

SILVER MASTER

CP-310

SERVICE MANUAL

DAINIPPON SCREEN MFG. CO., LTD.

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1. INTRODUCTION

This manual is intended to be used for after-sale service on the CP-310. For operation of the machine and other details, refer to CP-310 Operation Manual, Technical Guide and other related documents. Bear in mind that the specifications are subject to change without notice.

For parts ordering or consultation, refer to CP-310 Parts List and let us know the following information.

- model (CP-310)
- serial number
- reference numbers and descriptions of parts
- required quantities
- date of delivery

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For more information, CALL: Dainippon Screen
Mfg. Co., Ltd., Hikone Plant, Quality Control Dept.
(phone) 0749-24-1165

2. SPECIFICATIONS

Item	Specification
Master width	229 mm (9"), 254 mm (10"), 279 mm (11") 305 mm (12"), 310 mm (12 $\frac{1}{4}$ ")
Master length	370 mm to 480 mm (digital setting)
Max. output image size	310 mm x 430 mm (blank exposure: 310 x 480 mm)
Max. copy size	520 x 840 mm
Lens	focal length 360 mm f/19
Magnification range	60% - 125%
Exposure control	digital setting (0 to 99.9)sec or automatic integrating light-meter
Light source	Halogen lamps:100 V 500 W x 4
Cutter	motor-driven rotary cutter
Focusing	Auto-focusing with magnification scales
Processor tank capacity	Developer and Stabilizer: 12 liters each
Replenishing bottles	Developer and stabilizer: 2 liters each (constant liquid level system)
Developer thermo-control	500 W panel heater with thermo-control
Separate switches	Switches for feeding and cutting paper
Platemaking speed	
Initial:	95 - 112 sec
Cyclic:	30 - 35 sec
Machine dimensions	1430 (W) x 2250 (D) x 1745 (H) mm
Weight	300 kg
Electricity	1 ϕ , 100 V 3.0 kW, 50 or 60 Hz

[Option]

Dryer	700 W finned heater & thermo-control
Back-light copy holder	15 fluorescent lamps (15 W), built-in lamp box type

* The specifications are subject to change without notice.

Process Chart

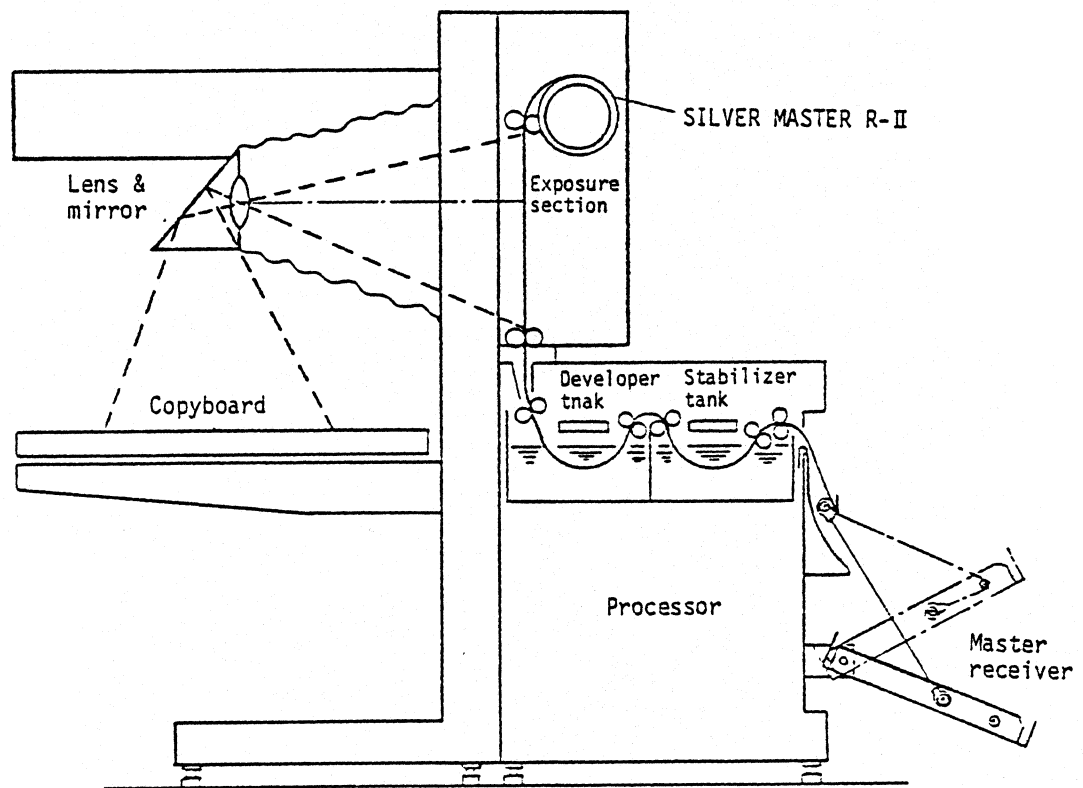
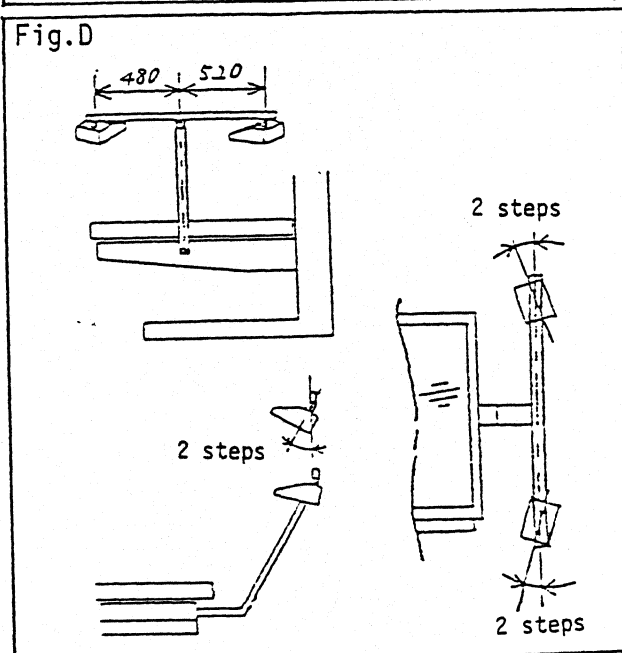
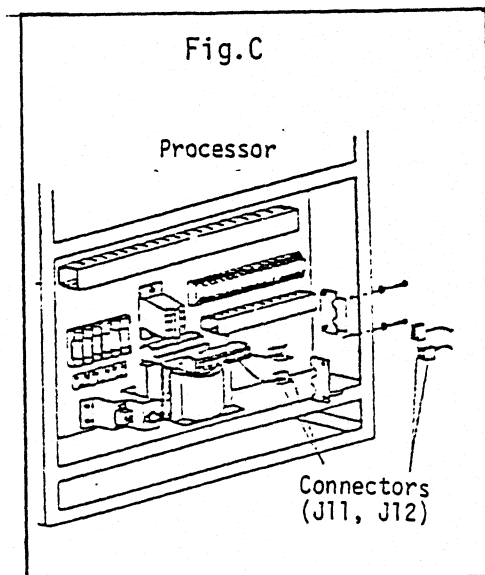
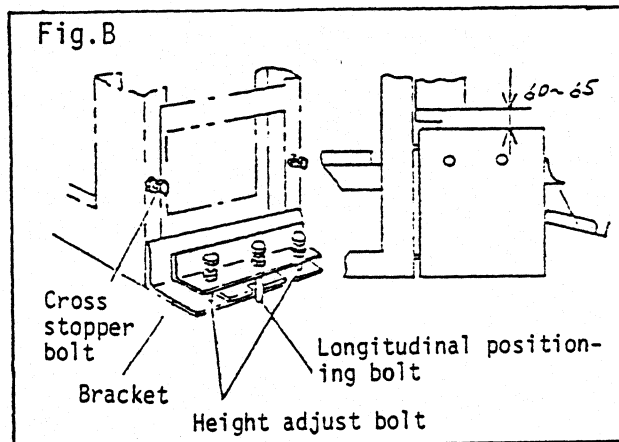
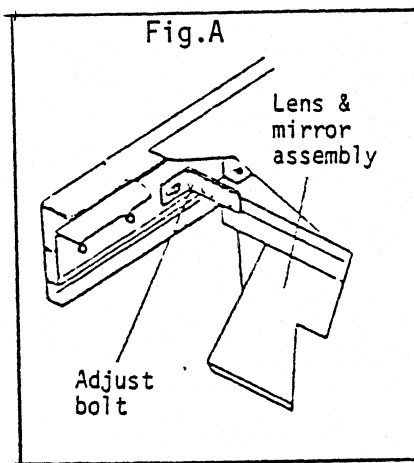
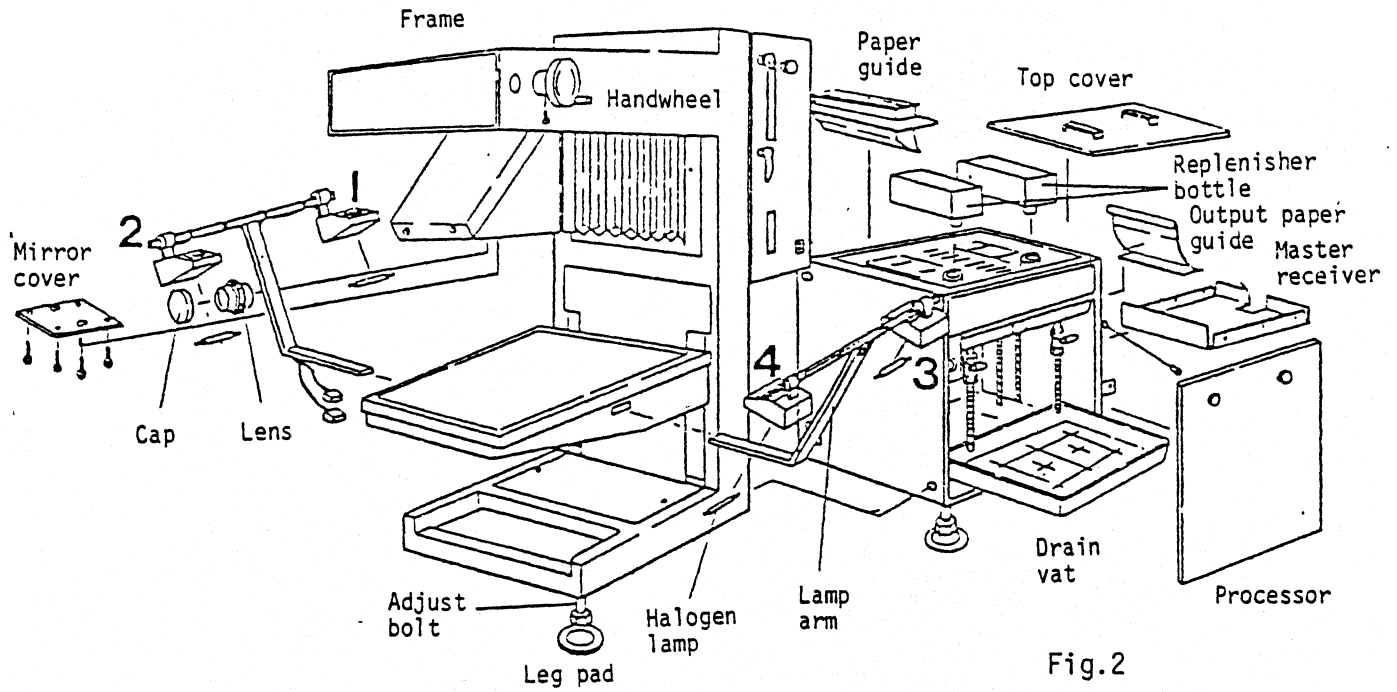
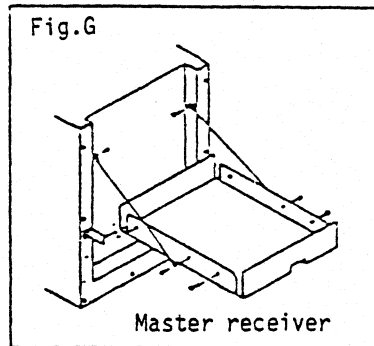
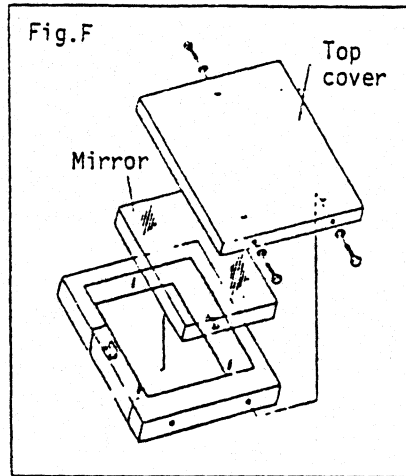
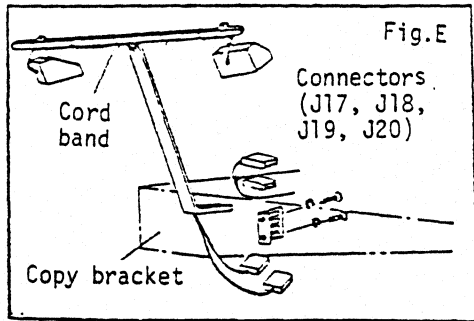


Fig.1

3. INSTALLATION





Packing List

Descriptions	Qty	Descriptions	Qty
Frame main body	1	Paper guide	1
Processor	1	Replenisher bottle	2
Right lamp arm	1	Master receiver	1
Left lamp arm	1	Output paper guide	1
Lamp house	4	Drain vat	1
Lens	1	Measuring cup	1
Mirror	1	Operation Manual	1
Lens drive handwheel	1	Test sample	1
Spool rims and shaft	1 set	Wall instruction sheet	1
Leg pad	8	Tool bag	1 set

Descriptions	Qty	Descriptions	Qty
Metal polishing compound	1	Glass fuse 1.0 A	4
Spring belt	3	2.0 A	4
Cord band	8	Glass fuse 30 A	4
Retouching paint	2	50 A	4
Retouching brush	2	Glass fuse 10 A	4
Blower brush	1	Cover screw	5 each
Glass fuse 0.3 A	2	Repair key	1
0.5 A	2		

Follow the procedure below to install the CP-310.

[Assembly and Preparations]

- (1) Put the leg pads in place and put the main frame on them.
- (2) Remove the bracket which secures the lens/mirror assembly and replace the screws as before. (Fig.A)
- (3) Remove the protective paper on the copy glass, put a level and adjust the adjust bolts to level the main frame so that the four bolts are equally weighted.
- (4) Connect the processor with the main frame. (Fig.B)
Fit the processor longitudinal positioning bolt into the positioning bracket and place the height adjust bolts on the main frame bracket. Then, level the processor so that the two processor stopper bolts are in touch with the processor.
- (5) Remove the processor left side cover and connect the connectors (J11 and J12) between the processor and main frame (Fig.C).
- (6) Insert the lamp arm into the copyboard down to the "▲" mark and lock it with the bolts. Attach the four lamp houses at point 1 (left, back), 2 (left, front), 3 (right, back) and 4 (right, front) respectively as shown and secure them at the "▲" mark on the respective lamp arms. Each lamp house is positioned by turning notch by notch and aligning with the "▲" mark as shown in Fig.D.
- (7) Pass the connectors (J17, J18, J19 and J20) through the lamp arms and connect them with the connectors under the copyboard. Then, secure them on the lamp arms with cord bands. (Fig.E)
- (8) Install halogen lamps.
Hold the lamp glass tubes with paper or the like on your hand. Don't hold them with bare hands.
- (9) Remove the mirror cover and attach the lens. Special care should be taken not to leave any fingerprint marks on the mirror surface.

- (10) Install the mirror. (Fig.F)
Remove the top cover from the mirror and put the mirror in the bracket with its reflecting surface down. Then, give a light press with the top cover. Special care should be taken not to leave any fingerprint marks on the reflecting surface.
- (11) Install the lens drive handwheel, master receiver (Fig.G), drain vat and other parts.
- (12) Remove the processing conveyor units from the processor and clean the units and the inside of the tanks. First, if the conveyor rollers do not rotate smoothly, rotate them by hand before test running.

[Mixing Processing Solutions]

- (1) Prepare developer and stabilizer according to the Operation Manual, and pour them into the respective tanks and replenisher bottles.
- (2) Load the replenisher bottles filled with processing solutions on the respective units.

[Connecting the Power Supply]

- (1) Turn off all the switches.
- (2) Connect the input line with the power source. (1 ϕ 100 V 3.0 kW)
- (3) Be sure to ground the green wire of the input line (Independent grounding is necessary.)

[Adjustment]

- (1) Turn on the POWER switch and check a series of operations according to the Operation Manual.
 - ° Regulating the sound level of the buzzer.
 - ° Checking a series of operations: exposure, paper feeding, cutting, development, stabilization and output.
 - ° Test exposure of the test chart.

(2) Developer temperature control

Make sure that the thermo-dial is set to 30°C (or ▲ mark) and that the heater is plugged in.

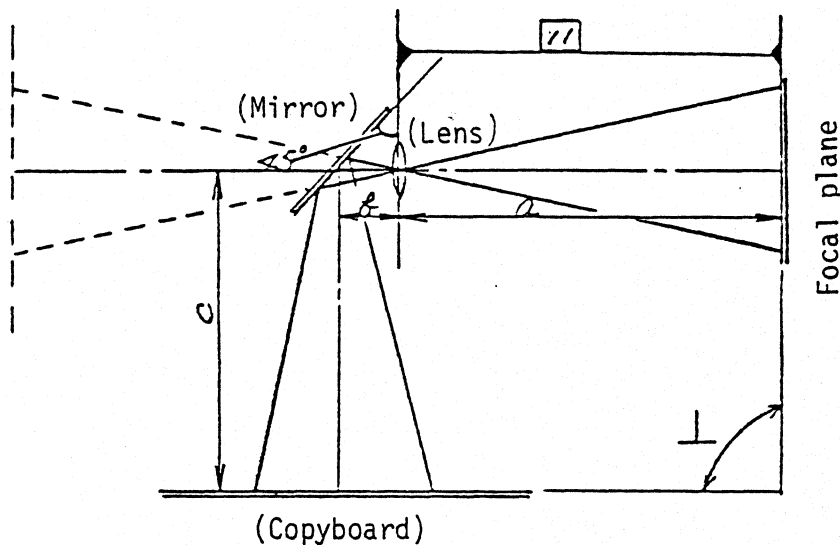
The developer temperature should be between 28°C and 31°C (82°F and 88°F) when the HEATER pilot lamp is out. If not so, adjust the developer temperature with the thermo-dial.

4. INSPECTION AND ADJUSTMENT OF THE OPTICAL SYSTEM

The focusing and sizing system is adjusted before shipment. However, if it is found to fail, make an inspection and an adjustment with the following procedure.

[Inspecting and Adjusting Procedure]

- | | | |
|---------------------------------------|-------------------------|------------------------------------------------------------------------|
| (1) Checking Image Distortion | Cross distortion | Adjustment of the height of the copy frame top surface (farther side). |
| | Longitudinal distortion | Adjustment of the copyboard suspending chain fitting hardware. |
| (2) Checking the Image Focus and Size | | Adjustment with the magnification scale. |



$$a = f(1 + m)$$

$$b + c = f(1 + \frac{1}{m})$$

$$m = \frac{a}{(b + c)}$$

f: focal length
(360 mm)

m: magnification

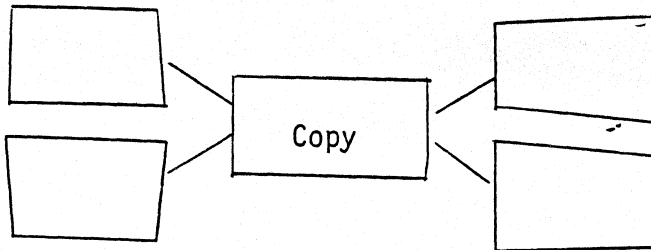
At least the following conditions should exist to make correct reproductions.

- (1) The focal plane, lens plane and copy plane are parallel to each other.
(Since the CP-310 employs a mirror, the angle between the lens plane and the mirror plane and the angle between the mirror plane and the copy plane should be 45° respectively.)

4.1. Correction of Image Distortion

If the focal plane and the copy plane are not parallel to each other, a trapezoidal image is produced. We call this "Image Distortion."

If such occurs, correct it by adjusting the copyboard.

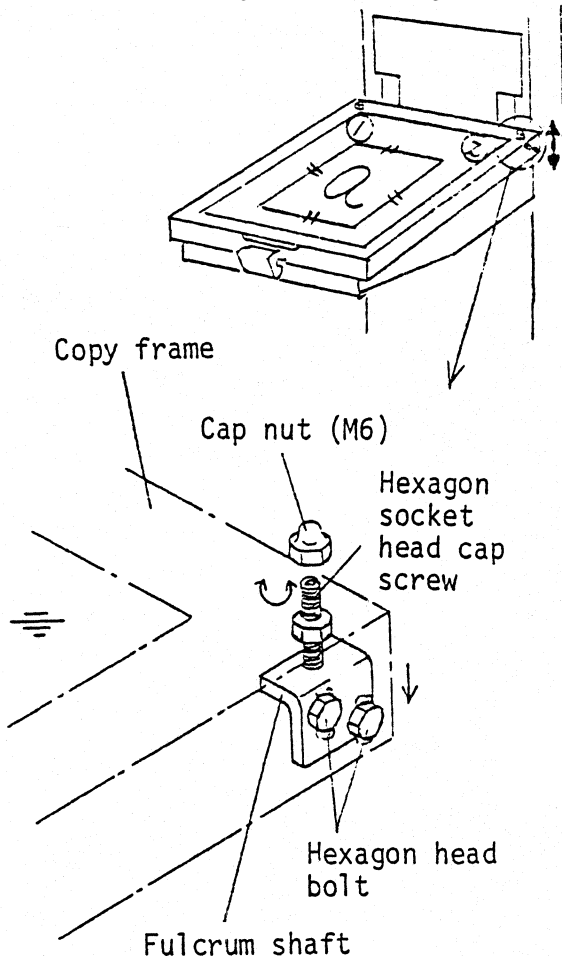


Allowable error (image distortion)
0.5 mm/270 mm or less

Load the test chart (ruled) and make an exposure of it at 100% magnification. Then, measure the four sides of the image and correct it with the procedure below.


[1] If a distortion occurs crosswise:

Adjust the height of the copy frame opposite (farther) side.



Measure the image (exposure).

If the image shape is as shown, proceed as follows:

(1)  Adjust the height of points ① and ② by equal amounts alternately.

- 1) Remove the M6 cap nut.
- 2) Put a wrench (width across flat: 3 mm) into the top of the M6 hexagon socket head cap screw and loosen the lock nut.
- 3) Then, retighten the lock nut by turning the hexagon socket head cap screw counterclockwise (approx. 0.3 mm/turn).

- 4) Loosen the M6 hexagon head bolts securing the fulcrum shaft.
- 5) Push the copy frame down and tighten the M6 hexagon head bolts with the hexagon socket head cap screw in contact with the fulcrum shaft.

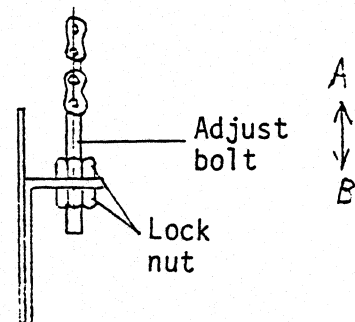
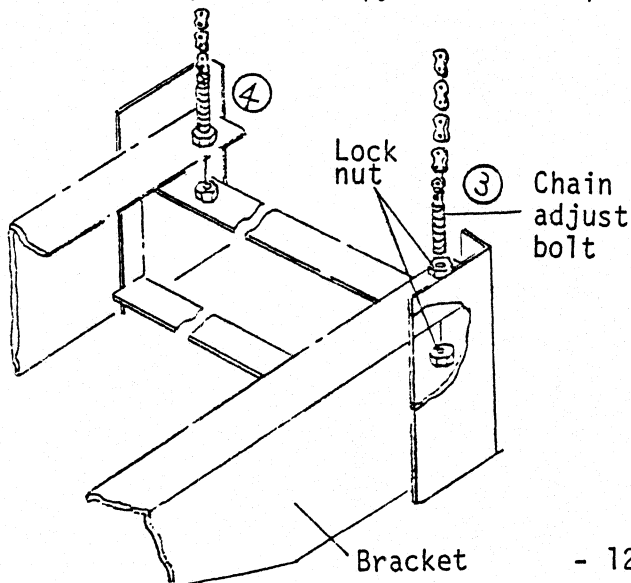
NB: Never touch the hook (nearer) side.

(2) ~~7a.7~~ Adjust the height of points ① and ② by equal amounts alternately.

- 1) Remove the M6 cap nut.
- 2) Loosen the M6 hexagon head bolts securing the fulcrum shaft.
- 3) Put a wrench (width across flat: 3 mm) into the top of the M6 hexagon socket head cap screw and loosen the lock nut.
- 4) Then, retighten the lock nut by turning the hexagon socket head cap screw clockwise (approx. 0.3 mm/turn).
- 5) Push the copy frame down and tighten the M6 hexagon head bolts with the hexagon socket head cap screw in contact with the fulcrum shaft.



[2] If a distortion occurs longitudinally:

Adjust the copyboard chain position.



- * The copyboard is suspended with two chains. It can be inclined by loosening either of the lock nuts and adjusting the chain adjust bolt.

Measure the image (exposure)

- (3)  Raise point (3) or lower point (4).
- (4)  Raise point (4) or lower point (3).

- * Each adjusting point has an upper and a lower lock nut.

In order to raise the copyboard, loosen the upper lock nut and tighten the lower lock nut. (One turn of the lock nut raises it about 0.6 mm.)

4.2. Focus/Scale Adjustment

- (1) Correct the image distortion as stated above.
- (2) Set the lens assembly or the copyboard to its 100% position. (Assume that the lens assembly has been set to its 100% position.)
- (3) Move the copyboard up and down bit by bit around the copyboard scale 100% division and make an exposure each time. Then, compare the exposures and find the copyboard position corresponding to the best focused image.
- (4) With the copyboard in the best focus position, make an exposure of a sample and calculate the magnification from the following equation:

$$\text{Magnification (\%)} = \frac{\text{output image size}}{\text{sample size}} \times 100$$

$$\text{ex.) } \frac{303}{300} \times 100 = 101(\%)$$

- (5) Adjust the respective scales to the calculated magnification (ex. 101%) with the lens assembly and the copyboard fixed.

- (6) Put the lens assembly and the copyboard in their 100% positions on the scales. Make an exposure and check the focus and size of the image obtained.

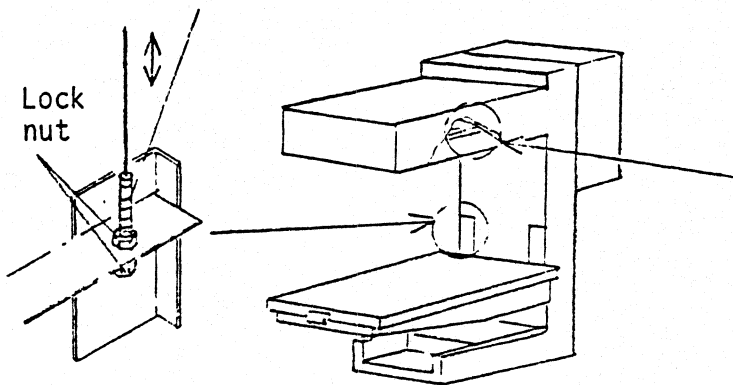
Required resolution: 10 lines/mm

Max. allowable dimensional error: ± 0.5 mm/270 mm

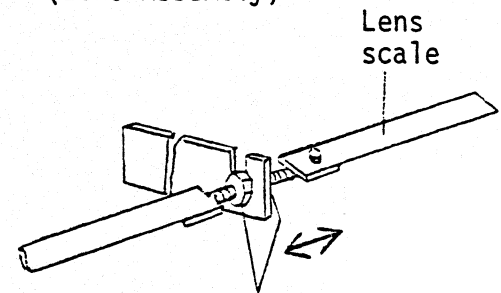
- (7) If the above requirements for dimensional accuracy and resolution are not met, repeat above steps 2 through 6.

(Copyboard)

Loosen the lock nuts and move the copy scale adjust bolt up or down.



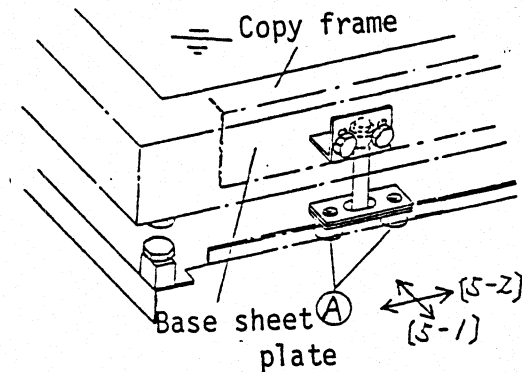
(Lens Assembly)



Loosen the lock nuts to move the scale.

5. OPTICAL AXIS ALIGNMENT

Make sure that master paper doesn't lie in a zigzag line in the exposure section. Then make an exposure of the copy base sheet, and check the position of the standard line printed in the exposed paper to check the position of the plate which has the copy positioning base sheet on it.

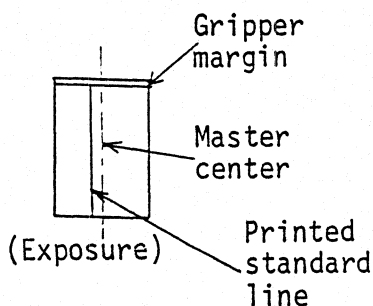


5.1. Longitudinal Adjustment (Left/right adjustment of the base sheet plate)

For example, if the printed standard line is at the left of the master (paper) centerline, it means that the copy frame is at the left of the normal position.

Therefore, in case of 100% magnification, loosen eight bolts at the four points (A) and move the frame to the right by the amount of the distance between the master centerline and standard line.

During the adjustment, the copy frame may not move smoothly because the torsion bar is functioning. Therefore, tap the bar joint with a hammer or the like in advance to push away the bar for adjustment convenience.



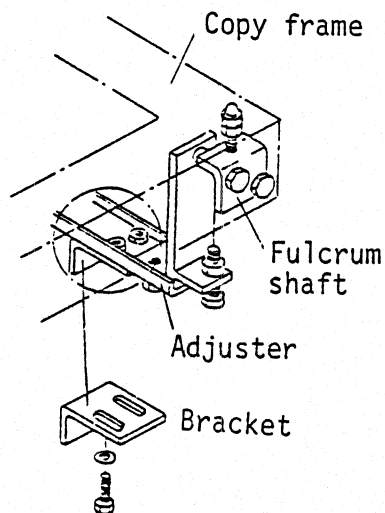
5.2. Cross Adjustment (front/back adjustment of the base sheet plate)

- (1) Set the paper short of the standard size so that the gripper margin of the paper is not exposed.
 - (2) Place a black triangle on the X-axis 100% standard line of the base sheet and make an exposure of it. Then, check the result.
 - (3) No adjustment is required if the vertex of the triangle is 2 mm (line width) from the gripper margin in the exposure.
 - (4) If not, loosen eight bolts at four points (A) in the same manner as "5.1." and adjust the base sheet plate by moving it back and forth.
- * When replacing the copy positioning base sheet, mark the old base sheet position on the copy glass surface. Take the same steps for optical axis realignment.

5.3. Longitudinal Adjustment of the Copy Frame

If optical axis realignment is made with the base sheet plate (longitudinally or crosswise), the copy frame may not be closed or opened smoothly.

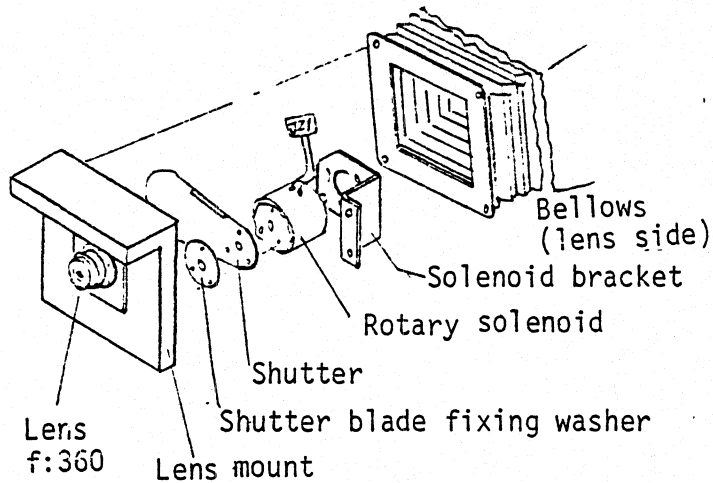
In such a case, adjust the copy frame longitudinally since the positional relationship between the copy frame and the base sheet plate is not correct.



- (1) Loosen four bolts at two points (B) on the rear of the copyboard.
- (2) Adjust the copy frame to make the space between the copy frame inside and base sheet plate equal.
- (3) Tighten the bolts at points (B).

6. LENS

Replacement of Shutter Solenoid



- (1) Remove the four screws (M4) securing the bellows on the lens mount.
- (2) Remove the rotary solenoid cord connector J21 and remove the two screws (M4) to remove the solenoid bracket.
- (3) Remove the three solenoid mounting screws (M4).
- (4) Remove the three shutter mounting screws (M3) to separate the solenoid from the shutter.

(5) When fitting the shutter to a new solenoid, take the reverse procedure taking care not to place the shutter the wrong way.

7. MIRROR

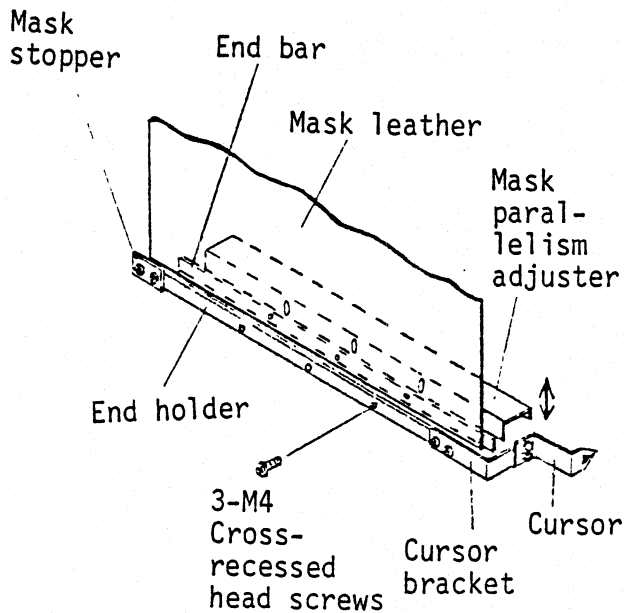
Replacement of the Mirror

Refer to "3. INSTALLATION."

8. EXPOSURE SECTION

8.1. Adjustment of the Shading Mask

8.1.1. If the shading mask is inclined:



(1) Remove the cloth tape (black) stuck on the bottom of the mask to prevent flare.

The cloth tape should be removed carefully since it is reused after adjustment.

(2) Loosen the three cross-recessed head screws (M4) for the mask parallelism adjuster to correct the mask position.

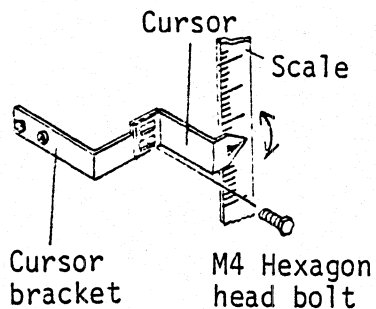
(3) Then, attach the said cloth tape on the mask bottom.

8.1.2. If the mask position does not correspond to the scale:

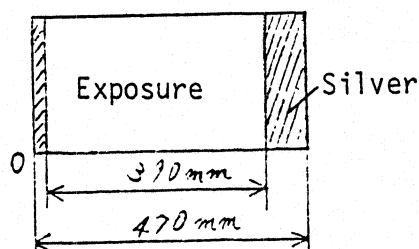
(1) The mask should be set shorter than the master feed length.

eg.) Master feed length: 470 mm

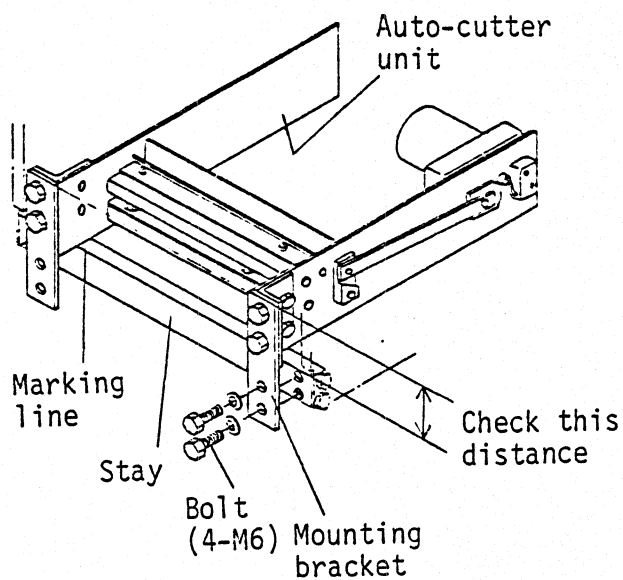
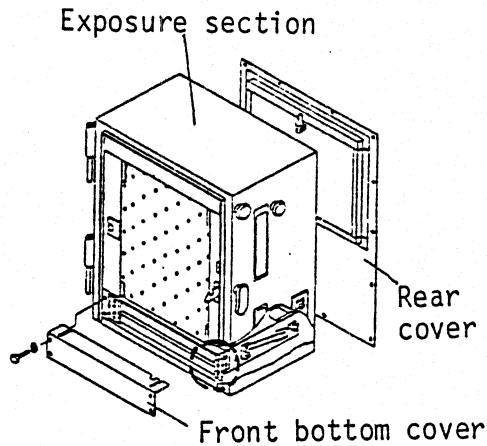
Mask set length: 390 mm



(2) Make an exposure and measure it. Loosen the two cursor fitting hexagon head bolts (M4) and adjust the cursor pointer so that the pointer points out the scale value equivalent to the measured exposure length.



8.2. Replacement of the Auto-cutter



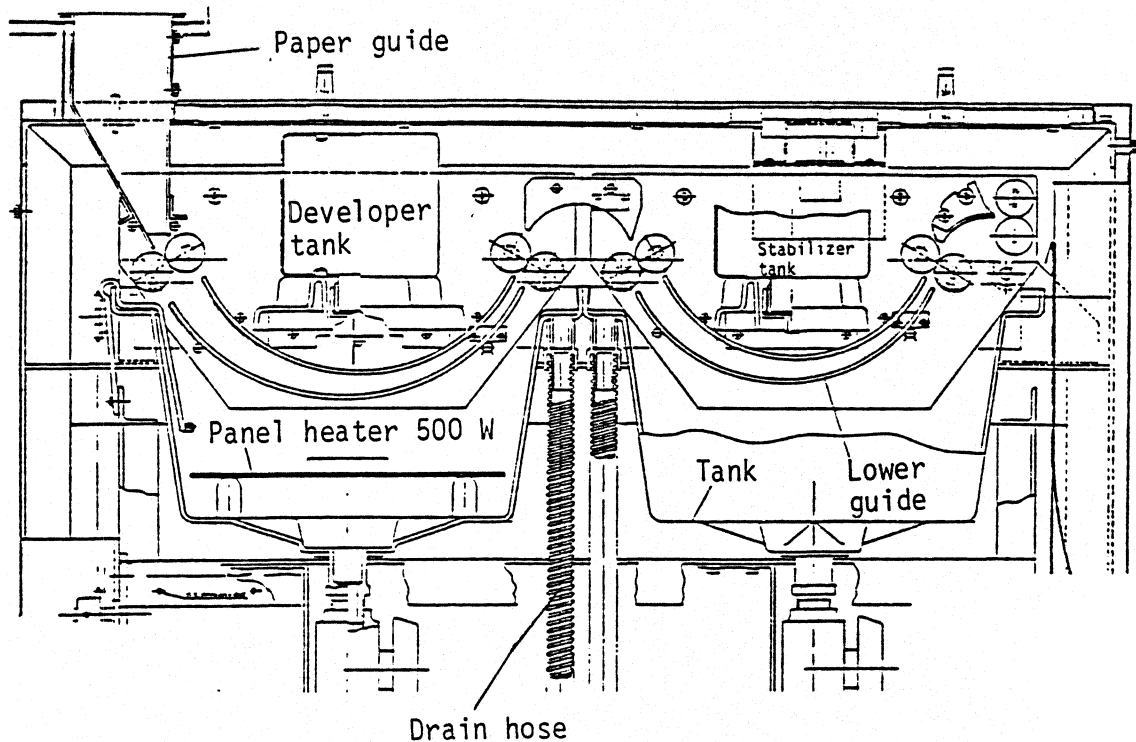
The auto-cutter is tapered to cut paper from its end to end, like scissors.

The entire cutter unit should be replaced.

- (1) Turn off the power switch.
- (2) Remove the rear cover and front bottom cover from the exposure section.
- (3) Remove the connector J5 for the cutter motor and connector J6 for the cutter origin.
- (4) The cutter unit mounting bracket is attached from the front bottom of the exposure section. Remove the four mounting bolts (M6) after marking the distance between the top of the mounting bracket and the stay and the bracket longitudinal position to replace it exactly as it was, later.
- (5) Gently pull out the cutter unit toward the front bottom of the exposure section.
- (6) Reverse the above removal procedure to install the cutter unit. Adjust the height of the mounting brackets when an orthogonality error of over 1 mm occurs in cutting paper.

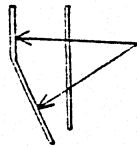
9. PROCESSOR

9.1. General Structure



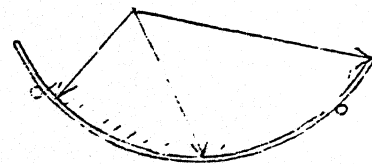
9.2. Probable Causes of Scratched Masters

A. Paper guide



Keep the paper guide surface clean and smooth with the supplied polishing compound.

- B. If the paper path surfaces of the lower guides in the developer and stabilizer tanks are dirty or a guide has scratches sensible with human fingers, polish it with sandpaper (#600 or finer) and finish it with the supplied polishing compound.



Usually, clean and smooth the guide surface with the compound when changing processing solutions.

9.3. Replacement of the Heater

The machine uses a panel heater (500 W) for developer. To replace the panel heater, disconnect the connector for the heater cord from the heater receptacle and remove the cord from the cord saddle. This removal procedure is easy.

