

DOUBLE-NEEDLE LOCKSTITCH NEEDLE-FEED
AUTOMATIC UNDERTRIMMER
INDUSTRIAL SEWING MACHINE

MODEL

LT2-2230-B1T

INSTRUCTION MANUAL

INTRODUCTION

Thank you very much for purchasing Mitsubishi industrial sewing machine.

Please read this instruction manual before operating the sewing machine. Please read also “Safety Manual”, “Instruction manual for Mitsubishi Limiservo X” and operate the sewing machine correctly and safely.

PRECAUTION BEFORE STARTING OPERATION

1 Safety Precautions

1. When turning the power on, keep your hands and fingers away from the area around/under the needle and the area around the pulley.
2. The power must be turned off when the machine is not used, or when the operator leaves his/her seat.
3. The power must be turned off before tilting the machine head, installing or removing the “V” belt, adjusting the machine, or replacing parts.
4. Avoid placing fingers, hairs, obstacles, etc. near the pulley, “V” belt, bobbin winder wheel, or motor when the machine is in operation. Injury could result.
5. Don't put fingers into the thread take-up lever cover, around/under the needle, or pulley when the machine is in operation.
6. If the belt cover, the finger guard, and/or the eye guard are installed, don't operate the machine without these safety devices.

2 Precaution before Starting Operation

1. If the machine's oil pan has an oil sump, never operate the machine without filling oil in it.
2. If the machine is lubricated by a drop oiler, never operate the machine without lubricating.
3. When a new sewing machine is operated, verify the rotational direction of the pulley with the power on.
(The pulley should rotate counterclockwise when viewed from the pulley.)
4. Verify voltage and (single or three) phase indicated on the nameplate of the motor.

3 Precaution for Operating Conditions

1. Avoid using the machine at abnormally high temperature (35°C or higher) or low temperature (5°C or lower). Otherwise, machine failure may result.
2. Avoid using the machine in dusty conditions.
3. Avoid using the machine in conditions filled with a lot of electric noises such as high-frequency welders.

CONTENTS

| | |
|--|----|
| PREPARATION FOR OPERATION | 1 |
| 1 Adjustment of the needle stopping position | 1 |
| USAGE PRECAUTION | 2 |
| 1 Lubrication (1) | 2 |
| 2 Lubrication (2) | 2 |
| 3 Lubrication condition and adjustment on lubrication to the thread take up lever | 3 |
| 4 Adjustment of lubrication to the rotating hook | 3 |
| 5 Precaution for the built-in type detector | 3 |
| 6 Installation of the belt cover | 3 |
| 7 Precaution on operation | 3 |
| HOW TO USE | 4 |
| 1 Installation of needles | 4 |
| 2 Winding of the bobbin thread | 4 |
| 3 Selection of the thread | 5 |
| 4 Threading of needle threads | 5 |
| 5 Adjustment of feed (stitch) length and backstitch | 7 |
| 6 Adjustment of the needle thread guide | 7 |
| 7 Setting of bobbins | 7 |
| 8 Threading of bobbin threads | 8 |
| 9 Adjustment of bobbin threads tension | 8 |
| 10 Adjustment of needle threads tension | 8 |
| 11 Adjustment of the thread take up spring | 8 |
| 12 Timing between the rotating hook motion and the needle motion | 9 |
| 13 Adjustment of the presser foot pressure | 10 |
| 14 Adjustment of the feed dog height | 11 |
| 15 Relationship between the rotating hook motion and the thread take-up lever motion | 12 |
| 16 Relationship between the rotating hook motion and the opener motion | 12 |
| 17 Relationship between the needle motion and the feed dog motion | 13 |
| 18 Installation position of the feed cam | 14 |
| 19 Adjustment of forward/backward feed length | 14 |
| 20 Installation of the movable knife | 15 |
| 21 Installation position of the thread trimmer cam | 16 |
| 22 Adjustment of the thread trimmer cam | 16 |
| 23 Adjustment of the thread tension releasing | 17 |
| 24 Adjustment of meshing pressure between the movable knife and the fixed knife | 18 |
| 25 Sharpening of the fixed knife | 18 |
| 26 Adjustment of the thread trimmer with changing the width between needles | 19 |
| 27 Installation of the solenoid arm | 20 |
| 28 Removal procedure of the hook | 20 |
| SPECIFICATIONS | 21 |

PREPARATION FOR OPERATION

1 Adjustment of the needle stopping position

1. Adjustment of “UP” position

When the pedal is kicked down by heel, the machine stops at “UP” position.

If marks deviate larger than 3 mm, adjust as follows.

- (1) Disconnect the plug (12pins) of cable from the machine head.
- (2) Run the machine and stop at “UP” position.
- (3) While holding the pulley, insert the “Adjusting tool” in the hole ㊶, then turn the tool.

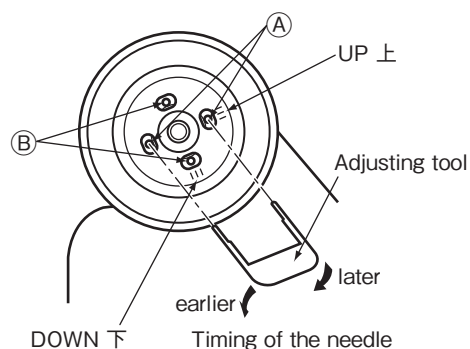
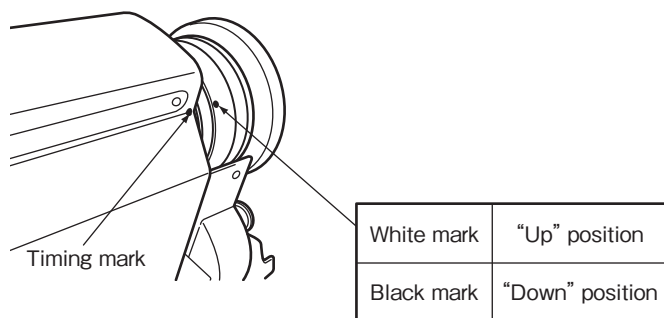
2. Adjustment of “Down” position

When the pedal is “Neutral” the machine stops at “Down” position.

If marks deviate large than 5 mm, adjust as follows.

- (1) Disconnect the plug (12pins) of cable from the machine head.
- (2) Run the machine and stop at “Down” position.
- (3) While holding the pulley, insert the “Adjusting tool” in the hole ㊷, then turn the tool.

3. Confirm the stop operation, then set the plug (12pins) coming from the machine head into the receptacle.



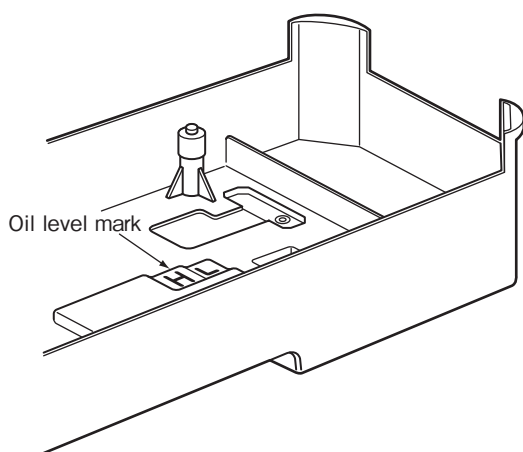
USAGE PRECAUTION

1 Lubrication (1)

Fill the oil reservoir with oil up to “H” mark.
Oil level should be periodically checked. If oil level is found below “L” level replenish oil to “H” level.
For oil, use “MC70M” specified by Mitsubishi.

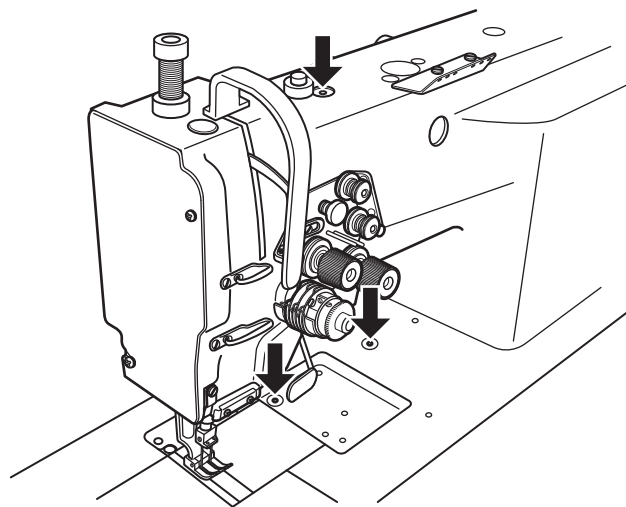
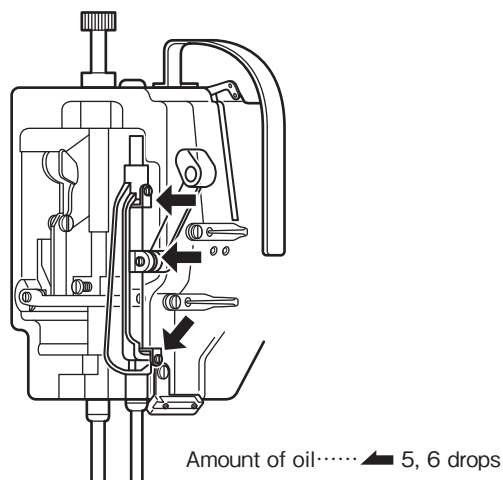
※ Refer

MC70M : Specific gravity (15°C) = 0.86 (g/cm³)
: Viscosity (40°C) = 10.9 (mm²/s)



2 Lubrication (2)

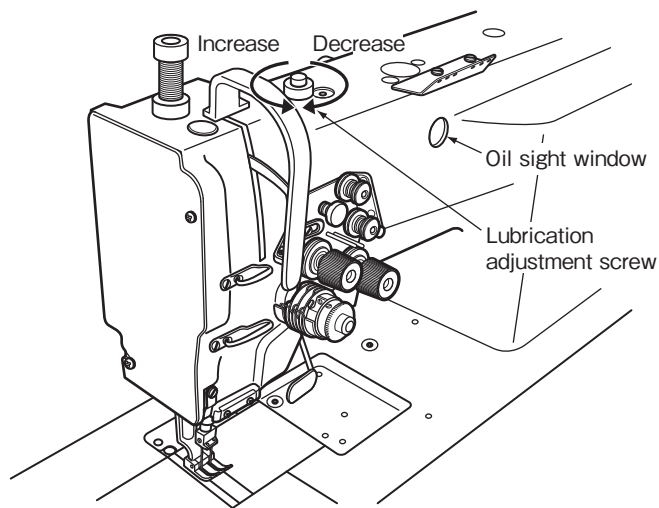
When a new sewing machine is used for the first time, or sewing machine left out of use for considerably long time is used again, replenish a suitable amount of oil to the portions indicated by arrows in the below figure.



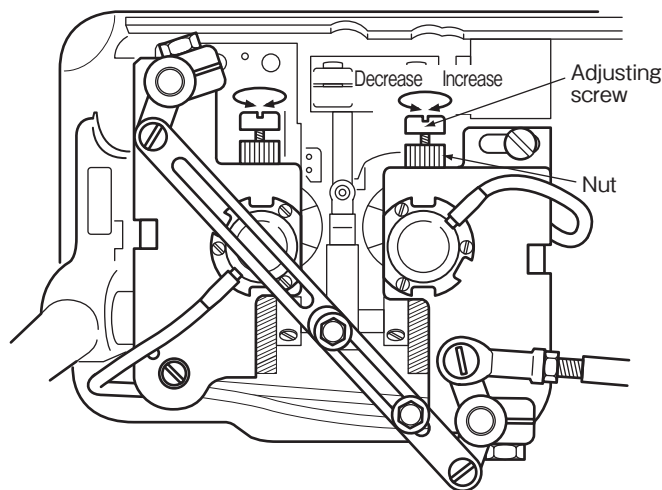
USAGE PRECAUTION

3 Lubrication condition and adjustment on lubrication to the thread take up lever

- (1) See dripping of oil through the oil sight window to check oiling condition during operation.
- (2) Adjust lubrication quantity to the thread take up lever mechanism by turning the lubrication adjustment screw.



4 Adjustment of lubrication to the rotating hook



5 Precaution for the built-in type detector

1. Since the optical type detecting element is used in the detector, prevent dust or oil from sticking to the detecting plate when the sewing machine pulley is removed for adjustment. If they have stuck, wipe them off with soft cloth carefully so that the surface is not scratched, do not let oil permeate the clearance on the detecting plate.
2. In case of disconnection of the position detector connector, running off the belt or complete constraint and over load, the motor is automatically turned off after predetermined time to prevent burning of the motor. (However, in case of half-constraint and over load, the power may not be turned off.) After the failure is eliminated, the normal operation is resumed by turning off the power once then turning on again.
The same operation occurs for the detector malfunction or the line breakage.

6 Installation of the belt cover

1. Install the belt cover on the machine side for safety. Refer to the provided instruction document contained in the same package.
2. Install the belt cover on the motor side for safety.

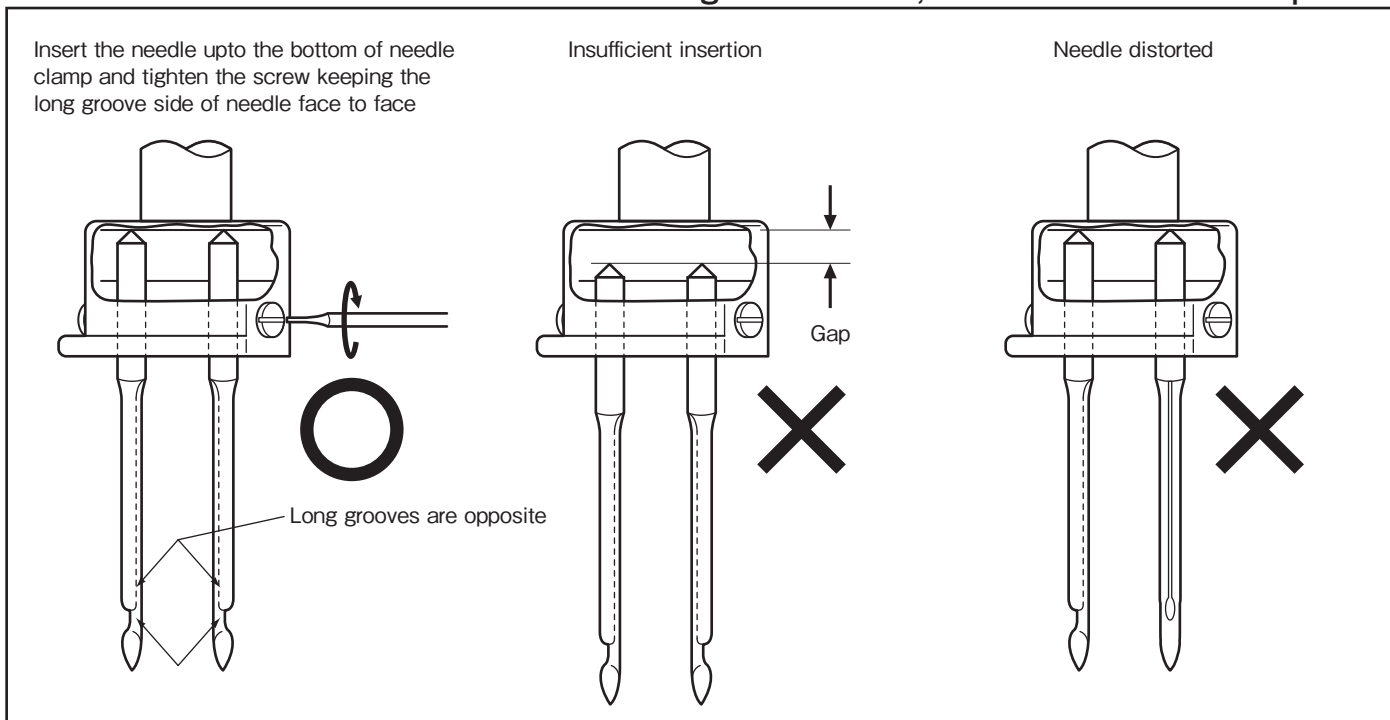
7 Precaution on operation

- (1) When the power is turned on or off, keep foot away from the pedal.
- (2) It should be noted that the brake may not work when the power is interrupted or power failure occurs during sewing machine operation.
- (3) Since dust in the control box might cause malfunction or control troubles, be sure to keep the control box cover close during operation.
- (4) Do not apply a multimeter to the control circuit for checking, otherwise voltage of multimeter might damage semiconductor components in the circuit.

HOW TO USE

1 Installation of needles

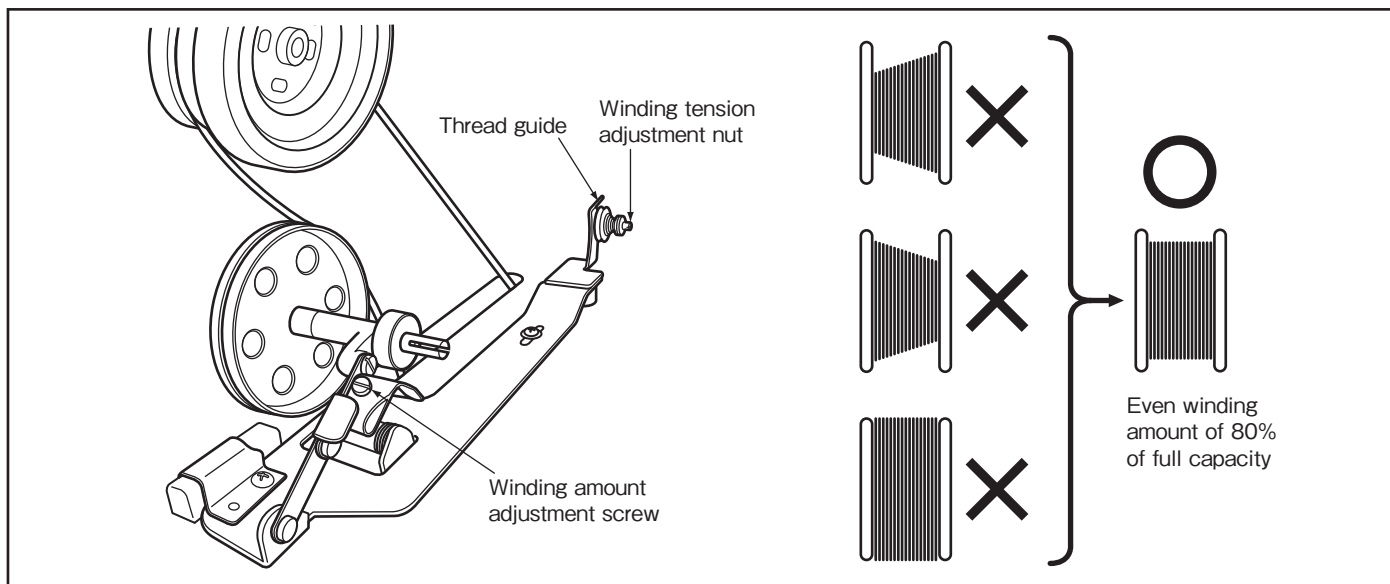
Note: Before installing the needles, be sure to turn off the power.



2 Winding of the bobbin thread

Note: When bobbin thread is wound, keep the presser foot lifted.

- Adjustment**
- **Tension of wound thread** Slack winding is recommended for polyester thread and nylon thread.
 - **Conically wound thread** Move the thread guide toward smaller diameter of wound thread layer.
 - **Amount of wound thread** Loosen the winding amount adjustment screw to decrease thread winding amount and tighten the screw to increase thread winding amount.



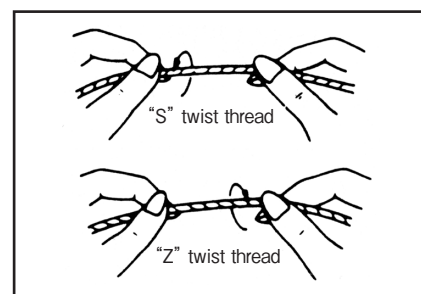
HOW TO USE

3 Selection of the thread

It is recommended to use “S” twist thread in the left needle (viewed from front), and “Z” twist thread in the right needle.

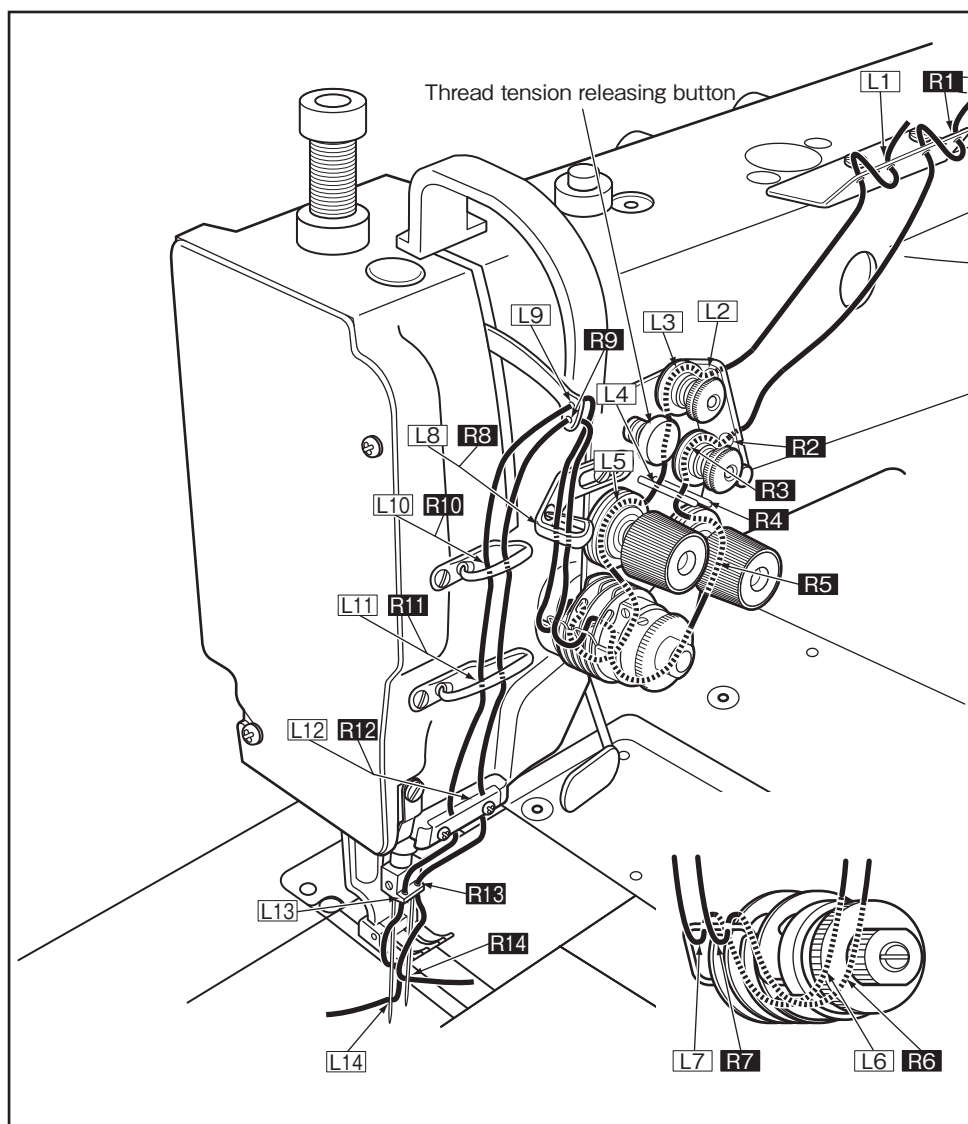
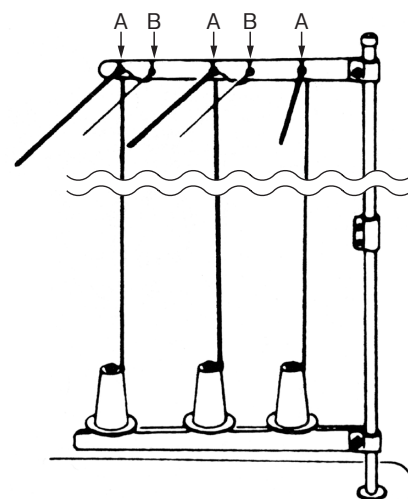
When discriminate use of needle threads is impossible, use “Z” twist thread in both the needles.

For bobbin thread, “S” twist thread as well as “Z” twist thread can be used.

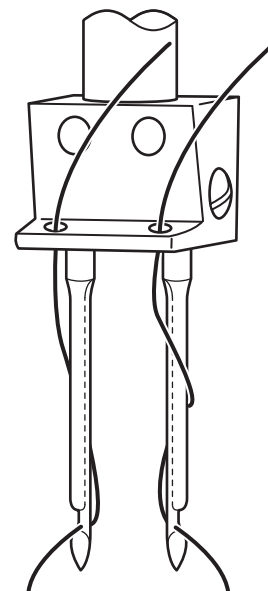


4 Threading of needle threads

1. Pass each needle thread through thread guide (A).
Note: When thin slippery thread (polyester thread or filament thread, etc.) is used,
Pass the thread through thread guide (B) as well.
2. With the thread take-up lever located at the upper most position, pass each needle thread in the order shown in the following figure.
Note: Pushing the needle thread tension releasing button shown in the figure below opens the saucer of the needle thread tension adjuster, and the needle thread can easily pulled out.

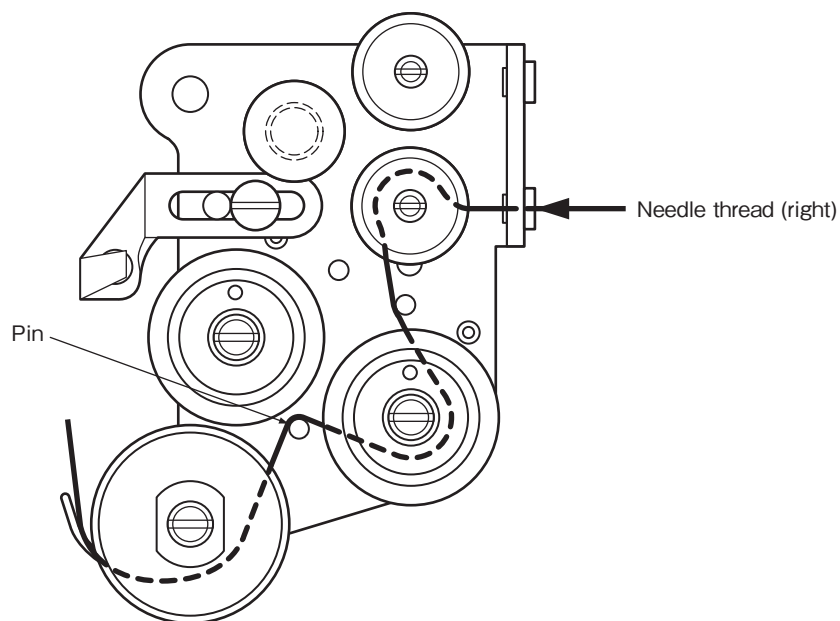


Note: When needles of small gauge (#11 or less) are used, each needle thread should be wound about 3/4 rotation around needles and then passed through needle eyes as shown in the figure, to assure neat stitches. It is recommended to use stepped needle.



HOW TO USE

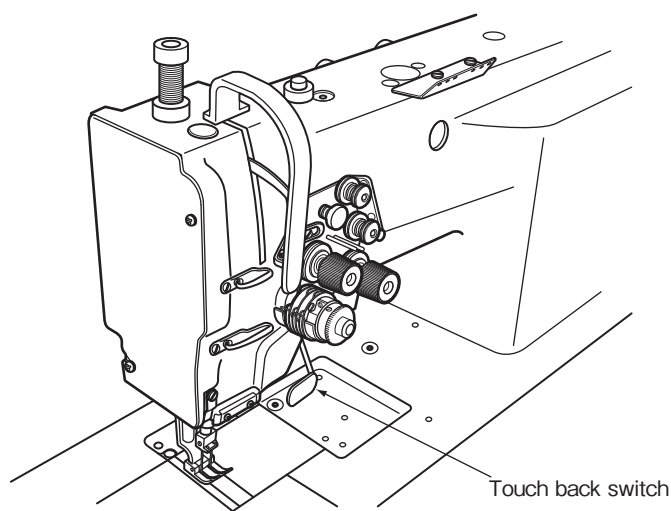
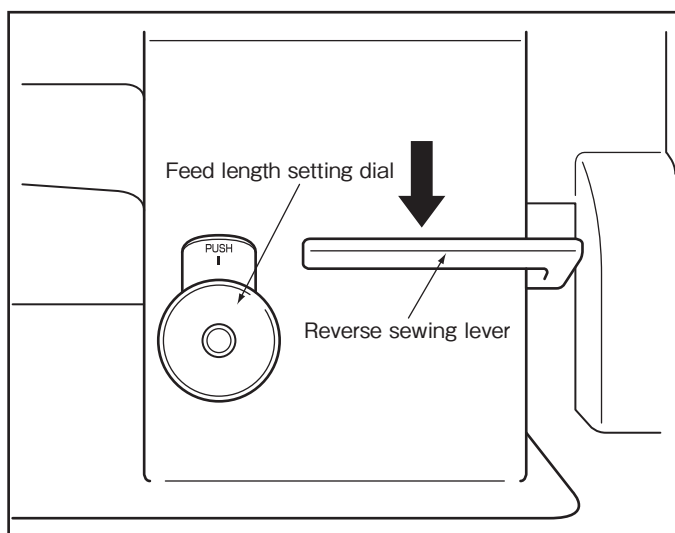
3. If the strong twisted thread (nylon or Tetron, etc.) is used and needle threads tension is strong (about 500gf or more), the right thread may be released from the thread tension disc. In this case, thread only the right thread as shown in the figure (keep the left thread standard).



HOW TO USE

5 Adjustment of feed (stitch) length and backstitch

- Adjustment of feed (stitch) length...Adjust feed length by turning the feed length setting dial while pushing PUSH lever.
- Backstitch...Direction of stitching can be reversed by depressing the reverse sewing lever or pushing the touch back switch.



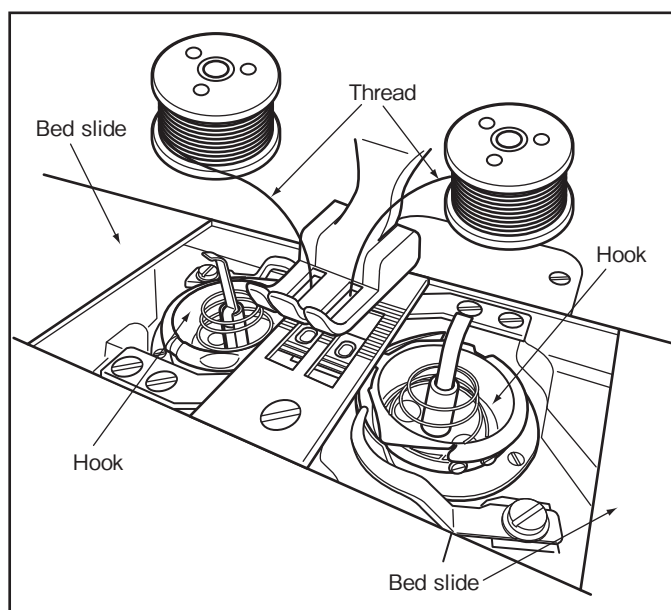
6 Adjustment of the needle thread guide

Adjust the needle thread guide of the needle thread tension adjuster according to the fabric, the thread, and sewing condition.

| Needle thread guide position | Left side | Center | Right side |
|------------------------------|-----------|----------|------------|
| Fabric | Heavy | Standard | Light |
| Needle thread supply | More | Standard | Less |

7 Setting of bobbins

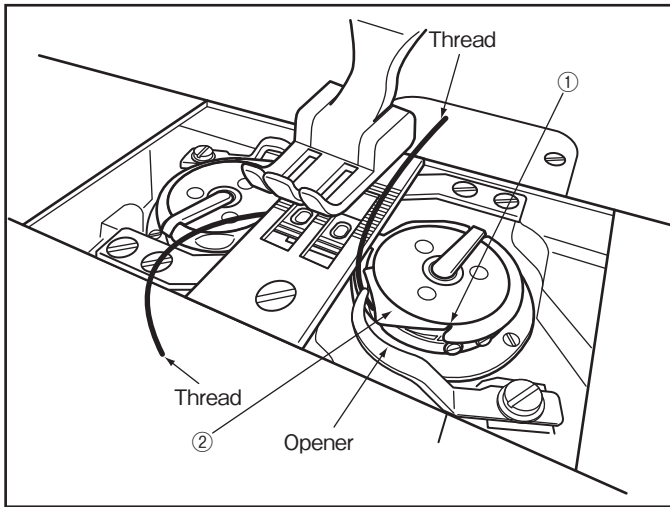
- (1) Pull out 5 cm thread tail from bobbins.
- (2) Put bobbins into hooks in the direction as the following figure.



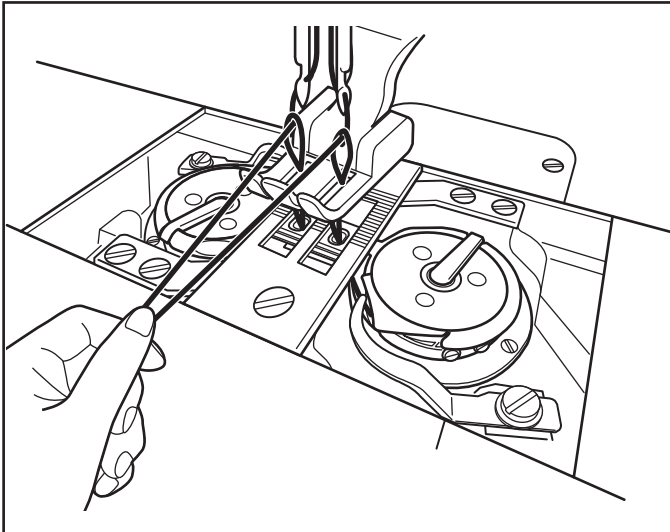
HOW TO USE

8 Threading of bobbin threads

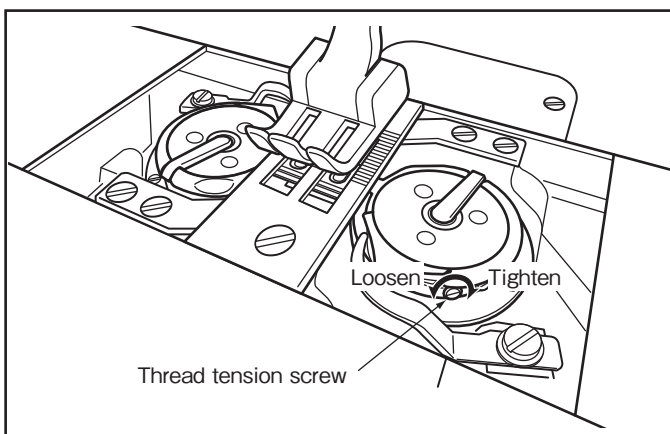
- (1) Put bobbin thread into the slit ①, pass under the lug ② and extend it above the bed.



- (2) While holding two needle threads with your left hand, turn the pulley one rotation with your right hand. The bobbin threads will come up when needle threads are lifted up as shown in the figure. Needle threads and bobbin threads should be aligned and led backward together.

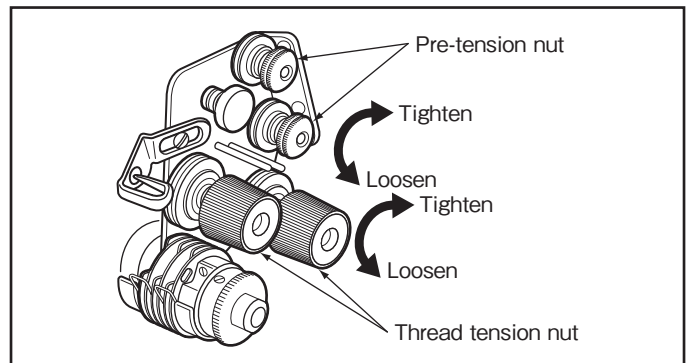


9 Adjustment of bobbin threads tension



10 Adjustment of needle threads tension

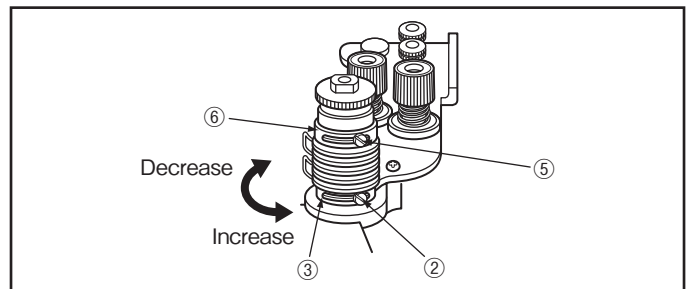
Adjust needle threads tension by turning thread tension nuts.



11 Adjustment of the thread take up spring

1. Adjusting movable range of the thread take up spring

- (1) To adjust the thread take up spring ① for the left thread, loosen the stopper stop screw ② and move the stopper ③.
- (2) To adjust the thread take up spring ④ for the right thread, loosen the stopper stop screw ⑤ and move the stopper ⑥.



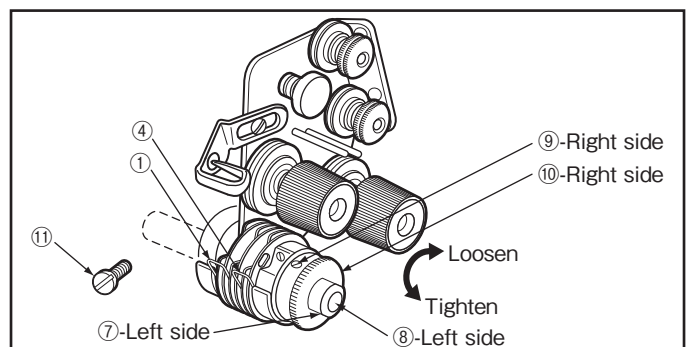
2. Adjusting intensity of the thread take up spring

- (1) Left thread:

Loosen the lock nut ⑦, and remove the face plate. Loosen the screw ⑪ in the arm. Turn the adjusting shaft ⑧. After adjustment, tighten the screw ⑪, and tighten the lock nut ⑦.

- (2) Right thread:

Loosen the screw ⑨, and turn the adjusting nut ⑩. After adjustment, tighten the screw ⑨.



12 Timing between the rotating hook motion and the needle motion

Adjust right and left timing in the same way at the same time.

Note: If you remove the presser foot, the throat plate, and the feed dog, it makes easier to adjust.

- (1) Set feed length to 4.5 mm.
- (2) Loosen two screws ①, and remove the link.
- (3) Loosen all screws ②, ③, ④, ⑤, and slide each hook saddle to outside.

Note: At this time, don't loosen the set screw ④ too much.

- (4) Check that the first screw of the large gear enters a notch, and set the needle bar at the lowest position.
- (5) Slide the large gear to the hook saddle and mesh with the small gear. At this time, adjust it so that one of three set screws ⑥ faces upward.
- (6) Lift the needle bar 2.4 mm from the lowest position, and adjust the saddle hook position so that the gap between the tip of the hook and the scarf of the needle is 0.05 mm or lower.

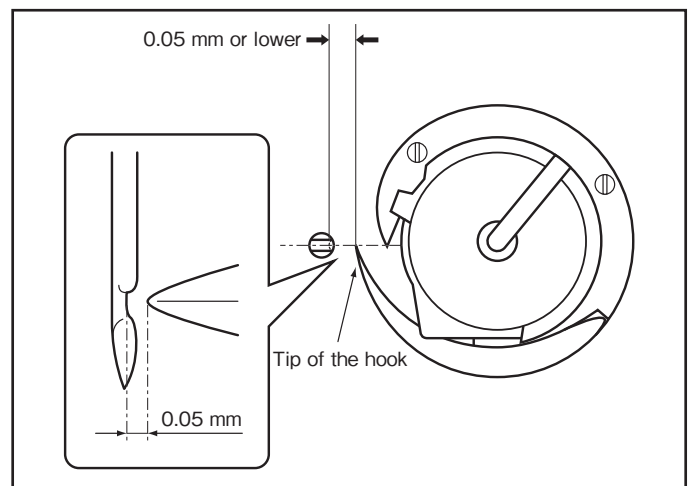
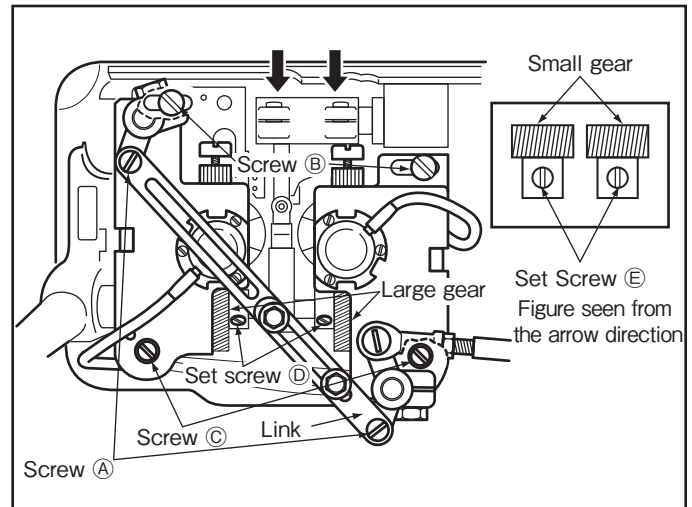
- (7) Tighten screws ②, ③.

Note: Be careful not to overtighten screws ③.

- (8) Have a small gap between the large gear and the saddle hook, and tighten all set screws ④.
- (9) Lift the needle bar 2.4 mm from the lowest position again, and adjust the tip of the hook position so that it is in the center of the needle.
- (10) While checking that the tip of the hook is in the center of the needle, and tighten set screws ⑥.

Note: Tighten each screw ⑥ little by little.

- (11) Install the link with the screws ① as before.
- (12) Return the machine head to the original position and adjust the needle guide position so that it come lightly in contact with the needle.

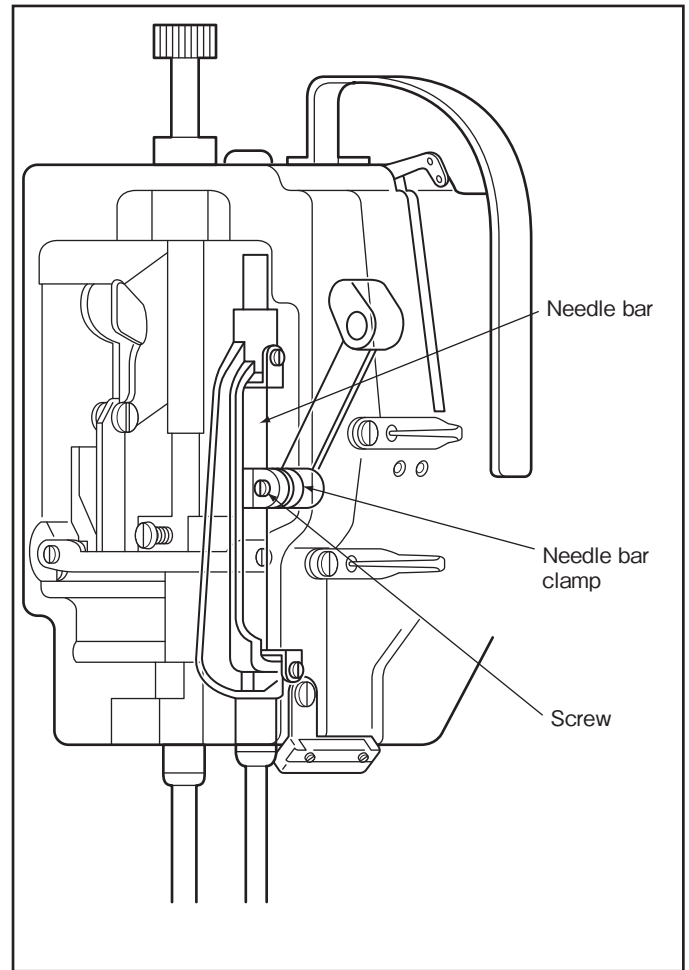


HOW TO USE

● Adjustment of the needle up and down position

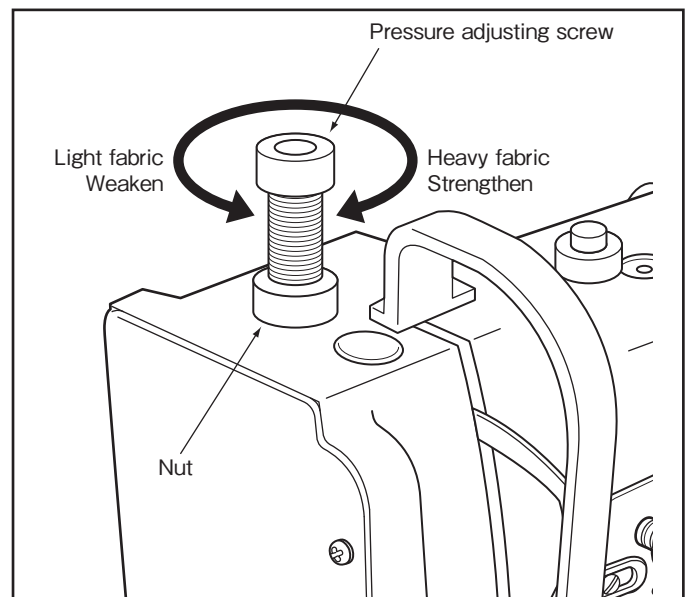
When the needle is lifted 2.4 mm from the lowest position, adjust the needle position so that the gap between the top of needle eye and the tip of the hook is 1.0 to 2.0 mm.

- (1) Remove the face plate, loosen the needle bar clamp screw, and vertically move the needle bar to adjust.
- (2) After adjustment, fully tighten the screw.



13 Adjustment of the presser foot pressure

- (1) Adjust the presser foot pressure by loosening the nut and turning the pressure adjusting screw.
- (2) After adjustment, fully tighten the nut.



HOW TO USE

14 Adjustment of the feed dog height

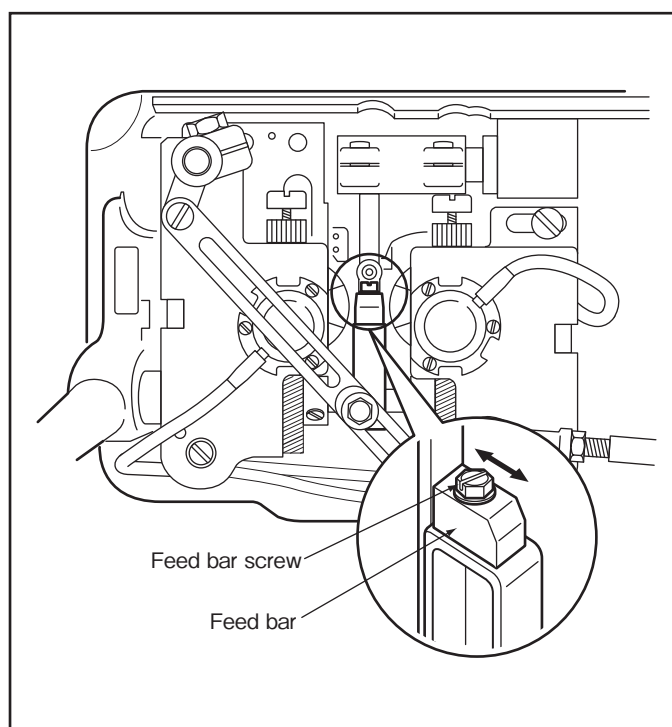
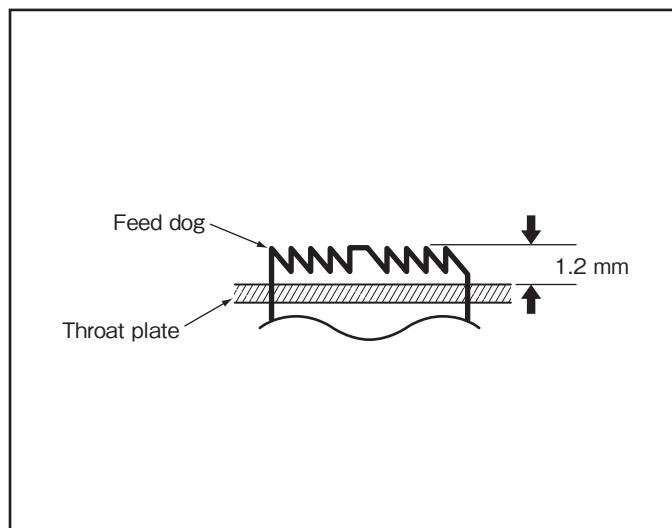
The feed dog height and the presser foot pressure must be adjusted according to the fabric.

- ◆ The fabric will be damaged if the feed dog extends too high, or if the presser foot pressure is too large.
- ◆ An even stitch length cannot be assured if the feed dog is too low, or if the presser foot pressure is too small.
- ◆ The feed dog height is the position where the needle is at the top position.

Adjustment of the feed dog height

- (1) Lean the machine head backward.
- (2) Turn the pulley by hand and stop it at the position where the feed dog rises to the maximum height.
- (3) Loosen the feed bar screw.
- (4) Vertically move the feed bar (in the direction indicated by the arrow in the figure) to adjust it to an adequate height.
- (5) After adjusting, tighten the feed bar screw.

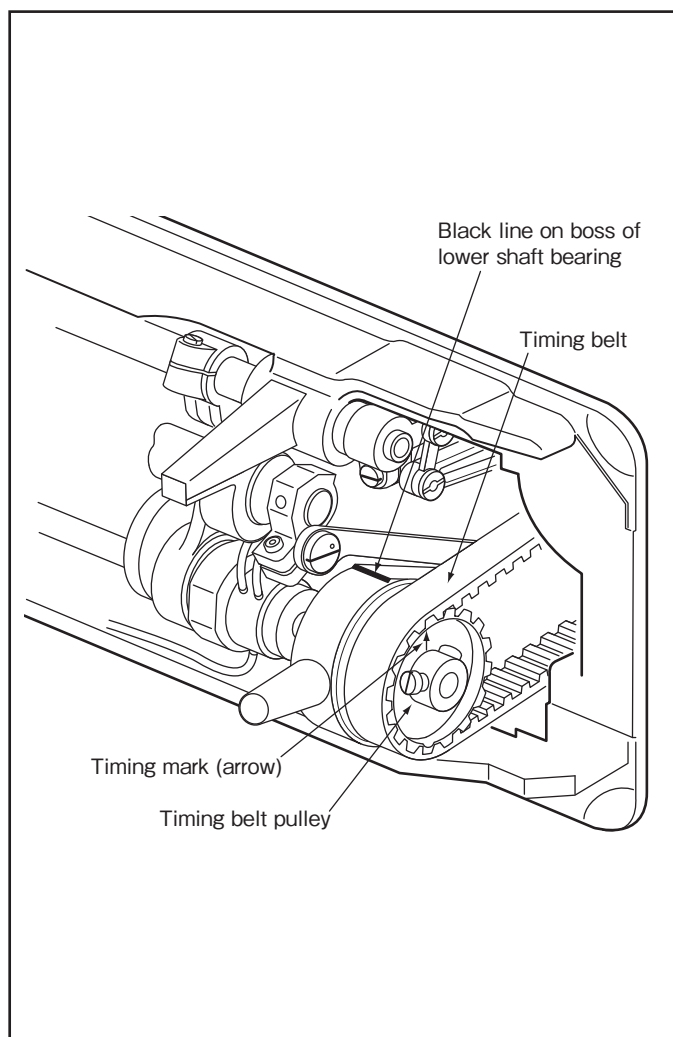
The feed dog height is factory-adjusted to 1.2 mm.



15 Relationship between the rotating hook motion and the thread take-up lever motion

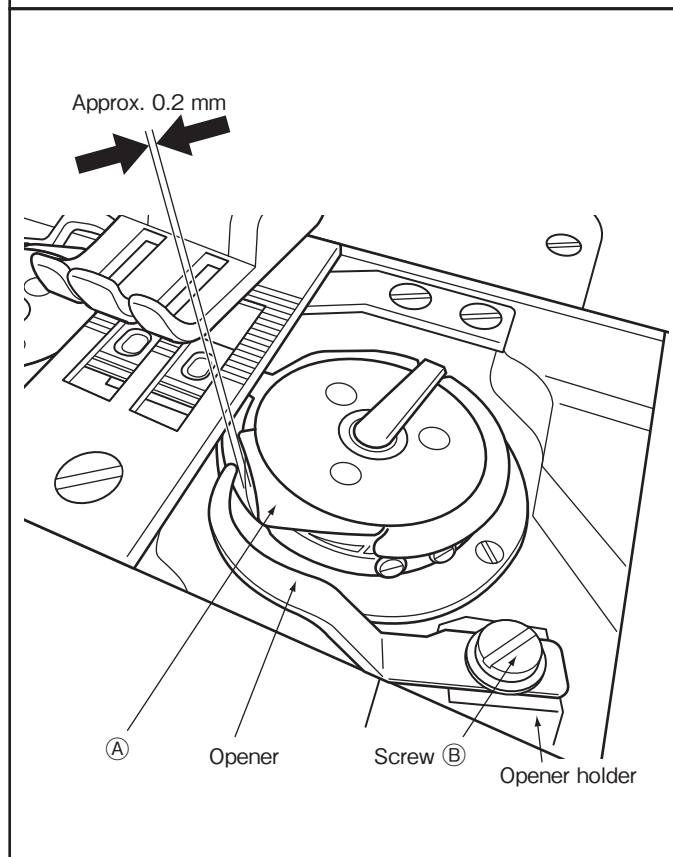
When the timing belt is removed for replacement, etc., the relation between the rotating hook motion and the thread take-up lever motion should be adjusted as follows:

- (1) Turn the pulley and stop when the thread take-up lever is lifted to the highest position.
- (2) Lean the machine head backward and check that the arrow (timing mark) put on the timing belt is aligned with the black line on the boss of lower shaft bearing.
- (3) If the timing mark is not in line with the black line, remove the timing belt and install it again to adjust.



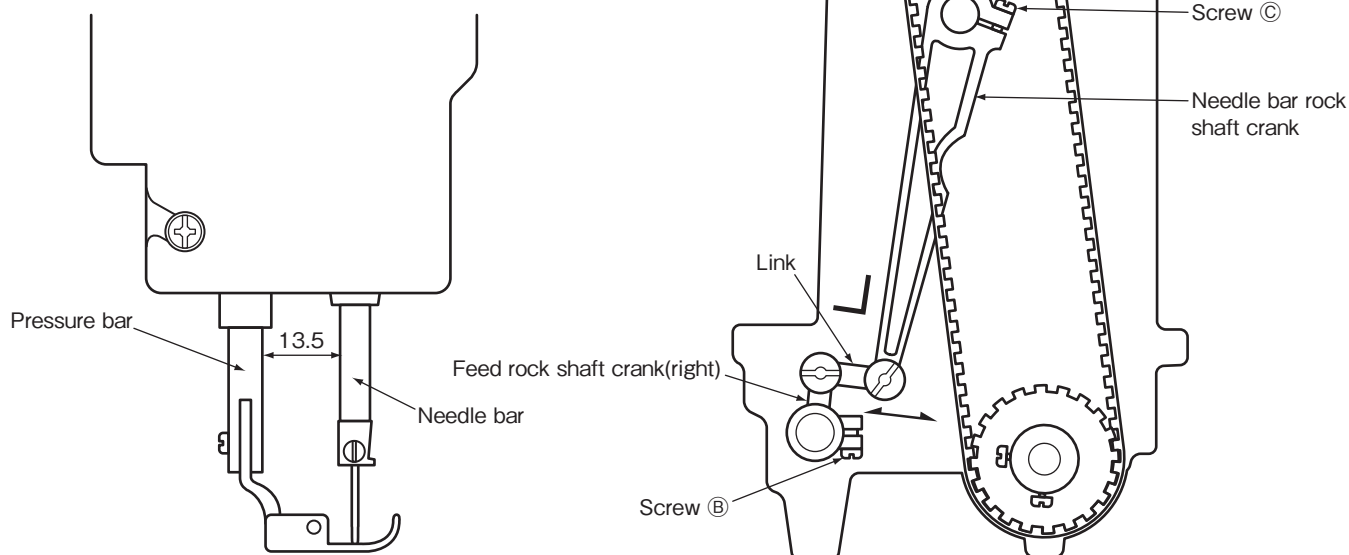
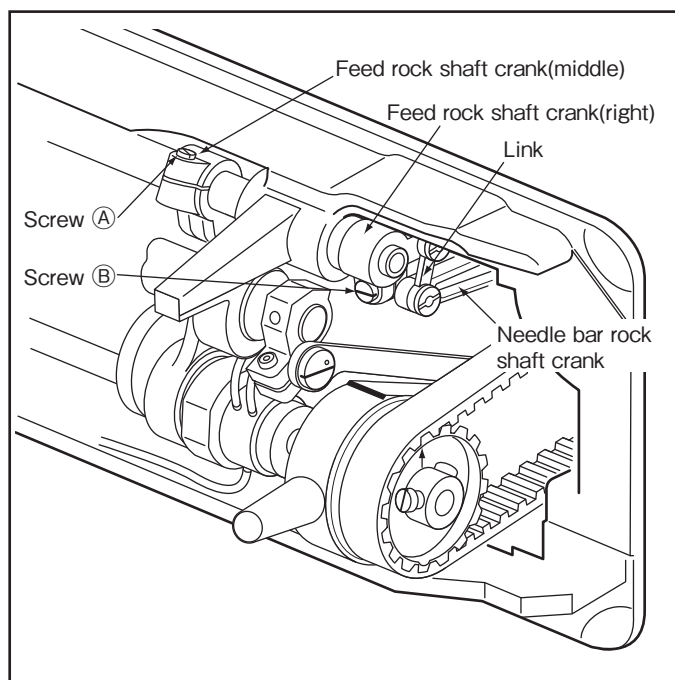
16 Relationship between the rotating hook motion and the opener motion

- (1) Turn the pulley by your hand and stop it at the position where the opener holder is located most remotely from the throat plate.
- (2) Check that the gap between the lug ① and the opener is approximately 0.2 mm.
- (3) If the gap is too large or small, loosen the opener holder screw ② and adjust position of the opener.



17 Relationship between the needle motion and the feed dog motion

- (1) Set the stitch length to "0" on the feed length setting dial.
- (2) Set the needle at the lowest position.
- (3) Lean the machine head backward.
- (4) Loosen the feed rock shaft crank set screws ①, ②.
- (5) Adjust the distance between the pressure bar and the needle bar to 13.5 mm and temporarily tighten the feed rock shaft crank set screws ①, ②.
- (6) Check that the needle bar rock shaft crank is connected with the link at a right angle as shown in the figure.
- (7) If the connection is not a right angle, remove the Rear cover, loosen screw ③ and move the link to connect the needle bar rock shaft crank with the link at a right angle.
- (8) After adjusting, fully tighten all screws ①, ②, ③. At this time, check that the needle enters the hole at center of the feed dog.

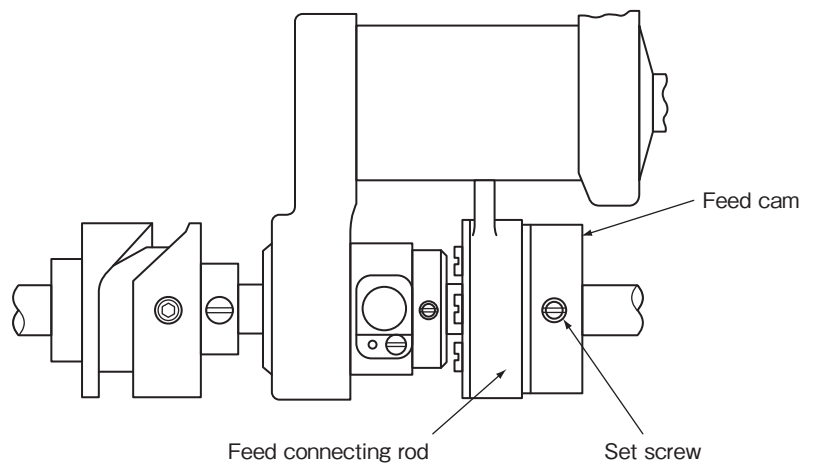
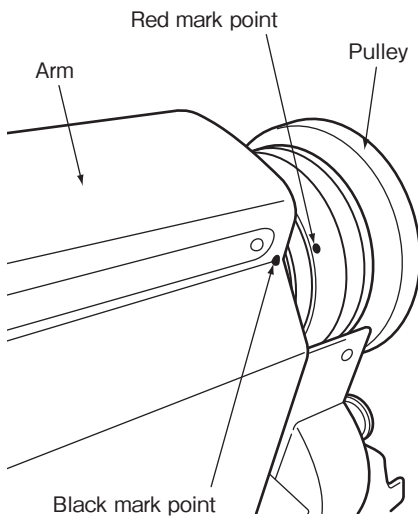
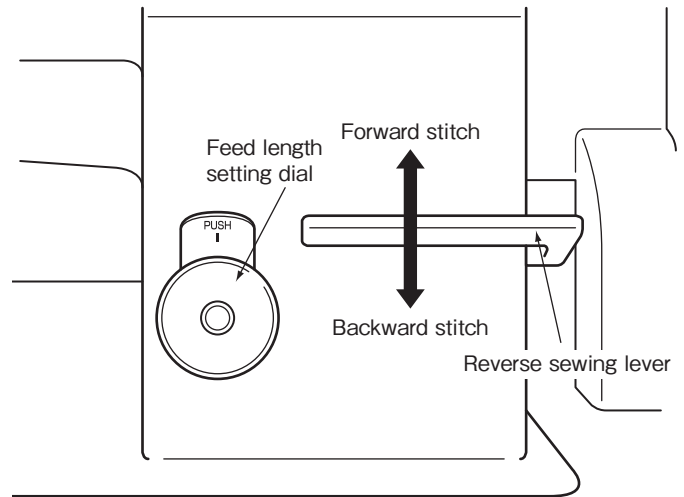


HOW TO USE

18 Installation position of the feed cam

- (1) Set the feed length setting dial to maximum.
- (2) Turn the pulley and stop it at the position where the red mark point on the pulley meets the black mark point on the arm.
- (3) Move the feed cam to the position shown in the figure, and repeat the forward stitch and the backward stitch.

At this time, set the feed cam to the lower shaft at the position where the needle (feed dog) stops.

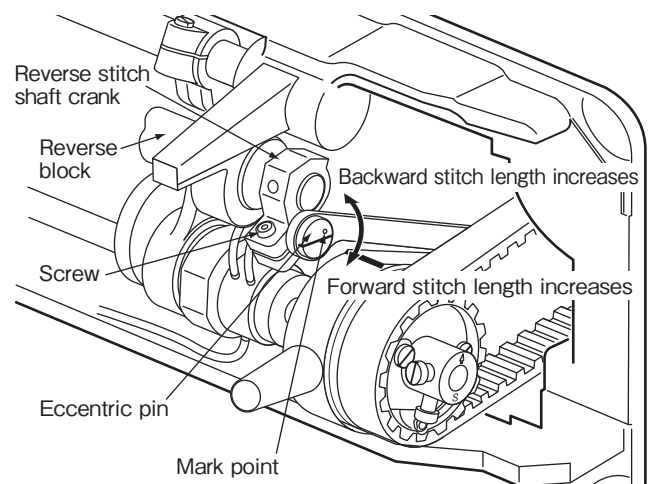


19 Adjustment of forward/backward feed length

The forward/backward feed length can be adjusted by moving the eccentric pin as shown in the figure.

- (1) Loosen the reverse stitch shaft crank screw.
- (2) To increase forward stitch length, turn the eccentric pin clockwise.
To increase backward stitch length, turn the eccentric pin counterclockwise.

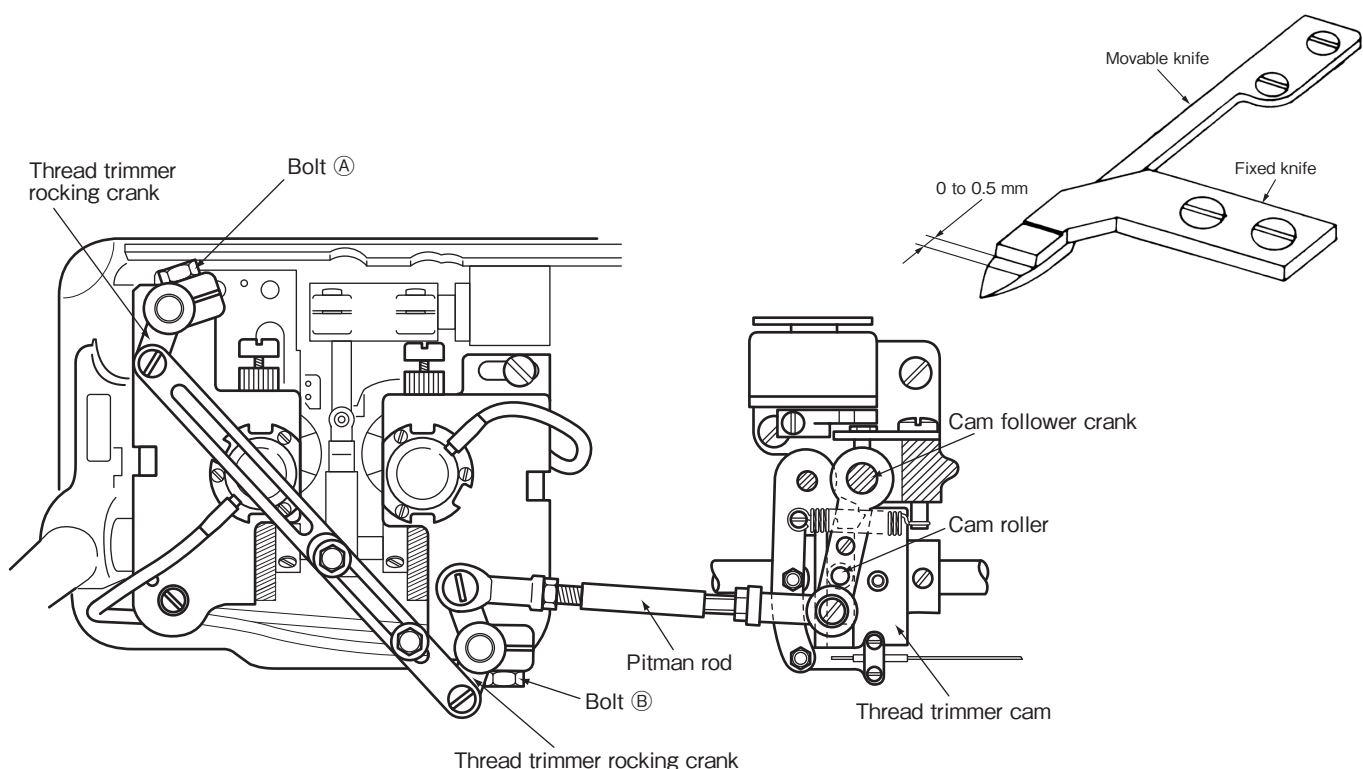
Note: Please adjust in the range where the mark point of the eccentric pin is facing to the reverse block side as shown in the figure.



20 Installation of the movable knife

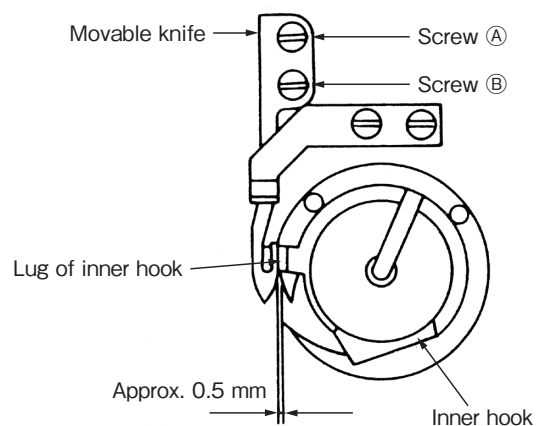
1. Initial position of the movable knife

- (1) Turn the pulley and stop it at the position where the needle comes to the lowest.
- (2) Put the cam roller into the thread trimmer cam groove by pushing the cam follower crank.
- (3) In this condition, turn the pulley and stop it at the position where the black mark point on the arm meets the white mark point on the pulley.
Set the cam follower crank at this position with a screwdriver temporarily preventing the cam roller coming out from the cam groove.
- (4) Loosen bolts ① and ②.
- (5) Adjust so that the tip slant portion of the movable knife protrudes 0 to 0.5 mm from the fixed knife, as shown in the figure and tighten bolts ① and ②.



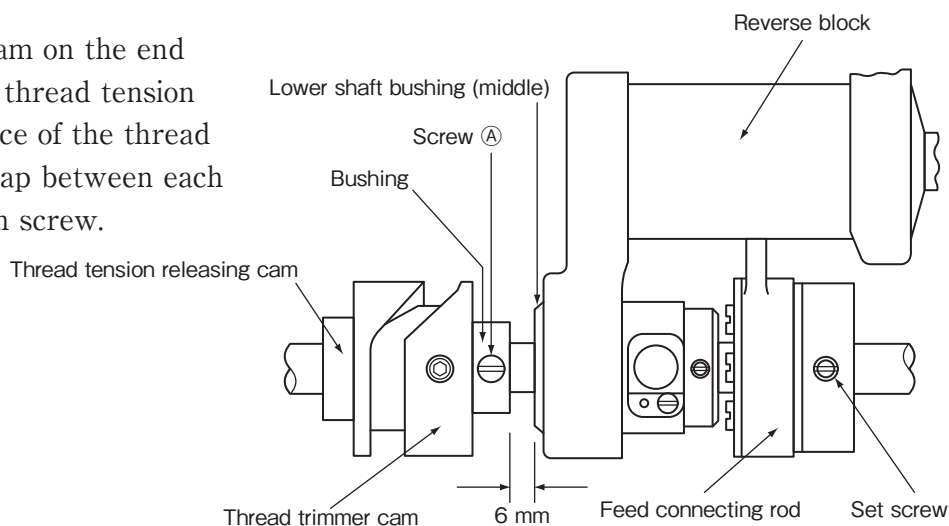
2. Gap between the movable knife and the lug of inner hook

- (1) Turn the pulley and stop it at the position where the needle comes to the lowest.
- (2) While pushing the cam follower crank, turn the pulley and stop it at the position where the movable knife move to the position as shown in the figure.
- (3) Turn the inner hook and adjust so that the gap between the movable knife and the lug of inner hook is about 0.5 mm (screws ① and ② should be loosened for this adjustment).



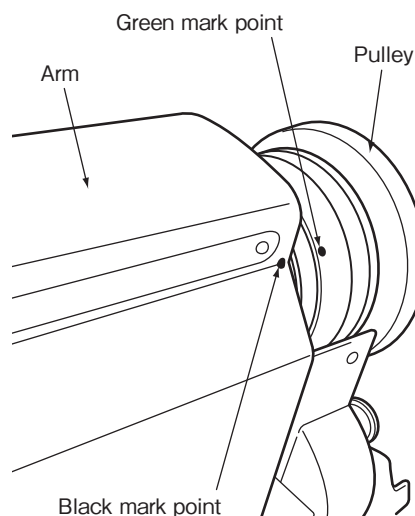
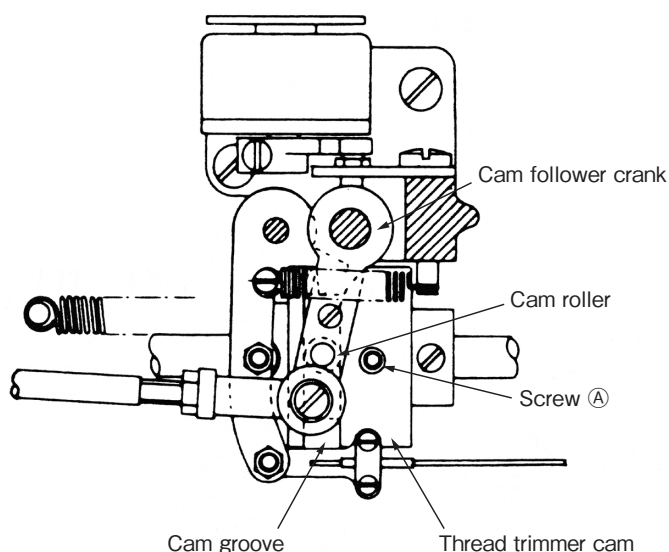
21 Installation position of the thread trimmer cam

- (1) Adjust so that the gap between the lower shaft bushing (middle) and the bushing is 6 mm and then tighten the screw ① to the flat on the lower shaft.
- (2) Place the thread trimmer cam on the end face of the bushing and the thread tension releasing cam on the end face of the thread trimmer cam (making the gap between each part zero), then tighten each screw.



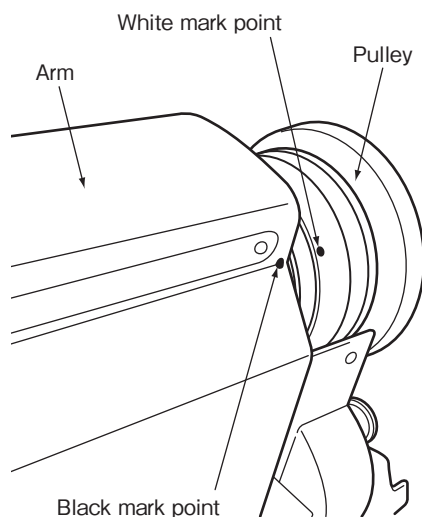
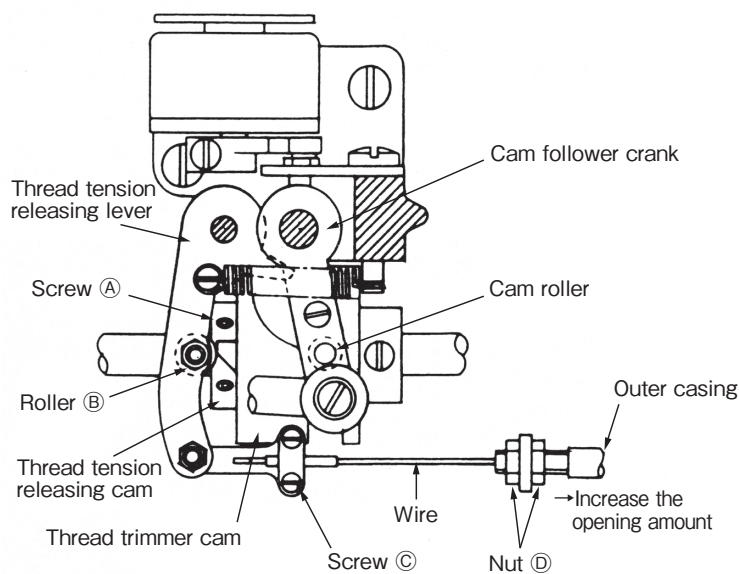
22 Adjustment of the thread trimmer cam

- (1) Turn the pulley and stop it at the position where the needle comes to the lowest.
 - (2) Put the cam roller into the thread trimmer cam groove by pushing the cam follower crank.
 - (3) Turning the pulley, adjust the thread trimmer cam so that the movable knife starts moving when the green mark point on the pulley comes in line with the black mark point on the arm.
- To adjust, loosen two thread trimmer cam clamp screws ①.



23 Adjustment of the thread tension releasing

- (1) Turn the pulley and stop it at the position where the needle comes to the lowest.
- (2) Put the cam roller into the thread trimmer cam groove by pushing the cam follower crank.
- (3) Turning the pulley, adjust the thread tension releasing cam so that the thread tension disc closes when the white mark point on the pulley comes in line with the black mark point on the arm.
To adjust, loosen two thread tension releasing cam clamp screws ㉑.
- (4) The opening amount of the thread tension disc should be adjusted with the thread tension releasing roller ㉒ mounted on the convex portion of the thread tension releasing cam, as shown in the figure.
To adjust, loosen screws ㉓ and pull the wire.
- (5) Make fine adjustments by loosening the nut ㉔.
- (6) Loosen the nut ㉔ and make the outer casing approach to the right to increase the opening amount.

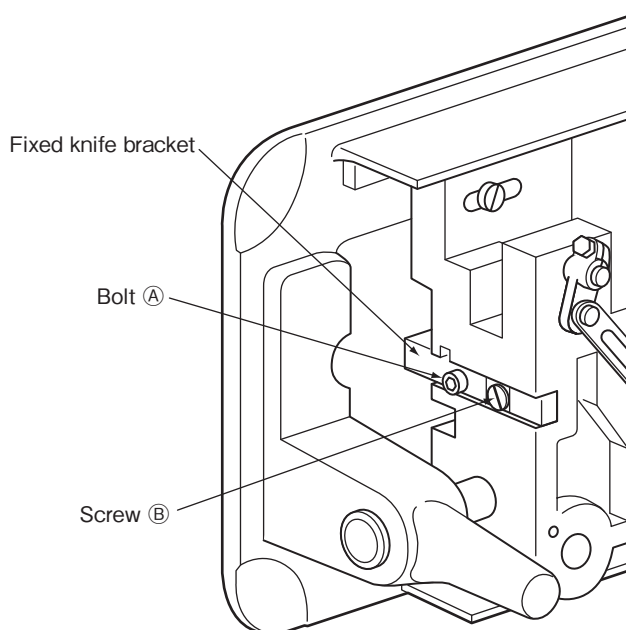


24 Adjustment of meshing pressure between the movable knife and the fixed knife

- (1) Loosen the fixed knife bracket clamp bolt ①.
- (2) Adjust meshing pressure by turning the up and down adjusting screw ②, and tighten the bolt ①.

Note: Since overpressure causes a large torque on the thread trimmer mechanism and trimming failure, adjust so that the thread can be trimmed with the minimum pressure.

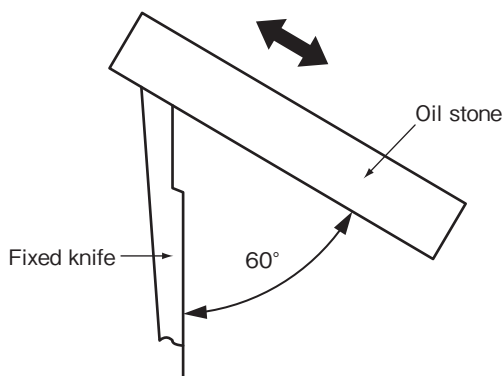
- (3) Move the movable knife and check that the thread can be sharply trimmed.



25 Sharpening of the fixed knife

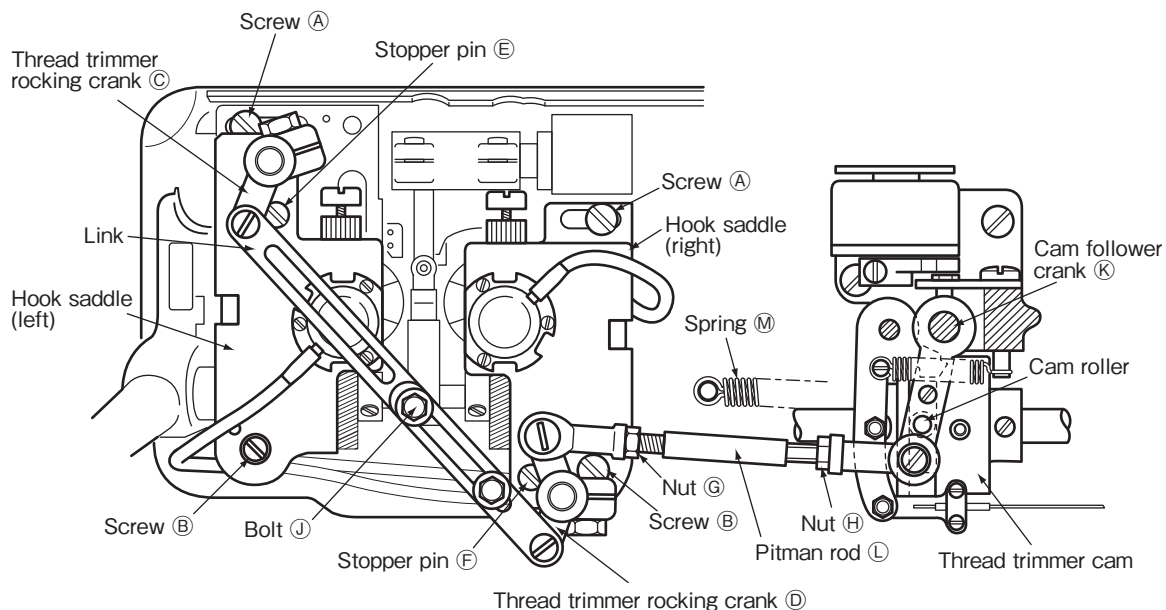
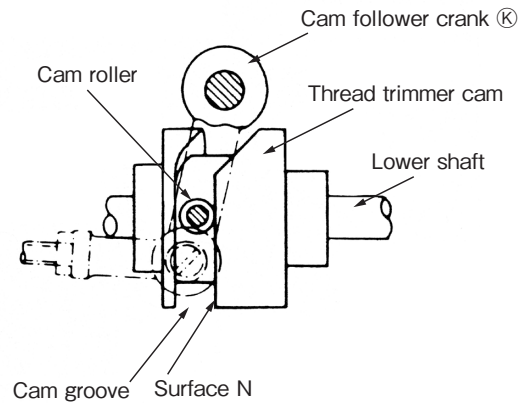
If the fixed knife is dull, it should be sharpened as shown in the figure.

Since it is very difficult to sharpen the movable knife, replace it with a new one when it dulls.



26 Adjustment of the thread trimmer with changing the width between needles

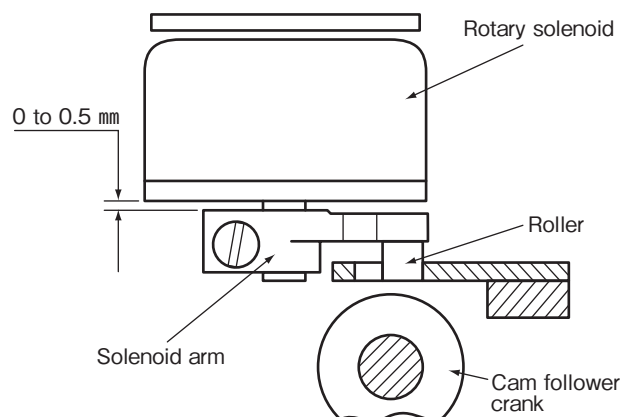
- (1) Replace the throat plate, the feed dog, the needle clamp, and the presser foot.
(Since the throat plate and the feed dog are special parts designed for the thread trimming machine, be sure to use those specified by us.)
Note: When the width between needles is 3/4 inches or more, replace the pitman rod ⑬.
- (2) Lean the machine head backward.
- (3) Loosen two link clamp bolts ⑪.
- (4) Remove the spring ⑭.
- (5) Loosen hook saddle clamp screws ① and ②, and adjust the gap between the needle and the hook.
- (6) After adjusting the needle and the hook, install the spring ⑭.
- (7) Contact thread trimmer rocking cranks ③ and ④ to stopper pins ⑤ and ⑥, and tighten the Link clamp bolt ⑪.
- (8) Turn the pulley and stop it at the position where the needle comes to the lowest.
- (9) Loosen nuts ⑦ and ⑧.
- (10) Push the cam follower crank ⑫ and adjust the pitman rod ⑬ so that the cam roller can smoothly enter the thread trimmer cam groove.
- (11) Adjustment of the cam groove and the cam roller
 - a) Put the cam roller into the thread trimmer cam groove by pushing the cam follower crank ⑫.
 - b) Turn the pitman rod ⑬, and adjust the gap between the cam roller and the surface N of the cam groove as small as possible, and tighten nuts ⑦ and ⑧.
 - c) Push the cam follower crank ⑫ again and check that the cam roller enters the thread trimmer cam groove smoothly.



27 Installation of the solenoid arm

- (1) Install the rotary solenoid so that the gap between the rotary solenoid and the solenoid arm is about 0 to 0.5 mm.

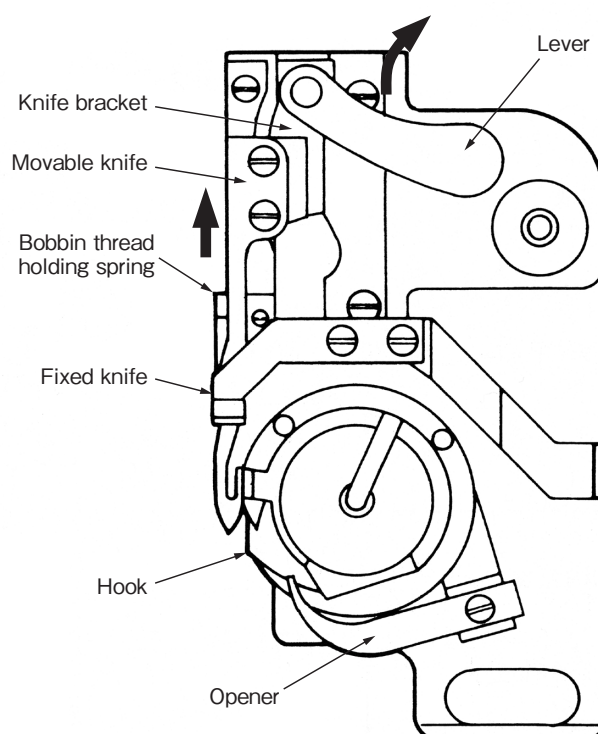
Note: If the gap is too large, the roller and the cam follower crank interfere while rotating movement of the solenoid, which causes malfunction and result in failure of the thread trimmer device.



28 Removal procedure of the hook

- (1) Loosen three set screws of the small gear to the hook shaft.
- (2) Remove the opener.
- (3) Remove the fixed knife.
- (4) Move the lever to the arrow direction, and move the movable knife to the arrow direction.
- (5) Remove the hook.

Note: To install the hook, reverse the removing procedure.



SPECIFICATIONS

LT2-2230-B1T Specifications

| Specifications | | Model | LT2-2230-B1T |
|----------------------------------|------|----------|--|
| Application | | | Medium-heavy material |
| Max. sewing speed (rpm) | | | 3,000 |
| Stitch length (mm) | | | 0 to 7 |
| Needle bar stroke (mm) | | | 35.0 |
| Thread take-up lever stroke (mm) | | | 64.5 |
| Presser foot stroke (mm) | Hand | | 7.0 |
| | Knee | | 13.0 |
| Needle | | | DP × 5 #18 |
| Hook (horizontal rotating hook) | | | Large |
| Bobbin | | | Made of aluminum for thread trimmer |
| Lubrication system | | | Automatic lubrication |
| Thread trimmer method | | | Combination of fixed knife and movable knife |
| Touch back | | | ○ |
| Bed dimensions (mm) | | | 517 × 178 |
| Needle gauge (mm) | | Standard | 6.4 |
| | | Special | 3.2、4.8、8、9.5、12.7 |

Note: ●Feed dog, throat plate, rotating hook, bobbin case, bobbin, and bed slide should be those designed for the thread trimmer.

- The bobbin should be of high quality free from deformation.
- Some materials, gauge sizes, and/or sewing conditions may require specifications other than those listed above.
- These specifications are subject to change for machine improvement.

mitsubishi **ELECTRIC CORPORATION**

Printed in Japan