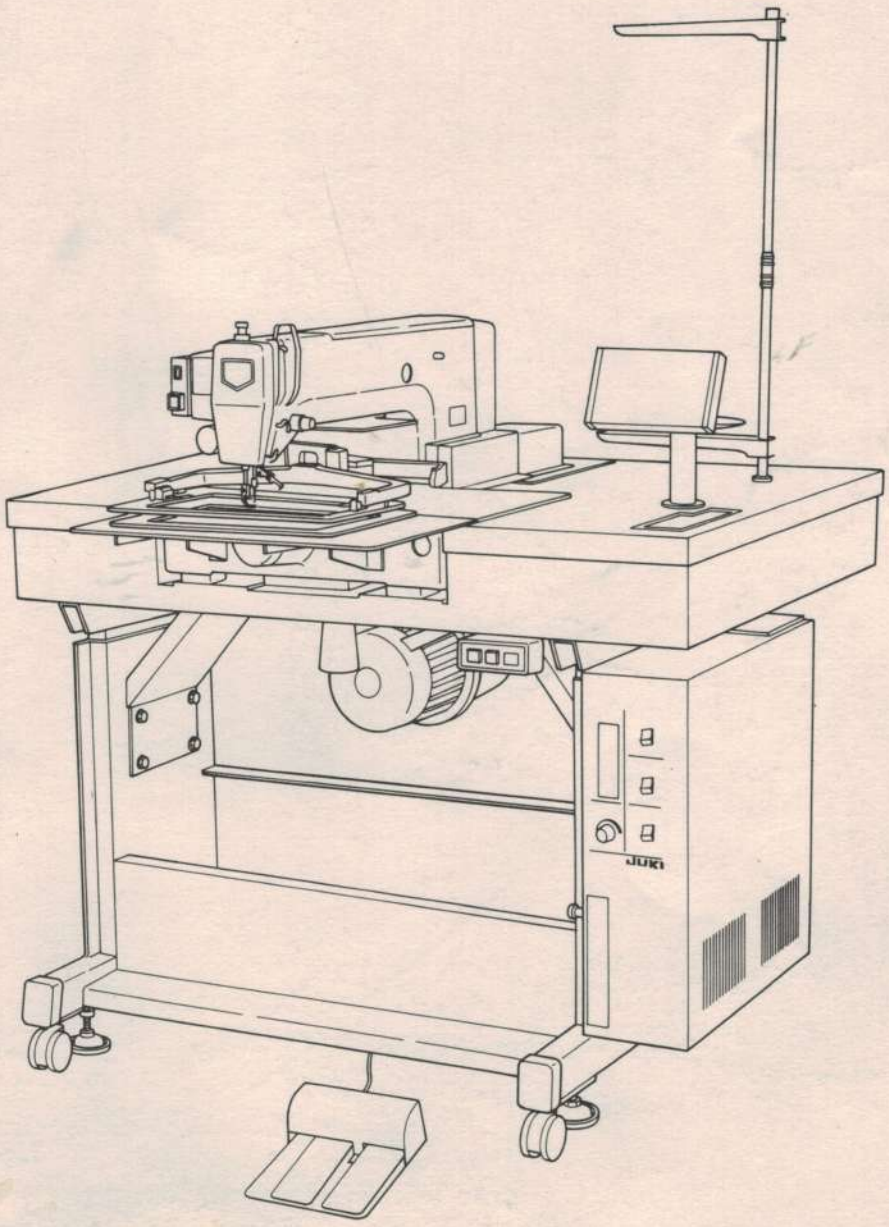
JUKI

Medium-sized 1-Needle Cylinder-bed, Lockstitch
Computer Control Cycle Machine

# AMS-220C

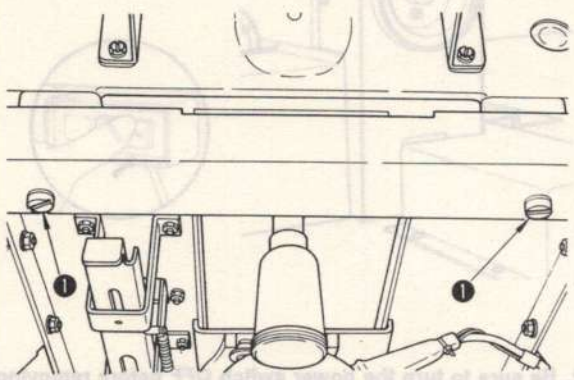
# INSTRUCTION MANUAL



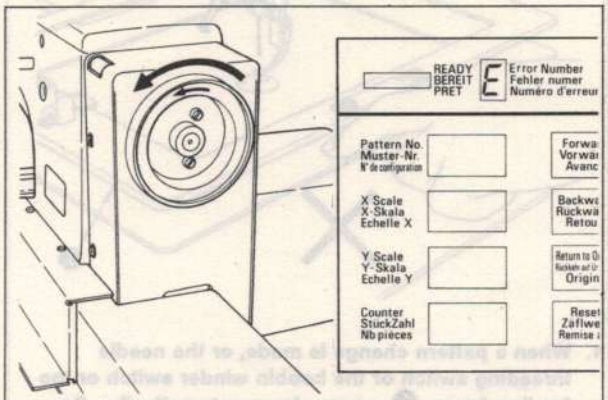

No.00
29056009

Congratulations on your purchase of JUKI Model AMS-220C.
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.

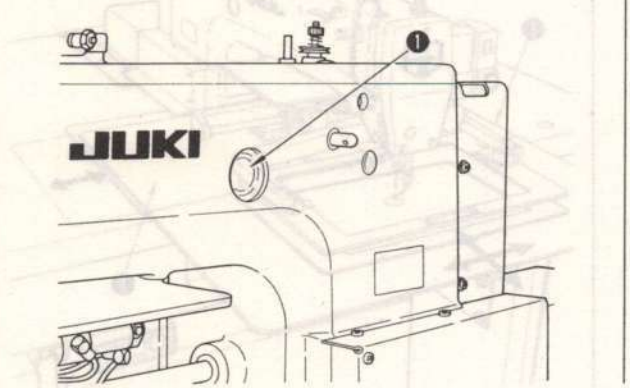
## PRECAUTIONS TO BE TAKEN

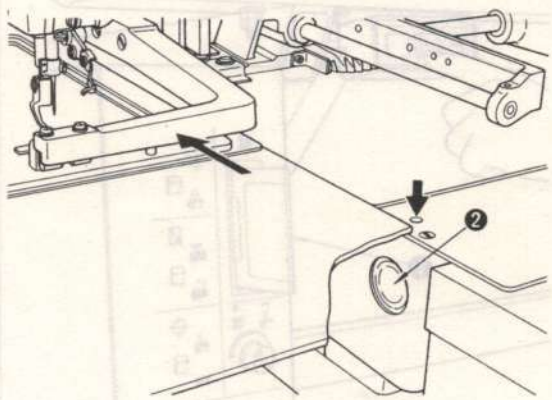


1. **Remove bed fixing bolt ❶ before starting operation. When transporting your AMS-220C, install bed fixing bolt ❶.**

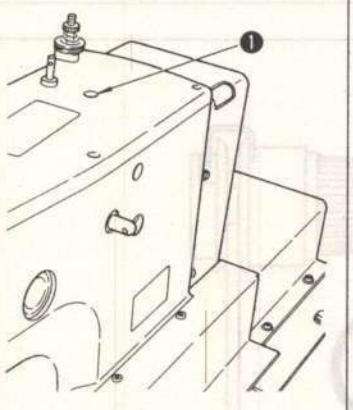


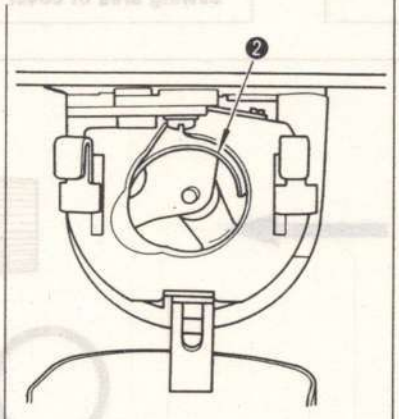

2. **The sewing machine should travel counter-clockwise (in the direction of the arrow), as observed from the pulley side. If the machine is allowed to run clockwise, the machine will automatically stop with error message indicated on the panel.**



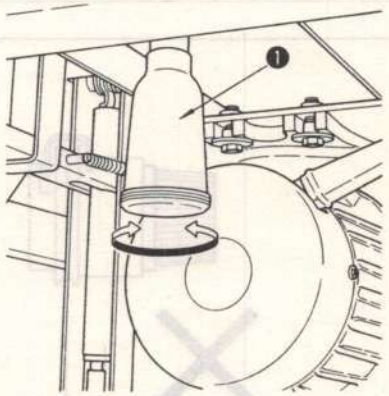



3. **Be sure to supply oil until the oil level reaches red marks ❶ and ❷ on the oil gauge. (When lubricating the bed, be sure to move the feeding frame to the left.)**



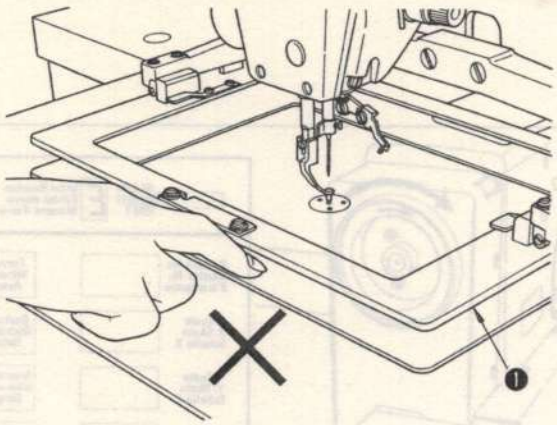


4. **Before starting the machine which has been newly set up or has not been used for a long period of time, apply a few drops of the lubricating oil to the crank assembly through hole ❶, one drop to racing surface ❷.**

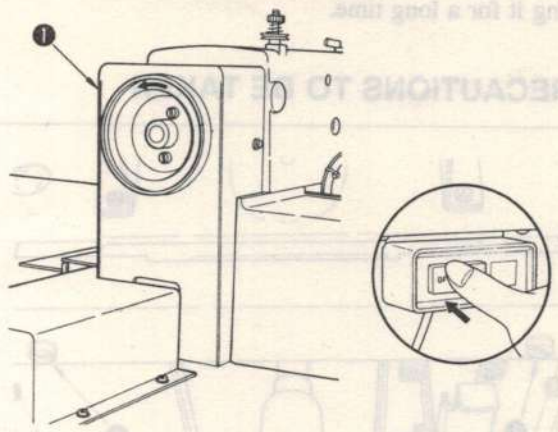


5. **When polyethylene oiler ❶ becomes filled with oil, remove it and drain the oil.**

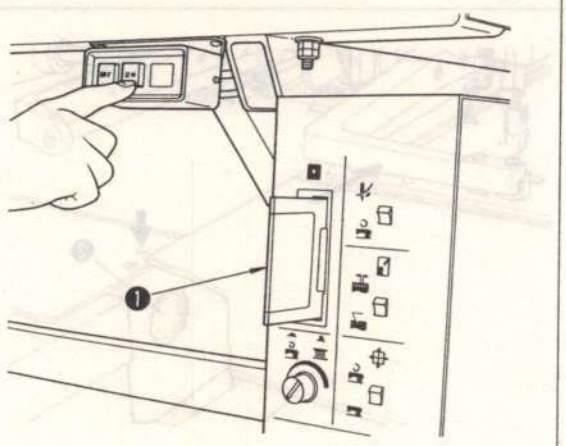
## PRECAUTIONS TO BE TAKEN DURING OPERATION



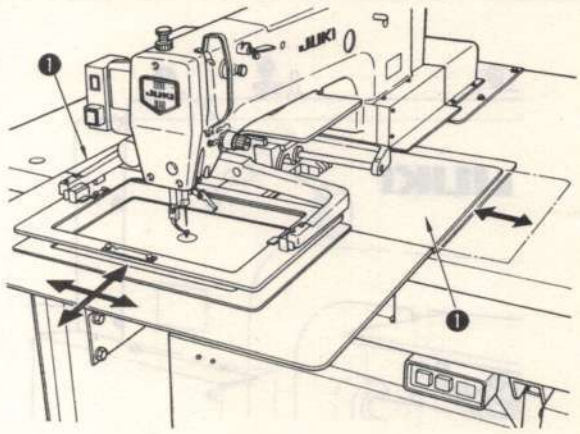

1. When a pattern change is made, or the needle threading switch or the bobbin winder switch or the feeding frame ❶ comes down automatically. So, never put your fingers under the feeding frame. Be sure to keep your fingers away from the feeding frame while the machine is in operation.



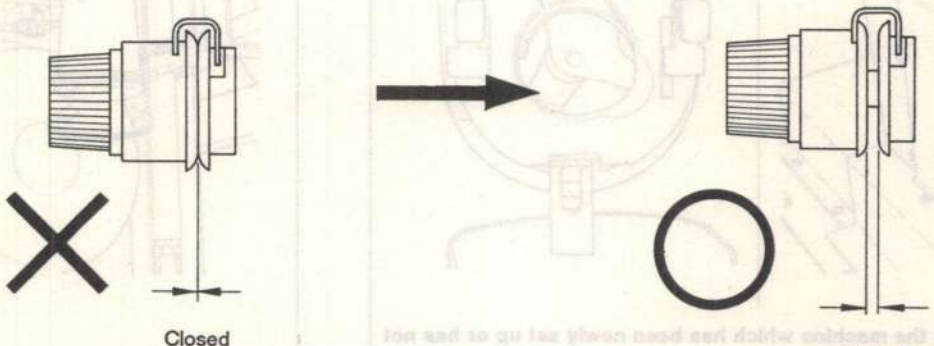

2. Be sure to turn the power switch OFF before removing belt cover ❶.
   Do not operate the machine with the belt cover removed.



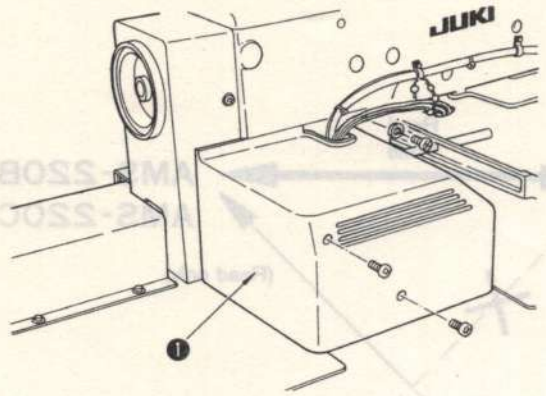

3. Be sure to load or unload floppy disk ❶ while the power is ON. If the power switch should be turned ON or OFF with the floppy disk mounted the data stored in the disk may be destroyed.

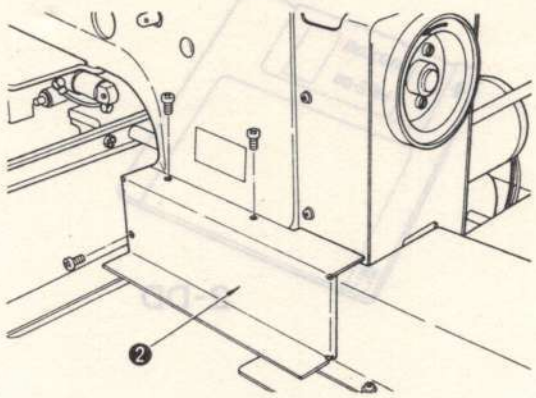


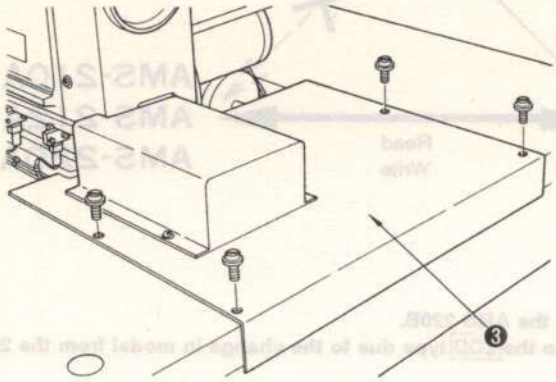

4. After the power switch is turned ON, the feeding frame will automatically move in the sewing area along the X and Y axes once you press the preparation switch. Be sure not to place anything within the range of the sewing area of cover ❶.

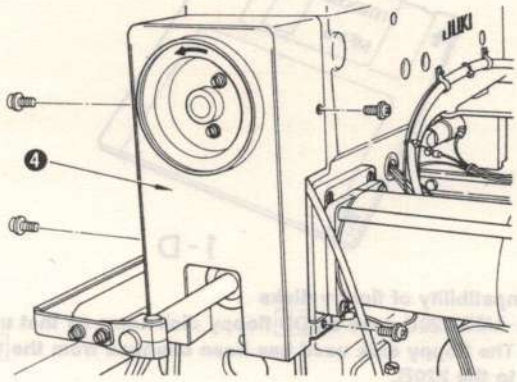


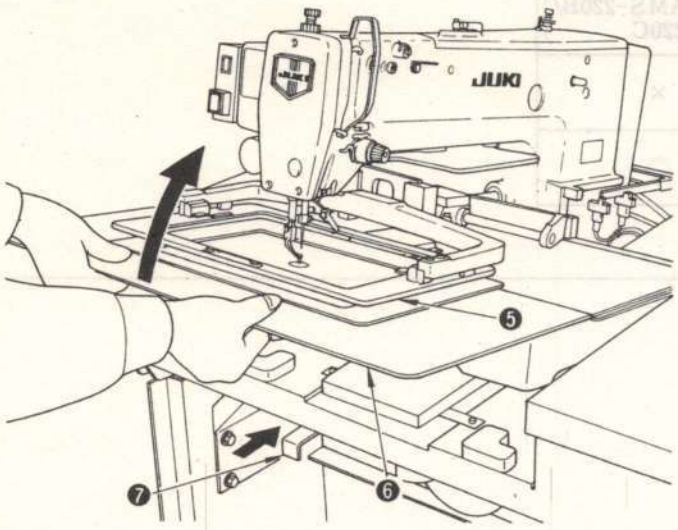

5. When the threader and sewing machine are switched ON, sew the desired sewing pattern with the thread tension disk closed. Once you have completed the thread trimming, the thread tension disk will open.

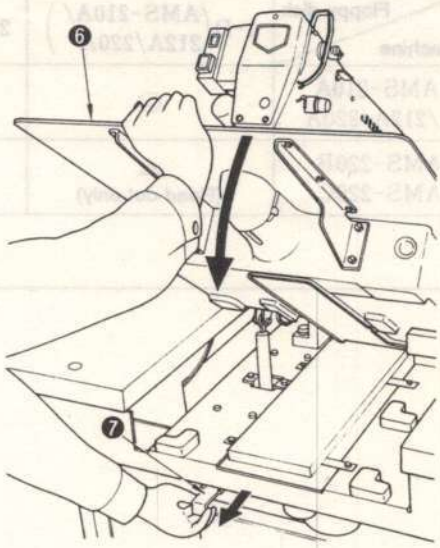


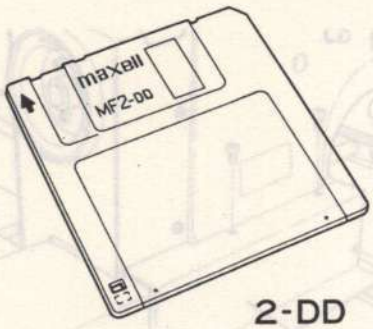



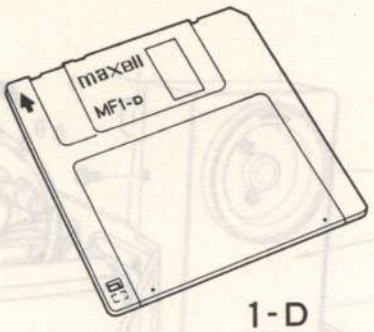

6. When raising the machine head, be sure to remove side-face cover ❶, Y-sensor cover ❷, table rear cover ❸ and belt cover ❹. Then move feeding frame ❺ to the central position, and raise auxiliary cover ❻ until stopper ❼ moves backward to its locked position. To bring the machone head down, push up auxiliary 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.

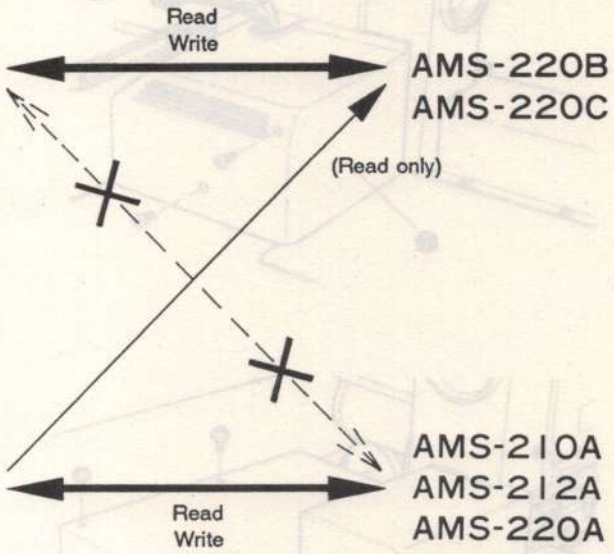
8. If your machine is equipped with a belt cover, finger guard, eye guard or any other protections, do not operate your machine with any of them removed.




2-DD




1-D




**9. Compatibility of floppy disks**

**The AMS-220C uses a 2DD floppy disk same as that used with the AMS-220B.**

*** The floppy disk used has been changed from the 1D type to the 2DD type due to the change in model from the 220A to the 220B.**

**Interchangeability table**

| Floppy disk / machine | 1-D (AMS-210A/212A/220A) | 2-DD (AMS-220B/220C) |
|---|---|---|
| AMS-210A /212A/220A | ○ | × |
| AMS-220B AMS-220C | △ (Read-out only) | ○ |

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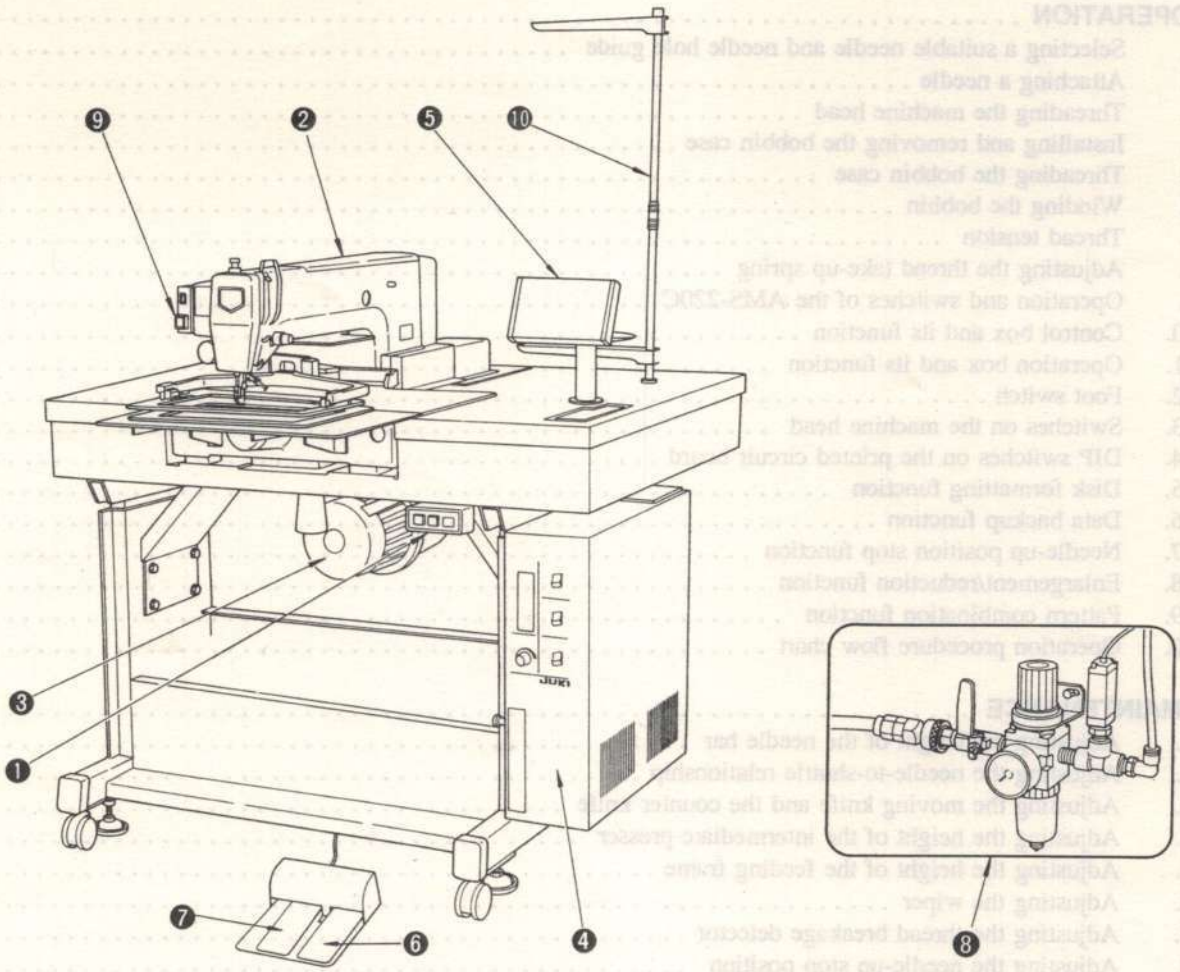
## I. GENERAL

The AMS-220C is an electronic, 1-needle, cylinder-bed, lockstitich 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 eqipped 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-220C 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, PGM-5, PGM-10B), 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.

### 1. Configuration

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




1. Power ON/OFF switch
2. Machine head
3. Sewing machine motor
4. Control box
5. Operation box
6. Feeding frame switch
7. Start switch
8. Intermediate presser lifting cylinder
9. Emergency stop switch
10. 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 size**
An exclusive long arm provided a sewing area as large as 200 mm x 145 mm (width x length).

3) **Large semi-rotary shuttle has been adopted.**
A large semi-rotary shuttle 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 input a pattern or to embroider with a maximum of 4,000 stitches. Furthermore, if using the combination mode, a pattern with a maximum of 16,000 stitches can be sewn.

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 stitich length or the number of stitiches. 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, 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.
Programming devices which are separately available
PGM-1 ..... Used with connected to the sewing machine. A small pattern can be input with enlarged using the digitizer input function.
PGM-5 ..... Used with connected to the sewing machine. This high-performance device enables the operator to input data only following the procedure same as the main unit input function.
PGM-10B ... Used independently. It is a personal computer type high-performance programming device, allowing the operator to input data while checking the created pattern on the display.

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-220C 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 needle point when setting a workpiece.

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

11) **Patterns used for the conventional AMS machines can also be used for the AMS-220.**
- The AMS-220C is capable of using (reading/writing) pattern data stored in floppy disks used with the AMS-210B, 212B and 220B with no additional operation.
- It is only capable of reading pattern data used with the AMS-210A, -212A and 220A. However, it is not capable writing pattern data on the floppy disk used with the AMS-210A, -212A and -220A.

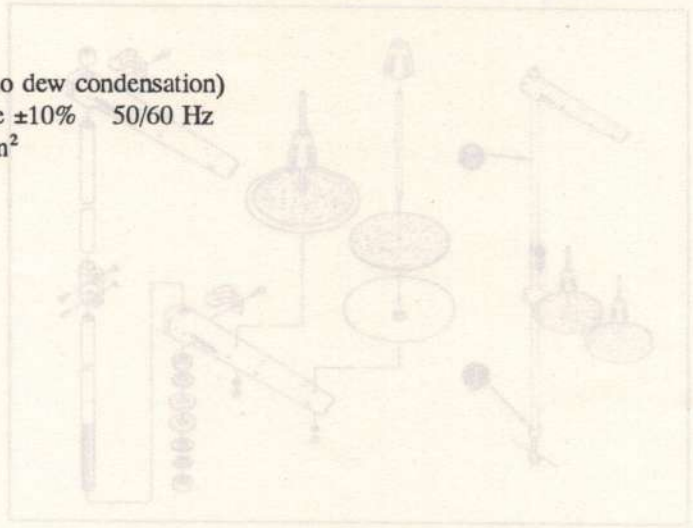
12) **A compressor unit can be attached to the machine after the set-up.**
A compressor unit is optionally available.
It can be attached to your AMS-220C with no additional machining.

13) **A milling unit can be attached to the machine after the set-up.**
A milling unit is optionally available.
It can be attached to your AMS-220C, which allows you to machine a plastic feeding frame or aluminum feeding frame as desired with ease.

## 3. Specifications

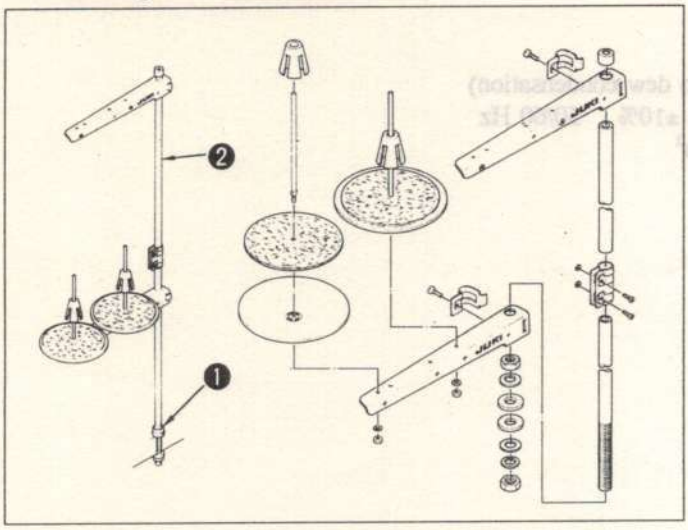
| | | |
|---|---|---|
| 1) | Sewing area: | X (lateral) direction 200 mm<br>Y (longitudinal) direction 145 mm |
| 2) | • Max.sewing speed:<br>(for stitch lengths of 3 mm or less) | 2,000 s.p.m. |
| | • Jump speed: | 208 mm/sec. |
| 3) | Stitch length: | Max. 10 mm (adjustable in 0.16 mm steps) |
| 4) | 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 (standard) (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: | Raised/lowered by an air cylinder (with release switch) |
| 17) | Memory medium: | 3.5 inch micro floppy disk<br>Memory pattern: 44 ~ 691 pattern/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.<br>Alternatively, the "Return to origin" switch may be pressed for quick move to the sewing start point or the 2nd origin after an emerfency 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.<br>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 maximum 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 ON/OFF switch" to "OFF". |
| 27) | Error indication: | 17 types of error indication are given. |
| 28) | Programming: | Involves point/linear/arc 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, 4P electronic-stop motor |
| 34) | Demensions: | 1,090 mm (W) × 1,105 mm (L) × 1,150 mm (H) (excluding thread stand) |
| 35) | Gross weight: | 270 kg |
| 36) | Power consumption: | 1 KVA |
| 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 ~ 5.5 kg/cm$^2$ |
| 41) | Air consumption: | 1.8 ℓ/min |



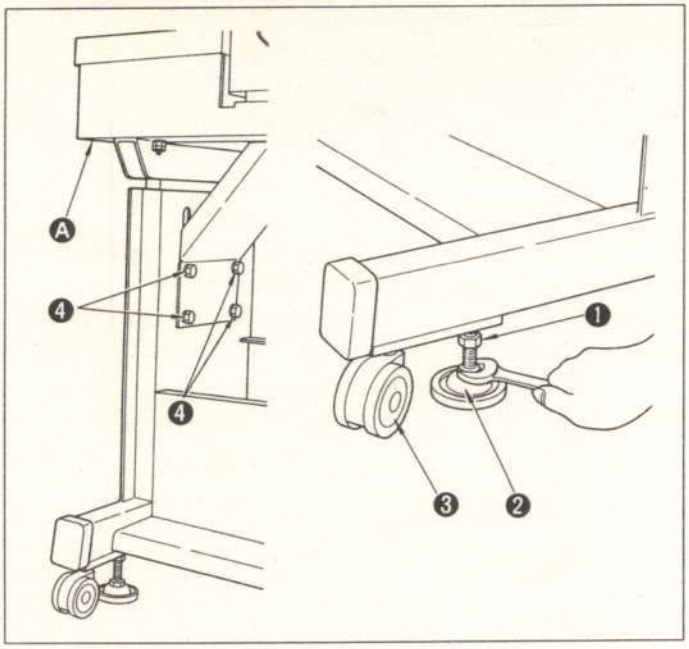
## II. INSTALLATION

### 1. Installing the thread stand



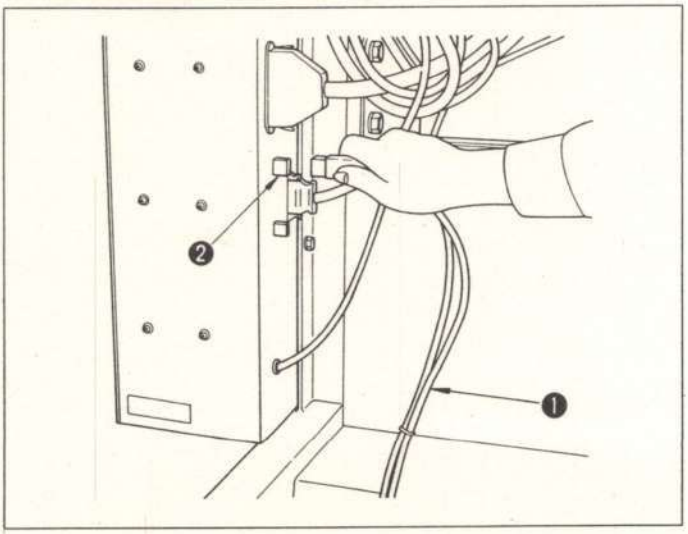

Assemble the thread stand, and put it in the hole in the top right corner of the machine table.
Tighten locknut ❶ to fix the thread stand.
When ceiling wiring is possible, pass the power cord through spool rest rod ❷.

### 2. Installing the pedestal



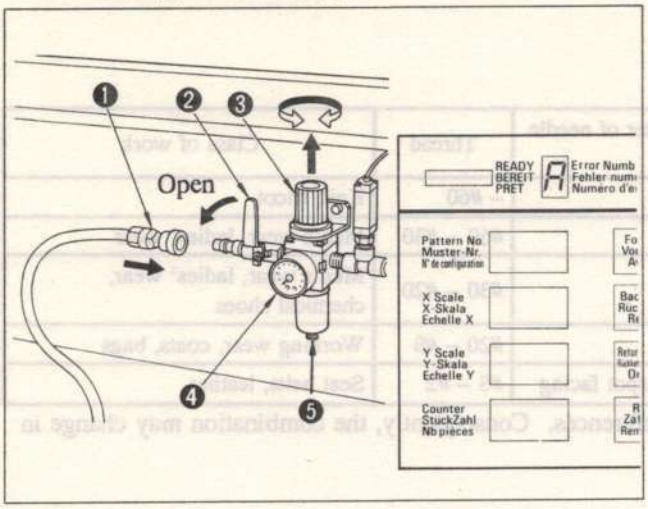

1) Install the pedestal on a flat place.
2) Loosen nut ❶, and raise caster ❸ until it starts idling by turning lever adjuster ❷. After the installation, fix level adjuster ❷ by tightening nut ❶.
3) The table height is adjusted by loosening eight bolts ❹ located at the right and left sides of the pedestal. At this time, be sure to adjust the table height while holding the table at four corners Ⓐ by four persons.

### 3. Connecting the foot switch




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

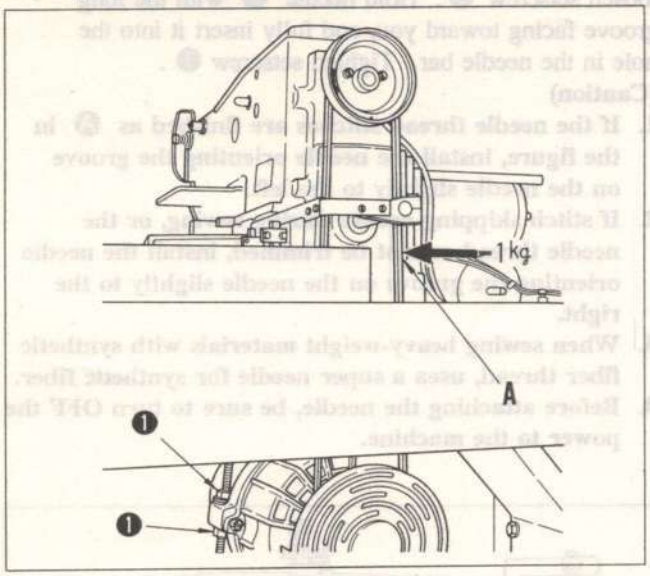
## 4. Connecting the air supply




1) Securely connect air supply hose (inside diameter 8 mm x outside diameter 12 mm) to quick-coupling joint ❶.
2) Open air cock ❷. Pull up air adjusting knob ❸, and adjust the air pressure so that air gauge ❹ indicates 5 to 5.5 kg/cm² by turning the knob.
3) If the air pressure is lower than 4 kg/cm², the machine stops while indicating error [A] on the display.

* Close air cock ❷, and press push-button ❺. At this time, the air pressure becomes 0 kg/cm².

## 5. Adjusting the belt tension




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

**(Caution)**

**Remove the intermediate presser before installing/removing the belt.**

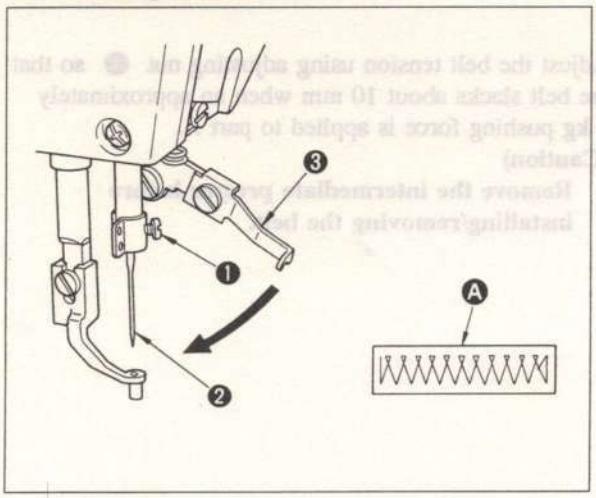
## III. OPERATION

### 1. Selecting a suitable needle and needle hole guide

| Material | Needle | Inside diameter of needle hole guide | Thread | Class of work |
|---|---|---|---|---|
| Extra light-weight | ~ # 11 DPx5 (DPx17) | φ1.6 for knit | ~ #60 | Knit, tricot |
| Synthetic | #11 ~ #14 DPx5 (DPx17) | φ1.6 | #60 ~ #30 | Men's wear, ladies' wear |
| Medium-weight | #14 ~ #18 (DPx5) DPx17 | φ2, φ2.4 | #30 ~ #20 | Men's wear, ladies' wear, chemical shoes |
| Heavy-weight | #18 ~ #21 (DPx5) DPx17 | φ2.4, φ3 | #20 ~ #8 | Working wear, coats, bags |
| Extra heavy-weight | #22 ~ #25 (DPx5) DPx17 | φ3, φ3 with spot facing | #8 ~ #2 | Seat belts, leather |

* The combinations shown in the above table are mere references. Consequently, the combination may change in accordance with the sewing conditions specified.

### 2. Attaching a needle

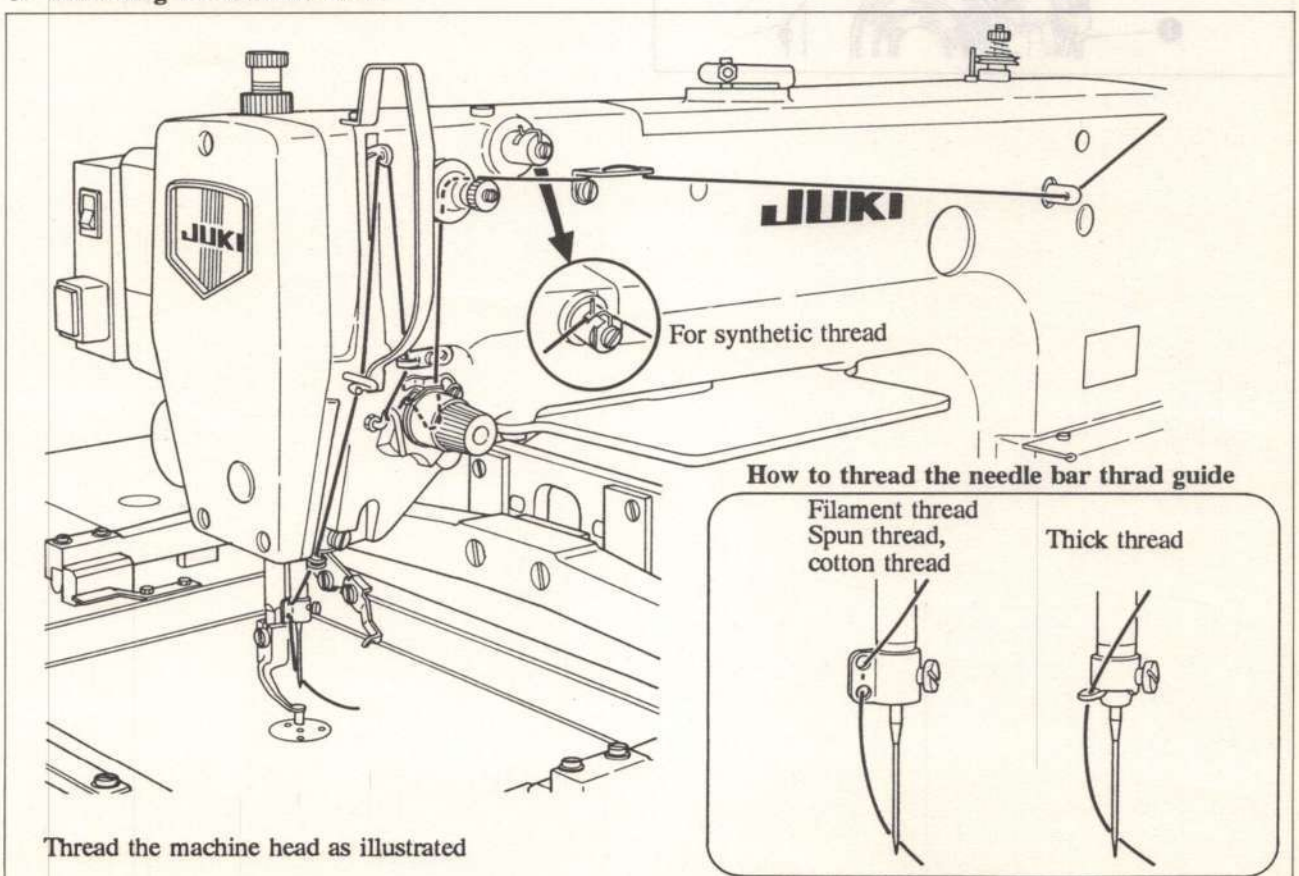



Move wiper ❸ in the direction of the arrow, and loosen setscrew ❶. Hold needle ❷ with the long groove facing toward you, and fully insert it into the hole in the needle bar. Tighten setscrew ❶.

**(Caution)**

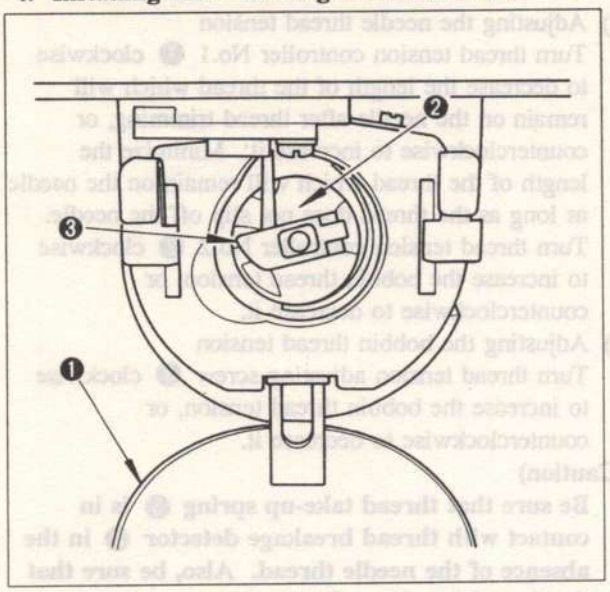
1. **If the needle thread stitches are finished as Ⓐ in the figure, install the needle orienting the groove on the needle slightly to the left.**
2. **If stitch skipping occurs during sewing, or the needle thread cannot be trimmed, install the needle orienting the groove on the needle slightly to the right.**
3. **When sewing heavy-weight materials with synthetic fiber thread, usea a super needle for synthetic fiber.**
4. **Before attaching the needle, be sure to turn OFF the power to the machine.**

### 3. Threading the machine head




Thread the machine head as illustrated

## 4. Installing and removing the bobbin case

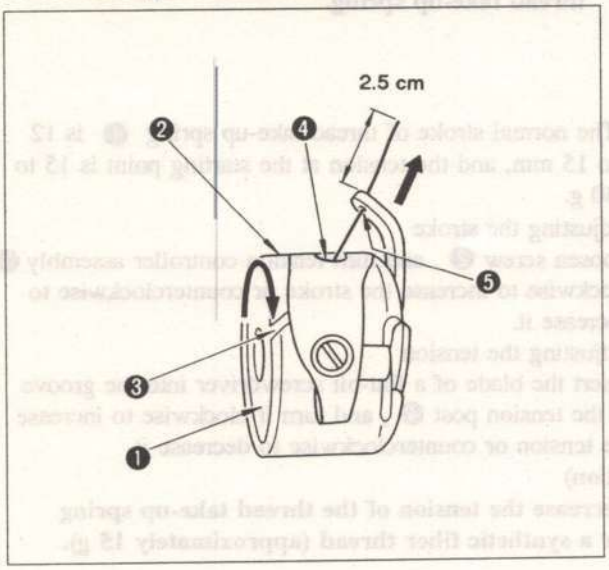



1) Open cylinder arm cap ❶ .
2) Raise and hold latch lever ❸ of bobbin case ❷ to take it out. The bobbin in the bobbin case does not come off as long as the latch lever is raised and held.
3) To load the bobbin case into the shuttle, fit it onto the shuttle shaft, and snap in the latch lever of the bobbin case.

**(Caution)**

**If bobbin case ❷ is not securely loaded in the shuttle, bobbin case ❷ may slip off during sewing. So be careful.**

## 5. Threading the bobbin case

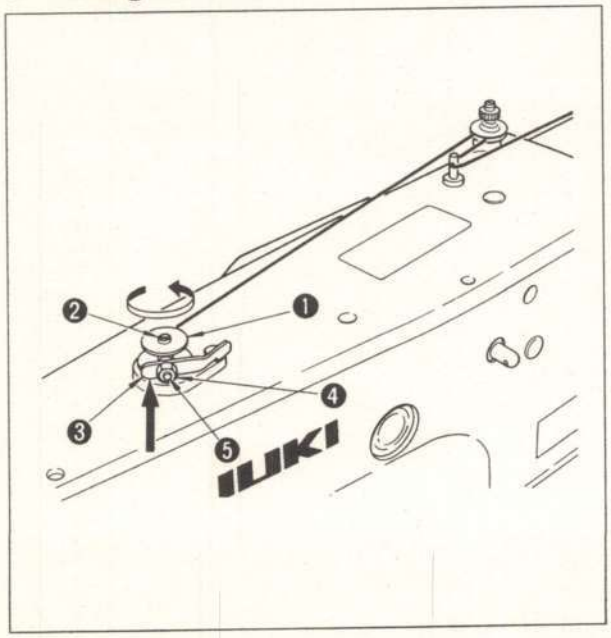



1) Hold bobbin ❶ in the hand so that it spins clokwise, and set it in bobbin case ❷ .
2) Pass the thread through slot ❸ in the bobbin case. Pull the thread to pass it under the tension spring out to thread exit ❹ . At this time, make sure that the bobbin turns in the direction of the arrow when the thread is pulled.
3) Pass the thread through hole ❺ , and pull the thread out about 2.5 cm from the hole.

**(Caution)**

**If the bobbin is installed in the bobbin case orienting the reverse direction, the bobbin thread tension may be affected by the idling spring resulting in an inconsistent tension. So be careful.**

## 6. Winding the bobbin

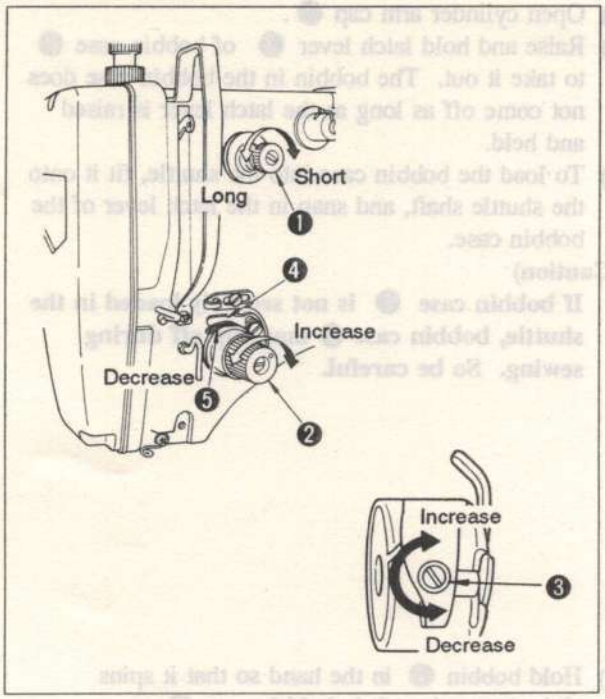



1) Attach bobbin ❶ to bobbin winder spindle ❷ .
2) Thread the winder in the order as illustrated and wind the thread onto the bobbin four or five turns.
3) Push bobbin winder trip latch ❸ in the direction of the arrow, and the winder starts to wind the bobbin.
4) To adjust the amount of thread wound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

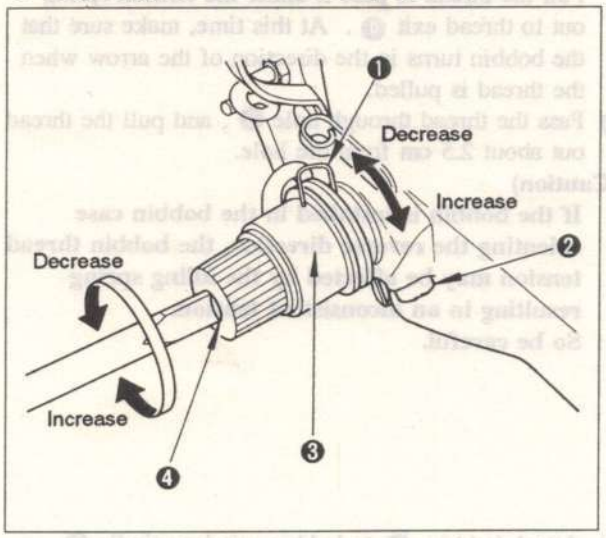



1) Adjusting the needle thread tension
Turn thread tension controller No.1 ❶ clockwise to decrease the length of the thread which will remain on the needle after thread trimming, or counterclockwise to increase it. Minimize the length of the thread which will remain on the needle as long as the thread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

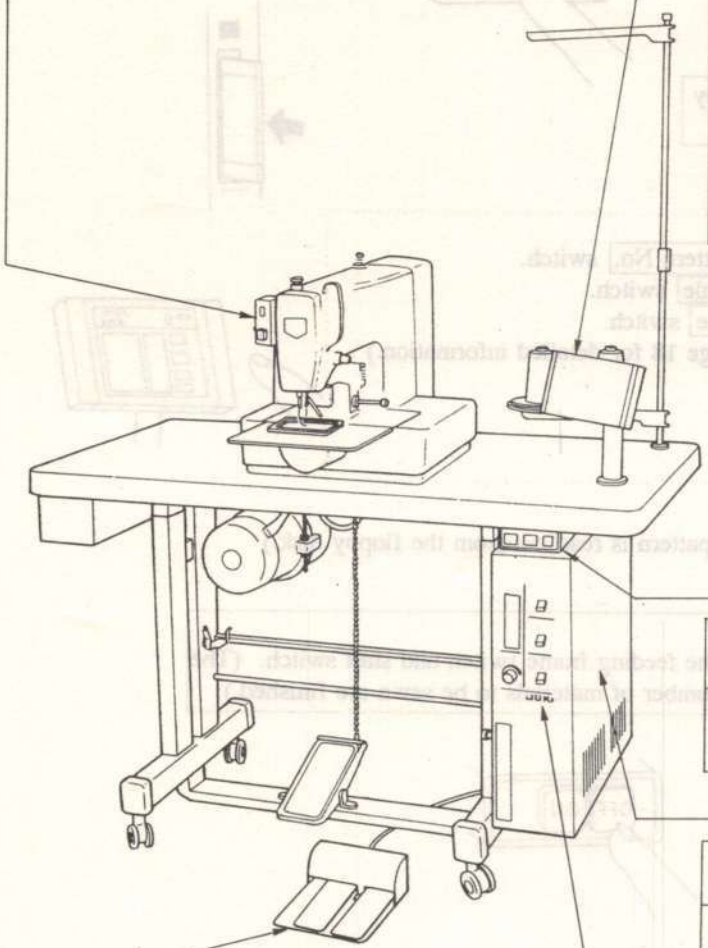
1) Adjusting the stroke
Loosen screw ❷ , and turn tension controller assembly ❸ clockwise to increase the stroke or counterclockwise to decrease it.
2) Adjusting the tension
Insert the blade of a flat-bit screwdriver into the groove in the tension post ❹ , and turn it clockwise to increase the tension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

**(Caution)**

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

## 9. Operation and switches of the AMS-220C

1) Operation switches arrangement
Switches are arranged in six different locations in consideration of frequency of operating each of them.



### Switches on the machine head

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Emergency stop switch | During sewing | P. 23 ~ |
| ② | Wiper switch | During sewing | P. 23 |

### Switches on the operation box (operation panel)

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Operation switches (Forward switch, etc.) | During sewing | P. 19 |
| ② | Setting switches (Pattern No. switch, etc.) | During sewing | P. 17 |
| ③ | Set ready switch | When changing over the sewing mode and data setting mode. | P. 19 |

### Power switch

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Power switch | When turning ON/OFF the power to the machine | |

### DIP switches (switches on the circuit board)

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | DIP switches | While the power to the machine is OFF. | P. 25 |

### Foot switch

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Feeding frame switch | During sewing | P. 23 |
| ② | Start switch | During sewing | P. 23 |

### Switches on the (front face) of the Control box

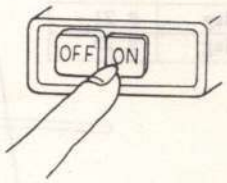
| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Max. speed limitation knob/ Bobbin winder ON/OFF switch | During sewing | P. 14 |
| ② | Needle threading switch | During sewing | P. 14 |
| ③ | Scale setting switch for INC/DEC of the stitch length & INC/DEC of the number of stitch | During data setting | P. 15 |
| ④ | Sewing machine ON/OFF switch | During sewing | P. 15 |

2) Basic operation

The basic operation of the AMS is to create a pattern and read out a pattern. These two kinds of operation allow the AMS to perform its minimum functions. (Explanation of the pattern creating procedure is omitted in this Instruction Manual since it is given in the Instruction Manual for the "main unit input function" and the Instruction Manual for the PGM Series.)

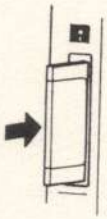
• Basic operation of the AMS (reading out a pattern)

Turn ON the power switch.




↓

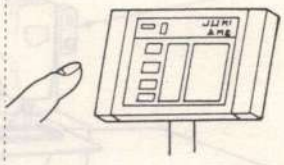
Load the floppy disk into the floppy disk driver.



↓

Switches on the operation box

Specify a pattern No. using the Pattern No. switch.
Specify an X scale using the X scale switch.
Specify a Y scale using the Y scale switch.
(See page 18 for detailed information.)



↓

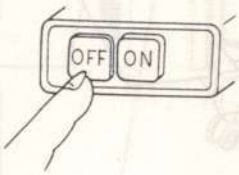
Turn ON the Set Ready switch.

↓ (At this time, a pattern is read out from the floppy disk.)

SEWING IS POSSIBLE
Sewing is performed by operating the feeding frame switch and start switch. (The sewing cycle is repeated until the number of materials to be sewn are finished.)

↓

Turn OFFthe power switch.




3) Operation and functions of the sewing machine other than those of reading patterns

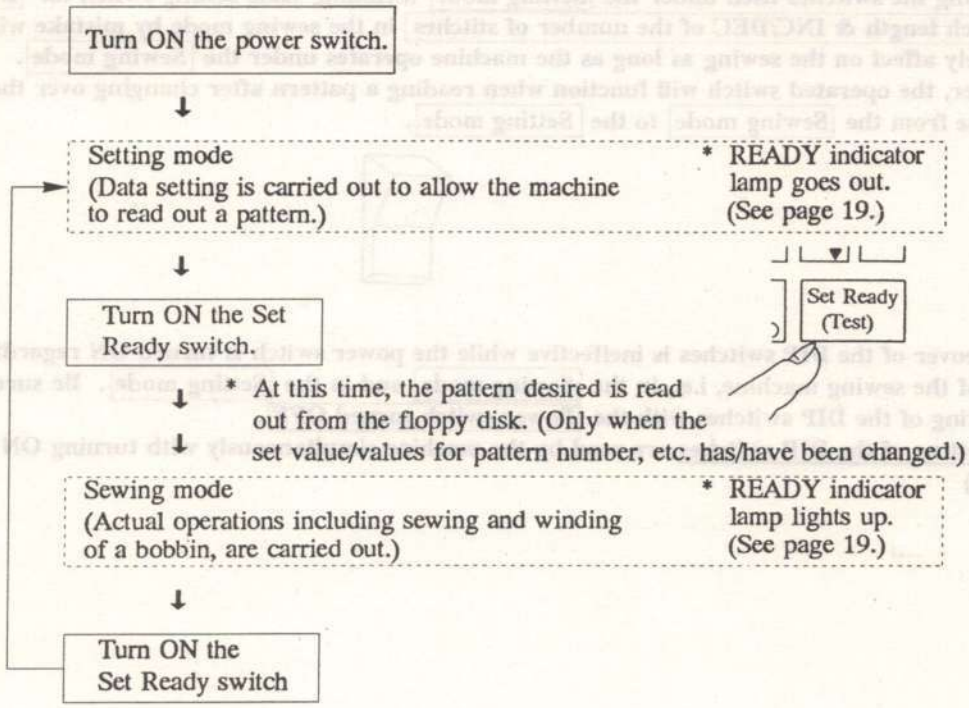
The AMS comes with automatically-performed functions including an error detecting function of reverse-rotation preventing function, etc. In the following cases, the machine should be operated (switches should be operated) in the way different from the above-stated procedure for reading out a pattern.

| | |
|---|---|
| ① | When sewing troubles including thread breakage occur during sewing<br>..... (Emergency stop switch, Backward switch, etc.) |
| ② | When higher efficiency, easier operation or further convenient operation is required for sewing<br>..... (Needle threading switch, DIP switches for each additional function required, etc.) |
| ③ | When higher seam quality is required<br>..... (Wiper switch, Speed adjusting variable resistor, DIP switches for each additional function required, etc.) |
| ④ | When performing inspection and maintenance of the sewing machine<br>..... (Rotary DIP switch) |
| ⑤ | When preventing sewing machine troubles<br>..... (Sewing machine ON/OFF switch, DIP switches of each additional function required, etc.) |

The AMS has many functions which are separately named in accordance with the respective purposes. These functions are controlled by the same switches by changing the operating method of them.
Now, let's explain these functions in the form of "function" and "operating method of the relevant switches".
(See the explanation of the respective functions described on and beyond page 17 and the explanation of the DIP switches described on and beyond page 25.)
Switches used to control any function which has no exclusive name are separately described in the form of "function" and "operating method (of the switch)".

4) Sewing mode/Setting mode and pattern reading
The AMS can be set to two different operation modes, one is the Sewing mode under which a pattern is actually sewn, a bobbin is wound, etc., the other is the Setting mode under which a pattern number, X/Y scale, etc. are specified to enable the machine to read out a pattern desired.
The Sewing mode and Setting mode can be changed over by operating the Set Ready switch on the operation panel (operation box). If a pattern number and X/Y scale are specified under the Setting mode, the machine will read out the pattern at the time of changing over the setting of the switch from the Setting mode to the sewing state, from the floppy disk loaded in the floppy disk drive.

• Sewing mode / Setting mode




* Immediately after turning ON the power switch, the machine is set to the setting mode, for the sake of ease of operation. This enables the operator to perform pattern changing with ease just after turning ON the power switch, if pattern to be used is frequently changed at the start of the working hours. Thanks to the "backup function", the machine stores the pattern used in memory even when the power to the machine is turned OFF. In the case where the same pattern is used for several days, the operator can set the machine to the Sewing mode without reading out the pattern from the floppy disk if pressing the Set Ready switch without changing the data specified for the pattern. (Refer to page 37 for the backup function.)

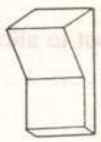
5) Relationship between the sewing mode/setting mode and the switches
Under the [Sewing mode], the machine is actually operated. On the other hand, preparation for reading of a pattern is carried out under the [setting mode]. This means that the machine functions in the two different ways in accordance with the mode to which the machine is set. Consequently, switches of the machine are divided into the two groups, one is the group of the switches used under the [Sewing mode] and the other is the group of the switches used under the [Setting mode].

| | |
|---|---|
| Switches used under the [Setting mode] | [Pattern No.] switch/[X scale] switch, etc. |
| Switches used under the [Sewing mode] | [Forward] switch/[Backward] switch, etc. on the operation panel, [Needle threading] switch, etc. on the front face of the control box |

Even if any of the switches used under the [Sewing mode] is used under the [Setting mode] by mistake, or any of those used under the [Setting mode] is used under the [Sewing mode] by mistake, no trouble may result since the switches are inoperative under the wrong mode.

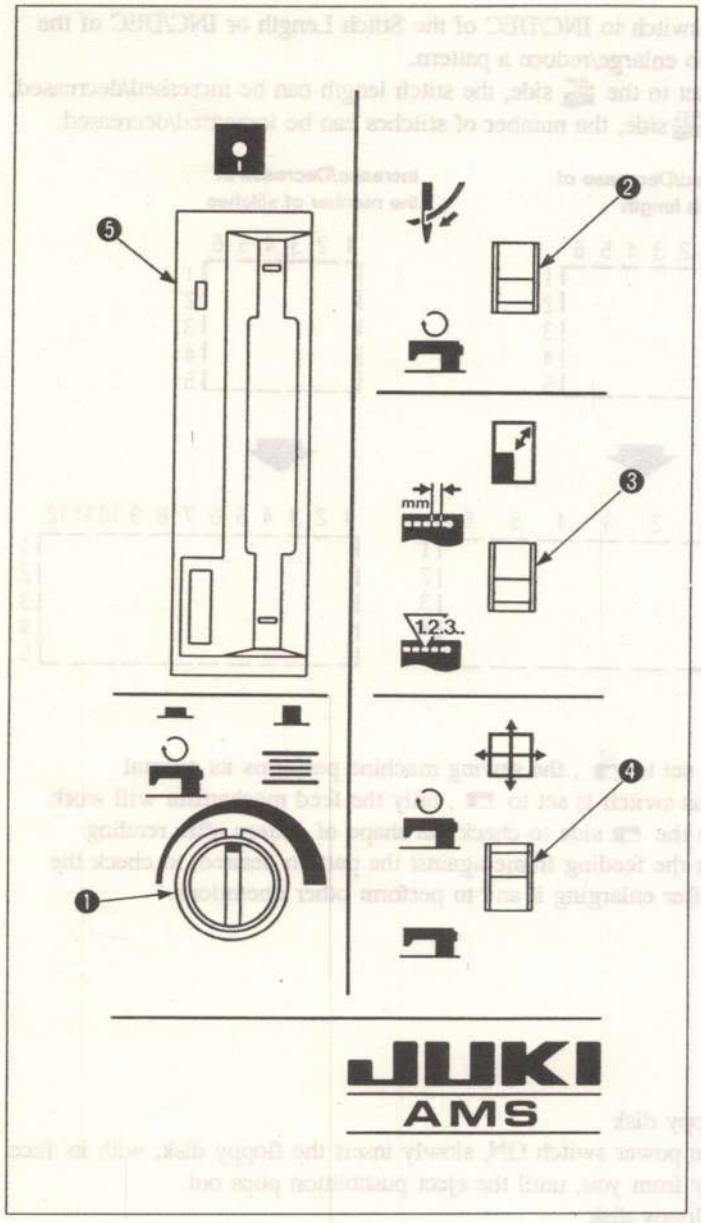
**(Cautions)**

- **The switches on the front face of the control box are seesaw switches. So, the following precautions should be taken when operating these switches.**
  **Operating the switches used under the [Setting mode] including scale setting switch for [INC/DEC of the stitch length & INC/DEC of the number of stitches] in the sewing mode by mistake will not adversely affect on the sewing as long as the machine operates under the [Sewing mode].**
  **However, the operated switch will function when reading a pattern after changing over the mode of the machine from the [Sewing mode] to the [Setting mode].**

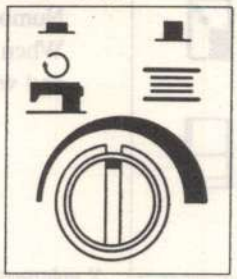


- **Changeover of the DIP switches is ineffective while the power switch is turned ON regardless of the mode of the sewing machine, i.e., in the [Sewing mode] and in the [Setting mode]. Be sure to change the setting of the DIP switches with the [Power switch turned OFF].**
  **(The setting of the DIP switches are read by the machine simultaneously with turning ON of the power switch.)**

## 10. Control box and its function




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

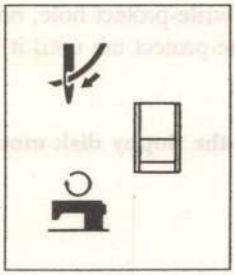


- **Max. speed limitation knob (used under the Sewing mode)**
  Normally, the sewing speed is automatically adjusted according to the stitch length. If a slower speed is required, however, turn the knob counterclockwise.

- **Bobbin winder ON/OFF switch (used under the Sewing mode)**
  Pull the knob toward you ( To turn ON the Bobbin winder switch ) while the sewing machine is stopped, and the feeding frame will automatically come down. Then Turn ON the start switch, and the sewing machine will run at a constant speed winding the bobbin.
  The machine can be stopped in the following three different methods.
  ① Press the knob back to its home position. (The Bobbin winder ON/OFF switch is turned OFF.)
  ② Press the Start switch again.
  ③ Turn ON the Emergency stop switch .
  If the machine is stopped by taking method ② or ③, it is necessary also to take method ① "press the knob back to its home position".

**(Caution)**
**Before bobbin winding, make sure that there is nothing under the needle.**

### ❷ Needle threading switch (used under the Sewing mode)

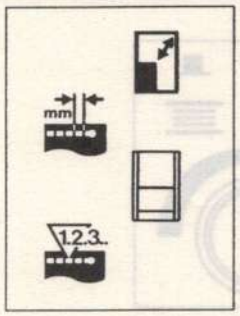


- Set the needle threading switch to the 🪡 side when the sewing machine is stopped, and the intermediate presser and feeding frame will automatically come down, upon which the needle will be threaded.
  When the machine is doing the above job, the Start switch will not work even if it is turned ON.

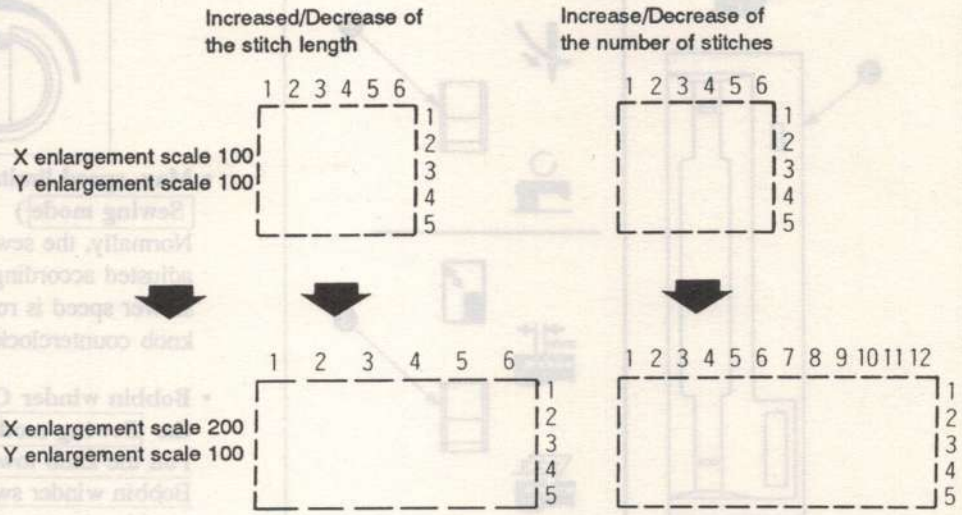
- Move the Needle threading switch up and down when the Emergency stop switch is turned ON and sewing machine is stopped, and thread trimming will be done.
  The Return to Origin, Forward and Backward keys will now become effective.

- If the Needle threading switch is moved up and 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 READY indicator LED lights up.) (See "Needle-up stop function" on page 38.)

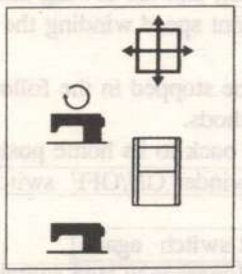
### ❸ Scale setting switch (INC/DEC of the stitch length & INC/DEC of the number of stitches)




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.

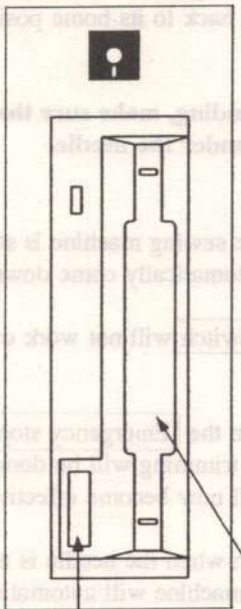



### ❹ Sewing machine ON/OFF switch



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. This switch is set to the side to check tha shape of pattern after reading the pattern, to check the feeding frame against the pattern desired, to check the size of the pattern after enlarging it and to perform other operations.

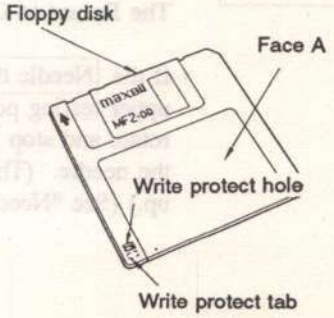
### ❺ Floppy disk driver




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, move the write-protect tab until it is exposed.

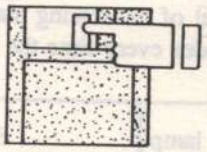
**(Caution)**

**Never turn the power switch ON or OFF with the floppy disk mounted.**

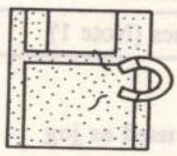


4) Precautions in handling floppy disks

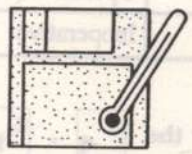
1. **Do not place the floppy disk near an ashtray or food and drink.**



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



2. **Do not touch the exposed parts of the floppy disk.**



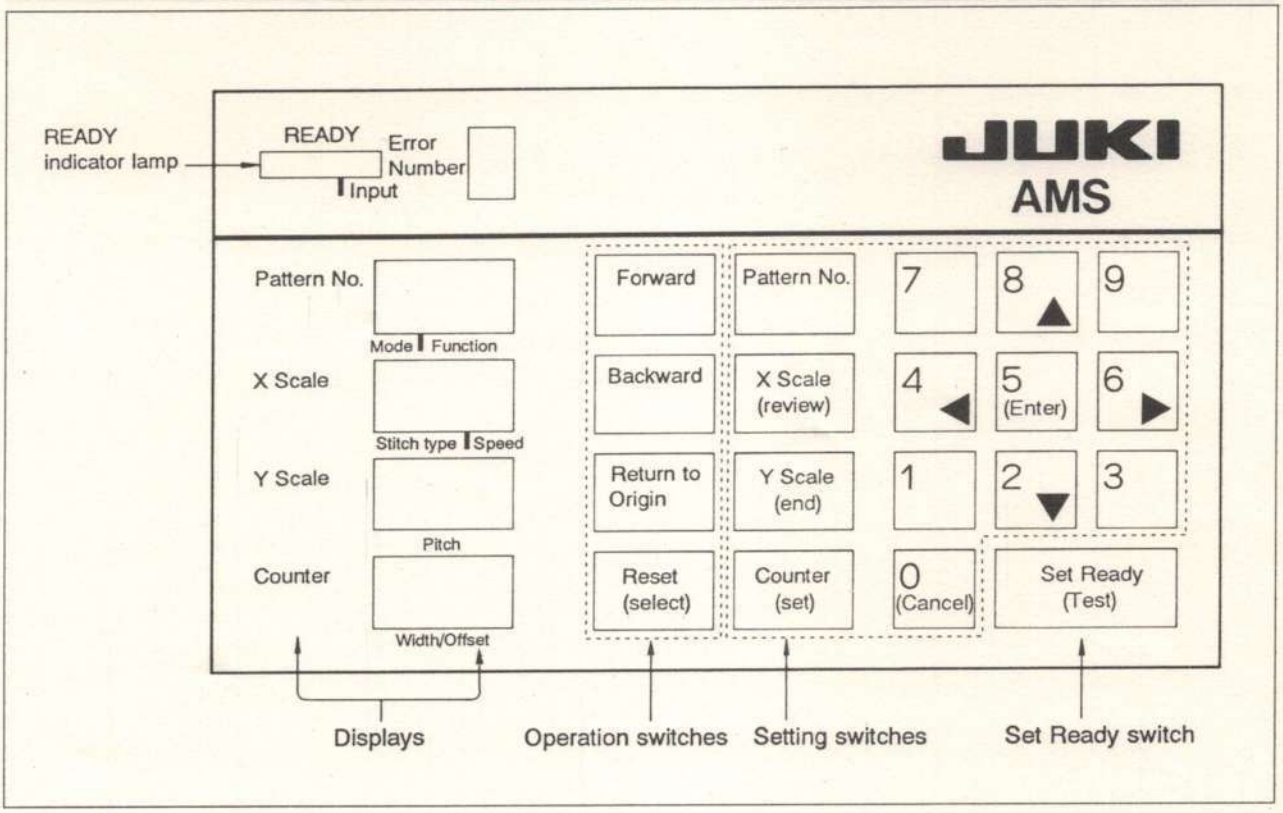
4. **Do not place the floppy disk in a hot place (51°C or higher) or a place exposed to direct sunlight.**

## 11. Operation box and its function

The sewing machine is operated under two different modes. The switches on the operation box are arranged in accordance with the operation mode of the sewing machine. The operation mode of the sewing machine is changed over between these two modes every time the Set Ready switch is pressed.

| State | READY indicator lamp | Sewing machine | Switch on the operation box to be used |
|---|---|---|---|
| Sewing mode | Lights up | Operative (sewing, winding a bobbin) | Operation switches |
| Setting mode | Goes out | Inoperative | Setting switches (Note 1) |

**(Note 1)**
**Among the setting switches, only the 4 ◀, 6 ▶, 8 ▲ and 2 ▼ switches can be used as jog switches under the Sewing mode.**




### 1) Function of the setting switches and operating method

**..... Used only when the machine is set to the Setting mode (the READY indicator lamp goes out).**

| Name of switch | Function | Operating method |
|---|---|---|
| Pattern No. | • Used to change the number representing pattern number indicated on the display.<br>• Changes pattern No. at the time of reading out the indicated pattern using the Pattern No. switch and 0 (Cancel), 1 through 9 (numeric switches). (A number of three figures)<br>• A number of three figures is used as the pattern number to read out the pattern from the floppy disk. | To make the display indicate 1 2 3, follow the procedure below.<br>Press the Pattern No. switch.<br>↓<br>Continuously press the 1, 2 ▼ and 3 switches.<br>**(Caution)**<br>**Be sure to input a pattern number of three figures.**<br>**Example Pattern No. 1 → 001**<br>**Pattern No. 10 → 010**<br>**Pattern No. 100 → 100** |

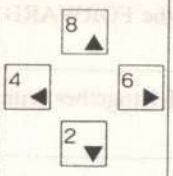
| Name of switch | Function | Operating method |
|---|---|---|
| X Scale (review)<br>Y Scale (end) | • Used to change the X scale or Y scale on the displays.<br>• Respective numbers of three figures on the displays are changed by operating the [X Scale (review)] or the [Y Scale (end)] switch and the number switches.<br>• Respective numbers of three figures are used as X scale and Y scale when reading out a pattern from the floppy disk.<br>**(Caution)**<br>**The range of number of three figures that can be specified is 001 (%) to 400 (%) while the size of pattern stored in the floppy disk is taken as 100 (%).** | To make the X scale display indicated [2 3 0], follow the procedure below.<br>Press the [X Scale (review)] switch.<br>↓<br>Continuously press the [2 ▼], [3] and [0 (Cancel)] switches.<br>* Similarly, the Y scale can be changed by pressing the [Y Scale (end)] switch first and then the number switches. |
| Counter (set) | • Used to change the number shown on the counter display.<br>• The number of three figures on the display is changed by using the [Counter (set)] switch and the number switches.<br>• This number is necessary when designating the "bobbin thread counting function" using the relevant DIP switch.<br>Refer to description on the "SW6-3" and "SW6-2" given on page 30 for the details of the "bobbin thread counting function".<br>• This number is not related to the function of reading out a pattern from the floppy disk.<br>**(Caution)**<br>**The range of number of three figures that can be specified is 001 to 999.** | To make the counter display indicate [0 5 2], follow the procedure below.<br>Press the [Counter (set)] switch.<br>↓<br>Continuously press the [0 (Cancel)], [5 (Enter)] and [2 ▼] switches. |
| (Number switches)<br>[7] [8 ▲] [9]<br>[4 ◀] [5 (Enter)] [6 ▶]<br>[1] [2 ▼] [3]<br>[0 (Cancel)] | • Used as number switches to change (specify) the numbers given on the pattern No., X/Y Scale and Counter.<br>**(Caution)**<br>**The [4 ◀], [6 ▶], [8 ▲] and [2 ▼] switches can also be used as jog switches. The function and operation method of the jog switches are to be described in "3) Operation switches".** | |

**2) Function and operating method of the Set ready switch**
**..... This switch is used both under the [Setting mode] and [Sewing mode].**

| Name of switch | Function | Operating method |
|---|---|---|
| Set Ready (Test) | • Used to change over the mode of the machine between the [Sewing mode] (the READY indicator lamp lights up) and the [Setting mode] (the READY indicator lamp goes out).<br>• If any of the numbers shown on the displays (excluding the Counter display) is changed under the [Setting mode], the machine will read out a pattern from the floppy disk when changing over the mode of the machine from the setting mode to the [Sewing mode].<br>**(Caution)**<br>**Whenever changing over the mode of the machine from the setting mode to the sewing mode, the feeding frame will perform below mentioned operation regardless of reading of a pattern from the floppy disk. So be sure to keep your hands away from the feeding frame.**<br>Operations to allow the machine to be set ready for sewing<br>① The feeding frame comes down.<br>② The origin is retrieved. (The feeding frame moves to the origin.)<br>③ The feeding frame moves to the sewing start position or to the second origin.<br>④ The feeding frame goes up. | [Sewing mode]<br>↓<br>Press the [Set Ready (Test)] switch.<br>↓<br>[Setting mode]<br>↓<br>(Change the numbers shown on the displays.)<br>Press the [Set Ready (Test)] switch.<br>↓<br>Pattern is read from the floppy disk.<br>↓<br>Operations to allow the machine to be set ready for sewing are performed.<br>↓<br>[Sewing mode] |

**3) Function of the operation switches and operating method**
**..... Only used under the [Sewing mode] (the READY indicator lamp lights up).**

| Name of switch | Function | Operating method |
|---|---|---|
| Forward<br>Backward | • When the Forward/Backward switch is pressed with the feeding frame down, the material is fed forward/backward by one stitch.<br>• When the Forward/Backward switch is kept pressed, the material is fed forward/backward at slow speed for the first one stitch, after which it is automatically fed forward/backward continuously at high speed.<br>• The state under which the feeding frame is lowered represents any of the following states, etc.<br>① When the feeding frame is lowered by operating the feeding frame switch.<br>② After the emergency stop switch is used to stop the sewing machine while the machine is in operation or after thread trimming (when the needle threading switch is moved up and down).<br>③ After the machine has automatically stopped in an error (error message [9]) during sewing due to needle thread breakage.<br>• Example of operations<br>① When checking the shape of pattern newly read out from the floppy disk.<br>② When you wish to sew the material again from the position where the sewing is automatically interrupted by needle thread breakage. | To continue sewing after thread breakage, follow the procedure below.<br>The machine automatically stops due to thread breakage.<br>↓<br>Return the feed mechanism to the stitch where the sewing has been interrupted using the [Backward].<br>↓<br>Depress the start switch. (The sewing is re-started.)<br>The material is fed forward. →<br>Sewing start<br>← The material is fed backward.<br>Sewing end |

| | | |
|---|---|---|
| Return to Origin | • When this switch is pressed with the feed frame lowered, the feed mechanism will automatically move straight to the sewing start point or the 2nd origin regardless of the pattern shape.<br><br>This switch is operative after operating the Forward or Backward switch.<br><br>(Caution)<br>If any special type of feeding frame such as the inverting feeding frame is used and an obstruction exists on the way to the sewing start point or the 2nd origin, the feeding frame may come in contact with the needle, etc. while it returns to the origin.<br>In this case, return the feeding frame to the sewing start point or the 2nd origin by operating the Backward switch. | |
| Reset (select) | • Used to reset the number shown on the Counter display when the machine is stopped.<br>• This is the switch to re-start the sewing machine after the machine is stopped by the "bobbin thread counting function".<br>Refer to description on the "SW6-3" and "SW6-2" given on page 30 for the details of the "bobbin thread counting function". | The number of pieces of material specified to be sewn is finished.<br>↓<br>The sewing machine is stopped by the "bobbin thread counting function".<br>(Indicator lamp flashes on and off)<br>↓<br>Press the Reset (select) switch.<br>↓<br>The number shown on the Counter display is reset.<br>(The machine is set to the state under which it is allowed to re-start sewing.) |
| Jog switches<br>  | • They are used to move the sewing position or to specify the 2nd origin. (This function is selected using the relevant DIP switch. See the description on "SW5-3" on page 27.)<br>• If any of the switches 2, 4, 6 and 8 is pressed immediately after lowering the feeding frame, the feed mechanism will move in the direction shown by the arrow on the pressed switch. The destination is used as the position to start sewing (sewing start point) or the 2nd origin.<br>• The movement of the feed mechanism is kept stored in memory unless another movement is specified or the operation mode of the machine is once changed over to the Setting mode .<br>• Thanks to the "backup function" (Refer to page 37) the movement of the feed mechanism is automatically stored in memory together with the data on the pattern used even if turning OFF the power to the sewing machine. | |

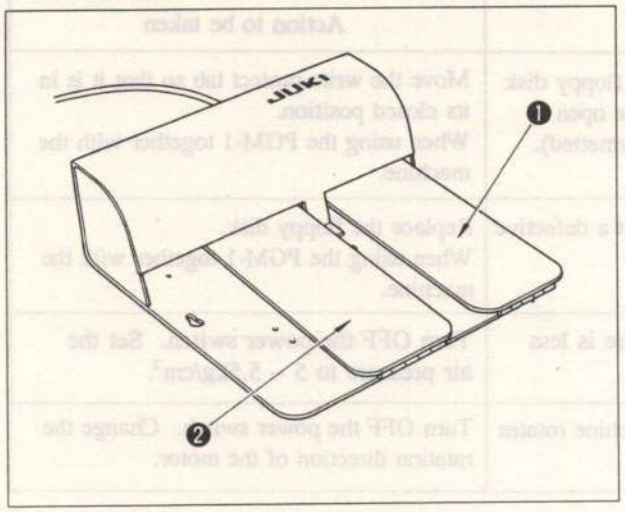
4) Error indications

| 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<br>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 no 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/on 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.<br>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 parts 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. |

| Error No. | Indicator lamp | Error description | Action to be taken |
|---|---|---|---|
| 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.<br>When using the PGM-1 together with the machine. |
| | ON | Comes on when trying to format a defective floppy disk. | Replace the floppy disk.<br>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 ~ 5.5kg/cm$^2$. |
| E | ON | Comes on when the sewing machine rotates in the reverse direction. | Turn OFF the power switch. Change the ratation direction of the motor. |

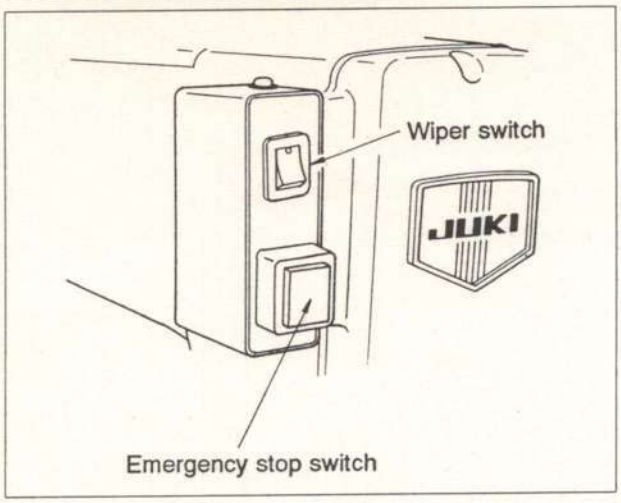
* For a sewing machine using compressed air.

## 12. Foot switch

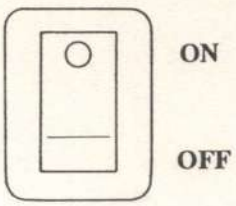



1) When feeding frame switch ❶ is depressed, the feeding frame will come down. Another depress on the switch makes the feeding frame go up.
2) When start switch ❷ is depressed with the feeding frame down, the machine will start sewing.

## 13. Switches on the machine head




① Wiper switch (used under the sewing mode)




| | |
|---|---|
| ON | The wiper actuates after thread trimming to sweep the thread. |
| OFF | The wiper is inoperative. |

**(Caution)**

1. **In addition to the wiper switch, the machine comes with the wiper selector switch (DIP switch) to control the "wiper prohibition function". (See the description on the SW6-7 on page 31.)**
2. **The wiper switch has been designed to operate under the sewing mode, however, the switch itself can be operated under the setting mode since it is mechanically a seesaw switch.**

② Emergency stop switch (used under the sewing mode)
If this push-button switch is pressed while the machine is running under the sewing mode, the machine will stop giving an error message on the display.

(Error message)

- Emergency stop switch is pressed during sewing. → Error 5 flashes on and off. → Move up/down the Needle threading switch on the control box. → Error 5 lights up.

(See also the description on the SW7-3 on page 33.)

- Emergency stop switch is pressed during jump. → Error 5 lights up.

(Operation after an emergency stop)

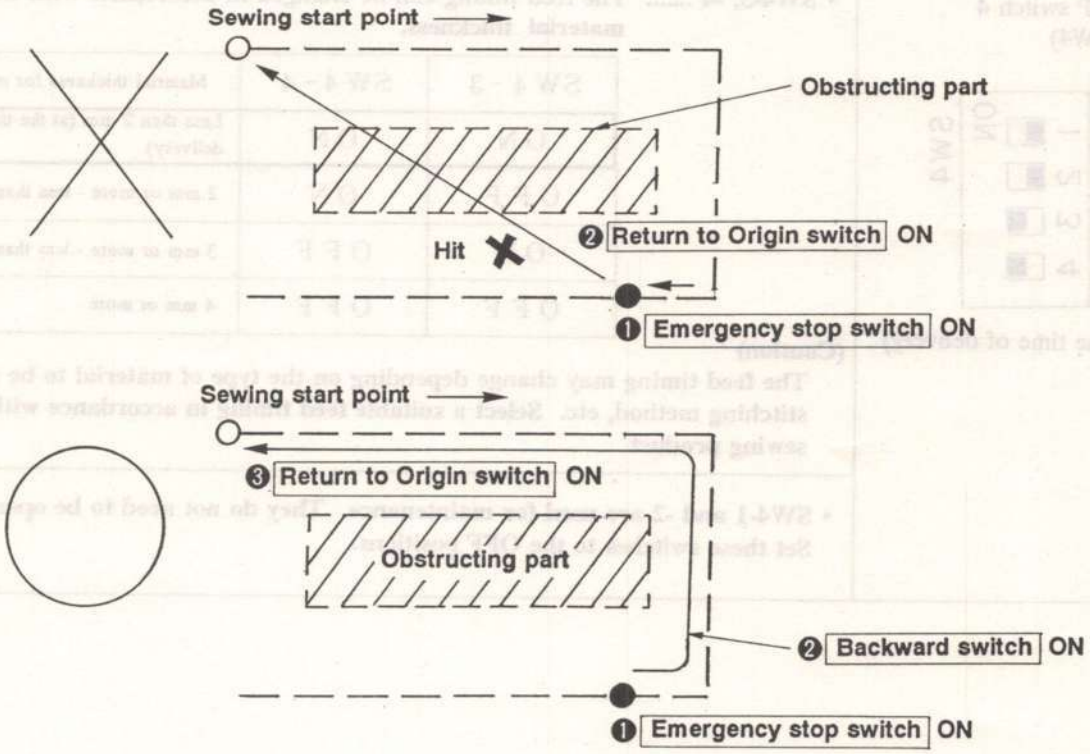
1. To re-start the sewing machine without operating any other switch
   → The start switch is operative in the both cases where Error 5 [flashes on and off] and Error 5 [lights up]. So turn ON the [start switch].
2. To re-start the sewing machine after changing the sewing start point (stitch) using the [Forward/Backward switch]
   → Move up/down the [Needle threading switch] (to make the thread trimmer actuate). Then the Error 5 will [light up] instead of flashing on and off. Then move the needle the position from which you wish to re-start sewing using the [Forward/Backward] switch , and turn ON the [start switch].

**(Caution) Moving the [Needle threading] switch up and down will make the sewing machine turn by one revolution, during which the needle will go up and come down. Never place your hands, etc. under the needle when operating the Needle threading switch.**

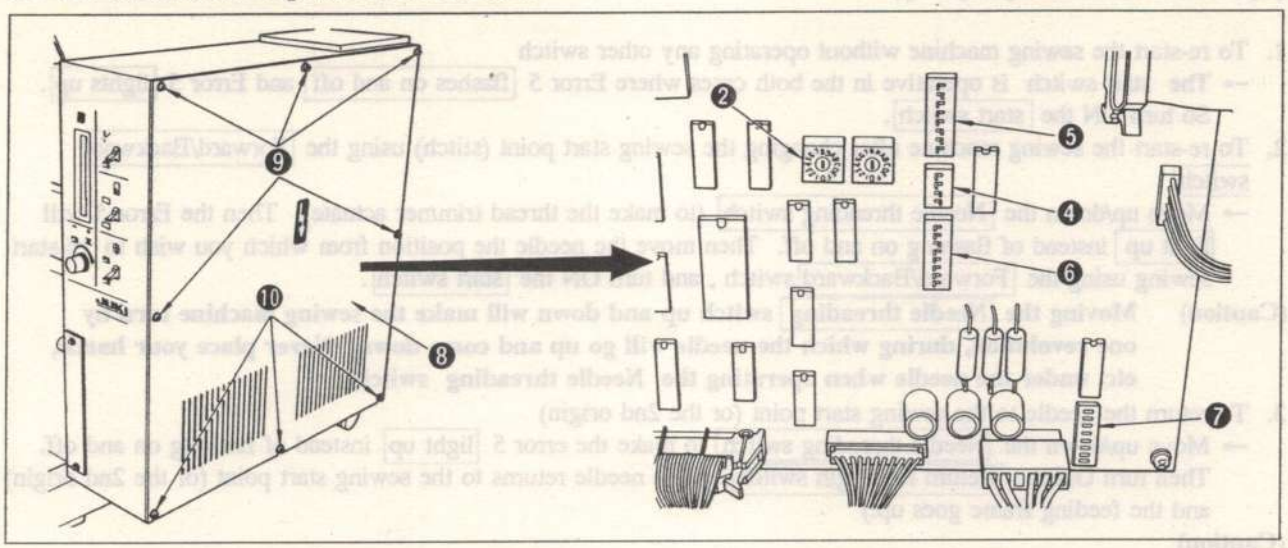
3. To return the needle to the sewing start point (or the 2nd origin)
   → Move up/down the [Needle threading switch] to make the error 5 [light up] instead of flashing on and off. Then turn ON the [Return to Origin switch]. (The needle returns to the sewing start point (or the 2nd origin) and the feeding frame goes up.)

**(Caution)**

**If your machine is equipped with an inverting clamp or if you use a special type of feeding frame, the inverting clamp or feeding frame may partly protrude from the needle. In this case, if turning ON the [Return to Origin switch] to make the needle return to the sewing start point, the needle may hit against the protruded section of the inverting clamp or feeding frame on the way to the sewing start point. This is very dangerous since needle breakage, etc. may result. Consequently, in the aforementioned case, return the needle to the sewing start point (or the 2nd origin) by keeping pressing the [Backward switch], and raise the feeding frame using the [Return to Origin switch].**



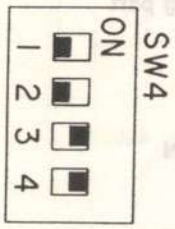
## 14. DIP switchs on the printed circuit board

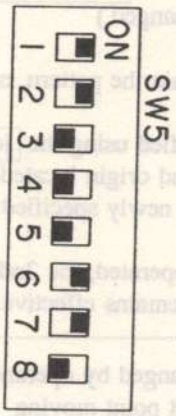


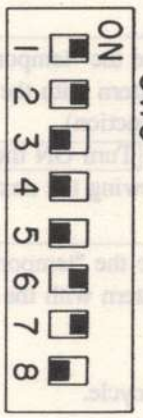

Remove five setscrew ❾ from control box cover ❽, loosen three screws ❿, and remove control box cover ❽, You will then see DIP switchs ❷, ❹, ❺, ❻ and ❼ mounted on the I/F printed circuit board located on the right as you face it.
The functions of the DIP switches are as follows:

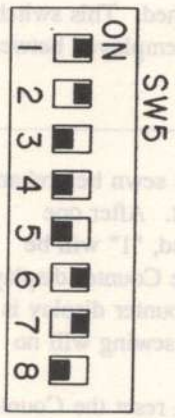
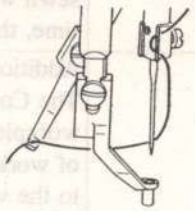
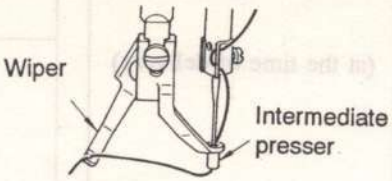
**(Caution)**

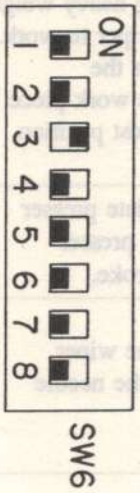
**Be sure to set the DIP switches while the power switch is turned OFF.**
**(Setting the DIP switchs while the power switch is turned ON will not be effective.)**

| Name of switch | Function |
|---|---|
| ❹ DIP switch 4 (SW4)<br>  <br>(at the time of delivery) | • **SW4-3, -4 ..... The feed timing can be changed in accordance with the material thickness.**<br>SW4-3 / SW4-4 / Material thickness for reference<br>ON / ON / Less than 2 mm (at the time of delivery)<br>OFF / ON / 2 mm or more - less than 3 mm<br>ON / OFF / 3 mm or more - less than 4 mm<br>OFF / OFF / 4 mm or more<br>**(Caution)**<br>**The feed timing may change depending on the type of material to be sewn, stitching method, etc. Select a suitable feed timing in accordance with the sewing product.** |
| | • **SW4-1 and -2 are used for maintenance. They do not need to be operated. Set these switches to the OFF positions.** |

| Name of switch | Function |
|---|---|
| ❺ DIP switch 5 (SW5)<br>  <br><br>(at the time of delivery) | • **SW5-2 ..... "Cycle stitching facility A" (Feeding frame position selection A)**<br>**It is used to select the position of the feeding frame (up or down) when the "temporary stop" command (pause) position in a pattern is reached.**<br><br>ON (This switch has been set to the ON position at the time of delivery.): The machine pauses at the position where the "temporary stop" command has been entered in a pattern with the feeding frame raised. (Cycle stitching function) [Turn ON the feeding frame switch]. → [Turn ON the start switch]. Then the machine starts sewing the next cycle.<br><br>OFF: The machine pauses at the position where the "temporary stop" command has been entered in a pattern with the feeding frame lowered. [Turn ON the start switch]. Then the machine starts sewing the next cycle.<br><br>* Temporary stop command<br>This command is used to temporarily stop the machine in a pattern. This command can be entered at a desired position (two or more positions) in a pattern to allow you to create (modify) it with ease when using the main unit input function/PGM-1, etc.<br>* Cycle sewing<br>Several sewing processes (cycles) are continuously sewn.<br>A pattern can be divided by the temporary stop command so that the material may be turned or changed while the feeding frame is raised.<br><br>**(Caution)**<br>**When the machine is in the cycle sewing mode (ON), be sure to take note of the following:**<br><br>Forward / Backward: 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. When the pedal change-over function A (SW5-7) is set to its [OFF] position (the feeding frame descends as long as the pedal is depressed), the feeding frame automatically goes up. When the switch is set to its [ON] position, turn [ON] the feeding frame switch, then turn [OFF] it.<br><br>Return to Origin: 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.<br><br>Bobbin thread counter: 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.<br><br>Set Ready (Test): 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. |

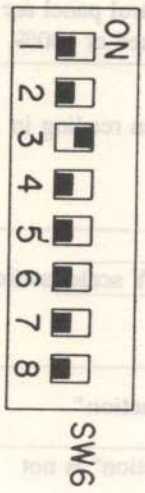
| Name of switch | Function |
|---|---|
| ❺ DIP switch 5 (SW5)<br>  <br><br>(at the time of delivery) | • **SW5-3 ..... Used to select either the "2nd origin setting function" or the "sewing start point moving function"**<br><br>**OFF** (This switch has been set to the OFF position at the time of delivery.): A 2nd origin can be newly set using the jog switches. (The location of the pattern is not changed.)<br>(Caution)<br>If the 2nd origin is specified within the pattern, note the followings.<br>① If a 2nd origin is newly specified using the jog switches, the conventional 2nd origin located in the pattern is ignored and the newly specified 2nd origin becomes effective.<br>② If the jog switches are not operated, the 2nd origin located in the pattern remains effective.<br><br>**ON**: The location of the pattern can be changed by operating the jog switches. (The "sewing start point moving function")<br>(The 2nd origin located within the pattern is ignored, and the machine does not stop at the 2nd origin.)<br><br>* 2nd origin<br>It is also called "turnout point". It means a point where the tip of needle rests when setting the workpiece to be sewn on the machine.<br>Normally, the tip of needle of an AMS sewing machine rests at the sewing start point (the first stitch of a pattern) before starting sewing. However, a 2nd origin is used whenever the needle resting at the sewing start point becomes an obstruction to the setting of a workpiece on the machine.<br>In this case, the location of the pattern does not change.<br>(Note that only one 2nd origin can be specified in the single pattern.)<br><br>* How to reset/change the specified point (the 2nd origin or the sewing start point) and how to store it in memory<br>Reset (Cancel) ..... To reset (cancel) the point specified using the jog switches, press the Set Ready switch twice.<br>The specified point is also canceled when reading out another pattern from the floppy disk.<br>At this time, the feeding frame comes down and the origin is retrieved. So be careful not to allow your hands to be caught under the feeding frame.<br>(If you wish to reset (ignore) the 2nd origin located within a pattern, set the SW5-3 to the ON position.)<br>Change ..... A point specified using the jog switches is automatically replaced by a newly specified point. So specify a new point at any desired position without canceling the conventional point.<br>Store in memory ..... When turning OFF the power to the machine under the sewing mode, the "backup function" works to store the specified point as well as the pattern in memory. |

| Name of switch | Function |
|---|---|
| ❺ DIP switch 5 (SW5)<br>  <br><br>(at the time of delivery) | **• SW5-4 ..... Wiper actuating point selecting function**<br>Normally, the wiper sweeps across the clearance between the intermediate presser and the needle. When sewing heavy-weight marerial, 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.<br>ON: The wiper sweeps between the intermediate presser and the workpiece after the intermediate presser has reached the highest position in its stroke.<br>OFF (This switch has been set to the ON position at the time of delivery.): The intermediate presser goes up after the wiper has swept across the clearance between the needle and the intermediate presser.<br>  <br>(OFF)<br>Material thickness:<br>up to 3 mm<br>  <br><br>(ON)<br>Material thickness:<br>3 to 5 mm |
| | **• SW5-5 ..... Origin detection selector switch**<br>If the workpiece is not caught in the way during feeding or an excessive load is applied to the workpiece, a feeding failure (step-out) may result. In this case, the needle may come in contact with the feeding frame or the finished pattern may be dislocated in the next sewing.<br>ON: After the completion of sewing, the machine returns to the sewing start point or the 2nd origin after detecting the origin.<br>OFF (This switch has been set to the OFF position at the time of delivery.): After the completion of sewing, the machine returns to the sewing start point or the 2nd origin. |
| | **• SW5-7 ..... "Pedal change-over function A"**<br>ON (This switch has been set to the ON position at the time of delivery.): Depress the feeding frame switch, and the feeding frame will come down. Depress the switch again, and the feeding frame will go up.<br>OFF: The feeding frame keep lowering as long as the feeding frame switch is depressed. |
| | **• SW5-1, -6 and -8 are used for maintenance. They do not need to be operated. Leave these switches as they have factory-set at the time of delivery.** |

| Name of switch | Function |
|---|---|
| ❻ DIP switch 6 (SW6)<br>  <br><br>(at the time of delivery) | • **SW6-2 ..... The setting of the Bobbin thread counter**<br>When the bobbin thread counting function is specified by setting the SW6-3 to the OFF position, the Counter counts the number of finished pieces until the set value is reached. This switch is used to select the counting method to be employed between subtraction and addition. |

| | |
|---|---|
| ON | Subtraction counter<br>Set the number of workpieces to be sewn beforehand, which is shown on the Counter first. After one piece of workpiece has been finished, "1" will be subtracted from the value set on the Counter display. When the value indicated on the Counter display is "000", it will flash on and off, and sewing will no longer possible.<br>Turning ON the [Reset switch] will reset the Counter, and the predetermined number of workpieces to be sewn will appear again on the Counter. At this time, the machine can start sewing. |
| OFF<br>(This switch has been set to the ON position at the time of delivery.) | Addition counter<br>The Counter starts counting up the number of workpieces finished from "000". After one piece of workpiece has been finished, "1" will be added to the value shown on the Counter display.<br>When the value indicated on the Counter display is the predetermined number of workpieces to be sewn, it will flash on and off, and sewing will no longer possible.<br>Turning ON the [Reset switch] will reset the Counter, and "000" will appear again on the Counter. At this time, the machine can start sewing.<br>**(Caution)**<br>**After inputting a set value of the Counter under the [setting mode], the Counter display flashes on and off immediately after pressing the Set [Ready switch] though the machine has not yet sewn any workpiece. In this case, press the [Reset switch] once to reset the value indicated on the Counter, then start sewing.** |

Refer to the explanation of the "SW6-3" on page 30 for the detailed description of the "bobbin thread counting function".

| Name of switch | Function |
|---|---|
| ❻ DIP switch 6 (SW6)   (at the time of delivery) | • **SW6-3 ..... Selection of the "bobbin thread counting function"** |

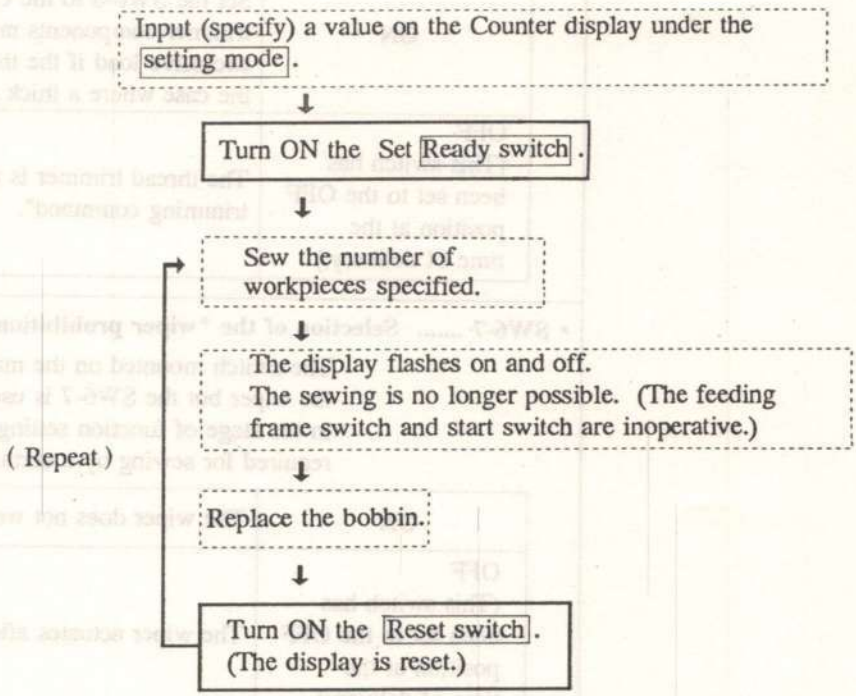
| | |
|---|---|
| OFF | The bobbin thread counting function is operative. (The function works.) |
| ON (This switch has been set to the ON position at the time of delivery.) | The bobbin thread counting function is inoperative. The Counter display on the operation panel works as the addition counter which counts up from "000" to "999". (When "999" is reached, the number on the display returns to "000".) The number on the Counter display is reset to "000" whenever pressing the Reset switch. |

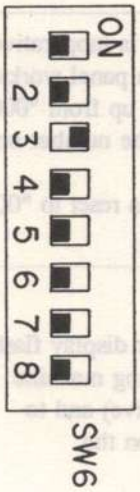
* Bobbin thread counting function

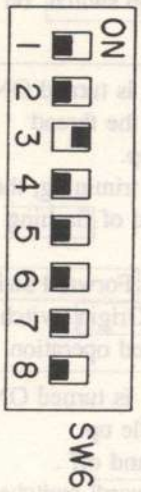
This is the function to make the number shown on the Counter display flash on and off to warn the operator that it is the time to stop the sewing machine (the feeding frame switch and start switch become inoperative) and to change the bobbin after the completion of sewing the pattern on the predetermined number of workpieces.

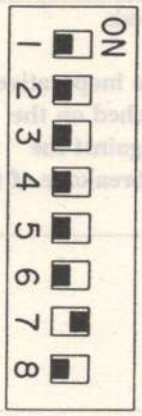
- Count the number of workpieces that can be sewn with one bobbin by pattern beforehand, and set the number on the Counter under the setting mode. (See the explanation of the switches on the operation panel on page 17.)
- Depressing the Reset switch make the feeding frame switch and start switch operative again allowing the sewing machine to continue sewing. (At this time, the number indicated on the Counter display will return to the initial value.)
- The two types of indicating method (counting method) are available for the Counter display, one is addition and the other is subtraction. Refer to the description on the SW6-2.

• Bobbin thread counting function flow



| Name of switch | Function |
|---|---|
| ❻ DIP switch 6 (SW6)<br>  <br><br>(at the time delivery) | **• SW6-4 ..... Selection of the "enlargement/reduction function"**<br>ON: The pattern cannot be enlarged/reduced. The [X/Y scale] switches in the control panel are made inoperative and the scale is fixed at 100%.<br>OFF (This switch has been set to the OFF position at the time of delivery): The pattern is enlarged/reduced when reading in the pattern from the floppy disk.<br>Refer to the explanation of the "[X scale] switch" and "[Y scale] switch" on page 18 for how to specify the X/Y scale.<br><br>**• SW6-5 ..... Selection of the "thread breakage detection function"**<br>ON: The "thread breakage detection function" is not effective. Set the SW6-5 to the ON position when the sewing machine is idling.<br>OFF (This switch has been set to the OFF position at the time of delivery.): The "thread breakage detecting function" works. When a thread breakage occurs, the machine automatically performs thread trimming, and stops running indicating error [9].<br><br>**• SW6-6 ..... Selection of the "thread trimmer prohibition function"**<br>This switch is used to make the machine perform sewing without actuating the thread trimmer even if the thread trimming command has been entered in a pattern.<br>ON: Thread trimmer does not work. Set the SW6-6 to the ON position when the thread trimmer components may be damaged by an excessive load if the thread trimmer is actuated in the case where a thick thread is used.<br>OFF (This switch has been set to the OFF position at the time of delivery.): The thread trimmer is actuated by the "thread trimming command".<br><br>**• SW6-7 ..... Selection of the "wiper prohibition function"**<br>The switch mounted on the machine head can be used to stop the wiper but the SW6-7 is used to make the wiper inoperative in the stage of function setting. This shortens the time required for sewing by a certain degree.<br>ON: The wiper does not work.<br>OFF (This switch has been set to the OFF position at the time of delivery): The wiper actuates after thread trimming. |

<table>
<tr><th>Name of switch</th><th>Function</th></tr>
<tr><td>❻ DIP switch 6<br>(SW6)<br>  <br><br>(at the time of delivery)</td><td>• SW6-8 ..... Selection of the "intermediate presser stop function"<br>This switch is used to make the intermediate presser inoperative.<br><table><tr><td>ON</td><td>The intermediate presser does not work.<br>(Caution)<br>If the intermediate presser is set to inoperative with the intermediate presser attached on the machine, the needle bar may hit against the intermediate presser, resulting in breakage of the related components.</td></tr><tr><td>OFF<br>(This switch has been set to the OFF position at the time delivery.)</td><td>The intermediate presser actuates.</td></tr></table>(Caution) Set the SW6-8 to the OFF position as long as the intermediate presser is normally used.<br>• SW6-1 is used for maintenance. It does not need to be operated.<br>Leave this switch to its OFF position.</td></tr>
</table>

| Name of switch | Function |
|---|---|
| ❼ DIP switch 7 (SW7)<br>  <br><br>(at the time of delivery) | • **SW7-3 ..... Selection of the "thread trimming after emergency stop function"**<br>This switch is used to make the machine automatically actuate the thread trimmer after pressing the [Emergency stop switch] on the machine head.<br>**ON**: When the [Emergency stop switch] is turned ON, the machine automatically actuates the thread trimmer and stops with its needle up. Since the machine performs thread trimming, the error indication [5 lights up] instead of [flashing on and off]. Consequently, you can operate the [Forward switch], [Backward switch] and [Return to Origin switch] immediately after the aforementioned operation.<br>**OFF** (This switch has been set to the OFF position at the time of delivery.): When the [Emergency stop switch] is turned ON, the machine will stop with its needle up. The error indication [5 flashes] on and off. To make the [Forward] and [Backward] switches and [Return to Origin] switch operative, move the [Needle threading] switch up and down once (to turn it ON and OFF) so that the error indication [5 lights up].<br>Refer to the description on the switches on the operation panel on page 19 for the function and operation of the [Forward] and [Backward] switches and [Return to Origin] switch. |
| | • **SW7-4, -5 ..... Selection of the sewing speed at sewing start**<br>The rotational speed (sewing speed) of the sewing machine at the start of sewing can be set to one of the following four different speeds. |

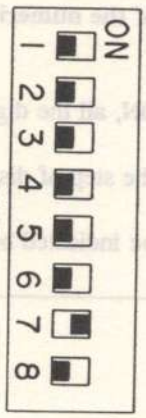
| SW7-4 | SW7-5 | 1st stitch | 2nd stitch | 3rd stitch | 4th stitch | 5th stitch | 6th stitch |
|---|---|---|---|---|---|---|---|
| OFF | OFF | 200 → | 600 → | 1000 → | 1400 → | 1800 → | 2000 |
| ON | OFF | 600 → | 600 → | 1000 → | 1400 → | 1800 → | 2000 |
| OFF | ON | 200 → | 2000 | | | | |
| ON | ON | 2000 → | **(Caution)** | | | | |

These two switches have been set to the [OFF] position at the time of delivery.

**(Caution)**

**The sewing speed is not automatically limited.**
**Set the sewing speed according to the sewing product at the time of inputting a pattern.**
**The sewing speed can be input using the main unit input function or the PGM-1, etc.**

* Sewing speed
In the AMS machines, the sewing speed is limited by stitch length.
For example, the maximum sewing speed is 2,000 s.p.m. when sewing a pattern with the stitch length of 3 mm as shown in the table above. However, the maximum sewing speed for a pattern with the stitch length of 4 mm is 1,500 s.p.m., which means that the sewing speed cannot be set to a value exceeding 1,500 s.p.m.

| Name of switch | Function |
|---|---|
| ❼ DIP switch 7 (SW7)<br>  <br><br>(at the time of delivery) | • **SW7-6 ..... Selection of the "feeding frame position at sewing end change-over function"**<br>ON: The feeding frame keeps clamping the sewing product (cloth, etc.) instead of going up upon completion of sewing. If you wish to raise the feeding frame, depress the [feeding frame switch]. **(Caution) The sewing machine cannot start sewing unless the feeding frame is lifted once.**<br>OFF (This switch has been set to the OFF position at the time of delivery.): The feeding frame goes up upon completion of sewing. (Normal state)<br><br>• **SW7-7 ..... Selection of the "automatic retainer compensation function"**<br>This switch is used to select either automatically or manually correct the position of the retainer.<br>OFF: The "automatic retainer compensation function" works.<br>ON (This switch has been set to the ON position at the time of delivery.): The "automatic retainer compensation function" does not work.<br><br>• Retainer compensation<br>The X-Y table built in the sewing machine uses the component called "retainer" which moves together with the feed mechanism.<br>It may shift from its predetermined position after a long period of usage, resulting in deformed shape of sewing pattern or an error in the origin retrieval. So, it is necessary to correctly position the retainer approximately once a day.<br><br>① Automatic compensating operation<br>The automatic retainer compensation function works when turning ON the [Set Ready switch] for the first time after turning [ON the power] to the machine.<br>The feeding frame comes down, and the feed mechanism travels back and forth until its stroke end is reached. (Then, the feed mechanism moves to the sewing start point or the 2nd origin as in the case of normal sewing, and the feeding frame goes up. This completes the automatic retainer compensating action.)<br>* The automatic retainer compensation is not performed when the [Set Ready switch] is pressed for the second time and afterward.<br>② How to manually correct the position of the retainer Turn OFF the power to the sewing machine. Then gradually move the feed mechanism by hand, back and forth and to the right and left until it will go no further. (About once a day)<br><br>• **SW7-1, -2 and -8 are used for maintenance. They do not need to be operated. Leave these switches as they have factory-set at the time of delivery.** |

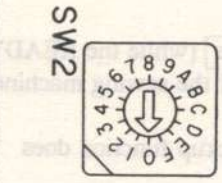
| Name of switch | Function |
|---|---|
| ❷ Rotary DIP Switch 2 (SW2) | • **Value set at "0".... (This switch is set at "0" at the time of delivery)** Make sure that the switch has been set at "0" for normal sewing. |
| | • **Value set at "2".... Serves to check the input of the individual switches and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

| | | | |
|---|---|---|---|
| Pattern No. | A | B | C |
| X-scale | D | E | F |
| Y-scale | G | H | I |

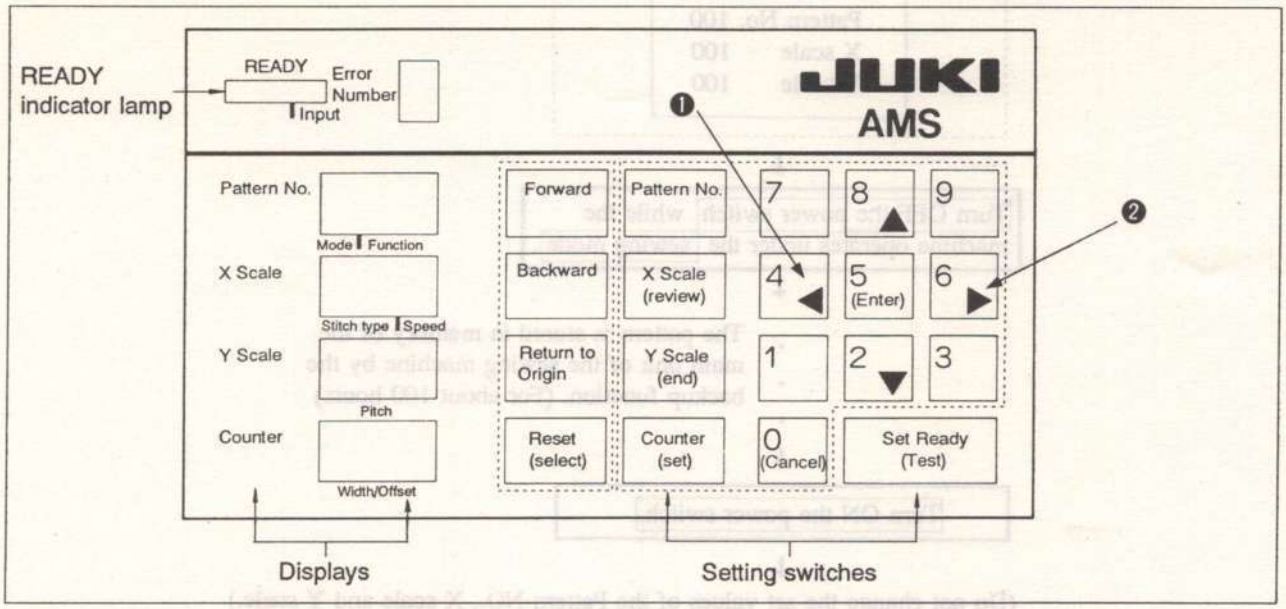
(Display table)

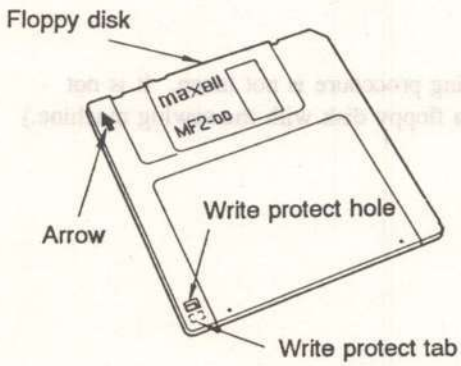
| Display / Step A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 (Operation switch) | 1 (Operation switch) | 2 (Operation switch) | 3 (Operation switch) | 4 (Operation switch) | 5 (Operation switch) | 6 (Operation switch) | 7 (Operation switch) |
| 1 | 8 (Operation switch) | 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)<br>  | • **Value set at "5"... Serves to check the machine origin.**<br>1. Set the switch at "5", turn ON the power switch, and treadle the feeding frame switch. The feeding frame will come down.<br>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.** |

## 15. Disk formatting function

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.**



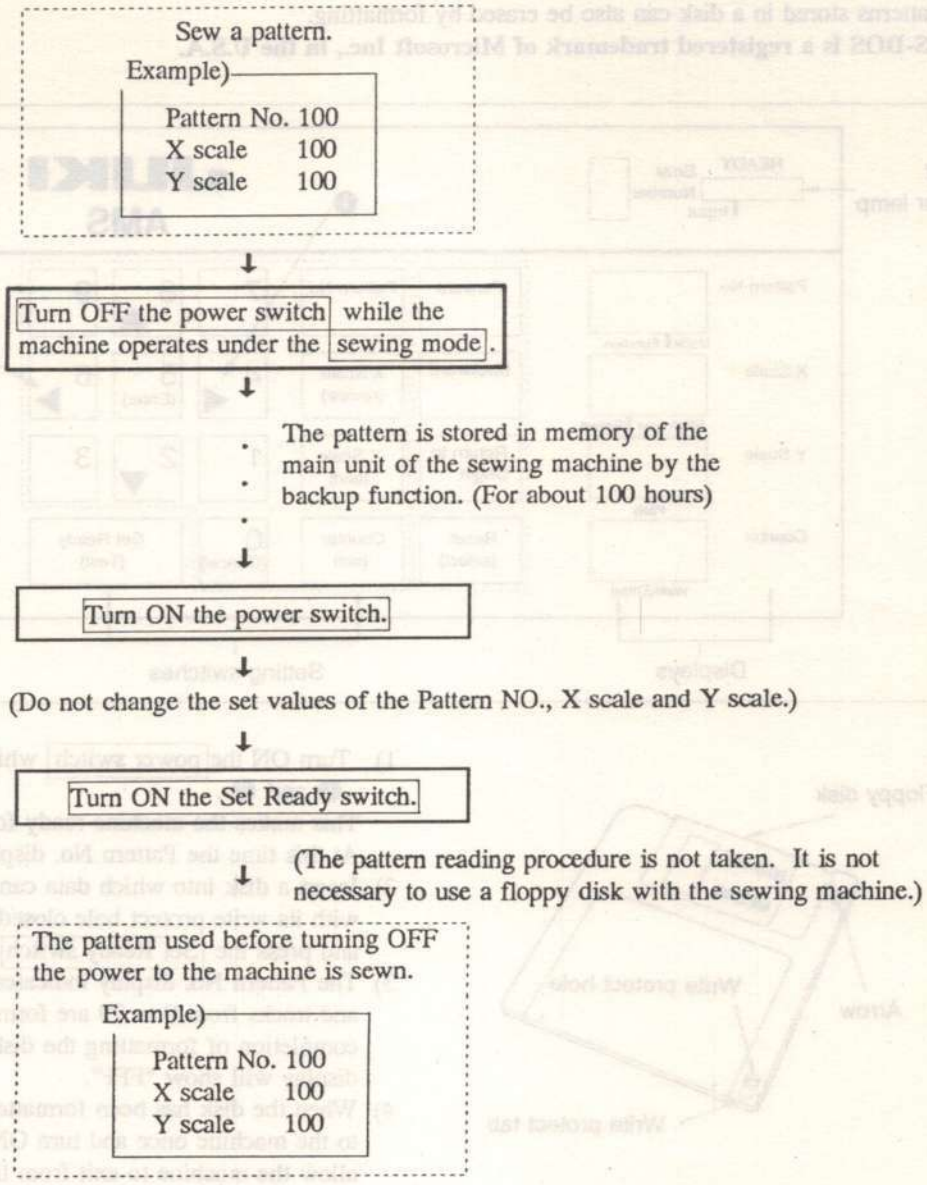

1) Turn ON the power switch while pressing switches ❶ and ❷.
This makes the machine ready for formatting a disk.
At this time the Pattern No. display will show "FFF".
2) Insert a disk into which data can be written (a disk with its write protect hole closed) into the disk drive, and press the Set Ready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

(Caution)
**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.**

## 16. Data backup function

In order to operate your AMS sewing machine, it is necessary to read a pattern you wish to sew in the main unit of the sewing machine after energizing the sewing machine ( turning ON the power switch ).
However, if you use the same pattern repeatedly, you can omit the aforementioned procedure when actuating the sewing machine ( turning ON the power switch ) after turning OFF the power switch once.
(Operating procedure)

- When you turn OFF the power switch while the machine operates under the sewing mode (while the READY indicator lamp lights up), the currently used pattern which has been read in the main unit of the sewing machine is automatically stored in memory built in the main unit of the sewing machine.
  (If turning OFF the power switch when the machine is in the setting mode, the data backup function does not work.)
- Then, turn ON the power switch, and turn ON the Set Ready switch without changing the set values for the "Pattern No.", "X scale" and "Y scale". This will change over the operation mode of the sewing machine to the setting mode without taking the pattern read-in procedure. As a result, you can use the pattern used before turning OFF the power switch for sewing again. (In this case, there is no need for a floppy disk.)




(Caution)

1. **The 2nd origin and sewing start point which are set by jog switches are also stored in memory together with the pattern.**
2. **Even if setting the Pattern No., X scale and Y scale to the values same as those used before turning OFF the power switch, the machine does not perform the pattern read-in operation.**

3. **If you wish to read the pattern with the Pattern No. same as that sewn before turning OFF the power switch from another floppy disk using the X scale and Y scale same as those used before, turn OFF the power switch once while the machine is set to the setting mode to make the data backup function inoperative.**
4. **The scale setting switch for INC/DEC of the stitch length & INC/DEC of the number of stitches mounted on the front face of the control box, as well as the Pattern No., etc., is also related to the pattern reading function. So, if changing the set value of the scale setting switch, the data backup function will be ineffective.**

### 17. Needle-up position stop function

In the AMS machines, when the needle is not at its highest position, error No. 3 will be indicated on the display. In this case, the foot switch, etc. are inoperative and the sewing machine cannot be operated. If the needle is not in its highest position under the sewing mode, you can bring the needle to its highest position by operating this switch instead of manually turning the pulley.

(Operating procedure)

If the needle is not in its highest position under the sewing mode, move the Needle threading switch mounted on the front face of the control box up and down after confirming there is nothing under the tip of needle.

① Move up the Needle threading switch. The feeding frame and the intermediate presser come down.

② Move down the Needle thread switch. The sewing machine makes one revolution (the needle goes up and comes down), and stops with its needle up. → The feeding frame and the intermediate presser go up.

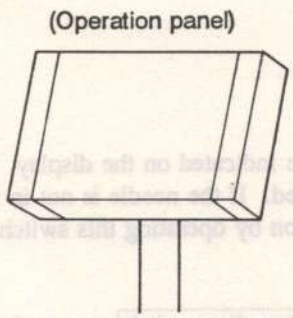
**(Caution)**

**The feeding frame, intermediate presser and needle moves up and down. It is very dangerous, therefore, to perform the above-stated operation with your hands, etc. placed under the feeding frame, intermediate presser and the tip of needle. So be careful.**

## 18. Enlargement/reduction function

The AMS machine is capable of enlarging/reducing a pattern when reading the pattern from the floppy disk. The pattern can be enlarged/reduced in the range of 1% to 400% (1/100 to 4 times of the original size) while the size of pattern written in the floppy disk is taken as 100%.

1) Switches used for the enlargement/reduction function



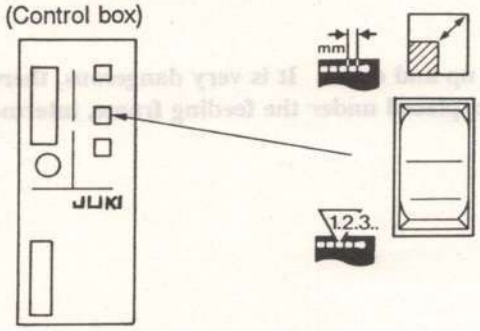

X Scale (review)

It is used to specify the scale (%) for enlargement/reduction of a pattern in the X direction (widthwise direction). It is pressed first.

Y Scale (end)

It is used to specify the scale (%) for enlargement/reduction of a pattern in the Y direction (lengthwise direction). It is pressed first.

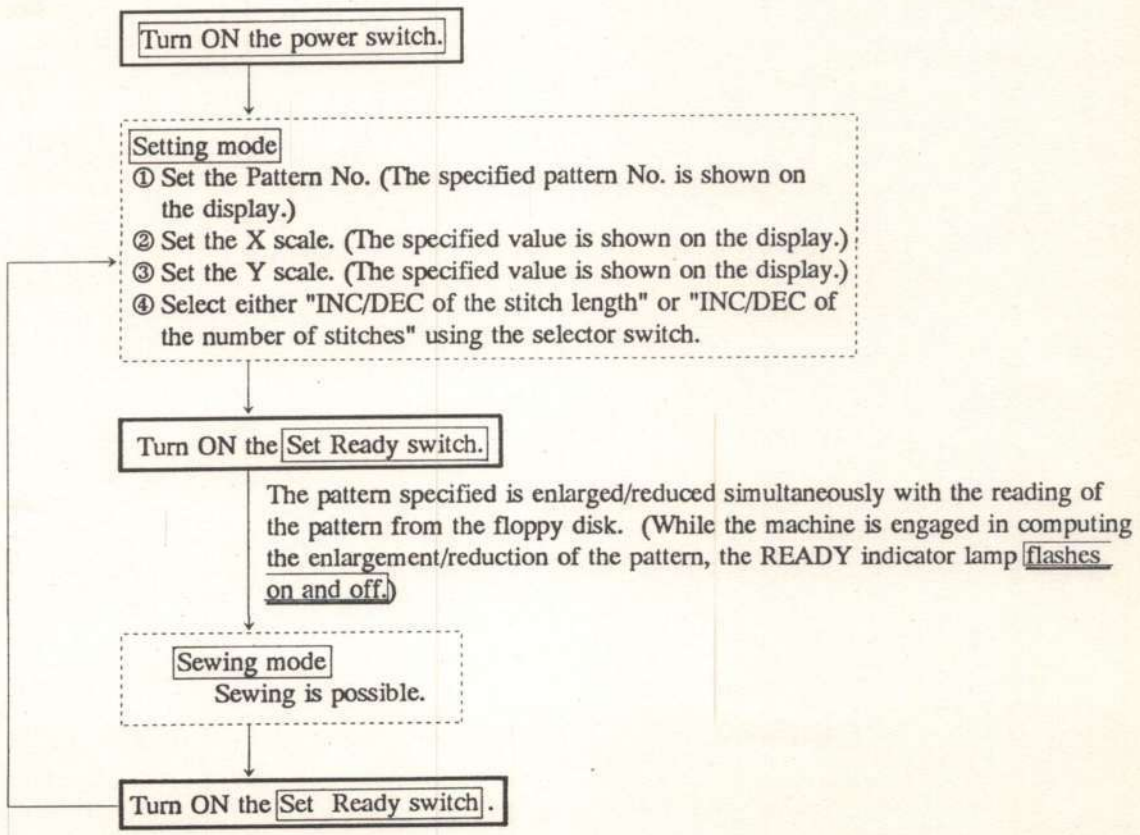
These switches are used to set the X scale and Y scale. Taking the size of pattern written in the floppy disk as 100%, set the scale within the range of 1% to 400% (1/100 to 4 times as large as the original size).




Scale setting switch for INC/DEC of the stitch length & INC/DEC of the number of stitches

This switch is used to select either to increase/decrease the stitch length in accordance with the enlargement/reduction scale or increase/decrease the number of stitches without changing the stitch length, when the pattern is enlarged/reduced as desired using the switches mounted on the aforementioned operation panel.

2) Operating procedure

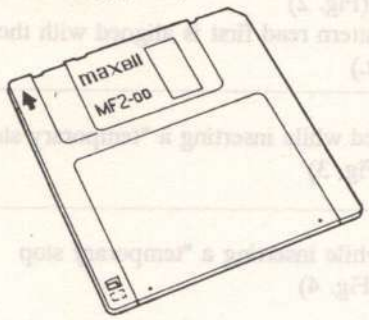


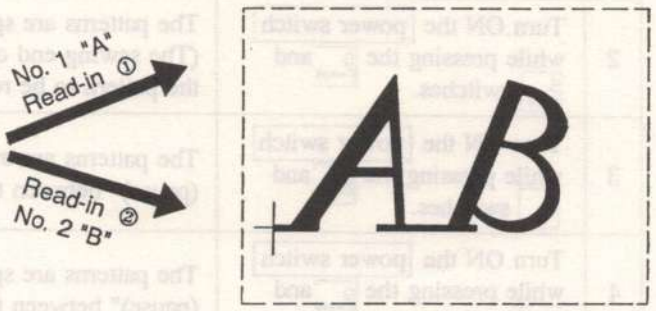
## 19. Pattern combination function

This function enables the machine to read only the desired parts of the patterns stored in the floppy disk to combine them for sewing.
The total number of stitches that can be combined is 16,000 stitches at the maximum. As long as the total number of stitches does not exceed 16,000, you need not care about the number of patterns.
If you have created embroidery patterns of all the alphabets respectively in the floppy patterns beforehand, you can combine some of these patterns to sew initials. This allows you to sew many different persons' names using a considerably small number of patterns (only 26 different patterns from A through Z).

(Patterns stored in the floppy disk)

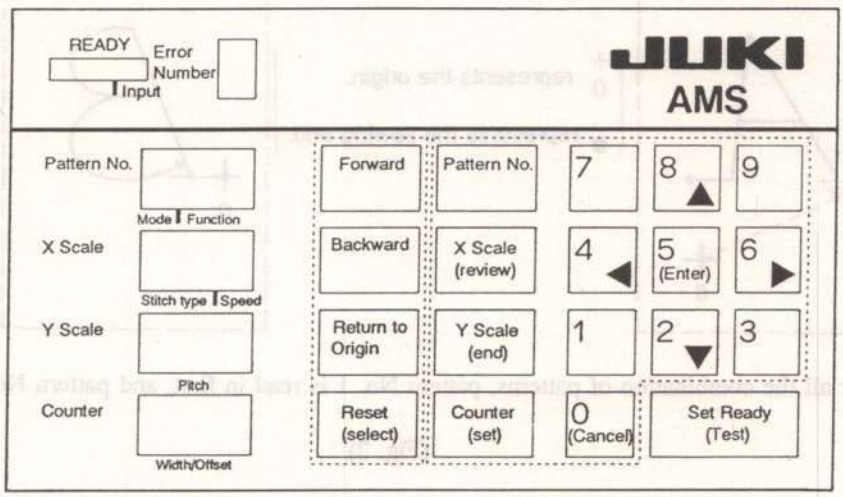
No. 1 ← "A"
No. 2 ← "B"
No. 3 ← "C"
No. 4 ← "D"
.....
No.26 ← "Z"




Pattern combination function

(Operating procedure)




This function is operated in the special way which is different from the other functions.

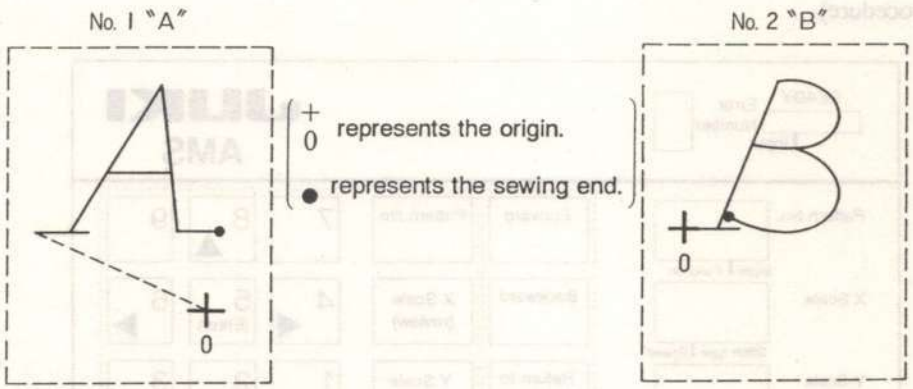
### ❶ Actuating the "pattern combination function"

Basically, the function is actuated by pressing the power switch while pressing the switches on the operation panel, as in the case of actuating the "disk formatting function" (See page 36).
The "pattern combination function" can be actuated in the four different ways in accordance with the pattern combining methods.

| | Actuating method | Pattern combining method |
|---|---|---|
| 1 | Turn ON the power switch while pressing the 0 (Cancel) and 2 ▼ switches. | The patterns are overlapped. (Fig. 1)<br>(The origins of the respective pattern read in the machine are aligned.) |
| 2 | Turn ON the power switch while pressing the 0 (Cancel) and 5 (Enter) switches. | The patterns are spliced. (Fig. 2)<br>(The sewing end of the pattern read first is aligned with the origin of the pattern to be read next.) |
| 3 | Turn ON the power switch while pressing the 0 (Cancel) and 3 switches. | The patterns are overlapped while inserting a "temporary stop (pause)" between them. (Fig. 3) |
| 4 | Turn ON the power switch while pressing the 0 (Cancel) and 6 ▶ switches. | The patterns are spliced while inserting a "temporary stop (pause)" between them. (Fig. 4) |

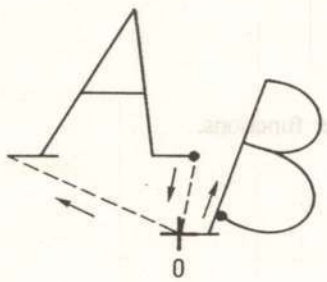
- Example of pattern combination -

Patterns stored in the floppy disk

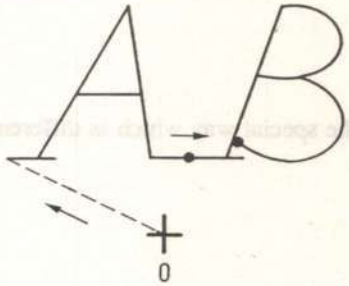



For all the combination of patterns, pattern No. 1 is read in first, and pattern No. 2 is read next.

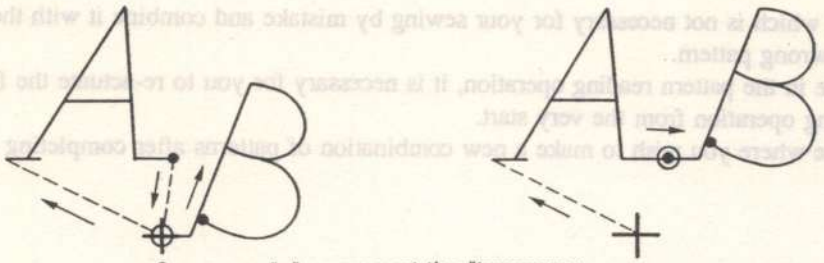
(Fig. 1)




(Fig. 2)



(Fig. 3)



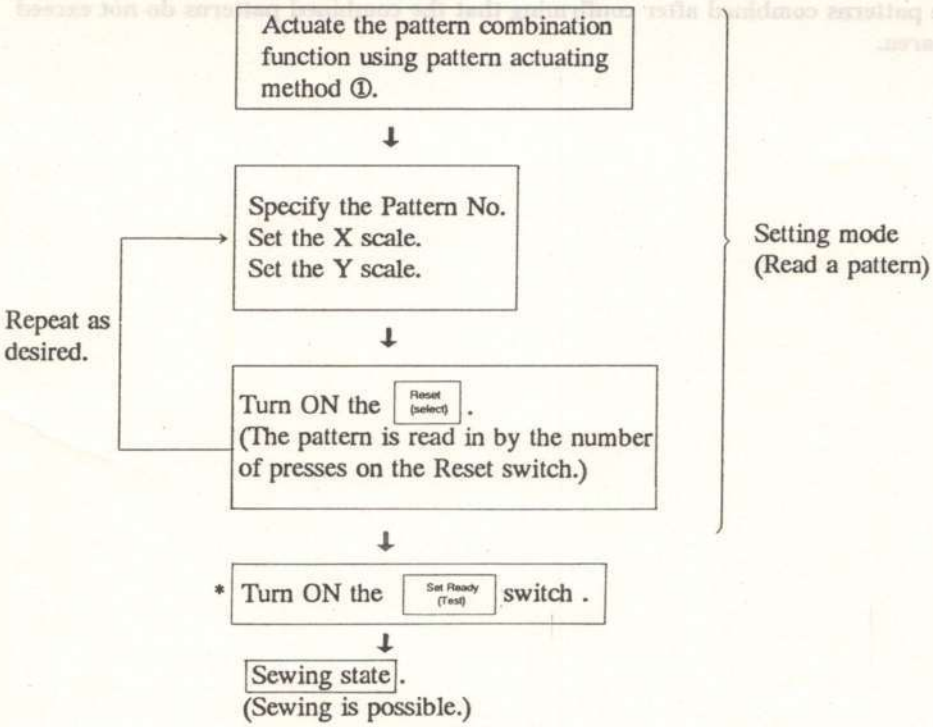

"o" represent the "temporary stop (pause)".

**(Caution)**

**Refer to the description on the SW5-2 on page 26 for the function of the "temporary stop (pause)".**

**❷ Reading in a pattern**

Normally, the pattern created under the setting mode is automatically read in at the moment when the setting mode is changed over to the sewing mode by turning ON the Set Ready switch. However, the pattern is read under the setting mode when actuating the "pattern combination function".
Use the Reset (select) to read in the pattern.




* When the data reading operation has been completed, turn ON the READY switch. This will make the sewing machine ready for sewing and to allow you to sew the combined patterns.

### ❸ Erasing the pattern read in

If you have read in the pattern which is not necessary for your sewing by mistake and combine it with the other patterns, you cannot erase the wrong pattern.
So, if you have made a mistake in the pattern reading operation, it is necessary for you to re-actuate the function and carry out the pattern reading operation from the very start.
(This is also applied to the case where you wish to make a new combination of patterns after completing the previous sewing.)

### ❹ Storing the patterns combined in memory

The patterns you have combined are stored in memory in the main unit of the sewing machine by turning OFF the [power switch] under the [sewing mode] (when the READY indicator [lamp lights] up ) by means of the backup function described on page 37. If you use the combined patterns again for the next sewing, actuate the machine by turning ON the [power switch] as in the normal operation.

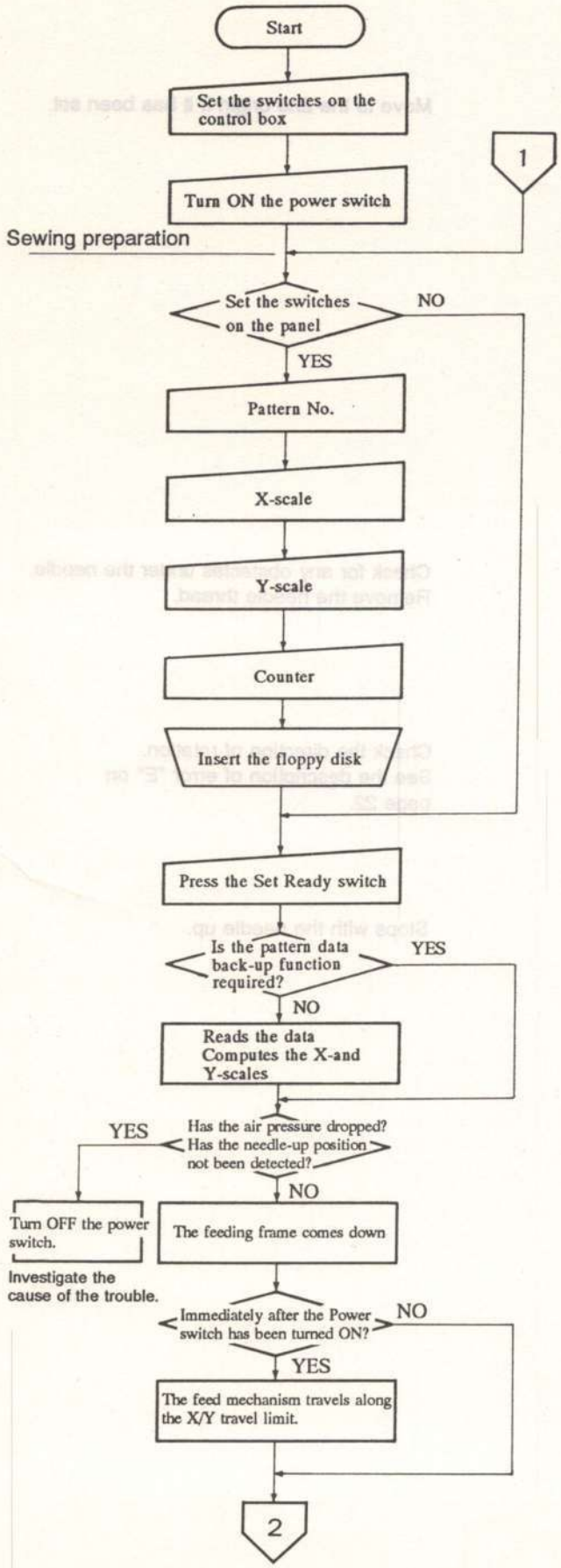
**(Caution)**

- **The Counter display (bobbin thread counter) on the operation panel does not count up/down until all the patterns combined have been finished.**
  **(Refer to the explanation of the SW6-2 on page 29 for the Counter.)**

- **Be sure to start sewing the patterns combined after confirming that the combined patterns do not exceed the predetermined sewing area.**

## 20. Operation procedure flow chart

Follow the operation flow chart given below:



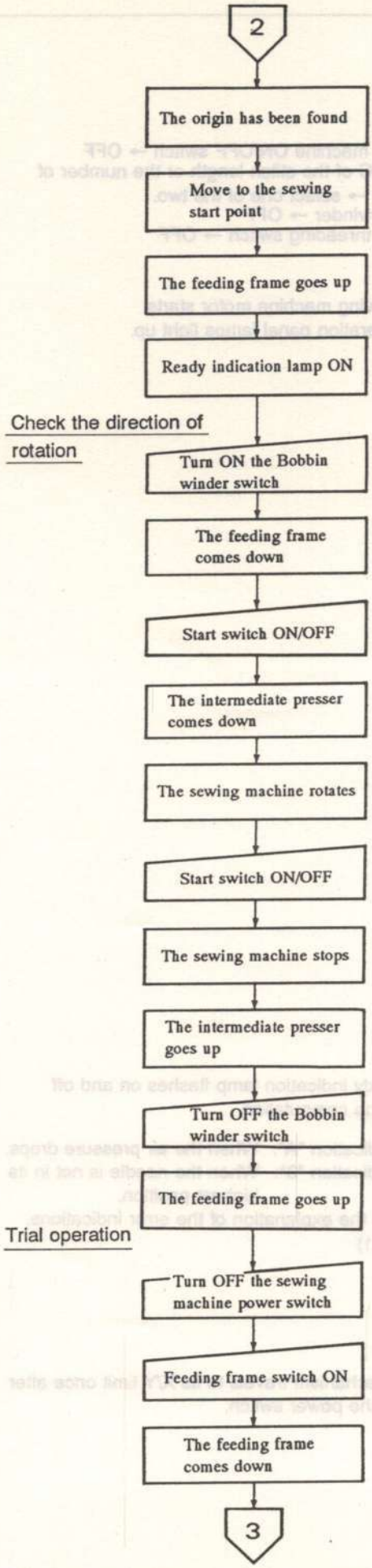

Sewing machine ON/OFF switch → OFF
INC/DEC of the stitch length or the number of stitches → select one of the two.
Bobbin winder → OFF
Needle threading switch → OFF

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

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

Error indication "A": When the air pressure drops.
Error indication "3": When the needle is not in its highest position.
Refer to the explanation of the error indications. (Page 21)

The feed mechanism travels to its X/Y limit once after turning ON the power switch.

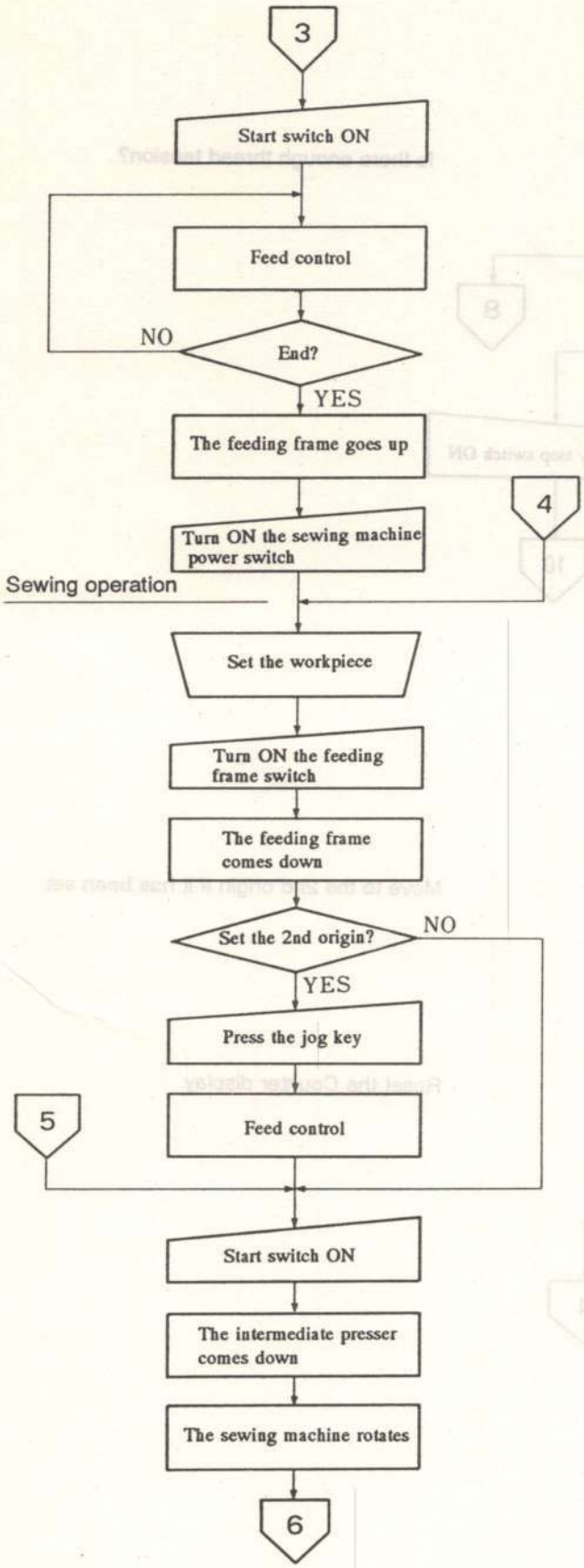



Move to the 2nd origin if it has been set.

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

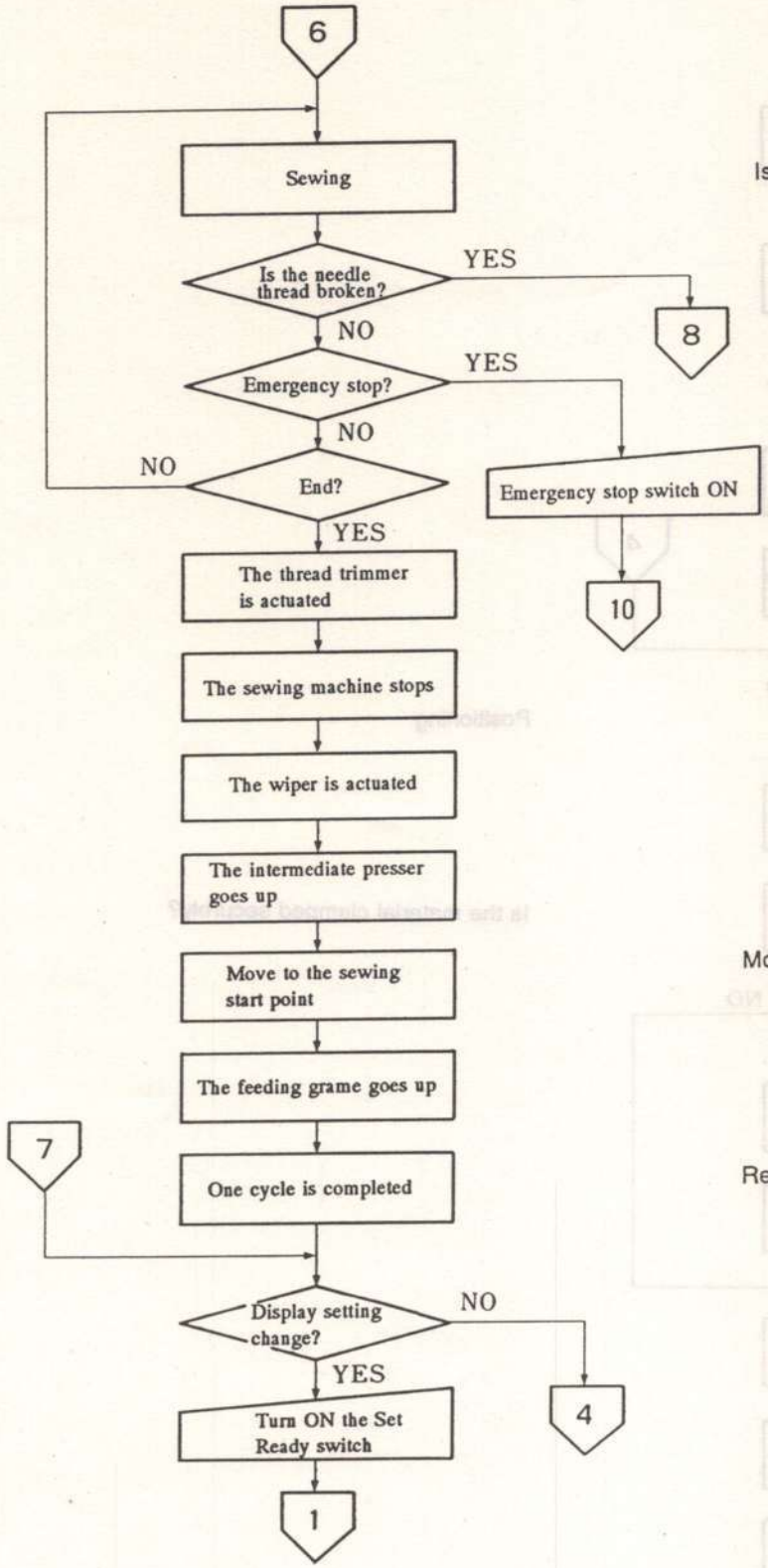
Check the direction of rotation.
See the description of error "E" on page 22.

Stops with the needle up.




Positioning

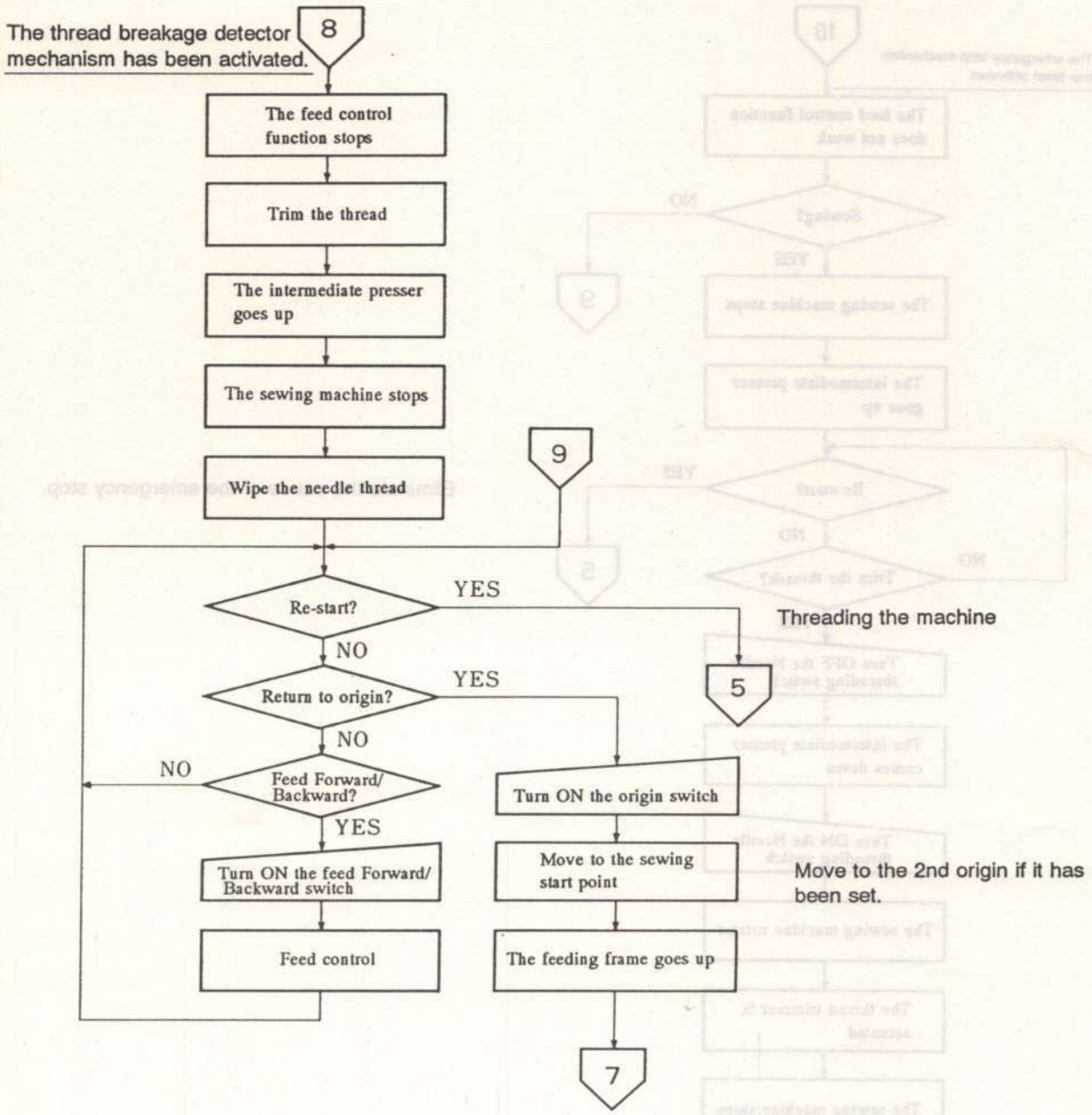
Is the material clamped securely?

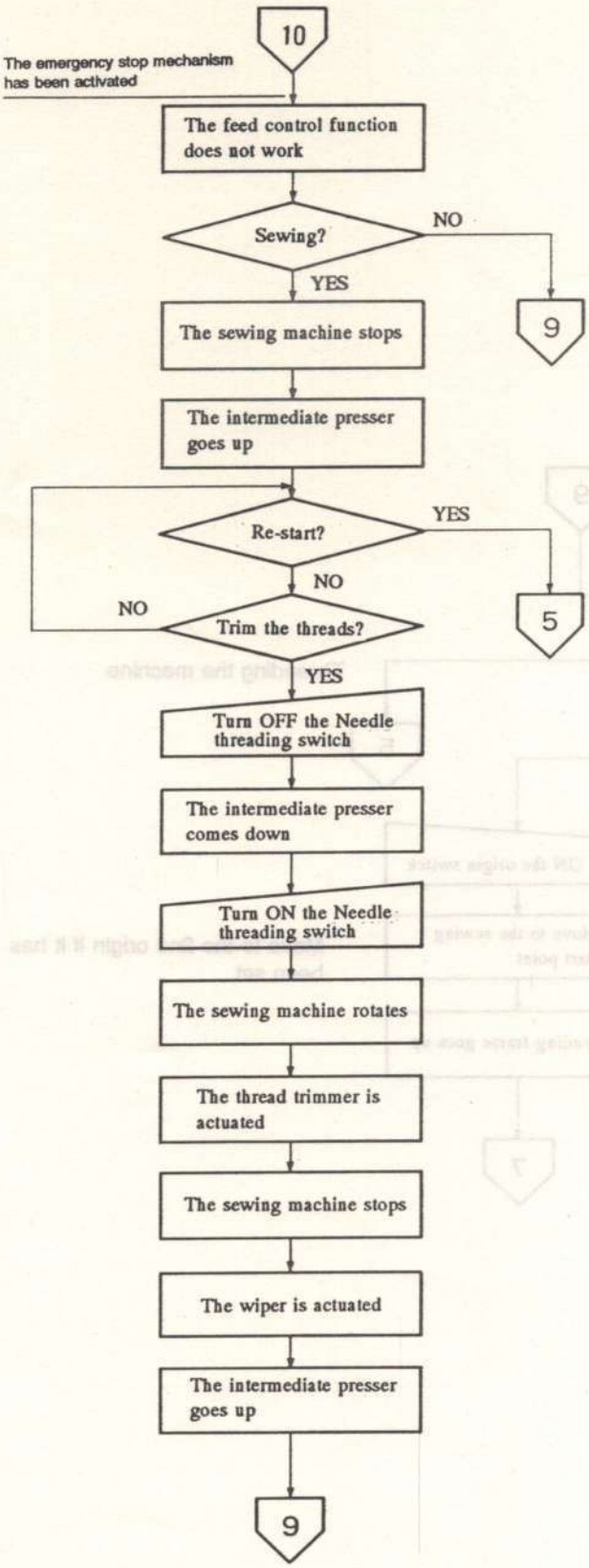



Is there enough thread tension?

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 intermediate presser goes up
The sewing machine stops
Wipe the needle thread
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**

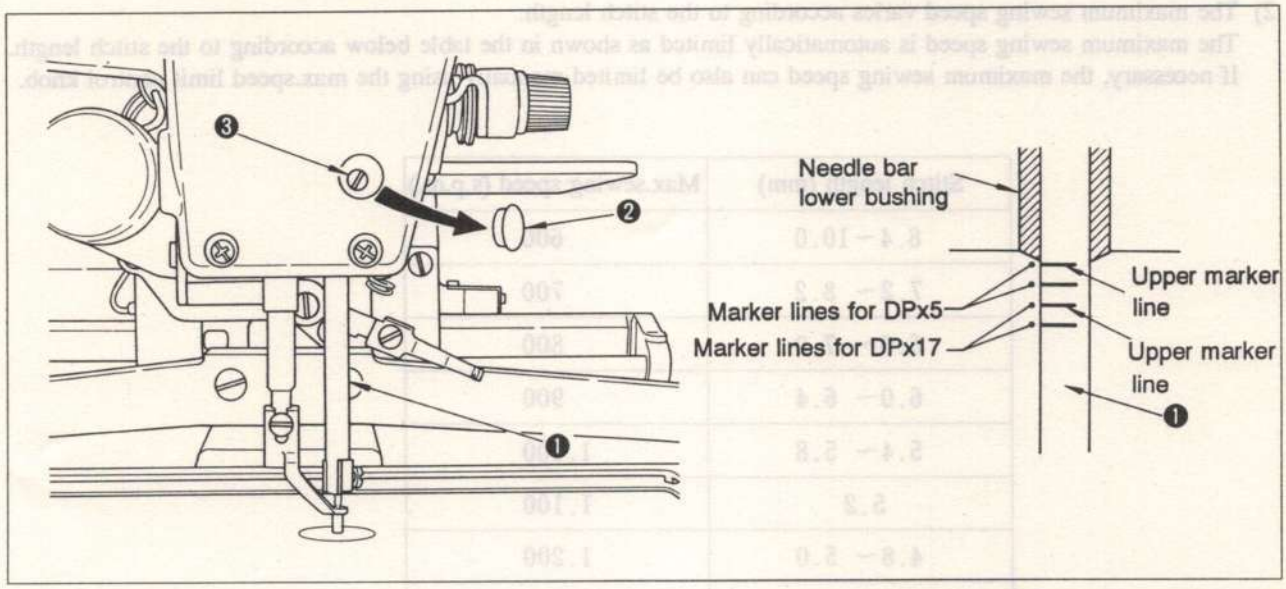
1) Before sewing a new pattern or a newly enlarged pattern, be sure to carry out trial sewing to check the pattern size with respect to the feeding frame.
2) The maximum sewing speed varies according to the stitch length.
   The maximum sewing speed is automatically limited as shown in the table below 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.) |
|---|---|
| 8.4～10.0 | 600 |
| 7.2～ 8.2 | 700 |
| 6.6～ 7.0 | 800 |
| 6.0～ 6.4 | 900 |
| 5.4～ 5.8 | 1,000 |
| 5.2 | 1,100 |
| 4.8～ 5.0 | 1,200 |
| 4.4～ 4.6 | 1,300 |
| 4.2 | 1,400 |
| 3.8～ 4.0 | 1,500 |
| 3.6 | 1,600 |
| 3.4 | 1,800 |
| 3.2 | 1,900 |
| 0.2～ 3.0 | 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 circuity by a tester, or else the tester voltage may be applied to a semiconductor component, and the compenent 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) Do not pull the sewing product on the machine during sewing. This may shift the needle position. If the X-Y needle entry point is dislocated, press the Set Ready switch twice. This will make the needle return to its predetermined sewing start position.

## IV. MAINTENANCE

### 1. Adjusting the height of the needle bar

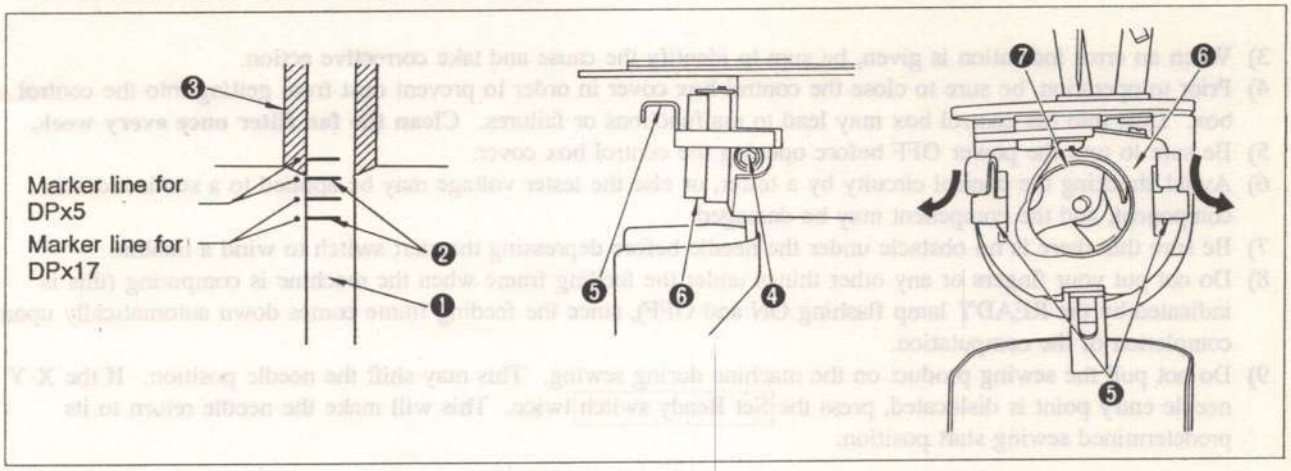



1) Bring needle bar ❶ to the lowest point of its stroke. Make the upper marker line on the needle bar align with the bottom end of the needle bar lower bushing, and remove cap ❷ . Then loosen needle bar connection screw ❸ , and adjust the height of the needle bar properly.
2) The needle bar has a pair of marker lines for the DP x 5 and another pair of marker lines for the DP x 17. Properly use these pairs of marker lines according to the needle used.

**(Caution)**

**After adjustment, be sure to turn the handwheel to check that the pulley rotates smoothly with a uniform torque. Slightly retard the shuttle timing for sewing floppy materials, or slightly advance it for sewing heavy-weight materials.**

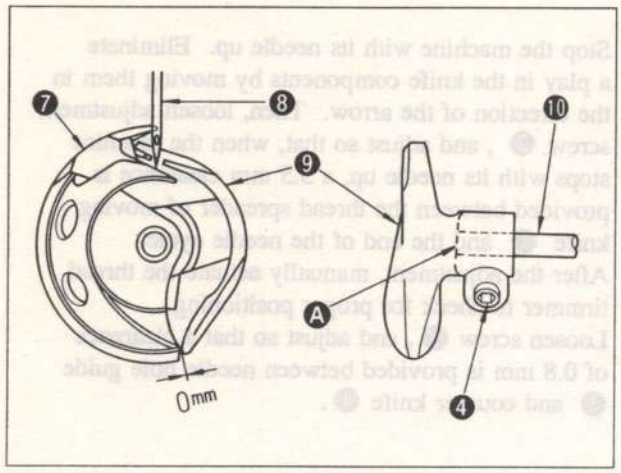
### 2. Adjusting the needle-to-shuttle relationship



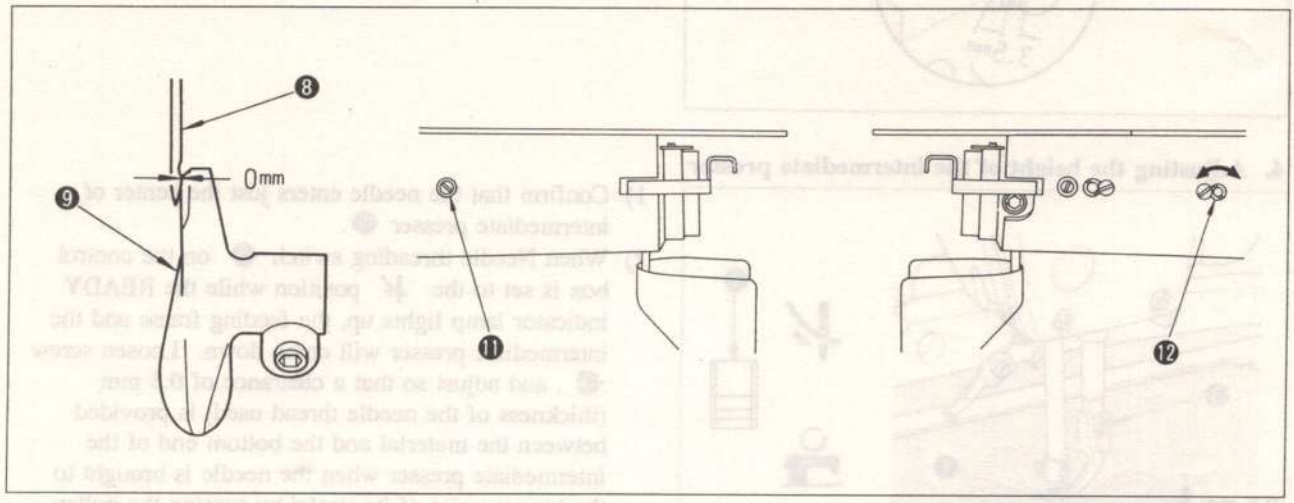

1) Turn the pulley by hand so that lower marker line ❷ on the ascending needle bar ❶ is aligned to bottom end of needle bar lower bushing ❸ . Loosen screw ❹ (with hexagon socket head) in the shuttle driver. Open right and left hooks ❺ in the direction of the arrows while pulling them toward you, and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

**(Caution)**

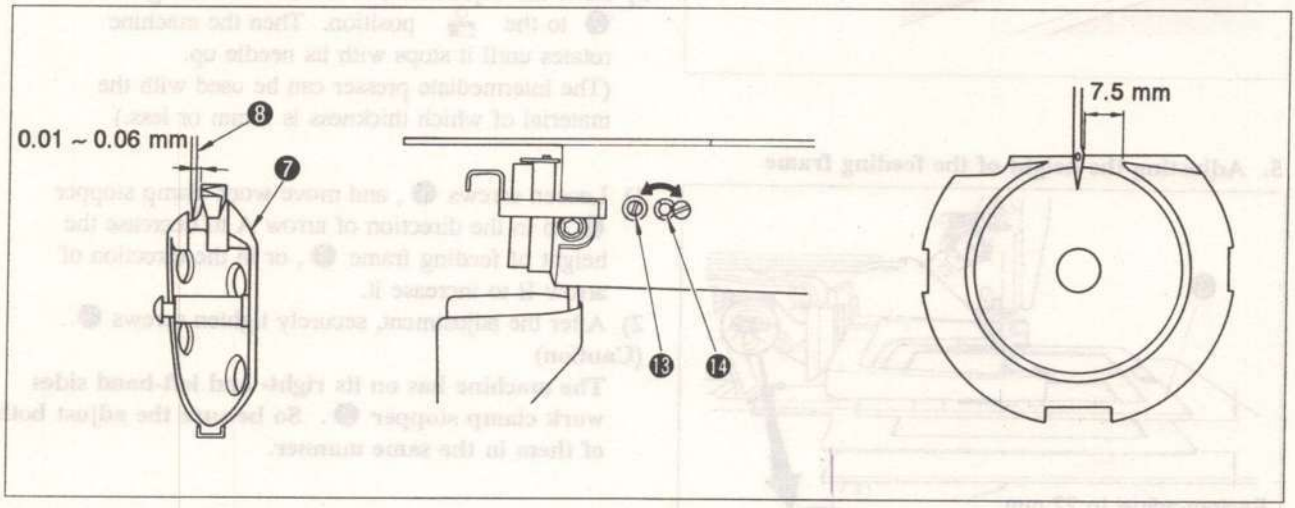
**At this time, be careful not to let shuttle ❼ come off and fall.**




2) Adjust so that the point of shuttle ❼ meets the center of needle ❽ , and that plane Ⓐ of shuttle driver ❾ is flush with shuttle driving shaft ❿ . Then tighten screw ❹ in the driver.

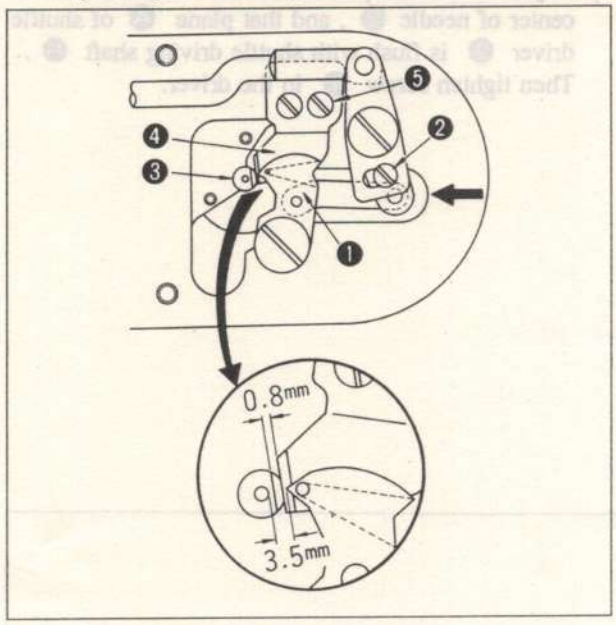



3) Loosen screw ⓫ in the shuttle driving shaft front bushing. Then turn adjusting shaft ⓬ of the shuttle driving shaft front bushing so that a clearance of 0 mm is provided between needle ❽ and front end face of driver ❾ . Then tighten screw ⓫ .



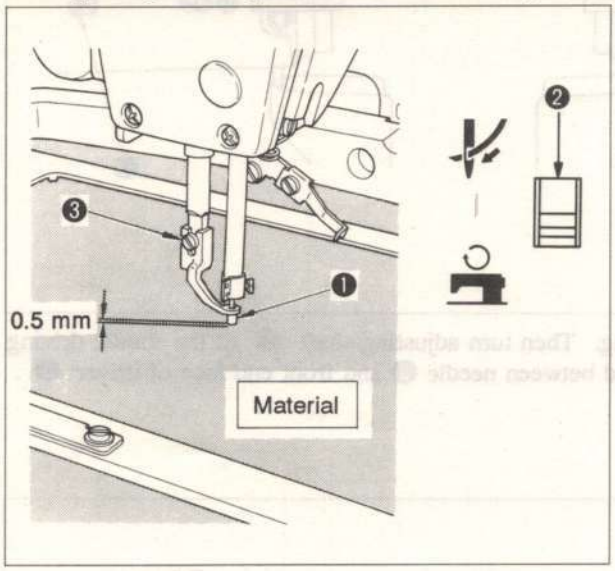

4) Loosen screw ⓭ in the shuttle race. Turn shuttle race adjusting shaft ⓮ clockwise/counterclockwise to adjust the longitudinal position of the shuttle race so that a clearance of 0.01 to 0.06 mm is provided between needle ❽ and the blade point of shuttle ❼ .
5) After the longitudinal position of the shuttle race has been properly adjusted, adjust the direction of rotation so that a clearance of 7.5 mm is provided between the needle and the shuttle race. Then tighten screw ⓭ in the shuttle race ring.
(When using thin threads with a thread count of #50 or higher, adjust the clearance between the needle and the shuttle race to 7.2 mm.)

### 3. Adjusting the moving knife and the counter knife



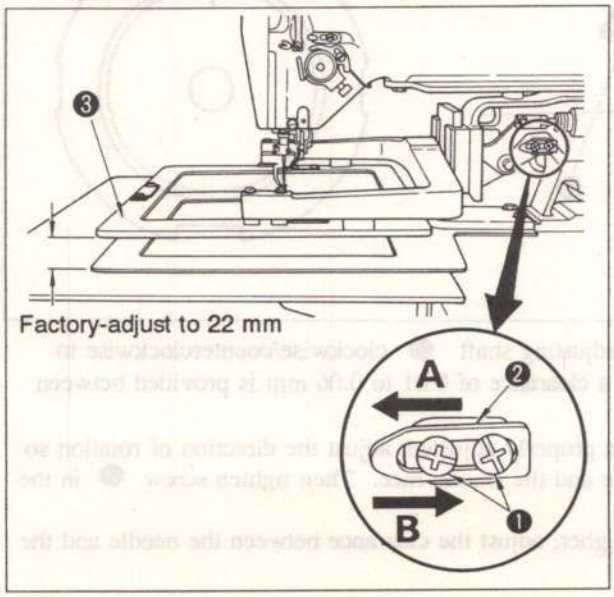

1) Stop the machine with its needle up. Eliminate a play in the knife components by moving them in the direction of the arrow. Then, loosen adjustment screw ❷ , and adjust so that, when the machine stops with its needle up, a 3.5 mm clearance is provided between the thread spreader of moving knife ❶ and the end of the needle eyelet.
2) After the adjustment, manually actuate the thread tirmmer to check for proper positioning.
3) Loosen screw ❺ , and adjust so that a clearance of 0.8 mm is provided between needle hole guide ❸ and counter knife ❹ .

### 4. Adjusting the height of the intermediate presser




1) Confirm that the needle enters just the center of intermediate presser ❶ .
2) When Needle threading switch ❷ on the control box is set to the position while the READY indicator lamp lights up, the feeding frame and the intermediate presser will come down. Loosen screw ❸ , and adjust so that a clearance of 0.5 mm (thickness of the needle thread used) is provided between the material and the bottom end of the intermediate presser when the needle is brought to the lowest point of its stroke by turning the pulley. If using a floppy material, adjust the clearance as small as the extent where the intermediate presser comes in contact with the material (a 0 mm clearance).
3) After the adjustment, set Needle threading switch ❷ to the position. Then the machine rotates until it stops with its needle up.
(The intermediate presser can be used with the material of which thickness is 5 mm or less.)

### 5. Adjusting the height of the feeding frame

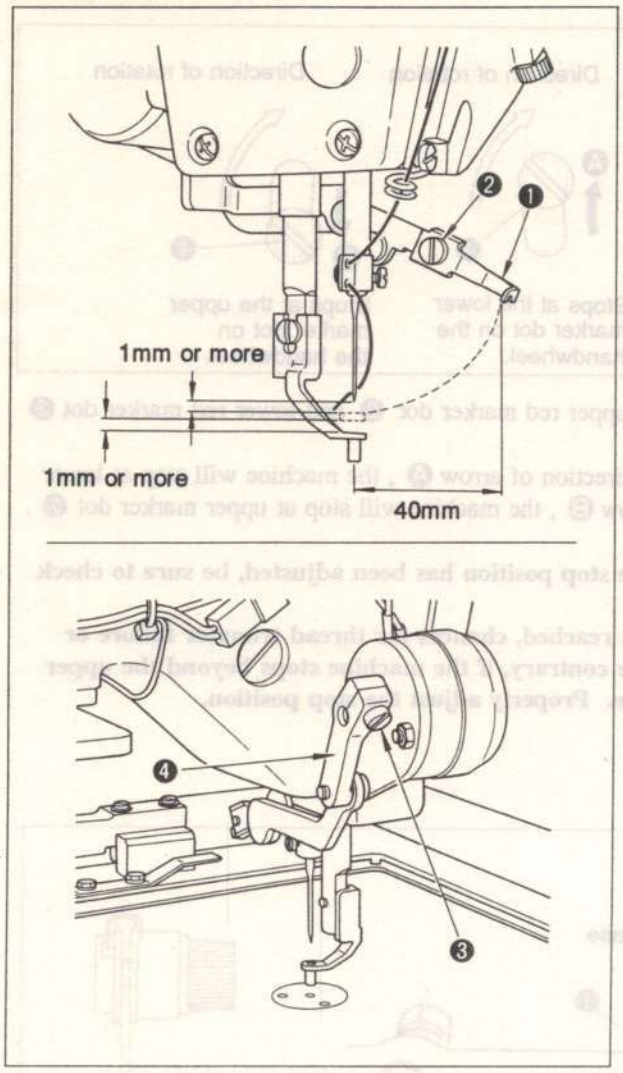



1) Loosen screws ❶ , and move work clamp stopper ❷ to in the direction of arrow A to decrease the height of feeding frame ❸ , or in the direction of arrow B to increase it.
2) After the adjustment, securely tighten screws ❶ .

**(Caution)**

**The machine has on its right- and left-hand sides work clamp stopper ❷ . So be sure the adjust both of them in the same manner.**

## 6. Adjusing the wiper



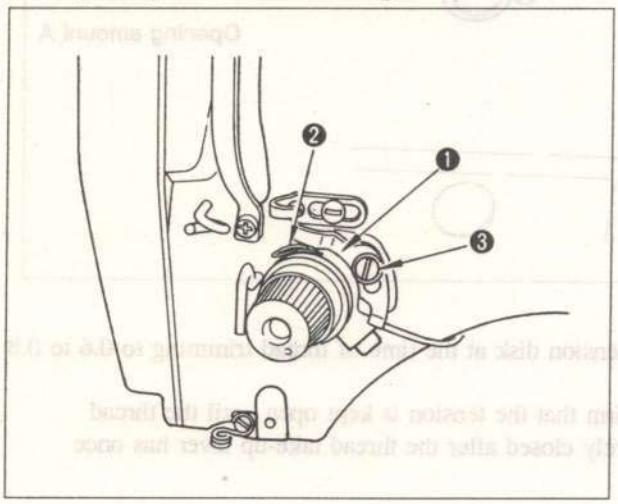

When the READY indicator lamp is ON, move the needle up to its highest position, and set the Needle threading switch to the position. Adjust so that, when wiper ❶ passes under the needle point, the clearance between the wiper and the needle point becomes 1 mm or more and the clearance between the wiper and the intermediate presser becomes also 1 mm or more.

Loosen screw ❷, and perform the aforementioned adjustment.

When the wiper is in its home position, the distance between the center of the needle and the end face of wiper ❶ should be 40 mm.

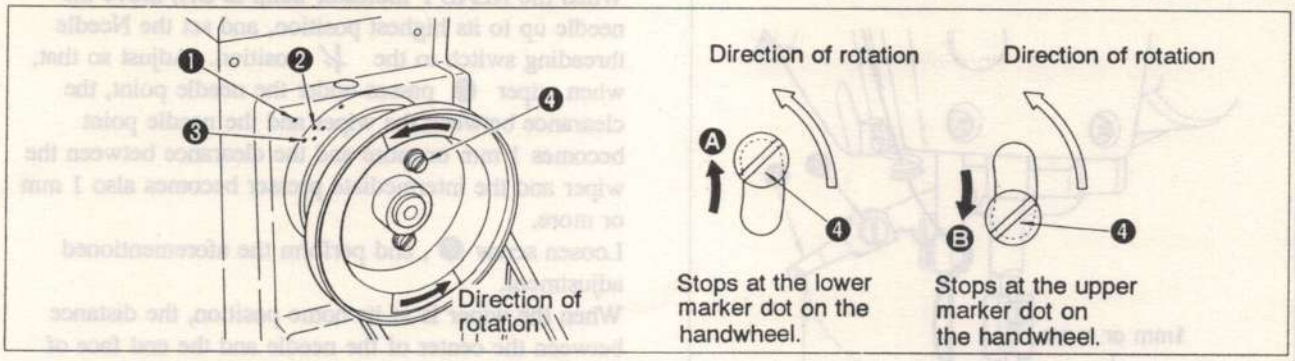
Loosen wiper arm clamping screw ❸, and perform the aforementioned adjustment by changing the installing angle of wiper arm ❹. (If using a material of which thickness exceeds 3 mm, there will be no clearance between the wiper and the needle and also between the wiper and the intermediate presser. In this case, change over the DIP switch SW5-4 referring to page 28.)

## 7. Adjusting the thread breakage detector



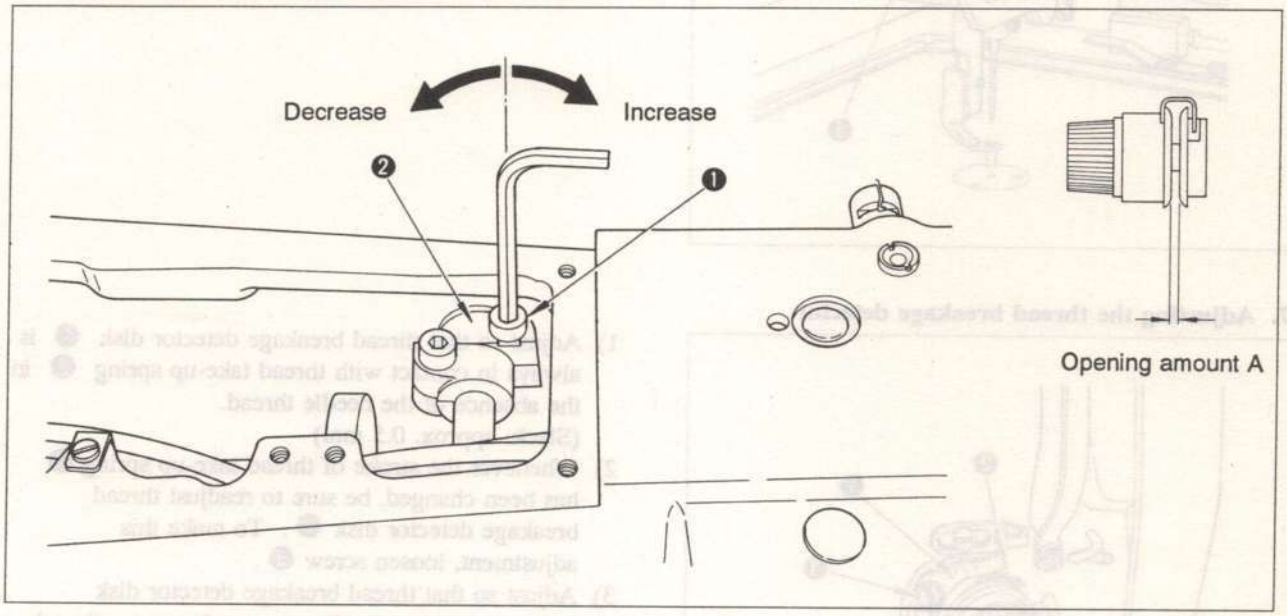
1) Adjust so that thread breakage detector disk ❶ is always in contact with thread take-up spring ❷ in the absence of the needle thread.
(Slack: approx. 0.5 mm)
2) Whenever the stroke of thread take-up spring ❷ has been changed, be sure to readjust thread breakage detector disk ❶. To make this adjustment,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

## 8. Adjusting the needle-up position




1) Marker dot ❶ on the machine arm should stop between upper red marker dot ❷ and lower red 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 failure 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 opening amount of tension disk




1) Remove the arm top cover.
2) Loosen screw ❶, and adjust the opening amount of the tension disk at the time of thread trimming to 0.6 to 0.8 mm by moving tension bracket ❷.
3) After the adjustment, turn the handwheel by hand to confirm that the tension is kept open until the thread take-up lever reaches its highest dead point and it is securely closed after the thread take-up lever has once reached there.