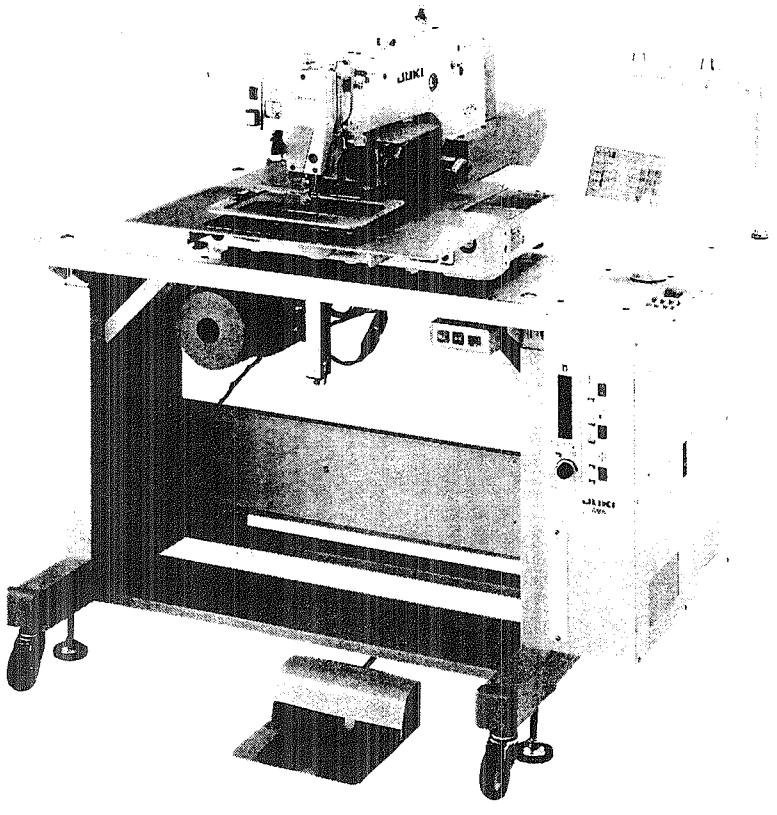
JUKI

Medium-sized Computer-controlled Cycle Machine

AMS-215C

ENGINEER'S MANUAL

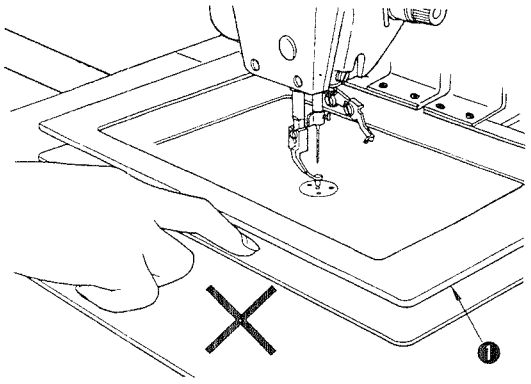


No. IV-72
1994.10

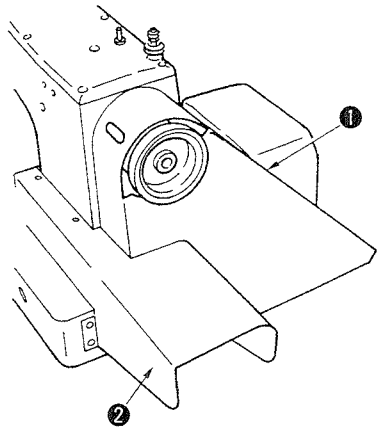
PREFACE

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."

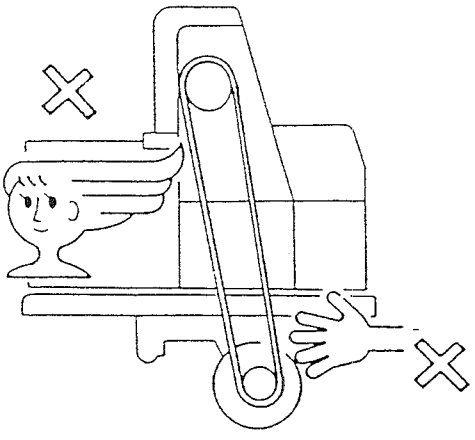
CAUTION



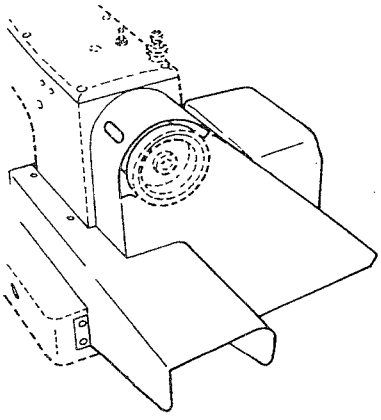
1. When a pattern change is made, or the bobbin winder switch or the feeding frame switch is turned ON, feeding frame ❶ comes down automatically. So, never put your fingers under the feeding frame. Be sure to keep your fingers away from the feeding frame while the machine is in operation.

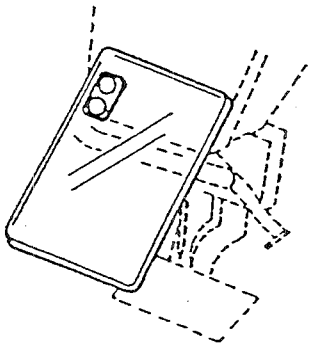


2. Be sure to turn the power switch OFF before removing belt cover ❶ and Y travel shaft cover ❷. Do not operate the machine with the belt cover removed.



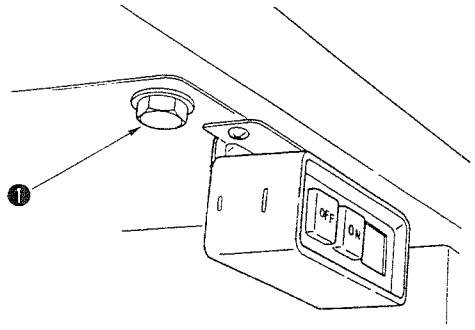
3. During operation, be careful not to allow your or any other person's head or hands to come close to the handwheel, V belt or motor. Also, do not place anything near any of these parts while is in operation. Doing so may be dangerous.



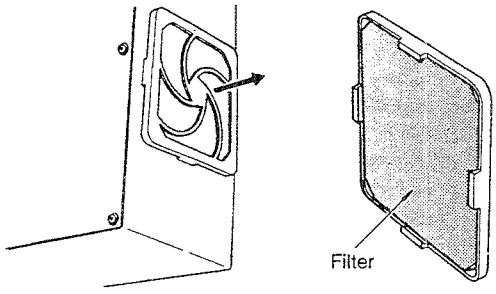


4. If your machine is equipped whit a belt cover, eye guard or any other protections, do not operate your machine with any of them removed.

CAUTIONS BEFORE OPERATION



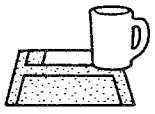
1. Remove bed fixing bolt ❶ before starting operation.
   When transporting your AMS-215C, install bed fixing bolt ❶.



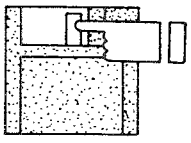
2. Clean the filter of the fan once every week.

3. Precautions in handling floppy disks

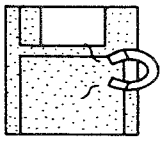
Do not place the floppy disk near an ashtray or food and drink.



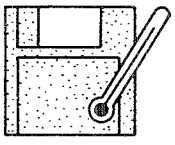
Do not touch the exposed parts of the floppy disk.

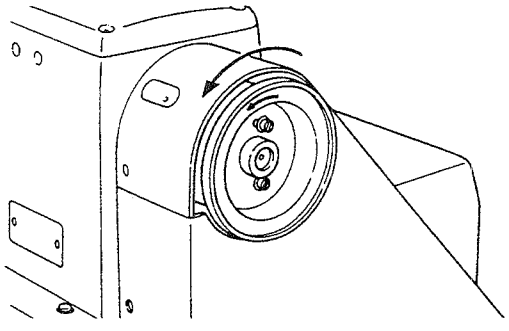


Do not bring the floppy disk close to a magnetized material.

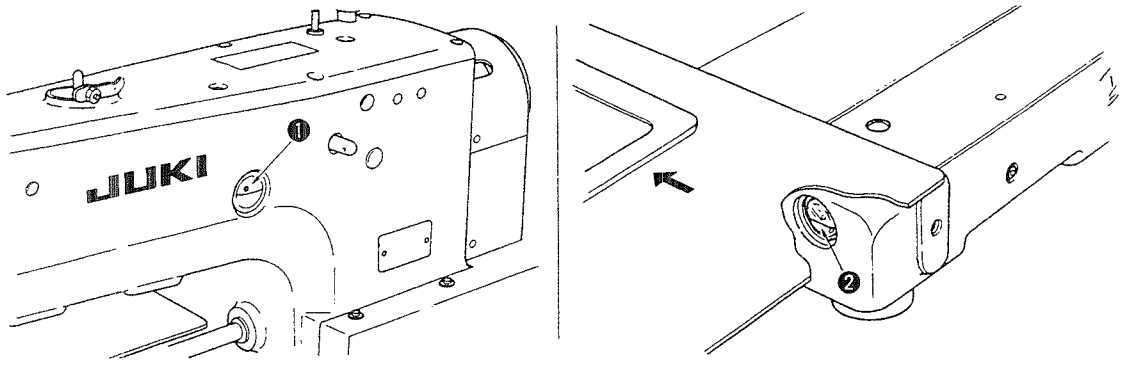


Do not place the floppy disk in a hot place (51°C or higher) or a place exposed to direct sunlight.

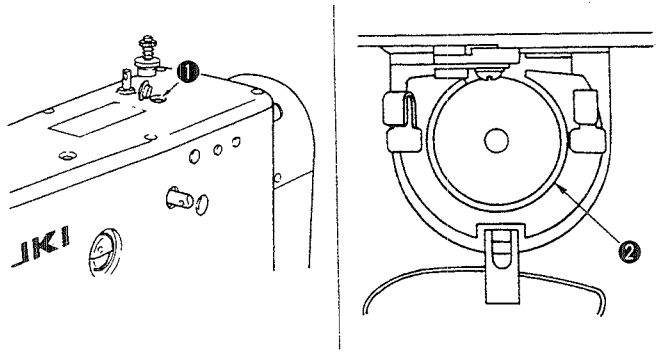




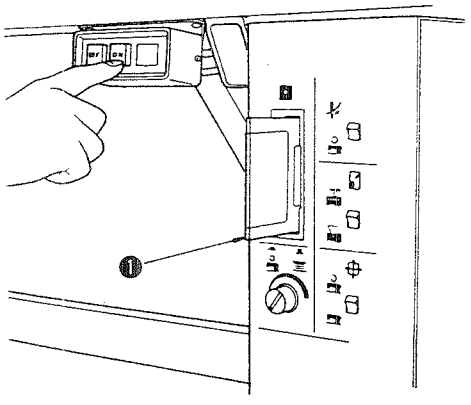
4. The sewing machine should run counterclockwise (in the direction of the arrow) as observed from the pulley side. Never allow the machine to run in the reverse direction.



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

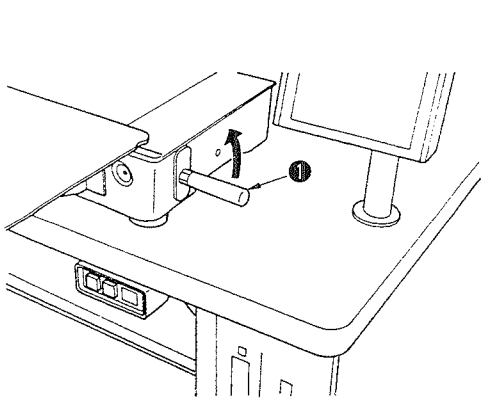


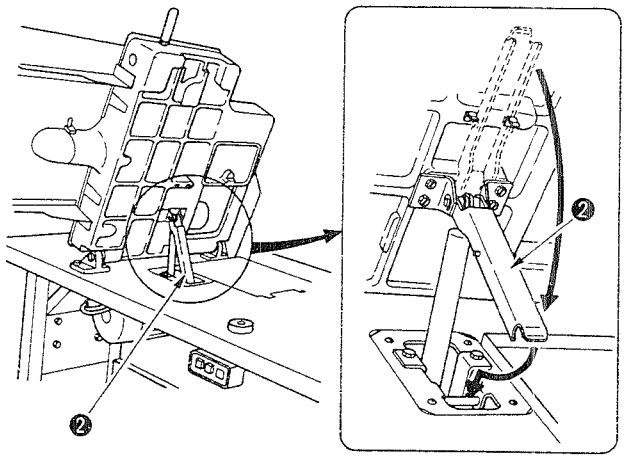
6. Before starting the machine which has been newly set up or has not been used for a long period of time, apply a few drops of the lubricating oil to the crank assembly through hole ❶, one drop to racing surface ❷.



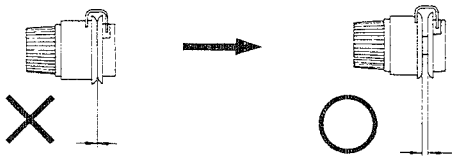
7. Be sure to load or unload floppy disk ❶ while the power is ON. If the power switch should be turned ON or OFF with the floppy disk mounted, the data stored in the disk may be destroyed.

8. The AMS-215C is provided with the main unit input function as standard, however, a sewing pattern which extends beyond the sewing area (180 mm × 110 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.



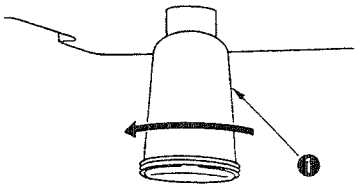


9. To raise the sewing machine, attach grip ❶ supplied with the sewing machine and raise the sewing machine in the direction of the arrow.
   Be sure to use stopper ❷ when working with the sewing machine raised.

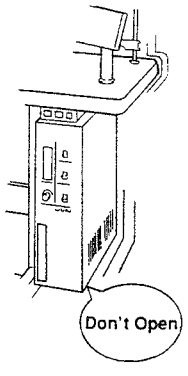


Closed Opened

10. 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.



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



12. 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.

CONTENTS

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 table 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 16,000 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 25 mm (standard), which allows a workpiece to be set easily.

10. **Assures stable stitch length regardless of sewing speed changes.**
The AMS-215C 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. **Cylinder bed sewing**
The AMS-215C can be used for cylinder bed sewing by removing the throat plate auxiliary cover.

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

15. **Multi sewing functions**
The machine 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-215C 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-215C, 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-215C.**
The AMS-215C 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-215C. The sewing patterns for the AMS-215C cannot be used for the other AMS series models of sewing machine. (Note: When using a sewing pattern used for the other AMS series models, the AMS-215C 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.)

2. SPECIFICATIONS

The specifications of the AMS-215C (1-needle, lockstitch cylinder bed computer-controlled cycle machine) are as follows:

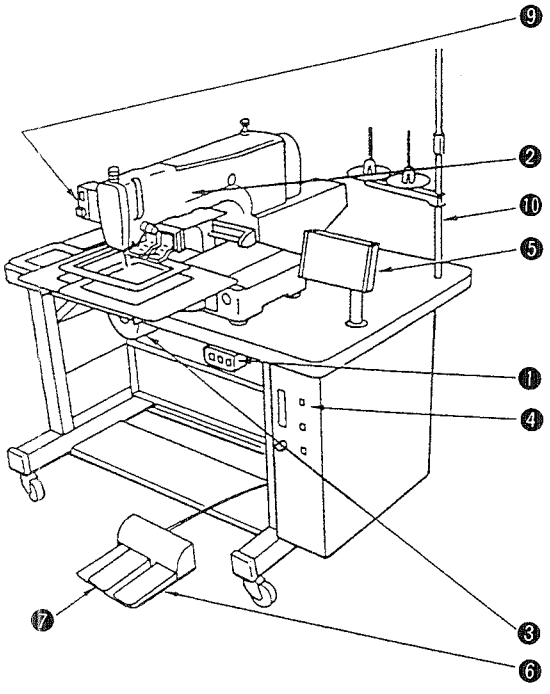
1.	Sewing area:	X (lateral) direction 180 mm Y (longitudinal) direction 110 mm
2.	Max. sewing speed (adjustable in 3 mm or less):	2,000 s.p.m.
3.	Stitch length:	Max. 12.7 mm (adjustable in 0.1 mm steps)
4.	Feed motion of feeding frame:	Intermittent feed (2-shaft drive by stepping motor)
5.	Needle bar 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.	Shuttle:	Large-capacity, semi-rotary type (self-lubricated) (Semi-rotary double-capacity hook for the sewing specification G)
11.	Bobbin case:	Large-capacity, semi-rotary shuttle type (Bobbin case for the semi-rotary double-capacity hook for the sewing specification G)
12.	Bobbin:	Large-capacity shuttle type (Bobbin for the double-capacity hook for the sewing specification G)
13.	Lubricating oil:	New Defrix Oil No. 2 (supplied by oiler)
14.	Thread trimmer:	Consists of moving knife and counter knife (actuated by grooved cam)
15.	Wiper:	Magnetically driven (with release switch)
16.	Intermediate presser lifter:	Vertical motion driven by an air cylinder (with release switch)
17.	Memory storage:	3.5 inch micro floppy disk Memory capacity: 691K 44 to 691 pattern can be stored in a cassette
18.	Sewing operation:	Starts/ends at sewing start point or the 2nd origin
19.	Feeding frame:	Descends when the feeding frame switch is pressed. Another press on the switch causes the feeding frame to ascend.
20.	Start:	The machine is started by turning the start switch ON with the feeding frame down.
21.	Temporary stop facility:	Used to stop machine operation during a stitching cycle. After a temporary stop, the feeding frame can be moved along the stitching line by operating the backward or forward switch. The interrupted stitching cycle can be completed by pressing the start switch. Alternatively, the return to origin switch may be pressed for quick move to the sewing start point or the 2nd origin.

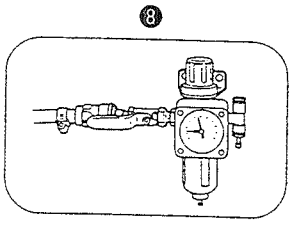
22.	Enlarging/Reducing facility:	Allows a pattern to be enlarged or reduced on the X axis and Y axis, independently when sewing a pattern. Scale: 0.001 to 4 times (0.001 steps can be selected)
23.	Enlarging/Reducing method:	Pattern enlargement/reduction can be done by increasing/decreasing either stitch length or the number or stitches.
24.	Max. sewing speed limitation:	The maximum sewing speed can be set limited to any value within a range of 180 to 2,000 s.p.m., using the external control knob.
25.	Pattern selection:	1 to 999 patterns can be selected by specifying the desired pattern Nos.
26.	Pattern checking facility:	A pattern configuration can be checked by setting the sewing machine ON/OFF switch to OFF.
27.	Error indication:	17 types of error indication are given.
28.	Programming:	Involves point/linear/arc numeral data, temporary stop, thread trim, jump data, sewing speed, and stitch length.
29.	Bobbin thread counter:	Tells the time to replace the bobbin. If this facility is not used, it works as a 0 to 999 ring counter with resetting function.
30.	Memory backup:	In case of a power interruption, the pattern being used will automatically be stored in memory so that the interrupted sewing cycle may be resumed simply by pressing the set ready switch after the power is restored. No floppy disk is necessary. The memory is held for 100 hrs.
31.	2nd origin setting facility:	Using jog keys, a 2nd origin (needle position after a sewing cycle) can be set in the desired position within the sewing area. The set 2nd origin is also stored in memory.
32.	Needle-up stop facility:	When the needle does not stop in its upper position, the needle can be brought up to the upper position by turning the needle threading switch ON or OFF (provided the READY lamp is ON.)
33.	Sewing machine motor:	400W, 4P electronic-stop motor (550 W, 2P for the sewing specification G)
34.	Dimensions (excluding thread stand):	1,200 mm (W) × 977 mm (L) × 1,200 mm (H)
35.	Gross weight:	250 kg
36.	Power consumption:	1 KVA
37.	Operating temperature range:	5° to 40°C
38.	Operating humidity range:	20 to 80% (no dew condensation)
39.	Line voltage:	Rated voltage ±10% 50/60 Hz

40.	Air pressure used:	5 to 5.5 kgf/cm^2 (0.5 to 0.55 MPa)
41.	Air consumption:	1.8 Nℓ/min.
42.	Input functions of the main unit:	Zigzag sewing ┐ Spline Offset sewing ┘ Curve, linear, point Different types of sewing machine control (pattern erasing, thread trimming, temporary stop, feeding frame up/down, speed change etc.) Point adding, point moving, point erasing, inverting etc.

3. OPERATION

3-1. 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.

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

⑥ **Feeding frame switch**
Turns ON/OFF the feeding frame solenoid at the time specified to lift or lower the feeding frame.

⑦ **Start switch**
Acts as the sewing command switch, and starts sewing based on the data stored in the micro floppy disk.

⑧ **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.

⑨ **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.

⑩ **Thread stand**

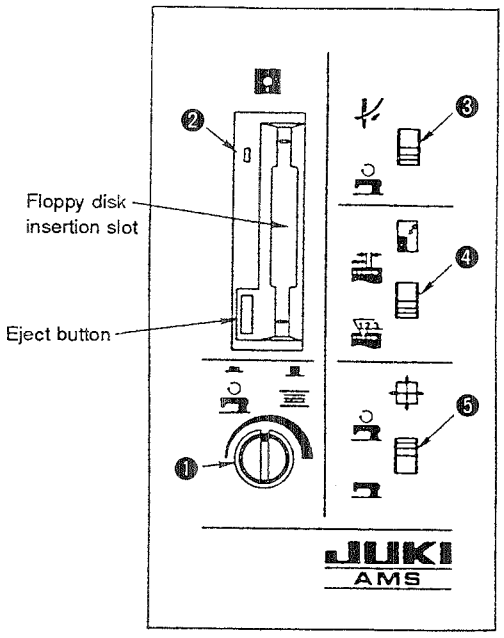


Fig. 3-2

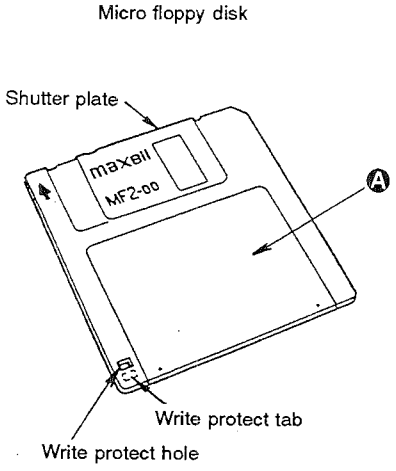


Fig. 3-3

❶ Maximum speed knob/Bobbin winder switch

(1) Maximum speed knob

This knob is used to set the maximum sewing speed of the machine. Normally, the sewing speed is automatically adjusted according to the stitch length. If a slower speed is required, turn this knob counterclockwise.

(2) Bobbin winder switch

Pull the knob toward you (to turn ON the bobbin winder switch) while the sewing machine is in the stop state, and the feeding frame will come down. Turn ON the start switch to allow the intermediate presser to come down, then the sewing machine rotates at a constant speed to wind the bobbin. (At this time, confirm that there is nothing under the needle.) The machine can be stopped by re-turning ON the start switch, pressing the knob (to turn OFF the bobbin winder switch) or turning ON the temporary stop switch. (Note that the bobbin winder switch is operative while the feeding frame is in the highest position.)

❷ Floppy disk driver

The operation LED shows that the driver is in a specified operating state.

(1) Loading the floppy disk

After turning ON the power switch slowly insert the floppy disk with side Ⓐ (as shown in Fig. 3-3) facing right until the eject push-button pops out.

(2) Unloading the floppy disk

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

(3) Write-protect hole (Fig. 3-3)
When the write-protect tab is moved so as to open the write-protect hole, it is no longer possible to write data on to the disk. Do this to store programming data. For writing data on to the disk, move the write-protect tab until it is exposed.

[Caution]

Never turn ON/OFF the power switch with the floppy disk loaded.

(4) Micro floppy disk (Fig. 3-3)
Precautions when handling and storing the floppy disk

1) Do not open the shutter and touch the magnetic surface.
2) Do not apply pressure on the shutter plate or the opening/closing spring (slider), or else the disk may become damaged.
3) Do not allow the hub to become damaged and do not use the disk with dust on the hub, or else errors may occur. Always keep the hub clean.
4) Do not use thinner, alcohol or Freon gas on the disk.
5) Do not use erasers on the disk.
6) Do not eat or drink near the disk.
7) Do not store the disk in a place where there is a magnetic field.
8) Do not store the disk in a dusty place.

❸ Needle threading switch

(1) When the needle threading switch is pressed side while the sewing machine is stopped, the intermediate presser and the feeding frame will come down to allow the needle to be threaded. If the start switch is pressed during needle threading, the sewing machine will not run.

(2) When the temporary stop switch is pressed ON and the sewing machine is stopped, the return to origin, forward and backward switches become valid after thread trimming has been performed, by raising or lowering the needle threading switch.
If the needle is not at its highest resting position (error [3]), the machine will be automatically driven and then stopped with the needle up, by raising/lowering the needle threading switch. Prior to the above operation, be sure that there is nothing under the needle. (The needle threading switch is valid while the sewing LED is lit up.)

❹ Scale switch (INC/DEC of Number of stitches)

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 enlargement or reduction of a pattern is set either by increasing or decreasing the stitch length or the number of stitches. Pattern enlargement or reduction data is read for computation while the Set Ready indicator lamp is ON. For point input, the enlargement or reduction of a pattern is always done by increasing or decreasing the stitch length.

❺ Sewing machine ON/OFF switch

When the program to operate the sewing machine is stored in the floppy disk, the machine will perform normal sewing operation according to the program by setting the sewing machine switch to the position. When this switch is set to the position, only the feed mechanism will work.
Whenever enlarging/reducing a pattern or sewing a newly programmed pattern, set this switch to the position to check the shape of the pattern in the program. After completing the check, set the switch to the position to start sewing.

3-3. Operation panel

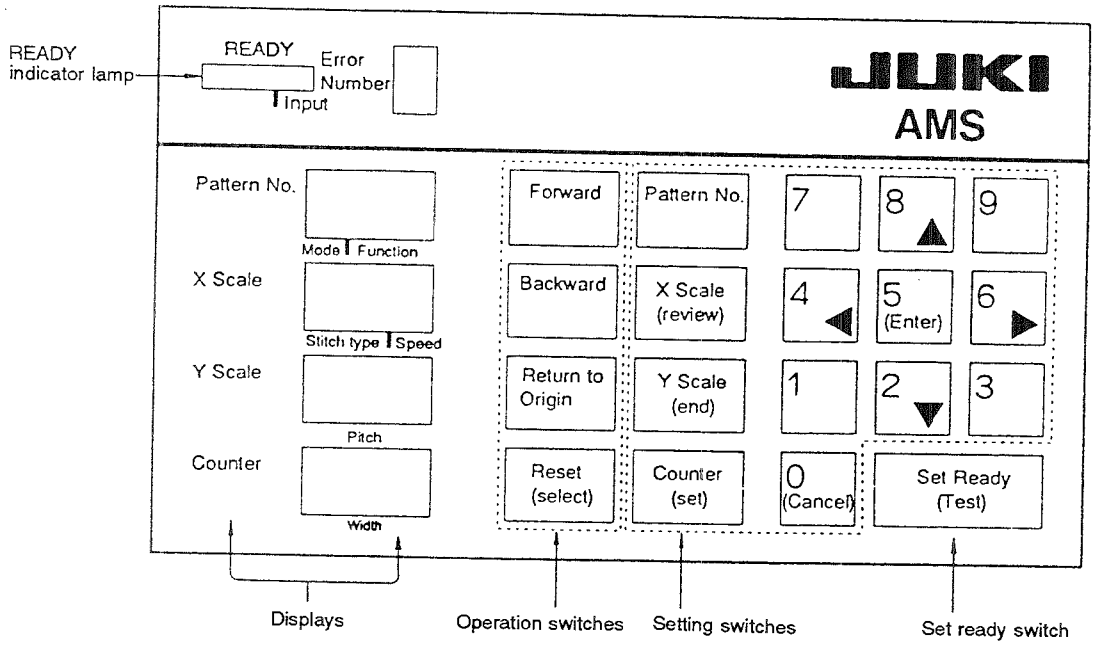


Fig. 3-4

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 2, 4, 6, 8: ▲ mark)

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.

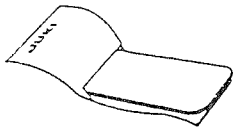
10. Error No. display
If any of the following errors occurs, it will be indicated by an "Error Number," and no further operation will be allowed.

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.

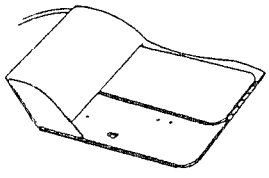
3-4. Other switches

1. Feeding frame switch



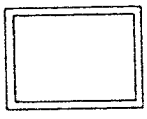
When the feeding frame switch (right) is pressed, the feeding frame will come down. Another press on the switch causes the feeding frame to go up.

2. Start switch



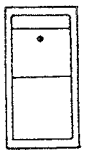
When the start switch (left) is pressed with the feeding frame down, the machine starts sewing.

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.

3-5. 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.

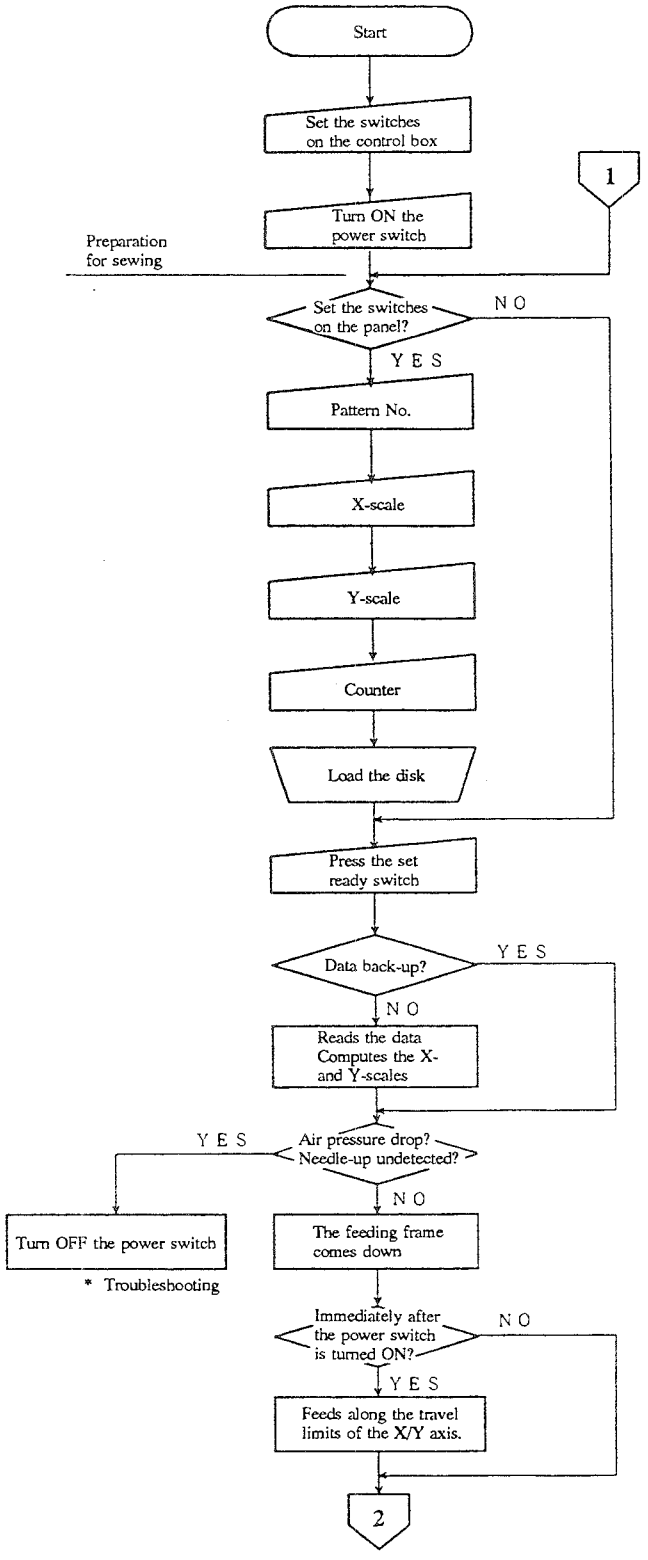
7. Remove the bed fixing bolt before starting operation. Install the bed fixing bolt at the time of transportation.

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.
The floppy disk (2DD) for the AMS-215C cannot be used with the AMS-A type, AMS-B type, AMS-210C, -212C and -220C models of sewing machines.

3-6. Operation procedure

Follow the operation procedure flow chart given below:



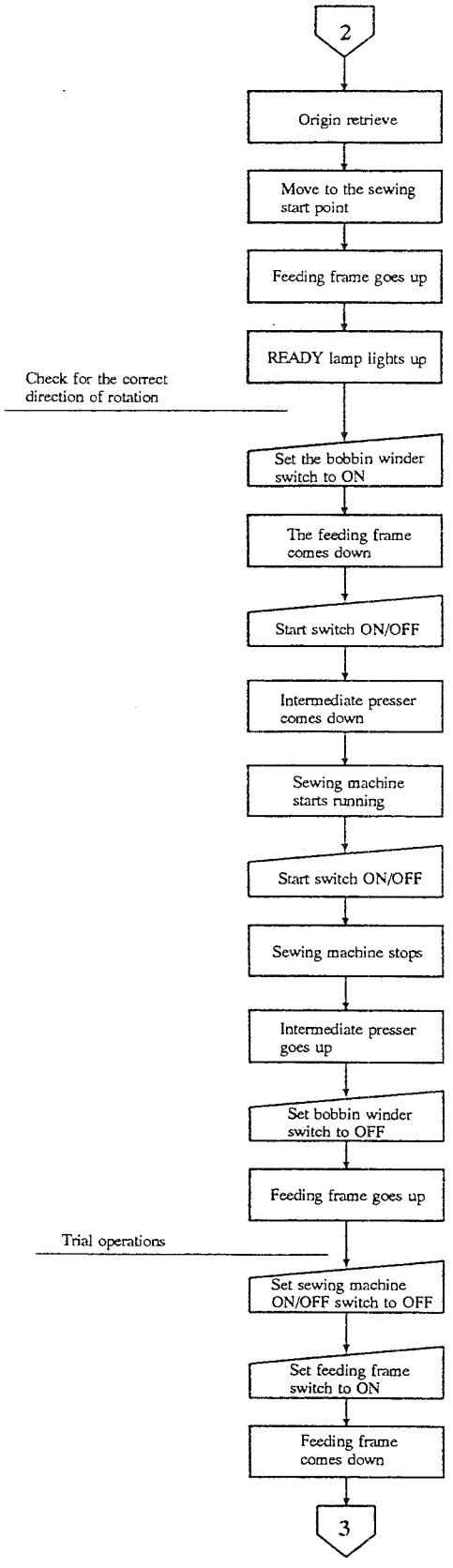
Sewing machine ON/OFF switch → OFF
INC/DEC of the stitch length or the number of stitches → select either of them.
Bobbin winder switch → OFF
Needle threading switch → OFF

Sewing machine motor starts to run.
Operation panel indicator lamps light up.

READY lamp flashes on and off during the computation.

Error indication "A" (air pressure drop error)
Error indication No. "3" (needle up error)
(See P. 165 for the error indication)

Performed once after the power switch is turned ON.

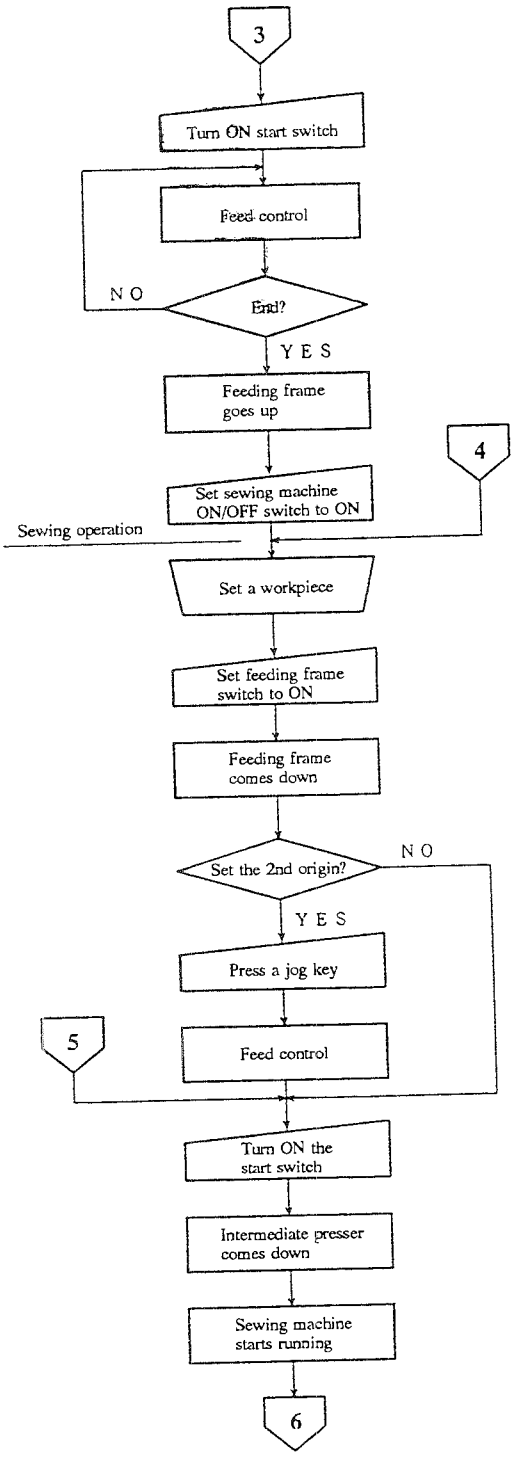


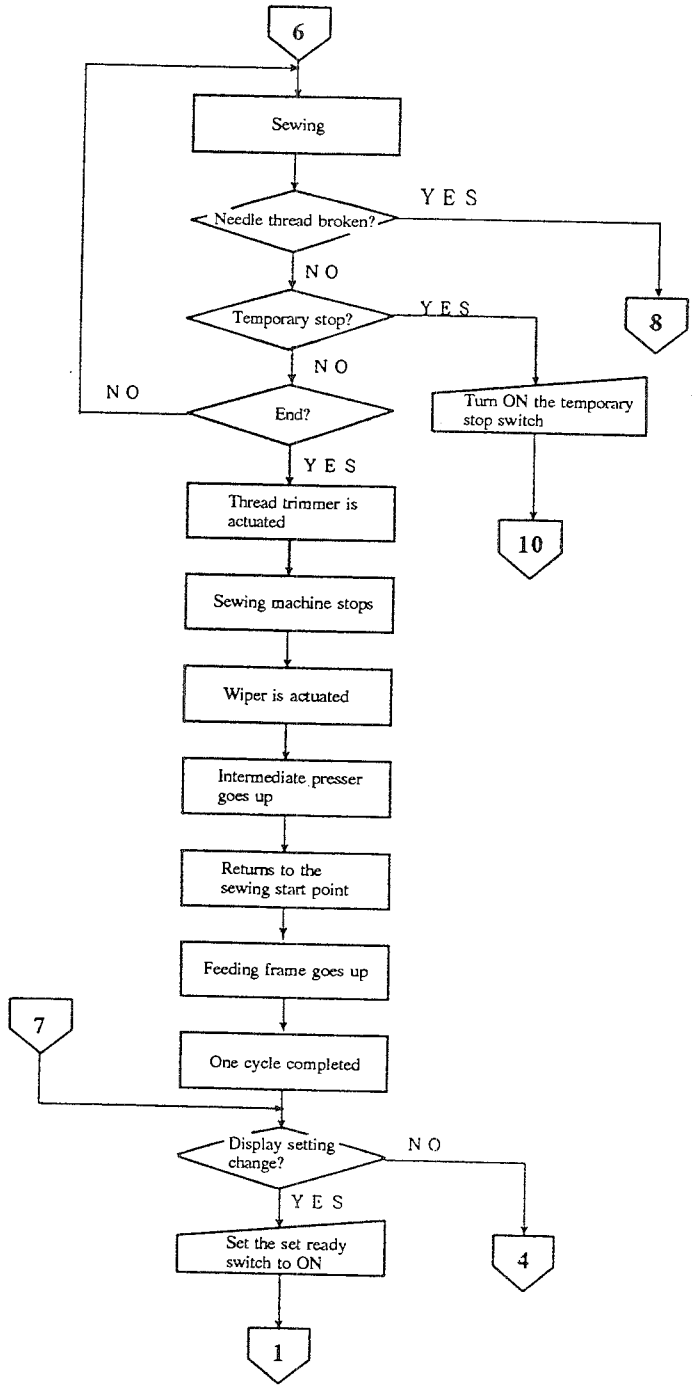
Move to the 2nd origin, if it has been set.

Make sure there is nothing under the needle.
Remove any needle thread.

Direction of rotation correct?
Refer to error indication "E". (P. 165)

Machine stop with the needle up.

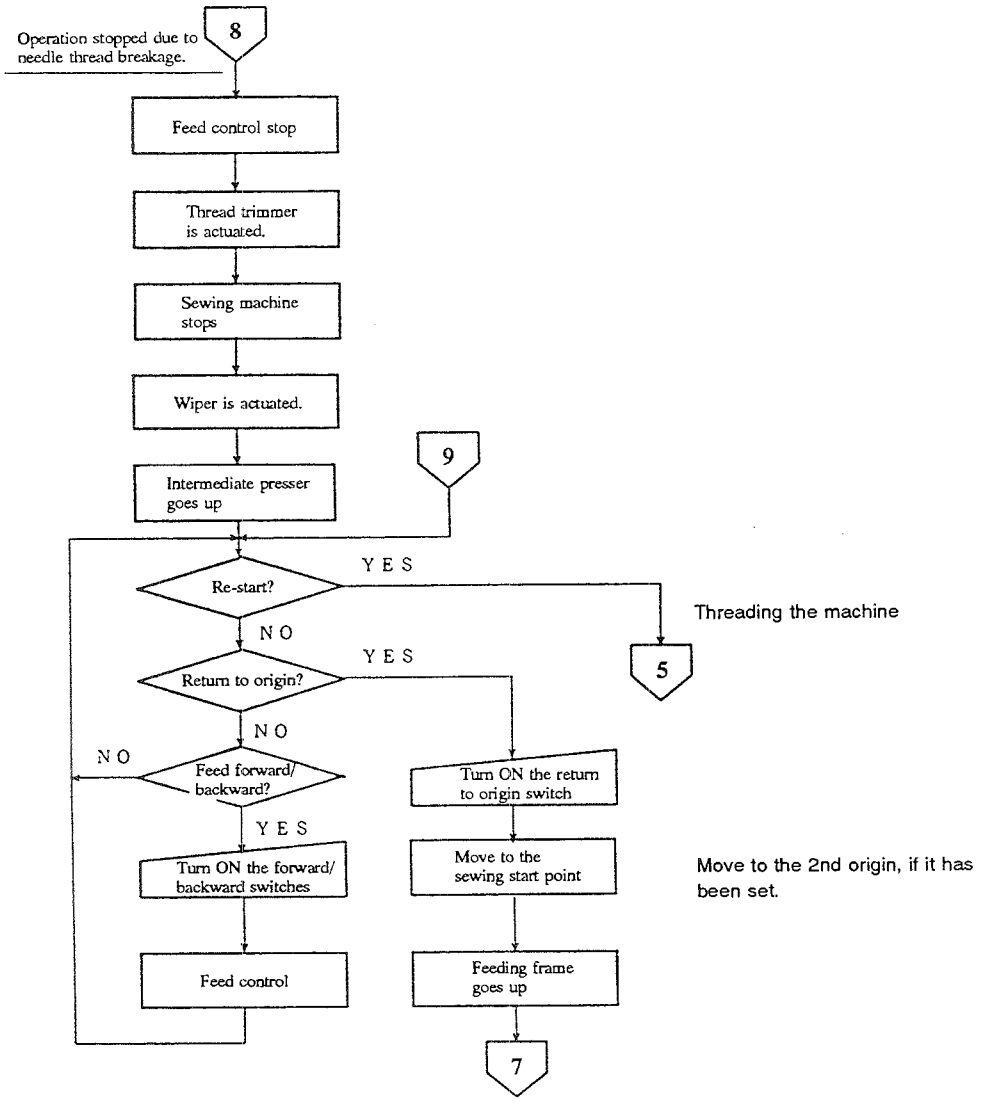

3
Turn ON start switch
Feed control
NO
End?
YES
Feeding frame goes up
4
Set sewing machine ON/OFF switch to ON
Sewing operation
Set a workpiece
Positioning
Set feeding frame switch to ON
Feeding frame comes down
Material held securely?
Set the 2nd origin?
NO
YES
Press a jog key
5
Feed control
Turn ON the start switch
Intermediate presser comes down
Sewing machine starts running
6

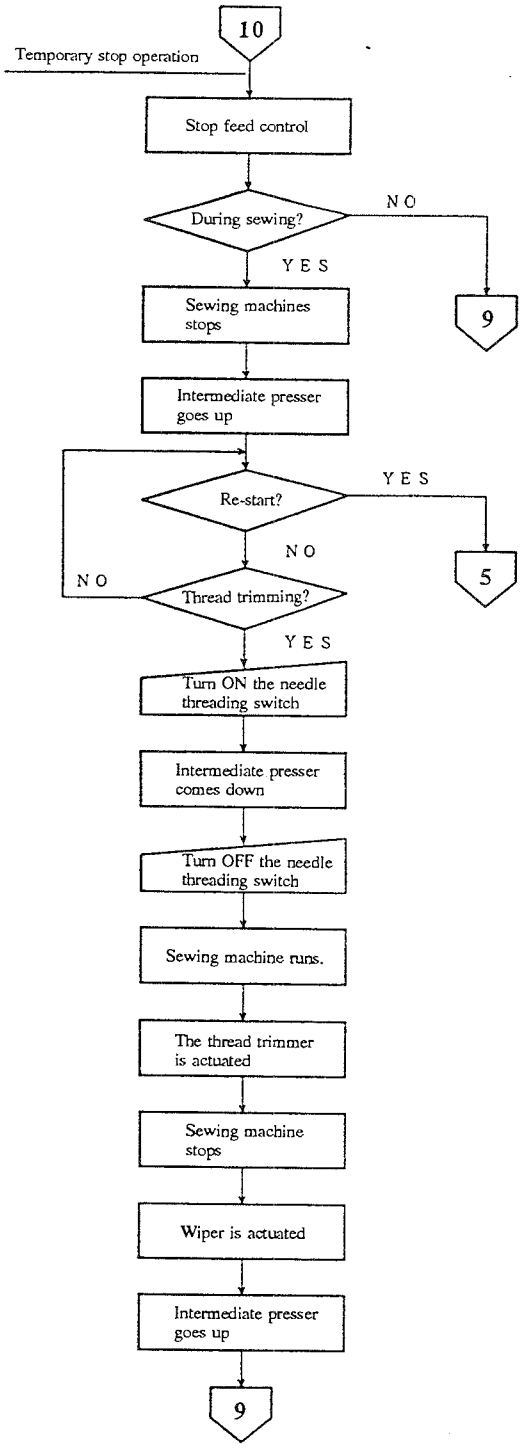


Thread tension balanced?

Returns to the 2nd origin, if it has been set.

Reset the Counter.


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
NO
Return to origin?
YES
5
NO
NO
Feed forward/ backward?
Turn ON the return to origin switch
YES
Turn ON the forward/ backward switches
Move to the sewing start point
Move to the 2nd origin, if it has been set.
Feed control
Feeding frame goes up
7



Eliminate the cause of the temporary stop.

3-7. 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
6.6 - 9.0	800
6.3 - 6.5	1,000
5.3 - 6.2	1,100
5.0 - 5.2	1,200
4.7 - 4.9	1,300
4.4 - 4.6	1,400
4.1 - 4.3	1,500
3.7 - 4.0	1,600
3.5 - 3.6	1,700
3.3 - 3.4	1,800
3.2	1,900
0.1 - 3.1	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

4-1. Sewing machine

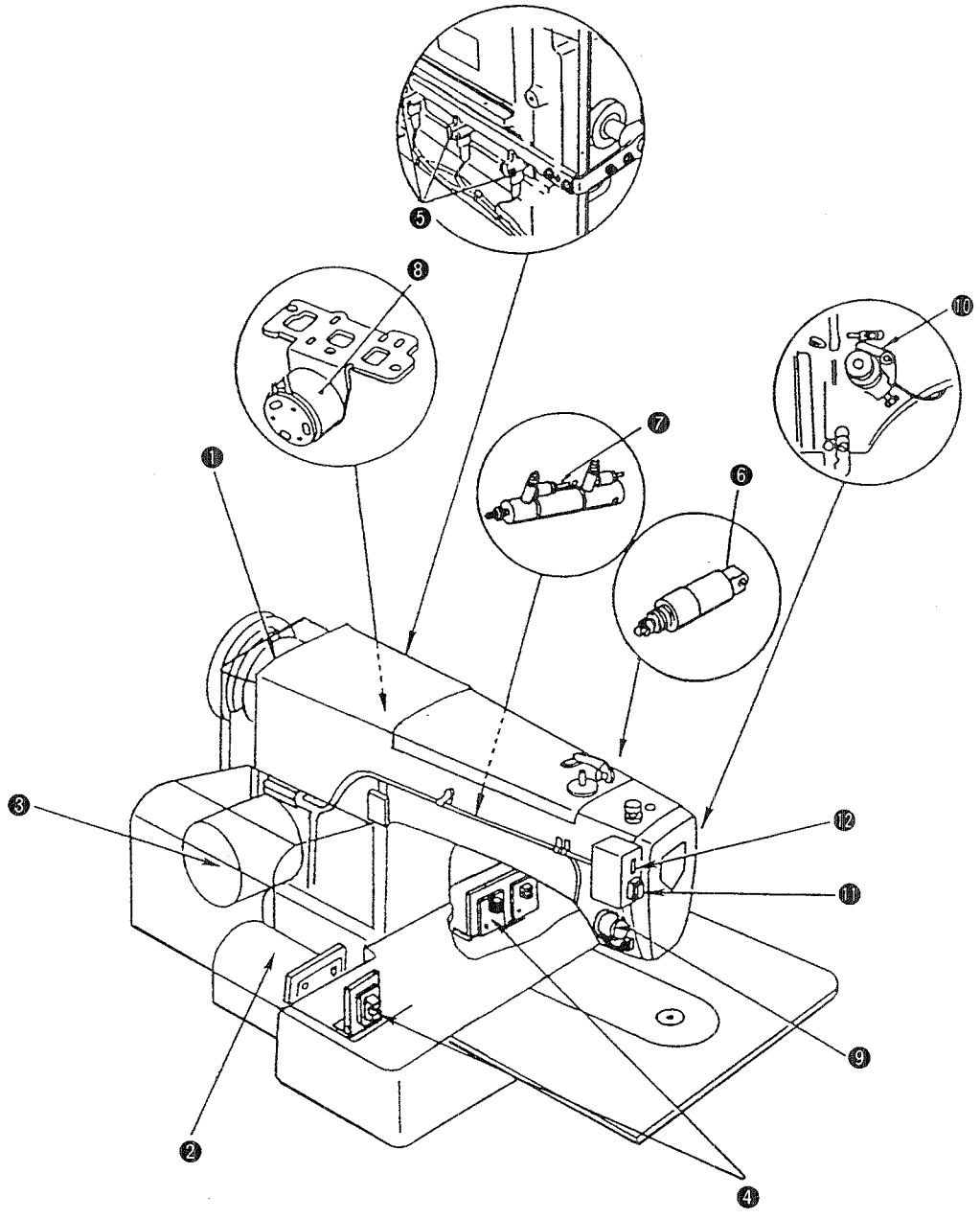


Fig. 4-1

❶ Synchronizer
❷ X-axis stepping motor
❸ Y-axis stepping motor
❹ X-axis sensor
❺ Y-axis sensor
❻ Work clamp foot cylinder
❼ Intermediate presser lifting cylinder
❽ Thread trimmer solenoid
❾ Wiper solenoid
❿ Thread breakage detector
⓫ Temporary stop switch
⓬ Wiper switch

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 position, and also detects the sewing speed, after which it sends input signals to the control box based on the detection results.

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

❸ **Y-axis stepping 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, and stop.

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

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

4-2. Control box

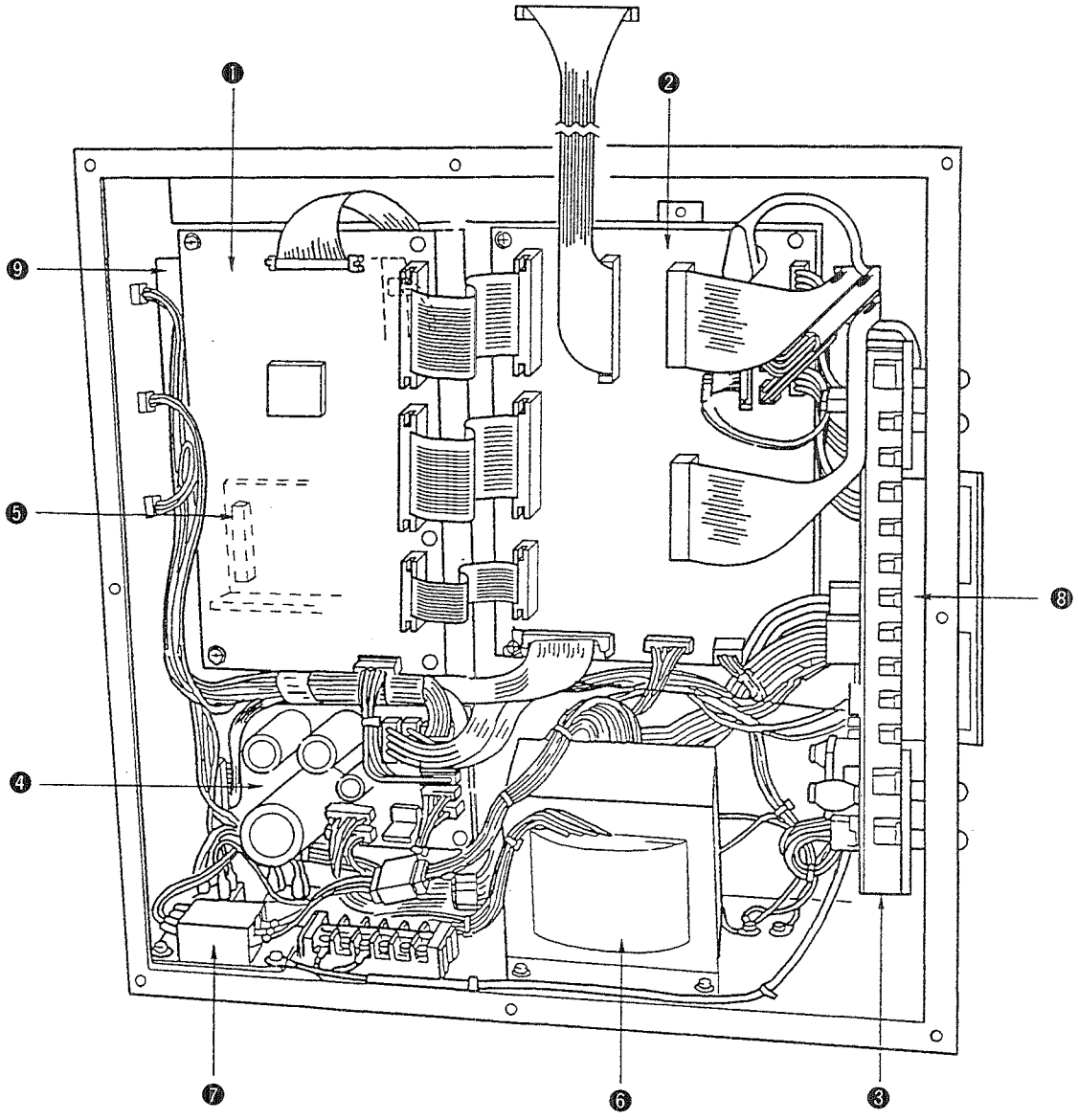


Fig. 4-2

❶ CPU circuit board
❷ I/F circuit board
❸ PMDC circuit board
❹ Power circuit board
❺ Switching regulator
❻ Transformer
❼ Fuse box
❽ Cooling fan
❾ Floppy disk driver

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

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

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

Power circuit board
Rectifies and stabilizes the outputs received 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

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

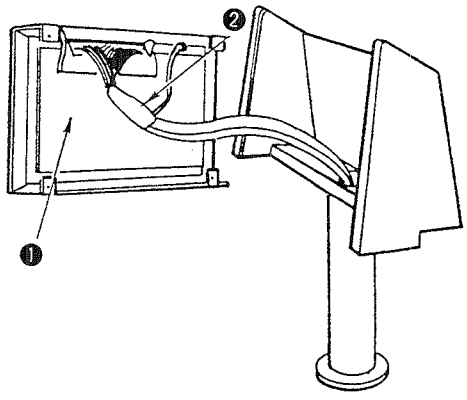
⑥ Transformer
Delivers 24V AC to drive the solenoids, 50V AC for the stepping motor actuator, 100V AC for the cooling fan and switching regulator, and 4.5V AC for the marking light.

⑦ 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.

⑧ Cooling fan
Used to cool the elements, taking in fresh air from outside the machine.

⑨ 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.

4-3. Operation panel



❶ Operation circuit board
❷ Operation panel relay cable

Fig. 4-3

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.

4-4. Motor

A 400W, 4-pole electronic-stop motor is used for the sewing machine motor. The clutch brake disk components are compatible with a general lockstitch sewing machine motor.

1. Structure of the motor and how the motor speed is changed
   The following diagram shows the structure of the electronic-stop motor. As long as the power of the machine stays ON, the motor (rotor, flywheel, and clutch disk) runs constantly. The clutch ring is connected to the output shaft through the splines, so it rotates together with the output shaft, and can slide crosswise.
   When the clutch coil is energized, lines of magnetic force are produced as shown by the solid line arrow, and the clutch ring is pressed against the clutch disk, thereby transmitting the motor rotation to the output shaft. When the brake coil is energized, lines of magnetic force are produced as shown by the broken line arrow, and the brake ring is pressed against the brake disk (constructed integral with the pulley side bracket, and does not turn), thus stopping the rotation of the output shaft.
   At medium speed, the clutch coil and the brake coil are energized for a short period of time alternately for rotation.

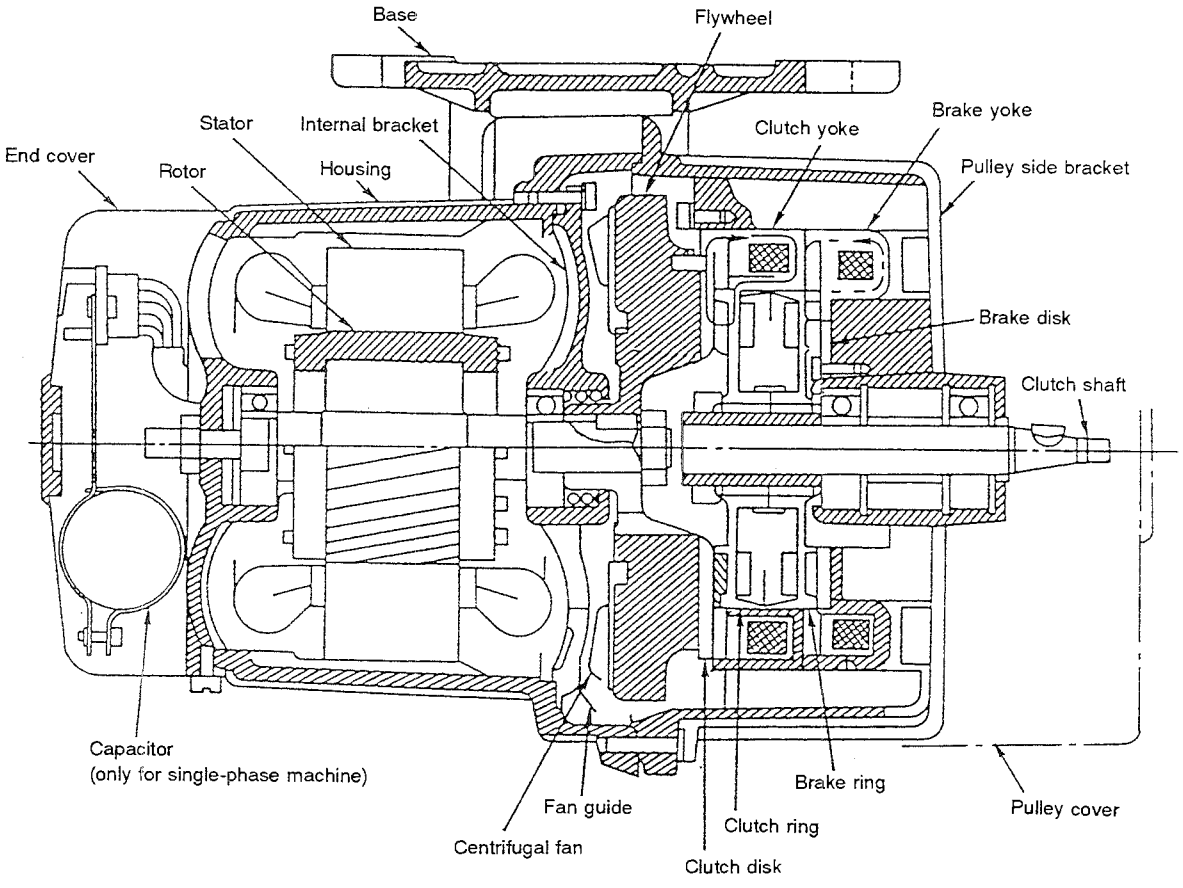


Fig. 4-4 Structure of Electronic-stop Motor

5. ADJUSTMENTS

5-1. Mechanical parts

STANDARD ADJUSTMENTS

(1) Checking the direction of rotation of the handwheel

After confirming that the READY indicator lamp has lit up, set the bobbin winder switch to "ON", and press the start switch. At this time, the handwheel should turn counterclockwise (in the direction of the arrow) as observed from the pulley side. If the handwheel turns in the reverse direction, error E will be indicated, and the machine will stop.

[Caution]

Be sure to check the direction of rotation of the handwheel after the machine has been installed or the powers supply wiring of the machine has been completed.
Do not start sewing unless the direction of rotation of the handwheel has been confirmed as correct.

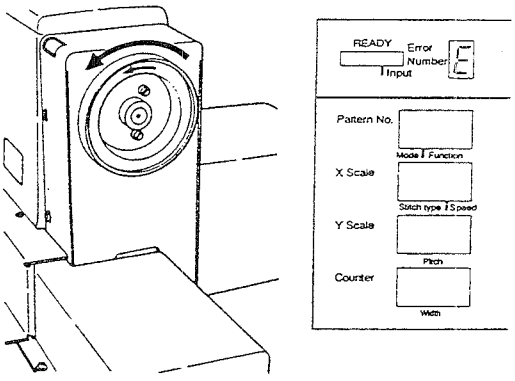


Fig. 5-1-1

(2) Height of the needle bar

Bring the needle bar to the lowest dead point in its stroke. Adjust so that the bottom end of the needle bar lower bushing is aligned with the upper marker line (for a DP×5 or DP×17 needle).

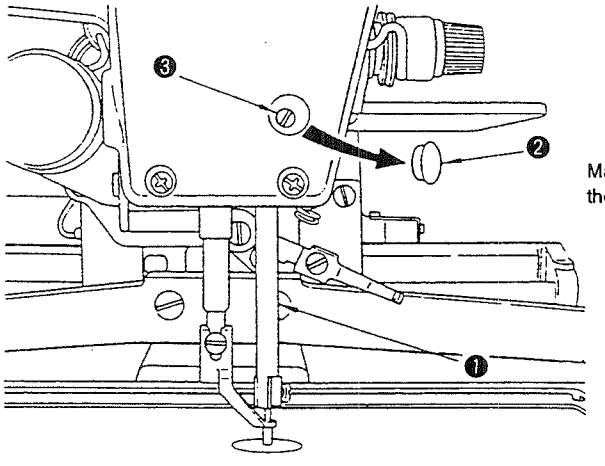


Fig. 5-2-1

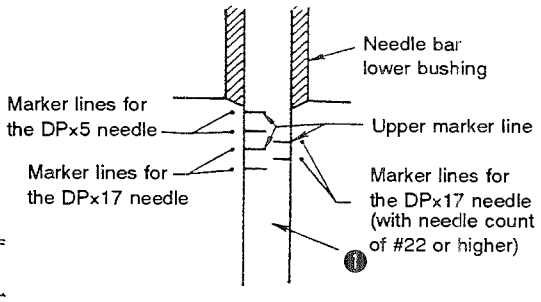
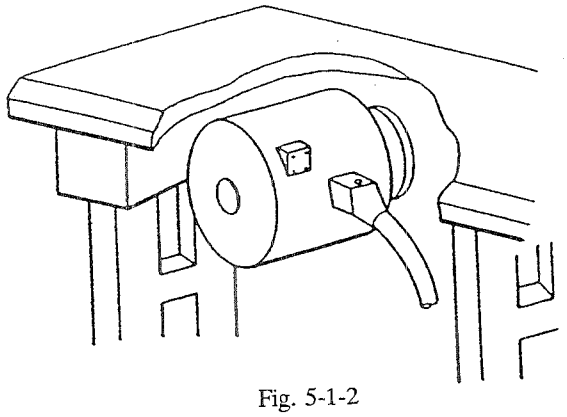


Fig. 5-2-2

[Caution]

The marker lines for DP×17 (#22 or higher count) are only engraved on the needle bar of the sewing machine of which specification code G.

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o If the handwheel turns in the reverse direction, disconnect the motor power plug, and reconnect it reversed.  Fig. 5-1-2	o If the handwheel turns in the opposite direction, the machine will stop showing the error [E]. In this case, the power switch can be turned OFF, but no other switch can be operated.
1) Turn ON the needle threading switch (the READY lamp lights up), and turn the handwheel by hand until the needle bar reaches its lowest dead point. 2) Remove rubber plug ❷ from the face plate. 3) Loosen needle bar connection setscrew ❸, and adjust the height of the needle by raising or lowering the needle bar ❶. 4) After making the adjustment, securely tighten setscrew ❸. 5) Turn OFF the needle threading switch. (The needle bar will return to its upper resting position.) 6) Attach rubber plug ❷ to the face plate.	o Stitch skipping or thread breakage may occur.

(3) Stop position of the main shaft

When the main shaft stops, marker dot ❶ on the machine arm should be midway between marker dot No. 1 ❷ and marker dot No. 2 ❸ on the handwheel. For the sewing machine of which specification code is G, adjust so that marker dot ❶ engraved on the machine arm rests between upper blue marker dot ❺ and lower marker dot ❻ engraved on the handwheel when the sewing machine stops.

[Caution]

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

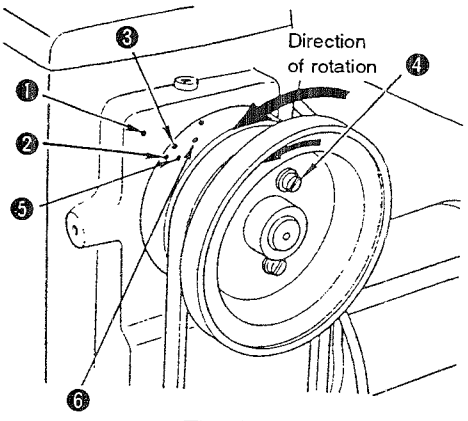


Fig. 5-3-1

(4) Height of the intermediate presser

1) Make sure that the sewing pattern data has been read and the sewing indication LED (READY lamp) has lit up before setting the workpiece on the machine.
2) Make sure that the needle entry point is in the center of intermediate presser ❶.
3) Set Needle threading switch ❷ in the control box to the side. The feeding frame and intermediate presser will then come down.
4) Turn the handwheel by hand until the needle bar reaches the lowest dead point of its stroke. Adjust so that a 0.5 mm (standard adjustment value) clearance is obtained between the top end of the intermediate presser and the workpiece.
5) After making the adjustment, set Needle threading switch ❷ to the side. The machine will then run until it reaches the needle-up stop position. (The maximum thickness of the material to be sewn using the intermediate presser is 5 mm.)

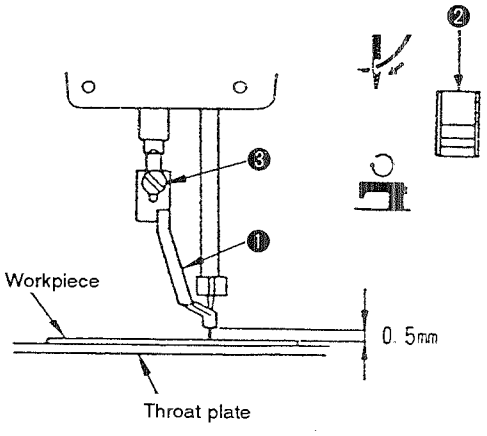
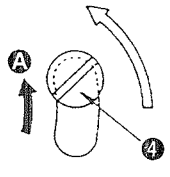
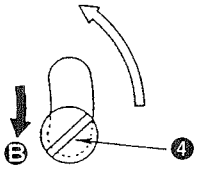
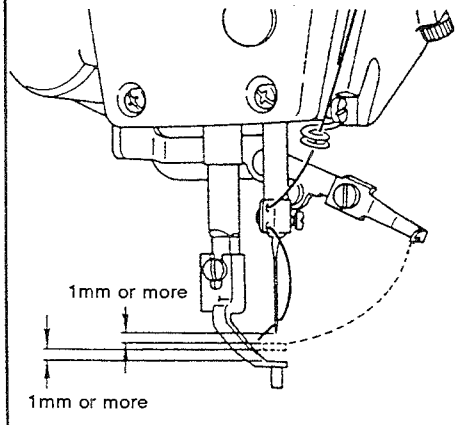


Fig. 5-4-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen solenoid mounting base setscrew ❹. 2) If the main shaft stops prematurely before marker dot No.1 ❷ or ❺ on the handwheel reaches marker dot ❶ on the machine arm, move setscrew ❹ in the direction of arrow Ⓑ and then tighten the setscrew in that position. On the other hand, if the main shaft stops after marker dot No. 2 ❸ or ❻ passes beyond marker dot ❶, move setscrew ❹ in the direction of arrow Ⓐ, and then tighten the setscrew in that position. 3) Repeat step 1), 2) until marker dot ❶ on the machine arm is located between marker dot No. 1 ❷ or ❺ and marker dot No. 2 ❸ or ❻ on the handwheel when the main shaft stops. 4) Securely tighten solenoid mounting base setscrew ❹. Direction of rotation  The marker dot ❶ on the machine arm stops at the marker dot No. 1 side on the handwheel. Direction of rotation  The marker dot ❶ on the machine arm stops at the marker dot No. 2 side on the handwheel.	o If the main shaft stops before marker dot ❶ reaches marker dot No. 1 ❷ or ❺ on the handwheel: Thread trimming operation cannot be completed (the main shaft stops before the moving knife meets the counter knife), leading to thread trimming failure. o If the main shaft stops after marker dot No. 2 ❸ or ❻ passes beyond marker dot ❶ on the machine arm: A clearance of 1 mm or greater shown in the figure cannot be obtained, and the wiper and intermediate presser will come in contact with the needle, which may cause the needle to bend or break. 
o Loosen intermediate presser setscrew ❸, and adjust the height of the intermediate presser following the procedure stated on the left. Upon completion of the adjustment, tighten the setscrew. [Be sure to adjust the height of the intermediate presser according to the thickness of the material or the type of thread to be used so that the material does not flap during sewing. When sewing floppy material, adjust so that there is no clearance (0 mm).] o After adjusting the height of the intermediate presser, be sure to check the position of the wiper (Refer to "STANDARD ADJUSTMENTS (9).")	o If the clearance is too great: Stitch skipping may occur. o If the clearance is too small: Loose stitches may result.

(5) **Feed bracket**

Adjust the clearance between the feeding frame and the surface of the throat plate when the feeding frame is in its upper resting position. (Maximum clearance 30 mm.)

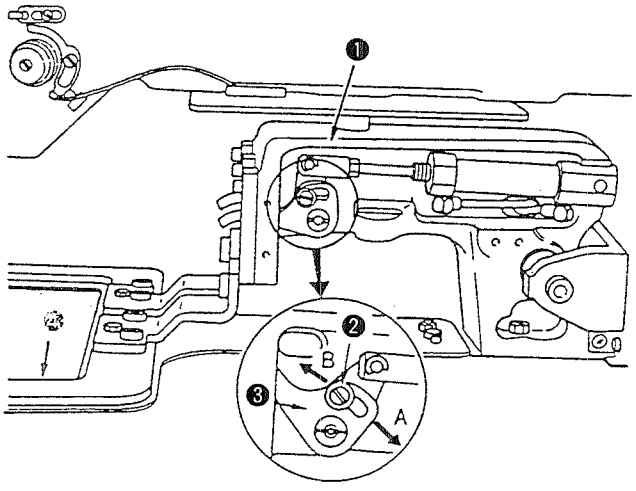


Fig. 5-5-1

(6) **Shuttle race spring**

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

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

[Caution]

If section Ⓑ is damaged, thread breakage or thread splitting might occur, or the thread might become dirty. Be sure to buff both faces of section Ⓑ. Be sure to buff the back side of the spring with care.

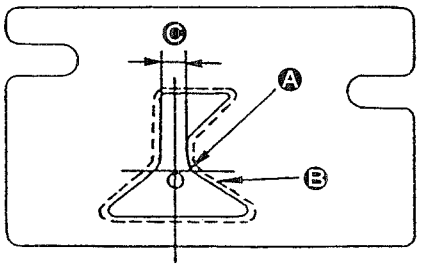
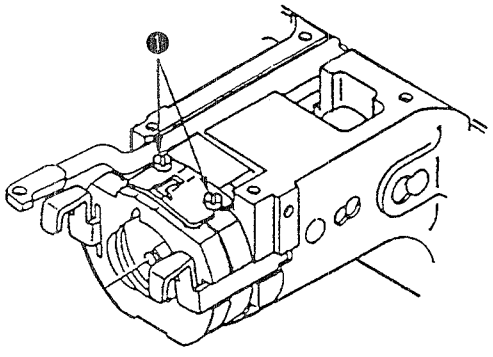


Fig. 5-6-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screw ❷ which is located in the right-hand or left-hand side of feed bracket ❶. Shifting lever ❸ in the direction arrow A will increase the height of feeding frame ❹ or in the direction arrow B will decrease the height of the feeding frame. 2) After the adjustment of the height of the feeding frame, securely tighten screw ❷.	o If the lift of the feeding frame is too small: The material cannot be set easily. o If the lift of the feeding frame is too great: The correct positioning of the material will be difficult when you try to set the material.
o Remove the feeding frame, feed plate and throat plate. Then adjust the position of the shuttle race spring using 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. 5-6-2	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.

(7) Timing between the needle and the shuttle

1) Needle bar timing
The bottom end of the needle bar lower bushing is aligned with the lower marker line (for a DPx5 or DPx17 needle) when the needle goes up. (Fig. 5-7-1)

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

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

4) Clearance between the needle and the blade point of the shuttle
Under the condition described in step 2) above, a 0.05 to 0.1 mm clearance Ⓑ will be obtained between the needle and blade point of the shuttle. (Fig. 5-7-4)

5) Clearance between the needle and the shuttle race
The clearance between the side face of the needle and the shuttle race is a 7.5±0.2 mm (when a #14 DPx5 or DPx17 needle is used). (Fig. 5-7-5)

6) Clearance between the shuttle and shuttle driver
The clearance between the shuttle and the shuttle driver is 0.5 to 0.7 mm. (Fig. 5-7-2)

1) Needle bar timing

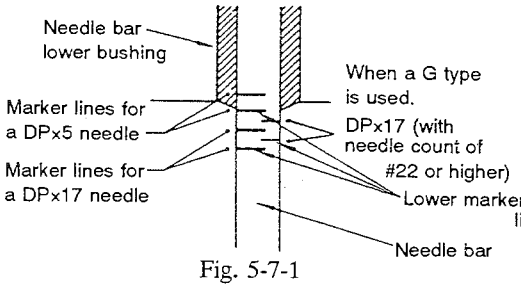


Fig. 5-7-1

2) Shuttle timing

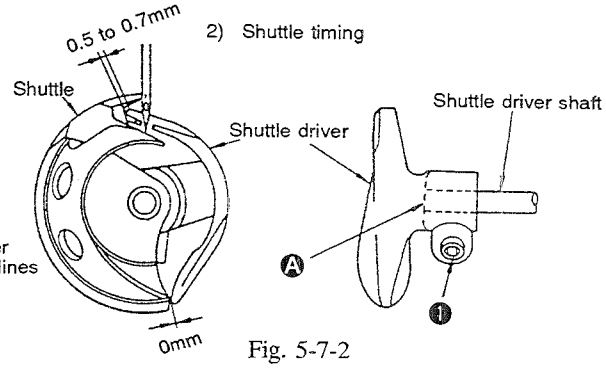


Fig. 5-7-2

3) Clearance between the needle and the shuttle driver

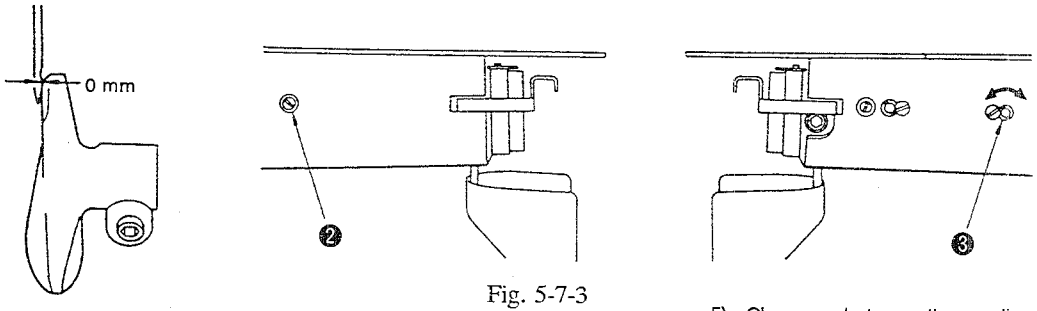


Fig. 5-7-3

4) Clearance between the needle and the blade point of shuttle

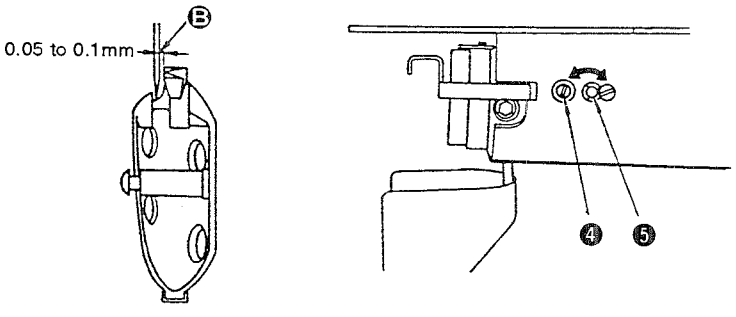


Fig. 5-7-4

5) Clearance between the needle and the shuttle race

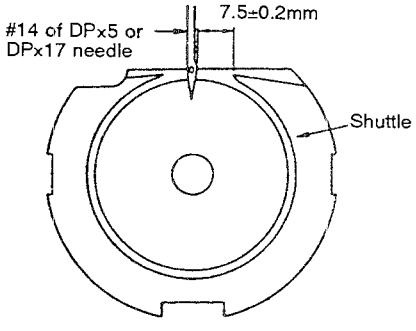


Fig. 5-7-5

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Refer to "STANDARD ADJUSTMENTS (7)-1)," and adjust so that the lower marker line (for a DP×5 or DP×17 needle) is aligned with the bottom face of the needle bar lower bushing. 2) Loosen driver setscrew ❶, and adjust the direction of rotation and the longitudinal direction referring to "STANDARD ADJUSTMENTS (7)-2)." **[Caution]** **When adjusting the shuttle timing, be sure to turn the shuttle in the direction of the arrow as shown in Fig. 5-7-2.** 3) Loosen lower bushing setscrew ❷, and turn lower bushing adjusting shaft ❸ to adjust so that there is no clearance between the needle and the front end of the shuttle driver. **[Caution]** **If the needle needs to be replaced according to a change in the type of needle, be sure to adjust the clearance between the needle and the shuttle driver. Since there are bound to be bent or damaged needles, be sure to check the shuttle timing after a needle has been replaced.** 4) Loosen shuttle race setscrew ❹, and adjust the clearance between the needle and the blade point of the shuttle by turning adjusting shaft ❺. 5) Loosen shuttle race setscrew ❹, and adjust the clearance between the needle and the shuttle race. Use great care when adjusting the clearance between the needle and the blade point of the shuttle described in step 4). [When sewing with a thin type of thread such as #50 or a greater count, be sure to adjust the clearance so that it is *7.0 to 7.3 mm after the standard adjustment of the position of the shuttle race spring has been completed.] **[Caution]** **Strike portion Ⓓ to adjust the clearance between the shuttle and the shuttle driver to 0.5 to 0.7 mm as shown in Fig. 5-7-2. After making the adjustment, be sure that portion Ⓒ is positioned equidistantly (clearance Ⓔ and Ⓕ should be equal) and vertically with respect to the shuttle.**	1), 2) For sewing floppy material, adjust the shuttle timing so that it is slightly slower than the standard shuttle timing. On the other hand, for sewing heavy-weight material, adjust the shuttle timing so that it is slightly faster than the standard timing (to prevent stitch skipping.) 3) If the clearance is greater than 0 mm, the needle will be bent by the blade point of the shuttle, resulting in scratches on the blade point of the shuttle and the needle. On the other hand, if the needle has excessive contact with the shuttle driver, stitch skipping may occur. 4) If the clearance exceeds the specified range (0.05 to 0.1 mm), stitch skipping may occur. If the clearance is inadequate, the needle will bit the blade point of the shuttle, causing scratches on the needle and the blade point of the shuttle. The scratches may cause the thread to bread or split finely. 5) If the clearance is less than 7.5 mm, poor needle thread spreading may result, often leading to the needle thread biting into the shuttle. [When sewing with a thinner type of thread, such as #50 or a greater count, adjust the timing between the needle and the shuttle race so that it is 7.0 to 7.3 mm (the clearance marked with an asterisk *). Otherwise, the thread easily bite into the shuttle.] o If the clearance between the shuttle driver and the shuttle exceeds the specified range (0.5 to 0.7 mm), the shuttle will produce loud noises. On the other hand, if the clearance is inadequate, the needle thread will fail to smoothly leave the shuttle resulting in an inadequately tensed stitch formation, when sewing with a thick thread.

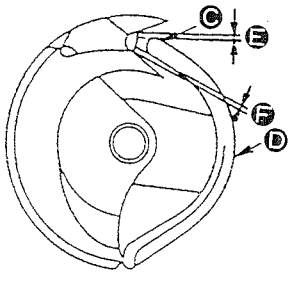


Fig. 5-7-6

(8) Height of the intermediate presser adjusting screw

The clearance A between the bottom of the intermediate presser adjusting screw and the top of the intermediate presser adjusting screw nut is 10±1 mm.

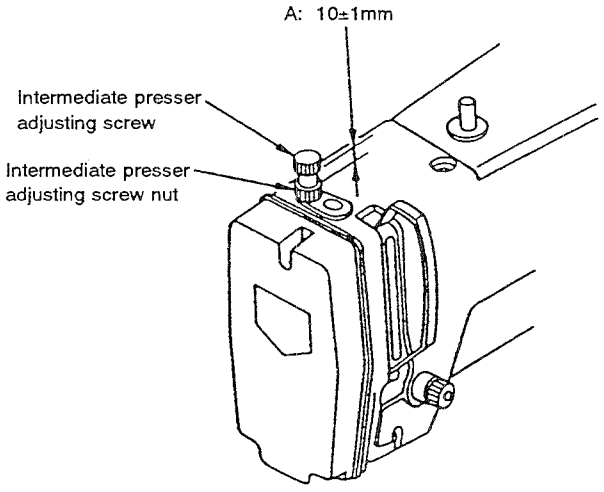


Fig. 5-8-1

(9) 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.

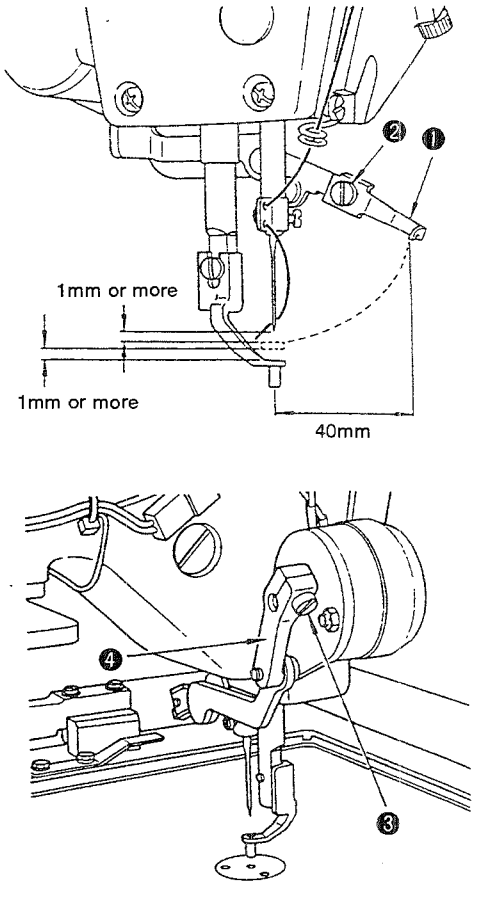


Fig. 5-9-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Loosen the adjusting screw nut, and turn the adjusting screw to make the adjustment. After making the adjustment, securely tighten the adjusting nut. o Adjustable range Ⓐ of the intermediate presser adjusting screw is 0 to 11 for the sewing machine of which sewing specification is S or 0 to 29 mm for the sewing machine of which sewing specification is H or G.	o If the adjusting screw is excessively tightened: The intermediate presser will fail to go up upon completion of a sewing cycle. o If the adjusting screw is inadequately tightened: A functional failure of the intermediate presser mechanism may result. **[Caution]** **This adjustment is made to obtain the proper pressure of the intermediate presser. This adjustment is not directly related to the machine's sewing ability. It is advisable not to make this adjustment too often so as to prevent the intermediate presser assembly from becoming damaged.**
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.

(10) Length of thread remaining on the needle

The length of thread remaining on the needle after thread trimming is 35 to 40 mm measured from the needle eye.
For synthetic thread, the length of thread remaining on the needle should be increased.

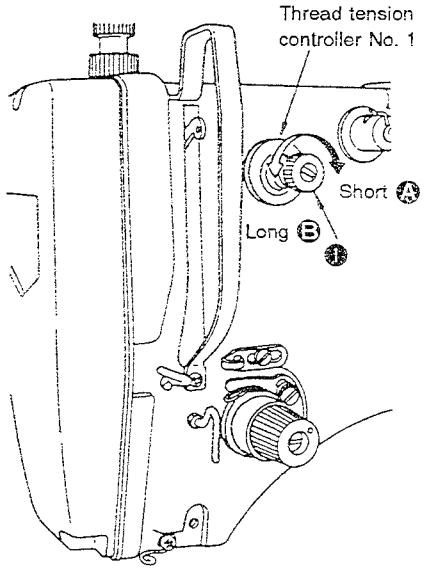


Fig. 5-10-1

(11) Thread take-up spring

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

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

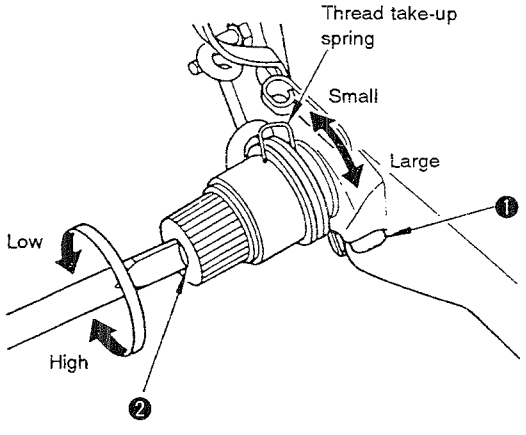


Fig. 5-11-1

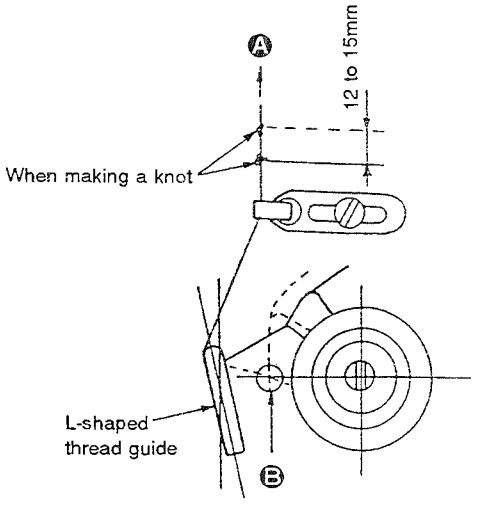


Fig. 5-11-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
Adjust tension controller No. 1. o Turning it in direction Ⓐ decrease the length of thread remaining on the needle. o Turning it in direction Ⓑ increases the length of thread remaining on the needle. **[Caution]** **If the tension release timing is delayed at the time of thread trimming, the thread remaining on the needle will be cut too short. Refer to "STANDARD ADJUSTMENTS (19)."** **The thread remaining on the needle may also be cut too short, if the thread take-up spring does not work normally. Refer to "RESULTS OF IMPROPER ADJUSTMENT (11)."**	o If the thread remaining on the needle is too short: The thread may slip off the needle at the sewing start. o If the thread remaining on the needle is too long: The thread may appear on the right side of the material, or make the wrong side of the material look messy. The thread may also bite into the shuttle at the sewing start.
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. 5-11-1) **[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. 5-11-2)**

(12) Thread breakage detector

1) The thread breakage detecting disk should be always in contact with the thread take-up spring in the absence of thread on the machine head. (The slack of the thread take-up spring should be about 0.5 mm.)
2) The thread breakage detecting disk should not be in contact with any other metallic parts except the thread take-up spring.

[Caution]

Whenever the stroke of the thread take-up spring has been changed, the thread breakage detecting disk must be readjusted.

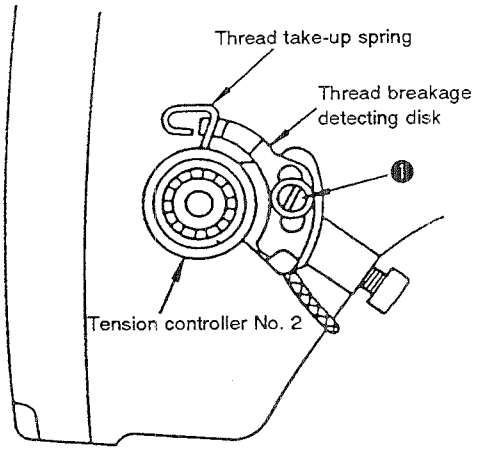


Fig. 5-12-1

(13) Moving knife and counter knife

1) When the sewing machine stops with its needle up, the clearance provided between the loop spreading portion of the moving knife and the end of the needle eyelet is 4.5 mm for the S or H type machine, or 6 mm for the G type machine.
2) The clearance provided between the counter knife and the needle hole guide is 0.8 mm for the S or H type machine, or 1.5 mm for the G type machine.

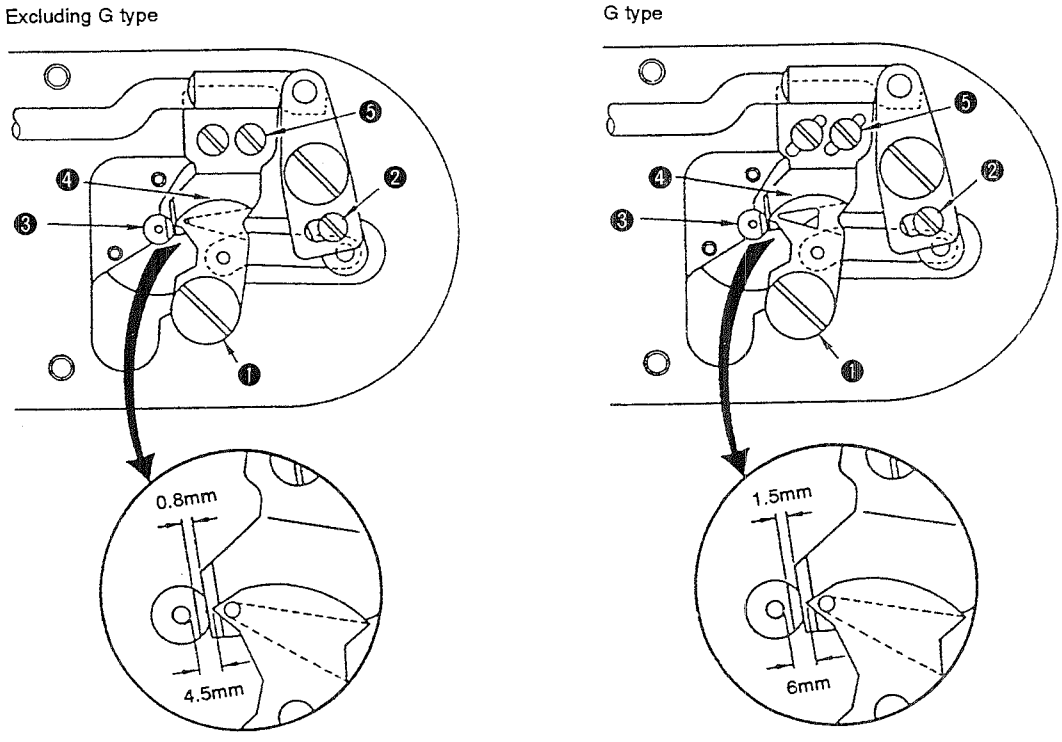


Fig. 5-13-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen setscrew ❶. 2) Move the thread breakage detecting disk adjustment as described at left. After adjustment, tighten the setscrew.	1) If the thread breakage detecting disk is not in proper contact with the thread take-up spring, the sewing machine would fail to stop even when the thread breaks. 2) If the thread breakage detecting disk is falsely in contact with a metallic part other than the thread take-up spring, the sewing machine would stop immediately even when it is started.
1) When the sewing machine stops in the upper stop position, loosen adjusting screw ❷ and adjust clearance between the thread spreader of moving knife ❶ and the edge of needle eyelet. 2) After the adjustment, manually actuate the thread trimmer to check for proper position. 3) Loosen screw ❺, and adjust clearance between the needle hole guide ❸ and the counter knife ❹.	o If the clearance provided between the counter knife and the needle hole guide is smaller than the specified value: The threads may be falsely trimmed by the blade point of the counter knife when they are pulled by the moving knife. As a result, both the needle and bobbin threads would be trimmed too short. o If the clearance provided between the counter knife and the needle hole guide is larger than the specified value: The longer thread may be left on the fabric after thread trimming, the thread trimmer may fail to trim the threads. o If the clearance provided between the counter knife and the needle hole guide is larger than the specified value: The unreliable thread spreader may result with consequent thread trimming failures. o If the clearance provided between the counter knife and the needle hole guide is smaller than the specified value: The thread trimming failures may result. The needle thread may be caught on the end of the moving knife preventing the proper stitch formation. The needle may hit the moving knife and may brake. The bobbin runs idling excessively.

Section to be adjusted (Refer to p.39 (13)) / Sewing specification	1)	2)
S • H	4.5 mm	0.8 mm
G	6 mm	1.5 mm

(14) 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. 5-13-1) (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)

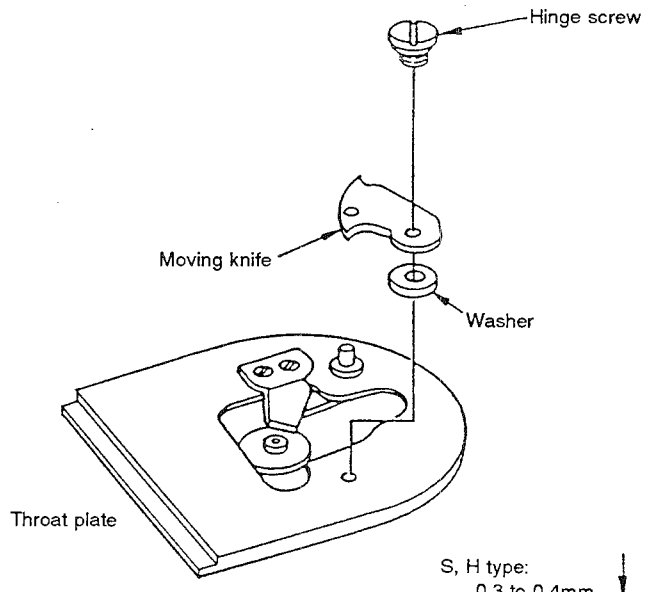


Fig. 5-14-1

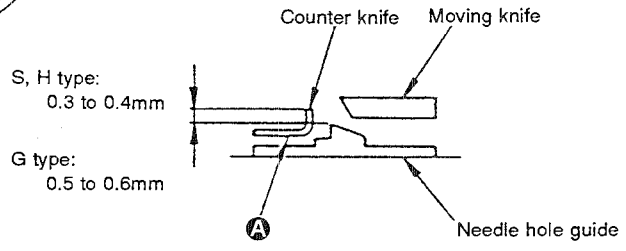


Fig. 5-14-2

- 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.

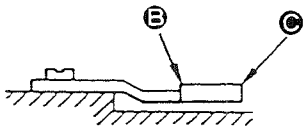


Fig. 5-14-3

{ 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.

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

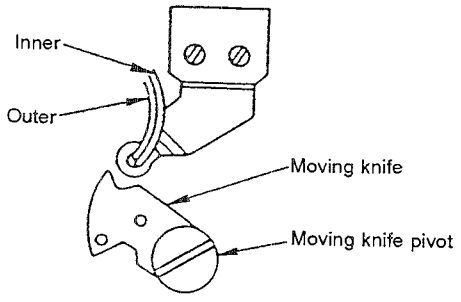


Fig. 5-14-4

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. 5-14-2) 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.

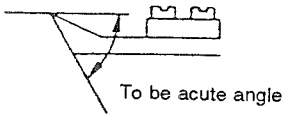


Fig. 5-14-5

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

(15) Thread trimming cam

1) When part Ⓐ of the cam follower is pushed down to maximize the clearance between the follower stopper and the cam follower, the clearance should be 0.3 mm. (Fig. 5-15-2)
2) The marker line on the thread trimming cam should be aligned with the marker dot on the main shaft with respect to the direction of rotation. (Fig. 5-15-6)
3) Install thread trimming link spring peg so that hole for the spring peg is vertically positioned and fix it to the bed with small screw. At this time, the small screw head should enter the bed as deep as 0 to 0.5 mm. (Fig. 5-15-3)
4) Put the thread trimming link spring in between the spring peg and the washer of the hinge screw in the thread trimmer connecting rod. (Fig. 5-15-4)
5) Adjust the clearance provided between the follower stopper and the cam follower to 0.2 mm. (Fig. 5-15-5)
6) At the time of thread trimming, the thread trimming cam shaft moves in the direction of the arrow. Upon completion of the thread trimming and thread releasing, the thread trimmer clutch mechanism is released when the cam shaft goes beyond the highest dead point of the thread take-up, and the cam follower returns to the end face of the arm.

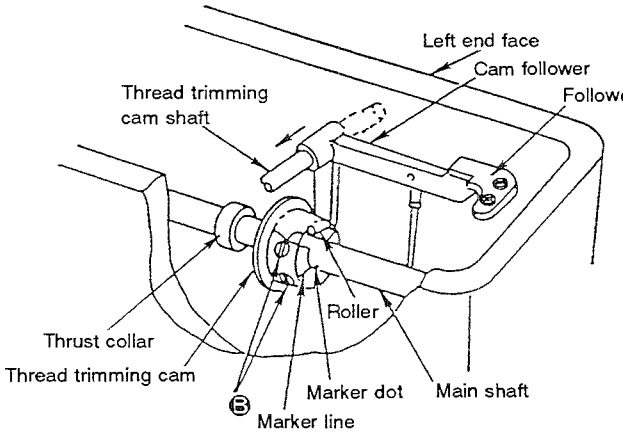


Fig. 5-15-1

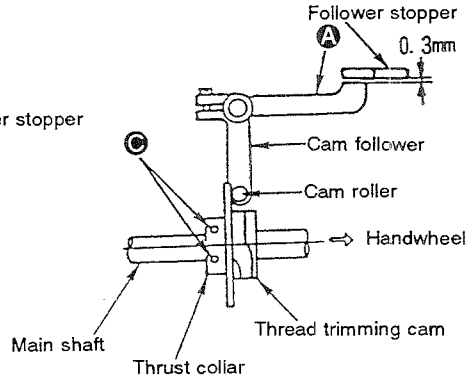


Fig. 5-15-2

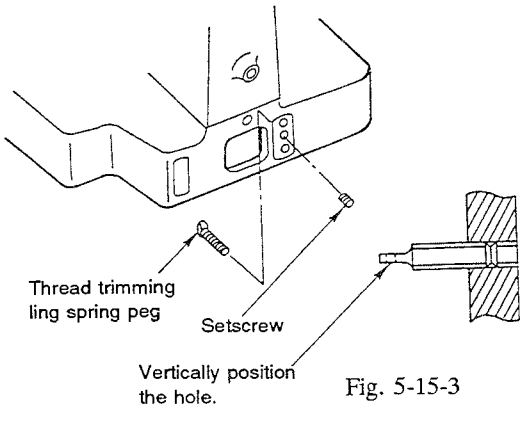


Fig. 5-15-3

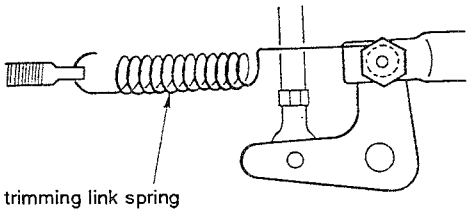


Fig. 5-15-4

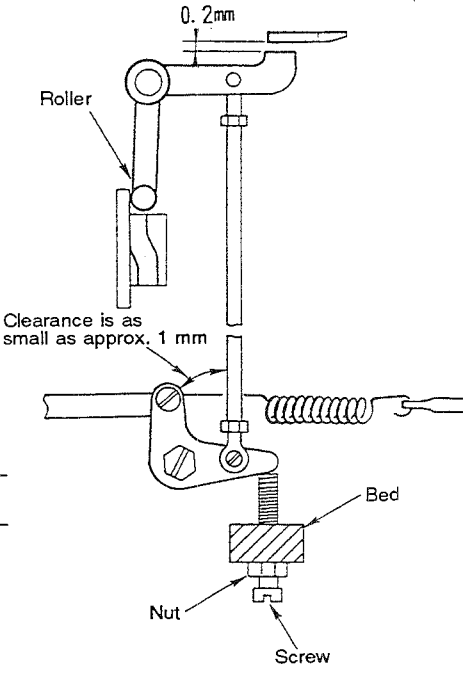
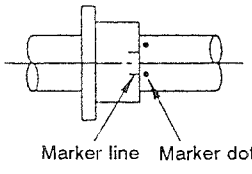


Fig. 5-15-5

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen setscrew Ⓑ and setscrew Ⓒ. 2) Insert a 0.3 mm spacer between the follower stopper and the hook of the cam follower, and pull up portion Ⓐ of the cam follower so that the follower stopper, spacer, and the cam follower will come in close contact. 3) Press the thread trimming cam and the thrust collar against the cam follower roller in the direction of the handwheel. Screw the thrust collar onto the main shaft. 4) Align the marker line on the thread trimming cam with the marker dot on the main cam. Screw the thread trimming cam onto the main shaft while pressing the thread trimming cam against the thrust collar. 5) Install thread trimming link spring peg so that the hole for the spring peg is vertically positioned and fix it to bed with small screw. At this time, the small screw head should enter the bed as deep as 0 to 0.5 mm. 6) Put the thread trimming link spring in between the spring peg and the washer of the hinge screw in the thread trimmer connecting rod. At this time, face the end of screw that has a longer hook toward the thread trimming link and the opening of the hook downward. 7) Place a 0.2 mm thick spacer between the follower stopper and the cam follower and tighten the screw in the thread trimming link stopper until you feel a small load. Now, fix the nut of the thread trimming link stopper. **[Caution]** **Do not use any tool when tightening the screw. Using a tool might extremely reduce the clearance provided between the cam follower stopper and the cam follower.**	1) Thread trimming failure may occur. 2) The machine may lock at the time of the start or thread trimming. 3) The thread cam shaft will fail to return to the start position in time, resulting in a loose stitch formation for the first stitch at the sewing start. **[Caution]** **If the machine locks, be sure to check the play of the main shaft with respect to the shaft direction, position or phase of the thread trimming cam. Also check the related parts.**

(Excluding G type)



(G type)

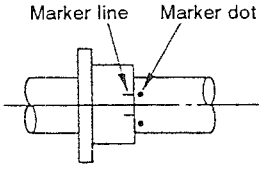


Fig. 5-15-6

(16) Thread trimming mounting base

1) When the cam follower is pushed inward (in the direction of the arrow), clearance Ⓐ between the edge of the thread trimming cam and the tension release shaft arm should be 0.8 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.

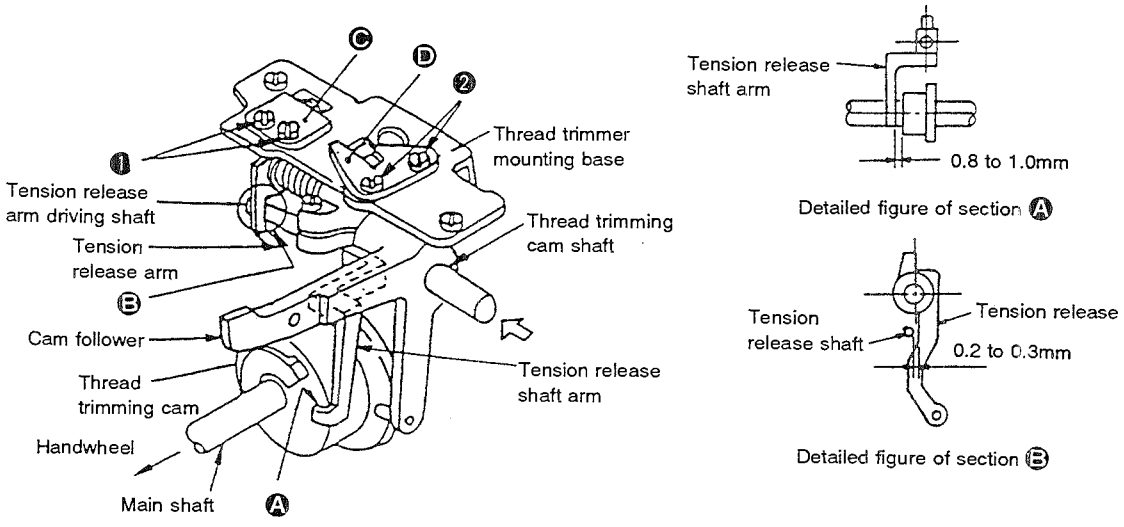


Fig. 5-16-1

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.

(17) Thread trimming magnet arm

When the cam follower is actuated to move in the direction of the shaft by the rotation of the thread trimming 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.

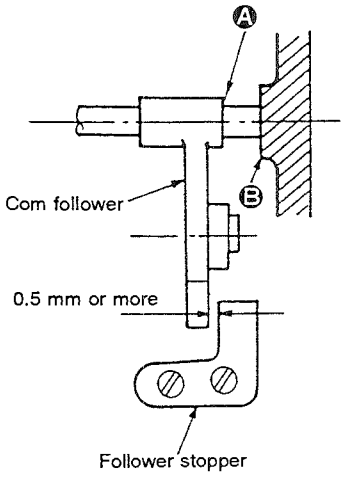


Fig. 5-17-1

(18) 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. 5-18-2)

[Caution]

After making the adjustment, push the thread trimming cam shaft in the direction of the arrow →(Fig. 5-16-1) 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.

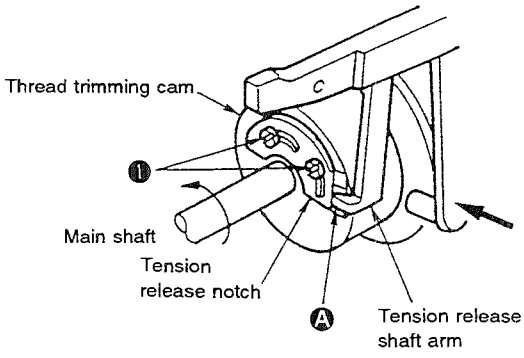


Fig. 5-18-1

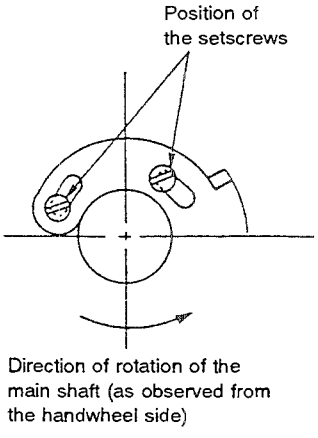


Fig. 5-18-2

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 (46)" on how to make the adjustment.	o Since the thread trimming clutch mechanism is not completely released, thread trimming and tension release will be performed even when the main shaft rotates at high speed. As a result, damage, abrasion, loosening, or play in the corresponding parts may occur. 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 "STANDARD ADJUSTMENTS (18)." 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.

(19) Amount of release of the tension disks

Pressing the thread trimming cam shaft in the direction of the arrow (→), turn the handwheel by hand in the normal direction of rotation until the tension release shaft arm rests on stepped portion Ⓐ of the tension release notch. Now, the rising amount of the tension disk of the tension controller No. 2 should be 0.6 to 0.8 mm for S or H type model of sewing machine or 0.8 to 1.0 mm for G type. (Fig. 5-16-1, Fig. 5-19-1, Fig. 5-19-2)

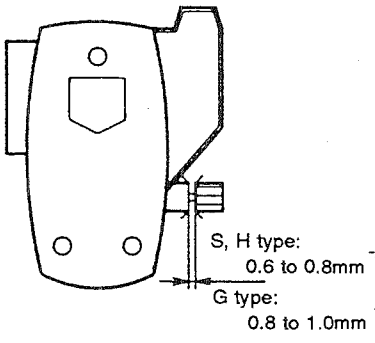


Fig. 5-19-1

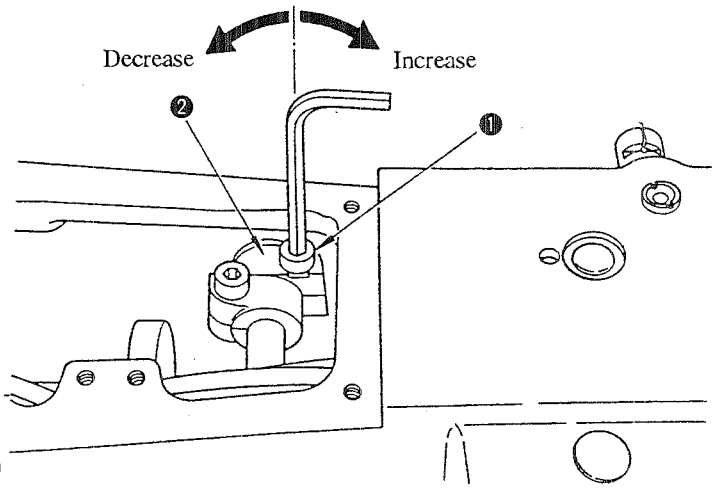


Fig. 5-19-2

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

(20) 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.

- The clearance between the intermediate presser adjusting screw and the nut of intermediate presser adjusting screw should be 10±1 mm for S type model of sewing machine or 5±1 mm for H or G type one. (Fig. 5-20-1)
- The intermediate presser rod should projects 19±0.2 mm (dimension B) from the top end of the intermediate presser bracket for S type model of sewing machine, or 2±0.2 mm for H or G type one.
- The needle should enter the center of the hole in the intermediate presser. (Fig. 5-20-3)
- The air flow adjustment of speed controller (B) mounted on the intermediate presser cylinder has been appropriately made. (Refer to the "STANDARD ADJUSTMENTS (41).")
- The operating air pressure has been adjusted to 5 to 5.5 kgf/cm^2 using the air regulator. (Refer to the "STANDARD ADJUSTMENTS (41).")

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

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

4) When the intermediate presser is in the lowest position of its stroke, the clearance between the bottom face of the intermediate presser and the top face of the intermediate presser bar lower bushing is 3±0.2 mm. Additionally, positioning pin ❹ keeps in contact with the top end of positioning link ❸ while the intermediate presser is actuated. (Fig. 5-20-5, Fig. 5-20-7)

[Caution]

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

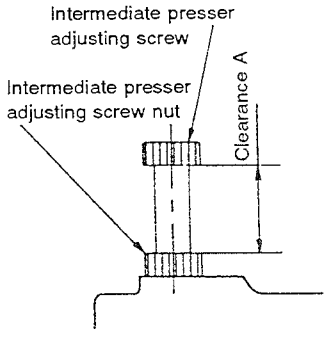


Fig. 5-20-1

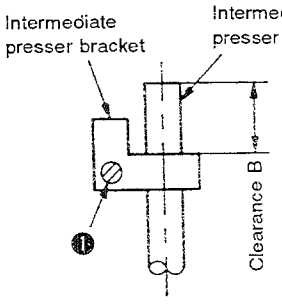


Fig. 5-20-2

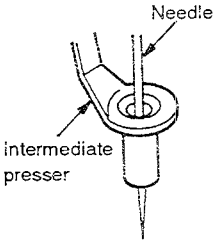


Fig. 5-20-3

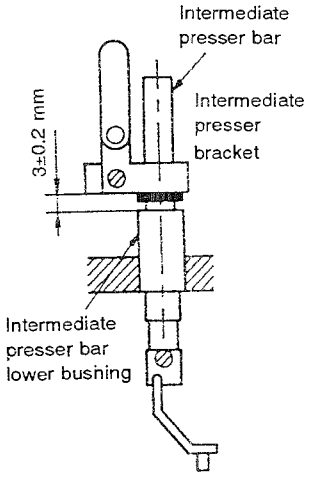


Fig. 5-20-6

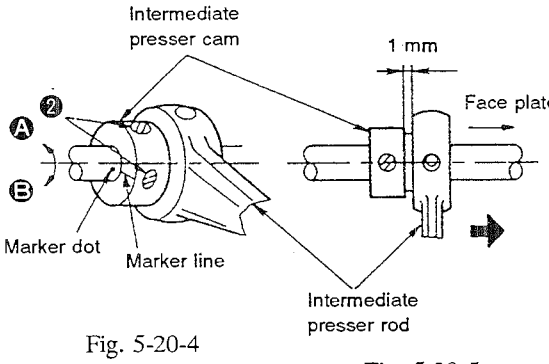


Fig. 5-20-4

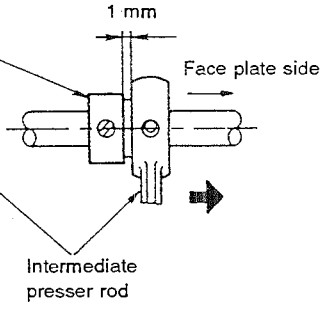


Fig. 5-20-5

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 10±1 mm. (Fig. 5-20-1) o Loosen intermediate presser bracket clamping screw ❶, and adjust the intermediate presser rod so that it projects 19±0.2 mm from the top end of the intermediate presser bracket for S type model of sewing machine, or 2±0.2 mm for H or G type one (Fig. 5-20-3) 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. 5-20-3) 2) Loosen intermediate presser cam setscrew ❷, and make the adjustment referring to the "STANDARD ADJUSTMENTS (20-2)." Then tighten setscrew ❷. For S or H type model of sewing machine, align the marker line engraved on the intermediate presser cam with the marker dot engraved on the main shaft in terms of the normal direction of rotation. For G type one, align the marker line with the marker dot on the main shaft in terms of the reverse direction of rotation. [At the time of delivery, the marker dot is aligned with the marker line and the intermediate presser reaches the lowest position of its stroke at the time when the needle bar reaches the lowest position of its stroke. Move the marker line in direction Ⓐ, and the intermediate presser will reach the lowest position of its stroke earlier than the needle bar will reach its lowest position. On the other hand, move the marker line in direction Ⓑ, and the intermediate presser will reach the lowest position of its stroke later than the needle bar. By making this adjustment, the optimum timing can be obtained in accordance with the type of material to be sewn.] (Fig. 5-20-4) 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 (20)-3). 4) Loosen setscrew ❹ with the needle bar at its lowest dead point (Fig. 5-21-1), and make the adjustment described in the "STANDARD ADJUSTMENTS (20)-4)" by moving intermediate presser oscillating shaft ❺ with intermediate presser positioning link ❸ closely pressed against positioning pin ❹. (Fig. 5-20-7)	1) The intermediate presser may fail to go up after the completion of a sewing cycle. **[Caution]** **Refer to the "RESULTS OF IMPROPER ADJUSTMENT (8)."** 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 (21).")

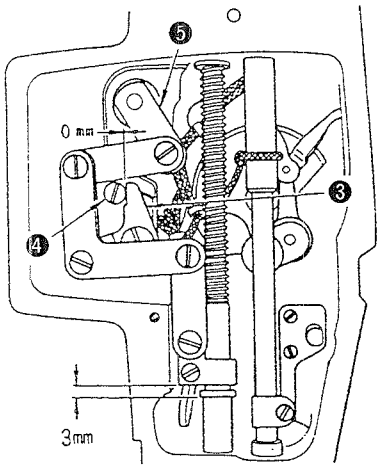


Fig. 5-20-7

(21) Vertical stroke of the intermediate presser

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

Alignment point	Vertical stroke of the intermediate presser (mm)
Furthest point in direction Ⓓ	7
Marker dot Ⓐ	6
Marker dot Ⓑ	5
Furthest point in direction Ⓔ	3

[Caution]
If the vertical stroke of the intermediate presser is changed:
Be sure to check the position of the wiper (refer to the "STANDARD ADJUSTMENTS (9)"). If the wiper has become improperly positioned, be sure to readjust its position. (Fig. 5-21-1)

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

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

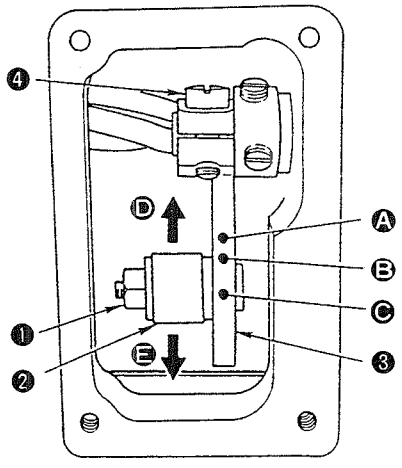


Fig. 5-21-1

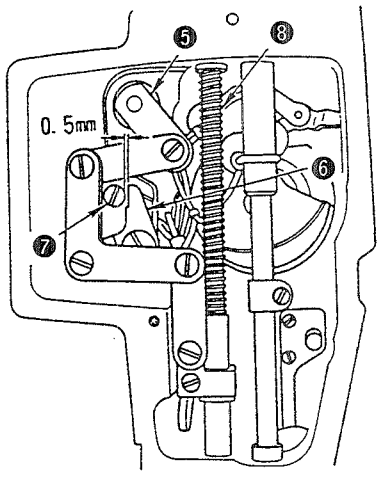


Fig. 5-21-2

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

(22) 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. 5-22-1)

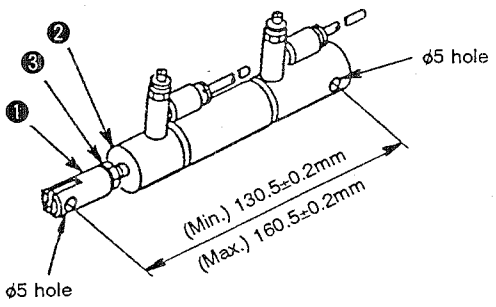


Fig. 5-22-1

(23) Bobbin winding

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

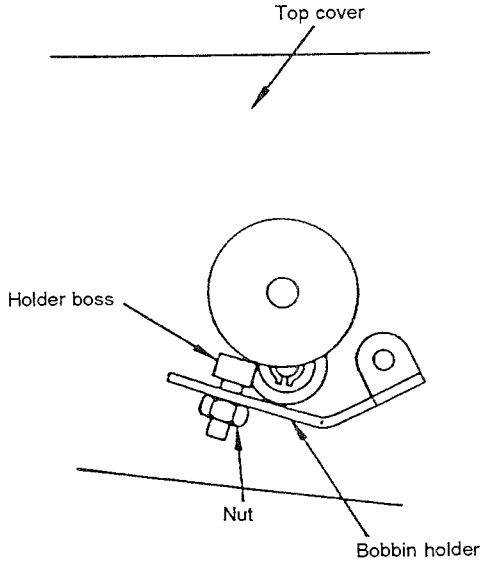


Fig. 5-23-1

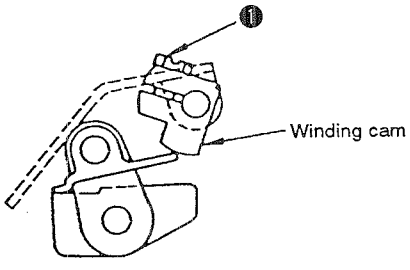


Fig. 5-23-2

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 (22)." After making the adjustment, securely tighten nut ❸ and intermediate cylinder knuckle ❶. (Fig. 5-22-1)	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.
1) Loosen the bobbin holder boss nut. Turn the bobbin holder boss so that the bobbin holder releases the bobbin which has been wound 80% full. After making the adjustment, tighten the nut. 2) If the above adjustment does not work, loosen setscrew ❶ at the rear of the top cover, and adjust the angle of the bobbin holder. After making the adjustment, tighten setscrew ❶.	o An improper amount of thread will be wound on the bobbin.

(24) Bobbin winder driving wheel

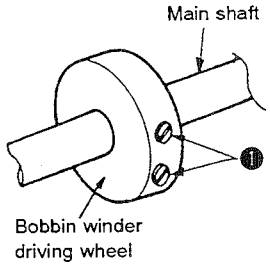


Fig. 5-24-1

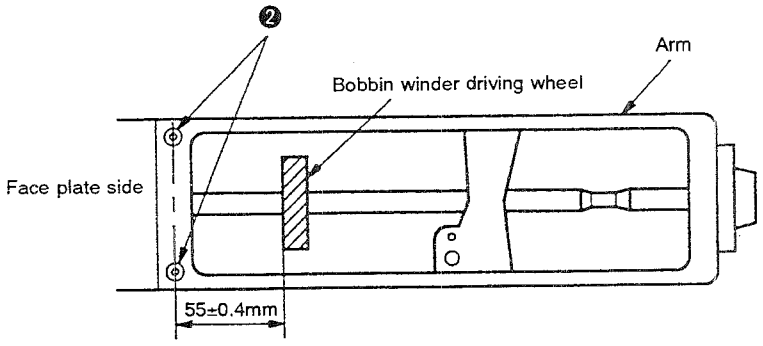


Fig. 5-24-2

(25) Height of the throat plate auxiliary cover

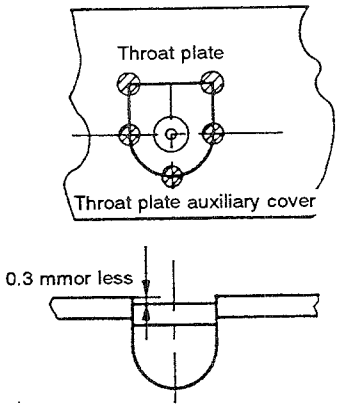


Fig. 5-25-1

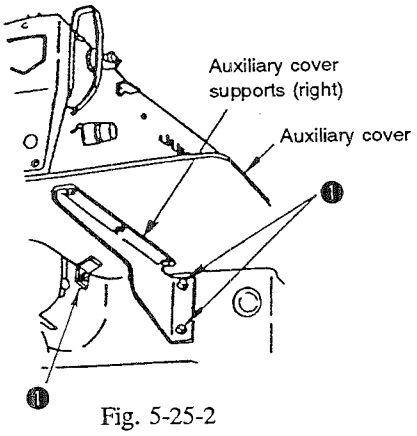


Fig. 5-25-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Loosen setscrews ❶, and adjust so that a 55±0.4 mm distance is obtained from the end face of the bobbin winder driving wheel and the center of the top face of cover attaching tap ❷. Then tighten the setscrews so that the bobbin winder driving wheel is fixed at the position. (Fig. 5-24-1, Fig. 5-24-2)	o The bobbin may fail to spin or the bobbin holder may fail to actuate, even if the bobbin is set on the bobbin winder.
o Loosen six setscrews ❶ (three setscrews in both the left and right) of the throat plate auxiliary cover supports, and adjust so that the throat plate auxiliary cover is positioned higher than the throat plate by 0.3 mm or less. Then tighten the setscrews. At this time, be careful to adjust the points marked by the portion (▨) (Fig. 5-25-1). (Fig. 5-25-1, Fig. 5-25-2)	o The feed plate will be caught by the stepped parts formed by the throat plate and the throat plate auxiliary cover resulting in a deformed pattern. o The feed plate may bend.

(26) Height of the work clamp foot slider

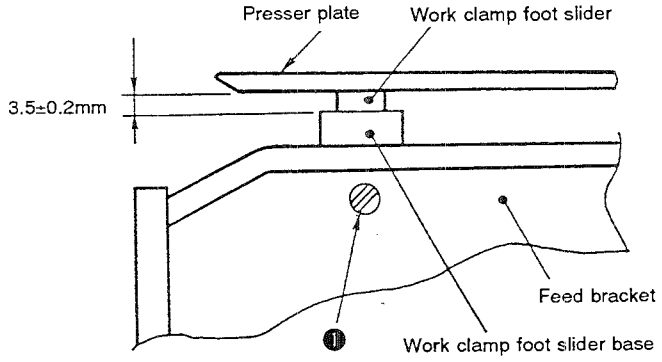


Fig. 5-26-1

(27) Holding force of the feeding frame ball catcher (when the optional feeding frame arm is used)

The feeding frame support shaft is released from the feeding frame ball catcher when the feeding frame support shaft base is pressed in the direction of the arrow with 3.5 to 4.0 kgf/cm^2 load. (Fig. 5-27-1)

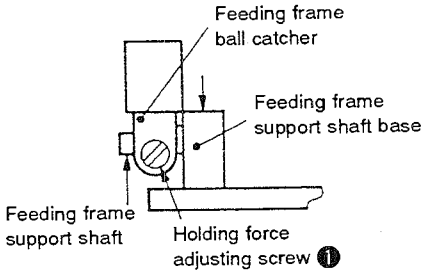


Fig. 5-27-1

(28) 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. 5-28-1)

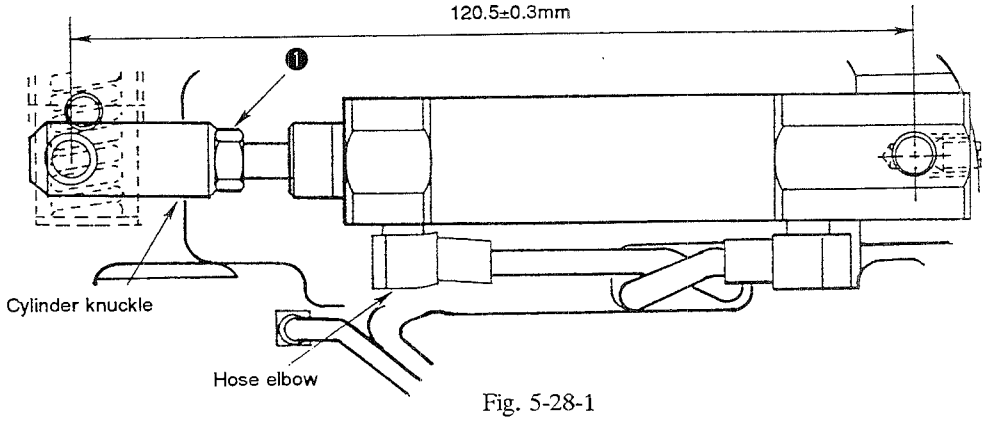


Fig. 5-28-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Loosen setscrew ❶, and adjust so that a 3.5±0.2 mm clearance is obtained between the presser plate and the work clamp foot slider base by turning the work clamp foot slider base using a wrench. Then tighten setscrew ❶.	o The pattern may be deformed.
o Refer to the "STANDARD ADJUSTMENT (27)," and adjust the holding force of the feeding frame ball catcher using holding force adjusting screw ❶. Turn holding force adjusting screw ❶ clockwise, and the holding force will be increased. Turn the screw in the reverse direction, and the holding force will be decreased. Be sure to adjust the holding force of the two feeding frame ball catchers mounted one each on both the right and left side.	o If the holding force is too strong: The feeding frame cannot be installed or removed. o If the holding force is inadequate: When the feeding frame goes up at the sewing end, the feeding frame may drop. The pattern may be deformed.
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 (28)." 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.

(29) Adjusting the top cover of X-travel unit and travel unit cover joint

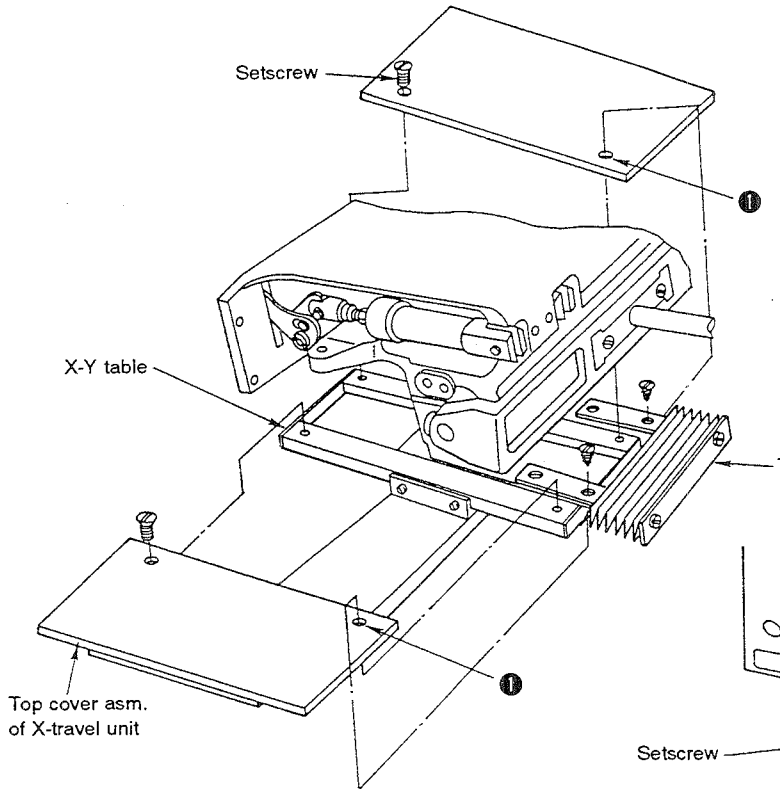


Fig. 5-29-1

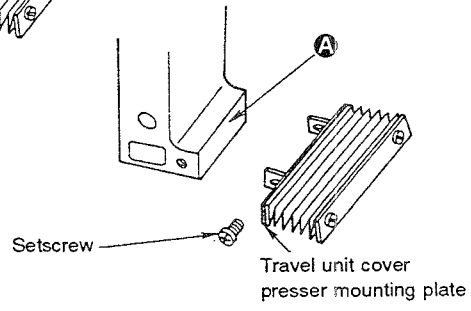


Fig. 5-29-2

(30) X guide shaft support

When the feed bracket is moved laterally by hand, both ends of the X guide shaft support should not move up and down.

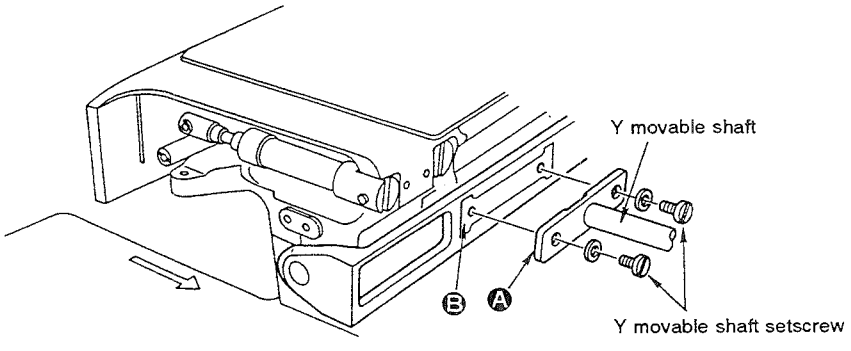


Fig. 5-30-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Put the top cover asm. of the X-travel unit between the X-Y table and the travel unit cover joint and fit the bored portion on the rear of the travel unit cover joint to drilled hole ❶. o Fix the top cover of the X-travel unit using the setscrews. Two of these setscrews are commonly used to fix the travel unit cover joint. **[Caution]** **After the adjustment, move the feed bracket back and forth as well as to the right and left to confirm that the top cover is not pushed against feed bracket auxiliary cover, throat plate auxiliary cover and the travel unit cover (A). (Figures 5-29-1, -29-2 and -53-1)** o Closely fitting the travel cover presser against plane A, fix the travel cover presser mounting presser on the feed bracket with the setscrews. (Figures 5-29-1 and -2)	o The corresponding parts may become damaged.
o Move the feed bracket toward the handwheel (in the direction of the arrow) by hand until it will go no further. o Loosen the Y movable shaft setscrews so that side A of the Y movable shaft comes in full contact with side B of the X guide shaft support. Then tighten the Y movable shaft setscrews.	o The pattern may be deformed.

(31) X-direction feed belt tension

Move the feed bracket as far to the left as possible. Adjust so that the X-direction feed belt slackens by 1.6 to 1.8 mm when a load of 500 g is applied to the middle (shown by the arrow) of the right belt.

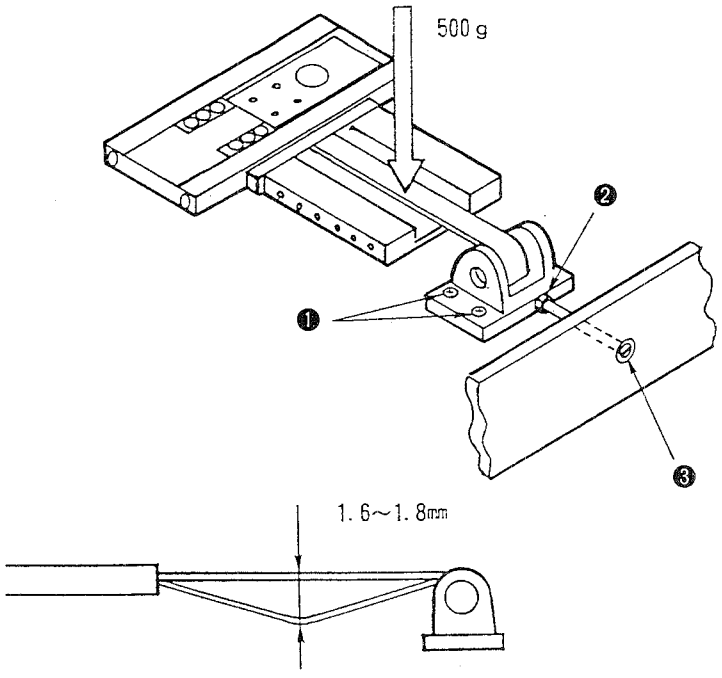


Fig. 5-31-1

(32) Y motor mounting base

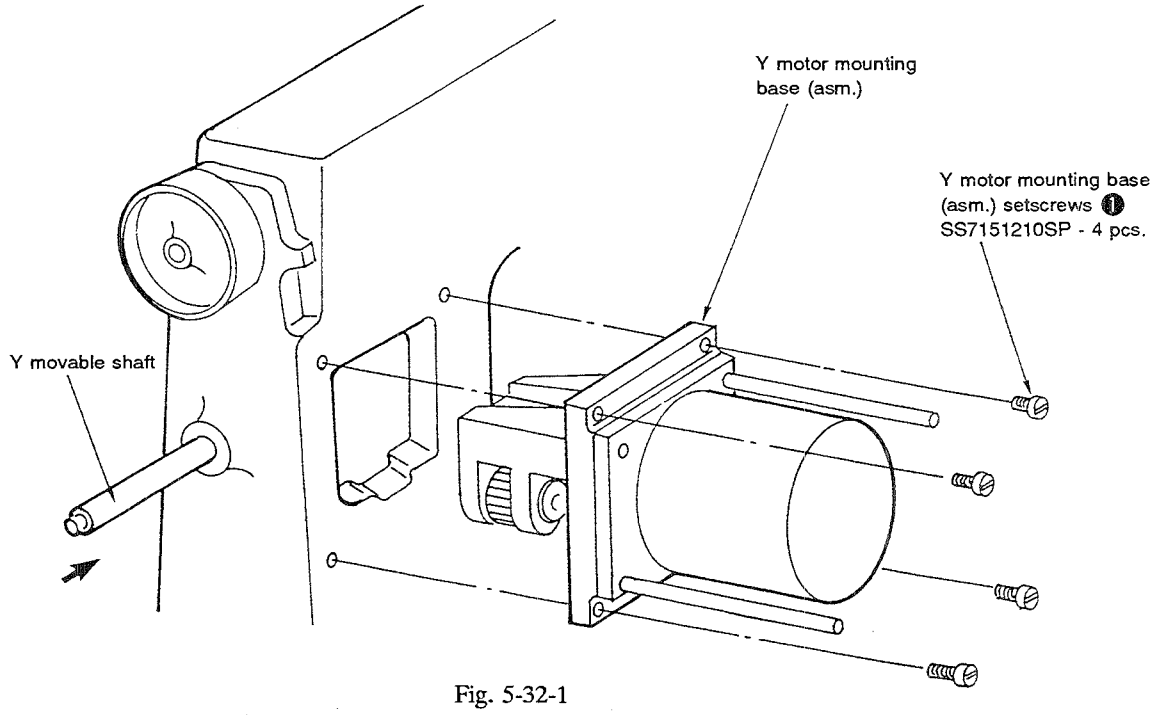


Fig. 5-32-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Loosen screw ❶ and nut ❷. Turn tension adjusting screw ❸ to adjust the belt tension. Tighten screw ❶ and nut ❷. **[Caution]** **Tightening screw ❶ will affect the belt tension, so check the belt slack again after tightening screw ❶. (Fig. 5-31-1)**	o The pattern may be deformed.
(1) Move the Y-travel shaft back and forth until a position at which the moving torque is maximized is reached. (2) Adjust the height of the Y motor base so that a starting torque of 2.5 to 4 kg is developed when pressing the Y-travel shaft is pressed, in the aforementioned state (1), in the direction of the arrow →. **[Caution]** **1. Do not connect the connector of the stepping motor to the machine.** **2. Adjust the Y motor base with the presser plate removed.** **3. This adjustment is not necessary in the regular maintenance. So, never loosen the screw in the Y motor base (asm.).**	o A loud noise will be produced along with the feed in the Y-direction. The pattern may be deformed, or the corresponding parts may become damaged.

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

A. Adjusting the origins

1) Remove the needle.
2) Set the origin gauge within the feeding frame.
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. 5-33-2)
4) Turn ON the power switch, and press the feeding frame switch to let the feeding frame come down. Then attach the needle.
5) Press the start switch. Only the feed mechanism will be actuated to find the origin. When the origin is found, the feed mechanism will be stopped.

[Caution]

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

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

[Caution]

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

B. Adjusting the X/Y travel limit

1) Follow the procedure described in step 1) through 5) of A.
2) Press jog keys [4◀] and [6▶] on the operation panel to move the feeding frame to the right or left so that the needle point stops on the X travel limit of the origin gauge. (±1.5 mm) (Error indication [4] will be shown.) (Fig. 5-33-1, Fig. 5-33-3)
3) Move the needle point back to within the X travel limit.
4) Press jog keys [8▲] and [2▼] on the operation panel to move the feeding frame forward and backward so that the needle point stops on the Y travel limit of the origin gauge. (±1.5 mm) (Error indication [4] will be shown.) (Fig. 5-33-1, Fig. 5-33-3)

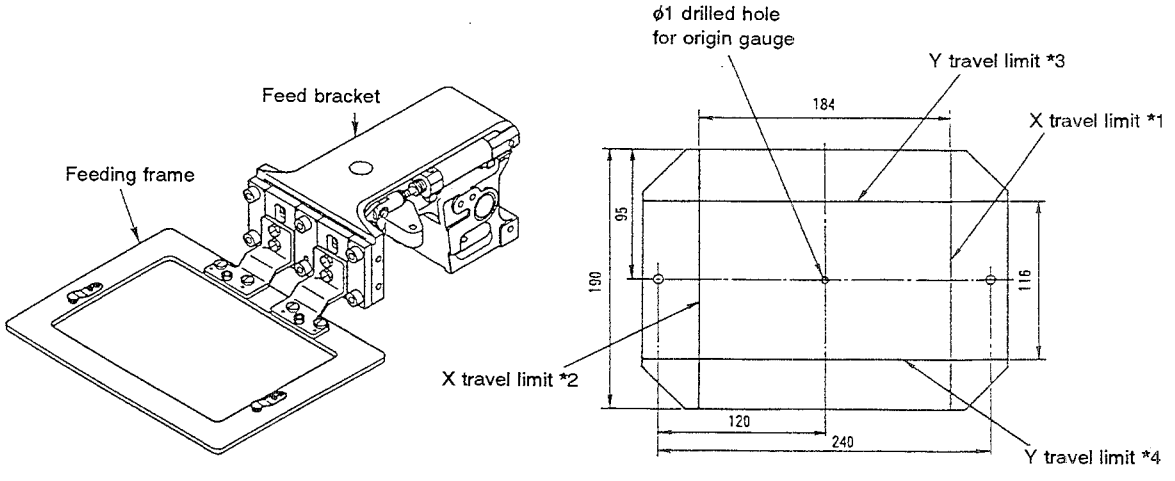


Fig. 5-33-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT

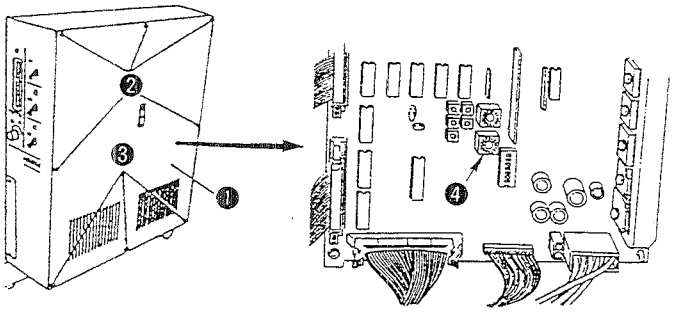
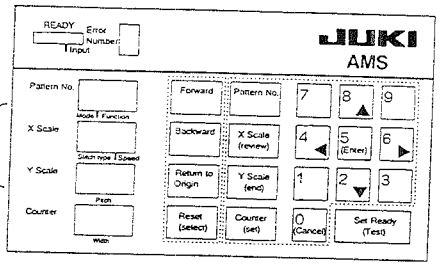


Fig. 5-33-2

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



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

Fig. 5-33-3

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

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

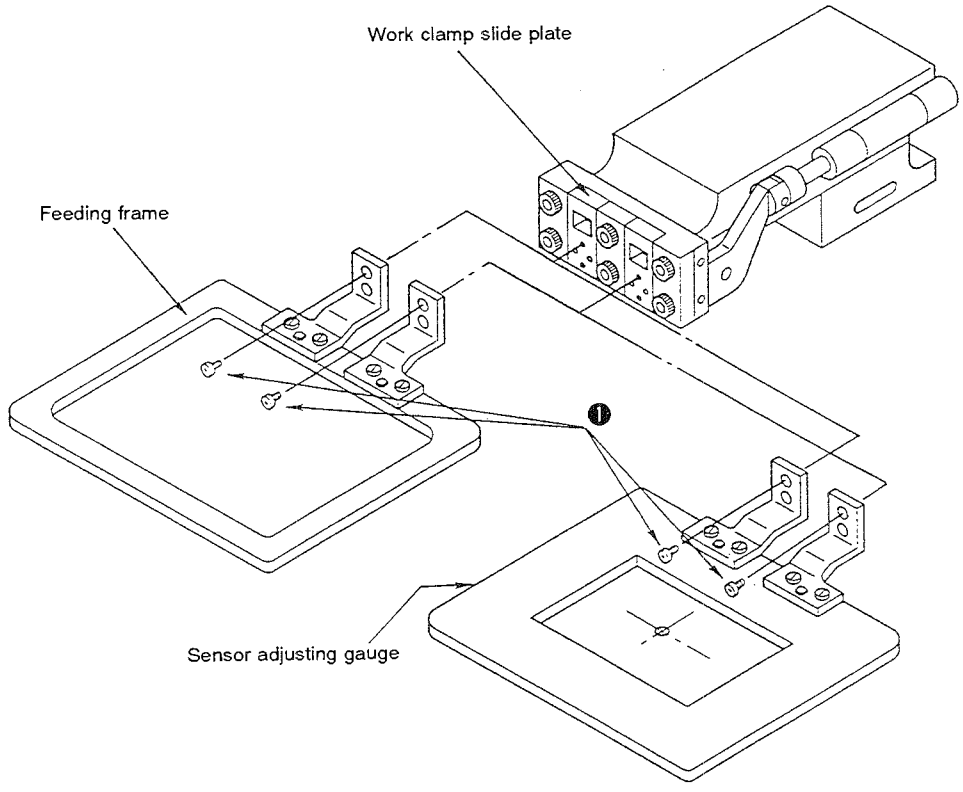


Fig. 5-33-4

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
A. Adjusting the X-axis origin and travel limit sensor 1) Remove the feed bracket auxiliary covers (left and right), and feed bracket cover. 2) Make the adjustments described in steps 1), 3) and 4) of the "STANDARD ADJUSTMENT (33)-1, A." 3) Press jog keys [4◄], [6►], [8▲] and [2▼] on the operation panel to move the feeding frame. Align the needle point with the ø0.5 drilled hole for origin of the origin gauge. (Fig. 5-33-5) 4) Loosen setscrews ❶, and move X sensor attaching plate asm. to the left or right until display (E) showing the X origin changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❶. (Fig. 5-33-3, Fig. 5-33-5) 5) Press jog key [6►] on the operation panel to move the feeding frame so that the needle point aligns with marker line V of travel limit *1. (Fig. 5-33-6, Fig. 5-33-3) 6) Loosen setscrews ❶, and move X-axis right travel limit sensor attaching plate asm. to the left or right until display (F) showing the travel limit *1 changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❶. (Fig. 5-33-3, Fig. 5-33-6) 7) Press jog key [4◄] on the operation panel to move the feeding frame so that the needle point aligns with marker line V of travel limit *2. (Fig. 5-33-3) 8) Loosen setscrews ❶, and move X-axis left travel limit sensor attaching plate asm. to the left or right until display (D) showing the travel limit *2 changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❶. **[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. 5-33-7)** **If they do not, adjust the clearance between the slit disk and the photo-coupler referring to "C. Clearance between the slit disk and the photo-coupler." Note that you should adjust the overlapping depth simultaneously with step 4), 6) and 8).**	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.

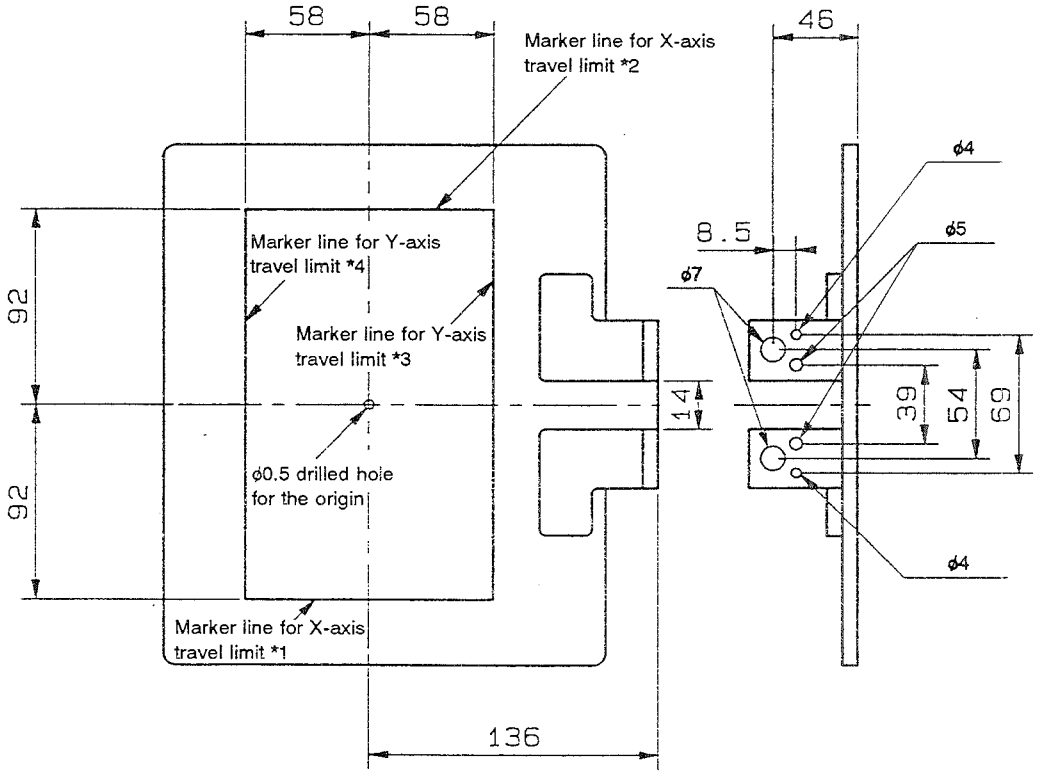


Fig. 5-33-5

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
B. Adjusting the Y-axis origin and travel limit 9) Remove the Y sensor cover. (Fig. 5-33-8) 10) Follow the same procedure described in steps 2) and 3). 11) Loosen setscrews ❶, and move the Y sensor attaching plate to the left or right until display (H) showing the Y origin changes from 1 to 0. Immediately after the display has changed, tighten setscrews ❶. (Fig. 5-33-3, Fig. 5-33-9) 12) Press jog key [8 ▲] on the operation panel to move the feeding frame until display (I) showing the travel limit *3 changes from 1 to 0. Immediately after the display has changed, stop the feeding frame. (Fig. 5-33-3) 13) Make sure that a gap between the sensor and the needle tip is 1.5 mm or less in terms of the marker line V of travel limit *3. 14) With regard to display (G) showing travel limit *4, press jog key [2 ▼] and make the adjustment referring to the procedure described in step 12). 15) With regard to marker line V of travel limit *4, make sure that the specified distance is obtained referring the procedure described in step 13). **[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 two Y-axis sensors. If they do not, adjust the clearance between the slit disk and the photo-coupler referring to "C. Clearance between the slit disk and the photo-coupler."**	

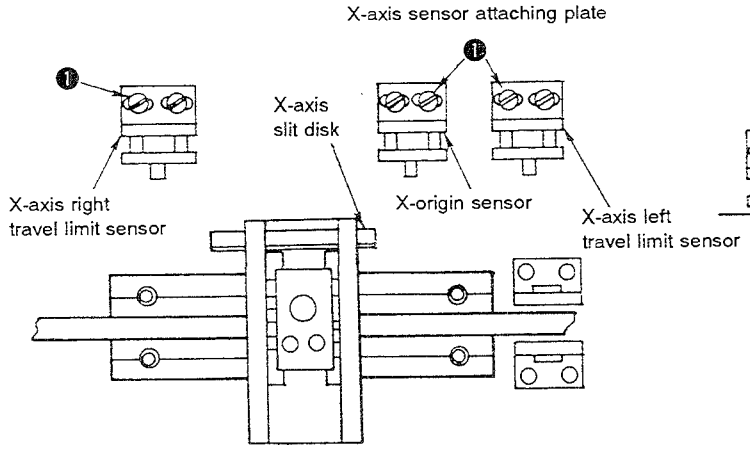


Fig. 5-33-6

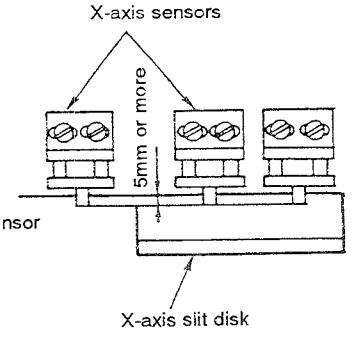


Fig. 5-33-7

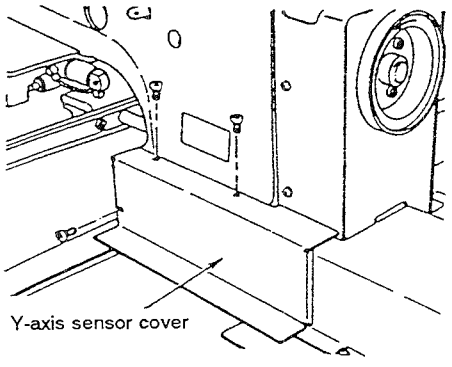


Fig. 5-33-8

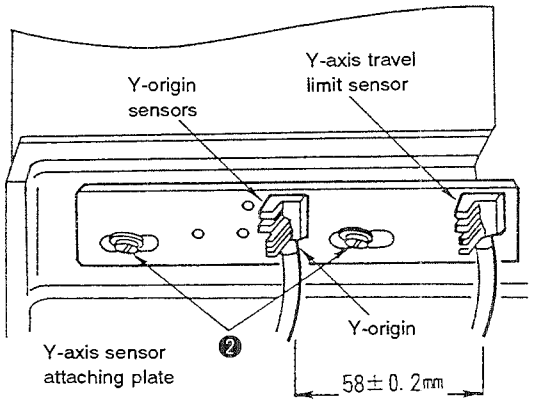


Fig. 5-33-9

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

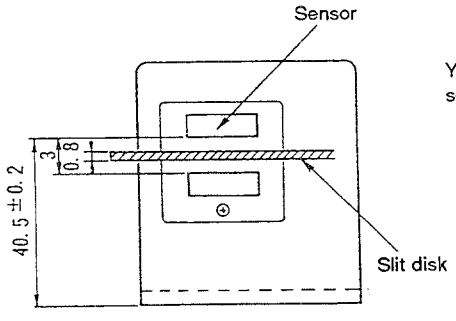


Fig. 5-33-10

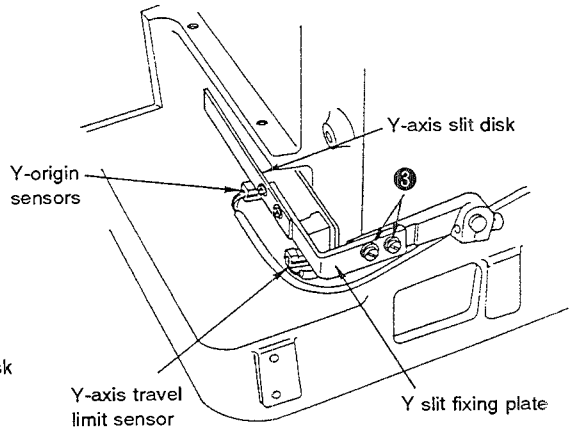


Fig. 5-33-11

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Adjusting the X sensor Respectively position the X travel sensors (right) and (left) so that they work when the feeding frame moves to the right and left by 92 mm. Then, fix them with screws ❶. (Figures 5-33-10 and -11) o Adjusting the Y sensor If the Y slit plate and photo-coupler do not overlap as deep as 5 mm or more, loosen screws ❸ and adjust the Y slit fixing plate. After the adjustment, fix it with the screws. Adjust the Y origin using screws ❷. (Figures 5-33-9 and -11) Adjusting the origin automatically determines the position of the Y travel limit sensor. **[Caution]** **Make sure that the slit disk does not come in contact with the photo-coupler.**	o The sensors fail to detect the X/Y origin or travel limits, resulting in the same problems caused by the improper adjustment of the origin or travel limits. o Since the slit disk may come in contact with the photo-coupler, the corresponding parts could become broken or damaged.

(34) Shuttle race ring

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

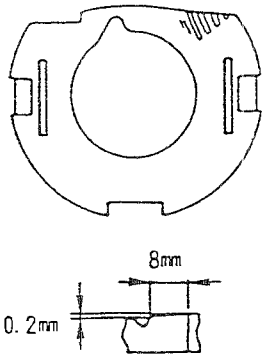


Fig. 5-34-1

(35) Eliminating play from the main shaft

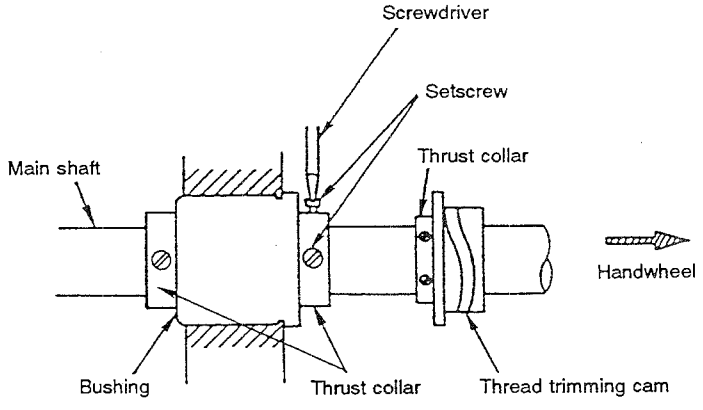


Fig. 5-35-1

(36) Belt tension

The middle of the belt should slacken by 10 mm when section A of the belt is subjected to 1 kg load.

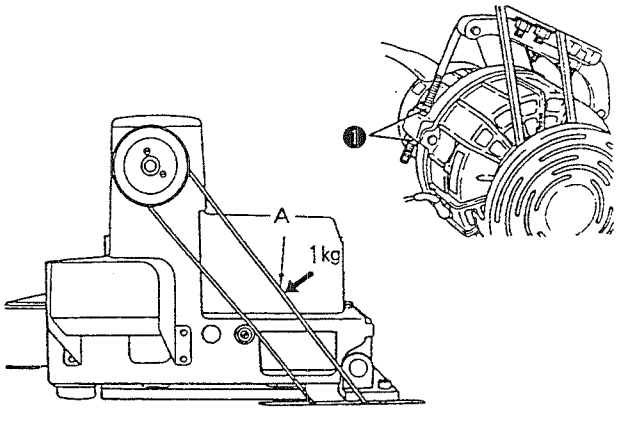


Fig. 5-36-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o If the hatched section does not have the dimensions of 0.2 mm× 8 mm, correct it using an oilstone.	
o Drawing the handwheel in the direction of the arrow, fix the thrust collar while pressing it against the intermediate bushing.	
o Loosen nuts ❶, and move the motor up or down to change the installation position of the motor. **[Caution]** **Be sure to remove or install the belt with the intermediate presser removed.**	o The vibration of the belt may increase, resulting in the sewing machine vibrating more greatly. **[Caution]** **If the vibration of the belt is excessive, the belt may come in contact with the belt cover. As a result, the belt may become damaged. Be sure to check the belt tension before operating the sewing machine.**

(37) Raising the sewing machine head

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

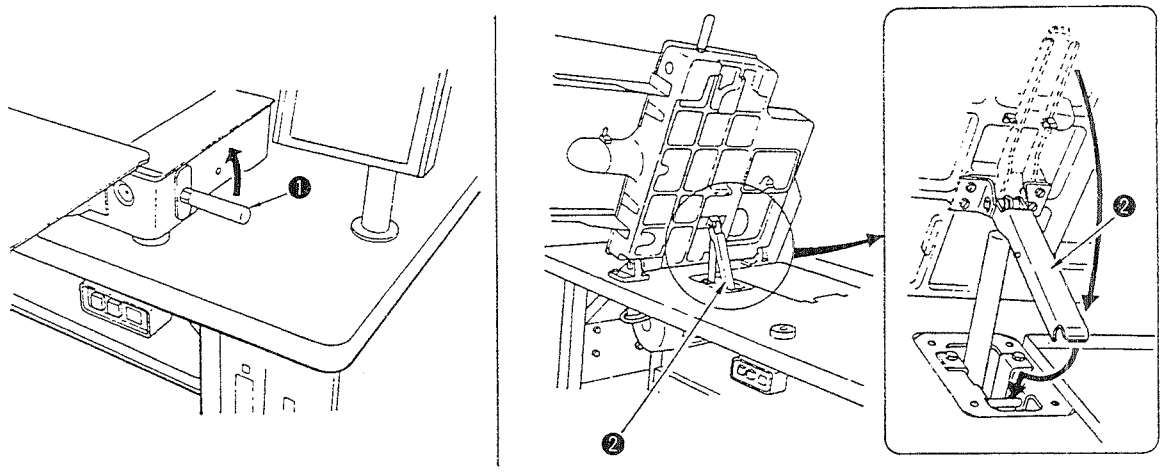


Fig. 5-37-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o To raise the sewing machine, attach grip ❶ supplied with the sewing machine and raise the sewing machine in the direction of the arrow. Be sure to use stopper ❷ when working with the sewing machine raised. **[Caution]** **Make sure that stopper ❷ is securely locked. It will be very dangerous if the stopper is not locked properly.**	

(38) Removing the V-belt

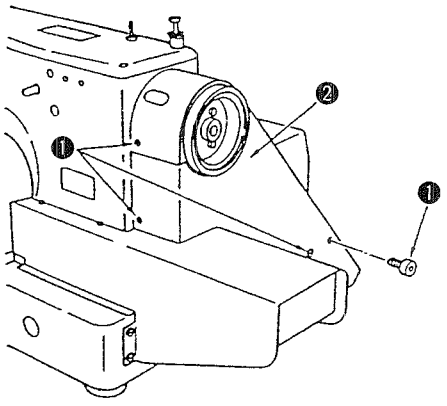


Fig. 5-38-1

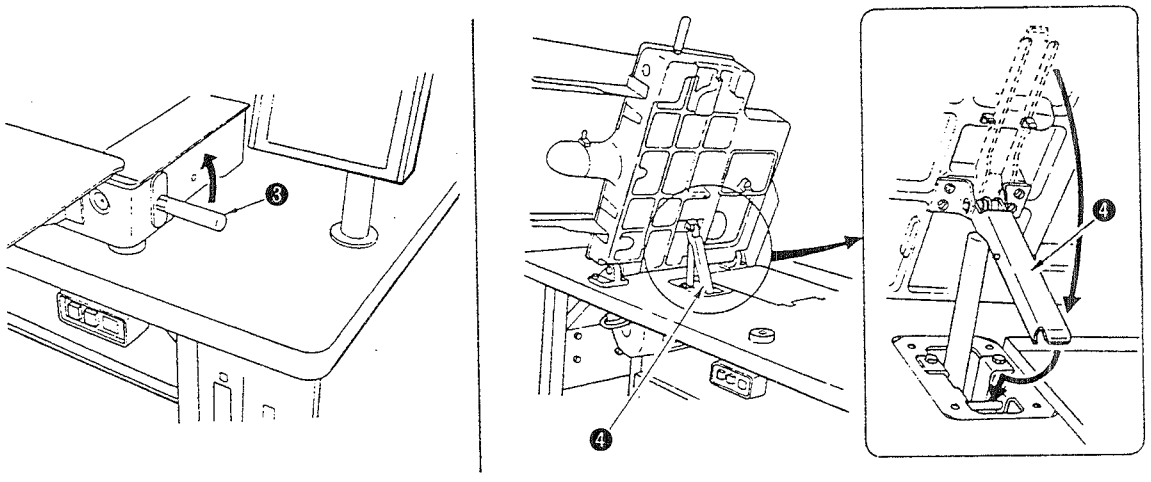


Fig. 5-38-2

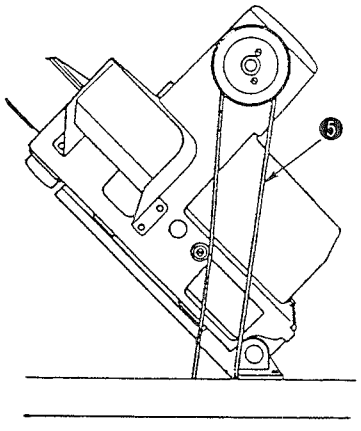


Fig. 5-38-3

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Remove screw ❶ and remove belt cover ❷. (Fig. 5-38-1) 2) Attach grip ❸ supplied with the machine in position, and raise it in the direction of the arrow. At this time, be sure to use stopper ❹. (Fig. 5-38-2) 3) Remove V-belt ❺. (Fig. 5-38-3)	

(39) Holding force of the plastic feeding frame blank plate

Adjust the fixing position of the plastic feeding frame blank plate.

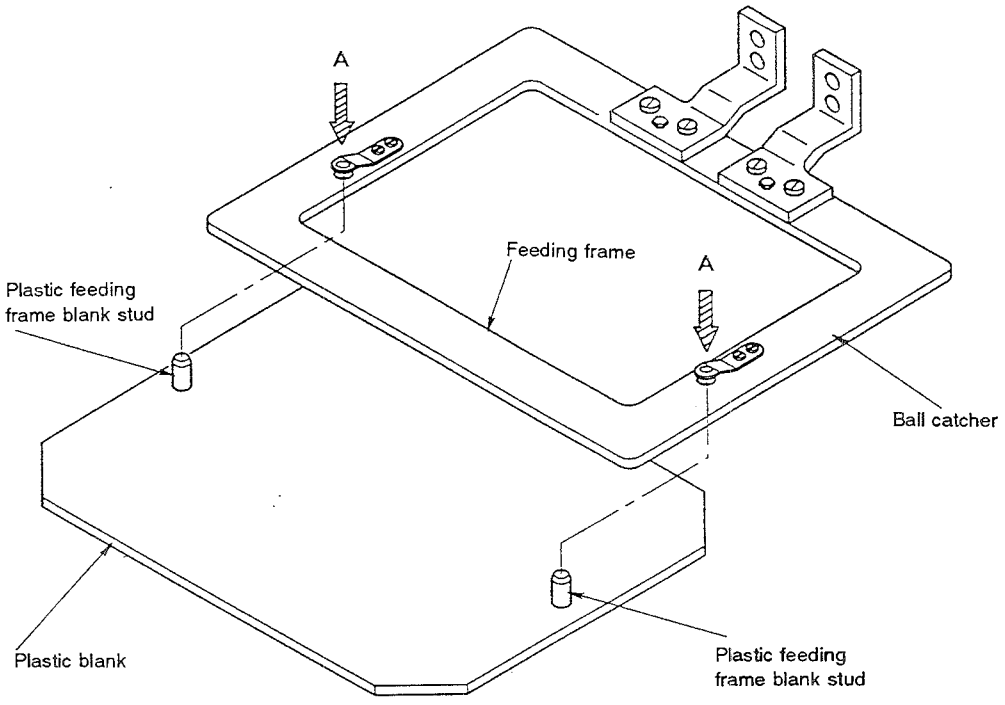


Fig. 5-39-1

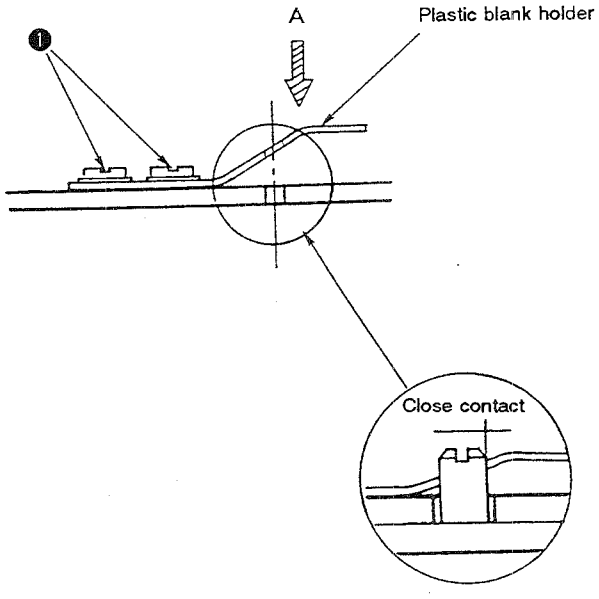


Fig. 5-39-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screw ❶. Attach the plastic blank to the feeding frame and fix it properly. (Fig. 5-39-1, Fig. 5-39-2) 2) Adjust the position of the plastic feeding frame blank so that the plastic feeding frame blank comes in close contact with the plastic feeding frame blank stud, while pressing the plastic feeding frame blank in the direction A. Then tighten screws ❶. (Fig. 5-39-2)	o The plastic feeding frame blank may easily drop from the feeding frame. The plastic feeding frame blank may fail to be set to the feeding frame.

(40) Feed plate

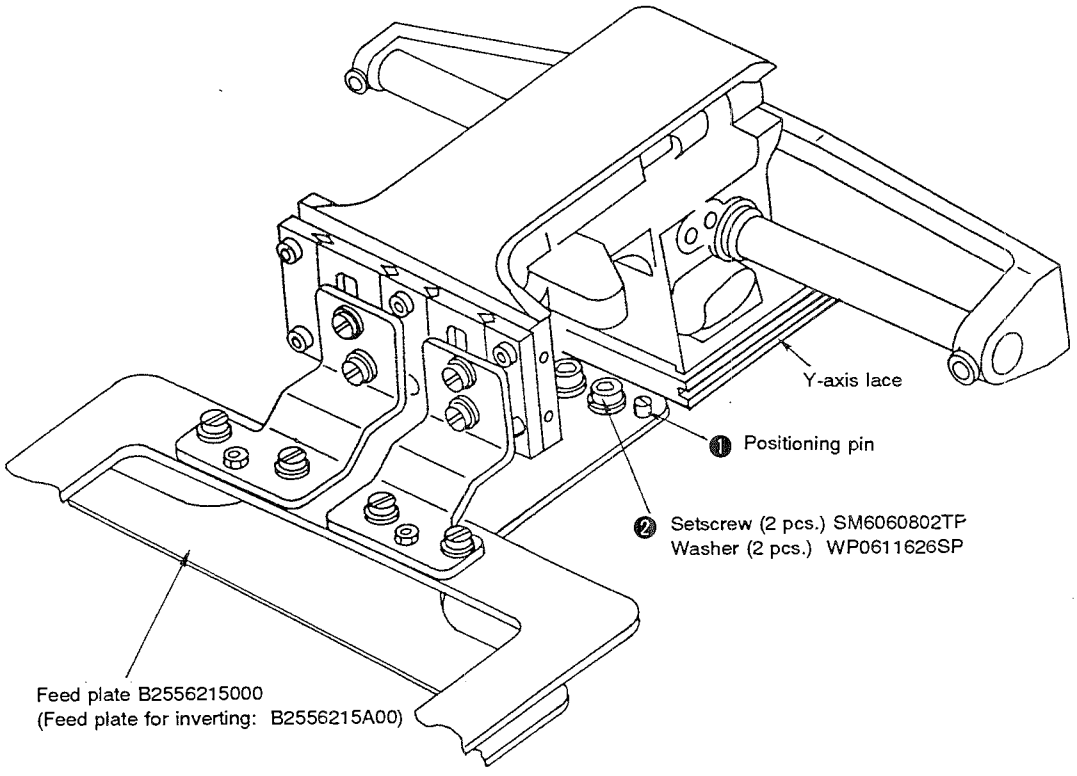


Fig. 5-40-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Fit positioning pin ❶ in the hole in the feed plate and fix the feed plate with two screws ❷. This determines the position of the feed plate. If you want to change the position of the feed plate, use the feed plate with positioning pin ❶ removed.	o The workpiece may slip during sewing.

(41) Adjusting the pneumatic components

1) Connect quick-coupling joint ❶, and open air cock ❺. At this time, air pressure gauge ❼ should indicate 5 to 5.5 kgf/cm^2 (0.5 to 0.55 MPa). (Fig. 5041-1)
2) If the value indicated on air pressure gauge ❼ is lower than 4 kgf/cm^2 (0.4 MPa), error indication [A] will be given, and the machine will stop. (Fig. 5-41-1)
3) The air pressure on the work clamp cylinder retracting side has been reduced to 1 to 1.5 kgf/cm^2 (0.1 to 0.15 MPa) and the feeding frame can be lowered by hand. (Fig. 5-41-2)
4) The needle knob of speed controller (for controlling the work clamp cylinder) is fixed by the nut at the position where the knob is turned in the reverse direction by one revolution after it has been securely tightened. (Fig. 5-41-3)
5) The needle knob of speed controller (for controlling the intermediate presser cylinder) is fixed by the nut at the position where the knob is turned in the reverse direction by five revolutions after it has been securely tightened. (Fig. 5-41-4)

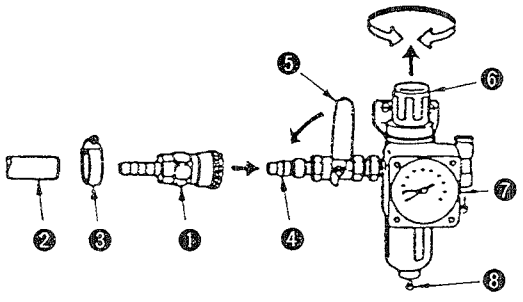
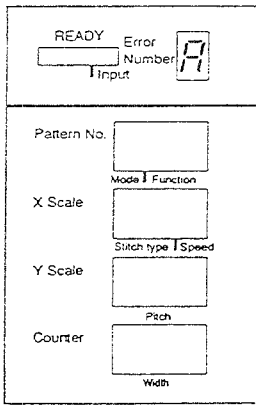


Fig. 5-41-1



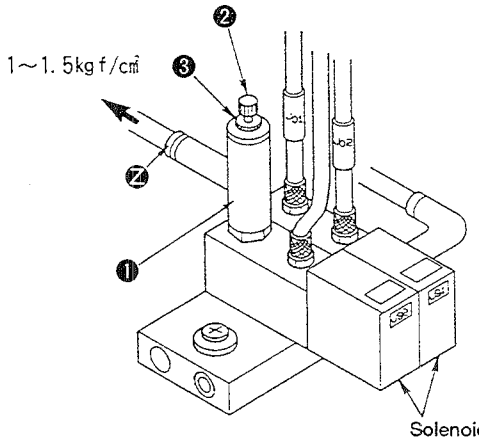


Fig. 5-41-2

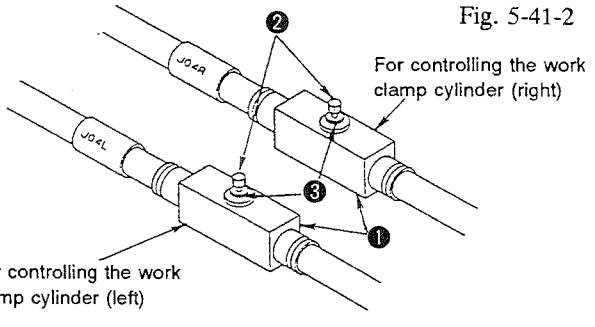


Fig. 5-41-3

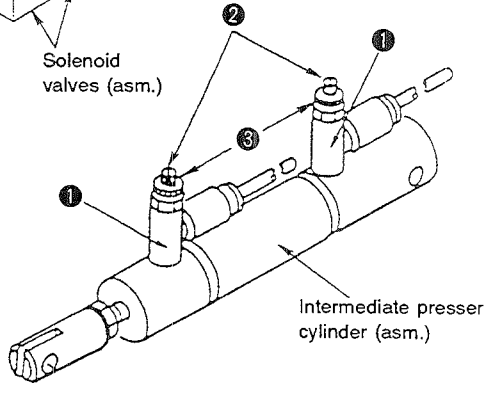


Fig. 5-41-4

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Connect the air supply hose 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, pull it up and then adjust air adjusting knob ❻ by turning it so that the air pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 to 0.55 MPa). Then press the knob to maintain the pressure value. 4) If the compressed air pressure is too low, the machine will stop running while indicating error [A] on the panel. * The air pressure will be 0 kgf/cm^2 if you close air cock ❺ and push the button ❽. **[Caution]** **After making the adjustment, set air pressure gauge ❼ so that it indicates 5 to 5.5 kgf/cm^2 (0.5 to 0.55 MPa), and make sure that error indication [A] goes out.** 5) 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. 5-41-2) 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 to 1.5 kgf/cm^2 (0.1 to 0.15 MPa). Then fix the knob at that position using nut ❸, and connect the air hose which has been removed. (Fig. 5-41-2) 6) Adjust needle knob ❷ of speed controller ❶, referring to the "STANDARD ADJUSTMENTS (41)-4)." Then fix the knob using nut ❸. (Fig. 5-41-3) 7) Remove the face plate. Adjust needle knob ❷ of speed controller ❶, referring to the "STANDARD ADJUSTMENTS (41)-4)." Then fix the knob using nut ❸. (Fig. 5-41-4)	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/cm^2 (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 (41)" as long as the machine is engaged in normal sewing. Note that the needle knobs and nuts described in steps 3) through 4) 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/cm^2, be sure to close air cock ❺, and press button ❽. (See Fig. 5-41-1)

(42) Connecting the pneumatic components

The circuit diagram for the pneumatic system is as follows:

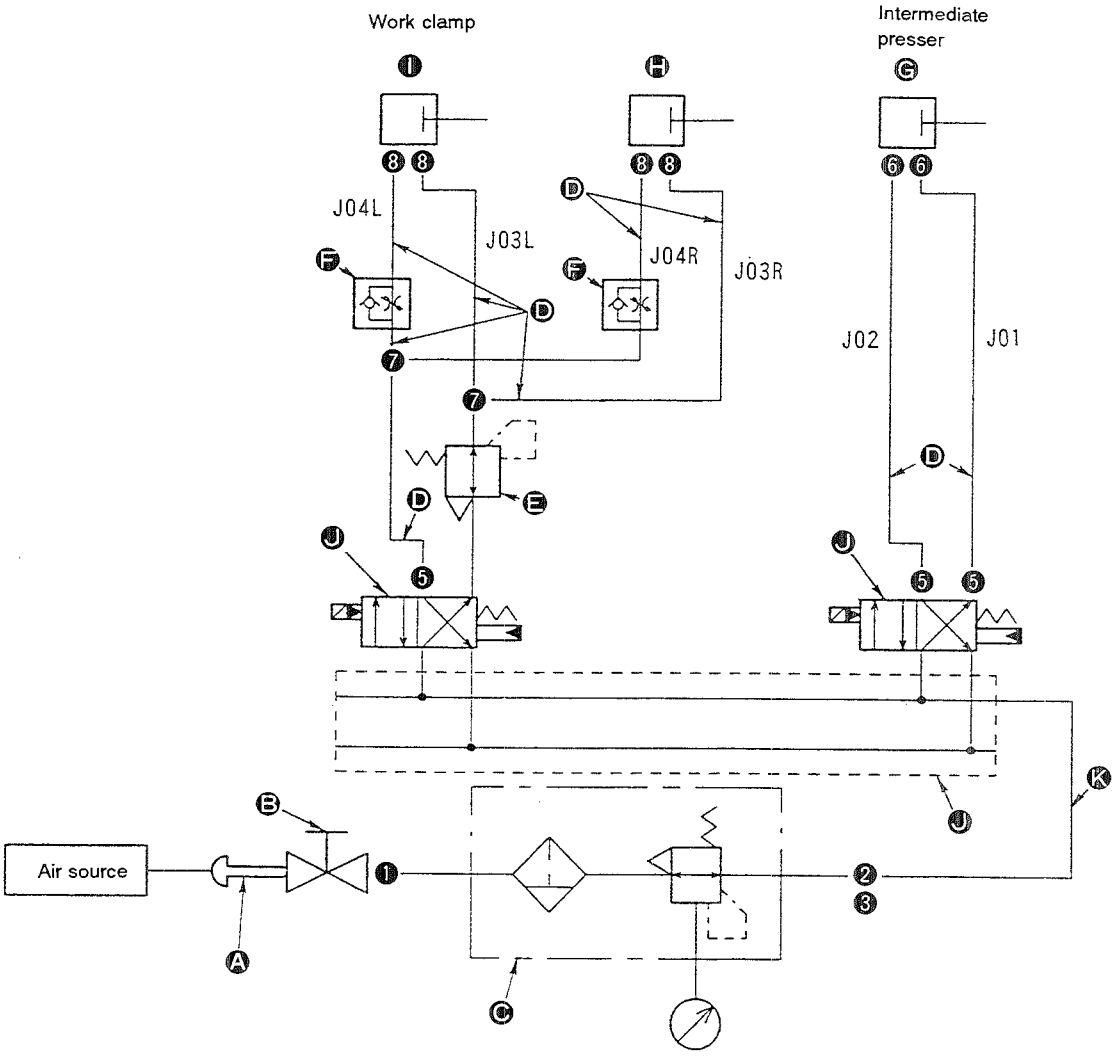


Fig. 5-42-1

Ⓐ	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 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

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Connect the pneumatic components referring to the circuit diagram for the pneumatic system. o If you use an air gun, you may connect the ϕ6 mm air tube to joint ❷. In this case, remove plug ❸.	o The work clamp mechanism and/or intermediate presser mechanism may malfunction. As a result, machine trouble may occur or the corresponding components may become damaged.

(43) Removing the handwheel and the generator stator

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

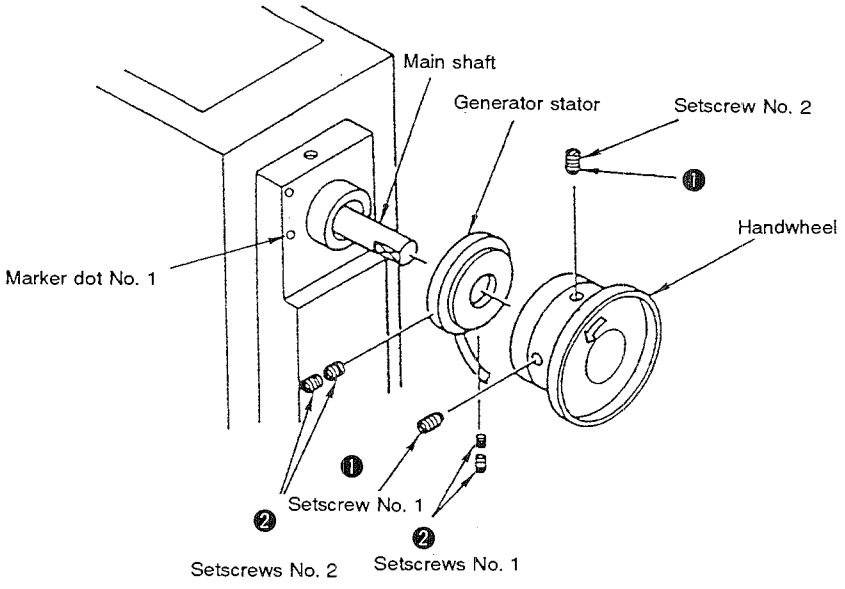


図5－43－1

(44) Removing the wiper and the wiper solenoid

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

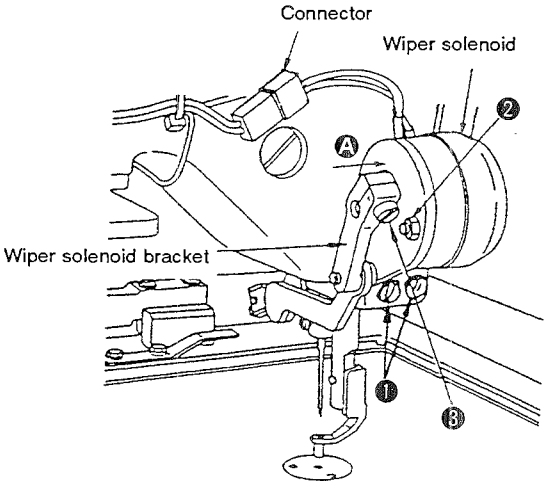
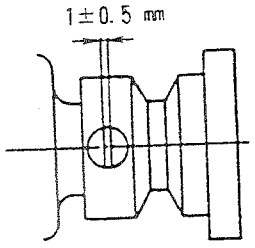
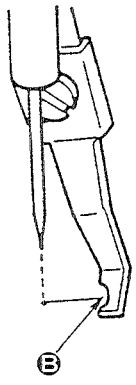


Fig. 5-44-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig. 5-43-2	o When installing the generator stator, be sure that setscrews No. 2 are aligned with marker dot No. 1 on the bracket (Fig. 5-43-1). 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. 5-43-2)
 Fig. 5-44-2	o Be sure to fix wiper solenoid locknut ❷ by applying LOCK-TITE No. 242 paint. (Fig. 5-44-1) o When tightening wiper solenoid installing plate setscrew ❶, be sure that portion Ⓑ of the top end of the wiper is aligned with the center of the needle. (Fig. 5-44-2) o Wiper solenoid bracket setscrew ❸ should be fixed in the position as described in the "STANDARD ADJUSTMENTS (9)." Press the wiper solenoid bracket in the direction of arrow Ⓐ, and determine the position of the bracket so that the specified distances are obtained. (Fig. 5-44-1)

(45) Removing the oscillating rock and crank rod

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

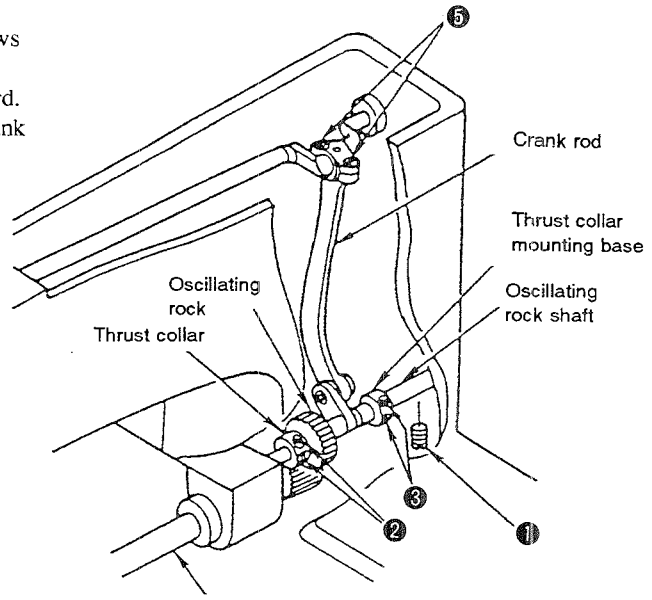


Fig. 5-45-1

(46) 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.

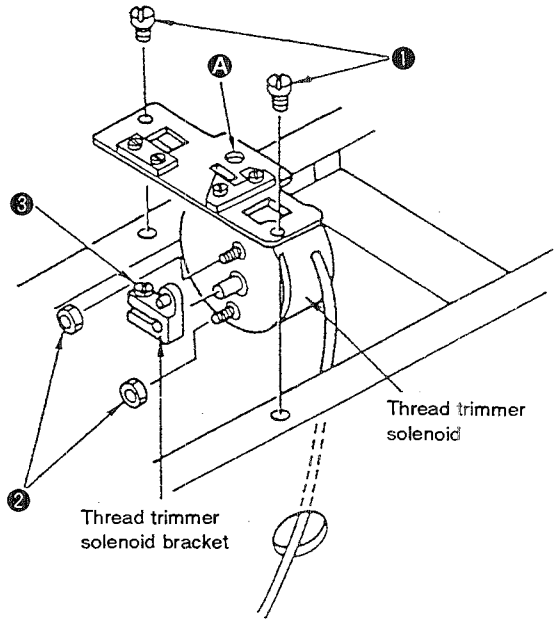
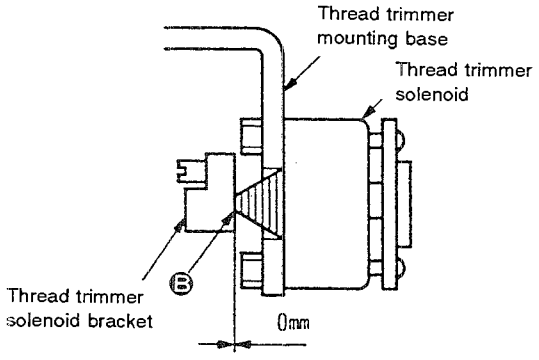


Fig. 5-46-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o Pay attention to the orientation of the cap of the crank rod.	o Be sure that the oscillating rock is free from axial play. o If the main shaft does not turn smoothly, correct the mounting position of the thrust collar and the thrust collar mounting base.
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. 5-46-2	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. 5-47-1). Then, insert a screwdriver through Ⓐ of the thread trimmer mounting base, and tighten setscrew ❸ (Fig. 5-46-1). At this time, adjust the clearance between the trimmer solenoid bracket and the thread trimmer solenoid Ⓑ to 0 mm. (Fig. 5-46-2) o For the adjustment of the thread trimmer mounting base, refer to "STANDARD ADJUSTMENT (16)."

(47) Removing the tension release arm components

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

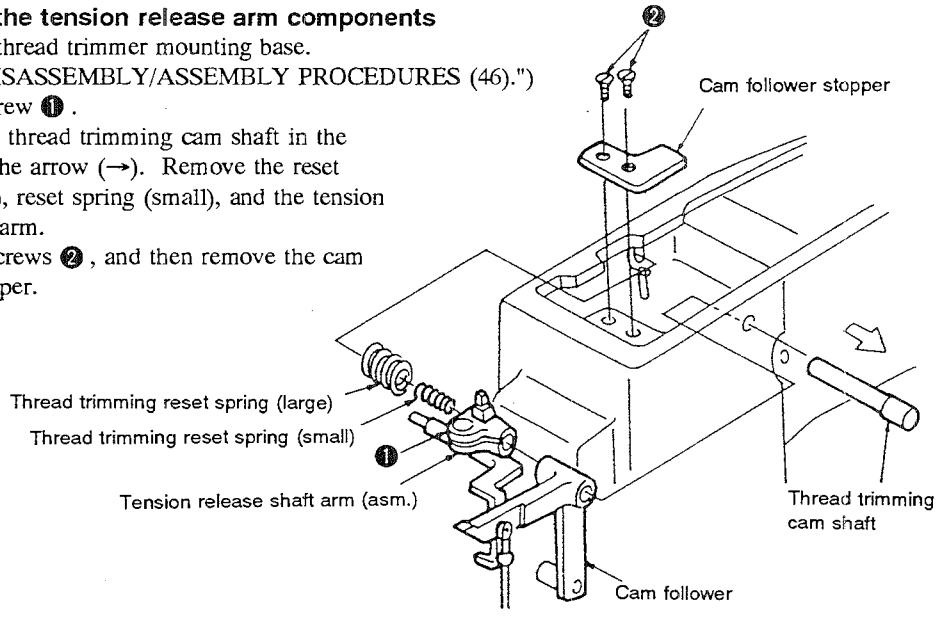


Fig. 5-47-1

(48) Removing the cam follower (asm.)

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

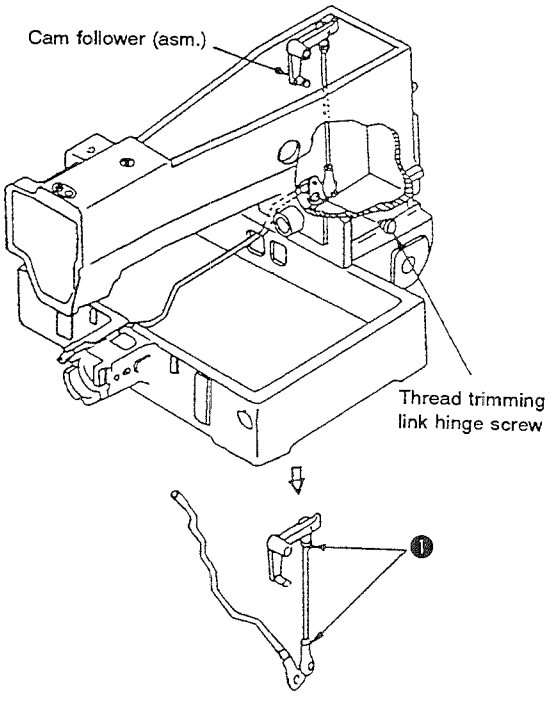
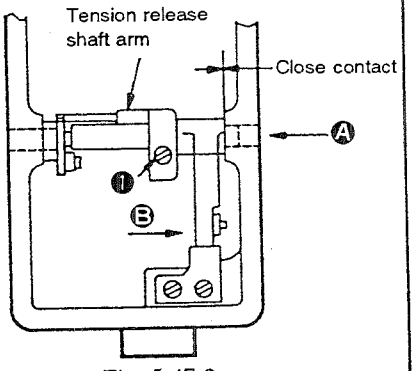
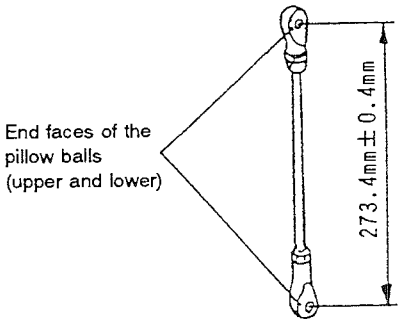


Fig. 5-48-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	o 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. 5-47-2 [At this time, adjust the thrusting direction so that the tension release shaft arm (asm.) and the cam follower turn smoothly and independently.]
o Do not loosen rod adjusting screw nut ❶.	o When the cam follower (asm.) has been disassembled, be sure to adjust the center-to-center distance of the pillow balls to 273.4±0.4 mm. [At this time, make sure that the end faces of the upper and lower pillow balls are parallel with each other.]  Fig. 5-48-2

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

1) Carry out steps 1) through 6) of "DISASSEMBLY/ASSEMBLY PROCEDURES (51) Disassembling the components of the intermediate presser driving mechanism."
2) Remove locknut ❶. Then remove washer ❷, O ring ❸ and the 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 model of sewing machine, remove the intermediate presser lifting spring.

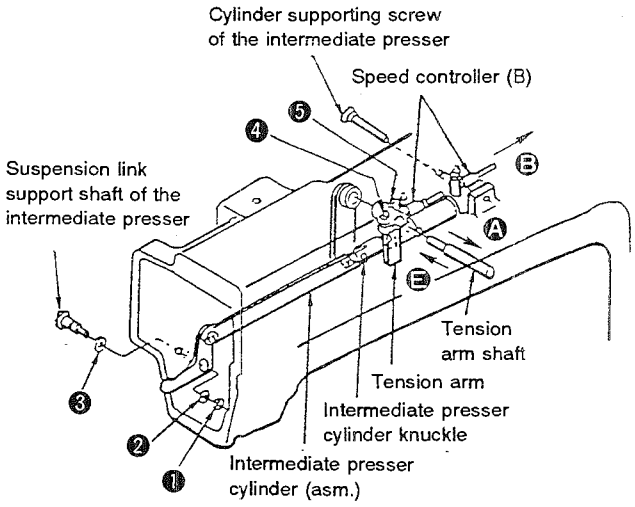


Fig. 5-49-1

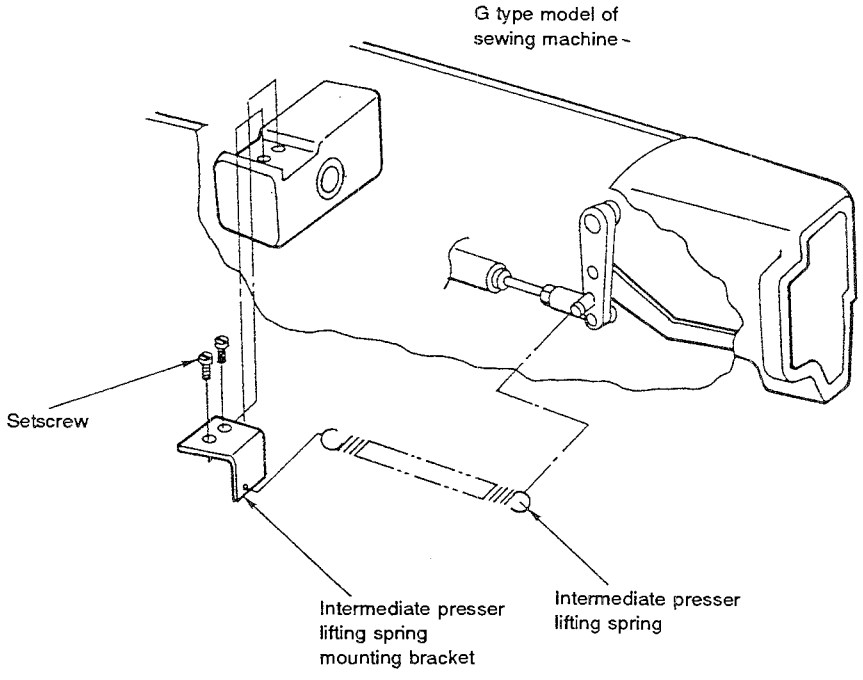
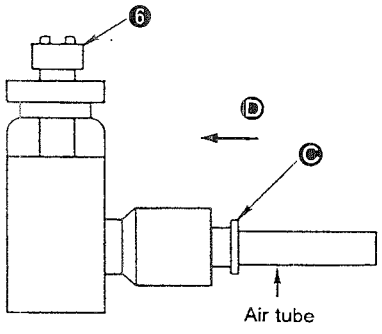


Fig. 5-49-2

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o Be sure to remove the air tube from speed controller (B) while pressing section Ⓒ in the direction of arrow Ⓓ. 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. 5-49-3	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 ❻, referring to the "STANDARD ADJUSTMENTS (41) Adjusting the pneumatic components." o When the intermediate presser cylinder knuckle is removed, refer to the "STANDARD ADJUSTMENTS (22) Adjusting the intermediate presser lifting stroke." o Tighten setscrew ❺ while slightly shifting it in the direction of arrow Ⓐ with the tension arm shaft shifted in the direction of arrow Ⓔ. At this time, make sure that the tension arm turns smoothly free from play. o Tighten setscrew ❹ referring to the "STANDARD ADJUSTMENTS (19) 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 ❸ so that the O ring does not become damaged.

(50) Disassembling the components of the tension release mechanism

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

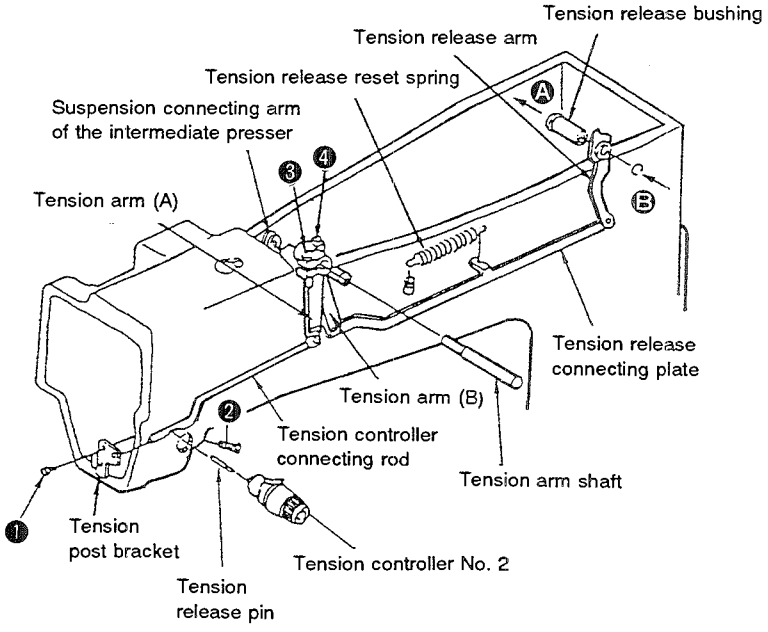


Fig. 5-50-1

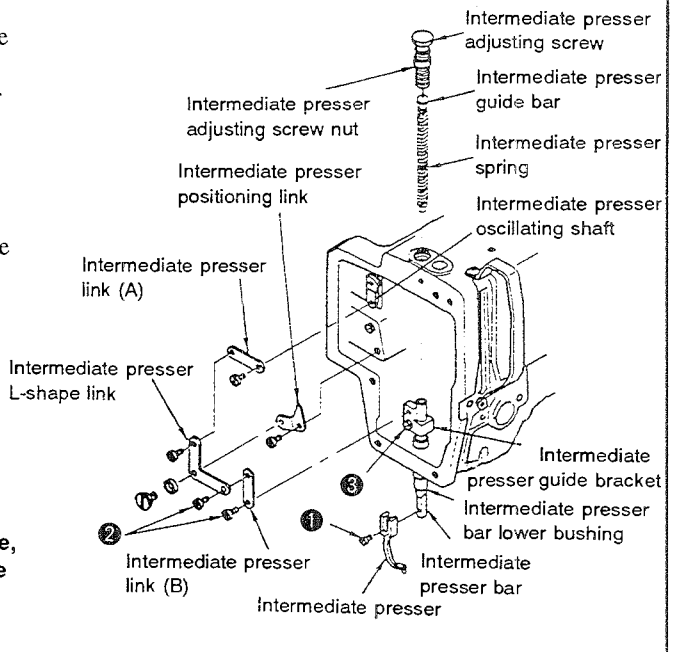
CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o When removing the tension release reset spring, take care not to damage the spring hook. o When removing the tension release bushing, wedge a ϕ8.5 to 11.5 mm hammering bar from the side face of the arm, and push out the bushing in the direction of arrow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

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

1) Set the air pressure to 0 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.



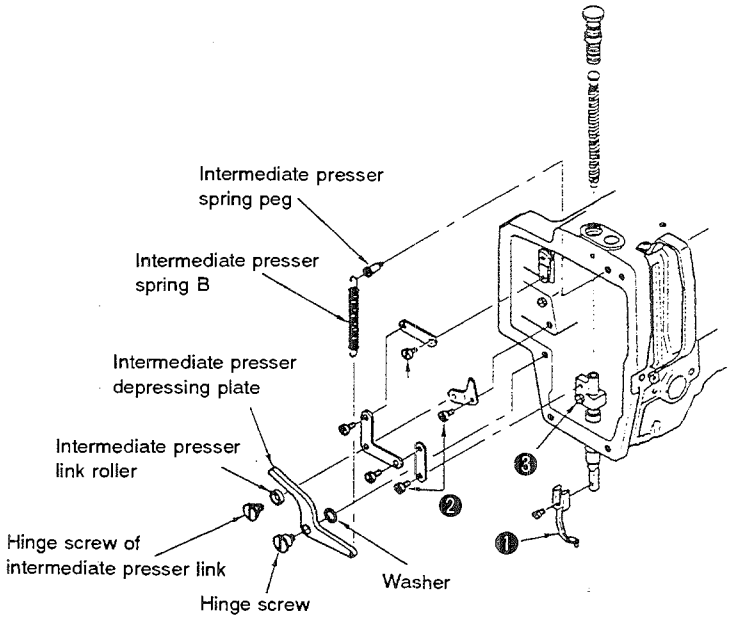


Fig. 5-51-1

CAUTIONS IN DISASSEMBLY

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

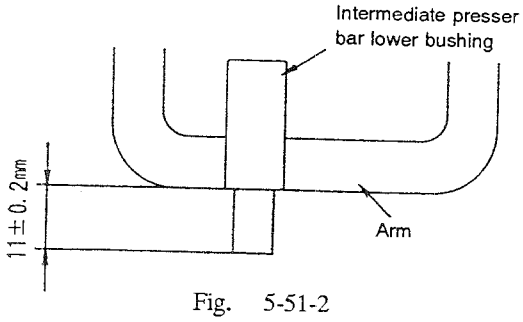


Fig. 5-51-2

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

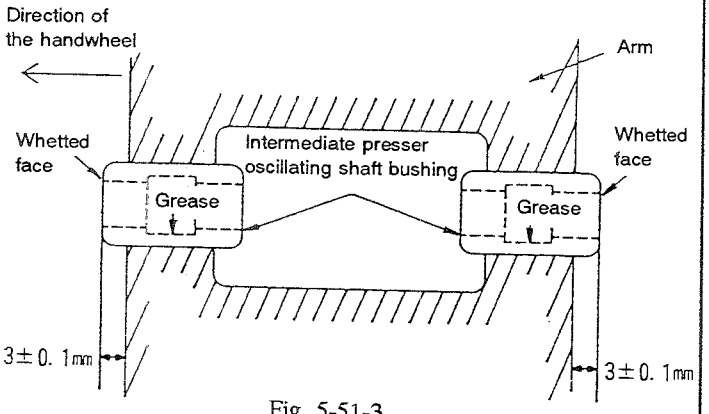


Fig. 5-51-3

CAUTIONS IN ASSEMBLY

- Assemble the intermediate presser bar, intermediate presser guide bracket and the intermediate presser adjusting screw, referring to steps 1) and 2) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."
- Apply grease to the abrasive part of intermediate presser link (A), the intermediate presser L-shaped link, intermediate presser link (B), the intermediate presser positioning link and the intermediate presser guide bracket.
- If the specified distance of 11±0.2 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.

- 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.

- Fix the intermediate presser rod bracket referring to step 4) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."
- Install the intermediate presser rod connecting shaft referring to the "STANDARD ADJUSTMENTS (21) Vertical stroke of the intermediate presser."
- When fixing the intermediate presser cam in its standard position, refer to steps 2) and 3) of the "STANDARD ADJUSTMENTS (20) Intermediate presser."

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

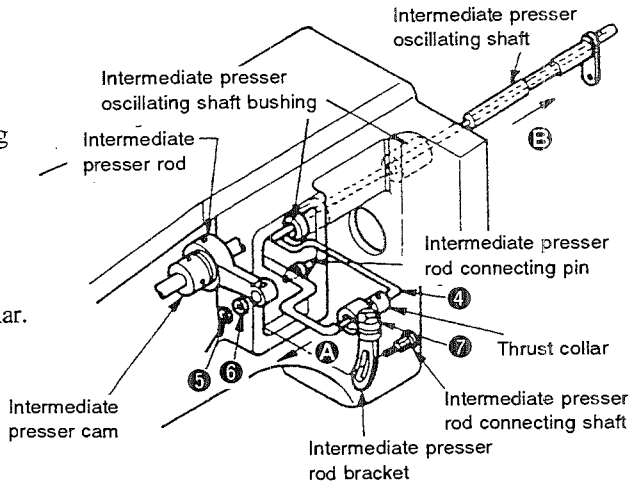


Fig. 5-51-4

(52) 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.

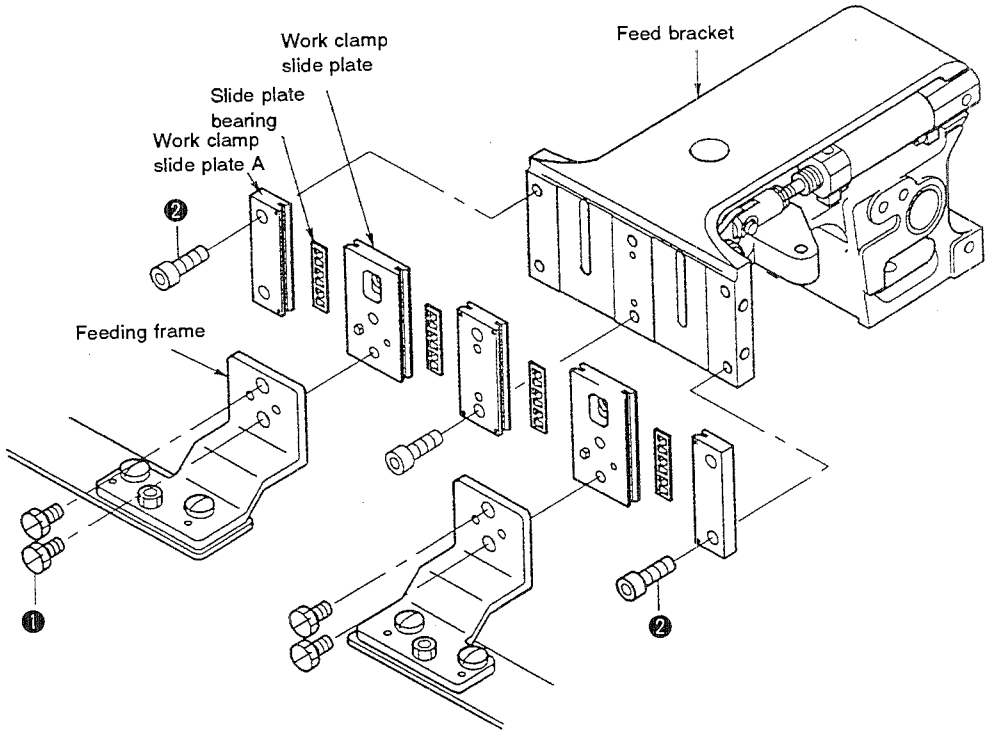
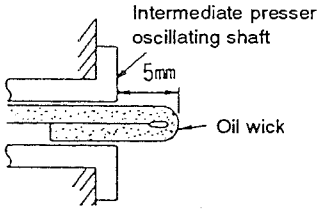
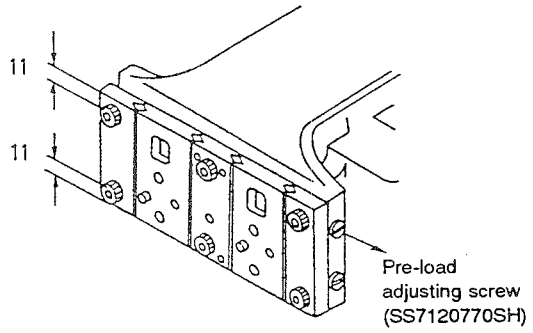
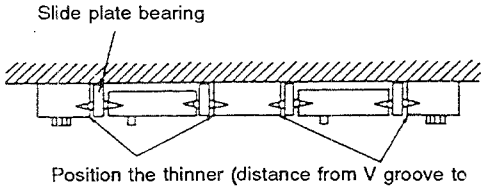
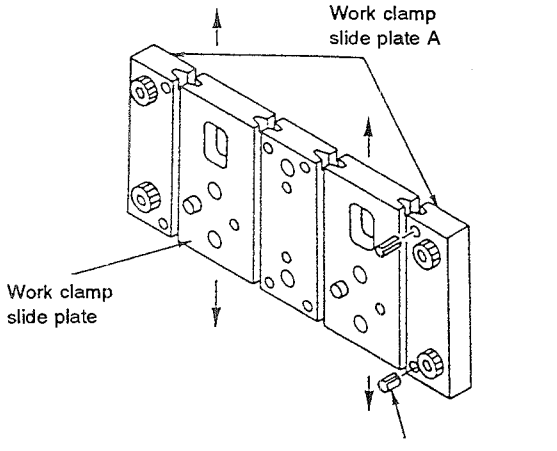


Fig. 5-52-1

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. 5-51-5.  Fig. 5-51-5
 Fig. 5-52-2  Position the thinner (distance from V groove to surface) one at the front. Fig. 5-52-3  Fig. 5-52-4	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.**

(53) Removing the travel unit cover joint

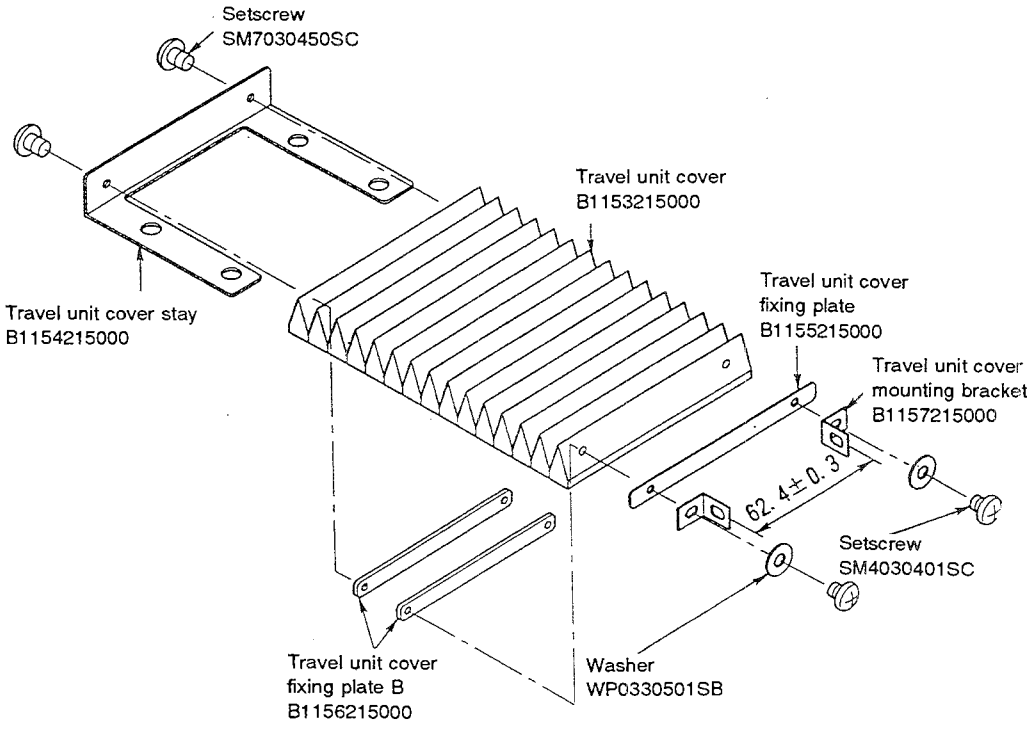


Fig. 5-53-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
[Caution] 1. Attach the travel unit cover fixing plate and travel unit cover fixing plate B with their sagging side faced toward the travel unit cover. 2. Fix the travel unit mounting brackets while tightening a screw in the slot. 3. Attach the moving unit cover mounting brackets with the face-to-face distance between them set to 62.4±0.3 mm.	

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

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

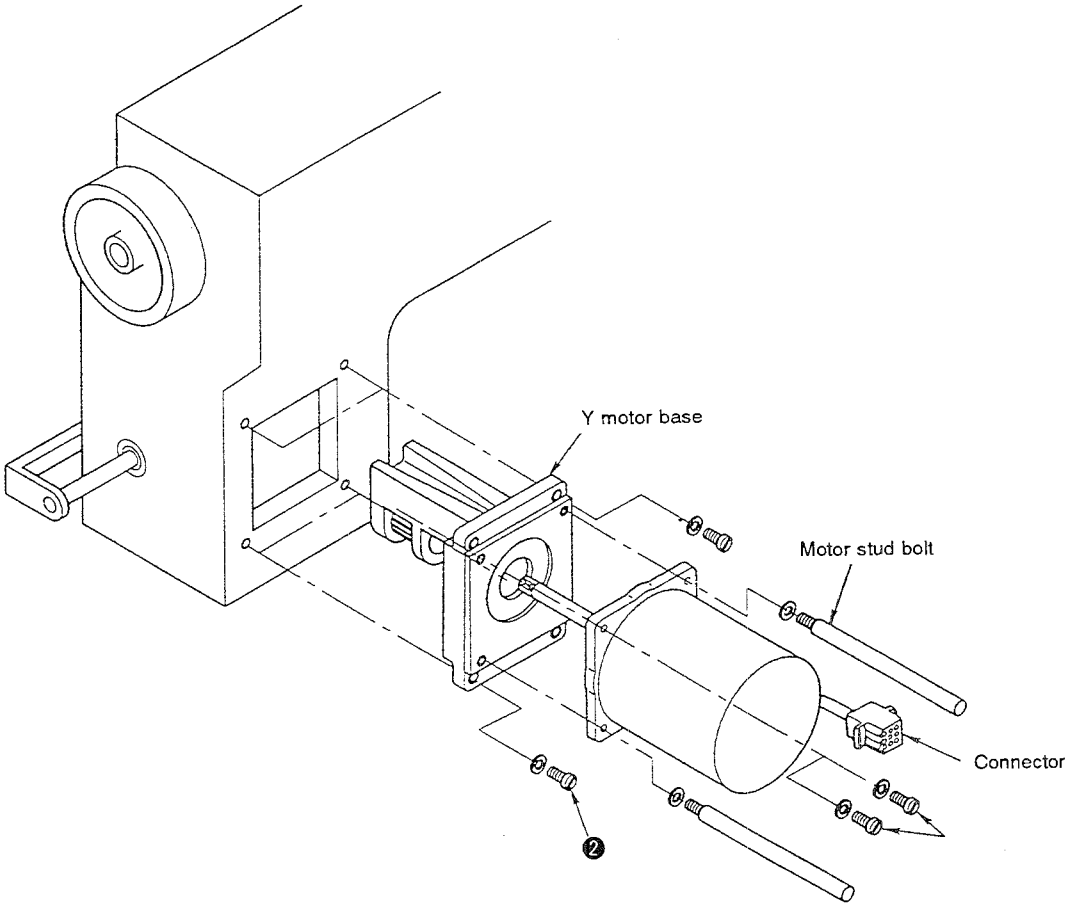
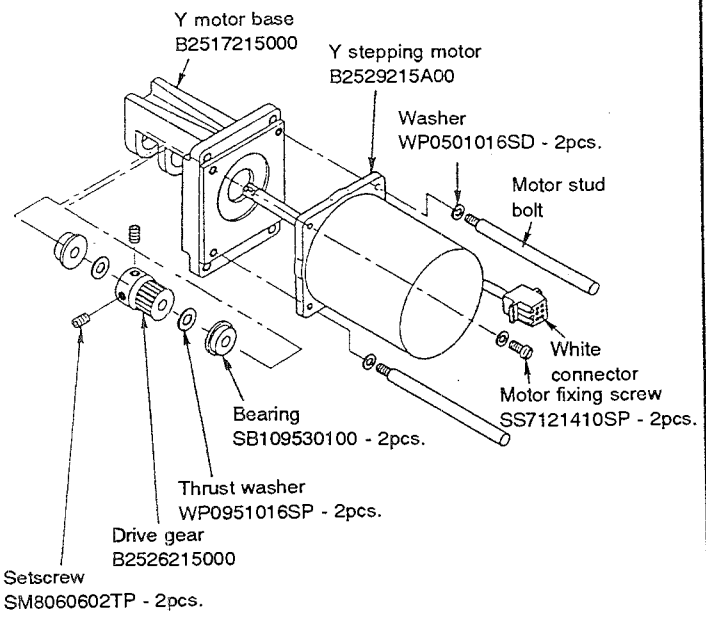


Fig. 5-54-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig. 5-54-2	[Caution] 1. Attach first the inner bearing, then the outer one. 2. Align the screws in the driving gear with the flat portion of the motor shaft and degrease them. Then, apply LOCKTITE No. 242 onto them. 3. Face the motor cable toward the face plate. 4. If the bearing and the shaft are hardly engaged with each other, do not forcibly press the main unit of the motor but try to engage them while holding the shaft. 5. Take care not to allow LOCKTITE to adhere to the threads of the screws.

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

1) Remove the feed plate. (Refer to the "STANDARD ADJUSTMENTS (40).")
2) Remove two setscrews ❶, and then remove the feed bracket.
3) Remove eight setscrews ❷, and then remove the throat plate auxiliary cover.
4) Remove setscrew ❸, and then remove the thread trimming link.
5) Remove four setscrews ❹, and then remove the throat plate.
6) Remove two setscrews ❺ and two setscrews ❻, and then remove travel unit cover. (Refer to the "STANDARD ADJUSTMENTS (29).")
7) Remove two setscrews ❼, and then remove the X travel unit upper cover (right) and X travel unit upper cover (left).
8) Remove ten setscrews ❽, and then remove the feed bracket cover (right) and feed bracket cover (left).

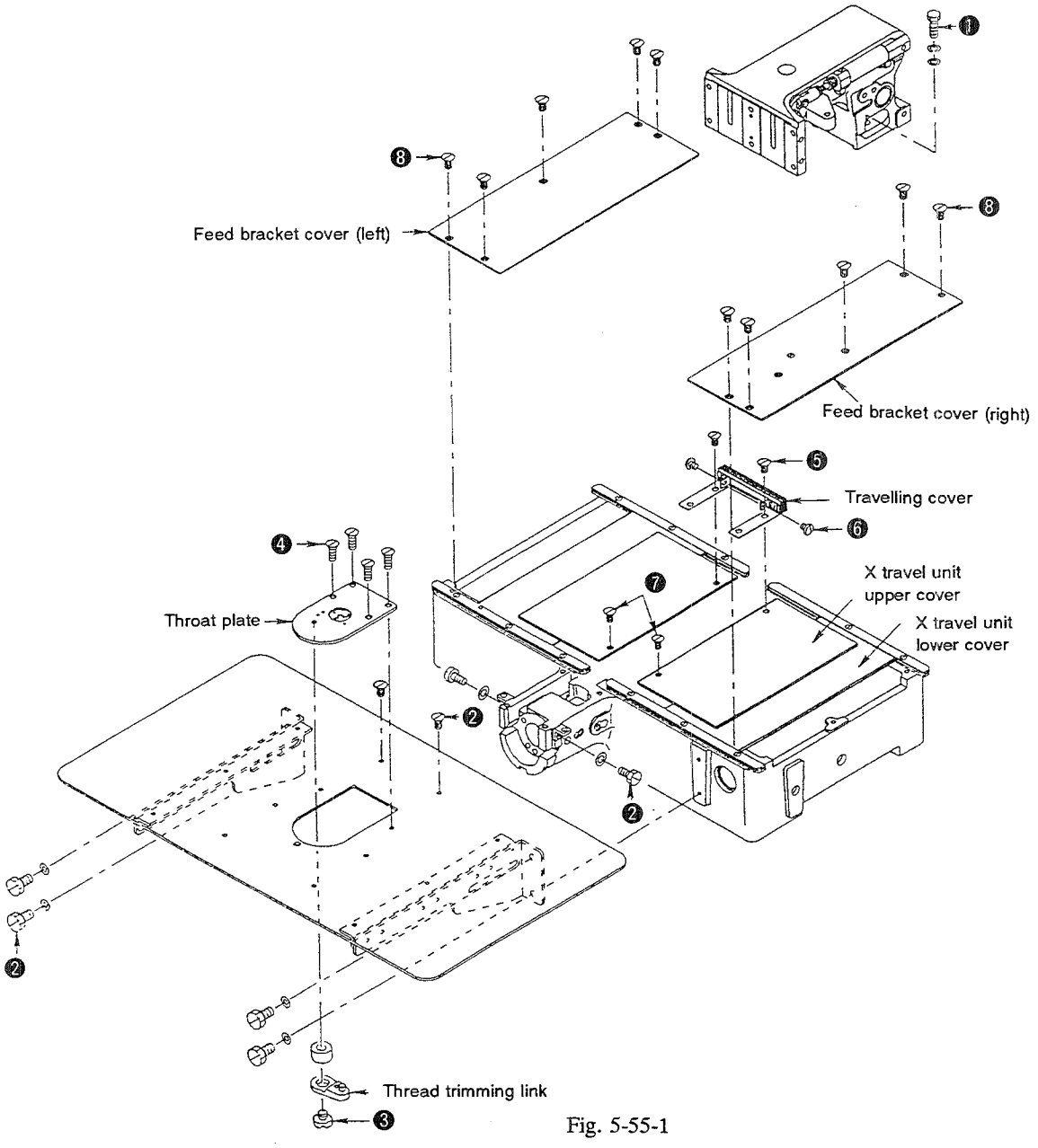


Fig. 5-55-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	o When installing the feed bracket (left/right) cover and travelling cover, refer to the "STANDARD ADJUSTMENTS (29)." o When installing the throat plate auxiliary cover, refer to the "STANDARD ADJUSTMENTS (25)." o When installing the feed plate, refer to the "STANDARD ADJUSTMENTS (40)." o Carefully prevent oil from adhering to the space located between the feed bar and the X travel unit upper cover. If oil accumulates there, an extra load will be applied to the stepping motor, resulting in step-out of the motor.

9) Remove the shuttle driver shaft. (Refer to the "DISASSEMBLY/ASSEMBLY PROCEDURES (57).")
10) Remove four setscrews ❾ , and then remove the X-axis feed stepping motor.
11) Remove two setscrews ❿ , and then remove the X guide shaft.
12) Remove locknut ⓭ and setscrew ⓮ .
13) Remove ten setscrews ⓫ and four setscrews ⓬ , and then remove the X-Y table.

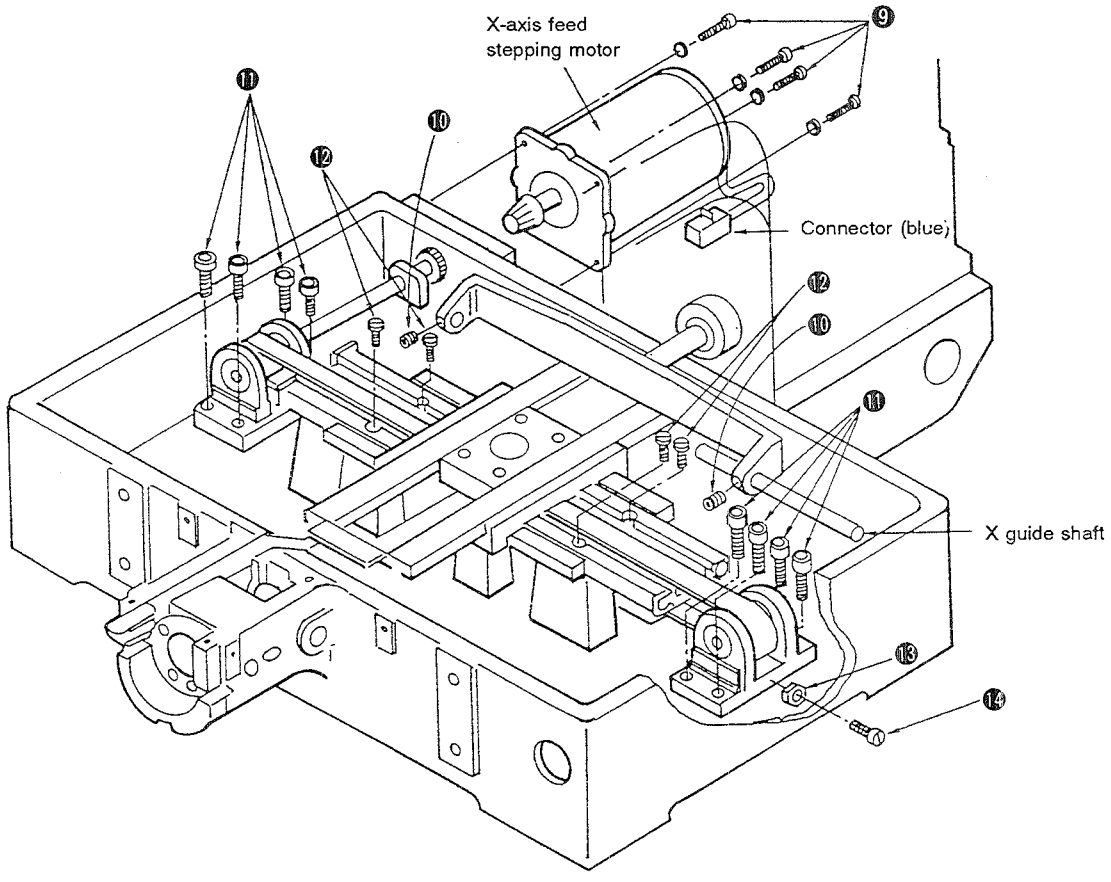
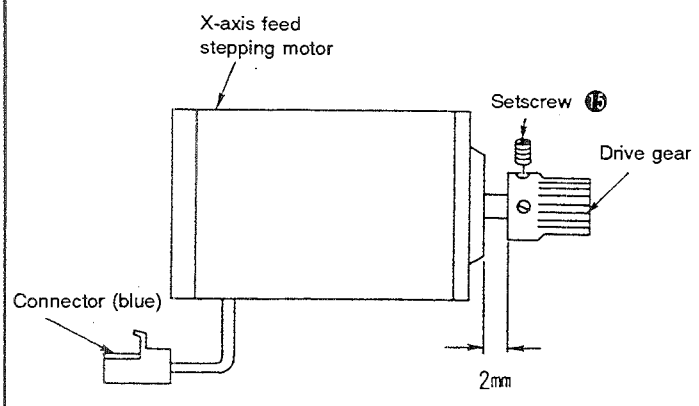
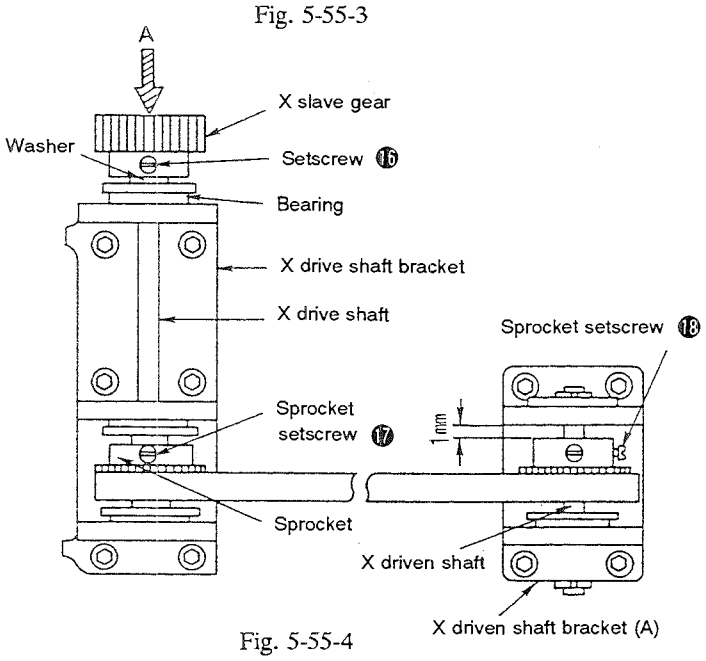
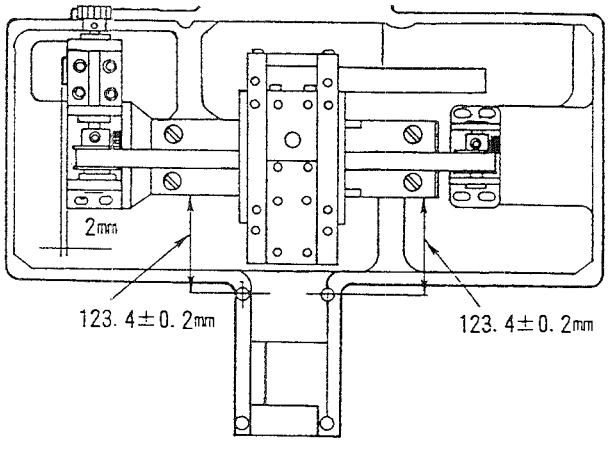


Fig. 5-55-2

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
 Fig. 5-55-3  Fig. 5-55-4  Fig. 5-55-5	o If you have removed the driving gear from the X feed stepping motor, degrease the setscrew and apply LOCKTITE No. 242 to it. Then, fix the driving gear while adjusting the clearance provided between the end face of the X feed stepping motor and the coupling to 2 mm. o If you have removed the X slave gear, lightly press it in direction A, and tighten setscrew ⑯ in the X slave gear after applying LOCKTITE No. 242 onto the setscrew. (Fig. 5-55-4) o If you have removed the sprocket from the X driven shaft bracket (A), apply LOCKTITE No. 242 to setscrew ⑱ and fix the sprocket to the bracket while adjusting the clearance provided between the sprocket and the end face of the bracket to 1 mm. o Position and fix the X-Y table according to Fig. 5-55-5. (Standard throat plate setscrew hole dia.: Setscrew hole dia. 11/64 pitch 40) After the X guide shaft has been installed, move the guide plate laterally and longitudinally to make sure that the guide plate can be moved smoothly. o To adjust the belt tension, refer to the "STANDARD ADJUSTMENTS (31)." o Adjust the clearance provided between the X driving shaft bracket and the machined end face of the bed to 2 mm.

(56) Disassembling the main shaft

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

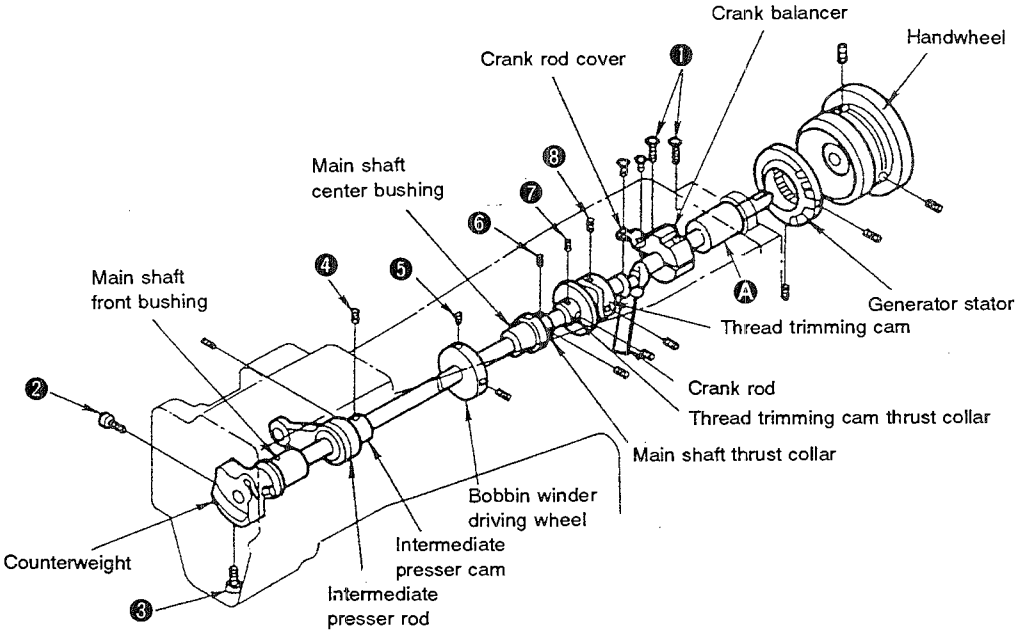


Fig. 5-56-1

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

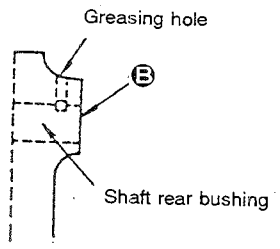


Fig. 5-56-2

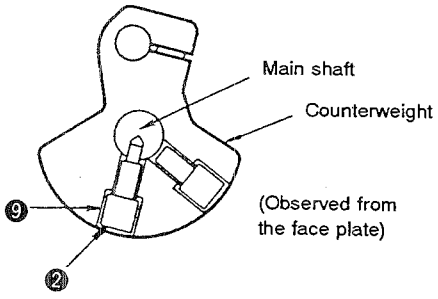


Fig. 5-56-3

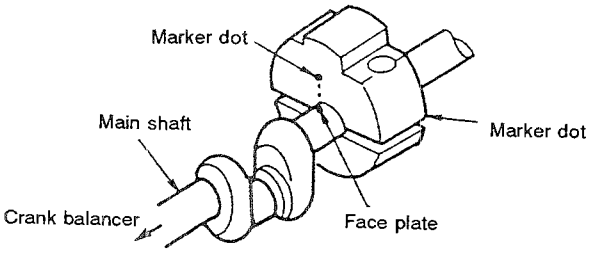


Fig. 5-56-4

(57) Removing the shuttle driver shaft

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

[Caution]

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

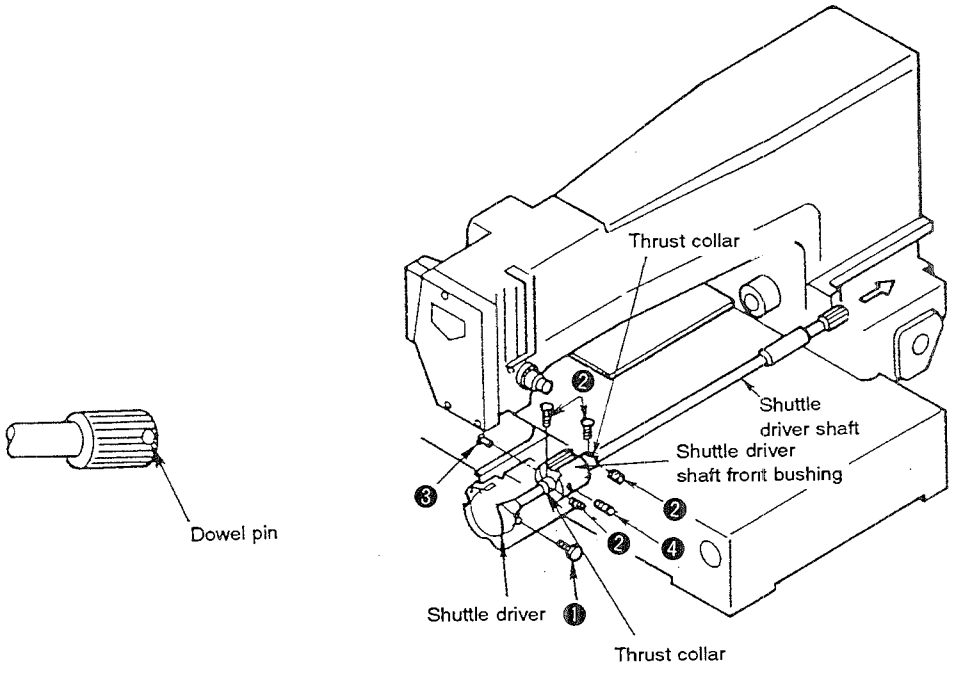


Fig. 5-57-1

CAUTIONS IN DISASSEMBLY

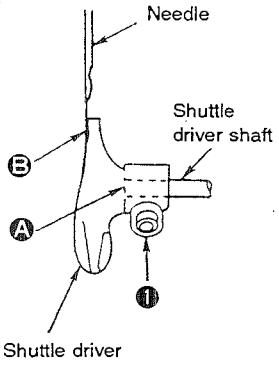


Fig. 5-57-2

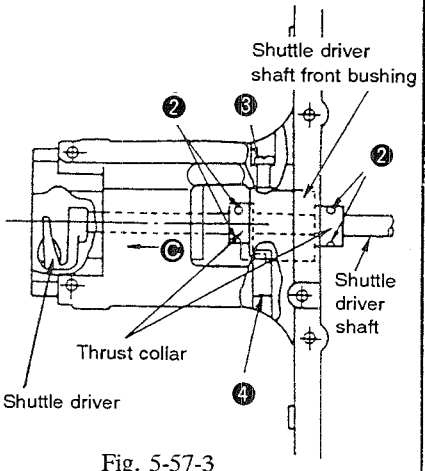


Fig. 5-57-3

CAUTIONS IN ASSEMBLY

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

(58) Assembling the feeding frame arm (optional)

1) Remove the work clamp feet (right and left) from the slide plate.
2) Attach the feeding frame arm to the slide plate and fix it with screws ❶.
3) Fix the feeding frame support shaft bearing on the feeding frame using the screw.
4) Insert the feeding frame support shaft into the support shaft bearing and temporarily tighten the screw. Then, attach the feeding frame to the ball catch and securely tighten the screw while eliminating a play.

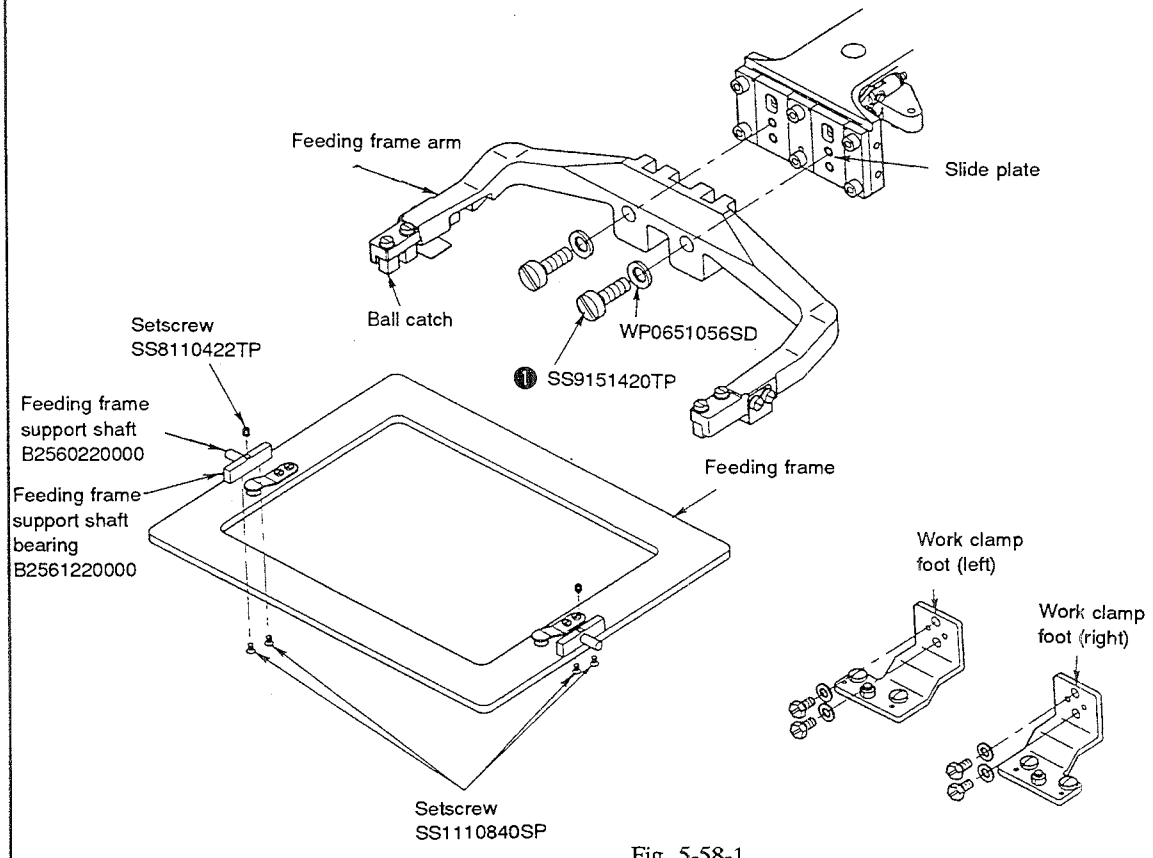


Fig. 5-58-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(59) 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. (See page 49.)
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.

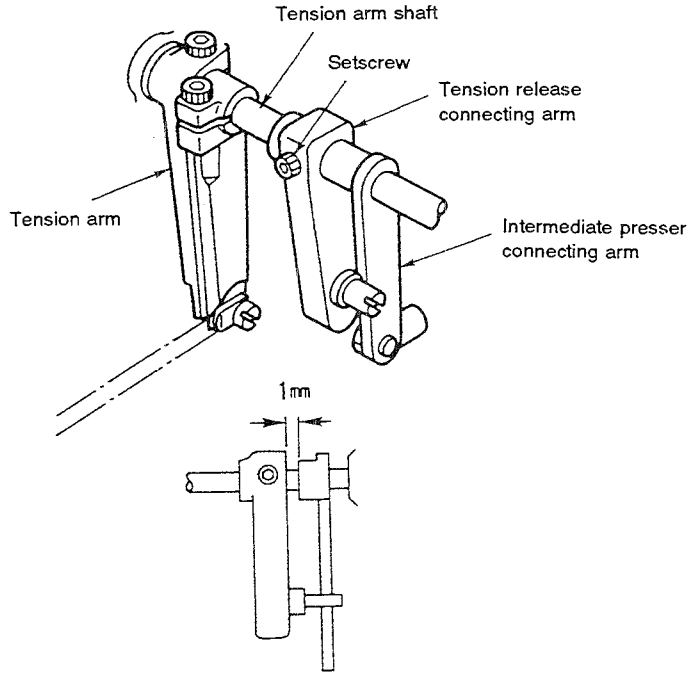


Fig. 5-59-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	o Be sure to adjust the components with the intermediate presser lifted to the highest position of its stroke. o After the assembling procedure, make sure that the tension disk rises as the intermediate presser goes up.

Greasing parts

- Supply grease when a grease-involving part has been disassembled or once every other year.
- Grease to be used:

Lithium-based grease No. 2

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

Manufacturer	Name of grease
ESSO	Templex N3

- Parts to be greased

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

Item	Details	Remarks
Parts to be greased	Y traveling shaft front bushing, inside Y traveling shaft rear bushing, inside Intermediate presser oscillating shaft bushing, inside Intermediate presser oscillating shaft, abrasive faces Intermediate presser oscillating shaft thrust collar, abrasive faces Intermediate presser link hinge screw and each link, abrasive faces Intermediate presser lifting link support shaft, abrasive parts Intermediate presser lifting link, top end Intermediate presser lifting link, abrasive parts Intermediate presser lifting guide plate, abrasive parts Shuttle race, needle components Shuttle driver shaft rear/front bushing, needle components Tension connecting rod, taper unit and abrasive parts Tension release resetting spring, hook Thread trimming cam, collar Thread trimming cam roller, periphery and abrasive parts Thread trimming link spring hook X-Y table retainer and tracking faces X guide shaft, abrasive parts X driving gear X-Y driving gear Y traveling shaft, periphery and rack face Y driving gear Bobbin winder adjusting components, abrasive parts Travelling cover (A) spring, hook and periphery Shuttle driver shaft thrust base, abrasive parts	ESSO Listan 2 or the equivalent
	Work clamp lever support, abrasive parts Work clamp lever, cylinder knuckle, abrasive parts Work clamp lever, top end Work clamp slide plate, abrasive parts Presser plate, abrasive faces	ESSO Templex N3
Parts related to greasing	Main shaft rear bushing Bobbin winder shaft base, bearing Inside of the linea bushing	ESSO Listan 2 or the equivalent
	Work clamp foot slider bracket	ESSO Templex N3
	Bobbin winder adjusting components, abrasive parts Intermediate spring B, hook Intermediate presser foot plate, abrasive parts Intermediate presser link roller Intermediate presser lifter spring hook	Only for the G type

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 or No. 601)

If it is hard to remove a screw which has been fixed using LOCK-TITE paint, heat it using a torch lamp to help remove the screw.

The following components use LOCK-TITE paint.

Item	Details			Remarks
LOCK-TITE paint applying parts	Part No.	Part Name	Q'ty	Use the LOCK-TITE No. 242 after removing any residual grease.
	B2532220000*	Y travelling shaft front bushing	1	
	B2532220000*	Y travelling shaft rear bushing	1	
	B1605220000*	Intermediate presser oscillating shaft bushing	2	
	B1403280000	Needle bar lower bushing	1	
	B1616220000	Intermediate presser bar lower bushing	1	
	SB712000100	Linear bushing	2	
	SS6150710SP	Intermediate presser positioning pin	1	
	NM6040003SC	Thread trimming solenoid lock nut	2	
	B2410220000	Thread trimming solenoid bracket pin	1	[Caution] For the four parts of whose part number are marked with asterisks (*), use LOCK-TITE No. 242 after applying Rockwick primer T grade.
	NM6040003SC	Wiper solenoid lock nut	2	
	SS9151120CP	Presser plate fixing screw	4	
	SL4031091SC	Oil drain setscrew	4	
	SS8090410TP	Setscrew for the face plate	1	
	SS8110560SP	Sealed screw for the face plate	2	
	B2540205B00	Setscrew of the driving gear	2	
	B1203215000*	Main shaft center bushing	1	
	B2540205B00	Sprocket setscrew	4	
	SM8060602TP	X, Y driving gear setscrew	4	
	SS8150822TP	Bed hinge rod setscrew	2	
	SS7121610SP	Motor setscrew	8	
	SS7151210SP	Y-motor base setscrew	4	
	SS8150822TP	X-guide shaft setscrew	2	
	PT0301600SH	Shuttle driver shaft taper pin	1	Use NUT LOCK after removing any residual grease

[Caution]

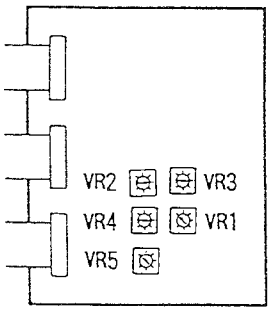
Never allow LOCK-TITE paint to get into the bearings, or else the bearings may not function properly.

5-2. Electrical parts

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 123), 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)

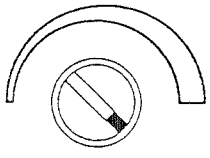
(right) V R 4 V R 1

(To the end of the counterclockwise turn)

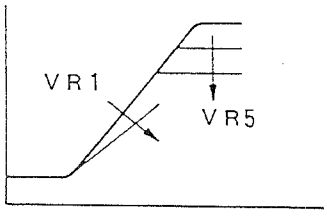
V R 5

(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 750 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.

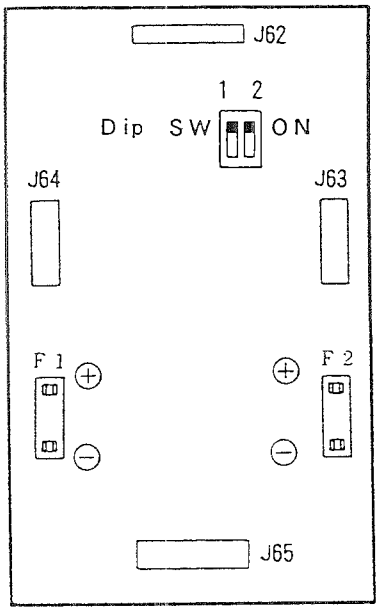
Numeric indication	Sewing speed (s.p.m.)
02	180±2
04	350^{+0}_{-50}
06	550^{+0}_{-50}
11	$1,050^{+0}_{-50}$
14	$1,350^{+0}_{-50}$
16	$1,550^{+0}_{-50}$
18	$1,750^{+0}_{-50}$
20	$1,950^{+0}_{-50}$

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

2. Adjusting the PMDC circuit board current

Two stepping motors are incorporated in the machine to actuate the feed mechanism, one for the X-axis feed, the other for the Y-axis feed. Each motor is independently actuate on the PMDC circuit board. Since all the currents are automatically regulated, they do not need to be adjusted. Consequently, only the current checking procedure is described below.

(1) Checking the current



The connectors of J63, J64 and J65 have to be connected when only the checking procedure is being carried out. The connector for J62 does not have to be connected when checking the current.

1) X-axis stepping motor (The X-axis stepping motor current flows through fuse F2).

① Be sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON side.
② Remove fuse F2. (Be careful not to remove circuit revision silk F-1 in place of fuse F2. They look similar and are likely to cause confusion.)
③ Connect the ammeter (10 Adc class) to the fuse box of fuse F2. (Take care not to confuse "+" with "-".)
④ Be sure that DIP switches SW1 and SW2 are set to their ON side, and then turn ON the power switch.
⑤ If the ammeter indicates a current value within the range 2±0.2 A, the electric current value of the X-axis stepping motor is normal.
⑥ Step DIP switch SW2 to its OFF side.
⑦ If the ammeter indicates a current value within the range 5±0.5 A, the electric current value of the X-axis stepping motor is normal.
⑧ Set DIP switch SW2 once more to its ON side, and check for the specified value 2±0.2 A on the ammeter.

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

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

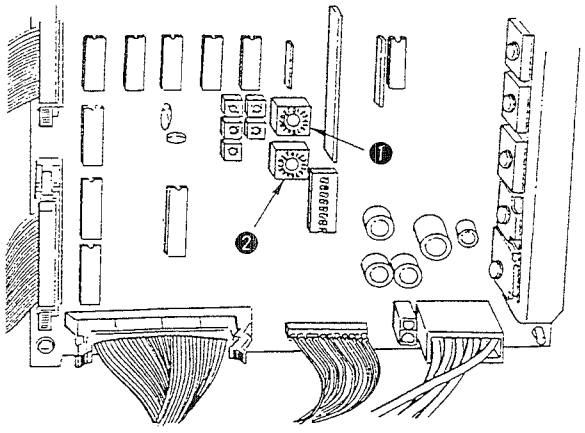
2) Y-axis stepping motor (The Y-axis stepping motor current flows through fuse F1.)

① Be sure that the power switch has been turned OFF, and DIP switches SW1 and SW2 have been set to their ON side.
② Remove fuse F1. (Be careful not to remove circuit revision silk F-1 in place of fuse F1. They look similar and are likely to cause confusion.)
③ Connect the ammeter (10 Adc class) to the fuse box of fuse F1. (Take care not to confuse "+" with "-".)
④ Be sure that DIP switches SW1 and SW2 are set to their ON side, and then turn ON the power switch.
⑤ If the ammeter indicates a current value within the range 2±0.2 A, the electric current value of the Y-axis stepping motor is normal.
⑥ Set DIP switch SW1 to its OFF side.
⑦ If the ammeter indicates a current value within the range 5±0.5 A, the electric current value of the Y-axis stepping motor is normal.
⑧ Set DIP switch SW1 once more to its ON side, and check for the specified value 2±0.2 A on the ammeter.

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

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

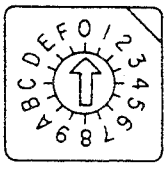
5-3. Rotary DIP switches for setting the test mode



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

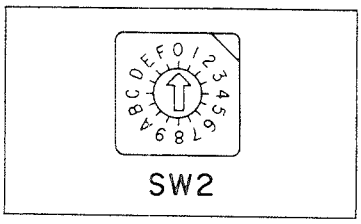
[Caution]

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.

Switch name	Function
❶ Rotary DIP switch 1 (SW1)	• This switch is not used. Set this switch to "0". (It has been set to "0" at the time of delivery.)
❷ Rotary DIP switch 2 (SW2) 	• **Set value "0" ..... Normal operation. (At the time of delivery)**

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

How to check the switches and sensors



1) If any trouble has occurred, you can check the switches and sensors for normal performance.
2) Open the cover of the control box. Set DIP switch SW1 mounted on the I/F (interface) circuit board at "2" using a small screwdriver.

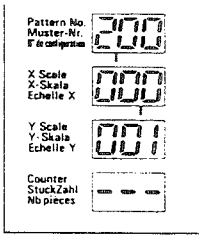
Operating procedure

① Set the SW2 at "2" and turn ON the power switch. All the displays on the operation box (panel) indicate "888."

② Depress the start switch or the feeding frame switch to make display A (Fig. 3) indicate the step (Fig. 2) to be checked.
Every time you depress the switch, indication given on display A will change successively.

③ Turn ON/OFF the switch or sensor to be check, and the corresponding display (B through I) will change over between "0" and "1."

(Fig. 1)



(Fig. 2)

Example of operation

(To check whether the [Reset] switch on the operation box (panel) works normally)

Set the SW2 at "2" and turn ON the power switch.

↓

(All the displays indicate "888.")

↓

Depress the feeding frame switch three times to set the step to "2." (Fig. 1)

Press the [Reset] switch. (Turn it ON/OFF.)
The Reset switch works normally as long as the indication shown on display B changes over between "0" and "1."
If the indication shown on display B does not change at all, suspect that the switch or related components are defective.

The blank columns are used for special-purpose maintenance.

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, maintaenance)			Air pressure sensor (Note 2)	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)								

(Fig. 3)

Pattern No. A B C — Mode | Function

X Scale D E F — Stitch type | Speed

Y Scale C H I — Pitch

(Caution)

1. **For some switches and sensors, the indication on display A will change from "0" to "1." For the other switches and sensors, it will change from "1" to "0."**
2. **Check the air pressure sensor by "reducing the air pressure" and "increasing the air pressure (5 kg or higher)" referring to "Connecting the air hoses" on page 4.**
3. **For start switch and feeding frame switches 1 and 2, the step (on display A) changes when depressing the switch. This means that the switches cannot be checked by observing a change of the indication on the display (0 ←→1). However, the switch can be checked by depressing the switch. The step corresponding to the switch depressed changes as long as the switch works normally.**
4. **To check the X and Y sensors, remove the connector of the stepping motor junction cable beforehand when the power to the machine is OFF. Then, set the step (shown on display A) to "9" and check the sensors by moving the feed (feeding frame) by hand to the back and forth and to the right and left.**

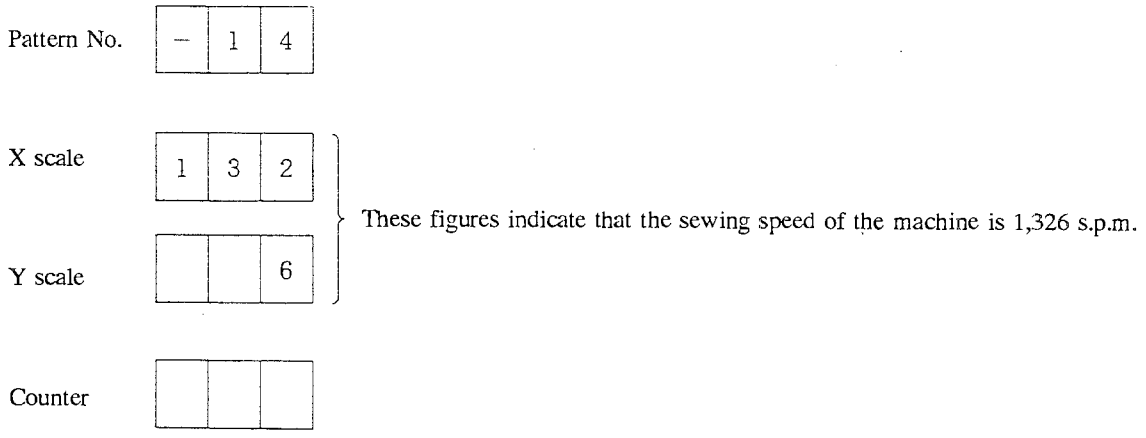
• **Set value "3" Sewing speed check program is selected.**
This switch serves to check the specified sewing speed and the actual sewing speed.

(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)

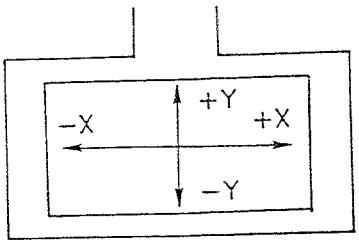


• **Set value "4" The sensor check program is selected.**
The condition of the individual sensors can be checked.

(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.

Pattern No.	–	0	1
X scale	-X	X0	+X
Y scale	–	Y0	±Y
Counter	–	–	–



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.

• **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:

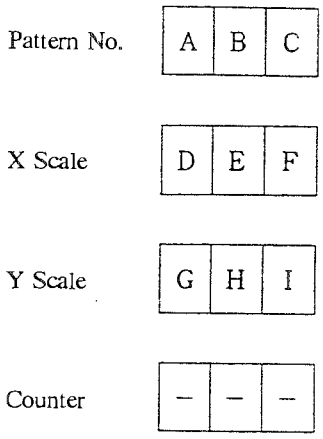
Pattern No.	–	0	1
X scale	1	0	1
Y scale	–	0	1
Counter	–	–	–

• **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."



(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

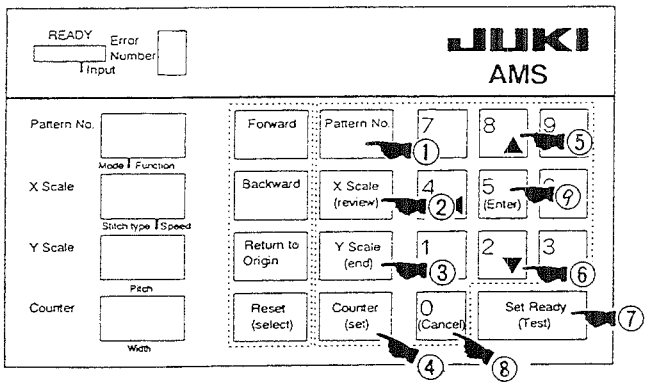
[Caution]

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.

6. FUNCTION

6-1. How to set the memory switches

6-1-1. 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

6-1-2. 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."

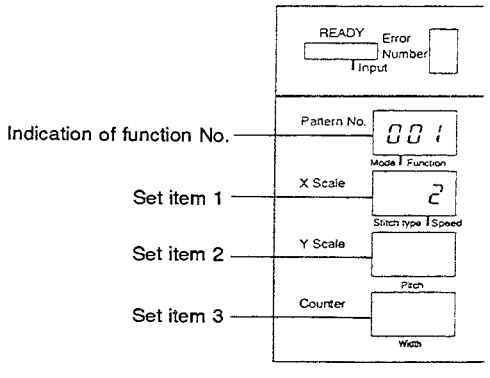
[How to start the level 2]

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.

[Indication]



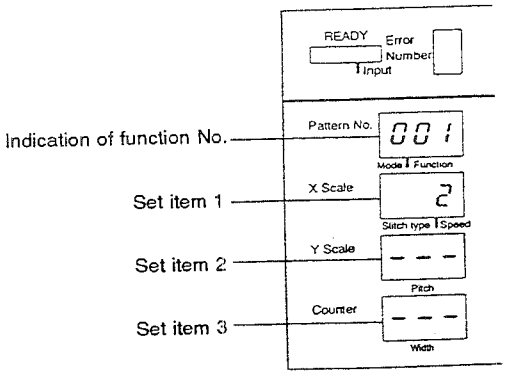
[Caution]

The function No. indication changes depending on the type of start level, i.e., level 1 or level 2. For details, refer to "6-1-4. Memory switch setting level table" and the "Contents" (on pages 129 and 130).

6-1-3. 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.

[5] + [6] + Power on



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.

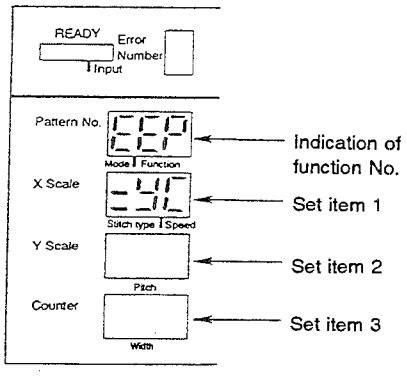
Example:
001: Indicates the selection of the jog function.
002: Indicates the second origin setting.

6-1-4. Memory switch setting level table and contents

Function No.	Function	Item	Start level 1	Start level 2	Page No.
0	Memory	1. Initialization of RAM		O	134
		2. Initialization of EEP-ROM		O	134
1	Jog function	1. Jog mode	O		135
2	X coordinate of receding position	1. Coordinate		O	136
3	Y coordinate of receding position	1. Coordinate		O	136
5	Retainer compensation	1. Mode	O		137
6	Returning route to the sewing start point	1. At the end of sewing	O		138
		2. Travel limit error	O		138
7	Returning route from a midpoint in sewing	1. Mode		O	139
8	Mechanical origin compensation	1. Amount of X compensation		O	140
		2. Amount of Y compensation		O	140
13	Enlargement/reduction	1. Mode	O		141
21	Cycle sewing	1. Performance of feeding frame (cycle sewing)	O		142
22	Thread trimming command	1. Switch	O		143
30	Bobbin thread counter	1. Counting	O		144
31	Floppy disk data reading operation	1. Selection of function		O	145
		2. Regular reading	O		145
33	Automatic pattern reading from floppy disk	1. Mode		O	146
35	Idling operation	1. Speed changing		O	147
36	Thread trimming at the time of temporary stop	1. Thread trimming action	O		147
40	Selection of sewing speed	1. Acceleration at the sewing start	O		148
		2. Selection of feed pitch/sewing speed	O		148
41	Feed control	1. Feeding position	O		148
42	Thread trimmer control	1. Control	O		149
43	Feeding frame control	1. Operation sequence	O		150
		2. Feeding frame holding state at the end of sewing	O		150
		3. Regular holding	O		150
44	Intermediate presser control	1. Control	O		151
		2. Operation timing	O		151
45	Wiper	1. Sweeping position	O		152
		2. Sweeping position	O		152
46	Thread clamp performance	1. Switch	O		153
		2. Thread clamp mechanism	O		153
47	Selection of thread breakage detecting function control	1. Switch	O		154
		2. Setting the number of stitches required to stop the machine (at the start)		O	154
		3. Setting the number of stitches required to stop the machine (during normal operation)		O	154

Function No.	Function	Item	Start level 1	Start level 2	Page No.
48	Selection of air pressure detecting function	1. Switch	O		155
49	Selection of needle-up position detecting function	1. Switch	O		155
51	Inverting mechanism control	1. Switch	O		156
53	Tension controller No. 3 control	1. Switch		O	156
55	Buzzer control	1. Switch		O	157
56	Selection of floppy disk data reading sequence	1. Retrieving sequence	O		157
81	Wiper (magnet) sweeping action	ON/OFF timing		O	158
82	Wiper (air) sweeping action	ON/OFF timing		O	159
84	Intermediate presser action timing	ON/OFF timing		O	160

6-1-5. 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.

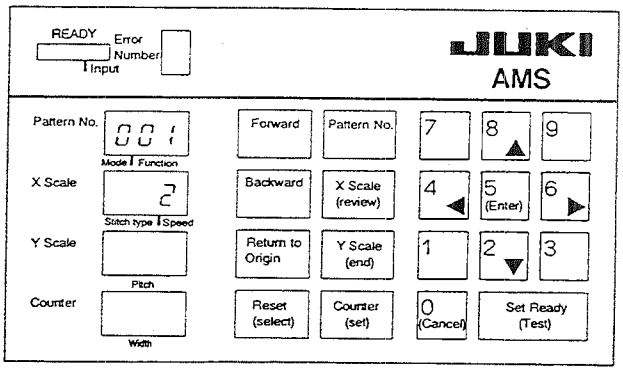
Example:
001: Indicates the selection of the jog function.
002: Indicates the second origin setting.

6-1-6. 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.

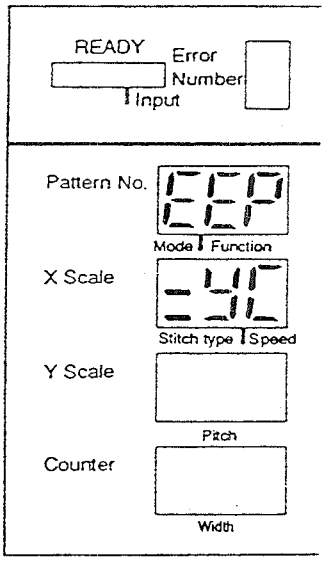


1) Explanation of the LED indications

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)

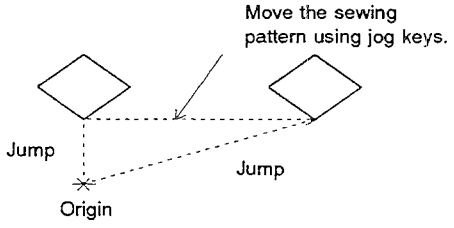
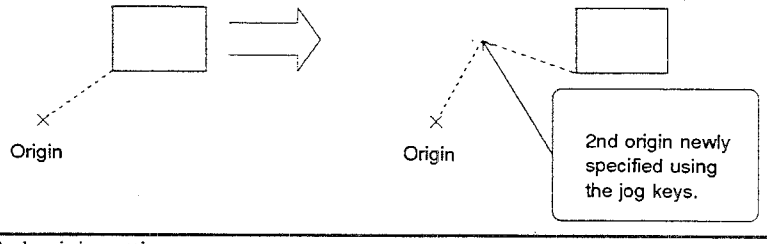
[Description]
The RAM is not initialized and the backup data are stored in memory. Note that the RAM is automatically initialized in care where the backup data is failed.

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-215CSS/CHS (with a monolithic feeding frame)	0	0	1	0
2	AMS-215CLS/CHL (with a separately-driven feeding frame)	0	2	1	0
3	AMS-215CBS/CHB (with a double-stepped stroke feeding frame)	0	1	1	0
4	AMS-215CSL/CHL (with a double-stepped stroke separately-driven feeding frame)	0	8	1	0
5	AMS-215CST/CHT (with a double-stepped stroke separately-driven feeding frame)	0	8	0	1
6	AMS-215CGL (with a separately-driven feeding frame)	0	8	1	1
7	AMS-215C (for embroidering)	1	2	1	0

[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.

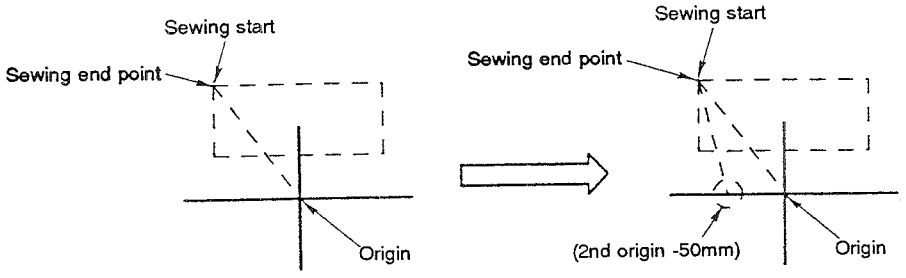
1) Operation setting		(Level 1)
Function No. 1		Function: Jog function
Item: 1 Jog mode		
Set value	0	Jog function is ineffective. [Description] The jog keys (4 , 6 , 8 and 2) are inoperative.
	1	Pattern travel [Description] A sewing pattern can be moved to a specified position by operating the jog keys (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] 
	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]

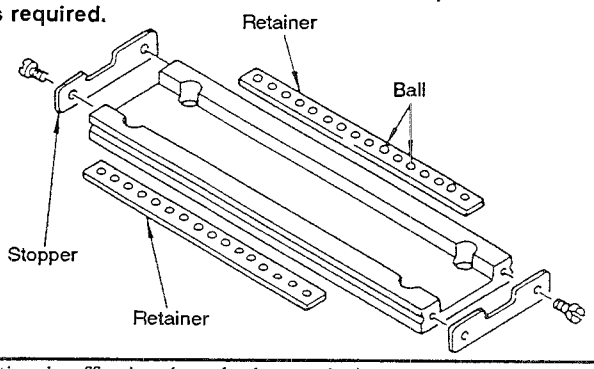
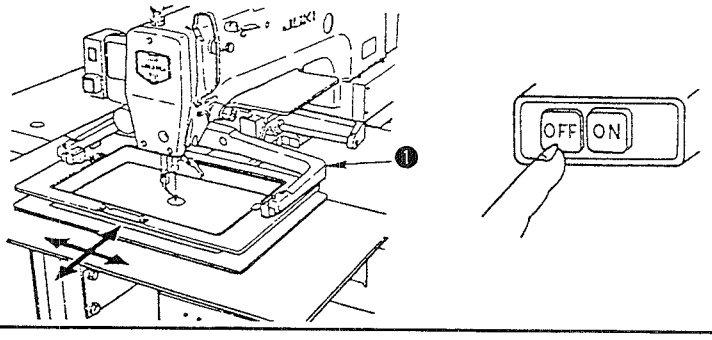


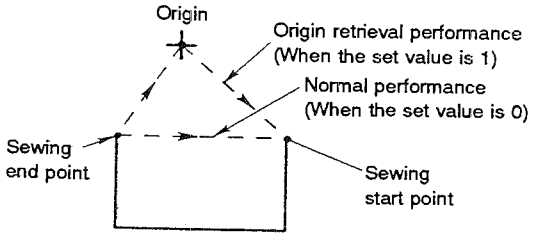
After the location of the 2nd origin is specified
(When the location of the 2nd origin is set to a point X=-500, Y=0)

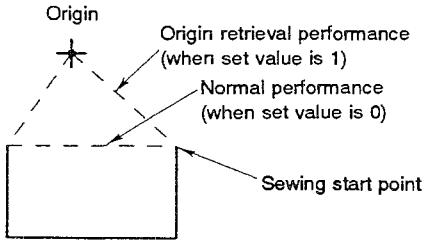
1) Operation setting		
Function No. 3	Coordinate of the location of 2nd origin	
Item: 1 Setting a Y coordinate of the location of 2nd origin		
Set value	-32767 ~ +32767	Setting the location of 2nd origin (Y coordinate) (Standard set value 0)

[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

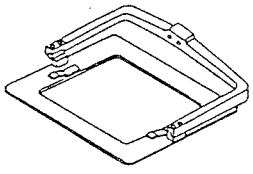
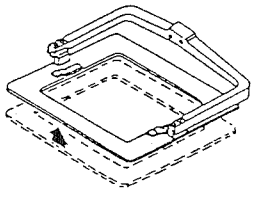
1) Operation setting		(Level 1)
Function No. 5		
Item: 1		
Set value	0	Retainer compensation function is inoperative.
		[Description] Retainer compensating performance is prohibited. Retainer compensation: The built-in X-Y table retainer of the sewing machine may shift out of position after a prolonged use. In this case, the shape of a sewing pattern will be deformed or the origin retrieval failure will be caused. In order to prevent the aforementioned troubles, the position of the retainer can be forcibly corrected after pressing the [Set Ready (Test)] switch for the first time after turning ON the power to the machine. This performance is called "retainer compensation performance." **[Note]** **Be sure to make the machine perform the retainer compensation unless a special performance is required.** 
	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. <Example> 
	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 1)
Function No. 21	Cycle stitching	
Item: 1 Performance of the feeding frame		
Set value	0	The feeding frame is held in the lowest position to secure the workpiece on the machine. (The feeding frame cannot be operated using the pedal switch.)
		[Description] If a temporary stop command has been entered in the sewing pattern used, the feeding frame will not go up even when the sewing machine stops.
	1	The feeding frame is held in the lowest position to secure the workpiece on the machine. (The feeding frame can be released from the aforementioned position by operating the pedal switch.) (Standard set value)
		[Description] If a temporary stop command has been entered in the sewing pattern used, the feeding frame can be raised by operating the feeding frame pedal switch after the sewing machine stops. * Cycle sewing means to sew several sewing processes (cycles) continuously. The feeding frame goes up to allow you to change the workpiece if you have entered a temporary stop command at the desired point in a pattern so as to divide the pattern at that point. 
	2	The feeding frame can be released from the lowest position. (The feeding frame can be lowered to secure the workpiece on the machine by operating the pedal switch.)
		[Description] If a temporary stop command has been entered in the sewing pattern used, the machine temporarily stops at that point and raises the feeding frame. Then, the feeding frame can be lowered by operating the pedal switch.  **[Caution] When the cycle sewing function is ON, take the below-stated precautions.** When the Forward or Backward key is pressed, the feed halts at the preset temporary stop position where the feeding frame can be raised or lowered using the feeding frame switch. If you want to continue to move the feed forward or backward, lower the feeding frame and re-start the operation. The Return to Origin switch is used to return the machine to the start point of the first cycle in a sewing pattern. If you want to return the machine to the start of the current cycle, use the Backward key. The Counter on the display counts the bobbin thread at the completion of a sewing pattern. If three cycles are input in a pattern, the Counter counts after the completion of the three cycles. The Set Ready switch is rendered ineffective while a sewing pattern (between cycles) even if the feeding frame goes up. Press the Set Ready switch after pressing the Return to Origin switch or after the completion of the pattern.

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.

(Level 1)

4) Operation system control

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.

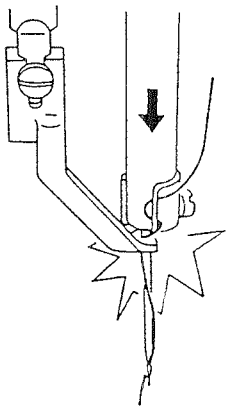
4) Operation system control		(Level 1)
Function No. 36		Selection of thread trimming after turning ON the temporary stop switch.
Item: 1 Thread trimming setting		
Set value	0	Thread trimmer automatically actuates.
		[Description] When the temporary stop switch is pressed, the sewing machine temporarily 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.

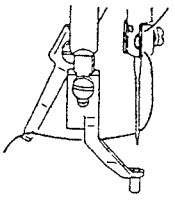
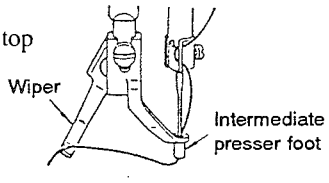
5) Mechanism control		(Level 1)
Function No. 40	Selection of the sewing speed	
Item: 1 Acceleration at the start of sewing		
Set value	0 ~ 4	Selection of the acceleration at the sewing start (depends on the setting of item 2 of function No. 1)
		[Description] The start-up speed of the sewing speed is 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 "(6-1-7) 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. [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.

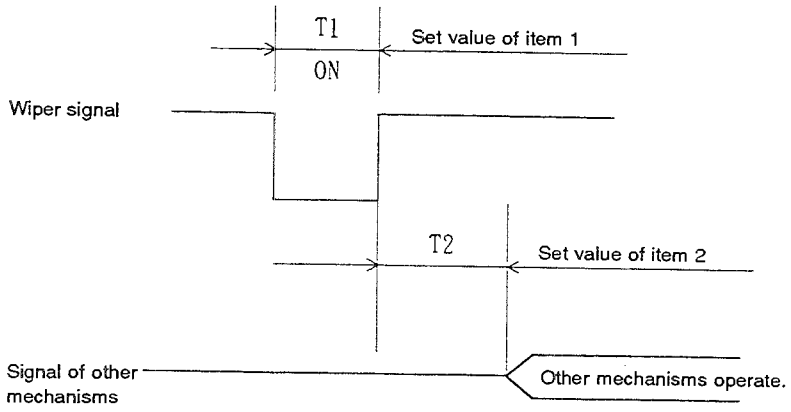
5) Mechanism control		(Level 2)
Function No. 53		Tension controller No. 3 control
Item: 1	Rendering the tension controller No. 3 control effective or ineffective.	
Set value	0	The tension controller No. 3 control is rendered ineffective.
		[Description] Even when the pattern data has a mark 2 data, the 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.

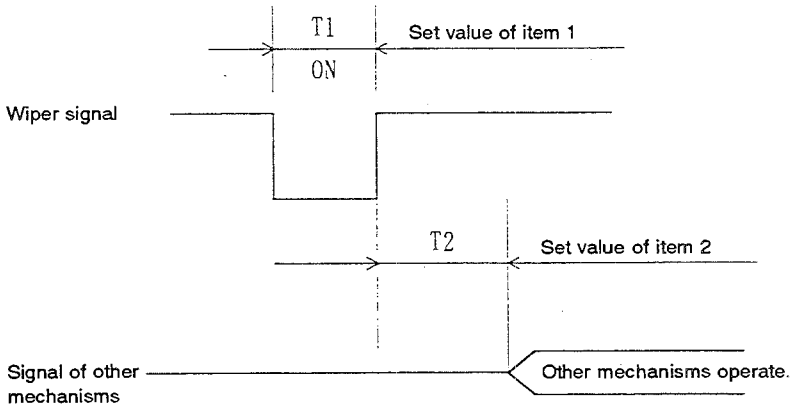
5) Mechanism control		(Level 2)
Function No. 55	Buzzer control	
Item: 1 Rendering the sound of buzzer when accepting a key switch effective or ineffective		
Set value	0	The sound of buzzer is ineffective. [Description] The buzzer does not sound when a key switch on the operation panel is pressed.
	1	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-215C 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-215C 2 : Floppy disk for the AMS-B type 3 : Floppy disk for the AMS-A type 4 : 5 : Normally disused. **[Note]** **Do not read data from the floppy disk for the AMS-215C, AMS-A or -B type model of sewing machine with the function set at 3 or 4.**

Set value	Data reading sequence		
	1	2	3
0	1	2	3
1	2	1	3
2	3	1	2
3	-	-	-
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.

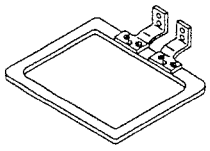
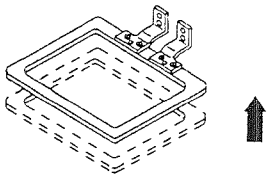
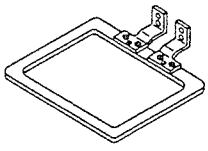
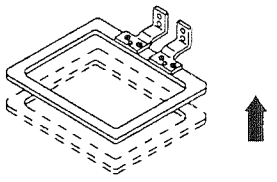
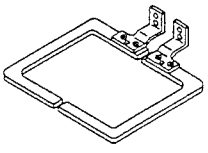
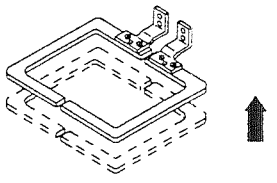
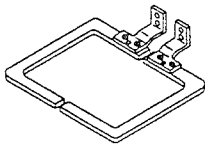
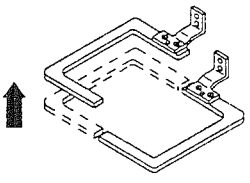


6) Setting the delay time		(Level 2)
Function No. 82		Wiper sweeping action (air)
Item: 1	The period of time during which the wiper (air) is energized and that required to reset the wiper are specified.	
Set value	0~999	Period of time during which the wiper is energized (Standard set value T1 = 100 ms) [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.

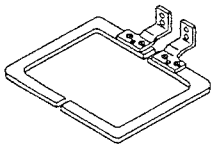
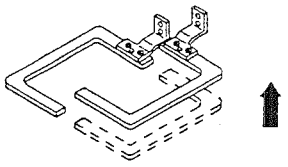
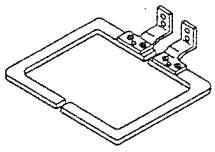
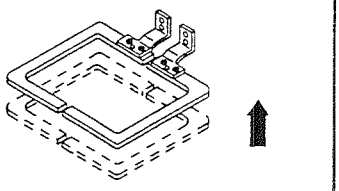
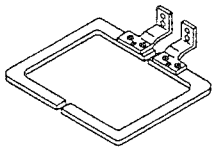
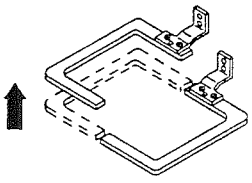
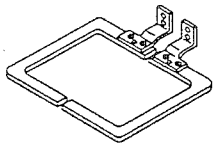
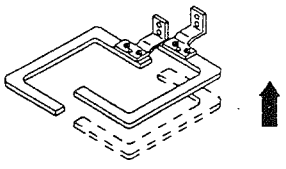
6-1-7. Feeding frame control

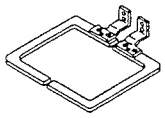
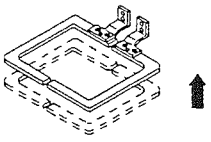
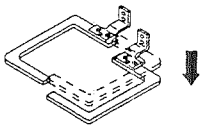
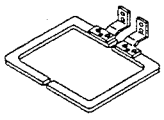
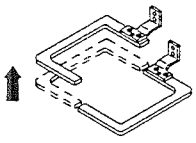
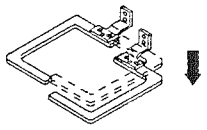
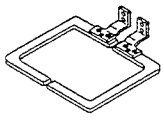
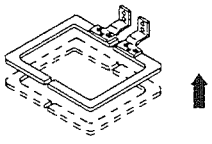
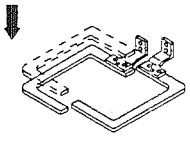
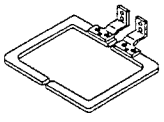
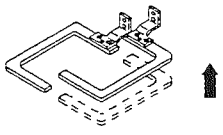
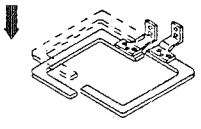
Items 1: Setting the operation sequence

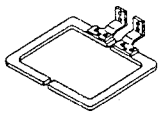
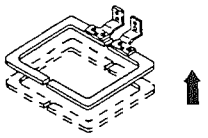
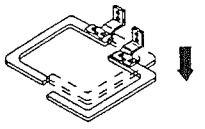
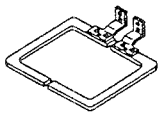
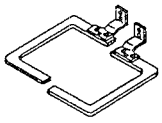
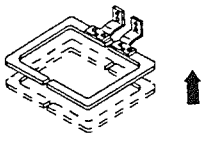
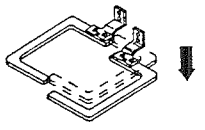
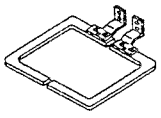
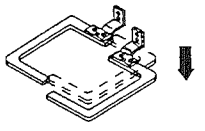
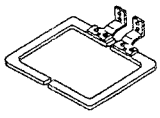
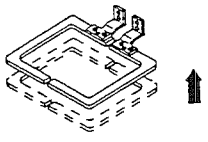
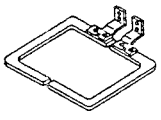
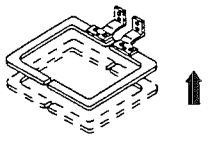
Set value	Classification	Double-stepped stroke	"1At the time of cycle sewing
0	 Monolithic feeding frame	×	 The feeding frame stops in the highest position of its stroke.
1	 Monolithic feeding frame	○	 The feeding frame stops in the highest position of its stroke.
2	 Separately-driven feeding frame	×	 The feeding frame stops in the highest position of its stroke.
3	 Separately-driven feeding frame	×	 The feeding frame stops only with its left 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.

Set value	Classification	Double-stepped stroke	*1At the time of cycle sewing
4	 Separately-driven feeding frame	×	 The feeding frame stops only with its right portion raised.
5	 Separately-driven feeding frame	○	 The feeding frame stops in the highest position of its stroke.
6	 Separately-driven feeding frame	○	 The feeding frame stops only with its left portion raised.
7	 Separately-driven feeding frame	○	 The feeding frame stops only with its right portion raised.

Set value	Classification	Double-stepped stroke	*1At the time of cycle sewing	*2Feeding frame operation controlled by the foot pedal
8	 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	 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	 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	 Separately-driven feeding frame	○	 The feeding frame stops only with its right portion raised.	 The left portion of the feeding frame comes down first.

Set value	Classification	Double-stepped stroke	*1At the time of cycle sewing	*2Feeding frame operation controlled by the foot pedal
12	 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	 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		○		 The right portion of the feeding frame comes down first.
15		×	 The feeding frame stops in the highest position of its stroke.	
16		○	 The feeding frame stops in the highest position of its stroke.	

[Caution]

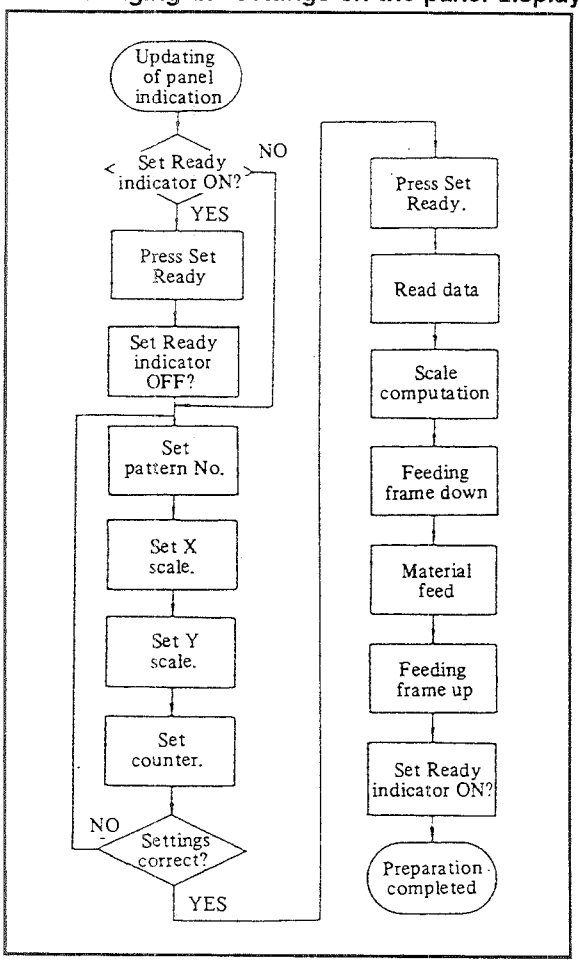
1. For the feeding frames marked with "*1," it is possible to select either close or open of the feeding frame, depending on the setting of item 1 of the memory switch 21, when it stops in the intermediate stop position.
2. For the feeding frames marked with "*2," it is possible to select either close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

6-2. Error messages

The error number or alphabets will be shown on the error number display of the operation panel to indicate the condition of the machine.

Error No.	Indicator lamp	Error description	Action to be taken
1	ON	Comes on if a malfunction has resulted in a data read-out error.	Press the Set Ready Key to read out the data again.
	ON The pattern No. indicator lamp flashes on and off	Starts when there is no data for the relevant number.	Set the correct Pattern No.
	Flash	A floppy disk is no inserted.	Insert a floppy disk.
2	ON	Comes on if the stitch length exceeds 12.7 mm over the computable range in an attempt to enlarge a pattern based on the number of stitches.	Correctly reset the X- and/on Y-scale.
3	ON	Comes on if the needle is not in its highest position.	Turn the handwheel until error No. "3" disappears. Or turn ON/OFF the Needle Threading switch to raise the needle to its highest position.
4	ON	Comes on if the maximum sewing area (180mm x 110mm) is exceeded.	During a sewing cycle: Press the Return to Origin key. While setting the 2nd origin: Press the Jog key.
5	Flash	Starts when the temporary stop switch is turned ON.	Press the start switch to actuate the sewing machine again. Turn ON/OFF the Needle Threading switch, and the thread will be trimmed. (The lamp display changes from "Flash" to "ON".)
	ON	Comes on when only the feeding frame is moving. Comes on when the temporary stop switch is turned ON.	Turn ON the start switch after pressing the return to origin and the forward or backward switch.
6	ON	When large pattern data have been read or a complicated processing has been carried out resulting in shortage of memory.	If the error has occurred when combining sewing patterns, press the set ready switch or re-specify a scale.
7	ON	Comes on if a malfunction has caused the machine to lock, or if there has been a failure in the needle position detector.	Turn OFF the power switch. Replace the defective parts or eliminate the cause of the machine locking. Then turn ON the power switch.
8	ON	Comes on if a poor connection of a solenoid connector is detected.	Turn OFF the power switch, and check for the loose solenoid connection.
9	ON	Comes on if the needle thread is broken.	Re-thread the machine head, press the return to origin switch and the forward or backward switches to move the feeding frame backward. Then press the start switch.
0	Flash	Starts when trying to format a floppy disk with the write-protect tab in the open position (the disk cannot be formatted).	Move the write-protect tab so that it is in its closed position.
	ON	Comes on when trying to format a defective floppy disk.	Replace the floppy disk.
A	ON (Flash)	Air pressure is low. Air is not supplied to the sewing machine. Connector of the junction cable for the air valve disconnects. (Air pressure has dropped during sewing.)	Turn OFF the power switch. Set the air pressure to 5~5.5 kgf/cm^2 (0.5~0.55 MPa). Connect the connector. (Adjust the air pressure to the specified value and re-start the sewing machine.)
E	ON	Comes on when the sewing machine rotates in the reverse direction.	Turn OFF the power switch. Change the rotation direction of the motor.

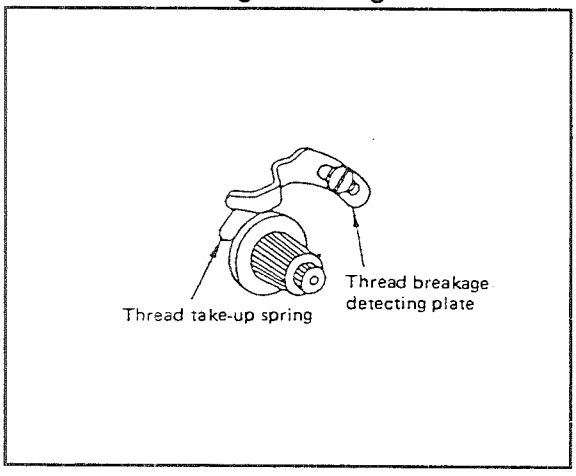
6-3. Changing the settings on the panel displays



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.

6-4. Thread breakage detecting function

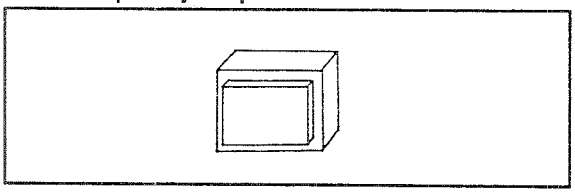


The thread breakage detector detects the breakage of the needle thread by checking the contact between the thread take-up spring and the thread breakage plate. While sewing, the motion of the thread take-up spring is synchronized with the motion of the needle bar. If the needle thread is lost due to 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.

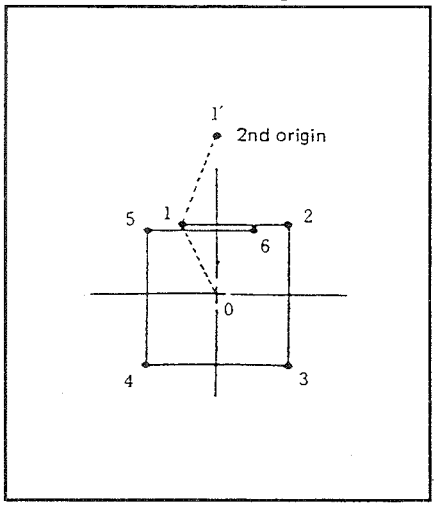
After re-threading the machine head, move the feeding frame forward or backward, using jog keys (▼) or (▲), and start switch to resume sewing, or move the feeding frame back to the sewing start by the return to origin switch.

6-5. 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.)

6-6. 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.

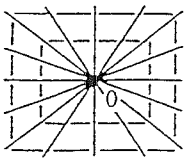
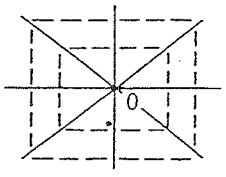
When the 2nd origin is denoted as 1' for a sewing pattern as illustrated, which consists of sewing from 1 to 6, jump from 6 to 1, and stop, the sewing procedure will be as follows: Jump from 1' to 1, sewing from 1 to 6, jump from 6 to 1', then stop.

6-7. 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.

6-8. 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.

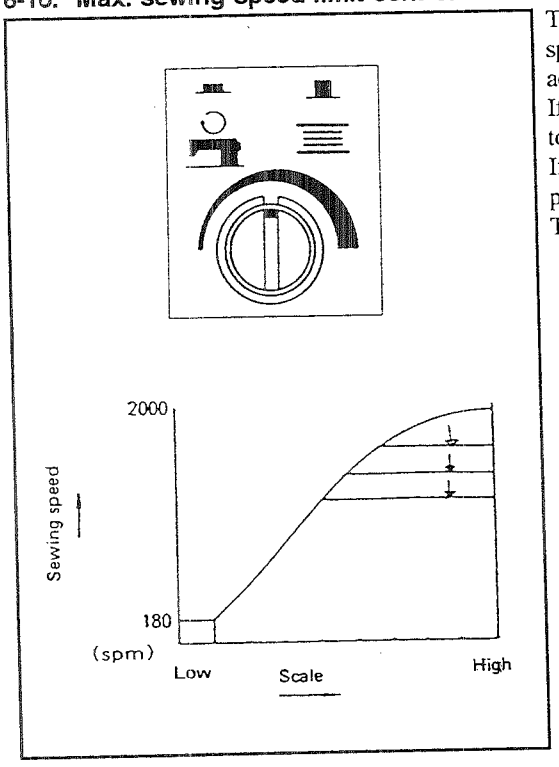
6-9. Memory back-up function

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.

6-10. 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.

6-11. Combining patterns

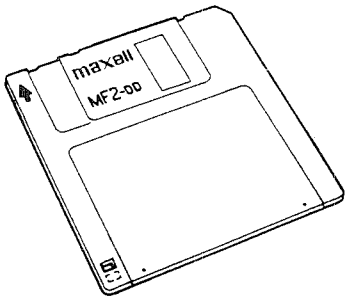
Pattern combination function

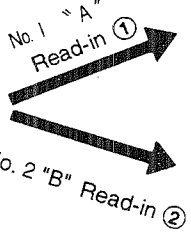
This function enables the machine to read only the desired parts of the patterns stored in the floppy disk to combine them for sewing.

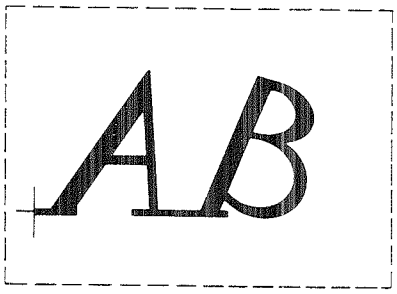
The total number of stitches that can be combined is 16,000 stitches at the maximum. As long as the total number of stitches does not exceed 16,000, you need not care about the number of patterns.

If you have created embroidery patterns of all the alphabets respectively in the floppy patterns beforehand, you can combine some of these patterns to sew initials. This allows you to sew many different persons' names using a considerably small number of patterns (only 26 different patterns from A through Z).

(Patterns stored in the floppy disk)
No. 1←"A"
No. 2←"B"
No. 3←"C"
No. 4←"D"
No. 26←"Z"







Pattern combination function

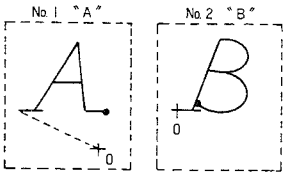
● **Actuating the "pattern combination function"**

The "pattern combination function" can be actuated in the our different ways in accordance with the pattern combining methods.

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

– Example of a combination of sewing patterns –

Sewing pattern data "A" and "B" stored in a floppy disk are combined taking the aforementioned four different methods.



("+0" indicates the origin.
"●" indicates the sewing end.)

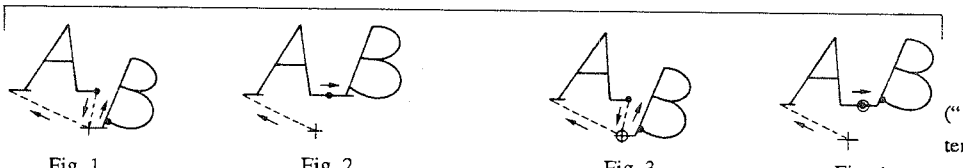
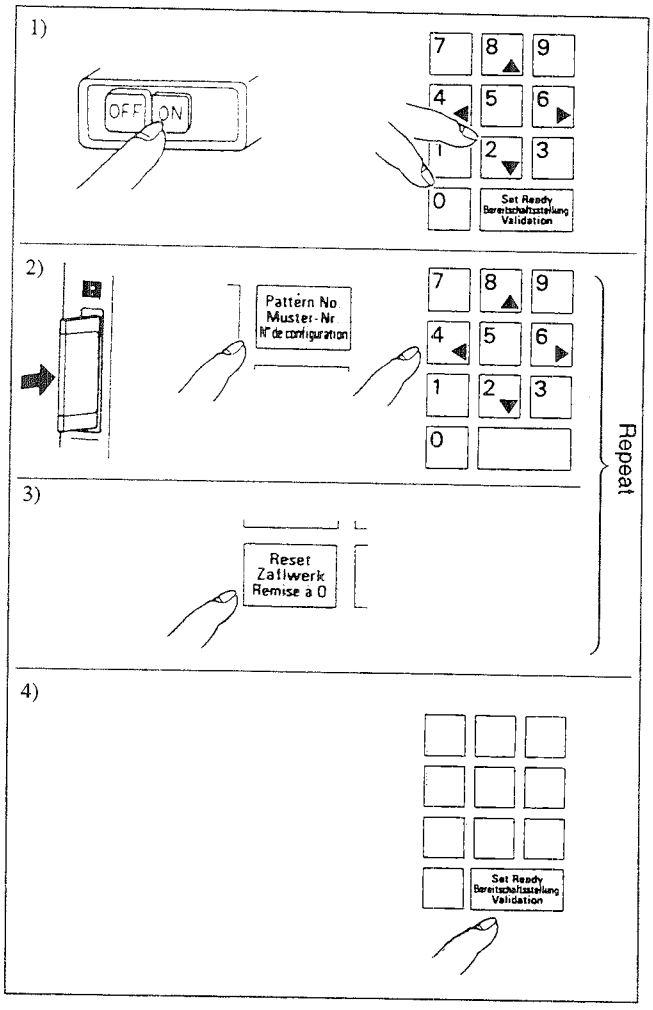


Fig. 1 Fig. 2 Fig. 3 Fig. 4

(" ○ " indicates a temporary stop.)

❷ Reading a sewing pattern data (In the case of ❶ -I)



1) Actuate the sewing pattern combining function in the actuating method described in ❶.

2) Insert a floppy disk into the floppy disk inserting slot and input a sewing pattern No. desired.
If you want to enlarge/reduce the sewing pattern input a scale now.

3) Press the switch, and the sewing pattern data will be read from the floppy disk.

(Caution) Sewing patterns can be combined as desired by repeating aforementioned steps 2) and 3).

4) After the desired sewing pattern data have been read out from the floppy disk, press the switch. This will make the sewing machine retrieve the origin then ready for sewing.

❸ Erasing the pattern read in

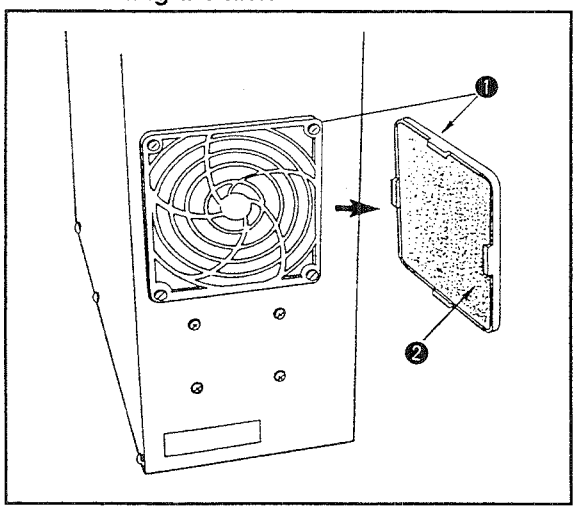
If you have read in the pattern which is not necessary for your sewing by mistake and combine it with the other patterns, you cannot erase the wrong pattern.
So, if you have made a mistake in the pattern reading operation, it is necessary for you to re-actuate the function and carry out the pattern reading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

❹ Storing the patterns combined in memory

It is impossible to write and store the combined pattern data on a floppy disk. Thanks to the data back-up function, however, the combined pattern data can be stored in memory of the main unit of sewing machine by turning OFF the power to the machine while the READY indicator lamp is on. To perform sewing, for the next time, using the combined pattern data, only press the switch.

7. MAINTENANCE AND INSPECTION

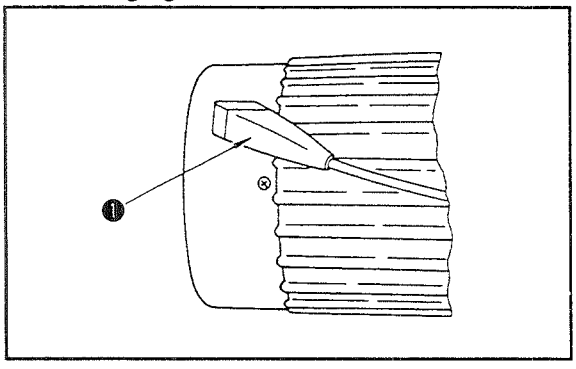
7-1. Cleaning the filter



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

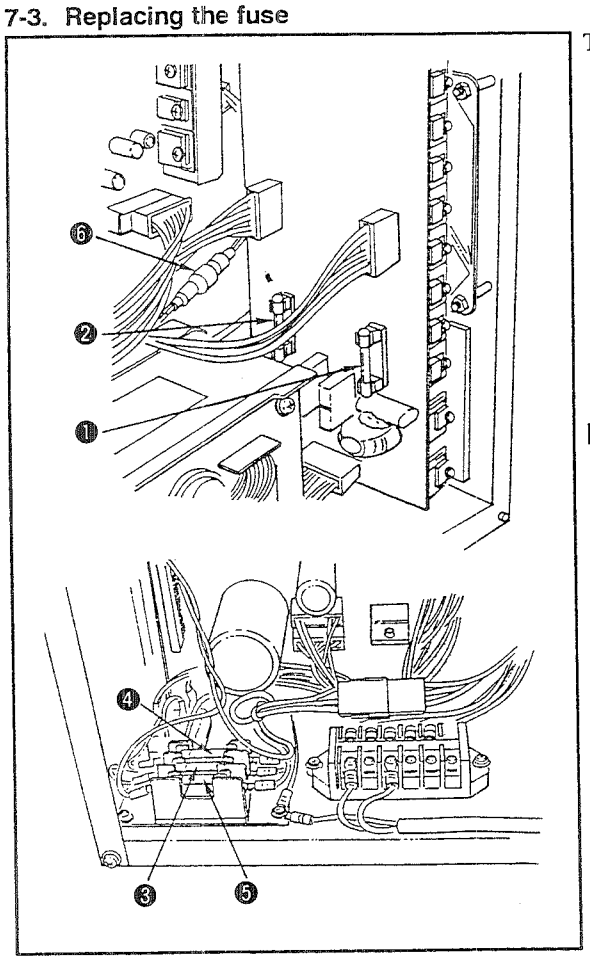
1) Pull the screen kit ❶ in the direction of the arrow to remove it.
2) Wash the filter ❷ under running water.
3) Reinstall the filter ❷ and the screen kit ❶.

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



1) Turn the power switch OFF.
2) Remove connector ❶ from the rear of the motor (on the opposite side from the handwheel).
3) Change the direction of connector by 180°, and reconnect it securely until it will go no further.

7-3. Replacing the fuse



The machine uses the following six fuses:

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

[Caution]

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

7-4. Adjustment and maintenance of the motors

1. Adjusting the clutch gap

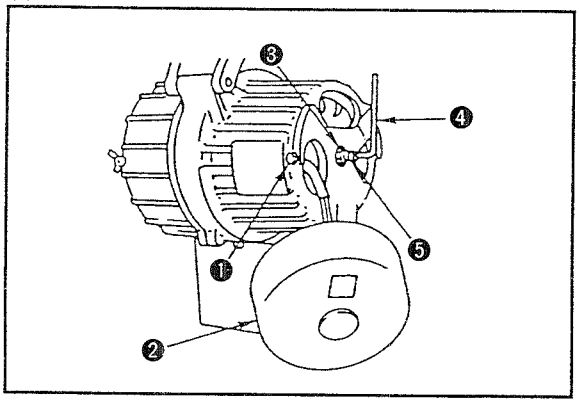
The clutch gap is factory-adjusted to 0.5 mm.

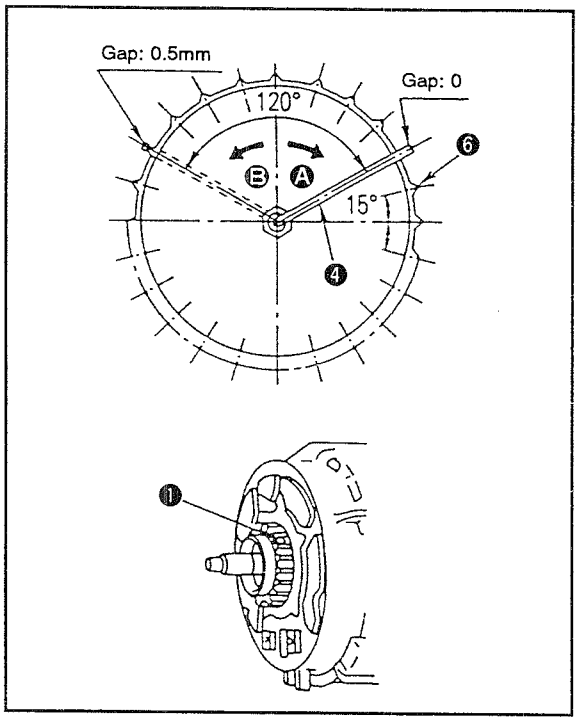
Readjust the clutch gap.

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

<Adjusting procedure>

(1) For HITACHI motor





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

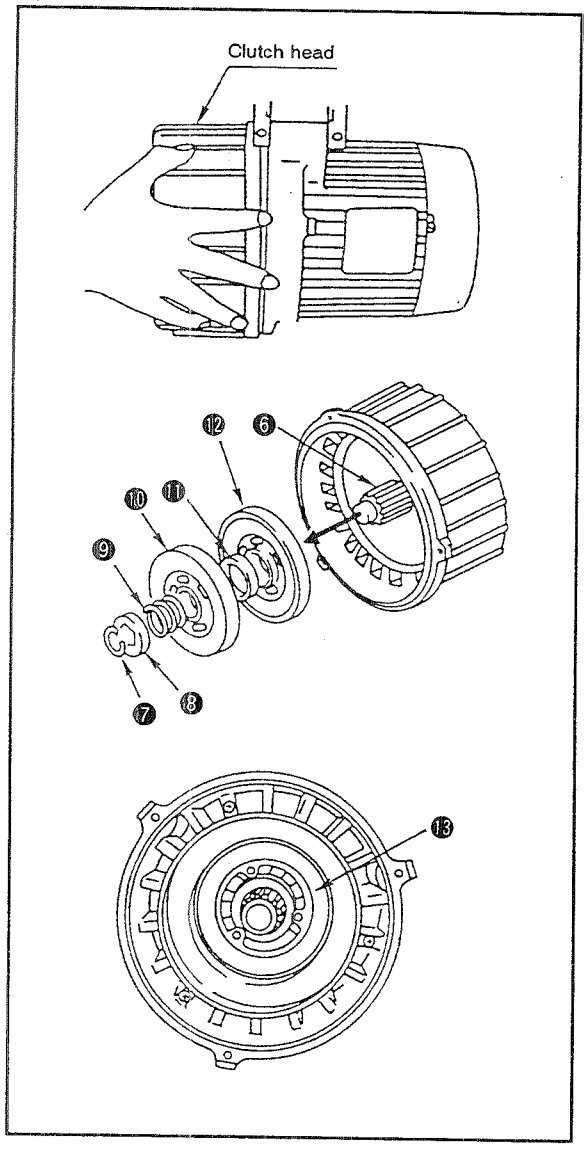
(2) For MATSUSHITA motor
First, turn adjustment screw ❶ fully counterclockwise. Then, slowly turn it clockwise until resistance is felt. Further turn the adjusting screw clockwise by 8 steps (120 degrees).

2. Replacing the clutch ring and brake ring

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

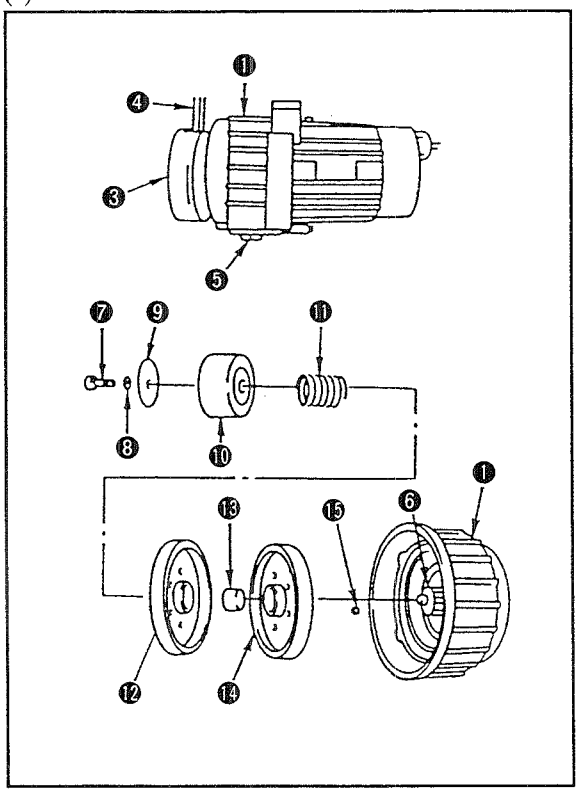
Turn the power OFF, and be sure that the motor has completely stopped before starting the replacement. (Wait for 3 to 5 minutes after turning the power OFF.)

(1) For HITACHI motor



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

(2) For MATSUSHITA motor



1) Remove pulley cover ❸ and belt ❹.
2) Remove screw ❺, and remove the clutch bracket from the motor.
3) Remove screw ❼ washer ❽, presser disk ❾, housing cover ❿, spring ❿, clutch ring ⓬, brake ring ⓮, and cushion ⓭ from clutch shaft ❻ of the clutch bracket.

[Caution]

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

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

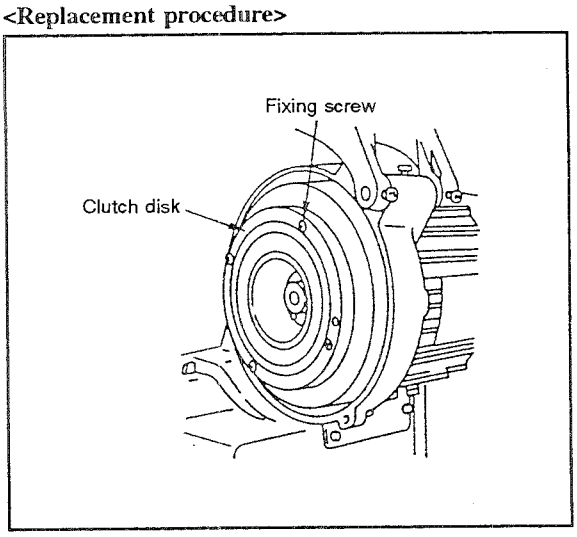
(3) Cleaning the spline assembly

Clean the splines with a rag if they are dirty. Apply the grease supplied with the motor to a new ring. Use only "MOLY PS265" grease, and never use any other grease. Attach the connector from the clutch head to the PSC box. Adjust the gap whenever the rings have been replaced.

3. Replacing the clutch disk

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

<Replacement procedure>



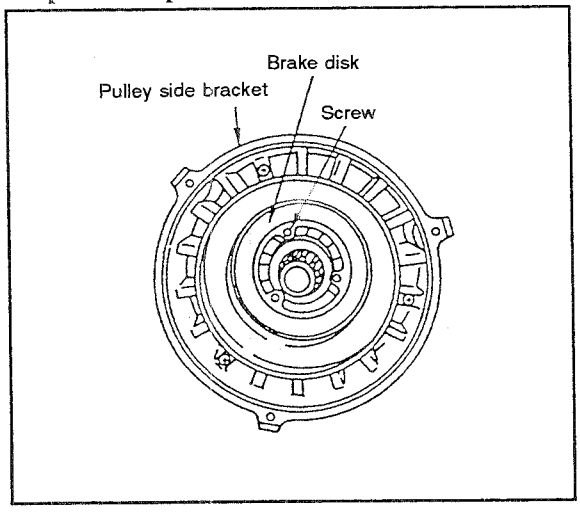
1) Remove the clutch head according to the previous paragraph, "Replacing the clutch ring and brake ring."
2) Loosen the four screws (M5×12) retaining the clutch disk, and remove the clutch disk.
3) Taking the faucet joint inside the vanes of the flywheel as the reference, fix a new clutch disk by alternately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

4. Replacing the brake disk

Replace the brake disk;

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

<Replacement procedure>



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

5. Cleaning the filter

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

7-5. Replacing the printed circuit boards

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-215C 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 four setscrews retaining the circuit board. Then replace the CPU circuit board with a new one.
4) Install the new CPU circuit board by reversing the above disassembly order. Pay attention to connect the connectors matching the numbers indicated on the circuit board and the numbers attached to the connectors.

[Caution]

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

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) Remove the connectors J13, J14 and J15 from the CPU circuit board.
3) Remove all connectors (J26 through J28, J32, J35 through J38; installed inside of the control box) (J31 and J35; installed outside of the control box) from the I/F circuit board.
   Connector for the synchronizer J31 and connector for the pneumatic solenoid drive are mounted on the wrong side of the circuit board, and designed to be directly connected with the connectors inserted from outside of the control box.
4) Remove six setscrews retaining the I/F circuit board so that the I/F circuit board is removed. Then replace the circuit board with a new one.
5) Install the new I/F circuit board by reversing the above disassembly order.

[Caution]

If the 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 the radiator from outside of the control box) so that the PMDC circuit board is removed. Then replace the circuit board with a new one.
4) Install the new PMDC circuit board by reversing the above disassembly order. Install the circuit board so that the connector J62 is positioned at the top.

[Caution]

Be sure to securely tighten the setscrews. The tightening torque has been specified to 14 kg at the time of delivery.

❹ ROWER circuit board

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

1) Turn OFF the power switch. Then open the control box cover.
2) Remove all connectors (J51 through J59) from the POWER circuit board.
3) Remove four setscrews retaining the power circuit board, 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.

7-6. How to measure the line voltage

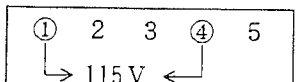
Printed circuit board	Tester red	Tester black	Voltage
POWER circuit board	J 51 – 1, – 2, – 3 (orange)	J 51 – 4, – 5, – 7 (black)	D C 34 V
	J 52 – 1, – 2 (orange)	J 52 – 6, – 7 (black)	D C 34 V
	– 3, – 4 (brown)	– 6, – 7 (black)	D C 33 V
	J 53 – 1, – 3, – 4 (yellow)	J 53 – 5, – 6, – 7 (green), – 8 (yellow/green)	D C 34 V
	J 54 – 1, – 2 (orange)	J 54 – 4, – 5 (green)	D C 70 V
	– 3 (yellow)	– 4, – 5 (green)	D C 24 V
	– 7 (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 (red)	J 56 – 6 (black)	D C 5 V
	– 2 (white)	– 6 (black)	D C 12 V
	– 6 (black)	– 3 (blue)	D C 12 V
	J 57 – 1 (red)	J 57 – 5, – 6 (black)	D C 5 V
	– 3 (white)	– 5, – 6 (black)	D C 12 V
	– 5, – 6 (black)	– 4 (blue)	D C 12 V
	J 58 – 1 (red)	J 58 – 5, – 6 (black)	D C 5 V
	– 2 (white)	– 5, – 6 (black)	D C 12 V
	– 5, – 6 (black)	– 4 (blue)	D C 12 V
	J 59 – 1 (white)	J 59 – 2, – 4 (black)	D C 12 V
	– 5 (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 − 3, − 4 (black)	D C 33V
	− 1 (red)	− 9, − 10 (black)	D C 5V
	− 2 (white)	− 9, − 10 (black)	D C 12V
	− 9, − 10 (black)	− 8 (blue)	D C 12V

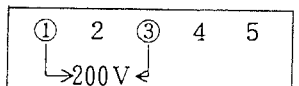
Connector	Tester red	Tester black	Voltage
J90 [Connector 6P of the power supply for the PGM-5A]	J 90 − 1 (red)	J 90 − 4 (black)	D C 5V
	− 2 (white)	− 4 (black)	D C 12V
	− 4 (black)	− 3 (blue)	D C 12V
J40 [Connector 6P of the transformer secondary output]	J 40 − 1 (gray)	J 40 − 2 (gray)	A C 24V
	− 3 (purple)	− 4 (purple)	A C 50V
	− 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

7-7. AC input voltage tap

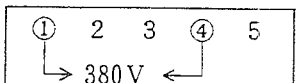
The power transformer comes in three types in voltage specifications.



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



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



No.	AC input voltage	Terminal
1	220 V	1 – 2
2	240 V	1 – 3
3	380 V	1 – 4
4	415 V	1 – 5
5	440 V	1 – 6

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

8. TROUBLES AND CORRECTIVE MEASURES

8-1. Troubles and corrective measures (mechanical parts)

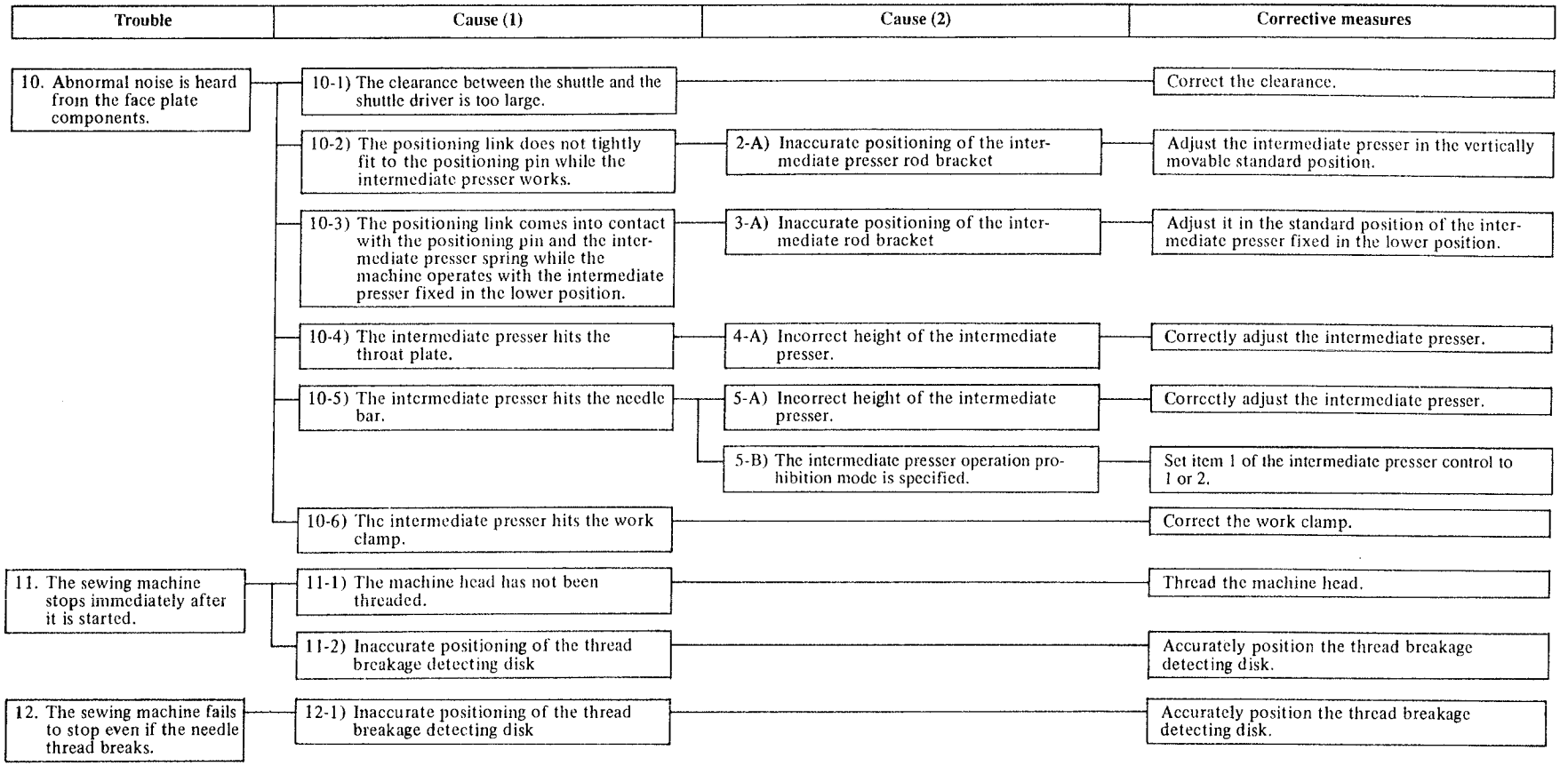
Trouble	Cause (1)	Cause (2)	Corrective measures
1. Mechanical lock	1-1) Improper needle-up position		Correct the stop position of the main shaft.
	1-2) Incomplete return of the thread trimming cam shaft	2-A) The thread trimmer follower sticks against the follower stopper	Correct the clearance between 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.

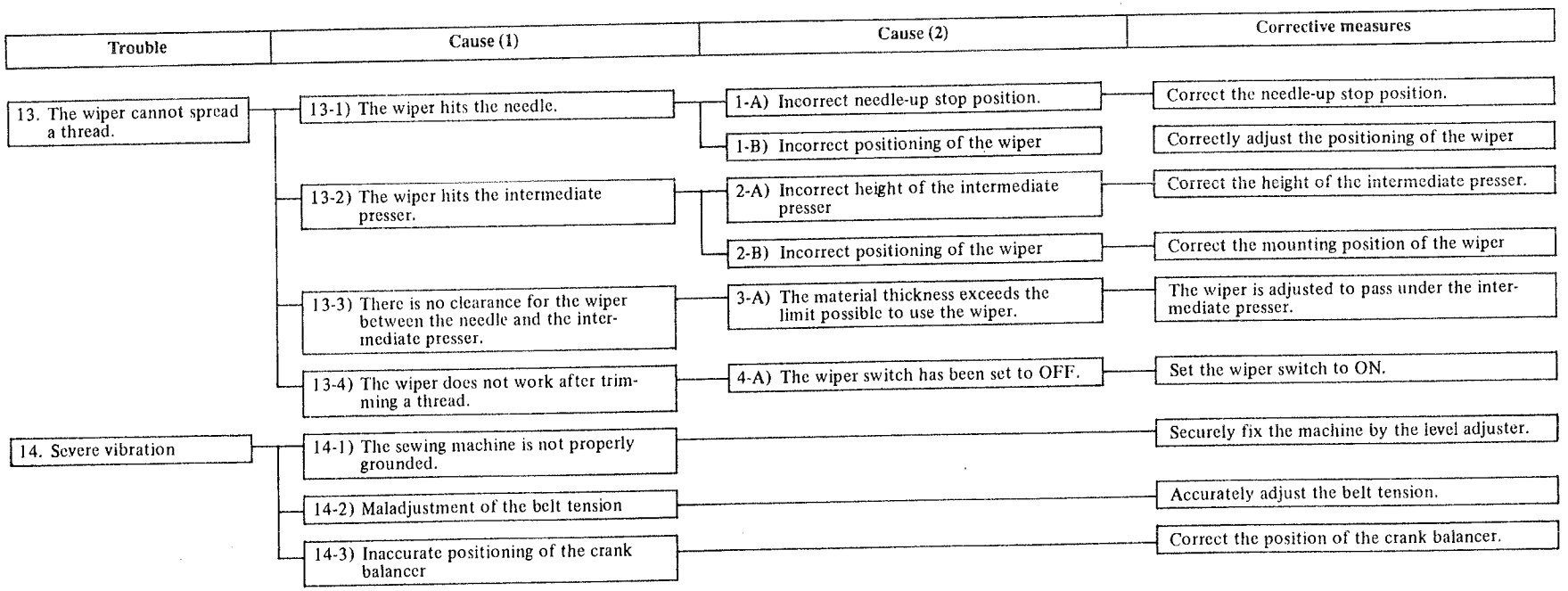
Trouble	Cause (1)	Cause (2)	Corrective measures
2. Deformation in sewn patterns	2-1) Inaccurate positioning of the generator stator		Accurately position the generator stator.
	2-2) Inaccurate positioning of the handwheel		Accurately position the handwheel.
	2-3) Maladjustment of the X-direction timing belt tension		Correct the belt tension.
	2-4) Maladjustment of the Y-direction feed gear backlash.		Correct the backlash.
	2-5) The feed in the X direction is unsmooth.	5-A) Improper height of the X guide shaft support	Properly position the X guide shaft support.
		5-B) Improper height of the throat plate auxiliary cover	Correct the height of the throat plate auxiliary cover.
		5-C) Improper height of the work clamp slider plate	Correct the height.
	2-6) The feed in the Y direction is unsmooth.	6-A) The Y direction moving race sticks against the feed bracket auxiliary cover.	Correct the feed bracket auxiliary cover.
		6-B) Improper height of the X guide shaft support	Properly position the X guide shaft support.
		6-C) Improper height of the work clamp slider plate	Correct the height.
		6-D) The throat plate auxiliary cover and the throat plate are caught in the lower plate.	Correct the height of the throat plate auxiliary cover and the lower plate.
		6-E) Y travel cover (B) hits the arm.	Correct the mounting position of the Y travel cover.
	2-7) Weak clamp pressure	7-A) Maladjustment of the pressure switch	Correctly adjust the pressure switch.
		7-B) Maladjustment of the regulator	Correctly adjust the regulator.
		7-C) The supply air pressure is too low.	Correctly adjust the supply air pressure.
	2-8) The feeding frame does not fit tightly to the feed plate.	8-A) Improper position of the feeding frame bracket.	Correctly adjust the position of the feeding frame bracket.

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.

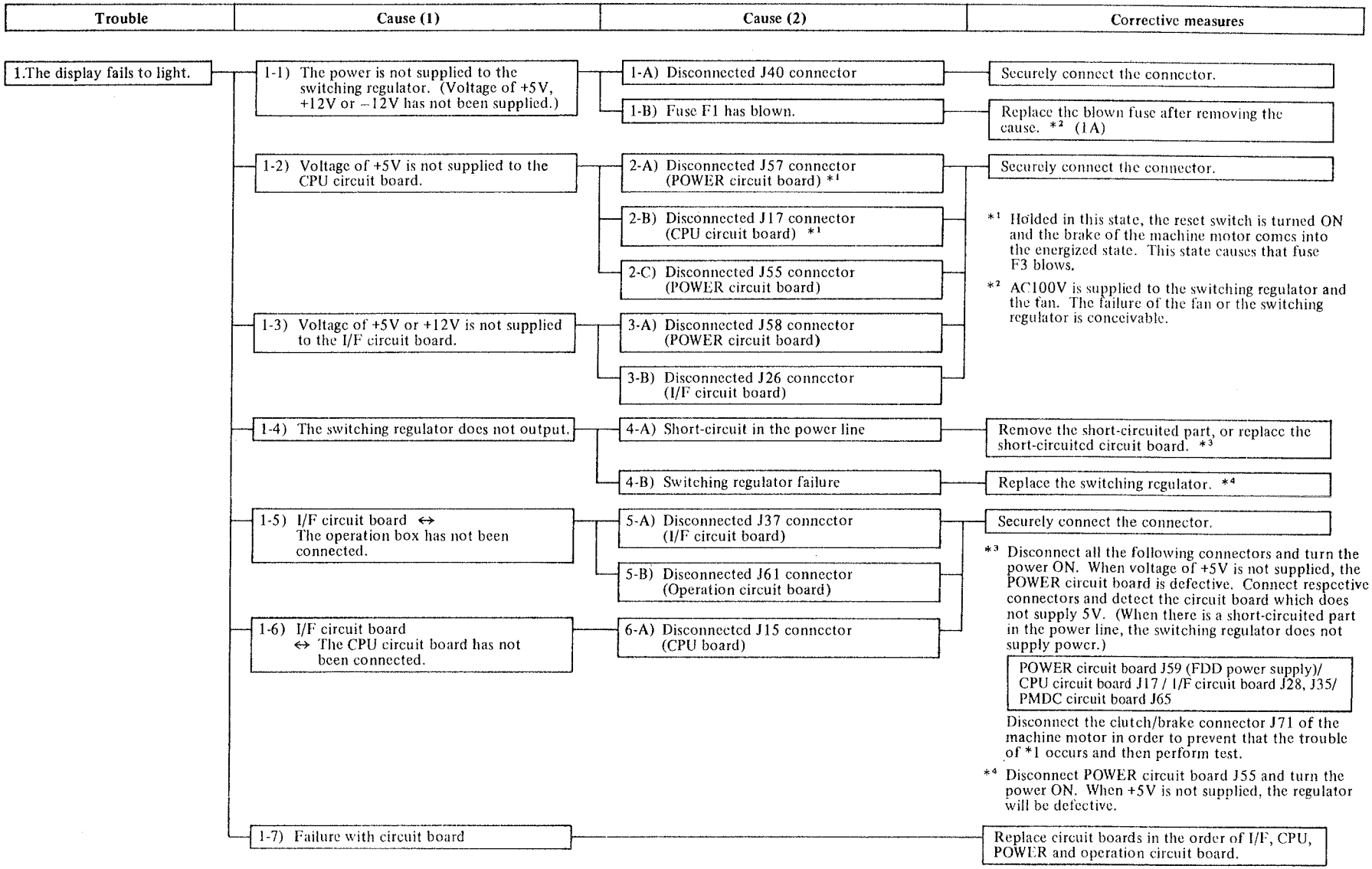
Trouble	Cause (1)	Cause (2)	Corrective measures
6. The feeding frame fails to go up.	6-1) The supply air pressure is too low.		Correctly adjust the supply air pressure.
	6-2) Maladjustment of the regulator		Correctly adjust the regulator.
	6-3) Maladjustment of the speed controller		Correctly adjust 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.
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.

Trouble	Cause (1)	Cause (2)	Corrective measures
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.
14-3) Inaccurate positioning of the crank balancer
Correct the position of the crank balancer.

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



*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.

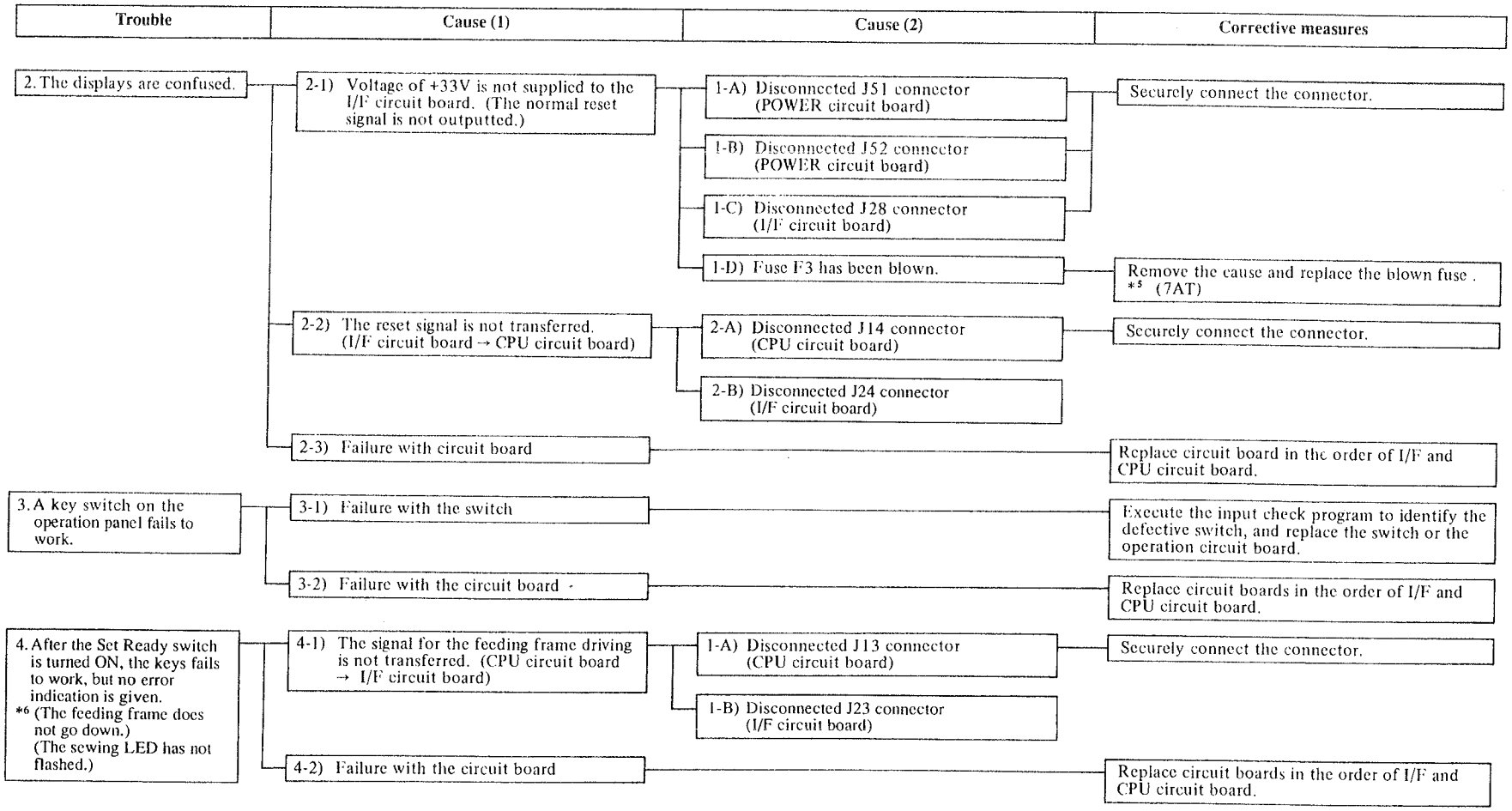
*2 AC100V is supplied to the switching regulator and the fan. The failure of the fan or the switching regulator is conceivable.

*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 respcetive 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 J28, J35/ PMDC circuit board J65

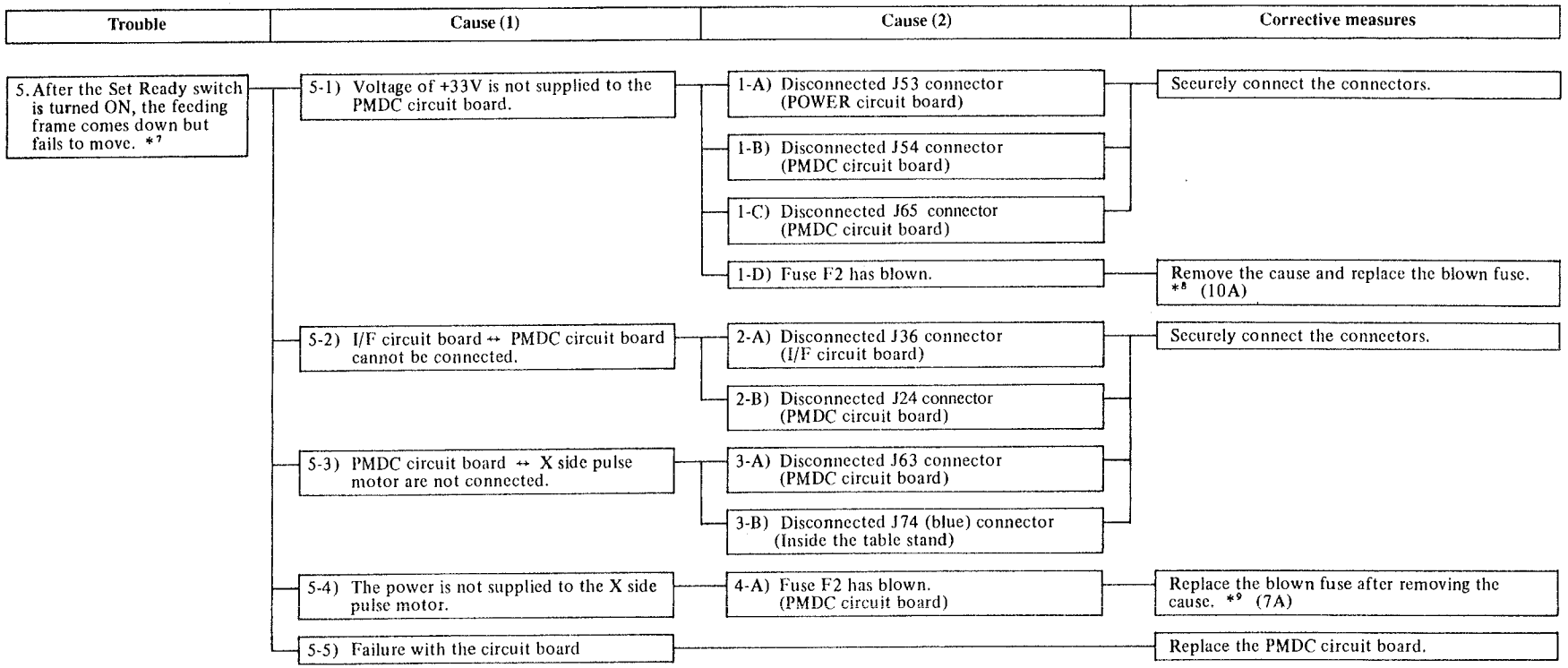
Disconnect the clutch/brake connector J71 of the machine motor in order to prevent that the trouble of *1 occurs and then perform test.

*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.

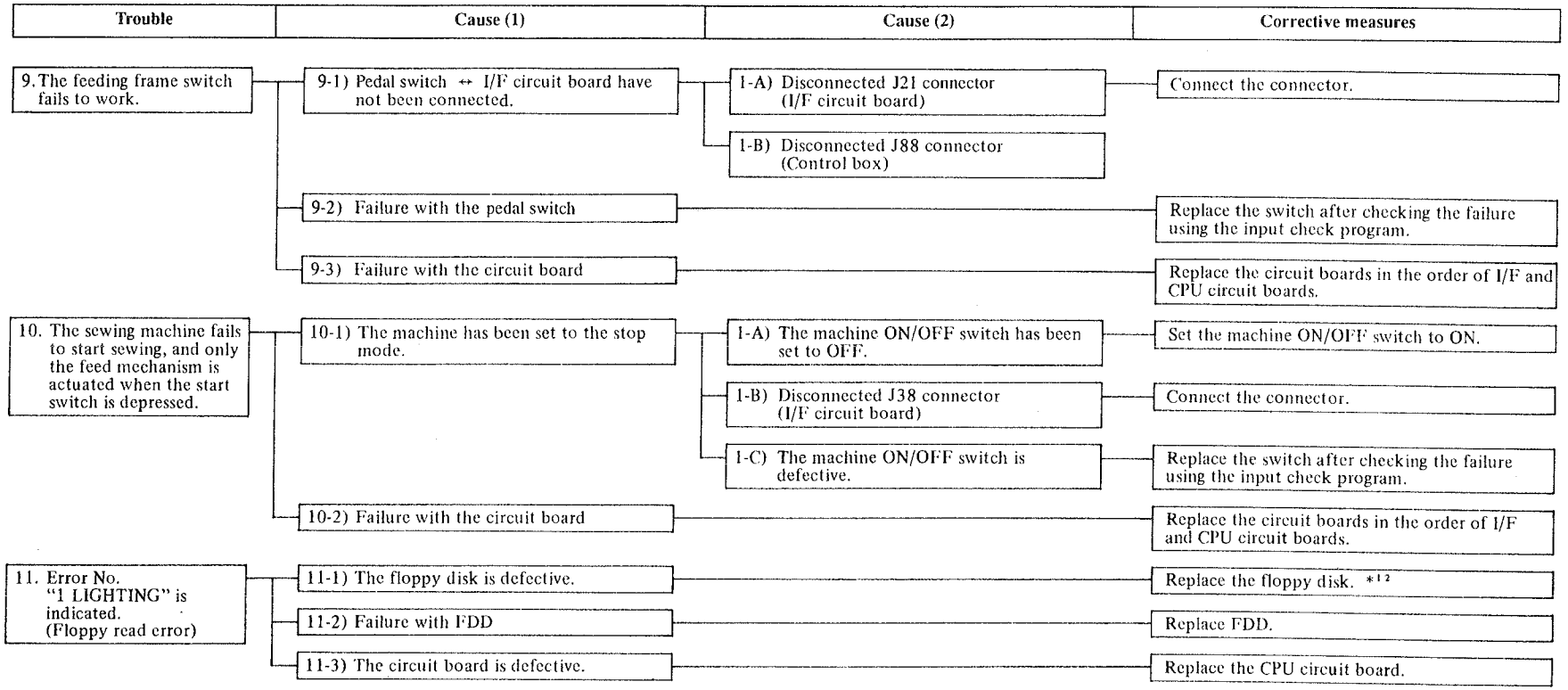
*8 The power is supplied to both X and Y axes by this. Check the current adjusted value axis on the PMDC circuit board.

*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.

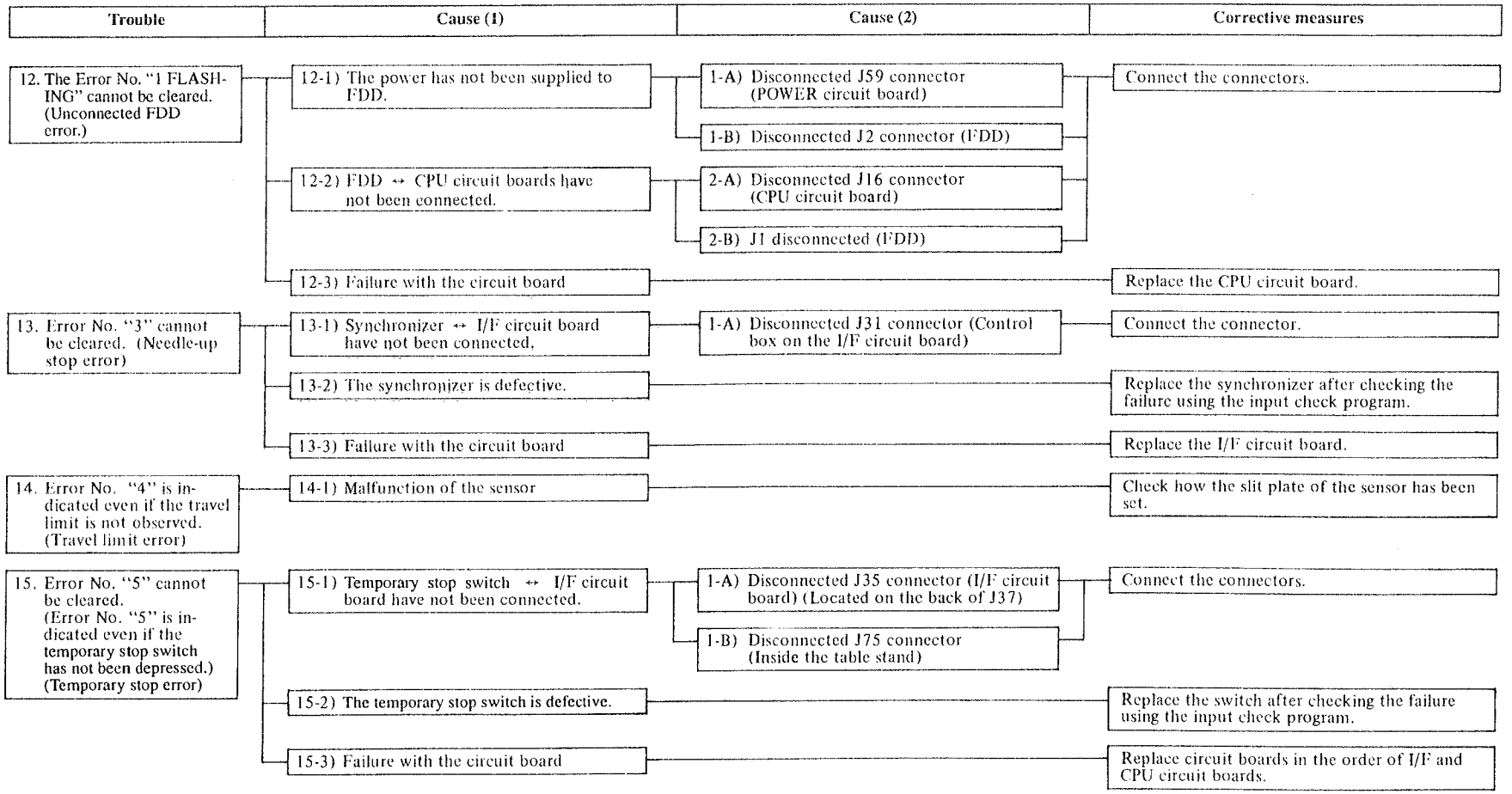
Trouble	Cause (1)	Cause (2)	Corrective measures
6. The feeding frame moves only to the X direction and stops. *10	6-1) PMDC circuit board ↔ Y axis pulse motor have not been connected.	1-A) Disconnected J64 connector (PMDC circuit board)	Securely connect the connectors.
		1-B) Disconnected J75 connector (Inside the table stand)	
	6-2) The power is not supplied to the Y-axis pulse motor.	2-A) Fuse F1 has blown. (PMDC circuit board)	Replace the blown fuse after removing the cause. *11 (7A)
	6-3) Failure with the circuit board		Replace the PMDC circuit board.
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.

*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.



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

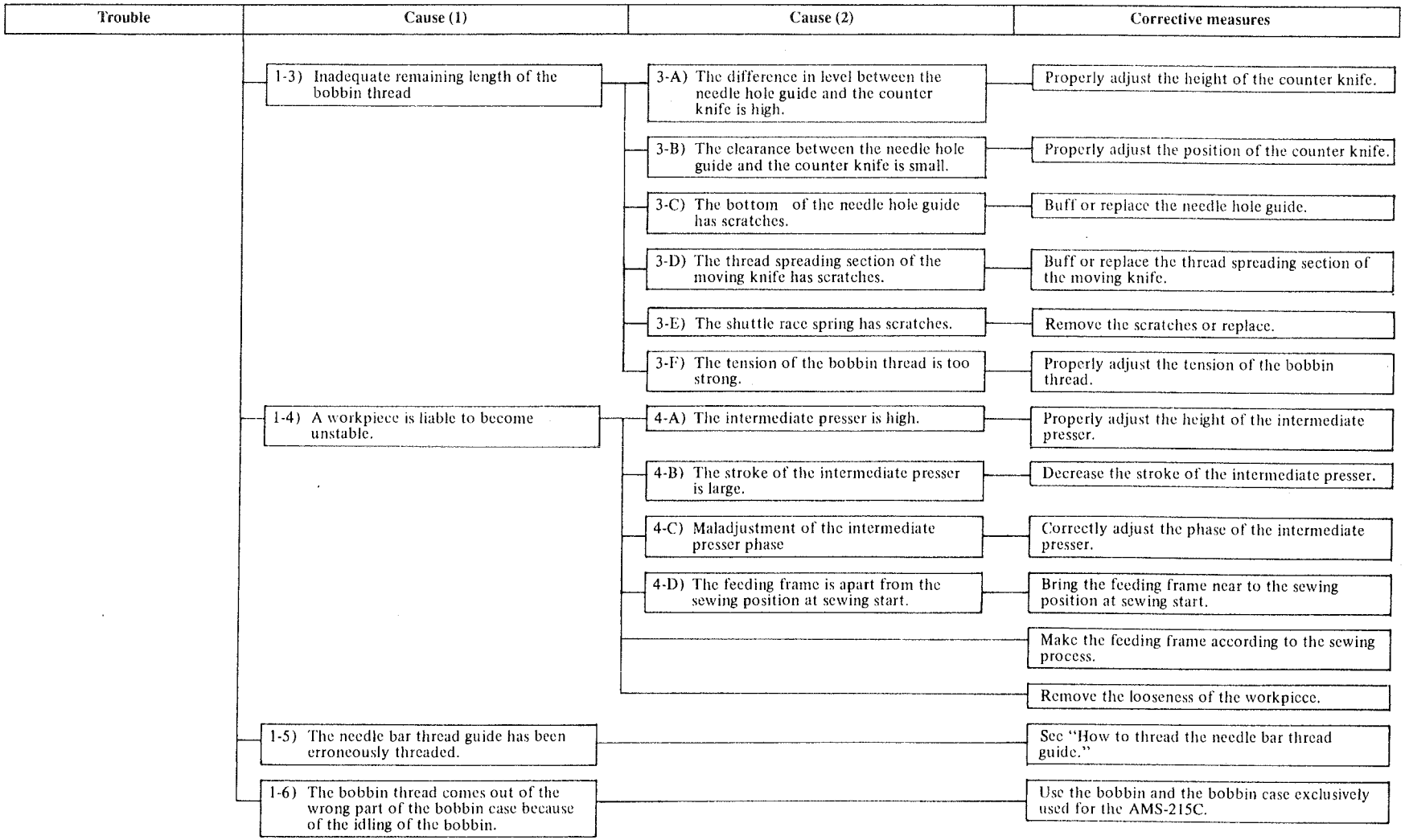

Trouble
Cause (1)
Cause (2)
Corrective measures
12. The Error No. "1 FLASHING" cannot be cleared. (Unconnected FDD error.)
12-1) The power has not been supplied to FDD.
1-A) Disconnected J59 connector (POWER circuit board)
1-B) Disconnected J2 connector (FDD)
Connect the connectors.
12-2) FDD ↔ CPU circuit 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 J75 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.

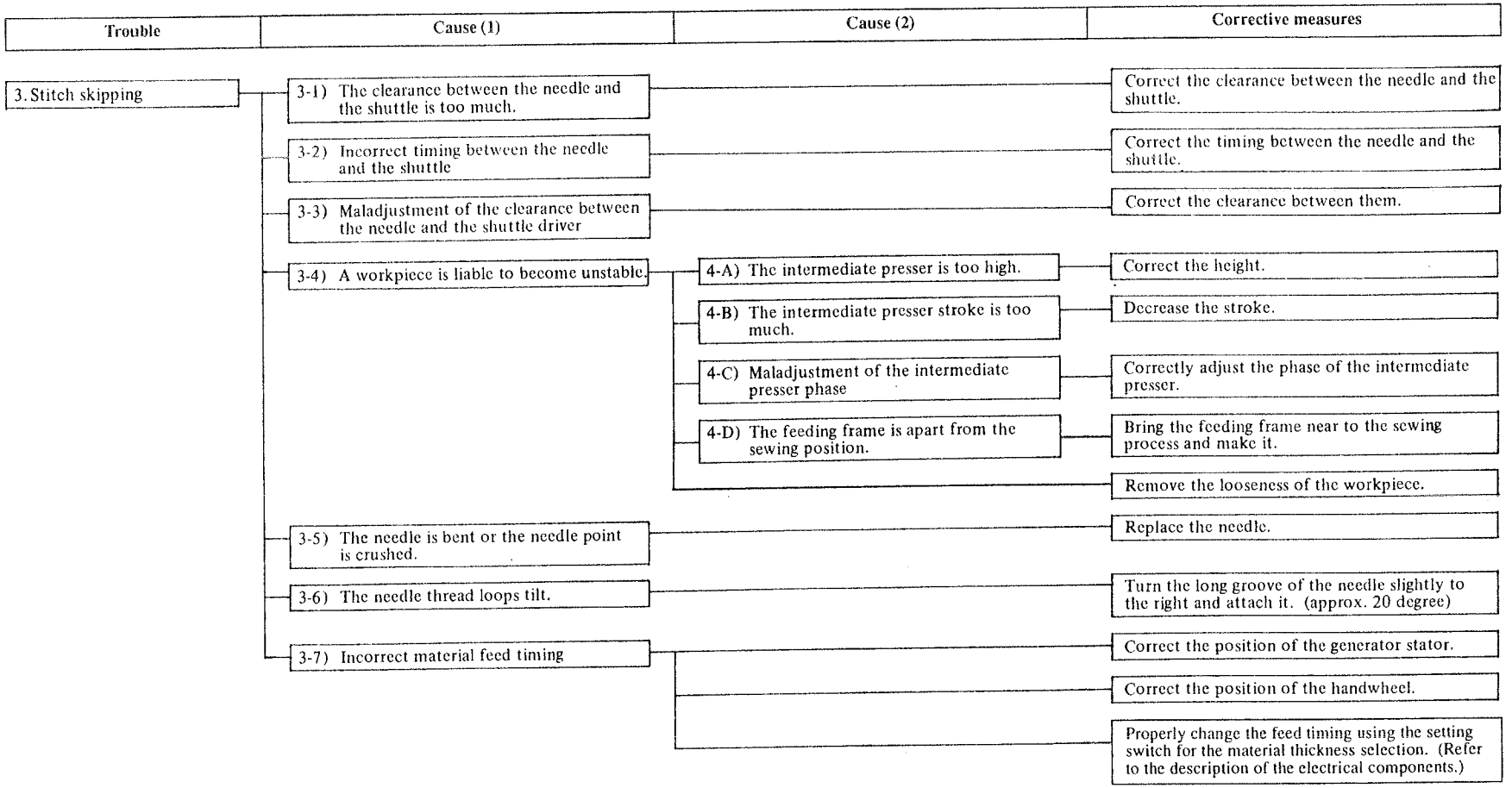
Trouble	Cause (1)	Cause (2)	Corrective measures
19. The thread breakage detector fails to work. (The 8 stitches at sewing start and the stitches within 3 stitches in sewing cannot be detected.)	19-1) The machine has been set to the thread breakage detection inetfecive mode.	1-A) Item 1 of memory switch 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)	Connect the connectors.
		1-B) Disconnected J79 connector	
	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.

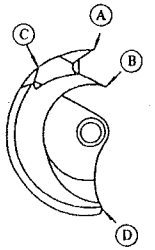
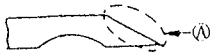
8-3. Troubles and corrective measures (Sewing conditions)

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-215C.

Trouble	Cause (1)	Cause (2)	Corrective measures
2. Needle breakage	2-1) Maladjustment of the clearanee 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 frame is apart from the sewing position.
Bring the feeding frame near to the sewing process and make it.
Remove the looseness of the workpiece.
3-5) The needle is bent or the needle point is crushed.
Replace the needle.
3-6) The needle thread loops tilt.
Turn the long groove of the needle slightly to the right and attach it. (approx. 20 degree)
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.")

Trouble	Cause (1)	Cause (2)	Corrective measures
	7-12) Sewing stitches become as the following illustration.		Attach the needle turning its long groove slightly to the right. (approx. 20 degree)
	7-13) The needle thread crosses in zigzag stitching.		Attach the needle turning its long groove slightly to the left. (approx. 10 degree)
8. Sewing problem arise when sewing with synthetic thread.	8-1) Thread breakage due to heat generated	1-A) The sewing speed is too high.	Decrease the speed using the speed control knob.
		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.

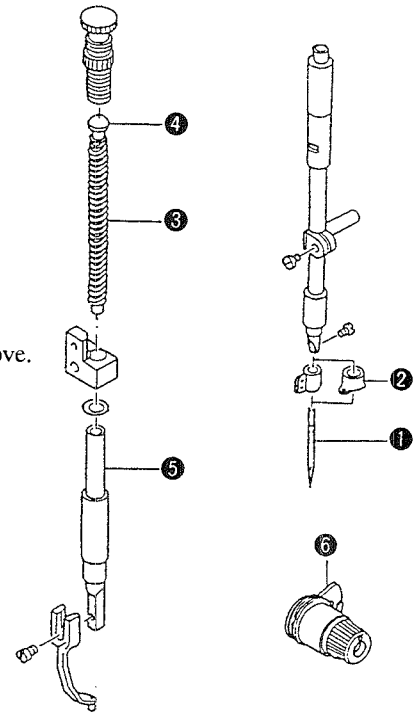
9. VARIOUS INFORMATION ON THE SEWING MACHINE

9-1. Changing the sewing specification

9-1-1. Changing the sewing specification from S (standard) type to H type (for heavy-weight materials)

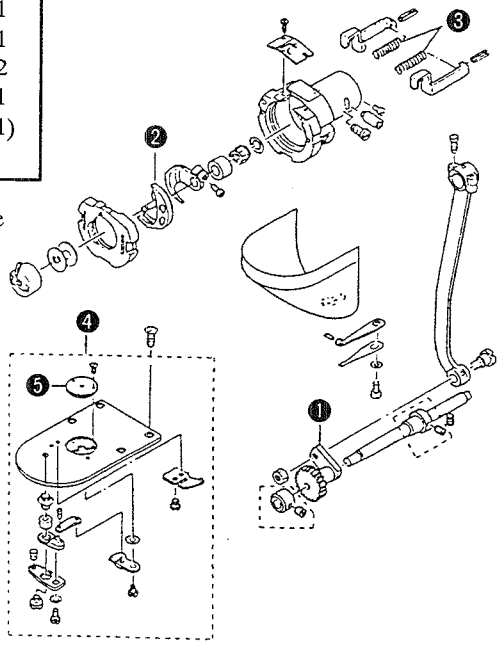
Needle bar and intermediate presser components			
1	MDP170B1800	Needle DPx17 #18	1
2	B1406210000	Needle bar thread guide	1
3	B1611224000	Intermediate presser spring	1
4	B1615224000	Intermediate presser rod	1
5	B1629224000	Intermediate presser guide rod	1
6	B23022050A0	Tension controller No. 2 asm.	1

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



Shuttle driving shaft components			
1	D1805MLBH00	Large pendulum	1
2	B181820500B	H type shuttle	1
3	13512405	H type shuttle race ring spring	2
4	B24252150AB	H type throat plate asm.	1
5	B242621000B	ϕ2 needle hole guide	(1)

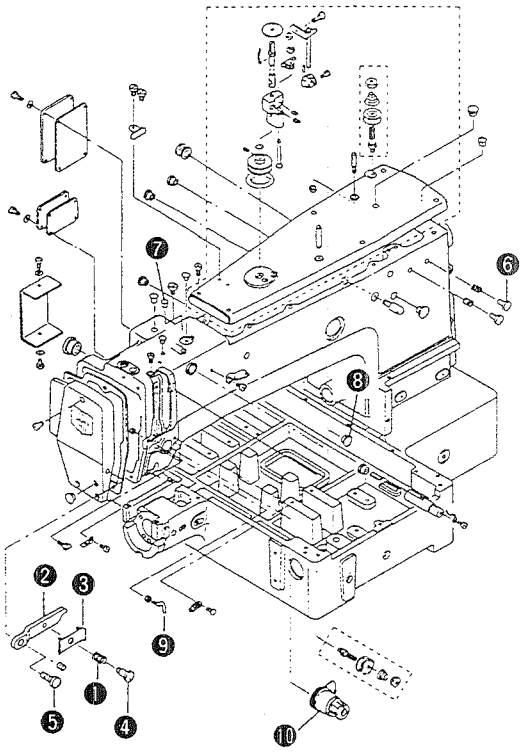
Replace the standard components with those given in the table above.



9-1-2. Changing the sewing specification from S (standard) type to G type (for heavy-weight materials)

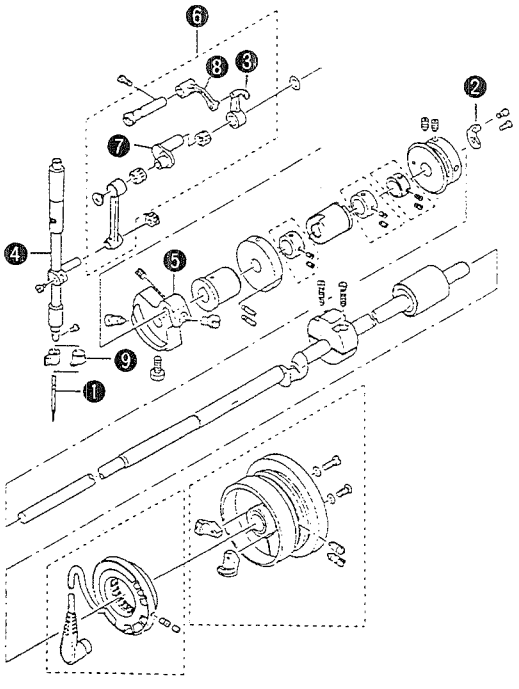
Machine head and miscellaneous cover components			
1	B1132521000	Needle thread presser spring	1
2	B1145210000	Needle thread presser mounting base	1
3	10129104	Needle thread presser plate	1
4	SD0380551SL	Hinge screw	1
5	SS7090910SP	Screw	1
6	SS7110840SP	Screw	2
7	TA0750704R0	Plug	1
8	TA1470704R0	Plug	1
9	B3118771000	Thread guide of tension controller No.2	1
10	B23022050A0	Tension controller No.2 joint	1

Add the components shown in the table above.

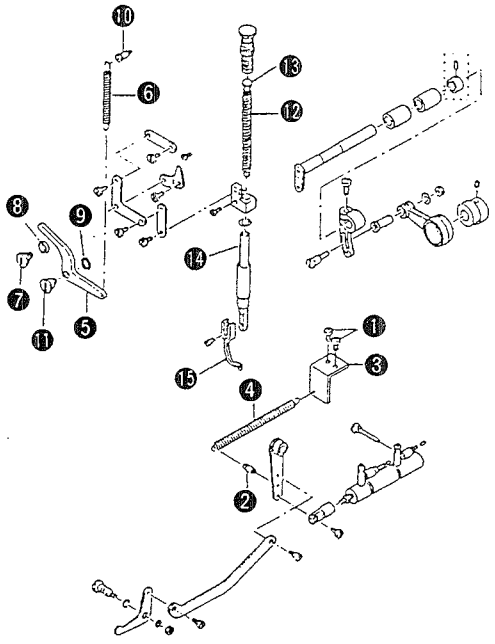


Main shaft and needle bar components			
1	MDP170B2300	Needle, DPx17 #23	1
2	B2312210A00	Tension release notch	1
3	B19012100A0	Link thread take-up asm.	(1)
4	B1401210A00	Needle bar	1
5	B1206210A00	Counterweight	1
6	B19012100B0	Link thread take-up asm.	1
7	B1407210000	Needle bar crank	(1)
8	B1903210000	Thread take-up crank	(1)
9	B1406210000	Needle bar thread guide	1

Replace the standard components with those shown in the table above.
In addition to the replacement of the aforementioned components, the thread trimming cam timing should be changed appropriately.
(See page 43.)

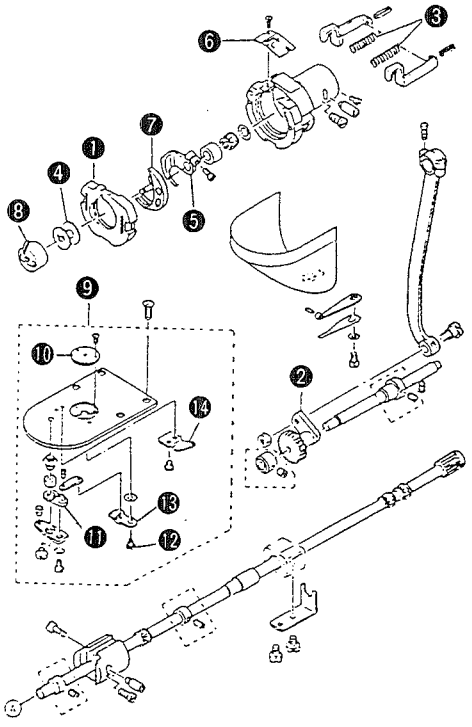


Intermediate presser components			
1	SS7110840SP	Screw	2
2	1012004	Spring peg	1
3	B1612215000	Intermediate presser lifter spring mounting plate	1
4	B1626215000	Intermediate presser lifter spring	1
5	B1641215000	Intermediate presser depressing plate	1
6	B1642215000	Intermediate presser spring B	1
7	B1644215000	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	B1611224000	Intermediate presser spring	1
13	B1615224000	Intermediate presser rod	1
14	B1629224000	Intermediate presser guide rod	1
15	B160122000G	Intermediate presser G	1



Add the components shown in the table above.
In addition to the replacement of the aforementioned components, the intermediate presser cam timing has to be adjusted appropriately. (See page 51.)

Shuttle driving shaft components			
1	B18172100AB	Shuttle race ring B joint	1
2	D1805MLBH00	Large pendulum	1
3	13512405	Shuttle race ring spring	1
4	B1805210A00	Bobbin	1
5	B1812210000	Driver	1
6	B1815210000	Shuttle race cap	1
7	B1818210000	Shuttle	1
8	B18282100A0	Bobbin case asm.	1
9	B24252150AC	G type throat plate (asm.)	1
10	B242621000H	ϕ3 needle hole guide H	(1)
11	B2416210000	Thread trimming lever, small	(1)
12	B2417210000	Hinge screw	(1)
13	B2421210AA0	Moving knife joint	(1)
14	B2424210A00	Counter knife	(1)



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

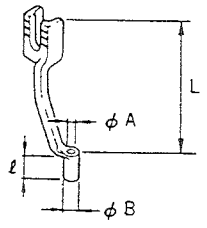
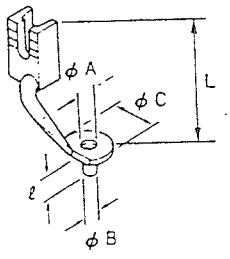
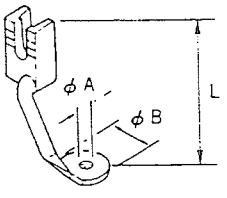
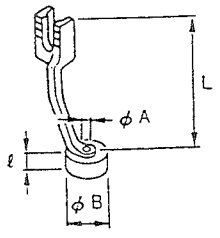
[Caution]

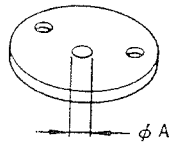
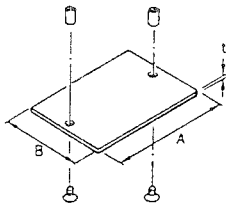
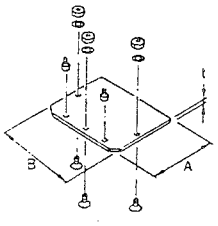
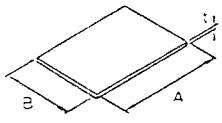
If an extra penetrating force is required when sewing a heavy-weight material, replace the motor (550 W, 2P), pulley and belt with appropriate ones.

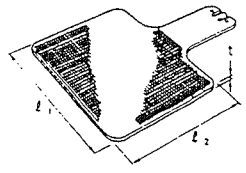
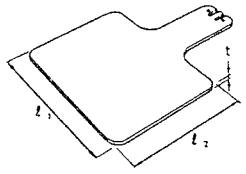
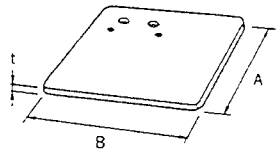
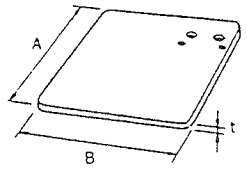
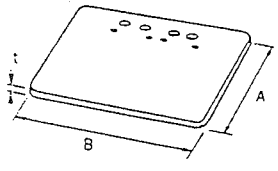
9-1-3. AMS-215C subclass model modification unit

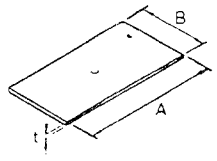
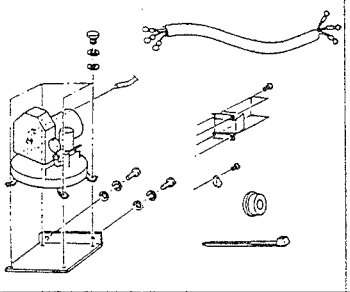
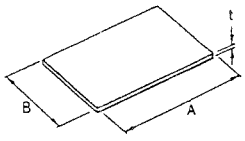
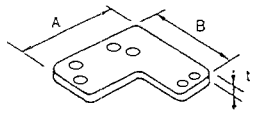
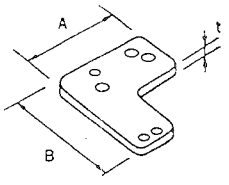
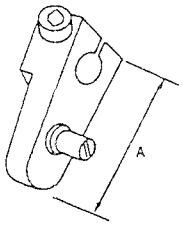
Part No.	Description of modification
B26062150A0	Standard → Separately-driven feeding frame
B43012150B0	Standard → Inverting intermediate presser
B4301215AB0	Double-stepped stroke feeding frame → Inverting intermediate presser
B4301215BB0	Separately-driven feeding frame → Inverting intermediate presser

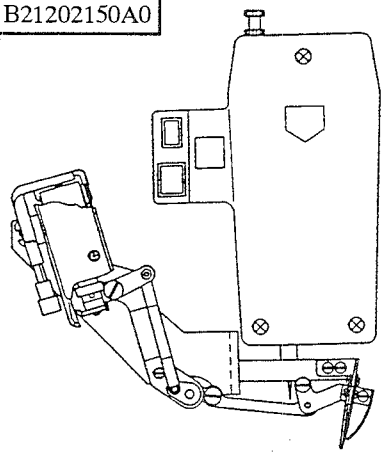
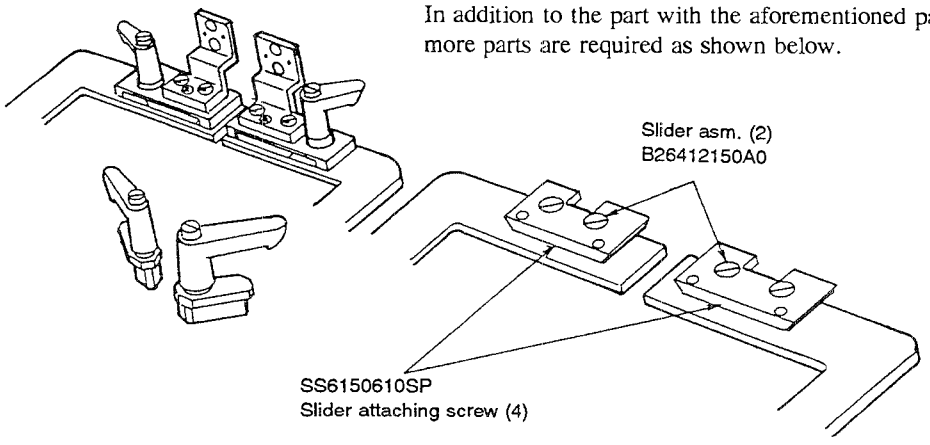
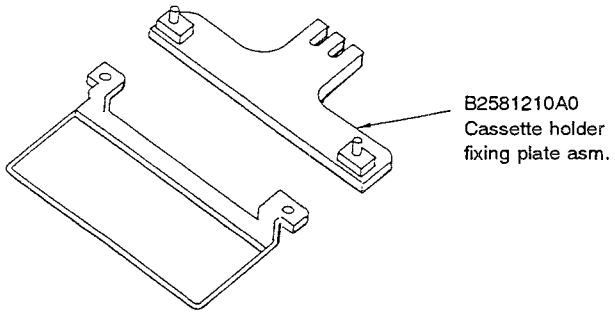
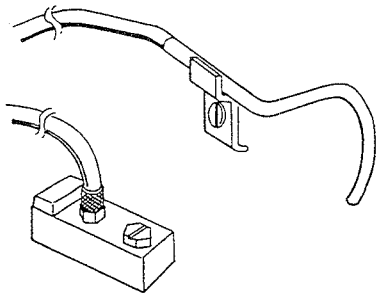
9-2. Options

Name of part	Type	Part No.	Size (mm)
1. Intermediate presser foot 	Intermediate presser foot (A)	B1601220000	φA × φB × ℓ × L 2.2 × 3.6 × 6 × 29.5
	Intermediate presser foot (B)	B160122000B	φA × φB × ℓ × L 3.5 × 5.5 × 6 × 29.5
	Intermediate presser foot (E)	B160122000E	φA × φB × ℓ × L 1.6 × 2.6 × 6 × 29.5
	Intermediate presser foot (F)	B160122000F	φA × φB × ℓ × L 2.2 × 3.6 × 9 × 29.5
	Intermediate presser foot (G)	B160122000G	φA × φB × ℓ × L 2.7 × 4.1 × 5 × 29.5
	Intermediate presser foot (C)	B160122000C	φA× φB× φC× ℓ ×L 2.2×3.6×12×6×29.5
	Intermediate presser foot (D)	B160122000D	φA × φB × L 2.2 × 12 × 34.5
	Intermediate presser foot asm. with ring	B16012200A0	φA × φB × ℓ × L 2.2 × 10 × 6 × 29.5

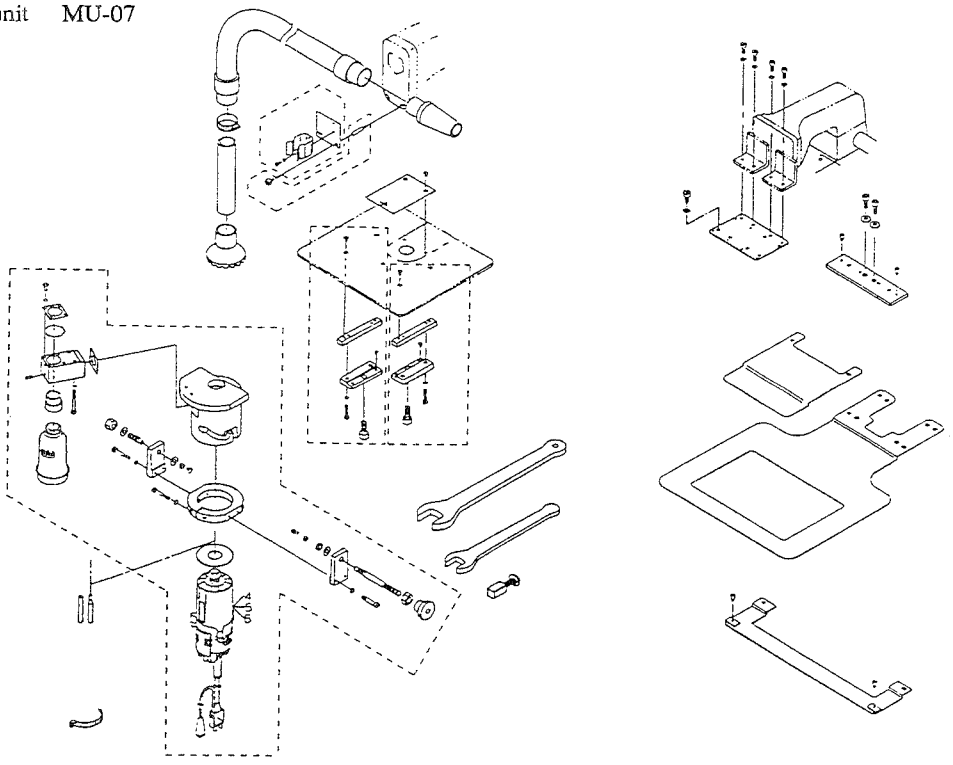
Name of part	Type	Part No.	Size (mm)
2. Needle hole guide 	Needle hole guide (A) for light-weight materials Needle hole guide (B) for medium-weight materials Needle hole guide (C) for knits Needle hole guide (D) for heavy-weight materials Needle hole guide (F) for heavy-weight materials Needle hole guide (G) for heavy-weight materials Needle hole guide (H) for heavy-weight materials Needle hole guide (H) The needle hole is shifted by 0.5 mm backward in terms of the center of the hole so as to reduce the clearance between the hole edge and this side of needle and widen the clearance between the hole edge and reverse side of needle. This allows loops to be formed with ease.	B242621000A B242621000B B242621000C B242621000D B242621000F B242621000G B242621000H	φ A = 1. 6 φ A = 2. 0 φ A = 1. 6 φ A = 2. 4 φ A = 3. 0 φ A = 3. 0 (with a counterbore) φ A = 3. 0 (eccentric hole)
3. Plastic blank  	Plastic feeding frame blank plate Plastic feeding frame blank stud Screw	B2557220000 B2559220000 SS1090510SP	A × B × t 256 × 190 × 3
	Separate type feeding frame blank (common to left and right)通) Screw Screw Washer Nut	B2618215000 SS7090410SP SS2111010TP WP0450000SD B1626850000	A × B × t 135 × 190 × 3
4. Sponge sheet 	Rubber sheet Sponge sheet Sheet (A) Sheet (B)	B2591220000 B2564215000 B2587220000 B2588220000	A × B × t 250 × 200 × 1. 5 A × B × t 300 × 200 × 1. 5 A × B × t 380 × 240 × 1 A × B × t 380 × 240 × 1. 5

Name of part	Type	Part No.	Size (mm)
5. Feed plate blank 	Feed plate blank with knurl	B2556215C00	ℓ1 × ℓ2 × t 285 × 199 × 1.2
	Feed plate blank without knurl	B2556215B00	ℓ1 × ℓ2 × t 285 × 199 × 1.2
	Feed plate blank without knurl (0.5mm)	B2556215D00	ℓ1 × ℓ2 × t 285 × 199 × 0.5
6. Machinable inverting intermediate presser plate 	Feeding frame blank, right with knurl	B2622215000	A × B × t 193 × 135 × 4
	Double-stepped feeding frame blank without knurl (common to left and right)	B2626215000	A × B × t 193 × 135 × 4
	Feeding frame, left with knurl	B2623215000	A × B × t 193 × 135 × 4
	Separate type feeding frame blank with knurl	B2620215000	A × B × t 193 × 279 × 4
	Separate type feeding frame blank without knurl	B2621215000	A × B × t 193 × 279 × 4

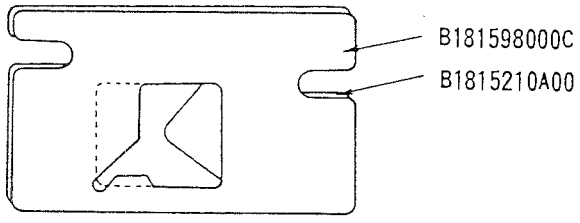
Name of part	Type	Part No.	Size (mm)
7. Cover 	Cover for throat plate	B1170215000	A × B × t 558 × 317 × 0.3
8. Compressor unit 	CU03		
9. Blank sheet for feed plate 	Sheet A for work clamp (velpolen) Sheet B for work clamp (velpolen) Sheet C for work clamp (velpoien)	B259522000A B259522000B B259522000C	A × B × t 1000 × 675 × 1 A × B × t 1000 × 675 × 3 A × B × t 1000 × 675 × 2
10. Presser joining metal fitting  	Special-purpose feeding frame, left asm. (A joining metal fitting used for attaching the feeding frame of the AMS-206, -210 or -212) Special-purpose feeding frame, right asm.	B26302150A0 B2630215AA0	A × B × t 66 × 58 × 4 A × B × t 66 × 58 × 4
11. Tension releaser 	Tension releasing arm interlocked with the intermediate presser • Release the needle thread tension in synchronization with the ascending motion of the intermediate presser. (Applicable to AMS-215C, -220C, -22B, -224B and -229B models.)	B23162150A0	A = 65

Name of part	Part No.	Configuration
12. Needle thread clamping device	B21202150A0	
13. One-touch utility clamp asm.	B26402150B0	In addition to the part with the aforementioned part No., two more parts are required as shown below. 
14. Cassette holder asm.	B25822150A0	In addition to the part with the aforementioned part No., two more parts are required as shown below. 
15. Needle cooler asm.	B47202150B0	

16. Milling unit MU-07



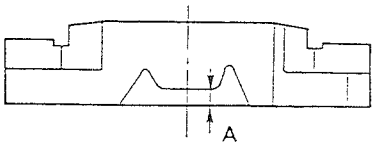
17. Shuttle race cap for preventing stitch skipping (2-plied)



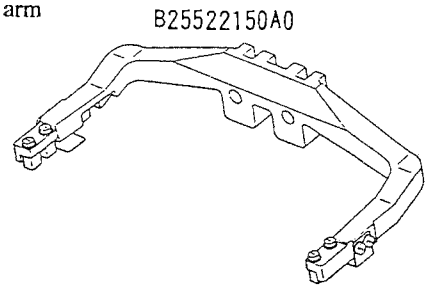
18. Shuttle race ring joint (for G type)

Shuttle race ring joints for preventing stitch skipping has been newly prepared. It comes in two types, in terms of dimension A, i.e., 0.8 mm and 1.3 mm. For the G type model of sewing machine, standard dimension A of the shuttle race ring joint is set to 1.3 mm. Reducing the clearance provided between the needle and the needle guard enables the machine to form loops more easily, thereby preventing stitch skipping.

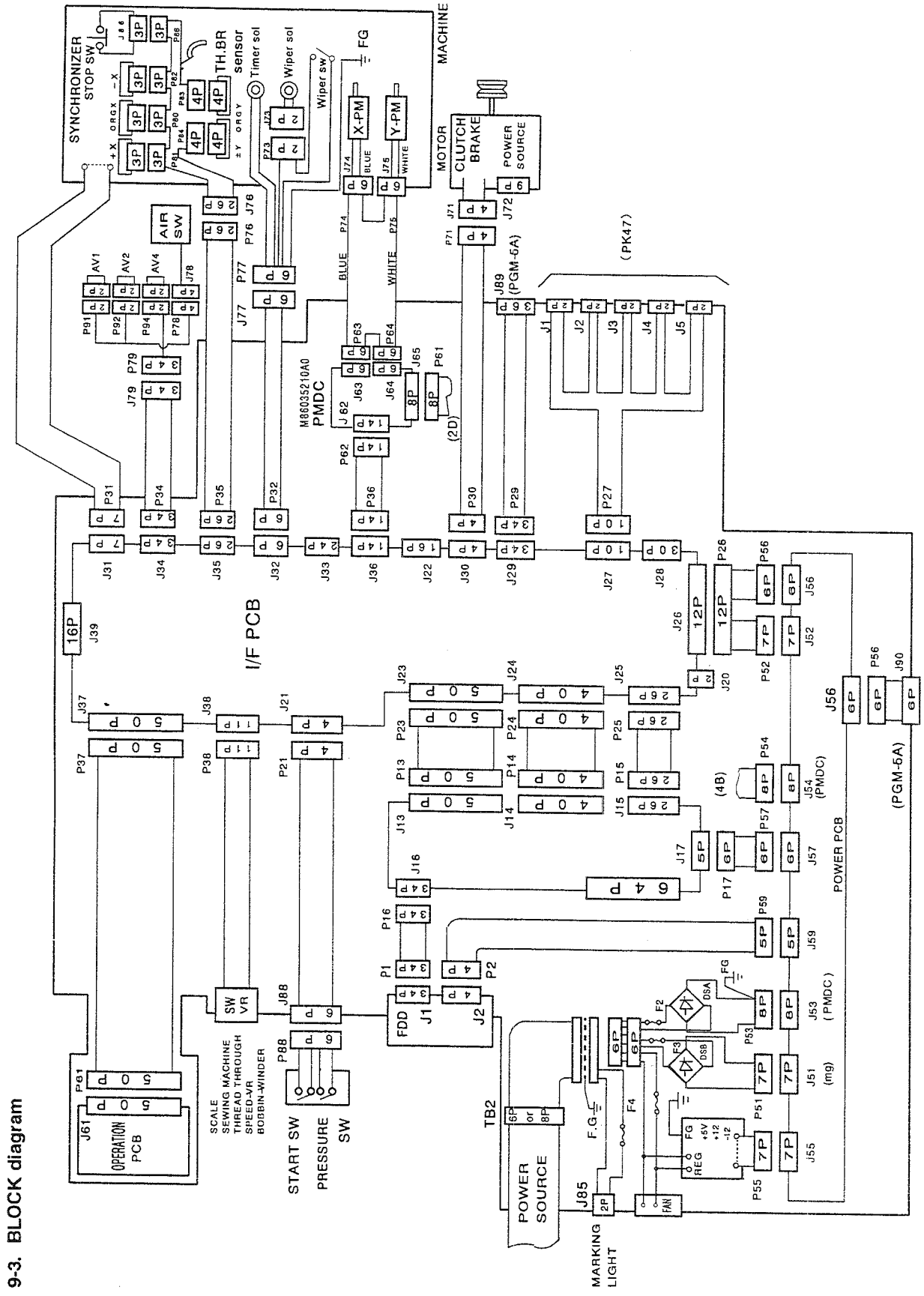
Height of the needle guard	Part No.	Needle count
A = 0.8mm	B18172100AC	Up to #14
A = 1.3mm	B18172100AB (standard)	Up to #24
A = 1.9mm	B18172100A0	Up to #25



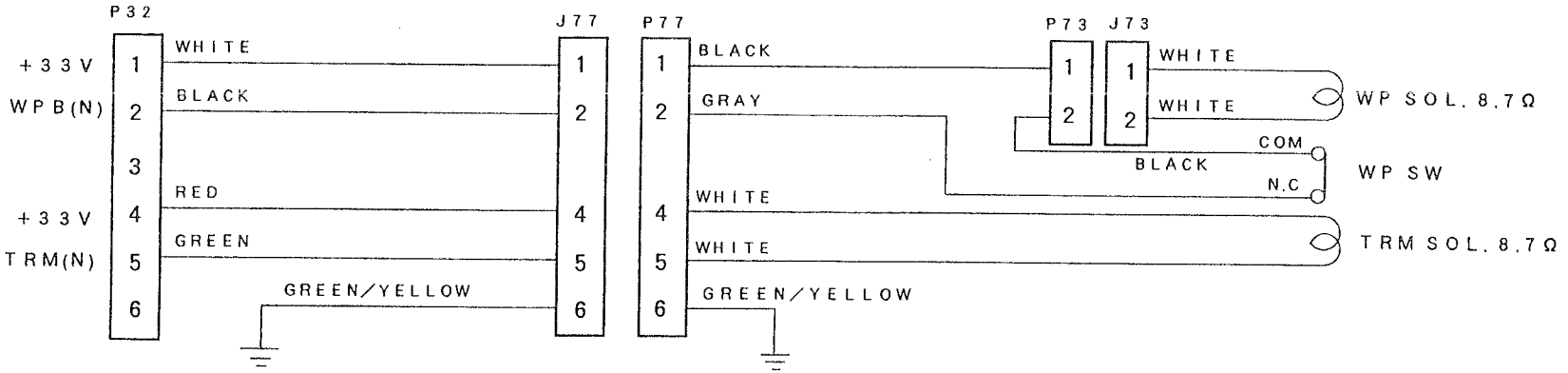
19. Feeding frame arm

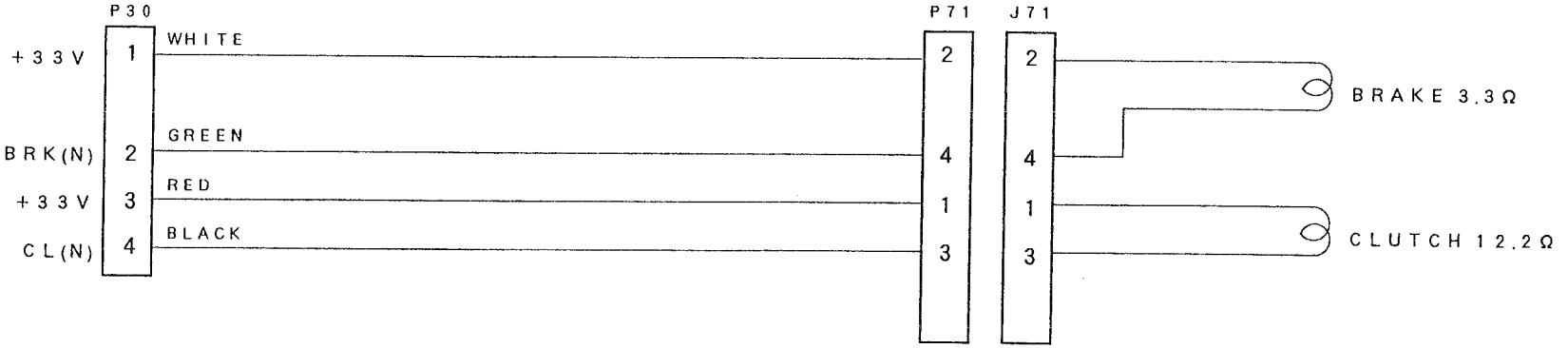


9-3. BLOCK diagram

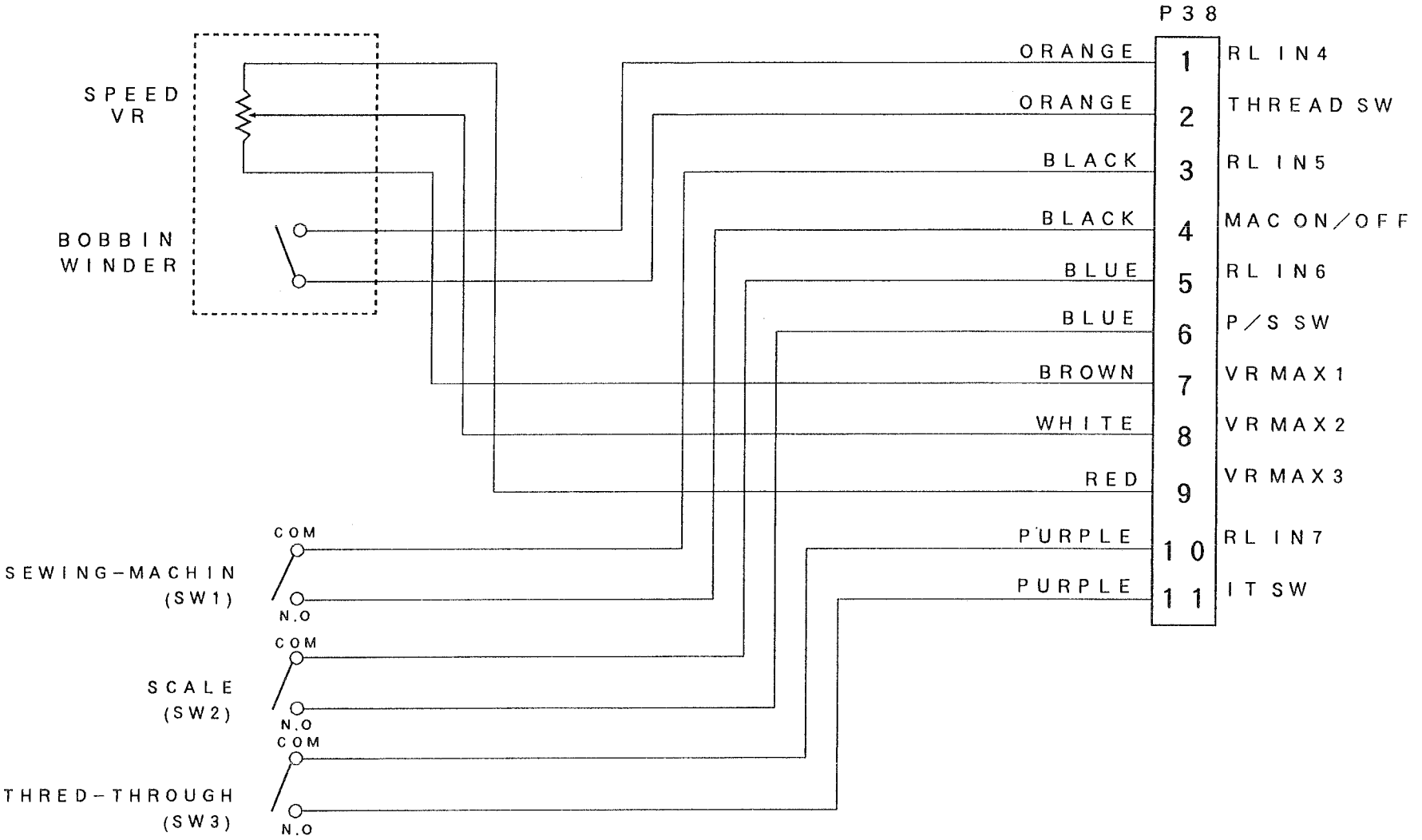


9-4. SOLENOID circuit diagram

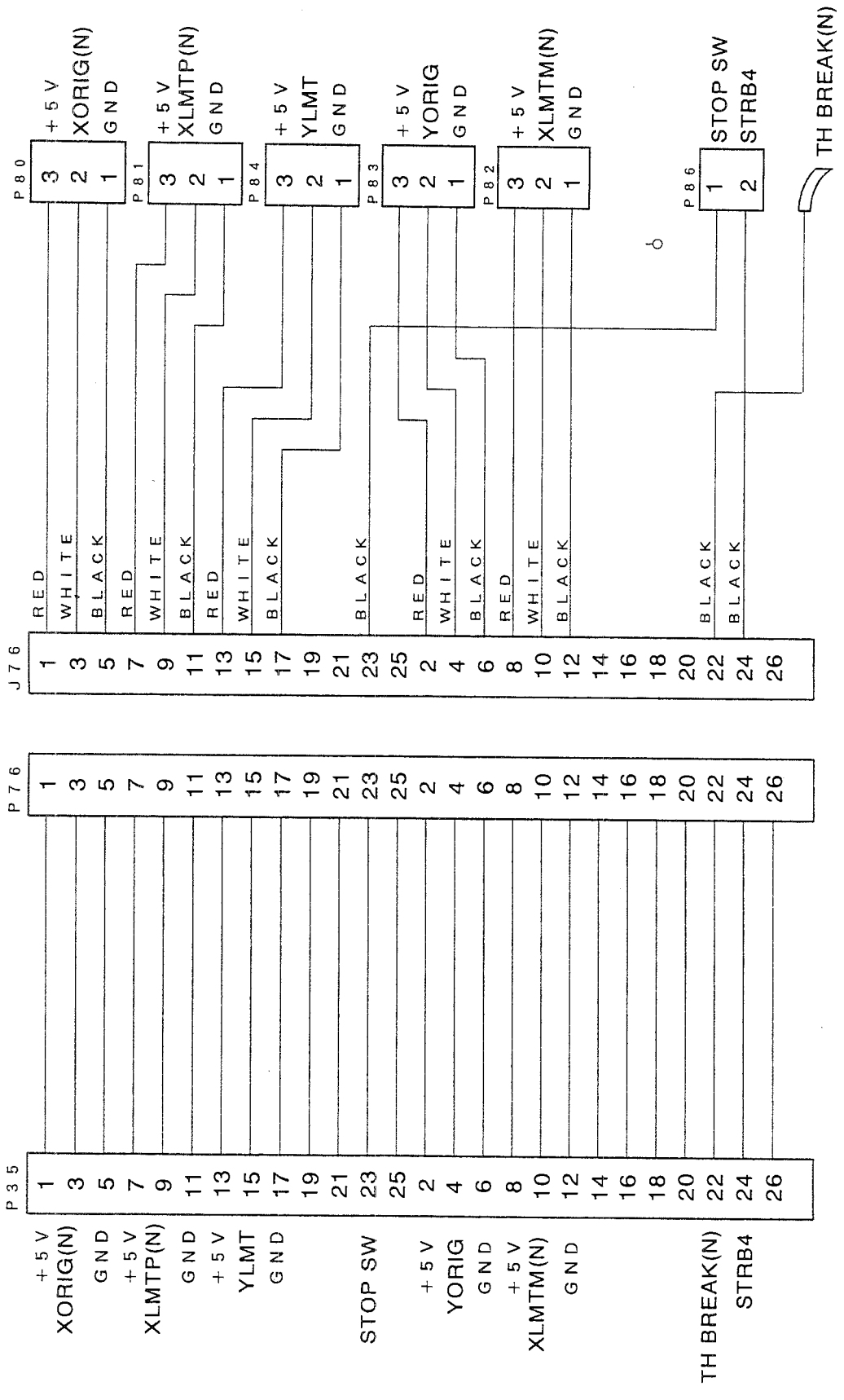




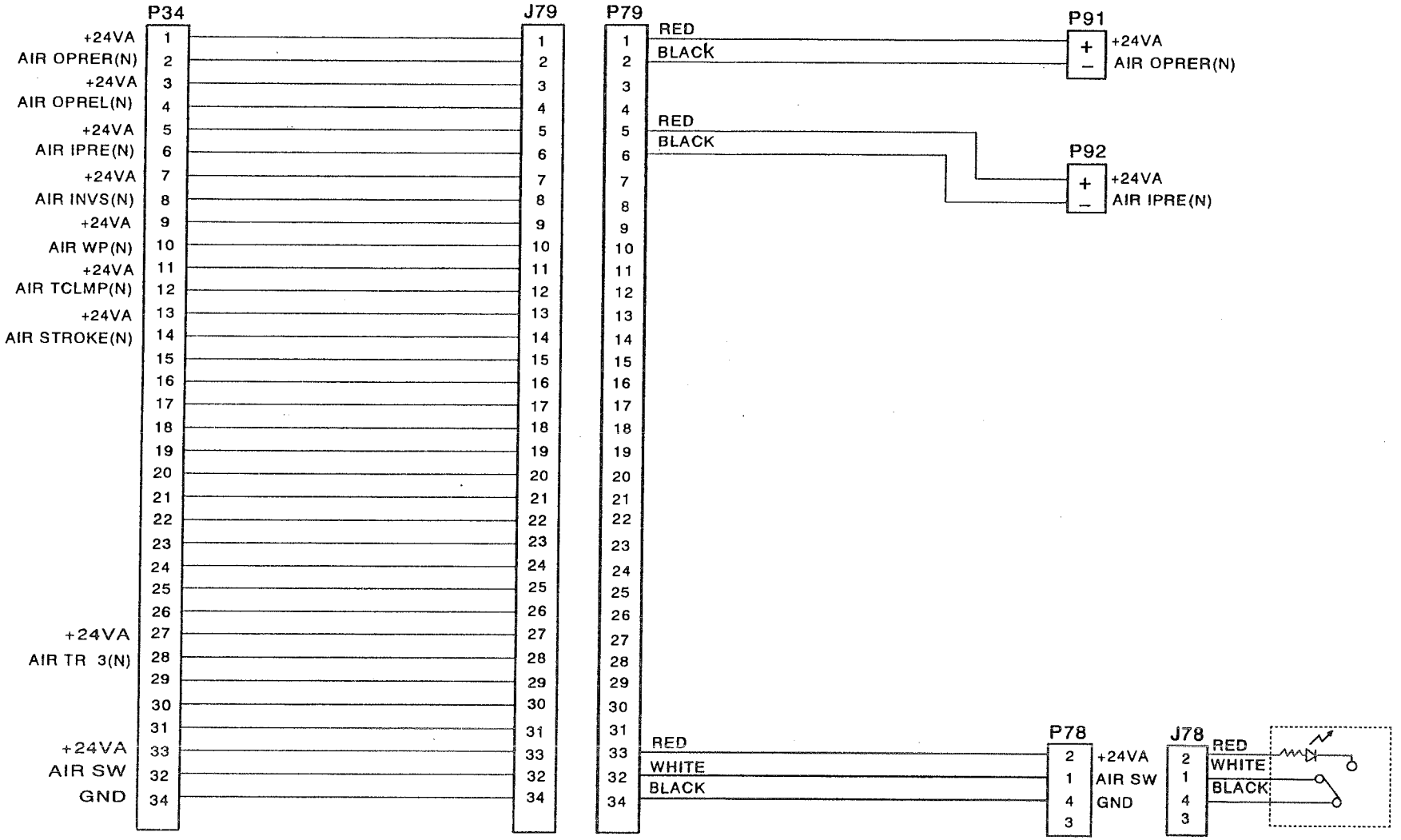
9-5. VR-SW circuit diagram



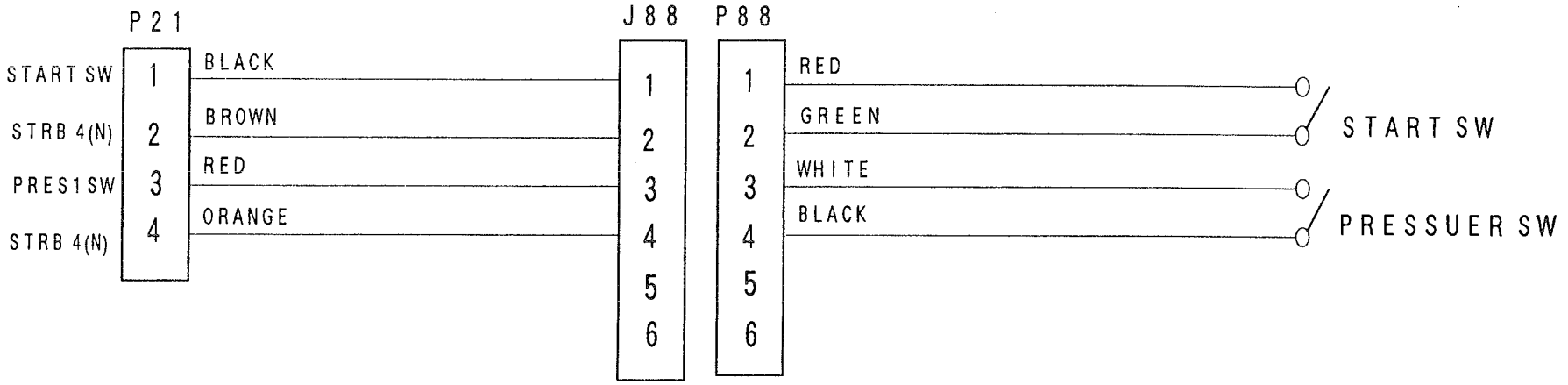
9-6. SENSOR circuit diagram



9-7. AIR VALVE circuit diagram

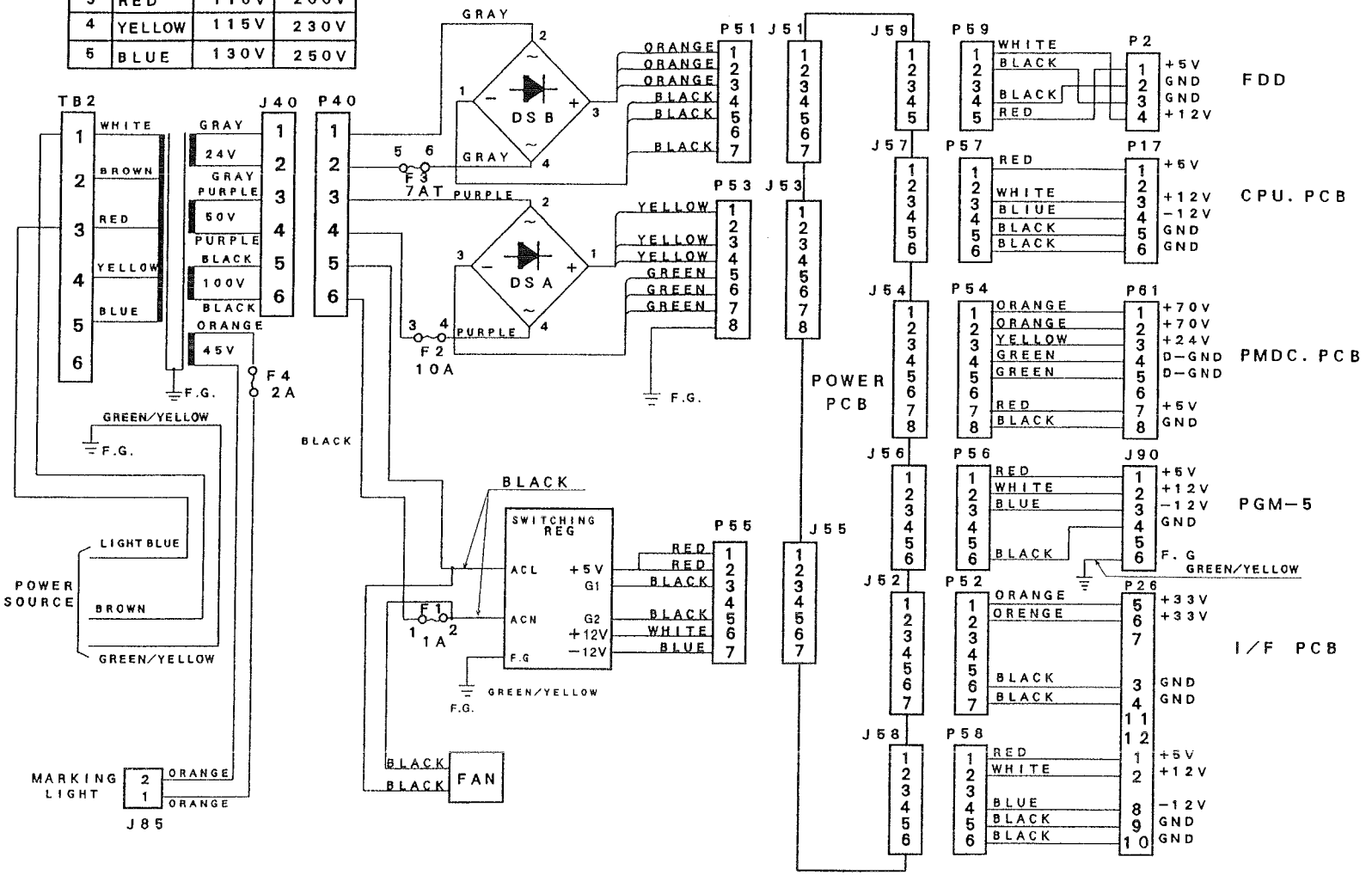


9-8. PEDAL SW circuit diagram

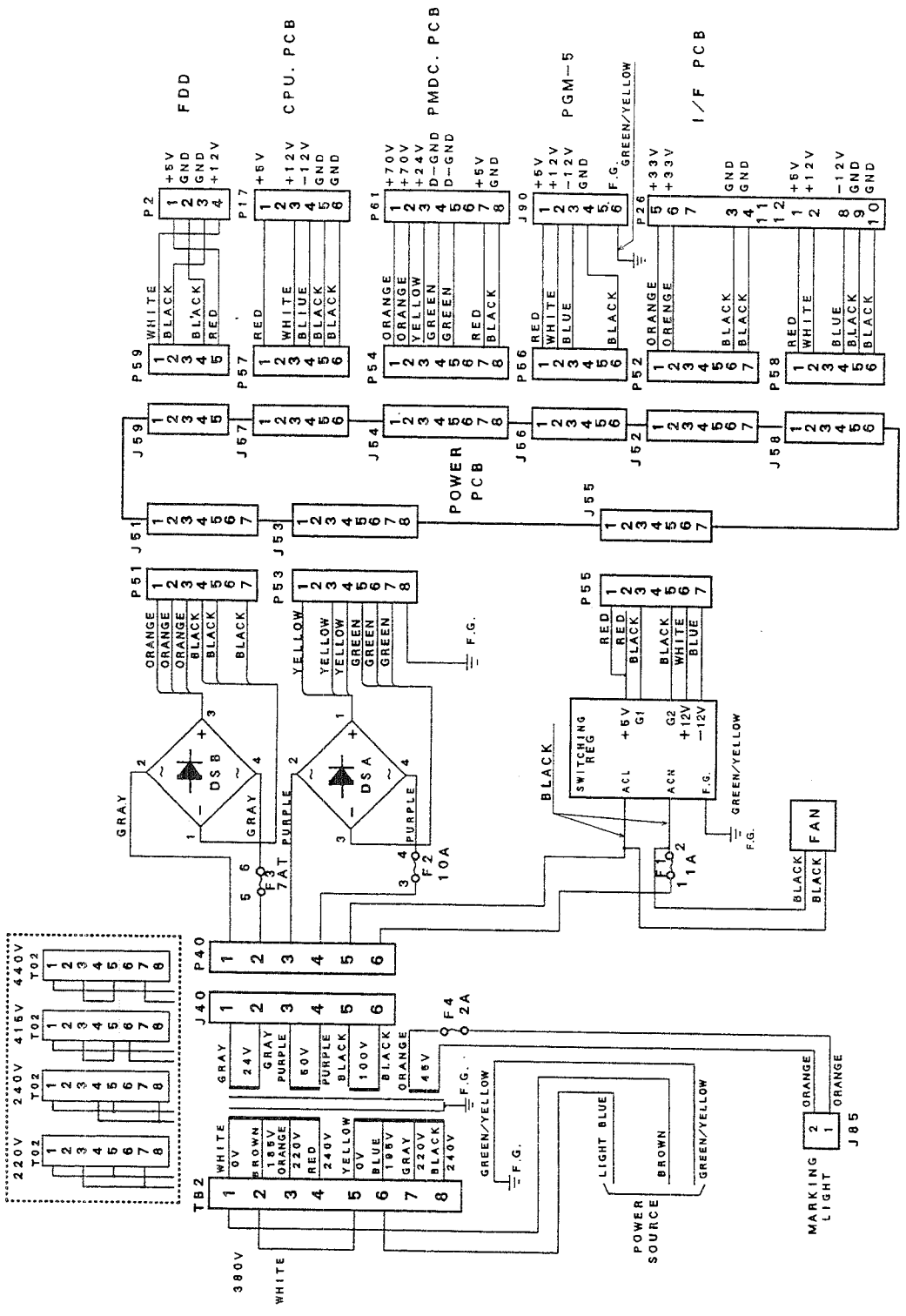


9-9. POWER circuit diagram (A)

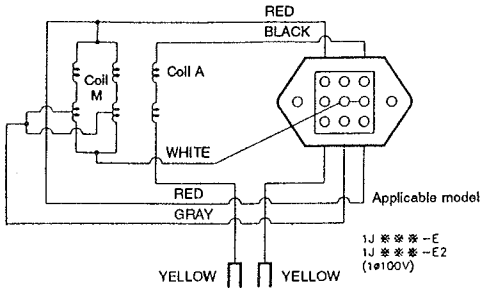
TB2 NO	COLOR	TRNS B 0~130V	TRNS A 0~250V
1	WHITE	0V	0V
2	BROWN	10V	10V
3	RED	110V	200V
4	YELLOW	115V	230V
5	BLUE	130V	250V

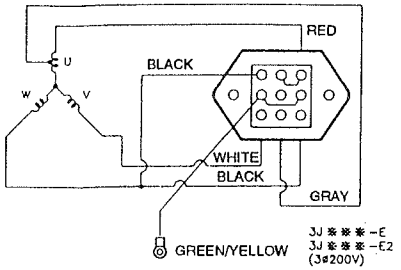


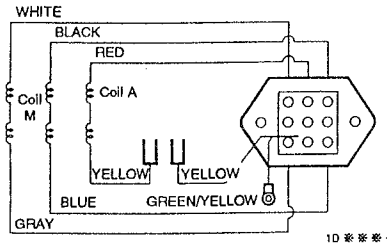
9-10. POWER circuit diagram (B)

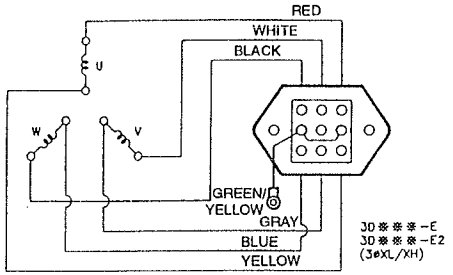


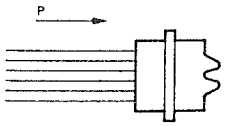
9-11. MOTOR connection diagram



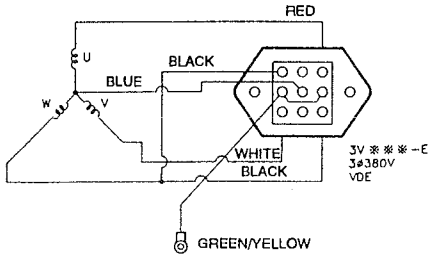


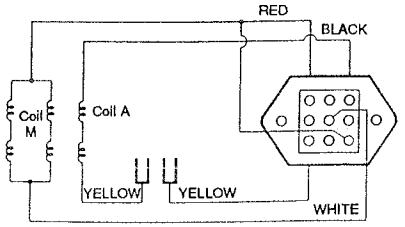


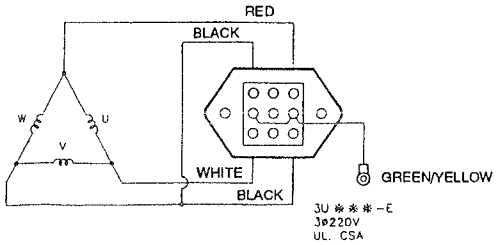




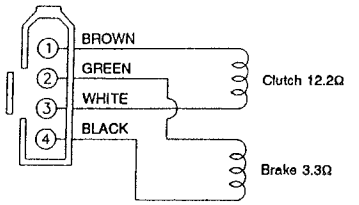
The arrangement of 9P connector pin: viewed from P



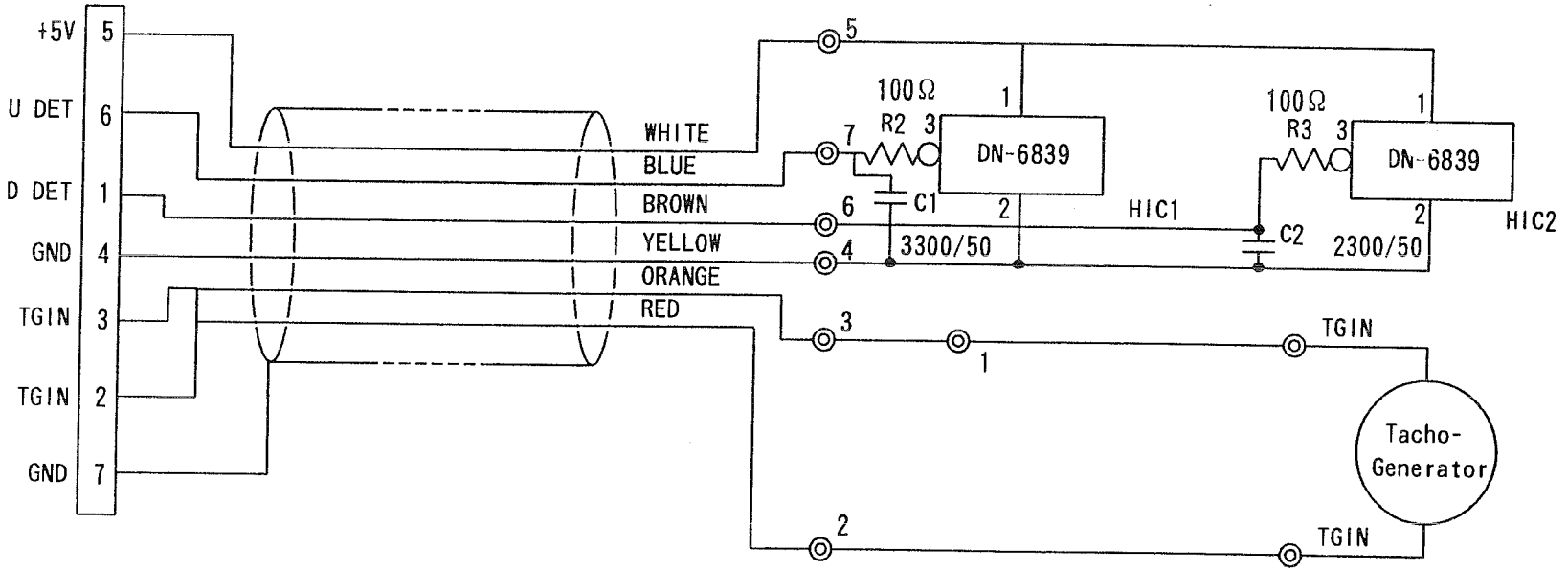




9-12. CLUTCH BRAKE connection diagram



9-13. SYNCHRONIZER circuit diagram



Computer-controlled cycle Machine with a Double-stepped Stroke Feeding frame
AMS-215CSB
AMS-215CHB
AMS-215CGB

[Note]
This Engineer's manual covers only the part which is the feature making this machine different from the AMS-215C.

1. FEATURES

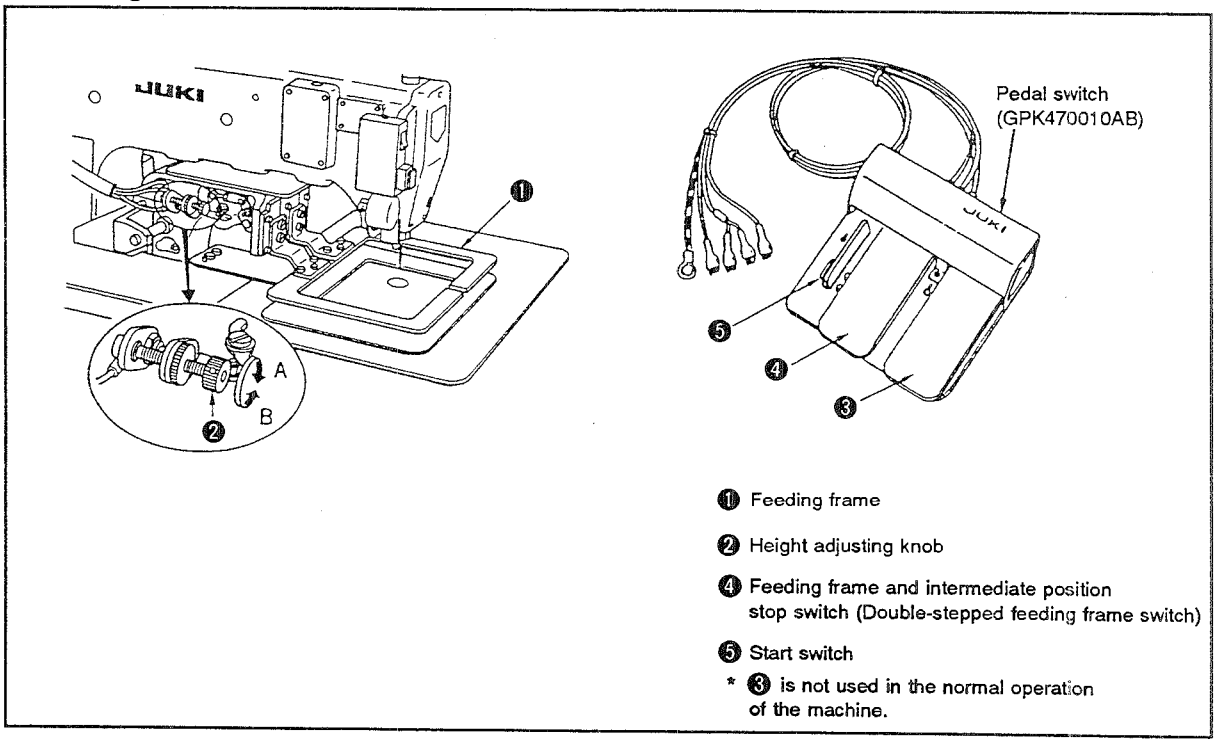
1) Lowering the feeding frame in the double-stepped actions allows the operator to position the sewing product on the machine with accuracy.
2) The height of the feeding frame in its intermediate stop position can be adjusted within the range of 0 through 30 mm with ease according to the thickness of 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

3-1. Configuration



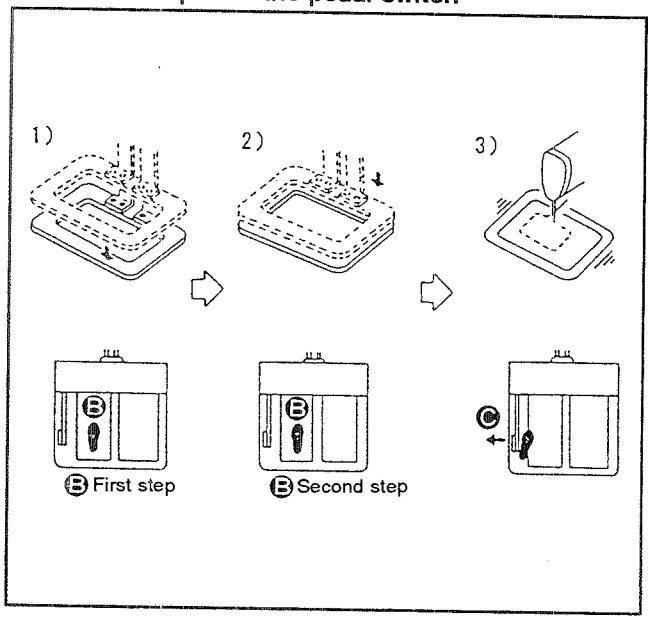
❶ Feeding frame
It comes down by operating the pedal switch

❷ **Height adjusting knob**
It is used to adjust the height of the 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.

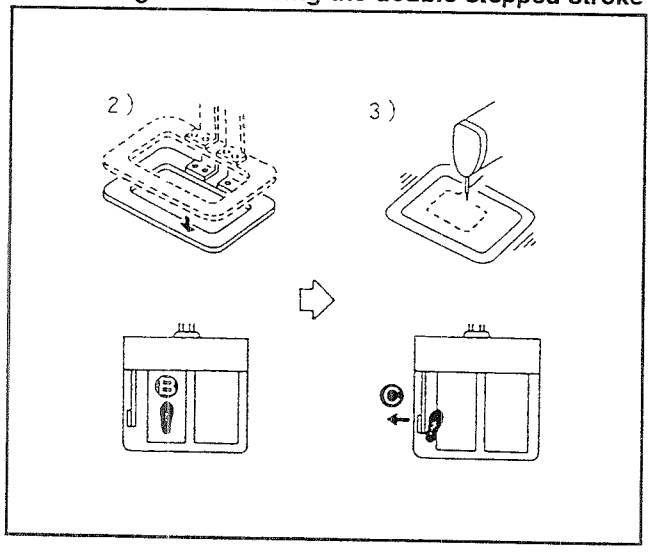
❺ **Start switch**
It is a switch to command the sewing machine how to sew the material according to the data stored in the micro floppy disk.

3-2. How to operate the pedal switch



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. Sewing without using the double-stepped stroke function



1) Set item 1 of function No. 43 of the memory switch to "0."
2) 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.
3) Depress pedal Ⓒ when the feeding frame rests in the lowest position of its stroke, and the sewing machine will start sewing.

4. ADJUSTMENTS

4-1. Adjusting the mechanical components

STANDARD ADJUSTMENTS

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

1) 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.

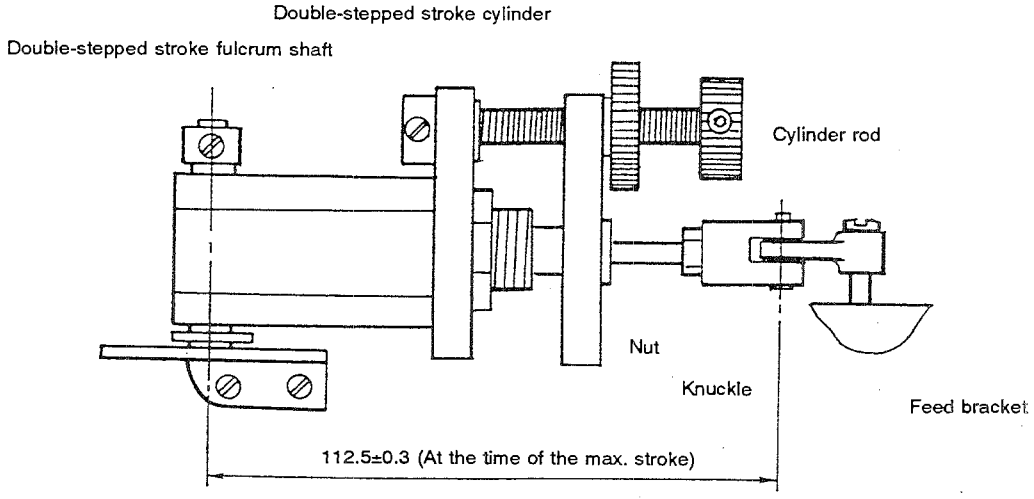


Fig. 4-1-1

(2) Adjusting the intermediate stop position of the feeding frame

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

Adjust the clearance between the feeding frame and the sewing product on the machine to approximately 1 mm. (The intermediate stop position of the feeding frame can be adjusted within the range of 0 through 30 mm above the top surface of the throat plate.)

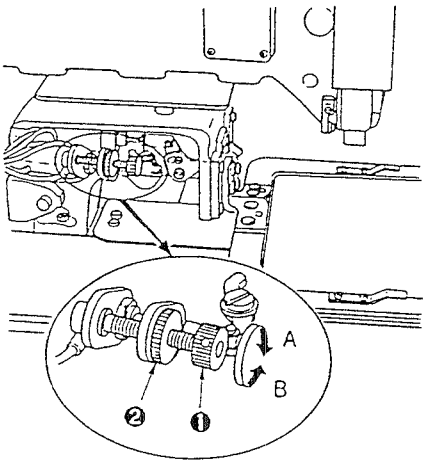


Fig. 4-2-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Draw the knuckle in the direction of the arrow to allow the double-stepped stroke cylinder to reach the max. stroke. 2) Loosen the nut and turn knuckle until a 112.5±0.3 mm center-to-center distance is obtained between the fulcrum shaft and the connecting shaft. Now, tighten the nut to fix the knuckle.	o If the center-to-center distance is shorter than the specified value, the feeding frame will fail to go up as high as 30 mm.
1) Loosen knob ❷. 2) Turn knob ❶ to adjust the intermediate stop position of the feeding frame slightly higher than the material thickness. Turn knob ❶ in direction A to heighten the intermediate stop position of the feeding frame or in direction B to lower it. 3) Securely tighten knob ❷.	o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease. o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine.

(3) Adjusting the pneumatic components

1) Connect quick-coupling joint ❶ in place and open air cock ❺. Then pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 MPa to 0.55 MPa). (Fig. 4-3-1)
2) If pressure gauge ❼ indicates 4 kgf/cm^2 (0.4 MPa) or lower value, the machine will stop with Error [A] shown on the operation panel. (Fig. 4-3-1)
3) The air pressure on the feeding frame cylinder retracting side has been reduced to 1 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa) and the feeding frame can be lowered by hand. (Fig. 4-3-2)
4) The needle knob of the speed controller (for work clamp cylinder) has been fixed at the position that is reached by loosening the knob by one turn after fully tightening it. (Fig. 4-3-3)
5) The needle knob of the speed controller (intermediate presser cylinder (asm.)) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-3-4)

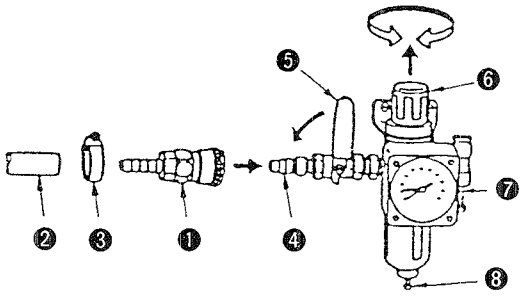
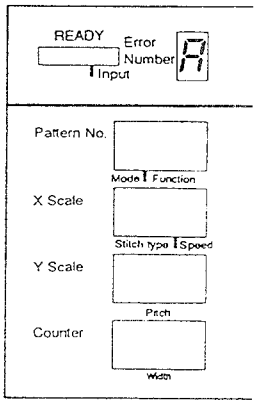


Fig. 4-3-1



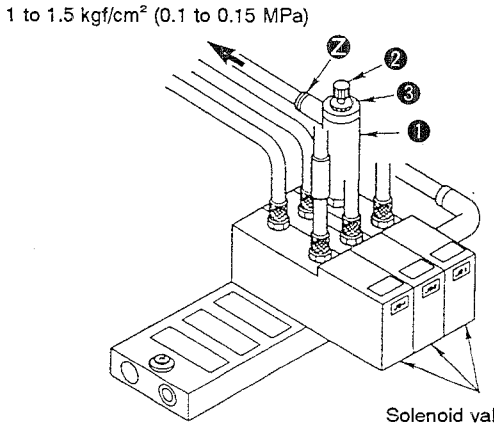


Fig. 4-3-2

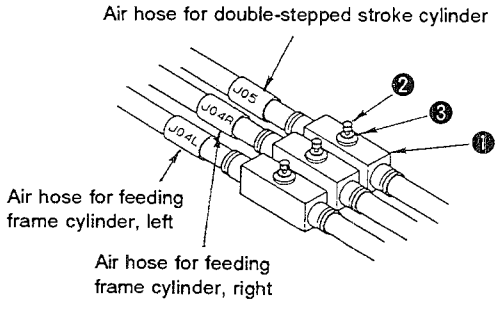


Fig. 4-3-3

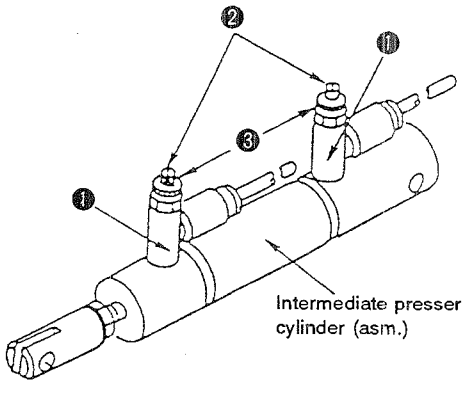


Fig. 4-3-4

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, pull up air regulating knob ❻ and then adjust the air pressure, by turning the knob, to allow pressure gauge ❼ to indicate an air pressure of 5 to 5.5 kgf/cm² (0.5 MPa to 0.55 MPa). Then, press the knob down to remain at that position. 4) If the air pressure is lower than the specified value, the machine will stop while giving error [A] on the display. * Close air cock ❺ and press pushbutton ❽, and the air pressure will be 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.** 5) Set the machine in its sewing state. Now remove the air hose by pressing section ❷ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-3-2) 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 to 5 kgf/cm² (0.1 MPa to 0.5 MPa). Then fix the needle knob using nut ❸. Now, securely connect the removed air hose in place. (Fig. 4-3-2) 6) Referring to the Standard adjustment (3)-4), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig. 4-3-3 and 4-3-4) 7) Remove the top cover. Referring to the Standard adjustment (3)-5), adjust needle knob ❷ of speed controller ❶ properly. After the adjustment, fix it using nut ❸. (Fig. 4-3-5)	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, Standard adjustment (3)-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. (See Fig. 4-3-1)

(4) Connecting the pneumatic components

The schematic diagram for the pneumatic system is as follows:

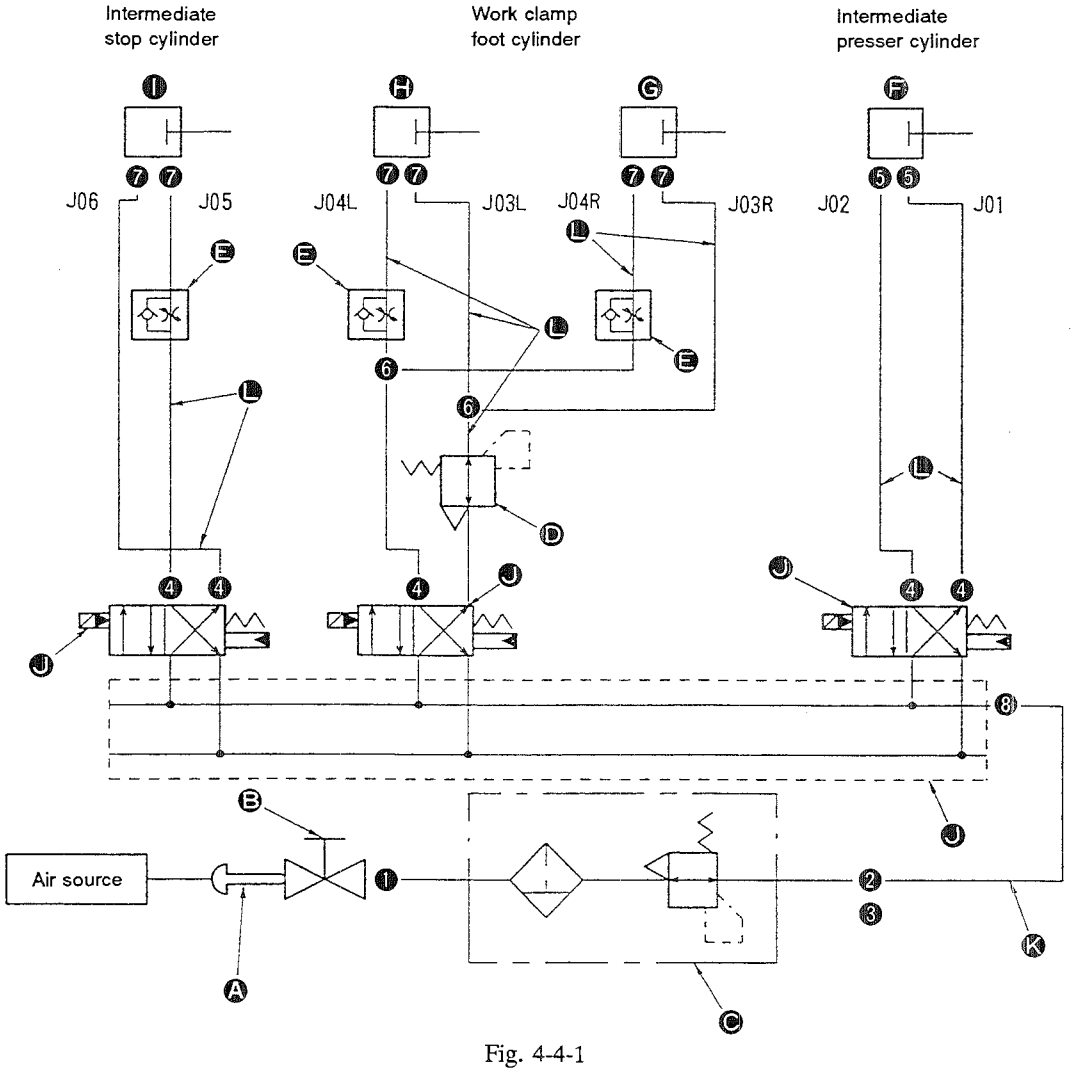


Fig. 4-4-1

Ⓐ	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)
Ⓘ	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)

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Connect the pneumatic components properly referring to the schematic diagram.	o Malfunction of the feeding frame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components.

(5) Installing the pedal switch (PK47)

1) Connect the connectors of the pedal switch to the connectors located on the back of the control box following the order as shown in the figure below.
2) Connect a ground wire.

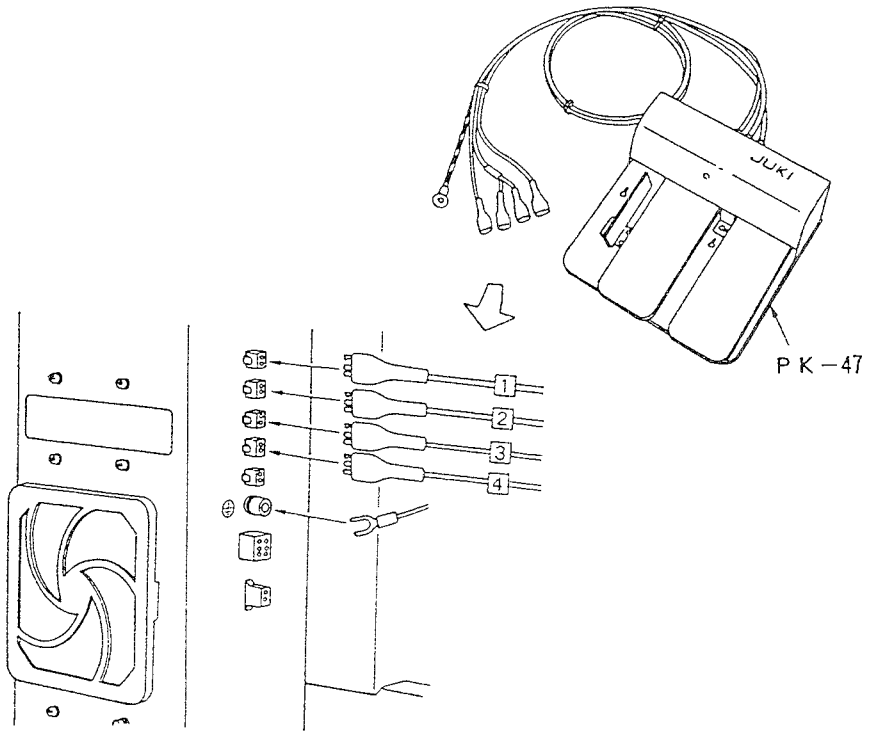


Fig. 4-5-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o The connector of the pedal switch relay cable (asm.) is a locking type one. So, be careful not to draw it out forcibly.	o Be sure to connect the connector of the pedal switch relay cable (asm.) following the correct order. If not, the feeding frame may fail to operate normally.

(6) Assembling the double-stepped stroke feeding frame

1) Assemble the double-stepped stroke feeding frame referring to Fig. 4-6-1.

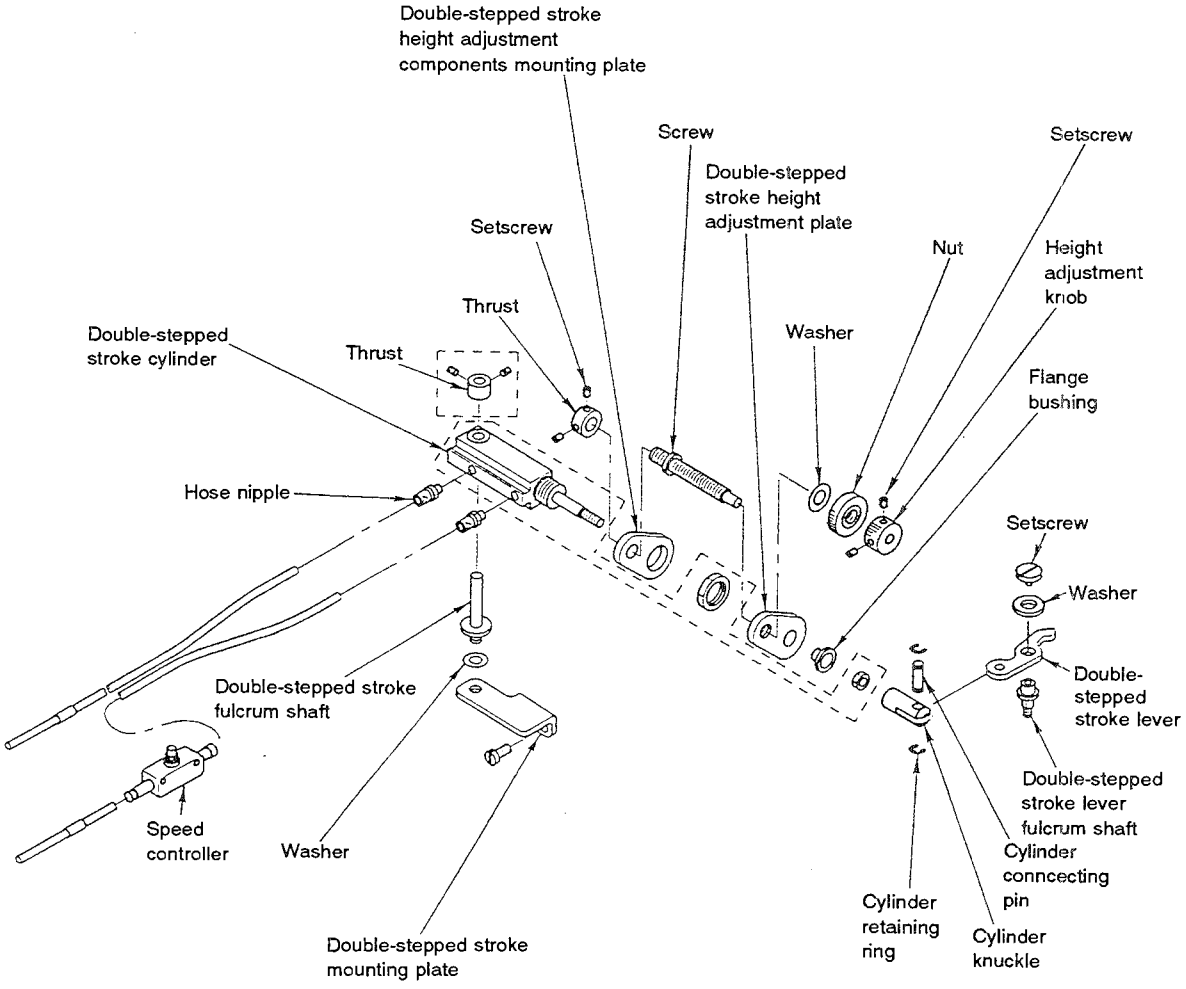


Fig. 4-6-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(7) Assembling the double-stepped stroke push plate

1) Assemble the double-stepped stroke feeding frame push plate to Fig. 4-7-1.
2) Assemble the nut and the cylinder knuckle so that a 120.5 ± 0.3 mm center-to-center distance is provided between the ϕ5 mm hole in the work clamp foot cylinder and the ϕ5 mm hole in the cylinder knuckle. (Fig. 4-7-2)

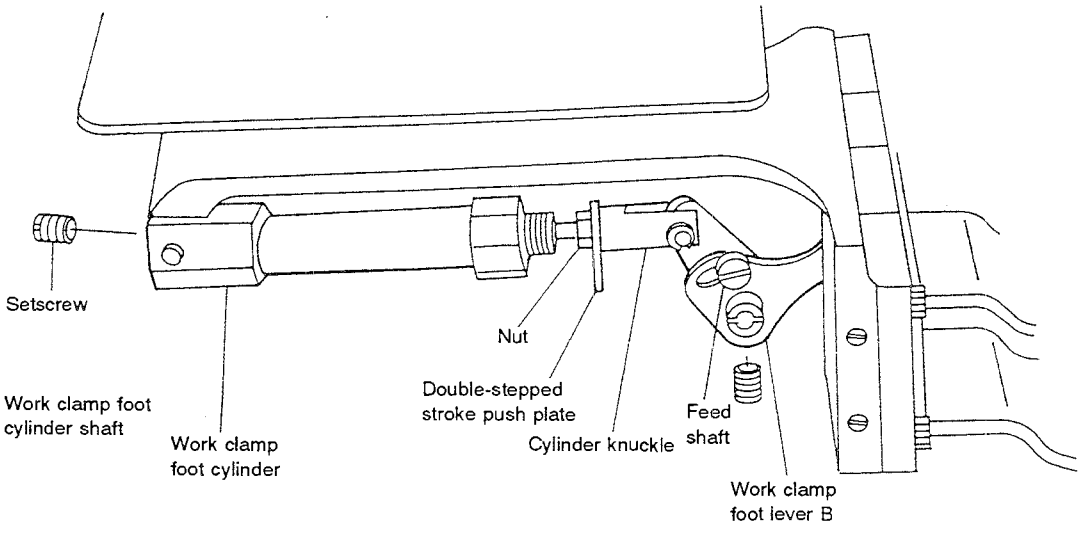


Fig. 4-7-1

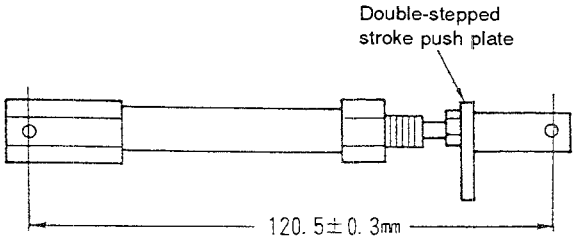


Fig. 4-7-2

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(8) Assembling the pneumatic components

Assemble the pneumatic components according to Fig. 4-8-1.

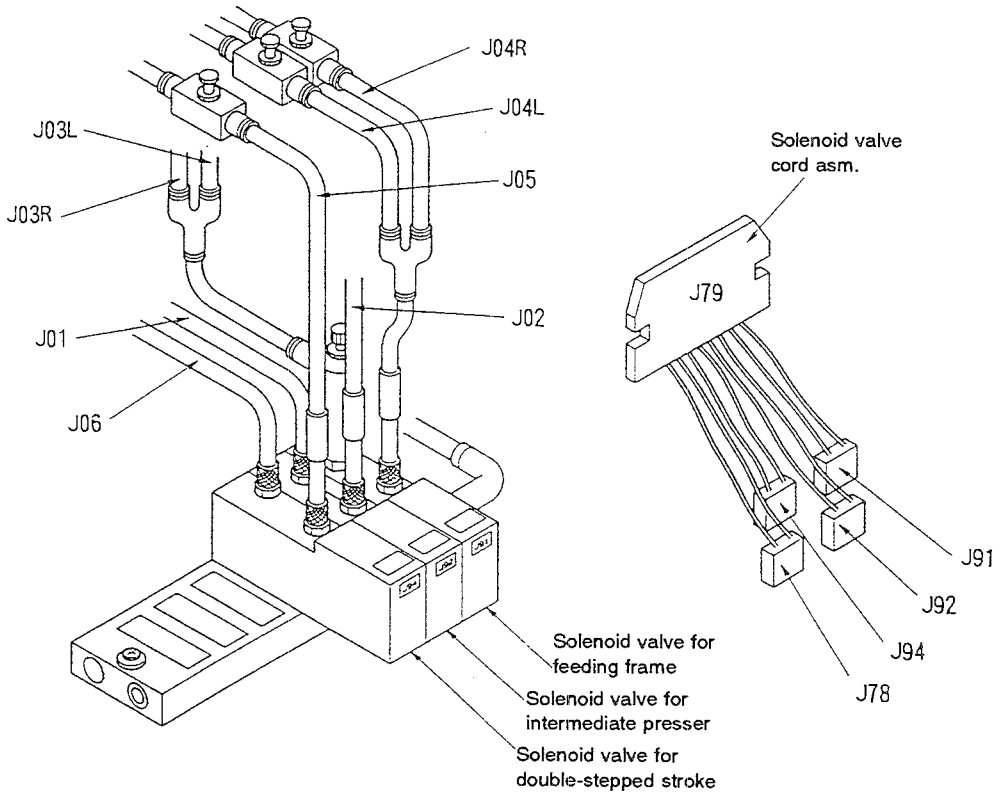


Fig. 4-8-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(9) 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 79). (See the figure below.)

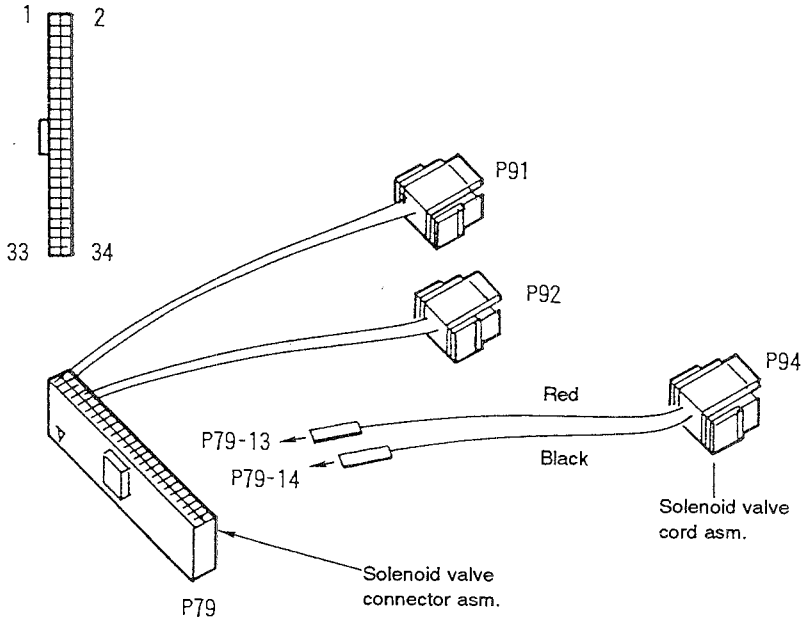


Fig 4-9-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

5. PARTS TO BE REPLACED WHEN CHANGING THE STANDARD TYPE MACHINE TO THE DOUBLE-STEPPED STROKE FEEDING FRAME TYPE MACHINE

(Refer to page 233, 235)

• Parts to be removed

	Name of part	Q'ty	Part No.
1	Solenoid valve asm.	-	PV0351130A0
2	2-pedal unit asm.	-	M85905130A0

• Parts to be additionally attached

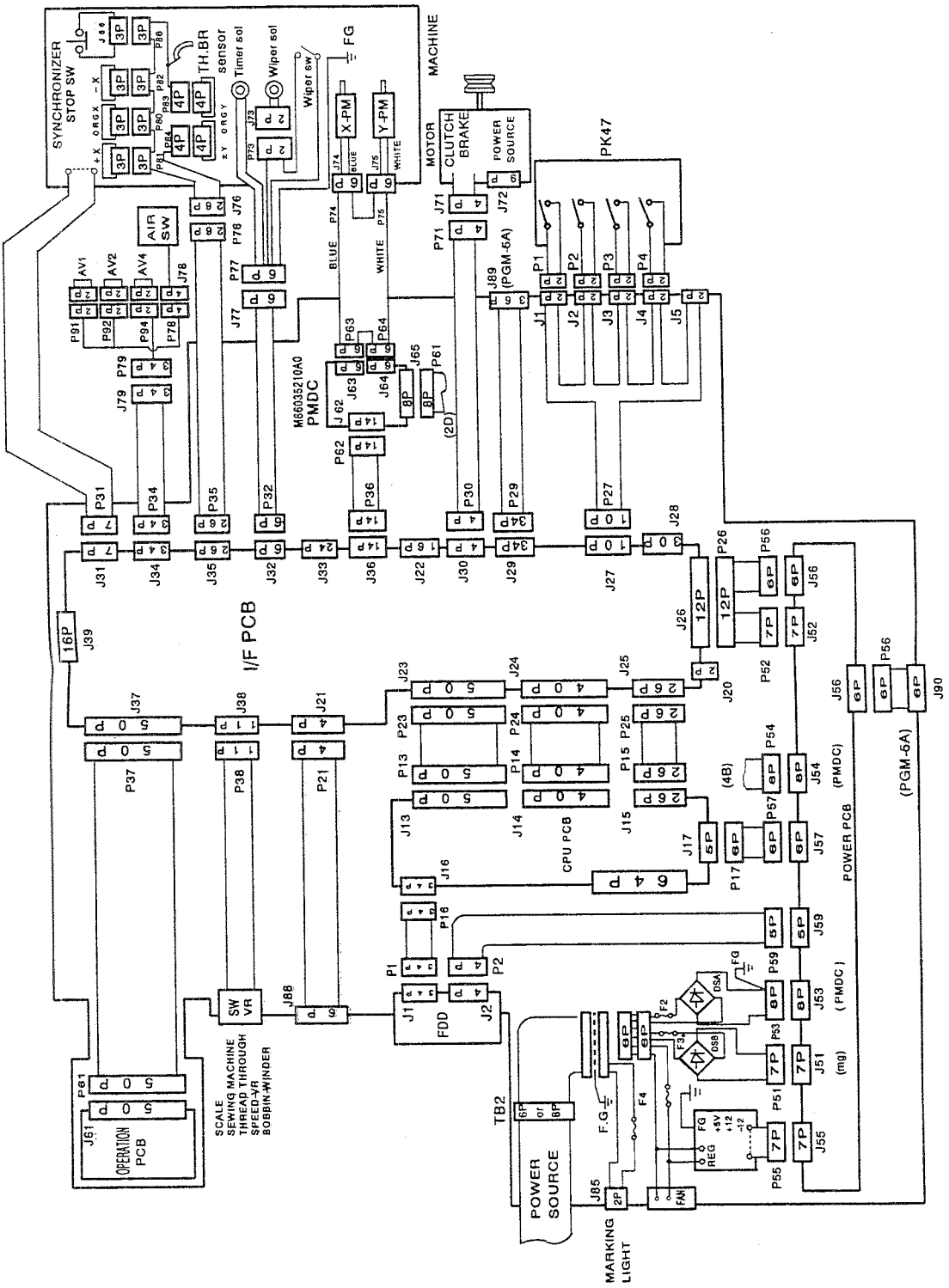
	Name of part	Q'ty	Part No.
1	Cylinder knuckle	1	B1625220000
2	Cylinder connecting pin	1	B1626220000
3	Double-stepped stroke lever spacer	1	B185351200E
4	Height adjusting knob	1	B2304205000
5	Double-stepped stroke mounting plate	1	B2514215000
6	Double-stepped stroke lever	1	B2516215000
7	Double-stepped stroke height adjustment plate	1	B2518215A00
8	Double-stepped stroke adjustment screw bracket	1	B2518215000
9	Screw	1	B2527215000
10	Double-stepped stroke fulcrum shaft	1	B2528215000
11	Flange bushing	1	B2548215000
12	Feed blacket asm.	1	B25502150AB
13	Double-stepped stroke fulcrum shaft thrust collar	1	B25792290A0
14	Double-stepped stroke lever fulcrum shaft	1	B3012490000
15	Height adjusting plate stopper	1	B3012816000
16	Air tube label J 05	1	B471122000E
17	Air tube label J 06	1	B471122000F
18	ϕ4 air tube	1.5M	BT0400251EB
19	Height adjusting screw thrust collar	1	CS0790731SH
20	Double-stepped stroke cylinder	1	PA1602510A0
21	Hose nipple	2	PJ032052503
22	Cylinder connecting pin retaining ring	2	RE0300000K0
23	Screw	1	SS6110520TP
24	Screw	2	SS6121010SP
25	Screw	2	SS8110422TP
26	Screw	2	SS8110422TP
27	Washer	1	WP0650876SD
28	Washer	1	WP0820816SD
29	Double-stepped stroke push plate	4	B2530215000
30	Air tube label J 05	1	B471122000E
31	Solenoid valve connector asm.	1	B47122150A0
32	ϕ4 air tube J 05	0.7M	BT0400251EB
33	Solenoid valve asm.	1	PV0351240B0
34	PK47/3-pedal unit	1	GPK470010AB

• Parts of which quantity used is to be changed

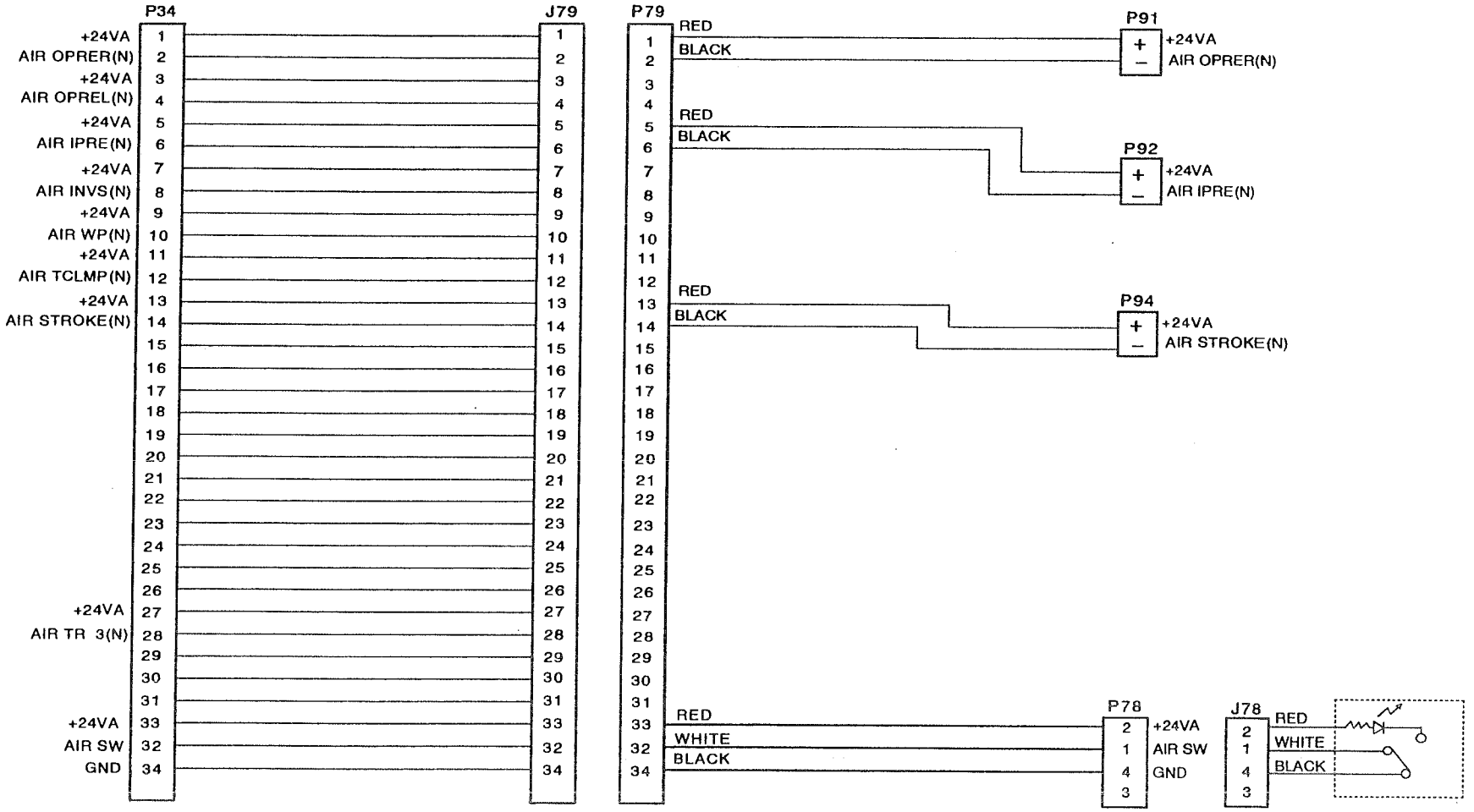
	Name of part	Q'ty	Part No.
1	Clip band	7 → 8	HX002330000
2	Speed controller	2 → 3	PC012401000
3	Hose nipple	3 → 5	PJ032052503

6. MATERIALS

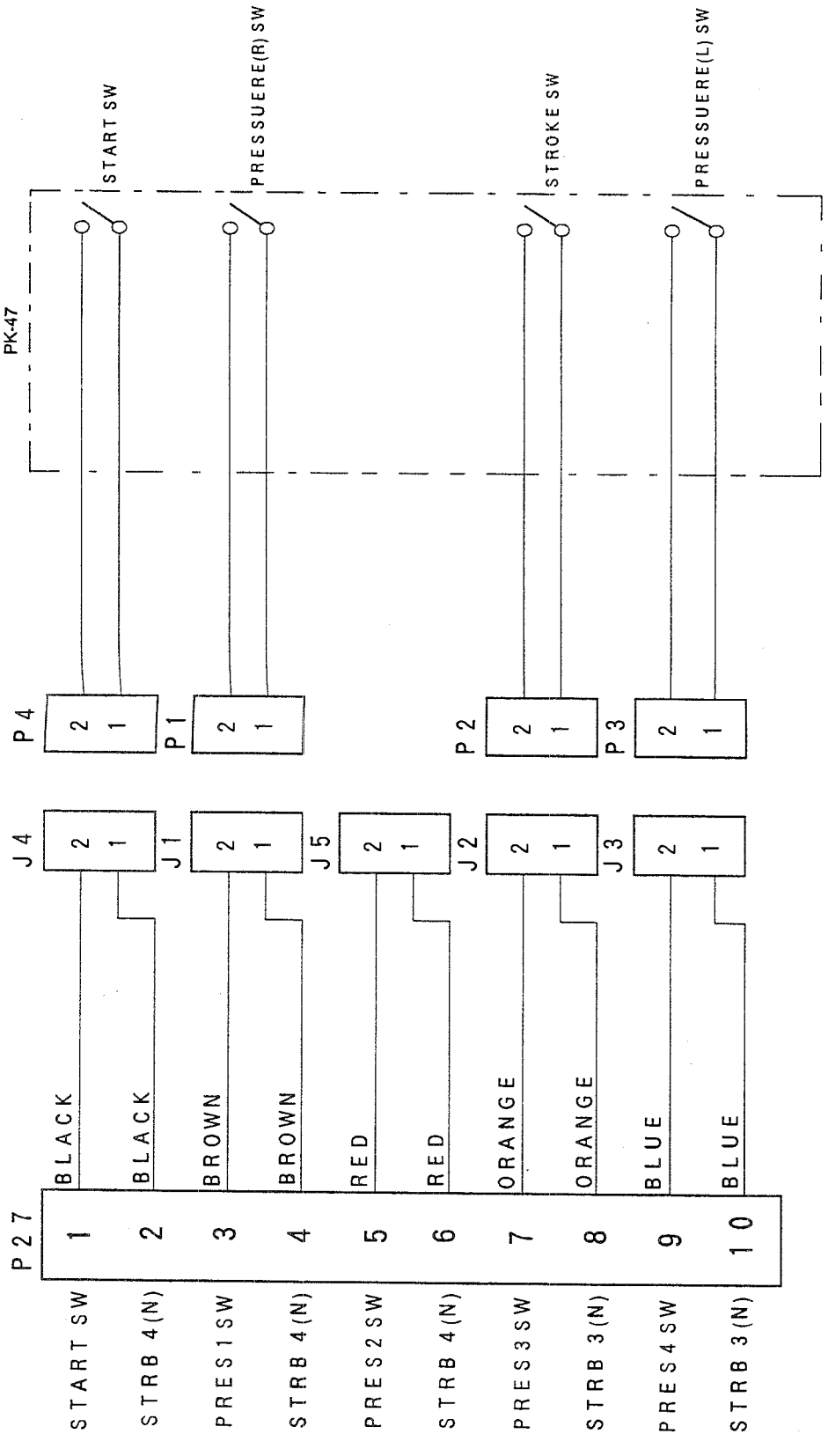
6-1. Block diagram for the AMS-215CSB, -215CHB and -215CGB



6-2. Air valve schematic diagram for the AMS-215CSB, -215CHB and -215CGB



6-3. Pedal switch schematic diagram



Computer-controlled Cycle Machine with a Double-stepped Feeding Frame
AMS-215CSL
AMS-215CHL
AMS-215CGL

[Note]
This Engineer's manual covers only the part which is the feature making this machine different from the AMS-215C.

1. FEATURES

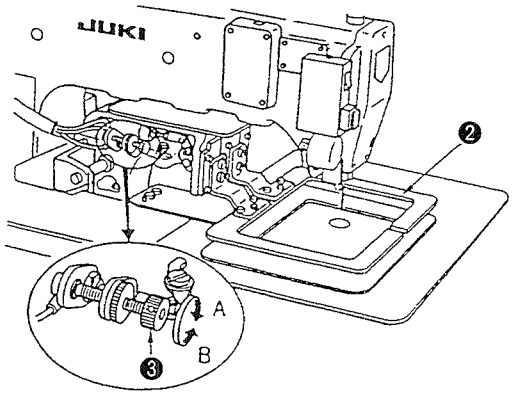
1) The machine comes with the feeding frame which is equipped with the degree of angle adjusting function so that the sewing product is uniformly clamped.
2) The machine is equipped with a double-stepped feeding frame. In addition, the left- and right-hand side feeding frames can be simultaneously raised/lowered 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.

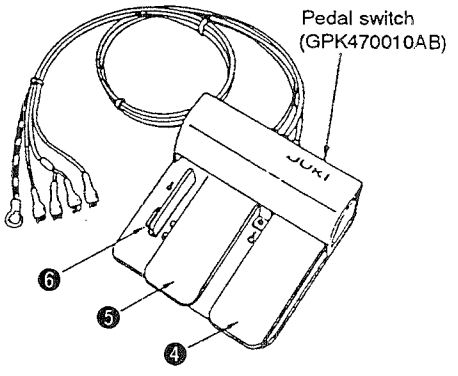
2. SPECIFICATIONS AND SPECIFIED VALUE

1) Lift of feeding frame (right)	Standard 25 mm	Max. 30 mm	
2) Lift of feeding frame (left)	Standard 25 mm	Max. 30 mm	(Height of the feeding frame in its intermediate stop position: 0 to 30 mm)

3. OPERATION OF THE SEWING MACHINE

3-1. Configuration





❹ Feeding frame

❸ Height adjusting knob

❺ Feeding frame switch and intermediate top switch (Double-stepped feeding frame switch)

❻ Start switch

* ❸ is not used in the normal operation of the machine.

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.

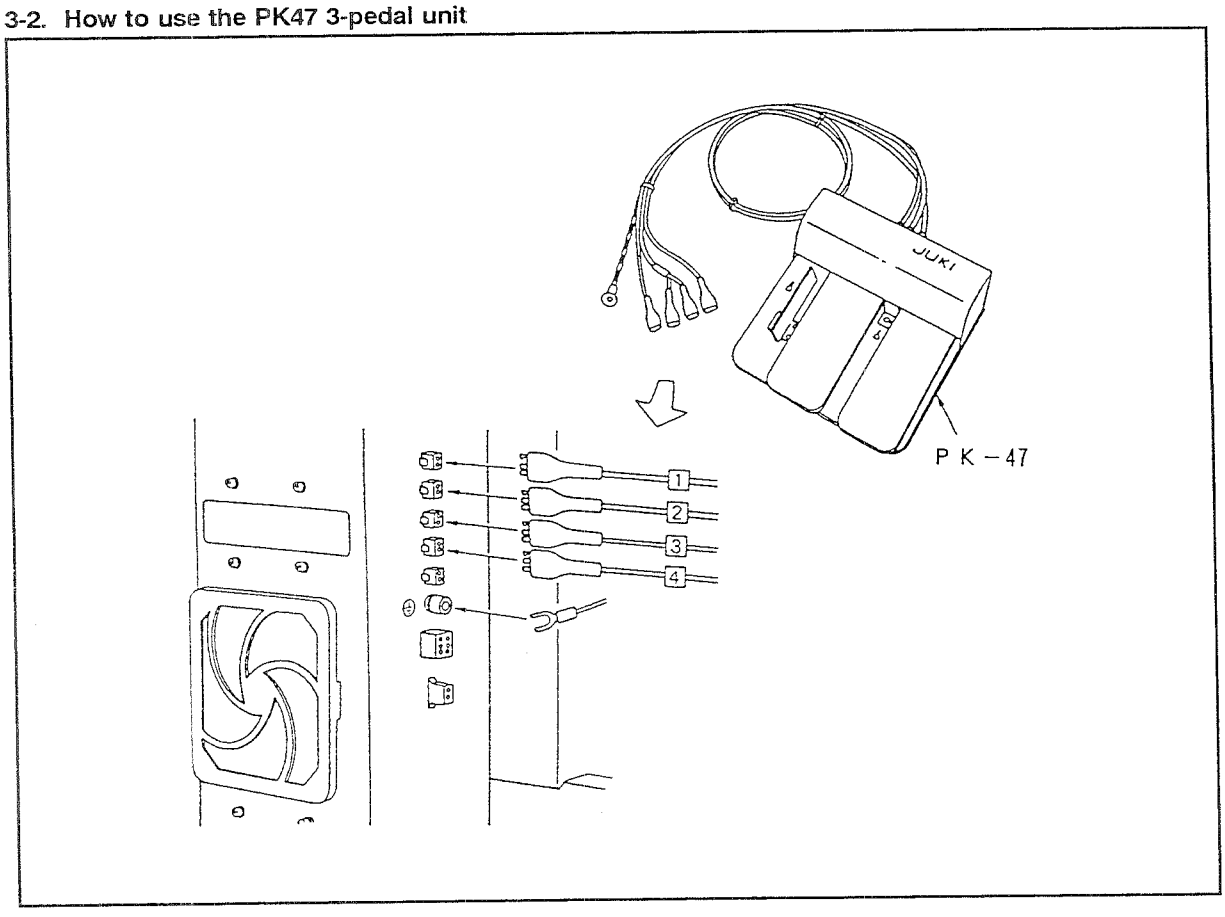
❸ **Height adjusting knob**
It is used to adjust the height of the intermediate stop position of the feeding frame (left).

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.

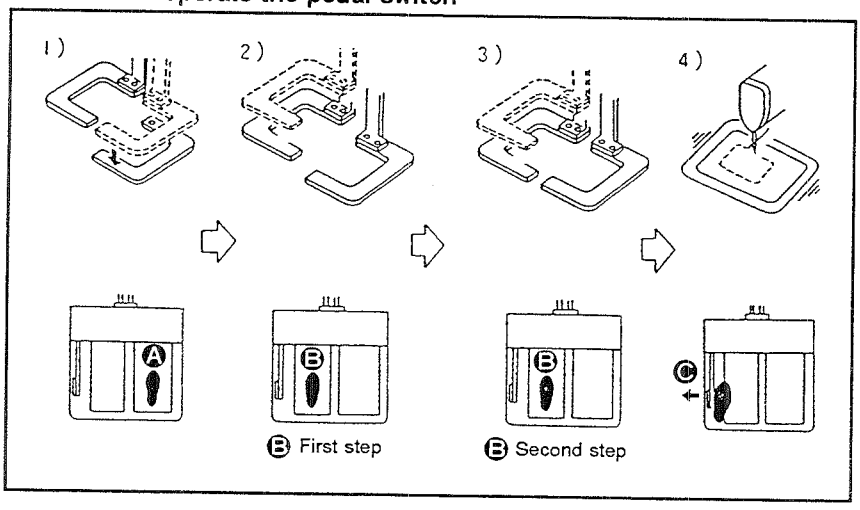
❻ **Start switch**
It is a switch to command the sewing machine how to sew the material. The machine sews the material according to the data stored in the micro floppy disk.

3-2. How to use the PK47 3-pedal unit



1) Connect the connectors of the pedal switch to the connectors mounted on the rear section of the control box following the order indicated in the figure.
2) Connect the ground wire.

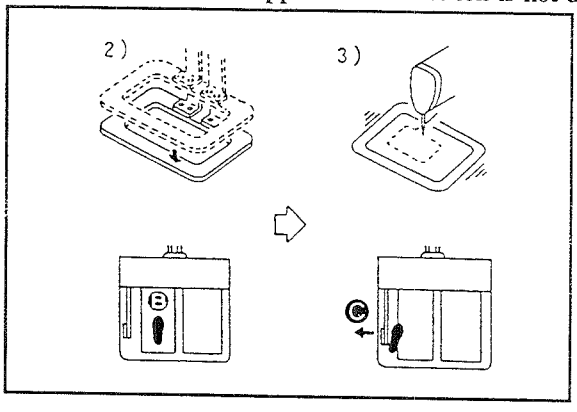
3-3. How to operate the pedal switch



1) Place the garment body under the feeding frame and depress pedal Ⓐ of the pedal switch, and the feeding frame (right) will come down to secure the garment body.
2) Put the part to be sewn on the garment body under the feeding frame (left) and lightly depress pedal Ⓑ, and the feeding frame (left) will stop in its intermediate stop position. Release the pedal in this state, and the feeding frame (left) will return to the previous height.
3) Position the part. Further depress pedal Ⓑ, and the feeding frame (left) will come down to the lowest position of its stroke to secure the part. Fully depress pedal Ⓑ again until it will go no further, and the feeding frame (left) will return to its intermediate position.
4) Depress pedal Ⓒ when both portions of the feeding frame rest in the lowest position of its stroke, and the sewing machine will start sewing.

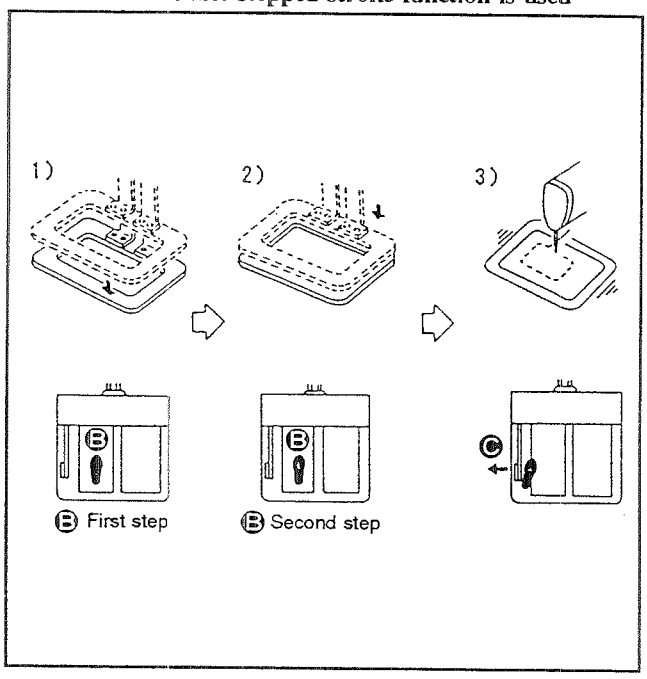
3-4. Sewing with the monolithic feeding frame installed on the machine

① When the double-stepped stroke function is not used



1) Set item 1 of function No. 43 of the memory switch to "0."
2) 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.
3) Depress pedal Ⓒ when the feeding frame rests in the lowest position of its stroke, and the sewing machine will start sewing.

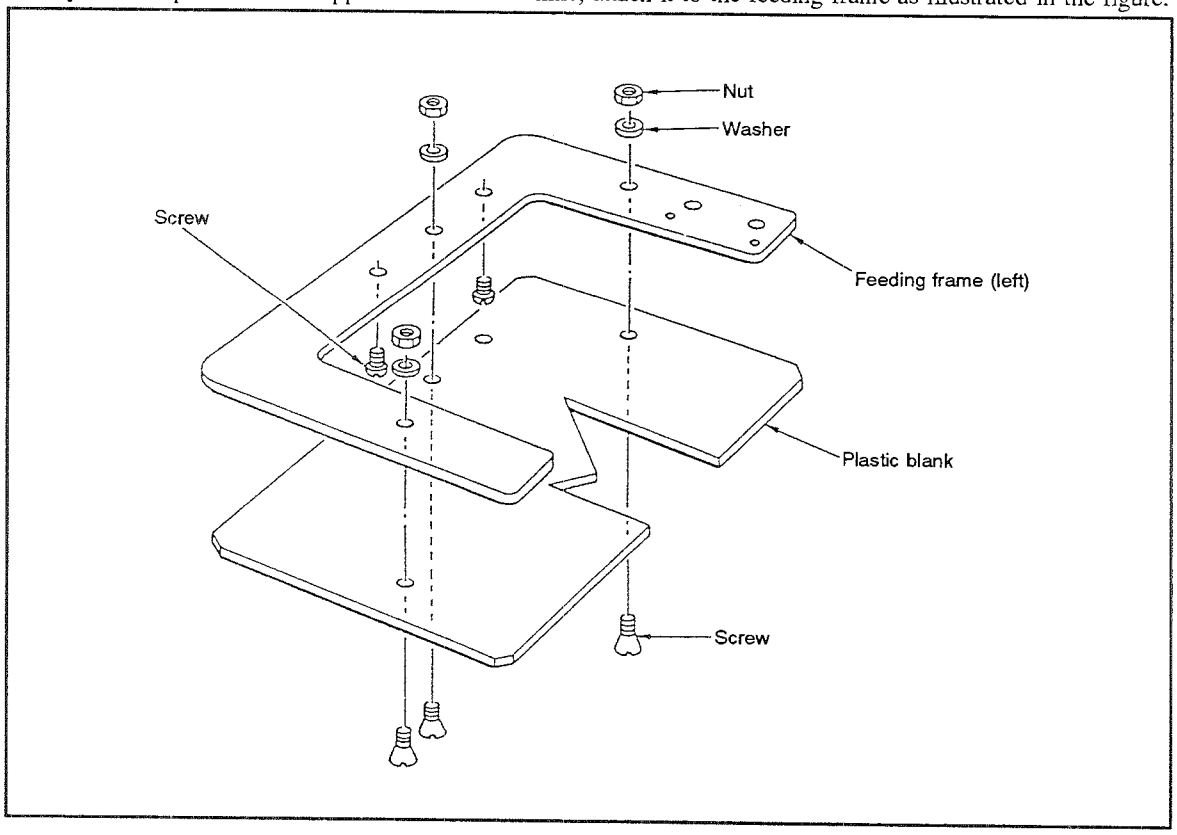
② When the double-stepped stroke function is used



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.

3-5. How to use a plastic blank

If you use a plastic blank supplied with the machine, attach it to the feeding frame as illustrated in the figure.



1) Machine a plastic blank supplied with the machine in accordance with the sewing pattern shape.
2) Attach the machined plastic blank to the feeding frame as illustrated in the figure shown above.

(Caution)

1. **Plastic blank is common to the right and left portions of the feeding frame. So, machine a plastic blank and attach it to the feeding frame, right.**
2. **If necessary, adhere a sponge sheet or rubber sheet supplied with the plastic blank to the machined blank for operation.**

4. ADJUSTMENTS

4-1. Adjusting the mechanical components

STANDARD ADJUSTMENTS

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

If the feeding frames (right) and (left) are in parallel to the throat plate, the pressure of the front side of the feeding frame is likely to drop. Consequently, be sure to adjust the inclination of the feeding frame so that the front side of each feeding frame is slightly lower than its rear side.

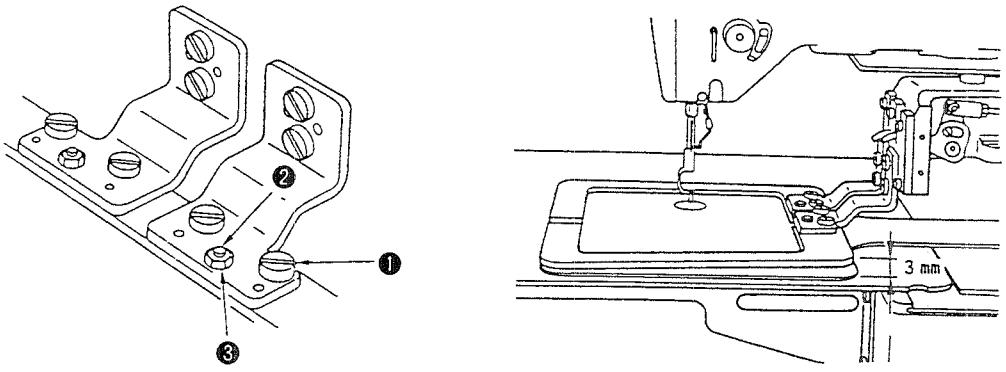


Fig. 4-1-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
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.**	o If the feeding frame is not sufficiently tilted, the work pressing force at the front side of the feeding frame may drop. o 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 227) of the Engineer's manual for the AMS-215CSB, AMS-215CHB and AMS-215CGB.

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

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

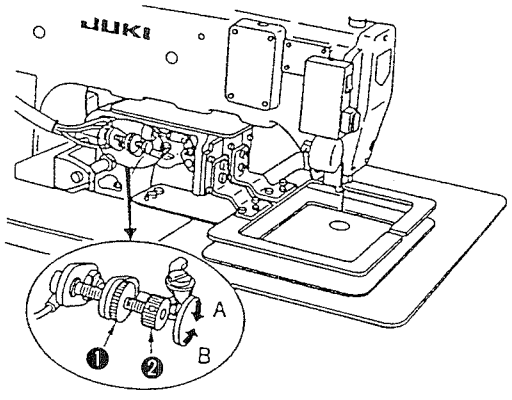


Fig. 4-3-1

Adjust the clearance between the feeding frame (left) and the sewing product on the machine to approximately 1 mm. (The intermediate stop position of the feeding frame can be adjusted within the range of 0 through 30 mm above the top surface of the throat plate.)

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen knob ❶. 2) Turn knob ❷ to adjust the intermediate stop position of the feeding frame slightly higher than the material thickness. Turn knob ❷ in direction A to heighten the intermediate stop position of the feeding frame or in direction B to lower it. 3) Securely tighten knob ❶. **[Caution]** **Only the feeding frame (left) is capable of stopping at the intermediate position.**	o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease. o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine.

(4) Adjusting the pneumatic components

1) Connect quick-coupling joint ❶ in place and open air cock ❺. Then pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 MPa to 0.55 MPa). (Fig. 4-4-1)
2) If pressure gauge ❼ indicates 4 kgf/cm^2 (0.4 MPa) or lower value, the machine will stop with Error [A] shown on the operation box panel. (Fig. 4-4-1)
3) The air pressure on the feeding frame cylinder retracting ride has been reduced to 1 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa) and the feeding frame can be lowered by hand. (Fig. 4-4-2)
4) The needle knob of the speed controller (for work clamp cylinder) has been fixed at the position that is reached by loosening the knob by one turn after fully tightening it. (Fig. 4-4-3).
5) The needle knob of the speed controller (intermediate presser cylinder (asm.)) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-4-4)

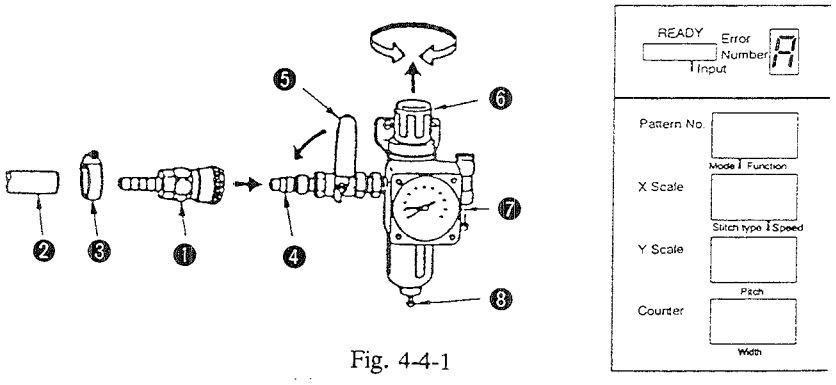


Fig. 4-4-1

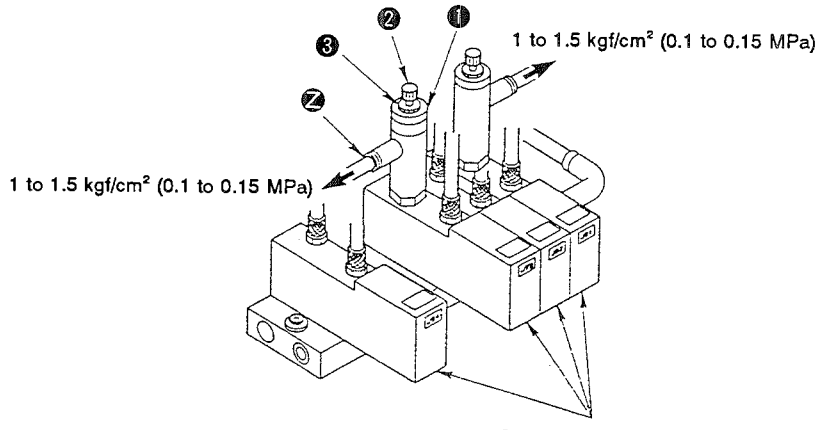


Fig. 4-4-2

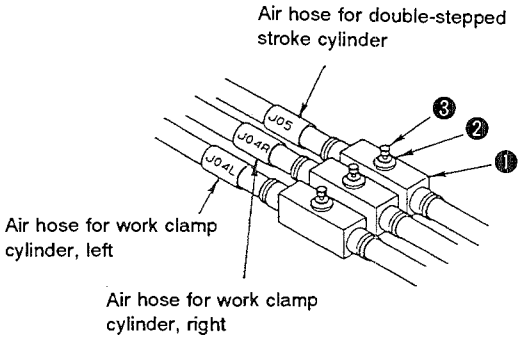


Fig. 4-4-3

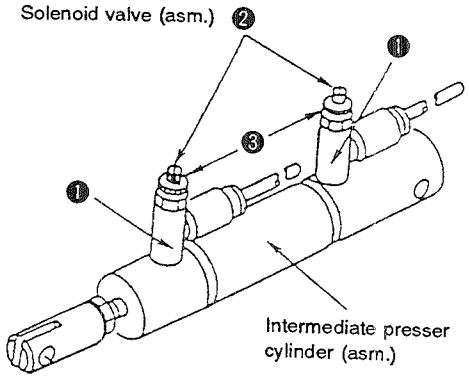


Fig. 4-4-4

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 clock ❺. Pull up air adjusting knob ❻, the turn it until pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 MPa to 0.55 MPa). Then push down the know to fix it at that position. 4) If the air pressure is lower than the specified value, the machine will stop while giving error [A] on the display. * Close air cock ❺ and press pushbutton ❽, and the air pressure will be 0 kgf/cm^2. 5) Set the machine in its sewing state. Now remove the air hose by pressing section ❼ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-4-2) 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 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa). Then fix the needle knob using nut ❸, and remove the pressure gauge. Now, securely connect the removed air hose in place. (Fig. 4-4-2) 6) Referring to the Standard adjustment (4)-4), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig. 4-4-3) 7) Remove the top cover Referring to the Standard adjustment (4)-5), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig. 4-4-4)	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 (4)-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/cm^2, close air cock ❺ and press button ❽. (See Fig. 4-4-1)

(5) Connecting the pneumatic components

The schematic diagram of the pneumatic components is as follows:

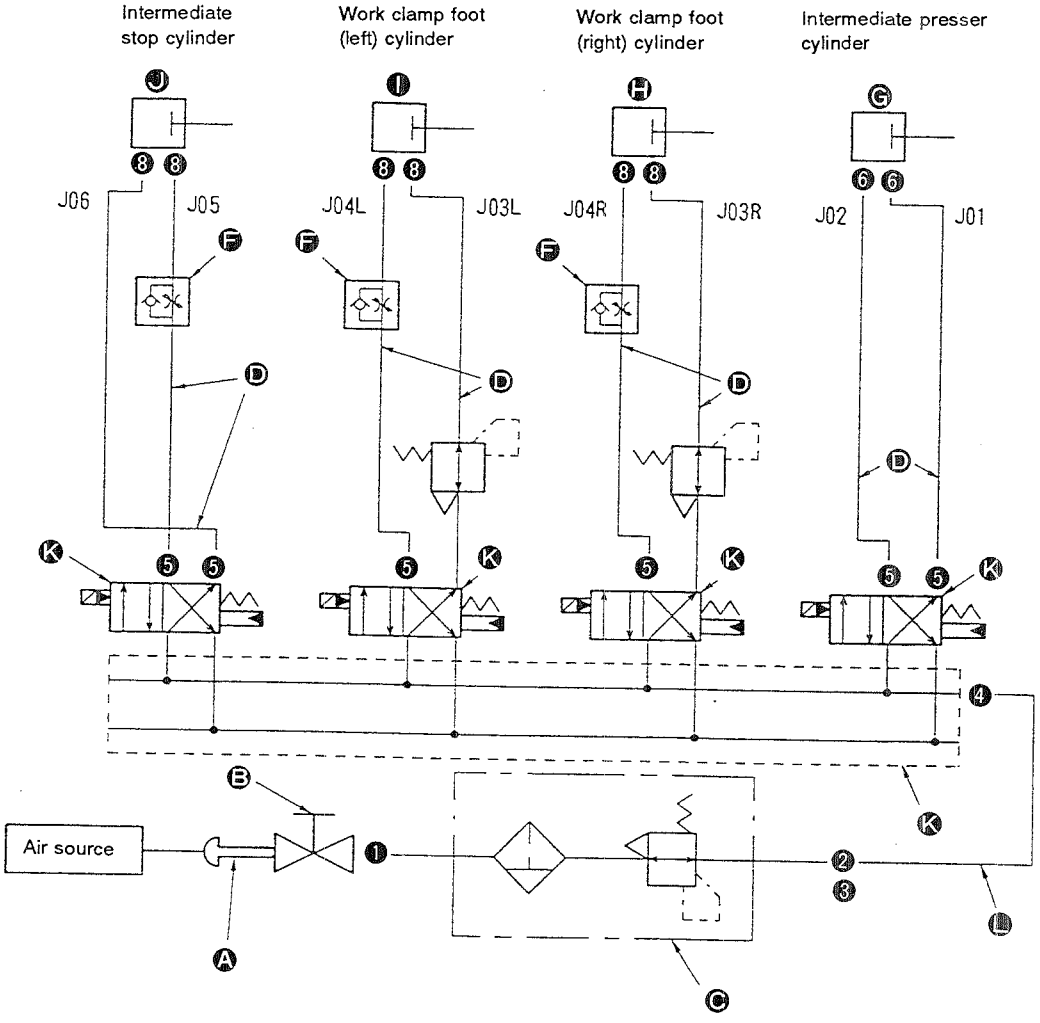


Fig. 4-5-1

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

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Connect the pneumatic components properly referring to the schematic diagram.	o Malfunction of the feeding fame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components.

(6) Installing the pedal switch (PK47)

Refer to "(5) Installing the pedal switch (PK47)" for the AMS-215CSB and -215CHB (on page 233).

(7) Removing the slide plate bearing and work clamp slide plate

Refer to page 99.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(8) Assembling the presser plate components

1) Assemble the presser plate components referring to Fig. 4-8-1.

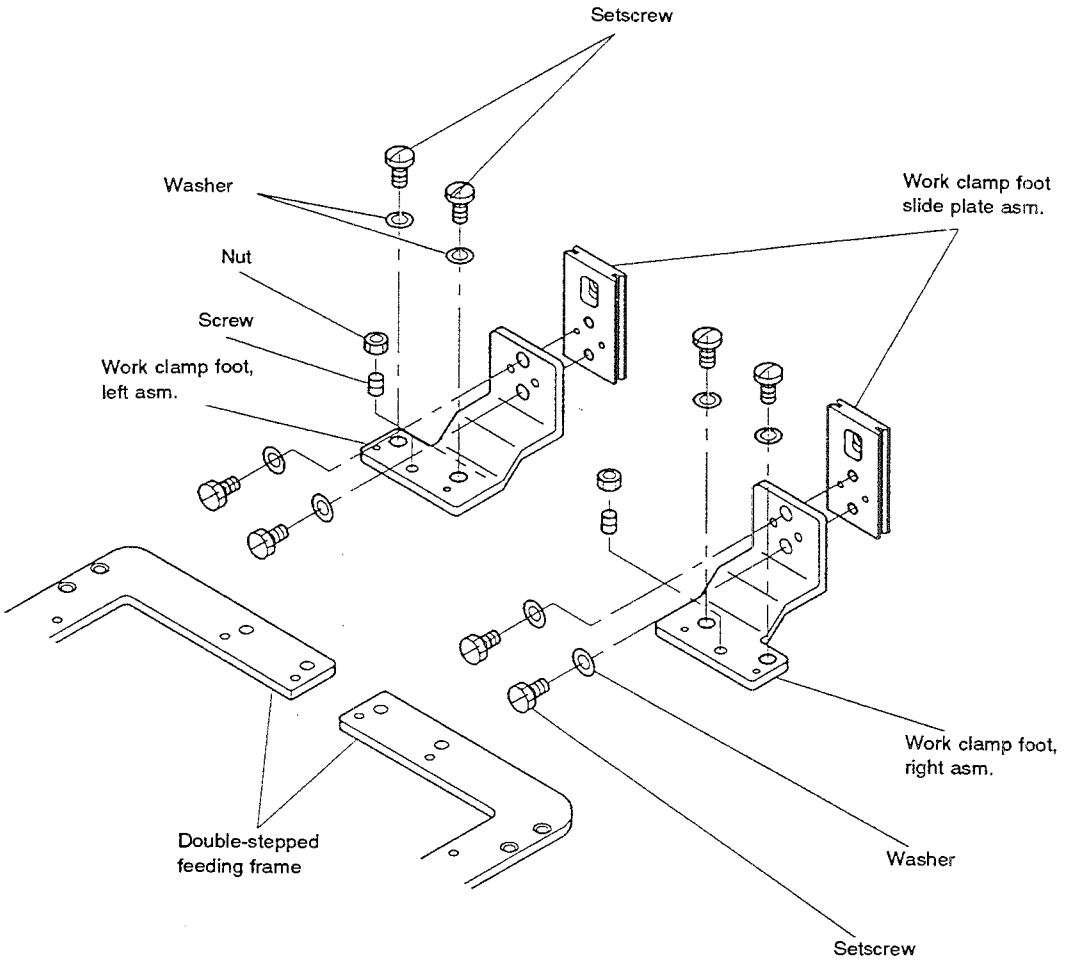


Fig. 4-8-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
o Be sure to tighten/loosen the adjustment screw in the feeding frame after the nut of the adjustment screw in the feeding frame has been loosened.	o After the presser plate components have been assembled, confirm that the feeding frame is laterally in parallel to (or the outside edge of the feeding frame is slightly lower than) the throat plate surface.

(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-215CSB, -215CHB and -215CGB.

(10) Assembling the pneumatic components

Assemble the pneumatic components referring to Fig. 4-10-1.

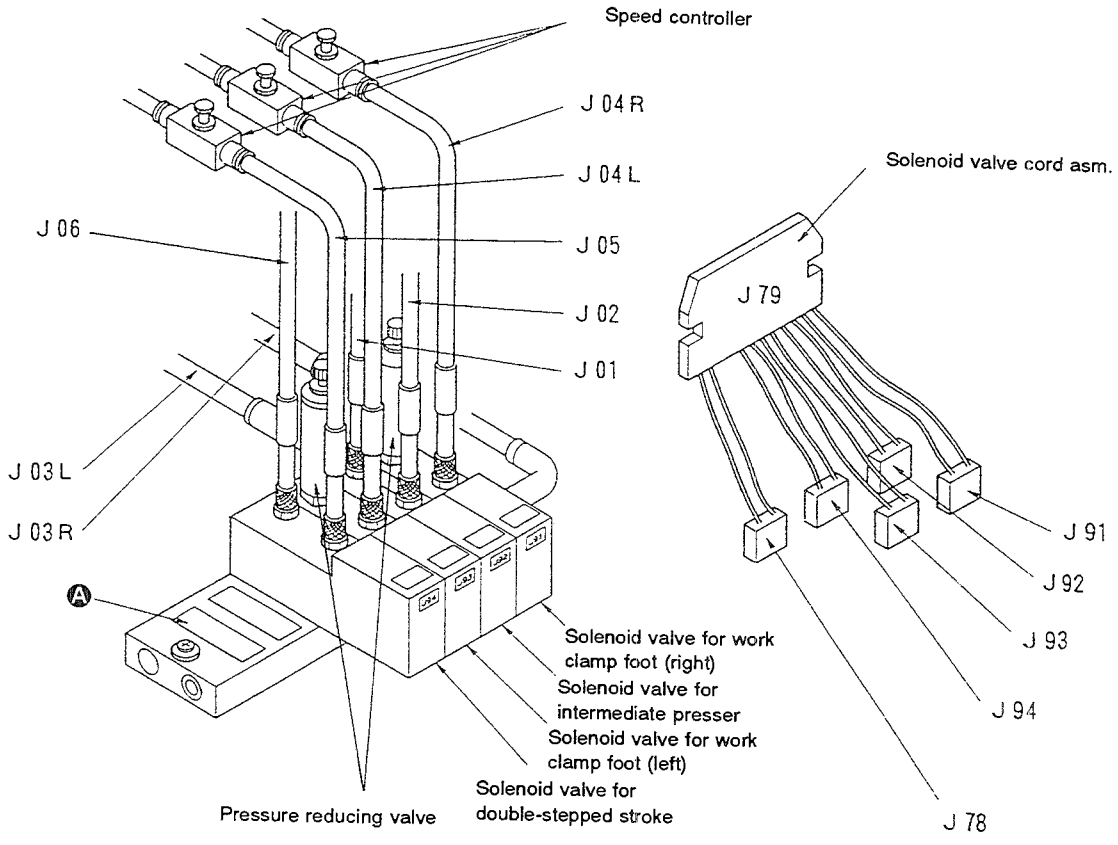


Fig. 4-10-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	o Solenoid valve asm. is provided with three blanking plates Ⓐ. Use the solenoid valve asm. with one of them removed.

(11) 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 (P79) of the solenoid valve cord asm. (See the figure below.)

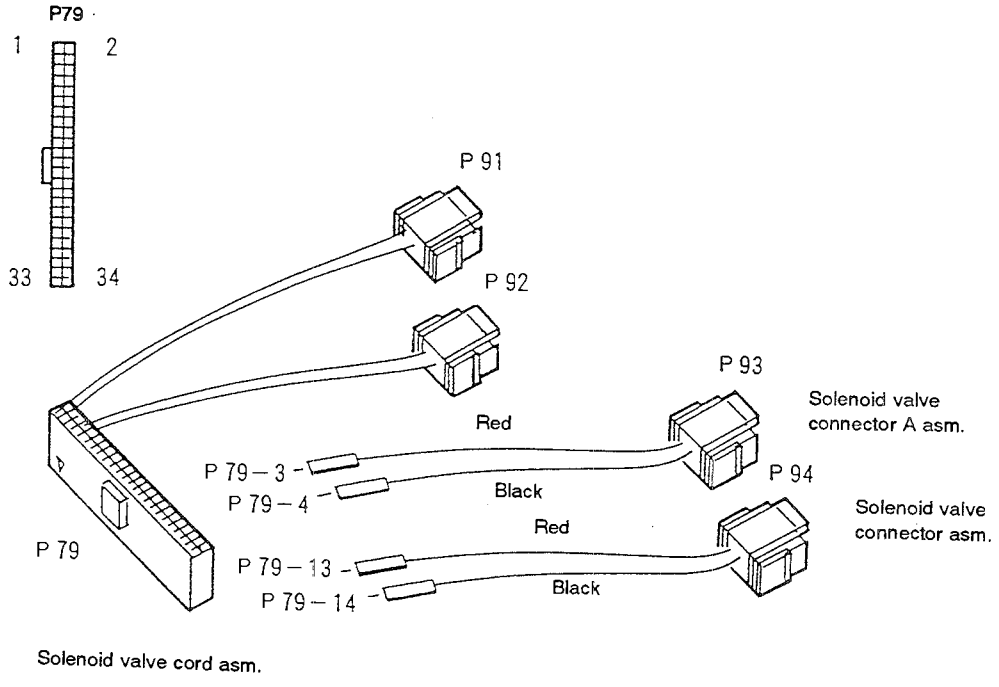


Fig. 4-11-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

5. PARTS TO BE REPLACED WHEN CHANGING THE STANDARD TYPE MACHINE TO THE DOUBLE-STEPPED FEEDING FRAME TYPE MACHINE

• Parts to be removed

	Name of part	Q'ty	Part No.
1	ϕ4 air tube J 03	1	BT0400251EB
2	ϕ4 air tube J 04	1	BT0400251EB
3	Y joint	1	PJ308040002
4	Solenoid valve asm.	1	PV0351130A0
5	2-pedal unit asm.	1	M85905130A0

• Parts to be additionally attached (Unit part No.: B26062150A0)

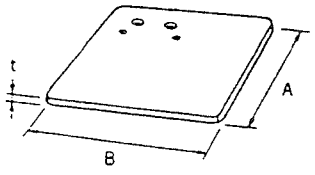
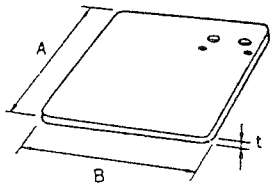
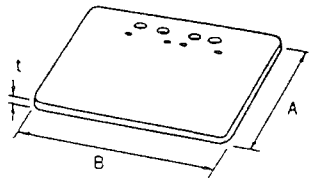
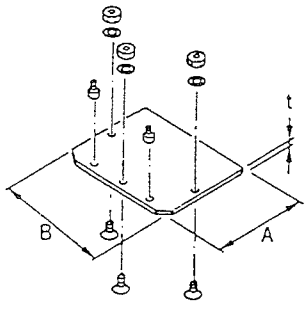
	Name of part	Q'ty	Part No.
1	Solenoid valve connector A asm.	1	B4712215AA0
2	Solenoid valve connector asm.	1	B47122150A0
3	Solenoid valve	2	PV140501000
4	Nut	6	B1626850000
5	Plastic blank for double-steppled feeding frame	4	B2618215000
6	Setscrew	6	SS2111010TP
7	Screw	4	SS7090410SP
8	Washer	6	WP0450000SD
9	Double-stepped stroke push plate	1	B2530215000
10	Double-stepped stroke cylinder	1	PA1602510A0
11	Hose nipple	2	PJ032052503
12	Retaining ring	2	RE0300000K0
13	Setscrew	1	SS6110520TP
14	Setscrew	2	SS6121010SP
15	Setscrew	2	SS8110422TP
16	Setscrew	2	SS8110422TP
17	Washer	1	WP0650876SD
18	Washer	1	WP0820816SD
19	Double-stepped stroke cylinder knuckle	1	B1625220000
20	Cylinder connecting pin	1	B1626220000
21	Double-stepped stroke lever spacer	1	B185351200E
22	Height adjusting knob	1	B2304205000
23	Double-stepped stroke mounting plate	1	B2514215000
24	Double-stepped stroke lever	1	B2516215000
25	Height adjusting plate	1	B2518215A00
26	Double-stepped stroke adjusting screw bracket	1	B2518215000
27	Height adjustment screw	1	B2527215000
28	Double-stepped stroke fulcrum shaft	1	B2528215000
29	Flange bushing	1	B2548215000
30	Feed bracket asm.	1	B25502150AB

	Name of part	Q'ty	Part No.
31	Double-stepped stroke fulcrum shaft thrust collar	1	B25792290A0
32	Double-stepped feeding frame	2	B2606215000
33	Double-stepped stroke lever fulcrum shaft	1	B3012490000
35	ø4 air tube	1.5M	BT0400251EB
34	Height adjusting plate stopper	1	B3012816000
36	Height adjusting screw thrust collar	1	CS0790731SH

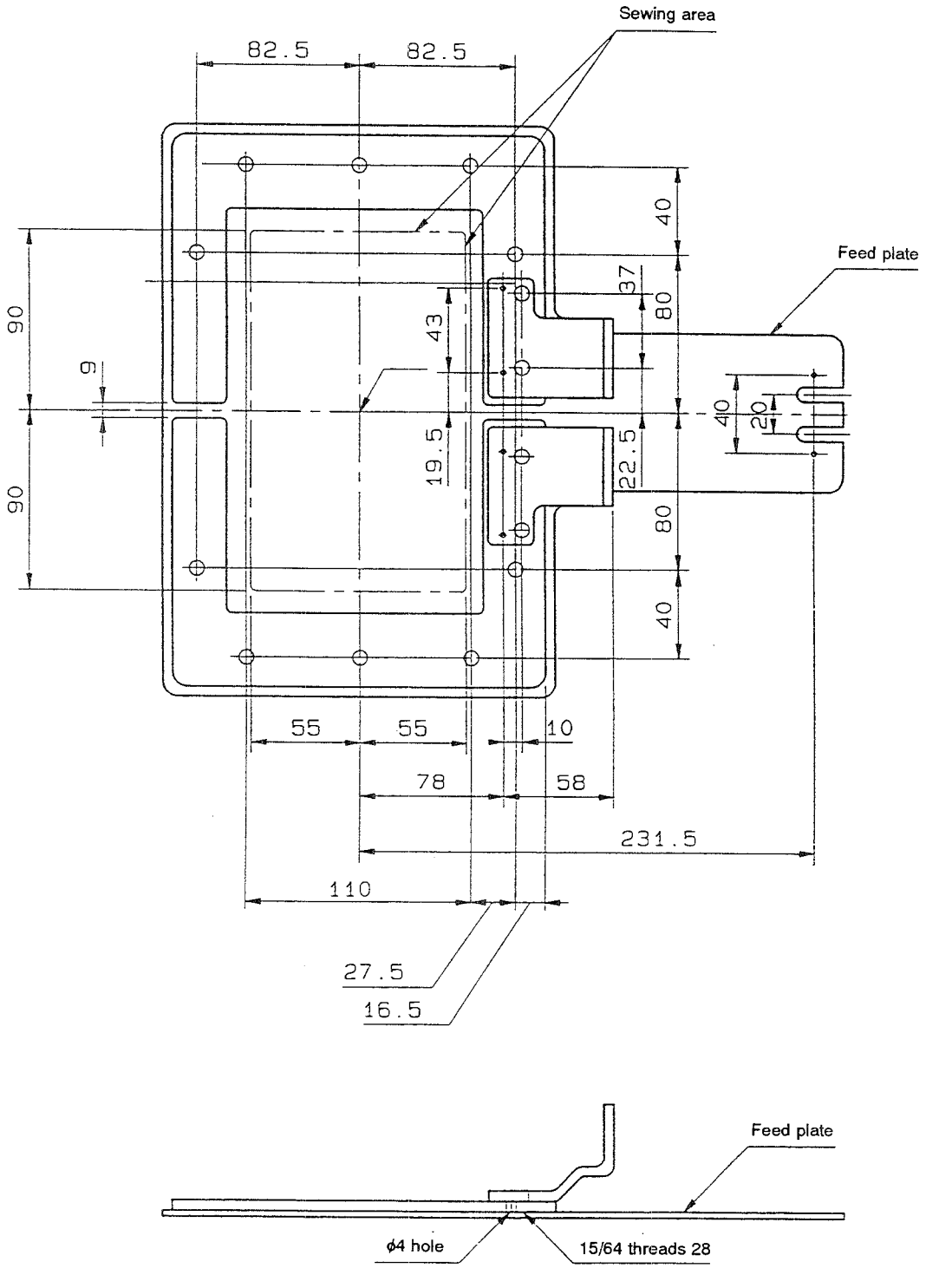
• Parts of which quantity used is to be changed

	Name of part	Q'ty	Part No.
1	Clip band	7 → 8	HX002330000
2	Speed controller	2 → 3	PC012401000
3	Pressure reducing valve	1 → 2	PF070501000
4	Hose nipple	3 → 6	PJ032052503

6. OPTIONS

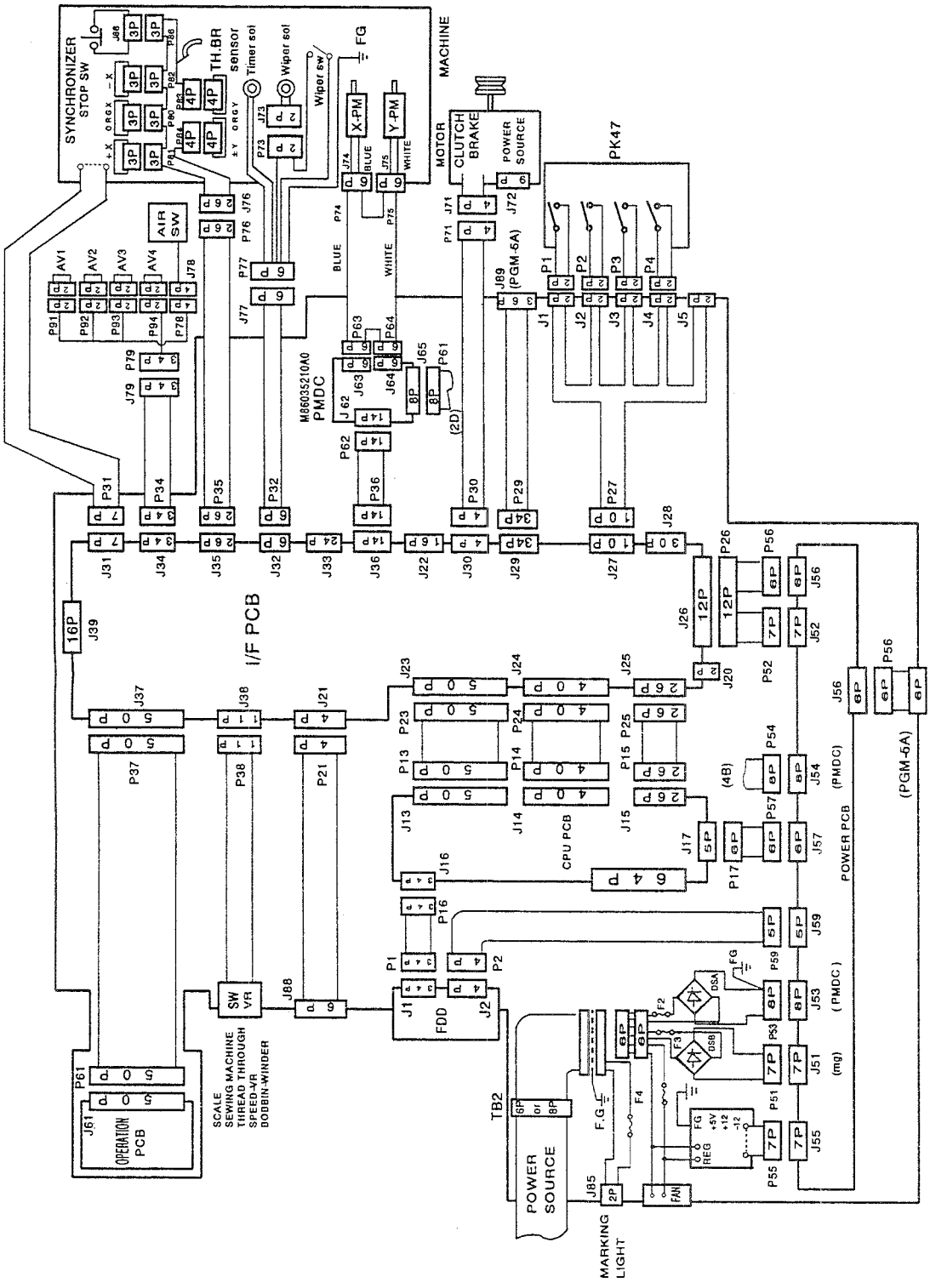
Name of part	Type	Part No.	Size (mm)
1. Machinable feeding frame  	Feeding frame (right) blank with knurl	B2622215000	193×135×4
	Double-stepped feeding frame blank without knurl (Common to left and right)	B2626215000	193×135×4
 	Feeding frame (left) blank with knurl	B2623215000	A×B×t 193×135×4
 	Separate 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

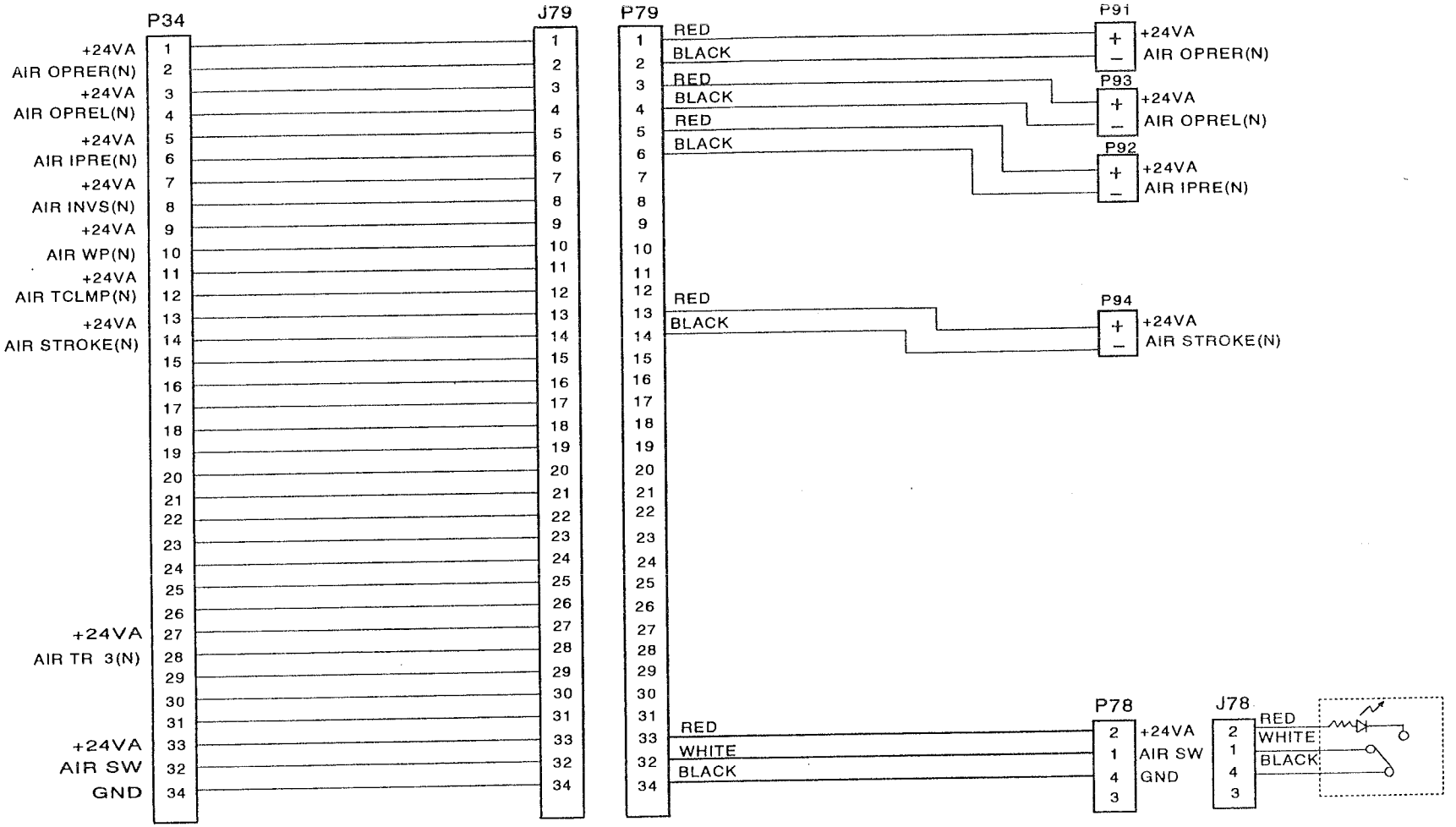


8. MATERIALS

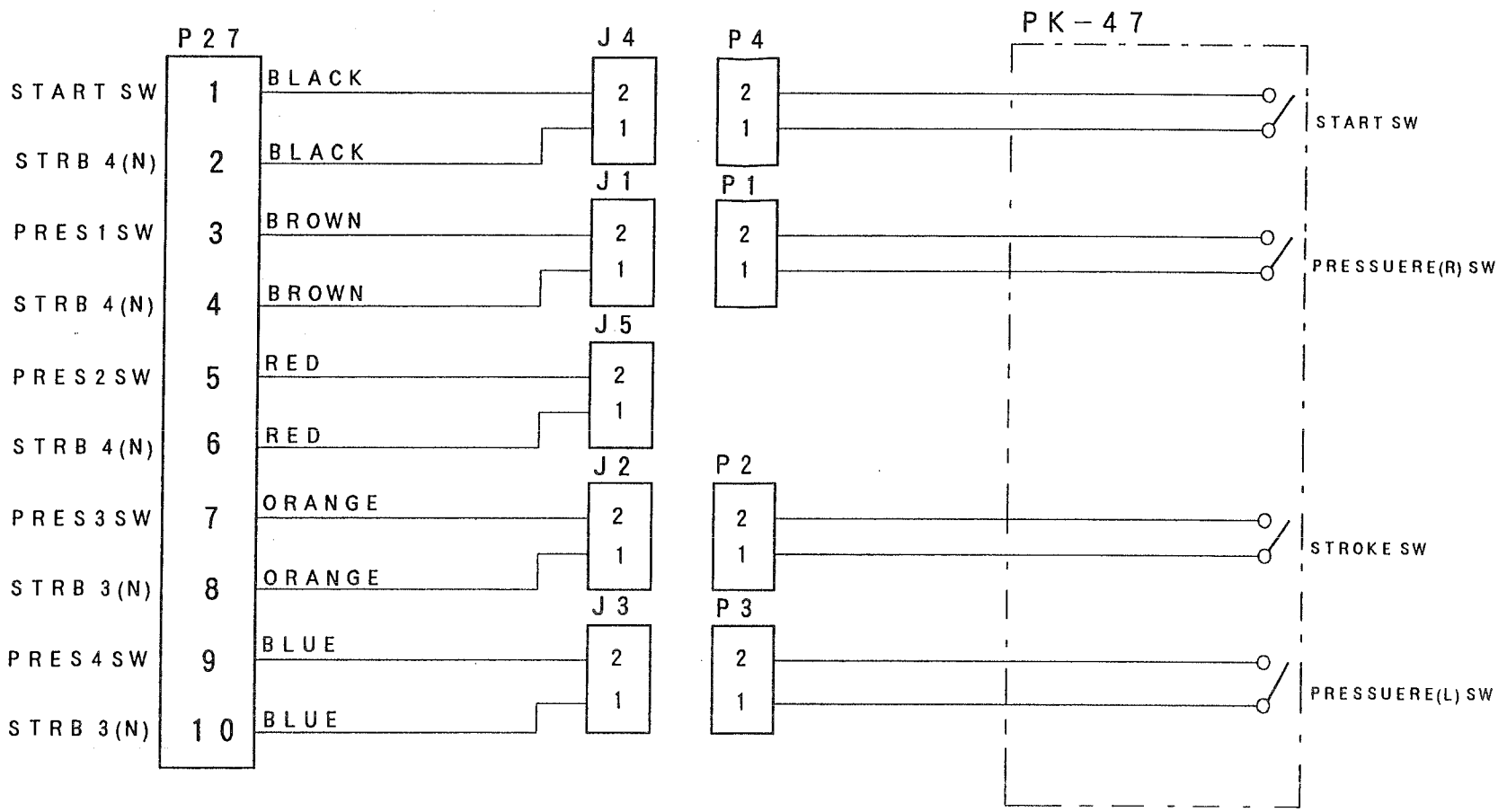
8-1. Block diagram for the AMS-215CSL, -215CHL and -215CGL



8-2. Air valve schematic diagram for the AMS-215CSL, -215CHL and -215CGL



8-3. Pedal switch schematic diagram



Computer-controlled Cycle Machine with Inverting Device
AMS-215CST
AMS-215CHT

[Note]
This Engineer's manual covers only the part which is the feature making this machine different from the AMS-215C.

1. FEATURES

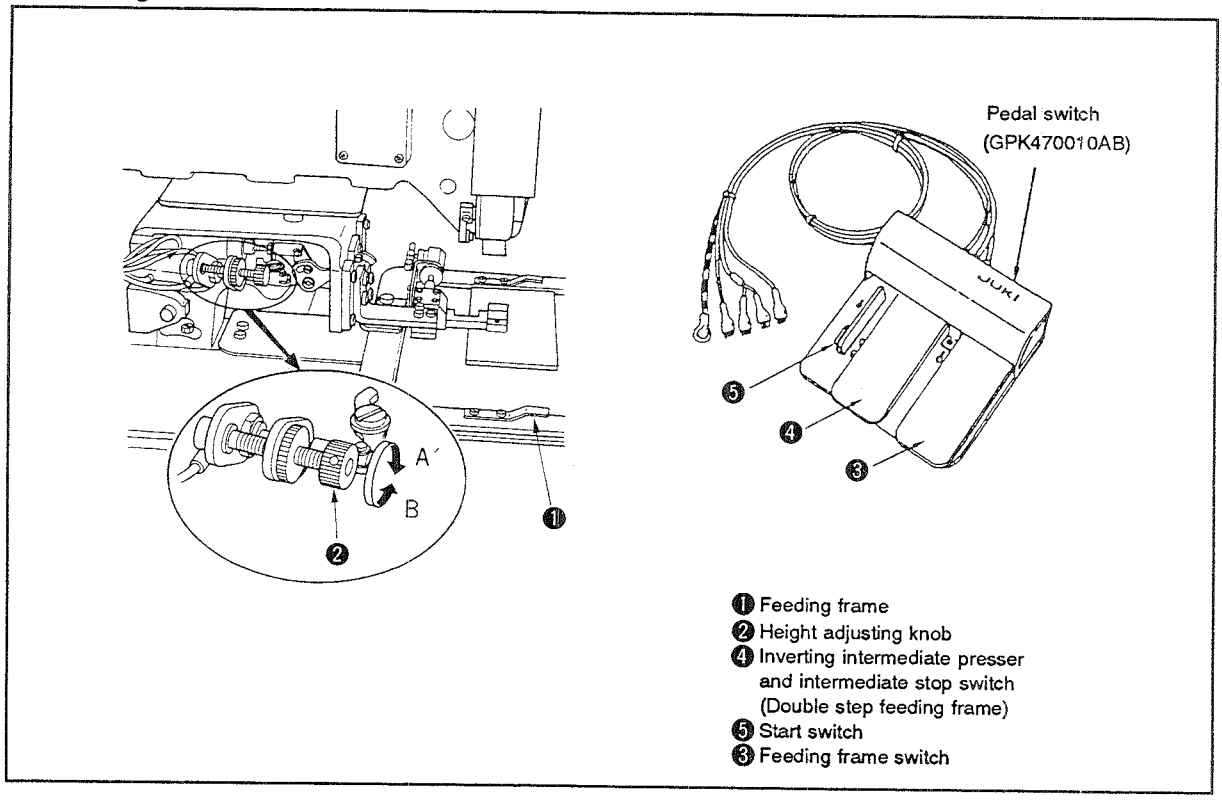
1) This machine can be used as the standard type machine by removing an inverting intermediate presser.
2) The machine comes with the inverting intermediate presser provided with the degree of angle adjusting function to allow the sewing product to be uniformly clamped.
3) Lift of the feeding frame and the lift of the inverting intermediate presser can be adjusted independently.

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-215CST/-215CHT
3)	Lift of inverting feeding frame:	Standard 25 mm
4)	Lift of inverting intermediate presser:	Standard 25 mm (Height of the presser in its intermediate stop position: 0 to 28 mm)
5)	Inverting crank control method:	Air driven. Left/right inverting method
6)	Multiply seam length within crank:	10 mm (left/right in X direction from the center of the crank)
7)	Enlarging/reducing facility:	When the reference point of enlargement/reduction is entered for an inversion pattern, the pattern can be enlarged/reduced.
8)	Enlarging/reducing method:	When the reference point of enlargement/reduction is entered for an inversion pattern, the pattern can be enlarged/reduced by increasing/decreasing the stitch length or number of stitches.
9)	Specification of the second origin:	The second origin cannot be set for an inversion pattern in the main unit of the sewing machine with inverting device.
10)	Take-up thread guide to be used:	Use the needle bar take-up thread guide for heavy-weight materials.

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.

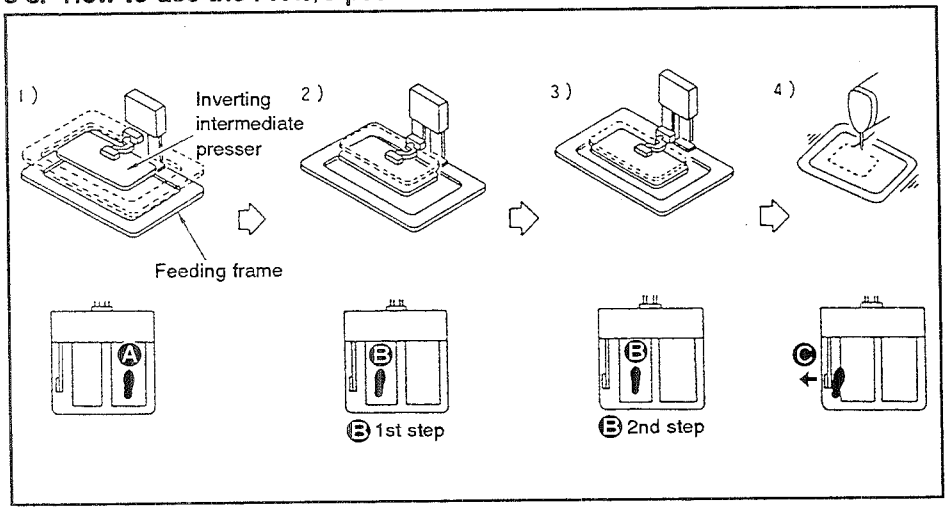
❹ **Inverting intermediate presser and intermediate position stop switch**
It is operated in the double-stepped actions. It is used to lower/lift the inverting intermediate presser between the highest position to the intermediate stop position and between the intermediate stop position and the lowest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

❺ **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.

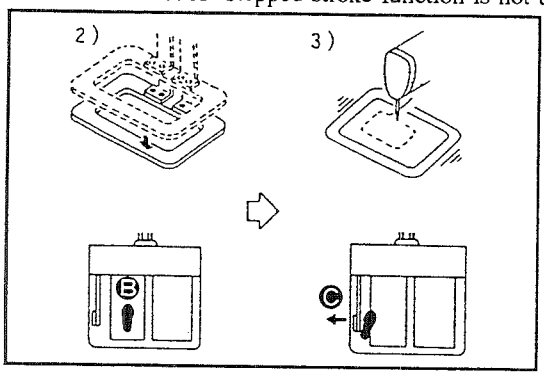
3-3. How to use the PK47/3-pedal unit



1) Place the garment body under the feeding frame and depress pedal Ⓐ, and the feeding frame will come down to secure the garment body. Another depress on pedal Ⓐ will allow the feeding frame to go up.
2) Put the label under the inverting intermediate presser and lightly depress pedal Ⓑ, and the inverting intermediate presser will stop in its intermediate stop position. Release the pedal in this state, and the inverting intermediate presser will return to the previous height.
3) Position the label. Further depress pedal Ⓑ, and the inverting intermediate presser will come down to the lowest position of its stroke to secure the label. Fully depress pedal Ⓑ again until it will go no further, and the inverting intermediate presser will return to its intermediate position.
4) Depress pedal Ⓒ when both the feeding frame and inverting intermediate presser rest in the lowest position of its stroke, and the sewing machine will start sewing.

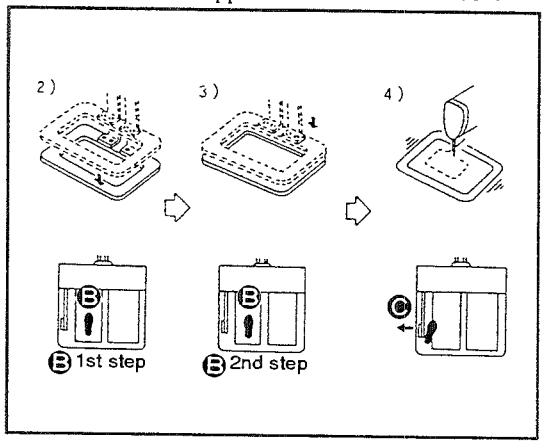
3-4. Sewing with the inverting intermediate presser removed

① When the double-stepped stroke function is not used



1) Set item 1 of function No. 43 of the memory switch to "0."
2) 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.
3) Depress pedal Ⓒ when the feeding frame rests in the lowest position of its stroke, and the sewing machine will start sewing.

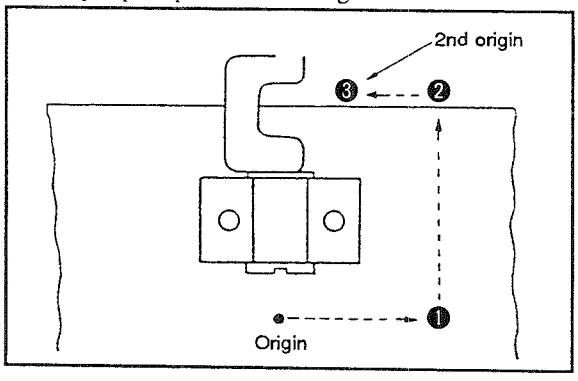
② When double-stepped stroke function is used



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.

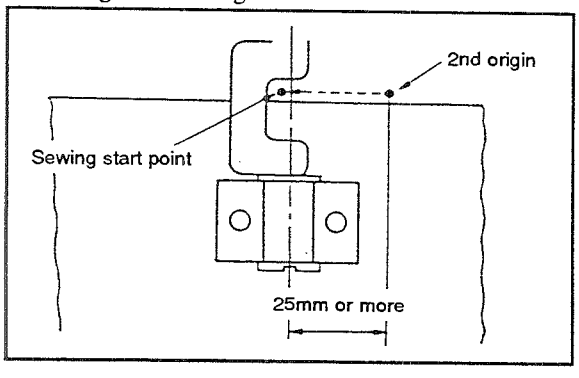
3-5. Cautions to be taken when creating a pattern

1. Jump input up to the 2nd origin



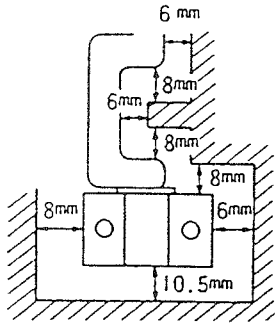
Pressing the Set Ready switch will move the feeding frame to the 2nd origin after retrieving the origin. At this time, the inverting intermediate mounting base may come in contact with the needle. To prevent this, "jump" should be entered up to the 2nd origin as illustrated in the figure.

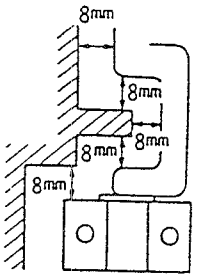
2. Setting the 2nd origin



When the sewing start point is retrieved after completion of sewing, the inverting crank rotates and the feeding frame goes up. At this time, the tip of the needle may come in contact with the inverting crank if the sewing start point is close to the inverting crank. To prevent this, specify the 2nd origin at the position which is 25 mm or more away from the center of the inverting crank shaft using the offset input function, and then enter "jump" from the 2nd origin to the sewing start point. When the 2nd origin has been set, the machine will return to the 2nd origin after completion of sewing.

3. Inputting the needle entry point near the crank shaft





When the crank is inverted

- As a rule, the sewing area near the crank shaft and the inverting intermediate presser mounting base is the portion indicated by attaching slanting line (▨). The sewing area in X (lateral) direction is not symmetrical. So, be careful.

[Caution]

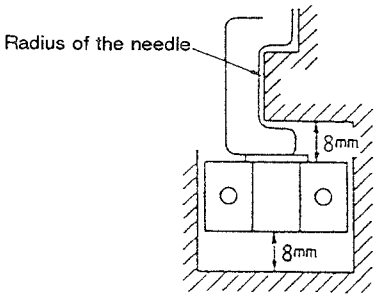
At this time, the sewing area will be as follow:

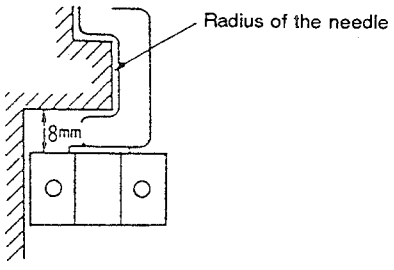
Max. X (lateral) direction 180 mm
Y (longitudinal) direction 103 mm
Min. X (lateral) direction 46 mm
Y (longitudinal) direction 42 mm

When the optional inverting intermediate presser mounting base is used:

Min. X (lateral) direction 38 mm
Y (longitudinal) direction 34 mm

- If a needle entry point is entered outside the sewing area indicated above, the applicable thickness of the material will be 4 mm or less. At this time, the sewing area will be the portion indicated by attaching slanting lines (▨) as illustrated in the figure.





When the crank inverted

[Caution]

At this time, the sewing area will be as follows:

Max. X (lateral) direction 180 mm
Y (longitudinal) direction 110 mm
Min. X (lateral) direction 34 mm
Y (longitudinal) direction 32 mm

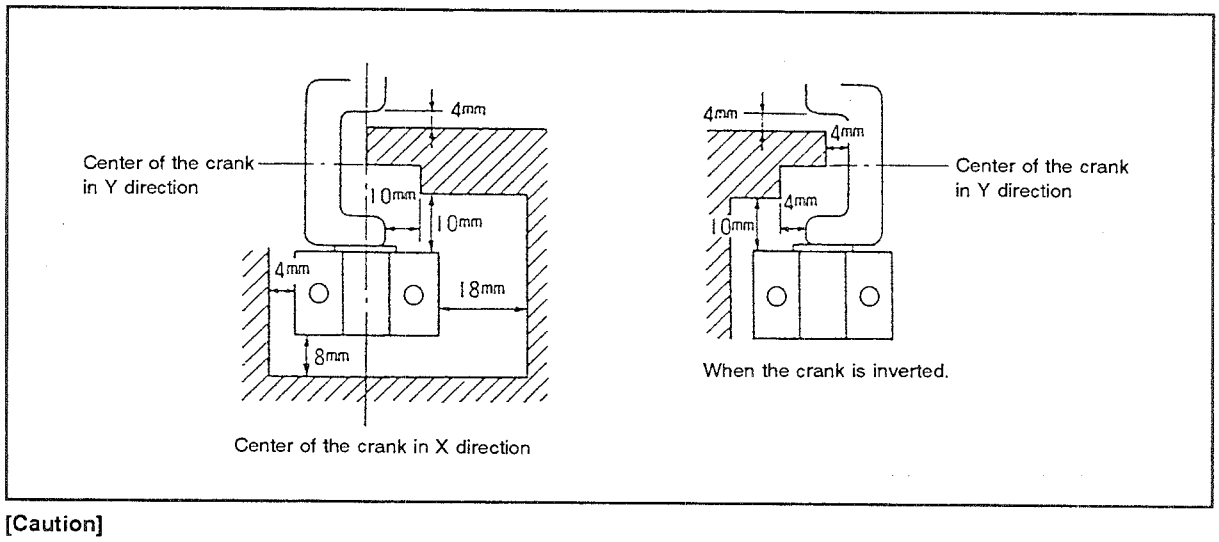
When the optional inverting intermediate presser mounting base is used:

Min. X (lateral) direction 26 mm
Y (longitudinal) direction 24 mm

If the thickness of the sewing product is 3.5 mm or less, multiply seam length within the crank is 22 mm at the maximum.

4. When intermediate presser is used

- As long as the thickness of the material is 4 mm or less, the standard intermediate presser can be used. At this time, however, the sewing area near the crank shaft and the inverting intermediate presser mounting base (indicated by attaching slanting lines ▨) will be different from the normal sewing area when the intermediate presser is used. So be careful. When using the intermediate presser, change over the setting of the memory switch (function No. 44) to the set value 1 (intermediate presser operation is effective.)



[Caution]

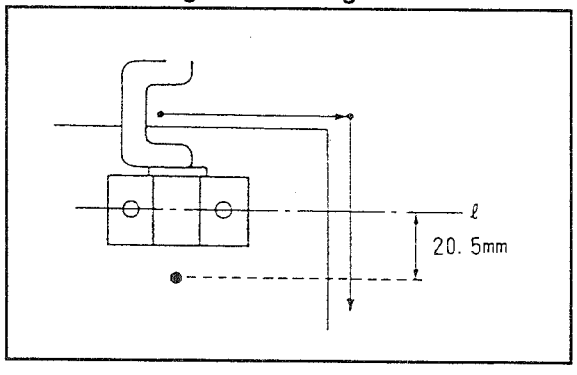
At this time, the sewing area will be as follows:

Max. X (lateral) direction 180 mm
Y (longitudinal) direction 107 mm
Min. X (lateral) direction 54 mm
Y (longitudinal) direction 41.5 mm

When the optional inverting intermediate presser mounting base is used:
Min. X (lateral) direction 46 mm
Y (longitudinal) direction 33.5 mm

If the thickness of the material used is 4 mm or more, the intermediate presser cannot be used.

3-6. 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 20.5 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.

3-7. 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."

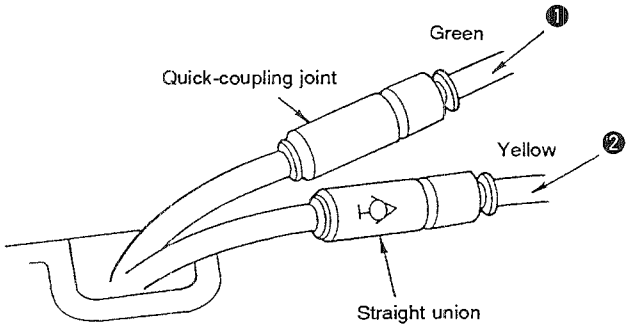


Fig. 3-7-1

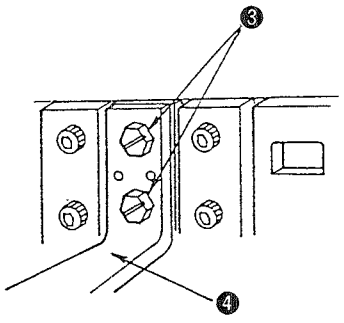


Fig. 3-7-2

3-8. 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.

3-9. 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

(1) 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.)

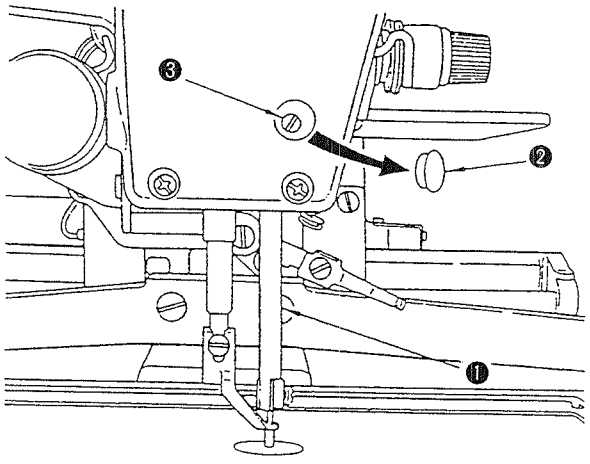


Fig. 4-1-1

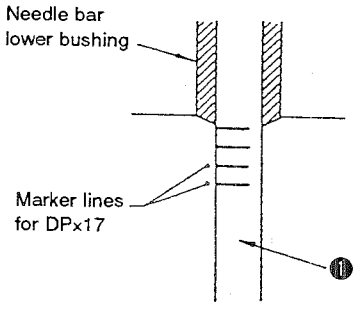


Fig. 4-1-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Turn ON the needle threading switch (the READY indicator lamp lights up). Then turn the handwheel by hand to bring the needle down to its lowest position. 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.

(2) Adjusting the degree of angle of the inverting intermediate presser

If the inverting intermediate presser is in parallel to the throat plate, the pressure of the front side of the inverting intermediate presser is likely to drop. Consequently, be sure to adjust the inclination of the inverting intermediate presser so that the front side of the inverting intermediate presser is slightly lower than its rear side.

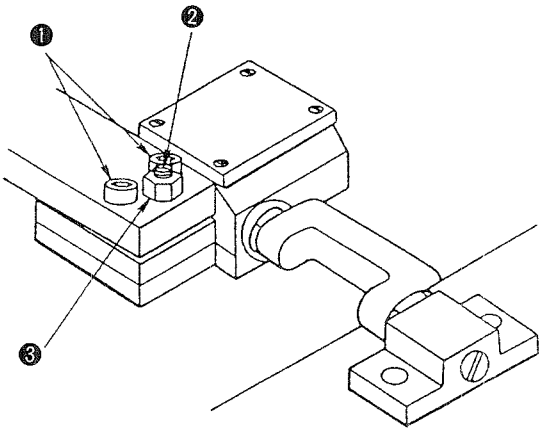


Fig. 4-2-1

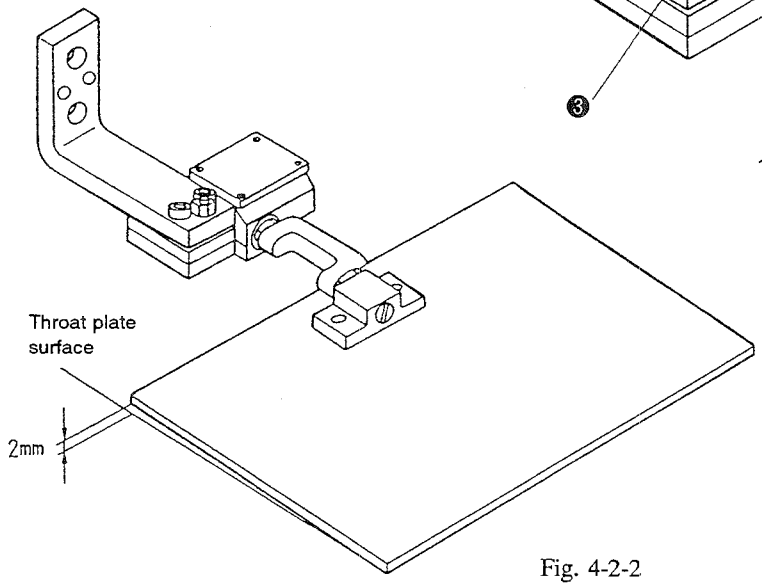


Fig. 4-2-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen screw ❶ and nut ❸. Turning adjustment screw ❷ clockwise will lower the front side of the inverting intermediate presser. 2) After the adjustment, securely tighten screw ❶ and nut ❸. **[Caution]** **As reference of the adjustment, the rear end of the inverting intermediate presser should be approximately 2 mm above the throat plate surface when the front end of the inverting intermediate presser meets the throat plate surface.**	o If the inverting intermediate presser is not sufficiently tilted, the work pressing force at the front side of the inverting intermediate presser may drop. o If the inverting intermediate presser is excessively tilted, trouble may result such as the inverting crank shaft fails to rotate and the inverting intermediate presser fails to go up.

(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 227) of the Engineer's manual for the AMS-215CSB, AMS-215CHB and AMS-215CGB.

(4) Adjusting the timing of the inverting crank shaft

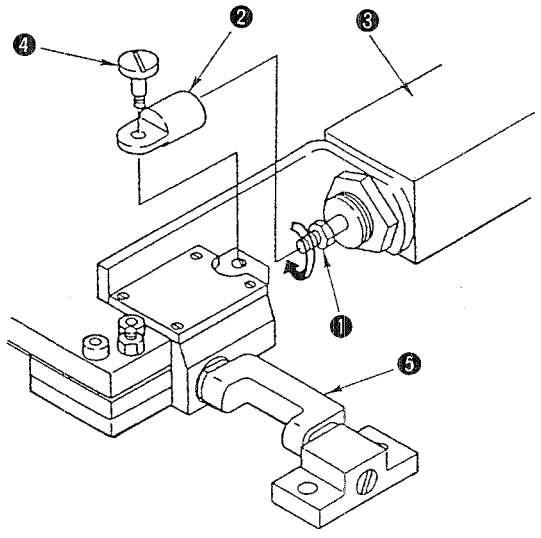


Fig. 4-4-1

(5) Adjusting the label guides

Use the label guides (accessory) to position the label on the machine.

[Caution]
If a label guide is used, be sure to adhere a sponge sheet supplied with the machine onto the under surface of the feeding frame.

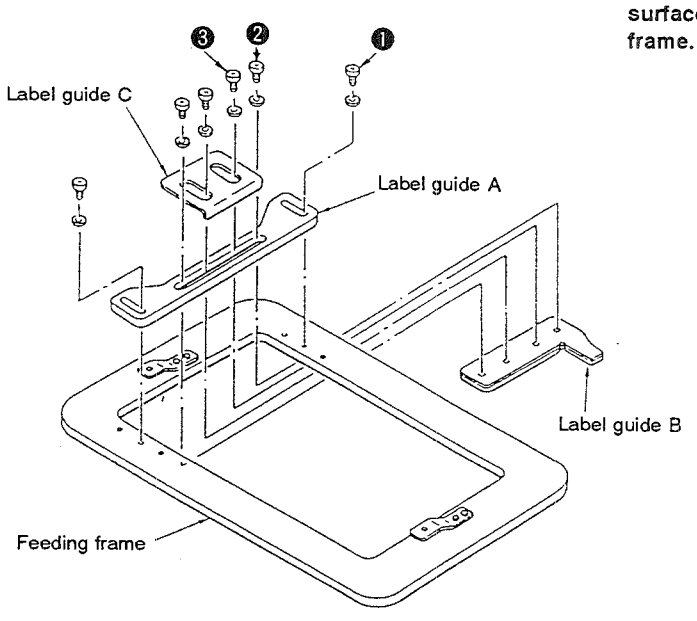


Fig. 4-5-1

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
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) Loosen screws ❶, and adjust the position of label guide (A) to the leftmost end of the label. Then tighten screws ❶. 2) Loosen screws ❷, and adjust the position of label guide (B) to the top end of the label. Then tighten screws ❷. **[Caution]** **If positioning a small-sized label on the machine, label guide (A) may come into contact with the inverting unit. In this case, use label guide (C) instead of label guide (A).**	

(6) Adjusting the intermediate stop position of the inverting intermediate presser

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

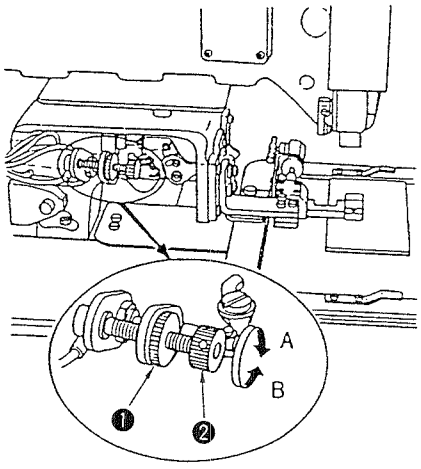


Fig. 4-6-1

Adjust the clearance between the inverting intermediate presser and the sewing product on the machine to approximately 1 mm.
(The intermediate stop position of the inverting intermediate presser can be adjusted within the range of 0 through 30 mm above the top surface of the throat plate.)

(7) 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 "(33)-1 Fine adjustment of the X/Y origins" (page 65) of the Engineer's manual for the AMS-215C.

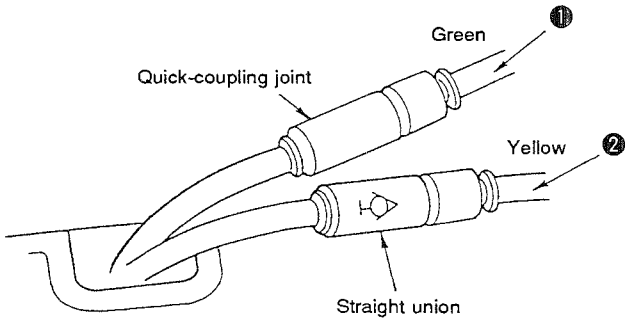


Fig. 4-7-1

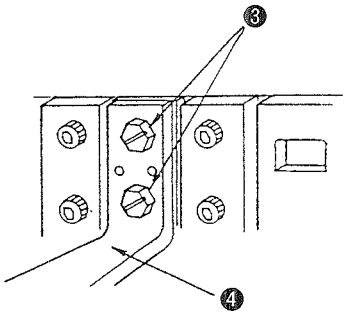


Fig. 4-7-2

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Loosen knob ❶. 2) Turn knob ❷ to adjust the intermediate stop position of the feeding frame slightly higher than the material thickness. Turn knob ❷ in direction A to heighten the intermediate stop position of the feeding frame or in direction B to lower it. 3) Securely tighten knob ❶. **[Caution]** **Only the inverting intermediate presser is capable of stopping at the intermediate position.**	o If the intermediate stop position of the feeding frame is too high, the material may not be positioned on the machine with ease. o If the intermediate stop position of the feeding frame is too low, the material cannot be smoothly moved on the machine.
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.	

(8) Adjusting the pneumatic components

1) Connect quick-coupling joint ❶ in place and open air cock ❺. The pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 MPa to 0.55 MPa). (Fig. 4-8-1)
2) If pressure gauge ❼ indicates 4 kgf/cm^2 (0.4 MPa) or lower value, the machine will stop with Error [A] shown on the operation panel. (Fig. 4-8-1)
3) The air pressure on the feeding frame cylinder retracting side and the intermediate stop cylinder extruding side has been reduced to 1 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa). (Fig. 4-8-2)
4) The air pressure on the inverting intermediate presser cylinder retracting side has been reduced to 1 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa). (Fig. 4-8-2)
5) The needle knob of the speed controller (for feeding frame) cylinder has been fixed at the position that is reached by loosening the knob by one turn after fully tightening it. (Fig. 4-8-3)
6) The needle knob of the speed controller (B) (for the intermediate presser cylinder) is fixed using a nut with loosened by 5 turns after it has been fully tightened. (Fig. 4-8-4)

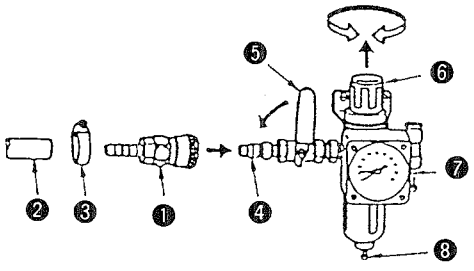
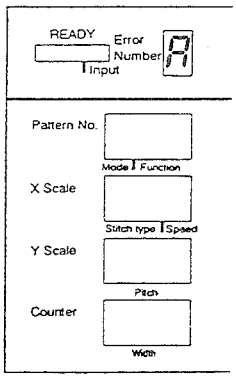


Fig. 4-8-1



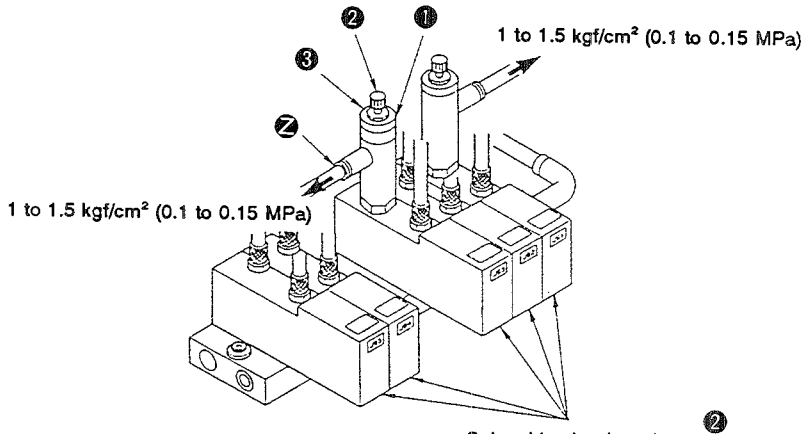


Fig. 4-8-2

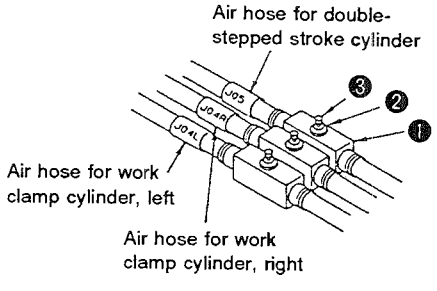


Fig. 4-8-3

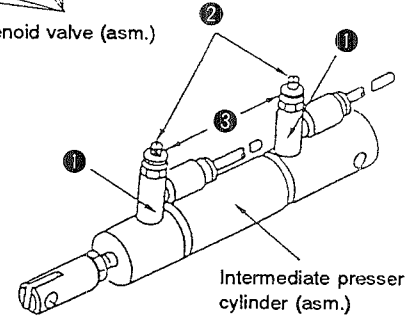


Fig. 4-8-4

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
1) Open air cock ❺. Pull up air adjusting knob ❻, then turn it until pressure gauge ❼ indicates 5 to 5.5 kgf/cm^2 (0.5 MPa to 0.55 MPa). Then push down the knob to fix it at that position. (Fig. 4-8-1) 2) Set the machine in its sewing state. Now remove the air hose by pressing section ❹ of pressure reducing valve ❶ which is fixed on the solenoid valve (asm.), and connect a commercially available pressure gauge instead of the removed air hose. (Fig. 4-8-2) 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 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa). Then fix the needle knob using nut ❸, and remove the pressure gauge. Now, securely connect the removed air hose in place. (Fig. 4-8-2) 3) Following the procedure same as described in step 3), depress the intermediate stop switch 5 times or more, and adjust so that the connected pressure gauge indicates 1 to 1.5 kgf/cm^2 (0.1 MPa to 0.15 MPa). 4) Referring to the Standard adjustment (8)-5), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig. 4-8-3) 5) Remove the top cover. Referring to the Standard adjustment (8)-6), properly adjust needle knob ❷ of speed controller ❶ and fix the knob with nut ❸. (Fig. 4-8-4)	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 (8)-2) through -6) are not required to be adjusted. Needle knobs and nuts referred in steps 3) 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/cm^2, close air cock ❺ and press button ❽. (Fig. 4-8-1)

(9) Connecting the pneumatic components

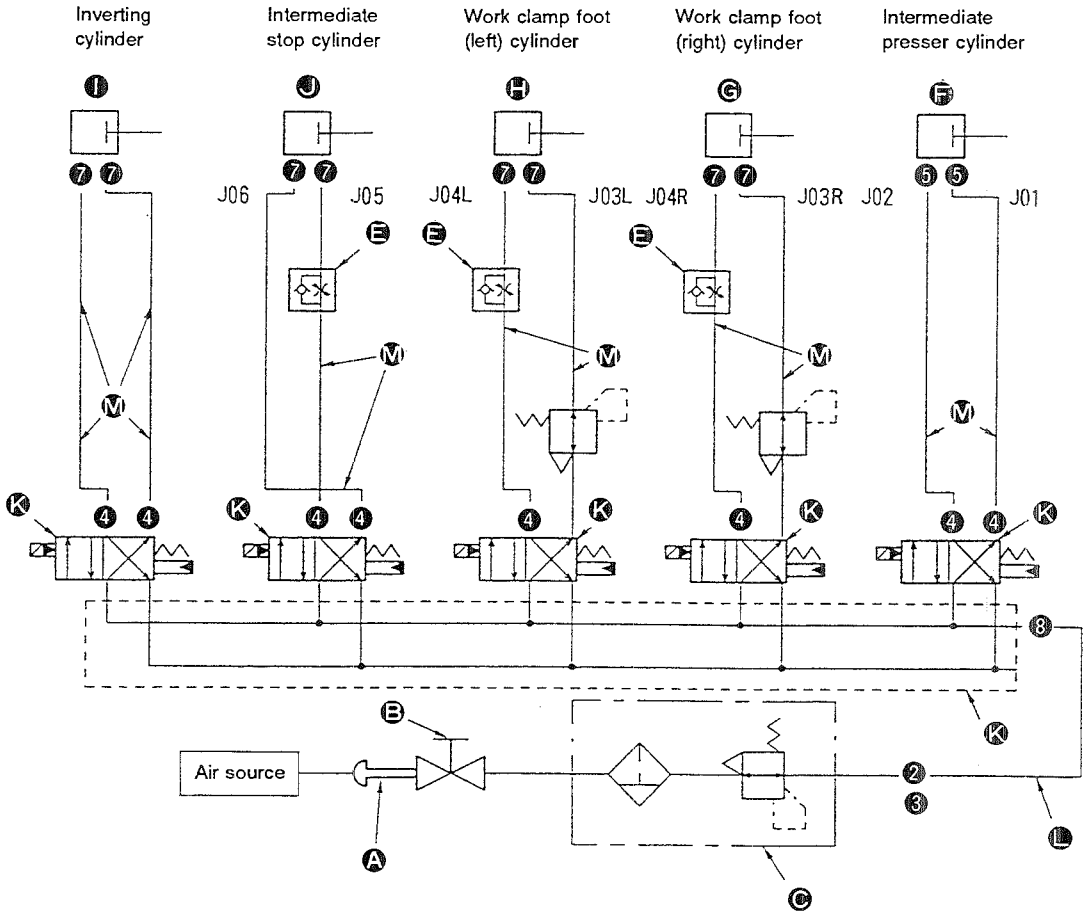


Fig. 4-9-1

Ⓐ	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
Ⓘ	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		

HOW TO ADJUST	RESULTS OF IMPROPER ADJUSTMENT
o Connect the pneumatic components properly referring to the schematic diagram.	o Malfunction of the feeding frame components and intermediate presser components may occur, resulting in machine failure or giving damages to the related components.

(10) **Installing the pedal switch (PK47)**
Refer to "(5) Installing the pedal switch (PK47)" for the AMS-215CSB, AMS-215CHB and AMS-215CGB (on page 233).

(11) **Removing the slide plate bearing and work clamp slide plate**
Refer to page 99.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

(12) Assembling the inverting intermediate presser asm.

1) Assemble the inverting intermediate presser asm. referring to Fig. 4-12-1.
2) Attach the inverting intermediate presser using the screws in the inverting intermediate presser to section Ⓐ.

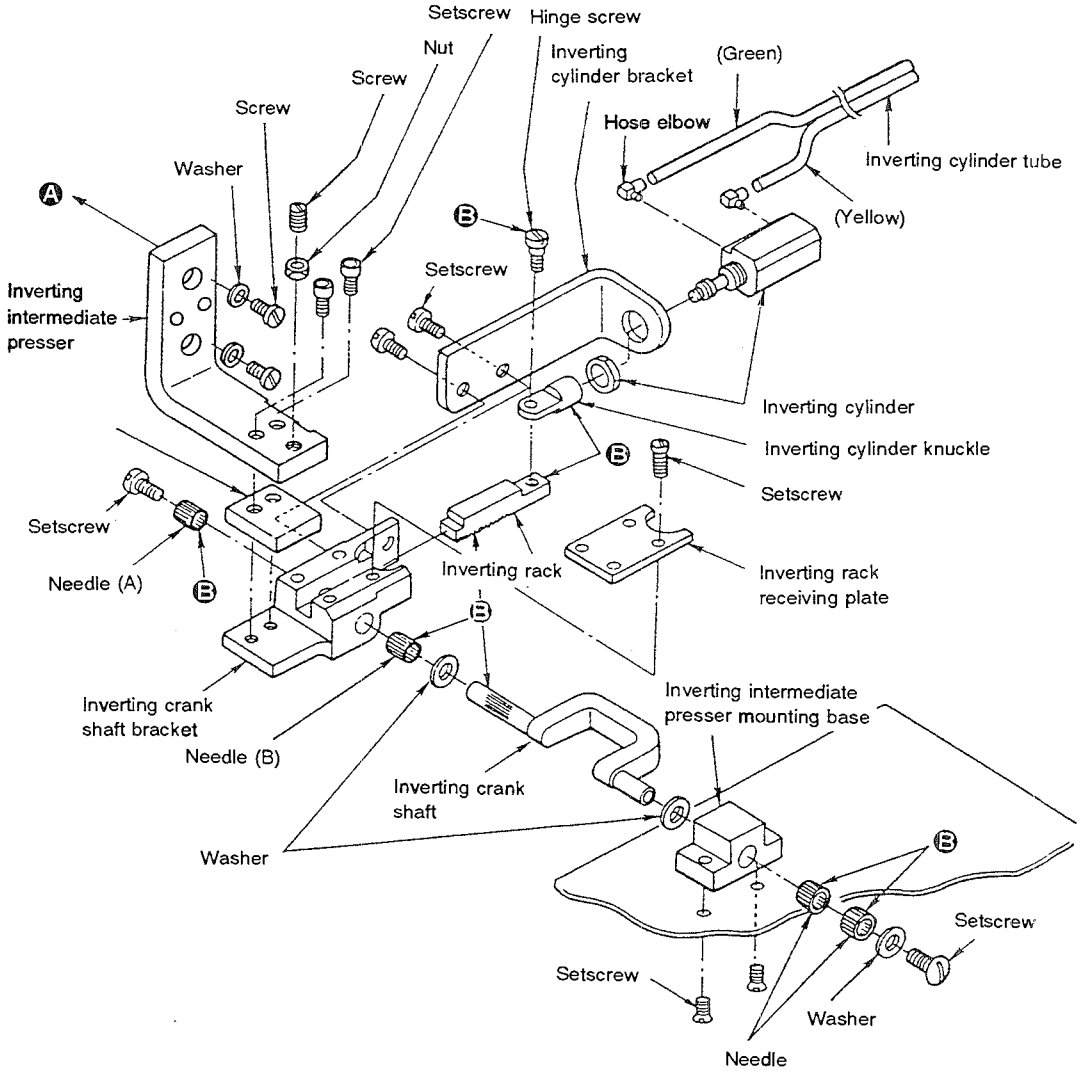


Fig. 4-12-1

(13) 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-215CSB and AMS-215CHB.

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
Do not pick up the inverting cylinder shaft with a tool, etc. [Caution] **The screws in the inverting intermediate presser and the washers of the screws in the inverting intermediate presser are not included in the inverting intermediate presser asm.**	o Attach the inverting cylinder so that the hose elbow faces away from you. o Do not pick up the inverting cylinder shaft with a tool, etc. o Apply grease to section Ⓑ.

(14) Assembling the label guides

Attach the label guides to the feeding frame asm. referring to Fig. 4-14-1.

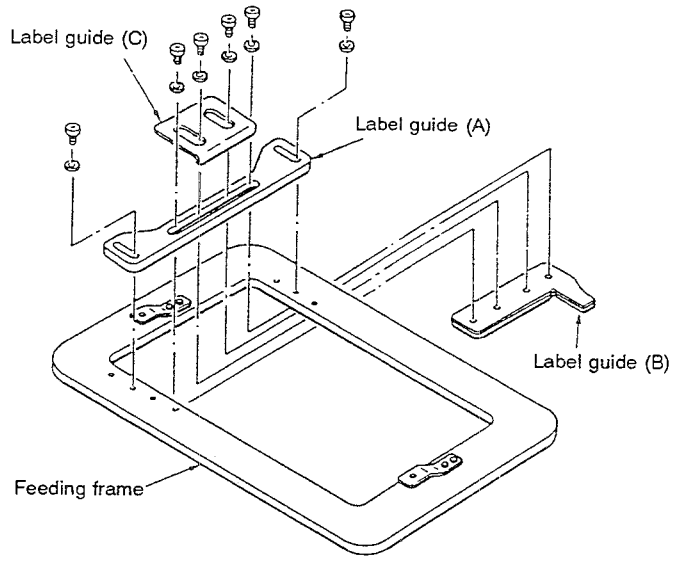


Fig. 4-14-1

(15) Assembling the pneumatic components

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

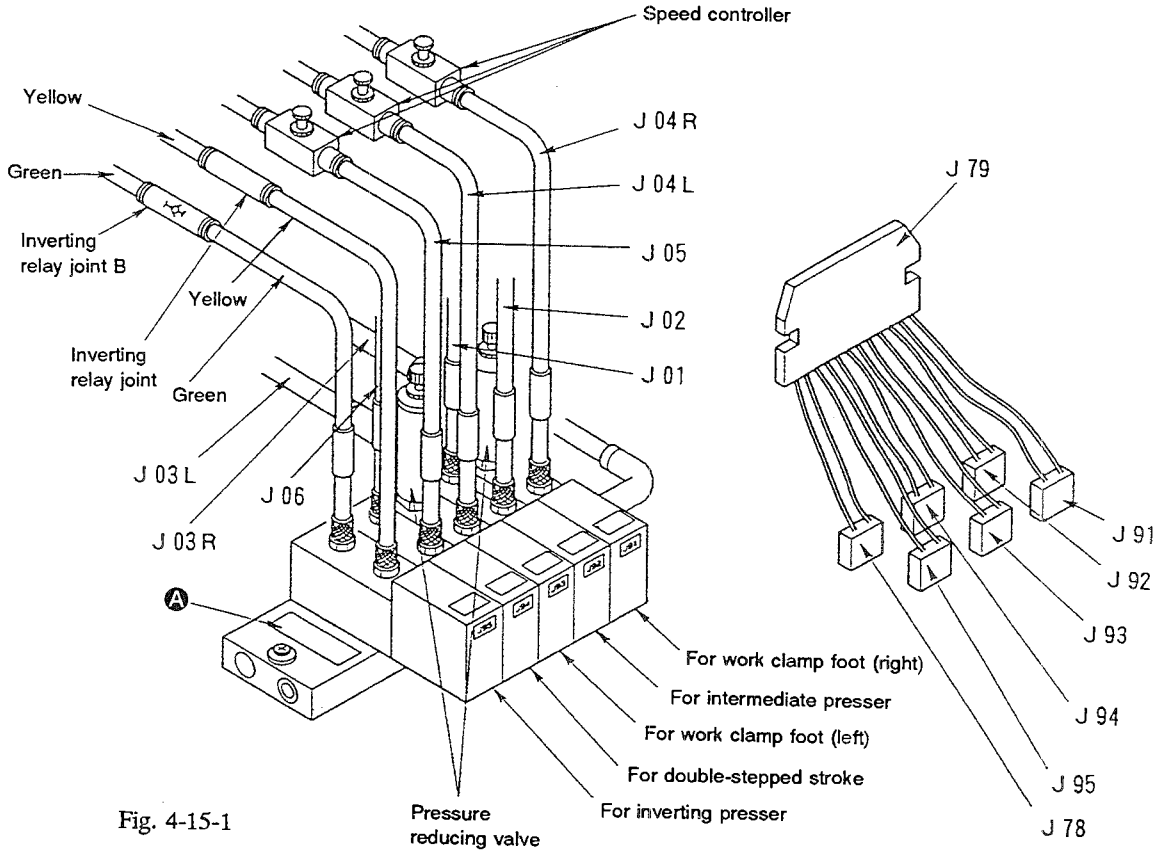


Fig. 4-15-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY
	[Caution] **If a label guide is used, be sure to adhere a sponge sheet supplied with the machine onto the under surface of the feeding frame.**
	o Solenoid valve asm. is provided with three blanking plates Ⓐ. Use the solenoid valve asm. with one of them removed.

(16) 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 (P79) of the solenoid valve cord asm. (See the figure below)

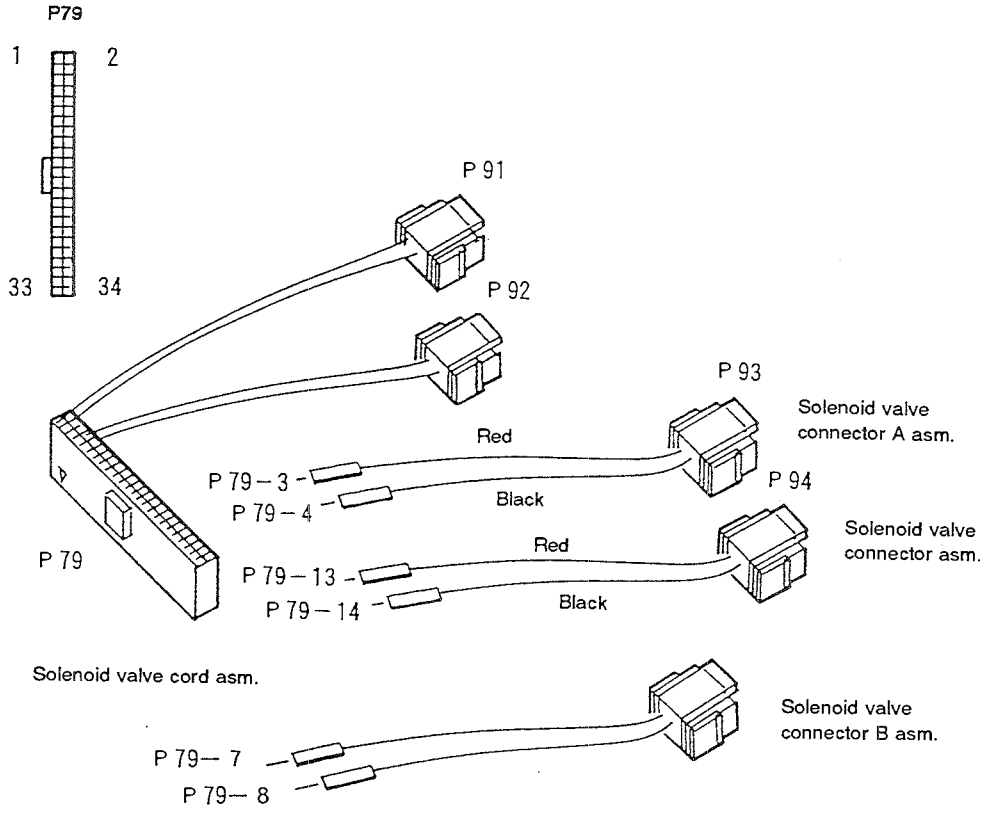


Fig. 4-16-1

CAUTIONS IN DISASSEMBLY	CAUTIONS IN ASSEMBLY

5. PARTS TO BE REPLACED WHEN CHANGING THE STANDARD TYPE MACHINE TO THE INVERTING DEVICE TYPE MACHINE (Refer to page 295, 297, 299)

• Parts to be removed

	Name of part	Q'ty	Part No.
1	Y joint	-	PJ308040002
2	ϕ4 air tube J 03	-	BT0400251EB
3	ϕ4 air tube J 04	-	BT0400251EB
4	Work clamp foot right asm.	-	B26042150A0
5	Work clamp foot left asm.	-	B26052150A0
6	Feeding frame arm	-	B2552220000
7	Feeding frame	-	B2553215000
8	Feed plate	-	B2556215000
9	Solenoid valve asm.	-	PV0351130A0
10	Needle #14	-	MDP500B1400
11	Needle bar take-up thread guide A	-	B1405210000
12	Intermediate presser	-	B1601220000
13	Screw	-	SS7091110SP
14	2-pedal unit asm.	-	M85905130AA

• Parts to be additionally attached (Unit part No.: B43012150B0)

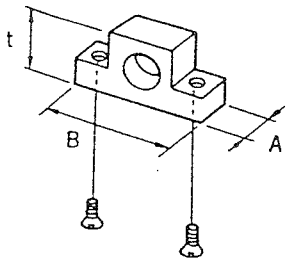
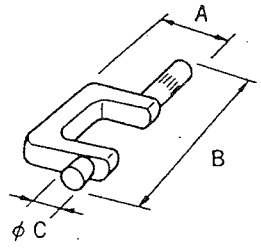
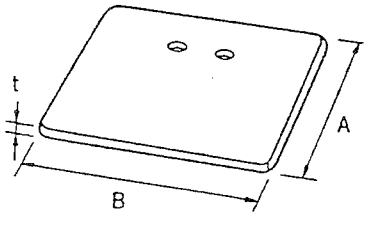
	Name of part	Q'ty	Part No.
1	Double-stepped stroke cylinder knuckle	1	B1625220000
2	Cylinder connecting pin	1	B1626220000
3	Double-stepped stroke lever spacer	1	B185351200E
4	Height adjusting knob	1	B2304205000
5	Double-stepped stroke mounting plate	1	B2514215000
6	Double-stepped stroke lever	1	B2516215000
7	Height adjusting plate	1	B2518215A00
8	Height adjusting screw bracket	1	B2518215000
9	Screw	1	B2527215000
10	Double-stepped stroke fulcrum shaft	1	B2528215000
11	Feed bracket asm.	1	B25502150AB
12	Feed plate for inverting	1	B2556215A00
13	Double-stepped stroke fulcrum shaft thrust collar	1	B25792290A0
14	Double-stepped stroke lever fulcrum shaft		B3012490000
15	Height adjusting plate stopper	1	B3012816000
16	ϕ4 air tube	1	BT0400251EB
17	Height adjusting screw thrust collar	1	CS0790731SH
18	Height adjusting plate sleeve	1	E5006171000
19	Needle DP x 17 #14	1	MDP170B1400
20	Needle bar take-up thread guide for heavy-weight materials	1	B1406210000
21	Inverting intermediate presser asm.	1	B43012150A0
22	Setscrew	2	SS7151210SP

	Name of part	Q'ty	Part No.
23	Washer	2	WP0651056SD
24	Solenoid valve connector asm.	1	B47122150A0
25	Solenoid valve connector A asm.	1	B4712215AA0
26	Solenoid valve connector B asm.	1	B4712215BA0
27	Inverting relay tube	1	B4329215000
28	Solenoid valve asm.	1	PV0351240B0
29	Solenoid valve	2	PV140501000
30	Inverting relay tube	1	PJ303040002
31	Clip band B	8	HX002330000
32	PK47/3-pedal unit (not included in the unit)	1	GPK470010AB
33	Inverting relay joint	1	PJ303040004
34	Inverting work clamp foot (asm.)	1	B2604215AA0
35	Double-stepped stroke push plate	1	B2530215000
36	Double-stepped stroke cylinder	1	PA1602510A0
37	Hose nipple	2	PJ032052503
38	Cylinder connecting pin retaining ring	2	RE0300000K0
39	Setscrew	1	SS6110520TP
40	Setscrew	2	SS6121010SP
41	Setscrew	2	SS8110422TP
42	Setscrew	2	SS8110422TP
43	Washer	1	WP0650876SD
44	Washer	1	WP0820816SD
45	Feeding frame for inverting	1	B2553215A00
46	Plastic blank for inverting	2	B2557215A00
47	Feeding frame sponge for inverting	1	B2564215A00
48	Label guide A	1	B4310215000
49	Label guide B	1	B43112200A0
50	Label guide C	1	B4312220000
51	Setscrew	2	SS4110715SP
52	Washer	2	WP0450000SD
53	Setscrew	2	SS4110715SP
54	Washer	2	WP0450000SD
55	Setscrew	2	SS4110715SP
56	Washer	2	WP0450000SD

• Parts of which quantity used is to be changed

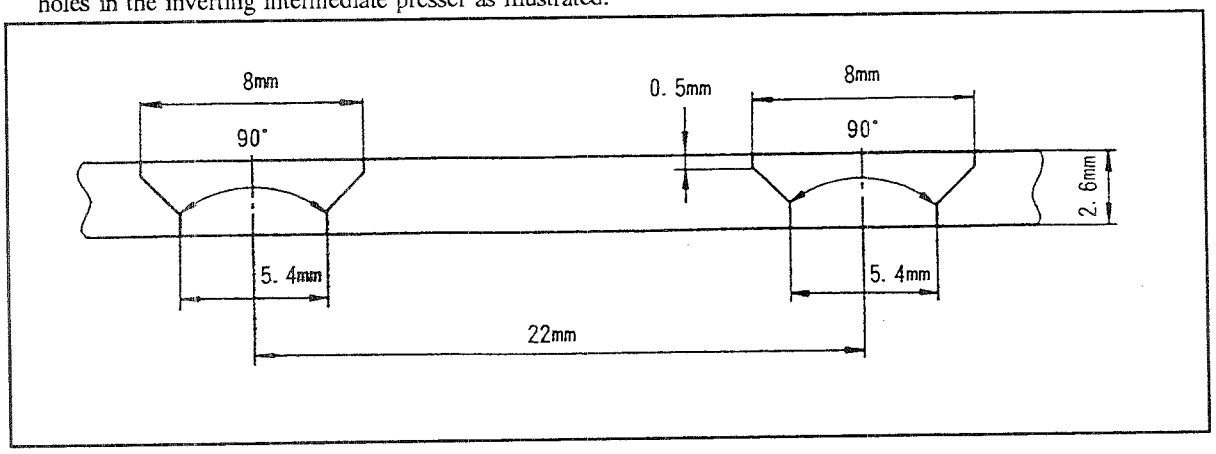
	Name of part	Q'ty	Part No.
1	Setscrew	4 → 2	SS7150910TP
2	Nut	2 → 1	NS6150330SD
3	Washer	4 → 2	WP0651056SD
4	Hose nipple	3 → 5	PJ032052503
5	Pressure reducing valve	1 → 2	PF070501000
6	Speed controller	2 → 3	PC012401000

6. OPTIONS

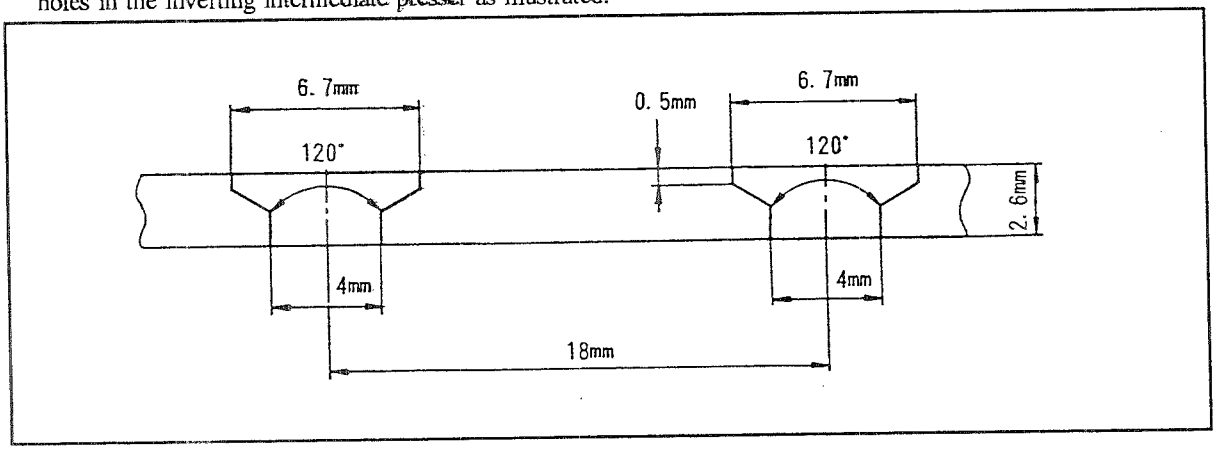
Name of part	Type	Part No.	Size (mm)
1. Intermediate presser mounting base 	Inverting intermediate presser mounting base B [It is necessary when the inverting intermediate presser blank, small (B4319220000) is used.]	B4616220000	A × B × t 8 × 24 × 15
	Screw	SS1090750SP	
2. Crank shaft 	Inverting crank 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. WHEN MANUFACTURING AN INVERTING INTERMEDIATE PRESSER

1) If you use the standard inverting intermediate presser mounting base (B4320220000), be sure to drill attaching holes in the inverting intermediate presser as illustrated.



2) If you use the optional inverting intermediate presser mounting base B (B4316220000), be sure to drill attaching holes in the inverting intermediate presser as illustrated.

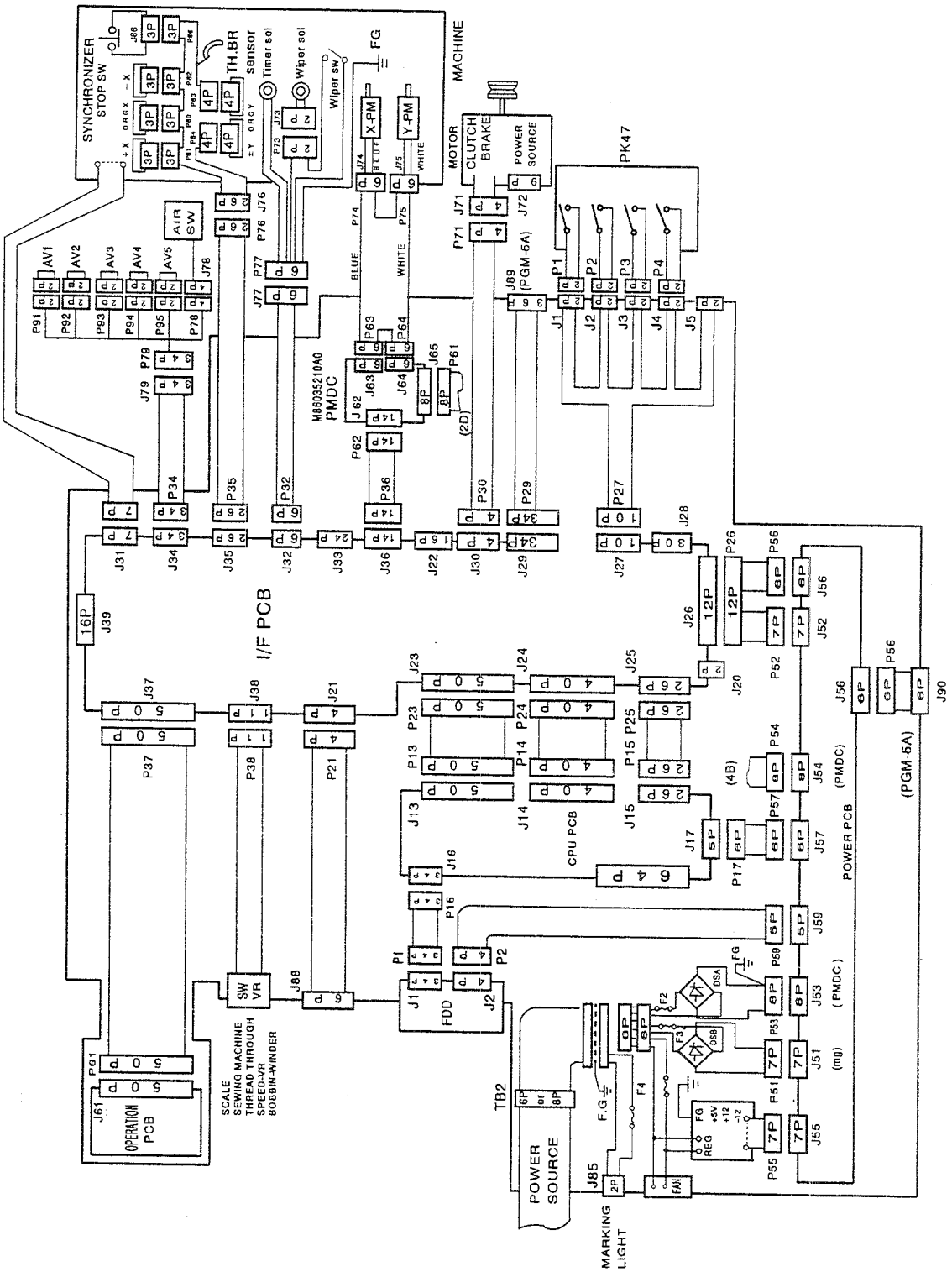


[Caution]

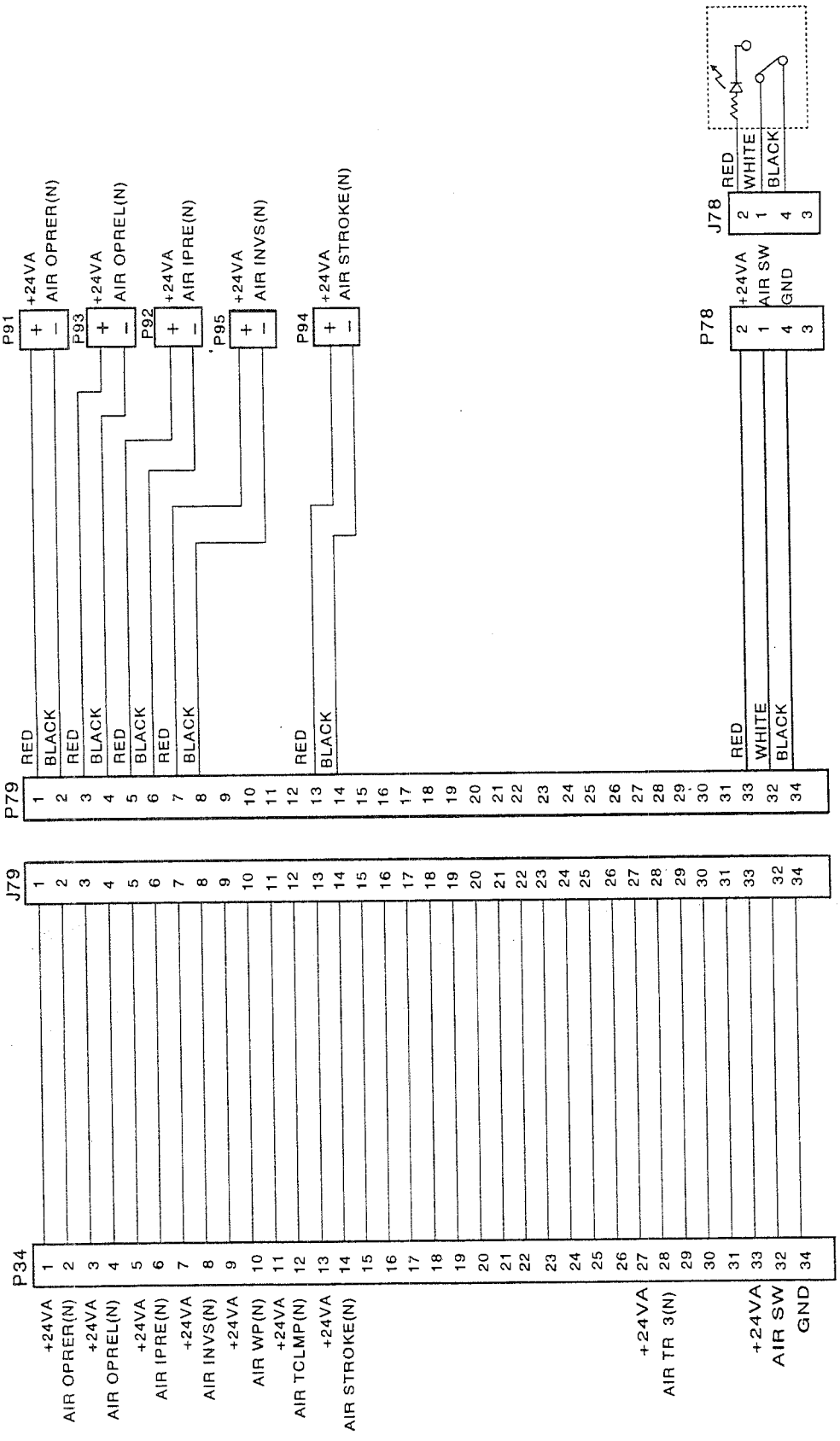
1. **Determine the location of the attaching holes to be drilled, considering the needle entry near the inverting crank shaft. (Refer to the description given in "3. Inputting the needle entry point near the crank shaft".)** **(See page 278.)**
2. **If the inverting intermediate presser is thicker than 2.6 mm, the applicable material thickness will be 4 mm or less.**

8. MATERIALS

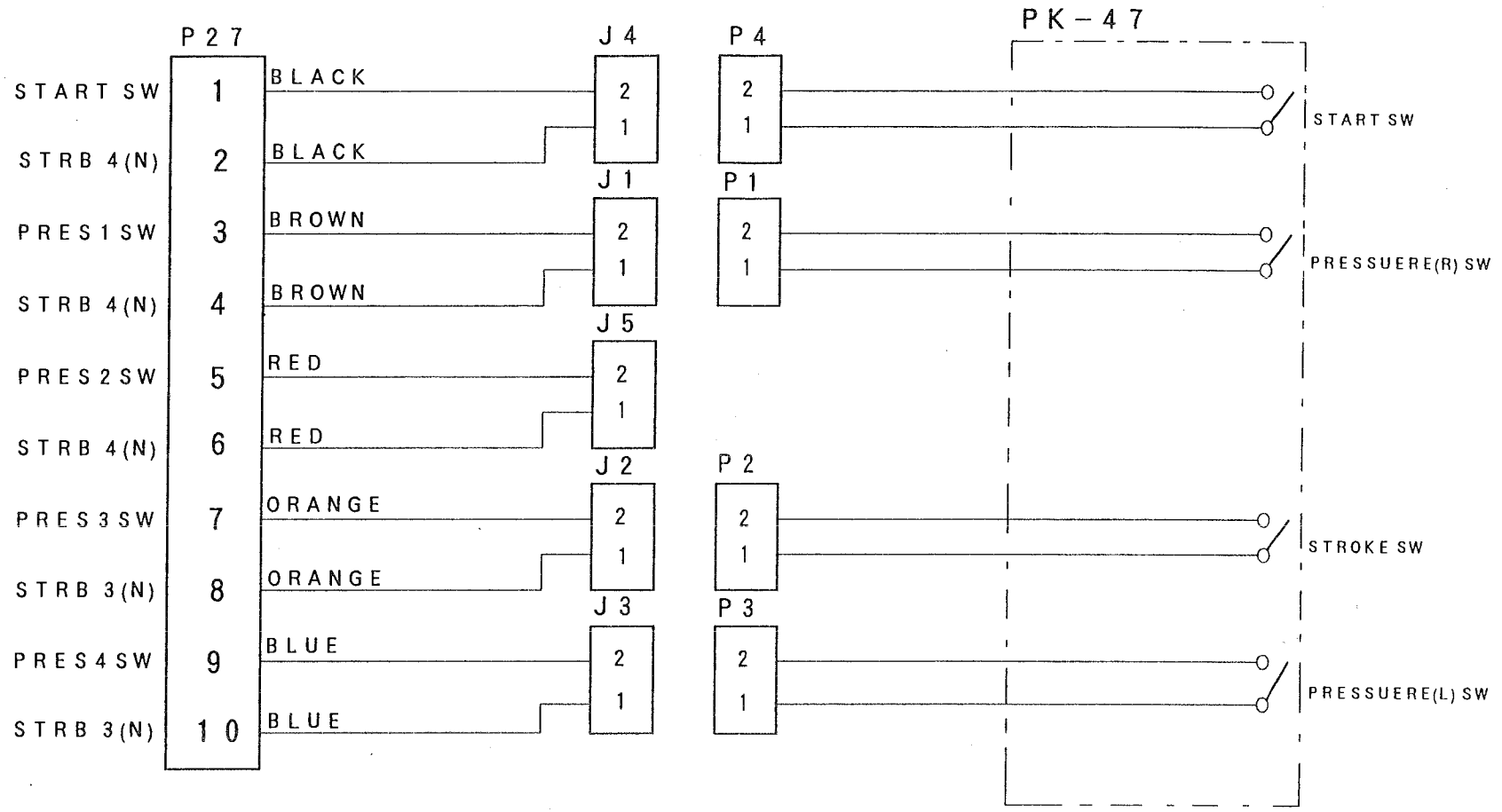
8-1. Block diagram for the AMS-215CST and -215CHT



8-2. Air valve schematic diagram for the AMS-215CST and -215CHT



8-3. Pedal switch schematic diagram



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

*The specifications and appearance are subject to change without notice.