



Catalog# PALS 4000 8/96

# PALS 4000 & 5000 Automatic Label Sewers



## INSTRUCTIONS & PARTS MANUAL

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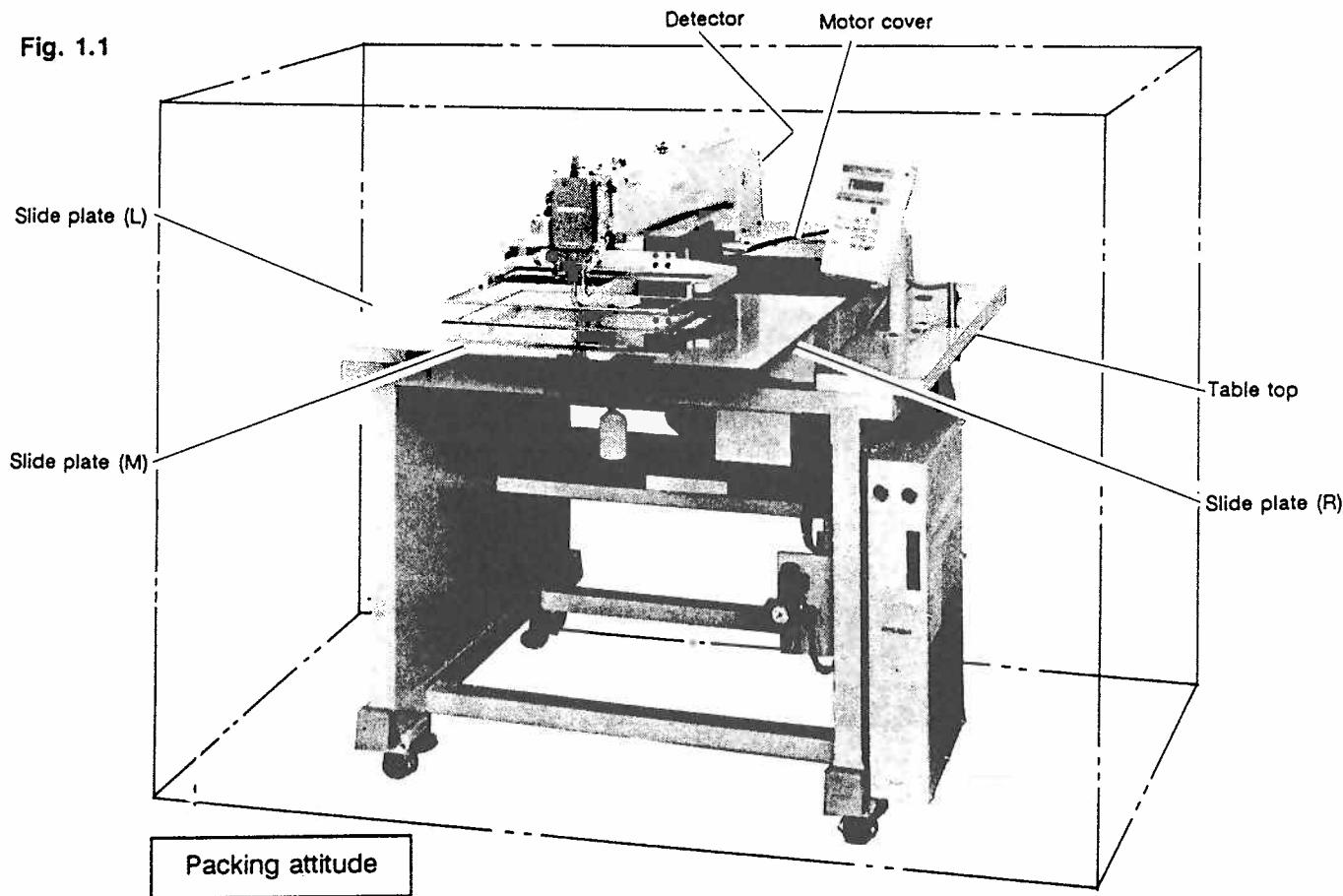
## 1. Unpacking and Check of Content

Before unpacking the content, please read carefully following cautions in order to conduct the preparation for operation effectively and satisfactorily.

### 1.1 Cautions at Unpacking

- (1) Since the machine head is heavy, pay attention when carrying.
- (2) Use a crane or a fork lift truck to carry the sewing machine table.
  - When carrying with a fork lift truck, be sure to place the sewing machine table on a pallet. Sufficient care should be taken not to drop the table from the pallet during carrying.
- (3) In order to prevent unexpected deform or damage, please be sure not to hold such vulnerable section as the slide plate, Motor cover, Table top, Detector, etc. Otherwise, it may cause accident by falling, etc.

Fig. 1.1



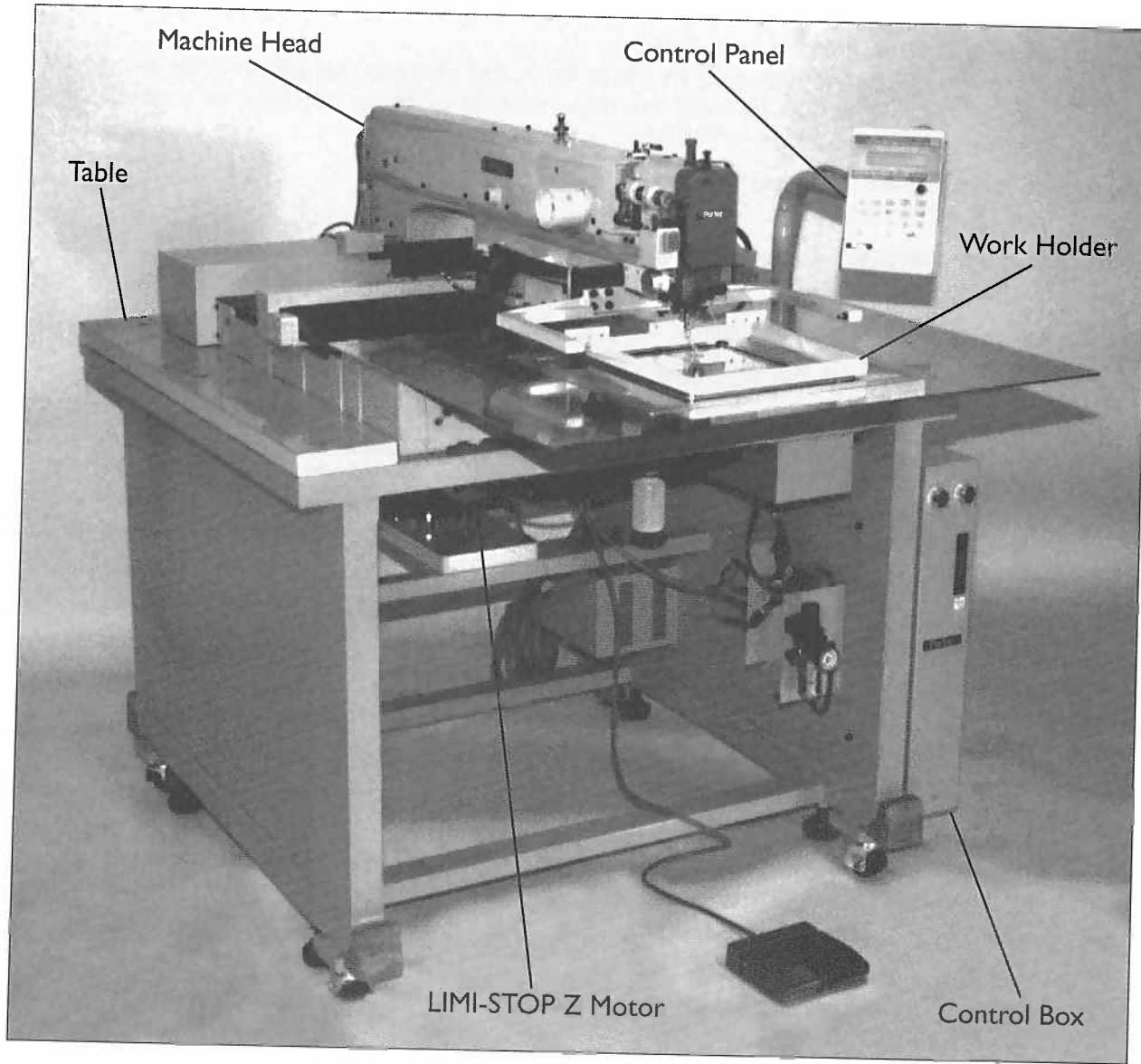
### 1.2 Confirmation of Content

First of all, please refer to the attached parts list (List of component parts) to confirm the standard composition of the product. If you need any optional accessories, please place orders consulting with the parts catalogue.

### 1.3 Please Check Following Points before Starting the Operation.

- (1) Check if the power supply is adequate to operate the machine.
- (2) The needle must be set such that it comes down at the center of presser foot.
- (3) LIMI-STOP Z motor must turn in the direction as specified. (Refer to section 5.5.)

## 2. Construction



### **3. Features**

#### **1. Increased Productivity**

- High speed sewing.  
Increased speed at large stitch length.
- Large-sized shuttle hook.  
The adoption of a large-sized shuttle hook (1.8 times larger than the size featured in the PALS 3000) makes it possible to drastically reduce the frequency with which the bobbin thread is replaced, and it enhances the work efficiency as well.
- Wide variety of needles and patterns  
Up to 150 patterns featuring the data for 8000 stitches per pattern can be stored on a single floppy disk to meet the requirements of fancy stitching or embroidery involving a large number of stitches.

#### **2. Increased sewing area**

(15.75 X 11.81)

#### **3. Optional clamping configuration**

(Pins vs. Saw Tooth)

#### **4. Improved operator loading access to allow better material handling**

#### **5. Less dependency on special skills or training**

- Simple input and operation thanks to interactive system.  
The LCD (liquid crystal display) vastly simplifies the preparation of the sewing patterns and the preparations made for operation, and it also displays operating errors in the form of messages. The teaching playback type of input makes it possible to create sewing patterns which match the clamp frame.
- Easy maintenance.  
The full line-up of troubleshooting functions make the pinpointing of trouble and its display on the LCD an easy task.
- Adding/subtracting counters provided as a standard feature.  
The subtracting counter sounds a buzzer when the bobbin thread should be replaced. The adding counter makes it possible to verify the output.

#### **6. Attractive seams and stitching**

- Stable feed system.  
The fabric feed mechanism features both a travel system which uses races and backlash-free timing belts. It enables reliable intermittent feed drive and produces clear, well-defined seams and stitches.
- Resolution in 0.1mm units.  
By bringing the resolution of the fabric feed mechanism accurately down to a 0.1mm pitch it is now possible to sew smoothly and precisely.
- Maximum stitch length of 12.7mm.  
The variable stitch length accommodates everything from delicate stitches such as embroidery to large-pitch sewing of such articles as container bags.
- Home position return function.  
As the stitching of one pattern is completed, the work holder returns to the home position so there is no accumulation of mechanical displacement.
- Cloth feed can be adjusted in 3 levels depending on the thickness of cloth.  
Further, the cloth feed can be adjusted in 2 levels in adaptation to the weight of work holder such as the attachment, etc.

## 4. Specifications

### 4.1 General Specifications

(1) Specifications of mechanisms (Figures in [ ] indicate PALS 5000)

Item	Specification
Type of stitching	Single-needle lockstitch
* Needle bar stroke	41.2 mm
Take-up lever stroke	68 mm
Needle	135x17 #22
Wiper	Lengthwise thread wiping drive (With wiper release switch)
Work holder lift	70mm Tilting
* Presser foot & needle lift	38mm
Presser foot stroke	4 to 10 mm
Hook	Large-sized shuttle hook
Bobbin case	With slip prevention spring
Bobbin	Aluminum bobbin for large-sized hook
Thread trimmer	Combination of fixed knife and movable knife (Plane scissoring)
Lubrication system	Manual oiling and replenishment with oil braid (Tank type)
Oil used	White spindle oil No.2
Sewing area	350 [400] mm(15.75 STD) in X direction 300mm in Y direction (11.812 STD)
Speed setting	200 to 2000 spm, 10 levels selectable
Max. sewing speed	2000 stitch/min. (for feed length of less than 2.0 mm)
Stitch length	0.1 to 12.7 mm
Dimensions	1535(W) x 1430(L) x 1210(H) mm (Excluding cotton stand)
Weight	470 kgf (Total weight including head, table)

\* Patent Pending

## (2) Specifications of control unit (Figures in [ ] indicate PALS 5000 )

Item	Specification			
Control system	All-electronic control system with microcomputer			
Sewing area	350×300 [400×300] mm			
Pattern storage medium	3.5-inch floppy disks and P-ROM (option)			
Number of programs stored	150 patterns			
Number of stitches stored	360000 stitches			
Number of stitches per pattern	8000 stitches			
Length of stitch	0.1 to 12.7 mm (resolution: 0.1 mm)			
Speed setting	200 to 2000 stitch/min. 10 levels selectable			
Enlargement/reduction	10 to 200% in 0.1% steps			
Mechanical home position	Set by optical sensor, insulator			
Mechanical home position correction	0.1 to 12.7 mm, adjustable in 0.1 mm units			
Secondary home position	Set by input program			
Halt	Set by input program			
Reverse rotation support output	Set by input program			
Baste stitching	Set by input program			
Test function	Jog switch			
Error display	Display of errors on LCD			
Troubleshooting functions	Check of input switch signals Check of output signals Verification and adjustment of sewing speed			
Power	Phases	Frequency (Hz)	Voltage (V)	Input (kVA)
	Single-phase	50, 60	100 110 120 200 220 230 240	1
	Three-phase	50, 60	200 220 380 415	1
Ambient temperature/humidity	5 to 40°C 30 to 80% (no condensation)			

## (3) Teaching specifications (Figures in [ ] indicate PALS 5000 )

Item	Specification
Input method	Point input and P-P (Point to Point) input by teaching
Pattern input area	350×300 [400×300] mm
Length of stitch	0.1 to 12.7 mm (resolution: 0.1 mm)
Enlargement/reduction	100% only
No. of input stitches	8000 stitches
Input data	Stitch data, feed data, thread trimming data, end data, secondary home position data, halt data, reverse turn support output data, baste stitch data
Stitch speed command	4-step setting: High speed (H), medium speed (MD1), medium to low speed (MD2), low speed (L)
Correction: Stitch number reduction  Stitch number addition 1 stitch correction Speed change  Function change	1 or N stitches reduced from last stitch; 1 or N stitches reduced from middle stitch; deletion of data from assigned position to the last stitch 1 stitch added at assigned position 1 stitch corrected at assigned position Speed change of N stitches from assigned position; speed change from assigned position to the last stitch Addition/deletion of function codes
Test function	Jogging at pattern input Jogging at correction (input data verification)
Data write	Written onto floppy disk and P-ROM
Delete	Deletion of assigned patterns (floppy disk only)

## (4) LIMI-STOP Z motor specifications

Model	CA-Z402E		CB-Z402E		CB-Z402E	
Drive motor	Output (W)	400	400	400	400	400
	Phases	Single phase		3 phase		3 phase
	Poles	2		2		2
	Voltage(V)	110		220		220/380/415
	Frequency (Hz)	50	60	50	60	50
	Full-load current(A)	5.8	5.6	2.2	2.0	1.9/1.3/1.2
	Full-load speed(spm)	2870	3470	2920	3500	2860
Type approval		Obtained				
Clutch	Output torque (kgf-m)	0.13	0.11	0.13	0.11	0.13

## 5. Installation

### 5.1 Securing the Sewing Machine Table

- (1) After placing the table in the prescribed position, turn the adjustors mounted underneath the table to secure the table so that it will not move. (See Fig. 5.1)
- (2) Install the table on a level and stable floor so that it will not shake or rock from side to side.

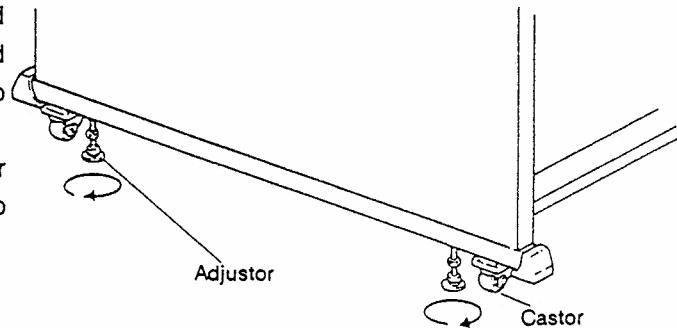


Fig. 5.1

### 5.2 Installing the Cotton Stand

Assemble the separately packed tension thread guide into the cotton stand, installing it at the right rear of the table.

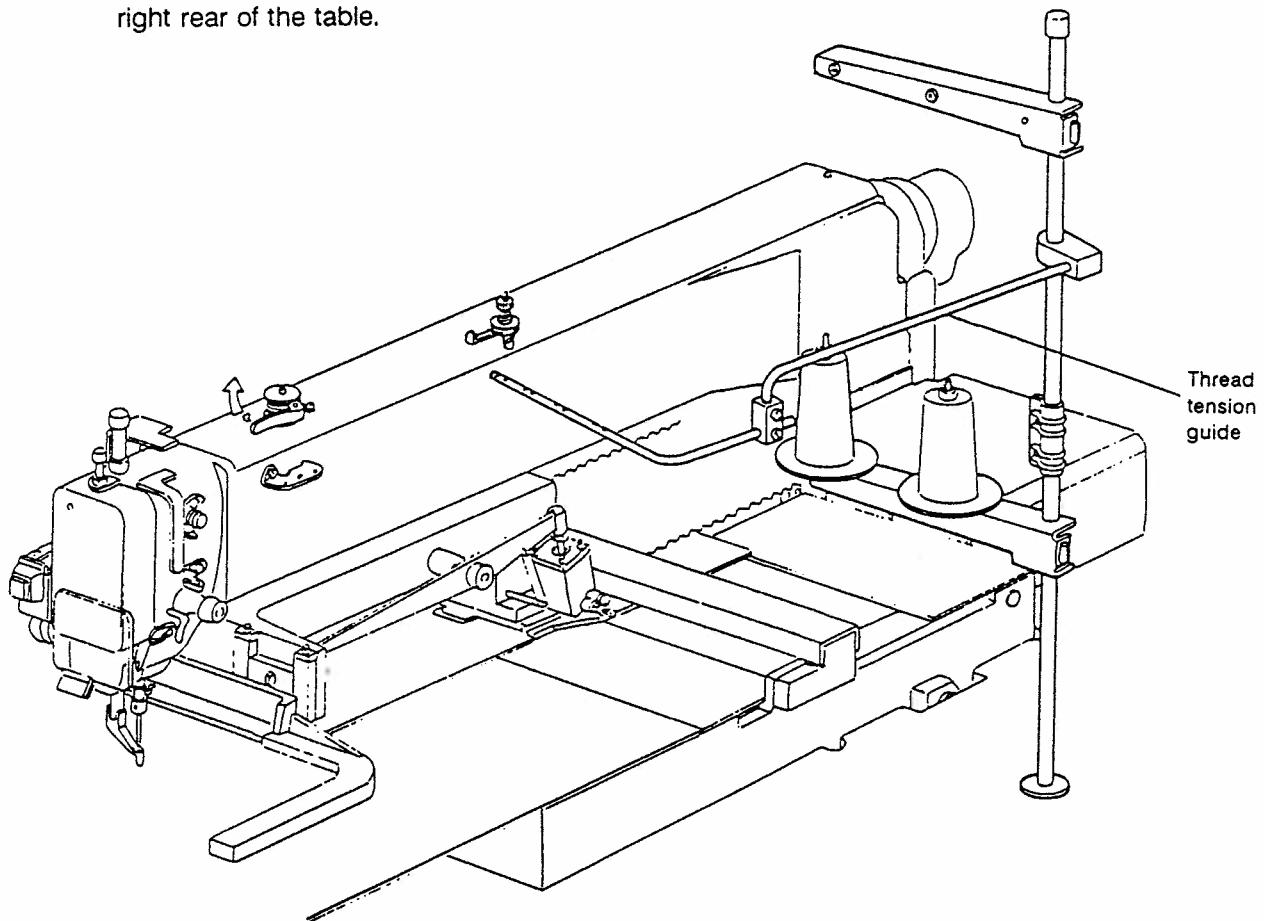


Fig. 5.2

### 5.3 Connecting the Air Tube

- (1) Connect the accessory air tube between joint E in Fig. 5.3 and the compressor.
- (2) Set the air pressure to 390 kPa (4 kgf/cm<sup>2</sup>).

To adjust the pressure, pull the adjust knob in the direction of the arrow and turn it. Upon completion of the adjustment, push the adjust knob down to return it to its original position.

\* Disconnecting the air tube

The air tube can easily be disconnected by first pushing it in and then pulling it while pushing in the joint sleeve.

- (3) Refer to Fig. 5.3 for the air connections.

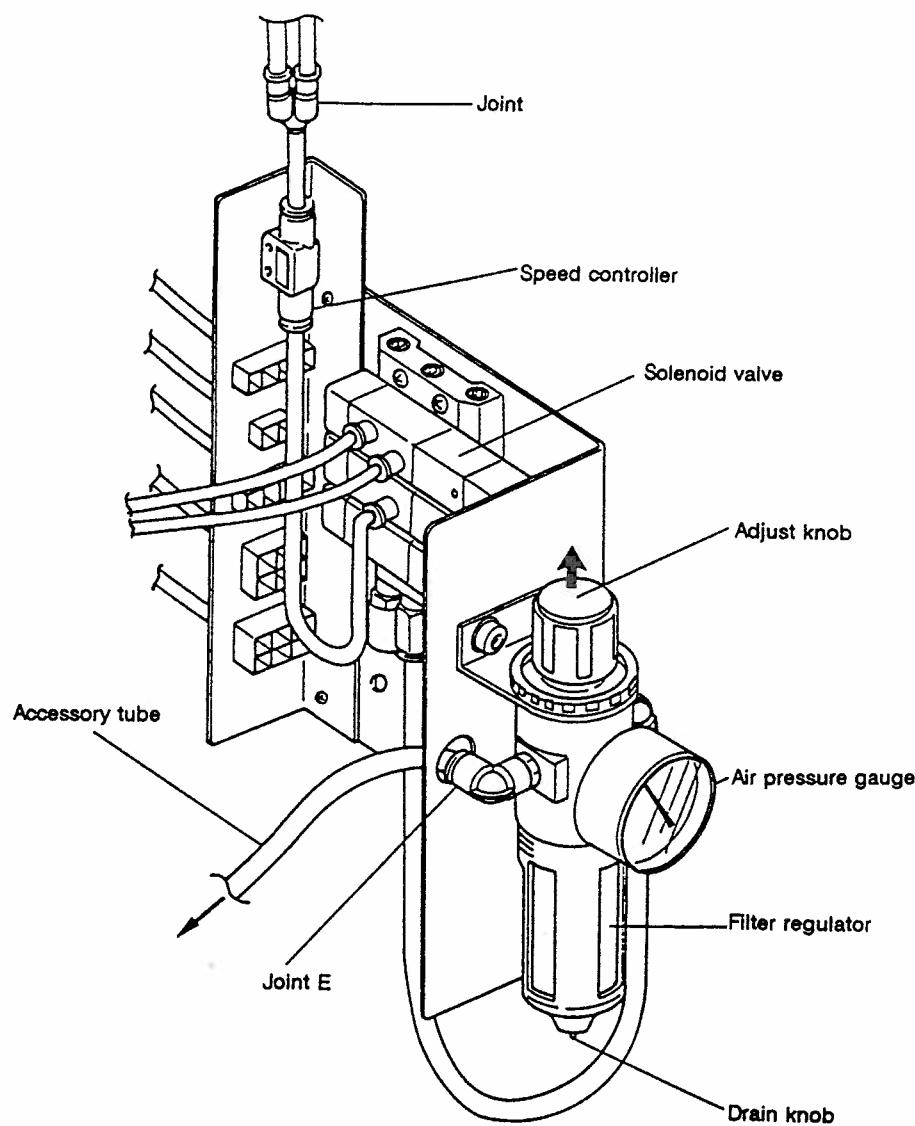
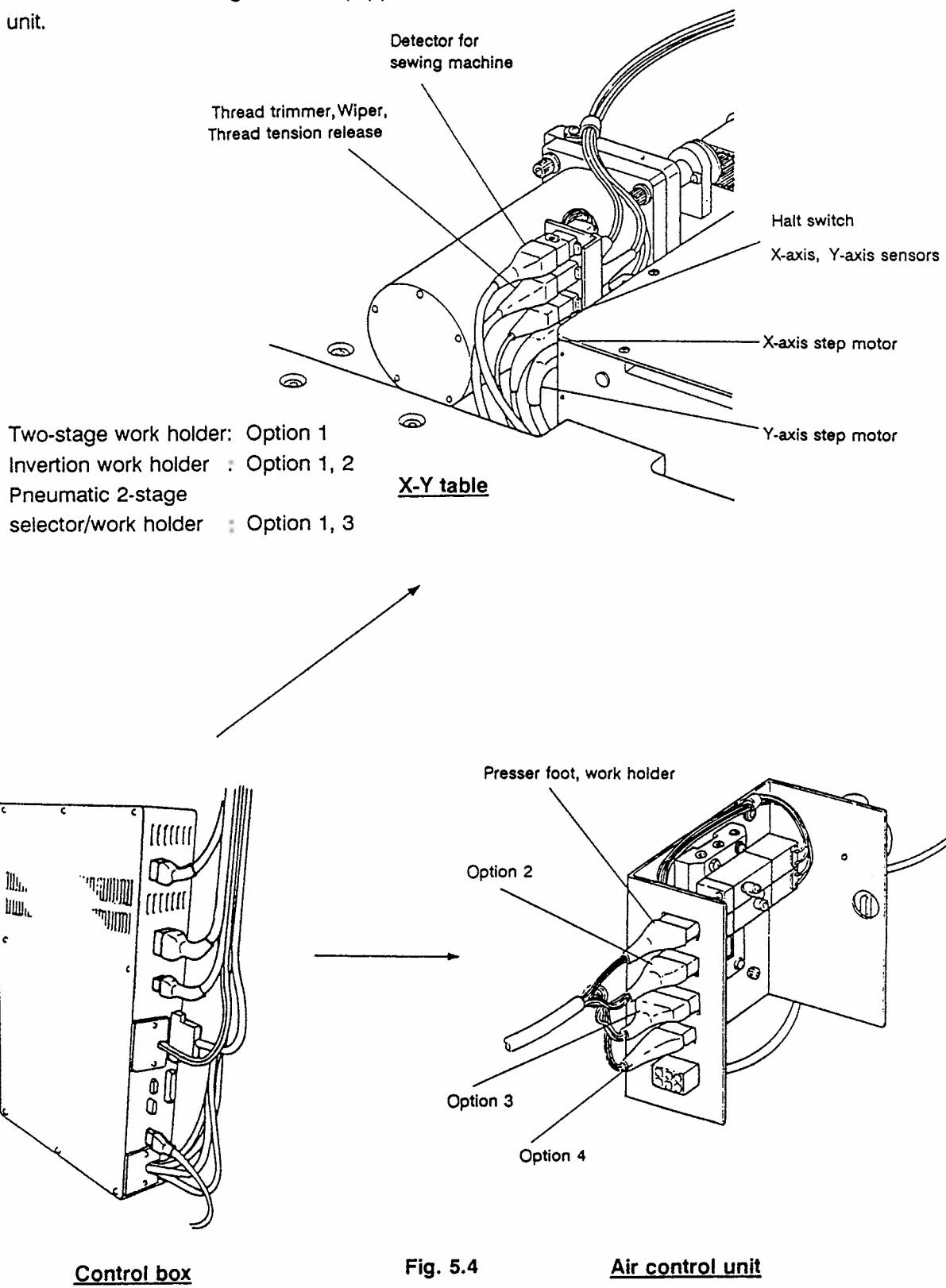


Fig. 5.3

#### 5.4 Wire Connections

Connectors shown in Fig. 5.4 are equipped to connect control box with X-Y table and air control unit.



## 5.5 Power Cord for Work Lamp

- When the work lamp (6V, 15-20W) is mounted, use the connecting leads provided at the front of the motor. Removing the insulating tube, strip the leads as necessary, make the connections, and then wind insulation tape around the connections.

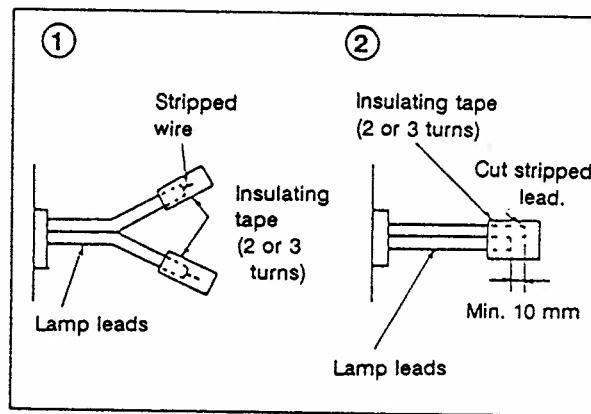
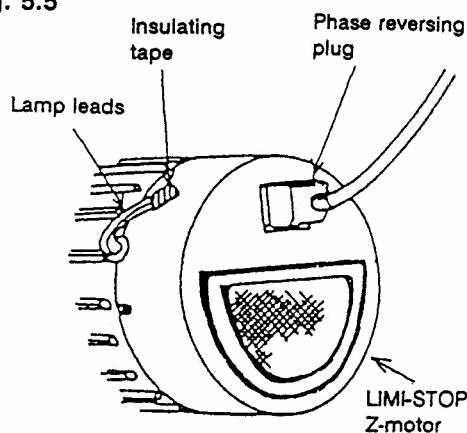
### Note

Although the lamp voltage is only 6V, the ground voltage is around 100V. Make absolutely sure that the power is turned off before the leads are connected.

- If the lamp will not be used, its two leads must be insulated to prevent shortcircuiting.

As in the figure on the right, proceed as for ① or ②, and be sure to insulate the leads. Shortcircuiting may result in a burn-out of the motor winding.

Fig. 5.5



## 5.6 Connecting the Power Cable

Use a power supply with a capacity high enough to accommodate the motor rating, and select a power cable which is more than adequate to accommodate the power supply requirements.

- When a 3-phase motor is used, connect the power supply in its correct phase sequence: "U" phase (red lead), "V" phase (white lead) "W" phase (black lead).
  - Connect the green lead in the 3-phase power cable to the ground terminal. To ensure safety, do not neglect to undertake this ground connection. Be sure to have a qualified electrician do this for you.
- This grounding work must be done if a single-phase power supply and the accessory conversion plug (for conversion from 3 pins with ground to 2 pins) are used.
- When a single-phase motor is used, do not plug the power cord into a branch socket but to a wall outlet.

### Notes

- All leads should be bundled together and secured so that they will not come into contact with the V-belts.
- The plugs and connectors must be securely connected.
- The power plug must be disconnected when any of the leads are connected.

### 5.7 Changing the Direction of the Motor Rotation

If the motor of the sewing machine is rotating in the reverse direction, reverse rotation is first identified automatically when operation is started, the following display appears, and the machine stops operating.

REVERSE ROTATION

When this display has appeared, normal rotation is restored by turning the phase-reversing plug through 180° and inserting it. Be sure to insert it properly as far as it will go. (See Fig. 5.6)

Since it takes about 5 minutes for a single-phase motor to stop completely after the power has been turned off, remember to switch on the power after it has stopped. (The direction of the motor rotation will remain unchanged if the power is turned on while the motor is running.)

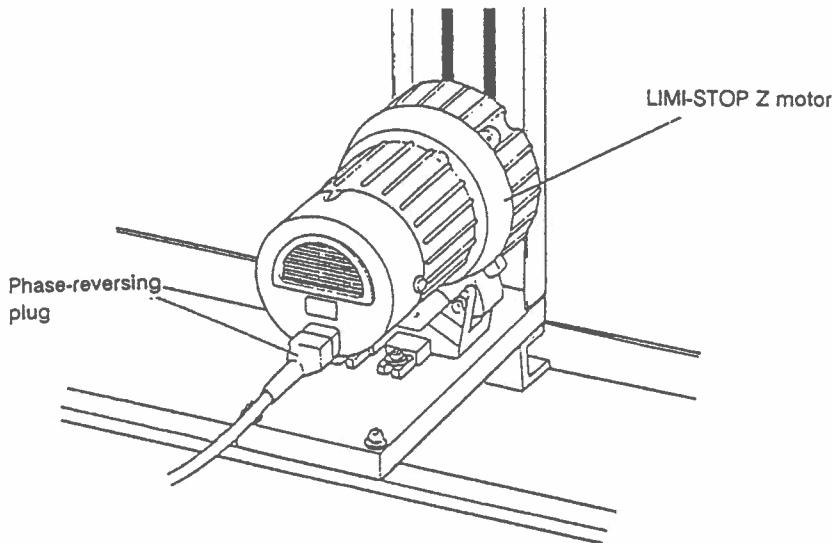


Fig. 5.6

#### Note

Be sure to set the power switch to the OFF position when disconnecting the power plug.

## 6. Checkpoints for Operation

### (1) Safety

- 1) A machine which is operating is dangerous and so every care must be taken not to touch any of its moving parts. Also, remember to turn off the power before proceeding with repair work or inspections.
  
- 2) Make absolutely sure that the sewing machine is grounded in order to safeguard against noise and electric shocks.

### (2) Operating environment

- 1) Do not operate the sewing machine at high temperatures (over 40°C) or low temperatures (under 5°C). Otherwise, trouble or malfunctioning may occur in the machine.
- 2) Do not install the sewing machine in a position where it will be exposed to direct sunlight or near a source of heat such as heating appliance.
- 3) Take care not to allow water or any other liquid substance from entering the machine head and control unit and to keep metal waste and other conductive materials away from the sewing machine.
- 4) The sewing machine cannot be used in an atmosphere where it will be exposed explosive gases, dust or oily vapors.
- 5) Avoid using the sewing machine in a location where it will be exposed to excessive shock or vibration.

### (3) Operation

- 1) Do not turn off the power or remove the floppy disk while the floppy disk drive is reading or writing data (while the drive LED is lighted). This may cause the data stored to be lost.
- 2) Turn off the power before inserting or removing the P-ROM cassette.
- 3) When sewing a new pattern or enlarging a pattern, be sure to perform a test operation and check the relationship between the work holder and pattern.
- 4) Remove your foot from the start switch (pedal switch) when turning the power switch ON or OFF.
- 5) The presser foot must be lowered when the balance wheel is turned manually. It is lowered when the power is off so that the wheel can be rotated without further adjustment. When the power is ON, it can be lowered by setting the bobbin winder switch to the ON position.
- 6) When a single-phase motor is being used, do not perform the start operation immediately but wait about 10 seconds after the power has been switched on until the motor operation stabilizes.
- 7) Burnouts may be caused by insufficient lubrication of the mechanical parts. Before operation, be sure to lubricate and check the parts.
- 8) Under no circumstances should the operator bring his or her fingers near the work holder while the sewing machine is being operated.
- 9) Do not operate the sewing machine without the eye guard and protective covers in place.

## (4) On the selection of operating conditions\*

- \* When selecting the operating conditions, refer to the cautions in the paragraph 2.3 "Advanced operation" of Instruction Manual (Control unit).

## 1) Selection based on the pressing weight

When a special clamp, etc. is attached to the standard presser, turn on the dip switch SW4-2 in the control box depending on the clamping weight. Rough guide of clamping weight is as listed below.

Clamping weight	Standard weight	Weight material
	0 ~ 1.0 kg	1.0 ~ 2.0 kg
Dip switch SW4-2	OFF	ON

## 2) Selection based on the thickness of sewing material

Ideal cloth feed timing for any particular material thickness is obtained by the selection of the dip switches SW4-6 and SW4-7 in the control box. Refer to following table for setting.

	Standard	Heavy fabric 1	Heavy fabric 2	Not used
Cloth thickness	0 ~ 3 mm	3 ~ 6 mm	6 ~ 8 mm	-
SW4-6	OFF	ON	OFF	ON
SW4-7	OFF	OFF	ON	ON

**On the max. sewing speed**

Max. sewing speed of the machine varies depending on the stitch length and the operating conditions as referred to in the last paragraph. Although the max. sewing speed control is designed to operate automatically as shown by the following table, an appropriate speed

- (5) should be set depending on the sewing material. (Regarding the speed setting, refer to the Instruction Manual, "Control unit".)

**Cautions for operation**

## (1) Cautions for safety

- \* Keep away your hand from under the needle or around the pulley when the power switch is turned on.
- \* Turn off the power switch when the machine is not operated or the operator leaves from the machine.
- \* Turn off the power switch also when V belt is installed or removed or during the adjustment or parts replacement.
- \* It is very dangerous to bring closer fingers or hair to the pulley, V belt or motor during operation.

## (2) Cautions before operating the machine

- \* When the machine is operated at the first time, turn on the power switch and check the turning direction of pulley.
- \* Check also whether the description of voltage, single or three phases on the name plate of motor is correct or not.

## (3) Cautions for the operating environment

- \* Do not operate the machine under a higher temperature (40°C or over) or a lower temperature (5°C or under) to avoid troubles.
- \* Do not operate the machine under the atmosphere contaminated dust, etc.

## 7 Handling the Sewing Machine Head

### 7.1 Turning the Arm Shaft Driving Handle Pulley

- (1) Use an Allen key to loosen screw **A** in the arm boss.
- (2) Turn the arm shaft driving handle pulley while pushing it in the direction of arrow **B**.
- (3) When the arm shaft driving handle pulley is turned toward you in the direction of the arrow **C**, the sewing machine rotates in the forward direction; when it is turned away from you, it rotates in the reverse direction.

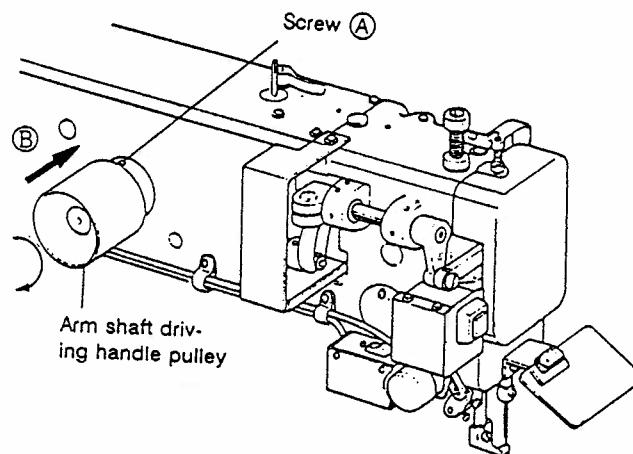


Fig. 8.2

#### Note

Make absolutely sure that the pulley is secured by screw **A** when the arm shaft driving handle pulley is not be used.

### 7.2 Lubrication

#### (1) Supplying the lubricant

Before proceeding with operation, be sure to lubricate, as necessary, parts **G** to **K** indicated by the arrows in Fig. 8.3.

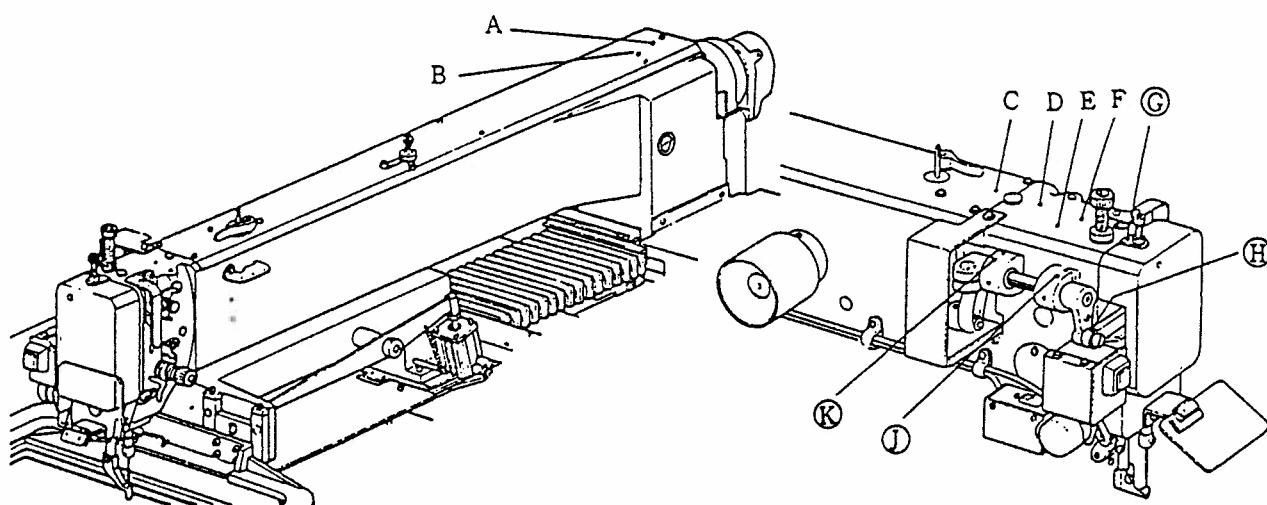


Fig. 8.3

Lubricate parts A to F before proceeding with a test run after the sewing machine has been installed. (Fig. 8.3 and 8.4)

(Normally, lubricant is supplied automatically from the oil supply tank.)

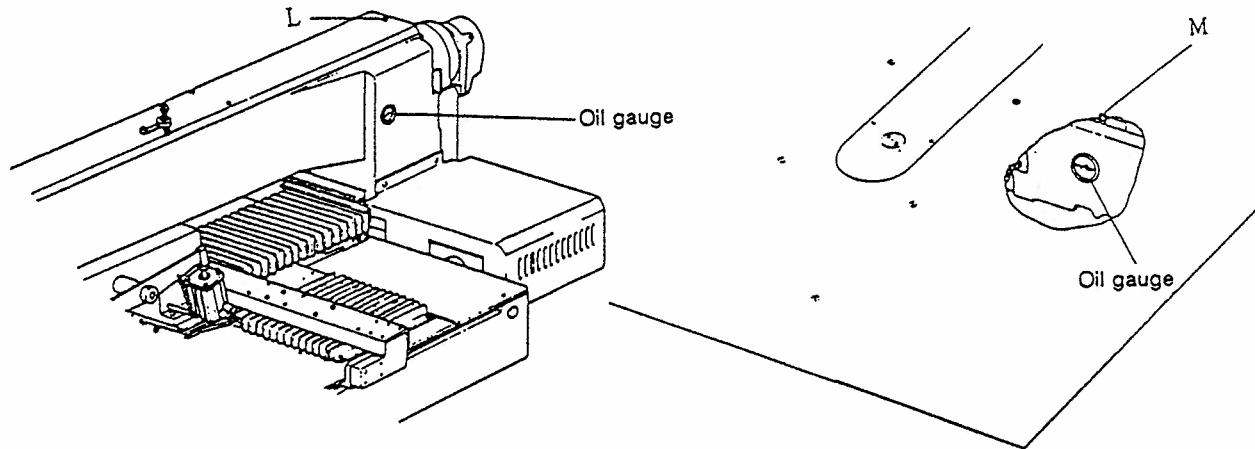
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**(2) Replenishing the oil tank**

Replenish oil through supply ports L and M on the arm side and head side, respectively, until the oil reaches the round red mark in the center of the oil gauge.

**Note**

Use white spindle oil #2 for lubrication.



**Fig. 8.4**

**(3) Oil disposal**

Oil is discharged from the drain pipe and collected in the oil bottle. (See Fig. 8.1) Oil must be disposed occasionally before the bottle is filled fully.

### **7.3 Installing the Needle**

- (1) Before installing or removing the needle, turn off the power so that the sewing machine will not be started up in error.
- (2) Insert the needle into the needle socket as far as it will go.
- (3) With the needle prime groove turned to the front, tighten up the needle set screw to secure the needle.
- (4) For more satisfactory stitching results, it is recommended that the needle be installed and turned by about 10° in the direction of the arrow in Fig. 8.5.

Insert the needle until it comes to the end, turn the elongated groove toward you, and tighten up the set screw.

Needle has not been inserted far enough.

Pointing in wrong direction.

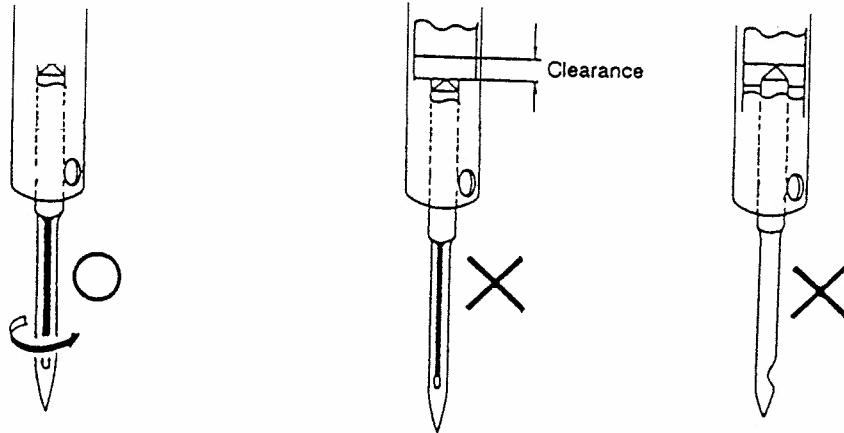


Fig. 8.5

#### 7.4 Threading the Needle Thread

The needle thread should be threaded, as shown in Figs. 8.6 and 8.7, with the thread end extended about 4 cm from the needle.

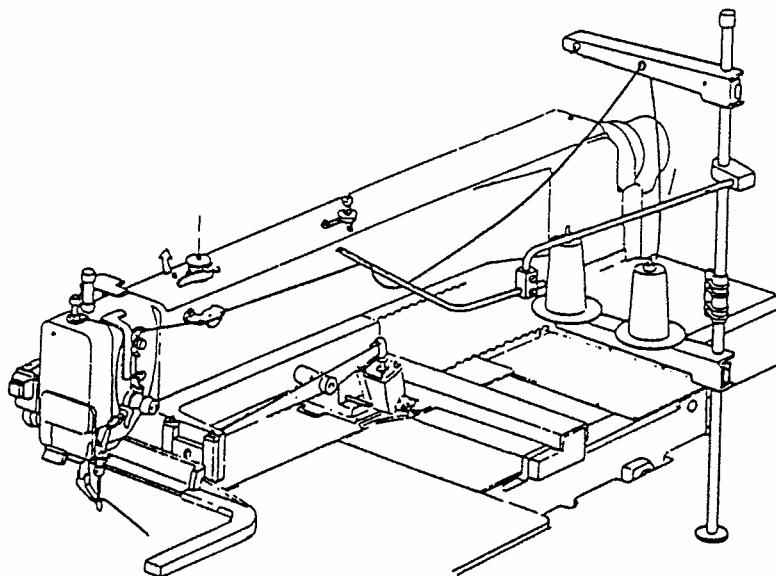


Fig. 8.6

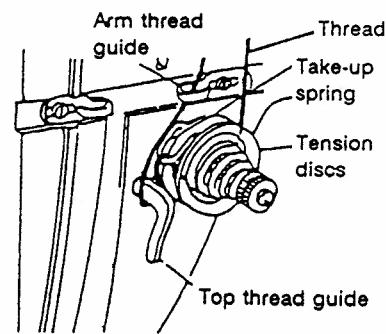
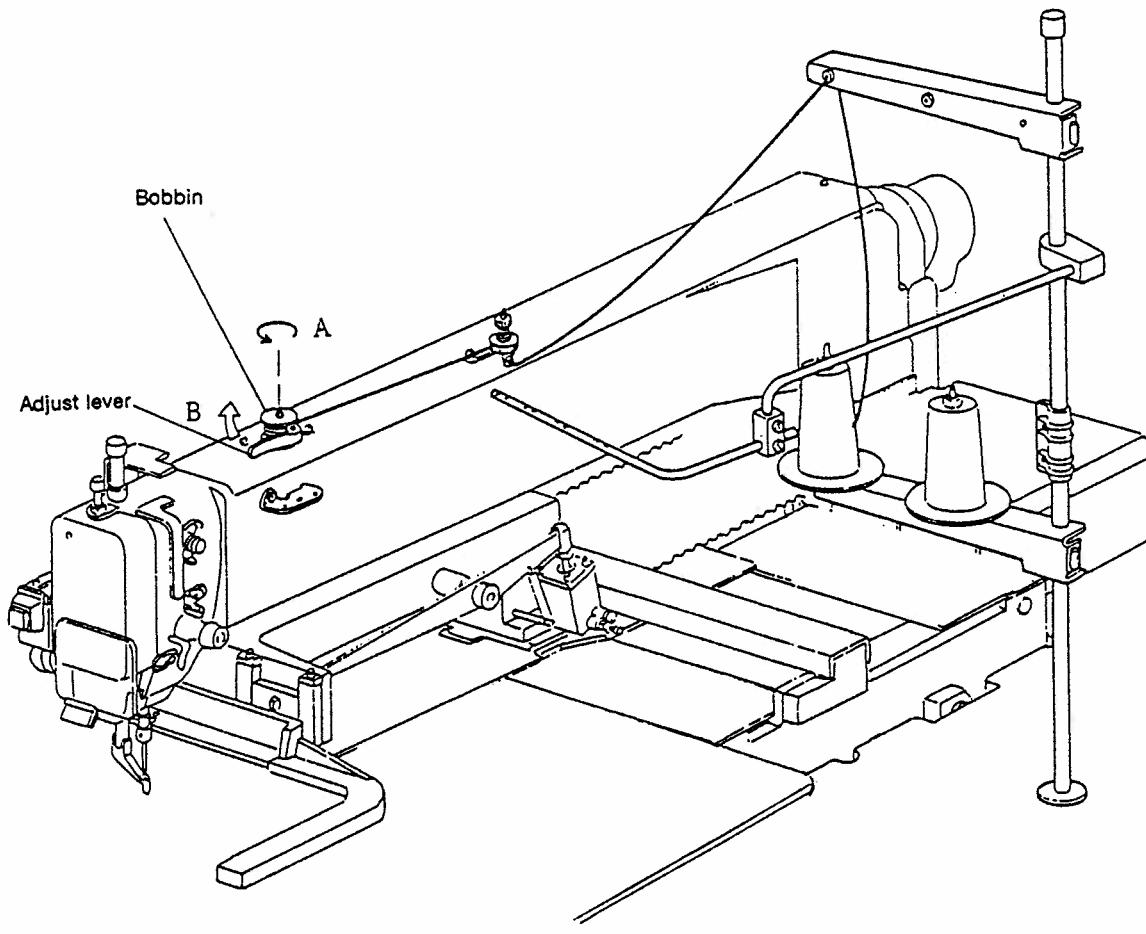


Fig. 8.7

## 7.5 Winding the Bobbin Thread

- (1) Pass the thread coming from the cotton stand as shown in Fig. 8.8 and wind the end of the thread around the bobbin by several turns in the direction of arrow "A".



**Fig. 8.8**

- (2) Push the adjust lever in the direction of arrow "B".
- (3) Lower the work holder using the work holder switch (black pedal switch).
- (4) Setting the bobbin winder switch on the control panel to the ON position (LED lights) lowers the presser foot and allows the sewing machine to enter the bobbin winder mode.
- (5) Step on the start switch (red pedal switch).  
While the start switch is pressed down, the sewing machine will operate at a speed equivalent to approximately 600 stitch/min..
- (6) Upon completion of the thread winding, press the bobbin winder key again.  
(This turns the LED off.)

## 7.6 Installing the Bobbin

- (1) Place the bobbin (B) inside the bobbin case (A).
- (2) Put the thread (E) into the slit (C) and pass it through the eyelet (D).  
(See Fig. 8.9)

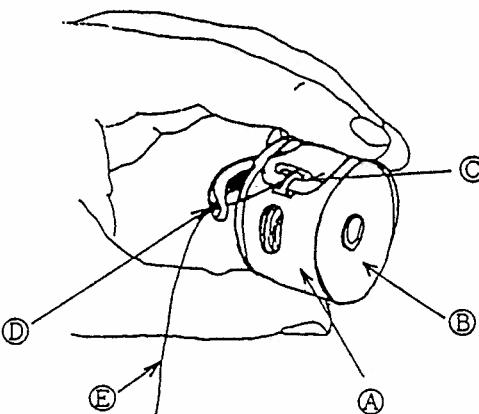


Fig. 8.9

## 7.7 Installing the Bobbin Case

- (1) Set the needle bar to its highest position and open the bottom cover.  
(See Fig. 8.10)
- (2) Open the bobbin case latch (A) fully and fit it securely into the inner hook.

### Note

The thread end should be extended about 2.5 cm from the square hole in the bobbin case.

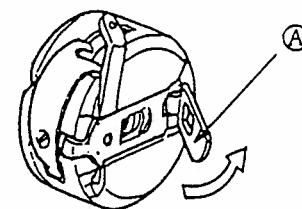
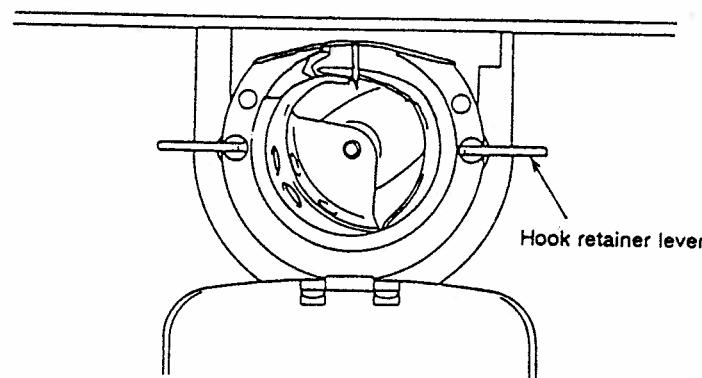


Fig. 8.10

## 7.8 Removing the Inner Hook

The hook clamp and inner hook itself can be removed by turning the hook clamp lever (Fig. 8.11) in the direction shown by the arrow as far as the horizontal position.



## 7.9 Thread Tension

Attain a balance between the needle thread tension and bobbin thread tension.

As shown in Fig. (A), the optimum tension balance is yielded when the needle thread is interlocked with the bobbin thread along the center line of the fabric layers.

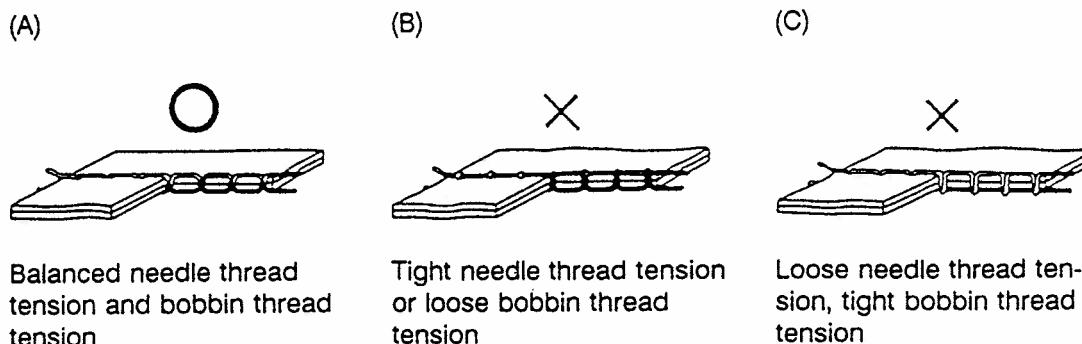


Fig. 8.12

### (1) Bobbin thread tension

The bobbin thread tension can be adjusted by turning the thread tension adjusting screw. The tension is increased by turning the screw clockwise and reduced by turning it counterclockwise. (Fig. 8.13)

### (2) Needle thread tension

The needle thread tension is adjusted in reference to the bobbin thread tension. To adjust, turn the tension regulating thumb nut in Fig. 8.14.

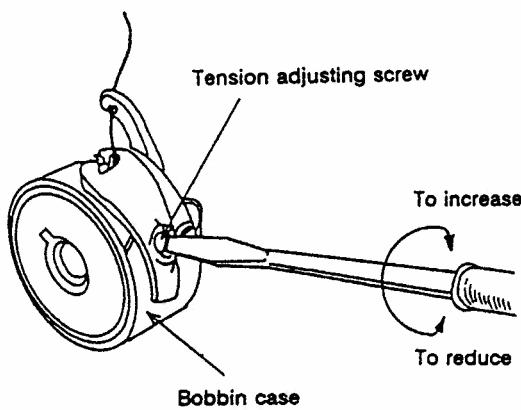


Fig. 8.13

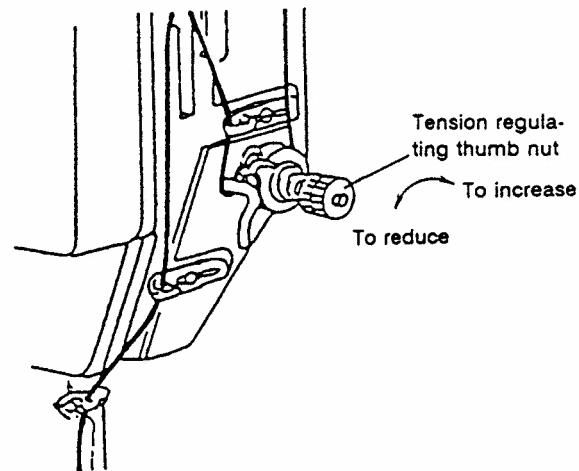


Fig. 8.14

### Note

Excessive tension may result in puckering or a broken thread.

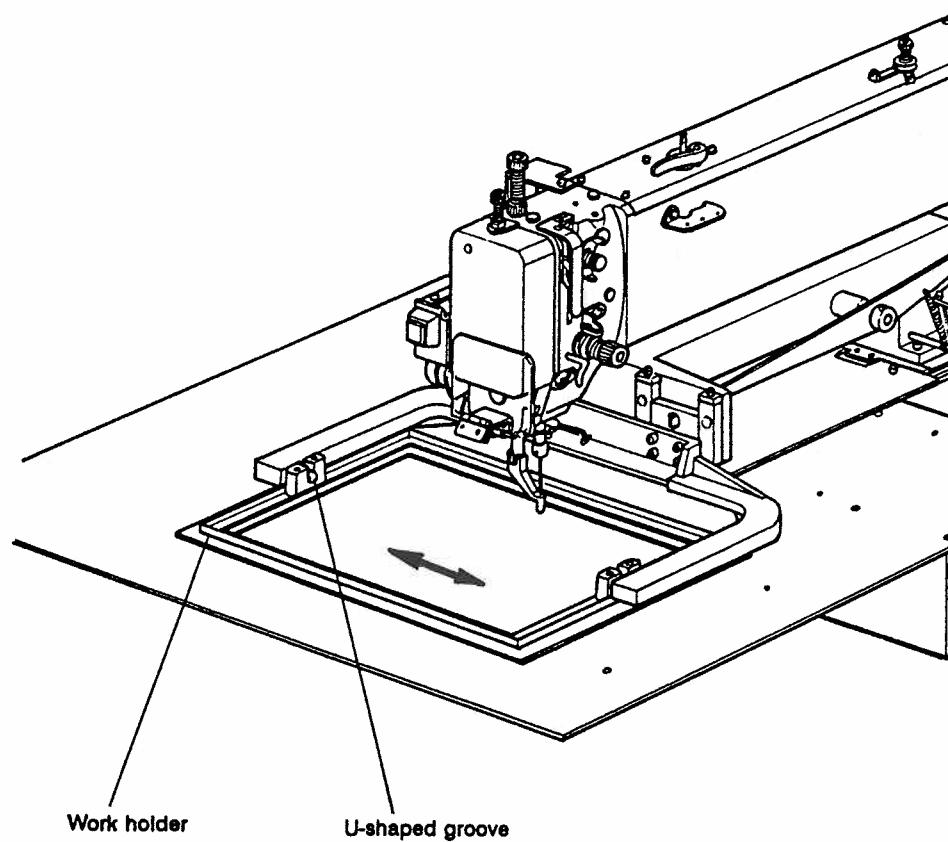
## 7.10 Adjusting the Work Holder

### 7.10.1 Adjusting the work holder pressure

The work holder pressure is generated by a pneumatic (air) system, and it can be adjusted by turning the air pressure regulator knob. (See Fig. 5.3) Increase the air pressure for a higher work holder pressure and reduce it for a lower pressure. The standard air pressure is 390 kPa (4 kgf/cm<sup>2</sup>).

### 7.10.2 Replacing the work holder

- (1) The work holder can be replaced in a single-action operation.  
To remove it, push the work holder down from the work holder arm pin.
- (2) To install the replacement work holder, engage its U-shaped groove with the work holder arm pin. Then check that there is no play in the direction indicated by the arrow. The existence of play may cause a shift in the stitches.



**Fig. 8.15**

### 7.11 Adjusting the Presser Foot

- (1) Check that the needle passes through the center of the presser foot hole.
- (2) Adjust the height of the presser foot by operating the sewing machine manually, by loosening the presser foot set screw or presser bar set screw (see Fig. 10.11) to yield a gap of between 0 and 0.5 mm (see Fig. 8.16) between the bottom-most position of the needle bar and surface of the fabric to be sewn, and then by tightening up the screw after adjustment.
- (3) The vertical stroke of the presser foot is factory-adjusted to 4 mm. To increase the stroke, loosen the bolt in Fig. 8.17 and move it up. The vertical stroke can be increased up to 10 mm.
- (4) To adjust the pressure of the presser foot, loosen the thumb nut in Fig. 8.17 and turn the presser foot adjusting screw.

The pressure increases when the screw is turned clockwise and reduced when it is turned counterclockwise. The figure shows the standard adjustment.

Normally, there is no need for the auxiliary adjusting screw to be touched.

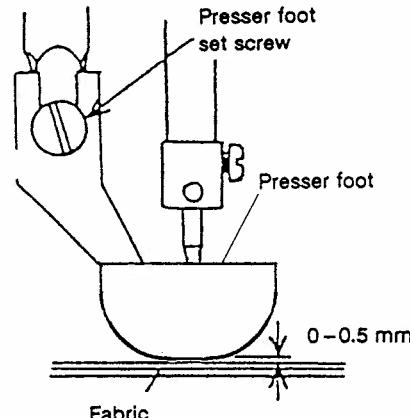


Fig. 8.16

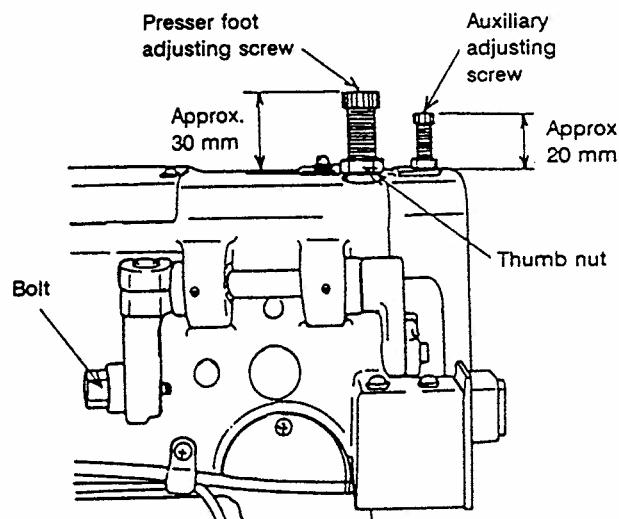


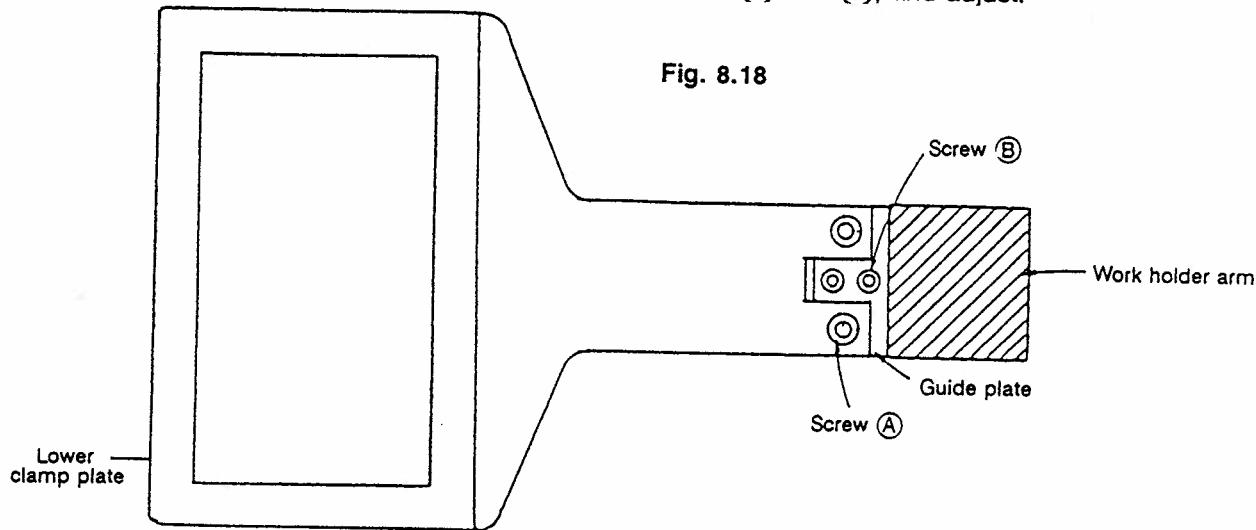
Fig. 8.17

#### Note

The height of the presser foot must also be changed when the thickness of the fabric is changed.

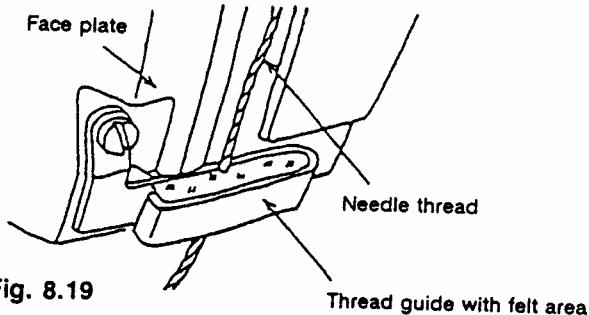
## 7.12 Replacing the Lower Clamp Frame (Fig. 8.18)

- (1) To replace the lower clamp frame, remove screws **A** and replace.
- (2) The guide plate is provided for positioning the lower clamp frame. If the lower clamp frame is not aligned with the work holder, loosen screws **A** and **B**, and adjust.



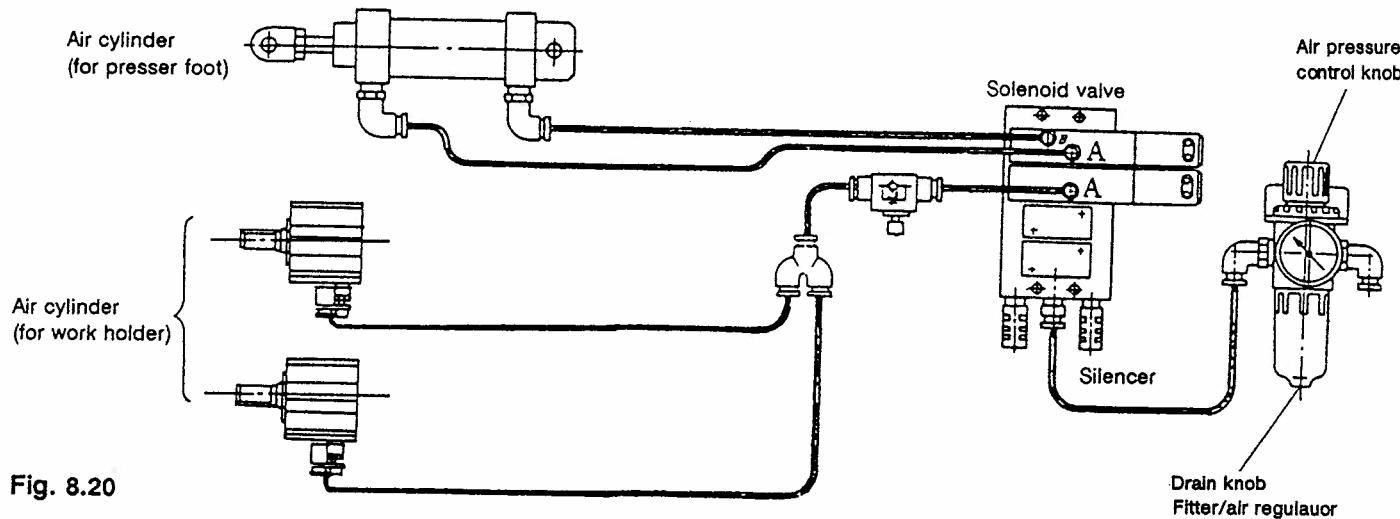
## 7.13 Lubrication with Silicone Oil

When applying silicone oil to the needle thread, mount the thread guide with the felt area onto the bottom part of the face plate, as shown in Fig. 8.19, and supply the oil to the felt area.



## 7.14 Air Piping to Cylinders for Work Holder, Presser Foot

Fig. 8.20 shows the air pipe connections to the cylinders.



## 8. Adjustment and Maintenance

### 8.1 Adjusting the Bobbin Winder

#### (1) Adjusting the winding volume

To reduce the winding volume, first loosen screw **A** and move the adjust lever toward the bobbin; conversely, to increase the volume, move it in the opposite direction.

The adjust lever is set so that it will return in the direction of arrow "a" with the thread wound up to 80% of its full volume on the bobbin.

#### (2) Adjusting the turning of the bobbin

Loosen screws **C** and **D** of the winder bobbin complete, mount onto the shaft a bobbin on which thread has been appropriately wound, and push the adjust lever in the direction of arrow "b". Next, move the bobbin winder complete in the direction of arrow "B" in the center of the figure. Once resistance is felt, tighten up screws **C** and **D** to finalize the positioning operation.

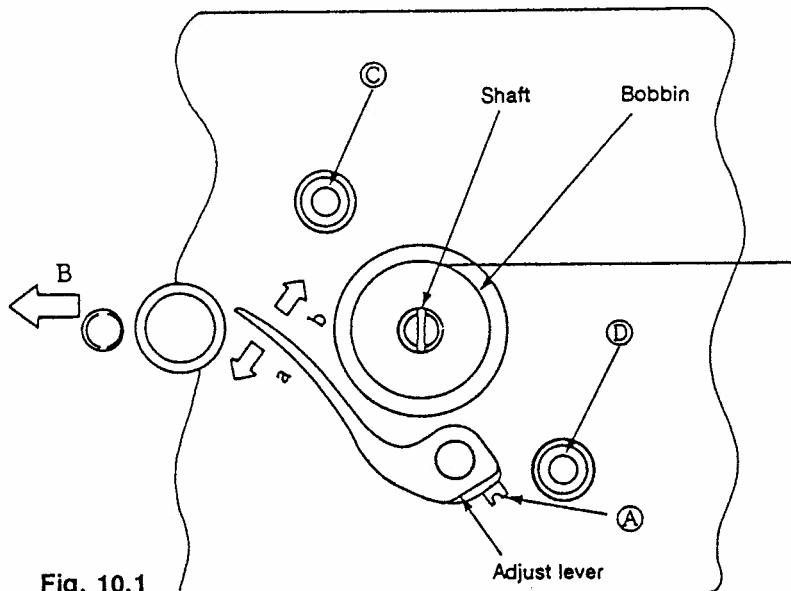


Fig. 10.1

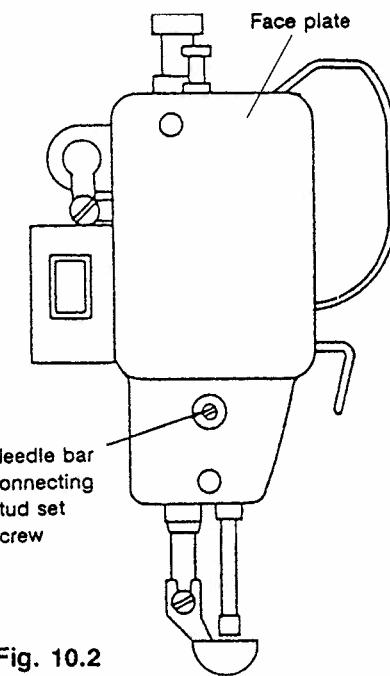


Fig. 10.2

### 8.2 Adjusting the Height of the Needle Bar

- (1) First, switch off the power.
- (2) Loosen the boss screw at the side of the arm so that the arm shaft driving handle pulley can be turned.
- (3) Turn the arm shaft driving handle pulley and stop it when the needle bar is at its bottom-most position.
- (4) Remove the rubber plug from the face plate and loosen the set screw of the needle bar clamp.

### 8.3 Adjusting the Driver and Hook

- (1) Use an Allen key to loosen the driver set screw. (A hole to insert the Allen key is provided under the cylinder head.)
- (2) Adjust the driver so that the head of the inner hook is aligned with the needle center when the pulley is turned and when timing mark C (or D) is pointing to the bottom end of the needle bar metal. (See Fig. 10.4)

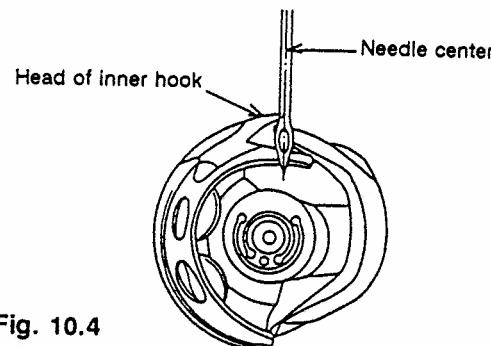


Fig. 10.4

- (3) Now adjust the position of the rotating hook so that a clearance of 0 to 0.05 mm is created between the head of the inner hook and needle. (See Fig. 10.6) The rotating hook can be moved by first loosening its set screw and then turning the eccentric pin using a slot-head screwdriver.

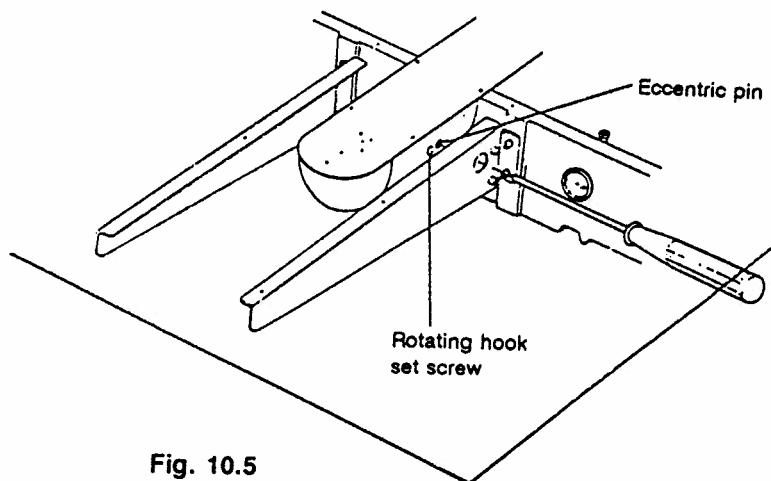


Fig. 10.5

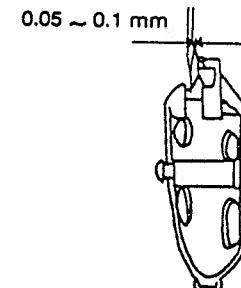


Fig. 10.6

- (4) In this condition, adjust the longitudinal position of the driver so that the clearance between the driver and needle is reduced to zero millimeters and then lock the driver set screw.

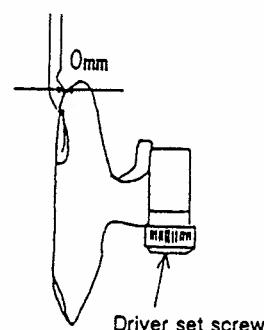


Fig. 10.7

\* Lateral adjustment of driver

As a general guideline and as shown in Fig. 10.8, the timing can also be adjusted by creating a clearance of about 3.2 mm between the head of the hook and left side of the needle when the head of the hook has been retracted to its leftmost position.

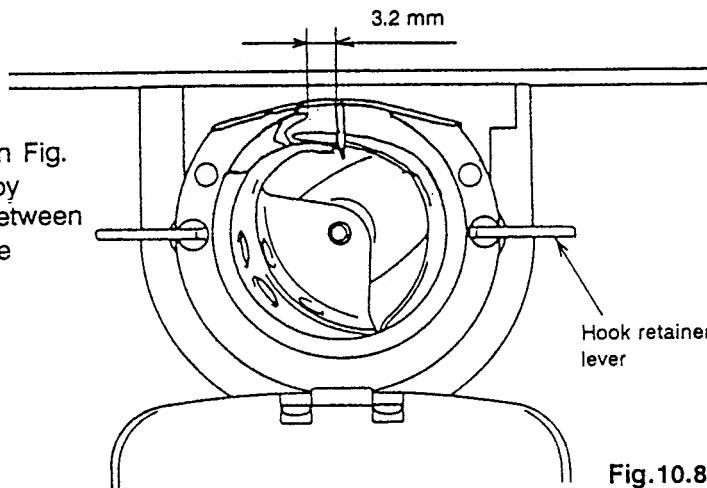


Fig.10.8

#### **8.4 Adjusting the Thread Guide (Above Hook) (Fig.10.9)**

- (1) Adjust the thread guide above the hook so that its left and right shoulders are aligned with the side surface of the needle.  
A failure in thread trimming may result if this position should shift out of alignment.
- (2) Adjust the thread guide so that a clearance (standard: 0.8 mm) between the hook retainer and thread guide is created which will permit the needle thread to pass through easily. A failure in thread trimming may result if this clearance is too great; conversely, if it is too small, improper thread tension, uneven length of the trimmed needle thread or jamming of the thread in the hook may result.
- (3) Check carefully that the surface condition is smooth since the condition of the thread guide surfaces with which the thread comes into contact greatly affects the thread tension and thread trimming performance.

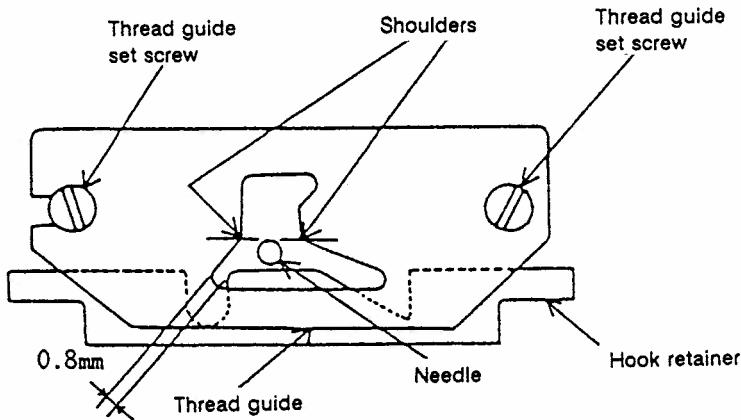


Fig. 10.9

## 8.5 Adjusting the Presser Foot

### 8.5.1 Adjusting the timing of the presser foot motion

To adjust the vertical motion of the presser foot, remove the cover on the back of the arm, and make the adjustment through the window.

- (1) Loosen the pulley set screw **C**.
- (2) Turn the pulley and stop it when the needle bar reaches its lowest position. The pulley set screw will be positioned at the front (standard position).
- (3) Loosen the pulley set screw **A**.
- (4) Secure the pulley **B**, and turn the pulley slowly to position ring **B**.
- (5) Turning the balance wheel in the forward direction (arrow "D") reduces the timing from the standard value; conversely, turning it in the opposite direction increases the timing.
- (6) After the adjustment, press down on the pulley **B** in the direction of the arrow "E" while tightening up set screws **A** and **C** in that order.
- (7) Position and secure the feed lifting crank using its clamping screw so that the vertical center line of the bell crank is made parallel to the presser foot bar when the take-up lever is at its highest position.

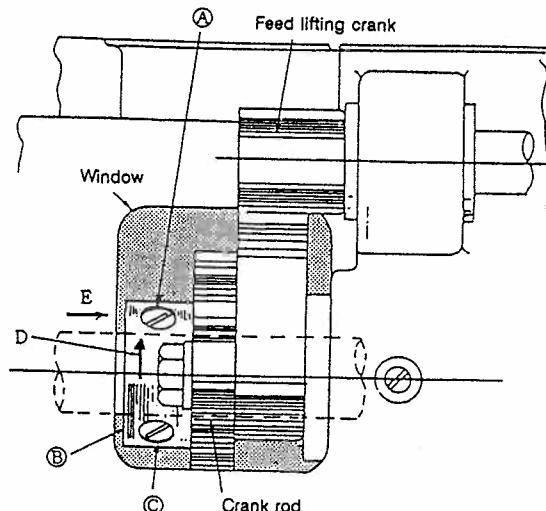


Fig. 10.10

### 8.5.2 Adjusting the vertical stroke of the presser foot

- (1) The stroke of the presser foot can be adjusted to zero and within a range from 2 to 10 mm. When connecting the link and arm using the step screw shown in Fig. 10.11, the stroke range is 4 to 10 mm; when connecting at screw hole "A", it is 2 to 5 mm; and when connecting at screw hole "B", it is zero.

This height is factory-set to 4 mm at the position shown in Fig. 10.11. To adjust the height in the various ranges, loosen the feed lifting crank bolt (see Fig. 8.17). When connecting hole A or B is used, the presser foot lift distance will be increased by between 1 and 2 mm when the sewing machine stops. Since the presser foot height is also subject to change, loosen the presser bar set screw and re-adjust the height of the presser bar.

- (2) Since the amount of noise and vibration increase in direct proportion to the extent of the vertical stroke, it is recommended that the stroke be adjusted to as low as possible.

### 8.5.3 Adjusting the presser foot height

- (1) Presser foot height during stitching

1) Without switching on the power and with the sewing machine at the stop position, turn the balance wheel by hand (and place the take-up lever at the highest position).

Then secure the feed lifting crank in Fig.10.10 so that the lengthwise center of the bell crank (see Fig.10.11) is made parallel to the presser bar. (For this adjustment, the eccentric ring must be adjusted properly.)

2) Place some fabric in position and turn the balance wheel by hand to set the presser foot to the lowest position. Now adjust the presser foot so that a clearance of between 0 and 0.5 mm is created between the bottom surface of the presser foot and the top of the fabric, and then secure the presser bar set screw. Also adjust the direction of the presser bar so that the needle will pass through the center of the hole in the tip of the presser foot.

3) Although the standard height of the presser foot is such that the clearance between the presser foot at its lowest position and the top of the fabric is between 0 and 0.5 mm, to prevent stitch skipping, this clearance can be reduced (by lowering the presser foot). However, noise will increase somewhat when the fabric is pushed down by the presser foot. Moreover, since an increase in the fabric holding time adversely affects the needle thread tension and seam tightness and since the fabric may be caught by the presser foot to throw the pattern into disarray, the lowering of the presser foot should be kept to the absolute minimum.

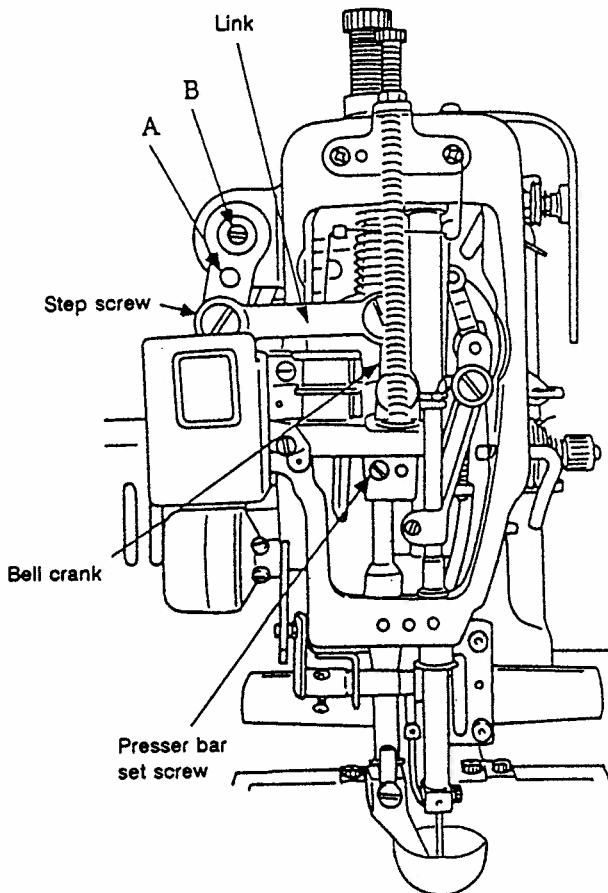
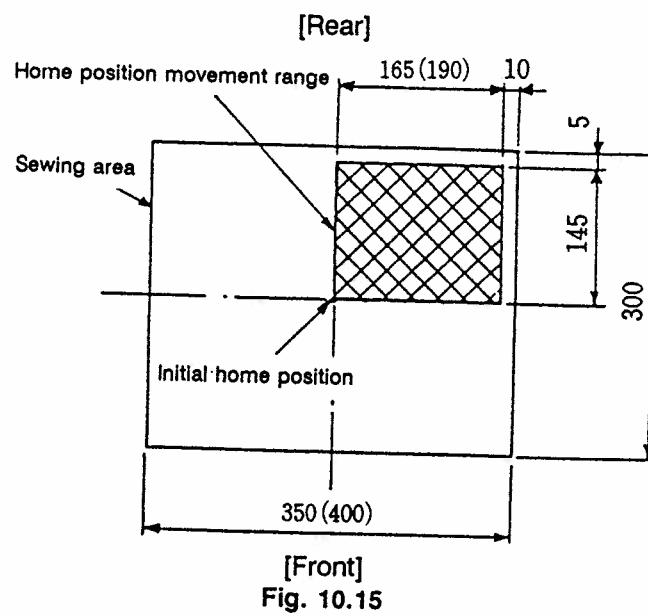


Fig. 10.11

## 8.6 Adjusting the Home Position

When the sewing machine is shipped from the factory, the standard home position is set to the center of the sewing area although it can be adjusted within the range below.

\*Figures in [ ] indicates 5000 method.

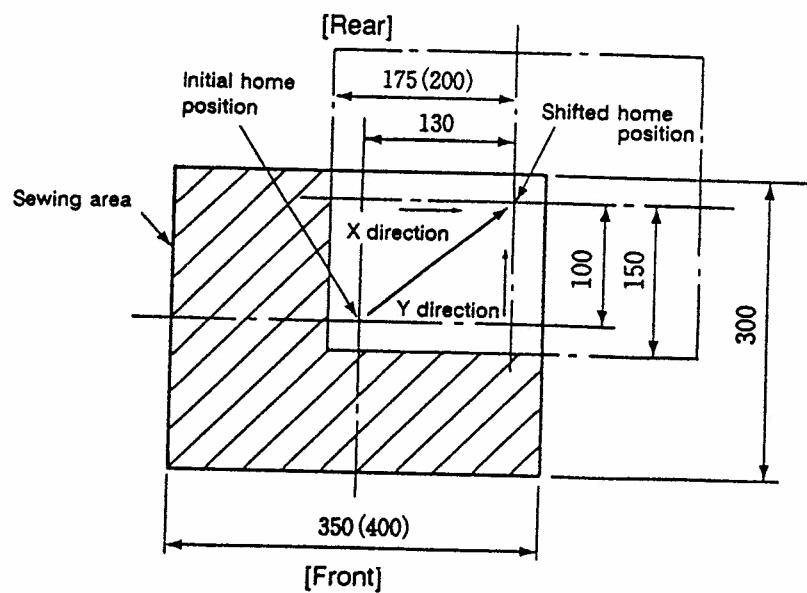


[Front]  
Fig. 10.15

### 8.6.1 Preparations for home position adjustment

- (1) Set SW4 switch 2 (area limit release) in the control panel to the ON position.  
If this switch is OFF, the effective sewing area will be reduced by an amount equivalent to the movement of the home position.

Example: Stitching will not be possible in the shaded area shown below if the home position is moved 130 mm in the X direction and 100 mm in the Y direction.



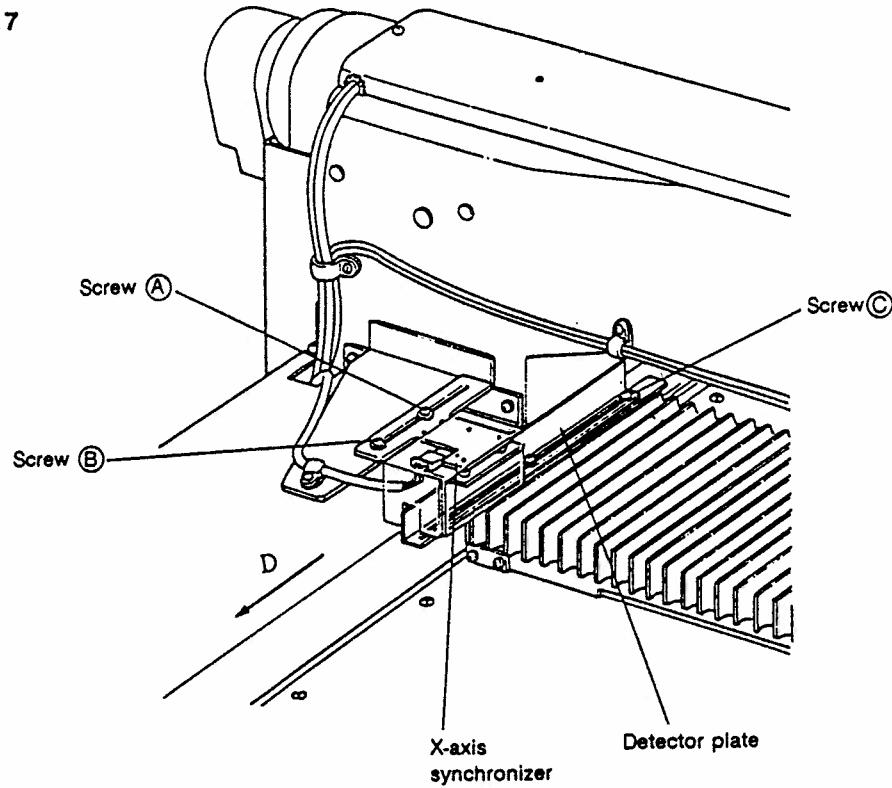
[Front]  
Fig. 10.16

- (2) The adjustment of the home position is facilitated when the procedure below is followed. Plot the center lines (X, Y directions) of the original home position and the desired home position on paper, and place the paper on the lower clamp frame. After performing home position return, place the paper so that the initial home position traced on the paper is brought under the needle, and carefully secure the paper on the frame using adhesive tape. Then proceed with the adjustment of the home position as described below.

### 8.6.2 Adjustment the home position in the X (right) direction

- (1) The home position is moved to the right when screws **(A)** and **(B)** are loosened and the X-axis detector is moved in the direction of arrow "D" (toward the left).
- (2) Similarly, the home position is moved to the right when screw **(C)** for the detection plate secured to the Y-axis bellows mounting plate is loosened, and the detection plate is moved in the opposite direction (toward the right) to that of arrow "D".
- (3) After having adjusted the home position, move the X-Y table by hand and check that there is no contact between the detector sensor area and detection plate.
- (4) Set the HOME key to ON, perform home position return, and check that the home position has been shifted as intended.

Fig. 10.17



### 8.6.3 Adjusting the home position in the Y (rear) direction

- (1) Remove the two screws securing the X-axis bellows (left) cover.
- (2) Remove all the screws of the rear cover, remove the cover itself and position the parts so that they appear as in Fig. 10.18.
- (3) The home position is moved to the rear when the two screws (A) of the Y-axis detector are loosened and the detection plate is moved in the direction of arrow B (toward the front).
- (4) If the adjustment of the home position cannot be accommodated by the leeway provided by the elongated groove on the Y-axis detector, remove the two screws (A), change the positions of the screws and adjust.
- (5) After having adjusted the home position, move the X-Y table by hand and check that there is no contact between the detector sensor area and detection plate.
- (6) Set the HOME key to ON, perform home position return, and check that the home position has been shifted as intended.

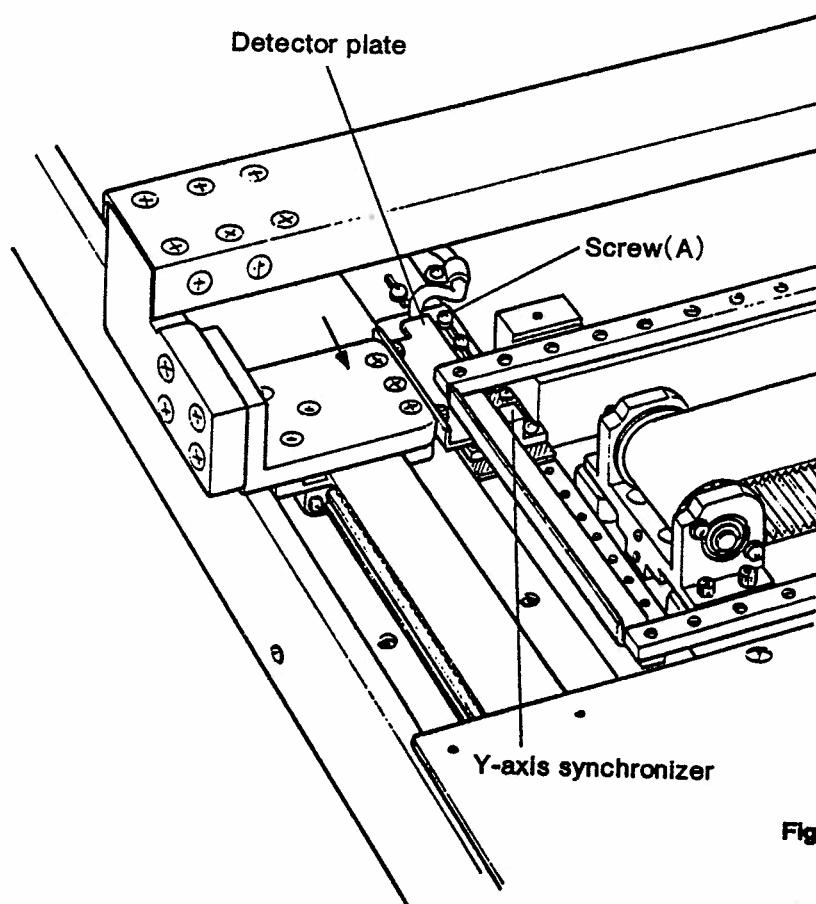


Fig. 10.18

## **8.7 Maintaining and Inspecting the X-Y Table**

- (1) Through prolonged use, the movement of the clamp bracket will be impaired by thread scraps and cotton dust adhering to the linear bearing. When this happens, get rid of the scraps and dust and any other foreign matter by first removing the X-axis bellows (Large and Small), and Y-axis bellows.
  - \* Structure of raceway
 

Raceway is an assembly of a pair of slide units and a track rail. A group of 3 such assemblies is provided at X axis side while a group of 2 such assemblies is provided at Y axis side.
  
- (2) Grease has been applied to the slide units although, after operation for a period of time or even after no use at all, aging will cause the properties of the grease to change. It is thus a good idea to replenish the grease about once every six months. Use Albania EP grease #2 or its equivalent, and apply to the linear bearing way surface of the track rail.

**Note**

If the oil runs out or if the grease dries out, this will result in increased sliding resistance which, in turn, results in a deterioration of the smoothness of operation and accuracy of the response. When the sewing machine has not been used for a prolonged period of time, inspect the raceway surfaces.

- (3) Since the X-Y table vibrates strongly during sewing operations and this may loosen the screws, it is recommended that regular inspections be conducted and the screws tightened up where necessary. In particular, looseness in the linear bearing has a direct effect on the sewing performance and so it is recommended that these be inspected every 3 months.
  - \* Screws for tightening track rail of linear bearing
 

The track rail is tightened up every other pitch which means that no tightening screws are missing.
  
- (4) Follow the procedure below to adjust a linear bearing which has become loose.
 

The reference side of the track rail is the side where the mounting surface has a shoulder, and the other side is the driven side. (See Fig. 10.19)

  - 1) Cleaning the mounting surface
 

Use a clean cloth to wipe the surface where the linear bearing will be mounted.
  - 2) Provisionally securing the track rails
 

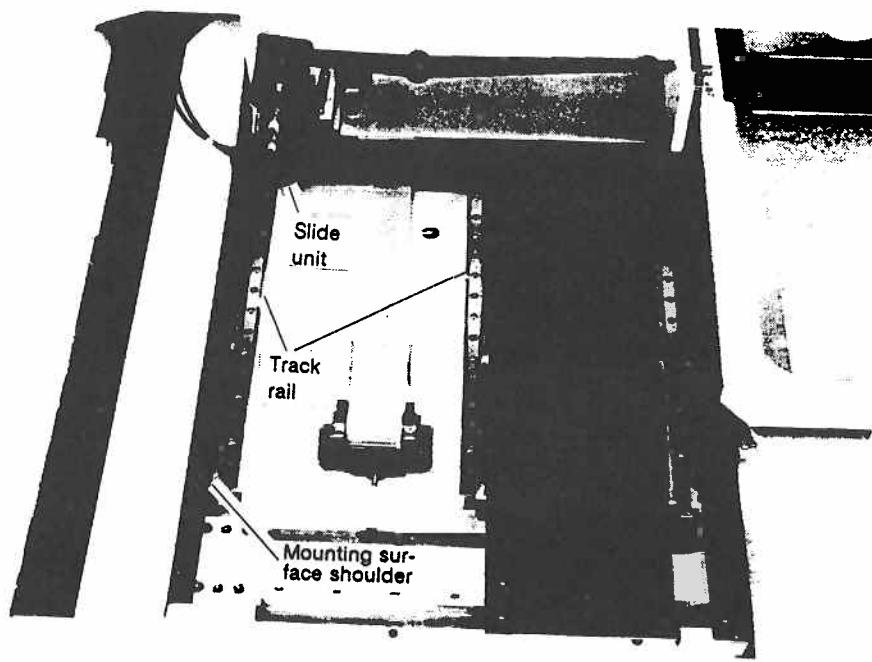
Provisionally secure the pair of track rails so that they can be moved slightly.
  - 3) Securing the track rails at the reference side
 

Press the track rails at the reference side firmly against the mounting surfaces, and tighten each of the screws successively in turn and repeat this procedure until they are all tightened up evenly together.
  - 4) Securing the slide units
 

Press all the slide units firmly against the mounting surfaces and secure them.

## 5) Securing the track rails at the driven side

Move the X-Y table and while checking that it moves smoothly, secure the track rails at the driven side. Proceed to tighten up the screws successively in turn and repeat this procedure until they are all tightened up evenly together.

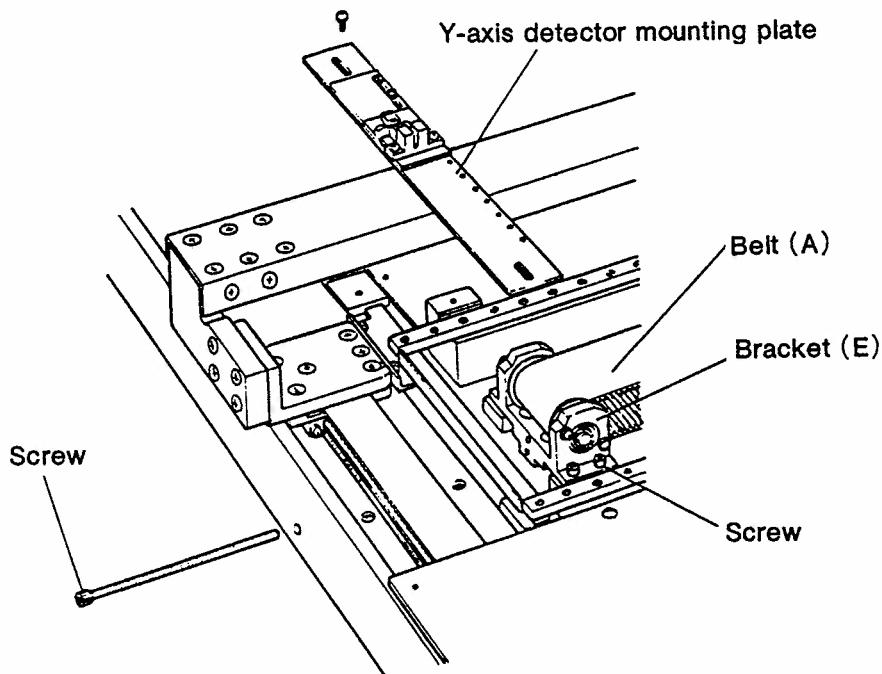
**Fig. 10.19****Notes**

1. When a linear bearing has been removed, the track rail will lean, causing the slide unit to slide and fall off. Therefore, in cases like this, stop the slide unit from sliding by holding it together and hold the track rail horizontally.
2. If one of the slide units of a race has fallen off, do not attempt to repair it or combine it with another slide unit for re-use. In cases like this, replace it with a complete race assembly (4 slide units and 2 track rails) so as to ensure that precision will be maintained.

## 8.8 Adjusting the X-Y Table Belt Tension

### 8.8.1 Adjusting the X-axis belt (A) tension

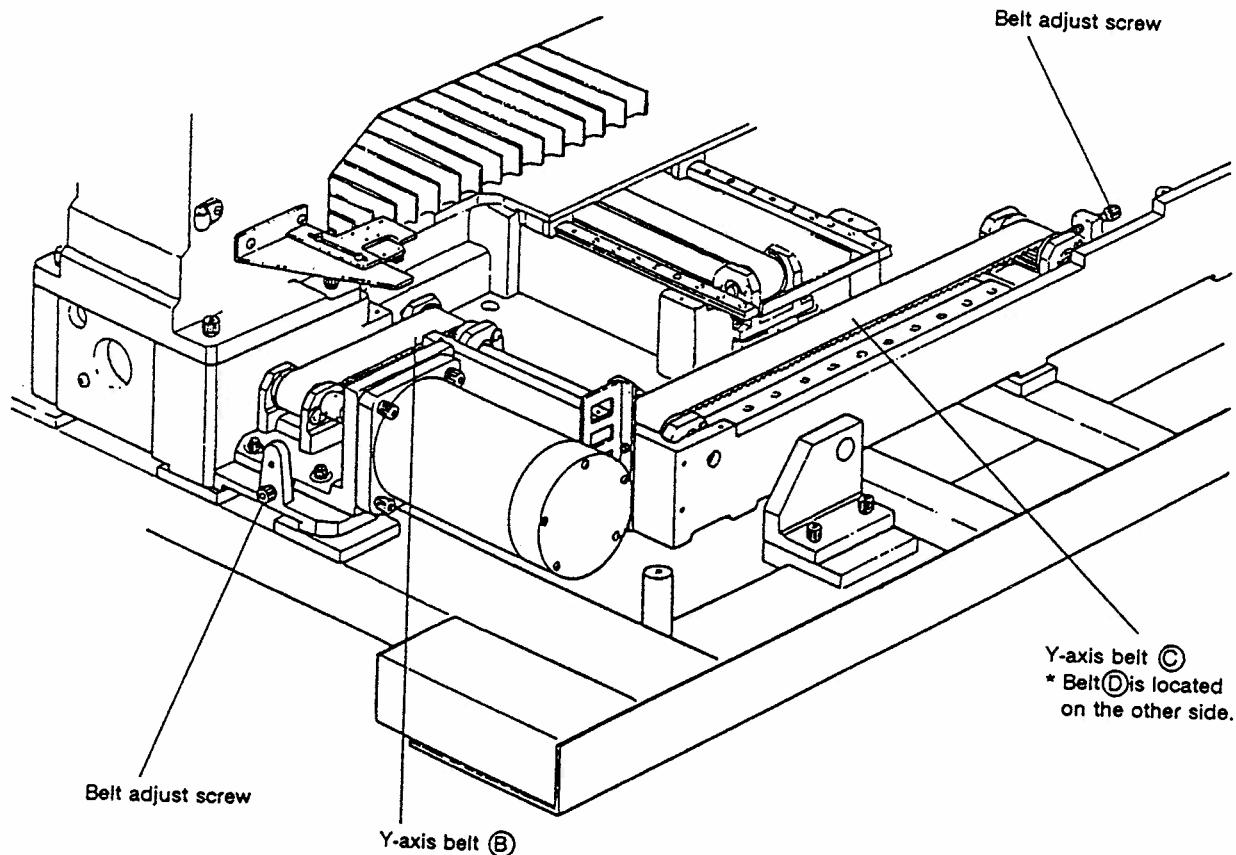
- (1) Remove the rear cover and X-axis beliowws(left).
- (2) REmove the Y-axis detector mounting plate.
- (3) Insert the assory screw from the left the left side of the bed and screw it into bracket E.
- (4) Loosen the 4 screw securing bracket E and rotate the screw to adjust the belt tension.
- (5) The belt tension increases when the screw is tightened up.
- (6) The proper belt tension is attained when there is no slack even when the belt is lightly pressed down by hand. (This tension is produced when the adjust screw is turned by approximately 90° from where it feels stiff to the touch.)



**Fig. 10.20**

**8.8.2 Adjusting the Y-axis belt (B), (C) tension**

- (1) Remove the front cover, X-axis large bellows (left) and (right), and the motor cover (left).
- (2) Adjust the Y-axis belts (B), (C) and (D), following the same procedure as in section 10.9.1.

**Fig.10.21**

## 8.9 Adjusting the Synchronizer

### 8.9.1 Adjusting the needle bar stop (up) position

- (1) Upon completion of the stitching, the sewing machine should stop with timing mark A on the arm aligned with timing mark B on the pulley. (See Fig. 10.22)
- (2) If the deviation between these two marks is 3 mm or more, loosen the synchronizer coupling set screw and turn the coupling to adjust the stop position. Turning the coupling clockwise delays the stop position; conversely, turning it counterclockwise advances the stop position.
- (3) If the needle bar stop comes too early, the needle thread may disengage from the needle eye when stitching is commenced. Conversely, if it is delayed, the needle will stop at a lower position which may mean that the wiper will be caught by the needle or that the movable knife will not move since the cam follower roller of the thread trimmer cannot enter the cam groove.

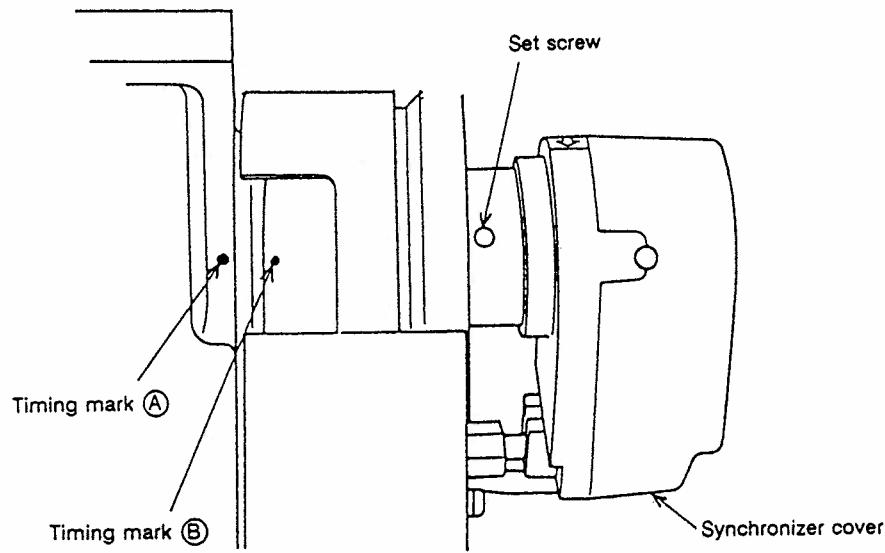


Fig. 10.22

### **8.9.2 Adjusting the position detecting discs**

The 3 position detecting discs do not normally need to be adjusted but it should be checked that their positions stand in the relationship indicated below.

- (1) Draw out the synchronizer cover toward the cable and remove it.

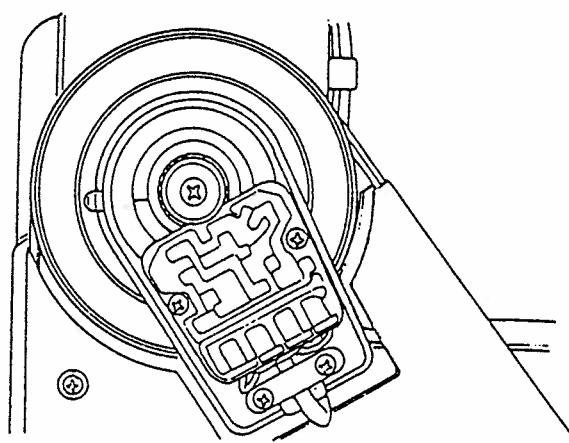


Fig. 10.23

- (2) The synchronizer comes with 3 position detecting discs. The front disc (red) is used to detect the DOWN position, the middle disc (black) to detect the UP position, and the rear disc (blue) to time the thread release.
- (3) The middle disc (black) has a scale. Align the triangular mark of the front disc (red) at the 115° position on this scale and the triangular mark of the rear disk (blue) at the 340° position.

Red disc (DOWN position)

Black disc (UP position)

Blue disc  
(thread release timing)

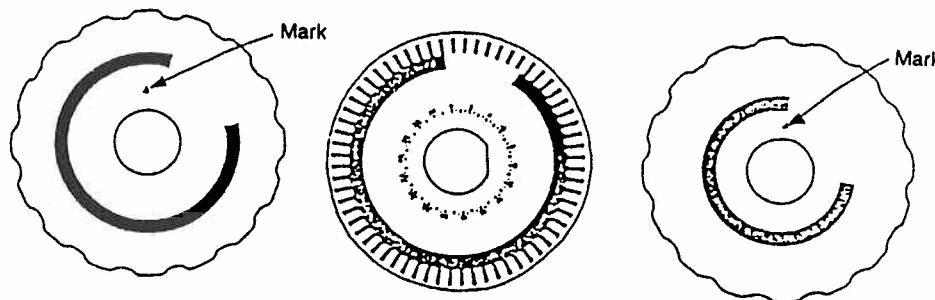
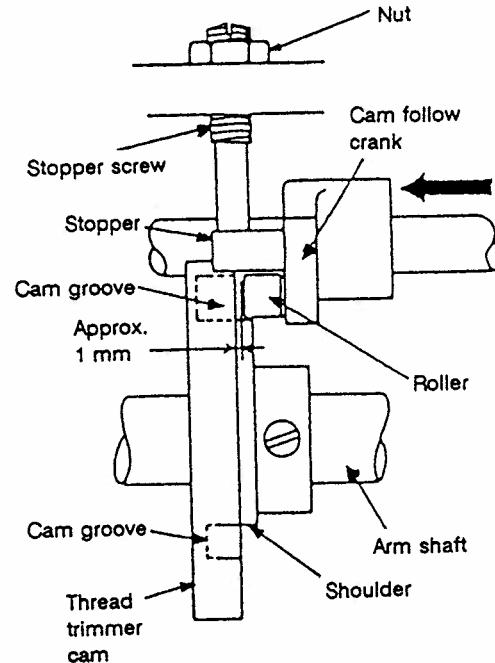


Fig. 10.24

## 8.10 Adjusting the Thread Trimmer

### 8.10.1 Cam follower arm adjustment

- (1) Adjust the cam follower so that the roller is normally positioned on the cam shoulder about 1 mm away from the thread trimmer cam, as shown in Fig. 10.25.
- (2) Use your hand to press the cam follower crank in the direction of the arrow in Fig. 10.25, and check that the roller engages with and disengages from the cam groove without resistance.
- (3) The range in which the roller can be engaged and disengaged is where the cam groove is concentric with the arm shaft. If the roller cannot be engaged and disengaged smoothly, check that the roller is positioned on the shoulder, loosen the nut in Fig. 10.25, tighten the stopper screw until it makes contact with the cam follower crank stopper, loosen the stopper screw by about one-third of a complete turn, and then tighten up the nut.



**Fig. 10.25**

### 8.10.2 Thread cutting blade adjustment

- (1) Proceed as below to adjust the movable knife so that its end coincides with the front of the hook retainer, as shown in Fig. 10.26, when the sewing machine stops.
- (2) Remove the slide plate (left).
- (3) Use a wrench to turn connecting bar nuts **(A)** and **(B)** in the direction of the arrow to loosen them.  
\* Nut **(A)** is the left screw nut; nut **(B)** is the right screw nut.
- (4) When the connecting bar is turned manually in the direction of the arrow, the movable knife moves toward the hook retainer; conversely, when it turned in the opposite direction, the knife moves away from the hook retainer.
- (5) Upon completion of the adjustment, tighten up nuts **(A)** and **(B)** to secure them.

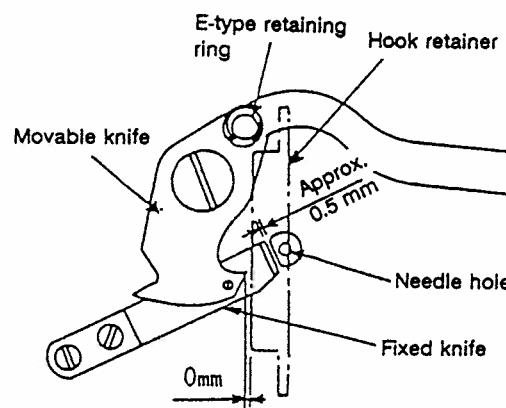
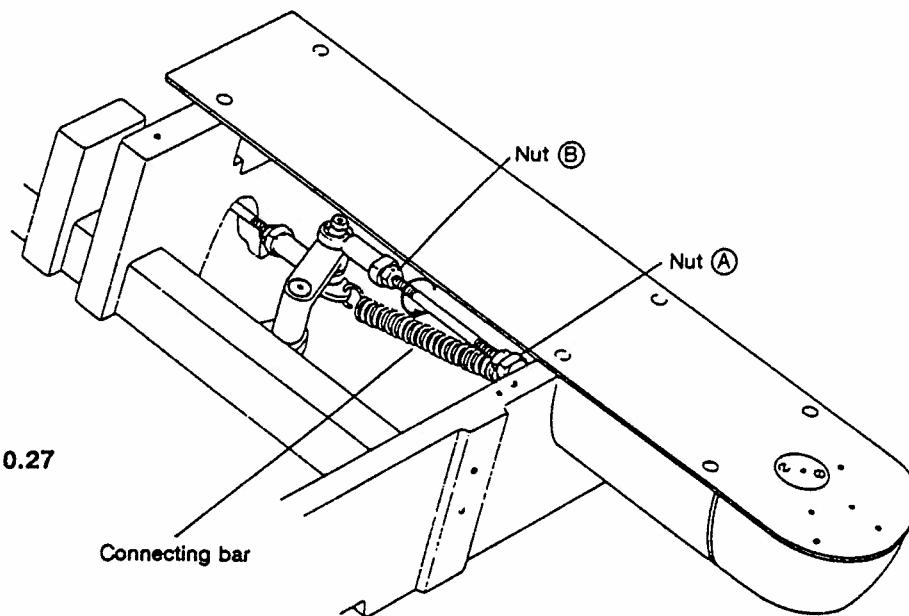


Fig. 10.26

Fig. 10.27



### **8.10.3 Blade drive arm spring force adjustment**

- (1) Remove the belt cover at the motor side and detach the V-belt.
- (2) Remove the oil pan. It is secured by the two screws on the V-belt side.
- (3) Remove the slide plate to which the thread cutting knife is attached.
- (4) Turn the pulley by hand until the connecting bar moves by a wide margin.
- (5) Now check whether the cam follower arm is returned by the force of the spring to where it makes contact gently with the stopper screw. Re-adjust as follows if the cam follower arm is not returned to the end by the force of the spring. (See Fig. 10.11).
- (6) Remove spring A, turn the wing nut and adjust. The spring force is increased when the wing nut is turned in the direction of the arrow.
- (7) Re-attach spring A to the hook and perform the check in (5).

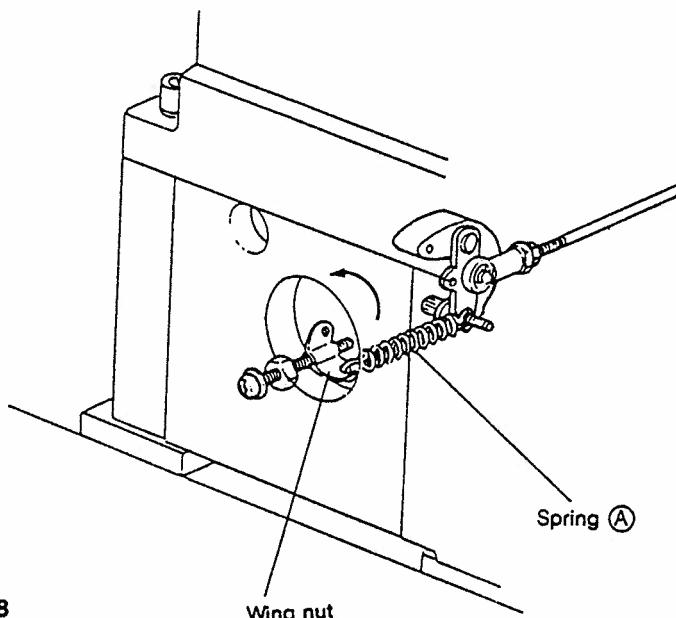


Fig. 10.28

#### **Notes**

1. If the returning spring force is too weak to bring the cam follower arm in contact with the stopper screw, it means that the roller cannot enter the groove and that the thread cannot be cut as a result.
2. Conversely, if the spring force is too strong, the contact pressure between the cam follower arm and stopper screw is too great, the roller cannot be removed from the groove, and the cam follower arm may be damaged as a result.

## 8.11 Adjusting the Trimmer Thread Tail Length

- (1) It is not possible to adjust the length of the thread tail left on the bobbin after trimming. Stitches may be skipped at the start of sewing if the trimmed thread does not extend for more than 22 mm from the bobbin case horn (see Fig. 8.9). If this should occur, proceed as follows.
- (2) Reduce the bobbin thread tension and, based on this, the needle thread tension as well since trimmed thread will contract when the bobbin thread tension is too high or when elastic thread is used. For the same reason, it is recommended that the thread be wound around the bobbin with the lowest possible tension.
- (3) If the fixed knife projects too far from the bottom of the needle plate, there is a danger that the thread, particularly true with thin thread, will rub against the fixed knife blade and that it may break or that the bobbin and needle threads will be shortened before the knife blade engages. To prevent this, install the fixed knife at a distance from the needle plate hole or remove the spacer below the needle plate to create a clearance of 0.2 mm or less between the fixed knife and needle plate. Care should be taken when the needle plate is re-installed to ensure that it is installed in its proper direction: the notch on the reverse of the needle plate should be on the same side as the fixed knife.

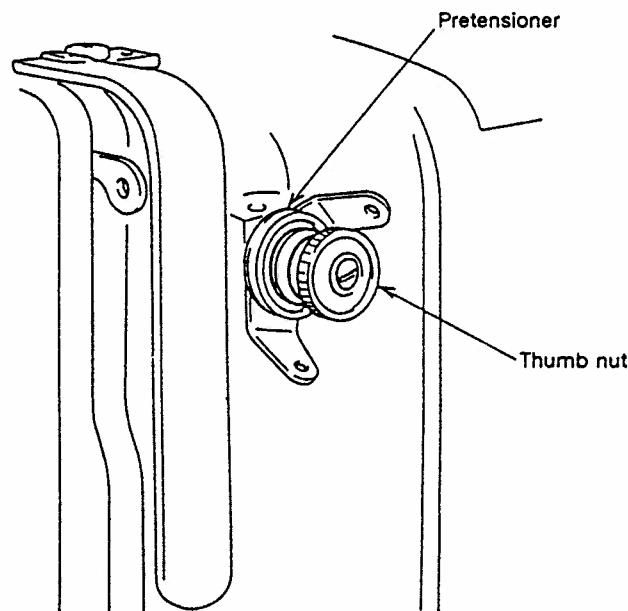
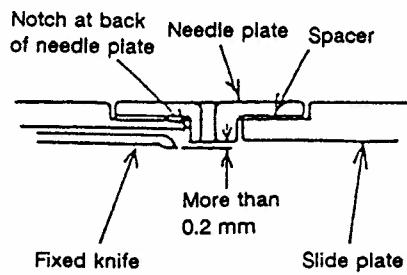


Fig. 10.29

Fig. 10.30

- (4) The trimmed needle thread tail length can be adjusted by turning the pretensioner thumb nut shown in Fig. 10.30. This length is shortened when the nut is turned clockwise.

## 8.12 Adjusting the Thread Release

- (1) If the thread release is not adjusted properly, the trimmed thread tail length will be reduced and stitches will be skipped or the needle thread may leave the needle when sewing commences.
- (2) If the tension discs do not close when the presser foot is lowered, the needle thread tension is reduced and the overall thread tension develops an imbalance.
- (3) When the thread release is adjusted properly, a clearance of 0.8 to 1.0 mm develops when the tension discs open, as shown in Fig. 10.31.

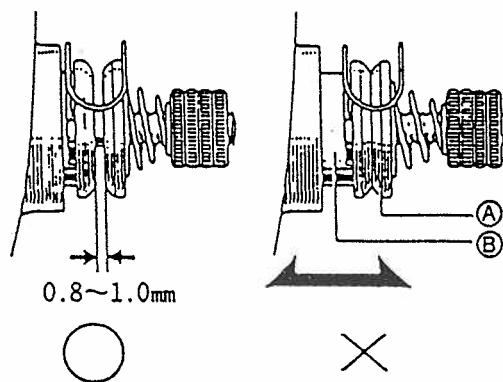


Fig. 10.31

- (4) Thread release occurs when the presser foot rises (the work holder is at the home position when the power is switched ON or the fabric is fed without stitching) and when threads are trimmed.
- (5) Adjusting the amount of thread release during thread trimming  
Fully turn the rotary solenoid (small) crank in the direction indicated by the arrow in Fig. 10.32.  
Adjust the position of the crank so that the tension discs open between 0.8 and 1.0 mm. When nut (A) is loosened and nut (B) is tightened up, the opening increases; conversely, when the opposite is done, the opening is reduced. If the adjustment amount is too great for it to be accomplished with the nut alone, loosen the wire clamping screw and adjust the position of the wire.

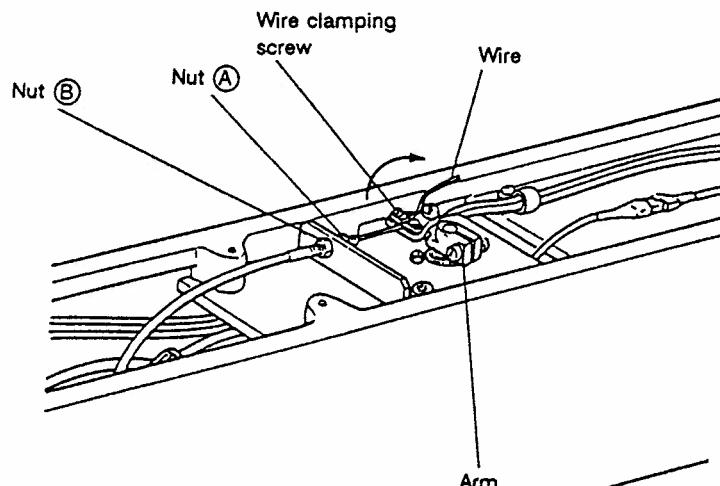


Fig. 10.32

### 8.13 Adjusting the Stroke of the Take-up Spring

- (1) Loosen the needle thread tension stud set screw **(B)**.
- (2) Turn the tension regulating thumb nut **(C)** clockwise or counterclockwise to adjust the stroke of the take-up spring, and then tighten up screw **(B)** after the adjustment.  
Turn to the right to increase the stroke.  
Turn to the left to reduce the stroke.

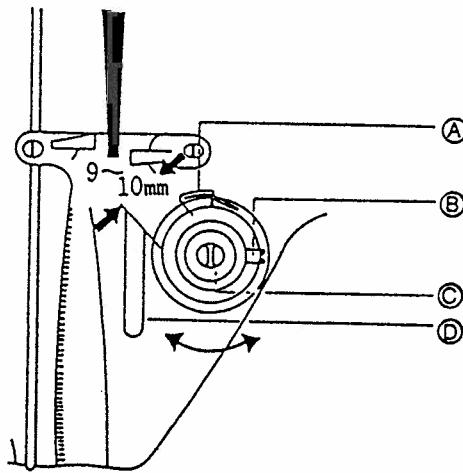


Fig. 10.33

The standard stroke of the take-up spring (clearance between take-up spring **(A)** and thread guide **(D)**) is 9 to 10 mm.

### 8.14 Adjusting the LIMI-STOP Z Motor Belt

- (1) Remove the belt cover.
- (2) Loosen the two nuts shown below.
- (3) Adjust the motor position using the upper nut so that the appropriate tension is yielded in the belt by the gravity of the motor. After the adjustment, tighten up the lower nut.

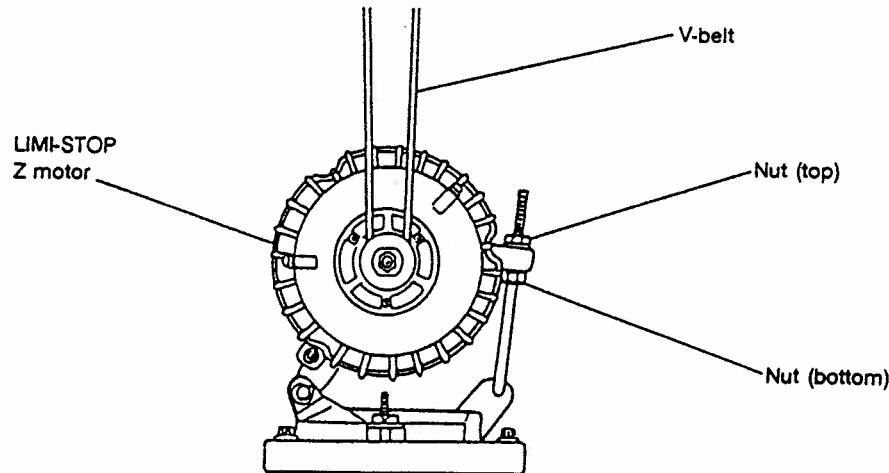
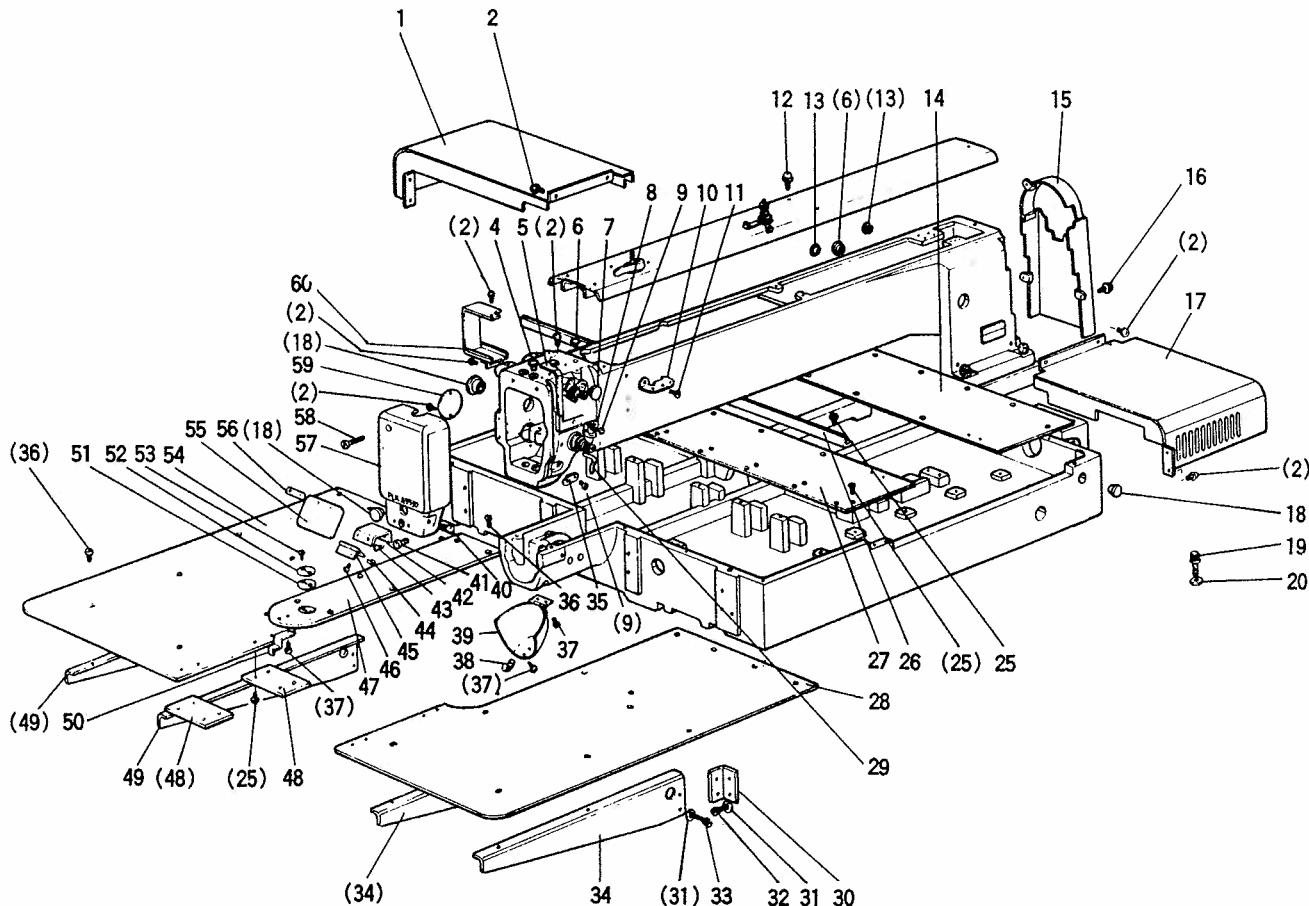


Fig. 10.34

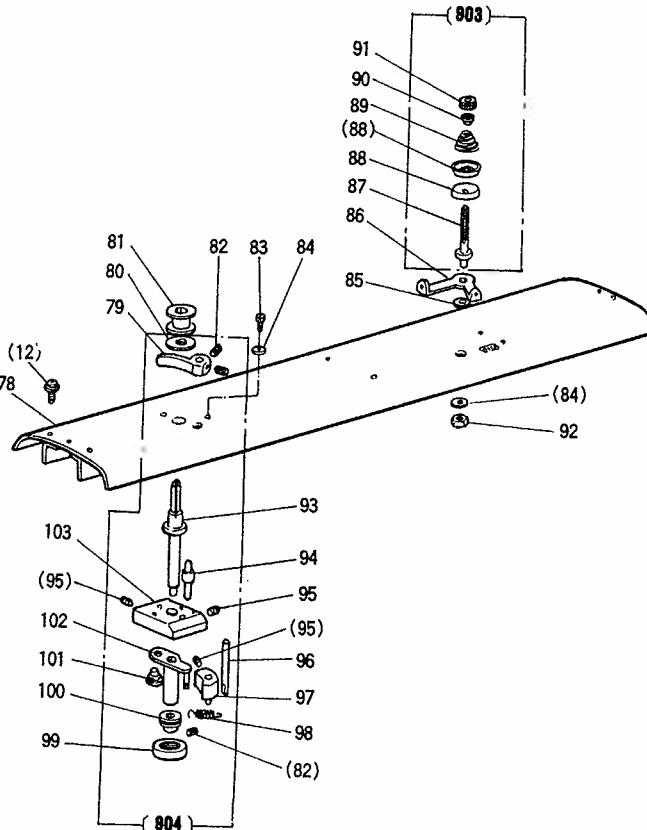
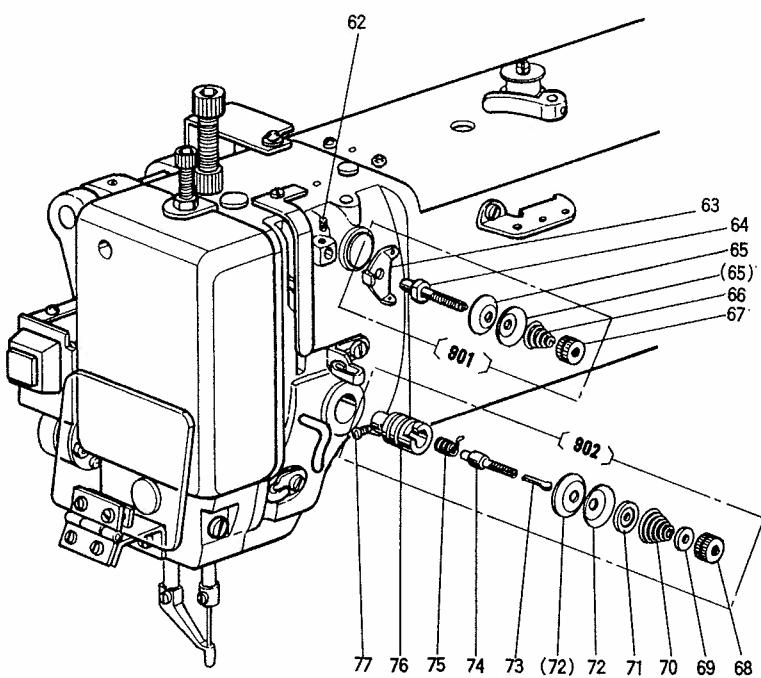
## ARM BED &amp; IT'S ACCESSORIES (I)

Fig. No.	Parts.No.	Description	Amt. Req.		Fig. No.	Parts.No.	Description	Amt. Req.	
			4000	5000				4000	5000
1	MA 35A0 849	Motor cover.....	1	1	34	MA 35A0 429	Bracket (right) .....	2	2
2	M9 1054 004	Screw M4X8.....	14	14	35	MF 10A0 181	Thread guide.....	1	1
4	MN 10A4 742	Oil cap .....	1	1	36	M9 1110 002	Screw $\frac{11}{64}(40) \times 8$ .....	28	28
5	MA 20A0 584	Thread take-up cover .....	1	1	37	M9 0906 003	Screw $\frac{9}{64}(40) \times 3.2$ .....	6	6
6	M9 1304 080	Rubber plug.....	3	3	38	MS 01A0 361	Latch .....	1	1
7	M9 1910 080	Rubber plug.....	4	4	39	MA 20E3 339	Cylinder cover (complete) .....	1	1
8	MG 43A0 181	Thread guide.....	1	1	40	M9 0909 003	Screw $\frac{9}{64}(40) \times 6$ .....	1	1
9	M9 0909 003	Screw $\frac{9}{64}(40) \times 6$ .....	2	2	41	M9 1106 003	Screw $\frac{11}{64}(40) \times 20$ .....	1	1
10	MF 36A1 180	Thread guide.....	1	1	42	MS 03A5 601	Eye guard adapter .....	1	1
11	M9 1110 002	Screw $\frac{11}{64}(40) \times 8$ .....	2	2	43	M9 1110 002	Screw $\frac{11}{64}(40) \times 8$ .....	2	2
12	M9 1055 004	Screw M4X22.....	5	5	44	M9 0806 002	Screw $\frac{1}{8}(44) \times 6$ .....	2	2
13	M9 0883 080	Rubber plug.....	3	3	45	MS 01A1 739	Hinge .....	1	1
14	MA 35A7 339	Cover .....	1	1	46	M9 0804 002	Screw $\frac{1}{8}(44) \times 3.5$ .....	2	2
15	MA 35A0 776	Belt cover .....	1	1	47	MS 18A0 470	Slide plate .....	1	1
16	M9 1330 004	Screw M5.....	3	3	48	MA 35A0 601	Adapter .....	2	2
17	MA 35A1 849	Motor cover.....	1	1	49	MA 35A1 429	Bracket (left) .....	2	2
18	M9 1910 080	Rubber plug.....	5	5	50	MS 01A0 192	Leaf spring .....	1	1
19	M9 0104 021	Bolt M10X30 .....	4	4	51	MS 01A1 476	Spacer .....	1	1
20	M9 1012 050	Washer 10 .....	4	4	52	MS 03A1 101	Needle plate .....	1	1
25	M9 1104 011	Screw $\frac{11}{64}(40) \times 8.3$ .....	26	26	53	M9 0605 010	Screw $\frac{3}{32}(56) \times 2.8$ .....	2	2
26	MA 35A8 339	Cover .....	1	1	54	MA 35A0 473	Slied plate (left) .....	1	1
27	MA 35A9 339	Cover .....	1	1	55	MA 36A0 473	Slide plate (left) .....	1	1
28	MA 35A0 474	Slide plate (right) .....	1	1	56	MS 01A0 160	Eye guard .....	1	1
	MA 36A0 474	Slide plate (right) .....	1	1	56	MS 01A0 477	Adapter .....	1	1
29	MF 70A1 180	Thread guide.....	1	1	57	MA 35A0 830	Face plate .....	1	1
	MA 36A0 830	Face plate .....	1	1	58	M9 1070 003	Screw M4X30 .....	1	1
30	MA 35A0 361	L-bracket .....	4	4	59	MA 35A5 339	Cover .....	1	1
31	M9 0511 050	Washer 5 .....	16	16	60	MA 20A4 339	Cover .....	1	1
32	M9 5002 017	Bolt M5X12 .....	8	8					
33	M9 5003 017	Bolt M5X8 .....	8	8					



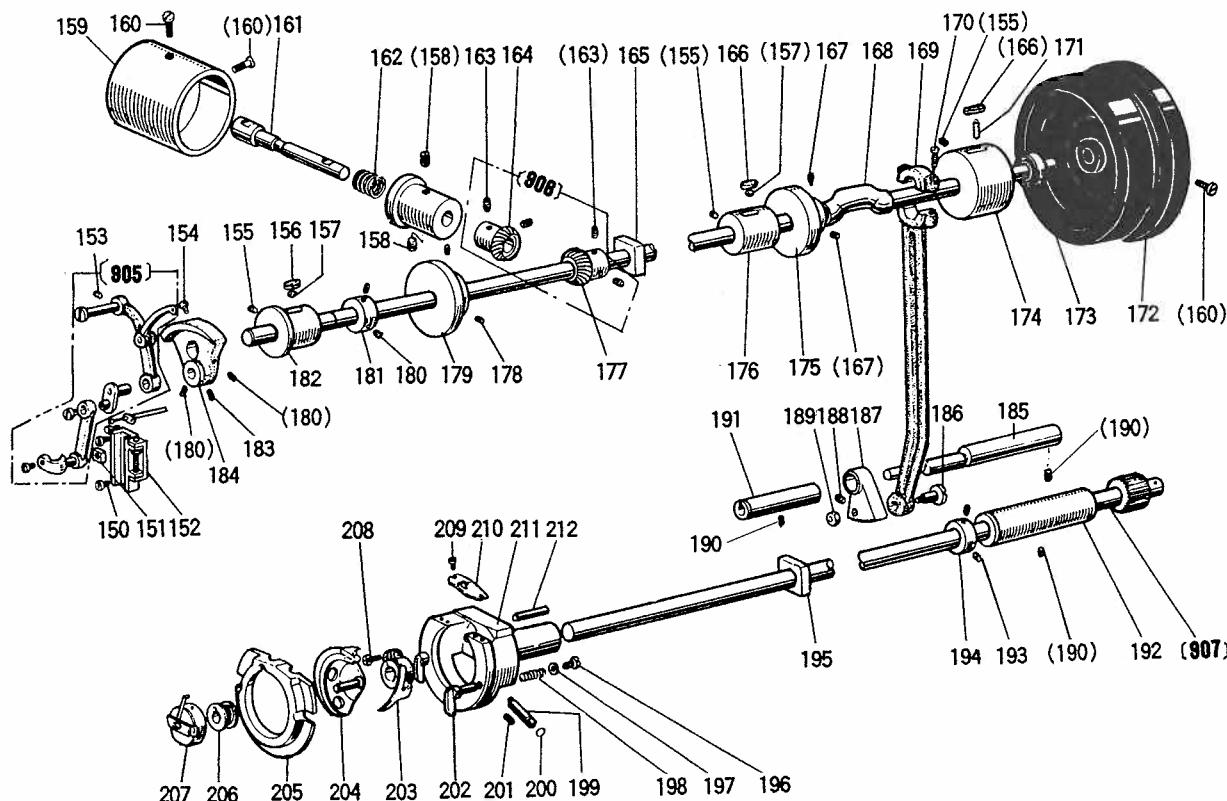
**ARM BED & IT'S ACCESSORIES (II)**

Fig. No.	Parts, No.	Description	Amt. Req.	Fig. No.	Parts, No.	Description	Amt. Req.
62	M9 1108 001	Screw 11/64(40)X5.5 .....	1	83	M9 4002 017	Bolt M4X8 .....	2
901	MF 00E0 550	Pre-tension complete .....	1	84	M9 0421 050	Washer 4 .....	8
63	MF 90A0 181	Thread guide .....	1	85	MA 20A0 352	Collar .....	1
64	MF 00A0 553	Thread tension stud .....	1	86	MS 14A1 180	Thread guide .....	1
65	MF 10A1 555	Thread tension discs .....	2	903	MS 14E0 180	Thread tension regulator complete .....	1
66	MF 36A0 245	Thread tension spring .....	1	87	MS 14A0 553	Thread tension stud .....	1
67	M9 1101 046	Thumb nut .....	1	88	MF 10A0 555	Thread tension disc .....	2
902	MA 16E0 210	Thread tension regulator complete .....	1	89	MM11A0 245	Thread tension spring .....	1
68	M9 1605 045	Thumb nut .....	1	90	MM11A0 702	Spring guide .....	1
69	MT 60A0 802	Thumb nut revolution stopper .....	1	91	M9 1602 046	Thumb nut .....	1
70	MN 50A1 245	Thread tension spring .....	1	92	M9 1007 045	Nut M4 .....	1
71	MM11A0 556	Thread tension releasing disc .....	1	93	MA 20A0 530	Driven shaft .....	1
72	MF 10A0 555	Thread tension discs .....	2	94	MA 20A1 530	Shaft .....	1
73	M9 0204 060	Thread tension releasing pin .....	1	95	M9 1055 020	Screw M4X4 .....	3
74	MF 10A0 553	Thread tension stud .....	1	96	MS 14A1 454	Stopper .....	1
75	MF 10A0 187	Thread take-up spring .....	1	97	MS 14A0 350	Cam .....	1
76	MF 10A0 709	Thread tension regulator bushing .....	1	98	MS 14A0 572	Helical spring .....	1
77	M9 0901 002	Screw 9/64(40)X4 .....	1	99	MS 03A0 417	Tire .....	1
78	MA 35A0 600	Top cover .....	1	100	MA 20A0 194	Wheel .....	1
79	MA 20A0 950	Lever .....	1	101	M9 9006 063	Pin .....	1
80	MA 20A0 476	Spacer .....	1	102	MA 20E1 750	Bushing complete .....	1
81	MA 10A0 123	Bobbin .....	1	103	MS 14A0 603	Bracket .....	1
82	M9 3002 020	Screw M3X4 .....	4	904	MA 20E0 190	Bobbin winder complete .....	1



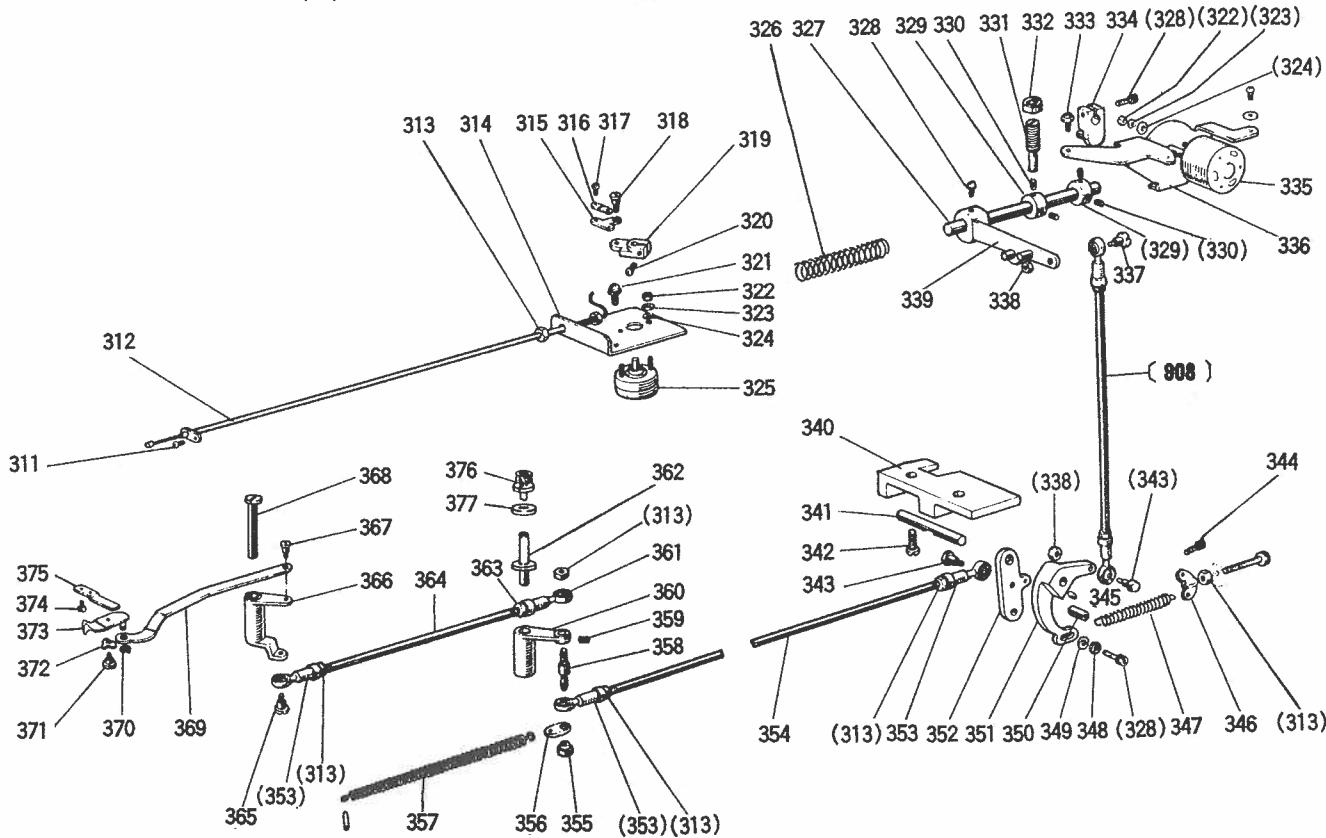
## SEWING MECHANISM

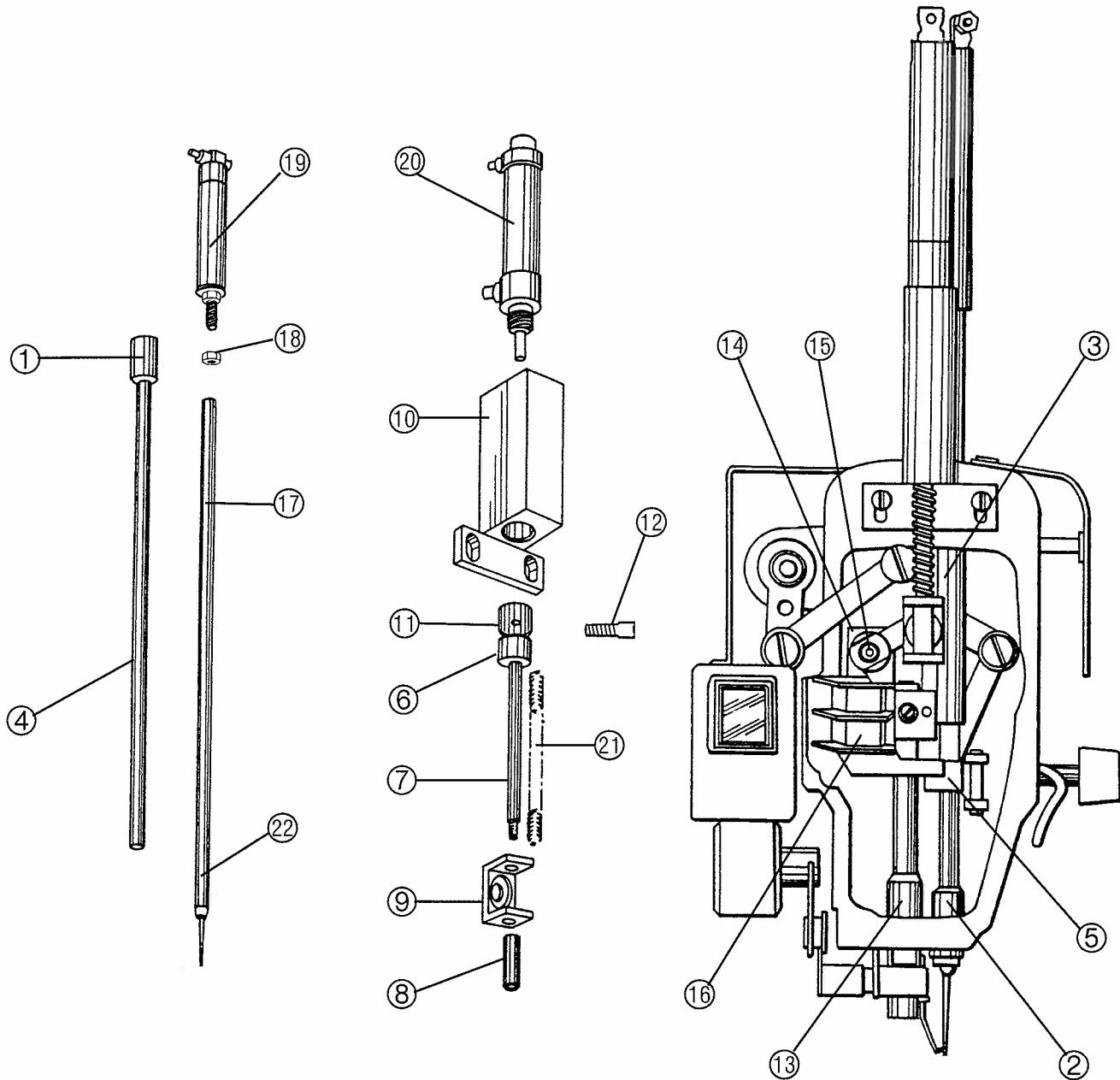
Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
141	MN 25B0 128	Needle DPX17 # 16.....		177	MF 40A0 330	Bevel gear for arm shaft.....	1
142	M9 0815 002	Screw $\frac{1}{8}$ (44)X4.5.....	1	178	M9 4006 021	Screw M4X6.....	2
143	MF 21D0 181	Thread guide.....	1	179	MS 14A0 682	Pulley.....	1
144	MF 10A1 181	Thread guide.....	1	180	M9 1602 001	Screw $\frac{1}{4}$ (40)X4.....	2
145	M9 1102 001	Screw $\frac{11}{64}$ (40)X2.7 .....	1	181	(MF 70A0 352)	Collar .....	1
146	MG 30A0 664	Needle bar bushing (lower) .....	1	182	MS 10A0 232	Arm shaft bushing (left) .....	1
147	MS 01A0 660	Needle bar.....	1	183	M9 1606 001	Screw $\frac{1}{4}$ (40)X6.....	1
148	M9 1502 001	Screw $\frac{15}{64}$ (28)X3 .....	1	184	(MS 01A0 383)	Crank .....	1
149	MS 01A0 663	Needle bar bushing (upper) .....	1	185	MS 01A0 891	Rock shaft.....	1
150	M9 1110 002	Screw $\frac{11}{64}$ (40)X8 .....	7	186	M9 8003 015	Screw .....	1
151	MF 10A0 325	Square block.....	1	187	MS 01A0 508	Sector gear .....	1
152	MS 03E0 662	Guide complete .....	1	188	M9 5004 021	Screw M5X5.....	1
805	MS 01E0 580	Thread take-up lever complete .....	1	189	M9 1802 045	Nut .....	1
153	M9 1221 001	Screw M5X12.....	1	190	M9 1222 001	Screw M5X6 .....	3
154	M9 1802 006	Screw .....	1	191	MS 01A0 833	Bushing .....	1
155	M9 1221 001	Screw M5X12.....	3	807	MA 35E0 450	Hook shaft complete .....	1
156	MA 20A0 740	Felt .....	1	192	MS 03A8 833	Hook shaft bushing .....	1
157	MS 10A1 740	Felt .....	2	193	M9 1506 001	Screw $\frac{15}{64}$ (28)X6 .....	2
158	M9 1224 001	Screw M5X8 .....	2	194	MM11A0 352	Collar .....	1
159	MA 35A0 682	Pulley .....	1	195	MA 35A1 833	Bushing .....	1
160	M9 1502 002	Screw $\frac{15}{64}$ (28)X12 .....	4	196	M9 0802 003	Screw $\frac{1}{8}$ (44)X4.5 .....	2
161	MA 35A3 530	Shaft .....	1	197	M9 3006 050	Washer .....	2
162	MA 35A2 572	Spring .....	1	198	MS 01A0 572	Spring .....	2
163	M9 1606 001	Screw $\frac{1}{4}$ (40)X7 .....	4	199	MS 01A0 761	Eccentric shaft .....	1
164	MF 40A0 333	Bevel gear .....	1	200	M9 0502 085	O-ring S5 .....	1
808	MF 10E0 335	Bevel gear (complete) .....	1	201	M9 1516 001	Screw $\frac{15}{64}$ (28)X13 .....	1
165	MA 35A0 833	Bushing .....	1	202	MS 09A0 950	Hook clamp .....	2
166	MF 60A2 740	Felt .....	2	203	MS 01A0 611	Hook driver .....	1
167	M9 1607 001	Screw $\frac{1}{4}$ (40)X4 .....	2	204	MA 10A0 120	Inner hook .....	1
168	MA 35A0 230	Arm shaft .....	1	205	MS 08A0 616	Hook retainer .....	1
169	MS 01A0 956	Connecting rod .....		206	MA 10A0 123	Bobbin .....	1
170	M9 1203 002	Screw $\frac{3}{16}$ (28)X15 .....	2	207	MS 17A0 125	Bobbin case .....	1
171	MS 09A0 740	Felt .....	1	208	M9 5001 021	Bolt M5X16 .....	1
172	MA 20A0 682	Pulley .....	1	209	M9 0853 002	Screw .....	2
173	M9 1473 086	Oil seal .....	1	210	MS 01A0 329	Thread guide .....	1
174	MS 09A0 233	Arm shaft bushing (right) .....	1	211	MS 01A0 121	Outer hook .....	1
175	MS 01A0 350	Thread trimmer cam .....	1	212	M9 0001 060	Pin m6-4X18 .....	1
176	MS 10A0 234	Arm shaft bushing (middle) .....	1				



## THREAD TRIMMING MECHANISM

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
311	M9 1110 002	Screw $11/64(40) \times 8$ .....	1	344	M9 0101 017	Bolt M5X .....	1
312	MA 35E0 746	Flexible wire (complete) .....	1	345	M9 1108 001	Screw $11/64(40) \times 5.5$ .....	1
313	M9 2074 045	Nut M5 .....	7	346	M9 1202 048	Nut .....	1
314	MA 35A3 603	Solenoid adapter .....	1	347	MA 35A0 572	Spring .....	1
315	MF 90A0 361	Bracket .....	1	348	M9 0501 053	Spring washer 5 .....	1
316	MF 36A0 750	Holder .....	1	349	M9 0550 050	Washer 5 .....	1
317	M9 0802 002	Screw $1/8(44) \times 7$ .....	2	350	M9 1109 045	Nut $11/64(40)$ .....	1
318	M9 1127 015	Screw $11/64(40)$ .....	1	351	MS 01A1 392	Knife driving crank .....	1
319	MS 07A0 228	Crank .....	1	352	MS 01A2 392	Knife driving crank .....	1
320	M9 1112 002	Screw $11/64(40) \times 12$ .....	1	353	MN 55A0 975	Connecting link .....	2
321	M9 1067 004	Screw M5X10 .....	2	354	M9 0504 023	Stud bolt .....	1
322	M9 1003 045	Nut M4 .....	4	355	M9 1383 045	Nut M5 .....	1
323	M9 0401 053	Spring washer 4 .....	4	356	MA 35A0 708	Hook .....	1
324	M9 0450 050	Washer 4 .....	4	357	MA 35A1 572	Spring .....	1
325	M9 1012 095	Rotary solenoid .....	1	358	MA 35A2 530	Shaft .....	1
326	MS 01A1 572	Spring .....	1	359	M9 1050 020	Screw M4X5 .....	1
327	MS 01A0 348	Shaft .....	1	360	MA 35A1 950	Lever .....	1
328	M9 5003 021	Bolt M5X12 .....	1	361	MN 72A0 975	Ball joint .....	1
329	MS 01A3 352	Collar .....	2	362	MA 20A4 454	Stepped pin .....	1
330	M9 5004 021	Screw M5X5 .....	4	363	M9 1374 045	Nut M5 (left) .....	1
331	M9 1504 005	Screw $15/64(28) \times 32$ .....	1	364	M9 5004 023	Stud bolt .....	1
332	M9 1503 045	Nut .....	1	365	M9 1101 017	Screw $11/64(40)$ .....	1
333	M9 1056 004	Screw M4X10 .....	3	366	MA 20A0 392	Knife driving crank .....	1
334	MS 01E0 430	Crank complete .....	1	367	M9 1214 015	Screw $3/16(28)$ .....	1
335	M9 0001 095	Rotary solenoid .....	1	368	MS 01A5 454	Stepped pin .....	1
336	MS 14A3 601	Solenoid adapter .....	1	369	MS 03A1 910	Link .....	1
337	M9 1101 015	Screw $11/64(40)$ .....	1	370	M9 0513 065	Snap ring 2.5 .....	1
338	M9 1104 045	Screw $11/64(40)$ .....	1	371	M9 1136 015	Screw $11/64(40)$ .....	1
339	MS 01E0 351	Cam follower complete .....	1	372	M9 6004 052	Wave washer 6 .....	1
908	MS 01E0 975	Connecting link complete .....	1	373	MS 03B0 838	Movable knife complete .....	1
340	MS 14A3 603	Bracket .....	1	374	M9 0906 003	Screw $9/64(40) \times 3.2$ .....	2
341	MS 01A4 454	Shaft .....	1	375	MS 14A0 838	Fixed knife .....	1
342	M9 1510 002	Screw $15/64(28) \times 12$ .....	2	376	M9 4002 017	Bolt M4X8 .....	1
343	M9 0101 017	Bolt $11/64(40)$ .....	2	377	M9 0421 050	Washer .....	1

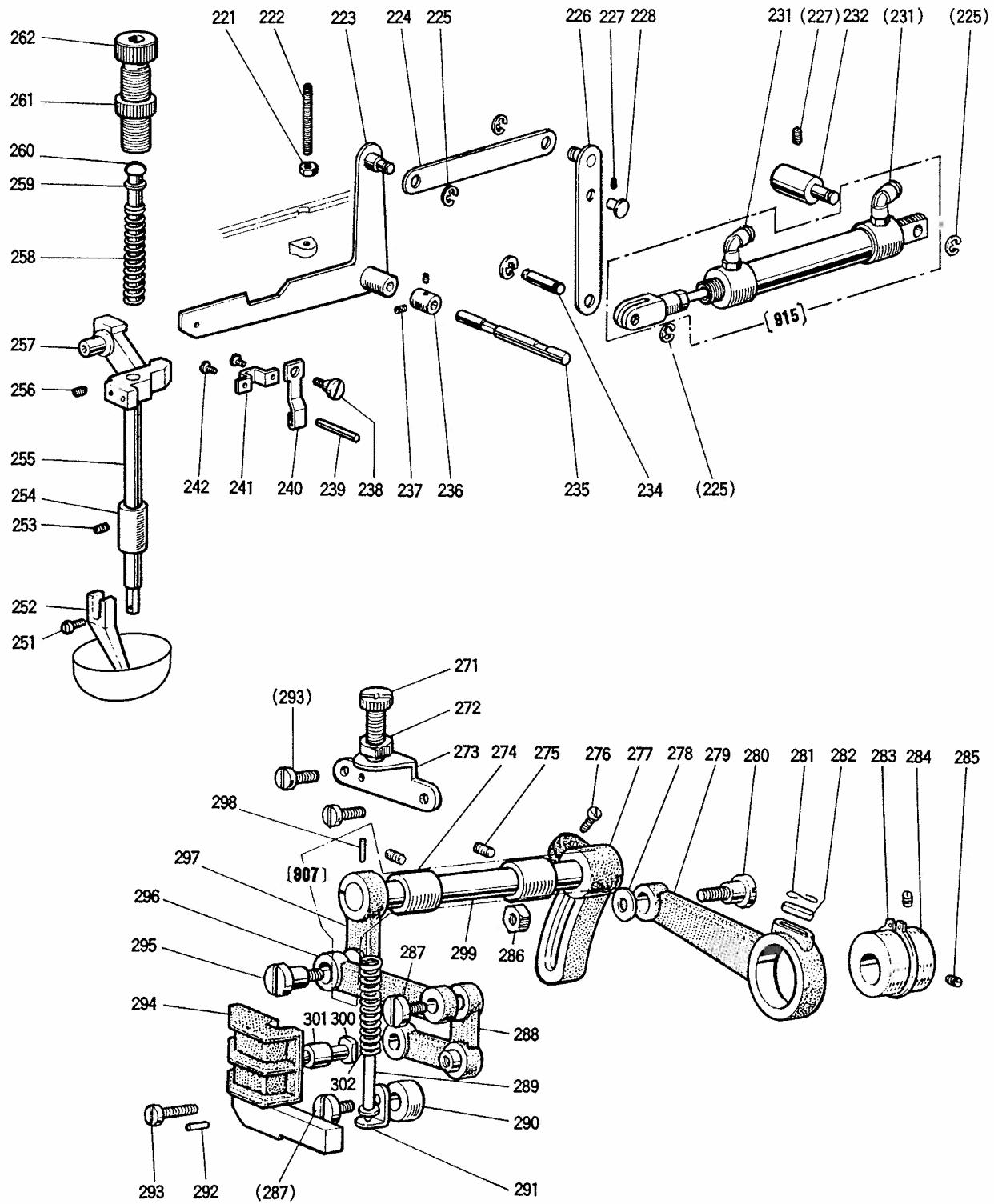


**NEEDLE BAR MECHANISM**

**NEEDLE BAR MECHANISM**

Ref #	Part #	Description	Qty	Ref #	Part #	Description	Qty
1.....800056 .....	ADAPTOR, CYLINDER .....	.1		12....PALS-114 .....	GUIDE SCREW .....	.1	
2.....PALS-101L .....	BUSHING LOWER .....	.1		13....PALS-115 .....	PRESSER FOOT BUSHING .....	.1	
3.....PALS-101U .....	BUSHING UPPER .....	.1		14....PALS-117 .....	HOLDER .....	.1	
4.....PALS-103 .....	NEEDLE BAR OUTER .....	.1		15....PALS-121 .....	RETAINER .....	.1	
5.....PALS-106 .....	NEEDLE BAR CLAMP .....	.1		16....PALS-122 .....	GUIDE BLOCK .....	.1	
6.....PALS-107 .....	PIVOT .....	.1		17....PALS-150 .....	NEEDLE BAR, INNER .....	.1	
7.....PALS-108 .....	LIFT ROD .....	.1		18....800057 .....	NUT .....	.1	
8.....PALS-109 .....	STOP .....	.1		19....NCJ-2KB 10-100 .....	NEEDLE CYLINDER .....	.1	
9.....PALS-110 .....	BRACKET, FOOT LIFT .....	.1		20....021.5-D .....	FOOT CYLINDER .....	.1	
10....PALS-111 .....	CYLINDER MOUNT .....	.1		21....800065 .....	SPRING .....	.1	
11....PALS-112 .....	CLEVIS .....	.1		22....4-40X5/64 S.S. ....	SET SCREW .....	.1	

## PRESSER BAR LIFT MECHANISM

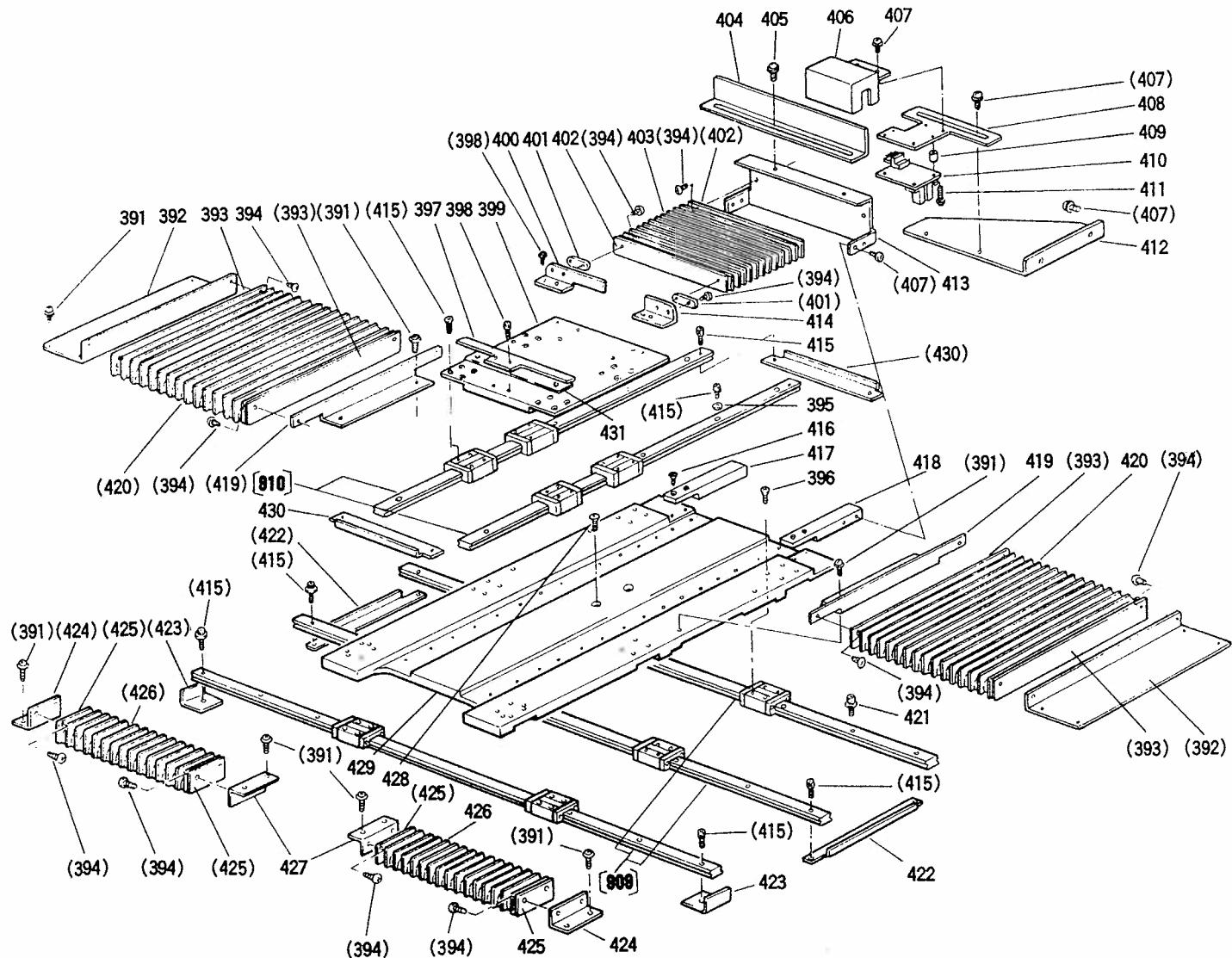


**PRESSER BAR LIFTING MECHANISM**

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	AMT. REQ.
221	M9 2075 045	Nut M8 .....	1	271	M9 1801 035	Feed regulating screw $\frac{9}{32}(28) \times 35$ .....	1
222	M9 8012 021	Screw M8X55 .....	1	272	M9 1802 045	Nut $\frac{9}{32}(28)$ .....	1
223	MA 35A0 252	Lifting lever .....	1	273	MG 30B1 261	Presser regulating bracket .....	1
224	MA 35A0 910	Link .....	1	274	MG 30A0 833	Feed lifting rock shaft bushing .....	2
225	M9 0511 065	E-type retaining ring 6 .....	4	275	M9 1108 001	Screw $\frac{11}{64}(40) \times 5.5$ .....	2
226	MA 35A0 950	Lever .....	1	276	M9 1603 003	Screw $\frac{1}{4}(40) \times 16$ .....	1
227	M9 1222 001	Screw M5X6 .....	2	277	MS 07A0 463	Feed lifting rock shaft crank .....	1
228	MA 35A0 530	Shaft .....	1	278	M9 0624 050	Washer 6 .....	1
				279	MG 30B0 384	Feed connecting crank rod .....	1
231	MA 20A0 571	Connector .....	2	280	M9 1550 015	Special bolt .....	1
915	MA 20E0 434	Air cylinder assy. ....	1	281	MF 60A0 700	Spring .....	1
232	MA 35A1 530	Shaft .....	1	282	MG 30B0 740	Felt .....	1
233	MA 35A0 434	Air cylinder .....	1	283	M9 0325 065	C-type stop ring 25 .....	1
234	M9 9009 063	Pin .....	1	284	MG 30A0 760	Feed lifting eccentric .....	1
235	MA 20A0 454	Shaft .....	1	285	M9 1606 001	Screw $\frac{1}{4}(40) \times 7$ .....	2
236	MA 20A1 352	Collar .....	1	286	M9 1572 045	U-nut $6 \times 0.75$ .....	1
237	M9 1503 001	Screw $\frac{15}{64}(28) \times 4.5$ .....	2	287	M9 1210 002	Screw $\frac{3}{16}(28) \times 10$ .....	2
238	M9 1225 015	Screw $\frac{3}{16}(28) \times 5.5$ .....	1	288	MG 10B0 763	Bell crank .....	1
239	M9 0415 060	Thread releasing pin .....	1	289	MS 03A6 154	Spring guide bar complete .....	1
240	MG 30B1 222	Thread releasing cam .....	1	290	MS 02A2 352	Collar .....	1
241	MG 30A0 154	Guide plate .....	1	291	MG 30B0 226	Guide bar adapter .....	1
242	M9 1109 002	Screw $\frac{11}{64}(40) \times 7$ .....	2	292	M9 0301 064	Spring pin 3X8 .....	2
251	M9 0922 002	Screw $\frac{9}{64}(40) \times 8$ .....	1	293	M9 1110 002	Screw $\frac{11}{64}(40) \times 8$ .....	3
252	MV 30A0 256	Presser foot .....	1	294	MS 05A0 765	Bell crank guide .....	1
253	M9 1102 001	Screw $\frac{11}{64}(40) \times 2.7$ .....	1	295	M9 1681 015	Screw $\frac{1}{4}(40) \times 12$ .....	1
254	MG 30B0 267	Presser bar bushing .....	1	296	MG 10B0 910	Feed lifting rock shaft link .....	1
255	MS 03A0 262	Presser bar .....	1	297	MS 02E0 460	Feed lifting rock shaft complete .....	1
256	M9 1506 001	Screw $\frac{15}{64}(28) \times 7$ .....	1	298	MS 02A0 462	Upper feed lifting rock shaft crank .....	1
257	MG 10B0 265	Presser bar holder .....	1	299	M9 0207 061	Taper pin .....	1
258	MS 03A1 572	Presser bar spring .....	1	300	M9 0507 063	Bell crank guide pin .....	1
259	M9 0625 050	Washer 6 .....	1	301	MG 10B0 411	Roller .....	1
260	MS 03A0 703	Presser bar guide .....	1	302	MS 03A2 572	Spring .....	1
261	M9 3202 047	Special nut $1\frac{1}{2}(28)$ .....	1				
262	M9 3213 035	Thumb screw $1\frac{1}{2}(28) \times 43$ .....	1				

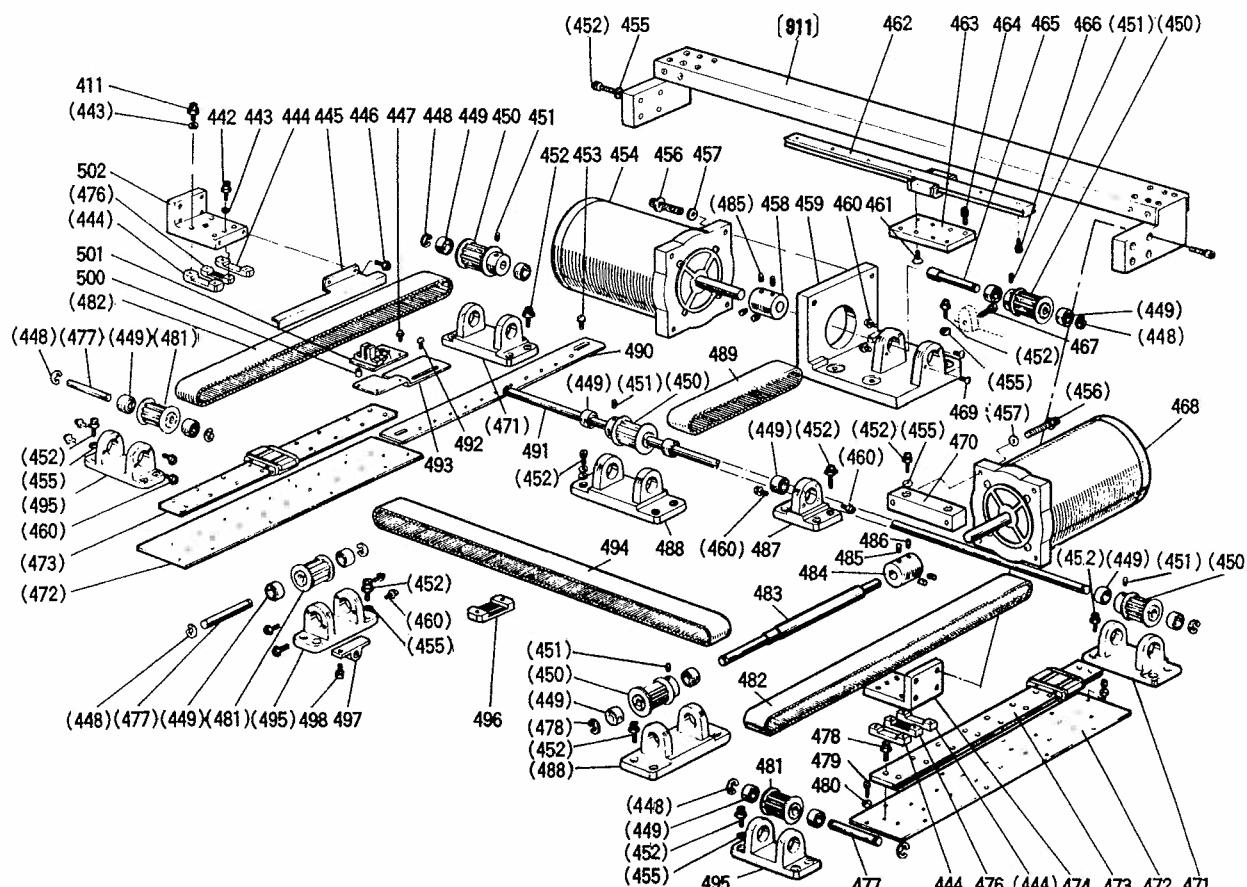
## X-Y TABLE MECHANISM (I)

Fig. No.	Parts.No.	Description	Amt.	Req.	Fig. No.	Parts.No.	Description	Amt.	Req.
			4000	5000				4000	5000
391	M9 1058 004	Screw M4×6 .....	12	12	412	MA 35A6 601	Detector adapter .....	1	1
392	MA 35A0 226	Shutter adapter .....	2		413	MA 35A7 601	Shutter adapter .....	1	1
	MA 60A0 226	Shutter adapter .....		2	414	MA 60A3 226	Shutter adapter .....	1	1
393	MA 60A1 226	Shutter adapter .....	4	4	415	M9 4003 017	Bolt M3×6 .....	28	28
394	M9 0856 004	Screw M3×4 .....	12	12	416	M9 1062 004	Screw M4×10 .....	4	4
395	M9 0317 050	Washer 3 .....	73	73	417	MA 35A0 602	Adapter .....	1	1
396	M9 4012 017	Bolt M3×8 .....	24	24	418	MA 35A1 602	Adapter .....	1	1
397	MA 35A1 361	Guide plate .....	1	1	419	MA 60A4 226	Shutter adapter .....	2	2
398	M9 4002 017	Bolt M4×8 .....	6	6	420	MA 35A2 458	Shutter .....	2	2
399	MA 60A0 957	Y-movable race .....	1	1	421	M9 4005 017	Bolt M3×10 .....	61	61
400	MA 60A2 226	Shutter adapter .....	1	1	422	MA 60A0 477	X-stopper .....	2	2
401	MA 35B0 601	Adapter .....	1	1	808	MA 60A0 920	X-linear way (pair) .....	1	1
402	MA 35A4 601	Shutter adapter .....	2	2	423	MA 35A3 477	X-stopper .....	2	2
403	MA 35A0 458	Shutter .....	1	1	424	MA 35A1 228	Shutter adapter .....	2	2
404	MA 35A0 407	Detector plate (X) .....	1		425	MA 60A6 226	Shutter adapter .....	4	4
	MA 36A0 407	Detector plate (X) .....		1	426	MA 35A3 458	Shutter .....	2	2
405	M9 0859 004	Screw M3×6 .....	2	2	427	MA 60A7 226	Shutter adapter .....	2	2
406	MA 35A6 339	Cover .....	1	1	428	M9 6002 031	Screw M4×12 .....	2	2
407	M9 1054 004	Screw M4×8 .....	10	10	429	MA 60A1 957	X-movable race .....	1	1
408	MA 35A5 601	Detector holder .....	1	1	430	MA 35A1 477	Y-stopper .....	2	2
409	MS 02A1 426	Supporter .....	3	3	810	MA 35A1 920	Y-linear way (pair) .....	1	1
410	M9 1002 096	Control circuit unit (X) .....	1	1	431	MA 60A1 476	Spacer .....	1	1
411	M9 0864 004	Screw M3×14 .....	3	3					



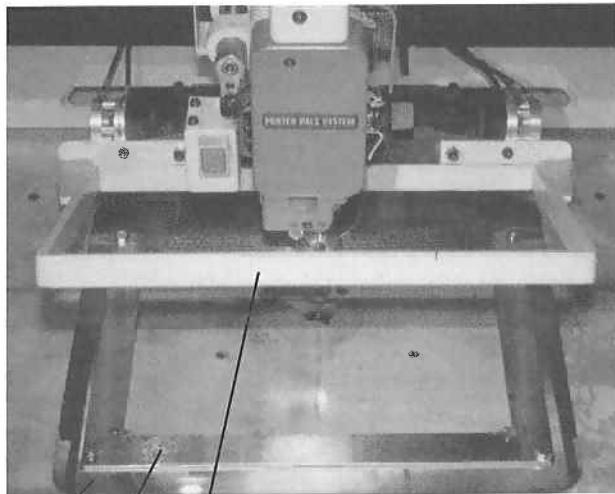
## X-Y TABLE MECHANISM (II)

Fig. No.	Parts.No.	Description	Amt. Req.	Fig. No.	Parts.No.	Description	Amt. Req.
			4000				4000
441	M9 4007 017	Bolt M4X12.....	8	470	MA 35A6 603	Motor adapter.....	1
442	M9 4002 017	Bolt M4X8.....	4	471	MA 35A0 758	Bracket.....	2
443	M9 0421 050	Washer 4.....	12	472	MA 60A4 601	Linear way adapter.....	2
444	MA 35A2 476	Spacer.....	4	473	MA 60A2 920	Linear way.....	1
445	MA 35A4 603	Detector plate (Y).....	1	474	MA 35A9 603	Bracket.....	1
446	M9 4008 017	Bolt M4X6.....	2	476	MA 35A0 781	Belt clammer (Y).....	2
447	M9 0864 004	Screw M3X14.....	3	477	MS 13A5 454	Shaft.....	3
448	M9 0604 065	E-type retaining ring 8.....	10	478	M9 4001 017	Bolt M4X10.....	10
449	MS 02A2 456	Ball bearing.....	17	479	M9 4011 021	Bolt M4X8.....	2
450	MA 35A0 767	Cog pulley.....	5	480	M9 0423 050	Nut M4.....	2
451	M9 5004 020	Screw M5X8.....	10	481	MA 35A1 767	Cog pulley.....	3
452	M9 5001 017	Bolt M5X20.....	44	482	MA 35A0 523	Cog belt (Y).....	2
453	M9 1056 004	Screw M4X10.....	2	483	MA 60A0 390	X-drive shaft.....	1
454	M9 5039 095	Motor complete (Y).....	1	484	MA 35A2 571	Sleeve.....	1
455	M9 0512 050	Washer 5.....	24	485	M9 1650 020	Screw M6X8.....	1
456	M9 8001 017	Bolt M8X25.....	8	486	M9 6005 020	Screw M6X5.....	6
457	M9 0825 050	Washer 8.....	8	487	MA 35A1 758	Bracket.....	2
458	MA 35A1 571	Sleeve.....	1	488	MA 30A0 758	Bracket.....	1
459	MA 60A3 603	Motor bracket.....	1	489	MA 35A2 523	Cog belt (Y).....	1
460	M9 1071 004	Screw M4X8.....	34	490	MA 35C0 601	Detector holder.....	1
461	M9 4001 037	Screw M4X12.....	4	491	MA 35A2 390	Y-drive shaft.....	1
811	MA 35A1 200	Y-axis cradle.....	4	492	M9 1054 004	Screw M4X8.....	2
	MA 36A0 200	Y-axis cradle.....	1	493	MA 35A0 408	Detector holder.....	1
462	MA 35A4 920	Linear way.....	1	494	MA 35A1 523	Cog belt (X).....	1
	MA 36A0 920	Linear way.....	1	495	MS 13A3 758	Bracket.....	3
463	MA 60A2 601	Linear way adapter.....	1	496	MA 35A1 781	Belt clammer (X).....	1
464	M9 5002 017	Bolt M5X12.....	4	497	MA 35A0 564	Bracket.....	1
465	MA 35A2 390	Y-drive shaft.....	1	498	M9 5004 017	Bolt M5X16.....	2
466	M9 4009 017	Bolt M3X12.....	7				
467	M9 5015 021	Bolt M5X20.....	1				
468	M9 5039 095	Motor complete (X).....	1				
469	M9 1119 002	Screw $\frac{11}{64}(40)\times 6.8$ .....	2				
			2				1

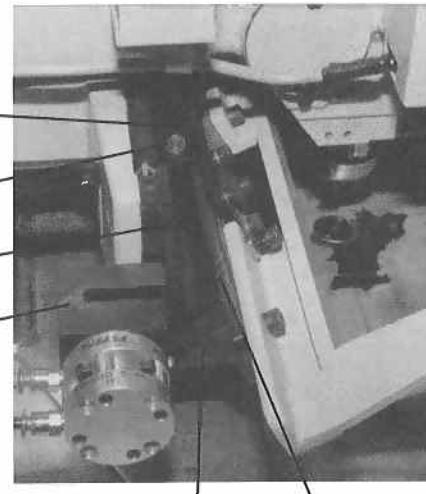


**WORK HOLDER MECHANISM**

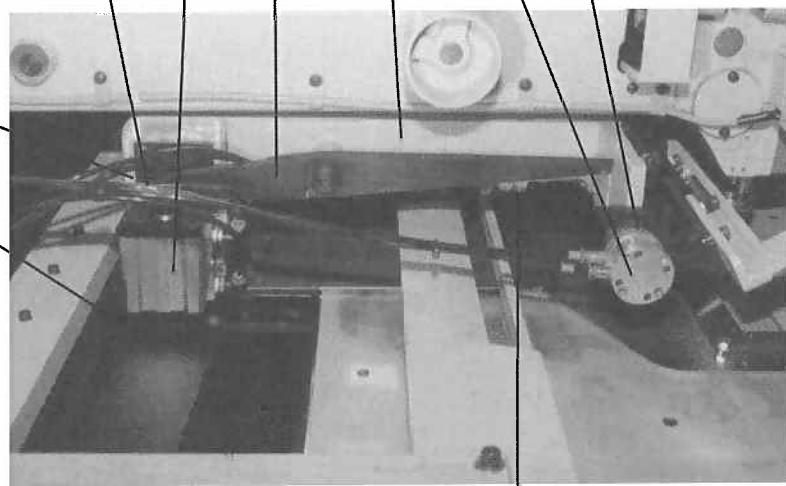
Ref #	Part #	Description	Qty	Ref #	Part #	Description	Qty
1.....800059 .....	Base Plate .....	1		11....PALS-218 .....	Pivot Shaft .....	1	
2.....800060 .....	Label Frame.....	1		12....PALS-214 .....	Hinge Center .....	1	
3.....800058 .....	Clamp .....	1		13....PALS-213 .....	Mounting Plate, Clamp .....	1	
4.....PALS-131 .....	Adaptor Cylinder (Not Shown) ....	2		14....PALS-124L & PALS-124R ....	Pivot Arm Left and Right.....	1	
5.....NCQ2B40-25DC.....	Air Cylinder .....	2		15....PALS-128 .....	Arm, Clamp Support.....	1	
6.....PALS-146L & PALS-146R ....	Arm .....	1		16....PALS-130 .....	Support Cylinder.....	2	
7.....F0-040.500-4R .....	Air Cylinder .....	2		17....PALS-124 .....	Pivot Arm .....	1	
8.....PALS-126 .....	Pin, Locking (Not Shown) .....	2		18....PALS-134(Under PALS-128) .Clevis .....	.....	1	
9.....PALS-123L & PALS-123R ....	Mount, Cylinder .....	1		19....PALS-147(Under PALS-128) .Air Cylinder .....	.....	1	
10....PALS-125L & PALS-125R ....	Hinge Left and Right.....	1		20....PALS-127(Attaches to back of PALS-213) Mount, Clevis .....	.....	1	



(1) (2) (3)



(12) (11) (10) (9) (14) (13)



(16)

(4)

(5)

(6)

(15)

(7)

(8)

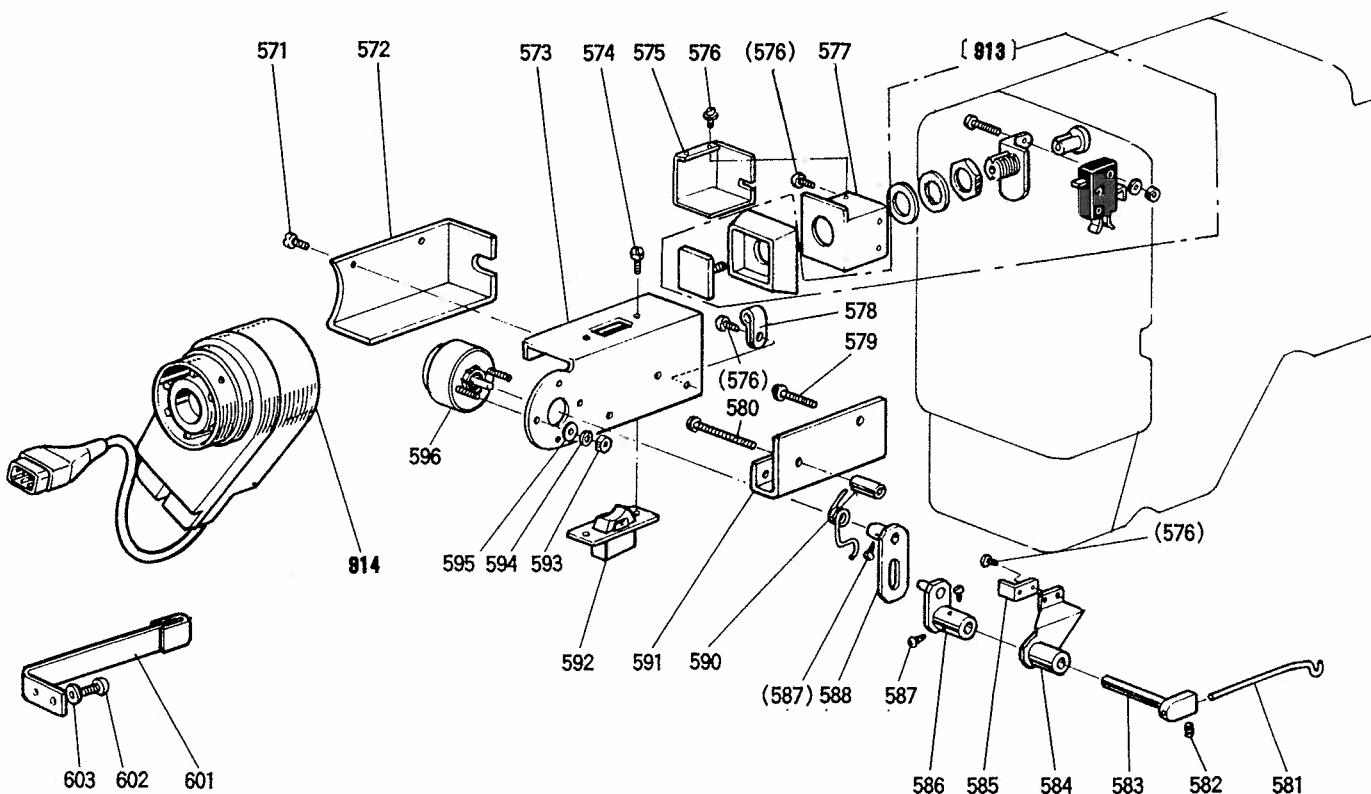
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(17)

(18) (19) (20)

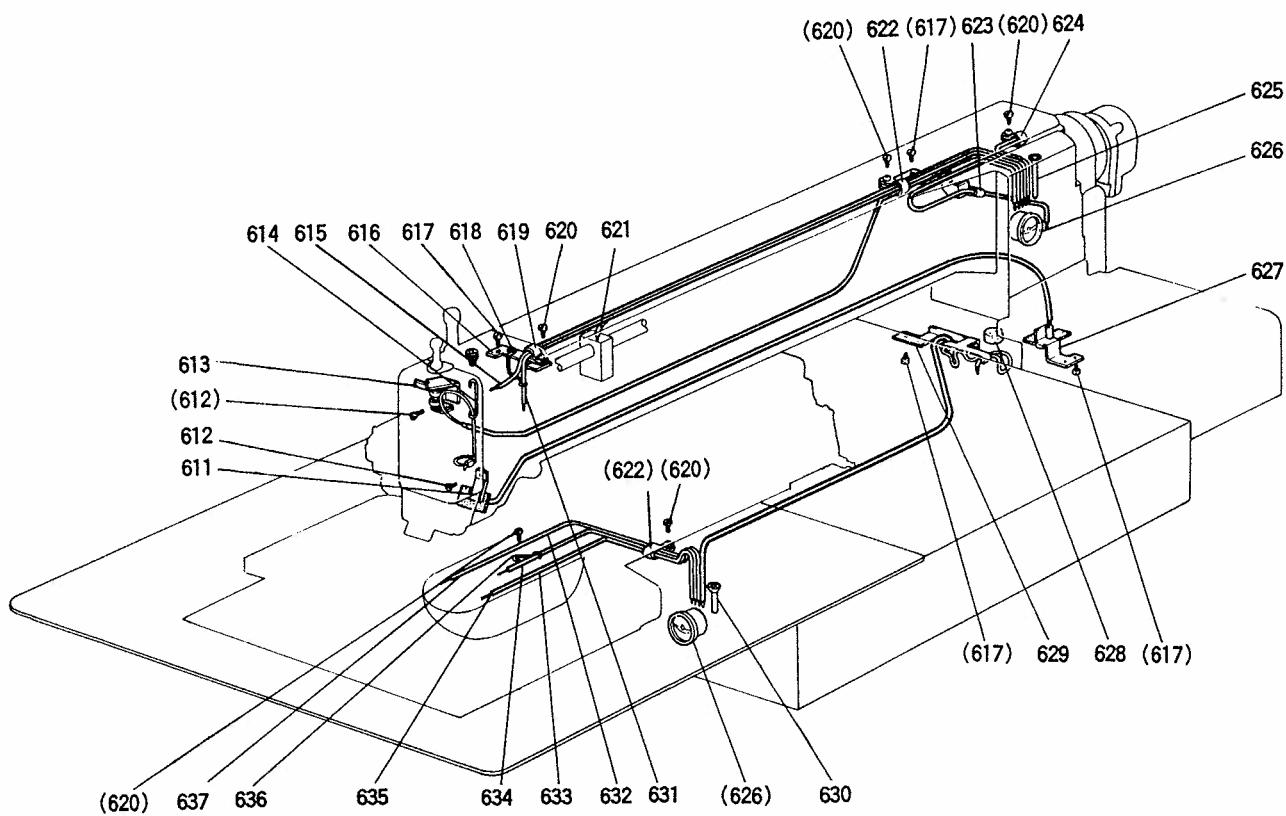
## WIPER &amp; DETECTOR MECHANISM

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
571	M9 0909 003	Screw $\frac{5}{64}(40) \times 6$	2	587	M9 0802 003	Screw $\frac{1}{8}(44) \times 4.5$	4
572	MA 20B1 339	Cover for solenoid	1	588	MS 02E0 983	Wiper crank	1
573	MA 20A0 509	Solenoid adapter	1	589	MS 02A4 729	Spring	1
574	M9 0856 004	Screw M3X6	2				
575	MA 20A0 486	Switch cover	1	590	MS 10A3 476	Spacer	1
576	M9 1054 004	Screw M4X8	6	591	MA 20A6 601	Adapter	1
577	MA 20A0 485	Switch adapter	1	592	MF 40E2 484	Toggle switch	1
578	M9 4003 099	Cord holder	1	593	M9 0874 045	Nut M3	2
579	M9 1057 004	Screw M4X20	1	594	M9 0301 053	Spring washer 3	2
				595	M9 0311 050	Washer 3	2
580	M9 1068 004	Screw M4X35	1	596	M9 0004 095	Rotary solenoid	1
581	MA 20A0 980	Wiper	1				
582	M9 1057 020	Screw M3X4	1	913	MS 02A0 484	Switch complete	1
583	MS 03A1 530	Wiper shaft	1	914	MA 35E0 406	Detector complete	1
584	MS 10A0 982	Wiper adapter	1	601	MA 20E0 802	Stopper	1
585	MS 02A1 477	Stopper	1	602	M9 1067 004	Screw M5X10	2
586	MS 02E0 981	Wiper crank	1	603	M9 0511 050	Washer 5	2



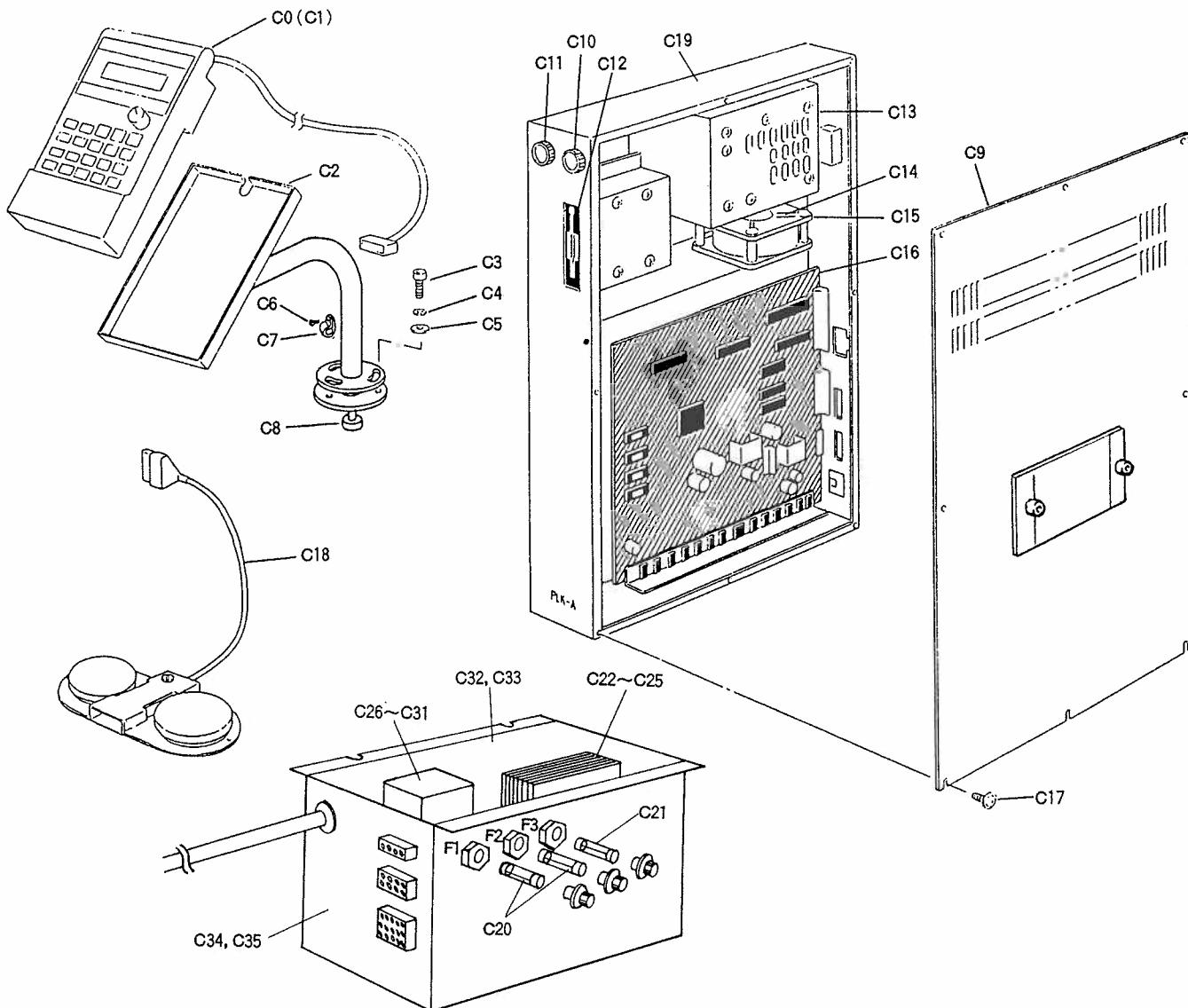
**OIL LUBRICATION MECHANISM**

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
611	MS 03A1 741	Holder .....	1	625	MA 20A5 688	Pipe .....	1
612	M9 1107 002	Screw 1 <sup>1</sup> / <sub>4</sub> (40)X5.5 .....	2	626	MN 10A0 135	Oil gauge.....	2
613	MA 35E0 780	Holder complete .....	1	627	MA 35E1 780	Holder complete .....	1
614	MS 03A2 780	Holder .....	1	628	MF 60A5 740	Felt .....	1
615	MA 35E0 688	Oil pipe complete .....	1	629	MA 35E2 780	Holder complete .....	1
616	MS 10A0 708	Bracket .....	1				
617	M9 1058 004	Screw M4X6 .....	8	630	MA 20A6 688	Pipe .....	1
618	MA 20A1 780	Holder .....	1	631	MA 35E2 688	Oil pipe complete .....	1
619	MA 20A0 620	Nylon clip .....	1	632	MA 35A0 688	Oil pipe .....	1
				633	MA 35A1 688	Oil pipe .....	1
620	M9 1054 004	Screw M4X8 .....	4	634	MA 35E3 688	Oil pipe complete .....	1
621	MA 35A1 688	Oil pipe complete .....	1	635	MA 35A0 148	String .....	1
622	MS 47P0 620	Nylon clip .....	2	636	MS 01A8 796	Holder .....	1
623	MA 20E2 780	Holder complete .....	1	637	MA 35A1 148	String .....	1
624	MA 20A1 620	Nylon clip .....	1				



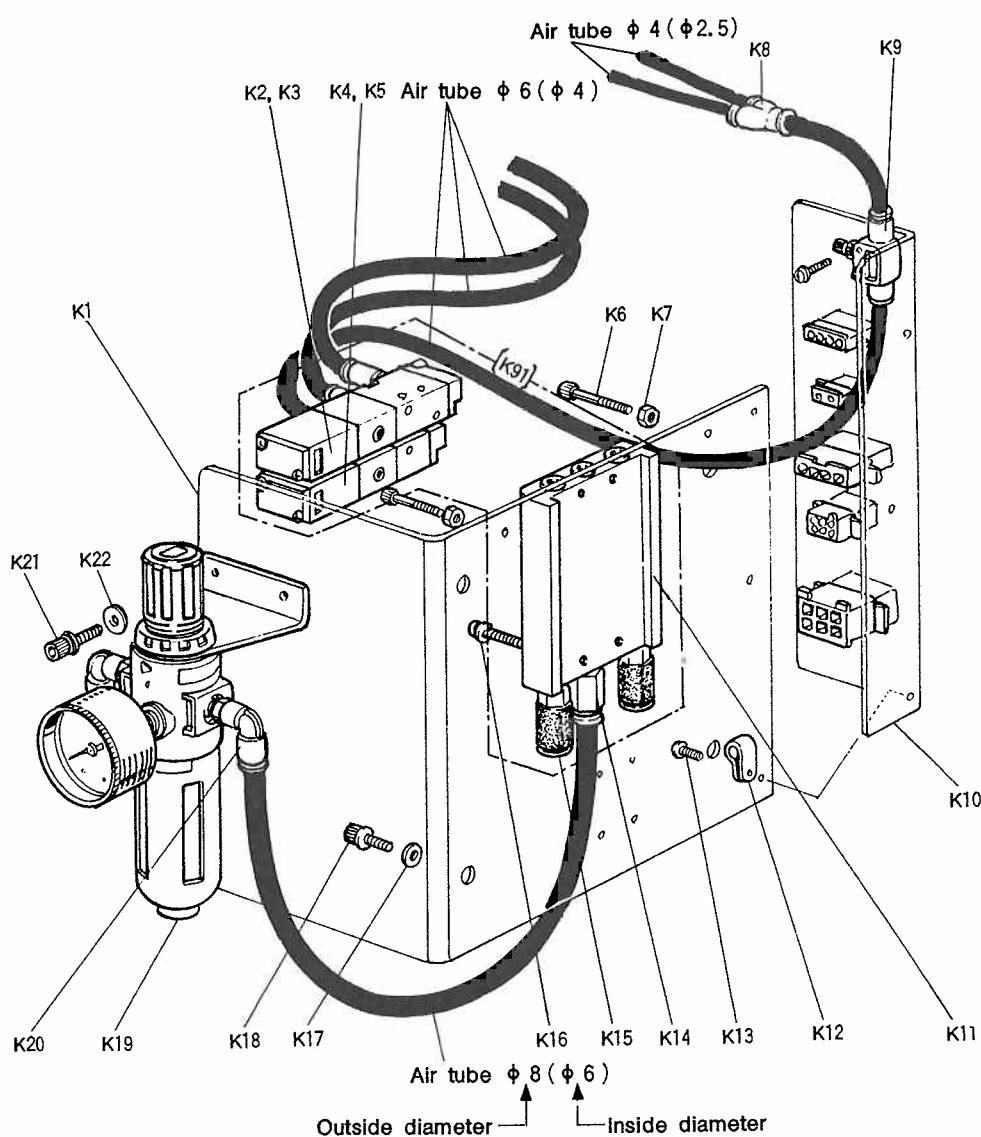
## CONTROL BOX

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
C0	M8 20E0 PAL	Operation panel (Japan) .....	1	C18	M8 10A0 FSW	Foot swich.....	1
C1	M8 20E1 PAL	Operation panel (English).....	1	C19	MA 35E0 499	Control box.....	1
C2	MA 35E0 483	Operation stand .....	1	C20	M8 2510 FUS	Fuse AC250V 10A.....	2
C3	M9 6006 021	Screw M6X12.....	3	C21	M8 2501 FUS	Fuse AC250V 1A .....	1
C4	M9 0601 053	Spring washer 6 .....	3	C22	M8 16A2 TRN	Transformer.....	1
C5	M9 0607 050	Washer 6 .....	3	C23	M8 16A4 TRN	Transformer.....	1
C6	M9 1069 004	Screw M4X8 .....	2	C24	M8 16T4 TRN	Transformer (Triple).....	1
C7	MA 20A2 620	Nylon clip .....	2	C25	M8 16V4 TRN	Transformer (VDE).....	1
C8	M9 0408 041	Screw 3.1X16 .....	1	C26	M8 2025 MS1	Magnet switch 3 $\phi$ AC200V/220/230/240V.....	1
C9	MA 35A0 742	Slide plate .....	1	C27	M8 4021 MS1	Magnet switch 3 $\phi$ AC380/415V.....	1
C10	M8 35A1 PSW	Power switch (green) OR2-FG-1A .....	1	C28	M8 1066 MS1	Magnet switch 1 $\phi$ AC100/110V .....	1
C11	M8 35A0 PSW	Power switch (red) OR .....	1	C29	M8 2036 MS1	Magnet switch 1 $\phi$ AC200V .....	1
C12	M8 35A0 FDD	YD-701-6030 Floppy disk driver .....	1	C30	M8 2336 MS1	Magnet switch 1 $\phi$ AC220V/230/240V ..	1
C13	M8 35A0 PMD	PMM-BA-5631-2B Stepping motor driver X,Y .....	2	C31	M8 1266 MS1	Magnet switch 1 $\phi$ AC120V .....	1
C14	MA 30A0 756	Finger guard A-31D .....	2	C32	MA 35E0 485	Power box .....	1
C15	M9 8005 093	Fan L80A0 AC100 .....	1	C33	MA 35E1 485	Power box (VDE) .....	1
C16	M8 35A2 CPU	Circuit board PLK-A2 CPU .....	1	C34	MA 16A4 601	Connector board .....	1
C17	M9 0434 037	Screw M4X10.....	8	C35	MA 16A5 601	Connector board (VDE) .....	1



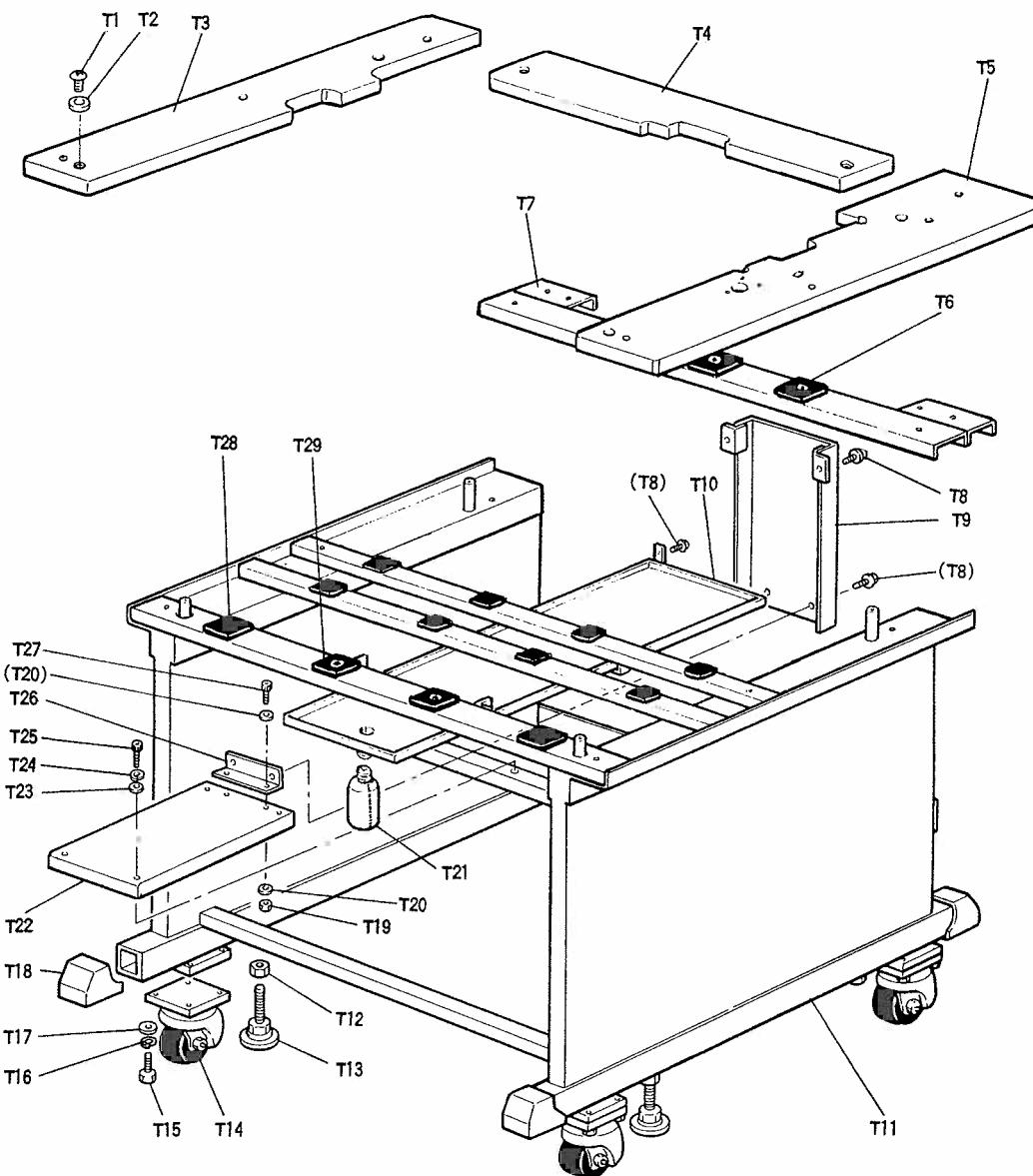
## PNEUMATIC CONTROL UNIT

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
K1	MA 20B2 601	Solenoid valve-adapter .....	1	K12	MS 47P0 620	Nylon clip .....	1
K2	M9 3018 093	Solenoid valve .....	2	K13	M9 1054 004	Screw M4X8 .....	3
K3	MA 20A5 571	Connector .....	4	K14	MA 20A7 571	Connector .....	1
K4	M9 3019 093	Solenoid valve .....	1	K15	M9 1035 089	Muffler .....	2
K5	MA 20A5 571	Connector .....	1	K16	M9 1066 004	Screw M4X25 .....	4
K6	M9 4014 021	Bolt M4X50 .....	2	K17	M9 0624 050	Washer 6 .....	4
K7	M9 1007 045	Nut M4 .....	2	K18	M9 6002 017	Bolt M6X12 .....	4
K8	MA 20A6 571	Connector .....	2	K19	MA 20A0 963	Filter • regulator .....	1
K9	M9 2209 098	Speed controller .....	2	K20	MA 20A8 571	Connector .....	2
K10	MA 35A0 715	Connector panel .....	1	K21	M9 5002 017	Bolt M5X12 .....	2
K11	M9 3020 093	Solenoid valve-manifold .....	1	K22	M9 0511 050	Washer 5 .....	2
				K91	M9 3028 093	Solenoid valve .....	1



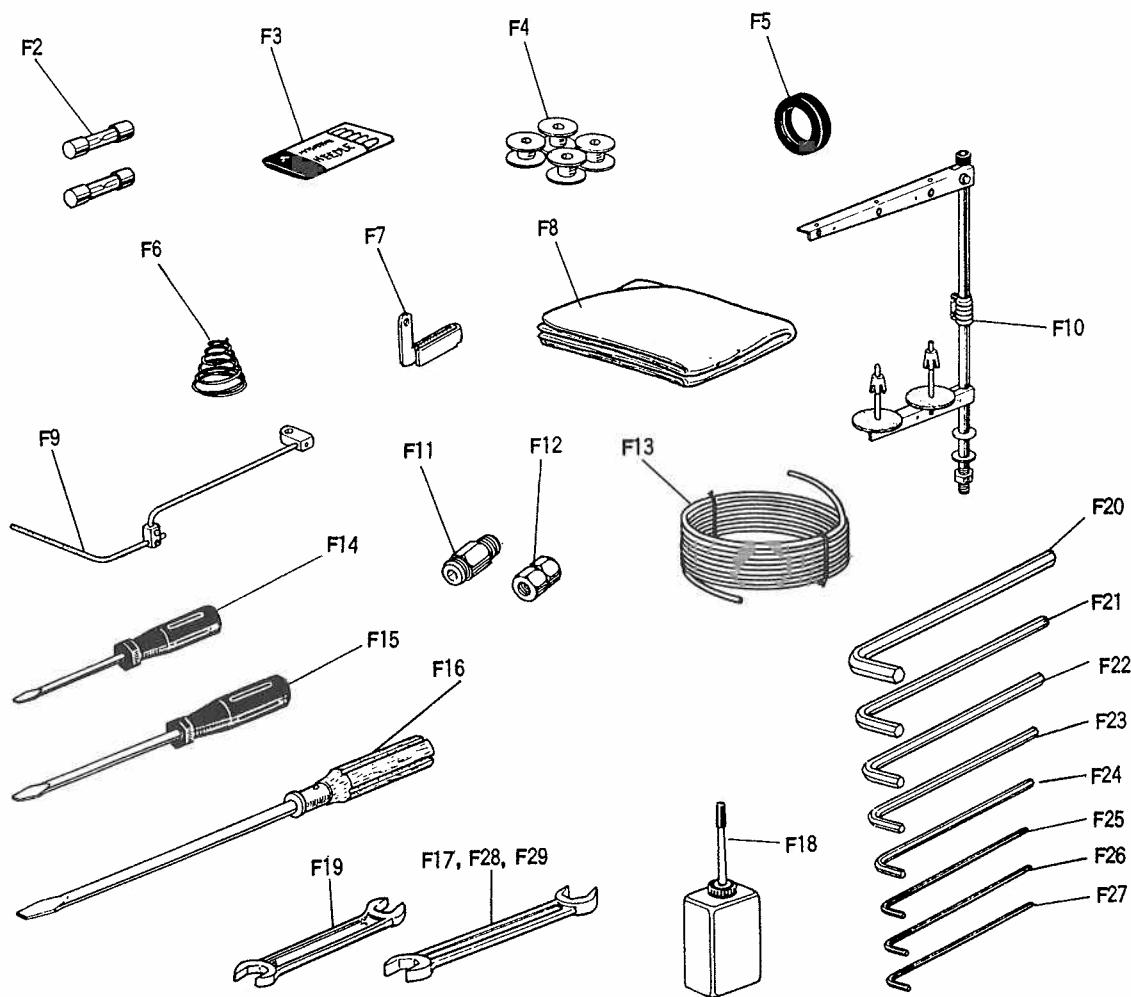
**TABLE & STAND**

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
T1	M9 1803 022	Bolt M8X4 .....	8	T16	M9 0802 053	Spring washer 8 .....	16
T2	M9 0823 050	Washer 8 .....	8	T17	M9 0815 050	Wafer 8 .....	16
T3	MA 35A4 595	Table top (left) .....	1	T18	MA 20A2 150	Top cap .....	4
T4	MA 35A6 595	Table top (back) .....	1	T19	M9 1382 045	Nut M5 .....	2
T5	MA 35A5 595	Table top (right) .....	1	T20	M9 0511 050	Washer 5 .....	2
T6	MA 35A0 419	Rubber cushion .....	2	T21	MF 20A0 130	Oil bottle .....	1
T7	MA 35A0 426	Adapter .....	1	T22	MA 35B8 601	Motor adapter .....	1
T8	M9 1054 004	Screw M4X8 .....	6	T23	M9 0624 050	Washer 6 .....	10
T9	MA 60E0 776	Belt cover .....	1	T24	M9 0624 053	Spring washer 6 .....	4
T10	MA 60A0 131	Oil pan .....	1	T25	M9 6016 021	Bolt M6X45 .....	4
T11	MA 35E1 150	Table .....	1	T26	MA 35B7 601	Adapter .....	1
T12	M9 5021 045	Nut M20 .....	4	T27	M9 5005 021	Bolt M5X40 .....	2
T13	MA 35A0 166	Adjustor .....	4	T28	MA 35A1 419	Rubber cushion .....	10
T14	MA 60A0 972	Caster .....	4	T29	MA 35A2 419	Rubber cushion .....	2
T15	M9 2056 022	Bolt M8X25 .....	16				



## ACCESSORIES

Fig. No.	Parts. No.	Description	Amt. Req.	Fig. No.	Parts. No.	Description	Amt. Req.
F2	M9 5003 099	Fuse 250V 10A .....	2	F16	MF 00A0 608	Screw driver (large).....	1
F3	MS 02A0 128	Needle DPX17-18.....	10	F17	MM 10A1 479	Spanner 10X14.....	1
F4	MS 17A0 123	Bobbin (for SC-180) .....	4	F18	MF 10A0 149	Oiler with oil .....	1
F5	MA 20A0 419	Rubber cushion.....	6	F19	MS 02A0 479	Spanner 13X17 .....	1
F6	MN 52A1 245	Tension spring .....	1	F20	MS 05A1 976	Socket wrench 6 .....	1
F7	MS 03A0 181	Thread guide .....	1	F21	MS 05A0 976	Socket wrench 5 .....	1
F8	MA 35A0 734	Polyethylene cover .....	1	F22	MS 01A1 976	Socket wrench 4 .....	1
F9	MA 35A0 180	Thread guide .....	1	F23	MF 90A0 976	Socket wrench 1/8 .....	1
F10	MF 40E0 193	Cotton stand assy. ....	1	F24	MS 02A2 976	Socket wrench 3 .....	1
F11	MA 30A0 571	Connector .....	1	F25	MS 02A1 976	Socket wrench 2.5 .....	1
F12	M9 1010 089	Socket .....	1	F26	MS 02A0 976	Socket wrench 2 .....	1
F13	MS 06A0 567	Tube .....	1	F27	MS 10A0 976	Socket wrench 1.5 .....	1
F14	MB 02A1 608	Screw driver (small) .....	1	F28	MS 10A1 976	Spanner 8X9 .....	1
F15	MB 02A0 608	Screw driver (middle) .....	1	F29	MS 10A2 976	Spanner 6X7 .....	1



# ORDERING INFORMATION

## **TO ORDER BY PHONE:**

**From Massachusetts (508) 922-2611**  
**From out of state (800) 343-8138**

**TO ORDER BY FAX:** **(617)599-7081**  
(Fax & Message Service available 24 hours per day.)

## **TO ORDER BY MAIL:**

**Porter International**  
97 Rantoul Street  
Beverly, MA 01915 USA

## **HAVE THIS INFORMATION READY:**

1. Machine Model Number
2. Part Number or complete part description
3. Customer Number
4. Person placing order
5. Bill To and Ship To addresses
6. Fax/Phone

## **PRICES AND TERMS:**

All prices are F.O.B. Beverly, MA, and are valid at the time of shipment.

All prices are list, unless otherwise noted.

Open account terms extended to firms with established credit.

Overseas orders must be paid before shipment unless otherwise noted.

## **SHIPPING:**

When ordering parts please state how the shipment is to be made (UPS Red, Blue, Orange or Ground; Federal Express, air mail).

Freight charges are included on invoice.

If a customer is on C.O.D. status, shipping costs are included in the C.O.D. amount.

## **TAXES:**

Where the law requires, state sales and/or use taxes must be charged.

## **MINIMUM ORDERS:**

Due to the rising costs of handling orders, we have established a minimum order of \$25.00.

## **RETURNED GOODS:**

Porter International has a policy on returned parts which must be strictly adhered to.

1. All customers must call Porter to obtain a RMA (Returned Material Authorization) number. Parts returned without a RMA number will be returned to customer. We will not accept parts returned 60 days after authorization.
2. All parts to be returned must be shipped to Porter prepaid unless otherwise instructed by our Customer Service Department.
3. Credit for parts will be issued upon inspection by Porter and credited against your account.
4. A restocking charge of 15% will be issued on parts ordered incorrectly by the customer, unless otherwise noted.

## **CLAIMS:**

If a parcel post shipment reaches you in damaged condition, advise us *immediately* so that a claim can be filed. All parcel post packages are insured by Porter. If a truck, UPS or express shipment arrives damaged, request the driver to make a notation on the freight bill. If the damage was concealed at the time of delivery, call the carrier for an inspection and obtain a DAMAGE REPORT. This is necessary in order to file a claim. In the case of truck lines, customer must file the claim. We will give any needed assistance, but the carrier is responsible for the safe arrival of goods.



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