Set to [ON].</td>
<td>• The [FL] function setting has been completed.</td>
<td></td>
</tr>
</tbody>
</table>

**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 [FL] 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 ) ]

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. (  + 1 )

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 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 | ( CD + 0 )

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. ( CD + 0 )

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 [ec] 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]).

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 IS7I UPS I

Enter program mode [P] ( + 1 )

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. ( + 1 )

Description

A) The half-stitch is validated with the switch [S7] connected to the sewing machine connector No. 10 pin.

B) Each time the 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 backstitch switch
Function setting S7 US

Enter program mode P (U + 1)

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. (U + 1)

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 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.25 When the tip of the needle is stuck in the thick fabric after thread trimming

Enter program mode (CD + (T))

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Program mode [P] will be entered.</td>
</tr>
<tr>
<td>2</td>
<td>Set function to [RU].</td>
</tr>
<tr>
<td>3</td>
<td>Set to [ON].</td>
</tr>
<tr>
<td>4</td>
<td>The [RU] function setting has been completed.</td>
</tr>
<tr>
<td>5</td>
<td>Return to the normal mode. (CD + (T))</td>
</tr>
</tbody>
</table>

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 [T] 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] ( + 1 )

1

- Program mode [P] will be entered.

2

- Set function to [TB].

3

- Set to [ON].

4

- The [TB] function setting has been completed.

5 Return to the normal mode. ( + 1 )

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 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 \[P \ (U + 1)\]

1. \[S2R \ OF \ IL \ ON\]

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

2. \[S2R \ OF \ IL \ ON\]

- Set function to \[S2R\].

3. \[S2R \ OF \ IL \ ON\]

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

4. \[S2R \ OF \ IL \ ON\]

- Set to \[OF\].

5. \[S2R \ OF \ IL \ ON\]

- Press the \[U\] key once, and set the function to \[IL\].

6. \[S2R \ OF \ IL \ ON\]

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

7. \[S2R \ OF \ IL \ ON\]

- Return to the normal mode. \[U + 1\]

**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 \[U\] key is pressed in step 3, the setting will alternate between \[OF\] and \[ON\]. (The factory setting is \[ON\].)

E) Each time the \[OK\] 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] (1 + 1)

1

2

* Program mode [P] will be entered.

* Set function to [TR].

3

4

* Set to [B1].

* The [TR] function setting has been completed.

5

Return to the normal mode. (1 + 1) Page 95

Description

A) Each time the [] 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 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 value 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 manufacturers' 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 \( P \) ( \( U + 1 \) )

1. \( P \)

- Program mode \( P \) will be entered.

2. \( P \)

- Set function to [TR].

3. \( P \)

- Set to [RK].

4. \( P \)

- The [TR] function setting has been completed.

5. \( P \)

Return to the normal mode. ( \( U + 1 \) )

Page 96

Description

A) Each time the \( M \) 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 75°.)

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 ( ( + )

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. ( ( + )

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 Bk 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

Enter program mode [P] (↓ + 1)

1. Program mode [P] will be entered.

2. Set function to [UES].

3. Set to [SB].

4. The [UES] function setting has been completed.

5. Return to the normal mode. (↓ + 1)  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 [↓] 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 [UES] connected to the option 2 connector No.4 pin.

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 + 1)

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. (1 + 1)

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 [BCR] 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

8. How to use the program mode

(Refer to the Table of Program Mode Functions on pages 96 to 98.)

<table>
<thead>
<tr>
<th>No.1</th>
<th>To adjust the pedal toe down amount (Ex. to set value 55 to sew quickly at a high speed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Function setting <strong>PDC</strong> [55]</td>
</tr>
</tbody>
</table>

| Enter program mode **A** ( + ) |

1. Program mode **A** will be entered.

2. Set function to **[PDC]**.

3. Set to [5].

4. Set to [5].

5. Complete the **[PDC]** function setting.

6. Return to the normal mode. ( + )

**Description**

A) The curve amount of the speed change for the amount that the pedal is pressed can be set.

The curve amount of the speed change for the size of the set value can be set.

To sew quickly at a high speed, increase the set value.

To finely adjust the medium speed region, decrease the setting.

B) The setting range is 10 ~ 99. (The factory setting is [30].)

C) Each time the key in step 3 or the key in step 4 is pressed, the set value will change between 0 ~ 9.

(However, the key is between 1 ~ 9.)
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 (O + ))

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. (O + )

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 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 [F] 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] (U + 13)

1. Program mode [A] will be entered.

2. Set function to [H].

3. Complete the [GA] function setting.

4. Return to the normal mode. (U + 1)

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 [G] 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]


1. Program mode [A] will be entered.

2. Set function to [NOS].

3. Set to [ON].

4. The [NOS] function setting has been completed.


Description

A) Only variable operation will be possible. Set position stopping and thread trimming will not be possible.

B) Each time the [6] 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])

功能设置 [FUO]

Enter program mode [B] ( + )

1. 2.

- Program mode [B] will be entered.
- Set function to [FUD].

3. 4.

- Set to [LO].
- Complete the [FUD] function setting.

6. 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 [ ] 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] ( + )

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. ( + )

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 [△] key in step 3 or [▽] key in step 4 is pressed, the set value will change between 0 ~ 9. (However, the [△] key is only between 0 ~ 8 for every two settings.)

Each time the [△] 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 [onT]

 Enter program mode [C] (  +  )

1. 

2. 

* Program mode [C] will be entered. 

* Set function to [ON].

3. 

* The [NCL] function setting has been completed.

4. Return to the normal mode. (  +  )

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 key is pressed, the setting will change in order of [OF][ON][SL]. (The factory setting is [OF].)

C) If the SO 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 ( 1 + 9 3 )

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. ( 1 + 1 )

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 \[\text{DI} \text{ CST.} + \text{CT} \text{ [10]}\]

Enter program mode \[D\] ( \[\uparrow\] + \[\text{Shift}\] )

1

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

2

- Set to [CST].

3

- The [DI] 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. ( \[\uparrow\] + \[\text{Shift}\] )

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 \[\text{Shift}\] 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 \[\text{Shift}\] key is pressed in the step 6, the set value will change from 0 to 9, and each time the \[\text{Shift}\] 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 \[S [A**] + M [A**]\]

Enter program mode \(\boxed{D} (\uparrow + \downarrow)\)

1.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - Program mode \(\boxed{D}\) will be entered.

2.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - Set function to \(\boxed{D2}\).

3.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - Set to \([TRM]\).

4.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - The \(\boxed{D2}\) function setting has been completed.

5.  Return to the normal mode. \(\boxed{D} (\uparrow + \downarrow)\)

6.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - The tacking setting mode will be entered.

7.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - Set to \([Start tacking valid]\).

8.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - Set to \([W tacking]\).

9.  \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
   - The tacking setting mode has been completed.

10. \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
    - The no. of tacking stitches setting mode will be entered.

11. \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
    - Set the no. of start tacking forward stitches to \([A]\).

12. \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
    - Set the no. of start tacking reverse stitches to \([A]\).

13. \[\boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \boxed{D} \]
    - Complete the no. of tacking stitches setting mode.
9. Operation of the Operation Panel Keys

Return to the normal mode. (↑)

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.)

![Invalid]

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] (© + S)

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. (© + 1)

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 [9] 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

3 stitches → 3 stitches 4 stitches → 2 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 [BT1].

3. * Set to [4].

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

5. Return to the normal mode. (↑ + ↓)

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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 [D] 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.

<table>
<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 correction stitches</td>
<td>-2 1/4</td>
<td>-2</td>
<td>-1 1/4</td>
<td>-1 1/4</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td></td>
</tr>
</tbody>
</table>

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 2]

(Ex.)

<table>
<thead>
<tr>
<th>No. of start tacking set stitches</th>
<th>Actual no. of stitches</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 stitches</td>
<td>3.5 stitches</td>
</tr>
</tbody>
</table>

(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. ( + )

Description

A) 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.)
B) With this setting, the reverse section will be 0.5 stitch shorter, and will be the correct no. of stitches.
C) Each time the [2] key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
D) Refer to the table in section D on page 75 for the relation of the no. of correction stitches and setting value.
E) The no. of corrected stitches set in BT2 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 [BT2 2] 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 Actual no. of stitches  
3 stitches  3 stitches  2 stitches  4 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 [BT3].  
3. Set to [4].  
4. The [BT3] function setting has been completed.  
5. Return to the normal mode. ( + )

Description

A) 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.)
B) With this setting, the reverse section will be one stitch shorter, and will be the correct no. of stitches.
C) Each time the [ key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.
D) Refer to the table in section D on page 75 for the relation of the no. of correction stitches and setting value.
E) The no. of corrected stitches set in BT3 is common for the end tack, N tack, M tack, and W tack.
F) The no. of stitches can be corrected easily by using this function and the end tack speed change (refer to page 34).

Note: When the function setting [CS] is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting [BT3 4] will be invalidated.

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9. Operation of the Operation Panel Keys

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

| Function setting BT4 2 |

(Ex.)

<table>
<thead>
<tr>
<th>No. of end tacking set stitches</th>
<th>Actual no. of stitches</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 stitches</td>
<td>3 stitches</td>
</tr>
<tr>
<td>3.5 stitches</td>
<td>2.5 stitches</td>
</tr>
</tbody>
</table>

(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 + I)

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. (U + I)

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Description

A) 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.)

B) 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.

C) Each time the key is pressed, the setting will change in order from 0 to 9, A, B, C, D, E, and F.

D) Refer to the table in section D on page 75 for the relation of the no. of corrected stitches and setting value.

E) The no. of corrected stitches set in BT4 is common for the end tack, M tack, and W tack.

F) 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 DI [GST] is set to stop the tacking set in No. 1 on page 71 at each corner, this function setting BT4 *1 will be invalidated.
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 $E$ ($\uparrow + \downarrow + \rightarrow$)

1. Error code No.
   - The last error code is displayed.
     (Ex. error code E1 is displayed.)

2. Error code No.
   - The second to last error code is displayed.
     (Ex. error code E3 is displayed.)

3. Error code No.
   - The third to last error code is displayed.
     (Ex. error code E8 is displayed.)

4. Error code No.
   - The fourth to last error code is displayed.
     (Ex. error code E2 is displayed.)

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

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

Program mode will be entered.

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

Set function to [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.

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

Press the key once and set the function to [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.

3. Check the pedal light heeling (S3).

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

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

4. Check the variable voltage with the pedal toe down.

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

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

5. Return to the normal mode.

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9. Operation of the Operation Panel Keys

No.3 To check the motor and encoder signals

Function setting ECA, ECB

Enter program mode [E] (U + 1 + P)

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 U 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. (U + 1)

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9. Operation of the Operation Panel Keys

No. 4 To check the position detector signal

Function setting [UP], [DN], [PG]

1. Enter program mode [E] ([U] + [O] + [F])
   
   * Program mode [E] will be entered.

2. Check the UP position signal.
   ([U] or [O] or [F])
   
   * Set the function to [UP]. [ON] or [OFF] will be displayed on [UP].

3. Check the DOWN position signal.
   ([D] or [O] or [F])
   
   * Press the [D] key once and set the function to [DN]. [ON] or [OFF] will be displayed on [DN].

4. Check the pulse (PG) signal.
   ([P] or [F])
   
   * Press the [P] key once and set the function to [PG]. [ON] or [OFF] will be displayed on [PG].

5. Return to the normal mode. ([U] + [O])
9. Operation of the Operation Panel Keys

No.5 To check each signal

| Function setting | F | 6TL | S7 | VR |

Enter program mode 

1. Program mode 

2. Check the presser foot lifting signal (F).

3. Check the input signal (6TL).

4. Check the backstitching signal (S7).

5. Check the variable voltage with the speed setting dial.

6. Return to the normal mode.

---

**Description**

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

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

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

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.

---

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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] ([J] + [T] + [O])

1. Program mode [E] will be entered.

2. Check the presser foot lifter output (FU).
   - Set the function to [FUO].
   - Press the [J] key once and set the function to [TO].

3. Check the thread trimmer output (T).
   - Press the [T] key once and set the function to [WO].

4. Check the wiper output (W).
   - Press the [W] key once and set the function to [WO].

5. Check the backstitching output (B).
   - Press the [B] key once and set the function to [BO].

6. Check the solenoid output, (NCL).
   - Press the [L] key once and set the function to [LO].

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

Description
The display will turn ON, and the presser foot lifter output will turn ON while the [F] key is pressed.

Description
The display will turn ON, and the thread trimmer output will turn ON while the [T] key is pressed.

Description
The display will turn ON, and the wiper output will turn ON while the [W] key is pressed.

Description
The display will turn ON, and the backstitching output will turn ON while the [B] key is pressed.

Description
The display will turn ON, and the solenoid output (NCL) will turn ON while the [L] key is pressed.

Return to the normal mode. ([J] + [T])
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] ([4] + [O] + [Q])

1. [4] [E] [S] [E] [R]
   * Program mode [R] will be entered.

2. [4] [E] [S] [E] [R] [O]
   * [RESET] will flicker when the [O] key is pressed.

3. [4] [L] [E] [A] [C]
   * When the [O] key is held down (for two seconds), the display will change to [CLEAR].

Description

A) When the display changes to [CLEAR] all settings will be returned to the factory settings.

B) To enter the normal mode from the [RESET] display, press the [4] key while holding down the [O] 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

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

Enter program mode \[+13+13\]

1. Program mode \(1\) will be entered.

2. Set function to \[180B\].

3. \[180B\] will flicker when \[\text{OK}\] is pressed.

4. \[\text{CLEAR}\] will be displayed when the \[\text{OK}\] key is pressed for approx. two seconds.

5. Press \[\text{OK}\] 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 \[\text{CLEAR}\] with the \[\text{OK}\] 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 \(1\) key while holding down \(1\). In this case, \[180B\] will not be set, and the last settings will be used.

C) Each time the \(1\) 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

<table>
<thead>
<tr>
<th>Model name</th>
<th>7-segment display</th>
<th>Sewing machine model</th>
</tr>
</thead>
<tbody>
<tr>
<td>180M</td>
<td>180M</td>
<td>LS2-1180-M1T(W)</td>
</tr>
<tr>
<td>180L</td>
<td>180L</td>
<td>LS2-1180-L1T</td>
</tr>
<tr>
<td>180H</td>
<td>180H</td>
<td>LS2-1180-H1T</td>
</tr>
<tr>
<td>180B</td>
<td>180B</td>
<td>LS2-1180-B1T</td>
</tr>
<tr>
<td>180SR</td>
<td>1805r.</td>
<td>LS2-1180-M1T-SR</td>
</tr>
<tr>
<td>210M</td>
<td>210N.</td>
<td>LS2-2210-M1T(W)</td>
</tr>
<tr>
<td>230M</td>
<td>230M</td>
<td>LT2-2230-M1TW</td>
</tr>
<tr>
<td>230L</td>
<td>230L</td>
<td>LT2-2230-L1T</td>
</tr>
<tr>
<td>230B</td>
<td>230B</td>
<td>LT2-2230-B1T</td>
</tr>
<tr>
<td>250M</td>
<td>250M</td>
<td>LT2-2250-M1TW</td>
</tr>
<tr>
<td>250A</td>
<td>250A</td>
<td>LT2-2250-A1T</td>
</tr>
<tr>
<td>250B</td>
<td>250B</td>
<td>LT2-2250-B1T</td>
</tr>
<tr>
<td>3370</td>
<td>3370.</td>
<td>LG2-3370-M1T</td>
</tr>
<tr>
<td>359</td>
<td>359.</td>
<td>DY-359-22BZ</td>
</tr>
<tr>
<td>3750</td>
<td>3750.</td>
<td>LY2-3750-B1T</td>
</tr>
<tr>
<td>410B</td>
<td>410B</td>
<td>LU2-4410-B1T</td>
</tr>
<tr>
<td>430B</td>
<td>430B</td>
<td>LU2-4430-B1T</td>
</tr>
<tr>
<td>630</td>
<td>630.</td>
<td>LX2-630-M1</td>
</tr>
<tr>
<td>180ME</td>
<td>180ME.</td>
<td>LS2-1180-M1T(W)</td>
</tr>
<tr>
<td>Mode name</td>
<td>Function name</td>
<td>Operability</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>XC-BMBL</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum speed</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>Low speed</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Thread trimming</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Start tacking speed</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>End tacking speed</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>Slow start speed</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>No. of slow start stitches</td>
<td>SLN</td>
</tr>
<tr>
<td></td>
<td>S0/SH input function setting</td>
<td>S0H</td>
</tr>
<tr>
<td></td>
<td>S0 operation mode</td>
<td>S0</td>
</tr>
</tbody>
</table>

**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 (S0N, SLN, ... H, TR ...)

---

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### Operation Panel Keys

#### Mode

<table>
<thead>
<tr>
<th>Function name</th>
<th>Mode name</th>
<th>Input signals UES</th>
<th>Operation mode of input signals UES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Caution

- The functions of the UES switch connected to the No. 1 and 2 pins in the option 2 connector can be selected with the settings. (Ex.) If set to [SB], this UES switch will become a switch that prohibits start tacking.

#### Operation mode of Input signals PSU

<table>
<thead>
<tr>
<th>Function Setting</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSU signal is input during operation, the needle UP position stop will occur.</td>
<td></td>
</tr>
</tbody>
</table>

#### Operation mode of Input signals PSD

<table>
<thead>
<tr>
<th>Function Setting</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSD signal is input during operation, all operation states will be halted, and the sewing machine will stop immediately with the brake.</td>
<td></td>
</tr>
</tbody>
</table>

#### Function Setting example

- 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. If the PSD signal is input during operation, the needle DOWN position stop will occur.

#### Unit Setting range

<table>
<thead>
<tr>
<th>Function Setting</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES signal is input during operation, the needle DOWN position stop will occur.</td>
<td></td>
</tr>
</tbody>
</table>

#### Operation mode of Operation mode of Input signals UES

<table>
<thead>
<tr>
<th>Function Setting</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSU signal is input during operation, the needle UP position stop will occur.</td>
<td></td>
</tr>
</tbody>
</table>

#### Function Setting example

- If set to [SB], this UES switch will become a switch that prohibits start tacking.

#### Unit Setting range

<table>
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<tr>
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#### Function Setting example

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#### Unit Setting range

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#### Function Setting example

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<tr>
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<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES signal is input during operation, the needle DOWN position stop will occur.</td>
<td></td>
</tr>
<tr>
<td>Mode name</td>
<td>Function name</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
</tr>
<tr>
<td>P mode</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>bCR</td>
<td></td>
</tr>
<tr>
<td>s70</td>
<td></td>
</tr>
<tr>
<td>bfl</td>
<td></td>
</tr>
<tr>
<td>sb</td>
<td></td>
</tr>
<tr>
<td>eb</td>
<td></td>
</tr>
</tbody>
</table>

Caution
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.
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Oper-</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
<th>Function setting example reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P mode</td>
<td>No. of stitches after PSU input PSU</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>0</td>
<td>Stitches</td>
<td>0 - 99</td>
<td>PSU</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>No. of stitches after PSD input PSD</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>0</td>
<td>Stitches</td>
<td>0 - 99</td>
<td>PSD</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Restart after PSD, PSU input PSN</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>OFF</td>
<td>-</td>
<td>-</td>
<td>PSN</td>
<td>on</td>
</tr>
<tr>
<td>1</td>
<td>Presser foot lift momentary FUM</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>OFF</td>
<td>-</td>
<td>-</td>
<td>FUM</td>
<td>on</td>
</tr>
<tr>
<td>1</td>
<td>FUM operation mode FU</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>M</td>
<td>-</td>
<td>-</td>
<td>FU</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cancel the presser foot lifting with full heeling FL</td>
<td>XOBMBL</td>
<td>O</td>
<td>O</td>
<td>OFF</td>
<td>-</td>
<td>-</td>
<td>FL</td>
<td>on</td>
</tr>
</tbody>
</table>

From the library of: Superior Sewing Machine & Supply LLC
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>P mode</td>
<td>Cancel pressor foot lifting with light heeling</td>
<td>S3L</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>53L</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Cancel of thread trimmer operation</td>
<td>S2L</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>52L</td>
<td>The thread trimming operation and subsequent presser foot lifting operation with full heeling or external thread trimmer signal S2 is prohibited.</td>
</tr>
<tr>
<td></td>
<td>Operation mode of input signal 6TL</td>
<td>6TL</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>6FL</td>
<td>The Input functions of the No. 6 pin in the sewing machine connector can be selected with the following settings.</td>
</tr>
</tbody>
</table>

**Caution**

The functions of the 6TL switch connected to the No. 5 and 6 pins in the sewing machine connector can be selected with the settings. (Ex.) If set to [ES], this 6TL switch will become the emergency stop signal switch.

**Function setting example reference page**

<table>
<thead>
<tr>
<th>Function setting example reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
</tr>
</tbody>
</table>

**Sewing machine**

- **6TL**

- **6FL**

- **ES**

- **UD**

- **U**

- **bc**

- **I**

- **0**

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 C6 in mode B.
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Oper-ability</th>
<th>Factory setting</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P mode</strong></td>
<td>S7 operation mode</td>
<td>S7</td>
<td>x</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UdS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>US</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>bSL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UCr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UbS</td>
</tr>
<tr>
<td></td>
<td>Reverse run needle lifting after thread trimming</td>
<td>RU</td>
<td>O</td>
<td>OF</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>RU reverse run angle</td>
<td>R8</td>
<td>O</td>
<td>30</td>
<td>Degree</td>
</tr>
<tr>
<td></td>
<td>Thread trimming with reverse feed</td>
<td>TB</td>
<td>O</td>
<td>OF</td>
<td>-</td>
</tr>
<tr>
<td>Mode name</td>
<td>Function name</td>
<td>Operability</td>
<td>Function validity</td>
<td>Factory setting</td>
<td>Unit</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>------</td>
</tr>
<tr>
<td>P mode</td>
<td>Full heeling, S2 signal operation mode S2R</td>
<td>O</td>
<td>O</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Cancel of interlock after full pedal heeling</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Thread trimming mode TR</td>
<td>O</td>
<td>O</td>
<td>M1</td>
<td>-</td>
</tr>
</tbody>
</table>

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 [DL], set the lifting output chopping duty FUD in the B mode to [LO] 33% duty. 

- Mitsubishi, Toyota, Seiko, Yakumo, Brother (excluding those noted below)
- Brother, Models: 705, 715, 716
- Dürkopp Adler, Model 270
- Juki
- Not used

9. Operation of the Operation Panel Keys

From the library of: Superior Sewing Machine & Supply LLC
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
<th>Function setting example reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Gain high/low selection GA</td>
<td>O</td>
<td>O</td>
<td>L</td>
<td>-</td>
<td>-</td>
<td>CR.</td>
<td>The high/low gain can be set. Set with the following according to the sewing machine being used.</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Slow start operation mode SLM</td>
<td>O</td>
<td>O</td>
<td>T</td>
<td>-</td>
<td>-</td>
<td>SN.</td>
<td>The slow start operation mode is selected. This is valid when the [ ] key is ON in the normal mode.</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Slow start operation will begin when the pedal is toed down or when the external run signal (S0, S1) is turned ON.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Gain high/low selection GA</td>
<td>O</td>
<td>O</td>
<td>L</td>
<td>-</td>
<td>-</td>
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<td>O</td>
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<td>-</td>
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<td>The slow start operation mode is selected. This is valid when the [ ] key is ON in the normal mode.</td>
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</tr>
<tr>
<td>P</td>
<td>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.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>Gain high/low selection GA</td>
<td>O</td>
<td>O</td>
<td>L</td>
<td>-</td>
<td>-</td>
<td>CR.</td>
<td>The high/low gain can be set. Set with the following according to the sewing machine being used.</td>
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</tr>
<tr>
<td>P</td>
<td>Slow start operation mode SLM</td>
<td>O</td>
<td>O</td>
<td>T</td>
<td>-</td>
<td>-</td>
<td>SN.</td>
<td>The slow start operation mode is selected. This is valid when the [ ] key is ON in the normal mode.</td>
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<tr>
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<td>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.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Slow start operation will begin when the pedal is toed down or when the external run signal (S0, S1) is turned ON.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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.

- For free setting of the thread trimming timing. Refer to the technical material for details.
- 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 S8 from the DOWN position to the UP position in mode B.
- This can be used for the blind stitch sewing machine.
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mode</td>
<td>Slow start when power is turned ON</td>
<td>SLP</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>–</td>
<td>–</td>
<td>SLP. ON OF</td>
</tr>
<tr>
<td></td>
<td>Pedal curve</td>
<td>PDC</td>
<td>O</td>
<td>O</td>
<td>30</td>
<td>–</td>
<td>10 ~ 99</td>
<td>PDC. **</td>
</tr>
<tr>
<td></td>
<td>Acceleration time simple setting</td>
<td>AC</td>
<td>O</td>
<td>O</td>
<td>M</td>
<td>–</td>
<td>–</td>
<td>AC.</td>
</tr>
<tr>
<td></td>
<td>Acceleration time ACT</td>
<td>ACT</td>
<td>O</td>
<td>O</td>
<td>14 ×10 Milliseconds</td>
<td>60 ~ 990</td>
<td>ACT. **</td>
<td>The acceleration time for the sewing machine to reach the high speed after pedal toe down or external run signal (S1) ON can be set. This is valid when the acceleration time simple setting is set to [–].</td>
</tr>
<tr>
<td></td>
<td>Deceleration time simple setting</td>
<td>DC</td>
<td>O</td>
<td>O</td>
<td>M</td>
<td>–</td>
<td>–</td>
<td>DC.</td>
</tr>
</tbody>
</table>

9. Operation of the Operation Panel Keys

From the library of: Superior Sewing Machine & Supply LLC
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<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Oper- ability</th>
<th>Function validity</th>
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<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>XC-BMBL</td>
<td>XC-BMBL</td>
<td></td>
<td></td>
<td>Function name</td>
<td>Setting example reference page</td>
</tr>
<tr>
<td>9. Operation of the Operation Panel Keys</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Deceleration time (DCT)**
  - Setting: 16 x10 milliseconds 60～990
  - *SC.*
  - **Caution:**
    - The factory setting 16 refers to 16 x10 milliseconds = 160 milliseconds.
    - 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.

- **S-character cushion (SC)**
  - Setting: 7 x10 milliseconds 0～990
  - *SC.*
  - 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 the key is set in the normal mode.

- **S-character cushion time setting (SCT)**
  - Setting: 7 x10 milliseconds 0～990
  - *SC.*
  - The t time can be 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)**
  - Setting: 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)**
  - Setting: OF
  - [PL] 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)**
  - Setting: OF
  - [NOS] 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.
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Function setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>B mode</td>
<td>Sawing machine shaft speed display</td>
<td>S</td>
<td>O</td>
<td>0</td>
<td>s/min</td>
<td>–</td>
<td>$S_1$</td>
<td>The sewing machine shaft speed during operation is displayed. Display range 0 ~ 9999s/min</td>
</tr>
<tr>
<td></td>
<td>Motor max. speed</td>
<td>MSP</td>
<td>O</td>
<td>36</td>
<td>x100</td>
<td>s/min</td>
<td>–</td>
<td>$NSP$</td>
</tr>
<tr>
<td></td>
<td>Timer setting for FUM operation mode</td>
<td>FCT</td>
<td>O</td>
<td>12</td>
<td>Second</td>
<td>1 ~ 99</td>
<td>$FCr$</td>
<td>** 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.</td>
</tr>
<tr>
<td></td>
<td>Time to motor drive after presser foot lifter bring down</td>
<td>FD</td>
<td>O</td>
<td>176</td>
<td>Milliseconds</td>
<td>0 ~ 998</td>
<td>$Fd.$</td>
<td>** 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.</td>
</tr>
<tr>
<td></td>
<td>Delay time of presser foot signal S3 input</td>
<td>S3D</td>
<td>O</td>
<td>10</td>
<td>x10</td>
<td>Milliseconds</td>
<td>10 ~ 990</td>
<td>$S3d.$</td>
</tr>
<tr>
<td></td>
<td>Presser foot lifting output chopping duty</td>
<td>FUD</td>
<td>O</td>
<td>M1</td>
<td>–</td>
<td>–</td>
<td>$F Ud.$</td>
<td>The chopping output duty during holding after the presser foot output FU presser foot lifting operation can be set.</td>
</tr>
<tr>
<td></td>
<td>Presser foot lifting output when power is turned ON</td>
<td>PFU</td>
<td>O</td>
<td>ON</td>
<td>–</td>
<td>–</td>
<td>$PFU$</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Thread trimming validity at neutral pedal</td>
<td>POS</td>
<td>O</td>
<td>OF</td>
<td>–</td>
<td>–</td>
<td>$P oS.$</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Operation when power is turned ON during 1 position setting</td>
<td>PIP</td>
<td>O</td>
<td>OF</td>
<td>–</td>
<td>–</td>
<td>$PIP.$</td>
<td>When 1 position is set with the $F_k$ 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.</td>
</tr>
<tr>
<td>Mode name</td>
<td>Function name</td>
<td>Operability</td>
<td>Function validity</td>
<td>Factory setting</td>
<td>Unit</td>
<td>Setting range</td>
<td>Digital display</td>
<td>Specification</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>------</td>
<td>---------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>B mode</td>
<td>Operation when power is turned ON during 2 position setting P2P</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>-</td>
<td>P2P, OF</td>
<td>When 2 position is set with the 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.</td>
</tr>
<tr>
<td></td>
<td>Weak brake mode BKM</td>
<td>O</td>
<td>O</td>
<td>E</td>
<td>-</td>
<td>-</td>
<td>bkm</td>
<td>The weak brake force can be set for when stopping the sewing machine when the key is turned ON in the normal mode.</td>
</tr>
<tr>
<td></td>
<td>Brake time BKT</td>
<td>O</td>
<td>O</td>
<td>14</td>
<td>x10 milliseconds</td>
<td>0 - 990</td>
<td>bkt, -</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Needle stop position before fabric C8</td>
<td>O</td>
<td>O</td>
<td>60</td>
<td>Degree</td>
<td>0 - 360</td>
<td>C8, -</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Needle DOWN position stop angle D8</td>
<td>O</td>
<td>O</td>
<td>28</td>
<td>Degree</td>
<td>10 - 50</td>
<td>D8, -</td>
<td>The coating angle at the needle DOWN position stop can be set.</td>
</tr>
<tr>
<td></td>
<td>Needle UP position stop angle U8</td>
<td>O</td>
<td>O</td>
<td>14</td>
<td>Degree</td>
<td>10 - 50</td>
<td>U8, -</td>
<td>The coating angle at the needle UP position stop can be set.</td>
</tr>
<tr>
<td></td>
<td>Reverse run angle from DOWN position to UP position K8</td>
<td>O</td>
<td>O</td>
<td>76</td>
<td>Degree</td>
<td>0 - 360</td>
<td>K8, -</td>
<td>The reverse run angle from the DOWN position to the UP position can be set.</td>
</tr>
<tr>
<td></td>
<td>ON angle of virtual TM EB</td>
<td>O</td>
<td>O</td>
<td>90</td>
<td>Degree</td>
<td>0 - 360</td>
<td>EB, -</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>ON start angle of virtual TM SB</td>
<td>O</td>
<td>O</td>
<td>50</td>
<td>Degree</td>
<td>0 - 360</td>
<td>SB, -</td>
<td>-</td>
</tr>
<tr>
<td>C mode</td>
<td>Solenoid output NCL</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>-</td>
<td>nCL, OF</td>
<td>The output functions of the No. 7 pin in the sewing machine connector can be selected with the following settings.</td>
</tr>
<tr>
<td></td>
<td>Caution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The thread release output L is output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The needle cooler output NLC is output. The output will turn ON during operation (including during thread trimming.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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 key ON/OFF in the normal mode.)</td>
</tr>
</tbody>
</table>

From the library of: Superior Sewing Machine & Supply LLC
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>C mode</td>
<td>Prohibit of simple setting mode for Mitsubishi thread trimming sewing machine</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>-</td>
<td>PSC,</td>
<td>The simple setting mode (program mode 1) for the Mitsubishi thread trimming sewing machine cannot be entered.</td>
</tr>
<tr>
<td>+</td>
<td>Prohibit of mode P thread trimming mode TR</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>-</td>
<td>TR-C.</td>
<td>The mode P thread trimming mode TR cannot be entered.</td>
</tr>
<tr>
<td></td>
<td>Panel switch operation prohibition PSW</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td>-</td>
<td>-</td>
<td>PSC.</td>
<td>The operation of the panel switches during the normal mode and tacking mode is prohibited. However, the setting of each program mode is possible.</td>
</tr>
<tr>
<td>D mode</td>
<td>Operation mode during tacking D1</td>
<td>O</td>
<td>O</td>
<td>M</td>
<td>-</td>
<td>-</td>
<td>Di.</td>
<td>The operation mode during tacking is determined.</td>
</tr>
<tr>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

- **9. Operation of the Operation Panel Keys**
- **From the library of: Superior Sewing Machine & Supply LLC**
<table>
<thead>
<tr>
<th>Mode</th>
<th>Function name</th>
<th>Oper-</th>
<th>Function</th>
<th>Factory</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ability</td>
<td>validity</td>
<td>setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D mode</td>
<td>Operation mode during start tack</td>
<td>D2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>completion</td>
<td></td>
<td></td>
<td>XC-BMBL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XC-BMBL</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stop time at each corner during</td>
<td>CT</td>
<td>O</td>
<td>O</td>
<td>5</td>
<td>0~990</td>
<td>d2.</td>
<td>The operation mode during the completion of start tack is determined.</td>
</tr>
<tr>
<td></td>
<td>start and backtacking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tack alignment</td>
<td>BM</td>
<td>O</td>
<td>O</td>
<td>OF</td>
<td></td>
<td>b1.</td>
<td>The stop time at each corner during tacking can be set when [CST] in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>operation mode D1 is set.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. of stitch compensation for</td>
<td>BT1</td>
<td>O</td>
<td>O</td>
<td>0</td>
<td>0~F</td>
<td>b1.</td>
<td>By finely adjusting the backstitch solenoid operation timing of start</td>
</tr>
<tr>
<td></td>
<td>start tacking alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tacking from forward to reverse, the no. of stitches can be compensated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The relation of the setting value and no. of stitch compensation is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>as shown below.</td>
</tr>
<tr>
<td></td>
<td>No. of stitch compensation for</td>
<td>BT2</td>
<td>O</td>
<td>O</td>
<td>0</td>
<td>0~F</td>
<td>b2.</td>
<td>By finely adjusting the backstitch solenoid operation timing of start</td>
</tr>
<tr>
<td></td>
<td>start tacking alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tacking from reverse to forward, the no. of stitches can be</td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>compensated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The relation of the setting value and no. of stitch compensation is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>as shown below.</td>
</tr>
<tr>
<td></td>
<td>No. of stitch compensation for</td>
<td>BT3</td>
<td>O</td>
<td>O</td>
<td>0</td>
<td>0~F</td>
<td>b3.</td>
<td>By finely adjusting the backstitch solenoid operation timing of end</td>
</tr>
<tr>
<td></td>
<td>end tacking alignment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>tacking from reverse to forward, the no. of stitches can be</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>compensated.</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>The relation of the setting value and no. of stitch compensation is</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>as shown below.</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Setting value</th>
<th>No. of compensated stitches</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>-2</td>
</tr>
<tr>
<td>8</td>
<td>-1/2</td>
</tr>
<tr>
<td>7</td>
<td>-4/3</td>
</tr>
<tr>
<td>6</td>
<td>-4/3</td>
</tr>
<tr>
<td>5</td>
<td>-1/2</td>
</tr>
<tr>
<td>4</td>
<td>-1</td>
</tr>
<tr>
<td>3</td>
<td>+1/4</td>
</tr>
<tr>
<td>2</td>
<td>+3/4</td>
</tr>
<tr>
<td>1</td>
<td>+5/4</td>
</tr>
<tr>
<td>0</td>
<td>+7/4</td>
</tr>
<tr>
<td>A</td>
<td>+9/4</td>
</tr>
<tr>
<td>B</td>
<td>+11/4</td>
</tr>
<tr>
<td>C</td>
<td>+13/4</td>
</tr>
<tr>
<td>D</td>
<td>+15/4</td>
</tr>
<tr>
<td>E</td>
<td>+17/4</td>
</tr>
<tr>
<td>F</td>
<td>+19/4</td>
</tr>
</tbody>
</table>

The last error code is displayed. Refer to page 113 for the error codes.

The second to last code is displayed. Refer to page 113 for the error codes.

The third to last code is displayed. Refer to page 113 for the error codes.

The fourth to last code is displayed. Refer to page 113 for the error codes.

The input status (ON/OFF) of the pedal toe down or external run signal S1 is displayed.

The input status (ON/OFF) of the full pedal heel or thread trimmer signal S2 is displayed.

The input status (ON/OFF) of the light pedal heel or presser foot lifting signal S3 is displayed.

The numerical value that is equivalent to the variable speed voltage VO with the pedal toe down is displayed. Display range: 000~3FF

The input status (ON/OFF) of the motor encoder A phase is displayed.

The input status (ON/OFF) of the motor encoder B phase is displayed.
<table>
<thead>
<tr>
<th>Mode name</th>
<th>Function name</th>
<th>Operability</th>
<th>Function validity</th>
<th>Factory setting</th>
<th>Unit</th>
<th>Setting range</th>
<th>Digital display</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>E mode</td>
<td>Input display</td>
<td>UP</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>UP. on/off</td>
<td>The input status (ON/OFF) of the detector UP signal is displayed. 82</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>DN</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>dn. on/off</td>
<td>The input status (ON/OFF) of the detector DN signal is displayed. 82</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>PG</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>PG. on/off</td>
<td>The input status (ON/OFF) of the detector PG signal is displayed. 82</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>PUE</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>PUE. on/off</td>
<td>The input status (ON/OFF) of Input signal UES. -</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>PSD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>PSD. on/off</td>
<td>The input status (ON/OFF) of the input signal PS. -</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>S0H</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>S0H. on/off</td>
<td>The input status (ON/OFF) of the low speed operation signal S0 or one shot signal SH is displayed. -</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>F</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>F. on/off</td>
<td>The input status (ON/OFF) of the presser foot lifting signal F is displayed. 83</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>6TL</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>6TL. on/off</td>
<td>The input status (ON/OFF) of input signal 6TL is displayed. 83</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>S7</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>S7. on/off</td>
<td>The input status (ON/OFF) of the backstitch signal S7 is displayed. 83</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>VR</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>vr. on/off</td>
<td>The numerical value that is equivalent to the variable speed voltage VO with the speed setting dial on the panel is displayed. Display range: 000 - 399. 83</td>
</tr>
<tr>
<td></td>
<td>Input display</td>
<td>CRS</td>
<td>O</td>
<td>O</td>
<td>ON/OFF</td>
<td>-</td>
<td>CRS. on/off</td>
<td>The status of the 8A fuse for solenoid output protection is displayed. Normal status: Repeats ON-OFF-ON display. -</td>
</tr>
<tr>
<td></td>
<td>Presser foot litter output</td>
<td>FUD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>FUD. on/off</td>
<td>The output status (ON/OFF) of the presser foot littering output FU is displayed. -</td>
</tr>
<tr>
<td></td>
<td>Thread trimmer output</td>
<td>TD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>TD. on/off</td>
<td>The output status (ON/OFF) of the thread trimmer output T is displayed. -</td>
</tr>
<tr>
<td></td>
<td>Wiper output</td>
<td>WD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>WD. on/off</td>
<td>The output status (ON/OFF) of the wiper output W is displayed. -</td>
</tr>
<tr>
<td></td>
<td>Backstitch output</td>
<td>BD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>BD. on/off</td>
<td>The output status (ON/OFF) of the backstitch output B is displayed. -</td>
</tr>
<tr>
<td></td>
<td>Solenoid output</td>
<td>LD</td>
<td>O</td>
<td>O</td>
<td>-</td>
<td>-</td>
<td>LD. on/off</td>
<td>The output status (ON/OFF) of the solenoid output NCL is displayed. -</td>
</tr>
<tr>
<td>Mode</td>
<td>Function name</td>
<td>Operability</td>
<td>Function validity</td>
<td>Factory setting</td>
<td>Unit</td>
<td>Setting range</td>
<td>Digital display</td>
<td>Specification</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>------</td>
<td>---------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>E</td>
<td>Presser foot lifter output FUG</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Fu. on/Of</td>
<td>The output status (ON/OFF) of the presser foot output with the key ON/OFF is changed.</td>
</tr>
<tr>
<td>E</td>
<td>Thread trimmer output TO</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>To. on/Of</td>
<td>The output status (ON/OFF) of the thread trimmer output T with the key ON/OFF is changed.</td>
</tr>
<tr>
<td>E</td>
<td>Wiper output WO</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Wo. on/Of</td>
<td>The output status (ON/OFF) of the wiper output W with the key ON/OFF is changed.</td>
</tr>
<tr>
<td>E</td>
<td>Backstitch output BO</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Bo. on/Of</td>
<td>The output status (ON/OFF) of the backstitch output B with the key ON/OFF is changed.</td>
</tr>
<tr>
<td>E</td>
<td>Solenoid output LO</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Lo. on/Of</td>
<td>The output status (ON/OFF) of the solenoid output NCL with the key ON/OFF is changed.</td>
</tr>
<tr>
<td>E</td>
<td>Output display WT</td>
<td>O</td>
<td>O</td>
<td>05 Watt</td>
<td>—</td>
<td>—</td>
<td>Wt. op</td>
<td>The motor's rated output value is displayed. [05] refers to 550W.</td>
</tr>
<tr>
<td>E</td>
<td>Voltage display VL</td>
<td>O</td>
<td>O</td>
<td>10/20 Volt</td>
<td>—</td>
<td>—</td>
<td>Vl. op</td>
<td>The rated input voltage value in the control box is displayed. [10] refers to 100V class, [20] to 200V class.</td>
</tr>
<tr>
<td>E</td>
<td>Model display TP</td>
<td>O</td>
<td>O</td>
<td>BMB</td>
<td>—</td>
<td>—</td>
<td>Tp. BMB</td>
<td>The control box model name is displayed.</td>
</tr>
<tr>
<td>E</td>
<td>Data version No. DV</td>
<td>O</td>
<td>O</td>
<td>***</td>
<td>—</td>
<td>—</td>
<td>Dv. ***</td>
<td>The data version No. (3-digit alpha-numeral) of the EEPROM is displayed.</td>
</tr>
<tr>
<td>E</td>
<td>Software version No. RV</td>
<td>O</td>
<td>O</td>
<td>***</td>
<td>—</td>
<td>—</td>
<td>Rv. ***</td>
<td>The version No. (3-digit alpha-numeral) of the software is displayed.</td>
</tr>
<tr>
<td>R</td>
<td>Reset</td>
<td>RESET</td>
<td>x</td>
<td>O</td>
<td>—</td>
<td>—</td>
<td>Reser.</td>
<td>The EEPROM data is returned to the EEPROM back up state. This is used to return the function settings to the factory settings.</td>
</tr>
<tr>
<td>Mode name</td>
<td>Function name</td>
<td>Oper-</td>
<td>Function validity</td>
<td>Factory setting</td>
<td>Unit</td>
<td>Setting range</td>
<td>Digital display</td>
<td>Specification</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>------</td>
<td>------------------</td>
<td>-----------------</td>
<td>------</td>
<td>---------------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>Simple setting for thread trimming sewing machine</td>
<td>x</td>
<td>O 180M</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>Refer to the simple setting values for the Mitsubishi thread trimming sewing machine shown on the next page for details.</td>
</tr>
</tbody>
</table>

Caution

Always reset before performing the simplified setting.
# Mitsubishi thread trimming machines simple setting values and motor pulley diameters

<table>
<thead>
<tr>
<th>Function</th>
<th>Digital display</th>
<th>Model</th>
<th>Setting speed</th>
<th>Motor pulley diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>High speed</td>
<td>Low speed</td>
</tr>
<tr>
<td>180M</td>
<td>180M</td>
<td>LS2-1180-M1T(W)</td>
<td>H 4000</td>
<td>L 250</td>
</tr>
<tr>
<td>180L</td>
<td>180L</td>
<td>LS2-1180-L1T</td>
<td>H 4000</td>
<td>L 250</td>
</tr>
<tr>
<td>180H</td>
<td>180H</td>
<td>LS2-1180-H1T</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>180B</td>
<td>180B</td>
<td>LS2-1180-B1T</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>180SR</td>
<td>180SR</td>
<td>LS2-1180-M1T-SR</td>
<td>H 4300</td>
<td>L 250</td>
</tr>
<tr>
<td>210M</td>
<td>210M</td>
<td>LS2-2210-M1T(W)</td>
<td>H 4000</td>
<td>L 250</td>
</tr>
<tr>
<td>230M</td>
<td>230M</td>
<td>LT2-2230-M1TW</td>
<td>H 3700</td>
<td>L 250</td>
</tr>
<tr>
<td>230L</td>
<td>230L</td>
<td>LT2-2230-L1T</td>
<td>H 3700</td>
<td>L 250</td>
</tr>
<tr>
<td>230B</td>
<td>230B</td>
<td>LT2-2230-B1T</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>250M</td>
<td>250M</td>
<td>LT2-2250-M1TW</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>250A</td>
<td>250A</td>
<td>LT2-2250-A1T</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>250B</td>
<td>250B</td>
<td>LT2-2250-B1T</td>
<td>H 3000</td>
<td>L 250</td>
</tr>
<tr>
<td>3370</td>
<td>3370</td>
<td>LG2-3370-M1T</td>
<td>H 4000</td>
<td>L 250</td>
</tr>
<tr>
<td>359</td>
<td>359</td>
<td>DY-359-22BZ</td>
<td>H 2000</td>
<td>L 250</td>
</tr>
<tr>
<td>3750</td>
<td>3750</td>
<td>LY2-3750-B1T</td>
<td>H 2000</td>
<td>L 250</td>
</tr>
<tr>
<td>410B</td>
<td>410B</td>
<td>LU2-4410-B1T</td>
<td>H 2000</td>
<td>L 250</td>
</tr>
<tr>
<td>430B</td>
<td>430B</td>
<td>LU2-4430-B1T</td>
<td>H 2000</td>
<td>L 250</td>
</tr>
<tr>
<td>630</td>
<td>630</td>
<td>LX2-630-M1</td>
<td>H 500</td>
<td>L 200</td>
</tr>
<tr>
<td>180ME</td>
<td>180ME</td>
<td>LS2-1180-M1T(W)</td>
<td>H 5000</td>
<td>L 250</td>
</tr>
</tbody>
</table>

Note: The factory settings are [180M].

The effective diameter of the sawing 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 sawing machine model (sewing machine name) type.

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

![Diagram of connector layout]

Variations in the diagram such as "white with gro", "blue back", etc., indicate differences in the actual wiring compared to the printed diagram.
### 2. Description of input/output signals

<table>
<thead>
<tr>
<th>Input/output signal name</th>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation signal S1</td>
<td>XC-BMBL</td>
<td>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 key setting is necessary.)</td>
</tr>
<tr>
<td>Thread trimming signal S2</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Presser foot lifter signal S3</td>
<td></td>
<td>Equivalent to light pedal heeling. Presser foot lifting operation is executed with S3 signal ON.</td>
</tr>
<tr>
<td>Variable speed command VC</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Constant voltage power supply +12V</td>
<td></td>
<td>This is the power for the variable speed command. A DC12V (MAX40mA) is output.</td>
</tr>
<tr>
<td>Input signal UES</td>
<td></td>
<td>The input function can be set with UES in mode on page 90. The factory setting is the needle UP position priority stop signal PSU. (The digital display is PU.)</td>
</tr>
<tr>
<td>Rated voltage power +12V</td>
<td></td>
<td>A DC12V (MAX40mA) is output. This can be used as the power source for the photoelectric switches in the amplifier.</td>
</tr>
<tr>
<td>Input signal PS</td>
<td></td>
<td>The input functions can be set with PS in mode on page 90. The factory setting is the needle DOWN position priority stop signal PSD. (The digital display is PD.)</td>
</tr>
<tr>
<td>Needle UP position output CK</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Input signal SO/SH</td>
<td></td>
<td>When mode S0/SH input function is set to S0: The functions set in the SO function mode on page 88 of mode are executed. When mode 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.</td>
</tr>
</tbody>
</table>
## 10. How to Use the Option Connector

<table>
<thead>
<tr>
<th>Input/output signal name</th>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presser foot lifter signal</td>
<td>F</td>
<td>When the F signal is turned ON during sewing machine stop, the presser foot lifter will operate with the automatic presser foot lifter.</td>
</tr>
<tr>
<td>Presser foot lifter output</td>
<td>FU</td>
<td>The presser foot lifter operation is carried out.</td>
</tr>
<tr>
<td>Thread trimming output</td>
<td>T</td>
<td>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 (C) on page 100. The factory setting is the thread release output L. (The digital display is OF.)</td>
</tr>
<tr>
<td>Wiper output</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Solenoid output</td>
<td>NCL</td>
<td></td>
</tr>
<tr>
<td>Backstitching output</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Input signal</td>
<td>6TL</td>
<td>The input function can be set with 6TL on page 93. The factory setting is the thread trimming release signal TL.</td>
</tr>
<tr>
<td>Backstitching switch</td>
<td>S7</td>
<td>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 (P) on page 94 will be executed when the sewing machine is stopped.</td>
</tr>
</tbody>
</table>
### 10. How to Use the Option Connector

#### 3. List of input signal functions

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

<table>
<thead>
<tr>
<th>Set value</th>
<th>SO</th>
<th>UES</th>
<th>PS</th>
<th>6TL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital display</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 $\text{C АТ}$ key is set to OFF)

(2) For operating with a high speed
Lever (white connector)
(Normal mode $\text{C АТ}$ key is set to OFF)

(3) When operating with high speed and inching (Normal mode $\text{C АТ}$ key is set to OFF)

(a) When using the lever connector

(b) When using the lever connector and option connector

Run (high speed) Option 2 (black connector)

* Set the No. 8 function in mode $\text{P}$ on page 37 before starting inching.
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.

<table>
<thead>
<tr>
<th>Error code</th>
<th>Probable cause</th>
<th>Inspection</th>
</tr>
</thead>
</table>
| E1         | • Is the wire to the motor short-circuited?  
             • Is the sewing machine load torque too high? | Check the motor wiring.  
                                   Check the sewing machine. |
| E2         | • Is the power voltage too high?  
             • Is the sewing machine inertia too high? | Check the power voltage.  
                                   Lengthen the deceleration time. (Refer to No. 3 in mode [A] on page 64.) |
| E3         | • Is the connector to the motor encoder securely inserted?  
             • Are the signals from the motor encoder correct?  
             • Is the sewing machine locked?  
             • Is the motor locked? | Check the connector insertion.  
                                   Check the encoder signals. (Refer to No. 3 in mode [E] on page 81.)  
                                   Check the sewing machine.  
                                   Check the motor. |
| E4         | • Is the motor connector securely inserted? | Check the motor connector insertion. |
| E8         | • Is the position detector connector securely inserted?  
             • Are the signals from the detector correct?  
             (UP/DOWN signal interruption) | Check the detector connector insertion.  
                                   Check the detector UP/DOWN signals. (Refer to No. 4 in mode [E] on page 82.) |
| E9         | • Is the solenoid wiring short-circuited?  
             • Solenoid defect (coil defect) | Check the solenoid wiring.  
                                   Replace the solenoid. |
| E0         | • 8A fuse in control box blown. | Replace the 8A fuse.  
                                   Note: EO will display for approximately 10 seconds after the power is turned OFF, but this is not an error. |
### 11. Error Display

<table>
<thead>
<tr>
<th>Others</th>
<th>Probable cause</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sewing machine does not run when the pedal is pressed.</td>
<td>• Is the lever unit connector securely inserted?</td>
<td>Check the lever unit connector insertion.</td>
</tr>
<tr>
<td></td>
<td>• Are the operation signals (S1) from the lever unit correct?</td>
<td>Check the S1 signal. (Refer to No. 2 in mode [E] on page 80.)</td>
</tr>
<tr>
<td>The sewing machine does not run at the high speed.</td>
<td>• Is the speed setting dial set in the low to medium range?</td>
<td>Turn to the right fully.</td>
</tr>
<tr>
<td></td>
<td>• Is the variable speed voltage from the speed setting dial set low?</td>
<td>Check the variable speed voltage. (Refer to mode [E] No.5 on page 83.)</td>
</tr>
<tr>
<td></td>
<td>• Is the variable speed voltage with the pedal toe down low?</td>
<td>Check the variable speed voltage. (Refer to No. 2 in mode [E] on page 80.)</td>
</tr>
<tr>
<td></td>
<td>• Is the (\frac{\mathcal{C}}{\mathcal{A}}) key turned ON when the external switch is used?</td>
<td>Turn the (\frac{\mathcal{C}}{\mathcal{A}}) key ON. (Refer to No. 4 in the normal mode on page 23.)</td>
</tr>
<tr>
<td></td>
<td>• Is the motor pulley diameter too small?</td>
<td>Check the motor pulley diameter. (Refer to item 3 on page 6.)</td>
</tr>
<tr>
<td>The thread is not trimmed even with heeling.</td>
<td>• Is the thread trimming signal (S2) from the lever unit correct?</td>
<td>Check signal S2. (Refer to No. 2 in mode [E] on page 80.)</td>
</tr>
<tr>
<td></td>
<td>• Is the thread trimmer operation release S2L ON?</td>
<td>Set S2L to OFF. (Refer to cancel of thread trimmer operation S2L in mode [P] on page 93.)</td>
</tr>
<tr>
<td>The presser foot lifter output does not operate.</td>
<td>• Is the light heeling signal (S3) or thread trimming signal (S2) from the lever unit correct?</td>
<td>Check signals S2 and S3. (Refer to No. 2 in mode [E] on page 80.)</td>
</tr>
<tr>
<td></td>
<td>• Is the presser foot lift signal (F) correct?</td>
<td>Check signal F. (Refer to No.5 in mode [E] on page 83.)</td>
</tr>
<tr>
<td></td>
<td>• Is the presser foot output (FU) correct?</td>
<td>Check FU output. (Refer to No. 6 in mode [E] on page 84.)</td>
</tr>
</tbody>
</table>
# 12. Specifications

## Motor

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Power</th>
<th>100V single phase 50/60 Hz</th>
<th>200V single phase, 3-phase 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name</td>
<td></td>
<td>XL-554-10</td>
<td>XL-554-20</td>
</tr>
<tr>
<td>Voltage (V)</td>
<td></td>
<td>100 ~ 120</td>
<td>200 ~ 240</td>
</tr>
<tr>
<td>Rated output (W)</td>
<td></td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>Rated speed (r/min)</td>
<td></td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Rated torque (N.m)</td>
<td></td>
<td>1.76 (0.18 Kgm)</td>
<td></td>
</tr>
</tbody>
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## Control box

<table>
<thead>
<tr>
<th>Specifications</th>
<th>General purpose automatic thread trimmer (XC-BMBL model)</th>
<th>XC-BMBL-10-05</th>
<th>XC-BMBL-20-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (V)</td>
<td>100-110/110-120</td>
<td>200-220/220-240</td>
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<tr>
<td>Speed control range</td>
<td>With sewing machine shaft (S/min) 70 ~ 4000 (MAX8999)</td>
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<tr>
<td></td>
<td>With motor shaft (r/min) 50 ~ 3600</td>
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</tr>
<tr>
<td>Solenoid voltage</td>
<td>DC 30V</td>
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<td></td>
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<tr>
<td>Lamp voltage</td>
<td>6V 15 ~ 20W</td>
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## Specifications

<table>
<thead>
<tr>
<th>Model Specifications</th>
<th>XC-BMBL</th>
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<tr>
<td>Lever unit</td>
<td>LK-CL-2X</td>
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<tr>
<th>Specifications</th>
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<td>Detector</td>
<td>XC-KB-12P</td>
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<table>
<thead>
<tr>
<th>Solenoid Specifications</th>
<th>Presser foot lifter FU</th>
<th>Thread trimming output</th>
<th>Wiper output</th>
<th>Thread release output</th>
<th>Backstitching output</th>
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<tbody>
<tr>
<td>Resistivity</td>
<td>10 (continuous rating) or more</td>
<td>5 (short rating) or more</td>
<td>5 (short rating) or more</td>
<td>5 (short rating) or more</td>
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# 12. Specifications

## Table of digital display

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<th>2</th>
<th>3</th>
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<table>
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<th>G</th>
<th>H</th>
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</thead>
<tbody>
<tr>
<td>Digital display</td>
<td>A</td>
<td>b</td>
<td>C</td>
<td>d</td>
<td>e</td>
<td>F</td>
<td>G</td>
<td>H</td>
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<th>R</th>
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<tbody>
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<td>Digital display</td>
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<td>N</td>
<td>o</td>
<td>o</td>
<td>P</td>
<td>r</td>
<td>S</td>
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<table>
<thead>
<tr>
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<th>V</th>
<th>W</th>
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</thead>
<tbody>
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<td>U</td>
<td>v</td>
<td>U</td>
<td>y</td>
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</tbody>
</table>

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