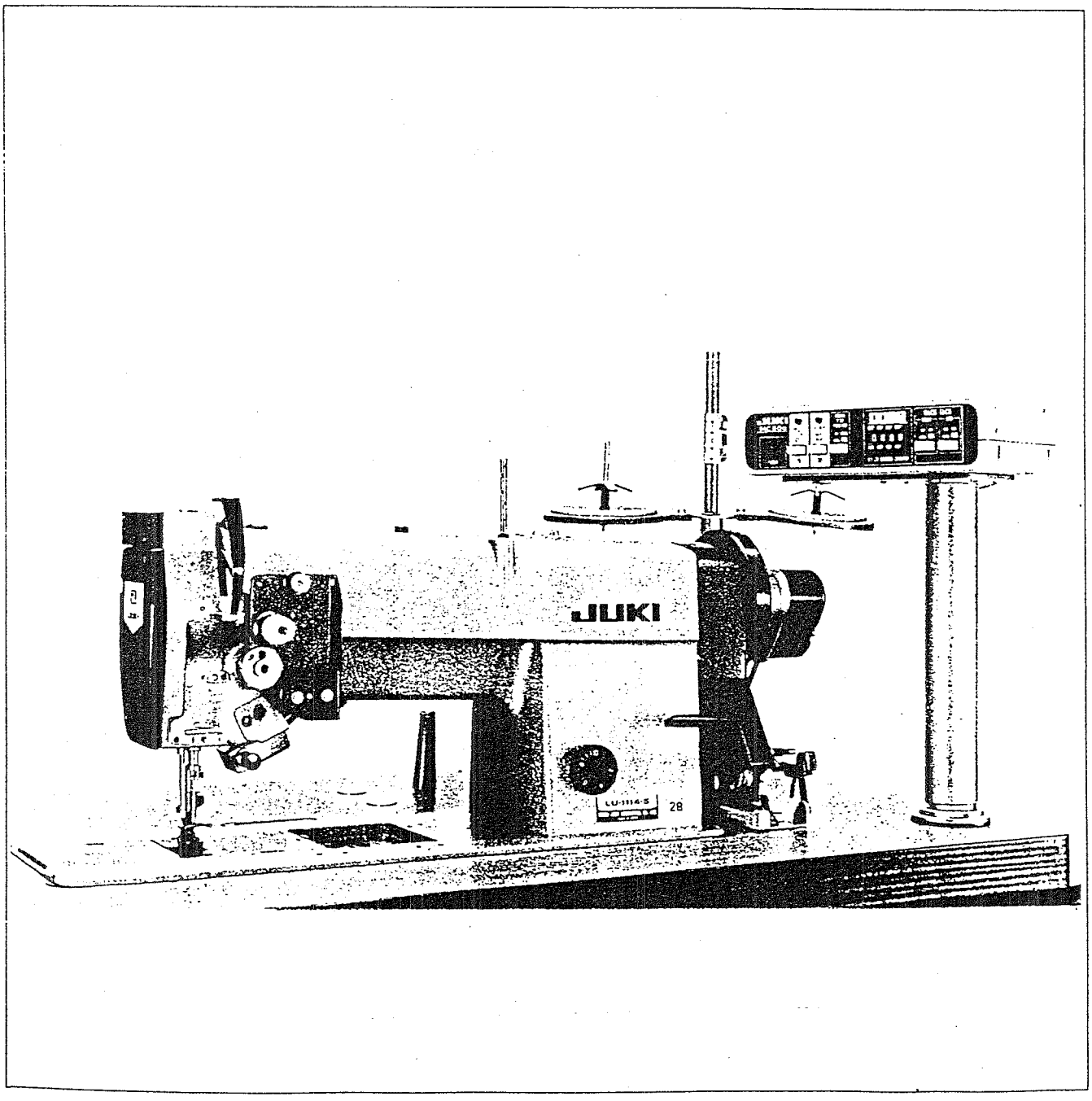
JUKI

1-Needle, Lockstitch, Unison feed Industrial Sewing Machine with Automatic Thread Trimmer & Automatic Reverse Feed

LU-1114-5

ENGINEER'S MANUAL



No. VI-3
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PREFACE

The Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the sewing machine.
This manual discusses the adjustment procedures, the results of improper adjustment, and other necessary information which are not covered by the Instruction Book intended for the maintenance personnel and operators at apparel factories.
It is advisable to use the pertinent Instruction Book and Parts Book together with the Engineer's Manual when carrying out the maintenance of this sewing machine. This manual mainly consist of three sections; the first section presents "Adjustment Standard", the second section, "How To Adjust", and the third, "Results of Improper Adjustments".

CAUTIONS IN OPERATION

1. Don't put your hand under the needle when you turn "on" the power switch or operate the machine.
2. Don't put your hand into the thread take-up cover while the machine is running.
3. Don't forget to cut off the power supply before you tilt the machine head backwards or replace the V-belt.
4. Never bring your fingers or hair close to, or place anything on the handwheel, V-belt, bobbin winder wheel or motor during operation. It may lead to serious personal injuries.
5. If your machine is provided a belt cover and finger guard, never operate your machine with any of them removed.

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1. SPECIFICATIONS

No.	Item	Specifications
1	Model No.	LU-1114-5-2B
2	Model name	1-Needle, Lockstitch, Unison feed Industrial Sewing Machine with Automatic Thread Trimmer & Automatic Reverse Feed
3	Applications	For medium-weight, heavy-weight, and extra heavy-weight materials
4	Sewing speed	Max. 2800 s.p.m. (*1 Varies according to the stitch length)
5	Needle	DP x 17, D1 x 3 #18 ~ #24 (Standard #23), Schmetz System 332
6	Thread	#30 to #8 (by British system)
7	Stitch length	Standard: 10 mm (0.394") (forward feed) x 4 mm (0.157") (reverse feed)
8	Presser foot lift	10 mm (0.394") by hand lifter, 13 mm (0.512") by knee lifter
9	Stitch length regulator	Wing-shaped dial
10	Reverse feed system	Externally mounted solenoid magnet (with one-touch type switch and hand lever)
11	Thread take-up	Slide-type
12	Needle bar stroke	33.4 mm (1.315")
13	Hook	Vertical-axis large hook (2.2 times) with long-shaft bobbin case
14	Bobbin case opener	Interlocked with hook driving eccentric cam (1:1 principle)
15	Feed mechanism	By slide block
16	Hook driving system	Screw gear
17	Top feed mechanism	Alternate lift : 6.5 mm (0.256") (when the intermediate and walking feet are equally set)
18	Main and hook driving shafts	Driving by timing belt
19	Lubrication	Fully automatic by plunger pump
20	Oil return flow	Circulated by felts
21	Thread trimmer	Rocks around the hook (Cam with safety device)
22	Tension release system	Push-pull solenoid interlocked with thread trimmer & Interlocked with presser foot lifter
23	Lubricating oil	New Defrix Oil No. 1
24	Machine bed size	517 x 178 mm (20.354" x 7.008")
25	Weight of machine head	41 kg
26	Motor	400W (1/2 HP) 4P Electro-stop motor (MC-200)

*1

Stitch length	Max. sewing speed	Normal sewing speed(s.p.m.)
4 mm (0.157") or less	2500	2300
Over 4mm (0.157") and 7mm (0.276") or less	2000	1800
Over 7mm (0.276") and 10mm(0.394") or less	1500	1300

(Note) The max. sewing speed of 2800 s.p.m. is applicable only to a stitch length of 4 mm (0.157") or less.

MODEL DESIGNATION

LU－1114－5 － 2B

Thread trimmer

Type (See the table of attachments below.)

ATTACHMENTS

	5-2	5-2B
Automatic thread trimmer	○	○
Automatic reverse feed		○
Motor and stand	○	○

SOLENOID SPECIFICATIONS

	Export	Solenoid stroke
Automatic thread trimmer	AC24V 2.5A	4 mm (0.157″)
Automatic reverse feed	AC24V 9.2A	8 mm (0.315″)

Standard adjustment

(1) Needle bar

1) Needle entry point

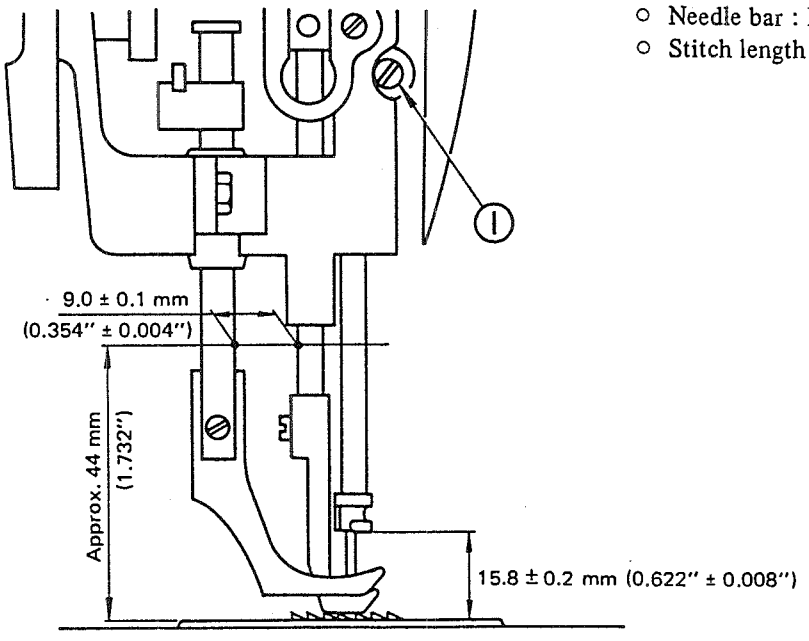


Fig. 1

2) Needle bar height

Requirements:
- Needle bar : In the lowest position
- Stitch length : 0 (Approx. 0 mm feed amount is obtained by turning the stitch length regulator dial fully clockwise.)

3) Needle entry in the needle feed slot

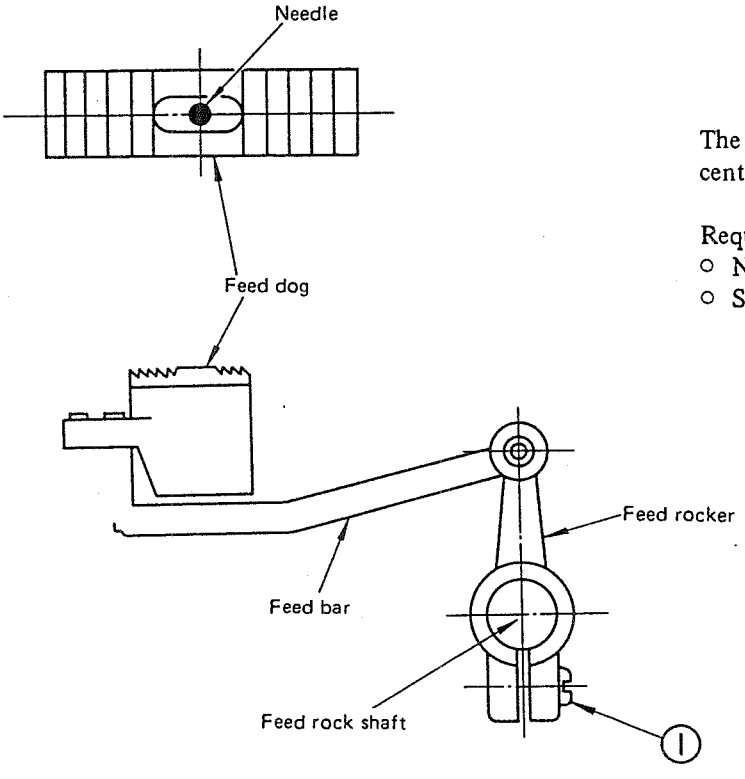
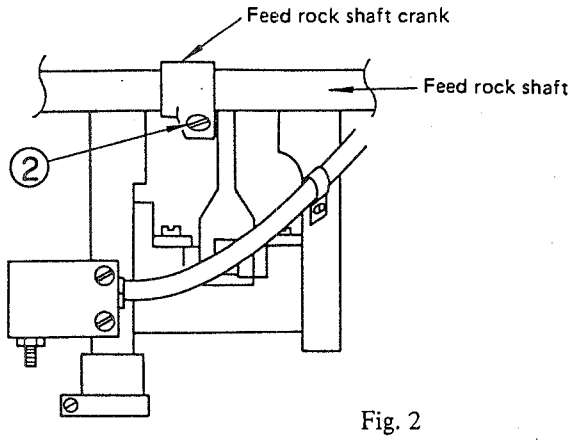


Fig. 3

The center of the needle must be located in the center of the needle feed slot.

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

How to Adjust	Effects of Adjustment
 Fig. 2 1. Turn the stitch length regulator dial fully clockwise. 2. Turn the handwheel until the needle bar comes down to its lowest point. 3. Loosen screw ②. (Fig. 2) 4. Adjust the distance between the needle bar and the presser bar as specified, and tighten screw ②.	If the clearance is too great; o When the stitch length is set to the maximum, the feed dog will hit the throat plate. o Stitch skipping or needle breaking may occur. If the clearance is too small; o When the reverse stitch is made at a maximum stitch length, the feed dog will hit the throat plate. o Stitch skipping or needle breaking may occur. * Thread trimming failure may occur.
5. Loosen screw ① of Fig. 1. 6. Adjust the distance between the bottom end of the needle bar and the throat plate surface to 15.8 mm (0.622"). Tighten screw ①. **(Note) After this adjustment, check the alignment of the needle with the center of the needle feed slot.**	o If the needle bar height is not correct, it may cause stitch skipping or thread breaking.
1. Turn the stitch length regulator dial fully clockwise. 2. Turn the handwheel until the needle bar comes down to its lowest point. 3. Loosen screw ① of Fig. 3. 4. Adjust the feed rocker so the center of the needle aligns with the center of the needle feed slot.	

(2) Needle-to-hook relation

1) Rising of needle

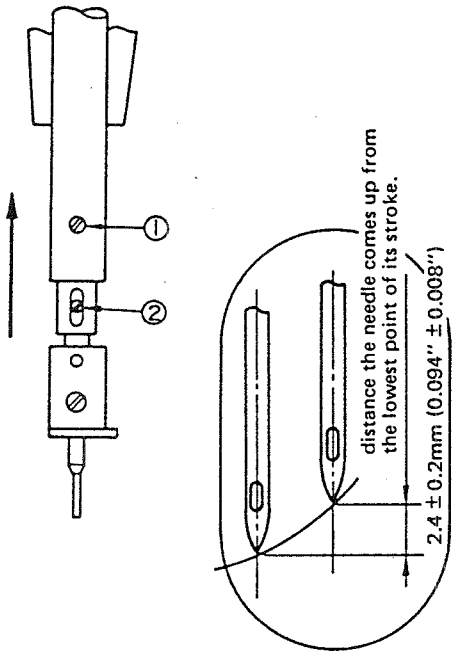


Fig. 4

2) Clearance between the needle and the hook point

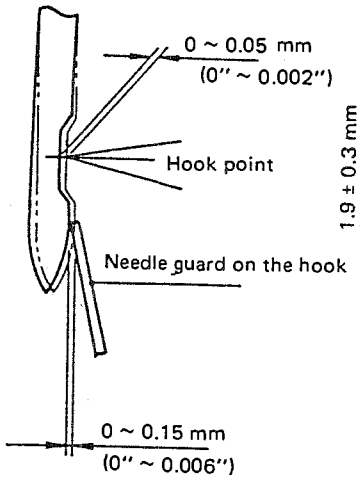


Fig. 5

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

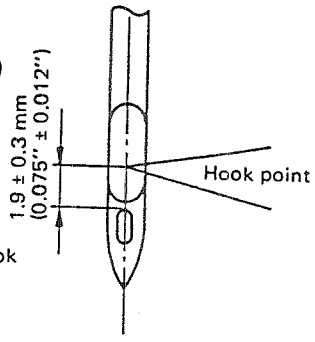


Fig. 6

Requirements;
- The needle bar goes up from the lowest point of its stroke.
- Stitch length : 6 mm (0.236")

(3) Working position of the bobbin case opening lever

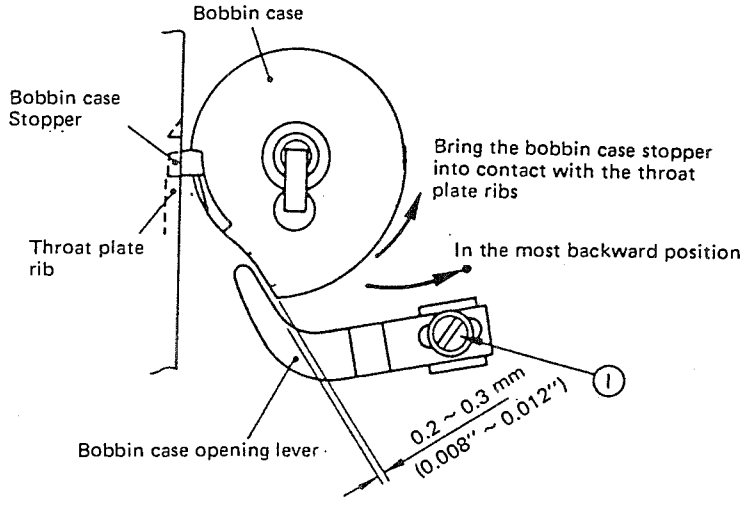
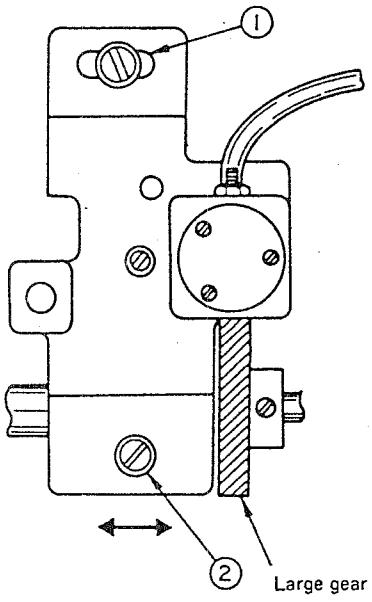


Fig. 8

Requirements;
- The bobbin case opening lever is in the most backward position.
- The bobbin case stopper is in contact with the thread plate rib.

How to Adjust	Effects of Adjustment
1. Set the stitch length dial to "6". 2. Tighten screw No. 1 of the large gear to the flat face of the hook driving shaft for preliminary installation. 3. Raise the needle bar 2.4 ± 0.2 mm (0.094" ± 0.008") from its lowest position to make the hook point meet the center of the needle. 4. With the above conditions maintained, tighten the setscrew (with a V-shaped end) into the V groove of the hook driving shaft. Also, tighten the other two screws. (See Fig. 10) 5. Loosen setscrews ① and ② , and move the hook driving shaft saddle to the right or left to adjust so a clearance of 0 to 0.05 mm (0 ~ 0.002") is provided between the hook point and the needle. (See Fig. 7). (At this time, be sure that the needle touches the needle guard on the hook by 0 to 0.15 mm (0 ~ 0.006") when the hook point meets the center of the needle.) 6. Position screw No. 1 of the large gear on the flat face of the hook driving shaft. Move the large gear in the axial direction to make fine adjustment so the hook point meets the center of the needle. (See Fig. 7).  Fig. 7	○ If these adjustments are made inaccurately, irregular stitching, stitch skipping or thread breaking may occur.
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 to 0.3 mm (0.008" ~ 0.012") clearance between the bobbin case opening lever and bobbin case.	If the clearance is too great. ○ Looped stitches or loose stitches (balloon stitches) may be formed. If the clearance is too small; ○ Bobbin case will be damaged while stitching.

(4) Clearance between the throat plate and the bobbin case stopper

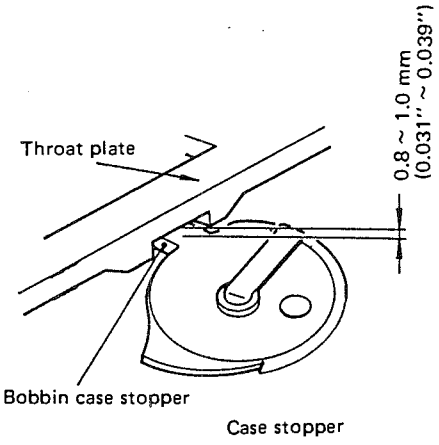


Fig. 9

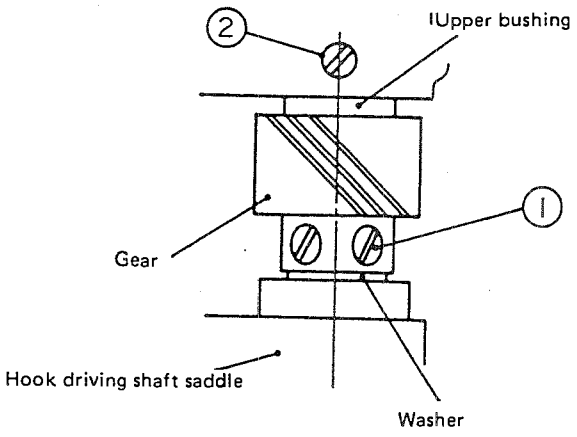
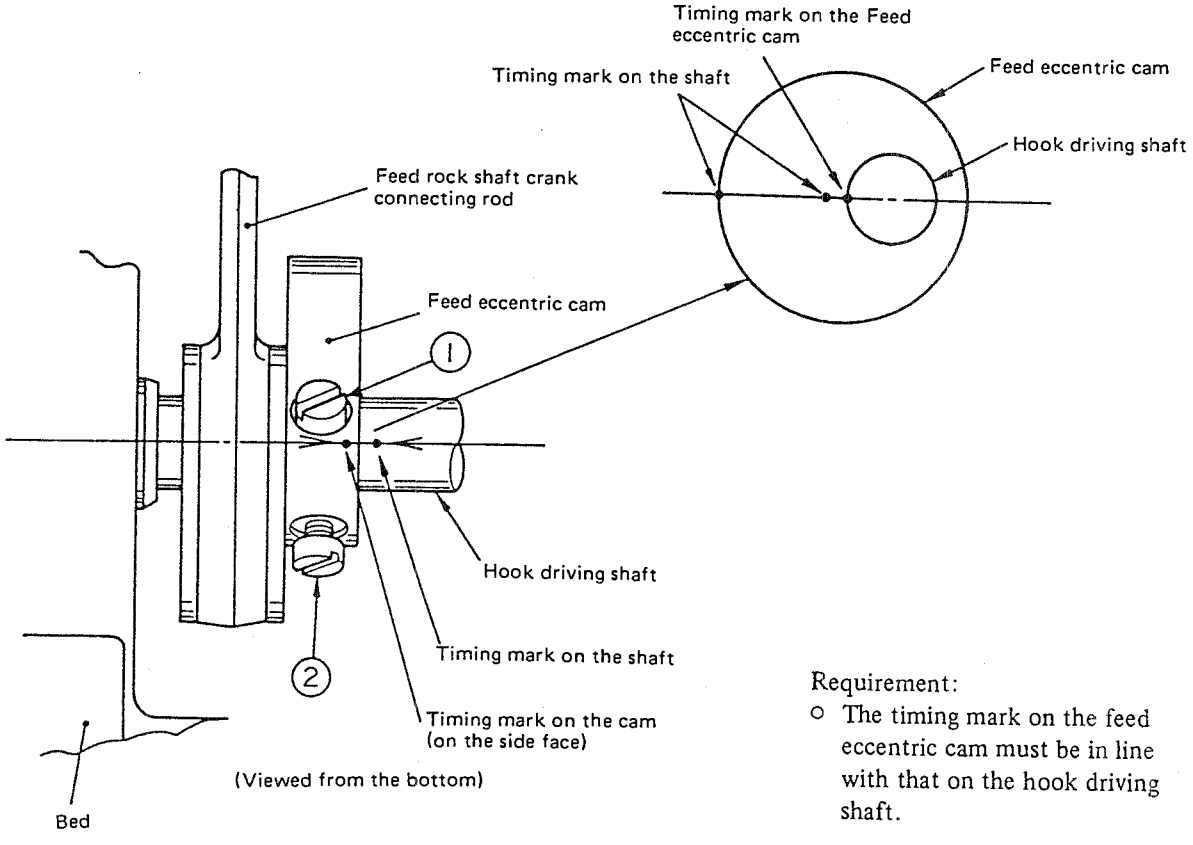


Fig. 10

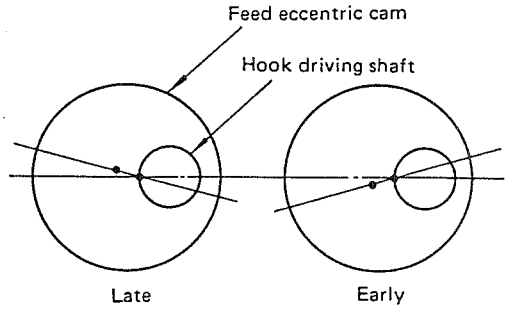
Requirements: ○ Clearance between the upper face of the bobbin case stopper and the throat plate must be 0.8 to 1.0 mm (0.031" ~ 0.039")

(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. 11

How to Adjust	Effects of Adjustment
1. Remove the throat plate. 2. Remove the bobbin case opening lever. 3. Take off the feed dog and the needles. 4. Loosen screws ①. 5. Turn the handwheel to bring the needle bar to the highest point and remove the hook. 6. Remove the gear from the sewing hook shaft and replace the washer by the one which has a suitable thickness to provide specified clearance at the throat plate. 7. At the same time, loosen screw ② and adjust the setting position of the upper bushing. 8. After the adjustment check also the working position of the bobbin case opening lever (Adjustment Standard and axial play of the hook).	If the clearance is too great; ○ The bobbin case may slip off the throat plate. If the clearance is too small; ○ Loose stitch or "balloon" stitch may be formed. ○ The moving knife may hit the hook while the thread trimmer is working.
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.	 Fig. 12
(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.	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.

(6) Height of feed dog

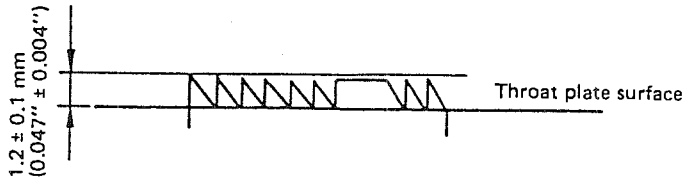


Fig. 13

Requirements:
- ○ Stitch length : 0 mm
- ○ A maximal projection of the feed dog teeth must be 1.2 ± 0.1 mm (0.047" ± 0.004") from the throat plate surface.

(7) Relation between the main shaft and the hook driving shaft

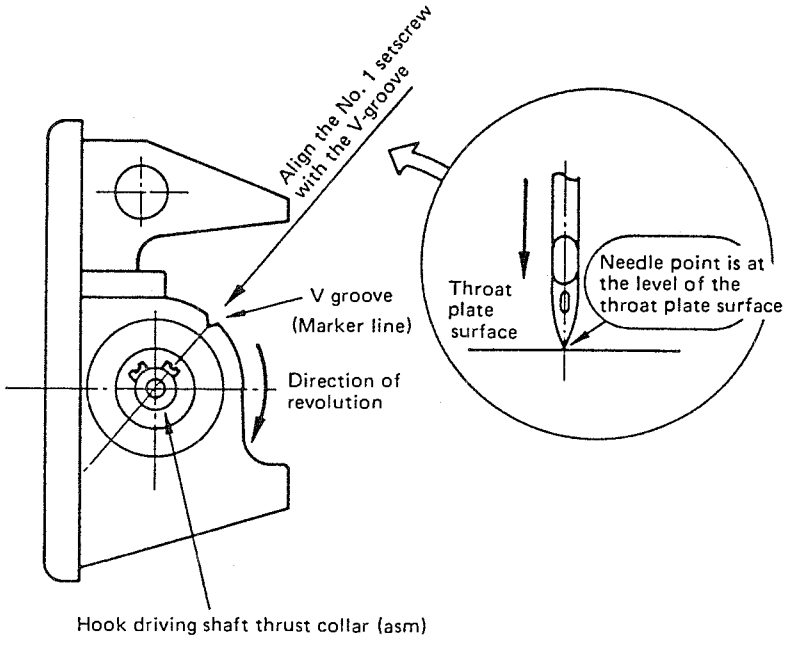


Fig. 15

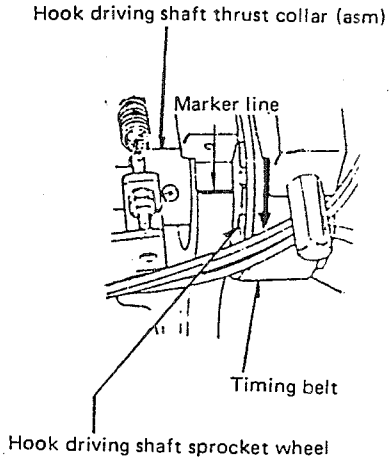
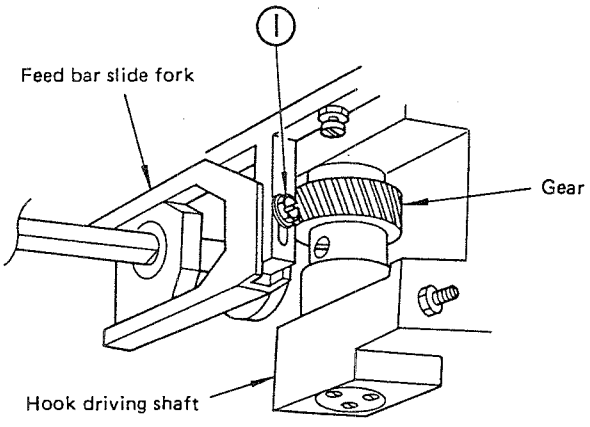


Fig. 16

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

How to Adjust	Effects of Adjustment
1. Turn the stitch length dial fully clockwise. 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 block so that the feed dog teeth projects 1.2 ± 0.1 mm (0.047" ± 0.004") from the throat plate surface.  Fig. 14	If the feed dog is too high; o The feed dog may hit the throat plate. o The stitch length becomes longer than the one set by the stitch dial. o The right needle thread may not be caught at the time of thread trimming. If the feed dog is too low; o 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.
1. Turn the stitch length dial fully clockwise. 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. 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.	o If the timing of the hook driving shaft to the main shaft is incorrect, loose stitches may be formed.

(8) Lubrication

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

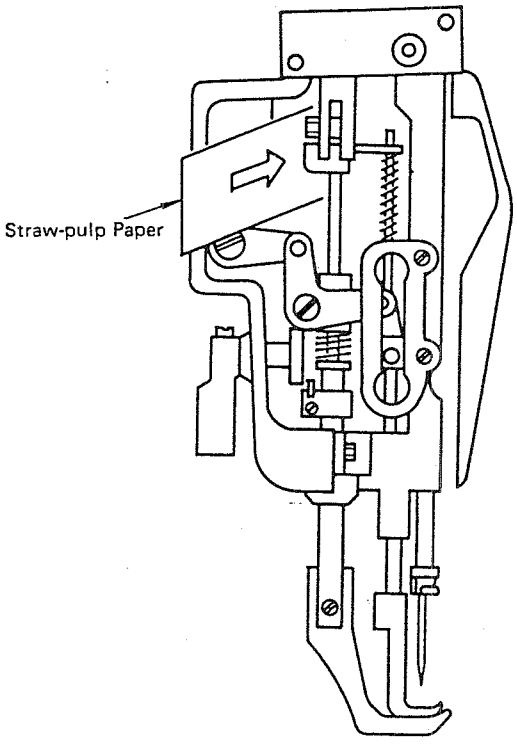
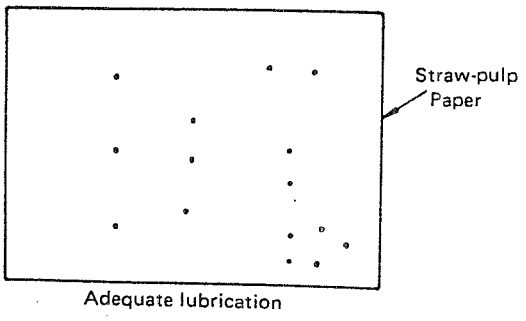


Fig. 17



Adequate lubrication

Requirements:
- Sewing speed : 1,800 s.p.m.
- 5 sec. on and 5 sec. off for 2 min.

2) How to judge the lubrication of the hooks:

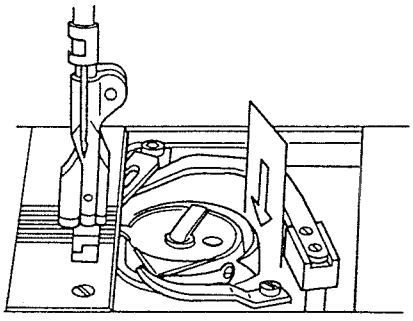
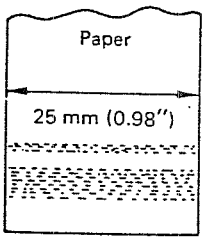
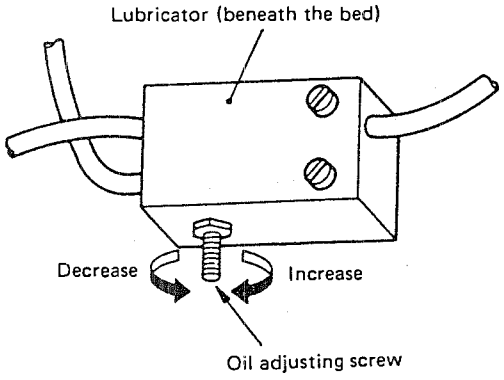
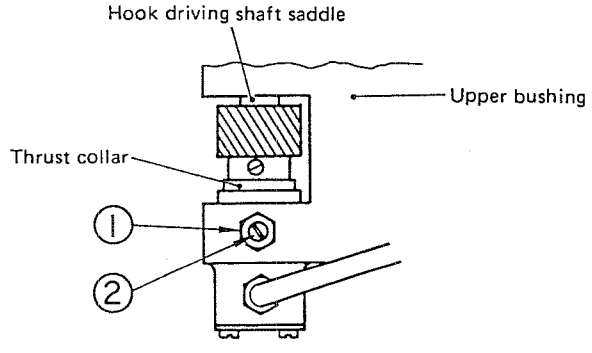


Fig. 19

Requirements:
- Sewing speed: 1,800 s.p.m.
- Let the machine idle for 30 seconds and hold a piece of paper 10 mm (0.394") 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.



Adequate oil splash
(in 5 seconds)

How to Adjust	Effects of Adjustment
Oil flow adjustment for the face plate components: Loosen the oil adjusting screw locknut shown in Fig. 18, 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 oil decreases, and vice versa.)  Fig. 18	○ 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.
Oil flow adjustment for the hook: A maximal amount of oil is fed to the hook when oil adjusting screw ② (Fig. 20) 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.**  Fig. 20	○ 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.

(9) Sway of the needles

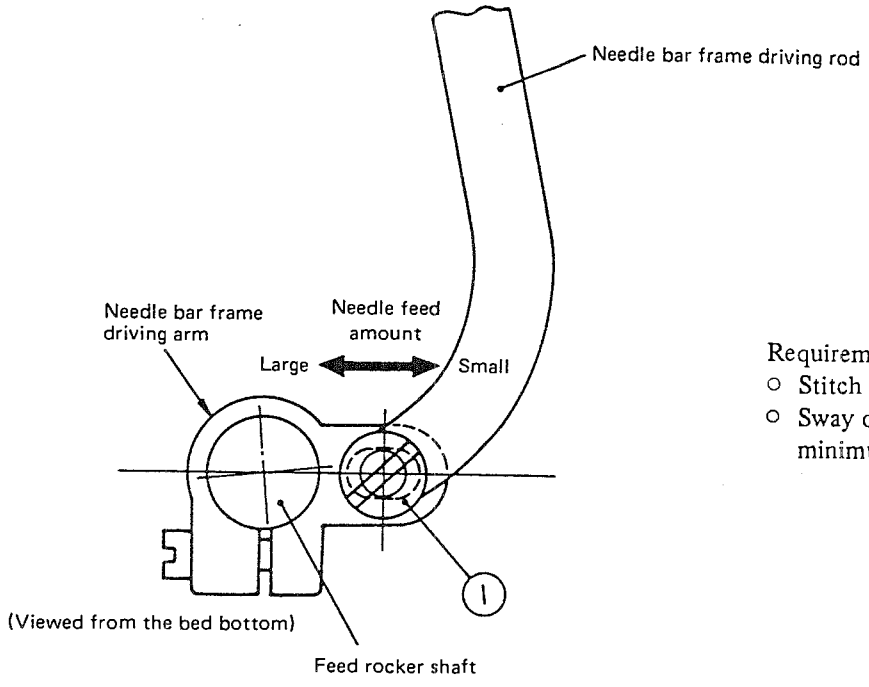


Fig. 21

Requirements:
- Stitch length : Maximum
- Sway of the needle must be reduced to minimum

(10) Stitch length in the forward and reverse feed

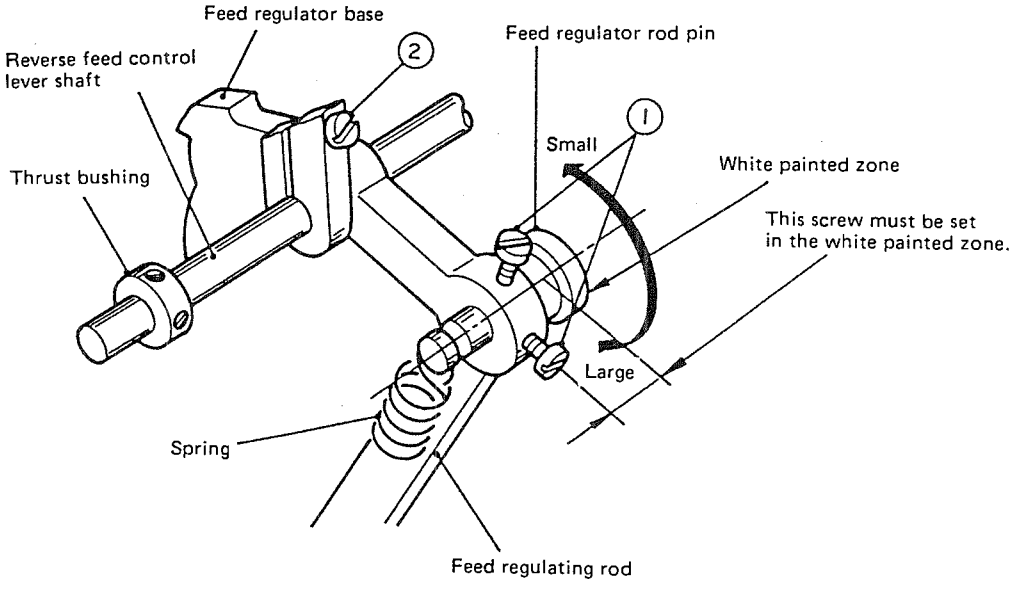


Fig. 22

Requirements:
- When the stitch length dial is set to "10", the actual stitch length checked using paper is 9.7 ± 0.2 mm (0.382" ± 0.008") (the handwheel is to be turned by hand).

How to Adjust	Effects of Adjustment
1. Set the stitch dial to the maximum. 2. Loosen screw ① shown in Fig. 21, and move the needle bar frame driving rod to make adjustment. 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. Then fix the rod to the needle bar frame driving arm. (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 (9.0 ± 0.1 mm (0.354" ± 0.004") between the presser bar and needle bar is also disturbed in making the above adjustment. Readjust the distance.**	○ Needle breaking may occur. ○ Stitch skipping may occur.
1. Loosen screws ① which fix the feed regulator base. 2. Turn the feed regulator rod pin in the direction of the arrow to make adjustment.	○ If the stitch length is not adjusted properly, the actual stitch length will greatly differ from the value set on the stitch length dial.

Adjustment Standard

(1) Thread trimmer

1) Height of the moving knife

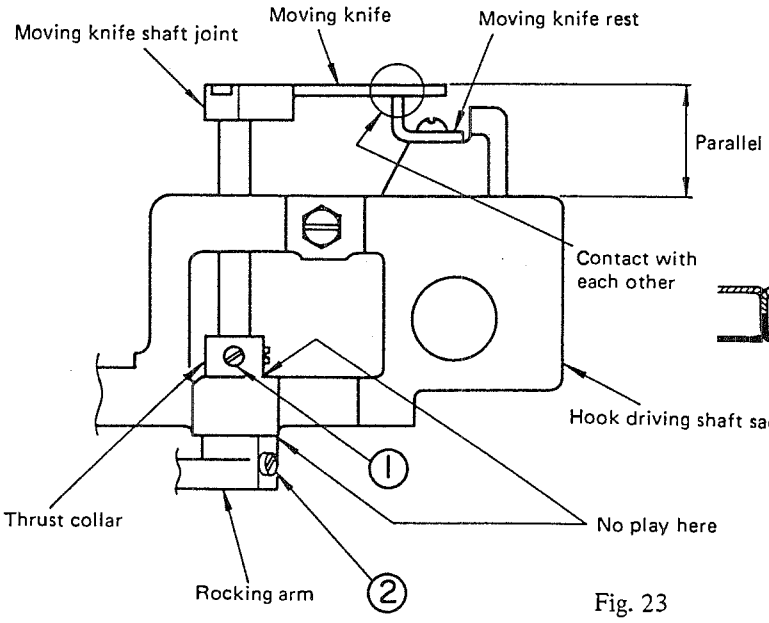
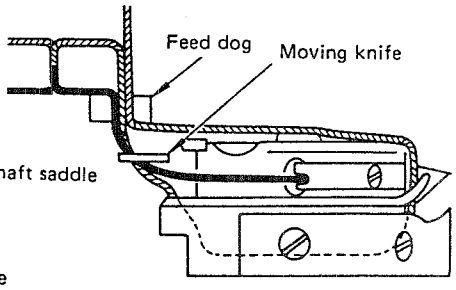


Fig. 23

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.

Vertical position of moving knife with respect to needle and bobbin threads



2) Initial position of the moving knife

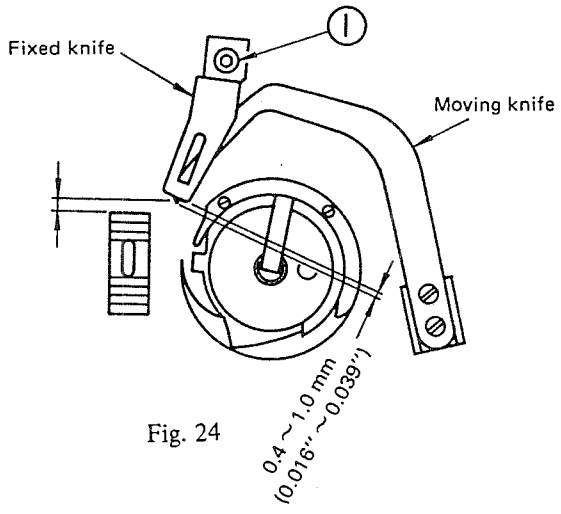


Fig. 24

Adjust the distance between the end surface of the feed dog and point A of the fixed knife to 2.5 mm (0.098").

(Note) Position the fixed knife first and then the moving knife.

Requirements:

1. Stitch length : 0 mm
2. Needle bar: In its lowest position
3. Distance between the presser bar and the walking bar: 9.0 ± 0.1 mm (0.354" ± 0.004")
4. The center of the needle meets that of the needle feed slot in the feed dog.

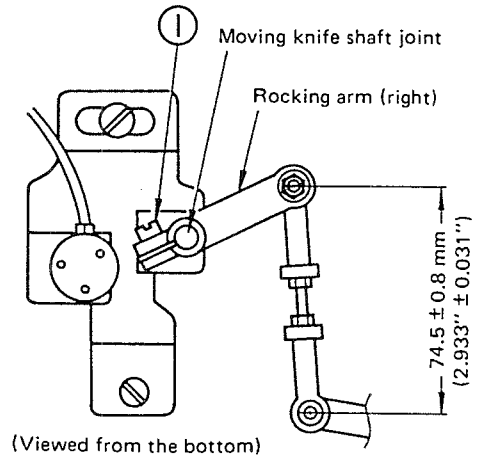
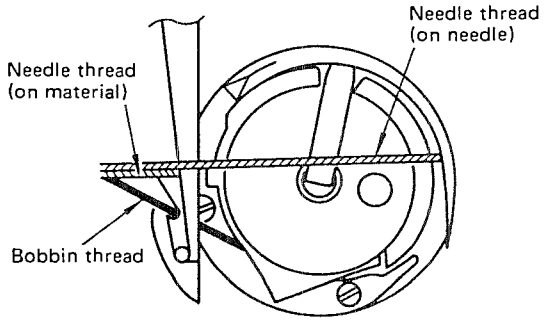
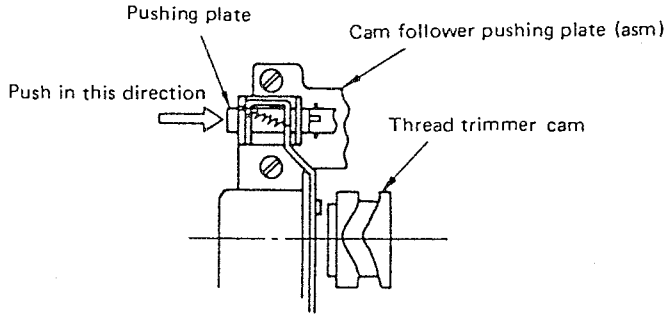
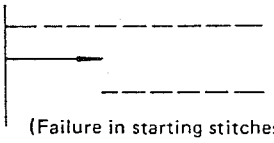


Fig. 25

How the moving knife catches the needle and bobbin threads



The first hook (on the end) of the moving knife catches the bobbin thread and the second hook catches the needle thread on the material.

How to Adjust	Effects of Adjustment
1. Remove the fixed knife from the hook driving 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 into contact with the top end of 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.**	If the moving knife is lower than the top end of the moving knife rest; o The moving knife hits the moving knife rest when it works. If it is too low, it may lock up the thread trimming mechanism. o The thread trimmer fails to sharply cut the thread. o 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; o The thread trimmer fails to sharply cut the thread. o The thread trimmer fails to catch the thread.
1. Loosen screws ① to release rocking arm (Fig. 25). 2. Adjust the position of the moving knife to the moving knife rest. 3. After the adjustment, push the pushing plate in the direction of the arrow in Fig.26 and turn the handwheel toward you to check that the requirements have been met. (Repeat this procedure several times to make sure.) **(Caution) When tightening screw ① to fix the rocking arm, make sure that there is no clearance at the surface of the hook driving shaft saddle.**  Fig. 26	If the moving knife juts out too much from the fixed knife; o Thread trimming failure may occur. o The thread trimmer may fail to catch the thread. If the moving knife juts out too little from the fixed knife; o The thread trimmer may fail to catch the thread. o The machine may fail in making some starting stitches as illustrated below;  (Failure in starting stitches)

3) Position of the thread presser

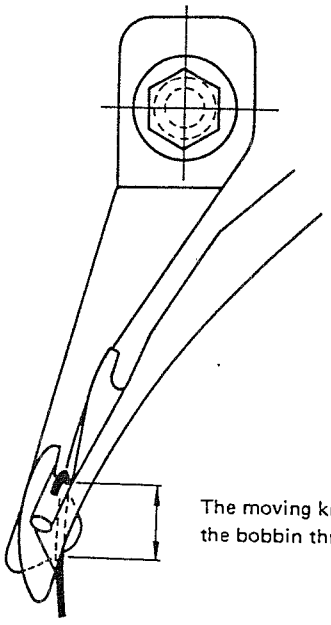
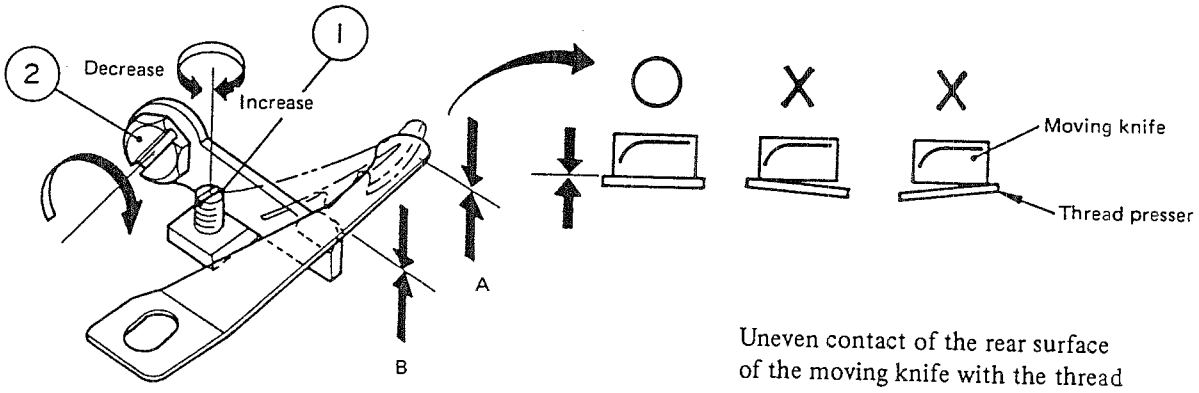


Fig. 27

4) Clamping pressure

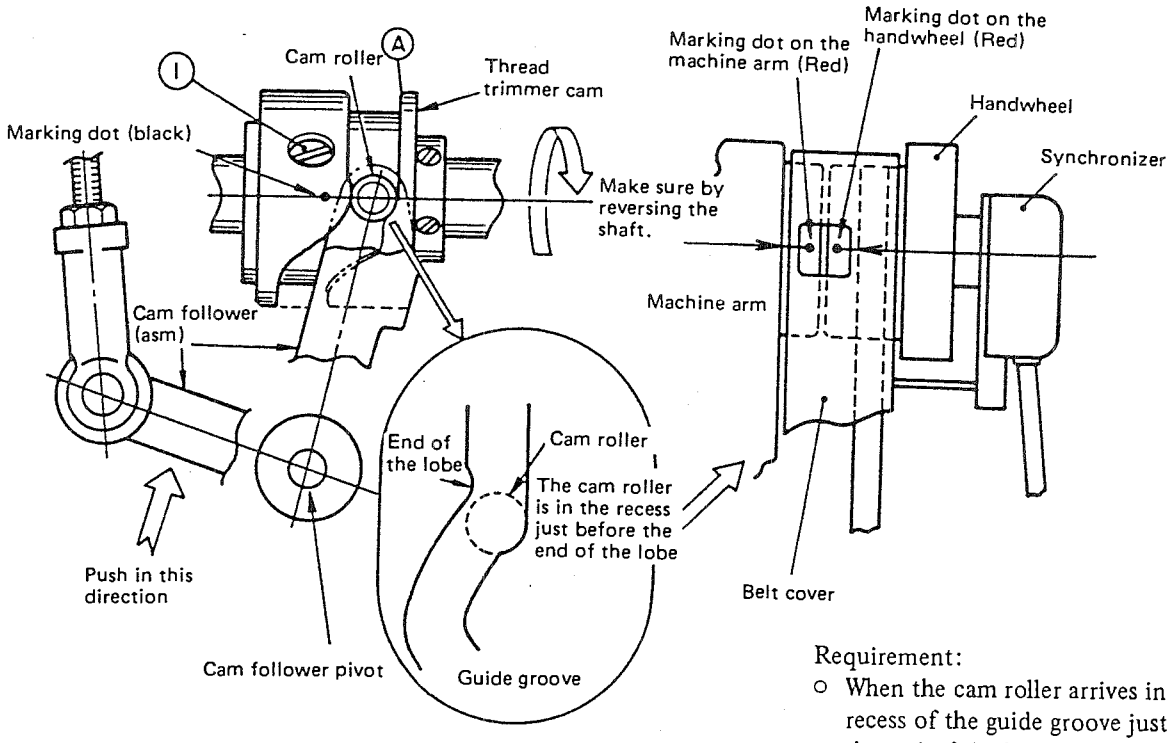


Uneven contact of the rear surface of the moving knife with the thread presser causes thread slippage.

Fig. 28

How to Adjust	Effects of Adjustment
1. Loosen setscrew ① of the fixed knife. (Fig. 24) 2. Properly position and install the thread presser so the bobbin thread is securely caught by the moving knife and the thread presser as illustrated in Fig. 27 when the moving knife goes back to its original position after thread trimming. (The needle thread is not clamped.) (Note) **The fixed knife 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 surface of the moving knife is in contact with the thread presser when the thread presser, moving knife, and fixed knife are installed. 2. Under the above conditions, bring the thread presser adjusting fixture in contact with the thread presser. To do this, loosen screw ② and turn screw ① to make adjustment. After adjustment, tighten screw ② . If thread is 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 presser clamping pressure is too high; ○ Several starting stitches are skipped.

5) Timing of thread trimming action



Requirement:

- 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 market dot on the handwheel.

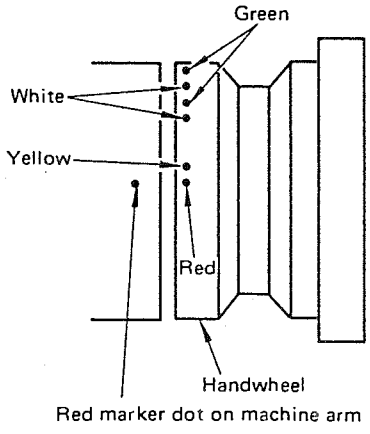
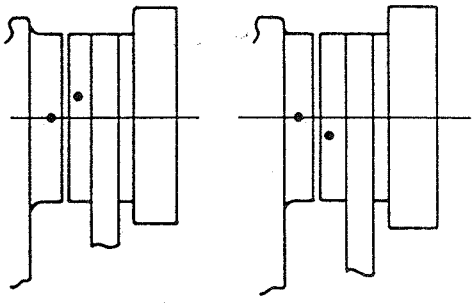


Fig. 29

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.**

Hook timing	Handwheel marker dots vs. Machine arm marker dot	
	Thread trimming timing	Stop position
2.4 mm (0.094") or less	Dot on arm aligns with red dot on handwheel.	Dot on arm is located between two white dots on handwheel.
2.4 mm ~ 3.2 mm (0.094" ~ 0.126")	Dot on arm aligns with yellow dot on handwheel	Dot on arm is located between two green dots on handwheel.

How to Adjust	Effects of Adjustment
1. Loosen two screws ① to release the thread trimmer cam. 2. Match the marking dot (red) on the handwheel with that (red) on the machine arm. 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). 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 Ⓐ of the guide groove.	 Early timing Late timing If the timing is too early; o The thread slips from the needle eye. o The thread trimmer may fail in cutting, needle or bobbin thread. o The needle thread may not be caught at the time of thread trimming when cotton thread is used. If the timing is too late; o The thread trimmer malfunctions.

6) Position of the trimmer cam driving mechanism

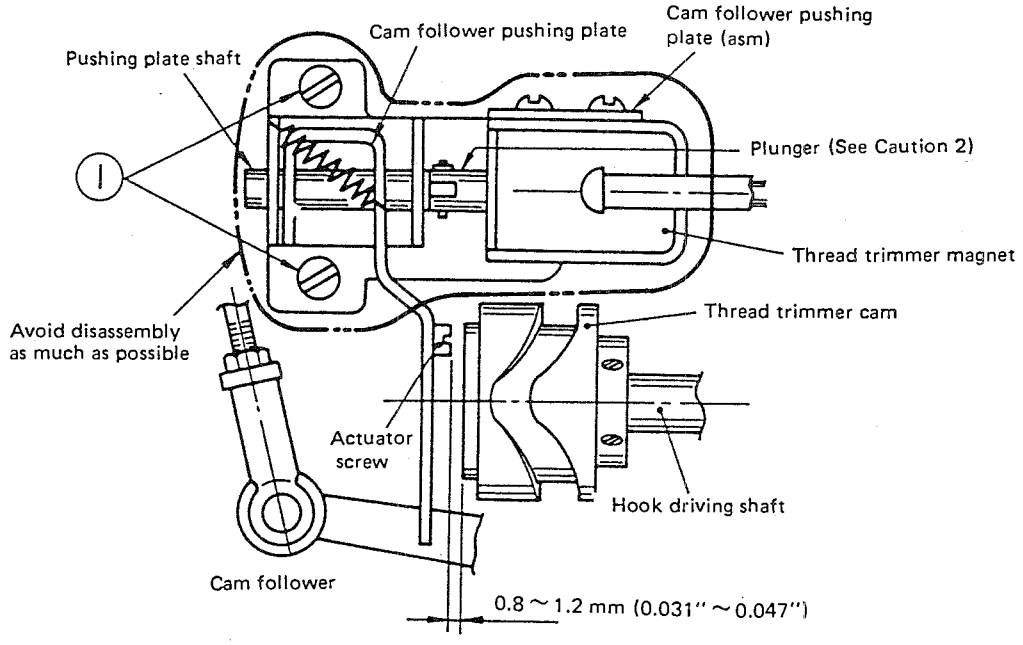


Fig. 30

Requirements:
- When the thread trimmer magnet is "off".
- There must be a 0.8 to 1.2 mm (0.031" ~ 0.047") clearance between the left end face of the thread trimmer cam and the top end of the actuator screw head.

7) 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"~ 0.012") clearance between the cam follower stopper (A) and the cam follower.

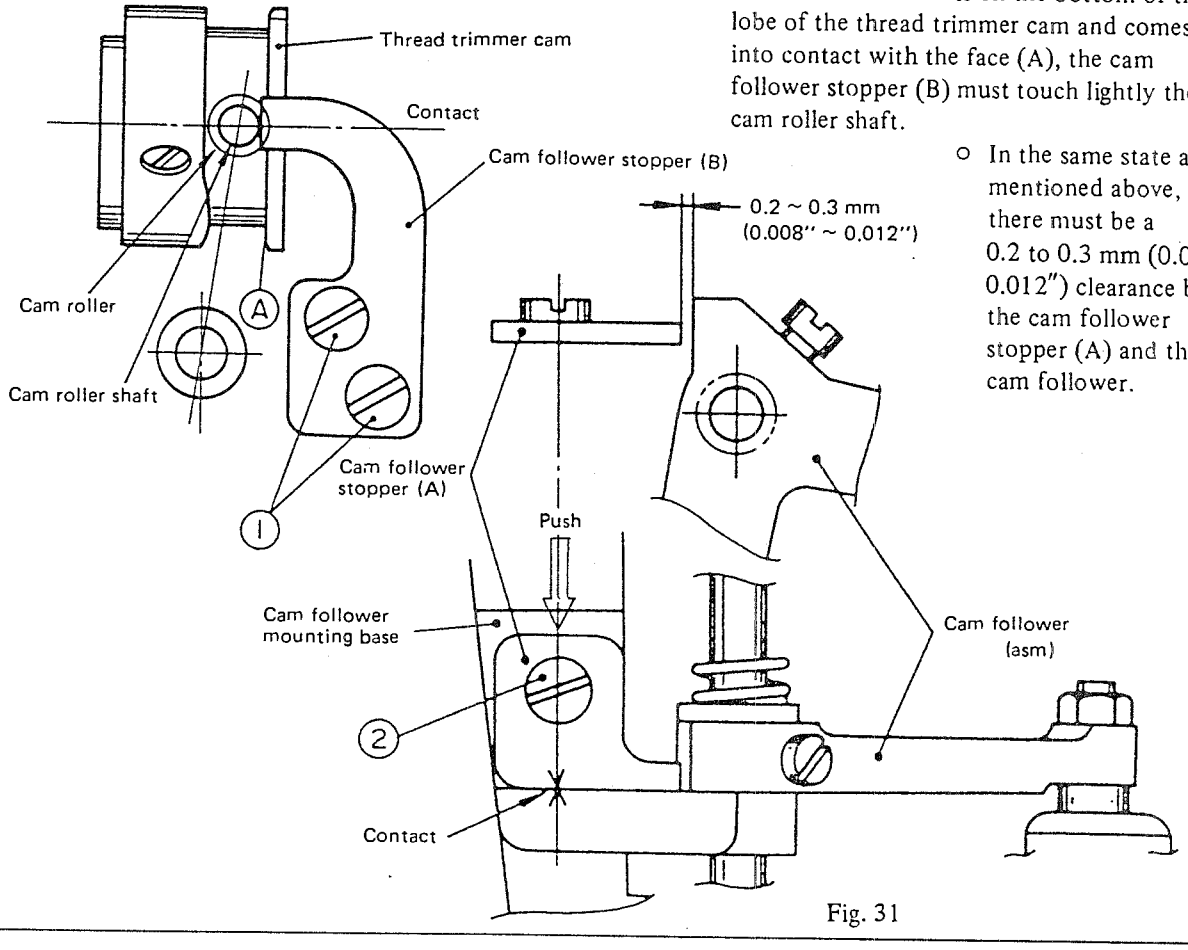


Fig. 31

How to Adjust	Effects of Adjustment
1. Loosen screws ① to release the cam follower pushing plate (asm). 2. Provide a 0.8 to 1.2 mm (0.031″~0.047″) release between the actuator screw head and the end face of the thread trimmer cam. Tighten screws ① **(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.**	If the clearance is too great; o Thread trimming failure may occur. If the clearance is too small; o The thread trimmer may be driven accidentally causing mechanical troubles.
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 the cam roller shaft and, at the same time, the cam roller touches the face (A) of the thread trimmer cam. Cam follower stopper (A) 1. Loosen screw ② . 2. Provide a 0.2 to 0.3 mm (0.008″~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; o It causes a mechanical trouble. o The needle-up stop action becomes unstable. If the cam follower stopper (B) does not touch the cam roller shaft; o The bobbin thread is not clamped causing stitch failure at the start. o It causes a mechanical trouble. If the clearance is too great; o Thread trimming failure may occur. o It causes a mechanical trouble. If the clearance is too small; o 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.

(2) Automatic reverse feed components

1) Stroke of the reverse feed magnet plunger

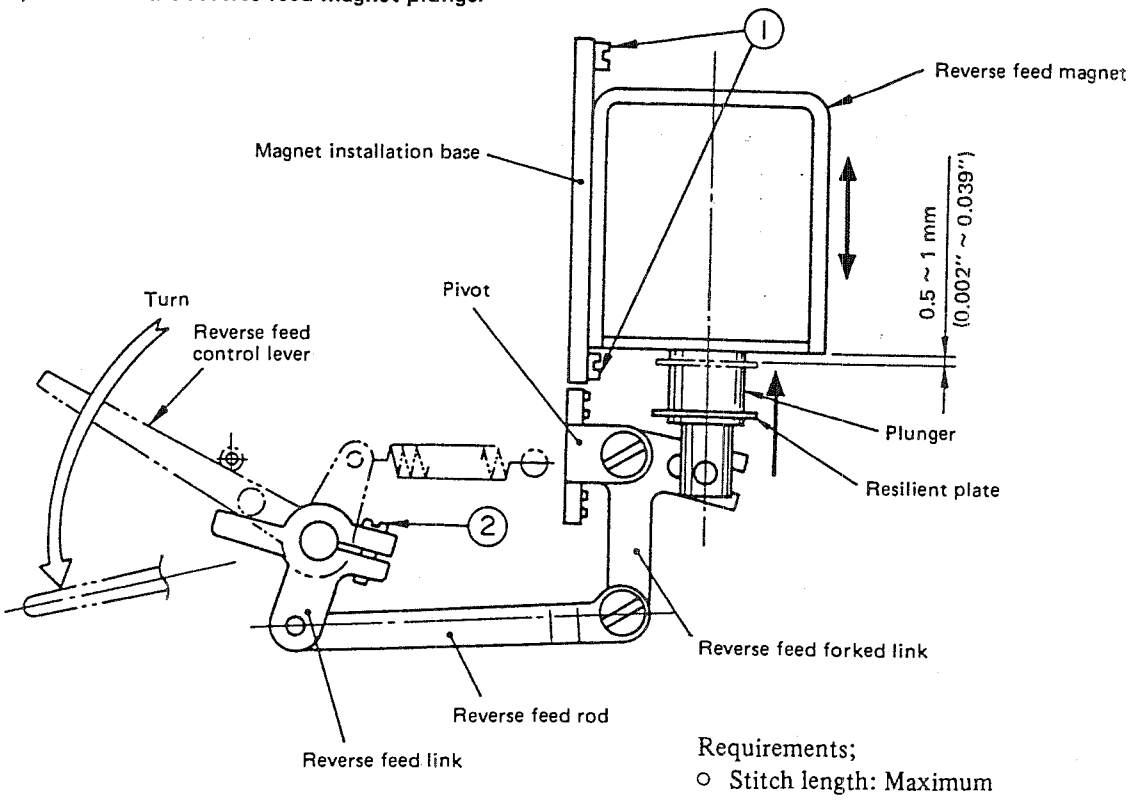


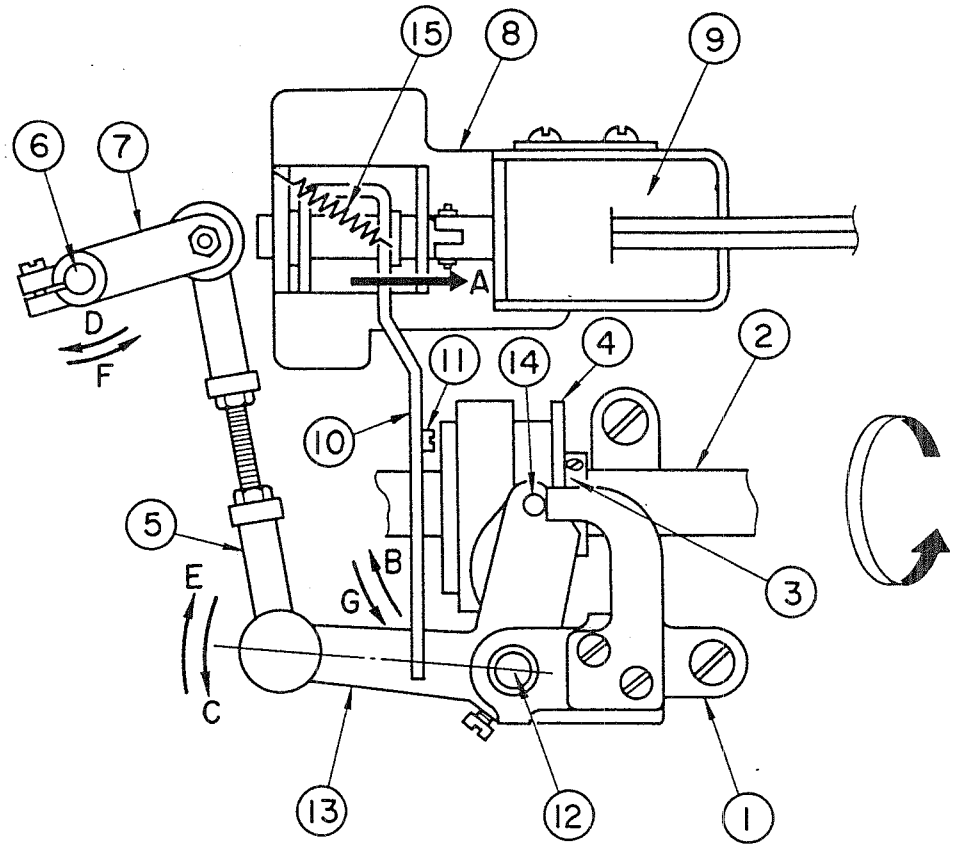
Fig. 32

Requirements;

- Stitch length: Maximum
- There must be a 0.5 to 1.0 mm (0.02"~ 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.

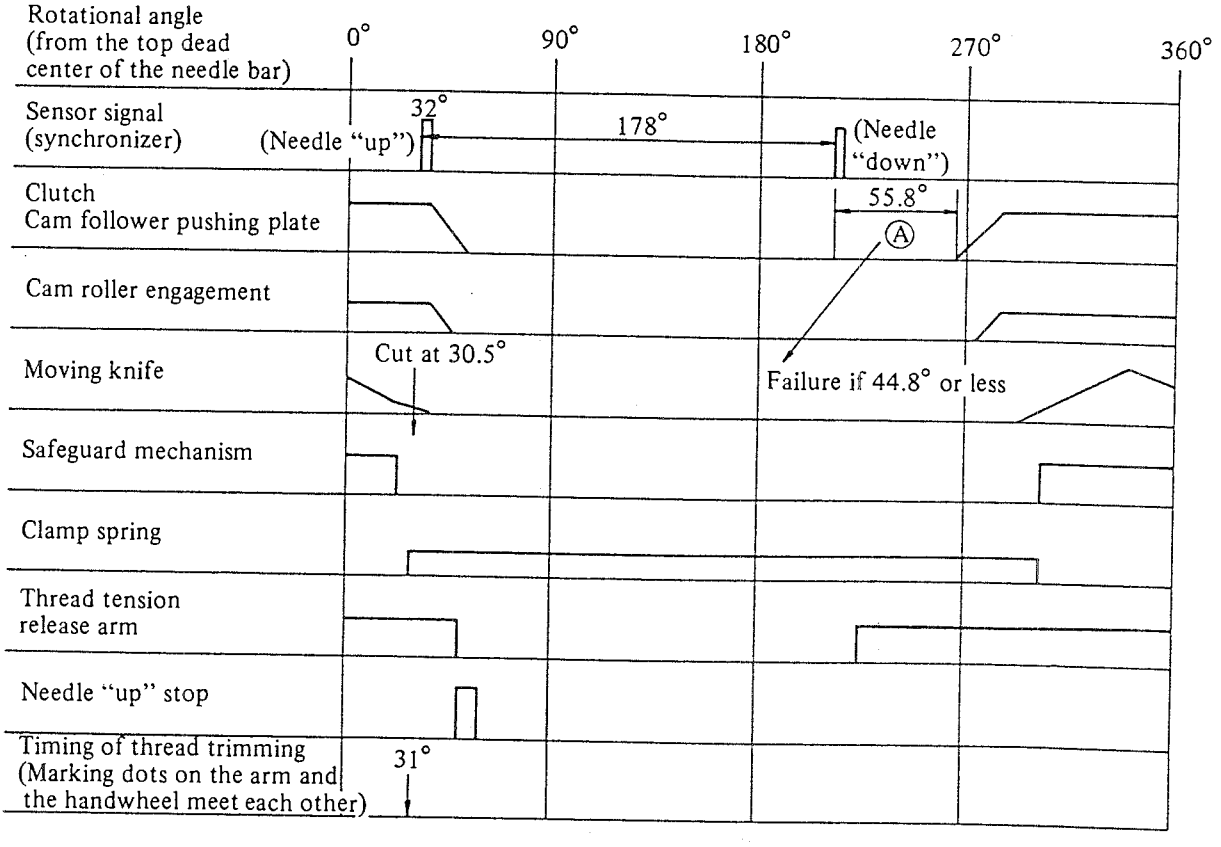
How to Adjust	Effects of Adjustment
1. Set the stitch length to the maximum. 2. Loosen screws ① to release the magnet installation base. 3. Turn the reverse feed control lever downwards as far as it will go and fix the reverse feed magnet installation base in the position where a 0.5 to 1.0 mm (0.02″~0.039″) clearance is provided between the bottom face of the magnet and the resilient plate attached to the plunger.	If the clearance is too great; o The automatic reverse feed mechanism may fail to work due to insufficient stroke of the plunger. If the clearance is too small; o The stitch length in the reverse feed becomes smaller that the set stitch length.

4. DESCRIPTION OF THE THREAD TRIMMER COMPONENTS



Structure viewed from the bottom

Fig. 33



1. When current flows into thread trimmer magnet ⑨ , the plunger is pulled in the direction of "A".
2. As the plunger is pulled, actuator screw ⑪ attached to cam follower pushing plate ⑩ , which is fixed to the plunger, engages with the side face of thread trimmer cam ④.
3. Cam follower pushing plate ⑩ is turned in the direction "B" by the cam causing cam follower ⑬ to move in the axial direction of cam follower shaft ⑫ . 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 ④ to rock cam follower ⑬ in the direction "C".
5. Rocking motion of the cam follower is transmitted via joint rods ⑤ and ⑦ to drive moving knife shafts ⑥ in the direction "D".
6. When the cam roller arrives at the rear end of the guide groove on the thread trimmer cam ④, cam follower ⑬ and moving knife shaft ⑥ move in the directions "E" and "F", respectively.
7. When the cam roller arrives the rear end of thread trimmer cam ④, cam follower pushing plate ⑩ is turned in the direction "G". At the same time, the thread trimmer magnet is switched "off" permitting spring ⑮ to pull back cam follower pushing plate ⑩ .
8. When cam follower pushing plate ⑩ goes back to its original position, cam follower ⑬ is pushed back to its original position by a force of spring in the axial direction of cam follower shaft ⑫ .

THREAD TRIMMER COMPONENTS

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
①	10312551	Cam follower installation base (asm) (B)	⑩	10117802	Cam follower pushing plate
②	10108504	Hook driving shaft	⑪	10118305	Actuator screw
③	CS1470710SH	Thrust collar	⑫	10116804	Cam follower shaft
④	10117307	Thread trimmer cam	⑬	10116754	Cam follower (asm)
⑤	10116507	Joint rod	⑭	D2428555B00A	Cam roller shaft
⑥	10116051	Moving knife shaft joint	⑮	B2037372000	Spring
⑦	10312700	Rocking arm			
⑧	10117851	Cam follower pushing plate (asm)			
⑨	10117604	Thread trimmer magnet			

5. HOW TO DISASSEMBLE AND RE-ASSEMBLE THE THREAD TRIMMER UNIT

DISASSEMBLE PROCEDURES (See Fig. 33 and Parts Book.)		NOTES ON RE-ASSEMBLING
Remove the throat plate.		Make sure that the bobbin case stopper rests in the recess of the throat plate.
Remove the fixed knife and the moving knife.	Use an Allen key to loosen the fixed knife setscrew.	See Fig. 24 of 3-(1)-2).
Remove rocking arm ⑦ from moving knife shaft joint ⑥.	Loosen the clamp screw.	See 3-(1)-1).
Remove joint rod ⑤ from rocking arm ⑦ and cam follower ⑬.	Remove the joint rod nut.	Set the length of joint rod ⑤ to 74.5 ± 0.8 mm (2.933" ± 0.031"). (See Fig. 25.)
Remove cam follower pushing plate ⑧.	Remove the two setscrews.	See 3-(1)-6).
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.	See 3-(1)-5), and 7).
Remove moving knife shaft joint ⑥ from the hook driving shaft saddle.	Loosen setscrews which fasten the thrust collar to the moving knife shaft.	See 3-(1)-1).
Remove cam follower installation base (asm) ①.	Remove the two setscrews from the installation base.	Align the center of the screws.

6. HOW TO ADJUST THE LIFTS OF THE PRESSER FOOT AND THE WALKING FOOT

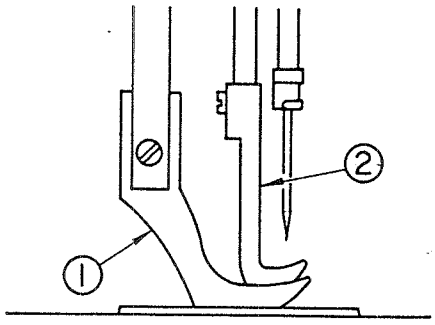


Fig. 34

1. The lifts of presser foot ① and walking foot ② which alternately go up are normally adjusted equally. If the absolute amount of the alternate lift needs to be changed, loosen nut ④, and move the upper feed driving rod up within the slot in upper feed spring rod ③ to increase the absolute lift amount, or move it down to decrease the amount. After adjustment, tighten nut ④.

2. To make the lift of presser foot ① different from that of walking foot ②, bring the soles of both presser foot ① and walking foot ② down to the level of throat plate surface, loosen screw ⑤ of the upper feed spring rod, turn the handwheel toward you, and retighten the screw. This will cause presser foot ① to go up higher than walking foot ②. If the handwheel is turned in the opposite direction from the one stated above, walking foot ② goes up higher than presser foot ①.

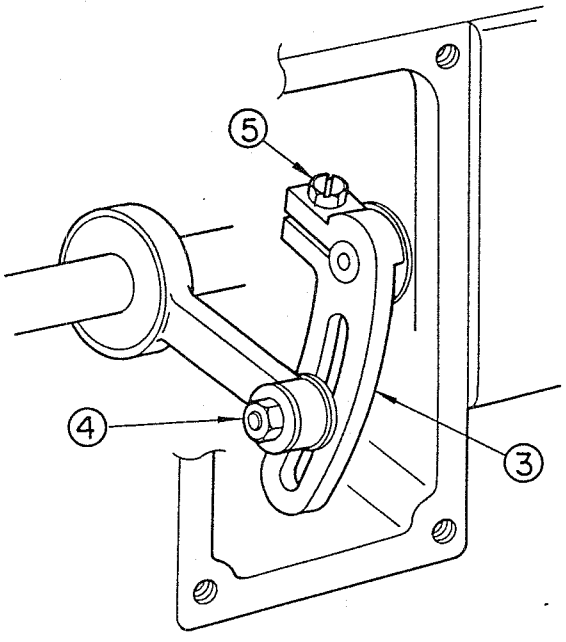


Fig. 35

7. HOW TO REPLACE THE TIMING BELT

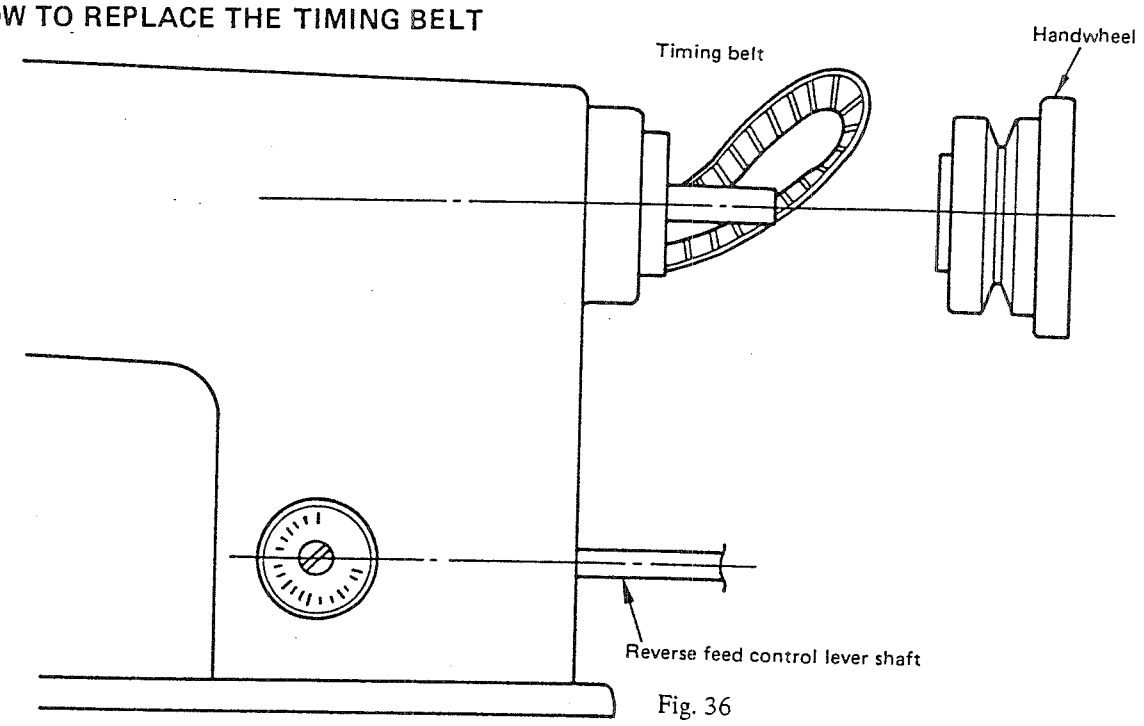


Fig. 36

Reverse feed components

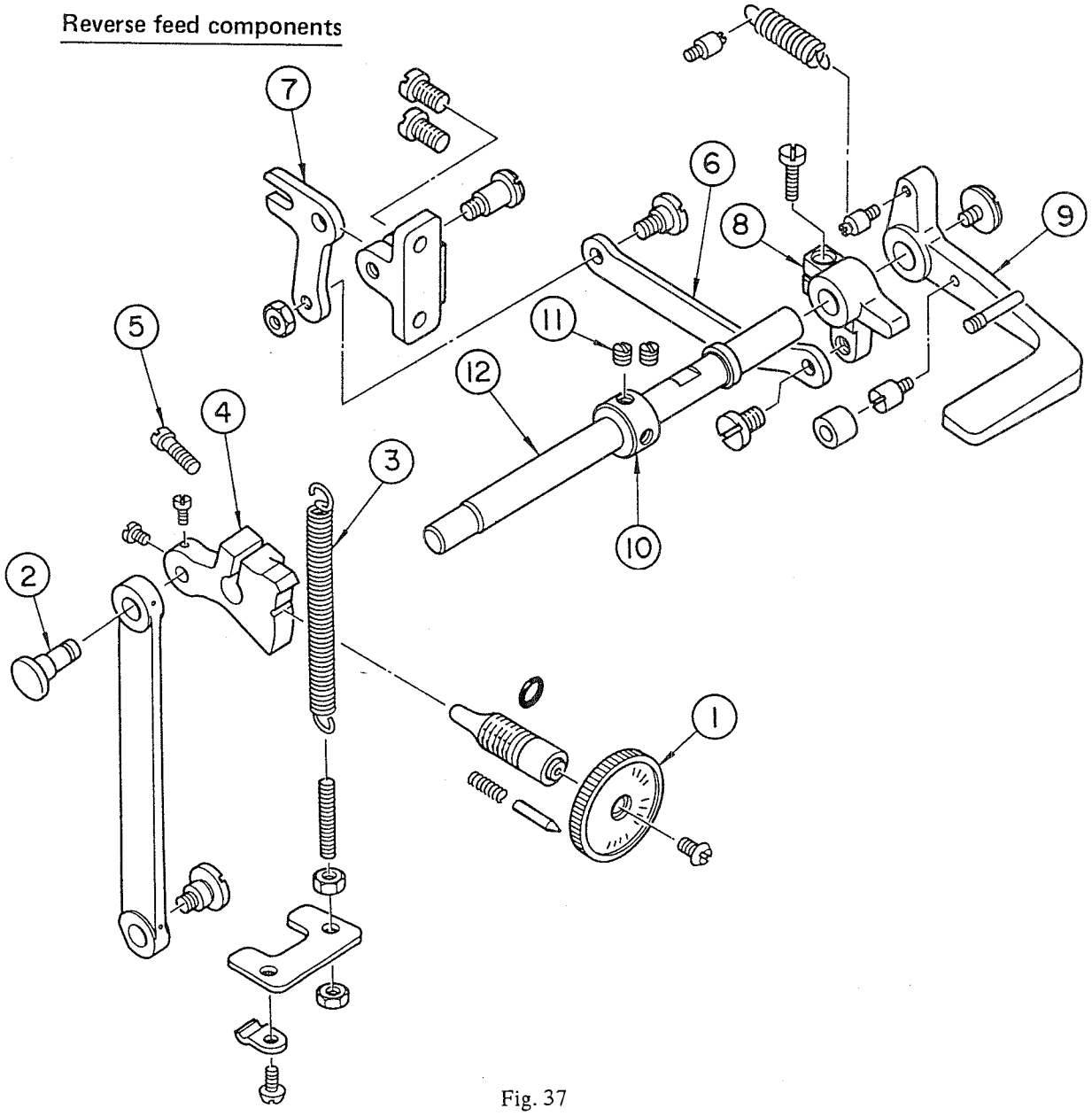


Fig. 37

HOW TO REPLACE	NOTES ON RE-ASSEMBLING
1. Remove the belt cover and the belt. 2. Take the synchronizer from the handwheel. 3. Loosen two setscrews and pull out by hand the handwheel. **(Caution) Don't use hammer to pull out the handwheel.** 4. Set stitch dial ① to the maximum. 5. Disconnect tension spring ③ from feed regulating pin ②. 6. Loosen the fastening screw of feed regulating arm ④. 7. Disconnect reverse feed rod ⑥ from the reverse feed forked link ⑦, and remove reverse feed link ⑧ and reverse feed control lever ⑨. 8. Loosen setscrews ① of thrust collar ⑩ on the reverse feed control lever shaft and pull out reverse feed control lever shaft ⑫. 9. Insert a new timing belt in the machine arm through an opening made by removing the handwheel and engage it with the sprocket wheel on the hook driving shaft.	o When setting the handwheel, take care not to let it bite the O-ring. Tighten the screw No. 1 (in the rotational direction) on the flat face of the shaft. o When inserting the reverse feed control lever, take care not to break the oil seal. o Adjust the timing of the hook driving shaft to the main shaft referring to 2-(7).

8. HOW TO REMOVE THE NEEDLE BAR FRAME

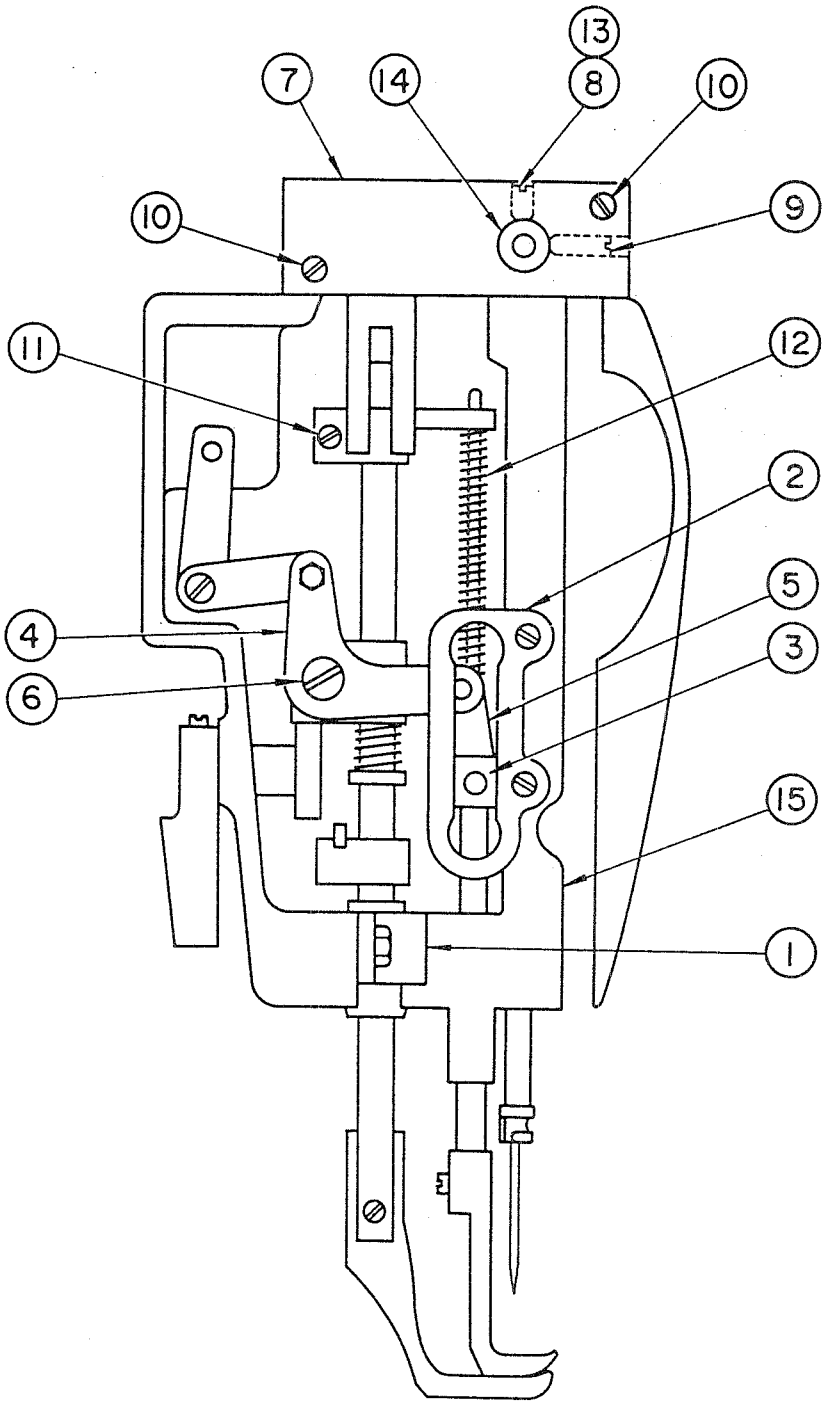


Fig. 38

How to Disassemble	Cautions in Disassembly
1. Remove the needle and the presser foot. 2. Remove needle bar frame guide ①. 3. Remove walking bar guide ② and slide block ③. 4. Remove the oil wick from L-shaped link④and walking bar driving link ⑤. 5. Loosen setscrew ⑥ and remove L-shaped link ④. 6. Loosen setscrews ⑧ and ⑨ to release needle bar frame drive base ⑦. 7. Remove two setscrews ⑩ and remove needle bar frame drive base ⑦. 8. Loosen screw ⑪ and remove spring ⑫ from the forked link. 9. Loosen setscrew ⑬ and remove needle bar frame stud ⑭. 10. Remove needle bar frame ⑮.	

9. HOW TO REMOVE PLAYS IN THE AXIAL DIRECTION

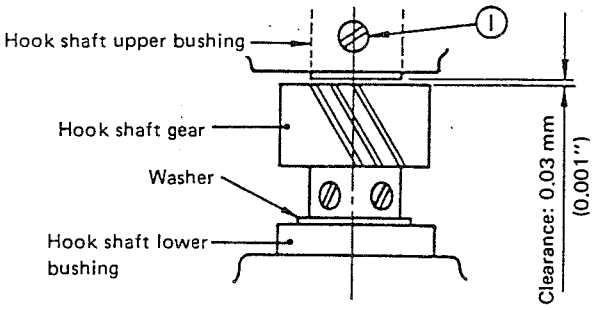


Fig. 40

Requirements;

- Clearance between the hook shaft gear and the hook shaft upper bushing must be 0.03 mm (0.001").

10. SYNCHRONIZER

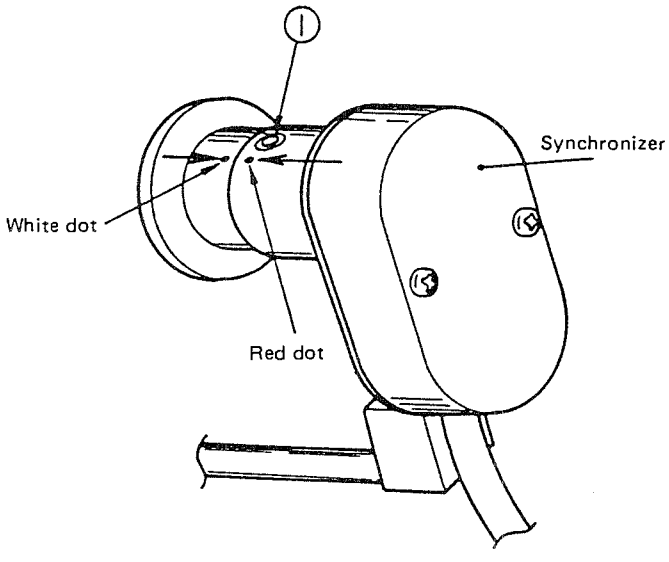
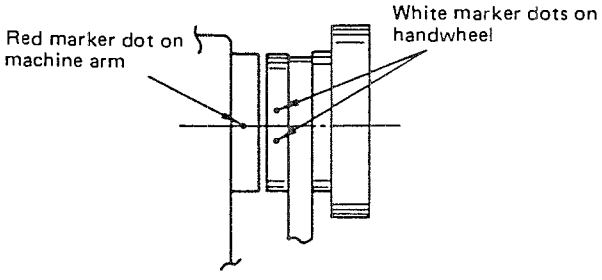
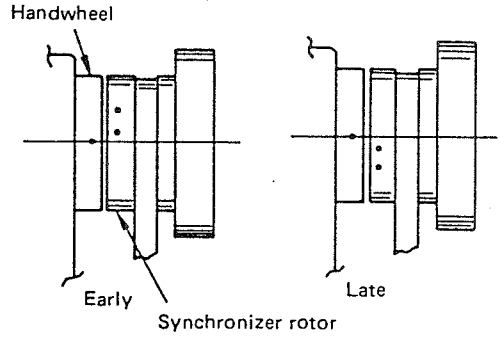


Fig. 41



Requirements;

- The red marker dot on the machine arm is between the two white marker dots on the handwheel when the machine stops with its needle up.

HOW TO ADJUST	EFFECTS OF ADJUSTMENT
Loosen screw ① and provide specified clearance.	○ 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 needle 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, loosen two screws ① on the synchronizer rotor and make fine adjustment.	 Fig. 42 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.

11. TABLE OF SELECTIVE PARTS

Description	Part No.	Tolerance (mm, inch)
Hook shaft gear	10111904	–0.2 ~ –0.1 (–0.008" ~ –0.004")
	10112100	0 ~ +0.1 (0 ~ 0.004")
	10112209	+0.1 ~ +0.2 (+0.004" ~ +0.008")
Hook shaft needle bearing	SB30953010A	0 ~ –0.002
	SB30953010B	–0.002 ~ –0.004
	SB30953010C	–0.004 ~ –0.006
	SB30953010	–0.006 ~ –0.008
Hook shaft upper bushing thrust plate	10109700 Mark 0	1 (0.039")
	10110906 1	1.1 (0.043")
	10111003 2	1.2 (0.047")
	10111102 3	1.3 (0.051")
	10111201 4	1.4 (0.055")
	10109809 5	1.5 (0.059")
	10112506 6	1.6 (0.063")
	10112605 7	1.7 (0.067")
	10112704 8	1.8 (0.071")

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

The following parts are fixed by "Lock-tite" paint (601) after they have been accurately positioned. Therefore, if these parts are disassembled, remove residual paint thoroughly using paint thinner and assemble them applying "Lock-tite" 601 after removing the moisture from the mating surfaces. 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 parts.

- 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.

- Hand lifter pivot support shaft.

13. PARTS FIXED BY BOND OR SEALING MATERIALS

The following parts are fixed or sealed against oil leakage:

Parts	Sealing/Bonding materials
1. Hand lifter shaft O-ring	THREE-BOND 1101
2. Thread take-up cover bottom	THREE-BOND 1101
3. Feeding lever shaft oil seal	Gum-type adhesive agent (for outside sealing)
4. Feed adjusting screw O-ring	THREE-BOND 1101
5. Oil sight window setscrew	THREE-BOND 1101

14. MAINTENANCE PARTS

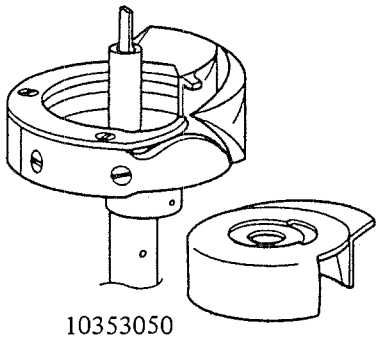
Basic maintenance parts

Part No.	Description	Remarks on installation
	Needle (DP x 17)	○ Direction of the long groove on the needle
*1 10353050 *2 10353016	Hook (asm) (for thread trimming) right	○ See "Needle-to-hook relation" and "Working position of the bobbin case opening lever". ○ See "Needle entry in the needle feed slot" and "Lubrication".
10353605	Bobbin (for thread trimming)	
10211100	Moving knife	○ See "Height of the moving knife" and "Position of the moving and fixed knives".
10312403	Fixed knife	○ See "Position of the thread presser".

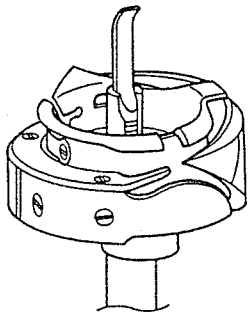
Recommendable maintenance parts

Part No.	Description	Remarks on installation
10112001	Hook shaft gear	○ Tighten three setscrews evenly.
10354504	Bobbin case opening lever	○ See 2-(3).
10116754	Cam follower (asm)	○ See 3-(1)-7).
10117802	Cam follower pushing plate	○ See 3-(1)-6).
10118305	Pushing plate actuator screw	○ See 3-(1)-6).
B3128-051-000	Thread take-up spring (A)	

Hook (for thread trimming) (*1, *2)



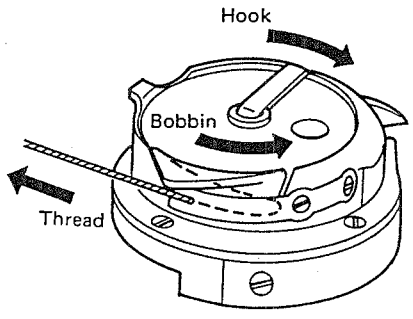
10353050



10353076

15. IMPORTANT CAUTIONS IN ADJUSTMENT

1. When you confirm the correct direction of revolution at the time of installation, don't operate the thread trimmer.
   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 pressure foot, and the feed dog will touch the throat plate.
3. Never remove the feed regulator arm plate (10106707) from the feed regulator base.
4. Screw tightening torque
   1) Fastening screw of the feed regulator base (10315703): 45 ~ 50 kg-cm
   2) Fastening screw of the reverse feed link (Screw ② , Fig. 32): 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 screw driver (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
5. Threading the bobbin case



(Note that the direction of the thread wound on the bobbin is opposite to the revolving direction of the hook.)

Fig. 43

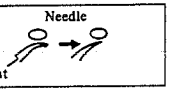
6. Do not move the magnet plate in the synchronizer.

(Note) For the adjustment of the needle-up stop position, see "10 synchronizer".

16. MECHANICAL TROUBLES AND CORRECTIVE MEASURES

TROUBLES	CAUSES	CHECKPOINTS	CORRECTIVE MEASURES	TEST REPORT
Lubricating oil does not circulate.	Oil level in the reservoir is too low.	Check the oil level.	Fill the oil reservoir in the bed between "H" and "L" marks.	
	The oil filter screen is clogged up with dust.		Clean up the oil filter screen.	
No oil appears in the oil sight window.	Filter screen holder is loose.		Tighten the screen holder clamping screw.	
	Oil tube connecting screws are loose.		Tighten the connecting screws.	
	Oil tube is disconnected.		Connect the oil tube securely.	
	Oil tube is broken.		Replace the broken tube.	
	The oil pump plunger is not centered.	Check the oil pump.	Center the oil pump plunger to its opening.	* This trouble may be caused by misalignment of the plunger at the time of repair or maintenance work.
Lubricating oil is not fed to the hook.	Oil does not flow in the oil tube connected to the hook.	Check the oil adjusting screw.	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.	
	The oil adjusting screw is not set properly.		See 2-(8).	
Lubricating oil leaks out.				
Oil leaks from the bottom of the reverse feed control lever.	The oil seal has worn out.		Replace the oil seal.	
Oil comes out from the edge of the bed slide.	Too much oil is fed to the hook.		See 2-(8).	
Oil leaks from the bottom of the thread take-up cover.	Too much oil is fed to the face plate components.		See 2-(8).	
	The sealing on the setscrew has deteriorated.		Apply new sealing agent (THREE-BOND 1101) to the set-screw.	
Oil leaks from the oil sight window setscrew.	The sealing on the setscrews has deteriorated.		Apply new sealing material (THREE-BOND 1101).	
Oil leaks from the knee lifter presser bar	The oil sealing has deteriorated.		Replace the oil sealing.	
Grease may leak from the rear bushing of the main shaft (for a new machine).				

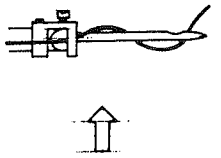
17. STITCH FAILURES AND CORRECTIVE MEASURES

FAILURE	CAUSES	CHECK POINTS	CORRECTIVE MEASURES
1. Thread breaking	Surface of thread path, needle point, hook point, throat plate or bobbin case is not smooth.	Check for the scratched parts.	Remove scratches from the hook point using a fine sandpaper. Make the throat plate slot surface smooth using a buffing wheel.
Thread is untwisted or torn.	Needle thread tension is too high.		Adjust the needle thread tension.
	Clearance between the bobbin case opening lever and the bobbin case is too great.	Check the clearance.	Reduce the clearance (see 2-(3)).
	The hook point hits the needle.	Check the clearance.	See 2-(2)-2).
	Lubricating oil fed to the hook is not enough.	Check the amount of lubricating oil.	See 2-(8).
Thread is broken leaving 20 to 30 mm (0.787"~ 1.181") thread on bottom of the fabrics.	Needle thread tension is too low.		Adjust the needle thread tension (this occurs rather in synthetic fiber thread).
	Thread take-up spring is too tight or its stroke is too small.		Reduce the tension of the thread take-up spring or increase its stroke.
	Needle-to-hook timing is wrong.	Check the marker lines on the needle bar.	See 2-(2).
2. Stitch skipping	Clearance between the needle and the hook point is too great.	Check the clearance.	See 2-(2)-2).
	Needle-to-hook timing is wrong.	Check the marker lines on the needle bar.	See 2-(1)-1), -2), -3), and 2-(2).
	Presser foot does not press the materials (insufficient presser foot pressure).	Check the pressure of the presser foot.	Tighten the presser spring regulator screw.
	Height of the needle bar is wrong.	Check the needle bar height at its lowest point.	See 2-(1)-2).
	Hook point is blunt.	Check the hook point.	Make the hook blade straight and sharp or replace the hook. 
	Needle guard on the hook is insufficient.	Check the clearance between the needle and the hook needle guard.	See 2-(2)-2).
	Needle size is not suitable.		Replace the needle by thicker one.

TEST REPORT

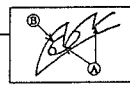
* If thread breaking or stitch skipping occurs frequently with synthetic fiber thread

1) Wind the thread once on to the needle.



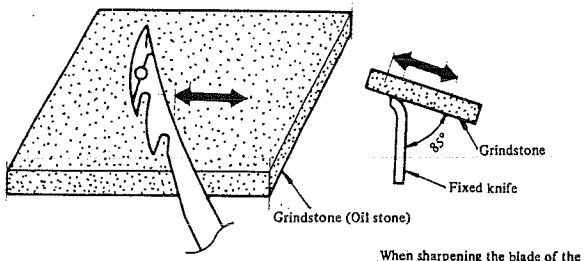
TROUBLES	CAUSES	CHECK POINTS	CORRECTIVE MEASURES	TEST REPORT
3. Loose stitch (balloon or looped stitch)	Bobbin case is threaded faultily.	Check that the thread passes through the forked tension spring on the bobbin case.	Thread the bobbin case correctly.	* If this trouble frequently happens; 1) Smooth the thread path. 2) Reduce the clearance between the bobbin case opening lever and the bobbin case to 0.15 or 0.2 mm (0.005" ~ 0.008"). But, don't reduce the clearance too much, or it may break the bobbin case.
	Thread path is not smooth or has burrs.	Check each thread path.	Sand the rough surface with a fine sandpaper or a buffing wheel.	
	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.	Replace the bobbin or hook.	
	Clearance between the bobbin case opening lever and the bobbin case is too great.	Check the clearance.	See 2-(3).	
	Clearance between the bobbin case stopper and the throat plate is too small.	Check the clearance.	See 2-(4).	
4. Irregular stitch	Bobbin case is threaded wrongly.	Check if the thread passes through the tension spring (at the forked end) on the bobbin case.	Thread the bobbin case correctly.	* Generally, when the needle thread "leaps", it forms unfavorable stitches. This phenomenon can be reduced or avoided by; 1) Reducing the clearance between the bobbin case opening lever and the bobbin case 2) Letting the bobbin spin freely in the bobbin case.
	Thread path is not smooth.	Check the thread path.	Smooth the thread path using a fine sandpaper or buffing wheel.	
	Bobbin does not spin smoothly in the bobbin case.	Draw the bobbin thread by hand and check if it comes out smoothly from the bobbin case.	Replace the bobbin or the hook.	
	Clearance between the bobbin case opening lever and the bobbin case is too great.	Check the clearance.	See 2-(3).	
	Bobbin thread tension is too low.		Adjust the tension spring on the bobbin case.	
	Bobbin is wound up too tight (especially synthetic fiber thread).	Check the tightness of the thread in the bobbin.	Wind the bobbin with an adequate tension.	
	Thread take-up spring does not work synchronously with the hook.	Check how far the take-up spring moves away from its initial position when the hook has drawn out the thread most.	Adjust the thread take-up spring to make it move about 1 mm (0.039") from its initial position when the hook has drawn out the thread most.	
	Clearance between the bobbin case stopper and the throat plate is too small.	Check the clearance.	See 2-(4).	
	In machine with thread trimmer, the racing-proof spring has been installed when the racing-proof cloth should be installed.	Use the racing-proof spring for synthetic fiber thread, and the racing-proof cloth for other threads.	Replace with the racing-proof spring (10111508) or racing-proof cloth (10208106) as required.	

18. MECHANICAL TROUBLES OF ATTACHMENTS AND CORRECTIVE MEASURES

TROUBLES	CAUSES	CHECK POINTS	CORRECTIVE MEASURES
AUTOMATIC THREAD TRIMMER			
1. Thread slips from the needle eye at the end of thread trimming action.	Tension post No. 1 is too tight.	Check the thread tension.	Reduce the thread tension applied by the tension post No. 1.
	Thread trimmer works too early.	Check the marker spots on the hand-wheel and the position of the thread trimmer cam.	See 3-(1)-5).
	Thread tension disc does not "float" sufficiently.	Check the clearance between the tension discs when releasing the thread.	
	The needle thread gets into the bobbin thread catching groove of the moving knife.	Check the initial position of the moving knife.	See 3-(1)-2).
2. Thread slips from the needle eye at the start of sewing.	Thread left in the needle eye is too short to start.		
	The thread tension post No. 1 is too tight.	Check the thread tension.	Reduce the tension.
	Tension discs does not "float" sufficiently to release the thread.	Check the clearance between the tension discs when releasing the thread.	
	Bobbin thread clamp spring is too weak.		See 3-(1)-4).
	Clamp spring is set in a wrong position.		See 3-(1)-3).
3. The first several stitches are not made.	Bobbin thread is not held positively.	Check if the bobbin thread is held or not.	See 3-(1)-2), 3-(1)-3) and 3-(1)-7).
	Bobbin thread tension is too low.		Increase the bobbin thread tension.
	Timing of the needle-up stop is too early.	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.	See 10. "Synchronizer"
	 The moving knife has edges at A and B.		Using a fine sandpaper or diamond file, remove the edges at A and B with care taken to the moving knife blade.
4. The thread breaks at stitching start after thread trimming.	The thread remaining on the needle is too long.	Check the tension of the thread tension controller No. 1	Increase the tension of the thread tension controller No. 1.

	TROUBLES	CAUSES	CHECK POINTS	CORRECTIVE MEASURES	TEST REPORT
5.	The thread trimmer fails to trim the bobbin thread when sewing stiff material in a large stitch length.	The presser foot was lifted before thread trimmer was actuated.	Check the operation timing of the knee lifter in relation to the thread trimming action.	Be sure to lift the presser foot after thread trimming has been completed.	
		The material was carelessly pulled to the left or prevented from advancing.	Check for correct material holding.	Set the material as free as possible at the time of thread trimming.	
		The moving knife failed to catch the bobbin thread.	Check to see if the point of the moving knife falsely pulls out the bobbin thread.	Sharpen the blade point of the moving knife.	
			Check the tension of the bobbin thread.	Increase the tension of the bobbin thread.	
		The thread slips off the moving knife at the time of thread trimming.	Check the tilt of the thread with respect to the moving knife.	See 3-(1)-2).	
6.	Thread trimmer does not cut the thread sharply (whiskered end).	Moving knife blade does not fit the fixed knife blade.	Position of the moving knife.		
		Knife blade is blunt.	Blades of the moving knife and fixed knife.	See 3-(1)-1), 3-(1)-2), and 3-(1)-3. Adjust or replace the moving knife or fixed knife.	
		Moving knife slants.	Motion of the moving knife blade (up and down).	See 3-(1)-1).	
		The clearance between the feed dog and the moving knife is not enough.	Clearance between the needle and the hook point.	See 2-(2)-2).	
7.	Thread trimmer does not cut the thread (fails to catch the thread).	Initial position of the moving knife is wrong.	Distance from the top end of the moving knife to that of the fixed knife.	See 3-(1)-2).	
		Needle entry point is wrong.	Distance from the needle bar to the presser bar.	See 2-(1)-1) and 2-(1)-3).	
		Moving knife does not come back to the fixed knife.	Thread trimming timing.	See 3-(1)-5).	
		Moving knife moves too much after trimming.	Position of the safeguard stopper.	See 3-(1)-7).	
		Timing of thread trimming is wrong.	Marking dot on the handwheel and thread trimmer cam position.	See 3-(1)-5).	
		Moving knife does not work.	Thread trimmer cam driving mechanism.	See 3-(1)-6).	
		Clutch fails to work.			
		The synchronizer timing is bad.	Alignment of the marker dots.	See 10. "Synchronizer"	

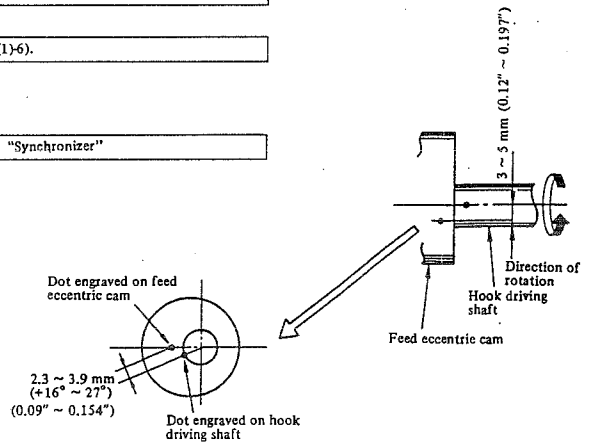
* How to sharpen the moving knife blade.



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 grindstone 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.)

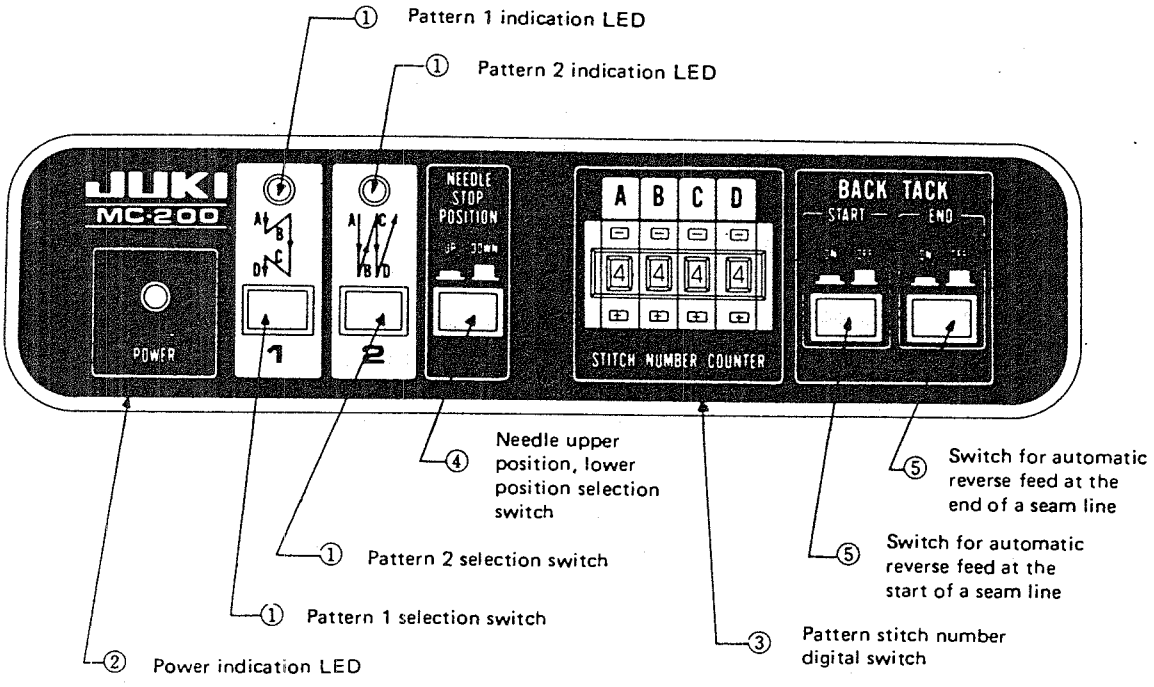


TROUBLES	CAUSES	CHECK POINTS	CORRECTIVE MEASURES	TEST REPORT
AUTOMATIC AND ONE-TOUCH TYPE REVERSE FEED MECHANISM				
1. Number of stitches preset by the stitch counter differs from the actual number of stitches.	Some of the components are interfered.	Connection between the plunger and the feed regulator.	Remove the cause of interference.	
	Spring to pull the feed regulator base is too tight.	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 stopping.	Reduce the tension of the spring.	
	Stroke of the reverse feed magnet plunger is too great.	Clearance between the bottom face of the magnet and the resilient plate attached to the plunger (standard; 0.5 to 1.0 mm (0.020" ~ 0.039")	See 3-(2)-1).	

19. ELECTRIC COMPONENTS

(1) Function of each switch on the CPU panel

CPU box panel



1) Pattern selection switches and pattern indication LED

- There are two basic stitching patterns; automatic reverse feed stitching 1, and Z pattern 2.
- A stitching pattern can be set by the pattern 1 selection switch or pattern 2 selection switch, and the selected pattern is shown by the pattern 1 indication LED or pattern 2 indication LED.
- A stitching pattern can not be changed during a pattern stitching period. Accordingly, a stitching pattern change should be made only when the power switch is turned on, or while the machine is in halt after completion of thread trimming.
- When the power switch in turned on, the automatic reverse feed stitching 1 is automatically set. Therefore, when performing the Z pattern 2 stitching immediately after the power switch is turned on, depress the pattern 2 selection switch without fail before starting the machine. If the Z pattern 2 is automatically set when the power switch is turned on, it may be due to the failure of the pattern 2 selection switch. However, it is possible to switch to the automatic reverse feed stitching 1, and to run the machine.

2) Power indication LED

- When the power switch is turned on, the power indicator lamp lights up.

3) Pattern stitch number digital switch

- The number of stitches for the automatic reverse feed, and Z pattern can be set from 0 to 9 stitches for A, B, C, and D, respectively by these switches. Depress [+] and [—] buttons according to stitching specifications.

4) **Needle upper position, lower position selection switch**

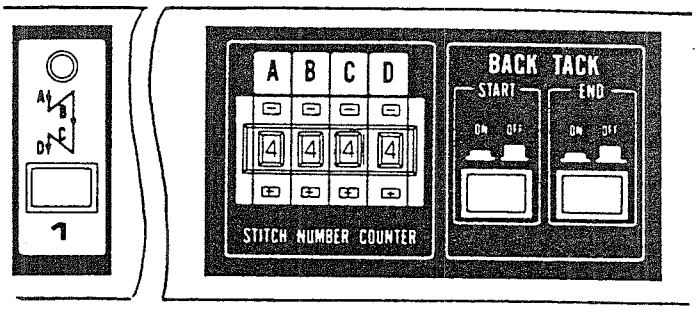
- The needle position (up or down) when the pedal is set at the neutral position can be easily changed by these switches.
- For this machine (LU-1114-5-2B), set the needle-up/down stop selector switch to needle-up stop.
- When the machine has been set so that it stops with its needle at the upper position, thread trimming action can be performed by treading on the pedal backward. In this case, the needle bar goes down once before the thread trimming action takes place.
- Even when the machine has been set to the needle-up stop, the point of the needle at its upper position may slightly enter an extremely heavy-weight material. This, however, does not occur at the time of needle-up stop after thread trimming.

5) **Automatic reverse stitching switch**

- The automatic reverse feed at the start or end of a seam line can be selected by operating the "ON" and "OFF" switches on the CPU box panel.
- During A stitching period of the reverse feed at the start, and D stitching period of the reverse feed at the end of a seam line, the one touch reverse feed switch is inoperative.

(2) How to operate the switch

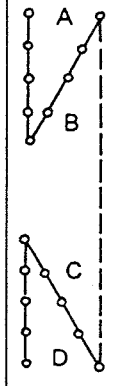
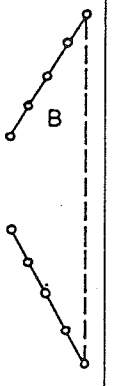
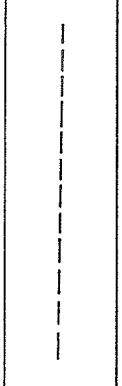
[Automatic reverse feed stitching]



1) The automatic reverse feed stitching is provided by depressing the Pattern 1 selection switch on the CPU box panel.
2) The automatic reverse feed stitching at the start or end of a seam line can be set by operating the "ON" and "OFF" switches.

3) The number of stitches for each of A to D can be set by depressing [+] and [−] buttons. Refer to the table "Number of stitches vs. Stitching pattern".
4) The machine runs automatically at a fixed speed during the reverse feed period at the start or end of a seam line.

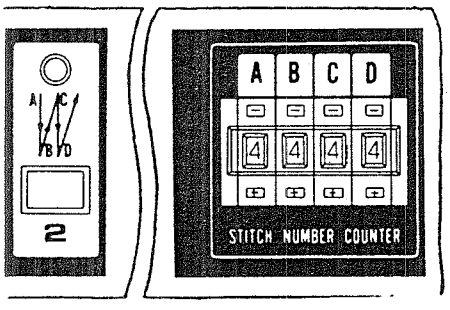
"Number of stitches vs. Stitching pattern"

A	1 ~ 9	1 ~ 9	0	1 ~ 9
B	1 ~ 9	1 ~ 9	1 ~ 9	0
C	1 ~ 9	1 ~ 9	1 ~ 9	0
D	1 ~ 9	0	0	1 ~ 9
Stitching pattern				

Note:

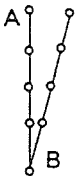
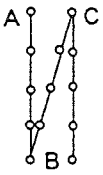
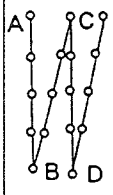
1. The one touch reverse feed switch is inoperative during A stitching period of the reverse feed at the start, and D stitching period of the reverse feed at the end of a seam line.
2. When the pedal is trodden backward (heel down) for thread trimming during A and B stitching periods of the reverse feed at the start, or within 2 stitches after completion of the reverse feed at the start of a seam line, the machine will proceed directly to thread trimming action without carrying out the reverse feed at the end of a seam line even when the switch for reverse feed at the end of a seam line has been set to "ON".
3. When the switch for reverse feed at the start has been set to "OFF", and when the pedal is trodden backward for thread trimming within 3 stitches from the start, the machine will proceed directly to thread trimming action without carrying out the reverse feed stitching at the end of the seam line even when the switch for reverse feed at the end has been set to "ON".
4. When the number of stitches has been set to B=0, the machine will start normal stitching without any reverse feed stitching at the start. In case of C=0, thread trimming action takes place without reverse feed stitching at the end of a seam line.

[Z pattern]



1) The Z pattern stitching is set by depressing the Pattern 2 selection switch on the CPU box panel.
2) The number of stitches for each of A to D can be set by depressing [+] and [−] buttons.
Refer to the table "Number of stitches vs. Stitching pattern".

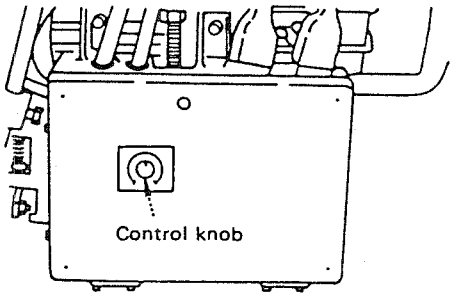
"Number of stitches vs. Stitching pattern"

A	1 ~ 9	1 ~ 9	1 ~ 9	1 ~ 9
B	0	1 ~ 9	1 ~ 9	1 ~ 9
C	0	0	1 ~ 9	1 ~ 9
D	0	0	0	1 ~ 9
Stitching pattern				

3) During A to D stitching period, the machine follows the stitching pattern automatically at a constant speed whether the pedal is trodden forward (toe down) or set to the neutral position, and stops after completion of thread trimming.
4) During A to D stitching periods, thread trimming can be done as required by threading on the pedal backward (heel down).

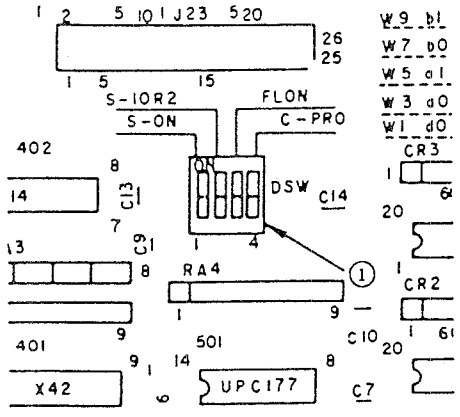
(3) Adjusting the maximum sewing speed

In LU-1114-5, 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.



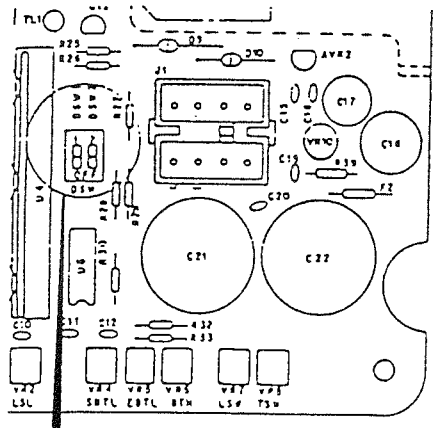
(4) Setting for the soft starting

The LU-1114-5 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 200-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.



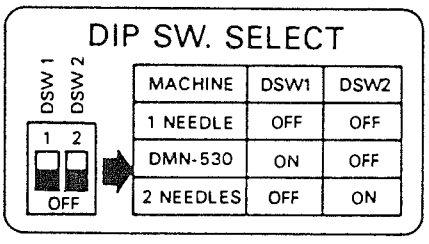
DSW1 (S-ON)	DSW2 (S-10R2)	Number of stitches
OFF	—	(No soft starting)
ON	OFF	(One-stitch soft starting)
ON	ON	(Two-stitch soft starting)

(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 with LU-1114-5, 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.)



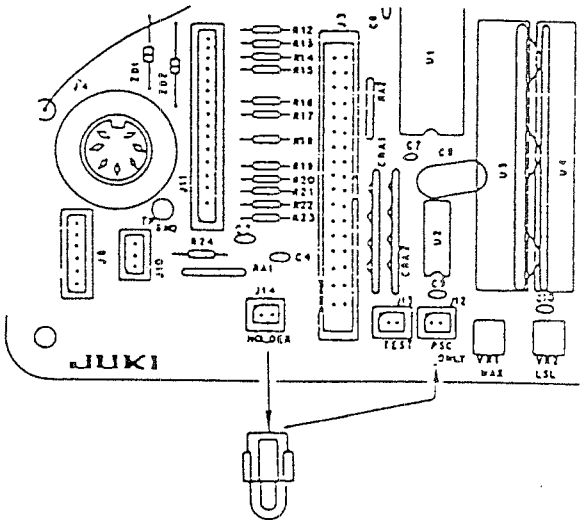
MACHINE	DSW1	DSW2
1 NEEDLE	OFF	OFF
DMN-530	ON	OFF
2 NEEDLES	OFF	ON

(6) Stand-by circuitry

The PSC board 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.

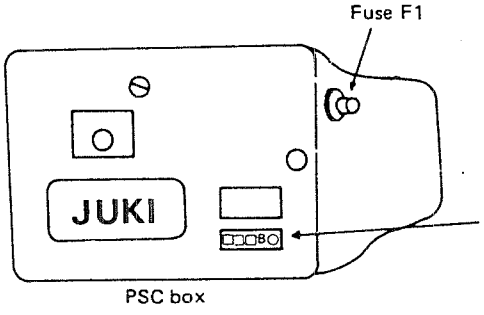


<How to switch to the stand-by circuitry>

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 means 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 needle down. The machine will stop with the needle up, but thread trimming can not be performed even when the pedal is trodden on backward (heel down).
Further, the automatic or one touch reverse feed stitch function does not work.

(7) How to replace the fuse



Fuse F1 (glass-tube fuse)
In case of A 200 V spec. Fuse: 5 A
In case of B 100 V spec. Fuse: 8 A

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 screw-driver.

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.

1 2 3 4 5 (EXAMPLE NO. 2)
100V

NO.	INPUT VOLTAGE	WIRE TERMINAL
1	100V	2 – 3
2	105V	2 – 4
3	110V	1 – 3
4	115V	1 – 4
5	120V	2 – 5
6	130V	1 – 5

INPUT VOLTAGE WIRE TABLE

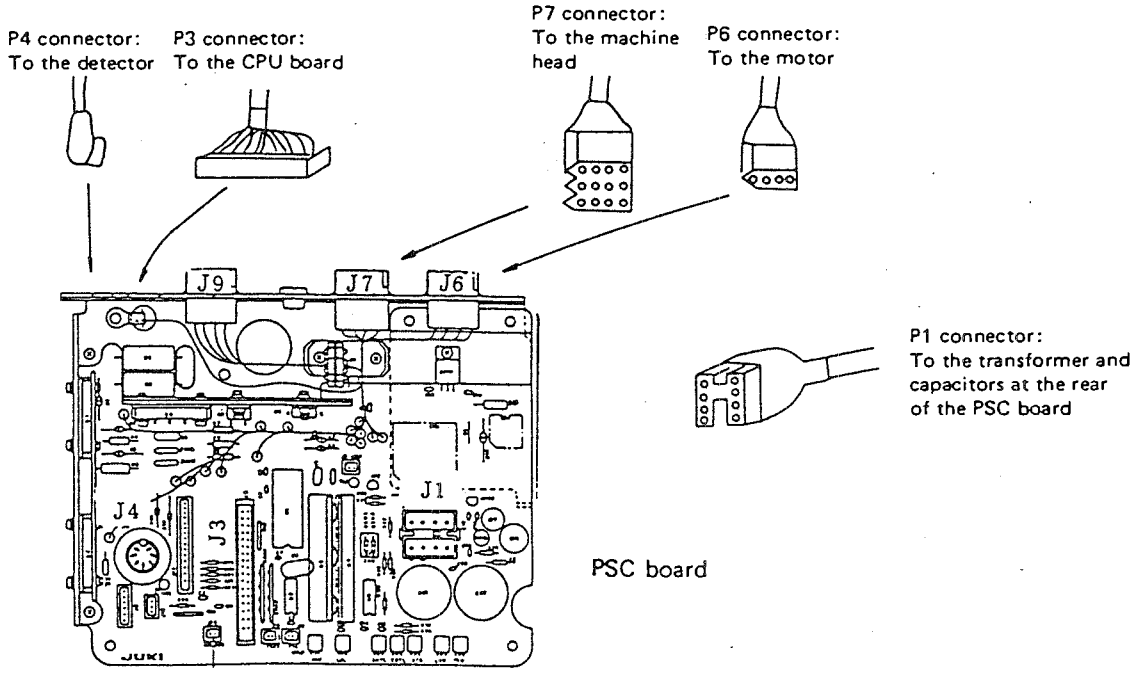
1 2 3 4 5 (EXAMPLE NO. 2)
200V

NO.	INPUT VOLTAGE	WIRE TERMINAL
1	190V	2 – 3
2	200V	1 – 3
3	220V	2 – 4
4	230V	1 – 4
5	240V	2 – 5
6	250V	1 – 5

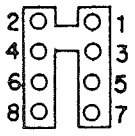
INPUT VOLTAGE WIRE TABLE

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 (LU-1114-5-2B)



(P1 connector)



1 – 3: 9VAC

2 – 5: 24VAC

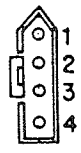
6 – 7: To C1 capacitor

4 – 8: To C2 capacitor

7. GND

8. GND

(P6 connector)



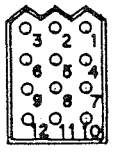
1. CL. COM
2. CL. DR

CL. solenoid: Approx. 12Ω,
Working voltage ... Approx. 34VDC

3. BR. COM
4. BR. DR

BR. solenoid: Approx. 3Ω,
Working voltage ... Approx. 34VDC

(P7 connector)



1. BT. SW
2. BT. RTN

B.T. switch

7. BT. COM
8. BT. DR

B.T. solenoid: Approx. 5Ω,
Working voltage ... Approx. 34VDC

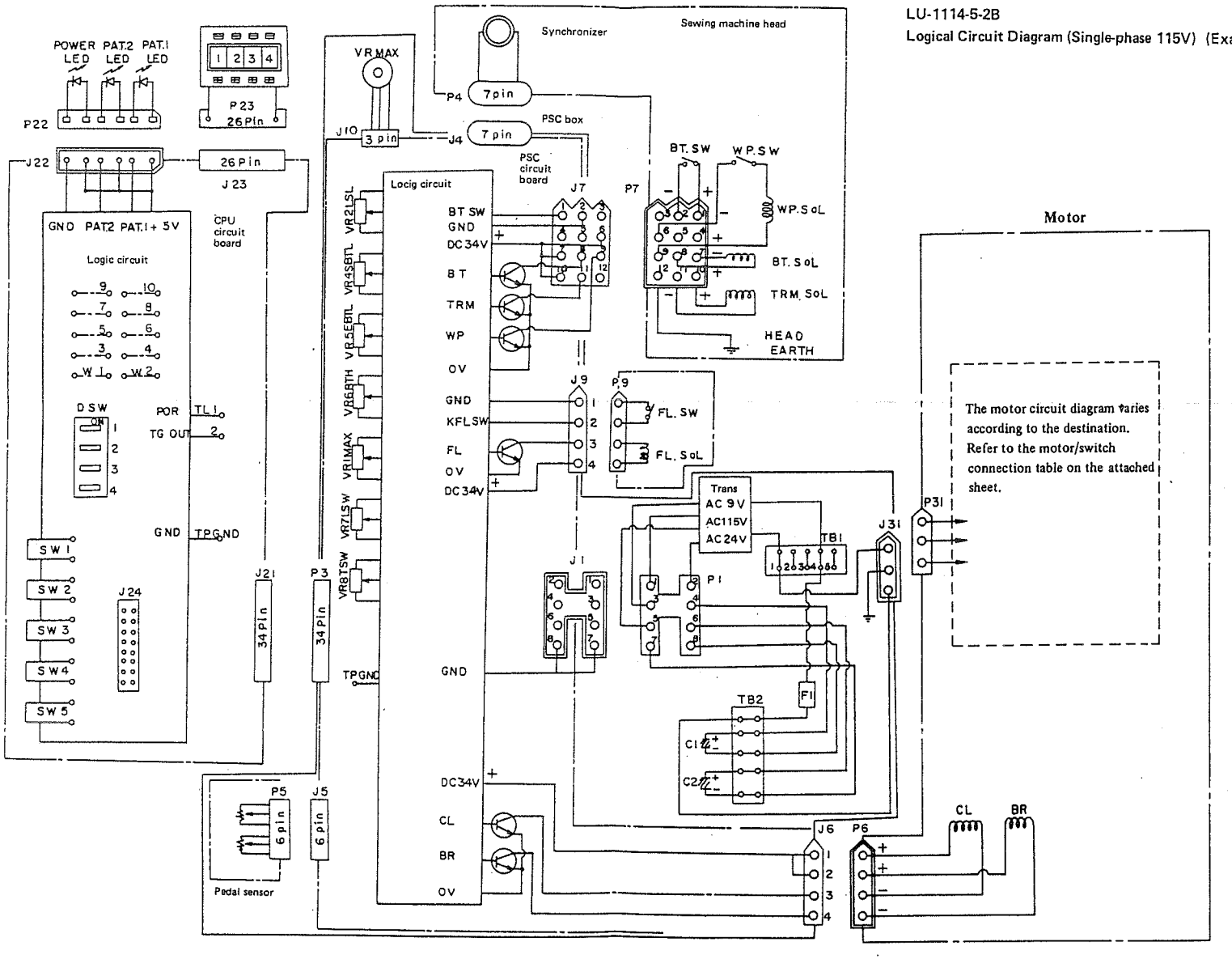
10. TRM. COM
11. TRM. DR

TRM solenoid: Approx. 11Ω,
Working voltage ... Approx. 34VDC

12. HEAD EARTH

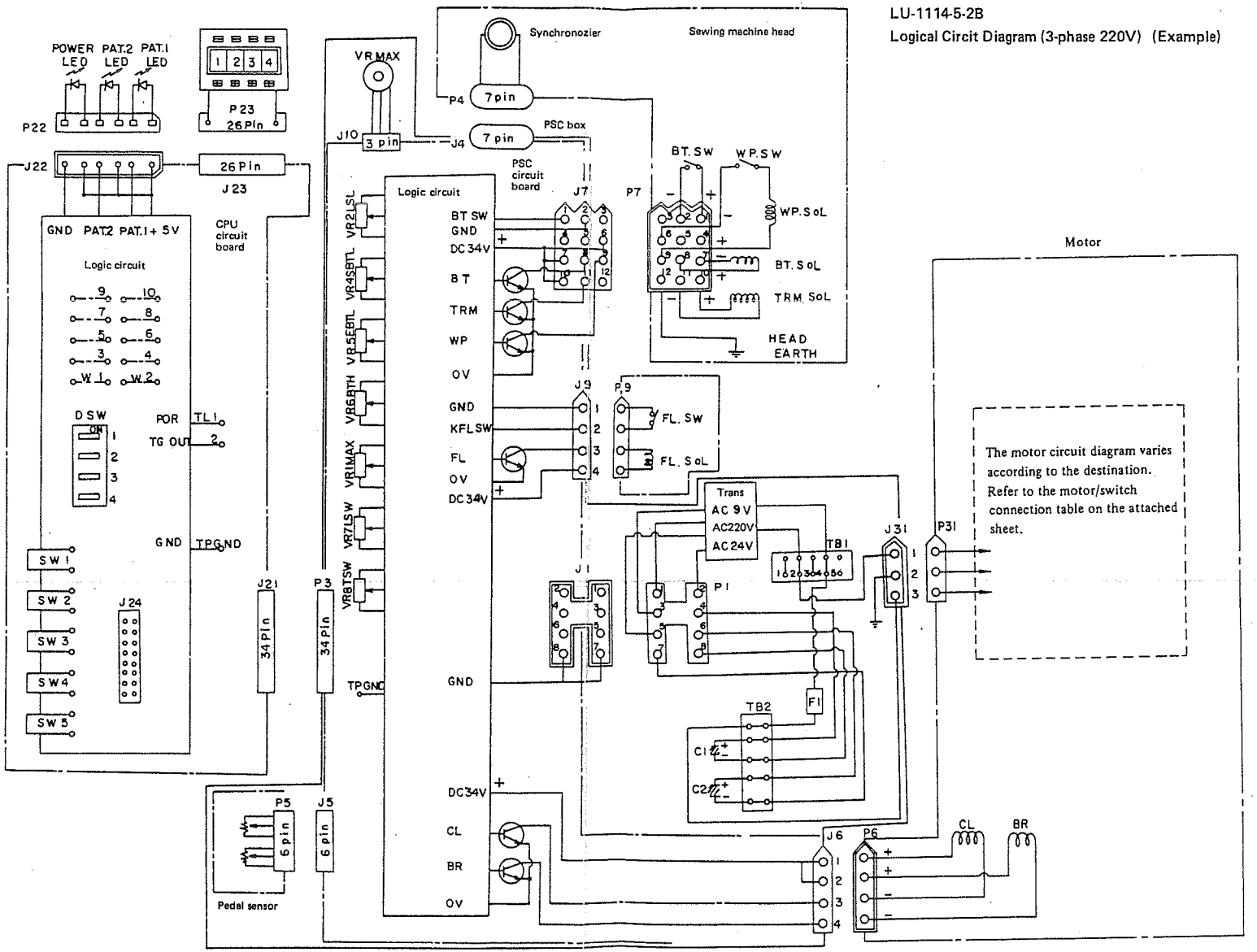
LU-1114-5-2B

Logical Circuit Diagram (Single-phase 115V) (Example)



LU-1114-5-2B

Logical Circit Diagram (3-phase 220V) (Example)



DIMENSIONS OF THE MACHINE TABLE (LU-1114-5)

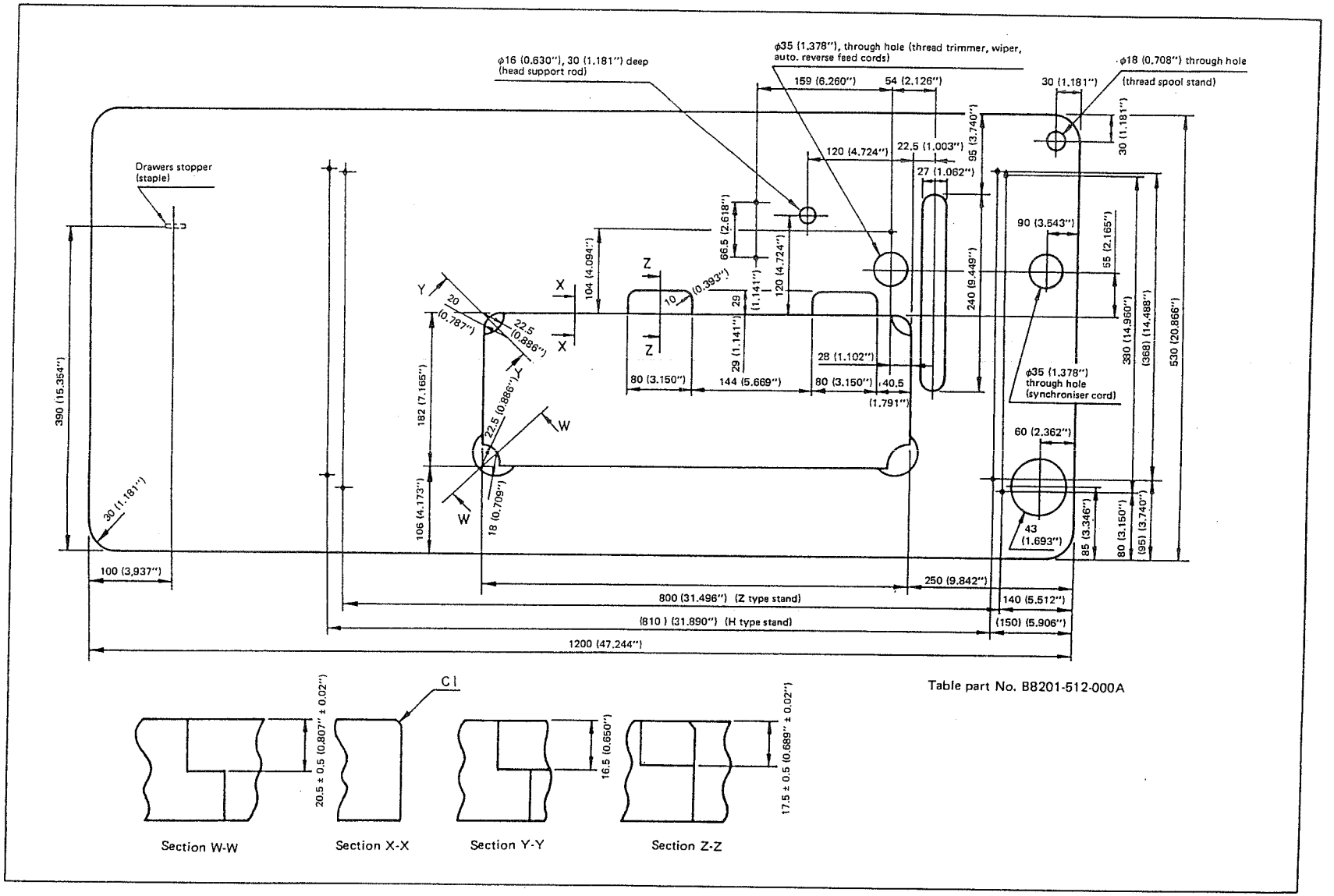


Table part No. B8201-512-000A