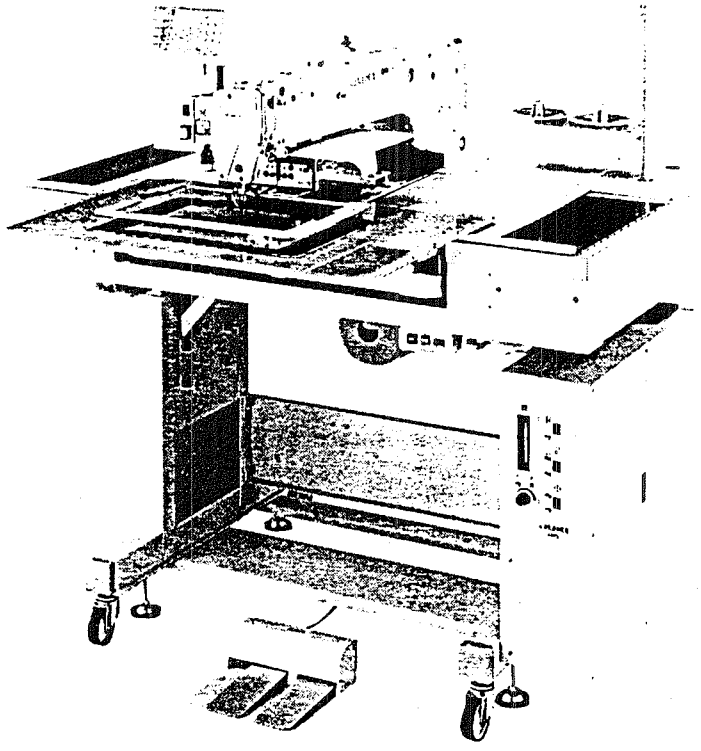
JUKI

Large-sized Computer-controlled Cycle Machine

AMS-223C

(Preliminary)

ENGINEER'S MANUAL



PREFACE

This Engineer's Manual is written for the technical personnel who are responsible for the service and maintenance of the machines.
The Instruction Manual for these machines intended for the maintenance personnel and operators at an apparel factory contains detailed operating instructions. And this manual describes "How to Adjust", "Results of Improper Adjustments", and other information which are not covered by the Instruction Manual.
It is advisable to use the pertinent Instruction Manual and Parts List together with this Engineer's Manual when carrying out the maintenance of these machines.
This manual mainly consist of three sections; the first section presents "Standard Adjustment", the second section, "How to Adjust", and the third, "Results of Improper Adjustment."

This Engineer's Manual describes the AMS-223C Series model of sewing machine. The model names (types) are described with the following abbreviated forms of their names for convenience' sake.

AMS - 223C [S] [S] - 5000

- [S] (2nd): Feeding frame
  - S : Standard monolithic feeding frame
  - B : Monolithic feeding frame with double-stepped stroke function
  - L : Separately-driven feeding frame with double-stepped stroke function
  - T : Inverting feeding frame with double-stepped stroke function
- [S] (1st): Sewing specification
  - S : Standard
  - H : Heavy-weight materials
  - G : Extra heavy-weight materials

Note) For sewing specification G, only S, B and L types of feeding frames are available.

This Instruction Manual is a manual for sewing machine with S type feeding frame. For explanations of the machine with B, L or T type feeding frame, refer to the separate volumes of Instruction Manuals for the respective types of machines.

This Engineer's Manual consists of four chapters in all. Chapter I mainly gives an explanation of the S type of the AMS-223C Series model of sewing machine. It also describes the subjects that are common to all the types of the AMS-223C 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-223C Series model of sewing machine which are not covered by Chapter I.
This Manual is written based on the Engineer's Manual for AMS-215C. Common items and description given in the Instruction Manual for AMS-223C are partly deleted from this Engineer's Manual. It is therefore necessary, when carrying out maintenance works of this machine, to refer not only to this Engineer's Manual but also to the Engineer's Manual for AMS-215C, Instruction Manual and Parts Book for AMS-223C.

- For the following items, refer to the Engineer's Manual for AMS-215C.

• Use of the machine	Explanation of the control box panel
• Configuration and functions of components	Configuration and functions of motor components
• Adjustment of components	Adjusting the timing of the shuttle race cap spring
	Height of the intermediate presser adjusting screw
	Adjusting the length of needle thread remaining
	Amount of thread wound round the bobbin
	Contour of the shuttle race ring
• Disassembly/assembly procedure	Removing the wiper and wiper magnet
• Maintenance and inspection	Adjustment and maintenance of the motor

- Refer to the Instruction Manual for the AMS-223C for the following items.

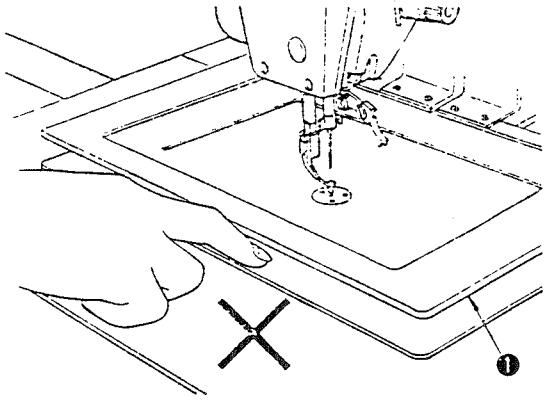
[Instruction Manual for the AMS-223C (standard type)]

[Instruction Manual for the AMS-223C subclass (with a double-stepped stroke feeding frame)]

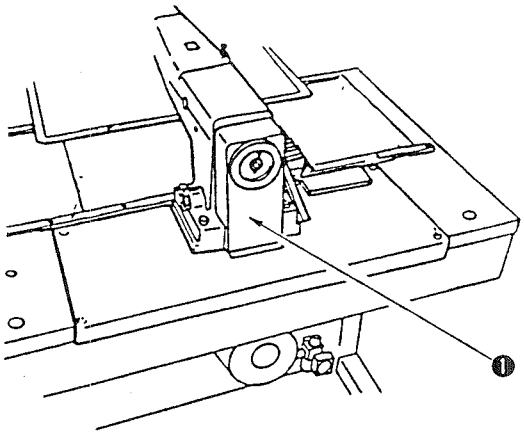
[Instruction Manual for the AMS-223C subclass (with a separately-driven feeding frame)]

[Instruction Manual for the AMS-223C subclass (with an inverting intermediate presser)]

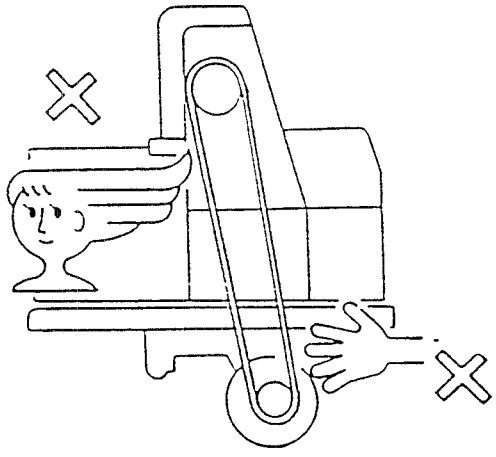
CAUTION



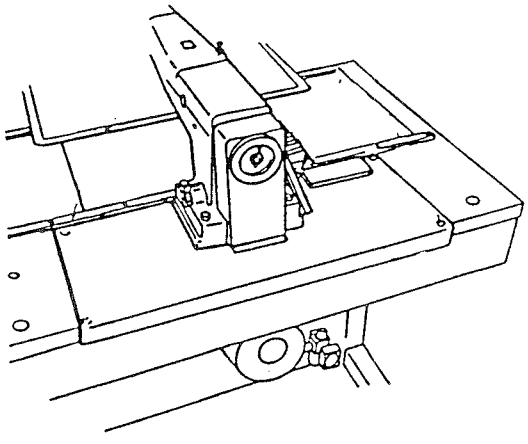
1. When a pattern change is made, or the bobbin winder switch or the feeding frame switch is turned ON, feeding frame ❶ comes down automatically. So, never put your fingers under the feeding frame. Be sure to keep your fingers away from the feeding frame while the machine is in operation.

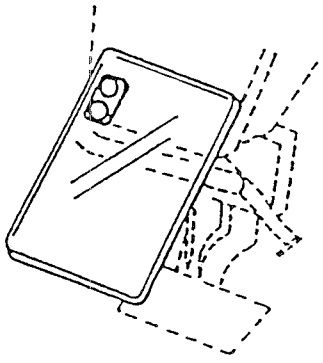


2. Be sure to turn the power switch OFF before removing belt cover ❶. Do not operate the machine with the belt cover removed.



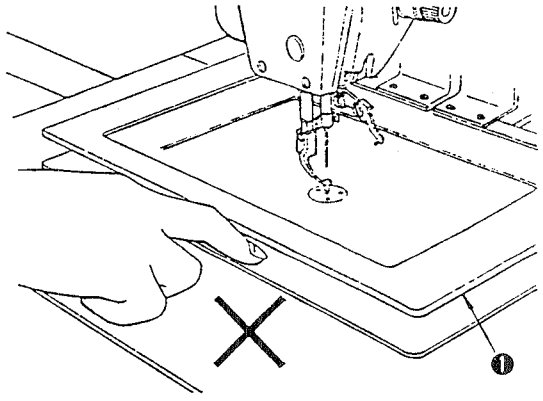
3. During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, V belt or motor. Also, do not place anything near any of these parts while is in operation. Doing so may be dangerous.





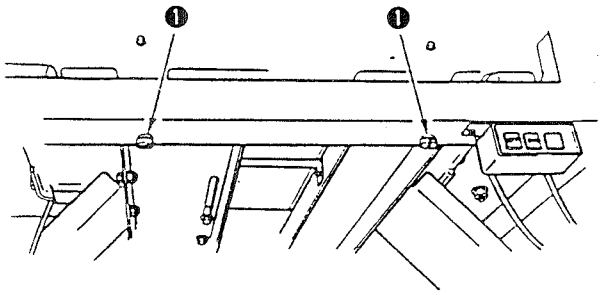
4. If your machine is equipped whit a belt cover, eye guard or any other protections, do not operate your machine with any of them removed.

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

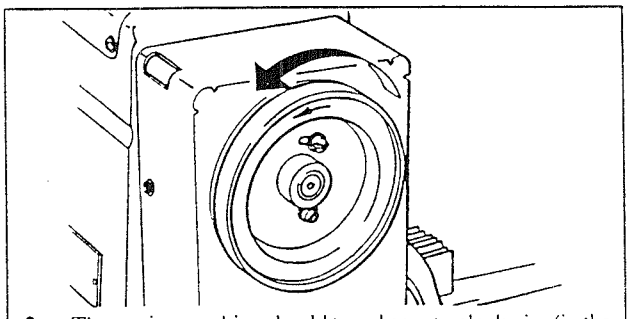


6. Don't put your hand under the needle when you turn "ON" the power switch or operate the machine.
7. Don't put your hand into the thread take-up cover while the machine is running.
8. To ensure safety, never operate the machine with the ground wire for the power supply removed.
9. The motor is completely silent when the machine is at rest. So, attention has to be paid not to forget to turn OFF the power to the machine.
10. If the machine is suddenly moved from a cold place to a warm place, dew condensation may be observed. In this case, turn ON the power to the machine after you have confirmed that there is no danger of water drops in the machine.
11. In time of thunder and lightning, stop your work and disconnect the plug from the receptacle so as to ensure safety.
12. When inserting/removing the power connector, the power switch has to be turned OFF in advance.
13. Dust in the control box will cause a malfunction and failure. So, be sure to close the cover of the control box during operation and periodically clean the filter of the fan every week.
    Be sure to turn OFF the power to the machine before opening the cover of the control box.
14. Do not inspect the inside portion of the control circuit with a tester since the voltage of the tester may be applied to the semi-conductors and damage them.
15. When winding a bobbin, depress the Start switch after confirming that no obstacle is placed under the needle.
16. While the READY indicator lamp flashes on and off, the computer is under operation. After the completion of operation, the feeding frame will automatically come down. Do not place your fingers or any other thing under the feeding frame.

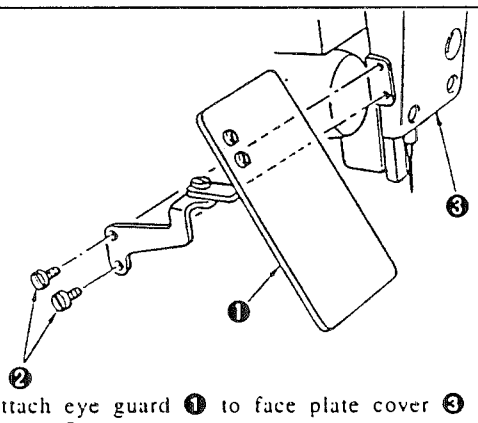
CAUTIONS BEFORE OPERATION



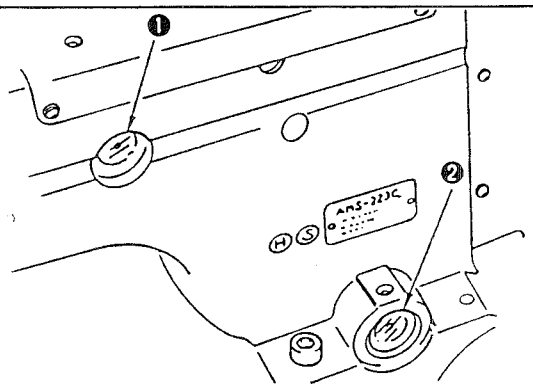
1. Remove bed fixing bolt ❶ before starting operation. When transporting your AMS-223C, install bed fixing bolt ❶ .



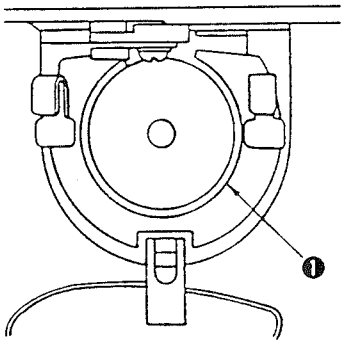
2. The sewing machine should travel counterclockwise (in the direction of the arrow), as observed from the pulley side. If the machine is allowed to run clockwise, the machine will automatically stop with error message [E] indicated on the panel.



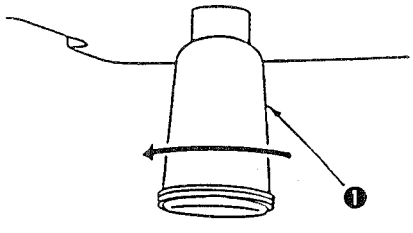
3. Attach eye guard ❶ to face plate cover ❸ using screws ❷ .



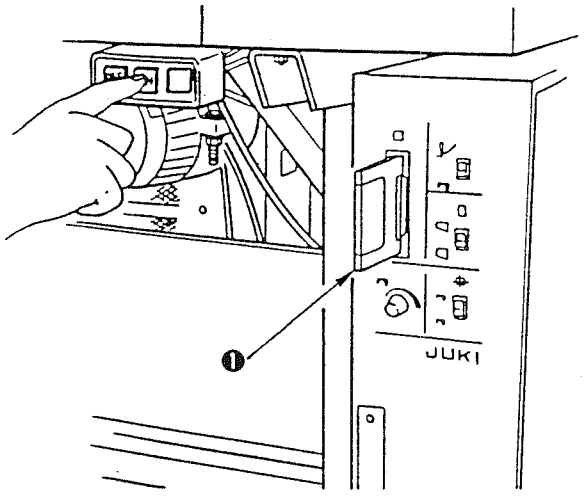
4. Be sure to supply oil until the oil level reaches red marks ❶ and ❷ on the oil gauge.



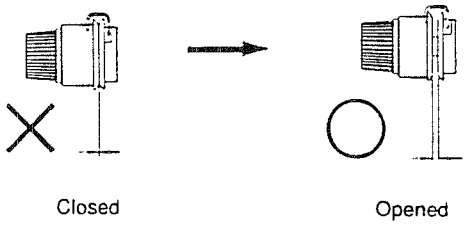
5. Apply one drop of the lubricating oil to the racing surface ❶ .



6. When polyethylene container ❶ becomes filled with oil, remove it and drain the oil.



7. Be sure to turn ON/OFF the power to the machine with floppy disk ❶ removed. If the power switch should be turned ON or OFF with the floppy disk ❶ mounted, the data stored in the disk may be destroyed.

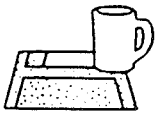


8. When the threader and sewing machine are switched ON, sew the desired sewing pattern with the thread tension disk closed. Once you have completed the thread trimming, the thread tension disk will open.

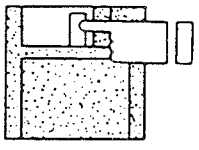
9. During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, V belt, bobbin winder or motor. Also, do not place anything near any of these parts while the machine is in operation. Doing so may be dangerous.

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

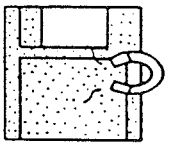
11. Precautions in handling floppy disks



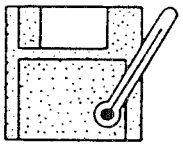
Do not place the floppy disk near an ashtray or food and drink.



Do not touch the exposed parts of the floppy disk.



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



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

12. Before sewing a new pattern or a new feeding frame (small) be sure to check the contour of the pattern for the relation between the feeding frame and the pattern.

13. Be sure to check for a cause of trouble and take a proper corrective measure when the error indicator lamp lights up.

14. Do not draw, by hand, the material being sewn during sewing. Doing so will cause the needle shift from the correct position. If the needle moves from the correct position in terms of the X/Y direction, press the [Set Ready switch] twice. This will return the needle to the normal origin.

15. The AMS-223C is provided with the main unit input function as standard, however, a sewing pattern which extends beyond the sewing area (300 mm × 200 mm) 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.}

CONTENTS

CHAPTER 1
AMS-223CSS, AMS-223CHS, AMS-223CGS (STANDARD FEEDING FRAME TYPE)

CHAPTER 1

STANDARD FEEDING FRAME TYPE (S TYPE)

AMS-223CSS

(for light-weight materials)

AMS-223CHS

(for medium-weight materials)

AMS-223CGS

(for heavy-weight materials)

- Subjects common to all the type of the AMS-223C Series model of sewing machine are also described.

1. FEATURES

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

2. **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**
As for input through the main unit, the feed is operated by means of a switch in the operation panel. In this way, appropriate data are input so as to meet the requirements of the sewing material which corresponds to the sewing needle. Patterns can also be easily input using the optional input device (PGM-5A).

4. **Micro floppy disk to store sewing pattern data**
A 2DD 3.5-inch micro floppy disk is used, accommodating 44 to 691 patterns.

5. **Easy operation and better design**
Key switches are used for easier operation. The compact operation panel is located on the sewing machine head for the user's convenience and for better design.

6. **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 memory switches, which permits optimum feed timing selection in accordance with each sewing product.

7. **The incorporation of a 16-bit microprocessor allows the machine to produce a maximum of 4,000 stitches per pattern.**
The max. number of stitches for a sewing pattern is normally 4,000. For combined pattern, as many as 20,000 stitches can be input. This enables the machine to adapt to the decorative stitching with many stitches.

8. **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.

9. **Easy workpiece setting**
In addition to the second origin setting function, the lift of the feeding frame is as high as 30 mm (max.), which allows a workpiece to be set easily.

10. **Assures stable stitch length regardless of sewing speed changes.**
The AMS-223C is designed to adjust the sewing speed for each stitch before feeding the material so as to provide the optimum feed timing for the sewing speed. This ensures consistent stitch lengths for any sewing speed.

11. **Newly-developed long arm ensures wider area under the arm.**
This means a material that needs added depth for setting can easily be set on the machine.

12. **The maximum stitch length can be increased.**
The stitch length can be increased to a maximum of 12.7 mm.

13. **Flexible response to material changes**
A DPx17 needle is used to sew heavy-weight material, while a DPx5 needle is used to sew light-weight material. The needle can be changed with the face cover installed. Furthermore, the same needle bar can be used regardless of the type of needle.

14. **Easy winding of the bobbin thread**
The bobbin winder is located near the operator. It is equipped with a bobbin thread cutting knife, thereby ensuring easy operation at the time of winding a bobbin.

15. **Multi sewing functions**
The machine comes with a needle thread breakage detecting function and a bobbin thread replacement indicating function, which enhance the machine's sewing capability.

16. **Shorter the time required for sewing**
At the end of sewing, the feeding frame automatically returns to the sewing start position, allowing for a quick sewing operation.

17. **Many kinds of pattern figure**
A micro floppy disk can accommodate nine different commands, and various pattern figures can be sew by combining them.

18. **Capability of responding to pattern changes improved.**
The machine is equipped with a feeding frame and feed plate which can be removed with the simple touch of a key. This allows the machine to respond flexibly to any pattern change. (Option)

19. **Feeding frame mechanism improved for greater stability**
The pneumatic driving system for the feeding frame allows the material to be fed with greater stability. Regardless of the thickness of the material, consistent pressure is obtained.

20. **Consistent sewing speed**
The 400W 4-pole sewing machine motor accommodates a standard pulley, allowing the machine to run at a consistent sewing speed. (G type: 550W 2P motor)

21. **Capable of inputting and modifying a complicated sewing pattern.**
The sewing machine is capable of inputting and modifying needle entry points in 0.1 mm steps.

22. **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-223C with no additional machining.

23. **A milling unit can be attached to the machine after the set-up.**
A milling unit is optionally available. It can be attached to your AMS-223C, which allows you to machine a plastic feeding frame or aluminum feeding frame as desired with ease.

24. **Patterns used for the AMS series model of sewing machine can also be used for the AMS-223C.**
The AMS-223C is capable of using sewing patterns that are used for all the AMS series models of sewing machines. However, note that a sewing pattern that exceeds the sewing area of the AMS-223C. Patterns used for the AMS-223C can also be used for the AMS-210C (0.1 mm type), -210P, -215C, -215P, -220C (0.1 mm type) and -220P. Note that however any pattern that exceeds the sewing area specified for the respective models of sewing machines cannot be used. (Note: When using a sewing pattern used for the other AMS series models, the AMS-223C will convert the conventional stitch length of 0.16 mm to 0.1 mm. This means that the stitch length and shape of the sewing pattern may change.)

25. **Hand pulley improves ease of maintenance.**
The machine arm is equipped with a hand pulley. This ensures easier maintenance works such as adjustment of needle entry when inputting a sewing pattern, adjustment of height of the intermediate presser and hook timing.

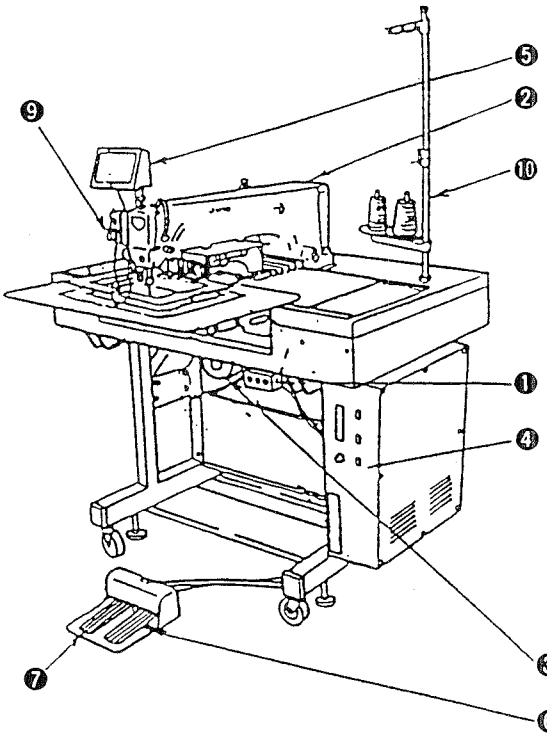
26. **Functions can be changed/specified.**
The machine incorporates a memory switch which allows the operator to change functions of the machine through the operation panel.

2. SPECIFICATIONS

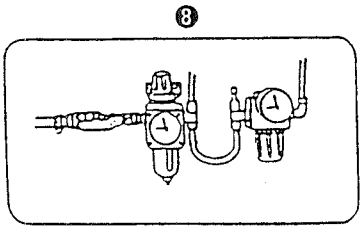
1)	Sewing area :	X (lateral) direction 300 mm Y (longitudinal) direction 200 mm
2)	• Max. sewing speed :	2,000 s.p.m. (adjustable in 3 mm or less)
	• Jump speed :	250 mm/sec.
3)	Stitch length :	0.1 to 12.7 mm (adjustable in 0.1 mm steps)
4)	Feed motion of feeding frame :	Intermittent feed (2-shaft drive by stepping motor)
5)	Needle bar stroke :	41.2 mm
6)	Needle :	DP × 5, DP × 17
7)	Lift of feeding frame :	25 mm (standard) Max. 30 mm
8)	Intermediate presser stroke :	4 mm (standard) (0,3 to 7 mm)
9)	Lift of intermediate presser :	20 mm
10)	Lubricating oil :	New Defrix Oil No. 2 (supplied by oiler)
11)	Intermediate presser lifter :	Vertical motion driven by an air cylinder (with release switch)
12)	Enlarging/Reducing method :	Pattern enlargement/reduction can be done by increasing/decreasing either stitch length or the number or stitches.
13)	Memory backup :	In case of a pawer interruption, the pattern being used will automatically be stored in memory so that the interrupted sewing cycle may be resumed simply by pressing the Set Ready switch after the power is restored. No floppy disk is necessary. The memory is held for 100 hrs.
14)	2nd origin setting facility :	Using jog keys, a 2nd origin (needle position after a sewing cycle) can be set in the desired position within the sewing area. The set 2nd origin is also stored in memory.
15)	Sewing machine motor :	400W, 4P electronic-stop motor (550W, 2P for the sewing specification G)
16)	Dimensions :	1,230 mm (W) × 1,190 mm (L) × 1,285 mm (H) (excluding thread stand)
17)	Gross weight :	284 kg
18)	Power consumption :	1 KVA
19)	Operating temperature range :	5° to 40°C
20)	Operating humidity range :	20 to 80% (no dew condensation)
21)	Line voltage :	Rated voltage ± 10% 50/60 Hz
22)	Air pressure used :	5 to 5.5 kgf/cm^2 (0.5 to 0.55 MPa) Note that the operating air pressure for driving the feeding frame is 3 to 3.5 kg/cm^2 (0.3 to 0.35 MPa).
23)	Air consumption :	1.8 ℓ/min.

3. OPERATION

Names of the main components



❶ Power ON/OFF switch
❷ Sewing machine head
❸ Sewing machine motor
❹ Control box
❺ Operation panel
❻ Feeding frame switch
❼ Start switch
❽ Air regulating device
❾ Temporary stop switch
❿ Thread stand



❶ Power ON/OFF switch	To turn ON/OFF the sewing machine motor, control box and operation panel.
❷ Sewing machine head	The work holder, which is driven by the stepping motor, moves 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.
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.
❺ Operation panel	Consists mainly of switches, digital 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. The memory switch is used for selecting operations and changing set values.
❻ Feeding frame switch	Turns ON/OFF the feeding frame solenoid at the time specified to lift or lower the feeding frame.
❼ Start switch	Acts as the sewing command switch, and starts sewing based on the data stored in the micro floppy disk.
❽ 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.
❾ Temporary stop switch	Press this switch to stop the feed and sewing mechanism of the sewing machine during operation. When this switch is pressed during a stitching cycle, the machine stops without performing automatic thread trimming. At this state, the return to origin, forward and backward switches become valid after thread trimming has been performed by raising or lowering the needle threading switch.
❿ Thread stand	

Operation panel

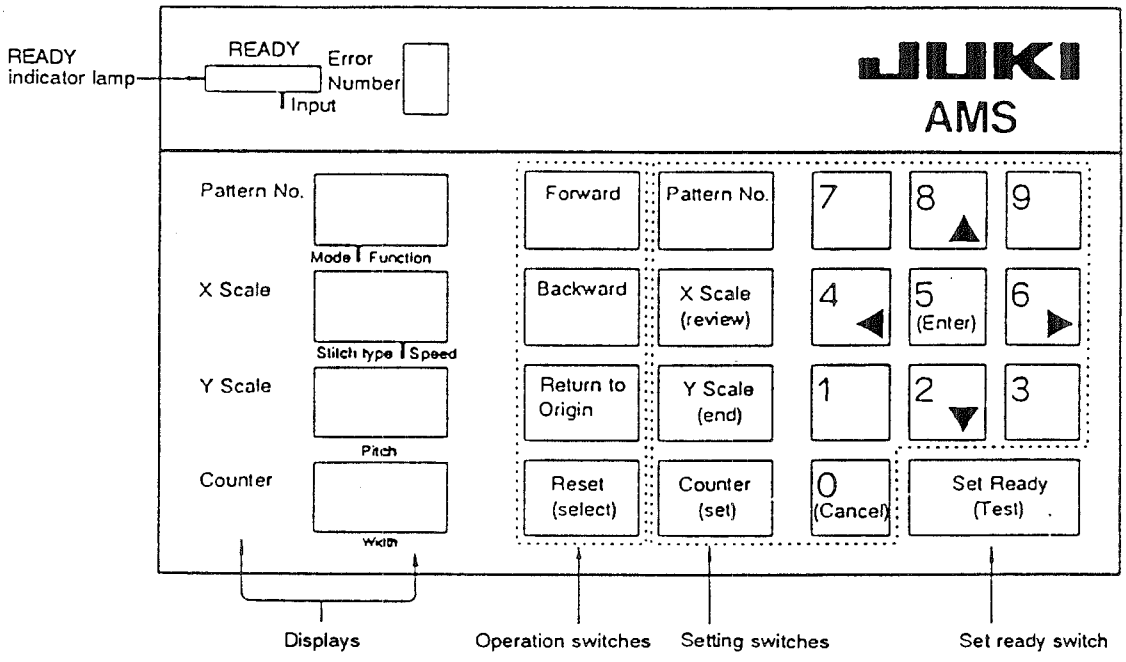


Fig.

1. Setting switches
   These switches can be set immediately after the power switch is turned ON or when the READY indicator lamp goes out by pressing the set ready switch. After pressing a setting switch, the desired value is entered using the numeric keys. The entered value will be shown on the corresponding digital display.
   The designated number must consist of three digits. If more than three digits are entered, only the last three digits entered will become the designated figures.

2. Pattern No.
   Selects a pattern or patterns which have been stored in the floppy disk (001 to 999).
   [Caution]
   If a pattern No. not stored in the floppy disk is specified, error number "1" is given, and the specified number flashes on and off on the display.

3. X Scale/Y Scale
   Taking a pattern written on the floppy disk as 100%, the original pattern can be enlarged or reduced in the X-axis and/or Y-axis independently within a range of 0.1% to 400%. The origin or the scale reference point determined when the program has been input is used as the reference point for enlarging or reducing the original pattern.
   [Caution]
   1. **Whenever a pattern has been enlarged, turn OFF the sewing machine ON/OFF switch, and be sure to check that the enlarged pattern stays within the sewing area of the feeding frame.**
   2. **With the scale switch set to "INC or DEC of stitch length," a pattern cannot be enlarged if the stitch length exceeds 12.7 mm. With the scale switch set to "INC or DEC of number of stitches," a pattern cannot be enlarged if the number of stitches exceeds the computable range (within 400 mm or 4,000 stitches by a jump input). Should this happen, error number "2" will be indicated.**
   3. **To enlarge/reduce the pattern in increments of 0.1%, set the Item 1 of Memory switch No. 13 to "2."**

4. Counter

Counts the number of garments sewn, and indicates when to replace the bobbin by means of an alarm. When the quantity of the bobbin thread has been reduced to the preset level, the counter flashes on and off urging you to replace the bobbin. Sewing is not possible while the counter is flashing on and off. Press the reset switch after replacing the bobbin, and the counter will be reset to "000", allowing the machine to be restarted. (The counter switch is turned OFF at the time of delivery.)

5. Set ready switch/READY (Sewing LED)

Sets off the following series of operation when pressed after setting the pattern No., X/Y scale, counter and scale switch (INC/DEC of stitch length or INC/DEC of number of stitches):

1) The specified pattern or patterns are read from the floppy disk.
2) Operation is performed based on the entered scale data. While the computation is being executed, the sewing LED (READY) flashes on and off.
3) Upon completion of the computation, the feeding frame comes down, automatically moves via the origin to the sewing start point (the 2nd origin if the 2nd origin has been set), and then goes up.

[Caution]

Remember that the above-mentioned series of operation to set the machine ready for sewing is performed only when the power switch is turned ON.

4) The READY lamp is continually lit instead of flashing on and off, showing that the machine is ready to start sewing. Note that you are not allowed to make any setting changes while the READY lamp is ON. To make a setting change in this case, press the set ready switch. This will cause the READY lamp to go out, thus permitting a setting change.

[Caution]

Do not put your fingers under the feeding frame since the feeding frame automatically comes down on completion of computation. If the pattern No. or X/Y scale is not changed, the pattern which has been used until the power is turned OFF can be sewn by simply turning ON the set ready switch. At this time, the floppy disk is not required.

6. Forward/Backward

When the forward switch is pressed with the feeding frame down, the material is fed forward by one stitch. When the backward switch is pressed with the feeding frame down, the material is fed backward by one stitch. If these switches are kept pressed, the material is fed slowly for the first stitch, after which it is automatically fed quickly.

7. Return to origin

When this switch is pressed during a temporary stop, the feeding frame will automatically move to the sewing start point or the 2nd origin, and the feeding frame will go up and stop.

8. Jog keys (Numeric key 1, 2, 3, 4, 6, 7, 8, 9)

These keys function as numeric keys while the READY lamp is OFF, and work as jog keys while the READY lamp is ON. If any of these keys is pressed with the feeding frame down at the sewing start, the needle will move in the direction shown by the arrow on the pressed key. At this time, the movement of the needle is automatically stored in memory. Set the 2nd origin at the desired position within the material feeding range.

9. Reset

Resets the counter value when pressed after a temporary stop following a press of the set ready switch or completion of pattern sewing. If the reset switch is pressed while the counter is flashing on and off, the total value indicated on the counter will be reset.

10. Error No. display

If any of the following errors occurs, it will be indicated by an "Error Number," and no further operation will be allowed.

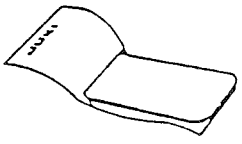
Error code	Description
1	Pattern No. error and read error.
2	Enlargement error
3	Needle up error
4	Sewing area error
5	Temporary stop indication
6	Memory capacity indication
7	Machine lock or needle position error
8	Solenoid connector error
9	Thread breakage indication
0	Micro floppy disk format error
A	Air pressure drop (less than 4 kgf/cm^2) error
E	Sewing machine reverse rotation error

11. Electronic buzzer

The electronic buzzer beeps each time a switch is pressed.

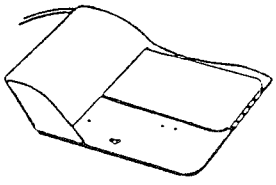
Other switches

1. Feeding frame switch



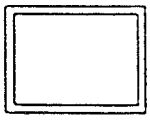
When the feeding frame switch (right) is pressed, the feeding frame will come down. Another press on the switch causes the feeding frame to go up.

2. Start switch



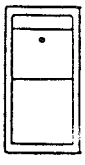
When the start switch (left) is pressed with the feeding frame down, the machine starts sewing.

3. Temporary stop switch



This switch is used to stop the feed and sewing mechanisms during operation. When this switch is pressed during a stitching cycle, error number "5" will be indicated. Subsequently, the error indication on the display will flash on and off and will then remain lit up.

4. Wiper switch



This switch is used to select whether the wiper is to be actuated after thread trimming.

Checking before operation

1. Be sure that the line voltage is suitable for the machine table.

2. Be sure that the needle stays within the feeding frame.

3. Be sure that the needle entry point is set at the center of the intermediate presser.

4. Be sure that no micro floppy is in the disk driver.

   [Caution]

   If the power switch is turned ON/OFF with a micro floppy disk loaded, the data stored in the disk may be erased. So be sure to load or unload the disk while the power is ON. Also, be sure to write-protect the disk except when writing data on the disk.

5. Check the direction of rotation of the sewing machine as follows:
   When the bobbin winder switch is turned "ON" upon completion of sewing preparation, the feeding frame will come down. The sewing machine will then run when the start switch is pressed. At this time, check that the pulley turns counterclockwise as observed from the pulley side. If the pulley turns in the opposite direction, correct it by reversing the motor power plug connection, i.e., turn the plug 180 degrees before reconnecting it.

   [Caution]

   Be sure to turn OFF the power switch before connecting or disconnecting the motor power plug. Also, be sure to securely connect the plug.

6. Check the oil level.
   Lubricate the machine (there are two lubrication holes) until the oil level reaches the red mark on the oil gauge. Before starting the sewing machine which has just been installed or which has not been used for a long period of time, apply a few drops of lubricating oil to the crank assembly through the crank lubricating hole, and one drop to the shuttle race surface.

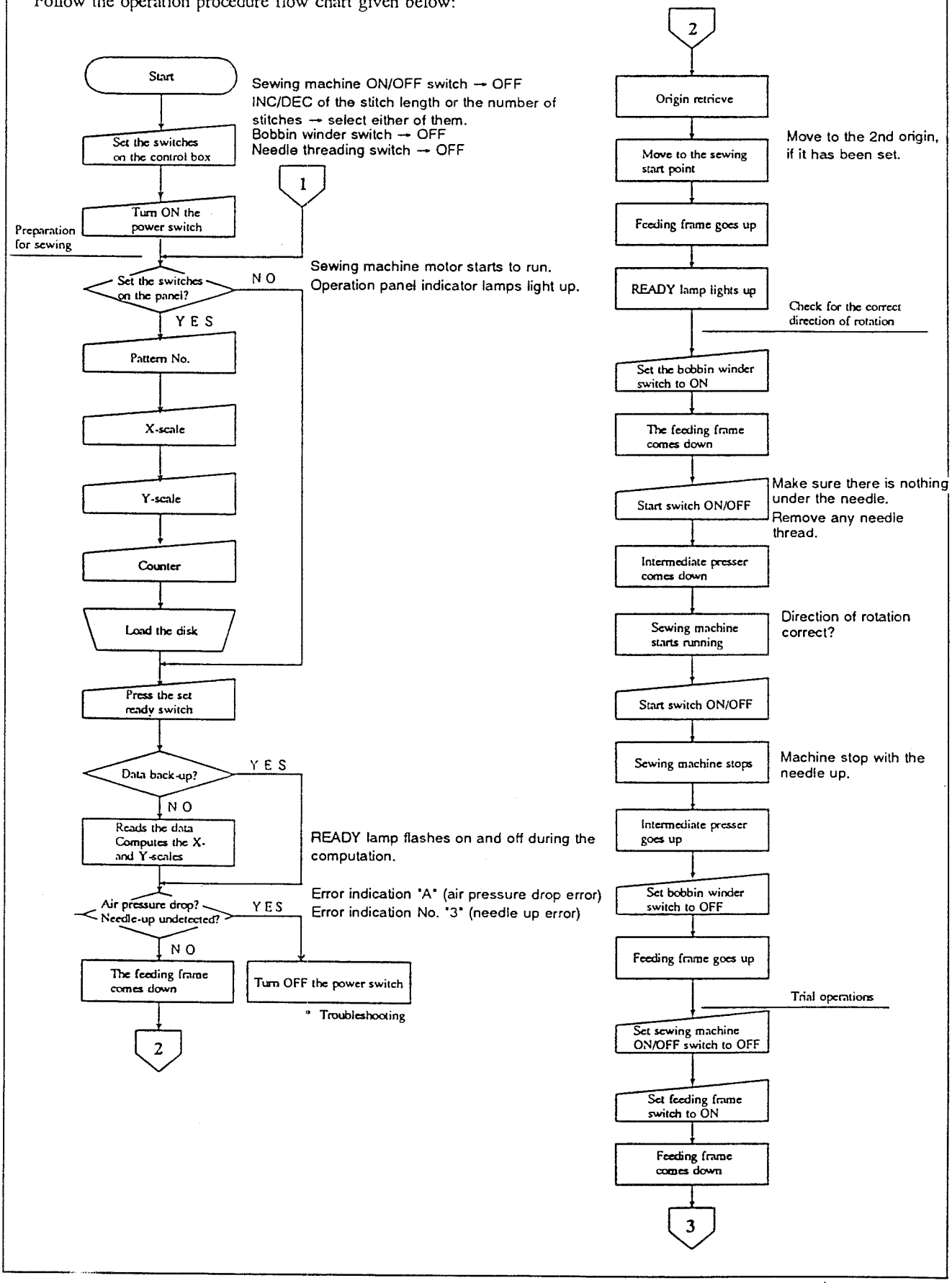
7. Remove the bed fixing bolt before starting operation. Install the bed fixing bolt at the time of transportation.

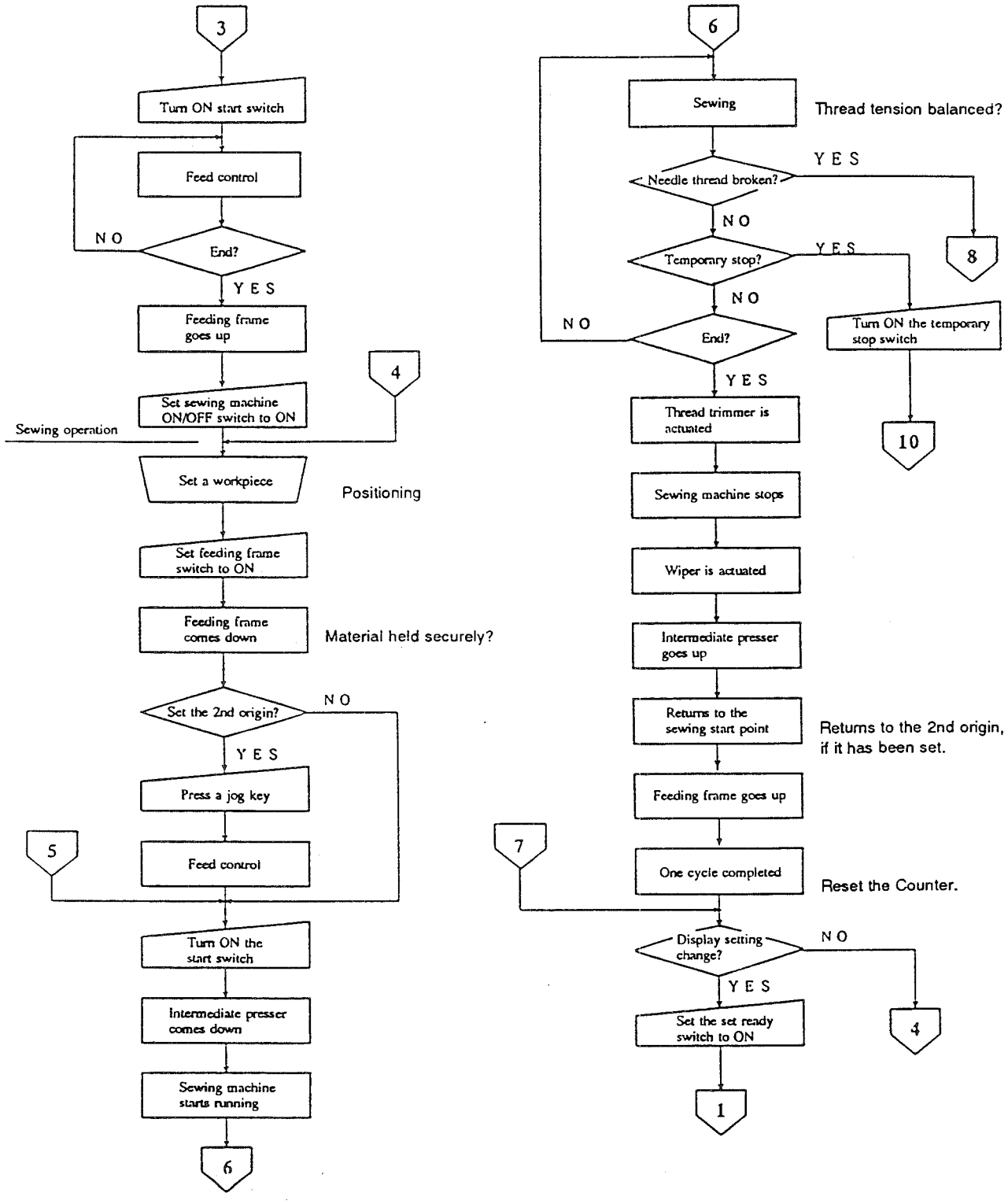
8. When the polyethylene oiler is completely filled with oil, remove the oiler so that it can drain.

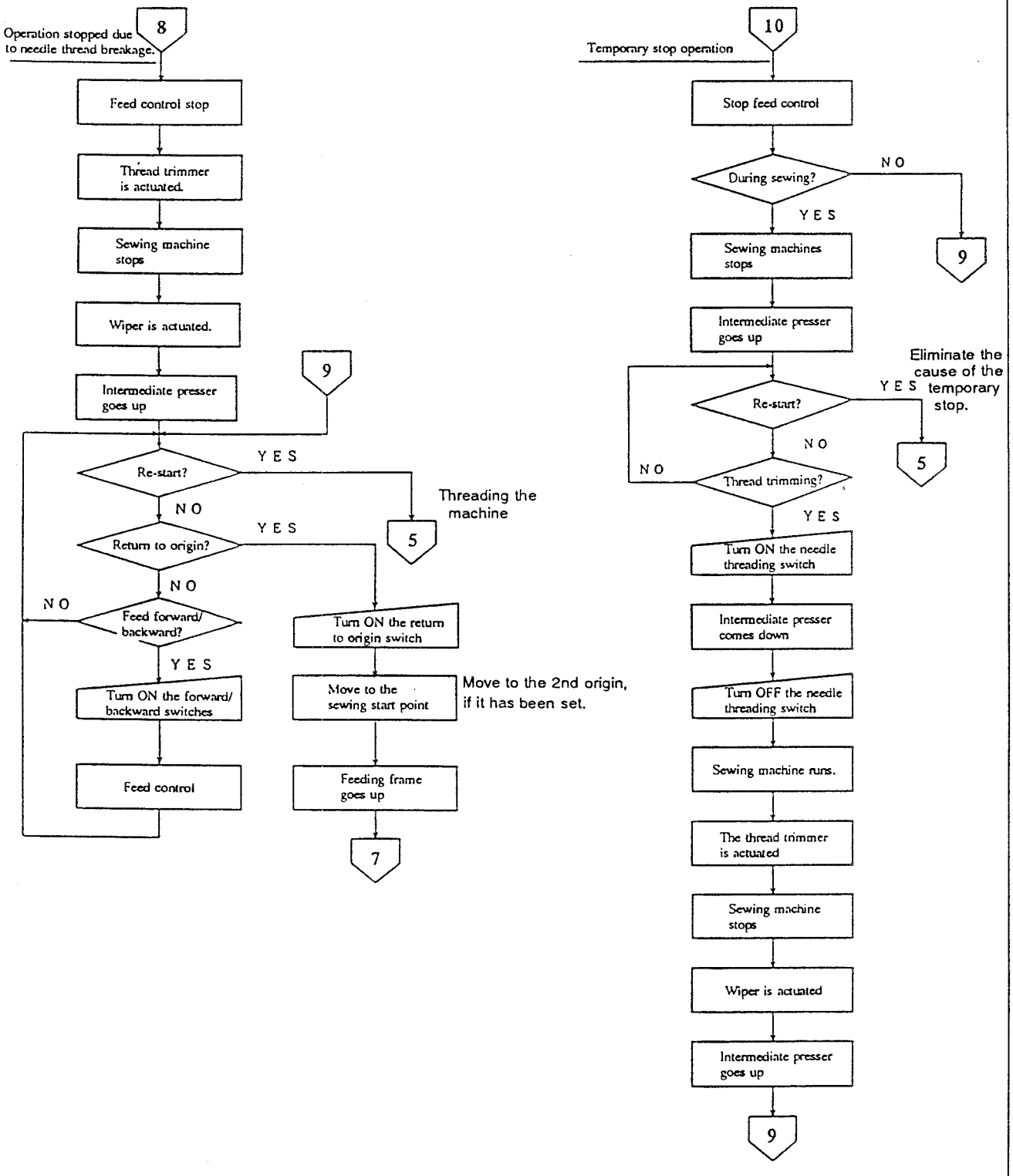
9. Compatibility of floppy disks
   For the AMS-A type floppy disk (1D) and AMS-B type floppy disk (2DD), data can only be read from them.
   Floppy disks used for the AMS-223C can also be used for the AMS-210C (0.1 mm type), -210P, -215C, -215P, -220C (0.1 mm type) and -220P. Note that however any pattern stored in a floppy disk that exceeds the sewing area specified for the respective models of sewing machines cannot be used.

Operation procedure

Follow the operation procedure flow chart given below:




3
Turn ON start switch
Feed control
NO
End?
YES
Feeding frame goes up
4
Set sewing machine ON/OFF switch to ON
Sewing operation
Set a workpiece
Positioning
Set feeding frame switch to ON
Feeding frame comes down
Material held securely?
Set the 2nd origin?
NO
YES
Press a jog key
5
Feed control
Turn ON the start switch
Intermediate presser comes down
Sewing machine starts running
6
6
Sewing
Thread tension balanced?
Needle thread broken?
YES
NO
Temporary stop?
YES
8
NO
NO
End?
Turn ON the temporary stop switch
YES
Thread trimmer is actuated
10
Sewing machine stops
Wiper is actuated
Intermediate presser goes up
Returns to the sewing start point
Returns to the 2nd origin, if it has been set.
Feeding frame goes up
7
One cycle completed
Reset the Counter.
Display setting change?
NO
YES
Set the set ready switch to ON
4
1


Operation stopped due to needle thread breakage.
8
Feed control stop
Thread trimmer is actuated.
Sewing machine stops
Wiper is actuated.
Intermediate presser goes up
9
Re-start?
YES
Threading the machine
5
NO
Return to origin?
YES
Turn ON the return to origin switch
Move to the sewing start point
Move to the 2nd origin, if it has been set.
Feeding frame goes up
7
NO
Feed forward/ backward?
YES
Turn ON the forward/ backward switches
Feed control
Temporary stop operation
10
Stop feed control
During sewing?
NO
YES
Sewing machines stops
9
Intermediate presser goes up
Eliminate the cause of the temporary stop.
Re-start?
YES
5
NO
NO
Thread trimming?
YES
Turn ON the needle threading switch
Intermediate presser comes down
Turn OFF the needle threading switch
Sewing machine runs.
The thread trimmer is actuated
Sewing machine stops
Wiper is actuated
Intermediate presser goes up
9

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 control knob. Be sure to select the optimum sewing speed according to the type of material.

Stitch length (mm)	Max. sewing speed (s.p.m.)
9.1 - 12.7	600
6.3 - 9.0	800
5.1 - 6.2	1,000
4.3 - 5.0	1,200
4.1 - 4.2	1,400
3.8 - 4.0	1,500
3.4 - 3.7	1,600
3.2 - 3.3	1,800
3.1	1,900
0.1 - 3.0	2,000

3. When an error indication is given, be sure to identify the cause and take corrective action.

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

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

6. Avoid checking the control circuitry by a tester, or else the tester voltage may be applied to semiconductor component, and the component may be damaged.

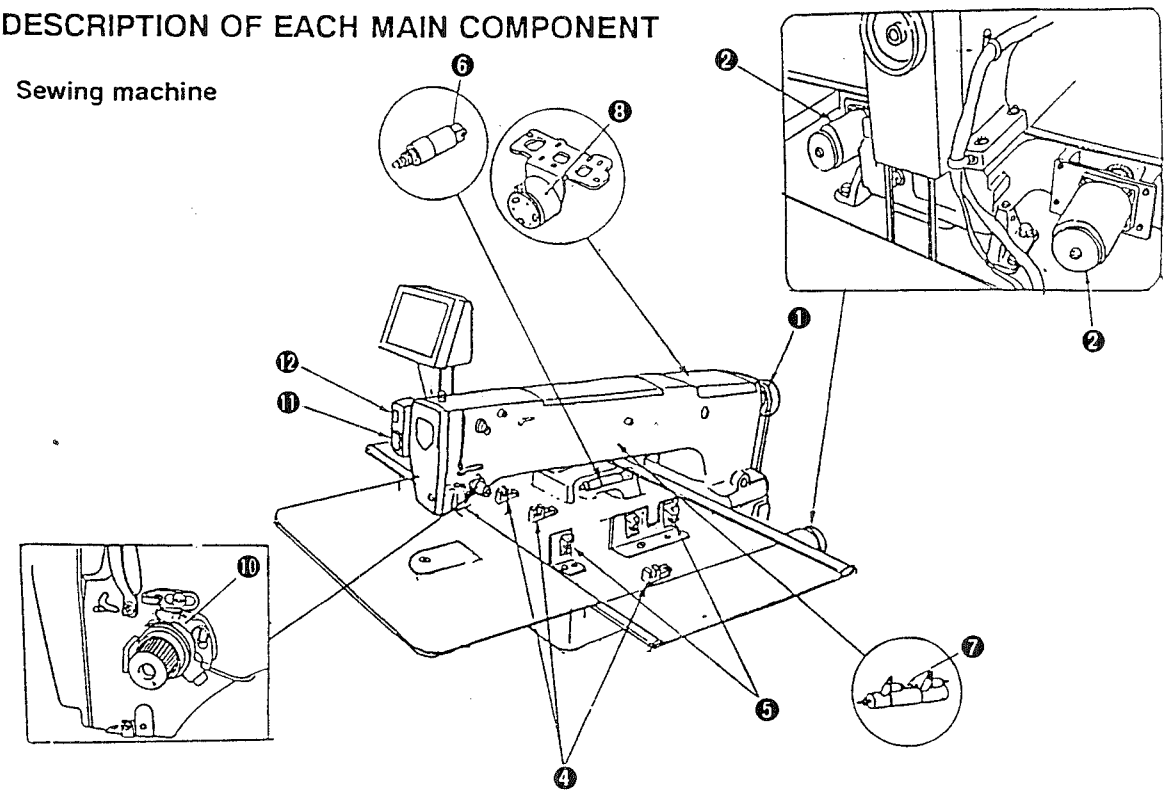
7. Be sure that there is no obstacle under the needle before depressing the start switch to wind a bobbin.

8. Do not put your fingers or any other things under the feeding frame when the machine is computing (this is indicated by the READY lamp flashing on and off), since the feeding frame comes down automatically upon completion of the computation.

9. Avoid pulling the workpiece while sewing. This may prevent correct needle entry. If X or Y needle entry point should be dislocated, press the Set Ready switch twice to go back to the correct sewing start point.

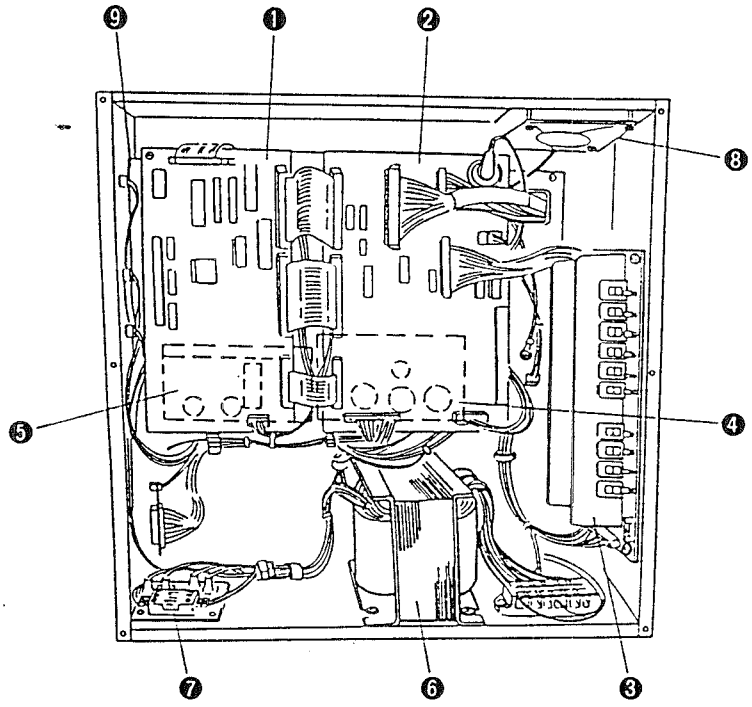
4. DESCRIPTION OF EACH MAIN COMPONENT

Sewing machine



❶ Synchronizer	Mainly consists of a generator stator and position detecting solenoid incorporated into the sewing machine pulley. It detects whether the needle is in its upper or lower positon, and also detects the sewing speed, after which it sends input signals to the control box based on the detection results.
❷ X-axis steping motor	Feeds material in the direction of the X-axis according to the pattern data given by the control box.
❸ Y-axis steping motor	Feeds material in the direction of the Y-axis according to the pattern data given by the control box.
❹ X-axis sensor	Mainly consists of an X-axis slit disk, an X-axis origin sensor and an X-axis travel limit sensor. It detects the origin in the X-axis 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 sensor	Mainly consists of a Y-axis slit disk, a Y-axis origin sensor and a Y-axis travel limit sensor. It detects the origin in the Y-axis 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 trimming.
⓫ Temporary stop switch	This switch is used to stop the feed and operation of the sewing machine during sewing. If the 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 thead trimming.

Control box



❶ CPU circuit board	The centerpiece 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	Activates 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 panel the CPU circuit board. The following circuits are mounted: • Magnet actuating circuit • Display actuating circuit • Solenoid valve actuating circuit • Sewing machine actuating circuit
❸ PMDC circuit board	Activates the stepping motor after receiving the control signal from the CPU circuit board through the I/F circuit board. It includes: • Current limiter circuit • Stepping motor driving circuit
❹ Power circuit board	Rectifies and stabilizes the outputs receiving from the secondary transformer to provide the power supply, and includes the following circuits: • Astable power circuit to drive the solenoids • Astable power circuit for the drive 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	Delivers 24V AC to drive the solenoids, 50V AC for the stepping motor actuator, 100V AC for the cooling fan and switching regulator, and 4.5V AC for the marking light.
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.
❾ Floppy disk driver	Reads the data stored in the floppy disk, and writes data on to the floppy disk after receiving a signal from the CPU circuit board.

Operation panel

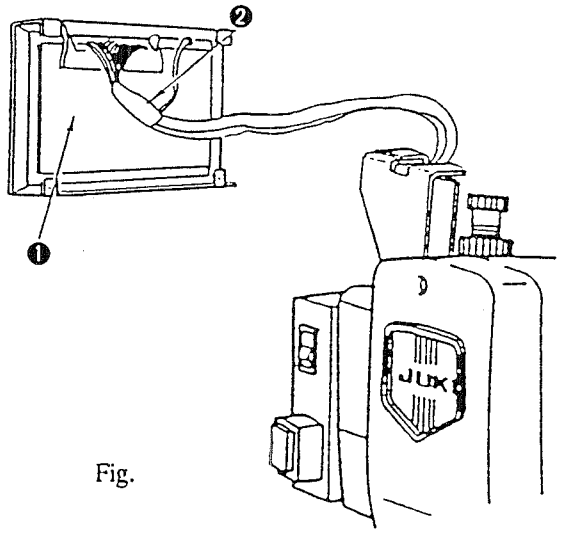


Fig.

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

STANDARD ADJUSTMENTS

(1) 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.

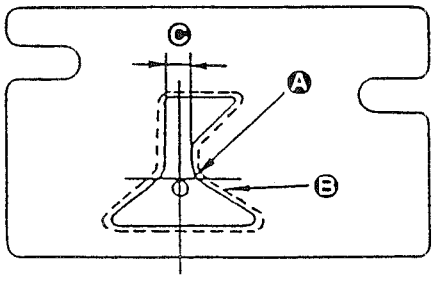


Fig.

(2) Thread take-up spring

Stroke: Pull the needle thread in direction Ⓐ. Moving distance of the needle thread should be 12 to 15 mm from the start to the end position. (Fig.)

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 by sewing the workpiece actually set on the machine.)

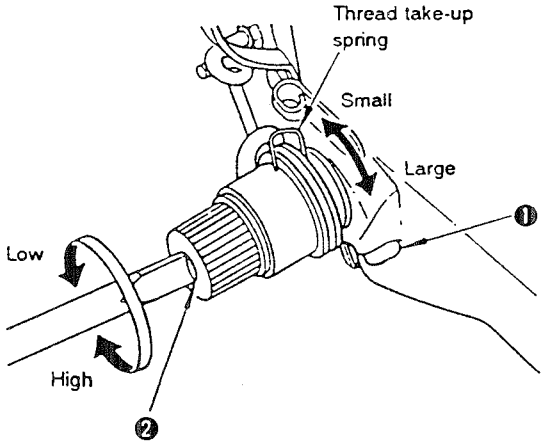


Fig.

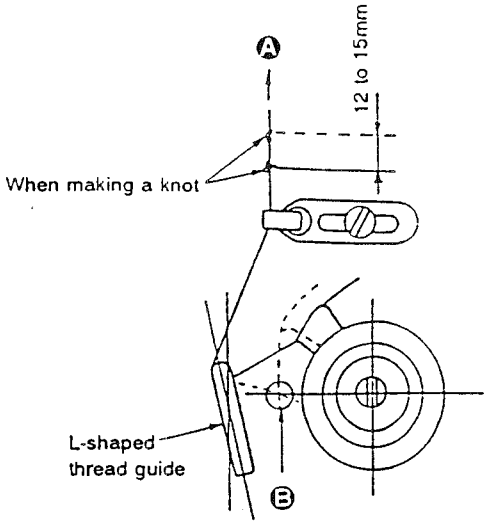
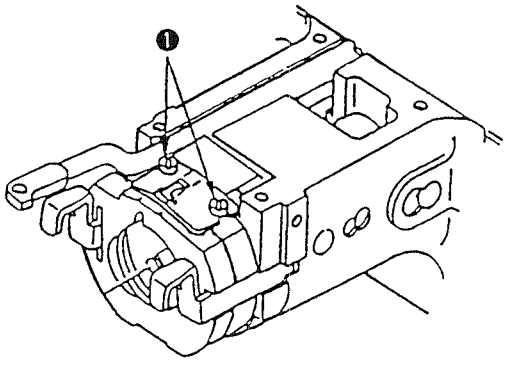


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Remove the feeding frame, feed plate and throat plate. Then adjust the position of the shuttle race spring using screw ❶. [Caution] **The lateral position of the shuttle race spring changes slightly at the time of adjusting the position of the shuttle race. Be sure to adjust the position of the shuttle race spring after the standard adjustment of the shuttle race has been completed.**  Fig.	o Lateral or longitudinal dislocation will cause the needle thread to bite into the shuttle. o If the shuttle race spring is located too deeply, the moving knife might not hook the needle thread. o If the shuttle race spring is located excessively to the left, the moving knife might not hook the bobbin thread.
1) Adjusting the stroke Loosen setscrew ❶, insert a screwdriver into tension controller No. 2 ❷, and turn it to adjust the stroke. 2) Adjusting the tension 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.) [Caution] **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 to 10 mm.**	o If the stroke exceeds the specified range: The thread remaining on the needle will be too short, resulting in the thread slipping off the needle at the sewing start. o If the stroke is inadequate: Needle breakage may occur at the sewing start when sewing with a thin thread. [Caution] **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 B. At this time, take care not to damage the thread path. (Fig.)**

(3) 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 to 1.0 mm.
2) Clearance Ⓔ between the tension release arm driving shaft and the tension release arm should be 0.2 to 0.3 mm.

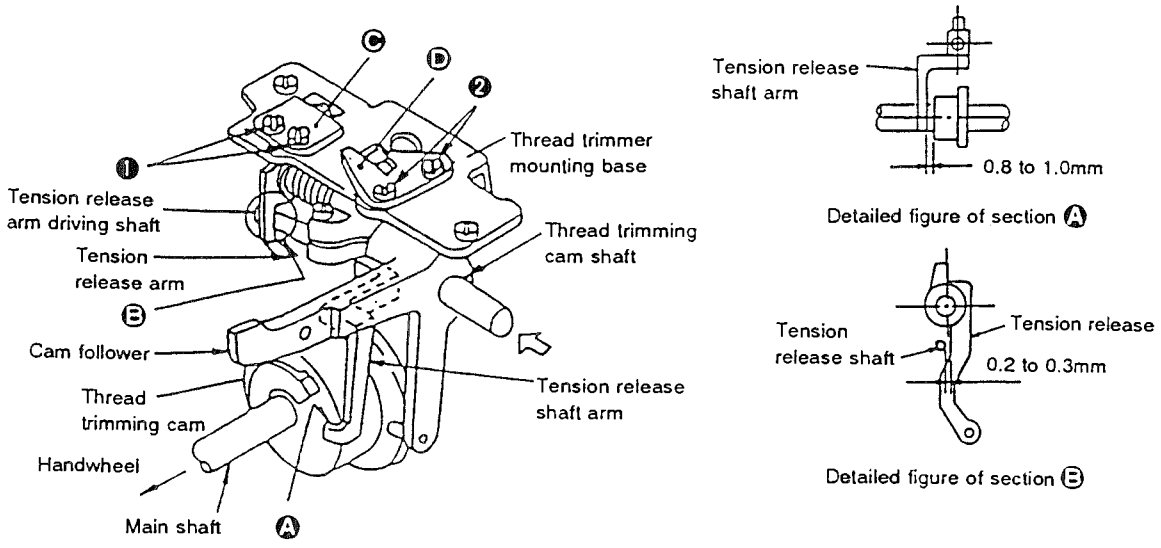


Fig.

(4) Position of the wiper

1) With the sewing machine stopped with its needle up, confirm that the sewing indication LED (READY lamp) light 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 or greater, when wiper ❶ passes the tip of the needle.
2) A 40 mm 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]

Normally, the wiper can be used with a material of which thickness is 3 mm or less. If the material thickness exceeds 3 mm, the wiper will fail to pass under the needle. In this case, set the Item 2 of Function No. 45 of the memory switch to "1." This enables the wiper to spread the thread under the intermediate presser.

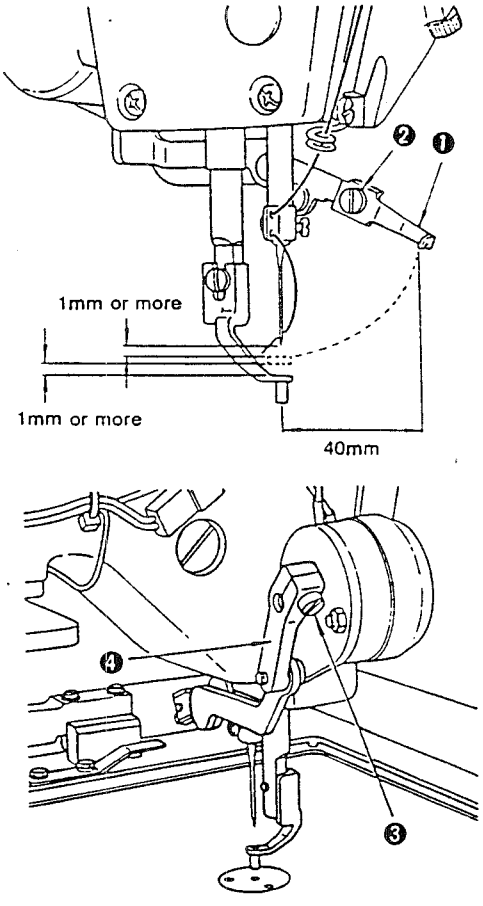


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen setscrew 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 to 1.0 mm. After adjustment, securely tighten setscrew ❷. 2) Loosen setscrew ❶. Move stopper Ⓒ forward or backward so that clearance Ⓔ between the tension release arm driving shaft and the tension release arm becomes 0.2 to 0.3 mm. After adjustment, securely tighten setscrew 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. 2) After completion of thread trimming, the thread trimming cam shaft will fail to return. As a result, a machine lock will occur.
1) Loosen setscrew ❷, and make the adjustment according to the procedure given on the left. After making the adjustment, securely tighten the setscrew. 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.	o The top end of the wiper may come in contact with the needle or the intermediate presser preventing proper thread wiping. 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. 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.

(5) 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 magnet 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 or more.

[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.

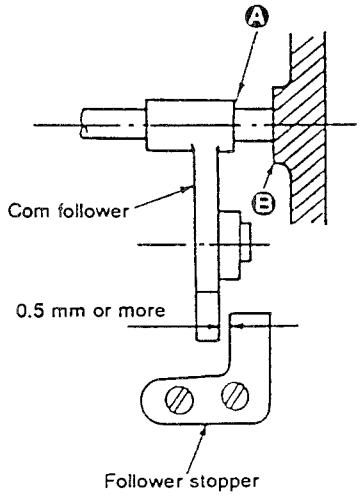


Fig.

(6) Tension release notch

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

[Caution]

After making the adjustment, push the thread trimming cam shaft in the direction of the arrow →(Fig.) until it is engaged with thread trimming clutch mechanism, and turn the handwheel by hand in the normal direction of rotation. At this time, make sure that the tension release shaft arm comes off tension release notch Ⓐ, and the tension disk of tension controller No. 2 closes upon returning of the cam follower to the end face of the arm.

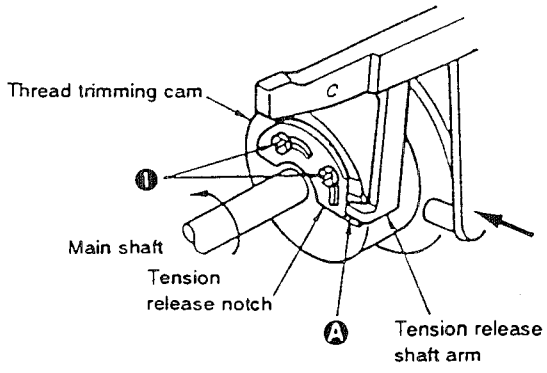


Fig.

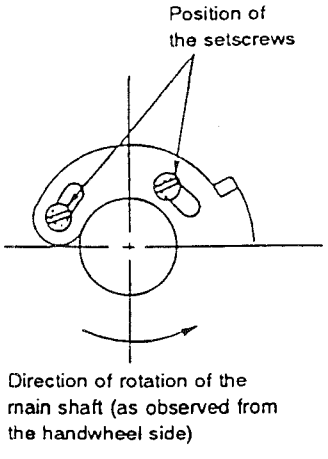


Fig.

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. o Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES ( )" 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. 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.
o Loosen setscrew ❶ , and adjust the tension release notch referring to the " " After making the adjustment, be sure to securely tighten setscrew ❶ .	o The length of thread remaining on the needle after thread trimming will be too short and inconsistent. o The thread may slip out from the needle eye at the sewing start.

(7) **Height of the moving knife and the counter knife**

- The thread trimmer which consists of a moving knife and counter knife should successfully cut a pair of #80 thread and another pair of #5 thread when the throat plate is removed and the thread rimming lever is manually actuated. (Fig.) (S, H type)
- The thread trimmer which consists of a moving knife and counter knife should successfully cut a pair of #2 thread and another pair of #30 thread. (G type)

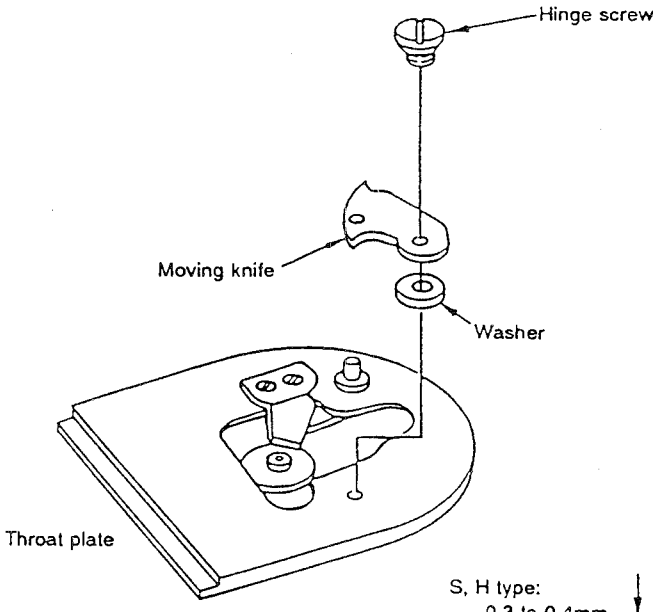


Fig.

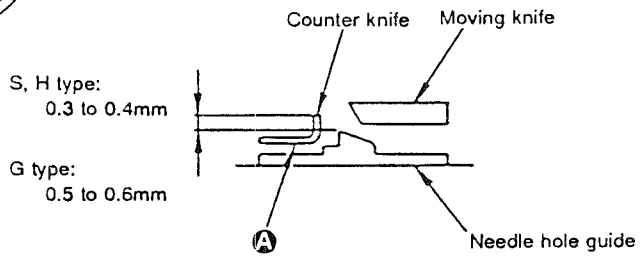


Fig.

- 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.

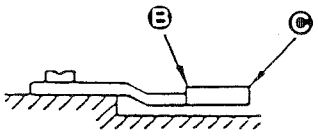


Fig.

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

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) After the trial thread trimming. A. If the outer thread as observed from the moving knife pivot cannot be trimmed, replace the washer with a thicker one. 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.
2) If the above adjustment fails to correct the thread trimming failure. A. If the height of the needle hole guide with respect to the counter knife blade is not within 0.3 to 0.4 for S or H type model of sewing machine or 0.5 to 0.6 mm for G type one, pry portion Ⓐ (Fig.) out using a screwdriver or the like to adjust the height of the needle hole guide with respect to the counter knife blade to the correct height. (At this time, make sure that the blade point is in parallel to the throat plate mounting surface.) B. If the angle of the counter knife blade illustrated below is larger than 90 degrees, cut the blade.	o If the height of the needle hole guide with respect to the counter knife blade exceeds 0.4 mm (S, H type) 0.6 mm (G type), both the needle thread and the bobbin thread will be cut too short. Especially when sewing with a thin thread, the needle thread and bobbin thread will be frequently cut too short.
3) If the corrective measures described in 1) and 2) above fails to correct the trouble, replace the moving knife or the counter knife.	

Part No.	Name of part	Thickness
B242328000A	Moving knife washer	0.4 mm
B242328000B	Moving knife washer	0.5 mm
B242328000C	Moving knife washer	0.6 mm
B242328000D	Moving knife washer	0.7 mm

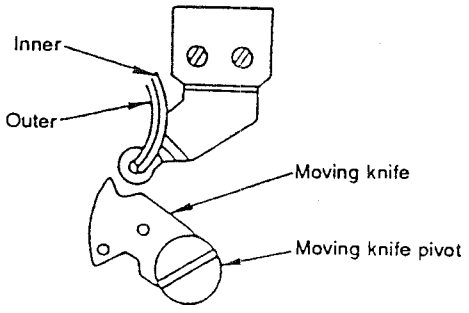


Fig.

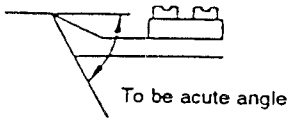


Fig.

(8) Adjusting the thread trimming cam

1) Press down portion Ⓐ of the cam follower so that a 0.3 mm clearance is provided between the follower stopper and the cam follower when the clearance is maximized. (Fig.)
2) Align the marker line engraved on the thread trimming cam with the marker line engraved on the main shaft in terms of the direction of rotation. (Fig.)
3) Adjust the thread trimming link spring suspension screw so that it rises 23.8 ± 0.5 mm above the installing plane and fix with a nut. (Fig.)
4) Put the shorter hook of the thread trimming link spring onto the thread trimming link spring suspension screw and the longer one through the hole in the thread trimmer connecting rod.
5) Adjust so that a clearance of 0.2 mm is provided between the follower stopper and the cam follower. (Fig.)
6) At the time of thread trimming, the thread trimming cam shaft moves in the direction of the arrow. After the completion of thread trimming and tension releasing performance, the clutch mechanism of the thread trimmer is released and the cam follower returns to the home position when the thread take-up reaches beyond the highest dead point.

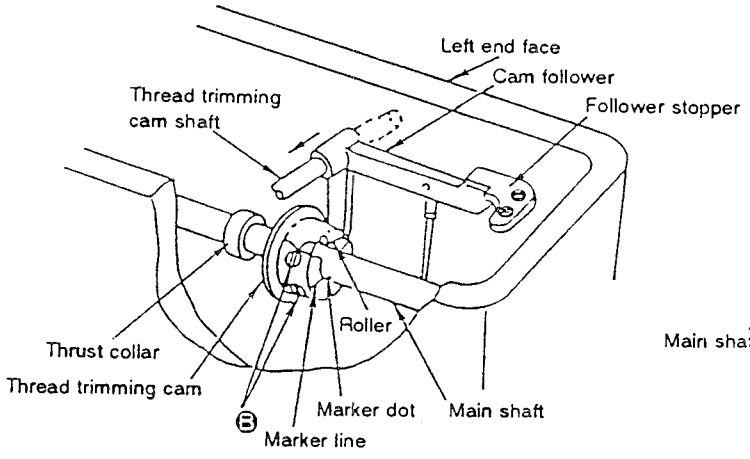
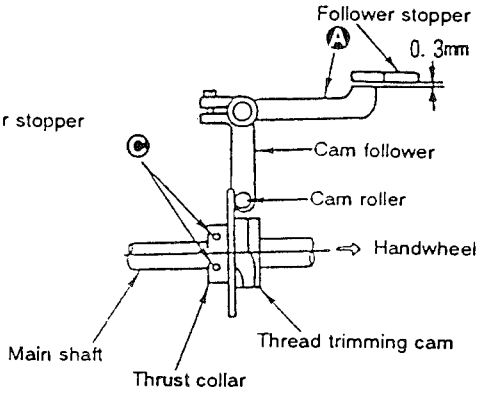


Fig.



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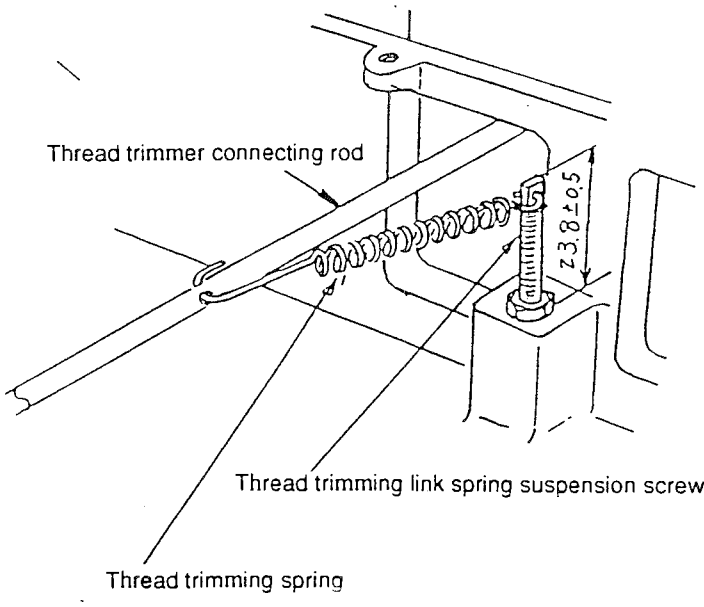

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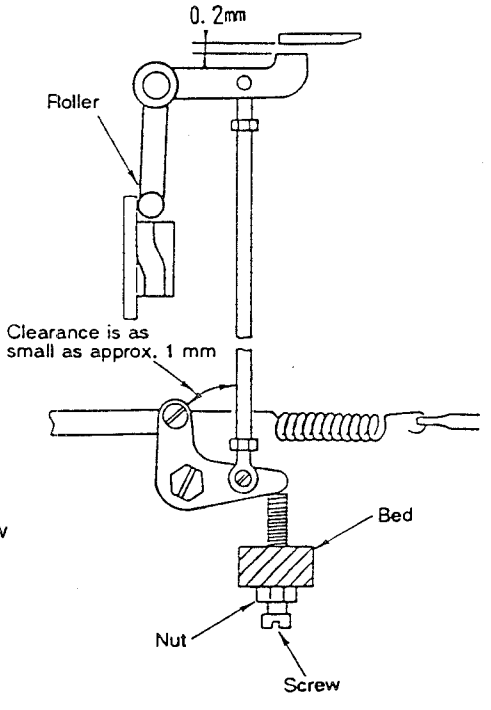
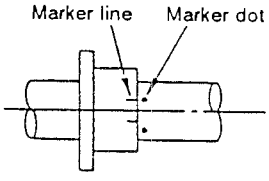


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screws Ⓔ in the thread trimming cam and screws Ⓒ in the thread trimming cam. 2) Place a 0.3 mm thick spacer between the follower stopper and the protruding portion of the cam follower and lift portion Ⓐ of the cam follower to keep the follower stopper, spacer and cam follower in absolute contact one another. 3) Pressing the thread trimming cam and the thread trimming cam thrust collar against the cam roller toward the handwheel, fix the thread trimming cam thrust collar in the main shaft using a screw. 4) Align the marker line engraved on the thread trimming cam with the marker dot engraved on the main shaft in terms of the direction of rotation. Pressing the thread trimming cam against the thread trimming cam thrust collar, fix the thread trimming cam on the main shaft with a screw. 5) Place a 0.2 mm thick spacer between the follower stopper and the cam follower and gradually tighten thread trimming link stopper screw until you feel a light load. Now, fix the thread trimming link stopper nut at that position. **[Caution]** **i) When tightening the stopper screw, do not use a tool. Tightening the screw with a tool may excessively decrease the clearance between the cam follower stopper and the cam follower.** **ii) When putting the spring into the spring suspension hole, take care not to deform the hook of the spring.**  Fig.	1) Thread trimming failure will occur. 2) The machine will be locked at the start of sewing or at the time of thread trimming. 3) Timing to make the thread trimming cam shaft to return to the initial position will be retarded, causing the first stitch at the sewing start to be sewn with poorly tensed. **[Caution]** **If the sewing machine is locked, inspect axial play in the main shaft, the position and timing of the thread trimming cam and the related components.**

(9) Intermediate presser

(The adjustments should be made after the operation air pressure has been decreased to 0 kgf/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 nut of intermediate presser adjusting screw should be 5 ± 1 mm. (Fig.)
- o The intermediate presser rod should projects 2 ± 0.2 mm (dimension B) from the top end of the intermediate presser bracket.
- o The needle should enter the center of the hole in the intermediate presser. (Fig.)
- o The air flow adjustment of speed controller (B) mounted on the intermediate presser cylinder has been appropriately made. (Refer to the "STANDARD ADJUSTMENTS ( ).")
- o The operating air pressure has been adjusted to 5 to 5.5 kgf/cm^2 using the air regulator. (Refer to the "STANDARD ADJUSTMENTS ( ).")

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

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

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±0.2 mm. Additionally, positioning pin ❹ keeps in contact with the top end of positioning link ❸ while the intermediate presser is actuated. (Fig. , Fig.)

[Caution]

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

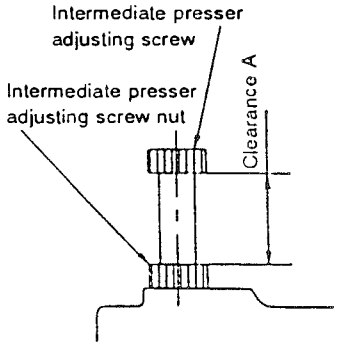


Fig.

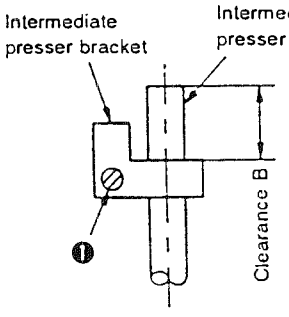


Fig.

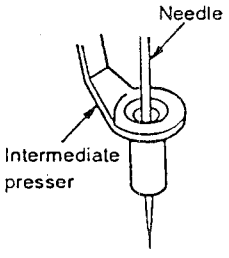


Fig.

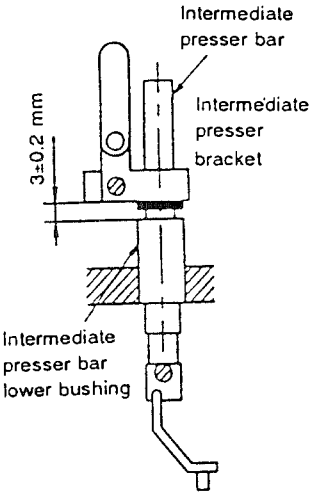


Fig.

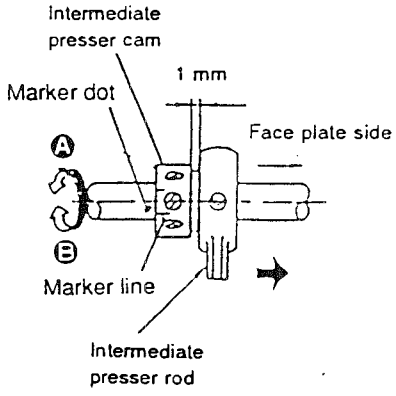


Fig.

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 5 ± 1 mm. (Fig.) o Loosen intermediate presser bracket clamping screw ❶ , and adjust the intermediate presser rod so that it projects 2±0.2 mm from the top end of the intermediate presser bracket (Fig.) and that the needle point enters just the center of the hole in the intermediate presser. Now, tighten intermediate presser bracket clamping screw ❶ . (Fig.) 2) Loosen screw ❷ in the intermediate presser cam and adjust the cam referring to "Standard adjustment ( )-2" so that the marker dot on the main shaft is aligned with the marker line on the intermediate presser cam in terms of the reverse direction of rotation. Then tighten screw 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.) 3) When making the adjustment described in step 2), adjust intermediate presser cam and the end face intermediate presser rod referring to the "STANDARD ADJUSTMENTS ( )-3). 4) Loosen setscrew ❹ with the needle bar at its lowest dead point (Fig.), and make the adjustment described in the "STANDARD ADJUSTMENTS ( )-4)" by moving intermediate presser oscillating shaft ❺ with intermediate presser positioning link ❸ closely pressed against positioning pin ❹. (Fig.)	1) The intermediate presser may fail to go up after the completion of a sewing cycle. [Caution] **Refer to the "RESULTS OF IMPROPER ADJUSTMENT ( )."** o The intermediate presser may fail to go up after the completion of a sewing cycle. 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. 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. 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. 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. 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. 4) Abnormal noise may occur during machine operation. [Caution] **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 kept to operate in this condition, the corresponding parts might break.** The specified vertical stroke will not be obtained. (Refer to the "STANDARD ADJUSTMENTS ( ).")

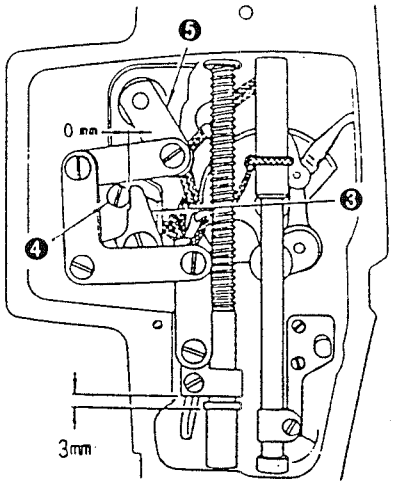


Fig.

(10) The intermediate presser lifting stroke

The distance from the center of the ϕ5 hole in intermediate presser cylinder knuckle ❶ to the center of the ϕ5 hole in the intermediate cylinder ❷ should be 130.5±0.2 mm when the intermediate cylinder is in its lowest position.

At the time, the intermediate presser lifting stroke is set to 20 mm (at the time of delivery).

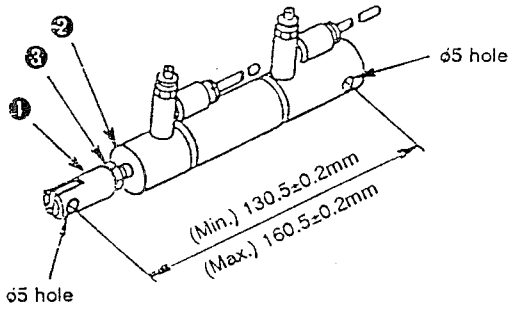


Fig.

(11) Eliminating play from the main shaft

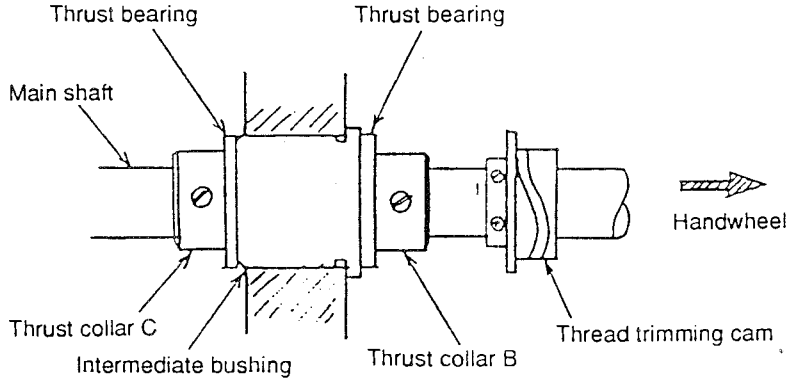


Fig.

(12) Vertical stroke of the work clamp foot

The distance from the center of the ϕ5 hole of the work clamp foot cylinder knuckle to the center of the ϕ5 hole of the cylinder knuckle should be 120.5±0.3 mm, then the shaft of the work clamp foot cylinder is in its lowest position.

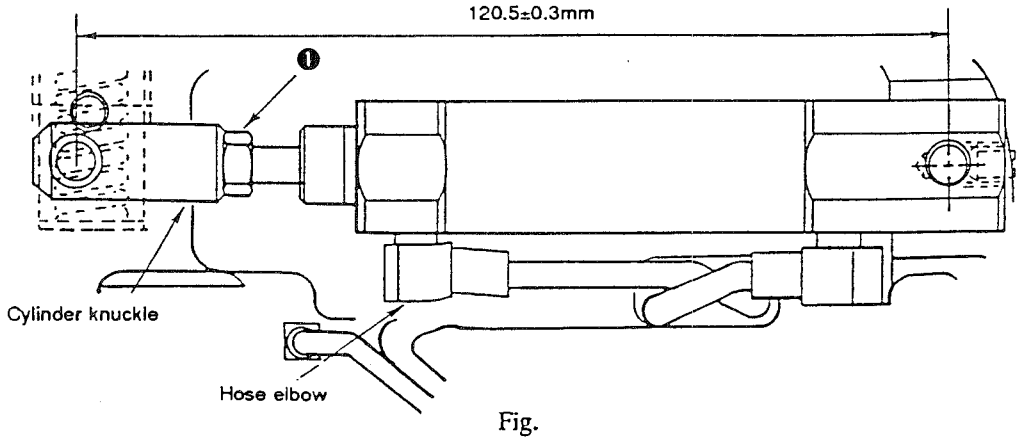


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Loosen shaft nut ❸ of intermediate presser cylinder ❷, and adjust the screwing depth of the intermediate cylinder knuckle ❶ referring to the "STANDARD ADJUSTMENT ( )." After making the adjustment, securely tighten nut ❸ and intermediate cylinder knuckle ❶. (Fig.)	o When the distance exceeds 130.5±0.2 mm: The intermediate presser lifting stroke is less than 20 mm. o When the distance is less than 130.5±0.2 mm: 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.
o Drawing the handwheel in the direction of the arrow, press the thrust collar B against thrust bearing and fix it there. Then, closely fit the thrust collar C onto the thrust bearing and fix it there.	
o Loosen nut ❶ of the work clamp cylinder shaft and adjust the screwing depth of the cylinder knuckle with regard to the shaft referring to the "STANDARD ADJUSTMENTS ( )." 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 120.5±0.3 mm: The feeding frame may fail to go up as high as 30 mm. o If the distance is less than 120.5±0.3 mm: The feeding frame may fail to come down to the lowest position of its stroke. As a result, the workpiece may slip from the correct position since it may not be held securely.

(13) Adjusting the feed bar auxiliary cover

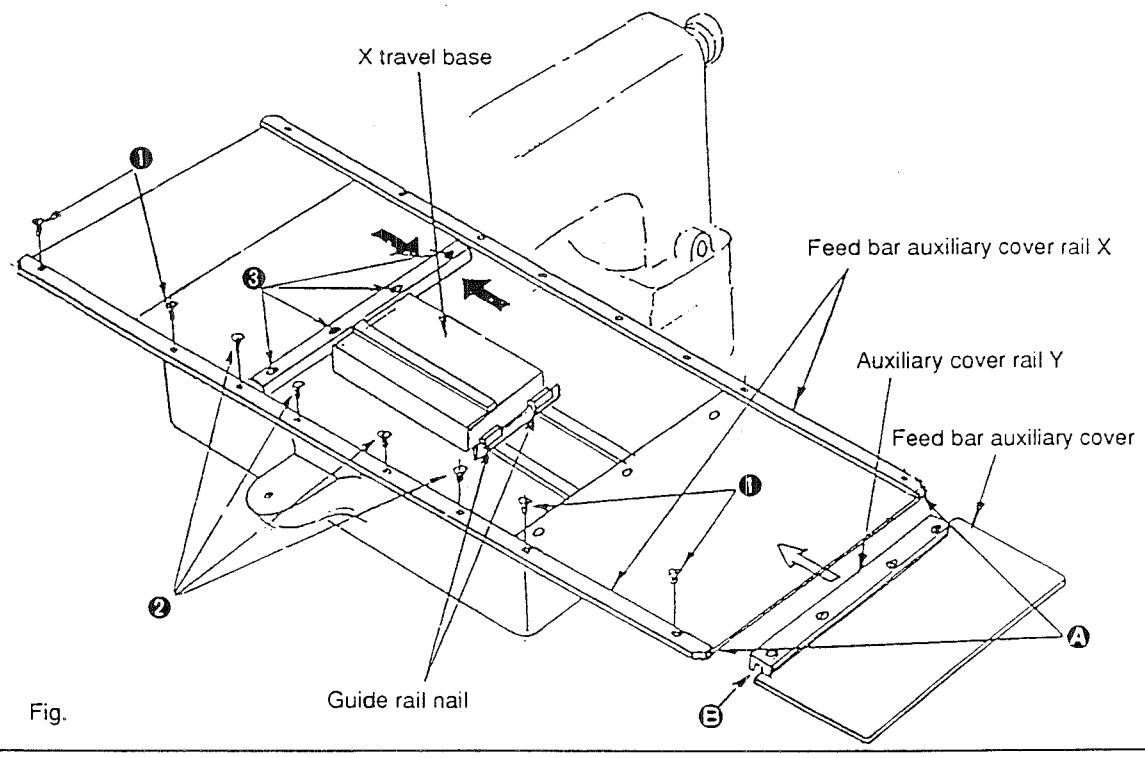


Fig.

(14) Adjusting the travel cover

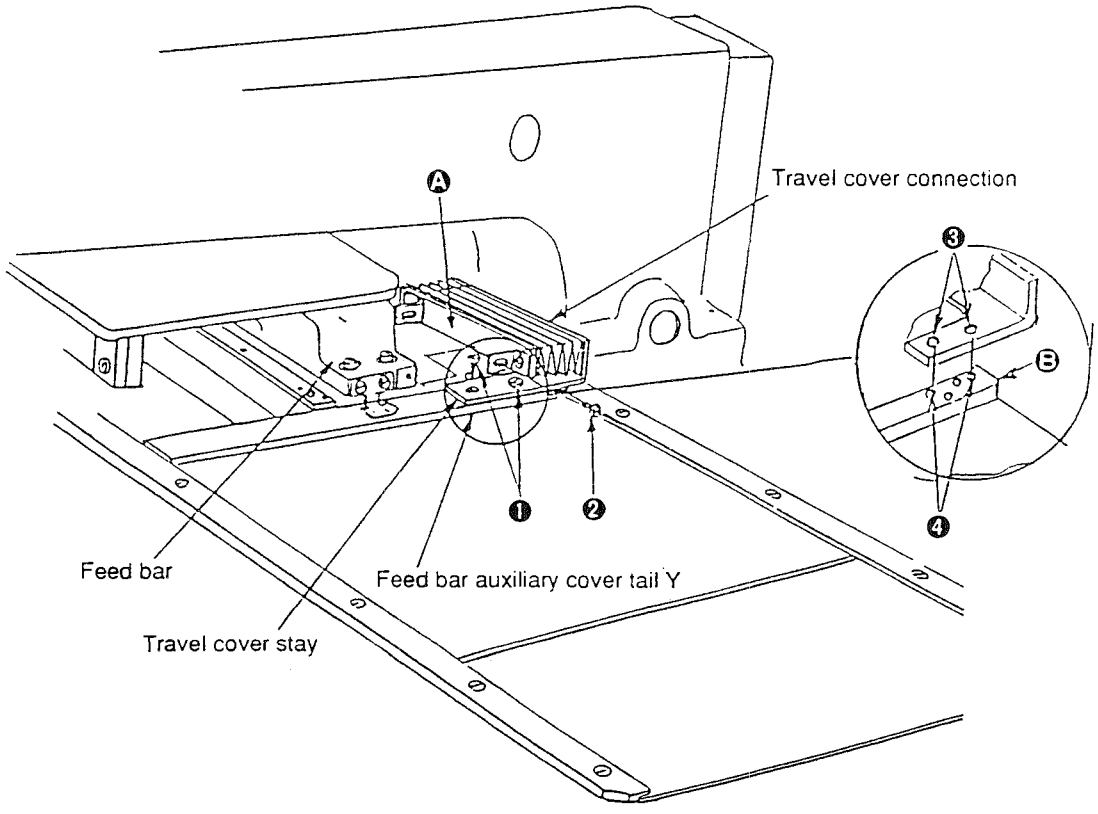


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
○ Slightly loosen screws ❶ (totally four pieces for the right- and left-side feed bars) and screws ❷ (totally four pieces for the right- and left-side feed bars). ○ Fit the feed bar auxiliary covers (right and left, totally two pieces) in grooved portion Ⓐ on the feed bar auxiliary cover rails X from the location of the auxiliary cover rail guide rail Y. ○ Fit grooved portion Ⓑ over the guide rail nail of the auxiliary cover rail guide from above. ○ Adjust the position of the feed bar auxiliary cover and the feed bar auxiliary cover rail X so that a clearance of approximately 0.5 mm is provided between them. Then, tighten screws ❶ and ❷. ○ Shift the feed bar auxiliary cover and the auxiliary cover rail Y in the direction of the arrow (➡) to eliminate a clearance existing between the guide rail nail and them. Then, tighten screws ❸. (Fig) **[Caution]** **Move the X travel base back and forth and to the right and left to ascertain that it does not come in contact with the feed bar auxiliary cover.**	○ Feed bar auxiliary cover will break or the feed bar auxiliary cover rail A (resin) will produce abrasion chips.
○ Align hole ❸ in the travel cover stay with drilled holes ❹ in the feed bar auxiliary cover rail Y (first and fourth holes as counted from end face Ⓑ .) ○ Fix the travel cover stay on the feed bar auxiliary rail Y with screws ❶. ○ Closely fitting plane Ⓐ of the travel cover fixing plate on the feed bar, fix the travel cover on the feed bar with screw ❷. **[Caution]** **After the adjustment, move the feed bar back and forth to ascertain that it does not come in contact with the travel cover.**	○ Related part(s) may break.

(15) Adjusting the tension of Y-direction feed belt

Shift the Y travel base forward until it will go no further. Adjust so that the belt sags 1.3 to 1.4 mm when a 1 kg load is applied to the center of the belt.

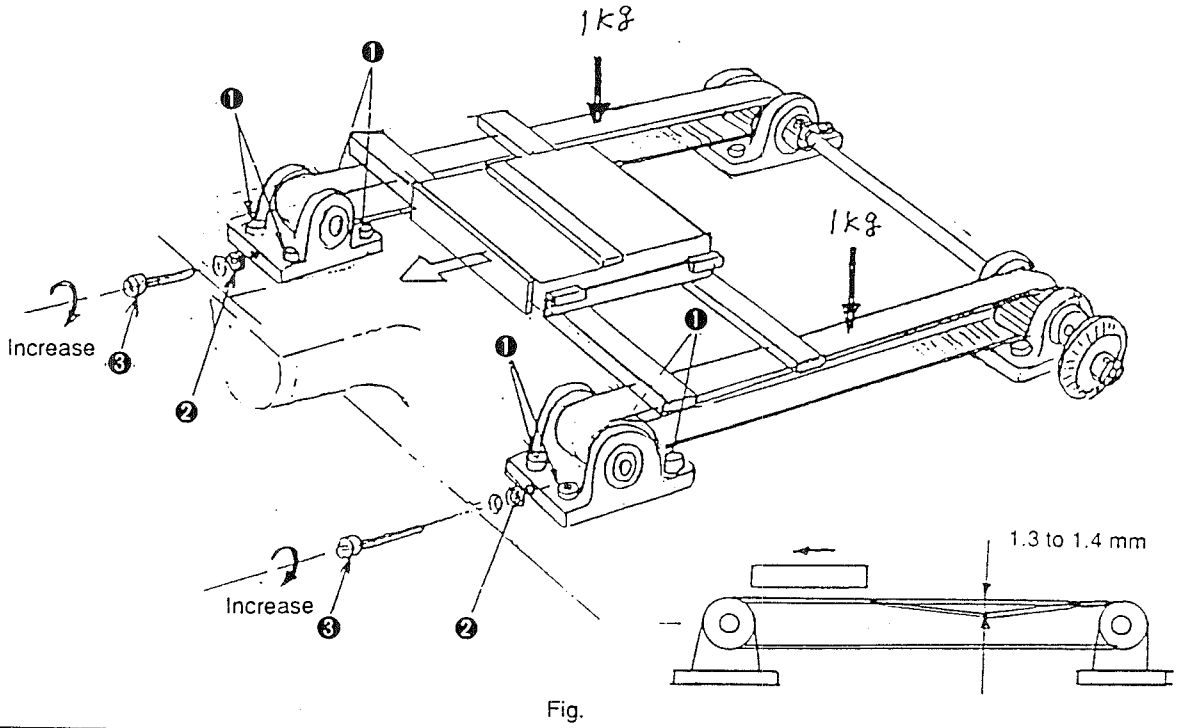


Fig.

(16) Adjusting the Y motor base

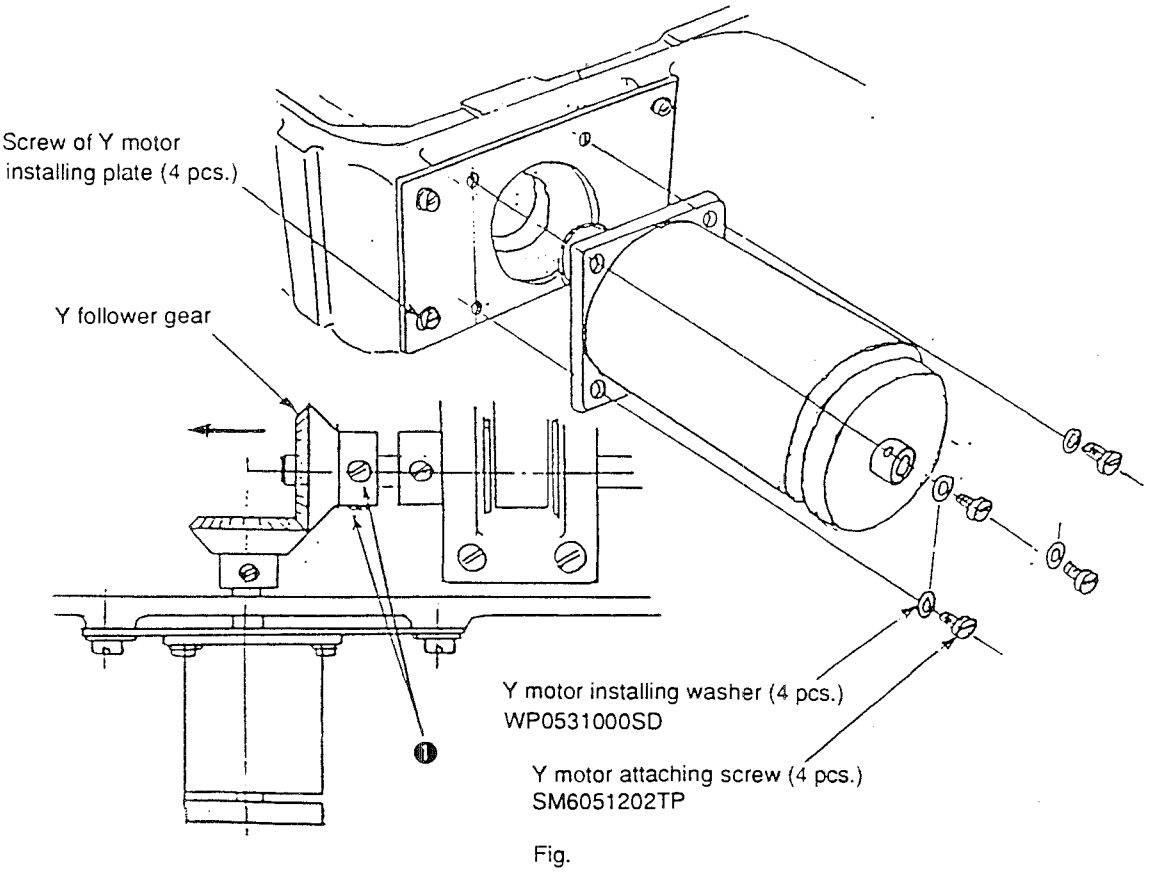


Fig.

RESULTS OF IMPROPER ADJUSTMENT	RESULTS OF IMPROPER ADJUSTMENT
o Loosen fixing screw ❶ and nut ❷. Adjust the belt tension by turning adjusting screw ❸. Once the belt tension is appropriately adjusted, tighten fixing screw ❶ and nut ❷. o Turn screw ❸ clockwise to increase the belt tension. o Following the procedure described above, adjust so that the right and left belts provides a uniform tension. [Caution] **Tightening fiking screw ❶ may change the belt tension. It is therefore necessary to check the sagging amount of the belt after tightening screw ❶ .** **(Fig)**	o Sewing pattern will be finished with deformed.
o Loosen screws ❶, move the Y follower gear in the direction of the arrow (←) to bring it to a position where there is no backlash. [Caution] **1. Do not connect the stepping motor connector.** **2. Perform the adjustment with the feed bar auxiliary cover removed.** **3. It is not necessary to adjust the Y motor base during routine maintenance. Never loosen the screws in the Y motor installing plate.**	o Feeding noise will be larger in terms of the Y direction and the sewing pattern will be finished with deformed.

(17) Adjusting the tension of X-direction feed belt

o Shift the feed bar until the left-travel end is reached. Loosen fixing screw ❶ and nut ❷. Turn belt tension adjusting screw ❸ to adjust so that the belt sags 1.6 to 1.7 mm when a 1 kgf load is applied to the center of the belt.

[Caution]
Tightening fixing screw ❶ may change the belt tension. It is therefore necessary to check the sagging amount of the belt after tightening screw ❶.

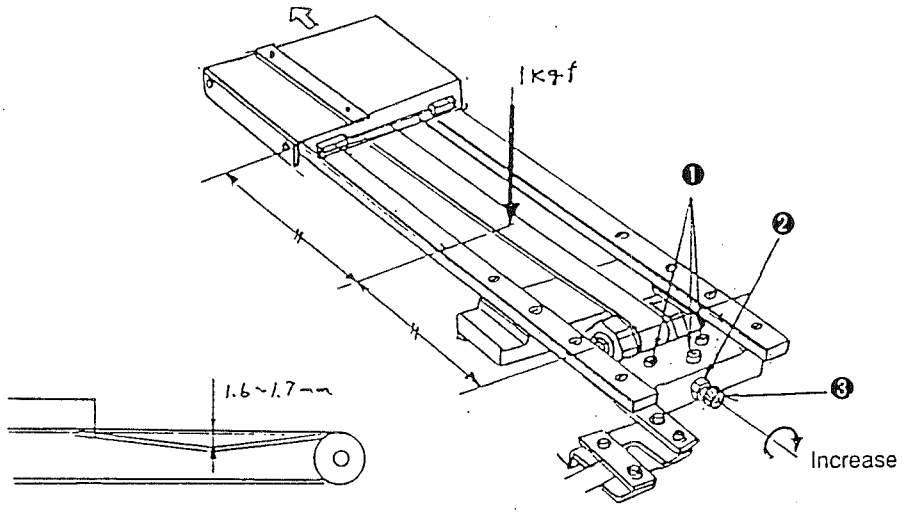


Fig.

(18) Adjusting the X motor base

o Loosen the screws in the X motor base, move the X motor (asm.) up or down to bring it to a position where there is no backlash. Then, fix the X motor (asm.) at that position.

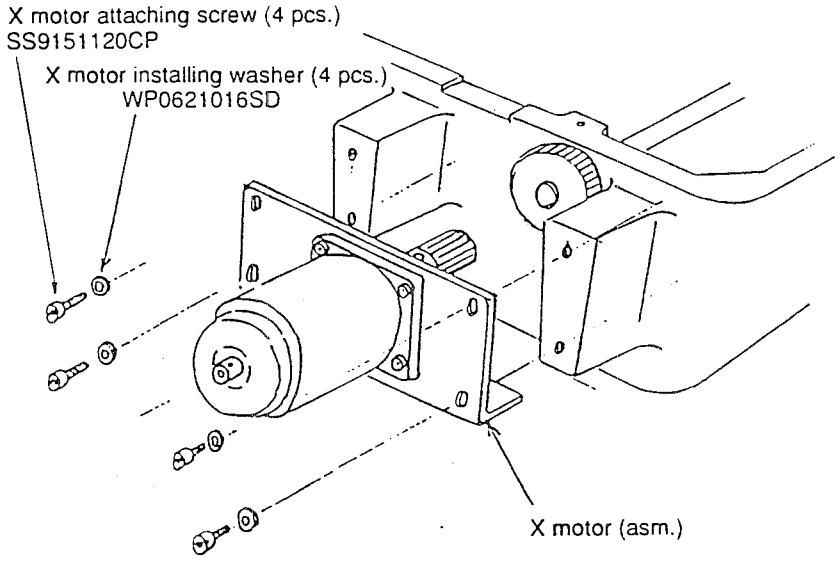
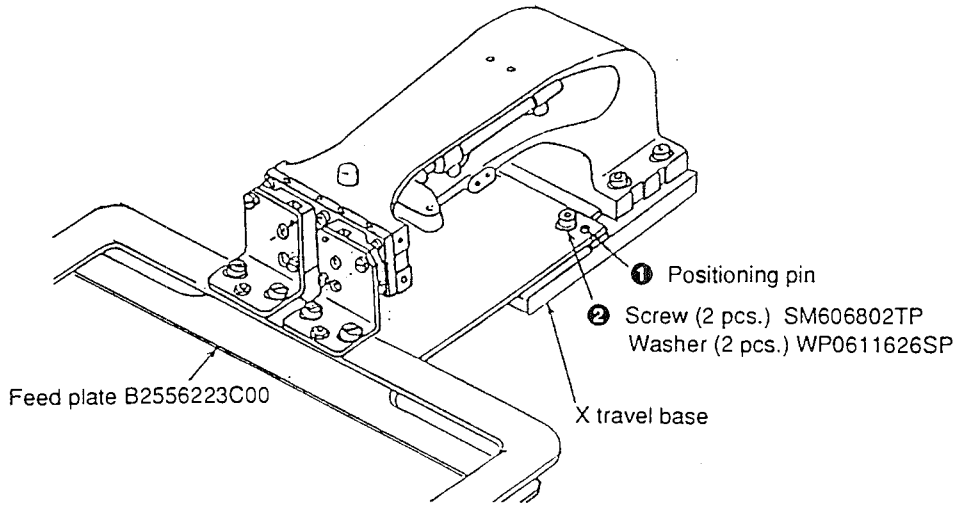


Fig.

(19) Adjusting the feed plate

○ Align positioning pin ❶ with the hole in the feed plate and fix the feed plate with two screws ❷. This determines the position of the feed plate.

○ When you want to change the position of the feed plate, remove positioning pin ❶ and re-position the feed plate.



(20) Adjusting the clamping force of the plastic blank presser

○ Loosen screws ❶ and press the plastic blank presser in direction A. In this state, adjust the position of the plastic blank presser so that it is closely fitted against the plastic blank fixing shaft. Then, tighten screws ❶.

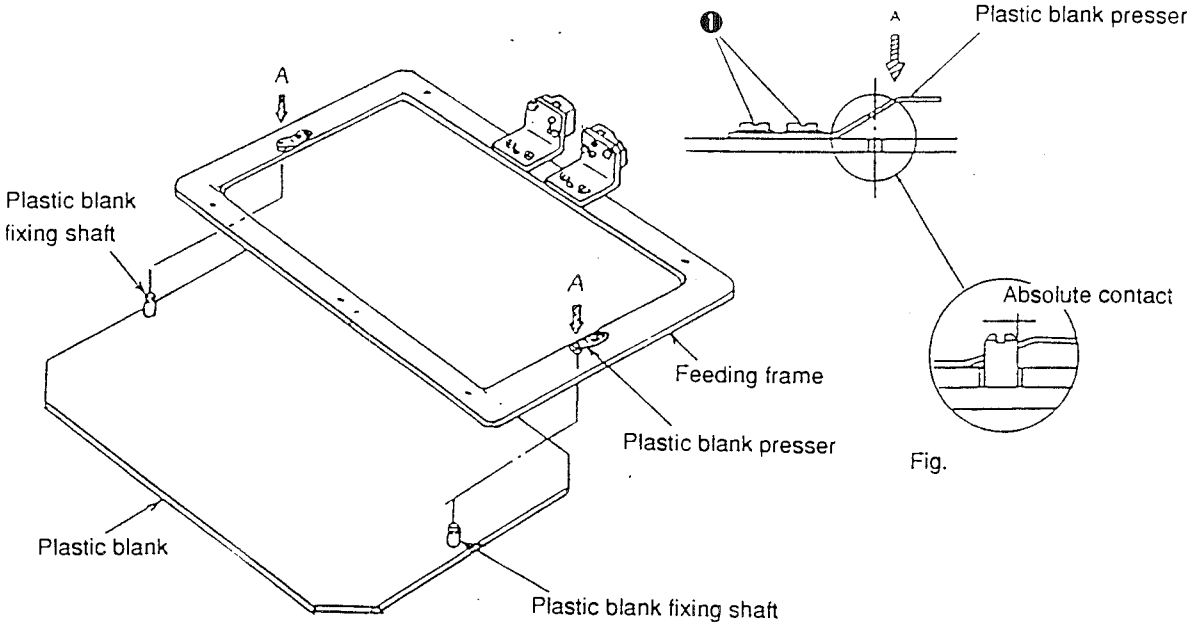


Fig.

Fig.

(21)-1 Confirming the X.Y origin and travel limit

A. Comfirming the origin

1) Remove the needle.
2) Remove the feeding frame. Place the origin gauge on the feed bar.
3) Remove five setscrews ❷, loosen the three setscrews ❸ of control box cover ❶, and remove control cover ❶. Set rotary DIP switch ❹ on the I/F circuit board mounted on the right side from you to 5 on the scale. (Fig.)
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 ø0.5 drilled hole for the origin gauge. (±0.2 mm).

[Caution]

Once the origin adjustment has been completed, turn OFF the power switch, and set rotary DIP switch ❹ to 0 (the switch has been factory - set to 0) on the scale. (Fig.)

B. Confirming 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) (Error indication [4] will be shown.) (Fig. , Fig.)
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) (Error indication [4] will be shown.) (Fig. , Fig.)

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
○ If center-to-center difference between the origin and the needle tip exceeds 0.2 mm, finely adjust to achieve correct alignment by moving the X origin sensor installing plate asm. or Y origin sensor installing plate asm. If center-to-center difference between the travel limit and the needle tip exceeds 1.5 mm, finely adjust to achieve correct alignment by moving the X travel limit sensor installing plate asm. or Y travel limit sensor installing plate asm. (Refer to "( )-2.")	

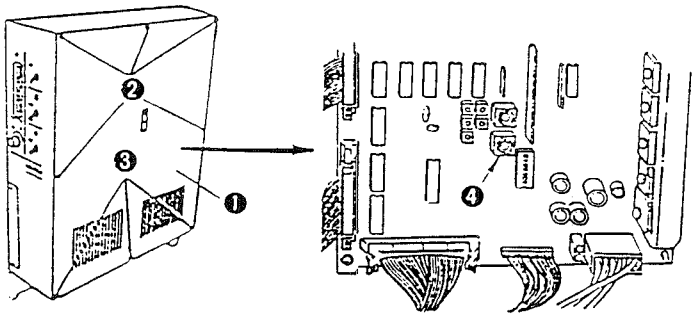
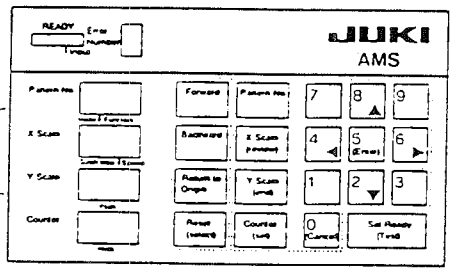


Fig.

- 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.



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

Fig.

(21)-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 guide pin as reference. (The related dimensions for the sensor adjusting gauge are shown in Fig. 5-33-5.)
4) Adjust the origin and the travel limit.

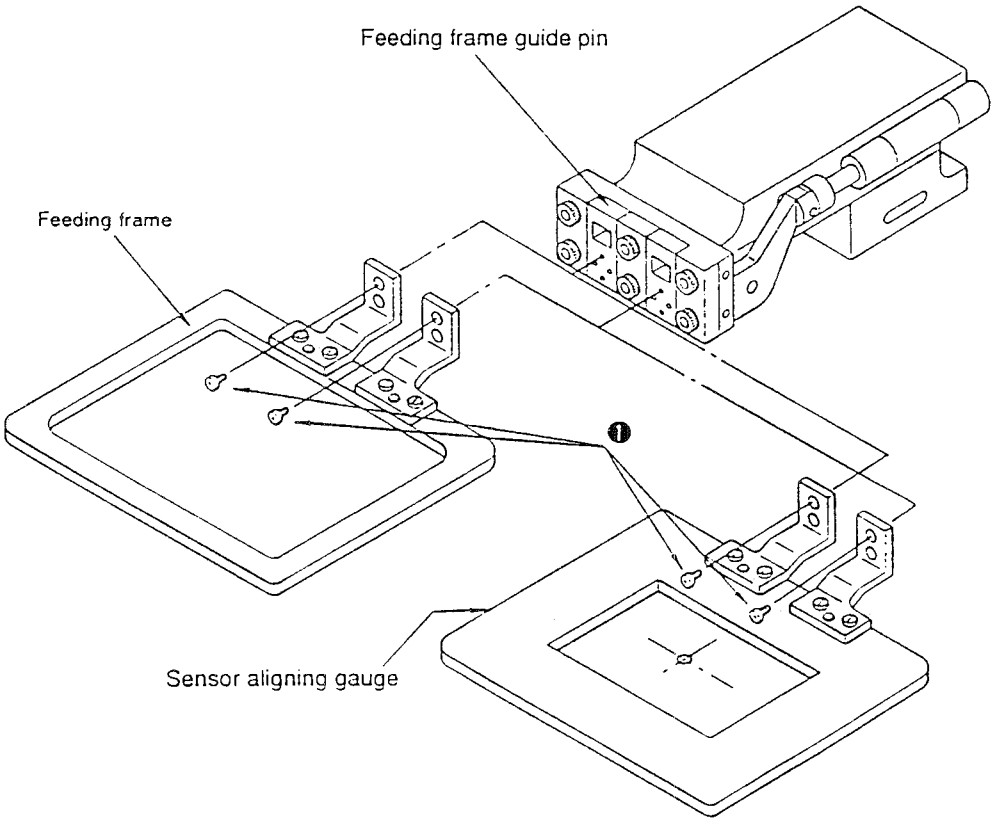
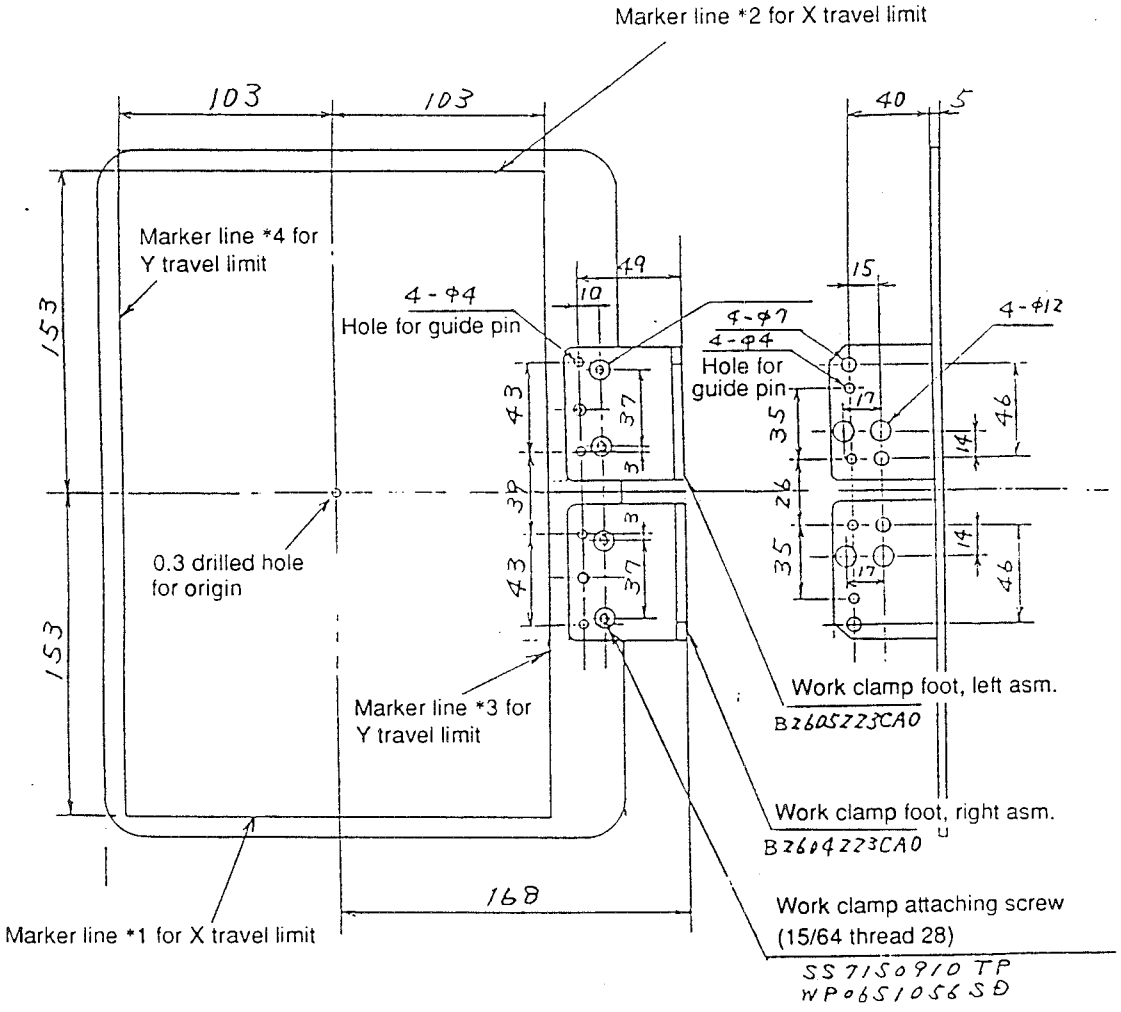


Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
A. Adjusting the X origin and X travel limit sensor 1) Remove the feed bar auxiliary covers (right and left), feed plate and throat plate auxiliary cover. 2) Perform the standard adjustment described in "( )-1 A-1), -3) and 4)." 3) Press the switches [4◄], [6►], [8▲] or [2▼] to move the feeding frame to make the tip of needle to meet 5 mm drilled hole in the origin gauge. (Fig.) 4) Loosen screws ❶ , move the X origin sensor installing plate asm. to the right or left so that the X origin indication (section E) changes from 1 to 0 (zero). Immediately after the indication has changed as described above, fix the X origin sensor installing plate asm. at that position with screws ❶ . (Figs.) 5) Press the [6►] switch on the operation box to move the feeding frame until the tip of needle meets the marker line *1V that indicates the travel limit of the origin gauge. (Figs.) 6) Loosen screws ❷ , move the X right travel limit sensor installing plate to the right or left so that the travel limit *1 indication (section F) changes from 1 to 0 (zero). Immediately after the indication has changed as described above, fix the X right travel limit sensor installing plate asm. at that position with screws ❷ . (Figs.) 7) Press the [4◄] switch on the operation box to move the feeding frame until the tip of needle meets the marker line *2V that indicates the travel limit. (Figs.) 8) Loosen screws ❸ , move the X left travel limit sensor installing plate to the right or left so that the travel limit *2 indication (section D) changes from 1 to 0 (zero). Immediately after the indication has changed as described above, fix the X left travel limit sensor installing plate asm. at that position with screws ❸ . (Fig.) [Caution] 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 or more, when the X-axis slit disk passes through the three X-axis sensors. (Fig.) If not, adjust the slit plate so that the aforementioned overlapping allowance of 5 mm is obtained and adjust the respective sensors installing plates so that correct clearances are provided between the sensors and photo coupler. Note that the aforementioned adjusting procedure has to be carried out in tandem with steps 4), 6) and 8). (Fig. 5-)	o If the origin has not been properly adjusted: The origin for inputting a pattern fails to align with the origin for sewing the pattern. o If the travel limit has not been properly adjusted: 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. [Caution] If the machine is operated under the condition mentioned above, the feed mechanism components might become damaged. Never operate the machine until the proper adjustments have been completed.

5) Adjust the sensor adjusting gauge to obtain the following dimensions.



HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
B. Adjusting the Y origin and Y travel limit sensor 9) Take the steps of procedure same as 1) through 3). 10) Loosen screws ❹ and move the Y origin sensor mounting base back or forth so that Y origin indication (section H) changes from 1 to 0. Immediately after the indication has changed as described above, fix the Y origin sensor mounting base at that position with screws ❹ . (Figs.) 11) Press the [8 ▲] switch on the operation box to move the feeding frame until the travel limit *3 indication (section I) changes from 1 to 0. Immediately after the indication has changed as described above, fix the Y travel limit sensor at that position with screws ❺ . (Figs.) 12) Press the [2 ▼] switch on the operation box to move the feeding frame until it stops at the travel end. At this time, make sure that a gap existing between the *4V marker line and the tip of needle is 1.5 mm or less. (Figs.) [Caution] **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 or more, when the Y-axis slit disk passes through the three Y-axis sensors. If not, adjust the Y sensor installing plate so that the aforementioned overlapping allowance of 5 mm is obtained and adjust the slit plate so that correct clearance is provided between the sensor and photo coupler. Note that the aforementioned adjusting procedure has to be carried out in tandem with steps 10) and 11). (Fig.)**	

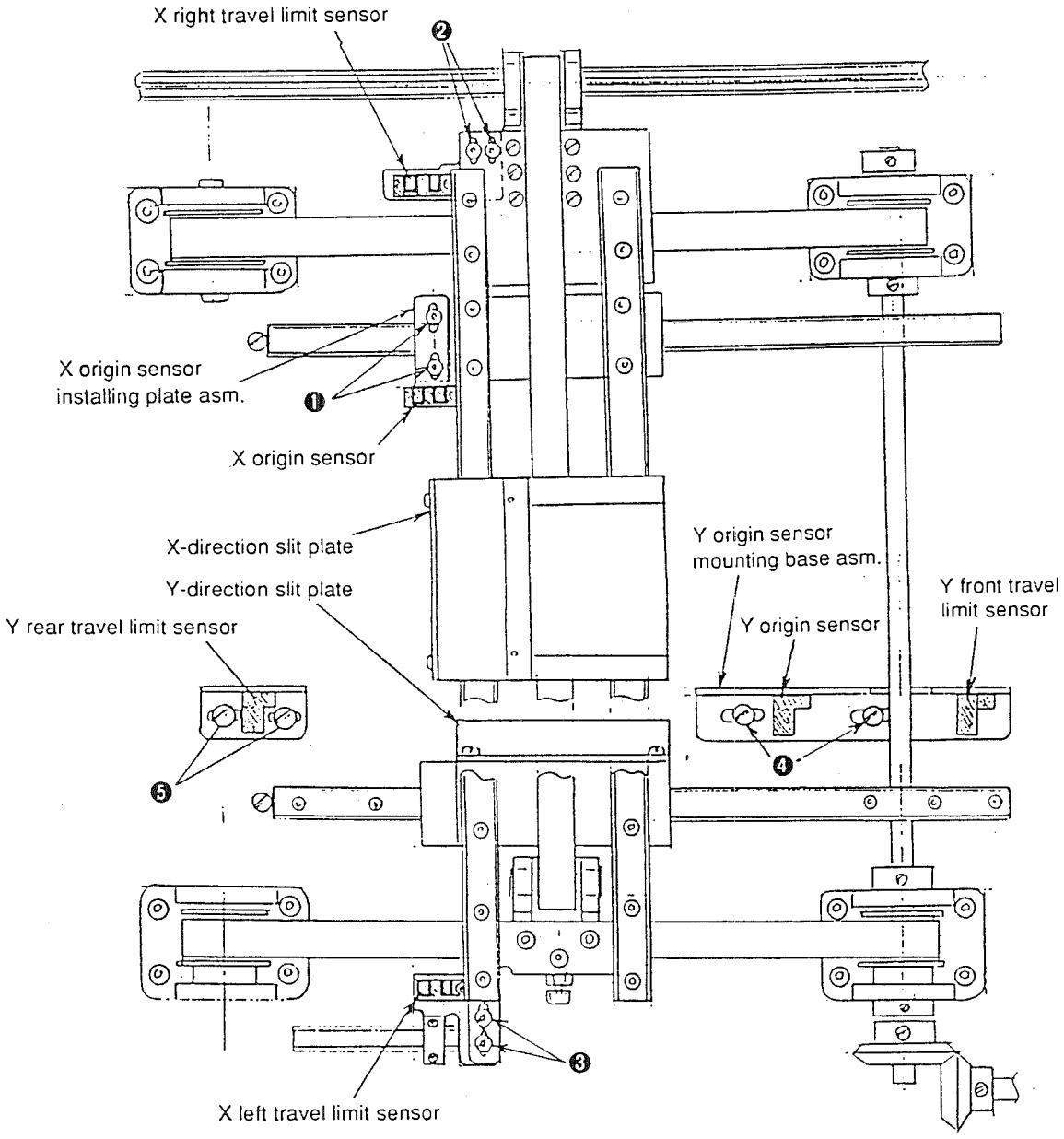

X right travel limit sensor
❷
X origin sensor
installing plate asm.
❶
X origin sensor
X-direction slit plate
Y-direction slit plate
Y rear travel limit sensor
❺
Y origin sensor
mounting base asm.
Y origin sensor
Y front travel
limit sensor
❹
❸
X left travel limit sensor

Fig.

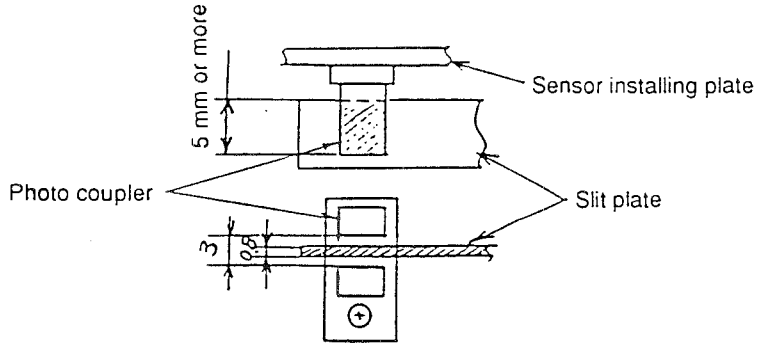

5 mm or more
Sensor installing plate
Photo coupler
Slit plate

Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
○ Adjusting the X sensor Adjust so that the X right travel limit sensor and the X left travel limit sensor respectively actuate when the feed mechanism moves 153 mm to the right and left from the origin. Then respectively fix them with screws ❷ and ❸. (Figs.) ○ Adjusting the Y sensor Adjust so that the Y rear travel limit sensor actuates when the feed mechanism moves 103 mm forward or backward from the origin. Then fix the sensor with screws ❺. (Figs.) The position of the Y front travel limit sensor is automatically determined by adjusting the origin. **[Caution]** **After the adjustment, be sure to ascertain that the slit plates do not interfere with the photo couplers.**	○ The sensors may fail to detect the origin and the travel limit, resulting in trouble same as those occur when the travel limit is not properly adjusted. ○ Slit plates may interfere with the photo couplers, causing the related components to be damaged.

(22) Adjusting the idler pulley

The bed has two holes for idler adjusting screws and another two holes for idler adjusting spring suspension screws. Respectively select either one in accordance with the timing belt tension.

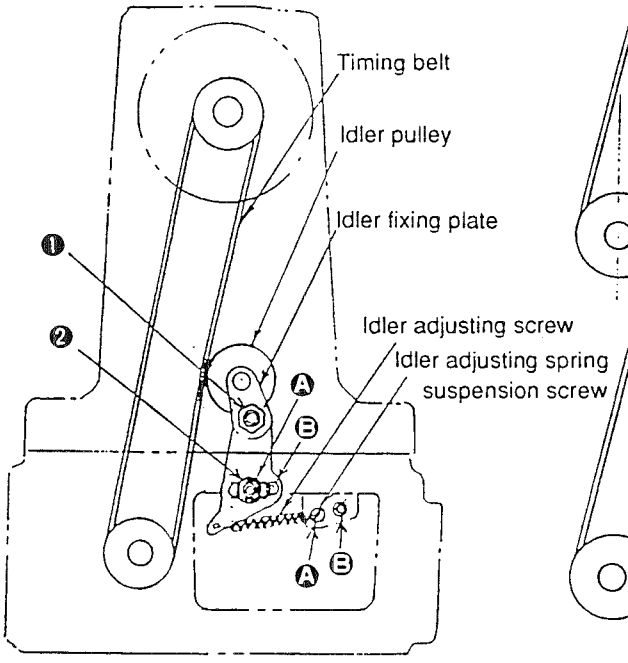


Fig.

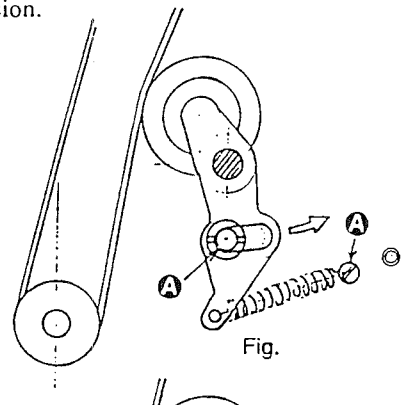


Fig.

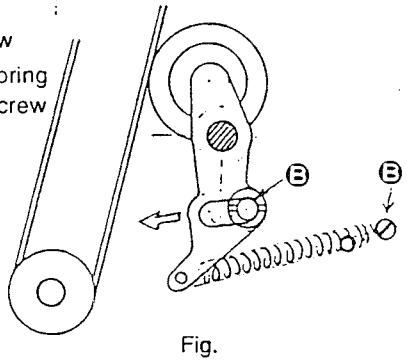


Fig.

(23) Adjusting the auxiliary pulley gears

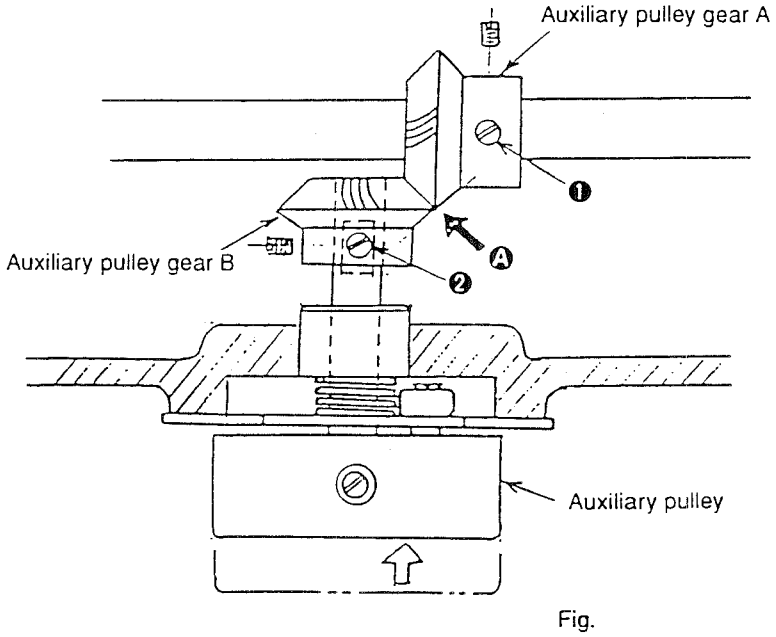


Fig.

(26) Bobbin winder driving wheel

* Loosen screws ❶ in the bobbin winder driving wheel. Adjust so that the end face of the bobbin winder driving wheel is spaced 55 ± 0.4 mm from the center of top cover installing tap ❷ of the machine arm.

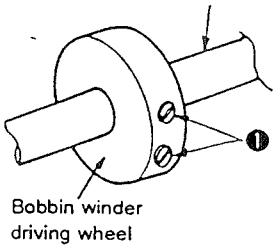


Fig.

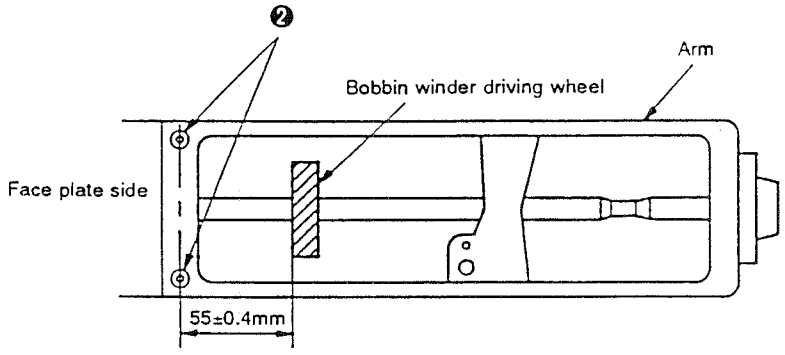


Fig.

(27) Height of the throat plate auxiliary cover

* Loosen screw ❶ in the throat plate auxiliary cover support and screws ❷ in the throat plate auxiliary cover base.
Move the throat plate auxiliary cover base and the throat plate auxiliary cover support up and down to adjust so that the throat plate auxiliary cover is positioned higher than the throat plate and so that the height in difference between them is 0.3 mm or less. Then, fix them with the screws. At this time, extra caution should be attached to the hatched portion (●) in the figure.

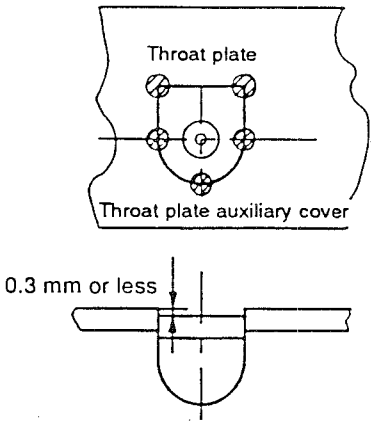
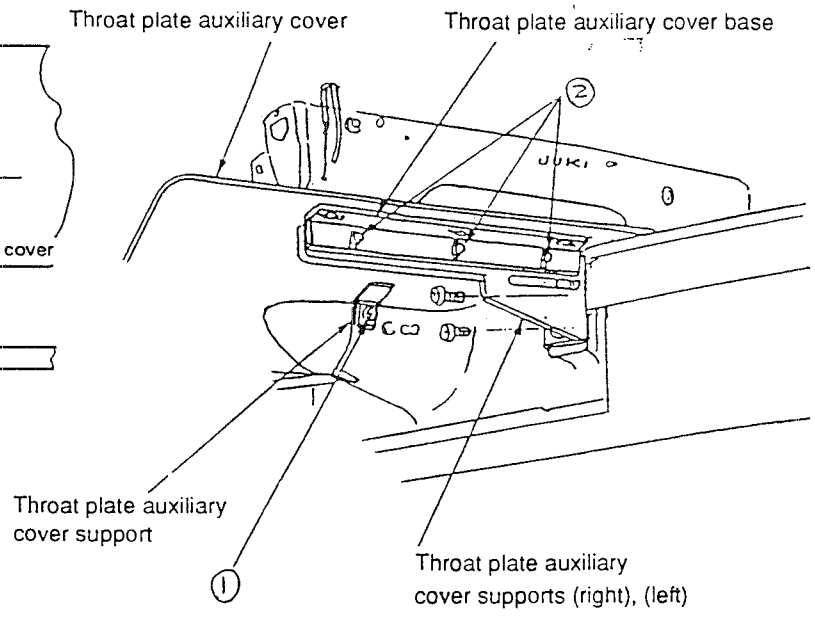


Fig.



(28) Disassembling the idler pulley

1) Remove the idler adjusting spring.
2) Remove nut ❶ and pull out the idler adjusting screw.
3) Remove nut ❷ and remove the idler pulley (asm.).

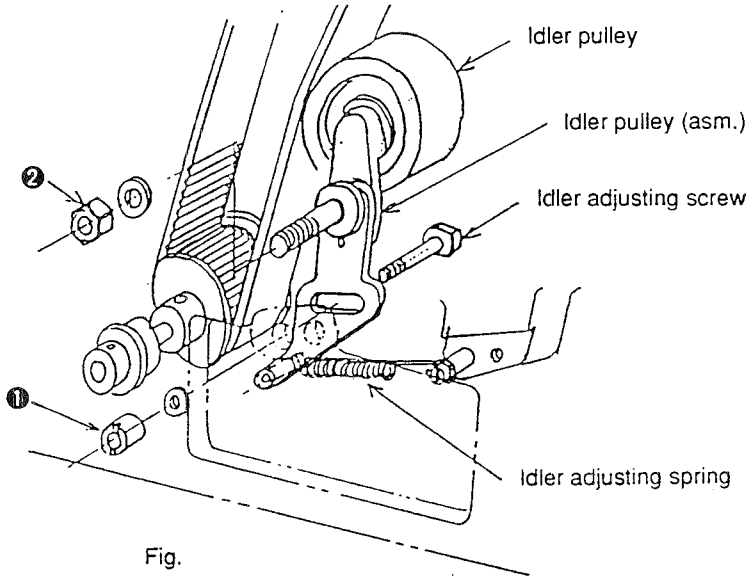


Fig.

* **When assembling the idler pulley (asm.), refer to "Standard adjustment ( )."**

(29) Disassembling the auxiliary pulley

1) Turn the auxiliary pulley to unlock it.
2) Loosen two screws ❶ and pull out the auxiliary pulley (asm.).
3) Remove two screws ❷ and remove the auxiliary pulley shaft.
4) Remove screw ❸ . Remove the auxiliary pulley bearing and the auxiliary pulley bearing spacer.
5) Remove four screws ❹ . Remove the auxiliary pulley lock disk.

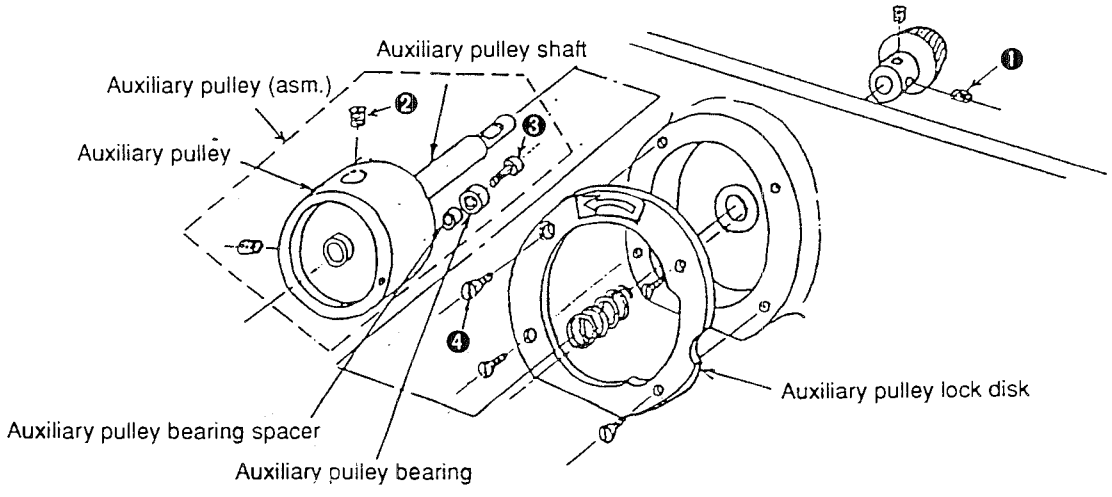


Fig.

* **When assembling the auxiliary pulley, refer to "Standard adjustment ( )."**

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) If the slot in the idler fixing plate is at the rightmost end in terms of the idler adjusting screw when nut ❶ and nut ❷ locating at installing position Ⓐ are loosened, change the installing position from Ⓐ to Ⓑ . 2) Similarly, if the slot in the idler fixing plate is at the leftmost end in terms of the idler adjusting screw when nuts locating at installing position (B) are loosened, change the installing position from Ⓑ to Ⓐ . (Figs.) 3) If the slot in the idler fixing plate comes in contact with the idler adjusting shaft even after the installing position has been changed, change the rank of the timing belt with an appropriate one. 4) Put the idler adjusting spring in position. Now, make sure that the spring applies pressure to the timing belt through the idler pully. Then, tighten nut ❷ and nut ❶ in the written order.	○ The machine will fail to perform sewing because of the phase shift between the main shaft and the hook driving shaft.
1) Turn the auxiliary pulley while pressing in it until it locks. 2) Respectively move the auxiliary pulley gears A and B until they are mated with each other at portion Ⓐ and tighten screw ❶ . Then, turn auxiliary pulley gear B until the tapped hole in it reaches the flat portion of the auxiliary pulley shaft and tighten screw ❷ .	

(24) Adjusting the pneumatic components

1) When quick-coupling joint ❶ is connected in position and air cock ❺ is opened, pressure gauge ❼ (for intermediate presser) should indicate 5 to 5.5 kgf/cm² and pressure gauge ❾ (for feeding frame) should indicates 3 to 3.5 kgf/cm². (Fig.)
2) If pressure gauge ❼ indicates an operating air pressure lower than 4 kgf/cm², the machine stops while giving error [A] on the display. (Fig.)
3) The air pressure on the feeding frame cylinder on the retracting side has been reduced to 1.5 to 2 kgf/cm². So, it is possible to lower the feeding frame by hand. (Fig.)
4) The needle knob of the speed controller (for the feeding frame cylinder) has been fixed in the state where it is loosened by one revolution after fully tightened. (Fig.)
5) The needle knob of the speed controller (for the intermediate presser cylinder) has been fixed with a nut in the state where it is loosened by a half revolution after fully tightened. (Fig.)

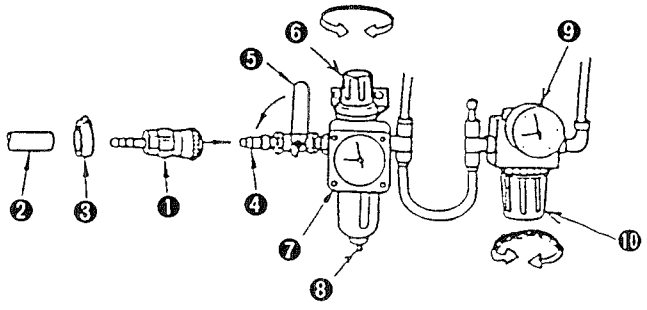
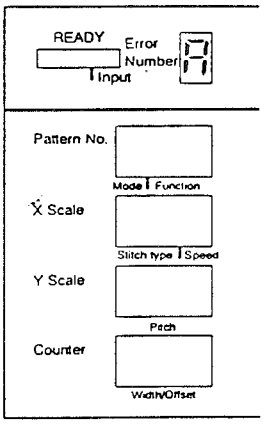


Fig.



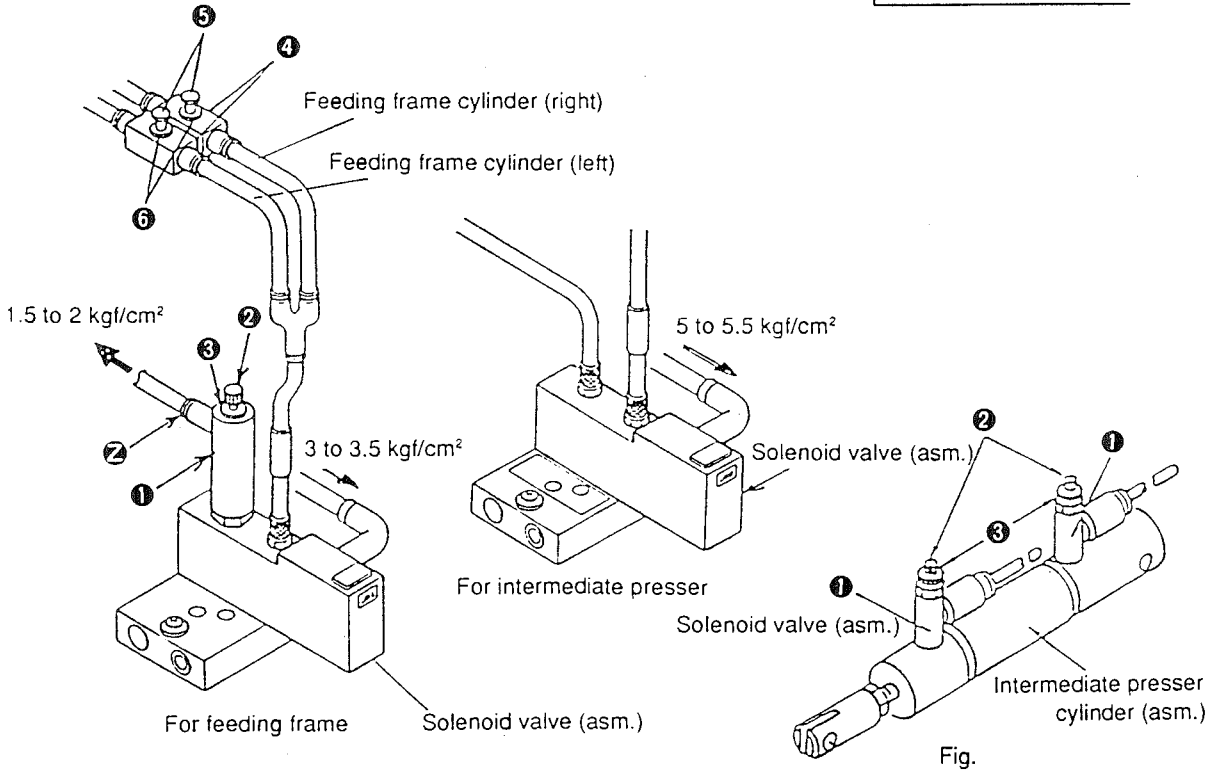


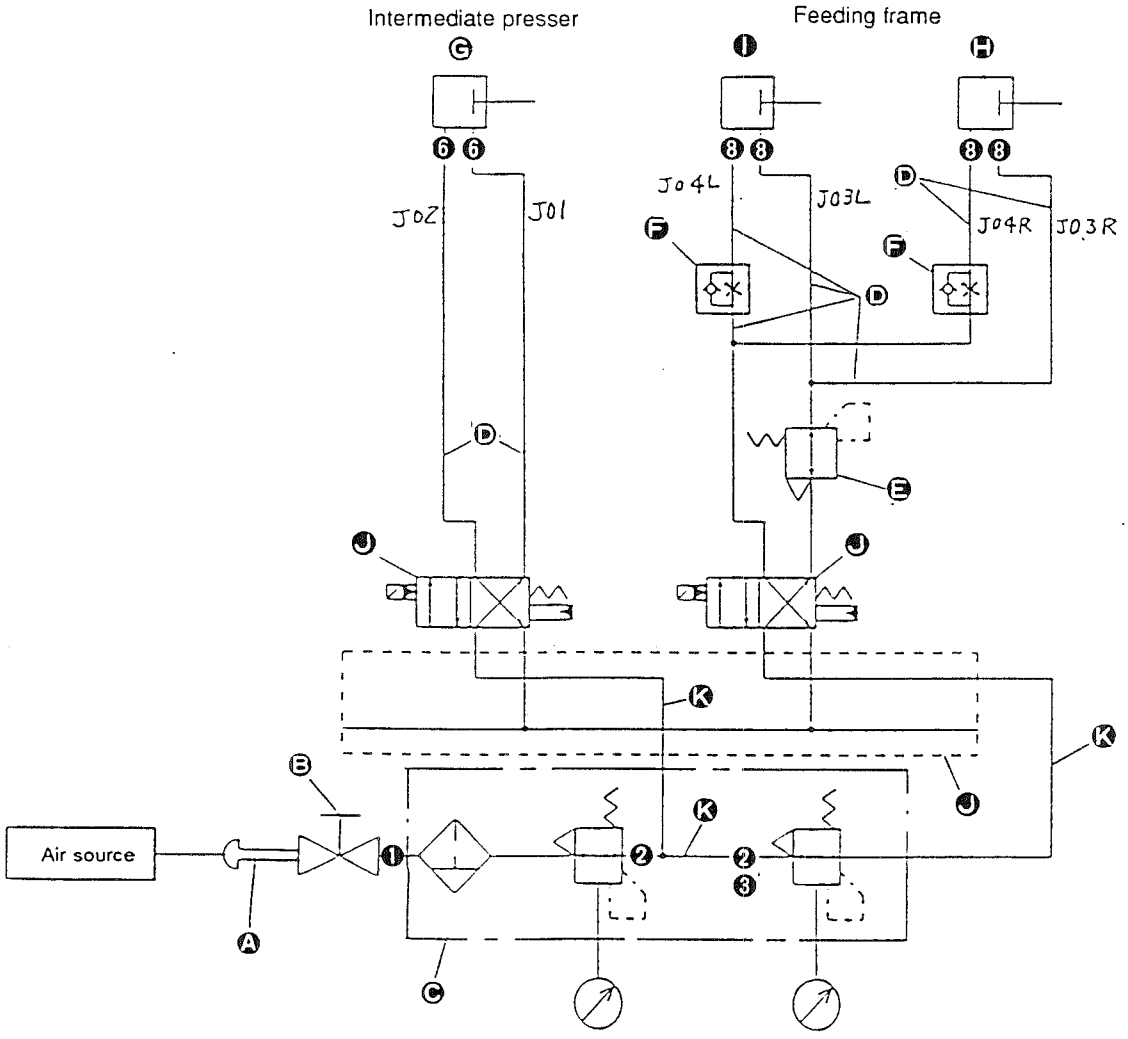
Fig.

Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Connect the air supply hose ❷ to quick-coupling joint (female) ❶ and fix it with cable clip ❸ . 2) Connect female side ❶ of the quick-coupling joint to male side ❹ of the joint. 3) Open air cock ❺ . Then, pull up air pressure regulating knob ❻ and turn it to adjust so that pressure gauge ❼ indicates 5 to 5.5 kgf/cm². Then, press down the knob so that it is secured. 4) Pull down air pressure regulating knob ❿ and turn it to adjust so that pressure gauge ❾ indicates 3 to 3.5 kgf/cm². Then press up the knob so that it is secured. 5) If the air pressure shown on pressure gauge ❼ is too low, the machine will stop while giving error [A] on the display. * Close air cock ❺ and press button ❽ . This will reduce the air pressure to 0 kgf/cm². **[Caution]** **After making the adjustment, set air pressure gauge ❼ so that it indicates 5 to 5.5 kgf/cm² (0.5 to 0.55 MPa), and make sure that error indication ❹ goes out.** 6) Under the sewing mode, remove the air hose by pressing section ❷ of pressure reducing valve ❶ that is fixed on the solenoid valve asm. Connect a commercially available pressure gauge. (Fig.) Treadle the feeding frame switch five times or more. Then turn needle knob ❷ of pressure reducing valve ❶ , and adjust the pressure gauge connected so that it indicates 1.5 to 2 kgf/cm² (0.15 to 0.2 MPa). Then fix the knob at that position using nut ❸ , and connect the air hose which has been removed. (Fig.) 7) Adjust needle knob ❺ of speed controller ❹ , referring to the "STANDARD ADJUSTMENTS ( )-4)." Then fix the knob using nut ❻ . (Fig) 8) Remove the face plate. Adjust needle knob ❷ of speed controller ❶ , referring to the "STANDARD ADJUSTMENTS ( )-5)." Then fix the knob nut ❸ . (Fig)	1) The work clamp mechanism and/or intermediate presser mechanism may malfunction. The machine will stop running while showing error indication [A]. 2) The machine may fail to detect a drop in the pressure of the air source. The machine will stop running while showing error indication [A] if the pressure gauge indicates normal operating air pressure (5 to 5.5 kgf/cm² (0.5 to 0.55 MPa)). 3) The appropriate pressing pressure of the work clamp will not be obtained. 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. 5) The intermediate presser may fail to move smoothly. A heavy metal noise may be produced while the intermediate presser is actuated. [Caution] **It is unnecessary to carry out Steps 2) through to 5) in the "STANDARD ADJUSTMENTS ( )" 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.** * When setting the air pressure gauge to 0 kgf/cm², be sure to close air cock ❺, and press button ❽. (See Fig.)

(25) Connecting the pneumatic components

Schematic circuit diagram for pneumatic components



Ⓐ	Quick-coupling joint socket
	Quick-coupling joint plug
Ⓑ	Air cock
Ⓒ	Filter regulator
Ⓓ	ϕ4 Air tube
Ⓔ	Pressure reducing valve
Ⓕ	Speed controller (A)
Ⓖ	Intermediate presser cylinder
Ⓗ	Work clamp cylinder (right)
❶	Work clamp cylinder (left)
Ⓙ	Solenoid valve (asm.)
	Manifold
	Solenoid valve
Ⓚ	ϕ6 Air tube

❶	Barrel nipple
❷	Double branch tube
❸	Plug
❹	Elbow union (B)
❺	Hose nipple
❻	Speed controller (B)
❼	Y-shaped joint
❽	Hose elbow

[Caution]

* If the components are improperly connected, the feeding frame components and the intermediate presser components will malfunction, causing the machine to fail or various parts to be damaged.
* If using an air gun or the like, a 6 air tube is allowed to be connected to joint ❷ . In this case, plug ❸ has to be removed.

(30) Disassembling the cam follower (asm.)

1) Remove the thread trimming cam shaft. (Refer to "Disassembly/assembly procedure ( ).")
2) Remove the throat plate.
3) Remove the X travel base (asm.) (Refer to "Disassembly/assembly procedure ( ).")
4) Remove the spring of the thread trimming link.
5) Remove the hinge screw of the thread trimming link.
6) Detach the cam follower from the underside of the bed while trying to bending it.

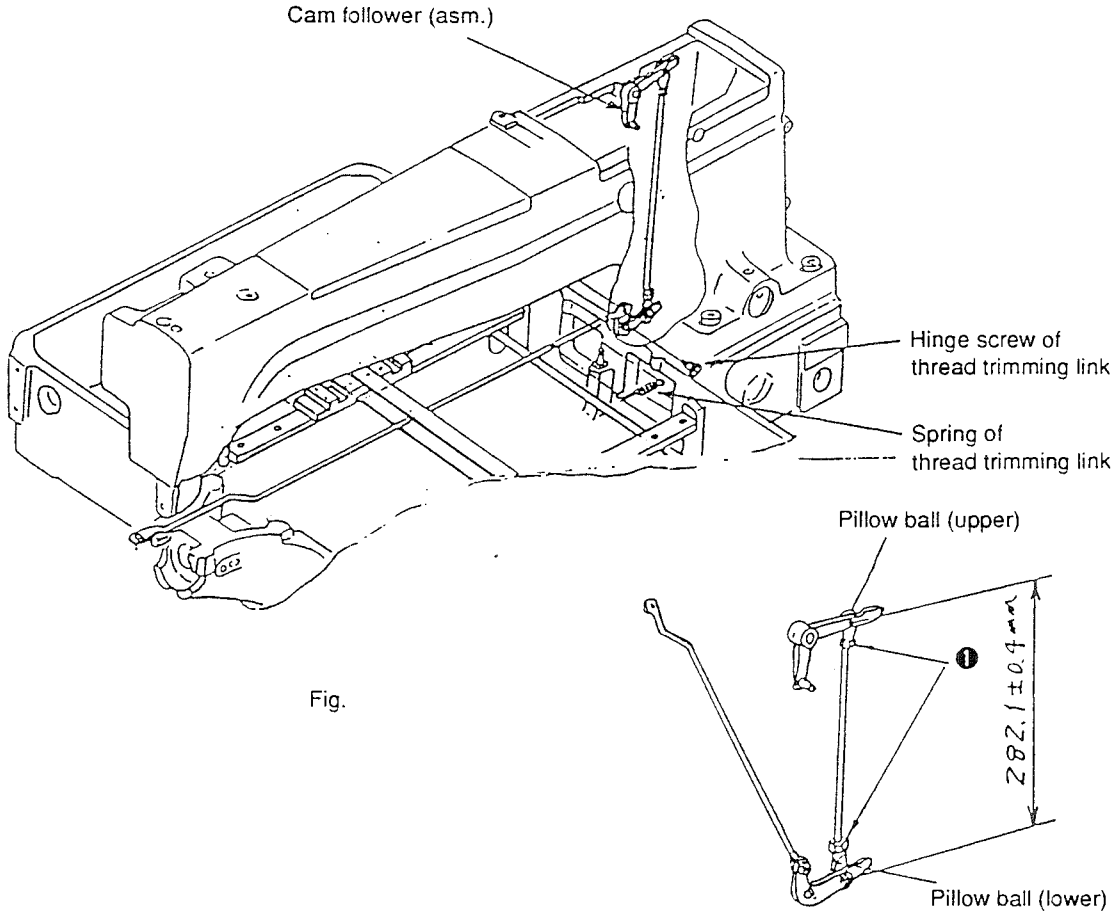


Fig.

*** Caution to be taken when disassembling/assembling the cam follower (asm.)**

1) Do not loosen rod adjusting screw nut ❶ .
2) When removing the spring of the thread trimming link, take care not to deform the hook of the spring.
3) When disassembling the cam follower (asm.), adjust center-to-center distance between the pillow balls to 282.1 ± 0.4 mm. (At this time, end faces of the respective pillow balls have to be in parallel to each other.)

(31) Disassembling the components of the tension release mechanism

1) Remove the thread trimmer mounting base referring to the "DISASSEMBLY/ASSEMBLY PROCEDURES ( )."
2) Remove the thread trimming cam shaft referring to "DISASSEMBLY/ASSEMBLY PROCEDURES ( )."
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 tension release arm, connecting plate and tension arm (B).

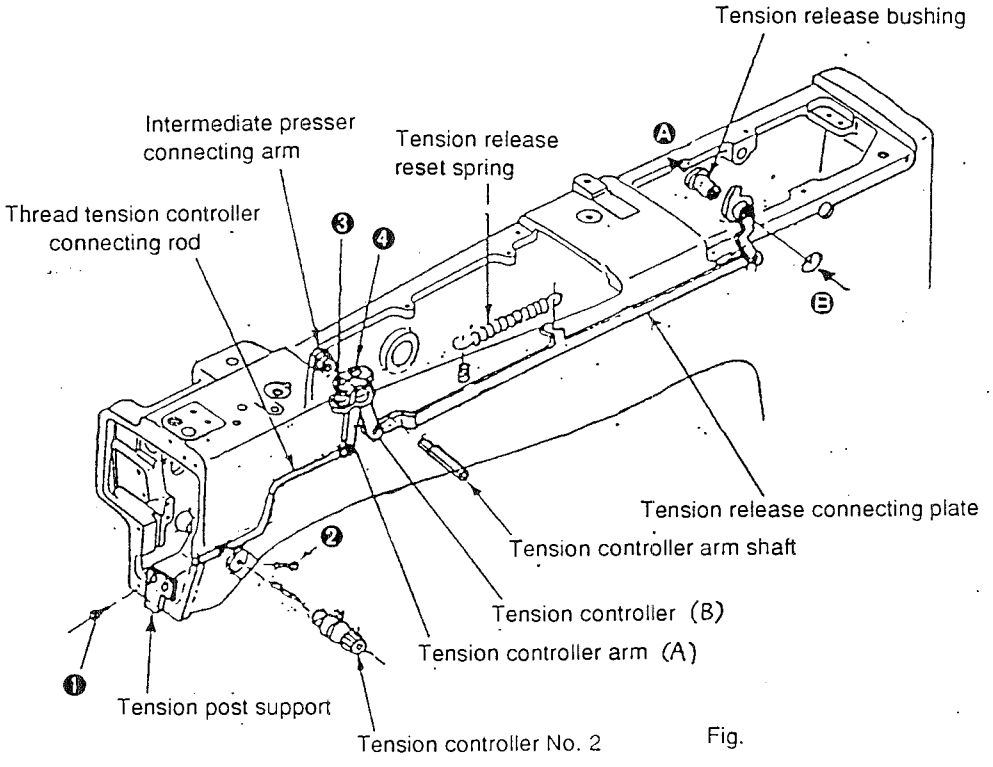


Fig.

* Caution to be taken when disassembling/assembling the tension release components

1) When removing the tension release reset spring, take care not to damage the spring hook.
2) When removing the tension release bushing, wedge a ø8.5 to 11.5 mm hammering bar from the side face of the arm, and push out the bushing in the direction of arrow Ⓑ.
3) 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.
4) When fixing tension arm (A) and (B), refer to "DISASSEMBLY/ASSEMBLY PROCEDURES Disassembling the lifting mechanism CAUTION IN ASSEMBLY."

(32) Assembling the optional tension release connecting arm (B23162150A0)

1) Fit the tension release connecting arm in the tension arm over the tension arm shaft.
2) Adjust the rising amount of the tension disk using the tension arm. Refer to the "STANDARD ADJUSTMENTS ( )."
3) When the tension disk is raised (the tension release shaft arm rests on the tension release notch), adjust the clearance provided between the tension release connecting arm and the intermediate presser connecting arm to 1 mm. Now, lightly press the pin mounted on the tension release connecting arm against the intermediate presser connecting arm, tighten the screw in the tension release connecting arm.

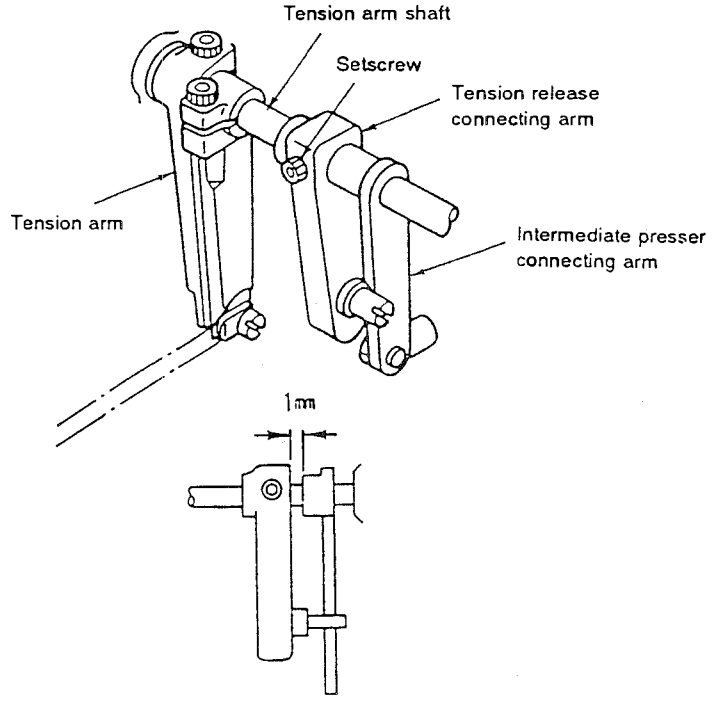


Fig.

* Caution to be taken when disassembling the tension release connecting arm

1) Be sure to perform the adjustment with the intermediate presser raised.
2) After the tension release connecting arm is assembled, ascertain that the tension disk opens as the intermediate presser goes up.

(33) Disassembling the large pendulum and crank rod of the hook driving shaft

1) Loosen two screws ❶ in the large pendulum of the hook driving shaft and two screws ❷ in the thrust collar. Then, pull the large pendulum shaft backward until it comes off.
2) Loosen two screws ❸ in the eccentric cam of the hook driving shaft.
3) Pull out the hook driving shaft. (See "Disassembly/assembly procedure ( ).")
4) Disassemble the joining section of the large pendulum, crank rod and eccentric cam of the hook driving shaft. (Fig.)
5) Remove screw ❹ from the hook driving shaft crank rod and three screws ❺ from the needle stopper of the hook driving shaft eccentric cam. Then, remove the hook driving shaft crank rod.

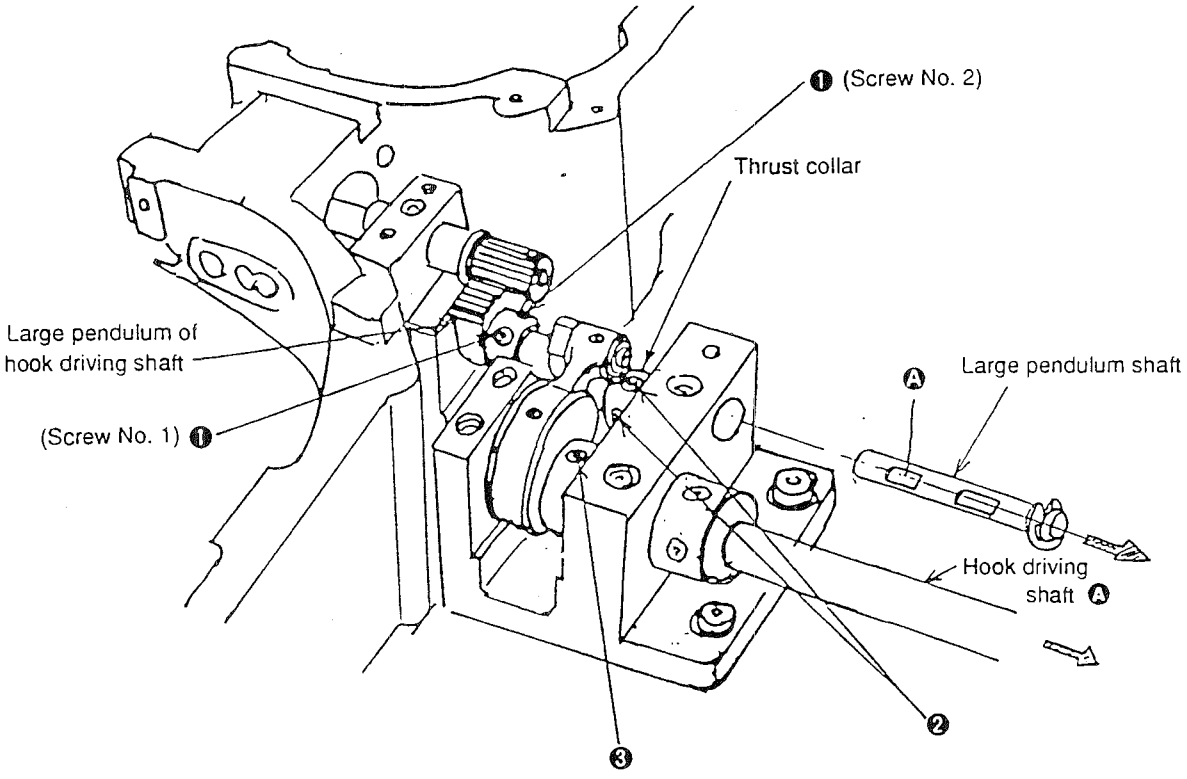


Fig.

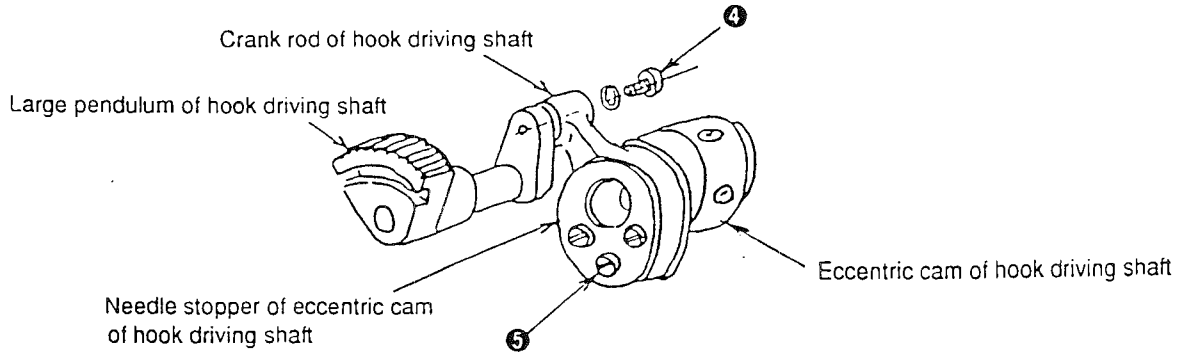
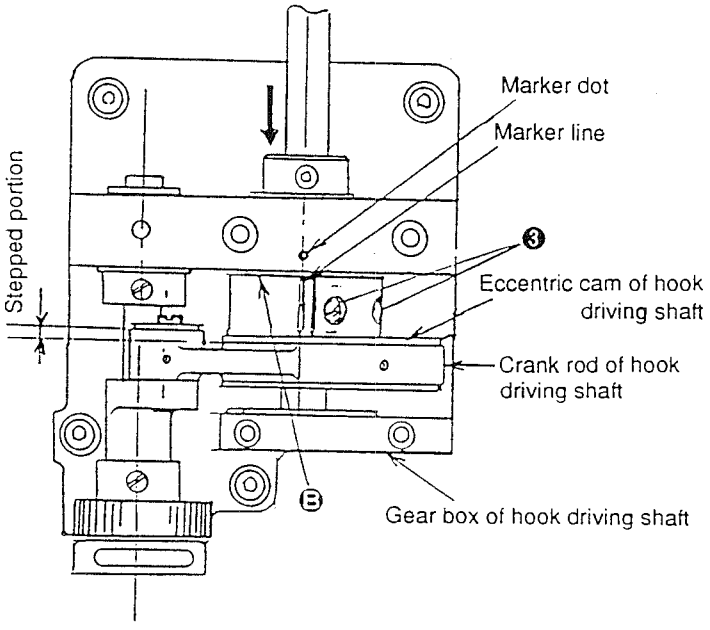


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
○ Needle bearings are joined with appropriately selected. It is therefore necessary to remove the needle bearings carefully checking the installing positions of respective bearings.  Fig.	○ When assembling the hook driving shaft A, refer to "Disassembly/assembly procedure ( )." ○ Carefully remove an axial play from the large pendulum of the hook driving shaft. ○ To assemble the large pendulum of the hook driving shaft, fix the eccentric cam on the hook driving shaft, fully shift the hook driving shaft backward and tighten screw No. 1 of screws ❶ in flat portion Ⓐ on the large pendulum of the hook driving shaft. Then, tighten screw No. 2 of screws No. 1. (Fig.) ○ To re-assemble the large pendulum of the hook driving shaft, the contact plane of the gear teeth have to be brought to the previous position so as to prevent the gear from producing large noise. ○ When assembling the crank rod of the hook driving shaft, carefully check the orientation of the rod (the rear side has a stepped portion). (Fig.) ○ To fix the eccentric cam of the hook driving shaft, bring the needle bar to the lowest position of its stroke, shift the hook driving shaft A in the direction of the arrow while aligning the left-hand side marker line engraved on the eccentric cam of the hook driving shaft with the marker dot engraved on the hook driving shaft gear box, and tighten two screws ❸ with the eccentric cam pressed against place Ⓔ . (Fig.)

(34) Removing the thread trimmer mounting base and the thread trimmer 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 locknut ❷.
6) Remove the thread trimmer solenoid.
7) Disconnect the lead wire of the thread trimmer solenoid from the connector.

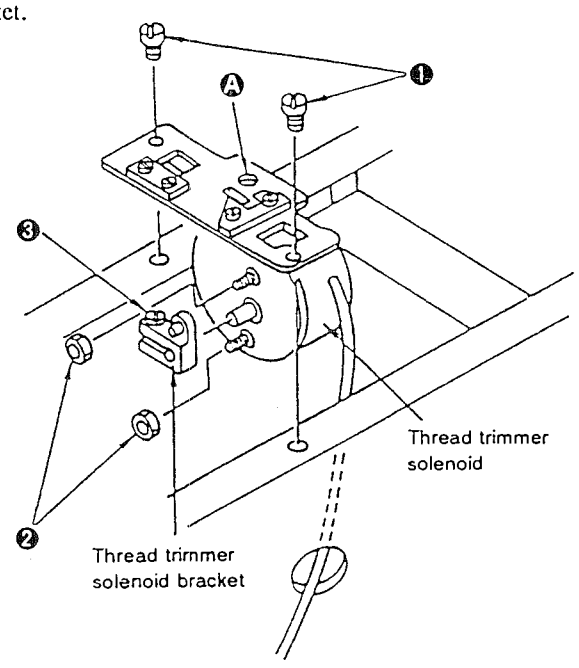


Fig.

(35) Removing the tension release arm components

1) Remove the thread trimmer mounting base. (Refer to "DISASSEMBLY/ASSEMBLY PROCEDURES ( ).")
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.

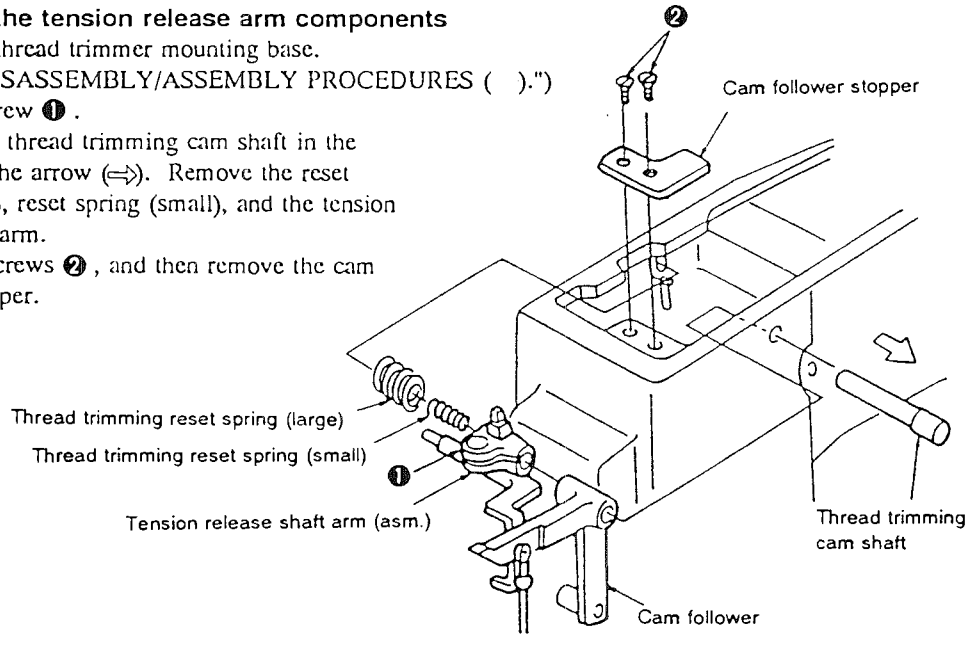
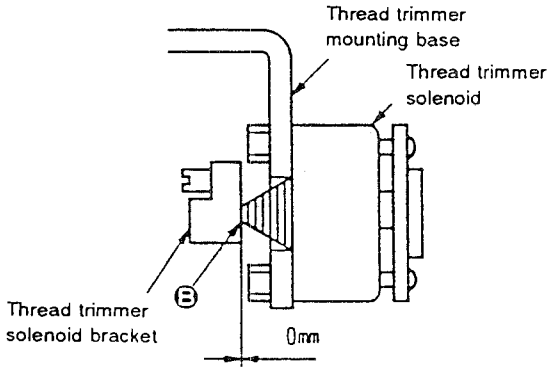
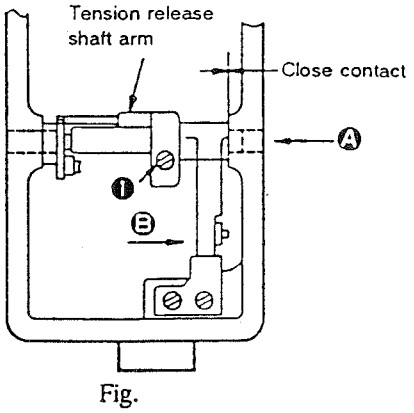


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o Note that the thread trimmer solenoid locknuts are fixed using the LOCK-TITE paint. o For removing the thread trimmer solenoid terminal from the connector, see the solenoid connection diagram.  Fig.	o Fix the thread trimmer solenoid locknuts by applying LOCK-TITE No. 242 after defatting them. o To fix the thread trimmer solenoid bracket, press the tension release shaft arm against the cam follower after fixing the thread trimmer mounting base (Fig.). Then, insert a screwdriver through Ⓐ of the thread trimmer mounting base, and tighten setscrew ❸ (Fig.). At this time, adjust the clearance between the trimmer solenoid bracket and the thread trimmer solenoid Ⓑ to 0 mm. (Fig.) o For the adjustment of the thread trimmer mounting base, refer to "STANDARD ADJUSTMENT ( )."
	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. Press the tension release shaft arm in the direction of arrow Ⓑ, and tighten tension release shaft arm setscrew ❶.  Fig. [At this time, adjust the thrusting direction so that the tension release shaft arm (asm.) and the cam follower turn smoothly and independently.]

(36) Disassembling the components of the intermediate presser lifting mechanism

1) Carry out steps 1) through 6) of "DISASSEMBLY/ASSEMBLY PROCEDURES ( ) Disassembling the components of the intermediate presser driving mechanism."
2) Remove locknut ❶. Then remove washer ❷, O ring ❸ and the suspension link support shaft of the intermediate presser.
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.

[Caution]

For the G type machine, remove the intermediate presser lifting spring and the intermediate presser connecting rod.

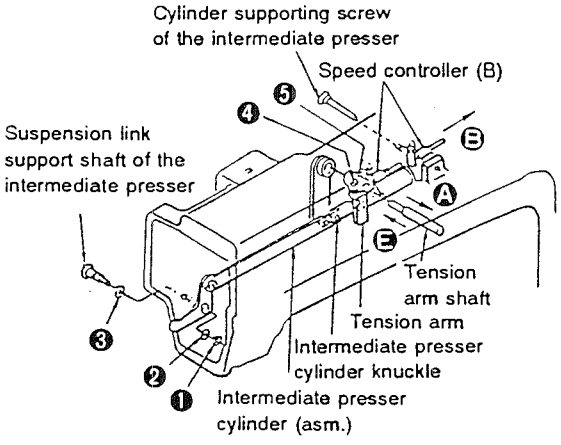


Fig.

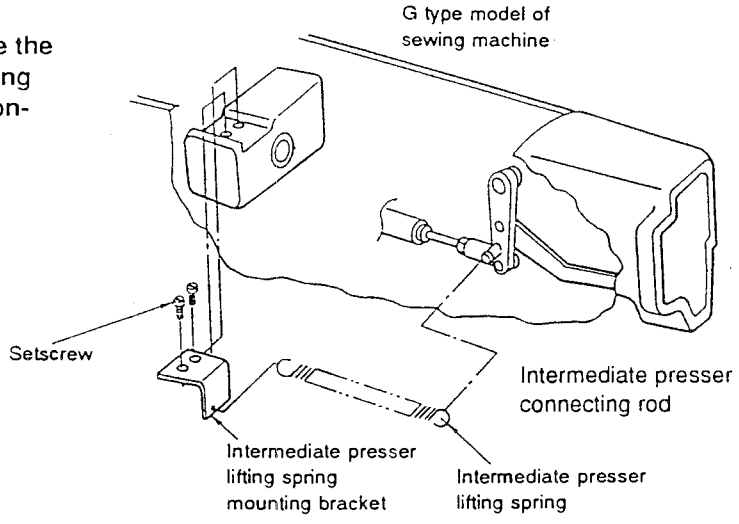
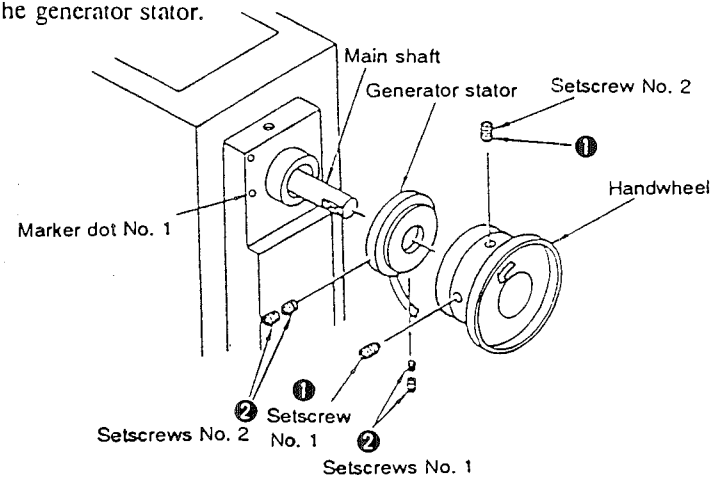
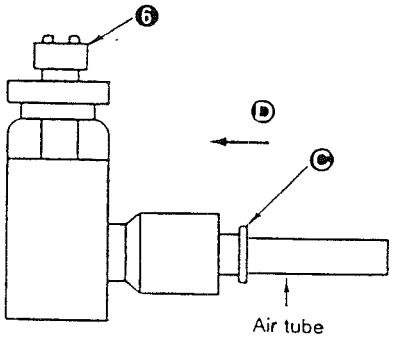
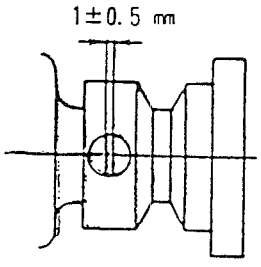


Fig.

(37) Removing the handwheel and the generator stator

1) Loosen two setscrews ❶ so that the handwheel is removed.
2) Remove two outer setscrews ❷ of the generator stator, and loosen the two inner setscrews.
3) Remove the generator stator.



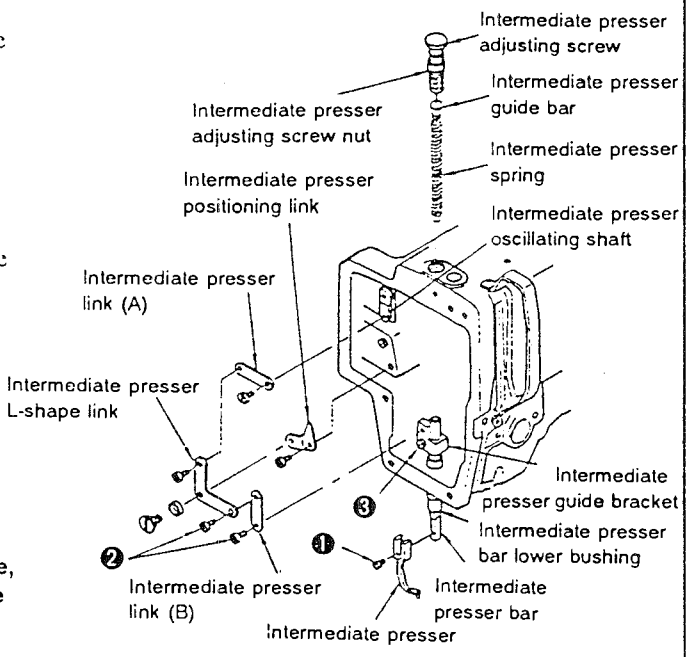
CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o Be sure to remove the air tube from speed controller (B) while pressing section Ⓒ in the direction of arrow Ⓓ. Use a mark to indicate the correct position for the reinstallation of the air tube which has been removed. [There are two different positions where 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.]  Fig.	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 while the machine is engaged in feeding material. During sewing, the intermediate presser may go up and come in contact with the needle bar. o Adjust the speed controller using adjusting screw 6, referring to the "STANDARD ADJUSTMENTS ( ) Adjusting the pneumatic components." o When the intermediate presser cylinder knuckle is removed, refer to the "STANDARD ADJUSTMENTS ( ) Adjusting the intermediate presser lifting stroke." o Tighten setscrew 5 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. o Tighten setscrew 4 referring to the "STANDARD ADJUSTMENTS ( ) Release amount of the tension disks." o When installing the intermediate presser suspension link, be sure to apply grease or lubrication oil to O ring 3 so that the O ring does not become damaged.
 Fig.	o When installing the generator stator, be sure that setscrews No. 2 are aligned with marker dot No. 1 on the bracket (Fig.). o When fixing the handwheel, be sure that setscrews No. 1 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±0.5 mm. (Fig.)

(38) Disassembling the components of the intermediate presser driving mechanism

1) Set the air pressure to 0 kgf/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 adjusting 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.

[Caution]

For the G type model of sewing machine, be sure to remove, in prior, intermediate presser spring Ⓔ and the intermediate presser depressing plate.



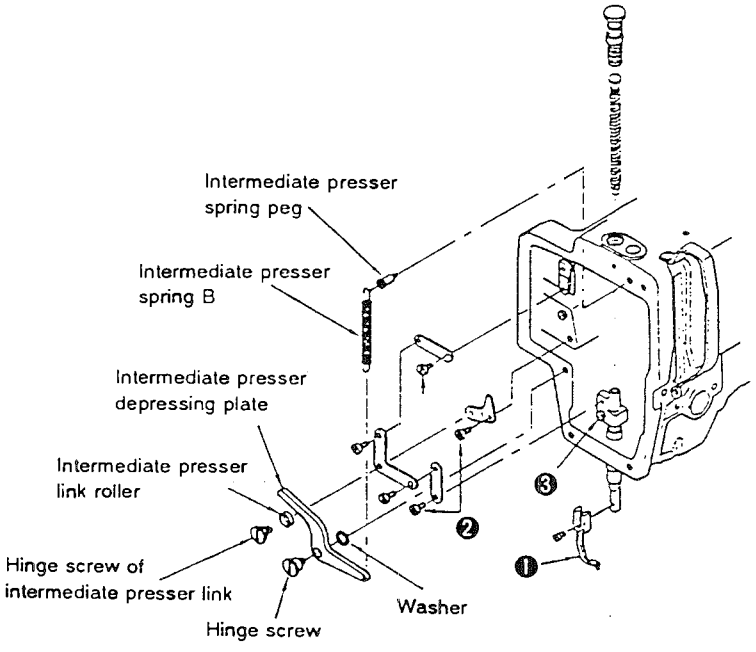
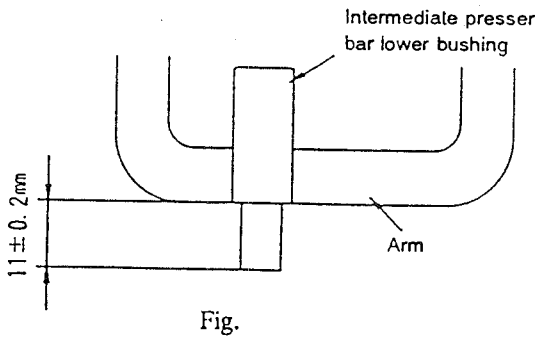
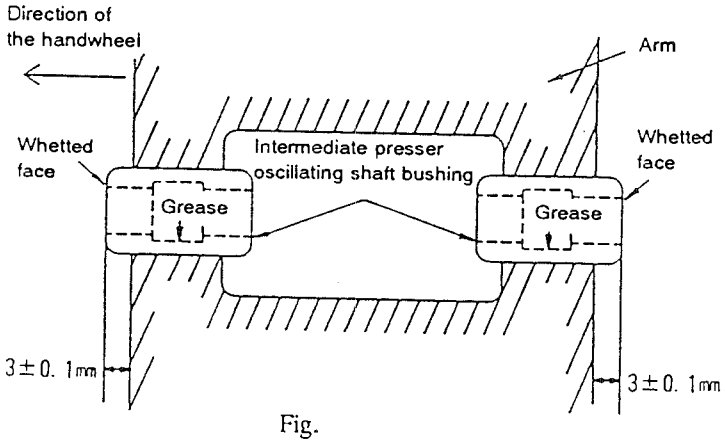


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o 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.	o 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 ( ) Intermediate presser." o 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. o If the specified distance of 11±0.2 mm between bottom of the intermediate presser bar lowering bushing and end of the arm is not obtained, the bottom of the intermediate presser may not be able to be fixed properly.
o 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.	o 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 oscillating shaft is allowed to turn smoothly without play. o Fix the intermediate presser rod bracket referring to step 4) of the "STANDARD ADJUSTMENTS ( ) Intermediate presser." o Install the intermediate presser rod connecting shaft referring to the "STANDARD ADJUSTMENTS ( ) Vertical stroke of the intermediate presser." o When fixing the intermediate presser cam in its standard position, refer to steps 2) and 3) of the "STANDARD ADJUSTMENTS ( ) Intermediate presser."

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.

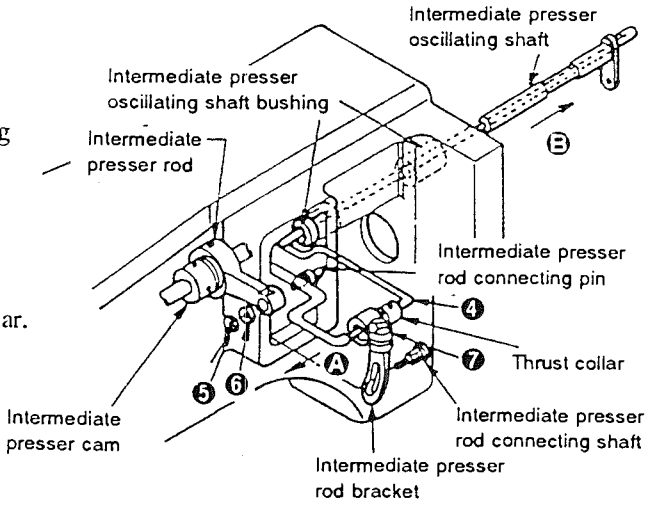


Fig.

(39) Disassembling the slide plate bearing and the work clamp slide plate

1) Remove four setscrews ❶, and then remove the feeding frame bracket.
2) Remove four setscrews ❷, and then remove work clamp slide plate A, work clamp slide plate and slide plate bearing.

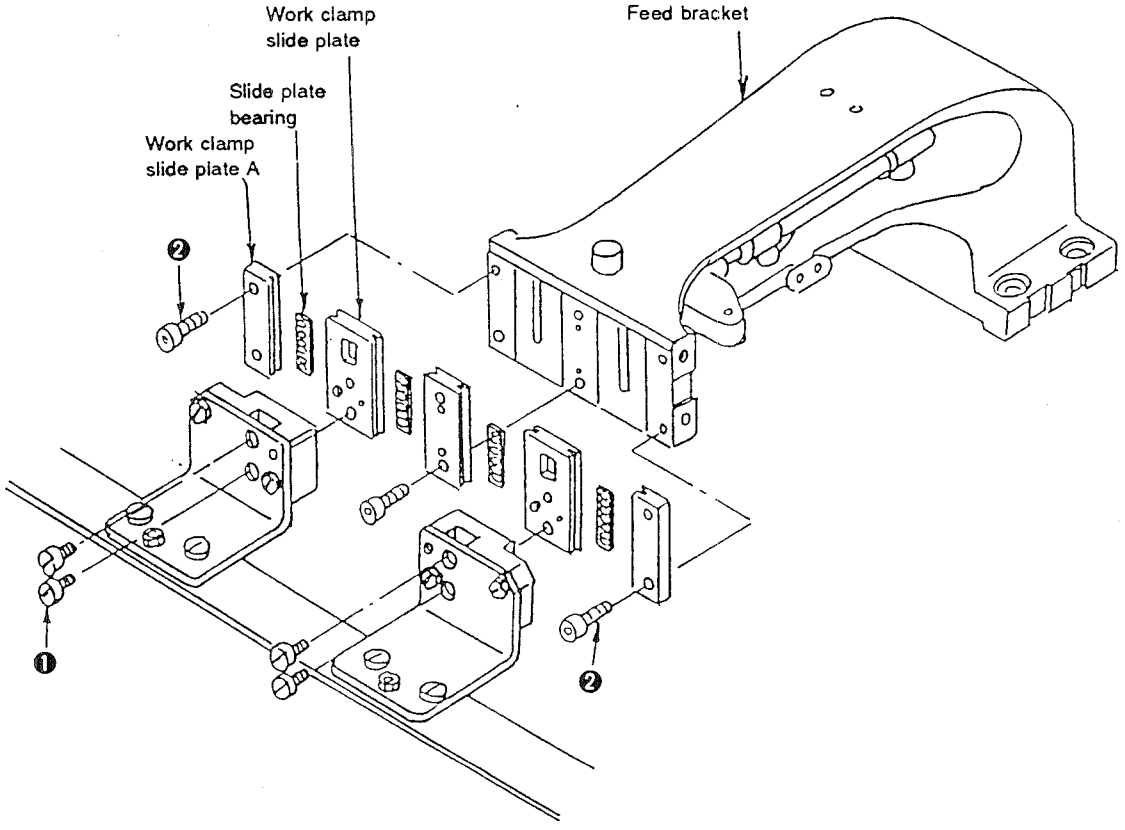
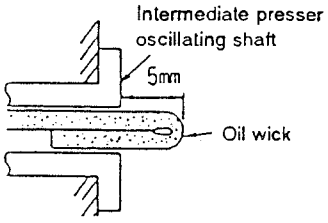
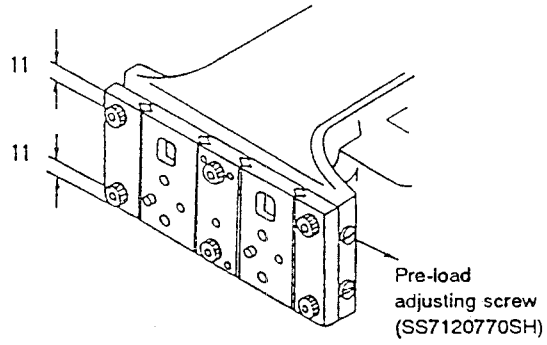
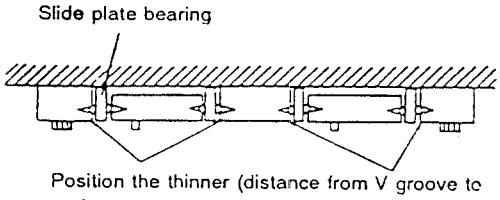
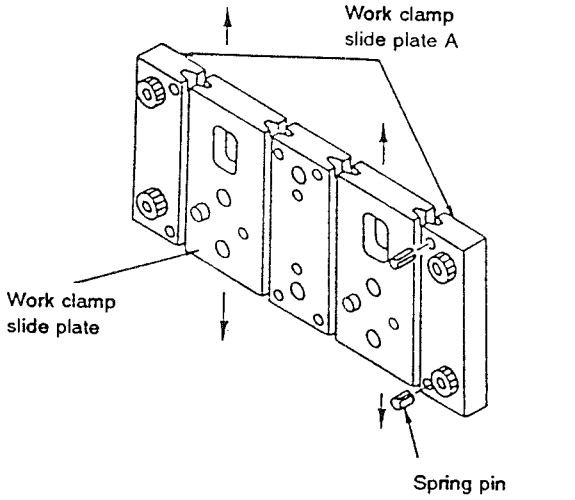


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	o 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.  Fig.
 Fig.  Position the thinner (distance from V groove to surface) one at the front. Fig.  Fig.	o The slide plate bearing and the work clamp slide plate have been preliminarily loaded. So, do not remove them unless doing so is quite necessary. o If you removed them, position the slide plate bearing at the center of the work clamp slide plate and lightly fix it using the pre-load adjusting screw. Move the work clamp slide plate up and down to apply a uniform pre-load to it and securely tighten screw ❷. **[Caution]** **The bearing produces a starting torque (sliding torque) of 100 to 800 g when it starts moving after it has come in contact with the spring pin when moving the work clamp slide plate up and down.**

(40) Disassembling the feed stepping motor and X-Y table

1) Remove the feed plate. (Refer to "Standard adjustment ( )."
2) Remove two screws ❶ . Loosen two screws ❷ and eight screws ❸ and lift the throat plate auxiliary cover until it comes off.
3) Remove screw ❹ and remove the thread trimming link.
4) Remove screws ❺ . Then, remove the throat plate.
5) Remove two screws ❻ and four screws ❼ . Then, remove the travel cover.
6) Remove four screws ❽ , then remove the feed bar
7) Remove eight screws ❾ and eight screws ❿ . Then, remove two feed bar auxiliary cover rails.
8) Remove the feed bar auxiliary cover.
9) Remove ten screws ⓫ . Remove the feed bar cover.

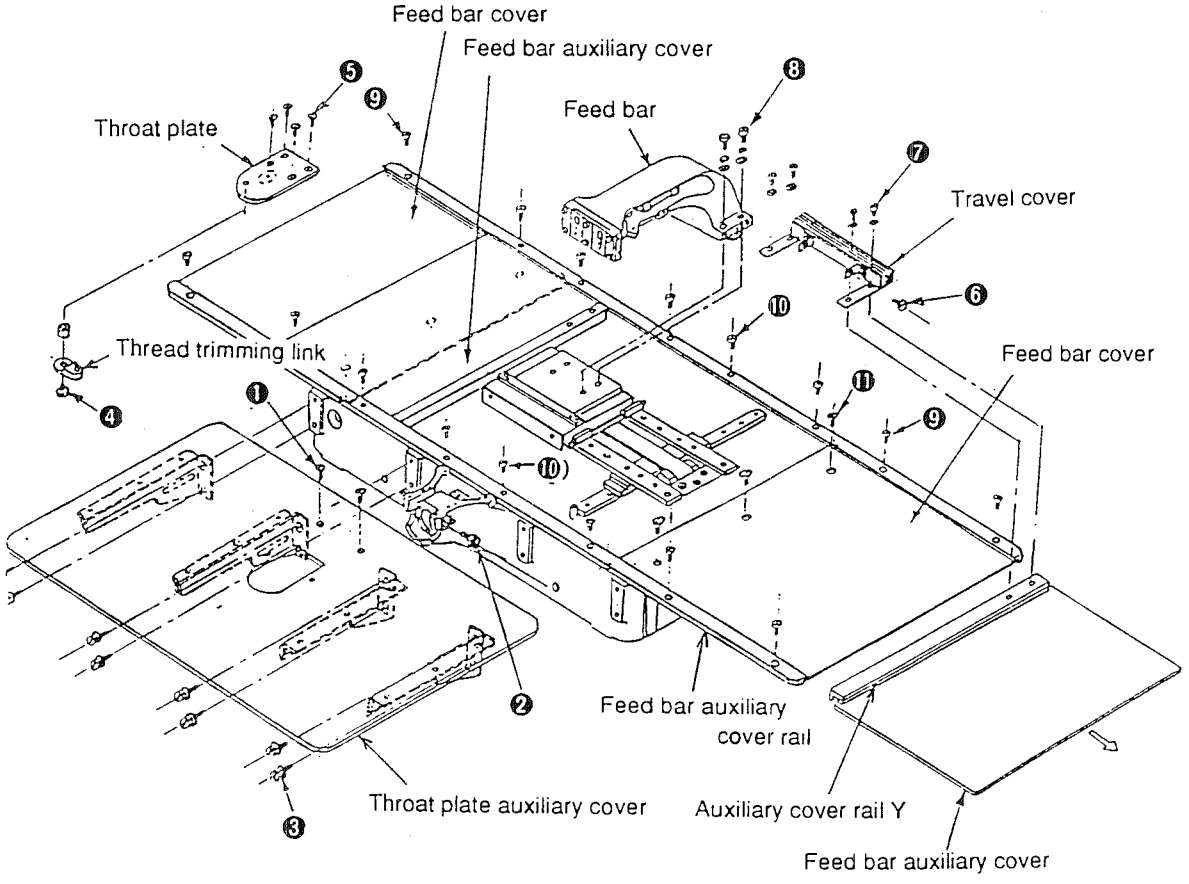
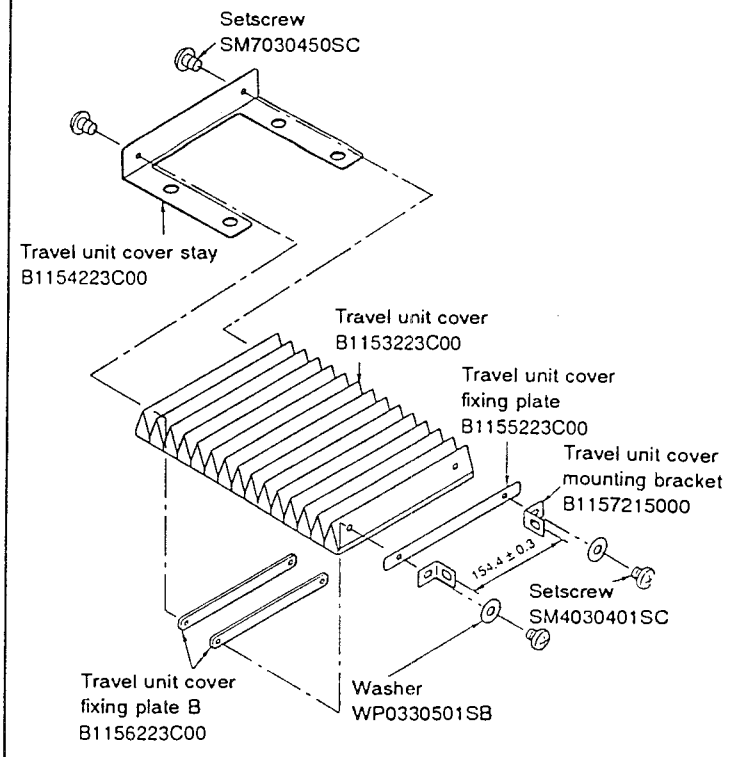


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig.	○ When assembling the throat plate auxiliary cover, refer to "Disassembly/assembly procedure ( )." ○ When assembling the feed bar auxiliary cover, refer to "Disassembly/assembly procedure ( )." ○ When the travel cover connection has been disassembled, assemble it following the steps described below. 1) Attach the travel cover fixing plates and the travel cover fixing plates B with their sagging side faced toward the travel cover. 2) Tighten the screw in the smaller hole in the travel cover installing plate. 3) Installing dimension of the travel cover installing plates (distance between inner surfaces of the plates) should be 154.4 ± 0.3 mm. (Fig.)

10) Remove two screws ⑫ , then remove the X belt presser.
11) Remove four screws ⑬ and remove the X sensor cord covers.
12) Remove two screws ⑭ and remove the cable presser.
13) Remove six screws ⑮ and remove the X sensor (A) asm., (B) asm. and (C) asm.
14) Remove locknut ⑯ and screw ⑰ . Remove three screws ⑱ and four screws ⑲ . Then, remove the X follower bracket base.
15) Remove four screws ⑳ , two nuts ㉑ and six screws ㉒ . Then, remove the X drive bracket base.
16) Remove eight screws ㉓ , then remove the X travel base (asm.).
17) Remove four screws ㉔ and remove the X motor (asm.).
18) Remove two screws ㉕ , two screws ㉖ and two screws ㉗ . Pull the bearing collar backward until it comes off. Then, remove the X drive spline shaft (asm.).

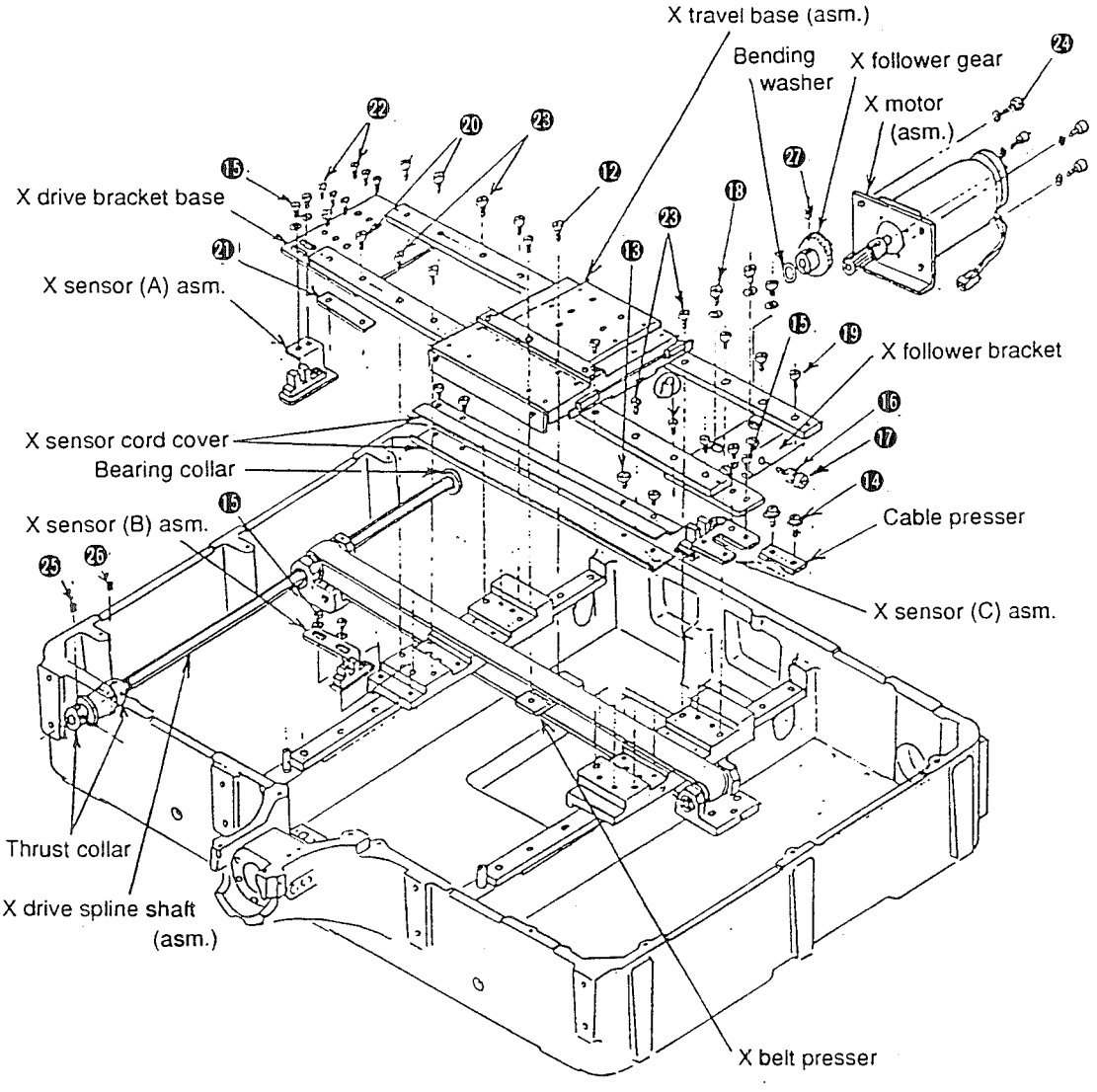


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
○ When disassembling the X travel base (asm.), temporarily tighten four M3 screws in both ends of X-LM guide so as to prevent bearings to suddenly drop off.	○ After the X motor (asm.) has been disassembled, refer to "Standard adjustment ( )." ○ After the X drive spline shaft (asm.) has been disassembled, mate the end face of the front thrust collar with the end face of the spline, fix the rear thrust collar over the spline shaft while carefully eliminating an axial play, and fix the X follower gear with the bending washer compressed by 0.1 to 0.2 mm. ○ Refer to "Standard adjustment ( )" for the adjustment of the belt tension. ○ Refer to "Standard adjustment ( )-2" for the adjustment of the X sensor. ○ Tighten screws ㉓ while preventing a traveling torque on the X travel base.

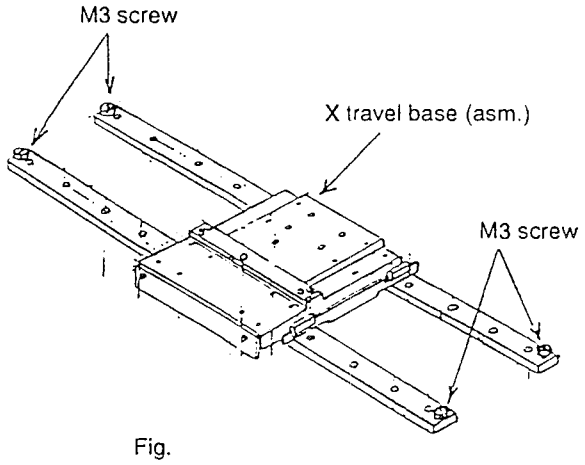


Fig.

○ Before disassembling the X drive spline shaft (asm.), temporarily tighten the thrust collars which have been removed in both ends of the spline shaft (asm.) because pulling out the spline shaft from the X drive bracket allows the bearing of the spline nut to suddenly drop off.

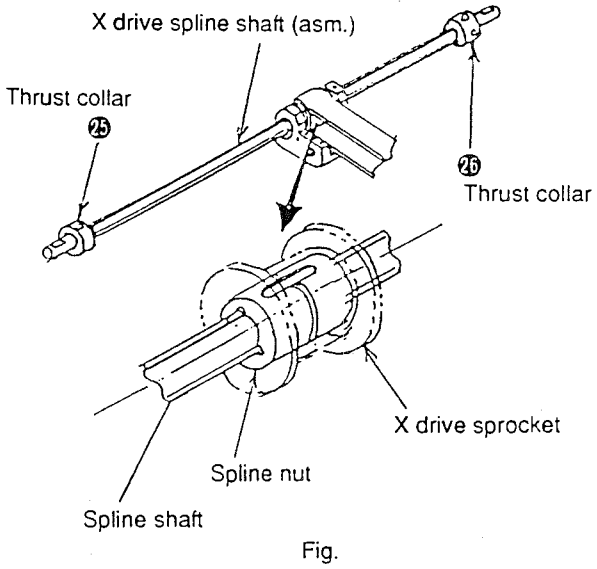


Fig.

19) Remove the thread trimmer connecting rod. (Refer to "Disassembly/assembly procedure ( )."
20) Remove the hook driving shaft. (Refer to "Disassembly/assembly procedure ( )."
21) Remove two screws ㉘ and two screws ㉔ . Then, remove two Y belt pressers.
22) Remove 16 screws ㉙ Then, remove the Y travel bases (left) and (right).
23) Remove 10 screws ㉚ . Then, remove the Y-LM guides (left) and (right).
24) Loosen two nuts ㉛ , then remove two belt tension adjusting screws.
25) Remove 16 screws ㉜ . Then, remove the Y drive shaft (asm.).
26) Remove four screws ㉝ , and remove the Y motor (asm.).

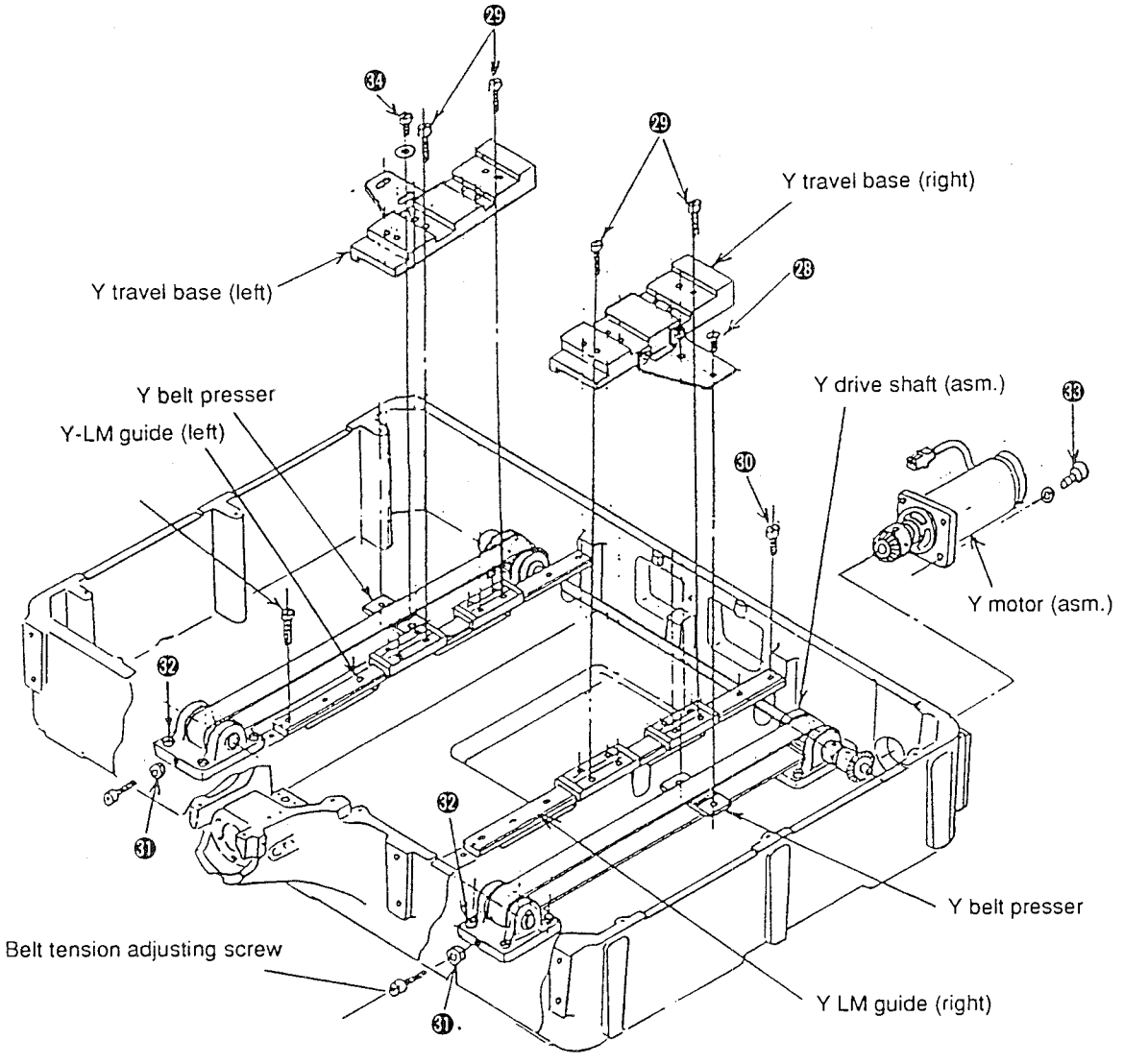


Fig.

CAUTIONS IN DISASSEMBLY

○ When disassembling the LM guides, temporarily tighten M3 screws in both ends of LM block so as to prevent bearings to suddenly drop off. (Fig.)

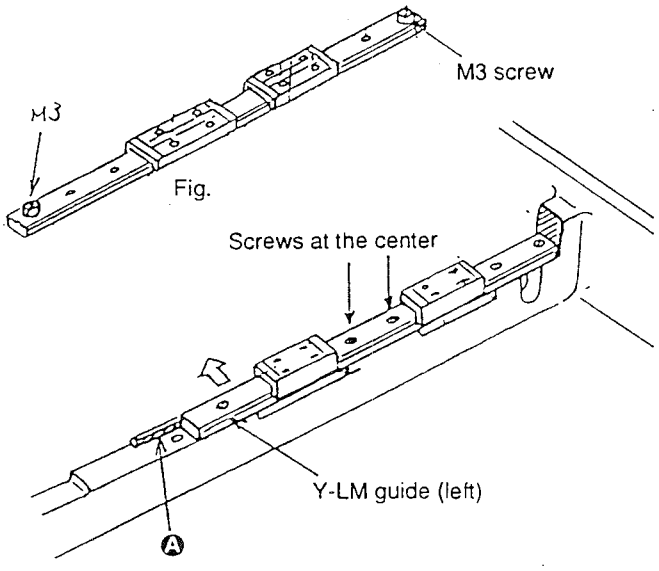


Fig.

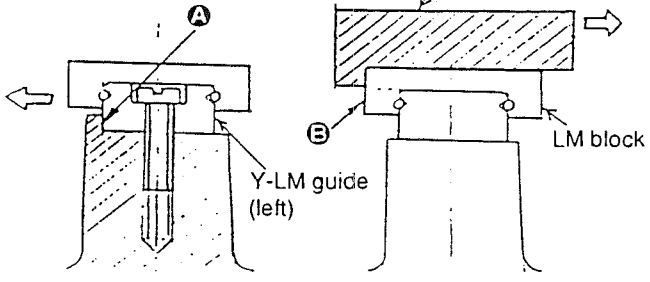


Fig.

Fig.

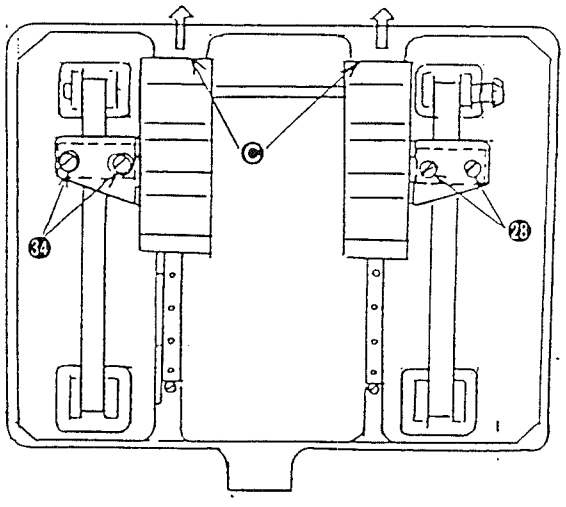


Fig.

CAUTIONS IN ASSEMBLY

○ When installing the Y-LM guide (left), tighten first the screws at the center of the guide with the leftmost end face of the guide pressed against plane Ⓐ. (Figs.)
○ When installing the LM-guide (right), a jig for the adjustment of parallelism is necessary.
○ When installing the Y travel base, fix it on the LM block with its stepped portion pressed against leftmost plane Ⓑ of the LM block. (Fig.)
○ If the Y motor (asm.) has been disassembled, refer to "Standard adjustment ( )."
○ Refer to "Standard adjustment ( )" for the adjustment of the belt tension.
○ When attaching the Y belt presser, tighten screws ㉘ with the rear end faces of the Y travel bases (left) and (right) pressed against surface Ⓒ of the bed. Then, tighten screws ㉞. (Fig.)

(41) Disassembling the main shaft

1) Loosen the idler pulley. (Refer to "Disassembly/assembly procedure ( ).")
2) Remove the handwheel. (Refer to "Disassembly/assembly procedure ( ).")
3) Remove screws ❶ and ❷ from the counterweight. Then, remove the counterweight.
4) Loosen two screws ❸ in the intermediate presser cam, two screws ❹ in the bobbin winder driving wheel, two screws ❺ in the auxiliary pulley gear (A), two screws ❻ in the main shaft thrust support, two screws ❼ in the thrust collar of the thread trimming cam, two screws ❽ in the thread trimming cam and screws ❾ and ❿ in the main shaft sprocket. Then, pull out the main shaft.

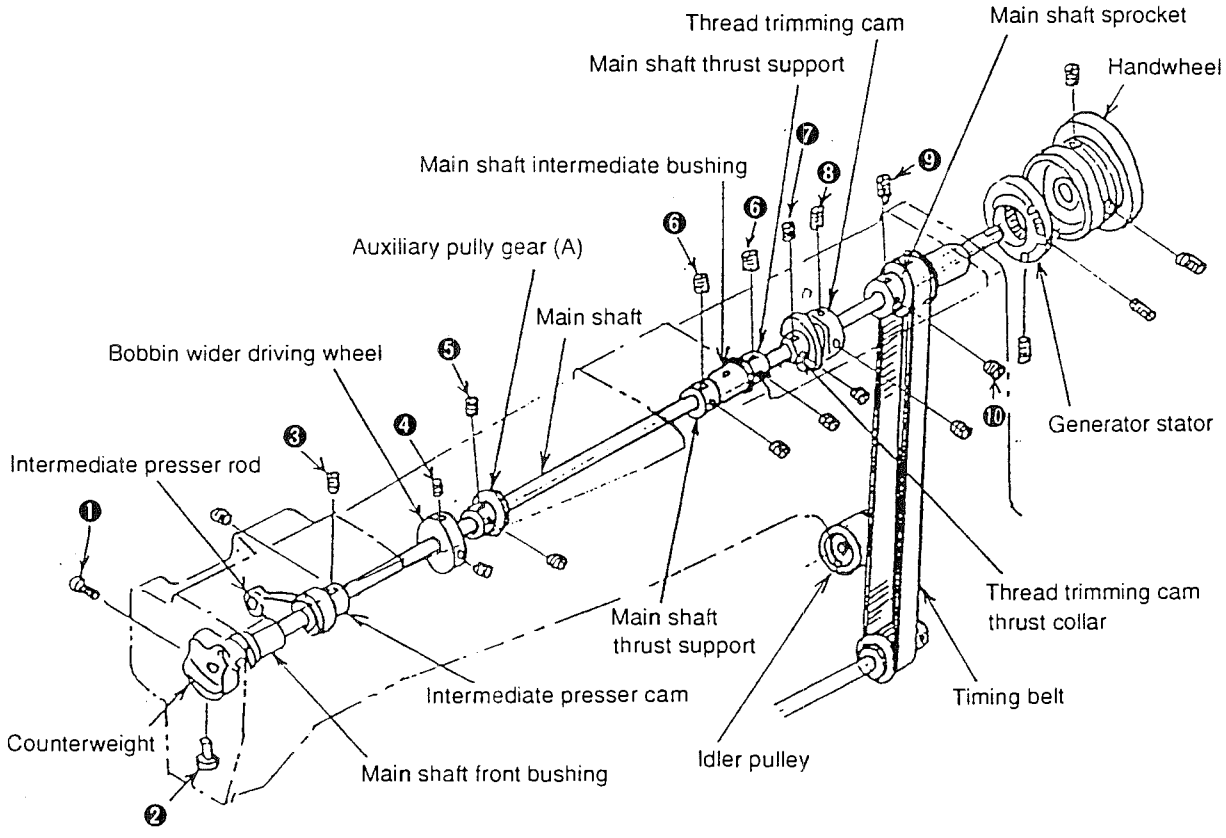
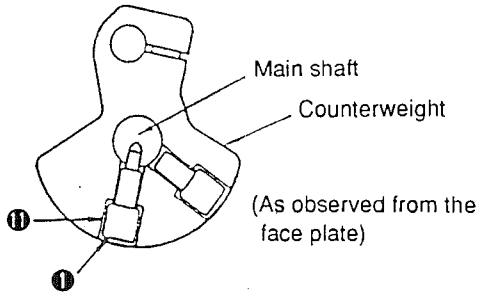
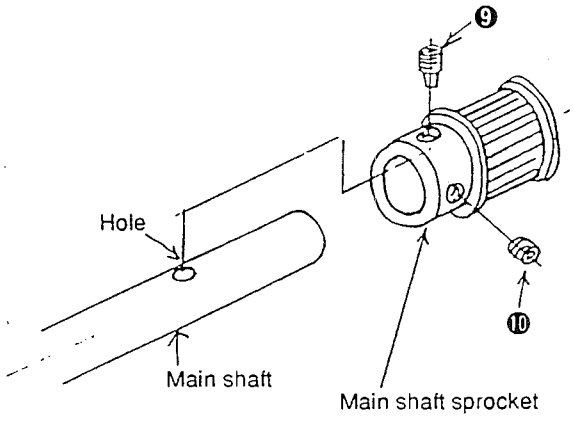


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig.  Fig.	1) When fixing the counterweight, put screw ❶ in tapped hole ⓫ in the counterweight. Then, align the tapered section at the end of screw ❶ with the tapered hole in the main shaft and tighten the screw. (Fig.) 2) Fix the thrust collar onto the main shaft referring to "Standard adjustment ( )." 3) When fixing the following, refer to the standard adjustments described below. ○ Intermediate presser cam ... Standard adjustment ( ) ○ Bobbin winder driving wheel ... Standard adjustment ( ) ○ Thread trimming cam thrust collar ... Standard adjustment ( ) ○ Thread trimming cam .... Standard adjustment ( ) 4) When attaching the handwheel, refer to "Disassembly/assembly procedure ( )." 5) When attaching the idler pulley, refer to "Disassembly/assembly procedure ( )." 6) When fixing he auxiliary pulley gear, refer to "Standard adjustment ( )." 7) Tighten screw ❾ (SS8661112TP) of the main shaft-sprocket with aligned with the hole in the main shaft. Then tighten screw ⓾ . (Fig.)

(42) Disassembling the hook driving shaft

1) Remove the idler pulley adjusting spring and adjusting screw. Loosen the nut not to allow the idler pulley to come in contact with the timing belt. (Refer to "Disassembly/assembly procedure ( ).")
2) Loosen two screws ❶, two screws ❷, screw ❸, screw ❹ and two screws ❺. Pull the hook driving shaft backward until it comes off.

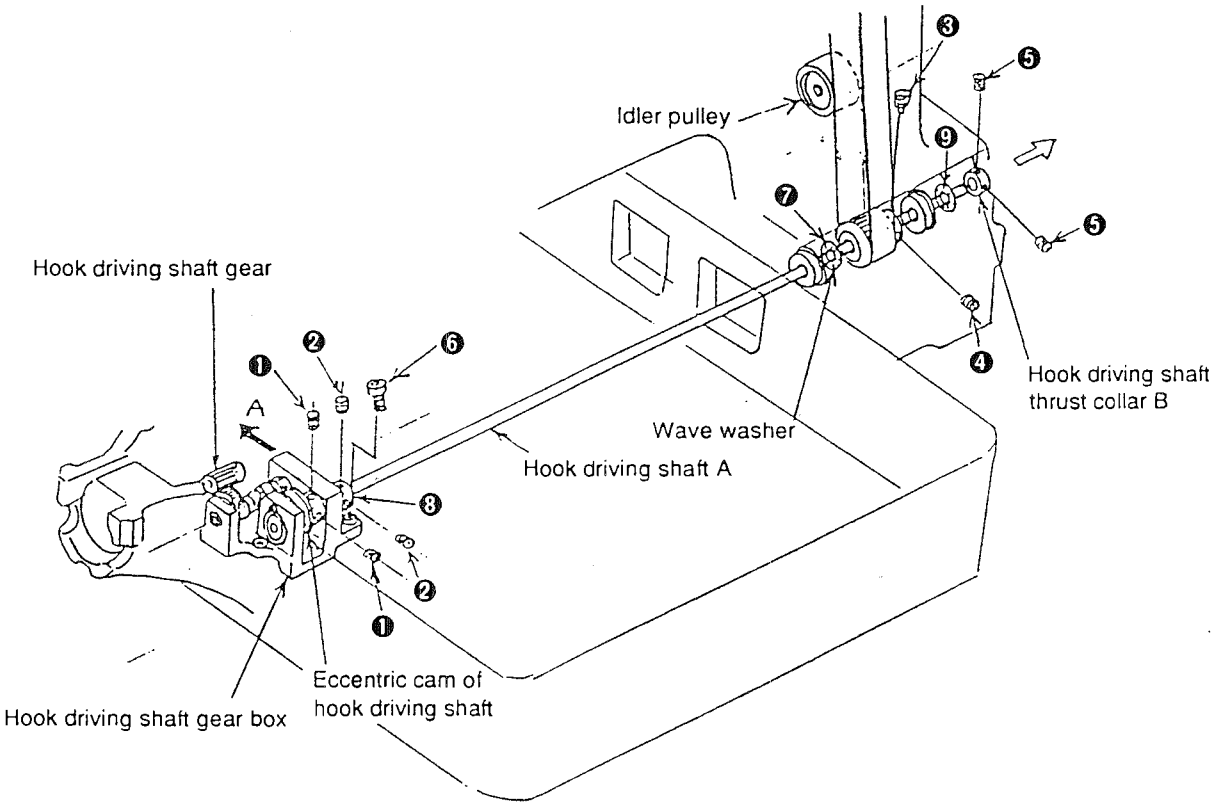


Fig.

(43) Disassembling the hook driving shaft gear connection

1) Remove the hook driving shaft gear box.
2) Loosen screw ❶, and remove the driver.
3) Loosen two screws ❷ and pull the hook driving gear connection backward until it comes off.

[Caution]

Never pull out the knock pin from the hook driving shaft gear.

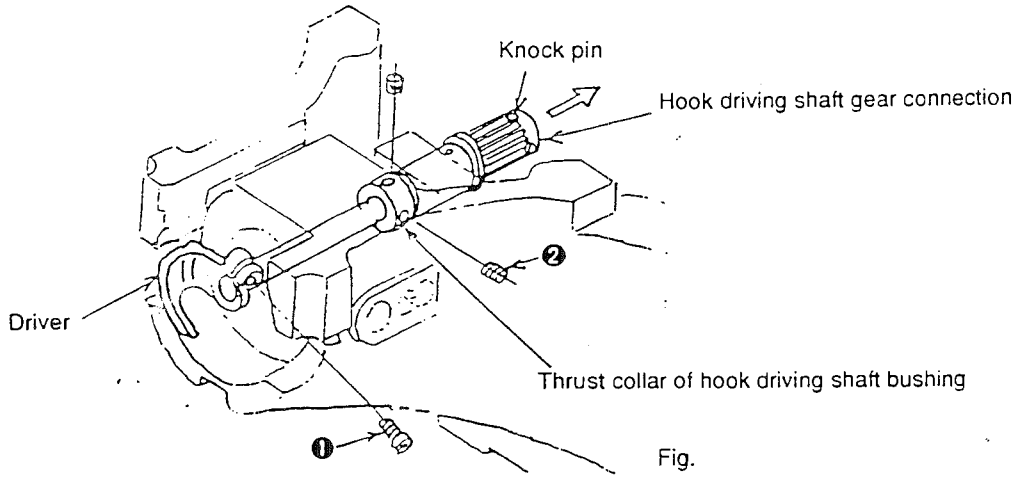
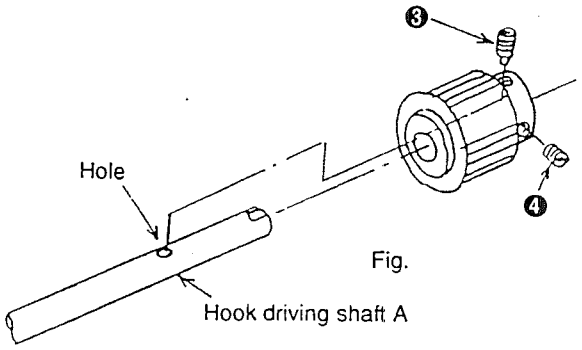
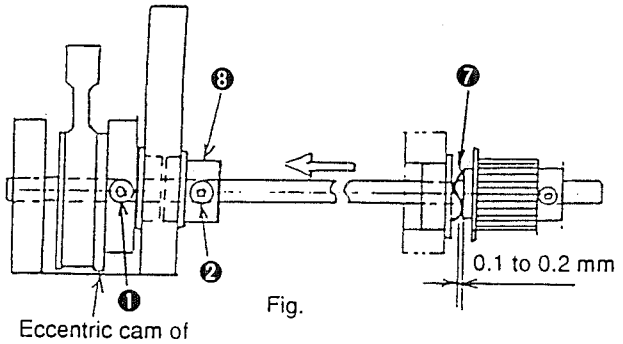
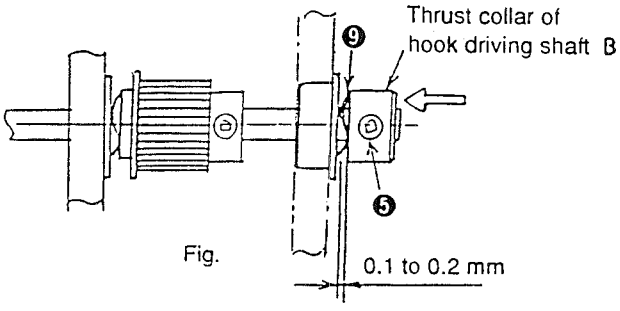
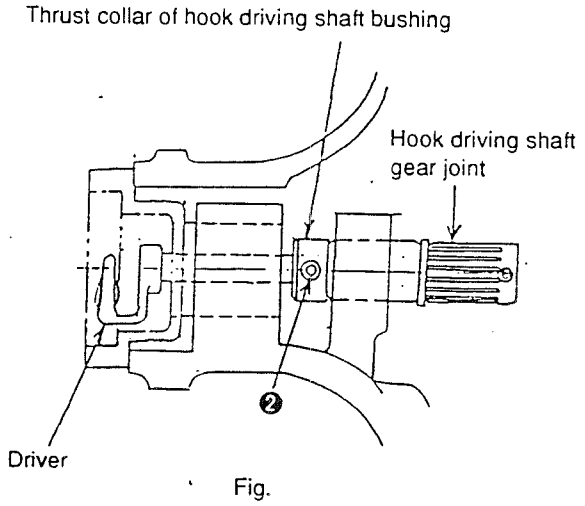


Fig.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig.  Fig.  Fig.	1) Pass all components onto the hook driving shaft A. Tighten screw ❸ (SS8661112TP) in the hook driving shaft sprocket with aligned with the hole in the hook driving shaft A. Then tighten screw ❹ . (Fig.) 2) Put four screws ❻ in the hook driving shaft gear box and keep the screws held loosened to release the gear box. 3) Pulling hook driving shaft A toward you so that wave washer ❼ is compressed by 0.1 to 0.2 mm, tighten two screws ❶ in the eccentric cam of the hook driving shaft. Then tighten screw ❷ eliminating a longitudinal play at thrust collar ❽ . (Fig.) 4) Shift the hook driving shaft gear box in the direction of arrow A, remove a backlash between the gear box and the hook driving shaft and tighten screw ❻ . 5) Press the hook driving shaft thrust collar B in the direction of the arrow so that wave washer ❾ is compressed by 0.1 to 0.2 mm. Then tighten screw ❺. (Fig.) 6) When attaching the hook driving shaft, refer to "Disassembly/assembly procedure ( )."
 Fig.	1) To re-assemble the same gear, the contact plane of the gear teeth had to be brought to the previous position so as to prevent the gear from producing large noise. 2) When assembling the hook driving shaft gear connection, ascertain that the hook driving shaft gear connection does not have a longitudinal play when screw ❷ is tightened.

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

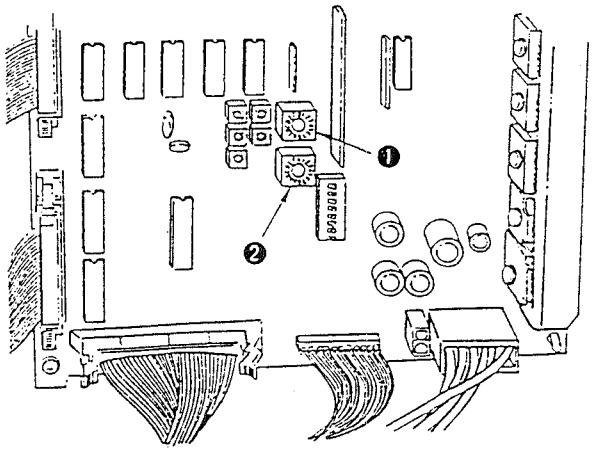
Manufacturer	Name of grease
ESSO	Templex N3

- 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	Description	Remarks
Portion to which grease is applied	Inner surface of intermediate presser rocking shaft bushing Sliding face of intermediate presser rocking shaft Sliding face of thrust collar of intermediate presser rocking shaft Hinge screw of intermediate presser link and sliding face of the respective links Sliding portion of fulcrum shaft of intermediate presser lifting link Top end of intermediate presser lifting link Each sliding portion of intermediate presser lifting link Each sliding portion of intermediate presser lifter connecting plate Needle of shuttle race Needle inside hook driving shaft bushing Tapered part and sliding portion of thread tension controller connecting rod Suspension screw of tension release returning spring Collar of thread trimming cam Periphery and sliding portion of thread trimming cam roller Hook of thread trimming link spring Tracking face of LM guide of XY table Sliding portion of bobbin winder adjuster unit All needles in hook driving shaft gear Needle and thrust needle of main shaft intermediate bushing Auxiliary pulley gear Bearing of auxiliary pulley Sliding face of guide rail nail	ESSO LISTAN 2 or equivalent
	Hook of intermediate presser spring B Each sliding portion of intermediate presser press-down plate Intermediate presser link roller Hook of intermediate presser lifting spring	G type only
	XY follower gear XY drive gear Sliding portion of fulcrum of work clamp lever Sliding portion of cylinder knuckle of work clamp lever Top end of work clamp lever Sliding portion of slide plate of work clamp foot Sliding face of presser plate	ESSO TEMPLEX N3
Portion in which grease is filled with grease	Main shaft rear bushing Main shaft intermediate bushing Auxiliary pulley bushing Bearing of bobbin winder shaft mounting base	ESSO LISTAN 2 or equivalent
	Work clamp slider support	ESSO TEMPLEX N3

Rotary DIP switches for setting the test mode



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.

❶ Rotary DIP switch 1 • 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 2 • Set value "0" ...Normal operation. (At the time of delivery)

• Set value "2" Input data check program is selected.

Signals of switches and sensors can be checked.

(1) Turn ON the power switch, and all of the number indicating sections on the display give

(2) Depress the feeding frame switch or the start switch, the step shown on indicating section A will be updated.

(3) Input data corresponding to each step, and "1" or "0" will be shown on the specified section of the display to indicate the state of the switch.

(Indicating section)

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

(Table of indications)

Display / Step (Display A)	B	C	D	E	F	G	H	I
0 (Operation box switch)	0	1	2	3	4	5	6	7
1 (Operation box switch)	8	9	Pattern No.	X Scale	Y Scale	Counter	Forward	Backward
2 (Operation box, maintenance)	Reset	Return to origin	Set Ready					
3 (Sensor, maintenance)			Air pressure sensor	Needle threading switch				
4 (Switch)				Temporary stop switch	Bobbin winder ON/OFF switch	Sewing machine ON/OFF switch	Scale setting switch (INC/DEC of the stitch length & INC/DEC of the number of stitches)	PGM-5A (Check for connection.)
5 to 7 (Maintenance)								
8 (Detector, error)			Thread breakage detector (error 9)	Lower detection	Upper detection (error 3)			
9 (Sensor, note 4)	X origin sensor	Y origin sensor	+X travel limit sensor (rightmost end)	-X travel limit sensor (leftmost end)	±Y travel limit sensor (front and rear)			
A (Option)								

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

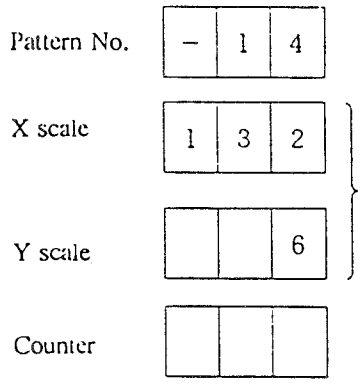
This switch serves to check the specified sewing speed and the actual sewing speed.

(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 temporary 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.

Pattern No. indication			Sewing speed
-	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:

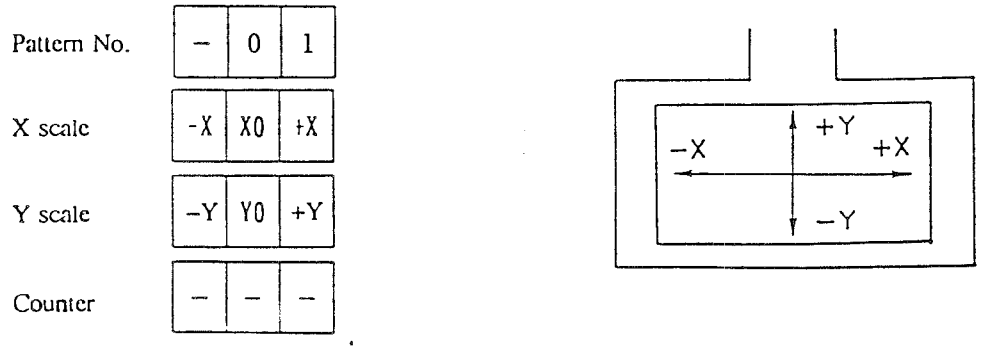
(Example)



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

The condition of the individual sensors can be checked.

(1) Remove the cables of X/Y stepping motors from the stepping motors.
(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.



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

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.

Parts to be fixed by LOCK-TITE paint

The machine is often started and stopped, so LOCK-TITE 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 LOCK-TITE paint after removing any moisture from the mating faces. (Use LOCK-TITE No. 242)

The following components use LOCK-TITE paint.

Item	Description			Remarks
Portions to be applied with LOCKTITE	Part No.	Name of part	Q'ty	
	B1502223C00	Presser plate fixing screw	4	
	SM6060802TP	Sealing screw of bottom of arm	2	
	B1605220000	Intermediate presser rocking shaft bushing	2	
	B1403280000	Needle bar lower bushing	1	Decrease and apply LOCKTITE No. 242.
	B1616220000	Intermediate presser bar lower bushing	1	
	B1847223C00*	Hook driving shaft bushing	1	
	SS6150710SP	Positioning pin of intermediate presser	1	
	NM6040003SC	Locknut of thread trimming magnet	2	
	B2410220000	Thread trimming magnet arm pin	1	
	NM6040003SC	Locknut of wiper magnet	2	[Caution] For the part attached with an asterisk (*), first apply LOQUICK PRIMER, then apply LOCKTITE No. 242.
	SM6040802TP	Screw of Y follower sprocket	4	
	SL4031481SC	Screw of oil extractor	4	
	SS8090410TP	Screw in side face of face plate cover	1	
	SS8110560SP	Sealing screw in side face of machine arm	2	
	SS8150432TH	Screw of X drive sprocket	2	
	B1203215000*	Main shaft intermediate bushing	1	
	B2540205B00	Sprocket screw	4	
	B1832223C00*	Bearing A of large pendulum	1	
	B1833223C00*	Bearing B of large pendulum	1	
	SM8060602TP	Screw of X follower sprocket	1	
	SM8060602TP	Screw of X drive gear	2	
	SM8061002TP	Screw of X follower gear	2	
	SM8060602TP	Screw of Y drive gear	2	
	SM8061002TP	Screw of Y follower gear	2	
	SM6030602TP	Screw of X-LM block	16	
	SM6031402TP	Screw of Y-LM block	16	
	SS1110840SP	Screw of feed plate installing plate	3	
	SS1110840SP	Screw of X stopper	3	
	SS1110840SP	Screw of auxiliary cover rail guide	4	
	SS1110840SP	Screw of X belt presser installing plate	2	
	SM6041202TP	Screw of X-LM guide	8	
	SM6061202TP	Screw of Y belt presser plate	4	
	SS2621540SP	Screw of X drive bracket	6	
	PT0301600SH		1	Decrease and apply NUTLOCK.

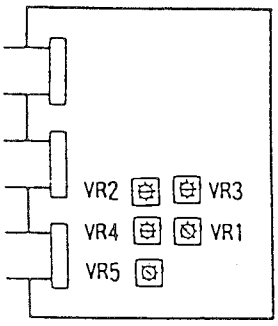
[Caution]

Never allow LOCK-TITE paint to get into the bearings, or else the bearings may not function properly.

1. Adjusting the sewing speed

The sewing speed is automatically changed 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 (see page), 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



(right) V R 2 V R 3 (right)

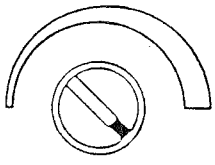
(right) V R 4 V R 1

(To the end of the counterclockwise turn)

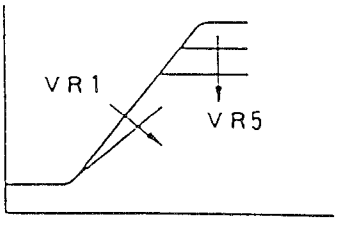
V R 5

(To the end of the counterclockwise turn)

Maximum speed limitation knob/bobbin winder switch



(To the end of the clockwise turn)



1) Set switch SW2 on the I/F circuit board to 3 on the scale.
2) Set variable resistor VR1 to VR5 as shown in the figure. The external maximum speed limitation knob should be set to MAX.
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) Indication "02" (pattern No.) will be shown on the operation panel.
6) Adjust the sewing speed to 180±2 s.p.m. using variable resistor VR3.
7) The machine stops when the temporary stop switch is pressed.
8) Carry out the procedures described in step 4) so that indication "06" is shown on the operation panel.
9) Adjust the sewing speed to 550 s.p.m. using variable resistor VR2.
10) Carry out the procedures in steps 4) and 7) so that indication "20" is shown on the operation panel.
11) Adjust the sewing speed to 1,950±10 s.p.m. using variable resistor VR1.
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 indication "14" is shown on the operation panel.
13) Adjust the sewing speed to 1,325±10 s.p.m. using variable resistor VR2.
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 "20" is shown on the operation panel.
15) Adjust the sewing speed to 1,925±10 s.p.m. using variable resistor VR5.
16) 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.
17) Adjust the sewing speed to 325±10 s.p.m. using variable resistor VR4.
18) 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	$1,950^{+0}_{-50}$

Adjust variable resistor VR1 to decrease the whole range of speed, and adjust variable resistor VR5 to decrease the maximum speed.

• **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.

(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.
(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) The feed bracket permits to be moved using the jog keys.
(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 changes 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	1
Y scale	1	0	1	Counter	–	–	–

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

(1) As 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 temporary stop switch. Turn OFF the power switch after the origin has been retrieved.

• **Selecting the set value "B" for specifying the output check program**

(1) When the power switch is turned ON, the display A will give "0" and displays B through I will give "1."

Pattern No.	A	B	C	X Scale	D	E	F
Y Scale	G	H	I	Counter	–	–	–

(2) When the feeding frame switch or the start switch is depressed, the step on the display A will be updated.
(3) When any of the numerical keys 0 through 7 is pressed in each step, the corresponding output will be turned ON.
At the same time, the specified display will give "0."
Note that, however, the output is turned ON only when the numerical key is held depressed.

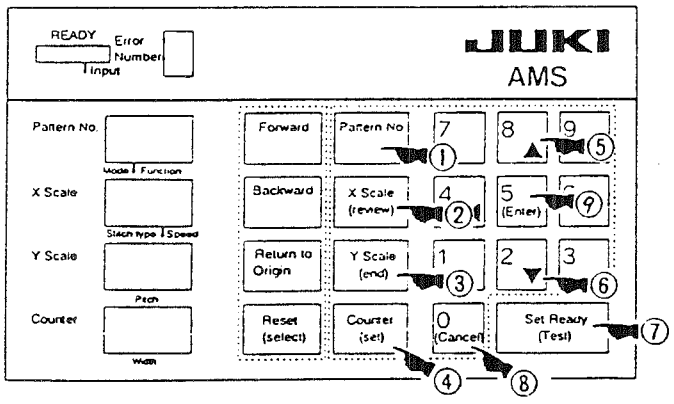
Display / Corresponding key / (A) step	B	C	D	E	F	G	H	I
	0	1	2	3	4	5	6	7
0	Feeding frame, right	Feeding frame, left	Intermediate presser	Inversion	Thread wiper (solenoid valve)	Thread clamp	Double-stepped stroke feeding frame	Optional solenoid valve
1	Thread trimmer (solenoid)	Thread wiper (solenoid)	External output	External output	External output	External output	External output	Tension controller No. 3
2	Optional photo-coupler 1	Optional photo-coupler 2	Optional photo-coupler 3	Optional photo-coupler 4	Optional photo-coupler 5	Optional photo-coupler 6	Optional photo-coupler 7	Optional photo-coupler 8

[Caution]
Do not press the numerical keys continuously when checking the output of the thread trimming solenoid or thread wiper solenoid.
Doing so may break the corresponding solenoid or transistor.

FUNCTION

How to set the memory switches

Key switches to be used



① Command key for changing function No.
② Command key for changing set item 1
③ Command key for changing set item 2
④ Command key for changing set item 3
⑤ Update key (+1)
⑥ Update key (-1)
⑦ Memory switch setting mode end key
⑧ Memory switch setting mode cancel key
⑨ Memory switch setting mode key

Operating the memory switches

[Start level of the memory switches]

There are two different start levels for the memory switches as described below.

Level 1: The function that allows selection of performances or change of set values which are supposed to be comparatively frequently changed is actuated. (Example: Operation mode of the intermediate presser, bobbin thread counter mode, etc.)

Level 2: The function that allows setting of special performances at the time of modification or more detailed operation modes is actuated. The level 2 actuates while including the function that actuates on the level 1.

[STEP 1] Starting procedure

[How to start the level 1]

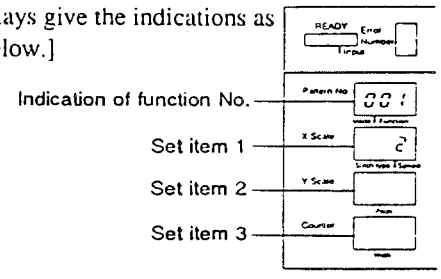
Set the rotary DIP switch (SW1) on the I/F circuit board to "0."

[How to start the level 2]

Set the rotary DIP switch (SW1) on the I/F circuit board to "3."

Turn ON the power switch while keeping the [5 (Enter)] key on the operation panel held depressed.

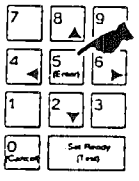
[The displays give the indications as shown below.]



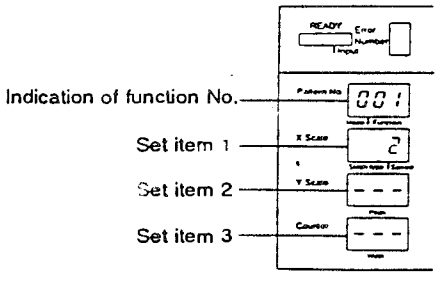
[Caution]

The function No. indication changes depending on the type of start level, i.e., level 1 of level 2. For details, refer to "Memory switch" setting level table and the "Contents" (on pages and).

Entering the memory switch setting mode



Turn ON the power switch while keeping the [5 (Enter)] key on the operation panel held depressed. In this case, the following indications will appear on the displays.



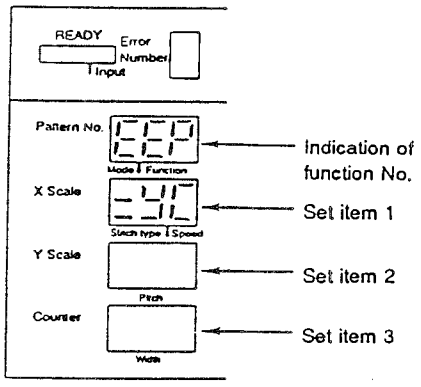
The function No. of the memory switch is shown on the pattern No. display.
Each function has as many as three different set items. The set values are shown on the X Scale, Y Scale and Counter displays. If the function does not have all of the three set items, "---" will appear on the display corresponding to the lacking set item.

Example:
001: Indicates the selection of the jog function.
002: Indicates the second origin setting.

Memory switch setting level table and contents

Function No.	Function	Item	Start level 1	Start level 2
0	Memory	1. Initialization of RAM		O
		2. Initialization of EEP-ROM		O
1	Jog function	1. Jog mode	O	
2	X coordinate of receding position	1. Coordinate		O
3	Y coordinate of receding position	1. Coordinate		O
5	Retainer compensation	1. Mode	O	
6	Returning route to the sewing start point	1. At the end of sewing	O	
		2. Travel limit error	O	
7	Returning route from a midpoint in sewing	1. Mode		O
8	Mechanical origin compensation	1. Amount of X compensation		O
		2. Amount of Y compensation		O
13	Enlargement/reduction	1. Mode	O	
21	Cycle sewing	1. Performance of feeding frame (cycle sewing)	O	
22	Thread trimming command	1. Switch	O	
30	Bobbin thread counter	1. Counting	O	
31	Floppy disk data reading operation	1. Selection of function		O
		2. Regular reading	O	
33	Automatic pattern reading from floppy disk	1. Mode		O
35	Idling operation	1. Speed changing		O
36	Thread trimming at the time of temporary stop	1. Thread trimming action	O	
40	Selection of sewing speed	1. Acceleration at the sewing start	O	
		2. Selection of feed pitch/sewing speed	O	
41	Feed control	1. Feeding position	O	
42	Thread trimmer control	1. Control	O	
43	Feeding frame control	1. Operation sequence	O	
		2. Feeding frame holding state at the end of sewing	O	
		3. Regular holding	O	
44	Intermediate presser control	1. Control	O	
		2. Operation timing	O	
45	Wiper	1. Sweeping position	O	
		2. Sweeping position	O	
46	Thread clamp performance	1. Switch	O	
		2. Thread clamp mechanism	O	
47	Selection of thread breakage detecting function control	1. Switch	O	
		2. Setting the number of stitches required to stop the machine (at the start)		O
		3. Setting the number of stitches required to stop the machine (during normal operation)		O
48	Selection of air pressure detecting function	1. Switch	O	
49	Selection of needle-up position detecting function	1. Switch	O	
51	Inverting mechanism control	1. Switch	O	
53	Tension controller No. 3 control	1. Switch		O
55	Buzzer control	1. Switch		O
56	Selection of floppy disk data reading sequence	1. Retrieving sequence	O	
[illegible]	Wiper (magnet) sweeping action	ON/OFF timing		O
82	Wiper (air) sweeping action	ON/OFF timing		O
84	Intermediate presser action timing	ON/OFF timing		O

Explanation of the memory switches



The pattern No. display gives the function No. of memory switches. Each function has as many as three different set items. The set values are shown on the X Scale, Y Scale and Counter displays. If the function does not have all of the three set items, "---" will appear on the display corresponding to the lacking set item.

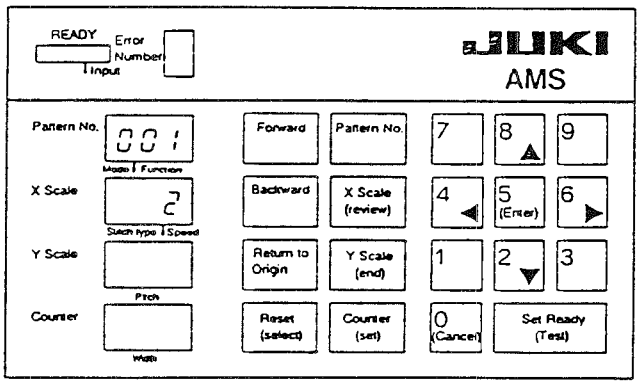
Example:
001: Indicates the selection of the jog function.
002: Indicates the second origin setting.

How to use the memory switch

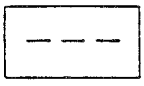
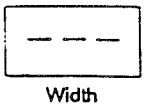
Specifying the memory switch

Pressing the [5 (Enter)] key, turn ON the power switch. The indication shown in the figure below will appear on the operation panel.

At this time, the level 1 actuates when the rotary DIP switch mounted on the I/F circuit board is set to "0," or the level 2 actuates when it is set to "3." Note that the level 2 includes the functions that actuate on the level 1.

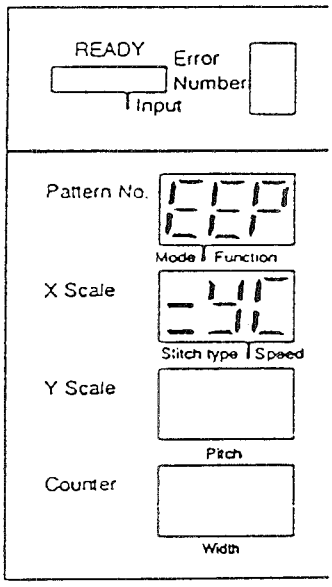


1) Explanation of the LED indications

Name of LED indication	Description
Pattern No.	Indicates a function No. of the memory switch.
X Scale	Indicates the set value for item 1 of the function No. shown on the Pattern No. LED.
Y Scale	Indicates the set value for item 2 of the function No. shown on the Pattern No. LED. Note that the indication illustrated below will appear on the Y Scale LED when no item 2 exists.  Pitch
Counter	Indicates the set value for item 3 of the function No. shown on the Pattern No. LED. Note that the indication illustrated below will appear on the Counter LED when no item 3 exists.  Width

2) Function of the setting switches and how to operate them

Name of switch	Function	Operation
Pattern No.	• Used to change the function No. of the memory switch shown on the Pattern No. LED. Select a function No. using the Pattern No switch and 2 ▼ or 8 ▲ key.	• To change the function No. from 41 to 46 Press the Pattern No switch. ↓ Press the 8 ▲ key five times.
X Scale (review)	• Used to change the set value for item 1 of the function No. shown on the X Scale LED. Select a function No. using the X Scale (review) switch and 2 ▼ or 8 ▲ key.	• To change the set value from 2 to 0 Press the X Scale (review) switch. ↓ Press the 2 ▼ key twice.
Y Scale (end)	• Used to change the set value for item 2 of the function No. shown on the Y Scale LED. Select a function No. using the Y Scale (end) switch and 2 ▼ or 8 ▲ key.	• To change the set value from 3 to 1 Press the Y Scale (end) switch. ↓ Press the 2 ▼ key twice.
Counter (set)	• Used to change the set value for item 3 of the function No. shown on the Counter LED. Select a function No. using the Counter (set) switch and 2 ▼ or 8 ▲ key.	• To change the set value from 2 to 6 Press the Counter (set) switch. ↓ Press the 8 ▲ key four times.

Name of switch	Function	Operation
Set Ready (Test)	• Used to terminate the memory switch setting procedure. 	Press the Set Ready (Test) switch. Indication shown in the figure given on the left will appear on the operation panel. • To make the set values effective Press the Set Ready (Test) switch. • To make the set values ineffective and return the machine to the state before starting up the memory switch setting mode Press the 0 (Cancel) key. Press the Set Ready (Test) switch twice. The memory switch setting mode will terminate and the machine will return to the state where the machine enters immediately after the power to the machine has been normally turned ON.

[Note]

A number shown on the LED can be continuously increased/decreased by keeping the 2 ▼ or 8 ▲ key held pressed.

[Caution to be taken when using the memory switches]

Function No. that is not described in the Engineer's Manual may be shown on the display. However, never change the setting of the set items available under the function No. Changing the setting might impair the normal operation of the sewing machine. If you change any of those settings unintentionally, be sure to perform initialization following the procedure described below. After the initialization, all the memory switches will be initialized to their initial state.

[How to initialize the memory switches]

It is possible to initialize the memory switches using item 2 of memory switch function No. 0 (initialization of memory switches).

Determine the set value of item 2 in accordance with the specifications of the type of your sewing machine and terminate the memory switch setting procedure. Then, input data.

This returns all the memory switches to their initial state.

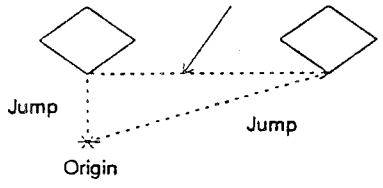
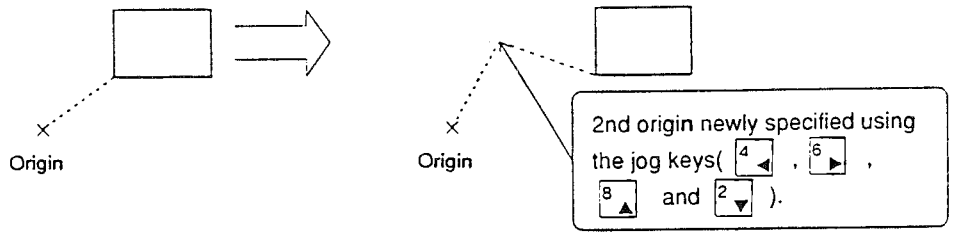
[Caution]

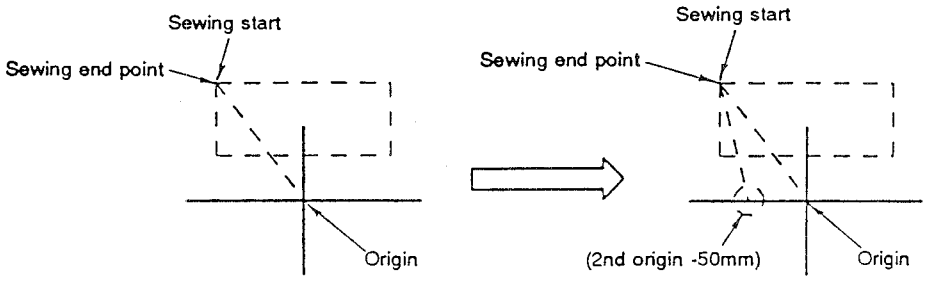
If the memory switches have been separately specified, write down the respective set values on a sheet of paper or the like. Then, start the aforementioned operation.

1) Operation setting		(Level 2)
Function No. 0	Function: Initialization of memory	
Item: 1 Initialization of RAM		
Set value	0	Regular initialization
		[Description] Whenever the power to the machine is turned ON, the machine initializes the RAM at all times. Example: Use this set item only for maintenance. Do not use it in normal times.
	1	Initialization is not performed. (Standard set value)
		[Description] The RAM is not initialized and the backup data are stored in memory. Note that the RAM is automatically initialized in care where the backup data is failed.
Item: 2 Initialization of EEP-ROM		
		Data setting range 0 to 10 This function allows the memory switches to be changed to set values adaptable to the type of machine by writing data on the respective types of machines into EEP-ROM. After the completion of initialization, set value A will return to "0."

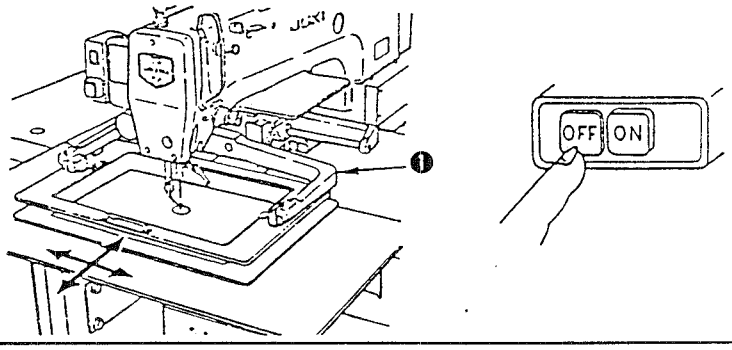
Set value A	Specification	Main motor control: 40 Acceleration at the sewing start: 1 Set value B	Feeding frame control: 43 Operation sequence: 1 Set value C	Intermediate presser control: 44 Control: 1 Set value D	Wiper: 45 Sweeping position: 2 Set value E
1	AMS-223CSS/CHS (with a monolithic feeding frame)	0	0	1	0
2	AMS-223CLS/CHL (with a separately-driven feeding frame)	0	2	1	0
3	AMS-223CBS/CHB (with a double-stepped stroke feeding frame)	0	1	1	0
4	AMS-223CSL/CHL (with a double-stepped stroke separately-driven feeding frame)	0	8	1	0
5	AMS-223CST/CHT (with a double-stepped stroke separately-driven feeding frame)	0	8	0	1
6	AMS-223CGL (with a separately-driven feeding frame)	0	8	1	1

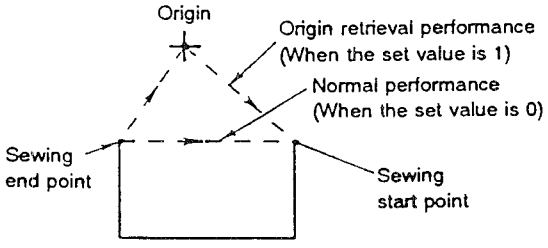
[Caution]
The aforementioned functions have been factory-set at the time of delivery. So use the functions only when the specifications of your machine is changed by replacing the control box or modifying the machine head.

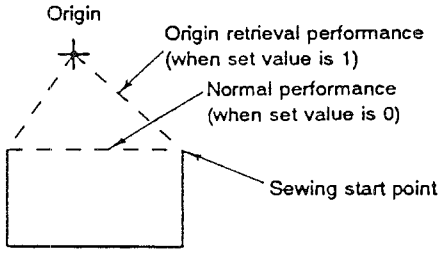
1) Operation setting		(Level 1)
Function No. 1	Function: Jog function	
Item: 1 Jog mode		
Set value	0	Jog function is ineffective. [Description] The jog keys ([4] , [6] , [8] and [2]) are inoperative.
	1	Pattern travel [Description] A sewing pattern can be moved to a specified position by operating the jog keys ([4] , [6] , [8] and [2]). Pattern data read from a floppy disk is moved to a new location by adding a distance by which the pattern data is to be moved using the jog function. The second origin contained in the pattern data is rendered ineffective. This setting can be reset by turning ON then OFF the [Set Ready (Test)] switch. The setting can also be canceled when reading another sewing pattern. To change the setting, create a new "point" using jog keys ([4] , [6] , [8] and [2]). This erases the previously set point. After you have input data, the newly specified "point" is stored in memory together with the original pattern due to the "backup function" even turning OFF the power to the machine. [Example] Move the sewing pattern using jog keys ([4] , [6] , [8] and [2]). 
	2	The 2nd origin setting (standard set value) [Description] The position specified using the jog keys ([4] , [6] , [8] and [2]) is set as the 2nd origin. A 2nd origin is specified for the convenience's sake during jump from the origin of the sewing pattern read from a floppy disk to the sewing start point without actually moving the sewing pattern. In this case, the 2nd origin contained in the pattern data will be ineffective. This setting can be reset by turning ON then OFF the [Set Ready (Test)] switch. [Example] 
	3	The 2nd origin setting [Description] A 2nd origin is specified in accordance with the set values of X and Y written in EEP-ROM. **[Caution]** **When this code is used, the 2nd origin specified in a sewing pattern is rendered ineffective.** In this data setting procedure, jog keys ([4] , [6] , [8] and [2]) are not operative. A 2nd origin is set in accordance with the set values of function Nos. 2 and 3.

1) Operation setting		(Level 2)
Function No. 2	Coordinate of the location of 2nd origin	
Item: 1 Setting an X coordinate of the location of 2nd origin		
Set value	-32767 ~ +32767	Setting the location of 2nd origin (X coordinate) (Standard set value 0)
		[Description] When the set value of jog mode (No. 1) of the memory switch is 3, an X coordinate specified for this item determines the location of 2nd origin. The X coordinate is shown with five figures number on the XY Scale LED. Unit: Set value × 0.1 mm [Example]  After the location of the 2nd origin is specified (When the location of the 2nd origin is set to a point X=-500, Y=0)

1) Operation setting		
Function No. 3	Coordinate of the location of 2nd origin	
Item: 1 Setting a Y coordinate of the location of 2nd origin		
Set value	-32767 ~ +32767	Setting the location of 2nd origin (Y coordinate) (Standard set value 0)
		[Description] When the set value of jog mode (No. 1) of the memory switch is 3, a Y coordinate specified for this item determines the location of 2nd origin. The Y coordinate is shown with a five-figure number on the XY Scale LED. Unit: Set value × 0.1 mm

1) Operation setting		(Level 1)
Function No. 5		
Item: 1		
	0	Retainer compensation is rendered ineffective. (Standard adjustment)
		[Description] **Retainer compensating performance isrendered ineffective.**
Set value	1	Retainer compensation is effective (standard set value)
		[Description] Retainer compensation performance is rendered effective. The machine performs the retainer compensation only when the [Set Ready (Test)] switch is pressed once after turning ON the power to the machine. However, when the [Set Ready (Test)] switch is pressed for the second time and beyond, the machine will not perform the retainer compensation. ① Automatic retainer compensation performance When the [Set Ready (Test)] is pressed for the first time after turning ON the power to the machine. The feeding frame comes down and the feed moves limit-to-limit within its travel range. (After that, the feed stops at the sewing start point or the 2nd origin and the feeding frame rests in the highest position of its stroke.) * Even when you press the [Set Ready (Test)] for the 2nd time and beyond, the retainer compensation is not performed. ② To manually perform retainer compensation Turn OFF the power to the machine. Gradually move feed ❶ back and forth and right and left until the respective travel limits are reached. (Once a day) **[Caution]** **If a special-purpose feeding frame is installed on your machine, the needle may break through the automatic retainer compensation performance. So, be sure to correct the retainer manually. To do this, carefully check the location of the needle.** 

1) Operation setting		(Level 1)
Function No. 6		Returning route to the sewing start point
Item: 1 When the sewing machine completes sewing		
Set value	0	The machine does not retrieve the mechanical origin. (Standard set value)
		[Description] The mechanical origin retrieval performance is not carried out.
	1	The machine retrieves the mechanical origin.
		[Description] After the completion of sewing (thread trimming), it is possible to move the machine to the sewing start point (or the 2nd origin) by way of the mechanical origin. <Example> 
Item: 2 When a travel limit error occurs.		
Set value	0	The machine does not retrieve the mechanical origin.
		[Description] The mechanical origin retrieval performance is not carried out.
	1	The machine retrieves the mechanical origin. (Standard set value)
		[Description] When a travel limit error has occurred during sewing, the machine retrieves the origin, then moves to the sewing start point (or 2nd origin).

1) Operation setting		(Level 2)
Function No. 7		Returning route from a midpoint in sewing
Item: 1	Mode setting	
Set value	0	Origin is retrieved along the data on the returning route stored in the system ROM. (Standard set value)
		[Description] For a standard sewing pattern, the machine returns to the sewing start point taking the shortest route. For an inversion pattern, the machine returns to the start point while avoiding the crank of inverting intermediate presser.
	1	The machine performs mechanical origin retrieval.
		[Description] The machine retrieves the origin from some midpoint in sewing (temporary stop at a midpoint in sewing pattern, thread breakage detection, etc.) and returns to the sewing start point. 
	2 ~	Special type of origin retrieving route
		[Description] In case where a special-purpose feeding frame or the like is used with you sewing machine, the machine is allowed to return to the origin taking a special route by inputting data on the route in the system ROM. **[Caution]** **If you want to use a special route, it is necessary to change the system ROM.**

1) Operation setting		(Level 2)
Function No. 8		Mechanical origin compensation
Item: 1	X axis mechanical orign compensation	
Set value	-99 ~ +99	X axis mechanical origin compensation value setting (Standard set value 0)
		[Description] The X axis mechanical origin can be corrected artificially by the amount specified for this item. <Example> When a feeding frame and sewing pattern that have been prepared using the other sewing machine, this function corrects a mechanical error.
Item: 2	Y axis mechanical origin compensation	
	-99 ~ +99	Y axis mechanical origin compensation value setting (Standard set value 0)
		[Description] The Y axis mechanical origin can be corrected artificially by the amount specified for this item.

2) Processing function setting		(Level 1)
Function No. 13	Enlargement/reduction	
Item: 1 Pattern enlargement/reduction mode setting		
Set value	0	Pattern enlargement/reduction mode is prohibited. [Description] Pattern enlargement/reduction is prohibited. The machine is allowed only to sew a sewing pattern according to the original size of the pattern data stored on a floppy disk.
	1	A scale can be set in 1% steps. (Standard setting) [Description] The XY scale can be set in 1% steps. Data setting range: 1 to 400% <Example of indication> 1 0 0
	2	A scale can be set in 0.1% steps. [Description] Set this item to 2 when you want to precisely specify a XY scale. Data setting range: 0 to 400.0% <Example of indication> 0 0. 0 **[Note]** **In this indication method, the hundreds digit is not shown on the Pattern No. LED. So, be careful.**

3) Command control		(Level 2)
Function No. 22	Thread trimming command	
Item: 1 Thread trimming command switch		
Set value	0	Thread trimming command is ineffective. [Description] A thread trimming command contained in sewing data is rendered ineffective. <Example> When a thick thread is used, an extra load is likely to be applied to the sewing machine mechanisms at the time of thread trimming causing the mechanism to be damaged. In this case, set item 1 to 0.
	1	Thread trimming command is effective. (Standard set value) [Description] The thread trimming command contained in sewing data is rendered effective.

4) Operation system control		(Level 1)
Function No. 30	Bobbin thread counter	
Item: 1 Operation mode setting		
Set value	0	UP counter (loop) (Standard set value)
		[Description] The bobbin thread counter operates as an adding counter. When one cycle stitching completes, the value shown on the bobbin thread counter increases by 1 count. The counter counts the bobbin thread from 000 to 999. Press the [Reset (select)] switch, and the value on the bobbin thread counter will be reset to 000.
	1	DOWN counter (loop)
		[Description] The bobbin thread counter operates as a subtracting counter. When one cycle stitching completes, the value shown on the bobbin thread counter decreases by 1 count. The counter counts the bobbin thread from 999 to 000. When 000 is reached, the counter will return to 999. Press the [Reset (select)] switch, and the value on the bobbin thread counter will be reset to 999.
	2	UP counter (The counter stops when the predetermined value is reached.)
		[Description] The bobbin thread counter operates as an adding counter. Specify the number of times of bobbin thread counting using the [Counter (set)] switch and numeric key, then press the [Counter (set)] switch, and the Counter LED will flash on and off to allow the operator to check the specified value. Press the [Counter (set)] switch, and "000" will be shown on the Counter LED. Now, the sewing machine is ready for sewing. Then, every time the sewing machine completes one cycle stitching, the value shown on the Counter LED will increase until the specified value is reached. When the specified value is reached, the value shown on the LED will flash on and off. Now, the sewing machine is incapable of continuing sewing any further.
	3	DOWN counter (The counter stops when 0 is reached.)
		[Description] The counter subtracts from the specified value until 000 is reached. When 000 is reached, the sewing machine stops. Specify the number of times of bobbin thread counting using the [Counter (set)] switch, and the bobbin thread counter will subtract one from the specified value every time the sewing machine completes a cycle stitching. When "000" is reached, the Counter LED will flash on an off. Now, the sewing machine is incapable of continuing sewing any further. Press the [Counter (set)] switch, and the bobbin thread counter will be reset to enable the sewing machine to start sewing. Even when the bobbin thread counter indicates a value other than "000," you can reset the value to the specified one using the [Counter (set)] switch.

4) Operation system control		(Level 1)
Function No. 31		Floppy disk data reading operation
Item: 1 Selection of function		
Set value	0	Data is read from floppy disk only under the standby state (Standard set value)
		[Description] Only when the machine is in the standby state (the READY indicator lamp goes out), the machine reads pattern data from the floppy disk by specifying the " Pattern No. → numerical key → Set Ready (Test) ."
	1	Sewing state. Data can be read under the sewing state as well as the standby state.
		[Description] Regardless of the state of the sewing machine, i.e., the standby state or the sewing state, pattern data can be changed. Changed data is read by specifying the " Pattern No. → numerical key → Set Ready (Test) ."
Item: 2 Data reading mode setting		
Set value	0	Selected reading (Standard set value)
		[Description] The machine does not read data from the floppy disk unless data on the pattern No. X/Y scale and the setting of the Scale setting switch (INC/DEC of the number of stitches) have been changed.
	1	Constant data reading
		[Description] Pattern data is read from the floppy disk regardless of the pattern No. specified, XY scale specified and the setting of INC/DEC of the number of stitches setting switch. <Example> Use this function when performing sewing without using backup data.

4) Operation system control		(Level 2)
Function No. 33		Automatic pattern reading from floppy disk
Item: 1 Mode setting		
Set value	0	Continuous reading is ineffective (Standard set value)
		[Description] The continuous pattern reading function is inoperative.
	1	Continuous reading is effective
		[Description] After the completion of sewing, the subsequent pattern data is read from the floppy disk. If the pattern numbers are not consecutive, the machine will enter the standby state to allow a pattern No. to be selected. [Operating procedure] After specifying 1 for the set value, press the Backward switch. Then, the error number display shows [H] to enable continuous pattern reading. If [H] is not shown on the Error Number display, the machine will perform the normal operation. <Example> Pattern Nos. will be as [1] → [2] → [3] → [*] → [5] → [6]. Temporary stop state (READY indicator lamp goes out.) When "5" is specified, the machine proceeds to the subsequent operation.

4) Operation system control		(Level 2)
Function No. 35		Idling operation
Item: 1 Speed changing		
Set value	0	Constant speed (Standard set value)
		[Description] The machine runs idle at a constant speed at all times.
	1	2-step speed
		[Description] While the machine performs jumping of sewing data, the jump speed can be increased by turning ON the Start switch.

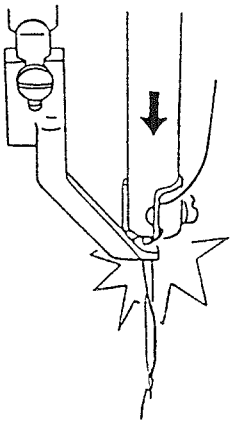
4) Operation system control		(Level 1)
Function No. 36		Selection of thread trimming after turning ON the temporary stop switch.
Item: 1 Thread trimming setting		
Set value	0	Thread trimmer automatically actuates.
		[Description] When the temporary stop switch is pressed, the sewing machine temporarily stops and the thread trimmer actuates.
	1	Thread trimmer is manually actuated. (Needle threading switch is used.) (Standard set value)
		[Description] When the temporary stop switch is pressed, the sewing machine stops and error No. "5" will flash on and off on the operation panel. In this state, the thread trimmer is actuated by turning ON then OFF the needle threading switch.
	2	Thread trimmer is manually actuated. (Temporary stop switch is used.)
		[Description] When the temporary stop switch is pressed, the sewing machine stops and error No. "5" will flash on and off on the operation panel. In this state, the thread trimmer is actuated by pressing the temporary stop switch again. The thread trimmer can also be actuated by operating the needle threading switch.

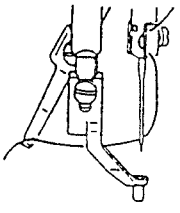
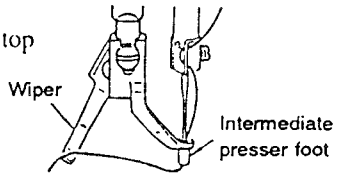
5) Mechanism control		(Level 1)
Function No. 40		Selection of the sewing speed
Item: 1 Acceleration at the start of sewing		
Set value	0 ~ 4	Selection of the acceleration at the sewing start (depends on the setting of item 2 of function No. 1)
		[Description] The start-up speed of the sewing speed is specified. It can be set to one of the six different stages. (Set value 1 is excluded.) Set value 0: The standard start-up speed. (Standard set value) Set value 1: Set value for embroidering (In this case, the start-up speed can be set to one of eight different stages.) Set value 2: High speed mode Set value 3: Medium speed mode 1 Set value 4: Medium speed mode 2
Item: 2 Sewing speed adapting to the material thickness		
Set value	0 ~ 3	Sewing speed adapting to the material thickness
		[Description] When sewing a heavy-weight material, the max. sewing speed can be limited to ensure a sufficient length of time to allow the material to be fed after the needle has come off the material. Set value 0: 2,000 s.p.m. Light-weight material Set value 1: 1,600 s.p.m. Set value 2: 1,300 s.p.m. Set value 3: 1,000 s.p.m. Extra heavy-weight material

5) Mechanism control		(Level 1)
Function No. 41		Feed control
Item: 1 Selection of the feed timing		
Set value	0 ~ 9	Selection of the feed start timing (Standard set value 0)
		[Description] The feed start timing can be advanced by 0 to 9 pulses so as to adapt to the material thickness. 9: Advances ⟷ 0: Retards (Standard value: 0) (Thick materials) (Thin materials) [Note] **When the max. sewing speed is set to 2,000 s.p.m., the feed start timing setting does not affect the max. sewing speed. So, when you operate your machine with the max. sewing speed set at 2,000 s.p.m., set the feed start timing at the standard set value.**

5) Mechanism control		(Level 1)
Function No. 42	Thread trimmer prohibition	
Item: 1 Designation of thread trimmer prohibition		
Set value	0	Thread trimmer is ineffective.
		[Description] Thread trimming is prohibited under any condition. <Example> When a thick thread is used, an extra load is likely to be applied to the sewing machine mechanisms at the time of thread trimming causing the mechanism to be damaged.
	1	Thread trimmer is effective. (Standard set value 0)
		[Description] All the functions related to the thread trimmer are rendered effective. The thread trimmer operates under the operation mode in accordance with the set values of Function Nos. 22 and 36.

5) Mechanism control		(Level 1)
Function No. 43	Feeding frame control	
Item: 1 Operation sequence setting		
Set value	0 – 31	Selection of the feeding frame (Standard set value depends on the setting of item 2 of function No. 1.)
		[Description] Refer to "( ) Feeding frame control."
Item: 2 Selection of the state of feeding frame at the sewing end		
Set value	0	The machine returns to the sewing start, then the feeding frame goes up. (Standard set value)
		[Description] After the completion of sewing, the sewing machine travels to the sewing start point, lifts the feeding frame and waits for the start of next sewing.
	1	The machine returns to the sewing start and stops with the feeding frame lowered.
		[Description] After the completion of sewing, the sewing machine travels to the sewing start point and waits for the start of next sewing with the feeding frame lowered. At this time, the feeding frame can be raised with the Feeding frame switch. **[Caution]** **The machine cannot be re-started unless the feeding frame is raised and lowered once.**
	2	The feeding frame goes up to its intermediate stop position while the sewing machine returns to the sewing start.
		[Description] The feeding frame goes up to the first step of the double-stepped stroke during jump from the sewing end. Then the feeding frame is held raised until the machine reaches the sewing start.
	3	The feeding frame goes up to its intermediate stop position while the sewing machine returns to the sewing start.
		[Description] The feeding frame goes up to the second step of the double-stepped stroke during jump from the sewing end. Then the feeding frame is held raised until the machine reaches the sewing start.
Item: 3 Selection of the constant-lowering of the feeding frame		
Set value	0	Normal control (Standard set value)
		[Description] The feeding frame can be raised/lowered by operating the Feeding frame switch. The feeding frame operates under the operation mode in accordance with the set values of items 1 and 2.
	1	Constant-lowering of the feeding frame during sewing
		[Description] As long as the READY indicator lamp is ON, the feeding frame is always held lowered. <Example> This operation mode is used when sewing a label or the like that is placed inside the feeding frame.

5) Mechanism control		(Level 1)
Function No. 44		Intermediate presser control
Item: 1 Intermediate presser control		
Set value	0	Intermediate presser prohibition (Standard set value for the CST and CHT types of sewing machines)
		[Description] The intermediate presser is made inoperative. The intermediate presser is always fixed at the highest position of its stroke. <Example> Make the intermediate presser prohibition effective when sewing an inverting sewing pattern or the intermediate presser is not required for sewing in terms of the structure of the feeding frame used. **[Caution]** **If the "prohibition" is specified without removing the intermediate presser, the needle bar will come in contact with the intermediate presser resulting in breakage of those components.** 
	1	Intermediate presser is operative. (Standard set value) Note that the CST and CHT types of sewing machines are excluded.
		[Description] The intermediate presser comes down at the start of sewing.
	2	Intermediate presser is operative.
		[Description] For the normal operation, the intermediate presser operates as in the case of set value (1). When the intermediate presser control is set to 2, the intermediate presser operates even when the sewing machine runs idle using the sewing machine ON/OFF switch.
Item: 2 Operation timing setting		
Set value	0	Intermediate presser comes down at the time of start-up (Standard set value)
		[Description] The intermediate presser is lowered immediately before the sewing machine starts to rotate after the start of sewing.
	1	Intermediate presser operates when the feeding frame comes down.
		[Description] The intermediate presser operates simultaneously with the lowering motion of the feeding frame. When the separately-driven feeding frame, which operates in several steps, is used, the intermediate presser is lowered simultaneously with the lowering motion of the feeding frame in the final step.

5) Mechanism control		(Level 1)
Function No. 45		Wiper operation
Item: 1 Wiper operation mode setting		
Set value	0	Wiper prohibition
		[Description] The wiper is made inoperative. Under the state where the wiper is operative, the cycle time is slightly lengthened since the response time required to operate the wiper is taken into account. If you want to shorten the cycle time when the wiper is not required for the current operation, use this mode. **[Caution]** **For the magnet-driven wiper, priority is given to the switch on the machine head.**
	1	Wiper is operative. (Standard set value)
		[Description] The magnet type wiper is made operative. A signal which matches the timing for actuating the magnetic type wiper is output. For the wiper operation timing, the wiper operates in accordance with the set value of item (2). **[Note]** **The switch mounted on the machine head that is used to set the wiper operation is given priority.**
	2	Wiper is operative.
		[Description] The pneumatic type wiper is made operative. A signal which matches the timing for actuating the pneumatic type wiper is output. For the wiper operation timing, the wiper operates in accordance with the set value of item (2).
Item: 2 Wiper operation timing setting		
Set value	0	Wiper sweeps above the intermediate presser. (Standard set value) Note that the CST, CHT and CGL types of sewing machines are excluded.
		[Description] The wiper sweeps above the intermediate presser. Use this mode when sewing a light-weight material.  Material thickness: Up to 3mm
	1	Wiper sweeps below the intermediate presser. Standard set value for the CST, CHT and CGL types of sewing machines.
		[Description] The wiper sweeps below the intermediate presser. Use this mode when sewing a heavy-weight material and the top end of the intermediate presser comes in contact with the material. Under this mode, the wiper sweeps below the intermediate presser after the intermediate presser has been raised.  Material thickness: 3–5mm

5) Mechanism control		(Level 1)
Function No. 46		Thread clamp operation
Item: 1	Thread clamp operation mode setting	
Set value	0	Thread clamp prohibition (Standard set value)
		[Description] The thread clamp is made inoperative.
	1	Thread clamp is operative. (Standard set value 0)
		[Description] For the operating timing of the thread clamp, the thread clamp operates in accordance with the set value of item 2.
Item: 2	Thread clamp operation timing setting	
Set value	1 ~ 15	Thread clamp swings above the intermediate presser. (Standard set value 1)
		[Description] The number of stitches to be sewn, from the state where the thread clamp retains the needle thread to the point at which it releases the thread, is specified. The data setting range is 1 to 15 (stitches) as counted from the point at which the main shaft starts to rotate.

5) Mechanism control		(Level 1)
Function No. 47		Selection of thread breakage detector
Item: 1	Operation mode setting	
Set value	0	Thread breakage detector prohibition
		[Description] The thread breakage detecting function is rendered ineffective. [Note] **Use the thread breakage detector prohibiting function to make the thread breakage detection ineffective when the needle thread tension is decreased by a large margin or when the thread breakage detector fails to work with consistency.**
	1	Thread breakage detector is operative. (Standard setting)
		[Description] The thread breakage detector is rendered effective. It works to stops the sewing machine, in case of thread breakage, in accordance with the number of stitches specified for item 2.
Item: 2	Setting the number of stitches required to stop the machine (at the sewing start)	
Set value	1 ~ 15	Setting the number of stitches required to stop the machine at the sewing start (Standard set value 8 stitches)
		[Description] The number of stitches required to stop the sewing machine after the detection of thread breakage at the sewing start is specified.
Item: 3	Setting the number of stitches required to stop the machine (during normal operation)	
Set value	1 ~ 15	Setting the number of stitches required to stop the machine during normal operation (Standard set value 3 stitches)
		[Description] The number of stitches required to stop the sewing machine after the detection of thread breakage during normal operation is specified.

5) Mechanism control		(Level 1)
Function No. 48		Selection of air pressure drop detecting function
Item: 1 Operation mode setting		
Set value	0	Air pressure drop detector prohibition
		[Description] The air pressure drop detecting function is rendered ineffective.
	1	Air pressure drop detector is effective. (Standard set value)
		[Description] The air pressure drop detector is rendered effective. When the detector detects a drop of air pressure and error indication "A" will appear on the operation panel. If an excessive drop of operating air pressure is detected while the sewing machine is in operation, "A" will flash on and off on the Error Number display. Once the operating air pressure reaches the sufficient value, the machine will enter the "temporary stop" state. To reset, take the procedure same as that taken after pressing the "Temporary stop" switch.

5) Mechanism control		(Level 1)
Function No. 49		Selection of upper detecting function
Item: 1 Operation mode setting		
Set value	0	Upper detecting function prohibition
		[Description] The upper detecting function is rendered ineffective regardless of the state of the sewing machine, i.e., preparation state or sewing state. It is possible to move the feed with the needle point placed near the feeding frame (workpiece) when programming data using the input functions of the main unit or checking the shape of a sewing pattern. Note that the upper detector works when starting up the sewing machine (when the main shaft rotates). In this case, an error will result if the needle is not in the highest position of its stroke. Also note that the needle can be returned to the highest position of its stroke by operating the needle threading switch.
	1	Upper detecting function is effective. (Standard set value)
		[Description] The upper detector is always rendered effective. If the needle is not in the highest position of its stroke when the feed operates and the main shaft rotates, error indication "3" will appear on the operation panel.

5) Mechanism control		(Level 2)
Function No. 51		Inverting mechanism control
Item: 1	Control of the inverting mechanism control	
Set value	0	The inverting mechanism control is rendered ineffective.
		[Description] Even when an inversion pattern is used, the inverting mechanism control is not performed.
	1	The inverting mechanism control is rendered effective. (Standard set value)
		[Description] When an inversion pattern is used, the inverting clamp control is rendered effective.

5) Mechanism control		(Level 2)
Function No. 53		Tension controller No. 3 control
Item: 1	Rendering the tension controller No. 3 control effective or ineffective.	
Set value	0	The tension controller No. 3 control is rendered ineffective.
		[Description] Even when the pattern data has a mark 2 data, the tension controller No. 3 control mechanism is rendered ineffective. Mark 2: The command which turns ON/OFF the signal of the tension controller No. 3. It can be input using a PGM-5A. Refer to the Instruction Manual for the PGM-5A for details.
	1	The tension controller No. 3 control is rendered effective. (Standard set value)
		[Description] The tension controller No. 3 control is rendered effective. The tension controller No. 3 is turned ON at a mark 2 data on the pattern data. When the next mark 2 data is reached, the tension controller No. 3 is turned OFF. In this way, the tension controller No. 3 control is, in repetition, turned ON at odd numbers of mark 2 data or OFF at even number of it.

5) Mechanism control		(Level 2)
Function No. 55		Buzzer control
Item: 1	Rendering the sound of buzzer when accepting a key switch effective or ineffective	
Set value	0	The sound of buzzer is ineffective.
		[Description] The buzzer does not sound when a key switch on the operation panel is pressed.
	1	The sound of buzzer is effective.
		[Description] The buzzer sounds when a key switch on the operation panel is pressed.

5) Mechanism control (Level 1)

Function No. 56 | Selection of floppy disk data reading sequence

Item: 1 Operation mode setting

Set value: 0 ~ 4 (Standard set value Mode 0) (AMS-223C priority mode)

[Description]

A long time is required to read data from a floppy disk because of difference and interchangeability of the floppy disks applicable to the AMS Series. Use this function to minimize the length of time required to read data stored on a floppy disk.

[Data reading sequence]

[1] : Floppy disk for the AMS-223C and AMS-215C
[2] : Floppy disk for the AMS-B type
[3] : Floppy disk for the AMS-A type
[4] :
[5] : Normally disused.

Set value	Data reading sequence		
	1	2	3
0	[1]	[2]	[3]
1	[2]	[1]	[3]
2	[3]	[1]	[2]
3	-	-	-
4	-	-	-

[Note]

Do not read data from the floppy disk for the AMS-223C, AMS-A or -B type model of sewing machine with the function set at 3 or 4.

6) Setting the delay time (Level 2)

Function No. 81 | Wiper sweeping action (magnet)

Item: 1 The period of time during which the wiper (magnet) is energized and that required to reset the wiper are specified.

Set value: 0~999 Period of time during which the wiper is energized (Standard set value T1 = 50 ms)

[Description]

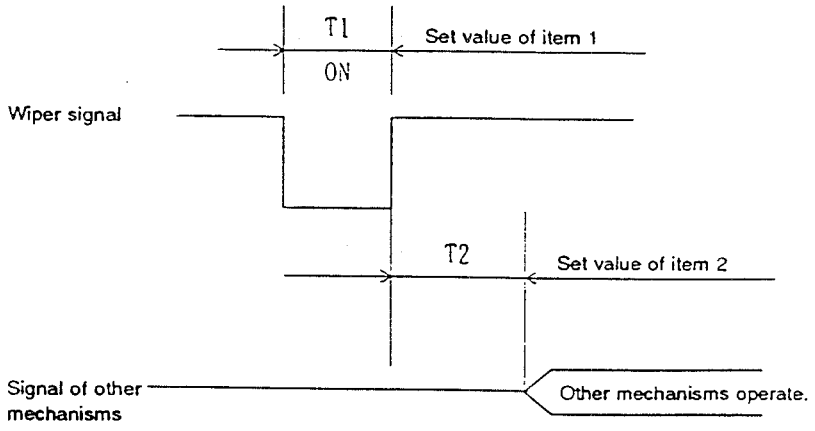
The length of time during which the wiper is in its ON state is specified.

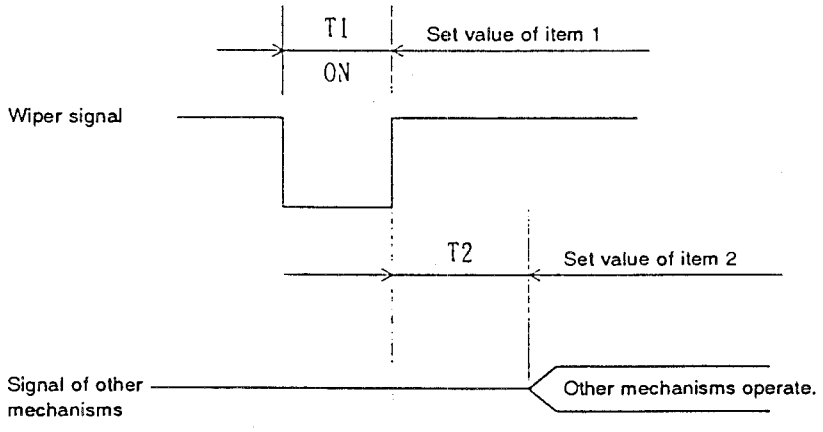
Item: 2 The period of time required to reset the wiper (magnet) is specified.

0~999 The period of time required to reset the wiper (Standard set value T2 = 100 ms)

[Description]

The length of time required to allow the machine to start the next operation from the completion of sweeping action of the wiper can be specified. During the specified length of time, other mechanisms are inoperative.

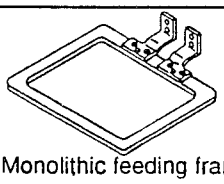
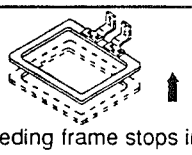
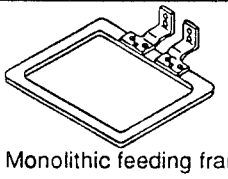
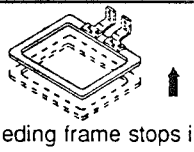
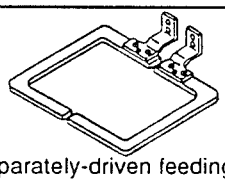
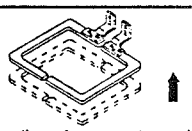
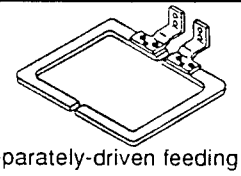
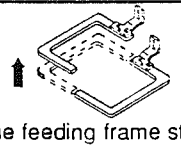
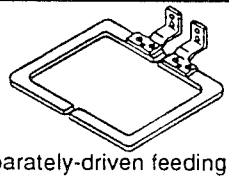
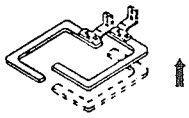
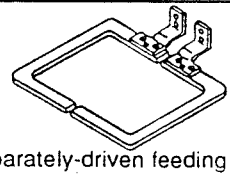
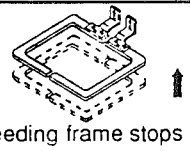
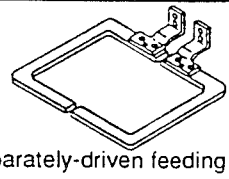
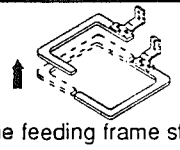
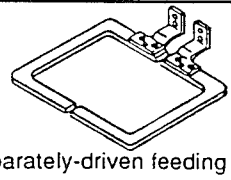
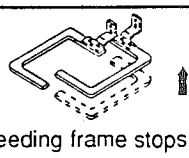


6) Setting the delay time		(Level 2)
Function No. 82	Wiper sweeping action (air)	
Item: 1	The period of time during which the wiper (air) is energized and that required to reset the wiper are specified.	
Set value	0–999	Period of time during which the wiper is energized (Standard set value T1 = 100 ms)
		[Description] The length of time during which the wiper is in its ON state is specified.
Item: 2	The period of time required to reset the wiper (air) is specified.	
	0–999	The period of time required to reset the wiper (Standard set value T2 = 100 ms)
		[Description] The length of time required to allow the machine to start the next operation from the completion of sweeping action of the wiper can be specified. During the specified length of time, other mechanisms are inoperative. 

6) Setting the delay time		(Level 2)
Function No. 84	Intermediate presser action timing	
Item: 1	Lowering the intermediate presser	
Set value	0–999	Setting the length of delay time after the intermediate presser has come down (ON timing) (Standard set value 50 ms)
		[Description] If the sewing machine starts running immediately after the intermediate presser has operated, the intermediate presser is likely to interfere with the needle bar since the intermediate presser has a mechanical delay. To prevent this, the sewing machine starts to run after the length of time specified for this item has passed.
Item: 2	Raising the intermediate presser	
	0–999	Setting the length of delay time after the intermediate presser has gone up (OFF timing) (Standard set value 150 ms)
		[Description] If the wiper actuates when the intermediate presser has not gone up to the highest position, the former may interfere with the latter. To prevent this, the wiper actuates after the length of time specified for this item has passed. During this period of time, neither the wiper nor the feed actuate.

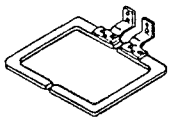
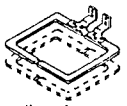
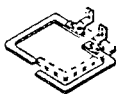
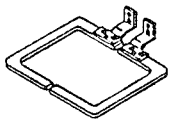
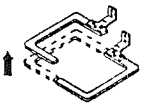
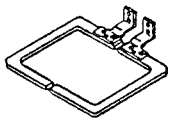
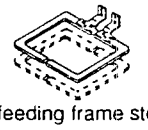
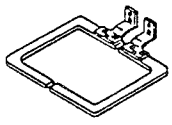
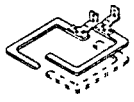
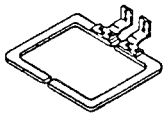
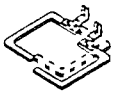
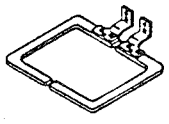
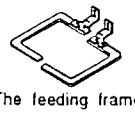
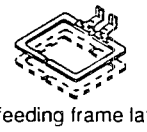
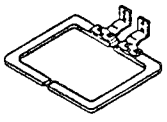
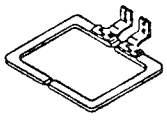
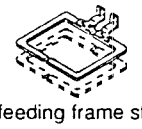
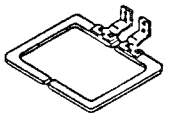
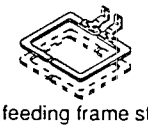
Feeding frame control

Items 1: Setting the operation sequence

Set value	Classification	Double-stepped stroke	At the time of cycle sewing
0 17	 Monolithic feeding frame	×	 The feeding frame stops in the highest position of its stroke.
1 18	 Monolithic feeding frame	○	 The feeding frame stops in the highest position of its stroke.
2 19	 Separately-driven feeding frame	×	 The feeding frame stops in the highest position of its stroke.
3 20	 Separately-driven feeding frame	×	 The feeding frame stops only with its left portion raised.
4 21	 Separately-driven feeding frame	×	 The feeding frame stops only with its right portion raised.
5 22	 Separately-driven feeding frame	○	 The feeding frame stops in the highest position of its stroke.
6 23	 Separately-driven feeding frame	○	 The feeding frame stops only with its left portion raised.
7 24	 Separately-driven feeding frame	○	 The feeding frame stops only with its right portion raised.

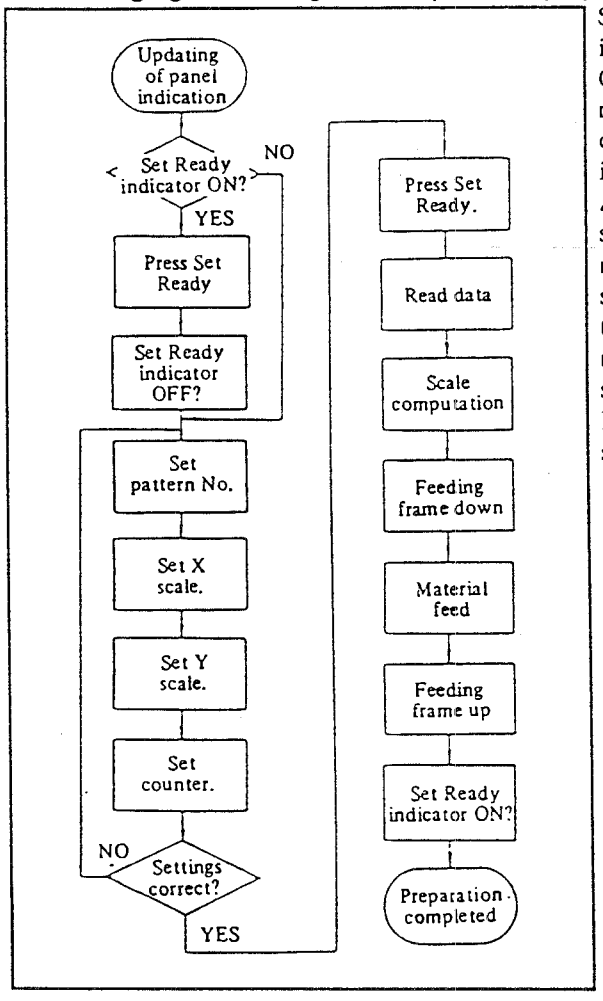
[Caution]

- In the "Double-stepped stroke" column, "○" indicates that the double-stepped stroke function can be used or "×" means that it cannot be used.
- The performance of the feeding frame equipped with an inverting device is same as that of the separately-driven feeding frame.
- When the number locating the lower portion of the set value column is specified, the mode under which the feeding frame is lowered only when the pedal is depressed.

Set value	Classification	Double-stepped stroke	At the time of cycle sewing	Feeding frame operation controlled by the foot pedal
8 25	 Separately-driven feeding frame	○	 The feeding frame stops in the highest position of its stroke.	 The right portion of the feeding frame comes down first.
9 26	 Separately-driven feeding frame	○	 The feeding frame stops only with its left portion raised.	 The right portion of the feeding frame comes down first.
10 27	 Separately-driven feeding frame	○	 The feeding frame stops in the highest position of its stroke.	 The left portion of the feeding frame comes down first.
11 28	 Separately-driven feeding frame	○	 The feeding frame stops only with its right portion raised.	 The left portion of the feeding frame comes down first.
12 29	 Separately-driven feeding frame	×	 The feeding frame stops in the highest position of its stroke.	 The right portion of the feeding frame comes down first.
13 30	 Separately-driven feeding frame	 The feeding frame stops in the highest position of its stroke.	 The feeding frame latches at the intermediate stop position.	 The right portion of the feeding frame comes down first.
14 31	 Separately-driven feeding frame	○		 The right portion of the feeding frame comes down first.
15 32	 Separately-driven feeding frame	×	 The feeding frame stops in the highest position of its stroke.	
16 33	 Separately-driven feeding frame	○	 The feeding frame stops in the highest position of its stroke.	
17 34	Separately-driven feeding frame	×	Only the right-hand side piece of the feeding frame goes up.	

1. **For the feeding frames marked with "[1]," it is possible to select either close or open of the feeding frame, depending on the setting of item 1 of the memory switch 21, when it stops in the intermediate stop position.**
2. **For the feeding frames marked with "[2]," it is possible to select either close or open of the feeding frame, depending on the setting of item 2 of the memory switch 43, when the sewing completes.**

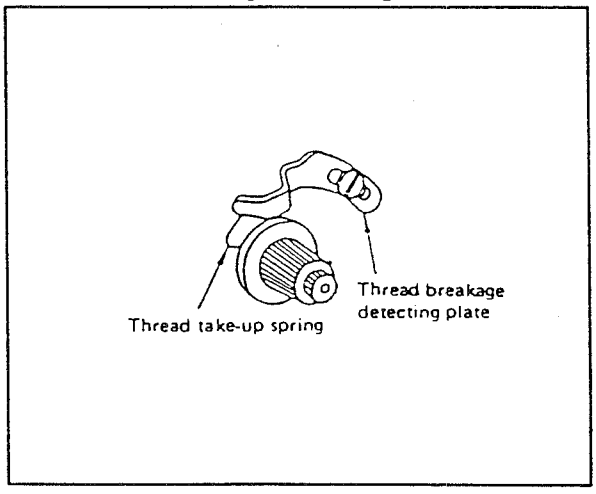
Changing the settings on the panel displays



Setting of the panel displays is allowed while the set ready indicator lamp is OFF. The set ready indicator lamp goes OFF when the set ready switch is pressed. After the set ready indicator lamp goes OFF, settings on the panel displays can be changed through the setting switches, including the pattern No., X scale, Y scale, and counter. After completion of setting changes, press the set ready switch again. This will cause the machine to automatically ready pattern data from the micro floppy disk, compute the scale, move the feeding frame to the sewing start point (or the 2nd origin), raise the feeding frame, and light the set ready indicator lamp to tell that the machine is ready to start sewing.

Before starting pattern sewing, be sure to perform trial sewing to confirm that the programmed pattern stays within the sewing area of the feeding frame.

Thread breakage detecting function

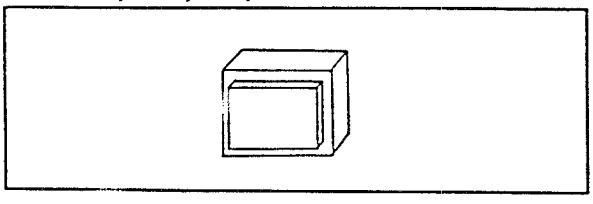


The thread breakage detector detects the breakage of the needle thread by checking the contact between the thread take-up spring and the thread breakage plate. While sewing, the motion of the thread take-up spring is synchronized with the motion of the needle bar. If the needle thread is lost due to breakage, the thread plate when it should leave the detecting plate. This makes it possible to detect the thread breakage. Upon detection of the thread breakage, the machine will slow down and trim the thread before it stops.

The machine stops after it sews 10 stitches when the thread breaks at sewing start, or after it sews 5 stitches when the thread breaks during a stitching cycle. Error No. "9" will be indicated.

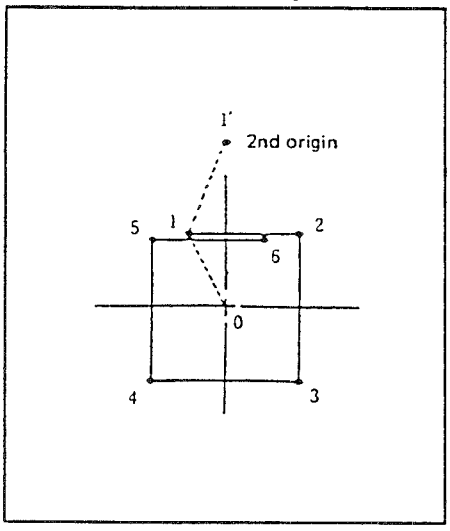
After re-threading the machine head, move the feeding frame forward or backward, using jog keys (▼) or (▲), and start switch to resume sewing, or move the feeding frame back to the sewing start by the return to origin switch.

Temporary stop function



This function is used to stop the feeding frame and the sewing mechanisms during a stitching cycle. When the temporary stop switch is pressed during sewing, the error No. 5 flashes on and off on the display. Move the needle threading switch up and down to allow the machine to perform thread trimming. The error No. indication on the display will light up instead of flashing on and off. Refer to the explanation of error No. 5 (on page 165.)

Function of setting the second origin



The second origin is set in order to facilitate workpiece setting. Setting of the second origin can be made using the pattern input function of the program input device and also using jog keys prior to sewing. When the second origin has been set, a sewing cycle starts and ends at the second origin.

The figure left shows a case where a jump is given from the origin to step 1, and pattern sewing is performed from steps 1 through 6. In this case, when the set ready switch is turned ON, the origin 0 is found, and the feeding frame moves to and stops at the sewing start point. Then, the feeding frame switch is depressed to lower the feeding frame. At this time, by pressing jog keys, (▼) (▲) (◀) (▶), the feeding frame can be moved in the direction shown by the arrow on each jog key so that the second origin may be set in the desired position within the allowable sewing area.

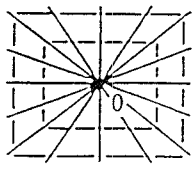
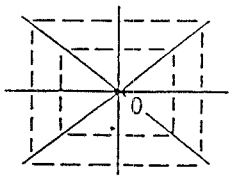
When the 2nd origin is denoted as 1' for a sewing pattern as illustrated, which consists of sewing from 1 to 6, jump from 6 to 1, and stop, the sewing procedure will be as follows: Jump from 1' to 1, sewing from 1 to 6, jump from 6 to 1', then stop.

Travel limit detecting function

The maximum allowable travels in the X- and Y-axis are 200 mm and 145 mm, respectively. When the feed exceeds these limits due to excessive pattern enlargement, this failure will be automatically detected, and the sewing and feed mechanisms are stopped, error No. "4" being shown on the Error No. display. To reset after this error, press the return to origin switch if the error indication is given during a sewing cycle. If the error indication is given while setting the second origin, use a jog key for resetting.

Pattern enlarging/reducing function

There are two different ways to enlarge or reduce a normal sewing pattern. In one method, the stitch length is increased or decreased, while in the other method, the number or stitches is increased or decreased.

	Normal pattern
Inc/Dec of stitch length	
Inc/Dec of Number of stitches	

In a normal pattern, enlargement or reduction is based on the origin (0,0).

In the method where the number of stitches is increased or decreased, the linear or curve data entered by the pattern input function of the pattern input device are specified to enlarge or reduce the pattern, with the stitch length unchanged. Referring to the pattern inputting procedure, perform a linear input and arc input fractionally. Not that all point inputs are processed by increasing or decreasing the stitch length.

Memory back-up function

When the power switch is turned OFF, the current pattern data, including the pattern No., X/Y scale, count setting and sewing data will be automatically stored in memory. The memory back-up lasts at least 100 hours. The stored data will be indicated when the power switch is turned ON, so repeated use of the same pattern can be readily achieved simply by pressing the set ready switch.

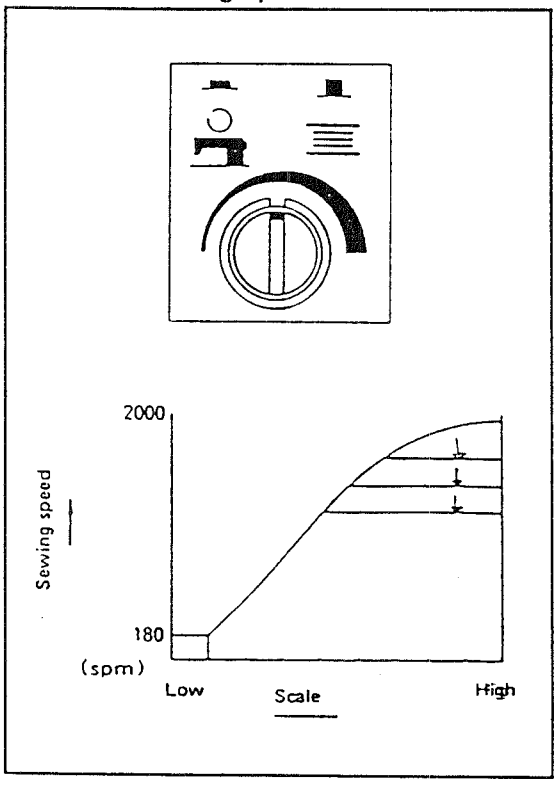
[Caution]

When sewing the pattern of which data has been stored in the machine using the back-up function, the floppy disk is not required to be loaded. But note that if the back-up pattern is enlarged or reduced, the floppy disk is required to be loaded on the machine.

The floppy disk is also required when the X/Y scale switches (Inc/Dec of stitch length or Inc/Dec of number of stitches) is operated. When there is no change of the data for the pattern No., X/Y scale, and Inc/Dec of stitch or Inc/Dec of number of stitches, the machine will not read the data from the floppy disk.

So, take care when sewing the one same pattern of which data is stored in two different floppy disks.

Max. sewing speed limit control knob

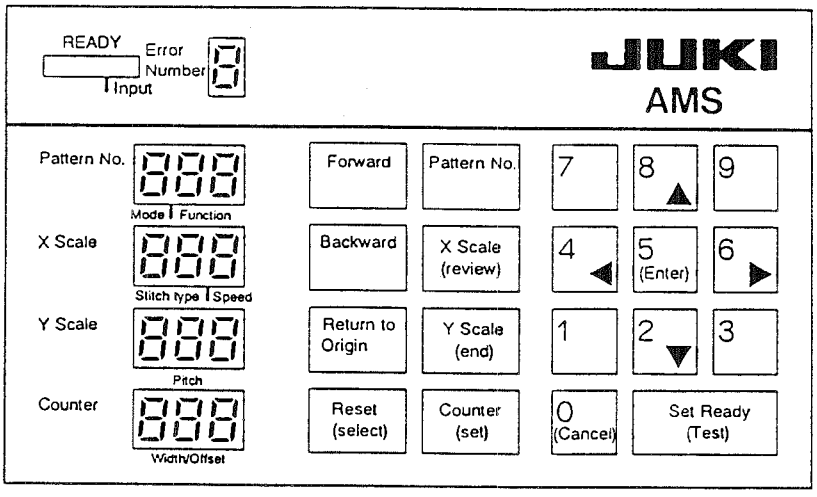


This control knob is used to specify the maximum sewing speed. Normally, the sewing speed is automatically set according to the stitch length.

If any lower speed is required, turn this knob counterclockwise to obtain the desired sewing speed.

If the sewing speed is partly lowered, speed setting within the pattern is required. Use the PGM-5A.

The chart shows the limitation of the maximum sewing speed.



Pattern data stored on the floppy disk can be read (and combined) to enable the machine to sew the pattern as a series of data. Sewing patterns can be combined in four different methods.

1. When the power to the machine is turned ON while keeping the "0" and "2" keys held pressed
   → Sewing patterns are combined using the origin as center of the patterns.
2. When the power to the machine is turned ON while keeping the "0" and "3" keys held pressed
   → Sewing patterns are combined using the origin as center of the patterns inserting a temporary stop command among the patterns.
3. When the power to the machine is turned ON while keeping the "0" and "5" keys held pressed
   → Sewing patterns are combined while aligning the sewing end with the origin.
4. When the power to the machine is turned ON while keeping the "0" and "6" keys held pressed
   → Sewing patterns are combined while aligning the sewing end with the origin and inserting a temporary stop command among the patterns.

[Caution]

If the combination mode has already been specified using the memory switch, the combination mode is actuated only by turning ON the power switch.

[Operating procedure]

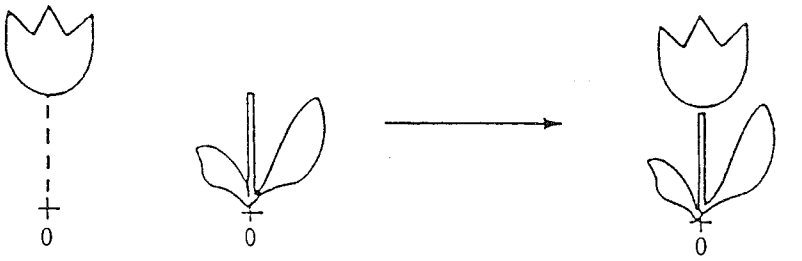
❶ Turn ON the power to the machine while keeping two switches held pressed as described above.

❷ Specify the pattern No. and scale to be read from the floppy disk and turn ON the counter switch. (Repeat this step as desired.)

❸ Press the Set Ready switch, and the machine ready for sewing.

- The pattern to be read from the floppy disk is backed up.
- To cancel the pattern, turn OFF the power to the machine once, re-turn it ON and read another sewing pattern. This cancels the previous sewing pattern.
- To change the patterns to be combined
  - In the edit mode, all sewing patterns including one that is read after the completion of sewing are added to be combined.
  - It is impossible to change (cancel/add) pattern that is placed in the middle of the combined patterns.

Example of use of combined patterns ("0" and "2")
The AMS-223C is capable of inputting as many as 4,000 stitches for a sewing pattern. To sew a pattern that needs more stitches such as in the case of embroidery, input a pattern with divided and combine the divided patterns.
Note that the pattern combined in the aforementioned way cannot be written on a floppy disk.



Pattern No. 001 No. 002 Combined pattern

Turn ON the power to the machine while keeping "0" and"2" held depressed.
↓
Specify Pattern No. 001.
↓
Turn ON the Counter switch.
↓
Data is read from the floppy disk. → Wait until the LED of the floppy disk drive goes out.
↓
Specify Pattern No. 002.
↓
Turn ON the Counter switch.
↓
Data is read from the floppy disk. → Wait until the LED of the floppy disk drive goes out.
↓
Turn ON the Set Ready switch.
↓
The machine moves to the sewing start point.
↓
READY indicator LED lights up.

Replacing the printed circuit boards

Types of printed circuit boards

❶ CPU circuit board (Control box)
❷ I/F circuit board (Control box)
❸ PMDC circuit board (Control box)
❹ POWER circuit board (Control box)
❺ Operating printed circuit board (Operation panel)
❻ Sensor printed circuit board (Sewing machine head)

❶ CPU circuit board

Acts as the brain of the AMS-223C and outputs the control signals to control the floppy disk driver unit, sewing machine head, and the PGM-5A.

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 two circuit board fixing screws and two latches. Then, replace the 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.

❷ I/F printed circuit board

The I/F circuit board receives the control signals from the CPU circuit board, and actuates the sewing machine head and the PGM-5A.

1) Turn OFF the power switch. Then remove the control box cover.
2) Romove all connectors (J21, J23 through J27, J29 through J32, J34 through J38) from the I/F circuit board.
3) Remove two circuit board fixing screws and two latches. Then, replace the circuit board with a new one.
4) Install the new I/F circuit board by reversing the above disassembly order.

[Caution]

If the machine runs without J31 connector for the synchronizer, the up position error "3" is not allowed to be reset.
If the J31 connector for the pneumatic solenoid drive is not installed, the operating air pressure drop error "A" is not allowed to be reset.

❸ 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 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 at the time of delivery.

❹ 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 three circuit board fixing screws and three latches, bundle wire cover and POWER circuit board. 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.

❺ Operating printed circuit board

This circuit board is fixed inside the control box. The switches, buzzers, and LEDs are mounted on it.

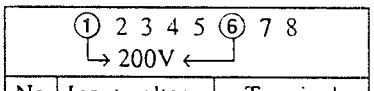
1) Turn OFF the power switch. Remove four setscrews from the control box rear cover.
2) Remove the connector J61 from the operating circuit board.
3) Remove six lock nuts for retaining the operating circuit board. Then remove the circuit board and replace with a new one.
4) Install the new operating circuit board by reversing the above procedure.

❻ Sensor printed circuit board

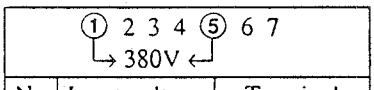
This circuit board is used for the sewing machine head, and acts to detect the X origin and the travel limit.
See Page 69 for the replacement.

AC input voltage tap

The power transformer comes in three types in voltage specifications.



No	Input voltage	Terminal
1	100V	2–3
2	110V	1–3
3	115V	1–4
4	120V	2–5
5	200V	1–6
6	220V	2–7
7	240V	2–8
8	250V	1–8



No	Input voltage	Terminal
1	220V	1–3
2	230V	2–4
3	240V	1–4
4	380V	1–5
5	415V	1–6
6	440V	1–7

Voltage can be selected by changing over the tap. Check the power supply required and connect the machine to the voltage tap which provides the voltage nearest to the required one.

How to measure the line voltage

Printed circuit board	Tester red	Tester black	Voltage
POWER circuit board	J 51 – 1, – 2, – 3 (orange)	J 51 – 4, – 5, – 7 (black)	D C 33 V
	J 52 – 5, – 6 (orange)	J 52 – 4, – 10 (black)	D C 33 V
	– 11, – 12 (brown)	– 3, – 9 (black)	D C 33 V
	J 53 – 1, – 3, – 4 (yellow)	J 53 – 5, – 6, – 7 (green)	D C 85 V
		– 8 (yellow/green)	
	J 54 – 1, – 5 (orange)	J 54 – 3, – 7 (green)	D C 85 V
	– 2 (yellow)	– 3, – 7 (green)	D C 24 V
	– 4 (red)	– 8 (black)	D C 5 V
	J 55 – 1, – 2 (red)	J 55 – 3, – 5 (black)	D C 5 V
	– 6 (white)	– 3, – 5 (black)	D C 12 V
	– 3, – 5 (black)	– 7 (blue)	D C 12 V
	J 56 – 1, – 4 (red)	J 56 – 3, – 6 (black)	D C 5 V
	– 2 (white)	– 3, – 6 (black)	D C 12 V
	– 3, – 6 (black)	– 5 (blue)	D C 12 V
	J 57 – 1, – 4 (red)	J 57 – 5, – 6 (black)	D C 5 V
	– 2 (white)	– 5, – 6 (black)	D C 12 V
	– 3, – 6 (black)	– 4 (blue)	D C 12 V
	J 59 – 3 (white)	J 59 – 2, – 4 (black)	D C 12 V
	– 1 (red)	– 2, – 4 (black)	D C 5 V

Printed circuit board	Tester red	Tester black	Voltage
CPU circuit board	J 17 – 1 (red)	J 17 – 5, – 6 } (black)	D C 5V
	– 3 (white)	– 5, – 6 } (black)	D C 12V
	– 5, – 6 } (black)	– 4 (blue)	D C 12V
PMDC circuit board	J 65 – 1, – 2 } (orange)	J 65 – 4, – 5 } (green)	D C 70V
	– 3 (yellow)	– 4, – 5 } (green)	D C 24V
	– 7 (red)	– 8 (black)	D C 5V
I/F circuit board	J 26 – 5, – 6 } (orange)	J 26 – 4, – 10 } (black)	D C 33V
	– 1 (red)	– 3, – 9 } (black)	D C 5V
	– 2 (white)	– 3, – 9 } (black)	D C 12V
	– 3, – 9 } (black)	– 8 (blue)	D C 12V

Connector	Tester red	Tester black	Voltage
J90 [Connector 6P of the power supply for the PGM-5A]	J 90 – 1 (red)	J 90 – 4 (black)	D C 5V
	– 2 (white)	– 4 (black)	D C 12V
	– 4 (black)	– 3 (blue)	D C 12V
J40 [Connector 6P of the transformer secondary output]	J 40 – 1 (gray)	J 40 – 2 (gray)	A C 24V
	– 3 (purple)	– 4 (purple)	A C 58V
	– 5 (black)	– 6 (black)	A C 100V
J85 [Connector 2P of the marking light output]	J 85 – 1 (orange)	J 85 – 2 (orange)	A C 4.5V

8. TROUBLES AND CORRECTIVE MEASURES

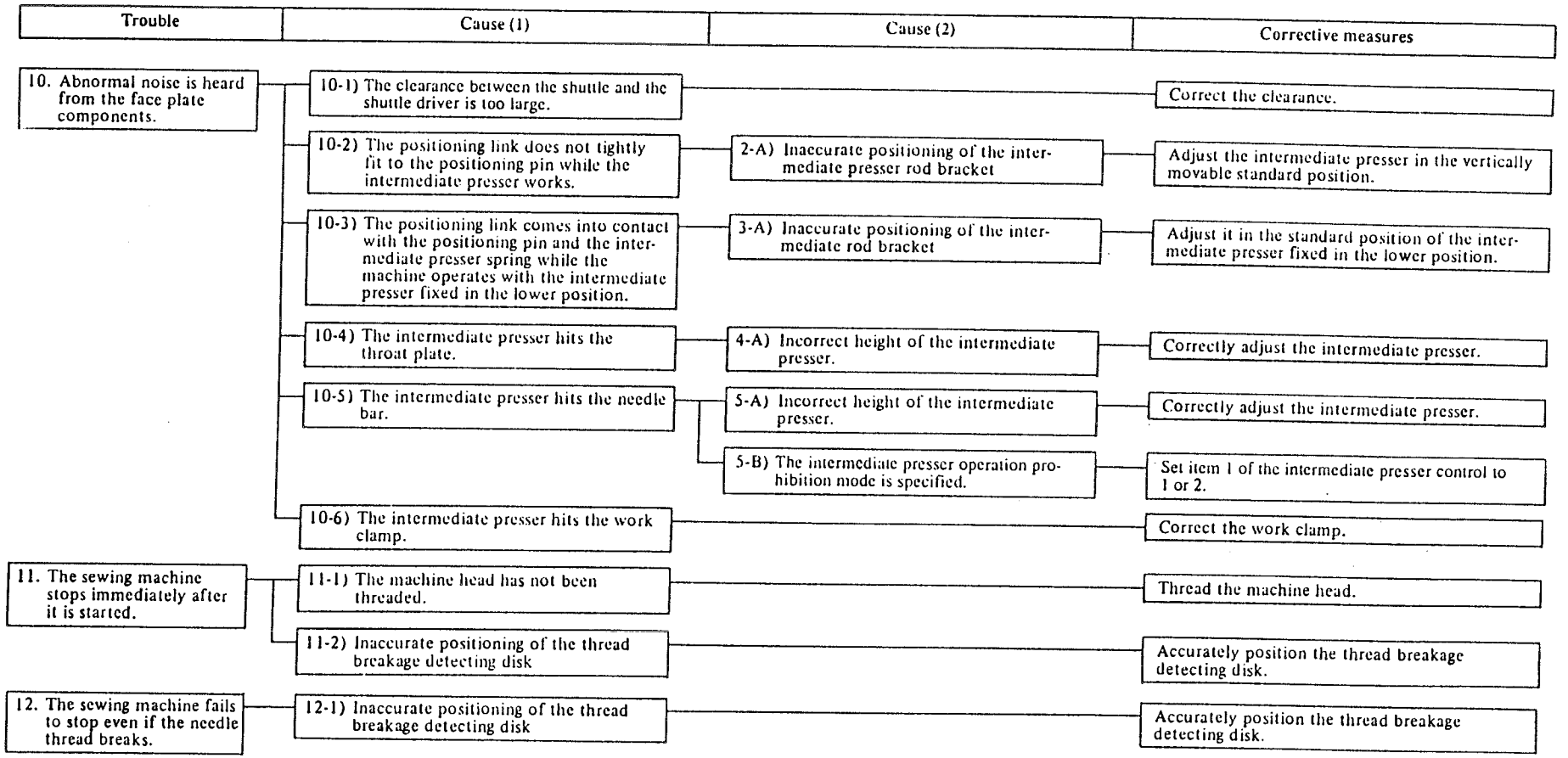
Troubles and corrective measures (mechanical parts)

Trouble	Cause (1)	Cause (2)	Corrective measures
1. Mechanical lock	1-1) Improper needle-up position		Correct the stop position of the main shaft.
	1-2) Incomplete return of the thread trimming cam shaft	2-A) The thread trimmer follower sticks against the follower stopper	Correct the clearance between the thread trimmer follower and the follower stopper.
		2-B) The tension release arm sticks against the tension release shaft arm	Correct the clearance between the tension release arm and the tension release shaft arm.
	1-3) Inaccurate positioning of the thread trimming cam	3-A) The marker line on the thread trimming cam is not aligned with the marker line on the main shaft.	Accurately position the thread trimming cam.
	1-4) Inaccurate positioning of the thread trimmer solenoid bracket	4-A) The thread trimmer solenoid bracket comes into contact with the thread trimming cam (longitudinal direction).	Accurately position the thread trimming cam (longitudinal direction).
		4-B) The thread trimmer follower contacts with the follower stopper and cannot rotate.	Accurately position the thread trimmer solenoid bracket (rotating direction).
	1-5) The moving knife fails to move smoothly.		Correct the blade pressure of the moving knife.
	1-6) Inaccurate initial positioning of the moving knife		Correct the initial position of the moving knife.
	1-7) Inaccurate positioning of the generator stator		Accurately position the generator stator.
	1-8) Inaccurate positioning of the handwheel		Accurately position the handwheel.

Trouble	Cause (1)	Cause (2)	Corrective measures
2. Deformation in sewn patterns	2-1) Inaccurate positioning of the generator stator		Accurately position the generator stator.
	2-2) Inaccurate positioning of the handwheel		Accurately position the handwheel.
	2-3) X timing belt tension is not properly adjusted.		Properly adjust the X timing belt tension.
	2-4) Y timing belt tension is not properly adjusted.		Properly adjust the Y timing belt tension.
	2-5) Backlash in X feed gear is not properly adjusted.		Properly adjust the backlash in the X feed gear.
	2-6) Backlash in Y feed gear is not properly adjusted.		Properly adjust the backlash in the Y feed gear.
	2-7) Traveling torque in X direction is excessive.	7-A) X-LM guides are not parallel to each other.	Adjust the installing position of the X-LM guide.
		7-B) Height of the throat plate auxiliary cover is out of specification.	Properly adjust the height of the throat plate auxiliary cover.
		7-C) Feed bar auxiliary cover rail X is not properly adjusted.	Adjust the installing position of the Y-LM guide.
	2-8) Traveling torque in Y direction is excessive.	8-A) Y-LM guides are not in parallel to each other.	Properly adjust the feed bar auxiliary cover.
		8-B) Improper height of the work clamp slider plate	Correct the height.
		8-C) 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.
	2-9) Weak clamp pressure	9-A) Maladjustment of the pressure switch	Correctly adjust the pressure switch.
		9-B) Maladjustment of the regulator	Correctly adjust the regulator.
		9-C) The supply air pressure is too low.	Correctly adjust the supply air pressure.
	2-10) The feeding frame does not fit tightly to the feed plate.	10-A) Improper position of the feeding frame bracket.	Correctly adjust the position of the feeding frame bracket.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
	3-2) Maladjustment of the X origin sensor		Correctly position the X origin sensor.
	3-3) Maladjustment of the Y slit plate		Correctly position the Y slit plate.
	3-4) Maladjustment of the Y origin sensor		Correctly position the Y origin sensor.
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.
	4-2) Maladjustment of the X travel limit sensor.		Correctly position the X travel limit sensor.
	4-3) Maladjustment of the Y slit plate		Correctly position the Y slit plate.
	4-4) Maladjustment of the Y travel limit sensor		Correctly position the Y travel limit sensor.
5. Inadequate lift of the feeding frame	5-1) Maladjustment of the work clamp stopper		Correctly adjust the work clamp stopper.
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 regulator		Correctly adjust the regulator.
	6-3) Maladjustment of the speed controller		Correctly adjust the speed controller.
	6-4) Maladjustment of the pressure switch		Correctly adjust the pressure switch.
	6-5) Unsmooth motion the feed bracket, link and slide plate		Apply grease.
			A workpiece is not clamped by all the surface of the feeding frame (uneven).
	6-6) Malfunction of the solenoid valve		Replace the solenoid valve.

Trouble	Cause (1)	Cause (2)	Corrective measures
7. The feeding frame fails to go 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.
	7-3) Maladjustment of the pressure switch		Correctly adjust the pressure switch.
	7-4) Unsmooth motion of the feed bracket and link		Apply grease.
	7-5) Malfunction of the solenoid valve		Replace the solenoid valve.
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.
	8-3) Maladjustment of the pressure switch		Correctly adjust the pressure switch.
	8-4) Malfunction of the solenoid valve		Replace the solenoid valve.
	8-5) Unsmooth motion of the intermediate presser link mechanism		Check the link mechanism for unsmooth motion and looseness, and apply grease.
	8-6) Inaccurate positioning of the intermediate presser adjusting screw		Accurately position the adjusting screw.
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.
	9-3) Maladjustment of the pressure switch		Correctly adjust the pressure switch.
	9-4) Malfunction of the solenoid valve.		Replace the solenoid valve.
	9-5) The intermediate presser operation prohibition mode is specified.		Set item 1 of the intermediate presser control to 1 or 2.
	9-6) The intermediate presser has been adjusted in the lower fixed position.		Adjust the intermediate presser in the vertically movable position.


Trouble
Cause (1)
Cause (2)
Corrective measures
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.
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.
10-3) The positioning link comes into contact with the positioning pin and the intermediate presser spring while the machine operates with 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.
10-4) The intermediate presser hits the throat plate.
4-A) Incorrect height of the intermediate presser.
Correctly adjust the intermediate presser.
10-5) The intermediate presser hits the needle bar.
5-A) Incorrect height of the intermediate presser.
Correctly adjust the intermediate presser.
5-B) The intermediate presser operation prohibition mode is specified.
Set item 1 of the intermediate presser control to 1 or 2.
10-6) The intermediate presser hits the work clamp.
Correct the work clamp.
11. The sewing machine stops immediately after it is started.
11-1) The machine head has not been threaded.
Thread the machine head.
11-2) Inaccurate positioning of the thread breakage detecting disk
Accurately position the thread breakage detecting disk.
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.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
		1-B) Incorrect positioning of the wiper	Correctly adjust the positioning of the wiper
	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
	13-3) There is no clearance for the wiper between the needle and the intermediate presser.	3-A) The material thickness exceeds the limit possible to use the wiper.	The wiper is adjusted to pass under the intermediate presser.
	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.
14. Severe vibration	14-1) The sewing machine is not properly grounded.		Securely fix the machine by the level adjuster.
	14-2) Maladjustment of the belt tension		Accurately adjust the belt tension.

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 or −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 J52 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-circuited part, or replace the short-circuited circuit board. *3
		4-B) Switching regulator failure	Replace the switching regulator. *4
	1-5) I/F circuit board ↔ The operation box has not been connected.	5-A) Disconnected J37 connector (I/F circuit board)	Securely connect the connector.
		5-B) Disconnected J61 connector (Operation circuit board)	
	1-6) I/F circuit board ↔ The CPU circuit board has not been connected.	6-A) Disconnected J15 connector (CPU board)	
	1-7) Failure with circuit board		Replace circuit boards in the order of I/F, CPU, POWER and operation circuit board.

*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.

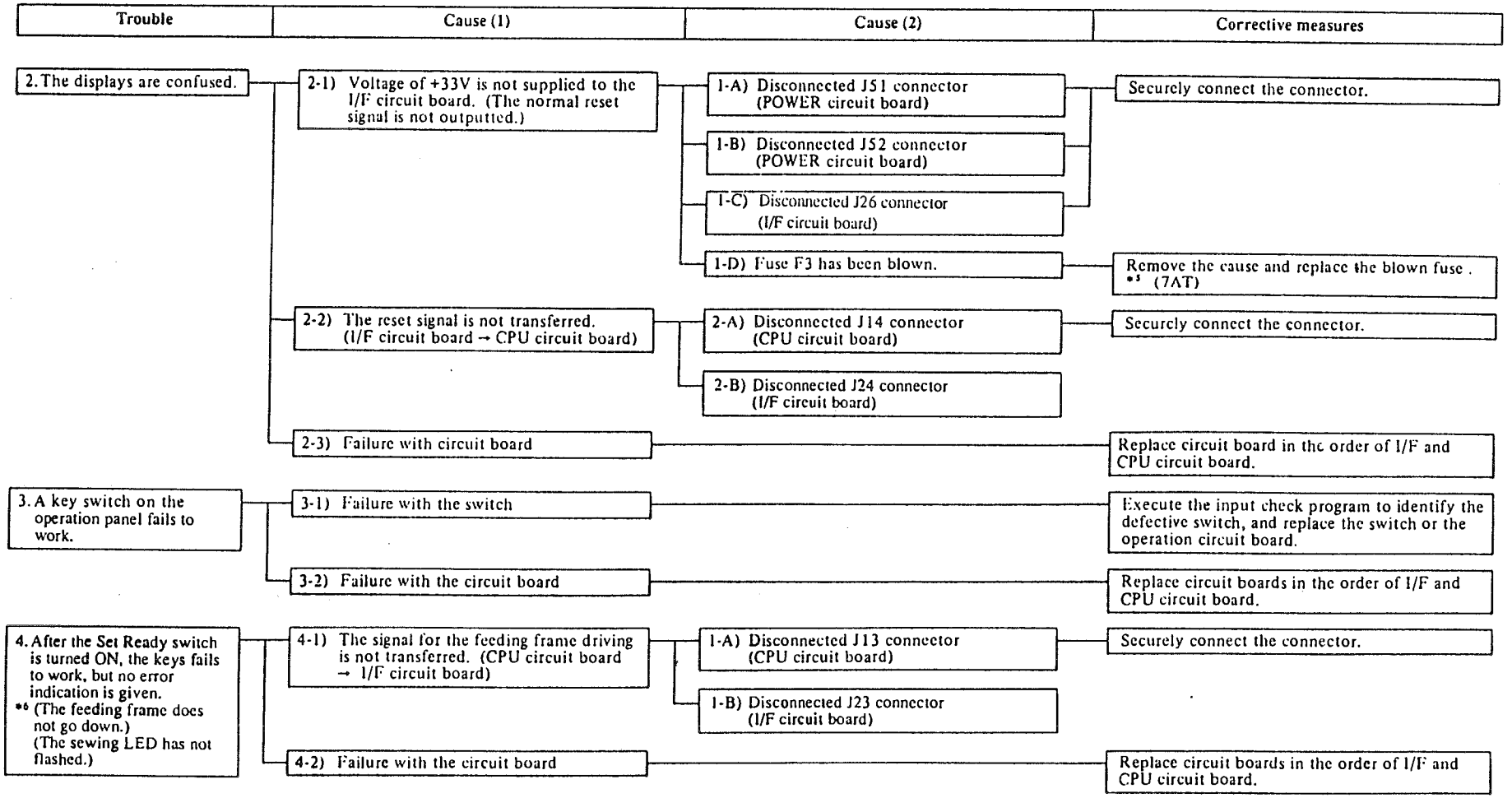
*2 AC100V is supplied to the switching regulator and the fan. The failure of the fan or the switching regulator is conceivable.

*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 J26, J35/ PMDC circuit board J65

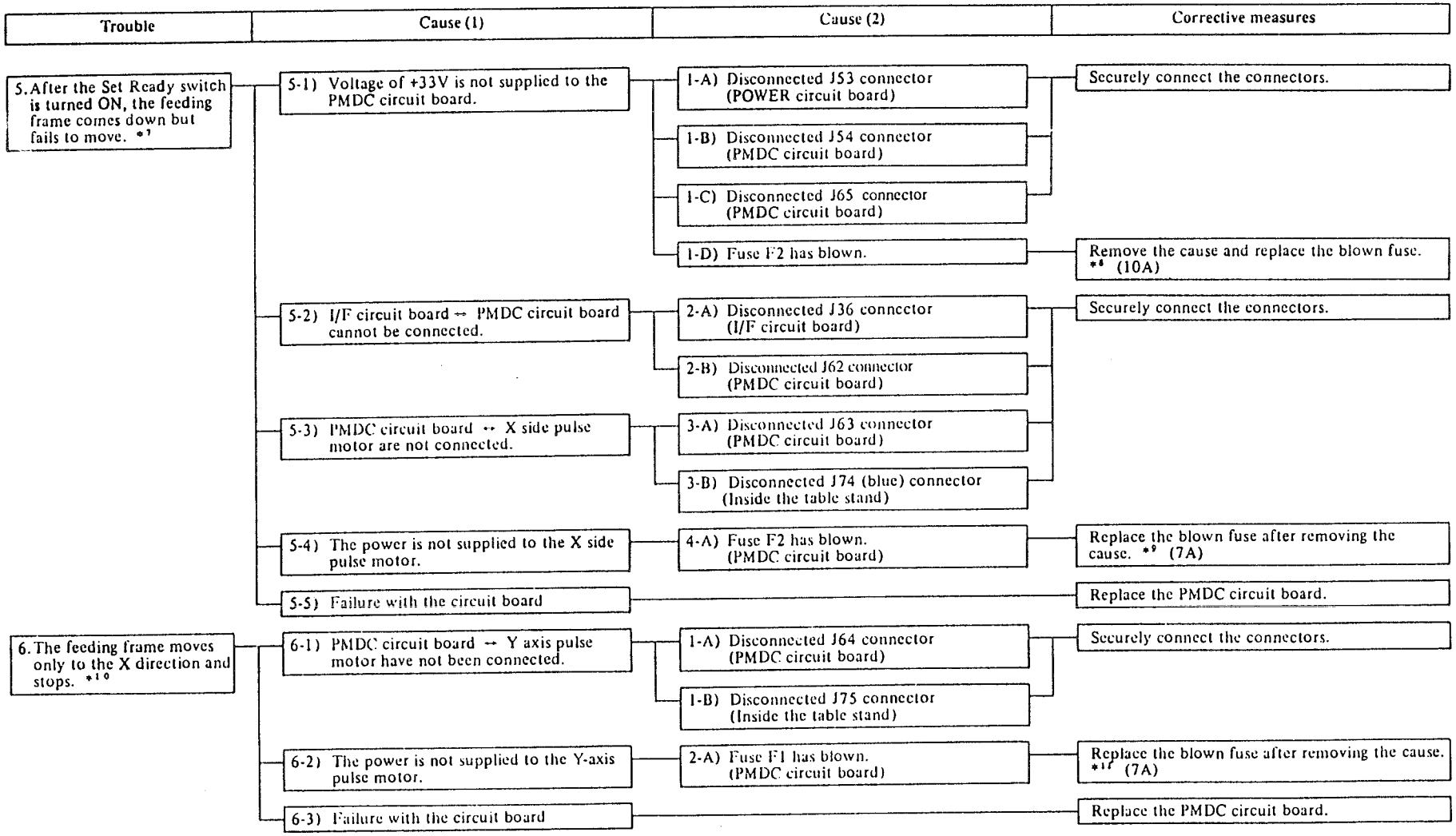
Disconnect the clutch/brake connector J71 of the machine motor in order to prevent that the trouble of *1 occurs and then perform test.

*4 Disconnect POWER circuit board J55 and turn the power ON. When +5V is not supplied, the regulator will be defective.



*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 pulse 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.

*8 The power is supplied to both X and Y axes by this. Check the current adjusted value axis on the PMDC circuit board.

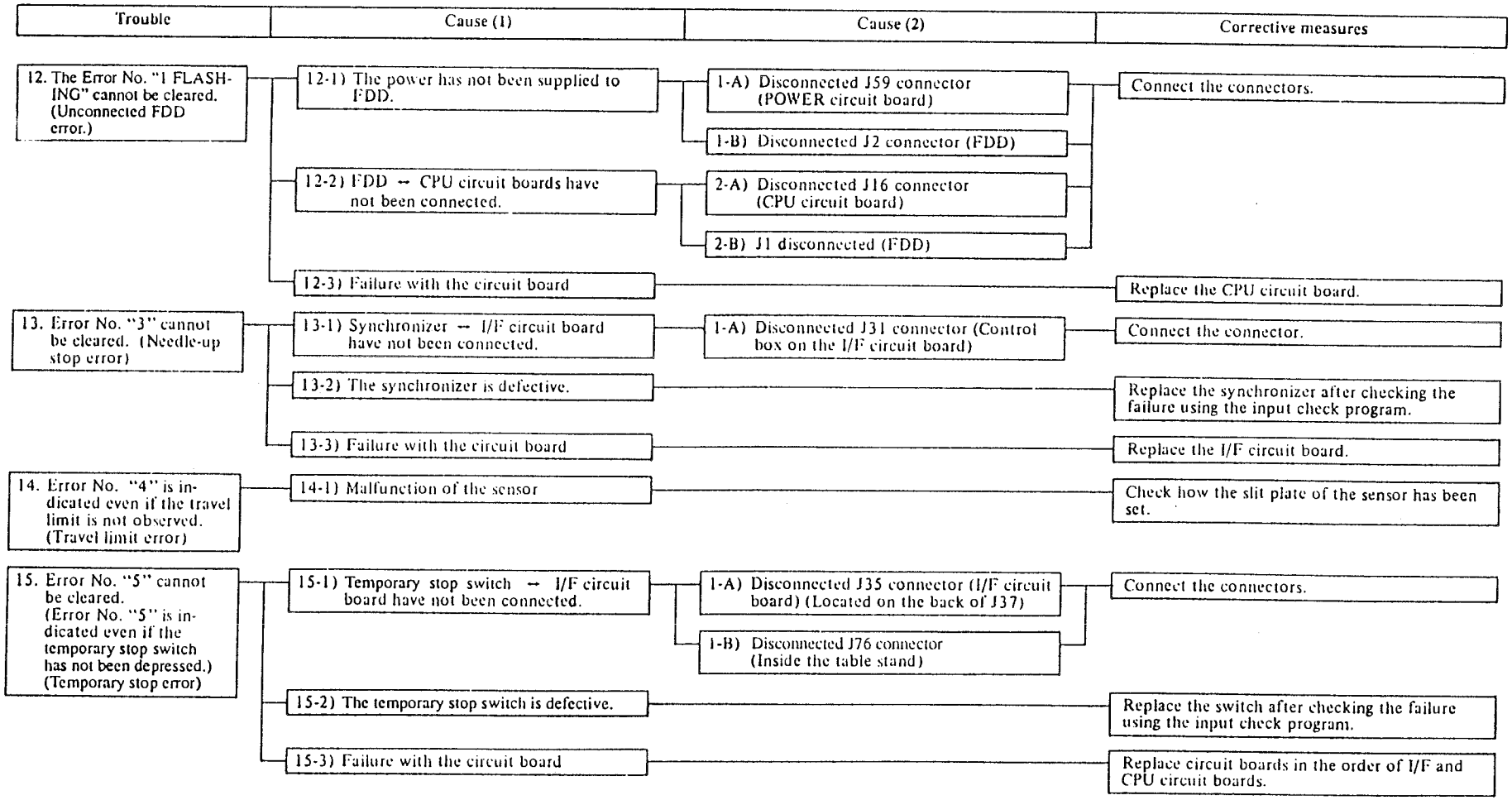
*9 The power is supplied to the X axis pulse motor by this. Check the current adjusted value in the X axis on the PMDC circuit board. When the power is supplied to *8 and *9, it is the failure with the circuit board if the fuses blow immediately.

*10 After detecting the X travel limit by the correction of the retainer, the feeding frame tries to move to Y direction.

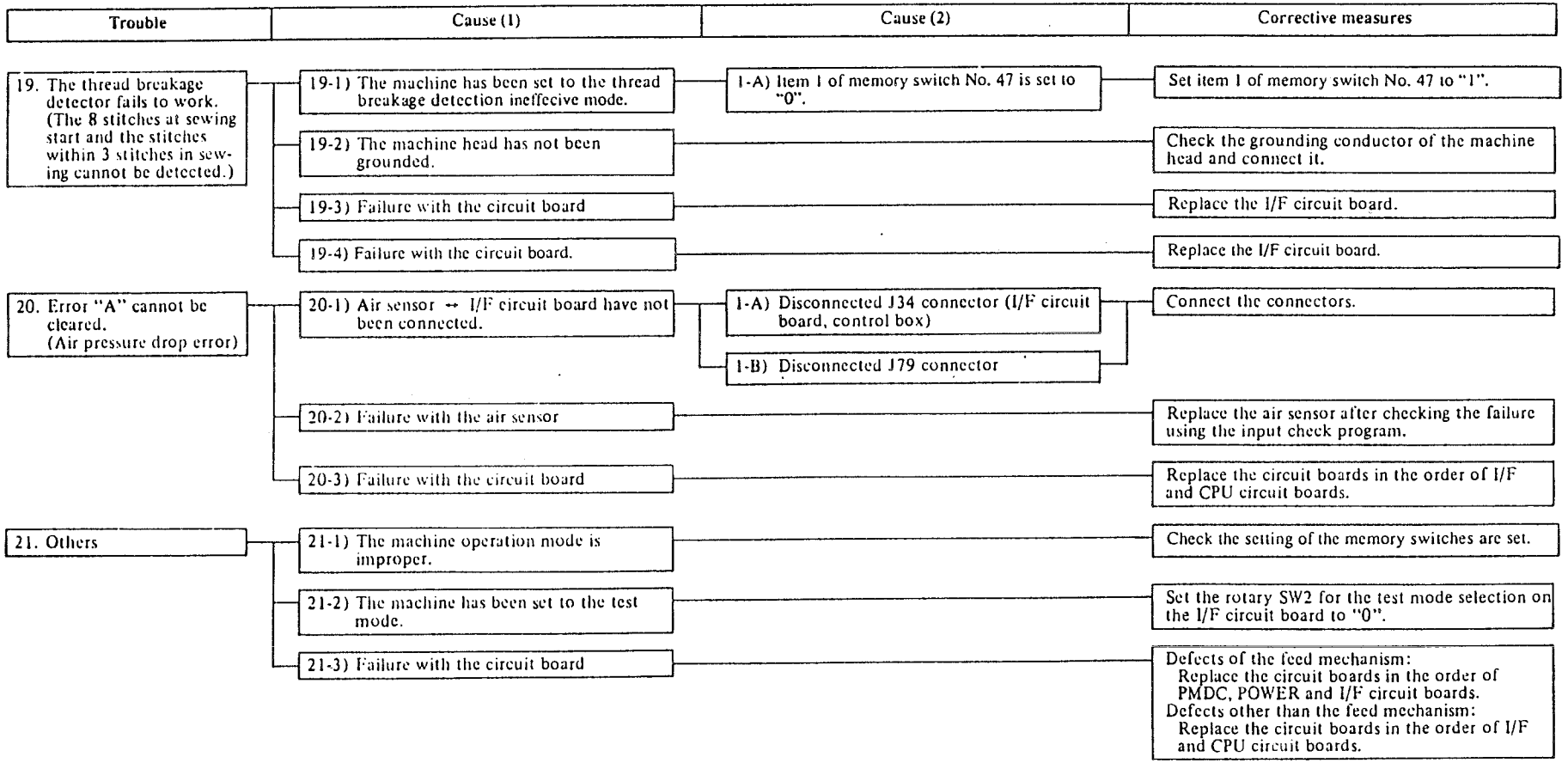
*11 The power is supplied to the Y axis pulse motor by this. Check the current adjusted value in the Y axis of the PMDC circuit board.
When the power supply is turned ON, it is the failure with the circuit board if the fuse blows immediately.

Trouble	Cause (1)	Cause (2)	Corrective measures
7. The correction of the retainer stops on the way while the power supply is turned ON. (It is impossible to detect the origin.	7-1) The signal of the machine head sensor has not been normally inputted.	1-A) Failure with the machine head sensor	Detect the defective sensor using the input check program and replace the defective sensor after confirming the connector.
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.
	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 the input check program.
	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) Pedal switch ↔ I/F circuit board have not been connected.	1-A) Disconnected J21 connector (I/F circuit board)	Connect the connector.
		1-B) Disconnected J88 connector (Control box)	
	9-2) Failure with the pedal switch		Replace the switch after checking the failure using the input check program.
	9-3) Failure with the circuit board		Replace the circuit boards in the order of I/F and CPU circuit boards.
10. The sewing machine fails to start sewing, and only the feed mechanism is actuated when the start switch is depressed.	10-1) The machine has been set to the stop mode.	1-A) The machine ON/OFF switch has been set to OFF.	Set the machine ON/OFF switch to ON.
		1-B) Disconnected J38 connector (I/F circuit board)	Connect the connector.
		1-C) The machine ON/OFF switch is defective.	Replace the switch after checking the failure using the input check program.
	10-2) Failure with the circuit board		Replace the circuit boards in the order of I/F and CPU circuit boards.
11. Error No. "1 LIGHTING" is indicated. (Floppy read error)	11-1) The floppy disk is defective.		Replace the floppy disk. *12
	11-2) Failure with FDD		Replace FDD.
	11-3) The circuit board is defective.		Replace the CPU circuit board.

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

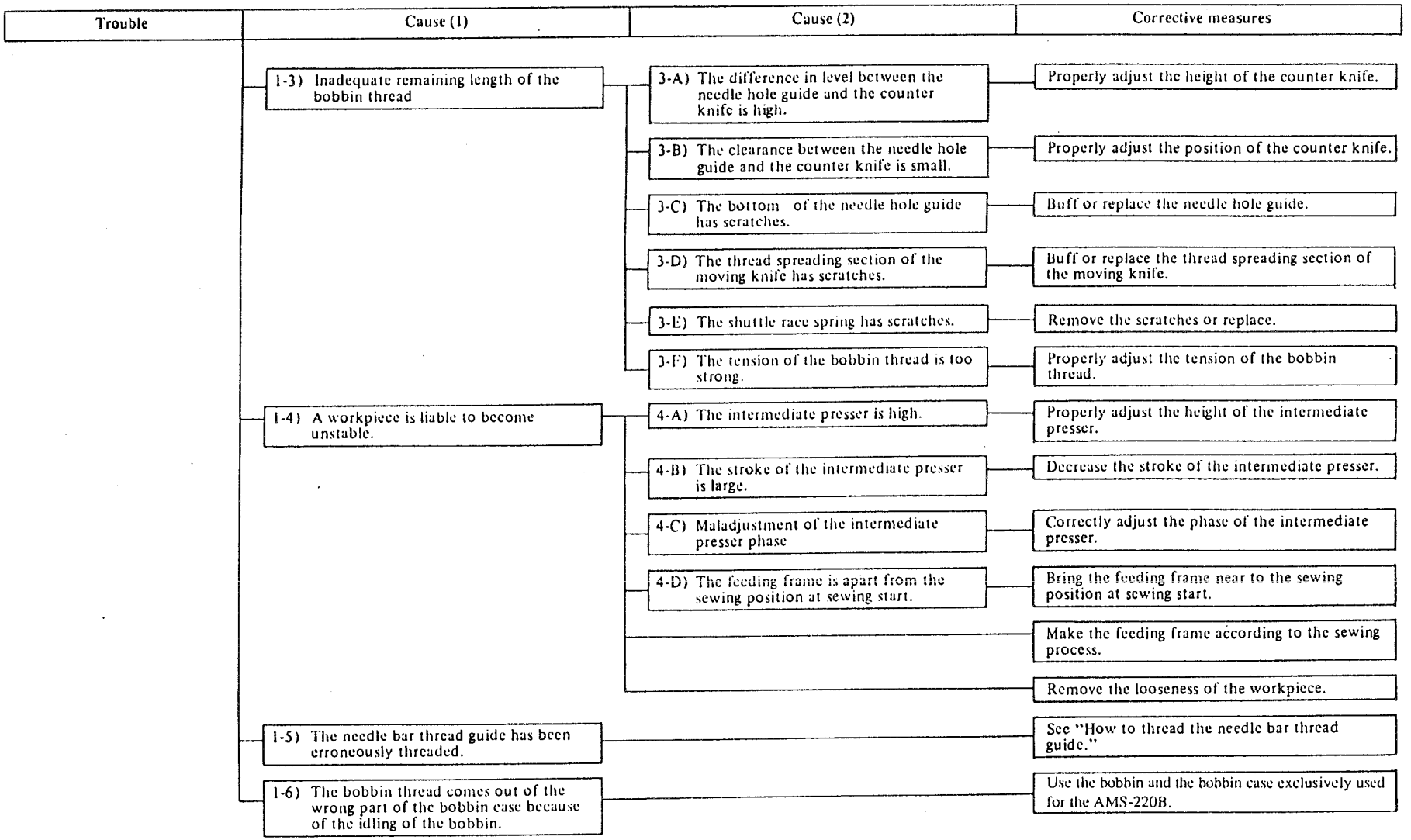

Trouble
Cause (1)
Cause (2)
Corrective measures
12. The Error No. "1 FLASHING" cannot be cleared. (Unconnected FDD error.)
12-1) The power has not been supplied to FDD.
1-A) Disconnected J59 connector (POWER circuit board)
1-B) Disconnected J2 connector (FDD)
Connect the connectors.
12-2) FDD ↔ CPU circuit 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.
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 temporary stop switch has not been depressed.) (Temporary stop error)
15-1) Temporary 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 J76 connector (Inside the table stand)
Connect the connectors.
15-2) The temporary stop switch is defective.
Replace the switch after checking the failure using the input check program.
15-3) Failure with the circuit board
Replace circuit boards in the order of I/F and CPU circuit boards.

Trouble	Cause (1)	Cause (2)	Corrective measures
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)	Connect the connectors.
		2-B) Disconnected J71 connector (Machine motor clutch/brake)	
	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.
	17-2) Failure with the circuit board.		Replace the I/F circuit board.
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)	Connect the connectors.
		1-B) Disconnected J77 connector (Control box)	
		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.

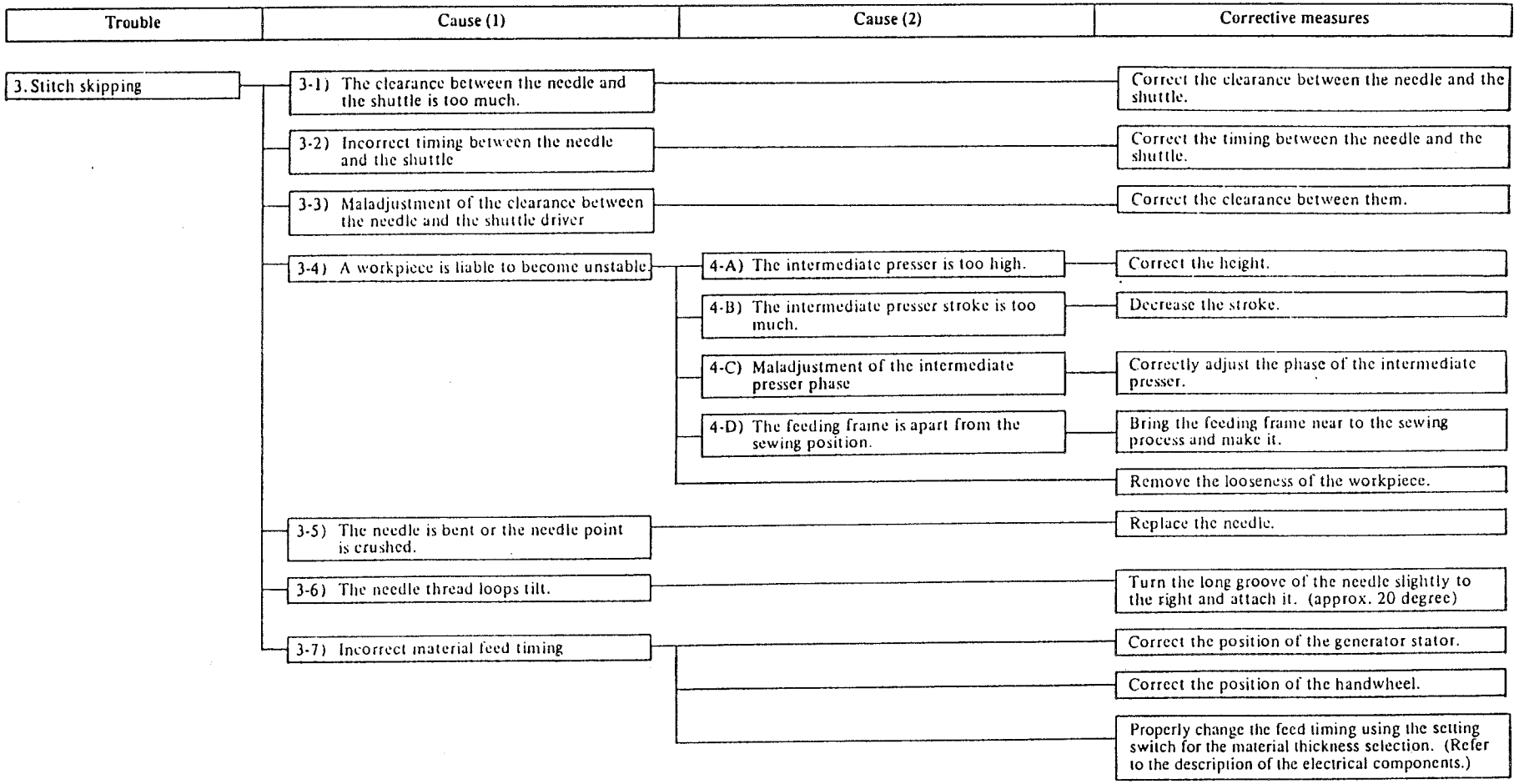

Trouble
Cause (1)
Cause (2)
Corrective measures
19. The thread breakage detector fails to work. (The 8 stitches at sewing start and the stitches within 3 stitches in sewing cannot be detected.)
19-1) The machine has been set to the thread breakage detection ineffecive mode.
1-A) Item 1 of memory switch No. 47 is set to "0".
Set item 1 of memory switch No. 47 to "1".
19-2) The machine head has not been grounded.
Check the grounding conductor of the machine head and connect it.
19-3) Failure with the circuit board
Replace the I/F circuit board.
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)
1-B) Disconnected J79 connector
Connect the connectors.
20-2) Failure with the air sensor
Replace the air sensor after checking the failure using the input check program.
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 the memory switches are set.
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".
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.

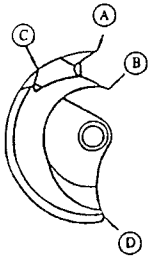
Troubles and corrective measures (Sewing conditions)

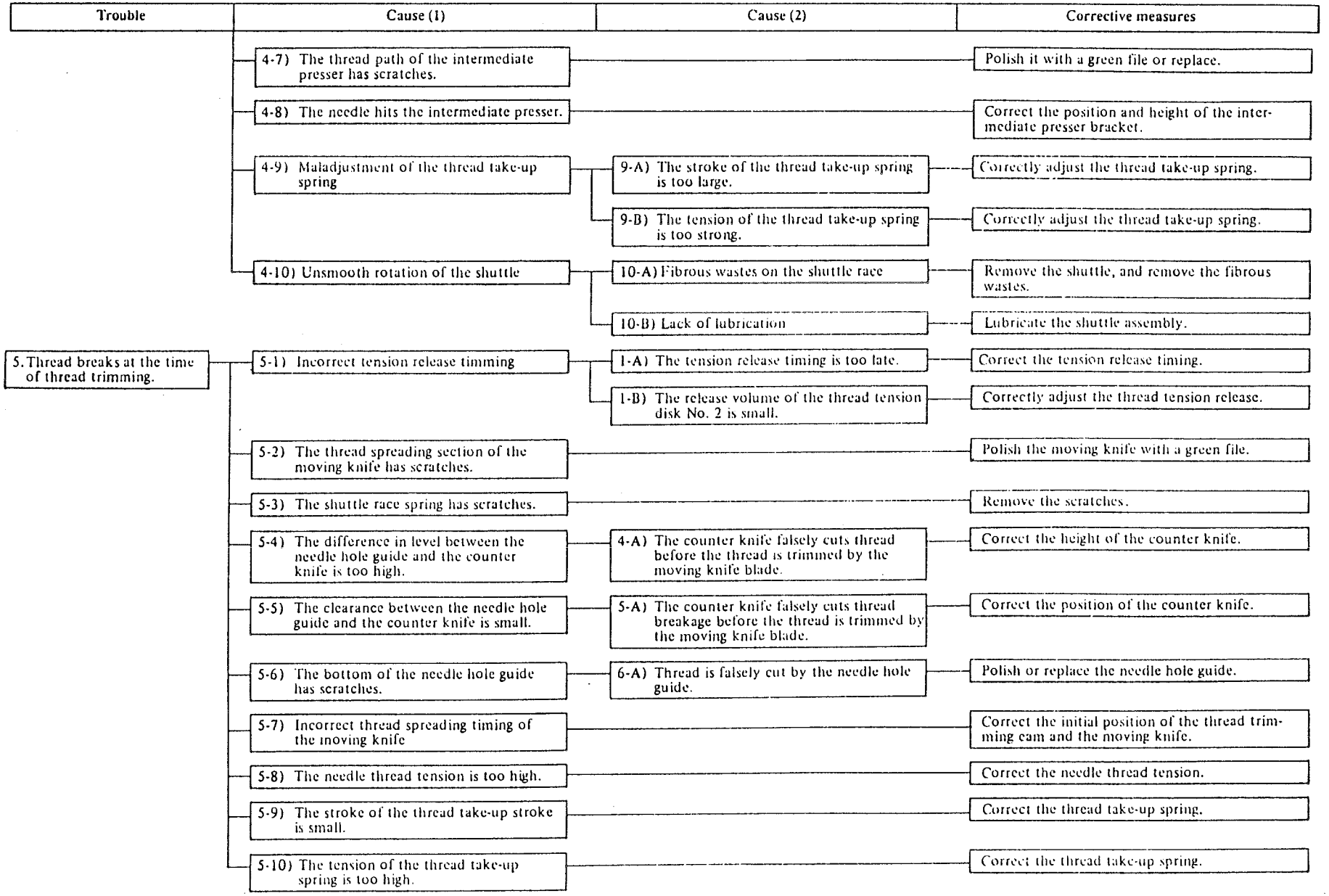
Trouble	Cause (1)	Cause (2)	Corrective measures
1. Thread slips off the needle at sewing start.	1-1) The 1st stitch has been skipped.	1-A) Improper sewing process	Make the stitch length shorter at sewing start. (Change in sewing process)
			Decrease the speed at sewing start.
			Change the sewing direction and position at sewing start.
		1-B) Incorrect material feed timing	Correctly position the generator stator.
			Correctly position the handwheel.
			Properly change the feed timing using the setting switch for the material thickness selection. (Refer to the description of the electrical components.)
		1-C) The through resistance of thread against a material is small.	Use a thinner thread. (Reduce the needle count. Example: #4 → #11.)
	1-2) Inadequate length of thread remaining on the needle.	2-A) The tension of the tension controller No. 1 is high.	Properly adjust the tension controller No. 1.
		2-B) The timing of the thread tension release is late.	Properly adjust the thread tension release timing.
		2-C) The release volume of the No. 2 thread tension disk is small.	Properly adjust the thread tension release.
		2-D) The thread take-up spring stroke is much.	Properly adjust the thread take-up spring.
		2-E) The thread take-up spring tension is weak.	Properly adjust the thread take-up spring.
		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.
		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.


Trouble
Cause (1)
Cause (2)
Corrective measures
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.
3-B) The clearance between the needle hole guide and the counter knife is small.
Properly adjust the position of the counter knife.
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.
3-F) The tension of the bobbin thread is too strong.
Properly adjust the tension of the bobbin thread.
1-4) A workpiece is liable to become unstable.
4-A) The intermediate presser is high.
Properly adjust the height of the intermediate presser.
4-B) The stroke of the intermediate presser is large.
Decrease the stroke of the intermediate presser.
4-C) Maladjustment of the intermediate presser phase
Correctly adjust the phase of the intermediate presser.
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 has 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-220B.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
	2-2) Maladjustment of the clearance between the needle and the shuttle		Correct the clearance between the needle and the shuttle.
	2-3) Incorrect feed timing		Correct the position of the generator stator.
			Correct the position of the handwheel.
			Properly change the feed timing using the setting switch for the material thickness selection. (Refer to the description of the electrical components.)
	2-4) The needle hits the moving knife.		Correct the position of the moving knife.
	2-5) The needle hits the intermediate presser.		Accurately position the intermediate presser bar bracket.
	2-6) The needle hits the wiper.		Correct the needle-up stop position.
			Accurately position the wiper.
	2-7) The needle is bent.		Replace the needle.
	2-8) The needle is thin.		Change the needle count according to the work-piece.
	2-9) The thickness of the workpiece exceeds the specified thickness.		The thickness possible to sew: 5 mm max.
	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.
3-2) Incorrect timing between the needle and the shuttle
Correct the timing between the needle and the shuttle.
3-3) Maladjustment of the clearance between the needle and the shuttle driver
Correct the clearance between them.
3-4) A workpiece is liable to become unstable
4-A) The intermediate presser is too high.
Correct the height.
4-B) The intermediate presser stroke is too much.
Decrease the stroke.
4-C) Maladjustment of the intermediate presser phase
Correctly adjust the phase of the intermediate presser.
4-D) The feeding fraine 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)
3-7) Incorrect material feed timing
Correct the position of the generator stator.
Correct the position of the handwheel.
Properly change the feed timing using the setting switch for the material thickness selection. (Refer to the description of the electrical components.)

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
		2-B) Position Ⓐ of the shuttle point is dull. 	Replace the shuttle.
		2-C) Inaccurate positioning of the shuttle race	Accurately position the shuttle race.
		2-D) The needle thread tension is weak.	Correct the needle thread tension.
		2-E) The tension of the thread take-up spring is weak.	Correct the thread take-up spring.
		2-F) The remaining length of the needle thread is too long.	Adjust the thread tension controller No. 1.
		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.
	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.


Trouble
Cause (1)
Cause (2)
Corrective measures
4-7) The thread path of the intermediate presser has scratches.
Polish it with a green file or replace.
4-8) The needle hits the intermediate presser.
Correct the position and height of the intermediate presser bracket.
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.
9-B) The tension of the thread take-up spring is too strong.
Correctly adjust the thread take-up spring.
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 timming
1-A) The tension release timing is too late.
Correct the tension release timing.
1-B) The release volume of the thread tension disk No. 2 is small.
Correctly adjust the thread tension release.
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.
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.
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.
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.
5-8) The needle thread tension is too high.
Correct the needle thread tension.
5-9) The stroke of the thread take-up stroke is small.
Correct the thread take-up spring.
5-10) The tension of the thread take-up spring is too high.
Correct the thread take-up spring.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
		1-B) The moving knife and counter knife fail to overlap properly.	Correct the height and position of the moving knife and counter knife.
		1-C) The counter knife blade is not parallel.	Adjusting the parallelism of the blade tip of the counter knife.
		1-D) Incorrect position of the counter knife.	Correct the position of the counter knife.
	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.
		2-B) Presence of scratches on the shuttle race spring (The shape of trimmed thread wastes are left.)	Remove the scratches.
	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.
		3-B) Incorrect path of the moving knife	Replace the moving knife or the throat plate.
		3-C) Inaccurate positioning of the thread trimming cam	Accurately position the thread trimming cam.
		3-D) Inaccurate positioning of the shuttle race spring	Accurately position the shuttle race spring.
	6-4) Skipping of the last stitch	4-A) Incorrect timing and clearance between the needle and shuttle	Correct the timing and the clearance.
		4-B) Incorrect height of the intermediate presser	Correct the height.
		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 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.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
	7-2) The thread tension disks No. 2 are falsely released.		Correctly adjust the thread releasing mechanism.
	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.
		3-B) The stroke of the thread take-up spring is large.	Correctly adjust the stroke.
	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.
	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.
	7-6) The clearance between the shuttle and the shuttle driver		Correctly adjust the clearance.
	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.
	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.
		11-B) Incorrect positioning of the handwheel	Correct the position of the handwheel.
			Change the feed timing by the material thickness selector DIP switch. (See "Electrical parts.")
	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. 10 degree)

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
		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)
		3-C) Incorrect feed timing	Correct the position of the generator stator.
			Correct the position of the handwheel.
			Set the DIP switches for thick material.
	8-4) Stitch skipping due to heat generated	4-A) The sewing speed is too high.	Decrease the speed using the speed control knob.
		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.
		5-B) The tension of the thread tension controller No. 2 is strong.	Decrease the tension of the thread tension controller No. 2.

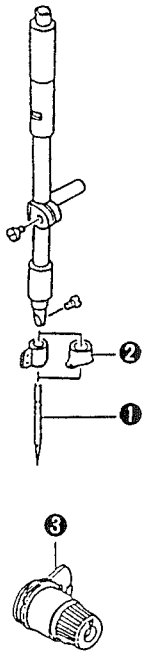
9. VARIOUS INFORMATION ON THE SEWING MACHINE

Changing the sewing specification

Changing the sewing specification from S (standard) type to H type (for heavy-weight materials)

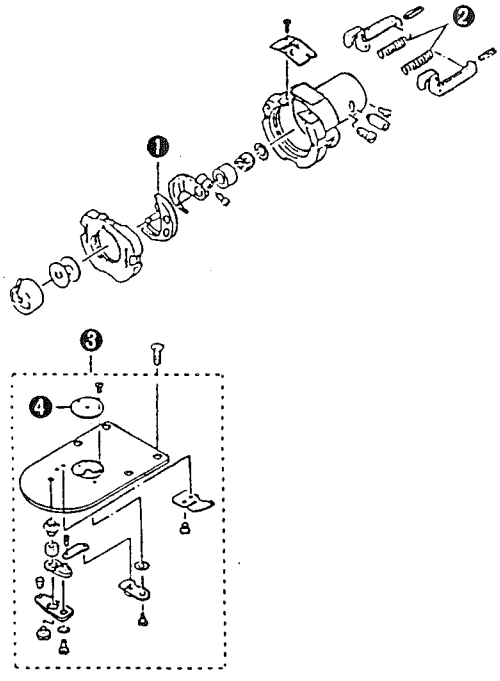
Needle bar and intermediate presser components			
1	MDP170B1800	Needle DPx17 #18	1
2	B1406210000	Needle bar thread guide	1
3	B23022050A0	Tension controller No. 2 asm.	1

Replace the standard components with those given in the table above.



Shuttle driving shaft components			
1	B181820500B	H type shuttle	1
2	13512405	H type shuttle race ring spring	2
3	B24252150AB	H type throat plate asm.	1
4	B242621000B	ø2 needle hole guide	(1)

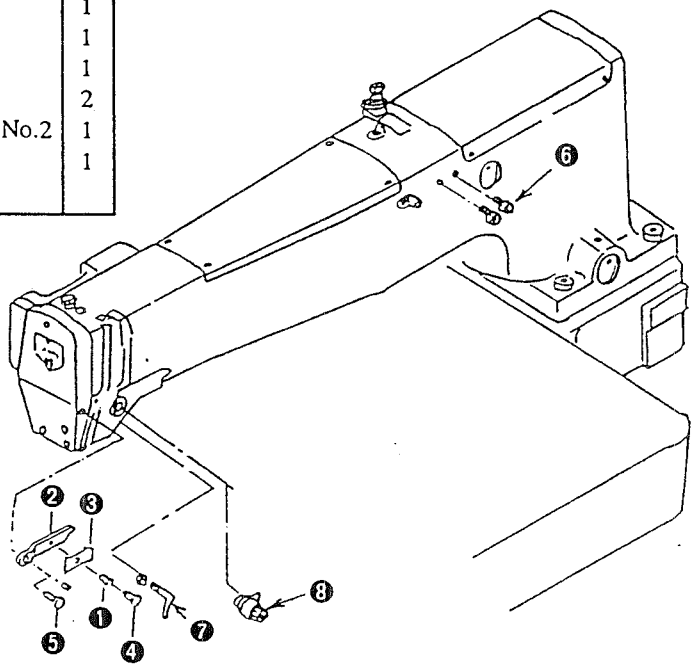
Replace the standard components with those given in the table above.



Changing the sewing specification from S (standard) type to G type (for heavy-weight materials)

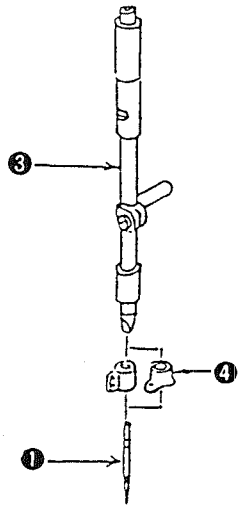
Machine head and miscellaneous cover components			
1	B1132521000	Needle thread presser spring	1
2	B1145210000	Needle thread presser mounting base	1
3	10129104	Needle thread presser plate	1
4	SD0380551SL	Hinge screw	1
5	SS7090910SP	Screw	1
6	SS7110840SP	Screw	2
7	B3118771000	Thread guide of tension controller No.2	1
8	B23022050A0	Tension controller No.2 joint	1

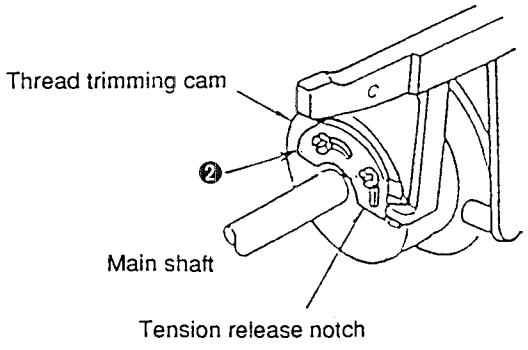
Add the components shown in the table above.



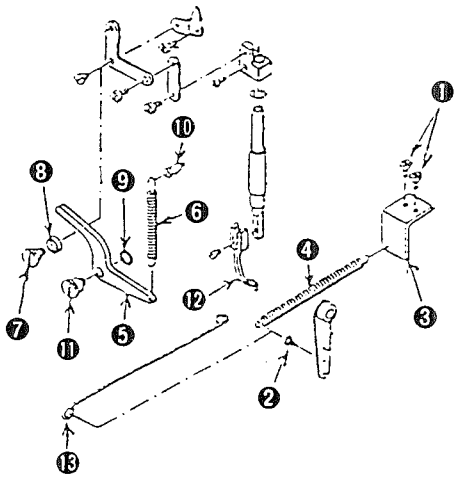
Main shaft and needle bar components			
1	MDP170B2300	Needle, DPx17 #23	1
2	B2312210A00	Tension release notch	1
3	B1401210A00	Needle bar	1
4	B1406210000	Needle bar thread guide	1

Replace the standard components with those shown in the table above.



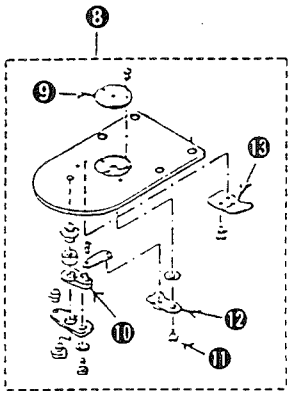


Intermediate presser components			
1	SS7110840SP	Screw	2
2	1012004	Spring peg	1
3	B1612215000	Intermediate presser lifter spring mounting plate	1
4	B1626215000	Intermediate presser lifter spring	1
5	B1641215000	Intermediate presser depressing plate	1
6	B1642215000	Intermediate presser spring B	1
7	B1644215000	Hinge screw	1
8	B1645215000	Intermediate presser link roller	1
9	B322877100B	Spacer	1
10	SD0550501SP	Intermediate presser spring peg	1
11	SD0720321TP	Hinge screw	1
12	B160122000G	Intermediate presser G	1
13	B1646223C00	Intermediate presser lifter connecting rod	1

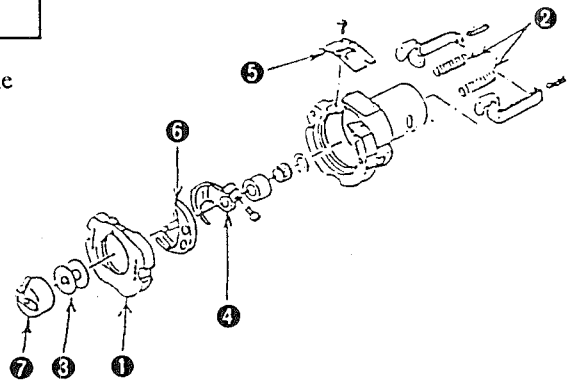


Add the components shown in the table above.

Shuttle driving shaft components			
1	B18172100AB	Shuttle race ring B joint	1
2	13512405	Shuttle race ring spring	2
3	B1805210A00	Bobbin	1
4	B1812210000	Driver	1
5	B1815210000	Shuttle race cap	1
6	B1818210000	Shuttle	1
7	B18282100A0	Bobbin case asm.	1
8	B24252150AC	G type throat plate (asm.)	1
9	B242621000H	ø3 needle hole guide H	(1)
10	B2416210000	Thread trimming lever, small	(1)
11	B2417210000	Hinge screw	(1)
12	B2421210AA0	Moving knife joint	(1)
13	B2424210A00	Counter knife	(1)



Replace the standard components with those shown in the table above.



[Caution]

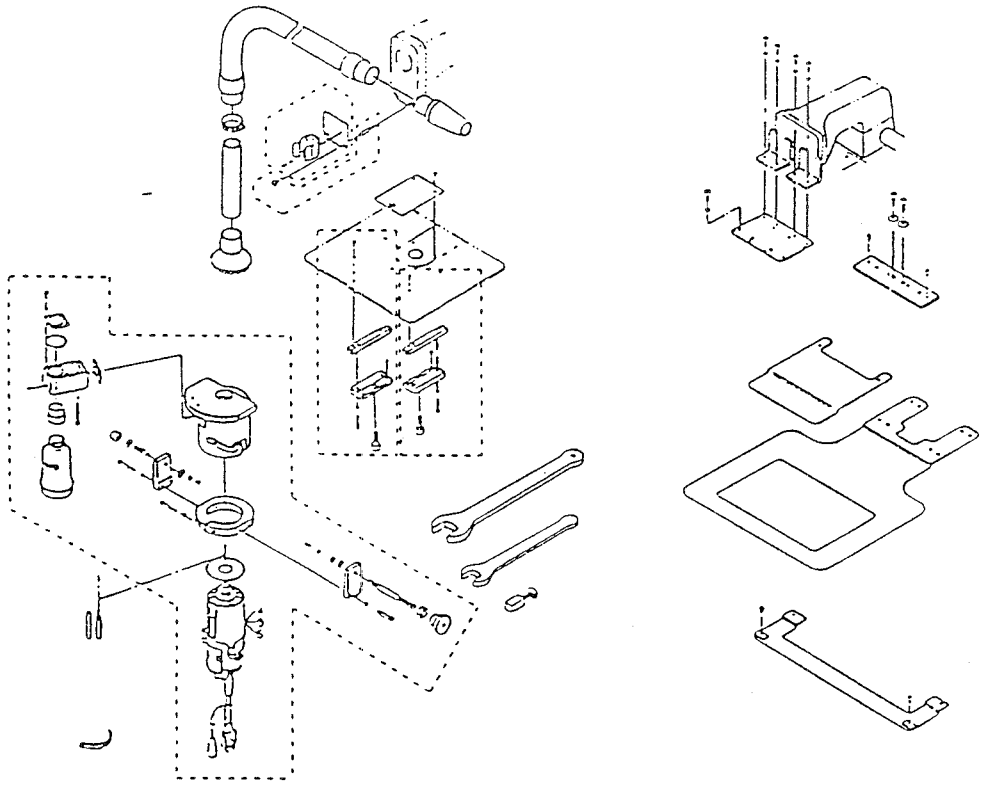
If an extra penetrating force is required when sewing a heavy-weight material, replace the motor (550 W, 2P), pulley and belt with appropriate ones.

AMS-223C subclass model modification unit

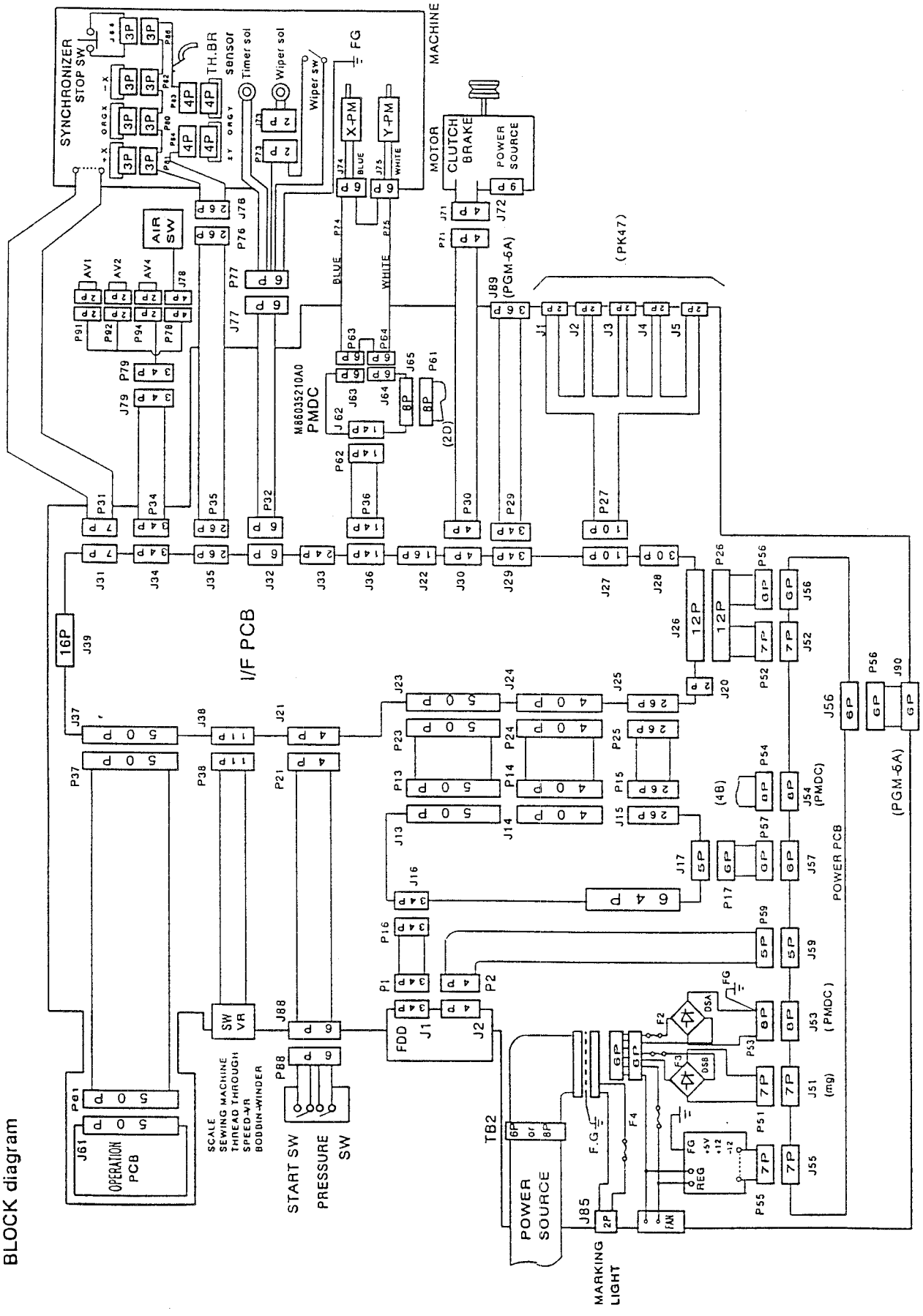
Part No.	Description of modification
B2606223CA0	Standard → Separately-driven feeding frame
B4301223CB0	Standard → Inverting intermediate presser
B4301223AB0	Double-stepped stroke feeding frame → Inverting intermediate presser
B4301223BB0	Separately-driven feeding frame → Inverting intermediate presser

Options

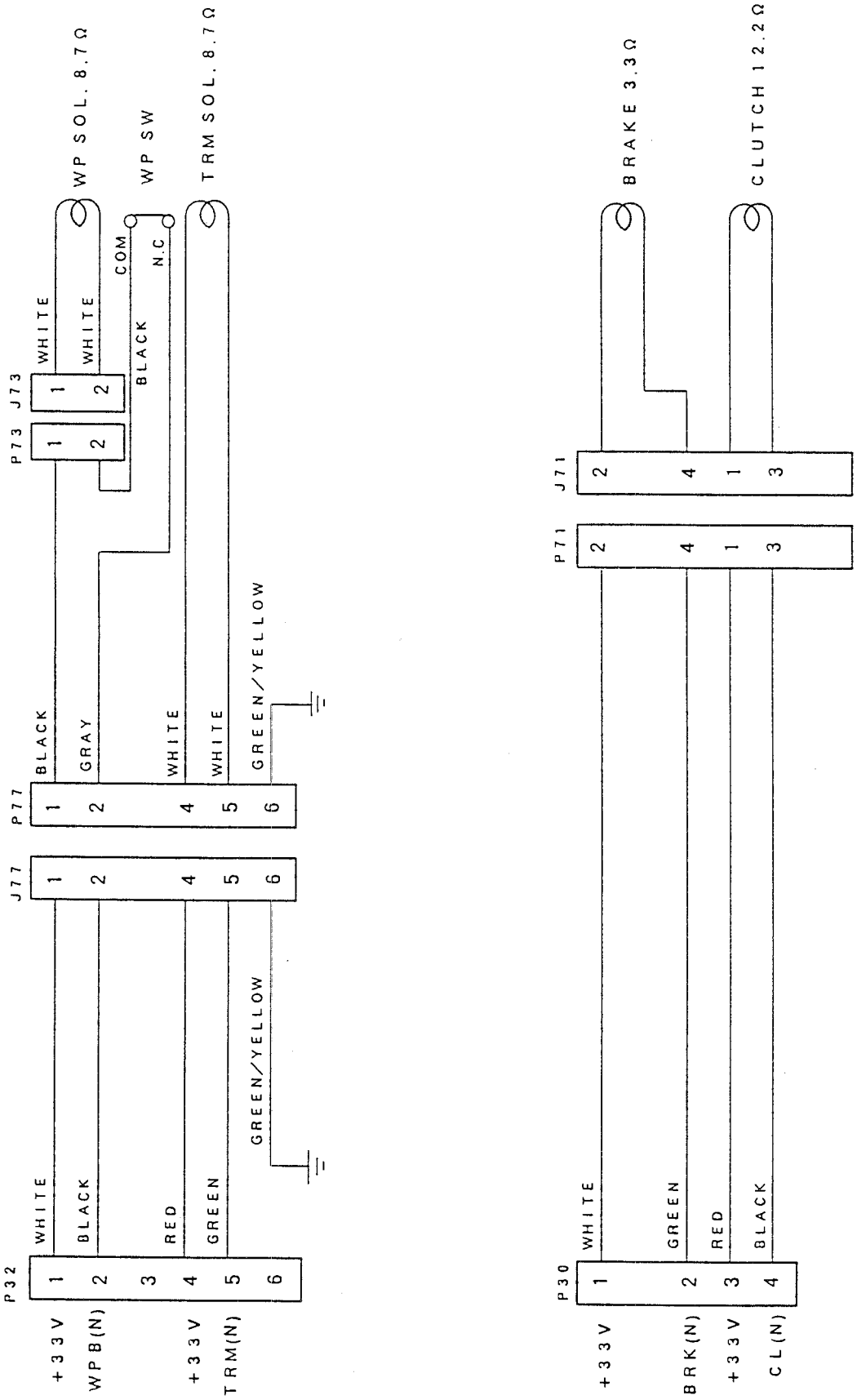
Milling unit MU-07



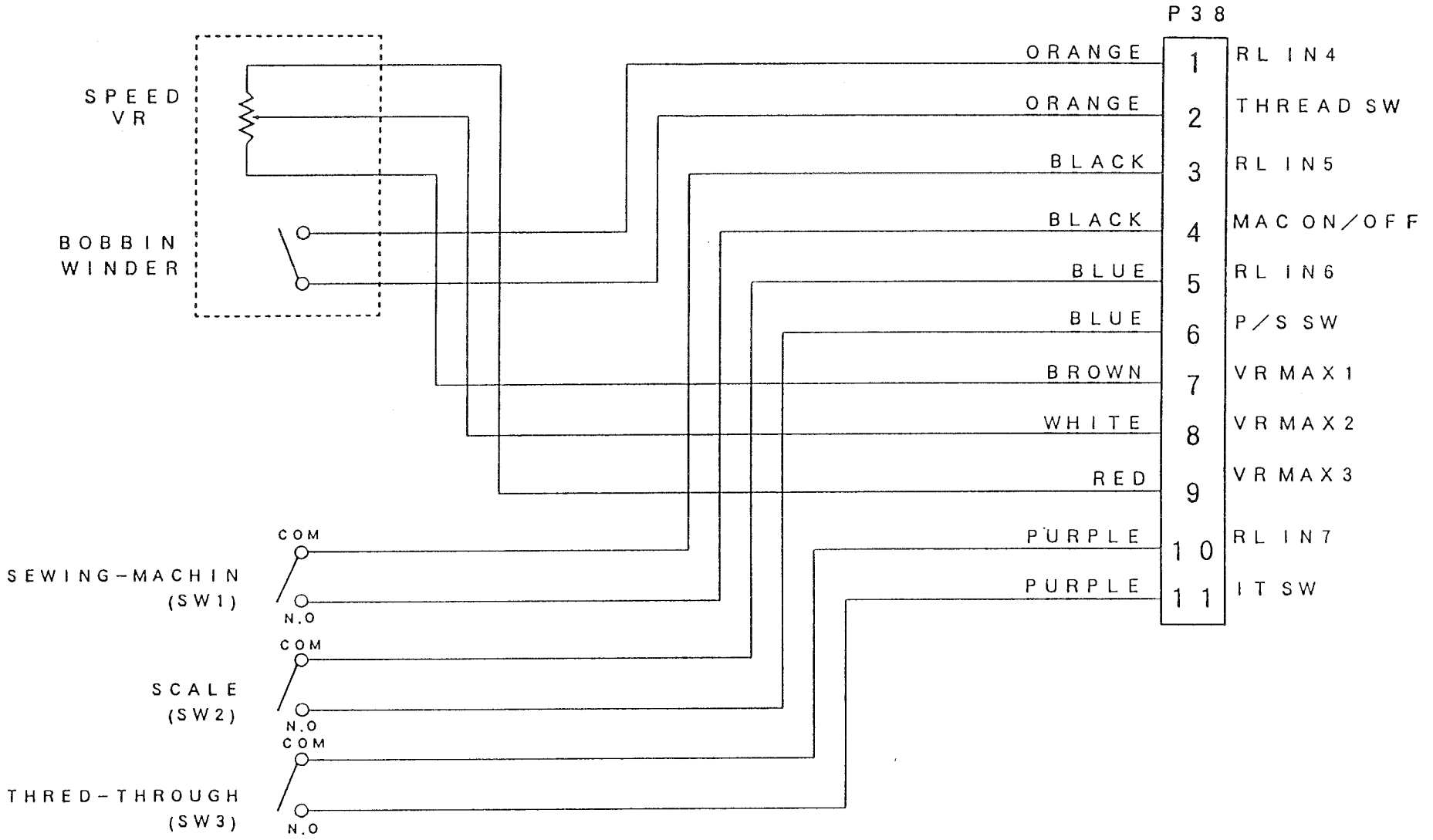
BLOCK diagram



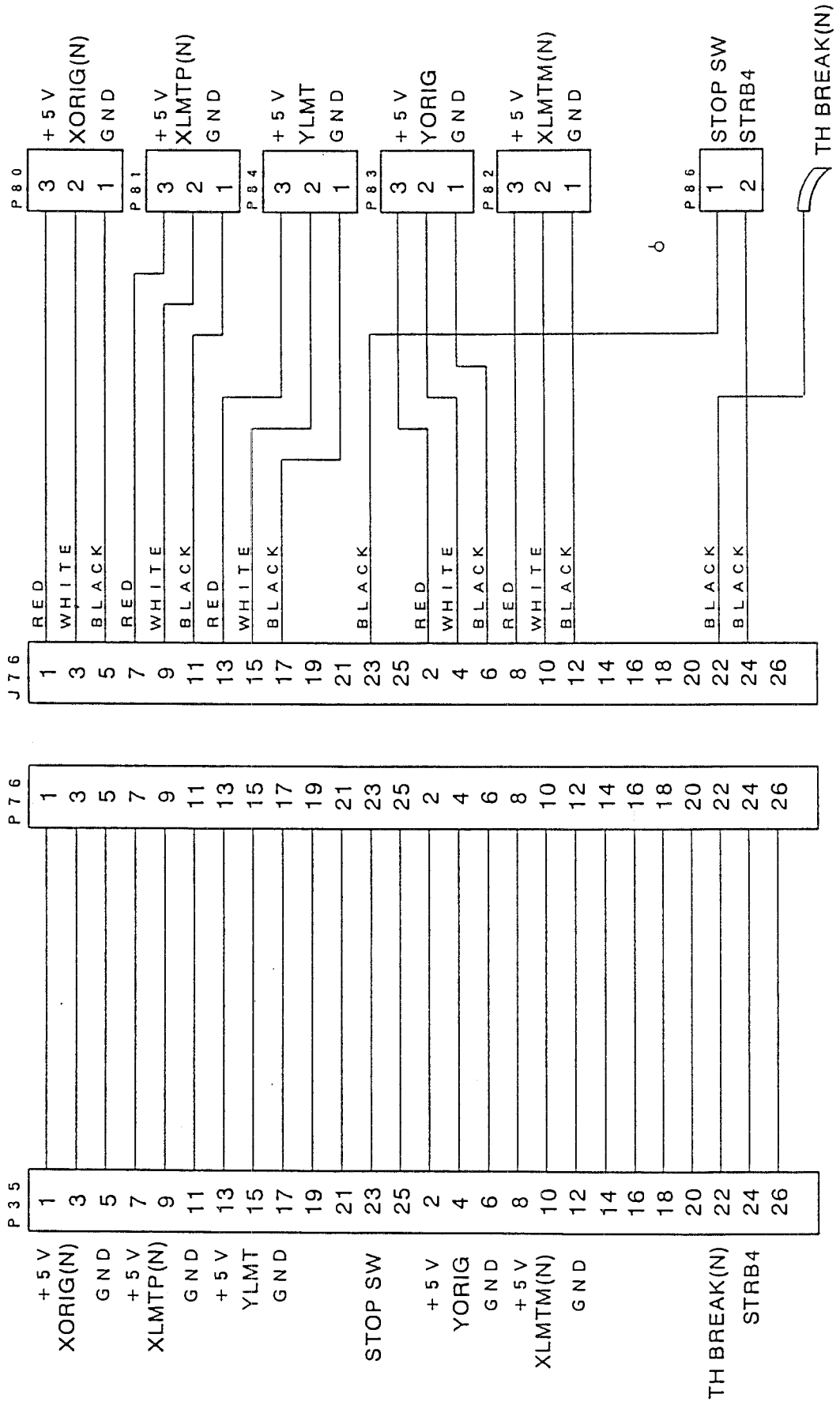
SOLENOID circuit diagram



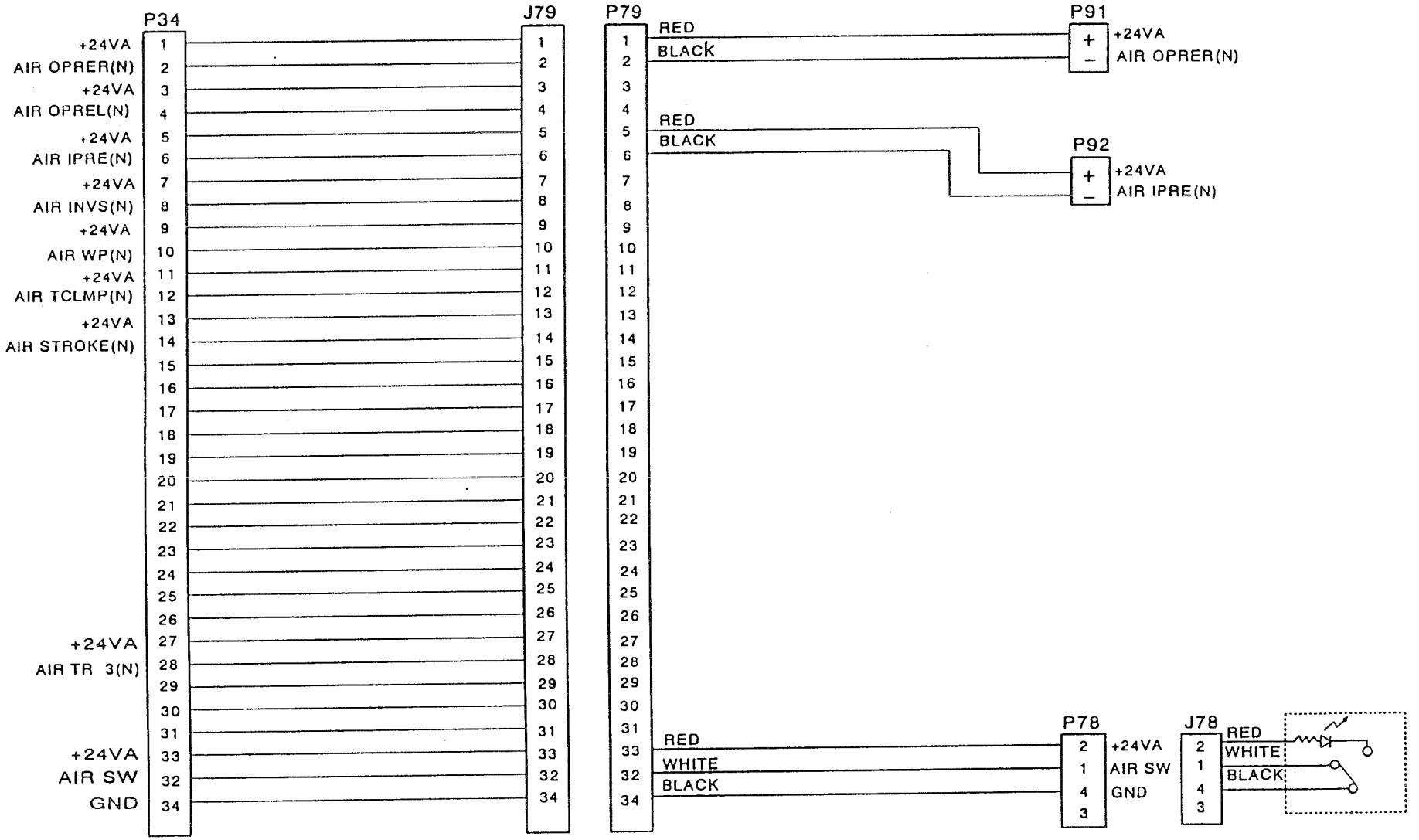
VR-SW circuit diagram



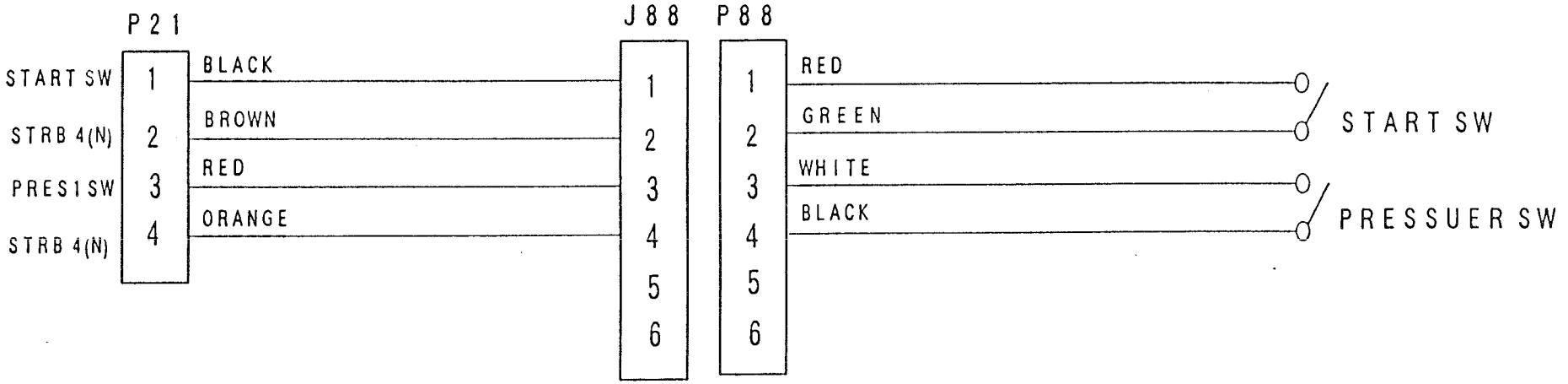
SENSOR circuit diagram



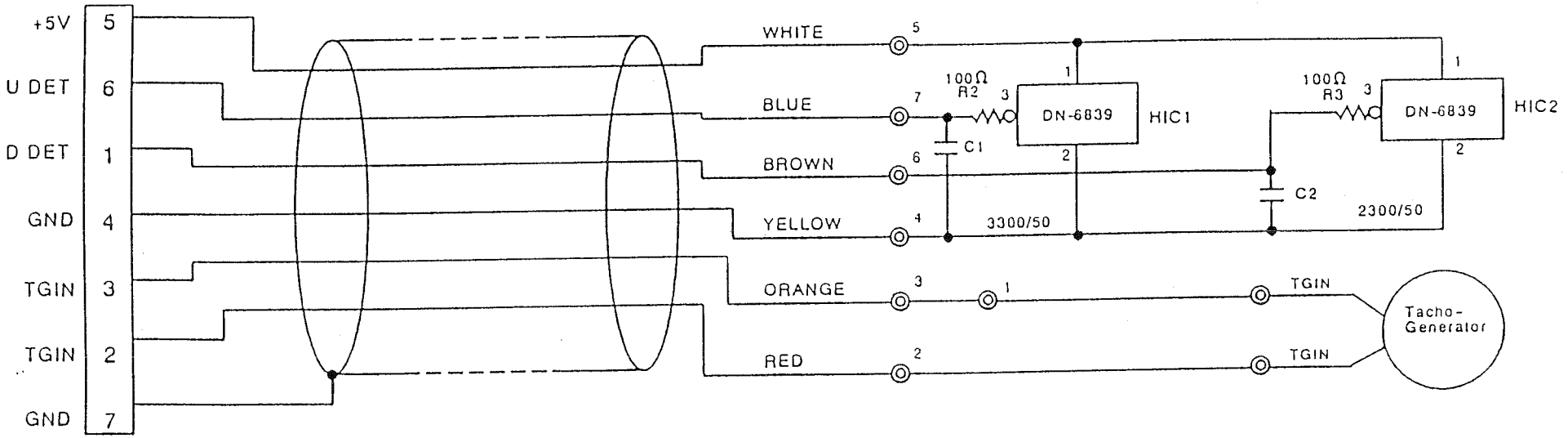
AIR VALVE circuit diagram



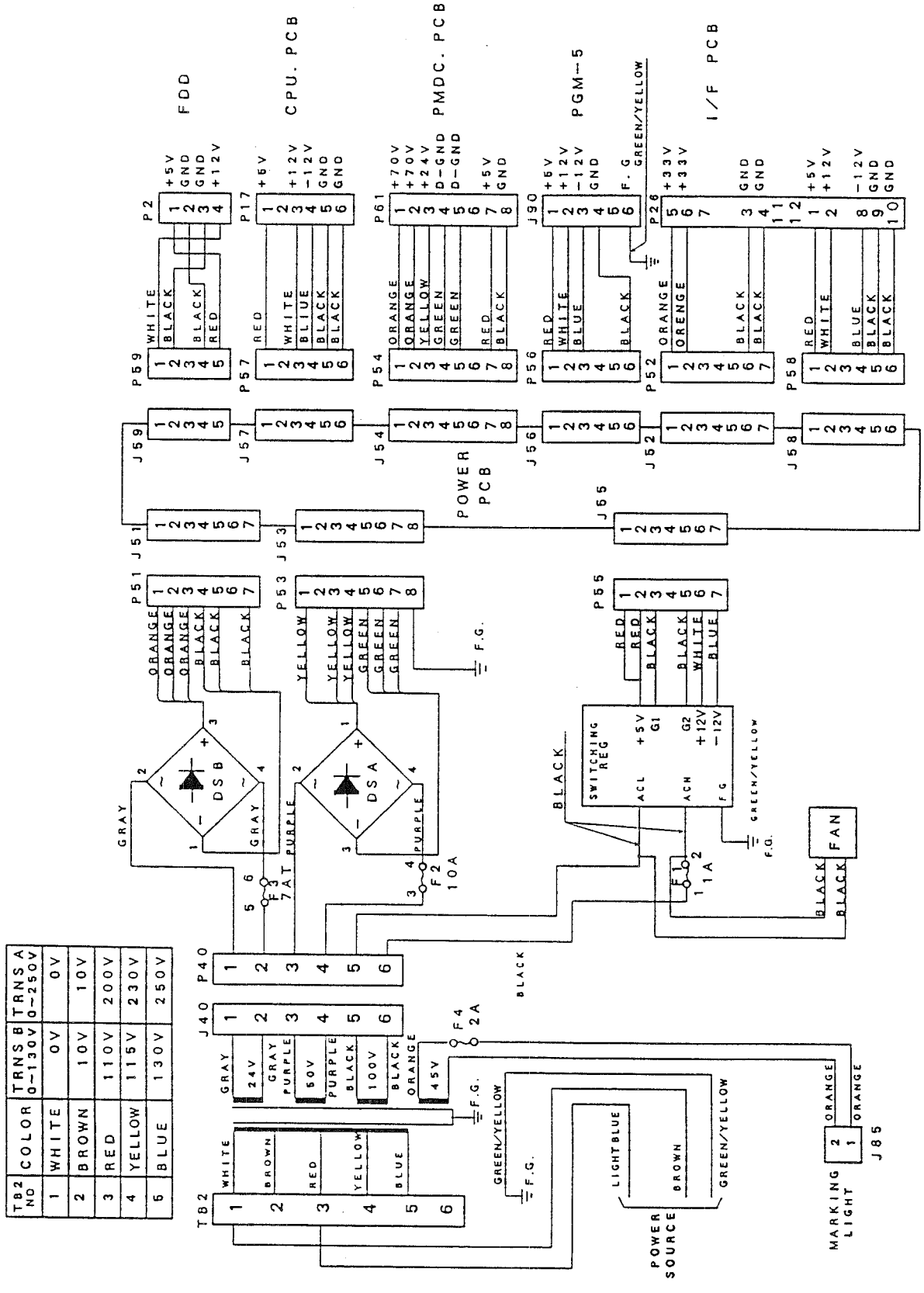
PEDAL SW circuit diagram



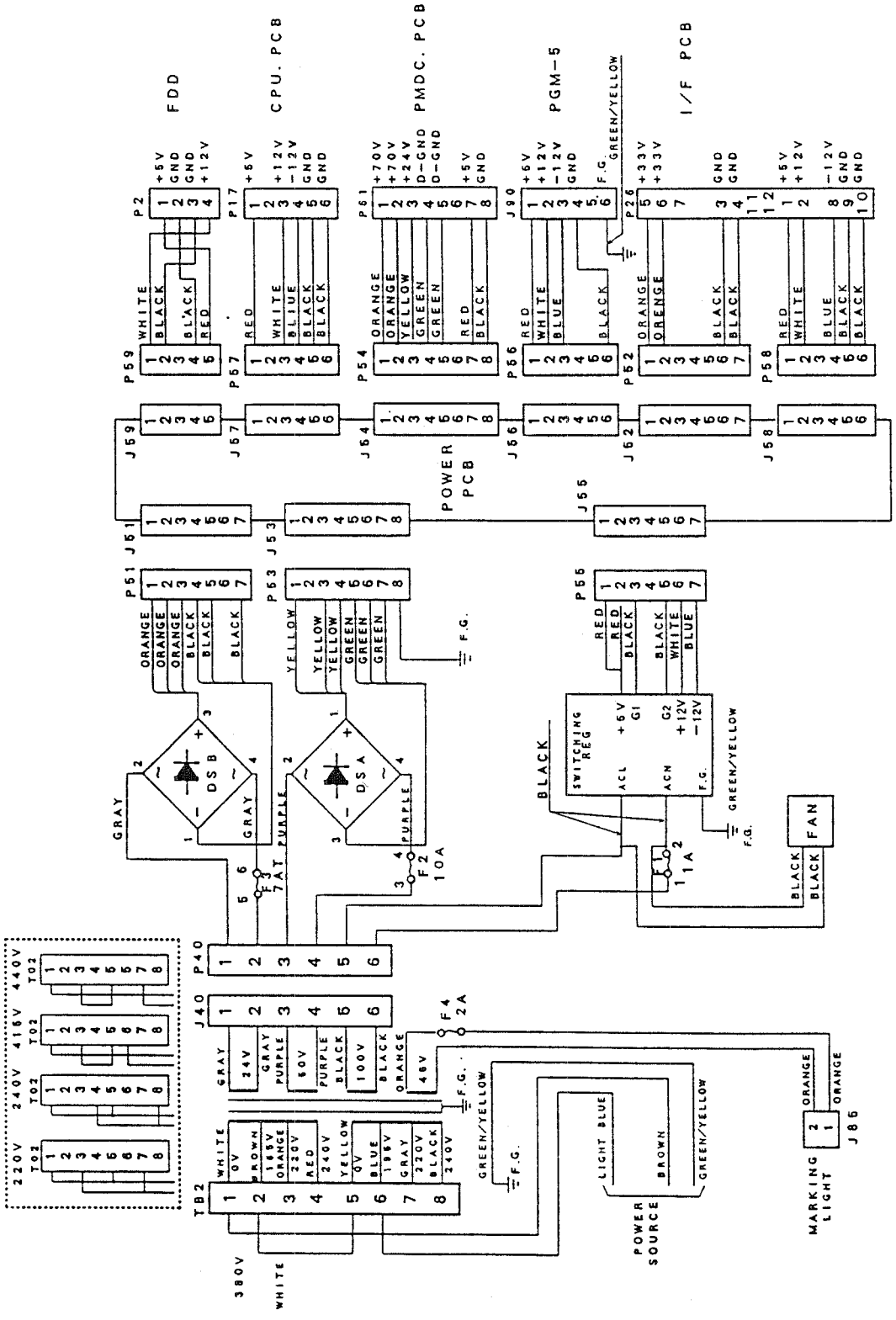
SYNCHRONIZER circuit diagram



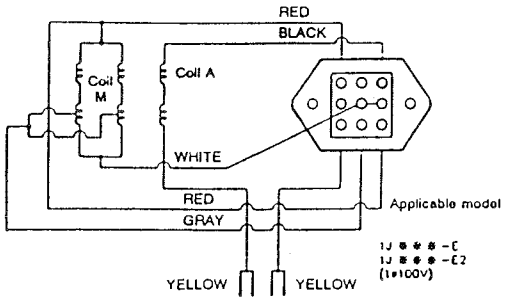
POWER circuit diagram (A)

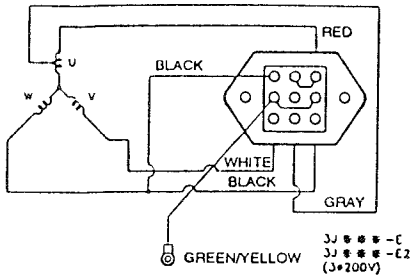


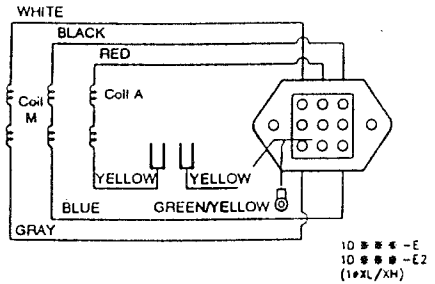
POWER circuit diagram (B)

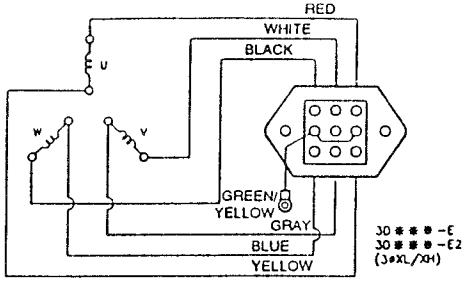


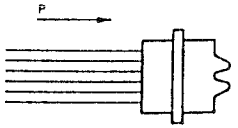
MOTOR connection diagram



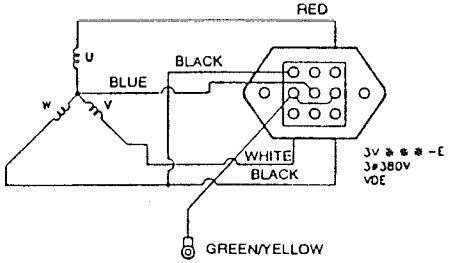


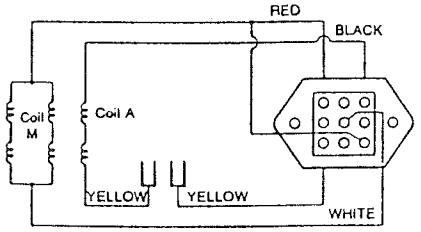


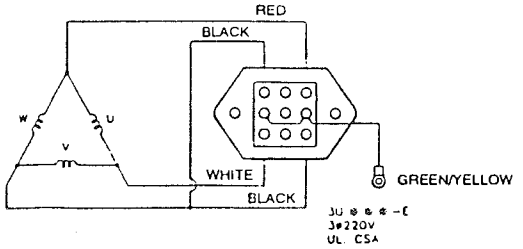




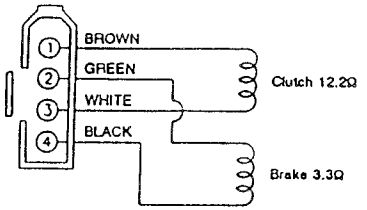
The arrangement of 9P connector pin: viewed from P



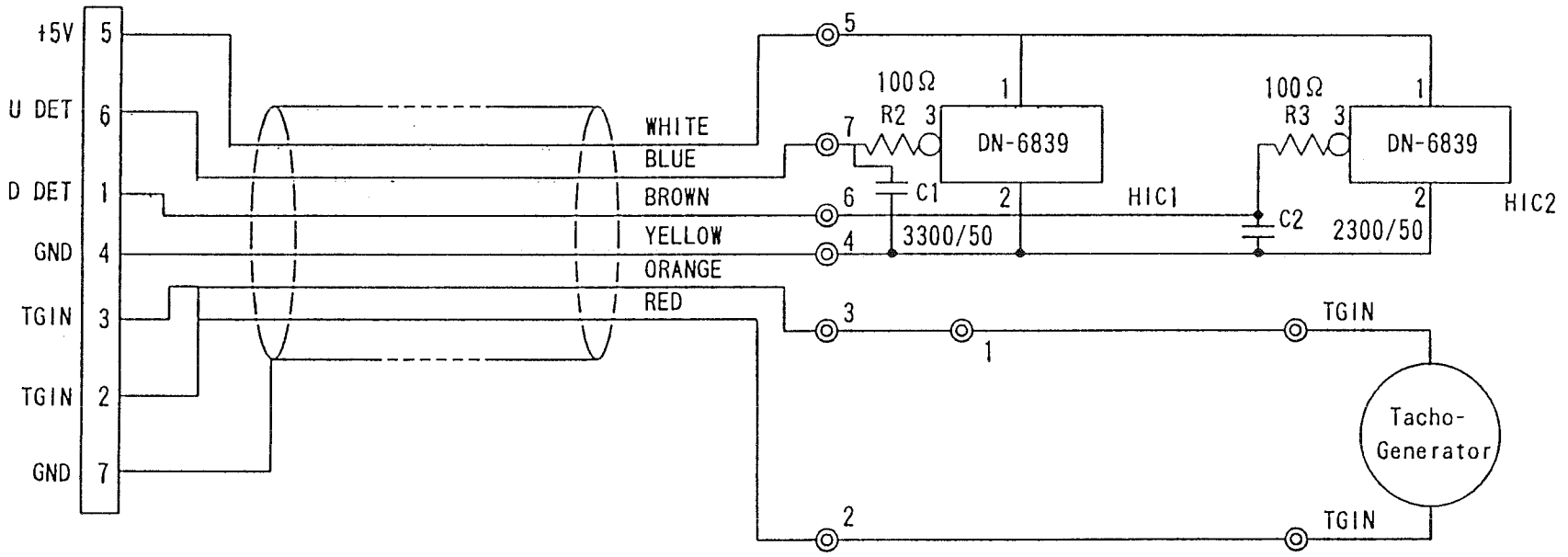




CLUTCH BRAKE connection diagram



SYNCHRONIZER circuit diagram



CHAPTER 2
COMPUTER-CONTROLLED CYCLE MACHINE WITH A DOUBLE-STEPPED STROKE FEEDING FRAME (B TYPE)

AMS-223CSB
(for light-weight materials)
AMS-223CHB
(for medium-weight materials)
AMS-223CGB
(for heavy-weight materials)

[Note]
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

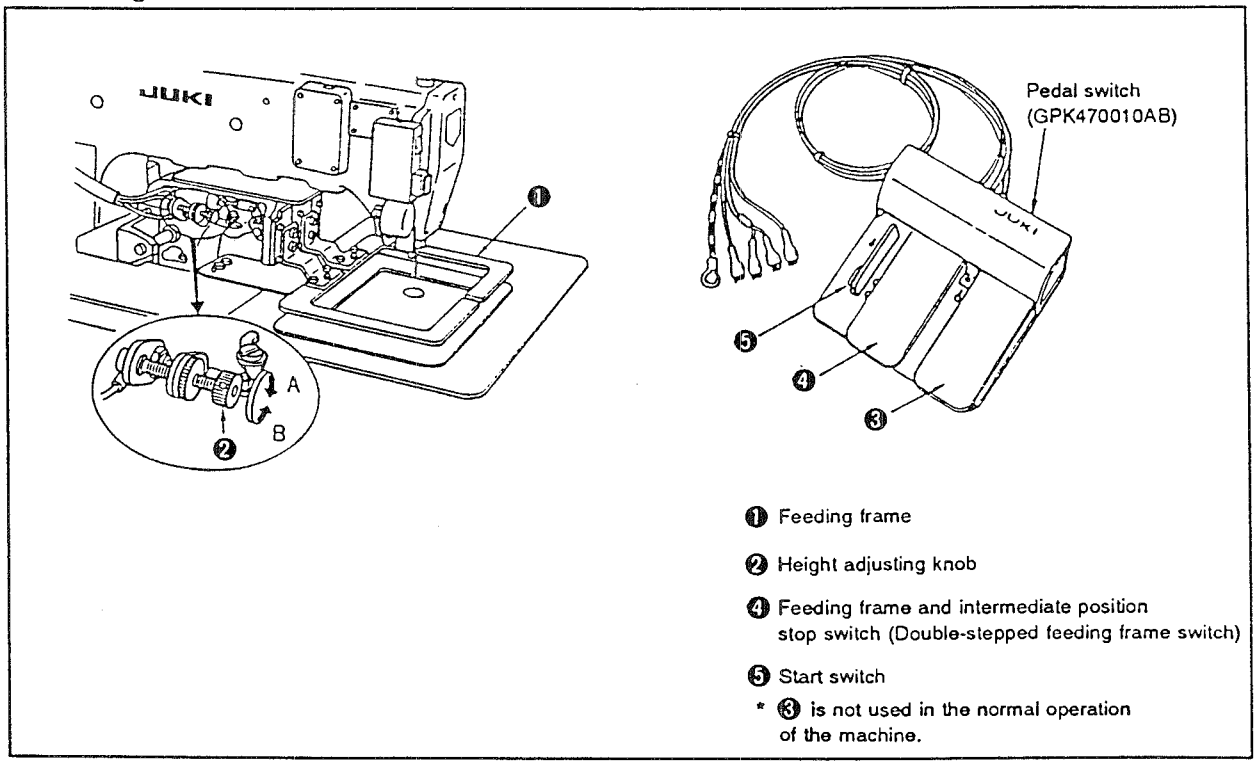
1) Lowering the feeding frame in the double-stepped actions allows the operator to position the sewing product on the machine with accuracy.
2) The height of the feeding frame in its intermediate stop position can be adjusted within the range of 0 through 30 mm with ease according to the thickness of the sewing product to be sewn.
3) The exclusive pedal switch (PK47) allows the operator to select the pedal operation mode as desired.

2. SPECIFICATIONS AND SPECIFIED VALUE

1) Height of the feeding frame in its intermediate stop position: 0 to 30 mm.

3. OPERATION OF THE SEWING MACHINE

Configuration



❶ Feeding frame
It comes down by operating the pedal switch

❷ Height adjusting knob
It is used to adjust the height of the feeding frame when it is stopped at its intermediate stop position.

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

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

4. ADJUSTMENTS

Adjusting the mechanical component

STANDARD ADJUSTMENTS

(1) Connecting the pneumatic components

The schematic diagram for the pneumatic system is as follows:

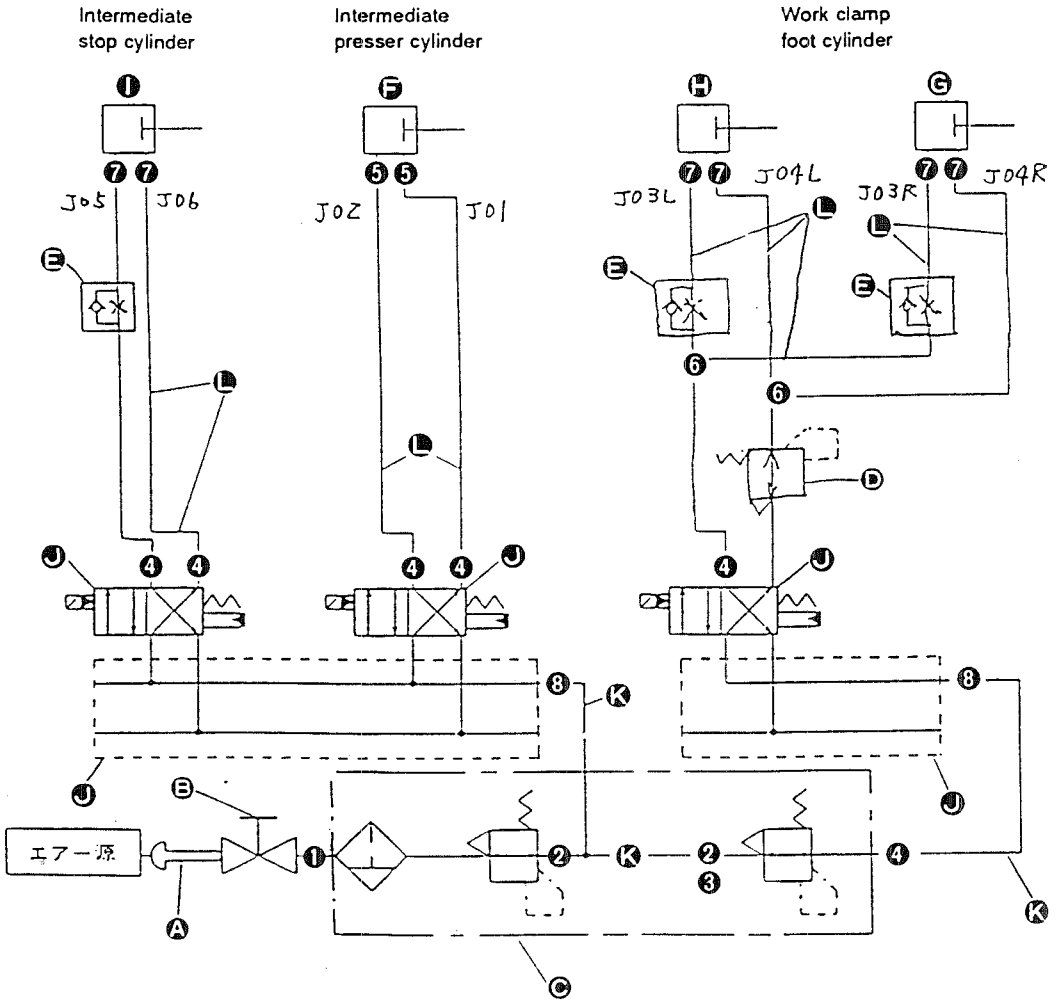


Fig.

Ⓐ	Quick-coupling joint socket
	Quick-coupling joint plug
Ⓑ	Air cock
Ⓒ	Filter regulator
Ⓓ	Pressure reducing valve
Ⓔ	Speed controller (A)
Ⓕ	Intermediate presser cylinder
Ⓖ	Work clamp foot cylinder (right)
Ⓗ	Work clamp foot cylinder (left)
❶	Intermediate stop cylinder
Ⓙ	Solenoid valve (asm.)
	Manifold
	Solenoid valve

Ⓚ	ϕ6 air tube
Ⓛ	ϕ4 air tube
❶	Barrel nipple
❷	T-cheese
❸	Plug
❹	Hose nipple
❺	Speed controller (B)
❻	Y joint
❼	Hose elbow
❽	Elbow union (B)

[Caution]

If the components are not correctly connected, feeding frame components and intermediate presser components will malfunction to cause the machine to fail and the related components to be damaged.

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

Adjust the center-to-center distance between the double-stepped stroke fulcrum shaft and the intermediate cylinder knuckle connecting shaft to 112.5 ± 0.3 mm when the intermediate stop cylinder draws in the most.

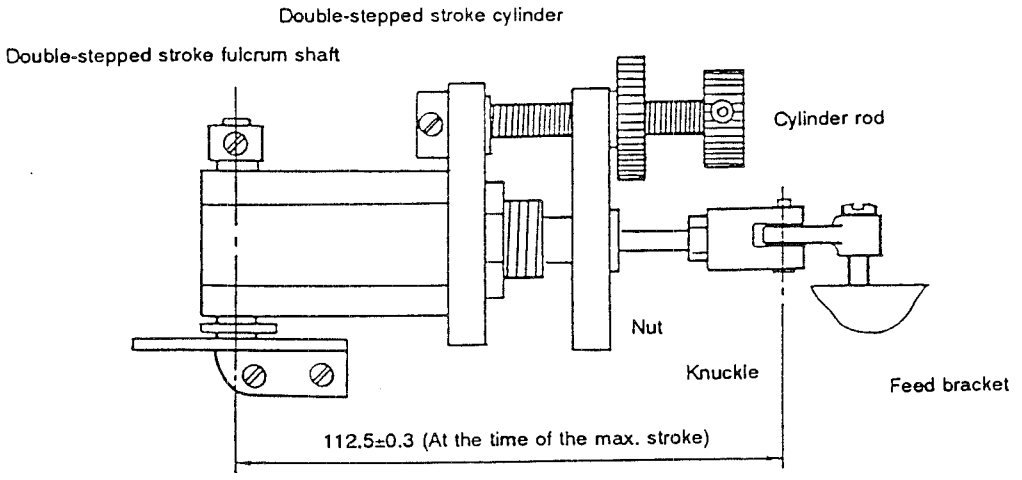


Fig.

[Caution]

If the center-to-center distance is shorter than the specified value, the feeding frame will fail to reach the specified lift of 30 mm.

(3) Assembling the double-stepped stroke feeding frame

Assemble the double-stepped stroke feeding frame referring to Fig.

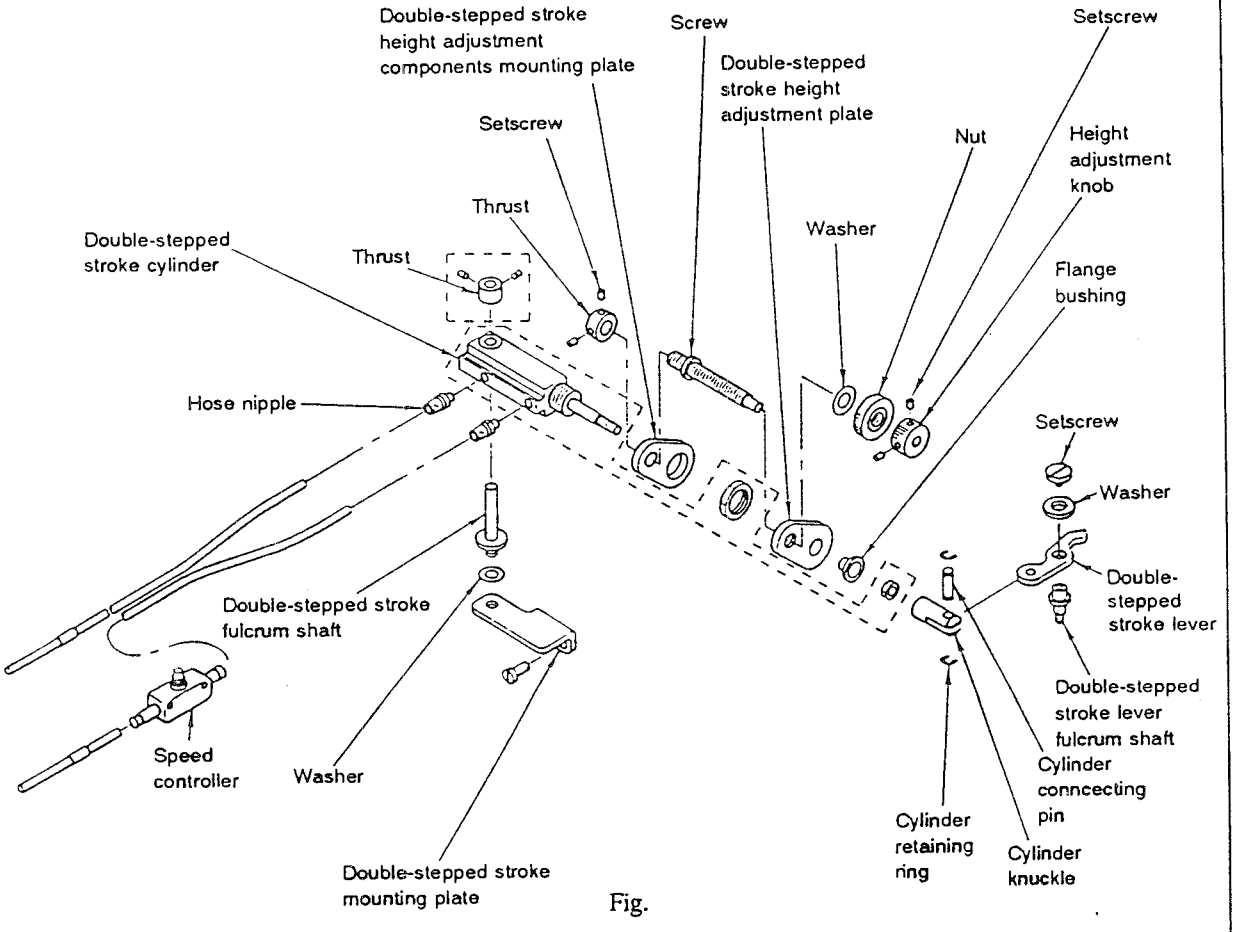


Fig.

(4) Adjusting the pneumatic components

1) When quick-coupling joint ❶ is connected in position and air cock ❺ is opened, pressure gauge ❼ (for intermediate presser) should indicate 5 to 5.5 kgf/cm² and pressure gauge ❾ (for feeding frame) should indicates 3 to 3.5 kgf/cm². (Fig.)
2) If pressure gauge ❼ indicates an operating air pressure lower than 4 kgf/cm², the machine stops while giving error [A] on the display. (Fig.)
3) The air pressure on the feeding frame cylinder on the retracting side has been reduced to 1.5 to 2 kgf/cm². So, it is possible to lower the feeding frame by hand. (Fig.)
4) The needle knob of the speed controller (for the feeding frame cylinder) has been fixed in the state where it is loosened by one revolution after fully tightened. (Fig.)
5) The needle knob of the speed controller (for the intermediate presser cylinder) has been fixed with a nut in the state where it is loosened by a half revolution after fully tightened. (Fig.)

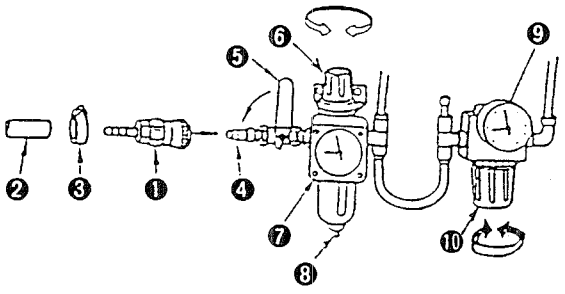
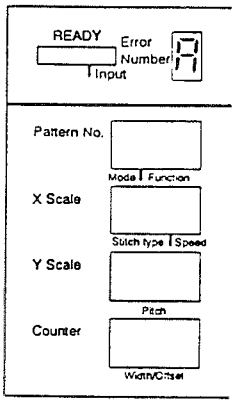
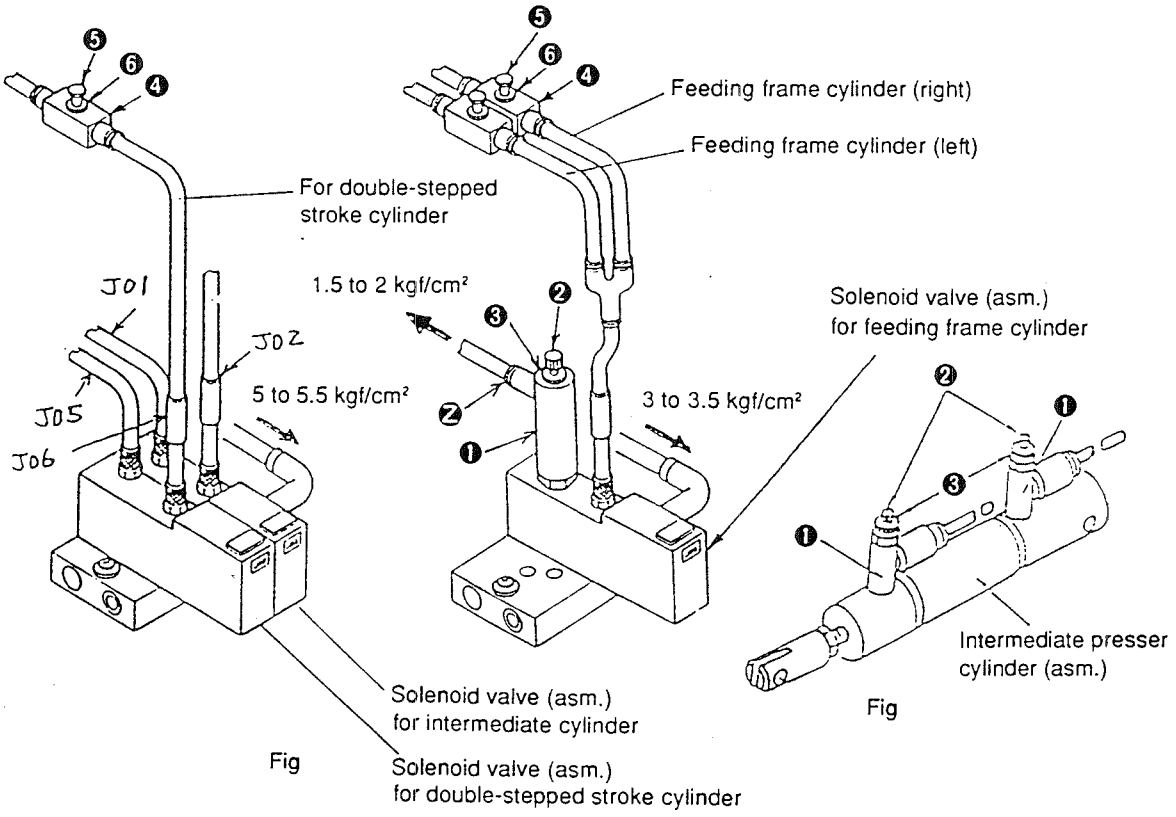


Fig.





Fig

Fig

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Connect air supply hose to quick-coupling joint (female) ❶ and fasten the hose with hose band ❸. 2) Connect female side ❶ and male side ❹ of the quick-coupling joint. 3) Open air cock ❺. Then, pull up air pressure regulating knob ❻ and turn it to adjust so that pressure gauge ❼ indicates 5 to 5.5 kgf/cm². Then, press down the knob so that it is secured. 4) Pull down air pressure regulating knob ❿ and turn it to adjust so that pressure gauge ❾ indicates 3 to 3.5 kgf/cm². Then press up the knob so that it is secured. 5) If the air pressure shown on pressure gauge ❼ is too low, the machine will stop while giving error [A] on the display. * Close air cock ❺ and press button ❽. This will reduce the air pressure to 0 kgf/cm². **[Caution]** **After the adjustment, return the indication on pressure gauge ❼ to 5 to 5.5 kgf/cm² (0.5 MPa to 0.55 MPa). Now confirm that Error [A] is not displayed any longer.** 6) 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.) Depress the feeding frame switch 5 times or more, and turn needle knob ❷ of pressure reducing valve ❶ until the connected pressure gauge indicates 1.5 to 2 kg/cm² (0.15 MPa to 0.2 MPa). Then fix the needle knob using nut ❸. Now, securely connect the removed air hose in place. (Fig.) 7) Referring to the Standard adjustment ( )-4), properly adjust needle knob ❺ of speed controller ❹ and fix the knob with nut ❻. (Fig.) 8) Remove the top cover. Referring to the Standard adjustment ( )-5), adjust needle knob ❷ of speed controller ❶ properly. After the adjustment, fix it using nut ❸. (Fig.)	1) Function failure of the feeding frame components and intermediate presser components may result. The machine stops with Error [A] indicated on the operation box panel. 2) Even if the air pressure drops, it cannot be detected. Under the normal operating air pressure (5 to 5.5 kgf/cm² (0.5 MPa to 0.55 MPa)), the sewing machine stops with Error [A] indicated on the operation panel. 3) An adequate work clamp pressing pressure is not provided. 4) The speed of vertical motion of the feeding frame may be too high or too low. 5) The intermediate presser may fail to move smoothly, or it may generates a keen metallic noise when it is in operation. **[Caution]** **Normally, Satandard adjustment -5) through -6) are not required to be adjusted. Needle knobs and nuts referred in steps 3) through 5), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.** * To set the air pressure to 0 kgf/cm², close air cock ❺ and press button ❽. (See Fig.)

(5) Assembling the double-stepped stroke push plate

1) Assemble the double-stepped stroke feeding frame push plate to Fig.
2) Assemble the nut and the cylinder knuckle so that a 120.5 ± 0.3 mm center-to-center distance is provided between the ø5 mm hole in the work clamp foot cylinder and the ø5 mm hole in the cylinder knuckle. (Fig.)

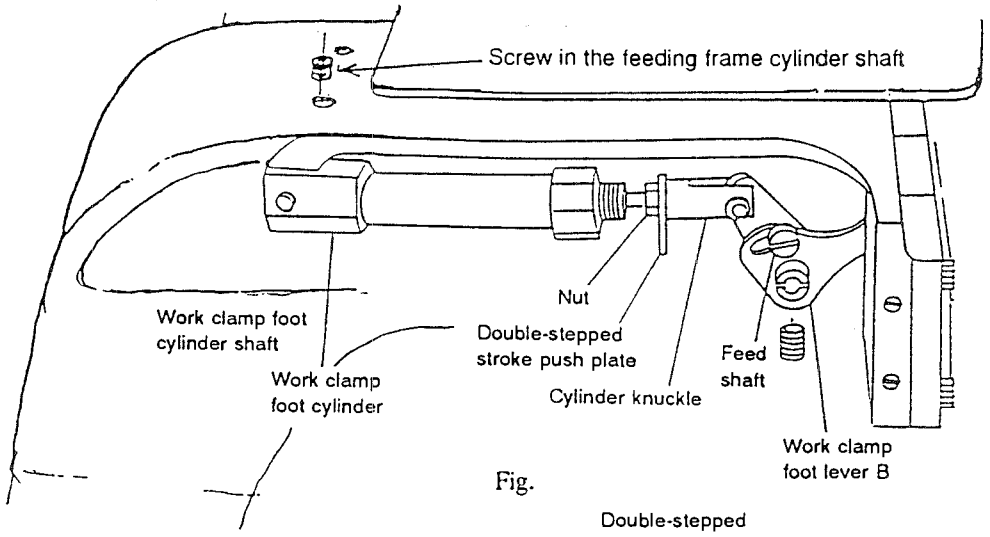


Fig.

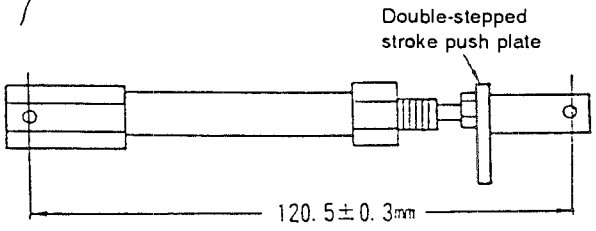
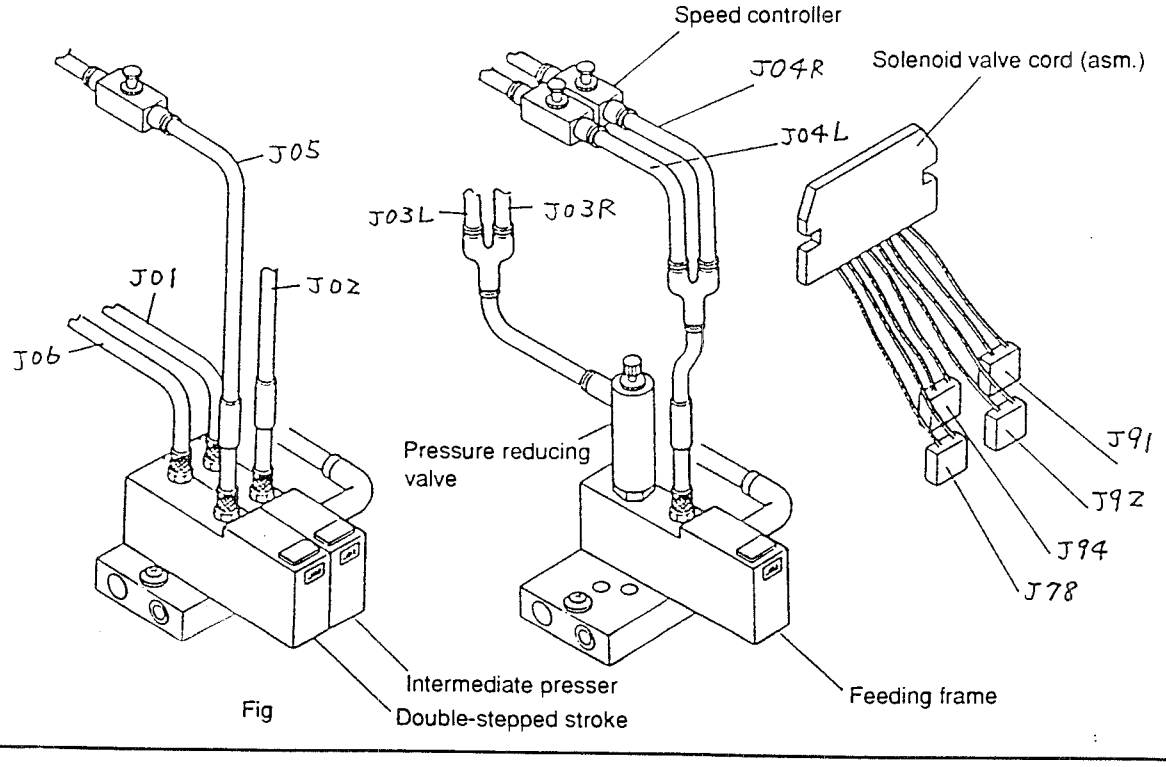


Fig.

(6) Assembling the pneumatic components

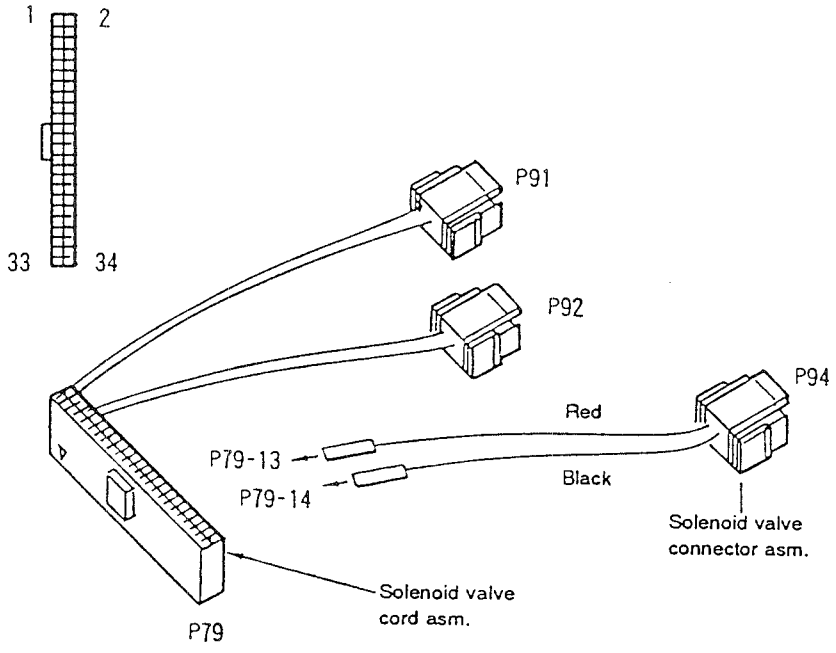
Assemble the pneumatic components according to Fig.



Fig

(7) **Connecting the double-stepped stroke feeding frame cable**

Connect the respective cables of the solenoid valve connector asm. to the connectors of the solenoid valve cord asm. (on page). (See the figure below.)



Fig

5. To change the type of feeding frame from standard to double-stepped stroke feeding frame

• Parts to be deleted

	Name of part	Q'ty	Part No.
1	2-pedal unit	–	M85905130AA
2	Screw in the side face of face plate cover	–	SS8090410TP
3	Sealing screw in the side face of face plate cover	–	SS8110560SP

• Parts to be added

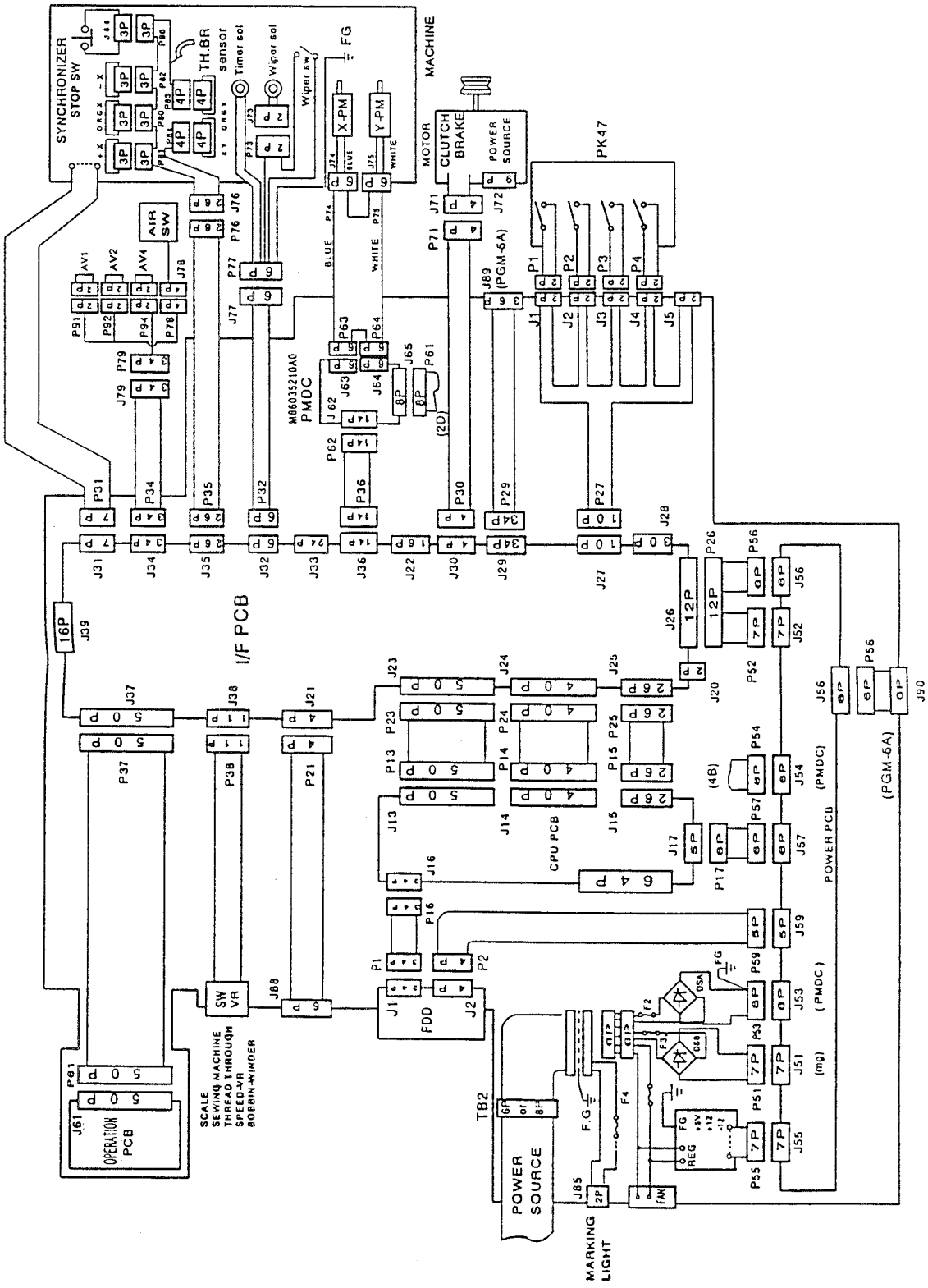
	Name of part	Q'ty	Part No.
1	Double-stepped stroke cylinder knuckle	1	B1625220000
2	Connecting pin of double-stepped stroke cylinder knuckle	1	B1626220000
3	Double-stepped stroke lever spacer	1	B185351200E
4	Height adjusting knob	1	B2304205000
5	Double-stepped stroke installing plate	1	B2514215000
6	Double-stepped stroke lever	1	B2516215000
7	Double-stepped stroke height adjusting plate	1	B2518215A00
8	Bracket of double-stepped stroke adjusting screw	1	B25128215000
9	Double-stepped stroke height adjusting screw	1	B2527215000
10	Double-stepped stroke fulcrum shaft	1	B2528215000
11	Double-stepped stroke presser plate	1	B2530215000
12	Flange bush	1	B2548215000
13	Thrust collar of double-stepped stroke fulcrum shaft	1	B25792290A0
14	Double-stepped stroke lever fulcrum shaft	1	B3012490000
15	Height adjusting plate stopper	1	B3012816000
16	Air tube label J05	2	B471122000E
17	Air tube label J06	1	B471122000F
18	Thrust collar of height adjusting screw	1	CS0790731SH
19	Double-stepped stroke cylinder	1	PA16025100A0
20	Hose nipple	2	PJ032052503
21	Snap ring of double-stepped stroke cylinder connecting pin	2	RE0300000K0
22	Screw of double-stepped stroke lever	1	SS6110520TP
23	Screw of double-stepped stroke installing plate	2	SS6121010SP
24	Screw of height adjusting knob	2	SS8110422TP
25	Screw of thrust collar of height adjusting screw	2	SS8110422TP
26	Washer of double-stepped stroke fulcrum shaft	1	WP0650876SD
27	Washer of stopper of height adjusting screw	1	WP0820816SD
28	Solenoid valve connector asm.	1	B47122150A0
29	Solenoid valve A	1	PV140501000
30	PK-47 3-pedal unit	1	GPK470010AB

• Parts of which quantity is to be changed

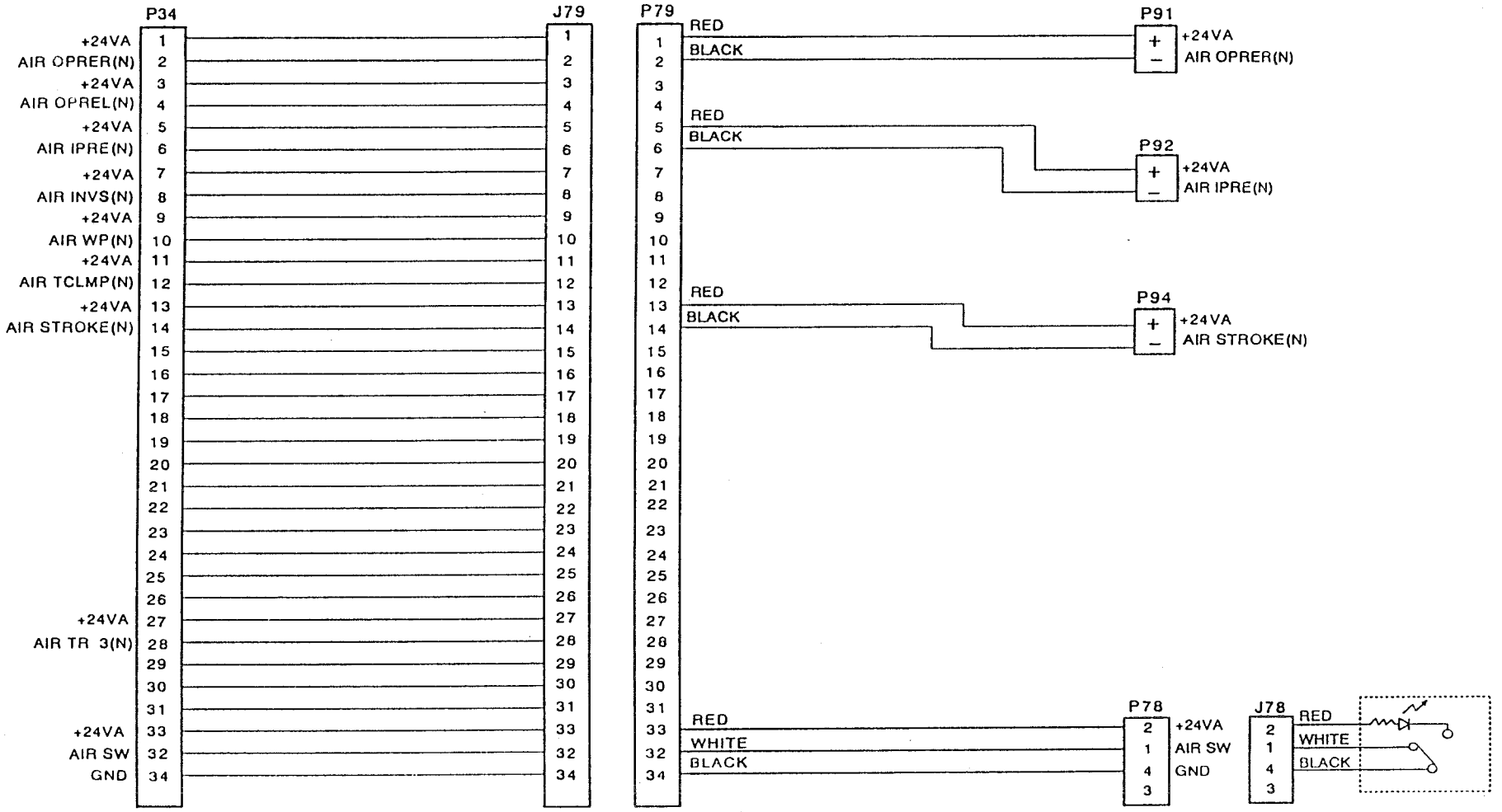
	Name of part	Q'ty	Part No.
1	Air tube A	5 m to 8 m	BT0400251EB
2	Speed controller	2 to 3	PC012401000
3	Hose nipple	3 to 5	PJ032052503

6. MATERIALS

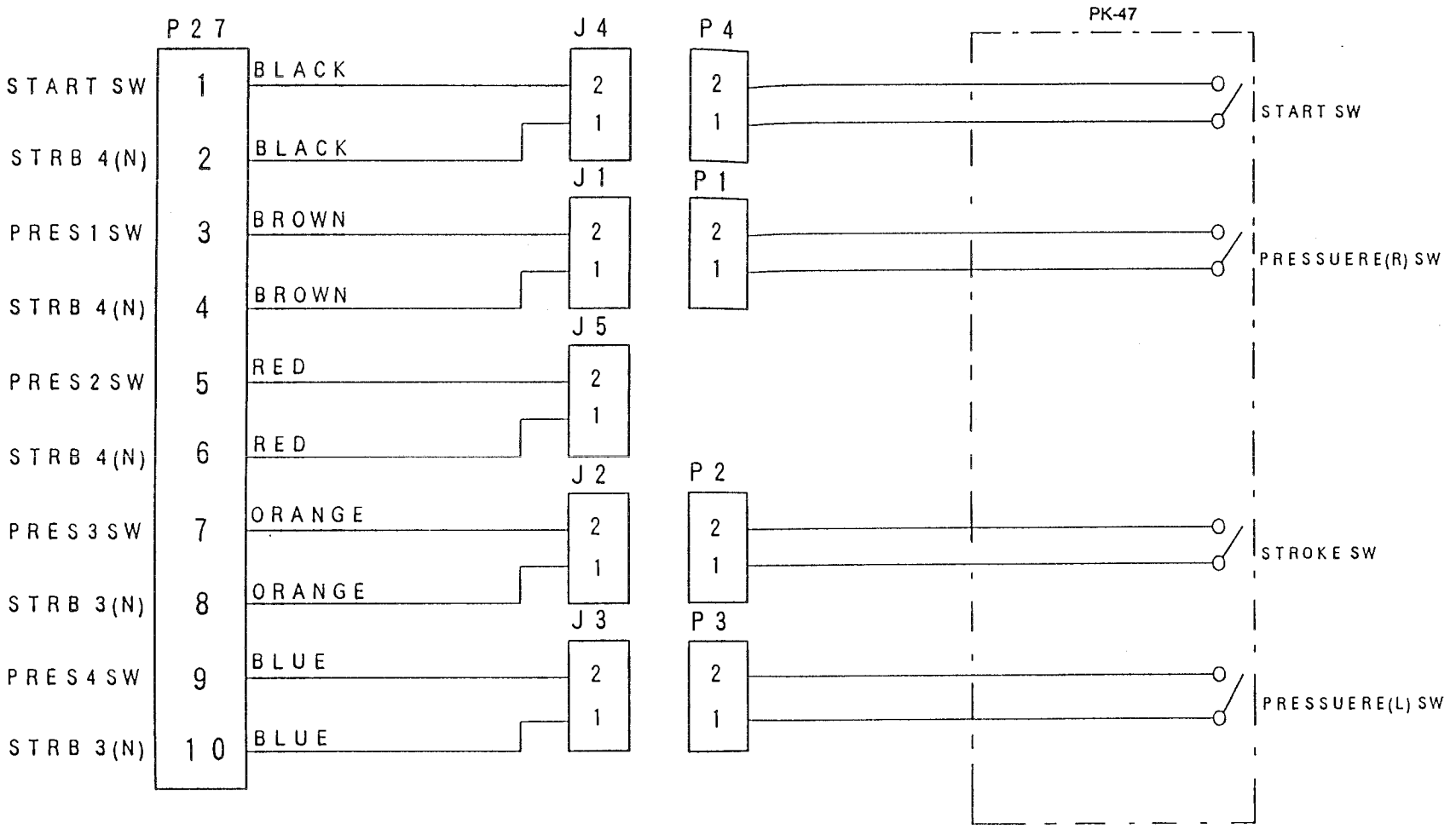
6-1. Block diagram for the AMS-223CSB, -223CHB and -223CGB



6-2. Air valve schematic diagram for the AMS-223CSB, -223CHB and -223CGB



6-3. Pedal switch schematic diagram



CHAPTER 3
COMPUTER-CONTROLLED CYCLE MACHINE WITH A DOUBLE-STEPPED FEEDING (L TYPE)

AMS-223CSL
(for light-weight materials)
AMS-223CHL
(for medium-weight materials)
AMS-223CGL
(for heavy-weight materials)

[Note]
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) Separately-driven feeding frame is adopted.
   The machine incorporates a separately-driven feeding frame that promises easier setting of sewing product on the machine.
2) The machine is equipped with a double-stepped feeding frame. In addition, the left- and right-hand side feeding frames can be simultaneously raised/lowered by changing over the setting of the DIP switch.
3) The lift of the left- and right-hand side feeding frames can be specified separately.
   Lifting amount of the right- and left-hand side pieces of the feeding frame can be separately specified in accordance with the contour of the sewing product.
4) The machines provided with a double-stepped stroke feeding frame device.
   The feeding frame (left) can be raised/lowered in two stages. This ensures accurate positioning of the sewing product on the machine.

(Caution)
For other features, the machine is same as the AMS- 223C.

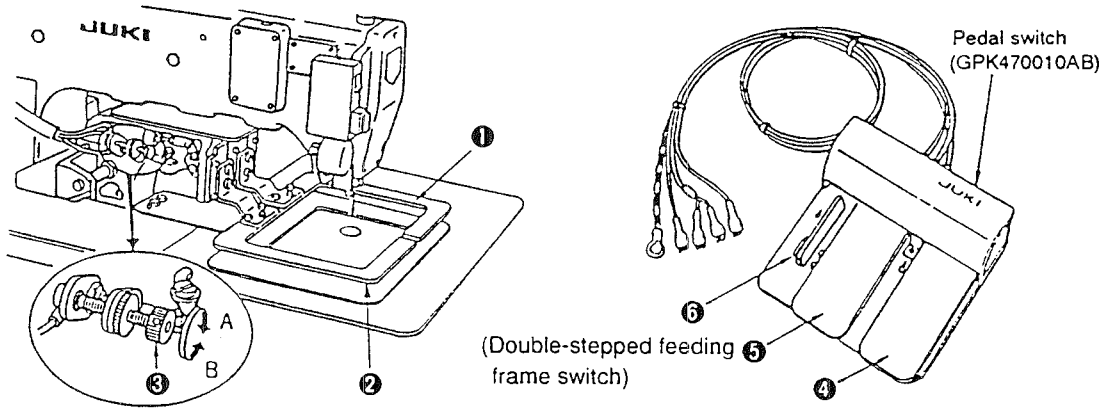
2. SPECIFICATIONS AND SPECIFIED VALUE

1)	Lift of feeding frame (right)	Standard 25 mm Max. 30 mm
2)	Performance of the feeding frame	Right- and left-side pieces of the feeding frame are capable of rising/lowering. (The left-hand side piece of the feeding frame is provided with double-stepped stroke function.)

(Caution)
For the other specifications, the machine is same as the AMS-223C.

3. OPERATION OF THE SEWING MACHINE

3-1. Configuration



❶ **Feeding frame (right)**
It is lowered by operating the pedal switch.

❷ **Feeding frame (left)**
It is lowered in the double-stepped actions by operating the pedal switch.

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 to the intermediate stop position and between the intermediate stop position and the lowest position of its stroke.

❻ **Start switch**
It 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.

4. ADJUSTMENTS

4-1. Adjusting the mechanical components

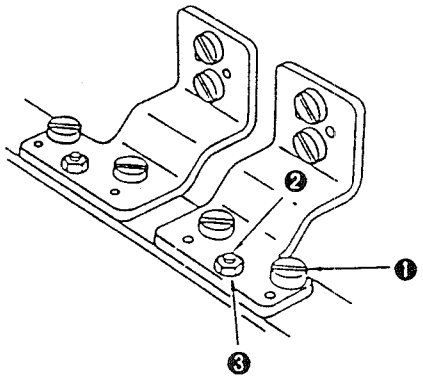
STANDARD ADJUSTMENTS

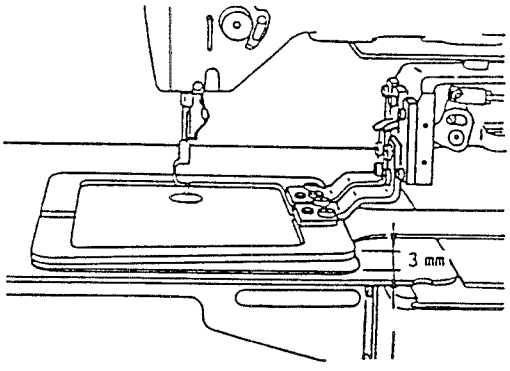
(1) Adjusting the degree of angle of the feeding frames (right) and (left)

1) Loosen screw ❶ and nut ❸. Turning adjustment screw ❷ clockwise will lower the front side of the feeding frame.
2) After the adjustment, securely tighten screw ❶ and nut ❸.

[Caution]

1. As reference of the adjustment, the rear end of the feeding frame should be approximately 3 mm above the throat plate surface when the front end of the feeding frame meets the throat plate surface.
2. The degree of angle adjusting mechanism is provided for the feeding frames (right) and (left) respectively.
3. If the feeding frame is not sufficiently tilted, the work pressing force at the front side of the feeding frame may drop.
4. If the feeding frame is excessively tilted, trouble may result such as the feeding frame fails to go up.





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

Refer to the description given in "(1) Adjusting the initial position of the intermediate stop cylinder" (page) of the Engineer's manual for the AMS-223CSB, AMS-223CHB and AMS-223CGB.

(3) Connecting the pneumatic components

The schematic diagram of the pneumatic components is as follows:

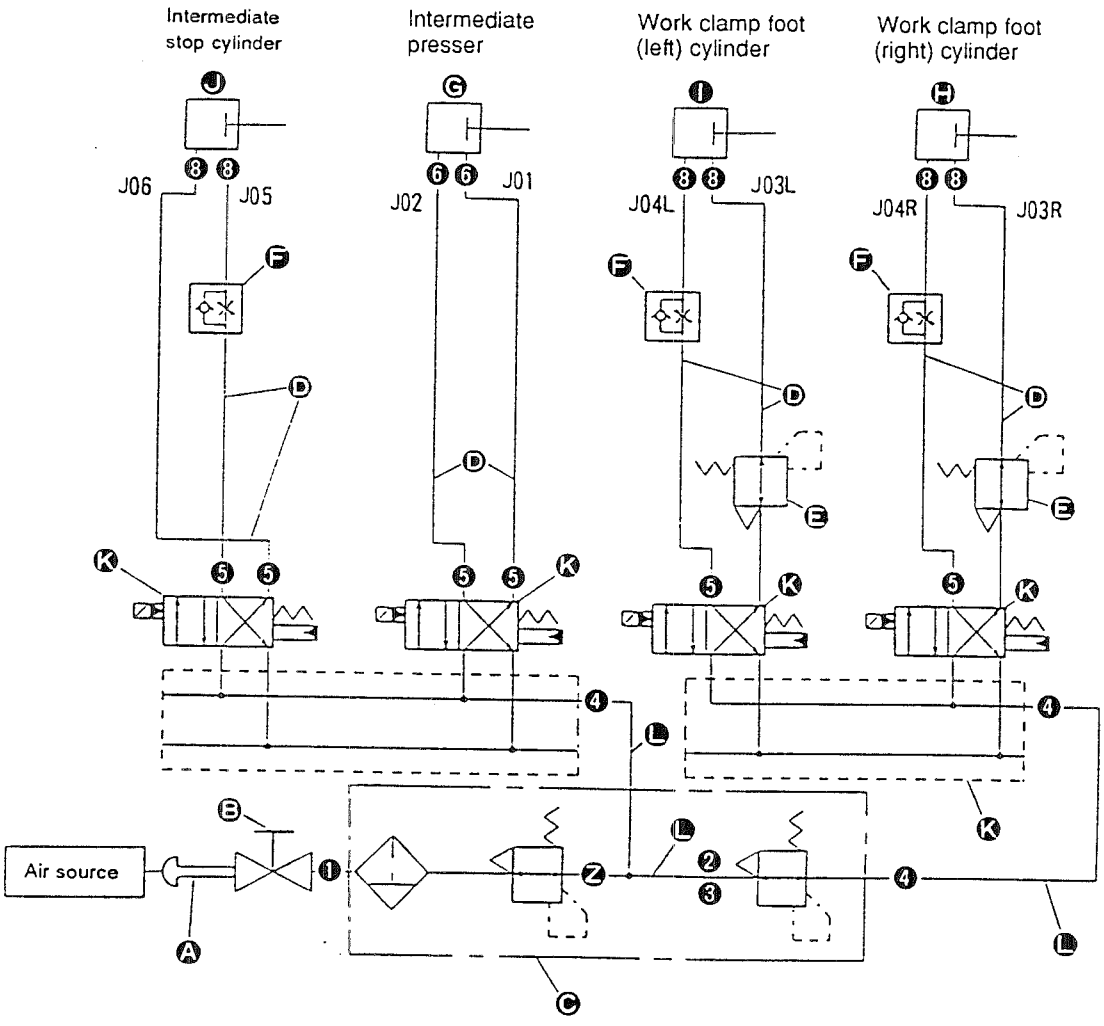


Fig. 4-5-1

Ⓐ	Quick-coupling joint socket
	Quick-coupling joint plug
Ⓑ	Air cock
Ⓒ	Filter regulator
Ⓓ	ϕ4 air tube
Ⓔ	Pressure reducing valve
Ⓕ	Speed controller (A)
Ⓖ	Intermediate presser cylinder
Ⓗ	Work clamp foot cylinder (right)
❶	Work clamp foot cylinder (left)
❾	Intermediate stop cylinder

Ⓚ	Solenoid valve (asm.)
	Manifold
	Solenoid valve
Ⓛ	ϕ6 air tube
❶	Barrel nipple
❷	T-cheese
❸	Plug
❹	Elbow union (B)
❺	Hose nipple
❻	Speed controller (B)
❽	Hose elbow

[Caution]

If the components are not correctly connected, feeding frame components and intermediate presser components will malfunction to cause the machine to fail and the related components to be damaged.

(4) Adjusting the pneumatic components

1) When quick-coupling joint ❶ is connected in position and air cock ❺ is opened, pressure gauge ❼ (for intermediate presser) should indicate 5 to 5.5 kgf/cm² and pressure gauge ❾ (for feeding frame) should indicates 3 to 3.5 kgf/cm². (Fig.)
2) If pressure gauge ❼ indicates an operating air pressure lower than 4 kgf/cm², the machine stops while giving error [A] on the display. (Fig.)
3) The air pressure on the feeding frame cylinder on the retracting side has ben reduced to 1.5 to 2 kgf/cm². So, it is possible to lower the feeding frame by hand. (Fig.)
4) The needle knob of the speed controller (for the feeding frame cylinder) has been fixed in the state where it is loosened by one revolution after fully tightened. (Fig.)
5) The needle knob of the speed controller (for the intermediate presser cylinder) has been fixed with a nut in the state where it is loosened by a half revolution after fully tightened. (Fig.)

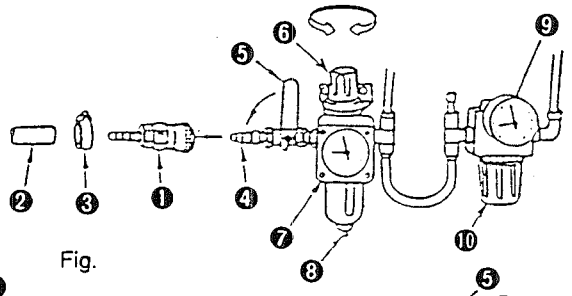
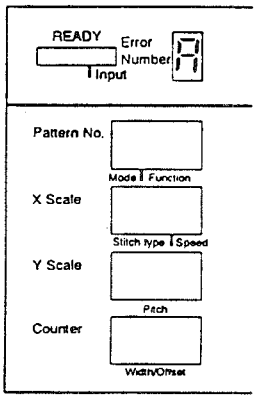


Fig.



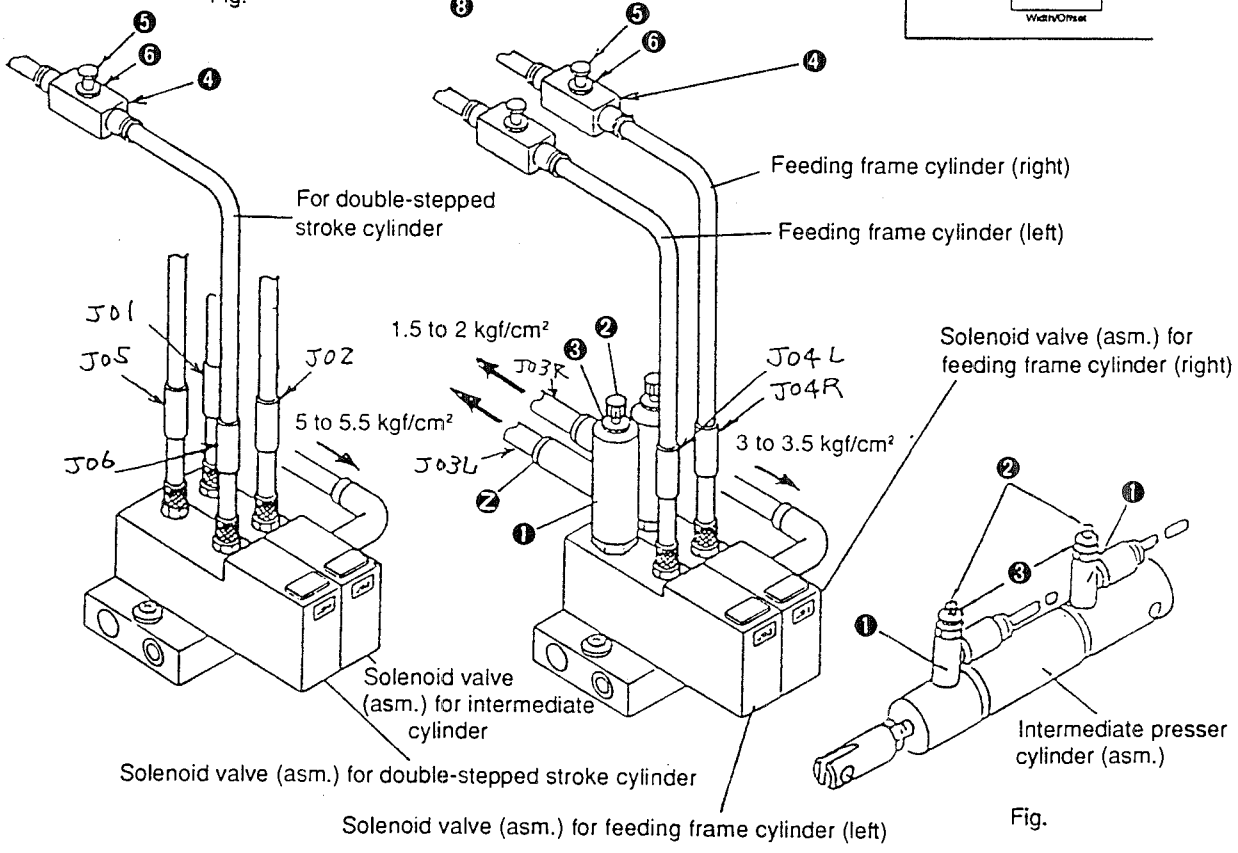


Fig.

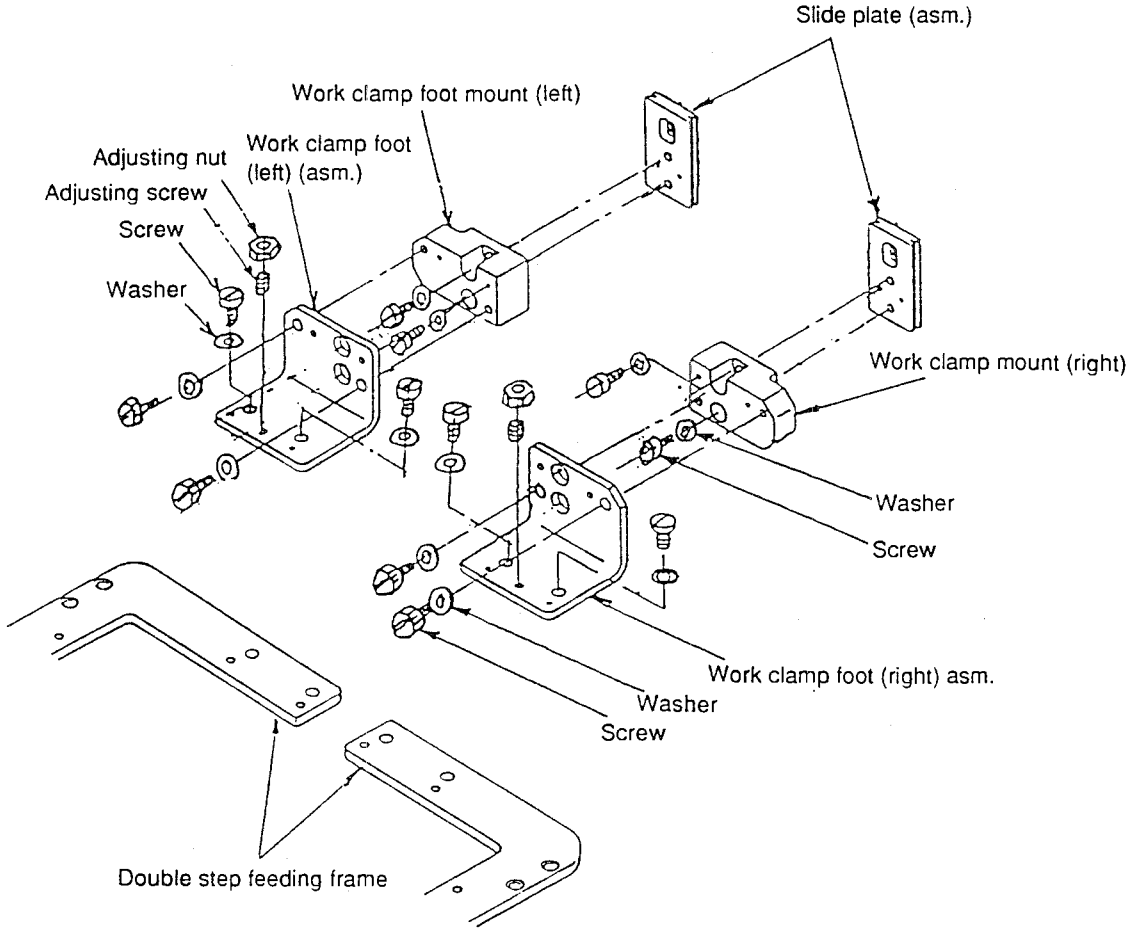
Fig.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Connect air supply hose to quick-coupling joint (female) ❶ and fasten the hose with hose band ❸. 2) Connect female side ❶ and male side ❹ of the quick-coupling joint. 3) Open air cock ❺. Then, pull up air pressure regulating knob ❻ and turn it to adjust so that pressure gauge ❼ indicates ❺ to 5.5 kgf/cm². Then, press down the knob so that it is securedd. 4) Pull down air pressure regulating knob ❿ and turn it to adjust so that pressure regulating knob ❿ and turn it to adjust so that pressure gauge ❾ indicaes 3 to 3.5 kgf/cm². Then press up the nob so that it is secured. 5) If the air pressure shown on pressure gauge ❼ is too low, the machine will stop while giving error [A] on the display. * Close air coke ❺ and press button ❽. This will reduce the air pressure to 0 kgf/cm². **[Caution]** **After the adjustment, return the indication on pressure gauge ❼ to 5 to 5.5 kgf/² (0.5 Mpa to 0.55 Mpa). Now confirm that Error [A] is not displayed any longer.** 6) 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.) Depress the feeding frame switch 5 times or more, and turn needle knob ❷ of pressure reducing valve ❶ until the connected pressure gauge indicates 1.5 to 2 kg/cm² (0.15 MPa to 0.2 MPa). Then fix the needle knob using nut ❸, and remove the pressure gauge. Now, securely connect the removed air hose in place. 7) Referring to the Standard adjustment ( )-4), properly adjust needle knob ❺ of speed controller ❹ and fix the knob with nut ❻. (Fig.) 8) Remove the top cover. Referring to the Standard adjustment ( )-5), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig.)	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. 2) An adequate work pressing pressure is not provided. 3) The speed of vertical motion of the feeding frame may be too high or too low. 4) The intermediate presser may fail to move smoothly, or it may generates a keen metallic noise when it is in operation. **[Caution]** **Normally, Standard adjustments-2) through -5) are not required to be adjusted. Needle knobs and nuts referred in steps 5) through 6), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.** * To set the air pressure to 0 kgf/cm², close air cock ❺ and press button ❽. (See Fig.)

(5) **Installing the pedal switch (PK47)**
Refer to "(5) Installing the pedal switch (PK47)" for the AMS-223CSB and -223CHB (on page).

(6) **Removing the slide plate bearing and work clamp slide plate**
Refer to page .

(7) **Assembling the presser plate components**
1) Assemble the presser plate components referring to Fig

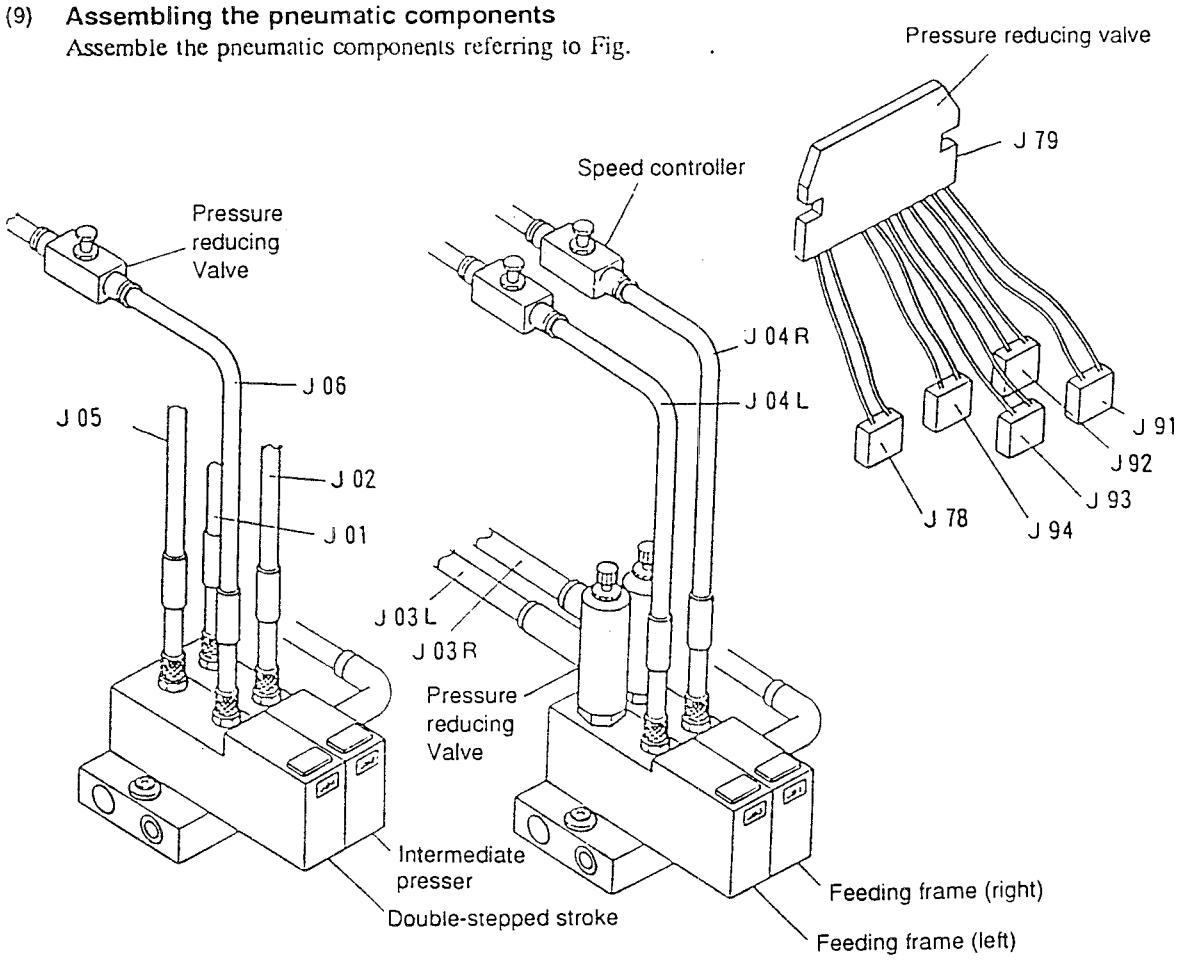


[Caution]
1) When tightening/loosening the feeding frame adjusting screw, be sure to loosen first the nut of the feeding frame adjusting screw.
2) After the assembly, ascertain that the feeding frame is in parallel to the top surface of the throat plate (or the outer side is slightly lowered) in terms of the lateral direction.

(8) **Assembling the double-stepped stroke feeding frame**
Refer to the description given in "( ) Assembling the double-stepped stroke feeding frame" (page) of the Engineer's manual for the AMS-223CSB and AMS-223CHB.

(9) **Assembling the pneumatic components**

Assemble the pneumatic components referring to Fig.



(10) **Connecting the solenoid valve connectors asm.**

Connect the respective cables of the solenoid valve connector asm. and solenoid valve connector A asm. to the connectors (P) of the solenoid valve cord asm. (See the figure below.)

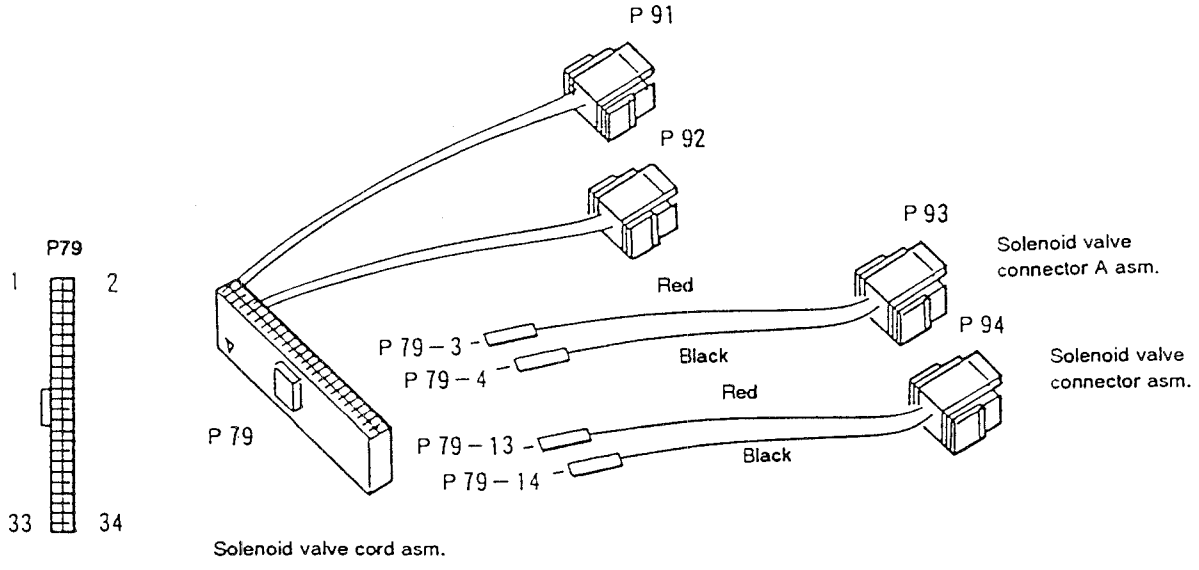


Fig.

5. To change the type of feeding frame from standard to separately- driven feeding frame

• Parts to be deleted

	Name of part	Q'ty	Part No.
1	Feeding frame	–	B2553223C00
2	Plastic blank presser	–	B2558220000
3	Screw of plastic blank presser	–	SS7110510SP
4	Washer of plastic blank presser	–	WP0450801SD
5	ø4 air tube J03	–	BT0400251EB
6	ø4 air tube J04	–	BT0400251EB
7	Y joint	–	PJ308040002
8	2-pedal unit asm.	–	M85905130A0

• Parts to be added

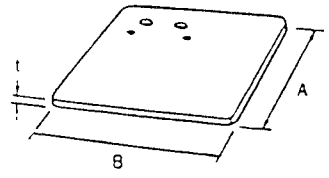
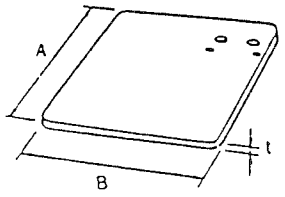
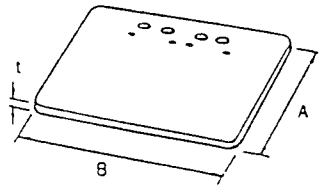
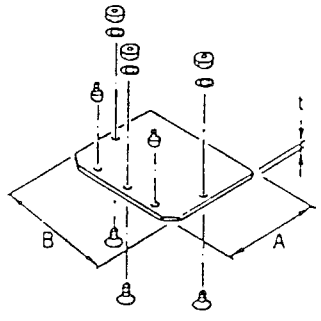
	Name of part	Q'ty	Part No.
1	Double-stepped stroke cylinder knuckle	1	B1625220000
2	Connecting pin of double-stepped stroke cylinder knuckle	1	B1626220000
3	Double-stepped stroke lever spacer	1	B185351200E
4	Height adjusting knob	1	B2304205000
5	Double-stepped stroke installing plate	1	B2514215000
6	Double-stepped stroke lever	1	B2516215000
7	Double-stepped stroke height adjusting plate	1	B2518215A00
8	Bracket of double-stepped stroke adjusting screw	1	B2518215000
9	Double-stepped stroke height adjusting screw	1	B2527215000
10	Double-stepped stroke fulcrum shaft	1	B2528215000
11	Double-stepped stroke presser plate	1	B2530215000
12	Flange bush	1	B2548215000
13	Thrust collar of double-stepped stroke fulcrum shaft	1	B25792290A0
14	Feeding frame for separately driven feeding frame	2	B2606223C00
15	Double-stepped stroke lever fulcrum shaft	1	B3012490000
16	Height adjusting plate stopper	1	B3012816000
17	Air tube label J05	2	B471122000E
18	Air tube label J06	1	B471122000F
19	Thrust collar of height adjusting screw	1	CS0790731SH
20	Double-stepped stroke cylinder	1	PA1602510A0
21	Hose nipple	2	PJ032052503
22	Snap ring of double-stepped stroke cylinder connecting pin	2	RE0300000K0
23	Screw of double-stepped stroke lever	1	SS6110520TP
24	Screw of double-stepped stroke installing plate	2	SS6121010SP

	Name of part	Q'ty	Part No.
25	Screw of height adjusting knob	2	SS8110422TP
26	Screw of thrust collar of height adjusting screw	2	SS8110422TP
27	Washer of double-stepped stroke fulcrum shaft	1	WP0650876SD
28	Washer of stopper of height adjusting screw	1	WP0820816SD
29	Solenoid valve connector A asm.	1	B4712215AA0
30	Solenoid valve connector asm.	1	B47122150A0
31	Solenoid valve A	2	PV140501000

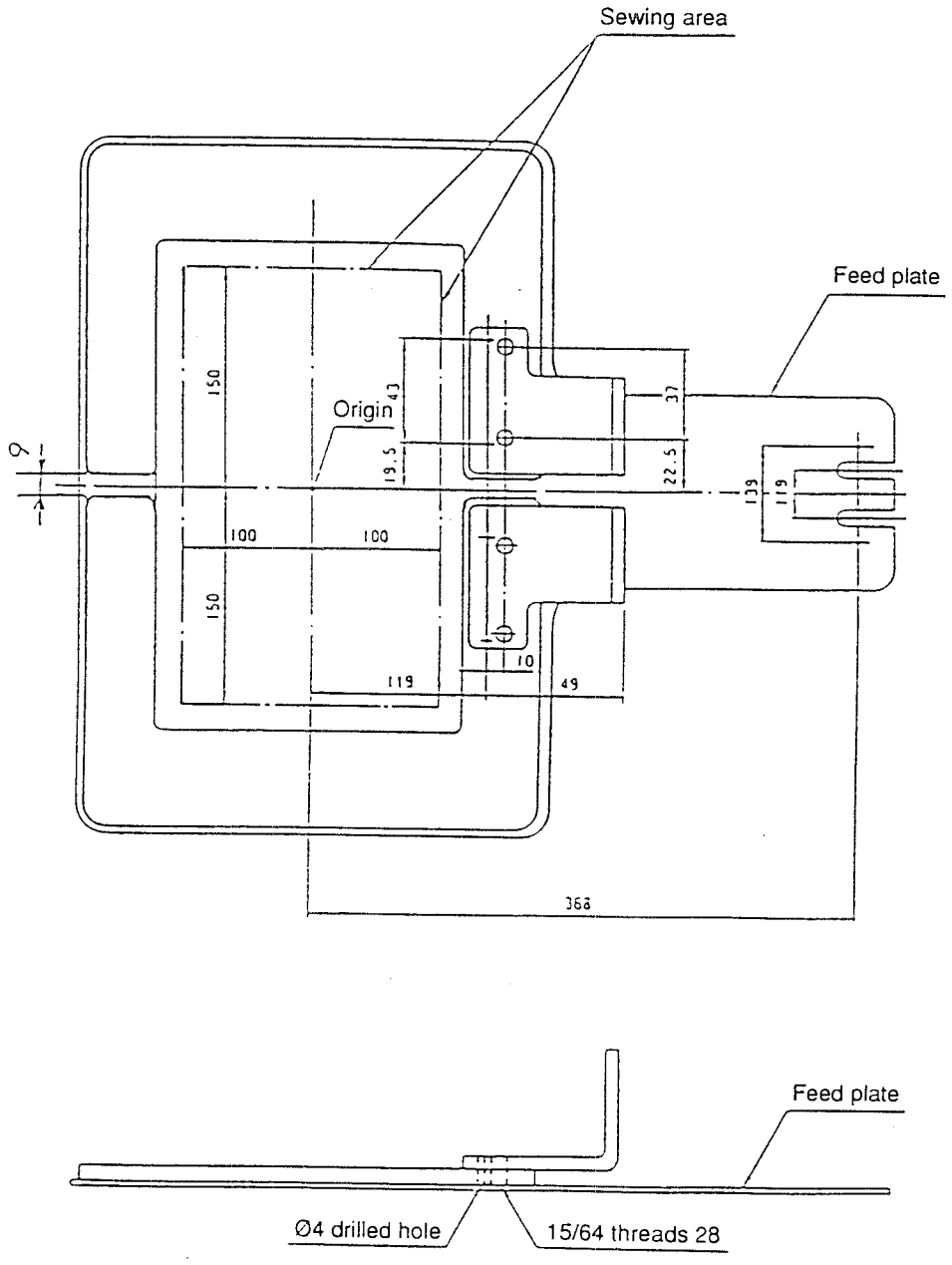
• Parts of which quantity is to be changed

	Name of part	Q'ty	Part No.
1	Air tube A	8 m	BT0400251EB
2	Speed controller	3	PC012401000
3	Pressure reducing valve	2	PF070501000
4	Hose nipple	6	PJ032052503

6. OPTIONS

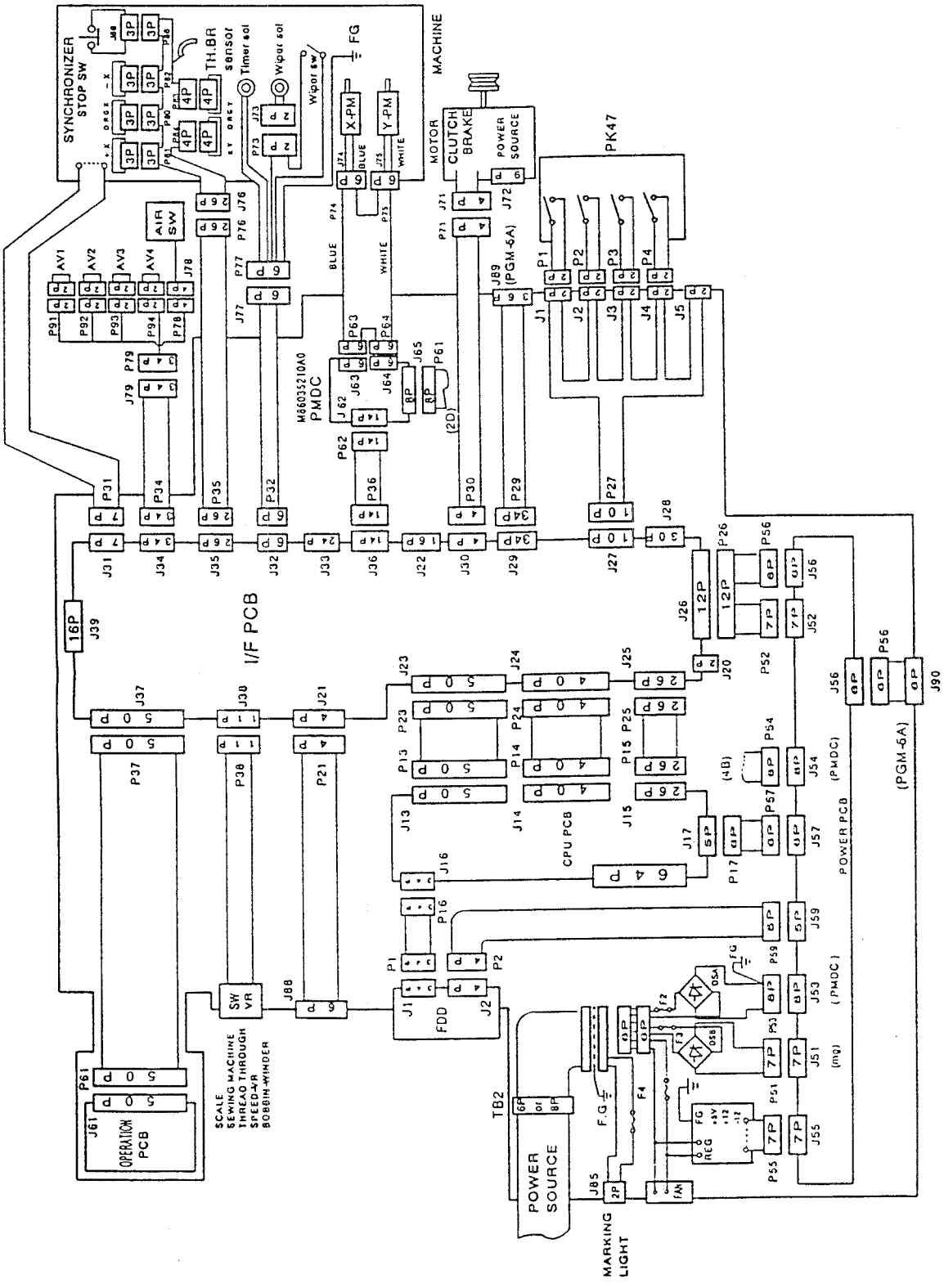
Name of part	Type	Part No.	Size (mm)
1. Machinable feeding frame			
	Feeding frame (right) blank with knurl	B2622215000	193×135×4
	Double-stepped feeding frame blank without knurl (Common to left and right)	B2626215000	193×135×4
	Feeding frame (left) blank with knurl	B2623215000	A×B×t 193×135×4
	Separate type work clamp blank with knurl	B2620215000	A×B×t 193×279×4
	Separate type work clamp blank without knurl	B2621215000	193×279×4
	Separate type plastic feeding frame blank (Common to left and right)	B2618215000	A×B×t 135×190×3
	Screw	SS7090410SP	
	Screw	SS2111010TP	
	Washer	WP0450000SD	
	Nut	B1626850000	

7. DIMENSIONS OF THE FEEDING FRAME

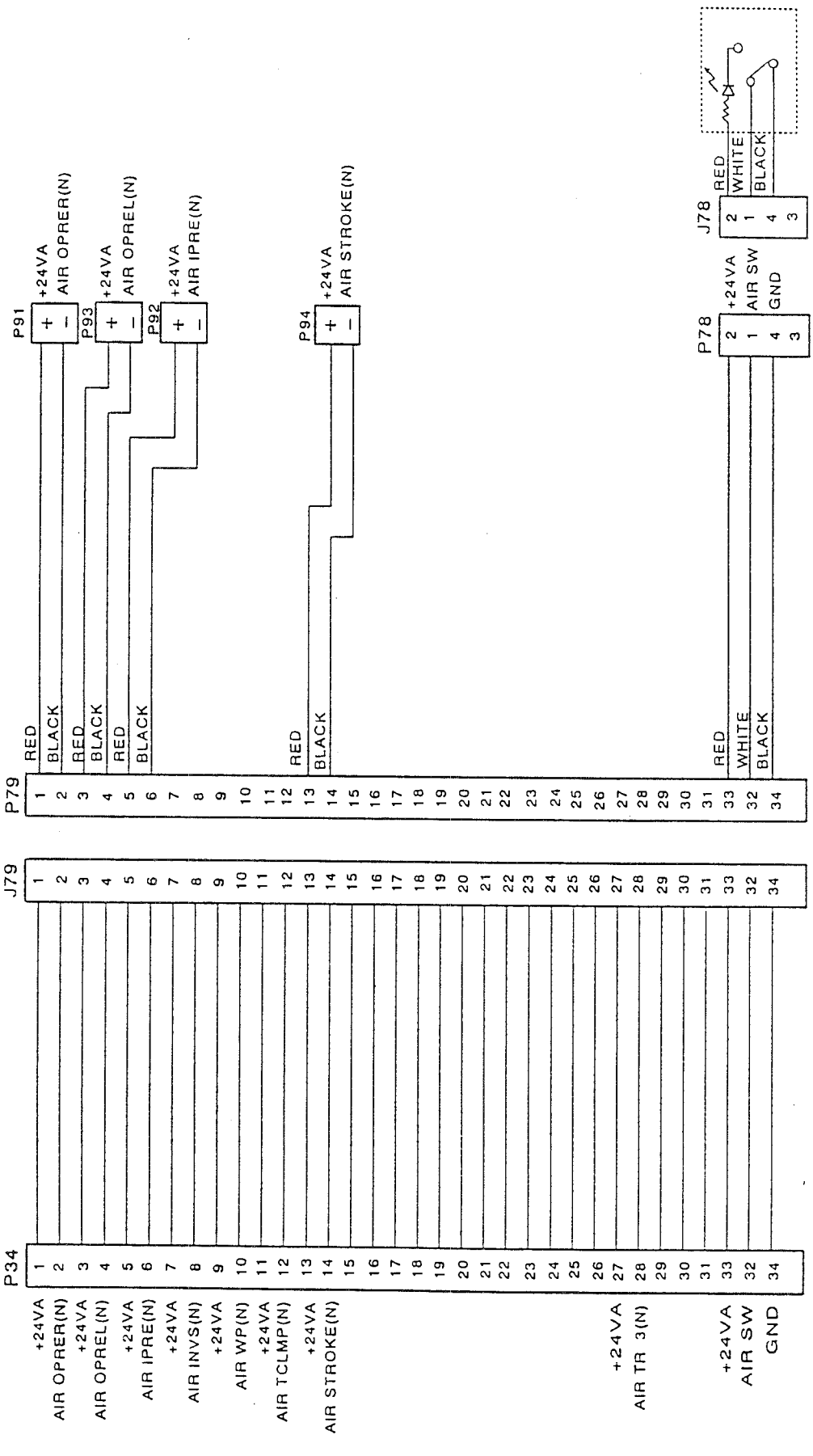


8. MATERIALS

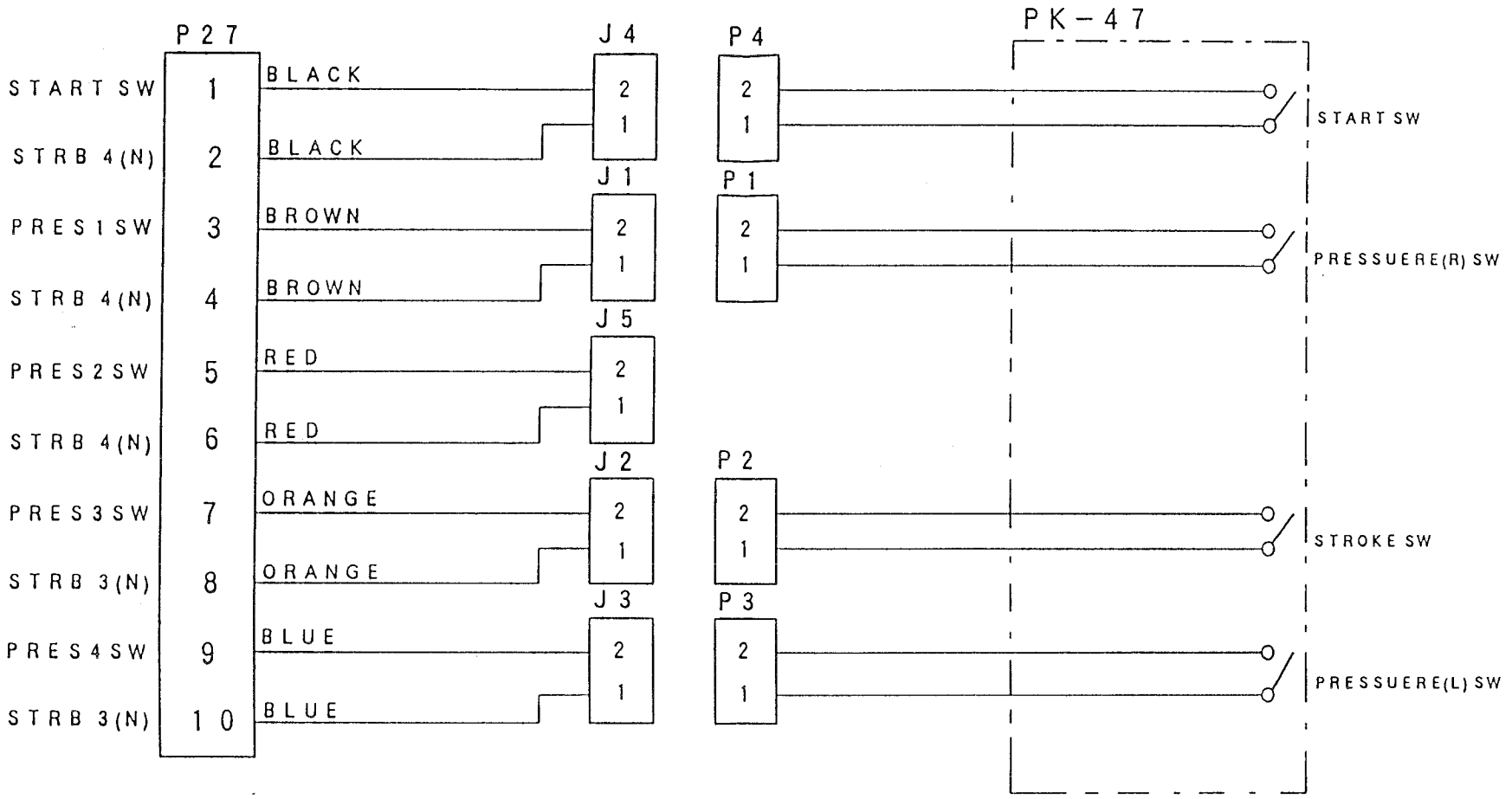
8-1. Block diagram for the AMS-223CSL, -223CHL and -223CGL



8-2. Air valve schematic diagram for the AMS-223CSL, -223CHL and -223CGL



8-3. Pedal switch schematic diagram



CHAPTER 4
COMPUTER-CONTROLLED CYCLE MACHINE WITH INVERTING PRESSER (T TYPE)

AMS-223CST
(for light-weight materials)
AMS-223CHT
(for medium-weight materials)

[Note]
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) Separately-driven feeding frame system is introduced.
   The machine comes with a separately-driven feeding frame ystem that promises easy setting of sewing product on the machine. The feeding frame and the inverting intermediate presser can be separately raised/lowered.
   The feeding frame can be used as a separately-driven feeding frame. In addition, the feeding frame and inverting intermediate presser can also be raised/lowered simultaneously by changing the memory switch correspondingly.
2) Lift of the feeding frame and intermediate presser can be separately adjusted.
   Lifting amount of the feeding frame and that of the intermediate presser can be separately specified in accordance with the contour of the sewing product.
3) Inclination angle of the inverting intermediate presser can be adjusted.
   To uniformly clamp the sewing product even at the corners, the inverting intermediate presser is equipped with the inclination angle adjusting mechanism.
4) Double-stepped stroke feeding frame device is equipped for the machine.
   The inverting intermediate presser can be raised/lowered in two stages, thereby accurately positioning the label to be sewn.
5) Separately-driven feeding frame can be modified to the standard feeding frame.
   If the inverting unit is removed and the standard feeding frame is used, the sewing area can be enlarged as wide as 300 mm in X direction and 200 mm in Y direction.

(Caution)

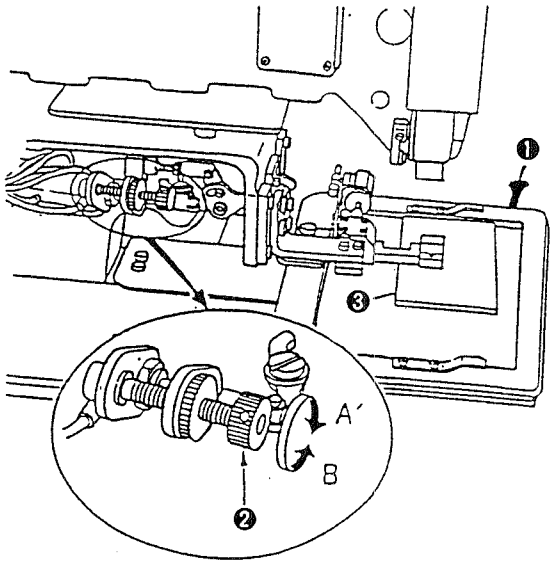
For other features, the machine is same as the AMS- 223C.

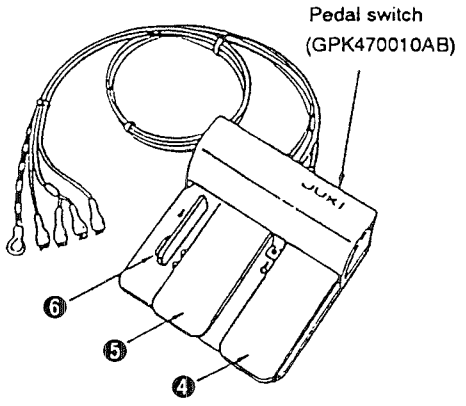
2. SPECIFICATIONS AND SPECIFIED VALUES

1)	Sewing area:	Max. X (lateral) direction 180 mm Y (longitudinal) direction 110 mm Min. X (lateral) direction 46 mm Y (longitudinal) direction 42 mm [When the inverting intermediate presser mounting base, that is optionally available, is used: Min. X direction 38 mm. Y direction 34 mm]
2)	Needle:	DP×17, exclusive for the AMS-223CST/-223CHT
3)	Lift of inverting feeding frame: Lift of inverting intermediate presser:	Standard 25 mm, Max. 30 mm Standard 25 mm, Max. 30 mm
4)	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.
5)	Inverting crank control method:	Air driven. Left/right inverting method

3. OPERATION

3-1. Configuration





❶ **Feeding frame**
It comes down by operating the pedal switch.

❷ **Height adjusting knob**
It is used to adjust the height of the inverting intermediate presser when it is stopped at its intermediate stop position.

❸ Inverting intermediate presser

❹ **Inverting intermediate presser and intermediate position stop switch**
It is operated in the double-stepped actions. It is used to lower/lift the inverting intermediate presser between the highest position to the intermediate stop position and between the intermediate stop position and the lowest position of its stroke.

❺ Inverting intermediate presser and intermediate stop witch

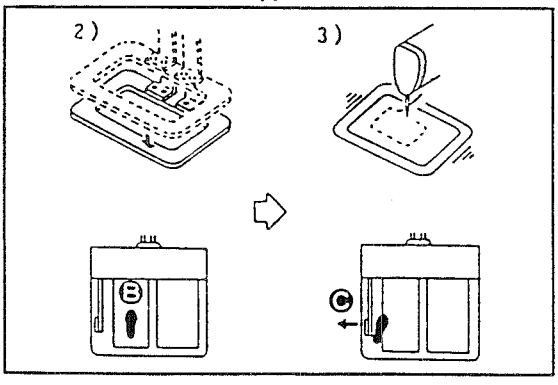
❻ **Start switch**
It is switch to command the sewing machine how to sew the material. The machine sews the material according to the data stored in the micro floppy disk.

3-2. Explanation of operation panel

Name of switch	Function
X Scale (review) 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 feeding frame. 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. 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.
7 8 9 4 5 (Enter) 6 1 2 3 0 (Cancel) Set Ready (Test)	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.

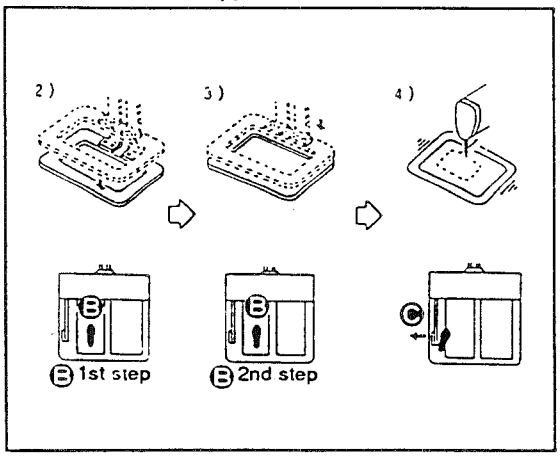
Sewing with the inverting intermediate presser removed

① When the double-stepped stroke function is not used



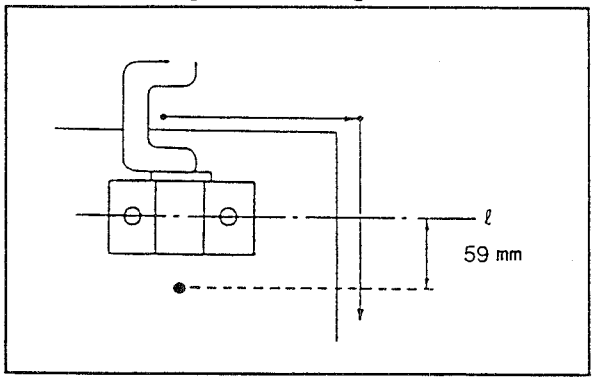
1) Remove the inverting unit and install the monolithic feeding frame
2) Set item 1 of function No. 43 of the memory switch to "0."
3) Place the sewing product on the machine and depress pedal Ⓑ of the pedal switch, and the feeding frame will come down. Depress pedal Ⓑ again, and the feeding frame will go up.
4) Depress pedal Ⓒ when the feeding frame rests in the lowest position of its stroke, and the sewing machine will start sewing.

② When double-stepped stroke function is used



1) Set item 1 of function No. 43 of the memory switch to "1."
2) Place the sewing product under the feeding frame and slightly depress pedal Ⓑ of the pedal switch, and the feeding frame will stop when the intermediate position of the pedal is reached. Release the pedal, and the feeding frame will return to the home position.
3) Accurately position the sewing product and further depress pedal Ⓑ, and the feeding frame comes down to the lowest position of its stroke and secures the sewing product. Fully depress pedal Ⓑ again until it will go no further, and the feeding frame will return to the intermediate position.
4) Depress pedal Ⓒ when the feeding frame rests in the lowest position of its stroke, and the sewing machine will start sewing.

3-3. Controlling 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 59 mm 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.

3-4. When the machine is used as the standard type machine

1) Remove air tubes ❶ and ❷ for inversion from the quick- coupling joint and straight union.
2) Remove screw ❸ , and remove inverting intermediate presser asm. ❹ .
3) When the intermediate presser is used, set item 1 of function No. 44 of the memory switch to "1."

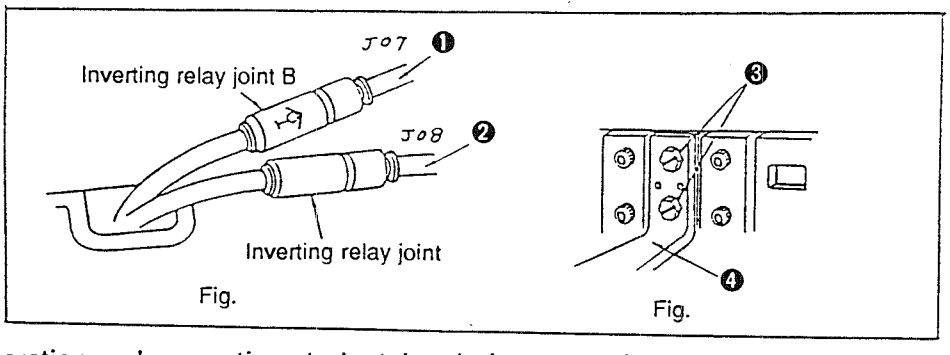


Fig. Fig.

3-5. Preparation and precautions to be taken before operation

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 controlling device.

[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.

Precautions to be taken during 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 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.]

4. ADJUSTMENTS

4-1. Adjusting the mechanical components

STANDARD ADJUSTMENTS

(9) Connecting the pneumatic components

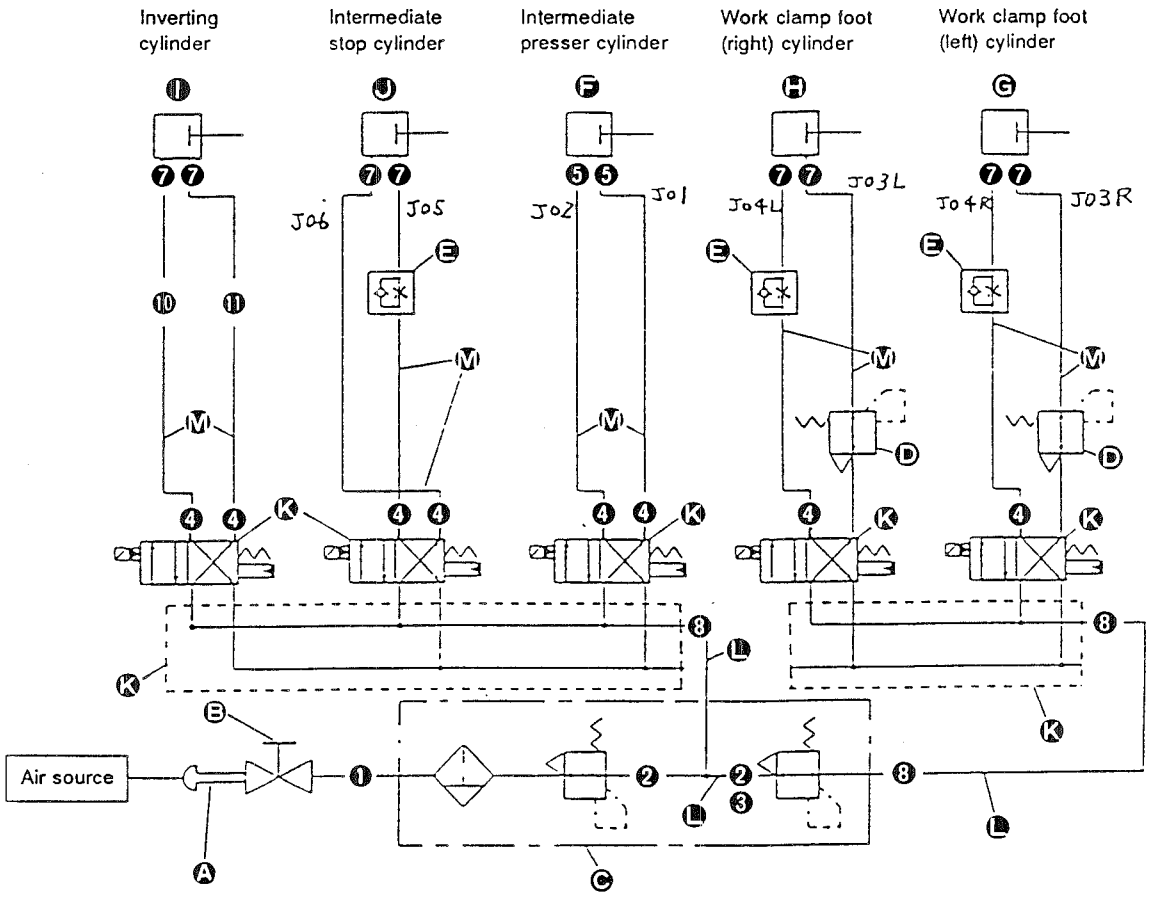


Fig.

Ⓐ	Quick-coupling joint socket	Ⓜ	ϕ4 air tube
	Quick-coupling joint plug	Ⓝ	Inverting cylinder tube
Ⓑ	Air cock	Ⓞ	Inverting relay tube
Ⓒ	Filter regulator	❶	Barrel nipple
Ⓓ	Pressure reducing valve	❷	T-cheese
Ⓔ	Speed controller (A)	❸	Plug
Ⓕ	Intermediate presser cylinder	❹	Hose nipple
Ⓖ	Work clamp foot cylinder (right)	❺	Speed controller
Ⓗ	Work clamp foot cylinder (left)	❻	Y joint
❶	Inverting cylinder	❼	Hose elbow
Ⓙ	Intermediate stop cylinder	❽	Elbow union (B)
Ⓚ	Solenoid valve (asm.)	❾	Quick-coupling joint
	Manifold	❿	Inverting relay joint
	Solenoid valve	⓫	Inverting relay joint (B)
Ⓛ	ϕ6 air tube		

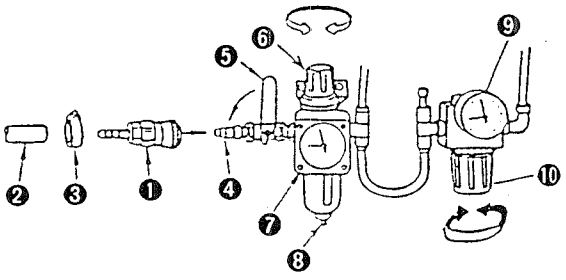
[Caution]

If the components are not correctly connected, feeding frame components and intermediate presser components will malfunction to cause the machine to fail and the related components to be damaged.

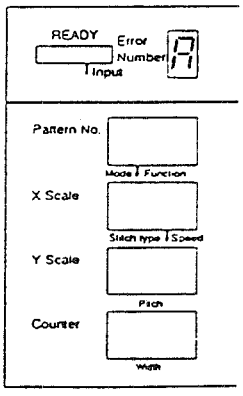
Standard adjustment

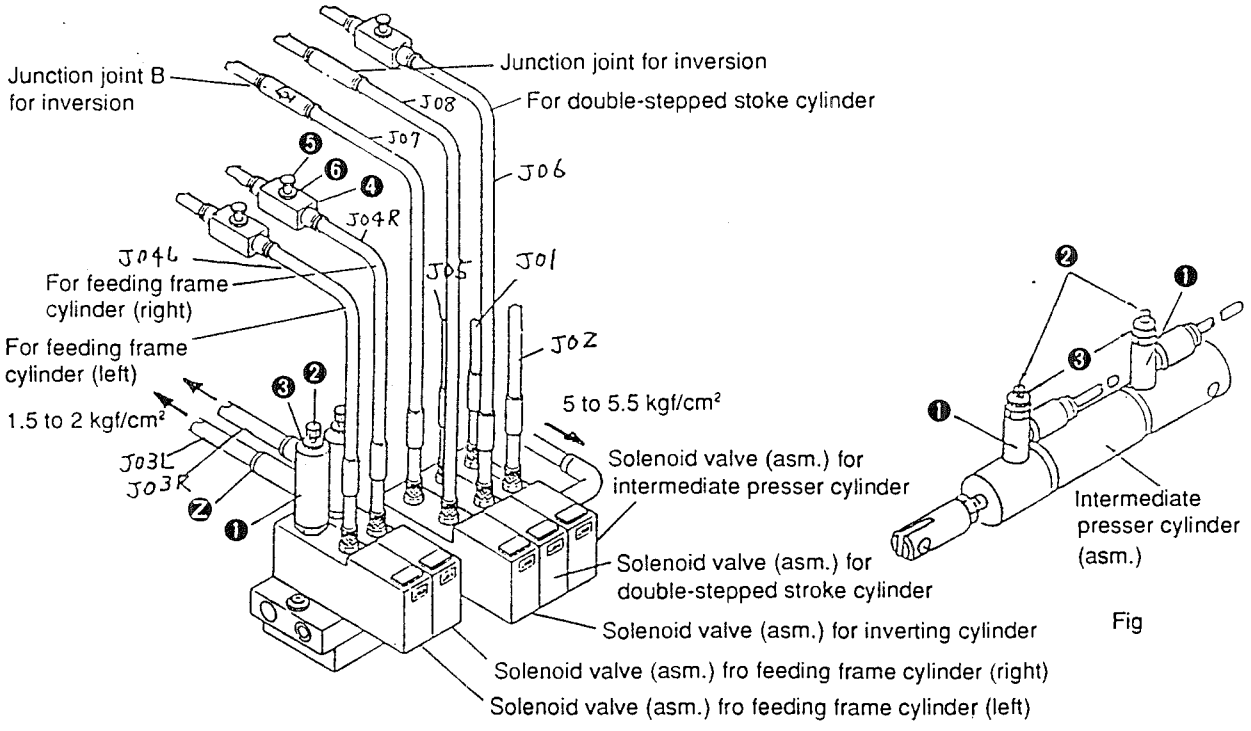
(1) Adjusting the pneumatic components

1) When quick-coupling joint ❶ is connected in position and air cock 5 is opened, pressure gauge ❼ (for intermediate presser) should indicate 5 to 5.5 kgf/cm² and pressure gauge ❾ (for feeding frame) should indicates 3 to 3.5 kgf/cm². (Fig.)
2) If pressure gauge ❼ indicates an operating air pressure lower than 4 kgf/cm², the machine stops while giving error [A] on the display. (Fig.)
3) The air pressure on the feeding frame cylinder on the retracting side has been reduced to 1.5 to 2 kgf/cm². So, it is possible to lower the feeding frame by hand. (Fig.)
4) The needle knob (needle valve?) of the speed controller (for the feeding frame cylinder) has been fixed in the state where it is loosened by one revolution after fully tightened. (Fig.)
5) The needle knob (needle valve?) of the speed controller (for the intermediate presser cylinder) has been fixed with a nut in the state where it is loosened by five revolutions after fully tightened. (Fig.)



Fig





Fig

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Connect air supply hose ❷ to quick-coupling joint (female) ❶ and fasten the hose with hose band ❸. (Fig.) 2) Connect female side ❶ and male side ❹ of the quick-coupling joint. (Fig.) 3) Open air cock ❺. Then, pull up air pressure regulating knob ❻ and turn it to adjust so that pressure gauge ❼ indicates 5 to 5.5 kgf/cm². Then, press down the knob so that it is secured. 4) Pull down air pressure regulating knob 10 and turn it to adjust so that pressure gauge ❾ indicates 3 to 3.5 kgf/cm². Then press up the knob so that it is secured. 5) If the air pressure shown on pressure gauge ❼ is too low, the machine will stop while giving error [A] on the display. **[Caution]** **After the adjustment, return the indication on pressure gauge ❼ to 5 to 5.5 kgf/cm² (0.5 MPa to 0.55 MPa). Now confirm that Error A is not displayed any longer.** 6) 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.) Depress the feeding frame switch 5 times or more, and turn needle knob ❷ of pressure reducing valve ❶ until the connected pressure gauge indicates 1.5 to 2 kgf/cm² (0.15 MPa to 0.2 MPa). Then fix the needle knob using nut 3, and remove the pressure gauge. Now, securely connect the remover air hose in place. (Fig.) 7) Referring to the Standard adjustment ( )-4), properly adjust needle knob ❺ of speed controller ❹ and fix the knob with nut ❻. (Fig) 8) Remove the top cover. Referring to the Standard adjustment ( )-5), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig.)	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. 2) An adequate work pressing pressure is not provided. 3) The feeding frame may fail to go up until its highest position is reached. 4) The speed of vertical motion of the feeding frame may be too high or too low. 5) The intermediate presser may fail to move smoothly, or it may generates a keen metallic noise when it is in operation. **[Caution]** **Normally, Standard adjustments ( )-2) through -5) are not required to be adjusted. Needle knobs and nuts referred in steps 3) through 5), in particular, have applied with oil-resistant white coating material to show that they have been already adjusted properly.** * To set the air pressure to 0 kgf/cm², close air cock ❺ and press button ❽. (Fig.)

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

Adjust so that the upper marker line (for DPx17) 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 DPx17 needle.)

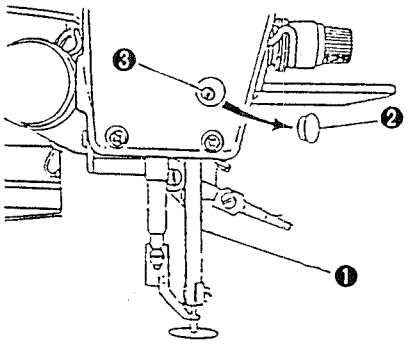


Fig.

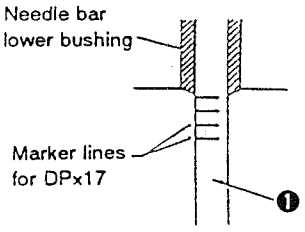


Fig.

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

Refer to the description given in "(1) Adjusting the initial position of the intermediate stop cylinder" (page) of the Engineer's manual for the AMS-223CSB, AMS-223CHB and AMS-223CGB.

(4) **Adjusting the timing of the inverting crank shaft**

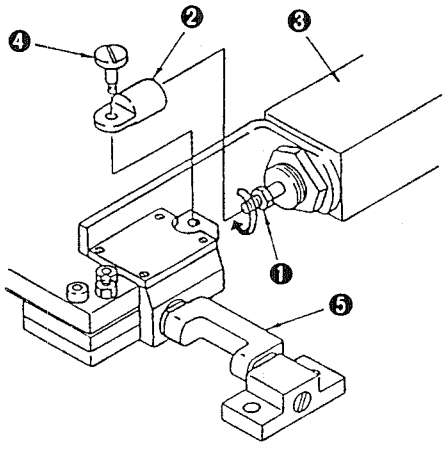


Fig.

(5) **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 foot (asm.).
2) Then, finely adjust the X-Y origin referring to the description given in "( )-1 Fine adjustment of the X/Y origins" (page) of the Engineer's manual for the AMS-223C.

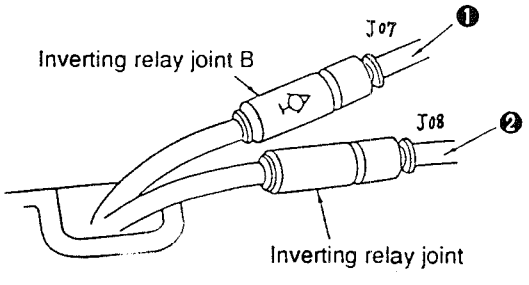


Fig.

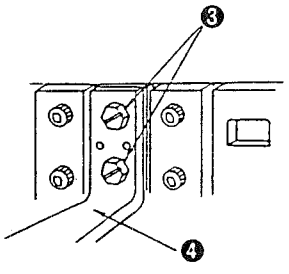


Fig.

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. 2) Remove plug ❷ in the cover of the face plate. 3) Loosen needle bar connection screw ❸. Then adjust the height of the needle bar by moving needle bar ❶ up and down. 4) After the adjustment, be sure to tighten screw ❸. 5) Turn OFF the needle threading switch. (The needle bar will return to its highest position.) 6) Attach plug ❷ in the cover of the face plate.	o Stitch skipping or thread breakage may result.
1) Turn nut ❶ in the direction of the arrow until it will go no further. 2) Attach inverting cylinder knuckle ❷ onto cylinder ❸. Fully turn the knuckle until it is securely fixed in place. 3) Tighten hinge screw ❹, and make inverting crank shaft ❺ invert to the right. 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. 5) Once the timing of the inverting crank shaft ❺ has been adjusted to allow the inverting crank shaft 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 not been properly adjusted, the inverting crank shaft may come in contact with the inverting intermediate presser when the shaft inverts.
1) Remove air tubes ❶ and ❷ for inversion from the quick-coupling joint and straight union. 2) Remove screws ❸, and remove inverting intermediate presser asm. ❹.	

(6) **Assembling the inverting intermediate presser asm.**

1) Assemble the inverting intermediate presser asm. referring to Fig.
2) Attach the inverting intermediate presser using the screws in the inverting intermediate presser to section Ⓐ.

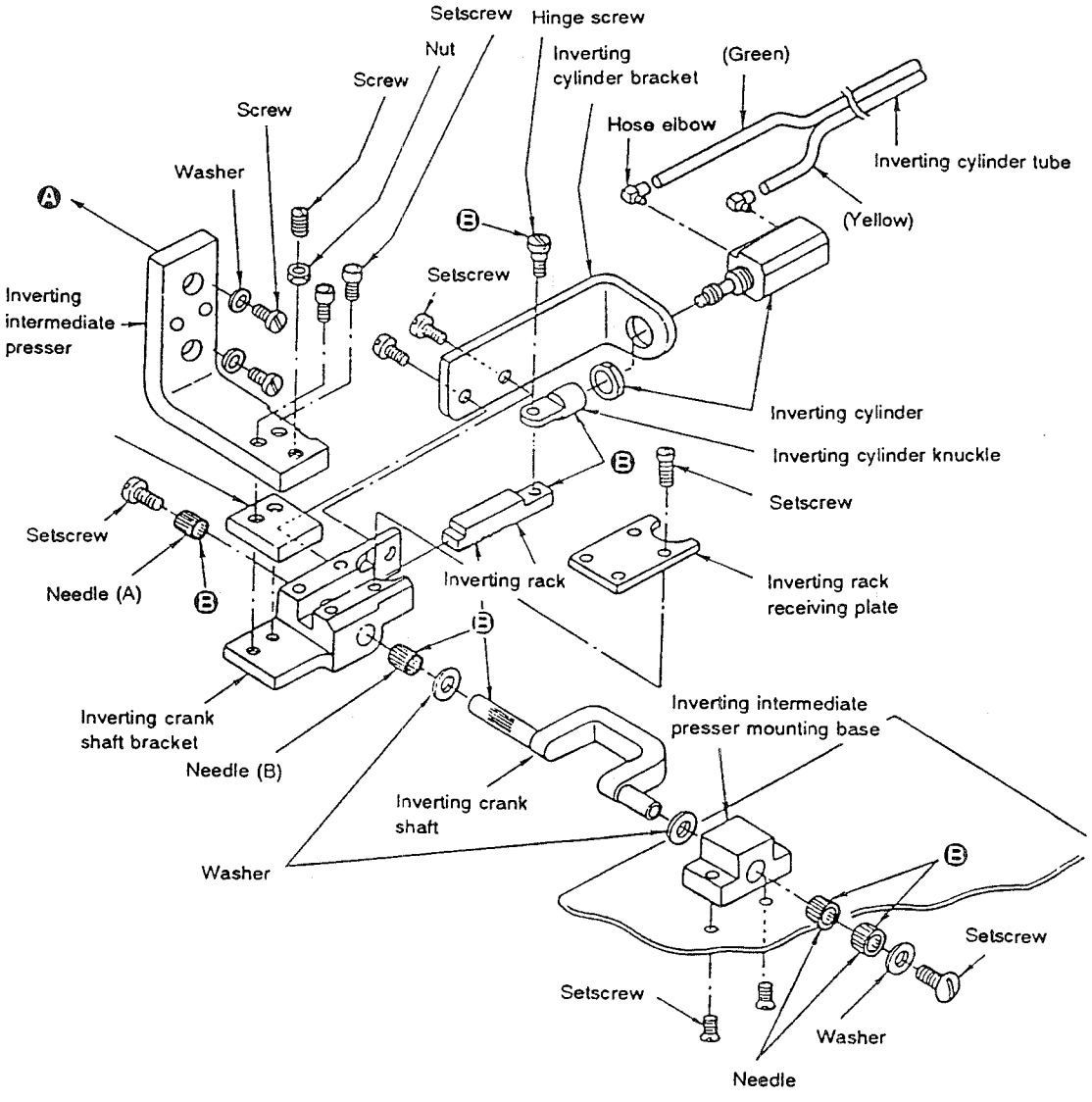


Fig.

[Caution in disassembly/assembly]

1) Screws and washers are excluded from the inverting intermaediate presser asm.
2) Attach the inverting cylinder so that the hose elbow faces backward.
3) Do not pinch the inverting cylinder shaft with a tool or the like.
4) Apply grease onto portion Ⓑ.

(7) **Assembling the pneumatic components**

Assemble the pneumatic components referring to Fig. 4-15-1.

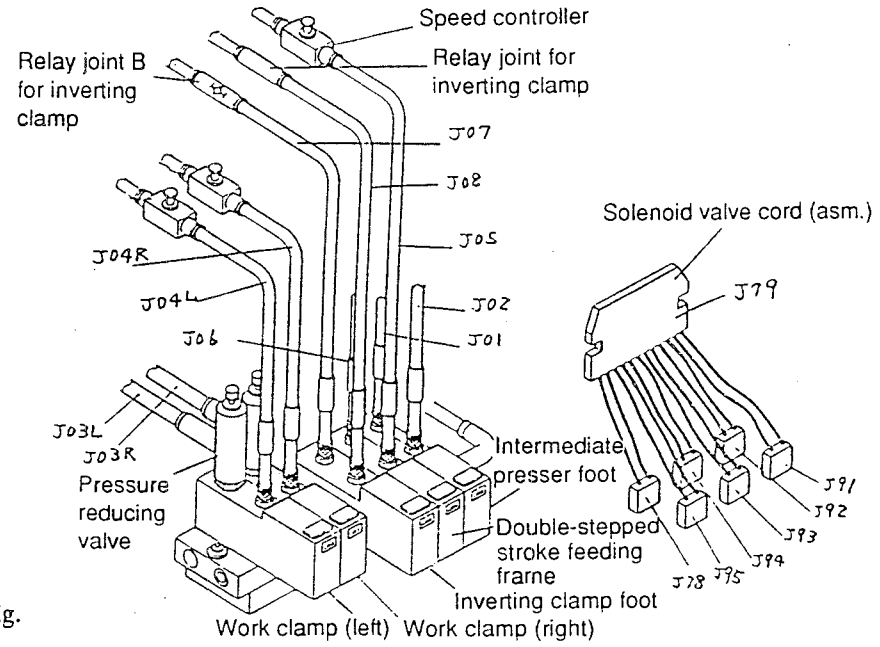


Fig.

(8) **Connecting the solenoid valve connectors asm.**

Connect the respective cables of the solenoid valve connector asm., solenoid valve connector A asm. and solenoid valve connector B asm. to the connectors (P) of the solenoid valve cord asm. (See the figure below)

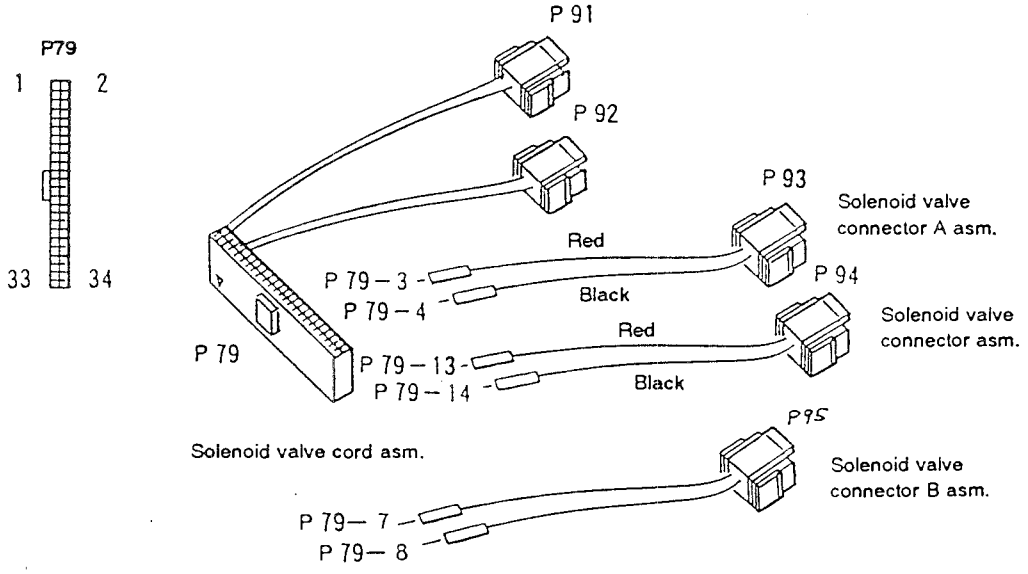


Fig.

(9) **Assembling the double-stepped stroke feeding frame**

Refer to the description given in "(6) Assembling the double-stepped stroke feeding frame" (page 235) of the Engineer's manual for the AMS-223CSB and AMS-223CHB.

(10) **Installing the pedal switch (PK47)**

Refer to "(5) Installing the pedal switch (PK47)" for the AMS-223CSB, AMS-223CHB and AMS-223CGB (on page).

5. To change the type of feeding frame from standard to the feeding frame with in inverting device

• Parts to be deleted

	Name of part	Q'ty	Part No.
1	Needle #14	–	MDP50081400
2	Needle bar thread guide A	–	B1405210000
3	Intermediate presser A	–	B1601220000
4	Screw of intermediate presser	–	SS7091110SP
5	Feeding frame	–	B2553223C00
6	Work clamp foot, right asm.	–	B2604223CA0
7	Work clamp foot, left asm.	–	B2605223CA0
8	Feed plate	–	B2556223C00
9	Work clamp foot (Feeding frame?) mount, right asm.	–	B2602223CA0
10	Work clamp foot (Feeding frame?) mount, left asm.	–	B2603223CA0
11	Screw of work clamp foot (feeding frame?) mount	–	SS7151210SP
12	Washer of work clamp foot (feeding frame?) mount, right asm.	–	WP0621026SP
13	ø4 air tube J03	–	BT0400251EB
14	ø4 air tube J04	–	BT0400251EB
15	Y joint	–	PJ308040002

• Parts to be added

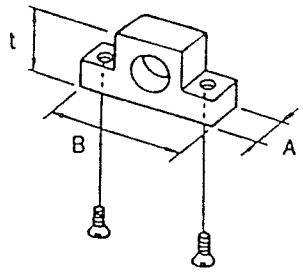
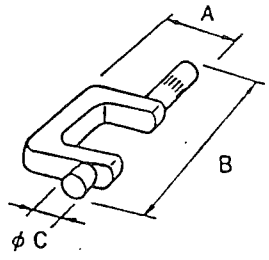
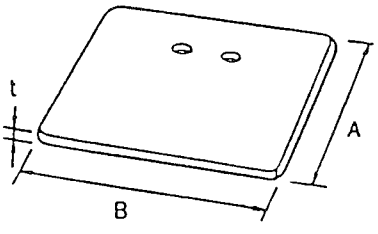
	Name of part	Q'ty	Part No.
1	Needle DP × 17 #14	1	MDP17081400
2	Needle bar thread guide for heavy-weight materials	1	B1406210000
3	Double-stepped stroke cylinder knuckle	1	B1625220000
4	Connecting pin of double-stepped stroke cylinder knuckle	1	B1626220000
5	Double-stepped stroke lever spacer	1	B185351200E
6	Height adjusting knob	1	B2304205000
7	Double-stepped stroke installing plate	1	B2514215000
8	Double-stepped stroke lever	1	B2516215000
9	Double-stepped stroke height adjusting plate	1	B2518215A00
10	Bracket of double-stepped stroke adjusting screw	1	B2518215000
11	Double-stepped stroke height adjusting screw	1	B2527215000
12	Double-stepped stroke fulcrum shaft	1	B2528215000
13	Inverting feed plate	1	B2558223C00
14	Thrust collar of double-stepped stroke fulcrum shaft	1	B25792290A0
15	Double-stepped stroke lever fulcrum shaft	1	B3012490000
16	Height adjusting plate stopper	1	B3012816000
17	Air tube label J05	2	B471122000E
18	Air tube label J06	1	B471122000F
19	Thrust collar of height adjusting screw	1	CS0790731SH
20	Double-stepped stroke cylinder	1	PA1602510A0
21	Hose nipple	2	PJ032052503
22	Snap ring of double-stepped stroke cylinder connecting pin	2	RE0300000K0
23	Screw of double-stepped stroke lever	1	SS6110520TP
24	Screw of double-stepped stroke installing plate	2	SS6121010SP
25	Screw of height adjusting knob	2	SS8110422TP
26	Screw of thrust collar of height adjusting screw	2	SS8110422TP
27	Washer of double-stepped stroke fulcrum shaft	1	WP0650876SD
28	Washer of stopper of height adjusting screw	1	WP0820816SD
29	Inverting feeding frame	1	B2553215A00

	Name of part	Q'ty	Part No.
30	Inverting work clamp foot (feeding frame?) right, asm.	1	B2607223CA0
31	Inverting intermediate presser asm.	1	B4301223CA0
32	Double-stepped stroke presser plate	1	B2530215000
33	Flange bush	1	B2548215000
34	Bead band	1	HX000220000
35	Solenoid valve connector asm.	1	B47122150A0
36	Solenoid valve connector A asm.	1	B4712215AA0
37	Solenoid valve connector B asm.	1	B4712215BA0
38	Solenoid valve asm.	1	PV0351240B0
39	Solenoid valve	1	PV140501000
40	Inverting junction joint	1	PJ303040002
41	Inverting junction joint B	1	PJ303040004
42	Elbow union	1	PJ304065101
43	Air tube label J07	1	B471122000I
44	Air tube label J08	1	B471122000J
45	Screw of intermediate presser	1	SS7091110SP
46	Inverting plastic blank	2	B2557215A00
47	Label guide A	1	B4310215000
48	Label guide B asm.	1	B43112200A0
49	Label guide C	1	B4312220000
50	Screw of label guide A	2	SS4110715SP
51	Washer of screw of label guide A	2	WP0450000SD
52	Screw of label guide B	2	SS4110715SP
53	Washer of screw of label guide B	2	WP0450000SD
54	Screw of label guide C	2	SS4110715SP
55	Washer of screw of label guide C	2	WP0450000SD
56	Feeding frame height adjusting screw	1	SS8150822TP
57	Screw of feeding frame	2	SS7150910TP
58	Washer of screw of feeding frame	2	WP0651056SD

• Parts of which quantity is to be changed

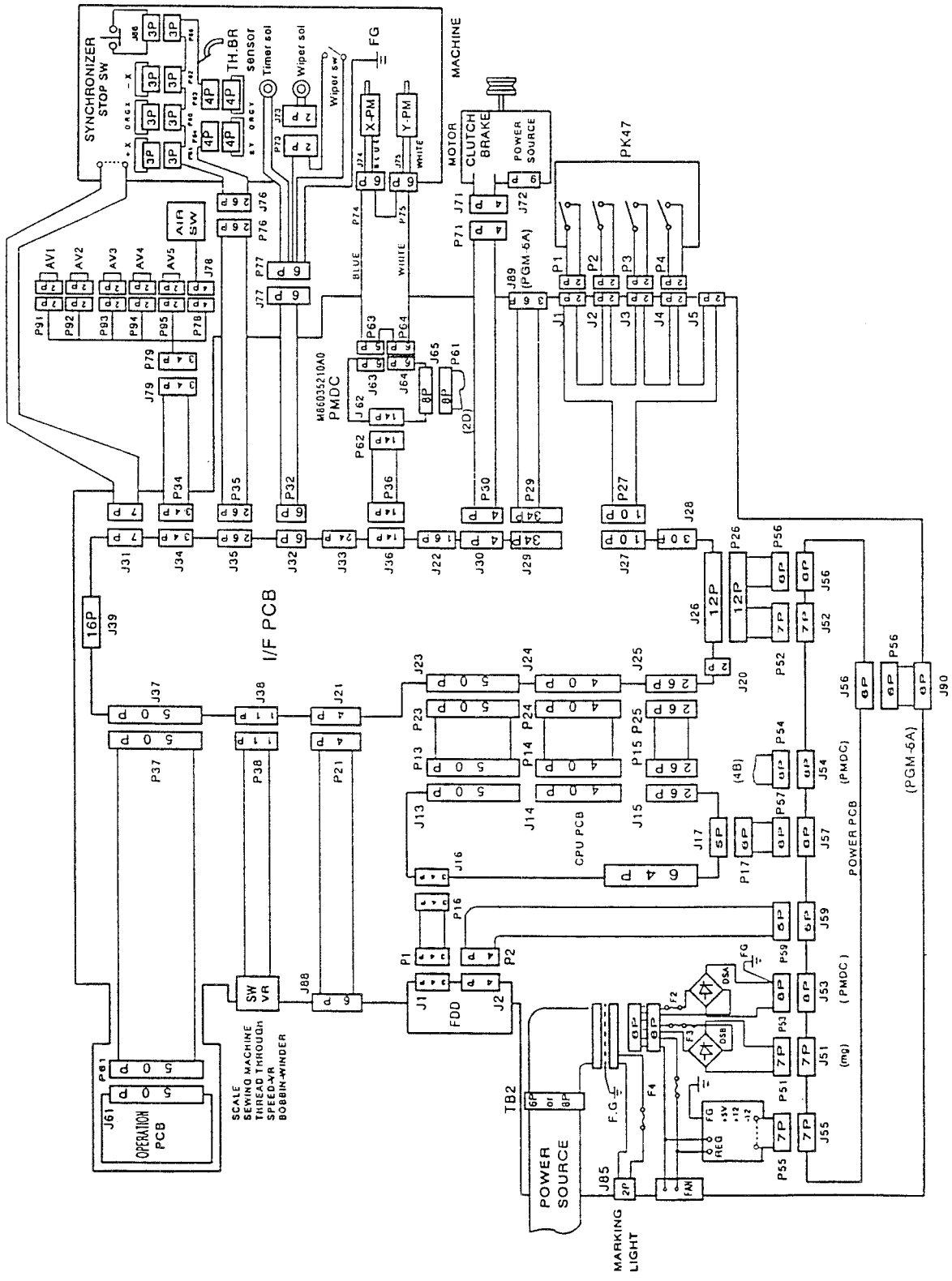
	Name of part	Q'ty	Part No.
1	Feeding frame height adjusting screw	2 → 1	SS8150822TP
2	Screw of feeding frame	4 → 2	SS7150910TP
3	Nut of feeding frame height adjusting screw	2 → 1	NS6150330SD
4	Washer of screw of feeding frame	4 → 2	WP0651056SD
5	Air tube A	5M → 9M	BT0400251EB
6	Cable clip band, black	8 → 14	HX002330000
7	Hose nipple	3 → 8	PJ032052503
8	Pressure reducing valve	1 → 2	PF070501000
9	Speed controller	2 → 3	PC012401000
10	Solenoid	2 → 1	B4717223C00

6. OPTIONS

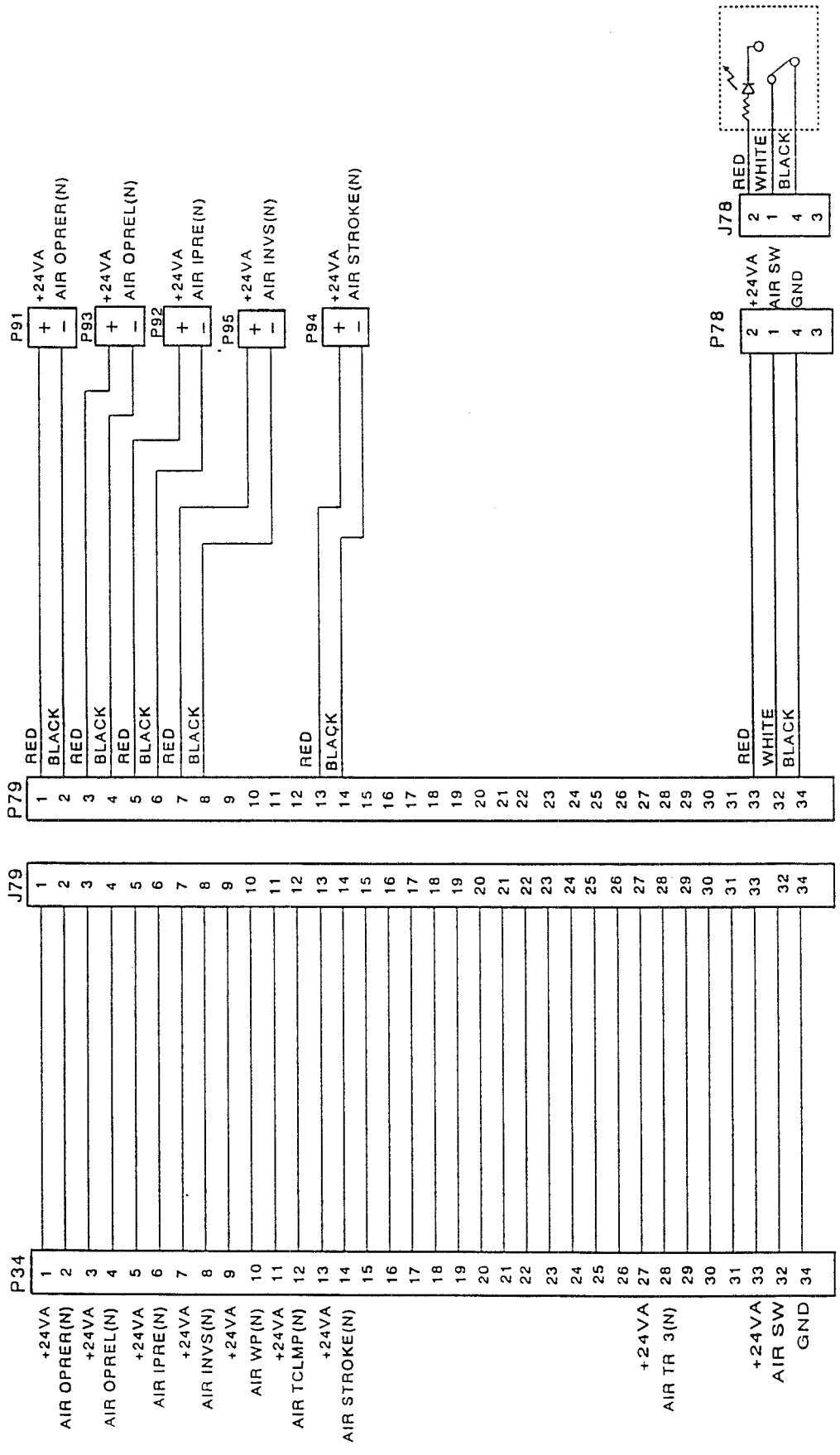
Name of part	Type	Part No.	Size (mm)
1. Intermediate presser mounting base 	Inverting intermediate presser mounting base B [It is necessary when the inverting intermediate presser blank, small (B4319220000) is used.]	B4616220000	A × B × t 8 × 24 × 15
	Screw	SS1090750SP	
2. Crank shaft 	Inverting crank shaft B	B4326220000	A × B × φ C 26 × 71 × 7
3. Machinable inverting intermediate presser 	Inverting intermediate presser plate blank with knurl, large	B4317220000	A × B × t 122 × 206 × 2. 6
	Inverting intermediate presser plate blank with knurl, medium	B4318220000	100 × 126 × 2. 6
	Inverting intermediate presser plate blank with knurl, small [It required the inverting intermediate presser mounting base B (B4316220000).]	B4319220000	50 × 80 × 2. 6

7. MATERIALS

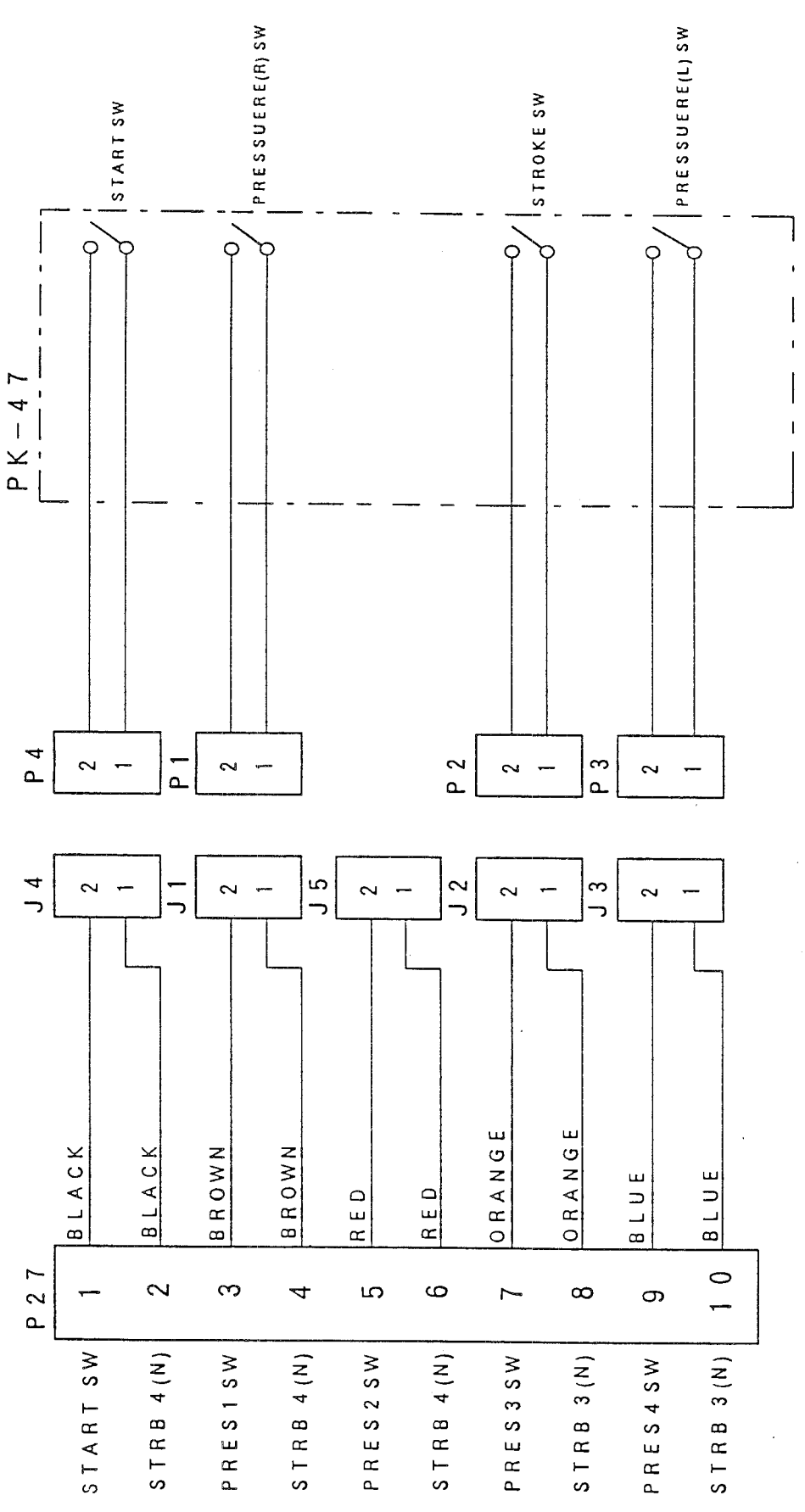
7-1. Block diagram for the AMS-223CST and -223CHT



7-2. Air valve schematic diagram for the AMS-223CST and -223CHT



7-3. Pedal switch schematic diagram



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