

# JUKI

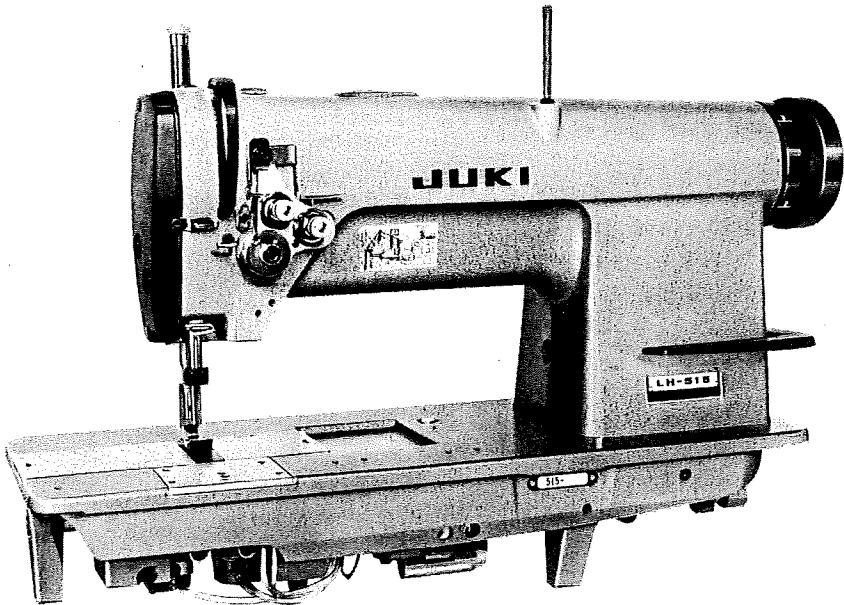
2-needle, Needle feed, Lockstitch Industrial  
Sewing Machine

## LH-512

2-needle, Needle feed, Lockstitch Industrial  
Sewing Machine with Reverse Feed Mechanism

## LH-515

# INSTRUCTION MANUAL



No.00

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## **I. GENERAL DESCRIPTION**

JUKI Model LH-512 is a high speed, 2-needle, needle feed, lockstitch industrial sewing machine with a sewing speed of 4,200 s.p.m.

JUKI Model LH-515 is a high speed, 2-needle, needle feed, lockstitch industrial sewing machine equipped with reverse feed mechanism, which is designed for withstanding high speed operations up to the maximum sewing speed of 3,500 s.p.m. and for aiming at excellent durability.

### **1. REMARKABLE FEATURES**

#### **○ Link type thread take-up**

This type of industrial sewing machine has usually been designed to be operated on the principle of a slide type thread take-up, although it was not sufficient in sewing speed and durability. By overcoming such technical problems, JUKI Model LH-515 has successfully been designed to employ the link type thread take-up mechanism which has sufficient durability without puckering the fabrics.

#### **○ Feed mechanism**

This model employs a push button type lead cam regulating system and also needle bearings. For the purpose of preventing any abrasion or seizure during a high speed operation, a durable and seizure-free material is used for the slide block type feed driving mechanism.

#### **○ Lubrication system**

The lubricating oil which is fed from the oil reservoir by means of the plunger pump located on the hook driving shaft is distributed to the left and right hook driving shaft saddles, pushed up to the oil sight window on the machine arm and also is delivered to the thread take-up lever shaft. The inside mechanism of the face plate is constantly lubricated through the oil wicks connected to the thread take-up lever shaft.

All other bearing metals are made of special sintered alloy which does not need lubrication.

#### **○ Bobbin case opening mechanism**

The bobbin case opening mechanism of the Model LH-515 is so designed as to achieve one motion while the sewing hook rotates twice, being different from the conventional models of which the mechanism achieves two motions. Thus, the improvement extends the life-time of the sewing hook and minimizes running noise.

#### **○ Hook shaft bearings**

High speed feature and durability of this model is assured by employing the precision needle bearings in the upper bushings of hook shafts on the both left and right.

## 2. SPECIFICATIONS

### LH-515

Sewing type .....	2-needle, lockstitch, needle feed, with reverse feed mechanism (by feed control lever).
Application .....	Light and medium heavy weight materials. (Men's shirts cuffs, front flies, attaching pockets to working uniforms, felling trousers, attaching tapes to tricot materials and sewing side face and waist inside of men's jackets, etc.)
Sewing speed .....	Max. 3,500 s.p.m.
Thread take-up .....	Link type thread take-up
Needle bar stroke .....	33.4mm (1-5/16")
Needles .....	DP x 7, No.11, No.14, No.16 or DP x 5, No.11, No.14, No.16
Presser lifting amount .....	7mm(9/32") by hand lifter, 10mm(25/64") by knee lifter.
Feed mechanism .....	Bottom feed and needle feed.
Stitch length .....	Max. 4mm(5/32")
Stitch length regulator .....	Feed eccentric adjustment system (by push button).
Needle gauge .....	3/32", 1/8", 5/32", 3/16", 7/32", 1/4", 9/32", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/8", 1-1/4", 1-3/8", 1-1/2"
Sewing hook .....	Horizontally arranged automatic lubricating hooks for high speed operation.
Lubrication system .....	Automatic lubricating system by means of plunger pump and lead pump.
Driving motor .....	3-phase 400W (1/2HP) clutch motor.
Table .....	Table for model LH-515

### LH-512

Sewing type .....	2-needle, needle feed, lockstitch
Sewing speed .....	Up to 4,200 s.p.m.

(All other specifications are same as LH-515)

# II. INSTALLATION AND OPERATION

## 1. INSTALLATION

The following procedure will simplify your installation works;

### (1) Hinges

First of all, you must fix the machine head onto the table by means of the accessory rubber hinges.

Make suitable recessions on the table using a round or straight chisel so that the width and thickness of such rubber hinges tightly fit them and nail the hinges on their positions with 2 pieces of nails.

### (2) Setting the oil reservoir

The oil reservoir must be set in the opening prepared on the table so that it is supported by 4 corners thereon as shown in the illustration.

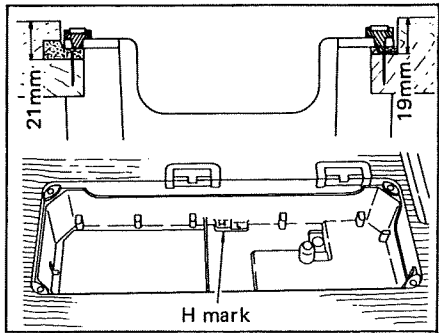
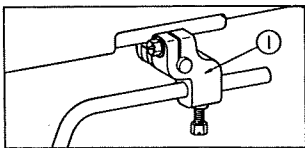


Fig. 1



1. Nail 4mm thick felts on the two corners of the near side of the table opening (operator's side).
2. Similarly, nail 6mm thick felts on the two corners of the far side (hinge side).
3. Place the oil reservoir on top of these felts.
4. Insert rubber cushions into 4 corners.
5. Put the round felts over the rubber cushions.

(Note) Knee press rod bearing bracket  
① should be installed as shown in the figure.

## 2. MOTOR PULLEY AND BELT

Use a 3-phase 400 W motor. The belt is M-type V belt.

Following table shows the relationship between the number of rotation of the machine with the dimension of the motor pulley (effective diameter).

	Rotation of machine	Part No. of motor pulley	Effective dia. of motor pulley
50 Hz	4,200 s.p.m.	MTK-PV100000	100 $\phi$
	4,000 s.p.m.	MTK-P0095000	95 $\phi$
	3,800 s.p.m.	MTK-PV090000	90 $\phi$
	3,400 s.p.m.	MTK-PV080000	80 $\phi$
	3,000 s.p.m.	MTK-PV070000	70 $\phi$

	Rotation of machine	Part No. of motor pulley	Effective dia. of motor pulley
60 Hz	4,200 s.p.m.	MTK-PV085000	85 $\phi$
	4,000 s.p.m.	MTK-P0080000	80 $\phi$
	3,800 s.p.m.	MTK-PV075000	75 $\phi$
	3,400 s.p.m.	MTK-P0065000	65 $\phi$
	3,000 s.p.m.	MTK-PV060000	60 $\phi$

(Note) For the first one month, operate the LH-512 machine with a speed of less than 3,800 s.p.m.

For LH-515, operate the machine with less than 3,000 s.p.m.

In the meantime, the machine will warm up appropriately.

### 3. PREPARATION FOR OPERATION

- (1) Fill the oil reservoir with lubricating oil up to the level marked with "H", take an urethane foam sheet out of the accessory box and place it under the hook driving shaft saddles to absorb noise and dust.
- (2) Those machines which are operated for the first time after setting up or after a long period of disuse, you must apply 2 or 3 drops of oil through the oil holes ① as shown in Fig.2.

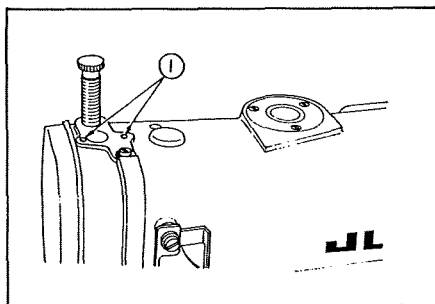


Fig. 2

- (3) Provide your machine with an idle run after pushing up the presser foot, and the lubricating oil will be circulated slowly to the oil gauge within 2 ~ 3 seconds.
- (4) Precaution
  - If you have to wait for 10 seconds or more until you observe the lubricating oil in the oil gauge, verify the following points:
    - (a) If the volume of oil is too short,
    - (b) If the plunger pump is normally running.

(If the plunger has not been aligned with the groove on the hook driving shaft, the lubricating oil will not be delivered properly. In such a case, correct the position of the bushing on the hook driving shaft accordingly.)
  - When the oil has reached the "L" mark of the oil reservoir, stop running the machine.

Be sure to verify that the oil is completely filled up to the "H" mark.

### III. HOW TO OPERATE THE MACHINE

#### 1. LUBRICATION

The amount of oil to lubricate the face plate mechanism has normally been adjusted at our factory before shipment. If necessary, you may adjust it by turning the adjusting screw shown in the Fig.3. The stable amount of oil is constantly supplied to the face plate mechanism from the thread take-up lever shaft through the oil wicks.

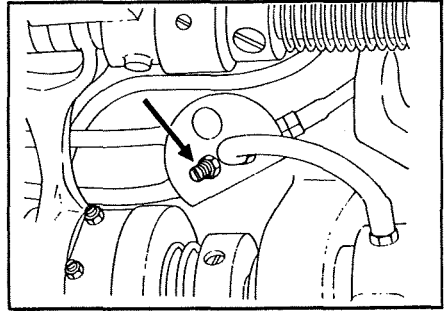


Fig. 3

Check the following points:

- (1) 2 oil wicks ( $3\phi$ ) must be passed through the thread take-up lever shaft.
- (2) The oil adjusting screw (Fig.3) located under the machine bed should have been screwed in by 3 or 4 turns.
- (3) The tips of oil wicks sheathed with aluminium pipe are very slightly touching the surfaces of the needle crank rod and the needle bar.
- (4) To check the amount of oil:

Hold a piece of rough paper facing to the mechanism as shown in Fig.4 so as to blot it with splashed oil. Run the machine for 5 seconds and then stop it for 5 seconds, repeat this intermittent test for 2 minutes and judge the amount of oil from the blot on the paper under the bright sunlight or artificial light. Fig.5 shows the optimum distribution of oil spots on the test paper.

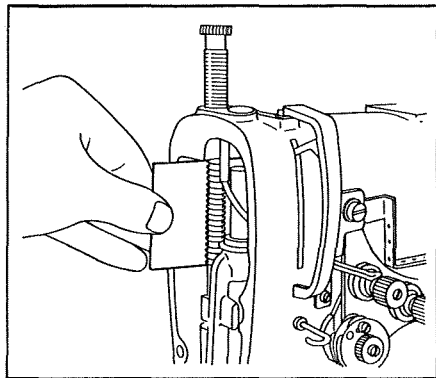


Fig. 4

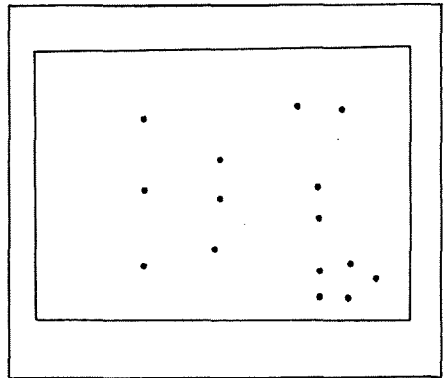


Fig. 5

2. LUBRICATION TO THE SEWING HOOK

The amount of oil to lubricate the sewing hook is increased by tightening the adjusting screws ① in Fig.6 and decreased by loosening them.

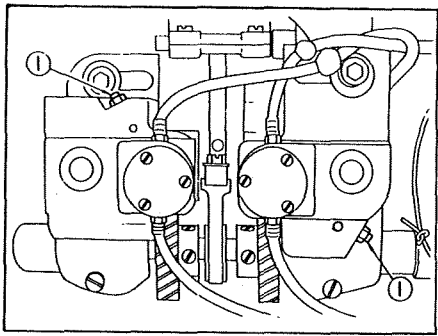


Fig. 6

3. ATTACHING THE NEEDLES

- (1) DP x 5 or DP x 7 needles must be used for this model.
- (2) Insert 2 needles fully into the needle clamp in such a manner as to make their long grooves face with each other as shown in Fig.7 and securely tighten with the clamp screws.

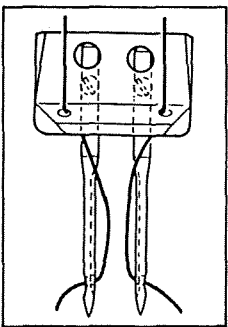


Fig. 7

Needle size	Thread size	Sewing material
No.11	No.80 to No.100	Calico of light weight, broad cloth
No.14	No.60 to No.80	Calico, Gabardine of light weight
No.16	No.40 to No.60	Woolen fabric, Gabardine
No.18	No.30 to No.20	Vinyl-leather

4. TWIST OF THREADS (Fig.8)

We recommend you to use a S-twist (left twist) thread ① for the left needle and a Z-twist thread (right twist) ② for the right needle. If not, loosely twisted threads or thicker threads than No.30 may be frequently broken at the left hand needle. Either twist of threads can be used for the bobbin thread.

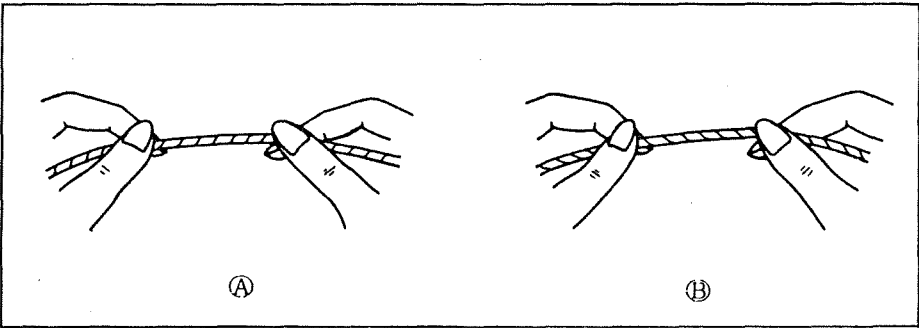


Fig. 8



## 5. PASSING THE NEEDLE THREADS

Pass the needle thread in the order shown in Fig.9.

The needle thread to be passed through the left hand needle (seeing from the operators' side) must be passed in the order of ① to ⑬ (Left thread tension disc → thread take-up lever upper hole → left needle). The right hand needle must be passed in the order of A to H (Right thread tension disc → thread take-up lever lower hole → right needle).

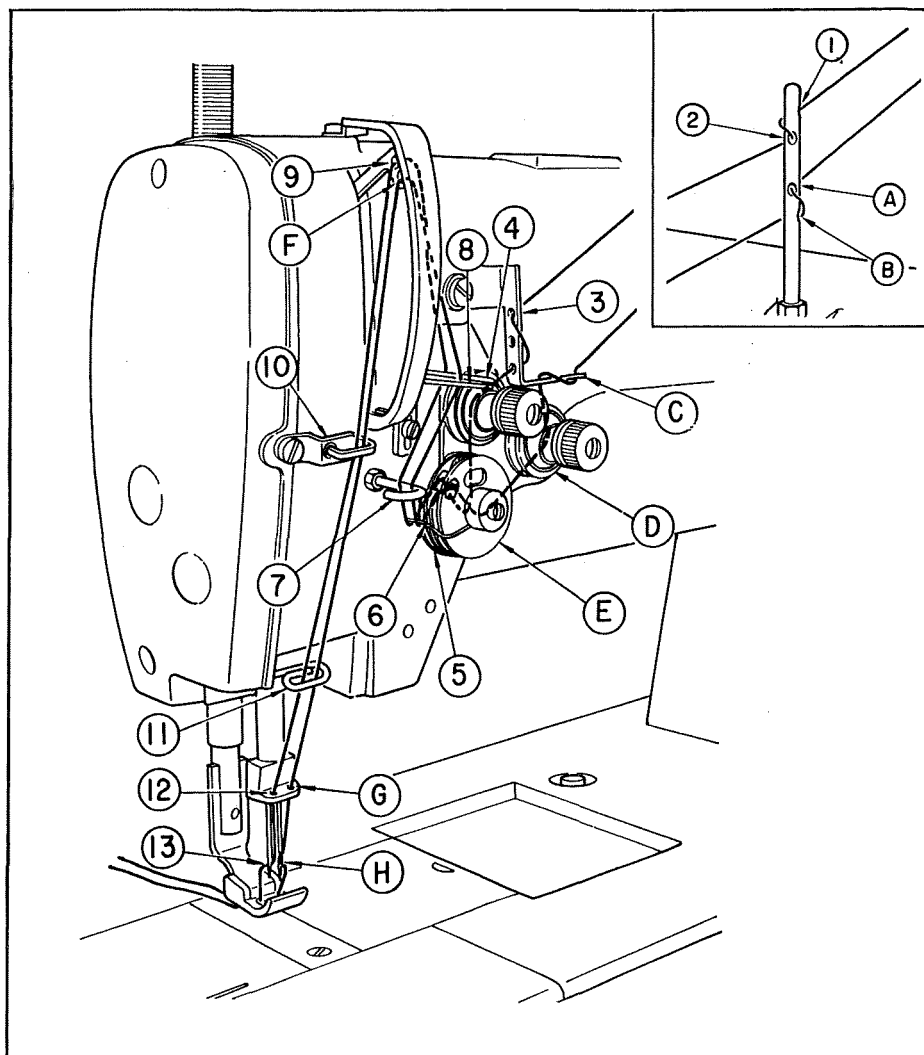


Fig. 9

## 6. PASSING THE BOBBIN THREAD

When you pull out the bobbin thread through the bobbin case holder, verify that the thread is passed through the notched part ① thereof without fail, as shown in Fig.10.

## 7. ADJUSTING THE THREAD TENSION

### (1) Needle thread tension.

For obtaining optimum needle thread tension, turn the thread tension post nut ① of Fig.11 for the right hand needle thread and the nut ② for the left hand needle thread. The thread tension will be increased by clockwise turn and decreased by counterclockwise turn.

### (2) Bobbin thread tension.

For adjusting the bobbin thread tension, turn the adjusting screws ① of Fig.12 on the left and right bobbin case holders. Clockwise turn increases and counterclockwise turn decreased the bobbin thread tension.

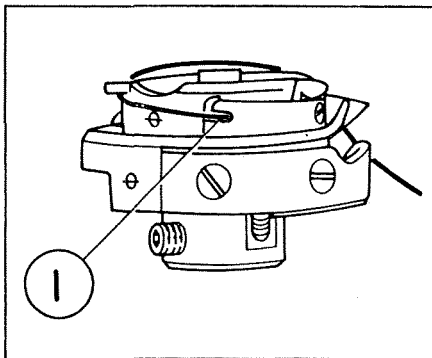


Fig. 10

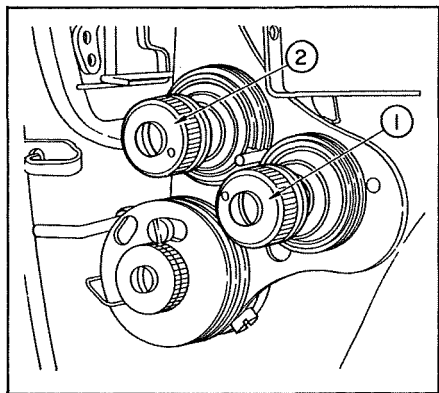


Fig. 11

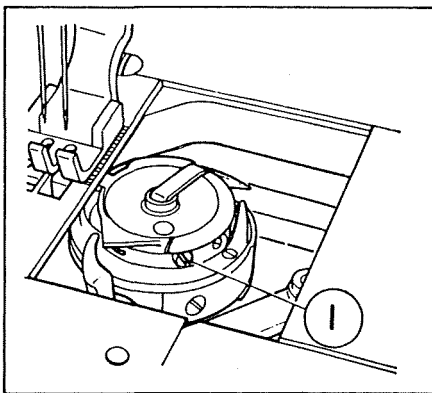


Fig. 12

### (3) Tension of thread take-up spring.

For adjusting the tension of the thread take-up spring, turn the thread take-up spring stud ① of Fig.13. The tension is increased by clockwise turn and decreased by counterclockwise turn. After adjustment, lock it by tightening the thread tension post nut ② of Fig.13. Normally, the tension of the thread take-up spring is about 20 g. and the stroke is 7mm(9/32") to 10mm(13/32"). When you sew a very light fabric or a synthetic fiber material, you must lessen the spring tension and increase it's stroke.

To change the stroke of the thread take-up spring, loosen the screw ① of Fig.14 and slide the stopper ② to the right for increasing and to the left for decreasing.

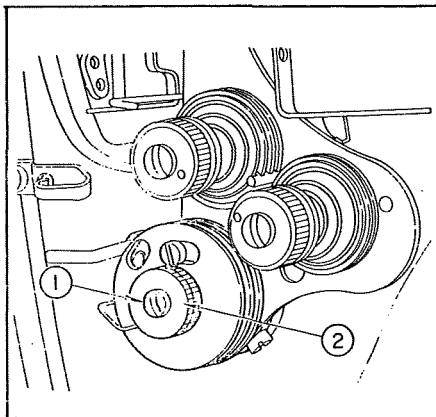


Fig. 13

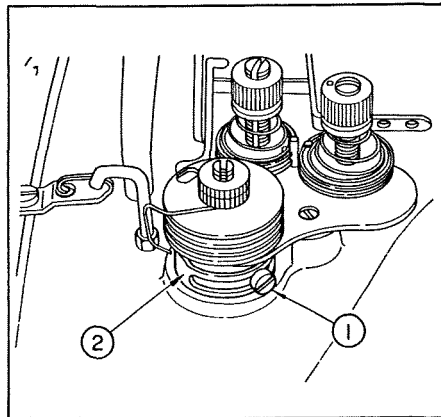


Fig. 14

## 8. ADJUSTING THE STITCH LENGTH (Fig.15)

As you keep on pressing down the button ① on the machine bed, rotate the hand wheel ② manually. When the button is engaged with a groove, adjust a desirable stitch length, which is indicated by the graduations on the handwheel, to the pointer ③

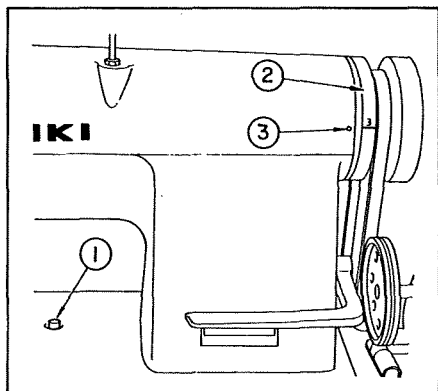


Fig. 15

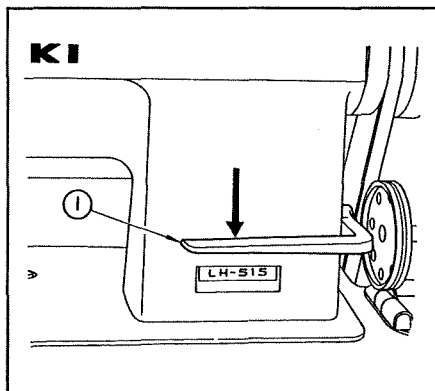


Fig. 16

## 9. REVERSE FEED (LH-515)

To produce the reverse stitches, press down the feed lever ① Fig.16 fully until it is limited by the stopper. The reverse feed is kept as long as you press it.

## IV. HOW TO ADJUST THE MACHINE

### 1. TIMING OF THE BOBBIN CASE OPENING MECHANISM

When the upper line engraved on the needle bar (① of Fig.17) coincides with the bottom surface of the needle bar frame (② of Fig.17), in other word, when the needle bar has gone up by  $0.2 \sim 0.3\text{mm}$  ( $1/128'' \sim 3/256''$ ) from it's bottom dead point, two engraved marks located on the pivot of the bobbin case opening lever link must aligned with each other as shown in Fig.18.

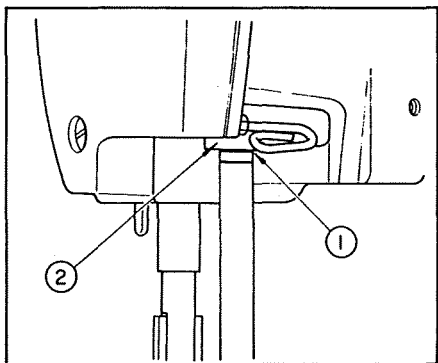


Fig. 17

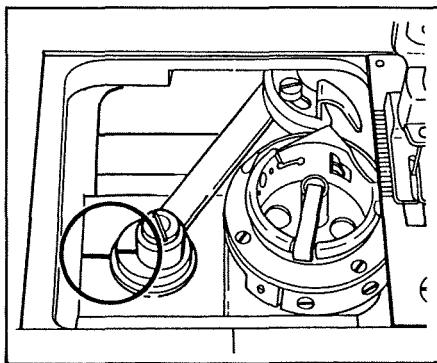


Fig. 18

### 2. ADJUSTING THE BOBBIN CASE OPENING MECHANISM

Adjust the position of the bobbin case opening lever (① of Fig.20) so as to open the bobbin case holder allowing the thread to pass through depending upon the thickness of such thread at the moment when the needle thread is pulled up along the bottom surface of throat plate as shown in Fig.19. To adjust the said lever, loosen the screw (② of Fig.20), obtain a correct position and finally tighten the screw. You must be careful not to allow it to open the bobbin case holder too much, or the sewing hook may make a high noise and shorten it's lifetime.

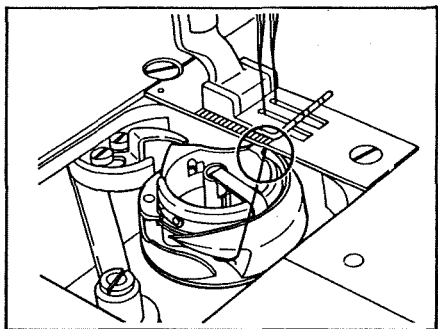


Fig. 19

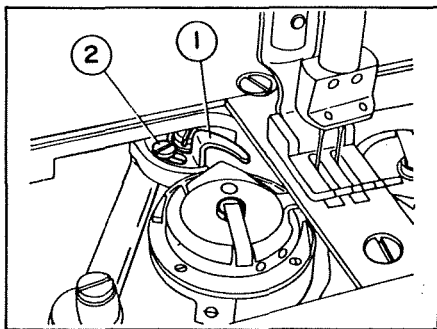


Fig. 20

### 3. MOVEMENT OF THE NEEDLE AND THE SEWING HOOK

#### (1) Timing of the needle and the sewing hook (Fig.21A & 21B)

Set the feed amount to 2mm( $5/64''$ ), and remove the throat plate.

- When the needle has gone up 2mm( $5/64''$ ) from it's bottom dead point, the timing of the needle and the sewing hook is as shown in Fig.21A.
- When the points of left and right sewing hooks coincide with the center lines of their needles, the clearance between each hook point and the needle face is 0.05mm as shown in Fig.21B.
- The hook point must point at a higher level by 1.2mm( $3/64''$ ) than the top edge of needle eye as shown in Fig.21A.

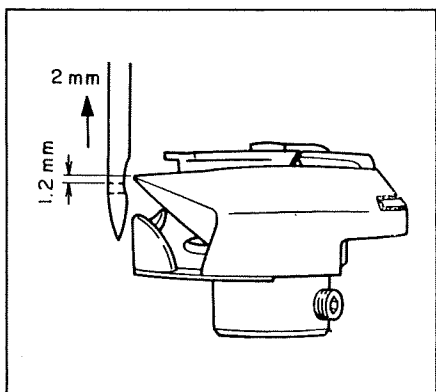


Fig. 21A

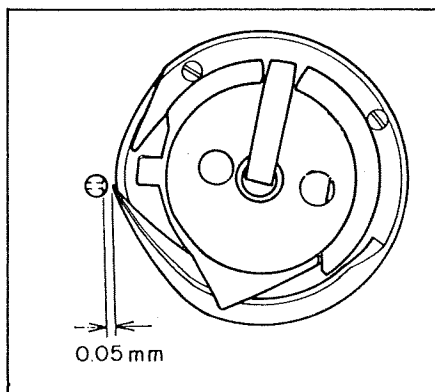


Fig. 21B

#### (Note)

The upper engraved marking line on the needle bar will coincide with the bottom surface of the needle bar frame, when the needle bar is at the bottom dead point.

The lower engraved line thereon will coincide with the bottom surface of the frame, when the needle bar has gone up by 2mm( $5/64''$ ) from it's bottom dead point.

## (2) Matching the timing of the sewing hook

Loosen the set screw (① of Fig.22) on the small gear which drives the hook driving shaft (small) and adjust the timing of sewing hook.

In order to eliminate any vertical looseness, after adjustment, you must tighten the said screw with such a manner as to push down the hook and to pull up the gear at the same time.

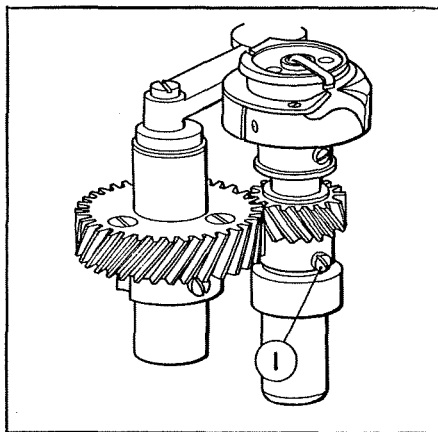


Fig. 22

## 4. ADJUST THE CLEARANCE BETWEEN THE NEEDLE AND THE HOOK POINT (Fig.23)

Adjust the clearance by correcting the sewing hook position according to following way:

- (a) Remove the presser foot and the throat plate.
- (b) Tilt the machine head backwards.
- (c) Loosen 3 screws which fix a hook driving shaft saddle (A, B screws are for the right saddle; A', B' screws are for the left saddle.)
- (d) Tap the hook driving shaft saddle gently to correct it's position.
- (e) Tighten the screws A(A') and B(B') and finally fix the saddle.

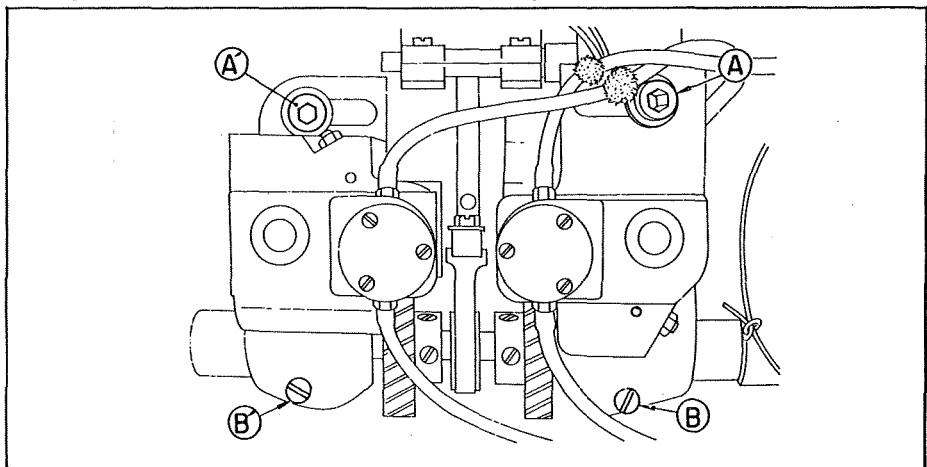


Fig. 23

## 5. DETACHING AND ATTACHING THE SEWING HOOK

### (1) Detaching the sewing hook.

- (a) Open the bed slide.
- (b) Bring up the presser foot and remove the throat plate.
- (c) Loosen 2 hexagon socket head screws (① of Fig.24), which fix a sewing hook to its driving shaft, by using a hexagonal spanner stored in the accessory box.
- (d) Bring up the needle at its top dead point by manually rotating the handwheel and take out the sewing hook upwards.

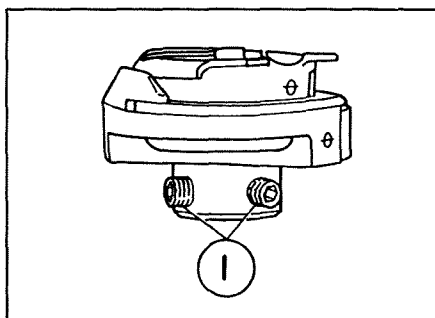


Fig. 24

### (2) Attaching the sewing hook

- (a) Reverse the procedures mentioned in (1).
- (b) Before attaching the throat plate, manually rotate the bobbin case holder so that the protruding part thereof agrees with the groove on the throat plate.

## 6. ADJUSTING THE HEIGHT OF THE FEED DOG

The standard height of the feed dog measuring from the top surface of the throat plate is 0.8mm(1/32"), as shown in Fig.25. Adjust it, if necessary, by loosening 2 screws which set the feed dog.

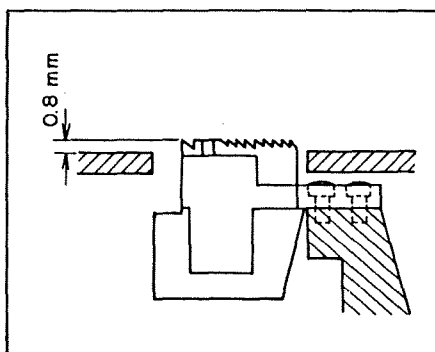


Fig. 25



## 7. ADJUSTING THE NEEDLE BAR FRAME

The correct clearance between the outer surfaces of the needle bar and the presser foot is 14mm(35/64") measuring bottom surface of the presser bar bushing when the stitch length has been set to 0mm, as illustrated in Fig.26

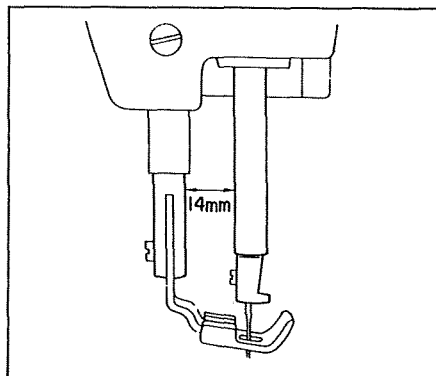


Fig. 26

The correctly adjusted feed movement is proved by the motion of the needle which constantly follows up the movement of the feed dog and is always pointing at the center of the needle hole on the feed dog.

For adjusting the longitudinal position of the needle bar frame, loosen the clamp screw (② of Fig.27) on the needle bar rock shaft driving rod crank (① of Fig.27), adjust the needle bar so that the needles are pointed at the center of the needle hole on the feed dog and re-tighten the clamp screw.

If the rock shaft driving rod (③ of Fig.27) hits the surface of the arm, loosen the clamp screw (① of Fig.28) on the rock shaft driving arm (rear) before tightening the screw (① of Fig.27), pull the driving rod crank fully towards you, re-tighten the clamp screw (① of Fig.28) at the point where the said clearance between the needle bar and the presser bar becomes 16.5mm(21/32"), and finally align the needles with the needle holes on the feed dog as mentioned before.

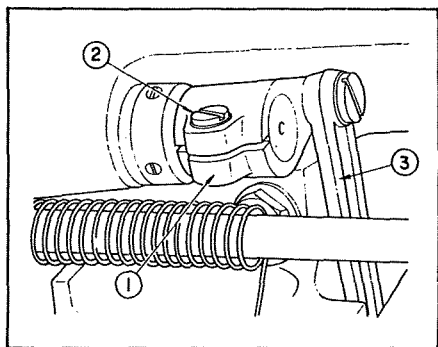


Fig. 27

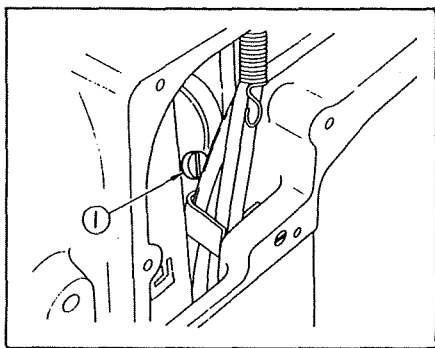


Fig. 28

## 8. ADJUSTING THE MAXIMUM STITCH LENGTH (LH-515)

When you can not get the maximum stitch length, you can adjust it by changing the position of the feed limiting plate (① of Fig.29) located on the back side of the machine bed.

If the maximum stitch length of the normal feed is not enough, tilt the machine head backwards, loosen 2 screws (② of Fig.29) clamping the feed limiting plate and slip the plate upwards. If the stitch length is too long, on the contrary, slip the said plate downwards and re-tighten the screws firmly. After adjustment you must measure the maximum stitch length for the distance of 11 stitches by manually forming such stitches on a piece of paper.

The maximum stitch length of the reverse feed can be adjusted by changing the height of the feed limiting plate using the adjusting screw (③ of Fig.29). Loosen the lock nut (④ of Fig.29) and turn the screw clockwise for increasing the stitch length or counter-clockwise for decreasing.

## 9. REPLACING THE TIMING BELT

Firstly, you must remove the reverse feed control lever shaft. Tilt the machine head backwards and loosen 2 screws which set the arm to the control lever shaft. And remove the end screw which is located on the opposite side of the feed lever and take out the lever and it's shaft as they are assembled together from the machine head towards the right hand side.

- (1) Disengage the timing belt from the sprocket wheels.
- (2) Take out the handwheel together with the built-in bearing.
- (3) Pull out the timing belt from the opening made by ② and insert new belt for replacement with care not to give any sharp bent to the new belt.

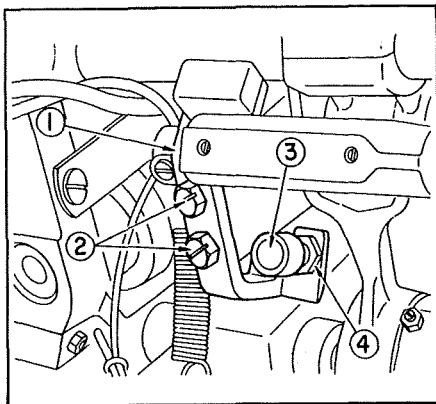


Fig. 29

## 10. ADJUSTING THE POSITION OF THE TIMING BELT

After replacing or disengaging the timing belt from the sprockets, you must adjust the position of it so as to match the movements of the main shaft and the hook driving shaft with each other.

Rotate the main shaft in the normal direction until the needle has come down to the same level as the top surface of the throat plate as shown in Fig.30, then, rotate the hook driving shaft in the normal direction until the first screw on the lower sprocket wheel (② of Fig.31) is aligned with the timing mark (③ of Fig.31) and put the timing belt on at this position.

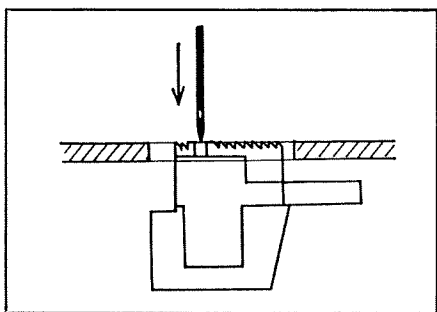


Fig. 30

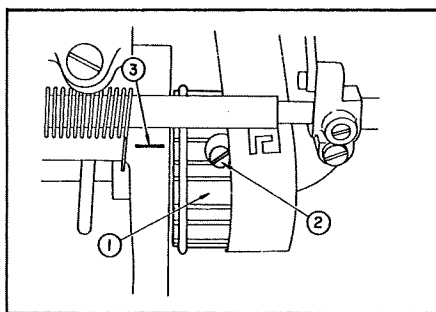





Fig. 31

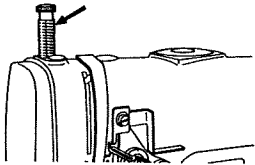
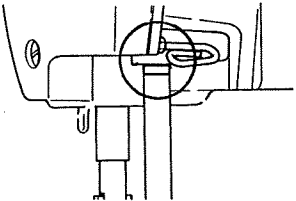
## V. HOW TO OBTAIN THE IDEAL SEWING CONDITIONS

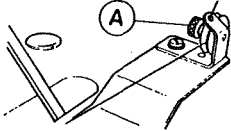
### ○ STANDARD SEWING CONDITIONS

Thickness of thread	Tetoron No.80	Nylon No.60	Cotton No.80	Cotton No.50	Vynylon No.30
Sewing material	Tetoron broadcloth 2 sheets	Tetoron broadcloth 2 sheets	Cotton gabardine 2 sheets	Cotton gabardine 2 sheets	Vinyl-leather 2 sheets
Needle	DP × 7 No.11	DP × 7 No.14	DP × 7 No.14	DP × 7 No.14	DP × 7 No.18
Needle thread tension	20g	25 to 30g.	45 to 50g.	50 to 60g.	80 to 100g.
Bobbin thread tension	15 to 20g.	15 to 20g.	25 to 30g.	25 to 30g.	30 to 40g.
Thread take-up tension	15g.	15g.	25g.	25g.	30g.
Thread take-up stroke	12mm (15/32")	12mm (15/32")	10mm (25/64")	10mm (25/64")	12mm (15/32")
Sewing speed. (s.p.m.)	3,500	3,500	3,500	3,500	3,500

## ○ TROUBLES AND CORRECTIVE MEASURES

Trouble	Cause	Corrective measures
<p>A. Thread breakage.</p> <p>1. Thread is ravelling or worn out.</p>	<p>(1) There are scratches on the surface of thread paths, on the pointed end of the needle, on the hook point or on the rear groove of the throat plate to positioning the bobbin case holder.</p> <p>(2) Needle thread tension is too high.</p> <p>(3) Bobbin case opening mechanism actuates too much.</p> <p>(4) Needle contacts with the sewing hook.</p> <p>(5) Lubricating oil fed to the sewing hook is too short.</p>	<p>○ Make those surfaces smooth by making use of a fine sand-paper for the hook point or a buff for the throat plate groove.</p> <p>○ Refer to III-7. "Adjusting the thread tension".</p> <p>○ Loosen the set screw on the bobbin case opening mechanism and bring it closer to the sewing hook. (see IV-2).</p> <p>○ Tap the hook driving shaft saddle gently to adjust the clearance between the needle and the blade point of sewing hook. (see IV-4)</p> <p>○ Adjust the amount of oil fed to the sewing hook. (see III-2).</p>
<p>2. Needle thread is snapped remaining a length of 2 to 3cm (about 1") on the bottom surface of sewing material.</p>	<p>(1) Needle thread tension is too low.</p> <p>(2) Thread take-up spring has high tension and small stroke.</p> <p>(3) Needles are attached incorrectly. (especially synthetic fiber thread is used.)</p>	<p>○ Synthetic fiber thread is affected significantly. Suitable needle thread tension is 20g. and bobbin thread tension is 15g. in the case of Synthetic fiber thread. (see III-7).</p> <p>○ Decrease the tension and increase the stroke of thread take-up spring. (see III-7-(3)).</p> <p>○ The cross-section view of 2 needle eyes as viewed from their top.</p> <p>a. Not good for synthetic fiber thread.</p>  <p>b. Standard.</p>  <p>c. In some cases good for synthetic fiber thread.</p> 

Trouble	Cause	Corrective measures
	<p>(4) Motions of sewing hook and the needle are not properly synchronized with each other.</p> <p>(5) Timing of bobbin case opening motion is not correct.</p>	<ul style="list-style-type: none"> <li>○ Adjust the timing between the needle and the hook. (see IV-3-(1)).</li> <li>○ Adjust the timing of bobbin opening motion. (see IV-1).</li> </ul>
B. Skip-stitching.	<p>(1) Clearance between the hook point and needle is too much.</p> <p>(2) Motions of sewing hook and the needle are not synchronized correctly with each other.</p> <p>(3) Presser foot is not functioning. (Pressing force is too small).</p> <p>(4) Needles are positioned incorrectly.</p> <p>(5) Height of the needle bar is not correct.</p>	<ul style="list-style-type: none"> <li>○ Correct the clearance. (see IV-4)</li> <li>○ Correct their timing. (see IV-3-(1))</li> <li>○ Tighten the presser spring regulator.</li> </ul>  <ul style="list-style-type: none"> <li>○ Correct their position. (see above A-2-(3))</li> <li>○ Upper marking line on the needle bar must coincide with the bottom surface of needle bar frame when the bar is at the bottom dead point.</li> </ul> 
C. Irregular stitches.	<p>(1) Bobbin thread is not passed through the notched part of tension spring on the bobbin case.</p> <p>(2) Outer rim of bobbin is not smooth enough to rotate freely.</p>	<ul style="list-style-type: none"> <li>○ Pass the bobbin thread through the notched part. (see III-6).</li> <li>○ Replace the bobbin or polish it with a fine sandpaper.</li> </ul>

Trouble	Cause	Corrective measures
1. Irregular stitches are formed as the sewing speed varies.	<p>(1) Tension of the thread take-up spring is too low.</p> <p>(2) Bobbin case opening mechanism does not work timingly.</p> <p>(3) Bobbin thread tension is too low.</p> <p>(4) Surface of thread paths is not smooth.</p> <p>(5) Sewing hook is faulty.</p>	<ul style="list-style-type: none"> <li>○ Correct the tension. (see III-7-(3)).</li> <li>○ Adjust the timing. (see IV-1).</li> <li>○ Tighten the tension spring. (see III-7-(2)).</li> <li>○ Polish such surface with a fine sandpaper.</li> <li>○ Replace it with new sewing hook.</li> </ul>
D. Puckering of the sewing material occurs very frequently	<p>(1) Both needle and bobbin thread tensions are too high.</p> <p>(2) Bobbin thread is wound too tight in the bobbin. (This is usually happened in the synthetic fiber thread.)</p> <p>(3) Pressing force applied by the presser foot is too strong.</p> <p>(4) Bottom surface of presser foot is not smooth.</p> <p>(5) Level of feed dog is too low.</p>	<ul style="list-style-type: none"> <li>○ Correct such thread tension. (see III-7).</li> <li>○ Take out the bobbin and wind it again more softly by loosening the thread tension regulator (A).</li> </ul>  <ul style="list-style-type: none"> <li>○ Loosen the presser spring regulator. (see the above B-(3)).</li> <li>○ Make it smooth by making use of a fine sandpaper.</li> <li>○ Adjust it to a little more high level. But, it must be lowered by about 0.15mm on it's way back measuring from the top surface of throat plate.</li> </ul>
E. Needle thread hops up and down during sewing.	<p>(1) Bobbin case opening mechanism does not function timingly.</p> <p>(2) Tension of thread take-up spring is too low.</p>	<ul style="list-style-type: none"> <li>○ Correct the timing of bobbin case opening mechanism so that the bobbin thread is regularly pulled out of the bobbin. (see IV-1 and 2.)</li> <li>○ Increase the tension. (see III-7-(3)).</li> </ul>

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