MITSUBISHI Industrial Sewing Machine Technical Information

Model LS2-190

ET-009A

ITSUBISH

Automatic Undertrimmer Single-Needle Lockstitch Sewing Machine

CONTENTS

1	Cons	tructio	on	• • • • • • • • • • • • • • • • • • • •	l	
2	Spec	ificat	ion	• • • • • • • • • • • • • • • • • • • •	3	
3	Deta	il sch	ema of thread trimmer system	•••••	5	
	1.	Elect	ric section	•••••	5	
	2.	Machin	ne head section	• • • • • • • • • • • • • • • • • • • •	6	
	3.	Diagra	ams of thread-trimmer knife m	otion	8	
4	Preparation before operation					
	l.	Insta	llation of sewing machine and	motor	9	
	2.	Adjus	tment of needle bar stop posi	tion	10	
5	Adju	istment		•••••	11	
	l.	Gener	al	•••••	11	
	2.	Threa	d trimmer system	••••••	11	
		2.1	Mechanism		11	
		2.2	Cautions on adjustment	•••••	11	
	3.	Disas	sembling each unit	•••••	11	
		3.1	Knife drive mechanism	• • • • • • • • • • • • • • • • • • • •	11	
		3.2	Ficker and thread trimming a	ctuator	12	
		3.3	Knife assembly	•••••	12	
	4.	Assem	bling and adjustment	•••••	12	
		4.1	Knife assembly	•••••	12	
		4.2	Picker and thread trimming a	ctuator	15	
		4.3	Knife drive mechanism	• • • • • • • • • • • • • • • • • • • •	18	
		4•4	Adjustment of length of need	lle thread end		
			after trimming	• • • • • • • • • • • • • • • • • • • •	23	
		4.5	Floating foot	•••••	23	
		4.6	Adjustment of touch-back pus	shbutton position	24	
		4.7	Wiper	• • • • • • • • • • • • • • • • • • • •	25	
		4.8	Cautions on installation of	solenoid	25	
		4•9	Hook, feed dog, bobbin case	and bobbin	26	
		4.10	Adjustment of feed dog incli	nation	26	
6	Tro	uble sh	ooting	••••	28	

의

 \bigcirc



- (1) Arm shaft
- (4) Take-up lever
- ⑦ Thread guide
- 10 Needle bar
- (3) Feed rock shaft crank, (left)

16 Picker

(19 Thread guide

- ② Pre-tension
- (5) Presser bar spring
- (8) Presser bar lifter
- (1) Movable knife
- (A) Eccentric shaft
- 17 Ficker bracket
- 20 Knife bracket

- ③ Presser bar regulating thumb screw
- (6) Tension regulator
- (9) Presser bar
- 12 Feed bar
- 15 Feed dog
- (18) Fixed knife
- (1) Thread guide

2	Oil check window	Ø	Balance wheel	24)	Synchronizer
\$	Feed forked connecting rod	26	Feed regulating dial	Ø	Vertical shaft
8 8	Reverse sewing lever	2 9	Cam shaft bracket	30	Feed rock shaft
3)	Crank rod	2	Feed lifting shaft	3	Oil pump
34)	Hook shaft	B	Thread trimmer soleno	id	36 Thread trimmer cam
37	Cam follower crank	39	Knee lifter	39	Actuating crank
40	Cam shaft				

•

From the library of: Superior Sewing Machine & Supply LLC

- 2 -

I,

2 Specification

		· · · · · · · · · · · · · · · · · · ·			
Item	LS2-190-MIT	LS2-190-MITW	LS2-190-HIT		
Material weight	Light	to medium	Heavy		
Max. sewing speed	5,000	S.P.M	3,500 S.P.M.		
Max. Stitch length * Note l	0	4mm			
Needle bar stroke	31.8m	nm.	33•0mm		
Presser foot stroke Knee lifter(Max.) / Manual	llmm/5mm				
Needle	DB x	1 #14	DB x 1 #22		
Throat plate	(Needl	e hole) 1.6ø	(Needle hole) 2.5¢		
Hook	Full rotation, lubrication (Thread trimmer Standard type	automatic r type),	Full rotation, automatic lubrication (Thread trimmer type), Heavy dury type		
Bobbin case	Bobbin case with racing prevetion spring				
Bobbin	Thread trimmer type steel bobbin				
Thread trimmer	Fixed and movable knives				
Thread trimmer starting method	Solenoid excitation				
Thread trimmer drive system	Cam drive				
Thread trimming speed	200 rpm				
Touch-back	0	0	0		
Wiper		0	<u>.</u>		

3 Detail Schema of Thread Trimmer System

3.1. Electric section LS2-190-M1TW



(6) Phase reversing plug



Parts Name

- ① Flexible wire 2 Thread tension release assy link guide (4) Spring (5) Picker actuating link (6) Cam shaft ⑦ Movable knife 8 Picker bracket 9 Picker 10 Knife driving fork (1) Movable knife crank 12 Fixed knife (3) Movable knife (1) Trimmer actuating 15 Picker drive crank adjusting bracket crank (6) Cam shaft bracket I Trimmer solenoid (18) Drive crank (19) Trimmer cam 20 Roller shaft bracket 2 Cam follower crank 2 Trimmer knife bracket 23 Thread guide
 - (3) Needle bar connecting

- 6 -





Parts Name

1	Stepped shaft	2	Cover	3	Screw
4	Switch	5	Cover	6	Switch
1	Torsion spring	8	Solenoid bracket	9	Wiper solenoid
0	Wiper connecting arm (assy)	1	Pushbutton lever	12	Wiper connecting c ran k
13	Wiper bracket	(4)	Stepped shaft	(5	Wiper
16	Back solenoid	17	Side cover	18	Gasket
19	Plunger	20	Link	2)	Bushing
22	Feed regulator	Ø	Spring bracket	24)	Reverse sewing crank
න	Reverse sewing lever shaft	26	Reverse sewing lever	Ø	Spring
Ø8)	Spring bracket	29	Spring		



- [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 respecitive plug receptacles.

2. Adjustment of needle position

Timing mark (B) is contacted with the first timing mark (C) 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

- Loosen the set screw (A) while supporting the magnet disk by hand, fit the timing mark (B) and (C) by turning the balance wheel, then tighten the set screw (A) 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 theostop position has been stabilized.



- 10 -

5 Adjustment

1. General

Since the sewing machine LS2-190 is a version of the standard singleneedle 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 D. 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 (E).
- 3.2.2. Loosen the screws (P), (G) to remove the flexible wire.
- 3.2.3 Remove the two screws (1) 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 (). 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 screwes (A)



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 (A).



Fig. 3

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.



From the library of: Superior Sewing Machine & Supply LLC

- 13 -

- (2) Adjustment of knife engagement
 - i) Loosen the movable knife crank set screw (A.
 - ii) Loosen the screw (B) and turn the adjusting screw (C) to assure good engagement of the knives.

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

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



Fig. 5

- iii) Tighten the screw B.
- iv) Lightly pushing the movable knife crank against the trimmer knife bracket with the knives fully engaged, tighten the set screw (A).
- 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 (A) \bullet

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 ${ar {A}}$.
 - 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 ($\!$.

- 2) Loosen the trimmer drive crank set screw ①. Keeping the stepped screw ④ in contact with the stoprer port of stopper plate ③, 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 \mathbb{O} .



4.2.3 Adjustment of picker (Fig. 8)

- Loosen the two screws
 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 (A).

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

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.

1 88

Fig. 9 About 1mm Tension regulator casing

- 17 -

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 (A) to adjust the cam follower crank in the axial direction of the cam shaft.
 - ii) Play in cercumferential 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 B 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 ① 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)

- 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 () have been tightened, make sure the cam shaft () can smoothly move.



Fig. 11

4.3.3. Installation of stopper

- With the stepped screw (A) of the trimmer actuating crank in contact with the stopper port of stopper plate (B), 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 () to adjust again.





3) Make the stepped screw (1) come into contact with the stopper port of stopper plate (1) manually, and check the gap between the cam follower crank and the roller shaft bracket. The standard gap ranges about 1.5mm.

- 20 -

- 4.3.4 Position of movable knife
 - 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)



Fig. 13



- 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 ()



Notes : 1. After the adjustment, make sure the set screw (B) 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 A.

- Match the second timing
 mark (B) 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 plung the roller into the cam groove.
- iv) Keeping this condition, turn only the trimmer cam forwardly until the roller begins



Fig. 16

being pressed up by cam groove, then secure the cam by tighten-

ing the screw A.

- Notes: 1. When the first timing mark () 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 (B) on the balance wheel coincides with the reference mark.
- 4.4 Adjustment of length of needle thread end after trimming

4.4.1 This adjustement can be made by turning the pretension regulating nut (A)

Turning the nut clockwise length of thread end becomes short

Turning the nut counter=clockwise length of thread end

becomes long



Fig. 17

4.5 Floating foot

Adjust the presser foot as follows:

- Adjust gap from the presser bar lower end surface to the presser bar bracket lower end surface to about 1.5mm.
- Loosen the stopper plate set screw (1) and turn the stopper plate to put it into stopper pin (B). Then tighten the set screw (A).

- 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 \bigcirc and then tighten the presser bar bracket set screw \bigcirc .
- 5) Loosen the screw (a) 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.



Fig. 19

- 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 lefward without the stopper, as shown in Fig. 20. The connecting arm should be secured by the scres (A).



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. 21

4.9 Hook, feed dog, bobbin case and bobbin

- Use the feed dog for LS2-190 application.





A

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.



Fig. 23

4) Use a furnished bobbin.

When an aluminum bobbin is used, wind thread on the bobbin with least tension as possible to revent 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 \bullet
- 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

6 Trouble shooting

Trouble	Cause	Remedy	Ref. para.
Thread cannot	Roller does not enter	Adjust trimmer cam	5.4.3.5
be trimmed	cam groove at the needle	position.	
	DOWN position		
	Fixed knife is not satis-	Adjust relationship	5.4.1.3
	factorily engaged with	between knives.	
	movable knife.		
	Movable knife position is	Adjust movable knife	5.4.3.4
	inadequate.	position.	
	Fixed knife position is		5.4.1.1
	inadequate.		5 4.1.2
	Machine stops too early.		4.2
Needle thread	Tension disc does not		5.4.2.4
comes off needle	open.		
trimming.	Trimming timing is too		5-4-3-5
-	early.		
	Gap between bobbin and		5-4-2-3
	picker point is too large		
	when picker is in motion.		
	Thread does not slip	Polish thread guide,	
	smoothly.	retainer, pretensioner	
		and tension \mathbf{r} egulator	
	Thread guide is scored.	where thread slips.	
		Polish or replace.	5 4.1.1
Thread is trim-	Thread cannot slip smooth-	Polish protruded part	
med with thread	ly at the hook positioner.	of hook positioner.	
cha boo tong.			

Trouble	Cause	Remedy	Ref. para.
Thread is trimmed with thread end too long.	Pretensioner adjusted too weak. Trimming delays.		5.4.4
			5.4.3.5
Stitch skipping	Trimmer type hook is	Use trimmer type hook	5.4.9
at starting	not used. (hook having bobbin		
Dewing		thread guide groove).	
	Racing of bobbin causes	Use bobbin case having	5.4.9
	entangling of thread	racing prevention	
		spring.	
	Bobbin thread tension is	Adjust bobbin thread	
	too tight.	tension to 10 - 15g.	
	Too large chamfering on	Use properly chamfered	
	presser foot and throat	presser foot and	
	plate.	throat plate.	
	Picker comes into con-		5.4.2.3
	tact with bobbin.		

١

