



**MITSUBISHI  
INDUSTRIAL  
SEWING  
MACHINE**

**Model**

**LT2-2230**

**Classes**

**Double-Needle  
Needle feed  
Lockstitch, Automatic  
Undertrimmer,  
Variable Speed**

**INSTRUCTION MANUAL**

## **PRECAUTIONS BEFORE STARTING TO OPERATE**

### **(1) Safety Precautions**

1. Keep your hands and fingers away from the area around the needle and the area around the pulley when turning the power on.
2. Power must be turned off when the machine is not in use, or when the operator leaves his/her seat.
3. Power must be turned off before tilting the machine head, installing or removing the "V" belt, adjusting the machine, or replacing its parts.
4. Avoid placing fingers, hair, bars etc., near the pulley, "V" belt, bobbin winder, or motor when the machine is operating.
5. Do not insert fingers into the thread take-up cover, under/around the needle, or pulley when the machine is operating.
6. If a belt cover, finger guard, and/or eye guard are installed, do not operate the machine without these safety devices.

### **(2) Precautions before Starting Operation**

1. If the machine's oil pan has an oil sump, never operate the machine before filling it.
2. If the machine is lubricated by a drop oiler, never operate the machine before lubricating.
3. When a new sewing machine is first turned on, verify the rotational direction of the pulley with the power on.  
(The pulley should rotate counterclockwise when viewed from the pulley.)
4. Verify the voltage and (single or three) phase with those given on the machine nameplate.

### **(3) Precautions for Operating Conditions**

1. Avoid using the machine at abnormally high temperatures (35°C or higher) or low temperatures (5°C or lower). Otherwise, machine failure may result.
2. Avoid using the machine in dusty conditions.

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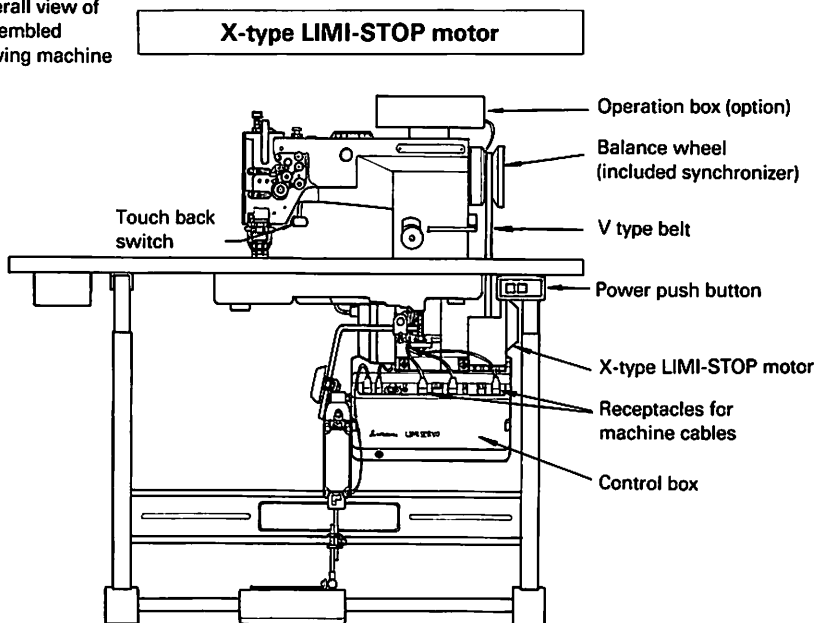
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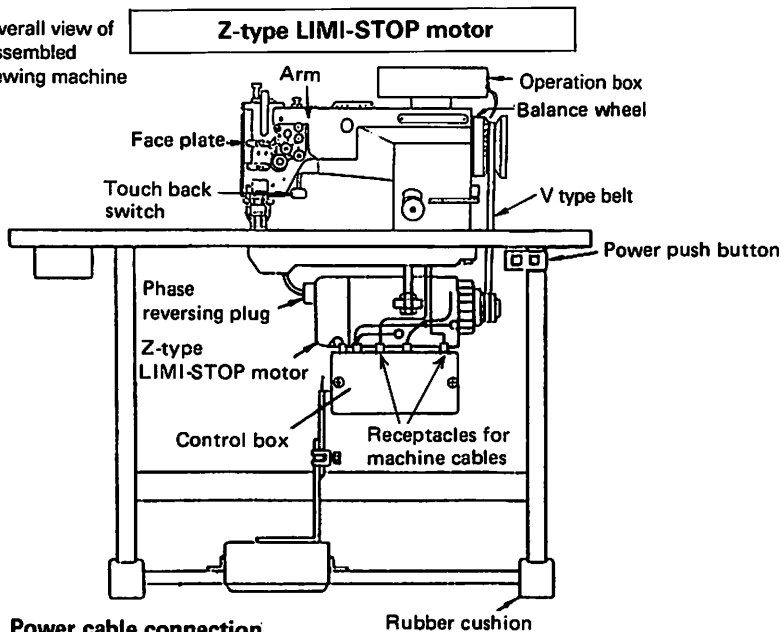
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## PREPARATION FOR OPERATION

- Overall view of assembled sewing machine



- Overall view of assembled sewing machine



### 1 Power cable connection

#### 1.1 Connectors

The connector (plug) of cable to be connected to the control box should be set to the corresponding receptacle after checking the direction of connection to be set.

## 1.2 Lamp Leads (standard type)

- (1) When a work lamp (6V, 15 to 20W) is used, remove the insulation tube from the lamp leads found at the side face of motor. Then, strip the leads properly and connect them to the lamp. After the connections with an insulation tape.

### CAUTION

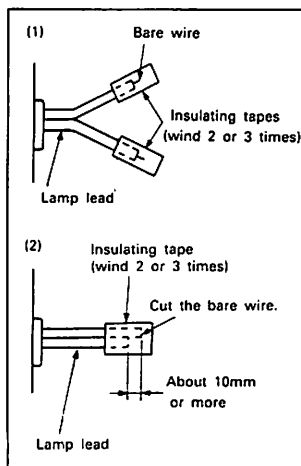
A work lamp voltage is 6V, but a voltage to ground from lamp leads is about 100V.

Be sure to turn off the power switch before the connection.

- (2) When a work lamp is not used, insulate the two lamp leads as shown in figure at right hand.  
If the lamp leads are shorted, the motor windings burn out.

### CAUTION

Do not connect the work lamp in parallel to any heating apparatus, e.g. foot warmer. Otherwise the load capacity is exceeded and the motor windings burn out.



## 1.3 Power Source Connection

- (1) When a three-phase motor is used, connect phase U to the red lead, phase V to the white lead, and phase W to the black lead. Be sure to connect the green lead to the ground terminal.
- (2) For power fuse, consult with near by located electrician or our service agency.
- (3) The capacity of fuse inside the control box is 8A.

## 1.4 Rotating Direction

The rotating direction of motor can be reversed by removing the rotation reversing plug on the side face of motor, turning it 180° and setting it again. For a single-phase motor, turn on the switch after the motor has completely stopped (approximately two minutes required). Also, be sure to insert the plug securely to the full depth.

## 2 Connection of control box

The control box should be connected as shown to the right. (Z-type LIM1 STOP motor)

**Note:** (1) Be sure to turn the powerswitch off for safety before connecting or disconnecting the connectors.  
(2) The combination of the machine heads with the motor control panels are specified below. Use special care for the correct combination when replacing the machine head or motor control panel.

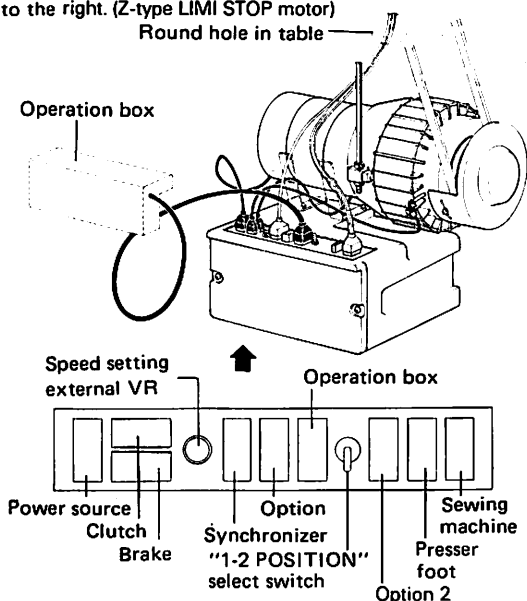
Machine head model	Control box model
LT2-2230-L	LF-AMDF-37
LT2-2230-M	
LT2-2230-B	LF-AMDF-30

“\*” means using voltage

1: 100V, 200V

2: 220-240V, 110~120V, 110/220V

3: 220/380V, 340V, 380V, 400~440V



The control box should be connected as shown to the right. (X-type LIM1 STOP motor)

**Note:** (1) Be sure to turn the power switch off for safety before connecting or disconnecting the connectors.  
(2) The combination of the machine heads with the motor control panels are specified below. Use special care for the correct combination when replacing the machine head or motor control panel.

Machine head model	Control box model
LT2-2230-L	XC-AM-**37
LT2-2230-M	
LT2-2230-B	XC-AM-**30

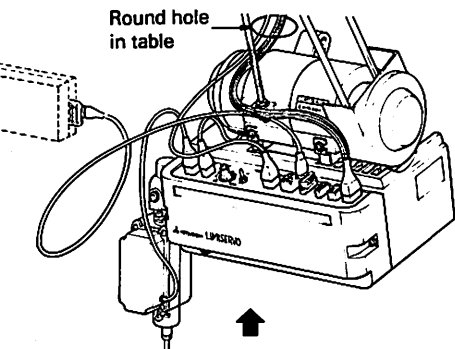
\*\* means using voltage

12: 110V ~ 120V

24: 220V ~ 240V

Operation box

Round hole in table



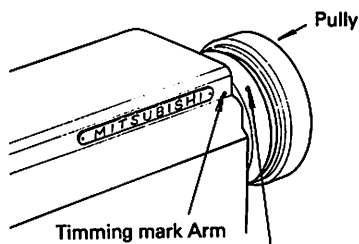
レベル	エンコーダ	速度	計位置	検出器	オプション1	操作箱	押上げ	オプション2	ピン
LEVER	ENCODER	SPEED	DOS	DETECTOR	OPTION	SW PANEL	F.L	OPTION2	S.M

### 3 Adjustment of needle bar stop position

#### 1. Adjust of "UP" position

When the pedal is kicked down by heel, the machine stops at "UP" position. If the marks deviate larger than 3 mm, adjust as follows.

- 1. Disconnect the plug (12 pins) 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 (A), then remove the tool.

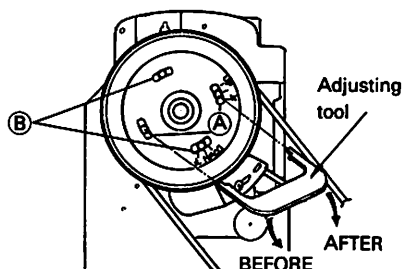


white mark	"Up" position
Black mark	"Down" position

#### 2. Adjust of "Down" position

When the pedal is "Neutral" the machine stops at "Down" position. If the marks deviate large than 5 mm, adjust as follows.

- 1. Disconnect the plug (12 pins) 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 (B), then remove the tool.

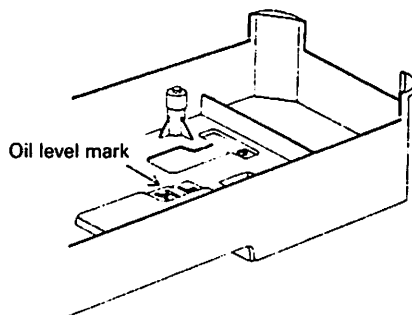


3. Confirm the stop operation, then set the plug (12 pins) coming from the machine head into the receptable.

## CAUTIONS ON USE

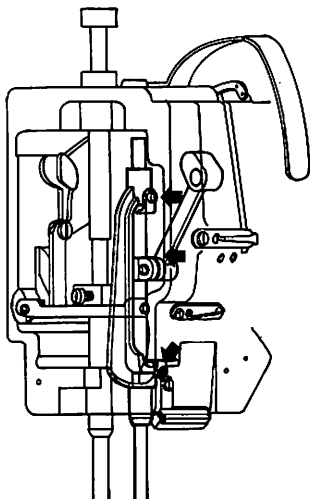
### 1 Oiling (1)

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 white spindle oil specified by Mitsubishi.



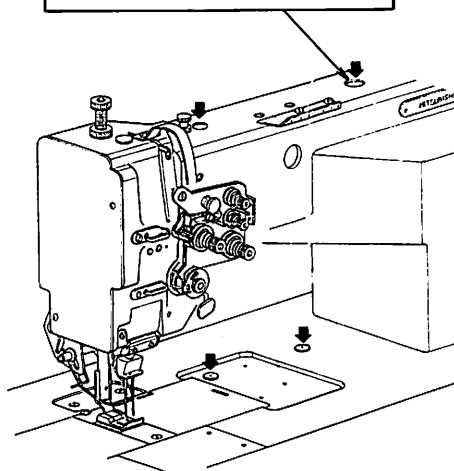
### Oiling (2)

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 arrow in the below figures.



Amount of oil ... 5 ~ 6 drops

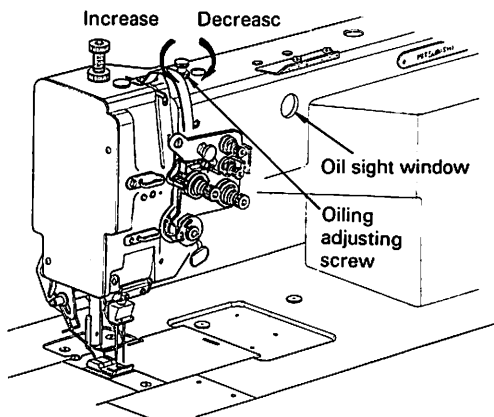
Don't replenish oil here in the case of "B" type sewing machine!



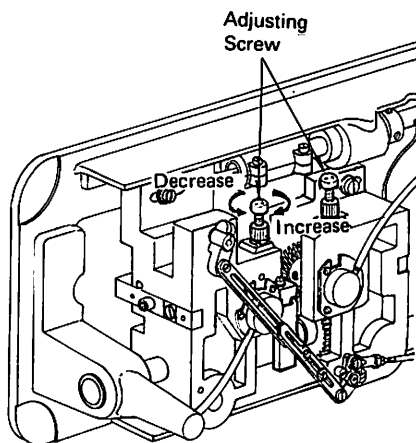
## CAUTIONS ON USE

### 2 Oiling condition and adjustment on oiling to thread take-up lever

- (1) See dripping of oil during operation through the oil sight window to check oiling condition in the machine arm.
- (2) Please use the oiling adjusting screw with respect to oiling to thread take-up lever mechanism.



### 3 Adjustment on oiling to rotating hook



### 4 Cautions 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.

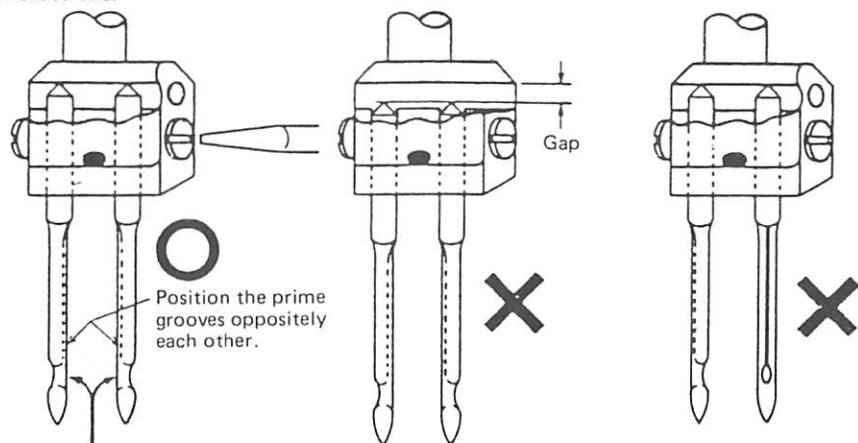


## OPERATION

### 1 Installation of needles

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

Put each needle into needle socket until it is stopped at the bottom of needle socket and turn two needles so that their prime grooves are positioned oppositely each other. Then tighten set screws.



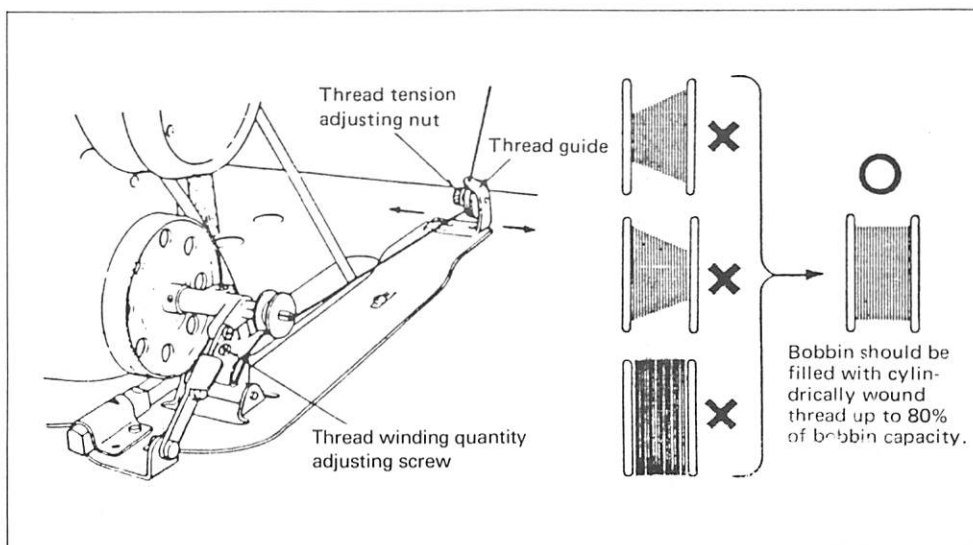
### 2 Winding of bobbin thread

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

#### Adjustment:

- Tension of wound thread
- Conically wound thread
- Length of wound thread

Slack winding is recommended for polyester thread and nylon thread. Move the thread guide toward smaller diameter of wound thread layer. Loosen the thread length adjusting screw to increase length of thread and tighten the screw to decrease length of thread.

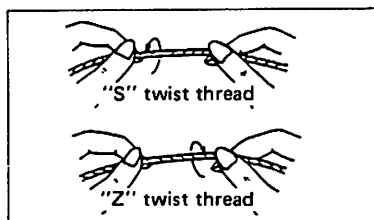


## OPERATION

### 3 Selection of 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.



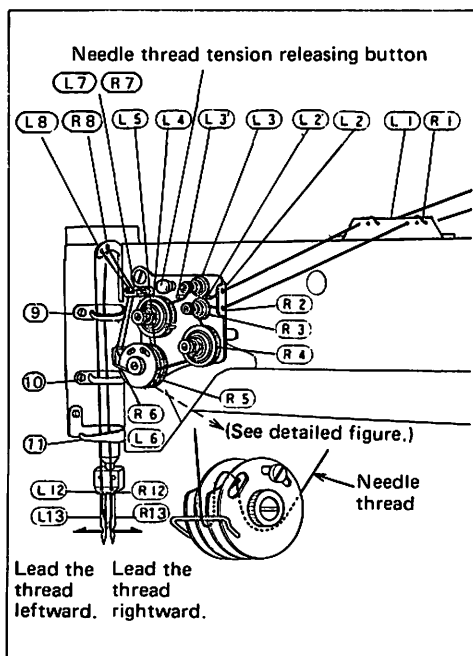
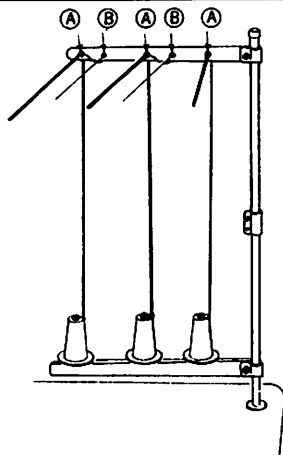
### 4 Threading of needle threads

- (1) Pass each needle thread through thread guide (A).

Note: When thin slippery thread (polyester thread or filament thread, for example) is used, pass the thread through thread guide (B) as well.

- (2) With the take-up lever located at the upper most position, pass each needle thread in the order shown in the following figure.

Note: Pressing the upper thread loosening button shown in the figure below opens the saucer of the upper thread tension adjuster, and the upper thread can easily pulled out.

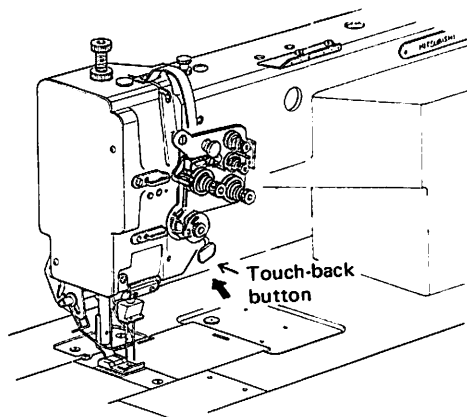
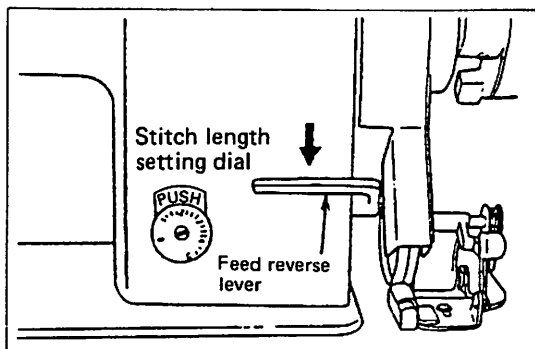


## OPERATION

### 5 Adjustment of stitch length and stitch reversing (touch back)

Note: To make stitch length smaller, depress the feed reverse lever and set the stitch length setting dial to a desired position.

- Touch-back button . . . Direction of stitching can be reversed by depressing this button. Stitching goes on in reversed direction while the button is held down, and returns to forward direction when the button is released.

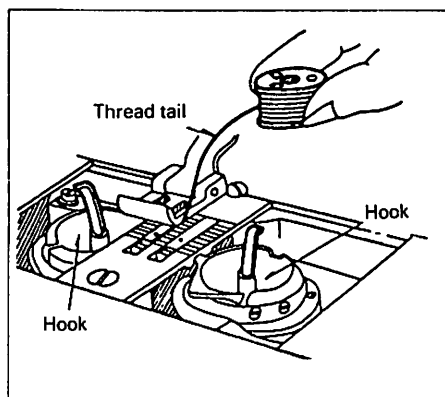


### 6 Setting of bobbin

- (1) Pull out 5 cm thread tail from the bobbin.
- (2) Hold the bobbin so that the bobbin thread is wound in right direction and put it into the hook.

### 7 Adjusting of needle thread guide

Please adjust needle thread guide of needle thread tensioner according to sewing condition.

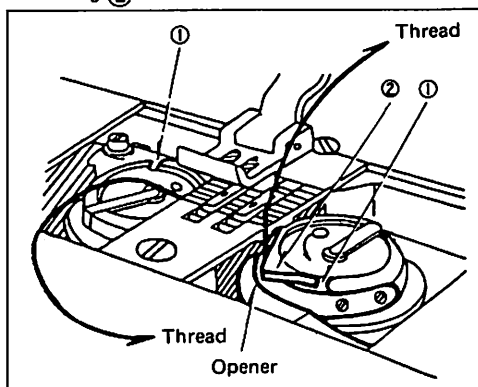


Thread guide position	Left	Middle	Right
Materials	The thicker than standard	L } Stand-B M } ard B }	The thinner than standard
Needle thread supply	More	Standard	Less

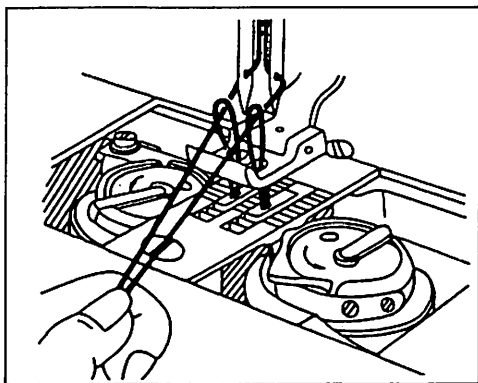
# OPERATION

## 8 Threading of bobbin threads

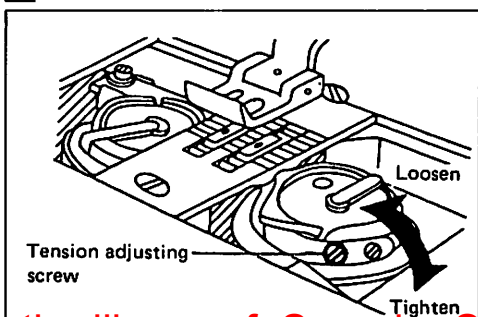
- (1) Put bobbin thread into the slit ①, pass under the lug ② and extend it below the bed.



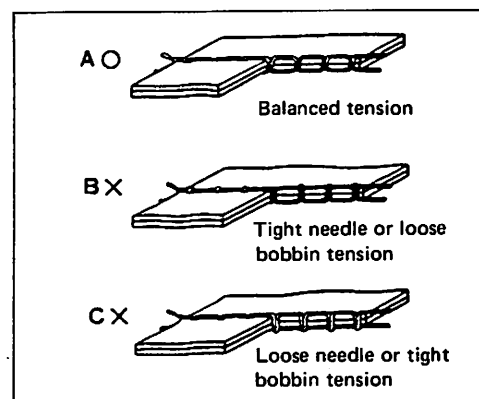
- (2) While holding the two needle threads by left hand, rotate the handwheel one turn by right hand. By pulling up the needle threads, as shown in the figure, the bobbin threads will be lifted. Both of bobbin thread and needle thread should be aligned and led backward.



## 9 Tension adjustment of bobbin threads

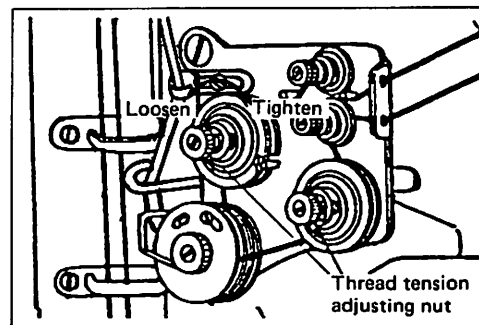


## 10 Balance of thread tension



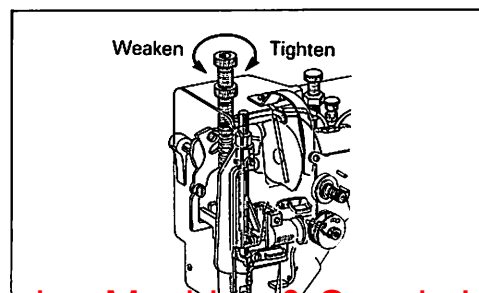
## 11 Needle thread tension

- Needle thread tension should be adjusted in reference to bobbin thread tension.
- To adjust needle thread tension, turn each tension adjusting nut. Needle thread tension can be also adjusted for special fabric and thread by changing intensity and stroke of thread take up spring.



## 12 Adjustment of presser foot pressure

- Pressure to fabric(s) can be adjusted by turning the pressure adjusting screw.



# OPERATION

## Timing between rotating hook motion and needle motion

- (1) Set stitch length on the stitch length setting dial shown table.
- (2) When needle is lifted (A) shown table, from the lowest position, the following positional relationship should be maintained.

Class	-L	-M	-B
Set the stitch length	2	3	4.5
Needle lift (A)	2.0 mm	2.2 mm	2.4 mm
Gap (B)	1.0 ~ 1.6 mm		
Clearance (C)	0.05 mm		

- The upper edge of needle eye should be 1.0 ~ 1.6 mm below the hook point.
- The hook point should be located at the center of needle axis.
- Gap between the hook point and the side face of needle should be 0.05mm.

- (3) Needle/rotating hook position can be adjusted as follows.  
(For easy adjustment, it is recommended that the presser foot, throat plate and feed dog assemblies are removed.)

### ● Position adjustment of hook point

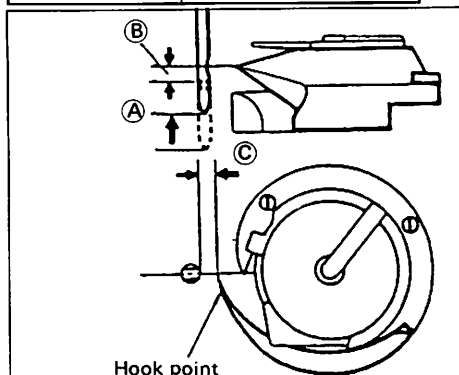
Adjust the hook point so that it comes to the center of needle axis.

- (1) Lean the machine head backward and loosen three set screws of hook shaft gear (small).
- (2) Turn the balance wheel and stop when the needle is lifted (A) mm shown table from the lowest position.
- (3) Rotate the hook by hand to position the hook point to the center of needle axis.
- (4) Move the hook bracket leftward or rightward and position it so that gap between the hook point and side face of needle is 0.05 mm. For this adjustment, each screws (A), (B) and two of (C) should be loosened.

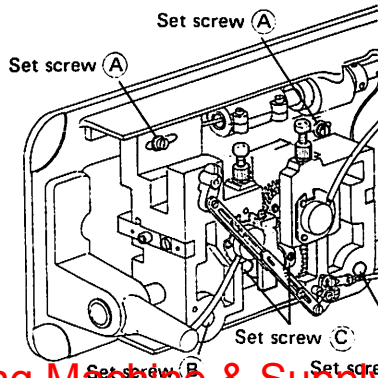
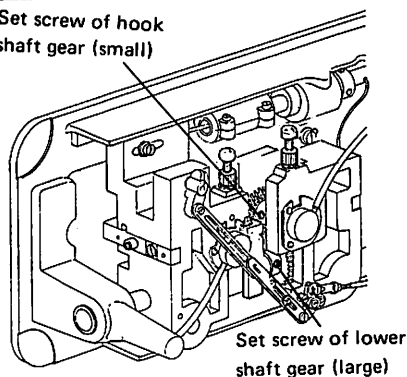
**Note:** In the adjustment, do not excessively loosen set screws (C) and always maintain meshing of hook shaft gear and lower shaft gear.

- (5) Tighten the set screws in the following order:

- ① While pressing the lower shaft gear (large) against the side face of hook bracket, tighten the set screws (C) first.
- ② After checking gap between the needle and the hook, tighten the set screws (A).
- ③ Then tighten the set screws (B).



Set screw of hook shaft gear (small)

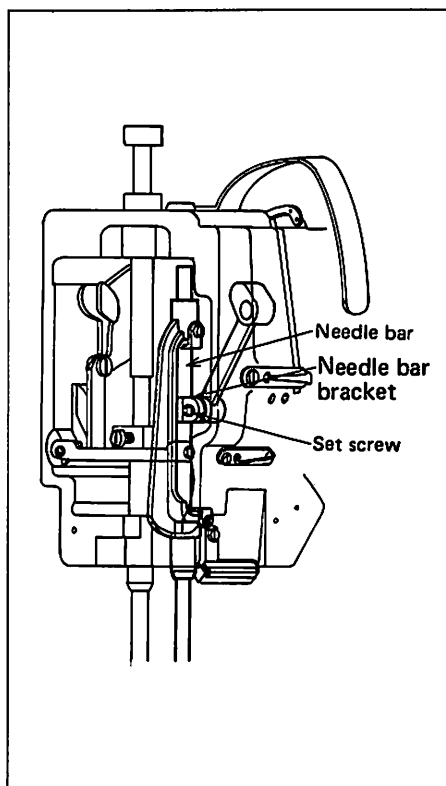


## OPERATION

### ● Position adjustment of needle point

Adjust needle position so that gap between the upper edge of needle eye and the hook point is ⑧ mm when the needle is lifted by ① mm from its lowest position shown in before page.

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



## OPERATION

### 14 Adjustment of feed dog height

Height of feed dog and pressure of presser foot should be adjusted for individual fabric(s) with the following cautions:

- ◆ Fabric will be damaged if the feed dog extends too high, or pressure of presser foot is too large.
- ◆ Even stitch length cannot be assured if the feed dog is too low or pressure of presser foot is too small.
- ◆ Feed dog height should be measured at the point where the needle is at the top position.

For light fabrics . . . Approx. 0.8mm from throat plate

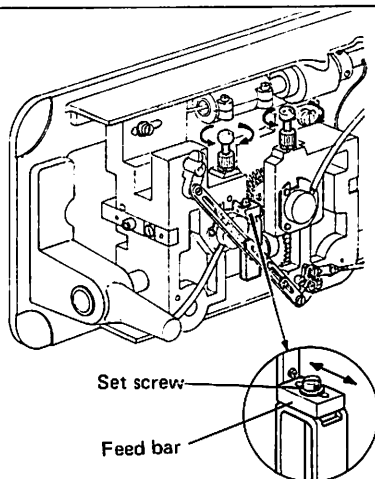
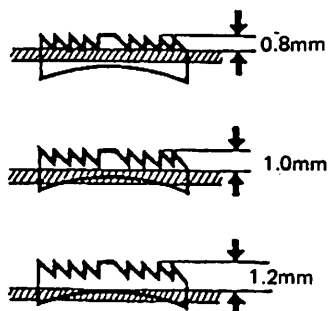
For usual fabrics . . . Approx. 1.0mm from throat plate

For heavy fabrics . . . Approx. 1.2mm from throat plate

#### Adjustment procedure

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

The feed dog height is factory-adjusted to 1 mm.

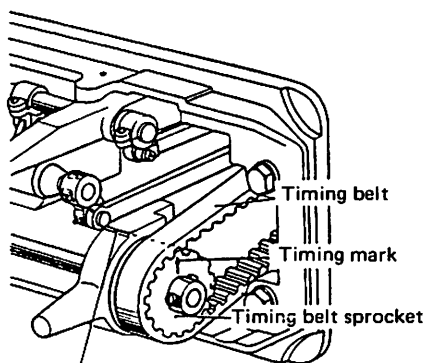


## OPERATION

### 15 Relationship between rotating hook motion and take-up lever motion

When the timing belt (cog belt) was removed for its replacement, for example, the relationship between rotating hook motion and take-up lever motion should be adjusted as follows:

- (1) Turn the balance wheel and stop when the take-up lever is lifted to its top position.
- (2) Lean the machine head backward and make sure the arrow (timing mark) put on the timing belt is in line with the black line on the boss of hook 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.

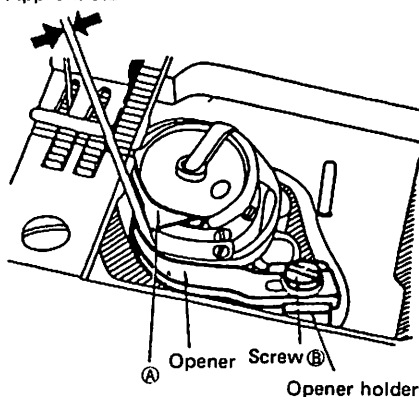


Black line on boss of  
hook shaft bearing

### 16 Relationship between hook motion and opener motion

- (1) Turn the balance wheel by hand and stop when the opener holder is located most remotely from the throat plate.
- (2) Make sure gap between the bobbin case (A) and the opener is approximately 0.2 mm.
- (3) If the gap is too large or small, loosen the opener set screw (B) and adjust position of the opener.

Approx. 0.2mm

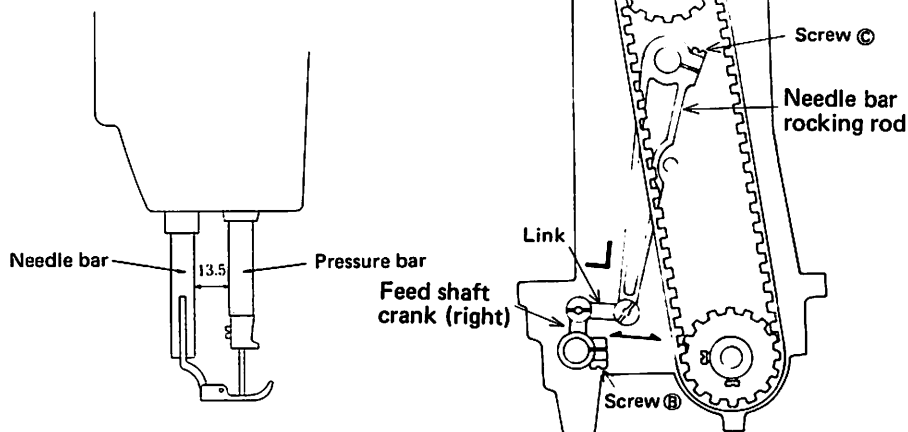
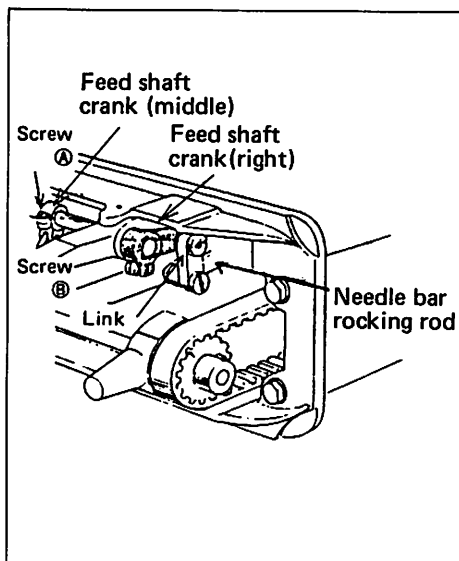




## OPERATION

### 17 Relationship between needle motion and feed dog motion

- The feed dog should be adjusted so that the needle can plunge into the feed dog needle hole at the center of the hole.
- (1) Set stitch length to "0" on the stitch length setting dial.
- (2) Lean the machine head backward.
- (3) Loosen the feed shaft crank set screw (A) and (B).
- (4) Lower the needle to the lowest position.
- (5) Adjust the distance between the pressure bar and the needle bar to be 13.5, and tentatively tighten the screws (A) and (B) of the feed shaft crank.
- (6) Check that the right feed shaft crank is connected with the link at right angle, as shown in Figure.
- (7) If the connection is not at right angle, remove the back cover, loosen the screw (C) and move the needle bar rocking rod in the arrow direction to adjust.
- (8) After the completion of adjustment, fully tighten the screws (A), (B) and (C).

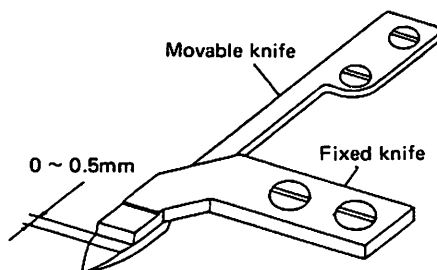
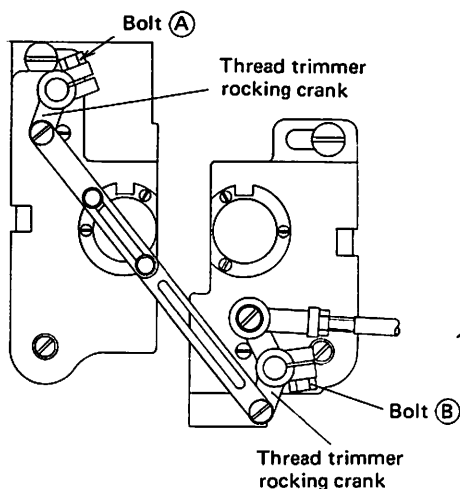


## OPERATION

### 18 Installation of movable knife

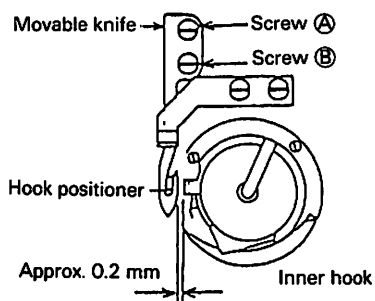
#### 1. Initial position of movable knife

- (1) Turn the balance wheel and lower the needle bar to the lowest position.
- (2) Push the cam follower crank so that the cam roller enters into the thread trimmer cam groove.
- (3) Turn the balance wheel until the black mark point on the arm meets the white mark point on the balance wheel.  
Set the cam follower crank at this position with a screwdriver temporarily preventing the cam roller coming out from the cam groove.
- (4) Loosen the thread trimmer rocking crank clamp bolts (A) and (B).
- (5) Adjust the movable knife so that the movable knife end slant portion protrudes 0 – 0.5 mm from the fixed knife, as shown in Figure and tighten the bolts (A) and (B).



#### 2. Gap between movable knife and bobbin case holder stopper

- (1) Turn the balance wheel by hand until needle reaches the lowest position.
- (2) With the needle at the lowest position, depress cam follower crank, turn the balance wheel until the movable knife reaches the extremity of its stroke.
- (3) Manually rotate the inner hook in the direction indicated by arrow in Figure and adjust gap between the movable knife and the inner hook stopper to about 0.2 mm (the screws (A) and (B) should be loosened for this adjustment).

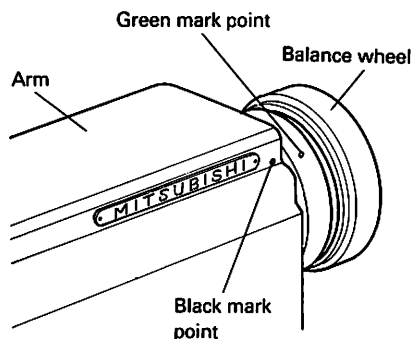
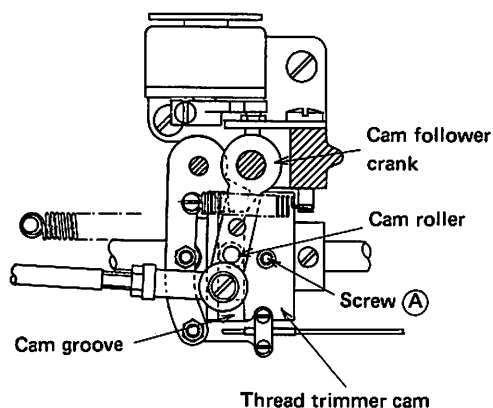


## OPERATION

### 19 Adjustment of thread trimmer cam

- (1) Turn the balance wheel by hand until the needles reach the lowest position.
- (2) Maintaining the needle position, depress the cam follower crank and put the cam roller into the groove of thread trimmer cam.
- (3) Turning the balance wheel by hand, adjust the thread trimmer cam so that the movable knife starts moving when the green mark point on the balance wheel comes in line with the black mark point on the arm.

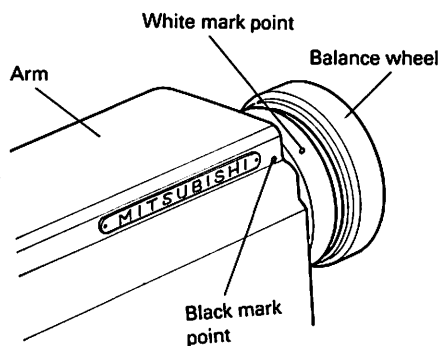
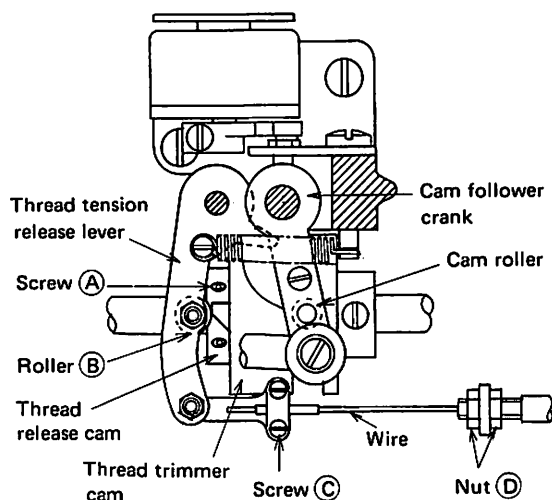
To adjust, loosen two thread trimmer cam clamp screws (A)



## OPERATION

### 20 Adjustment of thread tension regulator

- (1) Turn the balance wheel by hand until the needles reach the lowest position.
- (2) Maintaining the needle position, depress the cam follower crank and put the cam roller into the groove of thread trimmer cam.
- (3) Turning the balance wheel by hand, adjust the thread tension release cam so that the tension disc close when the white mark point on the balance wheel comes in line with the black mark point on the arm.  
To adjust, loosen two tension release cam clamp screws (A).
- (4) Opening degree of tension disc should be adjusted with the tension release roller (B) mounted on the convex portion of thread release cam, as shown in Fig.  
To adjust, loosen the screws (C) and draw the wire.
- (5) Make fine adjustment by loosening the nut (D).



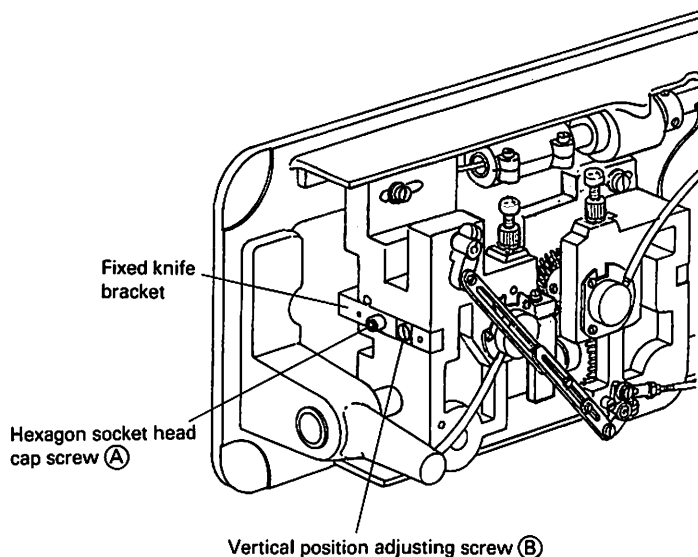
## OPERATION

### 21 Adjustment of meshing pressure of movable knife and fixed knife

- (1) Loosen the fixed knife bracket clamp hexagon socket head cap screw (A).
- (2) Turn the vertical position adjusting screw (B) to adjust meshing pressure and then tighten the hexagon socket head cap screw (A).

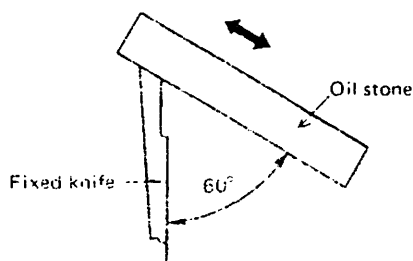
Note: Since excess pressure causes large torque to the thread trimming mechanism and trimming failure, adjust it so that thread can be trimmed with minimum pressure.

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



### 22 Sharpening of fixed knife

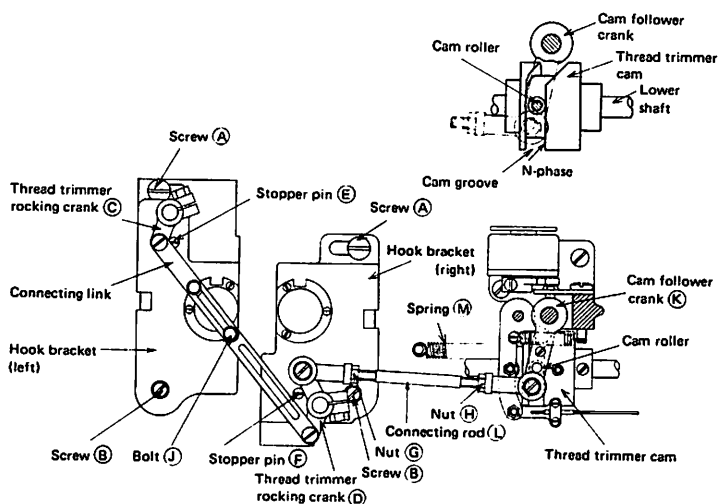
When the knives dull, the fixed knife should be sharpened as illustrated in Fig. Since it is very difficult to sharpen the movable knife, replace it with a new one when it dulls.



## OPERATION

### 23 Adjustment for change of needle gage

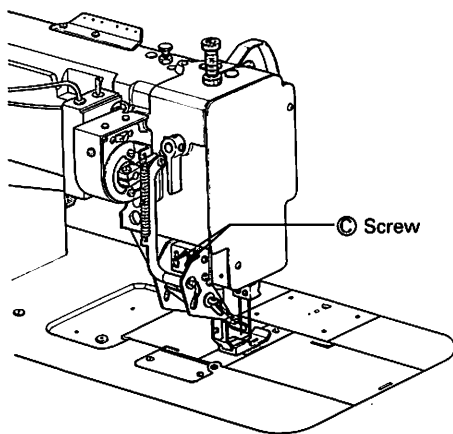
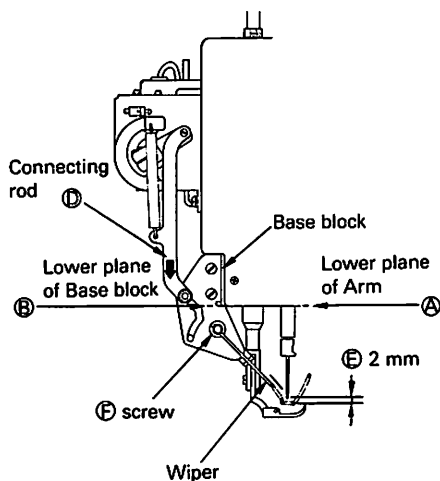
- (1) Replace the throat plate, feed dog and needle clamp.  
(Since the throat plate and feed dog are special parts designed for thread trimming machine, be sure to use those specified by us.)
- (2) Lean the machine head backward.
- (3) Loosen two connecting link clamp bolts (J).
- (4) Remove the spring (M).
- (5) Loosen the hook bracket clamp screws (A) and (B) and adjust gap between each needle and hook.
- (6) When the needles and hooks have been adjusted, install the spring (M).
- (7) Contact the rocking cranks (C) and (D) to the stopper pins (E) and (F) and tighten the connecting link clamp bolt (J).
- (8) Turn the balance wheel by hand until the needles reach the lowest position.
- (9) Loosen the nuts (G) and (H).
- (10) Depress the cam follower crank (K) and adjust the connecting rod (L) so that the cam roller can smoothly enter the groove of thread trimmer cam. Then tighten the nuts (G) and (H).
- (11) Adjustment of the cam groove and the cam roller
  - (a) Push the cam follower crank so that the cam roller enters into the cam groove.
  - (b) Turn the connecting rod (L) and adjust the clearance between the cam roller and the cam groove surface (N) as small as possible, and tighten the nuts (G) and (H).
  - (c) Push the cam follower crank again and check that the cam roller enters into the thread trimmer cam groove smoothly.



## OPERATION

### 24 Wiper adjustment

1. Run the machine then stop at "Up" position.
2. Loosen the screw ③, then adjust the base block so that the line ① and the line ② are the same plane, then tighten the screw ③.
3. Loosen the screw ④, then adjust the wiper move so as the ⑤ clearance is 2 mm, then tighten the screw ④.



# ADJUSTMENT AND OPERATION OF CONTROL UNIT (FOR Z-type LIMI-STOP motor)

## 1 "1-2 POSITION" select switch

Needle stop position can be selected between "1-POSITION" and "2-POSITION".

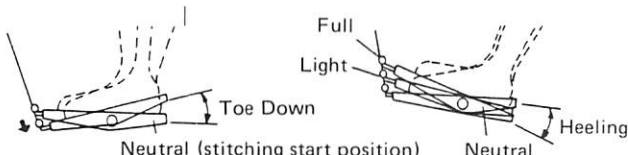
● mark . . . . . "2-POSITION"

● mark . . . . . "1-POSITION"

When the switch set at "1 POSITION", thread is trimmed in one turn of the sewing machine when the pedal is kicked back by heel.

## 2 Pedal operation

The pedal operation and resultant motion (stitching, thread trimming and needle motion) are as follows;

Pedal operation "1-2 POSITION" switch setting	Toe down ↓ Neutral	Neutral ↓ Light heeling	Neutral ↓ Full heeling
1 POSITION	Stop with needle at "UP" position	Presser foot goes up	Presser foot goes UP after one turn and thread trimming
2 POSITION	Stop with needle at "DOWN" position	Presser foot goes up	Presser foot goes UP after half (needle DOWN to UP) and thread trimming
Pedal operation			

- Notes:
1. Stitching speed can be changed by changing degree of pressing down of the pedal.
  2. For automatic presser foot lift, use optional unit, LE-FM-1 or LE-FM-2, or solenoid valve (DC 24V).
  3. For tackstitching, use optional control box, LD-C2, C4 or C6.

## 3 Adjusting the pedaling forces

### 1. Adjusting the pedal toe down force

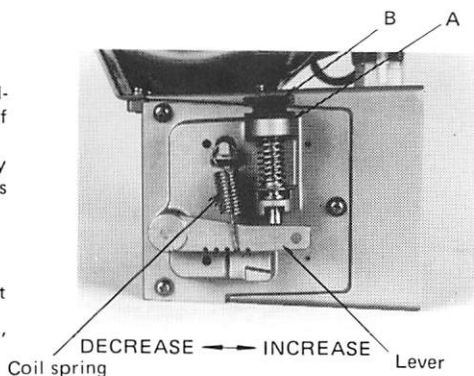
The pedal toe down force can be adjusted by changing hooking position of the coil spring to the lever.

It should be noted that the lever may not be stopped at position if the force is adjusted too small.

### 2. Adjusting the pedal heeling force

To adjust, loosen nut "A" and turn bolt "B".

After the adjustment, tighten nut "A" (see figure at right hand).



Adjusting the pedal pressing down force



# ADJUSTMENT AND OPERATION OF CONTROL UNIT

## 4 Adjusting the stitching speed

### 1. Adjusting the maximum stitching speed

#### 1) Adjustment of maximum speed (Speed achieved by fully depressing the pedal)

Two variable resistors are available for adjustment of the maximum speed: one is located in the control box and the other is on the control box front panel. The variable resistor on the control box front (external VR) permits adjustment of speed within the range from the low (minimum) speed to the maximum speed set by the internal variable resistor H.

The internal variable resistor H is factory-set as shown in the following table:

Internal Variable Resistor H Setting	External Variable Resistor Adjustable Range
3700 rpm (LT2-2230-L, M) 3000 rpm (LT2-2230-B)	Maximum speed to 200 spm

For speed setting out of the adjustable range of the external variable resistor, the setting of internal variable resistor H must be changed.

For fine speed adjustment, use a speed meter.

### CAUTION

Even if a larger motor pulley with a much larger diameter is used, the speed set by the two variable resistors cannot be increased.

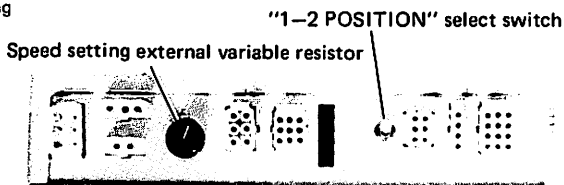
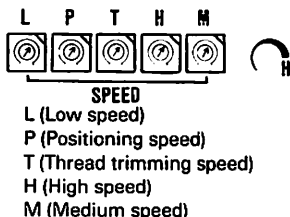
#### 2) Adjustment of low speed (Speed achieved by slightly depressing the pedal)

The low speed can be adjusted by the internal variable resistor L.

Speed increases when the internal variable resistor L is turned clockwise, and decreases when turned counterclockwise.

The adjustable range is 160 to 320 spm. (Factory-set to 200 spm.)

Internal variable resistors for speed setting



### Adjustment of Speeds

#### 3) Positioning speed

The positioning speed is adjustable with the internal variable resistor P.

Clockwise turn increases the speed and counterclockwise turn decreases. The adjustable range is 160 to 320 spm. (Factory-set to 250 spm.)

#### 4) Adjustment of thread trimming speed

The internal variable resistor T permits the adjustment of thread trimming speed. The speed increases when the internal variable resistor T is turned clockwise, and decreases when turned counterclockwise. (Factory-set to 175 spm.)

Since thread trimming speed may differ depending on machines, refer to the instruction manual if the sewing machine of consult our service agency for readjustment of thread trimming speed.

#### 5) Adjustment of backtacking speed

When an control switch panel (option) is used for backtacking, backtacking speed (medium speed) can be adjusted by the internal variable resistor M. Adjust the backtacking speed after the adjustment of maximum speed. It should be noted that if the maximum speed is adjusted after the adjustment of backtacking speed, the set backtacking speed will vary.

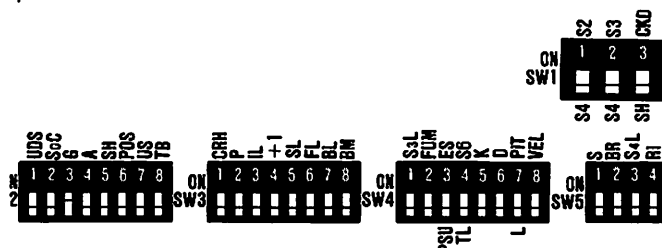
# ADJUSTMENT AND OPERATION OF CONTROL UNIT

## 5 Optional functions

By connecting external (optional) control signal to the option connector, and setting the correspond internal DIP switch, various optional functions can be used.

For details, consult with our service agency.

### (1) Internal Dip switches

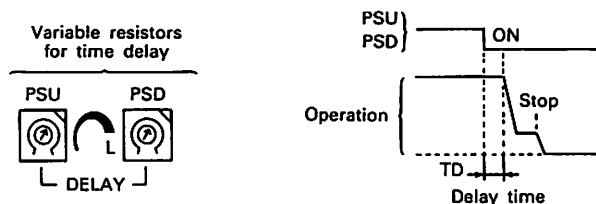


Internal Switches

- For UDS, S<sub>0</sub>C, A, SH, POS, US, TB, CRH, P, IL, +1, SL, FL, BL, BM, S<sub>3</sub>L, FUM, ES, S<sub>6</sub>, K, D, PIT, VEL, S, BR functions, refer to the instruction manual LF-AMDF control box functions.
- • S<sub>4</sub>L : High-speed operation signal (S<sub>4</sub>) inhibit switch
- • S<sub>4</sub>/S<sub>2</sub> : High-speed operation signal S<sub>4</sub>/pedal full heeling signal output select switch
- • SH/CKD : One-shot signal/needle DOWN position output select switch
- • S<sub>4</sub>/S<sub>3</sub> : High-speed operation signal/pedal light heeling signal output select switch
- Functions for reverse operation of sewing machine after thread trimming
  - RI : Reverse operation setting switch
- • G : Gain switch (to be set at "ON")

### (2) Internal variable resistors

Model LF-AMDF is incorporated with time delay variable resistors, as shown in Fig., which allow time delay in the range from 0.05 to 1.5 seconds. These variable resistors are activated a predetermined period of time after the input of thread trimmer priority stop PSU or DOWN positoin priority stop PSD which stops the sewing machine at UP or DOWN position after fabric end detection using a photoelectric switch, etc. These resistors are factory-set to full counterclockwise (minimum) position.



Internal Variable Resistors

# ADJUSTMENT AND OPERATION OF CONTROL UNIT (FOR X-type LIMI-STOP motor)

## 1 Setting the 1-2 POSITION Switch

The stop position of the sewing machine can be determined by the select switch on the panel.


mark ..... 2 POSITION

mark ..... 1 POSITION

When the switch is set to 1 POSITION, fully heeling the pedal causes the sewing machine to rotate one turn and trim the thread.

## 2 Pedal Operation

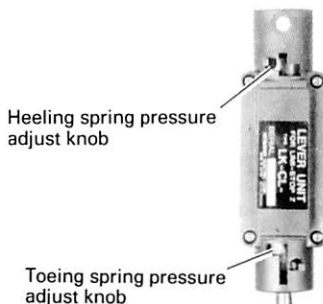
The two-step pedal heeling mechanism allows the thread to be trimmed and the presser foot to automatically go up.

Pedal Position 1-2 POSITION Setting	Toe down → Neutral	Neutral → Light Heeling	Neutral → Full Heeling
1 POSITION	Stop at needle UP position	Presser foot goes up.	Sewing machine rotates one turn and trims thread, then presser foot goes up.
2 POSITION	Stop at needle DOWN position	Presser foot goes up.	Sewing machine rotates half turn from DOWN to UP position and trims thread, then presser foot goes up.
Pedal operation			

**Note:** 1. The stitching speed can be varied by changing the pedal toeing degree.  
For automatic presser foot lifting, use the optional LE-FM-1, LE-FM-2 or LE-FA lifter or a solenoid valve (24V DC).

## 3 Adjusting the Pedal Toeing and Heeling Pressures

The lever unit spring pressure is adjustable in three steps by changing the position of the corresponding spring pressure adjust knob.



## 4 Adjusting the Operating Speeds

### 1 Adjusting the maximum speed (speed available with the pedal fully toed)

Two variable resistors are available for adjustment of the maximum speed; one is located in the control box and the other on the control box panel. The external variable resistor (knob) allows adjustment between low speed and the maximum speed set by the internal variable resistor H. The internal variable resistor H is factory-set as follows:

Internal Variable Resistor H Setting	External Knob Adjustable Range
3700spm (LT2-2230-L, -M) 3000 spm (LT2-2230-B)	Low speed to maximum speed.

To set to any speed outside the above range, adjust the internal variable resistor H, using a speed meter.

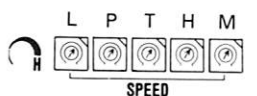
#### CAUTION

The speed set by the internal variable resistor H and external knob cannot be exceeded if a larger motor pulley is used.

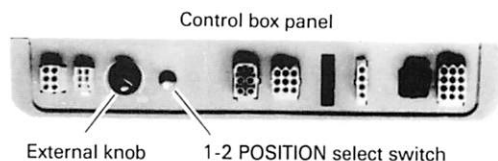
### 2. Adjusting the low speed (speed available with the pedal slightly toed)

The low speed is adjustable with the internal variable resistor L. Clockwise turn increases the low speed and counterclockwise turn decreases. The speed is adjustable between 160 and 320spm (factory-set to 250spm).

Speed setting internal variable resistors



- L (Low speed)
- P (Positioning speed)
- T (Thread trimming speed)
- H (High speed)
- M (Medium speed)



### 3. Positioning speed

The positioning speed can be adjusted by the internal variable resistor P (factory-set to 250spm). Turn it clockwise to increase and counterclockwise to decrease. the adjustable range is 160 to 320spm.

### 4. Adjusting the thread trimming speed

The thread trimming speed can be adjusted by the internal variable resistor T. Turn it clockwise to increase and counterclockwise to decrease. the trimming speed is factory-set to 200spm and may depend on the sewing machine used. When adjusting this speed, refer to the sewing machine adjusting manual of contact the service agency.

### 5. Adjusting the backtacking speed

When any on the control switch panels (option) is used for backtacking, the backtacking speed (medium speed) is adjustable with the internal variable resistor M which is factory-set to 1400 spm (at high speed of 4000spm).

## 5 Option · Functions

By setting the internal switches and connecting external switches to the option connectors as required, each control box can be used with various sewing machines with underbed trimmer and allows the sewing machine to be used as a standing-work machine or an automatic machine. For further details, contact the service agency.

### 1. Internal switches

Set the switches in accordance with the following specifications and Fig. 12 All internal switches are factory-set to OFF. When the Mitsubishi machine table set is used, the internal switches are factory-set to the positions.



Fig. 12 XC-AM Internal Switches

For the SH, BL, S<sub>0</sub>C, PSU/ES, G1, G2 and FUM functions, see the XC-AN and XC-AFL control box functions.

A: Standing-work sewing machine high-speed switch  
(Not required for the external knob)

SL, +1: Slow start switch

US: Needle UP control by back tack switch

POS: 1-2 POSITION switch

TB: Back tack solenoid at thread trimmer

S3L: Presser foot lifting cancel switch by light heeling

RU: Reverser needle lifting switch

Used to stop the sewing machine near the needle bar top dead center by reversing the motor after thread trimming.

S6/TL: Thread trimming safety/thread trimming cancel select switch

Used to switch the sewing machine connector 5 - 6 signal between the thread trimming safety S6 and thread trimming cancel TL functions.

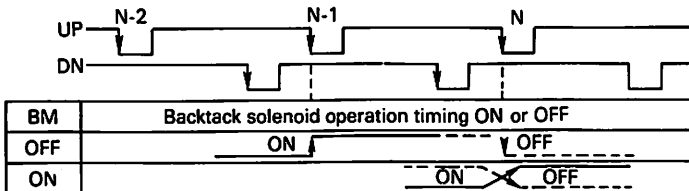
IL: Thread trimmer interlock cancel switch

Used to cancel the operation restart disable command at the time of thread trimming. Set to ON to restart operation after interlock time has passed.

BM: Backtacking stitch change switch

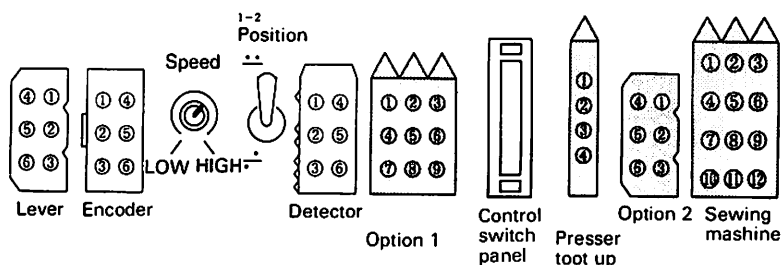
Used to set the back tack solenoid operation timing to match the length of backtacking stitch.

	0	1 stitch	2 stitches
SL	OFF	ON	ON
+1	OFF	OFF	ON

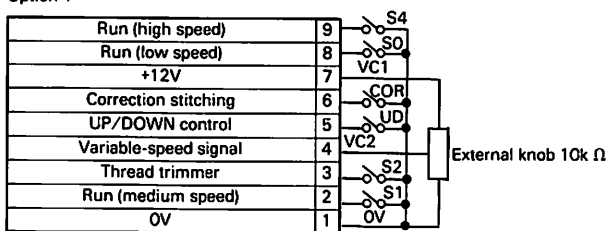


- UDS: Needle UP/DOWN control by back tack switch  
Allows a half stitch to be sewn by turning on the back tack switch S7 when the sewing machine has stopped.
- D: Start backtacking speed varying switch  
Allows start backtacking speed to be changed (between low and backtacking speeds) in accordance with the pedal toeing degree.
- P: Pfaff type thread trimmer switch (Model 463)

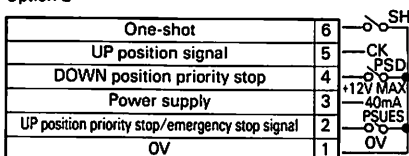
## 2. Option connectors



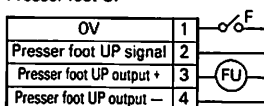
Option 1



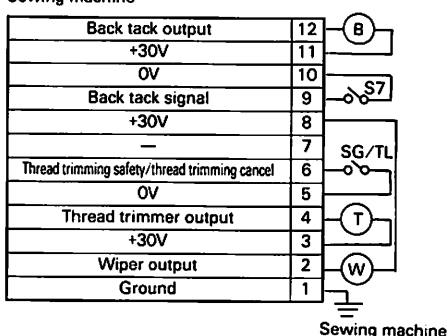
Option 2



Presser foot UP

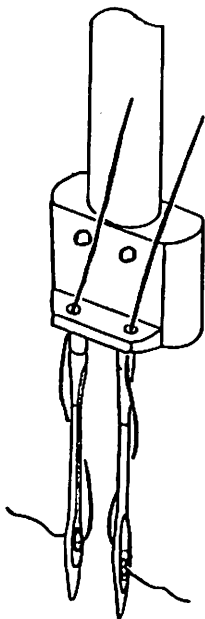


Sewing machine



**CAUTION:** Threading for light fabric stitching

When a needle of small gauge (below #11) is used, each needle thread should be wound about 3/4 turn around needle and then passed through needle eye, as shown below, to assure neat stitches. It is recommended to use stepped needle.



# SPECIFICATIONS

## Specifications of LT2-2230

Spec. \ Model	LT2-2230-LIT	LT2-2230-MITW	LT2-2230BIT
Application	Light fabric	Light ~ Midium-heavy, fabric	midium-heavy fabric
Stitching speed (Max.)	4000spm		300spm
Stitch length	0 ~ 4 mm		0 ~ 7 mm
Needle bar stroke	33.4 mm		35 mm
Presser foot stroke	Knee lifter Hand lifter	9 mm 7 mm	13 mm 7 mm
Needle	DP x 5 #11	DP x 5 #14	DP x 5 #18
Rotating hook (for thread trimmer use)	full-rotation, automatic lubarication, horizontal type hook, equipped with racing prevention spring		
Bobbin	Aluminum bobbin for thread trimmer use		
Thread trimming method	Combination of fixed knife and movable knife		
Lubrication	Automatic lubrication		
Automatic back	Touch-back		
Bed size	517 x 178 mm		

Needle gauge	Standard	3.2, 4.8, 6.4 mm
	Option	2.4, 4, 5.6, 8, 9.5, 12.7, 15.9, 19, 25.4, 28.5, 31.8, 38.1 mm

- Notes:
- Needle gauges of-L class machine, appicate 3.2,4,4.8,5.6,6.4,8,9.5 mm
  - Some materials, gauge sizes, and/or sewing conditions may require specifications other than those listed above.
  - Feed dog, throat plate, rotating hook, bobbin case and bobbin should be those designed for thread timmer.
  - Bobbin should be of high quality free from deformation.
  - This specification is subject to change for machine improvement.


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A180E128P02 Printed in Papan