

SERVICE MANUAL

FOR

**BROTHER MODEL DB2-B705
-100--200--400--500**



**BROTHER INDUSTRIES, LTD.,
NAGOYA, JAPAN.**

PREFACE

This service manual is made for the purpose of getting acquainted with our newly designed thread trimmer series, BROTHER Model DB2-B705-100 Series.

Normal troubles occur in your sewing room will be solved with the knowledge of instruction manual enclosed with the machine, however, in order to get much more perfect knowledge on this machine, this service manual may be helpful for your better maintenance. We duly hope that you get full knowledge on this machine by this service manual as well as instruction manuals and parts catalogues. Incidentally, this covers the description on our newly developed BROTHER Needle Positioning Motor, however, if you use with other brand's, please refer to one published by those manufacturer.

We sincerely hope that you will overcome the troubles which may arise in your factory with this pamphlet.

BROTHER INDUSTRIES, LTD.

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1. Features

(Head)

1. It ensures high graded sewing conditions and perfect durability at maximum high speed of 4,500 stitches per minute.
2. It is equipped with built-in bobbin winder with compact design and high performance.
3. Belt cover is equipped with as standard accessories, thus it ensures operators' safety.
4. Plunger pump is adopted on this machine, thus it ensures perfect oil return to oil reservoir even at slow speed operation. This pump can be easily disassembled by the mechaics.

(Thread trimming mechanism)

5. Simple thread trimming mechanism is adopted on this machine, so that it is quite easy adjustment and maintenance and it also features very safe construction.
6. Stable thread trimming jobs can be obtained because of the thread trimming mechanism driven by lower shaft.
7. Rotary knife around rotary hook is adopted to do faster trimming jobs and thread tails are shortened considerably in comparison with the conventional machine.
8. All accessories including feed dogs, presser feet and needle plates can be used with this machine in other words, such parts are common with other lock stitch sewing machines.
9. Built in thread wiper ensures much productivity. (-200)
10. The solenoid reverse mechanism operates with a soft touch and permits even the beginner to sew backward easily. (Type 400 specifications)
11. The pneumatic thread cutter sewing machine has a presser lifter which can be controlled with a single pedal operation and thus prevents operator fatigue. (Type 500 specifications)

(N.P. Motor)

12. This motor is newly designed with clutch mechanism on slow speed motor with the speed of 215 r.p.m., thus it ensures faster actions of thread trimming and stopping jobs.
13. Even the beginner can use this machine with single treadle pedal for inching, sewing, needle up and down position and thread trimming.
14. Synchronizer is designed with "Lead Switch" and all control circuits are not used with relays, thus its reliability and durability are very high.
15. Printed Circuit Boards (P.C.B.) are very easy to change and all components are designed to do so, which ensures easy maintenance.

Specifications

		DB2-B705-100	DB2-B705-200	DB2-B705-400	DB2-B705-500
Means of thread trimming		Electro-magnetic, rotary knife system thread trimming device.			
Means of thread releasing		Electro-magnetic solenoid			
Thread wiper		Nil	Equipped		
Quick back		Nil	Nil	Solenoid type	Air type
Aut refuter presser foot		Nil	Nil	Nil	Air type
Sewing speed	High speed:	4,500 s.p.m.			
	Slow speed:	215 r.p.m.			
Rotary hook		Specially designed hook			
Motor		"BROTHER" Needle Positioning Motor; or the like.			
		MD-931-811	MD-931-812	MD-931-814	MD-931-815
		3 phase 400W			

(NOTE)

1. Single phase motor is of different specs.
2. Specs. on machine head is referred to the instruction manual of Model DB2-B705.

3. Name of major components

This machine is composed of the following components.

(1) Head

- a. Head
- b. Thread trimming mechanism
- c. Treadle pedal
- d. Tension releaser
- e. Synchronizer
- f. Thread wiper (Optional parts for -200)

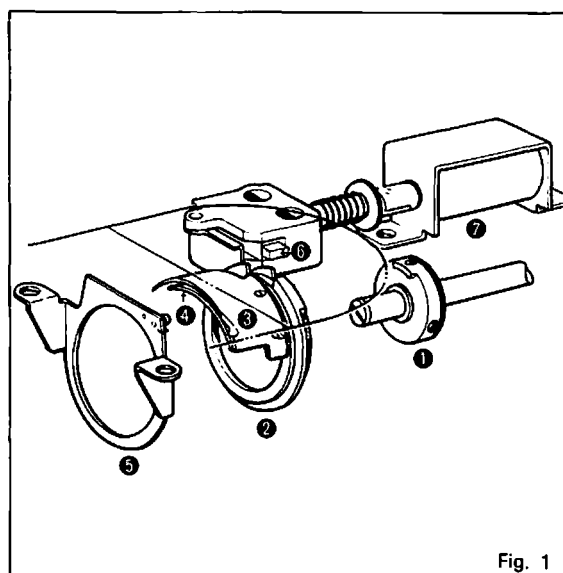
(2) Control box

(3) Needle Positioning Motor

4. Thread trimming mechanism

(1) Construction

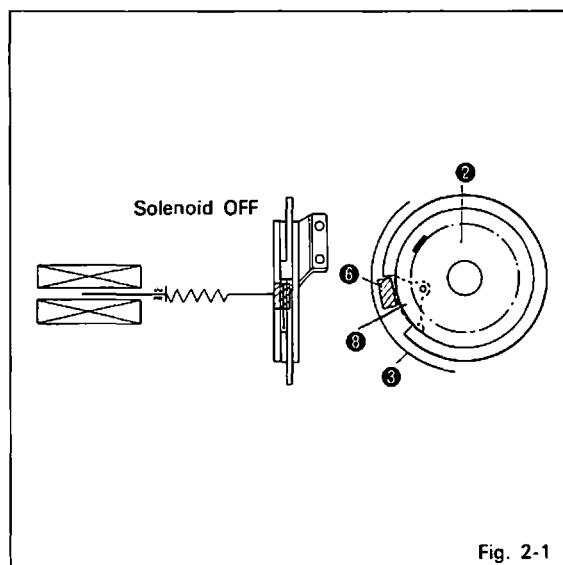
As per Fig. 1, there are composed of thread trimmer clutch ①, Holder ②, Knife ③, Lower thread finger ④, Holder plate ⑤, Stopper ⑥, and Solenoid ⑦.



(2) Procedures

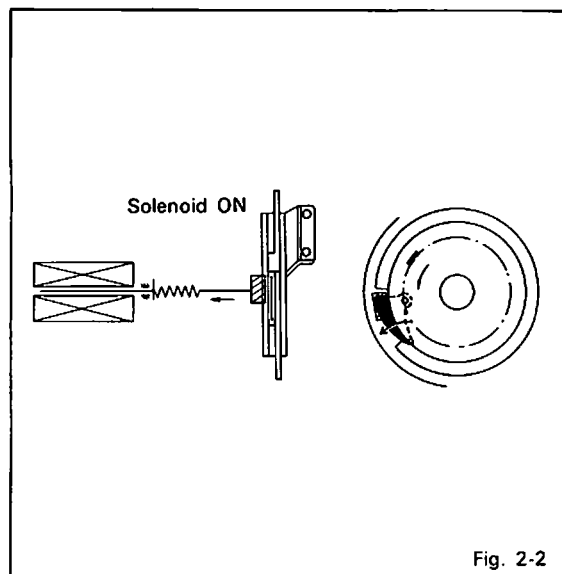
1) At high speed

As per Fig. 2-1, stopper presses down cam and holder is stationed.



II) At thread trimming signal comes from synchronizer

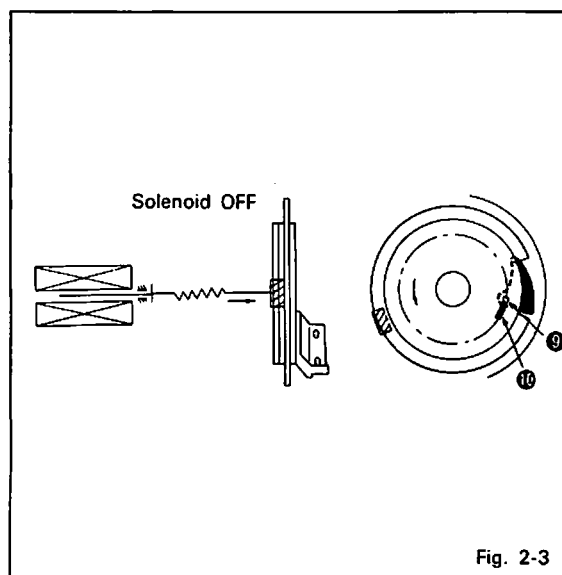
With your heel, when you presses down the treadle pedal, synchronizer will order to get thread trimming signal, solenoid is going to pull its plunger and stopper, then cam jumps up with the aid of the spring action. (Fig. 2-2)



III) Holder's rotation

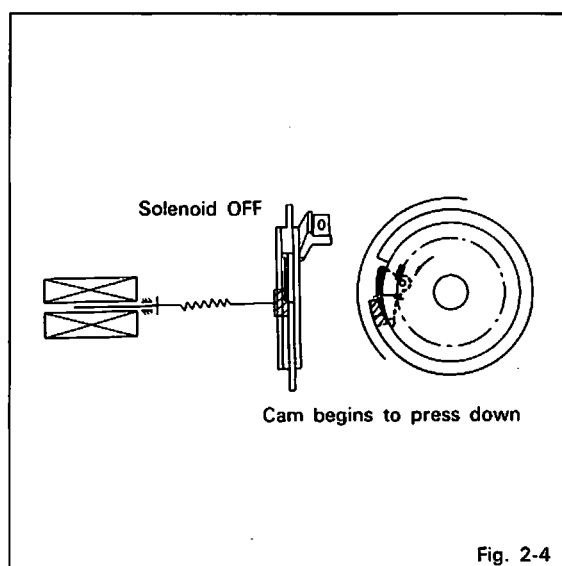
When the cam jumps up, its pin 9 is located in the same circumference with the projected portion of clutch 10, thus holder rotates together with clutch.

At that time, solenoid is already disengaged and stopper is positioned at its original position and it contacts with the face of holder. (Fig. 2-3)



IV) Just before ending thread trimming

As holder is rotating to the position of aforementioned position (I), stopper is climbing up to cam, thus cam is pressed down. (Fig. 2-4)



V) At ending thread trimming

Cam gradually pressed down is out of the circumference of clutch, then holder stops. At that time, the inertia of holder is absorbed by stopper. (Fig. 2-5)

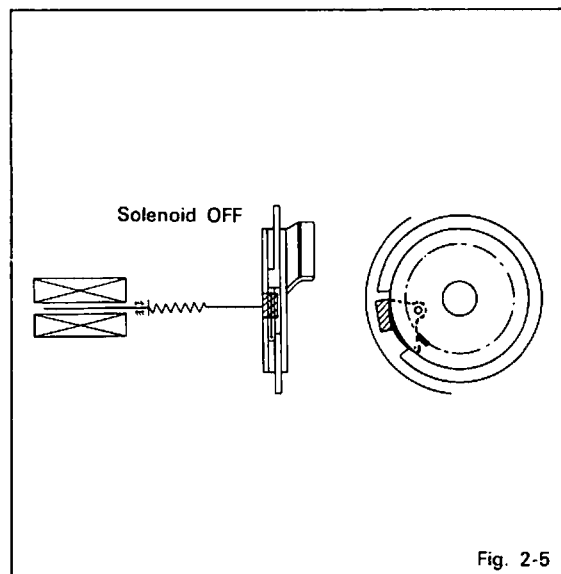


Fig. 2-5

(3) How to be trimmed upper and lower threads

As per the afore-mentioned procedures, upper and lower threads are trimmed as follows:

I) The hook point gets upper thread

At this time, needle comes up 2.2 mm from its lowest position, but the signal for thread trimming is given at its lowest position.

(Fig. 3-1)

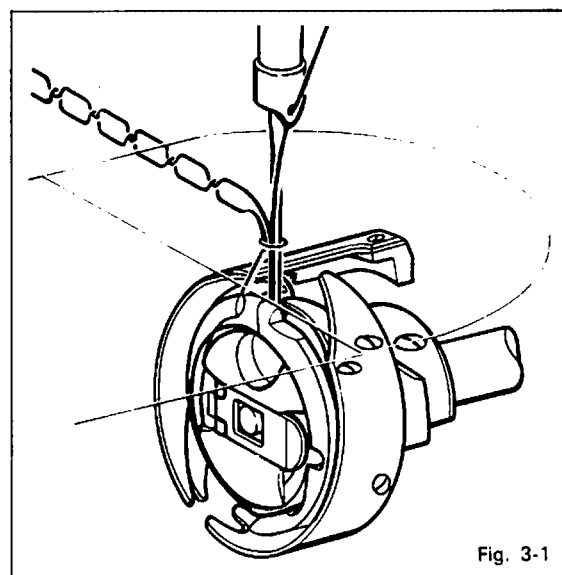


Fig. 3-1

II) Knife moves

Signal for thread trimming is given and by the action of clutch, knife moves with rotary hook's rotation. (Fig. 3-2)

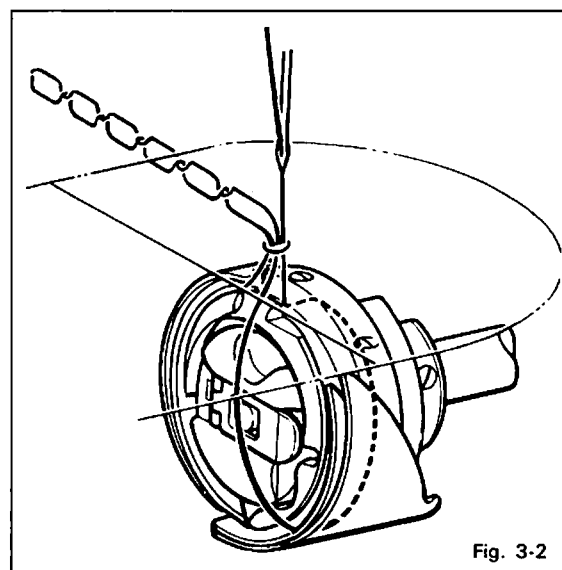


Fig. 3-2

III) Knife catches upper thread and lower thread finger gets lower thread

The point of knife comes into upper and lower threads which is separated by the rotary hook and the triangle-shaped loop which is formed by needle hole of the needle plate, thus the upper and lower thread is separated. (Fig. 3-3)

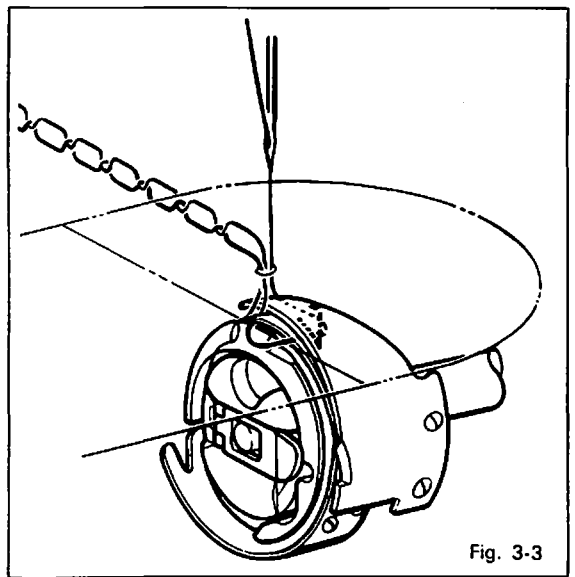


Fig. 3-3

At this time, the thread take-up lever is positioned at a bit higher point from its lowest position, (upper shaft angle; appr. 330°) and as per Figs. 3-4 and 3-5, the threads are separated.

In case of sooner or later timing, it affects on separation of upper and lower threads, then it causes error of thread trimming.

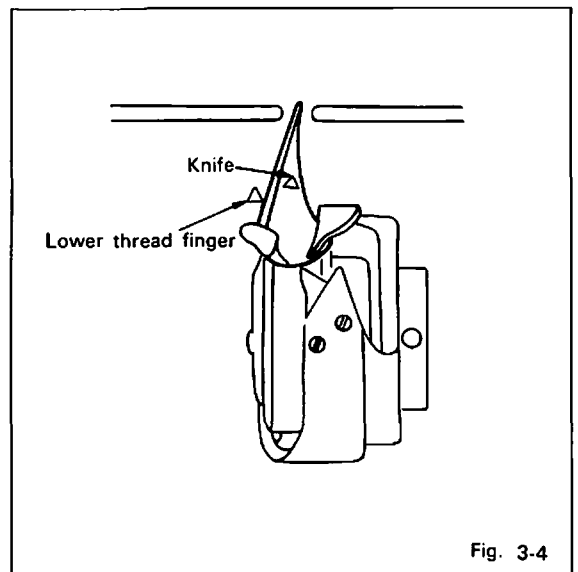


Fig. 3-4

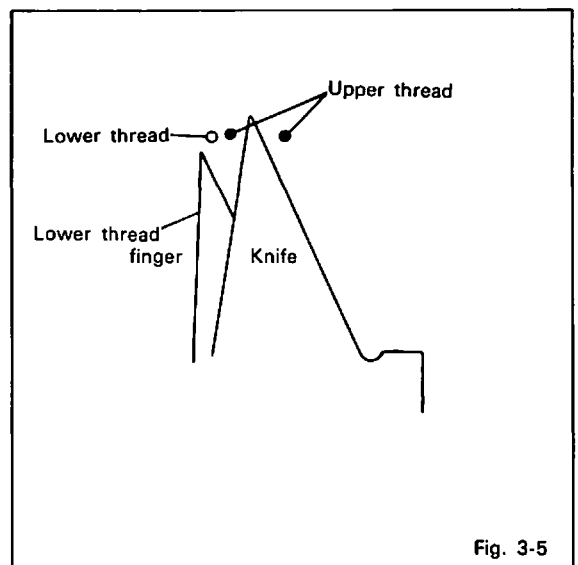


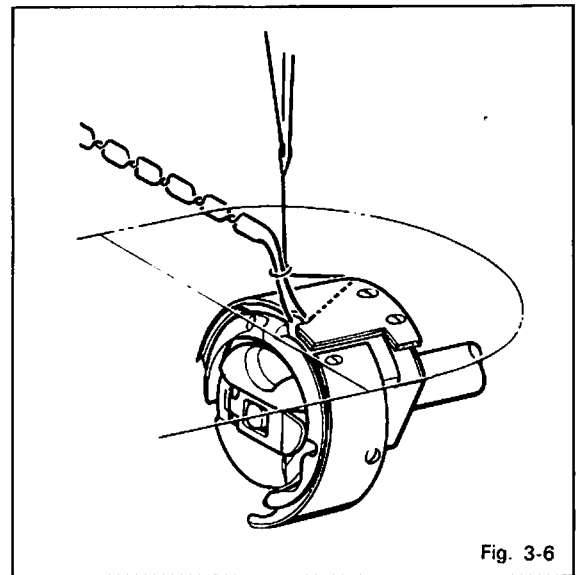
Fig. 3-5

IV) Upper and lower threads are trimmed

As per the above procedure, the upper and lower threads which are caught by knife holder are trimmed by the sharp edge of knife gradually expanded by their own shape.

At this time, the position of thread take-up lever is up highest. Due to the shape of the knife, not so as to be pulled the upper thread with excessive tension, the tension releaser is functioned to release the upper thread without any resistance.

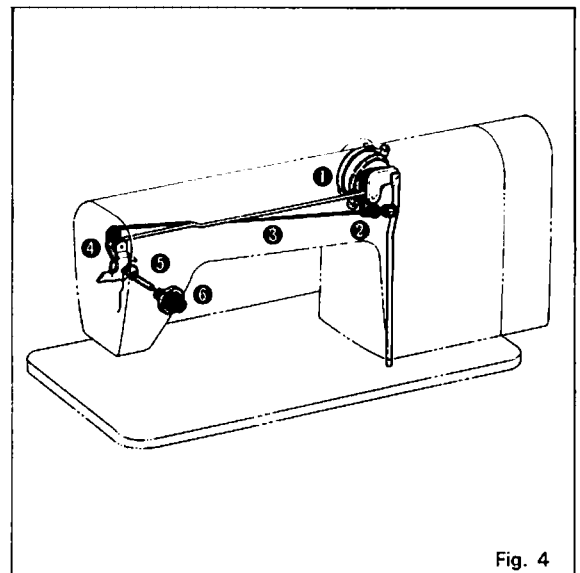
The threads which were caught by knife and holder are very much affected on the length of threads out of needle eye and bobbin case, and finally on the formation of the first stitch at the beginning of the next stitch. (Fig. 3-6)



(4) Tension releaser

In case that the signal for thread trimming is given, the tension release solenoid ① is functioned, pulled tension release lever ②, pushed tension release bar ⑤ with the intermediate action of connecting bar ③ and plate ④ and opened tension discs ⑥.

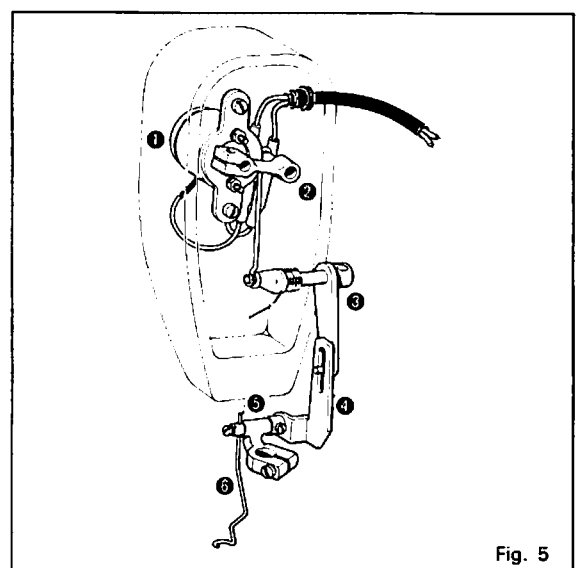
In case that the signal for needle up position is given the tension release solenoid is off, thus tension discs are closed. (Fig. 4)



(5) Thread wiper

In case that the signal for needle up position is given, with the interval of 10~100ms, the thread wiper solenoid ① is on, thus thread wiper ⑥ is functioned with the intermediate action of lever ③ and grooved link ④.

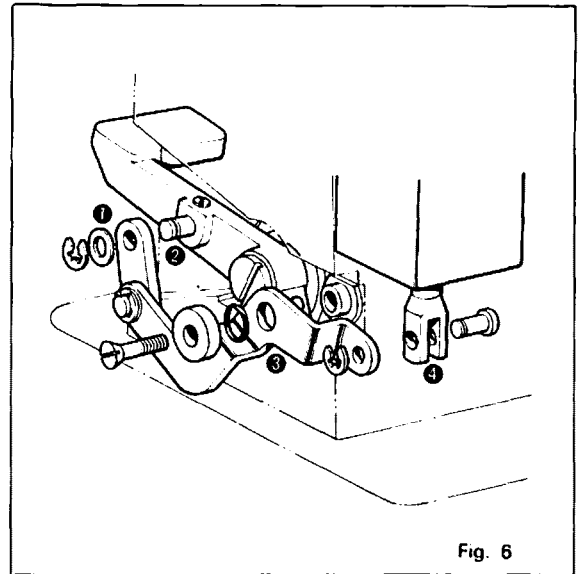
In case that the thread wiper solenoid is off, thread wiper returns to its original position with the aid of spring. (Fig. 5)



(6) Quickback mechanism

When the backtack button is pushed, reverse solenoid ❶ (Type 400) or reverse cylinder (Type 500) operates to lower reverse handle ❷ via lever ❸ and connecting link ❹. The machine sews backward as long as the backtack button is kept pushed.

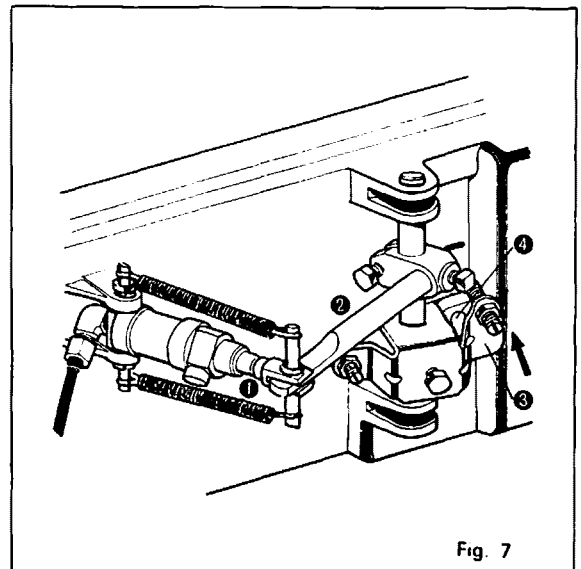
When the backtack button is released, a reset spring moves it back to its original position so that the machine sews forward again. (Fig. 6)



(7) Automatic presser lifter (Type 500)

When the power is switched on, the air pressure inside presser lifter cylinder ❶ increases to move the piston, which drives knee lifter ❸ via piston operating link ❷ to push up push rod ❹ and the presser foot. (Fig. 7)

When the treadle top plate is slightly stepped on, the air pressure inside presser lifter cylinder ❶ decreases to lower the presser foot.



5. Construction chart of Brother N.P. Motor

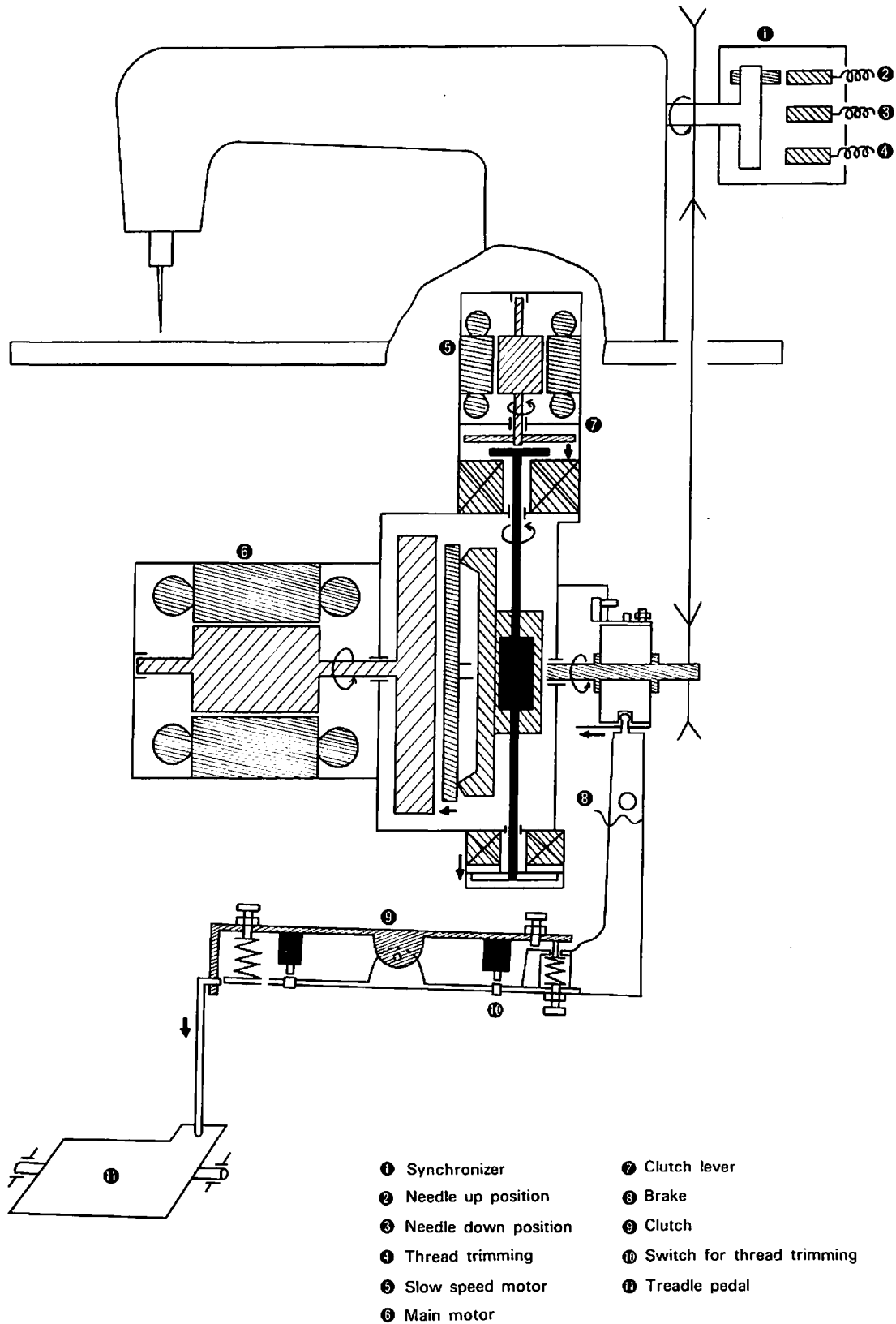
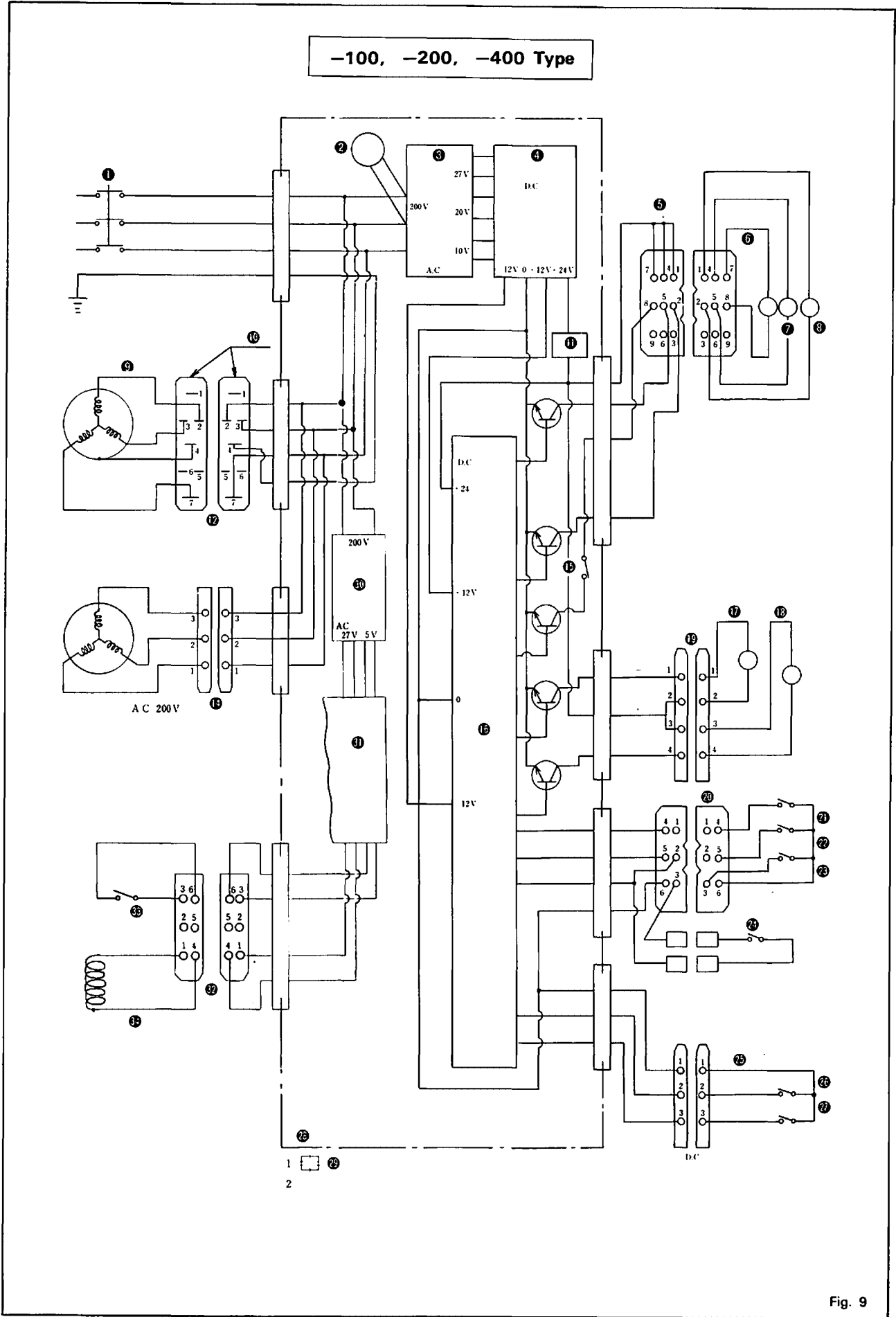


Fig. 8

6. Electric circuits



-500 Type

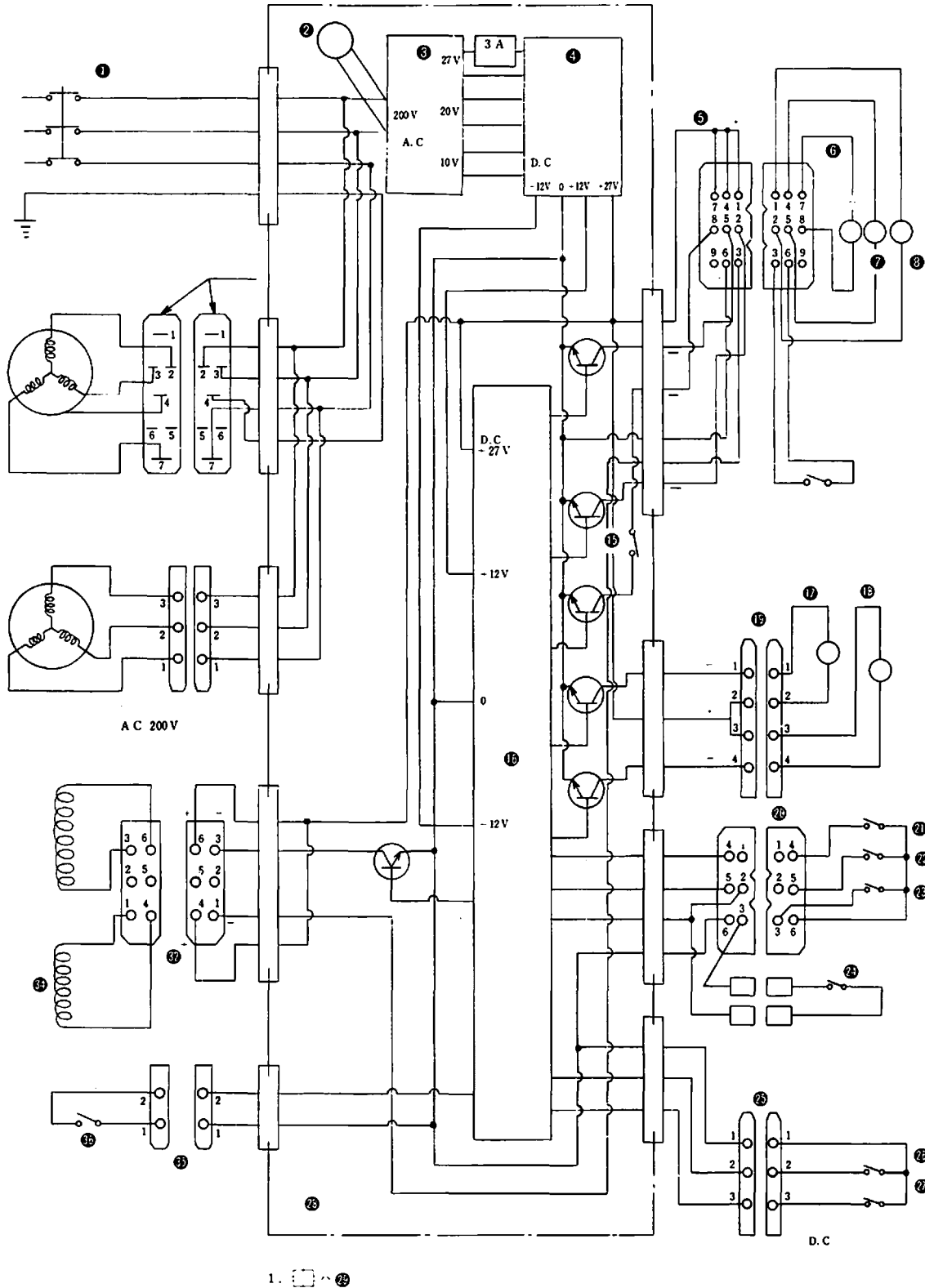


Fig. 10

- | | |
|---------------------------------|--|
| ①. Electric source SW | ⑩. 4P plug |
| ②. Pilot lamp | ⑪. 6P plug |
| ③. Transformer | ⑫. Needle up |
| ④. P. C. B. for electric source | ⑬. Needle down |
| ⑤. 9P plug | ⑭. Trimming |
| ⑥. Wiper coil | ⑮. Safety SW |
| ⑦. Tension releaser coil | ⑯. 3P plug |
| ⑧. Trimmer coil | ⑰. Micro SW for high speed |
| ⑨. Main motor | ⑱. Micro SW for trimming |
| ⑩. Mark | ⑲. Control box |
| ⑪. Fuse | ⑳. Stands for bushings for control box |
| ⑫. 7P plug | ㉑. Transformer |
| ⑬. Slow speed motor | ㉒. P.C.B. for electric source |
| ⑭. 3P plug | ㉓. 6P plug |
| ⑮. Wiper SW | ㉔. Back SW |
| ⑯. Logic circuit | ㉕. Back coil |
| ⑰. Brake coil | ㉖. 2P plug |
| ⑱. Clutch coil | ㉗. Foot pedal SW |

(1) Switching on

In case that you may switch on, whatever position of synchronizer may be, the brake is functioned not to move the sewing machine. This is so-called safety guard.

In case you will find that the needle is not positioned to be up the highest, you may press the treadle pedal on its rear end, thus needle comes up and stops.

(2) Pressing pedal on front end

By pressing the treadle pedal lightly, micro-switch is engaged, then the sewing machine runs slowly at 215 r.p.m., by the slow speed motor.

By pressing the treadle pedal further, the clutch contacts high speed motor, then, the sewing machine runs fast.

(3) Needle down position

In case that you may put the treadle pedal to be a neutral position, the micro-switch is disengaged, the sewing machine runs slowly by the slow speed motor and stops at needle down position.

(4) Thread trimming, thread wiping and needle up position

After the needle down position, in case you may press the rear end of the treadle pedal, the sewing machine runs slowly by the slow speed motor, thread trimming and tension releasing mechanisms are functioned, then the sewing machine stops at the needle up position, and thread wiper is functioned. In this case, please take note that you may fail to trim the threads if you press the treadle pedal so quickly. Also, when the sewing machine stops at the needle up position, even though you may press the rear end of the treadle pedal, the sewing machine does not run nor thread trimming may be functioned.

(5) Thread trimming, non-thread wiping and needle up position

In case that you would like to do the sewing jobs without thread wiping, switch off the thread wiper switch on the control box.

7. Setting up the machine

Setting the head, oil reservoir, thread stand on table is exactly same as Model DB2-B705's. Therefore, refer the instruction manual for Model DB2-B705.

(NOTE)

Do not hold the synchronizer in case you hold the sewing machine head.

(1) Motor pulley and V-belt

Motor pulley							
		115 mm	105 mm	100 mm	95 mm	90 mm	85 mm
50 Hz	High speed	4,550	4,300	4,050	3,850	3,650	3,450
	Slow speed	215	200	190	180	170	160
		95 mm	90 mm	85 mm	80 mm	75 mm	
60 Hz	High speed	4,550	4,300	4,100	3,850	3,550	
	Slow speed	215	200	190	180	165	
V-belt;		42 inches for 60Hz 43 inches for 50Hz					

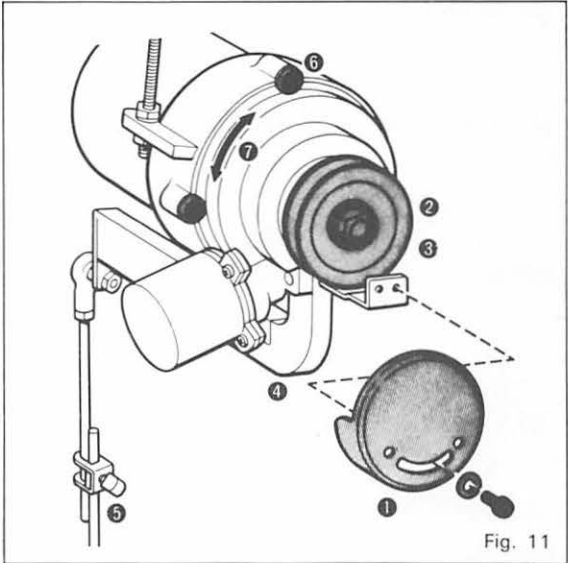
(2) Motor pulley change

If you wish to change the motor pulley, please take note the followings (Fig. 11)

- (1) Remove pulley cover ❶ and change the pulley ❷.
- (2) Fasten securely the nut ❸.
- (3) Get the proper tension of V-belt. (See the instruction manual of Model DB2-B705).
If the tension is too loose, the stop position is not accurate.
- (4) In case you may change the position of the motor, loosen three bolts ❹ and rotate bracket ❺ so that clutch lever ❻ and pull rod ❼ is right angle.

(NOTE)

The pulley to be used with this motor is recommended to use with BROTHER K pulley, although the commonly sold pulleys are applicable.



(3) Connection of wires

- I) Put the plugs out of sewing machine head and synchronizer into the table top hole ①. The wire out of synchronizer should be fixed with wire supporter ② on the belt cover. Connect the plugs ④ comes from control box ③. (Figs. 12, 13)
- II) To prevent the static electricity, connect the earth wire ⑤ out of table hinge to the bracket of motor.

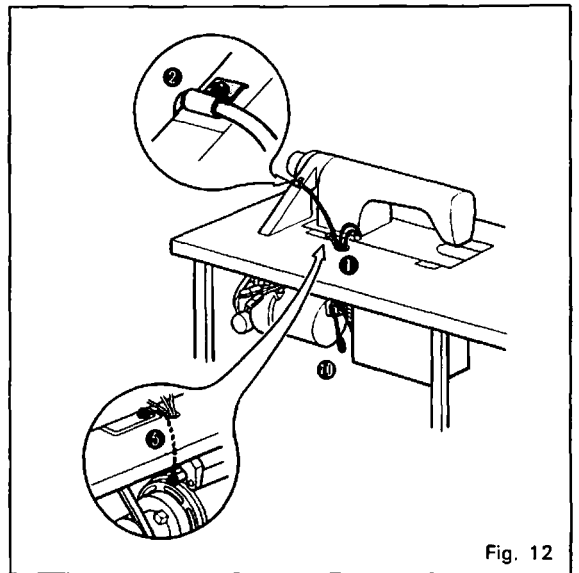


Fig. 12

- III) Pass the plugs through the hole in the table and connect them to the plug sockets leading from control box ⑤, safety device ⑥, valve box ⑦ and treadle ⑧. (Fig. 13, Fig. 14)
- (A) plug for Types 100, 200, 400, 500
 - (B) plug for Types 100, 200, 400, 500
 - (C) plug for Type 400
 - (D) plug for Type 500
 - (E) plug for Type 500
 - (F) plug for Types 100, 200, 400, 500

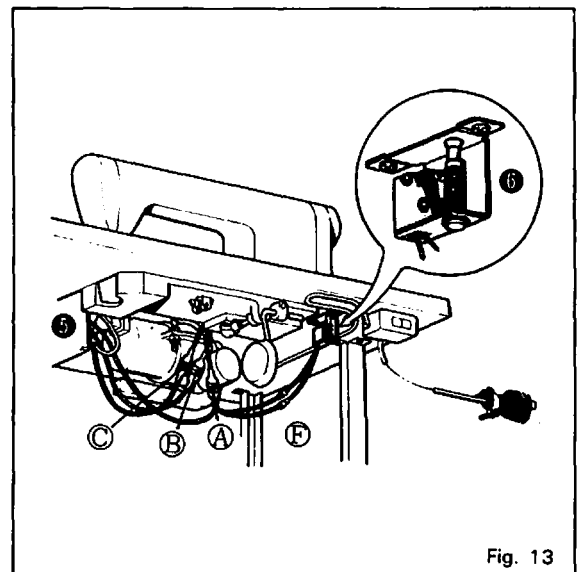


Fig. 13

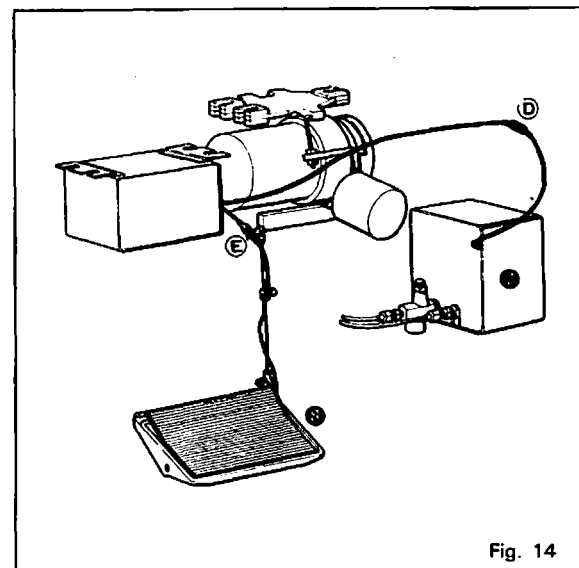
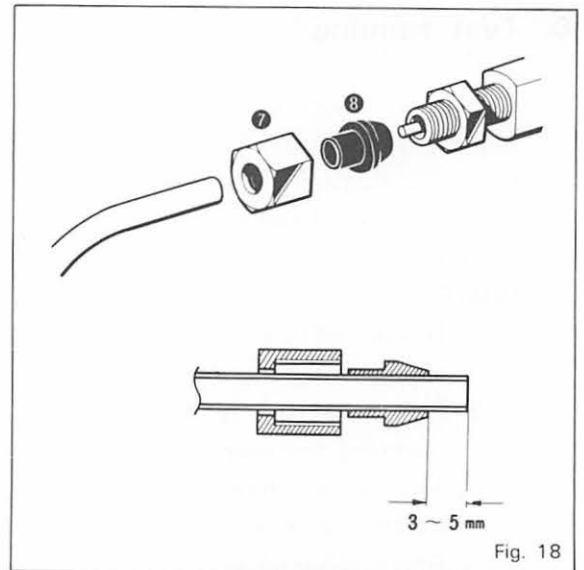


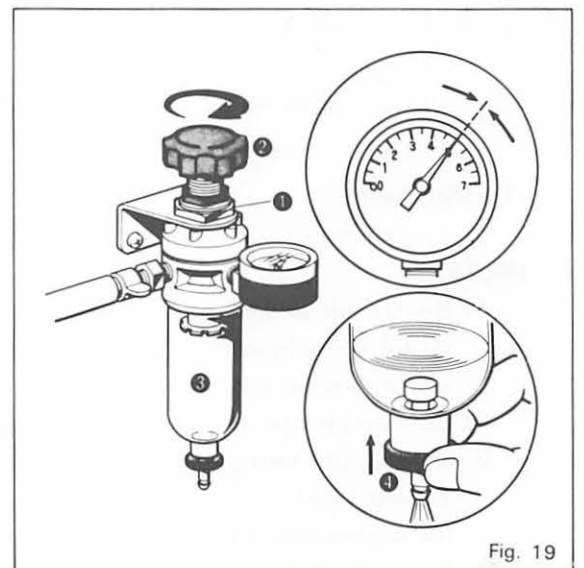
Fig. 14

- III) To connect the air tube to the connector, first disconnect nut ⑦ and sleeve ⑧ and then fit them over the tube end as shown in the figure. Insert the tube end into the socket, tighten the nut with your fingers, and then turn the nut once or twice with a spanner so the tube cannot be removed when pulled by hand. (Fig. 18)



(5) Air pressure (Type 500)

- (1) Keep air pressure at $5\text{kg/cm}^2 \pm 0.5\text{kg/cm}^2$. It can be regulated with the valve box reducing valve. If the air pressure is too low, loosen hexagonal nut ① and turn knob ② clockwise. If the air pressure is too high, turn the knob counterclockwise, operate the back-tack button or the treadle to lower the air pressure, and then increase the air pressure again. After its regulation, tighten the hexagonal nut to fix the knob. (Fig. 19)
- (2) If water collects inside bottle ③, stop the compressor to lower the air pressure and then push up drain cock ④ and discharge the water.



8. Test running

Remove the needle from needle bar.

It is vitally important for you to make sure each procedure and take the following step.

If you will find out any troubles, look into the trouble shooting in this service manual and take proper step.

(1) Switch on and make sure whether pilot lamp is put on, then switch off. At that time, the direction of motor should be examined.

(NOTE)

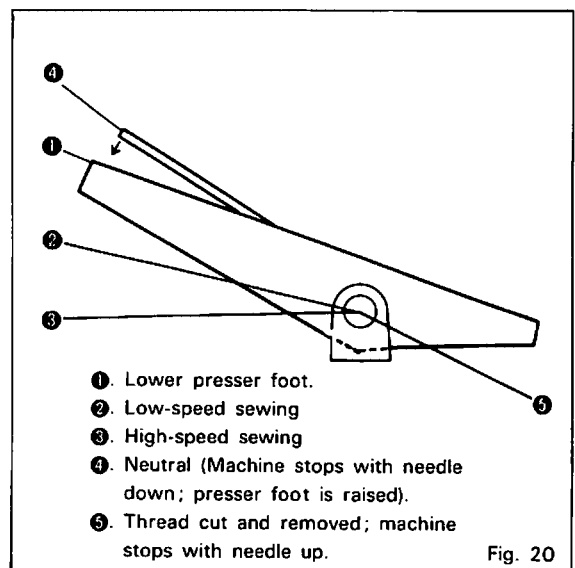
1. If you will find out that the sewing machine rotation is reverse, either two of three wires should be changed.
 2. This BROTHER Needle Positioning Motor is not featured to get reverse rotation by merely changing the position of the plug located in the motor body similar to BROTHER Clutch Motor. If you change the position of the plug, motor does not run. Connect the plug with connector matching red markings.
 3. Green coloured wire is earth wire which should be grounded.
 4. Do not switch on while you are pressing the treadle pedal. Pedal should be neutral position.
- (2) Make sure whether slow speed motor runs smoothly pressing the treadle pedal lightly.
- (3) Make sure whether the sewing machine stops at the needle down position, when the pedal is positioned at the neutral after pressing the pedal at the front.
- (4) Make sure whether the sewing machine stops at the needle up position after knife's rotation, when the pedal is pressed at the rear.
- (5) After making sure all the above procedures, put the needle and start sewing.

(Treadle Pedal)

Its operation and function is as per Fig. 13.

(NOTE)

1. Switch on and after recognition of the motor running with a few second interval, you may take the steps.
2. Do not set the wires on moving parts.
3. Switch off without fail to check the sewing machine as well as the motor for adjustment and repair.
4. Do not disconnect the plugs while switching on.
5. Do not pull the wire to disconnect the plugs or terminals.



9. Sewing tensions

(1) Pre-tension

When the threads are trimmed, the upper tension assembly is released, then the pre-tension is the only tension on the upper thread. If you may get the stronger the tension on it, the shorter the upper thread out of the needle eye after thread trimming is done, and vice versa. To adjust the tension, the thread-off, skip stitching at the beginning and thread tail on the top of material can be eliminated.

The standard length of thread after trimming is about 30~35 mm. (Fig. 21-1)

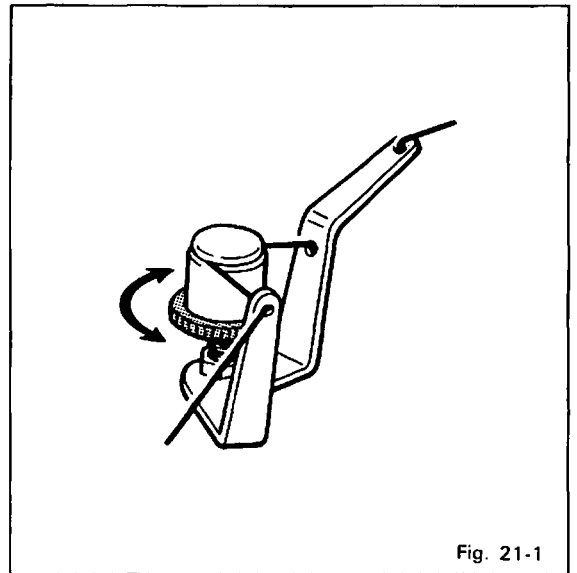


Fig. 21-1

(2) Upper tension

Upper tension is almost same as Model DB2-B705, however, take note the followings because of the thread trimming mechanism.

- I) On the synthetic threads, if you will loosen the tension, you may encounter the thread breakage at the beginning. (Fig. 22-2)
- II) Make sure the upper thread is given out of thread stand without much resistance. (After thread trimming, there causes thread-off at the beginning because of short upper thread out of the needle eye.)
- III) In case of skip stitches, the upper thread cannot be trimmed although the lower thread can be trimmed.
- IV) In order to avoid the skip stitch and upper thread-off at the beginning, select the following parts with much attention. (Fig. 23)

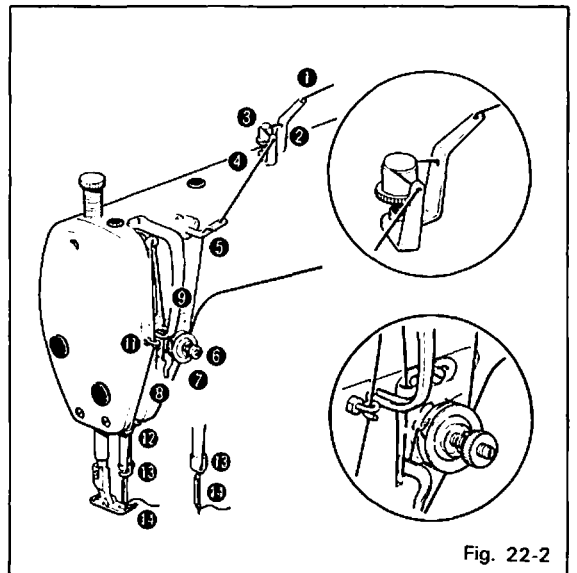


Fig. 22-2

a) Needle plate;

The smaller the hole ③, the better.

b) Presser foot;

The smaller on the points ① & ②, the better. But, the thicker thread over #50, use the standard presser foot.

c) Rotary hook;

Special hook.

"BROTHER" hook for Model B705-100 Series.

d) Feed dog;

Standard feed dogs can be used. But, the thicker feed dog cannot be recommended because the knife may hit the feed dog in case of too thick feed dog.

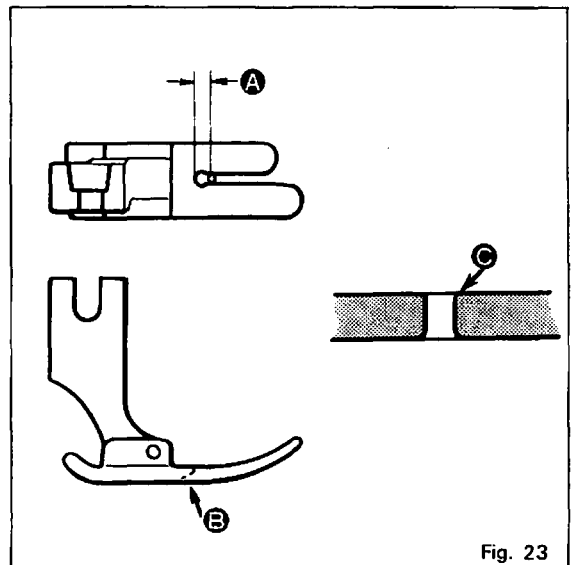


Fig. 23

(3) Lower tension

In order to prevent the bobbin from idle run, this machine is adopted with bobbin case with spring. Bobbin is recommended to be aluminium one.

(Fig. 24)

The recommended winding on bobbin is less than 80%.

The lower thread must be pulled out of eye of bobbin case.

The standard tension of bobbin spring is 5~10 gr.

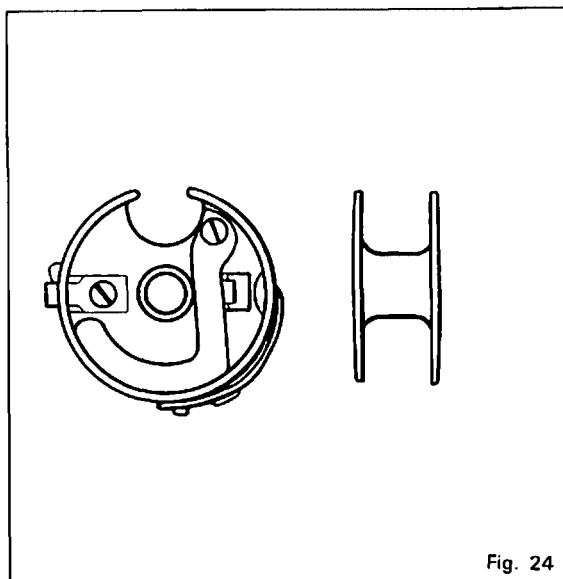


Fig. 24

How to adjust bobbin tension

- Loosen lower tension adjusting screw ❶ and get the tension of adjusting spring to be "0".
- Adjust the lower thread tension to turn the adjusting screw ❷ putting the bobbin into the bobbin case. (Fig. 25)

(NOTE)

*If you feel the unevenness to pull the thread out of bobbin case, correct the shape of tension spring.

*Incorrect tension of the bobbin case causes following troubles.

- In case of excessive tension; lower thread will jam in the bobbin case due to idle run.
- In case of weak tension; not properly trimmed with the knife.

Recommended lower thread tension; 10~25gr.
To obtain the above range of 10 to 25 grams in total, adjust the lower tension adjusting screw after completion of adjustment of bobbin spring.

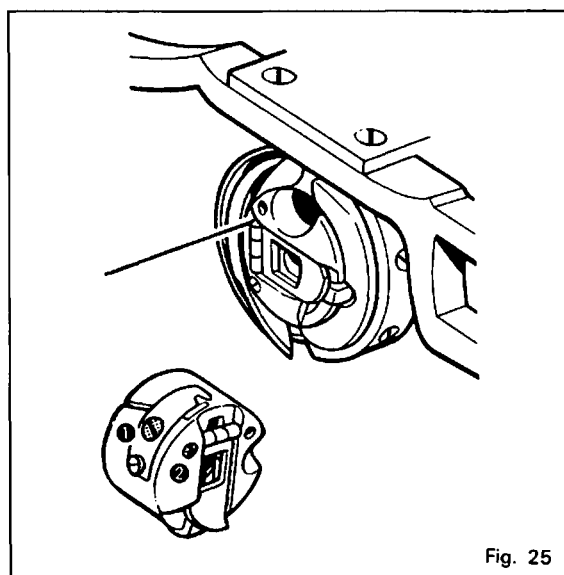


Fig. 25

10. Adjustment on sewing machine

(1) Adjusting thread trimming mechanism

1) Changing knife

Firstly, remove dust cover ❶ from stopper guide. After completion, make sure to fix it for safety sake.
Then, remove needle plate, and at the needle's lowest position, push stopper ❷ with your finger as per Fig. 26.

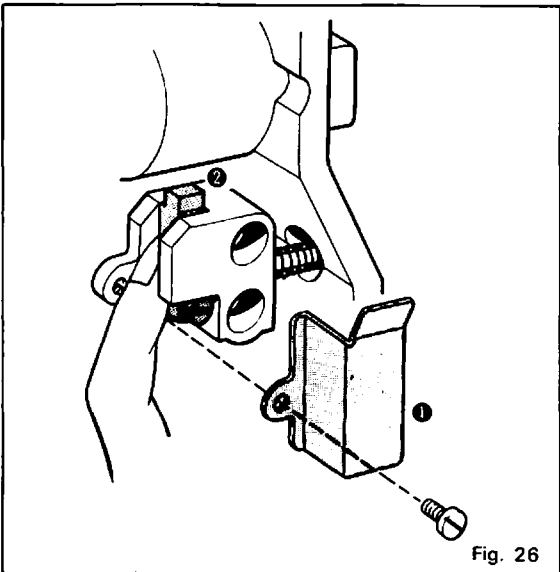


Fig. 26

Turn the pulley and get the position so as to loosen flat head screws for knife. (Fig. 27)

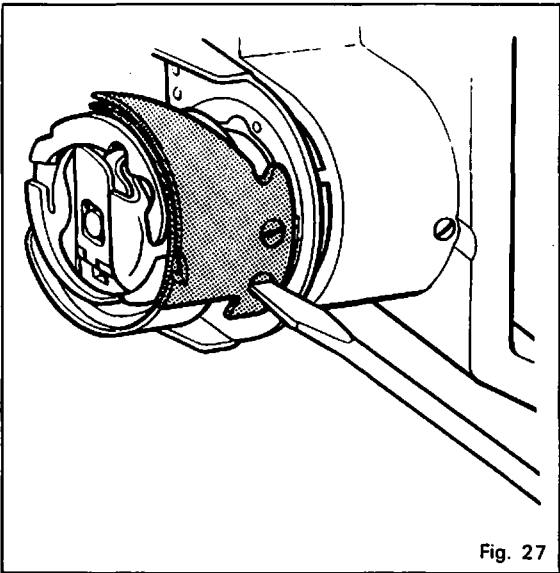


Fig. 27

Change knife ❹ by loosening flat head screws ❸. At that time, change the knife only although spacer ❺ and lower thread finger ❻ are removed. (Fig. 28)

Spacer thickness	Standard	0.5mm
	Thick material	0.7mm
Needle plate washer thickness	Standard	0.2mm
	Thick material	0.5mm

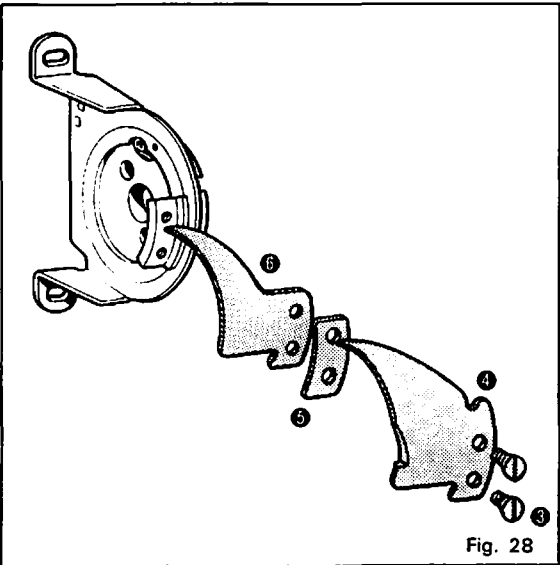


Fig. 28

To set the knife correctly, let the point of knife meet with needle, turn the pulley reversely and make sure the point of knife may contact with the centre axis of the needle as per Fig. 29.

Also make sure the clearances between knife and lower thread finger, and lower thread finger and rotary hook must be averaged about that of #8 cotton thread' pass without any resistance.

After completion, turn the pulley toward you and get the knife positioned at its beginning.

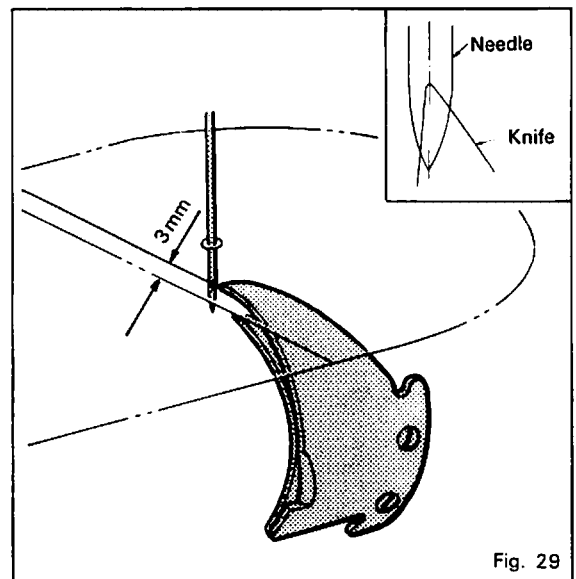


Fig. 29

II) Adjusting knife holder

In case that you may remove knife holder ⑦, turn the holder about half rotation, and at this position, remove holder bracket ⑧, then holder.

Adjust the position of holder bracket so that holder moves smoothly without much clearance. After completion, fasten the screw securely.

(Fig. 30)

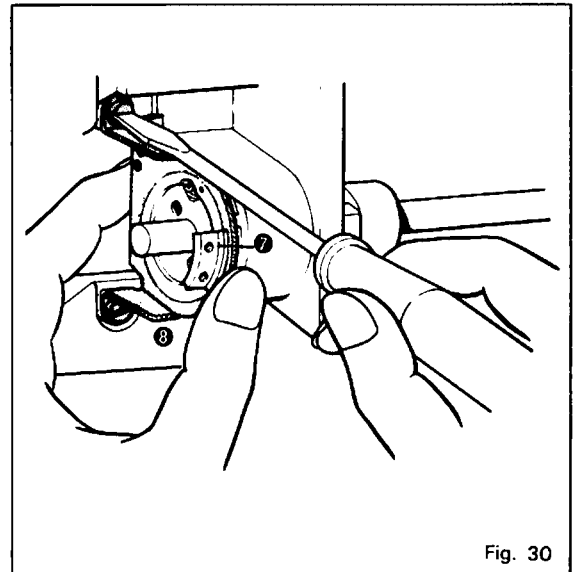


Fig. 30

III) Adjusting stopper

Loosen the slit so that the stroke of stopper may be 4mm. (Fig. 31)

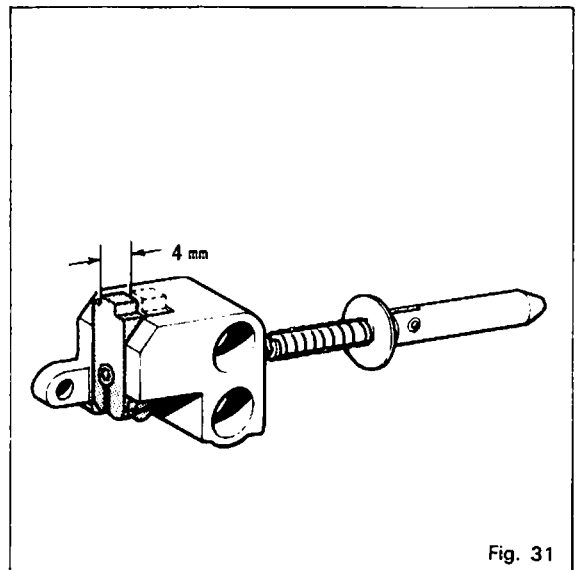


Fig. 31

When fixing stopper guide, firstly fix solenoid temporarily, and fix it onto the bed. Then, bring the needle down to its lowest position and push the stopper with your finger to its fullest extent, and turn the pulley slowly toward you, and make sure that the holder begins to move, stopper drops into the recess portion of holder, pawl ⑨ of ratchet on holder bracket drops into the first or second tooth of knife holder, and stops. (Fig. 32)

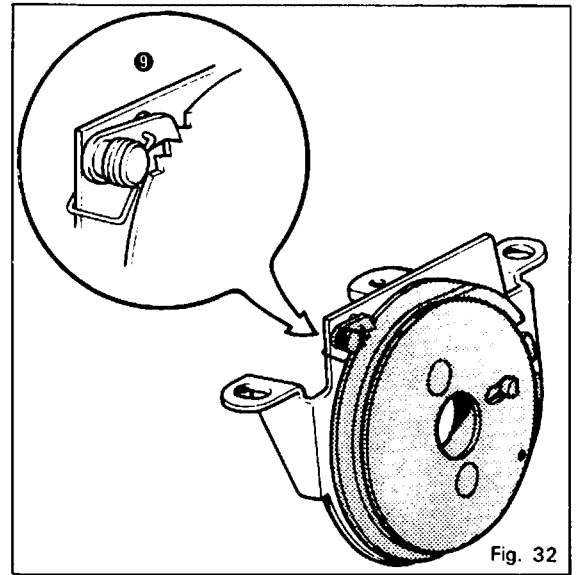


Fig. 32

If knife holder drops prior to the correct position, fasten stopper guide ⑩ so that it may be positioned far from lower shaft. (Fig. 33)

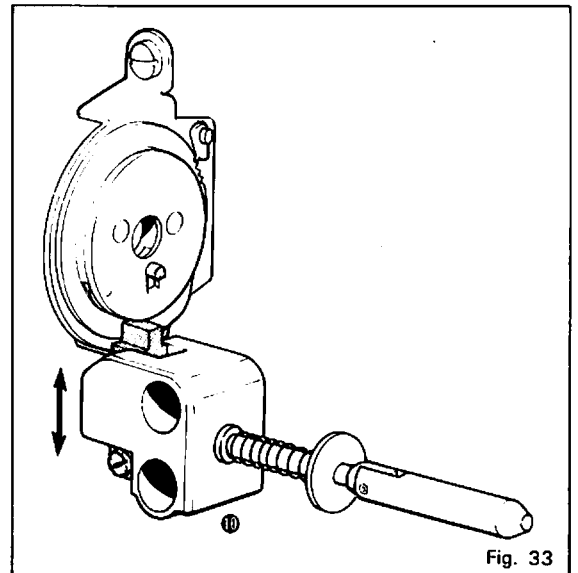


Fig. 33

IV) Adjusting solenoid for thread trimming

Fix solenoid so that its stroke may be 3.5mm. Fix stopper guide so that the left surface of stopper may be in contact with (A) surface of holder bracket.

Then, in case that you may push the stopper by your finger, and you get 0.5mm as per Fig34, the stroke of solenoid is kept as correct, 3.5mm.

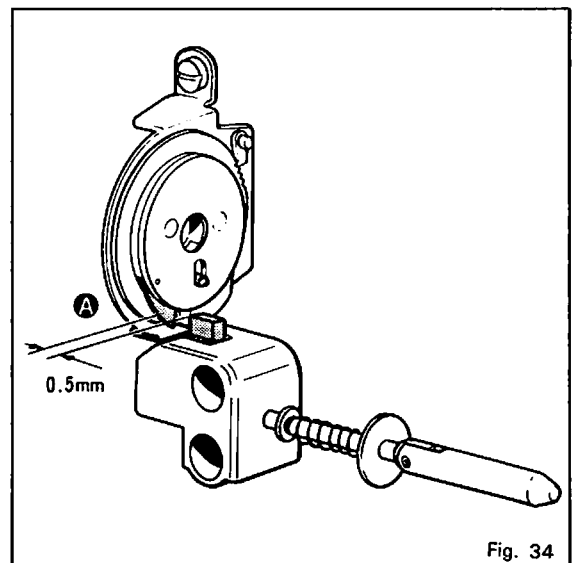


Fig. 34

If, on the contrary, this stroke is too big, loosen the screws for solenoid ⑪ and move it to left, and if small, to right. In this case, making sure that the stopper is returned with its spring action when you push it with your finger, you fix the solenoid moving it left or right. (Fig. 35)

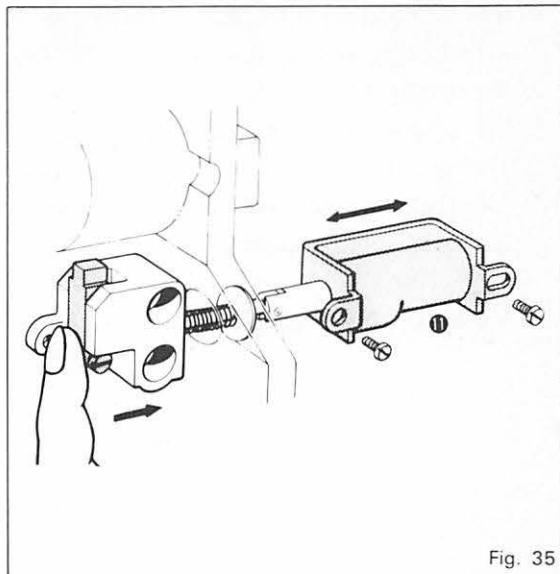


Fig. 35

V) Adjusting clutch

It is determined by the position of clutch ⑫ to get correct timing of thread trimming.

If you remove the needle plate, you may find out clutch adjusting holes as per Fig. 25. Turning the pulley toward you, put the hexagonal spanner into the hole and get the position of clutch so that the centre of needle meets with hook point, when next to ① hole meets hole ②. (Fig. 36)

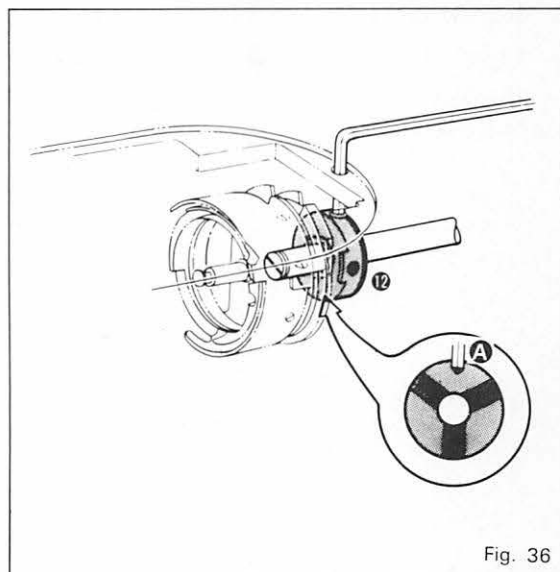


Fig. 36

In case of adjustment, loosen at first screws ③ and ④, and lastly screw ⑤, putting the spanner into ⑤, and turning the pulley slowly toward you, get the correct timing of needle and hook point. Then, fasten three screws securely. (Fig. 37)

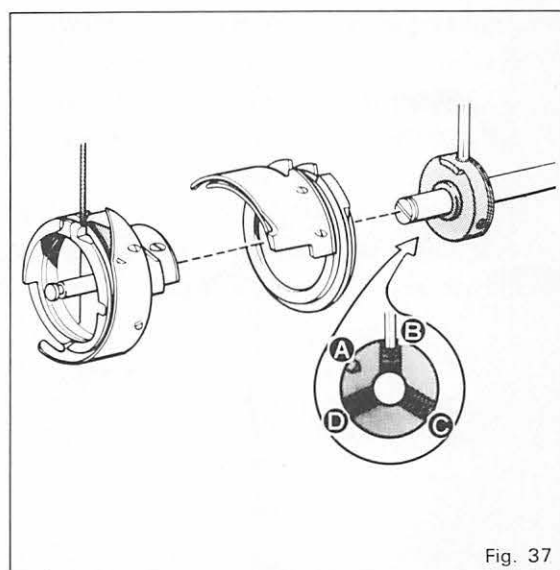


Fig. 37

(NOTE)

1. In case of setting prior to correct timing, the knife trims threads in advance. Setting excessively prior to correct timing, the angle between pin 14 of cam and projected portion 15 of clutch is so small, in this result, prior to the pin's climbing up, projected portion of clutch passes pin, clutch will function after one rotation of the lower shaft and needle will hit the knife. So that, please be careful on this adjustment. (Figs. 38 & 39)
2. In case of setting after correct timing, knife will function later, thus it causes missing of thread trimming.

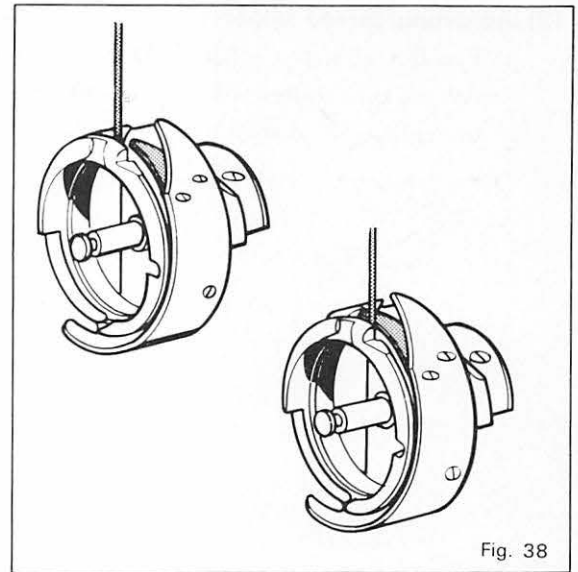


Fig. 38

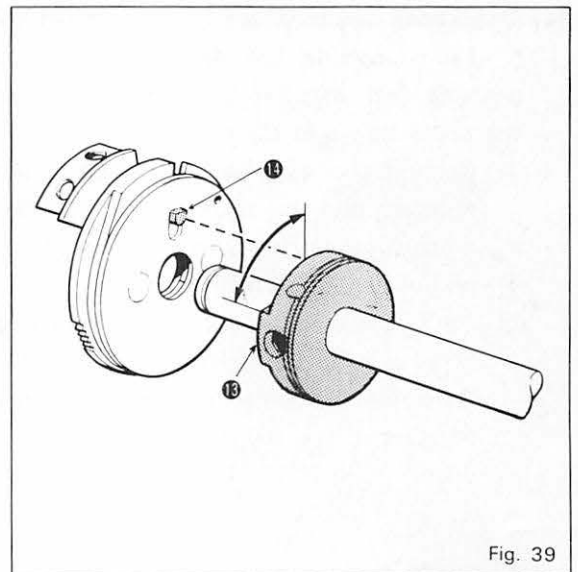


Fig. 39

(2) Adjusting tension releaser

I) Adjusting tension release solenoid

Fix tension release solenoid 1 on the arm, at that time, seeing from rear cover, fasten tension release lever 2 so that it is positioned at the lowest when you turn it clockwise. When fixing tension release lever, side face of tension release lever should be in line with the end of solenoid shaft. 3. (Fig. 40)

II) Adjusting tension releaser

When solenoid is functioned, set the collar 4 so that there exists 1mm space between two tension discs, also when solenoid is not functioned, make sure that the space does not exist between two tension discs.

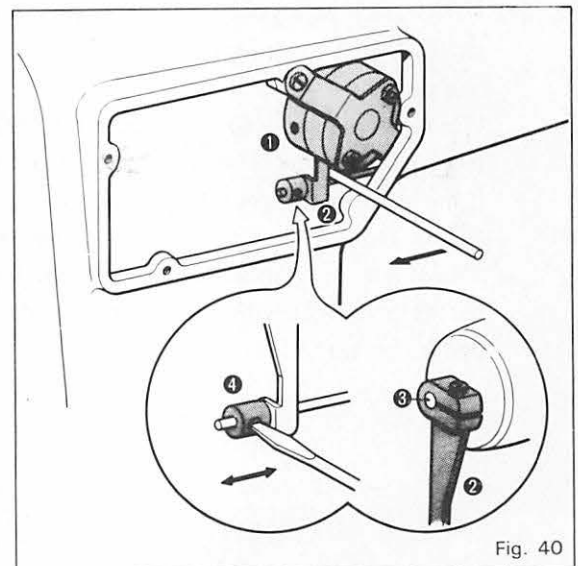
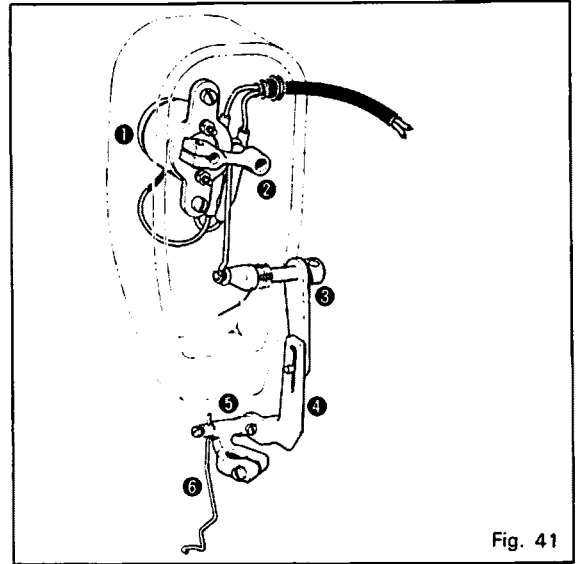


Fig. 40

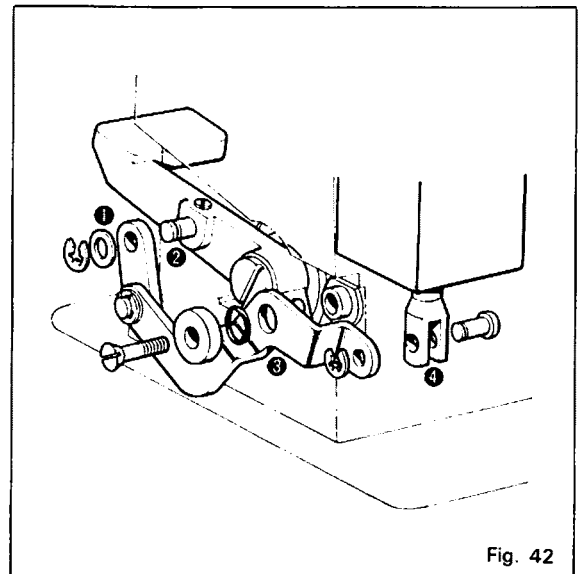
(3) Adjusting thread wiper

- 1) Fix thread wiper solenoid ❶ with face plate.
At that time, fasten solenoid link ❷ to be functioned equally against horizontal shaft. (Fig. 41)



(4) Quickback device assembly and adjustment

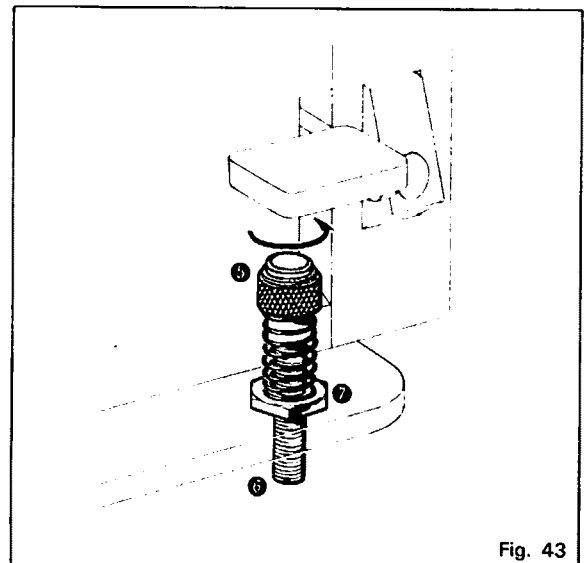
- I) Fit connecting link ❶ over reverse handle shaft ❷, and assemble lever ❸ with the arm in the order shown in the figure. in
- II) Connect the lever to plunger ❹. Insert the plunger into the reverse solenoid which is mounted on the base, and then install the base on the arm. (Type 400)
- III) Install the cylinder support, to which the reverse cylinder has been attached, on the arm. Assemble the lever and reverse cylinder ❹ together. (Type 500) (Fig. 42)



- IV) Backward stitches can be adjusted to a shorter length than forward stitches with the reverse stopper.

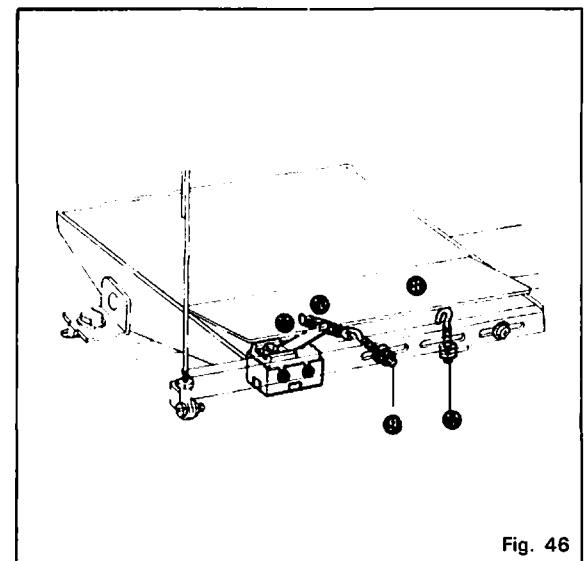
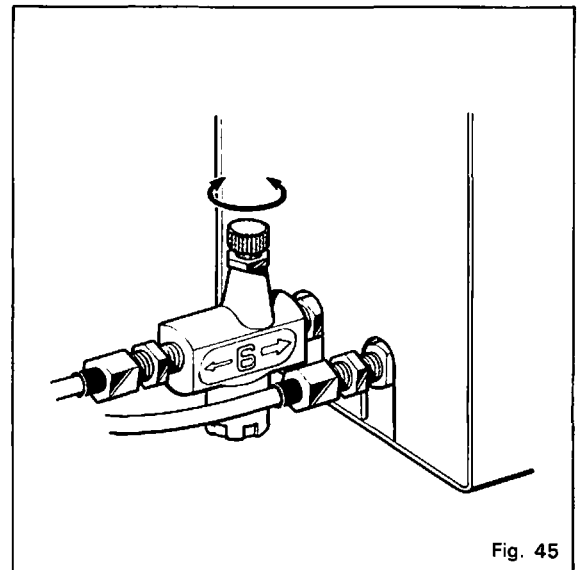
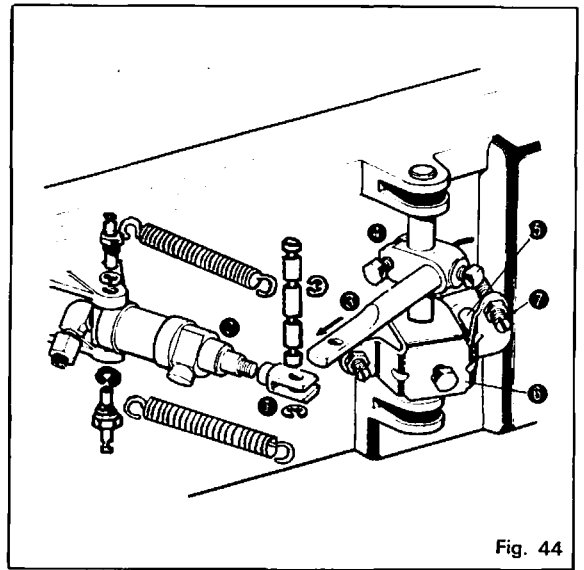
When stopper knob ❶ is turned counterclockwise, backward stitches will become shorter.

- V) If backward stitches must be adjusted so short as to require loosening the stopper knob almost out of contact with screw ❷, loosen nut ❸ and tighten the screw from under the bed. (Fig. 43)



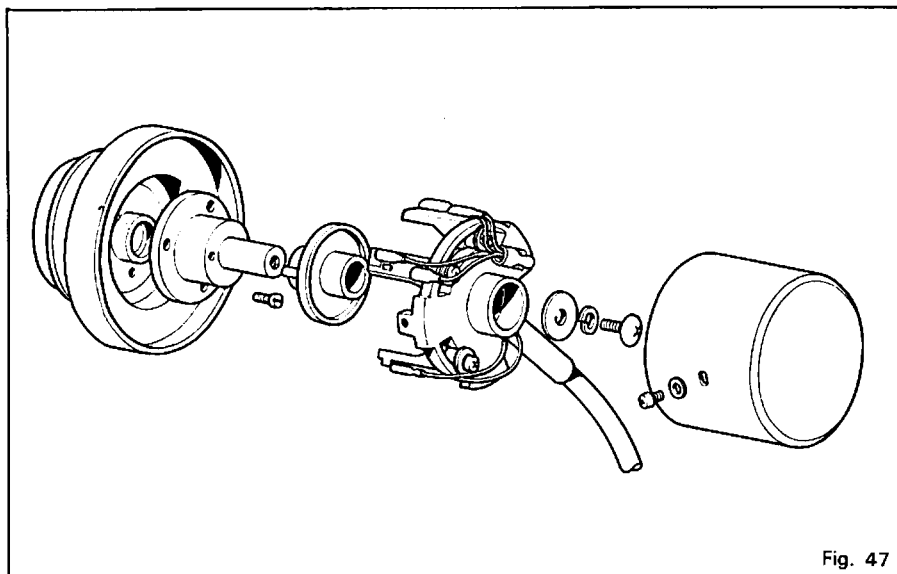
(5) Automatic presser lifter assembly and adjustment (Type 500)

- I) Connect presser lifter cylinder ② and piston operating link ③ with piston link coupling ①.
- II) Position knee lifter ⑥ with push rod ⑤ in the lowest position, and tighten knee lifter coupling ④ with the piston inserted all the way into the cylinder.
- III) Adjust knee lifter stopper ⑦ so that the presser foot will rise 8mm. (Fig. 44)
- IV) A delay device is provided so that the presser foot will rise after the threads have been cut. Delay time increases when VR-3 the control box is turned clockwise. (See 11.3.)
- V) If the presser foot rises before the thread wiper returns to its original position, the needle may interfere with thread wiping. The valve box has an adjuster for regulating presser rising speed. When its knob is turned clockwise, the speed decreases. (Fig. 45)
- VI) The tension of treadle top plate ⑧ can be adjusted by regulating the tension of pull spring ⑩ by moving in or out treadle pull spring hook ⑨. If the treadle top plate tension is too great, the machine will start running before the presser foot lowers fully. If the tension is too small, the presser foot will not rise.
- VII) Adjust the position of microswitch ⑪ so that it will be OFF before the top plate contact the treadle. Top plate adjusting screw ⑫ is used for adjusting the travel of the top plate. If it is too small, the presser foot may not rise because the microswitch may not be closed when the top plate is released. (Fig. 46)

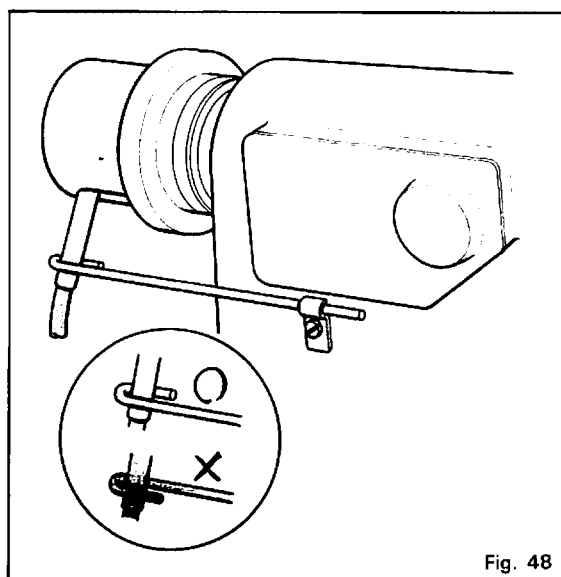


(6) Adjusting synchronizer

Follow (Fig.47)to disassemble and assemble.

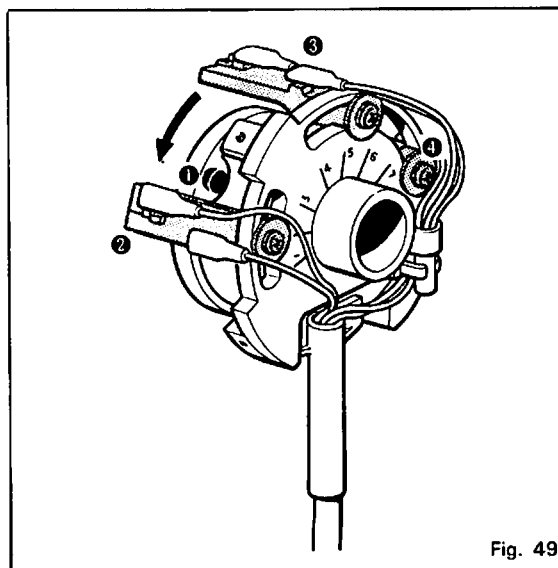


Fix synchronizer with its supporter as per Fig. 48.



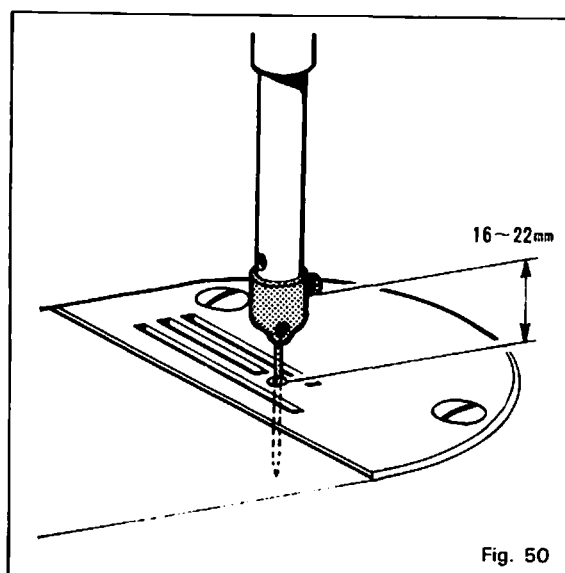
1) Adjusting position of thread trimming signal

Adjust the position of thread trimming signal so that lead switch ② is in line with magnet ① at the needle bar's lowest position. The adjustment is made by moving the position of lead switch. (Fig. 49)



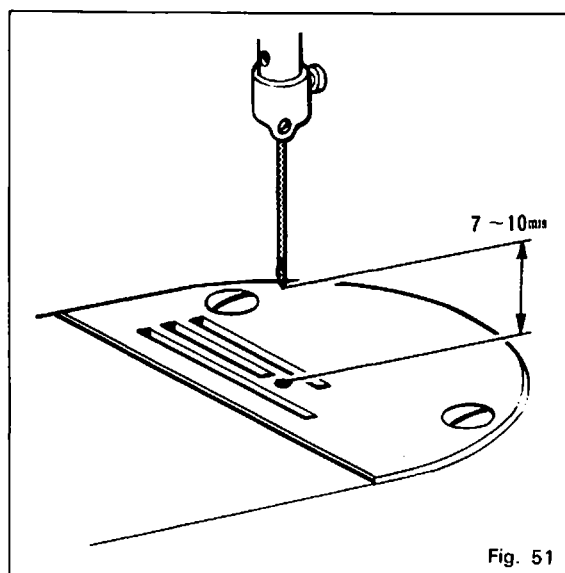
2) Adjusting position of needle down signal

When the sewing machine stops at its needle down position after high speed sewing and treadle pedal's neutral position, adjust to move the position of needle down lead switch ⑥ by loosening its screw so that the distance from the lower part of needle set screw and the surface of needle plate may be 16-22mm. (Fig. 50) The higher position will be obtained by turning it clockwise and the lower, counter clockwise.



3) Adjusting position of needle up signal

When the sewing machine stops at its needle up position after treadle pedal pressed down by your heel, adjust to move the position of needle up lead switch ④ (Fig. 49) by loosening its screw so that the distance from point of needle and top surface of needle plate may be 7-10mm. (Fig. 51)

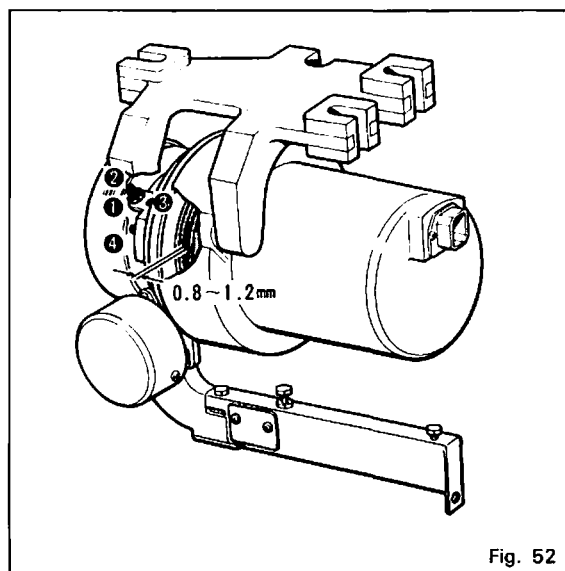


11. Adjusting motor

(1) Adjusting clutch play

After long usage of the motor causing wear of clutch lining, thus the play becomes too large, adjust it as per following procedures. (Fig. 52)

- 1) Loosen nut ①, screw ② and ③.
- 2) Pull clutch lever downward and adjust the play to be 0.8-1.2mm fastening clutch adjusting screw ④. The clutch adjusting screw can get 1mm play to rotate it 360°.
- 3) After adjustment is over, lift clutch lever upward, fasten screw ②, lock with nut ①, then fasten screw ③.
- 4) Make sure the play is existing by moving the lever up and down.
- 5) It is not necessary to adjust micro-switch on this adjustment.



(2) Adjusting treadle pedal

You can get the most suitable condition to be matched with you on its weight, play and so on. In this case, do adjustment on the angle and position of treadle pedal after making sure clutch lever and pull rod to be straightened. (Fig. 53)

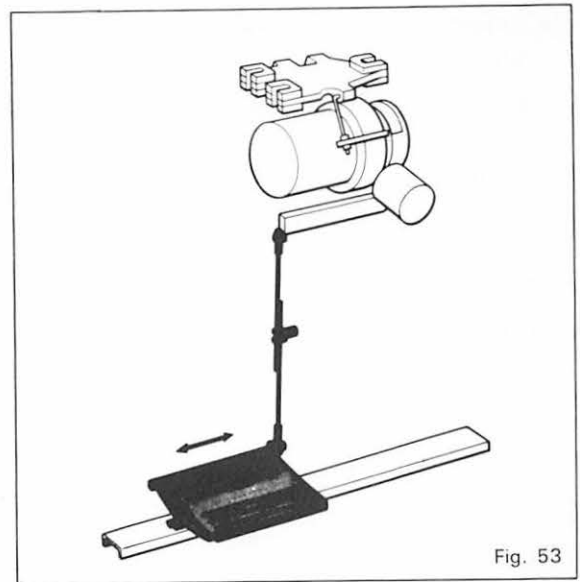


Fig. 53

1) Adjusting weight at slow speed sewing (inching)

In case that you may get inching by merely putting your feet on the treadle pedal or may not get it by pressing it lightly as per following procedures.

Loosen nut ❶ and adjust bolt ❷.

Fasten bolt ❶, the heavier the weight; and loosen it, the lighter.

After adjustment is over, fasten nut ❶ not to move bolt ❷. (Fig. 54-1)

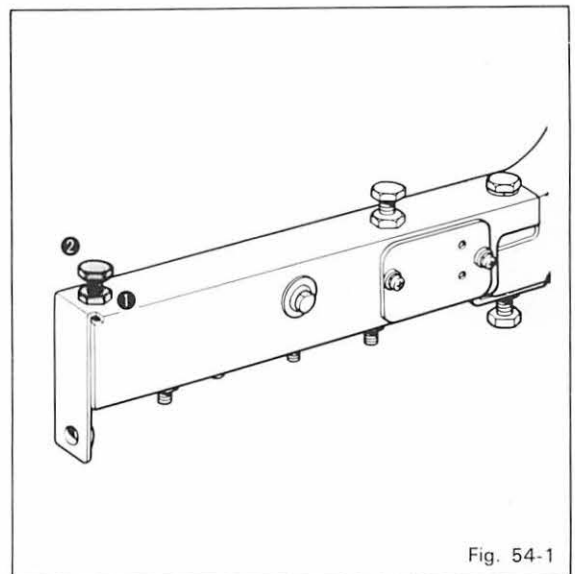


Fig. 54-1

2) Adjusting weight at thread trimming

Loosen nut ❸ and adjust bolt ❹.

Fasten bolt ❹, the heavier the weight; and loosen it, the lighter. (Fig. 54-2)

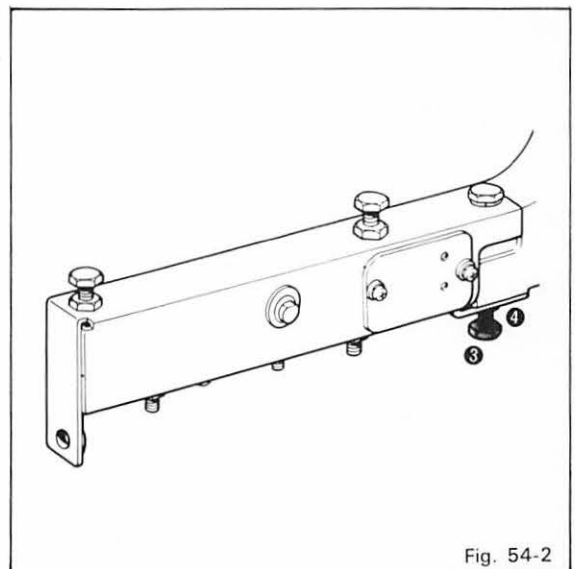


Fig. 54-2

3) Adjusting play at thread trimming

Loosen nut ⑤ and adjust bolt ⑥.

Fasten bolt ⑥, the smaller the play; and loosen it, the larger. (Fig. 54-3)

The bolt ⑥ can get 1.8mm play to rotate 360° at the end of the lever.

At this adjustment, adjust the position of micro-switch as well. (Refer Page 33)

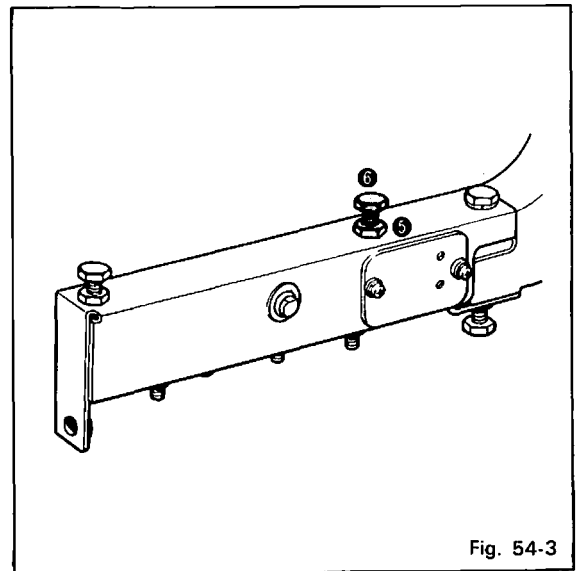


Fig. 54-3

(3) Adjusting control box

1) Adjusting needle down position

In case of irregular stoppage at needle down position, or sewing machine runs continuously at slow speed without stoppage, adjust the timer in the control box. (Fig. 55)

- Remove rear lid of control box.
- Turn VR-1 ① clockwise on Printed Circuit Board.
- Switch on, and press lightly the treadle pedal and set it as neutral.
At that time, sewing machine runs continuously at slow speed.
- At the above condition, turn VR-1 counter-clockwise very slowly, and you will find out the position where sewing machine stops at the needle down position, then turn VR-1 about 30°, counter-clockwise.
- Switch off and put rear lid onto control box.

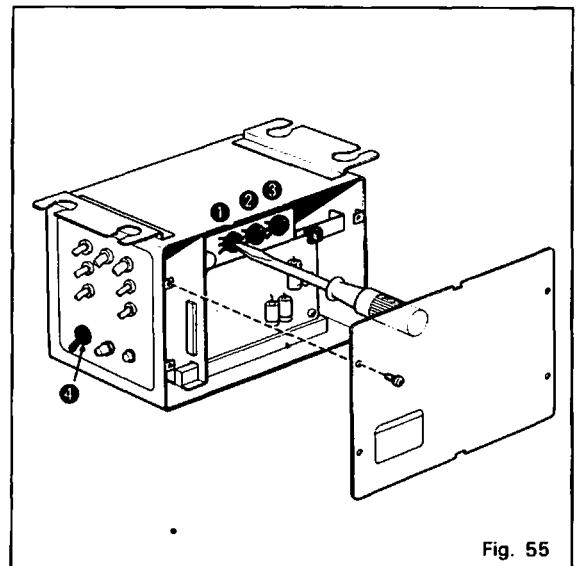


Fig. 55

2) Adjusting thread wiper

- Remove rear lid of control box.
- Turn VR-2 ② clockwise and after needle up position and time to begin to operate the thread wiper becomes longer.
Also turn VR-3 ③ clockwise and after thread wiping job and time to return the wiper becomes longer.

Accordingly, to adjust the timing of two regulators, you can get the most suitable timing of thread wiper.

In case you may not need to wipe off the thread, switch off switch ④.

(NOTE)

To adjust regulators VR-1, VR-2 and VR-3, with screw driver, please be careful not to touch anything except those regulators.

12. Maintenance of motor

(1) Change of micro-switches

- 1) Micro switch for inching
 - a. Loosen screw ① and remove micro switch ② out of clutch lever.
 - b. Pull out terminals ③ and relace switch.
Loosen nut ④, unscrew bolt ⑤, fix switch and adjust in the following manner.
 - c. Switch on, and as per Fig. 41, fasten slowly bolt ⑤ pressing by your finger, then sewing machine runs slowly.
 - d. Detatch your finger, turn bolt 180° further and fix it by nut ④. (Fig. 56)

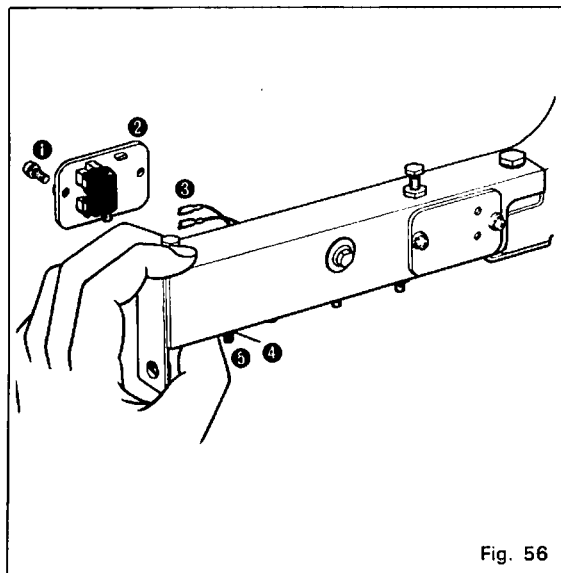


Fig. 56

- 2) Micro switch for thread trimming
 - a. Loosen screw ⑥ and replace it as mentioned-above. (Same micro switch is used both for inching and thread trimming).
 - b. Loosen nut ⑦ and bolt ⑧.
 - c. Switch on, press the treadle pedal light and get it at neutral position.
Press down the treadle pedal by your heel after needle down position, then fasten bolt ⑧ slowly pressing it by your finger as per Fig. 42, and sewing machine moves about 120°, and gets needle up position.
 - d. Detatch the treadle pedal and turn bolt ⑧ about 120° and fasten it with nut ⑦. (Fig. 57)

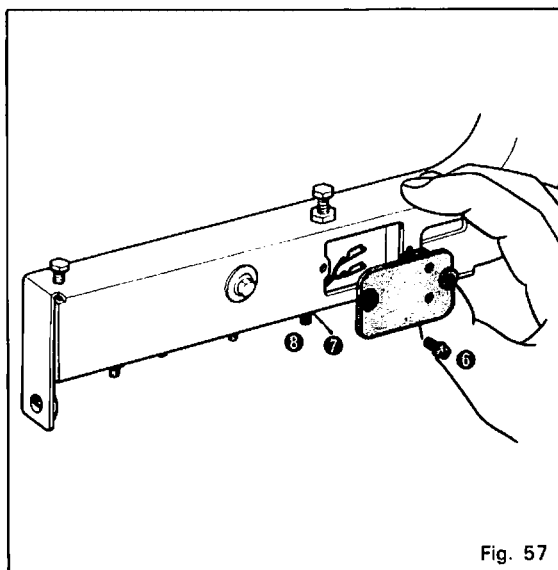


Fig. 57

(2) Changing linings

In case you replace the parts, please clean up every points.

- 1) Changing brake disc for slow speed motor.

- a. Remove screw ① and cover ②.
- b. Remove bolt ③ and replace brake disc ④ together with selation ⑤.
- c. To fix it, put the end of spring ⑥ into the hole ④ of brake disc and another end of spring into the hole of spring fixture ⑦ and turn 45° as per Fig. 58, and fasten bolt ③.

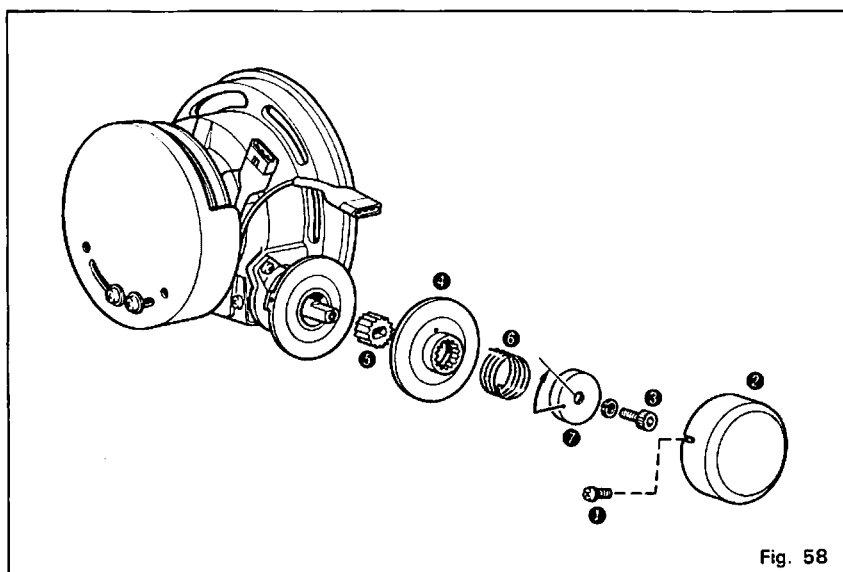


Fig. 58

2) Changing clutch plate for slow speed motor

- a. Detatch the plug out of slow speed motor wire ❶ as per Fig. 59.

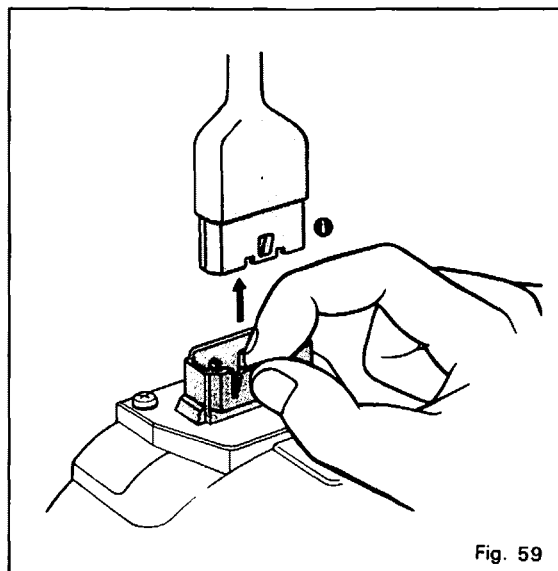


Fig. 59

- b. Loosen screw ❷ and remove slow speed motor ❸.
c. Loosen flat head screw ❹ and replace clutch plate ❺.
d. In this case, replace friction disc ❻ and selation ❼, as well, by loosening screw ❸. (Fig. 60)

To assemble it, take steps as reverse to disassemble, at that time, it is unnecessary to adjust the clearance.

- e. Install clutch plate ❺ with screw ❹.
f. Insert one end of spring ❿ into the hole in spring retainer ⓑ and the other end into the hole in disc ❻ on the other side, and then attach them to the motor shaft.
g. The hole in disc ❻ is about 60° away from the elliptical end of the motor shaft (Fig. 60-1), so turn disc ❻ about 60° counterclockwise and fix it. (Fig. 60-2)
h. Insert the spline shaft, and tighten washer ⓑ with screw ❸.
i. Install motor ❸ with screws ❷.
j. Insert auxiliary motor cord plug ❶ into the plug socket. (Fig. 60)

*No clearance adjustment is necessary.

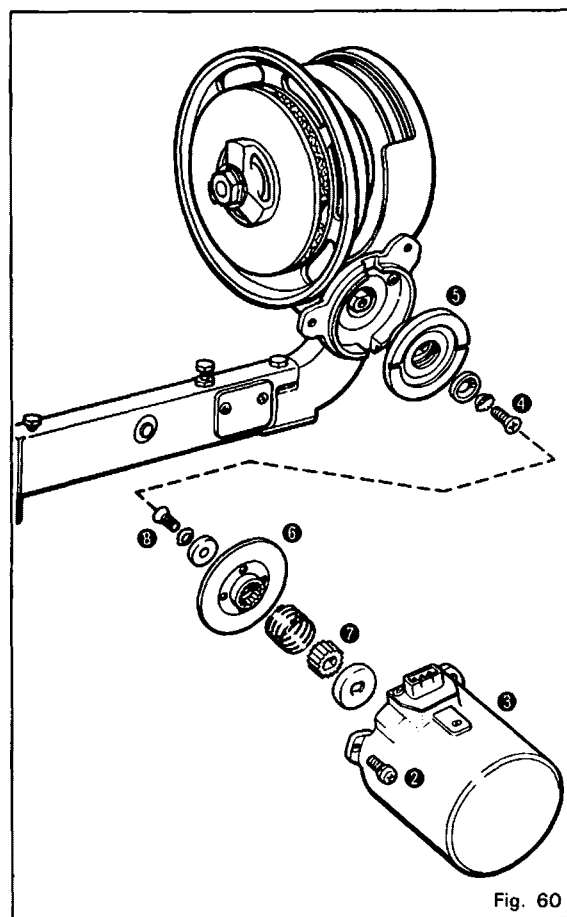


Fig. 60

(NOTE)

1. Spring ❿ is wound opposite to the brake spring so the latter cannot be used for the former.
2. When replacing the spline shaft, replace also the disc.

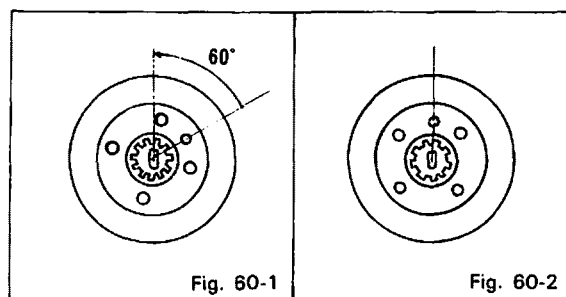


Fig. 60-1

Fig. 60-2

(4) Changing lead switch

- a. Remove cover and pull out the terminal ❶.
- b. Remove screw ❷ and replace lead switch ❸.
- c. To put the terminal ❶ must be done with red wire to be sewing machine pulley. (Fig. 64)

(NOTE)

Do not knock or drop LEAD SWITCH to give extra-ordinary shocks.

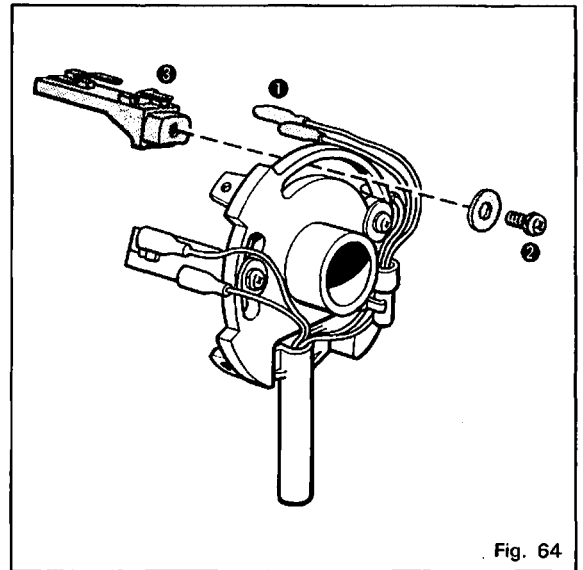


Fig. 64

13. Trouble shooting

(A) In relation with the sewing machine head

(1) Fail to trim the threads.

a. Both threads are caught by knife

CAUSE: Knife is not sharp enough.
(I) Flaw on the knife.

ADJUSTMENT: Replace

CAUSE: (II) Knife is worn out.

ADJUSTMENT: Replace

CAUSE: (III) Incorrect setting the knife, especially check the space between knife and lower thread finger.

ADJUSTMENT: Remove lints or dusts and/or replace.

b. Upper thread is trimmed but comes out of needle eye at the beginning or lower thread is not trimmed.

CAUSE: Incorrect setting of the knife. The point of knife should be in the centre axis of the needle.

ADJUSTMENT: (I) Fasten securely two flat head screws for knife. (See Page 20~21)

CAUSE: Incorrect position of the lower thread finger.

ADJUSTMENT: Make sure the clearances between knife and lower thread finger is 3mm.
(See Page 23~29)

c. Upper thread is not trimmed.

CAUSE: Out of timing the knife.

ADJUSTMENT: Correct it. (See Page 19 V)

d. Needle breaks at the beginning.

CAUSE: Out of timing the thread trimming signal.

ADJUSTMENT: At the needle's lowest position, get the synchronizer magnet in line with lead switch for thread trimming. (See Page 27~28 (6))

e. Knife does not move.

CAUSE: Solenoid does not function.

ADJUSTMENT: (I) Make sure that you press the treadle pedal by your heel.

(II) Check the circuit (See Page 41 (13))

(III) Adjusting of knife stopper (See Page 21~23, Fig. 31, 32, 33, 34, 35)

f. Thread trimming signal functions properly, but knife does not move.

CAUSE: Out of adjustment on thread trimmer knife stopper.

ADJUSTMENT: Adjust knife stopper to get 3.5mm clearance by pushing it by your finger.
(See Page 22 IV)

g. Knife does not trim the threads sharply and abnormal noise comes from rotary hook.

CAUSE: Knife does not move 360°.

(I) Incorrect setting of knife stopper.

ADJUSTMENT: Readjust two fastening screws for stopper guide as contact between clutch and holder detaches so quickly. (See Page 21 III)

CAUSE: (II) Heavy movement of holder.

ADJUSTMENT: Adjust the fixture of holder bracket so that holder moves without much resistance.

CAUSE: (III) Too early timing of needle up position.

ADJUSTMENT: Delay the timing a little. (See Page 27~28 (6))

h. When removing the materials, you feel resistance.

CAUSE: Upper thread for the next stitch is so long.

ADJUSTMENT: It prevents smooth movement of the knife, therefore, get stronger tension on the pre-tension. Especially, in case of thick thread, the thread out of needle eye is recommended to be about 30mm.

i. Lower thread is not trimmed.

CAUSE: Incorrect rotary hook is used.

ADJUSTMENT: Use special rotary hook, for BROTHER B705-100 Series.

j. Upper thread is not trimmed.

CAUSE: Skip stitch on the final stitch.

ADJUSTMENT: (I) Set the needle correctly.

(II) Get the smaller stroke of thread take-up spring.

(III) Adjust the needle down position. (See Page 28 Fig. 50)

CAUSE: Improper setting the hook position bracket.

ADJUSTMENT: Adjust the position of rotary hook position bracket to be the downmost when you put the machine head on the head rest.

(2) Thread-off at the beginning.

a. CAUSE: Thread release solenoid does not function.

ADJUSTMENT: Check the circuit. (See Page 41 (13))

b. CAUSE: Too small opening on tension discs.

ADJUSTMENT: Check the position of tension release lever, collar and upper tension regulator, and get the correct positions.

c. CAUSE: Too high the position at the needle up position.

ADJUSTMENT: Get weak tension, also check the thread passes in order to get smooth supply of the upper thread.

d. CAUSE: Incorrect combination on thread and needle size.

ADJUSTMENT: In case of thinner thread against needle size, it causes such a trouble, then, check the size.

Needle	Thread
#7-9	#100-120
#11-14	#80-50
#16-18	#40-20

e. CAUSE: Position of the knife and the flaw on it.

ADJUSTMENT: In case of existing flaw on the knife, it causes the shorter thread out of the needle eye. In case of improper position of the knife causes thread trimming even on the upper thread out of the needle eye. Check it, adjust or replace it.

f. CAUSE: Timing of the knife.

ADJUSTMENT: Advanced timing of the knife causes too short thread out of the needle eye, thus check the timing of clutch. (See Page 23 V)

(3) Skip stitch at the beginning.

a. CAUSE: Too short thread out of the needle eye.

ADJUSTMENT: Get the proper length of thread. (See Page 18)

b. CAUSE: Improper usage of needle, plate and presser foot.

ADJUSTMENT: Use correct ones. (See Page 18)

- c. CAUSE: Lower thread does not come up.
Improper usage of bobbin and bobbin case.
- ADJUSTMENT: When the thread trimming is done, bobbin runs idly in the bobbin case, thus the length of the lower thread is shortened.
Get the proper spring action of the bobbin case to be 5-10 grams.
Also use aluminium flat sided bobbin. (See Page 19)
- d. CAUSE: Shape of rotary hook and oil to the hook.
- ADJUSTMENT: In case of improper shape of the rotary hook, especially on the point of groove to catch the lower thread. The lower thread is wound into the hook in which case the upper thread loop fails to catch the lower thread.
Excessive oil supply to the rotary hook causes the lower thread stick to the hook, thus same trouble as above will cause.
Get the little oil flow to the rotary hook.
- e. CAUSE: Knife is not sharp enough.
- ADJUSTMENT: In case of dull knife, when thread trimming is done, the lower thread is pulled too excessively by the knife movement, thus it causes idle running in the bobbin case.

(4) A bad thread wiper

- a. Thread wiper hits needle and will not return.
- CAUSE: Operating time too long.
- ADJUSTMENT: Adjust operating time.
- CAUSE: Presser foot is automatically raised too soon.
- ADJUSTMENT: Adjust presser foot operating time.
- b. Thread wiper cannot remove upper thread from work.
- CAUSE: Upper thread too long.
- ADJUSTMENT: Adjust pre-tension
- CAUSE: Cloth and presser foot have too great resistance.
- ADJUSTMENT: Replace presser foot with one having.
- CAUSE: Operating time too short.
- ADJUSTMENT: Adjust operating time.
- CAUSE: Thread wiper operates too soon, wiping thread before tension disc closes fully.
- ADJUSTMENT: Adjust operating time.

NOTICE ON CHECKING MOTOR AND CONTROL BOX

1. Make sure to switch off when you plug in and off.
2. On Blue plug, the voltage on this circuit is very low, then it is not so dangerous even though you may be short circuit.
3. To check the resistance on Blue plug, please use the tester with $\times 1000$ Ohm Range or more, in order to avoid troubles on various switches.
4. Check the voltage ONLY on White plug out of control box.
5. To check the resistances on White plug and others, please use the tester with $\times 1$ Ohm Range.
6. To check the circuit with the tester, running the sewing machine, it is alright for the circuit if tester shows a slight movement.
7. Switch off when you may remove the rear lid of the control box.
8. To replace Fuse, make sure to use 3A's.

1) Motor does not run. Pilot lamp on the control box is off.

- a. CAUSE: No electricity puts in.
ADJUSTMENT: Check the electricity by the tester.
- b. CAUSE: Out of function on switch and/or wires.
ADJUSTMENT: Check the circuits by the tester.
- c. CAUSE: Out of order on pilot lamp.
ADJUSTMENT: Replace.

2) High speed motor does not run.

- a. CAUSE: Incorrect adjustment on the clutch spacing.
ADJUSTMENT: (I) Press the treadle pedal on the front without electricity and turn the sewing machine pulley by hand. Running smoothly is right.
(II) Make sure the play on the treadle pedal to be 7mm or more.
- b. CAUSE: Incorrect or incomplete plug-in on high speed motor.
ADJUSTMENT: (I) Plug should be inserted with red marking on the connector.
(II) Plug should be inserted to its fullest extent.
- c. CAUSE: High speed motor runs as single phase.
ADJUSTMENT: Plug off out of the receptacle on the motor body, and switching on, check the voltage between 2 and 3, 2 and 7, 3 and 7.
If the tester shows the voltage you are now using there, it is alright.
- d. CAUSE: Mal-winding on motor.
ADJUSTMENT: Replace motor itself.

(3) Reverse rotation of high speed motor.

- a. CAUSE: Electricity is not proper.
ADJUSTMENT: Change two wires out of three.

(NOTE)

The reverse rotation cannot be obtained with this BROTHER N. P. Motor as BROTHER clutch motor features.

(4) Sewing machine runs at slow speed continuously.

- a. CAUSE: Out of adjustment on micro-switch for high speed sewing or out of order.
ADJUSTMENT: (I) Plug off the wire for micro-switch for high speed sewing, then switch on.
If it stops, the micro-switch is out of order.
(II) Remove the micro-switch for high speed sewing out of clutch lever cover.
Check the circuit between terminals.
In case of the circuit being short, adjust the micro-switch.
In case of the circuit being right, replace micro-switch.
- b. CAUSE: Mal-function of P. C. B.
ADJUSTMENT: If it does not stop at step (I), the P. C. B. must be replaced.

(5) Sewing machine does not run at slow speed.

- a. CAUSE: Setting of brake lining is out of order or gears are out of order.
ADJUSTMENT: If the sewing machine pulley moves smoothly by your hand, it is alright.
- b. CAUSE: Fuse or P.C.B. is out of order.
ADJUSTMENT: Switch on, then if the sewing machine pulley does not move, it is alright.
In case that the pulley moves, mal-function on control circuits.
(1) Fuse.....Remove and check it.
Use 3A Fuse as replacement.
(II) P.C.B. for electricity } Plug off 4P plug for clutch and brake,
(III) P.C.B. for electronic control } ... switching on, check the voltage to be 27V
either between the terminal No. 1 and 2, or
3 and 4 on the control box junction terminal.
This must be alright.
- c. CAUSE: Micro-switch for high speed sewing is out of order or adjustment.
ADJUSTMENT: Plug off 3P plug, being short on the junction box terminal 1-3 on the control box,
and switch on. In case that the sewing machine runs at slow speed, the micro-
switch is out of order or adjustment.
In case of running at slow speed;
(1) Remove micro-switch for high speed sewing, plug in 3P plug and switch on.
Push the pull rod and if the sewing machine runs at slow speed, the adjustment
is not correct.
(II) In case that the sewing machine does not run, being short between the termi-
nals for micro-switch, and if the sewing machine runs at slow speed, micro-switch
is out of order.
(III) In case that the sewing machine does not run in step (1), wire is wrong.
In case of not running at slow speed;
Mal-function on P.C.B. or Fuse.
- d. CAUSE: Mal-function on slow speed motor.
ADJUSTMENT: Check the resistance between 1 and 2, 1 and 3, and 2 and 3 on the motor being
off 3P plug. If the tester shows between 0 to ∞ , it is alright.
- e. CAUSE: Wrong wire on slow speed motor.
ADJUSTMENT: Being off 3P plug, switch on, and check the voltage between the terminals 1 and
2, 1 and 3, and 2 and 3 on the control box.
If the tester shows the voltage you are now using, it is alright.
- f. CAUSE: Coils are damaged.
ADJUSTMENT: Being off 4P plug, check the resistance between 1 and 2, and 3 and 4 on the motor.
If the tester shows between 0 and ∞ , it is alright.

(6) Reverse rotation of slow speed motor.

- a. CAUSE: Wrong wiring.
ADJUSTMENT: Correct it.

(7) Sewing machine does not stop.

- a. CAUSE: Reed switch for needle down position is out of order or wires are damaged.
ADJUSTMENT: Being off 6P plug for synchronizer, short on 5 and 6 on the control box, switch on and let the treadle pedal at the neutral position.
If the sewing machine stops, reed switch is out of order, or the timer is out of adjustment. If the sewing machine does not stop, P.C.B. is mal-functioned.
- b. CAUSE: Timer is out of adjustment.
ADJUSTMENT: (I) Being off 6P plug, switch on, and let the treadle pedal at the neutral position, then check the circuit between 5 and 6 on the pin out of synchronizer.
If it can get ON or OFF, the timer is out of adjustment.
(II) Remove synchronizer cover and check the circuit for needle down position.
If it can get only OFF, reed switch is out of order.
If it can get ON or OFF, the wire is wrong.
(III) If it does not stop even though the timer is well adjusted, 6P plug is out of order.

(8) Sewing machine does not run constantly at high speed.

- a. CAUSE: Screws for adjusting clutch play are loosened.
ADJUSTMENT: Readjust.

(9) Sewing machine stops at random at its needle down position.

- a. CAUSE: Weak tension of V-belt.
ADJUSTMENT: Tighten it.
- b. CAUSE: Out of adjustment on the timer.
ADJUSTMENT: In this case, stop position is at needle down position or too much irregular.....
Check the timer and correct it.
- c. CAUSE: Out of order on reed switch for needle down position.
ADJUSTMENT: Sewing machine stops in any position. Replace reed switch.

(10) Sewing machine stops at needle up position.

- a. CAUSE: P.C.B. for electronic control is out of order.
ADJUSTMENT: Being off 3P plug, switch on and short the circuit between 1 and 2 on the control box and after making sure that the sewing machine runs at slow speed, detach it. In case of getting the needle up position, P.C.B. for electronic control is out of order, and replace it.
- b. CAUSE: Micro-switch for thread trimming is out of adjustment or order.
ADJUSTMENT: In case of getting the needle down position remove the micro-switch out of lever cover, plug in 3P plug switch on, and let the treadle pedal to be at the neutral position.
Needle up position.....Micro-switch is out of order.
Needle down position.....Micro-switch is out of adjustment.

(11) Incorrect position at needle down position.

- a. CAUSE: Incorrect position of reed switch.
ADJUSTMENT: Adjust the synchronizer.

(12) Sewing machine does not run at slow speed.

- a. CAUSE: Micro- switch for thread trimming is out of order.
ADJUSTMENT: Being off plug for micro-switch, set the position at needle down position, switch on, and be short the circuit between 1 and 3 on the control box.
If it runs, micro-switch for thread trimming is out of order or adjustment.
If it does not run, P. C. B. for electronic control is out of order.
- b. CAUSE: Micro-switch for thread trimming is out of adjustment.
ADJUSTMENT: (I) Remove micro-switch for thread trimming out of lever cover, plug in, switch on, set the needle at its down position, and push the pull rod upward.
If it runs, micro-switch for thread trimming is out of adjustment.
If it does not run, micro-switch for thread trimming is out of order.
(II) At the step (I), be short the circuit of terminal of micro-switch.
If it runs, micro-switch is out of order.
If it does not run, wire is wrong.

(13) Thread trimming and releasing does not function.

- a. CAUSE: Too short timing to press the treadle pedal down.
ADJUSTMENT: Press it down until needle goes up from its down position.
- b. CAUSE: P. C. B. for electronic control is out of order.
ADJUSTMENT: (I) Being off 9P plug, switch on, and after making sure that the needle is at its down position, and let the treadle pedal down by your heel.
At that time, check the voltage between 1 and 3 on the control box while needle moving up from its down position.
If the tester shows a slight movement, P. C. B. is alright, but solenoid for thread trimming is out of order.
(II) Check the voltage between 4 and 6.
If the tester shows a slight movement, P. C. B. is alright, but solenoid for thread releasing is out of order.
- c. CAUSE: Reed switch for thread trimming is out of order.
ADJUSTMENT: (I) Being off 6P plug of synchronizer, set the needle at its down position, switch on, be short the circuit 2 and 6 on the control box and press the treadle pedal down.
If solenoid is not functioned, P. C. B. is out of order.
If solenoid functions, reed switch or safety guard switch is out of order.
(II) Plug in 6P plug of the synchronizer, be short the terminal of reed switch for thread trimming, switch on, get the needle at its down position and press the treadle pedal down.
If it functions, the reed switch is out of order.
If it does not function, wiring is wrong.
- d. CAUSE: Safety guard switch or knee switch is out of order.
ADJUSTMENT: At the normal position of sewing machine, disconnect the plug of synchronizer, and check the circuit 2 and 3 on the control box.
If circuit is short, safety guard switch or knee switch is out of order.
If circuit is alright, it is okay.
- e. CAUSE: Solenoid coils are damaged.
ADJUSTMENT: (I) Being off 9P plug, check the resistance between 1 and 3 on the sewing machine and if tester does not show either 0 or ∞ , it is alright.
In this case, check solenoid movements mechanically.
(II) Check the resistance between 4 and 6 and if the tester does not show either 0 or ∞ , it is alright. In this case, it is out of mechanical order on solenoid for thread releaser.

(14) Sewing machine does not stop at needle up position.

- a. CAUSE: P.C.B. is out of order.
ADJUSTMENT: Being off 6P plug, be short the circuit between 4 and 6 on the control box, switch on, after making sure that the needle is at its down position, and press the treadle pedal down by your heel.
If it stops, reed switch is out of order.
If it does not stop, P.C.B. is out of order.
- b. CAUSE: Reed switch is out of order.
ADJUSTMENT: (I) Being off 6P plug, switch on, get the treadle pedal at the neutral position, and check the circuit between 4 and 6 on the synchronizer.
At that time, sewing machine runs at slow speed.
If it shows ON and OFF, the plug is not correctly engaged.
If it shows only OFF, reed switch is out of order.
(II) At the step (I), remove the synchronizer cover, and check the circuit between the terminal of reed switch.
If it shows ON and OFF, wiring is wrong.
If it shows only OFF, reed switch is out of order.

(15) Thread wiper does not function.

- a. CAUSE: Switch for thread wiper is not engaged.
ADJUSTMENT: Switch on in the control box.
- b. CAUSE: P.C.B. or switch is out of order.
ADJUSTMENT: (I) Being off 9P plug for thread wiper, switch on, after making sure that the needle is at its down position, and let the treadle pedal press down by your heel.
At this time, check the voltage between 7 and 8 on the control box.
If the tester shows a slight movement, circuit is alright, but solenoid for thread wiper is out of order.
If the tester does not show a movement, P.C.B. or switch for thread wiper is out of order.
(II) Remove the rear lid of control box, and check the circuit on the terminal of switch for thread wiper.
If the tester shows movement, P.C.B. is out of order.
If the tester does not show, switch for thread wiper is out of order.
- c. CAUSE: Switch for thread wiper is out of order.
ADJUSTMENT: Being off 9P plug for thread trimming, and check the resistance between 7 and 8 on the sewing machine head. If the tester does not show 0 or ∞ , it is alright.
At that time, check the mechanical operation.

(16) Thread wiping is not properly done.

- a. CAUSE: Timer on thread wiper is out of adjustment.
ADJUSTMENT: See Page, 30 (3)

(17) Needle does not stop at its up position correctly.

- a. CAUSE: Needle up position is out of adjustment.
ADJUSTMENT Adjust to refer Page. 27, (6).

(18) High speed motor gets heat abnormally.

- a. CAUSE: High speed motor is out of order.
ADJUSTMENT See Page 9
- b. CAUSE: Single running.
ADJUSTMENT See Page 9
- c. CAUSE: Incorrect adjustment on the clutch play.
ADJUSTMENT See Page 23 **(1)**

(19) Slow speed motor gets heat abnormally.

- a. CAUSE: Setting of brake lining is out of order, or gears are out of order.
ADJUSTMENT: See Page 26 **(2)**
- b. CAUSE: Mal-function on slow speed motor.
ADJUSTMENT: See Page 9, 26 **(2)**
- c. CAUSE: Single phase running.
ADJUSTMENT: See Page 9, 25 **(1)**

—400, —500 Type : See Page 10~11

- a. CAUSE: Reverse switch, reverse coil have wire breaks.
ADJUSTMENT: Pull out reverse 6P plug (large), check resistance across Pins 3 and 6 on machine side. If tester reads 0 ohm when reverse lever is pushed, and infinity when reverse lever is released, nothing is wrong with them.

CAUSE: Check resistance. Check resistance, About 5Ω
ADJUSTMENT: Pull out reverse 6P plug (large), check resistance across Pins 1 and 4 on machine side. Nothing is wrong if tester reads neither 0 ohm nor infinity. If nothing is wrong with them, reverse solenoid is mechanically faulty.
- b. CAUSE: Power circuit board faulty Shortcircuit Check voltage. About 24V
ADJUSTMENT: Pull out reverse 6P plug (large), shortcircuit Pins 3 and 6 on control box side, close power switch. If voltage appears across Pins 1 and 4, nothing is wrong with power circuit board.
- c. CAUSE: Reverse switch faulty. Check resistance.
ADJUSTMENT: Pull out thread cutter plug, check resistance across Pins 3 and 6 on machine side. If tester reads 0 ohm when reverse switch is pushed, and infinity when it is released, reverse switch is good.
- d. CAUSE: Reverse coil has wire breaks. Check resistance, About 50Ω.
ADJUSTMENT: Pull out 6P plug (large), check resistance across Pins 1 and 4 on machine side. If tester reads neither 0 ohm nor infinity, reverse coil is good. In this case, check mechanical weight.

(20) Air valve and related parts

- a. CAUSE: Treadle switch faulty, maladjusted, or has wire breaks.
ADJUSTMENT: Pull out presser lifter plug 2P, check resistance across Pins 1 and 2 on treadle side. Adjust so tester will read 0 ohm when treadle is stepped on, and infinity when it is released. If above adjustment cannot be made, either switch or cord is faulty.
- b. CAUSE: Control circuit board faulty.
ADJUSTMENT: Insert presser lifter plug 2P, pull out 6P plug (large), close power switch, check voltage across Pins 3 and 6 on control box side. (Do not step on treadle at this time.)
Circuit board is faulty if voltage falls short of about DC 30V; or presser coil is faulty if voltage is about DC 30V.
- c. CAUSE: Presser coil has wire breaks. Check resistance. About 50Ω.
ADJUSTMENT: Pull out 6P plug (large), check resistance across Pins 3 and 6 on machine side. If tester reads 0 ohm or infinity, presser coil is faulty; if tester reads neither 0 ohm nor infinity, air valve or its related part is faulty.
- d. CAUSE: Control circuit board faulty, presser 2P cord on control box side faulty.
ADJUSTMENT: Replace control circuit board.
If trouble persists even when control circuit board has been replaced, presser 2P plug on control box side has a cord wire break. When cord has been replaced, make sure that cord is long enough, particularly between treadle and staple, so cord will not be strained by staple when treadle is fully stepped on forward.

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