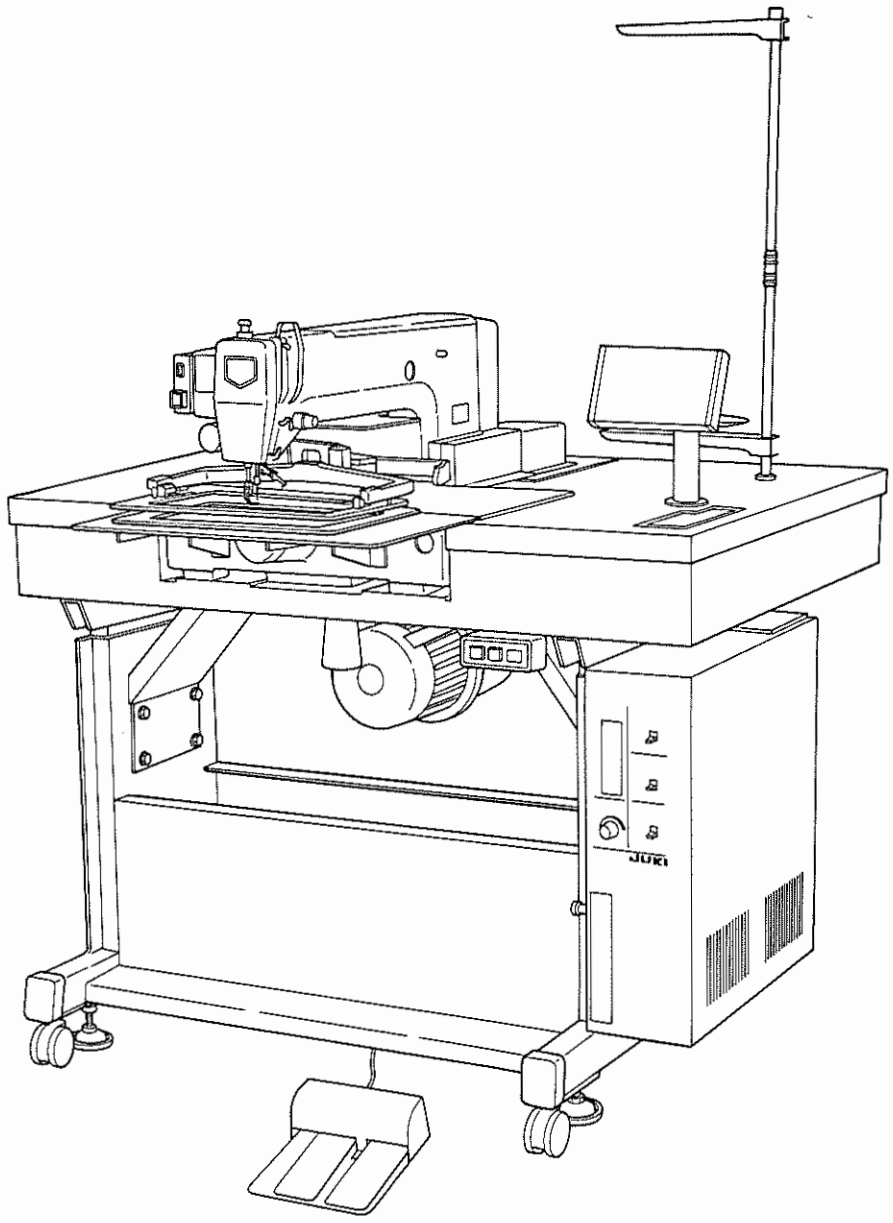
JUKI

Medium-sized 1-Needle Lockstitch
Computer Control Cycle Machine

AMS-220B

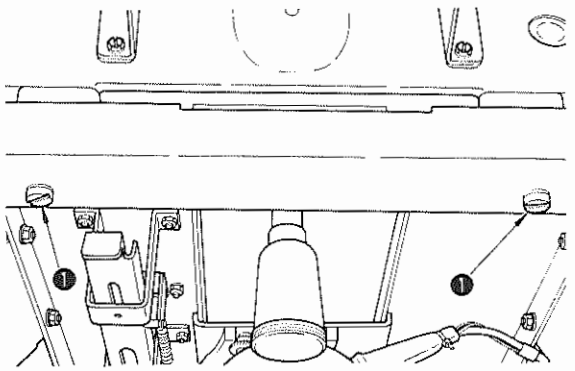
INSTRUCTION MANUAL



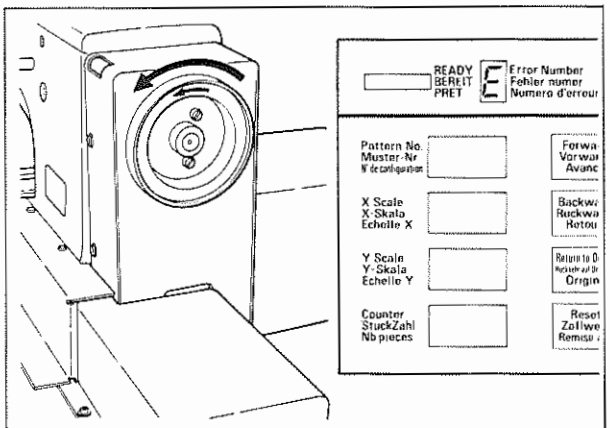
No.02
19563600

Congratulations on your purchase of JUKI Model AMS-220B!
Please read this instruction manual carefully before using this unit in order to get the most out of it and to enjoy using it for a long time.

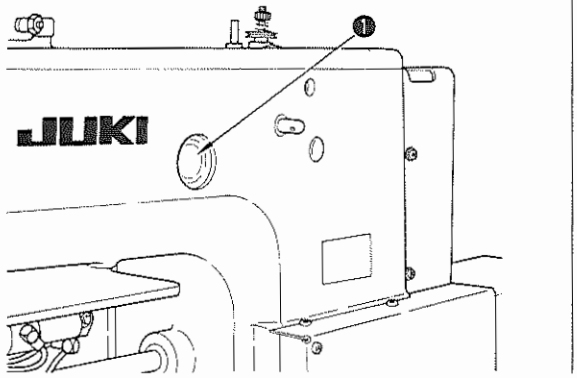
PRECAUTIONS TO BE TAKEN

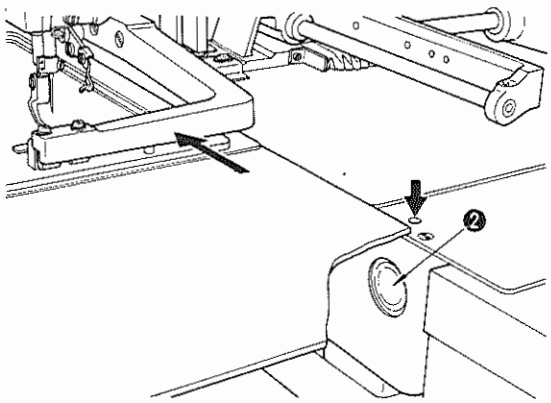


1. Remove bed fixing bolt ❶ before starting operation. When transporting your AMS-220B, install bed fixing bolt ❶ .

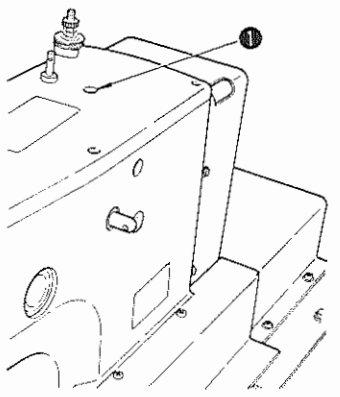


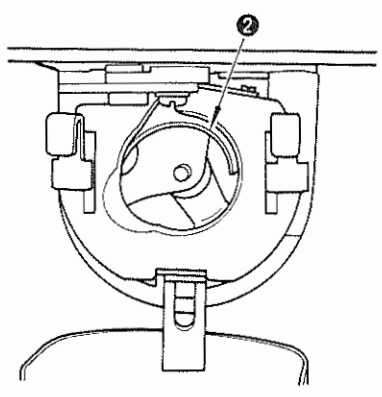
2. The sewing machine should travel counter-clockwise (in the direction of the arrow), as observed from the pulley side. If the machine is allowed to run clockwise, the machine will automatically stop with error message indicated on the panel.



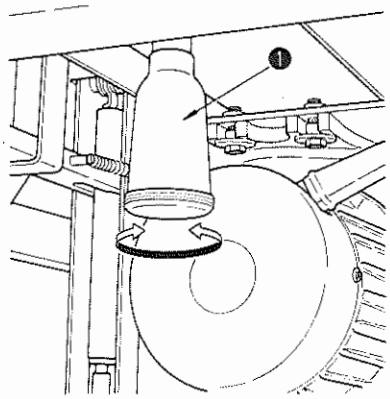


3. Be sure to supply oil until the oil level reaches red marks ❶ and ❷ on the oil gauge. (When lubricating the bed, be sure to move the feeding frame to the left.)



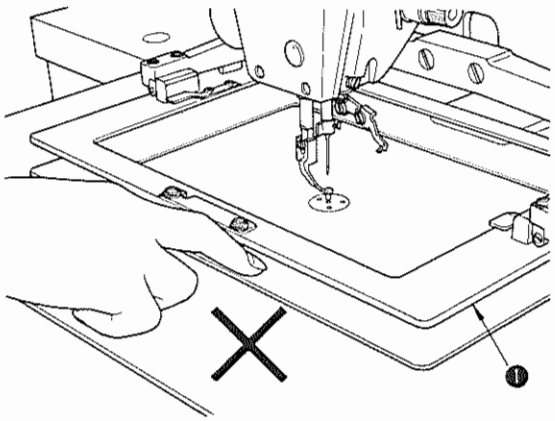


4. Before starting the machine which has been newly set up or has not been used for a long period of time, apply a few drops of the lubricating oil to the crank assembly through hole ❶, one drop to racing surface ❷ .

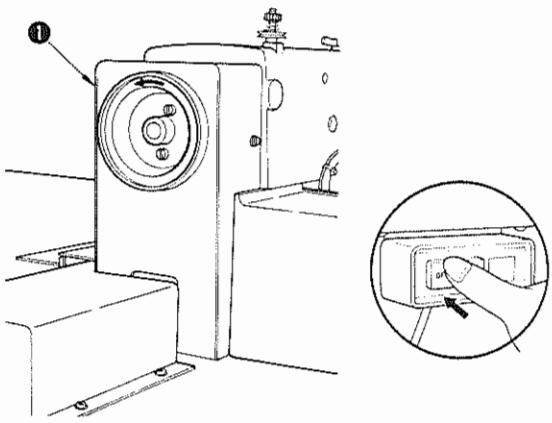


5. When polyethylene oiler ❶ becomes filled with oil, remove it and drain the oil.

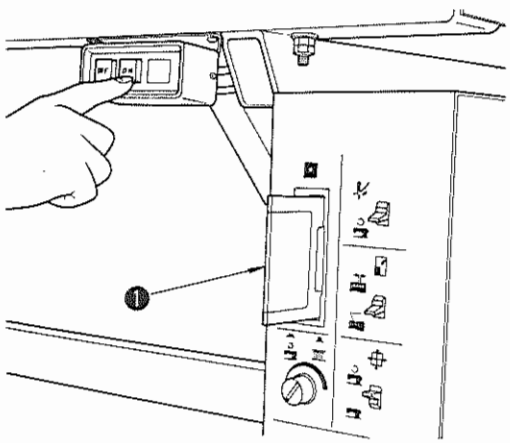
PRECAUTIONS TO BE TAKEN DURING OPERATION



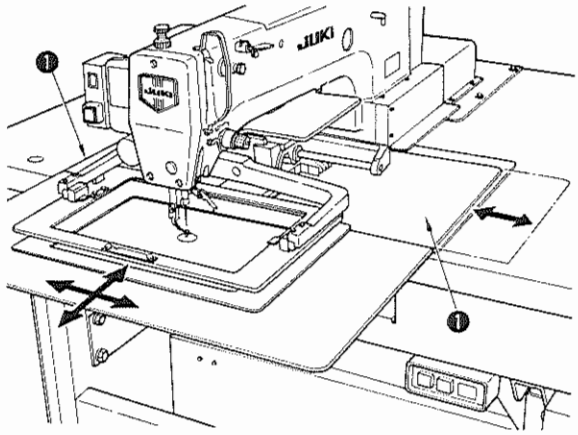
1. When a pattern change is made, or the needle threading switch or the bobbin winder switch or the feeding frame switch is turned ON, feeding frame ❶ comes down automatically. So, never put your fingers under the feeding frame. Be sure to keep your fingers away from the feeding frame while the machine is in operation.



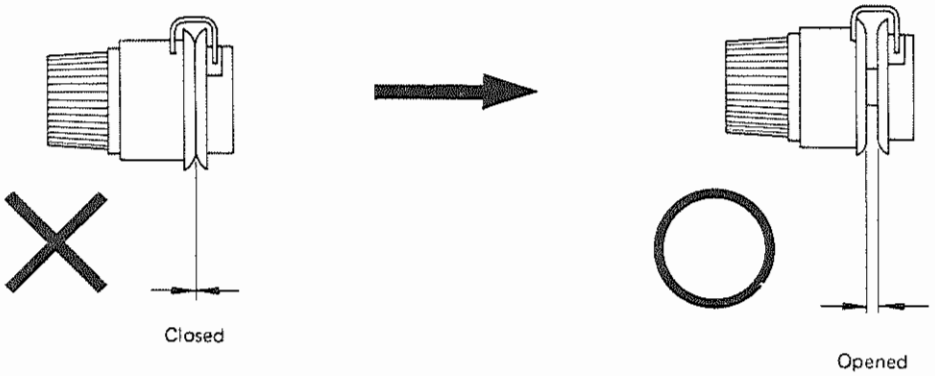
2. Be sure to turn the power switch OFF before removing belt cover ❶ .
Do not operate the machine with the belt cover removed.



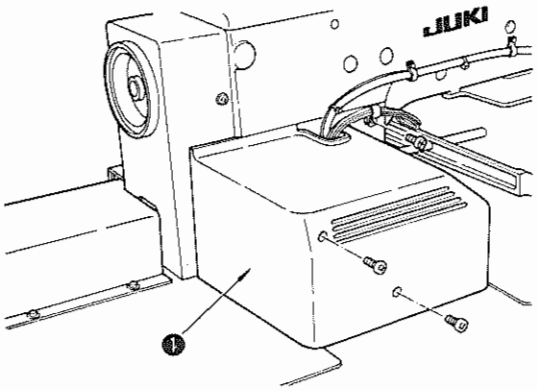
3. Be sure to load or unload floppy disk ❶ while the power is ON. If the power switch should be turned ON or OFF with the floppy disk mounted, the data stored in the disk may be destroyed.

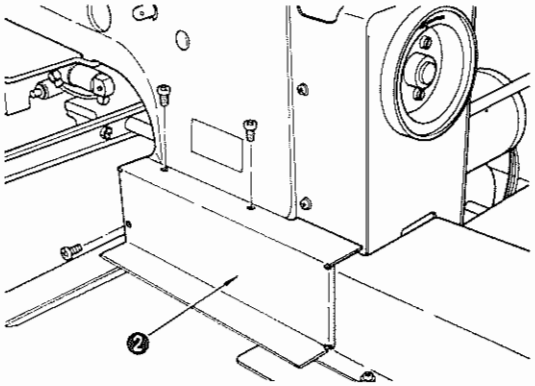


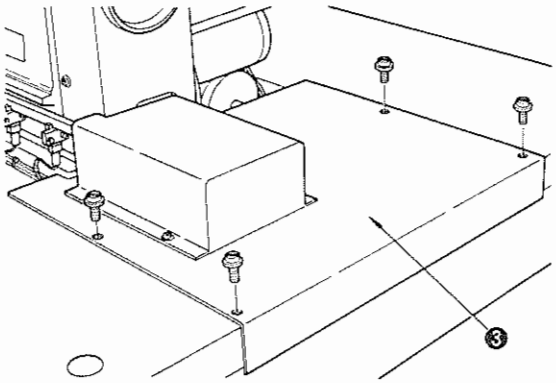
4. After the power switch is turned ON, the feeding frame will automatically move in the sewing area along the X and Y axes once you press the preparation switch. Be sure not to place anything within the range of the sewing area of cover ❶ .

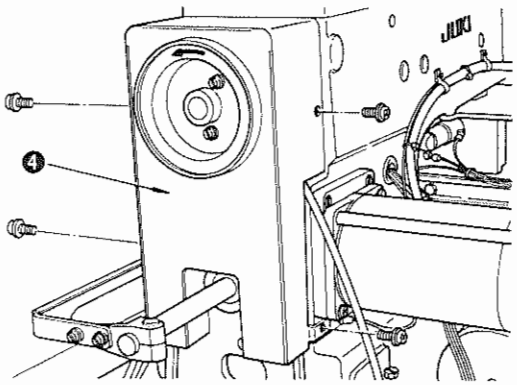


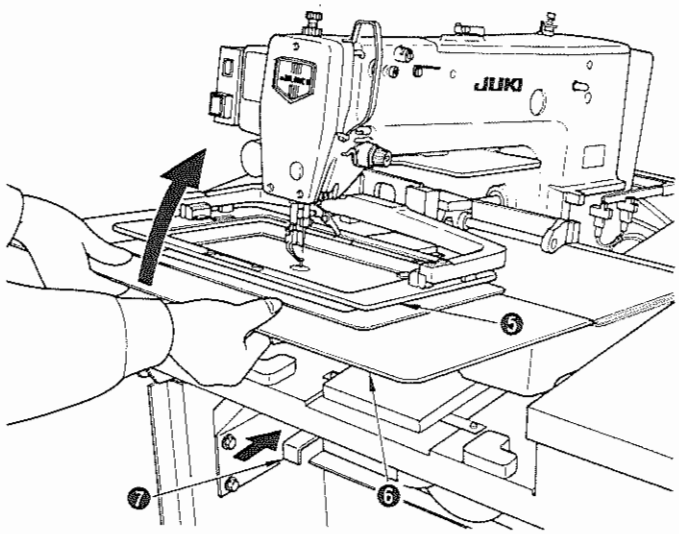
5. When the threader and sewing machine are switched ON, sew the desired sewing pattern with the thread tension disk closed. Once you have completed the thread trimming, the thread tension disk will open.

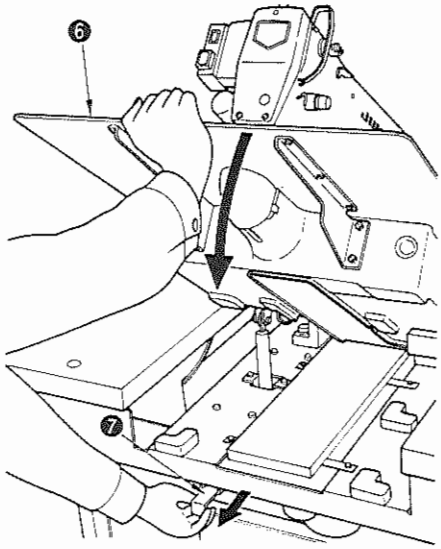








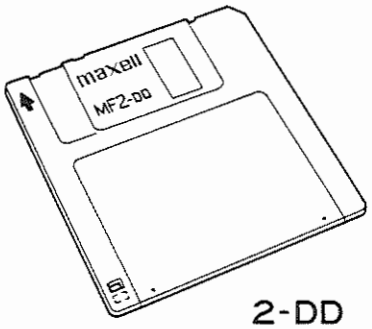




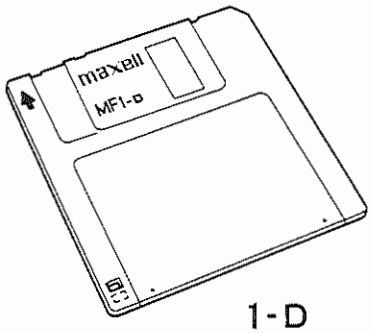
6. When raising the machine head, be sure to remove side-face cover ❶, Y-sensor cover ❷, table rear cover ❸ and belt cover ❹. Then move feeding frame ❺ to the central position, and raise auxiliary cover ❻ until stopper ❼ moves backward to its locked position. To bring the machine head down, push up auxiliary cover ❻ so that the machine head is slightly raised, and then pull stopper ❼ toward you so that you can bring the machine head down. Whenever you raise the machine head, the belt will come off, so be sure to re-install the belt before operating the machine. (If machine operation is started with the belt removed, error message [7] will be indicated. See the list of error message.)

7. During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, V belt, bobbin winder or motor. Also, do not place anything near any of these parts while the machine is in operation. Doing so may be dangerous.

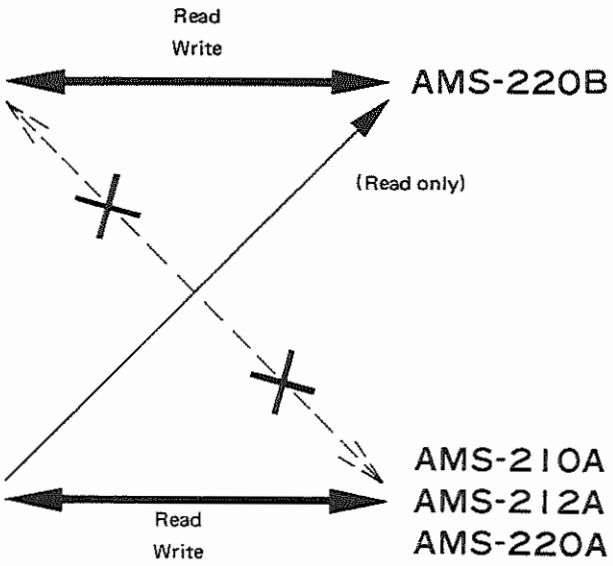
8. If your machine is equipped with a belt cover, finger guard, eye guard or any other protections, do not operate your machine with any of them removed.



2-DD



1-D



9. Compatibility of floppy disks

The floppy disk to be used with this machine has been changed from the 1-D type to the 2-DD type.
A floppy disk (2-DD) used with the AMS-220B cannot be applied to the AMS-210A, -212A, or -220A models of the sewing machine.
However, the AMS-220B is capable of reading only data stored in a floppy disk (1-D) used with the AMS-210A, -212A, or -220A.

CONTENTS

I. GENERAL

The AMS-220B is an electronic, 1-needle, cylinder-bed, lockstitch pattern sewing machine. It is an industrial automatic sewing machine designed mainly for sewing on various small parts and for joining fabrics.

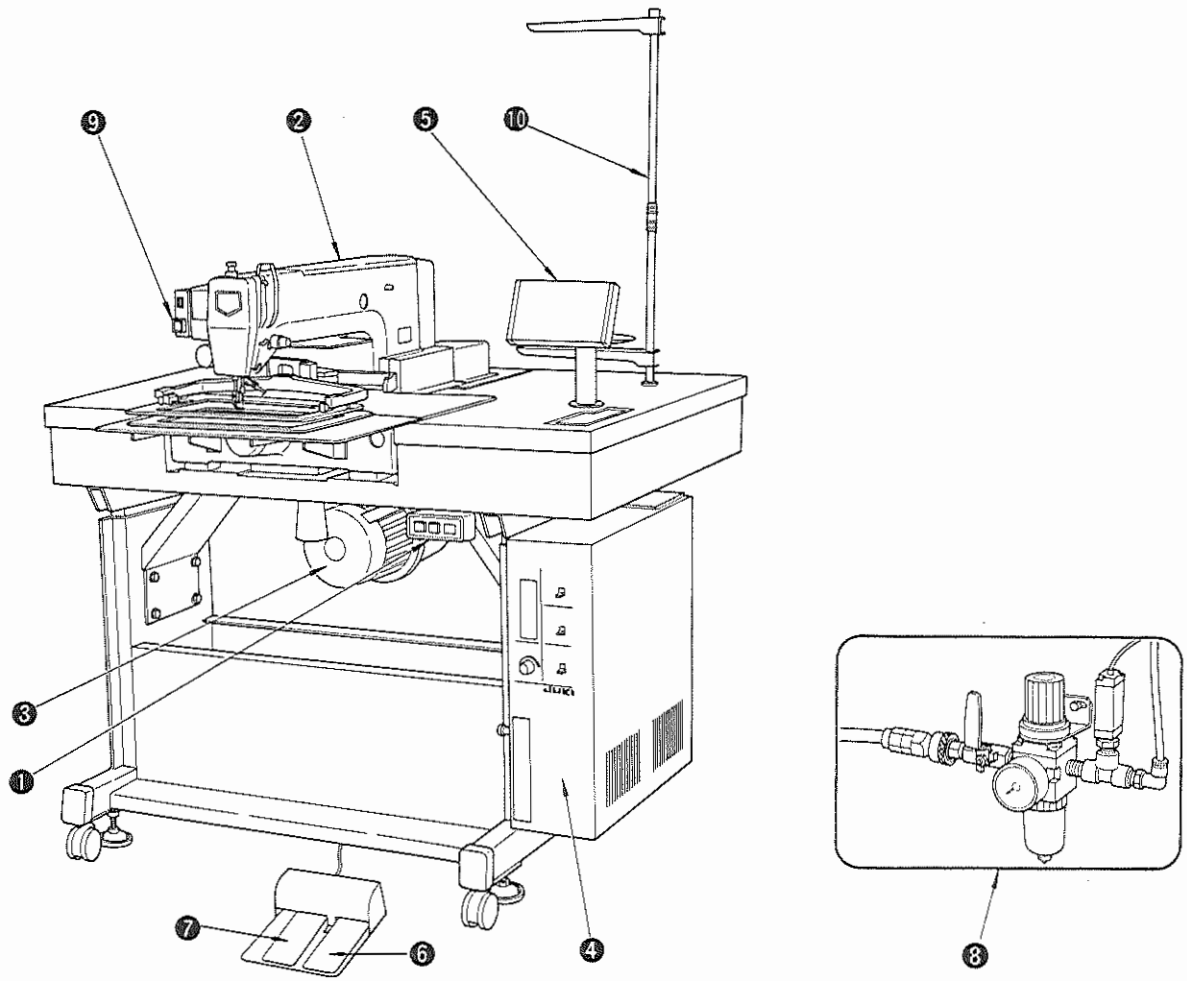
The sewing machine head is equipped with an exclusive long arm, which permits a wider sewing area. Thanks to the incorporation of a 16-bit microprocessor as the control device and the use of a micro floppy disk as the memory medium, the AMS-220B can successfully perform complicated pattern stitching and embroidering. A large semi-rotary shuttle has been adopted, which reduces the frequency of replacing the bobbin thread.

You can easily input patterns into the micro-floppy disk, using the JUKI compact programming device (PGM-1), available optionally. Before you input new sewing pattern data into the micro-floppy disk, you can do trial sewing to check the result and make any necessary modifications.

The AMS-220B is provided with a data input function in its main unit (main unit input) as a standard feature. You may input data in accordance with the sewing product while moving the feed using the control box.

1. Configuration

The following shows the main components of the AMS-220B:



❶ Power ON/OFF switch
❷ Machine head
❸ Sewing machine motor
❹ Control box
❺ Operation box
❻ Feeding frame switch
❼ Start switch
❽ Air-pressure control device
❾ Emergency stop switch
❿ Thread stand

2. Features

1) **Easy pattern change**
The work holder is driven by a stepping motor. You can change a stitching pattern simply by specifying the pattern No. affected.

2) **Wider sewing area**
The exclusive long arm permits a wider sewing area (200 mm (W) x 145 mm (L)).

3) **Large semi-rotary shuttle**
The AMS-220B is the first electronic sewing machine to adopt a large semi-rotary shuttle. This reduces the frequency of replacing the bobbin thread.

4) **Complicated pattern stitching and embroidering**
The 16-bit microprocessor for memory storage enables the machine to sew a pattern or to embroider with a maximum of 4,000 stitches.

5) **Wide range of pattern scale**
The X scale and Y scale can be independently set 0.01 to 4 times the original pattern.
This function is further supported by JUKI's unique method in which pattern enlargement/reduction is done by increasing or decreasing the stitch length or the number of stitches.
The combination of these functions permits highly flexible pattern enlargement and reduction.

6) **Capable of inputting various patterns**
Pattern data can be easily entered using either the control box, which is mounted on the main unit of the sewing machine as a standard device, or a JUKI compact type programming device (PGM-1), which is available as an option. When pattern data are entered under the main unit input feature, input is made in accordance with the sewing product by moving the feed using the switch in the control box, taking the needle as a reference.

7) **A micro-floppy disk as the memory medium for sewing patterns**
A 3.5-inch micro floppy disk is used. The disk accommodates 44 to 691 patterns.

8) **Provided with safety and testing facilities**
The AMS-220B is designed to give error indication upon detection of troubles, enabling you to identify the problem at a glance. In addition, the machine incorporates a facility for testing the switches and other functions. This facility is useful for quick troubleshooting.

9) **Easy workpiece setting**
The second origin can be set as desired, so you do not have to care about the position of the needlepoint when setting a workpiece.

10) **A longer stitch length**
The stitch length can be set up to 10 mm.

11) **Patterns used for the AMS-210A, -212A, and 220A can also be used for the AMS-220B.**
The AMS-220B is capable of reading pattern data stored in floppy disks used with the AMS-210A, -212A, and 220A and using them for the AMS-220B with no additional operation. However, the AMS-220B is not capable of writing pattern data on those floppy disks.
Consequently, apply the floppy disk (2DD) specified to be used with the AMS-220B when pattern data are to be written.

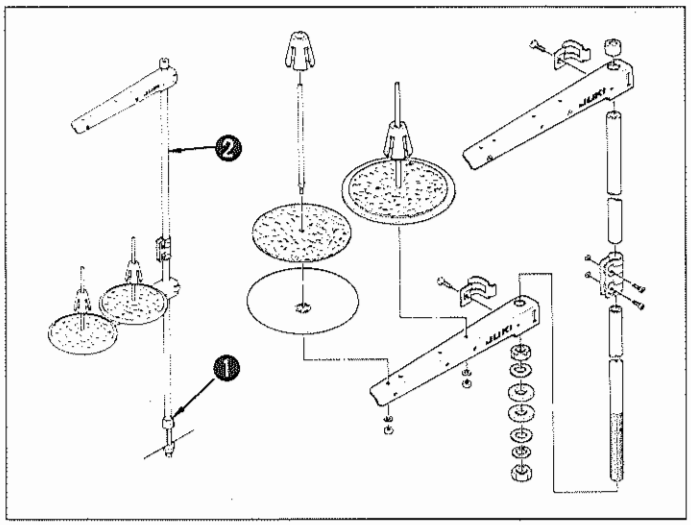
3. Specifications

1)	Seam length :	X (lateral) direction – 200 mm Y (longitudinal) direction – 145 mm
2)	Max. sewing speed :	2,000 s.p.m. (for stitch lengths of 2 mm or less)
3)	Stitch length :	Max. 10 mm (adjustable in 0.16 mm steps)
4)	Feed motion of feeding frame :	Intermittent feed (2-shaft drive by stepping motor)
5)	Needle bar stroke :	41.2 mm
6)	Needle :	DP x 5, DP x 17
7)	Lift of feeding frame :	22 mm (standard) Max. 25 mm
8)	Intermediate presser stroke :	4 mm (0, 3 ~ 7 mm)
9)	Lift of intermediate presser :	20 mm
10)	Shuttle :	Large semi-rotary type (self-lubricated)
11)	Bobbin case :	Large semi-rotary type
12)	Bobbin :	Large shuttle
13)	Lubricating oil :	New Defrix Oil No. 2 (supplied by oiler)
14)	Thread trimmer :	Consists of moving knife and counter knife (actuated by grooved cam)
15)	Wiper :	Magnetically driven (with release switch)
16)	Intermediate presser lifter :	Air-cylinder driven (with release switch)
17)	Memory medium :	3.5-inch micro floppy disk Memory pattern – 44 to 691 patterns/cassette
18)	Sewing operation :	Starts/ends at sewing start point or the 2nd origin
19)	Feeding frame :	Descends when the feeding frame switch is pressed. Another press on the switch causes the feeding frame to ascend.
20)	Start :	The machine is started by turning the start switch ON with the feeding frame down.
21)	Emergency stop facility :	Used to stop machine operation during a stitching cycle. After an emergency stop, the feeding frame can be moved along the stitching line by operating the "Backward" or "Forward" switch. The interrupted stitching cycle can be completed by pressing the start switch. Alternatively, the "Return to origin" switch may be pressed for quick move to the sewing start point or the 2nd origin after an emergency stop and the thread trimming.
22)	Enlarging/Reducing facility :	Allows a pattern to be enlarged or reduced on the X axis and Y axis, independently when sewing a pattern. Scale : 0.01 to 4 times (adjustable in 0.01 steps)
23)	Enlarging/Reducing method :	Pattern enlargement/reduction can be done by increasing/decreasing either stitch length or the number of stitches.
24)	Max. sewing speed limitation :	The max. sewing speed can be set limited to any value within a range of 180 to 2,000 s.p.m., using the external control knob.
25)	Pattern selection :	1 to 999 patterns can be selected by specifying the desired pattern Nos.
26)	Pattern checking facility :	A pattern configuration can be checked by setting the "Sewing machine" switch to "ON".
27)	Error indication :	17 types of error indication are given.
28)	Programming :	Involves point/linear/curve numeral data, temporary stop, thread trim, jump data, sewing speed, and stitch length.
29)	Bobbin thread counter :	Tells the time to replace the bobbin. If this facility is not used, it works as a 0 ~ 999 ring counter with resetting function.
30)	Memory backup :	In case of a power interruption, the pattern being used will automatically be stored in memory so that the interrupted sewing cycle may be resumed simply by pressing the Set Ready switch after the power is restored. No floppy disk is necessary. The memory is held for 100 hrs.

31)	2nd origin setting facility :	Using jog keys, a 2nd origin (needle position after a sewing cycle) can be set in the desired position within the sewing area. The set 2nd origin is also stored in memory.
32)	Needle-up stop facility :	When the needle does not stop in its upper position, the needle can be brought up to the upper position by turning the needle threading switch ON or OFF. (provided the READY lamp is ON)
33)	Sewing machine motor :	400W, 4-pole electronic-stop motor
34)	Dimensions :	1,090 mm (W) x 1,105 mm (L) x 1,150 mm (H) (excluding thread stand)
35)	Gross weight :	270 kg
36)	Power consumption :	600 VA
37)	Operating temperature range :	5° to 40°C
38)	Operating humidity range :	20 to 80% (no dew condensation)
39)	Line voltage :	Rated voltage ± 10% 50/60 Hz
40)	Air pressure used :	5 to 5.5 kg/cm^2
41)	Air consumption :	1.8 ℓ/min

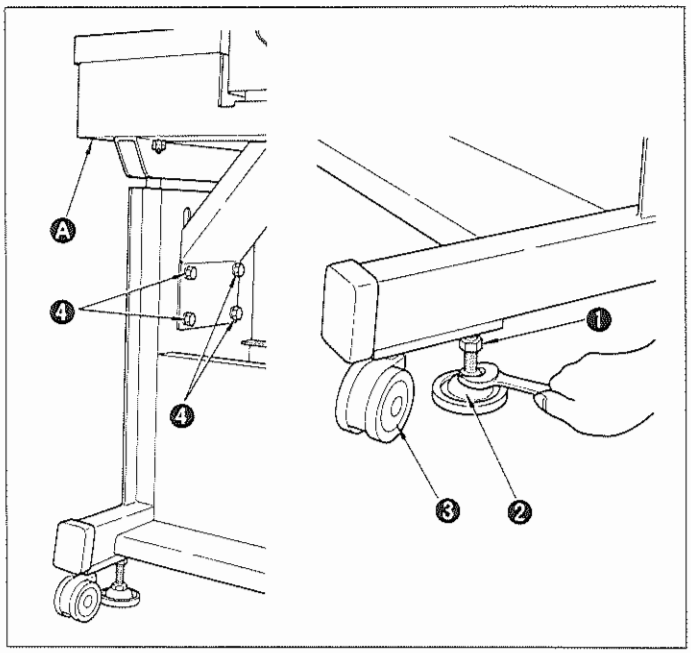
II. INSTALLATION

1. Installing the thread stand



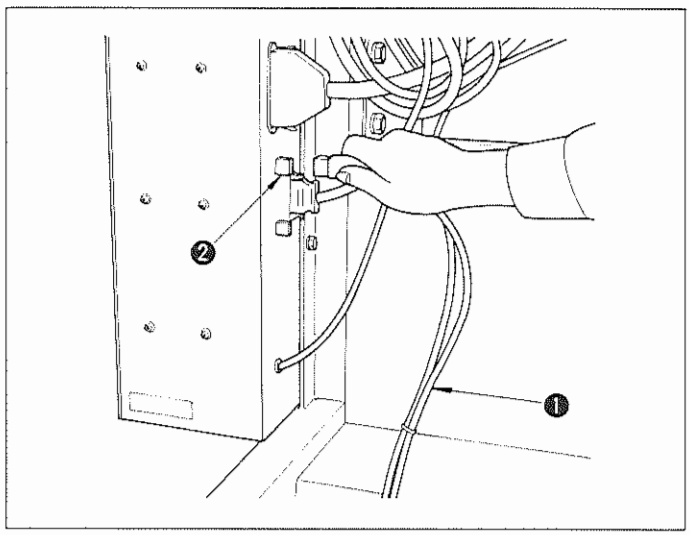
Assemble the thread stand, and put it in the hole in the top right corner of the machine table.
Tighten locknut ❶ to fix the thread stand.
When ceiling wiring is possible, pass the power cord through spool rest rod ❷ .

2. Setting the machine table



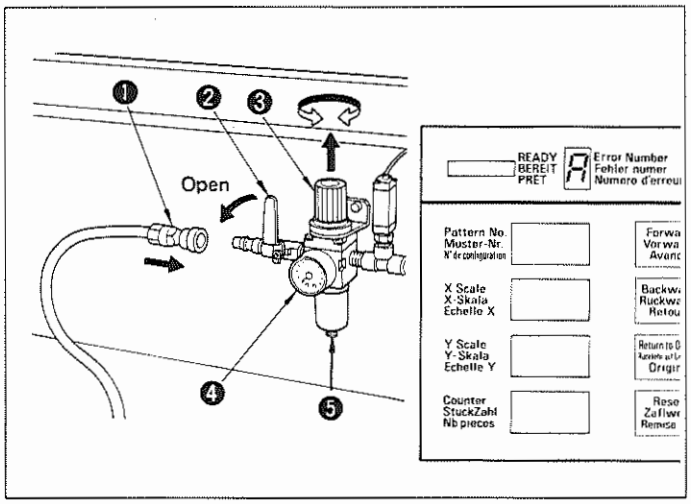
1) Install the machine table on a flat surface.
2) Loosen nut ❶ , and turn level adjuster ❷ to raise the machine table until caster ❸ begins moving. After installation, tighten nut ❶ and fix level adjuster ❷ securely.
3) The height of the machine table can be adjusted by loosening eight bolts ❹ . Be sure that points Ⓐ on the four corners are held by four persons so as to maintain safety when adjusting the height of the machine table.

3. Connecting the feeding frame and the start switch



Connect cords ❶ of the feeding frame and the start switch to connector ❷ on the control box.

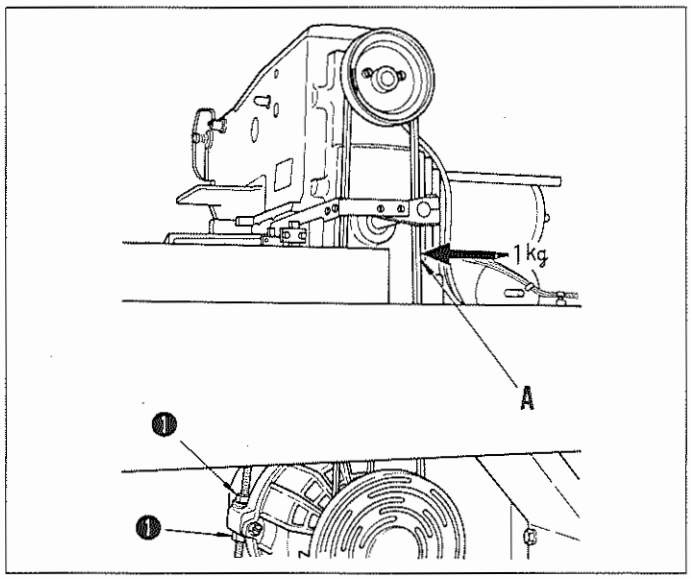
4. Connecting the air supply



1) Connect joint ❶ to the air supply hose (inner diameter 8 mm x outer diameter 12 mm) by hand.
2) Open air cock ❷, pull it up and then adjust air adjusting knob ❸ by turning it so that the air pressure gauge ❹ indicates 5 to 5.5 kg/cm^2. Then press the knob to maintain the pressure value.
3) If the air pressure is less than 4 kg/cm^2, the machine will stop, and error message [A] will be indicated.

* The air pressure will be 0 kg/cm^2 if you close air cock ❷ and button ❺.

5. Adjusting the belt tension



Adjust nut ❶ so that the belt slacks about 10 mm when about 1 kg pushing force is applied to part A.

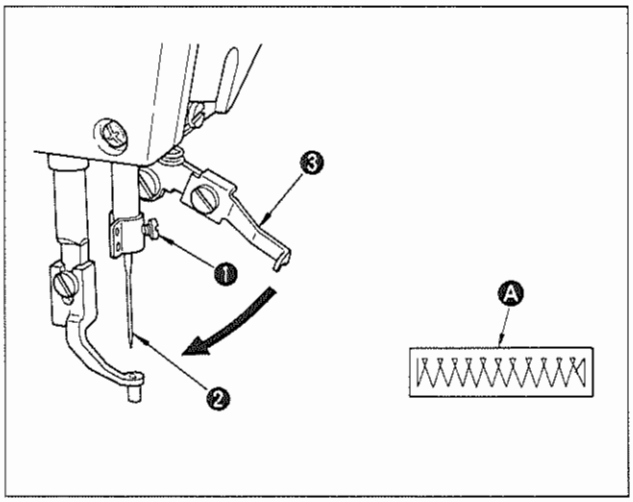
(Caution) Remove the intermediate clamp foot before installing or removing the belt.

III. OPERATION

1. Selecting a suitable needle

Material	Needle	Needle hole guide	Class of work
Extra light-weight	#11 DP x 5 (DP x 17)	B2426 210 00C	Knit, tricot
Synthetic	#14 DP x 5 (DP x 17)	B2426 210 00A	Men's suits, ladies' wear
Medium-weight	#16 DP x 5 (DP x 17)	B2426 210 00B	Men's suits, ladies' wear, chemical shoes
Heavy-weight	#18 (DP x 5) DP x 17	B2426 210 00D	Working wear, coats, bags

2. Attaching a needle

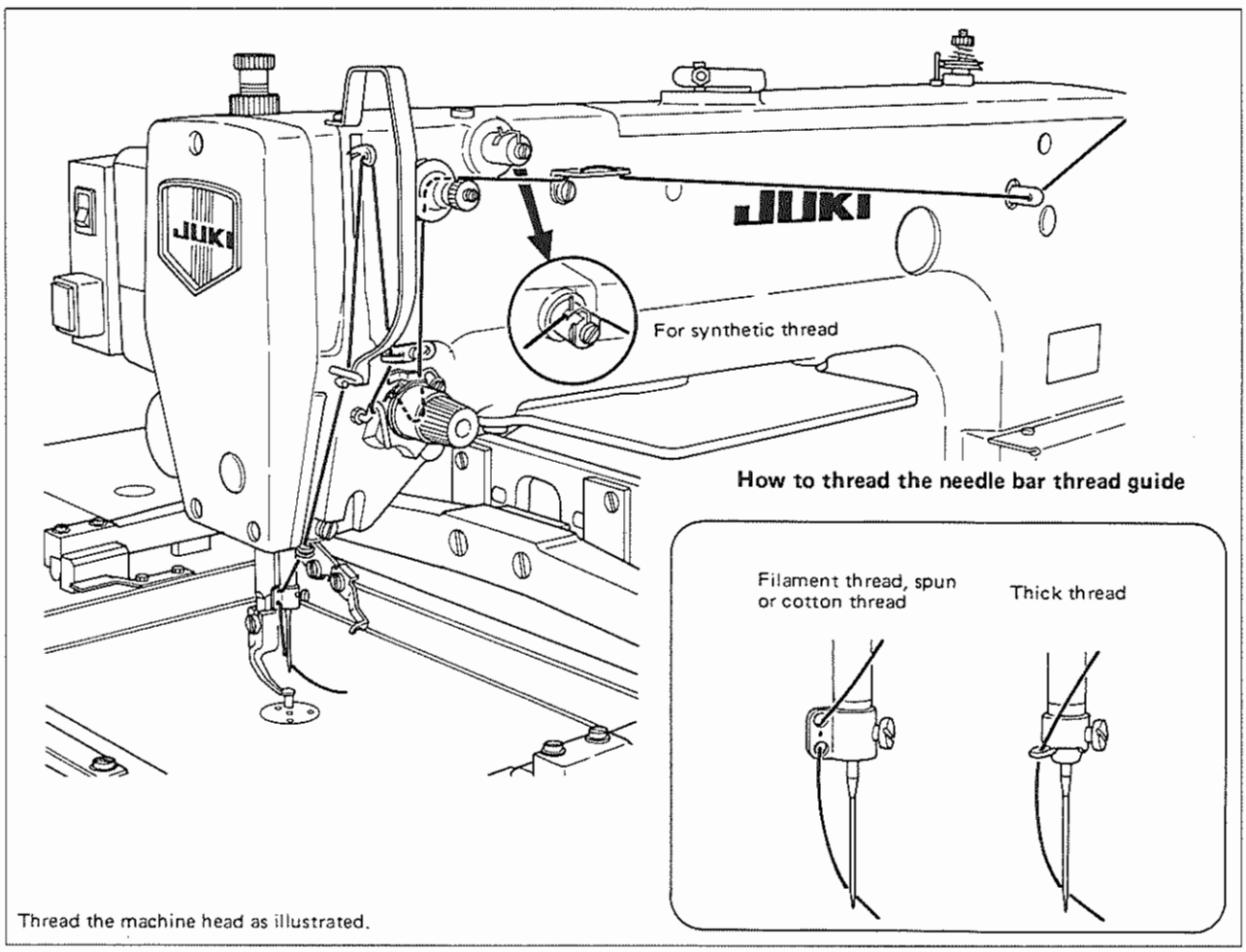


Move wiper ❸ in the direction of the arrow, and loosen setscrew ❶. Hold needle ❷ with the long groove facing toward you, and fully insert it into the hole in the needle bar. Tighten setscrew ❶.

(Notes)

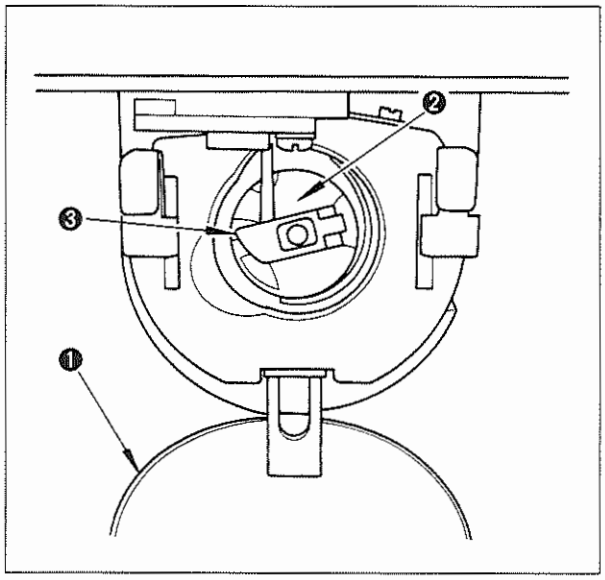
1. **If the needle thread stitches are to be made as shown in Ⓐ, attach the needle to the needle bar so that the long groove is oriented slightly to the left.**
2. **If you observe stitch skipping during sewing, or that the needle thread is not properly trimmed, attach the needle to the needle bar so that the long groove is oriented slightly to the right.**
3. **When sewing heavy-weight materials with synthetic fiber thread, use a super needle for synthetic fiber.**
4. **Before attaching the needle, be sure to turn the power OFF.**

3. Threading the machine head



Thread the machine head as illustrated.

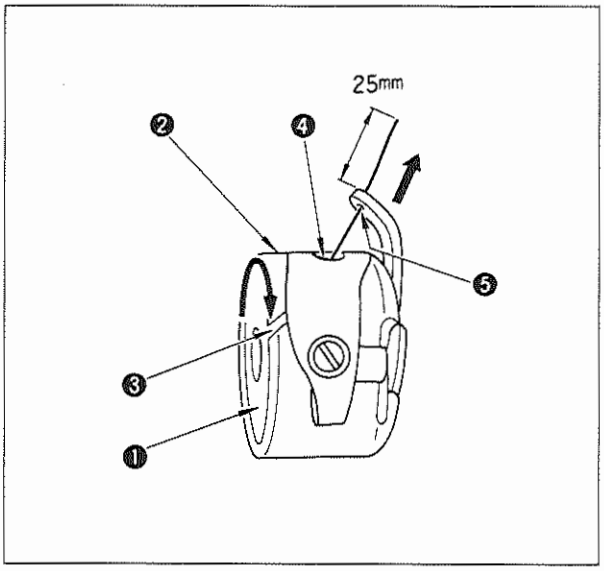
4. Installing and removing the bobbin case



1) Open cylinder arm cap ❶ .
2) Raise latch lever ❸ of bobbin case ❷ until it can go no further. Then hold the latch lever, and take out the case.
3) When installing the bobbin case in the shuttle, be sure to raise latch lever ❸ , fit it fully onto the shuttle shaft, and close the latch lever.

(Caution) If the bobbin case ❷ is not fully fitted onto the shuttle shaft, the bobbin case might come off from the shuttle during sewing, so take care when you install it.

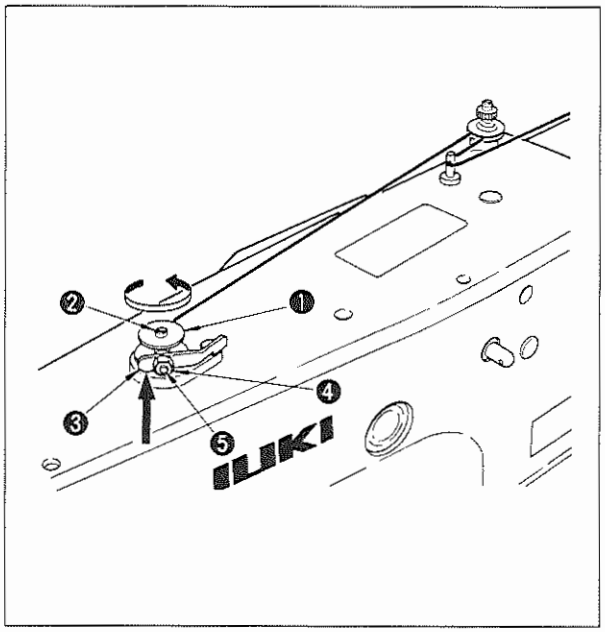
5. Installing the bobbin



1) Hold bobbin ❶ in hand so that it spins clockwise, and set it in bobbin case ❷ .
2) Pass the thread through slot ❸ in the bobbin case. Pull the thread to pass it under the tension spring out to thread exit ❹ . At this time, make sure that the bobbin turns in the direction of the arrow when the thread is pulled.
3) Pass the thread through hole ❺ , and pull the thread out about 25 mm from the hole.

(Caution) When a bobbin is set the wrong direction in the bobbin case, the racing spring may cause unstable bobbin thread tension, so take care to check the direction of the bobbin.

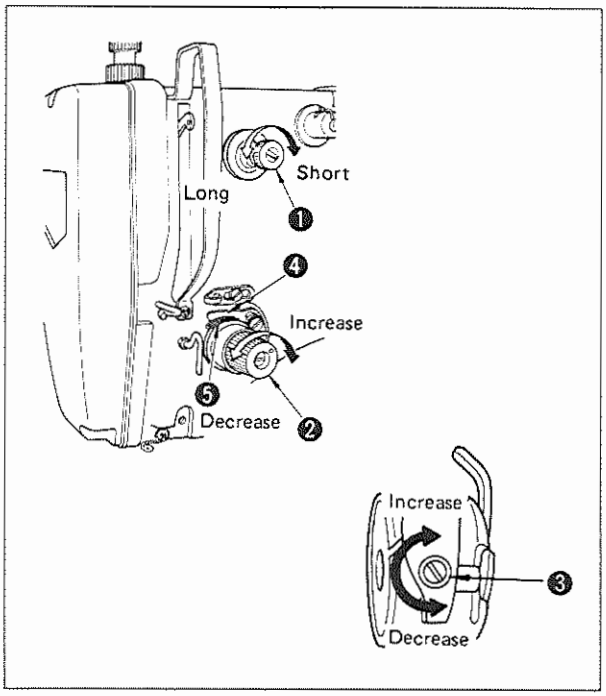
6. Winding a bobbin thread



1) Attach bobbin ❶ to bobbin winder spindle ❷ .
2) Thread the winder in the order as illustrated and wind the thread onto the bobbin four or five turns.
3) Push bobbin winder trip latch ❸ in the direction of the arrow, and the winder starts to wind the bobbin.
4) To adjust the amount of thread wound round the bobbin, loosen nut ❹ and screw in adjusting screw ❺ to decrease the thread amount.

(Caution) Be sure to use genuine JUKI bobbin cases and bobbins.

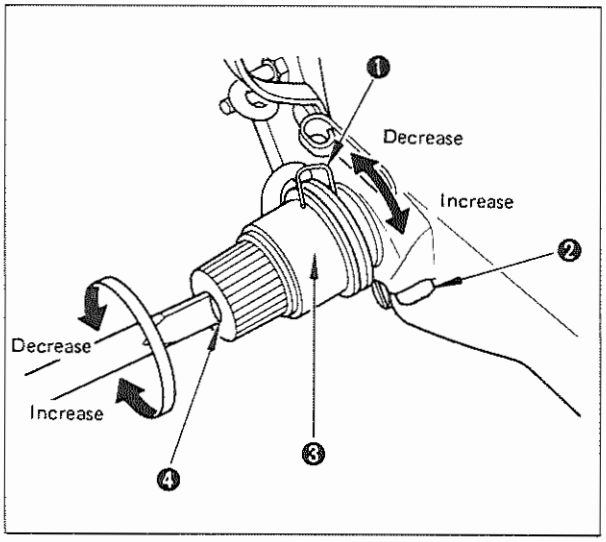
7. Thread tension



1) Adjusting the needle thread tension
   Turn thread tension controller No. 1 ❶ clockwise to decrease the length of the thread which will remain on the needle after thread trimming, or counterclockwise to increase it. Minimize the length of the thread which will remain on the needle as long as the thread does not slip off the needle.
   Turn thread tension controller No. 2 ❷ clockwise to increase the needle thread tension, or counterclockwise to decrease it.
2) Adjusting the bobbin thread tension
   Turn thread tension adjusting screw ❸ clockwise to increase the bobbin thread tension, or counterclockwise to decrease it.

(Caution) Be sure that thread take-up spring ❺ is in contact with thread breakage detector ❹ in the absence of the needle thread. Also, be sure that the thread breakage detector does not touch any adjacent metallic components other than the thread take-up spring.

8. Adjusting the thread take-up spring

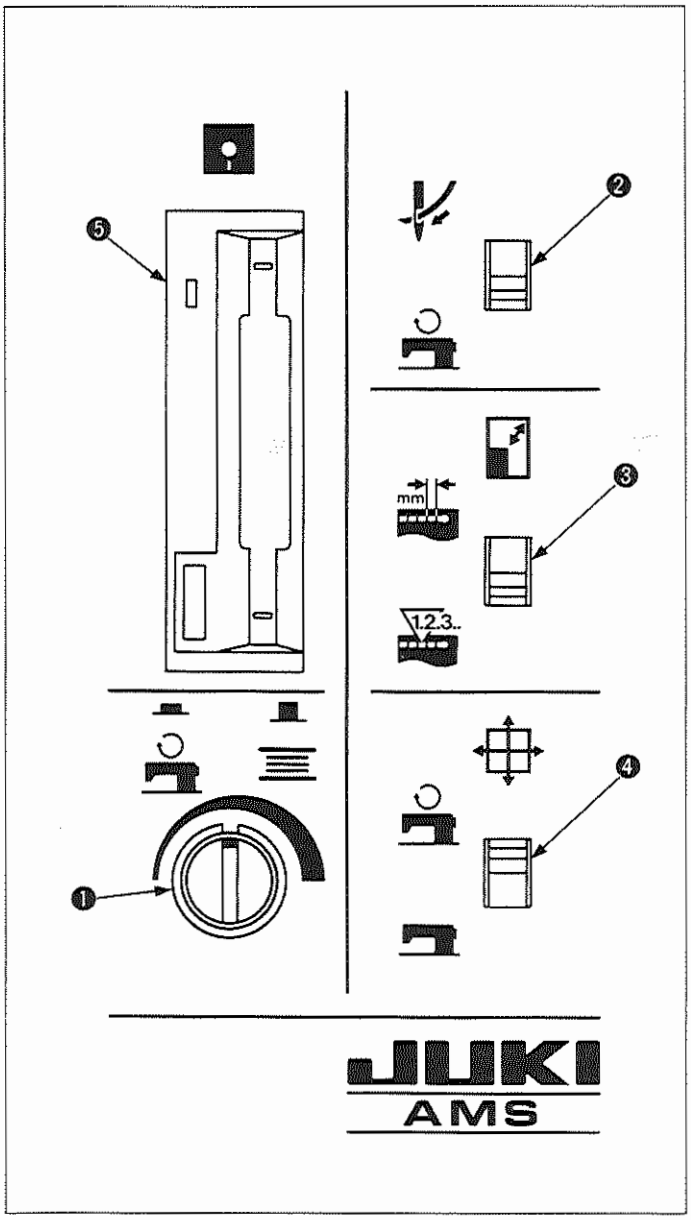


The normal stroke of thread take-up spring ❶ is 12 to 15 mm, and the tension at the starting point is 15 to 30 g.

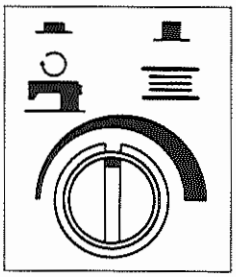
1) Adjusting the stroke
   Loosen screw ❷, and turn tension controller assembly ❸ clockwise to increase the stroke or counterclockwise to decrease it.
2) Adjusting the tension
   Insert the blade of a flat-bit screwdriver into the groove in the tension post ❹, and turn it clockwise to increase the tension or counterclockwise to decrease it.

(Note) Decrease the tension of the thread take-up spring for a synthetic fiber thread. (about 15g)

9. Control box



❶ Max. speed limitation knob/Bobbin winder ON/OFF switch



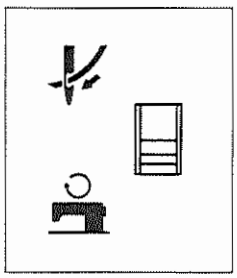
- **Max. speed limitation**

Normally, the sewing speed is automatically adjusted according to the stitch length. If a slower speed is required, however, turn the knob counterclockwise.

- **Bobbin winder ON/OFF switch**

Pull the lever toward you (to turn the bobbin winder switch ON) while the sewing machine is stopped, and the feeding frame will automatically come down. Then press the start switch, intermediate clamp foot will come down and the sewing machine will start running at a constant speed winding the bobbin.
To stop the sewing machine, press the start switch again, or push the lever back (to turn the bobbin winder switch OFF), or turn the emergency stop switch ON. The bobbin winder switch works only when the feeding frame is rising up.
(Before bobbin winding, make sure that there is nothing under the needle.)

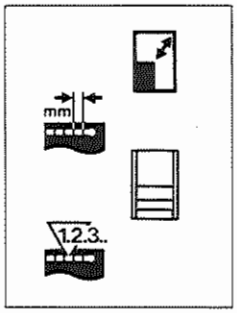
❷ Needle threading switch



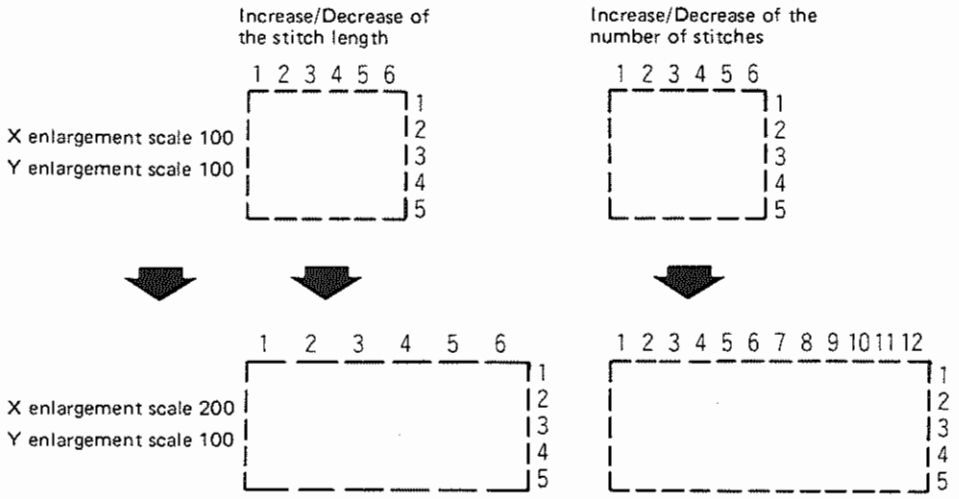
- Set the needle threading switch to the side when the sewing machine is stopped, and the intermediate presser and feeding frame will automatically come down, upon which the needle will be threaded.
When the machine is doing the above job, the start switch will not work even if it is turned ON.

- Move the needle thread switch up and then down when the emergency stop switch is turned ON and the sewing machine is stopped, and thread trimming will be done. The Return to Origin, Forward and Backward keys will now become effective.
If the needle thread switch is moved up and then down when the needle is not in its upper resting position (error message [3]), the sewing machine will automatically rotate and stop in the needle-up stop position. **Make sure that there is nothing under the needle. (This function is effective as long as the sewing LED is lit up.)**

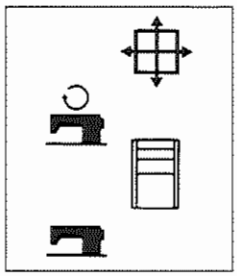
❸ Scale setting switch (INC/DEC of the stitch length & INC/DEC of the number of stitches)



Set the scale setting switch to INC/DEC of the Stitch Length or INC/DEC of the Number of Stitches to enlarge/reduce a pattern.
When the switch is set to the side, the stitch length can be increased/decreased, and when set to the side, the number of stitches can be increased/decreased.

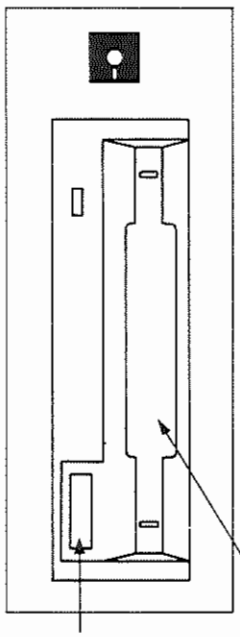


❹ Sewing machine ON/OFF switch



When this switch is set to , the sewing machine performs its normal operation. When this switch is set to , only the feed mechanism will work. It is advisable to set this switch to for checking a pattern before storing it in memory, checking for smooth motion of the feeding frame, or for setting the scale. After checking all these, set the switch to side to start sewing.

❺ Floppy disk driver

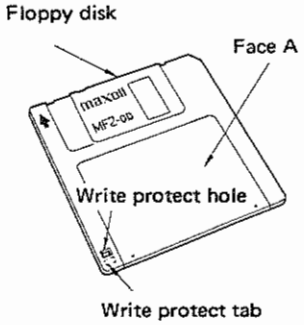


1) Loading the floppy disk
After turning the power switch ON, slowly insert the floppy disk, with its face A pointing away from you, until the eject pushbutton pops out.

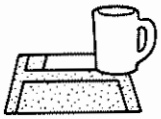
2) Unloading the floppy disk
Before turning the power switch OFF, press the eject pushbutton and take out the floppy disk.

3) Write-protect hole
When the write-protect tab is moved to open the write-protect hole, no data is allowed to be written into the disk. Do this for storing program data. For writing data into the disk, move the write-protect tab until it is exposed.

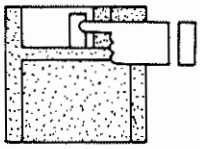
(Caution) Never turn the power switch ON or OFF with the floppy disk mounted.



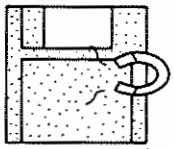
4) Precautions in handling floppy disks



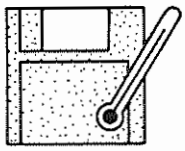
Do not place the floppy disk near an ashtray or food and drink.



Do not touch the exposed parts of the floppy disk.



Do not bring the floppy disk close to a magnetized material.

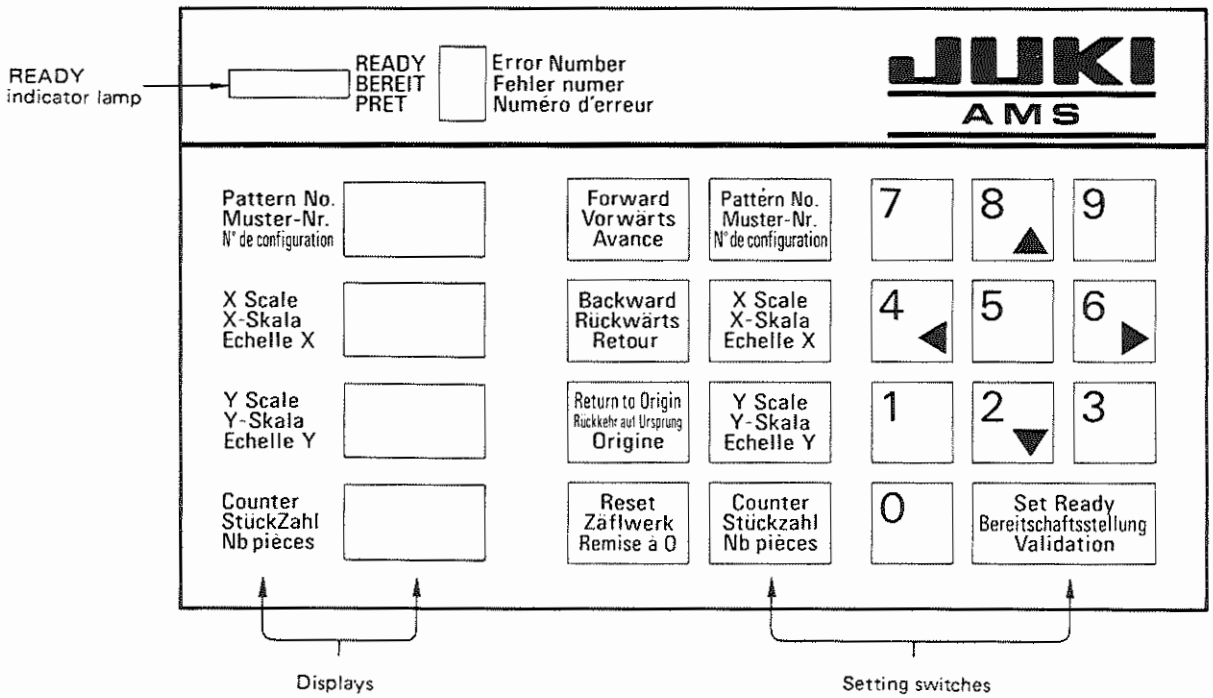


Do not place the floppy disk in a hot place (51° C or higher) or a place exposed to direct sunlight.

10. Operation box

The setting switches are rendered effective.

1. Immediately after the power switch is turned ON, and
2. When the "READY" indicator lamp is OFF. (This lamp goes OFF when the "Set Ready" switch is turned ON.)



1) Switches and their functions

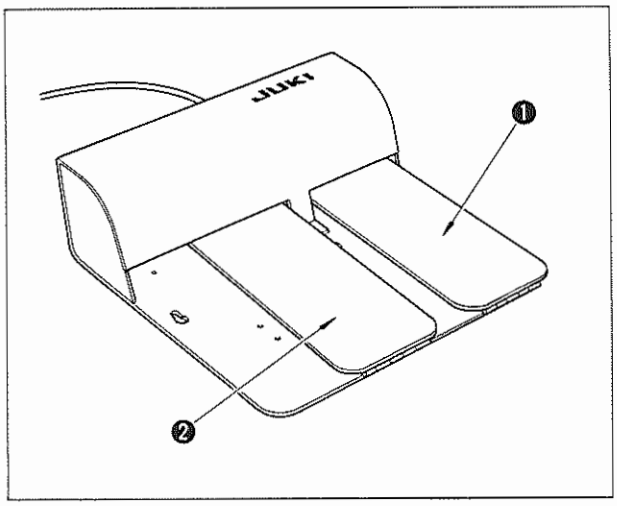
Name of switch	Function	Operation
Pattern No. Muster-Nr. N° de configuration	Selects a pattern or patterns which have been stored in the floppy disk. Note: If a pattern No. which has not been stored in the disk is specified, error number "1" is given, and the pattern No. blinks.	Turn ON the Pattern No. switch ↓ Press the desired numeric keys (Significant digits : 3) Example: Pattern No. 1 →001 Pattern No. 20 →020

Name of switch	Function	Operation
X Scale X-Skala Echelle X Y Scale Y-Skala Echelle Y	Taking a pattern written in the floppy disk as 100%, the original pattern can be enlarged or reduced in the X-axis and/or Y-axis, independently within the range of 1% to 400%. A pattern is enlarged/reduced by taking as the reference the machine origin or the enlargement/reduction reference point at the time of inputting the original pattern. **(Caution)** **1. Whenever a pattern has been enlarged, turn the Sewing Machine switch to "Off" and be sure to check that the enlarged pattern stays within the sewing area of the feeding frame.** **2. With the Scale switch set to "INC or DEC of Stitch Length", pattern enlargement cannot be done if the stitch length exceeds 10 mm. If the stitch length exceeds 4.8 mm, the error indication "2" is given.**	Turn the X Scale switch and/or Y Scale switch ON. ↓ Press the desired numeric keys Example: Enlargement 130% → 130 Reduction 50% → 050
Counter Stückzahl Nb pièces	Counts the number of sewn garments, and alarms the time to replace the bobbin. When the quantity of the bobbin thread has reduced to the preset level, the Counter flashes ON and OFF to urge you to replace the bobbin. You cannot sew while the Counter is flickering. Press the Reset switch after replacing the bobbin, then the counter will be reset, allowing you to restart sewing. This switch has been factory-set to the OFF position.	Turn the Counter switch ON ↓ Set the number of workpieces to be sewn by pressing the desired numeric keys. Example: 10 pcs. → 010 130 pcs. → 130
Set Ready Bereitschaftsstellung Validation	Provokes the following series of operation when pressed after setting the pattern No., X/Y scales, counter, and scale switch (INC/DEC of Stitch Length or INC/DEC of Number of Stitches): 1. The specified pattern or patterns are read from the floppy disk. 2. Operation is performed based on the entered scale data. While the computation is being executed, the READY indicator lamps blinks. 3. Upon completion of the operation, the feeding frame comes down and automatically moves via the origin to the sewing start point (the 2nd origin if the 2nd origin has been set), then it goes up. **(Caution) The Ready switch is effective only when the power switch has been turned ON. Refer to Section 4 of "PRECAUTIONS TO BE TAKEN DURING OPERATION."** 4. The READY indicator lamp stops flickering and stays ON instead, showing that the machine is ready to start sewing. Note that you are not allowed to make any setting changes while the READY indicator lamp is ON. To make a setting change in this case, press the Set Ready switch. This will cause the READY lamp to go out, permitting a setting change. **(Caution) Do not put your fingers under the feeding frame because the feeding frame automatically comes down upon completion of computation. After powering the machine up, the pattern sewing cycle which was interrupted due to a power failure can be resumed simply by turning the Set Ready switch ON when the pattern No. and X/Y enlargement ratio remain unchanged. No floppy disk is necessary.**	Set the Pattern No. switch X/Y scale switch, and counter. Press the Set Ready switch. ↓ READY indicator lamp ON ↓ Ready to start sewing
Forward Vorwärts Avance Backward Rückwärts Retour	When the FORWARD switch is pressed with the feeding frame down, the material is fed forward by one stitch. When the BACKWARD switch is pressed with the feeding frame down, the material is fed backward by one stitch. If these switches are kept depressed, the material is fed slowly for the first one stitch, after which it is automatically fed quickly.	This feature is effective when the feeding frame is down. Conveniently used for checking the current patterns or when restarting the interrupted sewing cycle after thread breakage.
Return to Origin Rückkehr auf Ursprung Origine	When this switch pressed during a pause, the feeding frame will automatically move to the sewing start point or the 2nd origin, and the feeding frame will go up and stop *	Used during a pause following an emergency stop and thread trimming or thread breakage detection.
Jog keys 8 ▲ 4 ◀ 5 6 ▶ 2 ▼	These keys function as numeric keys while the READY indicator lamp is OFF, and work as jog keys while the READY indicator lamp is ON. If any of these keys is pressed with the feeding frame down at sewing start, the needle will move in the direction shown by the arrow on the pressed key. At this time, the movement of the needle is automatically stored in memory. Set the second origin in the desired position within the work clamp foot traveling area.	This feature is effective when the feeding frame is down. Used for setting the 2nd origin.
Reset Zaflwerk Remise a 0	Resets the Counter when pressed after a pause which follows a press of the Set Ready switch or the completion of a pattern sewing.	

2) Error indications

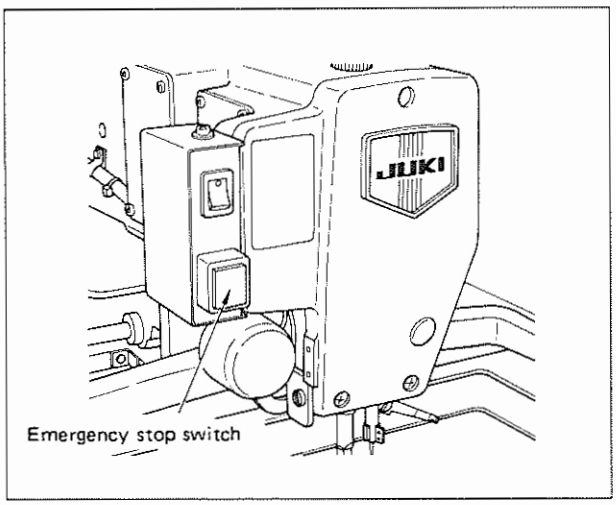
Error No.	Indicator lamp	Error description	Action to be taken
1	ON	Comes on if a malfunction has resulted in a data read-out error.	Press the Set Ready key to read out the data again.
	ON The Pattern No. indicator lamp flashes on and off	Starts when there is no data for the relevant number.	Set the correct Pattern No.
	Flash	A floppy disk is not inserted.	Insert a floppy disk.
2	ON	Comes on if the stitch length exceeds 10 mm over the computable range in an attempt to enlarge a pattern based on the number of stitches.	Correctly reset the X- and/or Y-scale.
3	ON	Comes on if the needle is not in its highest position.	Turn the handwheel until error No. "3" disappears. Or turn ON/OFF the Needle Threading switch to raise the needle to its highest position.
4	ON	Comes on if the maximum sewing area (200 mm x 145 mm) is exceeded.	During a sewing cycle : Press the Return to Origin key. While setting the 2nd origin : Press the Jog key.
5	Flash	Starts when the emergency switch is turned ON.	Press the start switch to actuate the sewing machine again. Turn ON/OFF the Needle Threading switch, and the thread will be trimmed. (The lamp display changes from "Flash" to "ON".)
	ON	Comes on when only the feeding frame is moving. Comes on when the emergency switch is turned ON.	Turn ON the start switch after pressing the Return to Origin and the FORWARD or BACKWARD keys.
6	Flash (slowly)	Starts when approximately 1,000 stitches remain for the pattern to be made.	When using the PGM-1 together with the machine.
	Flash (fast)	Starts when approximately 500 stitches remain for the pattern to be made.	When using the PGM-1 together with the machine.
7	ON	Comes on if a malfunction has caused the machine to lock, or if there has been a failure in the needle position detector.	Turn OFF the power switch. Replace the defective part(s) or eliminate the cause of the machine locking. Then turn ON the power switch.
8	ON	Comes on if a poor connection of a solenoid connector is detected.	Turn OFF the power switch, and check for the loose solenoid connection.
9	ON	Comes on if the needle thread is broken.	Re-thread the machine head, press the Return to Origin key and the FORWARD or BACKWARD keys to move the feeding frame backward. Then press the start switch.
0	Flash	Starts when trying to format a floppy disk with the write-protect tab in the open position (the disk cannot be formatted).	Move the write-protect tab so that it is in its closed position. When using the PGM-1 together with the machine.
	ON	Comes on when trying to format a defective floppy disk.	Replace the floppy disk. When using the PGM-1 together with the machine.
A	ON	Comes on when the air pressure is less than 4 kg/cm^2	Turn OFF the power switch. Set the air pressure to 5 ~ 5.5 kg/cm^2.
E	ON	Comes on when the sewing machine rotates in the reverse direction.	Turn OFF the power switch. Change the rotation direction of the motor.

11. Feeding frame switch and start switch



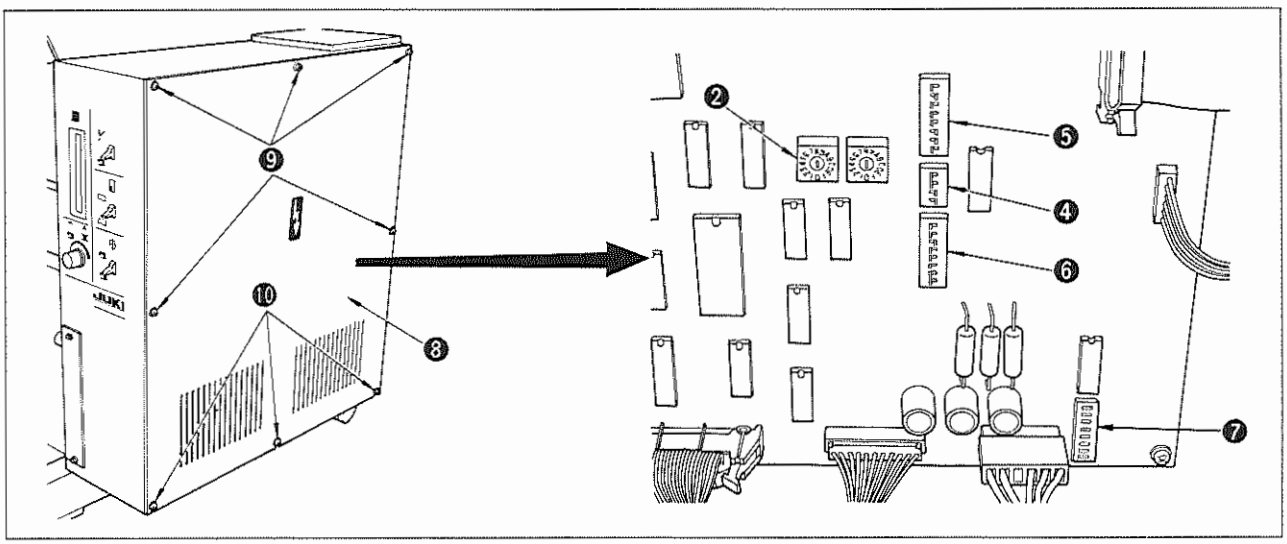
1) When feeding frame switch ❶ is depressed, the feeding frame will come down. Another press on the switch causes the feeding frame to go up.
2) When start switch ❷ is depressed with the feeding frame down, the machine starts sewing.

12. Emergency stop switch



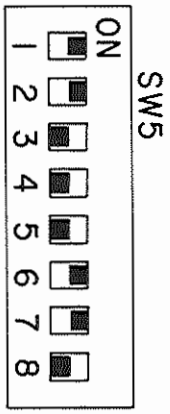
Press this pushbutton switch to stop the feed and sewing mechanisms of the machine during operation. When this switch is pressed during a stitching cycle, the machine gives the error indication No. 5.
Move the Needle Threading switch up and then down to do thread trimming. The error indicator lamp will remain ON instead of flashing on and off. Refer to the explanation of error No. 5 (on Page 14).

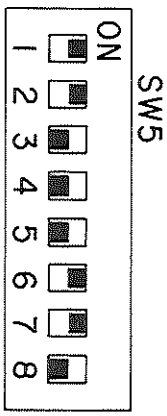
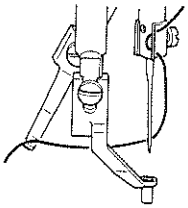
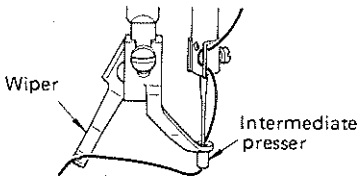
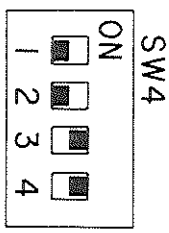
13. DIP switches on the printed circuit board



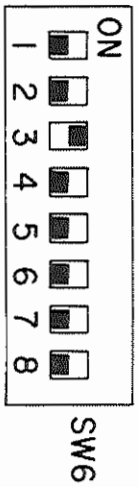
Remove five setscrews ❾ from control box cover ❽ , loosen three screws ❿ , and remove control box cover ❽ You will then see DIP switches ❷ , ❹ , ❺ , ❻ and ❼ mounted on the I/F printed circuit board located on the right as you face it.
The functions of the DIP switches are as follows:

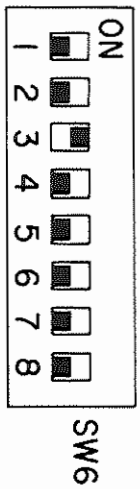
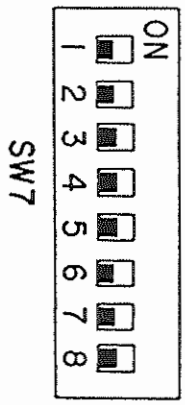
(Caution) Be sure to set the DIP switches while the power switch is turned OFF.
(Setting the DIP switches while the power switch is turned ON will not be effective.)

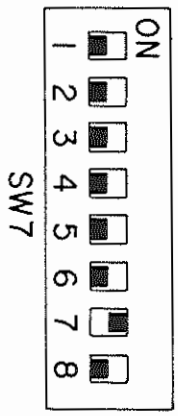
DIP switch name	Function
⑤ DIP switch 5 (SW5)  (at the time of delivery)	• SW5-2 ..... **Cycle stitching facility** By entering a "temporary stop" command (see the instruction manual for PGM-1) at the desired point in a pattern, the feeding frame can be raised so that a workpiece may be turned or changed. ON : The feeding frame goes up if you enter a Temporary stop. (DIP Switch SW5-2 has been set to its ON position at the time of delivery.) OFF : The feeding frame does not go up if you enter a Temporary stop. (When the machine is not in the cycle sewing mode, the feeding frame goes up at the 2nd origin.) **(Caution) When the machine is in the cycle sewing mode, be sure to take note of the following:** Forward / Vorwärts / Avance Backward / Rückwärts / Retour When the Forward or Backward key is pressed, the machine halts at the preset temporary stop point where the feeding frame can be raised or lowered using the feeding frame switch. (Note that the functions controlled by the pedal 1, and by the pedal 2 are not the same. So the selection must be made carefully.) Return to Origin / Rückkehr auf Ursprung / Origine When the Return to Origin switch is pressed, the machine goes back to the beginning of the first cycle of the pattern. If you want to go back to the beginning of the cycle being sewn, use the Backward key.  The counter counts up upon the completion of one pattern. If a pattern includes 3 cycles, the counter is incremented when the 3 cycles have been sewn. Set Ready / Bereitschaftsstellung / Validation The Set Ready switch is rendered ineffective while sewing a pattern (between cycles) even if the feeding frame goes up. Press the Set Ready switch after pressing the Return to Origin switch or after completion of the pattern. • SW5-3 ..... **Setting the 2nd origin by changing the sewing start point.** ON : The sewing pattern position can be changed by the jog key. OFF : The sewing start point can be changed by the jog key without changing the sewing pattern position. (DIP Switch SW5-3 has been set to its OFF position at the time of delivery.) (When the DIP switch is set to its ON position, the 2nd origin set within the pattern sewing area will become ineffective, and the machine will return to the sewing start point.)

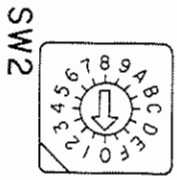
DIP switch name	Function
❺ DIP switch 5 (SW5)  (at the time of delivery)	• **SW5-4** ..... **Wiper actuating point selecting function** Normally, the wiper sweeps across the clearance between the intermediate presser and the needle. When sewing heavy-weight material, the clearance may be too small for the wiper to work. In this case, the wiper will be able to sweep across the clearance between the intermediate presser and the work-piece after the intermediate presser has reached the highest position in its stroke. ON : The wiper sweeps between the intermediate presser and the workpiece after the intermediate presser has reached the highest position in its stroke. OFF : The intermediate presser goes up after the wiper has swept across the clearance between the needle and the intermediate presser. (The switch is factory-set to the OFF position at the time of delivery.)  (OFF) Material thickness: up to 3 mm  (ON) Material thickness: 3 to 5 mm
	• **SW5-7** ..... **Pedal selector switch** ON : The feeding frame comes down when the feeding frame switch is depressed. Another press on the feeding frame switch may raise the feeding frame. (The switch is factory-set to the ON position at the time of delivery.) OFF : The feeding frame keeps coming down as long as the feeding frame switch is depressed.
	• **DIP switches, SW5-1, -5, -6 and -8 are used for maintenance purposes. These switches do not particularly need to be reset before operation. Keep these switches as they are at the time of delivery.**
❹ DIP switch 4 (SW4)  (at the time of delivery)	• SW4-3, 4 ..... **The feed timing can be selected according to the material thickness.** The SW4-3 and SW4-4 switches are both set to the ON position at the time of delivery. (Note) **The above settings may be unsuitable for some types of material or operation. Set them correctly according to the workpieces to be used.**
	• **DIP switches, SW4-1, and -2, are used for maintenance purposes. These switches do not particularly need to be reset before operation. Keep these switches as they are at the time of delivery.**

SW4-3	SW4-4	Material thickness
ON	ON	Less than 2 mm (set to the ON position at the time of delivery)
ON	OFF	2mm or more, but less than 3mm
OFF	ON	3 mm or more, but less than 4mm
OFF	OFF	4 mm or more

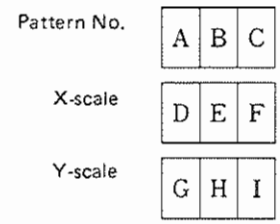
DIP switch name	Function
⑥ DIP switch 6 (SW6)  (at the time of delivery)	• **SW6-2 ..... The setting of the Bobbin Thread counter** There are two types of counting, subtraction and addition. Select the appropriate counting method. ON : Subtraction counter Set the number of workpieces to be sewn beforehand using the Counter switch. After a cycle has been completed, "1" will be subtracted from the value set on the display. When the value indicated is "000" on the Counter indicator, it will flash on and off, and sewing will no longer continue. The counter will be reset to allow sewing to be restarted once you press the Reset switch. Whenever the Reset switch is pressed, regardless of the value indicated on the display, the counter will be reset and will show the predetermined number of workpieces to be sewn. OFF : Addition counter (The switch has been set to the OFF position at the time of delivery) Set the number of workpieces to be sewn beforehand using the Counter switch. Then press the Set Ready key, and the Counter indicator display will flash on and off requiring confirmation of the value set. Press the Reset switch, and the value indicated will show "000" on the Counter indicator, enabling sewing operation. After a cycle has been completed, "1", will be added to the value on the display. The addition counter will continue to count until the value indicated reaches the predetermined number. When the value indicated shows the predetermined number, the indicator display will flash on and off, and sewing will no longer continue. Follow the same procedures as described above to reset the "ON/ Subtraction counter."
	• **SW6-3 ..... Reset function** ON : Not effective. (The switch has been set to the ON position at the time of delivery) The indicator is used for the addition counter, and shows figures from 0 to 999. (When the counter value passes 999, it will return to 0.) The indicated number can be reset by pressing the Reset switch. OFF : Effective (See "DIP Switch SW6-2" described above.)
	• **SW6-4 ..... Enlargement/reduction prohibition switch** ON : The pattern cannot be enlarged/reduced. The X/Y scale keys in the control box are made inoperative and the scale is fixed at 100%. OFF : The pattern can be enlarged/reduced. (The switch is factory-set to the OFF position at the time of delivery.)
	• **SW6-5 ..... Thread breakage detection function** ON : Not effective Set the SW6-5 DIP switch to the ON position when the sewing machine is idling. OFF : Effective (The switch is set to the OFF position at the time of delivery) If thread breakage is detected, the thread will be automatically trimmed, and the machine will stop. Set the SW6-5 DIP switch to the OFF position when the sewing machine is operating normally.

DIP switch name	Function
⑥ DIP switch 6 (SW6)  (at the time of delivery)	• SW6-8 ..... Intermediate presser stop function ON : Effective OFF : Not effective Set the SW6-8 DIP switch to the OFF position when using the intermediate presser during normal operation. (The switch is set to the OFF position at the time of delivery)
	• **The DIP switches, SW6-1, -6 and -7, are used for maintenance purposes. These switches do not particularly need to be reset before operation. Keep these switches as they are at the time of delivery.**
⑦ DIP switch 7 (SW7)  (At the time of delivery)	• SW7-2 ..... Used to select double-step stroke work clamp function ON : When setting the material on the machine, the feeding frame stops in the intermediate position of its stroke. OFF : The feeding frame comes down directly to its lowest position in one action. (This switch is set to its ON position when using the sewing machine incorporating a double-stepped stroke work clamp. Since the regular type machines do not use this function, set the switch to OFF.)
	• SW7-3 ..... Used to select function of trimming thread after emergency stop. ON : When the emergency stop switch is turned ON, the machine stops with its needle up after trimming the thread. OFF : When the emergency stop switch is turned ON, the machine stops with its needle up. (This switch is set to the OFF state at the time of delivery.) Thread trimming is actuated by turning ON/OFF the threading switch.. After thread trimming, functions of feed forward, feed backward and origin retrieval become operative.

Switch name	Function
⑦ DIP switch 7 (SW7)  (Same as when shipped from the factory)	• SW7-4, 5 . . . . . Sewing speed switch The sewing speed when the sewing machine is started varies depending on the switch setting. SW7-4 / SW7-5 / 1st stitch 2nd stitch 3rd stitch 4th stitch 5th stitch 6th stitch OFF / OFF: 200 → 600 → 1000 → 1400 → 1800 → 2000 → ON / OFF: 600 → 600 → 1000 → 1400 → 1800 → 2000 → OFF / ON: 200 → 2000 → ON / ON: ※ 2000 → It is set to OFF when shipped from the factory. * The sewing speed is not limited. It should therefore be specified so as to meet the sewing requirements when creating a pattern. **(Caution)** **The sewing speed is limited by the stitch length.**
	• SW7-6 . . . . . **Changeover function for the feeding frame position at the end of sewing** ON : At the end of sewing, the feeding frame does not go up, but holds the work piece it is. If the feeding frame needs to be raised, press the feeding frame switch. OFF : At the end of sewing, the feeding frame goes up. (Same as when shipped from the factory)
	• SW7-7 . . . . . **Retainer compensation selecting function** If the retainer for the X/Y table built into the sewing machine is used for a long time, a dislocation may result. In this case, a sewing malfunction or an origin retrieval error may occur. If the ready switch is pressed first after turning ON the power so as to prevent the troubles mentioned above by compensating for the retainer position, the forced compensation for the retainer position will be enabled called "Retainer compensation"). ON : The retainer is not compensated for. OFF : The retainer is compensated for. (Same as when shipped from the factory) **(Caution)** **The retainer is compensated for only when the ready switch is pressed once after turning ON the power supply with SW7-7 OFF. However, the retainer will not be compensated for even if it is pressed twice or more.**
	• **SW7-1 and 8 are used for maintenance purposes. They should remain turned OFF.**

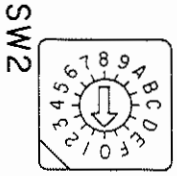
DIP switch name	Function
❷ Rotary DIP Switch 2 (SW2) 	• **Value set at "0" .... (This switch is set at "0" at the time of delivery)** Make sure that the switch has been set at "0" for normal sewing.
	• **Value set at "2" .... Serves to check the input of the individual switches and detection signals, as well as the output of the numerical displays.** 1. When the switch is set at "2" and the power switch is turned ON, all the digital displays will be indicated by "8". 2. When the feeding frame switch or the start switch is pressed, the step of display A will be updated. 3. When a step input is received, the corresponding display will be indicated by "1" or "0" to indicate the status of the switch.

(Display)



(Display table)

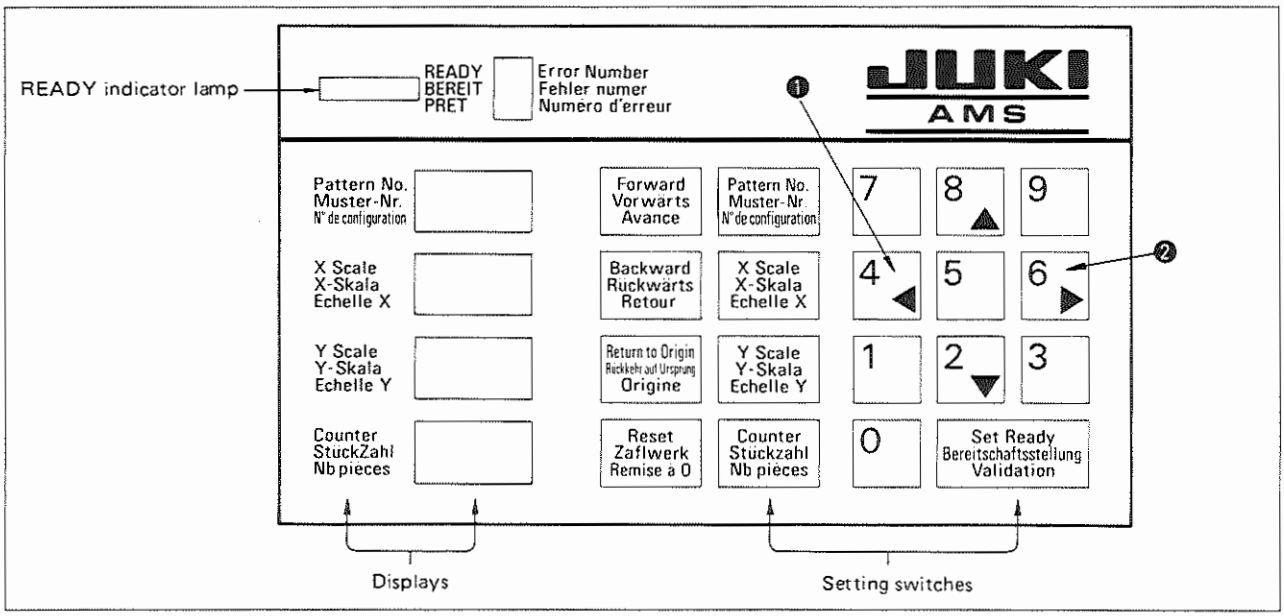
Display / Step A	B	C	D	E	F	G	H	I
0	0 (Operation switch)	1 (Operation switch)	2 (Operation switch)	3 (Operation switch)	4 (Operation switch)	5 (Operation switch)	6 (Operation switch)	7 (Operation switch)
1	8 (Operation switch)	9 (Operation switch)	Pattern No. (Operation switch)	X-scale (Operation switch)	Y-scale (Opertion switch)	Bobbin winder (Operation switch)	Forward (Operation switch)	Backward (Operation switch)
2	Reset (Operation switch)	Return to Origin (Operation switch)	Ready (Operation switch)	Emergency stop Thread trimming ON/OFF (SW7-3)	Sewing speed 1 (SW7-4)	Sewing speed 2 (SW7-5)	Sewing end Presser ON/OFF (SW7-6)	Initial feed action (SW7-7)
3	Material thickness (SW4-4)	Material thickness (SW4-3)	Digitizer X/Y inversion (SW4-2)	Combination standard (SW4-1)	Air sensor	(SW7-1)	(SW7-2)	Needle threading switch (Control box)
4	Start switch	Feeding frame switch 1	Feeding frame switch 2	Emergency stop switch	Bobbin winder (Control box)	Sewing machine ON/OFF switch (Control box)	INC/DEC of the stitch length or No. of stitches switch (Control box)	(PGM-1)
5	Standard/ double-step work clamp (SW5-8)	Pedal selector (SW5-7)	Double-step work clamp Pedal selector (SW5-6)	Origin detection (SW5-5)	Wiper actuating position selection function (SW5-4)	Sewing start point travel, Second origin setting (SW5-3)	Cycle sewing function (SW5-2)	Double step work clamp Cycle sewing function (SW5-1)
6	Intermediate presser stop function (SW6-8)	Wiper prohibition (SW6-7)	Thread trimmer inoperative (SW6-6)	Needle thread breakage detection function (SW6-5)	Enlargement/ reduction prohibition (SW6-4)	Reset function (SW6-3)	Counter function (SW6-2)	Double-step work clamp Sequence selector (SW6-1)
7	(SW1-8)	(SW1-4)	(SW1-2)	(SW1-1)	(SW2-8)	(SW2-4)	(SW2-2)	(SW2-1)
8			Thread breakage detector	Down detection signal	Up detection signal	Solenoid slip-off signal	T/G pulse signal	
9	X origin	Y origin	+ X limit	−X limit	+ Y limit	−Y limit		

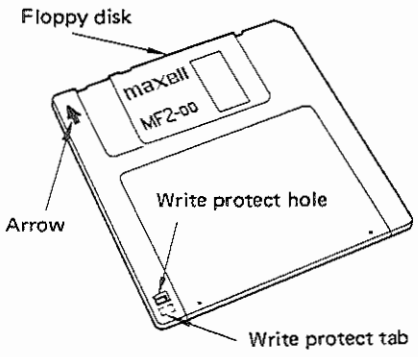
DIP switch name	Function
❷ Rotary DIP Switch 2 (SW2) 	• **Value set at "5" .... Serves to check the machine origin.** 1. Set the switch at "5," turn ON the power switch, and treadle the feeding frame switch. The feeding frame will come down. 2. Treadle the start switch, the origin will be automatically found, and the machine will stop at the origin. The feeding frame remains lowered. • **The DIP switches, SW2-1, 3, 4, 6 to 9, A to F are used for maintenance purposes. These switches do not particularly need to be reset before operation.**

14. Disk formatting facility

Any new disk must be formatted **(on the *MS-DOS)** before use. All patterns stored in a disk can also be erased by formatting.

*** MS-DOS is a registered trademark of Microsoft Inc., in the U.S.A.**





1) Turn the power ON while pressing switches ❶ and ❷ . This makes the machine ready for formatting a disk. At this time, the pattern No. display will show "FFF".
2) Insert a disk into which data can be written (a disk with its write protect hole closed) into the disk drive, and press the Set Ready switch.
3) The pattern No. display indicates the format track Nos., and tracks from 0 to 79 are formatted.
4) When the disk has been formatted, turn the power OFF once before turning it ON again to exit from the disk formatting mode.

(Precaution) **If you should take the disk out or turn the power OFF during formatting, the disk cannot be used. The disk must be formatted again.**
If an error "0" is displayed, it means the disk is defective. Do not use the disk.

15. Data back-up function

The AMS-220B has a sewing data back-up function, which actuates the sewing machine by simply turning ON the Set Ready switch after the power switch has been turned ON. There is no need for a floppy disk.
The AMS-220B is capable of memorizing the data of the second origin, set by the jog keys. The "move to the sewing start point" command can also be stored. It should be noted, however, that the data back-up function is effective only when there is a power failure while the Set Ready switch is turned ON and the sewing LED is lit up. When the sewing LED is not lit up, the data will not be memorized by the data back-up function.

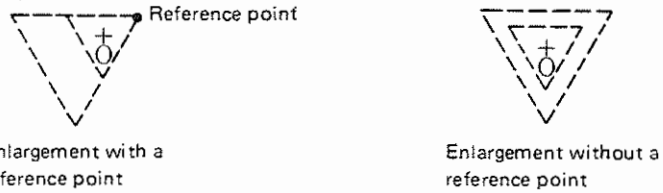
16. The needle-up position stop function

When the needle is not at its highest position with the sewing LED lit up (error No. "3" will be indicated), the sewing machine will rotate and stop in the needle-up position by setting the Needle threading switch to the upper position or lower position. (Carefully check the position of the feeding frame.)

17. Inputting the reference point for enlargement/reduction

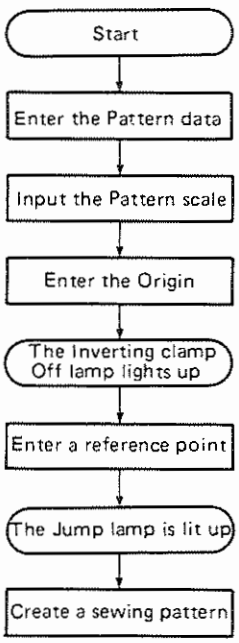
The reference point for enlargement/reduction can be set while inputting the sewing pattern data by connecting the AMS-220B with the PGM-1. When inputting the sewing pattern data using the PGM-1 and the standard pattern LED is lit up, the desired reference point for enlargement/reduction can be set and entered. The pattern will then be enlarged/reduced taking this point as the reference.

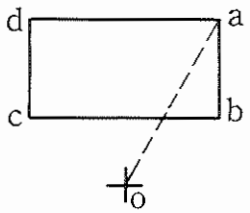
1) Example of pattern enlargement



2) Example of the procedure to set the reference point

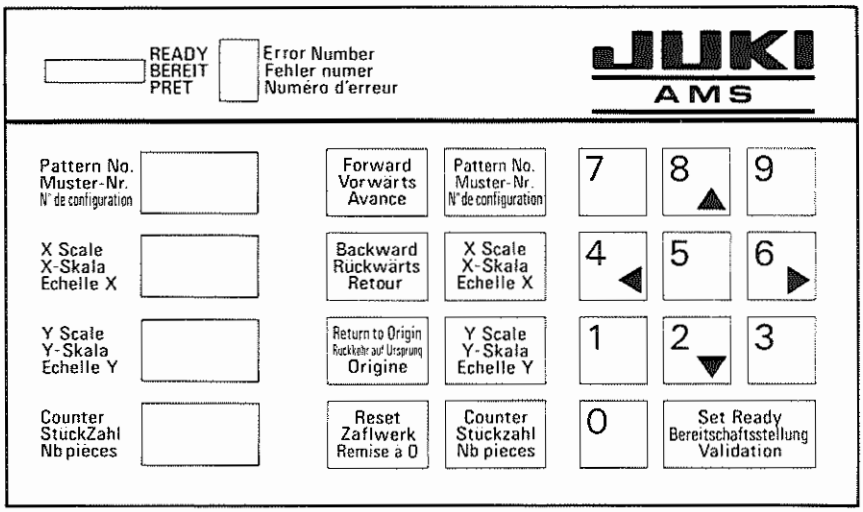
[How to input the reference point for enlargement/reduction]
The reference point serves to facilitate the positioning of garments of the same shape but different in size.
(The following chart shows the procedure to input the reference point for enlargement/reduction.)





① Select the Pattern data.
② Specify and enter the Pattern scale.
③ Specify and enter Origin "0".
④ Specify and enter point "a" when the Inverting Clamp Off lamp lights up.
⑤ Enter the Jump as Origin "0" → "a".
⑥ Specify and enter points b, c, d and a using the Linear input.
⑦ Enter the Thread trim.
⑧ Enter End.

18. Combination of patterns



Pattern data stored in the floppy disk can be read (combined) and sewn as a series of pattern data.
Four different data combinations are available.

1) Turn ON the power while pressing switches "0" and "2."
   → Patterns are combined taking the origin as the center.
2) Turn ON the power while pressing switches "0" and "3."
   → Patterns are combined taking the origin as the center and inserting a pause.
3) Turn ON the power while pressing switches "0" and "5."
   → Patterns are combined aligning the sewing end with the origin.
4) Turn ON the power while pressing switches "0" and "6."
   → Patterns are combined aligning the sewing end with the origin and inserting a pause.

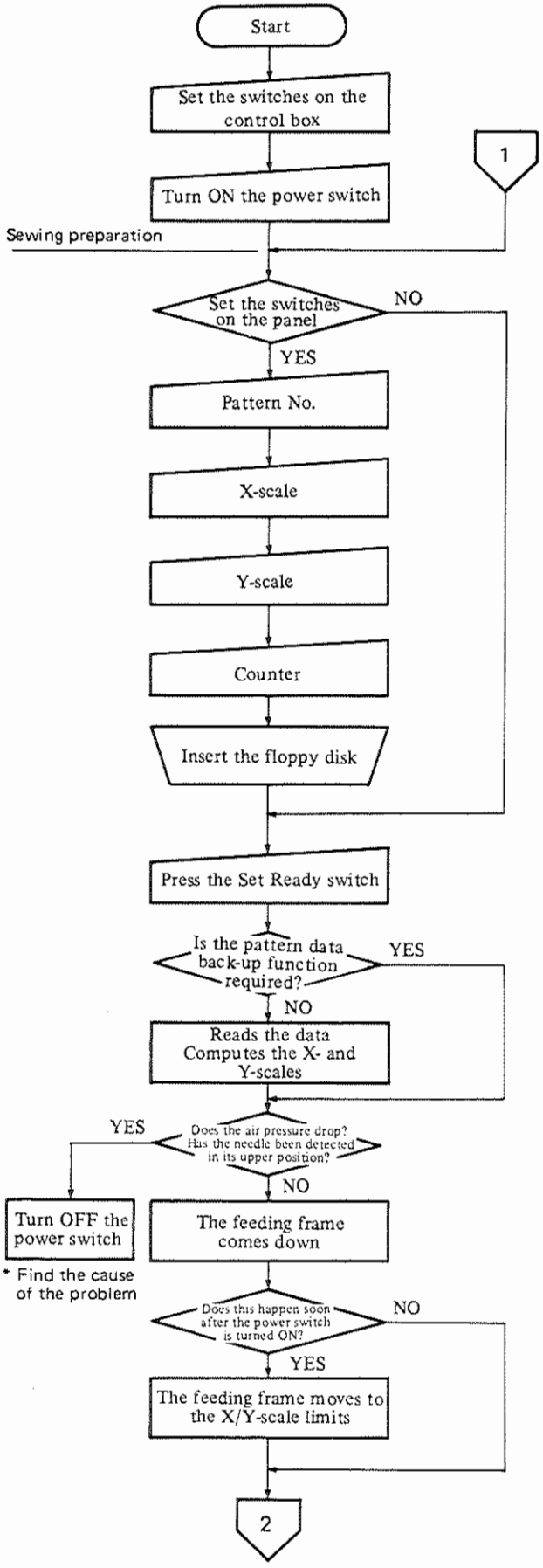
[How to operate]

① Turn ON the power while pressing the two switches as stated above.
② Specify the pattern number and scale of the pattern to be read from the floppy disk. Then turn ON the Reset switch. (Repeat this procedure step as desired.)
③ Turning ON the Set Ready switch will make the machine ready for sewing.

- The pattern data read from the floppy disk are backed up.
- Turn OFF the power once, then return ON the power and read another pattern data. This will erase the pattern that has been used.
- Changing the combination
  - Under the edit mode, all the pattern data that have been read after sewing are to be stored in memory.
  - Once the pattern data are combined, the details or orders of the patterns included in the pattern data combined cannot be changed, since the series of the patterns are stored as a single pattern data.

19. Operation procedure flow chart

Follow the operation flow chart given below:



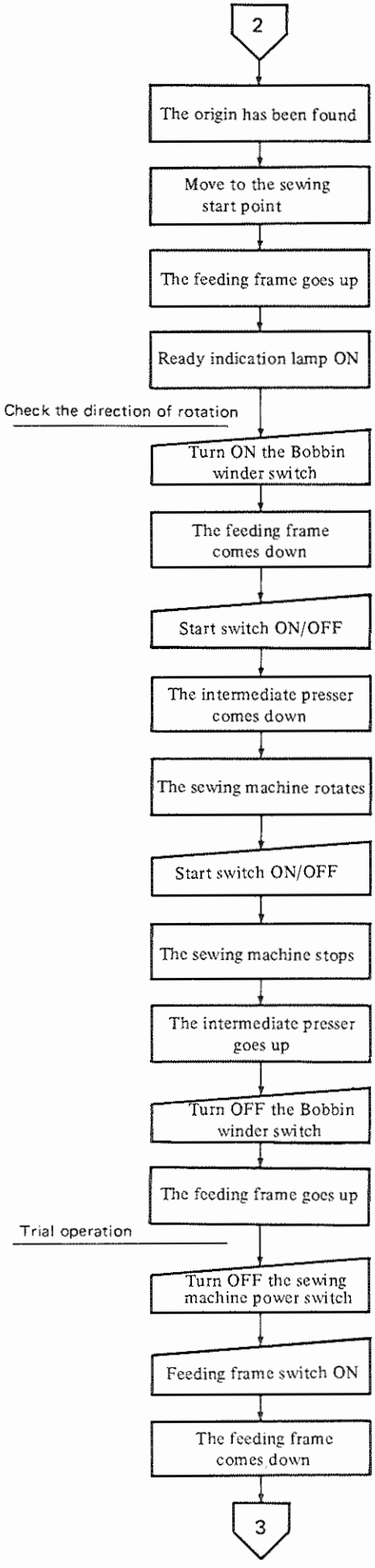
Sewing machine ON/OFF switch → OFF
INC/DEC of the stitch length or the number of stitches → select one of the two.
Bobbin winder → OFF
Needle threading switch → OFF

The sewing machine motor starts.
The operation panel lamps light up.

The ready indication lamp flashes on and off during the computation.

Error "A" The air pressure drops.
Error No. "3" The needle is not in its highest position.
(See the list of errors on page 14.)

The feeding frame comes down once after the power switch is turned ON.

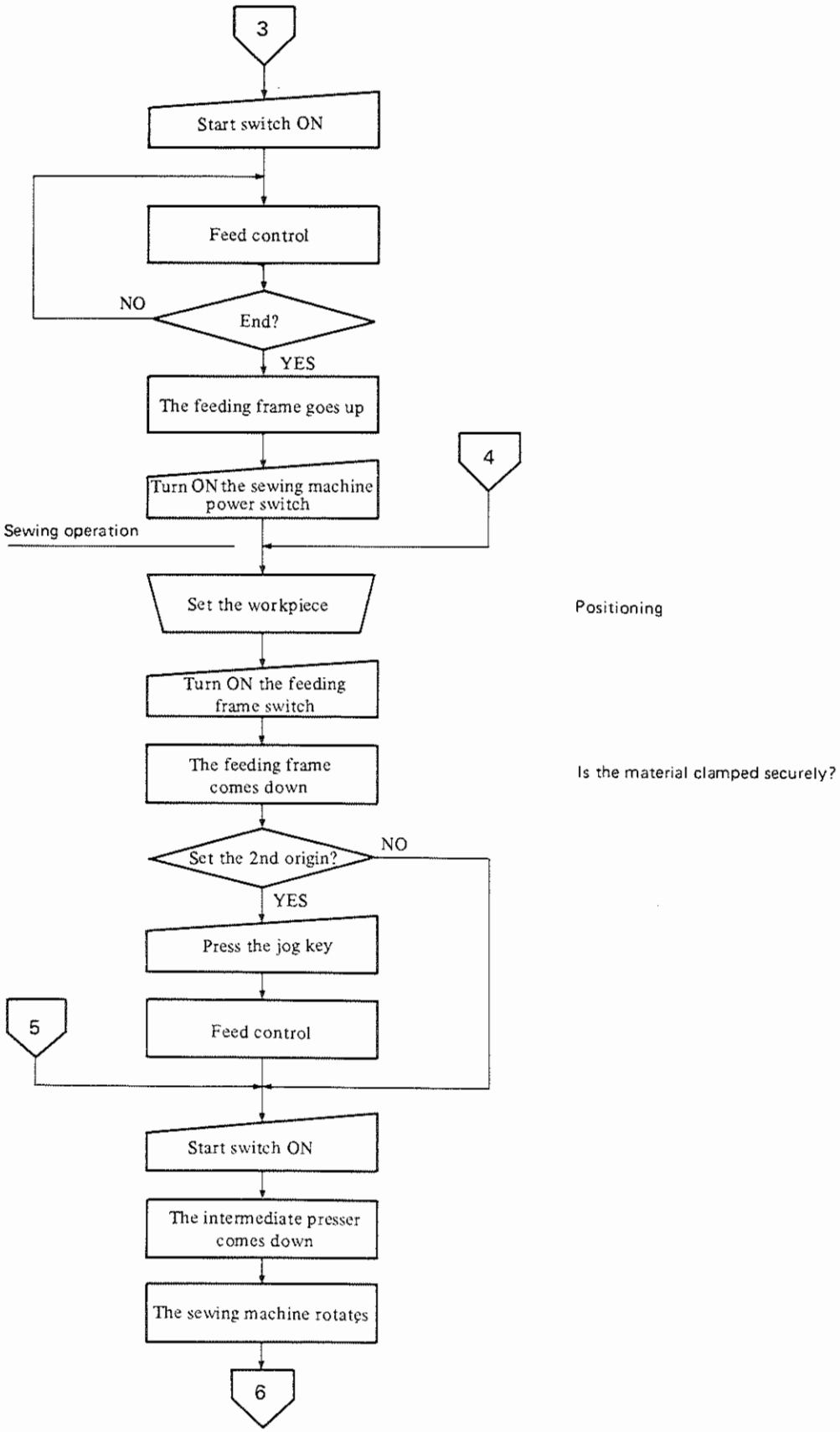


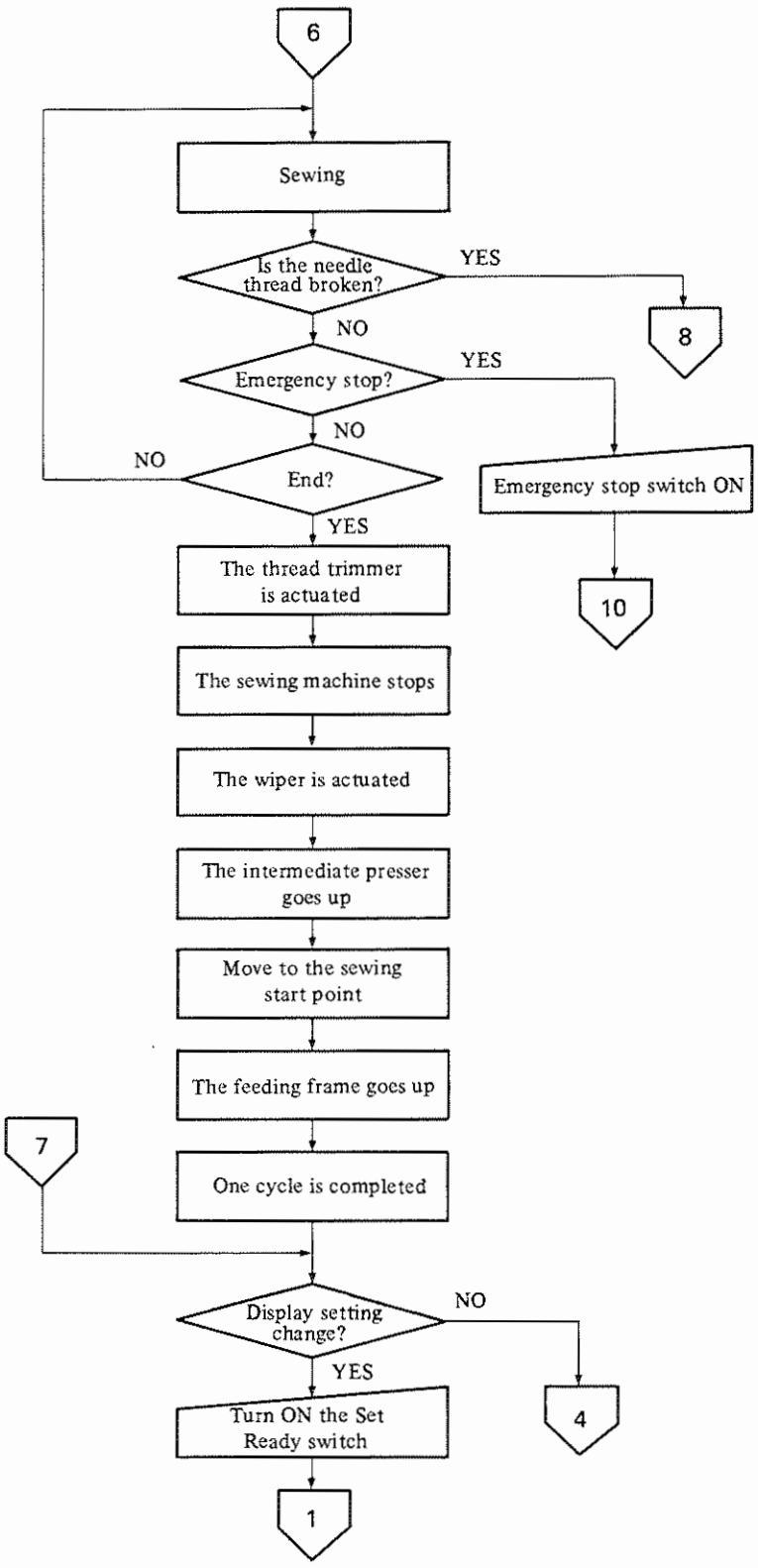
Move to the 2nd origin if it has been set.

Check for any obstacles under the needle.
Remove the needle thread.

Check the direction of rotation.
See the description of error "E" on page 14.

Stops with the needle up.

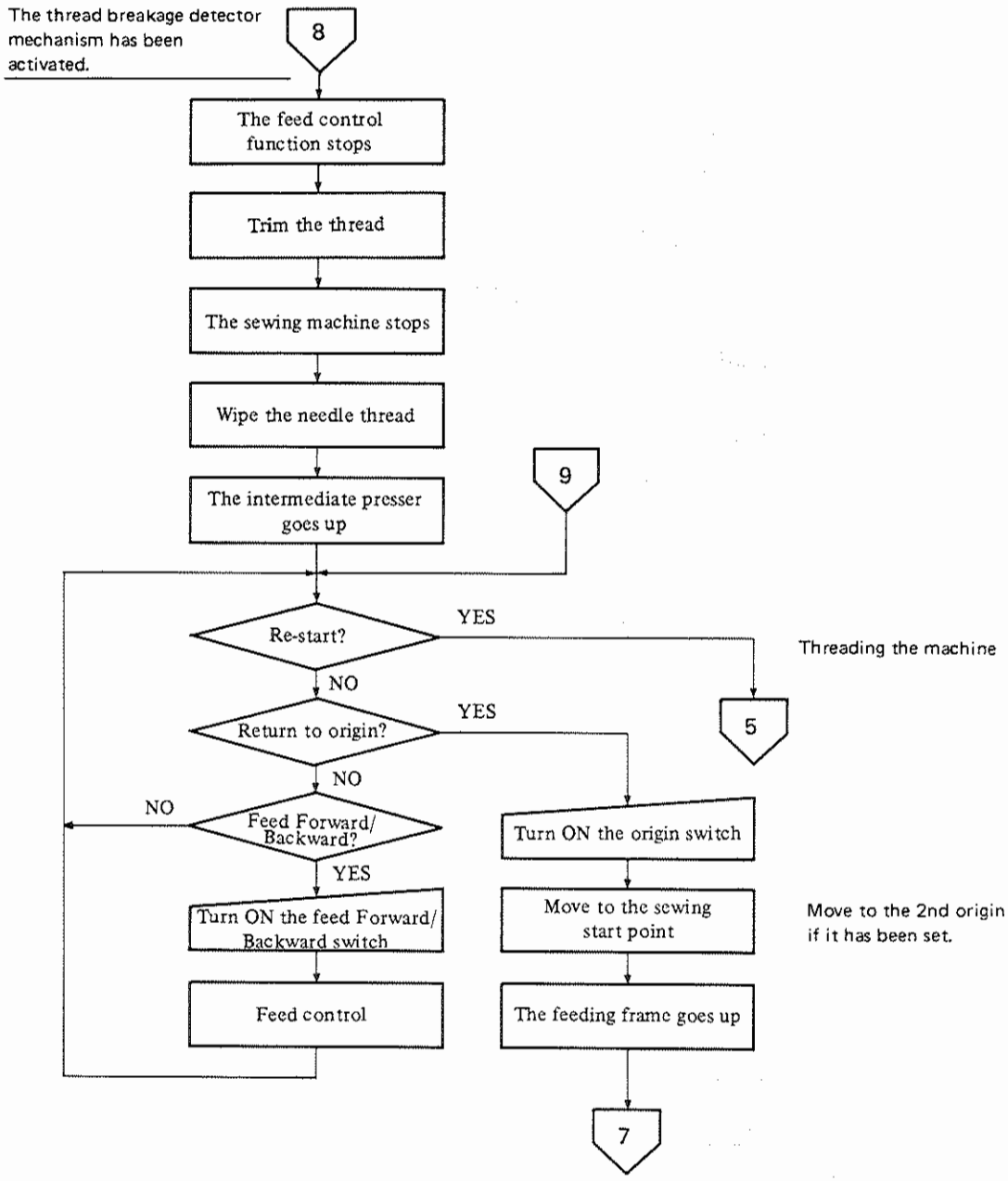

3
Start switch ON
Feed control
NO
End?
YES
The feeding frame goes up
4
Turn ON the sewing machine power switch
Sewing operation
Set the workpiece
Positioning
Turn ON the feeding frame switch
The feeding frame comes down
Is the material clamped securely?
Set the 2nd origin?
NO
YES
Press the jog key
5
Feed control
Start switch ON
The intermediate presser comes down
The sewing machine rotates
6

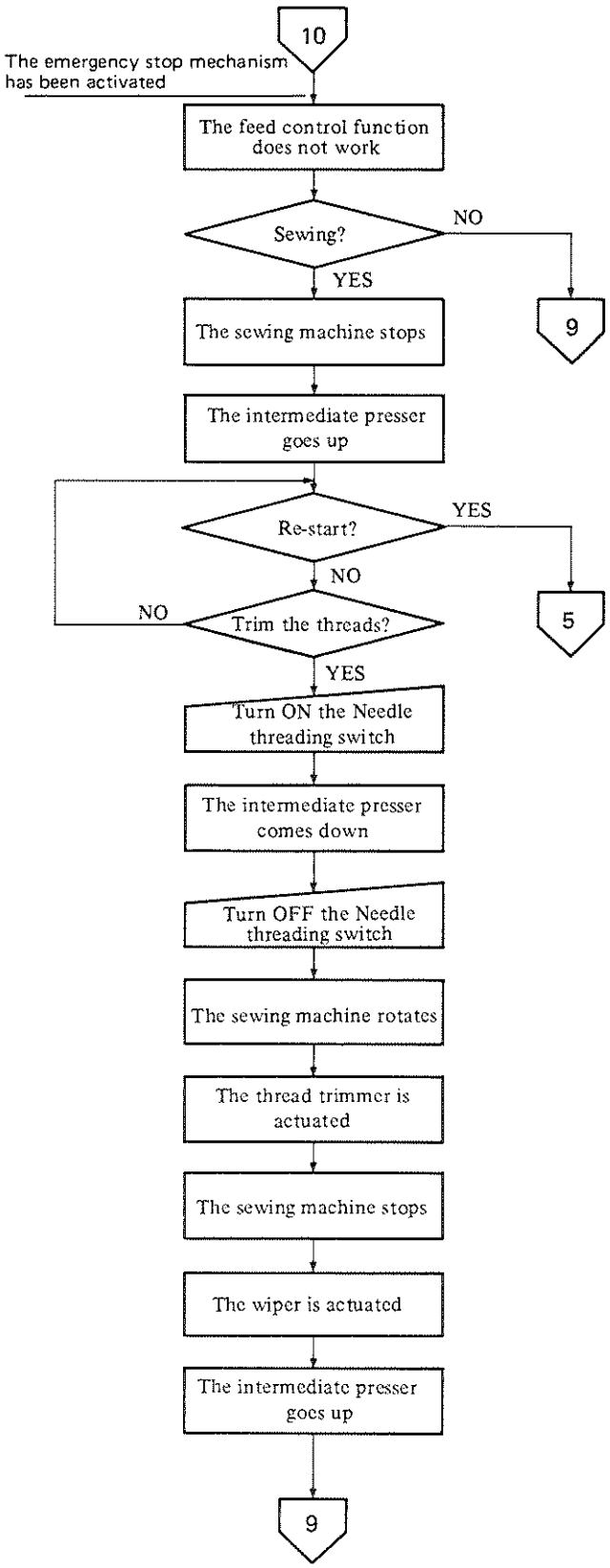


Is there enough thread tension?

Move to the 2nd origin if it has been set.

Reset the Counter display.


The thread breakage detector mechanism has been activated.
8
The feed control function stops
Trim the thread
The sewing machine stops
Wipe the needle thread
The intermediate presser goes up
9
Re-start?
YES
Threading the machine
NO
Return to origin?
YES
5
NO
NO
Feed Forward/ Backward?
Turn ON the origin switch
YES
Turn ON the feed Forward/ Backward switch
Move to the sewing start point
Move to the 2nd origin if it has been set.
Feed control
The feeding frame goes up
7



Eliminate the cause of the emergency stop.

★ Cautions in Operation

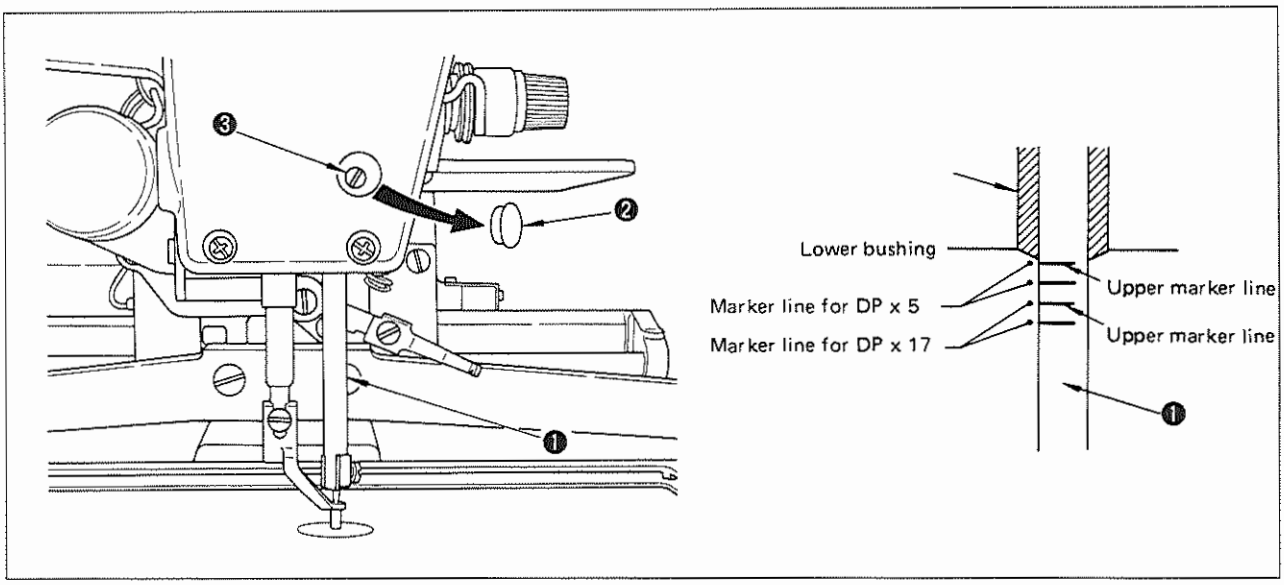
1) Before sewing a new pattern or a newly enlarged pattern, be sure to carry out trial sewing to check the pattern size with respect to the feeding frame.
2) The maximum sewing speed varies according to the stitch length.
   The maximum sewing speed is automatically limited as shown in the table below according to the stitch length. If necessary, the maximum sewing speed can also be limited manually using the max. speed limit control knob.

Stitch length (mm)	Max. sewing speed (s.p.m.)
7.2 ~10.0	400
5.6 ~ 7.0	600
4.6 ~ 5.4	800
4 ~ 4.4	1,000
3.6 ~ 3.8	1,200
3.2 ~ 3.4	1,400
2.8 ~ 3.0	1,600
2.2 ~ 2.6	1,800
0.2 ~ 2.0	2,000

3) When an error indication is given, be sure to identify the cause and take corrective action.
4) Prior to operation, be sure to close the control box cover in order to prevent dust from getting into the control box. Dust into the control box may lead to malfunctions or failures. **Clean the fan filter once every week.**
5) Be sure to turn the power OFF before opening the control box cover.
6) Avoid checking the control circuitry by a tester, or else the tester voltage may be applied to a semiconductor component, and the component may be damaged.
7) Be sure that there is no obstacle under the needle before depressing the start switch to wind a bobbin.
8) Do not put your fingers or any other things under the feeding frame when the machine is computing (this is indicated by the READY lamp flashing ON and OFF), since the feeding frame comes down automatically upon completion of the computation.
9) Avoid pulling the workpiece while sewing. This may prevent correct needle entry. If X or Y needle entry point should be dislocated, press the Set Ready switch twice to go back to the sewing start point.

IV. MAINTENANCE

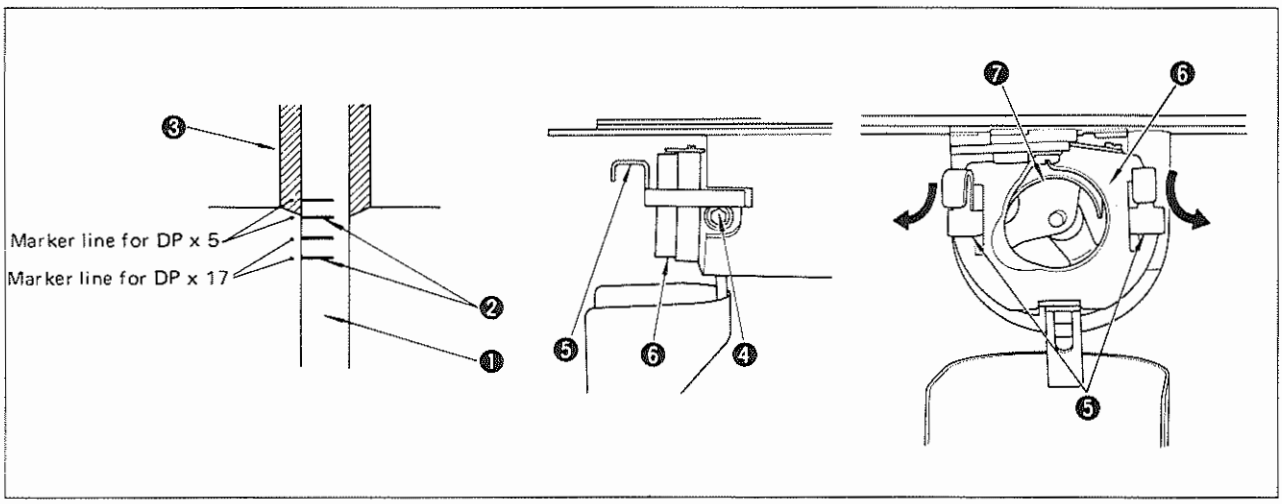
1. Adjusting the height of the needle bar



1) Bring needle bar ❶ down to the lowest in its stroke. Align the upper marker line on the needle bar with the bottom end of the lower bushing of the needle bar, remove cap ❷, and loosen setscrew ❸ Then correctly adjust the height of the needle bar.
2) The needle bar has a pair of marker line for the DP x 5 needle, and another pair for the DP x 17. Use these pairs of marker lines according to the needle to be used.

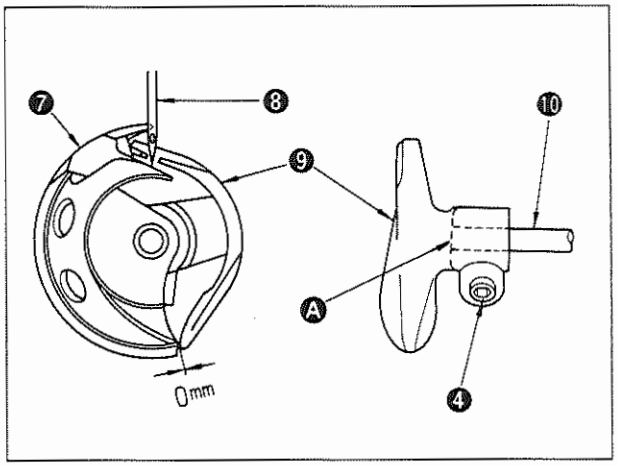
(Caution) Adjust the shuttle timing so that it runs slightly faster than normal timing when sewing floppy materials, or so that it runs slightly slower when sewing heavy-weight materials.

2. Adjusting the needle-to-shuttle relationship

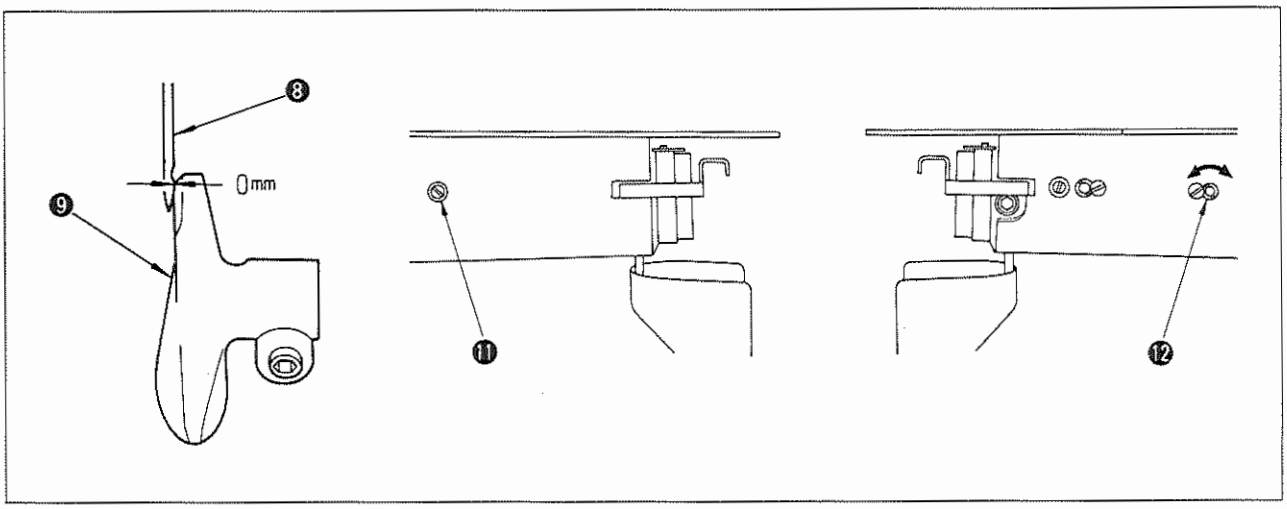


1) Turn the handwheel by hand to raise needle bar ❶ so that marker line ❷ aligns with the bottom end of needle bar lower bushing ❸. Loosen setscrew ❹ (with hexagon socket head). Open right and left hooks ❺ in the direction of the arrows while pulling them toward you, and remove shuttle race ring ❻.

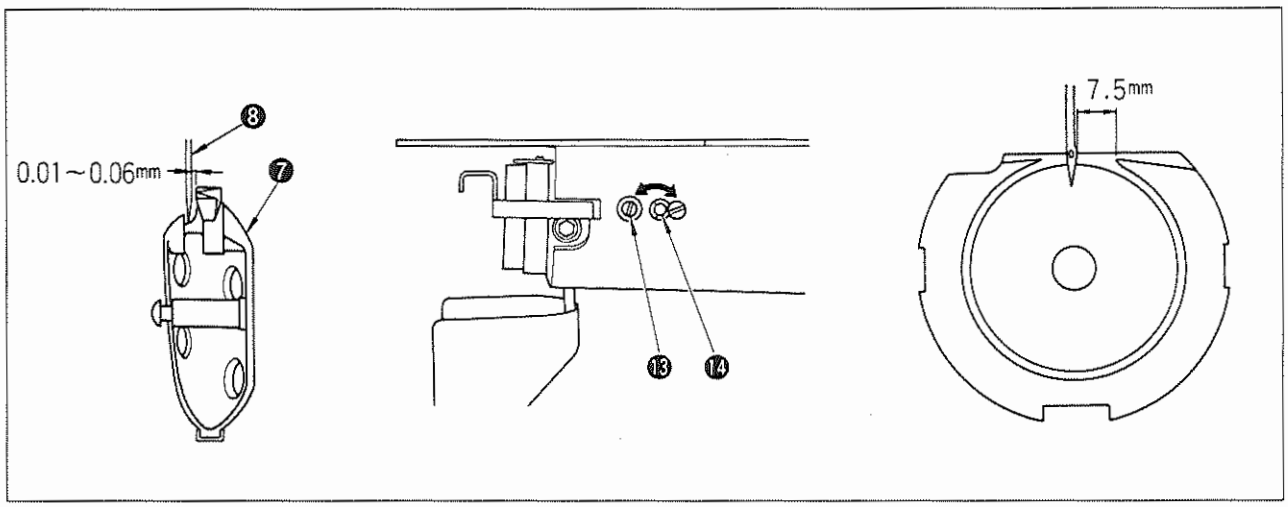
(Caution) At this time, be careful not to let shuttle ❼ come off and fall.



2) Adjust so that the blade point of shuttle ⑦ meets the center of needle ⑧, and so that driver ⑨ is aligned with the shuttle driver shaft ⑩ on face Ⓐ. Then tighten shuttle driver setscrew ④.



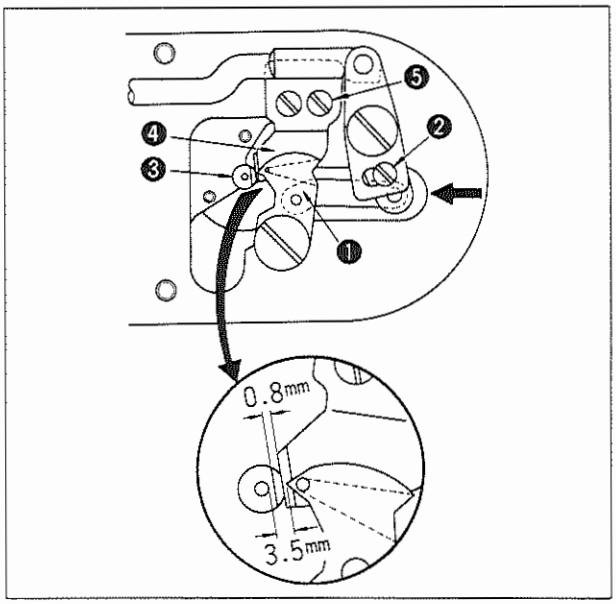
3) Loosen front bushing setscrew ⑪, turn front bushing adjusting shaft ⑫, and adjust so that the clearance between needle ⑧ and the front-end surface of shuttle driver ⑨ is 0 mm. Then tighten front bushing setscrew ⑪



4) Loosen shuttle race setscrew ⑬, and adjust the longitudinal position of the shuttle race. To do this adjustment, turn shuttle race adjusting shaft ⑭ clockwise or counterclockwise to provide a 0.01 to 0.06 mm clearance between needle ⑧ and the point of shuttle ⑦.

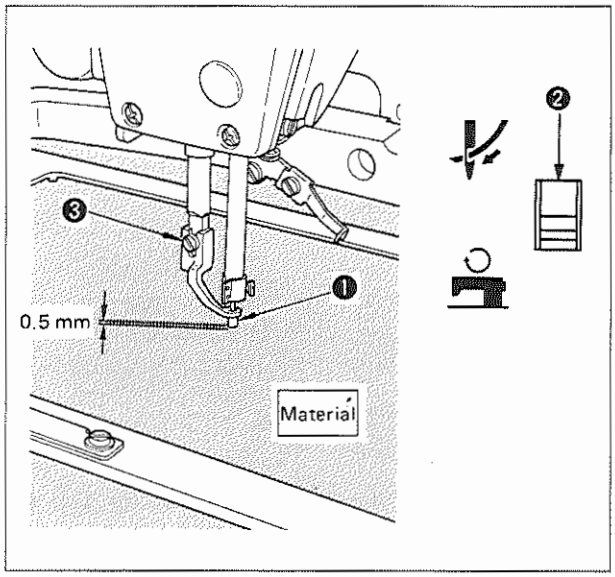
5) After adjusting the longitudinal position of the shuttle race, further adjust to provide a 7.5 mm clearance between the needle and the shuttle race. Tighten setscrew ⑬.
[When using thin threads with a thread thickness indication number of #50 or higher, adjust so that there is a 7.2 mm clearance between the needle and the shuttle race.]

3. Adjusting the moving knife and the counter knife



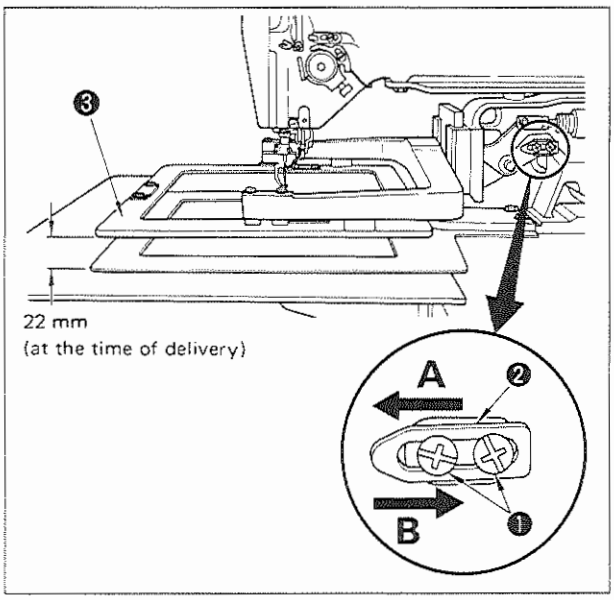
1) When the machine stops with its needle up, press in the direction of the arrow to eliminate any play. Then loosen adjusting screw ❷ and adjust so that a 3.5 mm clearance is obtained between the thread spreader of moving knife ❶ and the periphery of the needle hole.
2) After adjustment, actuate the thread trimmer by hand to check for proper positioning.
3) Loosen setscrew ❺ , and adjust so that there is a 0.8 mm clearance between needle hole guide ❸ and counter knife ❹ .

4. Adjusting the height of the intermediate presser



1) Be sure that the needle is positioned in the center of hole intermediate presser ❶ .
2) Make sure that the sewing LED lamp is ON, then set Needle threading switch ❷ in the control box to the side so as to cause the intermediate presser and the feeding frame to come down. Turn the handwheel to bring the needle down to its lowest position. Loosen screw ❸ and adjust to obtain a 0.5 mm clearance (depending on the thickness of the thread to be used) between the sole of the intermediate presser and the material.
When using floppy materials, allow the intermediate presser to closely adhere to the material (make a 0 mm clearance), if necessary.
3) After making the adjustment, set the Needle threading switch ❷ to side. The sewing machine will then be actuated, and will return to the needle-up stop position.
(The intermediate presser can be used for material whose thickness is 5 mm or less.)

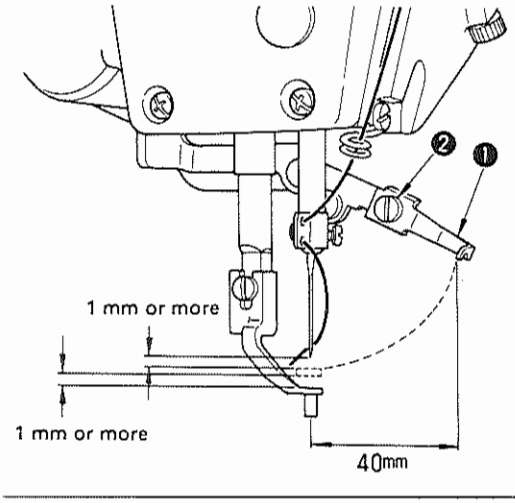
5. Adjusting the height of the feeding frame

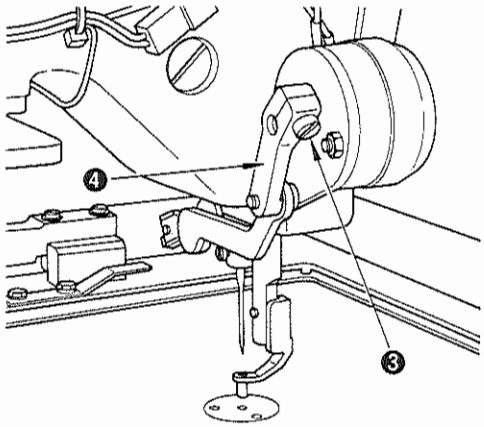


1) Loosen setscrew ❶ and set stopper ❷ the side of arrow A, and the height of feeding frame ❸ will be reduced. Set the stopper to the side of arrow B to add to the height of the feeding frame.
2) After making the adjustment, firmly tighten set-screw ❶ .

(Caution) Stoppers ❷ are equipped both on the left and right side. Be sure to make equal adjustment on both sides.

6. Adjusting the wiper



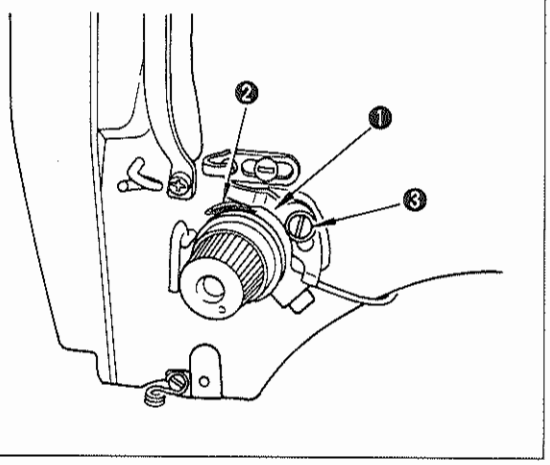


When the sewing LED lamp is ON, raise the needle to the highest position in its stroke, and set the Needle threading switch to the side. Loosen screw ❷ and adjust so that, when wiper ❶ passes under the needle point, the clearance between the wiper and the needle is 1 mm or more, and so that the clearance between the wiper and the intermediate presser is also 1 mm or more.

Loosen wiper arm setscrew ❸ , and adjust the attaching angle of wiper arm ❹ so that, when the wiper is in its home position, the distance between the center of the needle and the end of wiper ❶ is 40 mm.

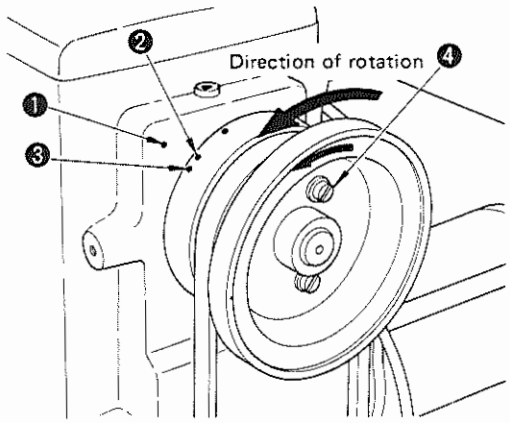
(When sewing heavy materials whose thickness exceeds 3 mm, there will be no clearance between the wiper and the needle, and between the wiper and the intermediate presser. Be sure to change the setting of the DIP switch by referring to the explanation of DIP Switch SW5-4 on page 17.)

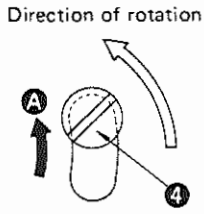
7. Adjusting the thread breakage detector



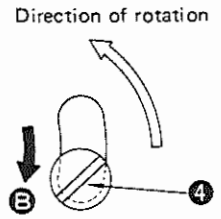
1) Adjust so that thread breakage detector disk ❶ is always in contact with thread take-up spring ❷ in the absence of the needle thread.
(slack: approx. 0.5 mm)
2) Whenever the stroke of thread take-up spring ❷ has been changed, be sure to readjust thread breakage detector disk ❶ . To make this adjustment, loosen screw ❸ .
3) Adjust so that thread breakage detector disk ❶ does not touch any adjacent metallic parts other than thread take-up spring ❷ .

8. Adjusting the needle-up stop position





Stops at the lower marker dot on the handwheel



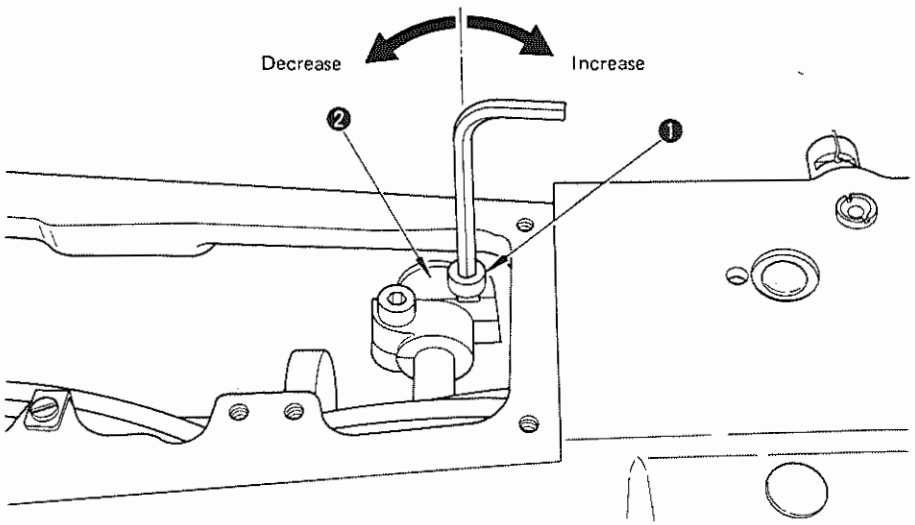
Stops at the upper marker dot on the handwheel

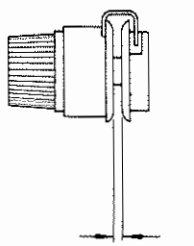
1) Marker dot ❶ on the machine arm should stop between upper marker dot ❷ and lower marker dot ❸ on the handwheel.
2) When adjusting screw ❹ is loosened and moved in the direction of arrow Ⓐ, the machine will stop at lower marker dot ❸. When it is moved in the direction of arrow Ⓑ, the machine will stop at upper marker dot ❷.

(Caution) 1. Usually, no adjustment is required. However, if the stop position has been adjusted, be sure to check the new stop position, setting a workpiece.

2. If the machine stops before the lower marker dot is reached, chances for thread trimmer failures or thread slipping off the needle may increase. On the contrary, if the machine stops beyond the upper marker dot, the wiper may interfere with the needle. Properly adjust the stop position.

9. Adjusting the float (lift) amount of the tension disk

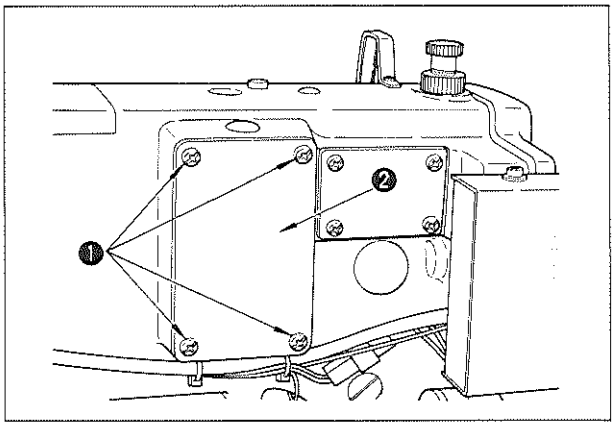


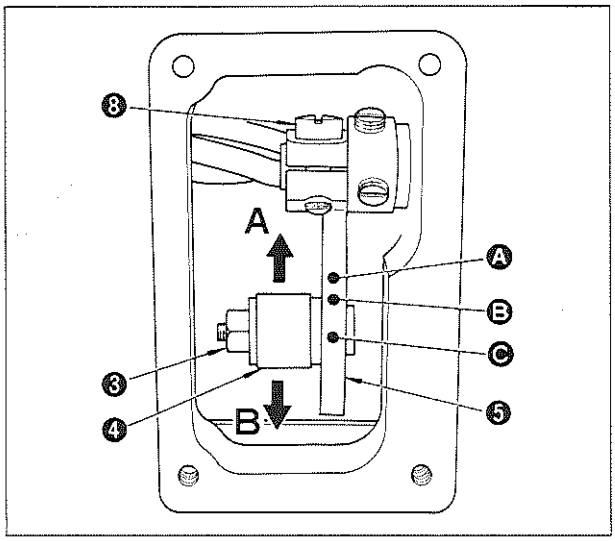


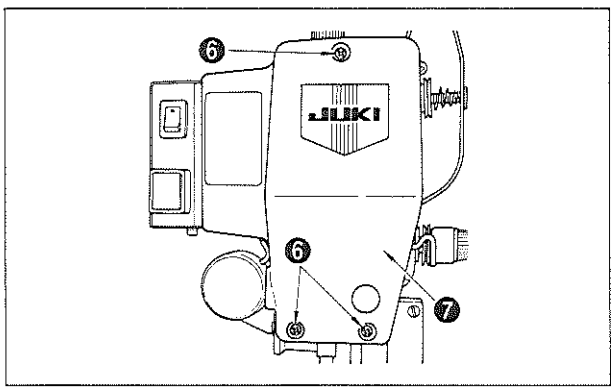
Float (lift) amount A

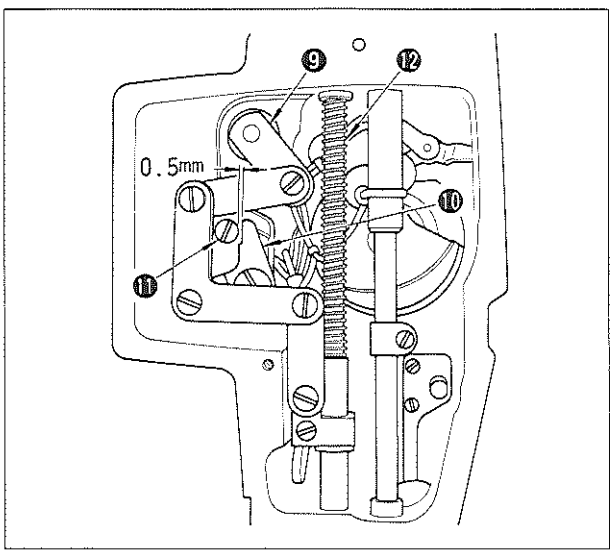
1) Remove the top cover.
2) Loosen setscrew ❶, and adjust the thread tension arm ❷ to obtain a tension disk float (lift) amount of 0.6 to 0.8 mm for thread trimming.
3) After making the adjustment, turn the handwheel by hand to check whether the tension disk keeps floating until the thread take-up lever reaches its upper dead-end point. Keep turning the handwheel, and check that the tension disk is firmly closed after the thread take-up lever starts lowering.

10. Adjusting the vertical stroke of the intermediate presser









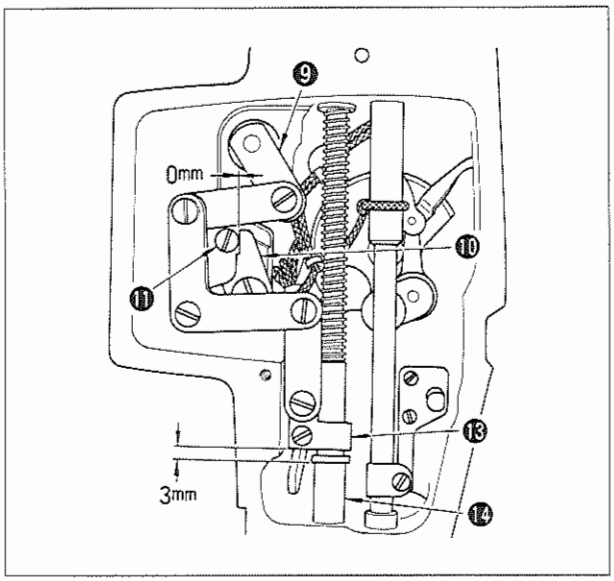
★ **The vertical stroke of the intermediate presser can be adjusted within the range from 3 mm to 7 mm.**

1) Remove setscrew ❶ , and remove cover ❷ .
2) Loosen rod connecting shaft nut ❸ of the intermediate presser, shift intermediate presser rod ❹ in direction Ⓐ to increase the stroke, or in direction Ⓑ to decrease the stroke. Adjust the stroke to 4 mm (normal).
3) Use marker dots Ⓐ , Ⓑ and Ⓒ on the intermediate presser rod arm ❺ to determine the stroke of the intermediate presser. When marker dot Ⓐ is aligned with the center of connecting shaft nut ❸ of the intermediate presser, the stroke will be 6 mm. When marker dot Ⓑ is aligned with the center of the nut, the stroke will be 5 mm, and when marker dot Ⓒ is aligned with the center of the nut, the stroke will be 4 mm.

★ **When setting the intermediate presser stroke to 0 mm (fixing it to stay in its lower dead-end point), make the following adjustments:**

4) Fix connecting rod nut ❸ of the intermediate presser so that the intermediate presser stays in the lowest position of its stroke.
5) Raise the needle bar to the highest position of its stroke.
6) Remove setscrew ❻ , and move face plate ❼ .
7) Loosen setscrew ❽ , and adjust so that there is a 0.5 mm clearance between intermediate positioning link ❿ and positioning pin ⓫ by shifting intermediate swing shaft ❾ .
8) Firmly tighten setscrew ❽ .

* Turn the handwheel by hand, and make sure that intermediate presser positioning link ❿ does not come in contact with positioning pin ⓫ , and that intermediate presser swing shaft ❾ does not come in contact with intermediate presser spring ⓬ .
Be sure to make the above adjustments after having decreased the air pressure to 0 kg/cm^2. (See Section 4, "Connecting the air supply," on page 6.)



★ **When resetting the intermediate presser stroke to 3 to 7 mm, make the following adjustments:**

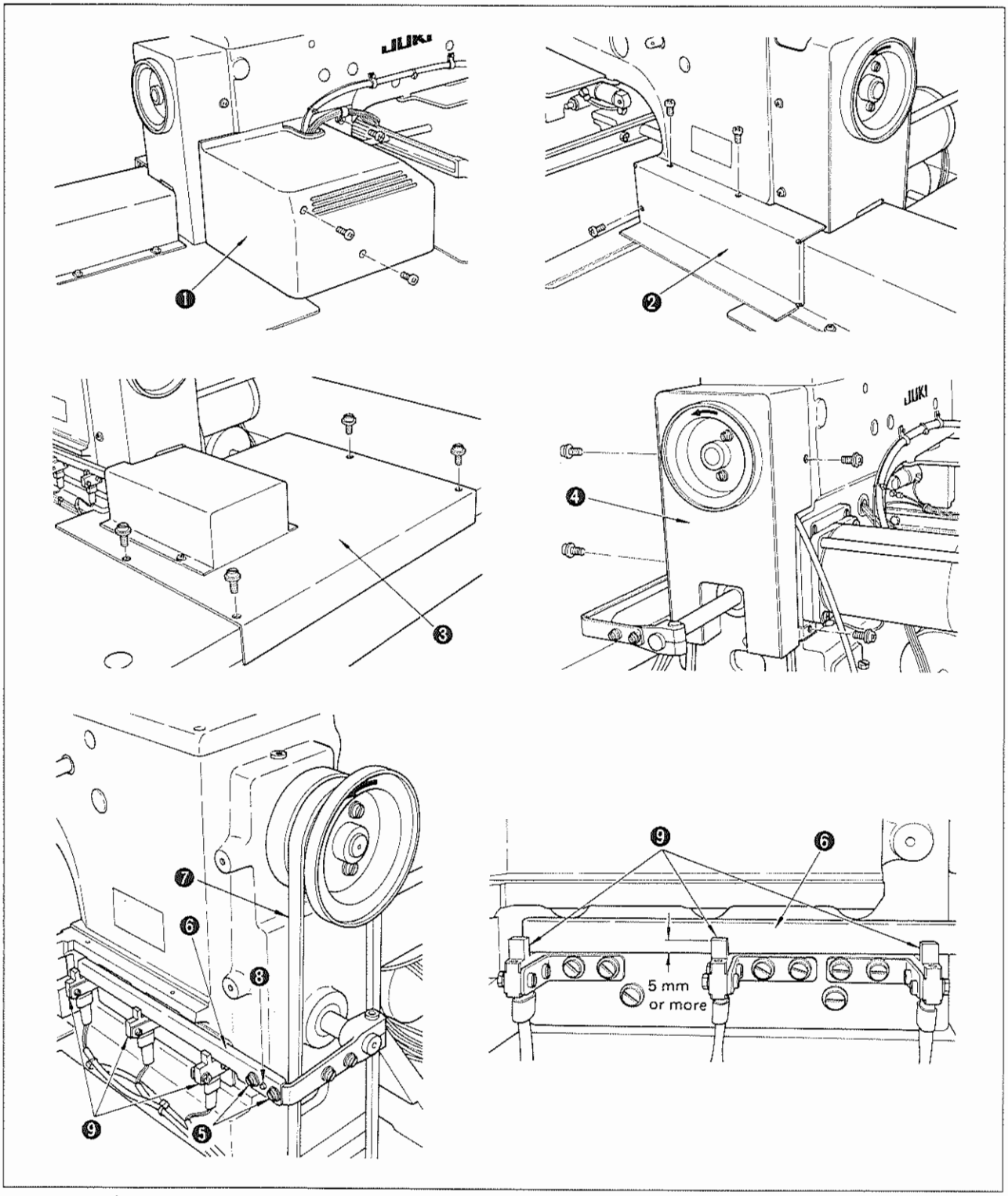
9) Lower the needle bar to its lower dead-end point.

10) Loosen setscrew ⑧, and shift intermediate presser swing shaft ⑨ so that intermediate presser positioning link ⑩ closely adheres to positioning pin ⑪, and so that the clearance between guide bracket ⑬ and intermediate presser bushing ⑭ is 3 mm.

11) Firmly tighten setscrew ⑧.

* Turn the handwheel by hand to rotate the main shaft. Then make sure that intermediate presser positioning link ⑩ closely adheres to positioning pin ⑪.
Be sure to make the above adjustments after having decreased the air pressure to 0 kg/cm^2. (See Section 4, "Connecting the air supply," on page 6.)

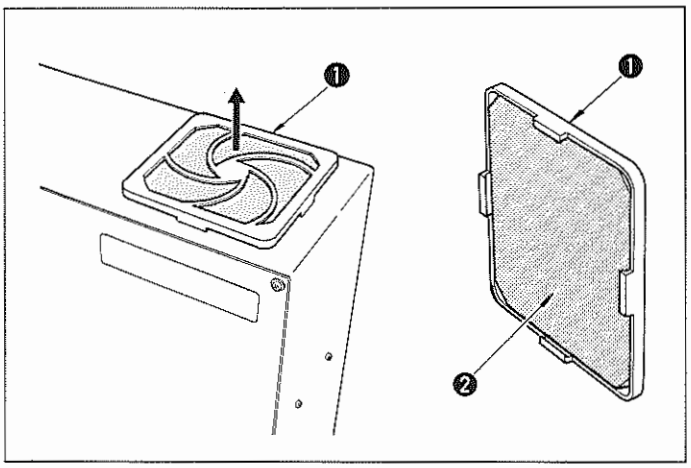
11. How to remove the V-belt



1) Remove side cover ❶ , Y-sensor cover ❷ , table rear cover ❸ , and belt cover ❹ .
2) Remove setscrew ❺ , and then remove Y-slit plate ❻ .
3) Remove the V-belt ❼ .

(When attaching Y-slit plate ❻ , determine the longitudinal position using positioning pin ❽ , and fit the plate into the groove of Y-sensors ❾ to reach 5 mm inside of the top and of the groove parallel with the sensors. Make sure that the Y-slit plate ❻ passes through the middle of the groove of the Y-sensors ❾ , but dose not come in contact with the sensors.)

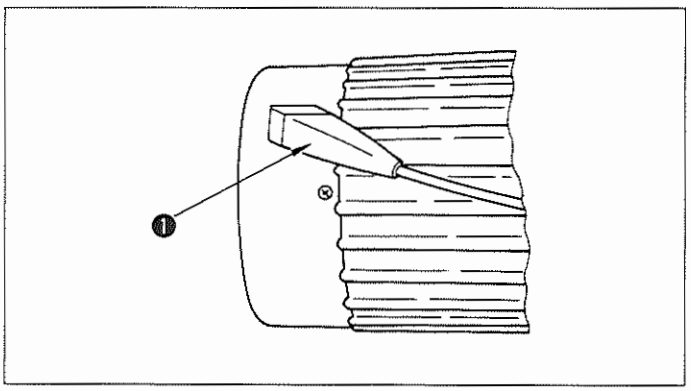
12. Cleaning the filter



Clean the filter ❷ of the control box fan once every week.

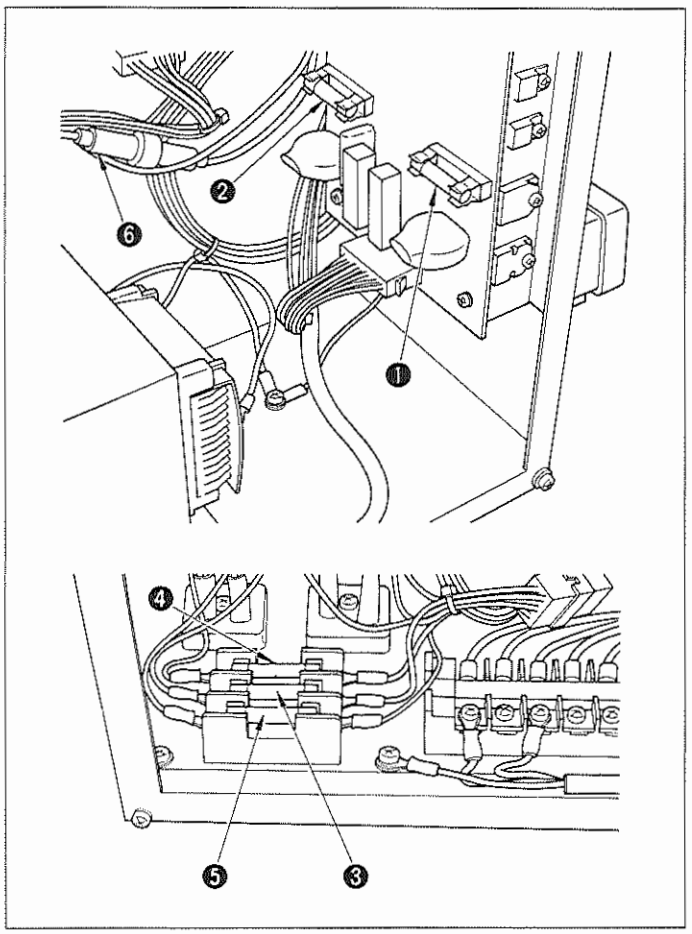
1) Pull the screen kit ❶ in the direction of the arrow to remove it.
2) Wash the filter ❷ under running water.
3) Reinstall the filter ❷ and the screen kit ❶.

13. Changing the direction of rotation of the sewing machine



1) Turn the power switch OFF.
2) Remove connector ❶ from the rear of the motor (on the opposite side from the handwheel).
3) Reverse the connector and reconnect it securely.

14. Replacing the fuse

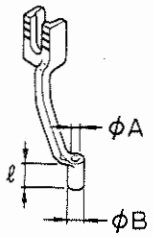
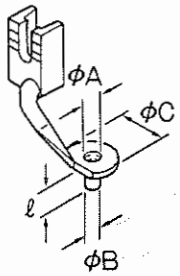
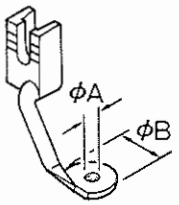
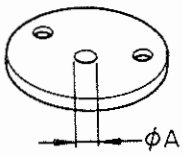
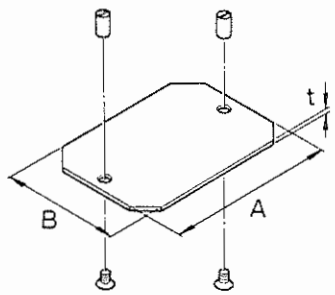
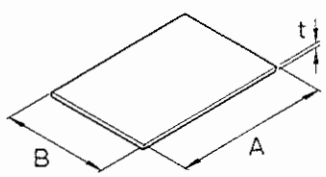


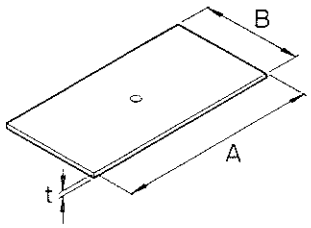
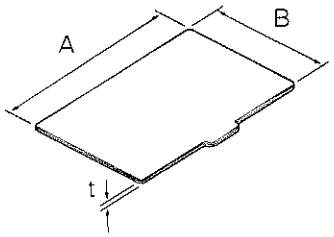
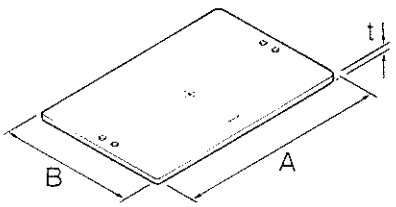
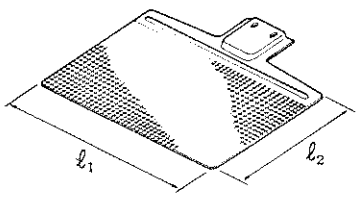
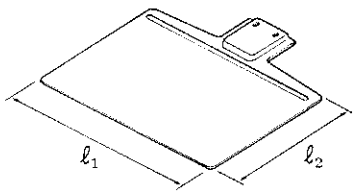
The machine uses the following six fuses:

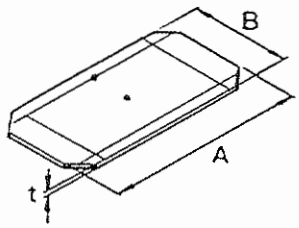
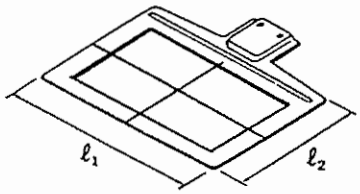
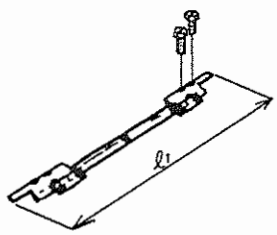
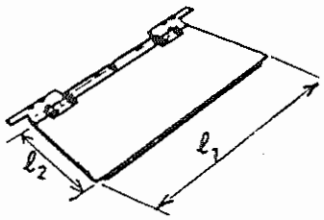
❶ 5A standard melting fuse for stepping motor (X) protection
❷ 7A standard melting fuse for stepping motor (Y) protection
❸ 10A standard melting fuse for stepping motor power supply protection
❹ 7AT time-lag fuse for solenoid power supply protection
❺ 1A standard melting fuse for 100VAC power supply protection
❻ 2A standard melting fuse for marking light power supply protection

(Caution) To replace a blown fuse, turn the power switch OFF, open the control box cover, and replace it with a new fuse with the specified capacity.

V. OPTIONS

Name of part	Type	Part No.	Size (mm)
1. Intermediate presser 	Intermediate presser (B)	B1610 220 00B	ϕA x ϕB x ℓ 3.5 x 5.5 x 6
	Intermediate presser (C)	B1601 220 00C	ϕA x ϕB x ϕC x ℓ 2.2 x 3.6 x 12 x 6
	Intermediate presser (D)	B1601 220 00D	ϕA x ϕB 2.2 x 12
2. Needle hole guide 	Needle hole guide (B) for medium-weight materials Needle hole guide (C) for knitted materials Needle hole guide (D) for heavy-weight materials Needle hole guide (F) for extra heavy-weight meterials	B2426 210 00B B2426 210 00C B2426 210 00D B2426 210 00F	ϕA = 2.0 ϕA = 1.6 ϕA = 2.4 ϕA = 3.0
3. Plastic blank 	Plastic feeding frame blank stud	B2559 220 000	
	Plastic feeding frame blank plate	B2557 220 000	A x B x t 278 x 193 x 3
	Screw	SS1090510SP	
	Rubber sheet	B2591 220 000	A x B x t 250 x 200 x 1.5

Name of part	Type	Part No.	Size (mm)
4. Auxiliary throat plate cover sheet 	Auxiliary throat plate cover sheet	B1170 220 000	A x B x t 564 x 300 x 0.13
5. Sponge sheet for feeding frame 	Sponge sheet for feeding frame	B2591 220 00B	A x B x t 296 x 196 x 1.5
6. Feeding frame blank 	Feeding frame blank	B2553 220 0Y0	A x B x t 344 x 218 x 4
7. Feed plate blank 	Feed plate blank with knurl	B2556 220 0Y0	ℓ_1 = 350 ℓ_2 = 243
	Feed plate blank without knurl	B2556 220 0YB	ℓ_1 = 350 ℓ_2 = 243

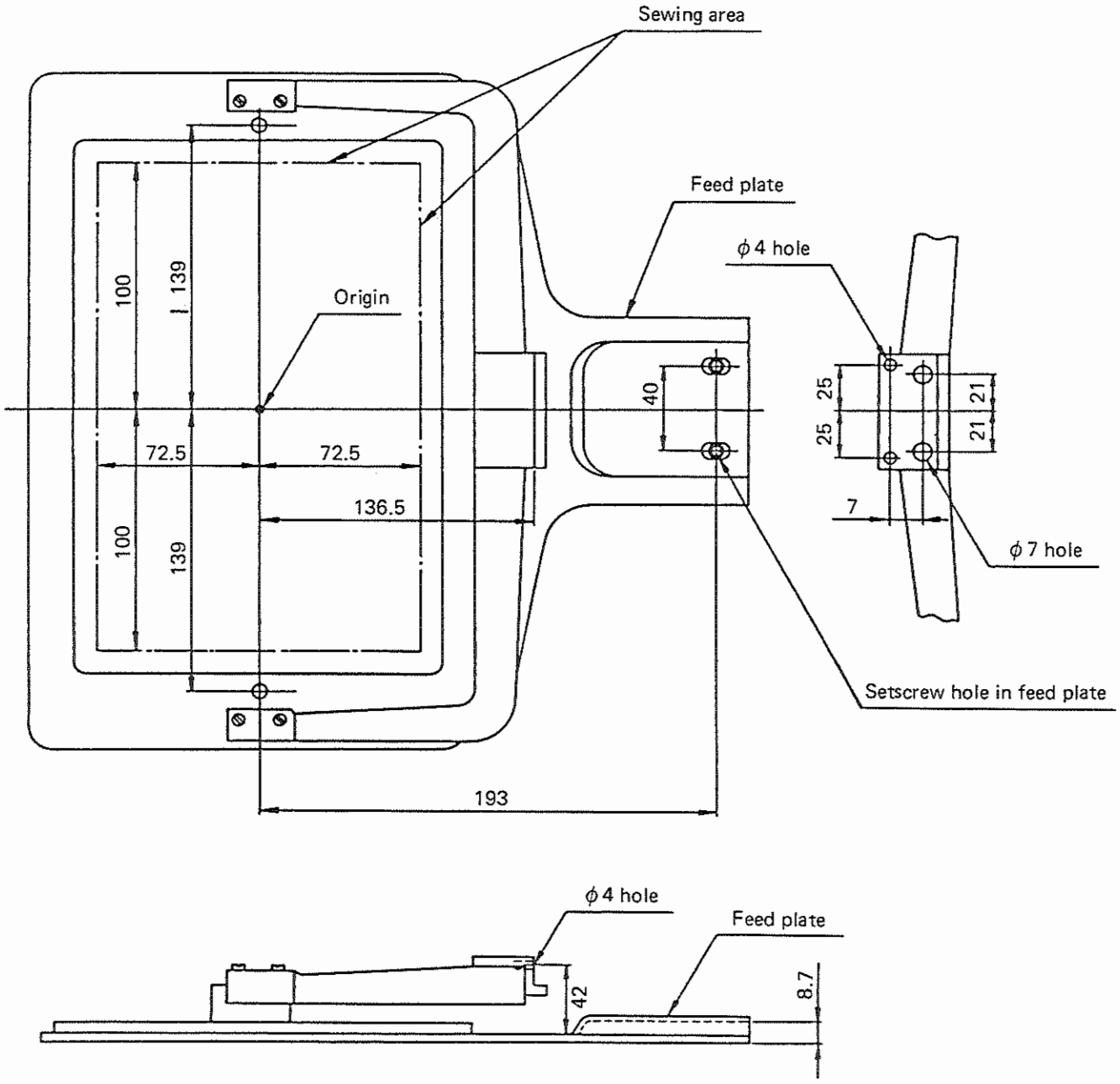
Name of part	Type	Part No.	Size (mm)
8. Origin gauge 	Origin gauge	B2593 220 000	A x B x t 294 x 193 x 3
9. Origin reference lower plate 	Origin reference lower plate	B2594 220 000	ℓ_1 x ℓ_2 350 x 243.5
10. Cassette holder 	Cassette holder fixing plate setscrew	SS9151 440 CP	
	Cassette holder fixing plate	B2581 220 000	$\ell_1 = 328$
	Cassette holder (asm.)	B2582 220 0A0	ℓ_1 x ℓ_2 380 x 247.5

VI. TROUBLES AND CORRECTIVE MEASURES

Trouble	Cause	Corrective measures	Page
1. Thread slips off the needle at sewing start	① Stitches are skipped at sewing start.	○ Adjust the clearance between the needle and the shuttle to 0.01 to 0.06 mm.	32
	② The thread remaining on the needle after thread trimming is too short.	○ Decrease the tension given by thread tension controller No. 1.	9
		○ Increase the tension of the thread take-up spring.	11
	③ The bobbin thread is too short	○ Decrease the bobbin thread tension.	9
		○ Increase the clearance between the needle hole guide and the counter knife.	33
	④ The feed timing is bad.	○ Properly adjust the feed timing.	17
2. Thread often breaks or synthetic thread splits finely.	① The shuttle or the shuttle driver has scratches.	○ Remove the shuttle or the shuttle driver, and remove the scratches, using a whetstone or buff.	
	② The needle has a defective eye.	○ Replace the needle.	
	③ The needle hole guide has scratches.	○ Buff or replace the needle hole guide.	
	④ The intermediate presser hole is scratched.	○ Buff or replace the intermediate presser.	
	⑤ The needle hits the intermediate presser.	○ Adjust the position of the intermediate presser.	33
	⑥ Fibrous wastes are in the groove of the shuttle race.	○ Remove the shuttle, and remove the fibrous wastes.	31
	⑦ The needle thread tension is too high.	○ Decrease the needle thread tension.	9
	⑧ The thread take-up spring tension is too high.	○ Decrease the thread take-up spring tension.	9
	⑨ The synthetic thread melts due to frictional heat.	○ Use silicone oil.	7
3. Needle often breaks.	① The needle is bent.	○ Replace the needle.	7
	② The needle hits the intermediate presser.	○ Properly position the intermediate presser.	33
	③ The feed timing is bad.	○ Correct the feed timing.	17
	④ The needle is too thin for the material.	○ Use a needle of the size suited to the material.	7
	⑤ The needle bends in contact with the shuttle driver.	○ Correct the needle-to-shuttle relationship in position.	32
4. Thread trimmer fails to trim thread.	① The counter knife is dull.	○ Replace the counter knife.	33
	② The clearance between the needle hole guide and the counter knife is too small.	○ Correct the clearance.	33
	③ The moving knife has been improperly positioned.	○ Correct the position of the moving knife.	33
	④ The last stitch has been skipped.	○ Correct the timing between the needle and the shuttle.	32
		○ Attach the needle so that the long groove of the needle faces slightly to the right.	7
5. Stitches are frequently skipped.	① The timing between the needle and the shuttle is bad.	○ Correctly position the shuttle with respect to the needle.	32
	② The clearance between the needle and the shuttle is too large.	○ Correctly position the shuttle with respect to the needle.	32
	③ The needle is bent.	○ Replace the needle.	7
	④ The feed timing is not correct.	○ Correct the feed timing.	17
	⑤ The needle bends in contact with the shuttle driver.	○ Correct the position of the shuttle driver.	32
	⑥ The height of the intermediate presser is incorrect.	○ Correct the height of the intermediate presser.	33
	⑦ The needle is not attached correctly.	○ Attach the needle so that the long groove of the needle faces slightly to the right.	7

Phenomenon	Cause	Corrective measure	Page
6. Improperly tensed stitches are made.	① Needle thread tension is insufficient. ② Tension disc No. 2 floats from its predetermined position. ③ Feed timing is not proper. ④ Height of intermediate presser is improper.	○ Increase the needle thread tension. ○ Adjust installation of tension disc No. 2. ○ Adjust the material feed timing. ○ Adjust the height of the intermediate presser.	9 9 17 33
7. Thread breaks at the time of thread trimming.	① Moving knife and counter knife are improperly positioned.	○ Adjust the position of the moving knife and counter knife.	33

(Diminsions of feeding frame)



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To order or for further information, please contact :

Please do not hesitate to contact our distributors or agents in your area for further informations when necessary.

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