

MITSUBISHI **Industrial Sewing Machine** **INSTRUCTION MANUAL**

Model PLK-0604

Single-Needle Lockstitch
Electronic Bar Tack Machine



In order to operate the sewing machine in the best condition at all times, please read this Instruction Manual carefully and properly handle and maintain the sewing machine.

Sections 1 ~ 9 describe the handling of the sewing machine and Sections 10 ~ 14 describe the detailed technical information.

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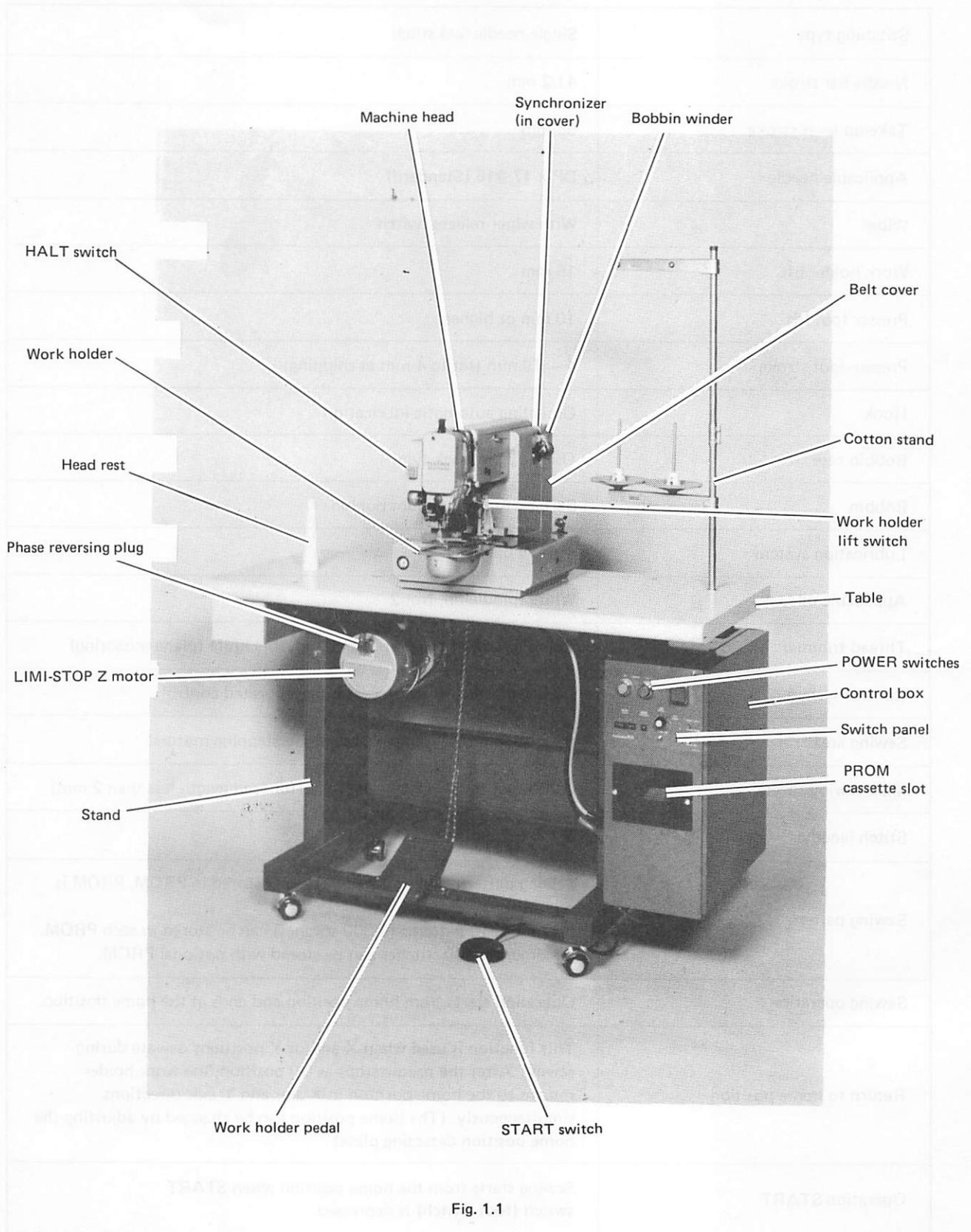
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1. CONSTRUCTION

PLK-0604 mainly consists of the parts shown below.



2. SPECIFICATIONS

2.1 Specification

Table 2.1

Stitching type	Single-needle lockstitch
Needle bar stroke	41.2 mm
Take-up lever stroke	68 mm
Applicable needle	DP x 17 #16 (Standard)
Wiper	With wiper release switch
Work holder lift	15 mm
Presser foot lift	10 mm or higher
Presser foot stroke	4 – 10 mm (set to 4 mm at shipping)
Hook	Oscilating automatic lubrication
Bobbin case	Oscilating bartack type
Bobbin	Bartack type aluminum bobbin
Lubrication system	Manual oiling
Applicable oil	White spindle oil, No. 2
Thread trimmer	Combination of fixed knife and movable knife (plane scissoring)
Control system	Full electronic, microprocessor incorporated control
Sewing area	60 x 40 mm (X-Y dual axial drive by stepping motors)
Max. sewing speed	2,000 spm (intermittent feed) . . . (for feed length less than 2 mm)
Stitch length	0.2 – 6.2 mm
Sewing pattern	Sewing pattern is reproduced with data stored in PROM. PROM is replaceable. Maximum 10 patterns (1,000 stitches) can be stored in each PROM. Maximum 4,000 stitches can be stored with optional PROM.
Sewing operation	Operation starts from home position and ends at the home position.
Return to home position	This function is used when X and/or Y positions deviate during sewing. After the needle stops at UP position, the work holder returns to the home position in X axis and Y axis directions simultaneously. (The home position can be changed by adjusting the home position detecting plate)
Operation START	Sewing starts from the home position when START switch (foot switch) is depressed.

Work holder	First depression of work holder lift switch causes the work holder to go down and another depression causes going up.
HALT function	Sewing operation can be suspended by depressing the HALT switch. After the suspension, the work holder can be moved stitch by stitch along the sewing pattern in inching operation. By depressing the START switch, the sewing can be started again.
Scale function	Pattern stored in PROM can be enlarged or reduced in X axis direction and Y axis direction independently. The scale can be set within a range from 0% to 199% at 1% increment.
Pattern select function	Any one of 10 patterns can be selected.
Sewing speed setting	Sewing speed can be set in nine steps within a range from 180 spm to 2,000 spm at about 200 spm increment.
Stitch correcting function	Stitches can be corrected or amended by moving the work holder stitch by stitch forward or backward along the pattern by operating JOG switch.
Test function	This function is used to check stitching operation at low speed. Pattern checking is also possible.
Error indicator	Trouble or failure is immediately identified.
Main drive motor	LIMI-STOP Z motor (for sewing machine)
Work holder	Solenoid-driven type
Permissible voltage regulation	±10% of rated voltage
Maximum power source requirement	800VA
Dimensions	535 mm (width) x 1,200 mm (length) x 1,110 mm (height) (cotton stand is not included in the height)
Weight	135 kg (Total weight including weights of head and table)

Table 2.2 LIMIT-STOP Z motor specification

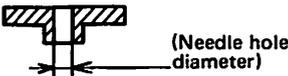
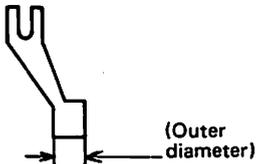
Model		CA-Z402E		CB-Z402E	
Drive motor	Output (W)	400		400	
	Phases	Single phase		Three phases	
	Poles	Two poles		Two poles	
	Voltage (V)	100, 120, 200, 220, 230, 240		200, 220, 380, 400, 415	
	Frequency (Hz)	50	60	50	60

Table 2.3 Power supply, table, motor and control box

Power supply			Model		
Phases	Voltage (V)	Frequency (Hz)	Table	Motor	Control box
Single	100	50/60	TLK-A302-P61	CA-Z402E	PLK-60-A10
Single	110	60	TLK-A362-P62	CA-Z402E	PLK-60-A11
Single	120	60	TLK-A362-P62	CA-Z402E	PLK-60-A12
Single	200	50	TLK-A352-P61	CA-Z402E	PLK-60-A20
Single	220–240	50	TLK-A352-P62	CA-Z402E	PLK-60-A23
Three	200	50/60	TLK-B302-P61	CB-Z402E	PLK-60-B20
Three	220	60	TLK-B362-P62	CB-Z402E	PLK-60-B22
Three	380	50	TLK-B352-P63	CB-Z402E	PLK-60-B38
Three	400–415	50	TLK-B352-P63	CB-Z402E	PLK-60-B40

2.2 Replacement parts for light and heavy fabrics

Table 2.4

Specification			
Name of part	For light fabric	For medium/ heavy fabric (Standard)	For heavy fabric
Thread tension regulator	→	For DB standard W346065G01	For heavy fabric W346065G02
Needle plate 	φ1.6 BA140D513H01	φ2.2 BA140D513H02	φ2.6 BA140D513H03
Presser foot 	φ3.5 (Inner dia.: φ2.5) BA130C201H02	φ4.5 (Inner dia.: φ3.5) BA130C201H01	←
Inner hook	→	Standard P975044 x 01	For heavy fabric P975043 x 01
Hook retainer	→	Standard W349796H02	For heavy fabric W349796H03

Note: Parts for light fabrics and heavy fabrics are optional.

2.3 Features

(1) Easy pattern change

Stitch data (pattern data) can be stored up to 1000 stitches in PROM cassette.

By using a PROM writer (option), pattern data can be easily stored in PROM.

Memory size can be expanded up to 4,000 stitches when optional (additional) PROM cassette is used together with the PROM writer PTN-4000.

(2) Work holder driven by stepping motor

Stepping motors are used to drive the work holder.

Since the work holder drive mechanism uses no frictional part such as cam, it permits maintenance-free long use.

(3) Pattern enlargement/reduction (SCALE function)

The patterns stored in PROM can be enlarged or reduced within a range from 0% to 199%.

(4) Stitching suspension (HALT function)

Stitching can be suspended and the work holder can be adjusted stitch by stitch along the pattern.

(5) Smooth and quiet start and stop

LIMI-STOP Z motor is used to drive the main shaft, permitting smooth start and stop and requiring no maintenance.

(6) Test function for checking the pattern

The work holder movement and stitching motion can be tested at low speed. This function is very helpful when a new pattern is stored.

(7) Various safety functions

○PROM cassette loading confirmation

○Data input error detection

○Excessive enlargement alarm

○Work holder overrun alarm

○Motor or machine standstill alarm (due to overload)

○V-belt out of pulley or breakage alarm

Error indication lamps are used to give alarms, permitting immediate identification of cause of trouble.

(8) Microprocessor incorporated full-electronic control system

8-bit microprocessor is used in the control system.

(9) Automatic home position return function

Since the work holder automatically returns to the home position when one pattern is completed, error dose not accumulate.

3. INSTALLATION

3.1 Installing the Table

3.1.1 Casters can be locked by pressing down the lever of each caster. To move the sewing machine, release the lock from each caster, by lifting the lever.

3.1.2 The sewing machine should be placed on flat and rigid floor.

3.1.3 The sewing machine can be operated in a standing as well as sitting posture.

Since the table has been factory-adjusted for sitting work, change the table height when the sewing machine is operated in a standing posture as follows:

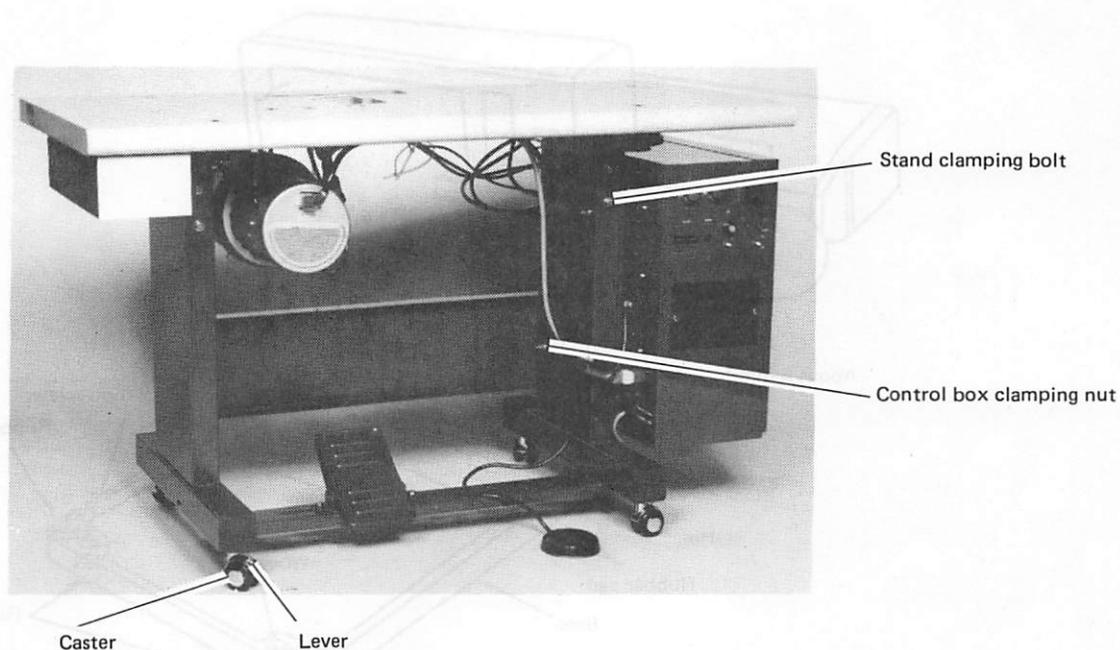


Fig. 3.1

- (1) Remove four control box clamping nuts and dismount the control box.
- (2) Remove each four left and right stand clamping bolts.
- (3) Lift the table by about 10 cm and secure it with the stand clamping bolts.
- (4) Install the control box.

Notes: (1) Table height should be changed before the machine head is installed.
(2) If table height must be changed after the machine head has been installed, dismount the head and then adjust (for safety).

3.2 Installing the Machine Head

- (1) Install the furnished head rest to the table (See Fig. 1.1)
- (2) Put each one rubber pad into four recesses found in the table.
- (3) Take out the machine head from the shipping case and place it on the table as shown in Fig. 3.2
Set each one rubber pad into recess at four corners of base bottom.
- (4) Secure the base to the table using furnished two wood screws.

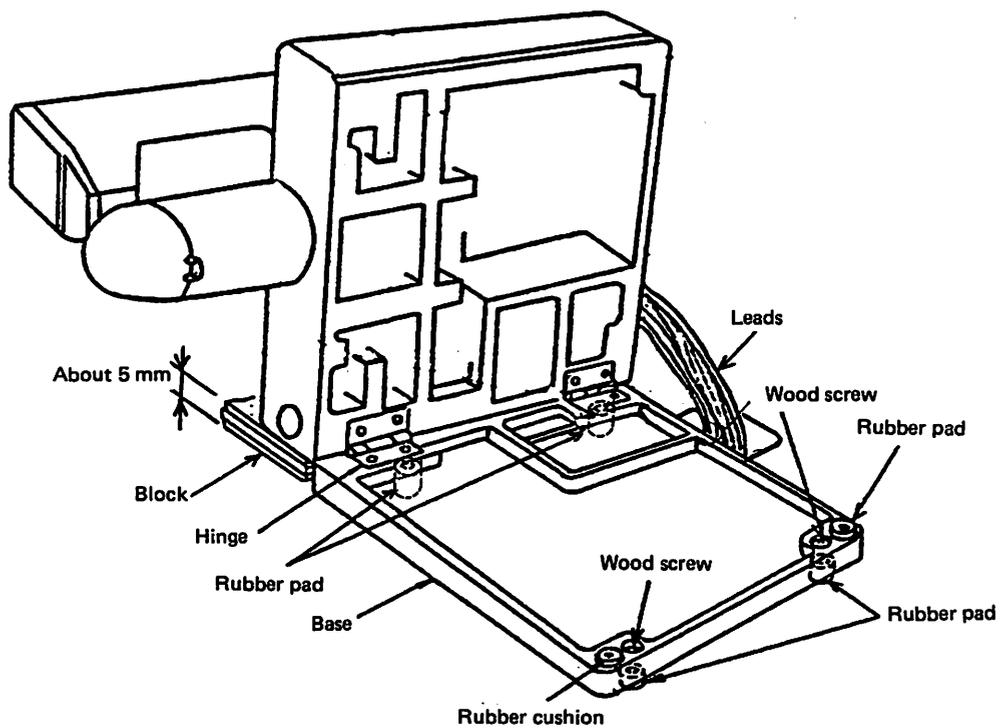


Fig. 3.2

- Notes:**
- (1) If the base is not secured to the table, it may spring up, due to gravity of the head, when the head is leaned.
 - (2) For prevention of spring up of the base, it is recommended to install a block of about 5 mm thick below the head, as shown in Fig. 3.2.

3.3 Connection of Leads

- (1) Pass the leads from the head through the hole provided in the table and connect them to the corresponding connectors (see Fig. 3.5).
- (2) Secure the leads in position with lead clamp so that they cannot come into contact with the belt. The cord band of lead clamp can be released by levering it with screwdriver as shown in Fig. 3.3.

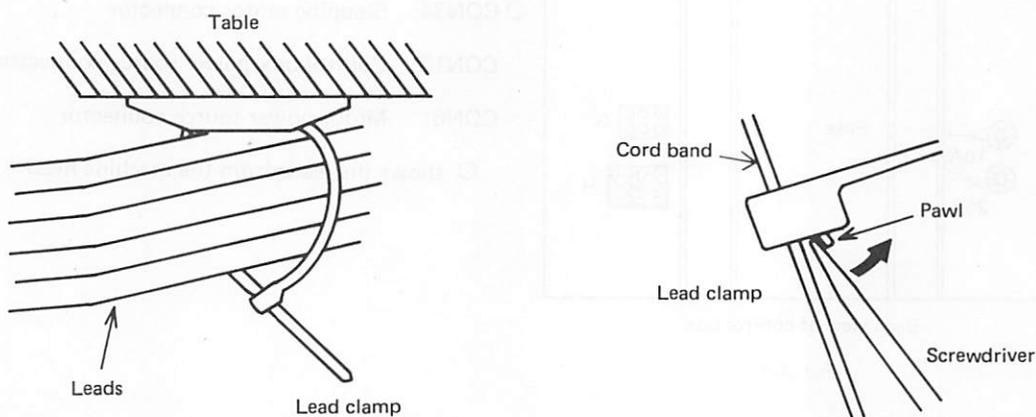


Fig. 3.3

Note: Two types of junction cord are used for connection of the control box to stepping motors (one is for X-axis stepping motor, and other is for Y-axis stepping motor). Since the X-axis cable may not be used for connection of Y-axis stepping motor, and vice versa, though the connectors of both junction cords are of the same type, identify each cable before the connection.

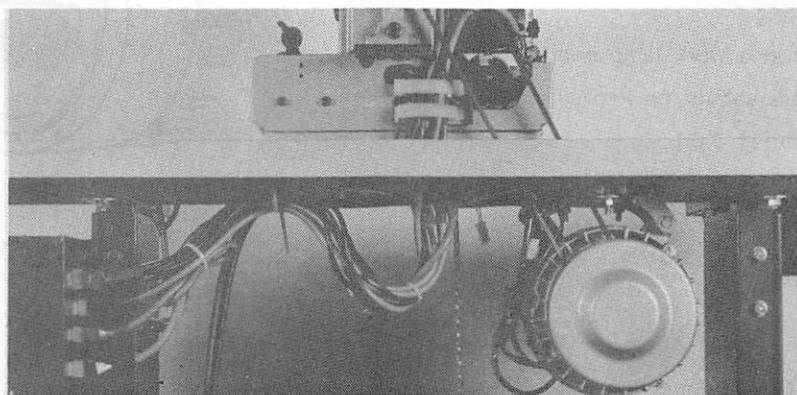
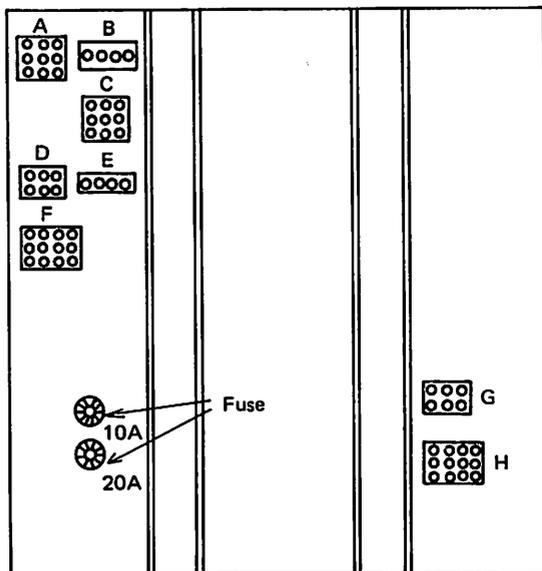


Fig. 3.4 Connection of machine head and control box

- (3) Install the V-belt to the pulleys with suitable tension. Note that the V-belt oscillates intensely at high speed operation of sewing machine if V-belt tension is faint.
- (4) Stand the machine head upright.
- (5) Since the belt cover must be removed when the head is leaned, or the balance wheel is turned by hand, do not install the cover until the sewing machine has been set up to be ready for operation.



Back view of control box

Fig. 3.5

- CON32: Thread trimmer connector
- CON33: Motor, clutch and brake connector
- CON17: Home position detector connector
- CON14: Synchronizer connector
- CON38: Work holder lift switch, start switch connector
- CON34: Stepping motor connector
- CON13: Control box power source connector
- CON6: Motor power source connector
- shows the leads from the machine head

3.4 Work Lamp Leads

- (1) To install a work lamp, draw out the lamp leads found at the back of the motor, remove the insulation tape, strip each lead and join them to the cord from the lamp. Apply the insulation tape after the connection.
- (2) For lamp, use that having the specified rating.
- (3) When a work lamp is not used, the two leads should be kept insulated by tape (see Fig. 3.6.)

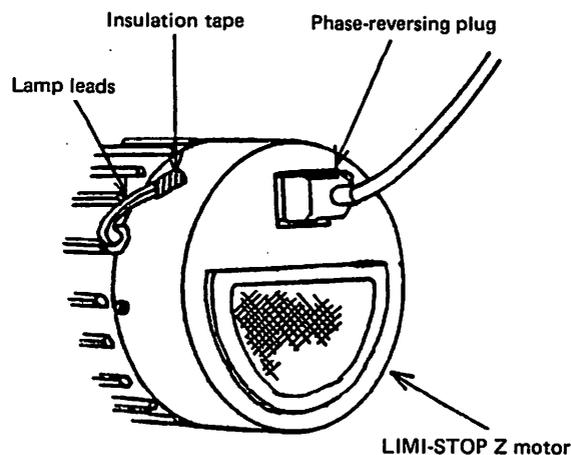


Fig. 3.6 Work lamp leads

3.5 Power Cable Connection

The power source capacity should be large enough for the motor rating and the power cable should be selected with sufficient allowance to the power source requirement.

- (1) When a three-phase motor is used, connect the power source in correct phase sequence as follows:
 - "U" phase Red lead
 - "V" phase White lead
 - "W" phase Black lead
- (2) Connect the green lead in the three-phase power cable to the ground terminal. For safety, do not fail to ground.
Be sure to leave the grounding work to a qualified electrician.

- (3) When a single-phase motor is used, do not plug the power cord to a branch socket, but plug to a wall outlet.

Notes: (1) All leads should be bundled and secured in position so that they cannot come into contact with the V-belt.
(2) Securely set the plugs and connectors.
(3) Before starting connection of leads, unplug the power cable or cord.

3.6 Installing the Work Holder Pedal

To use the work holder pedal, remove the motor cover and install the furnished chain to the pedal as shown in Fig. 3.7, using care not to allow its contact with the leads.

CAUTION:

When the machine head is leaned, the chain should have been loosened by unhooking. If the head is leaned without unhooking, the chain might be broken by tension.

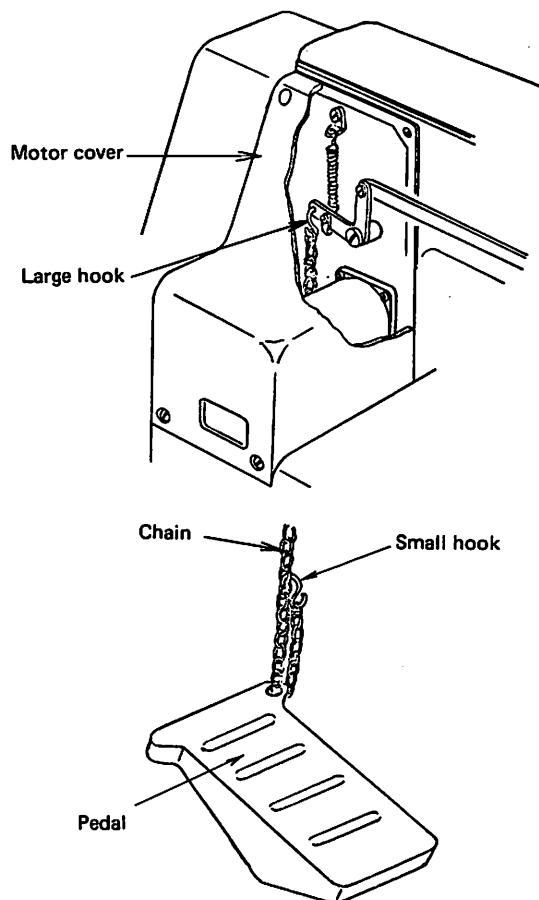


Fig. 3.7

4. PREPARATION AND CAUTIONS BEFORE THE USE

- (1) Make sure the source voltage meets that specified for the sewing machine.
- (2) Make sure the PROM cassette in which stitching pattern data are stored is properly inserted into the cassette slot.
- (3) Move and locate the work holder by hand so that the needle is always situated within the range of the work holder.
- (4) Make sure the presser foot is set up so that the needle falls on the center of presser foot.
- (5) Check the LIM-STOP Z motor for direction of rotation. (For switches, refer to Fig. 1.1 and 5.1.)
To check, turn on the power, depress the RESET button, operate the WORK HOLDER LIFT switch to lower the work holder and set the STOP/MOVE switch to "STOP" position (for functions of switches, refer to section 5).

While holding down the START switch (foot switch), see the pulley to check direction of its rotation.

The pulley should rotate in forward direction, viewed from the right side of the sewing machine (the correct direction of rotation is indicated by arrow near the pulley). (See Fig. 1.1.)

Direction of rotation of the motor can be reversed by changing 180° setting of the phase-reversing plug.

When changing the plug setting, use care to fully insert the plug into the socket.

- (6) Location of work holder

The work holder is located, in reference to its home position, as shown in Fig. 4.1.

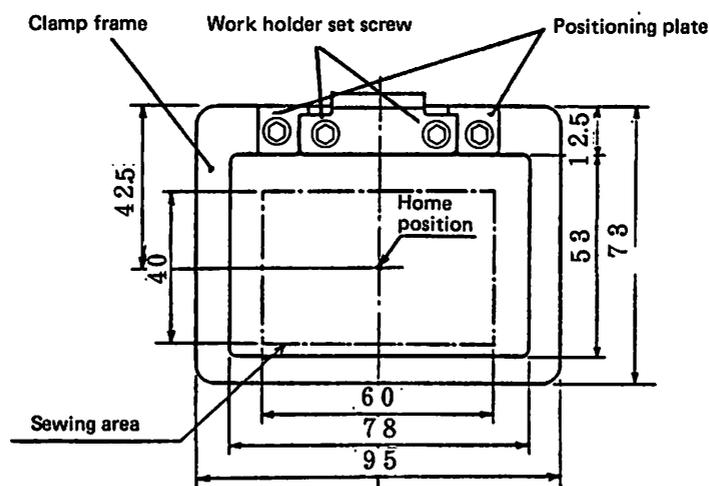


Fig. 4.1

- Notes:** (1) Before unplugging the power cord, depress the POWER OFF switch and make sure the pilot lamp does not light.
- (2) Before insertion and removal of PROM cassette, do not fail to turn off the power.

5. CONTROL SWITCHES AND THEIR FUNCTIONS

5.1 Switch panel

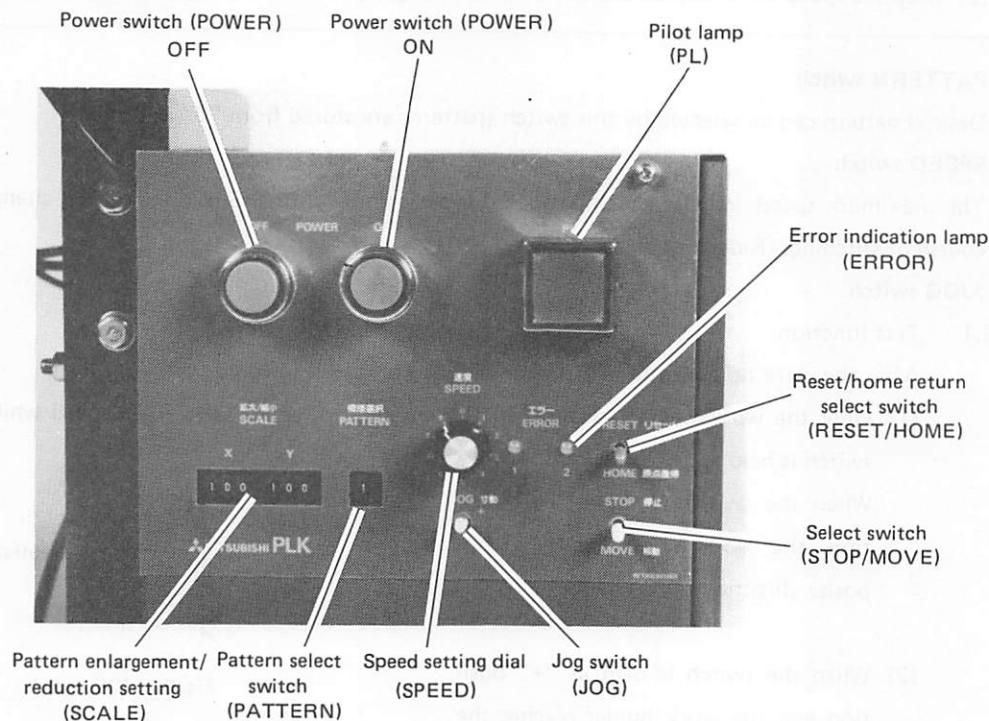


Fig. 5.1

5.2 POWER ON and POWER OFF switches

- (1) When the POWER ON switch (green pushbutton) is depressed, the pilot lamp (PL) lights indicating that the sewing machine is fed with the power source.

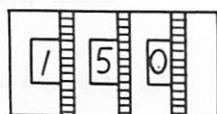
When the needle is at UP position, the work holder automatically returns to the home position.

- (2) When the POWER OFF switch (red pushbutton) is depressed, the pilot lamp goes out and the work holder, if it is at DOWN position, goes up.

5.3 SCALE switch

- (1) Let the patterns stored in PROM be 100% in size, they can be enlarged or reduced within a range from 0% to 199% in X axis and Y axis independently (stitch length can be enlarged or reduced).
- (2) Pattern is enlarged or reduced in reference to the home position.

Ex.:



Switch setting should be within a range from "000" to "199".

The third digit (hundred) is either "0" or "1".

150% (1.5 times)

Fig. 5.2 SCALE switch setting

- Notes:** (1) When pattern is enlarged, it should be verified that the enlarged pattern is within the range of sewing area. (Refer to para. 5.6.1.)
- (2) Machine speed RPM may be decreased when enlarged pattern is stitched. (Refer to para. 7 (4).)

5.4 PATTERN switch

Desired pattern can be selected by this switch (patterns are stored from "0" in PROM).

5.5 SPEED switch

The maximum speed (regular stitching speed) is set by this switch. Speed cannot be changed in mid course of stitching. (Refer to para. 7 (4).)

5.6. ±JOG switch

5.6.1 Test function

After the work holder returns to the home position and is lowered,

- (1) Only the work holder advances in the stitching direction at a fixed speed while the JOG switch is held at "+" position.

When the switch is set at "-" position, the work holder moves in opposite direction.

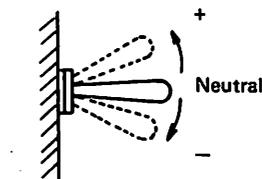


Fig. 5.3 JOG switch

- (2) When the switch is held at "+" position and the work holder reaches the end of pattern, the work holder goes up, and then returns to the home position.

When the switch is held at "-" position, the work holder returns to the home position and remains stopped there, thus permitting start of stitching by depressing the START switch, or permitting test by operating the (+) JOG switch.

- (3) During test, the presser foot is at DOWN position for stitching test, and at UP position for skip feeding test.

5.6.2 Stitch correct function

For correction or amendment of stitches, the work holder can be moved in forward and backward direction stitch by stitch along the pattern by operating the JOG switch after stitching is suspended by depressing the HALT switch (see Fig. 1.1.).

This inching motion is same as that of test function, but differs in that the work holder moves at a speed lower than the speed in test operation. This function is helpful for restarting the sewing after it is suspended due to thread breakage.

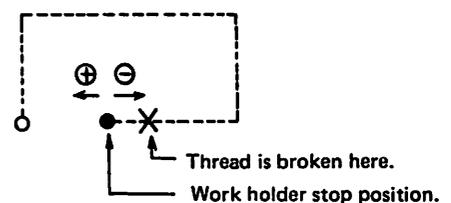


Fig. 5.4 Inching direction

5.7 RESET/HOME switch

- (1) "RESET" When the switch is set upward ("RESET" position), all machine movement is reset.
When the switch is set to this position during stitching operation, the machine stops with the needle stopped at UP position and all machine movement is reset.
- (2) "HOME" When the switch is set downward ("HOME" position), the work holder automatically returns to the home position.
(When the needle is at a position other than UP position, it goes up and the work holder returns to the home position.)
In usual operation, the switch is set at "HOME" position.

5.8 STOP/MOVE switch

The switch is set at "STOP" position mostly for bobbin winding, and for lowering of the presser foot.

(1) Bobbin winding

When the START switch is depressed after lowering the work holder with this switch set at "STOP" position the sewing machine runs at about 600 spm, but the work holder does not move at all.

(2) Lowering of presser foot

When this switch is set at "STOP" position, the presser foot goes down.

This switch setting is very helpful when the presser foot hinders threading.

In usual operation, the switch is set at "MOVE" position.

5.9 Error indication

The following "error" lamps light and operation stops when the following troubles occur.

(1) ERROR 1

Green No pattern data is stored or stored data are improper.

Red Pattern is enlarged excessively and stitch length exceeds 6.2 mm.

(2) ERROR 2

Green The work holder runs over its movable range → Scale down the pattern.

(3) ERROR 1, ERROR 2

Two red lamps (ERROR 1 and ERROR 2) lighting on

The needle is not at UP position when the power is turned on.

→ Set the RESET/HOME switch to "RESET" and then "HOME" position. The needle goes up to UP position, and the work holder returns to the home position.

Two red lamps (ERROR 1 and ERROR 2) flickering

The LIM-STOP Z motor or sewing machine itself is locked or the belt is out of pulley

→ Turn off the power, eliminate the cause of trouble and turn on the power again.

5.10 Work holder pedal

The work holder can be lifted or lowered by depressing this pedal (the height of work holder depends on degree of the pedaling).

The work holder pedal is very helpful when used to position a given fabric.

5.11 Work holder lift switch

The work holder goes down when this switch (pushbutton) is depressed, and goes up when it is depressed again. (See Fig. 1.1.)

5.12 HALT switch

This switch is used to suspend stitching operation (when thread is broken, for example). (See Fig. 1.1.)

5.13 START switch (Foot switch)

When this switch is depressed, sewing starts from the home position. (See Fig. 1.1.)

6. OPERATION

6.1 Inserting the PROM Cassette

Open the switch panel front cover and insert a PROM cassette in which necessary pattern data have been stored into the cassette slot, using care not to insert it in wrong direction. After the insertion, install the front cover again.

For pattern writing and erasure to and from PROM, optional PROM writer (PT-100, PT-100A or PTN-4000) is necessary. For handling of PROM cassettes, refer to section 11.

6.2 Switch Setting on Switch Panel

In order to check each function, set each switch on the switch panel as follows:

To check, set the SCALE switches (for X axis and Y axis) to "100", the PATTERN switch to any position ranging from "0" to "9", and the SPEED switch to "4".

As for the RESET/HOME switch and the STOP/MOVE switch, set them downward.

6.3 Switch Function Checking

When the above-instructed preparatory operation has been completed, turn on the power and check each function as follows:

(1) Home return:

Set the RESET/HOME switch to "RESET", and then to "HOME" to make sure the work holder returns to the home position (Refer to para. 5.7.)

(2) Work holder lowering motion:

The work holder should go down when the work holder lift switch is depressed (it will lift when the switch is depressed again.)

(3) Work holder movement:

The work holder should move tracing the given pattern when the JOG switch is set at "+" position. When the work holder reaches the end of the pattern, it should lift to the UP position, and return to the home position (the work holder stops and it does not go up when the switch is set to "NEUTRAL" position while the work holder is tracing the pattern). (Refer to para. 5.6.)

When the above-mentioned test is made, only the work holder moves and stitching motion does not occur.

By performing the test, check the dimensions and location of the work holder.

To check stitching condition, set stitching speed to "low switch" and proceed as instructed in para. 6.4.

Note: In order to make yourself familiar with each switch function, it is recommended to operate switches on the switch panel without needle thread.

6.4 Sewing Operation

- (1) Referring to Fig. 5.1, properly set switches on the switch panel.
- (2) Set up a fabric and depress the work holder lift switch to let down the work holder. Then depress the START switch, the sewing machine will start stitching. Once stitching starts, it continues even when the START switch is released, and stops with the work holder at UP position after thread trimming.

6.5 HALT Switch Operation

To suspend stitching, depress the HALT switch (Fig. 1.1). Stitching stops with the work holder at DOWN position after thread trimming.

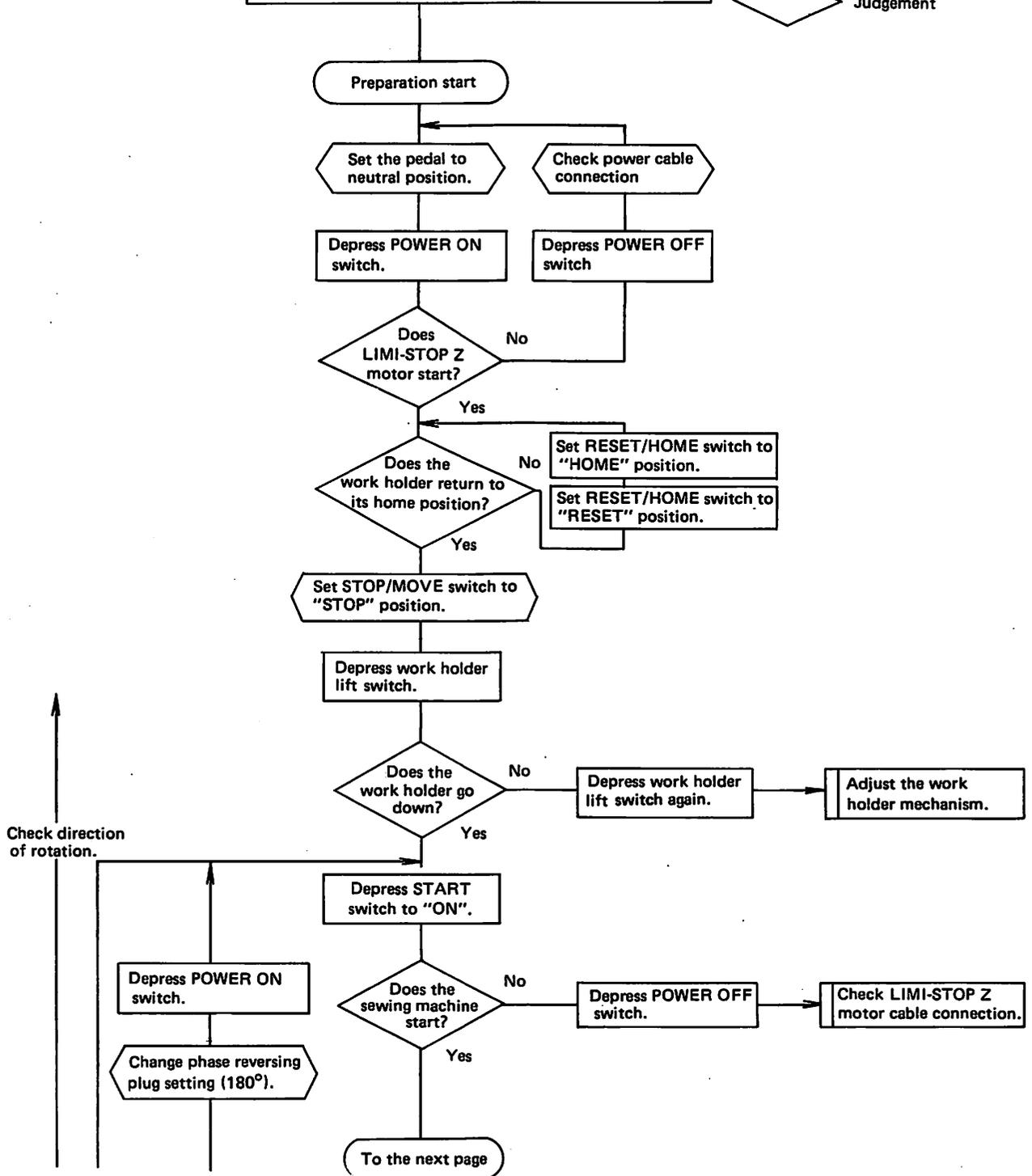
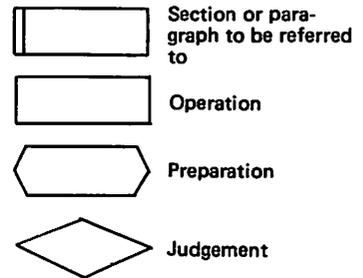
To start stitching again, adjust the stitching start position by operating the JOG switch and depress the START switch again. The sewing machine starts again and sews the remaining pattern.

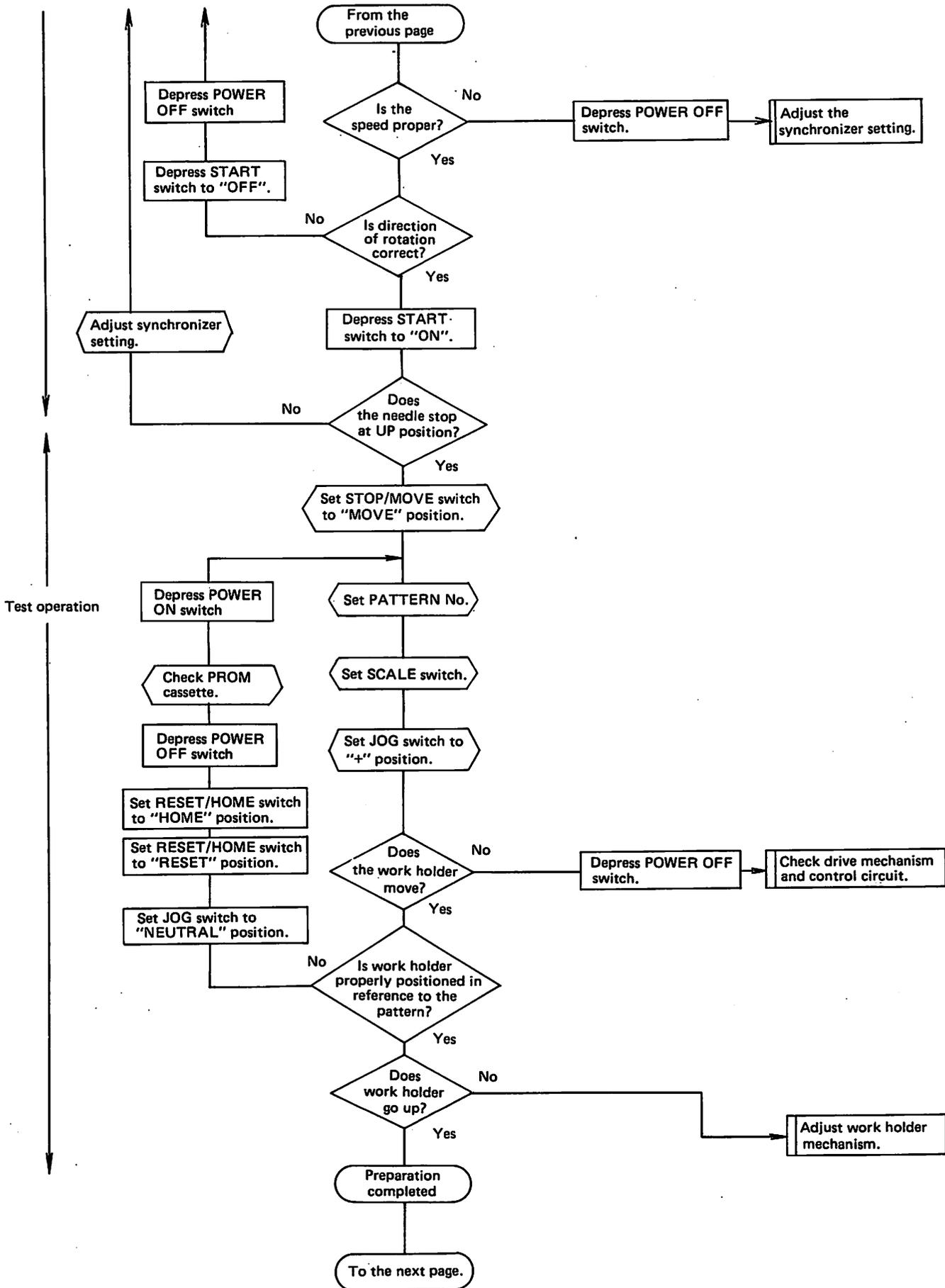
6.6 Operation Procedure and Checking

The sewing machine should be operated and checked in accordance with the following flow chart:

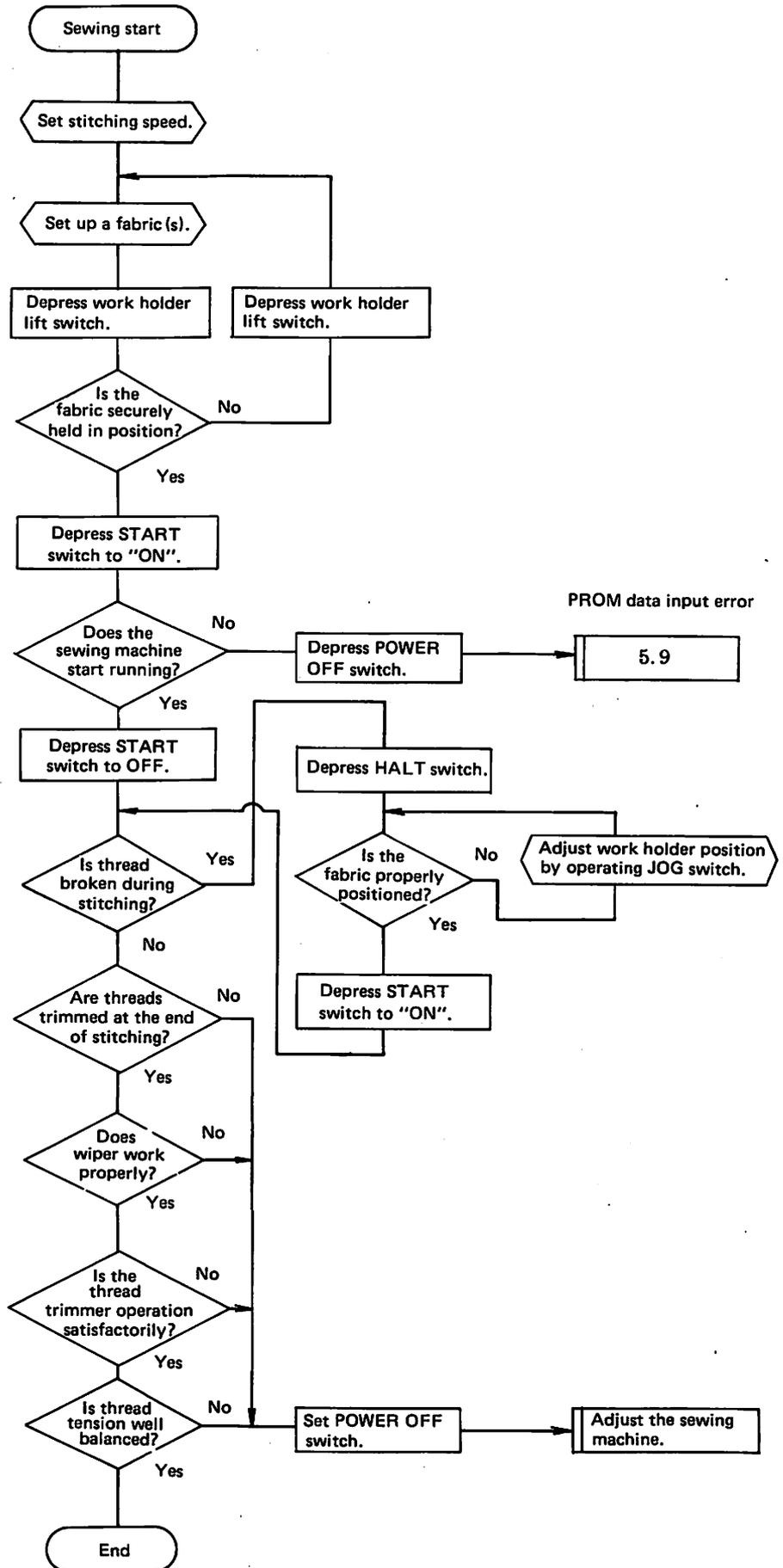
Checking before starting operation

- (1) Is the power cable properly plugged in power source outlet and connector?
- (2) Are all other cables properly plugged?
- (3) Is PROM cassette loaded on the machine?
- (4) Are fuses not blown out?





Automatic sewing operation



7. CAUTIONS ON USE

- (1) Before replacement of PROM in PROM cassette, carefully read section 11.
- (2) If any alarm (ERROR) lamp lights, trace its cause referring to the description in para. 5.9.
- (3) When a new pattern is stitched for the first time, or pattern is enlarged, be sure to perform test to check relationship between the work holder movement and the pattern.
- (4) Sewing maximum speed depends on stitch length.

The maximum speed automatically changes depending on stitch length, as shown in Table 7.1.

However, it should be properly set for individual fabric. (Refer to para. 5.5.)

Table 7.1 Relationship between sewing maximum speed and stitch length

Stitch length	Max. speed
5.4 ~ 6.2 mm	600 spm
4.8 ~ 5.2	850
4.0 ~ 4.6	1100
3.4 ~ 3.8	1300
2.8 ~ 3.2	1550
2.2 ~ 2.6	1800
Less than 2.0	2000

- (5) Dust entered in the control unit might cause malfunction or trouble. During operation, the control box cover should be kept close.
- (6) When the power is turned on, foot should not be placed on the START switch.
- (7) When adjustment is made on the sewing machine, be sure to turn off the power before gaining access to the mechanisms or control box interior.
- (8) Do not apply a multimeter to the control circuit for checking or adjustment. Otherwise semiconductors in the circuit might be damaged due to voltage from the multimeter.
- (9) When single-phase motor is used, do not immediately depress the START switch, but wait for about 10 sec. until the motor running is stabilized. after switching on the power.

8. NAME OF MAJOR PARTS OF MACHINE HEAD

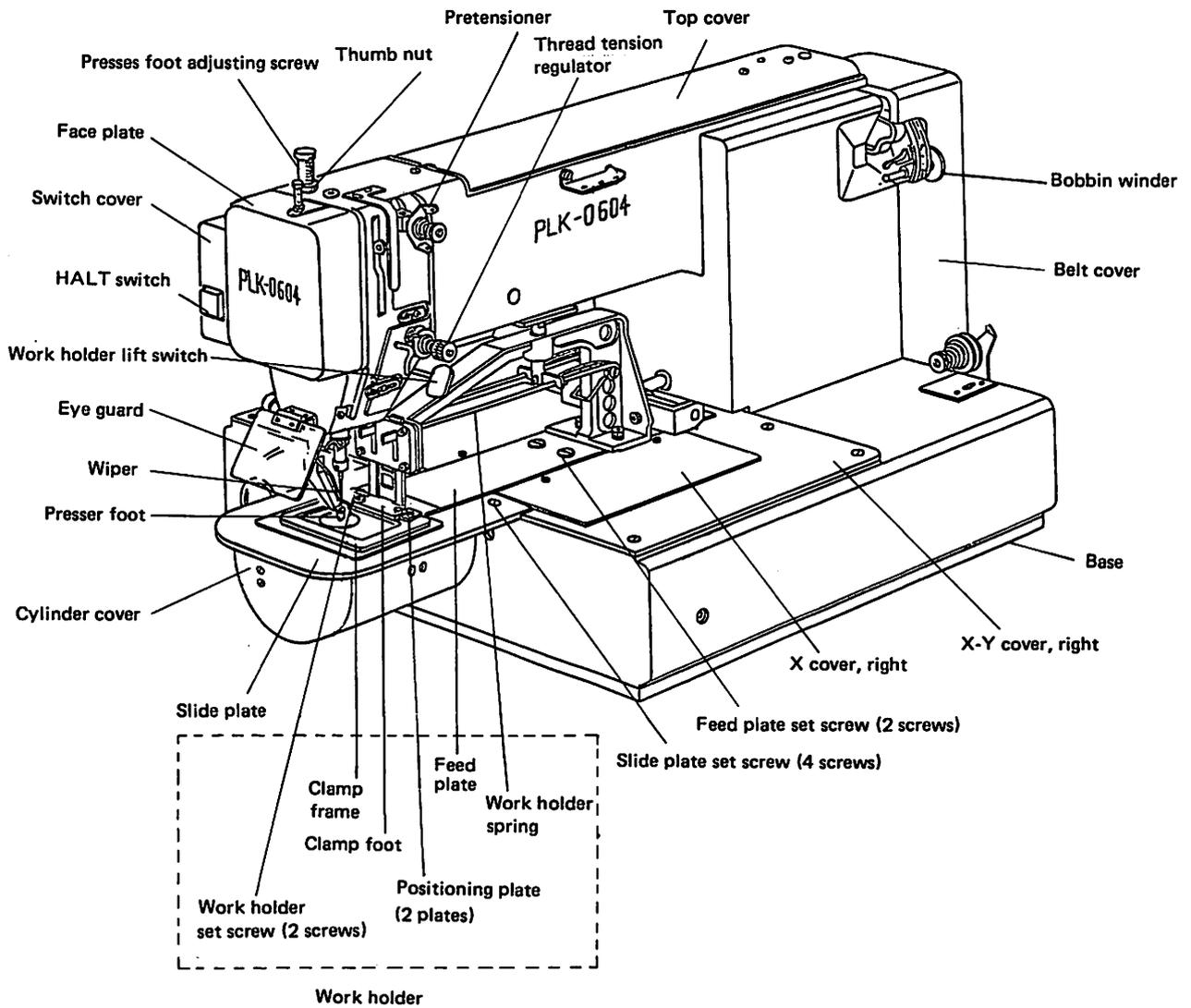


Fig. 8.1

9. HANDLING THE SEWING MACHINE HEAD

9.1 Installation of Needle

- (1) Before installing and removing the needle, turn off the power for safety.
- (2) Insert the needle into the needle socket unit it stops at the bottom of needle socket.
- (3) With the needle prime groove turned to the front, tighten the needle set screw to secure the needle.
- (4) For better stitching, though it depends on pattern, it is recommended to set the needle turned about 10° in the arrow direction.

Fully insert the needle, turn the prime groove to the front and tighten the set screw.

Needle not fully inserted.

Prime groove facing in wrong direction

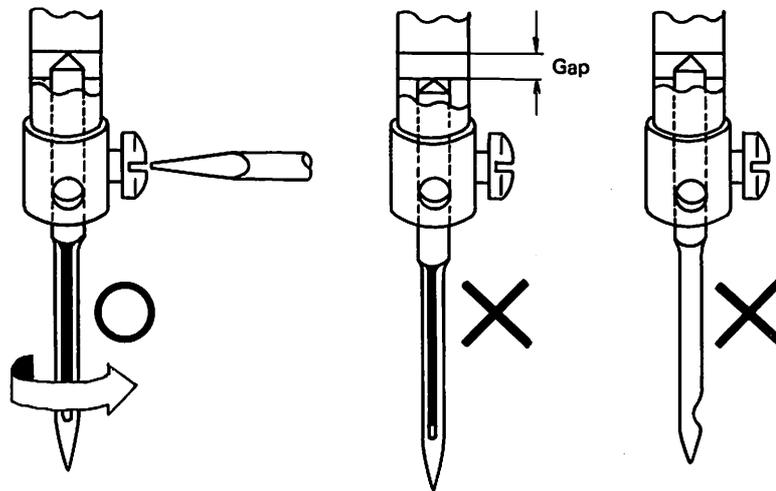


Fig. 9.1

9.2 Threading the Needle Thread

The needle thread should be threaded, as shown in Fig. 9.2, with the thread end extended about 4 cm from the needle.

9.3 Threading the Bobbin Thread

The bobbin thread should be passed through the horn of bobbin case, as shown in Fig. 9.11, and inserted into the hook with the thread end extended 2.5 cm from the horn hole.

9.4 Removing the Inner Hook

The inner hook can be removed by moving the hook clamp in the direction of arrow to horizontal position, as shown in Fig. 9.13.

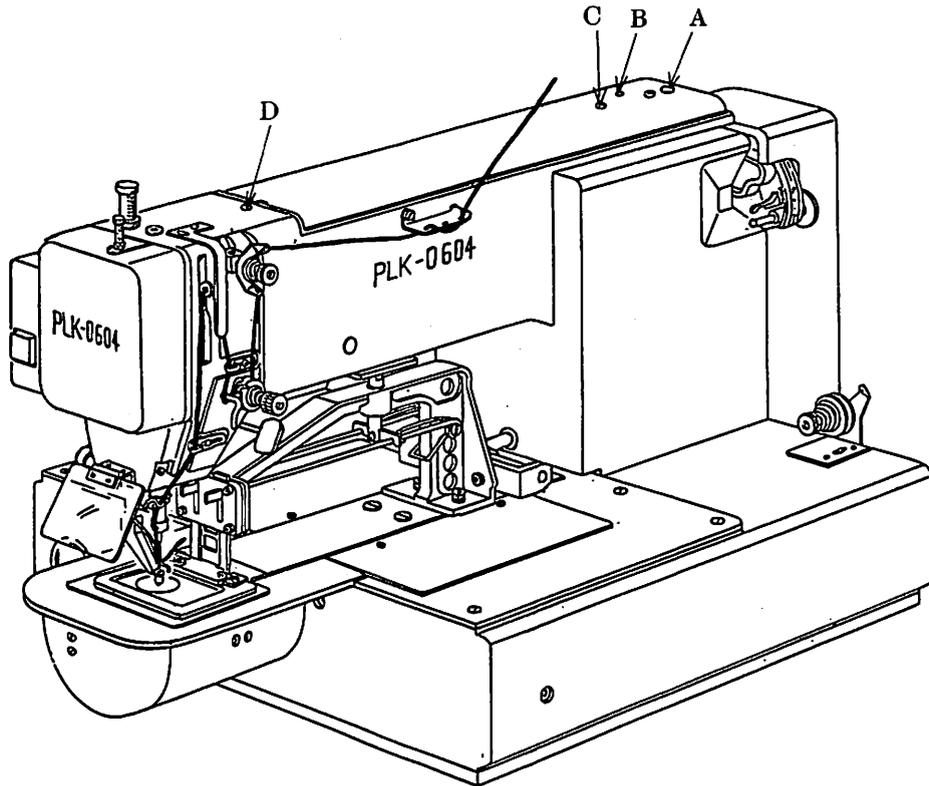


Fig. 9.2

9.5 Lubrication with Silicone Oil

To apply silicone oil to the needle thread, install the furnished thread guide having felt and dampen the felt with silicone oil.

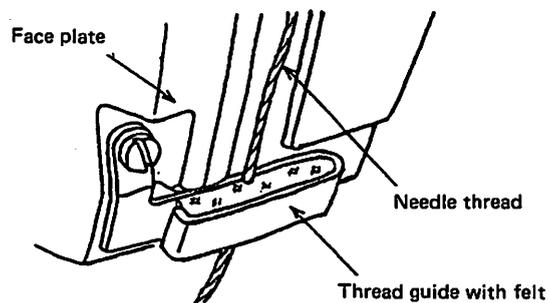


Fig. 9.3

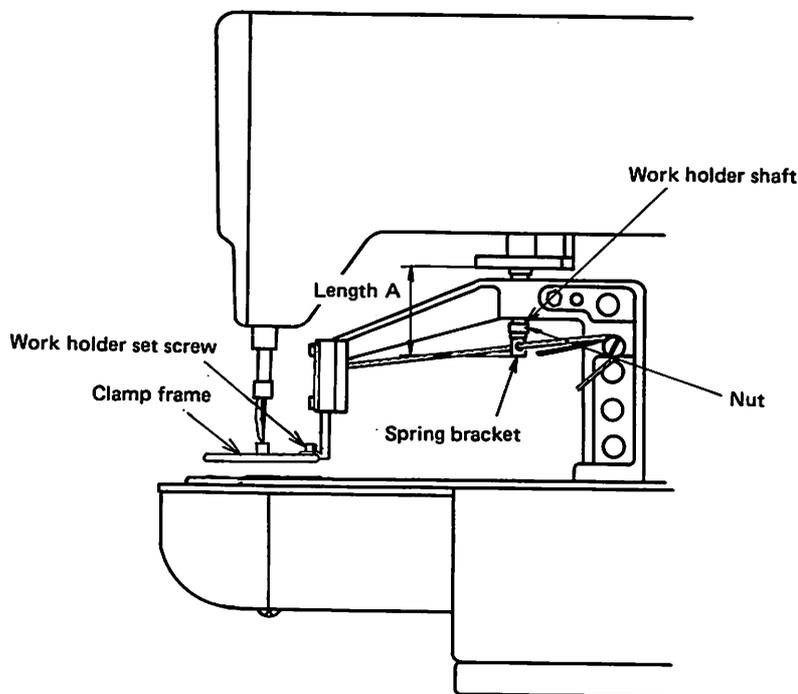


Fig. 9.4

9.6 Adjustment of Pressure

- (1) To increase pressure, loosen the nut (Fig. 9.4) and turn the work holder shaft counter-clockwise using a spanner (thereby length A becomes larger).
- (2) To decrease pressure, turn the work holder shaft clockwise.
- (3) With the standard adjustment, fabric(s) thicker than about 6 mm may not be held down. In this case, decrease the pressure.

9.7 Replacing the Work Holder Clamp Frame

- (1) To replace the clamp frame, remove the set screws (Fig. 8.1), remove the clamp frame and install other clamp frame.
- (2) When replacing the clamp frame, do not loosen the positioning plate. Clamp frame can be accurately installed by referring to the positioning plate.

9.8 Replacing the Feed Plate

- (1) To replace the feed plate, loosen the feed plate set screws, remove the feed plate and install the desired feed plate.
- (2) The feed plate should be installed in reference to the work holder.

9.9 Adjusting the Presser Foot

- (1) Make sure the needle comes at the center of the presser foot hole.
- (2) Loosen the presser bar set screw (Fig. 10.10) and adjust height of the presser foot so that the lower end of the presser foot is 0 ~ 0.5 mm above the fabric when the presser bar is at the lowest position.
- (3) The vertical stroke of presser foot is factory-adjusted to 4 mm. To increase the stroke, remove the switch cover, loosen the bolt shown in Fig. 9.6 and move it upward. The vertical stroke can be increased up to 10 mm.
- (4) To adjust pressure of the presser foot, loosen the thumb nut shown in Fig. 9.6 and turn the presser foot adjusting screw. The pressure increases when the screw is turned clockwise, and decreases when turned counter-clockwise. Fig. 9.6 shows the standard adjustment. In usual operation, readjustment of the auxiliary adjusting screw is not required.

Note: Height of the presser foot should be changed depending on thickness of fabric.

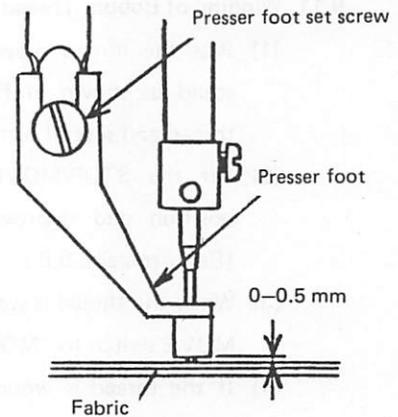


Fig. 9.5

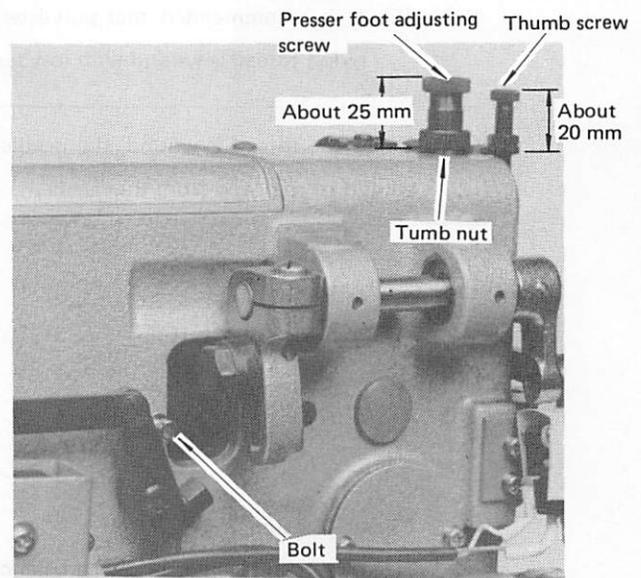


Fig. 9.6

9.10 Adjusting the Wiper

- (1) When the wiper is not used, the wiper release switch shown in Fig. 9.7 should be set at forward position.
- (2) Height of the wiper should be adjusted after loosening the wiper set screw so that the wiper moves about 1.0 mm above the presser foot when the sewing machine is stopped (with the take-up lever at its highest position) by turning off the power.

Fig. 9.7

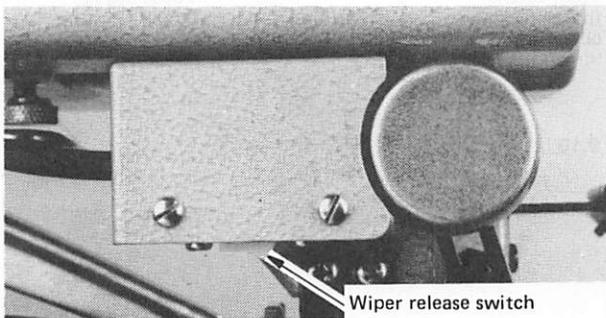
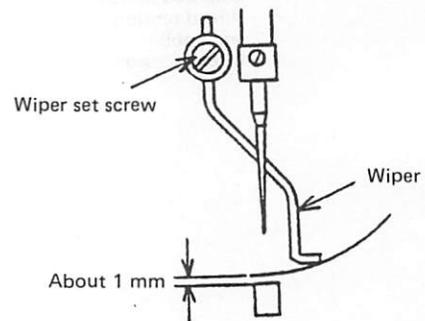


Fig. 9.8



Note: When height or vertical stroke of presser foot is changed, height of wiper should be adjusted.

9.11 Winding of Bobbin Thread

- (1) Pass the thread drawn out from the cotton stand as shown in Fig. 9.9 and wind the thread end several turns on the bobbin.
- (2) Set the STOP/MOVE switch to "STOP" position and depress the START switch. (Refer to para. 5.8.)
- (3) When the thread is wound up, set the STOP/MOVE switch to "MOVE" position.
- (4) If the thread is wound up conically, move the thread guide toward smaller diameter of wound thread layers.
- (5) It is recommended that polyester thread or nylon thread is wound with low tension.

Note: When the thread is wound, the needle thread should be removed from the needle.

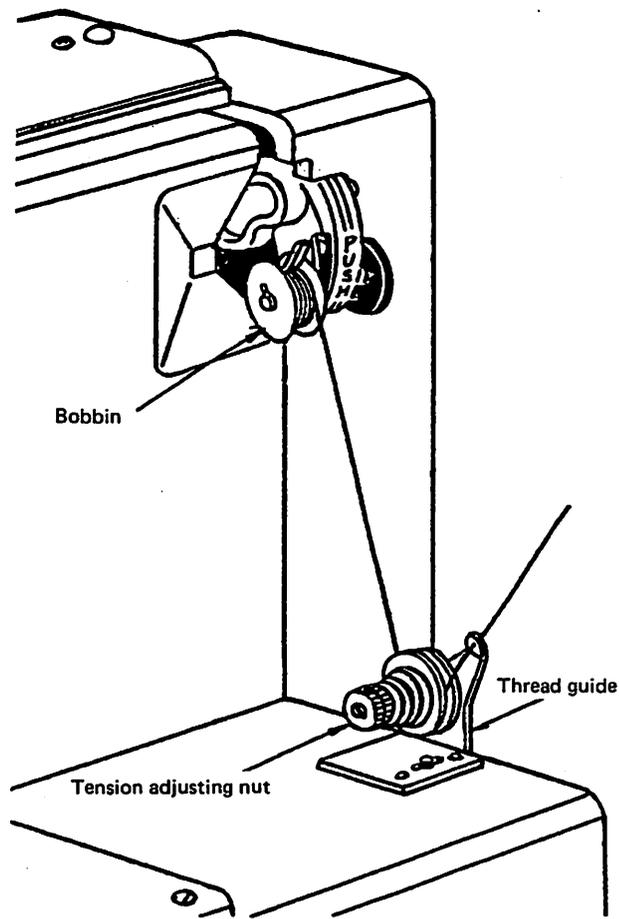


Fig. 9.9

9.12 Thread Tension

Needle thread tension should be balanced with the bobbin thread as shown below.

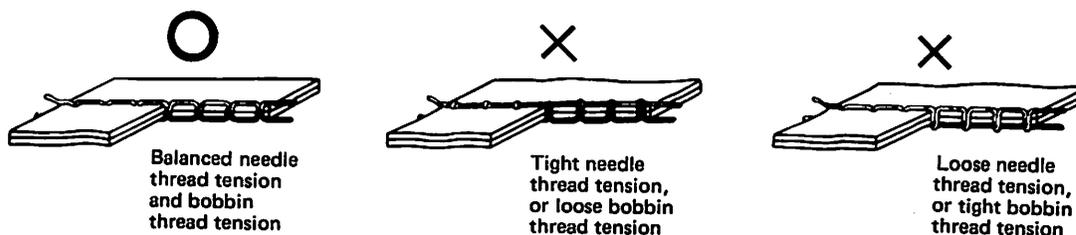


Fig. 9.10

(1) Bobbin thread tension

The standard bobbin thread tension for cotton thread #60 is that the bobbin case gradually goes down when the thread end is held by fingers and the bobbin case is released.

To adjust tension, turn the thread tension adjust screw shown in Fig. 9.11.

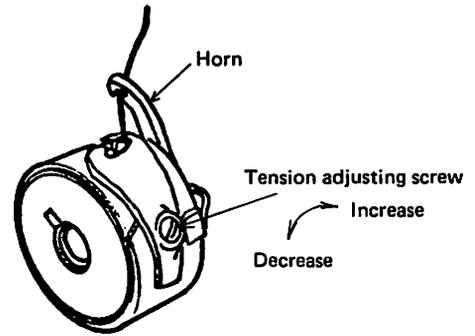


Fig. 9.11

(2) Needle thread tension

The needle thread tension should be adjusted in reference to bobbin thread tension.

To adjust, turn the tension regulator thumb nut shown in Fig. 9.12.

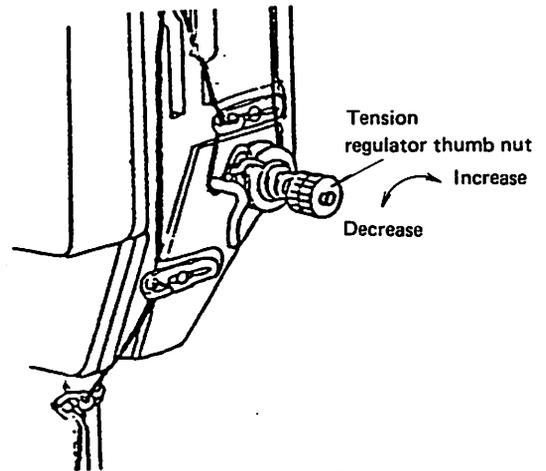


Fig. 9.12

9.13 Lubrication

- (1) Apply several drops of lubricating oil to "A", "B", "C" and "D" shown in Fig. 9.2 everyday.
- (2) Pour lubricating oil through the oil filler hole in the bed, shown in Fig. 9.13, until the oil level reaches the red mark on the oil gauge. Note that too much oil may spill when the head is leaned.

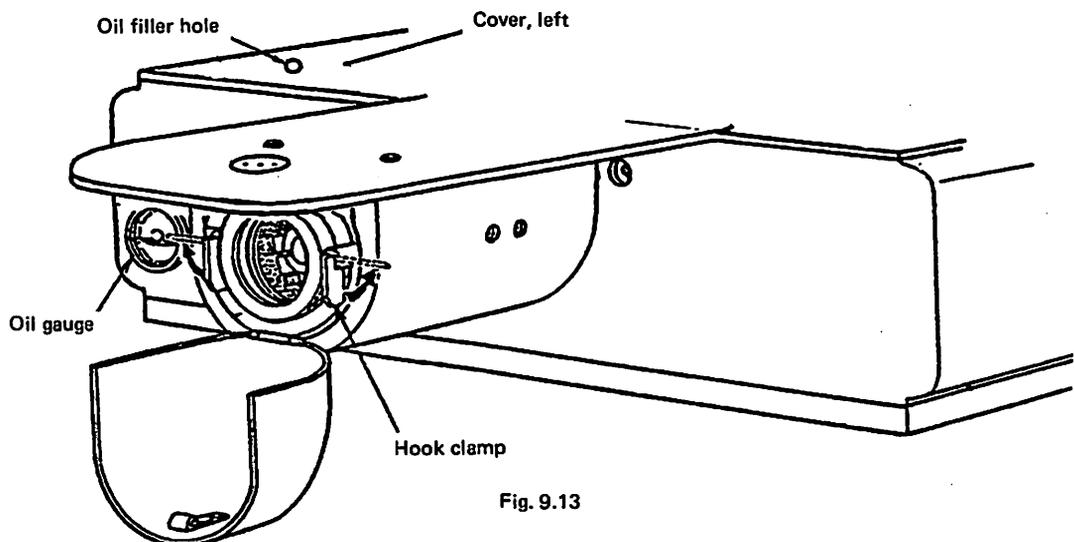


Fig. 9.13

- (3) If oil in the hook is excessive, remove the left cover, and one of two oil braid from the oil reservoir.
- (4) Remove the X covers (left and right) and feed plate, shown in Fig. 8.1, and apply several drops of oil to the retainer shown in Fig. 10.27 at least monthly.

10. ADJUSTMENT AND MAINTENANCE

10.1 Machine head

10.1.1 Adjusting the bobbin winder

Contact pressure of the rubber roller to the pulley can be adjusted by removing the belt cover, and by loosening the bobbin winder set screw.

10.1.2 Adjusting the height of needle bar

- (1) Remove the rubber plug from the face plate, as shown in Fig. 10.2, and loosen the needle bar set screw to adjust height of needle bar.
- (2) The standard needle bar height is that the needle bar is at the lowest position when the upper timing mark on the needle bar is aligned with the lower end of needle bar bushing, as shown in Fig. 10.3.

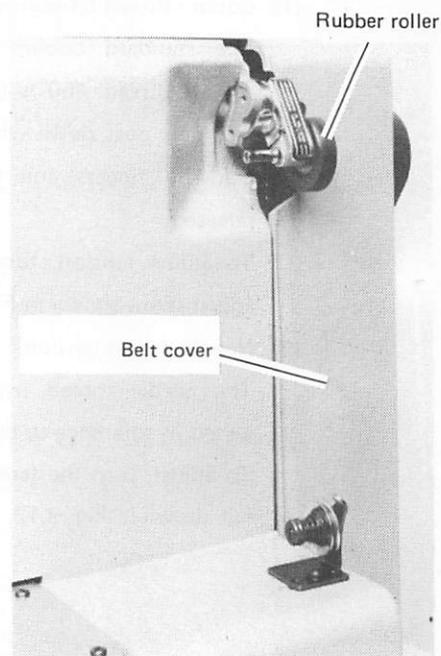


Fig. 10.1

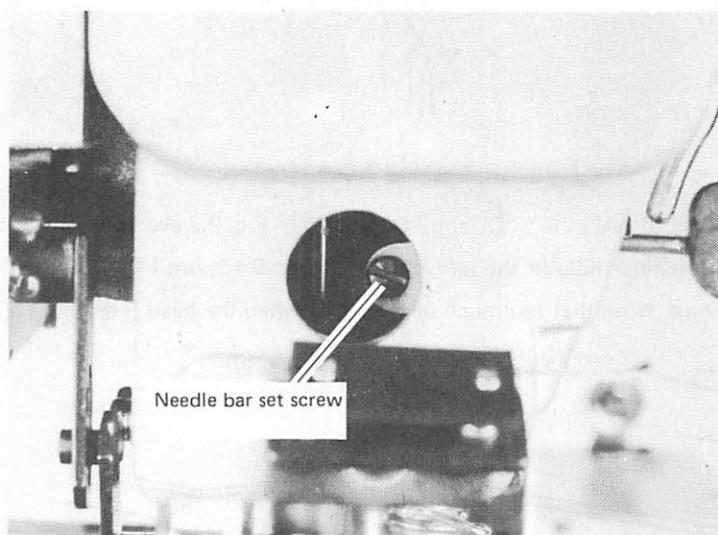


Fig. 10.2

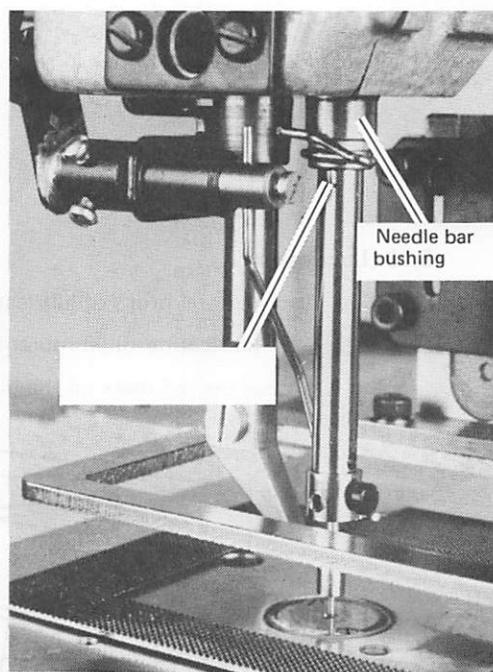


Fig. 10.3

10.1.3 Adjusting the driver

- (1) After setting the hook clamp to horizontal position, as shown in Fig. 10.4, to remove the inner hook and the hook retainer, loosen the driver set screw using a hexagon key wrench and adjust the driver.
- (2) To adjust, move the driver in forward or backward direction and position it so that gap between the driver and needle becomes zero. At the same time, it should be also adjusted in leftward and rightward direction. The standard position in leftward/rightward direction is that the hook point should come to the center of the needle when the lower timing mark on the needle bar (Fig. 10.3) meets the lower end of the needle bar bushing.

- (3) The same result can be obtained when the hook point is positioned about 3.2 mm apart from the left side surface of needle when the hook point is located at the left extremity, as shown in Fig. 10.5.

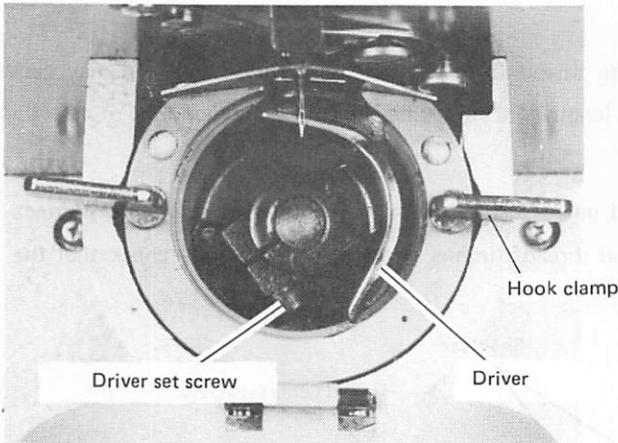


Fig. 10.4

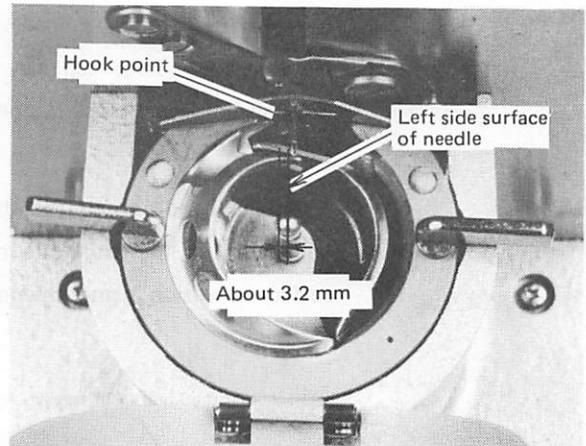


Fig. 10.5

10.1.4 Adjusting the hook

Loosen the outer hook set screw shown in Fig. 10.6 and turn the eccentric pin using a screwdriver to move the hook in forward/backward direction and adjust.

The outer hook should be adjusted so that gap between the hook point and the needle is within a range from 0 mm to 0.05 mm.

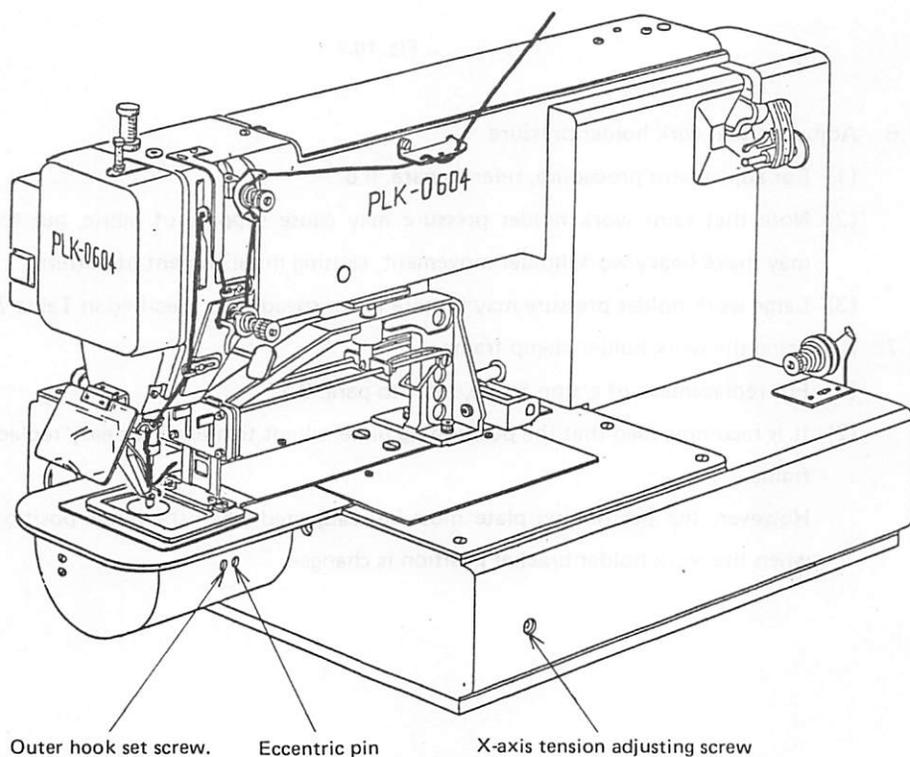


Fig. 10.6

10.1.5 Adjusting the thread guide (above hook) (Fig. 10.7)

- (1) Adjust the thread guide above the hook so that its left and right shoulders are aligned with the needle side surface.

If this adjustment is improper, thread trimming may not be done properly.

- (2) Adjust the thread guide so that a gap (standard gap: 0.8 mm) that permits needle thread to smoothly pass through is made.

Note that too large gap may cause thread trimming failure and too small gap may cause unbalanced thread tension, uneven length of trimmed needle thread and jamming of thread in the hook.

- (3) Since the condition of the thread guide surfaces with which thread comes into contact largely affects the stitch quality and thread trimmer performance, carefully check that the surface condition is smooth enough.

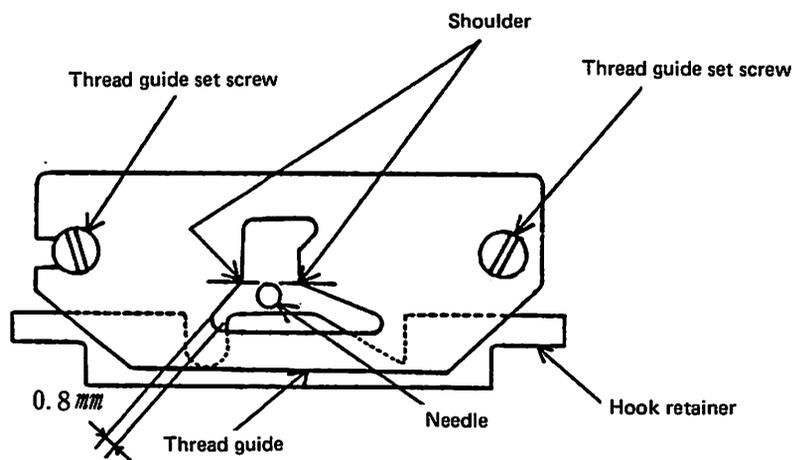


Fig. 10.7

10.1.6 Adjusting the work holder pressure

- (1) For adjustment procedure, refer to para. 9.6.
- (2) Note that faint work holder pressure may cause slippage of fabric, but too large pressure may make heavy work holder movement, causing misalignment of pattern.
- (3) Large work holder pressure may require lower speed than specified in Table 7.1.

10.1.7 Replacing the work holder clamp frame

- (1) For replacement of clamp frame, refer to para. 9.7.
- (2) It is recommended that the positioning plate is kept tightened for easy replacement of clamp frame.

However, the positioning plate must be readjusted when the home position is changed, or when the work holder bracket position is changed.

10.1.8 Adjusting the position of work holder solenoid

- (1) Loosen the solenoid set screw shown in Fig. 10.8 and adjust solenoid position so that the upper link is in contact with the stopper when the solenoid is pulled (the plunger is in contact with the solenoid bore bottom). (See Fig. 10.9.)
- (2) Note that work holder pressure becomes extremely small and the work holder may go up if the link is located leftward. (See Fig. 10.9.)

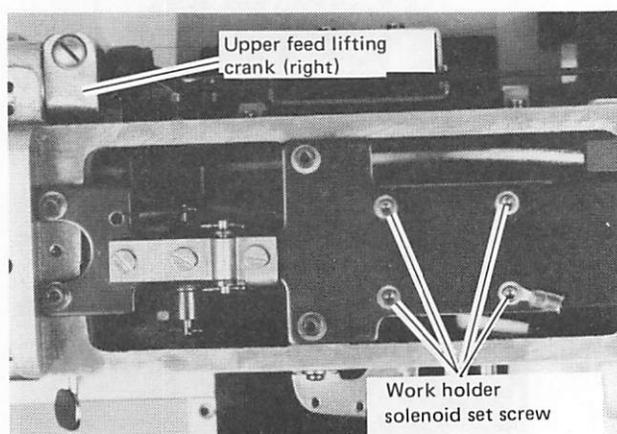


Fig. 10.8

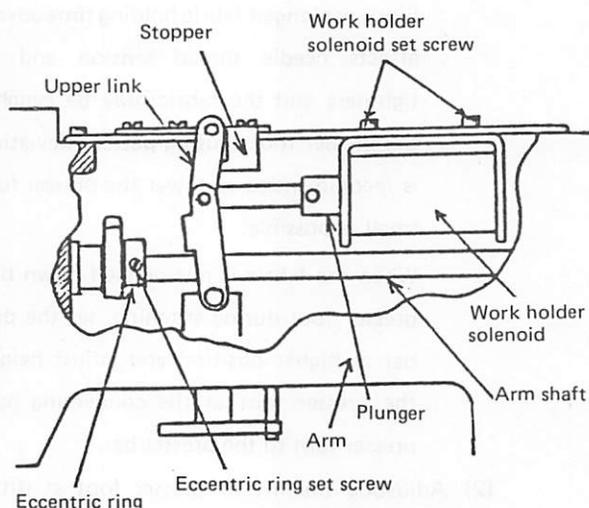


Fig. 10.9

10.1.9 Adjusting the presser foot

10.1.9.1 Adjusting the presser foot timing

- (1) Timing of presser foot vertical movement is governed by position of the eccentric ring shown in Fig. 10.9.

To adjust the timing, loosen the eccentric ring set screw and set the eccentric ring so that the presser foot assumes the lowest position when the needle bar is at its lowest position.

- (2) When the presser foot is at the lowest position the direction of the eccentric ring should be perpendicular to the illustration of Fig. 10.9, and face backward.

10.1.9.2 Adjusting the presser foot vertical stroke

- (1) For adjustment procedure, refer to para. 9.9.
- (2) Since the larger the vertical stroke, the larger is the noise and vibration, it is recommended to adjust the stroke as small as possible.

10.1.9.3 Adjusting the presser foot height

- (1) Presser foot height during stitching

- a. Turn the balance wheel by hand with the sewing machine turned off to locate the takeup lever at the highest position. Under this condition, adjust the upper feed lifting crank (right) shown in Fig. 10.8 so that the lengthwise center of bell crank (see Fig. 10.10) is parallel with the presser bar and then fix. (For this adjustment, the eccentric ring should have been properly adjusted.)
- b. Place a fabric in position and turn the balance wheel by hand to locate the presser foot to the lowest position. Under this condition, adjust the presser bar so that the presser foot (lower surface) is 0 – 0.5 mm above the fabric and then tighten the presser bar

set screw (standard adjustment).

To prevent stitch skipping, this gap should be made smaller. However, noise becomes somewhat larger and fabric holding time becomes longer when the fabric is pressed down by the presser foot.

Since prolonged fabric holding time adversely affects needle thread tension and seam tightness and the fabric may be caught by the presser foot causing pattern deviation, it is recommended to lower the presser foot as small as possible.

When the fabric is not pressed down by the presser foot during stitching, set the presser bar at higher position and adjust height of the presser foot at the connecting part of presser foot to the presser bar.

(2) Adjusting the lift of presser foot at stitching stop

- a. Make sure the adjustments of timing, vertical stroke and height of presser foot during stitching are standard.
- b. Lean the machine head and loosen the set screw of presser foot lifting crank (2).

With the lifting crank (1) set in the shaft, set the drive crank so that it is parallel to the shaft, as shown in Fig. 10.11, when the rotary solenoid (large) is not energized.

While pulling the drive crank, fully turn the rotary solenoid to make sure the center of the rod end (right) stop at the position 4 – 7 mm below the crossing line of the rotary solenoid axis center and the center of the rod end (left).

- c. With the presser foot at its lowest position lightly press down the lifting crank (2) (pull forward in the case shown in Fig. 10.11) by hand until it stops.

Locate the lifting crank (2) so that the stepped bolt is positioned about 2 mm above the stop position and secure the lifting crank (2).

The lift of presser foot at stitching stop can be increased by making smaller this clearance (2 mm), and decreased by making it larger.

The lift of presser foot at stitching stop is the vertical stroke of the presser foot when the rotary solenoid is fully turned with the drive crank fully pulled by hand.

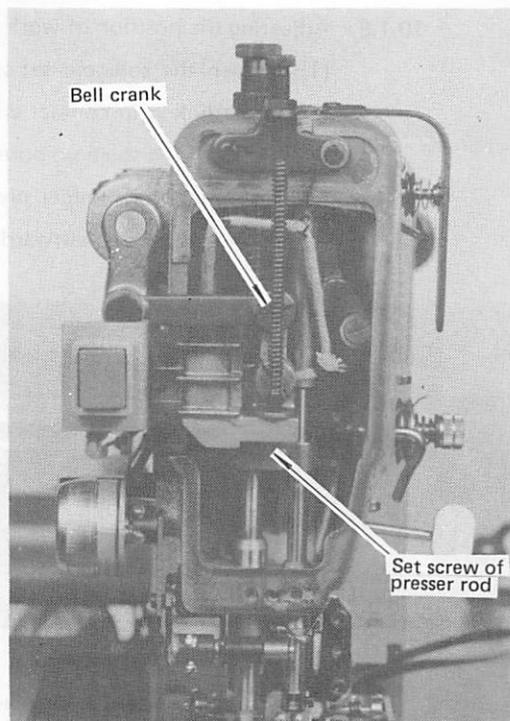


Fig. 10.10

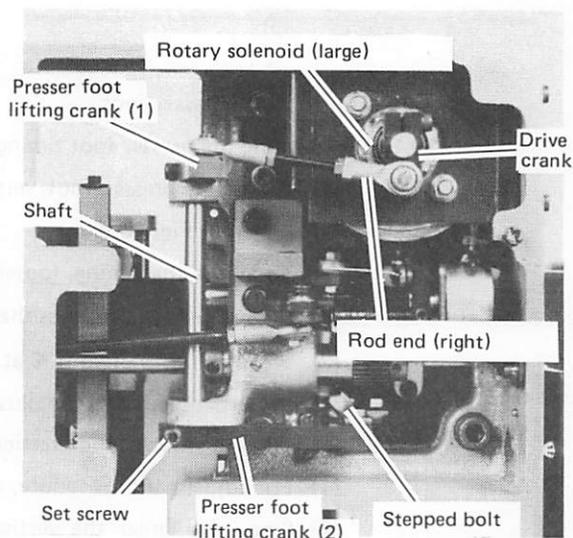


Fig. 10.11

10.1.10 Adjusting the thread trimmer

- (1) Adjust the cam follower so that the roller is found on the cam shoulder about 1 mm distant from the thread trimmer cam, as shown in Fig. 10.12.
- (2) Depress the cam follower crank in the direction of arrow shown in Fig. 10.12 by hand to make sure the roller can be engaged and disengaged with the cam groove smoothly.
- (3) The roller engaging and disengaging area should be within the range where the cam groove is concentric with the arm shaft.

If the roller cannot be engaged and disengaged smoothly, check that the roller is on the shoulder, loosen the nut shown in Fig. 10.12, tighten the stopper screw until it comes into contact with the cam follower crank stopper, loosen the stopper screw by about 1/3 turn and then tighten the nut.

- (4) To remove the knife assembly, loosen E-type stop ring (circlip) shown in Fig. 10.13, feed plate shown in Fig. 8.1 and four slide plate set screws.

The movable and fixed knives and slide plate can be removed at the same time.

- (5) To adjust the movable knife, loosen the movable knife position adjusting screw on the back of bed and adjust the knife drive crank so that the movable knife point stops 0.5 mm apart from the hook retainer when the stitching is stopped, as shown in Fig. 10.13. (See Fig. 10.14.)

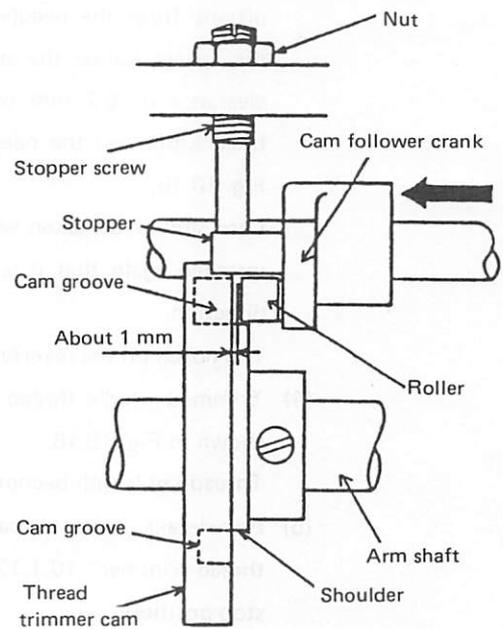


Fig. 10.12

If the movable knife is located too far from the needle hole, thread may not be trimmed satisfactorily, or the E-type stop ring strikes the thread guide set screw shown in Fig. 10.7. However, the movable knife located too close to the needle hole, trimmed needle thread tail might be caught between the fixed knife and the movable knife.

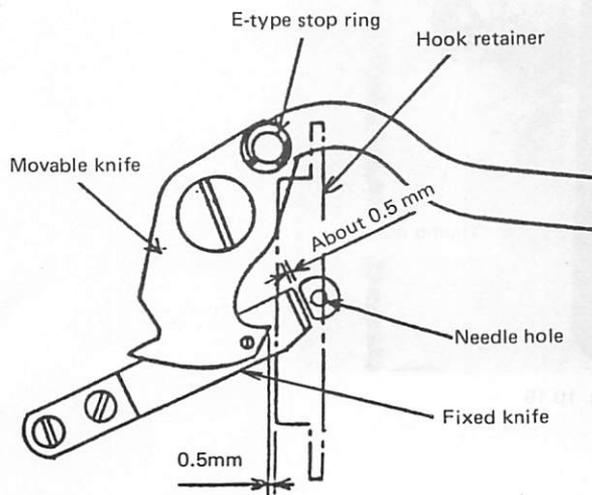


Fig. 10.13

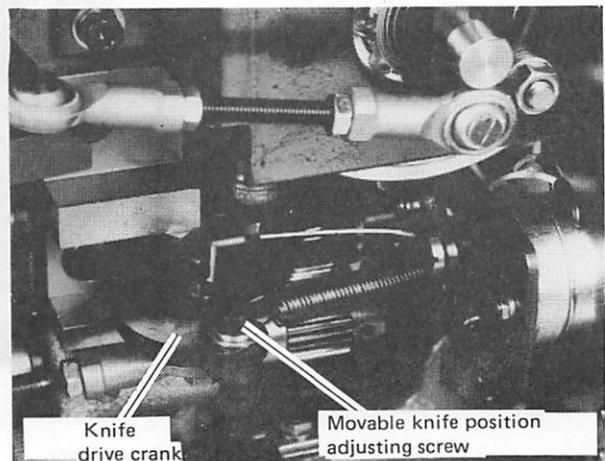


Fig. 10.14

10.1.11 Adjusting the trimmed thread tail length

- (1) Length of thread tail left on the bobbin after trimming is not adjustable. If trimmed thread does not extend longer than about 22 mm from the bobbin case horn (see Fig. 9.11), stitch may skip. In this case, the following checking and adjustment should be performed.
- (2) Since trimmed thread contracts when bobbin thread tension is too large, or when elastic thread is used, decrease bobbin thread tension and needle thread tension as well. For the same reason, it is recommended to wind thread with smaller tension.
- (3) When the clearance of Fig. 10.15 is more than 0.2 mm, thin thread may be cut before the movable knife is actuated.

To prevent this, install the fixed knife being distant from the needle plate hole or remove the spacer below the needle plate to provide clearance of 0.2 mm or smaller between the fixed knife and the needle plate, as shown in Fig. 10.15.

Care should be taken when the needle plate is installed again that it is not installed in wrong direction.

The notch on the reverse of needle plate should be on the same side as the fixed knife.

- (4) Trimmed needle thread tail length can be adjusted by turning the pretensioner thumb nut shown in Fig. 10.16.

Thread tail length becomes short when the thumb nut is turned clockwise.

- (5) For details, refer to para. 10.1.5 "Adjusting the thread guide..", 10.1.10 "Adjusting the thread trimmer" 10.1.12 "Adjusting the thread release" and 10.1.14 "Adjusting the needle stop position..."

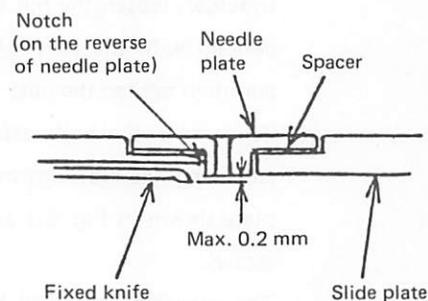


Fig. 10.15

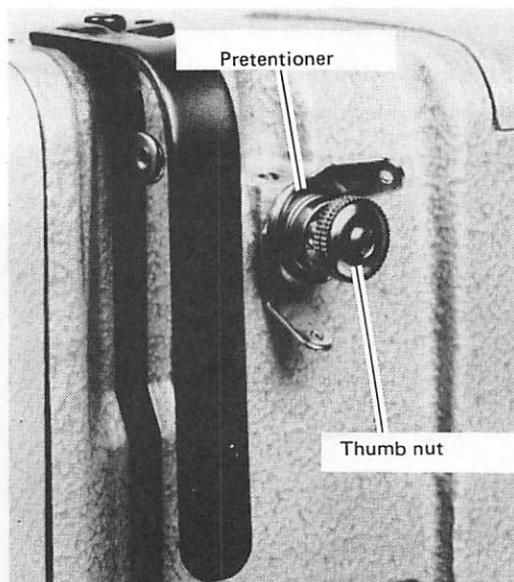


Fig. 10.16

10.1.12 Adjusting the thread release (tension disc pressure)

- (1) If thread release is not properly adjusted, trimmed thread tail length becomes short and stitch may skip or needle thread may leave the needle at start of sewing.
- (2) If the tension discs do not close when the presser foot is lowered, needle thread tension becomes faint and thread tensions are unbalanced.
- (3) When the thread release is properly adjusted, gap ranging from 0.8 mm to 1.0 mm is developed when the tension discs open, as shown in Fig. 10.17.
- (4) The tension discs open when the presser foot rises (the work holder is at the home position while the power is ON, or FEED without stitching), or when threads are trimmed.

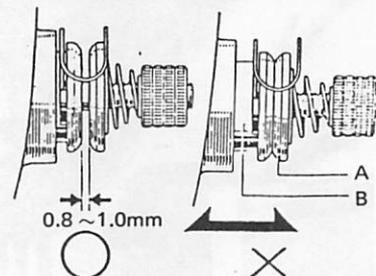


Fig. 10.17

- (5) Adjusting the tension disc release (opening degree of tension disc when the presser foot is lifted)

Lean the head and loosen the needle thread tension regulator set screw.

Fully turn the rotary solenoid (large) drive crank shown in Fig. 10.11 to lift the presser foot and adjust the position of the tension regulator casing (B) in the direction indicated by arrow in Fig. 10.17, so that the tension discs open 0.8 mm – 1.0 mm.

- (6) Adjusting the tension disc release (opening degree of tension disc when threads are trimmed)

Fully turn the rotary solenoid (small) crank in the direction indicated by arrow in Fig. 10.18 and adjust the position of the crank after releasing the crank set screw, so that the tension discs open 0.8 mm – 1.0 mm.

If tension disc opening is not adjustable within the movable range of the drive crank, loosen the wire clamping screw and adjust the position of the wire.

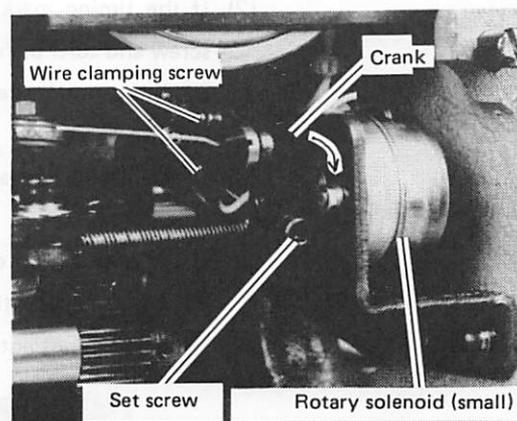


Fig. 10.18

10.1.13 Adjusting the wiper

- The wiper drive crank should be fixed to the rotary solenoid shaft so that it can swing evenly to the left and the right, as shown in Fig. 10.19.
- Make sure the drive crank can rotate through its entire movable range when the rotary solenoid is turned by hand with the drive crank depressed backward in the direction perpendicular to the illustration of Fig. 10.19.
- Locate and fix the driven crank so that the wiper point is found at position shown in Fig. 10.20 when the wiper is returned to the start position.
- For adjustment of height of the wiper, refer to para. 9.10 (2).

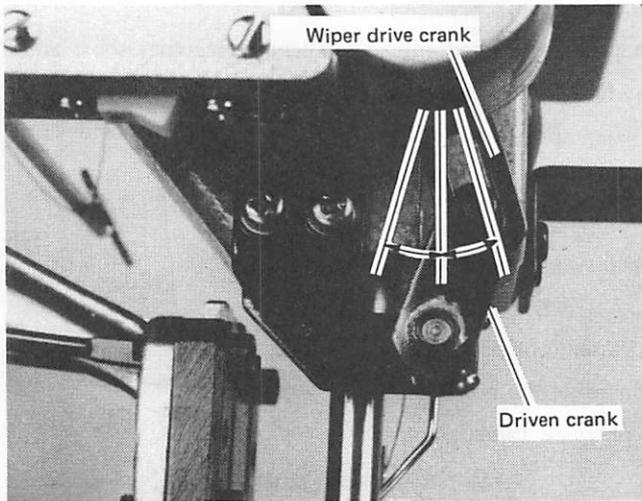


Fig. 10.19

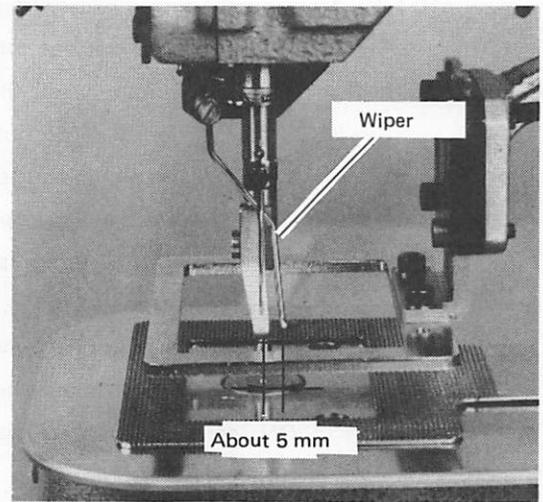


Fig. 10.20

10.1.14 Adjusting the needle bar stop (UP) position (Fig. 10.21)

- (1) When stitching is completed, the sewing machine should stop, the timing mark (A) on the arm being aligned with the timing mark (B) on the pulley.
- (2) If the timing marks are misaligned over 3 mm, loosen the synchronizer shaft coupling set screw and turn the coupling to adjust the needle bar stop (UP) position. Stopping timing delays when the coupling is turned clockwise, and advances when turned counter-clockwise.
- (3) If the needle bar stop is too early, the needle thread may leave the needle eye at start of stitching.
If the needle stop delays, the needle stops at a lower position and the wiper might be caught by the needle, or the movable knife does not move since the cam follower roller of thread trimmer cannot enter the cam groove.

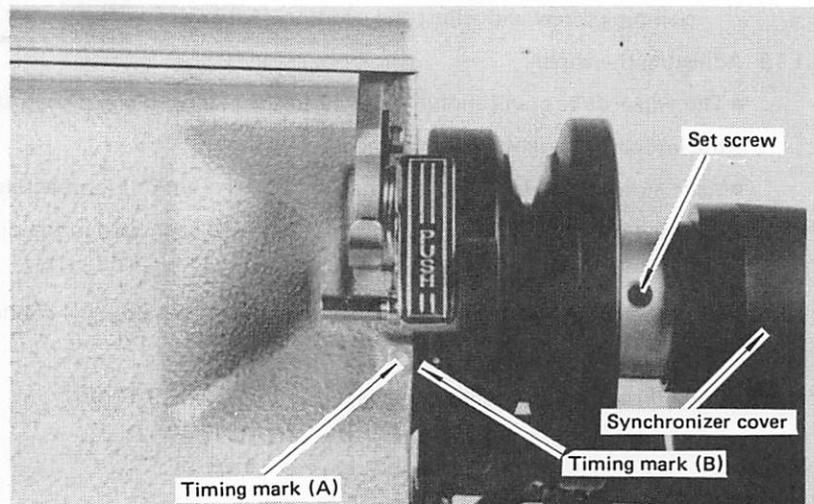


Fig. 10.21

Notes: Although the needle stop (DOWN) position is not required to be adjusted for usual operation, it is recommended to make the following checking:

- (1) Draw out the synchronizer cover toward the cable (see Fig. 10.21).

- (2) There are three position detecting discs in the synchronizer: the first one (red) is for detection of needle DOWN position, the second one (black) is for detection of UP position, and the third one (blue) is not in use.
- (3) Turn the first disc (red) to align the matching holes. (hold the circumference of the first disc to rotate).

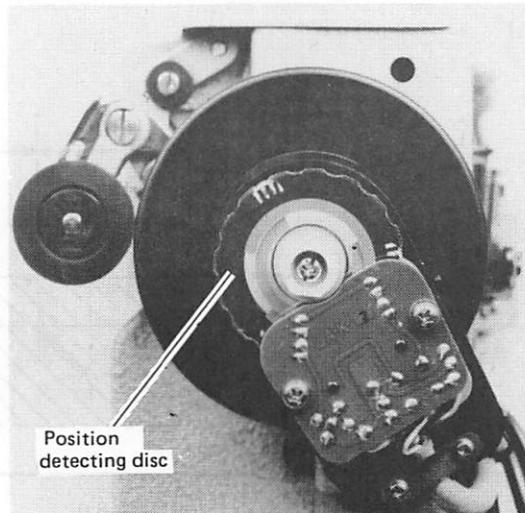


Fig. 10.22

10.1.15 Adjusting the home position

- (1) Install the home position detecting disc so that it does not come into contact with the X-Y detector.
- (2) The home position is established where the stepped portion of home position detector meets the center of X-Y detector (small).
- (3) The X-Y detector (large) is for detection at the limits of movable range.

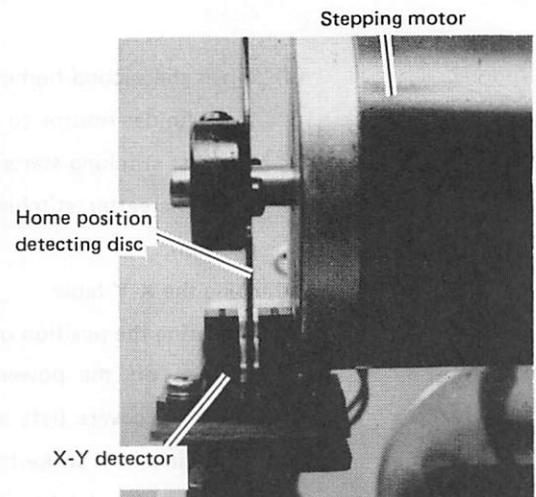


Fig. 10.23

When notches shown in Fig. 10.25 is provided in the home position detecting disc, the sewing machine stops and "ERROR" lamp lights when the notch is sensed.

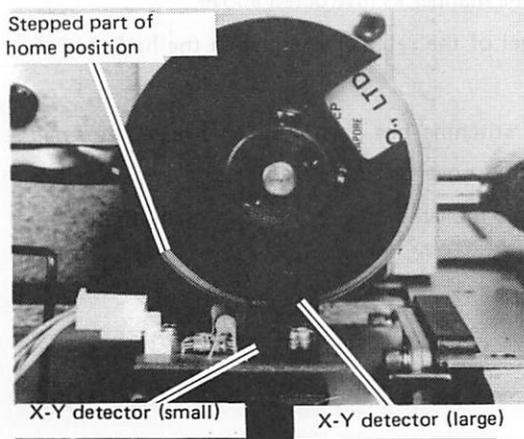


Fig. 10.24

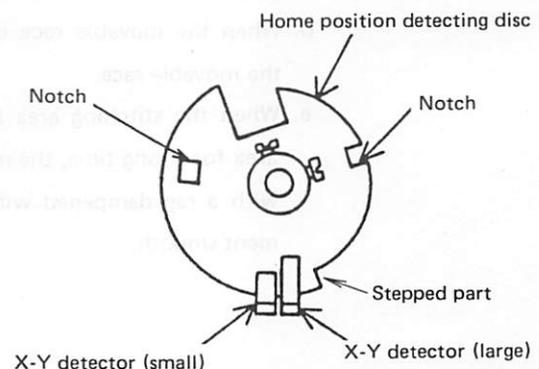


Fig. 10.25

- (4) Although the sewing area measures 60 mm by 40 mm in terms of mechanical restriction, the electrically controllable sewing area measures 30 mm each in left and right direction, and 20 mm each in forward and backward direction from the home position.
- (5) When the home position is changed, as shown by bold arrow in Fig. 10.26 for example, the sewing area is restricted to the shaded area. (Refer to para. 12.1 (C).)
- 12.1 (C).)

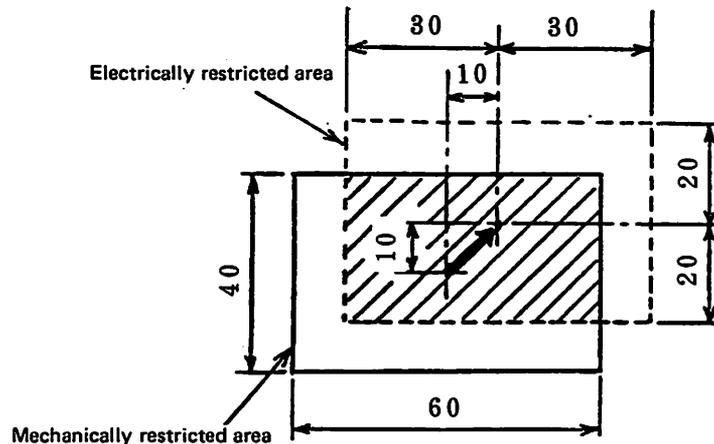


Fig. 10.26

- (6) When the second home position is stored in PROM by using a PROM writer PTN-4000, the work holder returns to the original home position when home return operation is done, and the first stitching starts from the original home position, stopping at the second home position. Thereafter, stitching starts from the second home position, and ends at the second home position.

10.1.16 Adjusting the X-Y table

(1) Adjusting the position of X-Y table

- a. Turn off the power and remove the needle, presser foot, X-Y covers (left and right) and X covers (left and right). Then adjust the table so that the movable race end and retainer end strike the stopper almost at the same time when the movable race is moved leftward and rightward. (See Fig. 10.27 and 10.28.)
- b. If the retainer strikes the stopper earlier than the movable race, let hit the retainer against the stopper several times to adjust.
- c. Adjust the table in the Y direction in the same manner as instructed above.
- d. When the movable race is moved, the travel of the retainer is equal to the half that of the movable race.
- e. When the stitching area is expanded after stitching has been done in a relatively small area for a long time, the movable race may not move smoothly. In this case, wipe the race with a rag dampened with oil and move the movable race by hand to make the movement smooth.

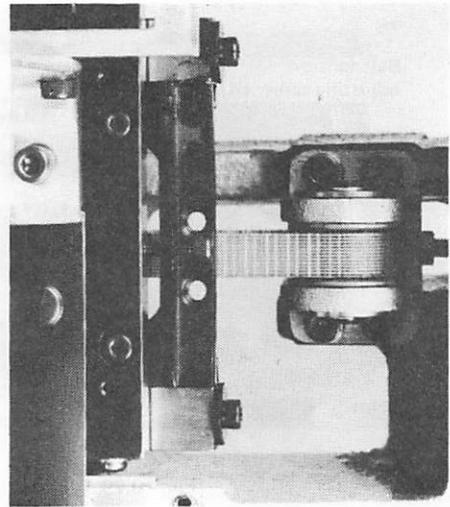
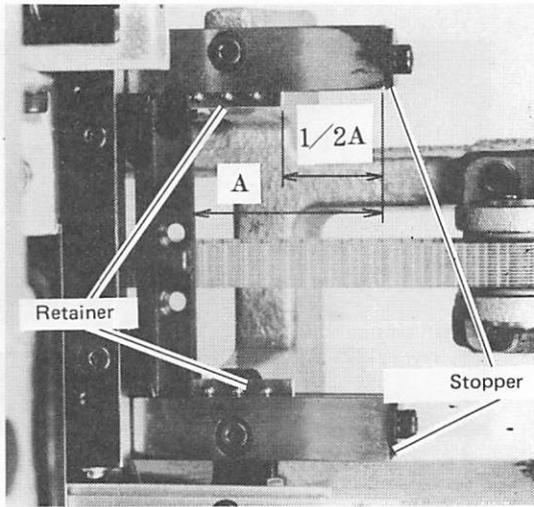


Fig. 10.27 When movable race is located at the right extremity

(2) Adjusting the X-Y table contact pressure

a. To adjust contact pressure of the X-Y table, remove the X-Y covers (left and right) shown in Fig. 10.28 and the X covers and loosen fixed race set screws (X) (2 screws) to such an extent that the fixed race (X) may be moved.

b. X-axis contact pressure increases when two contact pressure adjusting screws (X) are tightened.

c. Y-axis contact pressure can be adjusted in the same manner as for the X-axis.

d. Contact pressure should be as light as possible, and not cause any play.

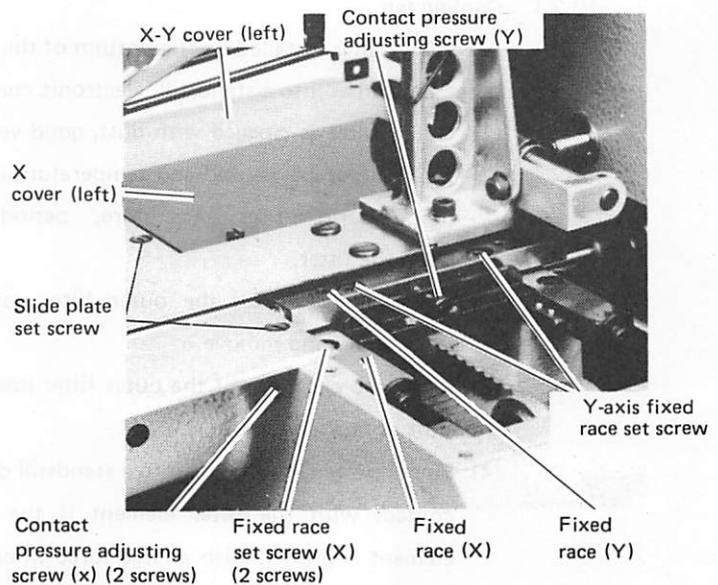


Fig. 10.28

10.1.17 Adjusting the belt tensions (X-Y table)

(1) To adjust tension of the X-axis belt, remove the right X-Y cover (see Fig. 10.28), loosen the nut shown in Fig. 10.29, loosen the four bracket set screws to such a degree that the bracket can be moved and then tighten the belt tension adjusting screw (X).

(2) To adjust tension of the Y-axis belt, remove the belt cover and motor cover, loosen the bracket set screw shown in Fig. 10.30 and tighten the belt tension adjusting screw (Y).

(3) The recommended belt tension is that no slack occurs when belt is lightly depressed by finger.

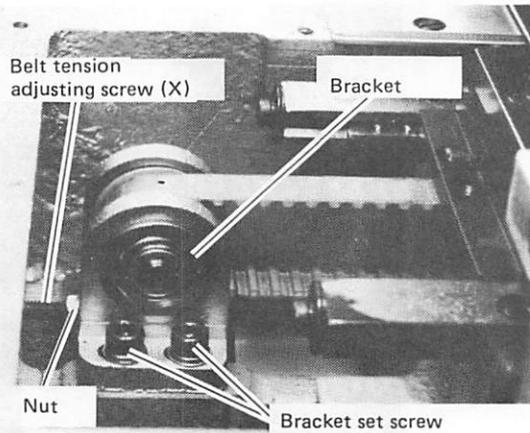


Fig. 10.29

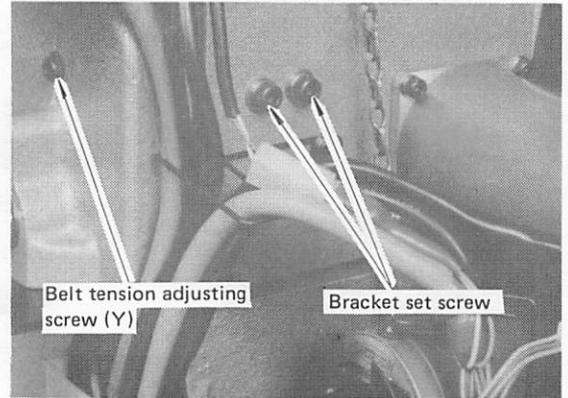


Fig. 10.30

10.2 Control box

10.2.1 Cooling fan

A cooling fan is installed on the bottom of the control box for cooling the control box interior. If the fan comes into a standstill, electronic components in the control box might be damaged.

- (1) If the filter is clogged with dust, good ventilation cannot be assured and temperature in the box interior rises. Therefore, periodically clean the filter.
- (2) To clean, lever up the outer filter using a screwdriver and remove.
- (3) After the cleaning, fit the outer filter into key slots at four corners.
- (4) Since the fan may come into a standstill due to contact with the filter element if the filter element is pressed with a large force when it is installed, carefully press the filter frame to install.

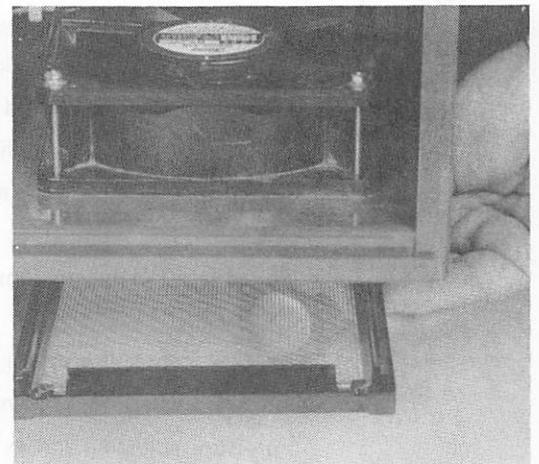


Fig. 10.31

10.2.2 Fuse

For fuse, each one glass-tube fuse of 10A rating and 20A rating is used. For location of each fuse, See Fig. 3.5. (Size of fuse: $\phi 6.4 \times 30$)

10.2.3 Magnetic breaker

Table 10.1 shows the thermal setting of the magnetic breaker (set at the factory).

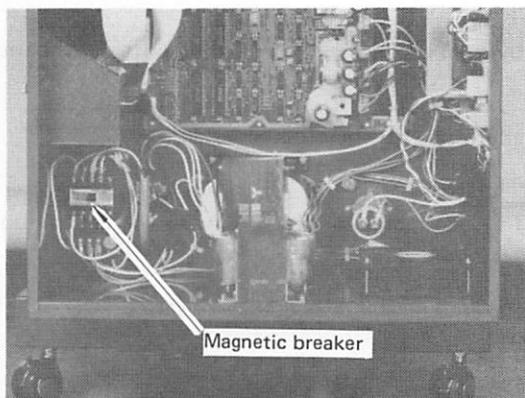


Fig. 10.32

Table 10.1

Phase	Power supply		Thermal setting (A)
	Voltage (V)	Frequency (Hz)	
Single-phase	100	50/60	7.8
Single-phase	110	60	6.5
Single-phase	120	60	6.5
Single-phase	200	50/60	3.7
Single-phase	200–240	50	3.4
Three-phase	200	50/60	2.6
Three-phase	220	60	2.6
Three-phase	380	50	2.1
Three-phase	400–415	50	2.1

10.3 LIMIT-STOP Z motor

10.3.1 Filters

Periodically clean the air filters at the end cover and on pulley side. (Note that clogged air filter may cause overheat to the motor.)

10.3.2 Motor

The motor is usually not required to be overhauled.

If stop position becomes inaccurate, rotation becomes unstable, or metallic sound occurs when the motor is braked, check the motor in the following order:

- (1) Turn off the power to stop the motor. (About 2 min. is required until the motor stops completely.)
- (2) Remove the belt and motor pulley.
- (3) Remove the cable plug (for brake) connected to the control box from the bracket.
- (4) Remove three bracket mounting screws.
- (5) Remove the bracket. The brake assembly will be removed together with the bracket.
- (6) Check the brake lining and brake disc for condition. If the brake lining is found worn out, replace it.
- (7) Holding the clutch shaft by hand, carefully pull it. The driven member (cup) and brake lining can be removed together with the clutch shaft.
If they cannot be removed, prepare two bolts (M5 x 0.8 thread length of min. 45 mm) and screw them into the tapped holes in the cup and boss (made of aluminum) to remove the clutch shaft.
- (8) To replace brake lining, remove the bearing on the pulley side and install a new brake lining and bearing. When the brake lining is installed, align the tapped hole mentioned at step (7) with holes in the brake lining. (Whenever bearing is removed, install a new bearing.)
- (9) Assemble each part in reverse steps to the disassembling. In assembling, if the clutch shaft cannot be set in place, lightly tap the clutch shaft end with mallet. (Do not tap it strongly).
- (10) When the brake lining is replaced, turn the clutch shaft by hand after assembling to make sure it can smoothly rotate and try operation for matching.

To match the brake lining, start the motor and depress the pedal at least 100 times.

***Cautions**

- During disassembling and assembling, carefully handle the brake cup avoiding its deformation or damage.
- Since bearing of special specification is used, address to us when it is replaced.

10.4 Prevention of malfunction due to noise, and grounding

- (1) Malfunction caused by noise may be eliminated to a certain extent by grounding the control box, synchronizer and sewing machine head.

(When the source voltage is larger than AC150V, grounding is indispensable for safety.

Leave the grounding work to qualified electrician.)

- (2) Do not locate the sewing machine near equipment that generates intense noise, such as high-frequency welders.

11. REPLACING THE PROM

PROM is installed in the socket on the printed circuit board (PCB) encased in the PROM cassette.

Referring to Fig. 11.1 and 11.2, replace it as follows:

- (1) Lever out the cassette cover using a screwdriver.
- (2) Take out the P.C. board from the cassette.
- (3) Remove the PROM from the socket using a screwdriver.
- (4) Install a new PROM in the socket. When installing, be careful not to place it in wrong direction, otherwise the PROM might be damaged.
- (5) Put the printed circuit board into the cassette and install the cassette cover.
- (6) Use care not to directly touch the P.C. board terminals (pins).
- (7) When removing the PROM with screwdriver, care should be taken not to damage the circuit pattern. It is recommended to use a IC remover (Type P-63, TAKARA TOOL S/S, for example).
- (8) Do not place the P.C. board and PROM on statically charged cloth or plastic, but place on a metallic sheet.

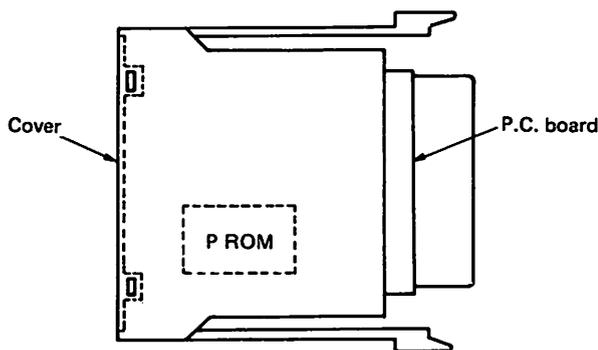
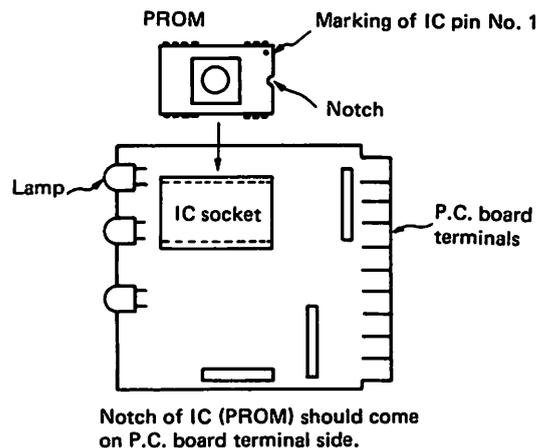


Fig. 11.1 Cassette



Notch of IC (PROM) should come on P.C. board terminal side.

Fig. 11.2 P.C. board

- (9) Optionally available PROM cassette for memory expansion should be installed as shown in Fig. 11.3.

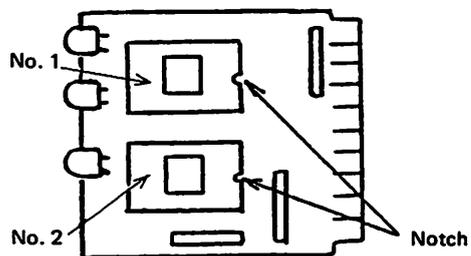


Fig. 11.3

12. AUXILIARY FUNCTIONS

The DIP switches SW₁ and SW₂ on the CPU card in the control box have the following functions:
(The switches are protected with transparent cover. After the setting, be sure to install the cover again.)

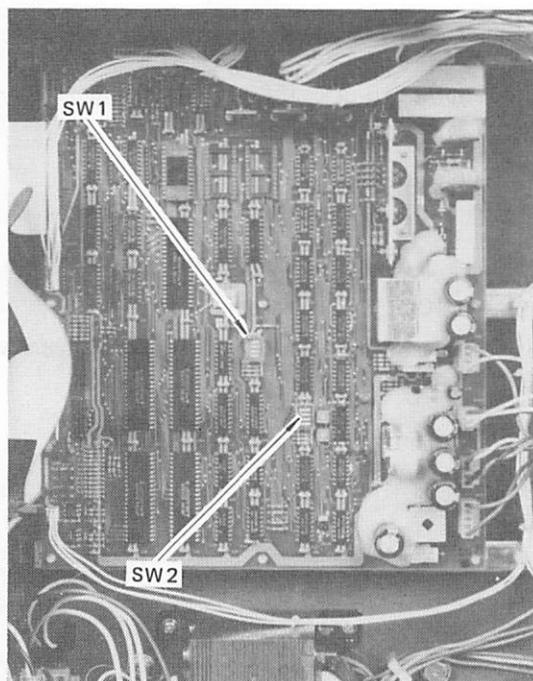
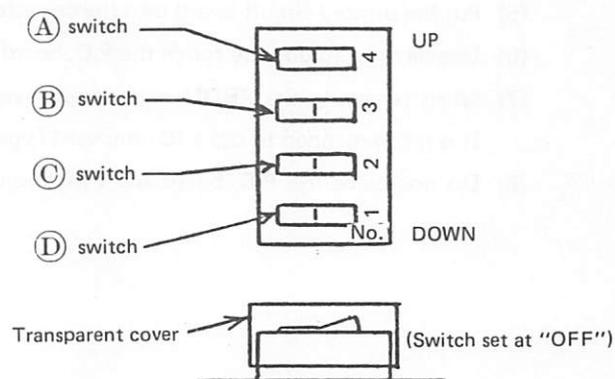


Fig. 12.1



Details of SW1 and SW2

12.1 SW₁

12.1.1 Repeat function

When (A) switch is set at "OFF", only one pattern is stitched and the work holder stops at the UP position (even when the start switch is kept depressed).

With (A) switch set at "ON", the work holder goes up when the power is turned on, the work holder lift switch is depressed to "ON" and the RESET/HOME switch is set to "REST" position. However, it remains lowered when the stitching is completed, and stitching can be resumed when the START switch is depressed again. Therefore, stitching can be repeated with work holder lowered.

The function is very useful when a pattern is sewn repeatedly, or when the embroidery clamp frame is used.

12.1.2 Home position return cancellation at power turning on

With (B) switch of SW₁ set at "OFF", the work holder automatically returns to the home position when the POWER ON switch is depressed and the needle is at UP position.

If the needle is not at UP position, however, the ERROR lamps "1" and "2" (red) light and the sewing machine does not start when the START switch is depressed.

In this case, let return the work holder by operating the RESET/HOME switch (refer to para. 5.7). The ERROR lamps will go out and the work holder will return to the home position after the needle goes up.

With (B) switch set at "ON", the ERROR lamps "1" and "2" (red) light, no matter where the needle is located, when the power is turned on. The work holder does not return to the home position and the machine does not start.

The work holder can be returned to the home position when the RESET/HOME switch is operated.

This function is used to avoid home position return at the time the power is turned on (when, otherwise the work holder may collide with other part of machine).

12.1.3 Enlargement/reduction (SCALE) cancellation

When (C) switch is at "OFF", the enlargement/reduction of pattern is possible (refer to para. 5.3) and sewing area measuring each 30 mm in left and right directions, and each 20 mm in forward and backward directions is available. (Fig. 10.26)

By setting (C) switch to "ON", the enlargement/reduction function can be reset, and no electrical restriction is imposed on the sewing area (refer to para. 10.1.15).

In this case, the pattern stored in the PROM is stitched in the real size (100%).

(D) switch is provisional, and has no function.

12.2 SW₂

These DIP switches are used to set fabric feed timing.

Table 12.1 shows timing at each switch setting.

(B) switch is set at "ON" when the sewing machine is shipped, thereby feeding of fabric starts when the arm shaft rotates by 4 pulses (one pulse corresponds to 5.6° of arm shaft rotating angle) after the synchronizer detects the needle DOWN position.

When (B) and (C) switches are set to "ON", for example, number of pulses becomes equal to 6 pulses and therefore feeding start timing delays by 2 pulses (equivalent to 11.2° of arm shaft rotating angle).

Table 12.1

Switch/Setting	Timing
(A) "ON"	8 pulses
(B) "ON"	4 pulses
(C) "ON"	2 pulses
(D) "ON"	1 pulse

Fabric feed timing can be checked as follows:

- (1) With the needle at UP position, turn on the power.
- (2) Depress the work holder lift switch to lower the work holder.
- (3) Start the sewing machine and depress the HALT switch while actual stitching is done.
- (4) While the operation is suspended, lean the machine head and remove the V-belt.
- (5) Without the V-belt, return the head.
- (6) Depress the START switch to "ON".

- (7) By turning the balance wheel by hand, the work holder is driven by the stepping motor.
- (8) Since the work holder movement corresponds to fabric feed timing, visually check the timing in reference to height of the needle.
- (9) In several seconds after the START switch is set to "ON", the ERROR (alarm) lamp lights (indicating that the V-belt is out of position) and the LIMIT-STOP Z motor clutch will be disengaged. However, it is OK to keep checking by turning the balance wheel by hand.

Details of connectors are shown below. (For location of each connector, see Fig. 3.5 and Fig. 13.1)

13.2 Motor (All connectors viewed from lead wire side)

(1) For three-phase connection

(200, 220, 400/415V)

(380V)

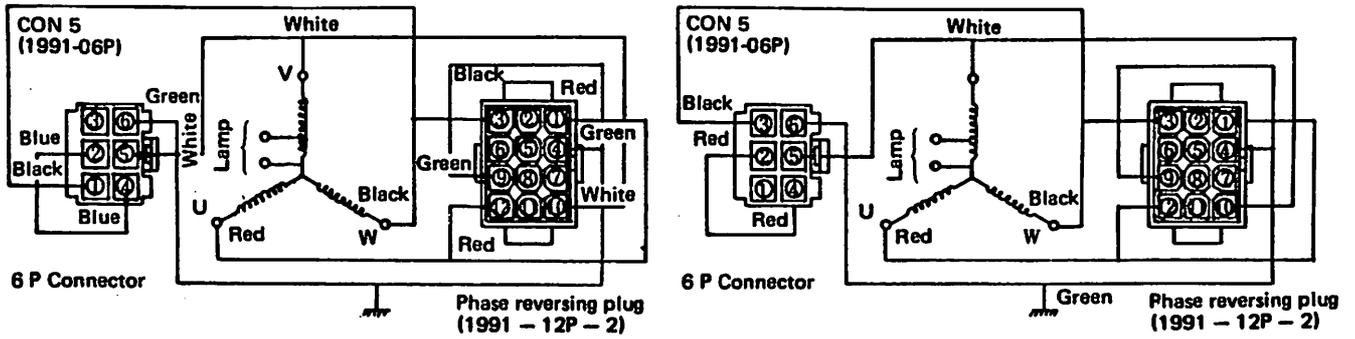


Fig. 13.2

(2) For single-phase connection

(100, 110V)

(220, 230, 240V)

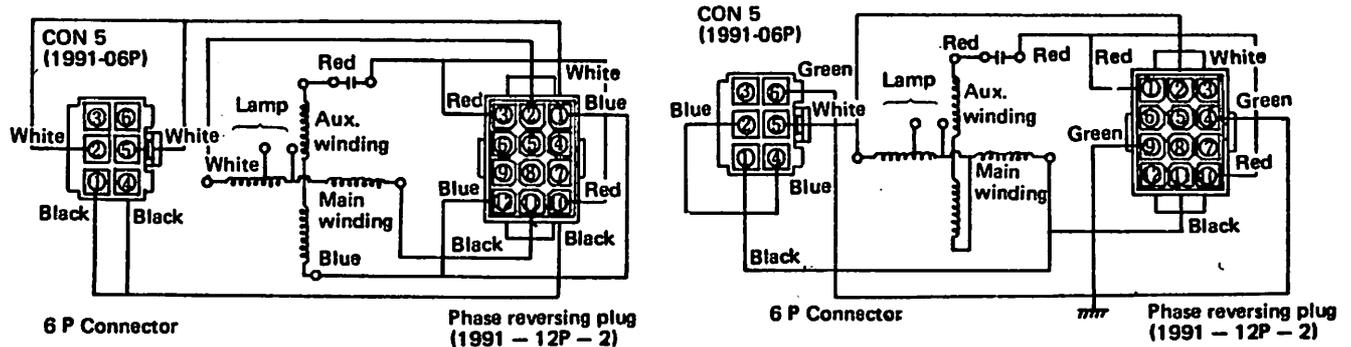


Fig. 13.3

(3) For clutch and brake connection

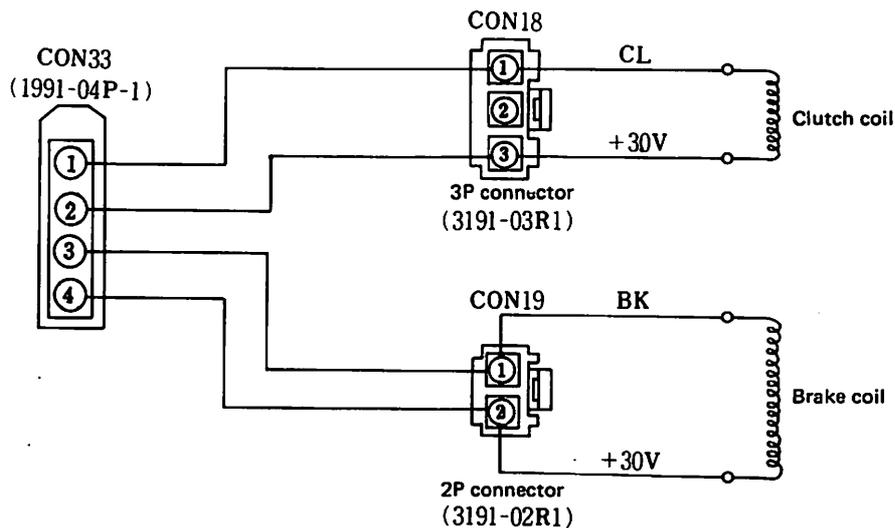


Fig. 13.4

13.3 Stepping Motor

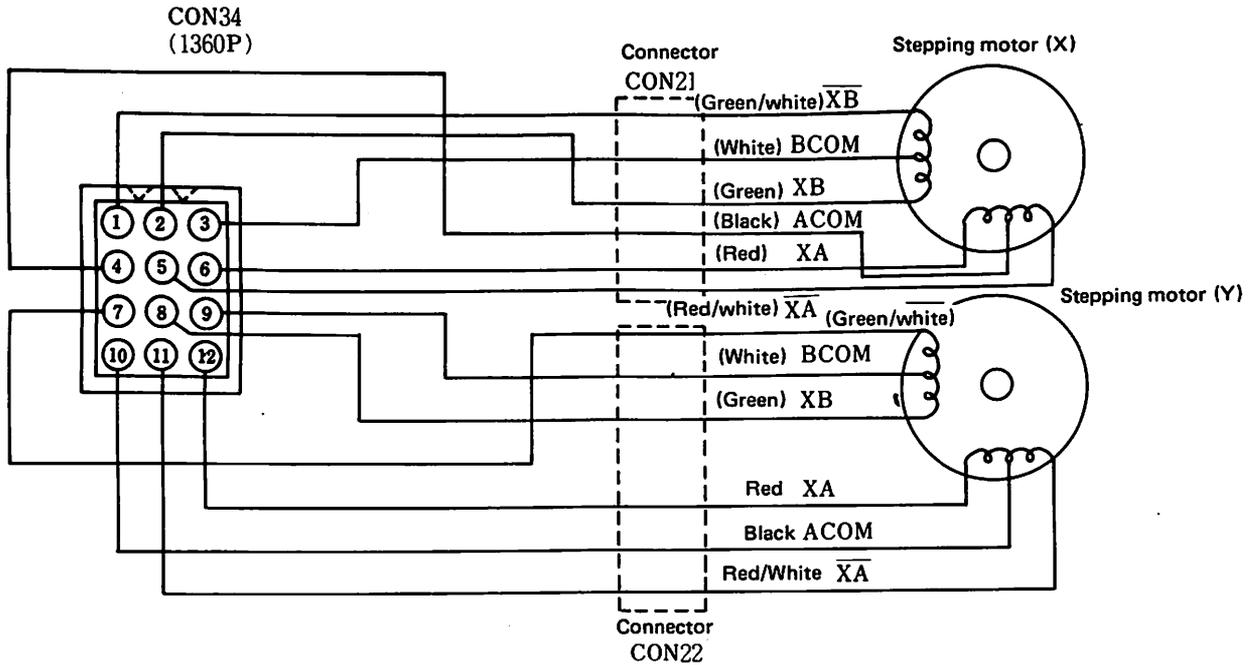


Fig. 13.5

13.4 Synchronizer

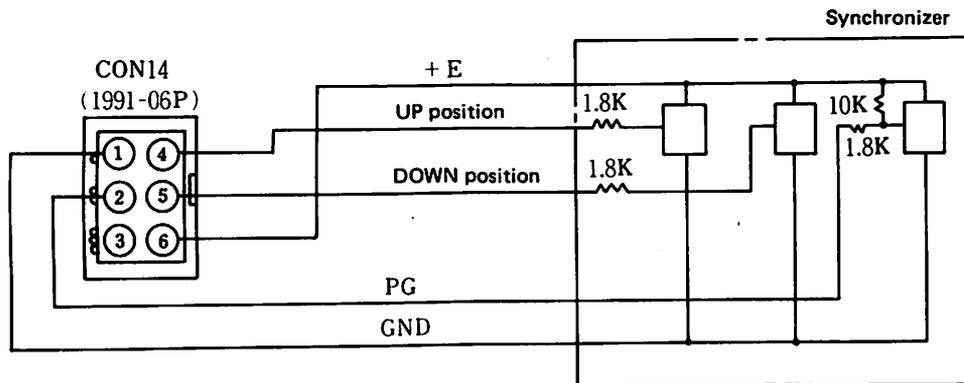


Fig. 13.6

13.5 Start switch, outer presser switch

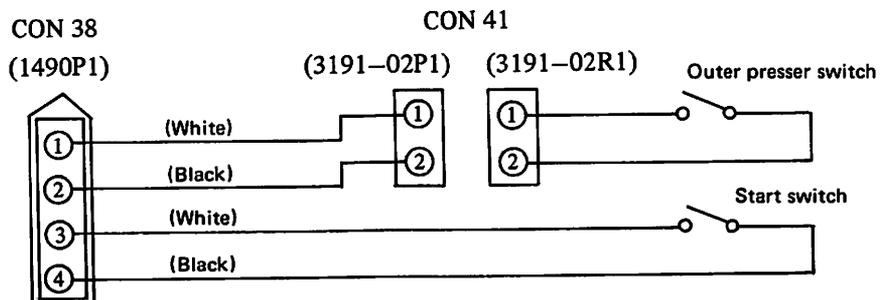


Fig. 13.7

13.6 Solenoids in Machine Head

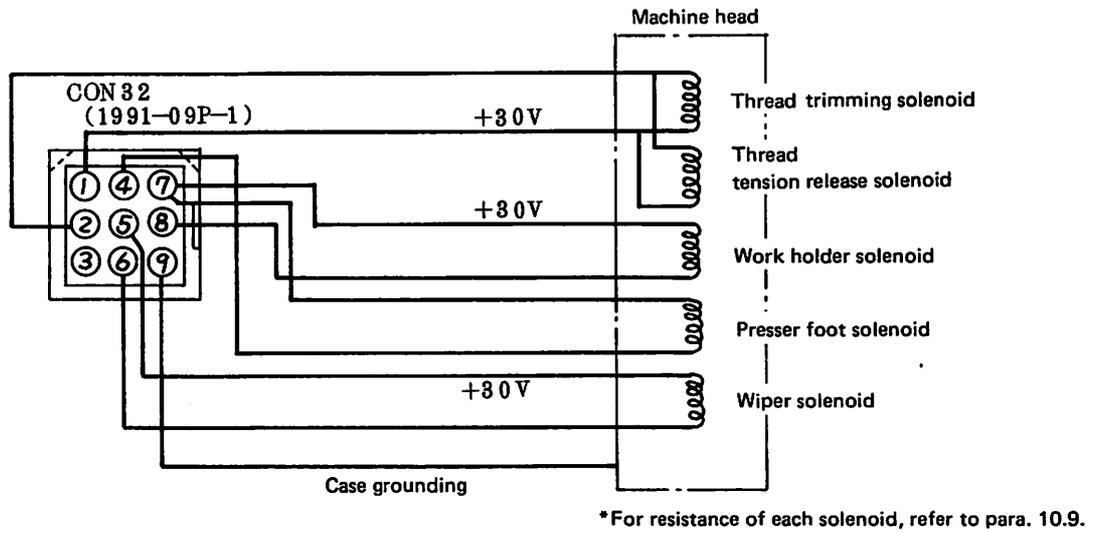


Fig. 13.8

13.7 HALT Switch

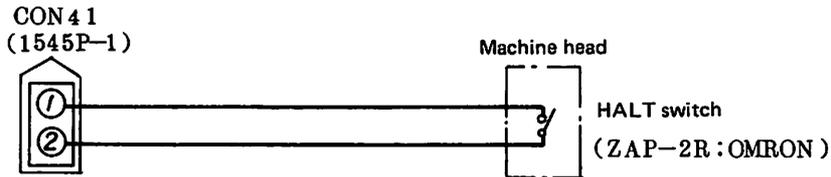


Fig. 13.9

13.8 Stepping Motor Position Detector

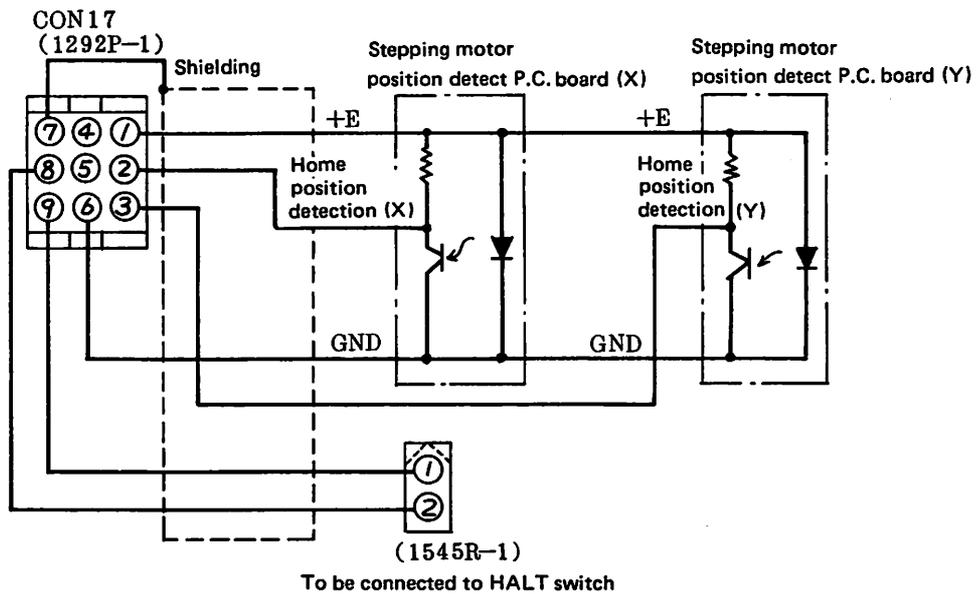


Fig. 13.10

13.9 Flat cable connection table

PLK-1D-CPU ↔ PLK-1-CST

Connector PS-50SEO-D4P1-1C

Table 13.1

CPU	Signal name	CST	CPU	Signal name	CST
1A	GND	1A	1B	GND	1B
2A		2A	2B	CS0	2B
3A	D4	3A	3B	CS3	3B
4A	D3	4A	4B	CS4	4B
5A	D5	5A	5B	CS5	5B
6A	D2	6A	6B	CS6	6B
7A	D6	7A	7B	CS7	7B
8A	D1	8A	8B	WR	8B
9A	D7	9A	9B		9B
10A	D0	10A	10B		10B
11A	A1	11A	11B	A0	11B
12A	A2	12A	12B		12B
13A	A10	13A	13B		13B
14A	A3	14A	14B		14B
15A	CST-CHECK	15A	15B		15B
16A	A4	16A	16B	A11	16B
17A	A5	17A	17B		17B
18A	A9	18A	18B		18B
19A	A6	19A	19B		19B
20A	A8	20A	20B		20B
21A	A7	21A	21B		21B
22A	CS1	22A	22B		22B
23A		23A	23B		23B
24A	CS2	24A	24B		24B
25A	+VCC	25A	25B	+VCC	25B

PLK-1D-CPU ↔ PLK-11-PAL

Connector PS-40SEO-D4P1-1C

Table 13.2

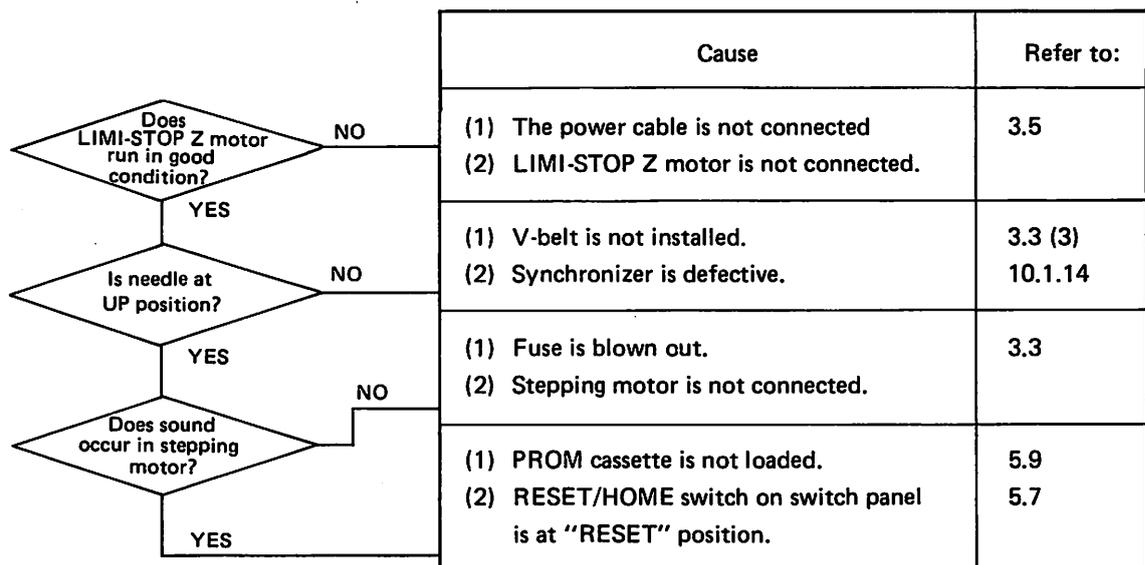
CPU	Signal name	PAL	CPU	Signal name	PAL
1A	GND	1A	1B	GND	1B
2A	ERR4	2A	2B	ERR3	2B
3A	ERR2	3A	3B	ERR1	3B
4A	JOG (-)	4A	4B	JOG (+)	4B
5A		5A	5B		5B
6A	XSCLS	6A	6B	RESET/HOME	6B
7A	YSCLS	7A	7B		7B
8A		8A	8B	STOP/MOVE	8B
9A	YSCALE 8	9A	9B	PSE 1	9B
10A	YSCALE 4	10A	10B	PSE 2	10B
11A	YSCALE 2	11A	11B	PSE 4	11B
12A	YSCALE 1	12A	12B	PSE 8	12B
13A	YSCALE 10	13A	13B	SPMAX 1	13B
14A	YSCALE 20	14A	14B	SPMAX 2	14B
15A	YSCALE 40	15A	15B	SPMAX 4	15B
16A	YSCALE 80	16A	16B	SPMAX 8	16B
17A	XSCALE 8	17A	17B	XSCALE 80	17B
18A	XSCALE 4	18A	18B	XSCALE 40	18B
19A	XSCALE 2	19A	19B	XSCALE 20	19B
20A	XSCALE 1	20A	20B	XSCALE 10	20B

14. TROUBLESHOOTING

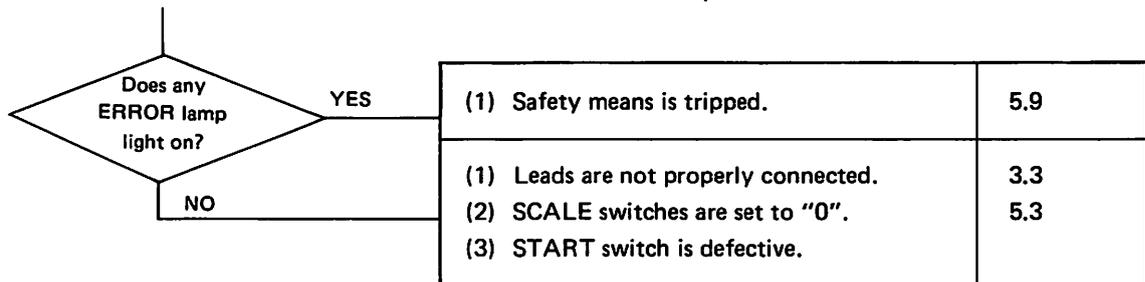
If any trouble occurs with the sewing machine, the following checking should be performed prior to elaborate troubleshooting.

- (1) Is the power source at the specified voltage?
Are all connectors, phase reversing plug and switches properly set?
- (2) Are the connectors in the control box properly installed?
- (3) Is the PROM cassette properly loaded in position?
(See the pilot lamp on the cassette to check.)
- (4) Does any ERROR (alarm) lamp on the panel light on?
(If any lamp is found lighting, trace the cause and remedy.)
- (5) If any fuse not blown out?
(Two fuses are used in the sewing machine.)

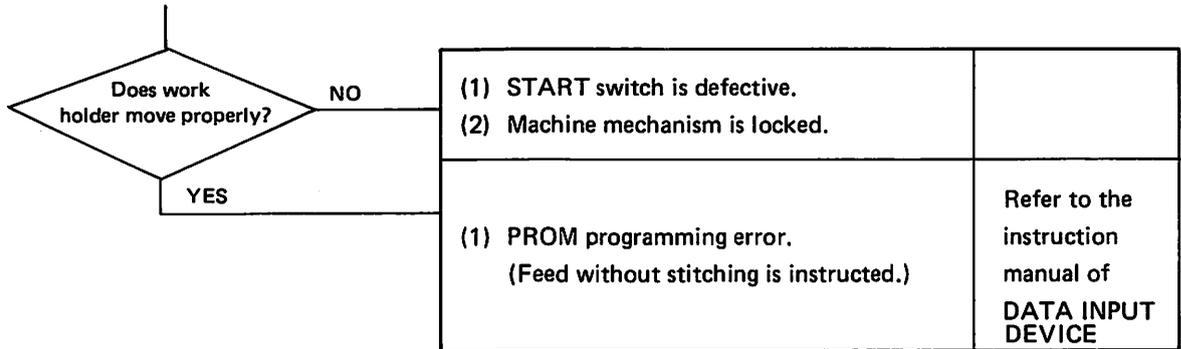
14.1 The work holder does not return to the home position when the power is turned on . . .



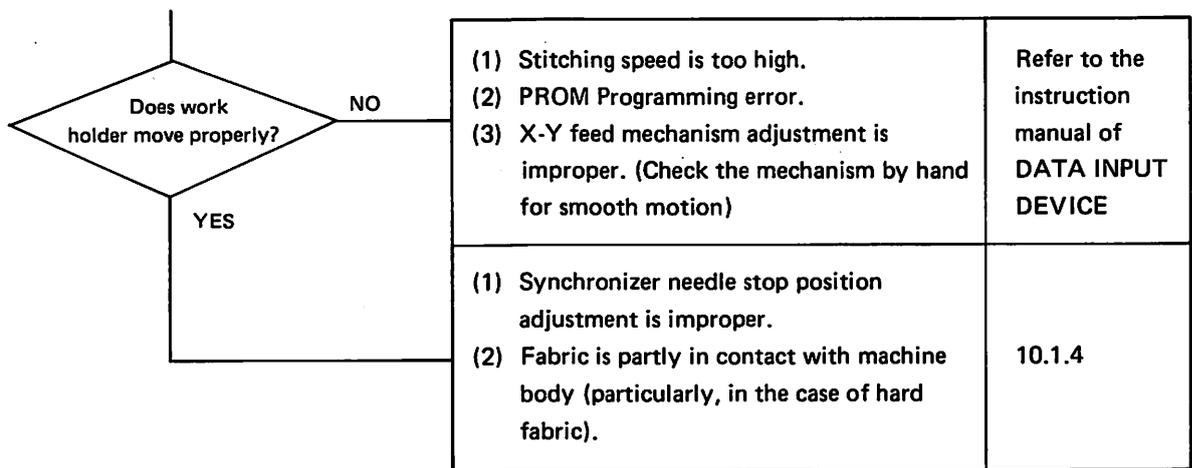
14.2 The work holder does not move when the START switch is operated . . .



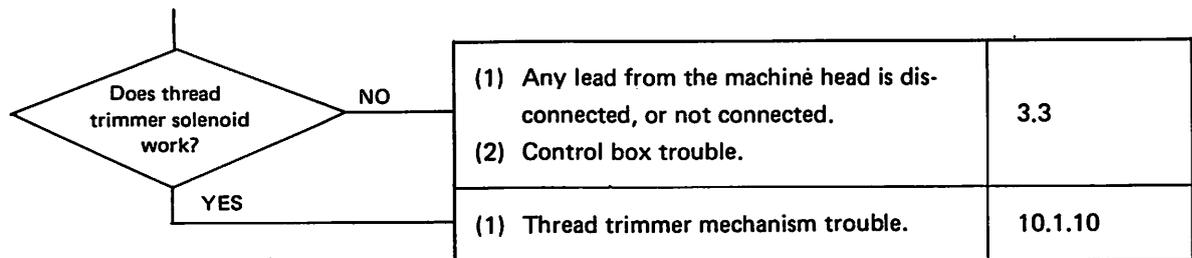
14.3 Sewing machine does not run . . .



14.4 Stitched pattern deviates . . .



14.5 Thread cannot be trimmed satisfactorily (the same is applied to the wiper and work holder) . . .



14.6 HALT (stitching suspension) operation is impossible . . .

<p>(1) HALT switch trouble (2) Any lead of HALT switch is disconnected, or not connected. (3) Control box trouble.</p>	<p>3.3</p>
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14.7 Stitching speed is unusually low . . .

(1) Torque required to drive the stitching is too large due to distorted mechanism. (2) Synchronizer trouble.	10.1.14
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14.8 Stitching speed is unusually high . . .

(1) Synchronizer pulse generator is disconnected. (2) Synchronizer trouble or improper adjustment.	10.1.14
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14.9 Checking the Machine Head Connectors

Measure resistances across pins of each connector.

The resistances should be as listed below.

Table 14.1

Solenoid	Resistance	CON32 pins (Machine 9-pin connector)
Wiper	12	Across 5 and 6
Thread trimmer and Thread tension release	5	Across 1 and 2
Work holder	12	Across 7 and 8
Presser foot	9.5	Across 4 and 7

Note: The resistances listed above are those measured at 20°C.

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