MITSUBISHI
Industrial Sewing Machine
Technical Information

Model LS2-190

Automatic Undertrimmer
Single-Needle Lockstitch
Sewing Machine
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<td>Thread trimmer cam</td>
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<td>Throat plate</td>
<td>(Needle hole) 1.6φ</td>
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<td>Wiper</td>
<td></td>
</tr>
<tr>
<td>Bed size</td>
<td></td>
</tr>
</tbody>
</table>
Note 1. T: Touch-back equipped  TW: Wiper and touch-back equipped
3.1. Electric section LS2-190-MITW

Parts Names

1. Sewing machine
2. Touch switch
3. Back solenoid
4. Balance wheel
5. Synchronizer
6. Thread trimmer solenoid
7. Wiper solenoid
8. Motor
9. Drive pulley
10. Control box
11. Machine cord plug
12. Synchronizer cord plug
13. Pedal
14. Switch panel
15. Power ON/OFF pushbutton
16. Phase reversing plug
3.2. Machine head section (1)

Parts Name

1. Flexible wire
2. Thread tension release assy
3. Needle bar connecting link guide
4. Spring
5. Picker actuating link
6. Cam shaft
7. Movable knife
8. Picker bracket
9. Picker
10. Knife driving fork
11. Movable knife crank
12. Fixed knife
13. Movable knife adjusting bracket
14. Trimmer actuating crank
15. Picker drive crank
16. Cam shaft bracket
17. Trimmer solenoid
18. Drive crank
19. Trimmer actuating link (6) Cam shaft
20. Roller shaft bracket
21. Cam shaft bracket
22. Trimmer knife bracket
23. Thread guide
### Parts Name

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Stepped shaft</td>
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<tr>
<td>2</td>
<td>Switch</td>
</tr>
<tr>
<td>3</td>
<td>Torsion spring</td>
</tr>
<tr>
<td>4</td>
<td>Wiper connecting arm (assy)</td>
</tr>
<tr>
<td>5</td>
<td>Wiper bracket</td>
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<tr>
<td>6</td>
<td>Back solenoid</td>
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<tr>
<td>7</td>
<td>Plunger</td>
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<td>8</td>
<td>Feed regulator</td>
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<td>9</td>
<td>Reverse sewing lever shaft</td>
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<td>10</td>
<td>Reverse sewing lever</td>
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<td>11</td>
<td>Step shaft</td>
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<td>12</td>
<td>Solenoid bracket</td>
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<td>13</td>
<td>Pushbutton lever</td>
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<td>Screw</td>
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<td>Switch</td>
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<td>Wiper connecting crank</td>
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<td>20</td>
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<td>22</td>
<td>Reverse sewing crank</td>
</tr>
<tr>
<td>23</td>
<td>Spring bracket</td>
</tr>
<tr>
<td>24</td>
<td>Spring</td>
</tr>
</tbody>
</table>

From the library of: Superior Sewing Machine & Supply LLC
1. Starting of trimming motion (needle at low position)

2. Movable knife spreads and sorts the thread as it moves forwards.

3. Movable knife catches the two threads (needle thread and bobbin thread) as it retreats.

4. Thread trimming
4 Preparation before Operation

1. Installation of sewing machine and motor

Wiring between sewing machine and control box

Note: Before plugging or unplugging, be sure to depress Power ON/OFF pushbutton to "OFF".

Pass two cables from the sewing machine through the round hole in the table and put the two plugs into the respective plug receptacles.
2. Adjustment of needle position

Timing mark ⑨ is contacted with the first timing mark © and stops after completing the trimming by kick-up of the pedal. Materials are fully adjusted, however, if the gap is above 3 mm, adjust the set position of the magnet disk as follows.

Preparation

1. Take off the plug (with twelve (12) pins) of the cord coming out of the machine head from the controller.
2. Remove the detector cover.
3. Operate the machine and stop it at a needleup position, and make the following adjustments under this condition.

Adjustment

1. Loosen the set screw ④ while supporting the magnet disk by hand, fit the timing mark ⑨ and © by turning the balance wheel, then tighten the set screw ④ again.
2. Step on the pedal and repeat kick back operations several times to ensure that the stop position is stabilized.
3. Insert the plug (12 pins) coming out of the machine head after the stop position has been stabilized.
Adjustment

1. General

Since the sewing machine LS2-190 is a version of the standard single-needle lockstitch machine and equipped with thread trimmer, the construction does not differ from the standard one except for the thread trimmer system and therefore description in this Manual is mainly concerned with the thread trimmer.

2. Thread trimmer system

2.1 Mechanism

The thread trimmer construction can be largely divided into four sections: namely, knives, knife drive mechanism, picker and trimming actuator, and synchronizer, each of which is of unit construction. Thanks to the unit construction, each section can be independently adjusted and installed with ease.

2.2 Cautions on adjustment

A hook shaft cam drive system is employed in the trimmer. In this drive system, if the machine runs with the roller (cam follower) engaged in the trimmer cam groove at adjustment of the sewing machine, for example, the movable knife comes into contact with the needle and/or feed dog and will be damaged. Therefore, the roller should enter the cam groove only in normal trimming cycle.

3. Disassembling each unit

3.1 Knife drive mechanism (cam shaft bracket unit)

3.1.1 Remove the stepped screw (A).

3.1.2 Remove the two screws (B) to remove the stopper plate (C).
3.1.3 Remove the three cam shaft bracket clamping screws (g).

Now the cam shaft bracket unit can be removed.

3.2 Picker and thread trimming actuator (Fig. 1)
3.2.1 Remove the stepped screw (f).
3.2.2 Loosen the screws (e) to remove the flexible wire.
3.2.3 Remove the two screws (d) to take out the solenoid bracket.

Now the picker and thread trimming actuator can be removed.

3.3 Knife assembly (Fig. 1)
3.3.1 Remove the hook.
3.3.2 Remove the two knife assembly clamping screws (c).

Now the knife assembly can be removed.

---

4. Assembling and adjustment

4.1 Knife assembly
4.1.1 Fig. 2 shows the standard installation and adjustment of the fixed knife and thread guide.
To adjust the relationship between the thread guide and the knife, loosen the two fixed knife clamping screws ©.

![Fig. 2](image)

4.1.2 The knife assembly should be installed in the dimension shown in Fig. 3 to the sewing machine.

To adjust the knife in reference to the needle position, loosen the screws ©.

![Fig. 3](image)

4.1.3 Setting of movable knife and engagement with fixed knife

1. In the standard engagement, the fixed knife comes into contact with the movable knife when they are positioned as shown in Fig. 4.

![Fig. 4](image)
(2) Adjustment of knife engagement

i) Loosen the movable knife crank set screw ①.

ii) Loosen the screw ⑧ and turn the adjusting screw ⑩ to assure good engagement of the knives.

Knife engagement becomes tight when the adjusting screw ⑩ is turned clockwise.

Knife engagement becomes loose when the adjusting screw ⑩ is turned counter-clockwise.

iii) Tighten the screw ⑩.

iv) Lightly pushing the movable knife crank against the trimmer knife bracket with the knives fully engaged, tighten the set screw ⑩.

4.1.4 Installing the knife assembly unit

Install the knife assembly unit in reverse steps to the disassembling.

4.1.5 Replacing the movable knife

To replace the movable knife, proceed as follows:

1) Remove the throat plate.

2) Loosen the movable knife crank set screw ①.
3) Take out the movable knife.
   (Take care not to lose the ball at the movable knife shaft end)
4) Put the ball in the recess provided at the movable knife shaft end.
   (For easy installation, previously apply grease on the recess and install the movable knife to the knife bracket.)
5) Adjust knife engagement as described previously.

4.2 Picker and thread trimming actuator

4.2.1 Installation
1) Assemble the parts as shown in Fig. 6.
2) Install the solenoid bracket using the two screws A.
3) Install the picker bracket using the stepped screw B.

![Fig. 6]

4.2.2 Connecting the thread trimming actuator with cam shaft bracket unit (Fig. 7)
1) Connect the trimmer crank with the link by the stepped screw C.
2) Loosen the trimmer drive crank set screw (1). Keeping the stepped screw (4) in contact with the stopper port of stopper plate (5), fully turn the armature counter-clockwise.

3) When the armature has been fully turned, maintaining the trimmer drive crank in that position, turn only the armature clockwise (to 1 - 2mm on the outer diameter) and tighten the screw (3).

![Fig. 7]

4.2.3 Adjustment of picker (Fig. 8)

1) Loosen the two screws (3) so that a gap of 1 - 1.5mm is developed between the picker bracket and the feed bar and move the picker drive plate to properly position the picker.

2) Position of picker in motion

The picker should be so located that the picker end can enter the bobbin case recess center and is positioned in 0.5 - 1mm apart from the bobbin side face.

To adjust the picker, loosen the two screws (4).

Note: When this gap (0.5 - 1 mm) is too large, the needle

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thread leaves the picker at thread trimming and will be trimmed with short thread end, thus the thread may come off the needle.

On the contrary, the picker comes into contact with the bobbin when the gap is adjusted too shortly, making impossible rotation of the bobbin, thereby bobbin thread is trimmed too short causing skipped stitch at starting.

4.2.4 Adjustment of needle thread tension releasing

1) Securely clamp the flexible wire end sleeve with the holder A.
2) Hold the wire B by the plate C.

Lightly pull the wire to eliminate slack of the wire and tighten the screw D.

Note: Turn the balance wheel by hand to actuate the thread trimmer and make sure the tension discs open about 1mm.
If the tension discs do not open sufficiently, the needle thread will be trimmed too short and come off the needle eye.

Too widely opened tension discs, however, do not give a suitable tension to the thread.

Note: Disc opening depends on the position of the tension regulator casing. To obtain the optimum opening of the discs, the groove of the casing, in which the thread take-up spring is set, should be in line with the arm boss surface.

4.3 Knife drive mechanism

4.3.1 Adjusting the cam shaft bracket unit

Fig. 10 shows the standard construction of the unit.

1) Adjusting the cam follower crank
   i) Axial direction of the cam shaft: Loosen the screw @ to adjust the cam follower crank in the axial direction of the cam shaft.
   ii) Play in circumferential direction of the cam shaft: To eliminate play in the circumferential direction of the cam shaft, adjust position of the roller.

2) Adjusting the knife driving fork
   i) Loosen the screw © to adjust position of the fork.

3) Adjusting the roller shaft
   i) Loosen the set screw © to release the roller shaft.

4) Do not loosen the nuts ©

When the nuts were loosened, be sure to securely tighten them. If the nuts become loose, the roller cannot properly enter the cam groove and thread cannot be trimmed.
4.3.2 Installation of cam shaft bracket unit (Fig. 11)

1) Put the movable knife crank pin A into the knife driving fork B and install the cam shaft bracket unit by tightening three clamping screws C.

2) After the three screws C have been tightened, make sure the cam shaft D can smoothly move.
4.3.3. Installation of stopper

1) With the stepped screw (4) of the trimmer actuating crank in contact with the stopper port of stopper plate (5), slide the stopper in the direction shown by arrow in Fig. 12 so that gap between the cam follower crank and the roller shaft bracket is about 1mm.

2) After the above-mentioned adjustment, make sure the gap between the roller shaft end and the cam circumference is within a range from 0.5mm to 1mm. If the gap is out of the range, loosen the roller shaft bracket set screw (6) to adjust again.

3) Make the stepped screw (4) come into contact with the stopper port of stopper plate (5) manually, and check the gap between the cam follower crank and the roller shaft bracket.

The standard gap ranges about 1.5mm.
4.3.4 Position of movable knife

1) The movable knife should be positioned as shown in Fig. 13 at its retired position. Note that the movable knife engaged too shallowly with the fixed knife might come into contact with the feed dog when the movable knife swings fully. Too deeply engaged knives, however, will not catch the thread. Either way mis-trimming might result.

2) To position the movable knife, loosen the knife driving fork set screw A and move the knife driving fork. (Fig. 14)

4.3.5 Adjustment of thread trimmer cam

1) Adjustment in axial direction
   i) Lock the bushing and the trimmer cam by the screw A and temporally clamp the bushing by one of the set screws B to the recess of the hook shaft.

   ii) Bring the flat part of the cam groove (left end of groove) to the roller, slightly move the cam so that the roller can smoothly enter and go out the cam groove and then tighten the screw B.
Notes: 1. After the adjustment, make sure the set screw matches the recess of the hook shaft.
2. There should be no gap between the bushing flange right face and the trimmer cam.

2) Adjustment in circumferential direction (Fig. 16)
   i) Loosen the two thread trimmer cam set screws.
   ii) Match the second timing mark put on the balance wheel to the reference mark on the arm.
   iii) Bring the flat portion of the cam groove (left end of groove) to the roller and press the roller shaft to plunge the roller into the cam groove.
   iv) Keeping this condition, turn only the trimmer cam forwardly until the roller begins being pressed up by cam groove, then secure the cam by tighten-
ing the screw \( \textcircled{4} \).

Notes: 1. When the first timing mark \( \textcircled{5} \) matches to the reference point after the adjustment, make sure the roller can smoothly enter and goes out the cam groove.

2. Turn the balance wheel by hand with the roller plunged in the cam groove to make sure the movable knife starts moving when the second timing mark \( \textcircled{6} \) on the balance wheel coincides with the reference mark.

4.4 Adjustment of length of needle thread end after trimming

4.4.1 This adjustment can be made by turning the pretension regulating nut \( \textcircled{4} \)

- Turning the nut clockwise \( \ldots \ldots \) length of thread end becomes short
- Turning the nut counterclockwise \( \ldots \ldots \) length of thread end becomes long

![Diagram](image)

Fig. 17

4.5 Floating foot

Adjust the presser foot as follows:

1) Adjust gap from the presser bar lower end surface to the presser bar bracket lower end surface to about 1.5mm.

2) Loosen the stopper plate set screw \( \textcircled{4} \) and turn the stopper plate to put it into stopper pin \( \textcircled{6} \). Then tighten the set screw \( \textcircled{4} \).
3) Place a spacer of about 1mm thick between the throat plate and the presser foot, let down the presser lifter © and loosen the presser bar bracket set screw ©.

4) Press down the presser bar bracket until it comes into contact with the presser lifter © and then tighten the presser bar bracket set screw ©.

5) Loosen the screw © and return the stopper plate as it was.

4.6 Adjustment of touch-back pushbutton position.

Loosen the screw A and adjust the pushbutton positon.
4.7 Wiper

4.7.1 Installing the wiper bracket
Install the wiper bracket at 35.5mm above the throat plate.

4.7.2 Installing the wiper connecting arm
Locate the wiper connecting arm so that the rotary solenoid stopper becomes effective when the wiper connecting crank end moves to 1 - 2mm leftward without the stopper, as shown in Fig. 20.

The connecting arm should be secured by the screws @.

4.8 Cautions on installation of solenoid
When installing the solenoid, adjust the solenoid in horizontal direction so that the solenoid plunger is accurately aligned with the link. Make sure the reverse sewing lever can smoothly move vertically and then tighten the solenoid clamping screws.

Fig. 20

Fig. 21
4.9 Hook, feed dog, bobbin case and bobbin

1) Use the undertrimmer hook which has the bobbin thread guide slit A as shown in Fig. 22.

2) Use the feed dog for LS2-190 application.

3) The bobbin case should have a spring A for prevention of racing (Fig. 23)

When bobbin thread tension is adjusted by the bobbin case, adjust the tension a little smaller than the tension in the ordinary single-needle lockstitch machine, considering the pressure of the spring for prevention of racing.

4) Use a furnished bobbin.

When an aluminum bobbin is used, wind thread on the bobbin with least tension as possible to prevent deformation due to wound thread tension.

4.10 Adjustment of feed dog inclination

4.10.1 Inclination of the feed dog should be adjusted depending on the given fabrics and sewing conditions.

Adjustment can be done as follows.
1) Loosen the feed rock shaft crank set screw A.

2) Turn eccentric shaft B using a screwdriver to adjust.

   Turning the pin clockwise ...... feed dog sags that side

   Turning the pin counter-clockwise ... feed dog sags this side

3) After the adjustment, be sure to tighten the screw A.

Fig. 24
### Trouble shooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
<th>Ref. para.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread cannot be trimmed</td>
<td>Roller does not enter cam groove at the needle DOWN position</td>
<td>Adjust trimmer cam position.</td>
<td>5.4.3.5</td>
</tr>
<tr>
<td></td>
<td>Fixed knife is not satisfactorily engaged with movable knife.</td>
<td>Adjust relationship between knives.</td>
<td>5.4.1.3</td>
</tr>
<tr>
<td></td>
<td>Movable knife position is inadequate.</td>
<td>Adjust movable knife position.</td>
<td>5.4.3.4</td>
</tr>
<tr>
<td></td>
<td>Fixed knife position is inadequate.</td>
<td></td>
<td>5.4.1.1</td>
</tr>
<tr>
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<td>Machine stops too early.</td>
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<td>5.4.1.2</td>
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<td></td>
<td>4.2</td>
</tr>
<tr>
<td>Needle thread comes off needle after thread trimming.</td>
<td>Tension disc does not open.</td>
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<td>5.4.2.4</td>
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<td>Trimming timing is too early.</td>
<td></td>
<td>5.4.3.5</td>
</tr>
<tr>
<td></td>
<td>Gap between bobbin and picker point is too large when picker is in motion.</td>
<td></td>
<td>5.4.2.3</td>
</tr>
<tr>
<td></td>
<td>Thread does not slip smoothly.</td>
<td>Polish thread guide, retainer, pretensioner and tension regulator where thread slips.</td>
<td>5.4.1.1</td>
</tr>
<tr>
<td></td>
<td>Thread guide is scored.</td>
<td>Polish or replace.</td>
<td>5.4.1.1</td>
</tr>
<tr>
<td>Thread is trimmed with thread end too long.</td>
<td>Thread cannot slip smoothly at the hook positioner.</td>
<td>Polish protruded part of hook positioner.</td>
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<tr>
<td>Trouble</td>
<td>Cause</td>
<td>Remedy</td>
<td>Ref. para.</td>
</tr>
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<td>----------------------------------------------</td>
<td>--------------------------------------------</td>
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<td>Thread is trimmed with thread end too long.</td>
<td>Pretensioner adjusted too weak.</td>
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<td>5.4.4</td>
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<td>Trimming delays.</td>
<td></td>
<td>5.4.3.5</td>
</tr>
<tr>
<td>Stitch skipping at starting sewing</td>
<td>Trimmer type hook is not used.</td>
<td>Use trimmer type hook (hook having bobbin thread guide groove).</td>
<td>5.4.9</td>
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<td>Racing of bobbin causes entangling of thread</td>
<td>Use bobbin case having racing prevention spring.</td>
<td>5.4.9</td>
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<tr>
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<td>Bobbin thread tension is too tight.</td>
<td>Adjust bobbin thread tension to 10 - 15g.</td>
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<td>Too large chamfering on presser foot and throat plate.</td>
<td>Use properly chamfered presser foot and throat plate.</td>
<td>5.4.2.3</td>
</tr>
<tr>
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<td>Picker comes into contact with bobbin.</td>
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