

JUKI®

PLC-1610

PLC-1610-7

PLC-1660

PLC-1660L

PLC-1660-7

PLC-1665

PLC-1690

ENGINEER'S MANUAL

29317104

No.00

PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the machine.

The Instruction Manual for these machines intended for the maintenance personnel and operators at an apparel factory contains operating instructions in detail. And this manual describes "Standard Adjustment", Results of Improper Adjustment", and other important information which are not covered by the Instruction Manual.

It is advisable to use the relevant Instruction Manuals and Parts Lists together with this Engineer's Manual when carrying out the maintenance of these machines.

In addition, refer the motor of the sewing machine with thread trimmer to the Instruction Manual and Engineer's Manual for the SC-11. Also, refer the control panel to the Instruction Manual for the CP-30 series and Installation Manual for the control panel.

This manual gives the "Standard adjustment" on the former page under which the most basic adjustment value is described and on the latter page the "Results of improper adjustment" under which stitching errors and troubles arising from mechanical failures and "Adjustment procedures" are described.

CONTENTS

1. SPECIFICATIONS	1	1) Upper / lower position of the moving knife	23
2. STANDARD ADJUSTMENT	3	2) Position of the counter knife	23
(1) Clearance between the throat plate and the inner hook stopper	3	3) Position of the cam installing link stoppers (A) and (B)	25
(2) Longitudinal position of the feed dog	3	4) Position of the thread trimmer cam and the thread trimming timing	27
(3) Needle entry	5	5) Position of the moving knife	29
(4) Height of the needle bar	7	6) Clamp spring	29
(5) Needle-to-hook timing	9	7) Position of the thread trimmer solenoid	31
1) Needle bar raising amount	9	8) Position of the reverse feed solenoid	31
2) Clearance between the needle and the blade point of hook	9	9) Adjusting the height of the auto lifter	33
3) Position of the needle and the blade point of the hook	11	10) Installing the synchronizer	33
(6) Bobbin case opening lever	11	4. PLACES WHERE LOCK-TITE PAINT IS USED	35
(7) Height of the feed dog	11	5. CONSUMABLE PARTS LIST	35
(8) Feed timing	13	6. TROUBLES IN SEWING AND CORRECTIVE MEASURES	36
1) Horizontal feed timing	13	7. TROUBLES WITH THREAD TRIMMER FUNCTION AND CORRECTIVE MEASURES	41
2) Vertical feed timing	13	8. TABLE OF EXCHANGING GAUGE PARTS FOR RESPECTIVE MODELS	44
3) Upper feed timing	15	(1) PLC-1660, PLC-1660L, PLC-1660-7	44
(9) Needle sway	15	(2) PLC-1665	45
(10) Normal and reverse feed stitching itches	17	(3) PLC-1610, PLC-1610-7	46
(11) Upper and lower positions of the needle bar frame	17	9. DRAWING OF THE TABLE	47
(12) Dimension of the needle stop adjusting slide stud (asm.)	19	(1) Slant table	48
(13) Position of the changing lever	19	(2) Flat table	49
(14) Safety device	21	(3) Flat table for PLC-1665	50
3. STANDARD ADJUSTMENT OF THE ADDITIONAL UNITS	23		
(1) Thread trimmer unit	23		

1. SPECIFICATIONS

Table 1

Model	PLC-1610	PLC-1660	PLC-1660L
Specifications	1-needle without thread trimmer	2-needle without thread trimmer	2-needle without thread trimmer (for longer stitch length)
Max. sewing speed	2,000 rpm		Stitch length 6 mm or less : 2,000 rpm Stitch length 6 to 10 mm : 1,200 rpm
Max. stitch length	6 mm (both normal and reverse feeds)		10 mm (both normal and reverse feeds)
Needle bar stroke	33.4 mm		
Thread take-up	Slide thread take-up		
Hook	Horizontal hook which is 1.6 times as large as normal hook		
Needle	SCHMETZ 134 x 35R Nm 110 to 160 Standard Nm 140 (#18 to #23 Standard #22)		SCHMETZ 134 x 35R Nm 140 to 200 Standard Nm 180 (#22 to #25 Standard #24)
Thread	#5 to #30		#1 to #8
Lift of presser foot	Auto-lifter : 15 mm Hand lifter : 10 mm		
Auto lifter	Provided as standard (Pneumatic auto-lifter device : AK-116)		
Air pressure, air consumption	0.5 MPa (5kgf / cm ²), 0.3 NI / min		
Amount of alternating vertical movement	2 to 8 mm		
Safety device	Provided as standard		
Bobbin winder	Builtin machine arm		
Weight of machine head	48 Kgf	49 Kgf	

Table 2

Model	PLC-1665	PLC-1610-7	PLC-1660-7
Specifications	2-needle without thread trimmer with organized split needle bars	1-needle with thread trimmer	2-needle with thread trimmer
Max. sewing speed	1,800 rpm	2,000 rpm	
Max. stitch length	6 mm (both normal and reverse feeds)		
Needle bar stroke	33.4 mm		
Thread take-up	Slide thread take-up		
Hook	Horizontal hook which is 1.6 times as large as normal hook		
Needle	SCHMETZ 134 x 35R Nm 110 to 160 Standard Nm 140 (#18 to #23 Standard #22)		
Thread	#5 to #30		
Lift of presser foot	Auto lifter : 15 mm Hand lifter : 10 mm		
Auto-lifter	Provided as standard (Pneumatic auto-lifter device : AK-116)		
Air pressure, air consumption	0.5 MPa (5 kgf / cm ²), 0.3 NI / min		
Amount of alternating vertical movement	2 to 8 mm		
Safety device	Provided as standard		
Bobbin winder	Builtin machine arm		
Weight of machine head	48 Kgf	50 Kgf	51 Kgf
Touch-back	-		
Power source	-		
Power consumption	-		
		Provided as standard	
		Single phase 100V, 3 - phase 200V	
		Rated 400VA (Max. 650VA)	

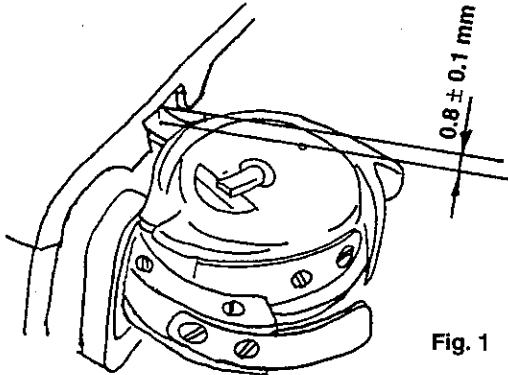
Table 3

Model	PLC-1690
Name of model	1-needle, high-post-bed, unison-feed, lockstitch machine (left hook type)
Max. sewing speed	1,600 rpm (depends on the sewing conditions.)
Max. stitch length	6 mm (both normal and reverse feeds)
Needle bar stroke	38 mm
Thread take-up	Slide thread take-up
Hook	Horizontal hook which is 1.6 times as large as normal hook
Needle	SCHMETZ 134 x 35R Nm 100 to 140 (standard Nm 120)
Thread	#8 to #30 (depends on the sewing conditions.)
Lift of presser foot	Hand lifter : 10 mm Knee lifter : 16 mm
Auto lifter	Optional (pneumatic type auto lifter AK-116)
Air pressure, air consumption	0.5 MPa (5 kgf / cm ²) • 0.3N l / min
Amount of alternating vertical movement	2 to 8 mm
Safety device	Provided as standard
Bobbin winder	Built in machine arm
Weight of machine head	57 kgf
Belt	M type V belt

2. STANDARD ADJUSTMENT

Standard Adjustment

(1) CLEARANCE BETWEEN THE THROAT PLATE AND THE INNER HOOK STOPPER



- Clearance between the top surface of the slot at hook stopping portion of the throat plate and the top surface of the inner hook stopper is 0.8 ± 0.1 mm.

- Setting dimension of the eccentric roller (reference)

PLC-1660 / 1660L / 1660-7 / 1665

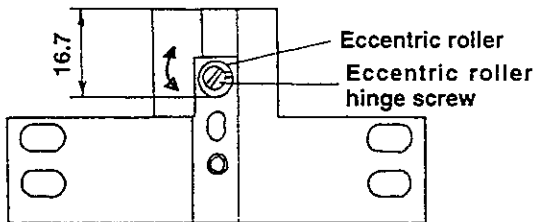


Fig. 2

PLC-1610 / 1610-7

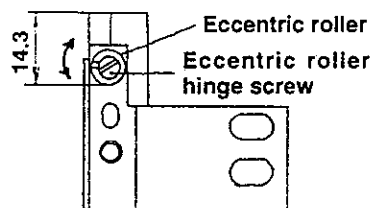


Fig. 3

PLC-1690

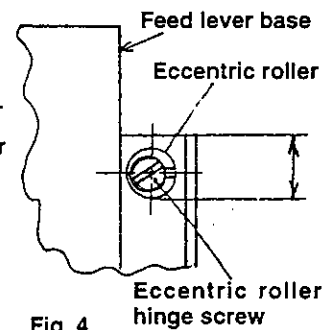


Fig. 4

(2) LONGITUDINAL POSITION OF THE FEED DOG

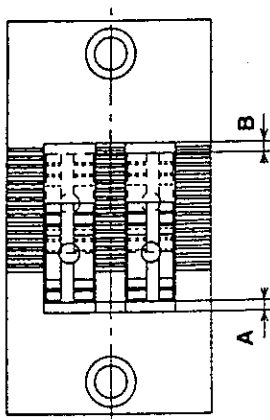


Fig. 5

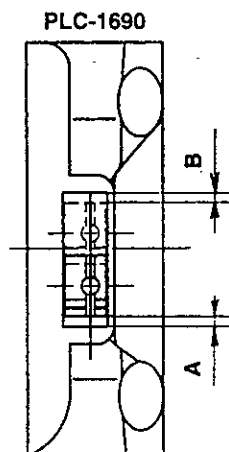


Fig. 6

Conditions

- Feed amount should be maximum.
- Longitudinal clearance between the throat plate and the feed dog should be equal.

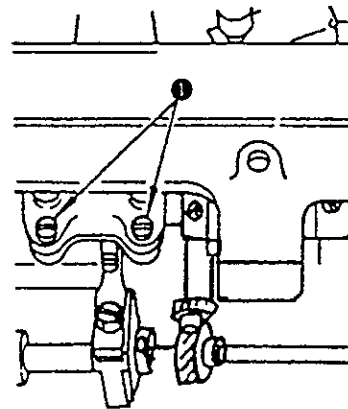


Fig. 7

A = Clearance between the feed dog and the throat plate when the feed dog travels to the front end.

B = Clearance between the feed dog and the throat plate when the feed dog travels to the back end.

Adjustment Procedures	Results of Improper Adjustment
<p>Adjust the setting position of the eccentric roller which is set in the throat plate holder so that it is set to the specified dimension.</p> <ol style="list-style-type: none"> 1) Remove the throat plate and the throat plate holder. 2) Loosen the eccentric roller hinge screw. 3) Adjust the position of the eccentric roller. 4) After the adjustment, tighten the eccentric roller hinge screw. <p>PLC-1690</p> <p>Adjust the setting position of the eccentric roller which is set to the feed lever base to obtain the specified dimension.</p> <ol style="list-style-type: none"> 1) Remove the throat plate and the throat plate holder. 2) Loosen the eccentric roller hinge screw. 3) Adjust the position of the eccentric roller. 4) After the adjustment, tighten the eccentric roller hinge screw. 	<p>If the clearance is excessive :</p> <ul style="list-style-type: none"> ○ The inner hook is likely to come off from the throat plate. <p>If the clearance is insufficient :</p> <ul style="list-style-type: none"> ○ Loose stitches (balloon stitches) will occur.
<ol style="list-style-type: none"> 1) Set the stitch dial to the maximum value. 2) Turn the handwheel by hand, and confirm that the clearance (A and B in Fig. 5, Fig. 6) between the feed dog and the slot on the throat plate is equal when the feed dog travels to the front end or to the back end. 3) When the clearance is not equal, loosen setscrews ① in the feed rocker so that the feed rocker works equally, and tighten the setscrews. 	<ul style="list-style-type: none"> ○ The throat plate comes in contact with the feed dog. As a result, contacting noise will be produced.

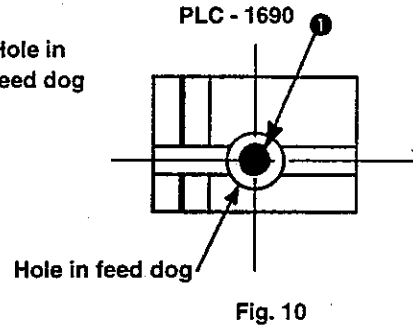
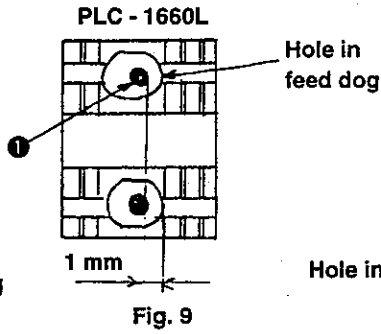
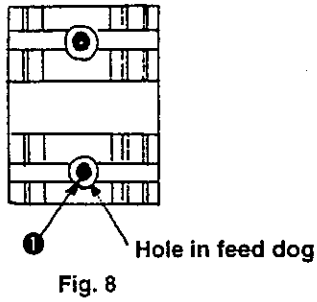
Standard Adjustment

(3) NEEDLE ENTRY

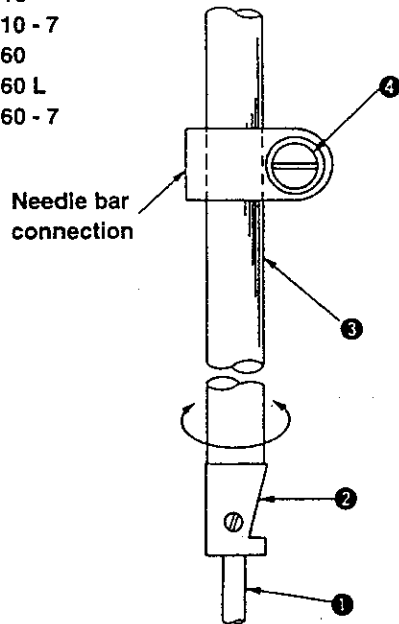
Conditions

- Feed amount should be minimum.
- Needle bar should be in the lower dead point.
- Needle should be in the center of the hole in the feed dog. (For PLC-1660, the distance from the end face of the needle hole to the outer periphery of the needle should be 1 mm.)

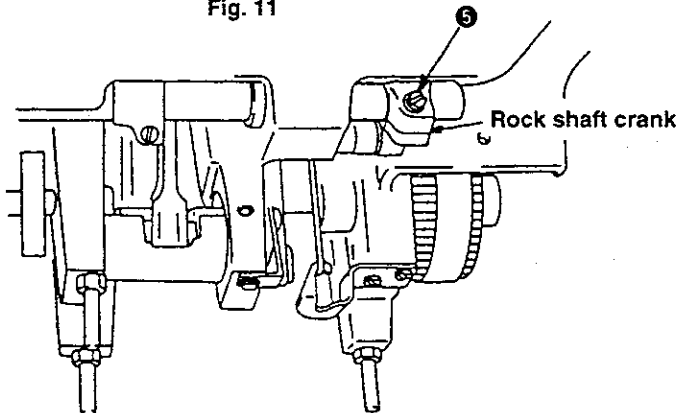
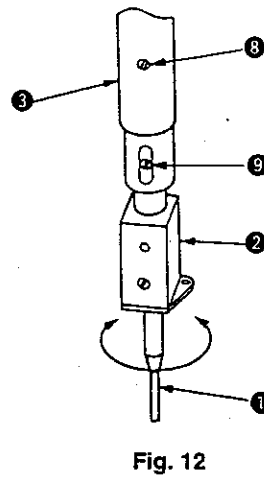
PLC - 1610
- 1610 - 7
- 1660
- 1660 - 7
- 1665



PLC - 1610
- 1610 - 7
- 1660
- 1660 L
- 1660 - 7



PLC - 1665



Adjustment Procedures	Results of Improper Adjustment
<p>○ PC-1610 / 1610-7</p> <ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring needle bar ③ in the lowest point. 3) Loosen setscrew ⑤ in the rock shaft crank. 4) Turn the rock shaft crank so that the needle comes in the center of the hole in the feed dog. After the adjustment, tighten the setscrew. <p>○ PLC-1660 / 1660-7</p> <ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring the needle bar in the lowest point. 3) Loosen setscrew ④ in the needle bar connection. 4) Turn needle bar ③ so that the needle comes in the center of the hole in the feed dog. After the adjustment, tighten setscrew ④. 5) If the needle is longitudinally shifted in the hole in the feed dog, loosen setscrew ⑤ in the rock shaft crank, and adjust by turning the rock shaft crank. Then, tighten setscrew ⑤. <p>(Caution) 1. Do not change the height of the needle bar. 2. Do not loosen needle clamp ②.</p> <p>○ PLC-1660L</p> <ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring the needle bar in the lowest point. 3) Loosen setscrew ④ in the needle bar connection. 4) Turn the needle bar so that the needle comes in the center of the hole in the feed dog. After the adjustment, tighten the setscrew. 5) To adjust the longitudinal position (Fig. 9) of the needle to the hole in the feed dog, loosen setscrew ⑤ in the rock shaft crank, and turn the rock shaft crank. After the adjustment, tighten the setscrew. <p>(Caution) 1. Do not change the height of the needle bar. 2. Do not loosen the needle clamp.</p> <p>○ PLC-1665</p> <ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring the needle bar in the lowest point. 3) Loosen setscrews ⑧ and ⑨. 4) Turn the needle bar so that the needle comes in the center of the hole in the feed dog. After the adjustment, tighten the setscrews. 5) If the needle is longitudinally shifted in the hole in the feed dog, loosen setscrew ⑤ in the rock shaft crank and adjust by turning the rock shaft crank. Then, tighten the setscrew. <p>(Caution) 1. Turning range of needle clamp ② is the clearance between the width of long slit of the needle bar and screw ⑨.</p> <p>○ PLC-1690</p> <ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring the needle bar to the lowest point. 3) Loosen setscrew ⑤ in the rock shaft crank 4) Turn the rock shaft crank so that needle ① comes in the center of the hole in the feed dog. After the adjustment, tighten setscrew ⑤ 	<p>○ Stitch skipping and thread breakage will result.</p> <p>○ Loose stitches will result.</p>

Standard Adjustment

(4) HEIGHT OF THE NEEDLE BAR

Conditions

- Feed amount should be the minimum.
- Needle bar should be raised from the lower dead point.

Table 4

Model	A (raising amount from lower dead point of needle bar)	B (distance from upper end of needle eyelet to blade point of hook)
PLC-1610 PLC-1610-7 PLC-1660 PLC-1660-7 PLC-1690	$2.0^{+0.2}_0$ mm	1.5 ± 0.2 mm
PLC-1660L	$2.4^{+0.2}_0$ mm	1.8 ± 0.2 mm
PLC-1665	$1.8^{+0.2}_0$ mm	1.0 ± 0.2 mm

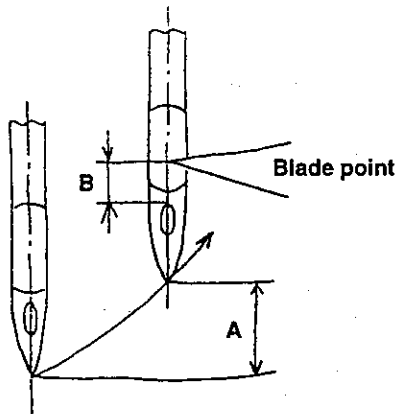


Fig. 14

Adjustment Procedures

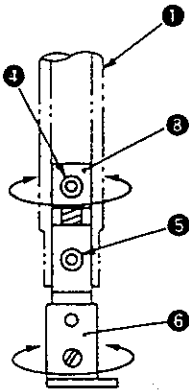
Results of Improper Adjustment

○ PLC-1610 / 1610-7 / 1660 / 1660-7

- 1) Set the stitch dial to the minimum value.
- 2) Turn the handwheel to bring the needle bar in the lowest point.
- 3) Loosen the setscrew in the needle bar connection, turn the handwheel and adjust so that the distance from the upper end of the needle eyelet to the blade point of the hook is dimension B when the needle bar is raised dimension A from the lowest point. After the adjustment, tighten the setscrew.

○ PLC-1665

Height of the needle bar is decided by the height of the needle clamp.



- Needle clamp ⑥ is raised or lowered by 0.6 mm by one turn. Remove screw ⑤, and raise or lower the needle clamp.
- Spring holder ④ is raised or lowered by 0.3 mm by half turn. Pull out screws ④ and ⑤, and turn the spring holder.

- 1) Set the stitch dial to the minimum value.
- 2) Turn the handwheel to raise the needle bar by $1.8^{+0.2}_0$ mm from the lowest point.
- 3) Turn the needle clamp, the spring holder or the both, and adjust so that the distance from the upper end of the needle eyelet to the blade point of the hook is 1 ± 0.2 mm. After the adjustment, tighten screws ④ and ⑤.

(Caution) After the adjustment, the needle entry position in the hole in the feed dog may shift.

○ PLC-1690

- 1) Set the stitch dial to the minimum value.
- 2) Turn the handwheel to bring the needle bar to the lowest point.
- 3) Loosen the setscrew in the needle bar connection, turn the handwheel, and adjust so that the distance from the upper end of the needle eyelet to the blade point of the hook is 1.5 ± 0.2 mm when the needle bar goes up by $2.0^{+0.2}_0$ mm from its lowest point. After the adjustment, tighten the setscrew.

Due to the change of the height of the needle bar, stitch skipping and thread breakage will result.

Standard Adjustment

(5) NEEDLE-TO-HOOK TIMING

Conditions

- Feed amount should be the minimum.
- Needle bar should be raised from the lower dead point.

Table 5

Model	A (raising amount from lower dead point of needle bar)	B (distance from upper end of needle eyelet to blade point of hook)
PLC-1610 PLC-1610-7 PLC-1660 PLC-1660-7 PLC-1690	$2.0^{+0.2}_0$ mm	1.5 ± 0.2 mm
PLC-1660L	$2.4^{+0.2}_0$ mm	1.8 ± 0.2 mm
PLC-1665	$1.8^{+0.2}_0$ mm	1.0 ± 0.2 mm

1) Needle bar raising amount

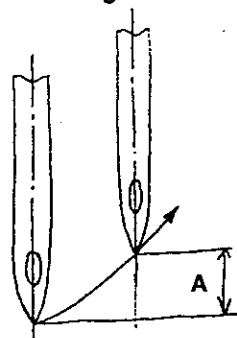


Fig. 15

2) Clearance between the needle and the blade point of hook

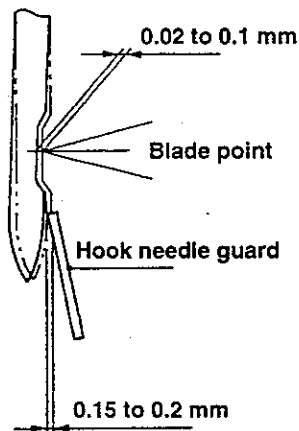
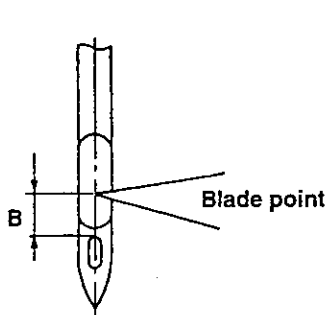


Fig. 16

3) Position of the needle and the blade point of the hook



Blade point is aligned with center of needle.

Fig. 17

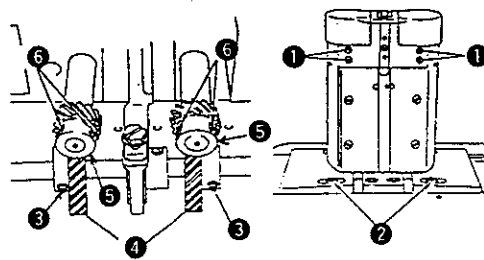


Fig. 18

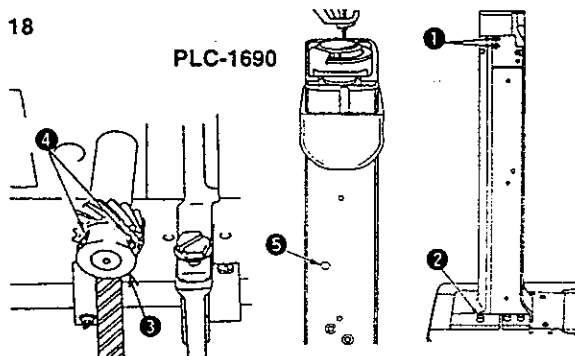


Fig. 19

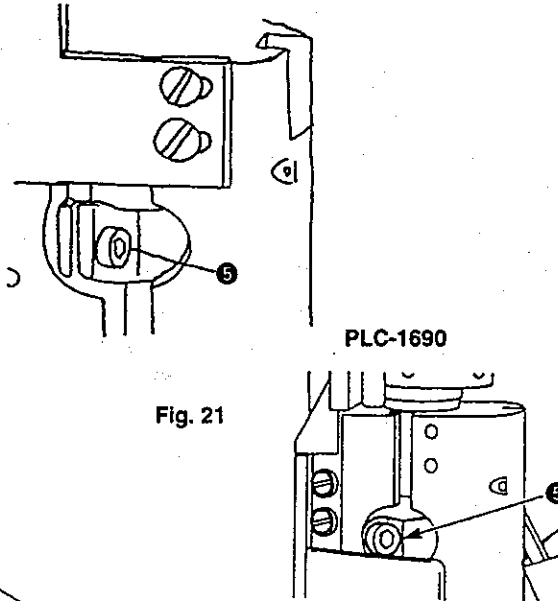
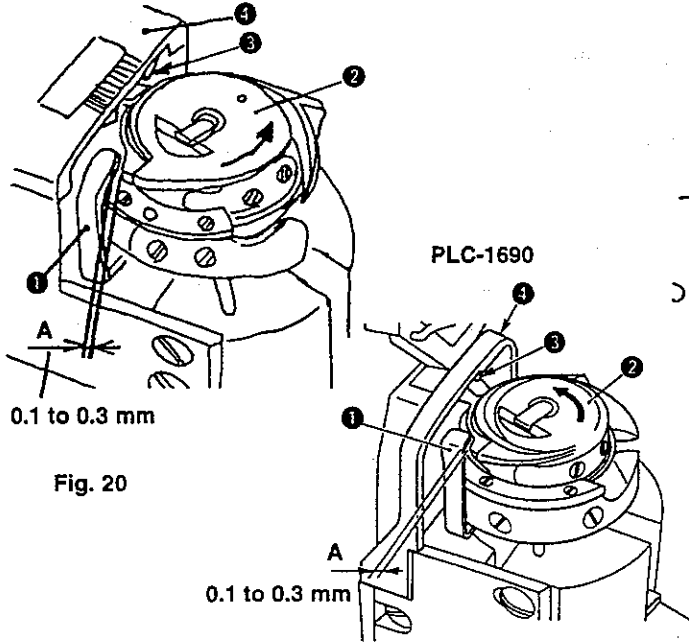
Adjustment Procedures	Results of Improper Adjustment
<ul style="list-style-type: none"> ○ When the clearance between the needle and the blade point of the hook or the needle gauge is changed : <ol style="list-style-type: none"> 1) Remove the connecting link hinge screw when the machine is with the thread trimmer. (Refer to the parts list.) 2) Loosen screws ❶ in the throat plate holder, screws ❷ in the hook driving shaft saddle and screws ❸ in the hook driving shaft gear. At this time, do not remove the setscrew No. 1 (set to the flat section of the hook driving shaft) of screws ❹. Loosening amount of the screw is to such an extent that the setscrew No. 1 does not come off from the flat section of the hook driving shaft when the hook driving shaft gear is turned by hand. 3) Set the stitch dial to the minimum value. 4) Raise the needle bar from the lowest point to dimension A. 5) Move the hook driving shaft saddle to the right or left, and adjust the clearance between the needle and the blade point of the hook, and the amount of the hook needle guard to the predetermined values. Then, tighten screws ❶ and ❷ to fix the hook driving shaft saddle. 6) Engage hook driving shaft gear ❹ with the pitch circle of hook shaft gear ❸, and fix it. ○ When the position of the needle and the blade point of the hook is changed : <ol style="list-style-type: none"> 1) Loosen three setscrews ❻ in hook shaft gear ❸. 2) Align the blade point of the hook with the center of the needle, and tighten screws ❻. <p>(Caution) After tightening the hook shaft gear, check the hook shaft for the thrust play.</p> 	<p>Stitch skipping and thread breakage will result.</p>
<p>PLC-1690</p> <ul style="list-style-type: none"> ○ Clearance between the needle and the blade point of hook. <ol style="list-style-type: none"> 1) Loosen four setscrews ❶ in the throat plate holder and four setscrews ❷ in the hook shaft base. 2) Set the stitch dial to the minimum value. 3) Raise the needle bar by $2^{+0.2}$ mm from its lower dead point. 4) Move the hook shaft base to the right or left to obtain the specified clearance between the needle and the blade point of hook, and the specified clearance between the needle and the hook needle guard. Then, tighten setscrews ❶ and ❷ to fix the hook shaft base. ○ If the position of the needle and the blade point of hook is changed. <ol style="list-style-type: none"> 1) Loosen three setscrews ❹ in hook shaft gear ❸. 2) Align the blade point of hook with the center of needle, and tighten setscrews ❹. <p>(Caution) After tightening the hook shaft gear, check the hook shaft for the thrust play.</p> <p>If fine adjustment is performed in addition to the aforementioned procedure.</p> <ol style="list-style-type: none"> 1. Turn the handwheel to align the blade point of hook with the center of needle. 2. Loosen the coupling setscrew through hole ❺ for screwdriver in the hook shaft base. 3. Turn the hook in the normal direction or in the reverse direction, and tighten the coupling setscrew. <p>(Caution) Tightening torque of the coupling setscrew should be 2.5 Nm (25 kgf·cm).</p> 	

Standard Adjustment

(6) BOBBIN CASE OPENING LEVER

Conditions

- When the bobbin case opening lever travelled to the back end.
- Press the hook stopper to the slit on the throat plate.



(7) HEIGHT OF THE FEED DOG

Conditions

- Feed amount should be the minimum.
- Feed dog should be A mm above the top surface of the throat plate when the feed dog protrudes most.

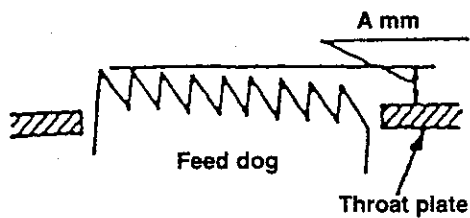


Fig. 22

Table 6

Model	A mm
PLC-1610	0.5 ^{+0.2}
PLC-1610-7	
PLC-1660	
PLC-1660-7	
PLC-1665	
PLC-1690	1.0 ⁰ _{-0.2}
PLC-1660L	

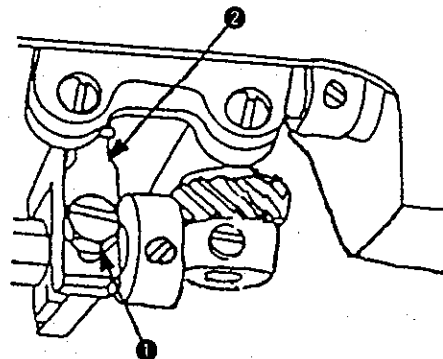


Fig. 23

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Turn the handwheel to cause bobbin case opening lever ❶ to travel to the back end. 2) Turn bobbin case ❷ in the opposite direction of the rotating direction of the hook (in the direction of arrow), and press the hook stopper to the slit on throat plate ❸. 3) Loosen setscrew ❹ in the bobbin case opening lever arm, and tighten setscrew ❺ so that a clearance of 0.1 to 0.3 mm is provided between the bobbin case opening lever and the bobbin case. 	<p>If the clearance is excessive :</p> <ul style="list-style-type: none"> ○ Loose stitches or thread breakage will result. <p>If the clearance is insufficient :</p> <ul style="list-style-type: none"> ○ Inner hook breakage will result.
<ol style="list-style-type: none"> 1) Set the stitch dial to the minimum value. 2) Turn the handwheel to bring the feed dog to the position where it protrudes most from the throat plate. 3) Loosen setscrew ❶, move feed bar fork ❷ up or down, and adjust the feed dog to A mm above the top surface of the throat plate. Then, tighten setscrew ❶. 	<p>When the height of the feed dog is low :</p> <ul style="list-style-type: none"> ○ Stitch length will be shortened. <p>When the height of the feed dog is high :</p> <ul style="list-style-type: none"> ○ Cloth returning phenomenon will occur.

Standard Adjustment

(8) FEED TIMING

1) Horizontal feed timing

Conditions

- Feed amount should be the maximum.
- Feed dog should not move even when the reverse feed control lever is lowered at the upper dead point of the needle bar.

(Observed from rear side of machine bed.)

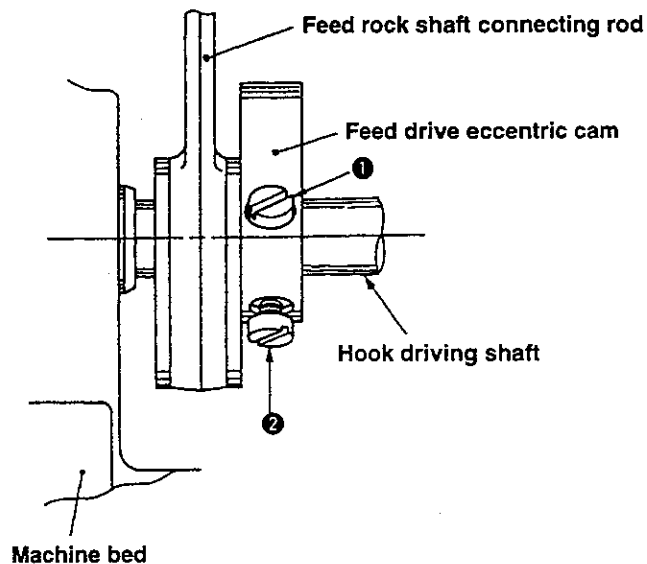


Fig. 24

2) Vertical feed timing

Conditions

- Feed amount should be the maximum.
- When the highest position of the feed dog is aligned with the top surface of the throat plate, the top point of the needle is also aligned with the top surface of the throat plate.

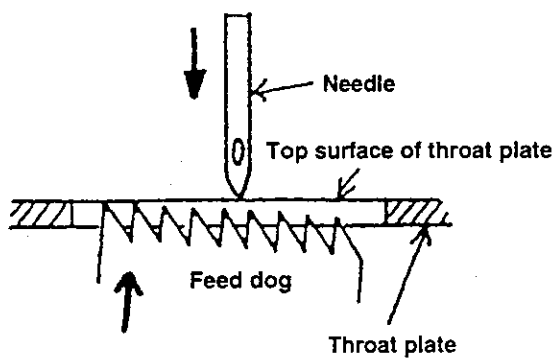


Fig. 25

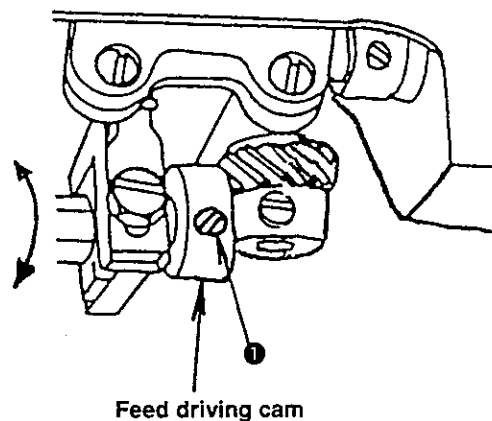


Fig. 26

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Set the stitch dial to the maximum value. 2) Loosen setscrews ❶ and ❷ in the feed drive eccentric cam. 3) Turn the handwheel to bring the needle bar in the upper dead point. 4) Turn the feed drive eccentric cam by hand, while moving the reverse feed control lever up or down, and stop it at the position where the feed dog does not move. Then, tighten the setscrews. 	<ul style="list-style-type: none"> ○ Thread tension will change. ○ Stitch length error at high / low speed will be deteriorated.
<ol style="list-style-type: none"> 1) Perform the work after adjusting the horizontal feed timing. 2) Loosen two setscrews ❶ in the feed driving cam. 3) Set the stitch dial to the maximum value. 4) Turn the handwheel in the direction of operator, and align the top point of the needle with the top surface of the throat plate. 5) Turn the feed driving cam, and align the top surface of the feed dog with the top surface of the throat plate. Then, tighten the setscrews. 	<ul style="list-style-type: none"> ○ Stitch length error at high / low speed will be deteriorated.

Standard Adjustment

3) Upper feed timing

Conditions

- Feed amount should be the maximum.
- When the needle comes down and the top point of the needle is aligned with the top surface of the throat plate, the walking foot is also aligned with the surface of the feed dog.

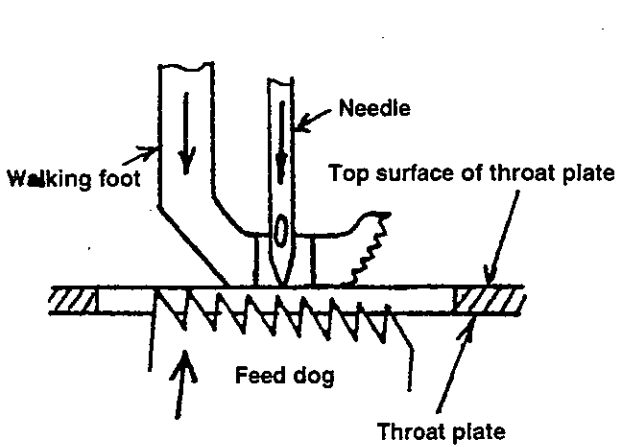


Fig. 27

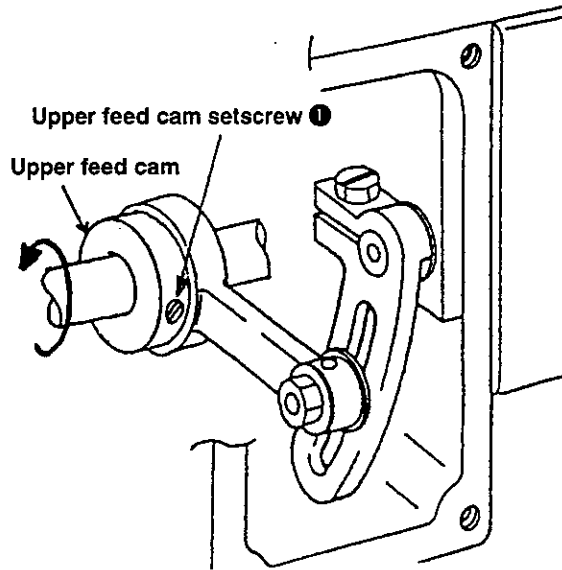


Fig. 28

(9) NEEDLE SWAY

Conditions

- Feed amount should be the maximum.
- Needle sway should be the minimum.

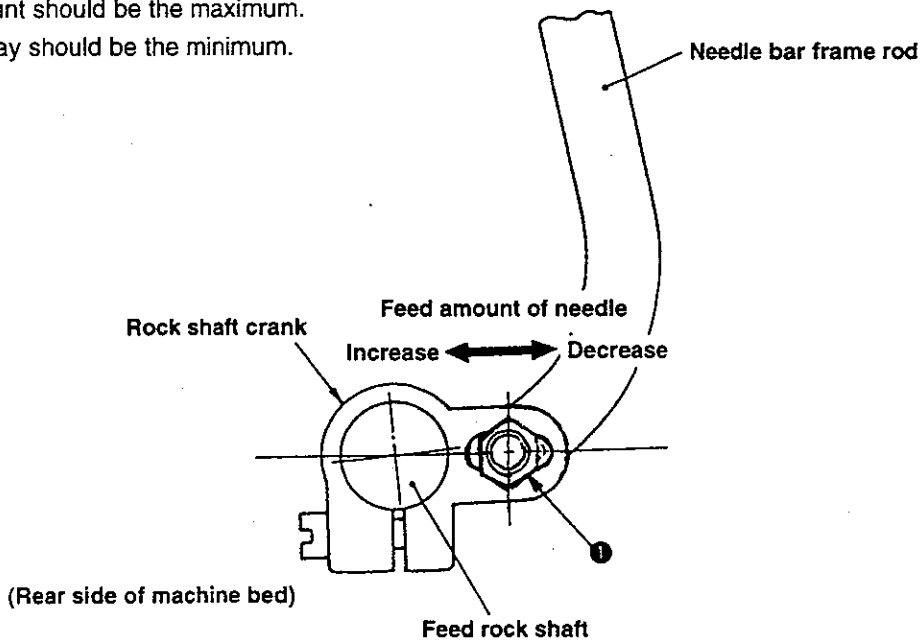


Fig. 29

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Remove the side cover. 2) Set the stitch dial to the maximum value. 3) Loosen two setscrews ❶ in the upper feed cam. 4) Turn the handwheel in the direction of the operator to align the top point of the needle with the top surface of the throat plate. 5) Turn the upper feed cam in the direction of the arrow to align the bottom face of the walking foot with the top surface of the throat plate. Then, tighten the setscrews. 	<p>If the timing is excessively advanced :</p> <ul style="list-style-type: none"> ○ Stitch tightness will be deteriorated. ○ Stitching pitch will be shortened. ○ Reverse feed motion will be applied to the walking foot. <p>If the timing is excessively retarded :</p> <ul style="list-style-type: none"> ○ Stitch tightness will be deteriorated. ○ Hangnail of needle thread will occur. ○ Stitching pitch will be lengthened.
<ol style="list-style-type: none"> 1) Set the stitch dial to the maximum value. 2) Loosen setscrew ❶ in the needle feed connecting shaft, and move the needle bar frame rod. 3) Temporarily tighten the set nut, turn the handwheel, and check the needle sway. Adjust the position of the needle bar frame rod so that the needle sway becomes the minimum. Then, tighten the set nut. 	<ul style="list-style-type: none"> ○ Needle breakage will result. ○ Stitch skipping will result.

Standard Adjustment

(10) NORMAL AND REVERSE FEED STITCHING PITCHES

Conditions

- Difference between the normal feed stitching pitch and the reverse feed stitching pitch is 0.2 mm or less when the stitch dial is set to "3".

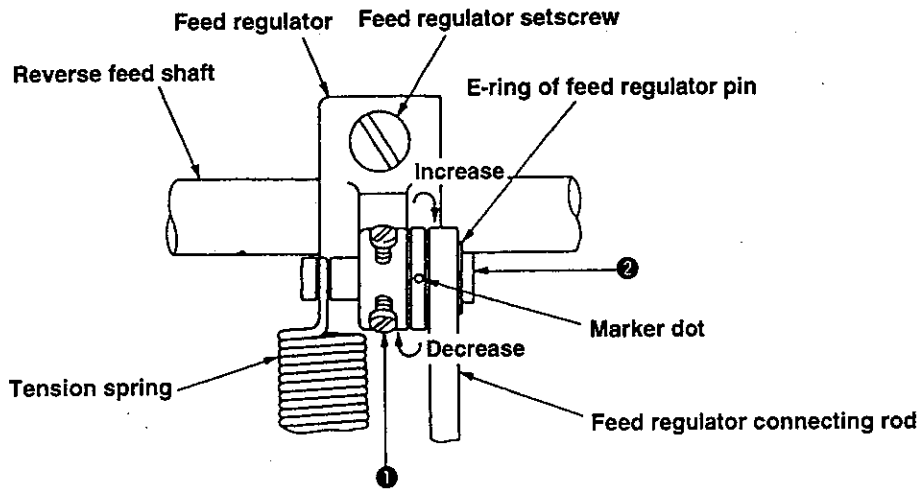


Fig. 30

(11) UPPER AND LOWER POSITIONS OF THE NEEDLE BAR FRAME

The respective clearances at the upper and lower positions of the needle bar frame and the needle bar are the values as given in the following table.

Table 7

Clearance	a	b	c
Needle bar asm.			
2-needle	0.2 mm or more	0	0.2 mm or more
Single needle	0.2 mm or more	*	0.2 mm or more

The section with * mark : Clearance is 0.15 mm or more when the needle bar is pushed from the bottom at the highest point of the needle bar.

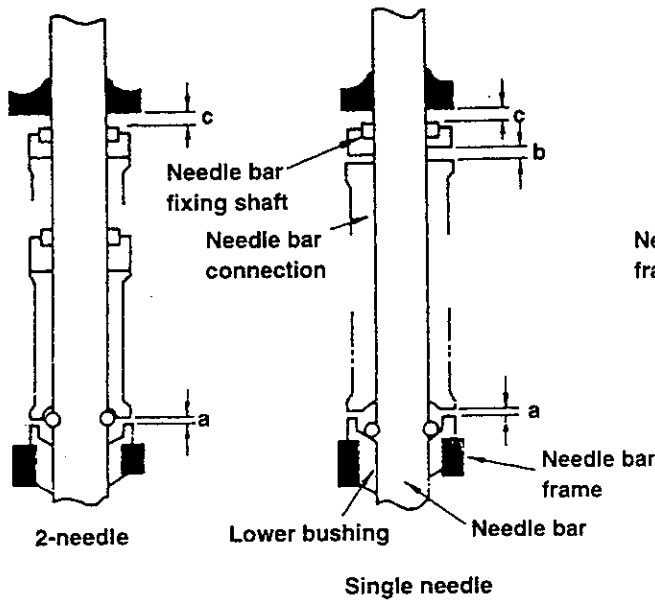


Fig. 31

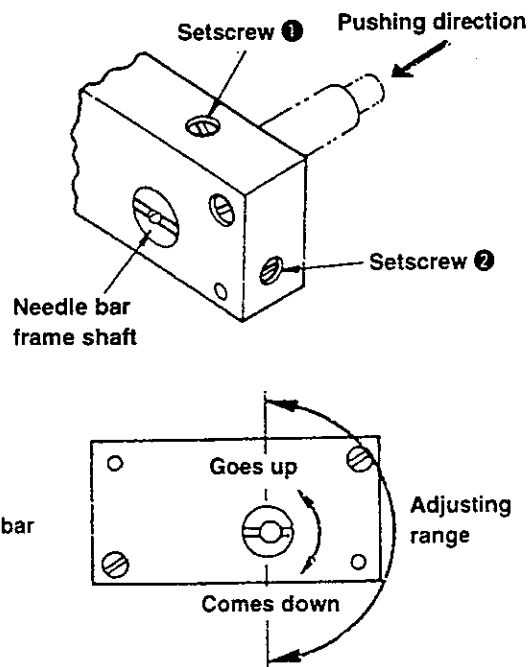


Fig. 32

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Set the stitch dial to the maximum value. 2) Loosen two feed regulator pin setscrews ❶. 3) Move feed regulator pin ❷ in the direction of the arrow, and adjust so that the difference between the normal feed stitching pitch and the reverse feed stitching pitch is 0.2 mm or less. Then, fix it. 	<ul style="list-style-type: none"> ○ Normal feed stitching pitch does not agree with the reverse feed stitching pitch.
<p>Loosen two setscrews ❶ and ❷ in the needle bar frame shaft, and turn the needle bar frame shaft counterclockwise while pushing the needle bar frame shaft in the direction of the arrow. Then, the needle bar frame goes up, and clearance "a" is decreased while clearance "c" is increased.</p> <p>When turning it clockwise, the clearances are reverse. (Adjusting range is to such an extent that the slit of the needle bar frame shaft becomes vertical.)</p> <p>After the adjustment, tighten setscrews ❶ and ❷ to fix the needle bar frame shaft.</p>	<ul style="list-style-type: none"> ○ Defective organized split bar mechanism will result.

Standard Adjustment

(12) DIMENSION OF THE NEEDLE STOP ADJUSTING SLIDE STUD (ASM.)

Assembling dimension of the needle stop adjusting slide stud (asm.) is 30.9 ± 0.1 mm.

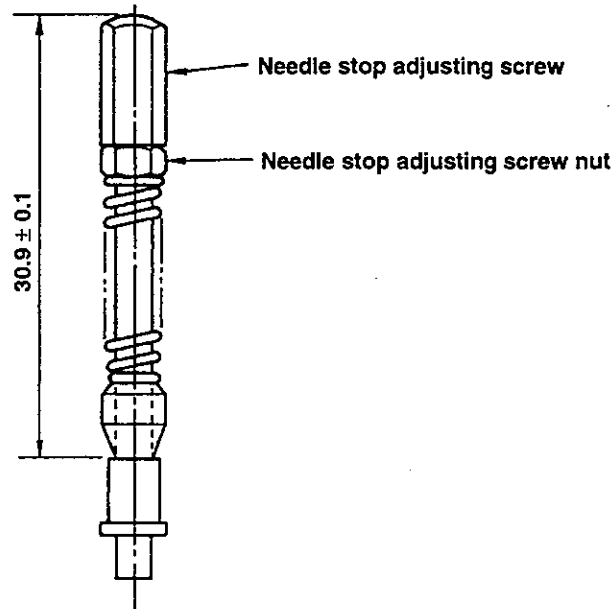


Fig. 33

(13) POSITION OF THE CHANGING LEVER

Position of the changing lever is on the right side of the graduations.

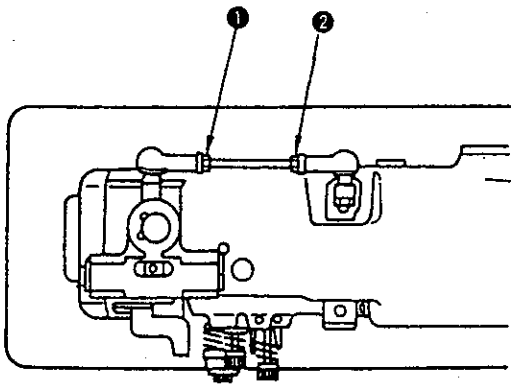


Fig. 34

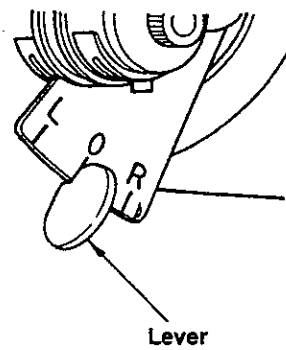


Fig. 35

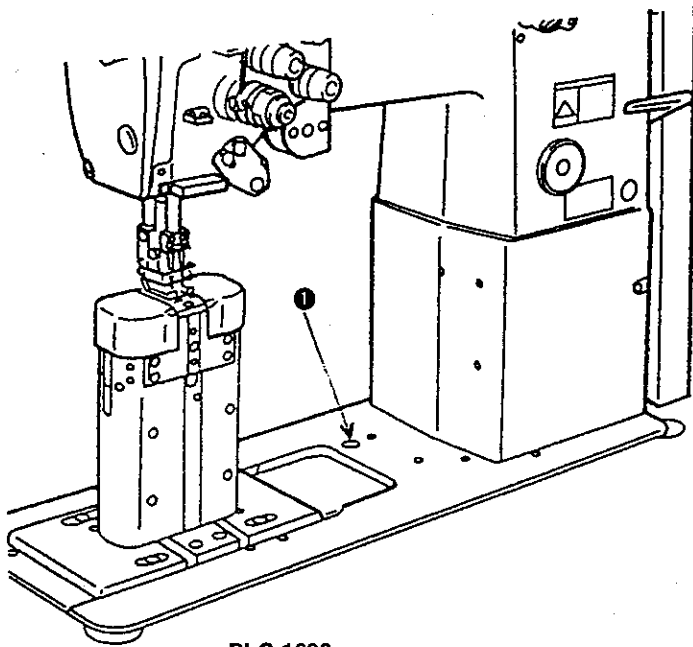
Adjustment Procedures	Results of Improper Adjustment
<p>1) Loosen the needle stop adjusting screw nut and adjust the length of the needle stop adjusting slide stud (asm.). Then, fix it with the nut.</p>	<p>○ Various places related to the needle bar frame components will be affected, resulting in the defective needle stop.</p>
<p>1) Turn counterclockwise nuts ❶ and ❷ attached to the ball joints, and turn the adjusting shaft until the engraved marker line on the tension base plate is aligned with the left side face of the changing lever.</p> <p>2) After the adjustment, tighten nuts ❶ and ❷ so as not to rotate the adjusting shaft.</p>	<p>○ If the position of the changing lever shifts, defective organized split needle bar mechanism will result.</p>

Standard Adjustment

(14) SAFETY DEVICE

Conditions

- Sewing machine should run idle during operation.
- Actuating torque of the safety device is $100 \pm 10 \text{ kgf}\cdot\text{cm}$.



PLC-1690

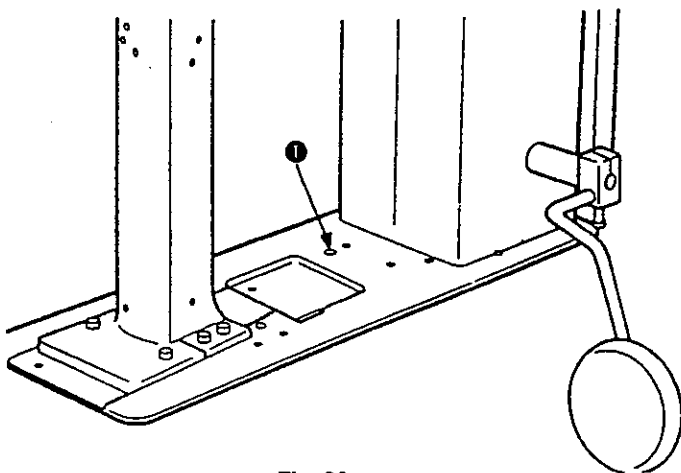


Fig. 36

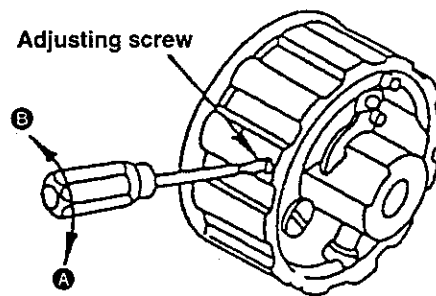


Fig. 37

Adjustment Procedures	Results of Improper Adjustment
<p>If an extra load is applied to the hook driving shaft or the like, the safety device will work. Once the safety device works, the hook will not rotate even if you turn the handwheel.</p> <p>1) How to reset the safety device</p> <ol style="list-style-type: none"> 1. Remove the cause (hook clogged with thread or the like). 2. Pressing push-button ① mounted on the top surface of the machine bed, strongly turn the handwheel in the reverse direction of rotation. 3. The safety device is reset with a click. <p>2) Adjusting the releasing torque</p> <p>Adjust the pressure of the safety device (when the device is hard to work or easily works.) by turning the adjusting screw in the direction of the arrow.</p> <p>Direction A → Releasing torque is large. Direction B → Releasing torque is small</p>	<p>When the torque setting is high :</p> <ul style="list-style-type: none"> ○ Hook, hook driving shaft gear, etc. will be damaged. <p>When the torque setting is low :</p> <ul style="list-style-type: none"> ○ Safety device easily works. As a result, operation is hindered.

3. STANDARD ADJUSTMENT OF THE ADDITIONAL UNITS

Standard Adjustment

(1) THREAD TRIMMER UNIT

1) Upper / lower position of the moving knife

Conditions

- Clearance between the top surface of the bobbin case and the bottom face of the moving knife is 0.5 ± 0.1 mm.

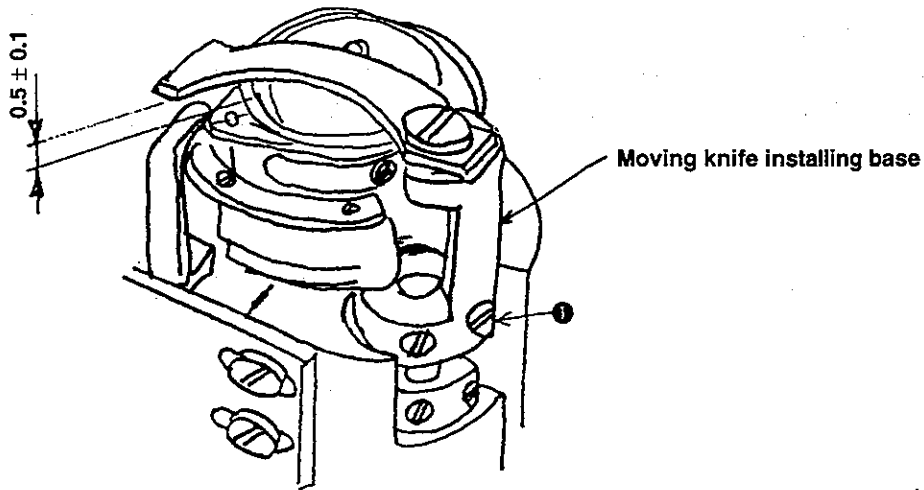
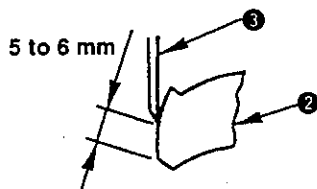


Fig. 38

(2) Position of the counter knife

1) Initial position (knife pressure)



Start of knife pressure

Fig. 39

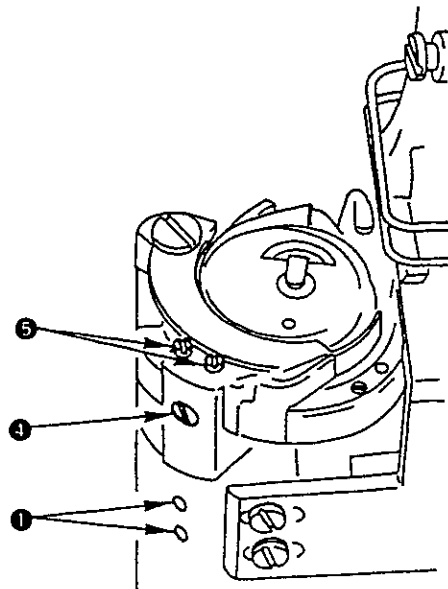


Fig. 40

Adjustment Procedures	Results of Improper Adjustment
<p>1) Loosen two setscrews ❶ in the moving knife installing base.</p> <p>2) Move the moving knife installing base up or down so that the clearance between the top surface of the bobbin case and the bottom face of the moving knife is 0.5 ± 0.1 mm.</p> <p>3) After the adjustment, tighten the setscrews.</p>	<p>If the clearance is wider than the specified value :</p> <ul style="list-style-type: none"> ○ Defective catching of needle and bobbin threads will result. <p>If the clearance is narrower than the specified value :</p> <ul style="list-style-type: none"> ○ There is no space where the thread enters in between the moving knife and the bobbin case. As a result, defective thread cutting will result.
<p>1) Initial position (knife pressure)</p> <p>❶ Loosen two setscrews ❶ in the counter knife installing base.</p> <p>❷ Turn moving knife ❷ by hand, and tighten setscrews ❶ in the counter knife installing base so that the position where counter knife ❸ and moving knife ❷ start coming in contact with each other is 5 to 6 mm.</p> <p>(Caution) Reduce the knife pressure as low as possible to such an extent that the needle and bobbin threads are cut together.</p> <p>2) Engagement of the blade faces of the moving knife and the counter knife</p> <ul style="list-style-type: none"> ○ If the engagement of the blade faces of the moving knife and the counter knife is not proper, thread cutting is dull, however high the knife pressure may be. Make sure of the engagement of the blade faces. <p>❶ Slightly loosen counter knife setscrew ❹ .</p> <p>❷ Move the counter knife with counter knife adjusting screws ❺ , and adjust the blade face.</p> <p>❸ After the adjustment, tighten setscrew ❹ .</p>	<p>If the knife pressure is excessively high :</p> <ul style="list-style-type: none"> ○ Blade sections of the counter knife and the moving knife may be damaged. ○ Torque at the time of thread cutting becomes large. As a result, machine lock will result. <p>If the knife pressure is insufficient :</p> <ul style="list-style-type: none"> ○ Thread cutting will be dull. <p>If the engagement of the blade faces of the moving knife and the counter knife is not proper :</p> <ul style="list-style-type: none"> ○ Defective thread cutting will result.

Standard Adjustment

3) Position of the cam installing link stoppers (A) and (B)

Conditions

- The cam installing link stopper (B) should be in a position where it slightly comes in contact with the cam roller shaft in the state that the cam roller comes in contact with face **A** on the cam groove when the cam groove on the thread trimmer cam is in the position of the straight section.
- Clearance between cam installing link stopper (A) and the cam installing link should be 0.1 to 0.15 mm when the cam roller is in the aforementioned position.

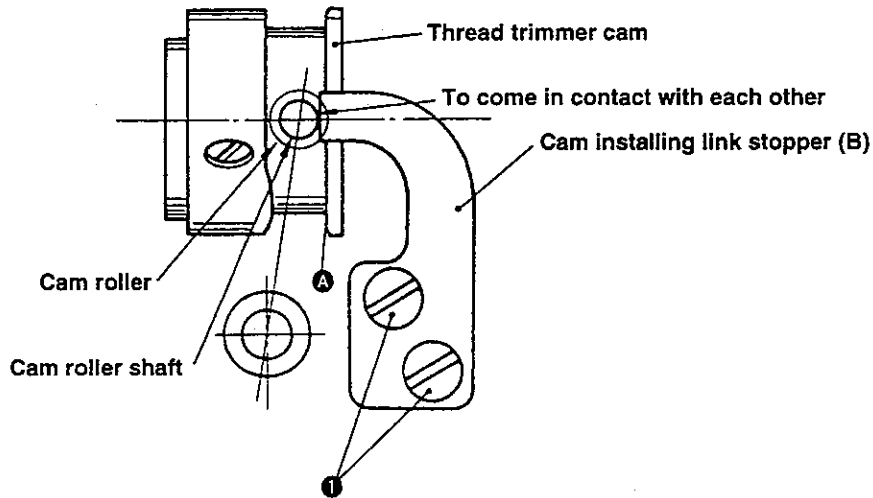


Fig. 41

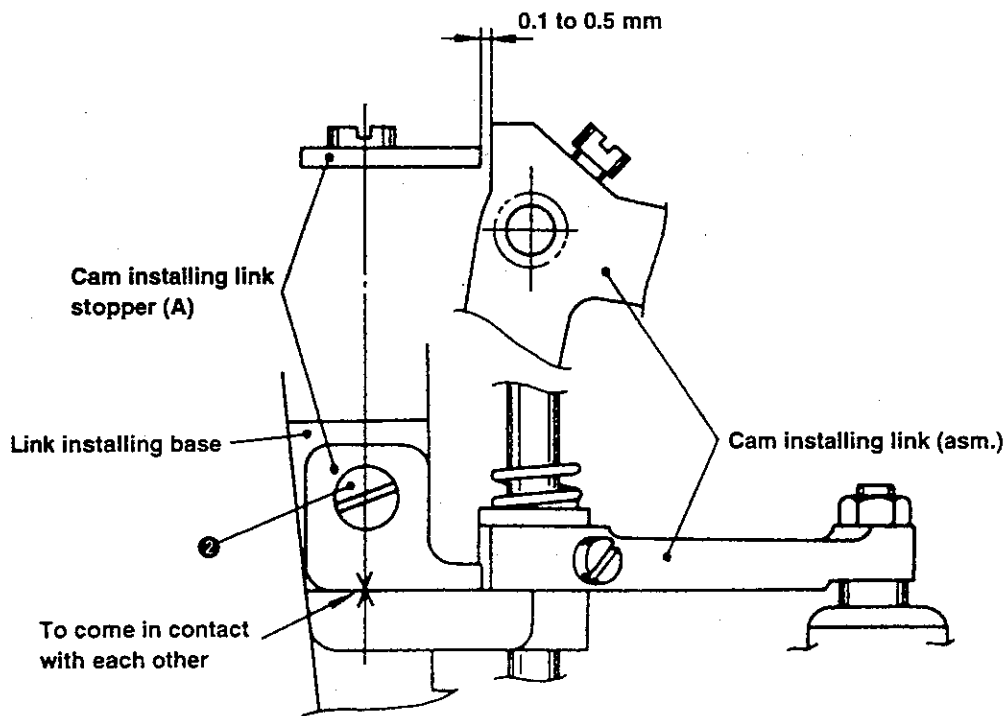


Fig. 42

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Loosen two setscrews ❶ in the cam installing link stopper (B). 2) Set the clearance between the cam installing link stopper (A) and the cam installing link to 0.1 to 0.15 mm. 3) In the state of step 2), adjust the position of the cam installing link stopper (B) so that the cam roller shaft slightly comes in contact with the cam installing link stopper (B). Then, tighten setscrews ❶. 	<p>If the clearance is wider than the specified value :</p> <ul style="list-style-type: none"> ○ Play of the moving knife in the rocking direction will be increased. <p>If the clearance is narrower than the specified value :</p> <ul style="list-style-type: none"> ○ The cam installing link does not come off the thread trimmer cam, and thread trimmer works at the start of sewing resulting in breakage of the cam installing link or machine lock.

Standard Adjustment

4) Position of the thread trimmer cam and the thread trimming timing

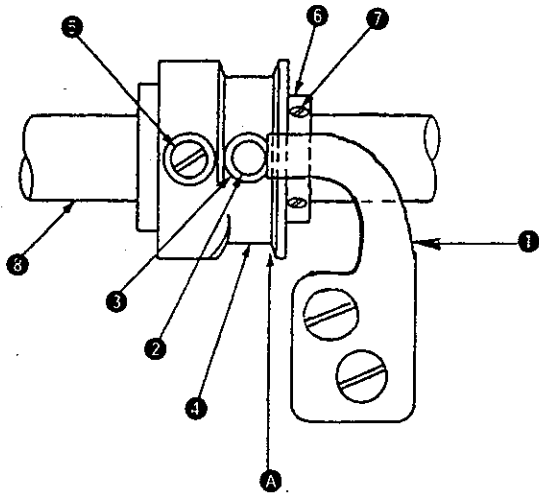


Fig. 43

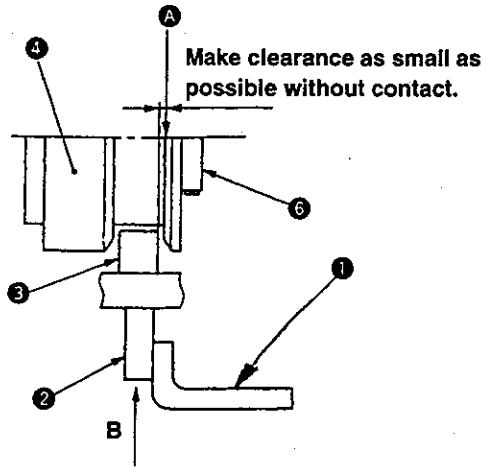


Fig. 44

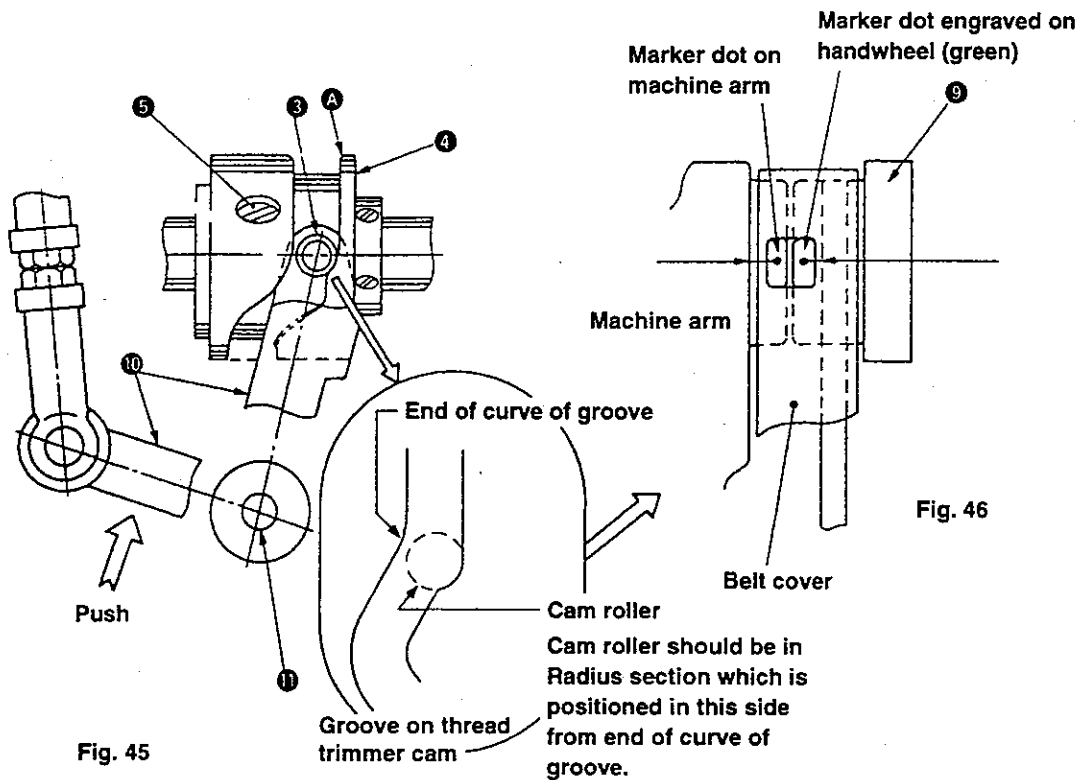


Fig. 45

Fig. 46

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) In the state that cam installing link stopper (B) ① comes in contact with cam roller shaft ②, move thread trimmer cam ④ in the lateral direction of hook driving shaft ⑧ so that the clearance between cam roller ③ and face A of thread trimmer cam ④ should be as small as possible without contact, and temporarily tighten setscrew ⑤ in the thread trimmer cam. 2) Fit hook driving shaft thrust collar ⑥ to the right end face of thread trimmer cam ④, and securely tighten two screws ②. 3) Loosen setscrew ⑤. 4) Turn the handwheel until the marker dot on the machine arm is aligned with the green marker dot engraved on the handwheel. 5) Fit cam roller ③ of cam installing link ⑩ in the groove on thread trimmer cam ④. (Push cam installing link ⑩ in the axial direction of cam installing link shaft ②.) 6) Tighten two setscrews ⑤ in the state that cam roller ③ is aligned with the Radius section which is positioned in this side from the end of the curve on the groove of thread trimmer cam ④ and that the roller comes in contact with face A on the groove on the thread trimmer cam, and fix thread trimmer cam ④. 	<p>If the timing is excessively retarded :</p> <ul style="list-style-type: none"> ○ Thread trimming motion cannot be released even at the upper stop position. <p>If the timing is excessively advanced :</p> <ul style="list-style-type: none"> ○ The knife will fail to cut the thread.

Standard Adjustment

5) Position of the moving knife

Condition

- Blade section of the moving knife should be aligned with the blade section of the counter knife when the marker dot engraved on the machine arm is aligned with the marker dot (red) engraved on the handwheel.

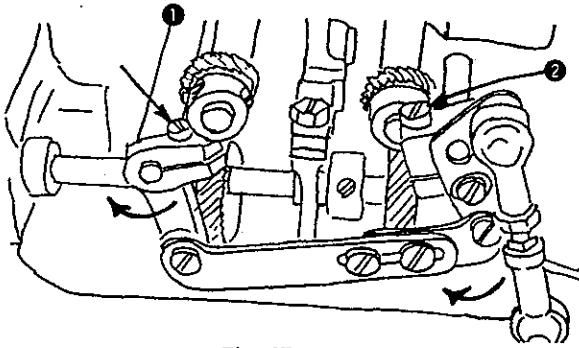


Fig. 47

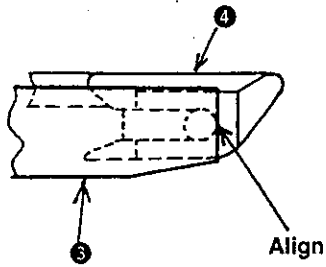


Fig. 48

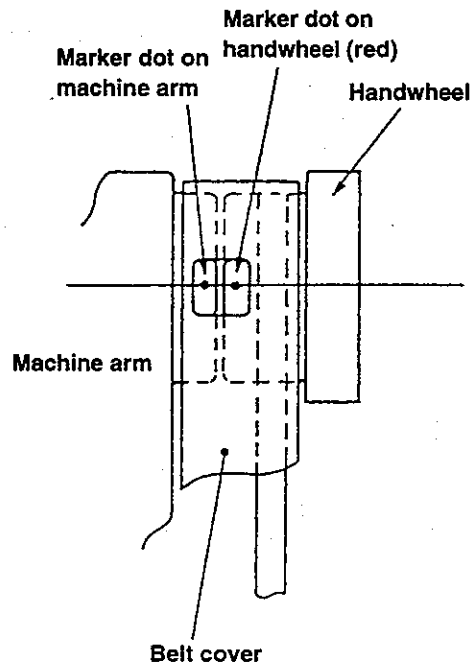


Fig. 49

6) Clamp spring

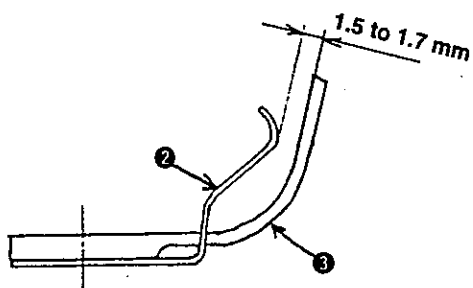


Fig. 50

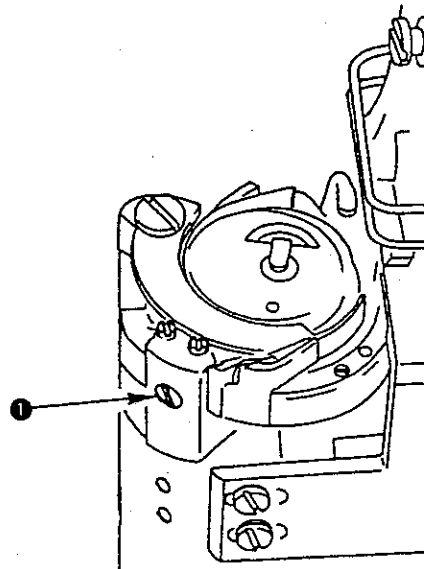


Fig. 51

Adjustment Procedures	Results of Improper Adjustment
<p>1) Loosen setscrew ❶ in the driving arm (left) and setscrew ❷ in the driving arm (right).</p> <p>2) Actuate the thread trimmer by hand, and align the marker dot engraved on the machine arm with the red marker dot engraved on the handwheel.</p> <p>3) Move moving knife ❹ until it comes to the position where the blade section of counter knife ❸ is aligned with the blade section of moving knife ❹.</p> <p>4) Slightly turn the driving arm (right) in the direction of the arrow, and tighten setscrew ❷. Then, tighten setscrew ❶ in the driving arm (left)</p> <p>5) Actuate the thread trimmer by hand, and make sure of the alignment of the blade sections.</p> <p>(Test report)</p> <p>Timing of the alignment of the blade sections will change in case where either the thread is placed or the thread is not placed. It is effective to advance the timing of the alignment of the blade sections if the moving knife does not fully return to its home position.</p>	<p>If the timing is excessively advanced :</p> <ul style="list-style-type: none"> ○ The bobbin case opening lever will come in contact with the moving knife when the moving knife advances. ○ Length of the needle thread remaining will be decreased. <p>If the timing is excessively retarded :</p> <ul style="list-style-type: none"> ○ The knife will fail to cut the thread.
<p>1) Slightly loosen setscrew ❶ in the outer knife.</p> <p>2) Slide clamp spring ❷ to the right or left to provide a clearance of 1.5 to 1.7 mm between the clamp spring and moving knife ❸.</p> <p>3) After the adjustment, tighten setscrew ❶.</p> <p>(Caution) Adjust so that the bottom face of the moving knife does not come in contact with the clamp spring.</p> <div data-bbox="324 1470 893 1722" data-label="Diagram"> </div>	<p>If the clearance is wider than the specified value :</p> <ul style="list-style-type: none"> ○ Defective clamping or stitch skipping at the start of sewing will result. <p>If the clearance is narrower than the specified value :</p> <ul style="list-style-type: none"> ○ Clamp pressure is excessively applied and deformation of the clamp spring or the like will occur.

Standard Adjustment

7) Position of the thread trimmer solenoid

Conditions

- When the thread trimmer solenoid is turned OFF.
- Clearance between the left end face of the thread trimmer cam and the end face of the pressing plate driving screw should be 0.8 to 1.2 mm.

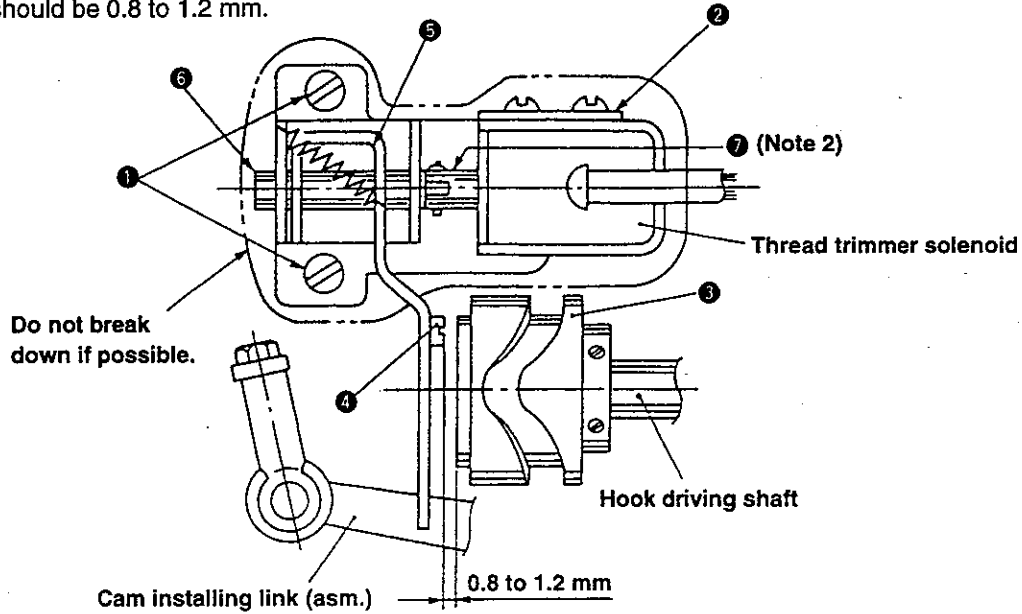
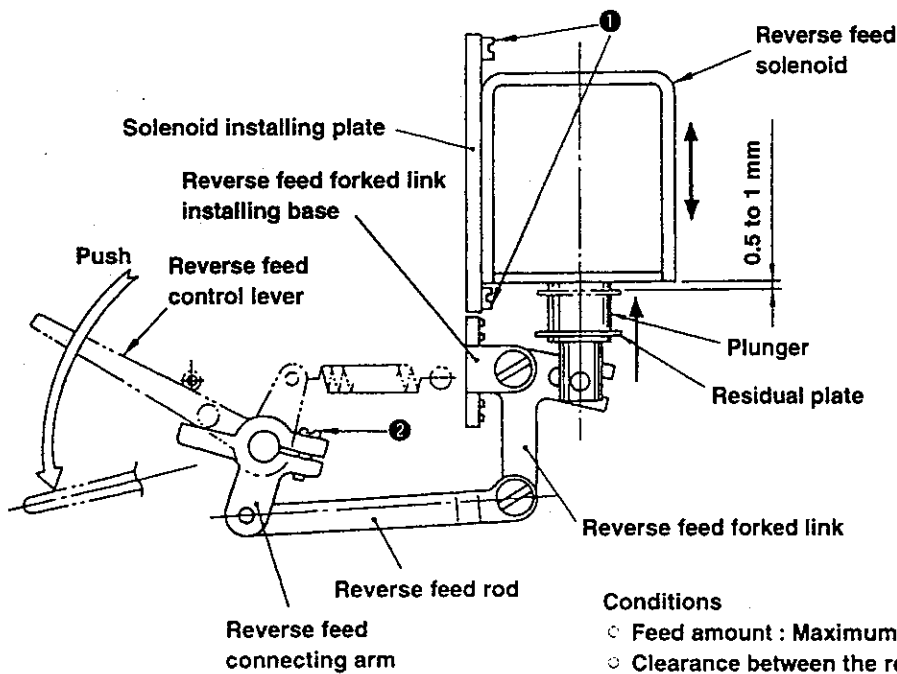


Fig. 52

8) Position of the reverse feed solenoid



Conditions

- Feed amount : Maximum
- Clearance between the reverse feed solenoid and the plunger residual plate is 0.5 to 1 mm when the reverse feed control lever is pushed until it stops.

Fig. 53

Adjustment Procedures	Results of Improper Adjustment
<p>1) Loosen two setscrews ❶ in the cam installing link pressing plate (asm.) ❷ .</p> <p>2) Move cam installing link pressing plate ❷ so that the clearance between the left end face of thread trimmer cam ❸ and pressing plate driving screw ❹ is 0.8 to 1.2 mm, and tighten setscrews ❶</p> <p>(Note) 1. Determine the position of cam installing link pressing plate (asm.) so that cam installing link pressing plate ❷ is parallel to the left end face of thread trimmer cam ❸ .</p> <p>2. When replacing parts of cam installing link pressing plate (asm.) ❷ , assemble the parts without contact by moving the pressing plate shaft and the plunger in the axial direction at the desired position in 360 degrees.</p>	<p>If the clearance is wider than the specified value :</p> <ul style="list-style-type: none"> ○ The knife will fail to cut the thread. <p>If the clearance is narrower than the specified value :</p> <ul style="list-style-type: none"> ○ Thread trimmer continually works resulting in the damage of the components.
<p>1) Set the stitch dial to the maximum value.</p> <p>2) Loosen setscrews ❶ in the solenoid installing plate.</p> <p>3) Push the reverse feed control lever until it stops, move the solenoid installing plate up and down, and fix the clearance between the residual plate attached to the plunger and the inside of the reverse feed solenoid to 0.5 to 1 mm.</p>	<p>If the clearance is wider than the specified value :</p> <ul style="list-style-type: none"> ○ Magnetism of the magnet will be reduced. As a result, the reverse feed may not be actuated. <p>If the clearance is narrower than the specified value :</p> <ul style="list-style-type: none"> ○ Stitch length in reverse feed stitching will be shortened.

Standard Adjustment

9) Adjusting the height of the auto lifter

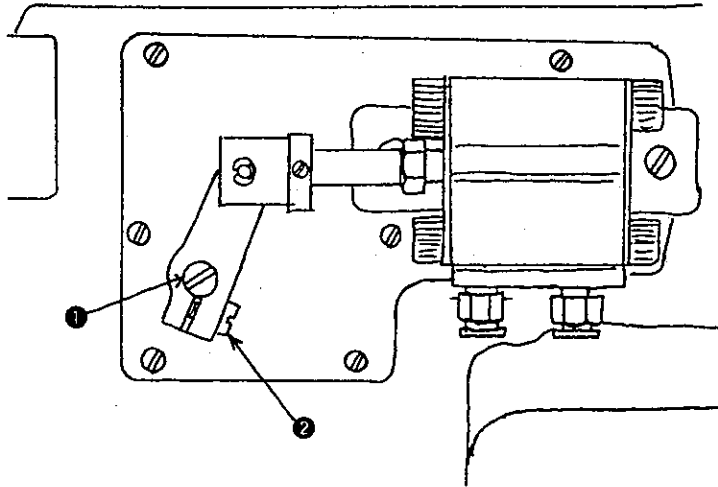


Fig. 54

10) Installing the synchronizer

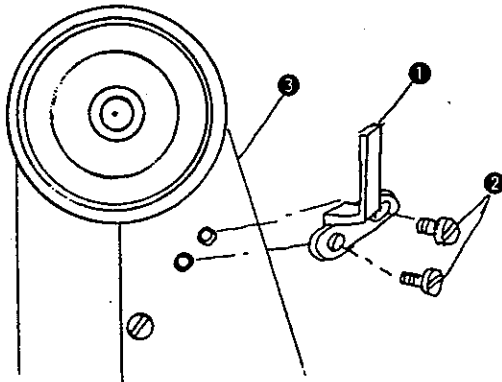


Fig. 55

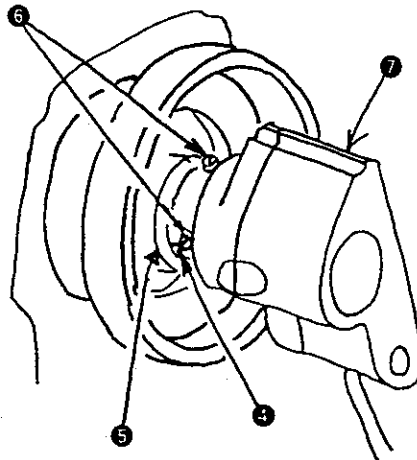


Fig. 56

Adjustment Procedures	Results of Improper Adjustment
<ol style="list-style-type: none"> 1) Loosen setscrew ② in the cylinder arm. 2) Turn cylinder arm shaft ① clockwise with a screwdriver to decrease the height of the presser lifter, and turn it counterclockwise to increase the height of the presser lifter. 3) After the adjustment, tighten setscrew ②. 	
<ol style="list-style-type: none"> 1) Install synchronizer support ① to belt cover ③ with attaching screws ②. 2) Install the synchronizer with setscrews ⑥ so that marker line ④ engraved on synchronizer ⑦ is aligned with marker dot ⑤ engraved on the handwheel. <p>(Note) If the installing position of the synchronizer is not proper, upper / lower stop position will be retarded or advanced. Perform the work so that the position is not shifted.</p>	<p>If the stop position is retarded :</p> <ul style="list-style-type: none"> ○ Needle comes down at the upper stop position. As a result, the needle may pierce the sewn product. ○ When drawing out the sewn product, the top point of the needle may be caught in the sewn product. <p>If the stop position is advanced :</p> <ul style="list-style-type: none"> ○ The knife will fail to cut the thread.

4. PLACES WHERE LOCK-TITE PAINT IS USED

Following parts are fixed by LOCK-TITE paint.

When disassembled these parts, be sure to wash the painted portions using a paint thinner and dry up the parts. Then, assemble them applying LOCK-TITE paint.

If it is hard to remove the parts which have been fixed using LOCK-TITE paint, heat it using a torch lamp or the like to help remove the parts.

(Note) It is advisable not to break down the parts if possible.

Table 8

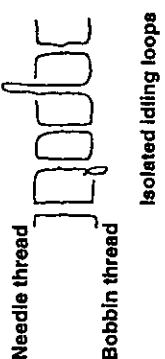
No.	Portions to be applied with LOCK-TITE	Part No.	LOCK-TITE No.
1	Safety clutch spring hinge screw and safety clutch hook hinge screw	SD0640322TP	LOCK-TITE #242
2	Upper feed connecting link hinge screw and L-shaped link hinge screw	21048707	LOCK-TITE #638
3	Feed lever square block hinge screw	SD0791051SP	LOCK-TITE #242
4	Feed lever square block hinge screw (PLC-1690)	SD0790433TP	LOCK-TITE #242
5	Knee lifter side bar pin	GAK88040000	LOCK-TITE #242
6	Needle bar rock shaft front crank stud	B1410771000	LOCK-TITE #242

5. CONSUMABLE PARTS LIST

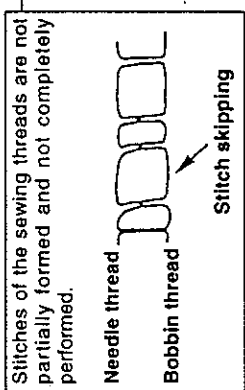
Table 9

Part No.	Description	Remarks
23025059	Hook with cap (asm.) for thread trimmer	For PLC-1610-7, PLC-1660-7
23027055	Hook with cap (asm.)	For PLC-1610, PLC-1660
23028053	Hook with cap (asm.)	For PLC-1660L
23039159	Hook with cap (asm.)	For PLC-1690
2302905	Hook with cap (asm.) for split needle	For PLC-1665
D9117141E00	Bobbin	
B9117201000	Bobbin	For PLC-1690
23005804	Moving knife	For PLC-1610-7, PLC-1660-7
23005903	Counter knife	
23006000	Clamp spring	
22603708	Felt	
	Needle	

6. TROUBLES IN SEWING AND CORRECTIVE MEASURES

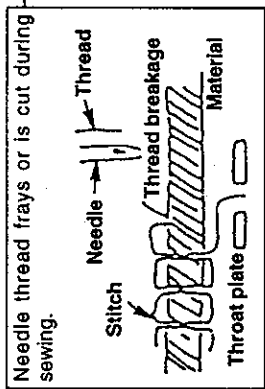
Trouble	Description	Cause (1)	Cause (2)	Corrective measure	
1. Isolated idling loops (loose stitches, looping)	<p>The position of the knotting point of sewing threads occurs suddenly above the cloth or below the cloth as a loop of thread.</p>  <p>Needle thread</p> <p>Bobbin thread</p> <p>Isolated idling loops</p>	The needle thread tension is insufficient.		Increase the needle thread tension.	
		The thread take-up spring has been improperly adjusted.	The stroke of the thread take-up spring is too small.	Increase the stroke of the thread take-up spring.	
		Hook components are defective.	Tension of the thread take-up spring is too low.	Increase the tension of the thread take-up spring.	
		Thread path is defective.	Clearance between the hook and the bobbin case stopper is too small.		
			Hook is defective (scratch on the hook).	Replace the hook with a new one.	
			Thread path is not smooth.	Finish the thread path to smoothen its surface.	
		Failed bobbin and bobbin case.	Thread path has a scratch.	Finish the thread path to smoothen its surface.	
			Thread path has been poorly finished.	Correct the thread path.	
			Failed engagement between the bobbin and the bobbin case. As a result, the bobbin thread is caught with the bobbin case.	Replace the bobbin or the bobbin case with a new one.	
		Bobbin has been unevenly wound with thread.	Defective tension adjusting spring of the bobbin case.	Replace the bobbin case with a new one.	
			Bobbin is running idle inside the bobbin case.	Strengthen the idling prevention spring.	
		Needle hole in the feed dog is small.	Tension is too low or too high.	Properly adjust the tension.	
		Needle is thinner for the thread used.		Use a feed dog with larger needle hole.	
		Needle is defective.		Replace the needle or the thread with a suitable one.	
Burr on the top of needle.	Replace the needle with a new one.				
	Orientation of the needle eyelet is defective.	Re-install the needle.			

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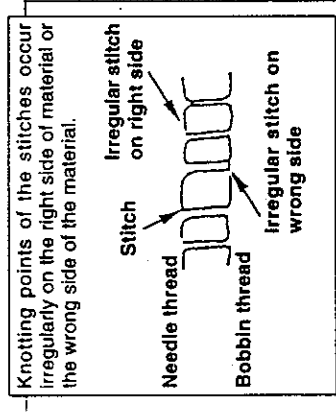
Trouble	Description	Cause (1)	Cause (2)	Corrective measure
2. Stitch skipping	 <p>Stitches of the sewing threads are not partially formed and not completely performed.</p> <p>Needle thread</p> <p>Bobbin thread</p> <p>Stitch skipping</p>	The feed timing is defective.	Feed timing is more advanced than the standard value.	Re-adjust the feed timing.
		The hook timing is defective.	Height of the feed dog is different from the standard one.	Re-adjust the height of the feed dog.
		The bobbin case opening lever is defective.	Hook timing is excessively advanced.	Retard the hook timing.
		The needle is defective.	Clearance between the hook and the bobbin case opening lever is too large.	Adjust so that the needle enters the center of the needle hole in the feed dog.
		Hook components are defective.	The needle is bent.	Replace the needle with a new one.
			Orientation of attaching needle is defective.	Re-attach the needle.
			The needle has a blunt tip.	Replace the needle with a new one.
			The needle is too thin or too thick for the thread used.	Replace the needle with a new one.
		The needle thread tension is too high.	Blade point of the hook is blunt or worn out.	Correct the blade point of the hook or replace the hook with a new one.
			The hook timing is defective.	Re-adjust the hook timing.
			Height of the needle bar is defective.	Adjust the height to the blade point of the hook by raising or lowering the needle bar.
			Clearance between the blade point of the hook and the needle is defective.	Decrease the clearance as small as possible.
			Function of the hook needle guard is defective.	Re-adjust the function.
			Loop formation is unstable.	Wind the thread around the needle.
			The needle thread tension is too high.	Decrease the needle thread tension.
Sewing speed is too high.	Decrease the sewing speed.			
Height of the needle bar is improper.	Re-adjust the height of the needle bar.			
Presser foot is defective.	Adjust the height of the feed dog.			
Feed timing is defective. (Bent needle)	Re-adjust the feed timing.			

To the next page

Trouble	Description	Cause (1)	Cause (2)	Corrective measure
		Thread take-up spring has been improperly adjusted.	Stroke of the thread take-up spring is too large.	Reduce the stroke of the thread take-up spring.
		Needle entry is defective.	Tension of the thread take-up spring is too high.	Decrease the tension of the thread take-up spring.
		Pressure of the presser foot is defective.	Needle comes in contact with the needle hole.	Adjust the needle entry position.
		Thread path is defective.	Pressure of the presser foot is too low.	Increase the pressure of the presser foot.
			Thread path is not smooth.	Finish the thread path.
			Thread path has a scratch.	Finish the thread path.
			Thread path has been poorly finished.	Correct the threading.
		Tension of the needle thread is defective.	Tension of the needle thread is too high or too low.	Properly adjust the tension.
			Tension of the thread tension No. 1 is too low.	Adjust the tension to such an extent that thread does not run.
		Needle is defective.	Needle is bent.	Replace the needle with a new one.
			Needle has a scratch.	Replace the needle with a new one.
			Needle has a blunt tip.	Replace the needle with a new one.
			Orientation of attaching needle is defective.	Re-attach the needle.
			Needle is too thin or too thick for the thread used.	Replace the needle with a new one.
		Hook components are defective.	Thread path of the hook has a scratch.	Finish the thread path.
			Blade point of the hook is blunt or worn out.	Correct the blade point of the hook or replace the hook with a new one.
			Clearance between the hook and the bobbin case stopper is too small.	Increase the clearance so that thread can easily move.
			Hook timing is excessively advanced.	Re-adjust the hook timing.
			Bobbin case opening lever provides too much clearance at the bobbin.	Re-adjust the clearance.
			Needle comes in contact with the blade point of the hook.	Properly adjust the needle-to-hook relation.



To the next page

Trouble	Description	Cause (1)	Cause (2)	Corrective measure
4. I r r e g u l a r stitches	Knotting points of the stitches occur irregularly on the right side of material or the wrong side of the material. 	The thread take-up spring has been improperly adjusted. Sewing speed is too high. Position of the needle is too low. Pressure of the presser foot is too low. Needle entry is defective. Hook components are defective.	The stroke of the thread take-up spring is too large or too small. Tension of the thread take-up spring is too high or too low. Thread is cut due to the heat. Position of the needle bar is too low. Needle is not properly attached to the needle bar. Hinge section of the presser foot is clogged with dust. As a result, thread is cut. Needle comes in contact with the needle hole in the throat plate. Amount of oil supplied to the hook is insufficient. Rear face of the bobbin case is clogged with dust. The hook timing is excessively advanced. Hook is defective (thread catching, defective thread path, etc.). Bobbin case opening lever provides too much clearance at the bobbin.* Clearance between the throat plate and the bobbin case stopper is too small. Bobbin thread feeding is defective due to failed engagement between the bobbin and the bobbin case. Bobbin thread is caught with the bobbin case due to defective thread winding around the bobbin. Bobbin is running idle inside the bobbin case. Tension adjusting spring of the bobbin case is defective. Bobbin has been excessively wound with the bobbin thread.	Re-adjust the stroke of the thread take-up spring. Re-adjust the tension. Decrease the sewing speed. Wind the thread around the needle. Raise the needle bar. Properly attach the needle. Increase the pressure of the presser foot. Re-adjust the needle entry position. Apply oil to the race face of the hook. Clean the bobbin case. Retard the hook timing. Replace the hook or correct the thread path. Reduce the clearance. Increase the clearance. Replace the bobbin or the bobbin case. Adjust the tension of the bobbin winder or position of the thread tension of the bobbin winder. Strengthen the idling prevention spring. Replace the bobbin case with a new one. Wind again so that thread does not come out of the periphery of the bobbin.

To the next page

Trouble	Description	Cause (1)	Cause (2)	Corrective measure
		The needle thread tension and bobbin thread tension are insufficient.	The stroke of the thread take-up spring is too large or too small.	Increase the needle thread tension and bobbin thread tension.
		The thread take-up spring has been improperly adjusted.	Tension of the thread take-up spring is too high or too low.	Adjust the stroke of the thread take-up spring.
		The thread path is defective.	The thread path is not smooth.	Adjust the tension of the thread take-up spring.
			The thread path has a scratch.	Finish the thread path.
			The thread path has not been properly finished.	Finish the thread path.
				Correct the threading.
		Feed timing is defective.		Re-adjust the feed timing.

7. TROUBLES WITH THREAD TRIMMER FUNCTION AND CORRECTIVE MEASURES

Troubles	Cause (1)	Cause (2)	Inspecting order and adjusting procedure
1. Several stitches skip at the start of sewing.	1-1) Length of thread remaining at the tip of needle after thread trimming is too short.	<ul style="list-style-type: none"> 1) -A Routing of the needle thread is abnormal. As a result, the needle thread tension is too high at the time of thread trimming. 1) -B Tension of the thread tension disk No. 1 is too high. 1) -C The thread tension disk No. 2 rises insufficiently at the time of thread trimming. 1) -D The thread trimming timing is excessively advanced. 1) -E The moving knife or the hook has a scratch. 	<ul style="list-style-type: none"> Inspect the route of the needle thread, and correct the thread entangled to the needle thread guide pin and the position of the thread guide on the thread stand.
	1-2) Failed clamp of the bobbin thread	<ul style="list-style-type: none"> 2) -A Attaching position of the clamp spring is not proper. 2) -B Clamp spring pressure is too low. 2) -C The clamp spring has a scratch. Or, it is broken. 2) -D The needle thread on the material side removes the bobbin thread. 	<ul style="list-style-type: none"> Turn the tension nut of the thread tension No. 1 counterclockwise to reduce the tension. Check whether the tension release solenoid works when the power is conducted. Inspect and adjust the thread trimming timing. Check the hook or the knife for the scratch, and finely polish it with buff or the like if there is a scratch on it. Replace the part with a new one if the scratch is serious. Properly adjust the position. Properly adjust the pressure, or replace it with a new one. Replace the clamp spring with a new one. Increase the pressure of the thread tension No. 1.
	1-3) Needle, walking foot or feed dog is not proper. Or, pressing pressure is too low.	<ul style="list-style-type: none"> 3) -A The needle is too thick. 3) -B Needle hole in the feed dog is too large. 3) -C Pressing pressure is too low. 	<ul style="list-style-type: none"> Use a thin thread to such an extent that loose stitches do not occur. Replace the presser spring regulator clockwise to increase the pressing pressure to such an extent that the feed dog defect is not made.

To the next page

Troubles	Cause (1)	Cause (2)	Inspecting order and adjusting procedure
2. Thread slips off the needle eyelet.	2-1) Needle thread slips off the needle eyelet immediately after thread trimming.	1) -A Length of needle thread remaining at the tip of the needle after thread trimming is too short.	Refer to "Cause (1) 1-1) A to E".
	2-2) Needle thread slips off the needle eyelet at the start of sewing.	1) -A Length of needle thread remaining at the tip of the needle at the start of sewing is too short.	Refer to "Cause (1) 1-1) A to E".
3. Defective thread trimming	3-1) Thread cannot be cut.	1) -A Height of the blades of moving knife and counter knife has been improperly adjusted.	Check the height of the moving knife and the counter knife.
		1) -B Blade of the moving knife or that of the counter knife has worn out, or been broken.	Replace the moving knife or the counter knife with a new one.
		1) -C Counter knife pressure is insufficient.	Re-adjust the knife pressure.
	3-2) Remaining of single thread occurs.	2) -A Blade of the moving knife or that of the counter knife has worn out, or been broken.	Replace the moving knife or the counter knife with a new one.
		2) -B Height of the blades of moving knife and counter knife has been improperly adjusted.	Check the height of the moving knife and the counter knife.
		2) -C Thread trimming timing is excessively retarded.	Check the cam timing.
		2) -D Counter knife pressure is insufficient.	Re-adjust the knife pressure.
	3-3) Moving knife stops on the way.	3) -A Thread is too thick.	Use a thread which is equivalent to the specifications.
		3) -C Needle thread tension is too high.	Decrease the tension of the thread tension No. 1.
		3) -D Needle thread tension is too low.	Increase the tension of the thread tension No. 1.


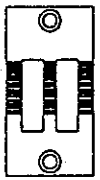


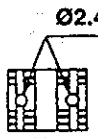
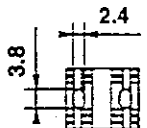
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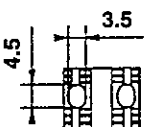
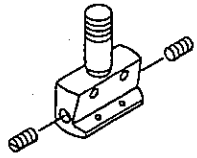
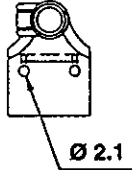
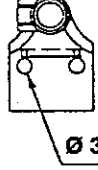
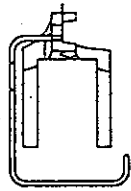
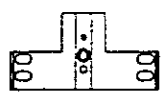
Troubles	Cause (1)	Cause (2)	Inspecting order and adjusting procedure
		3) -E Bobbin thread tension is too high.	Decrease the bobbin thread tension.
		3) -F Counter knife pressure is too high.	Adjust the position of the counter knife.
		3) -G Initial position of the moving knife is excessively advanced.	Check and adjust the initial position of the moving knife.
		3) -H Thread is not cut sharply.	Refer to "Cause (1) 3-1) and -2)".
	3-4) Needle thread cannot be clamped.	4) -A The last stitch skips.	Check and adjust the needle attaching and hook timing.
		4) -B Thread trimmer cam timing is excessively advanced or retarded.	Check and adjust the thread trimmer cam timing.
		4) -C Tip of the moving knife is broken or has a scratch.	Replace the moving knife with a new one.
	3-5) Bobbin thread cannot be clamped.	5) -A Stroke of the moving knife is too small.	Check and adjust the initial position of the moving knife.
		5) -B Routing of the bobbin thread is defective (bobbin thread comes off the bobbin thread guide in the bobbin case.)	Check the routing of the bobbin thread.
		5) -C Tip of the moving knife is broken or has a scratch.	Replace the moving knife with a new one.
		5) -D Height of the moving knife is too high or too low.	Check the height of the moving knife.
	3-6) Both needle thread and bobbin thread cannot be cut.	6) -A Height of the blades of moving knife and counter knife has been improperly adjusted.	Check the height of the moving knife and the counter knife.
		6) -B Height of the blades of moving knife and counter knife has been improperly adjusted.	Replace the moving knife and the counter knife.
		6) -C Counter knife pressure is insufficient.	Refer to "Adjusting the knife pressure".
		6) -D Moving knife fails to work.	Check and adjust the attaching position of the moving knife driving arm A.
			Check the motion of the thread trimmer solenoid.
			Check and adjust the synchronizer timing.

8. TABLE OF EXCHANGING GAUGE PARTS FOR RESPECTIVE MODELS

(1) PLC-1660, PLC-1660L, PLC-1660-7

Table 10

	1	2	3	4	5
PLC-1660-7	○		○	○	
PLC-1660	○		○		○
PLC-1660L		○			
NEEDLE GAUGE SIZE	THROAT PLATE		THROAT PLATE FOR LOWER TAPE ATTACHING	FEED	
					
mm	Stitch length : 6 mm	Stitch length : 10 mm	Stitch length : 6 mm		
8	230-15100	*	230-15357	230-20100	230-20308
10	230-15001	230-16108	230-15258	230-20001	230-20209

6	7	8	9	10	11
	○	○		○	○
	○	○		○	○
○	○		○	○	○
FEED	NEEDLE CLAMP ASM.	FEED FOOT ASM.		PRESSER FOOT ASM.	THROAT PLATE HOLDER
					
*	230-17650	107-83256	*	230-18757	230-17007
230-20407	230-17551	107-83355	230-22551	230-18658	230-16900

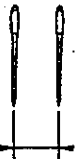


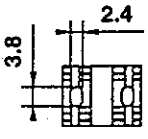


(Note) 1. Needle gauge sizes other than those described in the above table can be received as the special order parts.


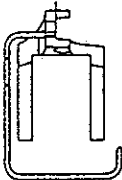
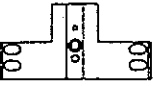
The range of the possible sizes is 3 to 20 mm.

2. The width of the tape for the throat plate for lower tape attaching is 12 mm when the needle gauge size is 8 mm and 14 mm when the size is 10 mm.

(2)PLC-1665

Table 11


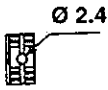
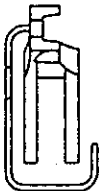

	1	2	3	4	5
NEEDLE GAUGE SIZE	THROAT PLATE	THROAT PLATE FOR LOWER TAPE ATTACHING	FEED	NEEDLE CLAMP LEFT ASM.	NEEDLE CLAMP RIGHT ASM.
					
mm					
8	230-15100	230-15357	230-20308	B1402-526-HALA	B1402-526-HARA
9.5	230-15001	*	230-20506	B1402-526-KALA	B1402-526-KARA
10	230-15001	230-15258	230-20209	230-23856	230-21355

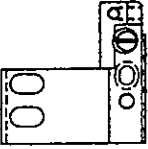
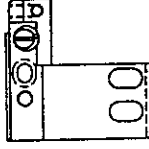
6	7	8
NEEDLE FOOT ASM.	PRESSER FOOT ASM	THROAT PLATE HOLDER
		
107-83256	230-18757	230-17007
230-22650	230-18658	230-16900
107-83355	230-18658	230-16900

- (Note)
1. Needle gauge sizes other than those described in the above table can be received as the special order parts.
The range of the possible sizes is 4 to 12 mm.
 2. The width of the tape for the throat plate for lower tape attaching is 12 mm when the needle gauge size is 8 mm and 14 mm when the size is 10 mm.

(3) PLC-1610, PLC-1610-7

Table 12

Description Class	THROAT PLATE	FEED	PRESSER FOOT ASM	FEED PLATE ASM.
				
Standard	230-30000	230-31008	230-33053	230-32055

THROAT PLATE HOLDER ASM.	
A	B
	
230-09251	230-09350

