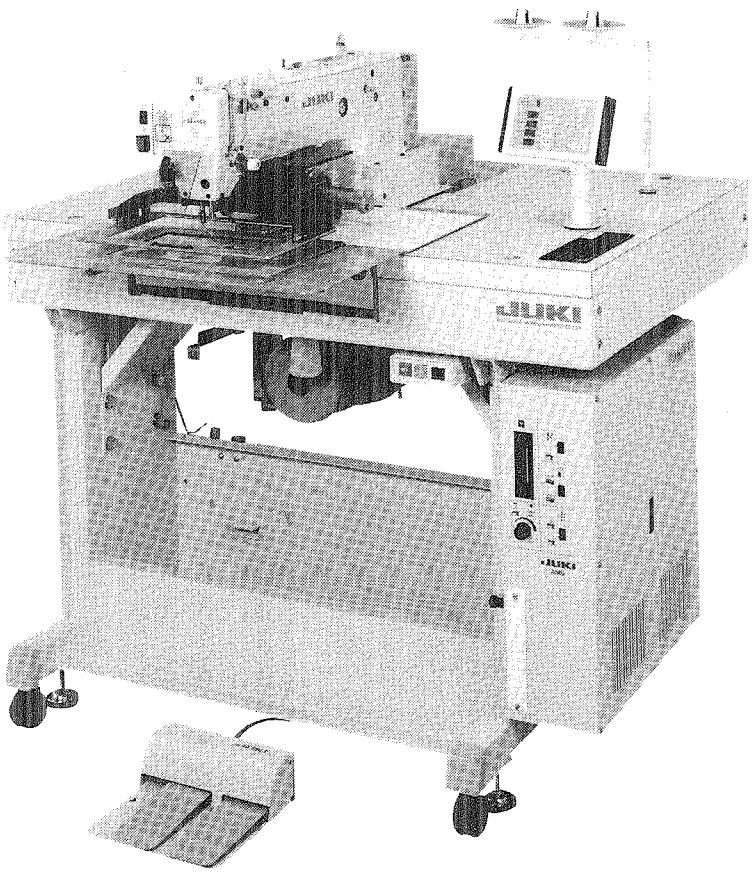
MAC.

JUKI

Computer-controlled Cycle Machine

# AMS-220C

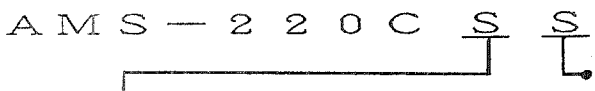
# ENGINEER'S MANUAL




IV-64
1993. 3

# PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service & maintenance of the sewing machines. This manual describes "How to adjust," "Results of improper Adjustment" and other functions which are not covered by the Instruction Manual intended for the maintenance personnel and sewing operators at a sewing factory.
All personnel engaged in repair of AMS-220C are required to carefully read "Standard Adjustment" which contains important information on the maintenance of AMS-220C.
The "Standard Adjustment" consists of two parts; the former part presents illustration and simplified explanation for the convenience of reconfirmation of the required adjustment values in carrying out actual adjustment after reading this manual once; and the latter part provides "Results of Improper Adjustment" in which sewing and/or mechanical failures, and the correcting procedures are explained for those persons who perform such adjustment for the first time.
It is advisable to use "AMS-220C Parts List" and "Instruction manual" together with this Engineer's manual.
This Engineer's Manual describes the AMS-220C Series model of sewing machine. The model names (types) are described with the following abbreviated forms of their names for convenience' sake.




Stitching type
- S: For light-weight materials
- H: For medium-weight materials
- G: For heavy-weight materials

Work clamp type
- S: Standard (Monolithic) work clamp
- B: Double-stepped stroke work clamp
- L: Double-stepped work clamp
- T: Inverted work clamp

| Model | Stitching type |
|---|---|
| AMS-220CSS<br>AMS-220CSB<br>AMS-220CSL<br>AMS-220CST | S type |
| AMS-220CHS<br>AMS-220CHB<br>AMS-220CHL<br>AMS-220CHT | H type |
| AMS-220CGS<br>AMS-220CGB<br>AMS-220CGL | G type |

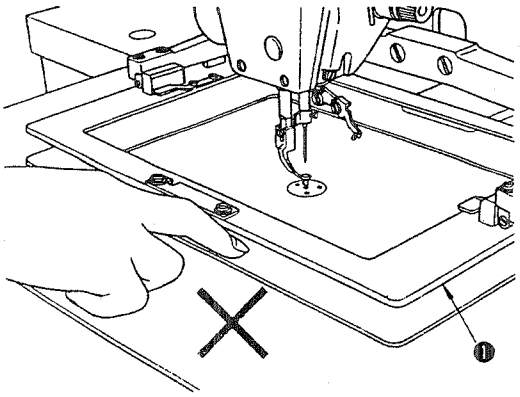
| Model | Work clamp type |
|---|---|
| AMS-220CSS<br>AMS-220CHS<br>AMS-220CGS | S type |
| AMS-220CSB<br>AMS-220CHB<br>AMS-220CGB | B type |
| AMS-220CSL<br>AMS-220CHL<br>AMS-220CGL | L type |
| AMS-220CST<br>AMS-220CHT | T type |

**(Caution)**

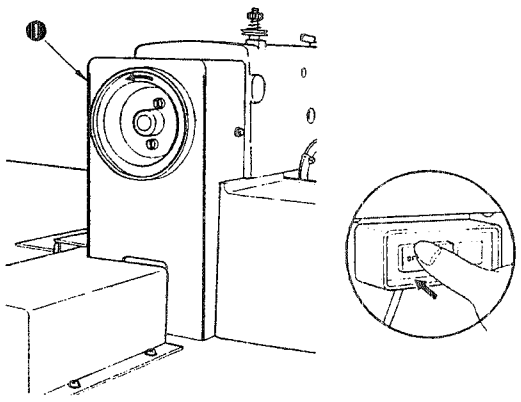
1. **Do not mix up the abbreviated form of double-stepped stroke work clamp type machine (B type) with the AMB-220B Series that is the previous model of the AMS Series.**
2. **The model name of sewing machine may be described in one abbreviated form which represents the sewing type or in the other abbreviated form which represents the work clamp type. So be careful.**

This Engineer's Manual consists of four chapters in all. Chapter I mainly gives an explanation of the S type of the AMS-220C Series model of sewing machine. It also describes the subjects that are common to all the types of the AMS-220C Series model of sewing machine. Chapter II to Chapter IV respectively gives explanations of the B type, L type and T type of the AMS-220C Series model of sewing machine which are not covered by Chapter I.

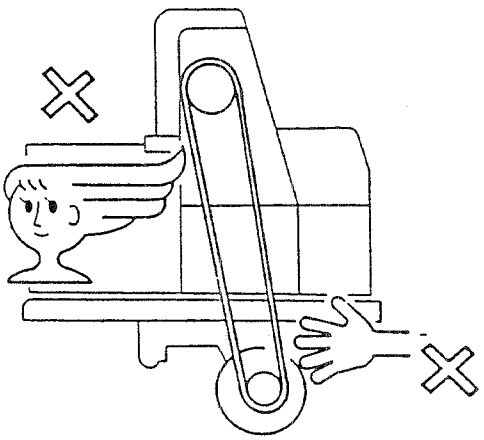
## CAUTIONS



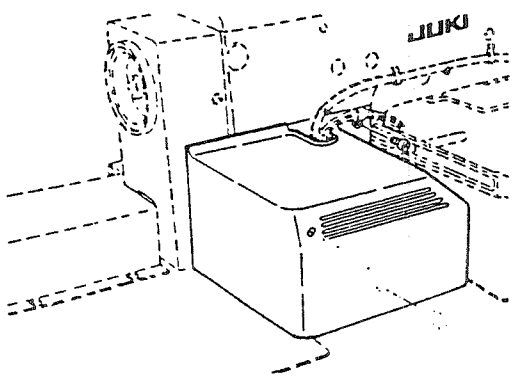
1. When a pattern change is made, or the needle threading switch or the bobbin winder switch or the feeding frame switch is turned ON, feeding frame ❶ comes down automatically. So, never put your fingers under the feeding frame. Be sure to keep your fingers away from the feeding frame while the machine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

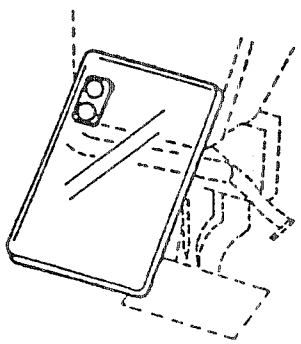


2. Be sure to turn the power switch OFF before removing belt cover ❶.
   Do not operate the machine with the belt cover removed.



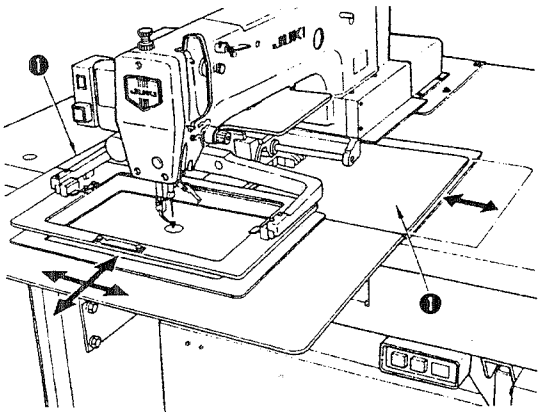
3. During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, V belt, bobbin winder or motor. Also, do not place anything near any of these parts while the machine is in operation. Doing so may be dangerous.



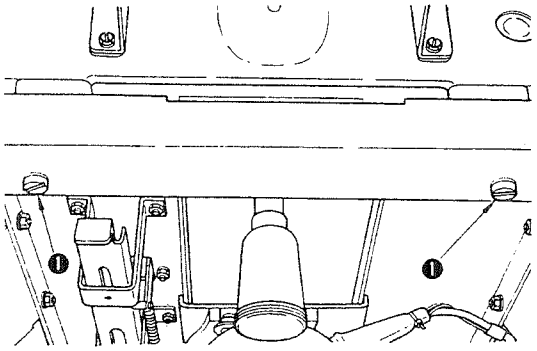
4. If your machine is equipped with a belt cover, finger guard, eye guard or any other protections, do not operate your macine with any of them removed.

5. Be sure to turn the power OFF before opening the control box cover.

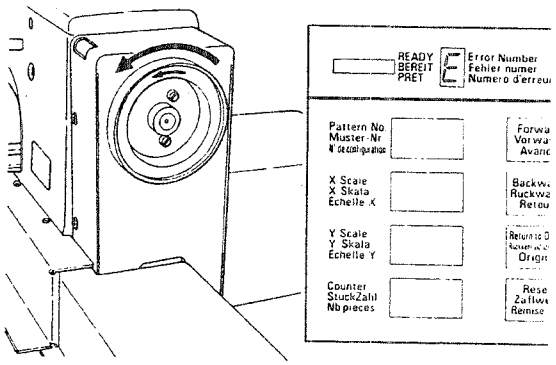



6. After the power switch is turned ON, the feeding frame will automatically move in the sewing area along the X and Y axes once you press the preparation switch. Be sure not to place anything within the range of the sewing area of cover 1 .
   Be sure to keep your fingers away from the feeding frame while the machine is in operation.

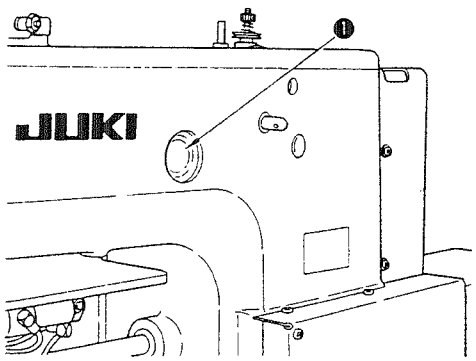
# PRECAUTIONS

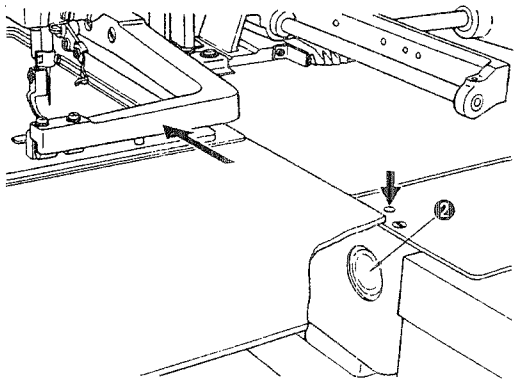



1. Remove bed fixing bolt ❶ before starting operation. When transporting your AMS-220C, install bed fixing bolt ❶.

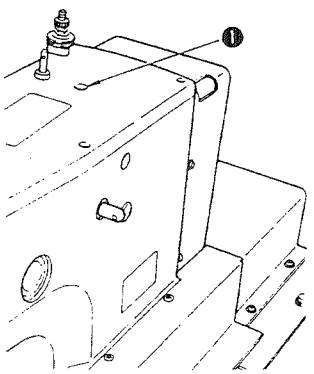


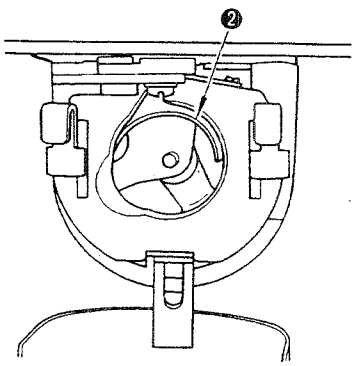

2. The sewing machine should travel counter-clockwise (in the direction of the arrow), as observed from the pulley side. If the machine is allowed to run clockwise, the machine will automatically stop with error message [E] indicated on the panel.



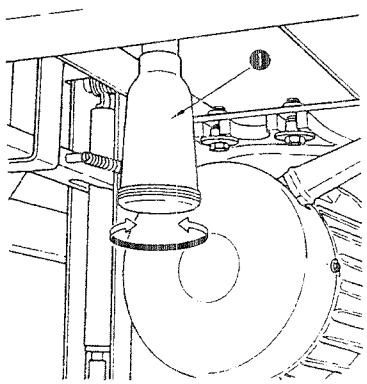




3. Be sure to supply oil until the oil level reaches red marks ❶ and ❷ on the oil gauge. (When lubricating the bed, be sure to move the feeding frame to the left.)

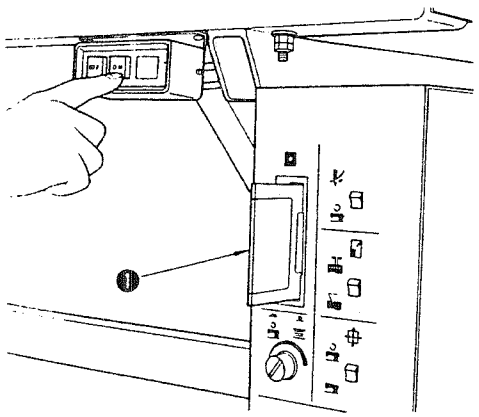



4. Before starting the machine which has been newly set up or has not been used for a long period of time, apply a few drops of the lubricating oil to the crank assembly through hole ❶, one drop to racing surface ❷.




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



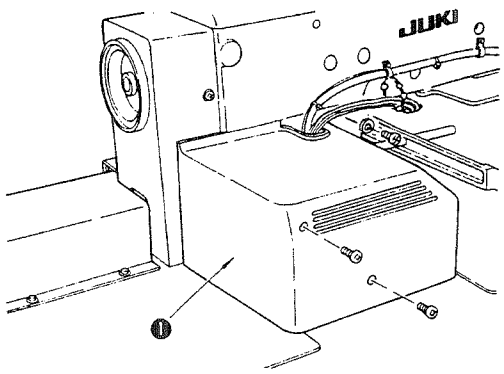
6. Be sure to load or unload floppy disk ❶ while the power is ON. If the power switch should be turned ON or OFF with the floppy disk mounted the data stored in the disk may be destroyed.

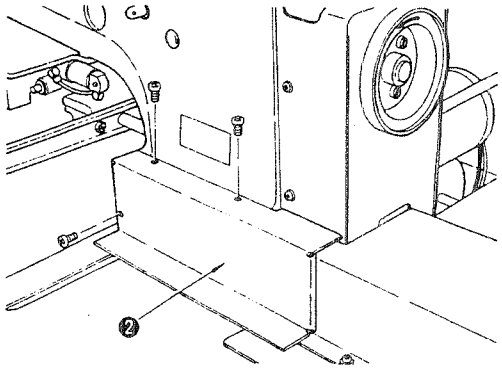

7. When the threader and sewing machine are switched ON, sew the desired sewing pattern with the thread tension disk closed. Once you have completed the thread trimming, the thread tension disk will open.

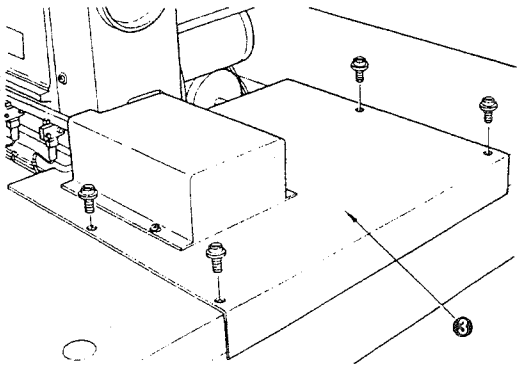
8. The AMS-220C Series model of sewing machine is provided with the main unit input function as standard, however, a sewing pattern which extends beyond the sewing area (200 mm (8.163") x 145 mm (5.709")) cannot be sewn even if inputting it. [When inputting data using the main unit input function, the travel limit of the sewing area cannot be detected with accuracy. So, sometimes pattern data which is larger than the sewing area specified may be created.]

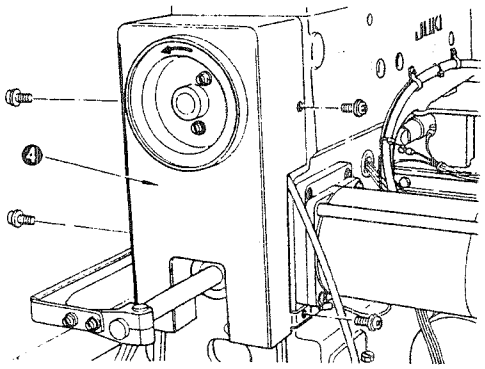
9. For the T type (the inverting clamp type), the sewing area in terms of Y direction (lengthwise) is limited to 111 mm (4.370") because of the position of the inverting clamp. Howerver, the lengthwise sewing size can be extended to 145 mm (5.709") only by removing the inverting clamp components from the T type of sewing machine.

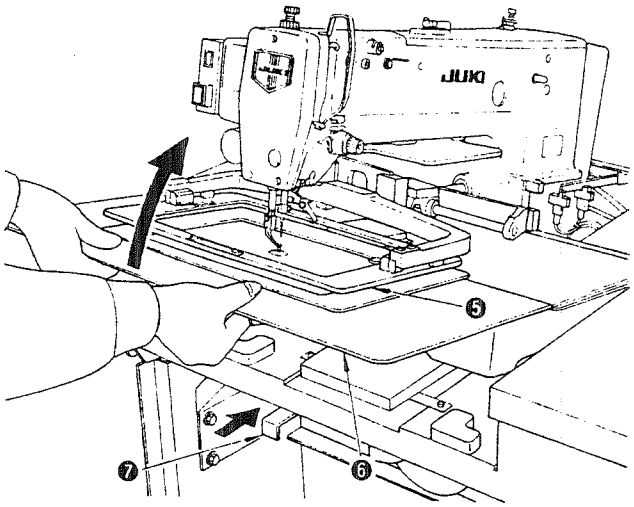
10. Prior to operation, be sure to close the control box cover in order to prevent dust from getting into the control box. Dust into the control box may lead to malfunctions or failures. Clean the fan filter once every week.

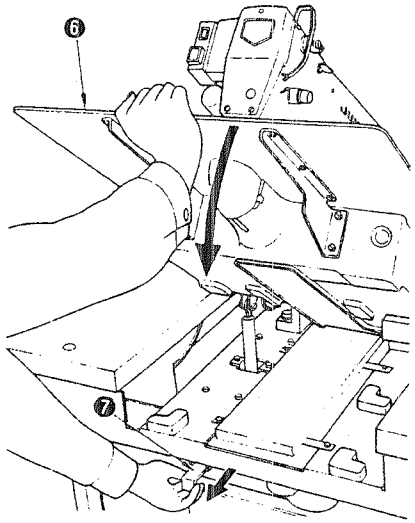


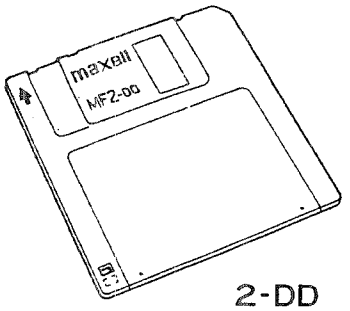



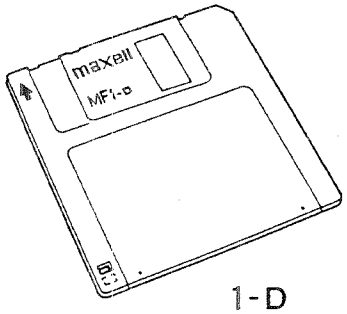



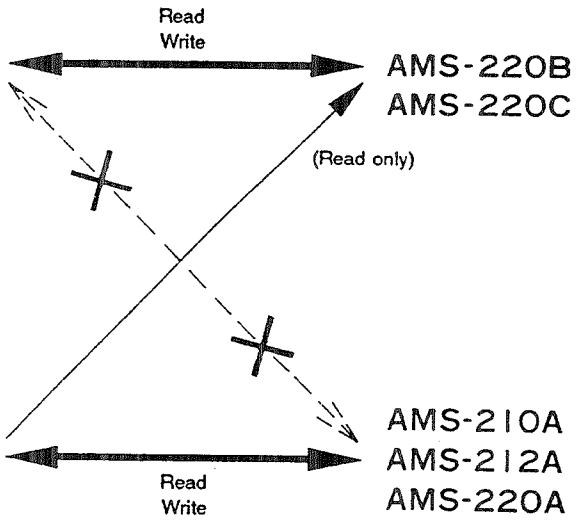

11. When raising the machine head, be sure to remove side-face cover ❶, Y-sensor cover ❷, table rear cover ❸ and belt cover ❹. Then move feeding frame ❺ to the central position, and raise auxiliary cover ❻ until stopper ❼ moves backward to its locked position. To bring the machone head down, push up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




2-DD




1-D




12. 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 | O | × |
| AMS-220B AMS-220C | △ (Read-out only) | O |

## CONTENTS

# CHAPTER I
# STANDARD WORK CLAMP TYPE (S TYPE)
# AMS-220CSS (for light-weight materials)
# AMS-220CHS (for medium-weight materials)
# AMS-220CGS (for heavy-weight materials)

## ● Subjects common to all the types of the AMS-220C Series model of sewing machine are also described.

## 1. FEATURES

1. **Easy pattern change**
   The machine comes with a stepping motor for driving the work clamp and the feed. A stitching pattern can be changed with ease by specifying a pattern No. desired.

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

3. **Permits the input of various pattern data**
   Pattern data can be easily entered in a simple procedure using either the operation box, which is mounted on the main unit of the sewing machine as a standard device, or a JUKI compact type programming device. 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 operation box, taking the needle as a reference. The main unit input feature also permits trial stitching.
   - 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.

4. **Micro floppy disk to store sewing pattern data**
   A 2DD 3.5-inch micro floppy disk is used, accommodating 44 to 691 patterns. However, the 1-D floppy disks for the AMS-220A can only be read, not written onto.

5. **Consistent sewing quality**
   A stepping motor is used to feed the material, allowing for precise control according to the thickness of the material. This feed timing can be changed using the DIP switches in the control box, which permits optimum feed timing selection in accordance with each sewing product.

6. **A pattern which contains many stitches can be sewn.**
   The machine incorporates a 16-bit microprocessor for memory storage. This enables the machine to sew a pattern with a maximum of 4,000 stitches*. If using the combination feature, you can sew as many as 16,000 stitches at a time.
   * The number of stitches is a value calculated while assuming general input pattern. When inputting actual data for sewing, the number of stitches may change in accordance with the jump length and kinds of element to be used.
     (Example: If creating a pattern using only the point input function and without using the jump input function, approximately as many as 8,000 stitches can be input in the pattern.)

7. **The maximum stitch length can be increased.**
The stitch length can be increased to a maximum of 10 mm (0.394").

8. **Patterns used for the conventional B type of AMS Series model of sewing machine can be used for the AMS-220C Series.**
The AMS-220C Series is capable of reading and writing pattern data used for the AMS-210B, -212B and -220B. (Provided with interchangeability)
Note that the AMS-220C Series is incapable of sewing a pattern which is larger than the specified sewing size.

9. **Patterns used for the conventional A type of AMS Series model of sewing machine can be used for the AMS-220C Series.**
The AMS-220C Series is capable of reading pattern data used for the AMS-210A, -212A and -220A. However, it is not capable of writing pattern data on the floppy disk used with the AMS-210A, -212A and -220A. So, to write pattern data, use a floppy disk (2DD) that is specified for the AMS-220C Series.

10. **Safety and testing facilities**
This machine is designed to indicate an error message upon the detection of a malfunction, enabling you to identify the problem at a glance. In addition, a facility for testing the switches and other functions has been incorporated into the machine. This facility is useful for fast troubleshooting.

11. **The machine comes with a semi-rotary large shuttle. (except G type)**
All the models included in the AMS-220C Series (except G type) are equipped with a semi-rotary large shuttle, thereby reducing the frequency of replacing the bobbin.

12. **Cylinder bed sewing**
The AMS-220C can be used for cylinder bed sewing by removing the throat plate auxiliary cover.

13. **Flexible response to material changes**
DP x 17 needle is used for sewing heavy-weight materials or DP x 5 needle is used for sewing light-weight materials. The machine is adaptable to either heavy-weight material or light-weight material without changing the needle bar.

14. **Easy winding of the bobbin thread**
Since the bobbin winder is located close to the operator, the operator is able to easily wind the bobbin thread.

15. **Multi sewing functions**
The machine is provided with many helpful features including the needle thread breakage detecting function to enable detection of a needle thread breakage and the bobbin thread replacement indicating function to allow the operator to replace the bobbin when the bobbin thread runs out. You may set the respective functions as desired in accordance with the application of your sewing machine.

16. **Shorter the time required for sewing**
The sewing speed has been increased to 2,000 s.p.m. when the stitch length is set to 3 mm (0.118"). The jump speed has been also increased to 208 mm (8.189")/sec. which is 1.7 times as high as the conventional speed.

17. **Easy workpiece setting**
In addition to the function of setting a 2nd origin as desired, the lifting amount of the feeding frame is as high as 22 mm (0.866") (max. 25 mm (0.984")). This allows the operator to set the workpiece on the sewing machine with ease.

18. **The machine comes with a double-stepped stroke work clamp mechanism. (B type, L type and T type)**
The B type of the AMS-220C Series model of sewing machine comes with a double-stepped stroke feeding frame. The L type comes with a double-stepped stroke feeding frame (left). T type incorporates a double-stepped stroke inverting intermediate presser. The respective feeding frames and presser go up and come down in the two steps (Height of the intermediate stop position of the feeding frames and inverting intermediate presser is adjustable.)
This function allows the operator to set the workpiece on the machine not only with ease but also with accuracy.

19. **The machine is equipped with the double-stepped work clamp. (L type and T type)**
For the L type, the right- and left-hand sections of the feeding frame can be separately raised/lowered. The order in which the right- and left-hand sections of the feeding frame are lowered can be changed over or both sections of the feeding frame can be simultaneously lowered by changing the setting of the relevant DIP switches. (For the T type, the order in which the right- and left-hand sections of the feeding frame come down cannot be changed over.)
For both the L type and T type, the lifting amount, lowering speed and pressing pressure of the right- and left-hand sections of the feeding frame can be separately specified.

20. **The angle of the feeding frame can be adjusted as desired. (L type and T type)**
The right- and left-hand sections of the feeding frame (for the T type, the inverting intermediate presser only) is equipped with the angle adjusting mechanism to allow the feeding frame/inverting intermediate presser to uniformly clamp all the corners of the material.

21. **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.

22. **A milling unit can be attached to the machine after the set-up.**
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.

- **For heavy-weight materials (G type)**

1. **The machine comes with a semi-rotary, double-capacity shuttle.**
The machine is equipped with a semi-rotary, double-capacity shuttle, thereby further reducing the frequency of replacing the bobbin.

2. **The machine is ideally suited for sewing heavy-weight materials.**
Thanks to the improved thread take-up lever, the machine is capable of sewing heavy-weight materials; sheet belt, leather etc. more smoothly.

3. **The machine is equipped with a thread trimmer which is designed to cut thick threads.**
The thread trimmer is capable of cutting thick needle thread and thick bobbin thread. (Thick thread equivalent to Spun #2, Ticket #6 or Tex #440 by English yarn count)

4. **The machine comes with a large silicon oil tank.**
The machine is equipped with a large silicon oil tank as standard accessory.

## 2. SPECIFICATIONS

| | |
|---|---|
| 1. Sewing range | X (lateral) direction x Y (longitudinal) direction<br>• AMS-220C: 200 mm (7.878") x 145 mm (5.709")<br>• AMS-220C (inversion): 200 mm (7.878") x 111 mm (4.370") |
| 2. Max. sewing speed | (Provided that the stitch length is 3 mm (0.118") or less) 2000 s.p.m. |
| 3. Jump speed | (Automatically changes in accordance with the degrees of an angle)<br>208 mm/sec. or more |
| 4. Stitch length | (Resolution 0.16 mm) Max. 10 mm (0.394") |
| 5. Feed by the work clamp foot | Intermittent feed (5-phase, stepping motor, 2-axle drive method) |
| 6. Needle bar stroke | 41.2 mm (1.662") |
| 7. Needles | DP x 5, DP x 17 |
| 8. Lift of the feeding frame | 22 mm (0.866") (standard) (25 mm (0.984") (max.)) |
| 9. Stroke of the intermediate presser | 4 mm (0.157") (standard) (0.3 (0.118") to 7 mm (0.276")) |
| 10. Lift of the intermediate presser | 20 mm (0.787") |
| 11. Shuttle | Models excluding G type: Semi-rotary large shuttle (automatic lubrication)<br>G type only: Semi-rotary, double-capacity shuttle (automatic lubrication) |
| 12. Bobbin case | Models excluding G type: Bobbin case for the semi-rotary large shuttle<br>G type only: Bobbin case for the semi-rotary, double-capacity shuttle |
| 13. Bobbin | Models excluding G type: Bobbin for the large shuttle<br>G type only: Bobbin for the double-capacity shuttle |
| 14. Lubricating oil | New Defrix Oil No.2 (supplied by an oiler) |
| 15. Thread trimmer | Consists of a moving knife and counter knife (driven by a grooved cam)<br>(Exclusive knife for G type) |
| 16. Wiper | Magnetically driven (with a release switch) |
| 17. Lifting method of the intermediate presser | Air cylinder-driven vertical movement (provided with a release switch) |
| 18. Feeding frame driving method | Air cylinder-driven feeding frame (the right- and left-hand sections of the feeding frame are separately driven) |
| 19. Work clamp mechanism | Comes down when the feeding frame pedal switch is depressed and goes up when the switch is depressed again or keeps coming down as far as the pedal switch is depressed. (Provided with the function selector switch.) |
| 20. Start | The machine is started by turning ON the start switch with the feeding frame down. |
| 21. Sewing start/end | The machine starts or ends at the sewing start or the 2nd origin. |
| 22. Memory storage | 3.5-inch micro floppy disk (2DD)<br>Memory capacity - 691K<br>44 to 691 patterns can be stored in a floppy disk |
| 23. Stop function | This function is used to stop machine operation during a stitching cycle. After a stop, the feeding frame can be started along the stitching line by operating the "Backward" or "Forward" switches. The interrupted stitching cycle can be completed by pressing the start switch. Alternatively, the "Return to origin" switch may be pressed for a quick move to the sewing start point or the 2nd origin after a stop. |
| 24. Enlarging/Reducing | A pattern can be enlarged or reduced on the X and Y axes, independently when sewing a pattern.<br>0.01 to 4 times (in 0.01 step) |

| | |
|---|---|
| 25. Enlarging/Reducing method | A pattern can be enlarged/reduced by increasing/decreasing either the stitch length or the number of stitches. |
| 26. Maximum sewing speed | 180 s.p.m. to 2,000 s.p.m.<br>Provided with an externally accessible variable resistor that is capable of limiting the sewing speed as desired within the max. sewing speed predetermined by stitch lengths. (The sewing speed can also be controlled in the sewing pattern data.) |
| 27. Pattern selection | 1 to 999 patterns can be selected by specifying the desired pattern Nos. |
| 28. Pattern checking | A pattern configuration can be checked by setting the "Sewing machine" switch to its "OFF" position.<br>Also, the [Forward]/[Backward] switches are used to check the sewing pattern shape stitch by stitch. |
| 29. Error indication | 17 types of error indication are shown on the operation panel. |
| 30. Programming | Involves point/linear/arc numeral data, temporary stop, thread trim, jump data, sewing speed, and stitch length. |
| 31. Bobbin thread counter | Indicates when to replace the bobbin. If this function is not used, it works as a 0 to 999 ring counter with a reset function. |
| 32. Backup of pattern data | When the power is turned OFF, the patterns in current use are automatically stored in memory. The stored patterns can be sewn when the "Set ready" switch is pressed after the power switch has been turned ON. At this time, it is not necessary to use a floppy disk. The data stored in memory is retained for 100 hours. |
| 33. Second origin | Immediately before starting sewing, a 2nd origin (turnout point) can be set at any desired position using jog switches. (It can be stored in memory for backup. The 2nd origin cannot be specified when reading an inverse pattern.) |
| 34. Moving the sewing start point | Immediately before starting sewing, the sewing pattern can be shifted in parallel to any desired position using jog switches. (It can be stored in memory for backup.) |
| 35. Stop function with the needle up | If the needle is not at its highest position, the machine can be stopped with the needle raised by turning ON/OFF the needle threading switch. (This function is valid while the sewing LED is lit up.) |
| 36. Sewing machine motor | Models excluding G type: 400 W, 4 P, electronic-stop motor<br>G type only: 550 W, 2 P, electronic-stop motor |
| 37. Dimensions (Excluding the thread stand) | W = 1090 mm (42.913")<br>L = 1105 mm (43.504")<br>H = 1150 mm (45.276") |
| 38. Gross weight | 270 kg |
| 39. Power consumption | 1 KVA |
| 40. Operating temperature range | 5 °C to 40 °C |
| 41. Operating humidity range | 20% to 80% (with no dew condensation) |
| 42. Line voltage | Rated voltage ± 10% 50/60 Hz |
| 43. Operating air pressure | 5 to 5.5 kg/cm$^2$ (with a detecting function) |
| 44. Air consumption | 1.8 ℓ/min. |

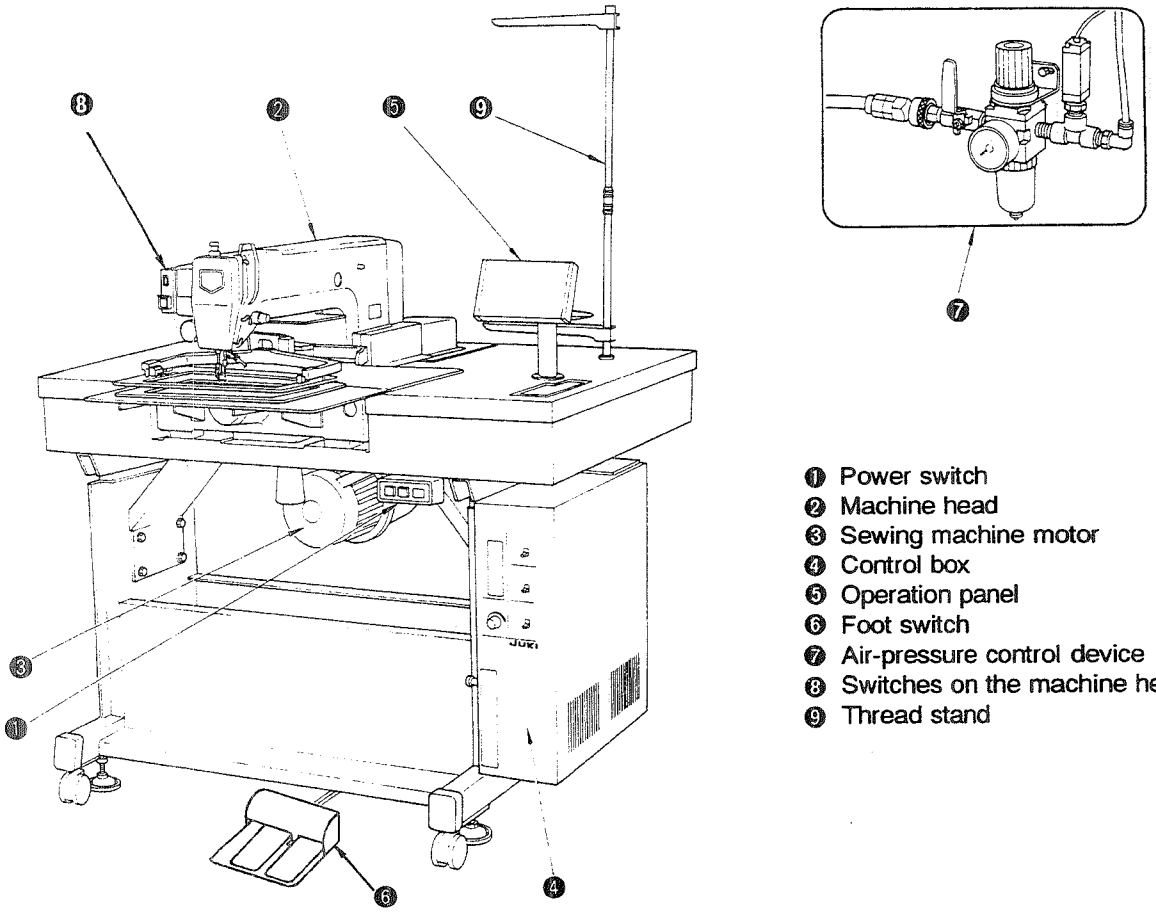
| | |
|---|---|
| 45. Main unit input function | Refer to the table below. |

| | | |
|---|---|---|
| Input/ Creation | Normal sewing | Linear (polygon), spline, arc, circle, point, jump |
| | Zigzag stitching | Linear (polygon), spline, arc, circle |
| | Offset sewing | Linear (polygon), spline, arc, circle |
| | Sewing machine control | Thread trimming, 2nd origin, temporary stop, speed changing, inversion |
| Modification | | Point deletion, point movement, point addition, element (part) deletion |
| Others | | Pattern reading (enlargement/reduction is possible), pattern writing, input of reference point for pattern enlargement/reduction, checking the set value, etc. |

* It is possible to input data to be added to the completed pattern, to combine completed patterns etc.

# 3. OPERATION

## 3-1. Names of the main components



❶ Power switch
❷ Machine head
❸ Sewing machine motor
❹ Control box
❺ Operation panel
❻ Foot switch
❼ Air-pressure control device
❽ Switches on the machine head
❾ Thread stand

Fig. 3-1

**❶ Power switch**
To turn ON/OFF the sewing machine motor, control box and operation panel.

**❷ Sewing machine head**
The work clamp and the feed, which are driven by a stepping motor, move a workpiece in synchronization with the vertical motion of the needle bar. This mechanism permits complicated pattern sewing.

**❸ Sewing machine motor**
The use of an electronic stop motor allows sewing at the desired speed under the control of the clutch and brake.
400 W, 4P (550 W, 2P only for the G type for sewing heavy-weight materials)

**❹ Control box**
Acts as the brain which controls the sewing machine. Electronic components are incorporated, including printed circuit boards and transformers, and sends out various input and output commands to other components.

⑤ **Operation panel**
Consists mainly of switches, digital displays and a buzzer. It receives commands from the control box, and outputs display data and switch information.
The main unit input operation is performed whereby the pattern is input while moving the feed so as to adjust the needle point.

⑥ **Foot switch**
Operating the feeding frame switch turns ON/OFF the feeding frame air cylinder and lifts/lowers the feeding frame.
If the start switch is then depressed, the sewing machine will start sewing.
Only the model of sewing machine provided with a standard feeding frame (S type) uses a 2-pedal unit. The other models of sewing machine use a 3-pedal unit (PK47).

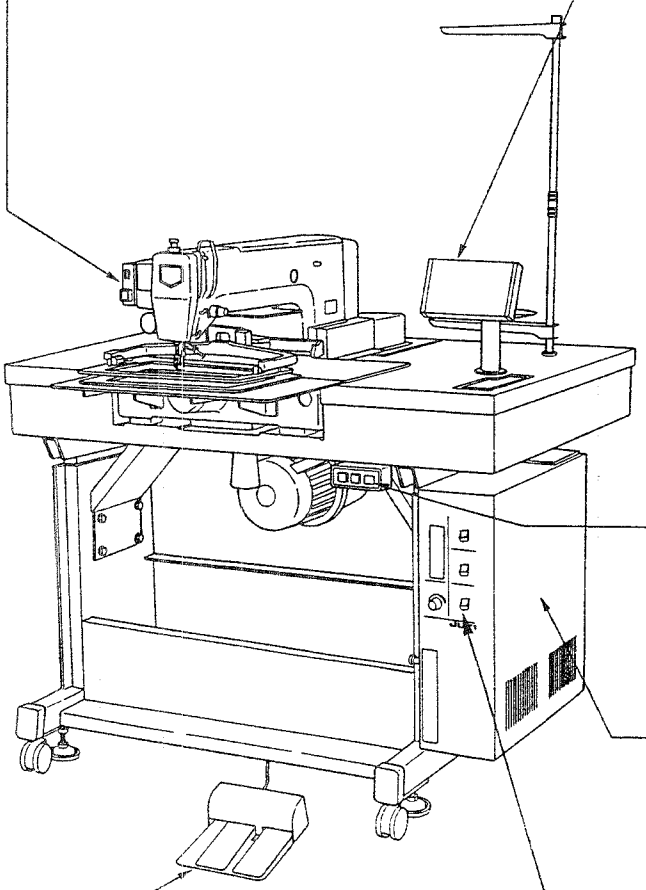
⑦ **Air regulating device**
Consists of the filter regulator, pressure gauge, air cock, pressure switch and other parts. It detects a drop in the air source pressure, indicating it with an error code. The device is also used to adjust the operating air pressure during installation of the sewing machine.

⑧ **Machine head switches**
Consist of the stop switch and the wiper switch.

⑨ **Thread stand**

## 3-2. 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 | Stop switch | Sewing mode | P.25 |
| ② | Wiper switch | Sewing mode | P.24 |

• Switches on the operation box (operation panel)

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Operation switches (Forward switch, etc.) | Sewing mode | P.20 |
| ② | Setting switches (Pattern No. switch, etc.) | Setting mode | P.17 |
| ③ | Set ready switch | When changing over the sewing mode and 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.156 |

* (Excluding the subclass machine)

• Foot switch

| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Feeding frame switch | Sewing mode | P.24 |
| ② | Start switch | Sewing mode | P.24 |

* Foot switches used with the subclass models of sewing machine are separately described.

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

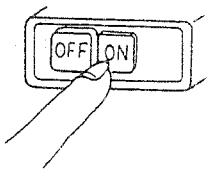
| No. | Name | Time for operation | Page for reference |
|---|---|---|---|
| ① | Max. speed limitation knob/ Bobbin winder ON/OFF switch | Sewing mode | P.13 |
| ② | Needle threading switch | Sewing mode | P.13 |
| ③ | Scale setting switch for INC/DEC of the stitch length & INC/DEC of the number of stitch. | Setting mode | P.14 |
| ④ | Sewing machine ON/OFF switch | Sewing mode | 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.

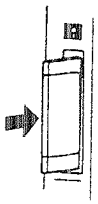
↓

Switches on the operation panel

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.
(Refer to the explanation given in "3-4. Operation panel.")

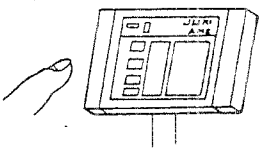
↓

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.)

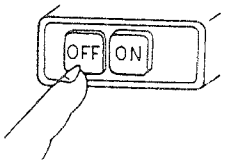


↓

Remove the floppy disk from the machine.

↓

Turn OFF the 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>..... (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". (Refer to "3-8. Description of functions and operating methods " and "6. Explanation of the DIP switches") 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 mode], from the floppy disk loaded in the floppy disk drive.

- [Sewing mode] / [Setting mode]

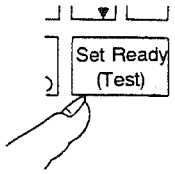
Turn ON the power switch

↓

Setting mode (Data setting is carried out to allow the machine to read out a pattern.)
* READY indicator lamp [goes out]. (Refer to the explanation given in "3-4. Operation panel.")

↓

Turn ON the Set Ready switch.



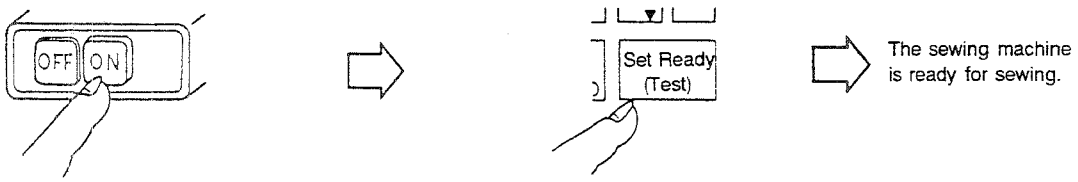

↓ * At this time, the pattern desired is read out from the floppy disk.
↓ (Only when the set values for pattern number, etc. have been changed.)

Sewing mode (Actual operations including sewing and winding of a bobbin, are carried out.)
* READY indicator lamp [lights up]. (Refer to the explanation given in "3-4. Operation panel.")

↓

Turn ON the Set Ready switch

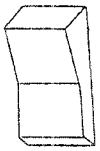
* Immediately after [turning ON the power switch], the machine is set to the [Setting mode], for the sake of ease of operation. This enables the operator to perform pattern changing with ease just after [turning ON the power switch], if pattern to be used is frequently changed at the start of the working 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 "3-8-3. Data 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 on the operation panel, 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. |

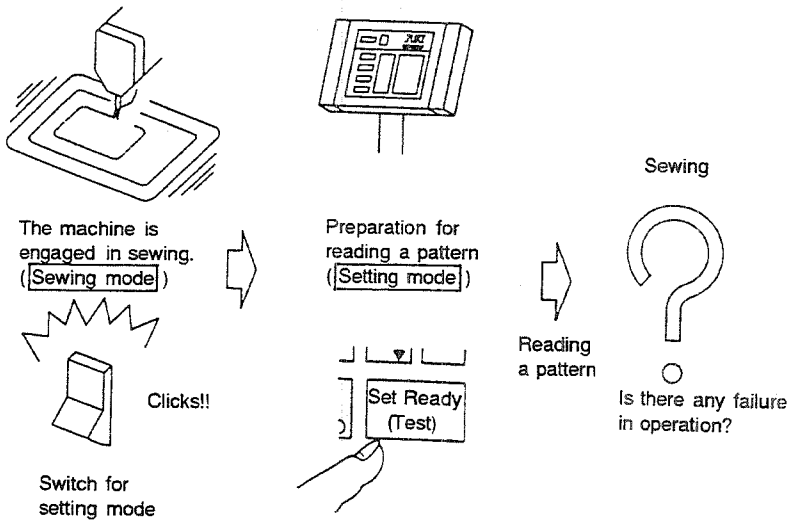
Even if any of the switches used under the [Sewing mode] is used under the [Setting mode] by mistake, or any of those used under the [Setting mode] is used under the [Sewing mode] by mistake, no trouble may result since the switches are inoperative under the wrong mode.



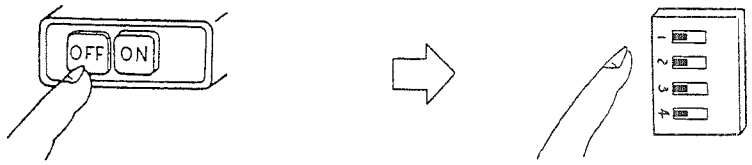
(Cautions)

- **The switches on the front face of the control box are seesaw switches. So, the following precautions should be taken when operating these switches.**

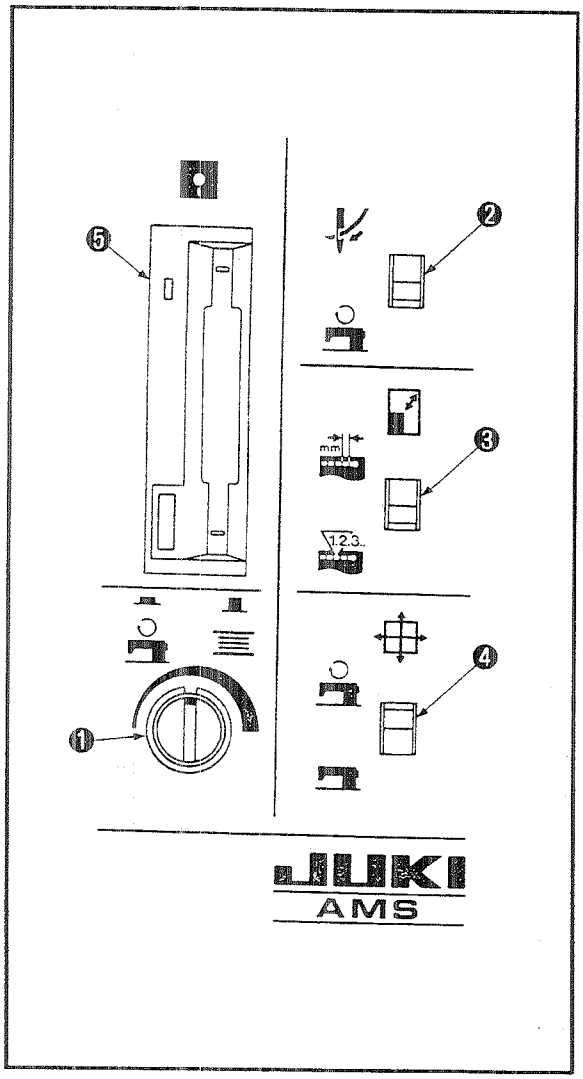
**Operating the switches used under the [Setting mode] including scale setting switch for [INC/DEC of the stitch length & INC/DEC of the number of stitches] in the [Sewing mode] by mistake will not adversely affect on the sewing as long as the machine operates under the [Sewing mode].**
**However, the operated switch will function when reading a pattern after changing over the mode of the machine from the [Sewing mode] to the [Setting mode].**



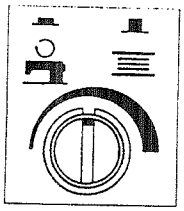

- **Changeover of the DIP switches is ineffective while the power switch is turned ON regardless of the mode of the sewing machine, i.e., in the [Sewing mode] and in the [Setting mode]. Be sure to change the setting of the DIP switches with the [Power switch turned OFF].**
**(The setting of the DIP switches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



## 3-3. Control box and its functions




**❶ Max. speed limitation knob/Bobbin winder ON/OFF switch (used under the [Sewing mode])**



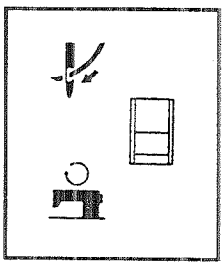
- **Max. speed limitation knob (used under the [Sewing mode])**
  Normally, the sewing speed is automatically adjusted according to the stitch length. If a slower speed is required, however, turn the knob counterclockwise.

- **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 and wind 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 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. Then, remove the needle thread and the bobbin thread.**

**❷ Needle threading switch (used under the [Sewing mode])**

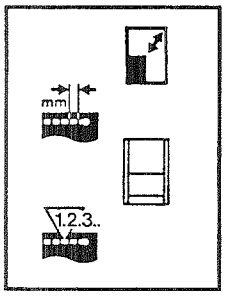


- Set the needle threading switch to the side when the sewing machine is stopped, and the intermediate presser and feeding frame will automatically come down, upon which the needle will be threaded.
  When the machine is doing the above job, the [Start switch] will not work even if it is turned ON.

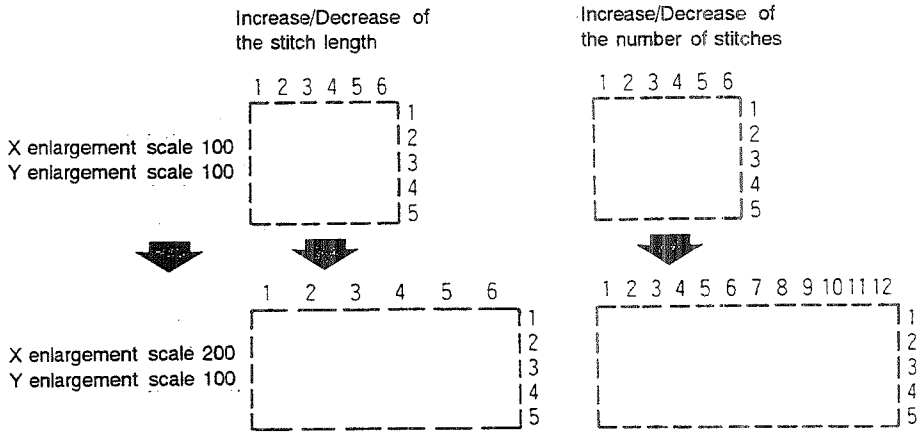
- Move the [Needle threading switch] up and down when the [Stop switch is turned ON] and sewing machine is stopped, and thread trimming will be done. The Return to Origin, Forward and Backward keys will now become effective.
  (See "3-7. ② Stop switch.")

- 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.
  (Refer to "3-8-4. Needle-up position stop function" for details.)

**⑧ Scale setting switch (INC/DEC of the stitch length & INC/DEC of the number of stitches) (Used under the [Setting mode])**

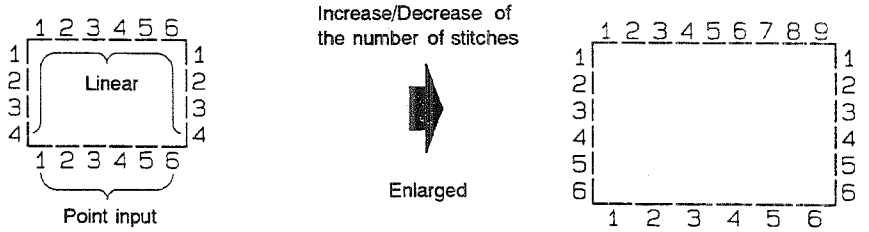



Set the scale setting switch to INC/DEC of the stitch length or INC/DEC of the number of stitches to enlarge/reduce a pattern.
When the switch is set to the side, the stitch length can be increased/decreased, and when set to the side, the number of stitches can be increased/decreased.
(Also refer to "3-8-5. Enlargement/reduction function.)

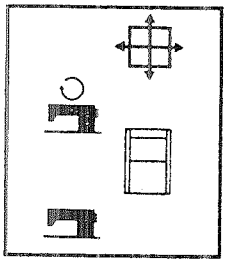



(Caution)

**Pattern data created by point input function can only be enlarged/reduced by increasing/decreasing the stitch length.**
**Spline pattern data or zigzag pattern data created by the main unit input functions other than linear (polygon) input function, circle input function and arc input function are taken as pattern data created by point input function. So, these pattern data also can only be enlarged/reduced by increasing/decreasing the stitch length.**



### ❹ Sewing machine ON/OFF switch (Used under the Sewing mode)

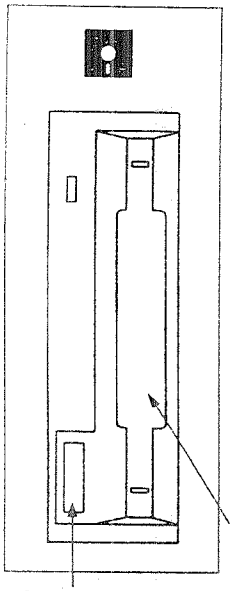


When this switch is set to , the sewing machine performs its normal operation.
When this switch is set to , only the feed mechanism will work.
This switch is set to the side to check the shape of pattern after reading the pattern, to check the feeding frame against the pattern desired, to check the size of the pattern after enlarging it and to perform other operations. The sewing machine is started in the normal operation steps, i.e., "the feeding frame comes down → Turn ON the Start switch."

(Caution)

- **It is advisable to set this switch to side for checking a pattern, which is to be used for the first time, before sewing it or enlarging/reducing a pattern.**
- **You may also check the pattern configuration using the Forward switch and Backward switch. When you creating a pattern using the main unit input function, you may check the pattern configuration after lowering the needle using the aforementioned switches. (Note that the intermediate presser cannot be lowered.)**

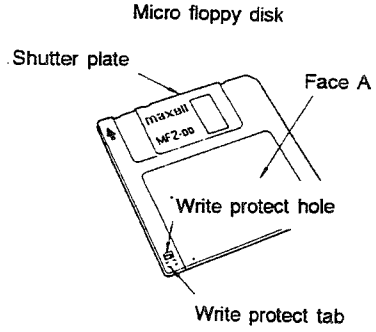
### ❺ Floppy disk driver




1) **Loading the floppy disk**
   After turning the power switch ON, slowly insert the floppy disk, with its face A brought to the right, until the eject pushbutton pops out.
2) **Unloading the floppy disk**
   Before turning the power switch OFF, press the eject pushbutton and take out the floppy disk.
3) **Write-protect hole**
   When the write-protect tab is moved to open the write-protect hole, no data is allowed to be written into the disk. Do this for storing program data. For writing data into the floppy disk, move the write-protect tab until it is exposed.

(Caution)

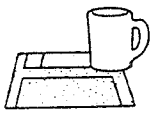
**Never turn the power switch ON or OFF with the floppy disk mounted.**



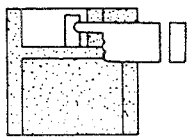
4) **Micro floppy disk**

Precautions in handling and storing the micro floppy disks

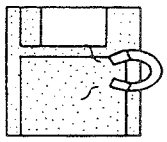
1. Do not open the shutter and touch the magnetic surfaces.
2. Do not apply a high pressure to the shutter plate or the opening/closing spring (slider), or else the disk may be damaged.
3. Do not allow the hub to deform or do not use the disk with dust gathered on the hub, or else errors may occur. Always keep the hub clean.
4. Do not use thinner, alcohol or Freon for the disk.
5. Do not use erasers on the disk.
6. Do not eat or drink near the disk.
7. Do not store the disk in a hot or humid place, or a place exposed to direct sunlight.
8. Do not store the disk in a dusty place.



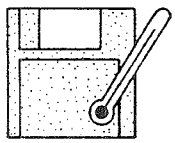
**Do not place the floppy disk near an ashtray or food and drink.**



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



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



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

### 3-4. Operation panel (box) and its functions

The sewing machine is operated under two different modes. The switches on the operation panel 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. (The machine is in the [Setting mode] just after the power to the machine has been turned ON.)

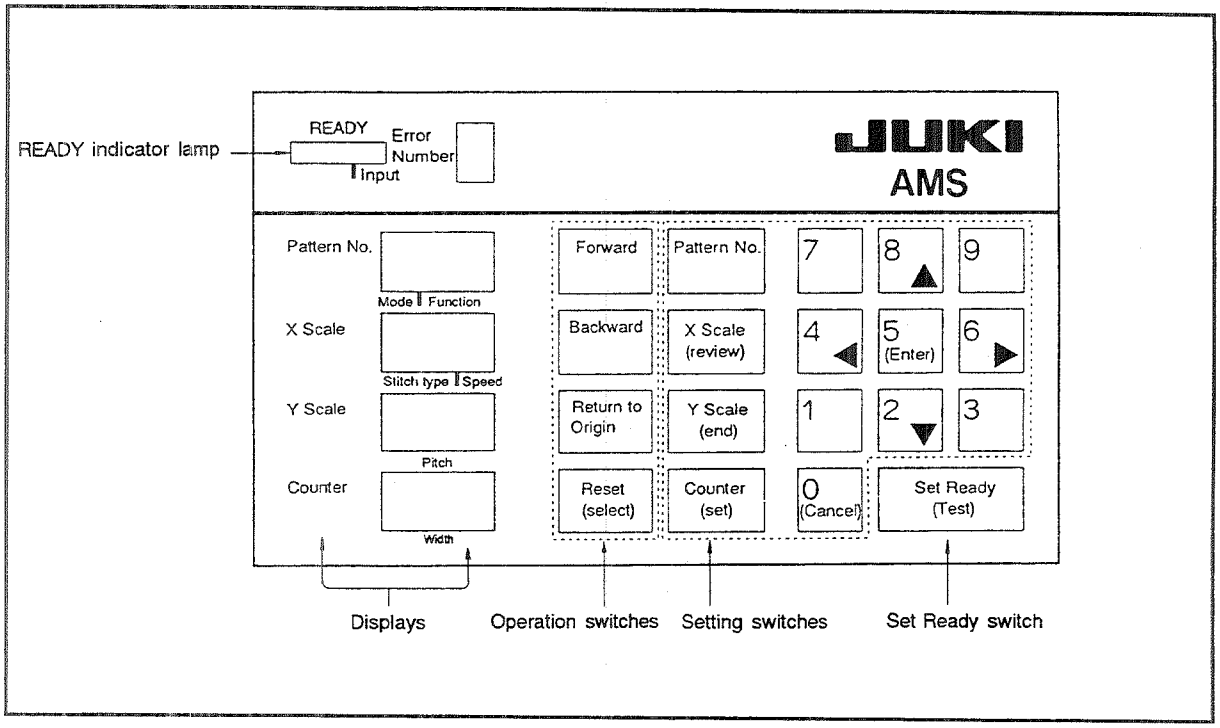
| Mode | READY indicator lamp | Sewing machine | Switch on the operation panel to be used |
|---|---|---|---|
| [Setting mode] | Goes out | Inoperative | Setting switches (Note 1) |
| [Sewing mode] | Lights up | Operative (sewing, winding a bobbin) | Operation switches |

**(Note 1)**

**Among the setting switches, only the [4 ◂], [6 ▸], [8 ▴] and [2 ▾] switches can be used as jog switches under the [Sewing mode].**

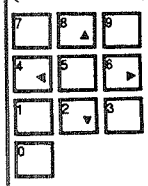
**(Note 2)**

**Every press on the respective switches on the operation panel generates a beep.**




**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).**

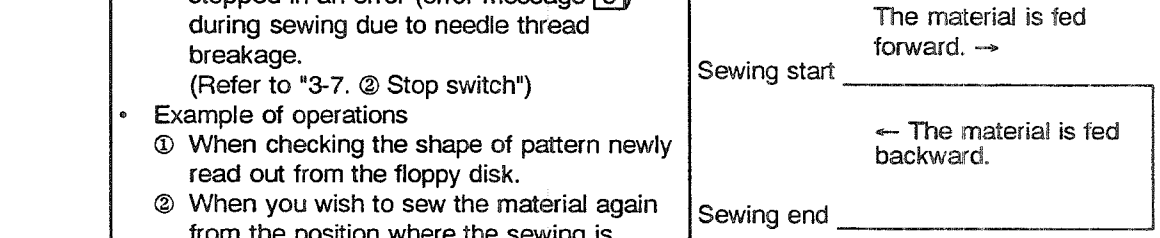
| Name of switch | Function | Operating method |
|---|---|---|
| [Pattern No.] | ◦ Used to change the number representing pattern number indicated on the display.<br>◦ Changes pattern No. at the time of reading out the indicated pattern using the [Pattern No.] switch and [0 Cancel], [1] through [9] (numeric 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.<br>◦ The number of significant digits is three. If a number of four or more figures is input, the last three figures will be effective. This is applied commonly to the switches described below.<br>(Caution)<br>**If setting a pattern No. that has not been stored in the floppy disk, error [1] will be shown on the Error Number display on the operation panel, and the pattern No. will flash on and off.** | 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:**<br>**Pattern No. 1 → 001**<br>**Pattern No. 10 → 010**<br>**Pattern No. 100 → 100** |

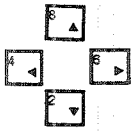
| Name of switch | Function | Operating method |
|---|---|---|
| X Scale (review)<br>Y Scale (end) | • Used to change the X scale or Y scale on the displays.<br>Respective numbers of three figures on the displays are changed by operating the X Scale (review) or the Y Scale (end) switch and the numeric 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 (%).**<br>• Refer to "❸ Scale setting switch (INC/DEC of the stitch length & INC/DEC of the number of stitches)" described in "3-3. Control box and its functions" and "3-8-5. Enlargement/reduction function." | To make the X scale display indicated 230, 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 numeric 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 numeric switches.<br>• The number of three figures is necessary when designating the "bobbin replacement setting function" using the relevant DIP switch. Refer to "SW6-3" and "SW6-2" described in "6. Explanation of the DIP switches" for detailed explanation of the "bobbin replacement setting 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 052, 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>  | • Used as numeric 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]. (When enlarging/reducing a pattern, the READY indicator lamp (LED) flashes on and off.)<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><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>↓<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 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>(Refer to "3-7. ② Stop switch")<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.<br>(The sewing is re-started.)<br>  |
| [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>This switch is operative after operating the [Forward] or [Backward] switch.<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.**<br>**(Refer to "3-7. ② Stop switch")** | |

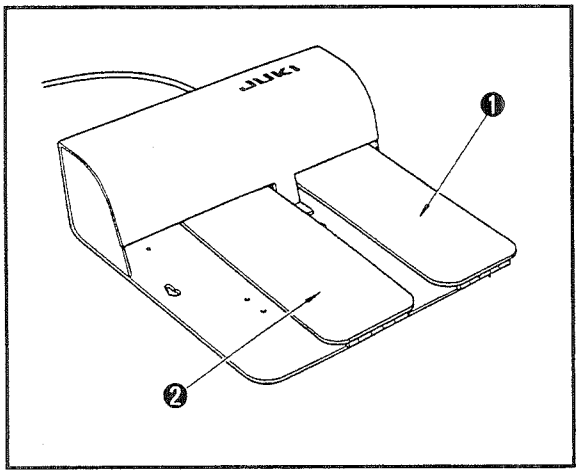
| Name of switch | Function | Operating method |
|---|---|---|
| Reset (select) | ◦ Used to reset the number shown on the Counter display when the machine is stopped.<br>◦ This is the switch to re-start the sewing machine after the machine is stopped by the "bobbin replacement setting function". Refer to "SW6-3" and "SW6-2" described in "6. Explanation of the DIP switches" for details. | The number of pieces of material specified to be sewn is finished.<br>↓<br>The sewing machine is stopped by the "bobbin replacement setting function". (Indicator lamp flashes on and off)<br>↓<br>Press the Reset (select) switch.<br>↓<br>The number shown on the Counter display is reset. (The machine is set to the state under which it is allowed to re-start sewing.) |
| Jog switches  | • They are used to move the sewing position or to specify the 2nd origin. (To be selected using the relevant DIP switches. Refer to "SW5-3" described in "6. Explanation of the DIP switches.")<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 29) 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. | |

### 3-5. 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 (0.394") 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 feed goes beyond the predetermined sewing area. | During a sewing cycle:<br>Press the Return to Origin key.<br>While setting the 2nd origin:<br>Press the Jog key. |
| 5 | Flash | Starts when the stop 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.<br>(The lamp display changes from "Flash" to "ON".) |
| | ON | Comes on when the stop switch is turned ON while only the feeding frame is moving. | Operate the Return to Origin switch, FORWARD switch or BACKWARD switch. Then press the Start switch to actuate the sewing machine again. |
| 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 synchronizer.<br>• Comes on if the pulley belt gets out of position. | • Turn OFF the power switch. Then, replace the failed component(s) or eliminate the cause of the machine locking.<br>• Attach the pulley belt correctly in position. |
| 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. |

| Error No. | Indicator lamp | Error description | Action to be taken |
|---|---|---|---|
| 9 | ON | Comes on if the needle thread is broken. | • Re-thread the machine head, operate the BACKWARD switch to return the machine to the position from which the sewing is to be re-performed. Then press the Start switch.<br>• Press the Return to Origin switch and the BACKWARD switch. |
| 0 | Flash | Starts when trying to format a floppy disk with the write-protect tab in the open position (the disk cannot be formatted). | Move the write-protect tab so that it is in its closed position. Then re-turn ON the Set Ready switch. |
| | ON | Comes on then trying to format a defective floppy disk. | Replace the floppy disk with a new one. Then re-turn ON the Set Ready switch. |
| A | ON | Comes on if the compressed air pressure drops below the specified value.<br>Comes on if the compressed air is not supplied to the machine.<br>Comes on if the connector of the air valve junction cable is unplugged. | • Turn OFF the power switch. Then set the compressed air pressure to 5 to 5.5 kgf/cm$^2$.<br>• Connect the connector. |
| E | ON | Comes on when the sewing machine rotates in the reverse direction. | Turn OFF the power switch. Change the rotation direction of the motor. |

### 3-6. Operating the foot switch (only for the S type)

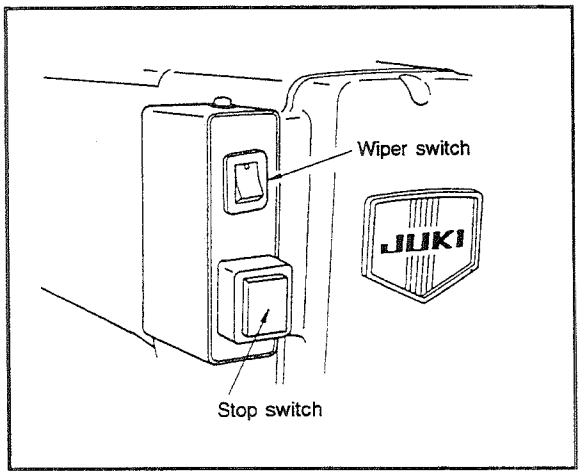



1) When feeding frame switch ❶ is depressed, the feeding frame will come down. Another depress on the switch makes the feeding frame go up.
2) When start switch ❷ is depressed with the feeding frame down, the machine will start sewing.

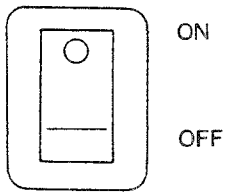
(Caution)

1. **When using the red and black pedals, the black pedal is used for operating the feeding frame and the red one is used for starting the sewing machine.**
2. **As long as the feeding frame switch is depressed, the feeding frame can be lowered. (Refer to the explanation of the "SW5-7" given in "6. Explanation of the DIP switches.")**

### 3-7. Switches on the machine head




① **Wiper switch (used under the Sewing mode)**



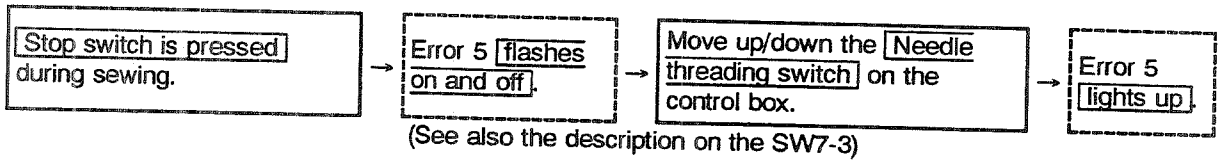

| | |
|---|---|
| ON | The wiper actuates after thread trimming to sweep the thread. |
| OFF | The wiper is inoperative. |

(Caution)

1. **In addition to the wiper switch, the machine comes with the wiper selector switch (DIP switch) to control the "wiper prohibition function". (Refer to the explanation of the "SW6-7" given in "6. Explanation of the DIP switches.")**
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 **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)



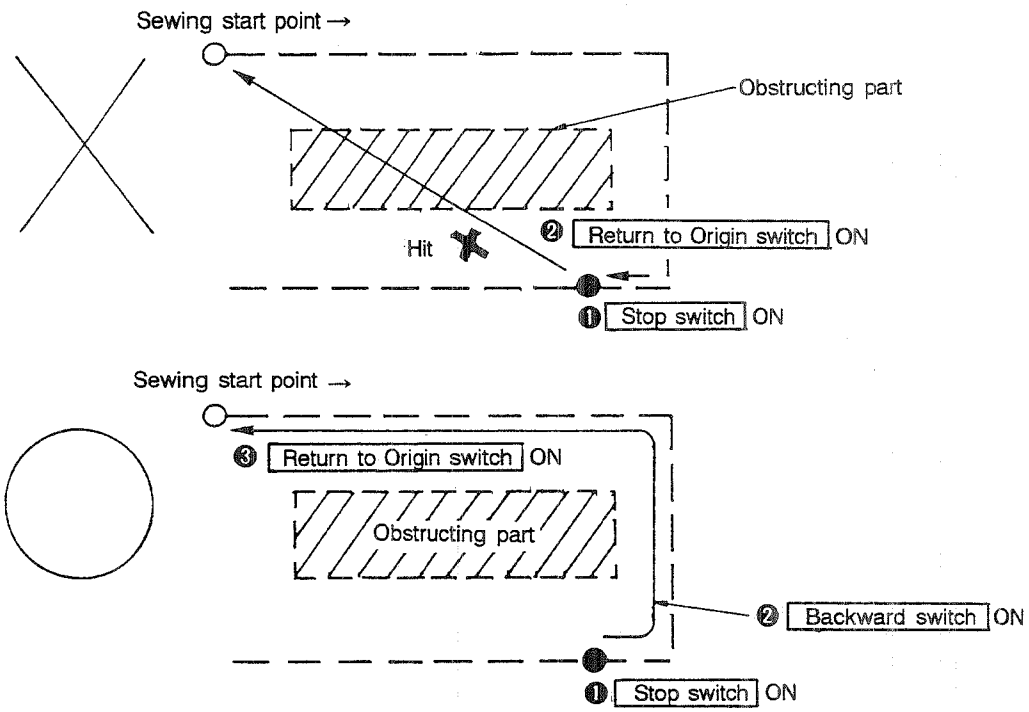

(See also the description on the SW7-3)


(Operation after a 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 [light 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].**


Sewing start point →
Obstructing part
Hit
❷ Return to Origin switch ON
❶ Stop switch ON
Sewing start point →
❸ Return to Origin switch ON
Obstructing part
❷ Backward switch ON
❶ Stop switch ON

## 3-8. Description of functions and operating methods

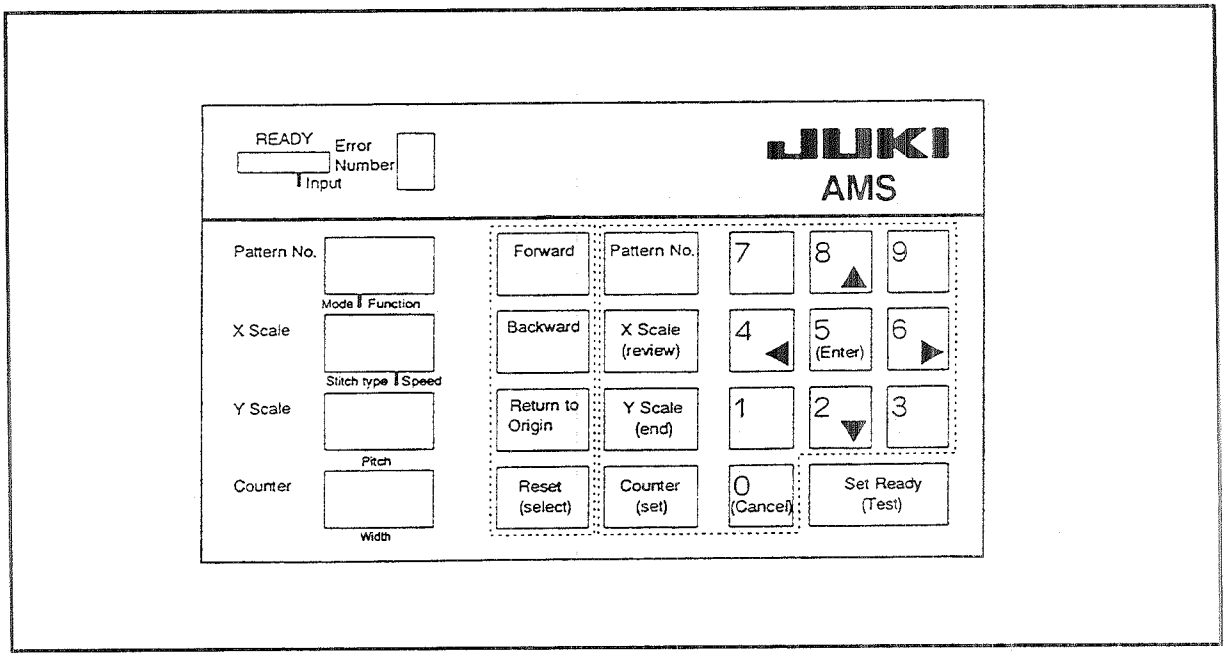
### 3-8-1. Table of functions to be set with DIP switches

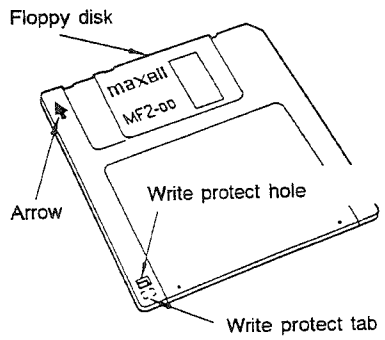
The following table shows the functions of the DIP switches.
Refer to "6. Explanation of the DIP switches" for the explanation of the respective functions.

| Function | DIP switch |
|---|---|
| Feed timing is selected in accordance with the material thickness. | SW4-3, -4 |
| "Cycle stitching facility B" (Raising/lowering of the feeding frame selection B) | SW5-1 |
| "Cycle stitching facility A" (Raising/lowering of the feeding frame selection A) | SW5-2 |
| Selection between "2nd origin setting function"/"Sewing start point changing function" | SW5-3 |
| "Wiper actuating point selecting function" | SW5-4 |
| Origin detection selector switch | SW5-5 |
| "Pedal selecting function B" | SW5-6 |
| "Pedal selecting function A" | SW5-7 |
| "Monolithic feeding frame/separately driven feeding frame change over function" | SW5-8 |
| "Separately driven feeding frame operation sequence change over function" | SW6-1 |
| Setting the "Bobbin thread counter" | SW6-2 |
| Setting the "Bobbin replacement setting function" | SW6-3 |
| Setting the "Enlarge/reduction function" | SW6-4 |
| Setting the "Thread breakage detection function" | SW6-5 |
| Setting the "Thread trimmer prohibition function" | SW6-6 |
| Setting the "Wiper prohibition function" | SW6-7 |
| Setting the "Intermediate presser stop function" | SW6-8 |
| Setting the "Double-stepped stroke feeding frame function" | SW7-2 |
| Setting the "Automatic thread trimming function at the time of a stop" | SW7-3 |
| Setting the sewing speed at the start of sewing | SW7-4 |
| Setting the "Feeding frame position at sewing end selecting function" | SW7-6 |
| Setting the "Automatic retainer compensation selecting function" | SW7-7 |

### 3-8-2. 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 [4] and [6]. 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)

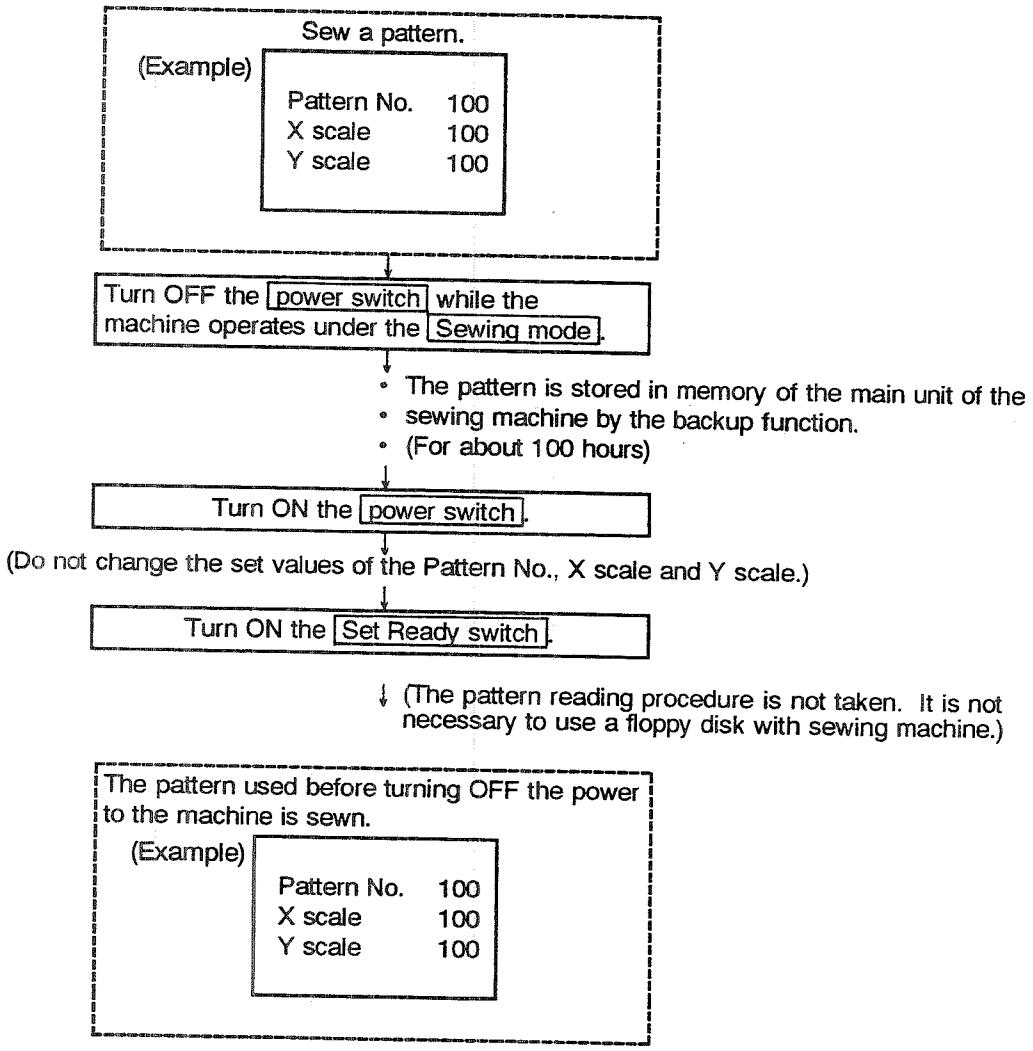
1. **If you should take the disk out or turn the power OFF during formatting, the disk cannot be used. The disk must be formatted again.**
   **If an error [0] is displayed, it means the disk is defective. Do not use the disk.**
2. **Use a floppy disk marked with "2DD."**
   **You may sometimes use (read/write data from/into) a floppy disk other than the 2DD type one after formatting it. In this case, always remember that a trouble is likely to occur during operation. Normal operation is not ensured unless a 2DD floppy disk is used.**

### 3-8-3. 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 the [power switch] is turned OFF after the completion of sewing, the current pattern data which have been read into the main unit of the sewing machine and used for the sewing which has just completed are automatically stored in the memory located inside the main unit of the sewing machine.
- 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 [Setting mode] of the sewing machine to the [Sewing 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 in the pattern which has the pattern No. that is same as the previously used pattern with the X/Y scale same as that specified for the previously used pattern, read in first a pattern which has another pattern No. Then, re-read in the desired pattern.**

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.**

### 3-8-4. 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 threading 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.

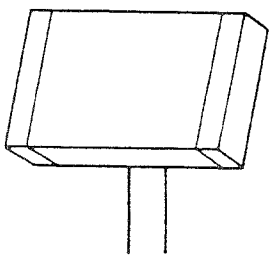
(Caution)
**The feeding frame, intermediate presser and needle moves up and down. It is very dangerous, therefore, to perform the above-stated operation with your hands, etc. placed under the feeding frame, intermediate presser and the tip of needle. So be careful.**

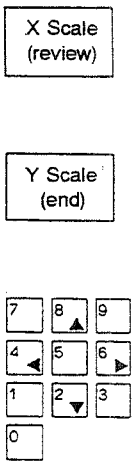
### 3-8-5. Enlargement/reduction function

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

(Operation panel)



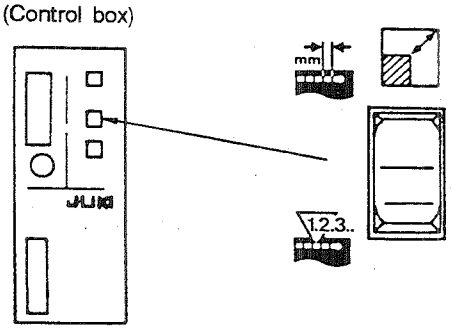



It is used specify the scale (%) for enlargement/reduction of a pattern in the X direction. It is pressed first.

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

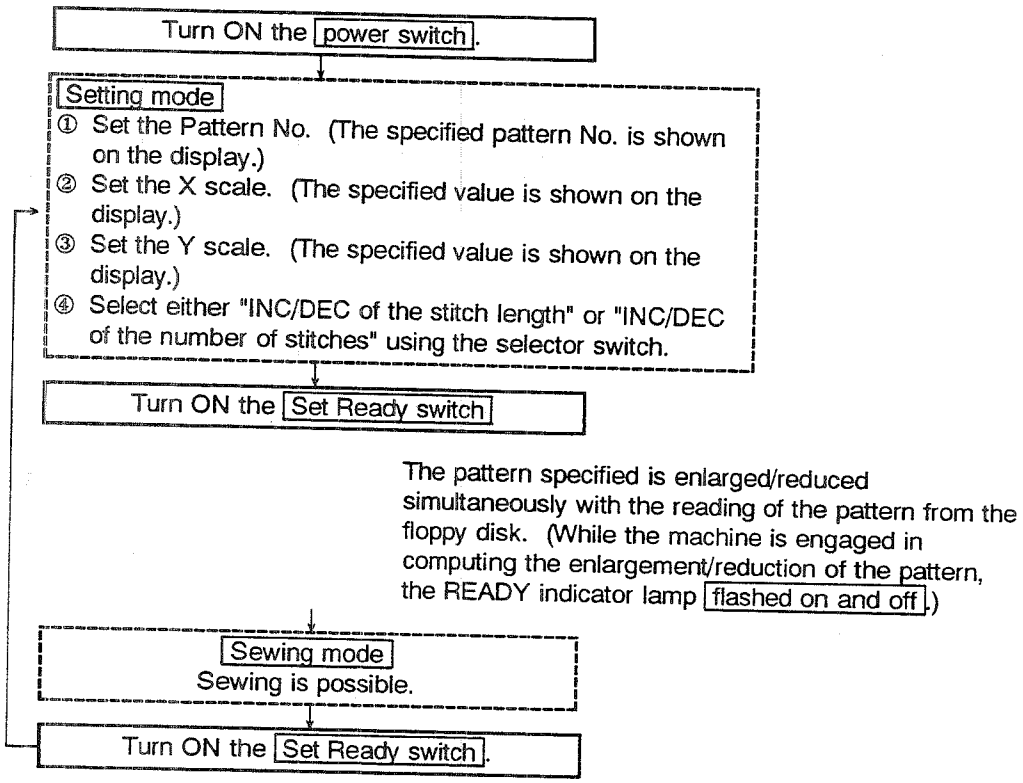
(Control box)




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

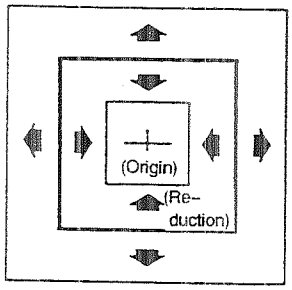
This switch is used to select either to increase/decrease the stitch length in accordance with the enlargement/reduction scale or increase/decrease the number of stitches without changing the stitch length, when the pattern is enlarged/reduced as desired using the switches mounted on the aforementioned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

2) Operating procedure



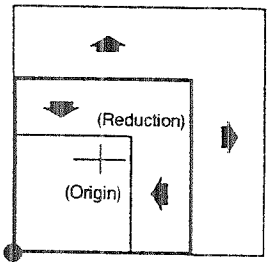

3) Reference point for pattern enlargement/reduction (center point)

- Normally, the AMS enlarges/reduces a pattern using its origin (mechanical origin) as the reference point (center point).




(Enlargement) Normal enlargement/reduction (Normal pattern)

- However, if a "reference point for pattern enlargement/reduction" has been entered in the programmed pattern, this "reference point for pattern enlargement/reduction" is used as the reference point (center point) when enlarging/reducing the pattern.




(Enlargement)

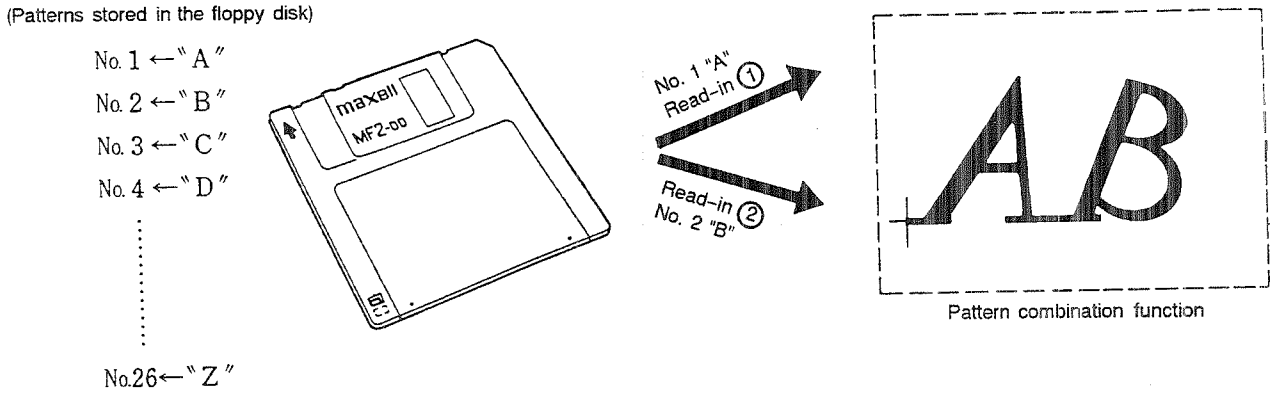
A pattern is enlarged/reduced centering the reference point for enlargement/reduction (for a pattern provided with a reference point for enlargement/reduction)

(Reference point for enlargement/reduction)

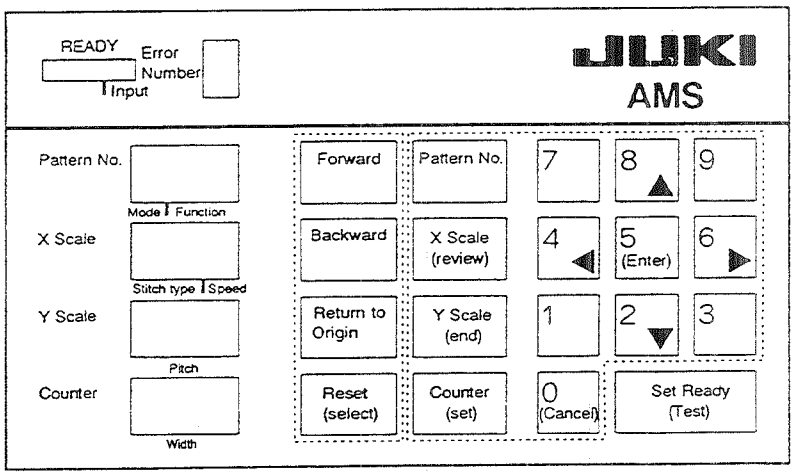
A reference point for pattern enlargement/reduction can added to the pattern created or specified in a pattern that is being created using the main unit input function or the programming device that is separately available.

### 3-8-6. 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).




(Operating procedure)




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

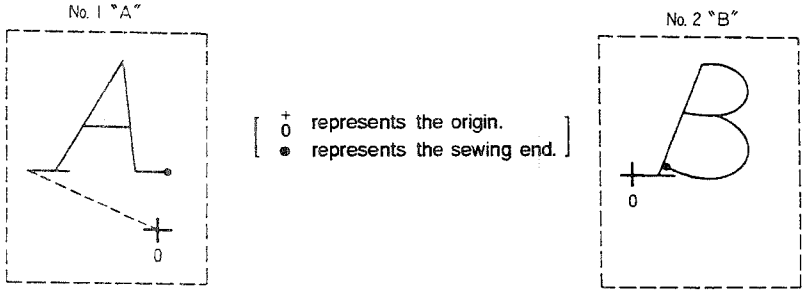
### ❶ Actuating the "pattern combination function"

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".
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) (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) (Align the sewing end of the pattern which has been read in first with the origin of the pattern to be read in 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) |

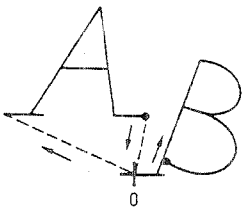
- Example of pattern combination -

Patterns stored in the floppy disk

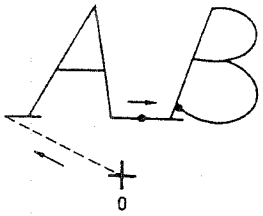



For all the combination of patterns, pattern No. 1 is read in first, and pattern No. 2 is read next.

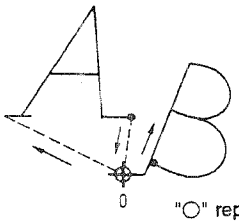
(Fig. 1)



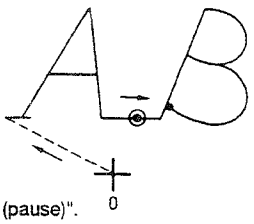

(Fig. 2)




(Fig. 3)




(Fig. 4)



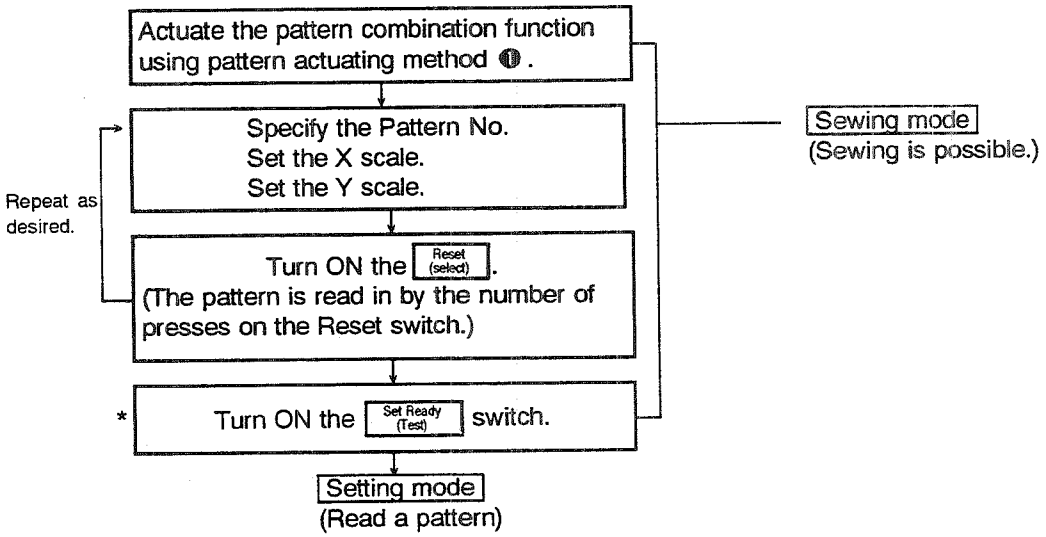

"○" represent the "temporary stop (pause)".

(Caution)

**Refer to the explanation of the "SW5-2" given in "6. Explanation of the DIP switches" for the function of "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 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 [Set ready switch]. This will make the [Sewing mode] 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.)

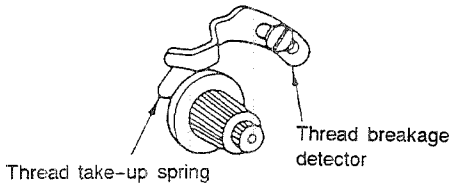
❹ **Storing the patterns combined in memory**

The combined patterns are stored in memory of the main unit of sewing machine by the data back-up function. To sew the combined patterns for the next time, actuate the sewing machine in the normal procedure using only the [Power switch].

(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" given in "6. Explanation of the DIP switches" for the bobbin thread counter.)**
- **Be sure to start sewing the patterns combined after confirming that the combined patterns do not exceed the predetermined sewing area.**

### 3-8-7. Thread breakage detecting function (Error [9])




When the thread take-up spring comes in contact with the thread breakage detecting plate, a thread breakage is automatically detected. The thread take-up spring moves in synchronization with the needle bar during sewing. If there is no needle thread on the thread take-up spring, the spring is held fitted to the thread breakage detecting plate. This causes the thread breakage detecting plate to detect a thread breakage. In this case, the sewing machine stops while gradually reducing the sewing speed.
If the needle thread breaks at the start of sewing, the sewing machine will stop after performing sewing by ten stitches. If the needle thread breaks during sewing, the sewing machine will stop after performing sewing by five stitches. When the sewing machine stops, error [9] will be shown on the display. After threading the machine head, the error can be reset by making the sewing machine perform re-sewing using the [FORWARD switch], the [BACKWARD switch] and the [Start switch] or by moving the feed to the sewing start position using the [Return to Origin switch].

(Caution)

**The thread breakage detection function can be set inoperative using the DIP switch (SW6-5). (Refer to the explanation given in "6. Explanation of the DIP switches.")**

### 3-8-8. Travel end detection function (Error [4])

The travel end of the feed is limited by the sensor. The travel end detection function automatically detects the boundary if the feed moves beyond the predetermined travel end due to excessive enlargement of a pattern, and stops the sewing machine and the feed giving the error indication [4] on the display. At this time, the stop state can be reset using the [Return to Origin switch] during sewing, or using the [jog switches] while a 2nd origin is being specified.

(Caution)

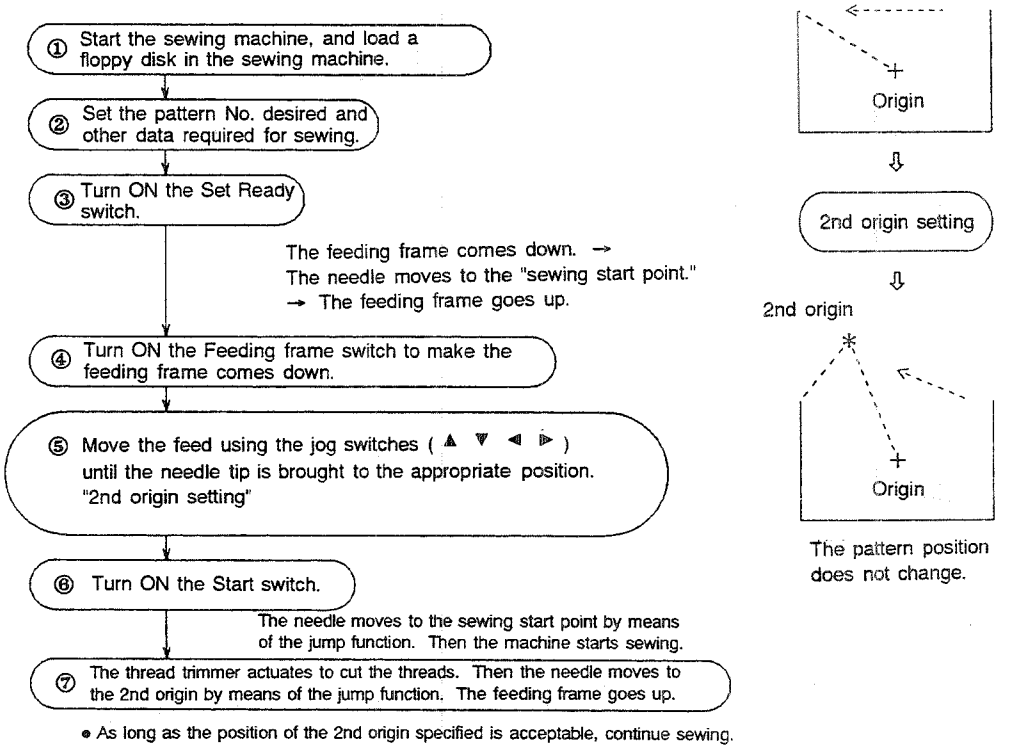
1. **Travel range of the feed**
   **The travel range of the feed is determined as follows by the size of the XY table and the attaching position of the sensor.**
   **AMS-220C 200 mm x 145 mm (7.874" x 5.709")**
   **Actually, the travel range has an approximately 1 mm (0.039") allowance from the sensor which detects the travel end of the feed to the mechanical travel end (stopper).**
2. **Sewing range**
   **The travel range of the feed is determined by the sensor, however, the sewing range is limited by the size, shape, height and other specifications of the feeding frame. The sensor does not work to stop the sewing machine even if the size of a pattern exceeds the predetermined sewing range. So, it is necessary to check the performance of the sewing machine before actually sewing the pattern (refer to the explanation given in "3-4. Operation panel (box) and its functions".)**
3. **Inverting type (T type)**
   **For the inverting type machines, in particular, the top side of a pattern in terms of the longitudinal (Y) direction is limited by the position of the inverting clamp. As a result, the max. sewing size in terms of Y direction is 111 mm (4.370"). (Refer to Chapter 4.)**

### 3-8-9. Second origin setting function and the sewing start point changing function

1. **Second origin setting function (SW5-3 has been set to its OFF position at the time of delivery.)**
   Normally the needle stays at the "sewing start point" before starting sewing. To facilitate the setting of a material on the sewing machine, the 2nd origin (also called "turnout point") is specified to allow the needle to move to a point (position) where the material can be set on the machine with ease.

   The 2nd origin can be input (specified) when creating a pattern. It can also be specified just before starting sewing.
   (Note that the 2nd origin cannot be specified when reading an inversion pattern in which the command for inversion has been input. Refer to Chapter 4 or the Instruction Manual for the "Input Functions of the Main Unit" for the command for inversion or the related information.)

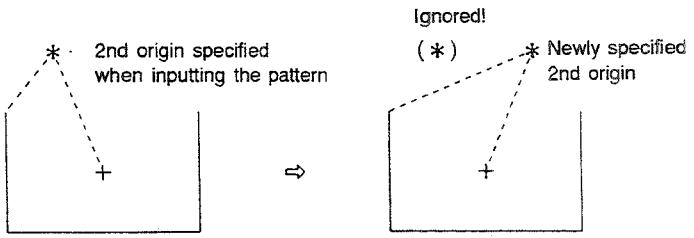
(Operating procedure)




• As long as the position of the 2nd origin specified is acceptable, continue sewing.

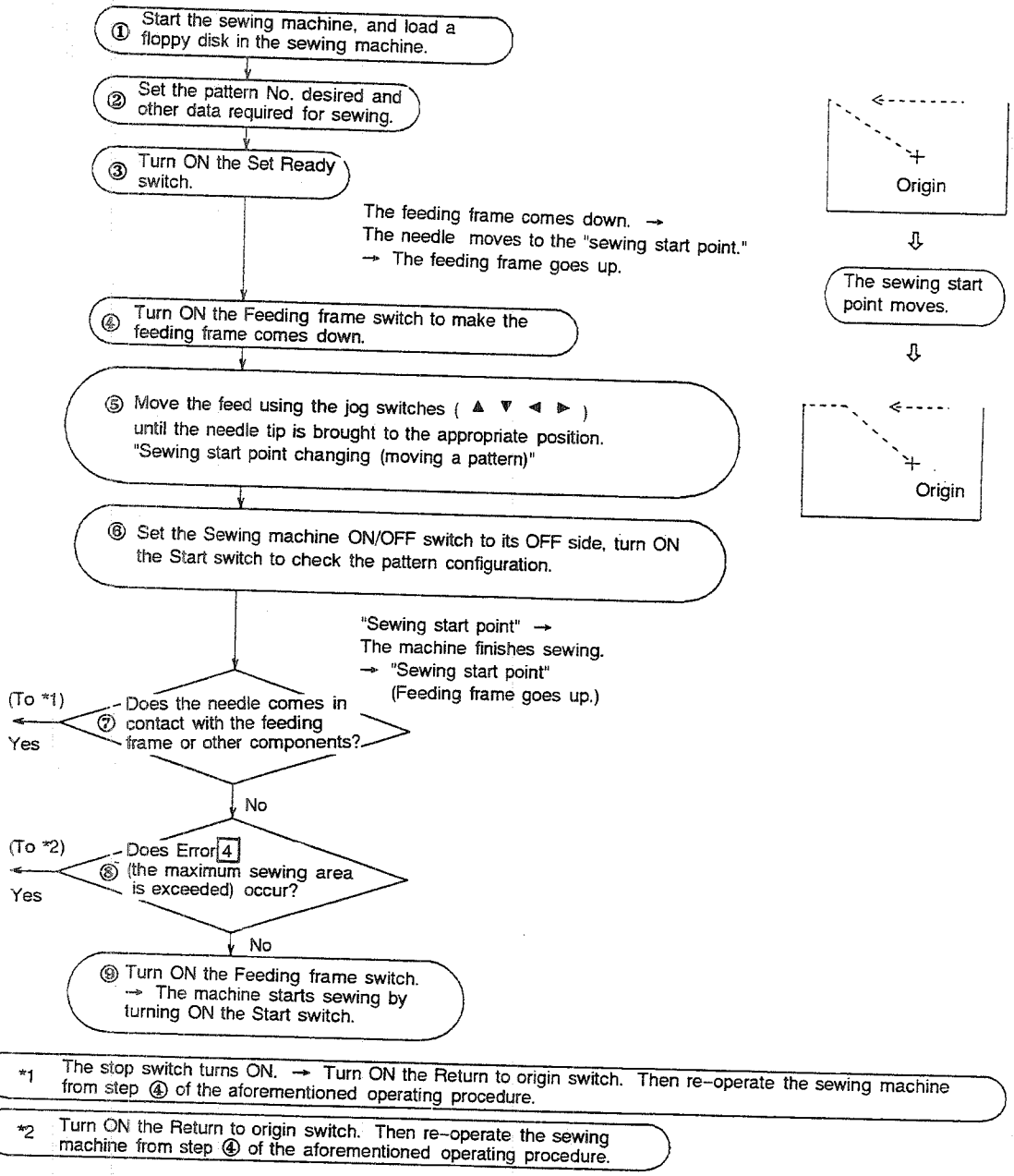
(Caution)

1. **Turn OFF the power to the machine after completing the sewing. Then the input data will be stored in memory by the data backup function.**
2. **To delete the 2nd origin setting position, turn ON the Set Ready switch twice.**
3. **To change the 2nd origin setting position, re-specify a new one following the aforementioned operating procedure from step ④.**
4. **See the description of the DIP switch SW5-3.**
5. **If specifying a 2nd origin in a pattern using this function, the conventional 2nd origin that has been already input when creating the pattern will be ignored.**



2. **"Sewing start point changing function" (SW5-3 is set to its ON position)**
   This function is used to move a pattern, which is read out from a floppy disk, in parallel.

(Operating procedure)

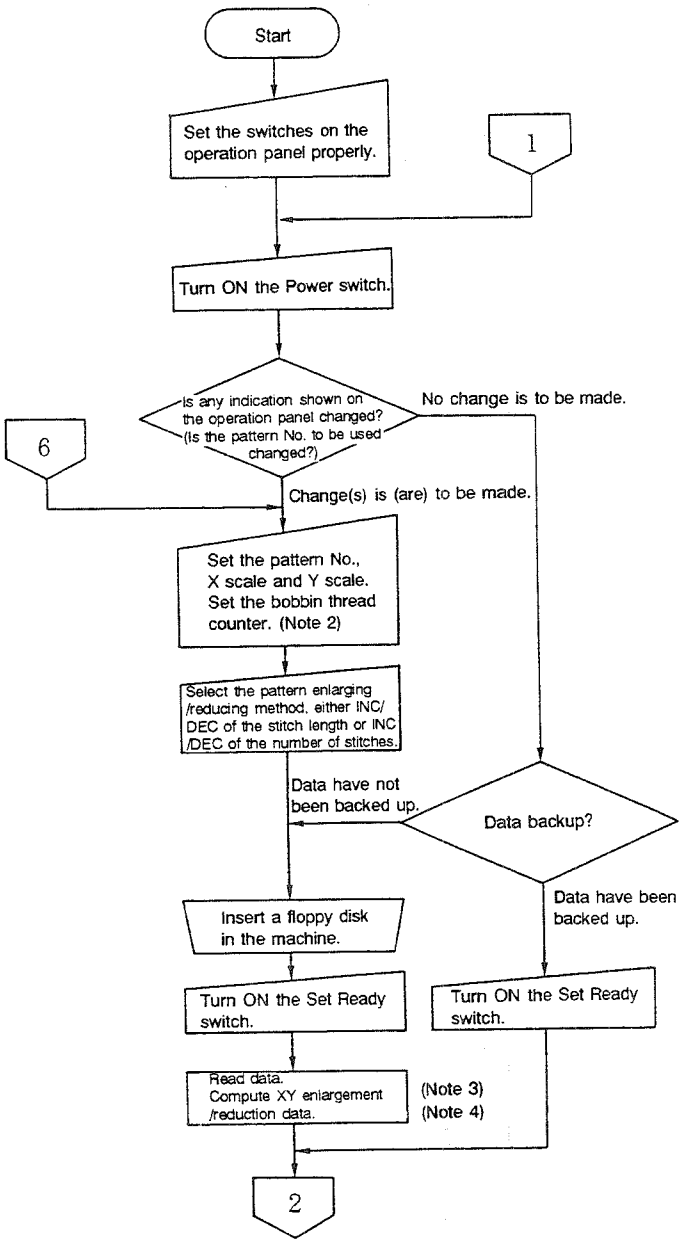



(Caution)

1. **Turn OFF the power to the machine after completing the sewing. Then the input data will be stored in memory by the data backup function.**
2. **To delete the sewing start point which has been changed using the "sewing start point changing function," turn ON the Set Ready switch twice.**
3. **To re-change the sewing start point, move the sewing start point as desired following the aforementioned operating procedure from step ④.**
4. **When using the Return to origin switch, the needle moves straight to the sewing start point. So, the Return to origin switch can be used as far as the tip of needle does not come in contact with the feeding frame and other components. If the tip of needle interferes with the feeding frame and other components, return the feed by pressing the [BACKWARD] switch until the sewing start is reached. Now, turn ON the [Return to Origin] switch.**
5. **If making this function operative by setting the DIP switch SW5-3 to its ON position, the conventional 2nd origin that has been already input when creating the pattern will be ignored. (Whether the sewing start point is changed or not.)**

## 3-9. Explanation of the operating procedure

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Power OFF<br>Setting mode<br>Sewing mode | ① Standard operation | * Refer to the explanation given in "6. Explanation of the DIP switches" if any of the DIP switches including SW6-3 are described in the following operating procedure. |




- Bobbin winder ON/OFF switch → Set it to its OFF position. (Press the switch.)
- Needle threading switch → Set the switch to its OFF position. (Set it to the side.)

(Note) 1. Change round the connection of the DIP switches and foot switches, if necessary.

- The sewing machine motor starts rotating.
- Indicator lamp (LED) on the operation panel lights up.
- The stepping motor is excited.

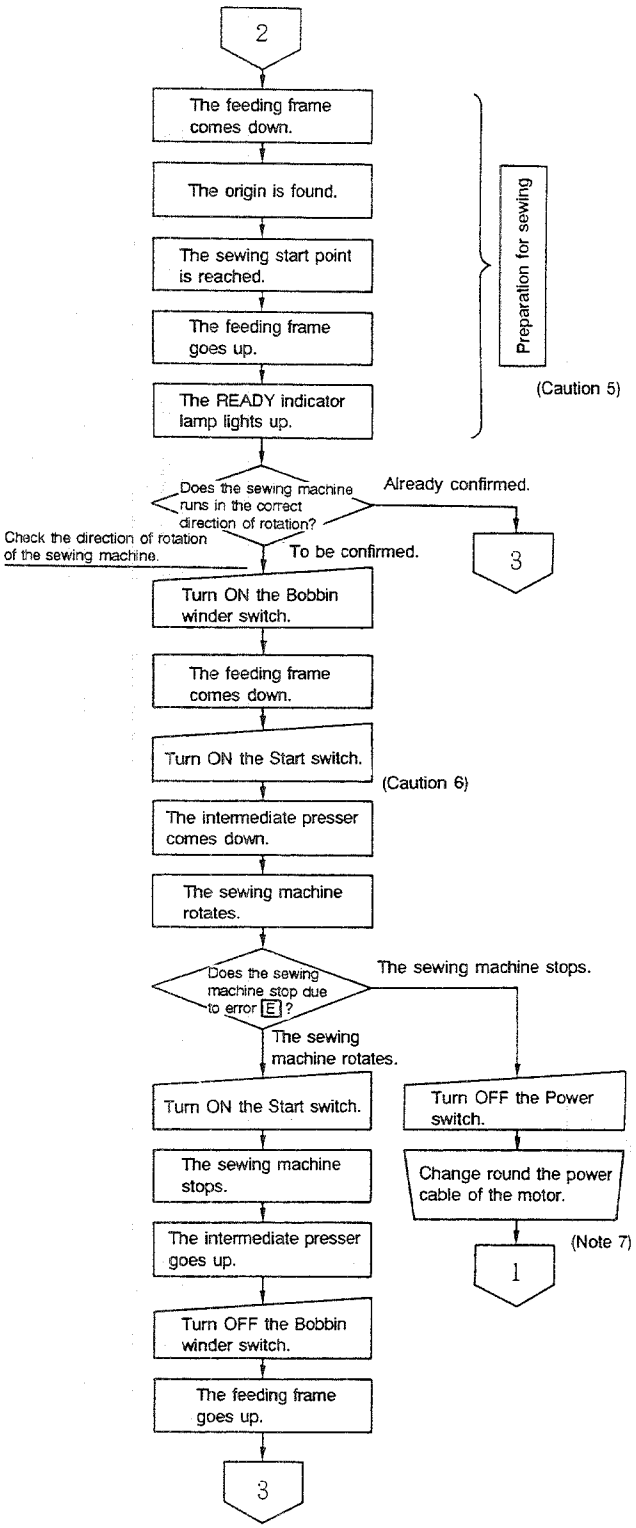
- Pattern No. : 001 to 999
- X/Y scale : 001 to 400 (%)

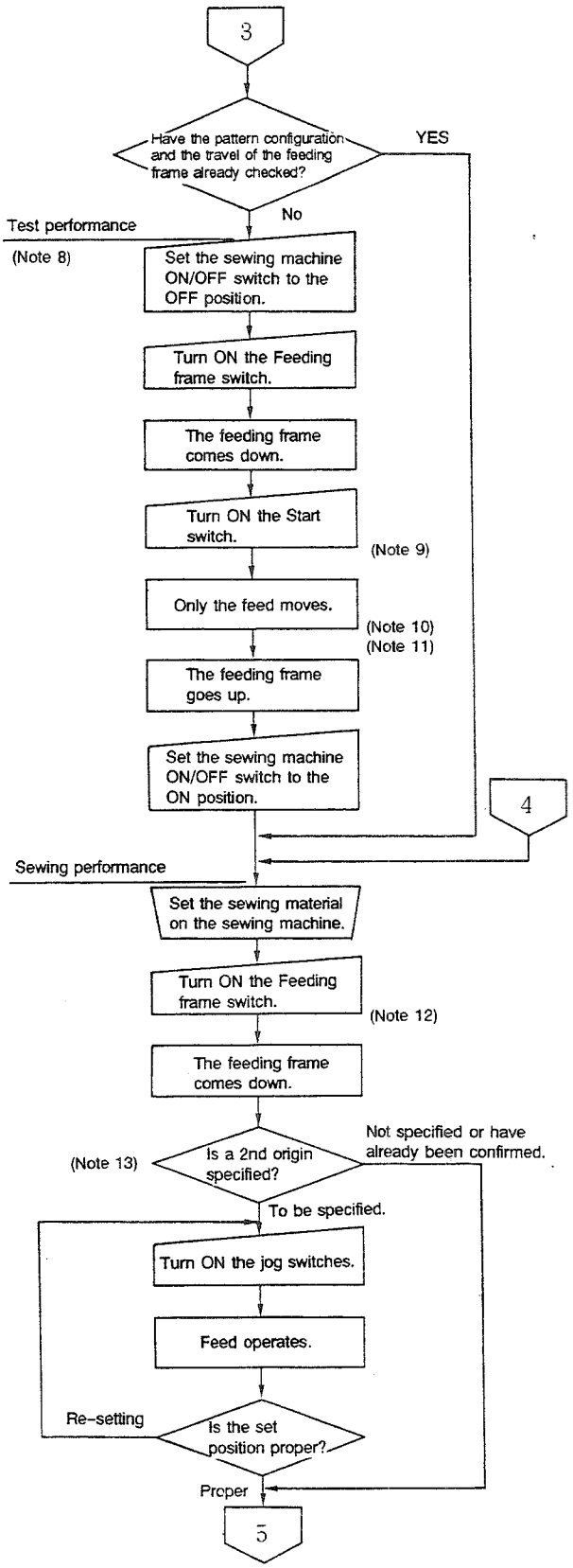
(Note) 2. The bobbin counter should be set when the "Bobbin replacement setting function" (DIP switch SW6-3) is set to effective.

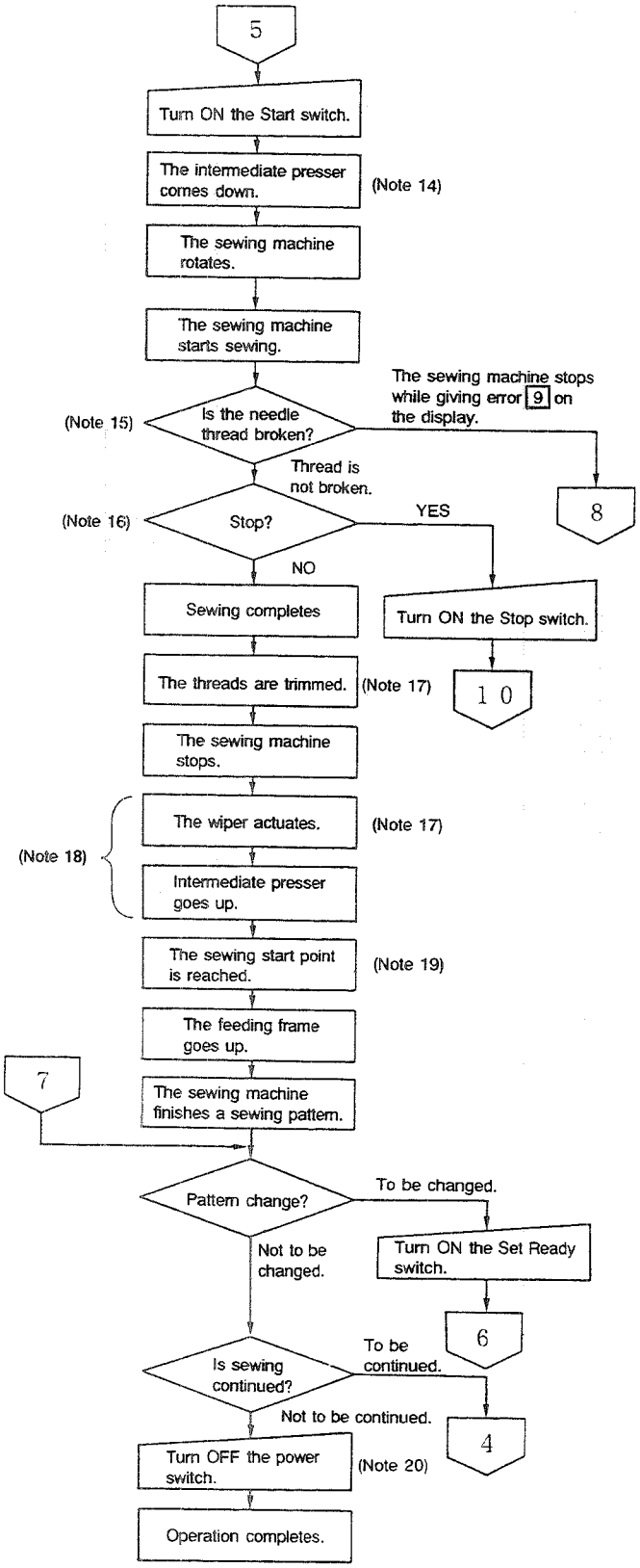
- While the enlargement/reduction data is computed, the READY indicator lamp flashes on and off.

(Note) 3. Error related to pattern No. : [1]
Error related to pattern enlargement/reduction : [2]

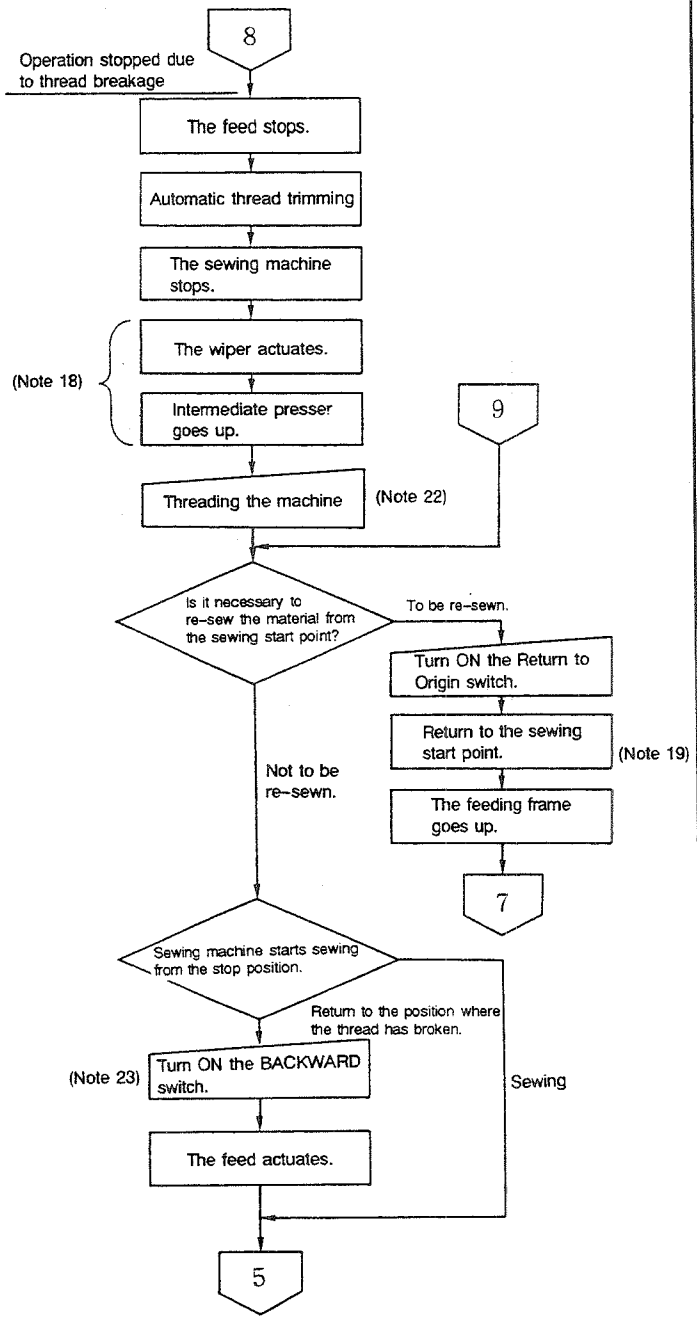
(Note) 4. The sewing data can be stored in memory for 100 hours by means of the data backup function.

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Sewing mode |  | (Note) 5. Keep your hands away from the feeding frame since the feeding frame comes down.<br>• If a 2nd origin has been set, it will be reached instead of the sewing start point. (See the description of SW5-3.)<br>• When the machine performs preparation for sewing for the first time after the power to the machine has been turned ON with the "automatic retainer compensating function" (DIP switch SW7-7) selected, the machine performs the retainer compensation in addition to the normal preparation for sewing.<br>• Check the area under the needle for any obstacles.<br>• Remove the needle thread.<br>(Note) 6. Never place your fingers or any other things under the needle.<br>• Error 7 is shown when the sewing machine is locked or the belt comes off.<br>• The sewing machine stops when turning ON the Start switch or turning ON the Stop switch.<br>It is also possible to stop the sewing machine by directly turns OFF the Bobbin winder switch. (Refer to the explanation given in "3-3. Control box and its function.")<br>(Note) 7. Be sure to change round the connection of the power cable (connector) of the motor after turning OFF the power to the machine. (See "7-2. Changing the direction of rotation of the sewing machine.) |

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Sewing mode |  | (Note) 8. In the following cases, the test performance (confirmation of the pattern configuration) should be carried out.<br>① Before using a pattern which has never been used.<br>② When enlarging/reducing a pattern.<br>③ Before using an exclusive feeding frame.<br>④ After adjusting the feed components or performing maintenance of them.<br>9. You can also carry out the test performance (confirmation of the pattern configuration) using the FORWARD and BACKWARD switches.<br>10. Travel limit error : 4<br>• The needle does not move up and down but the feed operates at a constant speed.<br>(Note) 11. If error 4 occurs or the needle interferes with the feeding frame, change the pattern to be sewn.<br>• Is the workpiece correctly positioned?<br>• Is the workpiece securely clamped?<br>• Is the height of the intermediate presser correct?<br>(Note) 12. The operating method of the Feeding frame switch changes in accordance with the type of the feeding frame.<br>* DIP switches related to the feeding frame SW5-6, SW5-7, SW5-8, SW7-6, etc.<br>(Note) 13. "Sewing start point moving function" is also provided for the machine. (SW5-3) |

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Sewing mode |  | (Note) 14. The intermediate presser is not used in the T type (standard) machines.<br>• Is the thread tension appropriate?<br>(Note) 15. Needle thread breakage detection : [9]<br>(Note) 16. Stop : [5] (flashes on and off or lights up)<br>(Note) 17. If thread trimming is not entered in the sewing pattern, the machine will not perform thread trimming.<br>• Making the thread trimmer invalid (SW6-6), making the wiper invalid (SW6-7), prohibiting the intermediate presser (SW6-8).<br>(Note) 18. For the G type, the [intermediate presser goes up] first, then the [wiper actuates]. (SW5-4)<br>• If the machine stops in its pause state, return to [5]. (SW5-1, SW5-2)<br>(Note) 19. When a 2nd origin has been specified, the 2nd origin is reached instead of the sewing start point.<br>• The feeding frame can be held in its lowest position. (SW7-6)<br>• Reset the Counter display. (Refer to the explanation of the SW6-2 and SW6-3.)<br>(Note) 20. If you turn OFF the power switch with the feeding frame lowered, the feeding frame will goes up simultaneously with turning-OFF of the switch. In this case, the feeding frame rests under the tip of the needle, the feeding frame will come in contact with the needle. |
| Power supply "OFF" | | |

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Sewing mode | ② Operation required in the case of thread breakage | |

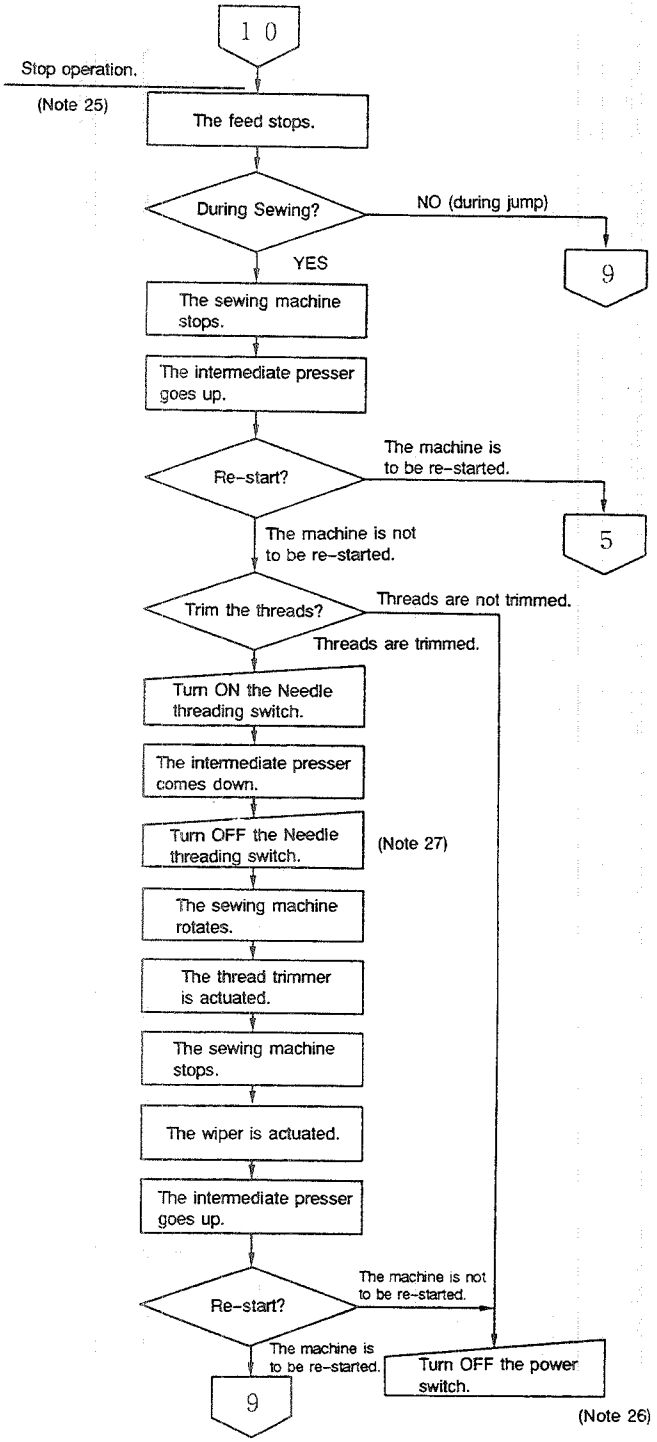



(Note) 21. It is also possible to make the "thread breakage detecting function" ineffective. (SW6-5)

(Note) 22. The thread breakage detector may also detects a thread breakage in the case where the bobbin thread runs out and cause the sewing machine to stop. (Check the bobbin thread.)

(Note) 23. The FORWARD switch can also be used.

| Mode | Operation procedure flow chart | Remarks and caution |
|---|---|---|
| Sewing mode | ③ Operation required when the Stop switch is turned ON | • Described in detail in "3-7. ② Stop switch." |




(Note) 24. Error indications
During sewing : [5] flashes on and off.
During jump : [5] lights up.

(Note) 25. Be sure to proceed to the next sewing after eliminating the cause of trouble that makes the sewing machine stop.
Be sure to turn OFF the power to the machine whenever you want to disassemble the sewing machine or adjust it.

(Note) 26. If the ascending feeding frame interferes with the needle, first cut the operating air supply to the machine. Then turn OFF the power switch.

• Needle threading switch

ON :
OFF :

(Note) 27. Keep your hands away from the underside of the needle since the needle moves up or down.

### 3-10. Precautions during 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. Set the maximum sewing speed to an appropriate value in accordance with the type of sewing product to be used.
   Furthermore, the maximum sewing length can be limited by inputting relevant data in a sewing pattern before starting sewing. Refer to the Instruction Manual for the "Input Functions of the Main Unit" for details.

| Stitch length (mm) | Max. sewing speed (s.p.m.) |
|---|---|
| 8.4 to 10.0 (0.331" to 0.394") | 600 |
| 7.2 to 8.2 (0.283" to 0.323") | 700 |
| 6.6 to 7.0 (0.260" to 0.276") | 800 |
| 6.0 to 6.4 (0.236" to 0.252") | 900 |
| 5.4 to 5.8 (0.213" to 0.228") | 1,000 |
| 5.2 (0.205") | 1,100 |
| 4.8 to 5.0 (0.189" to 0.197") | 1,200 |
| 4.4 to 4.6 (0.173" to 0.181") | 1,300 |
| 4.2 (0.165") | 1,400 |
| 3.8 to 4.0 (0.150" to 0.157") | 1,500 |
| 3.6 (0.142") | 1,600 |
| 3.4 (0.134") | 1,800 |
| 3.2 (0.126") | 1,900 |
| 0.2 to 3.0 (0.008" to 0.118") | 2,000 |

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

# 4. DESCRIPTION OF EACH MAIN COMPONENT

## 4-1. Sewing machine

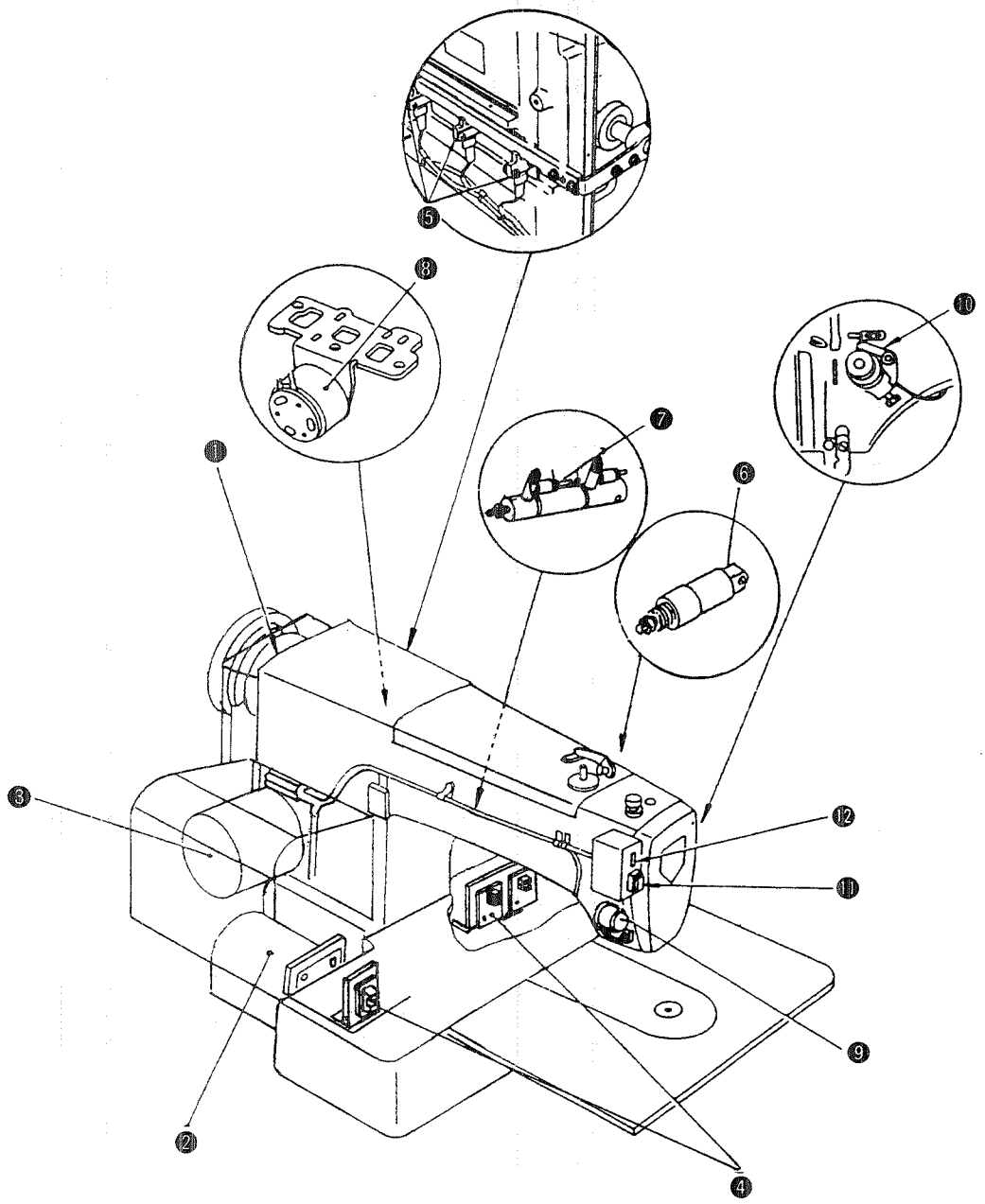



Fig. 4-1

❶ Synchronizer (generator stator)
❷ X-direction stepping motor
❸ Y-direction stepping motor
❹ X-axis sensors
❺ Y-axis sensors
❻ Work clamp foot cylinder
❼ Intermediate presser lifting cylinder
❽ Thread trimmer solenoid
❾ Wiper solenoid
❿ Thread breakage detector
⓫ Stop switch
⓬ Wiper switch
} (Switches on the machine head)

❶ Synchronizer (generator stator)
Mainly consists of a generator stator and position detecting solenoid incorporated into the sewing machine pulley. If detects whether the needle is in its upper or lower position, and also detects the sewing speed, after which it sends input signals to the control box based on the detection results. Sometimes, the synchronizer is called "generator stator."

❷ X-direction stepping motor
Feeds material in the direction of the X-axis according to the pattern data given by the control box.

❸ Y-direction stepping motor
Feeds material in the direction of the Y-axis according to the pattern data given by the control box.

❹ X-axis sensors
Mainly consists of an X-direction slit disk, an X-direction origin sensor, and an X-direction travel limit sensor. If detects the origin in the X direction within the sewing area and the boundary of the limited sewing area. It sends the input signals to the control box based on the detection results.

❺ Y-axis sensors
Mainly consists of a Y-direction slit disk, a Y-direction origin sensor, and a Y-direction travel limit sensor. It detects the origin in the Y direction within the sewing area and the boundary of the limited sewing area. It sends the input signals to the control box based on the detection results.

❻ Work clamp foot cylinder
By turning ON/OFF the feeding frame switch, the feeding frame activated by the air cylinder goes up and comes down to securely hold the material.

❼ Intermediate presser lifting cylinder
During sewing, the air cylinder controls the vertical stroke path of the intermediate presser, and actuates the intermediate presser causing it to go up and come down.

❽ Thread trimmer solenoid
Actuates the clutch mechanism for the thread trimmer according to the command from the synchronizer.
It then actuates causing the thread trimmer cam and thread trimmer mechanism to join together.

❾ Wiper solenoid
Actuates the wiper after the thread has been trimmed.

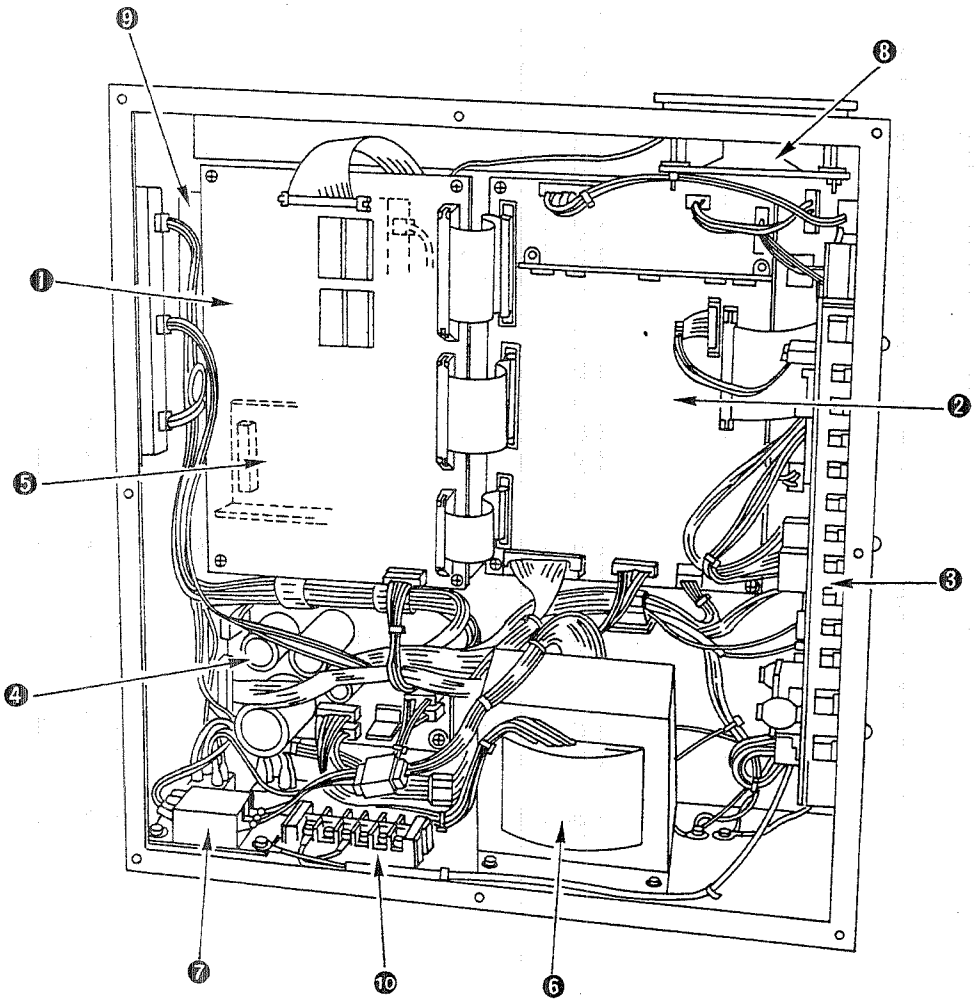
❿ Thread breakage detector
Detects the connection between the thread take-up spring and the thread breakage detector disk each time a stitch is formed, and sends the result in terms of an input signal to the control box. If needle thread breakage is detected, the sewing machine will slow down, trim the thread, and stop.

⓫ Stop switch
This switch is used to stop the feed and operation of the sewing machine during sewing. If this switch is turned ON, the machine will stop without performing thread trimming.

⓬ Wiper switch
Used to specify whether the wiper is to be actuated after thread trimming.

(Note)
**The stepping motor is sometimes called "pulse motor," and the magnet is sometimes called "solenoid."**

## 4-2. Control box



❶ CPU circuit board
❷ I/F circuit board
❸ PMDC circuit board
❹ Power circuit board
❺ Switching regulator
❻ Transformer
❼ Fuse box
❽ Cooling fan
❾ Floppy disk driver
❿ Transformer tap (terminal board)
(8P for 380 V system and 6P for the other systems.)

❶ **CPU circuit board**
The nucleus of the control unit. When the power switch is turned ON, it actuates the control unit after receiving the reset signal from the I/F circuit. It mainly consists of a microprocessor and electronic parts, including ICs.
- Floppy disk drive control circuit
- Microprocessor control circuit
- Input circuits for the switches
- Switch signal output circuit

❷ **I/F circuit board**
Actuates the sewing machine, magnet, and air cylinder solenoid valve after receiving signals from the CPU circuit board. It transmits the signals from the sewing machine or operation box (panel) to the CPU circuit board.
The following circuits are mounted:
- Magnet driving circuit
- Display driving circuit
- Solenoid valve driving circuit
- The sewing machine driving circuit and other circuits are mounted on the I/F circuit board.

❸ **PMDC circuit board**
It receives signals from the CPU circuit board by way of the I/F circuit board to drive the stepping motor.
The following circuits are mounted on the PMDC circuit board.
- Current limiter circuit (provided with a protection fuse)
- Stepping motor drive circuit

❹ **POWER circuit board**
Rectifies and stabilizes the outputs received from the secondary transformer to provide the power supply, and includes the following circuits:
- Unstable power circuit for driving the solenoids
- Unstable power circuit for driving the stepping motor
- +24V stable power circuit for the PMDC circuit board
- +5V, +12V, -12V wiring circuits

❺ **Switching regulator**
Receives a 100V output from the secondary transformer and outputs +5V, +12V and -12V.

❻ **Transformer**
It outputs 24 Vac for driving the magnets, 50 Vac for driving the stepping motor, 100 Vac for the cooling fan and switching regulator and 4.5 Vac for the marking light (provided with a protection fuse).

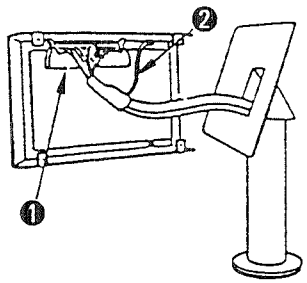
❼ **Fuse box**
Contains a 7A time lag fuse to protect the solenoids, a 10A fuse to protect the stepping motor and switching regulator, and a 1A fuse to protect the cooling fan.

❽ **Cooling fan**
Used to cool the elements, taking in fresh air from outside the machine. (The filter is provided for the cooling fan.)

❾ **Floppy disk driver**
Reads the data stored in the floppy disk (2DD, 1D), and writes data on to the floppy disk (2DD) after receiving a signal from the CPU circuit board.

❿ **Transformer tap (terminal board)**
It changes over the taps of the power cable in accordance with inputs from the transformer.

### 4-3. Operation panel (box)




❶ Operation circuit board
❷ Operation panel junction cable

❶ **Operation circuit board**
On this circuit board are mounted display parts which receive commands from the control box and switch parts which send switch data to the control box.

❷ **Operation panel junction cable**
This is a 50-core cable which connects the operation circuit board with the control box for transfer of signals.

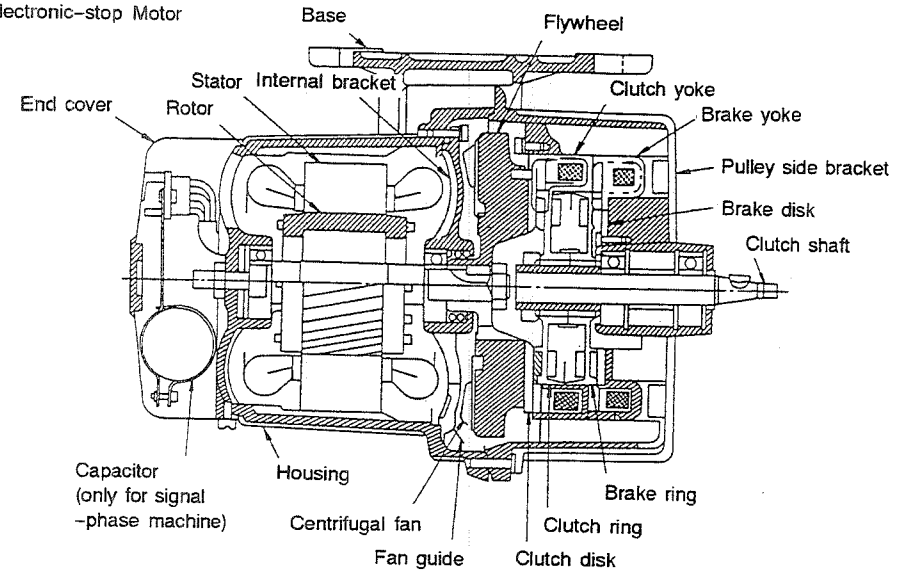
(Caution)
**Refer to the "7-5. Replacing the printed circuit board" for how to attach or replace the circuit boards. (Interchangeability of the printed circuit board is also described.)**

## 4-4. Motor

The sewing motor incorporates an electronic-stop motor (400 W 4P) (550 W 2P for the G type).
The clutch brake disk components are compatible with a general lockstitch sewing machine motor.

1. **Structure of the motor and how the motor speed is changed**
   The following diagram shows the structure of the electronic-stop motor. As long as the power of the machine stays ON, the motor (rotor, flywheel, and clutch disk) runs constantly.
   The clutch ring is joined by the output shaft and the spline. This mechanism makes the clutch ring rotate while being integral with the output shaft and enables it to slide to the right and left.
   When the clutch coil is energized, lines of magnetic force are produced as shown by the solid line arrow, and the clutch ring is pressed against the clutch disk, thereby transmitting the motor rotation to the output shaft.
   When the brake coil is energized, magnet lines of force as shown by dotted arrow are generated and the clutch ring is pressed against the clutch disk (the clutch disk is integral with the pulley-side bracket, so it does not rotate). This stops the rotation of the output shaft.
   At medium speed, the clutch coil and the brake coil are energized for a short period of time alternately for rotation.

Structure of Electronic-stop Motor



# 5. ADJUSTMENTS

## 5-1. Adjustment/assembly/disassembly of the mechanical components

### STANDARD ADJUSTMENTS

(1) **Checking the direction of rotation of the handwheel**

After confirming that the READY indicator lamp has lit up, set the [Bobbin Winder switch] to "ON", and press the start switch.

At this time, the handwheel should turn counterclockwise (in the direction of the arrow) as observed from the pulley side.

If the handwheel turns in the reverse direction, error [E] will be indicated, and machine will stop.

(Caution)

**Be sure to check the direction of rotation of the handwheel after the machine has been installed or the powers supply wiring of the machine has been completed.**

**Do not start sewing unless the direction of rotation of the handwheel has been confirmed as correct.**

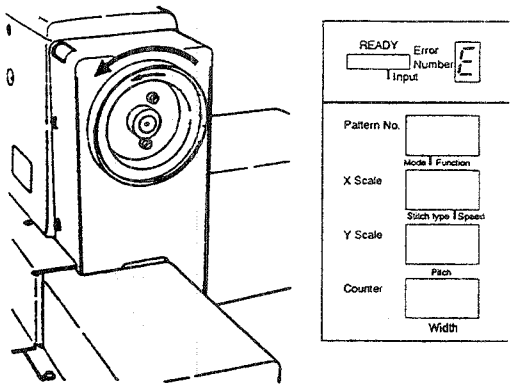
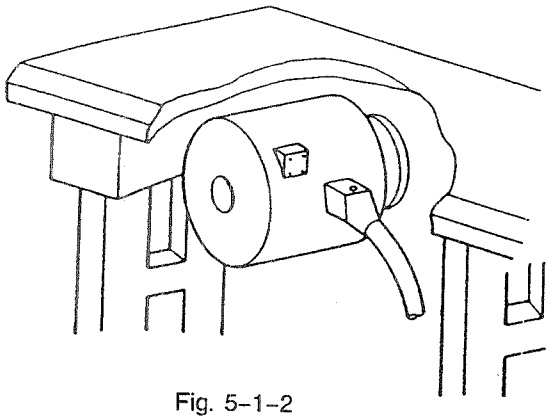



Fig. 5-1-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o If the handwheel turns in the reverse direction, disconnect the motor power plug, and reconnect it reversed.<br>  <br>Fig. 5-1-2 | o If the handwheel turns in the opposite direction, the machine will stop showing the error [E].<br>In this case, the [power switch] can be turned OFF, but no other switch can be operated. |

(2) **Height of the needle bar**

Bring the needle bar to the lowest dead point in its stroke.

Adjust so that the bottom end of the needle bar lower bushing is aligned with the upper marker line (for DP x 5, DP x 17 and thick needles thicker than DP x 17).

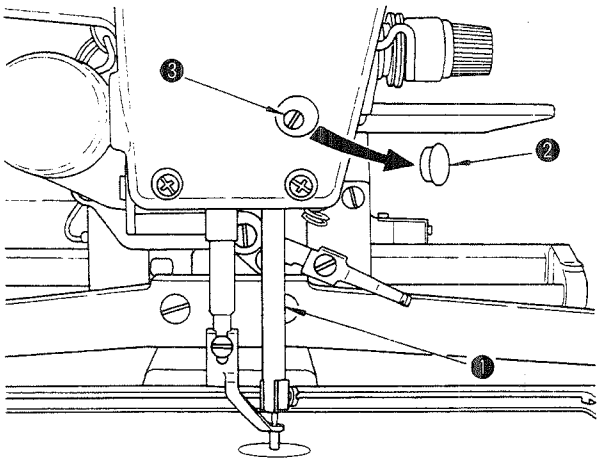



Fig. 5-2-1

(Relationship between the needles and the marker lines)

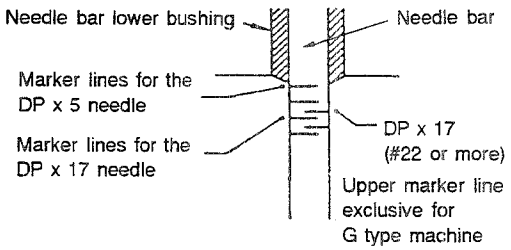



Fig. 5-2-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) While the READY indicator lamp (LED) is ON, turn ON the [Needle threading switch], then turn the handwheel by hand until the needle bar reaches the lowest point of its stroke.<br>2) Remove rubber plug ❷ from the face plate.<br>3) Loosen needle bar connection setscrew ❸, and adjust the height of the needle by raising or lowering the needle bar ❶.<br>4) After making the adjustment, securely tighten setscrew ❸.<br>5) Turn OFF the [Needle threading switch]. (The needle bar will return to its upper resting position.)<br>6) Attach rubber plug ❷ to the face plate.<br><br>(Caution)<br>**Setting the [Needle threading switch] to its ON position ( ) will make both feeding frame and intermediate presser come down. So, never operate the needle threading switch with your fingers or any other things placed under the feeding frame and the intermediate presser.**<br>**Returning the [Needle threading switch] to its OFF position ( ) will make the needle move up and down. So, never operate the needle threading switch with your fingers or any other things placed under the needle.** | o Stitch skipping or thread breakage may occur.<br>o The intermediate presser may break. |

(3) **Stop position of the main shaft**
When the main shaft stops, marker dot ❶ on the machine arm should be midway between marker dot No. 1 ❷ and marker dot No. 2 ❸ on the handwheel.

(Caution)

1. **Be sure to do this adjustment while the machine is ready to start sewing.**
2. **This adjustment is unnecessary for normal operation.**
   **If the stop position of the main shaft has been adjusted, be sure to check the newly adjusted stop position of the main shaft with the workpiece set on the machine.**

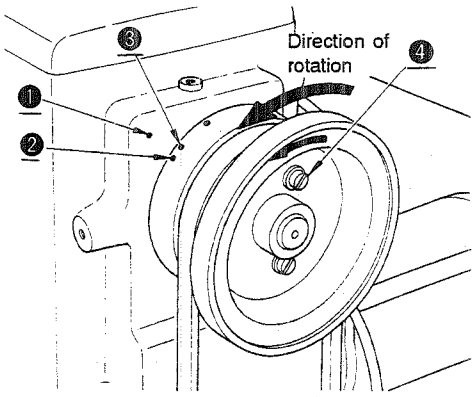
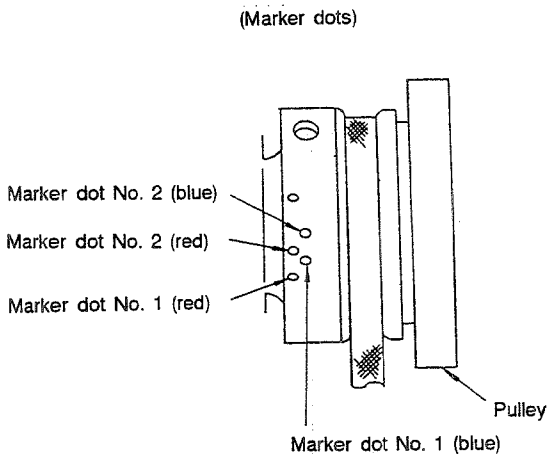
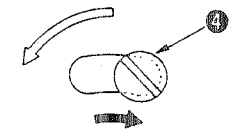



Fig. 5-3-1

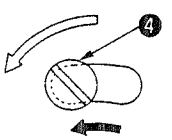



- Use the red marker dots for the machines other than the G type one.
- Use the blue marker dots for the G type machine.

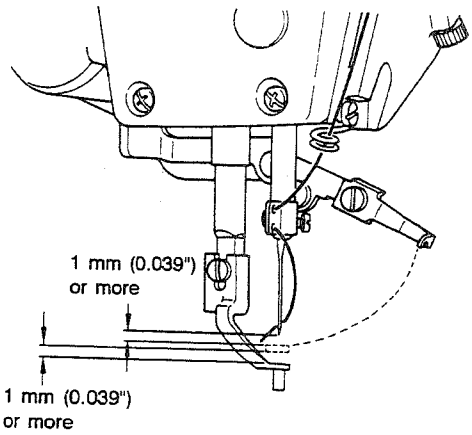
| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen solenoid mounting base setscrew ❹.<br>2) If the handwheel stops before its marker dot No. 1 ❷ reaches marker dot ❶ on the machine arm, turn screw ❹ in the magnet mounting base clockwise. If the handwheel stops after its marker dot No. 2 ❸ passes beyond marker dot ❶ on the machine arm, turn screw ❹ counterclockwise.<br>3) Repeat step 1) and 2) until marker dot ❶ on the machine arm is located between marker dot No. 1 ❷ and marker dot No. 2 ❸ on the handwheel when the main shaft stops.<br>4) Securely tighten solenoid mounting base setscrew ❹. | o If the handwheel stops before its marker dot No. 1 ❷ reaches marker dot ❶ on the machine arm, the thread trimmer will fail to complete the thread trimming action (the main shaft stops before the moving knife meets the counter knife), resulting in a thread trimming failure.<br>o If the main shaft stops after its marker dot No. 2 ❸ passes beyond marker dot ❶ on the machine arm, the specified clearance of 1 mm (0.039") or more cannot be obtained between the needle and the wiper and between the wiper and the intermediate presser. In this case, the wiper will interfere with the needle and the intermediate presser, resulting in breakage of the respective components. |




When the handwheel stops before its marker dot No. 1 reaches the marker dot on the machine arm




When the handwheel stops after its marker dot No. 2 passes beyond the marker dot on the machine arm



(4) **Height of the intermediate presser**

1) Make sure that the sewing pattern data has been read and the sewing indication LED (READY lamp) has lit up before setting the workpiece on the machine.
2) Make sure that the needle entry point is in the center of intermediate presser ❶.
3) Set [Needle threading switch] ❷ in the control box to the side. The feeding frame and intermediate presser will then come down.
4) Turn the handwheel by hand until the needle bar reaches the lowest dead point of its stroke. Adjust so that a 0.5 mm (0.020") (standard adjustment value) clearance is obtained between the top end of the intermediate presser and the workpiece.
5) After making the adjustment, set [Needle threading switch] ❷ to the side. The machine will then run until it reaches the needle-up stop position. The JUKI standard intermediate presser can be applied to a material of which thickness does not exceed 5 mm (0.197").

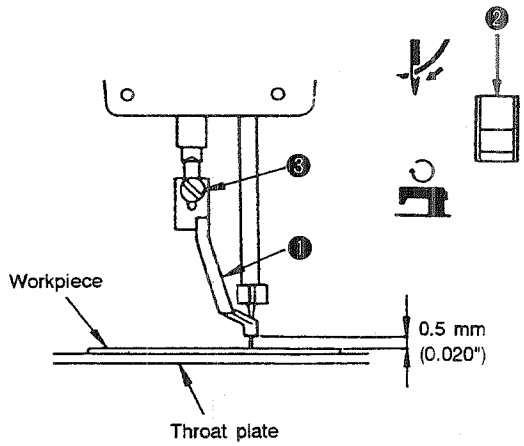



Fig. 5-4-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen intermediate presser setscrew ❸, and adjust the height of the intermediate presser following the procedure stated on the left. Upon completion of the adjustment, tighten the setscrew.<br>[Be sure to adjust the height of the intermediate presser according to the thickness of the material or the type of thread to be used so that the material does not flap during sewing. When sewing floppy material, adjust so that there is no clearance (clearance 0 mm).]<br>o After adjusting the height of the intermediate presser, be sure to check the position of the wiper (Refer to "STANDARD ADJUSTMENTS (9)").<br><br>(Caution)<br>**When needle threading switch ❷ is set to the position, the feeding frame and the intermediate presser will come down. When the switch is set to the position, the sewing machine will start rotating (the needle moves up and down). So, do not operate the needle threading switch with your hands or any other things placed under the feeding frame and the needle.** | o If the clearance is too great: Stitch skipping may occur.<br>o If the clearance is too small: Loose stitches may result. |

(5) **Feed bracket (Only S type)**

When the feeding frame is in its highest position, adjust so that the standard clearance of 22 mm (0.866") is provided between the feeding frame and the top surface of the throat plate. (Maximum clearance 25 mm (0.984")).

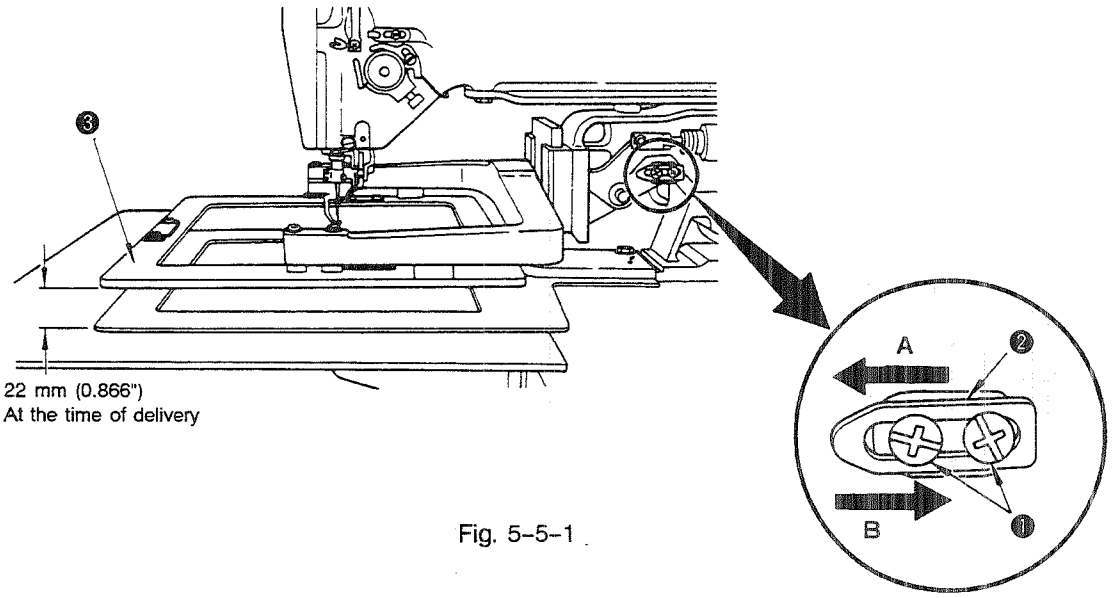



Fig. 5-5-1

(6) **Shuttle race spring**

Adjust the lateral position of the shuttle race spring so that the center of the needle is aligned with the center of groove width Ⓒ.

Adjust the longitudinal position of the shuttle race spring so that the rear end of the needle is aligned with corner point Ⓐ.

(Caution)

**If section Ⓑ is damaged, thread breakage or thread splitting might occur, or the thread might become dirty.**

**Be sure to buff both faces of section Ⓑ. Be sure to buff the back side of the spring with care.**

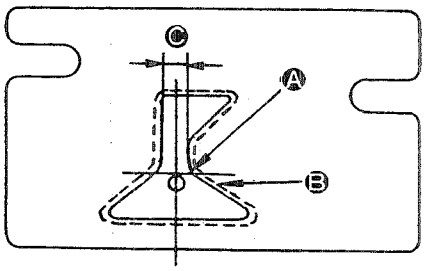
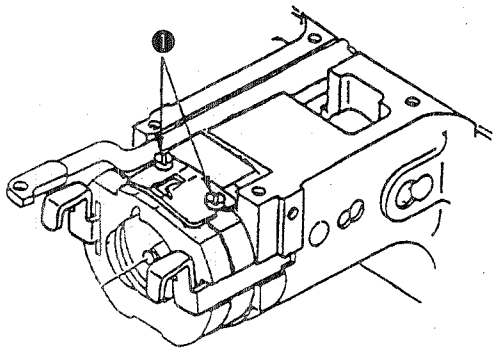



Fig. 5-6-1

(Caution)

**The shuttle race spring for the S type machine (for light-weight materials) or the H type machine (for medium-weight materials) is different from that for the G type machine (for heavy-weight materials) in terms of shape.**

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen stopper setscrews ❶ so that clamp stopper ❷ is set in the direction of arrow A. The lift of feeding frame ❸ will then be decreased. Move the clamp stopper in the direction of arrow B, and the lift of the feeding frame will be increased.<br>2) After making the adjustment, securely tighten stopper screws ❶.<br><br>(Caution)<br>**Stoppers ❷ are provided on both the left and right side, so be sure to adjust each stopper following the same procedure.** | o If the lift of the feeding frame is too small:<br>The material cannot be set easily.<br>o If the lift of the feeding frame is too great:<br>The correct positioning of the material will be difficult when you try to set the material. |
| o Remove the feeding frame, feed plate and throat plate. Then adjust the position of the shuttle race spring using screws ❶.<br><br>(Caution)<br>**The position of the shuttle race spring changes after adjusting the shuttle timing. So, be sure to perform the aforementioned adjustment whenever you have adjusted the shuttle timing (Standard adjustment 7).**<br><br>  <br><br>Fig. 5-6-2 | o Lateral or longitudinal dislocation will cause the needle thread to bite into the shuttle.<br>o If the shuttle race spring is located too deeply, the moving knife might not hook the needle thread.<br>o If the shuttle race spring is located excessively to the left, the moving knife might not hook the bobbin thread. |

(7) **Timing between the needle and the shuttle**

1) Needle bar timing
When the needle bar is ascending from its lowest dead point, the lower marker dot engraved on the needle bar meets the bottom end of the needle bar lower bushing. (Fig. 5-7-1)

2) Shuttle timing
Under the condition described in step 1) above, the center of the needle meets the blade point of the shuttle. (Fig. 5-7-2)

3) Clearance between the needle and the shuttle driver
Under the condition described in step 2) above, there will be no clearance between the needle and the shuttle driver when the end face of the shuttle driver shaft is aligned with side Ⓐ of the driver. (Fig. 5-7-2, Fig. 5-7-3)

4) Clearance between the needle and the blade point of the shuttle
Under the condition described in step 2) above, a 0.01 (0.0003") to 0.06 mm (0.002") clearance Ⓑ will be obtained between the needle and blade point of the shuttle. (Fig. 5-7-4)

5) Clearance between the needle and the shuttle race
The clearance between the side face of the needle and the shuttle race is a 7.5 (0.295") ± 0.2 mm (0.008") (when a #14 DP x 5 or DP x 17 needle is used). (Fig. 5-7-5)

6) Clearance between the shuttle and shuttle driver
The clearance between the shuttle and the shuttle driver is 0.5 (0.020") to 0.7 mm (0.028") (0.6 to 0.8 mm (0.024" to 0.031") for G type). (Fig. 5-7-2)

1) Needle bar timing

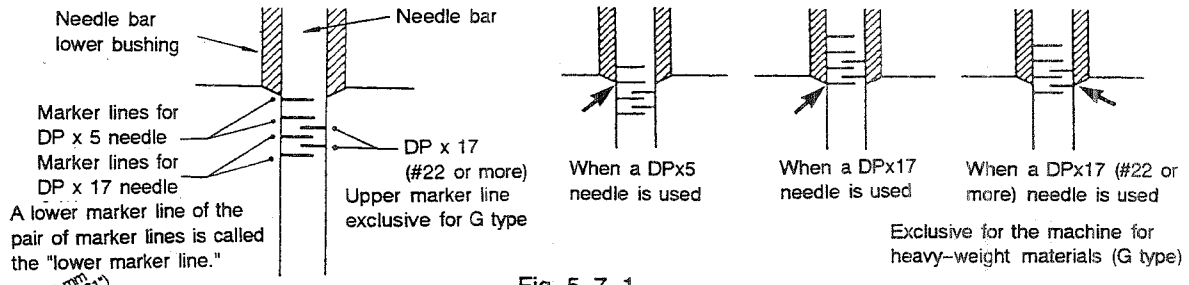
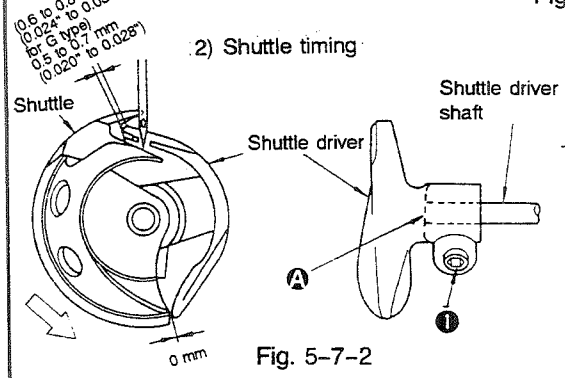



Fig. 5-7-1

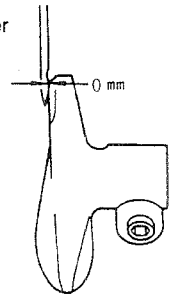



2) Shuttle timing




Fig. 5-7-2

3) Clearance between the needle and the shuttle driver



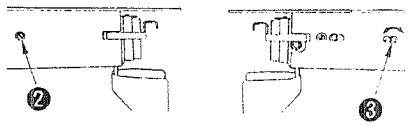




Fig. 5-7-3

4) Clearance between the needle and blade point of shuttle

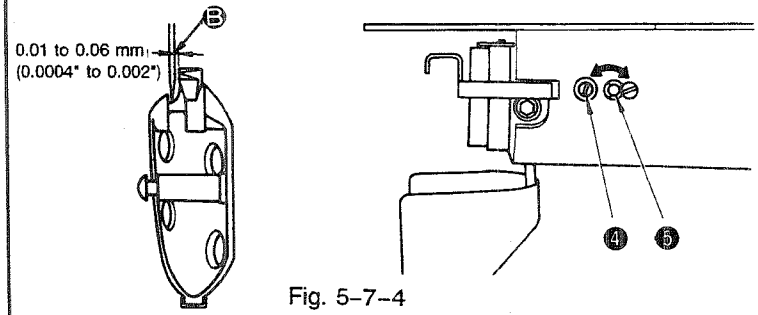



Fig. 5-7-4

5) Clearance between the needle and the shuttle race

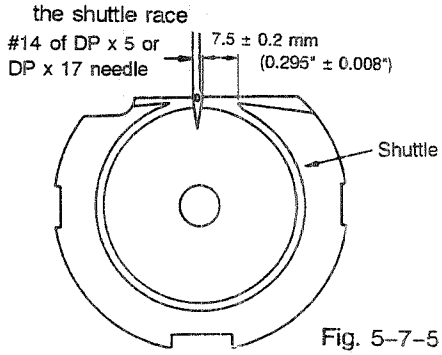
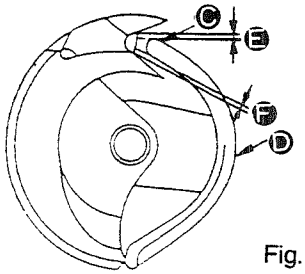



Fig. 5-7-5

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Align the lower marker line with the bottom end of the needle bar lower bushing referring to Fig. 5-7-1.<br>2) Loosen clamping screw ❶ in the driver. Adjust the direction of rotation of the shuttle (shuttle timing) and the longitudinal direction of the driver referring to Fig. 5-7-2.<br>(Caution)<br>**When adjusting the shuttle timing, be sure to turn the shuttle in the direction of the arrow ( ⇒ ) as shown in Fig. 5-7-2.**<br>3) Loosen lower bushing setscrew ❷, and turn lower bushing adjusting shaft ❸ to adjust so that there is no clearance between the needle and the front end of the shuttle driver. (Fig. 5-7-3)<br>After the adjustment, tighten screw ❷.<br>(Caution)<br>**If the needle needs to be replaced according to a change in the type of needle, be sure to adjust the clearance between the needle and the shuttle driver. Since there are bound to be bent or damaged needles, be sure to check the shuttle timing after a needle has been replaced.**<br>4) Loosen screw ❹ in the shuttle race, and adjust the clearance provided between the needle and the blade point of the shuttle by turning adjusting shaft ❺.<br>5) Loosen screw ❹ in the shuttle race, and adjust the clearance provided between the needle and the shuttle race.<br>Adjusting the clearance between the needle and the blade point of the shuttle as described in 4) will change the clearance between the needle and the shuttle race. So be careful.<br>[When sewing with a thin type of thread such as #50 or a greater count, be sure to adjust the clearance so that it is *7.0 (0.276") to 7.3 mm (0.287") after the standard adjustment of the position of the shuttle race spring has been completed.]<br>(Caution)<br>**1. Strike portion Ⓓ to adjust the clearance between the shuttle and the shuttle driver to 0.5 (0.020") to 0.7 mm (0.028") (0.6 to 0.8 mm for the G type) as shown in Fig. 5-7-2.**<br>**After making the adjustment, be sure that portion Ⓒ is positioned equidistantly (clearance Ⓔ and Ⓕ should be equal) and vertically with respect to the shuttle.**<br>**(For the G type, adjust so that an approximately 1 mm clearance is provided at section Ⓕ.)**<br>**2. Whenever you have adjusted the clearance between the needle and the blade point of the shuttle as described in 4) and the clearance between the needle and the shuttle race as described in 5), adjust the position of the shuttle race spring as described in "Standard adjustment (6)." (Note that the aforementioned case explained in the brackets [ ] is excluded.)** | 1), 2) For sewing floppy material, adjust the shuttle timing so that it is slightly later than the standard shuttle timing. On the other hand, for sewing heavy-weight material, adjust the shuttle timing so that it is slightly faster than the standard timing (to prevent stitch skipping.)<br>3) If the clearance is more than 0 mm, the needle will be bent by the blade point of the shuttle, resulting in scratches on the blade point of the shuttle and the needle.<br>On the other hand, if the needle has excessive contact with the shuttle driver, stitch skipping may occur.<br>4) If the clearance exceeds the specified range (0.01 (0.0004") to 0.06 mm (0.002")), stitch skipping may occur. If the clearance is inadequate, the needle will hit the blade point of the shuttle, causing scratches on the needle and the blade point of the shuttle. The scratches may cause the thread to break or split finely.<br>5) If the clearance is less than 7.5 mm (0.295"), poor needle thread spreading may result, often leading to the needle thread biting into the shuttle.<br>[When sewing with a thinner type of thread, such as #50 or a greater count, adjust the timing between the needle and the shuttle race so that it is 7.0 (0.276") to 7.3 mm (0.287") (the clearance marked with an asterisk *). Otherwise, the thread easily bite into the shuttle.]<br>o If the clearance between the shuttle driver and the shuttle exceeds the specified range (0.5 (0.020") to 0.7 mm (0.028")) (0.6 to 0.8 mm for the G type), the shuttle will produce loud noises. On the other hand, if the clearance is inadequate, the needle thread will fail to smoothly leave the shuttle resulting in an inadequately tensed stitch formation, when sewing with a thick thread.<br>  <br><br>Fig. 5-7-6 |

(8) **Height of the intermediate presser adjusting screw**
Adjust the distance between bottom end of the intermediate presser adjusting screw and the top of the nut of the intermediate presser adjusting screw to a value within the range of 0 to 11 mm (0" to 0.433") (0 to 29 mm (0" to 1.142") for the G type).

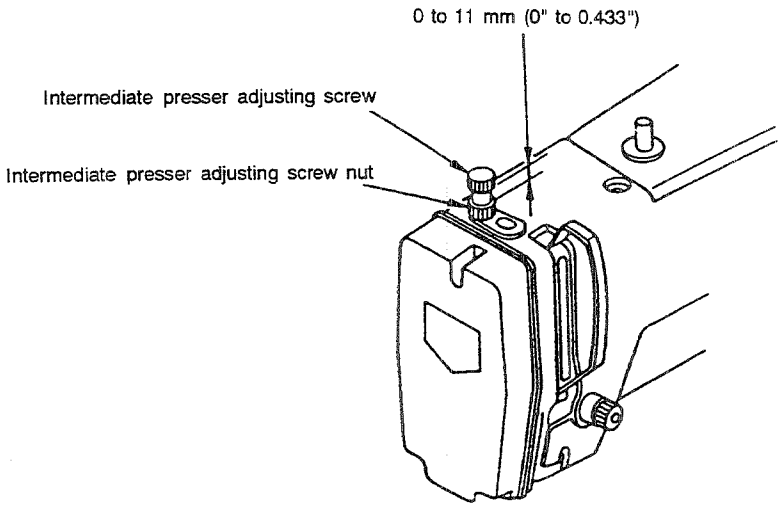



Fig. 5-8-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen the adjusting screw nut, and turn the adjusting screw to make the adjustment. After making the adjustment, securely tighten the adjusting nut. | o If the adjusting screw is excessively tightened:<br>The intermediate presser excessively presses the material at the overlapped section of the material. In this case, loose stitches may result.<br>o If the adjusting screw is inadequately tightened:<br>A functional failure of the intermediate presser mechanism may result.<br>When sewing a heavy-weight material, the needle may lift the material. In this case, stitch skipping or other sewing failures will result.<br><br>**(Caution)**<br>**Never adjust the sewing machine while the sewing machine is running. Doing so is very dangerous.** |

(9) **Position of the wiper**

1) With the sewing machine stopped with its needle up, confirm that the sewing indication LED (READY lamp) lights up, and set the Needle threading switch to the side. The clearance between the wiper and the needle and between the wiper and the intermediate presser should be 1 mm (0.039") or greater, when wiper ❶ passes the tip of the needle.

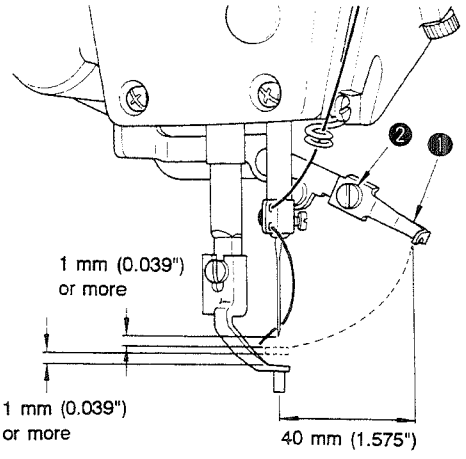
2) A 40 mm (1.575") distance should be obtained between the center of the needle and the end face of the wiper ❶ when wiper ❶ returns to its home position.

(Caution)

**The wiper can be used for material which is 3 mm (0.118") thick or less. If sewing a material thicker than 3 mm (0.118"), the wiper cannot pass between the needle and the intermediate presser. In this case, see "DIP SWITCH SW5-4" about switching SW5-4 to allow the wiper to pass under the intermediate presser.**

**(In this case, adjust the aforementioned clearance with the Needle threading switch held set to the position.)**

| | | |
|---|---|---|
| S, B, L types, etc. | The wiper passes between the intermediate presser and the tip of needle. (SW5-4 OFF) | A clearance of 1 mm should be provided between the wiper and the needle tip and between the wiper and the intermediate presser. (Fig. 5-9-1) |
| G type, etc. | The wiper passes between the intermediate presser and the sewing product. (SW5-4 ON) | A clearance of 1 mm or more should be provided between the wiper and the needle tip. (Fig. 5-9-2) |
| T type, etc. | When the intermediate presser is not used. (SW6-8 ON) | A clearance of 2 ± 1 mm (0.079" ± 0.039") should be provided between the wiper and the needle tip. (Fig. 5-9-2) |



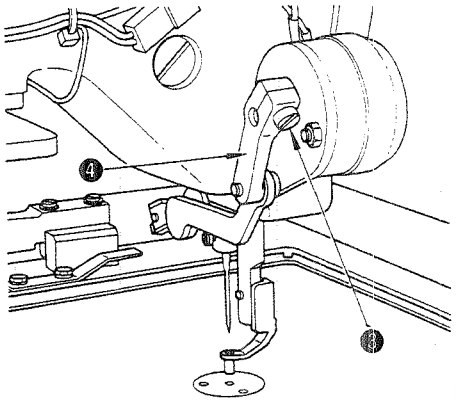
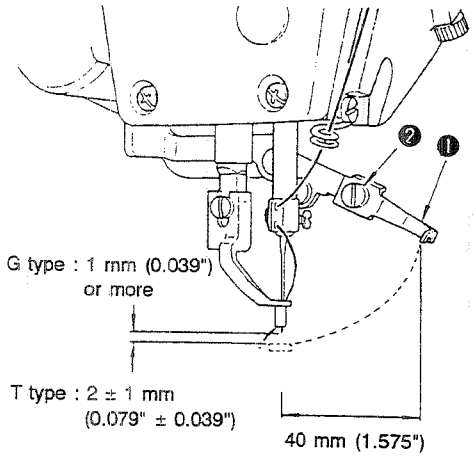




Fig. 5-9-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen setscrew ❷, and make the adjustment according to the procedure given on the left. After making the adjustment, securely tighten the setscrew.<br>2) Adjust the distance from the wiper to the center of the needle by loosening wiper setscrew ❸ so that the angle of attachment of wiper arm ❹ is appropriate.<br>  <br><br>Fig. 5-9-2 | o The top end of the wiper may come in contact with the needle or the intermediate presser preventing proper thread wiping.<br>If the machine is operated with the wiper kept in contact with the needle or the intermediate presser, the needle, intermediate presser, or the wiper might brake or become bent.<br>o If the tip of the needle is damaged (the tip of the needle is burred or the like), the needle may stick into the needle thread, and a stitching failure may result. |

(10) **Length of thread remaining on the needle**

The length of thread remaining on the needle after thread trimming is 35 (1.378") to 40 mm (1.575") measured from the needle eye.

For synthetic thread, the length of thread remaining on the needle should be increased.

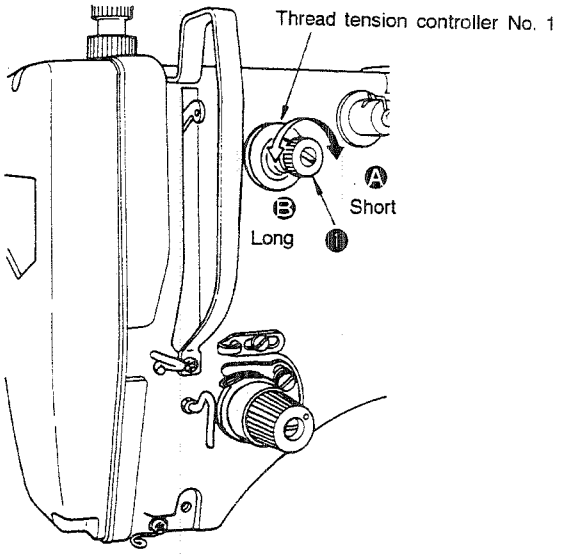



Fig. 5-10-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| Adjust tension controller No. 1.<br>o Turning it in direction Ⓐ decreases the length of thread remaining on the needle.<br>o Turning it in direction Ⓑ increases the length of thread remaining on the needle.<br><br>(Caution)<br>**If the tension release timing is delayed at the time of thread trimming, the thread remaining on the needle will be cut too short. Refer to "STANDARD ADJUSTMENTS (18)."**<br>**The thread remaining on the needle may also be cut too short, if the thread take-up spring does not work normally.**<br>**Refer to "RESULTS OF IMPROPER ADJUSTMENT (11)."** | o If the thread remaining on the needle is too short:<br>The thread may slip off the needle at the sewing start.<br>o If the thread remaining on the needle is too long:<br>The thread may appear on the right side of the material, or make the wrong side of the material look messy.<br>The thread may also bite into the shuttle at the sewing start. |

**(11) Thread take-up spring**

Stroke: Pull the needle thread in direction Ⓐ. Moving distance of the needle thread should be 12 (0.472") to 15 mm (0.591") from the start to the end position. (Fig. 5-11-2)

Tension: Adjust the tension according to the stitch formation. (Adjust the tension of the thread take-up spring by checking the result of the adjustment while sewing the workpiece actually set on the machine.)

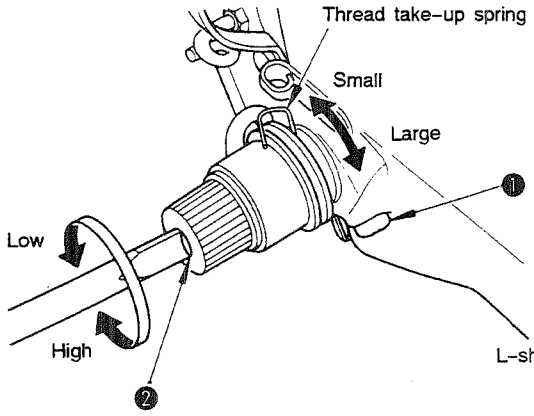



Fig. 5-11-1

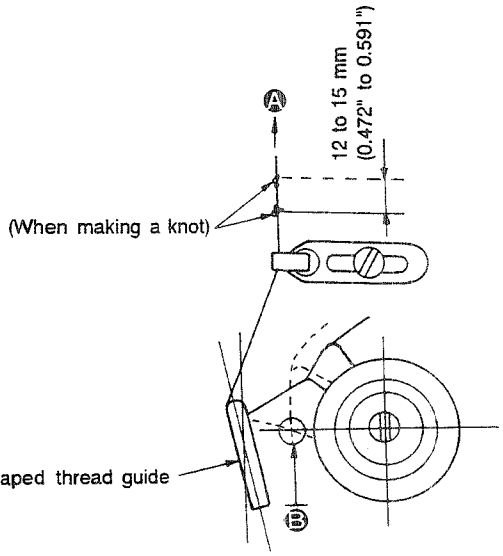



Fig. 5-11-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Adjusting the stroke<br>Loosen setscrew ❶, insert a screwdriver into tension controller No. 2 ❷, and turn it to adjust the stroke.<br>2) Adjusting the tension<br>Be sure that setscrew ❶ has been securely tightened. Insert a screwdriver into tension controller No. 2 ❷, and turn it to adjust the tension. (Fig. 5-11-1)<br><br>(Caution)<br>**When sewing with a thinner thread such as #50 or a greater count, adjust the stroke of the thread take-up spring so that it is 8 (0.315") to 10 mm (0.394").** | o If the stroke exceeds the specified range:<br>The thread remaining on the needle will be short, resulting in the thread slipping off the needle at the sewing start.<br>o If the stroke is inadequate:<br>Needle thread breakage may occur when sewing with a thin thread.<br><br>**(Caution)**<br>**1. If the thread take-up spring comes in contact with the L-shaped thread guide, the thread take-up spring will not return to the start position before thread trimming, and the thread remaining on the needle will be short. In this case, adjust the position of the L-shaped thread guide so that the thread take-up spring does not come in contact with the L-shaped thread guide at section Ⓔ. At this time, take care not to damage the thread path. (Fig. 5-11-2)**<br>**2. If the tension of the thread take-up spring is higher than that of the tension controller No. 2, the thread take-up spring will fail to operate, resulting in needle thread take-up failure.** |

(12) **Thread breakage detector**

1) The thread breakage detecting disk should be always in contact with the thread take-up spring in the absense of thread on the machine head.
(The slack of the thread take-up spring should be about 0.5 mm (0.020")).

2) The thread breakage detecting disk should not be in contact with any other metallic parts except the thread take-up spring.

(Caution)

1. **Whenever the stroke of the thread take-up spring has been changed, the thread breakage detecting disk must be readjusted.**
2. **As long as the thread breakage detector normally works, the sewing machine will stop after performing sewing by ten stitches if the needle thread breaks at the start of sewing, or by five stitches if the needle thread breaks during sewing. When the sewing machine stops because of thread breakage, error [9] will be shown on the display.**

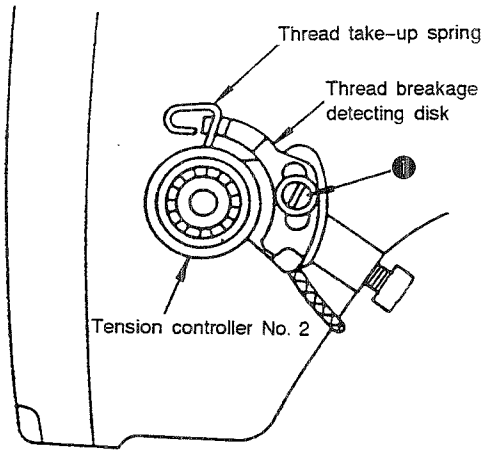



Fig. 5-12-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
| --- | --- |
| 1) Loosen setscrew ❶.<br>2) Move the thread breakage detecting disk adjustment as described at left. After adjustment, tighten the setscrew. | 1) If the thread breakage detecting disk is not in proper contact with the thread take-up spring, the sewing machine would fail to stop even when the thread breaks.<br>2) If the thread breakage detecting disk is falsely in contact with a metallic part other than the thread take-up spring, the sewing machine would stop immediately even when it is started. |

**(13) Moving knife and counter knife**

1) When the sewing machine is in a stop state with its needle up, the clearance between the thread spreading point of the moving knife and the edge of the needle hole is 3.5 mm (0.138") (5 mm (0.197") for the G type), provided play has been eliminated by pushing the thread trimming lever in the direction of the arrow.
2) The clearance between the counter knife and the needle hole guide is 0.8 mm (0.031") to 1 mm (0.039") (1.5 mm (0.059") for the G type).

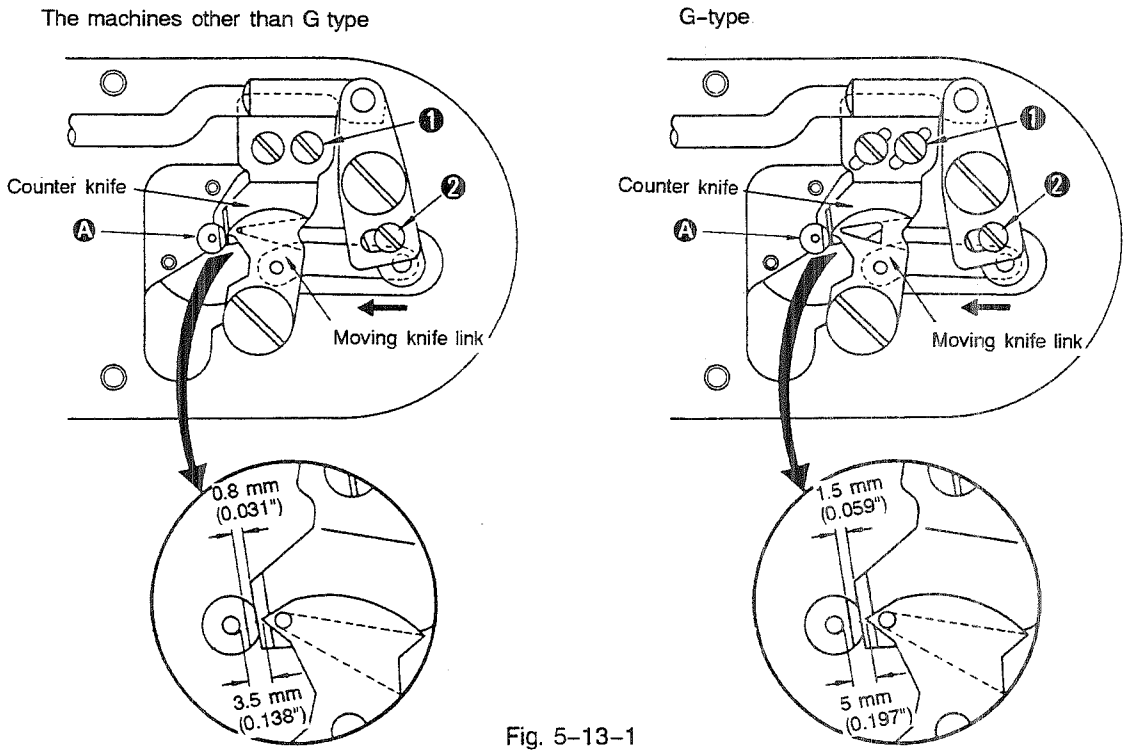



Fig. 5–13–1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Positioning the counter knife<br>Loosen two screws ❶ in the counter knife, and adjust the position of the counter knife.<br>2) Positioning the moving knife<br>Loosen screw ❷, and perform adjustment.<br>After adjustment, manually actuate the thread trimmer twice or three times to check for proper positioning.<br><br>(Caution)<br>**Be sure that the moving knife follows the correct path indicated by Ⓐ.** | o If the clearance between the counter knife and the needle hole guide is less than 0.8 mm (0.031") (1.5 mm (0.059") for the G type), the threads may be falsely trimmed by the blade point of the counter knife when they are pulled by the moving knife.<br>In this case the remaining length of the threads will be too short.<br>o If the clearance between the counter knife and the needle hole guide exceeds 1 mm (0.039"), longer thread may be left on the fabric after thread trimming, the thread trimmer may fail to trim the threads.<br>o If the clearance between the needle hole guide and the moving knife exceeds 3.5 mm (0.138") (5 mm (0.197") for the G type), unreliable thread spreading may result with consequent thread trimming failures.<br>o If the clearance between the needle hole guide and the moving knife is less than 3.5 mm (0.138") (5 mm (0.197") for the G type) thread trimming failures may result.<br>The needle thread may be caught on the end of the moving knife preventing the proper stitch formation.<br>The needle may hit the moving knife and may brake.<br>o The bobbin runs idling excessively. |

## (14) Height of the moving knife and the counter knife

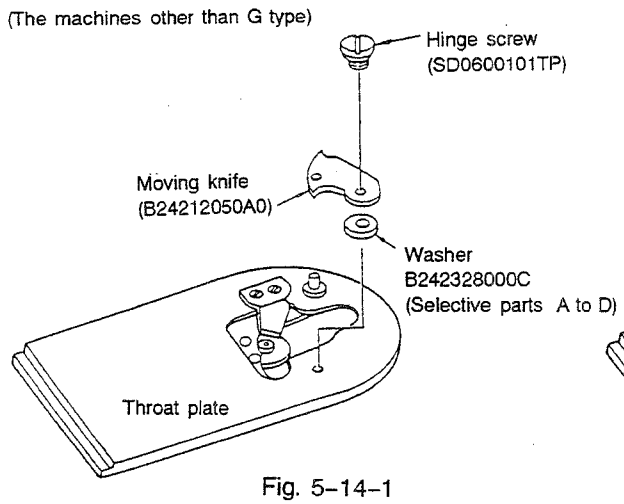



Fig. 5-14-1

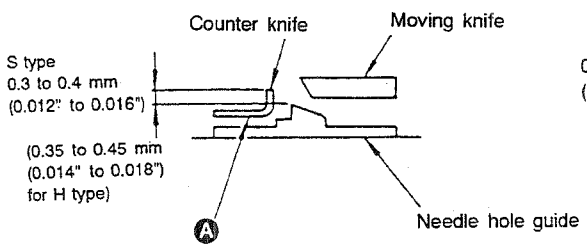



Fig. 5-14-2

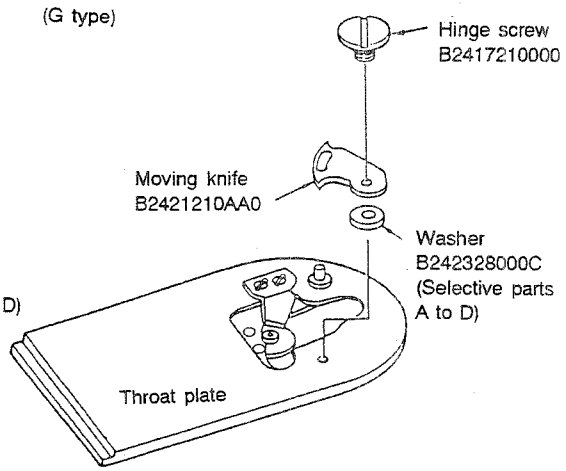



Fig. 5-14-3

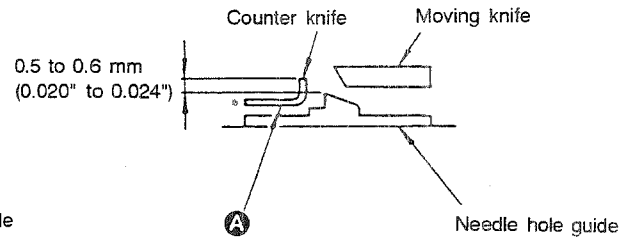



Fig. 5-14-4

**Parallelism of the counter knife blade point**

The counter knife blade should be parallel to the throat plate mounting surface in order to cut a pair of threads (needle and bobbin threads) evenly.

(The counter knife blade is parallel to the throat plate mounting surface. The difference in level between Ⓑ and Ⓒ is within 5/100.)

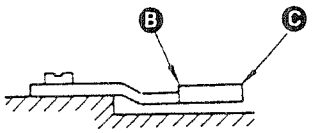



Fig. 5-14-5

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) After the trial thread trimming.<br>A. If the outer thread as observed from the moving knife pivot cannot be trimmed, replace the washer with a thicker one.<br>B. If the inner thread as observed from the moving knife pivot cannot be trimmed, replace the washer with a thinner one. | o Thread trimming failures may occur. |

| Part No. | Name of part | Thickness |
|---|---|---|
| B242328000A | Moving knife washer | 0.4 mm (0.016") |
| B242328000B | Moving knife washer | 0.5 mm (0.020") |
| B242328000C | Moving knife washer | 0.6 mm (0.024") |
| B242328000D | Moving knife washer | 0.7 mm (0.028") |

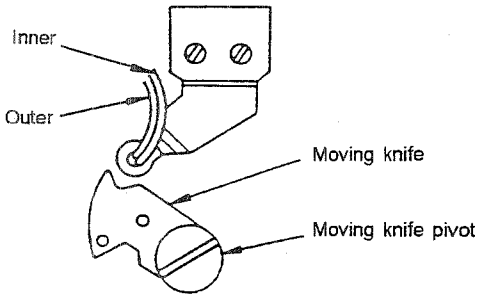



Fig. 5-14-6

| | |
|---|---|
| 2) If the above adjustment fails to correct the thread trimming failure:<br>A. If the difference in height between the needle hole guide and the blade of the counter knife is out of the specified value, adjust the difference in height properly by jarring section Ⓐ (in Fig. 5-14-2 and Fig. 5-14-4) with a screwdriver or the like. (At this time, be sure that the blade of the counter knife is in parallel to the throat plate mounting surface.)<br>B. If the angle of the counter knife blade illustrated below is larger than 90 degrees, cut the blade. | o If the difference in height between the needle hole guide and the counter knife blade exceeds the specified value, the needle thread and bobbin thread will be cut too short. Particularly when thin threads are used, the bobbin thread and needle thread will be likely to be cut short. |

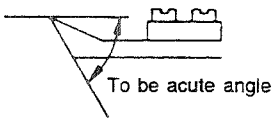



Fig. 5-14-7

3) If the corrective measures described in 1) and 2) above fails to correct the trouble, replace the moving knife or the counter knife.

**(15) Thread trimming cam**

1) When part Ⓐ of the cam follower is pushed down to maximize the clearance between the follower stopper and the cam follower, the clearance should be 0.2 mm (0.008"). (Fig.5-15-2)
2) The marker line on the thread trimming cam should be aligned with the marker dot on the main shaft with respect to the direction of rotation. (Fig. 5-15-1)
3) At the time of thread trimming, the thread trimming cam shaft moves in the direction of the arrow. Upon completion of the thread trimming and thread releasing, the thread trimmer clutch mechanism is released when the cam shaft goes beyond the highest dead point of the thread take-up, and the cam follower returns to the end face of the arm.

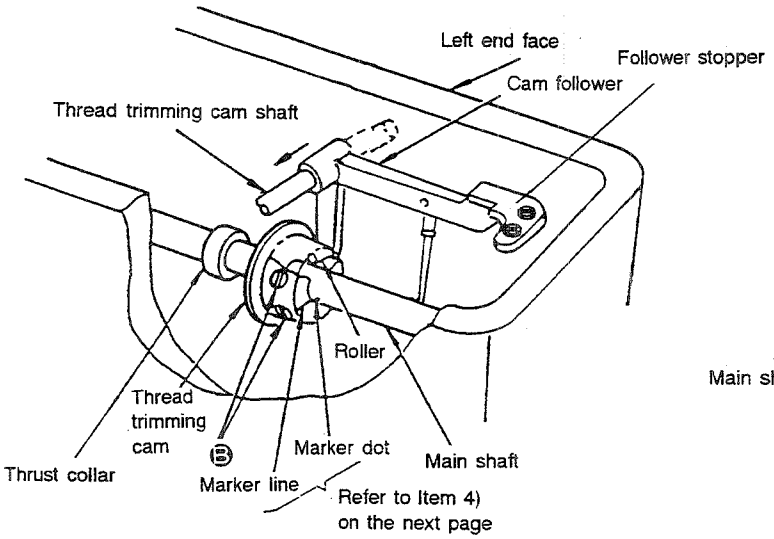



Fig. 5-15-1

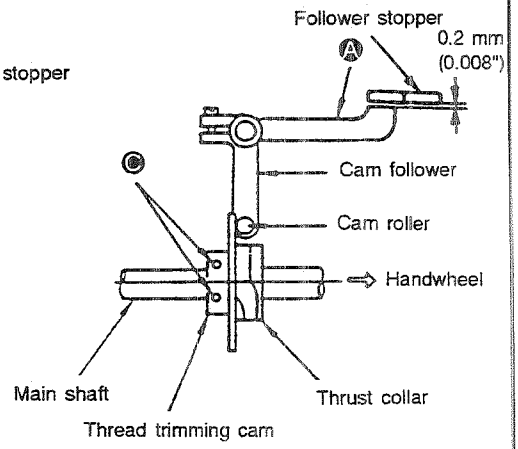



Fig. 5-15-2

**(16) Thread trimming mounting base**

1) When the cam follower is pushed inward (in the direction of the arrow ⇒), clearance Ⓐ between the edge of the thread trimming cam and the tension release shaft arm should be 0.8 (0.031") to 1.0 mm (0.039").
2) Clearance Ⓑ between the tension release arm driving shaft and the tension release arm should be 0.2 (0.008") to 0.3 mm (0.012").

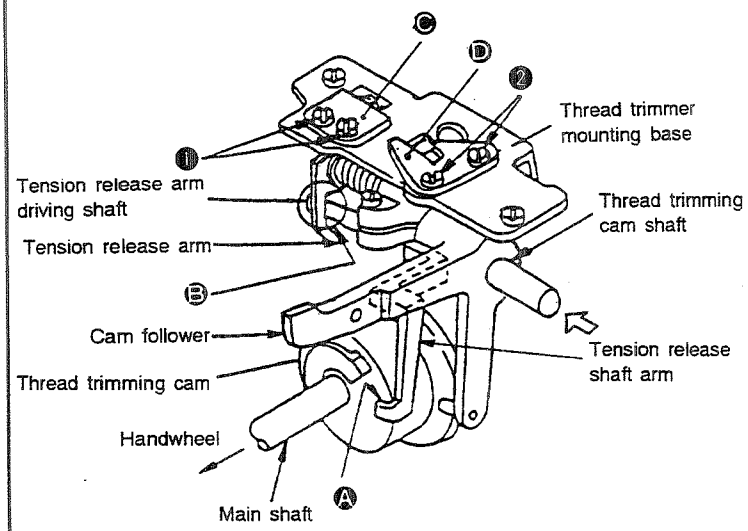
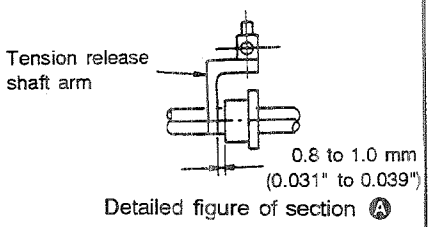
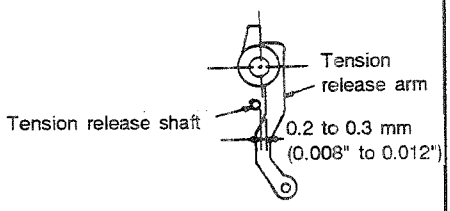


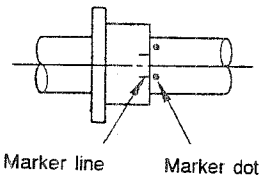
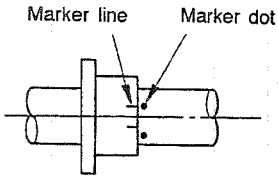

Fig. 5-16-1




Detailed figure of section Ⓐ




Detailed figure of section Ⓑ

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen setscrews Ⓑ and setscrews Ⓒ.<br>2) Insert a 0.2 mm (0.008") spacer between the follower stopper and the hook of the cam follower, and pull up portion Ⓐ of the cam follower so that the follower stopper, spacer, and the cam follower will come in close contact.<br>3) Press the thread trimming cam and the thrust collar against the cam follower roller in the direction of the handwheel. Screw the thrust collar onto the main shaft.<br>4) Align the marker line on the thread trimming cam with the marker dot on the main cam. Screw the thread trimming cam onto the main shaft while pressing the thread trimming cam against the thrust collar.<br><br>(For the machines other than G type)<br>  <br>Marker line Marker dot<br><br>(G type)<br>  <br>Marker line Marker dot | 1) Thread trimming failure may occur.<br>2) The machine may lock at the time of the start of thread trimming.<br>3) The thread cam shaft will fail to return to the start position in time, resulting in a loose stitch formation for the first stitch at the sewing start.<br><br>**(Caution)**<br>**If the machine locks, be sure to check the play of the main shaft with respect to the shaft direction, position or phase of the thread trimming cam. Also check the related parts.** |
| 1) Loosen setscrews ❷. Move plate Ⓓ, which retains the tension release shaft arm, forward or backward so that clearance Ⓐ between the edge of the thread trimming cam and the tension release shaft arm becomes 0.8 (0.031") to 1.0 mm (0.039"). After adjustment, securely tighten setscrews ❷.<br>2) Loosen setscrews ❶. Move stopper Ⓒ forward or backward so that clearance Ⓑ between the tension release arm driving shaft and the tension release arm becomes 0.2 (0.008") to 0.3 mm (0.012"). After adjustment, securely tighten setscrews ❶. | 1) At the time of thread trimming, the top end of the tension release shaft arm will come in contact with the end face of the thread trimming cam, and the thread trimming cam shaft will not be able to travel the normal stroke amount. As a result, a machine lock will occur.<br>2) After completion of thread trimming, the thread trimming cam shaft will fail to return. As a result, a machine lock will occur. |

(17) **Thread trimming magnet arm**

When the cam follower is actuated to move in the direction of the shaft by the rotation of the thread trimming arm (at the time of thread trimming), the clearance between the hook Ⓒ of the cam follower and the top end of the stopper should be 0.5 mm (0.020") or greater.

(Caution)

**When the machine is engaged in normal operation, side Ⓐ of the cam follower comes in close contact with side Ⓑ of the thread trimming magnet arm.**

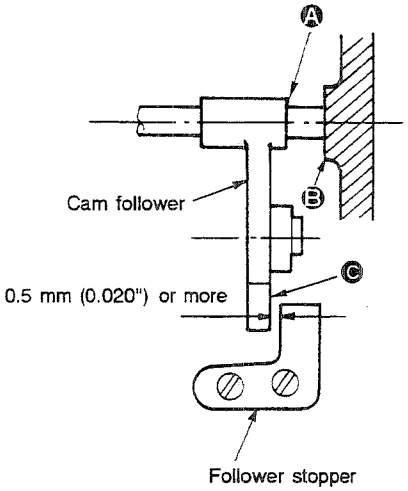



Fig. 5-17-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Appropriately position the thread trimming magnet arm on the thread trimming magnet arm shaft so that the specified clearance is obtained between the cam follower notch and the top end of the follower stopper.<br>o Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (46)" on how to make the adjustment. | o Since the thread trimming clutch mechanism is not completely released, thread trimming and tension release will be performed even when the main shaft rotates at high speed. As a result, damage, abrasion, loosening, or play in the corresponding parts may occur.<br>o Since the cam follower comes in contact with the follower stopper, the thread trimming mechanism will not work properly. As a result, a machine lock will occur. |

(18) **Tension release notch**

Closely fit the outside diameter of tension release notch setscrews ❶ to the left end (counterclockwise) of the long hole of the tension release notch, and fix the setscrew at that position. (Fig. 5-18-2)

(Caution)

**After making the adjustment, push the thread trimming cam shaft in the direction of the arrow ( ⇒ ) (Fig. 5-16-1) so that the thread trimming clutch mechanism is actuated, and turn the handwheel in the normal direction of rotation by hand. At this time, make sure that the tension release shaft arm is disengaged from the tension release notch, the cam follower returns to the end face of the arm, and the thread tension disk of tension controller No. 2 closes after the handwheel has gone beyond the highest dead point of the thread take-up.**

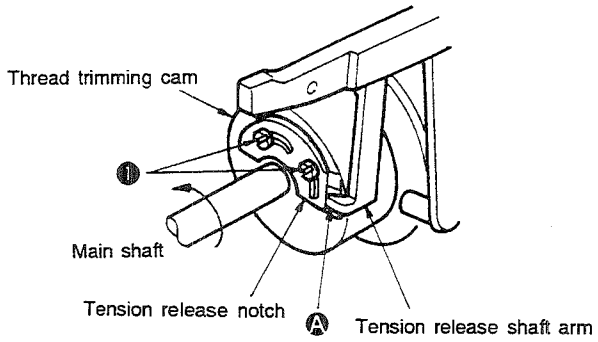



Fig. 5-18-1

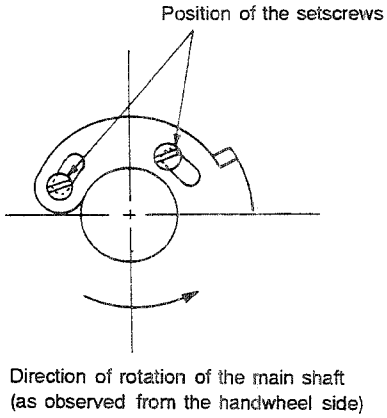



Fig. 5-18-2

(19) **Amount of release of the tension disks**

Press the cam follower in the direction of the arrow ( ⇒ ) (Fig. 5-16-1), and turn the handwheel in the normal direction of rotation by hand. When the tension release shaft arm rides on stepped section Ⓐ of the tension release notch (Fig. 5-18-1), the amount of release of the tension disks of tension controller No. 2 should be 0.6 (0.024") to 0.8 mm (0.031") (0.8 to 1.0 mm (0.031" to 0.039") for the G type). (Fig. 5-19-1)

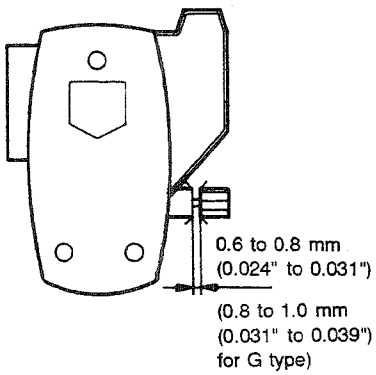



Fig. 5-19-1

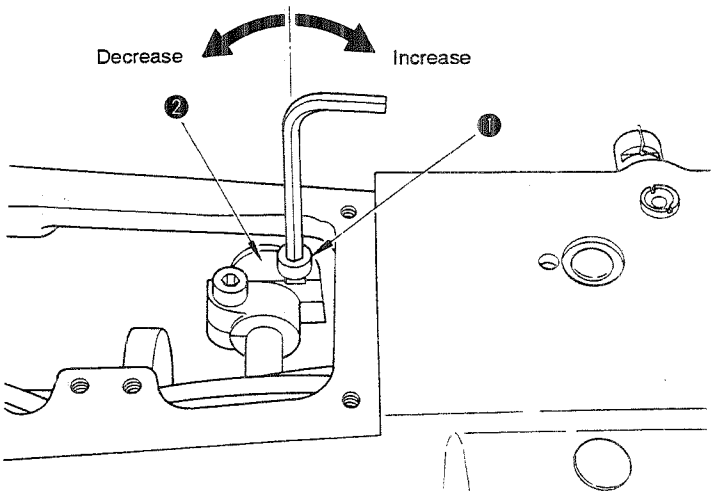



Fig. 5-19-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen screws ❶ in the tension release notch, and adjust the tension release notch. After the adjustment, securely fix the tension release notch by tightening screws ❶. | o The length of thread remaining on the needle after thread trimming will be too short and inconsistent.<br>o The thread may slip out from the needle eye at the sewing start. |
| o Loosen clamping screw ❶ in the tension controller arm, and adjust the rising amount of the tension disk by moving tension controller arm ❷. (Fig. 5-19-2)<br><br>(Caution)<br>o **After making the adjustment, turn the handwheel by hand to check that the thread tension disks keep opening until the thread take-up reaches its highest dead point and the disks are completely closed. (The tension disks open at the highest dead point.)**<br>o **If the tension disks close at the time of needle threading or actuating the machine, be sure to open the disks by sewing the desired pattern to actuate the thread trimming, or by pressing the thread trimming cam shaft in the direction of the arrow ( ⇒ ) (Fig. 5-16-1) to turn the handwheel in the normal direction of rotation and start the thread trimming clutch mechanism working so that the main shaft is brought to the upper resting position.** | o The length of thread remaining on the needle after thread trimming will be too short and inconsistent.<br>o A loose stitch formation may result. |

(20) **Intermediate presser** (The adjustments of the intermediate presser should be made after the operation air pressure has been decreased to 0 kg/cm$^2$).

1) After confirming that the READY lamp lights up, turn the [Needle threading switch] ON and OFF several times, and check that the intermediate presser moves smoothly up and down.

- o The clearance between the intermediate presser adjusting screw and the intermediate presser adjusting screw nut is 0 to 11 mm (0" to 0.433") (0 to 29 mm (0" to 1.142") for the G type). (Fig. 5-20-1)
- o The intermediate presser bar projects 19 (0.748") ± 0.2 mm (0.008") (2 ± 0.2 mm (0.079" ± 0.008") for the G type) from the top of the intermediate presser bracket. (Fig. 5-20-2)
- o The needle should enter the center of the hole in the intermediate presser. (Fig. 5-20-3)
- o The air flow adjustment of speed controller (B) mounted on the intermediate presser cylinder has been appropriately made. (Refer to the "STANDARD ADJUSTMENTS (41)")
- o The operating air pressure has been adjusted to 5 to 5.5 kg/cm$^2$ using the air regulator. (Refer to the "STANDARD ADJUSTMENTS (41).")

2) The marker dot on the main shaft is aligned with the marker line on the intermediate presser cam. (Fig. 5-20-4)

3) The clearance between the end face of the intermediate presser cam and the end face of the intermediate presser rod is 1 mm (0.039") with respect to the direction of the arrow after play has been eliminated. (Fig. 5-20-5)

4) When the intermediate presser is in the lowest position of its stroke, the clearance between the bottom face of the intermediate presser and the top face of the intermediate presser bar lower bushing is 3 (0.118") ± 0.2 mm (0.008").
Additionally, positioning pin ❹ keeps in contact with the top end of positioning link ❸ while the intermediate presser is actuated. (Fig. 5-20-5, Fig. 5-20-8)

**(Caution)**

**After making the adjustment, turn the handwheel by hand, and make sure that the adjustment has been done properly.**

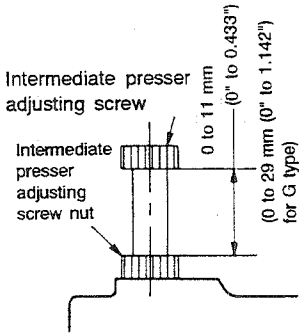



Fig. 5-20-1

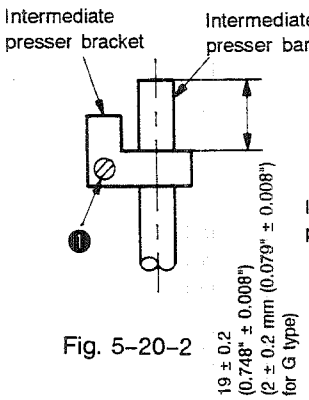



Fig. 5-20-2

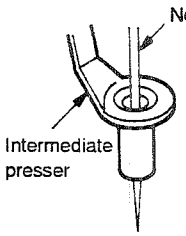



Fig. 5-20-3

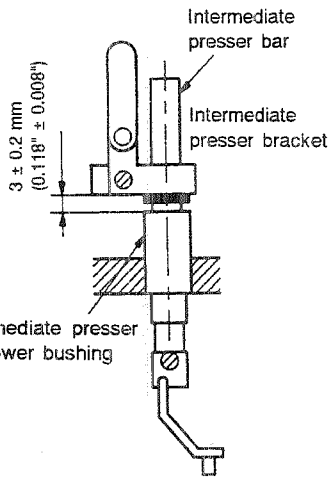



Fig. 5-20-6

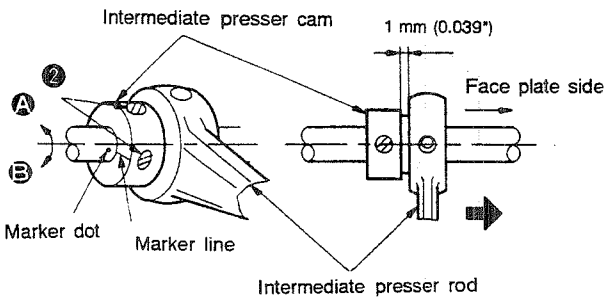



Fig. 5-20-4 Fig. 5-20-5

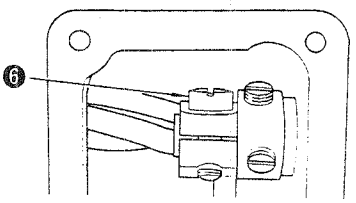
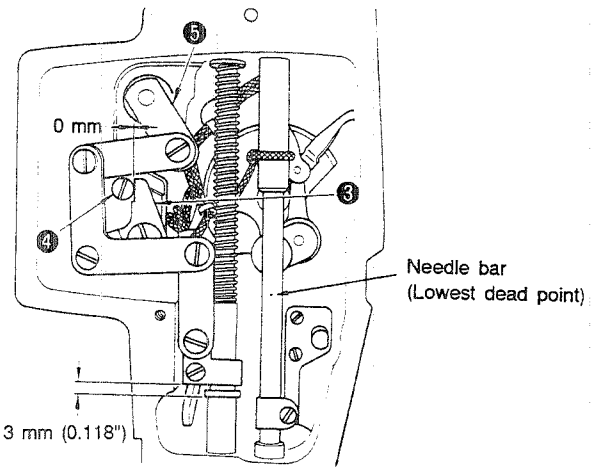



Fig. 5-20-7

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Adjust so that the clearance between the intermediate presser adjusting screw and the intermediate presser adjusting screw nut is 0 to 11 mm (0" to 0.433") (0 to 29 mm (0" to 1.142") for G type). (Fig. 5-20-1)<br>o Loosen setscrew ❶, and adjust so that the intermediate presser bar projects 19 (0.748") ± 0.2 mm (0.008") (2 ± 0.2 mm (0.079" ± 0.008") for G type) from the top end of the intermediate presser bracket (Fig. 5-20-2), and the needle enters the center of the hole of the intermediate presser. After making the adjustment, securely tighten setscrew ❶. (Fig. 5-20-3)<br>2) Loosen screws ❷ in the intermediate presser cam, and align the marker dot on the main shaft with the marker line on the intermediate presser cam.<br>Then tighten screws ❷ in the intermediate presser cam. [At the time of delivery, the marker dot is aligned with the marker line and the intermediate presser reaches the lowest position of its stroke at the time when the needle bar reaches the lowest position of its stroke. Move the marker line in direction Ⓐ, and the intermediate presser will reach the lowest position of its stroke earlier than the needle bar will reach its lowest position. On the other hand, move the marker line in direction Ⓑ, and the intermediate presser will reach the lowest position of its stroke later than the needle bar. By making this adjustment, the optimum timing can be obtained in accordance with the type of material to be sewn. (Fig. 5-20-4)]<br>3) When performing aforementioned adjustment 2), also adjust a clearance of 1 mm (0.039") is provided between the end face of the intermediate presser cam and the end face of the intermediate presser rod.<br>4) Bring the needle bar to its lowest dead point and loosen screw ❻ in the intermediate presser rod arm (Fig. 5-20-7). Now, adjust the above-stated clearance by moving the intermediate presser oscillating shaft ❺ with positioning link ❸ pressed against positioning pin ❹. (Fig. 5-20-8)<br>  <br><br>Fig. 5-20-8 | 1) The chamfered section on the top of the intermediate presser bar will enter the intermediate presser bar lower bushing when the intermediate presser is ascending.<br>This may result in oil leakage.<br>o The needle may fail to enter the center of the hole of the intermediate presser. As a result, a loose stitch formation will occur, or the needle will come in contact with the intermediate presser.<br>2) If the timing when the intermediate presser reaches the lowest dead point of its stroke is much earlier than the timing when the needle bar reaches the lowest dead point of its stroke, stitch skipping may occur.<br>On the other hand, if the timing when the intermediate presser reaches the lowest dead point is much later than the timing when the needle bar reaches the lowest dead point of its stroke, loose stitches may be formed or the intermediate presser may be caught in the overlapping sections of the material.<br>3) The intermediate presser cam may be pushed against the intermediate presser rod and the load torque may fluctuate when the main shaft rotates in the normal direction.<br>4) Abnormal noise may occur during machine operation.<br><br>**(Caution)**<br>**Abnormal noise will be produced especially when intermediate presser positioning link ❸ does not adequately come in contact with positioning pin ❹. If the machine is left to operate in this condition, the corresponding parts might break.**<br>**The specified vertical stroke will not be obtained. (Refer to the "STANDARD ADJUSTMENTS (21).")** |

(21) **Vertical stroke of the intermediate presser**

1) The center of connecting shaft nut ❶ of the intermediate presser rod aligns with marker dot Ⓒ. At this time, the vertical stroke of the intermediate presser is 4 mm (0.157") (at the time of delivery).
If the vertical stroke of the intermediate presser varies within the range from 3 (0.118") to 7 mm (0.276"), the center of connecting shaft nut ❶ of the intermediate presser rod should be positioned as shown in the table below, or aligned with the marker dot.

| Alignment point | Vertical stroke of the intermediate presser (mm) |
|---|---|
| Furthest point in direction Ⓓ | 7 (0.276") |
| Marker dot Ⓐ | 6 (0.235") |
| Marker dot Ⓑ | 5 (0.197") |
| Furthest point in direction Ⓔ | 3 (0.118") |

**(Caution)**
**If the vertical stroke of the intermediate presser is changed:**
**Be sure to check the position of the wiper (refer to the "STANDARD ADJUSTMENTS (9)"). If the wiper has become improperly positioned, be sure to readjust its position.**

(Fig. 5-21-1)

2) If the vertical stroke of the intermediate presser is set to 0 mm (the intermediate presser is fixed in the lowest position):
Connecting shaft nut ❶ of the intermediate presser rod should be fixed in the lowest position providing a 0.5 mm (0.020") clearance between intermediate presser positioning link ❻ and positioning pin ❼ in the highest dead point of the needle bar. (Fig. 5-21-2)

3) If the vertical stroke of the intermediate presser is set to return from 0 mm to 3 (0.118") to 7 mm (0.276"):
Refer to the "STANDARD ADJUSTMENTS (20)-4)."

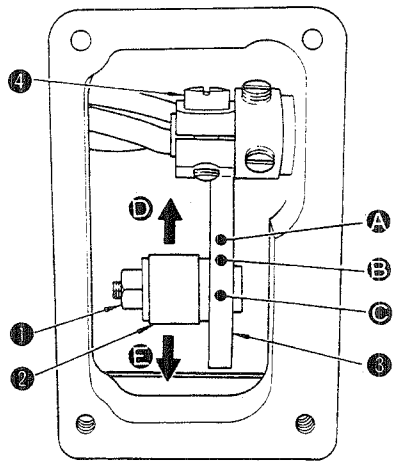



Fig. 5-21-1

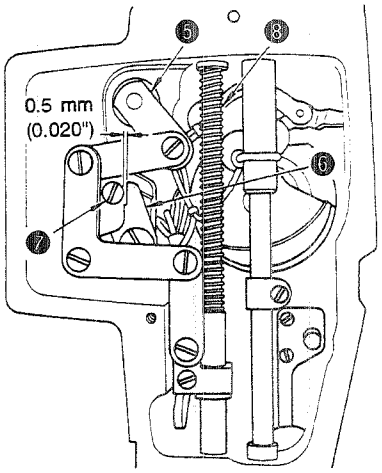



Fig. 5-21-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen connecting shaft nut ❶ of the intermediate presser rod and move intermediate presser rod ❷ in the direction of arrow Ⓓ to increase the stroke. Move the rod in the direction of arrow Ⓔ to decrease the stroke.<br>The standard vertical stroke of the intermediate presser is Ⓒ 4 mm (0.157").<br>Use marker dots Ⓐ, Ⓑ and Ⓒ as the standard points to make the adjustment. A 6 mm (0.236") stroke is obtained when the center of the connecting shaft nut ❶ of the intermediate presser rod aligns with marker dot Ⓐ. A 5 mm (0.197") stroke is obtained when the center of the connecting shaft nut of the intermediate presser rod aligns with marker dot Ⓑ. A 4 mm (0.157") stroke is obtained when the center of the connecting shaft nut of the intermediate presser rod aligns with marker dot Ⓒ.<br>2) Fix connecting shaft nut ❶ of the intermediate presser rod in the lowest position of the intermediate vertical stroke.<br>Bring the needle bar to its highest dead point.<br>Loosen setscrew ❹, and move intermediate presser oscillating shaft ❺ so that a 0.5 mm (0.020") clearance is obtained between intermediate presser positioning link ❻ and positioning pin ❼.<br>Securely tighten setscrew ❹.<br>**(Caution)**<br>**Make sure that intermediate presser positioning link ❻ does not come in contact with positioning pin ❼, and the intermediate presser oscillating shaft ❺ does not come in contact with intermediate presser spring ❽, when the handwheel is turned by hand to rotate the main shaft. If the machine operates under the condition that the link hits against the pin and the shaft hits against the spring, breakage of the corresponding parts may result. (Fig. 5-21-1, Fig. 5-21-2)**<br>3) Refer to the "STANDARD ADJUSTMENTS (20)-4)." | 1) The specified vertical stroke of the intermediate presser will not be obtained.<br>[In order to override the overlapping section of the material, the vertical stroke of the intermediate presser should be made greater. In this case, be sure to remember that floppy material cannot be easily fed if the vertical stroke is too great, resulting in stitch skipping.]<br>2) The 0 mm vertical stroke of the intermediate presser will not be obtained.<br>3) Refer to the "STANDARD ADJUSTMENTS (20)-4." |

(22) **The intermediate presser lifting stroke**

① Adjusting the S type of sewing machine (for light-weight materials)
When the intermediate presser cylinder retracts most, the center of ϕ5 hole of intermediate cylinder knuckle ❶ is spaced 113 (4.449") ± 0.2 mm (0.008") from the center of hole in intermediate presser cylinder ❷.
At the time, the intermediate presser lifting stroke is 20 mm (0.787") (at the time of delivery). (Fig. 5-22-1)

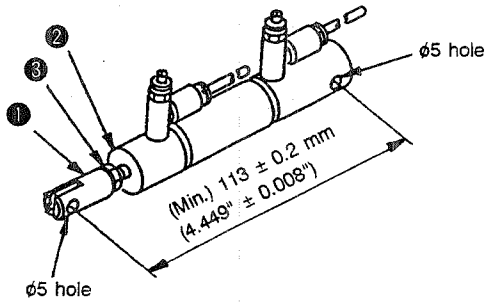



Fig. 5–22–1

② Adjusting the H type of sewing machine (for medium-weight materials) and the G type of sewing machine (for heavy-weight materials)
When the intermediate presser cylinder retracts most, the center of ϕ5 hole of intermediate cylinder knuckle ❶ is spaced 130.5 ± 0.2 mm (5.138" ± 0.008") from the center of hole in intermediate presser cylinder ❷.
At this time, the intermediate presser lifting stroke is 20 mm (0.787") (at the time of delivery) (Fig. 5-22-2)

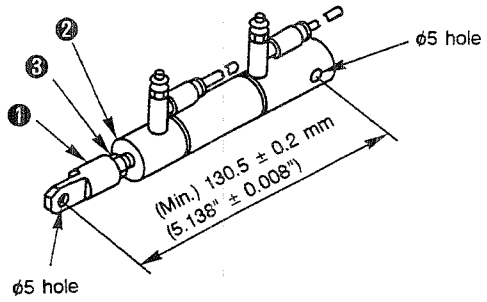
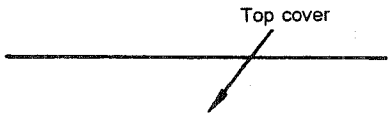



Fig. 5–22–2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen nut ❸ in the shaft of intermediate presser cylinder ❷. Screw in intermediate presser cylinder knuckle ❶ toward the shaft to adjust the hole-to-hole distance. After making the adjustment, securely tighten nut ❸ and intermediate cylinder knuckle ❶. (Fig. 5-22-1) (Fig. 5-22-2) | o When the distance exceeds 113 (4.449") ± 0.2 mm (0.008") (130.5 ± 0.2 mm (5.138" ± 0.008") for the H and G types of sewing machine): The intermediate presser lifting stroke is less than 20 mm (0.787").<br>o When the distance is less than 113 (4.449") ± 0.2 mm (0.008") (130.5 ± 0.2 mm (5.138" ± 0.008") for the H type of sewing machine): The intermediate presser will fail to be lifted. The round cornered section in the top end of the intermediate presser bar may enter the intermediate presser bar lower bushing while the intermediate presser goes up, resulting in an oil leak. |

**(23) Bobbin winding**

The bobbin holder should release the bobbin when the bobbin has been wound 80% full.



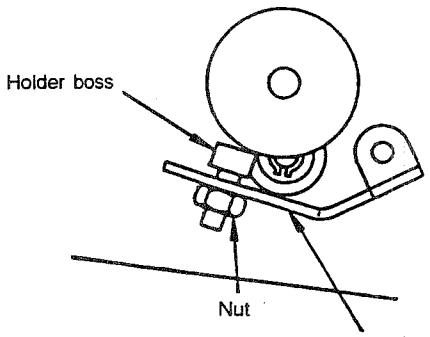




Fig. 5-23-1

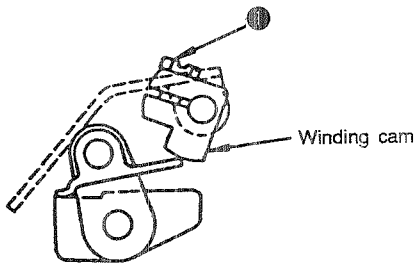



Fig. 5-23-2

**(24) Bobbin winder driving wheel**

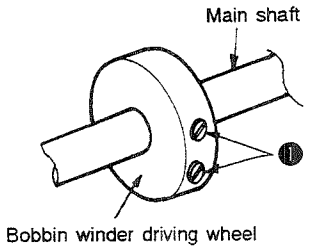



Fig. 5-24-1

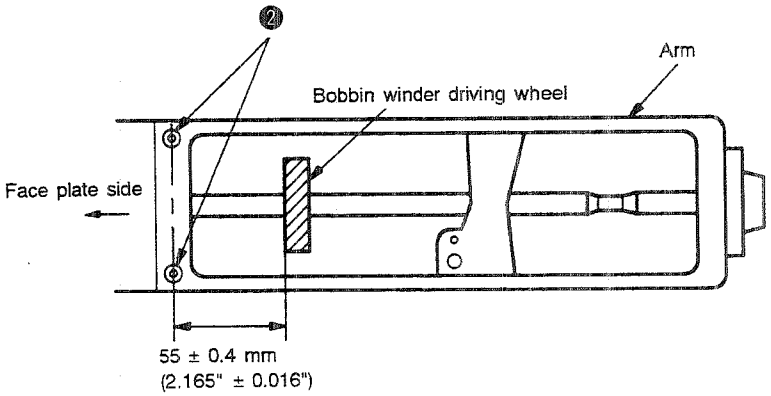



Fig. 5-24-2

**(25) Height of the throat plate auxiliary cover**

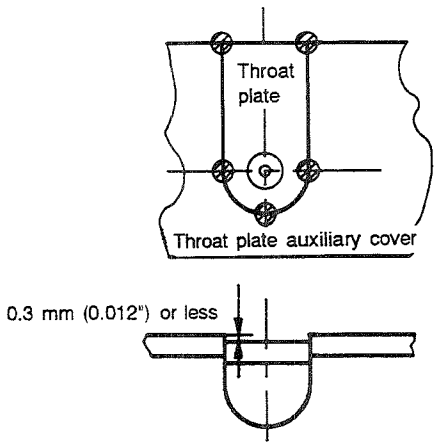



Fig. 5-25-1

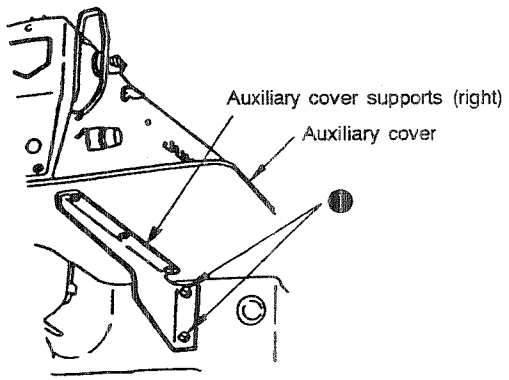



Fig. 5-25-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen the bobbin holder boss nut. Turn the bobbin holder so that it releases the bobbin when the bobbin has been wound 80% full. After making the adjustment, tighten the nut.<br>2) If the above adjustment does not work, loosen setscrew ❶ at the rear of the top cover, and adjust the angle of the bobbin holder. After making the adjustment, tighten setscrew ❶. | o An improper amount of thread will be wound on the bobbin. |
| o Loosen setscrews ❶, and adjust so that a 55 (2.165") ± 0.4 mm (0.016") distance is obtained from the end face of the bobbin winder driving wheel and the center of the top face of cover attaching taps ❷. Then tighten the setscrews so that the bobbin winder driving wheel is fixed at that position. (Fig. 5-24-1, Fig. 5-24-2) | o The bobbin may fail to spin or the bobbin holder (Fig. 5-23-1) may fail to actuate, even if the bobbin is set on the bobbin winder.<br>o The bobbin keeps on rotating after the bobbin has been fully wound. |
| o Loosen four setscrews ❶ (two setscrews in both the left and right) of the throat plate auxiliary cover supports, and adjust so that the throat plate auxiliary cover is positioned higher than the throat plate by 0.3 mm (0.012") or less. The tighten the setscrews.<br>At this time, be careful to adjust the points marked by the black dots ( ▨ ) (Fig. 5-25-1). (Fig. 5-25-1, Fig. 5-25-2) | o The feed plate will be caught by the stepped parts formed by the throat plate and the throat plate auxiliary cover, resulting in a deformed pattern.<br>o The feed plate may bend. |

(26) **Height of the work clamp foot slider bracket**

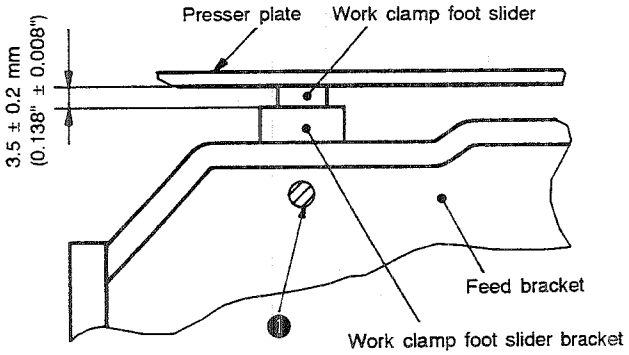



Fig. 5-26-1

(27) **Holding force of the feeding frame ball catcher**

The feeding frame support shaft is released from the feeding frame ball catcher when the feeding frame support bearing is pressed in the direction of the arrow with 3.5 to 4.0 kgf load. (Fig. 5-27-1)

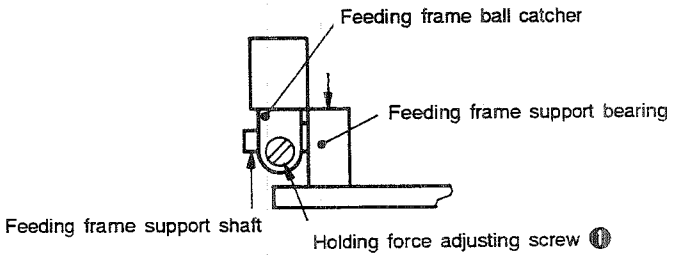



Fig. 5-27-1

(28) **Vertical stroke of the work clamp foot**

When the shaft of the work clamp foot cylinder retracts most, the distance from the center of the ϕ5 hole of the work clamp foot cylinder to the center of the ϕ5 hole of the cylinder knuckle should be 94 (3.701") ± 0.5 mm (0.020"). (Fig. 5-28-1)

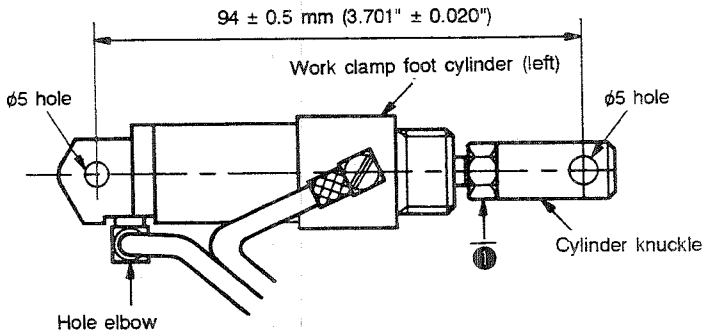



Fig. 5-28-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen setscrew ❶, and adjust so that a 3.5 (0.138") ± 0.2 mm (0.008") clearance is obtained between the presser plate and the work clamp foot slider bracket by turning the work clamp foot slider bracket using a wrench. Then tighten setscrew ❶. | o If the clearance provided between the presser plate and the work clamp slider bracket is larger than 3.5 mm (0.138"), an excessive load will be applied to the feed. As a result, the finished shape of the sewing pattern will be deformed.<br>o If the clearance provided between the presser plate and the work clamp slider bracket is smaller than 3.5 mm (0.138"), the feed will excessively vibrate. As a result, the finished shape of the sewing pattern will be deformed. |
| o Adjust the holding force using holding force adjusting screw ❶.<br>Turn holding force adjusting screw ❶ clockwise, and the holding force will be increased. Turn the screw in the reverse direction, and the holding force will be decreased. Be sure to adjust the holding force of the two feeding frame ball catchers mounted one each on both the right and left side. | o If the holding force is too strong: The feeding frame cannot be installed or removed.<br>o If the holding force is inadequate: When the work clamp foot goes up at the sewing end, the feeding frame may drop. The pattern may be deformed. |
| o Loosen nut ❶ in the work clamp cylinder shaft, and adjust the screw-in depth of the cylinder knuckle with respect to the shaft to 94 ± 0.5 mm (3.701" ± 0.020"). After adjustment, be sure to securely fix the cylinder knuckle using nut ❶. Equally adjust the two cylinders mounted one each on the left and right. | o If the distance exceeds 94 (3.701") ± 0.5 mm (0.020"): The feeding frame may fail to go up as high as 25 mm (0.984").<br>o If the distance is less than 94 (3.701") ± 0.5 mm (0.020"): The feeding frame may fail to come down to the lowest position to its stroke. As a result, the workpiece may slip from the correct position since it may not be held securely. The feed will excessively vibrates, and the finished shape of the sewing pattern will be deformed. |

**(29) Feed bracket auxiliary cover and travelling cover (B)**

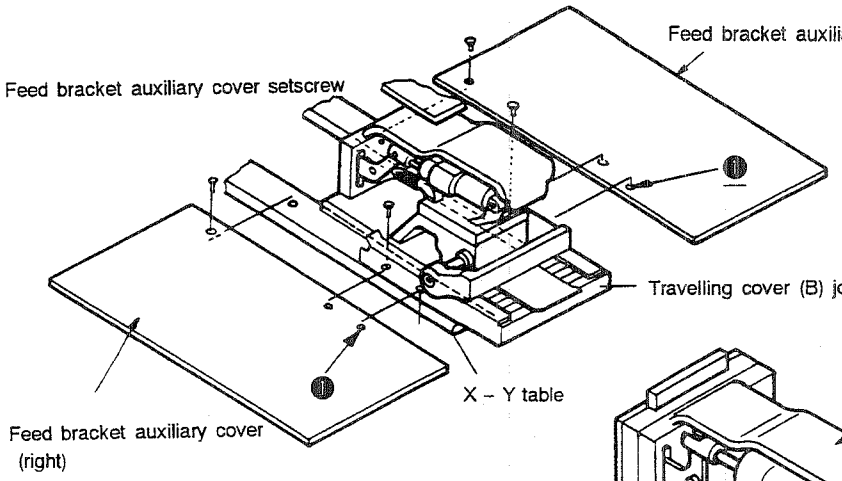



Fig. 5-29-1

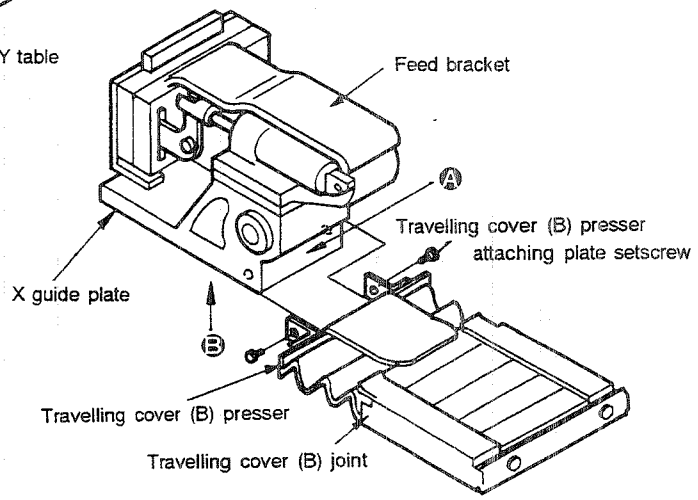



Fig. 5-29-2

**(30) X guide shaft support**

When the feed bracket is moved laterally by hand, no fluctuation of the load is observed and both ends of the X guide shaft support should not move up and down.

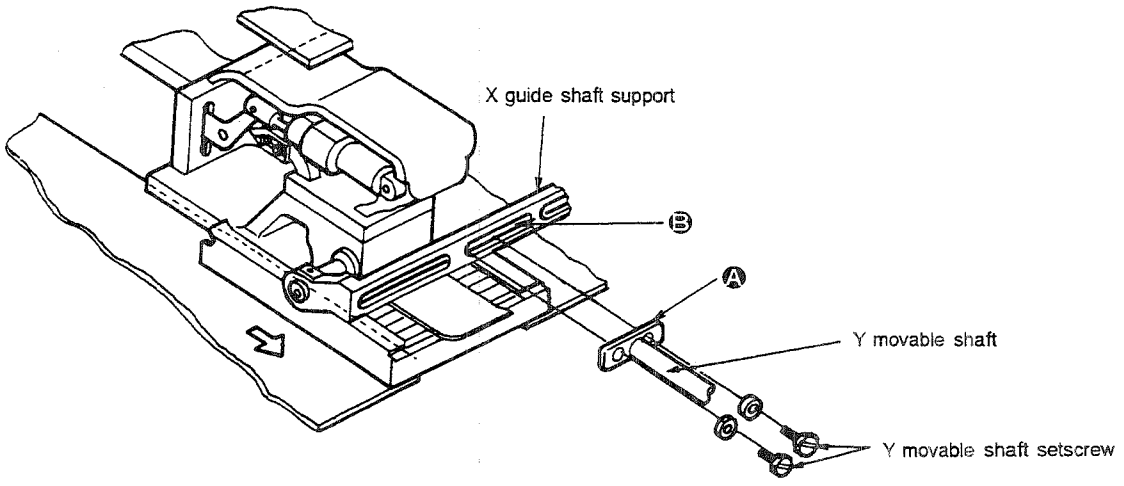



Fig. 5-30-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Insert the feed bracket auxiliary cover (left and right) between the X-Y table and the travelling cover (B) joint, and align the embossment on the underside of the travelling cover (B) joint with gimlet holes ❶.<br>o Tighten the feed bracket auxiliary cover setscrews. Two of the setscrews are used to fix the travelling cover (B) joint.<br>(Caution)<br>**At this time, as the travelling cover (B) presser is not fixed, the presser may come in contact with the draw spring the travelling cover (A) on the underside of the travelling cover (B) joint, resulting in an excessive pull on the spring. So take sufficient care not to stretch the spring. Furthermore, after making the adjustment, move the feed bracket back and forth to make sure that there is no excessive contact between the feed bracket auxiliary cover and the throat plate auxiliary cover and travelling cover (A). (Fig. 5-29-1, Fig. 5-29-2, Fig. 5-53-1)**<br>o Closely press the travelling cover (B) presser against face Ⓐ, and fix travelling cover (B) presser on the X guide plate using the presser attaching plate setscrew.<br>At this time, be sure to the cover (B) with the travelling cover (B) presser pressed in direction Ⓑ. (Fig. 5-29-1, Fig. 5-29-2) | o The corresponding parts may become damaged.<br>o If the covers are pushed against with each other, an excessive load will be applied to the feed. As a result, the finished shape of the sewing pattern will be deformed. |
| o Move the feed bracket toward the handwheel (in the direction of the arrow ( ⇒ )) by hand until it will go no further.<br>o Loosen the Y movable shaft setscrews so that side Ⓐ of the Y movable comes in full contact with side Ⓑ of the X guide shaft support. Then tighten the Y movable shaft setscrews. | o The pattern may be deformed. |

**(31) X-direction feed belt tension**

Move the feed bracket fully to the leftmost travel end. Adjust so that the X feed belt slacks by 0.5 mm (0.02") when a load of 500 g is applied to the middle (shown by the arrow ( ⇐ )) of the right-hand side belt. Then re-adjust so that the belt slacks by 1.6 to 1.8 mm (0.063" to 0.071") when a load of 500 g is applied to the same position.

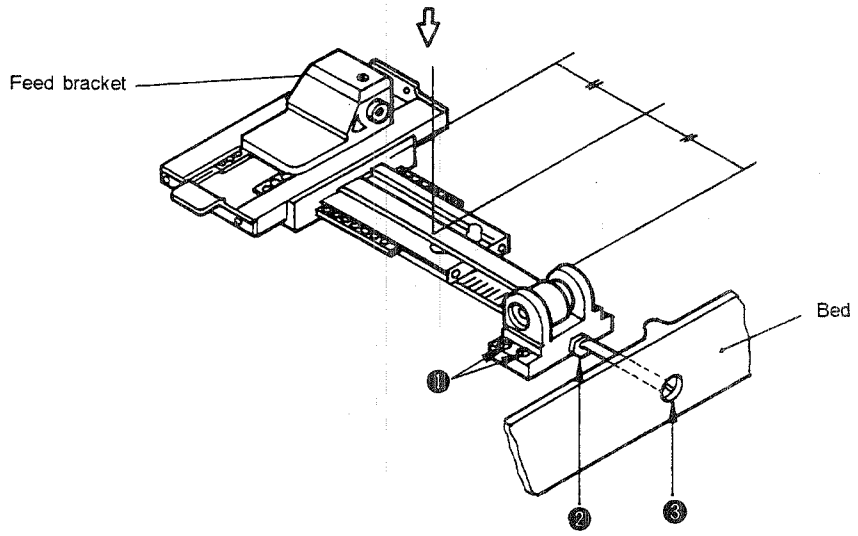



Fig. 5-31-1

**(32) Y motor mounting base**

Adjust so that face Ⓑ of the bottom end of the Y motor mounting base (asm.) comes in contact with face Ⓐ of the top end of the Y motor base stopper. Then fix the Y motor mounting base (asm.) at that position.

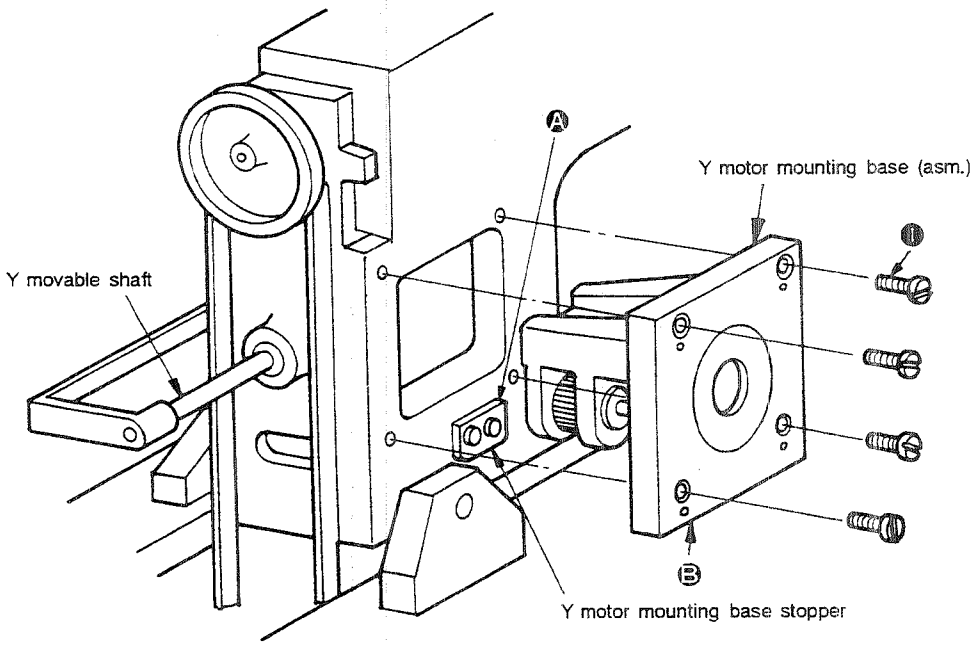



Fig. 5-32-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen screws ❶ and nut ❷. Turn tension adjusting screw ❸ to adjust the belt tension. Tighten screws ❶ and nut ❷.<br><br>(Caution)<br>**Tightening screws ❶ will affect the belt tension, so check the belt slack again after tightening screw ❶. (Fig. 5-31-1)** | o If the amount of slack of the belt is smaller than 1.6 to 1.8 mm (0.063" to 0.071") (the belt tension is too high), the belt may break.<br>o If the amount of slack of the belt is larger than 1.6 to 1.8 mm (0.063" to 0.071") (the belt tension is too low), the feed will excessively vibrate. As a result, the finished shape of the sewing pattern will be deformed. |
| o Loosen Y motor mounting base setscrews ❶, and adjust the position of the Y motor mounting base referring to the "STANDARD ADJUSTMENTS (32)." After making the adjustment, securely tighten setscrews ❶.<br><br>(Caution)<br>**The Y motor mounting base stopper which is used as the standard for adjusting the position of the Y motor mounting base (asm.) requires the exclusive jig when it is adjusted. The setscrew of the stopper is therefore coated with oil-resistant white paint to show that the adjustment has been completed.**<br>**With respect to normal maintenance work, it is not necessary to adjust the stopper. Never loosen the setscrew of the Y motor mounting base stopper.**<br><br>[If the position of the Y motor mounting base stopper has been changed, adjust the vertical position of the Y motor mounting base (asm.) so that the moving load torque (max. static load) of the single Y movable shaft is 2 to 2.5 kgf. Then check the position of the Y motor mounting base referring to the "STANDARD ADJUSTMENTS (32)." If the position of the base has been appropriately adjusted, fix the base at that position.] | o A loud noise will be produced along with the feed in the Y-direction. The pattern may be deformed, or the corresponding parts may become damaged. |

**(33)-1 Fine adjustment of the X/Y origins**

A. Adjusting the origins

1) Remove the needle.

2) Set the origin gauge within the feeding frame with section Ⓑ of the origin gauge (set the ϕ1 drilled hole on the handwheel side for reference) closely pressed to section Ⓐ of the feeding frame. Then press the blank plastic stopper on to section Ⓒ of the origin gauge. Tighten setscrews ⓫. (Fig. 5-33-1)

3) Remove five setscrews ❺, loosen the three setscrews ❻ of control box cover ❹, and remove control box cover ❹. Set rotary DIP switch (SW2) ❼ on the I/F circuit board mounted on the right side from you to 5 on the scale. (Fig. 5-33-2)

4) Turn ON the [power switch], and press the [feeding frame switch] to let the feeding frame come down. Then attach the needle.

5) Press the [start switch]. Only the feed mechanism will be actuated to find the origin. When the origin is found, the feed mechanism will be stopped.

**(Caution)**

**After the origin has been found, the feeding frame will not go up. The feeding frame will go up and come down only when the feeding frame switch is depressed. (Note that the origin gauge will come in contact with the needle if the feeding frame goes up with the needle attached. Be sure to bring the feeding frame to its highest position after the needle has been removed. Before adjusting the X/Y travel limit, first remove the needle beforehand.)**

6) Turn the handwheel by hand until the needle bar reaches the lowest position of its stroke. At this time, the needle point is positioned above the ϕ1 drilled hole for the origin of the origin gauge.

**(Caution)**

**Once the origin adjustment has been completed, turn OFF the [power switch], and set rotary DIP switch (SW2) ❼ to 0 (the switch has been factory-set to 0) on the scale. (Fig. 5-33-2)**

B. Adjusting the X/Y travel limit

1) Follow the procedure described in step 1) through 5) of A.

2) Press jog keys [4 ◀] and [6 ▶] on the operation panel to move the feeding frame to the right or left so that the needle point stops on the X travel limit of the origin gauge. (± 1.5 mm (0.059")) (Error indication [4] will be shown.) (Fig. 5-33-1, Fig. 5-33-3)

3) Move the needle point back to within the X travel limit.

4) Press jog keys [8 ▲] and [2 ▼] on the operation panel to move the feeding frame forward and backward so that the needle point stops on the Y travel limit of the origin gauge. (± 1.5 mm (0.059")) (Error indication [4] will be shown.) (Fig. 5-33-1, Fig. 5-33-3)

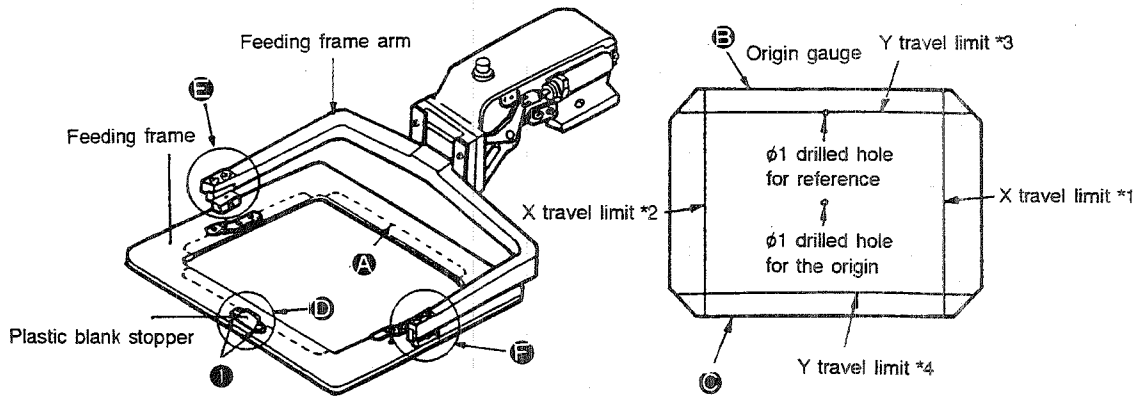
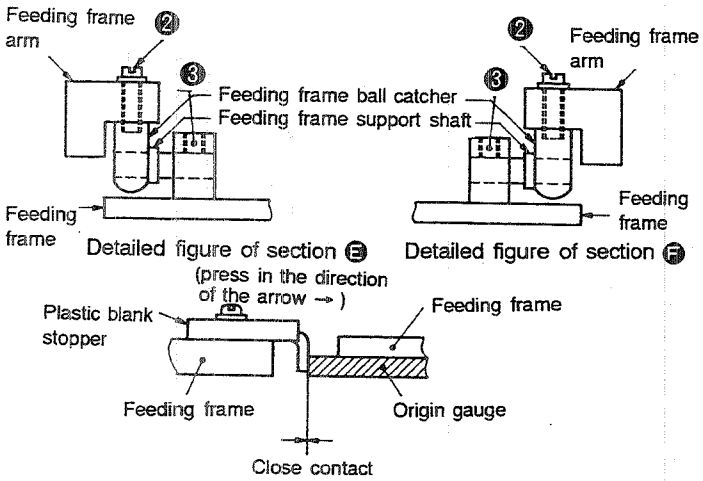



Fig. 5-33-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen setscrews ❷ and ❸ to move the feeding frame ball catcher and feeding frame support shaft to the left or right, and adjust so that the needle point is positioned above the ϕ1 drilled hole for the origin of the origin gauge. At this time, make sure that there is not play between the feeding frame ball catcher and the feeding frame support shaft.<br>[If the needle point fails to be positioned above the ϕ1 drilled hole for the origin of the origin gauge or above the X travel limit after the above-mentioned adjustments have been completed, adjust the origin sensor and the X/Y travel limit sensor according to the following "STANDARD ADJUSTMENTS (33)-2)."] | o Whenever a new feeding frame is used or the feeding frame ball catcher is removed once and re-attached, finely adjust the origin.<br>If the origin is not properly adjusted, the plastic blank work clamp (plate) which has been previously used cannot be used any longer since it will interfere with the needle.<br>o If several units of the same type of AMS-220C are used, a common plastic blank work clamp (plate) may not be used. |



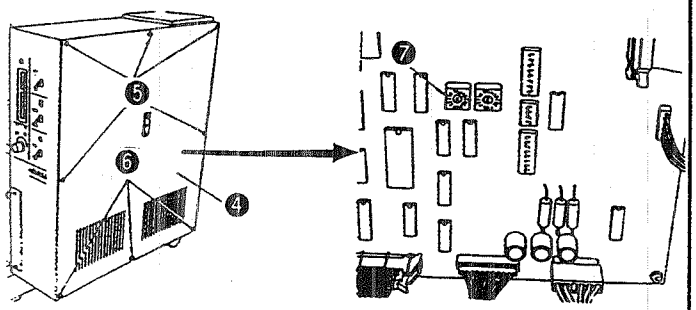
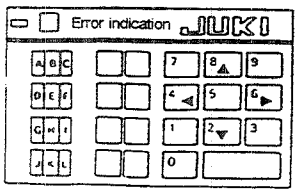




Fig. 5-33-2




Operation panel

- The positions of the X/Y origin and the X/Y travel limit sensor will be shown on the display of the operation panel as illustrated in Fig. 5-33-3.

- X-direction
  - D: Travel limit *2
  - E: Origin
  - F: Travel limit *1
- Y-direction
  - D: Travel limit *4
  - E: Origin
  - F: Travel limit *3

Fig. 5-33-3

**(33)-2 X/Y origins and travel limit sensors**

1) Remove the needle.
2) Remove setscrews ❶ and the feeding frame arm.
3) Attach the sensor adjusting gauge taking the position of the feeding frame arm guide pin as reference.
   (The related dimensions for the sensor adjusting gauge are shown in Fig. 5-33-5.)
4) Check the positions of origin and the X/Y travel limit referring to the "STANDARD ADJUSTMENTS (33)-1 Fine adjustment of the X/Y origin". (See Fig. 5-33-5)

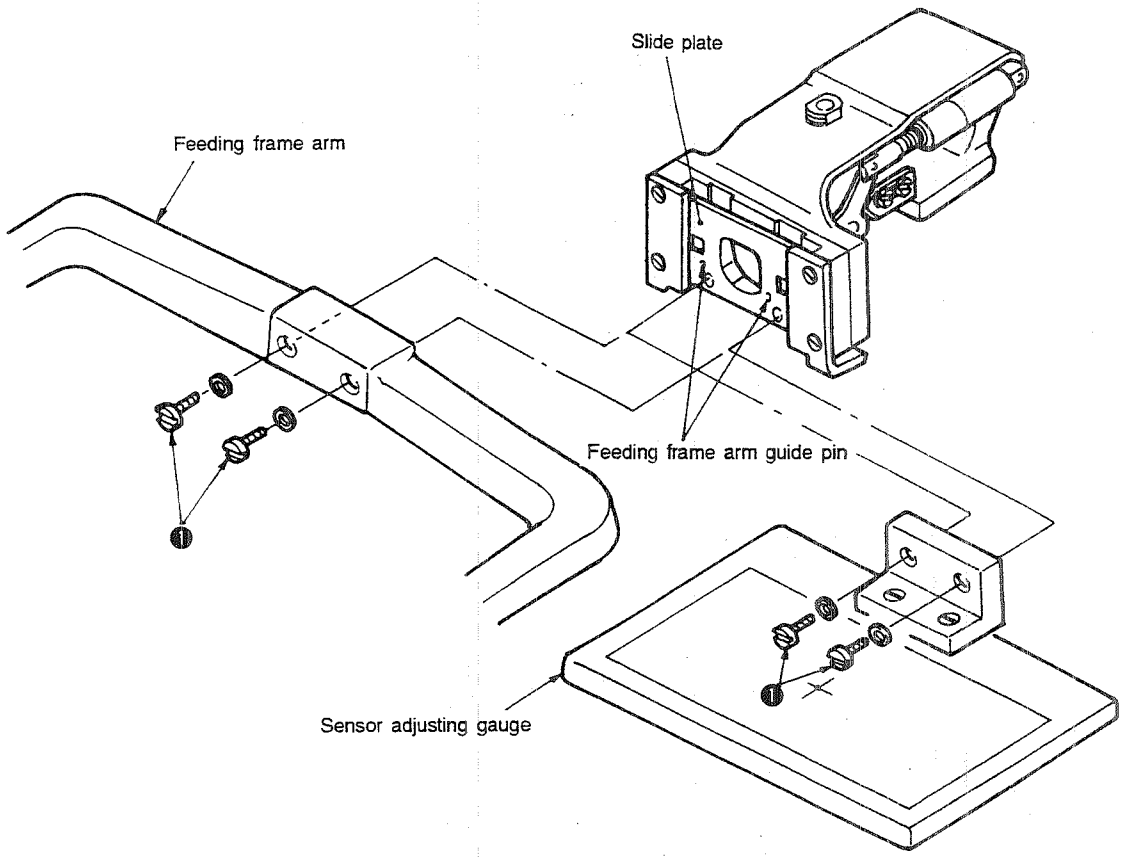



Fig. 5-33-4

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| A. Adjusting the X-axis origin and travel limit sensor<br>1) Remove the feed bracket auxiliary covers (left and right), and travelling cover (B). (Fig. 5-29-1, Fig. 5-29-2)<br>2) Make the adjustments described in steps 1), 3) and 4) of the "STANDARD ADJUSTMENT (33)-1, A."<br>3) Press jog keys [4 ◀] [6 ▶] [8 ▲] and [2 ▼] on the operation panel to move the feeding frame. Align the needle point with the ϕ0.5 drilled hole for origin of the origin gauge. (Fig. 5-33-5)<br>4) Loosen setscrews ❷, and move X sensor attaching plate (A) asm. to the left or right until display (E) showing the X origin changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❷. (Fig. 5-33-6, Fig. 5-33-3)<br>5) Press jog key [6 ▶] on the operation panel to move the feeding frame so that the needle point aligns with marker line V of travel limit *1. (Fig. 5-33-3, Fig. 5-33-5)<br>6) Loosen setscrews ❸ and move X sensor attaching plate (B) asm. to the left or right until display (F) showing travel limit *1 changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❸. (Fig. 5-33-3, Fig. 5-33-6)<br>7) Press jog key [4 ◀] on the operation panel to move the feeding frame until display (D) showing travel limit *2 changes from 1 to 0. Immediately after the display has changed, stop the feeding frame. (Fig. 5-33-3)<br>8) Turn the handwheel by hand to bring down the needle bar to the lowest position, and check that the gap between the needle point and marker line V on travel limit *2 is 1.5 mm (0.059") or less.<br>If the gap exceeds the specified range, adjust the position of the sensor for X-axis travel limit *2, keeping the distance 40.5 (1.594") ± 0.2 mm (0.008") shown in Fig. 5-33-11.<br><br>(Caution)<br>**After making the adjustments, make sure that the X-axis slit disk enters the center of the clearance between the sensor photo-couplers and that the slit disk overlaps the top end of the sensor photo-coupler by 5 mm (0.197") or more, when the X-axis slit disk passes through the three X-axis sensors. (Fig. 5-33-7) If they do not, adjust the clearance between the slit disk and the photo-coupler referring to "C. Clearance between the slit disk and the photo-coupler." Note that you should adjust the overlapping depth simultaneously with steps 4) and 6).** | o If the origin has not been properly adjusted:<br>The origin for inputting a pattern fails to align with the origin for sewing the pattern.<br>o If the travel limit has not been properly adjusted:<br>The sewing area may be narrower. The stepping motor fails to stop even when the mechanical travel limit has been reached. As a result, an abnormal noise may be produced.<br><br>(Caution)<br>**If the machine is operated under the condition mentioned above, the feed mechanism components might become damaged.**<br>**Never operate the machine until the proper adjustments have been completed.** |

5) Adjust so that the sensor positioning gauge satisfies the dimensions given in Fig. 5-33-5.

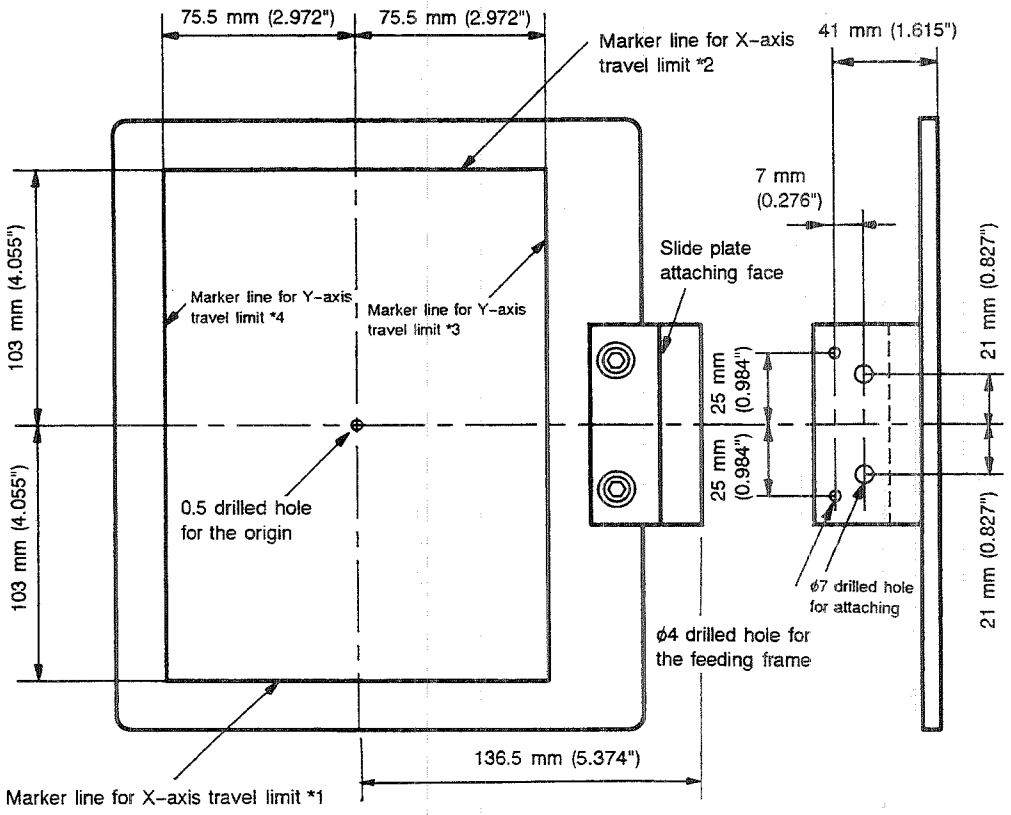



Fig. 5-33-5

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| B. Adjusting the Y-axis origin and travel limit<br>9) Remove the Y sensor cover. (Fig. 5-33-8)<br>10) Follow the same procedure described in steps 2) and 3).<br>11) Loosen setscrews ❹, and move the Y sensor attaching plate to the left or right until display (H) showing the Y origin changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❹. (Fig. 5-33-3, Fig. 5-33-9)<br>12) Press jog key [8 ▲] on the operation panel to move the feeding frame until display (I) showing the travel limit *3 changes from 1 to 0. Immediately after the display has changed, stop the feeding frame. (Fig. 5-33-3)<br>13) With regard to marker line V of travel limit *3, make sure that the specified distance is obtained referring to the procedure described in step 8).<br>If the gap exceeds the specified range, adjust the position of the sensor for Y-axis travel limit *3, keeping the distance 32.5 (1.280") ± 0.2 mm (0.008") shown in Fig. 5-33-13.<br>14) With regard of display (G) showing travel limit *4, press jog key [2 ▼] on the operation panel and make the adjustment referring to the procedure described in step 12).<br>15) With regard to marker line V of travel limit *4, make sure that the specified distance is obtained referring the procedure described in step 13).<br>If the specified distance is not obtained, adjust the position of the sensor for Y-axis travel limit *4 referring to the procedure described in step 13).<br><br>(Caution)<br>**After making the adjustments, make sure that the Y-axis slit disk enters the center of the clearance between the sensor photo-couplers and that the slit disk overlaps the top end of the sensor photo-coupler by 5 mm (0.197") or more, when the Y-axis slit disk passes through the three Y-axis sensors.**<br>**If they do not, adjust the clearance between the slit disk and the photo-coupler referring to "C. Clearance between the slit disk and the photo-coupler."** | |

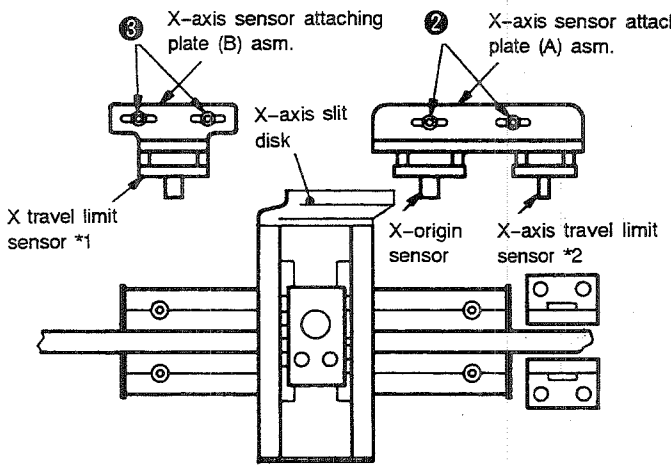



Fig. 5-33-6

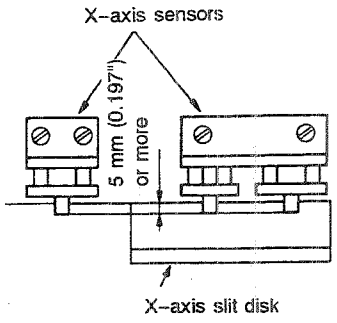



Fig. 5-33-7

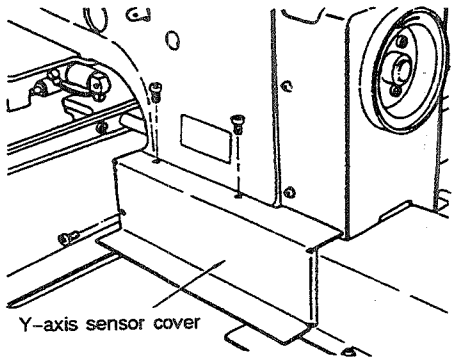



Fig. 5-33-8

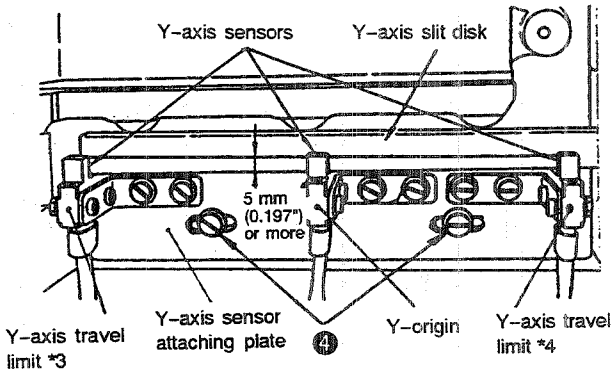



Fig. 5-33-9

C. Adjusting the clearance between the slit plate and the photo-coupler

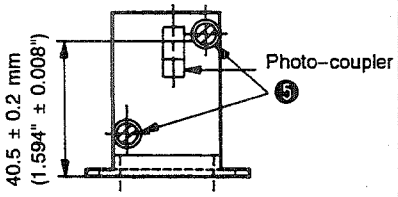



Fig. 5-33-10

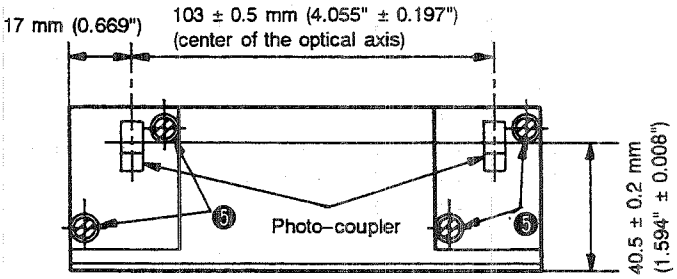



Fig. 5-33-11

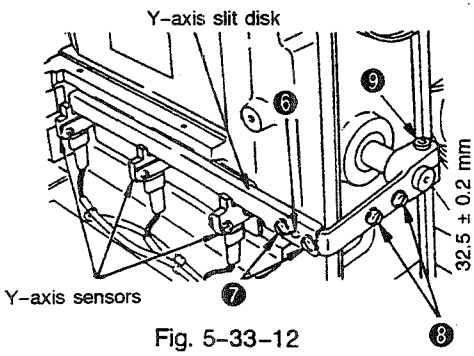



Fig. 5-33-12

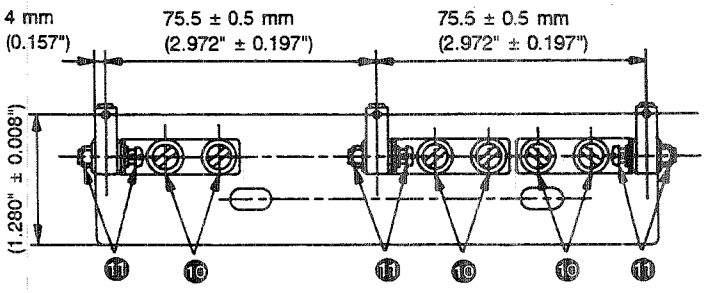
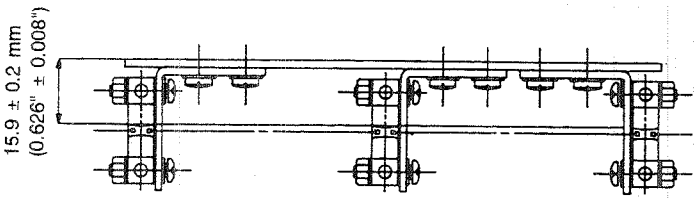



Fig. 5-33-13

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| C. Adjusting the clearance between the slit disk and the photo-coupler<br>o Adjusting the X-axis sensors<br>Loosen setscrews ❺, and adjust the X-axis sensors referring to Fig. 5-33-10 and Fig. 5-33-11. Then tighten setscrews ❺. (Fig. 5-33-10, Fig. 5-33-11)<br>o Adjusting the Y-axis sensors<br>Loosen setscrews ⓫, setscrews and setscrew nuts ⓭, and adjust the Y axis sensors referring to Fig. 5-33-13 and Fig. 5-33-14. Then tighten setscrews ⓫ and setscrews and setscrew nuts ⓭.<br>After making the above adjustments, check whether the slit disk has been adjusted so that it overlaps the photo-coupler by 5 mm (0.197") or more.<br>If the specified width is not obtained or the Y-axis slit disk is removed along with the replacement of the V-belt, be sure to determine the longitudinal position of the slit disk using positioning pin ❻, and adjust the overlapping width. Then fix the Y-axis slit disk using setscrews ❼. At this time, do not loosen setscrews ❽ and ❾ which have already been properly adjusted.<br>  <br><br>Fig. 5-33-14<br>**(Caution)**<br>**Make sure that the slit disk does not come in contact with the photo-coupler.** | o The sensors fail to detect the X/Y origin or travel limits, resulting in the same problems caused by the improper adjustment of the origin or travel limits.<br>o Since the slit disk may come in contact with the photo-coupler, the corresponding parts could become broken or damaged. |

**(34) Shuttle race ring**

If the blade point of the shuttle becomes badly worn out, remove the shuttle race ring and check whether or not the hatched section illustrated has the dimensions of 0.2 (0.008") x 8 mm (0.315").

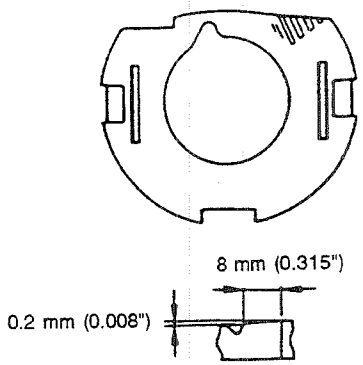



Fig. 5-34-1

**(35) Eliminating play from the main shaft**

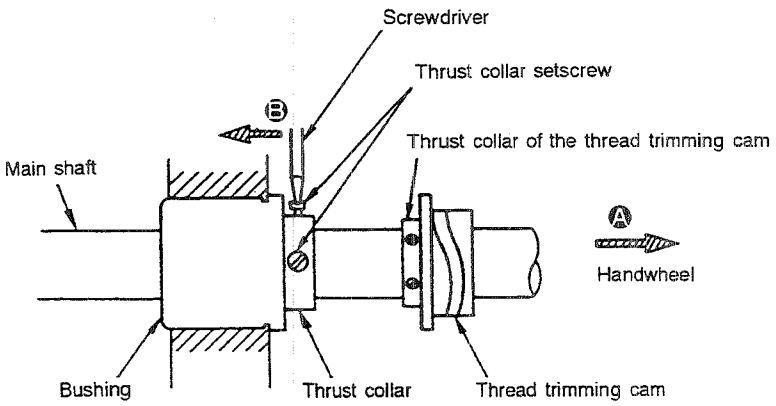



Fig. 5-35-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o If the hatched section does not have the dimensions of 0.2 mm (0.008") x 8 mm (0.315"), correct it using an oilstone. | |
| o Push the thrust collar in the direction of arrow Ⓑ while pulling the handwheel in the direction of arrow Ⓐ. Then fix the thrust collar. | o The machine will be locked and the main shaft attaching components will break. |

(36) **Belt tension**
The middle of the belt should slacken by 10 mm (0.394") when section Ⓐ of the belt is subjected to a 1 kg (2.2 pound) load.

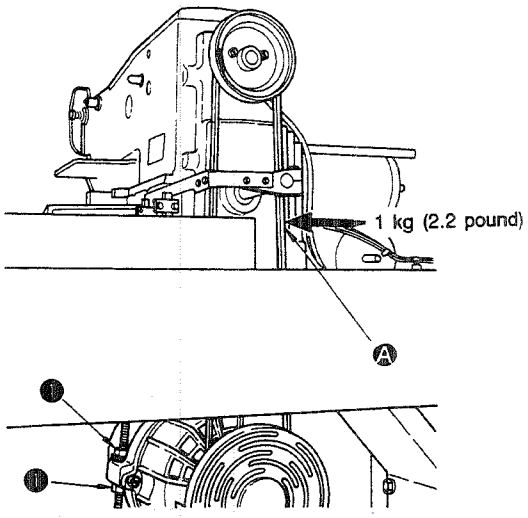



Fig. 5-36-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Loosen nuts ❶, and move the motor up or down to change the installation position of the motor.<br><br>(Caution)<br>**Be sure to remove or install the belt with the intermediate presser removed.** | o The vibration of the belt may increase, resulting in the sewing machine vibrating more greatly.<br><br>**(Caution)**<br>**If the vibration of the belt is excessive, the belt may come in contact with the belt cover. As a result, the belt may become damaged. Be sure to check the belt tension before operating the sewing machine.** |

## (37) Removing the V-belt

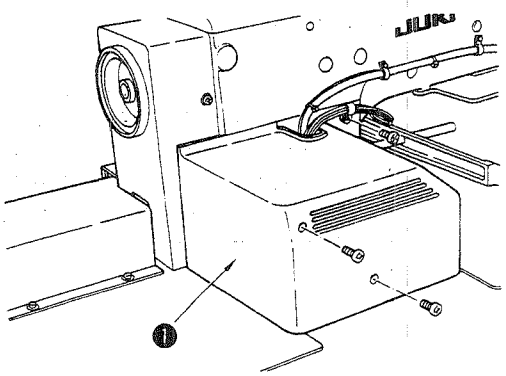



Fig. 5-37-1

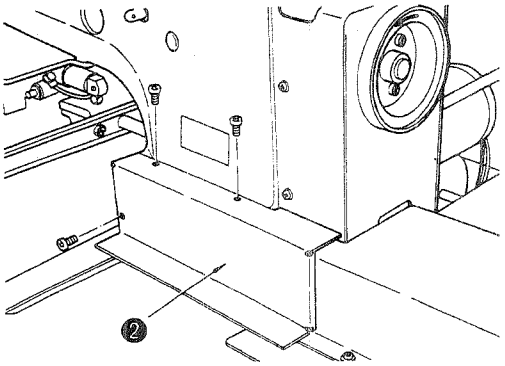



Fig. 5-37-2

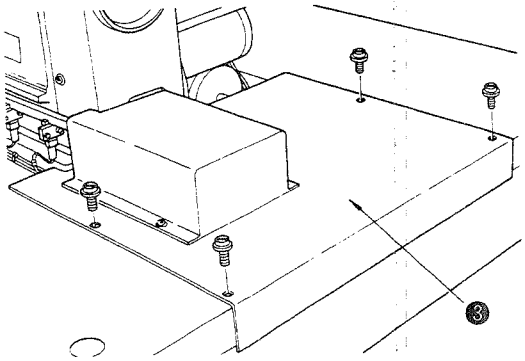



Fig. 5-37-3

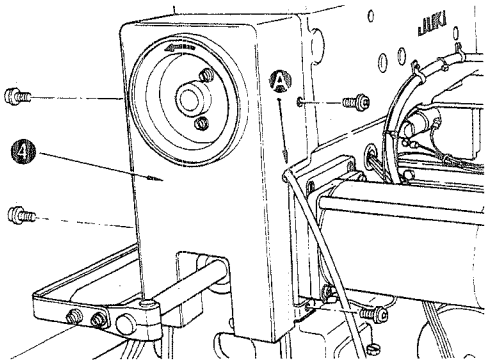



Fig. 5-37-4

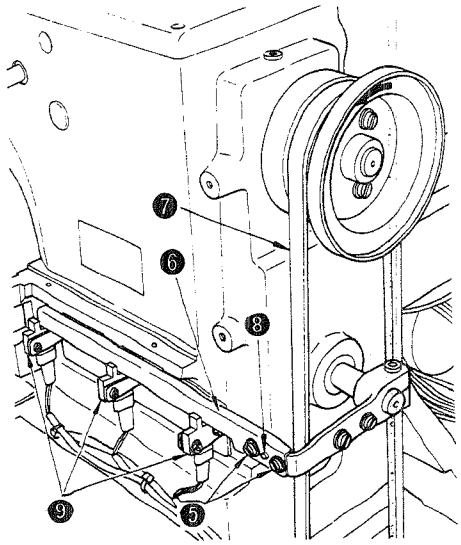



Fig. 5-37-5

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Remove side cover ⓫, Y sensor cover ⓬, table rear cover ⓭ and belt cover ❹.<br>(Fig. 5-37-1, Fig. 5-37-2, Fig. 5-37-3, Fig. 5-37-4)<br>2) Loosen setscrews ❺, and remove Y-axis slit disk ❻.<br>Take care not to touch and damage to Y sensors ❾.<br>(Fig. 5-37-5)<br>3) Remove V-belt ❼.<br><br>(Caution)<br>**When removing the table rear cover, washers (under each setscrew) are mounted between the table and the table rear cover. Take care not to lose them. (Fig. 5-37-3)**<br>**When attaching the belt cover in place, be sure to clamp the synchronizer cable at section Ⓐ (pass the cable through U-shaped groove). (Fig. 5-37-4)**<br>**Attach Y-axis slit disk ❻ referring to the "STANDARD ADJUSTMENTS (33)-C."** | |

**(38) Raising the sewing machine head**

When doing maintenance work on the shuttle driver shaft components, raise the sewing machine head according to the following procedure.

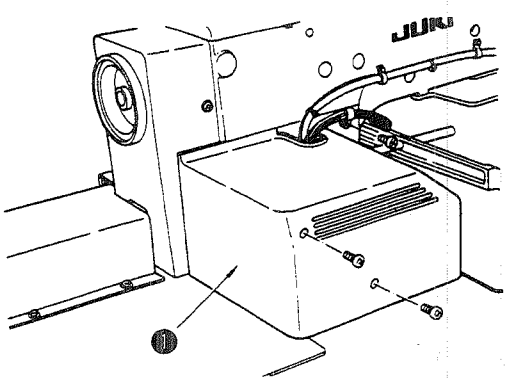



Fig. 5-38-1

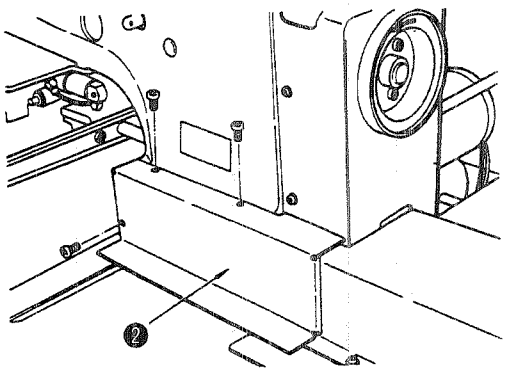



Fig. 5-38-2

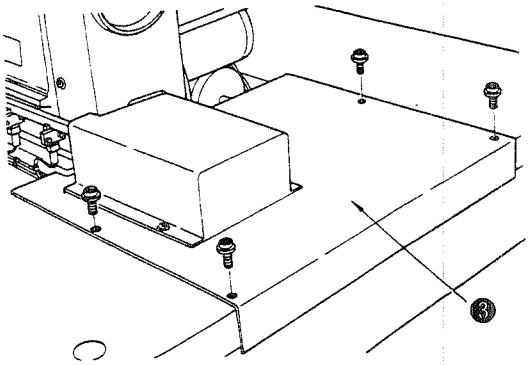



Fig. 5-38-3

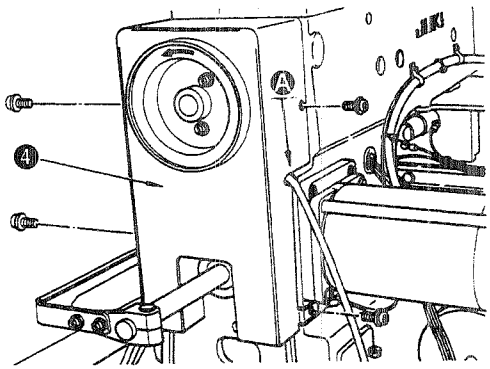



Fig. 5-38-4

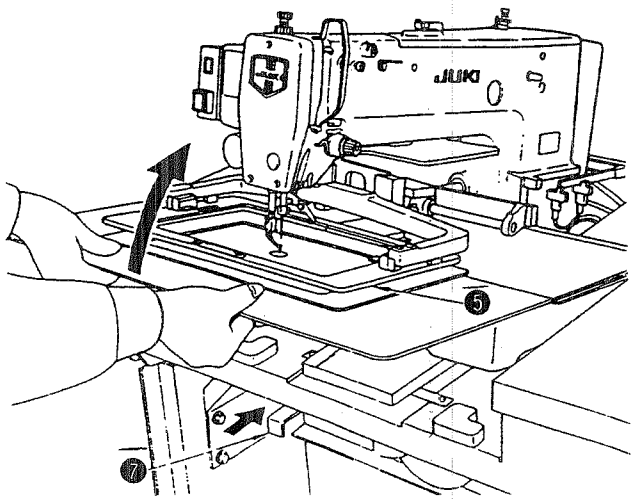



Fig. 5-38-5

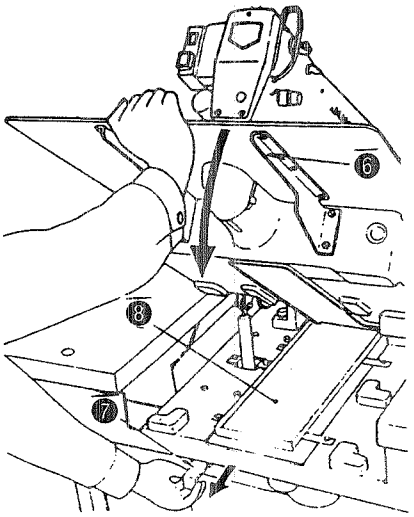



Fig. 5-38-6

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Remove side cover ❶, Y sensor cover ❷, table rear cover ❸ and belt cover ❹. (Fig. 5-38-1, Fig. 5-38-2, Fig. 5-38-3, Fig. 5-38-4)<br>(Caution)<br>**Be sure to remove all of the above components, or else the cover not removed may become damaged.**<br>2) Move feeding frame ❺ to the center. (Fig. 5-38-5)<br>(Caution)<br>**If the feeding frame is not in the center, the feed bracket auxiliary cover (right) may come in contact with the operation box (panel).**<br>3) Raise the machine head by throat plate auxiliary cover support ❻ until stopper ❼ moves away from you and locks. The machine will then remain tilted by 45 degrees. (Fig. 5-38-5)<br>(Caution)<br>**Make sure that stopper ❼ is securely locked. It will be very dangerous if the stopper is not locked properly.**<br>4) Loosen the four setscrews of oil pan ❽ and remove it. (Fig. 5-38-6)<br>5) When lowering the machine head, slightly raise the machine head by throat plate auxiliary cover support ❻, pull stopper ❼ toward you, and then slowly lower the machine head. The belt is removed from the machine whenever the machine head is raised. Be sure to install the belt again. (If the machine is actuated with the belt removed, error indication [7] will be shown. Refer to "3-6. Error indications.") (Fig. 5-38-6)<br>(Caution)<br>**When removing the table rear cover, the washers (under each setscrew) are mounted between the table and the table rear cover. Take care not to lose them. (Fig. 5-38-3)**<br>**When attaching the belt cover in place, be sure to clamp the synchronizer cable at section Ⓐ (pass the cable through U-shaped groove). (Fig. 5-38-4)** | |

**(39) Holding force of the plastic blank presser (Excluding the L-type)**
Adjust the fixing position of the plastic blank.

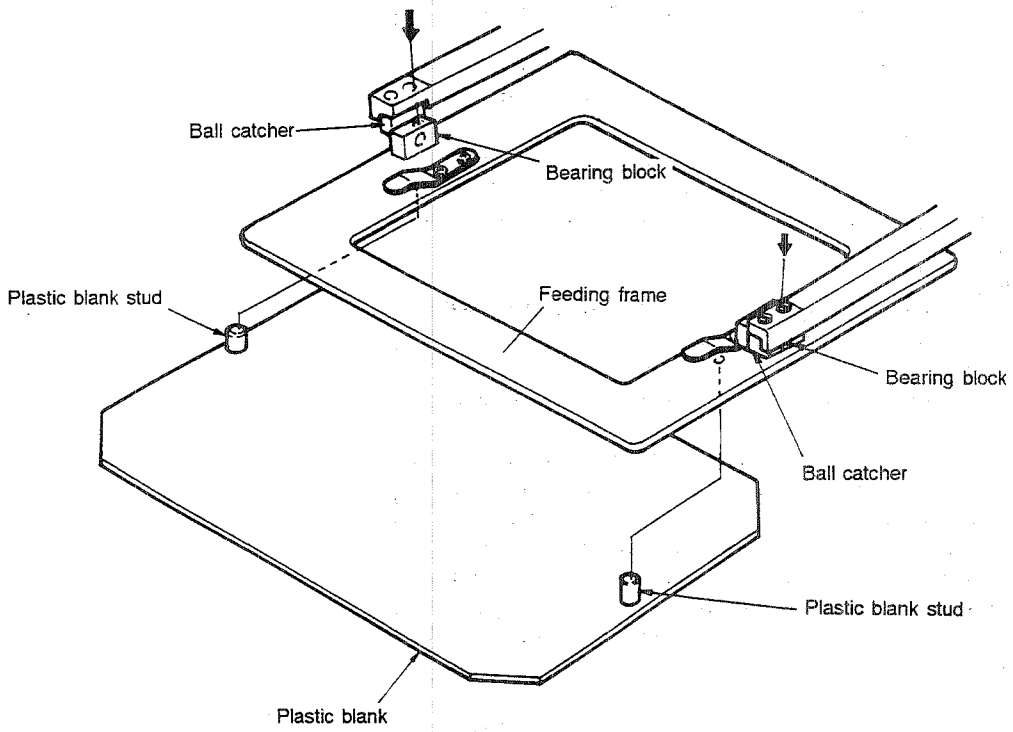



Fig. 5-39-1

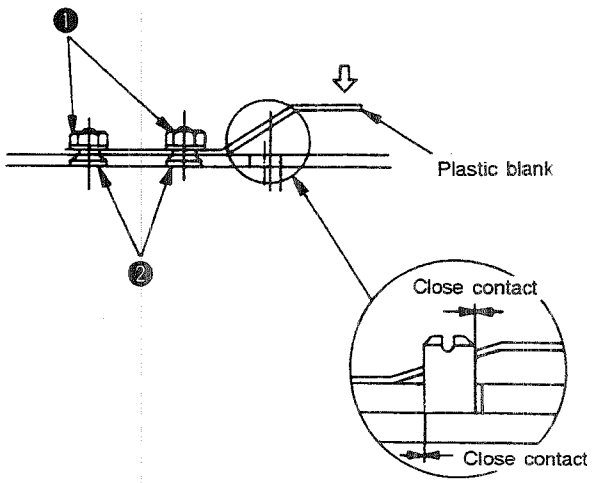



Fig. 5-39-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Press the top face of the feeding frame support bearing in the direction of the arrow so that the feeding frame is removed. (Fig. 5-39-1)<br>2) Loosen nuts ❶ and setscrews ❷. Set the plastic blank within the feeding frame referring to the "STANDARD ADJUSTMENTS (33)-1 A. 2)." (Fig. 5-39-1, Fig. 5-39-2)<br>3) Adjust the position of the plastic blank so that the plastic blank comes in close contact with the plastic blank stud, while pressing the plastic blank in the direction of the arrow. Then tighten nuts ❶ so that the plastic blank is temporarily fixed. (Fig. 5-39-2)<br>4) Remove the plastic blank from the feeding frame, then tighten nuts ❶ and setscrews ❷ so that the plastic blank is securely fixed. | o The plastic blank may easily drop from the feeding frame. The plastic blank may fail to be set to the feeding frame. |

(40) **Feed plate**

The inside of the feeding frame aligns with the inside of the feed plate.

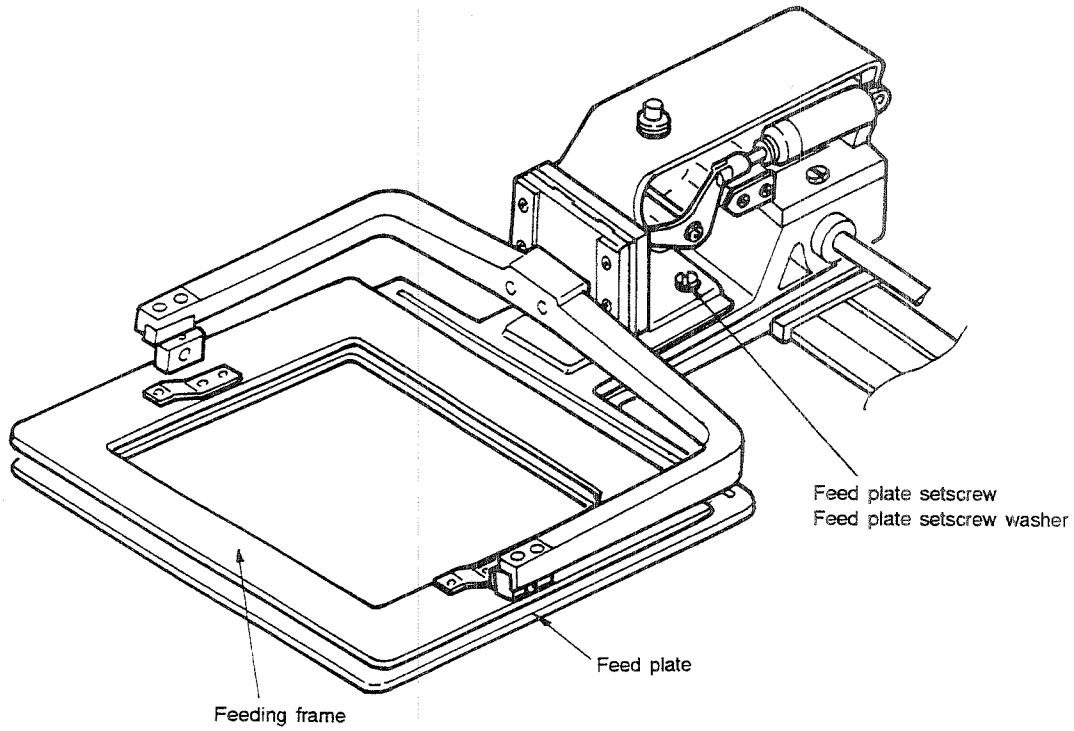



Fig. 5–40–1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Decrease the operating air pressure to 0 kg/cm$^2$ referring to the "STANDARD ADJUSTMENTS (41)."<br>2) Loosen the two setscrews retaining the feed plate, and then lower the feeding frame by hand.<br>3) After the adjustment of the position of the feed plate, fix the feed plate with two screws. | o The workpiece may slip during sewing. |

**(41) Adjusting the pneumatic components (For the S type of sewing machine only)**

1) Connect one-touch joint socket plug ❶, and open air cock ❷. At this time, air pressure gauge ❹ should indicate 5 to 5.5 kg/cm$^2$. (Fig. 5-41-1)
2) If the value shown on pressure gauge ❹ is lower than the specified compressed air pressure (less than approx. 4 kg/cm$^2$), the sewing machine stops while giving the error [A]. (Fig. 5-41-1)
3) The operating air pressure to thrust out the work clamp cylinder (asm.) is decreased to 2 to 2.5 kg/cm$^2$. (Fig. 5-41-3)
4) The needle knob of speed controller (A) (for controlling the work clamp cylinder) is fixed by the nut at the position where the knob is turned in the reverse direction by three revolutions after it has been securely tightened. (Fig. 5-41-4)
5) The needle knob of speed controller (B) (for controlling the intermediate presser cylinder) is fixed by the nut at the position where the knob is turned in the reverse direction by five revolutions after it has been securely tightened. (Fig. 5-41-5) (Fig. 5-41-6)

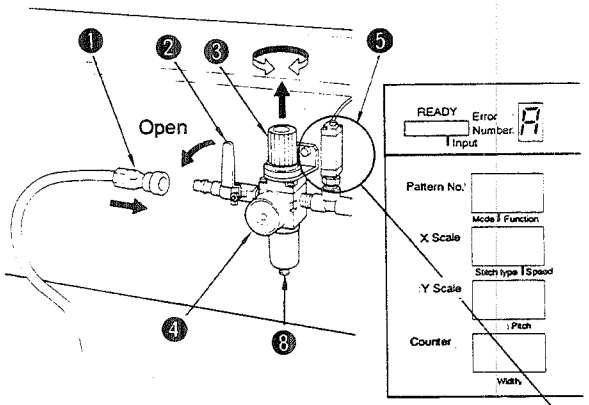



Fig. 5-41-1



Fig. 5-41-2

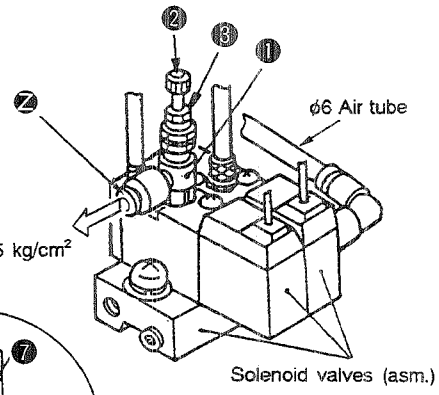



Fig. 5-41-3

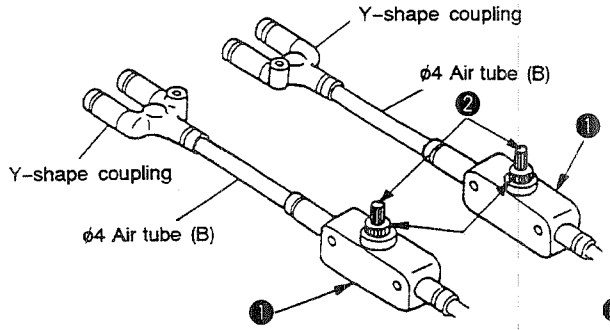



Fig. 5-41-4

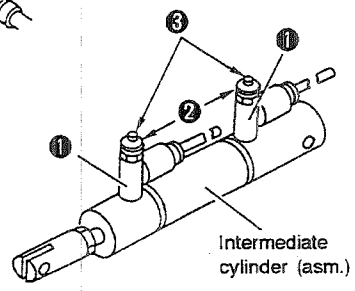



Fig. 5-41-5 (S type)

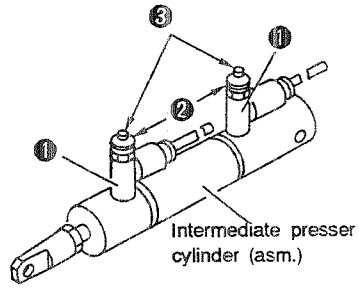
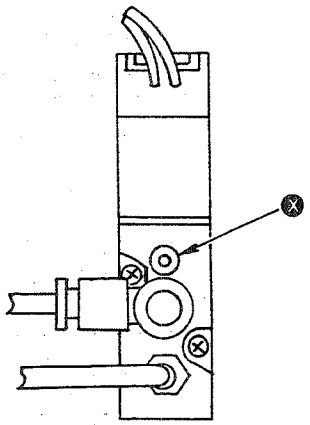



Fig. 5-41-6 (H type and G type)

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Open air cock ❷, pull up air pressure adjusting knob ❸, and turn the adjusting knob. Adjust air pressure gauge ❹ so that is indicates 5 to 5.5 kg/cm$^2$. Then press the knob and fix it at that position. (Fig. 5-41-1)<br>2) Refer to the procedure described in step 1). Adjust the air pressure gauge so that it indicates 3 kg/cm$^2$.<br>Turn adjusting screw ❻ of operating air pressure switch ❺ until marker line ❼ is set to step 4 on the scale. (Fig. 5-41-1, Fig. 5-41-2)<br>Turn ON the power switch. Make sure that error indication [A] is given when the [Set READY switch] is pressed so that the machine reads out the pattern data.<br>(Caution)<br>**After making the adjustment, set air pressure gauge ❹ so that it indicates 5 to 5.5 kg/cm$^2$, and make sure that error indication [A] goes out.**<br>3) Remove the table rear cover. (Fig. 5-38-3)<br>Set the sewing machine in the sewing state. Now, press section ❷ of pressure decreasing valve ❶ which is secured on the solenoid valve (asm.) and remove the air hose. Then connect a commercially available pressure gauge to the section from which the air hose has been removed. (Fig. 5-41-3)<br>Press the section marked with ⓧ by five times or more, and turn needle knob ❷ of pressure decreasing valve ❶ until the pressure gauge connected to the pressure decreasing valve indicates a pressure of 2 to 2.5 kg/cm$^2$. Then fix the needle knob at the adjusted position with nut ❸. Then, securely connect the air hose to the solenoid valve (asm.) that has been removed before the adjustment. (Fig. 5-41-3 and Fig. 5-41-7)<br>4) Remove the table rear cover. (Fig. 5-38-3)<br>Adjust needle knobs ❷ of speed controllers (A) ❶, referring to the "STANDARD ADJUSTMENTS (41)-4." Then fix the knob using nuts ❸. (Fig. 5-41-4)<br>5) Remove the face plate.<br>Adjust needle knobs ❷ of speed controllers (B) ❶, referring to the "STANDARD ADJUSTMENTS (41)-5." Then fix the knob using nuts ❸. (Fig, 5-41-5) (Fig. 5-41-6) | 1) The work clamp mechanism and/or intermediate presser mechanism may malfunction.<br>The machine will stop running while showing error indication [A].<br>2) The machine may fail to detect a drop in the pressure of the air source.<br>The machine will stop running while showing error indication [A] if the pressure gauge indicates normal operating air pressure (5 to 5.5 kg/cm$^2$).<br>3) The appropriate pressing pressure of the work clamp will not be obtained.<br>4) The feeding frame may fail to go up or come down at the appropriate speed. It may move at an excessive speed or at an insufficient speed.<br>5) The intermediate presser may fail to move smoothly.<br>A heavy metal noise may be produced while the intermediate presser is actuated.<br>(Caution)<br>**It is unnecessary to carry out Steps 2) through to 5) in the "STANDARD ADJUSTMENTS (41)" as long as the machine is engaged in normal sewing. Note that the needle knobs and nuts described in steps 3) through 5) are coated with oil resistant white paint to show that they have already been properly adjusted.**<br>* When setting the air pressure gauge to 0 kg/cm$^2$, be sure to close air cock ❷, and press button ❽. (See Fig. 5-41-1)<br>  <br>Solenoid valve<br>Fig. 5–41–7 |

**(42) Connecting the pneumatic components (For the S type only)**
The circuit diagram for the pneumatic system is as follows:

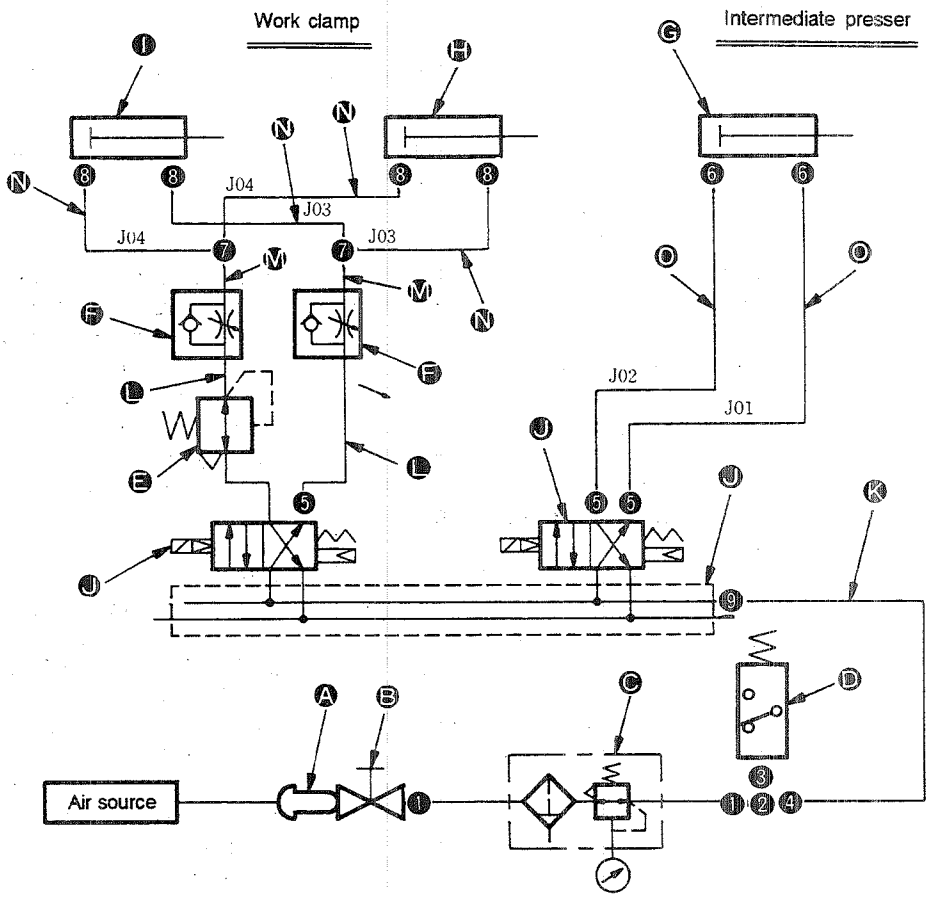
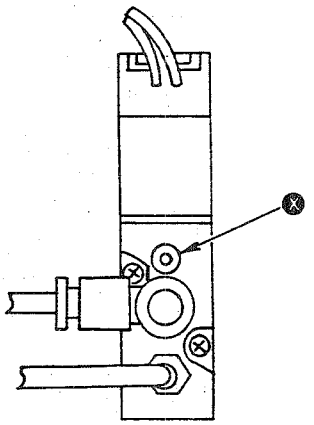



Fig. 5-42-1

| | |
|---|---|
| Ⓐ | One-touch joint socket |
| | One-touch joint plug |
| Ⓑ | Air cock |
| Ⓒ | Filter regulator |
| Ⓓ | Air pressure switch (asm.) |
| Ⓔ | Pressure decreasing valve |
| Ⓕ | Speed controller (A) |
| Ⓖ | Intermediate presser cylinder |
| Ⓗ | Work clamp cylinder (right) |
| Ⓘ | Work clamp cylinder (left) |
| Ⓙ | Solenoid valve (asm.) |
| | Manifold |
| | Solenoid valve |
| Ⓚ | ϕ6 air tube |

| | |
|---|---|
| Ⓛ | ϕ4 air tube (A) |
| Ⓜ | ϕ4 air tube (B) |
| Ⓝ | ϕ4 air tube (C) |
| Ⓞ | ϕ4 air tube (D) |
| ❶ | Barrel nipple |
| ❷ | T-shape cheese |
| ❸ | Pipe fitting bushing |
| ❹ | Elbow union (A) |
| ❺ | Hose nipple |
| ❻ | Speed controller (B) |
| ❼ | Y-shaped joint |
| ❽ | Hose elbow |
| ❾ | Elbow union (B) |

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Open air cock ❷, pull up air pressure adjusting knob ❸, and turn the adjusting knob. Adjust air pressure gauge ❹ so that is indicates 5 to 5.5 kg/cm$^2$. Then press the knob and fix it at that position. (Fig. 5-41-1)<br>2) Refer to the procedure described in step 1). Adjust the air pressure gauge so that it indicates 3 kg/cm$^2$.<br>Turn adjusting screw ❻ of operating air pressure switch ❺ until marker line ❼ is set to step 4 on the scale. (Fig. 5-41-1, Fig. 5-41-2)<br>Turn ON the power switch. Make sure that error indication [A] is given when the [Set READY switch] is pressed so that the machine reads out the pattern data.<br>**(Caution)**<br>**After making the adjustment, set air pressure gauge ❹ so that it indicates 5 to 5.5 kg/cm$^2$, and make sure that error indication [A] goes out.**<br>3) Remove the table rear cover. (Fig. 5-38-3)<br>Set the sewing machine in the sewing state. Now, press section ❷ of pressure decreasing valve ❶ which is secured on the solenoid valve (asm.) and remove the air hose. Then connect a commercially available pressure gauge to the section from which the air hose has been removed. (Fig. 5-41-3)<br>Press the section marked with ⊗ by five times or more, and turn needle knob ❷ of pressure decreasing valve ❶ until the pressure gauge connected to the pressure decreasing valve indicates a pressure of 2 to 2.5 kg/cm$^2$. Then fix the needle knob at the adjusted position with nut ❸. Then, securely connect the air hose to the solenoid valve (asm.) that has been removed before the adjustment. (Fig. 5-41-3 and Fig. 5-41-7)<br>4) Remove the table rear cover. (Fig. 5-38-3)<br>Adjust needle knobs ❷ of speed controllers (A) ❶, referring to the "STANDARD ADJUSTMENTS (41)-4)." Then fix the knob using nuts ❸. (Fig. 5-41-4)<br>5) Remove the face plate.<br>Adjust needle knobs ❷ of speed controllers (B) ❶, referring to the "STANDARD ADJUSTMENTS (41)-5)." Then fix the knob using nuts ❸. (Fig, 5-41-5) (Fig. 5-41-6) | 1) The work clamp mechanism and/or intermediate presser mechanism may malfunction.<br>The machine will stop running while showing error indication [A].<br>2) The machine may fail to detect a drop in the pressure of the air source.<br>The machine will stop running while showing error indication [A] if the pressure gauge indicates normal operating air pressure (5 to 5.5 kg/cm$^2$).<br>3) The appropriate pressing pressure of the work clamp will not be obtained.<br>4) The feeding frame may fail to go up or come down at the appropriate speed.<br>It may move at an excessive speed or at an insufficient speed.<br>5) The intermediate presser may fail to move smoothly.<br>A heavy metal noise may be produced while the intermediate presser is actuated.<br>**(Caution)**<br>**It is unnecessary to carry out Steps 2) through to 5) in the "STANDARD ADJUSTMENTS (41)" as long as the machine is engaged in normal sewing. Note that the needle knobs and nuts described in steps 3) through 5) are coated with oil resistant white paint to show that they have already been properly adjusted.**<br>* When setting the air pressure gauge to 0 kg/cm$^2$, be sure to close air cock ❷, and press button ❽. (See Fig. 5-41-1)<br>  <br>Solenoid valve<br>Fig. 5-41-7 |

(42) **Connecting the pneumatic components (For the S type only)**
The circuit diagram for the pneumatic system is as follows:

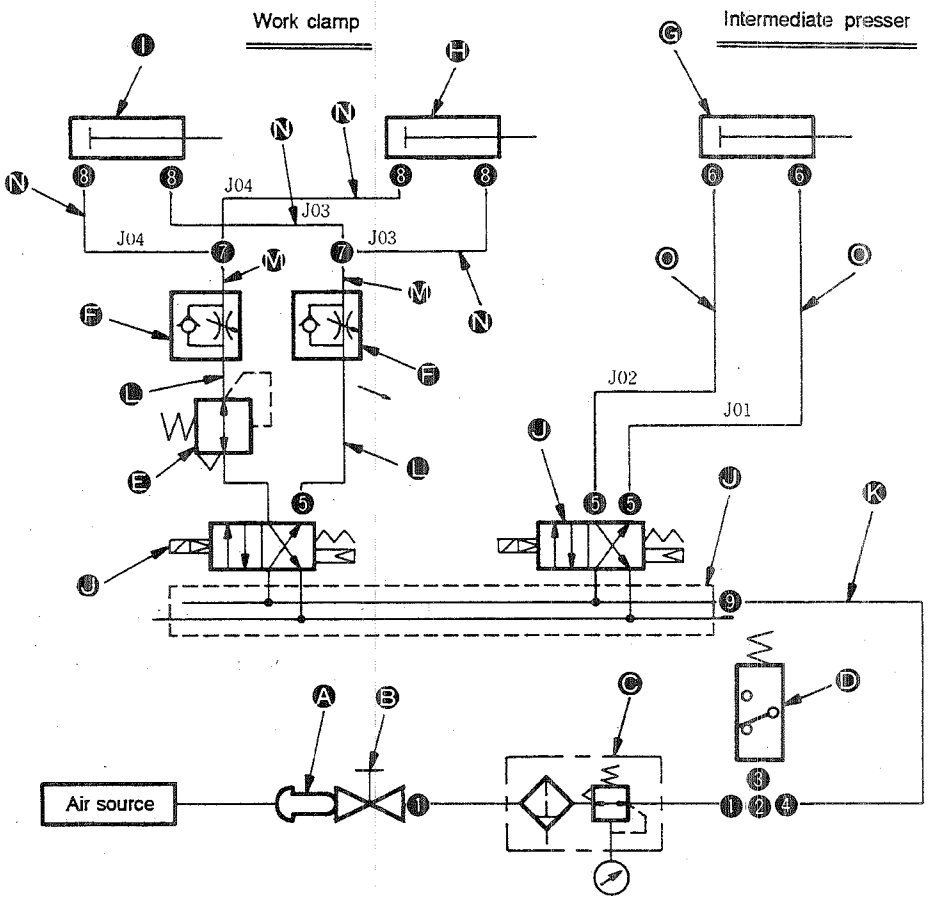
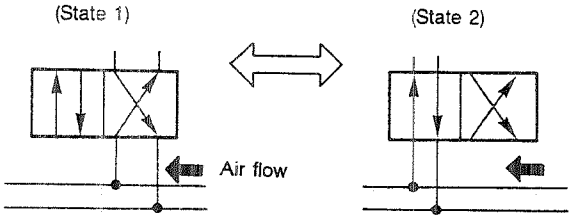
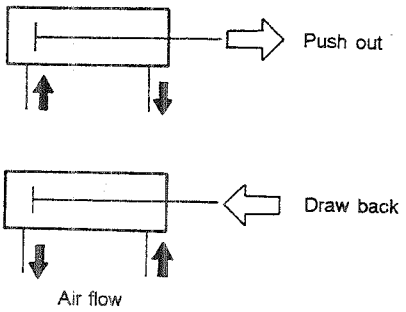



Fig. 5–42–1

| | |
|---|---|
| Ⓐ | One-touch joint socket |
| | One-touch joint plug |
| Ⓑ | Air cock |
| Ⓒ | Filter regulator |
| Ⓓ | Air pressure switch (asm.) |
| Ⓔ | Pressure decreasing valve |
| Ⓕ | Speed controller (A) |
| Ⓖ | Intermediate presser cylinder |
| Ⓗ | Work clamp cylinder (right) |
| Ⓘ | Work clamp cylinder (left) |
| Ⓙ | Solenoid valve (asm.) |
| | Manifold |
| | Solenoid valve |
| Ⓚ | ϕ6 air tube |

| | |
|---|---|
| Ⓛ | ϕ4 air tube (A) |
| Ⓜ | ϕ4 air tube (B) |
| Ⓝ | ϕ4 air tube (C) |
| Ⓞ | ϕ4 air tube (D) |
| ❶ | Barrel nipple |
| ❷ | T-shape cheese |
| ❸ | Pipe fitting bushing |
| ❹ | Elbow union (A) |
| ❺ | Hose nipple |
| ❻ | Speed controller (B) |
| ❼ | Y-shaped joint |
| ❽ | Hose elbow |
| ❾ | Elbow union (B) |

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Connect the pneumatic components referring to the circuit diagram for the pneumatic system.<br>* How to read the pneumatic system circuit diagram<br>① The symbols indicate the components shown in the table.<br>② Solenoid valve (asm.) ⓓ works as follows.<br>• When the power to the machine is turned OFF (the solenoid valve is in its OFF state), the pneumatic system circuit will be in (State 1).<br>• When the solenoid valve is turned ON, the pneumatic system circuit will be changed over to (State 2).<br>  <br><br>③ The air flow means the direction of air coming from the air source.<br>④ Cylinders ( ⓐ, ⓑ and ⓒ) which are called "double acting cylinders" are respectively provided with two air inlets (outlets).<br>  <br><br>⑤ Orientation of the speed controller (A)<br>If the speed controller is installed with its direction reversed, the adjusting direction of the knob will also be reversed.<br>Symbols ⓕ same as those shown on the Fig. 5-42-1 are attached to the components. So, properly attach each component with faced to the correct direction.<br>⑥ Example showing how to read the circuit diagram<br>Let's take the intermediate presser shown on the Fig. 5-42-1. When solenoid valve ⓓ is turned OFF ( ⊠ ), the air flow draws back cylinder ⓒ through the air tube J01.<br>When solenoid valve ⓓ is turned ON ( ⊞ ), the direction of the air flow is reversed. | o The work clamp mechanism and/or intermediate presser mechanism may malfunction. As a result, machine trouble may occur or the corresponding components may become damaged. |

(43) **Removing the handwheel and the generator stator**

1) Loosen two setscrews ❶ so that the handwheel is removed.
2) There are four setscrews ❷ on the generator stator.
   Remove the two outer setscrews, and loosen the two inner setscrews.
3) Remove the generator stator.
   (* The generator stator is sometimes called "synchronizer.")

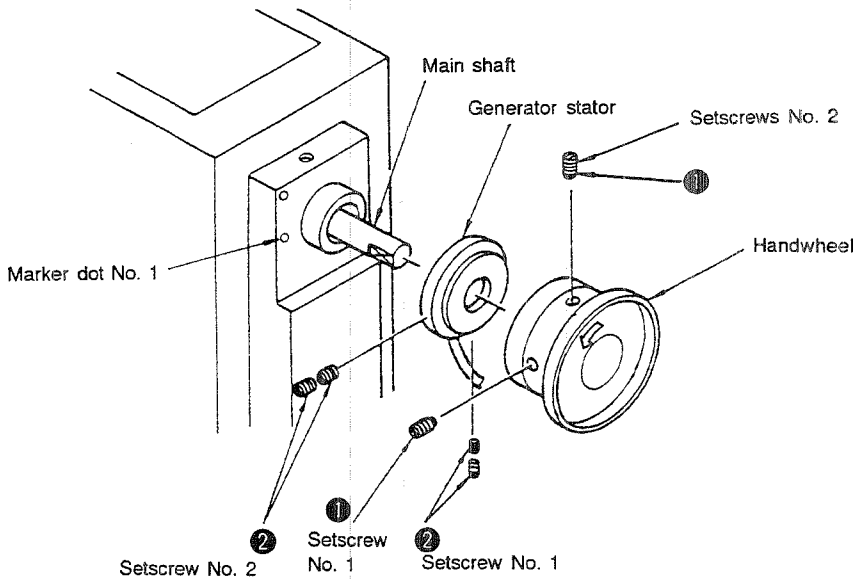



Fig. 5-43-1

(44) **Removing the wiper and the wiper solenoid**

1) Remove the connector.
2) Remove two setscrews ❶ which retain the wiper solenoid installation plate. Then remove the wiper solenoid (asm.).
3) Remove wiper solenoid locknut ❷.
4) Loosen wiper solenoid bracket setscrew ❸, and remove the wiper solenoid.

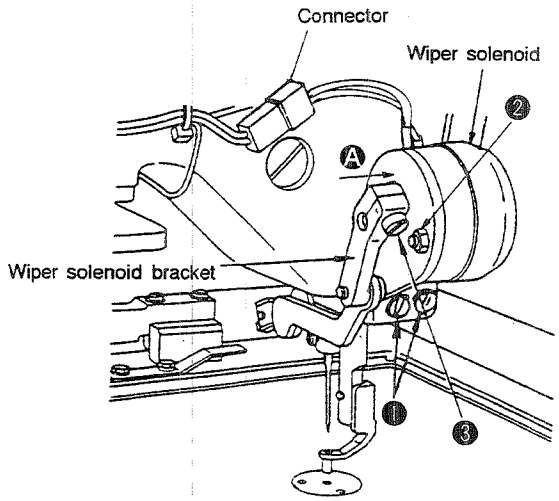
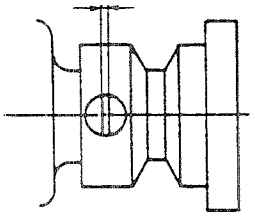
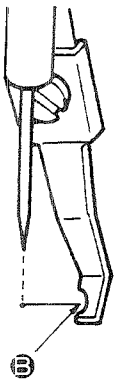



Fig. 5-44-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| 1 ± 0.5 mm (0.039" ± 0.020")<br>  <br>Fig. 5-43-2 | o When installing the generator stator, be sure that setscrews No. 2 ❷ are aligned with marker dot No. 1 on the bracket (Fig. 5-43-1).<br>o When fixing the handwheel, be sure that setscrew No. 1 ❶ are located on the flat part of the main shaft (observed from the correct rotational direction of rotation of the handwheel). At this time, adjust the clearance between the generator stator and the handwheel so that it is 1 (0.039") ± 0.5 mm (0.020"). (Fig. 5-43-2) |
|  <br><br>Fig. 5-44-2 | o Be sure to fix wiper solenoid locknut ❷ by applying LOCK-TITE No. 242 paint. (Fig. 5-44-1)<br>o When tightening wiper solenoid installing plate setscrews ❶, be sure that portion Ⓑ of the top end of the wiper is aligned with the center of the needle. (Fig. 5-44-2)<br>o Wiper solenoid bracket setscrew ❸ should be fixed in the position as described in the "STANDARD ADJUSTMENTS (9)." Press the wiper solenoid bracket in the direction of arrow Ⓐ, and determine the position of the bracket so that the specified distances are obtained. (Fig. 5-44-1) |

(45) **Removing the oscillating rock and crank rod**

1) Loosen setscrew ❶.
2) Loosen two setscrews ❷ and two setscrews ❸.
3) Remove the oscillating rock backward.
4) Remove setscrews ❺, and remove the crank rod and oscillating rock.

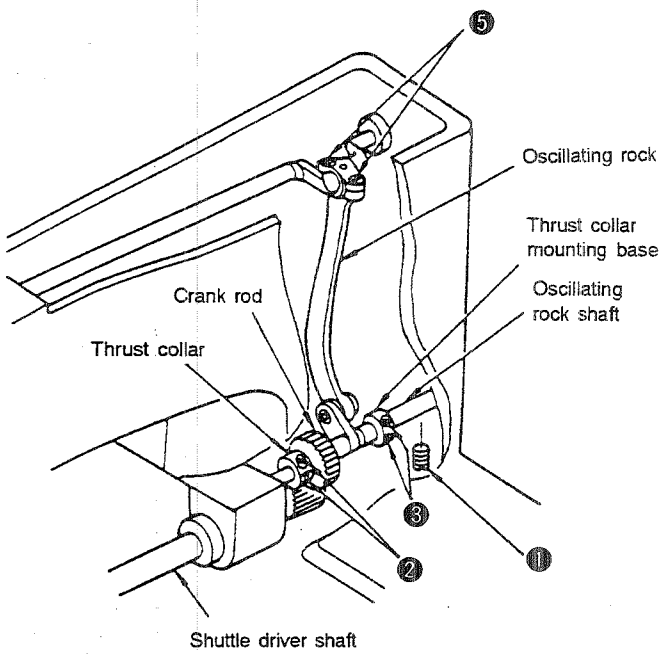



Fig. 5-45-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| o Pay attention to the orientation of the cap of the crank rod.<br>o The S type, H type and G type of sewing machines are different in terms of the oscillating rock. (Refer to the Parts Book.) | o Be sure that the oscillating rock is free from axial play.<br>o If the main shaft does not turn smoothly, correct the mounting position of the thrust collar and the thrust collar mounting base of the oscillating rock. |

(46) **Removing the thread trimmer mounting base and thread trimming solenoid**

1) Remove setscrews ❶.
2) Remove the thread trimmer mounting base.
3) Loosen setscrew ❸ to release the solenoid bracket.
4) Remove the solenoid bracket.
5) Remove lock nuts ❷ to release the thread trimming solenoid.
6) Remove the thread trimming solenoid.
7) Disconnect the lead wire of the thread trimming solenoid from the connector.

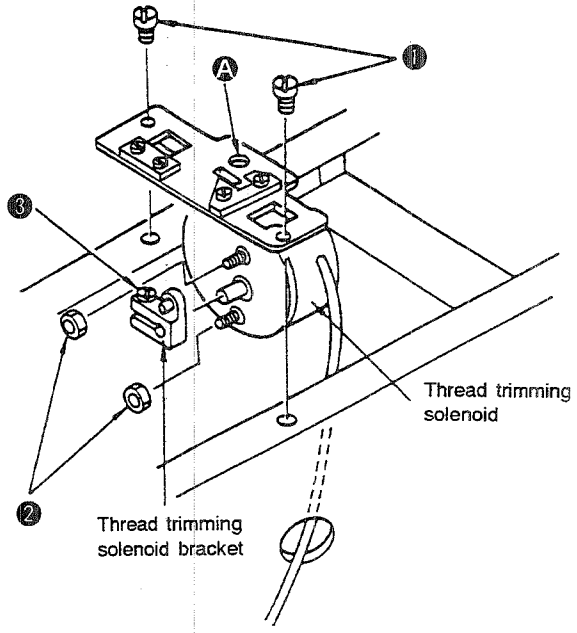



Fig. 5-46-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| o Note that the thread trimming solenoid lock nuts are fixed using the LOCK-TITE paint.<br>o Refer to "9-4. Solenoid connection diagram" when removing the terminal of the thread trimming magnet from the connector. | o Fix the thread trimming solenoid locknuts by applying LOCK-TITE No. 242 after removing any residual grease.<br>o To fix the thread trimming solenoid bracket, press the tension release shaft arm against the cam follower after fixing the thread trimmer mounting base (Fig. 5-47-1). Then, insert a screwdriver through Ⓐ of the thread trimmer mounting base, and tighten setscrew ❸ (Fig. 5-46-1). At this time, adjust the clearance between the trimming solenoid bracket and the thread trimming solenoid Ⓑ portion to 0 mm. (Fig. 5-46-2)<br>o For the adjustment of the thread trimmer mounting base, refer to "STANDARD ADJUSTMENT (16)". |

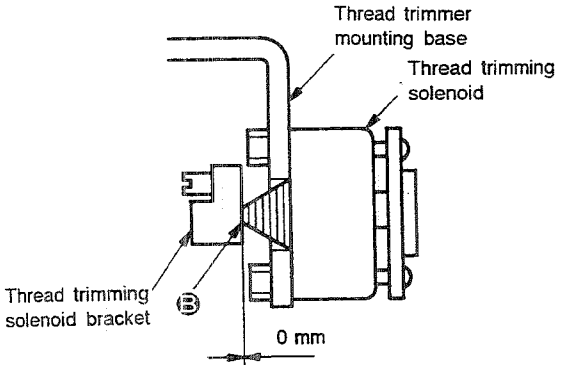



Fig. 5-46-2

(47) **Removing the tension release arm components**

1) Remove the thread trimmer mounting base.
   (Refer to "DISASSEMBLY/ASSEMBLY PROCEDURES (46).")
2) Loosen setscrew ❶.
3) Draw out the thread trimming cam shaft in the direction of the arrow ( ⇒ ). Remove the reset spring (large), reset spring (small), and the tension release shaft arm.
4) Remove setscrews ❷, and then remove the cam follower stopper.

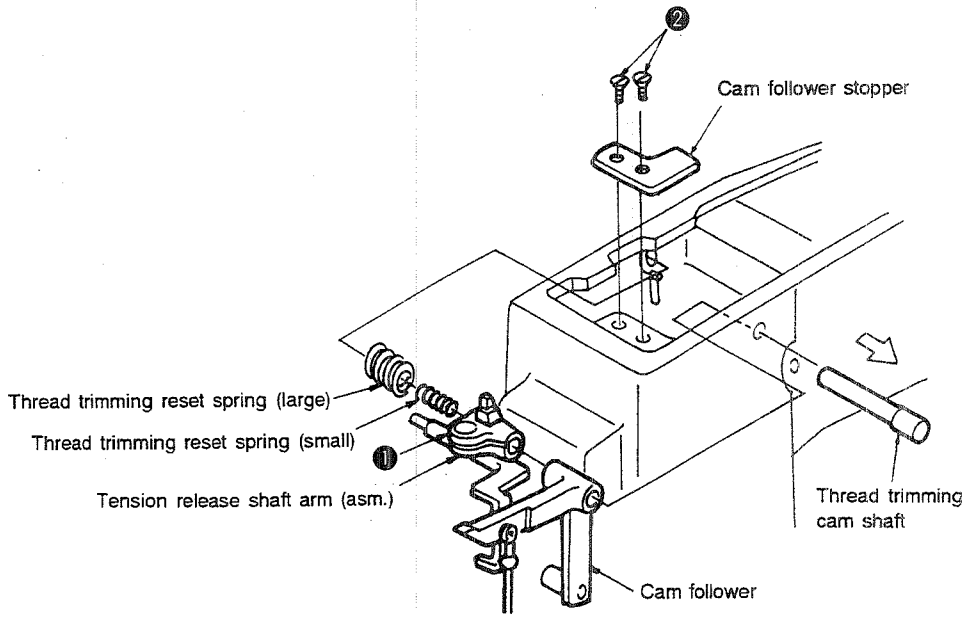
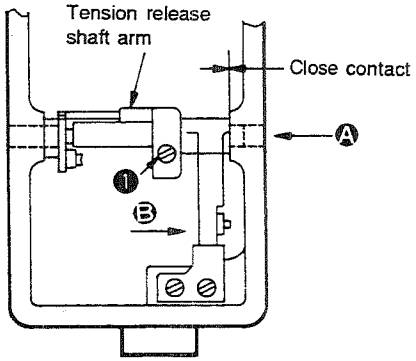



Fig. 5-47-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| | o Press the thread trimming cam shaft in the direction of arrow Ⓐ so that the end face of the stepped section of the thread trimming cam shaft comes in close contact with the end face of the cam follower.<br>Press the tension release shaft arm in the direction of arrow Ⓑ, and tighten tension release shaft arm setscrew ❶.<br>  <br><br>Fig. 5-47-2<br><br>[At this time, adjust the tension release shaft arm (asm.) and the cam follower in terms of the thrusting direction so that they turn smoothly and independently.] |

(48) **Removing the cam follower (asm.)**

1) Remove the thread trimming cam shaft.
   (See "DISASSEMBLY/ASSEMBLY PROCEDURES (47).")
2) Remove the throat plate.
3) Remove the X-Y table.
   (See "DISASSEMBLY/ASSEMBLY PROCEDURES (55).")
4) Remove the thread trimming link hinge screw.
5) Pass the cam follower under the machine bed while slightly bending it.

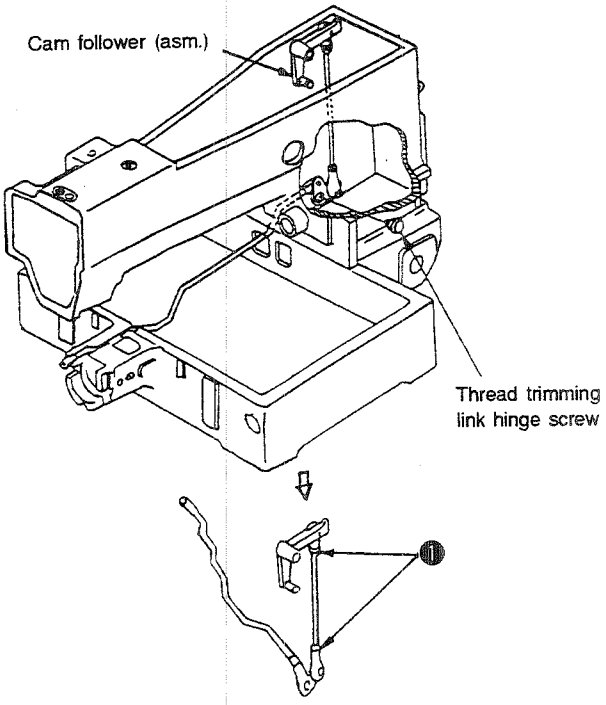



Fig. 5-48-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| o Do not loosen rod adjusting screw nuts ❶. | o When the cam follower (asm.) has been disassembled, be sure to adjust the center-to-center distance of the pillow balls to 272.4 (10.724") ± 0.4 mm (0.016").<br>[At this time, make sure that the end faces of the upper and lower pillow balls are parallel with each other.] |

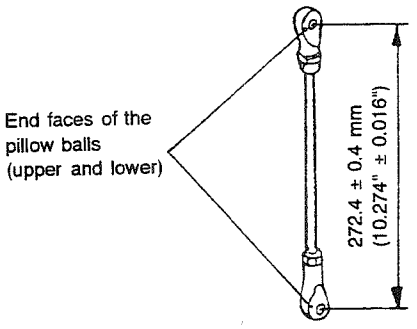


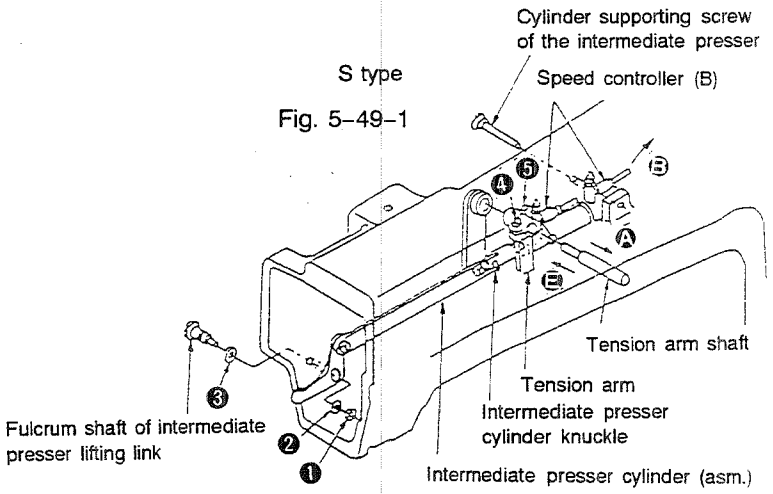

Fig. 5-48-2

(49) **Disassembling the components of the intermediate presser lifting mechanism**

1) Carry out steps 1) through 6) of "DISASSEMBLY/ASSEMBLY PROCEDURES (51) Disassembling the components of the intermediate presser driving mechanism."
2) Remove locknut ❶. Then remove washer ❷, O ring ❸ and the fulcrum shaft of intermediate presser lifting link.
3) Loosen setscrews ❹ and ❺, and draw out the tension arm shaft in the direction of arrow Ⓐ.
4) Remove the cylinder supporting screw of the intermediate presser.
5) Remove the air tube from speed controller (B).
6) Lift the intermediate presser cylinder (asm.) in the direction of arrow Ⓑ until you have completely removed it.

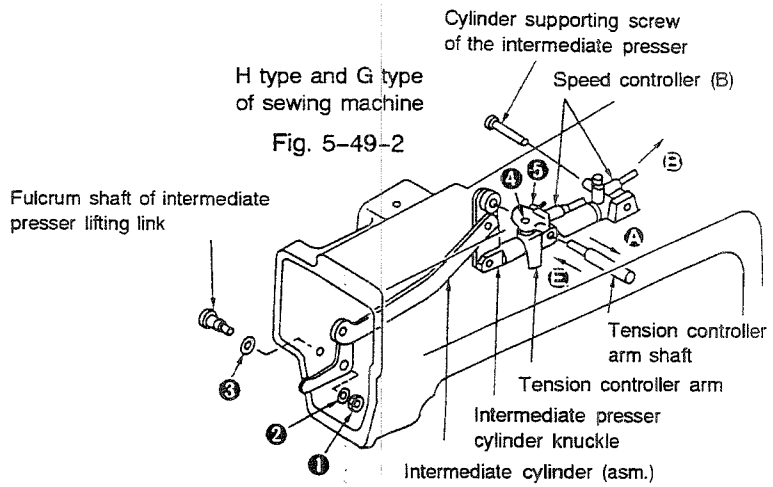
S type

Fig. 5-49-1




H type and G type of sewing machine

Fig. 5-49-2



| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| o Be sure to remove the air tube from speed controller (B) while pressing section Ⓒ in the direction of arrow Ⓓ. Mark the positions at which the two air tubes are attached when removing them from the speed controller to allow the operator to re-attach the air tubes again. [There are two different positions where the air tube can be installed. One is on the push-out side and the other is on the pull-in side of the cylinder rod.] | o If the air tube is installed on the opposite side, the intermediate presser may become lowered and may come in contact with the work clamp during jump. During sewing, the intermediate presser may go up and come in contact with the needle bar.<br>o Adjust the speed controller using adjusting screw ❻, referring to the "STANDARD ADJUSTMENTS (41) Adjusting the pneumatic components."<br>o When the intermediate presser cylinder knuckle is removed, refer to the "STANDARD ADJUSTMENTS (22) Adjusting the intermediate presser lifting stroke."<br>o Tighten setscrew ❺ while slightly shifting it in the direction of arrow Ⓐ with the tension arm shaft shifted in the direction of arrow Ⓔ. At this time, make sure that the tension arm turns smoothly free from play.<br>o Tighten setscrew ❹ referring to the "STANDARD ADJUSTMENTS (19) Release amount of the tension disks."<br>o When installing the fulcrum shaft of the intermediate presser lifting link, be sure to apply grease or lubrication oil to O ring ❸ so that the O ring does not become damaged. |

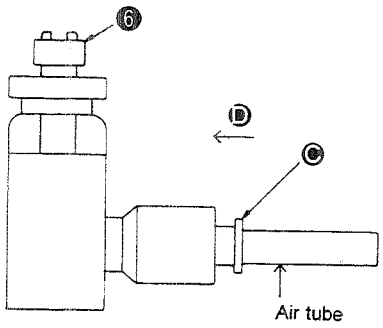



Fig. 5-49-3

(50) **Dissasembling the components of the tension release mechanism**

1) Remove the thread trimmer mounting base referring to the "DISASSEMBLY/ASSEMBLY PROCEDURES (46)."
2) Remove the thread trimming cam shaft referring to "DISASSEMBLY/ASSEMBLY PROCEDURES (49)."
3) Remove the tension release reset spring.
4) Loosen setscrew ❷, and remove the tension release pin for controller No. 2.
5) Remove setscrew ❶, and then remove the tension post bracket.
6) Loosen setscrews ❸ and ❹.
   Draw out the tension arm shaft, and remove tension arm (A) and the tension controller connecting rod.
7) Remove the tension release bushing in the direction of arrow Ⓐ. Then remove the tension release arm, tension release connecting plate and tension arm (B).

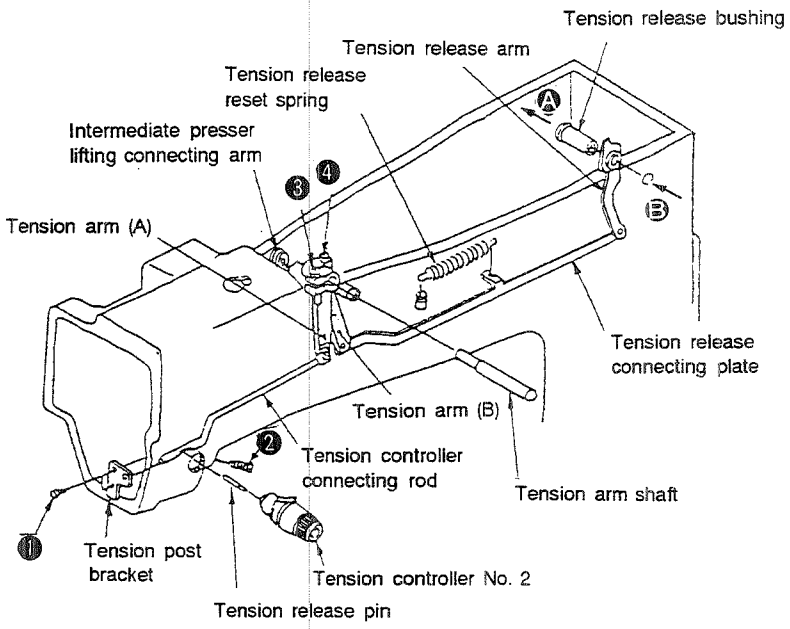



Fig. 5-50-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| o When removing the tension release reset spring, take care not to damage the spring hook.<br>o When removing the tension release bushing, wedge a ϕ8.5 (0.337") to 11.5 mm (0.453") hammering bar from the side face of the arm, and push out the bushing in the direction of arrow Ⓑ. | o Fit the tension release bushing so that the tension release arm moves smoothly without play. Make sure that the thread trimming cam shaft turns smoothly and can move in the axial direction.<br>o When fixing tension arm (A) and (B), refer to "DISASSEMBLY/ASSEMBLY PROCEDURES (49) Disassembling the components of the intermediate presser lifting mechanism CAUTION IN ASSEMBLY." |

**(51) Disassembling the components of the intermediate presser driving mechanism**

1) Set the air pressure to 0 kg/cm$^2$.
2) Remove setscrew ❶, and then remove the intermediate presser.
3) Loosen the nut of the intermediate presser adjusting screw. Then remove the intermediate presser adjusitng screw, intermediate presser guide bar and the intermediate presser spring.
4) Remove three setscrews ❷. Then remove intermediate presser link (A), the intermediate presser L-shaped link, intermediate presser positioning link and intermediate presser link (B).
5) Loosen setscrew ❸ and then the intermediate presser guide bracket.
6) Pull up the intermediate presser bar until you have completely removed it.

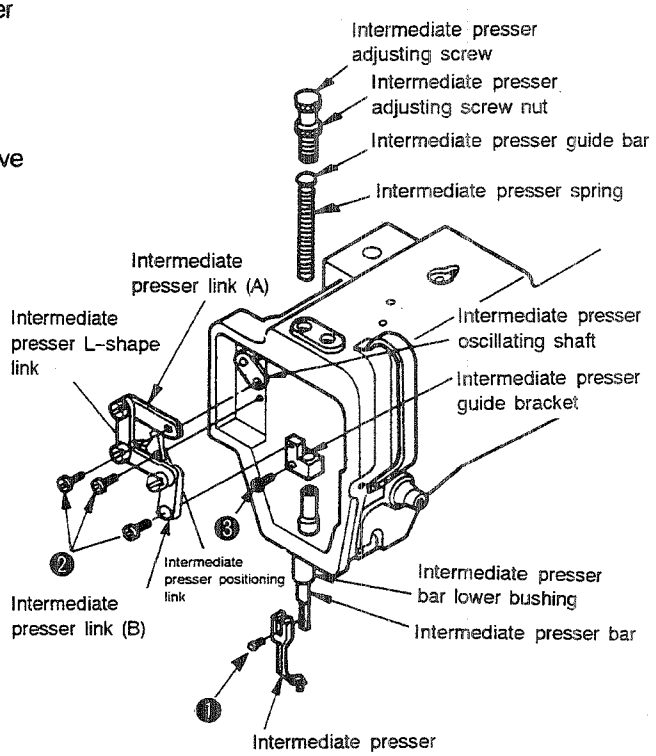



Fig. 5-51-1

7) Remove oil wick ❹ in the direction of arrow Ⓐ.
8) Remove nut ❺, and then remove washer ❻, the intermediate presser rod connecting pin and the intermediate presser rod connecting shaft.
9) Loosen setscrew ❼, and remove the intermediate presser rod arm.
10) Loosen the two setscrews retaining the thrust collar. Then remove the thrust collar.

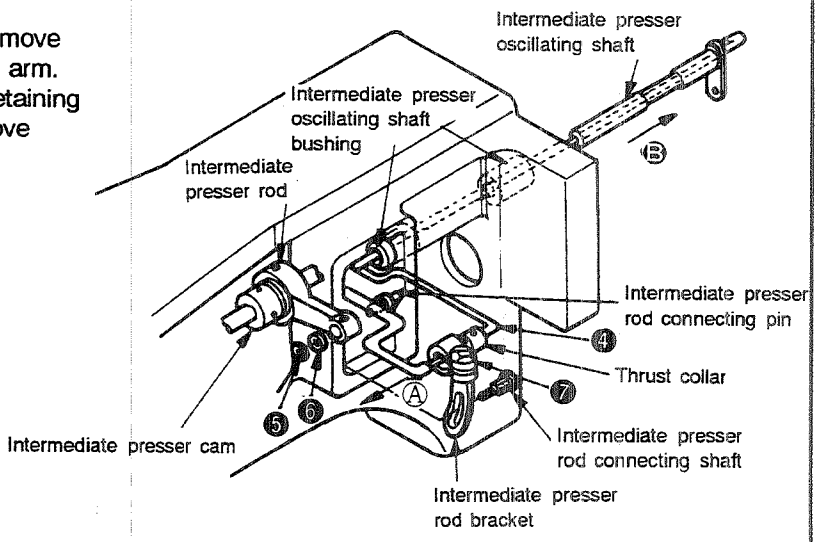



Fig. 5-51-2

## CAUTIONS IN DISASSEMBLY

- Do not remove the intermediate presser bar lower bushing.
  If it has been removed, apply LOCK-TITE No. 242 around the bushing after removing any residual grease. Then assemble it so that the distance specified below is obtained.

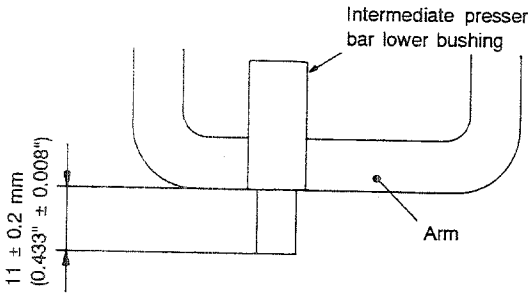



Fig. 5-51-3

- Do not remove the intermediate presser oscillating shaft bushing. (It is fixed using LOCK-TITE.)
  If it has been removed, apply LOCK-TITE No. 242 around the bushing after removing any residual grease. Then assemble it so that the distance specified below is obtained.

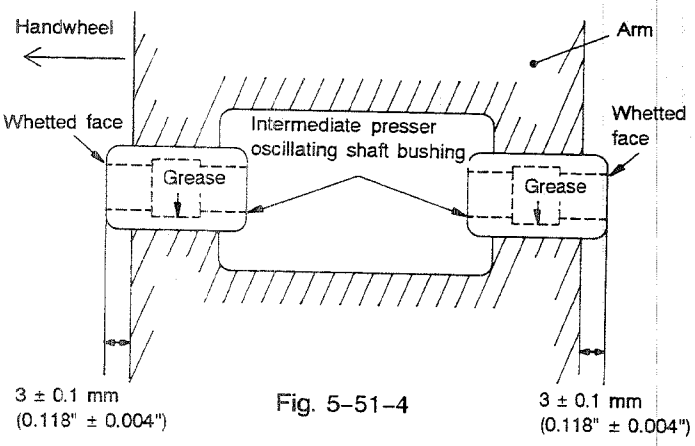



Fig. 5-51-4

## CAUTIONS IN ASSEMBLY

- Assemble the intermediate presser bar, intermediate presser guide bracket and the intermediate presser adjusting screw, referring to steps 1) and 2) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."
- Apply grease to the abrasive part of intermediate presser link (A), the intermediate presser L-shaped link, intermediate presser link (B), the intermediate presser positioning link and the intermediate presser guide bracket.
- If the specified distance of 11 (0.433") ± 0.2 mm (0.008") is not obtained, the bottom of the intermediate presser may not be able to be fixed properly.
- Be sure of the following when installing the intermediate presser oscillating shaft.
  1) Apply the grease to the hollowed section in the center of the inside of intermediate presser oscillating shaft bushing.
  2) Fix the thrust collar so that its whetted face faces toward the intermediate presser oscillating shaft bushing. Additionally, the thrust collar must be fixed using two setscrews so that the intermediate presser shaft is allowed to turn smoothly without play.
- Fix the intermediate presser rod bracket referring to step 4) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."
- Install the intermediate presser rod connecting shaft referring to the "STANDARD ADJUSTMENTS (21) Vertical stroke of the intermediate presser."
- When fixing the intermediate presser cam in its standard position, refer to steps 2) and 3) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."
- Pass oil wick ❹ through the intermediate presser oscillating shaft. Then fold the end protruding from the shaft, and insert the folded end into the shaft as shown in Fig. 5-51-5.

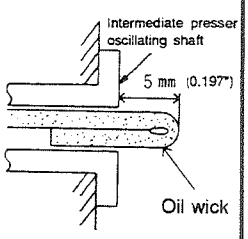



Fig. 5-51-5

(52) **Disassembling the slide plate bearing and the work clamp slide plate (S type only)**

1) Remove two setscrews ❶, and then remove the feeding frame arm.
2) Remove four setscrews ❷, and then remove work clamp slide plate bracket (right), work clamp slide plate bracket (left), the work clamp foot slide plate, the slide plate bearing and the work clamp slide plate.
3) Remove four setscrews ❸, and then remove the slide plate stoppers.

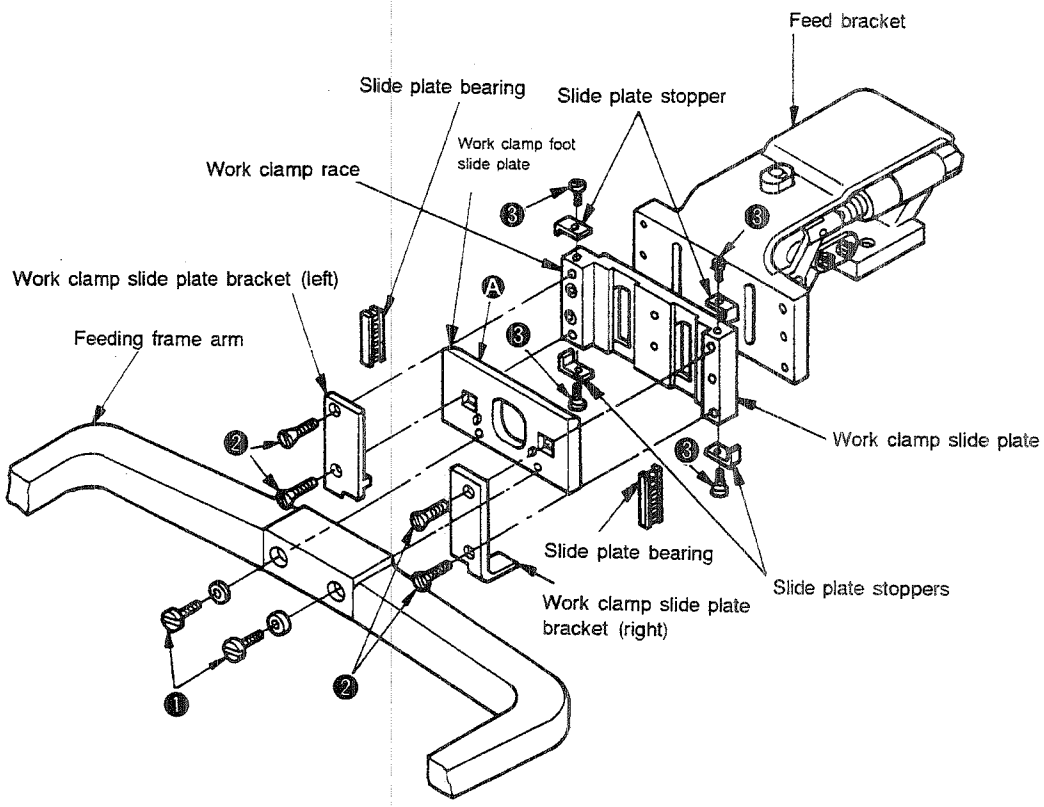



Fig. 5-52-1

## CAUTIONS IN DISASSEMBLY

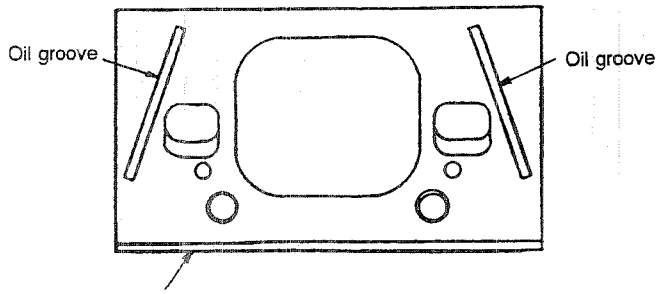



Fig. 5-52-2

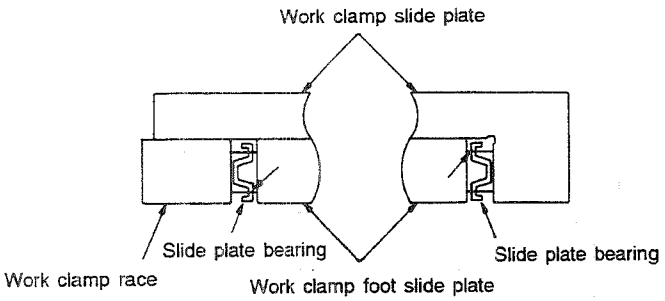



Fig. 5-52-3

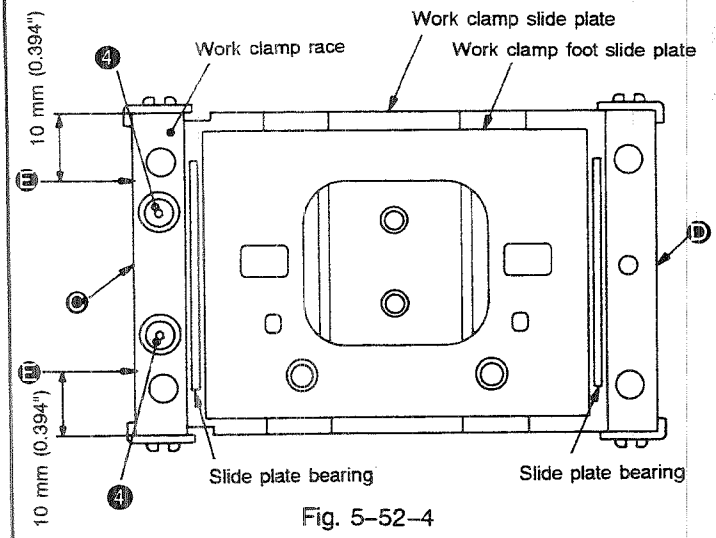



Fig. 5-52-4

**(Caution)**
**Setscrews ❹ have already been properly adjusted, so do not loosen them.**

## CAUTIONS IN ASSEMBLY

- When attaching the work clamp slide plate, be sure to fill the oil grooves in face Ⓐ with ESSO Templex N3 (grease).
  Additionally, apply ESSO Templex N3 to all abrasive parts.

- When installing the slide plate bearing:
  Install it so that side Ⓑ fits to the work clamp foot slide plate. Be sure to apply ESSO Templex N3 (grease) to the entire surface of the bearing.

- When installing the slide plate stopper:
  Fix the slide plate stopper so that the curved part of the stopper comes in close contact with race Ⓒ and Ⓓ of the work clamp slide plate.
- If setscrews ❹ have been loosened:
  Be sure to tighten setscrews ❹ while applying a 10 kg load to each of two points Ⓔ of the work clamp race.
- When tightening setscrews ❶:
  Be sure to tighten the setscrews so that the feeding frame comes in close contact with the feed plate when the feeding frame comes down. (See Fig. 5-40-1.)

(53) **Removing travelling cover (A)**

1) Remove the feed plate. (Refer to the "STANDARD ADJUSTMENTS (40).")
2) Remove the throat plate auxiliary cover, travelling cover (B), feed bracket auxiliary cover (right), feed bracket auxiliary cover (left), feed bracket cover (right) and feed bracket cover (left). (Refer to steps 3), 6), 7) and 8) of the "DISASSEMBLY/ASSEMBLY PROCEDURES (55).")
3) Remove the spring and metal fitting of travelling cover (A).
4) Draw out travelling cover (A) in the direction of arrow Ⓓ and then remove it.

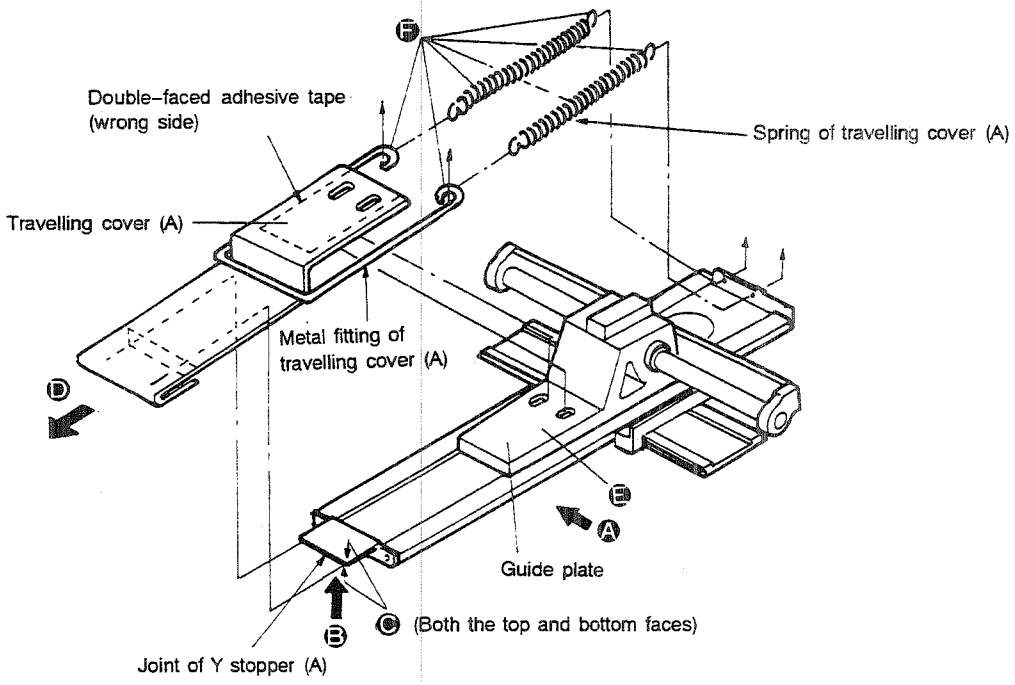
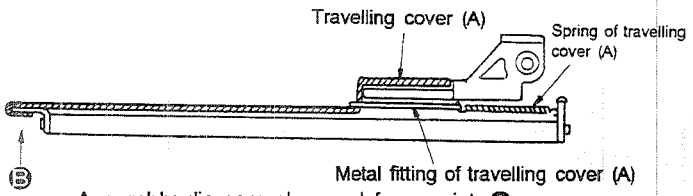



Fig. 5-53-1

## CAUTIONS IN DISASSEMBLY

- Be sure not to scratch the spring of travelling cover (A).
- Travelling cover (A) is fixed with the guide plate using the double-faced adhesive tape.
- Travelling cover (A) is fixed with the joint of Y stopper (A) by point C using a rubber adhesive agent.




Assembly diagram observed from point Ⓐ

Fig. 5-53-2

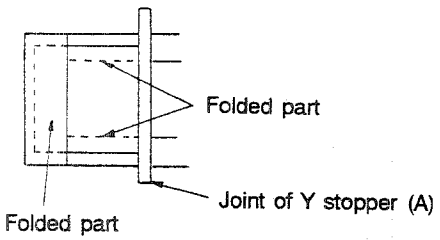



Figure observed from point Ⓑ

Fig. 5-53-3

## CAUTIONS IN ASSEMBLY

- Apply the rubber adhesive agent to point Ⓒ of the joint of Y stopper (A) after any residual grease has been wiped off. Then insert the joint of Y stopper (A) into the folded part of travelling cover (A).
- Remove any residual grease from part Ⓔ of the guide plate. Then, fix the guide plate with travelling cover (A) with double-faced adhesive tape, while fitting the tapped hole in the guide plate with the bored hole in traveling cover (A). At this time, take care not to crumple travelling cover (A).
- Be sure to hook the spring of travelling cover (A) so that the cover hook faces upward.
- Apply grease to the metal fitting of travelling cover (A) and part Ⓕ of the spring of travelling cover (A).

**(54) Disassembling the Y-axis feed stepping motor and the Y motor base**

1) Remove the two motor stud bolts.
2) Remove setscrews ❶, and then remove the Y-axis feed stepping motor.
3) Remove setscrews ❷, and then remove the Y motor base.

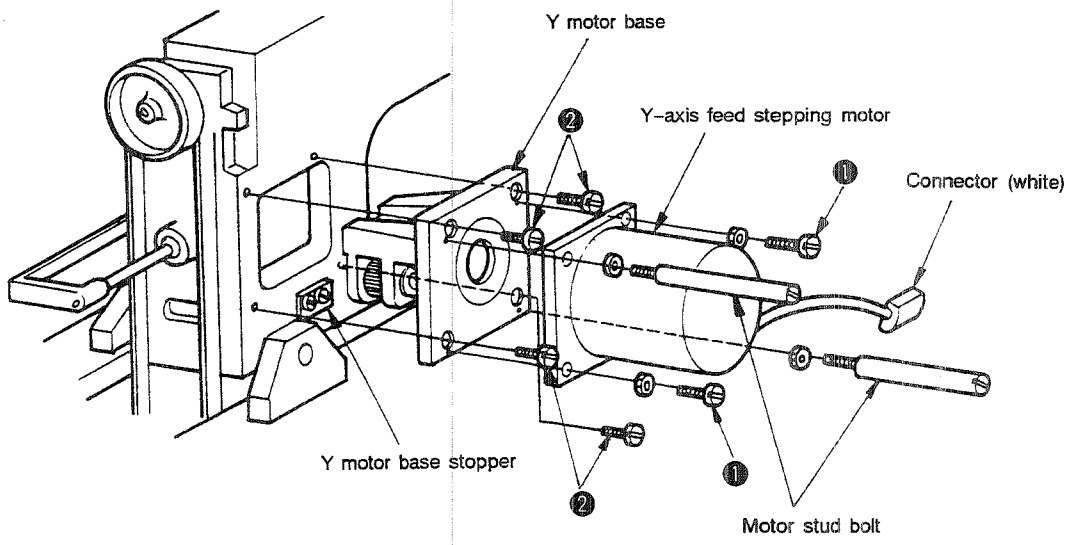


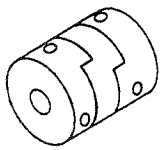

Fig. 5-54-1

* For the AMS-220C, the stepping motor, coupling, system ROM (4) are combined as shown in the table below.

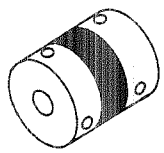
| Sewing machine | | X direction | | Y direction | | Indication of system ROM (4) |
|---|---|---|---|---|---|---|
| | | Stepping motor | Coupling | Stepping motor | Coupling | |
| ① | S type<br>B type<br>Preceding type | B25292200BA | B25372200A0<br>Iron separation type (a) | B25292200BB | B2538220000<br>Aluminum and rubber separation type (c) | 064 |
| ② | S type<br>B type<br>Later type | B2529220ABA<br>Mark "A" is printed on the connector. | | B2529220ABB<br>Mark "A" is printed on the connector. | B2538220A00<br>Aluminum and rubber separation type (with holes) (d) | 064A and beyond |
| ③ | L type<br>T type | | B2537220A00<br>Aluminum and rubber integral type (b) | | | 074 and beyond |

(Shape of the coupling)

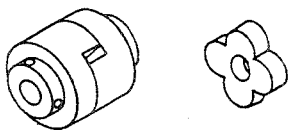
(a)



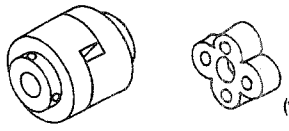
(b)



(c)



(d)



## CAUTIONS IN DISASSEMBLY

- The Y-axis feed stepping motor and the coupling changes in accordance with the type of sewing machine. See the table attached with an asterisk (*) shown on the page 140.
- Never loosen the setscrews of the Y motor base stopper.
- Do not remove the coupling fixed to the shaft of the Y-axis feed stepping motor.

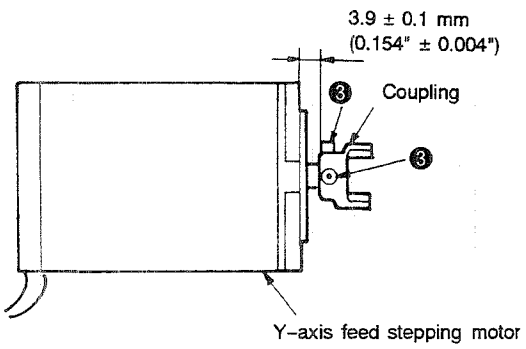



Fig. 5-54-2

- The Y motor base of the preceding types of sewing machine is installed in the two different ways.
- Do not remove the Y driving gear and coupling fixed to the Y drive shaft to the Y motor base.

Type 1

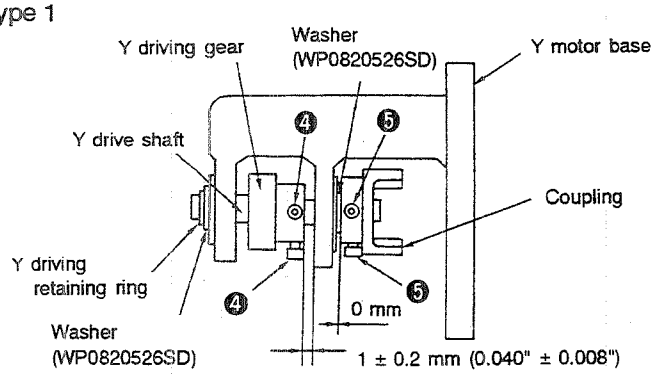



Fig. 5-54-3

Type 2

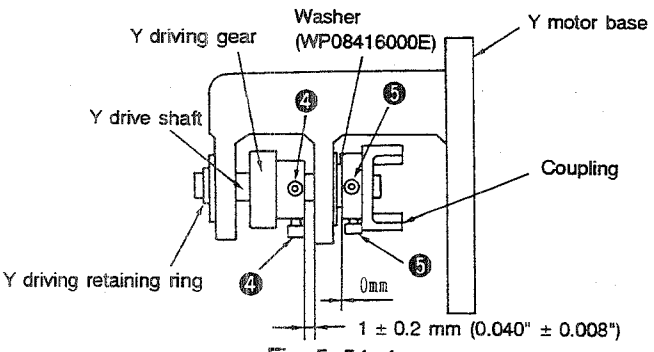



Fig. 5-54-4

## CAUTIONS IN ASSEMBLY

- When fixing the Y motor base, refer to the "STANDARD ADJUSTMENTS (32)."
- If the coupling of the Y-axis feed stepping motor has been removed, apply LOCK-TITE No. 242 to setscrews ❸, and fix the coupling so that a 3.9 ± 0.1 mm (0.154" ± 0.004") clearance is obtained between the coupling and the installation face of the Y-axis feed stepping motor.
- If the coupling and the Y driving gear have been removed, apply LOCK-TITE No. 242 to setscrews ❹ and ❺. Then fix the Y driving gear and the coupling so that a 1 ± 0.2 mm (0.039" ± 0.008") clearance is obtained between the Y motor base and the Y driving gear, and so that a 0 mm clearance is obtained between the Y driving shaft retaining ring and the coupling.
- Type 1 (Fig. 5-54-3)
  Type 2 (Fig. 5-54-4)
  Type 1 is an improved model of Type 2.

(55) **Disassembling the X-axis feed stepping motor and the X-Y table**

1) Remove the feed plate. (Refer to the "STANDARD ADJUSTMENTS (40)".)
2) Remove two setscrews ❶, and then remove the feed bracket.
3) Remove four setscrews ❷, and then remove the throat plate auxiliary cover.
4) Remove setscrew ❸, and then remove the thread trimming link.
5) Remove four setscrews ❹, and then remove the throat plate.
6) Remove two setscrews ❺ and two setscrews ❻, and then remove travelling cover (B). (Refer to the "STANDARD ADJUSTMENTS (29)".)
7) Remove two setscrews ❼, and then remove the feed bracket auxiliary cover (right) and feed plate auxiliary cover (left).
8) Remove ten setscrews ❽, and then remove the feed bracket cover (right) and feed bracket cover (left).
9) Remove two travelling cover (A) springs and travelling cover (A) metal fitting. (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (53)".)
10) Remove travelling cover (A). (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (53)".)

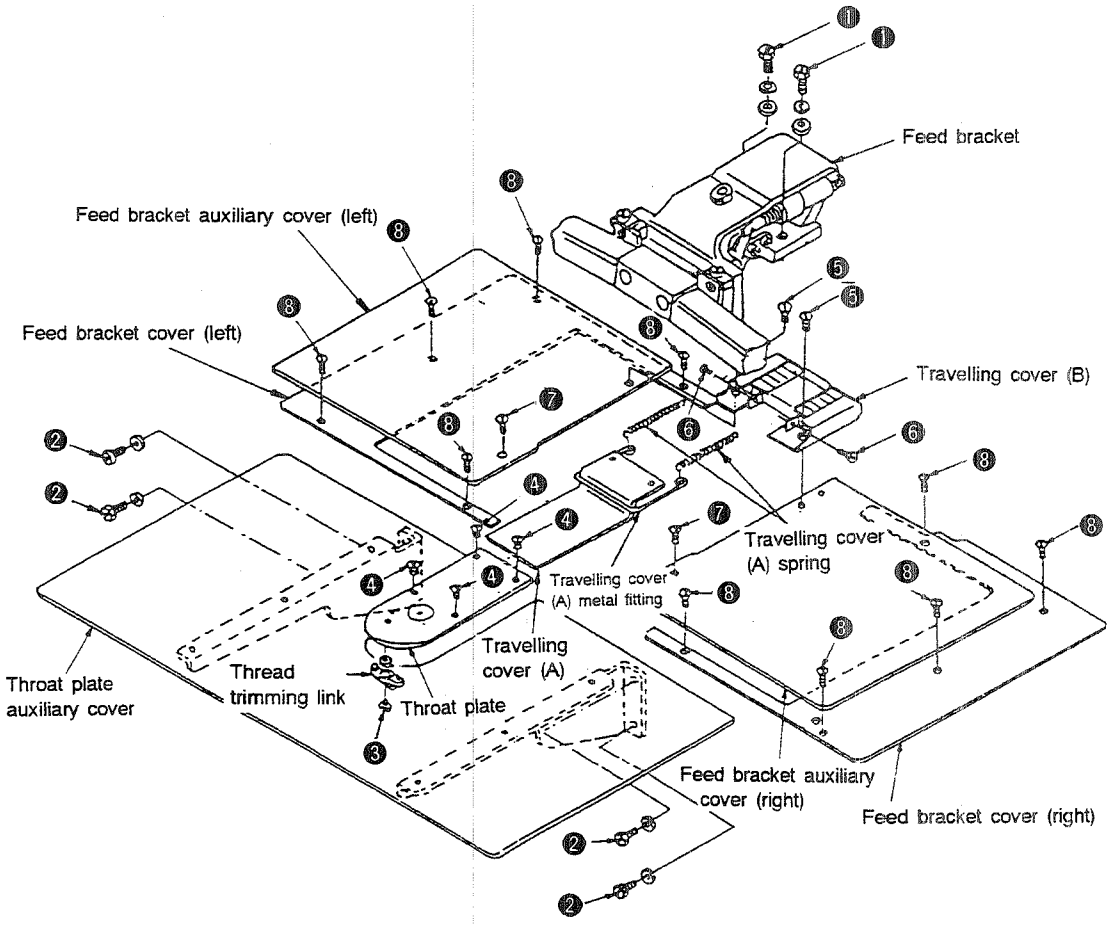



Fig. 5-55-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| o Be sure not to scratch the spring of travelling cover (A). | o When installing travelling cover (A), the spring of travelling cover (A) and the metal fitting of travelling cover (A), refer to the "DISASSEMBLY/ ASSEMBLY PROCEDURES (53)."<br>o When installing the feed bracket (left/right) and travelling cover (B), refer to the "STANDARD ADJUSTMENTS (29)."<br>o When installing the throat plate auxiliary cover, refer to the "STANDARD ADJUSTMENTS (25)."<br>o When installing the feed plate, refer to the "STANDARD ADJUSTMENTS (40)."<br>o Take care not to allow oil or other stains to attach on the section located between the feed bracket cover and the feed bracket auxiliary cover. Oil or other stains accumulated there will cause an extra load to the stepping motor of the feed, resulting in step-out. |

11) Remove the shuttle driver shaft. (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (57).")
12) Remove four setscrews ⑨, and then remove the X-axis feed stepping motor.
13) Remove two setscrews ⑩, and then remove the X guide shaft.
14) Remove lock nut ⑬ and setscrew ⑭.
15) Remove eight setscrews ⑪ and four setscrews ⑫, and then remove the X-Y table.

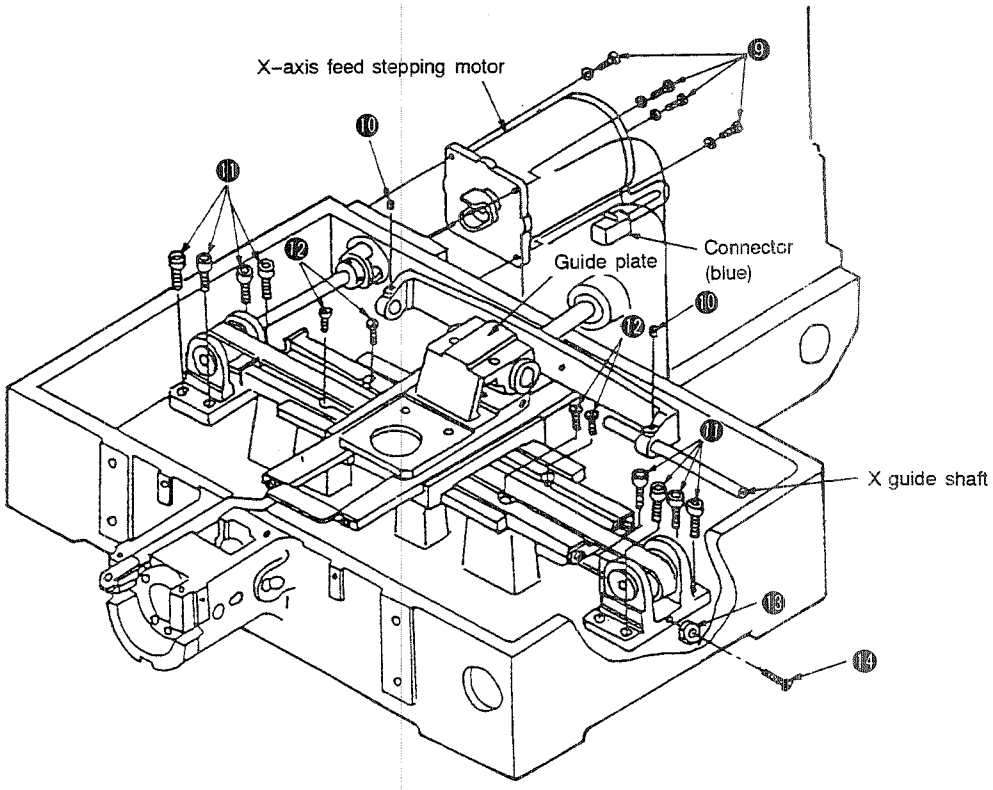
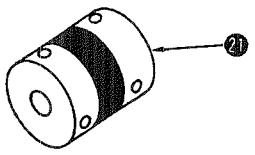
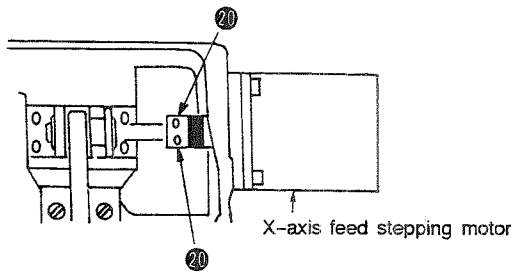



Fig. 5-55-2

**(Caution)**

**For the L type and T type of sewing machines, the aluminum and rubber integral type ㉑ of coupling is equipped.**
**Loosen screws ⑳ in the coupling, and remove the stepping motor.**



## CAUTIONS IN DISASSEMBLY

The X-axis feed stepping motor is different in accordance with the preceding and later models of the S type and B type of sewing machines.
See the table attached with an asterisk (*) shown on the page 140.

- Be careful not to scratch or lose the X-Y table bearing.

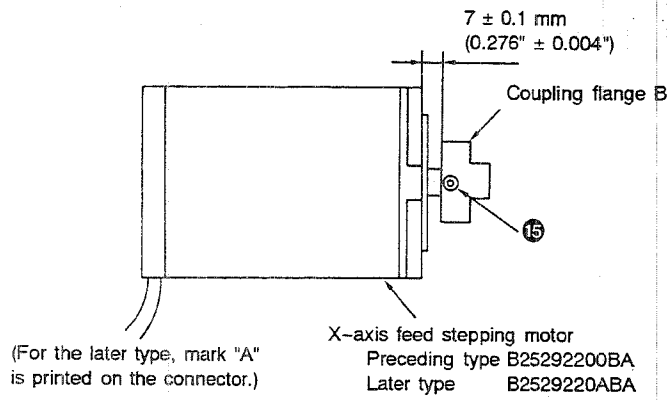



Fig. 5-55-3

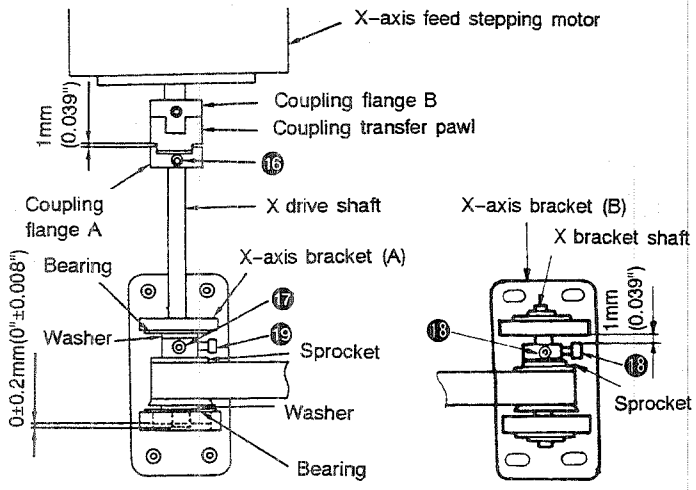



Fig. 5-55-4

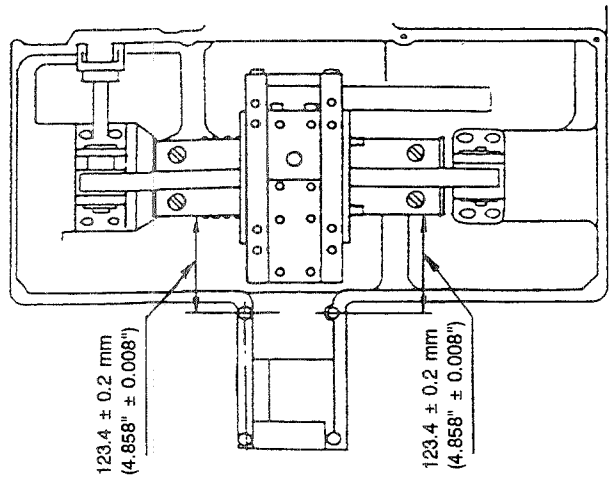



Fig. 5-55-5

## CAUTIONS IN ASSEMBLY

- If the coupling flange B of the X-axis feed stepping motor is removed, apply LOCK-TITE No. 242 onto screw ⑮ and adjust the clearance provided between the installing plane of the X-axis feed stepping motor and coupling flange B to 7 ± 0.1 mm (0.276" ± 0.004").
- If the coupling flange A of the X-Y table is removed, apply LOCK-TITE No. 242 to screw ⑯ and press the coupling transfer pawl against the coupling flange B to eliminate a clearance between them. Now, adjust so that a clearance of 1 mm (0.039") is provided between the coupling transfer pawl and the coupling flange A. Then fix them securely. (Apply grease to the clearance.)
- If the sprocket is removed from the X drive shaft, apply LOCK-TITE No. 242 onto screws ⑰ and ⑲. Then adjust so that a 0 ± 0.2 mm (0" ± 0.008") clearance is provided between the end face of the X driving shaft and the end face of the bearing.
- If the sprocket has been removed from the X bracket shaft, apply LOCK-TITE No. 242 to setscrews ⑱, and then fix the sprocket so that a 1 mm (0.039") clearance is obtained between the sprocket and the X-axis bracket (B).
- Position and fix the X-Y table according to Fig. 5-55-5.
  (Standard throat plate setscrew hole dia.: Setscrew hole dia. 11/64 pitch 40)
  After the X guide shaft has been installed, move the guide plate laterally and longitudinally to make sure that the guide plate can be moved smoothly.
- To adjust the belt tension, refer to the "STANDARD ADJUSTMENTS (31)."

(56) **Disassembling the main shaft**

1) Remove the handwheel and the generator stator (synchronizer). (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (43).")
2) Remove the crank rod cover. (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (45).")
3) Remove two setscrews ❶, and then remove the crank balancer.
4) Remove counterweight setscrews ❷ and ❸, and then remove the counterweight.
5) Loosen two intermediate presser cam setscrews ❹, two bobbin winder driving wheel setscrews ❺, two main shaft thrust collar setscrews ❻, two thread trimming cam thrust collar setscrews ❼, and two thread trimming cam setscrews ❽.
6) Lightly tap part Ⓐ with a brass rod to remove the main shaft together with the main shaft rear bushing.

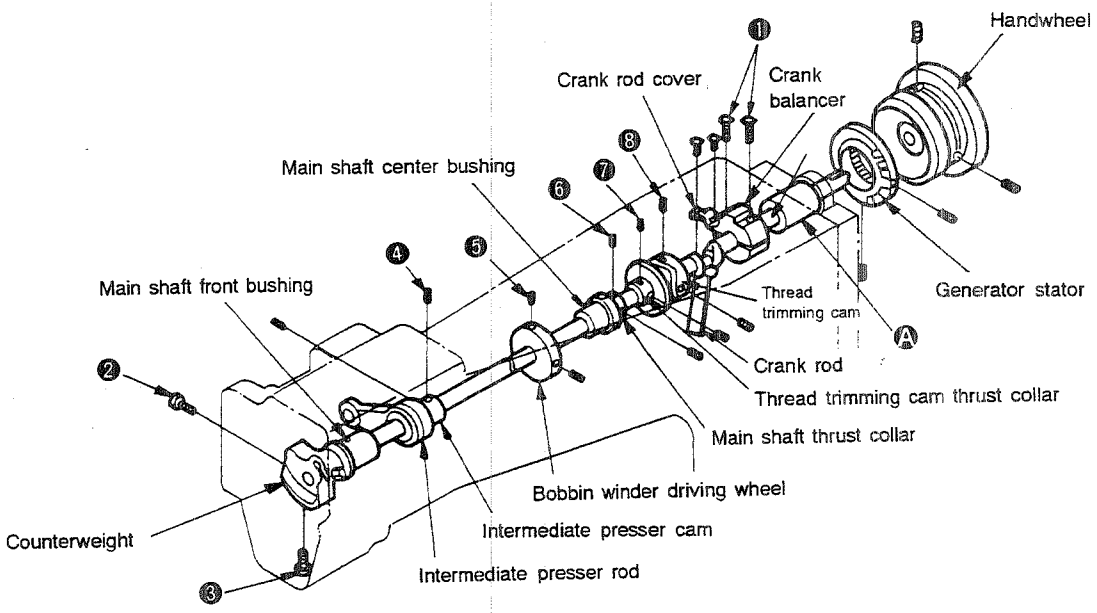



Fig. 5-56-1

## CAUTIONS IN DISASSEMBLY

o Be sure to use a brass rod or the like to tap part Ⓐ.

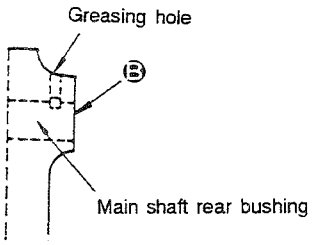



Fig. 5-56-2

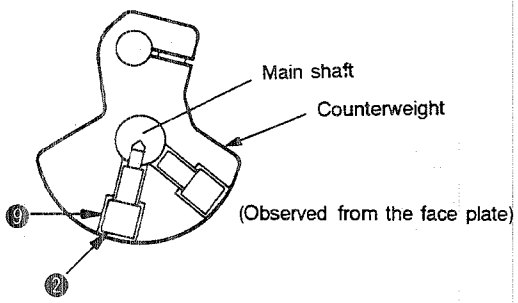



Fig. 5-56-3

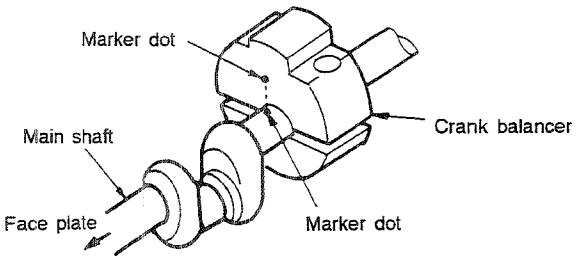



Fig. 5-56-4

## CAUTIONS IN ASSEMBLY

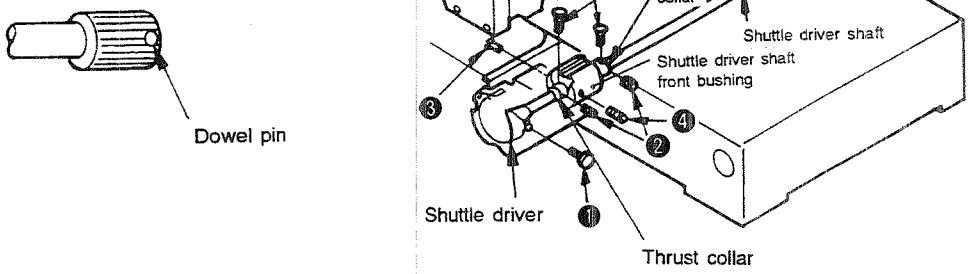
1) When driving in the main shaft rear bushing, be sure to align the greasing hole in the arm with the greasing hole in the main shaft rear bushing. In addition, be sure that the end face of the main shaft rear bushing is flush with the end face of the arm at face Ⓑ. (Fig. 5-56-2)
2) When fixing the counterweight, be sure to insert setscrew ② into screw hole ⑨, and fix so that the taper of the top end aligns with the taper hole in the main shaft. (Fig. 5-56-3)
3) Install the main shaft thrust collar referring to the "STANDARD ADJUSTMENTS (35)." (Position the oil groove so that it faces toward the center bushing.)
4) When fixing the following parts, refer to the corresponding "STANDARD ADJUSTMENTS."
   - o Intermediate presser cam ..... STANDARD ADJUSTMENTS (20)
   - o Bobbin winder driving wheel ..... STANDARD ADJUSTMENTS (24)
   - o Thrust collar of the thread trimming cam ..... STANDARD ADJUSTMENTS (15)
   - o Thread trimming cam ..... STANDARD ADJUSTMENTS (15)
5) When fixing the crank rod cover, refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (45)."
6) When fixing the crank balancer, make sure that the marker dot on the main shaft aligns with the marker dot on the crank balancer. (Fig. 5-56-4)
7) When installing the handwheel and the generator stator, refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (43)."

(57) **Removing the shuttle driver shaft**

1) Loosen shuttle driver setscrew ❶, and then remove the shuttle driver.
2) Loosen thrust collar setscrews ❷, and then draw out the shuttle driver shaft in a backward direction.

**(Caution)**

**Never remove the dowel pin from the shuttle driver shaft gear.**



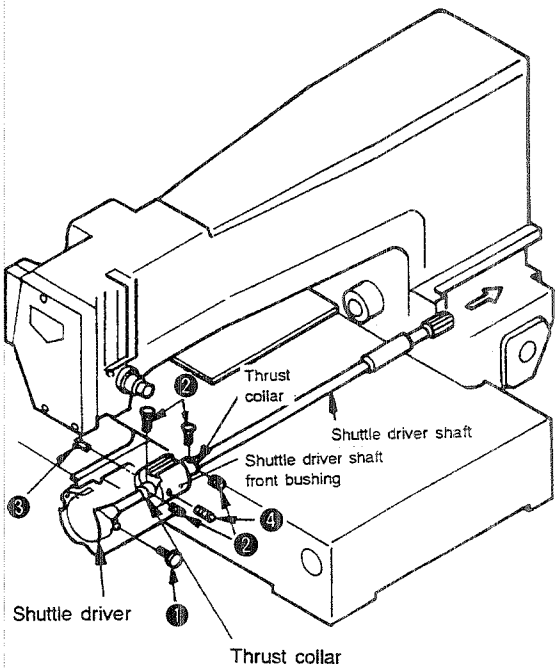




Fig. 5-57-1

## CAUTIONS IN DISASSEMBLY

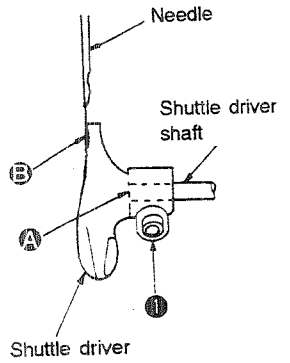



Fig. 5-57-2

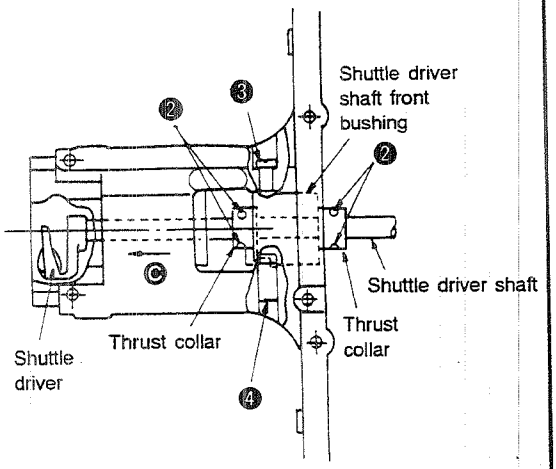



Fig. 5-57-3

## CAUTIONS IN ASSEMBLY

1) When assembling the same gear, be sure to assemble it so that the contact face of the teeth are in exactly the same position as before in order to prevent the gear from making a loud noise.
2) Temporarily fix the shuttle driver in a position where the shuttle driver is flush with the shuttle driver shaft at face Ⓐ.
3) Loosen setscrew ❸, and turn adjusting shaft ❹ so that the shuttle driver shaft front bushing moves in the direction of arrow Ⓒ and will go no further. Then tighten setscrew ❸.
4) Move the shuttle driver shaft forward or backward to adjust the position of the shuttle driver shaft so that the shuttle driver needle receiving point Ⓑ aligns with the center of the needle. Then fix the shuttle driver shaft using setscrews ❷, while pressing the two thrust collars toward the shuttle driver shaft front bushing.
5) Make sure that there is no longitudinal play in the shuttle driver shaft.

## 5-2. Greasing parts

- Supply grease when a grease-involving part has been disassembled or once every other year.
- Grease to be used:
  Lithium-based grease No. 2

| Manufacturer | Name of grease |
|---|---|
| ESSO | Listan 2, Beacon 2 |
| SHELL | Albania |
| NIPPON SEKIYU | Multinock 2, Epinock 2 |
| KYODO SEKIYU | Rezonix 2 |
| IDEMITSU KOSAN | Koronex 2 |

| Manufacturer | Name of grease |
|---|---|
| ESSO | Templex N3 |

- Parts to be greased
  If no grease pump is available, it is advisable to use a plastic oiler or an injector with the needle removed.

| Item | Details | Remarks |
|---|---|---|
| Parts to be greased | Y travelling shaft front bushing, inside<br>Y travelling shaft rear bushing, inside<br>Intermediate presser oscillating shaft bushing, inside<br>Intermediate presser oscillating shaft, abrasive faces<br>Intermediate presser oscillating shaft thrust collar, abrasive faces<br>Intermediate presser link hinge screw and each link, abrasive faces<br>Intermediate presser lifting link fulcrum shaft, abrasive parts<br>Intermediate presser lifting link, top end<br>Intermediate presser lifting link, abrasive parts<br>Intermediate presser lifting guide plate, abrasive parts<br>Shuttle race, needle components<br>Shuttle driver shaft rear bushing, needle components<br>Tension connecting rod, taper unit and abrasive parts<br>Tension release resetting spring, hook<br>Thread trimming cam, collar<br>Thread trimming cam roller, periphery and abrasive parts<br>X-Y table retainer and tracking faces<br>Y travelling shaft, periphery and rack face<br>Y driving gear<br>Bobbin winder adjusting components, abrasive parts<br>Travelling cover (A) spring, hook and periphery<br>Shuttle driver shaft thrust base, abrasive parts | ESSO Listan 2 or the equivalent |
| | Sliding plane of the flange of the X side coupling (S and B types)<br>Work clamp lever fulcrum shaft, abrasive parts<br>Work clamp lever, cylinder knuckle, abrasive parts<br>Work clamp lever, top end<br>Work clamp foot plate, abrasive parts<br>Presser plate, abrasive faces | ESSO Templex N3 |
| Parts related to greasing | Main shaft rear bushing<br>Bobbin winder shaft base, bearing | ESSO Listan 2 or the equivalent |
| | Work clamp foot slider bracket | ESSO Templex N3 |

## 5-3. Parts to be fixed by LOCKTITE paint

The machine is often started and stopped, so LOCKTITE paint is used to securely fix the screws which are likely to loosen easily.
When an assembly which includes the above-mentioned screws has been disassembled, completely remove the residual paint using a paint thinner, and re-assemble it using LOCKTITE paint after removing any moisture from the mating faces. (Use LOCKTITE NO. 242)
If it is hard to remove a screw which has been fixed using LOCKTITE paint, heat it using a torch lamp to help remove the screw.
The following components use LOCKTITE paint.

| Item | Details | | | Remarks |
|---|---|---|---|---|
| LOCKTITE paint applying parts | Part No. | Part Name | Quantity | Use the LOCKTITE No. 242 after removing any residual grease.<br><br>**(Caution)**<br>**For the two parts of whose part number are marked with asterisks (*), use LOCKTITE No. 242 after applying Rockwick primer T grade.** |
| | B2532220000* | Y travelling shaft front bushing | 1 | |
| | B2533220000* | Y travelling shaft rear bushing | 1 | |
| | B1605220000 | Intermediate presser oscillating shaft bushing | 2 | |
| | B1403280000 | Needle bar lower bushing | 1 | |
| | B1616220000 | Intermediate presser bar lower bushing | 1 | |
| | SB712000100 | Linear bushing | 2 | |
| | SS6150710SP | Intermediate presser positioning pin | 1 | |
| | NM6040003SC | Thread trimming solenoid locknut | 2 | |
| | B2410220000 | Thread trimming solenoid bracket | 1 | |
| | NM6040003SC | Wiper solenoid locknut | 2 | |
| | SS9151120CP | Presser plate fixing screw | 4 | |
| | SL4031091SC | Oil drain setscrew | 4 | |
| | SM6040802TP | Y driving gear setscrew | 2 | |
| | SM6040802TP | Sprocket setscrew | 4 | |
| | SS8150822TP | Screw of X coupling (S and B types) | 4 | |
| | SM8061002TP | Screw of X coupling (L and T types) | 4 | |
| | SM8061002TP | Screw of Y coupling | 4 | |
| | PT0301600SH | Shuttle driver shaft taper pin | 1 | |

(Caution)
**Never allow LOCKTITE paint to get into the bearings, or else the bearings may not function properly.**

## 5-4. Electrical parts

### 5-4-1. Adjusting the sewing speed

The sewing speed is specified according to the stitch length.
However, if the sewing speed is increased to more than the specified speed, defective feed (deformed pattern) will result.
If this happens, check the speed according to the Speed check (set value of "6-4. Rotary DIP switch" is "3."), and readjust the speed, if it has been found to be too fast, using the variable resistor (VR1 to VR5) on the I/F circuit board.

I/F circuit board

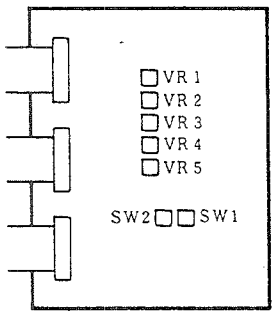
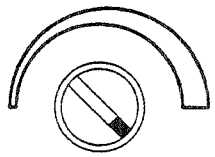



Fig. 1

| | | (Initial setting of the variable resistor) |
|---|---|---|
| VR1 |  | (Top) |
| VR2 |  | (Left) (Note 1) |
| VR3 |  | (Top) |
| VR4 |  | (Top) |
| VR5 |  | (To the end of the counterclockwise turn) |

Fig. 2

Maximum speed limitation knob/Bobbin winder switch



(To the end of the clockwise turn) Fig. 3

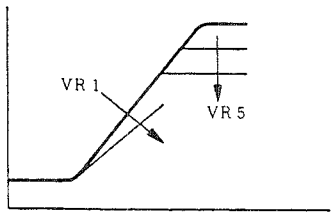
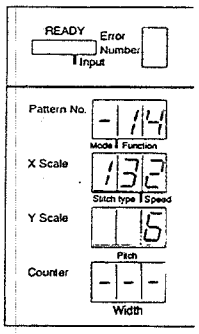



Fig. 4

1) Set switch SW2 on the I/F circuit board (Fig. 1) to 3 on the scale.
2) Set variable resistor VR1 to VR5 as shown in the Fig. 2.
   The external maximum speed limitation knob (Fig. 3) should be set to MAX. (Note 1)
3) When the [power switch] is turned ON, all of the numerical displays will show "-", and the speed check program will be executed.
4) Lower the feeding frame by depressing the [Feeding frame switch]. Then depress the [Start switch] so that the sewing machine starts running.
5) The indication on the operation panel is "02" (Pattern No.).
6) Adjust the sewing speed to 180 ± 2 s.p.m. using variable resistor VR3.
7) The machine stops when the [Stop switch] is pressed.
8) Carry out the procedures described in steps 4) and 7) so that indication "20" is shown on the operation panel.
9) Adjust the sewing speed to 1,950 ± 10 s.p.m. using variable resistor VR1.
10) Carry out the procedure described in step 7) so that the machine stops. Then carry out the procedures described in steps 4) and 7) so that indication "14" is shown on the operation panel.
11) Adjust the sewing speed to 1,325 ± 10 s.p.m. using variable resistor VR2.
12) Carry out the procedure described in step 7) so that the machine stops. Then carry out the procedures described in steps 4) and 7) so that the indication "20" is shown on the operation panel.
13) Adjust the sewing speed to 1,925 ± 10 s.p.m. using variable resistor VR5.
14) Carry out the procedure described in step 7) so that the machine stops. Then carry out the procedures described in steps 4) and 7) so that the indication "04" is shown on the operation panel.
15) Adjust the sewing speed to 325 ± 10 s.p.m. using variable resistor VR4.

16) Check whether the specified sewing speed is obtained at each indication on the operation panel as shown in the table below. This completes the sewing speed adjustments.

| Numeric indication | Sewing speed (s.p.m.) |
|---|---|
| 02 | 180 ± 2 |
| 04 | $350^{+0}_{-50}$ |
| 06 | $550^{+0}_{-50}$ |
| 11 | $1{,}050^{+0}_{-50}$ |
| 14 | $1{,}350^{+0}_{-50}$ |
| 16 | $1{,}550^{+0}_{-50}$ |
| 18 | $1{,}750^{+0}_{-50}$ |
| 20 | $1{,}950^{+0}_{-50}$ |



(In the case of 1,326 s.p.m.)

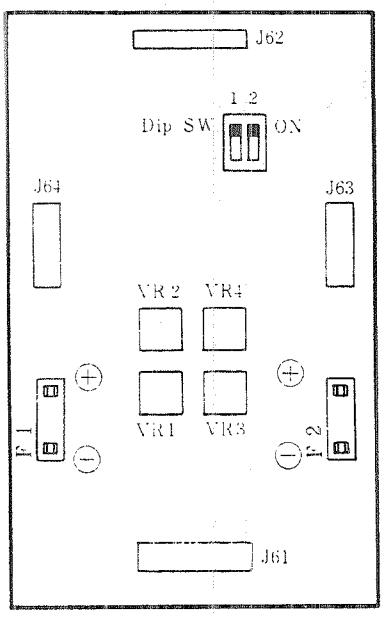
To wholly decrease the sewing speed, use the variable resistor VR1. To decrease the maximum sewing speed, use the variable resistor VR5. (Fig. 4)

**(Caution 1)**
**If the sewing speed cannot be adjusted to a desired value, turn the initial position of the variable resistor VR2 clockwise division after division and re-adjust the sewing speed. (See Fig. 2)**

### 5-4-2. Adjusting the PMDC circuit board current

Two stepping motors are incorporated in the machine to actuate the feed mechanism, one for the X-axis feed, the other for the Y-axis feed. Each motor is independently adjusted on the PMDC circuit board. If the current is not properly adjusted, the power of the stepping motor may drop or generate excessive heat, the PMDC circuit board may generate heat or break, or the fuse may blow.

(1) Checking the current




**(Caution)**
**The PMDC used with the AMS-220C uses a high supply voltage. So, to assure safety, never turn ON the power to the machine with the fuse removed excluding the case where a tester is connected to the circuit board.**

Do not turn the current adjusting variable resistor (VR1 to VR4) when only the checking procedure is being carried out.
The connectors of jumper plugs J61, J63 and J64 have to be connected. The connector for J62 does not have to be connected when checking the current.

1) X-axis stepping motor (The X-axis stepping motor current flows through fuse F2).
   ① Be sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON side.
   ② Remove fuse F2. (Be careful not to remove circuit revision silk F-1 in place of fuse F2. They look similar and are likely to cause confusion.)
   ③ Connect the ammeter (10Adc class alligator type) to the fuse box of fuse F2. (Connect the munus ⊖ terminal to the J61 side and the plus ⊕ terminal to the opposite side.)
   ④ Be sure that DIP switches SW1 and SW2 are set to their ON side, and then turn ON the power switch.
   ⑤ If the ammeter indicates a current value within the range 2 ± 0.1A, the electric current value of the X-axis stepping motor is normal.
   ⑥ Step DIP switch SW2 to its OFF side.
   ⑦ If the ammeter indicates a current value within the range 5 ± 0.1A, the electric current value of the X-axis stepping motor is normal.
   ⑧ Set DIP switch SW2 once more to its ON side, and check for the specified value 2 ± 0.1A on the ammeter.

**(Caution)**
**For normal operation, DIP switches SW1 and SW2 should be set to their ON side.**

This completes the checking of the electric current of the X-axis stepping motor.
If the electric current value is out of the specified range, follow the procedure described in step (2)-1) "Adjusting the electric current and making an adjustment."

2) Y-axis stepping motor (The Y-axis stepping motor current flows through fuse F1.)

① Be sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON side.

② Remove fuse F1. (Be careful not to remove circuit revision silk F-1 in place of fuse F1. They look similar and are likely to cause confusion.)

③ Connect the ammeter (10Adc class alligator type) to the fuse box of fuse F1. (Connect the minus ⊖ terminal to the J61 side and the plus ⊕ terminal to the opposite side.)

④ Be sure that DIP switches SW1 and SW2 are set to their ON side, and then turn ON the power switch.

⑤ If the ammeter indicates a current value within the range 2 ± 0.1A, the electric current value of the Y-axis stepping motor is normal.

⑥ Set DIP switch SW1 to its OFF side.

⑦ If the ammeter indicates a current value within the range 5 ± 0.1A, the electric current value of the Y-axis stepping motor is normal.

⑧ Set DIP switch SW1 once more to its ON side, and check for the specified value 2 ± 0.1A on the ammeter.

**(Caution)**

**For normal operation, DIP switches SW1 and SW2 should be set to their ON side.**

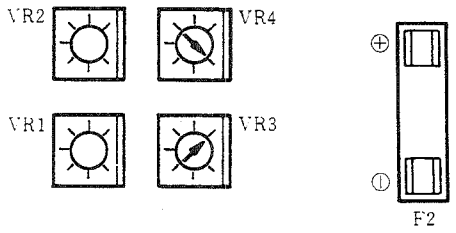
This completes the checking of the electric current of the Y-axis stepping motor.

If the electric current value is out of the specified range, follow the procedure described in step (2)-2) "Adjusting the electric current and making an adjustment."

(2) Adjusting the electric current

The connectors of jumper plugs J61, J63 and J64 have to be connected. The connector for J62 does not have to be connected when only the adjusting procedure is being carried out.

1) Adjusting the electric current of the X-axis stepping motor.




① Make sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON position.

② Use variable resistor VR3 and VR4 to adjust the electric current of the X-axis stepping motor.
Turn variable resistor VR3 clockwise until it will go no further, and then turn variable resistor VR4 counterclockwise until it will go no further (initial setting).

③ Remove fuse F2 (7A), and then connect the ammeter (10Adc class alligator type) to the fuse box of fuse F2. (Connect the minus ⊖ terminal to the J61 side and the plus ⊕ terminal to the opposite side.)

**(Caution)**

**The PMDC used with the AMS-220C uses a high supply voltage. So, to assure safety, never turn ON the power to the machine with the fuse removed excluding the case where a tester is connected to the circuit board.**

④ Turn ON the power switch

⑤ The value indicated on the ammeter is from approximately 0.5 to 0.7A. If the ammeter indicates 0A or more than 1A, the circuit board can be regarded as defective. Replace the circuit board.

⑥ Set DIP switch SW2 to its OFF position. Then turn variable resistor VR4, and adjust the current so that it is within 5 ± 0.1A.

⑦ Set DIP switch SW2 to its ON position. Then turn variable resistor VR3, and adjust the current so that it is within 2 ± 0.1A.

⑧ Reset DIP switch SW2 to its OFF position so as to check whether the specified range of the current value 5 ± 0.1A has been obtained. Once again reset DIP switch SW2 to its ON position so as to check whether the specified range of the current value 2 ± 0.1A has been obtained.

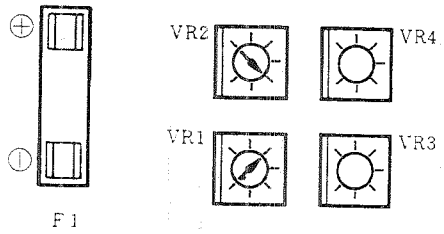
This completes the adjustment.

**(Caution)**

**Be sure to make adjustment for 2A after completing the adjustment for 5A. If you make the adjustments in the reverse order, the value adjusted may change.**

**After making the adjustment, be sure to set DIP switch SW2 to its ON position. Otherwise, heat may be generated, the fuse may blow, or the circuit board may become damaged.**

2) Adjusting the electric current of the Y-axis stepping motor




① Make sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON position.
② Use variable resistor VR1 and VR2 to adjust the electric current of the Y-axis stepping motor. Turn variable resistor VR1 clockwise until it will go no further, and then turn variable resistor VR2 counterclockwise until it will go no further (initial setting).
③ Remove fuse F1 (7A), and then connect the ammeter (10Adc class alligator type) to the fuse box of fuse F1. (Connect the minus ⊖ terminal to the J61 side and the plus ⊕ terminal to the opposite side.)

**(Caution)**

**The PMDC used with the AMS-220C uses a high supply voltage. So, to assure safety, never turn ON the power to the machine with the fuse removed excluding the case where a tester is connected to the circuit board.**

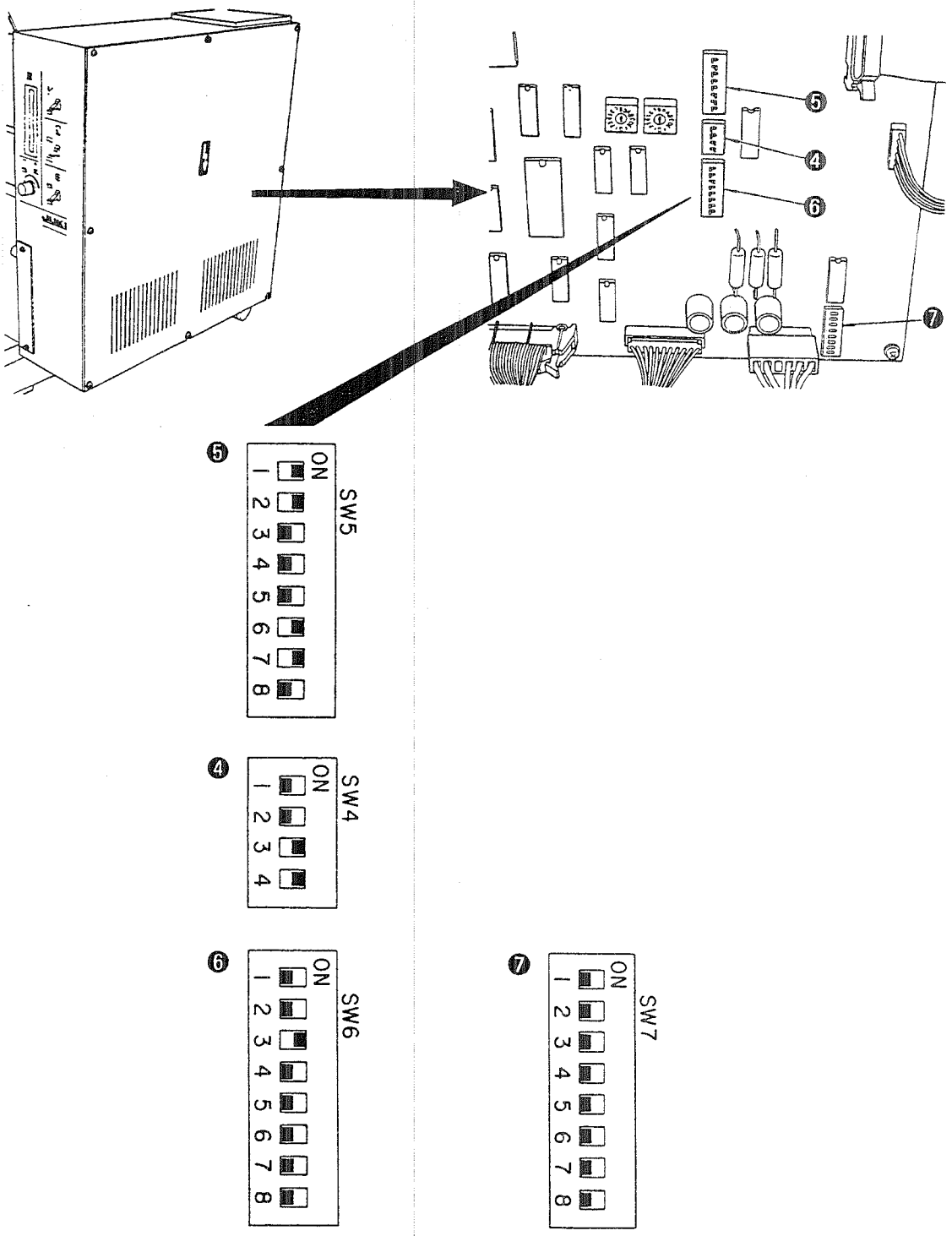
④ Turn ON the power switch.
⑤ The value indicated on the ammeter is from approximately 0.5 to 0.7A. If the ammeter indicates 0A or more than 1A, the circuit board can be regarded as defective. Replace the circuit board.
⑥ Set DIP switch SW1 to its OFF position. Then turn variable resistor VR2, and adjust the current so that it is within 5 ± 0.1A.
⑦ Set DIP switch SW1 to its ON position. Then turn variable resistor VR1, and adjust the current so that it is within 2 ± 0.1A.
⑧ Reset DIP switch SW1 to its OFF position so as to check whether the specified range of the current value 5 ± 0.1A has been obtained.
Once again reset DIP switch SW1 to its ON position so as to check whether the specified range of the current value 2 ± 0.1A has been obtained.

This completes the adjustment.

**(Caution)**

**Be sure to make the adjustment for 2A completing the adjustment for 5A. If you make the adjustments in the reverse order, the value adjusted may change.**
**After making the adjustment, be sure to set DIP switch SW1 to its ON position. Otherwise, heat may be generated, the fuse may blow, or the circuit board may become damaged.**

## 6. DIP SWITCHES




DIP switches SW5(8P), SW4(4P), SW6(8P), SW7(8P) which are used to select the function of the machine are mounted on the I/F circuit board.

**(Caution)**

1. **When the [power switch] is turned ON, the machine will start reading out the switch settings. Be sure to change the setting of the switches after the [power switch] has been turned OFF.**
2. **The set positions of the above-shown switches are for the S type of sewing machine at the time of delivery.**
   **The set positions of the DIP switches of the respective types of sewing machine are illustrated on the pages describing the respective DIP switches.**

## 6-1. Table of DIP switches

(1) Functions common to the standard type (S type) models and subclass models

Set positions of the DIP switches (at the time of delivery) change in accordance with the types of sewing machine.

However, the functions of the respective switches are common. So, this chapter describes the functions of the DIP switches.

| Switch | Description (Function) | Remarks |
|---|---|---|
| SW4-1 | | Used for maintenance |
| 2 | | |
| 3 | Used for selecting a feed timing in accordance with the material thickness. | |
| 4 | | |
| SW5-3 | Used to change over the 2nd origin setting function and the sewing start point moving function. | |
| 4 | Wiper actuating point selecting function | |
| 5 | Origin detection selector switch | |
| SW6-2 | Used for setting the Bobbin Thread counter | |
| 3 | Used for setting the Bobbin replacement setting function | |
| 4 | Used for setting the enlargement/reduction function | |
| 5 | Used for setting the thread breakage detection function | |
| 6 | Used for setting the thread trimmer prohibition function | |
| 7 | Used for setting the wiper prohibition function | |
| 8 | Used for setting the intermediate presser stop function | |
| SW7-1 | | Not used |
| 3 | Used for setting the automatic thread trimming after stop | |
| 4 | Used for setting the sewing speed at sewing start | |
| 5 | | Not used |
| 6 | Used for setting the feeding frame position at sewing end | |
| 7 | Used for setting the retainer compensation function | |
| 8 | | Not used |

(Caution)

1. **The respective DIP switches are set differently by the types of sewing machine at the time of delivery.**
   **The set positions of the DIP switches for the standard type (S type) of sewing machine are described in this chapter. The set positions of the DIP switches for the subclass models are described in Chapter 2 (B type), Chapter 3 (L type) and Chapter 4 (T type).**
   **The set positions of the DIP switches for the G type (for heavy-weight materials) of the respective models of sewing machine are described in accordance with their specifications.**
2. **If the specifications of the sewing machine are changed by modifications, set the DIP switches in accordance with the newly modified specifications of the sewing machine.**

(2) Functions different by the standard type (S type) and subclass models

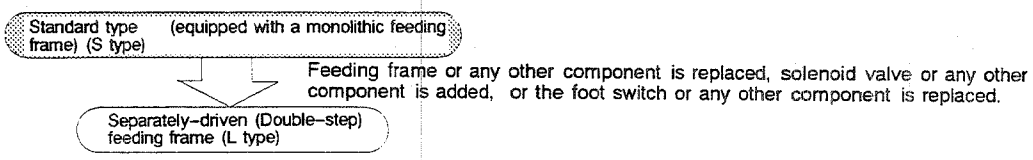
The captioned functions are related to the feeding frame components (including the foot switch). The function itself is same for every type of sewing machine. However, the feeding frame components are different by the types of sewing machine.
So, they need to be described separately.
For the standard type of sewing machine equipped with standard feeding frame (S) which is a monolithic feeding frame. This means that some of the following functions are not available in the standard type of sewing machine.

| Switch | Description (Function) | Applicable model (type) | | | |
|---|---|---|---|---|---|
| SW5-1 | "Cycle stitching function B" (Raising/lowering of the feeding frame selection B) | | | L | T |
| SW5-2 | "Cycle stitching function A" (Raising/lowering of the feeding frame selection A) | S | B | L | T |
| SW5-6 | "Pedal selecting function B" | | B | L | T |
| SW5-7 | "Pedal selecting function A" | S | B | L | T |
| SW5-8 | "Monolithic feeding frame/separately driven feeding frame change over function" | | | L | T |
| SW6-1 | "Separately driven feeding frame operation sequence change over function" | | | L | |
| SW7-2 | Selection of "double-stepped stroke feeding frame function" | | B | L | T |

(Caution)

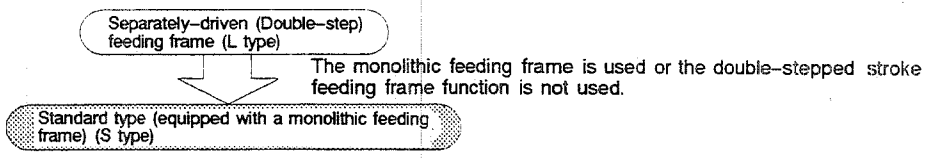
1. **The respective DIP switches are set differently by the types (S, B, T and L) of sewing machine at the time of delivery.**
   **The set positions of the DIP switches for the standard type (S type) of sewing machine are described in this chapter. The set positions of the DIP switches for the subclass models are described in Chapter 2 (B type), Chapter 3 (L type) and Chapter 4 (T type).**
2. **If the specifications of the sewing machine are changed by modifications, set the DIP switches in accordance with the newly modified specifications of the sewing machine.**

**(Example 1)**



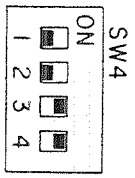
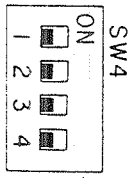

- **The "separately-driven (double-step) feeding frame sequence change-over function" controlled by the DIP switch SW6-1 and other functions can be used. (See Chapter 3.)**

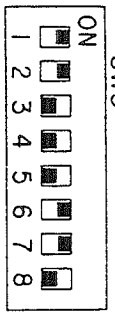
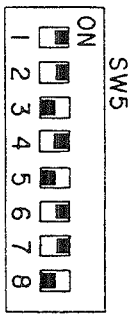
**(Example 2)**

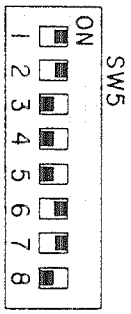
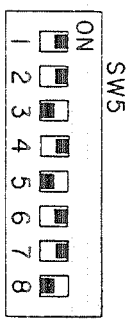
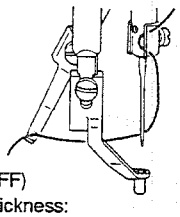
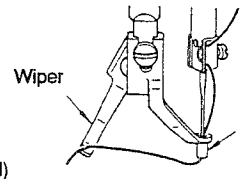


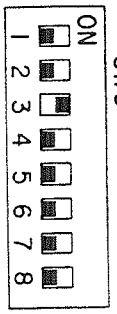

**The "cycle stitching facility B" controlled by the DIP switch SW5-1 and other functions cannot be used. (Refer to Chapter 1)**

## 6-2. Functions of DIP switches common to all the types of sewing machine

<table>
<tr><th>Name of switch</th><th>Function</th></tr>
<tr><td>❹ DIP switch 4 (SW4)<br>  <br><br>• Setting state of the switches for the sewing machines (excluding the G type) at the time of delivery<br>  <br><br>• Setting state of the switches for the G type of sewing machine at the time of delivery<br>AMS-220CGS<br>AMS-220CGB<br>AMS-220CGL</td><td>• SW4-3, -4 ..... The feed timing can be changed in accordance with the material thickness.<br><table><tr><th>SW4-3</th><th>SW4-4</th><th>Material thickness for reference</th></tr><tr><td>ON</td><td>ON</td><td>Less than 2 mm (0.079")</td></tr><tr><td>OFF</td><td>ON</td><td>2 mm (0.079") or more - less than 3 mm (0.118")</td></tr><tr><td>ON</td><td>OFF</td><td>3 mm (0.118") or more - less than 4 mm (0.157")</td></tr><tr><td>OFF</td><td>OFF</td><td>4 (0.157") mm or more</td></tr></table>(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.<br>• Only for the G type (for heavy-weight materials) of the respective models, both DIP switches (SW4-3 and SW4-4) are set to the OFF position to sew heavy-weight materials at the time of delivery.<br>• SW4-1 and -2 are used for maintenance. They do not need to be operated. Set these switches to the OFF positions.</td></tr>
</table>

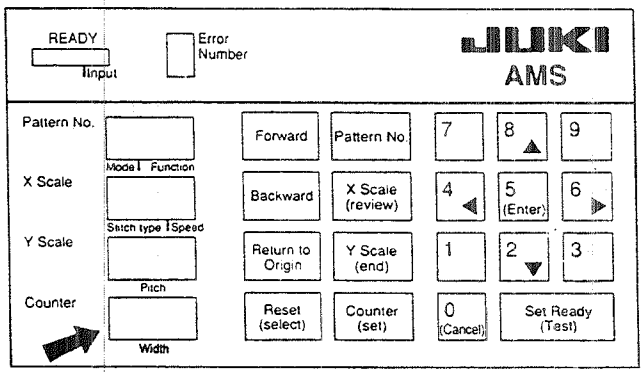
| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switches of the AMS-220CGS at the time of delivery)<br><br>* Refer to the other chapters for the setting state of the switches of the other types of sewing machine 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 "2nd origin setting function") (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>Set the DIP switches immediately after lowering the feeding frame.<br>Refer to "3-8-9. Second origin setting function and sewing start point moving function."<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 (before lowering the feeding frame). 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) .....<br>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 .....<br>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 .....<br>When turning OFF the power to the machine after setting the switches, the "backup function" works to store the specified point as well as the pattern in memory.<br><br>**(Caution)**<br>**1. The T type of sewing machine is equipped with the inverting unit, the inverting unit will interfere with the needle when the "sewing start point moving function." So, use the "sewing start point moving function" after removing the inverting unit.**<br>**2. For not only the T type of sewing machine but also any type of sewing machine, the "2nd origin setting function" will be ineffective when an inverting pattern in which an inverting command has been entered is read.** |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switches of the AMS-220CGS at the time of delivery)<br>* Refer to the other chapters for the setting state of the switches of the other types of sewing machine 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 (Fig. 1). When sewing a heavy-weight material, the clearance may be too small for the wiper to work. In this case, the wiper will be able to sweep across the clearance between the intermediate presser and the workpiece (Fig. 2) after the intermediate presser has reached the highest position of its stroke.<br>ON: The wiper sweeps between the intermediate presser and the workpiece after intermediate presser has reached the highest position in its stroke. (Fig. 2)<br>OFF: The intermediate presser goes up after the wiper has swept across the clearance between the needle and the intermediate presser. (Fig. 1)<br>(Fig. 1)<br>  <br>(OFF)<br>Material thickness:<br>up to 3 mm (0.118")<br>(Fig. 2)<br>  <br><br>(ON)<br>Material thickness:<br>3 to 5 mm (0.118" to 0.197")<br>* Only for the G type of sewing machine, the DIP switch SW5-4 is set to the ON position at the time of delivery for sewing heavy-weight materials. Change the setting state of the DIP switch in accordance with the thickness of material to be used. For not only the G type but also other types of sewing machine, be sure to perform the adjustment described in "(9) Position of the wiper" of "5-1. Adjustment of the mechanical components" whenever you have changed the setting of the DIP switch.<br>• **SW5-5 ..... Origin detection selector switch**<br>After the completion of sewing (thread trimming), the machine can return to the sewing start point (or the 2nd origin) by way of the mechanical origin.<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.<br>* If the workpiece is caught in the components or an excessive load is applied to the workpiece during sewing, the feeding failure (step-out) may result. In this case, the needle may interfere with the feeding frame or the finished pattern may be dislocated in the next sewing.<br>If the DIP switch SW5-5 is set to the ON position, the origin detecting function will work to detect the origin and will perform compensation every time the sewing machine completes sewing. So, even if a step-out of the machine occurs, no problem will be caused in the next sewing.<br>**(Caution)**<br>**For the T type of sewing machine, take care not to allow the feeding frame to interfere with the needle.** |

| Name of switch | Function |
|---|---|
| ⑥ DIP switch 6 (SW6)<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | • **SW6-2 ..... The setting of the Bobbin thread counter**<br>When the bobbin replacement setting 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".<br>When the SW6-3 has been set to its ON position, the SW6-2 becomes ineffective. In this case, the Counter display functions as a mere adding counter. ("999" is followed by "000." The Counter can be reset.)<br><br>The following description should be referred when the SW6-3 is set to its OFF position. |

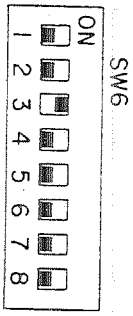
| | |
|---|---|
| ON | Subtraction counter<br>Set the number of workpieces to be sewn beforehand, which is shown on the Counter first. After one piece of workpiece has been finished, "1" will be subtracted from the value set on the Counter display.<br>When the value indicated on the Counter display is "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 OFF 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.**<br>**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 the next page for the detailed description of the "bobbin replacement setting function."




* Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery.

| Name of switch | Function |
|---|---|
| ⑥ DIP switch 6 (SW6) | • **SW6-3 ..... Selection of the "bobbin replacement setting function"** |



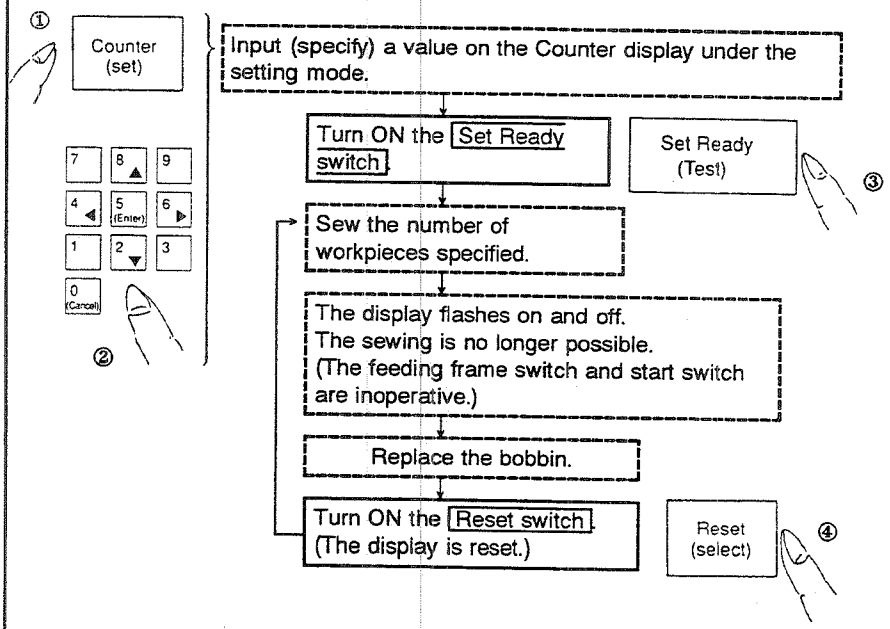

(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery)

| | |
|---|---|
| OFF | The bobbin replacement setting function is operative. (The function works.) |
| ON (This switch has been set to the ON position at the time of delivery.) | The bobbin replacement setting 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]. |

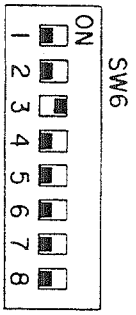
* **Bobbin replacement setting function**
This is the function to make the number shown on the Counter display flash on and off to warn the operator that it is the time to stop the sewing machine (the feeding frame switch and start switch become inoperative) and to change the bobbin after the completion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

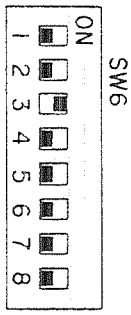
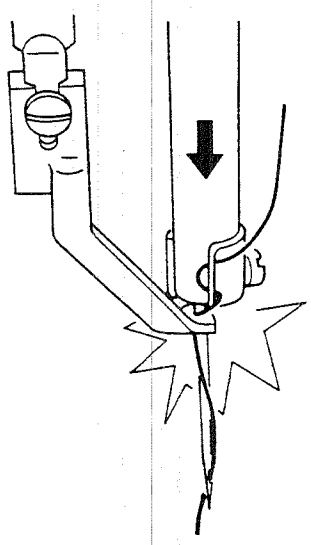
- Count the number of workpieces that can be sewn with one bobbin by pattern beforehand, and set the number on the Counter under the [setting mode]. (See the explanation of the switches on the operation panel.)
- Depressing the [Reset switch] make the feeding frame switch and start switch operative again 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.

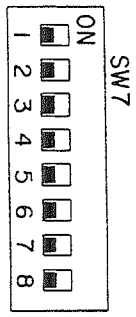
• Bobbin replacement setting function flow

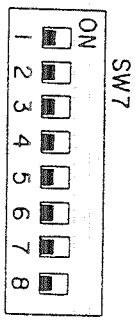
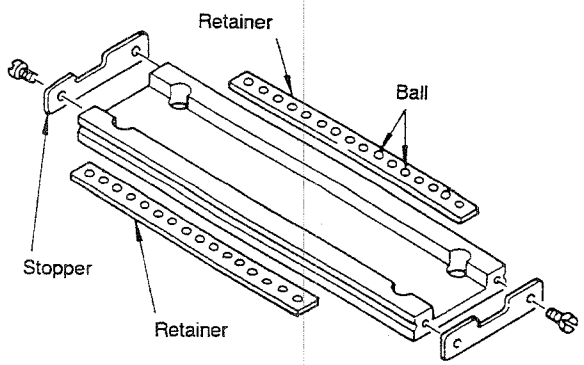


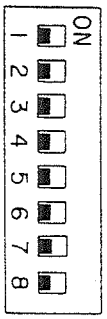
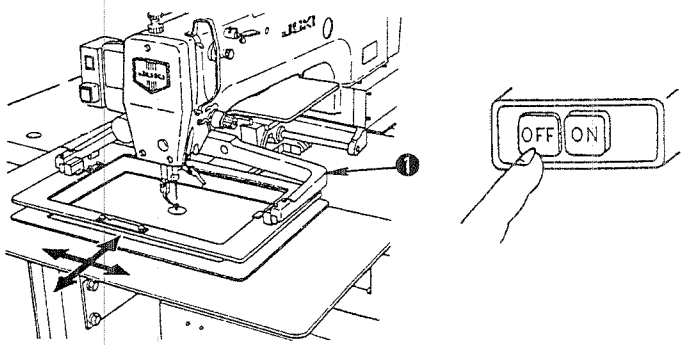

* Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery.

| Name of switch | Function |
|---|---|
| ⑥ **DIP switch 6 (SW6)**<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | • **SW6-4 ..... Selection of the "enlargement/reduction function"**<br>ON: The pattern cannot be enlarged/reduced. The [X/Y scale] switches in the operation 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 of the operation panel for how to specify the X/Y scale. |
| | • **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]. |
| | • **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". |
| * Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | • **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. (When the wiper switch mounted on the machine head is set to the ON state) |

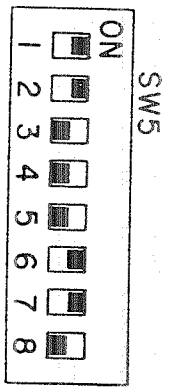
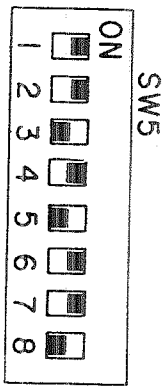
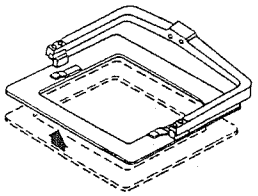
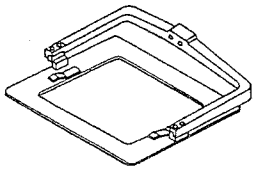
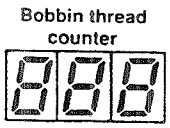
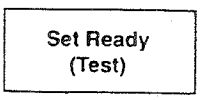
| Name of switch | Function |
|---|---|
| ⑥ DIP switch 6 (SW6)<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | • **SW6-8 ..... Selection of the "intermediate presser stop function"**<br>This switch is used to make the intermediate presser inoperative.<br><br>ON: 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.**<br><br>OFF (This switch has been set to the OFF position at the time of delivery.): The intermediate presser actuates.<br><br>**(Caution)**<br>1. **Set the SW6-8 to the [OFF] position as long as the intermediate presser is normally used. (For the S, B and L types)**<br>2. **The T type machine is equipped with an inverting device, which means that the machine has been delivered without an intermediate presser. Consequently, the "SW6-8" has been set to its ON position (intermediate presser is ineffective).**<br>**If you use the intermediate presser, set the switch to its [OFF] position.**<br>  <br>**If using the intermediate presser with the SW6-8 set to its [ON] position, the intermediate presser or the needle may break.** |
| * Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | |

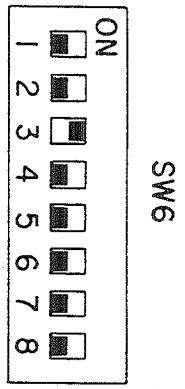
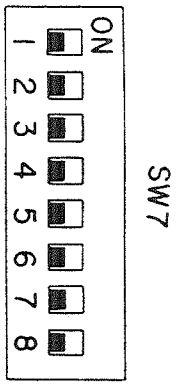
| Name of switch | Function |
|---|---|
| ⑦ **DIP switch 7 (SW7)**<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | • **SW7-3 ..... Selection of the "thread trimming after stop function"**<br>This switch is used to make the machine automatically actuate the thread trimmer after pressing the [Stop swtich] on the machine head.<br><br>**ON**: When the [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><br>**OFF** (This switch has been set to the OFF position at the time of delivery.): When the [Stop switch] is turned ON, the machine will stop with its needle up. The error indication [5 flashes on and off]. [Forward] switch, [Backward] switch, 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><br>• **SW7-4 ..... 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 two different speeds. Select the sewing speed which matches the sewing conditions given including the sewing product and thread to be used.<br><br>SW7-4: OFF — 1st stitch: 200 → 2nd stitch: 600 → 3rd stitch: 1000 → 4th stitch: 1400 → 5th stitch: 1800 → 6th stitch: 2000<br>SW7-4: ON — 1st stitch: 600 → 2nd stitch: 600 → 3rd stitch: 1000 → 4th stitch: 1400 → 5th stitch: 1800 → 6th stitch: 2000<br><br>(The DIP switch SW7-4 has been set to its OFF position regardless of the type of sewing machine at the time of delivery.)<br><br>**(Caution)**<br>**1. If you need a sewing speed lower than the sewing speeds shown in the above table at the start of sewing (example: 200 → 200 → 200 →), you can limit the sewing speed by inputting relevant data in the sewing pattern to be used by means of the main unit input function or a programming device such as PGM-1 which is separately available.**<br>**2. It is impossible to specify (input) a sewing speed, for the sewing start, that is higher than the sewing speeds shown in the above table.**<br>**3. Sewing speed**<br>**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 (0.118") as shown in the table above. However, the maximum sewing speed for a pattern with the stitch length of 4 mm (0.157") is 1,500 s.p.m., which means that the sewing speed cannot be set to a value exceeding 1,500 s.p.m.**<br>**Refer to "3-10. Precautions during operation"** |
| * Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | |

| Name of switch | Function |
|---|---|
| ⑦ DIP switch 7 (SW7)<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | • **SW7-6 ..... Selection of the "feeding frame position at sewing end change-over function"**<br><br>ON: The feeding frame keeps the sewing product held clamped instead of going up upon completion of sewing. If you wish to raise the feeding frame, depress the [feeding frame switch].<br><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.<br><br>**(Caution)**<br>**You cannot make the sewing machine start the next sewing unless the feeding frame is raised once after the completion of previous sewing.** |
| * Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | • **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><br>OFF (This switch has been set to the OFF position at the time of delivery.): The "automatic retainer compensation function" works.<br><br>ON: 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.<br>So, it is necessary for the retainer to collect a position approximately once a day.<br><br>  <br> |

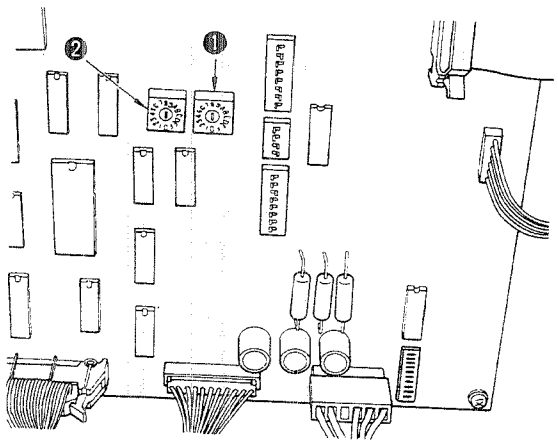
| Name of switch | Function |
|---|---|
| ⑦ **DIP switch 7 (SW7)**<br>  <br><br>(Setting state of the switches of the AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery) | ① Automatic compensating operation<br>The automatic retainer compensation function works when turning ON the Set Ready 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<br>Turn OFF the power to the sewing machine. Then gradually move the feed mechanism ❶ by hand, back and forth and to the right and left until it will go no further. (About once a day)<br><br>**(Caution)**<br>**If a special type of feeding frame is used, the needle may break if performing the automatic retainer compensation (SW7-7 OFF). So, be sure to manually perform the retainer compensation.**<br>**Be sure to watch the needle position carefully when manually performing the automatic retainer compensation.**<br>  <br> |
| | • The DIP switches SW7-1, -5 and -8 are not used. So, leave them to the OFF position. |
| * Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | |

## 6-3. Functions exclusive for the standard type (S type) of sewing machine

| Name of switch | Function |
|---|---|
| ⑮ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switches of the AMS-220CGS at the time of delivery)<br><br>* Refer to the other chapters for the setting state of the switches of the other types of sewing machine at the time of delivery. | • **SW5-2 ..... "Cycle stitching facility A" (Raising/lowering of the feeding frame 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>  <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 facility) Turn ON the [feeding frame switch]. → Turn ON the [start switch]. Then the machine starts sewing the next cycle.<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>* 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>**(Caution)**<br>**When the machine is in the cycle sewing mode (ON), be sure to take note of the following:**<br>  <br><br>  <br><br>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. To continue feeding the feed mechanism forward/backward, the feeding frame should be fully lowered.<br>  <br><br>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><br>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><br>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. |

<table>
<tr><th>Name of switch</th><th>Function</th></tr>
<tr><td>⑤ DIP switch 5 (SW5)<br><br>* Refer to the previous page for the set positions of the DIP switches.</td><td>• SW5-7 ..... "Pedal change-over function A"<br><table><tr><td>ON<br>(This switch has been set to the ON position at the time of delivery.)</td><td>Depress the feeding frame switch, and the feeding frame will come down. Depress the switch again, and the feeding frame will go up.</td></tr><tr><td>OFF</td><td>The feeding frame keeps lowering as long as the feeding frame switch is depressed.</td></tr></table>• SW5-1 ON<br>• SW5-6 ON<br>• SW5-8 OFF<br>Used for the other types of machine (subclass machines).<br>* If the type of the sewing machine is changed by modifications for a subclass, change the setting of the DIP switches in accordance with the modification.</td></tr>
<tr><td>⑥ DIP switch 6 (SW6)<br>  <br><br>(Set positions of the switches of AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery)</td><td>• SW6-1 OFF<br>Used for the other types of machine (subclass machines).<br>* If the type of the sewing machine is changed by modifications for a subclass, change the setting of the DIP switches in accordance with the modification.</td></tr>
<tr><td>⑦ DIP switch 7 (SW7)<br>  <br><br>(Set positions of the switches of AMS-220CSS, AMS-220CHS and AMS-220CGS at the time of delivery)</td><td>• SW7-2 OFF<br>Used for the other types of machine (subclass machines).<br>* If the type of the sewing machine is changed by modifications for a subclass, change the setting of the DIP switches in accordance with the modification.</td></tr>
</table>

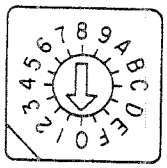
## 6-4. Functions of the rotary DIP switch (common to all the types of sewing machine)




The rotary DIP switches, SW1 and SW2 which are used to set the function, are mounted on the I/F circuit board.

**(Caution)**

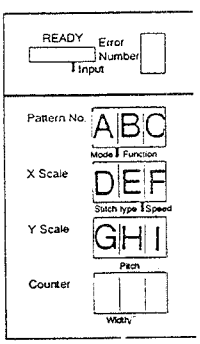
**When the power switch is turned ON, the machine will perform reading out the setting of the switches.**
**So, be sure to change the setting of the switches after the [power switch] has been turned OFF.**

| Switch name | Function |
|---|---|
| ❶ Rotary DIP switch (SW1) | • This switch is not used. Set this switch to "0". (It has been set to "0" at the time of delivery.) |
| ❷ Rotary DIP switch (SW2)  | • **Set value "0" ..... Normal operation (at the time of delivery)**<br>The normal operation is performed in the sewing mode selected using DIP switches (SW4, 5, 6 and 7) on the I/F circuit board. |

• **Set value "2"** **Serves to check the input of the switches.**

The performance of the switches and sensors can be checked.
The switches and sensors can be checked for the normal operation.

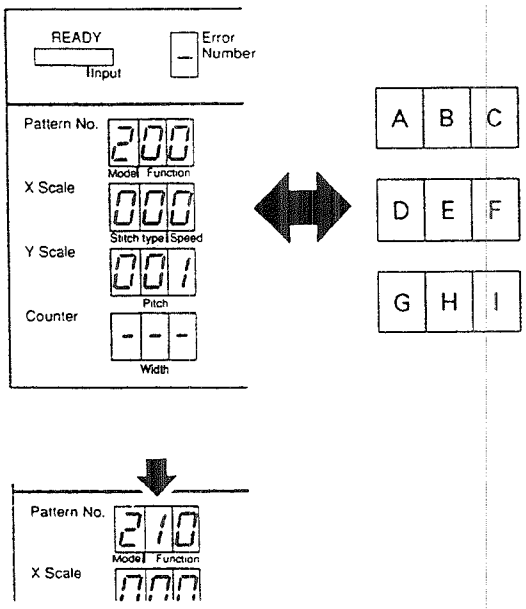
1). Operating procedure ("Table of correspondence between the steps and the switches and sensors" is shown on the next page.)




(1) Set the rotary DIP switch (SW2) at "2" and turn ON the power to the sewing machine.
(2) All the digital displays on the operation panel will indicated "8."
(3) Depress the foot switch (Start switch or Feeding frame switch) until the step you want to check is specified.
The step is indicated at the pattern No. display column corresponding to the hundreds digit (A in the figure on the left).
(4) Turn ON/OFF the switch or the sensor you wish to check.
If the switch or the sensor operates normally, the specified indication will change over to "1" or "0."

2). Example of operation

To check the Reset switch (Display B of the step 2 See the next page)




Set the SW2 at "2", and turn ON the power to the sewing machine.

↓

All the digital displays on the operation panel will indicated 8 .

↓

Depress the foot switch three times (the foot switch is turned ON) until the step 2 is specified. (Table shown on the left)

↓

Press the Reset (select) switch.

If the indication on display B changes to "1," the Reset switch operates normally.
If the indication given on display B remains "0," suppose that the switch, junction cable, circuit board, or other components may be defective.

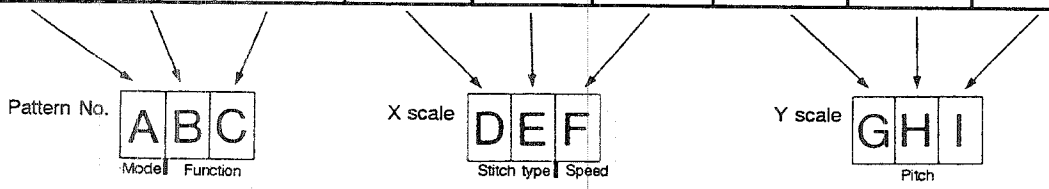
(Caution)

**For some switches and sensors, the indication changes from "0" to "1" when they are turned ON, and for other switches and sensors, the indication changes from "1" to "0" when they are turned ON.**

3). Table of correspondence between the steps and the switches and sensors

Foot switch [ON]

| 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 (Operation switch) | Bobbin winder (Operation switch) | Forward (Operation switch) | Backward (Operation switch) |
| 2 | Reset (Operation switch) | Return to Origin (Operation switch) | Ready (Operation switch) | SW7-3 | SW7-4 | SW7-5 | SW7-6 | SW7-7 |
| 3 | SW4-4 | SW4-3 | SW4-2 | SW4-1 | Air sensor (Connector) | SW7-1 | SW7-2 | Needle threading switch (Control box) |
| 4 | Start switch | Feeding frame switch 1 | Feeding frame switch 2 | 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) | |
| 5 | SW5-8 | SW5-7 | SW5-6 | SW5-5 | SW5-4 | SW5-3 | SW5-2 | SW5-1 |
| 6 | SW6-8 | SW6-7 | SW6-6 | SW6-5 | SW6-4 | SW6-3 | SW6-2 | 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 | | |




(Caution)

1. • The "operation switch" shown in the table above indicates the switches on the operation panel.
   • SW4-1 to SW7-7 are the DIP switches.
   • SW1-1 to SW2-8 are the rotary DIP switches.
   • Steps "8" and "9" are input signals of the sensors.
2. To check the sensor of step "9," remove the junction cable of the stepping motor (when the power to the machine has been turned OFF). Then check the sensor by moving the feed by hand.
3. The [start switch] and the [feeding frame switch] of step "4" change over to step "5" immediately after turning them ON.
   So, check the switches by depressing the foot switch (the start switch or feeding frame switch) when the sewing machine is in step "3." If the step changes from "3" to "4," the start switch and the feeding frame switch are normal.

• **Set value "3"  Setting speed check program is selected.**

This switch serves to check the specified sewing speed and the actual sewing speed. (No speed indicator is required.)

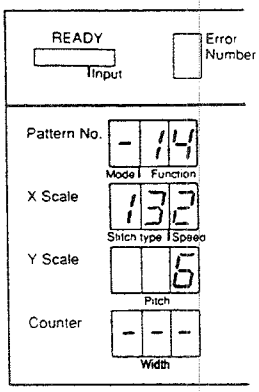
(1) When the [power switch] is turned ON, all numerical displays will give "-". At this time, turn the max. speed limit knob fully clockwise.
(2) When the [start switch] is depressed after the [feeding frame switch] is depressed to lower the feeding frame, the displays will give "02", and the sewing machine will start to run at a low speed.
(3) When the [Stop switch] is pressed, the sewing machine will stop.
(4) Each time steps (2) and (3) above are repeated, the sewing speed is updated. By so doing, the sewing machine speed for each stitch length can be checked.

(Table 1)

| Pattern No. indication | | | Sewing speed (Specified range) |
|---|---|---|---|
| - | 0 | 2 | 180 ± 2 |
| - | 0 | 4 | $350^{+0}_{-50}$ |
| - | 0 | 6 | $550^{+0}_{-50}$ |
| - | 1 | 1 | $1{,}050^{+0}_{-50}$ |
| - | 1 | 4 | $1{,}350^{+0}_{-50}$ |
| - | 1 | 6 | $1{,}550^{+0}_{-50}$ |
| - | 1 | 8 | $1{,}750^{+0}_{-50}$ |
| - | 2 | 0 | $1{,}950^{+0}_{-50}$ |

The sewing speed will be shown in the operation panel as follows:

(Example)




These figures indicate that the sewing speed of the machine is 1,326 s.p.m.

**(Caution)**

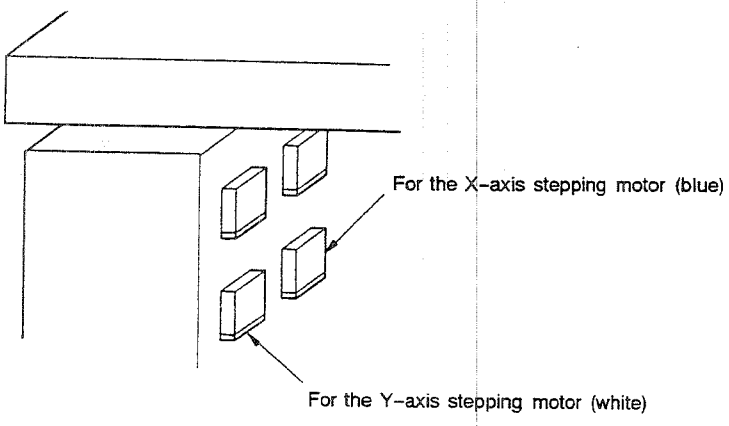
**The actual speed is specified for the AMS machines against the indicated speed codes (02 to 20). If the sewing speed is out of the specified range shown in Table 1 during the aforementioned checking procedure, adjust the sewing speed referring to "5-4-1. Adjusting the sewing speed."**

**In the case where the sewing speed exceeds the highest limit of the specified range, in particular, defective feed (step-out) may result. So be careful.**

• **Set value "4"  The sensor check progaram is selected.**

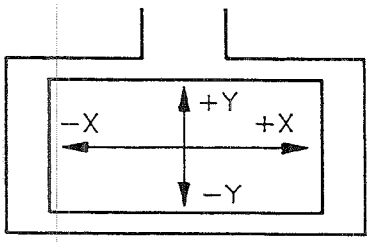
The condition of the individual sensors can be checked.

(1) Remove the cables of X/Y-axis stepping motors from the control box.
(Or else, the stepping motors will be excited and the feed bracket will not be allowed to be moved by hand.)



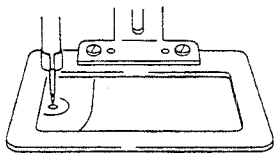

(2) When the power switch is turned ON, the condition of the sensors for the X/Y origin (X0, Y0) and X/Y limits (+X, -X, +Y, -Y) will be shown on the display of the X/Y scale on the operation panel.

| Pattern No. | — | 0 | 1 |
|---|---|---|---|
| X scale | -X | X0 | +X |
| Y scale | -Y | Y0 | +Y |
| Counter | — | — | — |




The direction, + or - will be determined by the position of the needle with regard to the feed bracket.

(Example) Display [-X]



The display of the limit sensor shows "0" when the limit is detected. When the sensor detects the points other than the limit, "1" will be shown.
The display of the origin sensor shows "1" when the sensor is in the + position, and shows "0" when the sensor is in the - position.

• **Set value "5"  Origin check program is selected.**

The position of the origin can be checked.
Be sure to readjust the position of the origin using this program, whenever an origin-related part has been replaced.
(Refer to "5-1. Adjusting the mechanical components (33)-1 Fine adjustment of the X/Y origin.")

(1) When the power switch is turned ON, the same indications as the "sensor check program" will be shown in the display on the operation panel. (See the previous page.)
(2) Depress the [start switch] after the [feeding frame switch] is depressed to lower the feeding frame.
(3) The feed bracket moves to the origin, and then stops.
(4) You can move the feed bracket using the [jog switches].
(5) Each time the [start switch] is depressed, the origin will be searched repeatedly.
(6) The condition of the sensors will be shown on the operation panel as the sensor check program. Generally, the machine origin will be set at the point where the numerical display chenges from 1 to 0.
Accordingly, the displays on the operation panel at the origin will be as follows:

| | | | |
|---|---|---|---|
| Pattern No. | — | 0 | 1 |
| X scale | 1 | 0 | 0 |
| Y scale | 1 | 0 | 1 |
| Counter | 1 | — | — |

• **Set value "6"  Continuous sewing is selected.**

(1) At the normal sewing, the program is read from the floppy disk, when the [Set Ready switch] is pressed.
(2) Depress the [feeding frame switch] so that the feeding frame comes down.
(3) Step on the [start switch], and the machine will start sewing. Upon completion of a sewing cycle, the machine will stop at the sewing start point.
(4) After the machine pauses about five seconds, the machine will automatically resume continuous sewing.
(5) After completion of sewing, stop the machine by pressing the [Stop switch]. Turn OFF the [power switch] after the origin has been retrieved.

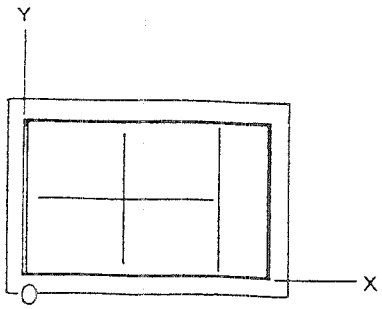
• **Set value "7"  PGM-1 LEDs check program is selected.**

(1) Connect the PGM-1 to the sewing machine.
(2) Turn ON the [power switch].
(3) The input procedure indicator lamps (LEDs) light up successively for one second in accordance with the predetermined input procedure starting from the pattern input. This allows you to check the LEDs for normal operation.

• **Set value "8"  PGM-1 digitizer check program is selected.**

This switch is used to check the coordinates which have been read by the coordinated reading device (digitizer).
The X coordinates will be shown on the X scale display and the Y coordinates on the Y scale display with a 0.1 mm (0.004") accuracy.

(Degitizer coordinates)




The digitizer will read within the following range, the left bottom being the origin.
$0 \leqq X \leqq 307.1$ mm (12.091")
$0 \leqq Y \leqq 204.8$ mm (8.063")

(1) Turn ON the power switch.
(2) Lightly press the digitizer, using the point of a stylus pen. Then each of the lower three digits of the coordinates read will be shown.

• **Set value "B"  Output check program is selected**

The performance of the feeding frame and wiper can be checked.
(1) When the power switch is turned ON, the following displays will be shown on the operation panel.

| | | | |
|---|---|---|---|
| Pattern No. | 0 | 0 | 0 |
| X scale | 0 | 0 | 0 |
| Y scale | — | — | — |
| Counter | — | — | — |

(2) The sewing machine components are operated by pressing the corresponding numeric keys on the operation panel.
- 9 ..... Feeding frame (Feeding frame (left) for the L type machine and the inverting intermediate presser for the T type)
- 8 ..... Feeding frame (right) (only for the L type) or the feeding frame (for the T type)
- 7 ..... Intermediate presser
- 4 ..... Wiper

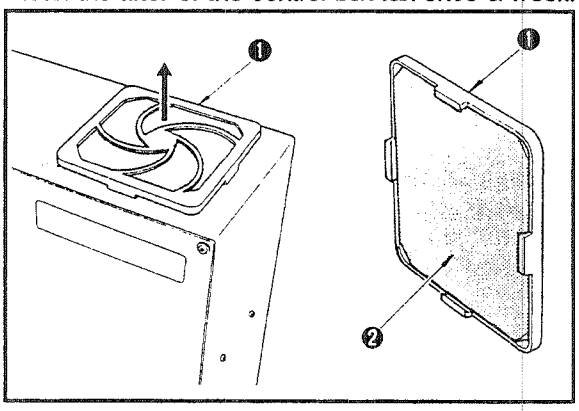
**(Caution)**
**1. Thread trimming magnet is inoperative.**

The set values 1, 9, A, C, D, E and F are not used. The sewing machine is operated under the normal operation mode.

# 7. MAINTENACE AND INSPECTION

## 7-1. Cleaning the filter

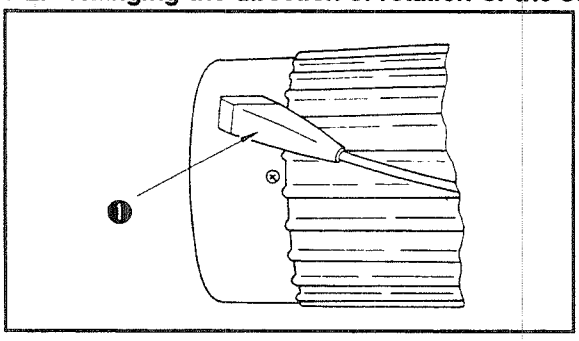
Clean the filter of the control box fan once a week.




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

1) Pull screen kit (filter cover) ❶ in the direction of the arrow so that the kit is removed.
2) Wash filter ❷ under running water.
3) Reinstall filter ❷ and screen kit ❶ to the position where they have been installed.

## 7-2. Changing the direction of rotation of the sewing machine

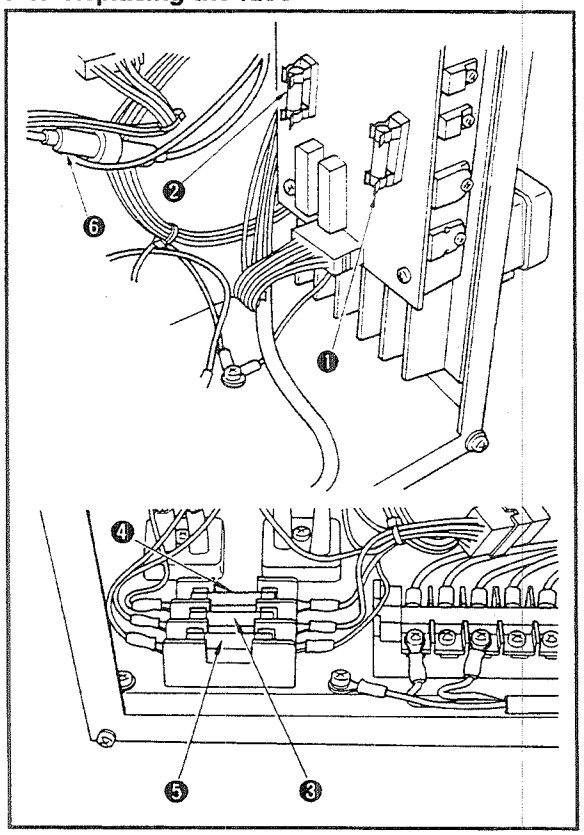



1) Turn the power switch OFF.
2) Remove connector ❶ from the rear of the motor (on the opposite side from the handwheel).
3) Reverse the connector (turn it 180 degrees) and reconnect it securely.

**(Caution)**

**For the sewing machine which uses a single-phase motor including 100 V type, be sure to turn ON the power switch several minutes after it has been turned OFF.**

## 7-3. Replacing the fuse




The machine uses the following six fuses:

❶ 7A standard melting fuse for stepping motor (X) protection
E9628252000

❷ 7A standard melting fuse for stepping motor (Y) protection
E9628252000

❸ 10A standard melting fuse for stepping motor power supply protection
E8523304000

❹ 7AT time-lag fuse for solenoid power supply protection
HF001400700

❺ 1A standard melting fuse for 100 VAC power supply protection
E9611601000

❻ 2A standard melting fuse for marking light power supply protection
E9613601000

**(Caution)**

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

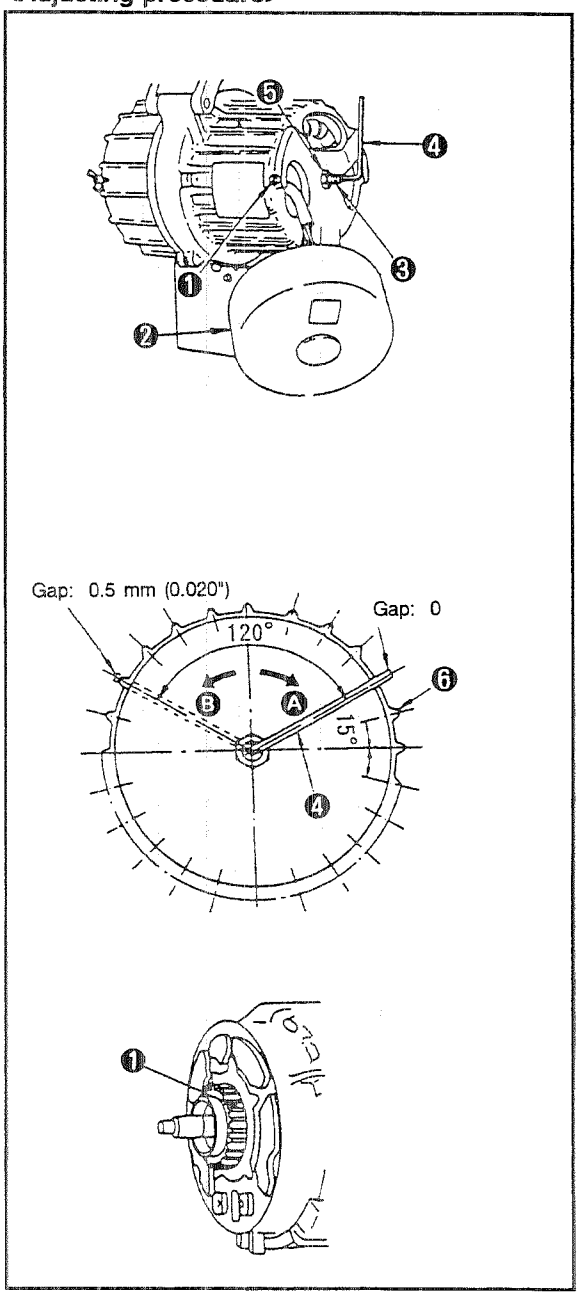
## 7-4. Adjustment and maintenance of the motors

### 1. Adjusting the clutch gap

The clutch gap is factory-adjusted to 0.5 mm (0.020").
Readjust the clutch gap.

- When the clutch ring or brake ring has been replaced.
- When the clutch gap is too small, causing constant friction between the clutch and brake with any of the following results:
  a) The main motor is overheated.
  b) The motor fails to run smoothly.
  c) A scorching smell of wood is produced (from an overheated cork).
  d) Even if the needle is stopped, it immediately starts to move by itself and fails to remain stationary.

**<Adjusting procedure>**




(1) For HITACHI motor

1) Turn OFF the power switch. Loosen screw ❶ in motor end cover ❷ after the flywheel of the motor stops its rotation, and remove the cover.
2) Remove the pulley cover, and then the V belt.
3) Loosen locknut ❺ using a wrench, insert L-shaped wrench key ❹ supplied with the motor into the hexagon socket of setscrew ❸.
4) Screw in the L-shaped wrench key in direction Ⓐ as illustrated while turning the pulley by finger until the inertia of the pulley can not longer driver the pulley (in other words, until the pulley's resistance is felt: 0 mm gap). Then, screw out the L-shaped wrench key in direction Ⓑ for eight cooling fins ❻ of the motor. (120 degrees = 0.5 mm (0.020") gap)
5) With the wrench key held in the position mentioned above, tighten lock nut ❺ by a spanner with care taken not move setscrew ❸.
6) After adjustment, manually turn the pulley to check it for smooth rotation. Turn the power switch ON, check the motor for proper operation, and carry out test run for 20 to 30 times.

(2) For MATSUSHITA motor

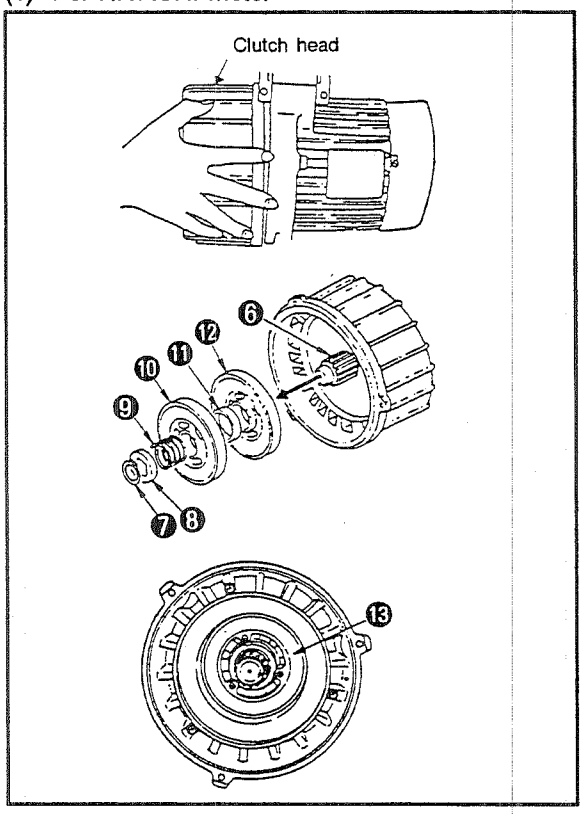
First, turn adjustment screw ❶ fully counterclockwise.
Then, slowly turn it clockwise until resistance is felt.
Further turn the adjusting screw clockwise by 8 steps (120 degrees).

## 2. Replacing the clutch ring and brake ring

When the clutch noise or brake noise has changed to a metallic noise after a long period of use, or when the motor has come to run unsmoothly, it is a sign of service life expiry of the frictional parts. Replace the clutch ring and brake ring as follows:

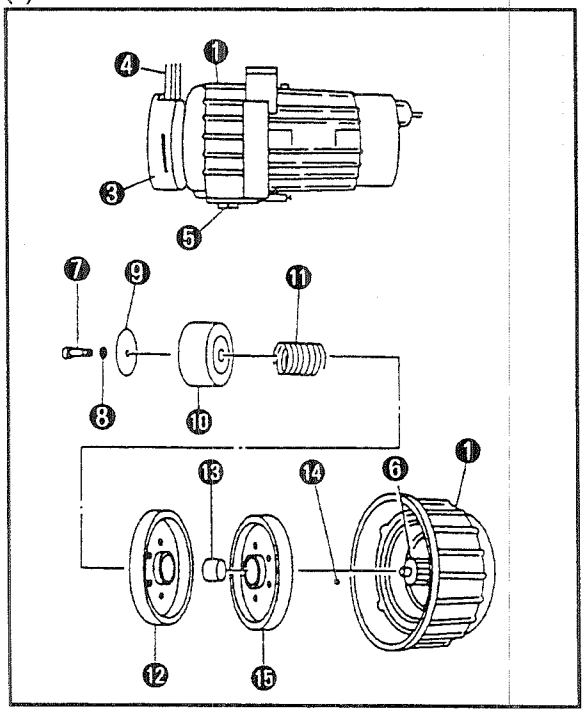
Turn the power OFF, and be sure that the motor has completely stopped before starting the replacement. (Wait for 3 to 5 minutes after turning the power OFF.)

(1) For HITACHI motor




1) Remove the connector 4P from the controller.
2) Remove the pulley cover and the V belt.
3) Unscrew the three mounting screws of the clutch head to remove the clutch head from the main body.
   (At this time, take care not to allow the clutch head to fall.)
4) Remove C ring ⑦.
5) Take out spring bearing ⑧, clutch resetting spring ⑨, clutch ring ⑩, spline cap ⑪, and brake ring ⑫.
6) Using a rag moistened with benzine, clean the surfaces of brake disk ⑬ and the clutch disk, and spline shaft ⑥.
   If the surfaces look brown, burnish the surfaces using a commercially available metal cleaner, then wipe them with a rag moistened with benzine.
   (Do not touch the surface of the clutch or brake ring by hand, or do not clean it with benzine.)

(2) For MATSUSHITA motor




1) Remove pulley cover ③ and belt ④.
2) Remove screw ⑤, and remove the clutch bracket from the motor.
3) Remove screw ⑦ washer ⑧, presser disk ⑨, housing cover ⑩, spring ⑪, clutch ring ⑫, brake ring ⑮, and cushion ⑬ from clutch shaft ⑥ of the clutch bracket.

**(Caution)**

**Be careful not to lose cylindrical key ⑭ which fits in the clutch shaft.**

4) Replace with a new movable disk, then adjust the clutch clearance.

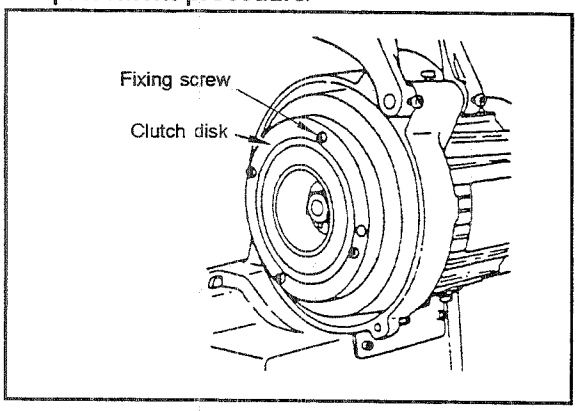
(3) Cleaning the spline assembly
Clean the splines with a rag if they are dirty. Apply the grease supplied with the motor to a new ring. Use only "MOLY PS265" grease, and never use any other grease. At the time of reassembly remember to reinstall the spline cap, and to attach the connector from the clutch head to the PSC box. Adjust the gap whenever the rings have been replaced.

### 3. Replacing the clutch disk

Replace the clutch disk.

- If the lining of the clutch ring has worn out to such an extent that the clutch disk comes in contact with the metal part of the clutch ring, and burnishing with a commercially available metal cleaner can no longer correct it.
- When the clutch disk has worn out unevenly due to partial contact with the clutch ring.

**<Replacement procedure>**



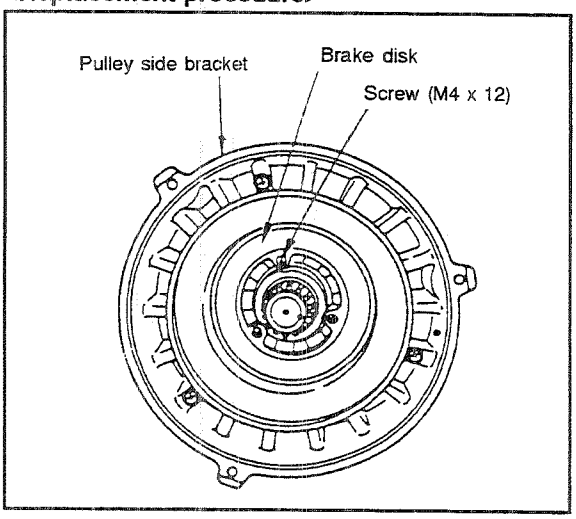

① Remove the clutch head according to the previous paragraph, "Replacing the clutch ring and brake ring."
② Loosen the four screws (M5 x 12) retaining the clutch disk, and remove the clutch disk.
③ Taking the faucet joint inside the vanes of the flywheel as the reference, fix a new clutch disk by alternately tightening the four screws (M5 x 12) gradually. At this time, be very careful not to scratch the clutch disk surface to be in contact with the friction plate.
④ Upon completion of the above step, turn the power switch ON, and check motor vibration before reinstalling the clutch head. If the vibration is severe, remove the fixing screws again, turn the clutch disk 90 degrees against the flywheel, and reinstall the clutch disk so that the motor vibration is reduced to a minimum.
⑤ After the motor has completely stopped, reinstall the clutch head, using the three screws.

### 4. Replacing the brake disk

Replace the brake disk:

- When the lining of the brake ring has worn out to such an extent that the brake disk comes in contact with the metallic part of the brake ring, and burnishing with a commercially available metal cleaner can no longer correct it.
- When the brake disk has worn out unevenly due to partial contact with the brake ring.

**<Replacement procedure>**




① Remove the clutch head.
② Pull out the ring.
③ Unscrew the three screws (M4 x 12) retaining the brake disk on the pulley side bracket to remove the brake disk.
④ Install a new brake disk on the pulley side bracket by gradually tightening the three fixing screws alternately.
At this time, be very careful not to scratch the brake disk surface which will contact the friction surface.
⑤ Finally, reinstall the ring before attaching the clutch head to the main body.

**5. Cleaning the filter**

If the filter is left clogged with fibrous wastes, the motor is likely to overheat, resulting in considerably shorted life of the lining. Clean the filter once a month or every other month.

## 7-5. Replacing the printed circuit boards

1. Types of printed circuit boards
   - ① CPU circuit board (Control box)
   - ② I/F circuit board (Control box)
   - ③ PMDC circuit board (Control box)
   - ④ POWER circuit board (Control box)
   - ⑤ Operating printed circuit board (Operation panel (box))
   - ⑥ Sensor printed circuit board (Sewing machine head)

① CPU circuit board

Acts as the brain of the AMS-220C and outputs the control signals to control the floppy disk driver unit, sewing machine head, and the PGM-1.

1) Turn OFF the [power switch]. Then open the control box cover.
2) Remove all connectors (J13 through J17) from the CPU circuit board.
3) Remove four setscrews retaining the circuit board.
   Then replace the CPU circuit board with a new one.
4) Install the new CPU circuit board by reversing the above disassembly order. Pay attention to connect the connectors matching the numbers indicated on the circuit board and the numbers attached to the connectors.

(Caution)

**The battery for the data back-up is mounted on the CPU circuit board. Be sure not to place the circuit board on a metal plate or alike. Never wrap the CPU circuit board with a sheet aluminum foil.**

② I/F printed circuit board

It receives control signals from the CPU circuit board and actuates the machine head and the programming device such as PGM-1.

1) Turn OFF the [power switch]. Then remove the control box cover.
2) Remove the connectors J13, J14 and J15 from the CPU circuit board.
3) Remove all connectors (J26 through J30, J32, J33, J35 through J38; installed inside of the control box) (J31 and J34; installed outside of the control box) from the I/F circuit board.
   Connector for the synchronizer J31 and connector for the pneumatic solenoid drive J34 (Air valve junction cable) are mounted on the wrong side of the circuit board, and designed to be directly connected with the connectors inserted from outside of the control box.
4) Remove six setscrews retaining the I/F circuit board so that the I/F circuit board is removed. Then replace the circuit board with a new one.
5) Install the new I/F circuit board by reversing the above disassembly order.

(Caution)

**If the sewing machine is operated without the synchronizer (generator stator) connector J31 connected, the sewing machine cannot be released from the up-position error [3].**
**If the J34 connector for the pneumatic solenoid drive is not installed, the operating air pressure drop error [A] is not allowed to be reset.**

③ PMDC circuit board

The PMDC circuit board receives the stepping motor driving signals from the CPU circuit board through I/F circuit board, and acts to drive the sewing machine head, X and Y stepping motors.

1) Turn OFF the [power switch]. Then open the control box cover.
2) Remove all connectors (J61 through J64) from the PMDC circuit board.
3) Remove six setscrews retaining the PMDC circuit board (the setscrews are also used to fix the radiator from outside of the control box) so that the PMDC circuit board is removed. Then replace the circuit board with a new one.
4) Install the new PMDC circuit board by reversing the above disassembly order.
   Install the circuit board so that the connector J62 is positioned at the top.

(Caution)

**Be sure to securely tighten the setscrews. The tightening torque has been specified to 14 kg/cm$^2$ at the time of delivery.**

④ POWER circuit board

This circuit board supplies voltage to each unit in the control box.

1) Turn OFF the [power switch]. Then open the control box cover.
2) Remove all connectors (J51 through J59) from the POWER circuit board.
3) Remove four setscrews retaining the POWER circuit board so that the POWER circuit board bundle wire cover are removed.
   Then replace the circuit board with a new one.
4) Install the new POWER circuit board by reversing the above disassembly order.
   Take care of connection of the connectors.

(Caution)

**Time for discharge of electrolytic capacitor:**
**For the normal use, the time for the discharge is about five seconds after the power switch has been turned OFF.**
**If the power is not supplied to the stepping motors or solenoids, about one and a half minutes will be required for the discharge of the POWER circuit board only.**
**After the predetermined length of time has passed, remove the connector.**

⑤ Operating printed circuit board

This circuit board is fixed inside the operation panel (box). The switches, buzzers, and LEDs are mounted on it.

1) Turn OFF the power switch. Remove four setscrews from the operation panel (box) rear cover.
2) Remove the connector J61 mounted on the circuit board. Now, remove the ground wire terminal.
3) Remove six lock nuts for retaining the operating circuit board. Then remove the circuit board and replace with a new one.
4) Install the new operating circuit board by reversing the above procedure.

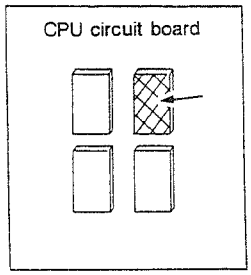
⑥ Sensor printed circuit board

It is used in the sewing machine head. It detects the X origin and the travel limit. To replace, refer to "5-1. (33)-2. X/Y origins and the travel limit sensors."

## 7-6. Interchangeability of the circuit boards

The circuit boards used for the AMS Series of the sewing machines have been designed to be interchangeable among the sewing machines included in the AMS. So, even if the circuit board of a certain type of the AMS breaks, it is possible to use the circuit board used with another type of the AMS in your plant.

① CPU circuit board
The PROM mounted on the CPU circuit board differs by the models of the control box. The CPU circuit board is provided with interchangeability by using the PROM exclusive for the respective models of the control box.




The asterisk (*) shows the revision of PROM.
Be sure to use the PROM whose revision is same as the currently used PROM or the latest revision unless there is any special reason for using the other one.

| Type of sewing machine (model of the control box) | Part No. of PROM (number indicated on PROM) |
|---|---|
| AMS-210B, AMS212B<br>AMS-210C, AMS-212C<br>(MC-514, magnetic feeding frame)<br>(MC-515, pneumatic feeding frame) | HL008420017<br>(017*)<br>• The PROM with part No. which has F and beyond for the asterisk (*) section is C type. |
| AMS-220B<br>(MC-513) | HL008420013<br>(013*) |
| AMS-220C (S, B type)<br>(MC-518) | HL008420064<br>(064*) |
| AMS-220C (L, T type)<br>(MC-518-1) | HL008420074<br>(074*) |
| AMS-224B<br>(MC-516) | HL008420029<br>(029*) |
| AMS-229B<br>(MC-517) | HL008420040<br>(040*) |

② I/F circuit board, operation circuit board
The AMS-210B, -212B, -220B, -224B, -229B, -210C, -212C and -220C use the I/F circuit board and the operation circuit board of one and same kind.

③ Power circuit board, PMDC circuit board
The AMS-210B, -212B, -220B, -224B, -210C and -212C use the power circuit board and the PMDC circuit board of one and same kind. (The AMS-229B and -220C use the different kinds of them.)

## 7-7. How to measure the line voltage

| Printed circuit board | Tester red | Tester black | Voltage |
|---|---|---|---|
| POWER circuit board | J51 -1, -2, -3 (orange) | J51 -4, -5, -7 (black) | DC 34 V |
| | J52 -1, -2 (orange) | J52 -6, -7 (black) | DC 34 V |
| | -3, -4 (brown) | -6, -7 (black) | DC 33 V |
| | J53 -1, -3, -4 (yellow) | J53 -5, -6, -7 (green), -8 (yellow/green) | DC 34 V |
| | J54 -1, -2 (orange) | J54 -4, -5 (green) | DC 70 V |
| | -3 (yellow) | -4, -5 (green) | DC 24 V |
| | -7 (red) | -8 (black) | DC 5 V |
| | J55 -1, -2 (red) | J55 -3, -5 (black) | DC 5 V |
| | -6 (white) | -3, -5 (black) | DC 12 V |
| | -3, -5 (black) | -7 (blue) | DC 12 V |
| | J56 -1 (red) | J56 -6 (black) | DC 5 V |
| | -2 (white) | -6 (black) | DC 12 V |
| | -6 (black) | -3 (blue) | DC 12 V |
| | J57 -1 (red) | J57 -5, -6 (black) | DC 5 V |
| | -3 (white) | -5, -6 (black) | DC 12 V |
| | -5, -6 (black) | -4 (blue) | DC 12 V |
| | J58 -1 (red) | J58 -5, -6 (black) | DC 5 V |
| | -2 (white) | -5, -6 (black) | DC 12 V |
| | -5, -6 (black) | -4 (blue) | DC 12 V |
| | J59 -1 (white) | J59 -2, -4 (black) | DC 12 V |
| | -5 (red) | -2, -4 (black) | DC 5 V |

| Printed circuit board | Tester red | Tester black | Voltage |
|---|---|---|---|
| CPU circuit board | J17 -1 (red) | J17 -5, -6 (black) | DC 5 V |
| | -3 (white) | -5, -6 (black) | DC 12 V |
| | -5, -6 (black) | -4 (blue) | DC 12 V |
| PMDC circuit board | J61 -1, -2 (orange) | J61 -4, -5 (green) | DC 70 V |
| | -3 (yellow) | -4, -5 (green) | DC 24 V |
| | -7 (red) | -8 (black) | DC 5 V |
| I/F circuit board | J28 -1, -2 (orange) | J28 -6, -7 (black) | DC 34 V |
| | -3, -4 (brown) | -6, -7 (black) | DC 33 V |
| | J26 -1 (red) | J26 -5, -6 (black) | DC 5 V |
| | -2 (white) | -5, -6 (black) | DC 12 V |
| | -5, -6 (black) | -4 (blue) | DC 12 V |

| Connector | Tester red | Tester black | Voltage |
|---|---|---|---|
| J90 (Connector 6P of the power supply for the PGM-1) | J90 -1 (red) | J90 -4 (black) | DC 5 V |
| | -2 (white) | -4 (black) | DC 12 V |
| | -4 (black) | -3 (blue) | DC 12 V |
| J40 (Connector 6P of the transformer secondary output) | J40 -1 (gray) | J40 -2 (gray) | AC 24 V |
| | -3 (purple) | -4 (purple) | AC 50 V |
| | -5 (black) | -6 (black) | AC 100 V |
| J85 (Connector 2P of the marking light output) | J85 -1 (orange) | J85 -2 (orange) | AC 4.5 V |

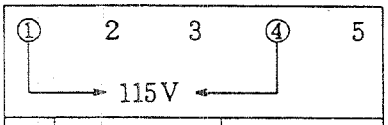
## 7-8. Changing over the AC input voltage (changing over the transformer taps)

The power transformer comes in three types in voltage specifications.

| | | |
|---|---|---|
| Transformer B | Adaptable to 100 to 130 V power supply | For the domestic market and general export |
| Transformer A | Adaptable to 190 to 250 V power supply | For the domestic market and general export |
| Transformer C | Adaptable to 220 to 440 V power supply | For Europe and general export |

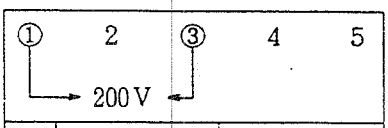
### (1) Changing over the transformer taps when the transformer A or transformer B is used (6P terminal board)

(Transformer B)



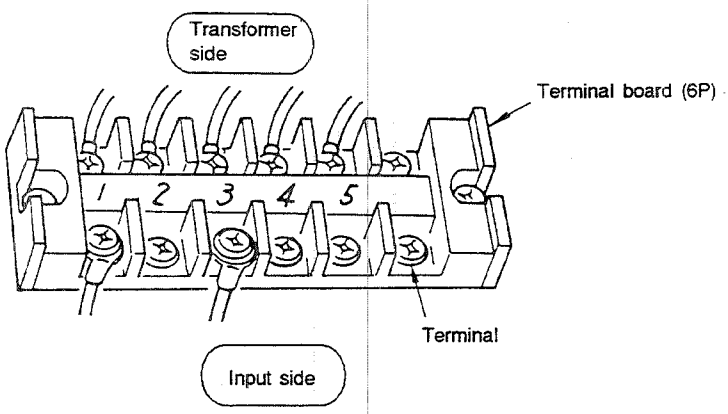

| No. | AC input voltage | Terminal |
|---|---|---|
| 1 | 100 V | 2 – 3 |
| 2 | 105 V | 2 – 4 |
| 3 | 110 V | 1 – 3 |
| 4 | 115 V | 1 – 4 |
| 5 | 120 V | 2 – 5 |
| 6 | 130 V | 1 – 5 |

(Transformer A)




| No. | AC input voltage | Terminal |
|---|---|---|
| 1 | 190 V | 2 – 3 |
| 2 | 200 V | 1 – 3 |
| 3 | 220 V | 2 – 4 |
| 4 | 230 V | 1 – 4 |
| 5 | 240 V | 2 – 5 |
| 6 | 250 V | 1 – 5 |

(Example of connection of a 200 V power supply)



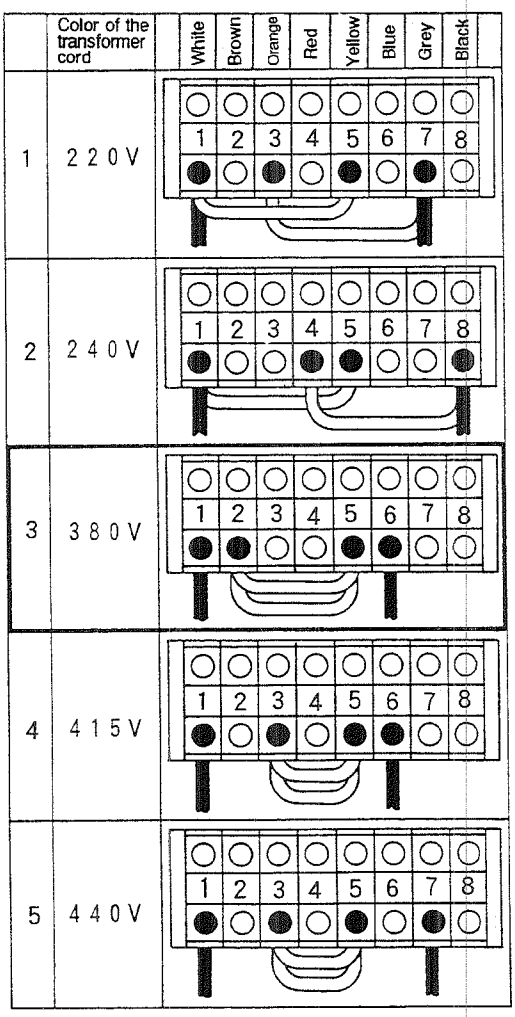

Voltage selection can be made by selecting an appropriate tap.
So, confirm the desired line voltage, and connect to the voltage tap whose voltage value is close to the desired line voltage.

(Caution)

1. **Be sure to change over the transformer taps with the power to the machine turned OFF. Be sure to set the cover on the terminal board except the case where the transformer taps are being changed over.**

### (2) Changing over the taps when transformer C is used (8P terminal board)

The power cord (primary power cord) is connected in a special way.
Confirm the power source to be used. Then select one of the following connecting methods 1 to 5 which matches the power source.




※ indicates the primary power cord.

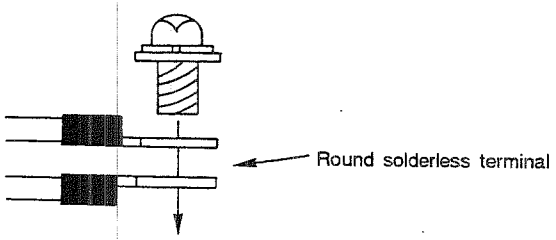
indicates the transformer tap cord asm.


(Transformer tap cord asm.)

(Standard state of terminal board at the time of delivery)

**(Caution)**

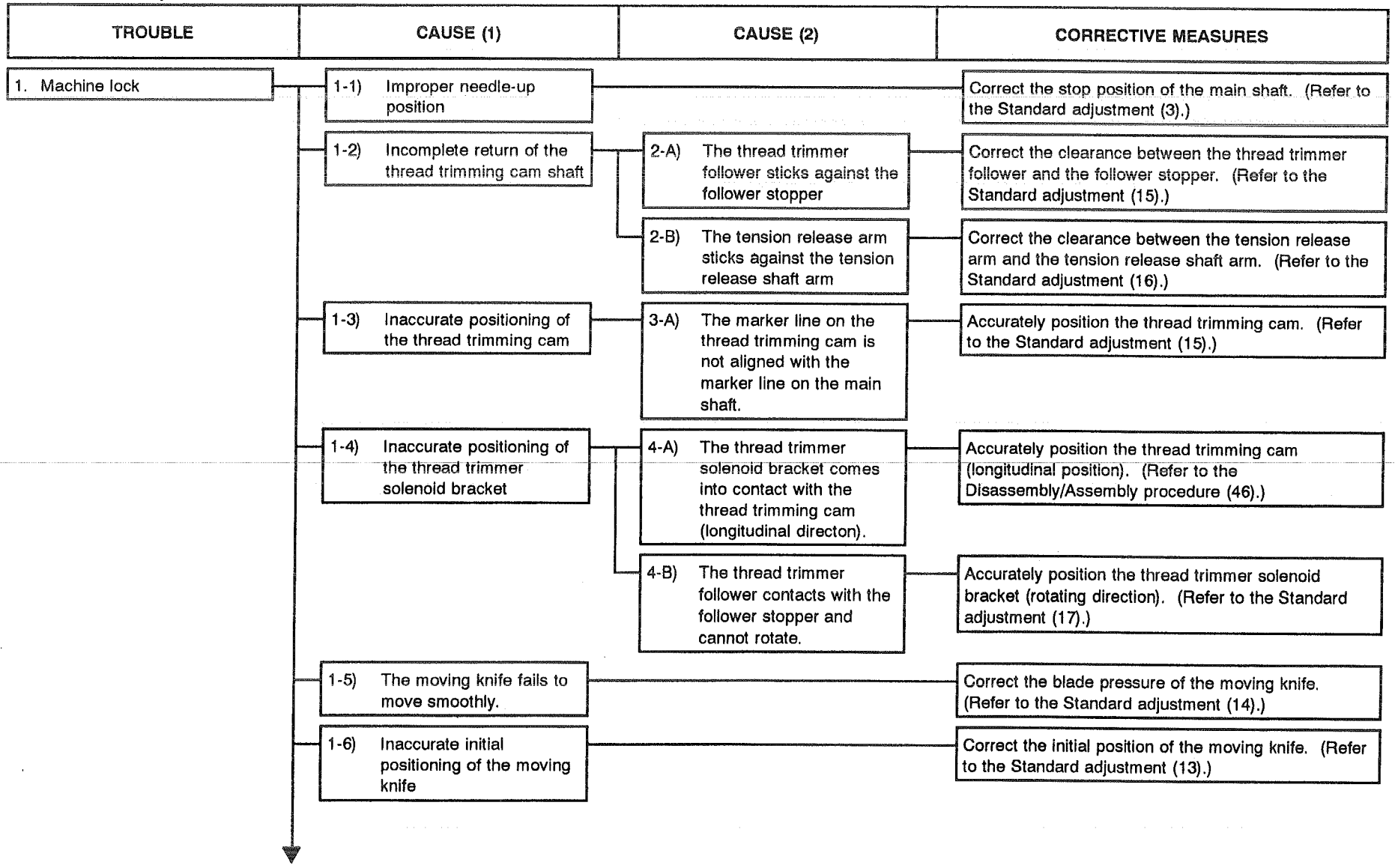
1. **Do not connect the cord in a way which is not shown above.**
2. **Be sure to change over the transformer taps with the power to the machine turned OFF. Be sure to set the cover on the terminal board except the case where the transformer taps are being changed over.**
3. **If the two cords are fixed at one terminal, take the connecting method illustrated below.**

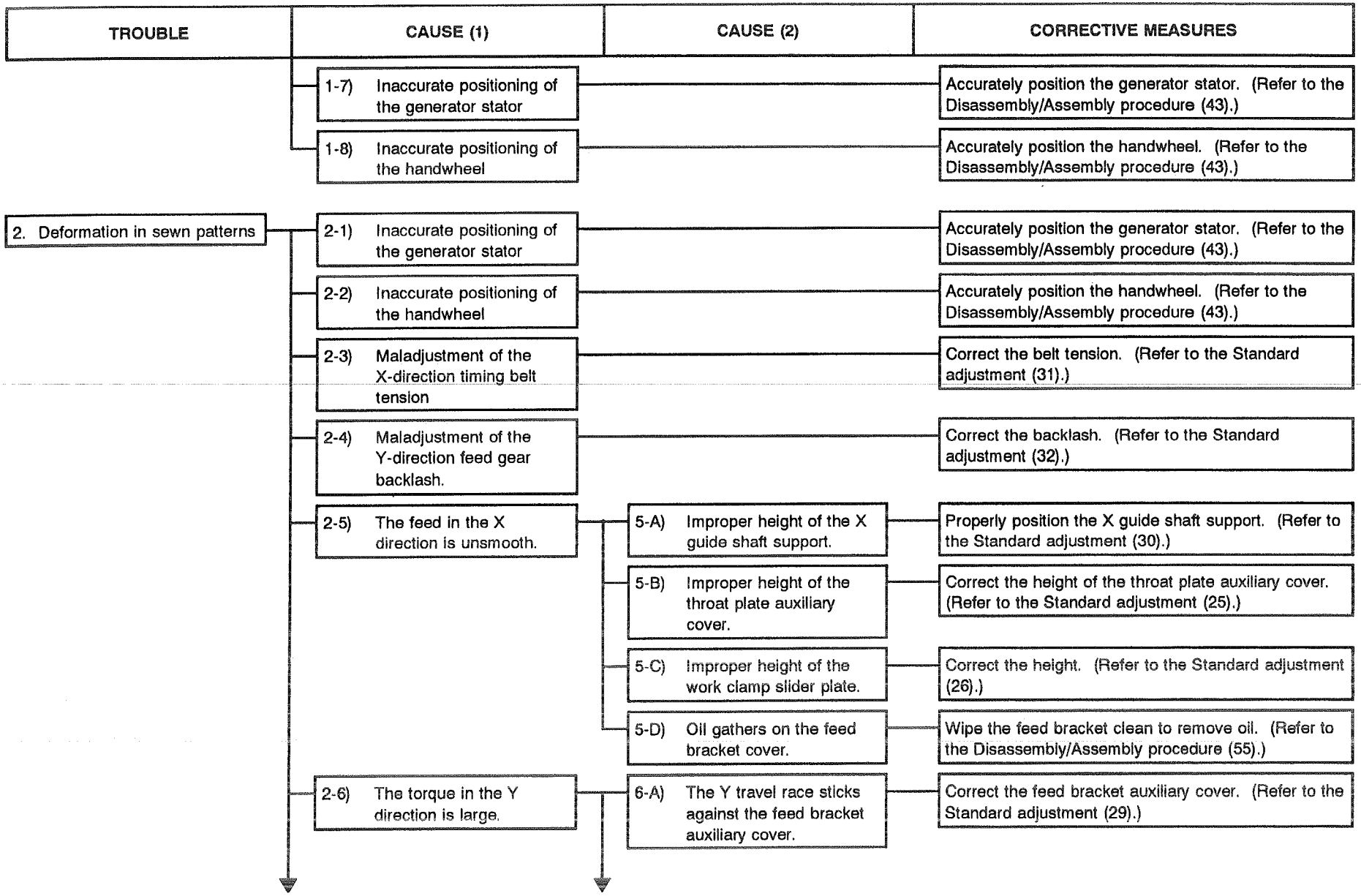


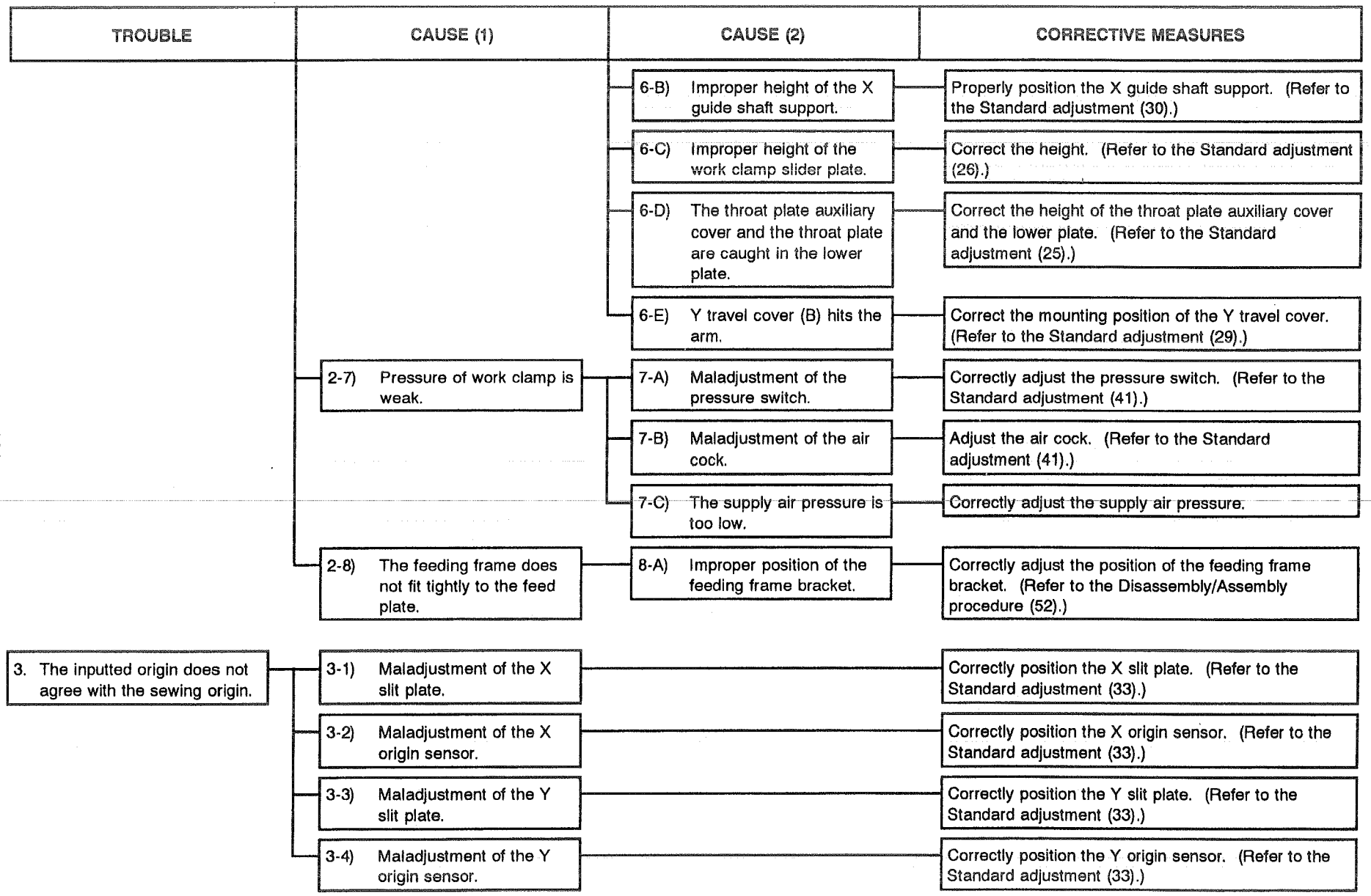

(In the case where two cords are fixed at one terminal)

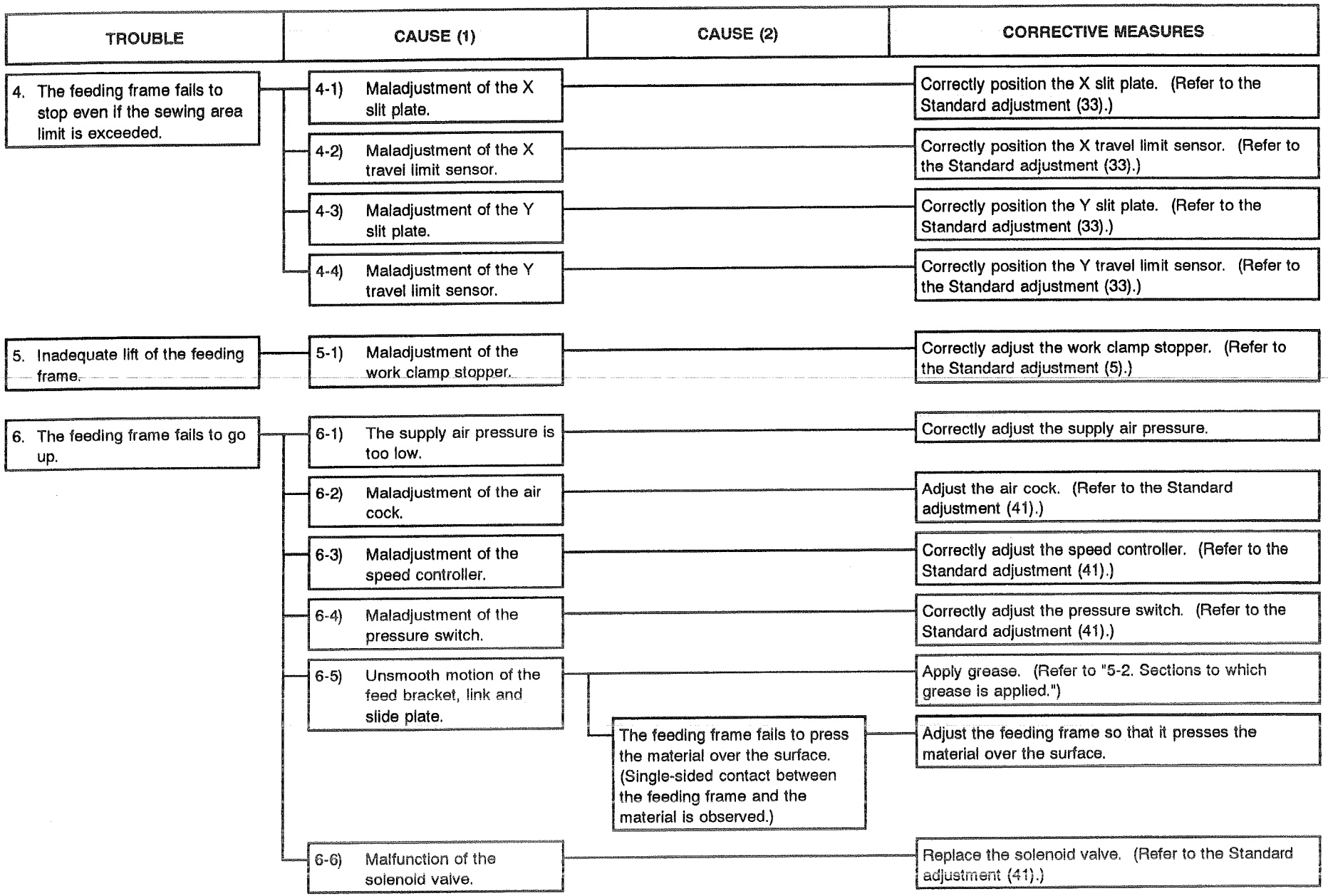
# 8. TROUBLES AND CORRECTIVE MEASURES

## 8-1. Mechanical parts

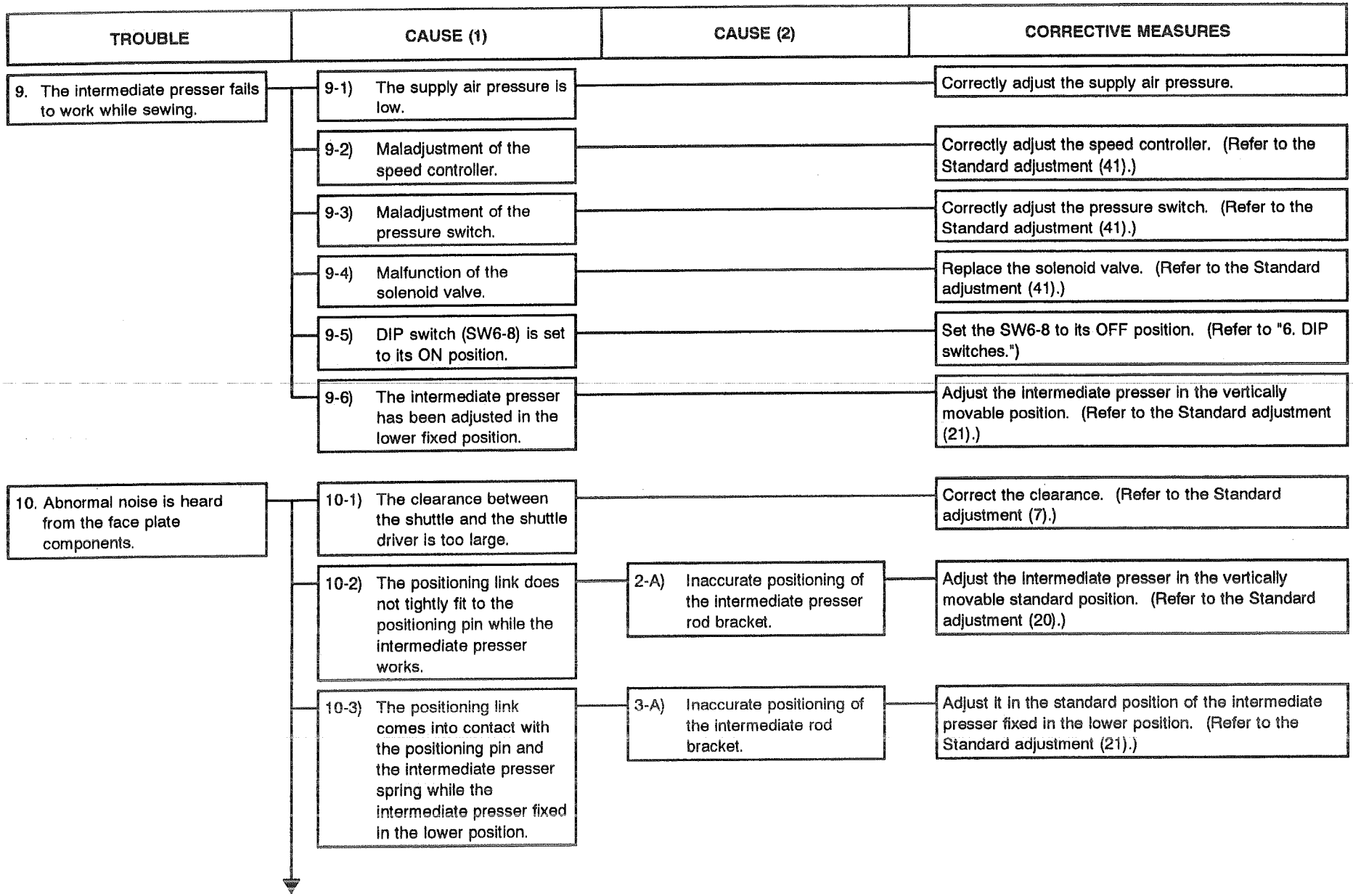


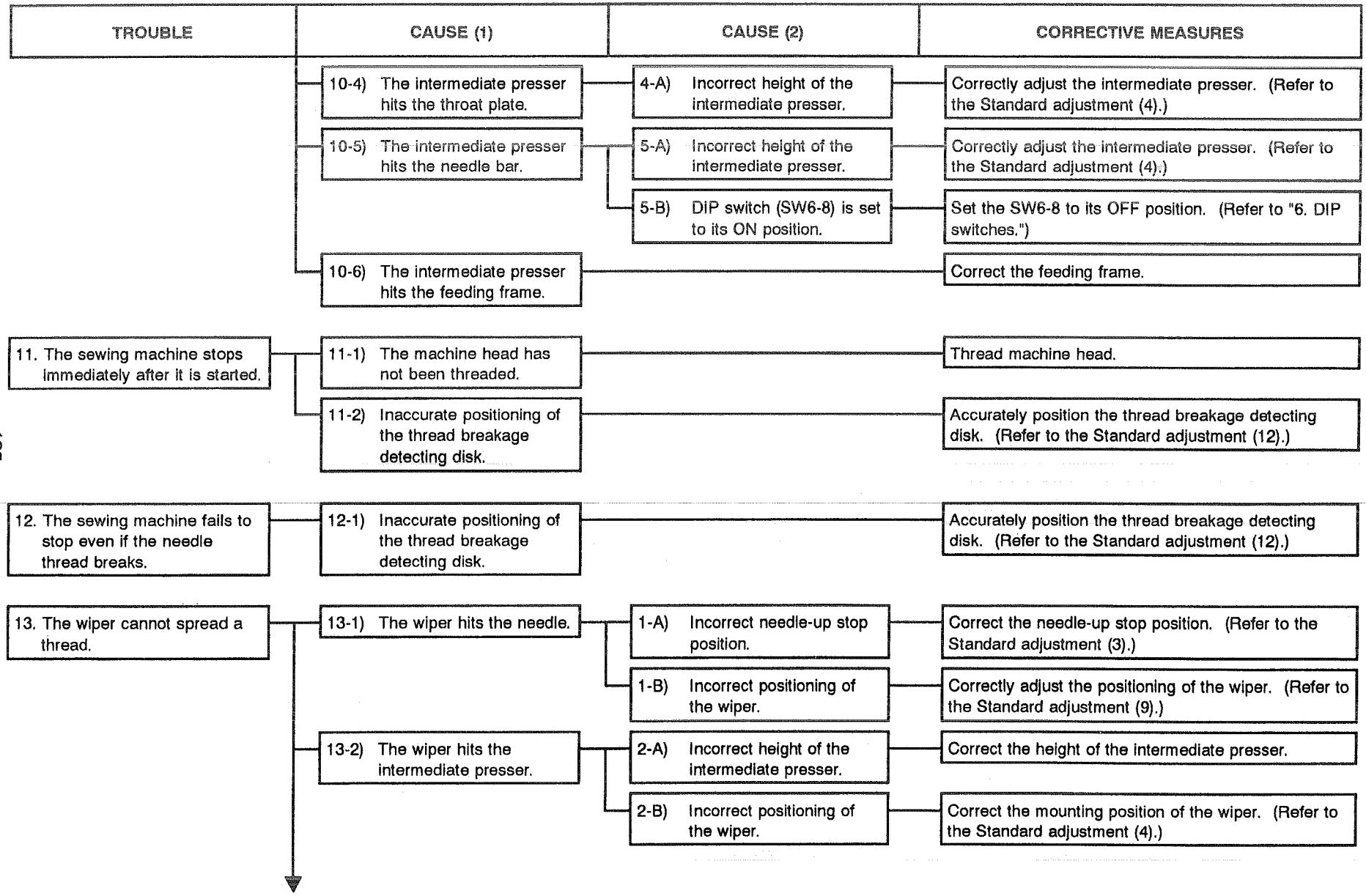

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
1-7) Inaccurate positioning of the generator stator
Accurately position the generator stator. (Refer to the Disassembly/Assembly procedure (43).)
1-8) Inaccurate positioning of the handwheel
Accurately position the handwheel. (Refer to the Disassembly/Assembly procedure (43).)
2. Deformation in sewn patterns
2-1) Inaccurate positioning of the generator stator
Accurately position the generator stator. (Refer to the Disassembly/Assembly procedure (43).)
2-2) Inaccurate positioning of the handwheel
Accurately position the handwheel. (Refer to the Disassembly/Assembly procedure (43).)
2-3) Maladjustment of the X-direction timing belt tension
Correct the belt tension. (Refer to the Standard adjustment (31).)
2-4) Maladjustment of the Y-direction feed gear backlash.
Correct the backlash. (Refer to the Standard adjustment (32).)
2-5) The feed in the X direction is unsmooth.
5-A) Improper height of the X guide shaft support.
Properly position the X guide shaft support. (Refer to the Standard adjustment (30).)
5-B) Improper height of the throat plate auxiliary cover.
Correct the height of the throat plate auxiliary cover. (Refer to the Standard adjustment (25).)
5-C) Improper height of the work clamp slider plate.
Correct the height. (Refer to the Standard adjustment (26).)
5-D) Oil gathers on the feed bracket cover.
Wipe the feed bracket clean to remove oil. (Refer to the Disassembly/Assembly procedure (55).)
2-6) The torque in the Y direction is large.
6-A) The Y travel race sticks against the feed bracket auxiliary cover.
Correct the feed bracket auxiliary cover. (Refer to the Standard adjustment (29).)

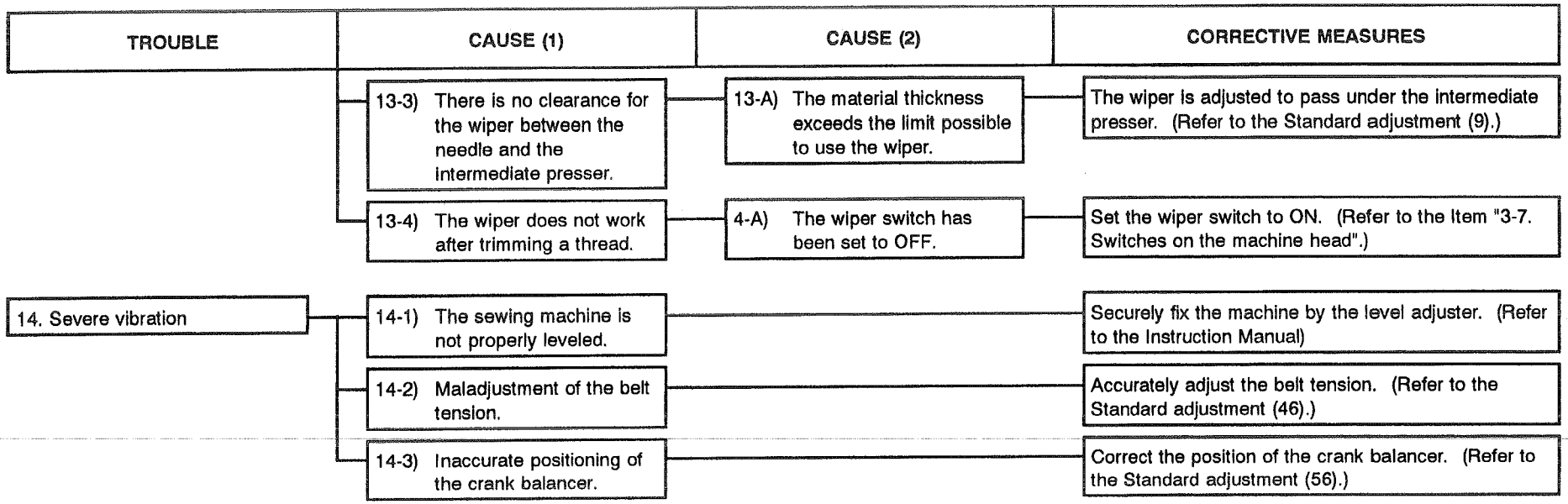

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
6-B) Improper height of the X guide shaft support.
Properly position the X guide shaft support. (Refer to the Standard adjustment (30).)
6-C) Improper height of the work clamp slider plate.
Correct the height. (Refer to the Standard adjustment (26).)
6-D) The throat plate auxiliary cover and the throat plate are caught in the lower plate.
Correct the height of the throat plate auxiliary cover and the lower plate. (Refer to the Standard adjustment (25).)
6-E) Y travel cover (B) hits the arm.
Correct the mounting position of the Y travel cover. (Refer to the Standard adjustment (29).)
2-7) Pressure of work clamp is weak.
7-A) Maladjustment of the pressure switch.
Correctly adjust the pressure switch. (Refer to the Standard adjustment (41).)
7-B) Maladjustment of the air cock.
Adjust the air cock. (Refer to the Standard adjustment (41).)
7-C) The supply air pressure is too low.
Correctly adjust the supply air pressure.
2-8) The feeding frame does not fit tightly to the feed plate.
8-A) Improper position of the feeding frame bracket.
Correctly adjust the position of the feeding frame bracket. (Refer to the Disassembly/Assembly procedure (52).)
3. The inputted origin does not agree with the sewing origin.
3-1) Maladjustment of the X slit plate.
Correctly position the X slit plate. (Refer to the Standard adjustment (33).)
3-2) Maladjustment of the X origin sensor.
Correctly position the X origin sensor. (Refer to the Standard adjustment (33).)
3-3) Maladjustment of the Y slit plate.
Correctly position the Y slit plate. (Refer to the Standard adjustment (33).)
3-4) Maladjustment of the Y origin sensor.
Correctly position the Y origin sensor. (Refer to the Standard adjustment (33).)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
4. The feeding frame fails to stop even if the sewing area limit is exceeded.
4-1) Maladjustment of the X slit plate.
Correctly position the X slit plate. (Refer to the Standard adjustment (33).)
4-2) Maladjustment of the X travel limit sensor.
Correctly position the X travel limit sensor. (Refer to the Standard adjustment (33).)
4-3) Maladjustment of the Y slit plate.
Correctly position the Y slit plate. (Refer to the Standard adjustment (33).)
4-4) Maladjustment of the Y travel limit sensor.
Correctly position the Y travel limit sensor. (Refer to the Standard adjustment (33).)
5. Inadequate lift of the feeding frame.
5-1) Maladjustment of the work clamp stopper.
Correctly adjust the work clamp stopper. (Refer to the Standard adjustment (5).)
6. The feeding frame fails to go up.
6-1) The supply air pressure is too low.
Correctly adjust the supply air pressure.
6-2) Maladjustment of the air cock.
Adjust the air cock. (Refer to the Standard adjustment (41).)
6-3) Maladjustment of the speed controller.
Correctly adjust the speed controller. (Refer to the Standard adjustment (41).)
6-4) Maladjustment of the pressure switch.
Correctly adjust the pressure switch. (Refer to the Standard adjustment (41).)
6-5) Unsmooth motion of the feed bracket, link and slide plate.
Apply grease. (Refer to "5-2. Sections to which grease is applied.")
The feeding frame fails to press the material over the surface. (Single-sided contact between the feeding frame and the material is observed.)
Adjust the feeding frame so that it presses the material over the surface.
6-6) Malfunction of the solenoid valve.
Replace the solenoid valve. (Refer to the Standard adjustment (41).)

| TROUBLE | CAUSE (1) | CAUSE (2) | CORRECTIVE MEASURES |
|---|---|---|---|
| 7. The feeding frame fails to come down. | 7-1) The supply air pressure is low. | | Correctly adjust the supply air pressure. |
| | 7-2) Maladjustment of the speed controller. | | Correctly adjust the speed controller. (Refer to the Standard adjustment (41).) |
| | 7-3) Maladjustment of the pressure switch. | | Correctly adjust the pressure switch. (Refer to the Standard adjustment (41).) |
| | 7-4) Unsmooth motion of the feed bracket and link. | | Apply grease. (Refer to "5-2. Sections to which grease is applied.") |
| | 7-5) Malfunction of the solenoid valve. | | Replace the solenoid valve. (Refer to the Standard adjustment (41).) |
| 8. The intermediate presser fails to go up after sewing. | 8-1) The supply air pressure is low. | | Correctly adjust the supply air pressure. |
| | 8-2) Maladjustment of the speed controller. | | Correctly adjust the speed controller. (Refer to the Standard adjustment (41).) |
| | 8-3) Maladjustment of the pressure switch. | | Correctly adjust the pressure switch. (Refer to the Standard adjustment (41).) |
| | 8-4) Malfunction of the solenoid valve. | | Replace the solenoid valve. (Refer to the Standard adjustment (41).) |
| | 8-5) Unsmooth motion of the intermediate presser link mechanism. | | Check the link mechanism for unsmooth motion and looseness, and apply grease. (Refer to "5-2. Sections to which grease is applied.") |
| | 8-6) Inaccurate positioning of the intermediate presser adjusting screw. | | Accurately position the adjusting screw. (Refer to the Standard adjustment (8).) |


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
9. The intermediate presser fails to work while sewing.
9-1) The supply air pressure is low.
Correctly adjust the supply air pressure.
9-2) Maladjustment of the speed controller.
Correctly adjust the speed controller. (Refer to the Standard adjustment (41).)
9-3) Maladjustment of the pressure switch.
Correctly adjust the pressure switch. (Refer to the Standard adjustment (41).)
9-4) Malfunction of the solenoid valve.
Replace the solenoid valve. (Refer to the Standard adjustment (41).)
9-5) DIP switch (SW6-8) is set to its ON position.
Set the SW6-8 to its OFF position. (Refer to "6. DIP switches.")
9-6) The intermediate presser has been adjusted in the lower fixed position.
Adjust the intermediate presser in the vertically movable position. (Refer to the Standard adjustment (21).)
10. Abnormal noise is heard from the face plate components.
10-1) The clearance between the shuttle and the shuttle driver is too large.
Correct the clearance. (Refer to the Standard adjustment (7).)
10-2) The positioning link does not tightly fit to the positioning pin while the intermediate presser works.
2-A) Inaccurate positioning of the intermediate presser rod bracket.
Adjust the intermediate presser in the vertically movable standard position. (Refer to the Standard adjustment (20).)
10-3) The positioning link comes into contact with the positioning pin and the intermediate presser spring while the intermediate presser fixed in the lower position.
3-A) Inaccurate positioning of the intermediate rod bracket.
Adjust it in the standard position of the intermediate presser fixed in the lower position. (Refer to the Standard adjustment (21).)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
10-4) The intermediate presser hits the throat plate.
4-A) Incorrect height of the intermediate presser.
Correctly adjust the intermediate presser. (Refer to the Standard adjustment (4).)
10-5) The intermediate presser hits the needle bar.
5-A) Incorrect height of the intermediate presser.
Correctly adjust the intermediate presser. (Refer to the Standard adjustment (4).)
5-B) DIP switch (SW6-8) is set to its ON position.
Set the SW6-8 to its OFF position. (Refer to "6. DIP switches.")
10-6) The intermediate presser hits the feeding frame.
Correct the feeding frame.
11. The sewing machine stops immediately after it is started.
11-1) The machine head has not been threaded.
Thread machine head.
11-2) Inaccurate positioning of the thread breakage detecting disk.
Accurately position the thread breakage detecting disk. (Refer to the Standard adjustment (12).)
12. The sewing machine fails to stop even if the needle thread breaks.
12-1) Inaccurate positioning of the thread breakage detecting disk.
Accurately position the thread breakage detecting disk. (Refer to the Standard adjustment (12).)
13. The wiper cannot spread a thread.
13-1) The wiper hits the needle.
1-A) Incorrect needle-up stop position.
Correct the needle-up stop position. (Refer to the Standard adjustment (3).)
1-B) Incorrect positioning of the wiper.
Correctly adjust the positioning of the wiper. (Refer to the Standard adjustment (9).)
13-2) The wiper hits the intermediate presser.
2-A) Incorrect height of the intermediate presser.
Correct the height of the intermediate presser.
2-B) Incorrect positioning of the wiper.
Correct the mounting position of the wiper. (Refer to the Standard adjustment (4).)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
13-3) There is no clearance for the wiper between the needle and the intermediate presser.
13-A) The material thickness exceeds the limit possible to use the wiper.
The wiper is adjusted to pass under the intermediate presser. (Refer to the Standard adjustment (9).)
13-4) The wiper does not work after trimming a thread.
4-A) The wiper switch has been set to OFF.
Set the wiper switch to ON. (Refer to the Item "3-7. Switches on the machine head".)
14. Severe vibration
14-1) The sewing machine is not properly leveled.
Securely fix the machine by the level adjuster. (Refer to the Instruction Manual)
14-2) Maladjustment of the belt tension.
Accurately adjust the belt tension. (Refer to the Standard adjustment (46).)
14-3) Inaccurate positioning of the crank balancer.
Correct the position of the crank balancer. (Refer to the Standard adjustment (56).)

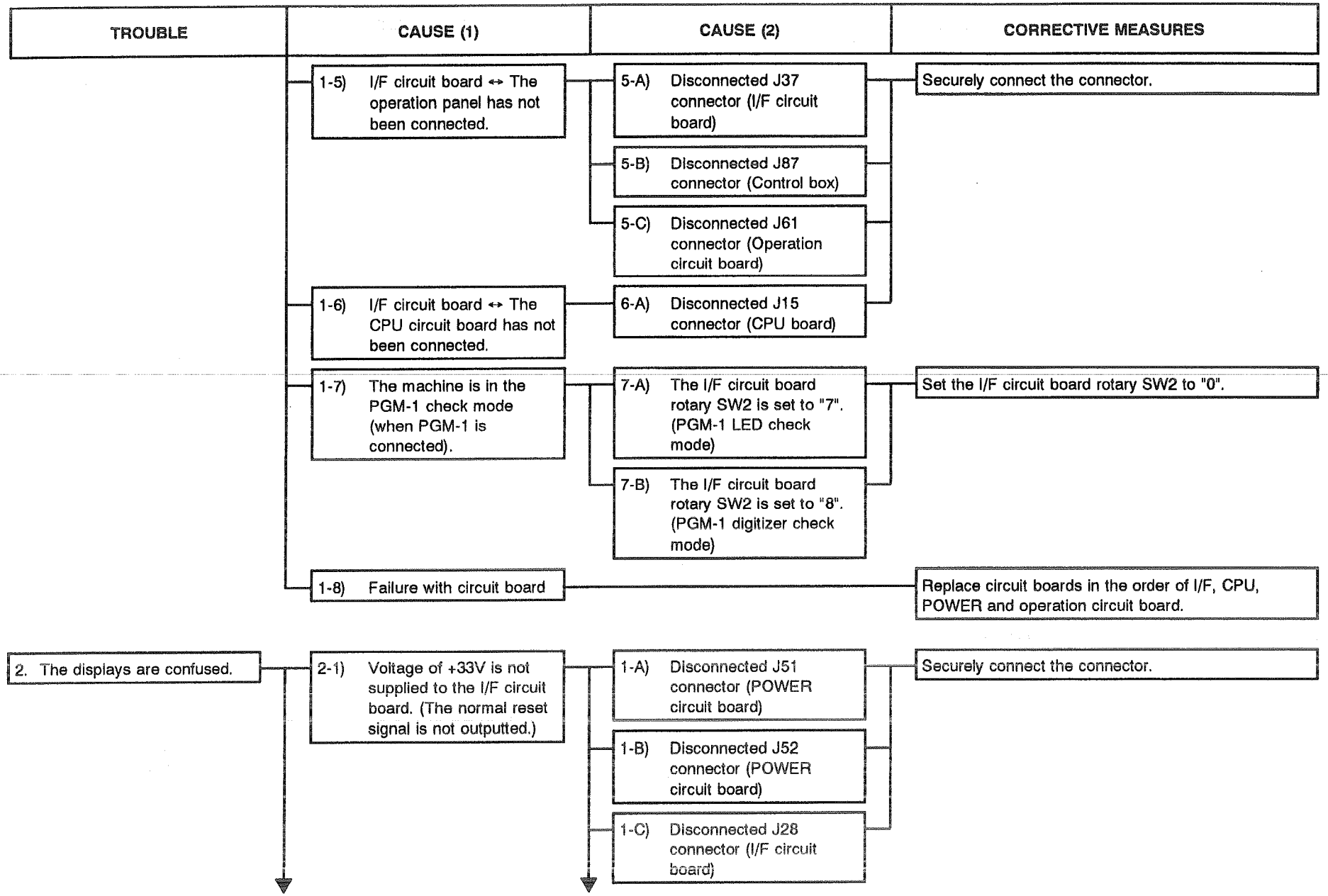
## 8-2. Troubles and corrective measures (electrical parts) (Refer to the block diagram.)

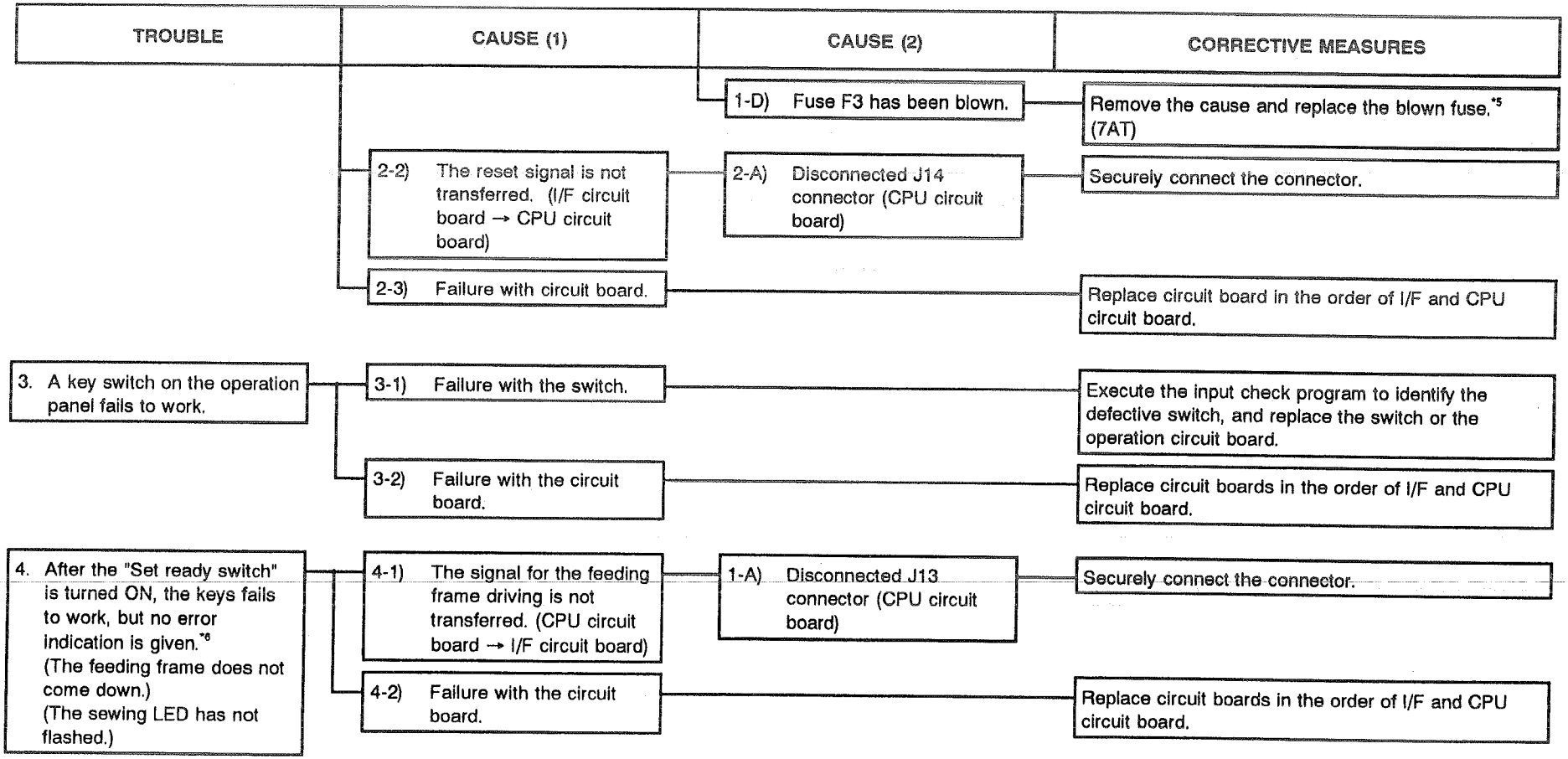
| TROUBLE | CAUSE (1) | CAUSE (2) | CORRECTIVE MEASURES |
|---|---|---|---|
| 1. The display fails to light. | 1-1) The power is not supplied to the switching regulator. (Voltage of 5V, +12V of -12V has not been supplied.) | 1-A) Disconnected J40 connector. | Securely connect the connector. |
| | | 1-B) Fuse F1 has blown. | Replace the blown fuse after removing the cause.*2 (1A) |
| | 1-2) Voltage of +5V is not supplied to the CPU circuit board. | 2-A) Disconnected J57 connector (POWER circuit board.)*1 | Securely connect the connector. |
| | | 2-B) Disconnected J17 connector (CPU circuit board)*1 | |
| | | 2-C) Disconnected J55 connector (POWER circuit board) | |
| | 1-3) Voltage of +5V or +12V is not supplied to the I/F circuit board. | 3-A) Disconnected J58 connector (POWER circuit board) | |
| | | 3-B) Disconnected J26 connector (I/F circuit board) | |
| | 1-4) The switching regulator does not output. | 4-A) Short-circuit in the power line. | Remove the short-circuit part, or replace the short-circuit board.*3 |
| | | 4-B) Switching regulator failure. | Replace the switching regulator.*4 |

*1 Holded in this state, the reset switch is turned ON and the brake of the machine motor comes into the energized state. This state causes that fuse F3 blows.
*2 AC100V is supplied to the switching regulator and the fan. The failure of the fan or the switching regulator is conceivable.
*3 Disconnect all the following connectors and turn the power ON. When voltage of +5V is not supplied, the POWER circuit board is defective. Connect respective connectors and detect the circuit board which does not supply 5V. (When there is a short-circuited part in the power line, the switching regulator does not supply power.)

| | | | |
|---|---|---|---|
| POWER circuit board J59 (FDD power supply) | CPU circuit board J17 | I/F circuit board J58 | |
| PMDC circuit board J61 | Control box J86 | | |

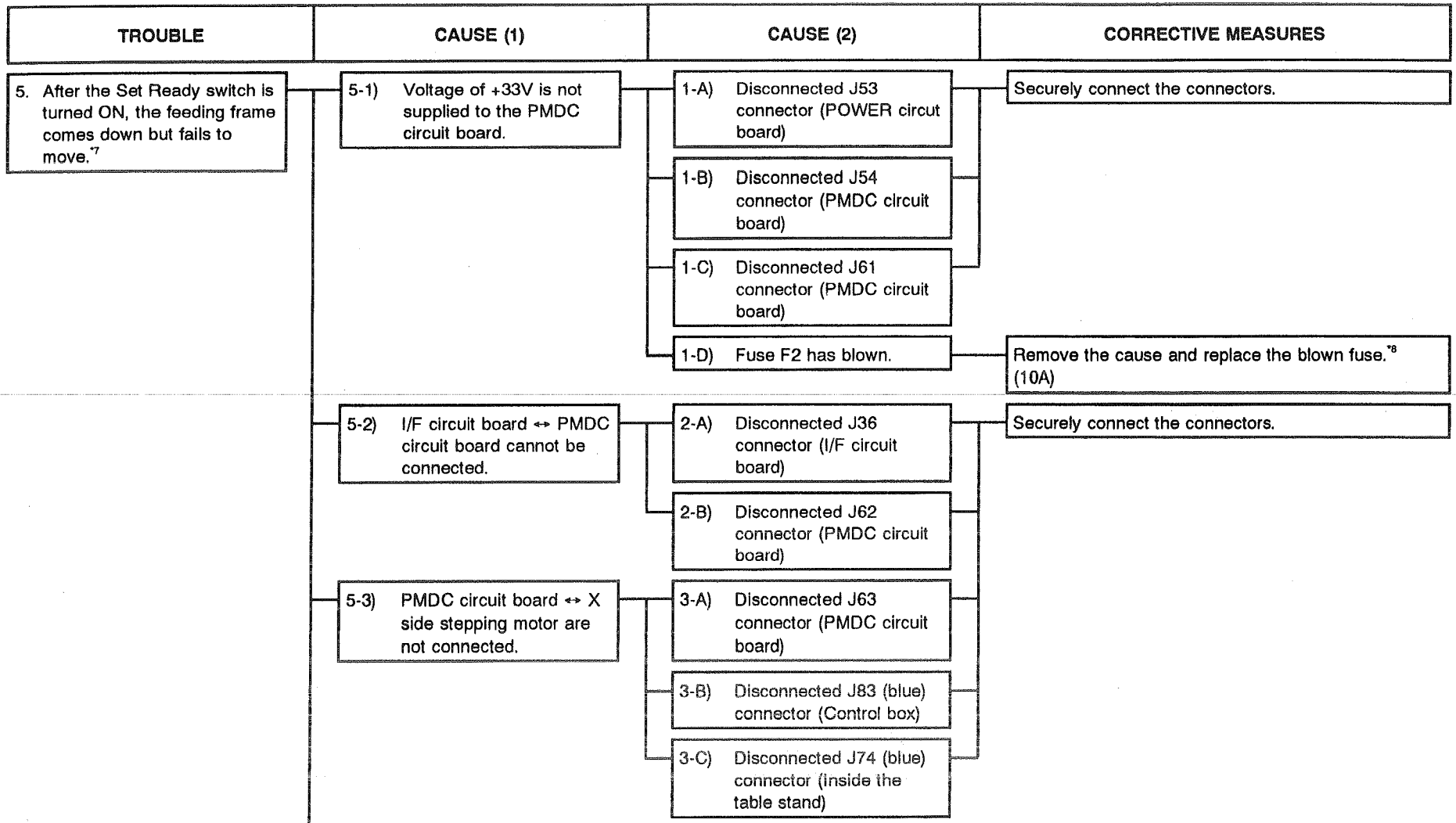
Disconnect the clutch/brake connector J71 of the machine motor in order to prevent that the trouble of *1 occurs and then perform test.
*4 Disconnect POWER circuit board J55 and turn the power ON. When +5V is not supplied, the regulator will be defective.


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
1-5) I/F circuit board ↔ The operation panel has not been connected.
5-A) Disconnected J37 connector (I/F circuit board)
5-B) Disconnected J87 connector (Control box)
5-C) Disconnected J61 connector (Operation circuit board)
Securely connect the connector.
1-6) I/F circuit board ↔ The CPU circuit board has not been connected.
6-A) Disconnected J15 connector (CPU board)
1-7) The machine is in the PGM-1 check mode (when PGM-1 is connected).
7-A) The I/F circuit board rotary SW2 is set to "7". (PGM-1 LED check mode)
7-B) The I/F circuit board rotary SW2 is set to "8". (PGM-1 digitizer check mode)
Set the I/F circuit board rotary SW2 to "0".
1-8) Failure with circuit board
Replace circuit boards in the order of I/F, CPU, POWER and operation circuit board.
2. The displays are confused.
2-1) Voltage of +33V is not supplied to the I/F circuit board. (The normal reset signal is not outputted.)
1-A) Disconnected J51 connector (POWER circuit board)
1-B) Disconnected J52 connector (POWER circuit board)
1-C) Disconnected J28 connector (I/F circuit board)
Securely connect the connector.



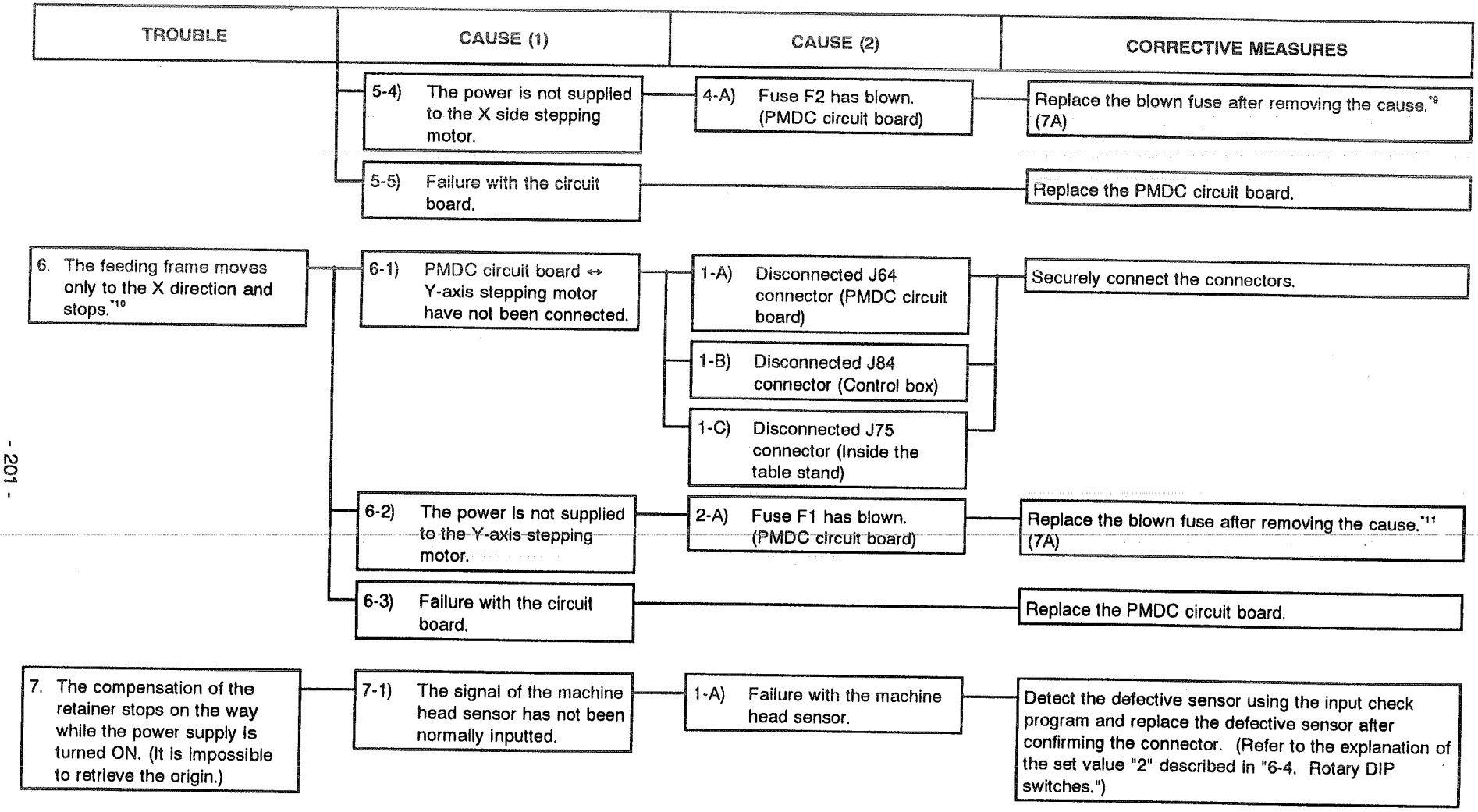

*5 The power supply for driving the machine head solenoid (thread trimmer solenoid, wiper solenoid) and the machine motor (clutch, brake) and the power supply for the air cylinder and driving the solenoid valve.
The reduction of the solenoid resistance value → The damage of the driving transistor on the I/F circuit board is conceivable. Measure the solenoid resistance value.

*6 The feeding frame is lowered and the origin retrieval is performed. However, J13 connector is equipped with the signal for presser foot driving and the stepping motor driving, so the machine does not work. Errors are not also outputted.

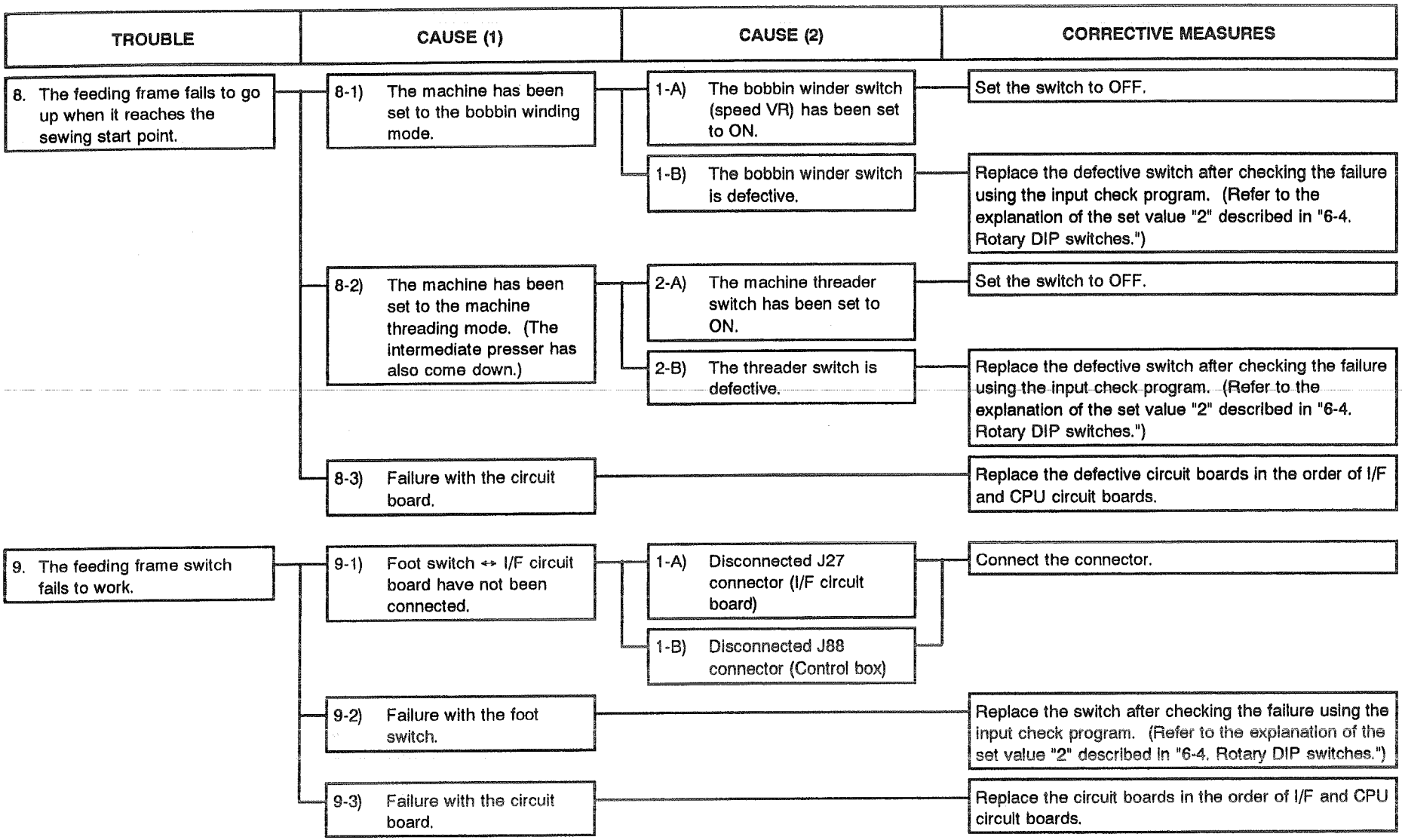


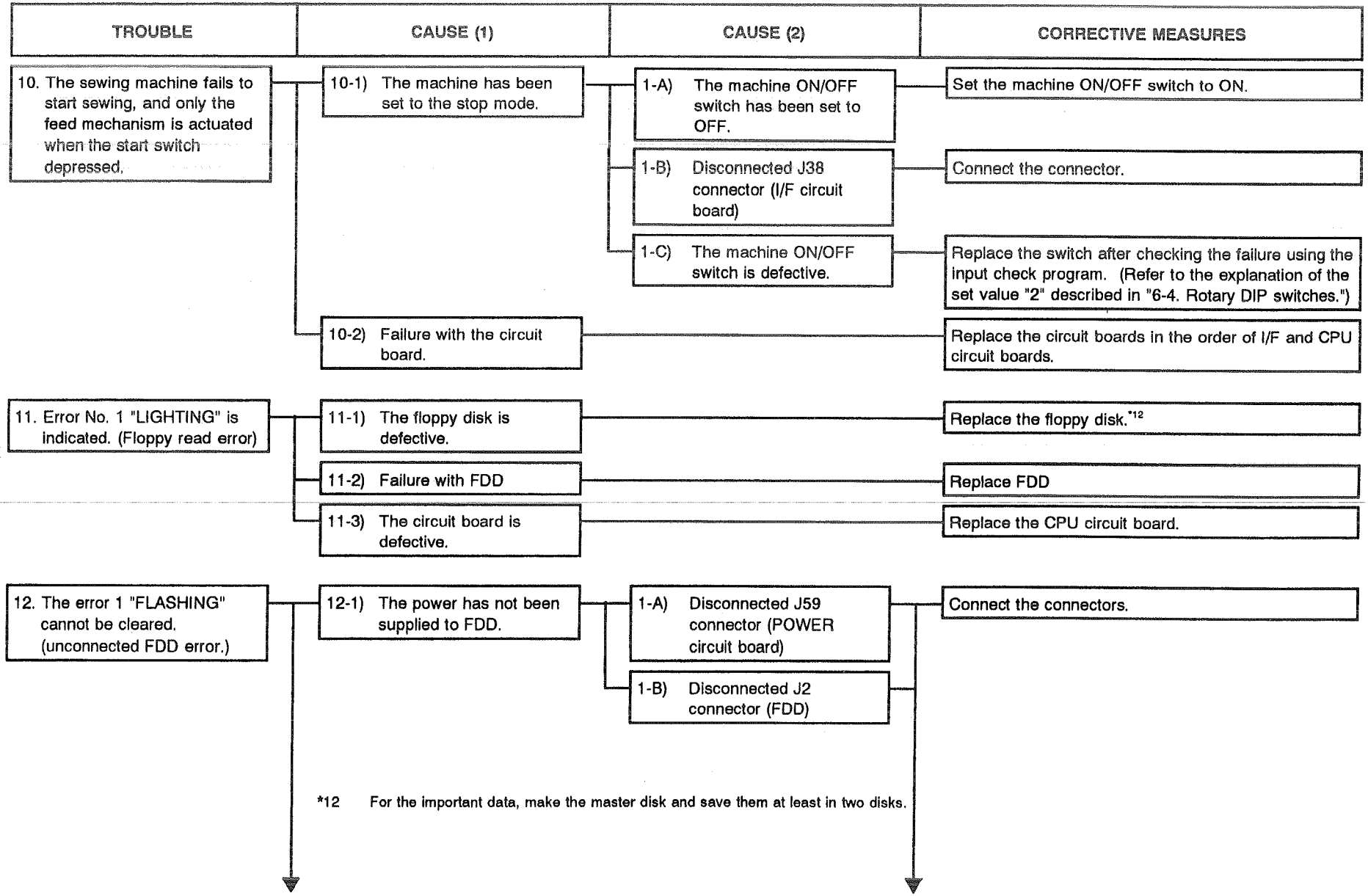

*7 It is tried to move the feeder to the X travel limit in order to correct the retainer after the power supply has been turned ON. (Refer to "5-4-2. Adjusting the current of the PMDC circuit board.")

*8 The power is supplied to both X and Y axes by this. When the power is supplied, it is the failure with the circuit board if the fuses blow immediately. Check the current adjusted value axis on the PMDC circuit board. (Refer to "5-4-2. Adjusting the current of the PMDC circuit board.")

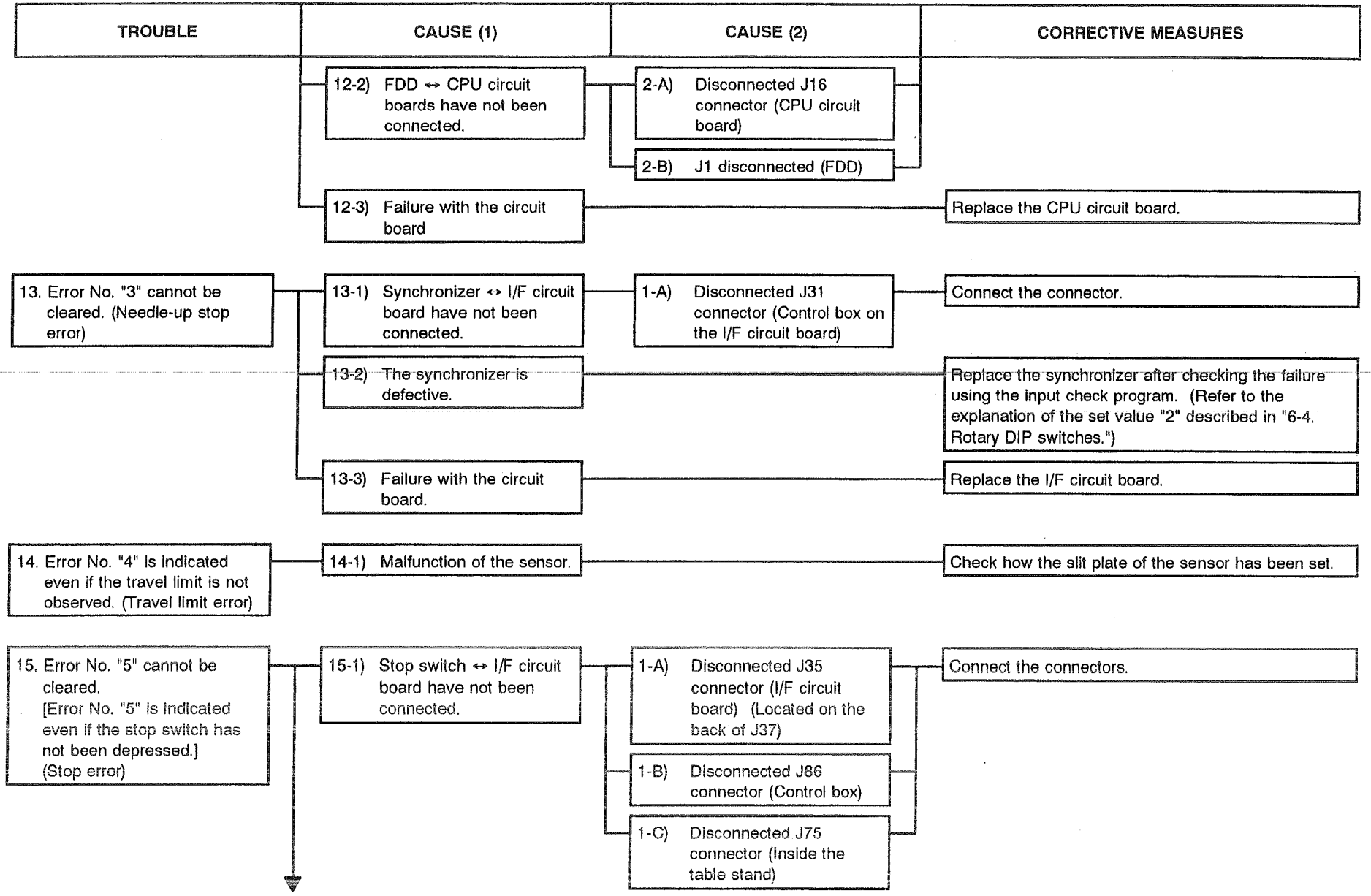


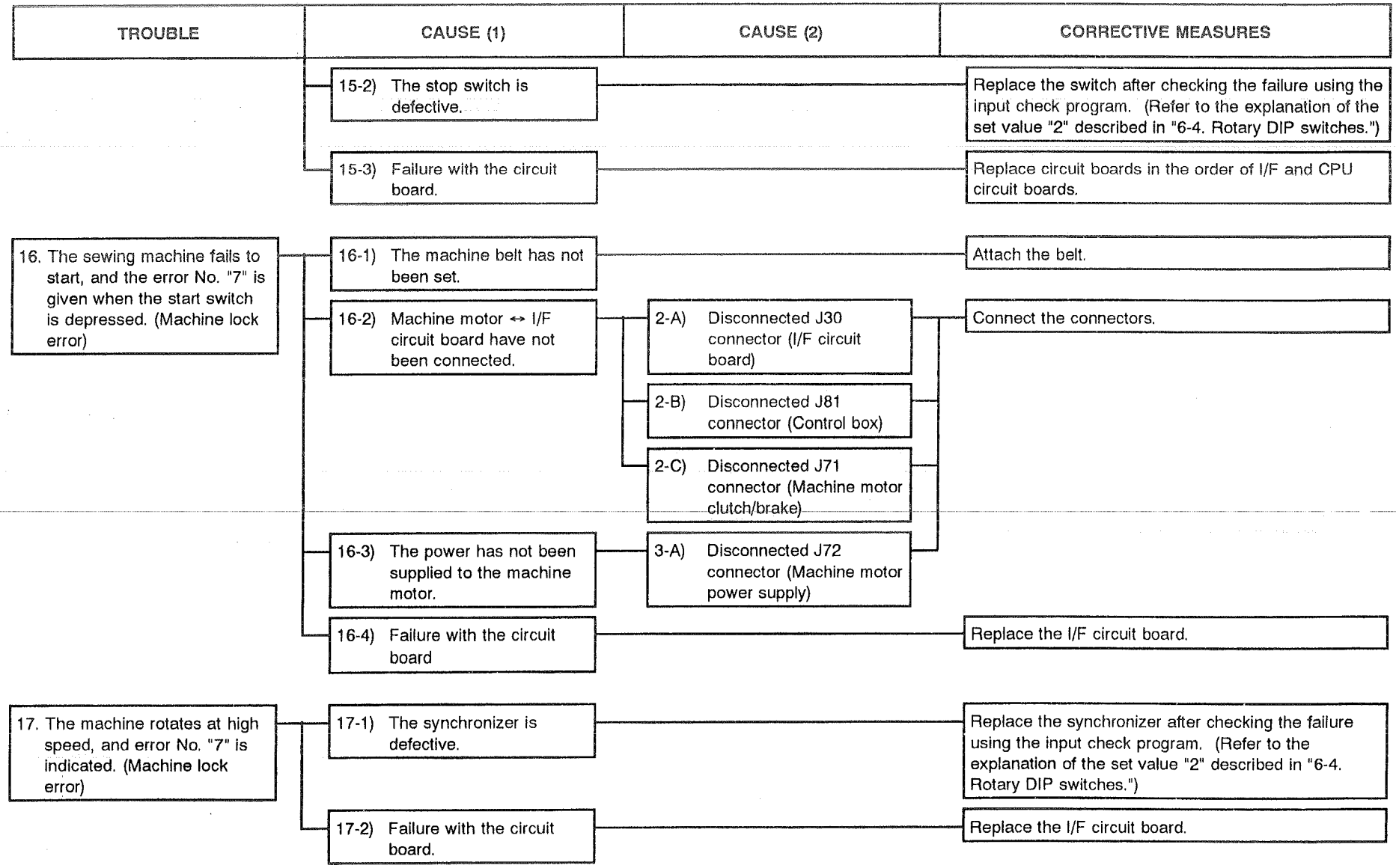

*9 The power is supplied to the X-axis stepping motor by this. Check the current adjusted value in the X axis on the PMDC circuit board. When the power is supplied, it is the failure with the circuit board if the fuses blow immediately. (Refer to "5-4-2. Adjusting the current of the PMDC circuit board.")
*10 After detecting the X travel limit by the compensation of the retainer, the feeding frame tries to move to Y direction.
*11 The power is supplied to the Y-axis stepping motor by this. Check the current adjusted value in the Y axis of the PMDC circuit board. (See page 113) When the power supply is turned ON, it is the failure with the circuit board if the fuse blows immediately.

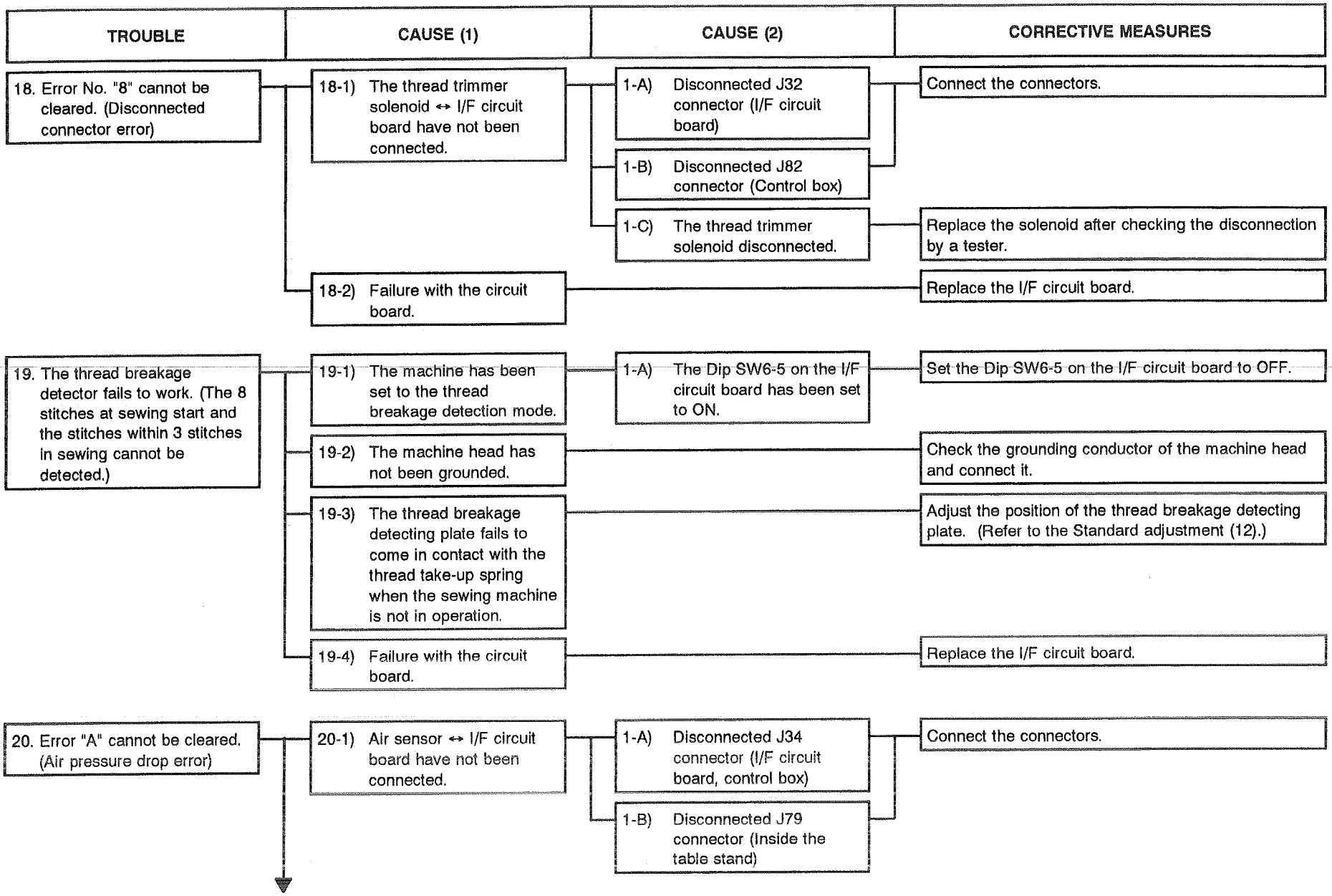

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
8. The feeding frame fails to go up when it reaches the sewing start point.
8-1) The machine has been set to the bobbin winding mode.
1-A) The bobbin winder switch (speed VR) has been set to ON.
Set the switch to OFF.
1-B) The bobbin winder switch is defective.
Replace the defective switch after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
8-2) The machine has been set to the machine threading mode. (The intermediate presser has also come down.)
2-A) The machine threader switch has been set to ON.
Set the switch to OFF.
2-B) The threader switch is defective.
Replace the defective switch after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
8-3) Failure with the circuit board.
Replace the defective circuit boards in the order of I/F and CPU circuit boards.
9. The feeding frame switch fails to work.
9-1) Foot switch ↔ I/F circuit board have not been connected.
1-A) Disconnected J27 connector (I/F circuit board)
Connect the connector.
1-B) Disconnected J88 connector (Control box)
9-2) Failure with the foot switch.
Replace the switch after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
9-3) Failure with the circuit board.
Replace the circuit boards in the order of I/F and CPU circuit boards.

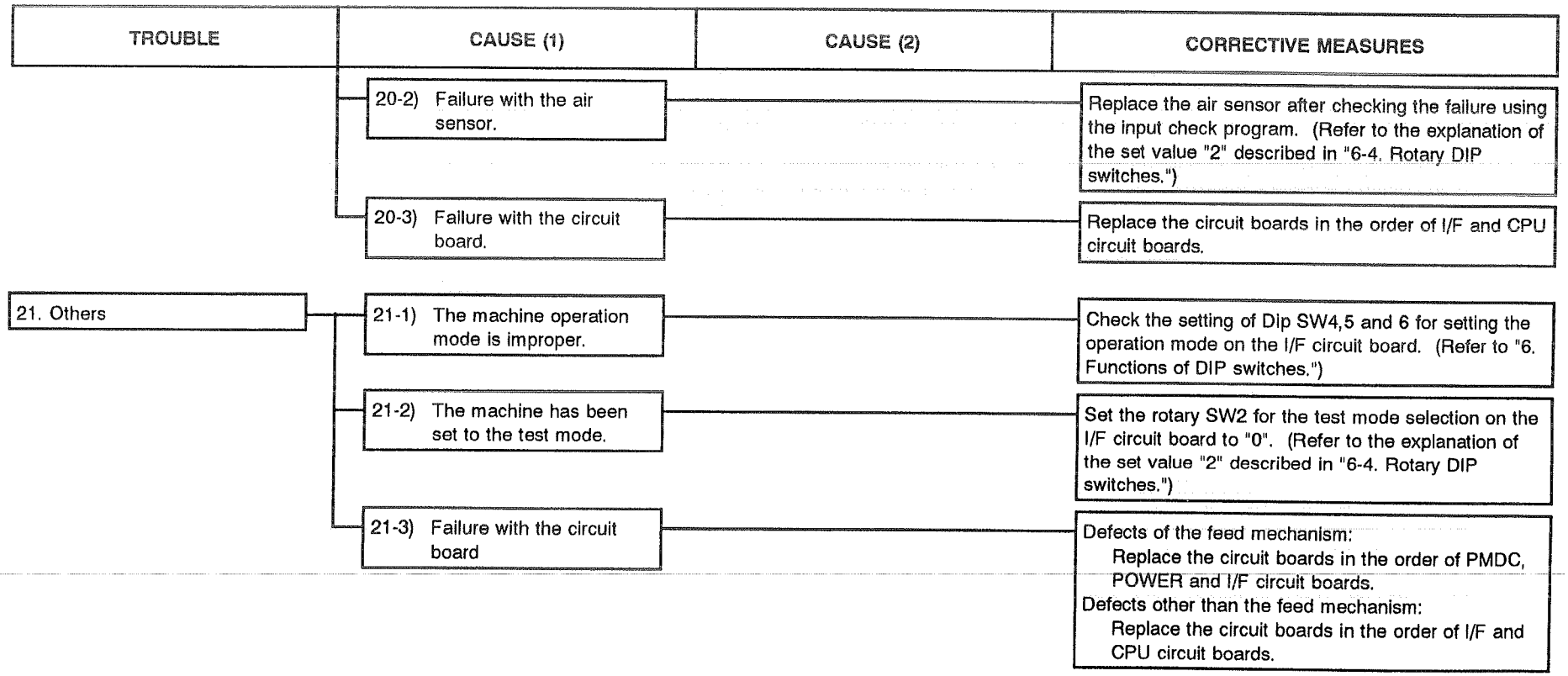



*12 For the important data, make the master disk and save them at least in two disks.

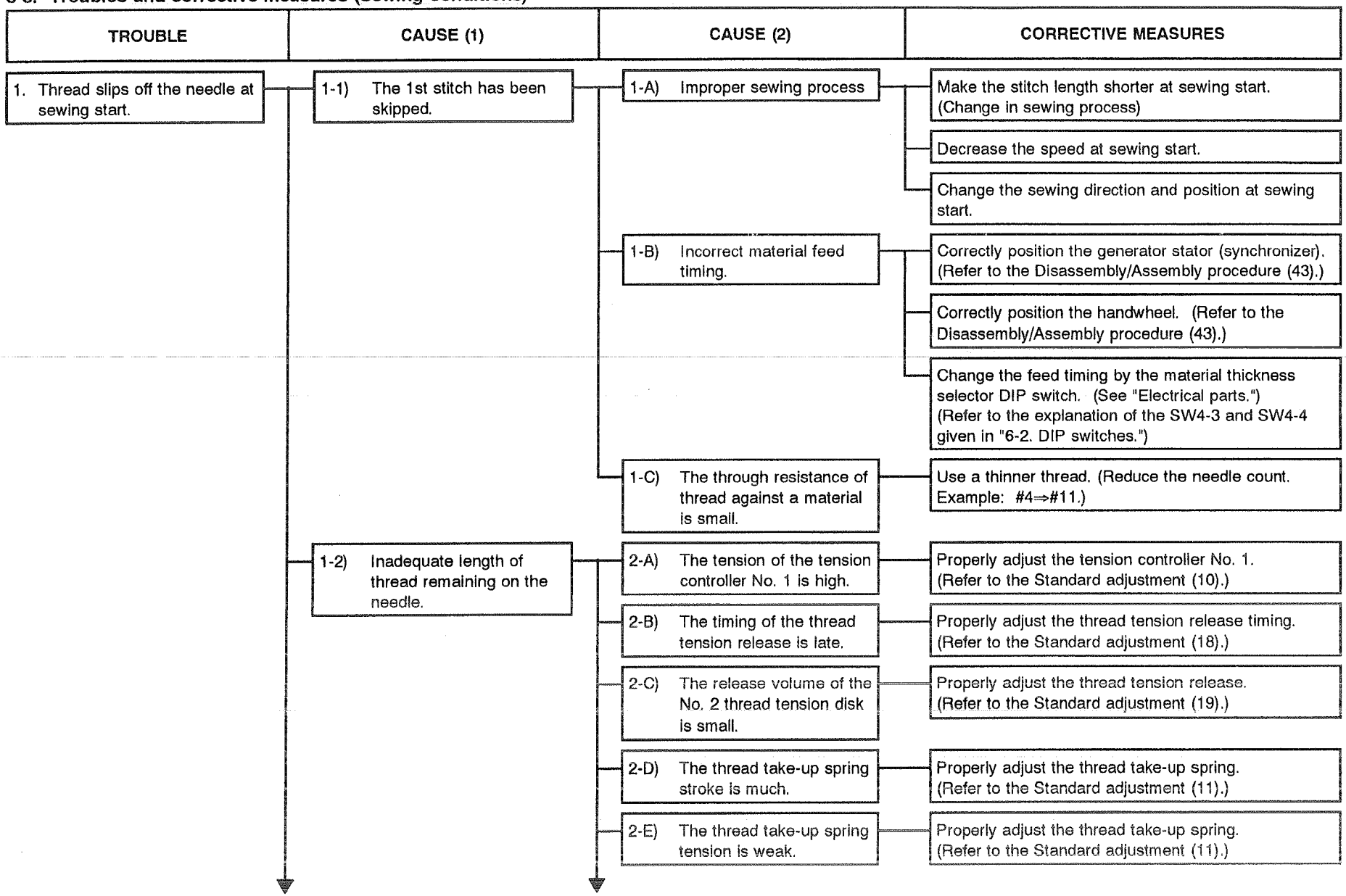

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
12-2) FDD ↔ CPU circuit boards have not been connected.
2-A) Disconnected J16 connector (CPU circuit board)
2-B) J1 disconnected (FDD)
12-3) Failure with the circuit board
Replace the CPU circuit board.
13. Error No. "3" cannot be cleared. (Needle-up stop error)
13-1) Synchronizer ↔ I/F circuit board have not been connected.
1-A) Disconnected J31 connector (Control box on the I/F circuit board)
Connect the connector.
13-2) The synchronizer is defective.
Replace the synchronizer after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
13-3) Failure with the circuit board.
Replace the I/F circuit board.
14. Error No. "4" is indicated even if the travel limit is not observed. (Travel limit error)
14-1) Malfunction of the sensor.
Check how the slit plate of the sensor has been set.
15. Error No. "5" cannot be cleared.
[Error No. "5" is indicated even if the stop switch has not been depressed.]
(Stop error)
15-1) Stop switch ↔ I/F circuit board have not been connected.
1-A) Disconnected J35 connector (I/F circuit board) (Located on the back of J37)
1-B) Disconnected J86 connector (Control box)
1-C) Disconnected J75 connector (Inside the table stand)
Connect the connectors.

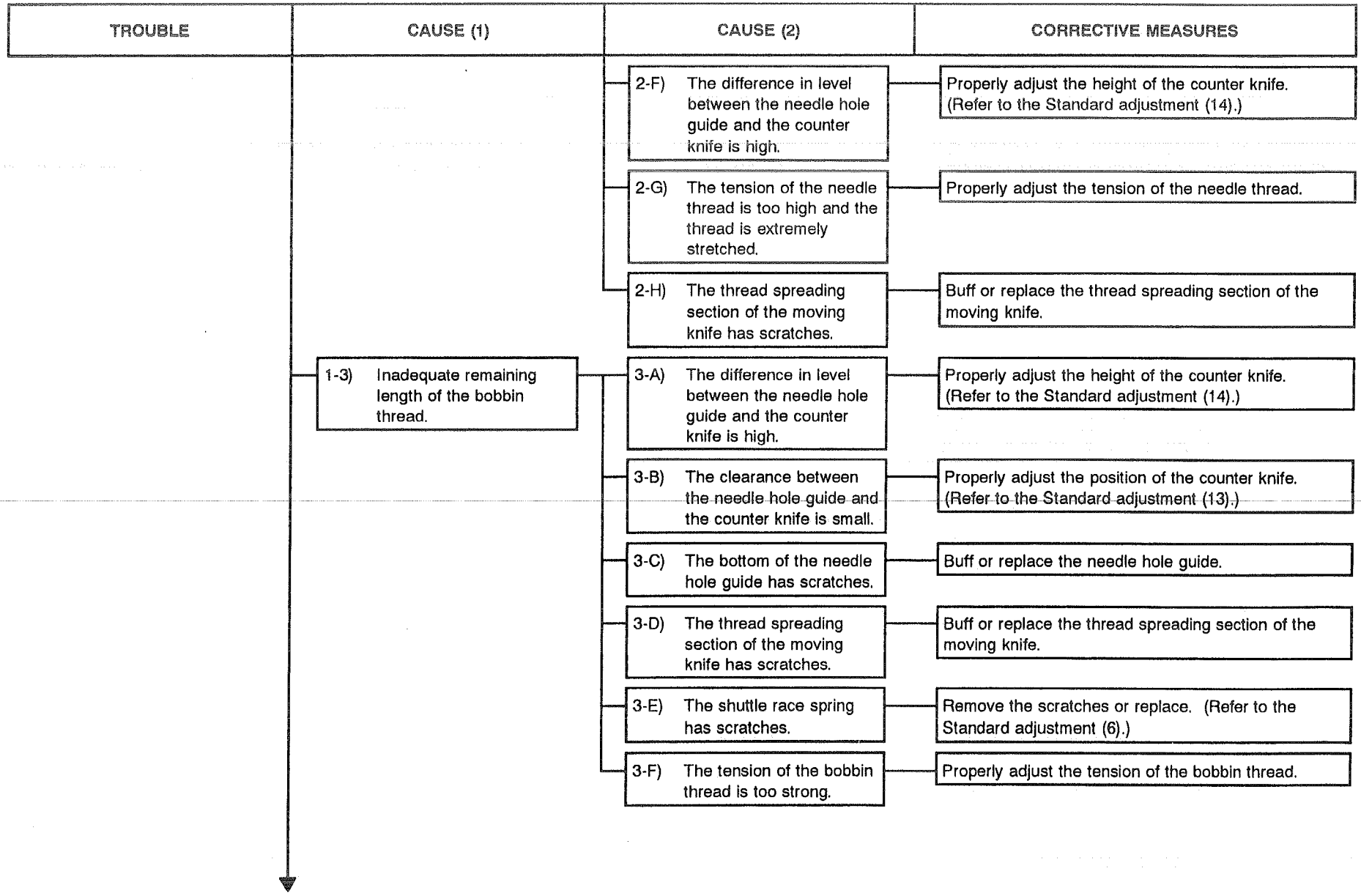

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
15-2) The stop switch is defective.
Replace the switch after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
15-3) Failure with the circuit board.
Replace circuit boards in the order of I/F and CPU circuit boards.
16. The sewing machine fails to start, and the error No. "7" is given when the start switch is depressed. (Machine lock error)
16-1) The machine belt has not been set.
Attach the belt.
16-2) Machine motor ↔ I/F circuit board have not been connected.
2-A) Disconnected J30 connector (I/F circuit board)
2-B) Disconnected J81 connector (Control box)
2-C) Disconnected J71 connector (Machine motor clutch/brake)
Connect the connectors.
16-3) The power has not been supplied to the machine motor.
3-A) Disconnected J72 connector (Machine motor power supply)
16-4) Failure with the circuit board
Replace the I/F circuit board.
17. The machine rotates at high speed, and error No. "7" is indicated. (Machine lock error)
17-1) The synchronizer is defective.
Replace the synchronizer after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
17-2) Failure with the circuit board.
Replace the I/F circuit board.

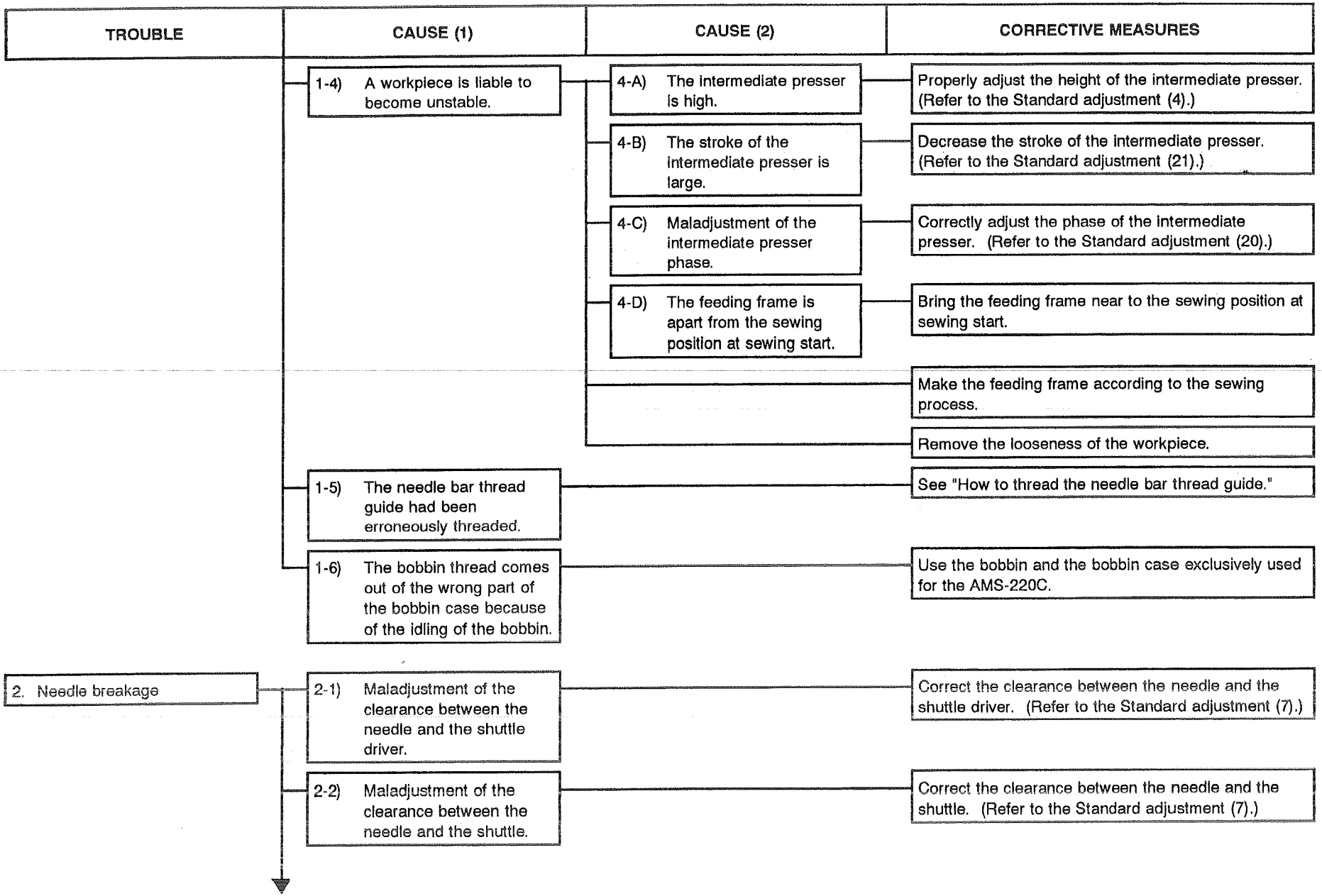

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
18. Error No. "8" cannot be cleared. (Disconnected connector error)
18-1) The thread trimmer solenoid ↔ I/F circuit board have not been connected.
1-A) Disconnected J32 connector (I/F circuit board)
1-B) Disconnected J82 connector (Control box)
Connect the connectors.
1-C) The thread trimmer solenoid disconnected.
Replace the solenoid after checking the disconnection by a tester.
18-2) Failure with the circuit board.
Replace the I/F circuit board.
19. The thread breakage detector fails to work. (The 8 stitches at sewing start and the stitches within 3 stitches in sewing cannot be detected.)
19-1) The machine has been set to the thread breakage detection mode.
1-A) The Dip SW6-5 on the I/F circuit board has been set to ON.
Set the Dip SW6-5 on the I/F circuit board to OFF.
19-2) The machine head has not been grounded.
Check the grounding conductor of the machine head and connect it.
19-3) The thread breakage detecting plate fails to come in contact with the thread take-up spring when the sewing machine is not in operation.
Adjust the position of the thread breakage detecting plate. (Refer to the Standard adjustment (12).)
19-4) Failure with the circuit board.
Replace the I/F circuit board.
20. Error "A" cannot be cleared. (Air pressure drop error)
20-1) Air sensor ↔ I/F circuit board have not been connected.
1-A) Disconnected J34 connector (I/F circuit board, control box)
Connect the connectors.
1-B) Disconnected J79 connector (Inside the table stand)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
20-2) Failure with the air sensor.
Replace the air sensor after checking the failure using the input check program. (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
20-3) Failure with the circuit board.
Replace the circuit boards in the order of I/F and CPU circuit boards.
21. Others
21-1) The machine operation mode is improper.
Check the setting of Dip SW4,5 and 6 for setting the operation mode on the I/F circuit board. (Refer to "6. Functions of DIP switches.")
21-2) The machine has been set to the test mode.
Set the rotary SW2 for the test mode selection on the I/F circuit board to "0". (Refer to the explanation of the set value "2" described in "6-4. Rotary DIP switches.")
21-3) Failure with the circuit board
Defects of the feed mechanism:
Replace the circuit boards in the order of PMDC, POWER and I/F circuit boards.
Defects other than the feed mechanism:
Replace the circuit boards in the order of I/F and CPU circuit boards.

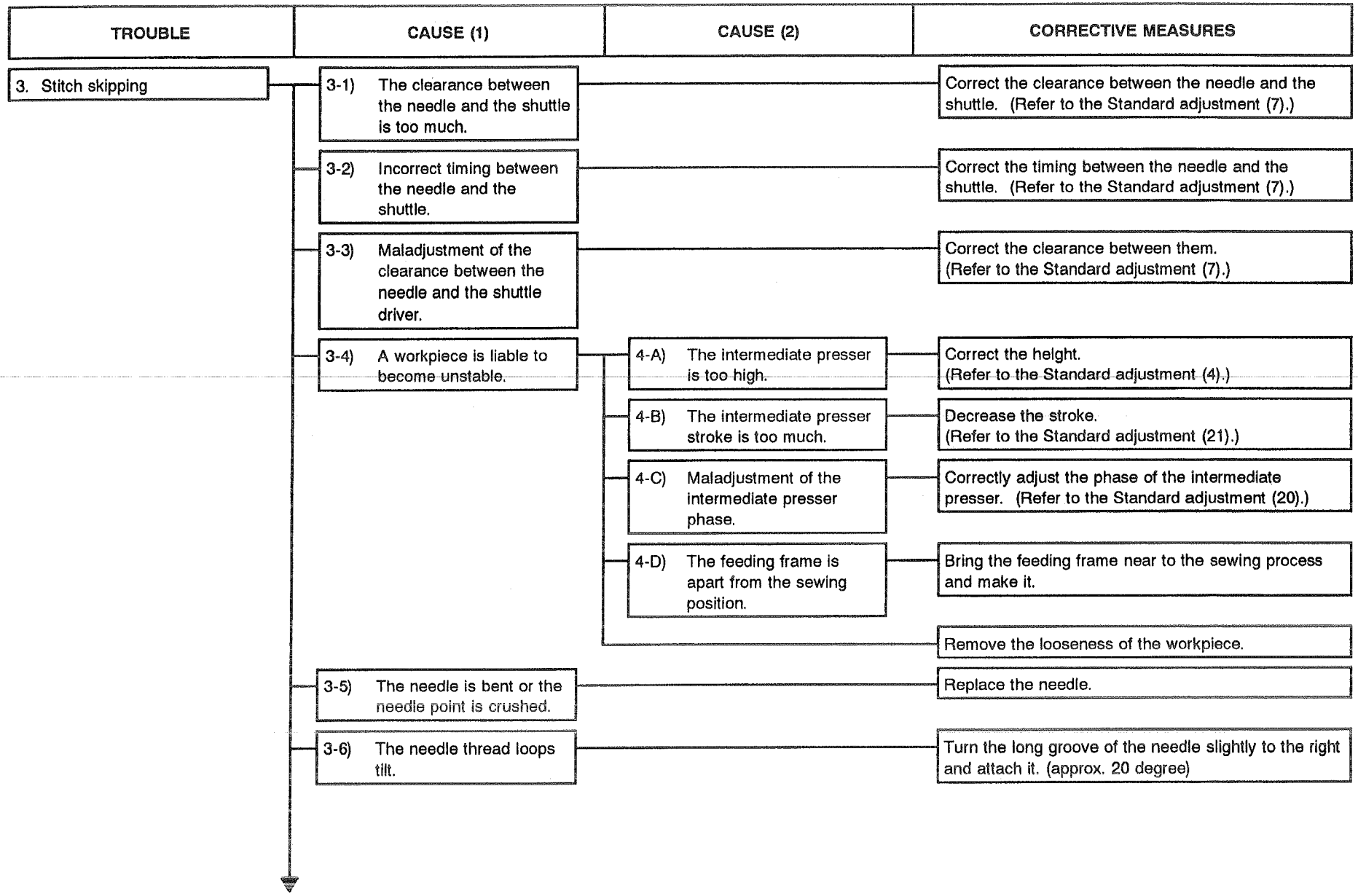
## 8-3. Troubles and corrective measures (Sewing conditions)

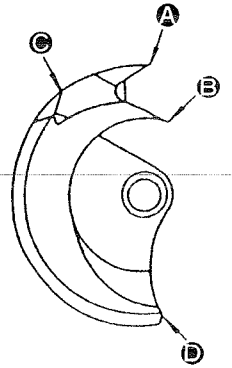
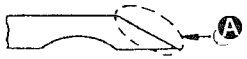


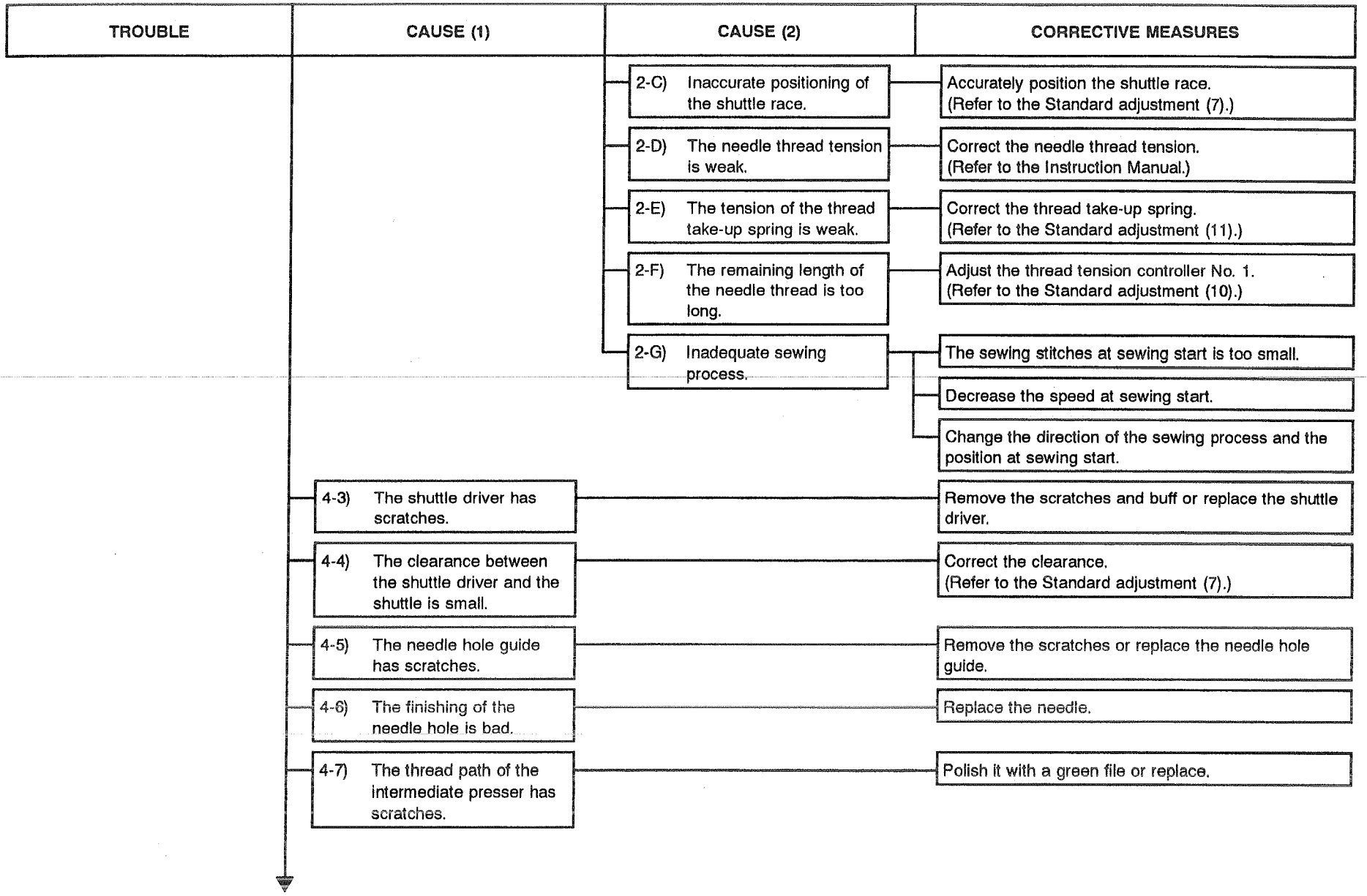

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
2-F) The difference in level between the needle hole guide and the counter knife is high.
Properly adjust the height of the counter knife. (Refer to the Standard adjustment (14).)
2-G) The tension of the needle thread is too high and the thread is extremely stretched.
Properly adjust the tension of the needle thread.
2-H) The thread spreading section of the moving knife has scratches.
Buff or replace the thread spreading section of the moving knife.
1-3) Inadequate remaining length of the bobbin thread.
3-A) The difference in level between the needle hole guide and the counter knife is high.
Properly adjust the height of the counter knife. (Refer to the Standard adjustment (14).)
3-B) The clearance between the needle hole guide and the counter knife is small.
Properly adjust the position of the counter knife. (Refer to the Standard adjustment (13).)
3-C) The bottom of the needle hole guide has scratches.
Buff or replace the needle hole guide.
3-D) The thread spreading section of the moving knife has scratches.
Buff or replace the thread spreading section of the moving knife.
3-E) The shuttle race spring has scratches.
Remove the scratches or replace. (Refer to the Standard adjustment (6).)
3-F) The tension of the bobbin thread is too strong.
Properly adjust the tension of the bobbin thread.

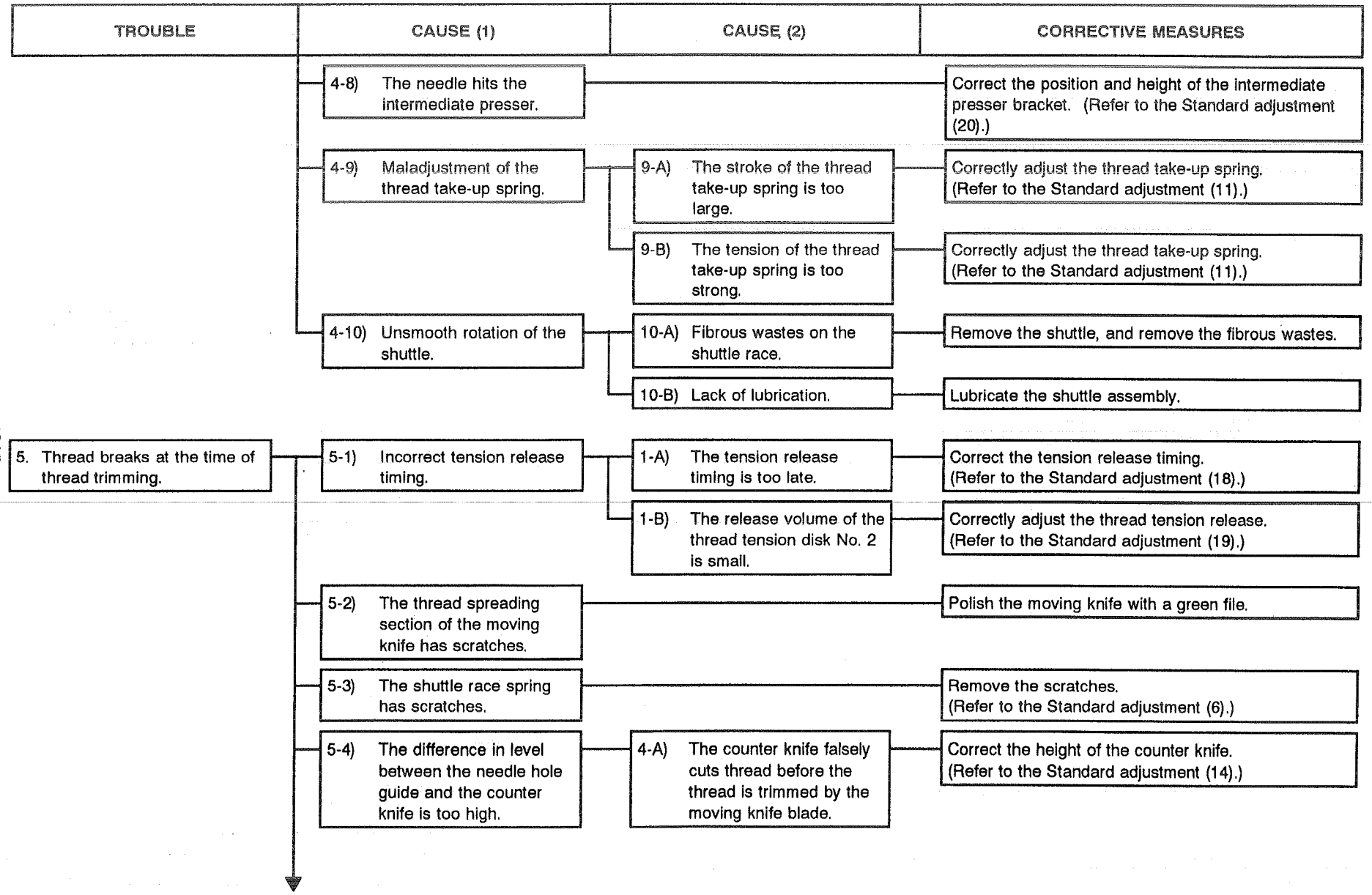

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
1-4) A workpiece is liable to become unstable.
4-A) The intermediate presser is high.
Properly adjust the height of the intermediate presser. (Refer to the Standard adjustment (4).)
4-B) The stroke of the intermediate presser is large.
Decrease the stroke of the intermediate presser. (Refer to the Standard adjustment (21).)
4-C) Maladjustment of the intermediate presser phase.
Correctly adjust the phase of the intermediate presser. (Refer to the Standard adjustment (20).)
4-D) The feeding frame is apart from the sewing position at sewing start.
Bring the feeding frame near to the sewing position at sewing start.
Make the feeding frame according to the sewing process.
Remove the looseness of the workpiece.
1-5) The needle bar thread guide had been erroneously threaded.
See "How to thread the needle bar thread guide."
1-6) The bobbin thread comes out of the wrong part of the bobbin case because of the idling of the bobbin.
Use the bobbin and the bobbin case exclusively used for the AMS-220C.
2. Needle breakage
2-1) Maladjustment of the clearance between the needle and the shuttle driver.
Correct the clearance between the needle and the shuttle driver. (Refer to the Standard adjustment (7).)
2-2) Maladjustment of the clearance between the needle and the shuttle.
Correct the clearance between the needle and the shuttle. (Refer to the Standard adjustment (7).)

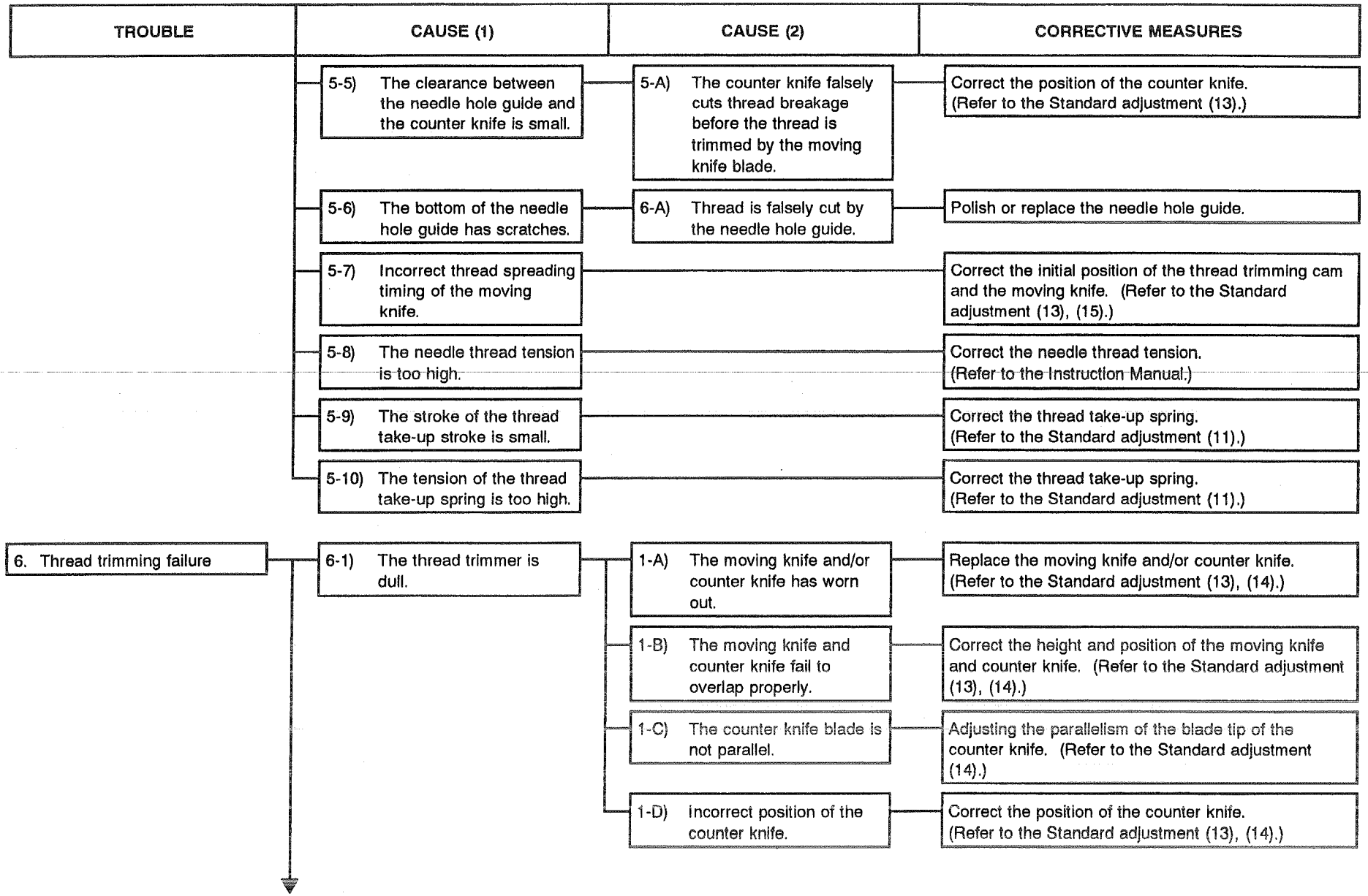
| TROUBLE | CAUSE (1) | CAUSE (2) | CORRECTIVE MEASURES |
|---|---|---|---|
| | 2-3) Incorrect feed timing. | | Correct the position of the generator stator. (Refer to the Disassembly/Assembly procedure (43).) |
| | | | Correct the position of the handwheel. (Refer to the Disassembly/Assembly procedure (43).) |
| | | | Change the feed timing by the material thickness selector DIP switch. (See "Electrical parts.") (Refer to the explanation of the SW4-3 and SW4-4 given in "6. DIP switches.") |
| | 2-4) The needle hits the moving knife. | | Correct the position of the moving knife. (Refer to the Standard adjustment (13).) |
| | 2-5) The needle hits the intermediate presser | | Accurately position the intermediate presser bar bracket. (Refer to the Standard adjustment (20).) |
| | 2-6) The needle hits the wiper. | | Correct the needle-up stop position. (Refer to the Standard adjustment (3).) |
| | | | Accurately position the wiper. (Refer to the Standard adjustment (9).) |
| | 2-7) The needle is bent. | | Replace the needle. |
| | 2-8) The needle is thin. | | Change the needle count according to the workpiece. |
| | 2-9) The thickness of the workpiece exceeds the specified thickness. | | The thickness possible to sew: 5 mm (0.197") max. (Refer to the Standard adjustment (4).) |
| | 2-10) The needle hole guide has scratches. | | Remove the scratches or replace. |

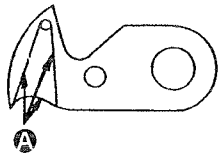

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
3. Stitch skipping
3-1) The clearance between the needle and the shuttle is too much.
Correct the clearance between the needle and the shuttle. (Refer to the Standard adjustment (7).)
3-2) Incorrect timing between the needle and the shuttle.
Correct the timing between the needle and the shuttle. (Refer to the Standard adjustment (7).)
3-3) Maladjustment of the clearance between the needle and the shuttle driver.
Correct the clearance between them. (Refer to the Standard adjustment (7).)
3-4) A workpiece is liable to become unstable.
4-A) The intermediate presser is too high.
Correct the height. (Refer to the Standard adjustment (4).)
4-B) The intermediate presser stroke is too much.
Decrease the stroke. (Refer to the Standard adjustment (21).)
4-C) Maladjustment of the intermediate presser phase.
Correctly adjust the phase of the intermediate presser. (Refer to the Standard adjustment (20).)
4-D) The feeding frame is apart from the sewing position.
Bring the feeding frame near to the sewing process and make it.
Remove the looseness of the workpiece.
3-5) The needle is bent or the needle point is crushed.
Replace the needle.
3-6) The needle thread loops tilt.
Turn the long groove of the needle slightly to the right and attach it. (approx. 20 degree)

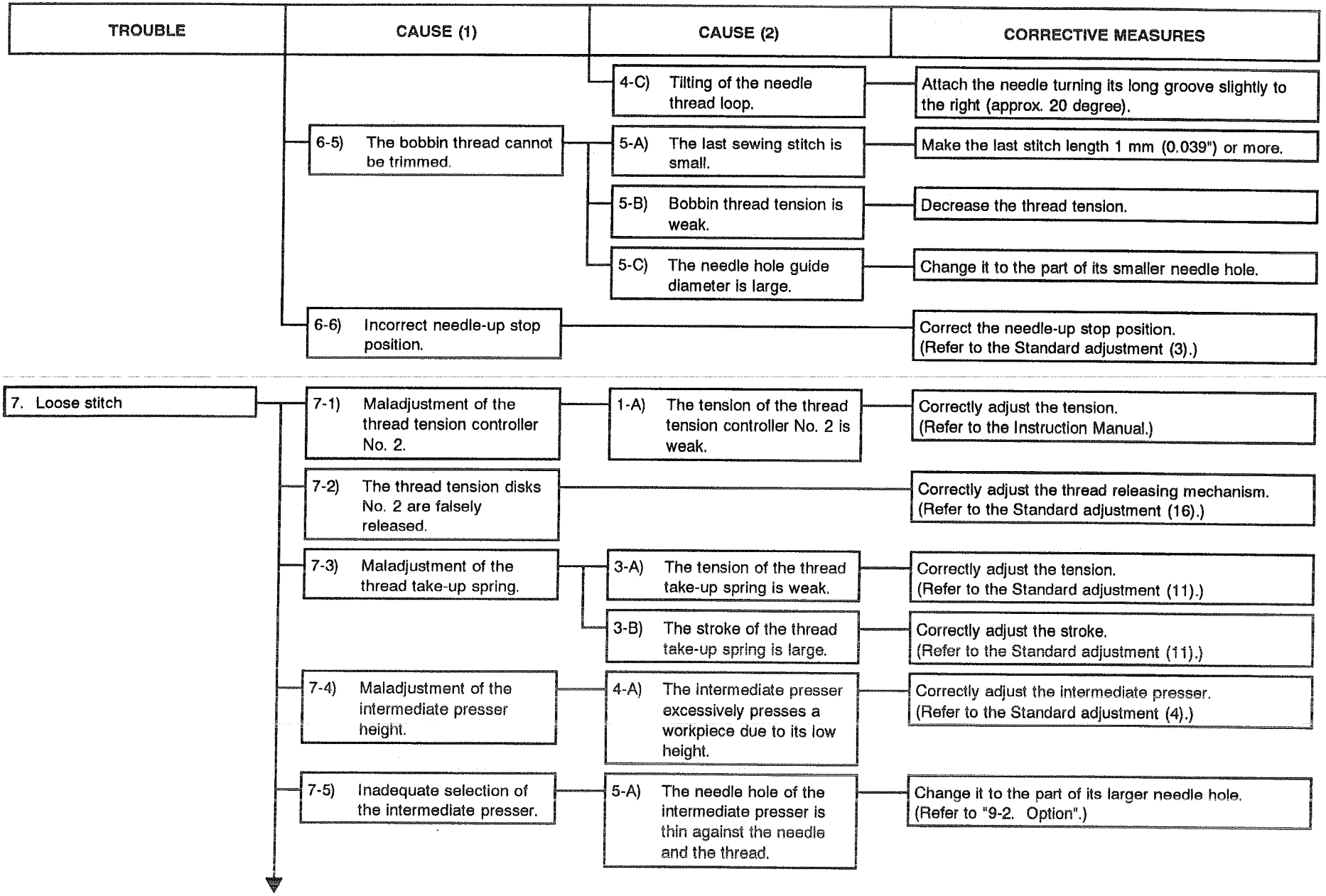
| TROUBLE | CAUSE (1) | CAUSE (2) | CORRECTIVE MEASURES |
|---|---|---|---|
| | 3-7) Incorrect material feed timing. | | Correct the position of the generator stator. (Refer to the Disassembly/Assembly procedure (43).) |
| | | | Correct the position of the handwheel. (Refer to the Disassembly/Assembly procedure (43).) |
| | | | Change the feed timing by the material thickness selector DIP switch. (See "Electrical parts.") (Refer to the explanation of the SW4-3 and SW4-4 given in "6. DIP switches.") |
| 4. Thread breakage | 4-1) Scratches on the shuttle.   | 1-A) A scratch on the portion Ⓐ (The needle hits the shuttle.) | Smooth the shuttle point using an oilstone, then polish the shuttle point with a green file. Adjust the clearance between the needle and shuttle. |
| | | 1-B) A scratch on portion Ⓑ (produced when the needle bends or breaks) | Smooth the scratched portion, using an oilstone, then polish it with a green file. |
| | | 1-C) A scratch on portion Ⓒ (scratched by the needle when removing the shuttle) | Smooth the scratched portion, using an oilstone, then polish it with a green file. |
| | | 1-D) A scratch on portion Ⓓ | Smooth the scratched portion, using an oilstone, then polish it with a green file. |
| | 4-2) Thread bites into the shuttle. | 2-A) Inaccurate positioning of the shuttle race spring. | Accurately position the shuttle race spring. (Refer to the Standard adjustment (6).) |
| | | 2-B) Position Ⓐ of the shuttle point is dull.   | Replace the shuttle. |

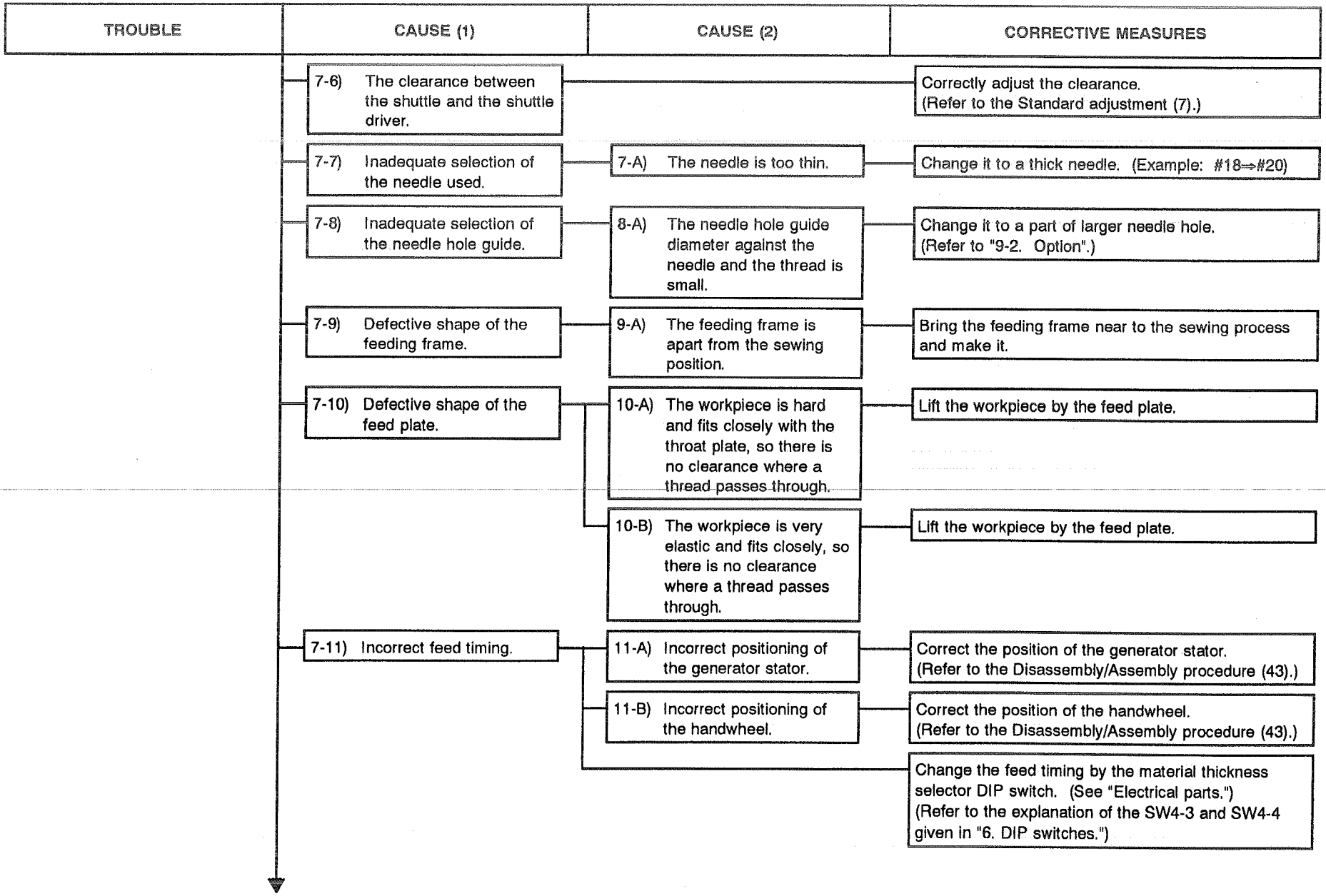

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
2-C) Inaccurate positioning of the shuttle race.
Accurately position the shuttle race. (Refer to the Standard adjustment (7).)
2-D) The needle thread tension is weak.
Correct the needle thread tension. (Refer to the Instruction Manual.)
2-E) The tension of the thread take-up spring is weak.
Correct the thread take-up spring. (Refer to the Standard adjustment (11).)
2-F) The remaining length of the needle thread is too long.
Adjust the thread tension controller No. 1. (Refer to the Standard adjustment (10).)
2-G) Inadequate sewing process.
The sewing stitches at sewing start is too small.
Decrease the speed at sewing start.
Change the direction of the sewing process and the position at sewing start.
4-3) The shuttle driver has scratches.
Remove the scratches and buff or replace the shuttle driver.
4-4) The clearance between the shuttle driver and the shuttle is small.
Correct the clearance. (Refer to the Standard adjustment (7).)
4-5) The needle hole guide has scratches.
Remove the scratches or replace the needle hole guide.
4-6) The finishing of the needle hole is bad.
Replace the needle.
4-7) The thread path of the intermediate presser has scratches.
Polish it with a green file or replace.

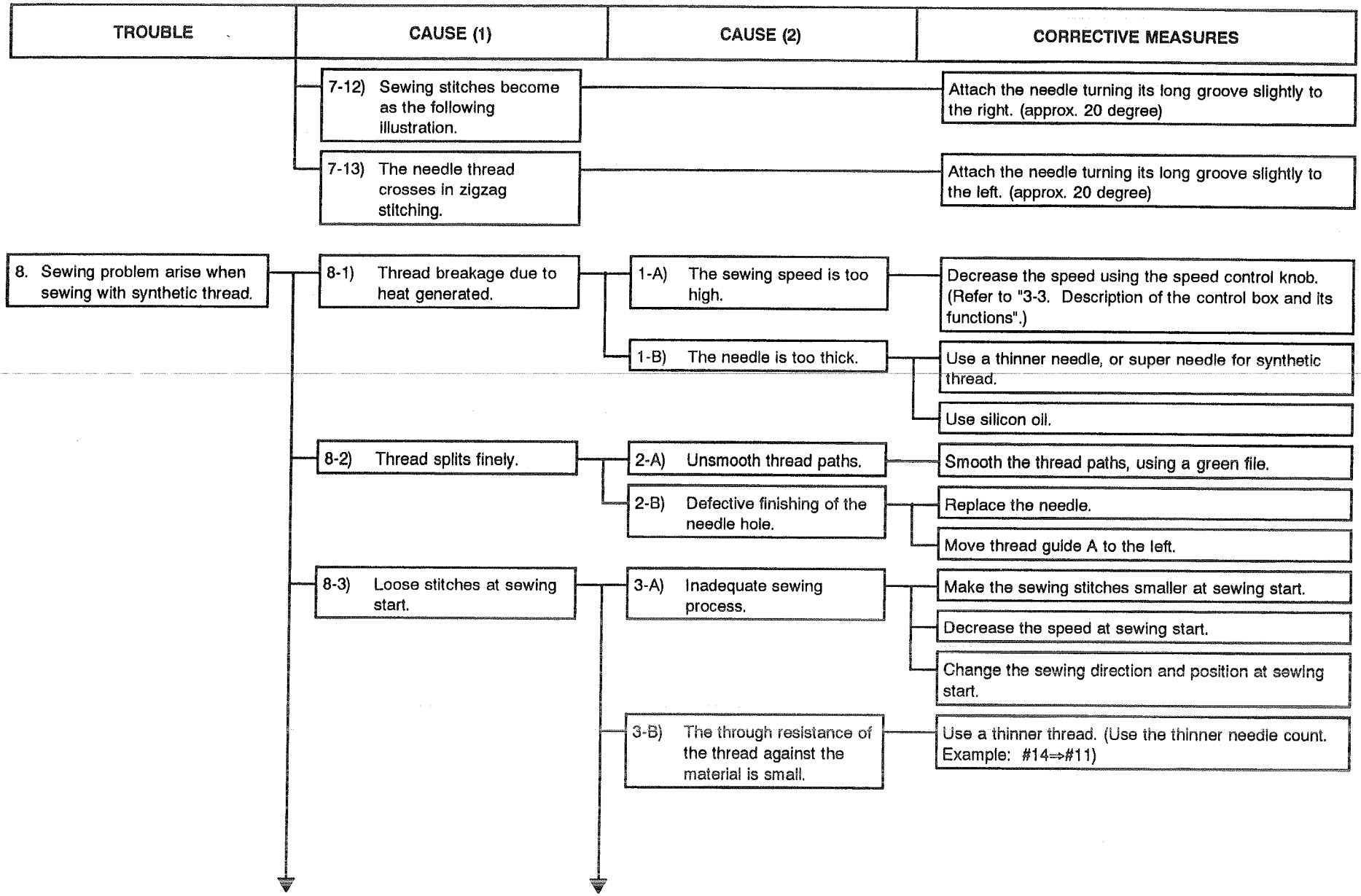

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
4-8) The needle hits the intermediate presser.
Correct the position and height of the intermediate presser bracket. (Refer to the Standard adjustment (20).)
4-9) Maladjustment of the thread take-up spring.
9-A) The stroke of the thread take-up spring is too large.
Correctly adjust the thread take-up spring. (Refer to the Standard adjustment (11).)
9-B) The tension of the thread take-up spring is too strong.
Correctly adjust the thread take-up spring. (Refer to the Standard adjustment (11).)
4-10) Unsmooth rotation of the shuttle.
10-A) Fibrous wastes on the shuttle race.
Remove the shuttle, and remove the fibrous wastes.
10-B) Lack of lubrication.
Lubricate the shuttle assembly.
5. Thread breaks at the time of thread trimming.
5-1) Incorrect tension release timing.
1-A) The tension release timing is too late.
Correct the tension release timing. (Refer to the Standard adjustment (18).)
1-B) The release volume of the thread tension disk No. 2 is small.
Correctly adjust the thread tension release. (Refer to the Standard adjustment (19).)
5-2) The thread spreading section of the moving knife has scratches.
Polish the moving knife with a green file.
5-3) The shuttle race spring has scratches.
Remove the scratches. (Refer to the Standard adjustment (6).)
5-4) The difference in level between the needle hole guide and the counter knife is too high.
4-A) The counter knife falsely cuts thread before the thread is trimmed by the moving knife blade.
Correct the height of the counter knife. (Refer to the Standard adjustment (14).)

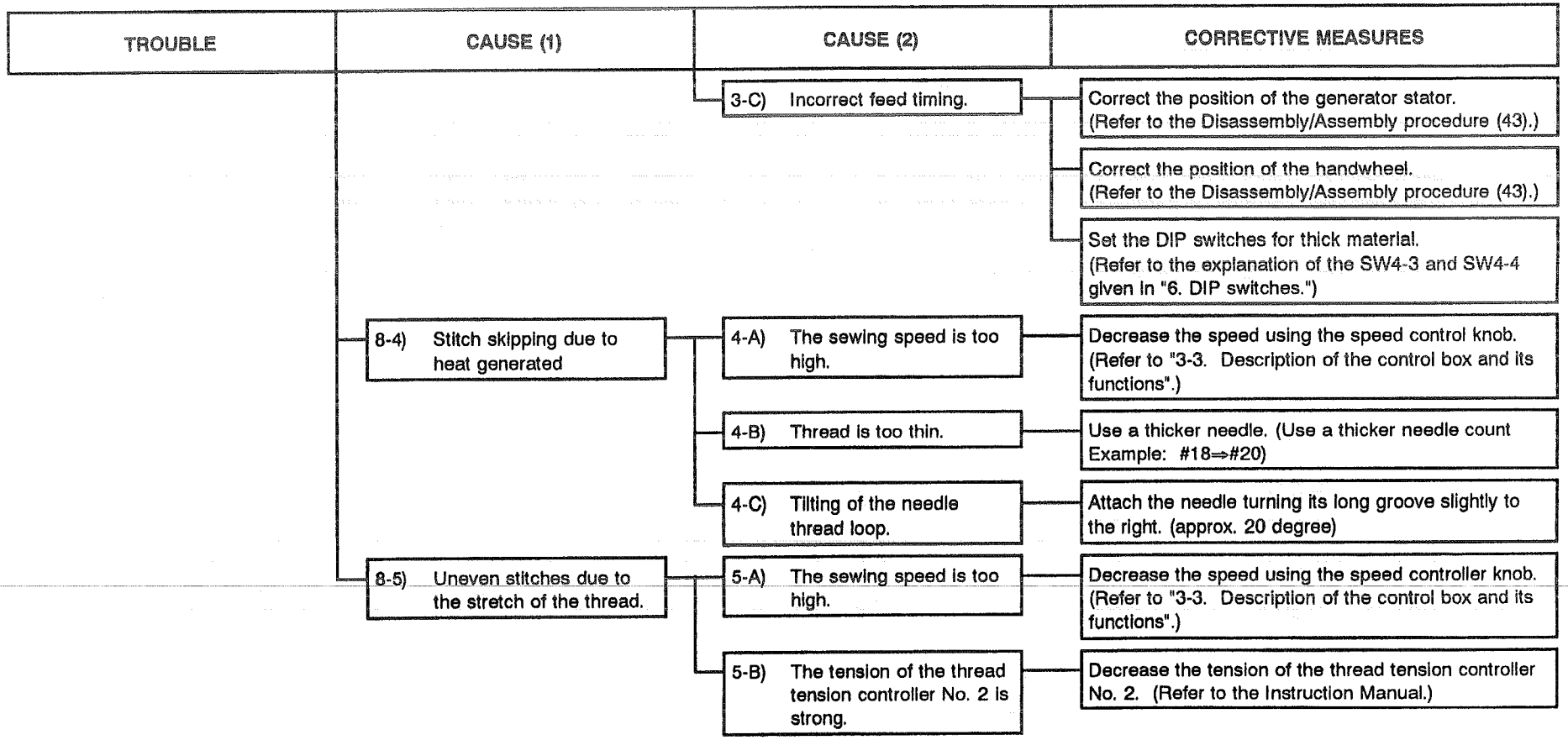

TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
5-5) The clearance between the needle hole guide and the counter knife is small.
5-A) The counter knife falsely cuts thread breakage before the thread is trimmed by the moving knife blade.
Correct the position of the counter knife. (Refer to the Standard adjustment (13).)
5-6) The bottom of the needle hole guide has scratches.
6-A) Thread is falsely cut by the needle hole guide.
Polish or replace the needle hole guide.
5-7) Incorrect thread spreading timing of the moving knife.
Correct the initial position of the thread trimming cam and the moving knife. (Refer to the Standard adjustment (13), (15).)
5-8) The needle thread tension is too high.
Correct the needle thread tension. (Refer to the Instruction Manual.)
5-9) The stroke of the thread take-up stroke is small.
Correct the thread take-up spring. (Refer to the Standard adjustment (11).)
5-10) The tension of the thread take-up spring is too high.
Correct the thread take-up spring. (Refer to the Standard adjustment (11).)
6. Thread trimming failure
6-1) The thread trimmer is dull.
1-A) The moving knife and/or counter knife has worn out.
Replace the moving knife and/or counter knife. (Refer to the Standard adjustment (13), (14).)
1-B) The moving knife and counter knife fail to overlap properly.
Correct the height and position of the moving knife and counter knife. (Refer to the Standard adjustment (13), (14).)
1-C) The counter knife blade is not parallel.
Adjusting the parallelism of the blade tip of the counter knife. (Refer to the Standard adjustment (14).)
1-D) Incorrect position of the counter knife.
Correct the position of the counter knife. (Refer to the Standard adjustment (13), (14).)

| TROUBLE | CAUSE (1) | CAUSE (2) | CORRECTIVE MEASURES |
|---|---|---|---|
| | 6-2) Thread wastes are left in the shuttle cover. | 2-A) Presence of a burr on portion Ⓐ of the moving knife (The shape of trimmed thread will be " ⊃ ", and thread wastes are left.   | Remove the burr(s) using a green file, or replace the moving knife. (Refer to the Standard adjustment (14).) |
| | | 2-B) Presence of scratches on the shuttle race spring (The shape of trimmed thread wastes are left.) | Remove the scratches. (Refer to the Standard adjustment (6).) |
| | 6-3) The moving knife fails to spread the thread. | 3-A) Incorrect initial position of the moving knife. | Correct the initial position of the moving knife. (Refer to the Standard adjustment (13).) |
| | | 3-B) Incorrect path of the moving knife. | Replace the moving knife or the throat plate. (Refer to the Standard adjustment (13).) |
| | | 3-C) Inaccurate positioning of the thread trimming cam. | Accurately position the thread trimming cam. (Refer to the Standard adjustment (15).) |
| | | 3-D) Inaccurate positioning of the shuttle race spring. | Accurately position the shuttle race spring. (Refer to the Standard adjustment (6).) |
| | 6-4) Skipping of the last stitch. | 4-A) Incorrect timing and clearance between the needle and shuttle. | Correct the timing and the clearance. (Refer to the Standard adjustment (7).) |
| | | 4-B) Incorrect height of the intermediate presser. | Correct the height. (Refer to the Standard adjustment (4).) |


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
4-C) Tilting of the needle thread loop.
Attach the needle turning its long groove slightly to the right (approx. 20 degree).
6-5) The bobbin thread cannot be trimmed.
5-A) The last sewing stitch is small.
Make the last stitch length 1 mm (0.039") or more.
5-B) Bobbin thread tension is weak.
Decrease the thread tension.
5-C) The needle hole guide diameter is large.
Change it to the part of its smaller needle hole.
6-6) Incorrect needle-up stop position.
Correct the needle-up stop position. (Refer to the Standard adjustment (3).)
7. Loose stitch
7-1) Maladjustment of the thread tension controller No. 2.
1-A) The tension of the thread tension controller No. 2 is weak.
Correctly adjust the tension. (Refer to the Instruction Manual.)
7-2) The thread tension disks No. 2 are falsely released.
Correctly adjust the thread releasing mechanism. (Refer to the Standard adjustment (16).)
7-3) Maladjustment of the thread take-up spring.
3-A) The tension of the thread take-up spring is weak.
Correctly adjust the tension. (Refer to the Standard adjustment (11).)
3-B) The stroke of the thread take-up spring is large.
Correctly adjust the stroke. (Refer to the Standard adjustment (11).)
7-4) Maladjustment of the intermediate presser height.
4-A) The intermediate presser excessively presses a workpiece due to its low height.
Correctly adjust the intermediate presser. (Refer to the Standard adjustment (4).)
7-5) Inadequate selection of the intermediate presser.
5-A) The needle hole of the intermediate presser is thin against the needle and the thread.
Change it to the part of its larger needle hole. (Refer to "9-2. Option".)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
7-6) The clearance between the shuttle and the shuttle driver.
Correctly adjust the clearance. (Refer to the Standard adjustment (7).)
7-7) Inadequate selection of the needle used.
7-A) The needle is too thin.
Change it to a thick needle. (Example: #18⇒#20)
7-8) Inadequate selection of the needle hole guide.
8-A) The needle hole guide diameter against the needle and the thread is small.
Change it to a part of larger needle hole. (Refer to "9-2. Option".)
7-9) Defective shape of the feeding frame.
9-A) The feeding frame is apart from the sewing position.
Bring the feeding frame near to the sewing process and make it.
7-10) Defective shape of the feed plate.
10-A) The workpiece is hard and fits closely with the throat plate, so there is no clearance where a thread passes through.
Lift the workpiece by the feed plate.
10-B) The workpiece is very elastic and fits closely, so there is no clearance where a thread passes through.
Lift the workpiece by the feed plate.
7-11) Incorrect feed timing.
11-A) Incorrect positioning of the generator stator.
Correct the position of the generator stator. (Refer to the Disassembly/Assembly procedure (43).)
11-B) Incorrect positioning of the handwheel.
Correct the position of the handwheel. (Refer to the Disassembly/Assembly procedure (43).)
Change the feed timing by the material thickness selector DIP switch. (See "Electrical parts.") (Refer to the explanation of the SW4-3 and SW4-4 given in "6. DIP switches.")


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
7-12) Sewing stitches become as the following illustration.
Attach the needle turning its long groove slightly to the right. (approx. 20 degree)
7-13) The needle thread crosses in zigzag stitching.
Attach the needle turning its long groove slightly to the left. (approx. 20 degree)
8. Sewing problem arise when sewing with synthetic thread.
8-1) Thread breakage due to heat generated.
1-A) The sewing speed is too high.
Decrease the speed using the speed control knob. (Refer to "3-3. Description of the control box and its functions".)
1-B) The needle is too thick.
Use a thinner needle, or super needle for synthetic thread.
Use silicon oil.
8-2) Thread splits finely.
2-A) Unsmooth thread paths.
Smooth the thread paths, using a green file.
2-B) Defective finishing of the needle hole.
Replace the needle.
Move thread guide A to the left.
8-3) Loose stitches at sewing start.
3-A) Inadequate sewing process.
Make the sewing stitches smaller at sewing start.
Decrease the speed at sewing start.
Change the sewing direction and position at sewing start.
3-B) The through resistance of the thread against the material is small.
Use a thinner thread. (Use the thinner needle count. Example: #14⇒#11)


TROUBLE
CAUSE (1)
CAUSE (2)
CORRECTIVE MEASURES
3-C) Incorrect feed timing.
Correct the position of the generator stator. (Refer to the Disassembly/Assembly procedure (43).)
Correct the position of the handwheel. (Refer to the Disassembly/Assembly procedure (43).)
Set the DIP switches for thick material. (Refer to the explanation of the SW4-3 and SW4-4 given in "6. DIP switches.")
8-4) Stitch skipping due to heat generated
4-A) The sewing speed is too high.
Decrease the speed using the speed control knob. (Refer to "3-3. Description of the control box and its functions".)
4-B) Thread is too thin.
Use a thicker needle. (Use a thicker needle count Example: #18⇒#20)
4-C) Tilting of the needle thread loop.
Attach the needle turning its long groove slightly to the right. (approx. 20 degree)
8-5) Uneven stitches due to the stretch of the thread.
5-A) The sewing speed is too high.
Decrease the speed using the speed controller knob. (Refer to "3-3. Description of the control box and its functions".)
5-B) The tension of the thread tension controller No. 2 is strong.
Decrease the tension of the thread tension controller No. 2. (Refer to the Instruction Manual.)

# 9. ADDITIONAL DATA

## 9-1. Expendable parts

### 1. General expendable parts

| Part No. | Part name | Remarks |
|---|---|---|
| Refer to the Parts List | Needle | Refer to the Instruction Manual. |
| B1818205000<br>B181820500B<br>B1818210000 | Shuttle for S type (light-weight materials)<br>Shuttle for H type (medium-weight materials)<br>Shuttle for G type (heavy-weight materials) | • Refer to the Standard adjustment (7).<br>• Double-capacity shuttle is used for G type of sewing machine (for heavy-weight materials). Large shuttle is used for the other types of sewing machine. |
| B24212050A0<br>B2421210AA0 | Coupling of moving knife<br>Coupling of moving knife for G type | • Refer to the Standard adjustments (13) and (14). |
| B2424210000<br>B2424210A00 | Counter knife<br>Counter knife for G type | • Refer to the Standard adjustments (13) and (14). |
| Refer to "Options." | Needle hole guide | • It should be replaced with a new one if the needle eyelet is damaged or the needle eyelet diameter is enlarged. Refer to the height of the moving knife and counter knife which are listed above. |
| B3112761000<br><br>D3112L4BB00 | Thread take-up spring for S type (light-weight materials)<br>Thread take-up spring for H and G types | |
| B2303280000 | Tension release pin | |

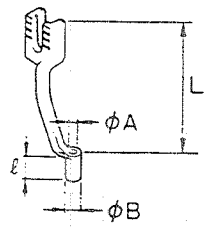
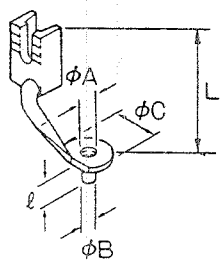
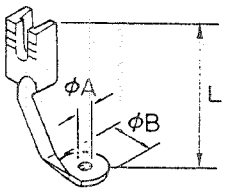
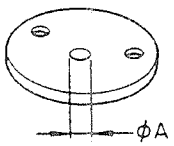
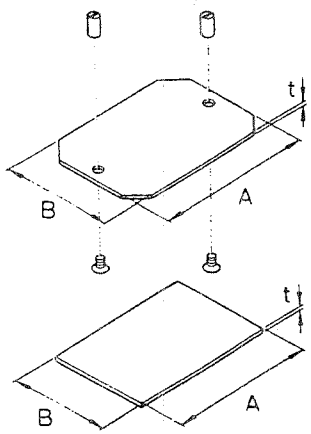
### 2. Expendable parts to be replaced as required

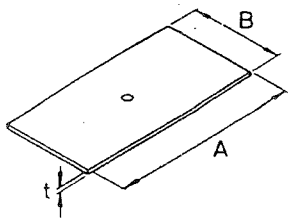
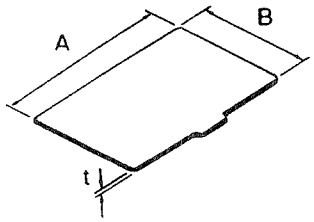
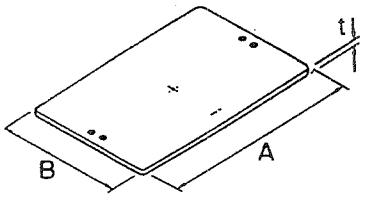
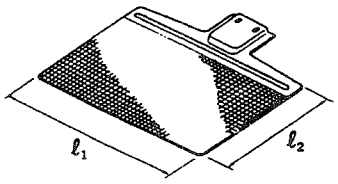
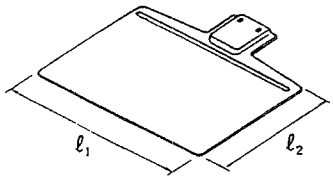
| Part No. | Part name | Cautions in installation |
|---|---|---|
| B1150220000 | Travelling cover (A) | See Disassembly/Assembly Procedure (53). |
| B11532200A0 | Travelling cover (B) joint | See Standard Adjustment (29), Disassembly/Assembly Procedure (55). |
| B2312220000 | Tension release notch | See Standard Adjustment (18). |
| B3212210000 | Bobbin winder friction wheel | |
| B2562220000 | Feeding frame ball catcher | See Standard Adjustment (33). |

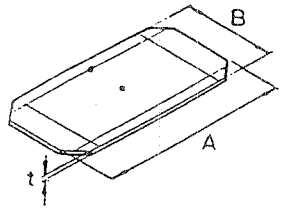
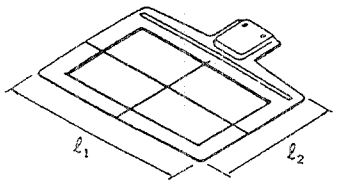
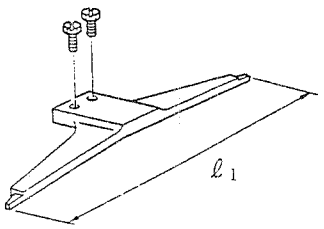
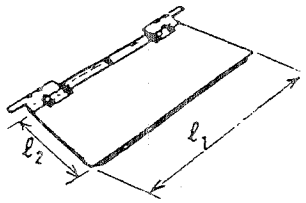
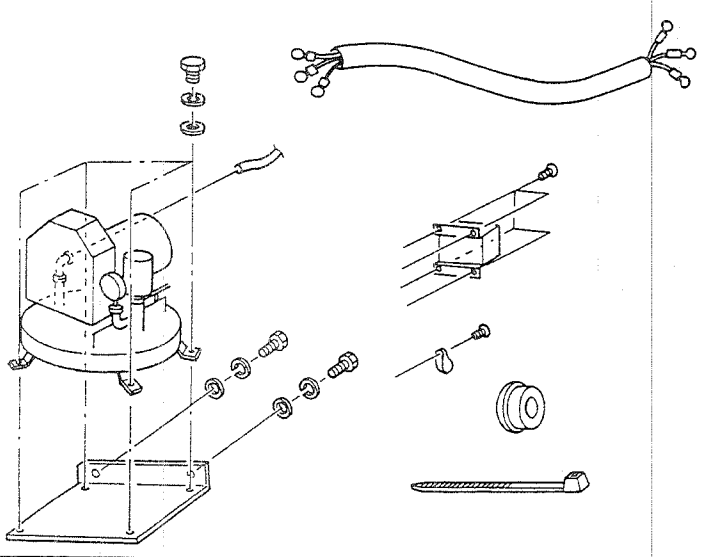
### 3. Parts which are likely to be lost or damaged during repair

| Part No. | Part name | Cautions in installation |
|---|---|---|
| SS1062210TP | Needle hole guide setscrew | |
| SS7090620TP | Thread tension rod bracket setscrew | |
| SS6060410TP | Shuttle upper spring setscrew | |
| SS9090833TP | Thread release notch setscrew | |

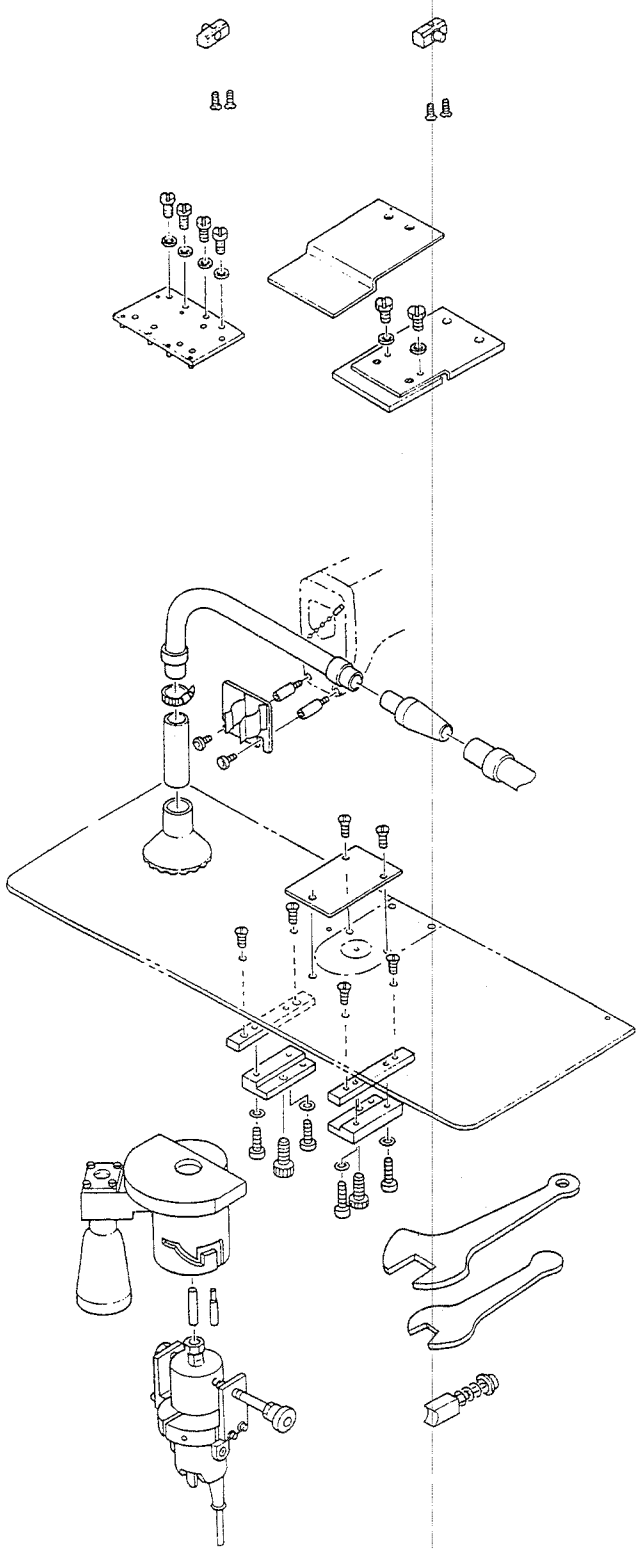
## 9-2. Options (options common to all the types of sewing machine and those only for S type of sewing machine)

| Name of part | Type | Part No. | Size (mm) |
|---|---|---|---|
| 1. Intermediate presser       | Intermediate presser (A) | B1601220000 | φAxφBxℓxL<br>2.2x3.6x6x29.5<br>(0.087"x0.142"x0.236"<br>x1.161") |
| | Intermediate presser (B) | B160122000B | φAxφBxℓxL<br>3.5x5.5x6x29.5<br>(0.138"x0.217"x0.236"<br>x1.161") |
| | Intermediate presser (E) | B160122000E | φAxφBxℓxL<br>1.6x2.6x6x29.5<br>(0.063"x0.102"x0.236"<br>x1.161") |
| | Intermediate presser (F) | B160122000F | φAxφBxℓxL<br>2.2x3.6x9x29.5<br>(0.087"x0.142"x0.236"<br>x1.161") |
| | Intermediate presser (G) | B160122000G | φAxφBxℓxL<br>2.7x4.1x5x29.5<br>(0.106"x0.161"x0.197"<br>x1.161") |
| | Intermediate presser (C) | B160122000C | φAxφBxφCxℓxL<br>2.2x3.6x12x6x29.5<br>(0.087"x0.142"x0.472"<br>x0.236"x1.161") |
| | Intermediate presser (D) | B160122000D | φAxφBxL<br>2.2x12x34.5<br>(0.087"x0.472"x<br>1.358") |
| 2. Needle hole guide   | Needle hole guide (A) for light-weight materials | B242621000A | φA = 1.6 (0.063") |
| | Needle hole guide (B) for medium-weight materials | B242621000B | φA = 2.0 (0.079") |
| | Needle hole guide (C) for knits | B242621000C | φA = 1.6 (0.063") |
| | Needle hole guide (D) for heavy-weight materials | B242621000D | φA = 2.4 (0.094") |
| | Needle hole guide (F) for heavy-weight materials | B242621000F | φA = 3.0 (0.118") |
| | Needle hole guide (G) for heavy-weight materials | B242621000G | φA = 3.0 (0.118")<br>(With a counterbore) |
| 3. Plastic blank   | Plastic feeding frame blank stud | B2559220000 | |
| | Plastic feeding frame blank plate | B2557220000 | AxBxt<br>278x193x1.5<br>(10.945"x7.598"x<br>0.059") |
| | Screw | SS1090510SP | |
| | Rubber sheet | B2591220000 | AxBxt<br>250x200x1.5<br>(9.843"x7.874"x<br>0.059") |

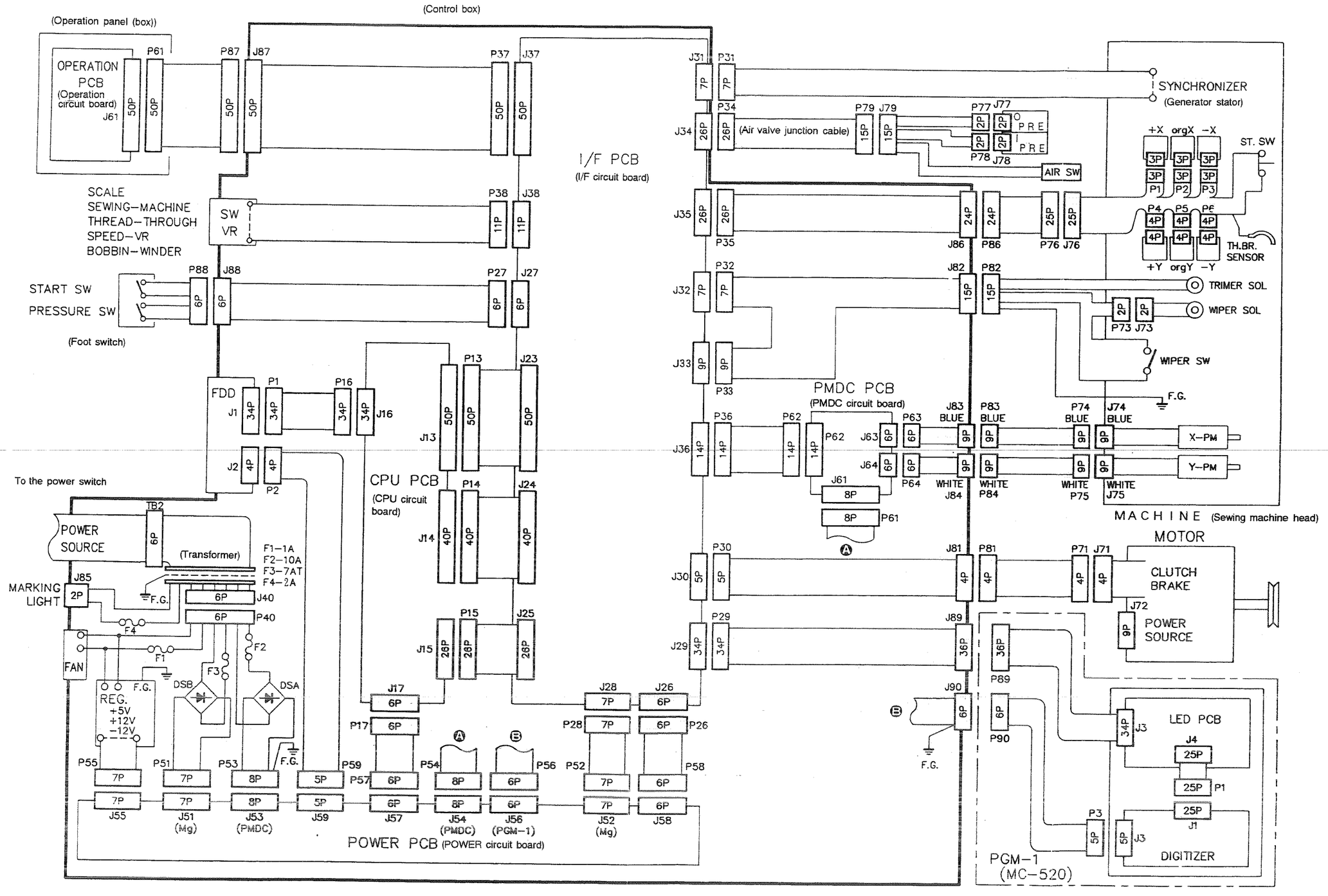
| Name of part | Type | Part No. | Size (mm) |
|---|---|---|---|
| 4. Auxiliary throat plate cover sheet   | Auxiliary throat plate cover sheet | B1170220000 | AxBxt<br>564x300x0.13<br>(22.205"x11.811"x<br>0.005") |
| 5. Sponge sheet for feeding frame   | Sponge sheet for feeding frame | B259122000B | AxBxt<br>296x196x1.5<br>(11.654"x7.717"x<br>0.059") |
| 6. Feeding frame blank   | Feeding frame blank | B25532200Y0 | AxBxt<br>344x218x4<br>(13.543"x8.583"x<br>0.157") |
| 7. Feed plate blank   | Feed plate blank with knurl | B25562200Y0 | $\ell_1$ = 350 (13.780")<br>$\ell_2$ = 243 (9.567") |
|   | Feed plate without knurl | B25562200YB | $\ell_1$ = 350 (13.780")<br>$\ell_2$ = 243 (9.567") |

| Name of part | Type | Part No. | Size (mm) |
|---|---|---|---|
| 8. Origin gauge   | Origin gauge | B2593220000 | AxBxt<br>294x193x3<br>(11.575"x7.598"x<br>0.118") |
| 9. Origin reference feed plate   | Origin reference feed plate | B2594220000 | $\ell_1 x \ell_2$<br>350x243.5<br>(13.780"x9.587") |
| 10. Cassette holder   | Screw | SS9151440CP | |
| | Fixing plate | B2581220000 | $\ell_1$ = 328 (12.913") |
|   | Cassette holder (asm.) | B25822200A0 | $\ell_1 x \ell_2$<br>380x247.5<br>(14.961"x9.744") |
| 11. Compressor unit  | | CU03 | |

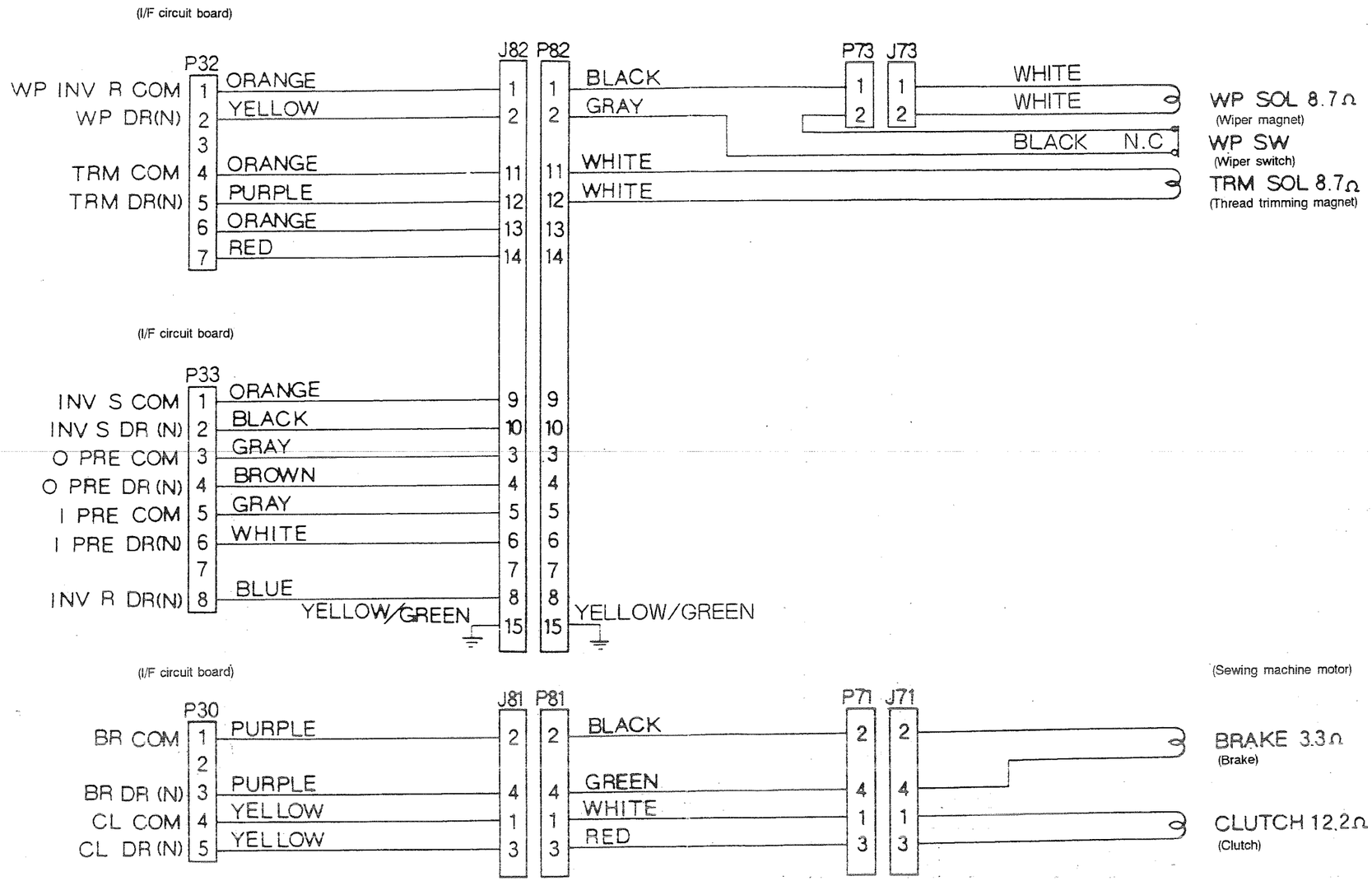
| Name of part | Type |
| --- | --- |
| 12. Milling unit | MU03 |



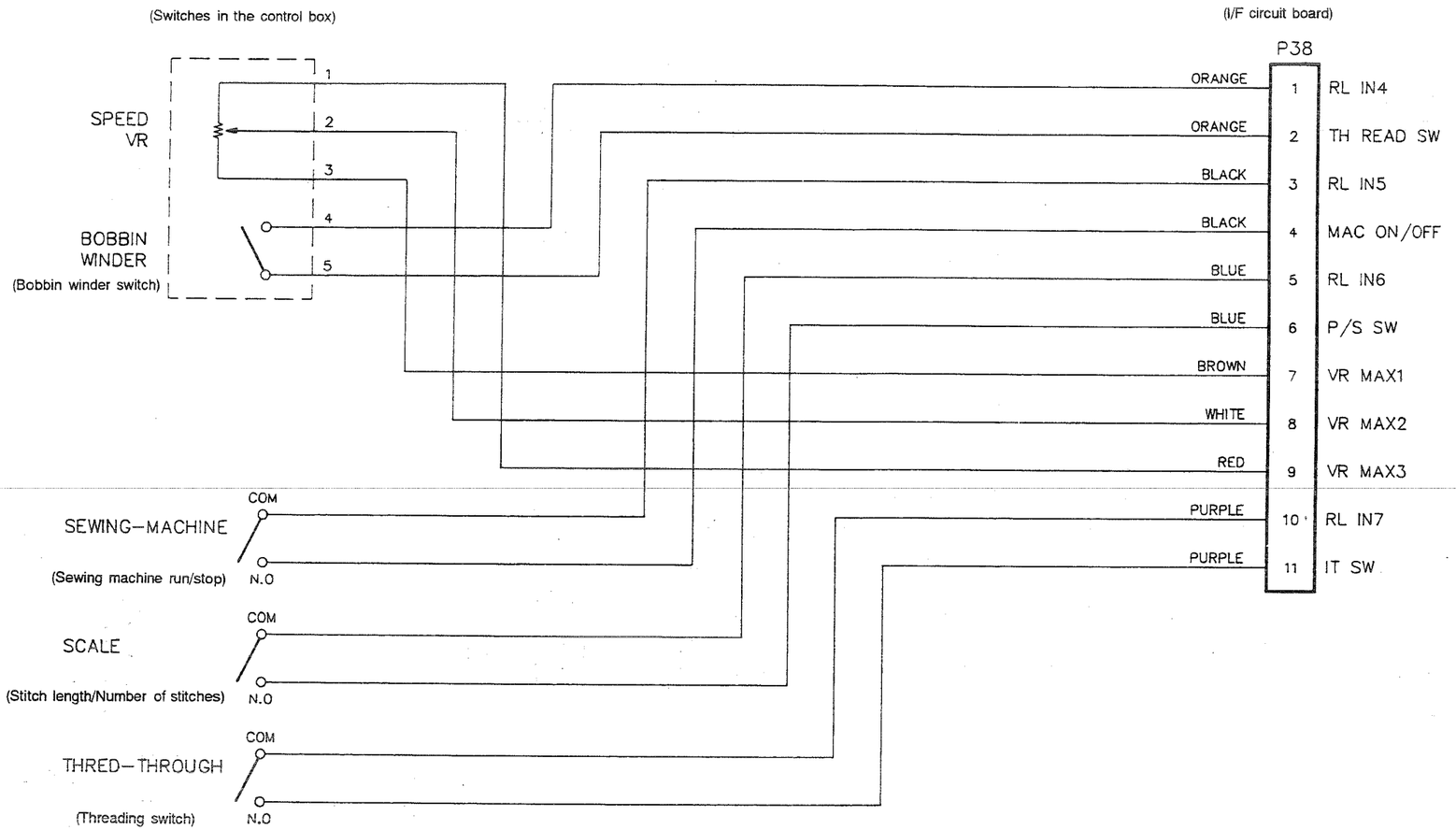
## 9-3. BLOCK diagram (For S type)



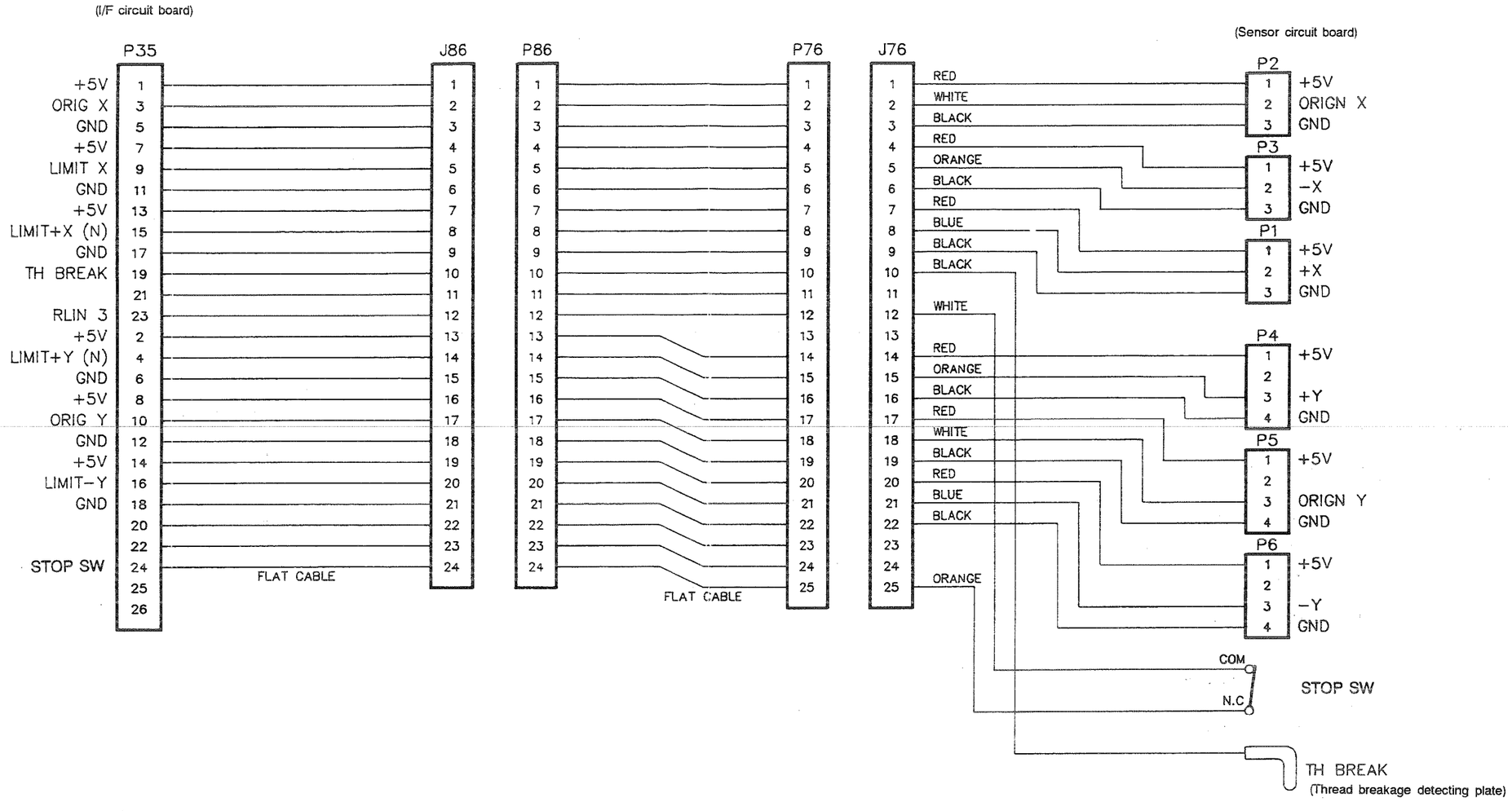
## 9-4. SOLENOID circuit diagram (Common to all the types of sewing machine)



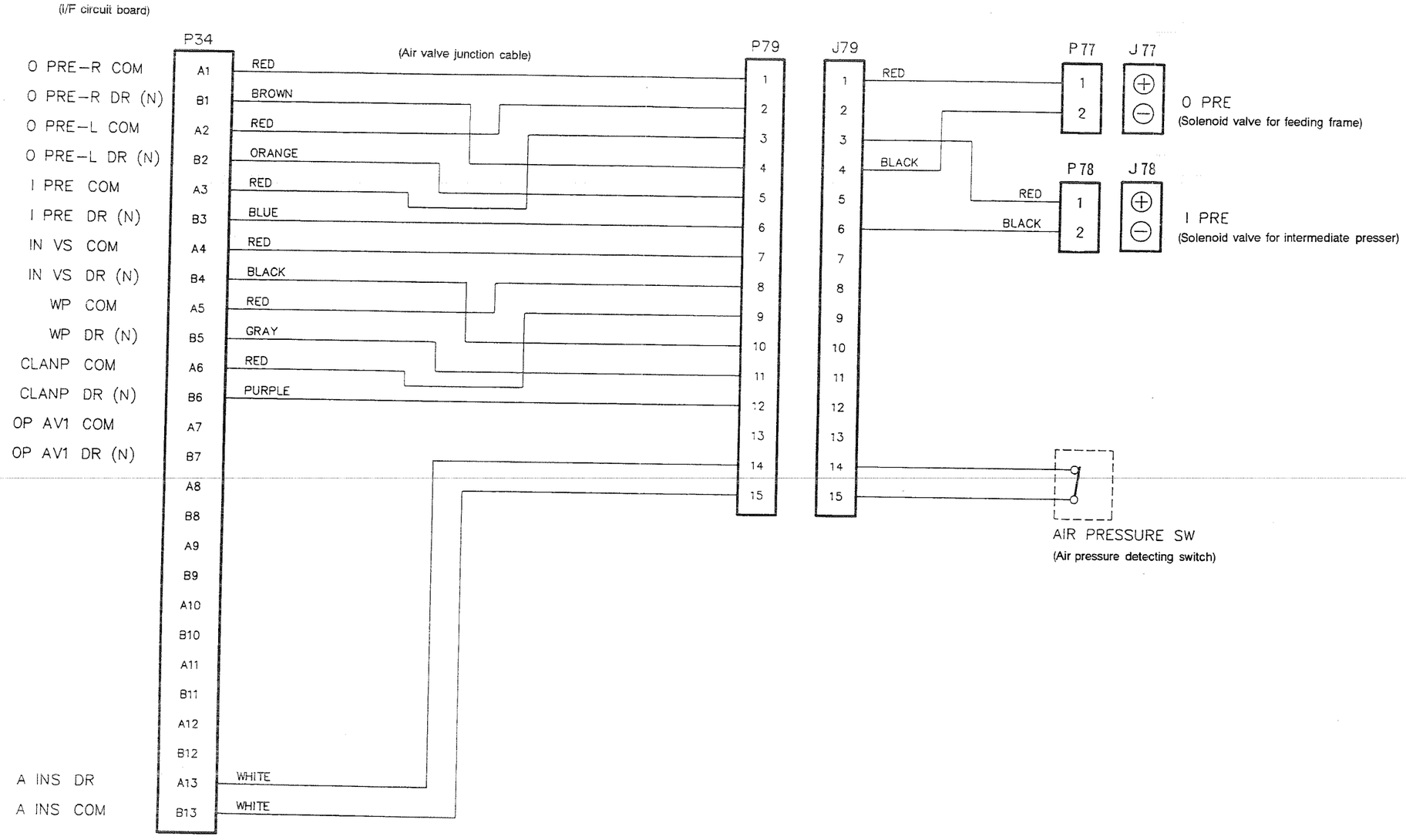
## 9-5. Variable resistor and switch circuit diagram (common to all the types of sewing machine)



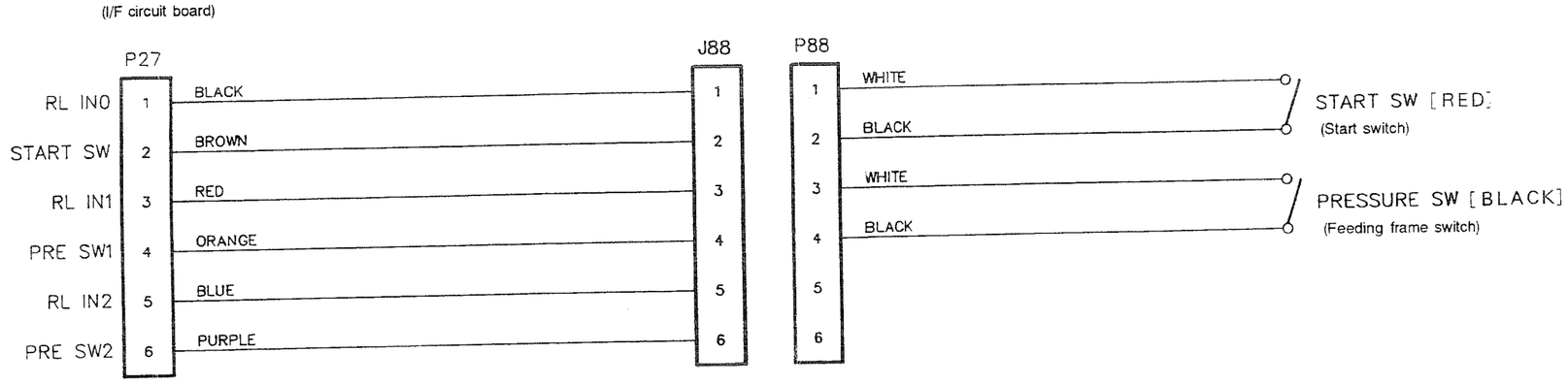
## 9-6. SENSOR circuit diagram (Common to all the types of sewing machine)



## 9-7. AIR VALVE circuit diagram (For S type)



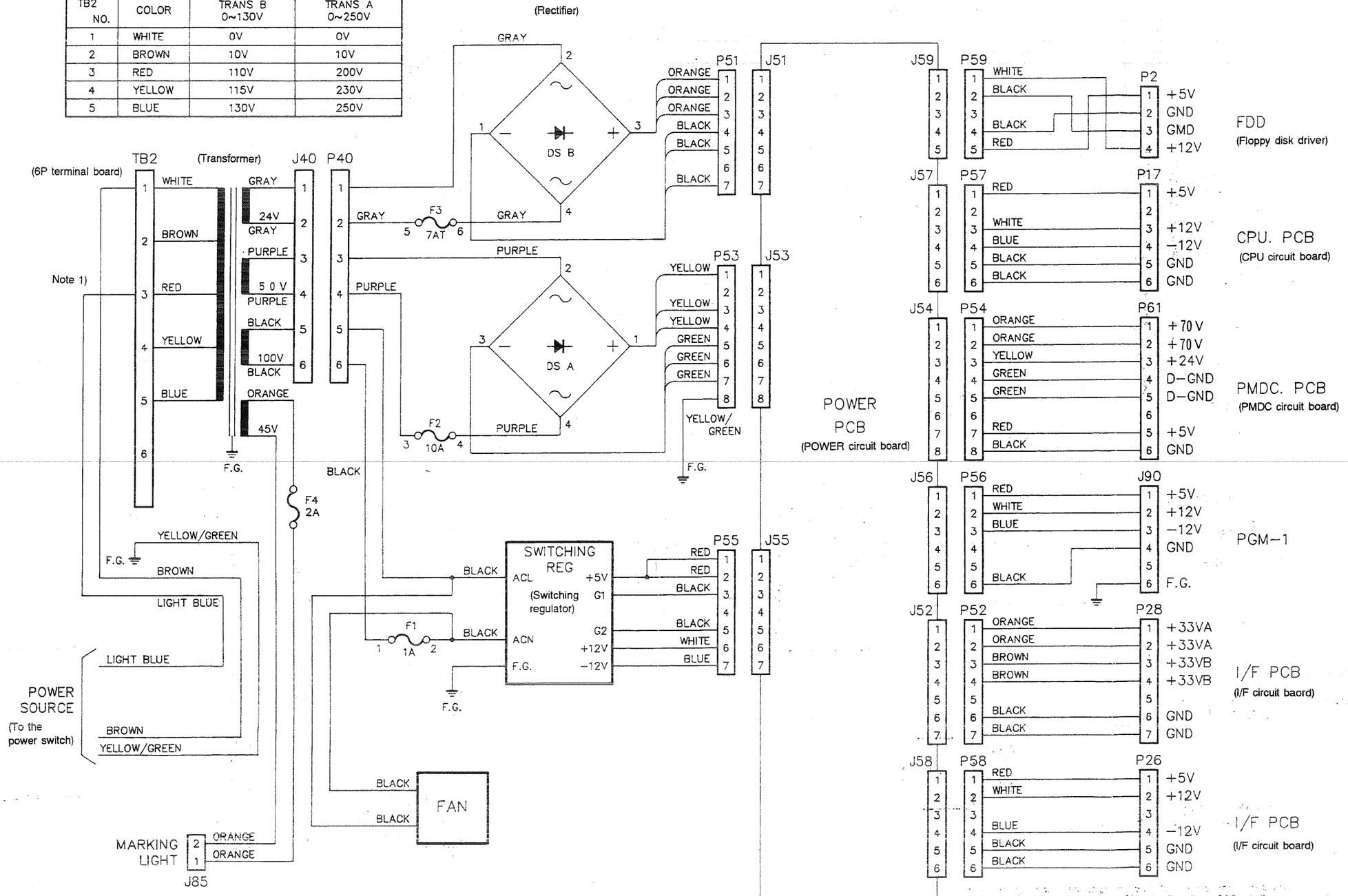
## 9-8. FOOT SW circuit diagram (For S type)




* Refer to the color of pedal shown in brackets when the red/black pedal is used.

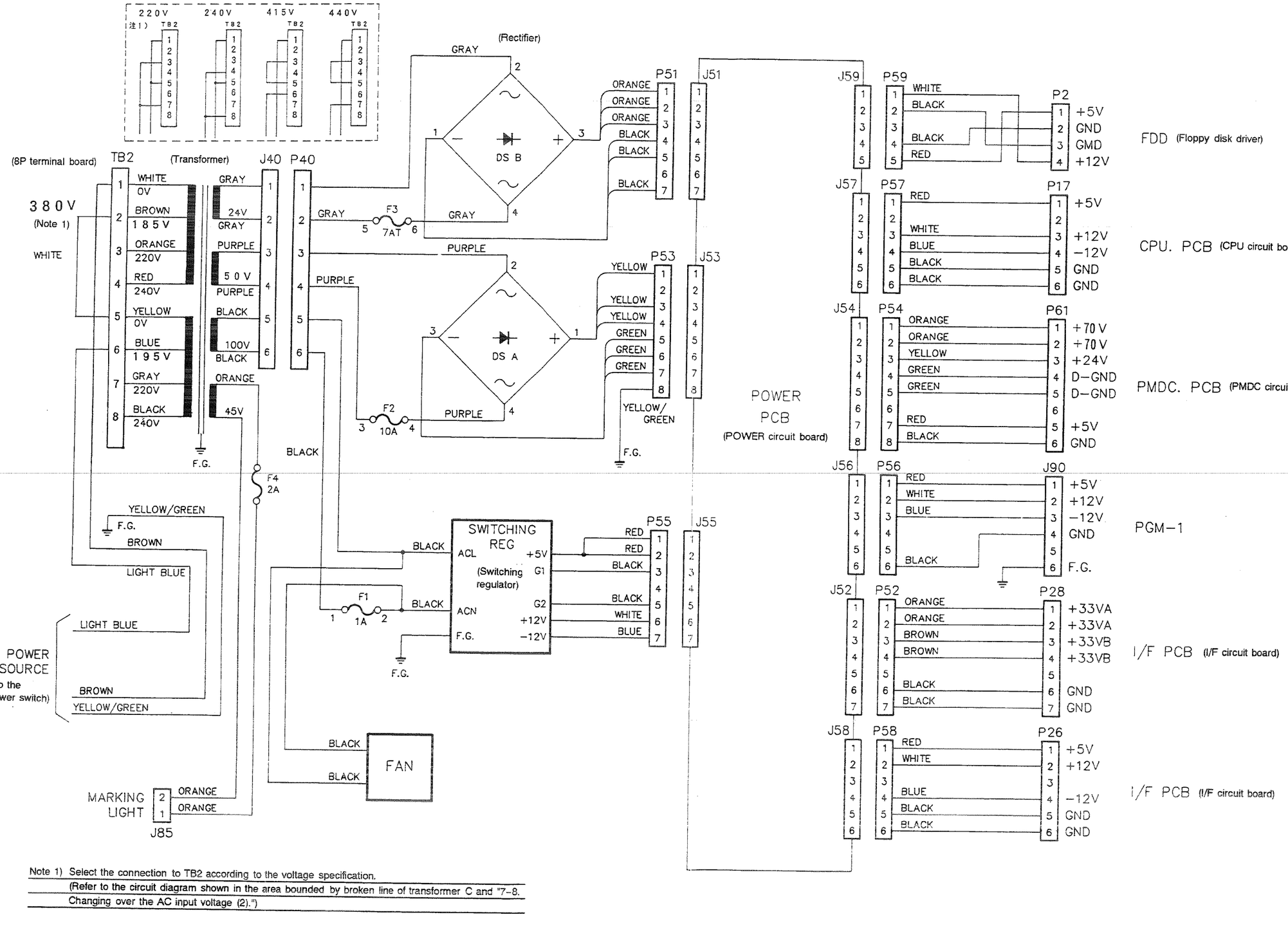
## 9-9. POWER circuit diagram (A) (common to all the type of sewing machine)

| TB2 NO. | COLOR | TRANS B 0~130V | TRANS A 0~250V |
|---|---|---|---|
| 1 | WHITE | 0V | 0V |
| 2 | BROWN | 10V | 10V |
| 3 | RED | 110V | 200V |
| 4 | YELLOW | 115V | 230V |
| 5 | BLUE | 130V | 250V |



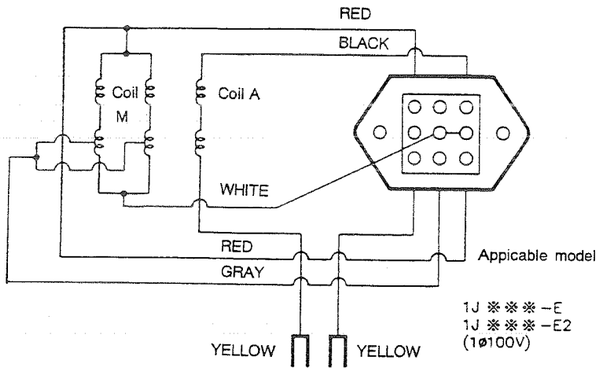

Note 1) Select the connection to TB2 according to the voltage specification.

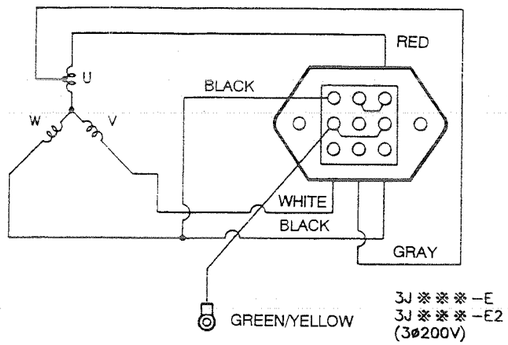
## 9-10. POWER circuit diagram (B) (common to all the type of sewing machine)

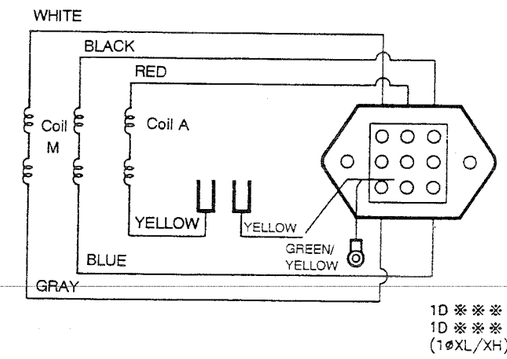


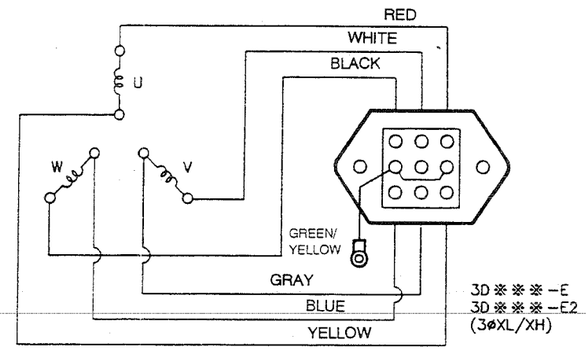

Note 1) Select the connection to TB2 according to the voltage specification.
(Refer to the circuit diagram shown in the area bounded by broken line of transformer C and "7-8. Changing over the AC input voltage (2).")

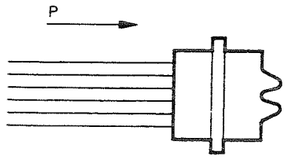
## 9-11. MOTOR connection diagram (common to all the type of sewing machine)



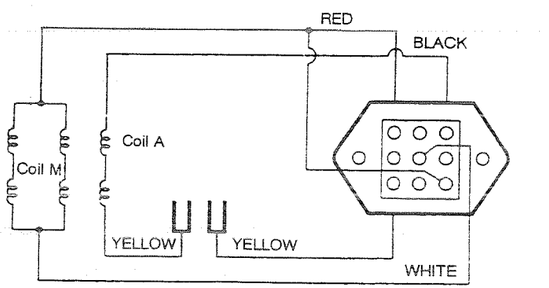



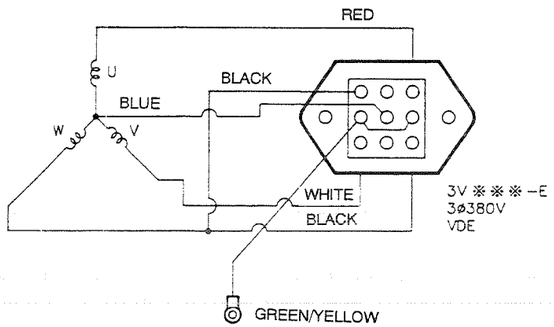



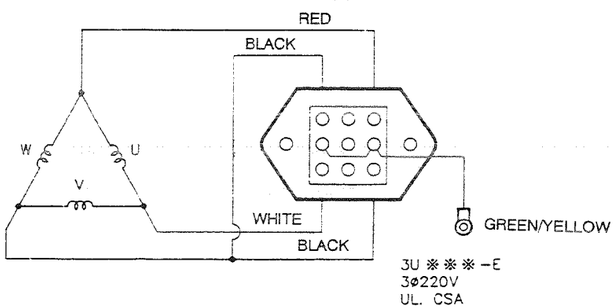



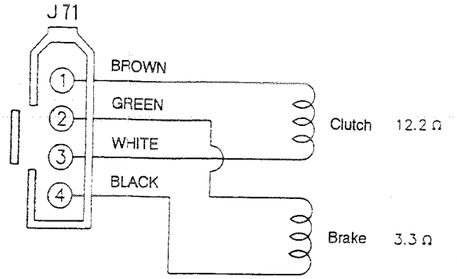

The arrangement of 9P connector pin: viewed from P



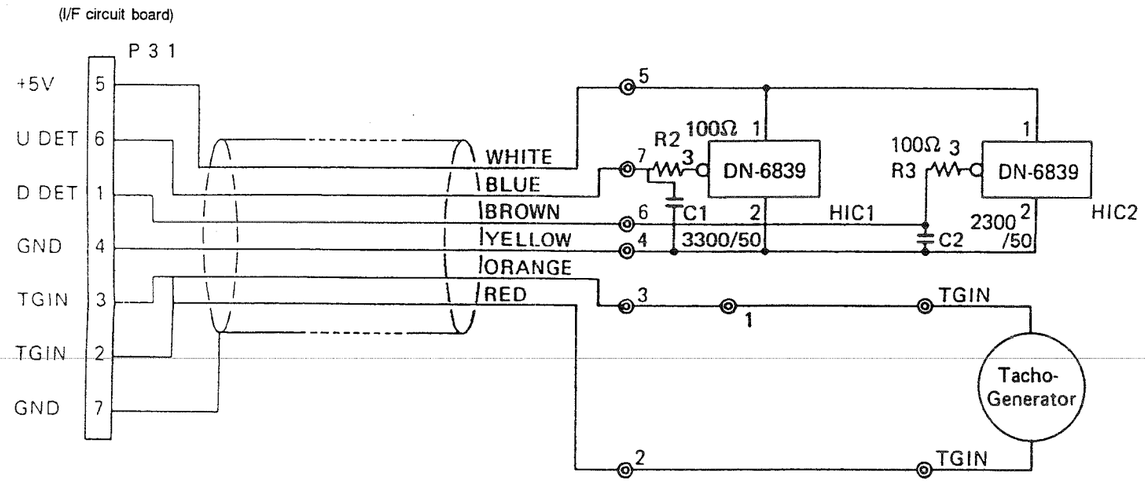




## 9-12. CLUTCH BRAKE connection diagram (common to all the type of sewing machine)



## 9-13. Synchronizer (generator stator) circuit diagram (common to all the types of sewing machine)



## 9-14. Defective feed checking sheet (AMS-220C)

If a defective feed (such as step-out) occurs, check the following items.
It is advisable to start the checking procedure from the items which do not require exchangeable parts.
This enables you to perform troubleshooting with efficiency.

1) Sewing speed has been poorly adjusted.

Confirmation

| |
|---|
| Set the rotary DIP switch (SW2) to "3" (to select the "speed check" function) and check the following item. |

① Sewing speed is too high. → Re-adjust the sewing speed referring to "5-4-1. Adjusting the sewing speed of the sewing machine."

2) Mechanical cause

(Excessive play)

Confirmation A

| |
|---|
| Turn ON the power to the machine. Lower the feeding frame and check the feed mechanism for a play by moving the feeding frame back and forth and to the right and left by hand. |

① Screw in the coupling has loosened. → Apply LOCKTITE to the screw again, and re-tighten it.

② Screw in the sprocket has loosened. → Apply LOCKTITE to the screw again, and re-tighten it.

③ Excessive play at the coupling (the coupling has worn out) → Replace the coupling (rubber).

④ Other play → Remove any play.

(Smooth operation of the feed mechanism is hindered.)

Confirmation B

| |
|---|
| Turn OFF the power to the machine. Set the operating air pressure to 0 kg/cm$^2$. Lower the feeding frame by hand.<br>Remove the stepping motor junction cable (connector) and check the following items by moving the feeding frame back and forth and to the right and left by hand.<br>Be sure to re-connect the junction cable (connector) to the previous position with the power to the machine turned OFF. |

⑤ Screw in the needle hole guide has loosened. → Re-tighten the screw.

⑥ There is a difference in height between the throat plate and the throat plate auxiliary cover. (The feed plate and the feeding frame interfere with the throat plate and the throat plate auxiliary plate.)
→ Adjust the difference in height properly. "25. Adjusting the height of the throat plate auxiliary cover"

⑦ The feed plate has excessively bent. → Correct the feed plate.

⑧ The other components fail to move smoothly. → Eliminate the cause(s) to impair smooth operation of the relevant components.

(Grease-related components)

Confirmation C

Visual observation

⑨ Y-travel shaft and bearing are out of grease or stained.

⑩ X-guide shaft support are out of grease or stained.

⑪ Lower face of the presser plate is out of grease or stained.

⑫ Retainer is out of grease or stained.

⑬ Other components are out of grease or stained.

→ Clean the relevant component(s) and apply grease to it (them). "5-2. Sections to which grease is applied."

(Excessive load)

Confirmation D

Same as confirmation B

⑭ Tension of the timing belt is too high. → Adjust the tension of the timing belt. "(31) X-direction feed belt tension"

⑮ Backlash at the gear is insufficient. → Adjust the backlash. "(32) Y-motor base."

⑯ Pressure of the feeding frame is too high. → Adjust the pressure of the feeding frame. "(41) Adjusting the pneumatic components"

⑰ Feeding frame (especially the one made by users) is too heavy.
→ Improve the feeding frame so that it is more light in weight.

⑱ The feed bracket auxiliary cover provides an excessive load.
→ Perform the adjustment described in "(29) Feed bracket auxiliary cover."

⑲ X-guide shaft support is pushed against the other components.
→ Perform the adjustment described in "(30) X-guide shaft support."

⑳ A clearance between the presser plate and the work clamp slider is too small.
→ Perform the adjustment described in "(26) Height of the work clamp slider bracket."

㉑ Stepping motor shaft has bent.

㉒ Retainer has broken. Retainer ball has come off.

㉓ Travel shaft and bearing have worn out.

→ Replace the defective component or repair it.

㉔ Excessive load of the other components → Remove the excessive load from them.

(Miscellaneous)

Confirmation E

Visual observation

㉕ The timing belt tension is too low. → Adjust the timing belt tension. "(31) X-direction feed belt tension"

㉖ The feeding frame comes in single-sided contact with the related components.
→ Correct the feeding frame by adhering a piece of sponge to it.

㉗ Pressure of the feeding frame is too low. → Adjust the pressure of the feeding frame. "(41) Adjusting the pneumatic components"

㉘ Miscellaneous

3) Electrical causes

① Transformer tap (terminal board) has been improperly connected. (Check the connection using a tester and visually check it.)
→ Change over the transformer tap. "7-8. Changing over the AC input voltage"

② Insufficient current of PMDC circuit board (Check the current using a tester.)
→ Adjust the electric current. "5-4-2. Adjusting the current of PMDC circuit board"

③ Attaching screw in the sensor circuit board has loosened. (Visual observation)
→ Adjust the screw by re-tightening it. "(33)-2. Adjusting the origin sensor and travel limit sensor"

④ Stepping motor junction cable or the other cable has been disconnected. Connector is defective. (Check the connection using a tester and visually check it.)
→ Repair the defective component or replace it with a new one.

⑤ Generator stator is defective. (Set the SW2 to "2" to select the input check function, and check the generator stator.)
→ Replace the generator stator with a new one. "(43) Removing the handwheel and generator stator"

⑥ Stepping motor and PMDC circuit board are defective. (Lower the feeding frame and turn ON the jog switches on the operation panel one by one to check the performance of the feeding frame.)
→ Replace the defective component with a new one.

⑦ Miscellaneous

## 9-15. Explanation of terminology

- Needle-up stop position .....
  The needle (main shaft) always stops at the predetermined position at the sewing end. This predetermined position is called the needle-up stop position. If the needle (main shaft) is not in the highest position before the sewing machine starts sewing or starts idling or other operations, an error may result. In this case, the sewing machine is inoperative. (Page 54)

- Feed .....
  The AMS Series feeds the workpiece (cloth, etc.) using a stepping motor in accordance with the motion of needle in order to sew the workpiece according to the pattern desired.
  The components that transmit the motion of stepping motor to the workpiece are called the "feed."

- Feed forward/Feed backward .....
  The feed is moved forward or backward by operating the [Forward] switch or [Backward] switch on the operation panel.
  The position of the needle can be moved toward the sewing end along the pattern shape by one stitch by pressing the Forward switch. On the other hand, it can be moved toward the sewing start along the pattern shape by one stitch by pressing the Backward switch. This function is conveniently used when sewing a pattern from the middle or checking a pattern shape.

- Feed timing .....
  The AMS Series of sewing machine has adopted the "intermittent feed system" to feed the material. This system feeds the workpiece (cloth, etc.) while the needle comes off the workpiece. It is to say, the feed completes the feeding of the workpiece when the needle penetrates the workpiece.
  The relationship between the vertical stroke of the needle and the performance of the feed mechanism is called the "feed timing."
  * If the thickness of the workpiece is excessive, the needle starts penetrating the workpiece before the feed completes the feeding of the workpiece, resulting in stitch skipping or needle breakage. In this case, adjust the feed timing using the relevant DIP switch.

- Jump feed .....
  This means that the needle point moves without sewing the workpiece.
  The "jump feed" is available as same as the "zigzag" input and "point sewing" input in the "Main Unit Input Function" or the "PGM Series." The "jump" is widely used to join a pattern with another or many other occasions.

- Function .....
  One particular action of the machine is called "function."
  There are many different kinds of function including major ones such as the "pattern combining function" which are actuated by operating several switches and minor ones such as "needle-up stop function" which are actuated by operating single switch.
  These function will help you greatly as you are familiar with the operation of the AMS Series of sewing machine.
  * The major functions are listed on page 243.

- Origin .....
  The word "origin" indicates the following two different points according to circumstances.
  ① Mechanical origin ..... For the AMS sewing machine, a mechanical origin is designated that can be found by the relevant sensor.
  The mechanical origin is the standard position of the main unit of the sewing machine.
  ② Origin for a pattern ..... This is the standard position of the pattern created.
  When reading a pattern in the sewing machine, the origin for the pattern should be aligned with the mechanical origin of the sewing machine.
  (The two origins may not be aligned with each other when using the pattern combining function. See page 32.)

- Origin retrieval .....

  This is the performance to let the stepping motor which moves the workpiece (cloth, etc.) know the position of the origin (mechanical origin) after turning ON the power to the sewing machine. Turning ON the [Set Ready] switch under the [setting state] makes the stepping motor retrieve the mechanical origin.
  After the completion of the performance of origin retrieval, the motor moves to the sewing start.
  **(Caution)**
  **The feeding frame automatically comes down at the time of origin retrieval. So, do not put your hands, etc. under the feeding frame at that time.**

- Return to origin .....

  This function is actuated by pressing the [Return to Origin] switch on the operation panel.
  When the [Return to Origin] switch is pressed in the middle of a pattern, the needle position may move (return) directly to the sewing start and the feeding frame goes up.
  If the pattern has the 2nd origin, the needle point may move (return) to the 2nd origin.

- Cycle .....

  If a pattern contains a pause (intermediate stop command), the machine automatically stops at the pause position to allow the operator to raise the feeding frame and add a workpiece (cloth, etc.) to the currently sewn one.
  The former part of a pattern and latter part of it which is divided by a pause are respectively called "cycle."
  Consequently, in this case, the pattern has two cycles.

- Jog switches .....

  These switches are used to move the feed and the needle point as desired. They are used in the 2nd origin setting function" (P. 36), "sewing start point changing function" (P. 37) and "main unit input function." (See page 21)

- Setting state .....

  This is one of the basic terms used for the AMS Series.
  The setting state is a state of the sewing machine in which the values (pattern No., etc.) required to allow the AMS to read pattern data are specified using the operation panel switches.

- Second origin .....

  The 2nd origin is a position (point) to which the needle point is moved before starting sewing regardless of the shape of pattern to be sewn. Normally, the 2nd origin is created in a pattern at the time of inputting pattern data, however, the AMS Series is capable of inputting the 2nd origin using the 2nd origin setting function of the main unit of the sewing machine just before sewing a pattern selected. (See page 36)

- Sewing start point .....

  This is the position of the first stitch of a pattern. If the 2nd origin has not been specified, the needle point moves to the sewing start point before starting sewing.

- Inversion point .....

  This is the position to drive the inverting mechanism (reverse the inverting clamp). It is necessary for an inversion pattern (label attaching pattern, etc.) sewn by the AMS sewing machine with an inverting mechanism.
  There are two different methods to input an inversion point, one is to input it automatically at the predetermined position and the other is to input it at a position that can be specified as desired.

- Pattern .....

  A sewing pattern to be sewn. Generally, this word indicates the patterns that have been written in a floppy disk. If you find words "sewing pattern", suppose that the 2nd origin or jump are not contained in the words.
  However, remember that the word "pattern" includes all the data of pattern including the 2nd origin and jump.
  * Pattern data is sometimes called "data" in explanations.

- Writing a pattern .....
  This is the procedure to store a pattern created using the "main unit input function" or "PGM Series" of programming devices in a floppy disk.
  To write a pattern using the "main unit input function", it is necessary for you to prepate a [2DD] floppy disk which has been formatted beforehand. (See page 28)

- Inputting a pattern .....
  This is the procedure to create a pattern to be sewn using the "main unit input function" or "PGM Series" of programming devices.
  After inputting a pattern, the pattern is written in a floppy disk (stored in memory). Then the actual sewing is carried out using the floppy disk with set in the sewing machine.
  * Refer to the Instruction Manual for the "main unit input function" or that for the "PGM Series" for how to input (create) a pattern.

- Reading a pattern .....
  This is the procedure to read a pattern stored in a floppy disk out to the memory of the main unit of the sewing machine.
  This procedure is also called "read-out of a pattern."
  Both words can be also used in the case of taking a pattern in the memory of the input devices including the PGM-1.

- Disk format .....
  Any new disk cannot be used with the AMS or PGM Series as it is. It must be initialized to make it adaptable to a device with which the disk is to be used. The procedure is called "disk format" (or "format"). (See page 28)
  * If you format a used-up floppy disk, all the data stored in it will be erased, as you know by the word "initialize." After the formatting, the floppy disk will be one that is same as a new floppy disk formatted.

- Flow chart .....
  It is a chart that shows the operating procedure and the performance of the sewing machine provoked by the procedure in order. Some flow charts are inserted in this Instruction Manual. They explain the aforementioned items concerning certain operations respectively in a simple way. In addition, a flow chart covering the whole operation of the sewing machine is shown. The flow charts will help you in many occasions.

- Sewing size .....
  Each model of the AMS Series of sewing machine has its own sewing size within which the sewing is possible. (Refer to the "Specifications.")
  If the needle point excessively goes out of the specified sewing size when sewing a large pattern, the relevant sensor works to stop the sewing machine with the Error [4] indicated on the panel.

- READY indicator LED .....
  This is the indicator lamp to discriminate the sewing state from the setting state of the sewing machine. (Refer to page for each state of the sewing machine.)
  (Sewing state ... The READY indicator LED [lights up]. Setting state ... The READY indicator LED [goes out].)

- Sewing state .....
  This is one of the basic terms for the AMS Series. It is the state under which the AMS sewing machine is capable of performing normal operation (sewing bobbin winding, etc.). (See page 11)

- Sewing speed .....
  The sewing speed is expressed in the unit of "s.p.m.", which indicates the number of stitches to be sewn in one minute.
  In the AMS Series, the maximum sewing speed is limited in accordance with the stitch length. (See page 44)
  However, the sewing speed can be specified in several ways as long as the sewing speed remains within the max. sewing speed.

- Retainer compensation .....
  This is one of the maintenance procedures to help you use the AMS for a long time. Refer to page 167.

(Major functions table)

| Name of function | Page for reference |
|---|---|
| Main unit input function | Instruction manual |
| Data back-up function | 29 |
| Enlargement/reduction function | 30 |
| Second origin setting function | 36 |
| Wiper actuating point selecting function | 161 |
| Bobbin replacement setting function | 163 |
| Thread trimmer prohibition function | 164 |
| Intermediate presser stop function | 165 |
| Feeding frame position at the sewing end change-over function | 167 |
| Error detecting function (safety mechanism) | 22 |
| Pattern combination function | 32 |
| Disk formatting function | 28 |
| Needle-up position stop function | 30 |
| Sewing start point changing function | 37 |
| Pedal change-over function | 170 |
| The setting of the Bobbin thread counter | 162 |
| Wiper prohibition function | 164 |
| Thread trimming after stop function | 166 |
| Automatic retainer compensation function | 167 |
| Cycle stitching function | 169 |

# CHAPTER 2
# DOUBLE-STEPPED STROKE FEEDING FRAME TYPE (B TYPE)
# AMS-220CSB (for light-weight materials)
# AMS-220CHB (for medium-weight materials)
# AMS-220CGB (for heavy-weight materials)

● **This chapter covers only the part which is the feature making the aforementioned models different from the S type machine explained in Chapter 1.**

## 1. FEATURES

1) The feeding frame comes down in two steps, thereby allowing the operator to position the sewing product with accuracy.

2) Height of the intermediate stop position of the feeding frame can be adjusted within the range of 0 to 12 mm (0" to 0.472") in accordance with thickness of the sewing product.

3) The pedal operating method can be selected as desired using the 3-pedal unit (PK-47).

4) Other features of the machine conform to "1. Features" described in Chapter 1.

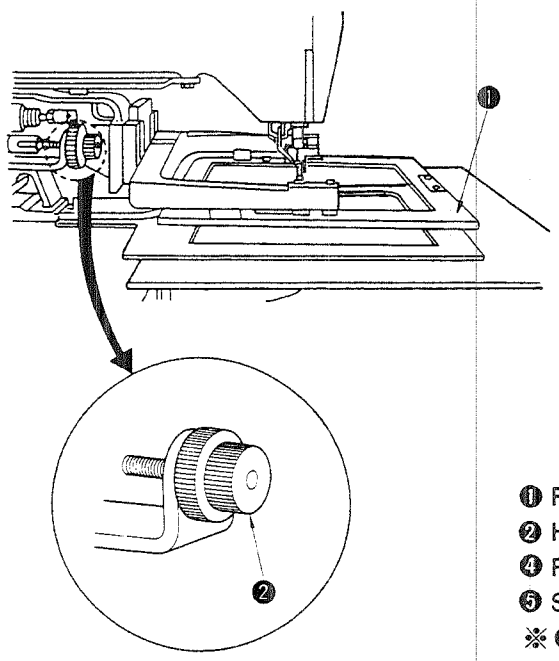
## 2. SPECIFICATIONS AND SPECIFIED VALUES

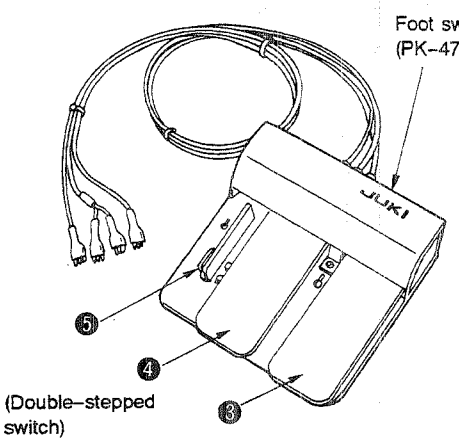
1) Height of intermediate position of feeding frame: 0 to 12 mm (0" to 0.472")

2) Other specifications and specified values conform to those given in "2. Specifications and specified values" of Chapter 1.

# 3. OPERATION OF THE SEWING MACHINE

## 3-1. Configuration




❶ Feeding frame
❷ Height adjusting knob
❹ Feeding frame switch and intermediate stop switch
❺ Start switch
※ ❸ is not used in the normal operation of the machine.

**❶ Feeding frame**
It is lowered by operating the foot switch.

**❷ Height adjusting knob**
It is used to adjust the height of the intermediate stop position of the feeding frame.

**❹ Feeding frame switch and intermediate stop switch**
This is a double-stepped switch. It is used to lower/lift the feeding frame between the highest position and the intermediate stop position and between the intermediate stop position, and the lowest position of its stroke.

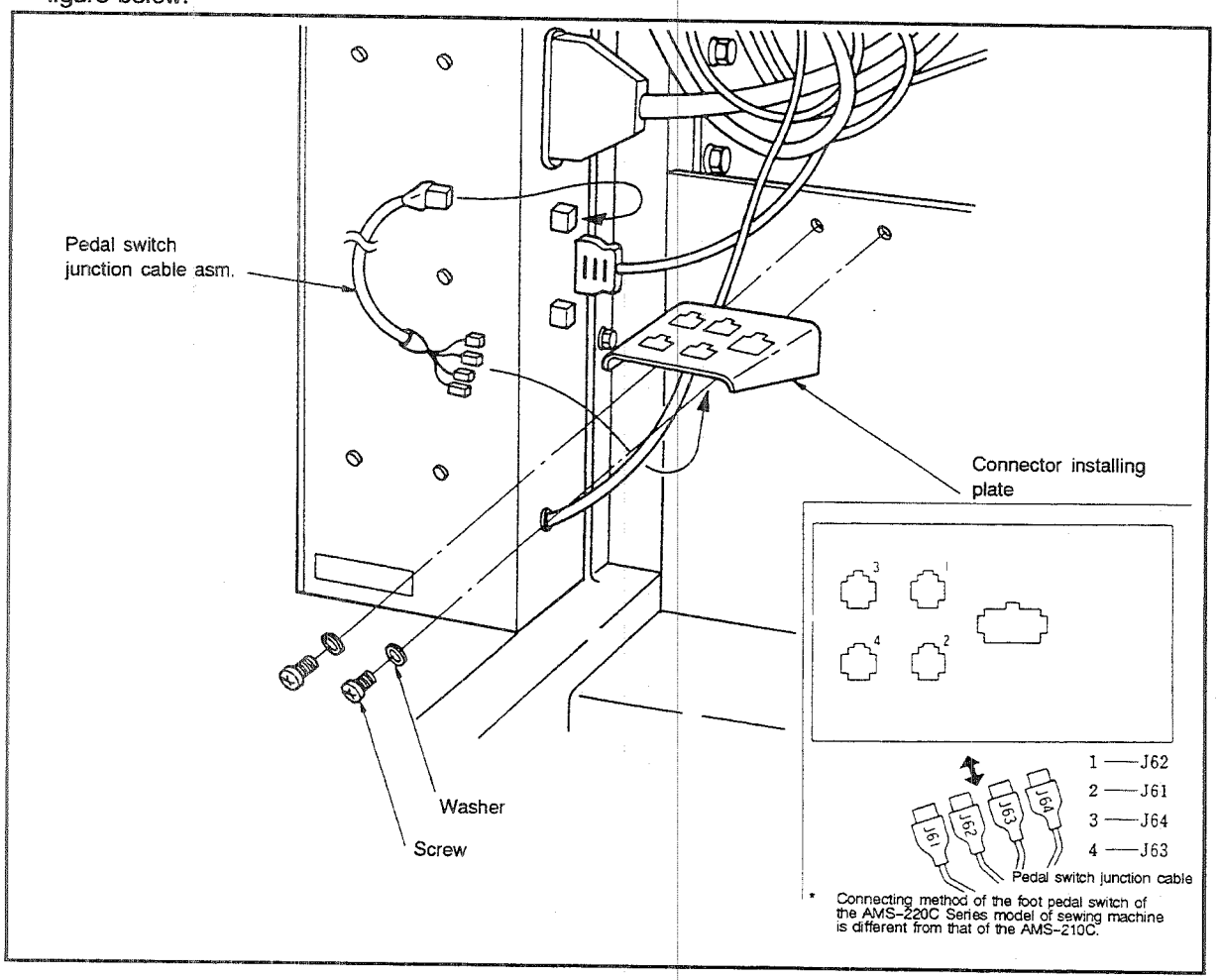
**❺ Start switch**
This is a switch to command the sewing machine how to sew the material. The machine sews the material according to the data stored in the micro floppy disk.

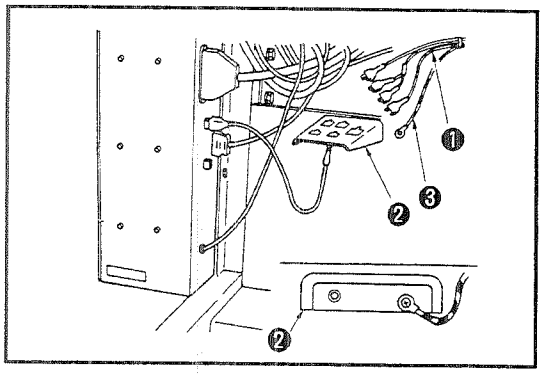
### 3-2. How to use the foot switch (PK-47 3-pedal unit)

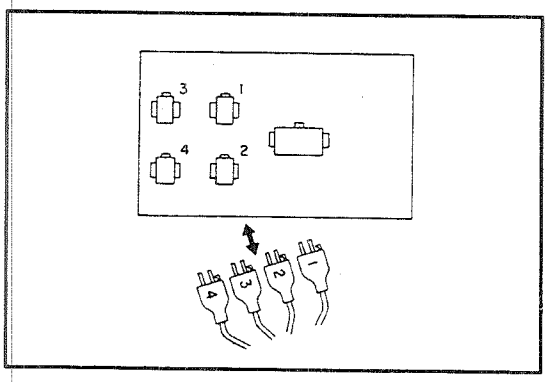
The PK-47 is necessary to operate the double-stepped stroke feeding frame type (B type) of the AMS-220C Series of sewing machine. The PK-47 operates in three different ways according to the connection of the connectors of the PK-47 and the setting of the DIP switches.

**1. Connecting the foot switch**

1) Attach the junction cable (asm.) of the foot switch and the connector mounting plate as shown in the figure below.

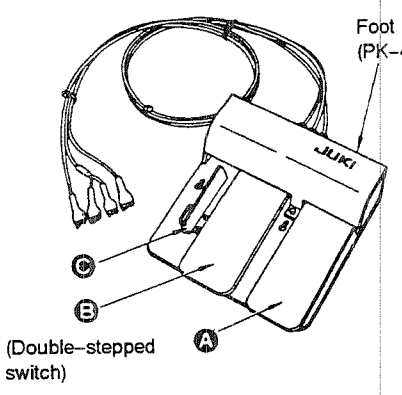


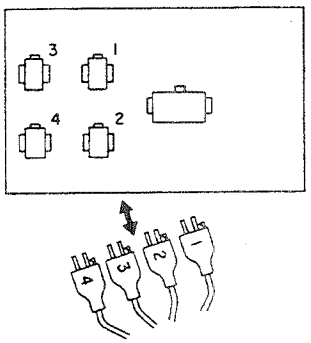





2) Connect four cables ❶ of the foot pedal switch to connector installing plate ❷.
3) Connect ground wire ❸ to the screw located on the right-hand side of connector installing plate ❷.
4) Each of the pedal switch cables has a number. So connect them following the order illustrated in the figure.

2. **How to operate the foot switch**
Select one operating method from among those described below. (When the double-stepped stroke feeding frame function is used)




| Connection of connectors<br>Connector plate side - Cable side | Setting of DIP switch<br>SW5-6 | Operation of the foot pedal switch and actions of the feeding frame |
|---|---|---|
| (J62) 1 —— 1<br>(J61) 2 —— 2<br>(J64) 3 —— 3<br>(J63) 4 —— 4 | ※ O N | Initial position of the feeding frame / (Comes down as long as the pedal is depressed.) Ⓑ1 ON / (Goes up when Ⓑ2 is turned ON again.) Ⓒ ON (START) |
| | O F F | Initial position of the feeding frame / (Comes down as long as the pedal is depressed.) Ⓑ1 ON / (Comes down as long as the pedal is depressed.) Ⓑ2 ON / Ⓒ ON (START) |
| 1 —— 4<br>2 —— 2<br>3 —— 3<br>4 —— 1 | ※ O N | Initial position of the feeding frame / (Comes down as long as the pedal is depressed.) Ⓑ1 ON / (Goes up when Ⓑ2 is turned ON again.) Ⓐ ON (START) |

Explanation of the codes

Ⓐ : Switch of pedal Ⓐ

Ⓑ1: First step of pedal Ⓑ

Ⓑ2: Second step of pedal Ⓑ

Ⓒ : Switch of pedal Ⓒ

※ : The setting of the switch marked with an asterisk (*) is the setting of the switch at the time of delivery.

**(Caution)**

1. **When changing the setting of the DIP switch, be sure to refer to the explanation of the SW5-6 in "5. Explanation of the DIP switches."**
2. **Be sure to set the DIP switch SW5-7 to its OFF position. (The switch has been set to its OFF position at the time of delivery.)**
**Note that the SW5-6 is not operative when the double-stepped stroke feeding frame function is not used. In this case, the operating method of the foot pedal switch can be selected using the SW5-7. (Refer to the explanation of the SW5-7 and SW5-6.)**

**Explanation of the actions of the feeding frame (for the setting shown in a rectangle ☐ )**

1) Depressing pedal Ⓑ so that the first step switch of pedal Ⓑ is turned ON, which will lower the feeding frame until its predetermined intermediate stop position is reached. (Intermediate stop position)
When you release your foot from the pedal, the feeding frame will go up.

2) Depressing pedal Ⓑ so that the second step switch of pedal Ⓑ is turned ON, which will lower the feeding frame to the lowest position of its stroke. At this time, the feeding frame will be held lowered even if releasing your foot from pedal Ⓑ.
(Depressing pedal Ⓑ again (so that the second step switch of pedal Ⓑ is turned ON), which will raise the feeding frame to its intermediate stop position. When you release your foot from pedal Ⓑ, the feeding frame will go up.)

3) Depressing pedal Ⓒ so that the switch of pedal Ⓒ is turned ON, which will make the sewing machine start running.

# 4. ADJUSTMENTS

## 4-1. Adjusting the mechanical components

**STANDARD ADJUSTMENTS**

**(1) Adjusting the feed bracket**

Adjust the clearance provided between the feeding frame and the top surface of the throat plate when the feeding frame is in its highest position. (The clearance can be adjusted to 25 mm (0.984") at the maximum.)

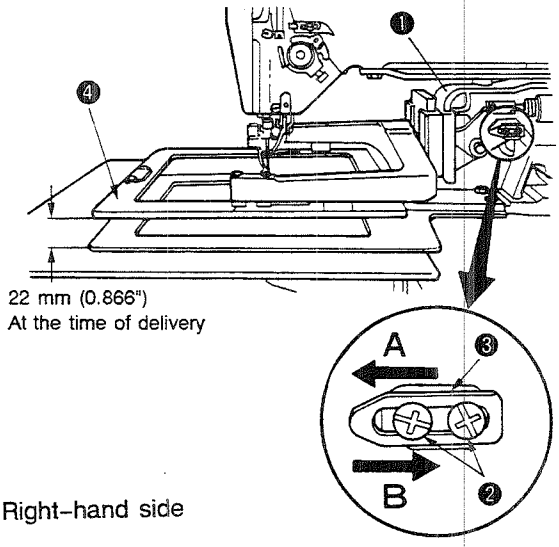



Fig. 4-1-1

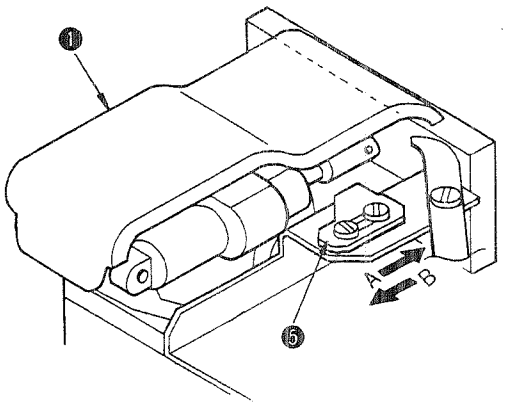



Fig. 4-1-2

**(2) Adjusting the initial position of the intermediate stop cylinder**

1) Arrange the nut so that the center-to-center distance of 79 ± 0.3 mm (3.110" ± 0.012") is provided between the intermediate stop cylinder shaft and the intermediate stop cylinder knuckle connecting shaft when the intermediate stop cylinder retracts the most.

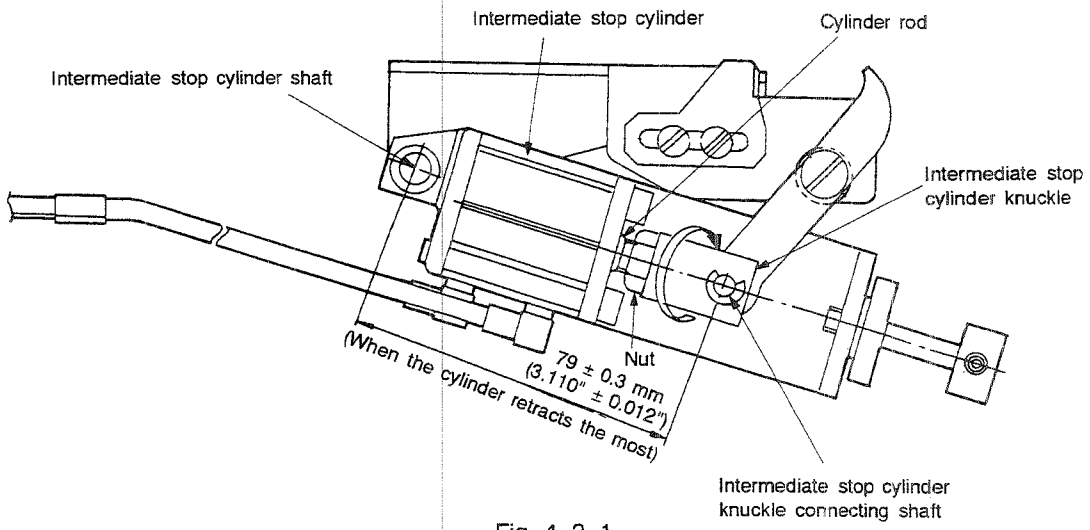
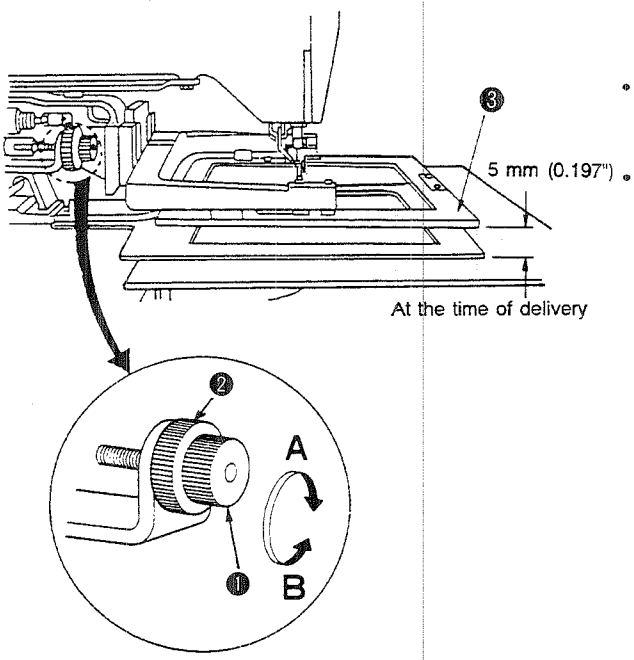



Fig. 4-2-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen screws ❷ in work clamp stopper (right) ❸ which is located in the right-hand side of feed bracket ❶. Shifting work clamp stopper (right) ❸ to the side of arrow A will lower the height of feeding frame ❹ or to the side of arrow B will increase it. (Fig. 4-1-1)<br>2) After the adjustment of the height of the feeding frame, be sure to securely tighten screws ❷. (Fig. 4-1-1)<br>3) Adjust work clamp stopper (left) ❺ located on the left-hand side of feed bracket ❶ following the same procedure as that for work clamp stopper (right) ❸ described above. (Fig. 4-1-2)<br>[Work clamp stopper (left) ❺ and work clamp stopper (right) ❸ are different in shape, however, they can be adjusted in the same procedure.] | o If the lifting amount of the feeding frame is insufficient, the material will not be set on the machine with ease.<br>o If the lifting amount of the feeding frame is excessive, the material cannot be accurately positioned with ease. |
| 1) Assemble the intermediate stop cylinder components with the intermediate stop cylinder knuckle fully turned in the direction of the arrow so that the center-to-center distance between the intermediate stop cylinder shaft and the connecting shaft is smaller than 79 mm (3.110").<br>2) Turning the nut in the direction of the arrow will increase the aforementioned center-to-center distance.<br>So, turn the nut in the direction of the arrow until the center-to-center distance of 79 ± 0.3 mm (3.110" ± 0.012") is obtained.<br>Then, turn the nut in the reverse direction to fix the intermediate stop cylinder knuckle. | o If the center-to-center distance between the cylinder shaft and the connecting shaft is smaller than the specified value, the highest intermediate stop position of the feeding frame will be lower than 12 mm (0.472").<br>o If the center-to-center distance between the cylinder shaft and the connecting shaft is larger than the specified value, the feeding frame will fail to be fully lowered. |

(3) **Adjusting the intermediate stop position of the feeding frame**

Adjust the height of the intermediate stop position of the feeding frame to allow the operator to position the sewing product on the machine with ease.




- The height of the feeding frame in its intermediate stop position has been factory-adjusted to 5 mm (0.197") at the time of delivery. (Fig. 4-3-1)
- The intermediate stop position of the feeding frame can be adjusted within the range of 0 to 12 mm (0" to 0.472").
- Set a material to be sewn on the machine and adjust it so that an approximately 1 mm (0.039") clearance is provided between the feeding frame and the material. This will allow the operator to set the material accurately in place with ease.

Fig. 4–3–1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen height adjusting shaft stopper ❷ in direction B. Turn height adjusting knob ❶ in direction A to make the feeding frame ❸ stop at a lower position in its intermediate stop state, or in direction B to make the feeding frame ❸ stop at a higher position in that state.<br>2) After the adjustment, securely tighten height adjusting shaft stopper ❷ by turning it in direction A.<br>**(Caution)**<br>**Determine a proper intermediate stop position of the feeding frame by actually operating it.** | o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease.<br>o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine. |

(4) **Adjusting the pneumatic components**

1) Connect quick-coupling joint socket plug ❶ in place and open air cock ❷. Then pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. (Fig. 4-4-1)
2) If pressure gauge ❹ indicates a lower value (lower than 4 kg/cm$^2$), the machine will stop with Error [A] shown on the operation panel. (Fig. 4-4-1)
3) The air pressure on the retracting side of the intermediate stop cylinder is reduced to 2 to 2.5 kg/cm$^2$. (Fig. 4-4-3)
4) The air pressure on the extruding side of the feeding frame cylinder is reduced to 1 to 1.5 kg/cm$^2$. (Fig. 4-4-3)
5) The two needle knobs of the speed controller (A) for the air supply are fixed using nuts with loosened by 3 turns after they have been fully tightened. (Fig. 4-4-4)
6) The needle knob of the speed controller (A) for the air exhaustion is fixed using a nut with loosened by a slightly less than one turn after it has been fully tightened. (Fig. 4-4-5)
7) The needle knob of the speed controller (B) (for the intermediate presser cylinder) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-4-6 and Fig. 4-4-7)

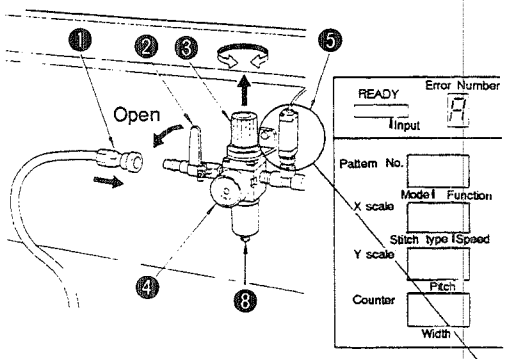



Fig. 4-4-1

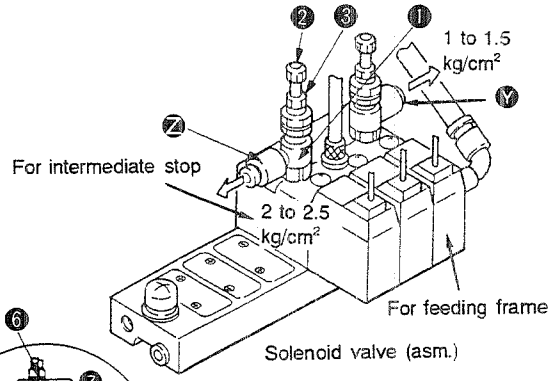



Fig. 4-4-3

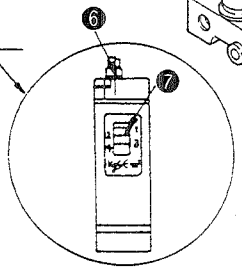


Fig. 4-4-2

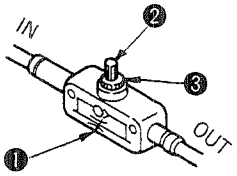



Fig. 4-4-4

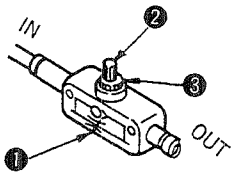



Fig. 4-4-5

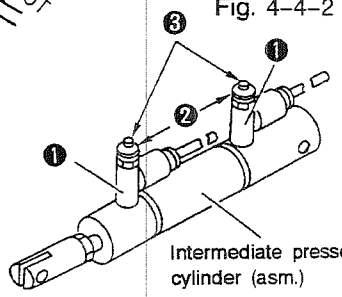



Fig. 4-4-6 (S type)

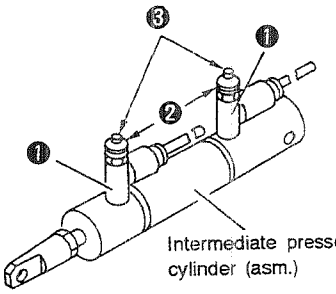
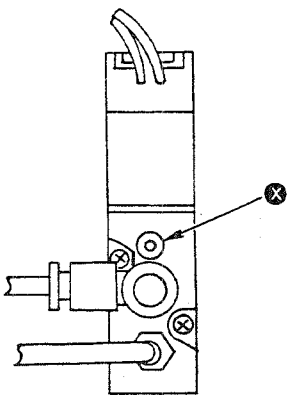



Fig. 4-4-7 (H type and G type)

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Open air cock ❷. Pull up air adjusting knob ❸, then turn it until pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. Then push down the knob to fix it at that position. (Fig. 4-4-1)<br>2) Adjust the knob so that the pressure gauge indicates 3 kg/cm$^2$ following the same procedure as that described in step 1).<br>Turn adjusting screw ❻ of pressure switch ❺ to make pointer ❼ indicate scale 4 . (Fig.4-4-1 and Fig. 4-4-2)<br>Turn ON the power to the machine. Then confirm that Error [A] is given on the operation panel when the pattern reading operation is provoked by pressing the [READY] switch on the operation panel.<br>**(Caution)**<br>**After the adjustment, return the indication on pressure gauge ❹ to 5 to 5.5 kg/cm$^2$. Now confirm that Error [A] is not displayed any longer.**<br>3) Remove the rear cover of the table. (Refer to Fig. 5-38-3 shown in the Standard Adjustment of Chapter 1.)<br>Set the machine in its sewing state. Now, remove the air hose by pressing section ❷ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-4-3)<br>Depress the section attached with a cross mark ❽ by five times or more, and turn needle knob ❷ of pressure reducing valve ❶ until the connected pressure gauge indicates a pressure of 2 to 2.5 kg/cm$^2$. Then fix the needle knob using nut ❸, and remove the pressure gauge. Now, securely connect the removed air hose in place. (Fig. 4-4-3 and Fig. 4-4-8)<br>4) Following the same procedure as described in step 3), depress the section marked with a cross ❽ by five times or more, and adjust the knob so that the pressure gauge connected to section ❼ indicates a pressure of 1 to 1.5 kg/cm$^2$. (Fig. 4-4-3 and Fig. 4-4-8)<br>5) Adjust needle knob ❷ of speed controller (A) ❶ properly. After the adjustment, fix it using nut ❸. (Fig. 4-4-4)<br>6) Adjust needle knob ❷ of speed controller (B) ❶ properly. After the adjustment, fix it using nut ❸. (Fig. 4-4-5)<br>7) Remove the top cover.<br>Adjust needle knob ❷ of speed controller (B) ❶ properly. After the adjustment, fix it using nut ❸. (Fig. 4-4-6 and Fig. 4-4-7) | 1) Function failure of the feeding frame components and intermediate presser components may result. The machine stops with Error [A] indicated on the operation panel.<br>2) Even if the air pressure drops, it cannot be detected. Under the normal operating air pressure (5 to 5.5 kg/cm$^2$), the sewing machine stops with Error [A] indicated on the operation panel.<br>3) An adequate work pressing pressure is not provided.<br>4) The feeding frame may fail to go up until its highest position is reached.<br>5) The speed of vertical motion of the feeding frame may be too high or too low.<br>6) The intermediate presser may fail to move smoothly, or it may generate a keen metallic noise when it is in operation.<br>**(Caution)**<br>**Normally, standard adjustments (4)-2 through -7 are not required to be adjusted. Needle knobs and nuts referred in steps 3) through 7), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.**<br>* To set the air pressure to 0 kg/cm$^2$, close air cock ❷ and press button ❽. (See Fig. 4-4-1.)<br>  <br>Solenoid valve<br>Fig. 4-4-8 |

**(5) Connecting the pneumatic components**

The schematic diagram of the pneumatic components is as follows:

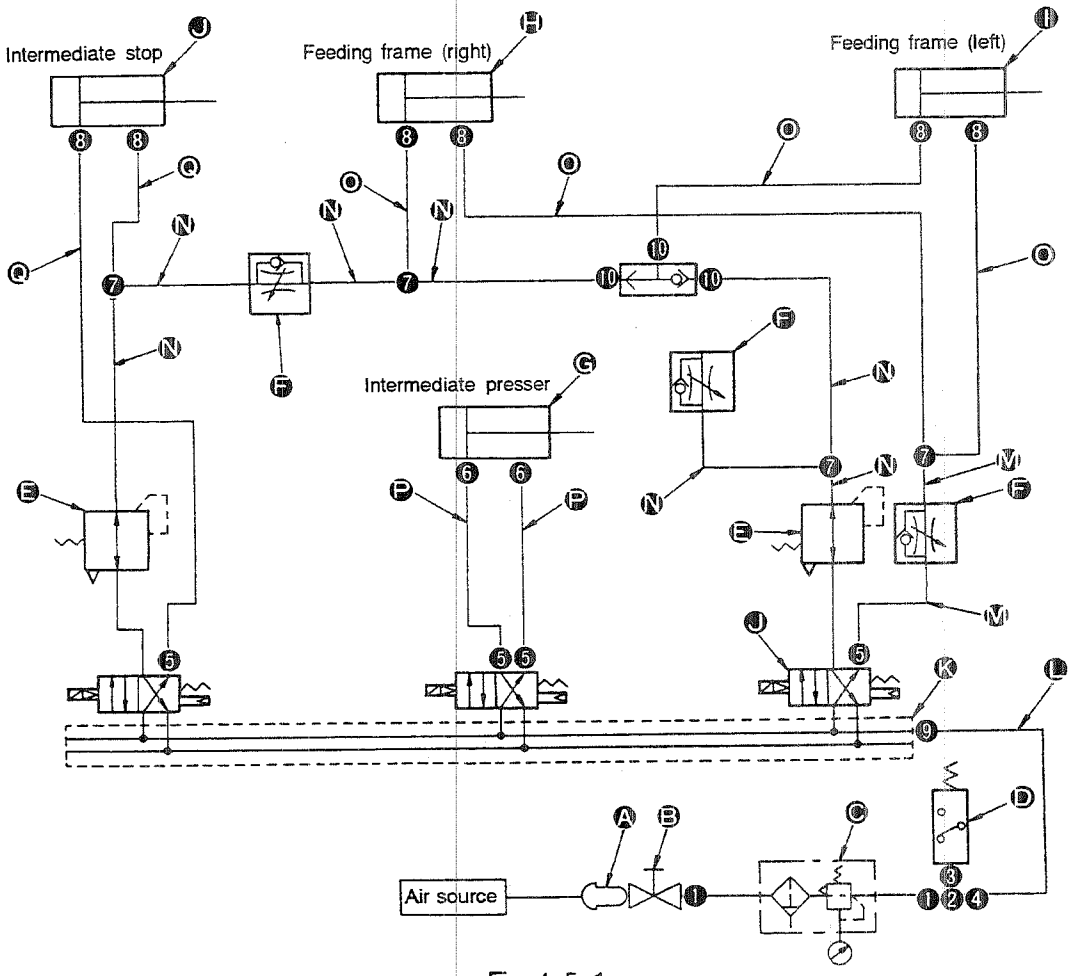



Fig. 4–5–1

| | |
|---|---|
| Ⓐ | Quick-coupling joint socket |
| | Quick-coupling joint plug |
| Ⓑ | Air cock |
| Ⓒ | Filter regulator |
| Ⓓ | Pressure switch (asm.) |
| Ⓔ | Pressure reducing valve |
| Ⓕ | Speed controller (A) |
| Ⓖ | Intermediate presser cylinder |
| Ⓗ | Work clamp cylinder (right) |
| Ⓘ | Work clamp cylinder (left) |
| Ⓙ | Intermediate stop cylinder |
| Ⓚ | Solenoid valve (asm.) |
| | Manifold |
| | Solenoid valve |
| Ⓛ | ϕ6 air tube |

| | |
|---|---|
| Ⓜ | ϕ4 air tube (A) |
| Ⓝ | ϕ4 air tube (B) |
| Ⓞ | ϕ4 air tube (C) |
| Ⓟ | ϕ4 air tube (D) |
| Ⓠ | ϕ4 air tube (F) |
| ❶ | Barrel nipple |
| ❷ | T-cheese |
| ❸ | Fitting bushing |
| ❹ | Elbow union (A) |
| ❺ | Hose nipple |
| ❻ | Speed controller (B) |
| ❼ | Y joint |
| ❽ | Hose elbow |
| ❾ | Elbow union (B) |
| ❿ | Quick-coupling joint |

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Connect the pneumatic components properly referring to the schematic diagram (Fig. 4-5-1) and Disassembly/assembly procedure (7).<br><br>* "(42) Connecting the pneumatic components" of Chapter 1 (S type) describes how to read the schematic diagram. So, refer to the description given there, if necessary. | o Malfunction of the feeding frame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components. |

(6) **Assembling the double-stepped stroke feeding frame (asm.)**

1) Assemble the double-stepped stroke feeding frame (asm.) referring Fig. 4-6-1.
2) Attach the double-stepped stroke feeding frame installing bracket to section Ⓒ in Fig. 4-6-2, with the double-stepped stroke feeding frame attaching screws.

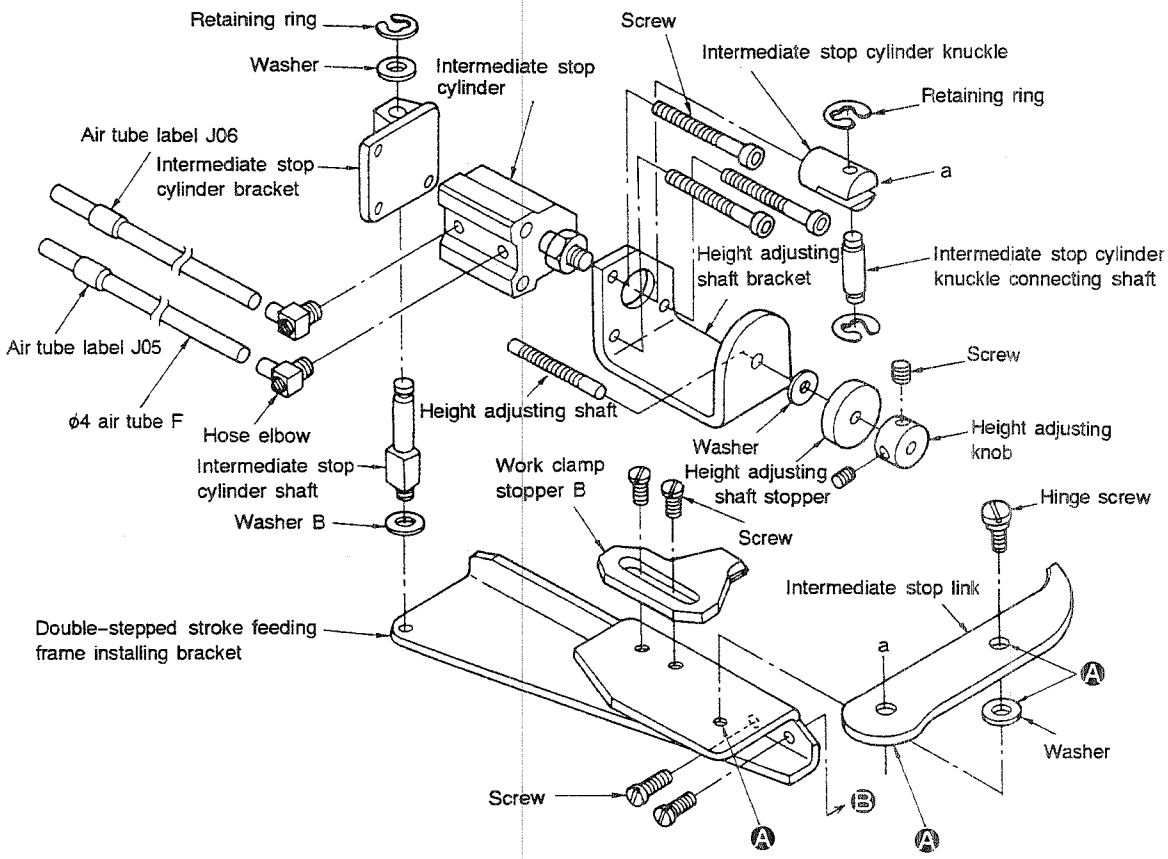



Fig. 4-6-1

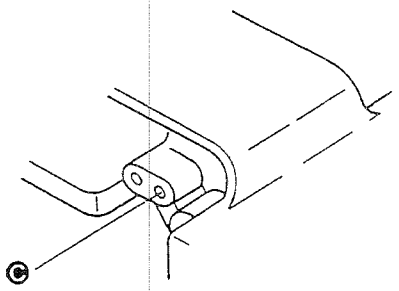
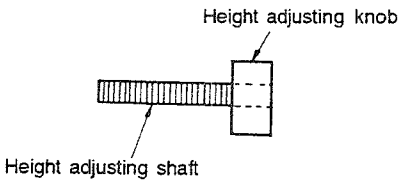



Fig. 4-6-2

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| | o Attach the intermediate stop cylinder in place after the height adjusting shaft has been attached to the height adjusting shaft bracket.<br>o Apply grease to section Ⓐ.<br>o Take care not to allow the intermediate stop cylinder and the height adjusting shaft bracket to come in contact with the top surface of the double-stepped stroke feeding frame installing bracket.<br>o Attach the height adjusting knob so that its end face is flush with the end face of the height adjusting shaft.<br>  <br><br>o After the double-stepped stroke feeding frame (asm.) has been installed on section Ⓒ of the feed bracket as shown in Fig. 4-6-2, move the feed bracket by hand fully in the X and Y directions to confirm that the feed bracket does not interfere with the X guide shaft support or other components. |

(7) **Assembling the pneumatic components**

Assemble the pneumatic components referring to Fig. 4-7-1.

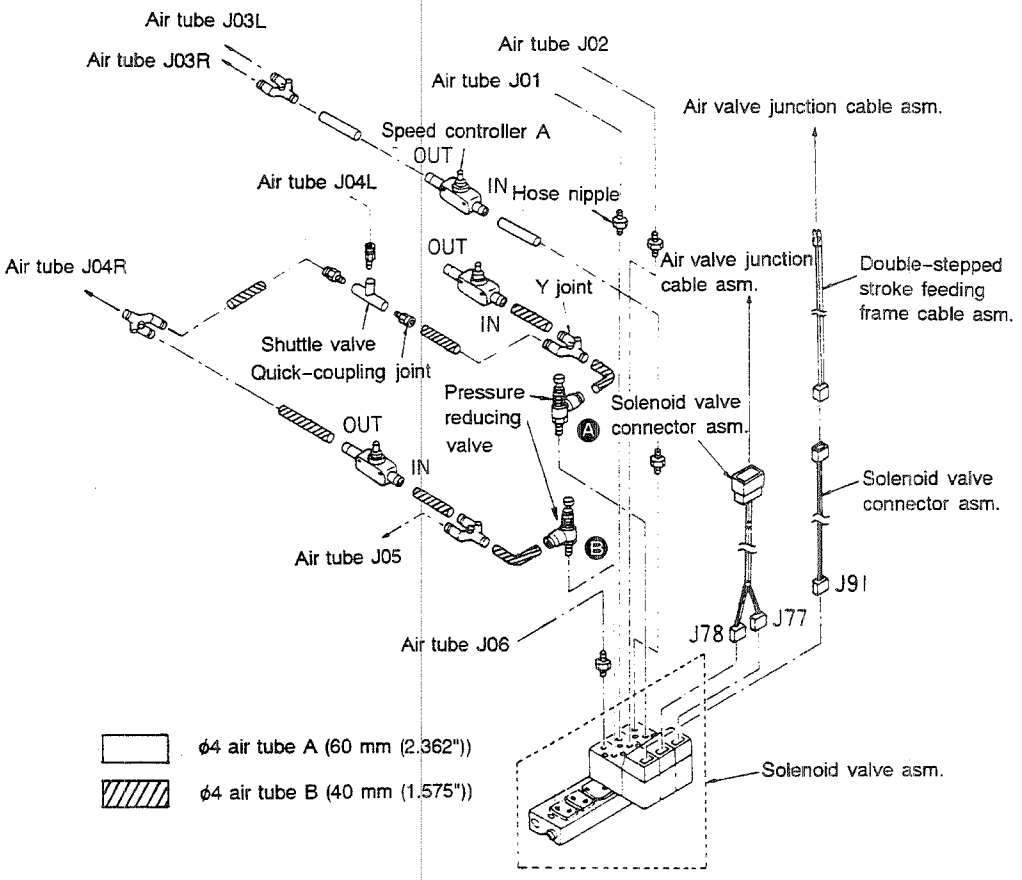
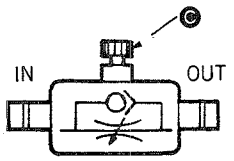



Fig. 4-7-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| | o Adjust pressure reducing valve Ⓐ to 1.5 kg/cm$^2$. Adjust pressure reducing valve Ⓑ to 2.5 kg/cm$^2$.<br>o Attach the speed controller A as it faces in direction shown in the figure below. Adjust the lifting/lowering speed of the feeding frame by pressing the knob mounted on the top of the speed controller A.<br>  <br><br>Note that the speed controller Ⓒ should be adjusted so that it leaks a little amount of air when lowering the feeding frame.<br>o Also refer to Standard adjustments (4) and (5). |

(8) **Connecting the double-stepped stroke feeding frame cables**

1) Remove screws Ⓐ, and remove the cover of the air valve junction cable (asm.).
2) Pass the double-stepped stroke feeding frame cable (asm.) through the vinyl tube of the air valve junction cable (asm.).
3) Connect the double-stepped stroke feeding frame cable (asm.) to A-7 and B-7 of connector (26-pin) of the air valve junction cable (asm.).

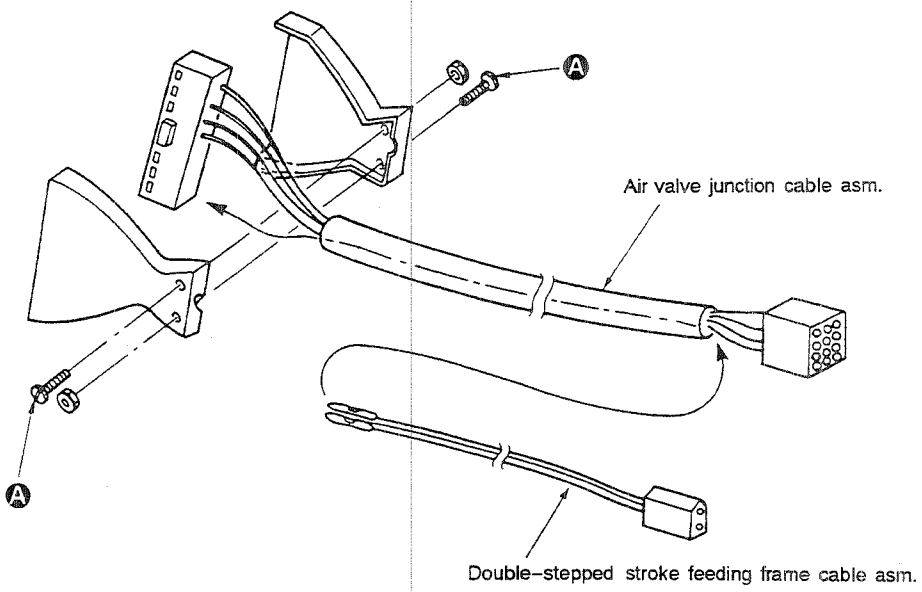
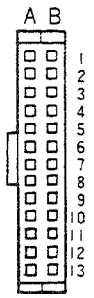



Fig. 4-8-1




A-7 : Connect the double-stepped stroke feeding frame cable (red) to it.
B-7 : Connect the double-stepped stroke feeding frame cable (yellow) to it.

Fig. 4-8-2

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| | o Attach the cover to the air valve junction cable (asm.) while taking care not to allow the wires to be caught under the cover. (Fig. 4-8-1)<br>o Since numbers A1 to A13 and B1 to B13 are engraved on the connectors of the air valve junction cable (asm.), connect the double-stepped stroke feeding frame cable (asm.) to the correct ones referring to Fig. 4-8-2. |

## 5. EXPLANATION OF THE DIP SWITCHES

### 5-1. DIP switches table (exclusive for the B type)

● **Functions which differ according to the types of sewing machine, i.e., the standard model (S type) and the respective subclass models**
The captioned functions of the sewing machine are related to the feeding frame (including the foot switch). The functions themselves do not change, however, the actions provoked by the respective functions differ according to the types of sewing machine. Consequently, the functions need to be explained separately. Refer to Chapter 1 for the explanation of the other switches (functions).

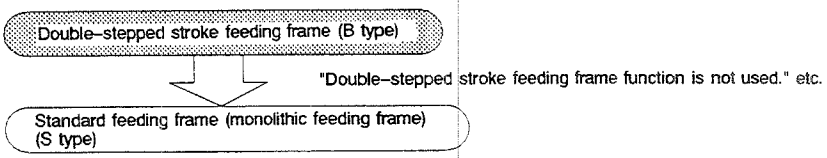
| Switch | Description (Function) | Applicable model (type) | | | |
|---|---|---|---|---|---|
| SW5-1 | "Cycle stitching function B" (Raising/lowering of the feeding frame selection B) | | | L | T |
| SW5-2 | "Cycle stitching function A" (Raising/lowering of the feeding frame selection A) | S | B | L | T |
| SW5-6 | "Pedal selecting function B" | | B | L | T |
| SW5-7 | "Pedal selecting function A" | S | B | L | T |
| SW5-8 | "Monolithic feeding frame/separately driven feeding frame change over function" | | | L | T |
| SW6-1 | "Separately driven feeding frame operation sequence change over function" | | | L | |
| SW7-2 | Selection of "double-stepped stroke feeding frame function" | | B | L | T |

(Caution)

1. **The setting of the respective switches, at the time of delivery, differs by the types of sewing machine (S, B, T and L). The setting of the DIP switches of B type machine, which is equipped with the double-stepped stroke feeding frame, at the time of delivery is described in this chapter. The setting of the DIP switches of the other types is described in the following chapters.**
   **Chapter 1 Standard model (S type)**
   **Chapter 3 (L type)**
   **Chapter 4 (T type)**

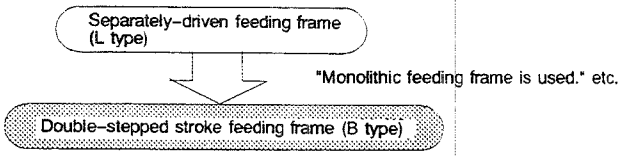
2. **If you have changed the specifications of the sewing machine because of modifications, set the DIP switches to adapt the sewing machine to the functions of the newly changed model.**

   **(Example 1)**



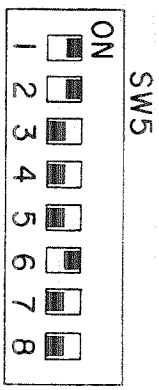
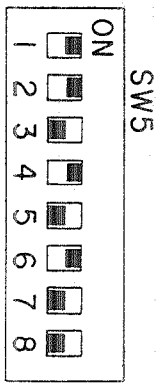
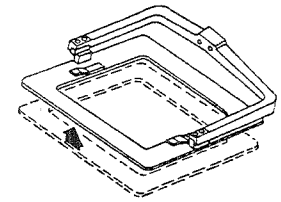
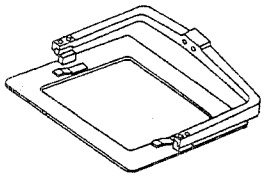

   ● **DIP switch SW5-6 "pedal change-over function B" cannot be used. (Refer to Chapter 1.)**

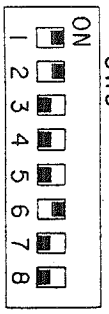
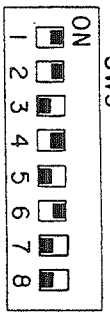
   **(Example 2)**

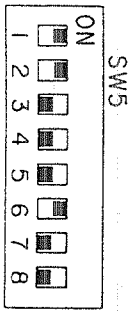
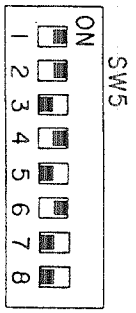


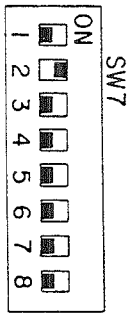
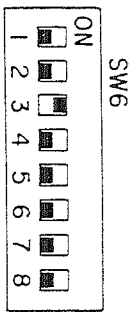

   ● **DIP switch SW6-1 "double-stepped stroke feeding frame sequence change-over function" cannot be used. (Refer to this chapter.)**

5-2. DIP switch table (exclusive for B type)

| Name of switch | Function |
|---|---|
| ⑥ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSB and AMS-220CHB at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGB at the time of delivery) | • **SW5-2 ..... Cycle stitching facility A (Raising/lowering of the feeding frame selection A)**<br>Used to specify the performance (up/down) of the feeding frame at the position in a pattern where a "temporary stop" command (pause) has been entered. Note that a "temporary stop" is impossible when the feeding frame has been lifted to its intermediate stop position.<br>  <br>  <br>ON: The switch has been set to the ON position at the time of delivery. — The sewing machine temporarily stops with the feeding frame raised, at the position in a pattern where a temporary stop command has been entered. (Cycle stitching facility) Turn ON the [Feeding frame switch]. → Turn ON the [Start switch]. This makes the machine start the next stitching cycle.<br>OFF — The sewing machine temporarily stops with the feeding frame lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start switch] makes the machine start the next stitching cycle.<br>* Temporary stop command<br>This command is used to make the sewing machine temporarily stop in one pattern. A temporary stop command can be entered, using the main unit input function or the programming device such as PGM-1, at a point that is convenient for creating/modifying the pattern. (The temporary stop command can be entered at two or more points in a pattern.)<br>* Cycle stitching<br>The cycle stitching is a sewing method where several stitching processes (cycles) are continuously sewn. By entering a "temporary stop" command at the desired point in a pattern, the feeding frame can be raised so that a workpiece (cloth, etc.) may be turned or changed. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSB and AMS-220CHB at the time of delivery) | (Caution)<br>**When the machine is in the cycle stitching mode (ON), be sure to take note of the following points:**<br>Forward / Backward: When the FORWARD or BACKWARD key is pressed, the machine halts at the predetermined temporary stop point where the feeding frame can be raised or lowered using the feeding frame switch. If you wish to feed the material forward or backward continuously, operate either key after lowering the feeding frame.<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 which is being sewn, use the BACKWARD key.<br>Bobbin thread counter: The counter counts up upon the completion of one pattern. If a pattern includes three cycles, the counter is incremented when the three cycles have been sewn.<br>Set Ready (Test): The Set Ready switch is rendered ineffective while the sewing machine is 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. |
|  <br><br>(Setting state of the switch of the AMS-220CGB at the time of delivery) | • **SW5-7 ..... Pedal selecting function A (for the first step of the feeding frame)**<br>This function is controlled by the feeding frame switch (pedal switch). The function of this switch changes in accordance with the ON/OFF of the "double-stepped stroke feeding frame function." The pedal selecting function A facilitates operation further if it is used in combination with the pedal selecting function B (SW5-6).<br>① When the "double-stepped stroke feeding frame function" is specified (effective) ... (The SW7-2 is set to its ON position).<br>ON: When the [Feeding frame (first-step)] switch is depressed, the feeding frame (first step) comes down. Another depress on the same pedal switch makes the feeding frame go up.<br>OFF (The switch has been set to the OFF position at the time of delivery.): The Feeding frame (first step) keeps on coming down as long as the [Feeding frame (first-step)] switch is held depressed.<br>② When the "double-stepped stroke feeding frame function" is (ineffective) ... (The SW7-2 is set to its OFF position).<br>ON: When the [Feeding frame] switch is depressed, the feeding frame comes down. Another depress on the same pedal switch makes the feeding frame go up.<br>OFF: The feeding frame keeps on coming down as long as the [Feeding frame] switch is held depressed.<br>The SW5-7 works to control the feeding frame (first-step) when the "double-stepped stroke feeding frame function" is used, or control the entire feeding frame when the function is rendered ineffective. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSB and AMS-220CHB at the time of delivery) | • **SW5-6 ..... Pedal selecting function B (for the 2nd step of the feeding frame)**<br>The function is controlled by the feeding frame switch (pedal switch). The function of this switch changes in accordance with the ON/OFF of the "double-stepped stroke feeding frame function."<br><br>① When the "double-stepped stroke feeding frame function" is specified (effective) ... (The SW7-2 is set to its ON position).<br><br>ON (The switch has been set to the ON position at the time of delivery.): When the [Feeding frame (second-step)] switch is depressed, the feeding frame (second-step) comes down. Another depress on the same pedal switch makes the feeding frame go up.<br><br>OFF: The feeding frame keeps on coming down as long as the [Feeding frame (second-step)] switch is held depressed.<br><br>The SW5-6 works to control the feeding frame (second-step) when the "double-stepped stroke feeding frame function" is used. When the function is made ineffective, the function itself is rendered ineffective. |
|  <br><br>(Setting state of the switch of the AMS-220CGB at the time of delivery) | • SW5-1 ON This switch is used in the other models of sewing machine.<br>• SW5-8 OFF * If you have changed the specifications of the machine, change the setting of the switch accordingly. |

<table>
<tr><th>Name of switch</th><th>Function</th></tr>
<tr><td>⑦ DIP switch 7 (SW7)<br>  <br><br>(Setting state of the switches of the AMS-220CSB, AMS-220CHB, and AMS-220CGB at the time of delivery)</td><td>• SW7-2 ..... Selection of the "double-stepped stroke feeding frame function"<br><table><tr><td>ON<br>(The switch has been set to the ON position at the time of delivery.)</td><td>The feeding frame operates as the "double-stepped stroke feeding frame."</td></tr><tr><td>OFF</td><td>The feeding frame does not operate as the "double-stepped stroke feeding frame."<br>The feeding frame is lowered by operating the Feeding frame switch once.</td></tr></table><br>(Caution)<br>The ON/OFF setting of the SW7-2 affects the function of the other DIP switches (SW5-7/SW5-6). So, it is necessary to refer to the explanation of the aforementioned DIP switches when changing over the setting of the SW7-2 between ON and OFF.</td></tr>
<tr><td>⑥ DIP switch 6 (SW6)<br>  <br><br>(Setting state of the switches of the AMS-220CSB, AMS-220CHB and AMS-220CGB at the time of delivery)</td><td>• SW6-1 ..... OFF<br>The switch is used in the other models of sewing machine.<br>* If you have changed the specifications of the sewing machine because of modifications, set the DIP switch to adapt the sewing machine to the functions of the newly changed model.</td></tr>
</table>

## 6. REFERENCES

### 6-1. To change the standard type of sewing machine (S type) to the double-stepped stroke feeding frame type of sewing machine (B type)

• Parts to be deleted

| | Part name | Q'ty | Part No. |
|---|---|---|---|
| 1 | Solenoid valve (asm.) | - | PV0351130A0 |
| 2 | 2-pedal unit (asm.) (conventional color) | - | M85905130A0 |
| 3 | 2-pedal unit (asm.) (urban white) | - | M85905130AA |

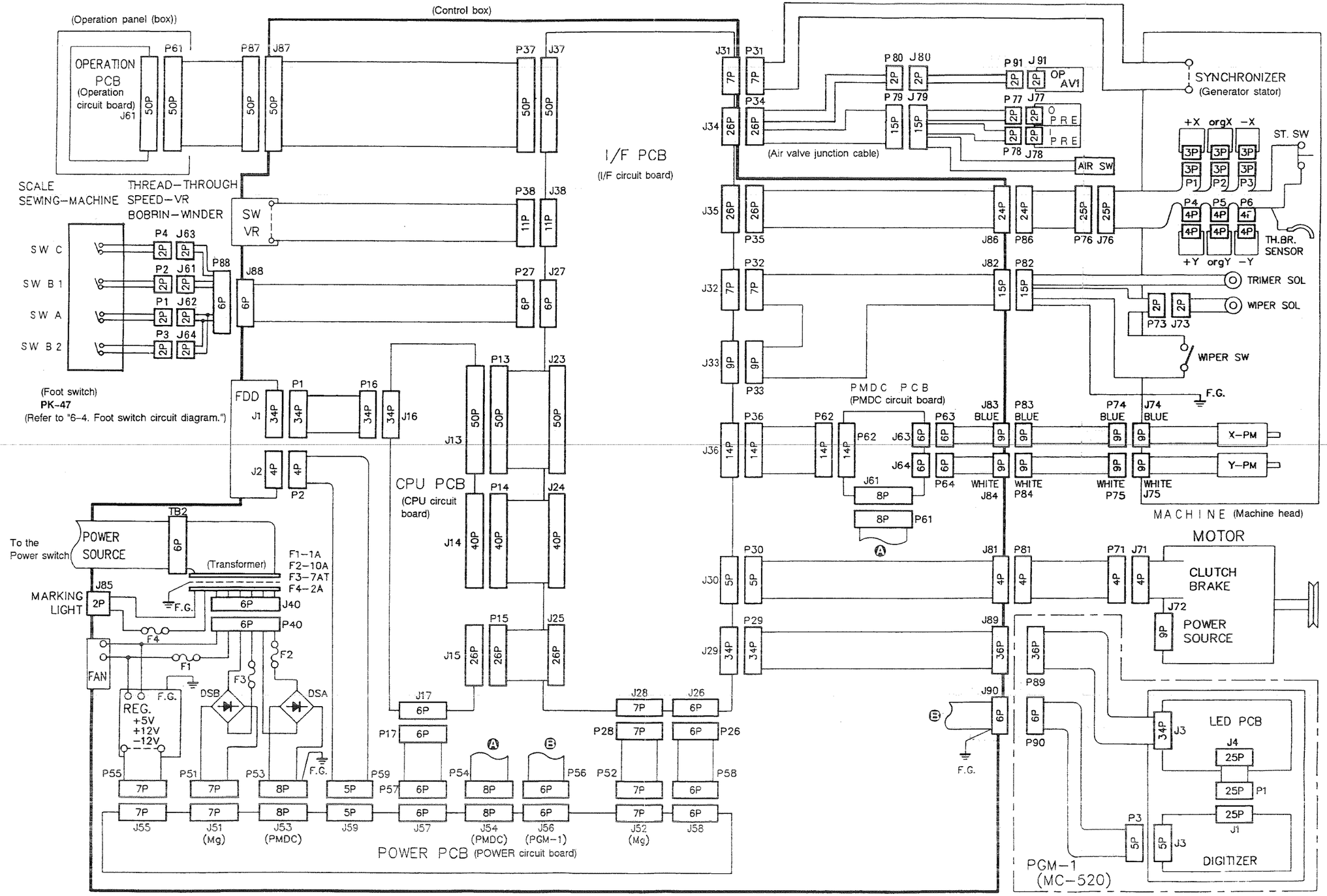
• Parts to be added

| | Part name | Q'ty | Part No. |
|---|---|---|---|
| 1 | Double-stepped stroke feeding frame (asm.) | 1 | B25142200A0 |
| 2 | Attaching screw | 2 | SS6121060SP |
| 3 | Solenoid valve connector (asm.) | 1 | B47122200A0 |
| 4 | Solenoid valve (asm.) | 1 | PV0351240B0 |
| 5 | Double-stepped stroke feeding frame cable (asm.) | 1 | B47142200A0 |
| 6 | Shuttle valve | 1 | PV205101000 |
| 7 | Quick-coupling joint | 3 | PJ301045101 |
| 8 | Cable band B | 6 | HX002330000 |
| 9 | Nylon clip B | 1 | HX00150000E |
| 10 | Pedal switch junction cord (asm.) | 1 | B82052200A0 |
| 11 | Connector attaching plate | 1 | B8213206000 |
| 12 | Screw | 2 | SM4040601SC |
| 13 | Washer | 2 | WP0430800SC |
| 14 | PK-47 3-pedal unit (conventional color) | 1 | GPK470010A0 |
| 15 | PK-47 3-pedal unit (urban white) | 1 | GPK470010AB |

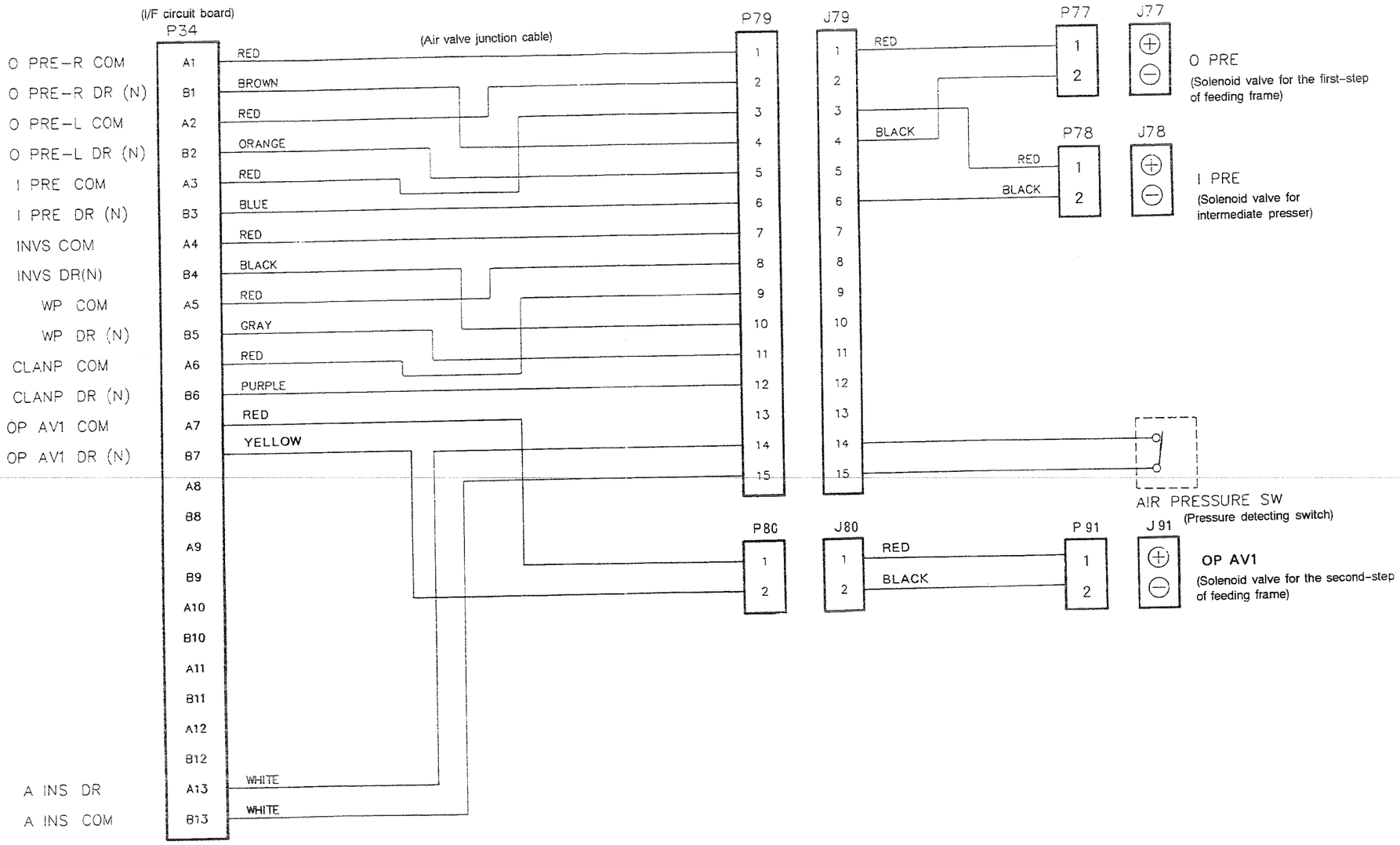
• Parts of which quantity used is to be changed

| | Part name | Q'ty | Part No. |
|---|---|---|---|
| 1 | Work clamp stopper | 2 → 1 | B2580220000 |
| 2 | Screw | 4 → 2 | SS6120940SP |
| 3 | Nylon clip | 3 → 2 | EA9502B0500 |
| 4 | φ4 air tube B | 2 → 7 | B471022000B |
| 5 | Hose nipple | 3 → 4 | PJ032052503 |
| 6 | Y-joint | 2 → 4 | PJ308040002 |
| 7 | Pressure reducing valve | 1 → 2 | PF070501000 |
| 8 | Speed controller A | 2 → 3 | PC012401000 |

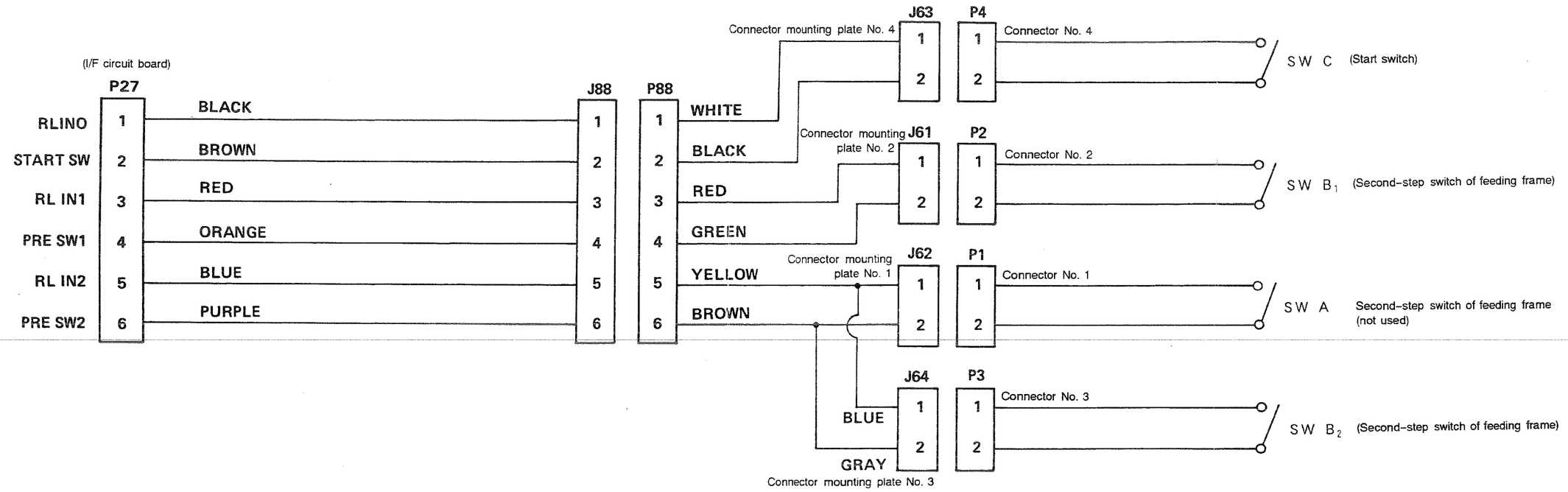
## 6-2. Block diagram (for the B type)



## 6-3. Air valve schematic diagram (for the B type)



## 6-4. Foot switch (PK-47) circuit diagram (for the B type)




※ The function of the switch shown in parenthesis has been specified at the time of delivery.
Refer to the setting of the foot pedal switch enclosed in a rectangle given in "3-2. 2. How to operate th foot switch."

# CHAPTER 3
# SEPARATELY-DRIVEN FEEDING FRAME TYPE (L TYPE)
# AMS-220CSL (for light-weight materials)
# AMS-220CHL (for medium-weight materials)
# AMS-220CGL (for heavy-weight materials)

● **This chapter covers only the part which is the feature making the aforementioned models different from the S type machine explained in Chapter 1.**

## 1. FEATURES

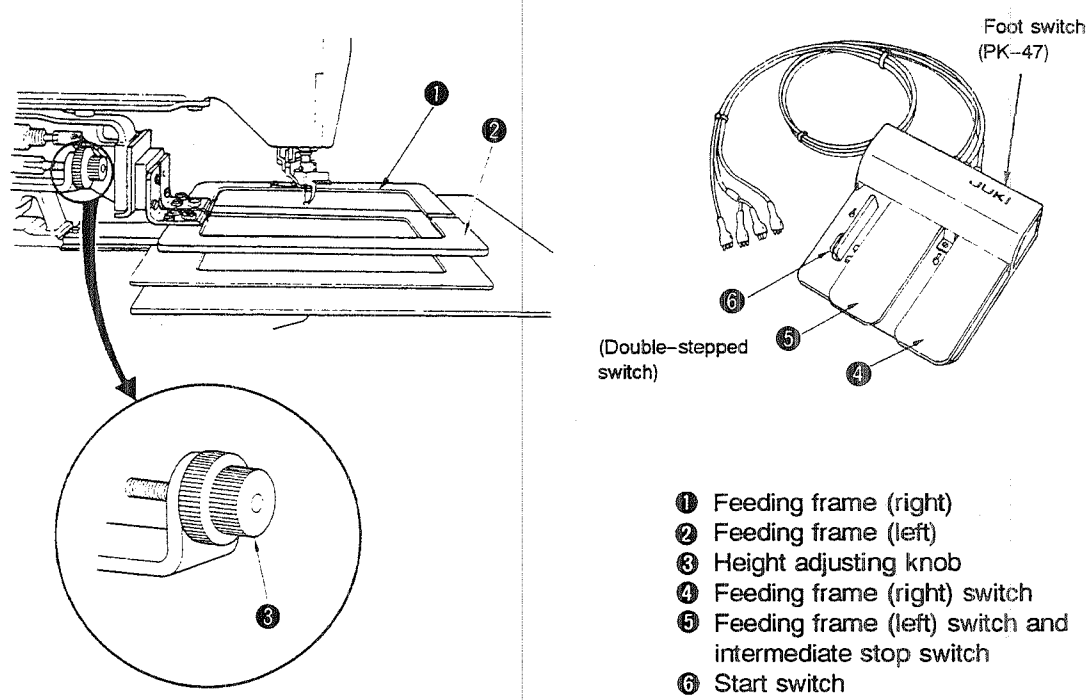
1) The machine comes with the feeding frame which is equipped with the degree of angle adjusting function so that the sewing product is uniformly clamped.
2) The machine is equipped with a separately-driven feeding frame. In addition, the left- and right-sections of feeding frame can be simultaneously raised/lowered by changing over the setting of the DIP switch.
3) The order of lowering the right- and left-hand sections of feeding frame can be changed over. Furthermore, the lift of the left- and right-hand sections of feeding frame can be specified separately.
4) The left-hand section of feeding frame is equipped with the double-stepped stroke feeding frame function.
5) Other features of the machine conform to "1. Features" described in Chapter 1.

## 2. SPECIFICATIONS AND SPECIFIED VALUES

1) Lift of feeding frame (right): Standard 22 mm (0.866") Max. 25 mm (0.984")
2) Lift of feeding frame (left): Standard 22 mm (0.866") Max. 25 mm (0.984") (Height of the feeding frame in its intermediate stop position: 0 to 12 mm (0" to 0.472"))
3) Other specifications and specified values conform to "2. Specifications and specified values" described in Chapter 1.

# 3. OPERATION OF THE SEWING MACHINE

## 3-1. Configuration




❶ Feeding frame (right)
❷ Feeding frame (left)
❸ Height adjusting knob
❹ Feeding frame (right) switch
❺ Feeding frame (left) switch and intermediate stop switch
❻ Start switch

* The settings of switches ❹, ❺ and ❻ have been determined at the time of delivery. (The setting of these switches can be changed over, if necessary.)

❶ Feeding frame (right)
It is lowered by operating the foot switch.

❷ Feeding frame (left)
It is lowered in the double-stepped actions by operating the foot switch. (equipped with double-stepped stroke function)

❸ Height adjusting knob
It is used to adjust the height of the intermediate stop position of the feeding frame (left).

❹ Feeding frame (right) switch
It is used to lower/lift the feeding frame (right).

❺ Feeding frame (left) switch and intermediate stop switch
This is a double-stepped switch. It is used to lower/lift the feeding frame (left) between the highest position and the intermediate stop position, and between the intermediate stop position and the lowest position of its stroke.

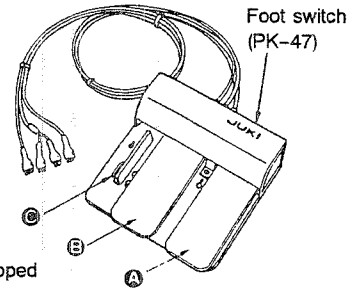
❻ Start switch
This is a switch to command the sewing machine how to sew the material. The machine sews the material according to the data stored in the micro floppy disk.

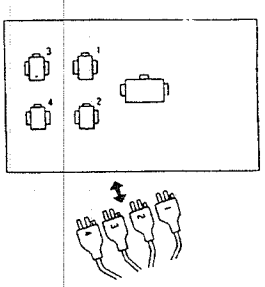
## 3-2. How to use the foot switch (PK-47 3-pedal unit)

The PK-47 is necessary to operate the separately-driven feeding frame type (L type) of the AMS-220C Series of sewing machine. The PK-47 operates in five different ways according to the connection of the connectors of the PK-47 and the setting of the DIP switches.

1. Connecting the foot switch
Connect the foot switch (PK-47) referring to "1. Connecting the foot switch" in "3-2. How to use the foot switch" described in Chapter 2.

2. How to operate the foot switch
Select one operating method from among those described below.




| Method of connecting the connectors | Setting of the DIP switches | | Functions of the foot pedal switch and actions of the feeding frame (SW5-8 ON) |
|---|---|---|---|
| On the connector plate side - Cable side | SW6-1 | SW5-6 | |
| (J62) 1 —— 1<br>(J61) 2 —— 2<br>(J64) 3 —— 3<br>(J63) 4 —— 4 | * ON | * ON | Initial position of the feeding frame. (Goes up when Ⓐ is re-turned ON.) Ⓐ ON. (Comes down while the pedal is held depressed.) Ⓑ1 ON. (Goes up when Ⓑ2 is re-turned ON.) Ⓑ2 ON. Ⓒ ON. START |
| | | OFF | Initial position of the feeding frame. (Goes up when Ⓐ is re-turned ON.) Ⓐ ON. (Comes down while the pedal is held depressed.) Ⓑ1 ON. (Comes down while the pedal is held depressed.) Ⓑ2 ON. Ⓒ ON. START |
| | OFF | ON | Initial position of the feeding frame. (Comes down while the pedal is held depressed.) Ⓑ1 ON. (Goes up when Ⓑ2 is re-turned ON.) Ⓑ2 ON. (Goes up when Ⓐ is re-turned ON.) Ⓐ ON. Ⓒ ON. START |
| 1 —— 4<br>2 —— 2 | * ON | * ON | Initial position of the feeding frame. (Goes up when Ⓒ is re-turned ON.) Ⓒ ON. (Comes down while the pedal is held depressed.) Ⓑ1 ON. (Goes up when Ⓑ2 is re-turned ON.) Ⓑ2 ON. Ⓐ ON. START |
| 3 —— 3<br>4 —— 1 | OFF | ON | Initial position of the feeding frame. (Comes down while the pedal is held depressed.) Ⓑ1 ON. (Goes up when Ⓑ2 is re-turned ON.) Ⓑ2 ON. (Goes up when Ⓒ is re-turned ON.) Ⓒ ON. Ⓐ ON. START |

Explanation of the codes:
- Ⓐ ... Pedal Ⓐ switch
- Ⓑ1 ... 1st step switch of pedal Ⓑ
- Ⓑ2 ... 2nd step switch of pedal Ⓑ
- Ⓒ ... Pedal Ⓒ switch

**(Caution)**
**Whenever you want to change the setting of the DIP switches, refer to the explanation of SW5-6 and SW6-1. Note that the DIP switch SW5-7 should be set to its OFF position.**

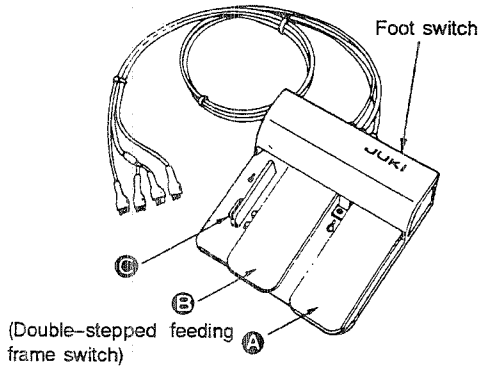
The setting marked by an asterisk (*) is the setting at the time of delivery.

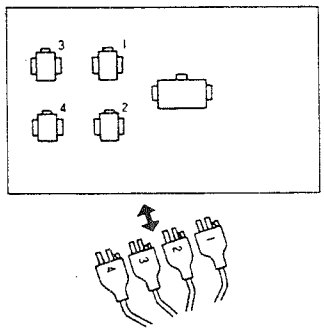
**Explanation of the actions of the feeding frame (for the setting enclosed in a rectangle ( ▭ ))**

1) Depressing pedal Ⓐ will lower the feeding frame (right).
   Depressing pedal Ⓐ again will raise the feeding frame (right).
2) Depressing pedal Ⓑ so that the first step switch of pedal Ⓑ is turned ON, which will lower the feeding frame (left) until its predetermined intermediate stop position is reached. (Intermediate stop)
   When you release your foot from the pedal, the feeding frame (left) will go up.
3) Depressing pedal Ⓑ so that the second step switch of pedal Ⓑ is turned ON, which will lower the feeding frame (left) until its lowest position is reached.
   Turning ON the second step switch of pedal Ⓑ again, the feeding frame (left) will go up until the predetermined intermediate stop position is reached. (Intermediate stop position) In this state, turning OFF the second step switch of pedal Ⓑ, then turning it ON will make the feeding frame (left) come down to its lowest position.
4) Depressing pedal Ⓒ, when the feeding frames (right) and (left) are in the respective lowest positions, will make the machine start running.

### 3-3. When the machine is used as the standard type machine (monolithic feeding frame)

Set the DIP switches SW5-8 and SW7-2 to their OFF positions.
Now, depress pedal Ⓑ, and the feeding frame (right) and feeding frame (left) will move simultaneously.



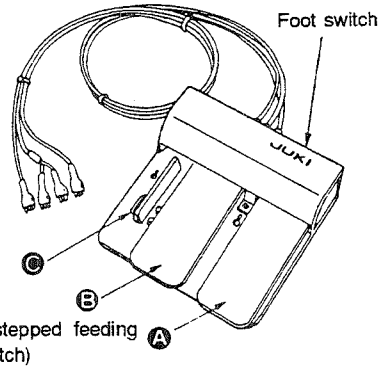
| Method of connecting the connectors | Setting of the DIP switch | Functions of the foot pedal switch and actions of the feeding frame |
|---|---|---|
| On the connector plate side - Cable side | SW5-7 | |
| 1 —— 1<br>2 —— 2<br>3 —— 3<br>4 —— 4 | ON | Initial position of the feeding frame<br>(Goes up when Ⓑ is re-turned ON.)<br>ⒷON<br>ⒸON START |
| | OFF | Initial position of the feeding frame<br>(Comes down while the pedal is held depressed.)<br>ⒷON<br>ⒸON START |
| 1 —— 4<br>2 —— 2<br>3 —— 3<br>4 —— 1 | ON | Initial position of the feeding frame<br>(Goes up when Ⓐ is re-turned ON.)<br>ⒷON<br>ⒶON START |

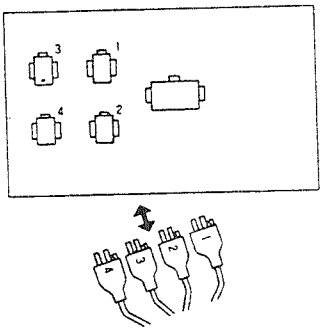
* The foot pedal operates differently according to the setting of the DIP switches and the connection of the connectors.
(Refer to the explanation given in "5. DIP switches.")

* When the machine is used as the standard type machine (monolithic feeding frame), the setting of the DIP switch SW5-6 is ineffective.

### 3-4. When the double-stepped stroke function is not used

When the DIP switch SW7-2 is set to its OFF position to make the double-stepped stroke feature of the feeding frame (left) inoperative and allow it to come down to its lowest postion in the single-step stroke as the feeding frame (right). (It is not necessary to remove the double-stepped stroke feeding frame.)




| Method of connecting the connectors | Setting of the DIP switches | | Functions of the foot pedal switch and actions of the feeding frame SW6-1 ON / SW5-8 ON |
|---|---|---|---|
| On the connector plate side - Cable side | SW5-7 | SW5-6 | |
| (J62) 1 – 1<br>(J61) 2 – 2 (3)<br>(J64) 3 – 3 (2)<br>(J63) 4 – 4 | ON (OFF) | OFF (ON) | Initial position of the feeding frame / (Goes up when Ⓐ is re-turned ON.) / (Comes down while the pedal is held depressed.) → Ⓐ ON → $Ⓑ_1$ ON → Ⓒ ON (START) |
| 1 – 1<br>2 – 2 (4)<br>3 – 4 (2)<br>4 – 3 | | ON (OFF) | Initial position of the feeding frame / (Goes up when Ⓐ is re-turned ON.) / (Goes up when $Ⓑ_1$ is re-turned ON.) → Ⓐ ON → $Ⓑ_1$ ON → $Ⓑ_2$ ON (START) |
| 1 – 2<br>2 – 3 (1)<br>3 – 1 (3)<br>4 – 4 | OFF (ON) | OFF (ON) | Initial position of the feeding frame / (Comes down while the pedal is held depressed.) / (Comes down while the pedal is held depressed.) / (Turn ON Ⓒ by depressing the back part of the pedal with your heel.) → $Ⓑ_1$ ON → $Ⓑ_2$ ON (START) |
| | | ON (OFF) | Initial position of the feeding frame / (Comes down while the pedal is held depressed.) / (Goes up when $Ⓑ_2$ is re-turned ON.) → $Ⓑ_1$ ON → $Ⓑ_2$ ON → Ⓒ ON (START) |

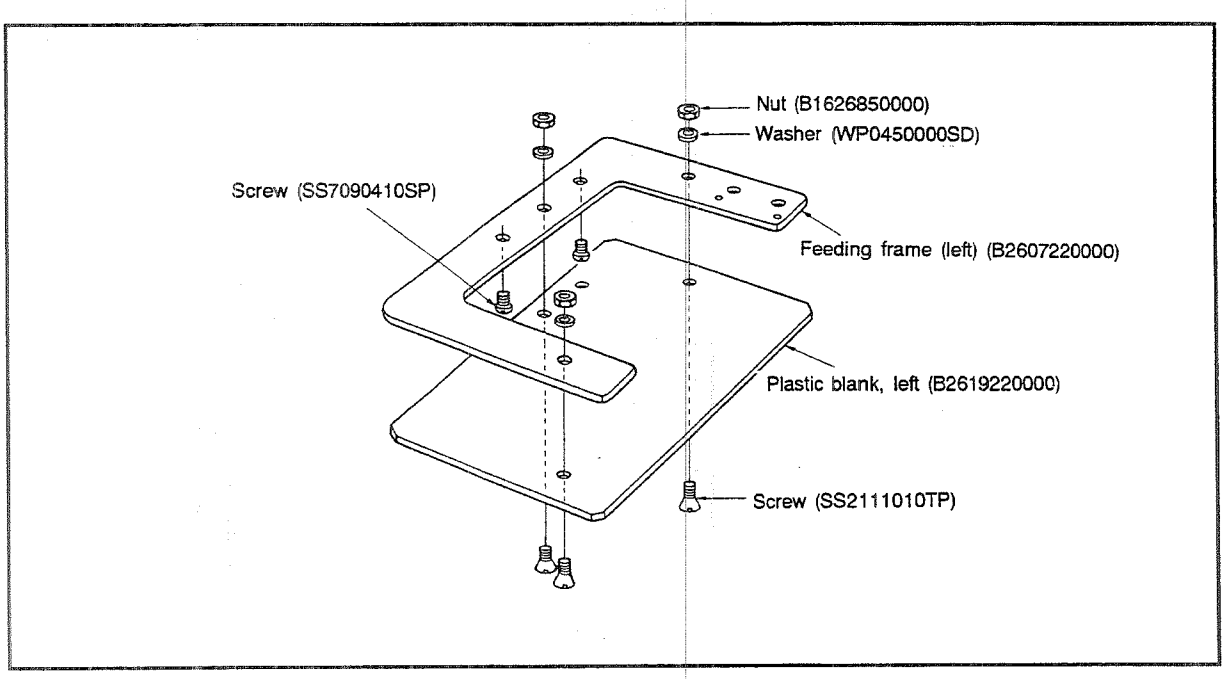
- The DIP switches should be set as shown in parenthesis when you want to lower the feeding frame (left) first. If the DIP switches are set as shown in parenthesis, set the DIP switch SW6-1 to its OFF position.

Explanation of the codes:

Ⓐ ... Pedal Ⓐ switch
$Ⓑ_1$ ... 1st step switch of pedal Ⓑ
$Ⓑ_2$ ... 2nd step switch of pedal Ⓑ
Ⓒ ... Pedal Ⓒ switch

### 3-5. How to use a plastic blank

If you use a plastic blank supplied with the machine, attach it to the feeding frame as illustrated in the figure.



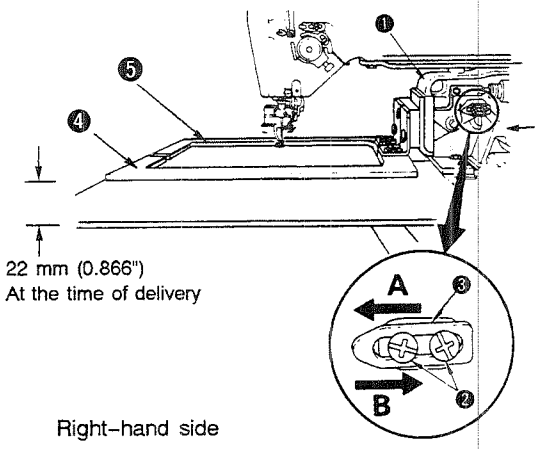
# 4. ADJUSTMENTS

## 4-1. Adjusting the mechanical components and disassembling/assembling them

### STANDARD ADJUSTMENTS

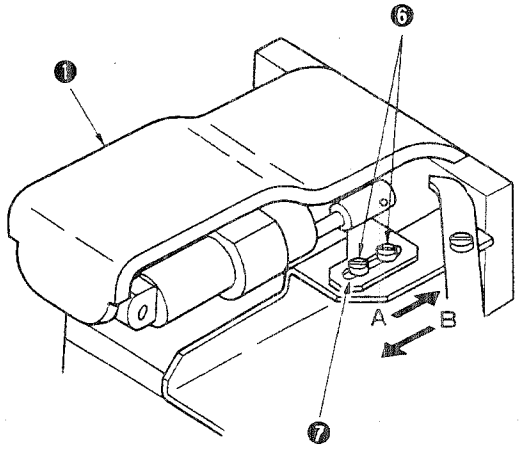
**(1) Adjusting the feed bracket**

Adjust the clearance between the top surface of the throat plate and the feeding frame (right) or feeding frame (left) when the highest position of the respective feeding frames is reached. (Either clearance can be adjusted to 25 mm (0.984") at the maximum.)




Right-hand side

Fig. 4-1-1




Left-hand side

Fig. 4-1-2

**(2) Adjusting the degree of angle of the feeding frames (right) and (left)**

If the feeding frames (right) and (left) are in parallel to the throat plate, the pressure of the front side of the feeding frame is likely to drop. Consequently, be sure to adjust the inclination of the feeding frame so that the front side of each feeding frame is slightly lower than its rear side.

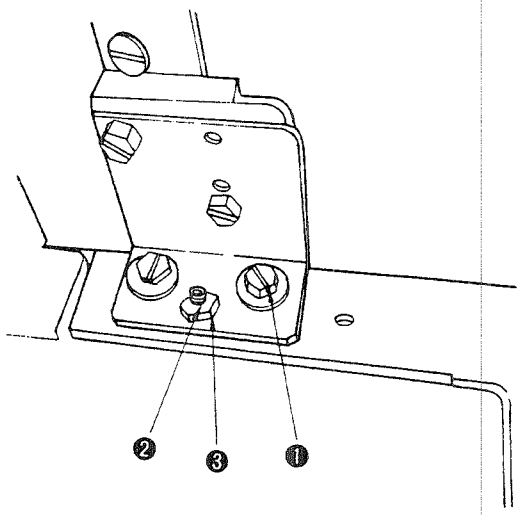


Fig. 4-2-1

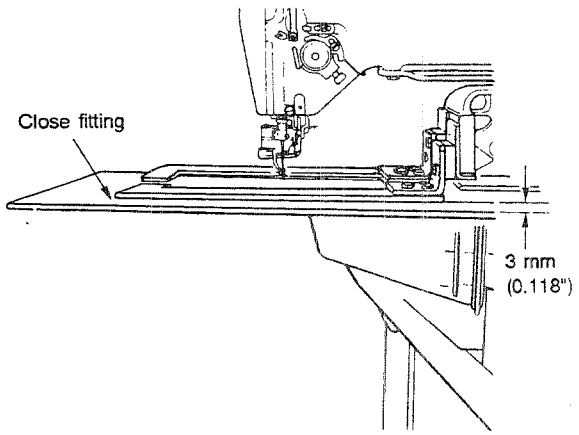



Fig. 4-2-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen screws ❷ in work clamp stopper (right) ❸ which is located in the right-hand side of feed bracket ❶. Shifting work clamp stopper (right) ❸ to the side of arrow A will lower the height of feeding frame (right) ❹ or to the side of arrow B will increase it. (Fig. 4-1-1)<br>2) After the adjustment of the height of the feeding frame (right), be sure to securely tighten screws ❷. (Fig. 4-1-1)<br>3) Loosen screws ❻ in work clamp stopper (left) ❼ which is located in the left-hand side of feed bracket ❶. Shifting work clamp stopper (left) ❼ to the side of arrow A will lower the height of feeding frame (left) ❺ shown in Fig. 4-1-1 or to the side of arrow B will increase it. (Fig. 4-1-2)<br>4) After the adjustment of the height of the feeding frame (left), be sure to securely tighten screws ❻. (Fig. 4-1-2) | o If the lifting amount of the feeding frames (right) and (left) is insufficient, the material may fail to be placed on the machine with ease.<br>o If the lifting amount of the feeding frames (right) and (left) is excessive, the material cannot be positioned with accuracy when setting it on the machine. |
| 1) Set the operating air pressure to 0 kg/cm$^2$. Then, lower the feeding frame.<br>2) Loosen screw ❶ and nut ❸. Turning adjustment screw ❷ clockwise will lower the front side of the feeding frame.<br>3) After the adjustment, securely tighten screw ❶ and nut ❸.<br><br>(Caution)<br>**1. As reference of the adjustment, the rear end of the feeding frame should be approximately 3 mm (0.118") above the throat plate surface when the front end of the feeding frame meets the throat plate surface. (Fig. 4-2-2)**<br>**2. The degree of angle adjusting mechanism is provided for the feeding frames (right) and (left) respectively.** | o If the feeding frame is not sufficiently tilted, the work pressing force at the front side of the feeding frame may drop.<br>o If the feeding frame is excessively tilted, the feeding frame may fail to go up. |

(3) **Adjusting the initial position of the intermediate stop cylinder**

Refer to the description given in "(2) Adjusting the initial position of the intermediate stop cylinder" of Chapter 2 (B type).

(4) **Adjusting the intermediate stop position of the feeding frame (left)**

Adjust the height of the intermediate stop position of the feeding frame (left) to allow the operator to position the sewing product on the machine with ease.

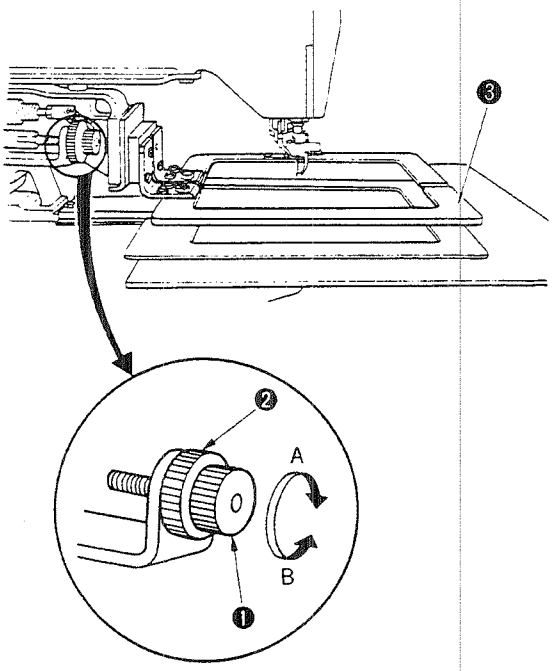



Fig. 4–16–1

- The height of the feeding frame (left) in its intermediate stop position has been factory-adjusted to 5 mm (0.197") at the time of delivery.
- The intermediate stop position of the feeding frame can be adjusted within the range of 0 to 12 mm (0" to 0.472").
- Set a material to be sewn on the machine and adjust the height so that an approximately 1 mm (0.039") clearance is provided between the feeding frame (left) and the material. This will allow the operator to set the material accurately in place with ease.

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| | |
| 1) Loosen height adjusting shaft stopper ❷ in direction B. Turn height adjusting knob ❶ in direction A to make the feeding frame (left) ❸ stop at a lower position in its intermediate stop state, or in direction B to make the feeding frame (left) ❸ stop at a higher position in that state.<br>2) After the adjustment, securely tighten height adjusting shaft stopper ❷ by turning it in direction A.<br><br>(Caution)<br>**1. Determine a proper intermediate stop position of the feeding frame (left) by actually operating it. The double-stepped stroke feeding frame function (intermediate stop) is operative only for the feeding frame (left).**<br>**2. You can also make the double-stepped stroke feeding frame function ineffective. Refer to "3-4. When the double-stepped stroke function is not used."** | o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease.<br>o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine. |

(5) **Adjusting the pneumatic components**

1) Connect quick-coupling joint socket plug ❶ in place and open air cock ❷. Then pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. (Fig. 4-5-1)
2) If pressure gauge ❹ indicates a lower value (lower than 4 kg/cm$^2$), the machine will stop with Error [A] shown on the operation panel. (Fig. 4-5-1)
3) The air pressure on the extruding side of the feeding frame (right) cylinder and the retracting side of the intermediate stop cylinder is reduced to 2 to 2.5 kg/cm$^2$. (Fig. 4-5-3)
4) The air pressure on the extruding side of the feeding frame (left) cylinder is reduced to 1 to 1.5 kg/cm$^2$. (Fig. 4-5-3)
5) The four needle knobs of the speed controller (A) for the air supply are fixed using nuts with loosened by 3 turns after they have been fully tightened. (Fig. 4-5-4)
6) The needle knob of the speed controller (A) for the air exhaustion is fixed using a nut with loosened by a slightly less than one turn after it has been fully tightened. (Fig. 4-5-5)
7) The needle knob of the speed controller (B) (for the intermediate presser cylinder) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-5-6 and Fig. 4-5-7)

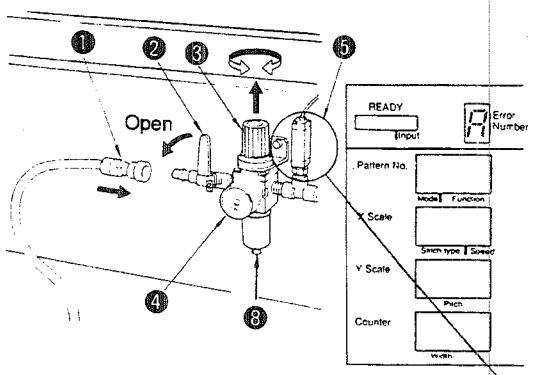



Fig. 4-5-1

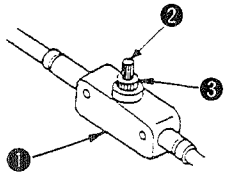


Fig. 4-5-4

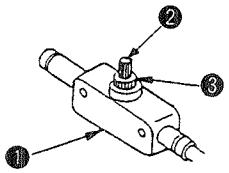


Fig. 4-5-5

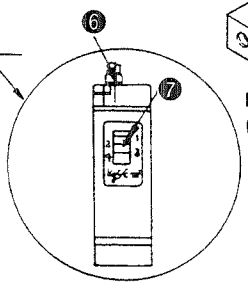


Fig. 4-5-2

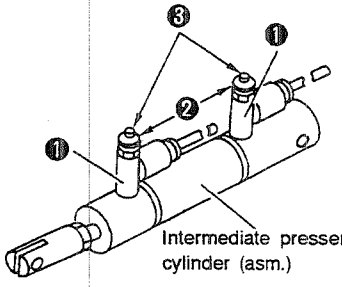



Fig. 4-5-6 (S type)

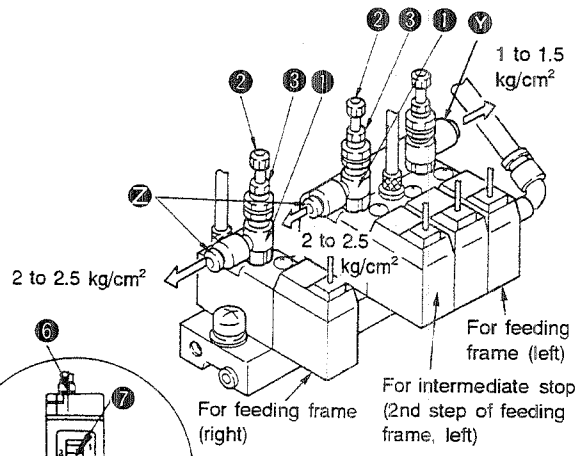



Fig. 4-5-3

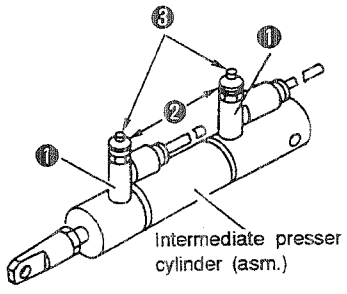
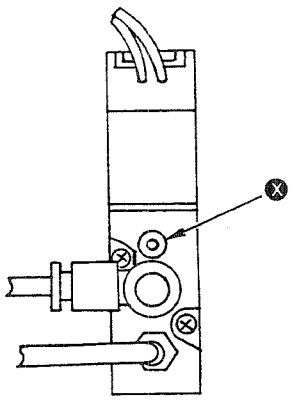



Fig. 4-5-7
(H type and G type)

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Open air cock ❷. Pull up air adjusting knob ❸, then turn it until pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. Then push down the knob to fix it at that position. (Fig. 4-5-1)<br>2) Adjust the knob so that the pressure gauge indicates 3 kg/cm$^2$ following the procedure same as that described in step 1).<br>Turn adjusting screw ❻ of pressure switch ❺ to make pointer ❼ indicate scale 4. (Fig.4-5-1, Fig. 4-5-2)<br>Turn ON the power to the machine. Then confirm that Error [A] is given on the operation panel when the pattern reading operation is provoked by pressing the [READY] switch on the operation panel.<br>**(Caution)**<br>**After the adjustment, return the indication on pressure gauge ❹ to 5 to 5.5 kg/cm$^2$. Now confirm that Error [A] is not displayed any longer.**<br>3) Remove the rear cover of the table. (Refer to Fig. 5-38-3 given in "(38) Raising the machine (machine head)" of Chapter 1.)<br>Set the machine in its sewing state. Now, remove the air hose by pressing section ❷ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-5-3)<br>Depress the section attached with a cross mark ❽ by five times or more, and turn needle knobs ❷ of pressure reducing valves ❶ until the connected pressure gauge indicates a pressure of 2 to 2.5 kg/cm$^2$. Then fix the needle knob using nuts ❸. Now, securely connect the removed air hose in place. (Fig. 4-5-3 and Fig. 4-5-8)<br>4) Following the procedure same as described in step 3), depress the section marked with a cross ❽ by five times or more, and adjust the knob so that the pressure gauge connected to section ❼ indicates a pressure of 1 to 1.5 kg/cm$^2$.<br>(Fig. 4-5-3 and Fig. 4-5-8)<br>5), 6) Adjust needle knobs ❷ of speed controllers (A) ❶ properly. After the adjustment, fix it using nuts ❸.<br>(Fig. 4-5-4 and Fig. 4-5-5)<br>7) Remove the top cover.<br>Adjust needle knobs ❷ of speed controllers (B) ❶ properly.<br>After the adjustment, fix it using nuts ❸. (Fig. 4-5-6 and Fig. 4-5-7) | 1) Function failure of the feeding frame components and intermediate presser components may result.<br>The machine stops with Error [A] indicated on the operation panel.<br>2) Even if the air pressure drops, it cannot be detected. Under the normal operating air pressure (5 to 5.5 kg/cm$^2$), the sewing machine stops with Error [A] indicated on the operation panel.<br>3) An adequate work pressing pressure is not provided.<br>4) The feeding frame may fail to go up until its highest position is reached.<br>5) The speed of vertical motion of the feeding frame may be too high or too low.<br>6) The intermediate presser may fail to move smoothly, or it may generate a keen metallic noise when it is in operation.<br>**(Caution)**<br>**Normally, standard adjustments (9)-2) through -7) are not required to be adjusted. Needle knobs and nuts referred in steps 3) through 7), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.**<br>* To set the air pressure to 0 kg/cm$^2$, close air cock ❷ and press button ❽. (See Fig. 4-5-1.)<br>  <br>Solenoid valve<br>Fig. 4–5–8 |

(6) **Connecting the pneumatic components**

The schematic diagram of the pneumatic components is as follows:

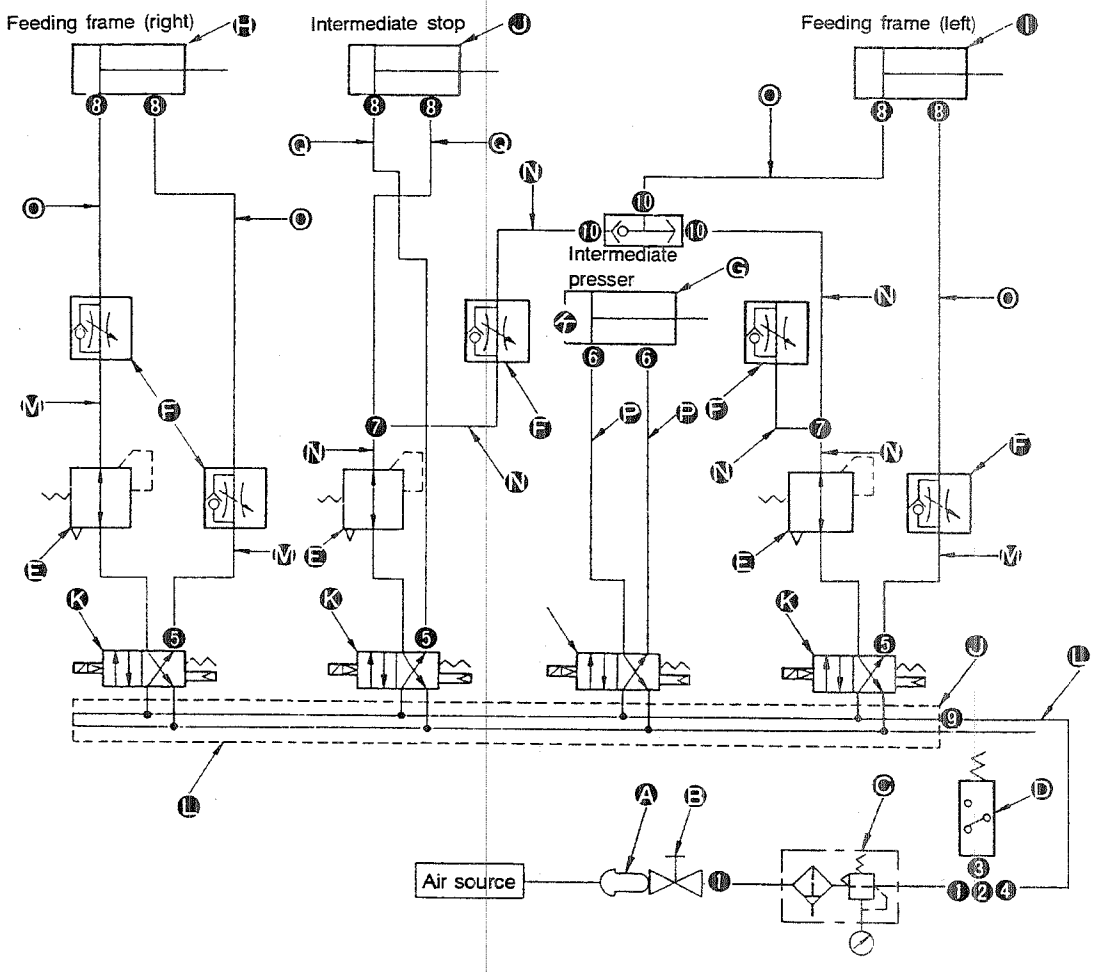



Fig. 4-6-1

| | |
|---|---|
| Ⓐ | Quick-coupling joint socket |
| | Quick-coupling joint plug |
| Ⓑ | Air cock |
| Ⓒ | Filter regulator |
| Ⓓ | Pressure switch (asm.) |
| Ⓔ | Pressure reducing valve |
| Ⓕ | Speed controller (A) |
| Ⓖ | Intermediate presser cylinder |
| Ⓗ | Work clamp cylinder (right) |
| Ⓘ | Work clamp cylinder (left) |
| Ⓙ | Intermediate stop cylinder |
| Ⓚ | Solenoid valve (asm.) |
| | Manifold |
| | Solenoid valve |
| Ⓛ | ϕ6 air tube |

| | |
|---|---|
| Ⓜ | ϕ4 air tube (A) |
| Ⓝ | ϕ4 air tube (B) |
| Ⓞ | ϕ4 air tube (C) |
| Ⓟ | ϕ4 air tube (D) |
| Ⓠ | ϕ4 air tube (F) |
| ❶ | Barrel nipple |
| ❷ | T-cheese |
| ❸ | Fitting bushing |
| ❹ | Elbow union (A) |
| ❺ | Hose nipple |
| ❻ | Speed controller (B) |
| ❼ | Y joint |
| ❽ | Hose elbow |
| ❾ | Elbow union (B) |
| ❿ | Quick-coupling joint |

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| Connect the pneumatic components properly referring to the schematic diagram (Fig. 4-6-1) and Disassembly/assembly procedure (10).<br>* "(42) Connecting the pneumatic components" of Chapter 1 (S type) describes how to read the schematic diagram. So, refer to the description given there, if necessary. | o Malfunction of the feeding frame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components. |

(7) **Removing the slide plate bearing and work clamp slide plate**

1) Remove seven screws ❶. Then remove the work clamp slide plate bracket (right), work clamp slide plate bracket (left), work clamp slide plate bracket (center), work clamp foot slide plate, slide plate bearing and work clamp slide plate.
2) Remove six screws ❷, and remove the slide plate stoppers.

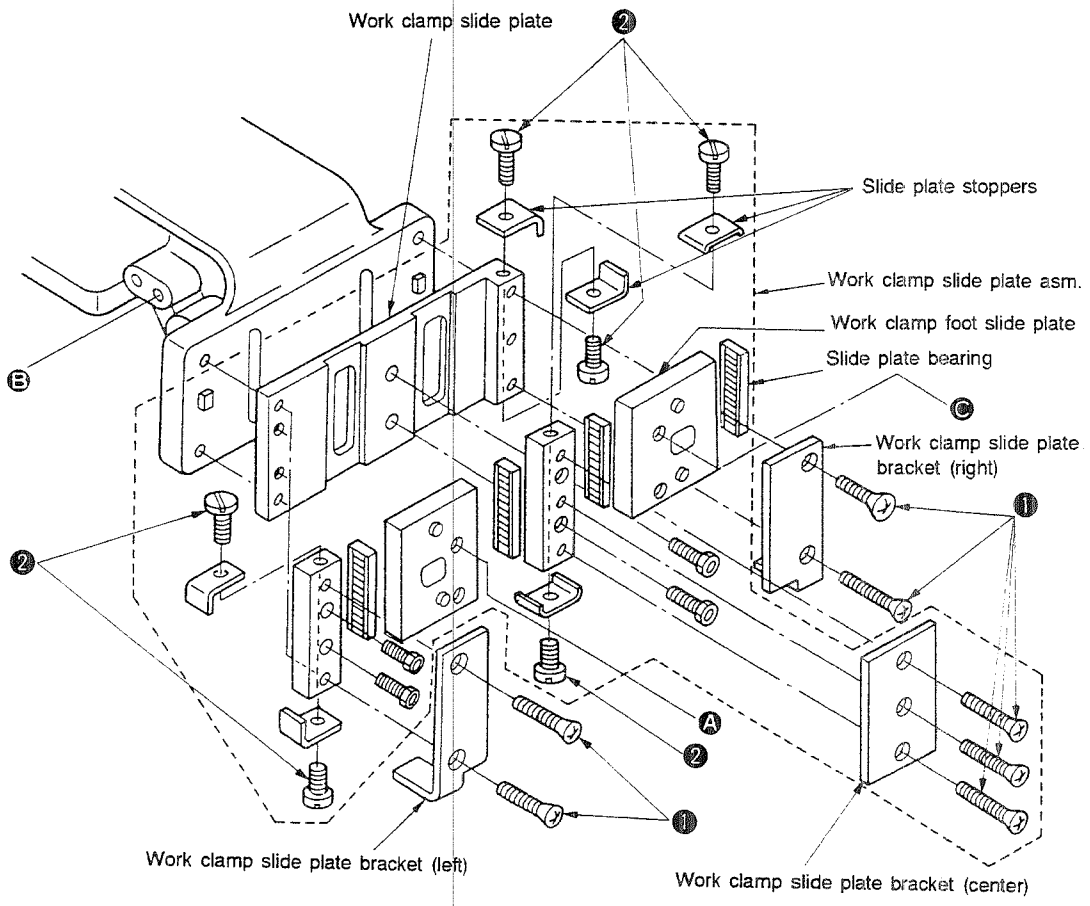
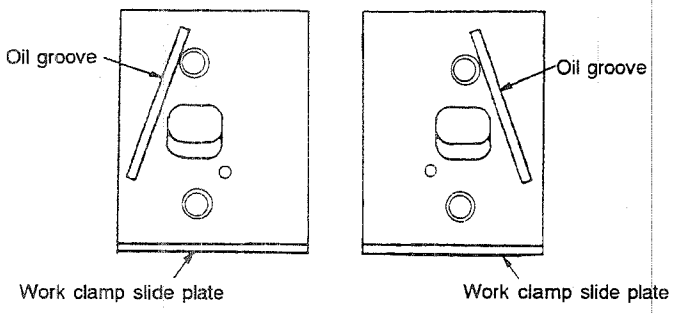
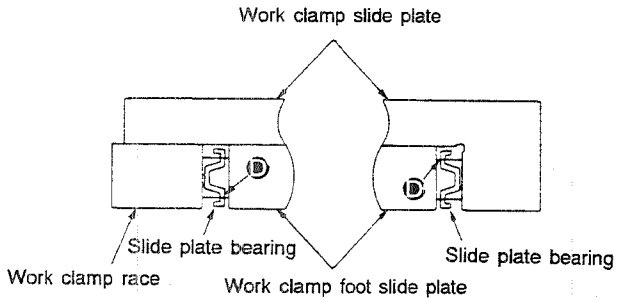
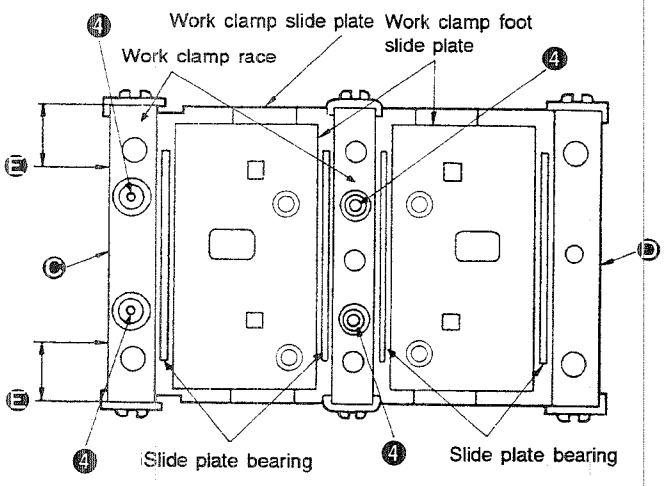



Fig. 4-7-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
|  <br>Fig. 4-7-2 | o Fill the oil groove with ESSO TEMPLEX N3 and apply it to sliding parts before attaching the work clamp slide plates. |
|  <br>Fig. 4-7-3 | o Install the slide plate bearings with planes Ⓓ of the respective bearings attaching to the flat side of the work clamp foot slide plate as shown in Fig. 4-7-3.<br>Apply ESSO TEMPLEX N3 to the entire surface of the respective bearings. |
|  <br>Fig. 4-7-4 | o Install the work clamp foot plate stoppers with the curved parts of the slide plate stoppers pressed against plane Ⓓ of the work clamp slide plate and work clamp race Ⓒ.<br>o Once screws ❹ have been loosened, be sure to re-tighten screws ❹ while applying a 10 kg load to each of two sections Ⓔ of the work clamp race. |

(8) **Assembling the work clamp components**

1) Assemble the work clamp components referring to Fig. 4-8-1.
2) Attach the work clamp foot mount (right) asm. and work clamp foot mount (left) asm. respectively to section ⓒ and section Ⓐ using screws of the work clamp foot mount (asm.) as illustrated in Fig. 4-8-1.

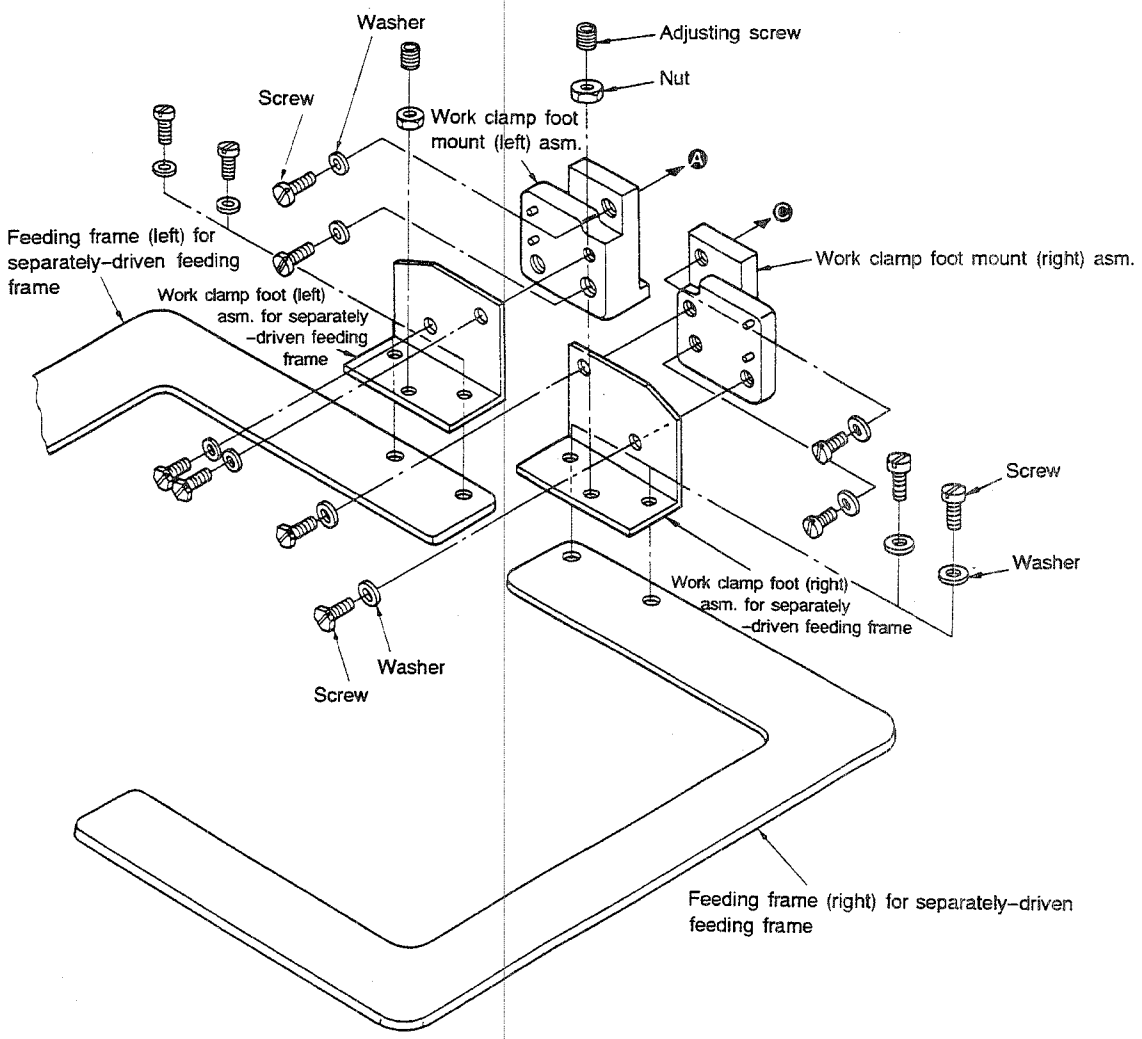



Fig. 4-8-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| o Be sure to tighten/loosen the adjustment screw in the feeding frame after the nut of the adjustment screw in the feeding frame has been loosened. | o After the work clamp components have been assembled, confirm that the feeding frame is laterally in parallel to (or the outside edge of the feeding frame is slightly lower than) the throat plate surface.<br>o Assemble the feeding frames (right) and (left) referring to Standard adjustment (2). |

(9) **Assembling the double-stepped stroke feeding frame**

Refer to the description given in "(6) Assembling the double-stepped stroke feeding frame" of Chapter 2 (B type).

(10) **Assembling the pneumatic components**

Assemble the pneumatic components referring to Fig. 4-10-1.

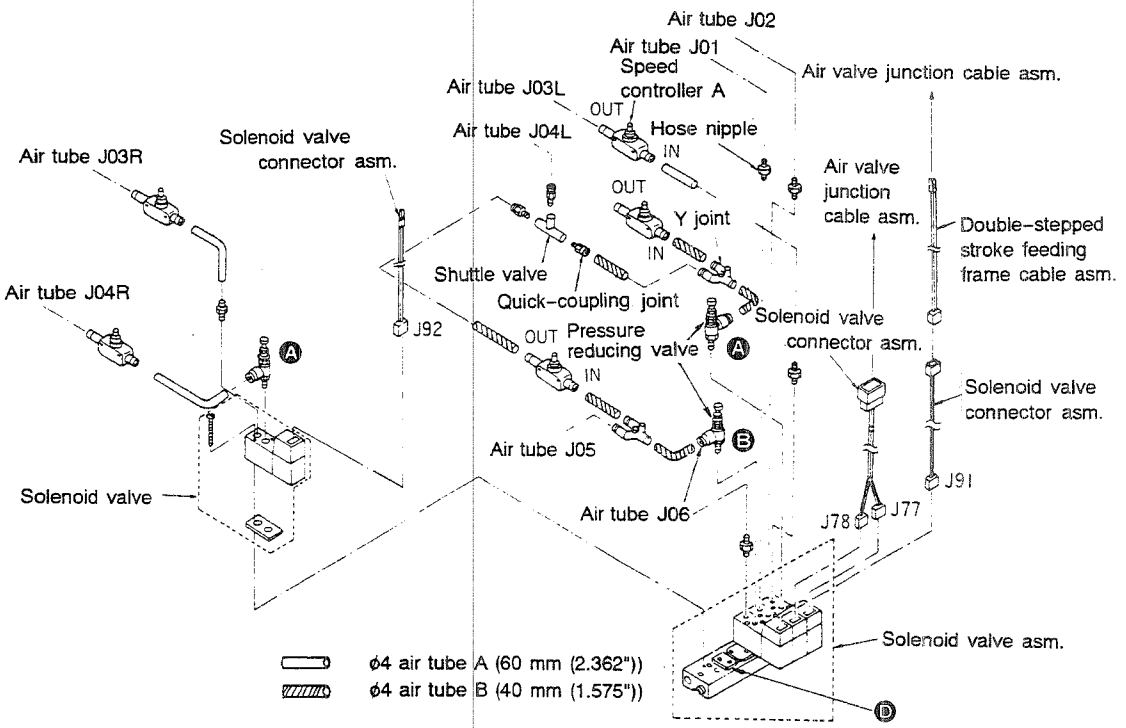
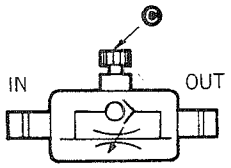



Fig. 4-10-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| | |
| | ○ Solenoid valve (asm.) is provided with three blanking plates Ⓓ. Use the solenoid valve (asm.) with one of them removed.<br>○ Adjust pressure reducing valve Ⓐ to 1.5 kg/cm$^2$. Adjust pressure reducing valve Ⓑ to 2.5 kg/cm$^2$.<br>○ Attach the speed controller A so that it faces in direction shown in the figure below.<br>  <br>Adjust the lifting/lowering speed of the feeding frame by pressing the knob mounted on the top of the speed controller A.<br>Note that the speed controller Ⓒ should be adjusted so that it leaks a little amount of air when lowering the feeding frame.<br>○ Also refer to Standard adjustments (5) and (6). |

(11) **Connecting the solenoid valve connectors asm.**
Connect the eight connectors to the plug of the solenoid valve connectors (asm.) (15P) as illustrated in Fig. 4-11-1.

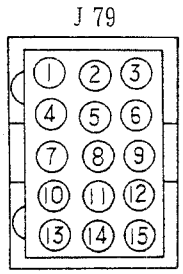



Fig. 4-11-1

① Solenoid valve connector J77 (red) for the feeding frame (left)

④ Solenoid valve connector J77 (black) for the feeding frame (left)

③ Solenoid valve connector J78 (red) for the intermediate presser foot

⑥ Solenoid valve connector J78 (black) for the intermediate presser foot

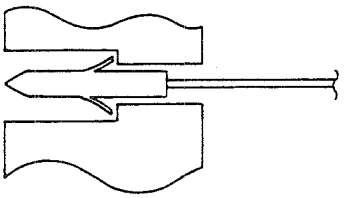
② Solenoid valve connector B (asm.) (for feeding frame, right) J92 (red)

⑤ Solenoid valve connector B (asm.) (for feeding frame, right) J92 (black)

⑭ Wiring of pressure switch (black)

⑮ Wiring of pressure switch (red)

(12) **Connecting the double-stepped stroke feeding frame cables**
Refer to the description given in "(8) Connecting the double-stepped stroke feeding frame cables" of Chapter 2 (B type).

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| (Caution)<br>o **The solenoid valve connector J77 for the feeding frame (left) and the solenoid valve connector J78 for the intermediate presser foot are included in the solenoid valve connector asm. (B47122200A0).**<br>o **Separately refer to "Disassembly/assembly procedure (12)" for the explanation of solenoid valve connector for intermediate stop (for 2nd step of feeding frame, left).** | o The wiring pin has nails. So, be sure to insert it in the connector until the nails are securely fitted in the stepped section of the connector.<br>  <br>o Connector numbers from 1 through 15 are engraved on the solenoid valve connector (asm.) (15P). Connect the cables correctly referring to the numbers indicated in Fig. 4-11-1. |
| | |

## 5. EXPLANATION OF THE DIP SWITCHES

### 5-1. DIP switches table (exclusive for the L type)

- **Functions which differ according to the types of sewing machine, i.e., the standard model (S type) and the respective subclass models**

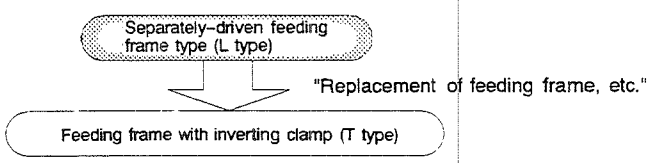
The captioned functions of the sewing machine are related to the feeding frame (including the foot switch). The functions themselves do not change, however, the actions provoked by the respective functions differ according to the types of sewing machine. Consequently, the functions need to be explained separately.

| Switch | Description (Function) | Applicable model (type) | | | |
|---|---|---|---|---|---|
| SW5-1 | "Cycle stitching function B" (Raising/lowering of the feeding frame selection B) | | | L | T |
| SW5-2 | "Cycle stitching function A" (Raising/lowering of the feeding frame selection A) | S | B | L | T |
| SW5-6 | "Pedal selecting function B" | | B | L | T |
| SW5-7 | "Pedal selecting function A" | S | B | L | T |
| SW5-8 | "Monolithic feeding frame/separately driven feeding frame change over function" | | | L | T |
| SW6-1 | "Separately driven feeding frame operation sequence change over function" | | | L | |
| SW7-2 | Selection of "double-stepped stroke feeding frame function" | | B | L | T |

(Caution)

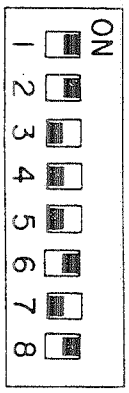
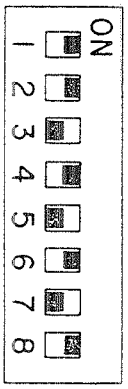
1. **The setting of the respective switches, at the time of delivery, differs by the types of sewing machine (S, B, T and L).**
   **The setting of the DIP switches of the separately-driven feeding frame type, at the time of delivery, is described in this chapter.**
   **The setting of the DIP switches of the other types is described in the following chapters.**
   **Chapter 1 Standard model (S type)**
   **Chapter 2 (B type)**
   **Chapter 4 (T type)**
2. **If you have changed the specifications of the sewing machine because of modifications, set the DIP switches to adapt the sewing machine to the functions of the newly changed model.**

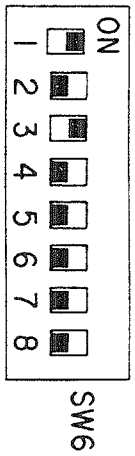
   **(Example 1)**

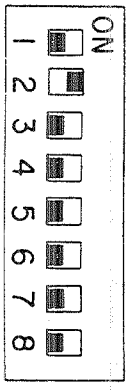
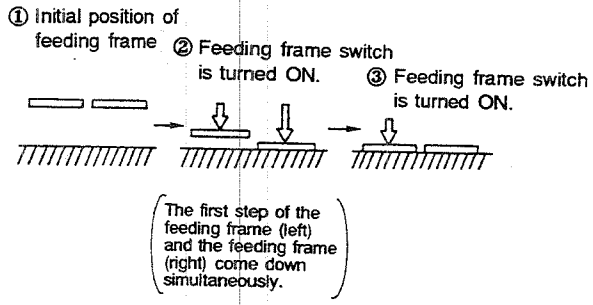



- **DIP switch SW6-1 "separately-driven feeding frame sequence change-over function" cannot be used. (Refer to Chapter 4.)**

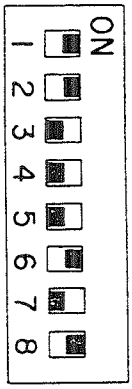
## 5-2. Functions of DIP switches (exclusive for the L type)

| Name of switch | Function |
|---|---|
| ⑥ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGL at the time of delivery) | • **SW5-8 ..... Monolithic feeding frame/separately driven feeding frame changing-over function**<br>Used to change over the function of the feeding frame between "making the right- and left-hand sections of the feeding frame go up/come down simultaneously (monolithic feeding frame)" and "making the right- and left-hand sections of the feeding frame go up/come down independently (separately driven feeding frame)."<br><br>ON (The switch has been set to the ON position at the time of delivery.): The right- and left-hand sections of the feeding frame go up/come down independently. (Separately-driven feeding frame)<br>OFF: The right- and left-hand sections of the feeding frame go up/come down simultaneously. (Monolithic feeding frame)<br><br>**(Caution)**<br>**1. The ON/OFF setting of the SW5-8 affects the function of the other DIP switches (SW5-1, 5-2, 5-6, 5-7 and 6-1). So, it is necessary to refer to the explanation of the aforementioned DIP switches when changing the setting of the SW5-8 between ON and OFF.**<br>**2. When the setting of the SW5-8 has been changed over between ON and OFF, maloperation will result unless the connection of the foot switch and other related conditions are changed accordingly.**<br>**Be sure to refer to "3-2. 2. How to operate the foot switch" and "3-3. When the machine is used as the standard type (monolithic feeding frame)."** |

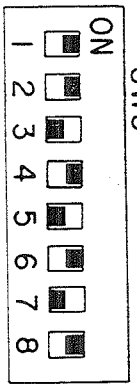
| Name of switch | Function |
|---|---|
| ⑥ **DIP switch 6 (SW6)**<br>  <br><br>(Setting state of the switches of the AMS-220CSL, AMS-220CHL and AMS-220CGL at the time of delivery) | • **SW6-1 ..... Separately-driven feeding frame operation sequence changing-over function**<br>Used to select either the right-hand or the left-hand section of the feeding frame comes down first, when the feeding frame is operated as a separately driven feeding frame (SW5-8 is set to its ON position).<br><br>ON (The switch has been set to the ON position at the time of delivery.) — The feeding frame (right) comes down first.<br>OFF — The feeding frame (left) comes down first.<br><br>**(Caution)**<br>**1. When the feeding frame is used as the monolithic feeding frame with the separately-driven feeding frame function made inoperative (SW5-8 OFF), the ON/OFF setting of the DIP switch SW6-1 does not affect the operation of the sewing machine.**<br>**2. When the setting of the SW6-1 has been changed over between ON and OFF, maloperation will result unless the connection of the foot switch and other related conditions are changed accordingly.**<br>**Be sure to refer to "3-2. 2. How to operate the foot switch" and "3-4. When the double-stepped stroke feeding frame function is not used."** |

| Name of switch | Function |
|---|---|
| ⑦ DIP switch 7 (SW7)<br>  <br><br>(Setting state of the switches of the AMS-220CSL, AMS-220CHL and AMS-220CGL at the time of delivery) | • SW7-2 ..... Selection of the "double-stepped stroke feeding frame function"<br><br>ON (The switch has been set to the ON position at the time of delivery.): The feeding frame (left) operates as the "double-stepped stroke feeding frame."<br><br>OFF: The feeding frame (left) does not operate as the "double-stepped stroke feeding frame." The feeding frame (left) is lowered by operating the Feeding frame switch once.<br><br>**(Caution)**<br>**1. The ON/OFF setting of the SW7-2 affects the function of the other DIP switch (SW5-7). So, it is necessary to refer to the explanation of the aforementioned DIP switch when changing over the setting of the SW7-2 between ON and OFF.**<br>**2. When the setting of the SW7-2 has been changed over between ON and OFF, maloperation will result unless the connection of the foot switch and the setting of the other DIP switches are changed accordingly. Be sure to refer to "3-2. 2. How to operate the foot switch" and "3-4. When the double-stepped stroke feeding frame function is not used."**<br>**3. If the DIP switch SW5-8 is set to its OFF position (monolithic feeding frame), also set the DIP switch SW7-2 to its OFF position. In the case of the L type, the double-stepped stroke function is effective only for the feeding frame (left). So, the L type may not be ideally-suited machine if you want to operate the feeding frame as the monolithic feeding frame with the double-stepped stroke function. (When the SW5-8 is set to its OFF position and the SW7-2 is set to its ON position.)**<br><br>  <br> |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5) | • **SW5-7 ..... Pedal selecting function A**<br>Used to control the feeding frame switch (pedal switch)<br>The function of this switch depends on the "separately-driven feeding frame function" and "double-stepped stroke feeding frame function."<br>The pedal selecting function A facilitates operation further if using in combination with the pedal selecting function B (SW5-6).<br>Refer to "3-2. 2. How to operate the foot switch." |



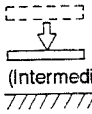

(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)




(Setting state of the switch of the AMS-220CGL at the time of delivery)

① When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)
* When both of the aforementioned functions are used.
(The SW5-8 and SW7-2 have been set to the ON position at the time of delivery.)

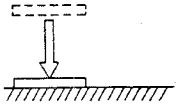
Turn ON the feeding frame (first step of feeding frame, left) switch.



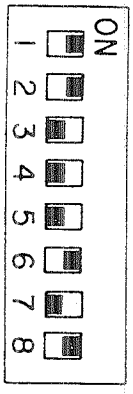
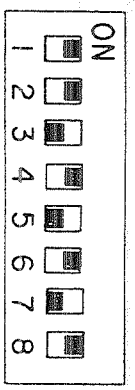
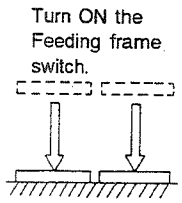

| | |
|---|---|
| ON | When the [Feeding frame (first-step of feeding frame, left)] switch is depressed, the feeding frame (first-step of feeding frame, left) comes down.<br>Another depress on the same pedal switch makes the feeding frame (first-step of feeding frame, left) go up. |
| OFF<br>(The switch has been set to the OFF position at the time of delivery.) | The feeding frame (first-step of feeding frame, left) keeps on coming down as long as the [Feeding frame (first-step of feeding frame, left)] switch is held depressed. |

② When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)
* When only the "separately-driven feeding frame function" is used

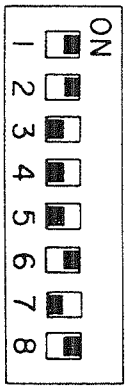
Turn ON the Feeding frame (left) switch.



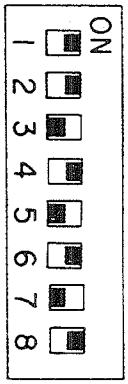
| | |
|---|---|
| ON | When the [Feeding frame (left)] switch is depressed, the feeding frame (left) comes down.<br>Another depress on the same pedal switch makes the feeding frame (left) go up. |
| OFF<br>(The switch has been set to the OFF position at the time of delivery.) | The feeding frame (left) keeps on coming down as long as the [Feeding frame (left)] switch is held depressed. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGL at the time of delivery) | ③<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)<br>* When only the "double-stepped stroke feeding frame function" is used<br>In this state, the L type of sewing machine may not be smoothly operated. So, operate the machine in this state only when the feeding frame has been modified to the standard type. (Refer to the explanation of the DIP switch SW7-2.)<br><br>④<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)<br>* When the feeding frame is used as the monolithic feeding frame<br>  <br><br>ON: When the [Feeding frame] switch is depressed, the feeding frames (left) and (right) come down. Another depress on the same pedal switch makes the feeding frames (left) and (right) go up.<br>OFF (The switch has been set to the OFF position at the time of delivery.): The feeding frames (left) and (right) keep on coming down as long as the [Feeding frame] switch is held depressed. |

| Name of switch | Function |
|---|---|
| ⑥ DIP switch 5 (SW5) | • **SW5-6 ..... Pedal selecting function B**<br>Used to control the feeding frame switch (pedal switch)<br>The function of this switch depends on the "separately-driven feeding frame function" and "double-stepped stroke feeding frame function."<br>The pedal selecting function B facilitates operation further if using in combination with the pedal selecting function A (SW5-7).<br>Refer to "3-2. 2. How to operate the foot switch." |



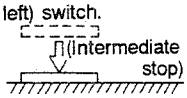

(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)




(Setting state of the switch of the AMS-220CGL at the time of delivery)

① When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)
* When both of the aforementioned functions are used. (The SW5-8 and SW7-2 have been set to the ON position at the time of delivery.)

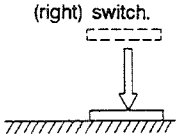
Turn ON the feeding frame (second step of feeding frame, left) switch.



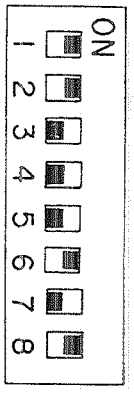
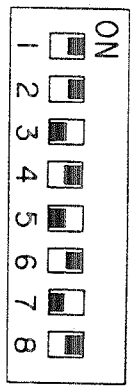

| | |
|---|---|
| ON (The switch has been set to the ON position at the time of delivery.) | When the [Feeding frame (second-step of feeding frame, left)] switch is depressed, the feeding frame (second-step of feeding frame, left) comes down. Another depress on the same pedal switch makes the feeding frame (second-step of feeding frame, left) go up. |
| OFF | The feeding frame (second-step of feeding frame, left) keeps on going up as long as the [Feeding frame (second-step of feeding frame, left)] switch is held depressed. |

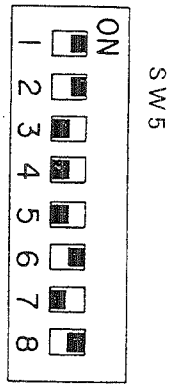
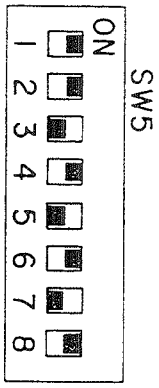
② When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)
* When only the "separately-driven feeding frame function" is used

Turn ON the Feeding frame (right) switch.

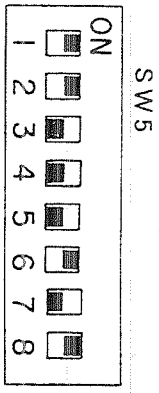


| | |
|---|---|
| ON (The switch has been set to the ON position at the time of delivery.) | When the [Feeding frame (right)] switch is depressed, the feeding frame (right) comes down. Another depress on the same pedal switch makes the feeding frame (right) go up. |
| OFF | The feeding frame (right) keeps on coming down as long as the [Feeding frame (right)] switch is held depressed. |

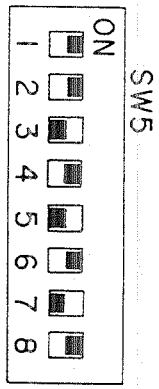
| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGL at the time of delivery) | ③ When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)<br>* When only the "double-stepped stroke feeding frame function" is used<br>In this state, the L type of sewing machine may not be smoothly operated. So, operate the machine in this state only when the feeding frame has been modified to the standard type. (Refer to the explanation of the DIP switch SW7-2.)<br><br>④ When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)<br>* When the feeding frame is used as the monolithic feeding frame<br>The switch becomes inoperative.<br><br>(Caution)<br>**The SW5-6 works to control the double-stepped stroke feeding frame (second-step) when the "double-stepped stroke feeding frame function" is used, or control the separately-driven feeding frame (right) when the double-stepped stroke feeding frame function is rendered ineffective. (Provided that the separately-driven feeding frame is effective)** |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSL and AMS-220CHL at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGL at the time of delivery) | • **SW5-2 ..... Cycle stitching facility A (Raising/lowering of the feeding frame selection A)**<br>Used to specify the performance (up/down) of the feeding frame at the position in a pattern where a "temporary stop" command (pause) has been entered. Note that the function differs according to the selection of the "separately-driven feeding frame function" (ON/OFF of the DIP switch SW5-8).<br><br>When the "separately-driven feeding frame function" is specified (effective) ..... SW5-8 ON<br>* When the right- and left-hand sections of the feeding frame are independently operated (The DIP switch SW5-8 has been set to this state at the time of delivery.)<br>• The DIP switch SW5-2 facilitates operation further if using in combination with the SW5-1.<br><br>ON (The switch has been set to the ON position at the time of delivery.): The sewing machine temporarily stops with the feeding frame (left) raised, at the position in a pattern where a temporary stop command has been entered. Turn ON the [Feeding frame (left)] switch. → Turn ON the [Start switch]. This makes the machine start the next stitching cycle.<br><br>OFF: The sewing machine temporarily stops with the feeding frame (left) lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle.<br><br>When the "separately-driven feeding frame function" is ineffective ..... SW5-8 OFF<br>* When the right- and left-hand sections of the feeding frame are operated as the monolithic feeding frame.<br><br>ON (The switch has been set to the ON position at the time of delivery.): The sewing machine temporarily stops with the feeding frames (left) and (right) raised, at the position in a pattern where a "temporary stop" command has been entered. Turn ON the [Feeding frame] switch. → Turn ON the [Start] switch. This makes the machine start the next stitching cycle.<br><br>OFF: The sewing machine temporarily stops with the feeding frames (left) and (right) lowered, at the position in a pattern where a "temporary stop" command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle.<br><br>* Temporary stop command<br>This command is used to make the sewing machine temporarily stop in one pattern. A temporary stop command can be entered, using the main unit input function or the programming device such as PGM-1, at a point that is convenient for creating/modifying the pattern. (The temporary stop command can be entered at two or more points in a pattern.)<br>* Cycle stitching<br>The cycle stitching is a sewing method where several stitching processes (cycles) are continuously sewn. By entering a "temporary stop" command at the desired point in a pattern, the feeding frame can be raised so that a workpiece (cloth, etc.) may be turned or changed.<br>**(Caution)**<br>**When the machine is in the cycle stitching mode, be sure to take note of the following points:** |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5) | |




(Setting state of the switches of the AMS-220CSL and AMS-220CHL at the time of delivery)




(Setting state of the switch of the AMS-220CGL at the time of delivery)

Forward

Backward

When the FORWARD or BACKWARD key is pressed, the machine halts at the predetermined temporary stop point where the feeding frame can be raised or lowered using the feeding frame switch.
If you wish to feed the material forward or backward continuously, operate either key after lowering the feeding frame.

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 which is being sewn, use the BACKWARD key.

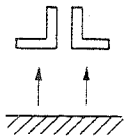
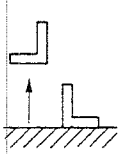
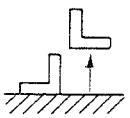
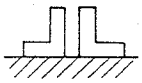
Bobbin thread counter

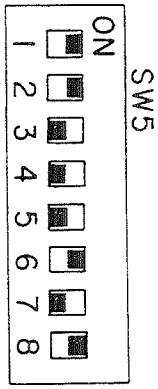
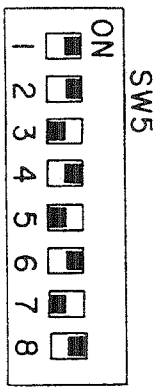
The counter counts up upon the completion of one pattern.
If a pattern includes three cycles, the counter is incremented when the three cycles have been sewn.

Set Ready (Test)

The Set Ready switch is rendered ineffective while the sewing machine is 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.

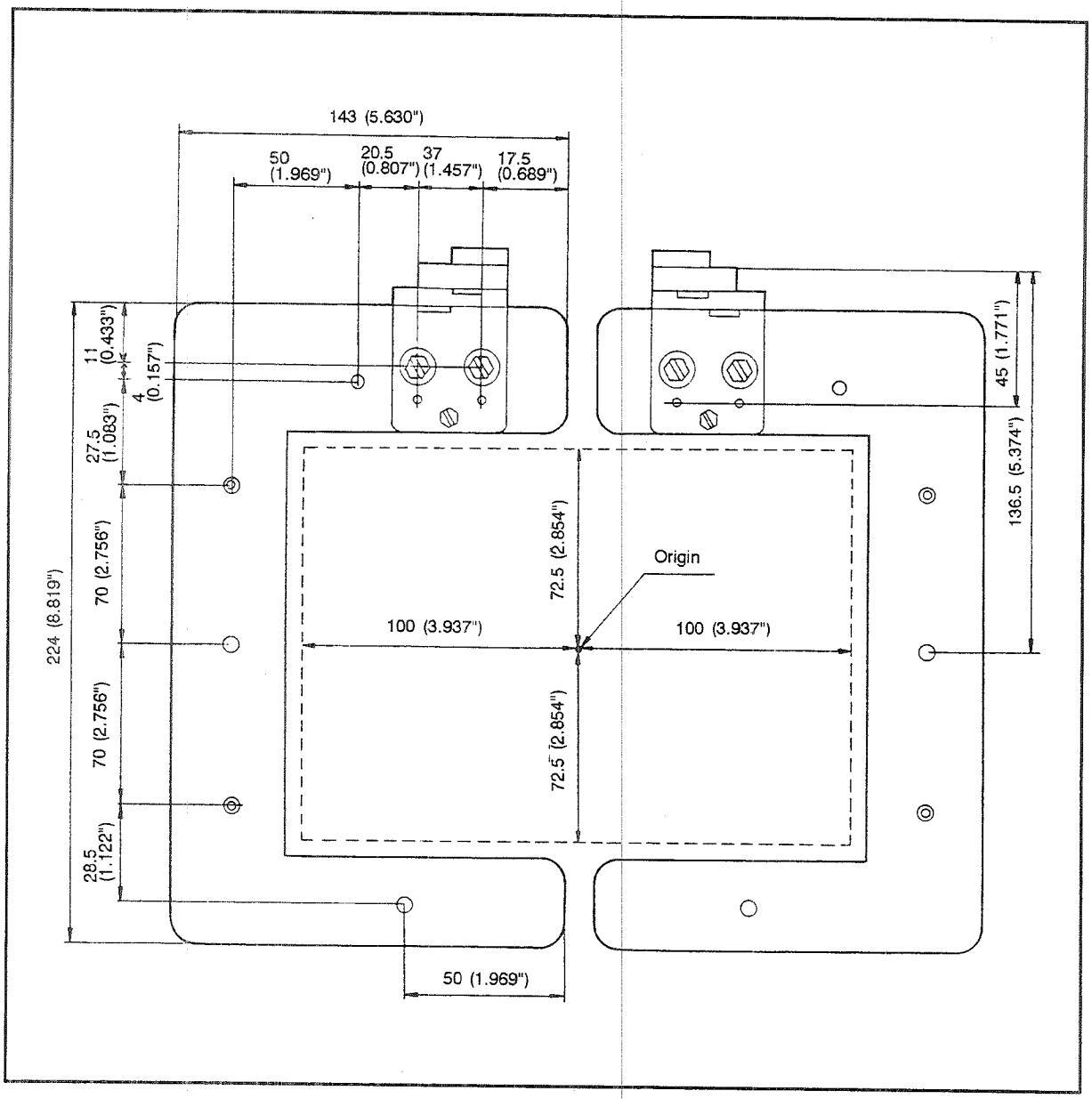
* Combination of the SW5-2 "cycle stitching facility A" and SW5-1 "cycle stitching facility B"
When the "separately-driven feeding frame function" is effective (The DIP switch SW5-8 has been set to its ON position at the time of delivery.)

| SW5-2 (left) | ON | | OFF | |
|---|---|---|---|---|
| SW5-1 (right) | ON | OFF | ON | OFF |
| Action of feeding frame at the position in a pattern where a temporary stop command (pause) has been entered | Both the right- and left-hand sections of the feeding frame go up.  | Only the left-hand section of the feeding frame goes up.  | Only the right-hand section of the feeding frame goes up.  | Both the right- and left-hand sections of the feeding frame are held lowered.  |

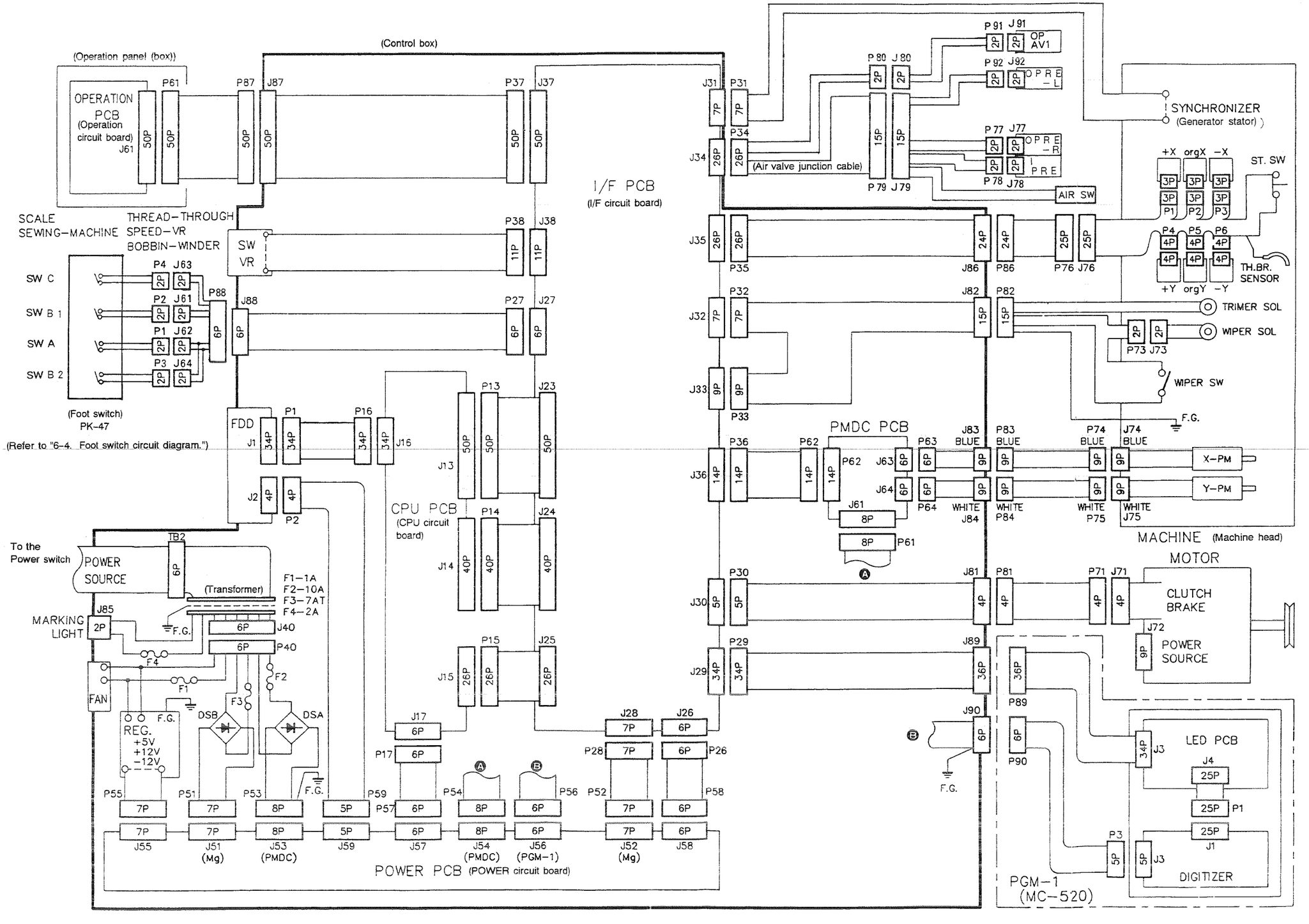
| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CSS and AMS-220CHS at the time of delivery)<br>  <br><br>(Setting state of the switch of the AMS-220CGL at the time of delivery) | • **SW5-1 ..... Cycle stitching facility B (Raising/lowering of the feeding frame selection B)**<br>Used to specify the performance (up/down) of the feeding frame (right) at the position in a pattern where a "temporary stop" command (pause) has been entered.<br>Note that the function is effective only when the "separately-driven feeding frame function" is specified (effective) (the DIP switch SW5-8 is set to its ON position).<br>When the "separately-driven feeding frame function" is specified (effective) ..... SW5-8 ON<br>* When the right- and left-hand sections of the feeding frame are independently operated (The DIP switch SW5-8 has been set to this state at the time of delivery.)<br>• The DIP switch SW5-1 facilitates operation further if using in combination with the SW5-2.<br>**ON** (The switch has been set to the ON position at the time of delivery.): The sewing machine temporarily stops with the feeding frame (right) raised, at the position in a pattern where a temporary stop command has been entered. Turn ON the [Feeding frame (right)] switch. → Turn ON the [Start] switch. This makes the machine start the next stitching cycle.<br>**OFF**: The sewing machine temporarily stops with the feeding frame (right) lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle.<br>**(Caution)**<br>**1. When the right- and left-hand sections of the feeding frame are operated as the monolithic feeding frame with the "separately-driven feeding frame function" made ineffective (the DIP switch SW5-8 is set to its OFF position) to allow the both sections of the feeding frame to go up/come down simultaneously, the ON/OFF setting of the DIP switch SW5-1 does not affect the operation of the sewing machine. Refer to the explanation of the SW5-2.**<br>**2. When the sewing machine is operated under the cycle stitching mode (ON), refer to the caution given on the previous page.** |

# 6. REFERENCES

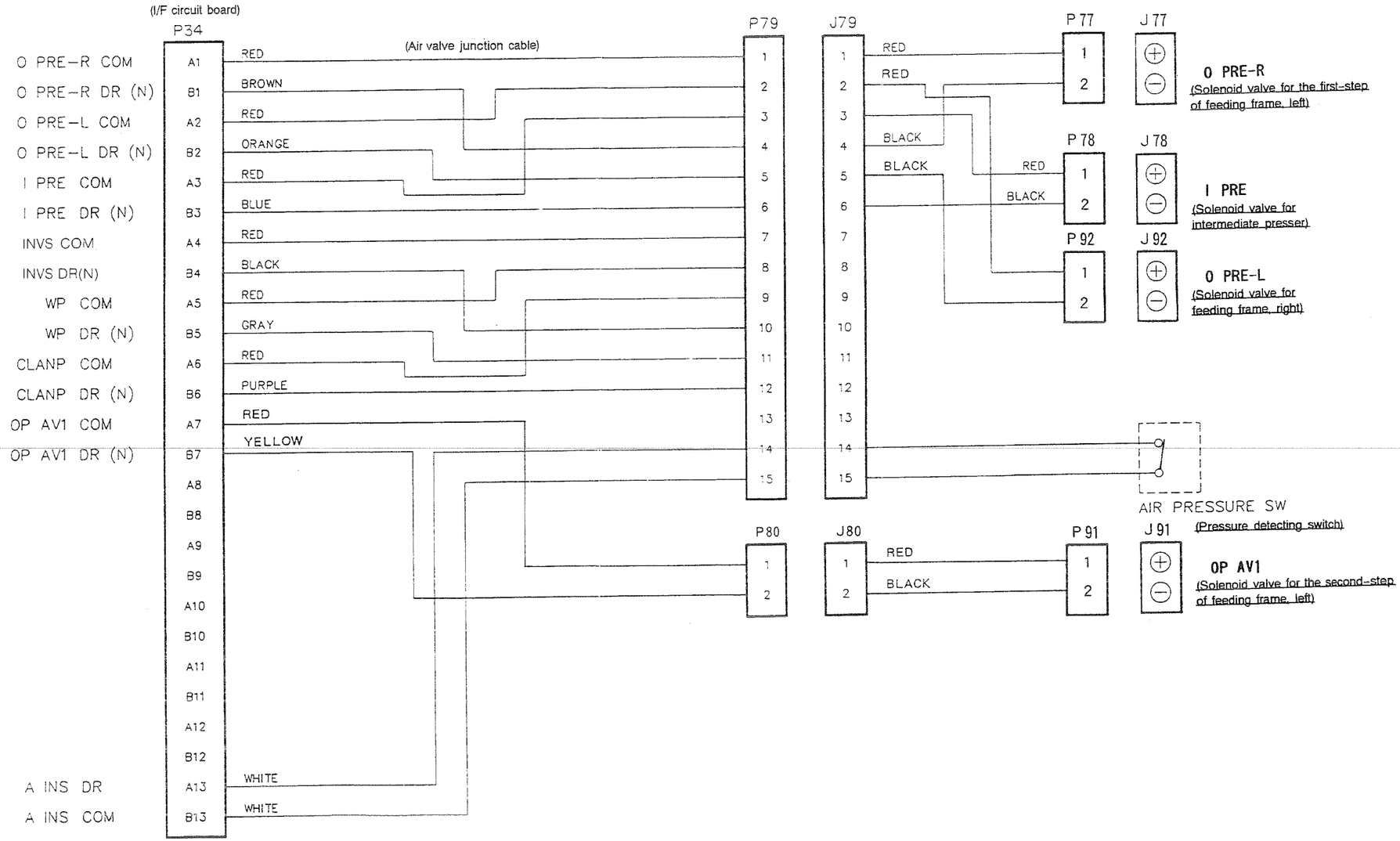
## 6-1. Dimensions of the feeding frame



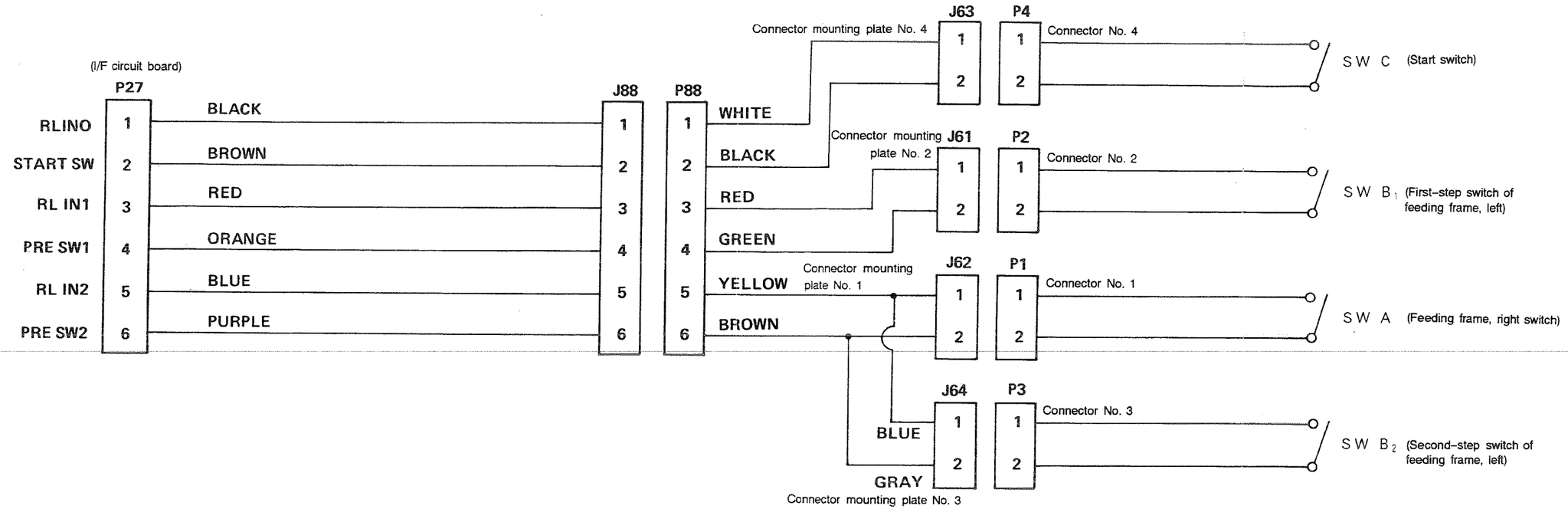
## 6-2. Block diagram (for the L type)



## 6-3. Air valve schematic diagram (for the L type)



## -4. Foot switch (PK-47) circuit diagram (for the L type)



## 6-5. To change the standard type machine to the separately-driven feeding frame type machine

• Parts to be removed

| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Feeding frame auxiliary cover, right | - | B1110220000 |
| 2 | Feeding frame auxiliary cover, right (for the sewing machine in urban-white) | - | B111022000A |
| 3 | Feeding frame auxiliary cover, left | - | B1118220000 |
| 4 | Feeding frame auxiliary cover, left (for the sewing machine in urban-white) | - | B111822000A |
| 5 | Throat plate auxiliary cover support, right | - | B1113220000 |
| 6 | Throat plate auxiliary cover support, left | - | B1121220000 |
| 7 | Work clamp slide plate (asm.) | - | B25722200A0 |
| 8 | Work clamp foot slide plate bracket, right | - | B2554220000 |
| 9 | Work clamp foot slide plate bracket, left | - | B2555220000 |
| 10 | Feeding frame | - | B2552220000 |
| 11 | Screw | - | SS7151610SP |
| 12 | Washer | - | WP0641600SC |
| 13 | Feeding frame ball catcher | - | B2562220000 |
| 14 | Screw | - | SS7111410SP |
| 15 | Washer | - | WP0450000SD |
| 16 | Support rubber | - | B2563220000 |
| 17 | Feeding frame (asm.) | - | B25532200A0 |
| 18 | Feed plate | - | B2556220000 |
| 19 | Solenoid valve (asm.) | - | PV0351130A0 |
| 20 | 2-pedal unit (asm.) | - | M85905130A0 |
| 21 | x coupling | 1 | B25372200A0 |
| 22 | Screw | 4 | SS8150822TP |
| 23 | System ROM | 1 | HL008420064 |

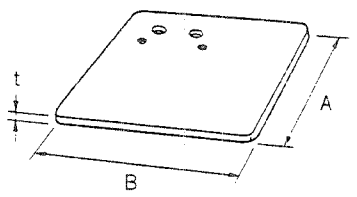
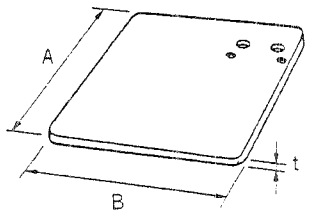
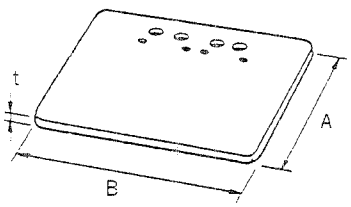
• Parts to be additionally attached

| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Joint for top cover, right | 1 | B11262200A0 |
| 2 | Joint for top cover, left | 1 | B11272200A0 |
| 3 | Bottom cover, right | 1 | B1128220000 |
| 4 | Bottom cover, right (for the sewing machine in urban-white) | 1 | B112822000A |
| 5 | Bottom cover, left | 8 | B1129220000 |
| 6 | Bottom cover, left (for the sewing machine in urban-white) | 8 | B112922000A |
| 7 | Screw | 8 | SM1030601SC |
| 8 | Nut | 8 | NM7030550SB |
| 9 | Top cover sheet | 2 | B1131220000 |
| 10 | Throat plate auxiliary cover support, right | 1 | B1113224000 |
| 11 | Throat plate auxiliary cover support, left | 1 | B1121224000 |
| 12 | Throat plate auxiliary cover holder | 2 | B1132224000 |
| 13 | Screw | 6 | SS9110920CP |
| 14 | Washer | 6 | WP0520656SA |
| 15 | Feed plate for separately-driven feeding frame | 1 | B2601220000 |
| 16 | Work clamp foot mount (asm.), right | 1 | B26022200A0 |
| 17 | Work clamp foot mount (asm.), left | 1 | B26032200A0 |
| 18 | Work clamp foot (asm.), right for separately-driven feeding frame | 1 | B26042200A0 |
| 19 | Work clamp foot (asm.), left for separately-driven feeding frame | 1 | B26052200A0 |
| 20 | Feeding frame, right for separately-driven feeding frame | 1 | B2606220000 |
| 21 | Feeding frame, left for separately-driven feeding frame | 1 | B2607220000 |
| 22 | Work clamp slide plate bracket, right for separately-driven feeding frame | 1 | B2544222000 |
| 23 | Work clamp slide plate bracket, left for separately-driven feeding frame | 1 | B2545222000 |
| 24 | Work clamp slide plate (asm.) for separately-driven feeding frame | 1 | B26102200A0 |
| 25 | Work clamp foot (asm.) for double-stepped stroke feeding frame | 1 | B25142200A0 |
| 26 | Screw | 4 | SS7151210SP |
| 27 | Screw | 4 | SS9151410CP |
| 28 | Screw | 4 | SS7150910TP |
| 29 | Adjusting screw | 2 | SS8150822TP |
| 30 | Attaching Screw | 2 | SS6121060SP |
| 31 | Nut | 2 | NS6150330SD |
| 32 | Washer | 4 | WP0651056SD |
| 33 | Washer | 4 | WP0651056SD |
| 34 | Washer | 4 | WP0651056SD |
| 35 | Solenoid valve connector (asm.) | 1 | B47122200A0 |
| 36 | Solenoid valve connector B (asm.) | 1 | B47122200AB |
| 37 | Double-stepped stroke feeding frame cable (asm.) | 1 | B47142200A0 |
| 38 | Solenoid valve (asm.) | 1 | PV0351240B0 |
| 39 | Shuttle valve | 1 | PV205101000 |
| 40 | Quick-coupling joint | 3 | PJ301045101 |
| 41 | Cable band B | 6 | HX002330000 |
| 42 | Nylon clip B | 1 | HX00150000E |
| 43 | Sponge sheet, right | 1 | B2616220000 |
| 44 | Sponge sheet, left | 1 | B2617220000 |
| 45 | Connector mounting plate | 1 | B8213206000 |
| 46 | Screw | 2 | SM4040601SC |
| 47 | Washer | 2 | WP0430800SC |
| 48 | PK-47 3-pedal unit | 1 | GPK470010A0 |
| 49 | Pedal switch junction cord (asm.) | 1 | B82052200A0 |
| 50 | x coupling | 1 | B2537220A00 |
| 51 | Screw | 4 | SM8061002TP |
| 52 | System ROM | 1 | HL008420074 |

- Parts of which quantity used is to be changed

| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Work clamp stopper | 2 → 1 | B2580220000 |
| 2 | Screw | 4 → 2 | SS6120940SP |
| 3 | Nylon clip | 3 → 2 | EA9502B0500 |
| 4 | ϕ4 air tube A | 2 → 3 | B471022000A |
| 5 | ϕ4 air tube B | 2 → 6 | B471022000B |
| 6 | Hose nipple | 3 → 5 | PJ032052503 |
| 7 | Pressure reducing valve | 1 → 3 | PF070501000 |
| 8 | Speed controller A | 2 → 5 | PC012401000 |

## 6-6. Options (to be added to the L type)

| Name of part | Type | Part No. | Size (mm) |
|---|---|---|---|
| 1. Plastic blank   | Feeding frame (right) blank with knurl | B26222200Y0 | A x B x t<br>224 x 143 x 4 (8.819" x 5.630" x 0.157") |
| | Separately-driven feeding frame blank without knurl | B26262200Y0 | 224 x 143 x 4 (8.819" x 5.630" x 0.157") |
|   | Feeding frame (left) blank with knurl | B26232200Y0 | A x B x t<br>224 x 143 x 4 (8.819" x 5.630" x 0.157") |
|   | Separatable work clamp blank with knurl | B26202200Y0 | A x B x t<br>224 x 290 x 4 (8.819" x 11.417" x 0.157") |
| | Separatable work clamp blank without knurl | B26212200Y0 | 224 x 290 x 4 (8.819" x 11.417" x 0.157") |

# CHAPTER 4
# INVERTING CLAMP TYPE (T TYPE)
# AMS-220CST (for light-weight materials)
# AMS-220CHT (for medium-weight materials)

● **This chapter covers only the part which is the feature making the aforementioned models different from the S type machine explained in Chapter 1.**

## 1. FEATURES

1) This machine can be used as the standard type machine by removing an inverting intermediate presser.
2) The machine comes with the inverting intermediate presser provided with the degree of angle adjusting function to allow the sewing product to be uniformly clamped.
3) Lift of the feeding frame and the lift of the inverting presser can be adjusted independently.
4) The inverting intermediate presser is provided with the double-stepped stroke function.
5) Other features of the machine conform to "1. Features" described in Chapter 1.

## 2. SPECIFICATIONS AND SPECIFIED VALUES

| | | |
|---|---|---|
| 1) | Sewing area: | Max. X (lateral) direction 200 mm (7.874")<br>Y (longitudinal) direction 111 mm (4.370")<br>Min. X (lateral) direction 46 mm (1.811")<br>Y (longitudinal) direction 42 mm (1.654")<br>(Sewing area when the optional inverting intermediate presser installing base: Min. X direction 38 mm (1.496"). Y direction 34 mm (1.496"))<br>* Sewing size can be extended to 145 mm (5.709") by removing the inverting intermediate presser. |
| 2) | Needle: | DP x 17, (exclusive) |
| 3) | Lift of feeding frame: | Standard 22 mm (0.866")<br>Max. 25 mm (0.984") |
| 4) | Lift of inverting intermediate presser: | Standard 20 mm (0.787")<br>Max. 22 mm (0.866") (Height of the presser in its intermediate stop position: 0 to 12 mm (0" to 0.472")) |
| 5) | Inverting crank control method: | Air driven. Left/right inverting method |
| 6) | Overlapping seam length within crank: | 10 mm (0.394") (left/right in X direction from the center of the crank) |
| 7) | Enlarging/reducing facility: | When the reference point of enlargement/reduction is entered for an inversion pattern, the pattern can be enlarged/reduced. |
| 8) | Enlarging/reducing method: | When the reference point of enlargement/reduction is entered for an inversion pattern, the pattern can be enlarged/reduced by increasing/decreasing the stitch length or number of stitches. |
| 9) | Specification of the second origin: | The second origin cannot be set for an inversion pattern in the main unit of the sewing machine with inverting device.<br>(Second origin setting function)<br>Specify (input) a second origin in a pattern using the main unit input function or the like. |
| 10) | Take-up thread guide to be used: | Use the needle bar take-up thread guide for heavy-weight materials. |

11) Other specifications and specified values conform to "2. Specifications and specified values" described in Chapter 1.

# 3. OPERATION

## 3-1. Cautions (to be additionally taken in the case of the T type)

### 3-1-1. Important safety instructions to be observed and preparation to be made

1. Be sure to confirm that the needle has not attached in place on the machine before supplying air to the machine using the air regulator.

**(Caution)**

**When the air is supplied to the machine, the feeding frame and the inverting intermediate presser will simultaneously go up. At this time, if the needle rest above the inverting intermediate presser, the needle may break. This is very dangerous, so be careful.**

2. Be sure to confirm the pattern No. to be read out from the floppy disk before actually reading it out from the disk using the [Set Ready] switch.

**(Caution)**

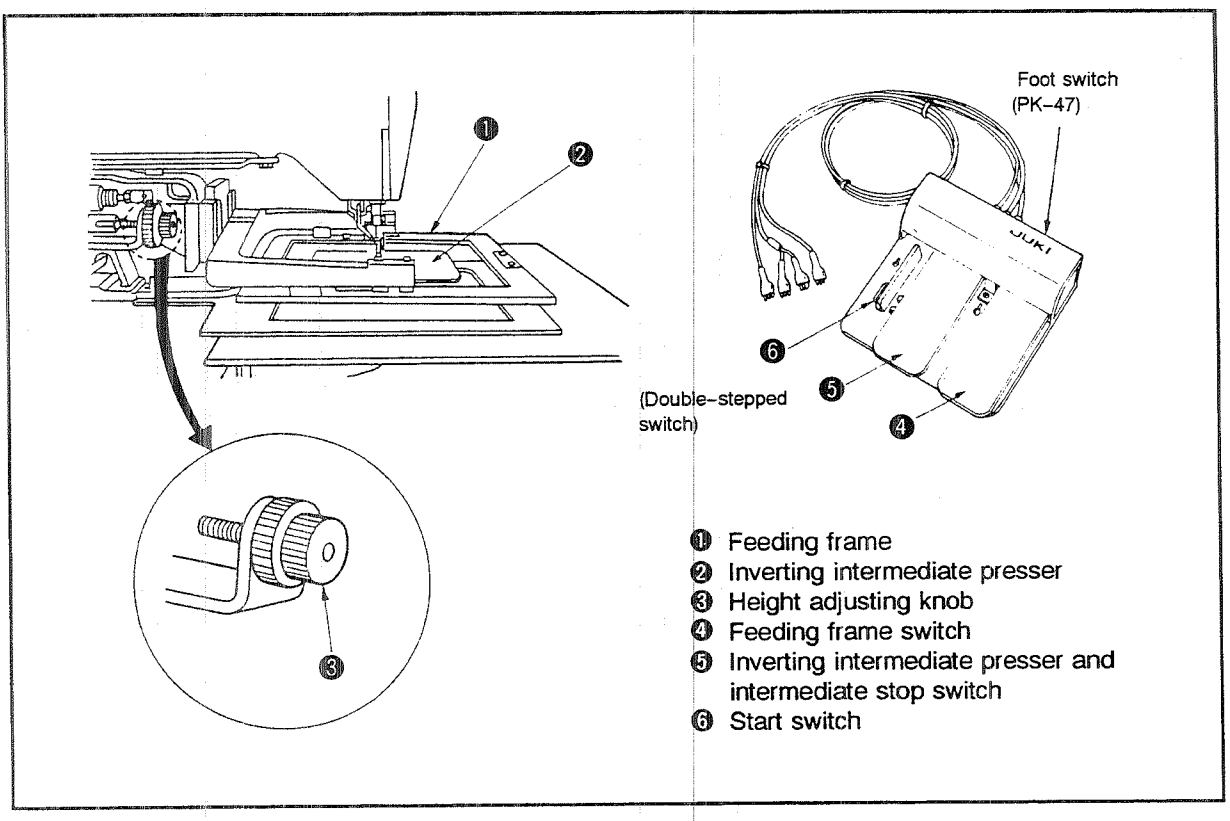
**If a wrong pattern No. is specified and read out, the needle may break when the inverting intermediate presser is ascending. This is very dangerous, so be careful.**

### 3-1-2. For safe operation

1) Normally, the intermediate presser cannot be used.
If you wish to use the intermediate presser, the sewing area near the inverting crank shaft is different from the normal sewing area. So be careful.

2) If the thickness of the material to be sewn is 2 mm (0.079") or more, the wiper may come in contact with the inverting crank shaft or the needle. So do not use the wiper.
(After completion of sewing, the inverting crank shaft will act as a wiper when the 2nd origin is retrieved. So the wiper is not necessary.)

## 3-2. Configuration




❶ Feeding frame
It comes down by operating the foot switch. The major function of the feeding frame is to clamp the garment to be sewn on the machine etc.

❷ Inverting intermediate presser
It comes down by operating the foot switch in the double-stepped stroke. The major function of the inverting intermediate presser is to clamp the label or pocket to be sewn on the sewing machine. (Provided with the double-stepped stroke function)

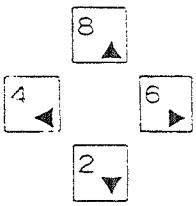
❸ Height adjusting knob
It is used to adjust the height of the inverting feeding frame when it is stopped at its intermediate stop position.

❹ Feeding frame switch
It is used to lower/lift the feeding frame.

❺ Inverting intermediate presser and intermediate stop switch
It is operated in the double-stepped stroke. It is used to lift/lower the inverting intermediate presser between the highest position and the intermediate stop position, and between the intermediate stop position and the lowest position of its stroke.

❻ Start switch
This is a switch to command the sewing machine how to sew the material. The machine sews the material according to the data stored in the micro floppy disk.

### 3-3. Explanation of operation panel (box) and its function

| Name of switch | Function |
|---|---|
| X Scale (review)<br>Y Scale (end) | If the reference point of enlargement/reduction is entered when creating an inversion pattern, the pattern created can be enlarged/reduced. At this time, be sure to specify the scale paying attention not to allow the needle to come in contact with the work clamp.<br>If the reference point of enlargement/reduction for an inversion pattern is not entered, no pattern enlargement or reduction is performed even if any scale other than 100% is set.<br>Therefore, the display will automatically indicate 100%. |
| Set Ready (Test) | For a normal pattern, when a pattern has been read out, the feeding frame comes down from the desired needle position and automatically moves to the sewing start point (or a 2nd origin if the 2nd origin has been set) by way of the origin. For an inversion pattern, however, the method of searching the origin and the method of moving to the sewing start point are different from those for a normal pattern in order to prevent the inverting intermediate presser mounting base from interfering with the tip of the needle. |
| Return to Origin | For an inversion pattern, the method of returning to the origin or to the 2nd origin is different from that of a normal pattern because of the need for preventing the inverting intermediate presser mounting base from coming in contact with the tip of the needle. |
| Jog keys<br>  | Since 2nd origin setting is prohibited for an inversion pattern in this model, no 2nd origin setting can be performed even if jog keys are operated.<br>Do not use the sewing start point moving function (3-9-9 of Chapter 1), since the inverting intermediate presser may come in contact with the needle, which is dangerous. |

Refer to "3-5. Explanation of operation panel and its function" of Chapter 1 for the description which is not covered by the aforementioned explanation.

**(Caution)**

**An inversion pattern means a pattern in which an inversion command has been input when creating it.**

**Refer to the Instruction Manual for the main unit input function for details.**

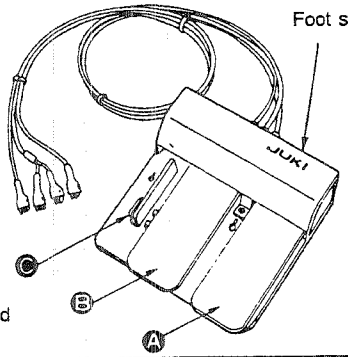
### 3-4. How to use the foot switch (PK-47 3-pedal unit)

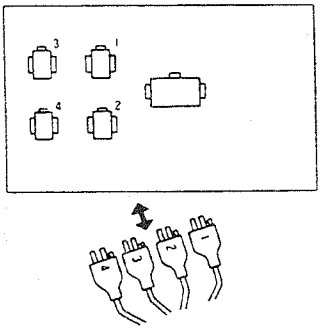
The PK-47 is necessary to operate the separately-driven feeding frame type (L type) of the AMS-220C Series of sewing machine. The PK-47 operates in five different ways according to the connection of the connectors of the PK-47 and the setting of the DIP switches.

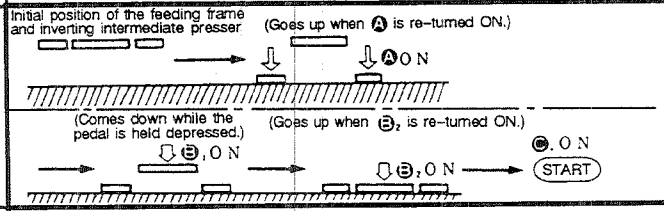
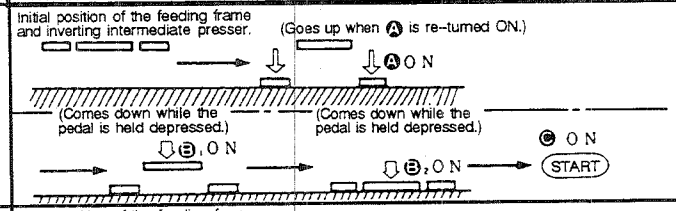
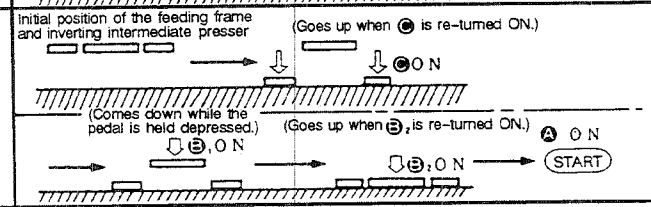
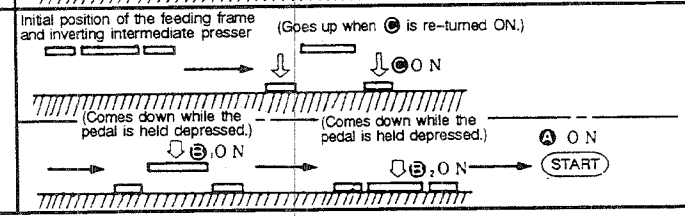
1. **Connecting the foot switch**
   Connect the foot switch (PK-47) referring to "1. Connecting the foot switch" in "3-2. How to use the foot switch" described in Chapter 2.

## 2. How to operate the foot switch

Select one operating method from among those described below.




| Method of connecting the connectors | Setting of the DIP switches | Functions of the foot pedal switch and actions of the feeding frame and inverting intermediate presser |
|---|---|---|
| On the connector plate side - Cable side | SW5-6 | |
| (J62) 1 —— 1<br>(J61) 2 —— 2 | *ON |  |
| (J64) 3 —— 3<br>(J63) 4 —— 4 | OFF |  |
| 1 —— 4<br>2 —— 2 | ON |  |
| 3 —— 3<br>4 —— 1 | OFF |  |

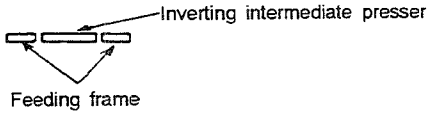


Explanation of the codes:

- Ⓐ ... Pedal Ⓐ switch
- $Ⓑ_1$ ... 1st step switch of pedal Ⓑ
- $Ⓑ_2$ ... 2nd step switch of pedal Ⓑ
- Ⓒ ... Pedal Ⓒ switch

The setting marked by an asterisk (*) is the setting at the time of delivery.

※




(Caution)

1. Be sure to set the DIP switch SW5-7 to its OFF position. (The switch has been set to its OFF position at the time of delivery.)
2. When changing the setting of the DIP switch, be sure to refer to the explanation of the SW5-6 in "5. Explanation of the DIP switches."
3. The description given in the above table is applied when the separately-driven feeding frame function is effective (SW5-8 ON) and the double-stepped stroke feeding frame function is effective (SW7-2 ON).

**Explanation of the actions of the feeding frame (for the setting enclosed in a rectangle ( ▭ ))**

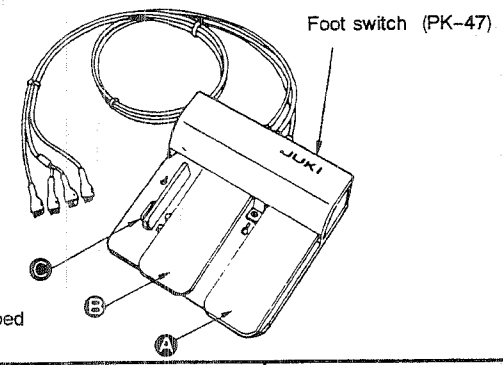
1) Depressing pedal Ⓐ will lower the feeding frame.
   Depressing pedal Ⓐ again will raise the feeding frame.
2) Depressing pedal Ⓑ so that the first step switch of pedal Ⓑ is turned ON, which will lower the inverting intermediate presser until its predetermined intermediate stop position is reached. (Intermediate stop)
   When you release your foot from the pedal, the inverting intermediate presser will go up.
3) Depressing pedal Ⓑ so that the second step switch of pedal Ⓑ is turned ON, which will lower the inverting intermediate presser until its lowest position is reached.
   Turning ON the second step switch of pedal Ⓑ again, the inverting intermediate presser will go up until the predetermined intermediate stop position is reached. (Intermediate stop position) In this state, turning OFF the second step switch of pedal Ⓑ, and turning it ON will make the inverting intermediate presser come down to its lowest position.
4) Depressing pedal Ⓒ, when the feeding frame and inverting intermediate presser are in the respective lowest positions, will make the machine start running.

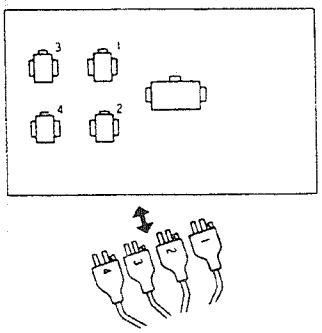
**(Caution)**

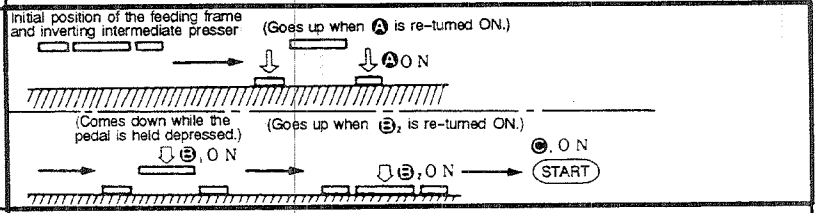
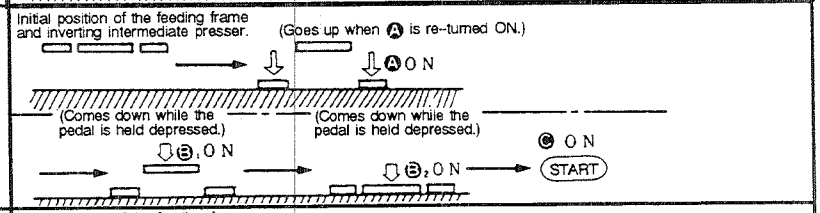
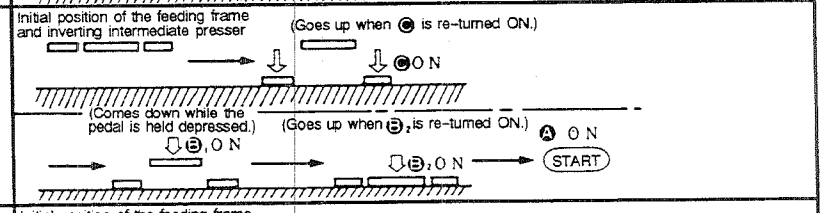
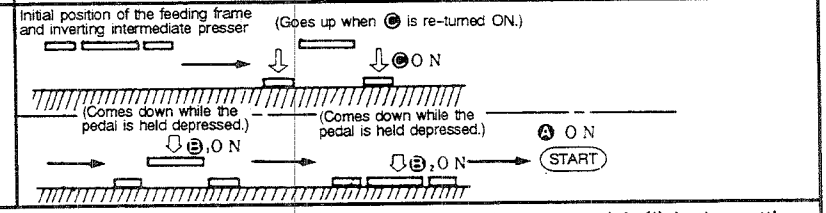
**It is impossible to make the inverting intermediate presser come down in prior to the feeding frame. (Refer to "5. Explanation of DIP switches, SW6-1.")**
**It is impossible to make the feeding frame go up in prior to the inverting intermediate presser.**

## 2. How to operate the foot switch

Select one operating method from among those described below.



| Method of connecting the connectors | Setting of the DIP switches | Functions of the foot pedal switch and actions of the feeding frame and inverting intermediate presser |
|---|---|---|
| On the connector plate side - Cable side | SW5-6 | |
| J62 1 —— 1<br>J61 2 —— 2 | *ON |  |
| J64 3 —— 3<br>J63 4 —— 4 | OFF |  |
| 1 —— 4<br>2 —— 2 | ON |  |
| 3 —— 3<br>4 —— 1 | OFF |  |

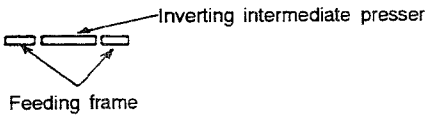


Explanation of the codes:

- Ⓐ ... Pedal Ⓐ switch
- $Ⓑ_1$ ... 1st step switch of pedal Ⓑ
- $Ⓑ_2$ ... 2nd step switch of pedal Ⓑ
- Ⓒ ... Pedal Ⓒ switch

The setting marked by an asterisk (*) is the setting at the time of delivery.

※




(Caution)

1. Be sure to set the DIP switch SW5-7 to its OFF position. (The switch has been set to its OFF position at the time of delivery.)
2. When changing the setting of the DIP switch, be sure to refer to the explanation of the SW5-6 in "5. Explanation of the DIP switches."
3. The description given in the above table is applied when the separately-driven feeding frame function is effective (SW5-8 ON) and the double-stepped stroke feeding frame function is effective (SW7-2 ON).

**Explanation of the actions of the feeding frame (for the setting enclosed in a rectangle ( ▭ ))**

1) Depressing pedal Ⓐ will lower the feeding frame.
   Depressing pedal Ⓐ again will raise the feeding frame.
2) Depressing pedal Ⓑ so that the first step switch of pedal Ⓑ is turned ON, which will lower the inverting intermediate presser until its predetermined intermediate stop position is reached. (Intermediate stop)
   When you release your foot from the pedal, the inverting intermediate presser will go up.
3) Depressing pedal Ⓑ so that the second step switch of pedal Ⓑ is turned ON, which will lower the inverting intermediate presser until its lowest position is reached.
   Turning ON the second step switch of pedal Ⓑ again, the inverting intermediate presser will go up until the predetermined intermediate stop position is reached. (Intermediate stop position) In this state, turning OFF the second step switch of pedal Ⓑ, and turning it ON will make the inverting intermediate presser come down to its lowest position.
4) Depressing pedal Ⓒ, when the feeding frame and inverting intermediate presser are in the respective lowest positions, will make the machine start running.

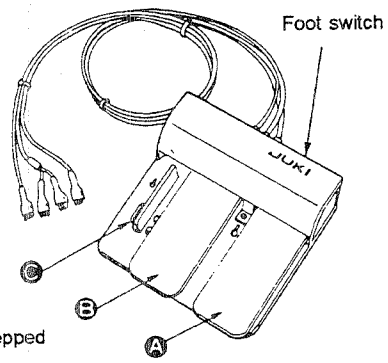
(Caution)

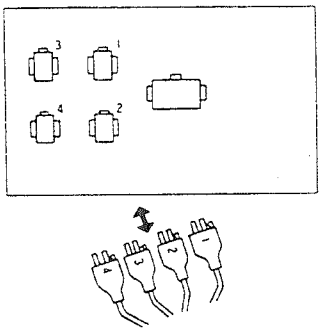
**It is impossible to make the inverting intermediate presser come down in prior to the feeding frame. (Refer to "5. Explanation of DIP switches, SW6-1.")**

**It is impossible to make the feeding frame go up in prior to the inverting intermediate presser.**

### 3-5. When the double-stepped stroke function is not used

When the DIP switch SW7-2 is set to its OFF position to make the double-stepped stroke feature of the feeding frame (left) inoperative and allow it to come down simultaneously with the feeding frame.




| Method of connecting the connectors | Setting of the DIP switches | | Functions of the pedal switch and actions of the feeding frame and inverting intermediate presser (SW6-1 ON) (SW5-8 ON) |
|---|---|---|---|
| On the connector plate side - Cable side | SW5-7 | SW5-6 | |
| (J62) 1 — 1<br>(J61) 2 — 2<br>(J64) 3 — 3<br>(J63) 4 — 4 | ON | ON | Initial position of the feeding frame and inverting intermediate presser<br>(Goes up when Ⓐ is re-turned ON.) (Goes up when Ⓑ1 is re-turned ON.)<br>ⒶON Ⓑ1 ON ⓒON START |
| 1 — 1<br>2 — 2<br>3 — 4<br>4 — 3 | | OFF | Initial position of the feeding frame and inverting intermediate presser<br>(Goes up when Ⓐ is re-turned ON.) (Comes down while the pedal is held depressed.)<br>ⒶON Ⓑ1ON Ⓑ2ON START |
| 1 — 2<br>2 — 3<br>3 — 1<br>4 — 4 | OFF | OFF | Initial position of the feeding frame and inverting intermediate presser<br>(Comes down while the pedal is held depressed.) (Comes down while the pedal is held depressed.) (Turn ON ⓒ by depressing the back part of the pedal with your heel.)<br>Ⓑ1ON Ⓑ2ON START |
| | | ON | Initial position of the feeding frame and inverting intermediate presser<br>(Comes down while the pedal is held depressed.) (Goes up when Ⓑ2 is re-turned ON.)<br>Ⓑ1ON Ⓑ2ON ⓒON START |

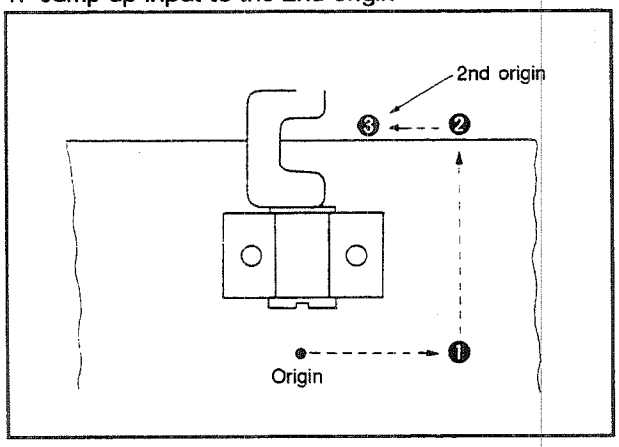
- It is impossible to make the inverting intermeidate presser come down in prior to the feeding frame. (The inverting intermediate presser will interfere with the feeding frame)

Explanation of the codes:

Ⓐ ... Pedal Ⓐ switch
Ⓑ1 ... 1st step switch of pedal Ⓑ
Ⓑ2 ... 2nd step switch of pedal Ⓑ
ⓒ ... Pedal ⓒ switch

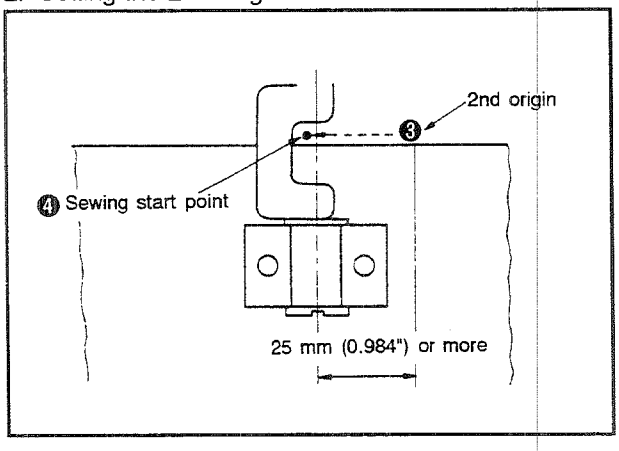
### 3-6. Cautions to be taken when creating a pattern

1. Jump up input to the 2nd origin



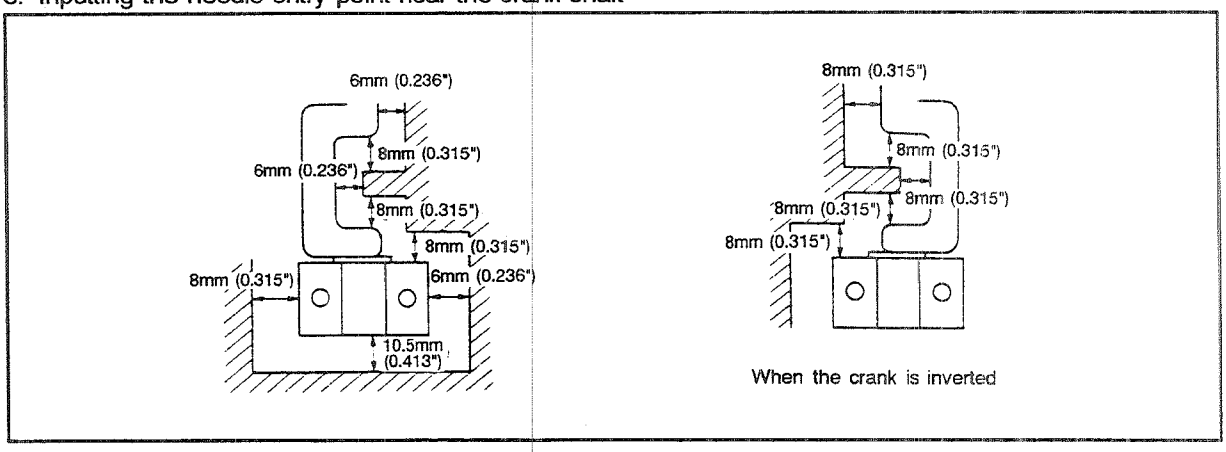

Pressing the Set Ready switch will move the feeding frame to the 2nd origin after retrieving the origin.
At this time, the inverting intermediate mounting base may come in contact with the needle. To prevent this, "jump" should be entered up to 2nd origin ❸ as illustrated in the figure.

2. Setting the 2nd origin




When the sewing start point is retrieved after completion of sewing, the inverting crank rotates and the feeding frame goes up. At this time, the tip of the needle may come in contact with the inverting crank if the sewing start point is close to the inverting crank. To prevent this, specify 2nd origin ❸ at the position which is 25 mm (0.984") or more away from the center of the inverting crank shaft using the offset input function, and then enter "jump" from the 2nd origin to sewing start point ❹. When 2nd origin ❸ has been set, the machine will return to 2nd origin ❸ after completion of sewing.

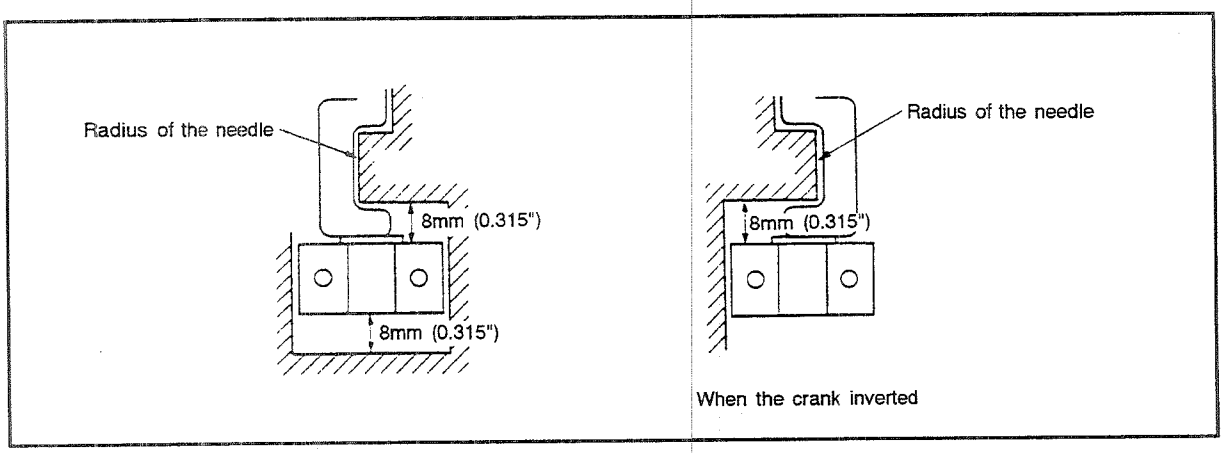
3. Inputting the needle entry point near the crank shaft




- In principle, the sewing area near the crank shaft and the inverting intermediate presser mounting base are the portion indicated by attaching slanting lines ▨ .
  The sewing area in X (lateral) direction is not bisymmetrical. Be careful.

(Caution)
**At this time, the sewing area will be as follows:**
**Max. X (lateral) direction 200 mm (7.874")**
**Y (longitudinal) direction 113 mm (4.448")**
**Min. X (lateral) direction 46 mm (1.811")**
**Y (longitudinal) direction 42 mm (1.654")**
**(When the optional inverting intermediate presser mounting base is used:**
**Min. X (lateral) direction 38 mm (1.496")**
**Y (longitudinal) direction 34 mm (1.339"))**

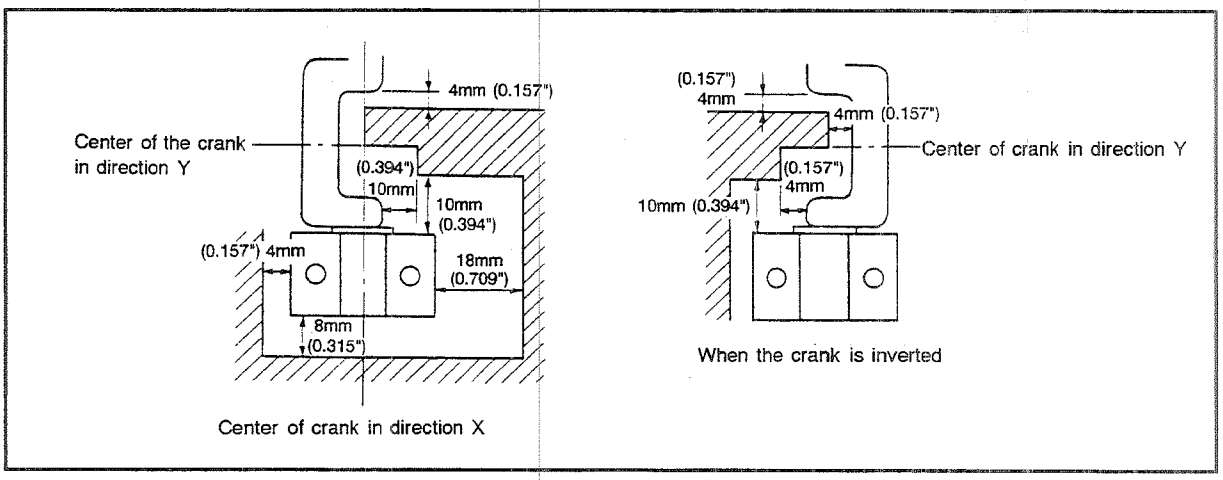
- If a needle entry point is entered outside the sewing area indicated above, the applicable thickness of the material will be 4 mm (0.157") or less. At this time, the sewing area will be the portion indicated by slanting lines ▨ as illustrated in the figure.




(Caution)
**At this time, the sewing area will be as follows:**
**Max. X (lateral) direction 200 mm (7.874")**
**Y (longitudinal) direction 120 mm (4.724")**
**Min. X (lateral) direction 34 mm (1.339")**
**Y (longitudinal) direction 32 mm (1.260")**
**(When the optional inverting intermediate presser mounting base is used:**
**Min. X (lateral) direction 26 mm (1.024")**
**Y (longitudinal) direction 24 mm (0.945"))**
**If the thickness of the sewing product is 3.5 mm (0.138") or less, overlapped seam length within the crank is 22 mm (0.866") at the maximum.**

4. When the intermediate presser is used (DIP switch SW6-8 is set to its OFF position)

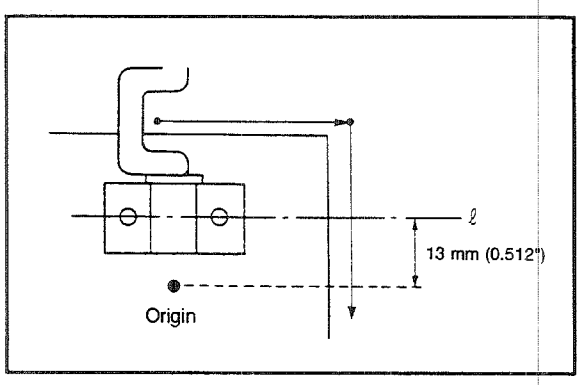
- As long as the thickness of the material is 4 mm (0.157") or less, the standard intermediate presser can be used.
  At this time, however, the sewing area (indicated by slanting lines ▨ ) will be different from the normal sewing area when the intermediate presser is used. So be careful.




(Caution)

**At this time, the sewing area will be as follows:**
**Max. X (lateral) direction 200 mm (7.874")**
**Y (longitudinal) direction 117 mm (4.606")**
**Min. X (lateral) direction 54 mm (2.126")**
**Y (longitudinal) direction 41.5 mm (1.634")**
**(When the optional inverting intermediate presser mounting base is used:**
**Min. X (lateral) direction 46 mm (1.811")**
**Y (longitudinal) direction 33.5 mm (1.319"))**
**If the thickness of the material used is 4 mm (0.157") or more, the intermediate presser cannot be used. Set the DIP switch SW6-8 to its ON position, and remove the intermediate presser.**

### 3-7. Explanation of the control of the inverting crank



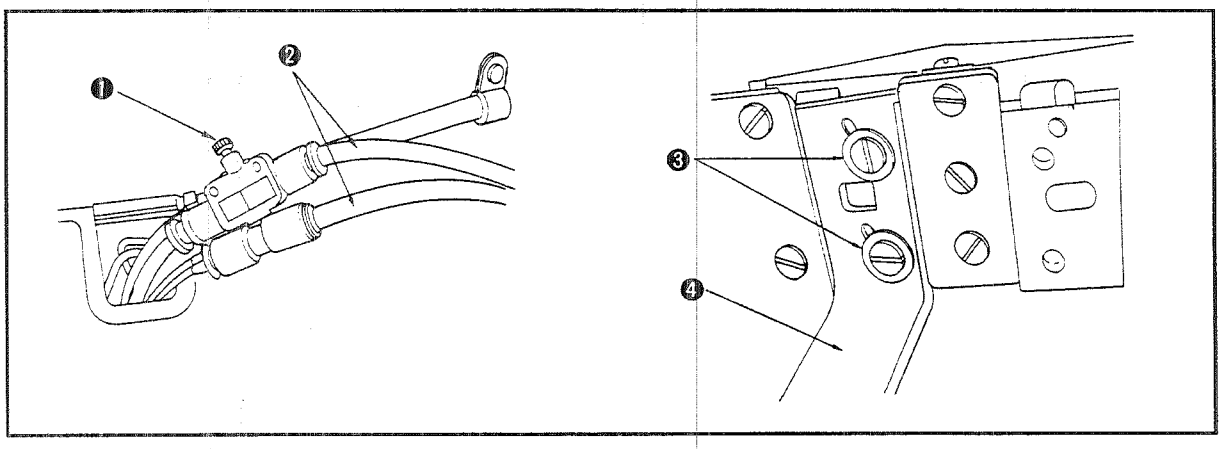

1) For an inverting pattern by automatic inversion function
   When sewing from the back end toward the front of the material, the inverting crank shaft inverts when the needle entry passes line ℓ which is 13 mm (0.512") behind the origin.
2) For an inverting pattern by the voluntary inverting function
   The inverting crank shaft inverts at the point of inversion which has been entered on the pattern. Note that the inverting crank shaft does not invert on line ℓ.

(Caution)

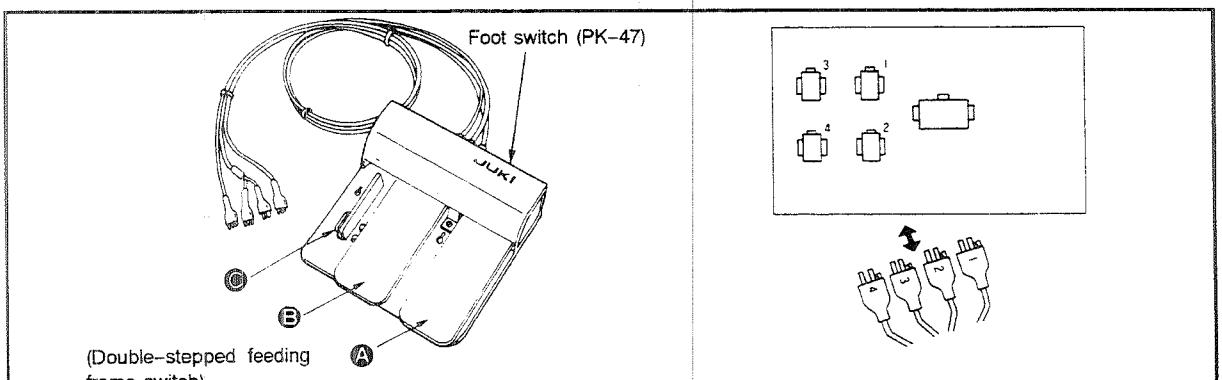
**For the voluntary inverting function, the point of inversion on the created pattern data can be specified as you wish.**
**However, the inverting crank will face to the left ⟨ at the sewing start and will then turn to the right ⟩ at the first of inversion point.**
**After that, it will turn in alternate directions at every point of ⟨, ⟩ inversion. Consequently, the specified number of points of inversion should be an odd number. If an even number is specified, the inverting crank will face to the left ⟨. As a result, the crank may come in contact with the needle at the sewing end causing the needle to break.**

### 3-8. When the machine is used as the standard type machine

1) Turn speed controller knob ❶ clockwise until it will go no further, and remove inverting cylinder tube ❷.
2) Remove screws ❸, and remove inverting intermediate presser (asm.) ❹.
3) Set the DIP switches SW5-8 and SW7-2 to their OFF position.
4) If using the intermediate presser, set the DIP switch SW6-8 to its OFF position.




* Foot pedal is operated differently according to the ON/OFF setting of the DIP switches and how the connectors are connected.




| Method of connecting the connectors | Setting of the DIP switch | Functions of the pedal switch and actions of the feeding frame |
|---|---|---|
| On the connector plate side - Cable side | SW5-7 | |
| (J62) 1 − 1<br>(J61) 2 − 2<br>(J64) 3 − 3<br>(J63) 4 − 4 | ON | Goes up ⟵ Ⓑ ON / Ⓑ ON ⟶ Comes down ⟶ Ⓒ ON ⟶ START |
| | OFF | Goes up ⟵ Ⓑ ON / Ⓑ OFF ⟶ Comes down ⟶ Ⓒ ON ⟶ START |
| 1 − 4<br>2 − 2<br>3 − 3<br>4 − 1 | ON | Goes up ⟵ Ⓑ ON / Ⓑ ON ⟶ Comes down ⟶ Ⓐ ON ⟶ START |

**(Caution)**
**The ON/OFF setting of the DIP switch SW5-6 is rendered ineffective.**

# 4. ADJUSTMENTS

## 4-1. Adjusting the mechanical components and disassembling/assembling them

### STANDARD ADJUSTMENTS

**(1) Height of the needle bar**

Adjust the hight of the needle bar so that the upper marker line (for DP x 17) engraved on the needle bar is aligned with the bottom end of the lower bushing of the needle bar when the needle bar is in its lowest dead point.

(For the sewing machine provided with an inverting device, use a DP x 17 needle.)

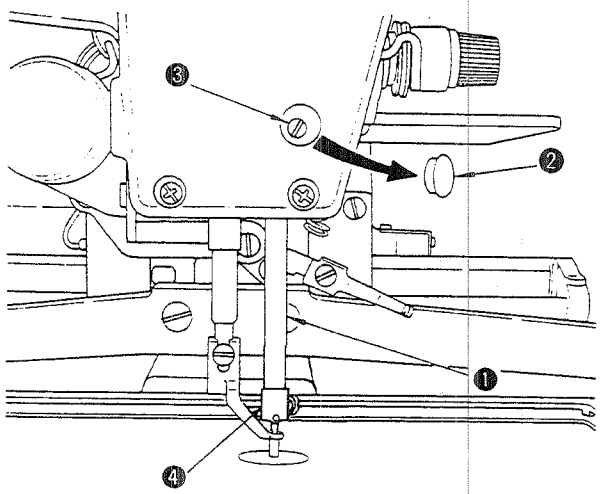



Fig. 4-1-1

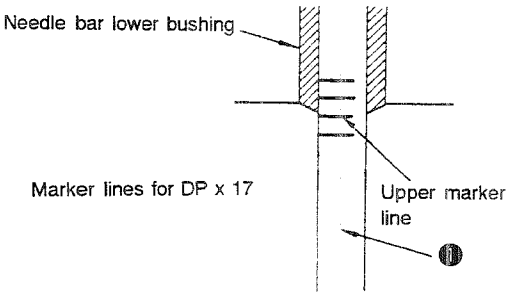



Fig. 4-1-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Turn ON the [Needle threading] switch (the READY indicator lamp lights up). Then turn the handwheel by hand to bring the needle down to its lowest position.<br>2) Remove plug ❷ in the cover of the face plate.<br>3) Loosen needle bar connection screw ❸. Then adjust the height of the needle bar by moving needle bar ❶ up and down.<br>4) After the adjustment, be sure to tighten screw ❸.<br>5) Turn OFF the [Needle threading] switch. (The needle bar will return to its highest position.)<br>6) Attach plug ❷ to the cover of the face plate.<br>* For the inverting type machine, use needle bar thread guide ❹ for heavy-weight materials.<br><br>(Caution)<br>**When the [Needle thread] switch is turned ON in step 5), the main shaft will make a revolution causing the needle to go up/come down. So, be sure not to place your fingers or any other things under the tip of needle.** | o Stitch skipping or thread breakage may result. |

(2) **Adjusting the feed bracket**

Adjust the clearance between the top surface of the throat plate and the feeding frame or inverting intermediate presser when the highest position of the respective components is reached.
(The highest lift of the feeding frame is 25 mm (0.984"). The highest lift of the inverting intermediate presser is 22 mm (0.866").)

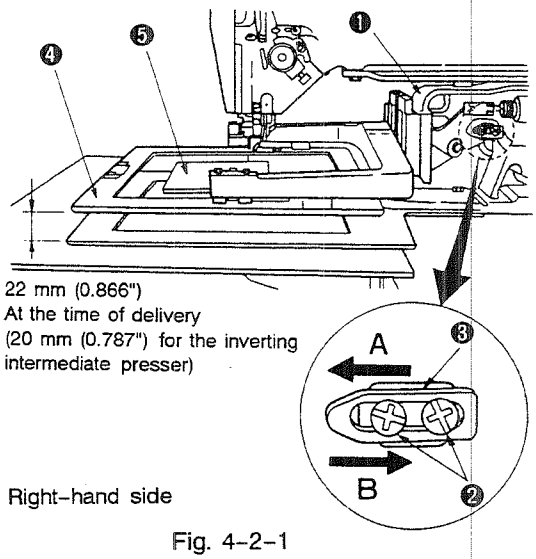



Fig. 4-2-1

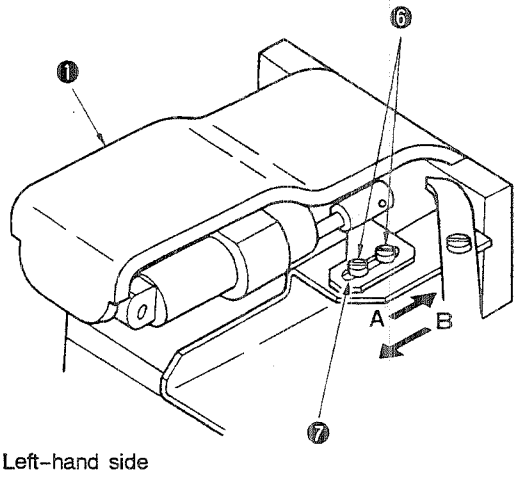



Fig. 4-2-2

(3) **Adjusting the degree of angle of the inverting intermediate presser**

If the inverting intermediate presser is in parallel to the throat plate, the pressure of the front side of the inverting intermediate presser is likely to drop. Consequently, be sure to adjust the inclination of the inverting intermediate presser so that the front side of the inverting intermediate presser is slightly lower than its rear side.

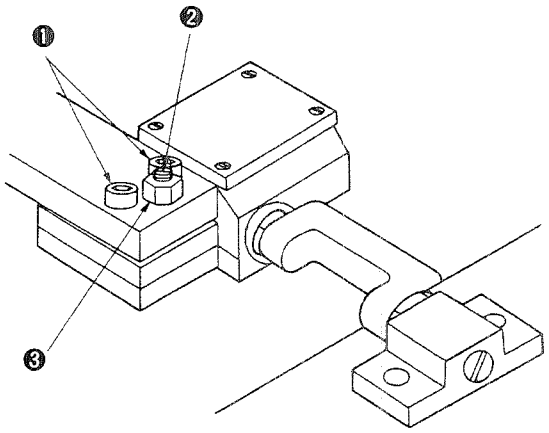


Fig. 4-3-1

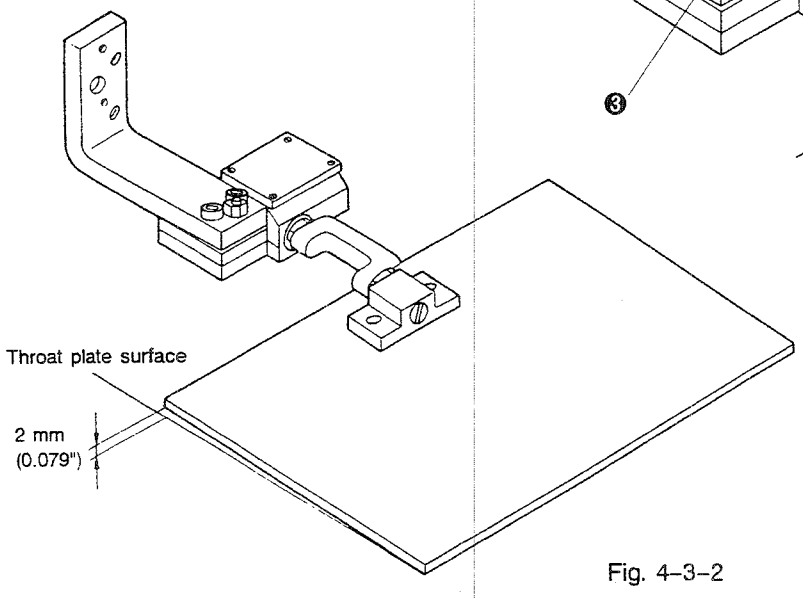



Fig. 4-3-2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen screws ❷ in work clamp stopper (right) ❸ which is located in the right-hand side of feed bracket ❶. Shifting work clamp stopper (right) ❸ to the side of arrow A will lower the height of feeding frame ❹ or to the side of arrow B will increase it. (Fig. 4-2-1)<br>2) After the adjustment of the height of the feeding frame, be sure to securely tighten screws ❷. (Fig. 4-2-1)<br>3) Loosen screws ❻ in work clamp stopper (left) ❼ which is located in the left-hand side of feed bracket ❶. Shifting work clamp stopper (left) ❼ to the side of arrow A will lower the height of inverting intermediate presser ❺ shown in Fig. 4-2-1 or to the side of arrow B will increase it. (Fig. 4-2-2)<br>4) After the adjustment of the height of the feeding frame (left), be sure to securely tighten screws ❻. (Fig. 4-2-2) | o If the lifting amount of the feeding frame is insufficient, the material may fail to be placed on the machine with ease.<br>o If the lifting amount of the feeding frame is excessive, the material cannot be positioned with accuracy when setting it on the machine. |
| 1) Loosen screws ❶ and nut ❸. Turning adjustment screw ❷ clockwise will lower the front side of the inverting intermediate presser.<br>2) After the adjustment, securely tighten screws ❶ and nut ❸.<br><br>(Caution)<br>**As reference of the adjustment, the rear end of the inverting intermediate presser should be approximately 2 mm (0.079") above the throat plate surface when the front end of the inverting intermediate presser meets the throat plate surface.** | o If the inverting intermediate presser is not sufficiently tilted, the work pressing force at the front side of the inverting intermediate presser may drop.<br>o If the inverting intermediate presser is excessively tilted, trouble may result as the inverting crank shaft fails to rotate and the inverting intermediate presser fails to go up. |

(4) **Adjusting the initial position of the intermediate stop cylinder**
Refer to the description given in "(2) Adjusting the initial position of the intermediate stop cylinder" of Chapter 2 (B type).

(5) **Adjusting the timing of inverting crank shaft**

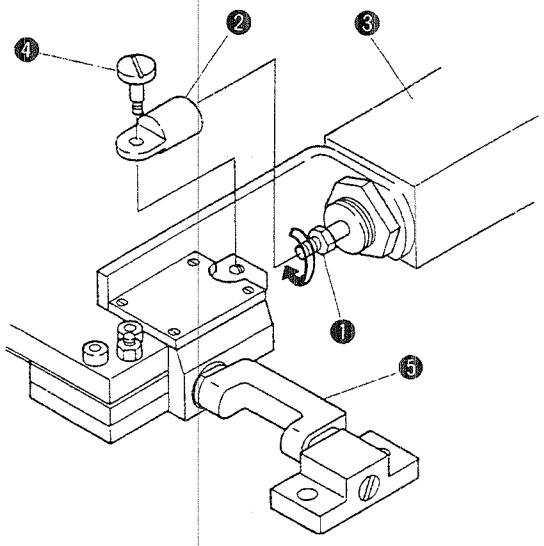



Fig. 4-5-1

(6) **Adjusting the label guides**
Use the label guides (accessory) to position the label on the machine.

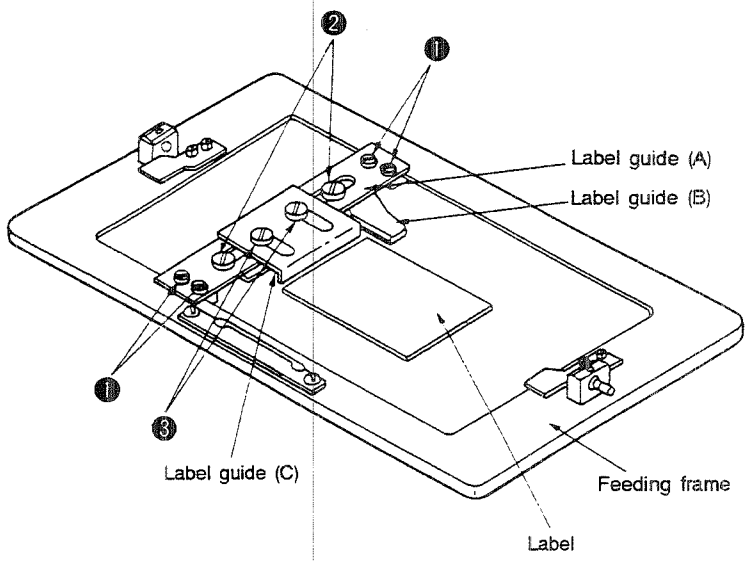



Fig. 4-6-1

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| | |
| 1) Turn nut ❶ in the direction of the arrow until it will go no further.<br>2) Attach inverting cylinder knuckle ❷ to cylinder ❸. Fully turn the knuckle until it is securely fixed in place.<br>3) Tighten hinge screw ❹, and make inverting crank shaft ❺ invert to the right.<br>4) Turning nut ❶ using a wrench in the direction of the arrow will make the cylinder shaft turn, thereby changing the timing of inverting crank shaft ❺.<br>5) Once the timing of the inverting crank shaft ❺ has been adjusted to allow the inverting crank shaft ❺ to turn to the right and left in the uniform timing, turn nut ❶ in the opposite direction of the arrow to fix inverting cylinder knuckle ❷ in place. | o If the timing of the inverting crank shaft has been properly adjusted, the inverting crank shaft may come in contact with the inverting intermediate presser when the shaft inverts. |
| 1) Loosen screws ❶, and adjust the position of label guide (A) to the leftmost end of the label. Then tighten screws ❶.<br>2) Loosen screws ❷, and adjust the position of label guide (B) to the top end of the label. Then tighten screws ❷.<br><br>(Caution)<br>**If positioning a small-sized label on the machine, label guide (A) may come into contact with the inverting unit.**<br>**In this case, use label guide (C) instead of label guide (A).** | |

(7) **Adjusting the intermediate stop position of the inverting intermediate presser**

Adjust the height of the intermediate stop position of the inverting intermediate presser to allow the operator to position the sewing product on the machine with ease.

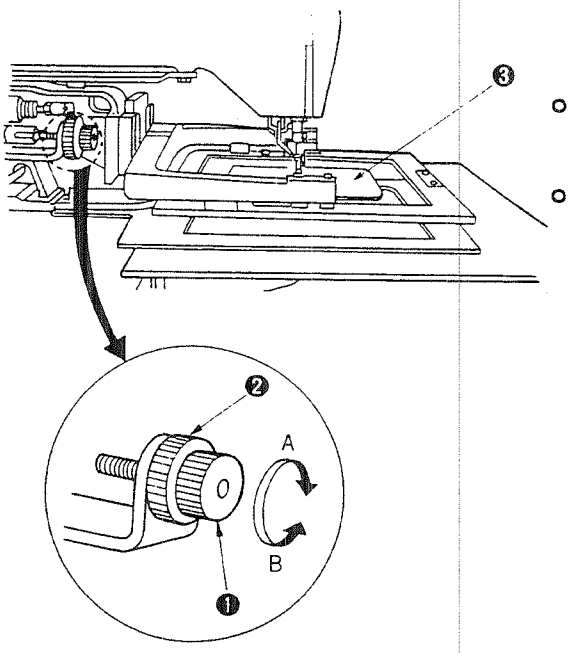



Fig. 4–7–1

- The height of the inverting intermediate presser in its intermediate stop position has been factory-adjusted to 5 mm (0.197") at the time of delivery.
- The intermediate stop position of the inverting intermediate presser can be adjusted within the range of 0 to 12 mm (0.472").
- Set a material to be sewn on the machine and adjust the adjusting knob so that an approximately 1 mm (0.039") clearance is provided between the inverting intermediate presser and the material. This will allow the operator to set the material accurately in place with ease.

(8) **Finely adjusting the X-Y origin**

Adjust the origin and the traveling end in the X-Y directions using the origin gauge.

1) Remove the inverting intermediate presser (asm.).
2) Then, finely adjust the X-Y origin referring to the description given in "(33)-1. Finely adjusting the X-Y origin" of Chapter 1 (S type).

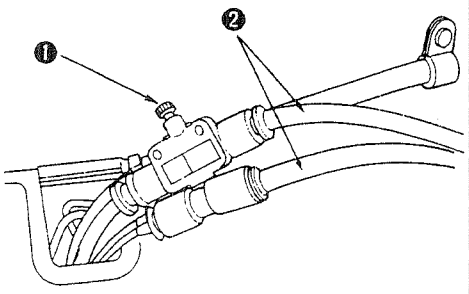



Fig. 4–8–1

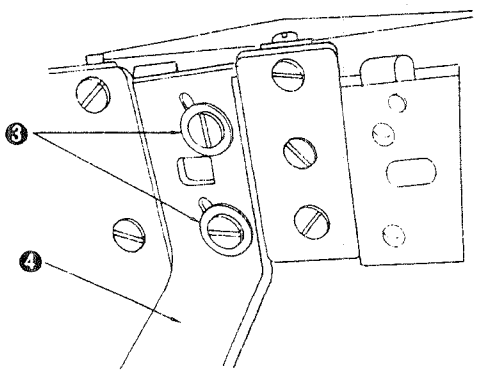



Fig. 4–8–2

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Loosen height adjusting shaft stopper ❷ in direction B. Turn height adjusting knob ❶ in direction A to make inverting intermediate presser ❸ stop at a lower position in its intermediate stop state, or in direction B to make the presser stop at a higher position in that state.<br>2) After the adjustment, securely tighten height adjusting shaft stopper ❷ by turning it in direction A.<br><br>(Caution)<br>**1. Determine a proper intermediate stop position of the inverting intermediate presser by actually operating it. The double-stepped stroke function (intermediate stop) is effective only for the inverting intermediate presser.**<br>**2. You can make the double-stepped stroke function ineffective. Refer to "3-5. When the double-stepped stroke function is not used."** | o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease.<br>o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine. |
| 1) Turn knob ❶ of the speed controller clockwise until it will go no further. Then remove inverting cylinder tube ❷.<br>2) Remove screws ❸, and remove inverting intermediate presser (asm.) ❹. | |

(9) **Adjusting the pneumatic components**

1) Connect quick-coupling joint socket plug ❶ in place and open air cock ❷. Then pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. (Fig. 4-9-1)
2) If pressure gauge ❹ indicates a lower value (lower than 4 kg/cm$^2$), the machine will stop with Error [A] shown on the operation panel. (Fig. 4-9-1)
3) The air pressure on the extruding side of the feeding frame cylinder and the retracting side of the intermediate stop cylinder is reduced to 2 to 2.5 kg/cm$^2$. (Fig. 4-9-3)
4) The air pressure on the extruding side of the inverting intermediate cylinder is reduced to 1 to 1.5 kg/cm$^2$. (Fig. 4-9-3)
5) The five needle knobs of the speed controller (A) for the air supply are fixed using nuts with loosened by 3 turns after they have been fully tightened. (Fig. 4-9-4)
6) The needle knob of the speed controller (A) for the air exhaustion is fixed using a nut with loosened by a slightly less than one turn after it has been fully tightened. (Fig. 4-9-5)
7) The needle knob of the speed controller (B) (for the intermediate presser cylinder) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-9-6 and Fig. 4-9-7)

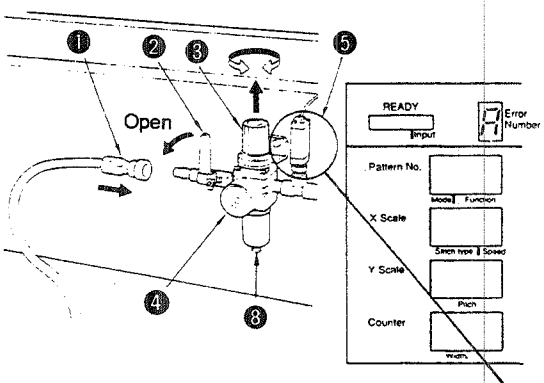



Fig. 4-9-1

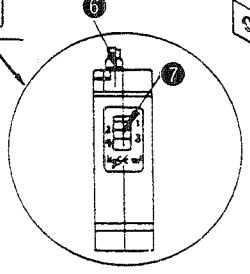


Fig. 4-9-2

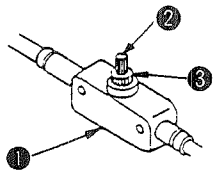


Fig. 4-9-4

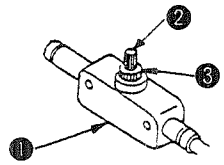


Fig. 4-9-5

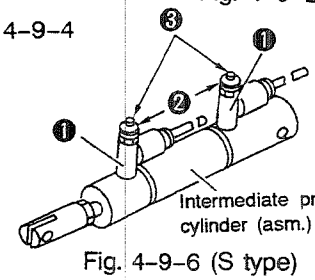



Fig. 4-9-6 (S type)

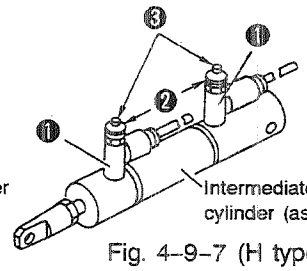



Fig. 4-9-7 (H type)

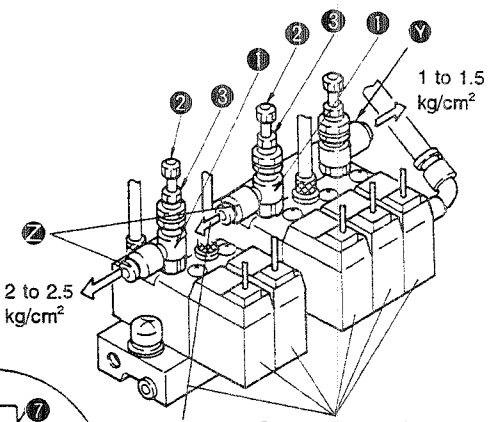
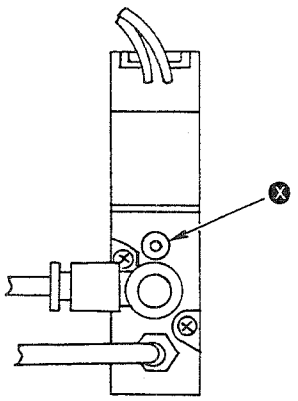



Fig. 4-9-3

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| 1) Open air cock ❷. Pull up air adjusting knob ❸, then turn it until pressure gauge ❹ indicates 5 to 5.5 kg/cm$^2$. Then push down the knob to fix it at that position. (Fig. 4-9-1)<br>2) Adjust the knob so that the pressure gauge indicates 3 kg/cm$^2$ following the procedure same as that described in step 1).<br>Turn adjusting screw ❻ of pressure switch ❺ to make pointer ❼ indicate scale 4. (Fig.4-9-1 and Fig. 4-9-2)<br>Turn ON the power to the machine. Then confirm that Error [A] is given on the operation panel when the pattern reading operation is provoked by pressing the READY switch on the operation panel.<br>**(Caution)**<br>**After the adjustment, return the indication on pressure gauge ❹ to 5 to 5.5 kg/cm$^2$. Now confirm that Error [A] is not displayed any longer.**<br>3) Remove the rear cover of the table. (Refer to Fig. 5-38-3 given in "Standard adjustment" of Chapter 1 (S type).)<br>Set the machine in its sewing state. Now, remove the air hose by pressing section ❷ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-9-3)<br>Depress the section attached with a cross mark ⊗ by five times or more, and turn needle knob ❷ of pressure reducing valve ❶ until the connected pressure gauge indicates a pressure of 2 to 2.5 kg/cm$^2$. Then fix the needle knob using nut ❸. Now, securely connect the removed air hose in place. (Fig. 4-9-3 and Fig. 4-9-8)<br>4) Following the same procedure as described in step 3), depress the section marked with a cross ⊗ by five times or more, and adjust the knob so that the pressure gauge connected to section ❼ indicates a pressure of 1 to 1.5 kg/cm$^2$.<br>(Fig. 4-9-3 and Fig. 4-9-8)<br>5), 6) Adjust needle knob ❷ of speed controller (A) ❶ properly.<br>After the adjustment, fix it using nut ❸.<br>(Fig. 4-9-4 and Fig. 4-9-5)<br>7) Remove the top cover.<br>Adjust needle knob ❷ of speed controller (B) ❶ properly. After the adjustment, fix it using nut ❸. (Fig. 4-9-6 and Fig. 4-9-7) | 1), 2) Even if the air pressure drops, it cannot be detected. Under the normal operating air pressure (5 to 5.5 kg/cm$^2$), the sewing machine stops with Error [A] indicated on the operation panel.<br>3) An adequate work pressing pressure is not provided.<br>4) The feeding frame may fail to go up until its highest position is reached.<br>5) The speed of vertical motion of the feeding frame may be too high or too low.<br>6) The intermediate presser may fail to move smoothly, or it may generate a keen metallic noise when it is in operation.<br>**(Caution)**<br>**Normally, standard adjustments (9)-2) through -7) are not required to be adjusted. Needle knobs and nuts referred in steps 3) through 7), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.**<br>* To set the air pressure to 0 kg/cm$^2$, close air cock ❷ and press button ❽. (See Fig. 4-9-1.) |




Solenoid valve

Fig. 4-9-8

**(10) Connecting the pneumatic components**

The schematic diagram of the pneumatic components is as follows:

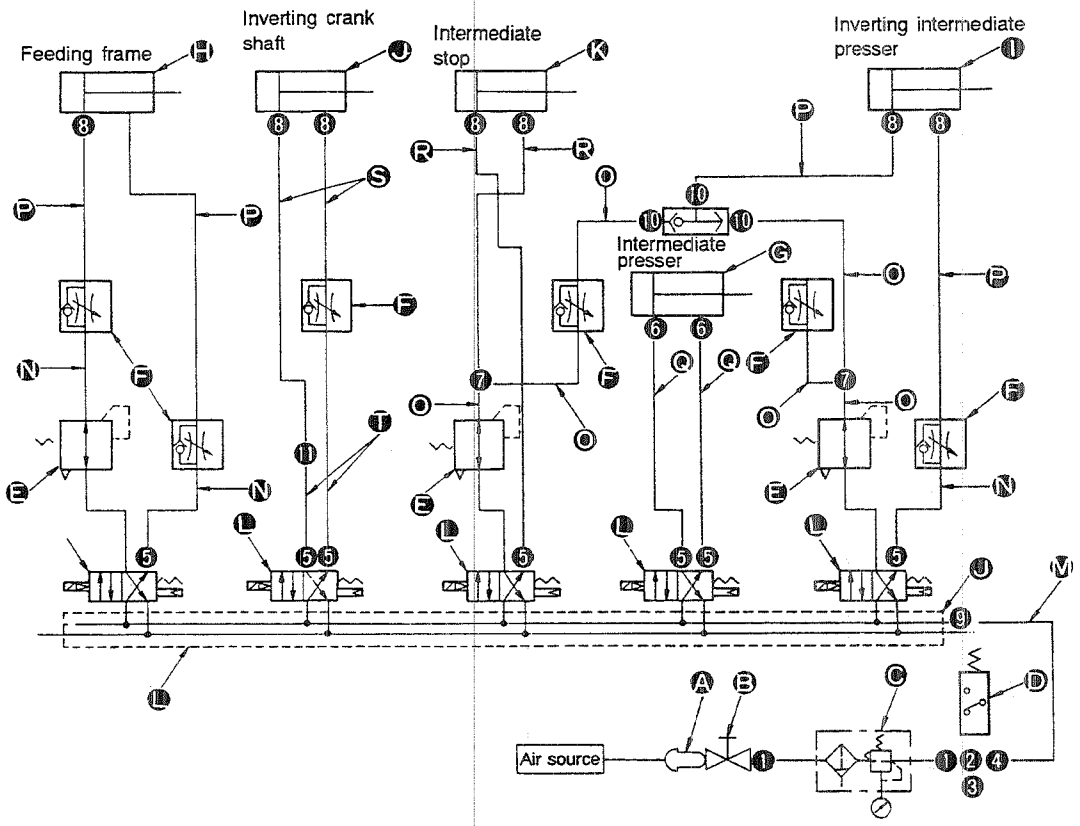



Fig. 4–10–1

| | |
|---|---|
| Ⓐ | Quick-coupling joint socket |
| | Quick-coupling joint plug |
| Ⓑ | Air cock |
| Ⓒ | Filter regulator |
| Ⓓ | Pressure switch (asm.) |
| Ⓔ | Pressure reducing valve |
| Ⓕ | Speed controller (A) |
| Ⓖ | Intermediate presser cylinder |
| Ⓗ | Work clamp cylinder (right) |
| Ⓘ | Work clamp cylinder (left) |
| Ⓙ | Inverting cylinder |
| Ⓚ | Intermediate stop cylinder |
| Ⓛ | Solenoid valve (asm.) |
| | Manifold |
| | Solenoid valve |
| Ⓜ | ϕ6 air tube |
| Ⓝ | ϕ4 air tube (A) |

| | |
|---|---|
| Ⓞ | ϕ4 air tube (B) |
| Ⓟ | ϕ4 air tube (C) |
| Ⓠ | ϕ4 air tube (D) |
| Ⓡ | ϕ4 air tube (F) |
| Ⓢ | Inverting cylinder tube |
| Ⓣ | Inverting relay tube |
| ❶ | Barrel nipple |
| ❷ | T-cheese |
| ❸ | Fitting bushing |
| ❹ | Elbow union (A) |
| ❺ | Hose nipple |
| ❻ | Speed controller |
| ❼ | Y joint |
| ❽ | Hose elbow |
| ❾ | Elbow union (B) |
| ❿ | Quick-coupling joint |
| ⓫ | Inverting relay joint |

| HOW TO ADJUST | RESULTS OF IMPROPER ADJUSTMENT |
|---|---|
| o Connect the pneumatic components properly referring to the schematic diagram (Fig. 4-10-1) and Disassembly/assembly procedure (16).<br>* "(42) Connecting the pneumatic components" of Chapter 1 (S type) describes how to read the schematic diagram. So, refer to the description given there, if necessary. | o Malfunction of the feeding frame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components. |

**(11) Removing the slide plate bearing and work clamp slide plate**

Refer to the description given in "(7) Removing the slide plate bearing and work clamp slide plate" of Chapter 3 (L type).

**(12) Assembling the inverting intermediate presser (asm.)**

1) Assemble the inverting intermediate presser (asm.) referring to Fig. 4-12-1.
2) Attach the inverting intermediate presser using the screws in the inverting intermediate presser to "section Ⓐ in Fig. 4-7-1 which is given in Disassembly/assembly procedures of Chapter 3 (L type)."

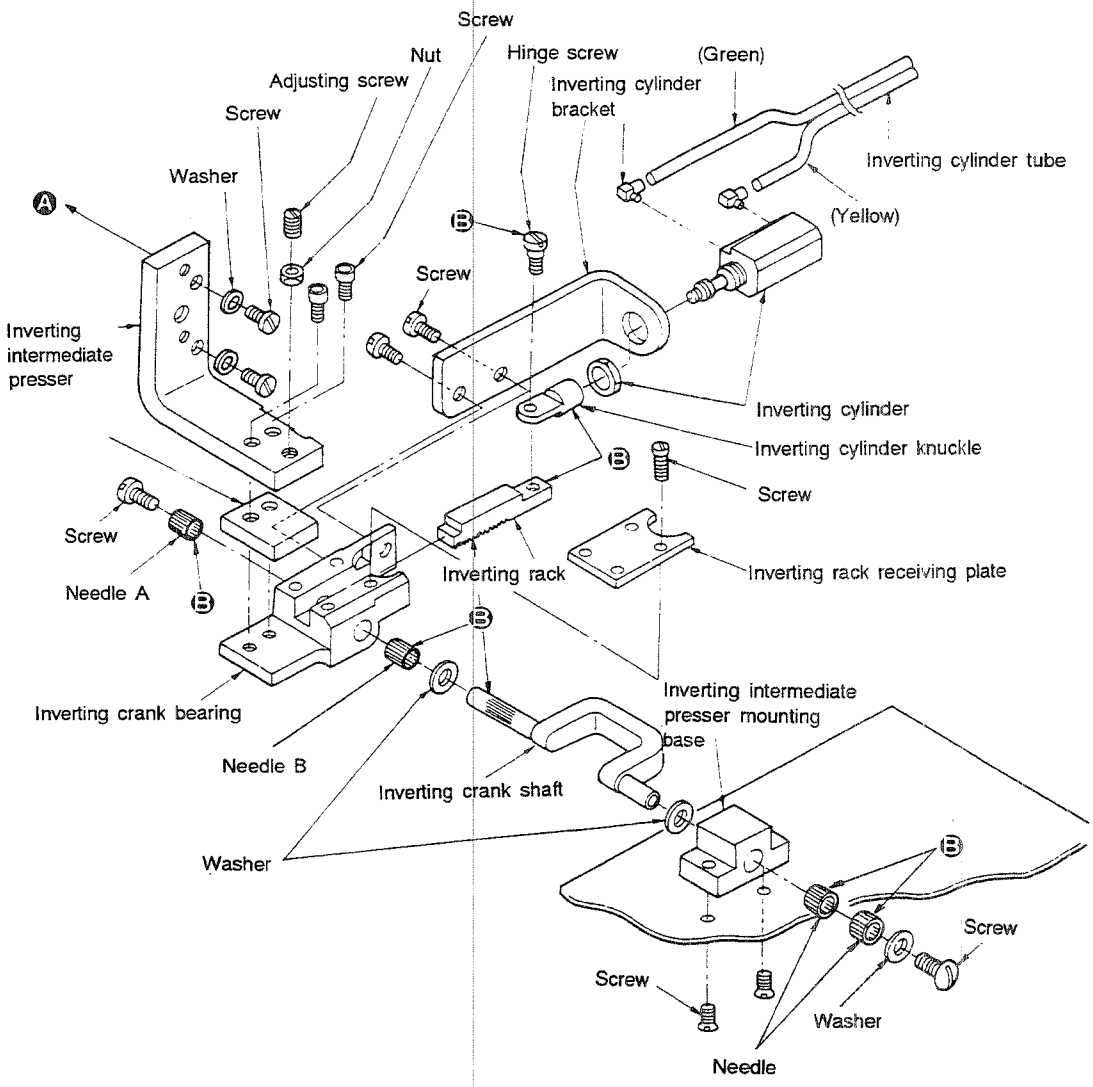



Fig. 4-12-1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| | |
| Do not pinch the inverting cylinder shaft with a tool, etc.<br><br>(Caution)<br>**The screws in the inverting intermediate presser and the washers of the screws in the presser are not included in the inverting intermediate presser (asm.).** | o Attach the inverting cylinder so that the hose elbow faces away from you.<br>o Do not pinch the inverting cylinder shaft with a tool, etc.<br>o Apply grease to section Ⓑ. |

(13) **Assembling the feeding frame arm**
Attach the feeding frame arm using screws ❶ to "section ⓒ in Fig. 4-7-1 which is given in Disassembly/assembly procedures of Chapter 3 (L type)".

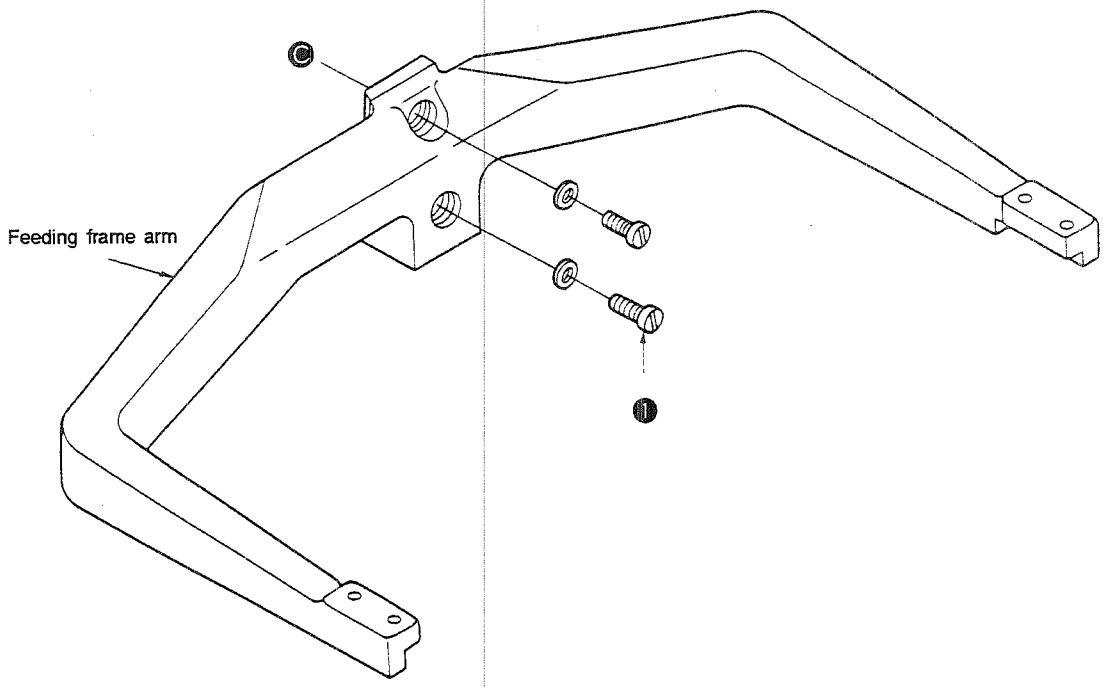



Fig. 4-13-1

(14) **Assembling the double-stepped stroke feeding frame (asm.)**
Refer to the description given in "(6) Assembling the double-stepped stroke feeding frame" of Chapter 2 (B type).

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
| --- | --- |
| | |
| | |

**(15) Assembling the label guides**

Attach the label guides to the feeding frame (asm.) referring to Fig. 4-15-1.

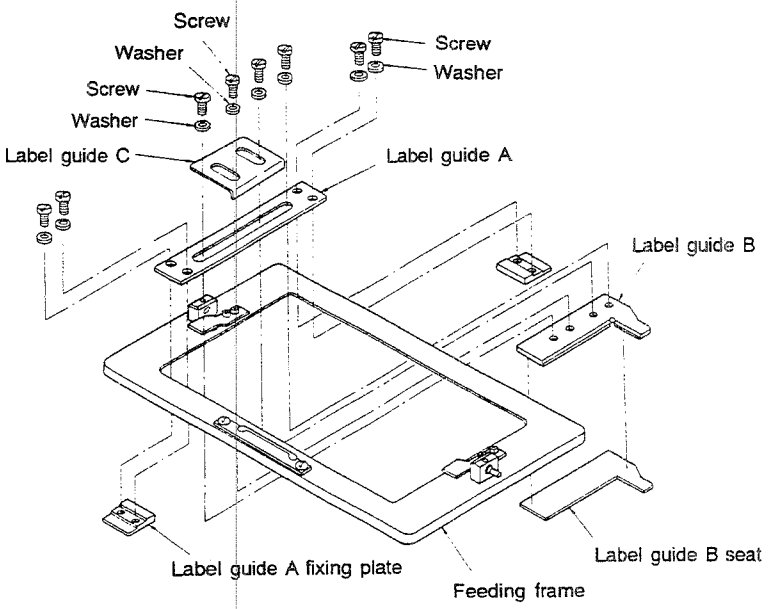



Fig. 4–15–1

**(16) Assembling the pneumatic components**

Assemble the pneumatic components referring to Fig. 4-16-1.

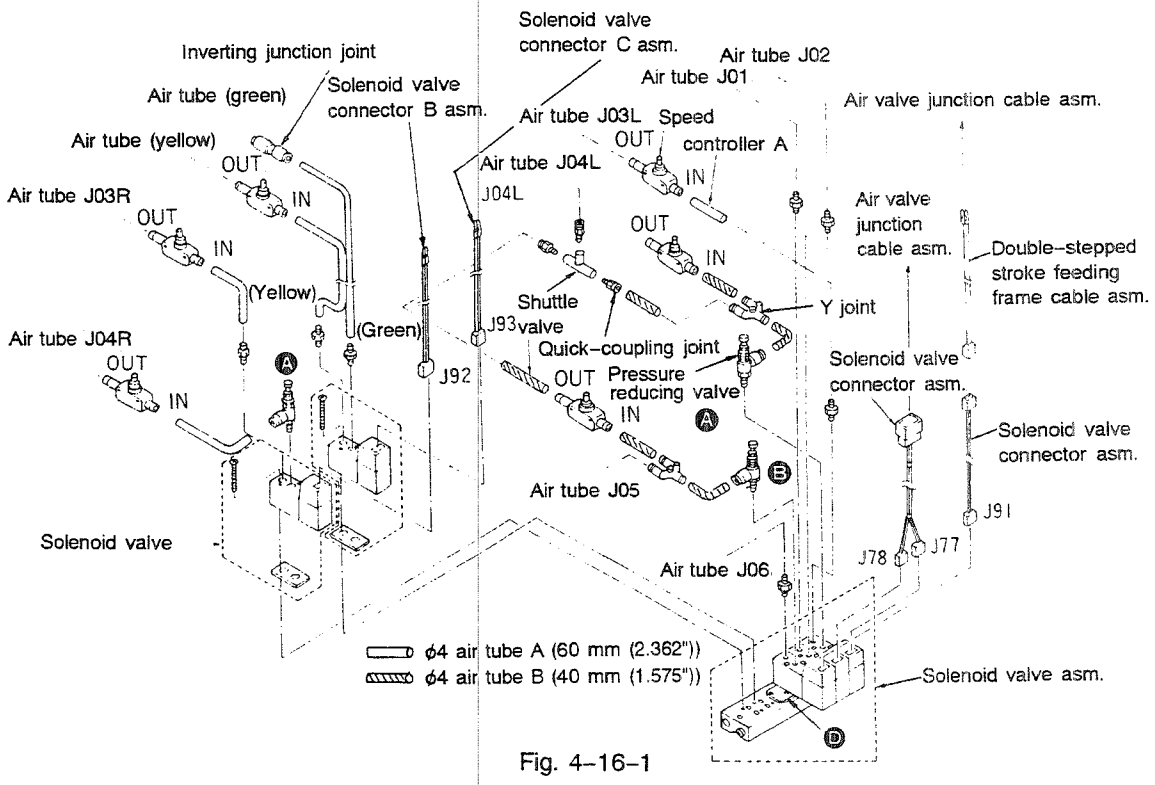
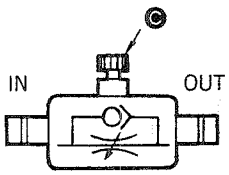



Fig. 4–16–1

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| | |
| | ○ Solenoid valve (asm.) is provided with three blanking plates Ⓓ . Use the solenoid valve (asm.) with two of them removed.<br>○ Adjust pressure reducing valve Ⓐ to 1.5 kg/cm$^2$. Adjust pressure reducing valve Ⓑ to 2.5 kg/cm$^2$.<br>○ Attach the speed controller A so that it faces in direction shown in the figure below.<br>  <br>Adjust the lifting/lowering speed of the feeding frame by pressing the knob mounted on the top of the speed controller A.<br>Note that the speed controller Ⓒ should be adjusted so that it leaks a little amount of air when lowering the feeding frame. |

(17) **Connecting the solenoid valve connectors (asm.)**
Connect the ten connectors to the plug of the solenoid valve connectors (asm.) (15P) as illustrated in Fig. 4-17-1.

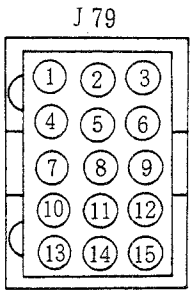



Fig. 4-17-1

① Solenoid valve connector J77 (red) for the inverting intermediate presser

④ Solenoid valve connector J77 (black) for the inverting intermediate presser

③ Solenoid valve connector J78 (red) for the intermediate presser foot

⑥ Solenoid valve connector J78 (black) for the intermediate presser foot

② Solenoid valve connector B (asm.) (for feeding frame) J92 (red)

⑤ Solenoid valve connector B (asm.) (for feeding frame) J92 (black)

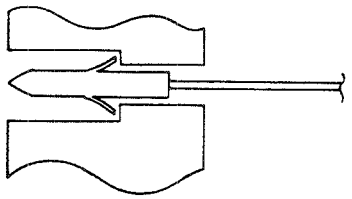
⑦ Solenoid valve connector C (asm.) (for inverting clamp) J93 (red)

⑩ Solenoid valve connector C (asm.) (for inverting clamp) J93 (black)

⑭ Wiring of pressure switch (black)

⑮ Wiring of pressure switch (red)

(18) **Connecting the double-stepped stroke feeding frame cables**
Refer to the description given in "(8) Connecting the double-stepped stroke feeding frame cables" of Chapter 2 (B type).

| CAUTIONS IN DISASSEMBLY | CAUTIONS IN ASSEMBLY |
|---|---|
| (Caution)<br>o **The solenoid valve connector J77 for the inverting intermediate presser and the solenoid valve connector J78 for the intermediate presser foot are included in the solenoid valve connector (asm.) (B47122200A0).**<br>o **Separately refer to Disassembly/assembly procedure (18) for the solenoid connector for intermediate stop (for the second step of inverting intermediate presser).** | o The wiring pin has nails. So, be sure to insert the wiring pin in the connector until the nails are securely fitted in the stepped section of the connector.<br>  <br>Fig. 4-17-2<br>o Connector numbers from 1 through 15 are engraved on the solenoid valve connector (asm.) (15P) Connect the cables correctly referring to the numbers indicated in Fig. 4-17-1. |
| | |

# 5. EXPLANATION OF THE DIP SWITCHES

## 5-1. DIP switches table (exclusive for the T type)

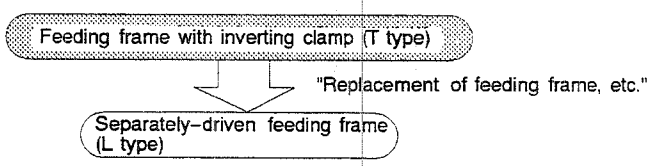
- Functions which differ according to the types of sewing machine, i.e., the standard model (S type) and the respective subclass models
  The captioned functions of the sewing machine are related to the feeding frame (including the foot switch). The functions themselves do not change, however, the actions provoked by the respective functions differ according to the types of sewing machine. Consequently, the functions need to be explained separately.

| Switch | Description (Function) | Applicable model (type) | | | |
|---|---|---|---|---|---|
| SW5-1 | "Cycle stitching function B" (Raising/lowering of the feeding frame selection B) | | | L | T |
| SW5-2 | "Cycle stitching function A" (Raising/lowering of the feeding frame selection A) | S | B | L | T |
| SW5-6 | "Pedal selecting function B" | | B | L | T |
| SW5-7 | "Pedal selecting function A" | S | B | L | T |
| SW5-8 | "Monolithic feeding frame/separately driven feeding frame change over function" | | | L | T |
| SW6-1 | "Separately driven feeding frame operation sequence change over function" | | | L | |
| SW7-2 | Selection of "double-stepped stroke feeding frame function" | | B | L | T |

(Caution)

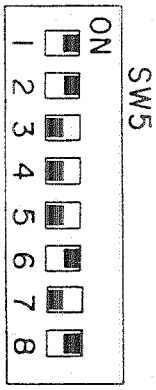
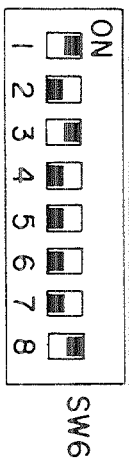
1. **The setting of the respective switches, at the time of delivery, differs by the types of sewing machine (S, B, T and L).**
   **The setting of the DIP switches of the "feeding frame with inverting clamp" (T type) of sewing machine, at the time of delivery, is described in this chapter.**
   **The setting of the DIP switches of the other types is described in the following chapters.**
   **Chapter 1 Standard model (S type)**
   **Chapter 2 (B type)**
   **Chapter 3 (L type)**
2. **If you have changed the specifications of the sewing machine because of modifications, set the DIP switches to adapt the sewing machine to the functions of the newly changed model.**

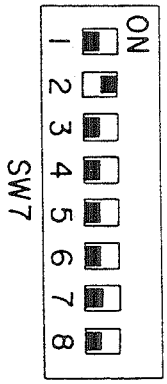
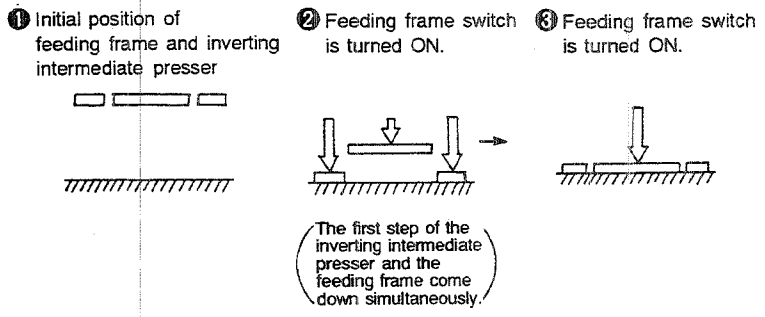
   **(Example 1)**

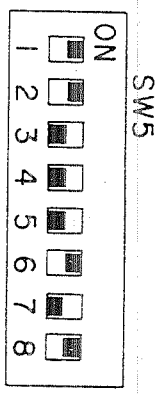



- **DIP switch SW6-1 "separately-driven feeding frame sequence change-over function" can be used. (Refer to Chapter 3.)**

## 5-2. Functions of DIP switches (exclusive for the T type)

<table>
<tr><th>Name of switch</th><th>Function</th></tr>
<tr><td>⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery)</td><td>• SW5-8 ..... Monolithic feeding frame/separately driven feeding frame changing-over function<br>Used to change over the function of the presser foot between "making the feeding frame and inverting intermediate presser go up/come down simultaneously (monolithic presser foot)" and "making the feeding frame and inverting intermediate presser go up/come down independently (separately driven presser foot)."<br><table><tr><td>ON<br>(The switch has been set to the ON position at the time of delivery.)</td><td>The feeding frame and the inverting intermediate presser go up/come down independently. (Separately-driven presser foot)</td></tr><tr><td>OFF</td><td>The feeding frame and the inverting intermediate presser go up/come down simultaneously. (Monolithic presser foot)</td></tr></table>(Caution)<br>1. The ON/OFF setting of the SW5-8 affects the function of the other DIP switches (SW5-1, 5-2, 5-6, 5-7 and 6-1). So, it is necessary to refer to the explanation of the aforementioned DIP switches when changing the setting of the SW5-8 between ON and OFF.<br>2. When the setting of the SW5-8 has been changed over between ON and OFF, maloperation will result unless the connection of the foot switch and other related conditions are changed accordingly.<br>Be sure to refer to "3-4. 2. How to operate the foot switch" and "3-8. When the machine is used as the standard type (monolithic feeding frame)."</td></tr>
<tr><td>⑥ DIP switch 6 (SW6)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery)</td><td>• SW6-1 ..... Separately-driven feeding frame operation sequence changing-over function<br>Used to select either the inverting intermediate presser or the feeding frame comes down first, when the feeding frame is operated as a separately driven feeding frame (SW5-8 is set to its ON position).<br><table><tr><td>ON<br>(The switch has been set to the ON position at the time of delivery.)</td><td>The feeding frame comes down first.</td></tr><tr><td>OFF</td><td>The inverting intermediate presser comes down first. (Caution 2.)</td></tr></table>(Caution)<br>1. When the feeding frame is used as the monolithic feeding frame with the separately-driven feeding frame function made inoperative (SW5-8 OFF), the ON/OFF setting of the DIP switch SW6-1 does not affect the operation of the sewing machine.<br>2. The inverting device, which has been equipped on the sewing machine as standard, is incapable of lowering the inverting intermediate presser first. (Since the inverting intermediate presser will interfere with the feeding frame.)<br>Set the SW6-1 to its OFF position after the specifications of sewing machine has been changed (e.g., from the T type to the L type).</td></tr>
</table>

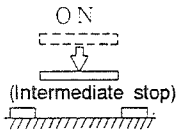
| Name of switch | Function |
|---|---|
| ❼ DIP switch 7 (SW7)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | • **SW7-2 ..... Selection of the "double-stepped stroke feeding frame function"**<br><br>ON (The switch has been set to the ON position at the time of delivery.): The inverting intermediate presser operates as the "double-stepped stroke presser."<br><br>OFF: The inverting intermediate presser does not operate as the "double-stepped stroke presser." The inverting intermediate presser is lowered by operating the Feeding frame switch once.<br><br>**(Caution)**<br>**1. The ON/OFF setting of the SW7-2 affects the function of the other DIP switch (SW5-7). So, it is necessary to refer to the explanation of the aforementioned DIP switch when changing over the setting of the SW7-2 between ON and OFF.**<br>**2. When the setting of the SW7-2 has been changed over between ON and OFF, maloperation will result unless the connection of the foot switch and the setting of the other DIP switches are changed accordingly. Be sure to refer to "3-4. 2. How to operate the foot switch" and "3-5. When the double-stepped stroke feeding frame function is not used."**<br>**3. If the DIP switch SW5-8 is set to its OFF position (monolithic feeding frame), also set the DIP switch SW7-2 to its OFF position. In the case of the T type, the double-stepped stroke function is effective only for the inverting intermediate presser. So, the T type may not be an ideally-suited machine if you want to operate the feeding frame as the monolithic feeding frame with the double-stepped stroke function. (When the SW5-8 is set to its OFF position and the SW7-2 is set to its ON position.)**<br><br>  <br> |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | • **SW5-7 ..... Pedal selecting function A**<br>Used to control the feeding frame switch (pedal switch)<br>The function of this switch depends on the "separately-driven feeding frame function" and "double-stepped stroke feeding frame function."<br>The pedal selecting function A facilitates operation further if using in combination with the pedal selecting function B (SW5-6).<br>(Refer to "3-4. 2. How to operate the foot switch.") |

①

When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)
* When both of the aforementioned functions are used. (The SW5-8 and SW7-2 have been set to the ON position at the time of delivery.)

Turn ON the first step of inverting intermediate presser switch.

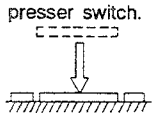



| | |
|---|---|
| ON | When the [Inverting intermediate presser (first-step)] switch is depressed, the inverting intermediate presser comes down until the first step is reached. Another depress on the same pedal switch makes the inverting intermediate presser go up. |
| OFF (The switch has been set to the OFF position at the time of delivery.) | The inverting intermediate presser keeps on coming down to its first step as long as the [Inverting intermediate presser (first-step)] switch is held depressed. |

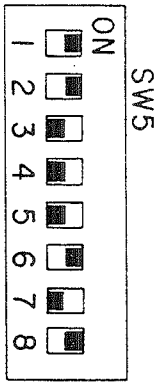
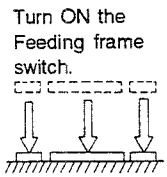
②

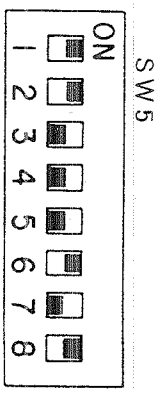
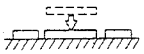
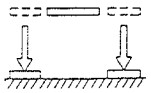
When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)
When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)
* When only the "separately-driven feeding frame function" is used

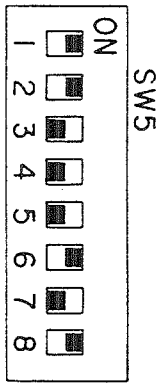
Turn ON the Inverting intermediate presser switch.

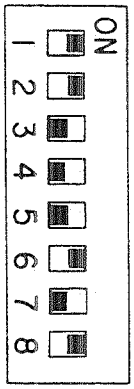


| | |
|---|---|
| ON | When the [Inverting intermediate presser] switch is depressed, the inverting intermediate presser comes down. Another depress on the same pedal switch makes the inverting intermediate presser go up. |
| OFF (The switch has been set to the OFF position at the time of delivery.) | The inverting intermediate presser keeps on coming down as long as the [Inverting intermediate presser] switch is held depressed. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | ③<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)<br>* When only the "double-stepped stroke feeding frame function" is used<br>In this state, the T type of sewing machine may not be smoothly operated. So, operate the machine in this state only when the feeding frame has been modified to the B type. (Refer to the explanation of the DIP switch SW7-2.)<br><br>④<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)<br>* When the feeding frame is used as the monolithic feeding frame<br>  <br><br>ON: When the [Feeding frame] switch is depressed, the feeding frame and inverting intermediate presser come down. Another depress on the same pedal switch makes them go up.<br>OFF (The switch has been set to the OFF position at the time of delivery.): The feeding frame and inverting intermediate presser keep on coming down as long as the [Feeding frame] switch is held depressed. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | • **SW5-6 ..... Pedal selecting function B**<br>Used to control the feeding frame switch (pedal switch)<br>The function of this switch depends on the "separately-driven feeding frame function" and "double-stepped stroke feeding frame function."<br>The pedal selecting function B facilitates operation further if using in combination with the pedal selecting function A (SW5-7).<br>Refer to "3-4. 2. How to operate the foot switch."<br><br>① Turn ON the second-step of inverting intermediate presser switch.<br>  <br>When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)<br>When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)<br>* When both of the aforementioned functions are used. (The SW5-8 and SW7-2 have been set to the ON position at the time of delivery.)<br><br>ON (The switch has been set to the ON position at the time of delivery.): When the [Inverting intermediate presser (second-step)] switch is depressed, the inverting intermediate presser (second-step) comes down. Another depress on the same pedal switch makes the inverting intermediate presser go up.<br><br>OFF: The inverting intermediate presser (second-step) keeps on coming down as long as the [Inverting intermediate presser (second-step)] switch is held depressed.<br><br>② Turn ON the Feeding frame switch.<br>  <br>When the "separately-driven feeding frame function" is specified (effective) ..... (SW5-8 ON)<br>When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)<br>* When only the "separately-driven feeding frame function" is used<br><br>ON (The switch has been set to the ON position at the time of delivery.): When the [Feeding frame] switch is depressed, the feeding frame comes down. Another depress on the same pedal switch makes the feeding frame go up.<br><br>OFF: The feeding frame keeps on coming down as long as the [Feeding frame] switch is held depressed. |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | ③<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is specified (effective) ..... (SW7-2 ON)<br>* When only the "double-stepped stroke feeding frame function" is used<br>In this state, the T type of sewing machine may not be smoothly operated. So, operate the machine in this state only when the feeding frame has been modified to the B type. (Refer to the explanation of the DIP switch SW7-2.)<br><br>④<br>When the "separately-driven feeding frame function" is ineffective ..... (SW5-8 OFF)<br>When the "double-stepped stroke feeding frame function" is ineffective ..... (SW7-2 OFF)<br>* When the feeding frame is used as the monolithic feeding frame<br>The DIP switch SW5-6 becomes inoperative.<br><br>**(Caution)**<br>**The SW5-6 works to control the inverting intermediate presser (second-step) when the "double-stepped stroke function" is used, or control the feeding frame when the double-stepped stroke function is rendered ineffective. (Provided that the separately-driven feeding frame function is effective)** |

| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) | • **SW5-2 ..... Cycle stitching facility A (Raising/lowering of the feeding frame selection A)**<br>Used to specify the performance (up/down) of the feeding frame at the position in a pattern where a "temporary stop" command (pause) has been entered. Note that the function differs according to the selection of the "separately-driven feeding frame function" (ON/OFF of the DIP switch SW5-8). |

When the "separately-driven feeding frame function" is specified (effective) ..... SW5-8 ON

* When the feeding frame and inverting intermediate presser are independently operated (The DIP switch SW5-8 has been set to the ON state at the time of delivery.)

• The DIP switch SW5-2 facilitates operation further if using in combination with the SW5-1.

| | |
|---|---|
| ON (The switch has been set to the ON position at the time of delivery.) | The sewing machine temporarily stops with the inverting intermediate presser raised, at the position in a pattern where a temporary stop command has been entered. Turn ON the [Inverting intermediate presser] switch. → Turn ON the [Start] switch. This makes the machine start the next stitching cycle. |
| OFF | The sewing machine temporarily stops with the inverting intermediate presser lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle. |

When the "separately-driven feeding frame function" is ineffective ..... SW5-8 OFF

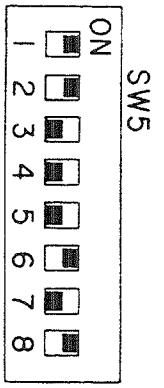
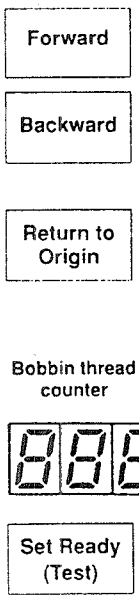
* When the feeding frame and inverting intermediate presser are operated as the monolithic feeding frame.

| | |
|---|---|
| ON (The switch has been set to the ON position at the time of delivery.) | The sewing machine temporarily stops with all the work clamp components (the feeding frame and inverting intermediate presser) raised, at the position in a pattern where a temporary stop command has been entered. Turn ON the [Feeding frame] switch. → Turn ON the [Start] switch. This makes the machine start the next stitching cycle. |
| OFF | The sewing machine temporarily stops with all the work clamp components lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle. |

* Temporary stop command
This command is used to make the sewing machine temporarily stop in one pattern. A temporary stop command can be entered, using the main unit input function or the programming device such as PGM-1, at a point that is convenient for creating/modifying the pattern. (The temporary stop command can be entered at two or more points in a pattern.)

* Cycle stitching
The cycle stitching is a sewing method where several stitching processes (cycles) are continuously sewn. By entering a "temporary stop" command at the desired point in a pattern, the feeding frame can be raised so that a workpiece (cloth, etc.) may be turned or changed.

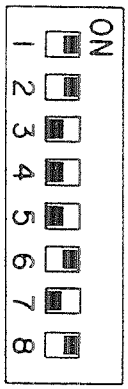
**(Caution)**
**When the machine is in the cycle stitching mode, be sure to take note of the following points:**

| Name of switch | Function |
|---|---|
| ❺ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switches of the AMS-220CST and AMS-220CHT at the time of delivery) |  <br><br>When the FORWARD or BACKWARD key is pressed, the machine halts at the predetermined temporary stop point where the feeding frame can be raised or lowered using the feeding frame switch. If you wish to feed the material forward or backward continuously, operate either key after lowering the feeding frame.<br><br>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 which is being sewn, use the BACKWARD key.<br><br>The counter counts up upon the completion of one pattern. If a pattern includes three cycles, the counter is incremented when the three cycles have been sewn.<br><br>The Set Ready switch is rendered ineffective while the sewing machine is 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. |

* Combination of the SW5-2 "cycle stitching facility A" and SW5-1 "cycle stitching facility B"
When the "separately-driven feeding frame function" is effective (The DIP switch SW5-8 has been set to its ON position at the time of delivery.)

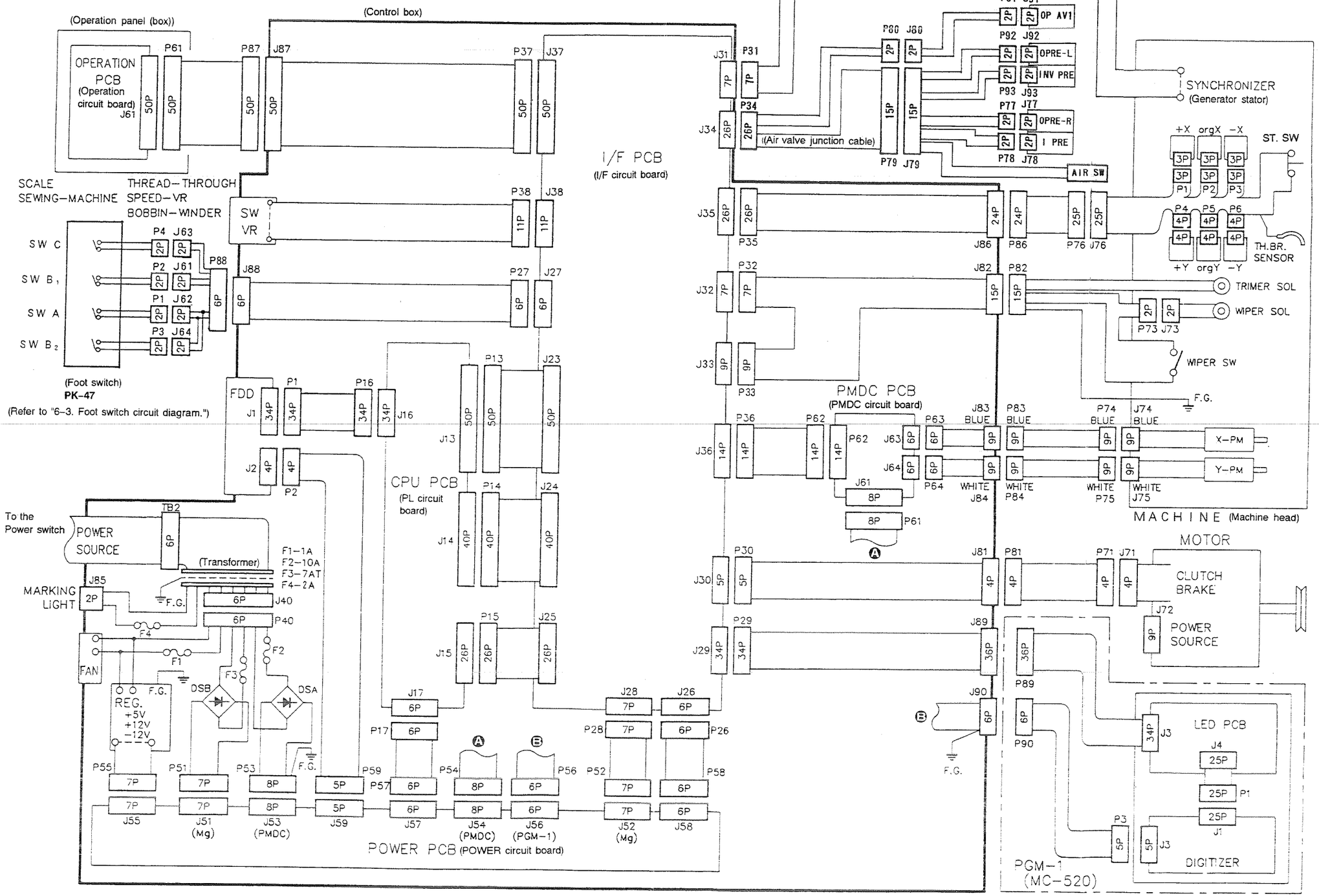
| SW5-8 | * ON | | | |
|---|---|---|---|---|
| SW5-2 (inverting intermediate presser) | * ON | | OFF | |
| SW5-1 (feeding frame) | * ON | OFF | ON | OFF |
| Action of feeding frame and the inverting intermediate presser at the position in a pattern where a temporary stop command (pause) has been entered | All the work clamp components (the feeding frame and inverting intermediate presser) go up. | Only the inverting intermediate presser goes up. | Only the feeding frame goes up. (The feeding frame and the inverting intermediate presser interfere with each other.) | All the work clamp components (the feeding frame and inverting intermediate presser) are held lowered. |

The setting of the switch marked with an asterisk (*) is the setting of the switch at the time of delivery.

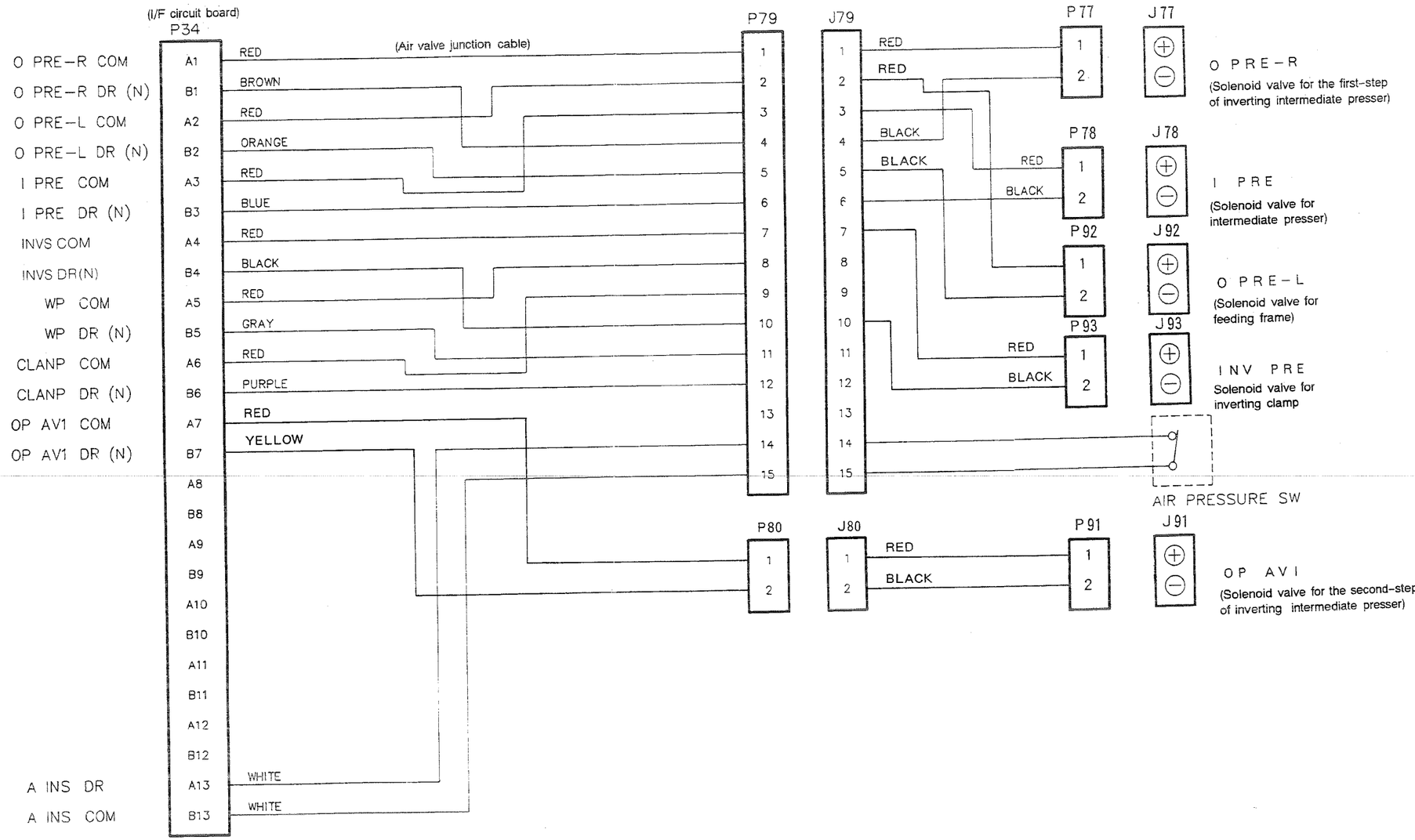
| Name of switch | Function |
|---|---|
| ⑤ DIP switch 5 (SW5)<br>  <br><br>(Setting state of the switch of the T type at the time of delivery) | • **SW5-1 ..... Cycle stitching facility B (Raising/lowering of the feeding frame selection B)**<br>Used to specify the performance (up/down) of the feeding frame at the position in a pattern where a "temporary stop" command (pause) has been entered. Note that the function is effective only when the "separately-driven feeding frame function" is specified (effective) ... (the DIP switch SW5-8 is set to its ON position).<br>When the "separately-driven feeding frame function" is specified (effective) ..... SW5-8 ON<br>* When the feeding frame and inverting intermediate presser are independently operated (The DIP switch SW5-8 has been set to the ON state at the time of delivery.)<br>◦ The DIP switch SW5-1 facilitates operation further if using in combination with the SW5-2.<br>ON (The switch has been set to the ON position at the time of delivery.): The sewing machine temporarily stops with the feeding frame raised, at the position in a pattern where a temporary stop command has been entered. (Cycle stitching facility) Turn ON the [Feeding frame] switch. → Turn ON the [Start] switch. This makes the machine start the next stitching cycle.<br>*** Be sure to set the DIP switch SW5-2 to its ON position. (Caution 2)**<br>OFF: The sewing machine temporarily stops with the feeding frame lowered, at the position in a pattern where a temporary stop command has been entered. Turning ON the [Start] switch makes the machine start the next stitching cycle.<br>(Caution)<br>**1. When the feeding frame and inverting intermediate presser are operated as the monolithic feeding frame with the "separately-driven feeding frame function" made ineffective (the DIP switch SW5-8 is set to its OFF position) to allow all the work clamp components (the feeding frame and inverting intermediate presser) to go up/come down simultaneously, the ON/OFF setting of the DIP switch SW5-1 does not affect the operation of the sewing machine. Refer to the explanation of the SW5-2.**<br>**2. Do not set the DIP switches SW5-1 to its ON position and SW5-2 to its OFF position to allow only the feeding frame to go up. Doing so will cause the feeding frame and the inverting intermediate presser to interfere with each other. (Refer to the description marked with an asterisk (*) on the left-hand page.)**<br>**3. When the sewing machine is operated under the cycle stitching mode (ON), refer to the caution given on the previous page.** |

## 6. Materials

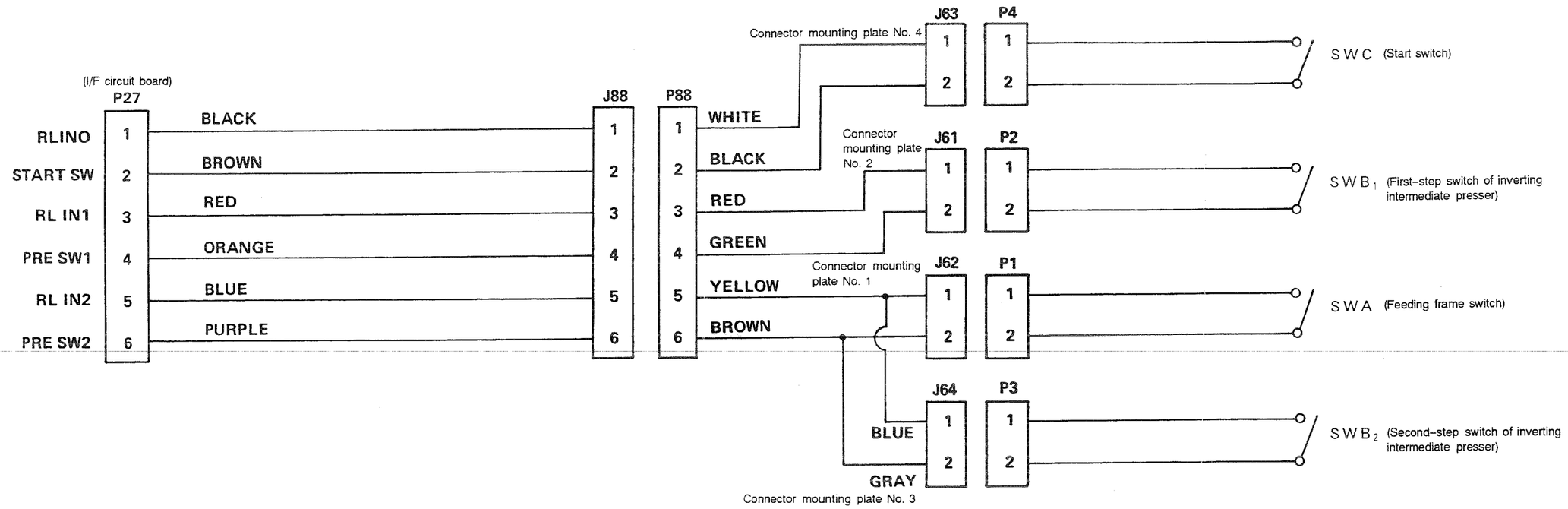
### 6-1. Block diagram (for the T type)



## 6-2. Air valve schematic diagram (for the T type)



## 6-3. Foot switch (PK-47) circuit diagram (for the T type)




* The function of the switch shown in parenthesis is that specified at the time of delivery.
Refer to the setting shown in a rectangle given in "3-4. 2. How to operate the foot switc

## 6-4. To change the standard type machine to the inverting unit type machine

- Parts to be removed

| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Feeding frame auxiliary cover, right | - | B1110220000 |
| 2 | Feeding frame auxiliary cover, right (for the sewing machine in urban-white) | - | B111022000A |
| 3 | Feeding frame auxiliary cover, left | - | B1118220000 |
| 4 | Feeding frame auxiliary cover, left (for the sewing machine in urban-white) | - | B111822000A |
| 5 | Throat plate auxiliary cover support, right | - | B1113220000 |
| 6 | Throat plate auxiliary cover support, left | - | B1121220000 |
| 7 | Work clamp slide plate (asm.) | - | B25722200A0 |
| 8 | Work clamp foot slide plate bracket, right | - | B2554220000 |
| 9 | Work clamp foot slide plate bracket, left | - | B2555220000 |
| 10 | Feeding frame | - | B2552220000 |
| 11 | Solenoid valve (asm.) | - | PV0351130A0 |
| 12 | Needle #14 | - | MDP500B1400 |
| 13 | Needle bar thread guide A | - | B1405210000 |
| 14 | Intermediate presser A | - | B1601220000 |
| 15 | Screw | - | SS7091110SP |
| 16 | 2-pedal unit (asm.) | - | M85905130A0 |
| 17 | 2-pedal unit (asm.) (for the sewing machine in urban-white) | - | M85905130AA |
| 18 | x coupling | - | B25372200A0 |
| 19 | Screw | - | SS8150822TP |
| 20 | System ROM | - | HL008420064 |

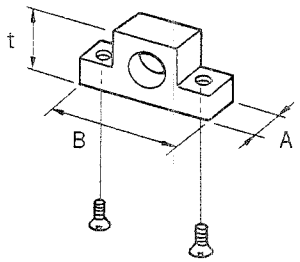
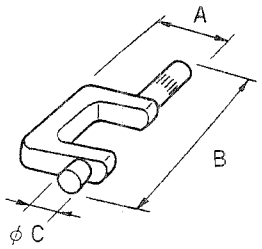
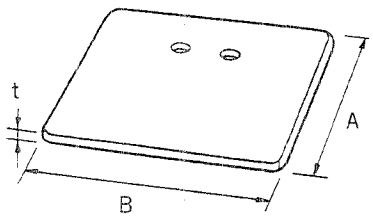
• Parts to be additionally attached

| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Joint for top cover, right | 1 | B11262200A0 |
| 2 | Joint for top cover, left | 1 | B11272200A0 |
| 3 | Bottom cover, right | 1 | B1128220000 |
| 4 | Bottom cover, left (for the sewing machine in urban-white) | 1 | B112822000A |
| 5 | Bottom cover, left | 1 | B1129220000 |
| 6 | Bottom cover, left (for the sewing machine in urban-white) | 1 | B112922000A |
| 7 | Screw | 8 | SM1030601SC |
| 8 | Nut | 8 | NM7030550SB |
| 9 | Top cover sheet | 2 | B1131220000 |
| 10 | Throat plate auxiliary cover support, right | 1 | B1113224000 |
| 11 | Throat plate auxiliary cover support, left | 1 | B1121224000 |
| 12 | Throat plate auxiliary cover holder | 2 | B1132224000 |
| 13 | Screw | 6 | SS9110920CP |
| 14 | Washer | 6 | WP0520656SA |
| 15 | Needle DP x 17 #14 | 1 | MDP170B1400 |
| 16 | Needle bar thread guide for heavy-weight materials | 1 | B1406210000 |
| 17 | Slide plate bracket, right | 1 | B2544222000 |
| 18 | Slide plate bracket, left | 1 | B2545222000 |
| 19 | Work clamp foot slide plate (asm.) | 1 | B26102200A0 |
| 20 | Double-stepped stroke feeding frame (asm.) | 1 | B25142200A0 |
| 21 | Attaching screw | 2 | SS6121060SP |
| 22 | Inverting intermediate presser, (asm.) | 1 | B43012200A0 |
| 23 | Screw | 2 | SS7151210SP |
| 24 | Washer | 2 | WP0651056SD |
| 25 | Inverting feeding frame arm | 1 | B4322220000 |
| 26 | Solenoid valve connector (asm.) | 1 | B47122200A0 |
| 27 | Solenoid valve connector B (asm.) | 1 | B47122200AB |
| 28 | Solenoid valve connector C (asm.) | 1 | B47122200AC |
| 29 | Double-stepped stroke feeding frame cable (asm.) | 1 | B47142200A0 |
| 30 | Inverting junction tube | 1 | B4329220000 |
| 31 | Solenoid valve (asm.) | 1 | PV0351240B0 |
| 32 | Solenoid valve | 2 | PV140501000 |
| 33 | Shuttle valve | 1 | PV205101000 |
| 34 | Quick-coupling joint | 3 | PJ301045101 |
| 35 | Inverting junction joint | 1 | PJ303040002 |
| 36 | Cable band B | 6 | HX002330000 |
| 37 | Nylon clip B | 1 | HX00150000E |
| 38 | Tube clamp A | 1 | HX002890000 |
| 39 | Tube clamp B | 2 | HX000220000 |
| 40 | PK-47 3-pedal unit | 1 | GPK470010A0 |
| 41 | PK-47 3-pedal unit (for the sewing machine in urban-white) | 1 | GPK470010AB |
| 42 | Pedal switch junction cord (asm.) | 1 | B82052200A0 |
| 43 | Connector mounting plate | 1 | B8213206000 |
| 44 | Screw | 2 | SM4040601SC |
| 45 | Washer | 2 | WP0430800SC |
| 46 | x coupling | 1 | B2537220A00 |
| 47 | Screw | 4 | SM8061002TP |
| 48 | System ROM | 1 | HL008420074 |

• Parts of which quantity used is to be changed

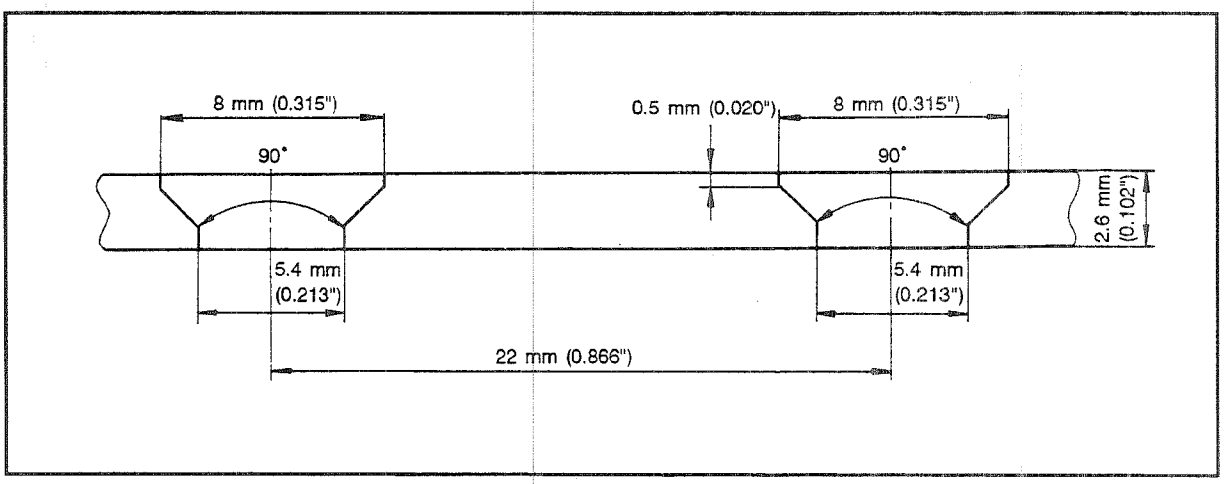
| | Name of part | Q'ty | Part No. |
|---|---|---|---|
| 1 | Work clamp stopper | 2 → 1 | B2580220000 |
| 2 | Screw | 4 → 2 | SS6120940SP |
| 3 | Nylon clip | 3 → 2 | EA9502B0500 |
| 4 | ϕ4 air tube A | 2 → 3 | B471022000A |
| 5 | ϕ4 air tube B | 2 → 6 | B471022000B |
| 6 | Hose nipple | 3 → 7 | PJ032052503 |
| 7 | Pressure reducing valve | 1 → 3 | PF070501000 |
| 8 | Speed controller A | 2 → 6 | PC012401000 |

### 6-5. Options (to be added to the T type)

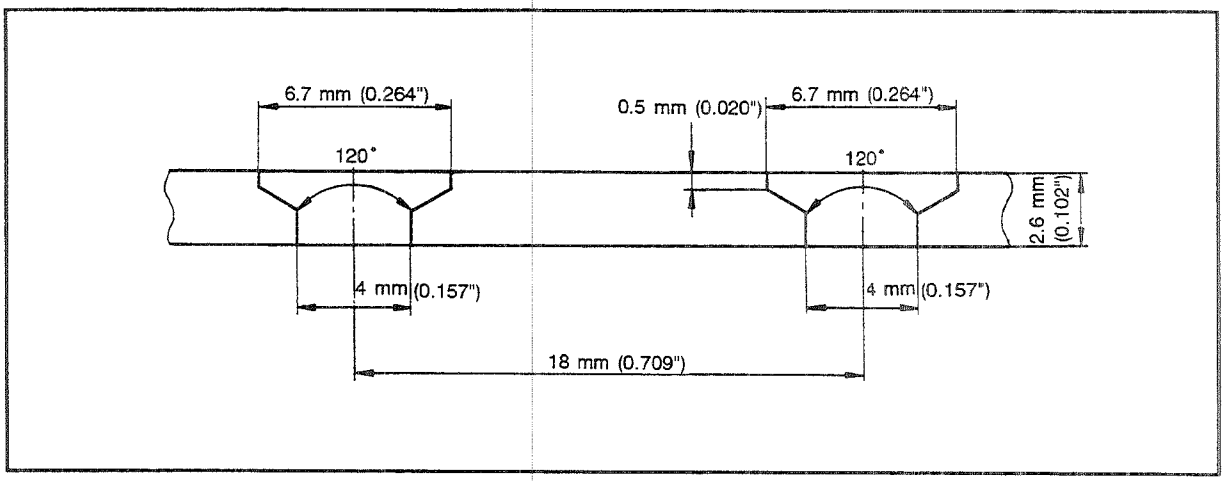
| Name of part | Type | Part No. | Size (mm) |
|---|---|---|---|
| 1. Intermediate presser mounting base   | Inverting intermediate presser mounting base B<br><br>Screw | B4316220000<br><br>SS1090750SP | A x B x t<br>8 x 24 x 15 (0.315" x 0.945" x 0.591") |
| 2. Crank shaft   | Inverting crank shaft B | B4326220000 | A x B x ϕC<br>26 x 71 x 7 (1.024" x 2.795" x 0.276") |
| 3. Plastic blank   | Inverting intermediate presser plate blank with knurl, large<br><br>Inverting intermediate presser plate blank with knurl, medium<br><br>Inverting intermediate presser plate blank with knurl, small | B4317220000<br><br>B4318220000<br><br>B4319220000 | A x B x t<br>122 x 206 x 2.6 (4.803" x 8.110" x 0.102")<br>100 x 126 x 2.6 (3.937" x 4.961" x 0.102")<br>50 x 80 x 2.6 (1.969" x 3.150" x 0.102") |

## 6-6. When manufacturing an inverting intermediate presser

1) If you use the standard inverting intermediate presser mounting base (B4320220000), be sure to drill attaching holes in the inverting intermediate presser as illustrated.




2) If you use the optional inverting intermediate presser mounting base B (B4316220000), be sure to drill attaching holes in the inverting intermediate presser as illustrated.




**(Caution)**

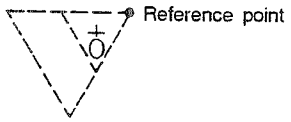
1. **Determine the location of the attaching holes to be drilled, considering the needle entry near the inverting crank shaft. (Refer to the description given in "3. Inputting the needle entry point near the crank shaft" (Page. 276).)**
2. **If the inverting intermediate presser is thicker than 2.6 mm (0.102"), the applicable material thickness will be 4 mm (0.157") or less.**

## 6-7. Inputting a reference point for pattern enlargement/reduction and an inversion point using a PGM-1

This subject is not covered by the Instruction Manual for the PGM-1.
It is described separately for the other programming devices.

### 1. Description of the function

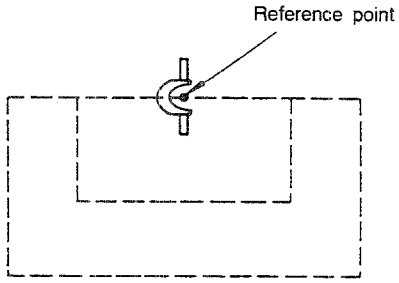
1) Inputting a reference point for enlargement/reduction of a normal pattern
At the time of programming a pattern, by entering a point that you want to use as the reference point for enlargement or reduction, the pattern can be enlarged or reduced taking the point as the reference point.
If this point has not been input, the pattern enlargement/reduction will be carried out taking the conventional origin.




Enlargement based on preset reference point

Enlargement with no reference point input

2) Inputting a reference point for enlargement/reduction of an inversion pattern
As in the case of a normal pattern, by entering an enlargement/reduction reference point while the Inverting Clamp indicator LED lit up, the inversion pattern can be enlarged or reduced with the specified point as the reference point.
No enlargement or reduction can be made without this point.




Enlargement based on the preset reference point

N.G

No reference point input

(Caution)
**Be very careful with the reference point input, since an improper reference point may cause the crank shaft to interfere with the needle when the pattern is enlarged/reduced, resulting in needle breakage.**

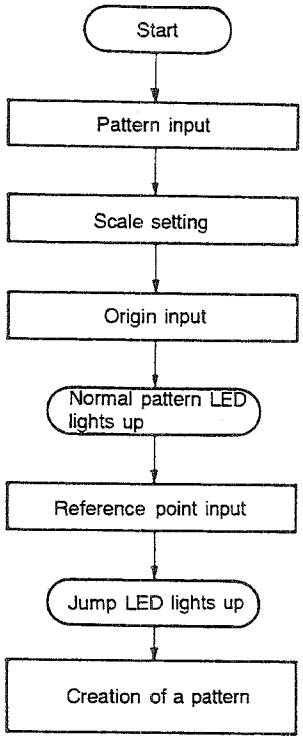
3) Inputting an inversion point for an inversion pattern
To program an inversion pattern, enter data up to a point where the inverting crank shaft is to be reversed, cause the "jump" indicator lamp to light up, and specify "0." This will make the inverting crank shaft to be reversed at that point.
If no inversion point has been entered, the inverting crank shaft will be reversed at the conventional position that is 14 mm (0.551") away from the center of the inverting crank.

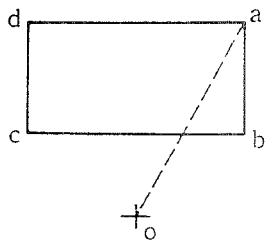
## 2. Explanation of inputting procedure

1) Entering a reference point for enlargement/reduction for a normal pattern

**[ Example ]**

A reference point for enlargement/reduction will permit easier positioning for sewing workpieces which have the same configuration but different sizes.



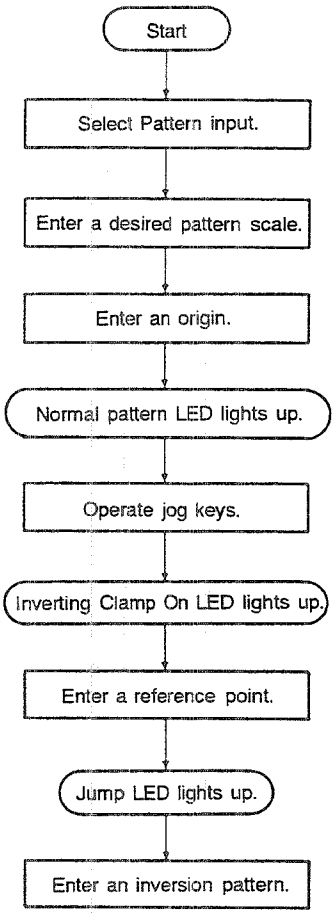



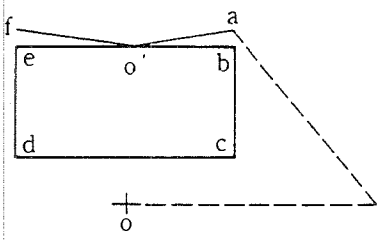

①. Select the "Pattern input."
②. Enter a desired pattern scale.
③. Enter the origin "o."
④. Hit point "a" to enter it while the Normal pattern LED lights up. (Point "a" is used as the reference point for enlargement/reduction.)
⑤. Enter a jump from origin "o" to reference point "a."
⑥. Enter the following points under the Linear input mode.
b → c → d → a
⑦. Enter a thread trimming.
⑧. Programming completes.

2) Inputting a reference point for enlargement/reduction for an inversion pattern

**[ Example ]**

For inversion patterns whose label sizes are almost the same, the same inverting intermediate presser is used.
Inversion pattern with different label sizes may also be handled.




①. Select the "Pattern input."
②. Enter a desired pattern scale.
③. Enter the origin "o."
④. Operate the jog keys to make the Inverting Clamp On LED light up.
⑤. Enter point "b" which is to be used as the reference point for enlargement/reduction. (The Jump LED lights up.)
⑥. Enter a jump from origin "o" to reference point "a."
⑦. Enter the following points under the Linear input mode. (Point "a" has already been entered.)
o → b → c → d → e → o' → f
⑧. Enter a thread trimming.
⑨. Programming completes.
(Points "a" and "b," and "e" and "f" indicate the same points.)

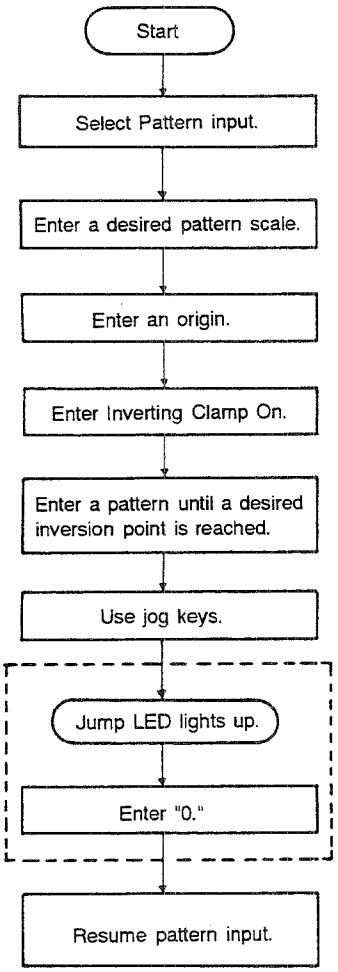
(Caution)

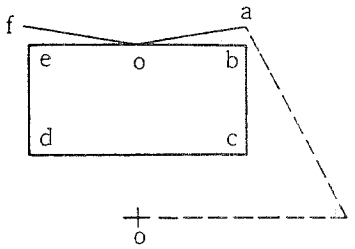
1. **The reference point for enlargement/reduction of an inversion pattern are related to both the inverting intermediate presser and the inverting crank shaft.**
   **So, after enlarging/reducing a pattern, it is necessary to make sure that they do not come in contact with each other during forward or backward feed.**
2. **The aforementioned procedure ④ (data input) is carried out to declare that the pattern to be input will be an "inversion pattern" and to store it in pattern data.**
   **Without this declaration, the procedures including an inverting point input (next page) cannot be carried out.**

3) Inputting an inverting point for an inversion pattern

**[ Example ]**

The inverting clamp can be used even for a pattern whose label size is too small to pass over the inversion line.




① . Select the "Pattern input."
② . Enter a desired pattern scale.
③ . Enter the origin "o."
④ . Enter "Inverting Clamp On." ("Inversion" is specified.)
⑤ . Enter a jump from origin "o" to point "a."
⑥ . Enter the following points under the Linear input mode. (Point "a" has already been entered.)
o' → b → c
⑦ . Operate the jog keys to make the Jump LED light up. (For making pattern inversion at point "c")
⑧ . Press the numeric key "0" on the PGM-1.
⑨ . Enter the following points under the Linear input mode. (Point "c" has already been entered.)
d → e → o' → f
⑩ . Enter a thread trimming.
⑪ . Programming completes.
(Points "a" and "b," and "e" and "f" indicate the same points.)

With the programming procedure described above, you can cause the inverting crank to be reversed at point "c."

Inversion points can be set by the steps enclosed with the broken line shown above. You can set any number of inversion points as desired by performing the steps in the broken-line rectangle.
The inverting crank is oriented to the left ( ) at the start of sewing, and shifted to the right ( ) at an inversion point. After that, the inverting crank is alternately shifted to the right and left ( , ) for each inversion point.
Be sure to always set an odd number of inversion points. If you have set an even number, the inverting crank will be oriented to the left ( ) at the end of sewing. As a result, the inverting crank will interfere with the needle at the end of sewing, causing the needle to break.
It is impossible to set any inversion points under the following conditions:

1. The area in which "jump" is input before reaching the sewing start point
2. Immediately after entering a 2nd origin after the intermediate stop point
3. Immediately after entering a thread trimming

JUKI

JUKI CORPORATION
BUSINESS OFFICE
1-23-3 KABUKI-CHO
SHINJUKU-KU, TOKYO 160, JAPAN.
PHONE : 03(3205)1188, 1189, 1190
FAX : 03(3203)8260, (3205)9131
TELEX : J22967, 232-2301

To order or for further information, please contact :

Printed in Ja