2-Needle, Needle Feed Lockstitcher with automatic thread trimmer

LH-1172
LH-1172-5-4B

ENGINEER’S MANUAL

29264504
1986.4
PREFACE

This Engineer’s Manual is written for the technical personnel who are responsible for the service and maintenance of the machine. The Instruction Book for these machines, intended for the maintenance personnel and operators at a garment factory, contains detailed operating instructions. This Engineer’s Manual describes “How to adjust” and “Results of improper adjustment” and also other information which are not covered by the Instruction Book.

It is advisable to use the pertinent Instruction Book and Parts Book together with this Engineer’s Manual when carrying out the maintenance of these machines.

This manual mainly consists of three sections; “Adjustment Standard”, “How to adjust”, and “Results of improper adjustment”.
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<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model No.</td>
<td>LH-1172-54B</td>
</tr>
<tr>
<td>2</td>
<td>Model description</td>
<td>2-needle, needle feed lockstitcher with automatic thread trimmer, wiper, and large-size hook</td>
</tr>
<tr>
<td>3</td>
<td>Uses by type</td>
<td>“S” specification: For medium- and heavy-weight materials.</td>
</tr>
<tr>
<td>4</td>
<td>Sewing speed</td>
<td>Max. 2,500 s.p.m. Normal 2,300 s.p.m. (depends on stitch length of type of operation)</td>
</tr>
<tr>
<td>5</td>
<td>Needle</td>
<td>DP x 5 #18 ~ #23 (Schmetz System 134)</td>
</tr>
<tr>
<td>6</td>
<td>Thread</td>
<td>#30 ~ #8</td>
</tr>
<tr>
<td>7</td>
<td>Needle gauge size</td>
<td>3/16&quot; ~ 5/8&quot;</td>
</tr>
<tr>
<td>8</td>
<td>Stitch length (Forward x Reverse)</td>
<td>8 x 4 mm (0.314&quot; x 0.157&quot;)</td>
</tr>
<tr>
<td>9</td>
<td>Presser foot lift</td>
<td>Hand lifter: 9 mm (0.354&quot;) Knee lifter: 10 mm (0.394&quot;)</td>
</tr>
<tr>
<td>10</td>
<td>Auto-lifter</td>
<td>AK-11 (option)</td>
</tr>
<tr>
<td>11</td>
<td>Stitch length regulator</td>
<td>Wing-shape dial</td>
</tr>
<tr>
<td>12</td>
<td>Reverse feed system</td>
<td>Externally mounted solenoid magnet with touch back switch and hand lever</td>
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<td>Thread take-up</td>
<td>Slide type thread take-up</td>
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<tr>
<td>14</td>
<td>Needle bar stroke</td>
<td>33.4 mm (1.314&quot;)</td>
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<tr>
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<td>Hook (2.2-fold capacity)</td>
<td>Vertical axis shuttle race with long-shaft bobbin case</td>
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<td>16</td>
<td>Bobbin case opener</td>
<td>Interlocking with hook driving eccentric cam (1:1 principle)</td>
</tr>
<tr>
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<td>Take-up spring</td>
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<td>18</td>
<td>Feed mechanism</td>
<td>By slide block</td>
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<td>Circulated by felts</td>
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<td>Thread trimmer</td>
<td>Rocks around the hook (cam with safety mechanism)</td>
</tr>
<tr>
<td>25</td>
<td>Tension release system</td>
<td>Interlocked with thread trimming clutch</td>
</tr>
<tr>
<td>26</td>
<td>Wiper components</td>
<td>Swaying type</td>
</tr>
<tr>
<td>27</td>
<td>Motor</td>
<td>400 W 4P (JUKI electronic-stop motor)</td>
</tr>
<tr>
<td>28</td>
<td>Control Box</td>
<td>MC-200</td>
</tr>
<tr>
<td>29</td>
<td>Lubrication oil</td>
<td>JUKI New Defrix Oil No. 1</td>
</tr>
<tr>
<td>30</td>
<td>Bed size</td>
<td>517 x 178 mm (20.354&quot; x 7&quot;)</td>
</tr>
<tr>
<td>31</td>
<td>Head weight</td>
<td>44 kg</td>
</tr>
</tbody>
</table>
MODEL DESIGNATION

LH-1172 □ □-5-4B

(Example) LH model of “S” specification in 1/4” needle gauge size with thread trimmer (complete) (LH-1172SF-5-4B)

○ ATTACHMENTS

<table>
<thead>
<tr>
<th>Attachment</th>
<th>5-2</th>
<th>5-4</th>
<th>5-2B</th>
<th>5-4B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic thread trimmer</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Wiper</td>
<td></td>
<td>○</td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Automatic reverse feed</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Motor, Stand</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</table>

○ STITCH SPECIFICATIONS AND PRESENCE OF AUTOMATIC THREAD TRIMMER

<table>
<thead>
<tr>
<th>Stitch specification</th>
<th>With Automatic thread trimmer</th>
<th>Without Automatic thread trimmer</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>○</td>
<td>○</td>
<td>For medium- to heavy-weight materials</td>
</tr>
</tbody>
</table>

○ CODE FOR NEEDLE GAUGE SIZE

<table>
<thead>
<tr>
<th>Gauge size</th>
<th>Code D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/16&quot;</td>
<td>4.8</td>
<td>5.6</td>
<td>6.4</td>
<td>7.1</td>
<td>7.9</td>
<td>8.5</td>
<td>12.7</td>
<td>15.9</td>
</tr>
<tr>
<td>7/32&quot;</td>
<td>9.5</td>
<td>10.5</td>
<td>11.5</td>
<td>12.5</td>
<td>13.5</td>
<td>14.5</td>
<td>15.5</td>
<td>16.5</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>15.9</td>
<td>16.9</td>
<td>17.9</td>
<td>18.9</td>
<td>19.9</td>
<td>20.9</td>
<td>21.9</td>
<td>22.9</td>
</tr>
<tr>
<td>9/32&quot;</td>
<td>22.9</td>
<td>23.9</td>
<td>24.9</td>
<td>25.9</td>
<td>26.9</td>
<td>27.9</td>
<td>28.9</td>
<td>29.9</td>
</tr>
<tr>
<td>5/16&quot;</td>
<td>29.9</td>
<td>30.9</td>
<td>31.9</td>
<td>32.9</td>
<td>33.9</td>
<td>34.9</td>
<td>35.9</td>
<td>36.9</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>36.9</td>
<td>37.9</td>
<td>38.9</td>
<td>39.9</td>
<td>40.9</td>
<td>41.9</td>
<td>42.9</td>
<td>43.9</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>43.9</td>
<td>44.9</td>
<td>45.9</td>
<td>46.9</td>
<td>47.9</td>
<td>48.9</td>
<td>49.9</td>
<td>50.9</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>50.9</td>
<td>51.9</td>
<td>52.9</td>
<td>53.9</td>
<td>54.9</td>
<td>55.9</td>
<td>56.9</td>
<td>57.9</td>
</tr>
</tbody>
</table>

(Standard)

Note: The parenthesized figures are mm conversions.

○ SOLENOID SPECIFICATIONS

<table>
<thead>
<tr>
<th>Attachment</th>
<th>Export</th>
<th>Solenoid stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic thread trimmer</td>
<td>AC24V  2.5A</td>
<td>4 mm (0.158&quot;)</td>
</tr>
<tr>
<td>Wiper</td>
<td>AC24V  4.4A</td>
<td>45°</td>
</tr>
<tr>
<td>Automatic reverse feed</td>
<td>AC24V  9.2A</td>
<td>8 mm (0.315&quot;)</td>
</tr>
</tbody>
</table>
2. ADJUSTMENT STANDARD

Adjustment Standard

(1) Needle bar

1) Needle entry point

![Diagram of needle bar entry point with specifications and measurement details.]

Fig. 1

Requirements:
- Needle bar: In the lowest position
- Stitch length: "0" mm

2) Needle bar height

![Diagram of needle bar height with specifications and measurement details.]

Fig. 3

Requirements:
- Needle bar: In the lowest position
- Stitch length: "0" mm
### How to Adjust

1. Set the stitch length to "0" mm.
2. Turn the handwheel until the needle bar has come down to the lowest point of its stroke.
3. Loosen screw ①.
4. Provide the specified clearance between the needle bar and the presser bar and tighten screw ①.

**Fig. 2**

- Set the stitch length to "0" mm.
- Turn the handwheel until the needle bar has come down to the lowest point of its stroke.
- Loosen screw ①.
- Adjust the needle bar to the specified height, then retighten screw ①.

*Caution* Make sure that the needle runs in the middle of the needle feed slot after the adjustment.

**Fig. 4**

### Results of Improper Adjustment

- **If the clearance is too great;**
  - When the stitch length is set to the maximum, the feed dog will hit the throat plate.
  - Stitch skipping or needle breaking may occur.

- **If the clearance is too small;**
  - When the reverse stitch is made at a maximum stitch length, the feed dog will hit the throat plate.
  - Stitch skipping or needle breaking may occur.
  - Thread trimming failure may occur.

- **If the needle bar height is not correct,** it may cause stitch skipping or thread breaking.
3) Needle entry in the needle feed slot

Both needles must enter the middle of each needle feed slot.

Requirements:
- Needle bar: In the lowest position.
- Stitch length: "0" mm

Fig. 5

Feed dog
Feed bar
Feed rock shaft

Fig. 6
### How to Adjust

<table>
<thead>
<tr>
<th>If the needle bar is installed twisted:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Set the stitch length to 0 mm.</td>
</tr>
<tr>
<td>2. Turn the handwheel until the needle bar has come down to the lowest point of its stroke.</td>
</tr>
<tr>
<td>3. Loosen screw ① (Fig. 4)</td>
</tr>
<tr>
<td>4. Turn the needle bar until both needles stay in the middle of their needle feed slots. Tighten screw ① (Fig. 4).</td>
</tr>
</tbody>
</table>

(Caution) Take care not to change the height of the needle bar.

- Don’t turn the needle clamp before screw ① (Fig. 4) is loosened. Otherwise, the needle clamp may come down accidentally while stitching.

### Results of Improper Adjustment

<table>
<thead>
<tr>
<th>If the needles fail to enter the middle of their slots, stitch skipping, thread breaking or loose stitch may occur.</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the needles enter the far end of the elongated slots (2 x 3 mm) viewed from the operator’s side, the needle thread forming a stitch comes out too much on the fabric.</td>
</tr>
<tr>
<td>If the needles enter the near end of the elongated slot, thread trimming failure may occur.</td>
</tr>
</tbody>
</table>

If the needle deflects in the lengthwise direction of the needle feed slot:

1. Loosen screw ① (Fig. 6)
2. Adjust the position of the feed rocker so that both needles stay in the middle of the slots.
(2) Needle-to-hook relation

1) Rising of needle

When the lower engraved line meets the lower end of the needle bar frame:

Fig. 7

Specifications | Rising of needle (distance “a”) | Hook point height (distance “b”)
--- | --- | ---
S | 2.5 – 3.2 mm (0.098” – 0.126”) | 1 – 1.5 mm (0.04” – 0.059”)

2) Clearance between the needle and the hook point

Fig. 8

3) Hook point location above the top end of the needle eye.

Fig. 9

Requirements:
- The needle bar must be brought up from the lowest point of its stroke.
- Stitch length: S specification: 5 mm (0.197”)

(3) Working position of the bobbin case opening lever

Bring the bobbin case stopper into contact with the throat plate ribs

Fig. 11

Requirements:
- The bobbin case opening lever is in the most backward position.
- The bobbin case stopper is in contact with the throat plate ribs.
How to Adjust

1. Set the stitch length to 5 mm (0.197”).
2. Turn the handwheel until the needle bar goes up 2.5 (0.098”) to 3.2 (0.126”) mm (standard: 2.6 mm (0.102”)) from its lowest point.
3. Adjustment of the clearance between the needle and the hook point; Loosen screws ① and ② to release the hook driving shaft saddle and move the saddle in the direction of the arrow for the clearance as specified. Tighten two screws ① and ② after the adjustment.
4. Adjustment of the hook point location to the needle eye; Loosen three screws which set the small gear to the hook shaft and align the hook point with the needle center.

(Caution) When you replace the hook, you must adjust the position of the needle guard too.

<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
</table>
| 1. Turn the handwheel toward you until the bobbin case opening lever has gone back to the most backward position of its stroke.  
2. Turn the bobbin case in the opposite direction to that of the hook until the bobbin case stopper comes into contact with the throat plate ribs.  
3. Loosen screw ① and provide a 0.2 (0.008”) to 0.3 (0.012”) mm clearance between the bobbin case opening lever and bobbin case. Tighten screw ①. | ○ If these adjustments are made inaccurately, irregular stitching, stitch skipping or thread breaking may occur.  
* Irregular stitches, especially “balloon” stitches, may result if the hook timing is too early or late.  
* Irregular stitches may be corrected by slightly delaying the hook timing.  
If the clearance is too great;  
○ Loose or “balloon” stitch may be formed.  
If the clearance is too small;  
○ Bobbin case will be damaged while stitching.  

Fig. 10

- Hook driving shaft gear

From the Library of Superior Sewing Machine & Supply LLC
(4) Clearance between the throat plate and the bobbin case stopper

**Requirements:**
- Clearance between the upper face of the bobbin case stopper and the throat plate must be 0.8 (0.031") to 1.0 (0.04") mm.
<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove the throat plate.</td>
<td>If the clearance is too great:</td>
</tr>
<tr>
<td>2. Remove the bobbin case opening lever.</td>
<td>○ The bobbin case may slip off the throat plate.</td>
</tr>
<tr>
<td>3. Take off the feed dog and the needles.</td>
<td>If the clearance is too small:</td>
</tr>
<tr>
<td>4. Loosen screw ①.</td>
<td>○ Loose stitch or &quot;balloon&quot; stitch may be formed.</td>
</tr>
<tr>
<td>5. Turn the handwheel to bring the needle bar to</td>
<td>○ The moving knife may hit the hook while the thread</td>
</tr>
<tr>
<td>the highest point and remove the hook.</td>
<td>trimmer is working.</td>
</tr>
<tr>
<td>6. Remove the gear from the sewing hook shaft</td>
<td></td>
</tr>
<tr>
<td>and replace the washer by the one which has a</td>
<td></td>
</tr>
<tr>
<td>suitable thickness to provide the specified</td>
<td></td>
</tr>
<tr>
<td>clearance at the throat plate.</td>
<td></td>
</tr>
<tr>
<td>7. At the same time, loosen screw ② and adjust</td>
<td></td>
</tr>
<tr>
<td>the setting position of the upper bushing.</td>
<td></td>
</tr>
<tr>
<td>8. After the adjustment check also the working</td>
<td></td>
</tr>
<tr>
<td>position of the bobbin case opening lever (</td>
<td></td>
</tr>
<tr>
<td>Adjustment Standard 2-(3)) and 9.</td>
<td></td>
</tr>
</tbody>
</table>

From the Library of Superior Sewing Machine & Supply LLC
(5) Timing of cloth feed action

Requirement;
○ The timing mark on the feed eccentric cam must be in line with that on the hook driving shaft.

Fig. 14

(6) Height of feed dog

Requirements;
○ Stitch length: 0 mm
○ A maximal projection of the feed dog teeth must be $0.9 \pm 0.1$ mm ($0.035" \pm 0.004"") from the throat plate surface.

Fig. 16
### How to Adjust

1. Loosen screws ① and ② to set free the feed eccentric cam.
2. Match the timing mark on the feed eccentric cam with that on the hook driving shaft.
   Tighten two screws ① and ②.

(Caution) • When aligning the timing marks, look through both marks straight toward the axis of the shaft and carefully fix the eccentric cam.
• When tightening the screws, set the eccentric cam properly in the direction of the axis of the hook driving shaft, in order to avoid extra load when revolving.

### Results of Improper Adjustment

- **If the timing is too early:**
  - Loose stitches may be formed.

- **If the timing is too late:**
  - Loose stitches may be formed.
  - Thread trimming failure may occur.

1. Set the stitch length to 0 mm.
2. Turn the handwheel until the feed dog has risen at maximum from the throat plate surface.
3. Loosen screw ① and adjust the height of the feed bar slide fork so that the feed dog teeth projects 0.9 \((0.035\text{"})\) ± 0.1 mm \((0.004\text{"})\) from the throat plate surface.

- **If the feed dog is too high:**
  - The stitch length becomes longer than the one set by the stitch dial.
  - The feed dog may hit the throat plate.
  - The thread trimmer may fail to catch the right needle thread at the time of thread trimming.

- **If the feed dog is too low:**
  - The stitch length becomes smaller than the one set by the stitch dial.
  - The moving knife hits the feed dog while the thread trimmer is working.
  - Thread trimming failure may occur.
(7) Relation between the main shaft and the hook driving shaft

Requirements:
- The needle to be lowered.
- Stitch length: 0 mm

Fig. 18

(8) Timing to release thread tension

Requirements:
- The same setting for the hand lifter and knee lifter.

Fig. 19
### How to Adjust

1. Set the stitch length to 0 mm.
2. Disengage the timing belt from the sprocket wheel of the hook driving shaft.
3. Turn the handwheel toward you until the needle point has come down at the level of the throat plate surface. (At this time, the top face of the feed dog should be about 0.4 mm (0.016") below the throat plate surface.)
4. Turn the hook driving shaft toward you to align the No. 1 setscrew of its thrust collar with the V groove on the machine bed.
5. Mesh the timing belt with the sprocket wheel on the hook driving shaft and let them firmly engage with each other by turning the handwheel.

### Results of Improper Adjustment

- If the timing of the hook driving shaft to the main shaft is incorrect, loose stitches may be formed.

When the presser foot has risen 9 mm (0.354") above the throat plate, and the clearance between the thread tension discs is 1 mm (0.039") or less;

1. Check whether or not the thread tension release plate is distanced 9 ± 0.3 mm (0.354" ± 0.012") from its mounting base.
2. If the distance is smaller than 9 ± 0.3 mm, (0.354 ± 0.012") replace the thread tension release pin to meet the requirement.

**Thread tension release pin**
- Left: B3127051000
- Right: B3127527000

3. After replacement, confirm that a clearance is left between the tension release plate and the tension release bar.

![Fig. 20](image)

**Fig. 20**

If the clearance between the thread tension discs is too small;
- Thread does not pass smoothly through the thread tension controller.

If the clearance between the thread tension discs is too large;
- Loops of thread are produced on the fabric while a corner is being stitched

* If the proper clearance shown in Fig. 20 is not provided, the tension discs will be released, which may cause loose starting stitches after thread trimming or may cause the needle thread to wind round the hook.
(9) Lubrication

1) How to judge the lubrication of the components in the face plate:

Requirements:
- Sewing speed: 2,300 s.p.m.
- 5 sec. on and 5 sec. off for 2 min.

2) How to judge the lubrication of the hooks:

Requirements:
- Sewing speed: 2,300 s.p.m.
- Let the machine idle for 30 seconds and hold a piece of paper 10 mm (0.39") away from the side face of the hook, and the oil lines will be drawn on the paper in 5 seconds if both hooks are properly lubricated.
### How to Adjust

**Oil flow adjustment for the face plate components:**
Loosen the oil adjusting screw locknut shown in Fig. 22, and turn the oil adjusting screw either clockwise or counterclockwise for an optimum oil amount. (The components beyond the thread take-up support shaft is lubricated by oil wick, and the amount of lubricating oil is adjusted merely by the stiffness of the oil wick. As the oil wick is made stiffer, the amount of the lubricating of decreases, and vice versa.)

![Diagram of oil adjusting screw](Fig. 22)

**Oil flow adjustment for the hook:**
A maximal amount of oil is fed to the hook when oil adjusting screw 1 (Fig. 24) is fully tightened.
1. Loosen oil adjusting screw locknut 1.
2. Turn oil adjusting screw 2 for an optimum oil amount and tighten locknut 1.

(Caution) Don’t tighten locknut 1 too much, or it may break the thread of oil adjusting screw 2.

![Diagram of hook drive](Fig. 24)

### Results of Improper Adjustment

- If the oil amount is too small, the needle bar crank rod or the neighboring parts may seize while running.
- If the oil amount is too much, oil leakage may occur.
- If the oil amount is too small, loose stitches may be formed or the hook may wear or seize.
- If the oil amount is too much, the sewing thread and cloth may be stained with surplus oil.
(10) Sway of the needles

![Diagram of needle bar frame driving rod and feed rocker shaft.]

Requirements:
- Stitch length: 8 x 4 mm (0.314" x 0.157")
  (Forward x Reverse stitching)
- Sway of the needle must be reduced to a minimum

(Viewed from the bed bottom)

Fig. 25

(11) Stitch length in the forward and reverse feed

![Diagram of feed regulator base, feed regulator rod pin, and white painted zone.]

Requirements:
- At the stitch length "3", the difference in the stitch length between the forward and reverse feed must be 0.2 mm (0.008") or less.

Fig. 26
<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Set the stitch dial to the maximum.</td>
<td>○ Needle breaking may occur.</td>
</tr>
<tr>
<td>2. Loosen screw ① shown in Fig. 25, and move the needle bar frame driving rod to make adjustment.</td>
<td>○ Stitch skipping may occur.</td>
</tr>
<tr>
<td>3. Tighten screw ①, and turn the handwheel by hand to check the sway of the needles. Position the needle bar frame driving rod so that the needle sway is minimized. The fix the rod to the needle bar frame driving arm.</td>
<td></td>
</tr>
<tr>
<td>(Note) 1) After this adjustment, the position of the needle center with respect to the needle feed slots must be readjusted. 2) The specified distance (14.2 (0.559&quot;) ± 0.1 (0.04&quot;) mm between the presser bar and needle bar is also disturbed in making the above adjustment. Readjust the distance.</td>
<td></td>
</tr>
<tr>
<td>1. Loosen screws ① which fix the feed regulator base.</td>
<td>○ It is not adjusted properly, the stitch length of the reverse feed differs from the forward feed.</td>
</tr>
<tr>
<td>2. Turn the feed regulator rod pin in the direction of the arrow to make adjustment. Tighten screws ①.</td>
<td></td>
</tr>
</tbody>
</table>
3. ADJUSTMENT STANDARD FOR THE ATTACHMENTS

<table>
<thead>
<tr>
<th>Adjustment Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Thread trimmer</td>
</tr>
<tr>
<td>1) Height of the moving knife</td>
</tr>
</tbody>
</table>

- Fig. 27

Requirements:
- With the fixed knife removed, the moving knife must be in contact with the moving knife rest and must be parallel to the upper face of the hook driving shaft saddle.

<table>
<thead>
<tr>
<th>(2) Initial position of the moving knife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements:</td>
</tr>
<tr>
<td>1. Stitch length: 0 mm (Needle bar at the lowest point).</td>
</tr>
<tr>
<td>2. Distance between the needle bar and presser bar: 14.2 ± 0.1 mm (0.559&quot; ± 0.004&quot;) (at 52.7 mm (2.075&quot;) above the throat plate surface).</td>
</tr>
<tr>
<td>3. Needle center meets the center of each needle feed slot.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(Note) Position the fixed knives first and then the moving knives.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig. 28</td>
</tr>
</tbody>
</table>

- Fig. 29
### How to Adjust

1. Remove the fixed knife from the hook shaft saddle.
2. Loosen two screws (1) to release the thrust collar from the moving knife shaft.
3. Loosen screw (2) to release the rocking arm.
4. Move the moving knife shaft joint up and down to bring the moving knife rest. Tighten screws.

*(Caution)* When you fix the thrust collar and rocking arm to the moving knife shaft, take care not to leave any clearance at the hook driving shaft saddle.

### Results of Improper Adjustment

- **If the moving knife is lower than the top end of the moving knife rest:**
  - The moving knife hits the moving knife rest when it works. If it is too low, it may lock up the thread trimming mechanism.
  - The thread trimmer fails to sharply cut the thread.
  - The thread trimmer fails to cut the thread (thread trimmer fails to catch the thread).

- **If the moving knife is higher than the top end of the moving knife rest:**
  - The thread trimmer fails to sharply cut the thread.
  - The thread trimmer fails to catch the thread.

- **If the moving knife juts out too much from the fixed knife:**
  - Thread trimming failure may occur.
  - The thread trimmer may fail to catch the thread.

- **If the moving knife juts out too little from the fixed knife:**
  - The thread trimmer may fail to catch the thread.
  - The machine may fail in making some starting stitches as illustrated below;

  ![Failure in starting stitches](image)

* If bobbin thread catching failures occur when the feed dog has been replaced (especially when the feed dog with a round hole has been replaced by one with a slot), readjust the position of the moving and fixed knives (decrease the dimension $0.8 \pm 0.4$ (0.031" ± 0.016") from the Library of Superior Sewing Machine & Supply LLC
3) Position of the thread presser

Left

Right

Until it will go no further

Fig. 31

4) Clamping pressure

Uneven contact of the rear surface of the moving knife with the thread presser causes thread slippage.

Fig. 32
<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
</table>
| 1. Loosen the setscrews of the fixed knife (Fig. 28)  
2. Move the right and left thread pressers in the same direction until they will go no further as shown in Fig. 31. Then retighten the setscrews of the fixed knives.  
(Note) The fixed knives may be moved while making this adjustment. | ○ The machine may fail in making some starting stitches.  
○ When a thick thread is used, it may be entangled with the hook, causing the mechanism to lock. |

| 1. The rear surfaces of the moving knives are in contact with the thread pressers when the thread presser, moving knives, and fixed knives are installed.  
2. Under the above conditions, bring the thread presser adjusting fixtures in contact with the thread pressers. To do this, loosen screw (2), and turn screw (1) to make adjustment. After adjustment, tighten screw (2).  
If threads are not clamped even after the above adjustment is made;  
1) Loosen screw (2), and turn screw (1) to adjust the clamping pressure. After adjustment, tighten screw (2). | If the thread presser clamping pressure is inadequate;  
○ Starting stitches are skipped when a thick thread has been replaced by a thin thread.  
If the thread clamping pressure is too high;  
○ Several starting stitches are skipped. |
5) Timing of thread trimming action

Requirements:
- When the cam roller arrives in the recess of the guide groove just before the end of the lobe, the marker dot on the machine arm aligns with the red or yellow marker dot on the handwheel.

(Note) The thread trimming timing and the stop position depend on the adjustment of the hook timing. Perform adjustment in accordance with the following table.

<table>
<thead>
<tr>
<th>Hook timing</th>
<th>Handwheel marker dots vs. Machine arm marker dot</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thread trimming timing</td>
</tr>
<tr>
<td>2.6 mm (0.102&quot;) or less</td>
<td>Dot on arm aligns with red dot on handwheel.</td>
</tr>
<tr>
<td>2.6 mm ~ 3.2 mm (0.102&quot; ~ 0.126&quot;)</td>
<td>Dot on arm aligns with yellow dot on handwheel</td>
</tr>
<tr>
<td>How to Adjust</td>
<td>Results of Improper Adjustment</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>1. Loosen two screws (①) to release the thread trimmer cam.</td>
<td>![Diagram of Early timing]</td>
</tr>
<tr>
<td>2. Match the marking dot (red) on the handwheel with that (red) on the machine arm.</td>
<td>Early timing</td>
</tr>
<tr>
<td>3. Put the cam roller of the cam follower (asm) in the guide groove of the thread trimmer cam (push the cam follower in the axial direction of the cam follower shaft).</td>
<td></td>
</tr>
<tr>
<td>4. Turn by hand the thread trimmer cam until the cam roller arrives in the recess of the guide groove just before the end of the lobe and fix the cam. When tightening the two screws, hold the roller pressing against the side (②) of the guide groove.</td>
<td>If the timing is too early;</td>
</tr>
<tr>
<td></td>
<td>o The thread slips from the needle eye.</td>
</tr>
<tr>
<td></td>
<td>o The thread trimmer may fail in cutting right or left, needle or bobbin thread.</td>
</tr>
<tr>
<td></td>
<td>o The right needle thread may not be caught at the time of thread trimming when cotton thread is used.</td>
</tr>
<tr>
<td></td>
<td>If the timing is too late;</td>
</tr>
<tr>
<td></td>
<td>o The wiper hits the needle</td>
</tr>
<tr>
<td></td>
<td>o The thread trimmer malfunctions.</td>
</tr>
</tbody>
</table>
6) Position of the thread trimmer cam

**Fig. 35**

Requirements:
- When the cam roller reaches the peak of the lobe of the thread trimmer cam;
- The cam roller shaft must touch the thread tension release arm and there must be a 0.2 to 0.4 mm (0.008" to 0.016") clearance between the thread tension release arm and the thread tension release plate.

7) Position of the trimmer cam driving mechanism

**Fig. 36**

Requirements:
- When the thread trimmer magnet is "off";
- There must be a 0.8 to 1.2 mm (0.031" to 0.047") clearance between the left end face of the thread trimmer cam and the top end of the actuator screw head.
<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Loosen two screws to release the thread trimmer cam from the hook driving shaft.</td>
<td>If the clearance is too great;</td>
</tr>
<tr>
<td>2. Loosen screws ① to release the thrust collar.</td>
<td>○ The thread may slip from the needle eye.</td>
</tr>
<tr>
<td>3. Put the cam roller in the guide groove on the thread trimmer cam (push the cam follower (asm) in the direction of the axis of the cam follower shaft).</td>
<td>○ The needle-up stop position becomes unstable causing the wiper to hit the needle.</td>
</tr>
<tr>
<td>4. Turn the cam until the cam roller arrives the peak of the lobe. (By so doing, the cam roller shaft moves the thread tension release arm causing the thread tension release plate to latch the arm.)</td>
<td>If the clearance is too small;</td>
</tr>
<tr>
<td>5. Move the thread trimmer cam in the axial direction of the hook driving shaft in the way that the clearance between the thread tension release arm and the thread tension release plate becomes 0.2 to 0.4 mm (0.008” to 0.016”) and fix the thrust collar.</td>
<td>○ The thread may slip from the needle eye.</td>
</tr>
<tr>
<td>6. Make sure once again the timing of the thread trimming action and fasten the thread trimmer cam to the hook driving shaft.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the clearance is too great;</td>
</tr>
<tr>
<td>○ The thread may slip from the needle eye.</td>
</tr>
<tr>
<td>○ The needle-up stop position becomes unstable causing the wiper to hit the needle.</td>
</tr>
<tr>
<td>If the clearance is too small;</td>
</tr>
<tr>
<td>○ The thread may slip from the needle eye.</td>
</tr>
</tbody>
</table>

(Caution) 1. When tightening screws ① make sure that the cam follower pushing plate is parallel to the end face of the thread trimmer cam.

2. When replacing cam follower pushing plate (asm) components, assemble them so that the pushing plate shaft and plunger smoothly move axially at any point of 360 degree.
8) Clearance between the tension discs for releasing the thread

When the cam roller arrives the peak of the lobe of the thread trimmer cam, the tension discs must permit the cotton thread #5 to pass smoothly through them.

9) Position of the safeguard mechanism

Requirements:
- When the cam roller is on the bottom of the lobe of the thread trimmer cam and comes into contact with the face (A), the cam follower stopper (B) must touch lightly the cam roller shaft.
- In the same state as mentioned above, there must be a 0.2 to 0.3 mm (0.008" to 0.012") clearance between the cam follower stopper (A) and the cam follower.
### How to Adjust

1. Loosen nuts ①.
2. Pull the thread tension release wire in either direction as illustrated and tighten nuts ①.

If the above procedure fails to provide an adequate clearance between the discs, loosen screw ① shown below, and move flexible wire ② in either direction to make further adjustment of the disc clearance.

---

### Results of Improper Adjustment

If the clearance is too great:
- The thread trimmer cam seizes the cam follower causing mechanism troubles.

If the clearance is too small:
- The thread left on the needle after trimming becomes shorter.
- The thread slips from the needle eye.

---

**Cam follower stopper (B)**

1. Loosen screws ①.
2. Turn the handwheel until the cam roller arrives the bottom of the lobe of the thread trimmer cam.
3. Tighten two screws ① in the way that the cam follower stopper (B) lightly touches cam roller shaft and, at the same time, the cam roller touches the face ③ of the thread trimmer cam.

### Cam follower stopper (A)

1. Loosen screw ②.
2. Provide a 0.2 to 0.3 mm (0.008" to 0.012") clearance between the cam follower and the cam follower stopper (A) when the cam follower (B) is in the above-mentioned state.

---

If the cam follower stopper (B) juts out too much:
- It causes a mechanical trouble.
- The needle-up stop action becomes unstable causing the wiper to hit the needle.

If the cam follower stopper (B) does not touch the cam roller shaft:
- The bobbin thread is not clamped causing stitch failure at the start.
- It causes a mechanical trouble.

If the clearance is too great:
- Thread trimming failure may occur.
- It causes a mechanical trouble.

If the clearance is too small:
- The cam follower is not released from the thread trimmer cam, causing the thread trimmer to work at the start of sewing. It may break down the thread trimmer and cause other related troubles.

---

![Diagram](image-url)
(2) Wiper components

Requirements;
- Position of wiper: 43.8 x 20.7 mm (1.724" x 0.815")

Fig. 40

(3) Automatic reverse feed components

1) Stroke of the reverse feed magnet plunger

Requirements;
- Stitch length: Maximum
- There must be a 0.5 to 1.0 mm (0.02" to 0.039") clearance between the bottom face of the magnet and the resilient plate attached to the plunger when the reverse control lever has been turned fully downwards.

Fig. 41
<table>
<thead>
<tr>
<th>How to Adjust</th>
<th>Results of Improper Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Loosen two screws (1), and provide the specified distance 20.7 mm (0.815&quot;) as illustrated between the presser bar and the end of the wiper. Then tighten screws (1).</td>
<td>○ The wiper, if set longer than 43.8 mm (1.724&quot;), strikes the needle clamp during machine operation.</td>
</tr>
<tr>
<td>2. Loosen screw (2), and move the wiper in the arrowed directions to set the wiper length to 43.8 mm (1.724&quot;). Tighten screw (2).</td>
<td>○ If the distance between the presser bar and the end of the wiper is larger than 20.7 mm (0.815&quot;) the wiper strikes the needle clamp during machine operation.</td>
</tr>
<tr>
<td>○ If the distance between the presser bar and the end of the wiper is smaller than 20.7 mm (0.815&quot;), the wiper may strike and break the needle when the wiper is actuated.</td>
<td></td>
</tr>
</tbody>
</table>

1. Set the stitch length to the maximum.  
2. Loosen screws (1) to release the magnet installation base.  
3. Turn the reverse feed control lever downwards as far as it will go and fix the reverse feed magnet installation base in the position where a 0.5 to 1.0 mm (0.02" to 0.039") clearance is provided between the bottom face of the magnet and the resilient plate attached to the plunger.  
   | If the clearance is too great;  
   ○ The automatic reverse feed mechanism may fail to work due to insufficient stroke of the plunger.  
   | If the clearance is too small;  
   ○ The stitch length in the reverse feed becomes smaller than the set stitch length.
### 4. DESCRIPTION OF THE THREAD TRIMMER COMPONENTS

#### Structure viewed from the bottom

#### Fig. 42

<table>
<thead>
<tr>
<th>Rotational angle (from the top dead center of the needle bar)</th>
<th>0°</th>
<th>90°</th>
<th>180°</th>
<th>270°</th>
<th>360°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor signal (synchronizer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Needle “up”)</td>
<td>32°</td>
<td>178°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cam follower pushing plate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cam roller engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moving knife</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut at 30.5°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure if 44.8° or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safeguard mechanism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thread tension release arm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needle “up” stop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing of thread trimming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Marking dots on the arm and the handwheel meet each other)</td>
<td>31°</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. When current flows into thread trimmer magnet \(\text{1}\), the plunger is pulled in the direction of “A”.

2. As the plunger is pulled, actuator screw \(\text{3}\) attached to cam follower pushing plate \(\text{4}\), which is fixed to the plunger, engages with the side face of thread trimmer cam \(\text{4}\).

3. Cam follower pushing plate \(\text{4}\) is turned in the direction “B” by the cam causing cam follower \(\text{7}\) to move in the axial direction of cam follower shaft \(\text{8}\). As a result, the cam roller of the cam follower engages with the guide groove on the thread trimmer cam.

4. Revolution of the hook driving shaft is transmitted via thread trimmer cam \(\text{4}\) to rock cam follower \(\text{17}\) in the direction “C”.

5. Rocking motion of the cam follower is transmitted via joint rods \(\text{6}, \text{9}, \text{11}\) and \(\text{10}\) to drive moving knife shafts \(\text{7}\) and \(\text{8}\) in the direction “D”.

6. At this moment, cam roller shaft \(\text{15}\) moves thread tension release arm \(\text{19}\) in the direction “H”. As a result, tension release arm \(\text{19}\) is locked up by tension release plate \(\text{20}\) at the front end of the guide groove on the thread trimmer cam.

7. When cam roller \(\text{4}\) arrives at the rear end of the guide groove on the thread trimmer cam, cam follower \(\text{17}\) and moving knife shafts \(\text{7}\) and \(\text{8}\) move in the directions “E” and “F”, respectively.

8. When the cam roller arrives at the rear end of thread trimmer cam \(\text{4}\), cam follower pushing plate \(\text{14}\) is turned in the direction “G”. At the same time, the thread trimmer magnet is switched off permitting spring \(\text{21}\) to pull back cam follower pushing plate \(\text{14}\).

9. When cam follower pushing plate \(\text{14}\) goes back to its original position, cam follower \(\text{17}\) is pushed back to its original position by a force of spring in the axial direction of cam follower shaft \(\text{16}\).

10. At the same time, thread tension release plate \(\text{20}\) is pushed up and unlocks thread tension release arm \(\text{19}\) causing the tension discs to close for the next sewing cycle.

### THREAD TRIMMER COMPONENTS

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10116663</td>
<td>Cam follower installation base (asm) (B)</td>
<td>2</td>
<td>10108504</td>
<td>Hook driving shaft</td>
</tr>
<tr>
<td>3</td>
<td>CS1470710SH</td>
<td>Thread trimmer cam</td>
<td>4</td>
<td>10117307</td>
<td>Thrust collar</td>
</tr>
<tr>
<td>5</td>
<td>10123057</td>
<td>Thread tension release wire joint</td>
<td>6</td>
<td>10116507</td>
<td>Joint rod</td>
</tr>
<tr>
<td>7</td>
<td>10116051</td>
<td>Moving knife shaft joint</td>
<td>8</td>
<td>10116051</td>
<td>Moving knife shaft joint</td>
</tr>
<tr>
<td>9</td>
<td>10116309</td>
<td>Rocking arm (right)</td>
<td>10</td>
<td>10116200</td>
<td>Rocking arm (left)</td>
</tr>
<tr>
<td>11</td>
<td>10116457</td>
<td>Link (asm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>10117851</td>
<td>Cam follower pushing plate (asm)</td>
</tr>
<tr>
<td>13</td>
<td>10117604</td>
<td>Thread trimmer magnet</td>
</tr>
<tr>
<td>14</td>
<td>10117802</td>
<td>Cam follower pushing plate</td>
</tr>
<tr>
<td>15</td>
<td>10118305</td>
<td>Actuator screw</td>
</tr>
<tr>
<td>16</td>
<td>10116804</td>
<td>Cam follower shaft</td>
</tr>
<tr>
<td>17</td>
<td>10116754</td>
<td>Cam follower (asm)</td>
</tr>
<tr>
<td>18</td>
<td>D2428555B00A</td>
<td>Cam roller shaft</td>
</tr>
<tr>
<td>19</td>
<td>10117000</td>
<td>Thread tension release arm</td>
</tr>
<tr>
<td>20</td>
<td>10117208</td>
<td>Thread tension release plate</td>
</tr>
<tr>
<td>21</td>
<td>B2037372000</td>
<td>Spring</td>
</tr>
</tbody>
</table>
### 5. HOW TO DISASSEMBLE AND RE-ASSEMBLE THE THREAD TRIMMER UNIT

**DISASSEMBLE PROCEDURES (See Fig. 42 and Parts Book.)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remove the throat plate</td>
</tr>
<tr>
<td>2.</td>
<td>Remove the fixed knives and the moving knives on the both sides. Use an Allen key to loosen the fixed knife setscrews.</td>
</tr>
<tr>
<td>3.</td>
<td>Remove link. Pull out the hinge screws from the rocking arms on the right and on the left.</td>
</tr>
<tr>
<td>4.</td>
<td>Remove rocking arms left and right from their moving knife shaft joints and. Loosen their clamp screws.</td>
</tr>
<tr>
<td>5.</td>
<td>Remove joints rod from rocking arm and cam follower. Remove the joint rod nuts from both ends.</td>
</tr>
<tr>
<td>6.</td>
<td>Remove cam follower pushing plate. Remove two setscrews.</td>
</tr>
<tr>
<td>7.</td>
<td>Remove thread tension release wire joint from thread tension release arm. Remove two nuts which fasten release arm at both ends.</td>
</tr>
<tr>
<td>8.</td>
<td>Remove the hook driving shaft. Loosen the fastening screws and setscrews which fix the shaft components to the shaft and disengage the timing belt from the sprocket wheel on the hook driving shaft.</td>
</tr>
<tr>
<td>9.</td>
<td>Remove moving knife shaft joints and from the hook driving shaft saddle. Loosen setscrews which fasten the thrust collar to the moving knife shaft.</td>
</tr>
<tr>
<td>10.</td>
<td>Remove cam follower installation base (asm). Remove the two setscrews from the installation base.</td>
</tr>
</tbody>
</table>
NOTES ON RE-ASSEMBLING

Make sure that the bobbin case stopper rests in the recess of the throat plate.

See Fig. 28 of 3-(1)-2.

The effective length of the link (asm) (center-to-center of connection holes) (See Fig. 29.)

See 3-(1)-1). (See Fig. 27)

Set the length of joint rod \( \sigma \) 74.5 \( \pm \) 0.8 mm \((2.933'' \pm 0.031'')\) between the centers of the nuts which fix the rod at both to \( \sigma \) and \( \tau \). (See Fig. 29)

See 3-(1)-7).

See 3-(1)-8).

See 3-(1)-5), -6), and -9).

See 3-(1)-1).

Align the center of the screws.
6. HOW TO INSTALL THE WIPER

Turn the armature while pushing it until it will go no further.

Allow the wiper to move until it stops.

Fig. 43
<table>
<thead>
<tr>
<th>HOW TO ADJUST</th>
<th>NOTES ON RE-ASSEMBLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Allow the wiper to move until it stops.</td>
<td></td>
</tr>
<tr>
<td>2. Turn the armature of the rotary solenoid in the arrowed direction while</td>
<td></td>
</tr>
<tr>
<td>pushing it until it will go no further, and then tighten screw ( \textcircled{1} ).</td>
<td></td>
</tr>
</tbody>
</table>
7. HOW TO REPLACE THE TIMING BELT

8. HOW TO REMOVE THE NEEDLE BAR FRAME DRIVE BASE

1. Remove the hand lifter and face plate.
2. Remove cover (A) of needle stop changer base (B), and draw (B) out of the presser bar upper bushing.
3. Remove needle bar frame drive base guide (C).
4. Remove setscrews (I) to remove the needle bar frame drive shaft base.

(Note 1) The needle bar frame drive shaft base is fixed to the machine arm by two paper pins. The needle bar frame drive base is attached to the needle bar frame drive shaft base, so use great care when removing the shaft base. Removal of the needle bar frame drive base can be done more easily by removing the needles.

(Note 2) The needle bar frame drive base can be removed easily by driving a wedge with long blade into the clearance between the machine arm and needle bar frame drive base as shown below.
<table>
<thead>
<tr>
<th>HOW TO REPLACE</th>
<th>NOTES ON RE-ASSEMBLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Remove the belt cover and the belt.</td>
<td>o When setting the handwheel, take care not to let it bite</td>
</tr>
<tr>
<td>2. Take the synchronizer from the handwheel.</td>
<td>the O-ring.</td>
</tr>
<tr>
<td>3. Loosen two setscrews and pull out by hand the handwheel.</td>
<td>Tighten the screw No. 1 (in the rotational direction) on the</td>
</tr>
<tr>
<td>(Caution) Don’t use hammer to pull out the handwheel.</td>
<td>flat face of the shaft.</td>
</tr>
<tr>
<td>4. Set the stitch length to the maximum.</td>
<td>o When inserting the reverse feed control lever, take care</td>
</tr>
<tr>
<td>5. Disconnect the tension spring from the feed regulating pin.</td>
<td>not to break the oil seal.</td>
</tr>
<tr>
<td>6. Loosen the fastening screw of the feed regulating arm.</td>
<td>o Adjust the timing of the hook driving shaft to the main</td>
</tr>
<tr>
<td>7. Disconnect the reverse feed rod from the reverse feed forked link, and</td>
<td>shaft referring to 2-(7).</td>
</tr>
<tr>
<td>remove the reverse feed link and the reverse feed control lever.</td>
<td></td>
</tr>
<tr>
<td>8. Loosen setscrews of the thrust collar on the reverse feed control lever</td>
<td></td>
</tr>
<tr>
<td>shaft and pull out the reverse feed control lever shaft.</td>
<td></td>
</tr>
<tr>
<td>9. Insert a new timing belt in the machine arm through an opening made by</td>
<td></td>
</tr>
<tr>
<td>removing the handwheel and engage it with the sprocket wheel on the hook</td>
<td></td>
</tr>
<tr>
<td>driving shaft.</td>
<td></td>
</tr>
</tbody>
</table>
9. HOW TO REMOVE PLAYS IN THE AXIAL DIRECTION

Fig. 46

Requirements:
○ Clearance between the hook shaft gear and the hook shaft upper bushing must be 0.03 mm (0.001")

10. SYNCHRONIZER

Fig. 47

Requirements:
○ The red marker dot on the machine arm is between the two white marker dots (or the two green marker dots) on the handwheel when the machine stops with its needles up.
### HOW TO ADJUST

Loosen screw ① and provide specified clearance.

### EFFECTS OF ADJUSTMENT

- If the clearance is greater than 0.03 mm (0.001") it may cause stitch skipping.
- If the clearance is smaller than 0.03 mm (0.001") it may seize the neighboring components.

1. Match the red dot with the white dot and tighten screw ①.
2. Check that the red dot on the machine arm is between the two white dots on the handwheel when the machine stops with its needles up (with material and thread set on the machine).
3. If the red dot on the machine arm is not between the two white dots on the handwheel (or between the two green maker dots), loosen two screws ① on the synchronizer rotor and make fine adjustment.

---

![Diagram](Fig. 48)

If the timing of the synchronizer rotor is too early:
- Thread trimming failures may occur.
- A click may be heard at the sewing start, or the moving knife may be erroneously actuated at the sewing start with consequent stitching accident in the worst case.

If the timing of the synchronizer rotor is too late:
- Thread trimming failures may occur.
- The needles may strike the wiper.
### 11. TABLE OF SELECTIVE PARTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
<th>Tolerance (mm, inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hook shaft gear</td>
<td>10111904</td>
<td>−0.2 to −0.1 (−0.008&quot; to −0.004&quot;)</td>
</tr>
<tr>
<td></td>
<td>10112100</td>
<td>0 to +0.1 (0 to 0.004&quot;)</td>
</tr>
<tr>
<td></td>
<td>10112209</td>
<td>+0.1 to +0.2 (+0.004&quot; to +0.008&quot;)</td>
</tr>
<tr>
<td>Hook shaft needle bearing</td>
<td>SB30953010A</td>
<td>0 to −0.002</td>
</tr>
<tr>
<td></td>
<td>SB30953010B</td>
<td>−0.002 to −0.004</td>
</tr>
<tr>
<td></td>
<td>SB30953010C</td>
<td>−0.004 to −0.006</td>
</tr>
<tr>
<td></td>
<td>SB30953010D</td>
<td>−0.006 to −0.008</td>
</tr>
<tr>
<td>Feed rock needle bearing</td>
<td>B1636581A00</td>
<td>0 to −0.002</td>
</tr>
<tr>
<td></td>
<td>B1636581B00</td>
<td>−0.002 to −0.004</td>
</tr>
<tr>
<td></td>
<td>B1636581C00</td>
<td>−0.004 to −0.006</td>
</tr>
<tr>
<td></td>
<td>B1636581D00</td>
<td>−0.006 to −0.008</td>
</tr>
<tr>
<td>Hook shaft upper bushing thrust plate</td>
<td>10109700 Mark 0</td>
<td>1 (0.039&quot;)</td>
</tr>
<tr>
<td></td>
<td>10110906</td>
<td>1.1 (0.043&quot;)</td>
</tr>
<tr>
<td></td>
<td>10111003</td>
<td>1.2 (0.047&quot;)</td>
</tr>
<tr>
<td></td>
<td>10111102</td>
<td>1.3 (0.051&quot;)</td>
</tr>
<tr>
<td></td>
<td>10111201</td>
<td>1.4 (0.055&quot;)</td>
</tr>
<tr>
<td></td>
<td>10109809</td>
<td>1.5 (0.059&quot;)</td>
</tr>
<tr>
<td></td>
<td>10112506</td>
<td>1.6 (0.063&quot;)</td>
</tr>
<tr>
<td></td>
<td>10112605</td>
<td>1.7 (0.067&quot;)</td>
</tr>
<tr>
<td></td>
<td>10112704</td>
<td>1.8 (0.071&quot;)</td>
</tr>
</tbody>
</table>

### 12. PARTS TO BE FIXED BY "LOCK-TITE" PAINT

The following part is fixed by "Lock-tite" paint (601) after it has been accurately positioned. Therefore, if this part is disassembled, remove residual paint thoroughly using paint thinner and assemble it applying "Lock-tite" 601 after removing the moisture from the mating surface. If the screw which has been fixed by the paint is too hard to loosen, it is advisable to warm it using a torch lamp.

(Caution) It is not recommendable to disassemble the part.

- Feed regulating arm plate (setscrew) Part No. 10106706
- If the feed regulating arm plate (setscrew) is disassembled, the actual stitch length may substantially differ from the stitch dial indication.
13. PARTS FIXED BY BOND OR SEALING MATERIALS

The following parts are fixed on sealed against oil leakage:

<table>
<thead>
<tr>
<th>Parts</th>
<th>Sealing/Bonding materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hand lifter shaft O-ring</td>
<td>THREE-BOND 1101</td>
</tr>
<tr>
<td>2. Thread take-up cover bottom</td>
<td>THREE-BOND 1101</td>
</tr>
<tr>
<td>3. Feeding lever shaft oil seal</td>
<td>Gum-type adhesive agent (for outside sealing)</td>
</tr>
<tr>
<td>4. Feed adjusting screw O-ring</td>
<td>THREE-BOND 1101</td>
</tr>
<tr>
<td>5. Oil sight window setscrew</td>
<td>THREE-BOND 1101</td>
</tr>
<tr>
<td>6. Thread tension release wire mounting base setscrew</td>
<td>THREE-BOND 1101</td>
</tr>
</tbody>
</table>

14. MAINTENANCE PARTS

Basic maintenance parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Remarks on installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10353159</td>
<td>Hook (asm) left (for model with thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10353050</td>
<td>Hook (asm) right (for model with thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10353852</td>
<td>Hook (asm) left (for model without thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10353753</td>
<td>Hook (asm) right (for model without thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10353605</td>
<td>Bobbin (for model with thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10354009</td>
<td>Bobbin (for model without thread trimmer)</td>
<td>○ See “Needle-to-hook relation” and “Working position of the bobbin case opening lever”. ○ See “Needle entry in the needle feed slot” and “Lubrication”.</td>
</tr>
<tr>
<td>10211100</td>
<td>Moving knife</td>
<td>○ See “Height of the moving knife” and “Position of the moving and fixed knives”.</td>
</tr>
<tr>
<td>10232403</td>
<td>Fixed knife</td>
<td>○ See “Position of the thread presser”.</td>
</tr>
</tbody>
</table>

Recommendable maintenance parts

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Remarks on installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10112001</td>
<td>Hook shaft gear</td>
<td>○ Tighten three setscrews evenly.</td>
</tr>
<tr>
<td>10354405</td>
<td>Bobbin case opening lever</td>
<td>○ See 2-(3).</td>
</tr>
<tr>
<td>10116754</td>
<td>Cam follower (asm)</td>
<td>○ See 3-(1)-9.</td>
</tr>
<tr>
<td>10117802</td>
<td>Cam follower pushing plate</td>
<td>○ See 3-(1)-7.</td>
</tr>
<tr>
<td>10118305</td>
<td>Pushing plate actuator screw</td>
<td>○ See 3-(1)-7.</td>
</tr>
<tr>
<td>B3128051000</td>
<td>Thread take-up spring (A)</td>
<td></td>
</tr>
<tr>
<td>B3128527000</td>
<td>Thread take-up spring (B)</td>
<td></td>
</tr>
<tr>
<td>B35105120A0</td>
<td>Oil felt (asm)</td>
<td></td>
</tr>
</tbody>
</table>
15. IMPORTANT CAUTIONS IN ADJUSTMENT

1. When you confirm the correct direction of revolutions at the time of installation, don’t operate the thread trimmer, with the motor running in the reverse direction. If the motor runs in the wrong direction, it will break the thread trimmer. (Correct direction: the handwheel revolves towards you.)

2. In the special adjustment for the Needle Entry Point (see 2-(1)-1), if you set the needle bar closer to the presser bar than the standard, the needle will hit the presser foot, the feed dog will touch the throat plate, and the needle clamp will hit the wiper holder connection, respectively.

3. Never remove the feed regulator arm plate (10106706) from the feed regulator base.

4. Screw tightening torque
   1) Fastening screw of the feed regulator base (10107100): 45 ~ 50 kg-cm
   2) Fastening screw of the reverse feed link (Screw 2, Fig. 41): 45 ~ 50 kg-cm
      A torque of 45 to 50 kg-cm is obtained by tightening the screw 1/4 to 1/2 turns after reaching the end of its thread using an accessory screwdriver (large).
   3) Oil sight window: 5 ~ 10 kg-cm
   4) Hook driving shaft saddle setscrew (A): 80 ~ 100 kg-cm
   5) Hook driving shaft upper bushing setscrew: 10 ~ 12 kg-cm
   6) Changer rocking block setscrew: 20 ~ 25 kg-cm

5. Do not move the magnet plate in the synchronizer.
19. ELECTRIC COMPONENTS

(1) Function of each switch on the CPU panel

CPU box panel

- **Pattern Indicator LED (Light Emitting Diode)**
  - Indicates pattern No.

- **Memory indicator LED (Light Emitting Diode)**
  - Indicates memory No.

- **Number of stitch indicator LED (Light Emitting Diode)**
  - Indicates the number of stitches for each step (A to D).

- **Switches for setting the number of stitches**
  - Switches for setting the number of stitches for each step (A to D).
  - Setting range: 0 to 9 stitches
  - "+" key switch: Increase the number of stitches
  - "-" key switch: Decreases the number of stitches

- **Memory setting switches**
  - Used to indicate the storing locations and stored contents of sewing pattern, number of stitches and ON/OFF of automatic reverse feed stitching.
  - "+" key switch: Increases memory No.
  - "-" key switch: Decreases memory No.
  - Simultaneous operation of "+" and "-" key switches: Both switches are pressed at the same time to call an unset memory No.
  - For the operation method, refer to paragraph 9-6.

- **Pattern setting switch**
  - Used to select and set one of the four different patterns shown on the control panel.
  - When the switch is kept ON for more than 0.5 second, the patterns are repeatedly indicated in the order of 1 to 4.

- **Battery replacement time telling LED (Light Emitting Diode)**
  - Tells the time to replace the battery for storing the set numbers of stitches in memory. Replace the battery within a month after this lamp lights up. For battery replacement, refer to paragraph 16.

- **Indicator LED of automatic reverse feed stitching at sewing start (Light Emitting Diode)**
  - Lights up when the switch of automatic reverse feed stitching at sewing start is set for ON.

- **Indicator LED of automatic reverse feed stitching at sewing end (Light Emitting Diode)**
  - Lights up when the switch of automatic reverse feed stitching at sewing end is set for ON.

- **CPU control panel cover**
  - This cover is removed when changing the several selectable functions of the sewing machine. For the details, refer to paragraph 10.

- **Switch of automatic reverse feed stitching at sewing start**
  - Used to turn ON or OFF the automatic reverse feed stitching at sewing start.
  - It turns ON or OFF alternately each time it is depressed.
  - (This switch is effective for pattern 1, 2 or 4, but ineffective when the number of stitches for step B is set for "0".)

- **Switch of automatic reverse feed stitching at sewing end**
  - Used to turn ON or OFF the automatic reverse feed stitching at sewing end.
  - It turns ON or OFF alternately each time it is depressed.
  - (This switch is effective for pattern 1, 2 or 4, but ineffective when the number of stitches for step C in pattern 1, or for step B in pattern 2, and is set to "0".)

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## 16. MECHANICAL TROUBLES AND CORRECTIVE MEASURES

<table>
<thead>
<tr>
<th>TROUBLES</th>
<th>CAUSES</th>
<th>CHECKPOINTS</th>
<th>CORRECTIVE MEASURES</th>
<th>TEST REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubricating oil does not circulate.</td>
<td>Oil level in the reservoir is too low.</td>
<td>Check the oil level.</td>
<td>Fill the oil reservoir to the bed between &quot;H&quot; and &quot;L&quot; marks.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The oil filter screen is clogged up with dust.</td>
<td></td>
<td>Clean the oil filter screen.</td>
<td></td>
</tr>
<tr>
<td>No oil appears in the oil sight window.</td>
<td>Filter screen holder is loose.</td>
<td></td>
<td>Tighten the screen holder clamping screw.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil tube connecting screws are loose.</td>
<td></td>
<td>Tighten the connecting screws.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil tube is disconnected.</td>
<td></td>
<td>Connect the oil tube securely.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil tube is broken.</td>
<td></td>
<td>Replace the broken tube.</td>
<td></td>
</tr>
<tr>
<td>Lubricating oil is not fed to the hook.</td>
<td>The oil pump plunger is not centered.</td>
<td>Check the oil pump.</td>
<td>Center the oil pump plunger to its opening.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil does not flow in the oil tube connected to the hook.</td>
<td>Check the oil adjusting screw.</td>
<td>Close the oil flow by tightening the oil adjusting screw fully, turn the screw in the reverse way by 6 turns and fix it by the locknut.</td>
<td></td>
</tr>
<tr>
<td>Lubricating oil leaks out.</td>
<td>The oil seal has worn out.</td>
<td></td>
<td>Replace the oil seal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil comes out from the edge of the bed slide.</td>
<td>Too much oil is fed to the hook.</td>
<td>See 2-(2).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil leaks from the bottom of the thread take-up cover.</td>
<td>Too much oil is fed to the face plate components.</td>
<td>See 2-(2).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The seal on the setscrew has deteriorated.</td>
<td>Apply new sealing agents (THREE-BOND 1101) to the setscrew.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The sealing on the setscrew has deteriorated.</td>
<td>Apply new sealing material (THREE-BOND 1101).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricating oil is not fed to the hook.</td>
<td>The oil adjusting screw is not set properly.</td>
<td></td>
<td>See 2-(5).</td>
<td></td>
</tr>
</tbody>
</table>

* This trouble may be caused by misalignment of the plunger at the time of repair or maintenance work.
## 17. STITCH FAILURES AND CORRECTIVE MEASURES

### STITCH FAILURES

<table>
<thead>
<tr>
<th>FAILURE</th>
<th>CAUSES</th>
<th>CHECK POINTS</th>
<th>CORRECTIVE MEASURES</th>
<th>TEST REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thread breaking</td>
<td>Surface of thread path, needle point, hook point, throat plate or bobbin case is not smooth.</td>
<td>Check for the scratched parts.</td>
<td>Remove scratches from the hook point using a fine sandpaper. Make the throat plate slot surface smooth using a buffing wheel.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Needle thread tension is too high.</td>
<td></td>
<td>Adjust the needle thread tension.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clearance between the bobbin case opening lever and the bobbin case is too great.</td>
<td>Check the clearance.</td>
<td>Reduce the clearance (see 2-(3)).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The hook point hits the needle.</td>
<td>Check the clearance.</td>
<td>See 2-(2)-2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lubricating oil fed to the hook is not enough.</td>
<td>Check the amount of lubricating oil.</td>
<td>See 2-(9).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Stitch skipping</td>
<td>Needle thread tension is too low.</td>
<td></td>
<td>Adjust the needle thread tension (this occurs rather in synthetic fiber thread).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clearance between the needle and the hook point is too great.</td>
<td>Check the clearance.</td>
<td>Reduce the tension of the thread take-up spring or increase its stroke.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Needle-to-hook timing is wrong.</td>
<td>Check the marker lines on the needle bar.</td>
<td>See 2-(2).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presser foot does not press the materials (insufficient presser foot pressure).</td>
<td>Check the pressure of the presser foot.</td>
<td>Tighten the presser spring regulator screw.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Height of the needle bar is wrong.</td>
<td>Check the needle bar height at its lowest point.</td>
<td>See 2-(1)-2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Align the hook points with the end face of the needle #21 as illustrated, so that the right-hand needle-to-hook timing is delayed by a needle's thickness.</td>
<td>Make the hook blade straight and sharp or replace the hook.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Needle guard on the hook is insufficient.</td>
<td>Check the clearance between the needle and the hook needle guard.</td>
<td>See 2-(2)-2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Needle size is not suitable.</td>
<td></td>
<td>Replace the needles by thicker ones.</td>
<td></td>
</tr>
</tbody>
</table>

*If thread breaking or stitch skipping occurs frequently with synthetic fiber thread (Tetoron #80 ~ #50): 1) Wind the threads once on to the needle.*

### CHECK POINTS

- **Check for the scratched parts.**
- **Check the clearance.**
- **Check the marker lines on the needle bar.**
- **Check the pressure of the presser foot.**
- **Check the needle bar height at its lowest point.**
- **Make the hook blade straight and sharp or replace the hook.**
- **Replace the needles by thicker ones.**

### CORRECTIVE MEASURES

- **Remove scratches from the hook point using a fine sandpaper.**
- **Make the throat plate slot surface smooth using a buffing wheel.**
- **Adjust the needle thread tension.**
- **Reduce the clearance (see 2-(3)).**
- **See 2-(2)-2.**
- **See 2-(9).**
- **Reduce the tension of the thread take-up spring or increase its stroke.**
- **Tighten the presser spring regulator screw.**
- **See 2-(1)-2.**

### TEST REPORT

- *If thread breaking or stitch skipping occurs frequently with synthetic fiber thread (Tetoron #80 ~ #50): 1) Wind the threads once on to the needle.*
- *If stitch skipping occurs frequently with cotton thread: Find which needle causes stitch skipping, and delay its needle-to-hook timing by a needle's thickness from that of the other needle.*

### Diagram

- Hook point
- Needle clamp
- DP x 5 #21
- Align Left
- Align Right

(Example) Suppose that the right-hand needle causes stitch skipping:
1. Loosen screws which fix the hook shaft gear of the right-hand hook.
2. Needle DP x 5 #21 is used and stitch length is "4".
3. Align the hook points with the end face of the needle #21 as illustrated, so that the right-hand needle-to-hook timing is delayed by a needle's thickness.
### TROUBLES

<table>
<thead>
<tr>
<th>Loose stitch (balloon or looped stitch)</th>
<th>Bobbin case is threaded faultily.</th>
<th>Check that the thread passes through the forked tension spring on the bobbin case.</th>
<th>Thread the bobbin case correctly.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thread path is not smooth or has burrs.</td>
<td>Check each thread path.</td>
<td>Adjust the thread tension on the bobbin case.</td>
</tr>
<tr>
<td></td>
<td>Bobbin does not spin smoothly in the bobbin case.</td>
<td>Draw the bobbin thread by hand and check if the thread comes out smoothly from the bobbin case.</td>
<td>Replace the bobbin or hook.</td>
</tr>
<tr>
<td></td>
<td>Clearance between the bobbin case opening lever and the bobbin case is too great.</td>
<td>Check the clearance.</td>
<td>See 2(3).</td>
</tr>
<tr>
<td></td>
<td>Clearance between the bobbin case stopper and the throat plate is too small.</td>
<td>Check the clearance.</td>
<td>See 2(4).</td>
</tr>
<tr>
<td></td>
<td>The bobbin case has been fitted improperly.</td>
<td>Check if the bobbin case has been fitted snugly or not.</td>
<td>Replace the bobbin case or the hook.</td>
</tr>
<tr>
<td></td>
<td>The feed dog is too high.</td>
<td>Check it against the standard height.</td>
<td>Refer to &quot;Height of the feed dog&quot;.</td>
</tr>
<tr>
<td></td>
<td>The needle feed slot is not suited to the stitch length.</td>
<td>The needle feed slot should be 2 x 3 (0.079&quot; x 0.118&quot;) for a stitch length exceeding 4 mm (0.157&quot;) and a2 (0.079&quot;) for a stitch length of 4 mm (0.157&quot;) or less.</td>
<td>Change the position of the feed dog.</td>
</tr>
</tbody>
</table>

### CHECK POINTS

1. Loose stitch (balloon or looped stitch)
   - Bobbin case is threaded faultily.
   - Check that the thread passes through the forked tension spring on the bobbin case.
2. Bobbin thread tension is too low.
   - Check the thread tension on the bobbin case.
3. Bobbin is wound up too tight (especially synthetic fiber thread).
   - Check the tightness of the thread in the bobbin.
4. Bobbin thread tension is too low.
   - Check the tightness of the thread on the bobbin case.
5. Bobbin thread tension is too low.
   - Check the thread tension on the bobbin case.
6. Bobbin does not spin smoothly in the bobbin case.
   - Draw the bobbin thread by hand and check if the thread comes out smoothly from the bobbin case.
7. Clearance between the bobbin case opening lever and the bobbin case is too great.
   - Check the clearance.
8. Clearance between the bobbin case stopper and the throat plate is too small.
   - Check the clearance.
9. The bobbin case has been fitted improperly.
   - Check if the bobbin case has been fitted snugly or not.
10. The feed dog is too high.
    - Check it against the standard height.
11. The needle feed slot is not suited to the stitch length.
    - The needle feed slot should be 2 x 3 (0.079" x 0.118") for a stitch length exceeding 4 mm (0.157") and a2 (0.079") for a stitch length of 4 mm (0.157") or less.

### CORRECTIVE MEASURES

1. Thread the bobbin case correctly.
2. Adjust the thread tension on the bobbin case.
3. Use the racing-proof spring for synthetic fiber thread, and the racing-proof cloth for other threads.
4. Use the racing-proof spring for synthetic fiber thread, and the racing-proof cloth for other threads.
5. Replace the race-proof spring (10111508) or replace the race-proof cloth (10321066) as required.
6. Replace the race-proof spring (10111508) or replace the race-proof cloth (10321066) as required.
7. Replace with the race-proof spring (10111508) or replace the race-proof cloth (10321066) as required.
8. Check that the hook timing is correct.
9. Delve the hook case into 2.8 - 3.2 mm (0.110" - 0.126") (If the machine is equipped with a thread trimmer, also delay the thread trimming timing).
18. MECHANICAL TROUBLES OF ATTACHMENTS AND CORRECTIVE MEASURES

<table>
<thead>
<tr>
<th>TROUBLES</th>
<th>CAUSES</th>
<th>CHECK POINTS</th>
<th>CORRECTIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTOMATIC THREAD TRIMMER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Thread slips from the needle eye at the end of thread trimming action.</td>
<td>Tension post No. 1 is too tight.</td>
<td>Check the thread tension.</td>
<td>Reduce the thread tension applied by the tension post No. 1.</td>
</tr>
<tr>
<td></td>
<td>Thread trimmer works too early.</td>
<td>Check the marker dots on the handwheel and the position of the thread trimmer cam.</td>
<td>See 3-(1)-5.</td>
</tr>
<tr>
<td></td>
<td>Thread tension disc does not &quot;float&quot; sufficiently.</td>
<td>Check the clearance between the tension discs when releasing the thread.</td>
<td>See 3-(1)-8.</td>
</tr>
<tr>
<td></td>
<td>The bobbin thread gets into the bobbin thread catching groove of the moving knife.</td>
<td>Check the initial position of the moving knife.</td>
<td>See 3-(1)-2.</td>
</tr>
<tr>
<td></td>
<td>The thread guide thread presser (felt) has worn out due to thread rubbing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thread left in the needle eye is too short to start.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The first several stitches are not made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Thread slips from the needle eye at the start of sewing.</td>
<td>The thread tension post No. 1 is too tight.</td>
<td>Check the thread tension.</td>
<td>Reduce the tension.</td>
</tr>
<tr>
<td></td>
<td>The tension discs do not &quot;float&quot; sufficiently to release the thread.</td>
<td>Check the clearance between the tension discs when releasing the thread.</td>
<td>See 3-(1)-8.</td>
</tr>
<tr>
<td></td>
<td>Bobbin thread clamp spring is too weak.</td>
<td></td>
<td>See 3-(1)-4.</td>
</tr>
<tr>
<td></td>
<td>Clamp spring is set in a wrong position.</td>
<td></td>
<td>See 3-(1)-3.</td>
</tr>
<tr>
<td>3. The first several stitches are not made.</td>
<td>Bobbin thread is not held positively.</td>
<td>Check if the bobbin thread is held or not.</td>
<td>See 3-(1)-2, 3-(1)-3 and 3-(1)-9.</td>
</tr>
<tr>
<td></td>
<td>Bobbin thread tension is too low.</td>
<td>Check if the amount of the take-up lever between the needle-stop point and the upper dead point of the take-up lever is too great or not.</td>
<td>Increase the bobbin thread tension.</td>
</tr>
<tr>
<td></td>
<td>Timing of the needle-up stop is too early.</td>
<td>Check if the amount of the take-up lever between the needle-stop point and the upper dead point of the take-up lever is too great or not.</td>
<td>See 10. &quot;Synchronizer&quot;</td>
</tr>
<tr>
<td></td>
<td>The moving knife has edges at A and B.</td>
<td>Using a fine sandpaper or diamond file, remove the edges at A and B with care taken to the moving knife blade.</td>
<td></td>
</tr>
</tbody>
</table>

**CHECK POINTS CORRECTIVE MEASURES**

<table>
<thead>
<tr>
<th>TROUBLES</th>
<th>CAUSES</th>
<th>CHECK POINTS</th>
<th>CORRECTIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>TROUBLES</td>
<td>CAUSES</td>
<td>CHECK POINTS</td>
<td>CORRECTIVE MEASURES</td>
</tr>
</tbody>
</table>

**TEST REPORT**

* Such troubles as "thread escapes from the needle eye" and "the first several stitches are not made" are mainly caused by shortness of the thread left in the needle eye at the start. These troubles are frequently caused when a short stock is made with thin synthetic fiber thread. In order to minimize such troubles, change the timing of the following components:
1) Start of the moving knife: 30° - 31° - 31°
2) Needle-up stop: 50° - 68° - 60° - 65°

How to change the timing:
1) Stick a piece of paper (10.5 - 13 mm [0.413" - 0.512"] long) using adhesive tape to the handwheel aligning its one end with the center of the marking dot on the handwheel as illustrated.
2) Turn the handwheel until the other end of the paper arrives at a point shown by the marking dot on the arm.
3) Adjust the thread trimmer cam according to 3-(1)-5.4)
4) Next, set the marking dot on the synchronizer to that on the handwheel flange in the way to delay the timing as illustrated.
5) Adjust the height of the wiper so that the wiper does not interfere with the needles.

**TROUBLES**

- The first several stitches are not completed. This trouble may be also caused by a bobbin in which is wound a less amount of thin thread. In such a case, fill up the bobbin.
- The pressure of the clamping spring is too high.
- The pressure of the clamping spring is too high.
- The pressure of the clamping spring is too high.
- This trouble often occurs if feed dogs with large needle feed slots are used for thin needles. (Replace the feed dogs with A-type feed dogs.)

From the Library of Superior Sewing Machine & Supply LLC
4. **Thread trimmer does not cut the thread sharply (whiskered end).**

<table>
<thead>
<tr>
<th>TROUBLES</th>
<th>CAUSES</th>
<th>CHECK POINTS</th>
<th>CORRECTIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving knife blade does not fit the fixed knife blade.</td>
<td>Moving knife blade is blunt.</td>
<td>Position of the moving knife.</td>
<td>See 3-(1)-1, 3-(1)-2, and 3-(1)-3. Adjust or replace the moving knife or fixed knife.</td>
</tr>
<tr>
<td>Moving knife slants.</td>
<td>Motion of the moving knife blade (up and down).</td>
<td></td>
<td>Set 3-(1)-1.</td>
</tr>
<tr>
<td>The clearance between the feed dog and the moving knife is not enough.</td>
<td>Clearance between the needle and the hook point.</td>
<td></td>
<td>Set 2-(2)-2.</td>
</tr>
<tr>
<td>Initial position of the moving knife is wrong.</td>
<td>Distance from the top end of the moving knife to that of the fixed knife.</td>
<td></td>
<td>Set 3-(1)-2.</td>
</tr>
<tr>
<td>Needle entry point is wrong.</td>
<td>Distance from the needle bar to the presser bar.</td>
<td></td>
<td>See 2-(1)-1 and 2-(1)-3.</td>
</tr>
<tr>
<td>Moving knife does not come back to the fixed knife.</td>
<td>Thread trimming timing.</td>
<td></td>
<td>See 3-(1)-5.</td>
</tr>
<tr>
<td>Moving knife moves too much after trimming.</td>
<td>Position of the safeguard stopper.</td>
<td></td>
<td>Set 3-(1)-5.</td>
</tr>
<tr>
<td>Timing of thread trimming is wrong.</td>
<td>Marking dot on the handwheel and thread trimmer cam position.</td>
<td></td>
<td>Set 3-(1)-7.</td>
</tr>
<tr>
<td>Moving knife does not work.</td>
<td>Thread trimmer cam driving mechanism.</td>
<td></td>
<td>See 3-(1)-9.</td>
</tr>
<tr>
<td>Clutch fails to work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The synchrotrimer timing is bad.</td>
<td>Alignment of the marker dots.</td>
<td></td>
<td>Set 16. “Synchrotrimer”</td>
</tr>
<tr>
<td>The bobbin thread tension is extremely low.</td>
<td></td>
<td></td>
<td>Apply more tension to the bobbin thread through the tension spring.</td>
</tr>
</tbody>
</table>

5. **Thread trimmer does not cut the thread (fails to catch the thread).**

- **How to sharpen the moving knife blade.**
  - Grindstone (Oil stone)
  - When sharpening the blade of the moving knife, be sure to bring the blade surfaces into close contact with the surface of the grindstone. (A rougher surface is better for sharper finish of the blade.)
  - “Fails to catch the thread”.
  - If this trouble frequently happens, set the feed eccentric cam slightly earlier than the standard in relation to the hook driving shaft.

**HOW TO ADJUST**

1. Adjust the timing of the cloth feed action referring to 2-(5).
2. Set the marker dot engraved on the feed eccentric cam to 2.3 through 3.9 mm (0.09" - 0.154") from the marker dot on the hook driving shaft as illustrated. (After this adjustment, check the stitch length once again.)

- Dot engraved on feed eccentric cam
  - 2.3 - 3.9 mm (0.09" - 0.154")

- Dot engraved on hook driving shaft
  - Direction of rotation
  - Hook driving shaft
  - Feed eccentric cam

From the Library of Superior Sewing Machine & Supply LLC
## TROUBLES

### WIPER COMPONENTS

1. Wiper fails to wipe the thread.
   - The top end of the wiper faces in a wrong way.
   - Thread is not cut completely.
   - Bobbin thread clamping pressure is too high.
   - CAUSES
     - The top end of the wiper faces in a wrong way.
     - Thread is not cut completely.
     - Bobbin thread clamping pressure is too high.
   - CHECK POINTS
     - Correct the orientation of the wiper.
     - See Troubles 18-4 and 18-5
     - See 3-(1)-4.
     - CORRECTIVE MEASURES

2. Wiper hits the needle.
   - Thread trimming action is too late.
   - Cam follower stopper (B) presses too much the cam roller shaft.
   - Timing of the synchronizer is too late.
   - Working level of the wiper is too high.
   - CAUSES
     - Thread trimming action is too late.
     - Cam follower stopper (B) presses too much the cam roller shaft.
     - Timing of the synchronizer is too late.
     - Working level of the wiper is too high.
   - CHECK POINTS
     - Check the marking dot on the handwheel.
     - See 3-(1)-5.
     - See 3-(1)-6.
     - See 3-(1)-9.
     - See 10.
   - CORRECTIVE MEASURES

### AUTOMATIC AND ONE TOUCH TYPE REVERSE FEED MECHANISM

1. Number of stitches preset by the stitch counter differs from the actual number of stitches.
   - Some of the components are interfered.
   - Spring to pull the feed regulator base is too tight.
   - Stroke of the reverse feed magnet plunger is too great.
   - CAUSES
     - Some of the components are interfered.
     - Spring to pull the feed regulator base is too tight.
     - Stroke of the reverse feed magnet plunger is too great.
   - CHECK POINTS
     - Connection between the plunger and the feed regulator.
     - Check if the reverse feed control lever can be depressed fully downwards with a pressure of 1.2 kg or less when the machine is at rest.
     - Clearance between the bottom face of the magnet and the resilient plate attached to the plunger (standard: 0.1 to 1.0 mm (0.004" - 0.039").
   - CORRECTIVE MEASURES
     - Remove the cause of interference.
     - Reduce the tension of the spring.
     - See 3-(3)-1.

2. Stitch length in the reverse feed differs from that in the forward feed (up to 4 mm (0.157") stitches).
   - Inclination of the feed regulator base is inadequate.
   - Relation of the stitch length to the feed regulator rod pin when the machine is at rest.
   - CAUSES
     - Inclination of the feed regulator base is inadequate.
   - CHECK POINTS
     - See 2-(11).
   - CORRECTIVE MEASURES

### TEST REPORT

- If the wiper does not return when thick thread is used:
  - Check if the thread gets entangled with the wiper causing the presser foot to float.
  - In this state, if the thread is broken, the wiper will return.
  - This phenomenon is prevented by reducing the projection of the moving knife. (0.4 - 1.2 mm) (0.016" - 0.047")
The motor circuit diagram varies according to the destination. Refer to the motor switch connection table on the attached sheet.
Logical circuit diagram (3-phase 220V)

The motor circuit diagram varies according to the destination. Refer to the motor/switch connection table on the attached sheet.
When 3-phase motor is used:

**SW3XL - 1 220 - 250V 3p**

- Switch side Connection diagram
- Motor side

**SW3XH - 1 380 - 440V 3p**

- Switch side Connection diagram
- Motor side

**SW38N - 1**

- Switch side Connection diagram
- Motor side

**SW38K - 1**

- Color of Lead Wire
  - (B) Blue
  - (K) Black
  - (K/W) Black/White
  - (T) Brown
  - (GN) Green/Yellow
  - (R) Red

- Switch side Connection diagram
- Motor side

(Note) The same motor connection is used for the switch types, SW3XL - 1, SW3XH - 1, SW38N - 1, and SW38K - 1.

(Note) The pin layout of the 9P connector is to be observed from P.

(Note) Fit in the above connectors as shown on the right.
DIMENSIONS OF THE MACHINE TABLE (LH-1172-5-4B)

- Drawer stopper (staple)
- ø16, 30 deep (head support rod) (0.630", 1.181")
- ø35 (1.378") through hole (thread trimmer, wiper, auto reverse feed cords)
- ø5.9 (0.236") through hole (thread spool stand)
- ø18 (0.709") through hole (thread spool stand)

Sections:
- Section W-W
- Section X-X
- Section Y-Y
- Section Z-Z

Table part No. 1014509
DIMENSIONS OF THE MACHINE TABLE (LH-1172-5-4B)

- Drawer stopper (staple)
- Section W-W
- Section X-X
- Section Y-Y
- Section Z-Z

Table part No. 10144509
Sewing patterns

Memory Nos. 1 to 9 are provided as locations for storing sewing patterns. The memory contents include the type of pattern, the numbers of stitches for steps A to D, and ON/OFF of reverse feed stitching. By specifying the memory No. of the desired sewing pattern stored, sewing operation can be done according to the setting shown on the CPU control panel.

(Several sewing patterns are set at the factory to check for proper operation before delivery.)

<table>
<thead>
<tr>
<th>Memory No.</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern No.</td>
<td></td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of stitches A</td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of stitches B</td>
<td></td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of stitches C</td>
<td></td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of stitches D</td>
<td></td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Automatic reverse feed stitching at start</td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Automatic reverse feed stitching at end</td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Table 1

* Memory No. 0 is exclusively used for sewing without automatic reverse feed stitching and inching.
* Memory Nos. 4, 6, 7, 8 and 9 have no set sewing patterns.
* The memory contents enclosed with the bold line can be freely set.
* When the numbers of stitches for all the steps, A to D are set for “0”, the pattern No. will be “1”.
* It is advisable to set sewing patterns in the order of memory Nos. (1, 2, ..., 9) according to the sewing operation.
1. How to call set sewing patterns
A set sewing pattern can be called by operating the memory "+" key switch and the memory "-" key switch. When the setting is as shown in Table 1, the memory No. changes like \[ \begin{align*} 1 & \rightarrow 2 \rightarrow 3 \\ 5 & \rightarrow 6 \rightarrow 7 \end{align*} \] as illustrated when the memory "+" key switch is depressed. At this time, the memory contents of each memory No. will be shown. When the memory "-" key switch is depressed, the change goes like \[ \begin{align*} 1 & \rightarrow 6 \rightarrow 3 \rightarrow 2 \rightarrow 1 \end{align*} \]. (A memory No. with no set sewing pattern is automatically skipped.) Keep on depressing either memory switch until the desired sewing pattern is reached.

2. How to change the number of stitches for a set sewing pattern
The number of stitches for a set sewing pattern can be changed by depressing the "+" or "-" number of stitches setting key switch for the step (A to D) whose number of stitches is to be changed. (The "+" key switch decreases the number of stitches, while the "-" key switch decreases it. When either of these switches is continuously depressed, the number of stitches will also change continuously.)

3. How to change ON/OFF of automatic reverse feed stitching of a set sewing pattern
The switches of automatic reverse feed stitching at sewing start and end turn ON or OFF alternately each time they are depressed.

(Caution) * If the number of stitches for step B is set for "0", the automatic reverse feed stitching at sewing start cannot be engaged.
* If the number of stitches for step C is set for "0", the automatic reverse feed stitching at sewing end cannot be engaged.
* In the case of pattern 3, the automatic reverse feed stitching at sewing start or end cannot be engaged.
4. How to change the pattern shape of a set sewing pattern
When the pattern switch is kept depressed for more than 0.5 second, the pattern indication changes. Keep on depressing the pattern switch until the pattern No. having the desired pattern shape is reached. (The pattern Nos. 1 to 4 are repeatedly indicated.) When the pattern No. has been changed, all the numbers of stitches which have previously been set will be cleared to “0”. Therefore, it is necessary to set the numbers of stitches again.

5. How to erase set sewing patterns
Call the memory No. (3, for instance) to be erased using the memory switch. Next, keep on depressing the pattern switch for more than 0.5 second. The pattern No. indication will change and at the same time the numbers of stitches will be all reset to “0”. This erases the contents of the specified memory No. (3 in this case). Now, you can change it to the desired memory No.

6. How to set a new sewing pattern
1. When the memory “+” and “−” key switches are depressed at the same time, memory Nos. (1, 2, −9) which have not been set will be automatically indicated in sequence. When the setting is as shown in Table 1, memory Nos. will be indicated in the order illustrated when you keep on depressing the memory switches. Release the switches at the moment the desired memory No. appears.
2. Next, if the desired pattern shape belongs to a pattern No. other than “1”, depress the pattern switch for more than 0.5 second to change the indication to the desired pattern No.
3. Using the number of stitch setting switches, set the number of stitches for each step (A to D).
(Note) Depress the memory “+” and “−” key switches at the same time as illustrated.
(3) Adjusting the maximum sewing speed

In the LH-1172-5, the sewing speed can be easily adjusted from a low speed of about 500 s.p.m. up to the maximum speed through the control knob on the PSC box cover. As the control knob is turned counterclockwise, the maximum sewing speed reduces.

(4) Setting for the soft starting

The LH-1172-5 machine is provided with a "soft" starting feature to ensure stitch formation at the start of a seam line for sewing heavy-weight materials. The "soft" starting is a feature to run the machine at a low speed for the beginning one stitch (1 to 2 stitches for 210 type). This soft starting feature works whether the switch for reverse feed stitching at the start of a seam line is set to "ON" or "OFF". The soft starting is set by turning on the dip switches (DSW) 1 and 2 on the CPU printed circuit board.

<table>
<thead>
<tr>
<th>DSW1</th>
<th>DSW2</th>
<th>Number of stitches</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>-</td>
<td>—— —— —— —— —— (No soft starting)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>—— —— —— —— (One-stitch soft starting)</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>—— —— —— —— (Two-stitch soft starting)</td>
</tr>
</tbody>
</table>
(5) Setting the dip switches on PSC printed circuit board

Properly set the dip switches (DSW1 and DSW2) in the PSC box to provide the control best suited for each machine head. For most operations, both DSW1 and DSW2 are set to OFF.

DSW1: Set this dip switch to ON for DMN530-5 or DMN531-5.
DSW2: Set this dip switch to ON when sewing medium-weight material by LH-1172-5, or if the clutch/brake disks produce clatter at a low speed. (Note that low sewing speed may be reduced when DSW2 is set to ON.)

(6) Setting for a machine with Auto-lifter

A machine equipped with Auto-lifter (AK-11) requires an exclusive PSC box but it uses the same CPU box as that for a machine without Auto-lifter. Set the dip switch (DSW) FL ON (see “Setting for the soft starting”) to ON for a machine with Auto-lifter.

(7) Stand-by circuitry

The PSC box is provided with a stand-by circuitry which is capable of controlling the sewing speed (through the pedal action) or stop of the machine in the absence of the CPU board. In case of a CPU board failure, this stand-by circuitry functions to cause the machine to operate, without the CPU board, as a machine with needle-up/down stop feature, by changing the connection of the connectors.

**<Function of the stand-by circuitry>**

The stand-by circuitry controls the start, sewing speed, and stop of the machine through the pedal action. (The needle-up/down stop function works, but thread trimming, automatic or one touch reverse feed stitch features are inoperative.)

The control knob for maximum sewing speed is operative.
<How to switch to the stand-by circuitry>

(1) Turn off the power switch, open the cover of the PSC box, and remove the J3 plug.
(2) Attach the connector at J14 (HOLDER) to H12 (PSC ONLY).
(3) Close the cover of the PSC box with the J3 plug left disconnected.

This completes the switching to the stand-by circuitry.

When the power switch is turned on, the power indication lamp on the CPU box will not light. However, this does not mean any failure.

When the pedal is depressed forward (toe down), the machine will start, and the speed can be controlled.
When the pedal is returned to the neutral position, the machine will stop with the needles down. The machine will stop with the needles up, but thread trimming cannot be performed even when the pedal is trodden on backward (heel down).
Further, the automatic and one touch reverse feed stitch functions do not work.

(8) How to replace the fuse

The fuse is located on the right side of the PSC box as shown above. Make sure to turn off the power switch before replacing the fuse. If the new fuse immediately blows, identify the cause. Do not replace a blown fuse with one having a larger capacity.
To take out the fuse, turn the fuse holder cap in the arrowed direction to remove it using a Phillips screwdriver.

There are two types of PSC box in the power supply voltage; one type of PSC box operates on 100 volt, and the other operates on 200 volt. Use a 100 V PSC box for a single-phase 110 V ~ 125 V, and a 200 V PSC box for other power supply voltage (single-phase 220 V ~ 250 V, 3-phase 220 V ~ 250 V, or 3-phase 380 V ~ 440 V). The 100 V PSC box has transformer taps for 100 V, 105 V, 110 V, 115 V, 120 V, and 130 V. The 200 V PSC box has 190 V, 200 V, 230 V, 240 V, and 250 V transformer taps. Use the most suitable tap in accordance with the power supply voltage. For a 3-phase 380 V ~ 440 V power supply voltage, calculate the tap voltage from the following formula to select a tap having the most approximate voltage:

\[
\text{The voltage of a tap to be selected} = \frac{\text{Power supply voltage}}{\sqrt{3}}
\]

Example: For a 400 V power supply voltage

\[
\text{Tap voltage} = \frac{400}{1.732} = 230.9 = 230 \text{ [V]}
\]

To make connection to a necessary tap, turn off the power, and remove the PSC board. Then you will find a terminal base. Perform connection in accordance with the label indicating the voltages for voltage switching.

Caution: When operating the PSC box on a 380 V ~ 440 V power supply voltage, confirm that the specified switch and motor are used without fail, or else the PSC box will be damaged.
Connection Diagram of the Connectors (LH-1172-5-4B AK-11)

P4 connector:
To the detector

P3 connector:
To the CPU board

P9 connector:
To the machine head

P7 connector:
To the motor

P1 connector:
To the transformer and capacitors at the rear of the PSC board

PSC board

(P6 connector)

1. CL. COM
2. CL. DR
3. BR. COM
4. BR. DR

(P7 connector)

1. BT. SW
2. BT. RTN
6. WP. COM
9. WP. DR
7. BT. COM
8. BT. DR
10. TRM. COM
11. TRM. DR
12. HEAD EARTH

(P9 connector)

1. KFL SW RTN
2. KFL SW
3. FL. DR
4. FL. COM

1 - 3: 9VAC
2 - 5: 24VAC
6 - 7: To C1 capacitor
4 - 8: To C2 capacitor

1. CL. solenoid: Approx. 12Ω,
   Working voltage ... Approx. 34VDC
2. BR. solenoid: Approx. 3Ω,
   Working voltage ... Approx. 34VDC
3. BR. solenoid: Approx. 12Ω,
   Working voltage ... Approx. 34VDC
4. BT. solenoid: Approx. 5Ω,
   Working voltage ... Approx. 34VDC
5. TRM solenoid: Approx. 11Ω,
   Working voltage ... Approx. 34VDC
6. WP. solenoid: Approx. 12Ω,
   Working voltage ... Approx. 34VDC
7. GND
8. GND

From the Library of Superior Sewing Machine & Supply LLC
**MOTOR/SWITCH CONNECTION TABLE**

When single phase motor is used:

<table>
<thead>
<tr>
<th>Switch side</th>
<th>Connection diagram</th>
<th>Motor side</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1XL · 1</td>
<td><img src="image1" alt="Diagram of SW1XL · 1" /></td>
<td><img src="image2" alt="Diagram of Motor side" /></td>
</tr>
<tr>
<td>110 ~ 125V 1φ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW1XH · 1</td>
<td><img src="image3" alt="Diagram of SW1XH · 1" /></td>
<td></td>
</tr>
<tr>
<td>220 ~ 250V 1φ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note) The same motor connection is used for both switch types, SW1XL · 1 and SW1XH · 1.

**Remarks**

- **Switch side**
  - The pin layout of the 9P connector is to be observed from P.
- **Motor side**
  - (Note) Fit in the above connectors as shown on the right.