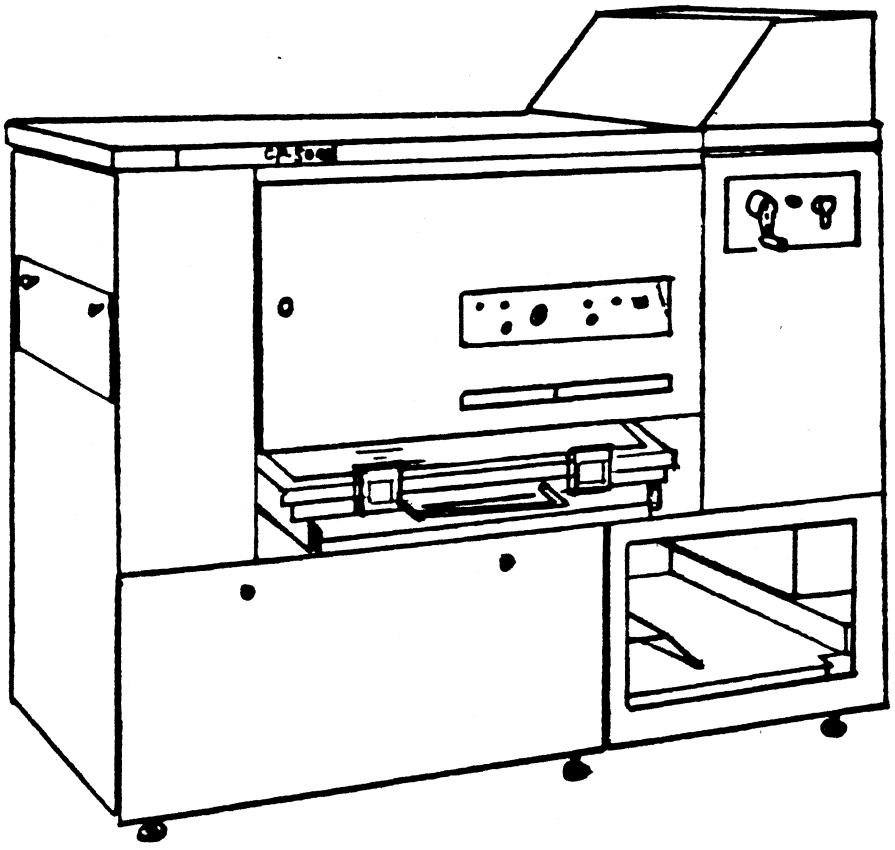
米国駐在員事務所 御中

SILVER MASTER PLATEMAKER

CP-500s

SERVICE MANUAL



SCREEN DAINIPPON SCREEN MFG. CO., LTD.

CONTENTS

1. INTRODUCTION

This Manual is intended to be used for after-sale service on CP-500S. For operation of the machine and other details, refer to "CP-500S OPERATION MANUAL", "TECHNICAL GUIDE" and other related documents. Bear in mind that the machine structure and specifications are subject to change without notice.
For parts ordering or consulation, let us know the following information, referring to "CP-500S PARTS LIST".

- model (CP-500S)
- serial number
- reference numbers and descriptions of parts
- required quantities
- date of delivery

2. SPECIFICATIONS

° Master width:	254 mm (10"), 279 mm (11"), 305 mm (12") 404 mm (15.9"), 508 mm (20") 550 mm (21.5/8") Slide variable spool type.
° Master feed length:	370 mm ∿ 820 mm
° Max. output size:	550 mm x 790 mm (white paper exposure: 550 mm x 820 mm)
° Max. input size:	550 mm x 790 mm
° Original loading method:	By drawing out original frame and loading an original with its face up. Base sheet supplied for positioning.
° Processor capacity:	Developing tank .... 18 ℓ Stabilizing tank ... 16 ℓ
° Replenisher tank capacity:	Developer, stabilizer ... each 2 ℓ
° Temperature control:	530 W panel heater (thermodial control) for the developing tank.
° Dryer:	1.4 kW heater (thermodial control)
° Lens:	f 260 mm, in-mirror type
° Magnification:	100% (same-size output)
° Exposure method:	Slit type (scanning by lens & light source)
° Exposure control:	Power thyristor (with a light-level adjust dial)
° Light source:	Two halogen lamps, 130 V, 1.5 kW
° Independent switches:	MASTER SET switch DRYER switch Master feed switch Master cut switch
° Master rewind:	Manual rewinding with a handle
° Master seam detection:	Alarm buzzer, automatic over-cut

° Processing rate: 660 mm/min
Initial process: 120 sec (60 Hz),
140 sec (50 Hz)
Cyclic process: 58 sec (60 Hz),
68 sec (50 Hz)

° Machine dimensions: 1860 (W) x 990 (D) x 1660 (H) mm

° Weight: 650 Kg (Main unit 550 Kg; Processor 100 Kg)

° Electricity: 1 φ, 100 V, 1.0 kW, 50/60 Hz
1 φ, 200 V 6.4 kW

Process Chart

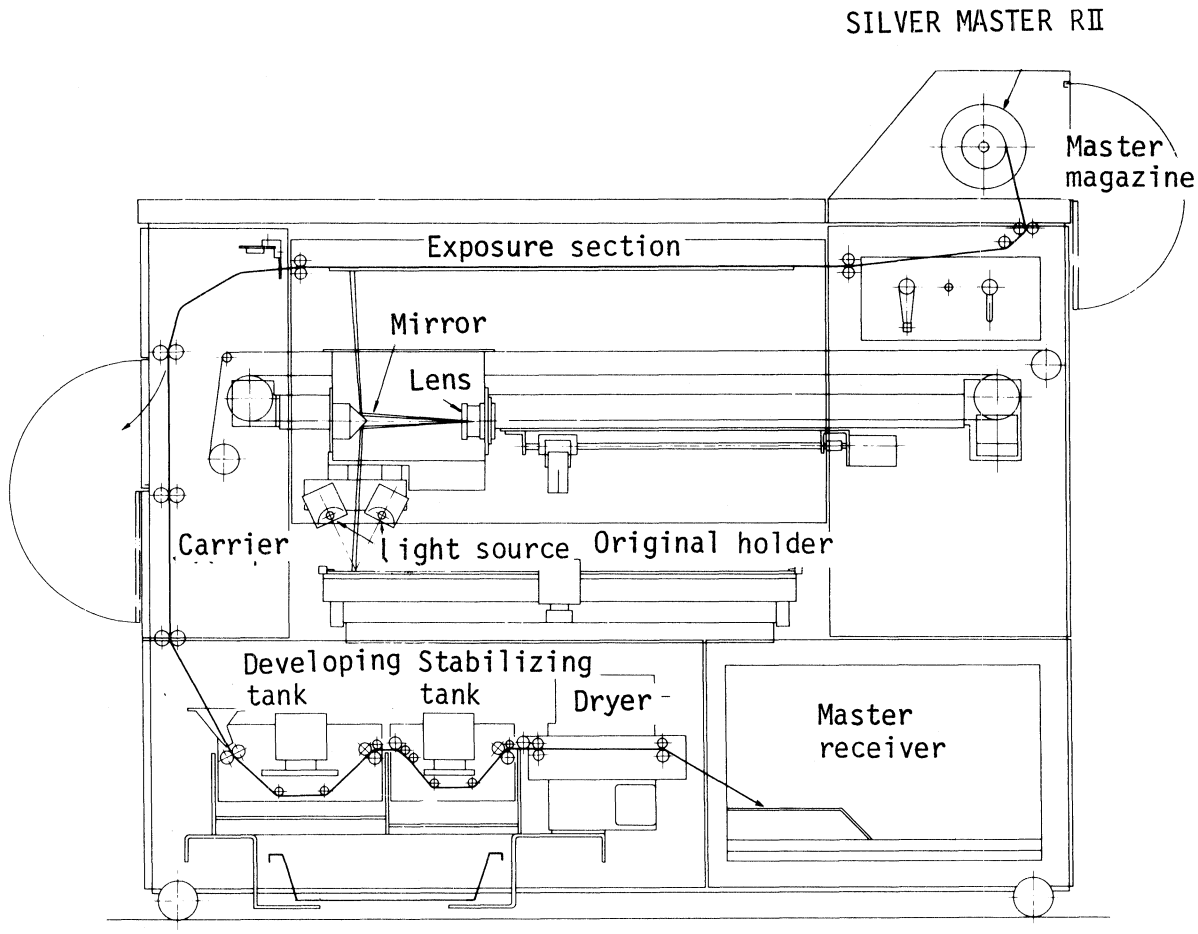


Fig. 1

3. INSTALLATION PROCEDURES

[Conditions for Installation]

(1) Place the machine horizontally on a floor strong enough to withstand a machine weight of 650 Kg.

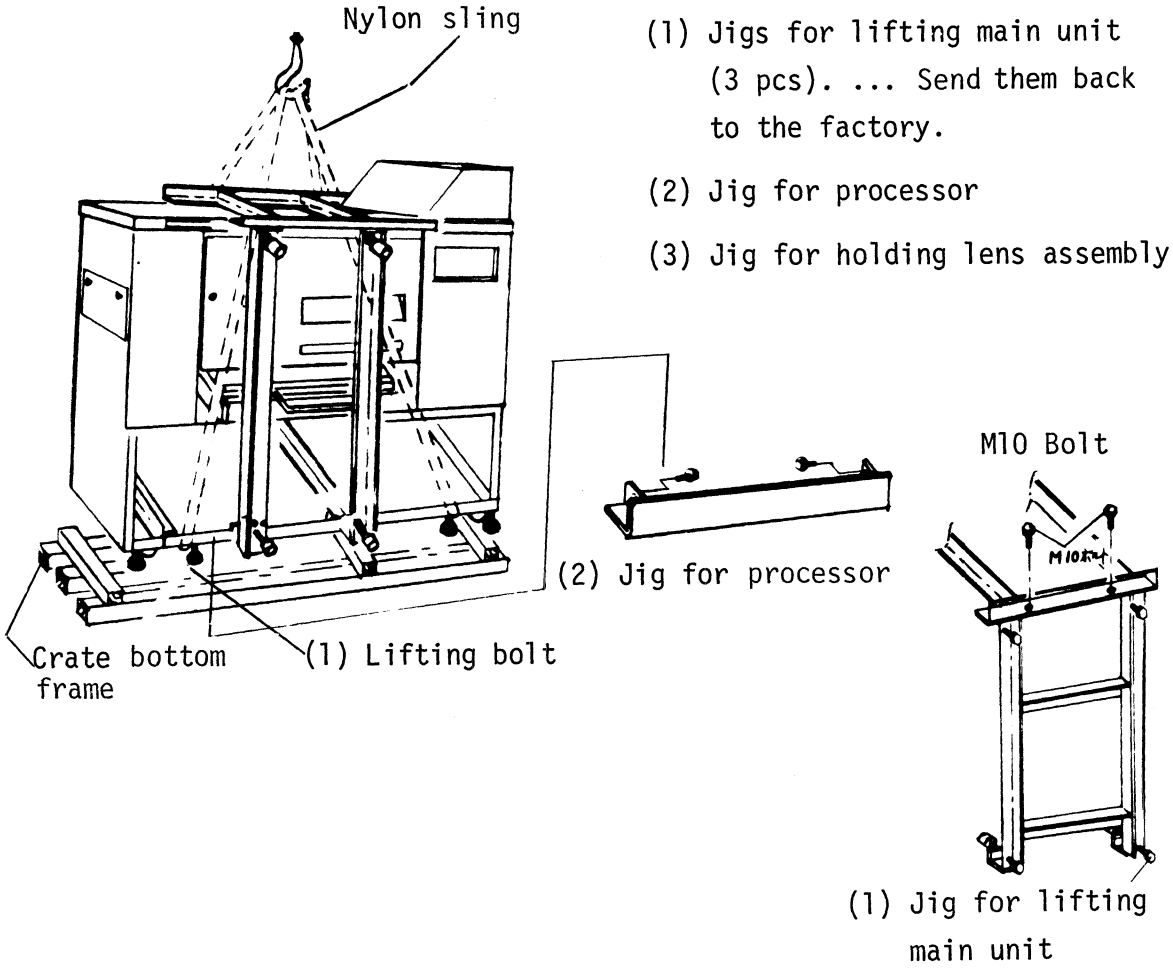
(2) Avoid a place where there is vibration. The floor surface should not be rough.

(3) Avoid a place exposed to direct rays of the sun.

(4) Use wires which bear the supply power of 1 ϕ 100 V - 1.0 kW and 1 ϕ 200 V - 6.4 kW. Voltage fluctuation should be kept within $\pm$10%.

(5) Leave at least 40 cm space around the main unit for servicing.

Fig. 2



[Jigs]

(1) Jigs for lifting main unit (3 pcs). ... Send them back to the factory.

(2) Jig for processor

(3) Jig for holding lens assembly

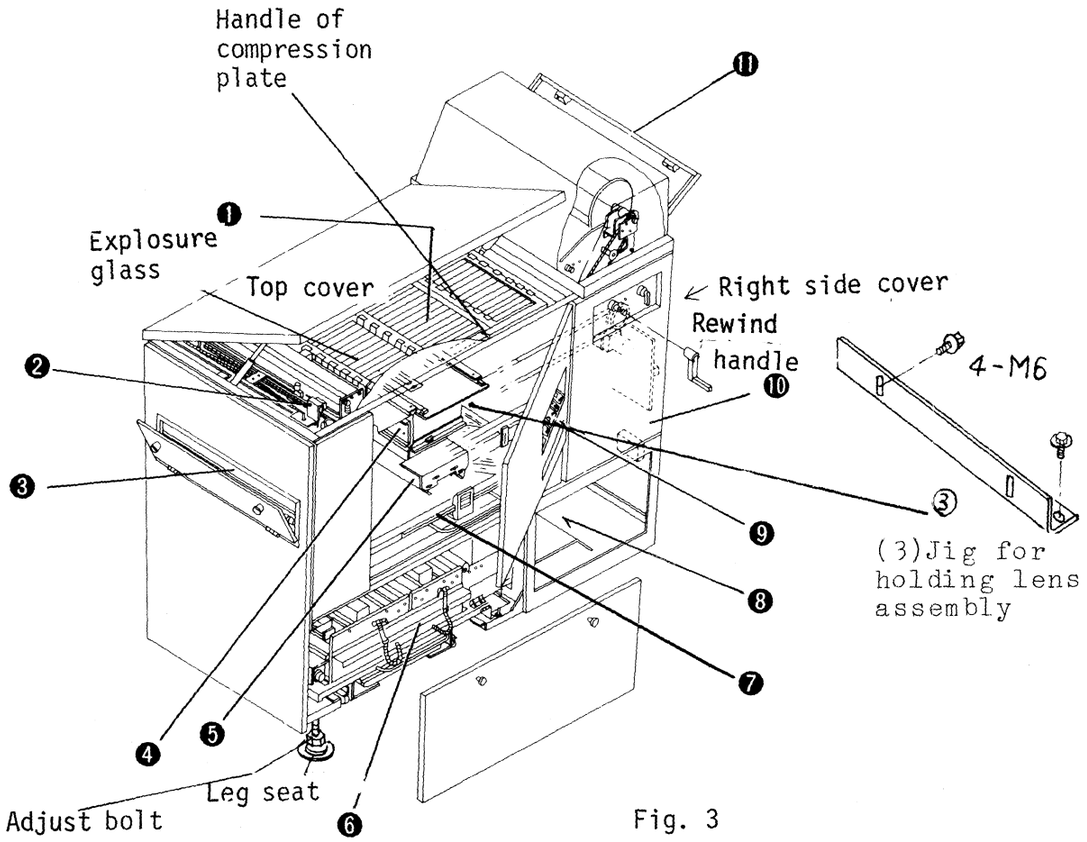


Fig. 3

(1) Exposure Section
(2) Cutter
(3) Carrier (intermediate paper outlet)
(4) Lens/Mirror Assembly
(5) Light Source
(6) Processor/Dryer
(7) Original Holder
(8) Master Receiver
(9) Main Control Panel
(10) Switchboard
(11) Master Magazine

[Packing List]

When unpacking, be sure to check all parts against the packing list to make sure that no parts have been overlooked.

	Qty		Qty
(1) Main Unit	1	(14) Wall-stuck Operating Instructions	1
(2) Processor	1		
(3) Spool and Shaft	1 set	(15) Tool Set	1
(4) Halogen Lamp	2	(16) Cutter Blade	10
(5) Rewinding Handle Spring	1 each	(17) Blower Brush	1
(6) Replenisher Bottle	2	(18) Mirror Cleaning Spray	1
(7) Master Guide	1	(19) Metal Plishing Compound	1
(8) Leg Seat	6	(20) Retouching Paints	1 each
(9) Vat	1	(21) Spring Belt	3
(10) Tunnel	1	(22) Glass Fuse 2 A	1
(11) Measuring Cup	1	(23) Glass Fuse 3 A	4
(12) Test Chart	2	(24) Glass Fuse 5 A	4
Sample Original	1	(25) Glass Fuse 10 A	4
(13) Operation Manual Technical Guide Drain Disposal Manual	1 each	(26) Enclosed Fuse 30 A	2

[Unpacking]

A. Main Unit

(1) Remove the crate except the crate bottom frame.

(2) Hitch the nylon slings to the lifting bolts on the main unit bottom and lift the main unit to remove the crate bottom frame (Fig. 2). Remove the jig for lifting the main unit referring to Fig. 3 (4-M10)

(3) Casters on the bottom of the main unit can be used for carrying the unit.

B. Processor

(1) Remove the crate.

(2) Lift the processor to remove the crate bottom frame.

(3) Casters on the bottom of the processor can be used for carrying it.

[Installation]

(1) Carry the main unit to the installation site and put the leg seats under four adjust bolts.

(2) Remove the middle and lower rear covers.

(3) Open the top cover of the exposure section, cut the band for holding the compression plate and hook the handle to the top cover.

(4) Put a sheet of clean paper on the exposure glass and put a level on it. Adjust with the adjust bolts until the main unit is held in the horizontal position. Keep the four casters free or off the floor.

(5) Once remove the jig securing screws (2-M6) to take off the jig and reinstall them to secure the rails (after leveling the main unit, tighten the bolts on both sides of the processor a little.)

(6) Carry the processor and lift its rear to put the wheels on the rails. Connect the processor and the main unit through connector CN12 and secure its cord with the cord retainer. Then push the processor into the main unit.

(7) Put down the processor casters on both sides of the processor until they touch the floor and tighten the caster lock bolts.

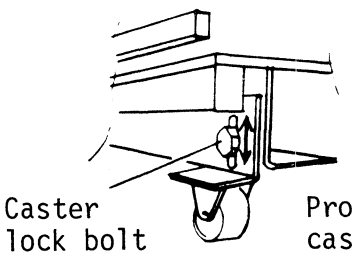


Fig. 4

(8) Remove the jig for holding the lens assembly by removing 4-M6 bolts (Fig. 3).

(9) Take away the band binding the original holder. (The holder is bound on both its operation and non-operation side.)

(10) Remove the lens cap; remove the screws (2-M4) securing the slit plate on the bottom of the lens assembly, and hold the plate handle to draw out the plate to the right. The lens cap is in the main unit.

(See Fig. 5)

(11) Install the rewind handle. (Be careful not to miss the spring.)

(12) Install the halogen lamps with their markings (130 V, 1500 W) facing the operator. (For the installing method and precautions, refer to "Operation Manual".)

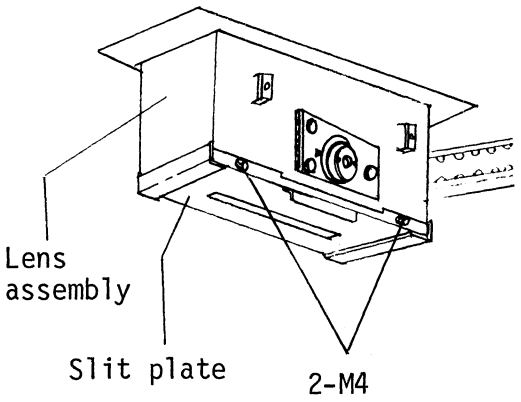


Fig. 5

(13) Install the light source shield.

(14) Install the master receiver cover with four knurled screws.

(15) Install the master guide and the drain vat to the processor. Remove the developing unit and the stabilizing unit from the respective tanks and clean the tanks and units. If the rollers don't turn smoothly, turn them by hand.

(16) Take the line cord out of the main unit and lay it on the floor. Then attach the lower rear cover.

[Mixing processing solutions]

(1) Prepare developing and stabilizing solutions according to "Operation Manual" and pour them into the respective tanks and replenisher bottles.

(2) Load the replenisher bottles filled with replenisher on the respective unit.

[Connecting the Power Supply]

(1) Set the 100 V and 200 V POWER switches on the sub-control panel (1) to OFF.

(2) After checking the power supplied in the building, connect the line cord.

(Power requirement; 1 ϕ 100 V - 1.0 kW
2 ϕ 200 V - 6.4 kW)

(3) Be sure to earth the green grounding wires for 100 V and 200 V.

[Inspection and Adjustment]

(1) Set the 100 V and 200 V POWER switches to ON.

(2) Load a master (paper) roll according to "Operation Manual".

(3) Check and adjust the position of the leading end of master. (Refer to the nameplate (located on the switchboard) indicating the timer settings specified according to the local power frequency.)

1) Remove the right side cover.

2) Adjust timer [T_1] so that the master leading end may be flush with the cutting plane. Clockwise turn of the timer increases the amount of master to be fed. Counterclockwise turn decreases it.

(4) Adjust the master feed-back. (Refer to the nameplate indicating the timer settings specified according to the local power frequency.)
After master roll loading, push the START button to feed back the master. Make sure that its leading end has get back to the extension of the mark (▲) on the exposure glass.
If not, adjust timer [T_2] on the switchboard. Clockwise turn of the timer increases the amount of master to be fed back and counterclockwise turn decreases it.

(5) Check and adjust carrier operating time (timer [T_B]).
The master just exposed is fed out and cut off and the carrier begins to carry it. Then at the same time when the leading end of the master is caught by the processor inlet rollers, it gets slackened by approx. 20 ∿ 30 mm for a moment and the carrier stops operating.
If the slack is not proper, adjust it with timer [T_B]. Clockwise turn increases the slack and counterclockwise turn decreases it.

(6) Developer temperature control:
Developer temperature should be 28 ∿ 30°C when the heater pilot lamp goes out. If not, adjust the thermo-dial on the processor.

[Final Assembly and Inspection]

(1) Install the middle rear cover.

(2) Install the right side cover.

(3) Install the light source shield.

(4) Install the fluorescent lamp for illuminating the original holder.

(5) Inspection:
Make a series of checks in accordance with "Operation Manual"

* Conduct running tests using the test chart.

* Check the master feed length.

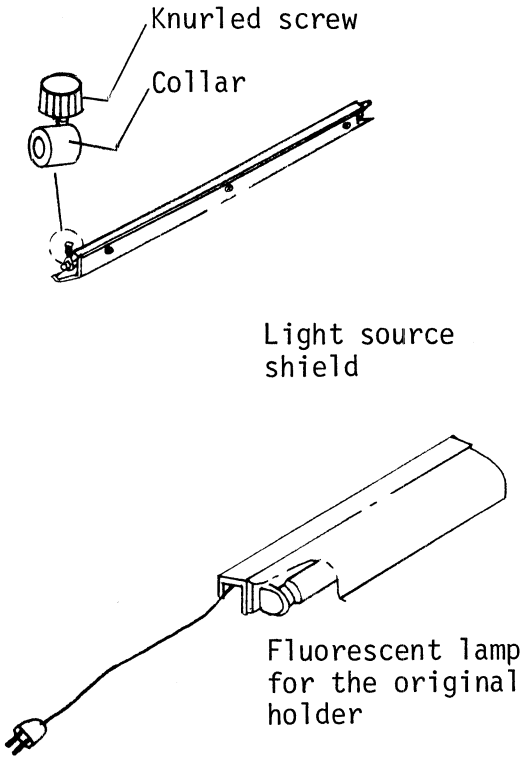
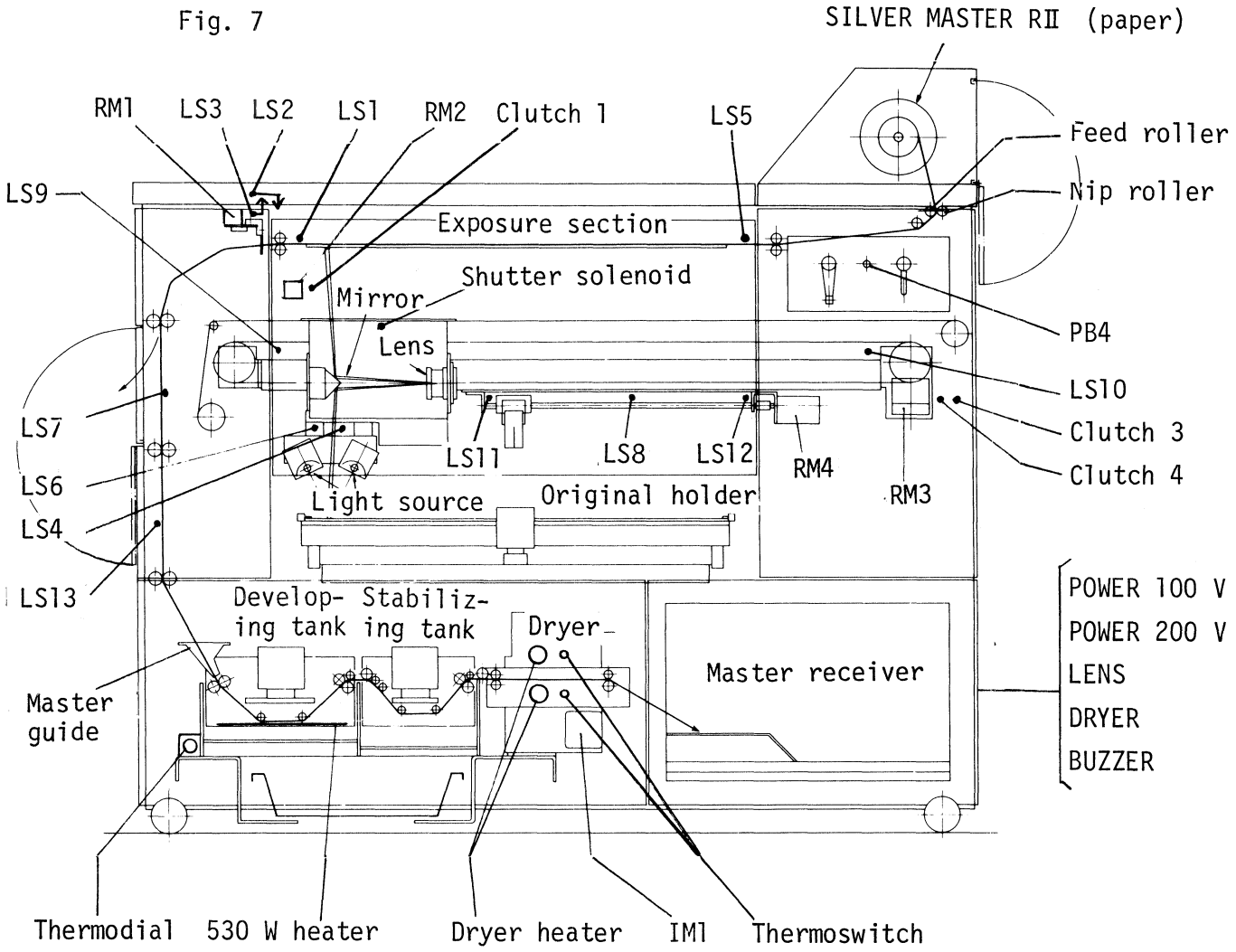


Fig. 6

4. MACHINE DESCRIPTION AND OPERATION

Fig. 7



LS1 —— Master cutting plane set reference/
master seam detect limiter
LS2 —— Cutter reversal limiter
LS3 —— Cutter origin limiter
LS4 —— Master feed-back adjust limiter
LS5 —— Master end detect limiter
LS6 —— Lens assembly origin limiter
LS7 —— Master output guide plate interlock
LS8 —— Master length set limiter
LS9 —— Lens assembly left safety limiter
LS10 — Lens assembly right safety limiter

LS11 — Master length set left safety limiter
LS12 — Master length set right safety limiter
LS13 — Processor inlet limiter
RM1 —— Master cut motor
RM2 —— Master feed motor
RM3 —— Lens assembly drive motor
RM4 —— Master length set motor
IM1 —— Processor motor

Step	Procedure	Operation and Conditions
Loading paper	1. Load master	1. Select the master width.
	2. Set the nip roller to 'LOCK'.	2. RY8 is turned on with MASTER SET button PB8 on. And the master feed motor starts to feed the master toward ◀ direction.
	3. Turn MASTER SET button ON.	3. The leading end of the master hits on LS1. After the time set on timer [T_1] is up, RY8 is turned off and the master feed stops. (At this time the leading end of the master becomes flush with the cutting plane.)
	4. Adjust timer [T_1].	4. At the same time, the START·OK lamp is lit.
Loading original	1. Draw out the original frame.	1. Draw out the frame toward you as much as possible to open the upper frame.
	2. Open the upper glass frame.	2. If the original can't be seen well, use the fluorescent lamp to illuminate it.
	3. Put the original with its face up.	
Setting master length	1. Operate snap switch TS6.	1. RM4 turns in conjunction with TS6 and sets the master length ranging from 370 to 820 mm.
Starting	1. Turn start button PB1 ON.	[Conditions for START·OK] (1) Set the cutter in its original position. (2) Turn the master end limiter on. (3) Set the lens assembly to its origin. (4) Set the master output guide plate interlock in its outer position. (5) Now master loading is over.

Exposure scanning

1. RY2-1 and RY2-2 are turned on and held by themselves. With RY2-2 on, timer [T_2] is excited and the master is fed toward ► direction for the time period set on [T_2] (master feed-back), during which clutch CL1 is on.

2. After the time set on timer [T_3] is up (that is, after the master feed-back is over), RY11 is turned on and the lens assembly drive motor starts running. With clutch CL3 on, the lens assembly moves toward ► direction. At the same time, with light source relay RY8 on, the shutter opens.

Feeding master (Returning the lens assembly to the origin

3. When the lens assembly hits on the master length set switch LS8, it stops moving and RY10 is turned on. This excites [T_3]. At the same time RY9-1 and RY9-2 are turned on and held by themselves. With lens assembly drive motor RM3 and clutch CL2 on, the lens assembly moves toward the origin (◄ direction). (At this time, when the light source and shutter are in contact with LS8, the lamp is on, and when not so it is out.) Simultaneously with RY8 on, CL1 is turned on to run master feed motor RM2 and the master is fed toward ◄ direction.

4. When the lens assembly hits on master feed-back adjust limiter LS4, RY3 is turned on and held by itself. At the same time [T_2] is excited. Thereafter the lens assembly hits on lens origin limiter LS6 and stops moving. RY9-1 and RY9-2 are turned off.

5. The master is fed back by the required length or until the time set on [T_2] is up, and the feed-back stops.

		6. RY3 is turned on and the time set on [T_2] is up, which causes RY4 to be turned on and held by itself.
Cutting master		7. With RY4 on, master cut motor RM1 runs to cut the master in ▲ direction.
		8. After cutting the cutter bracket hits on cutter reversal limiter LS2 which turns off RY3 and RY4. At the same time, RY7 is turned on and held by itself. Counter CO counts up once.
Carrying cut master		9. With RY4 off, the master cut motor runs to cut in ▼ direction and stops when cutter origin limiter LS3 is turned on. RY7 is turned on, which causes RY8 and master feed motor RM2 to be turned on to feed the master toward ◀ direction.
		10. The master is carried and turns on processor inlet limiter LS13 in the carrying compartment which excites [T_3]. When the time set on [T_3] is up, the master feed drive stops and then in turn the master is fed by the processor. When the time set on [T_3] is up, RY5 is turned off and START·OK pilot lamp PL4 is lit to indicate that the machine is ready.
Lighting START·OK lamp again		
Developing	1. Turn the heater switch on.	11. The master is treated in the developing tank. The panel heater (530 W) and the thermoswitch work to maintain the developer at proper temperatures (approx. 28 ∿ 31°C).
Stabilizing		12. The master is treated in the stabilizing tank.
Drying	1. Turn DRYER switch on.	13. The master is dried in the dryer. The dryer consists of a finned upper heater (200 V 800 W), a finned lower heater (200 V 600 W) and a thermoswitch which maintain proper drying temperatures.
Unloading master		14. The dried master is output to the master receiver.

5. INSPECTION AND ADJUSTMENT OF OPTICAL SYSTEM

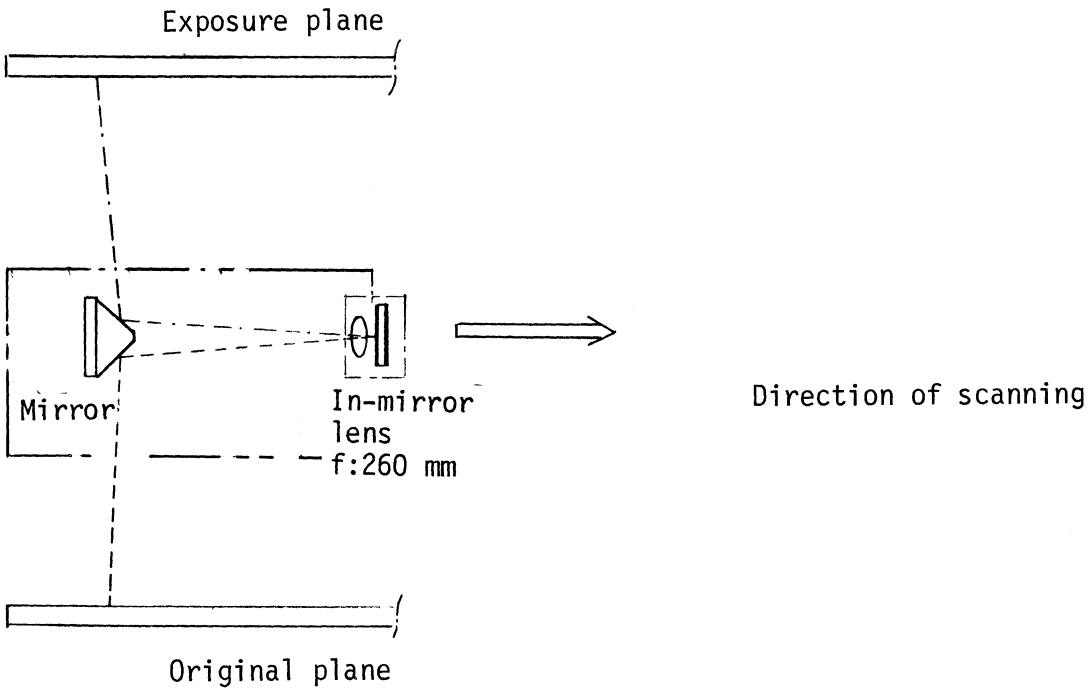
The focusing and sizing system is well adjusted before shipment. However if it is found to fail, make an inspection and an adjustment with the following procedures.

[Inspecting and Adjusting Procedures]

(1) Image size/slant correction; —— Adjustment by vertical movement of the original frame.

(2) Focus adjustment; ———— Adjustment by horizontal movement of the lens.

Fig. 8



Distance between the original plane (C) and the lens (L) — $A = f(1 + \frac{1}{m})$

Distance between the lens (L) and the exposure plane (P) — $B = f(1 + m)$

f: focal distance of the lens

m: magnification

Theoretical positional relationship among the original, lens, and exposure plane for good focus.

$A = B$

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

(ex.) f:260 mm, m:100%

$260(1 + \frac{1}{1}) = 260(1 + 1)$

$A = B = 520$

However, practically the focal distance varies with individual lenses.

A. [Focus Check]

(1) Make an exposure of the test chart (the resolution chart) or Mitsubishi standard chart with 70% over the normal light exposure.

(2) If 8.3 lines/mm or higher resolution is obtained when the exposure is checked through a loupe, the image is regarded as in good focus.

(3) If a similar resolution is not obtained, make a focus adjustment.

[Focus Adjustment]

Adjustment by horizontal movement of the lens.

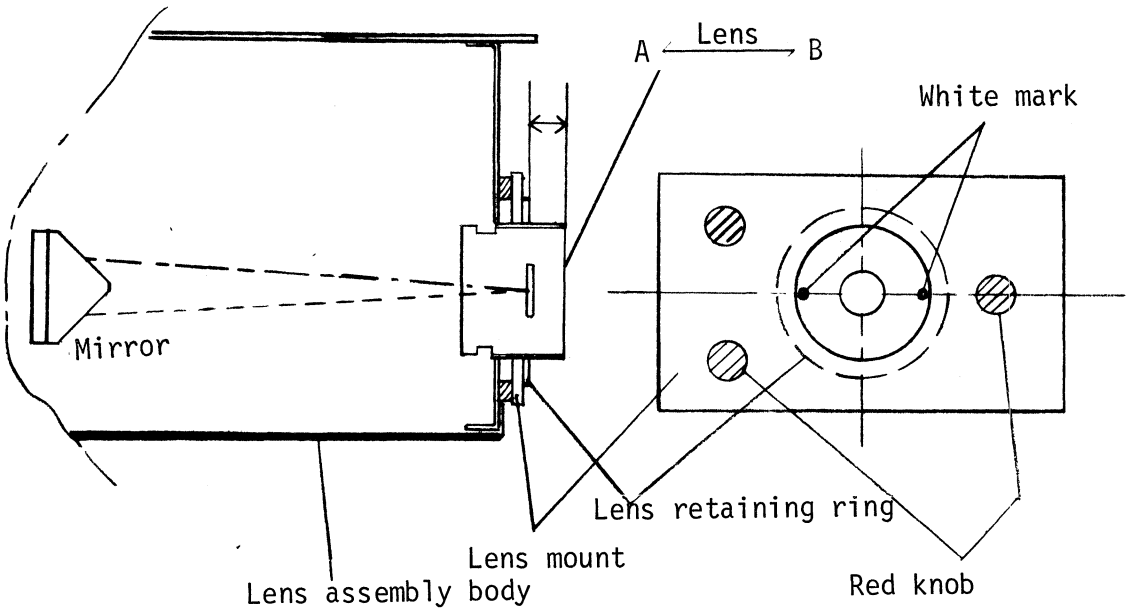


Fig. 9

(See Fig 9)

(1) Before adjusting the focus, be sure to measure the distance between the right end of the lens and the lens retaining ring with a scale to record the original position.

(2) Hold the lens by hand to prevent it from turning, and turn the lens retaining ring clockwise to loosen it.

(3) When the lens is turned clockwise, it moves in the A direction.
* There are two white marks on the lens. Turn the lens for 180° each time so that it may be held in the horizontal position. (One rotation (360°) of the lens moves it by 1 mm horizontally.

(4) Make an exposure of the test chart with the lens retaining ring locked. If the exposure is less clear as compared with the exposure previously made, return the lens to the original position and turn it further counterclockwise to move it in the B direction. Then make an exposure of the test chart again and compare it with the previous one.

(5) Using the above steps (3) and (4), adjust so as to get the best focus position (8.3 lines/mm or higher resolutions)

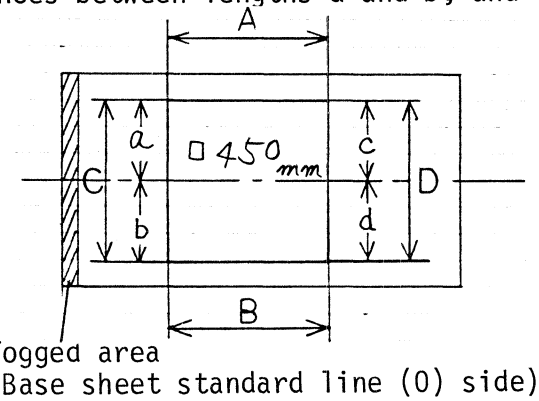
These steps should be taken accompanied with check of the image size.

B. [Image Size/Slant Correction]

(1) Load the test chart (ruled) or a scale suitable for checking the sizing.

(2) Make an exposure of it with the master length about 600 mm. Measure sides A, B, C and D of the image and calculate the differences between lengths a and b, and c and d. See the figure below.

Fig. 10



(Allowance)

① A, B, C, D (450 mm square)
The slant should be within ±0.5 mm

② a - b, c - d
The difference should be within ±0.4 mm.

[Adjusting Procedure]

Adjustment by vertical movement of the original frame base.

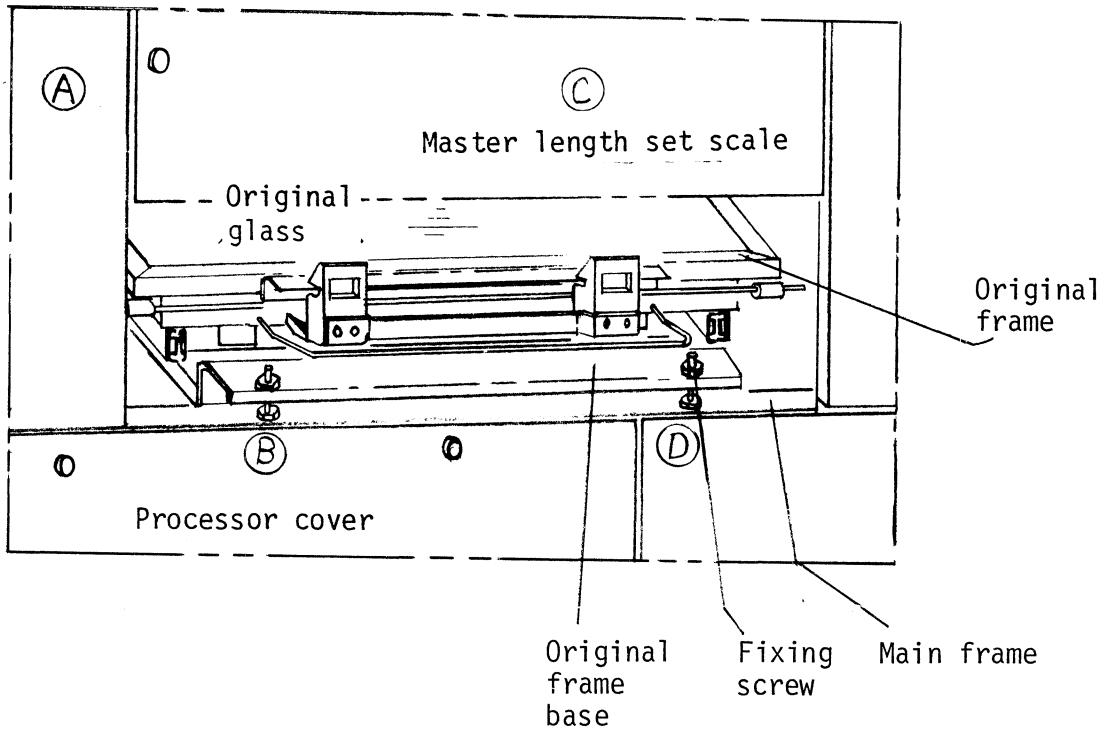


Fig. 11

* The length of A or B in the direction of feeding master can't be adjusted. The mechanism of the machine retains sizing accuracy in this direction.

* As the CP-500S utilizes a slit exposure method, first measure lengths C and D and then lengths a, b, c, and d.

(See Fig. 11)

(1) Put the exposure on the original glass with its face up and its fogged end toward the standard line (0) of the base sheet.

(2) The original frame is attached to the frame base and secured on the main frame with four screws Ⓐ, Ⓑ, Ⓒ and Ⓓ.

(3) Adjust lengths a, b, c, and d with screws Ⓐ, Ⓑ, Ⓒ and Ⓓ respectively.

(4) If, for example, the length b is longer, lower the frame base with screw B.
If the length d is shorter, raise the base with screw Ⓓ.

— NOTE —

Turning the nut of the screw for 180° changes the length by approx 0.3 mm.

6. ADJUSTMENT OF FOGGED LENGTH OF MASTER FRONT
(allowable length: 15 mm or less)

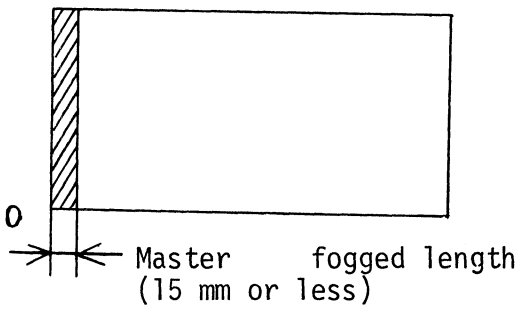


Fig. 12

* In the slit exposure method, the fogged area becomes black as shown to the left because the area is exposed twice.

* Be sure to make two exposures with the same master set length and measure the fogged length of the second exposure.

[Adjustment]

Move the bracket for the master feed-back adjust limiter to the right or left.

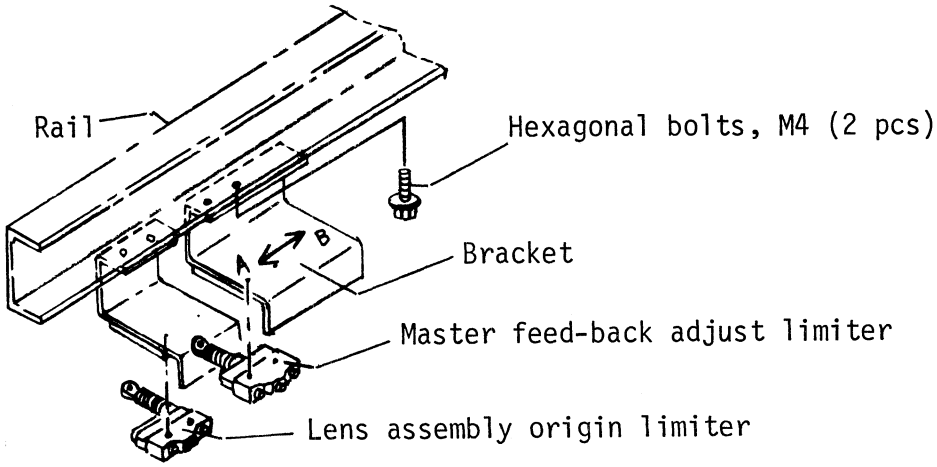


Fig. 13

° If the fogged length is larger, move the bracket in the direction A. Move the bracket securing the feed-back adjust limiter to the left by the excess length. (Loosen two hexagonal bolts (M4) and move the bracket in parallel to the rail. Then tighten the bolts.)

° If the fogged length is smaller (silver appears in the master end.), move the bracket in the direction B. Move the bracket in the opposite direction.

* When the fogged length has been adjusted, the master feed length also changes.

7. Inspection and Adjustment of Illumination Distribution

Although the halogen lamps (130 V, 1.5 kW) are so arranged to illuminate the exposure plane uniformly, an uneveness in the illumination distribution may exist. If the lamp has been replaced, check the distribution of illuminance with the following procedure:

[Checking Procedure]

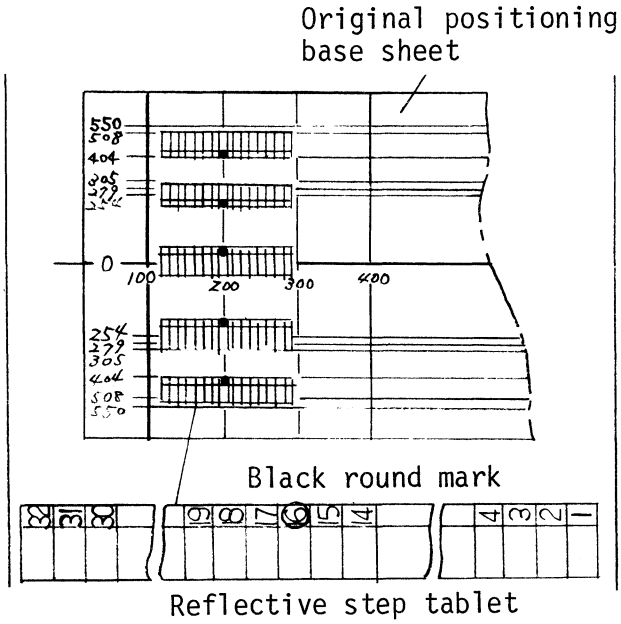


Fig. 14

(1) Set the master length to 400 mm.

(2) Draw out the original frame and open the upper glass frame.

(3) Put five reflective step tablets or substitutes in such a way that their marks (black circles) align with the 200 mm line of the original positioning base sheet. (See Fig. 14)

(4) Make an exposure with standard light exposure.

(5) Cut off the printed step tablet in the center of the exposure.

(6) Compare the marked steps of the other four printed step tablets with that of the cut step tablet, and check for any density difference (measure in terms of the number of steps).

(7) If, as a result of comparison, uneveness or density difference in terms of the number of steps is found to be within 1.5 steps, it means that the lamp replacement has not caused any significant change in the illumination distribution and a uniform distribution of over 80% is assured.

[Adjusting Procedure]

If the difference is more than 1.5 steps, make an adjustment with the following procedure.

Fig. 15

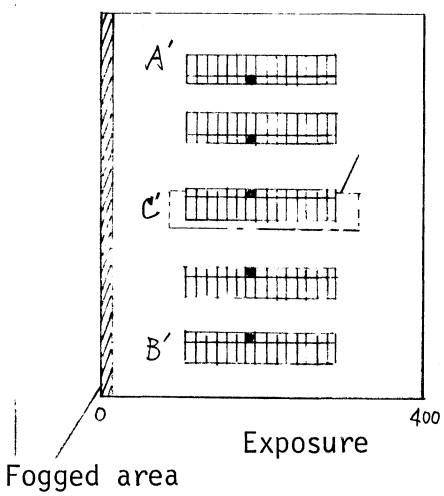
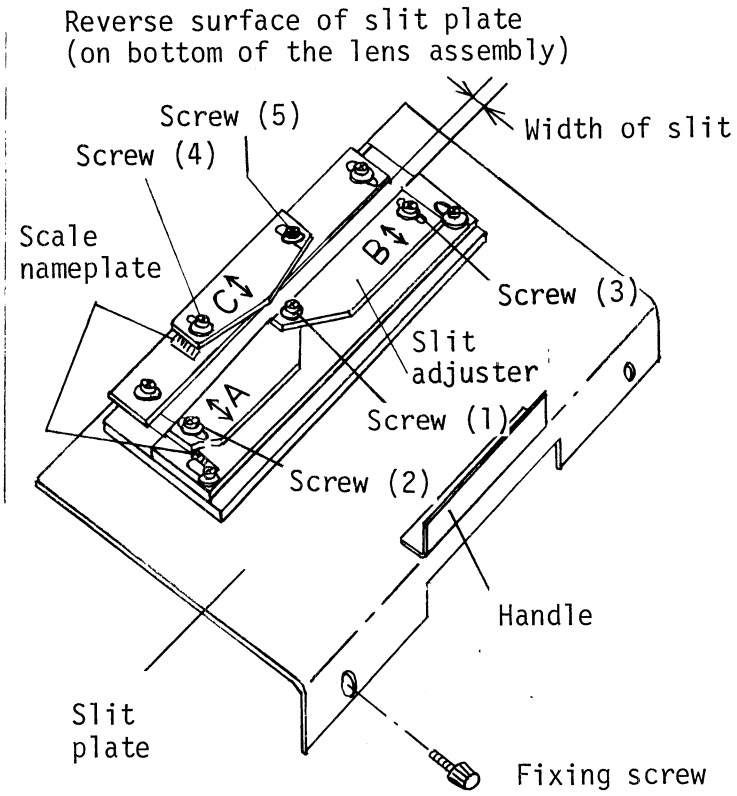


Fig. 16



(1) Open the cover of the main control panel.

(2) Remove the light source shield.

(3) Unfasten the two slit plate securing screws on the bottom of the lens assembly and draw out the slit plate by sliding its handle to the right. (Hold it by hand firmly because the plate is not slid so easily.)

(4) Put the slit plate with its reverse side up. (See Fig. 16)
For the relationship between the slit adjusters and the exposure, see Figs. 15 and 16.

* A scale nameplate is provided at both ends of each slit adjuster (A, B, C) to fascilitate the adjuster's return to the original position.

[1] If the exposed area A' is brighter than the central one:

Loosen screws ① and ② and move the adjuster A by 2 mm in such a way that the slit width decreases at its outer side, and fix it. After adjustment, make an exposure and check the result. If the result is not satisfactory, repeat the same step.

[2] If the exposed area B' is brighter than the central one:

Loosen screws ① and ③ and move the adjuster B by 2 mm in such a way that the slit width decreases at its outer side, and fix it. After adjustment, make an exposure and check the result. If the result is not satisfactory, repeat the step.

[3] If the central exposed area C' is brighter than the areas A' and B':

Loosen the screws ④ and ⑤ and move adjuster C by 2 mm in such a way that the center width of the slit decreases, and fix it. In case of local unevenness in the center area, only one end of the adjuster C may be moved. After adjustment, make an exposure and check the result.

* As mentioned above, although it is possible to decrease the width of the slit for adjustment (light quantity 30 WN), it is restricted and almost impossible to increase the width, or increase the light quantity.

8 . ADJUSTMENT OF MASTER LENGTH

* Before adjustment, make sure that the fogged length of the master front is within the allowable range.

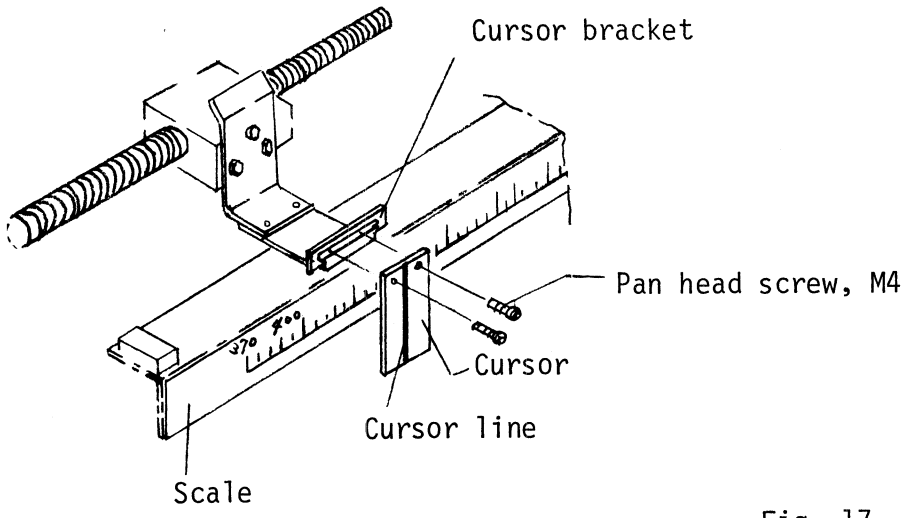


Fig. 17

[Adjusting Procedures]

(1) Set the cursor to the proper position and make an exposure.

(2) Measure the length of the exposure just made and align the cursor line with the scale division corresponding to the measured length. (The cursor is fixed on the bracket with two pan head screws M4. Its adjusting range is within the width of the long hole of the bracket.)

9. Shading Masks

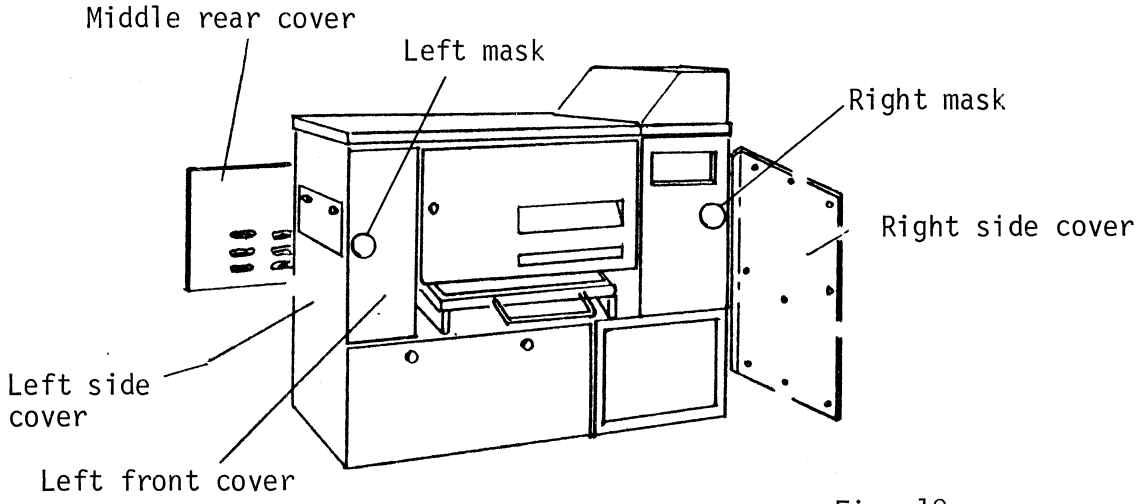


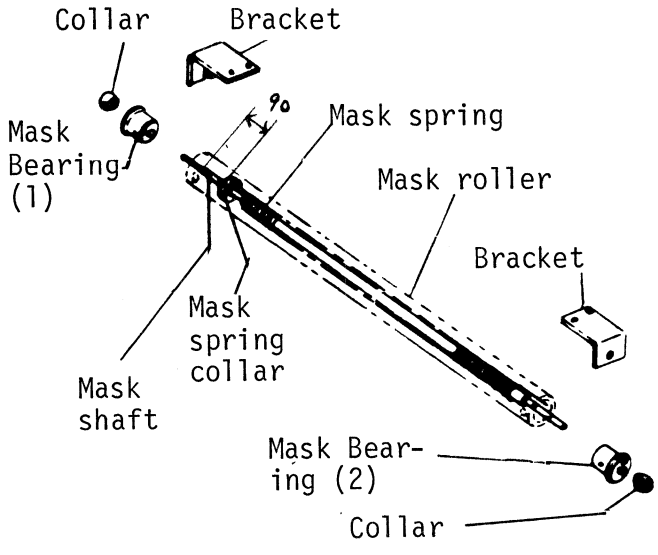
Fig. 18

The masks move as the lens assembly moves. In order to check the left mask, remove the following covers;

(1) Middle rear cover
(2) Left side cover
(3) Left front cover

In order to check the right mask, remove the right side cover.

Fig. 19



[Structure of Mask]

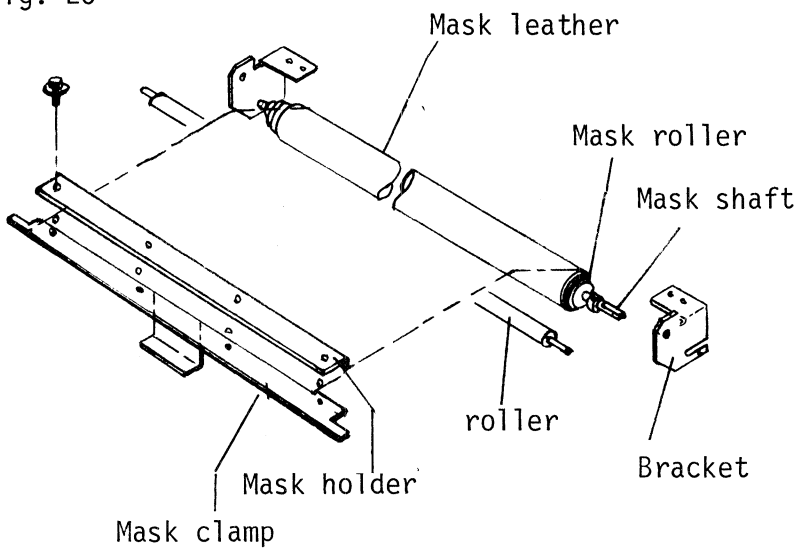
For the machines of serial numbers 1001 to 1050:
The mask roller is made of wood.

For the machines of serial numbers 1051 onward:
The mask roller is made of plastics.

In the mask roller, the mask spring collar is fixed 90 mm away from the notched end of the mask shaft and the mask spring end is inserted into the collar.

The mask bearing is fixed with a screw to each end of the mask roller. The mask spring end is fixed to the mask bearing (2). The collar is fixed at distance 1.0 mm from the mask bearing end.

Fig. 20



[Adjustment of Mask Spring Coils]

Adjust the mask springs in order to keep the mask roller in the proper working condition and balance movement of the lens assembly in the following way before fitting them on the brackets.

* When adjusting the mask spring, be sure to move the lens assembly to the operator (mask) side using the lever for moving the lens assembly.

Machines of serial numbers 1001 to 1050:

Right mask ..... 15-coiled springs
Left mask ..... 19-coiled springs

Machines of serial numbers 1051 and after:

Right mask ..... 20-coiled springs
Left mask ..... 25-coiled springs

10. Lens Assembly Slip Detecting Device

Fig.21

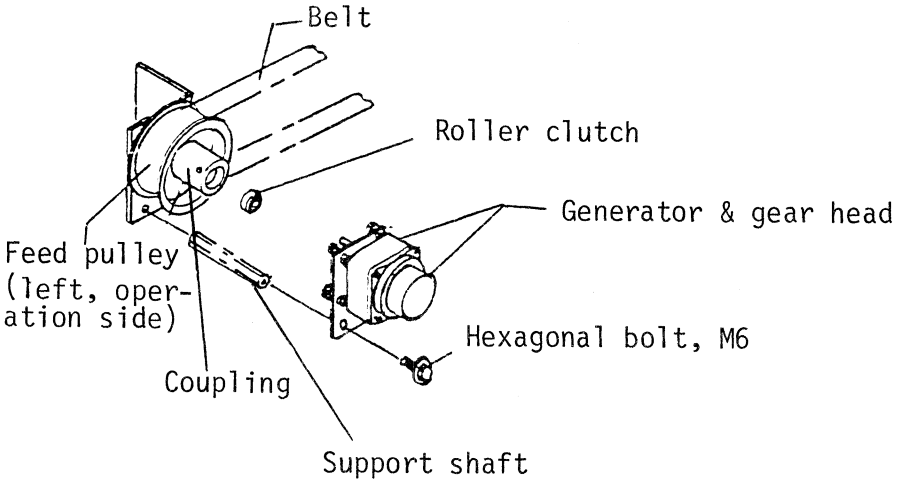
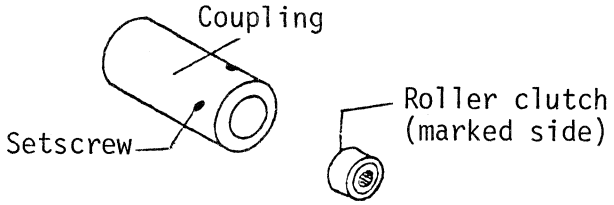


Fig.22



* This slip detecting device consists of a coupling, a roller clutch and a tachometer generator.

* If trouble in the movement of the lens assembly occurs during exposure, the slip detecting device works so that:

  (1) both the lens assembly drive motor stops running to stop the lens assembly,

  (2) the light source (halogen lamps) is turned off,

  (3) the shutter is closed, and

  (4) the buzzer is sounded.

[Possible Causes]

(1) As the lens assembly slides, it slips

(2) The belt for sliding the lens assembly is broken.

(3) The roller clutch is not tightly fit in the coupling and the outer ring of the clutch is slipping.

(4) The roller clutch has been inserted the wrong way. .... See Fig.22. (The clutch must be inserted in such a specified way that its marking is inward in the coupling.)

II. Replacement of the Mirror —— (machines of serial Nos. 80080-1051 onward)

The mirror is built in the lens assembly and cannot be seen from outside. Follow the procedure stated under for replacement.
For the steps marked with asterisk(s), make a careful inspection and note the result of the inspection because the steps are important for reassembly.

[Preparations]

(1) Open the main control panel cover and remove the shading plate in the front from the lens assembly.

(2) Remove both the upper and middle rear covers.

(3) Open the top cover, and hook the compression plate of the exposure section to the top cover.

(4) Turn on the power (100 V, no-fuse breaker), move the lens assembly to the center with the LENS feed switch and unhook the mask from the right and left mask hooks. Then, turn off the power.

(5) Make sure that the stopper of the top shading plate is completely in touch with the lens assembly (*). See Fig.23. Never neglect this step since it is important for reassembly.

(6) Check if the end face of the final slit bracket aligns with the slit scale (**). See Fig.24. Never neglect this step since it is important for reassembly.

Replacement of Mirror (inside the lens assembly)

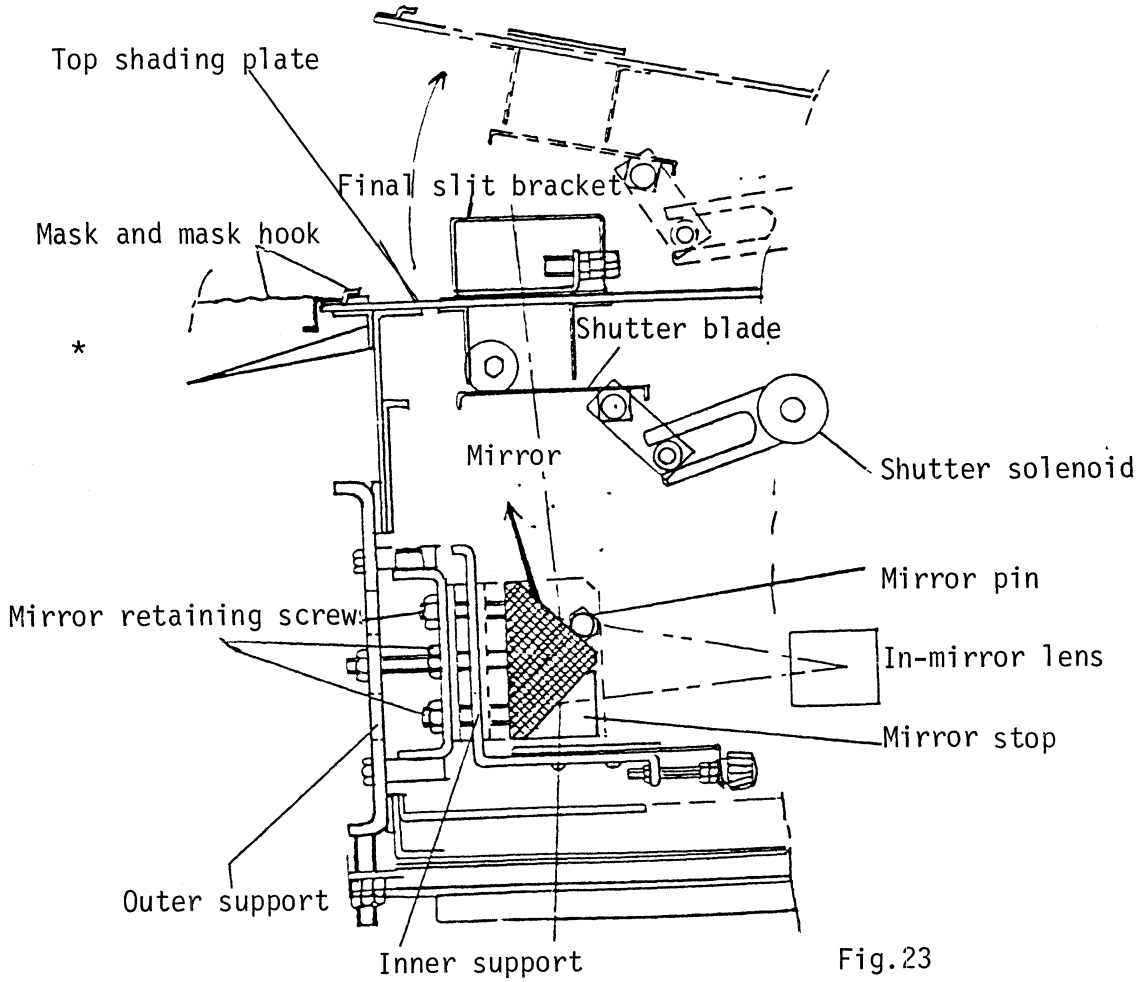


Fig.23

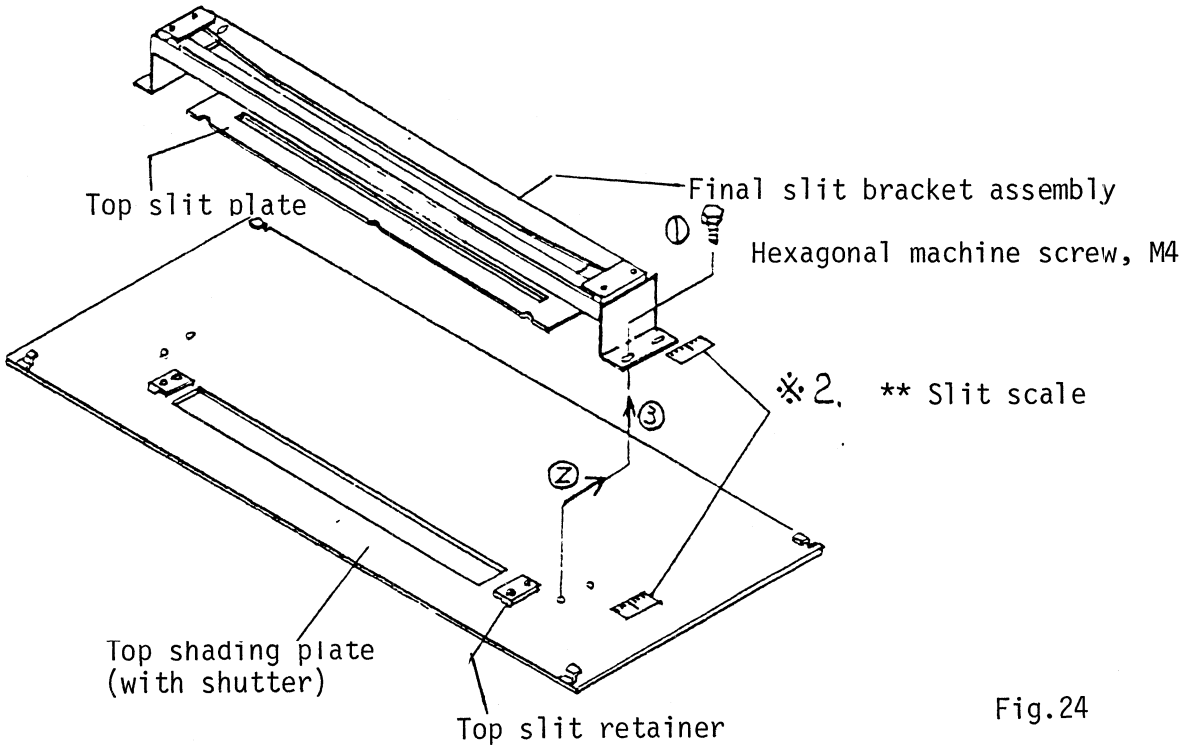


Fig.24

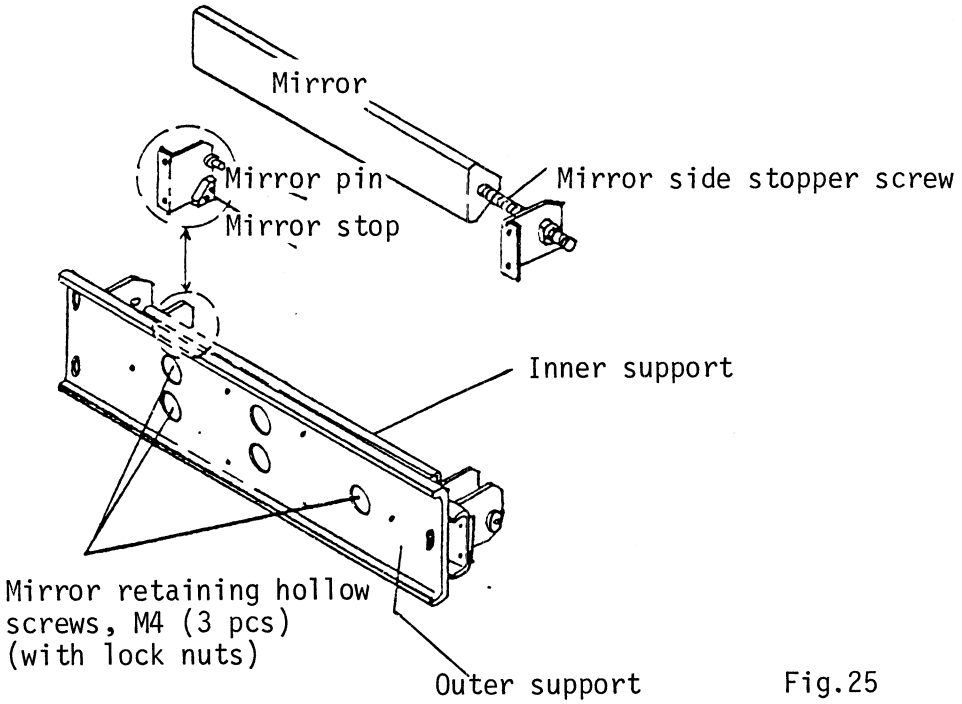


Fig.25

* Check if the stopper of the top shading plate is completely in touch with the lens assembly.

** Check if the end face of the final slit bracket aligns with the slit scale.

[Removal of the Mirror] —— See Figs.23, 24 and 25.

(1) After carrying out the check in step (6) (**), remove the four hexagonal screws (M4) and slide the top slit plate to the right until it comes off the top slit retainers. Then, remove the final slit bracket assembly.

(2) After carrying out the check in step (5) (*), remove the four pan head screws (M4) to remove the top shading plate (with shutter). Remove the connector from the shutter solenoid.

****

The mirror is fixed with a pin and a stop on its reflecting side, three retaining screws on its rear side and two side stopper screws.

****

(3) Loosen the mirror side stopper screw on the operator side.

(4) Loosen the three lock nuts (M4) inside the round holes of the outer support and loosen the mirror retaining hollow screws while holding the mirror with your hand.

(5) The mirror can be taken out upward when the retaining screws are loosened until they are flush with the inner support surface.

[Installation of the Mirror]

****

When installing a new mirror, take enough care not to stain or scratch it.

****

(1) The procedure is reverse to that for removal.
Put in the mirror from above and hold it by hand with its reflecting face in contact with both the mirror pin and stop.

(2) Tighten the three mirror retaining screws on the rear side evenly and lock them with the nuts.

(3) Tighten the side stopper screws, and make sure that the mirror is secure in place. Then lock them with the nuts.

[Reassembly]

(1) Place the top shading plate on the lens assembly. Don't forget to connect the connector for the shutter solenoid. Make sure that the top shading plate stopper is in touch with the lens assembly in the same manner as before (*). Then lock the plate.

(2) Install the final slit bracket assembly. Also make sure that the positional relationship between the final slit bracket end face and the slit scale is the same as before (**). Then lock the bracket.

(3) Hook the mask ends to the mask hooks on the top shading plate.

(4) Reattach the covers, turn on the power (100 V, no-fuse breaker) and return the lens assembly to its original position.

(5) Check the image for a slant, and the image size and focus, referring to the paragraphs "A. [Focus Check]" on p.17 and "B. [Image Size/ Slant Correction]" on p.18.

12. Replacement of Original Holder Upper Frame Glass

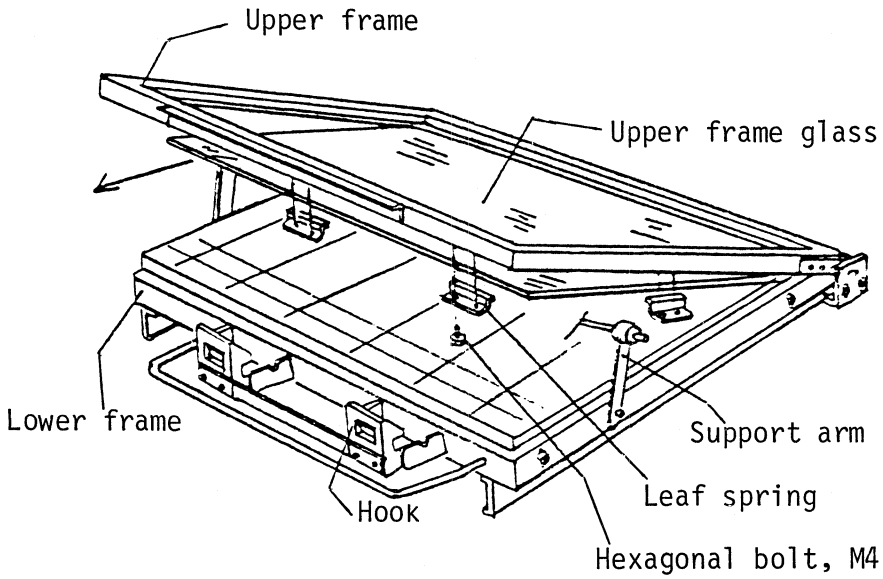


Fig.26

The original holder upper glass is fixed to the upper frame with 8 leaf springs.

When replacing the upper frame glass, proceed as follows.

[Removal] —— It is recommended that two persons do this job.

(1) Remove the middle rear cover.

(2) Loosen the three leaf springs located inward on the side opposite to the operator with a spanner for M4. (Never remove the springs.)

(3) Open the control panel cover and draw out the original holder fully, holding the handle.

(4) Release the hook and let one person lift the upper frame to above the specified position in which it is held by the support arm.

(5) Remove the five remaining leaf springs holding the upper glass by hand.

(6) Pull the glass in the direction of arrow shown in Fig.26 with care. The glass may stick to the rubber skirt of the upper frame.

[Installation]

****

When installing a new upper glass, take care not to scratch it.

****

The procedure is reverse to that for removal.

(1) Insert the new upper glass between the upper frame and the three leaf springs on the inward, opposite side.

(2) After making sure of the positional relationship between the glass and the rubber skirt, install the five remaining springs.

(3) Install the middle rear cover.

(4) Check the image for a slant, and the image size and focus referring to "A. [Focus Check]" on p.17 and "B. [Image Size/Slant Correction]" on p.18.

13. Driving Section —— (Replacement of Master Feed Clutch)

Driving Section

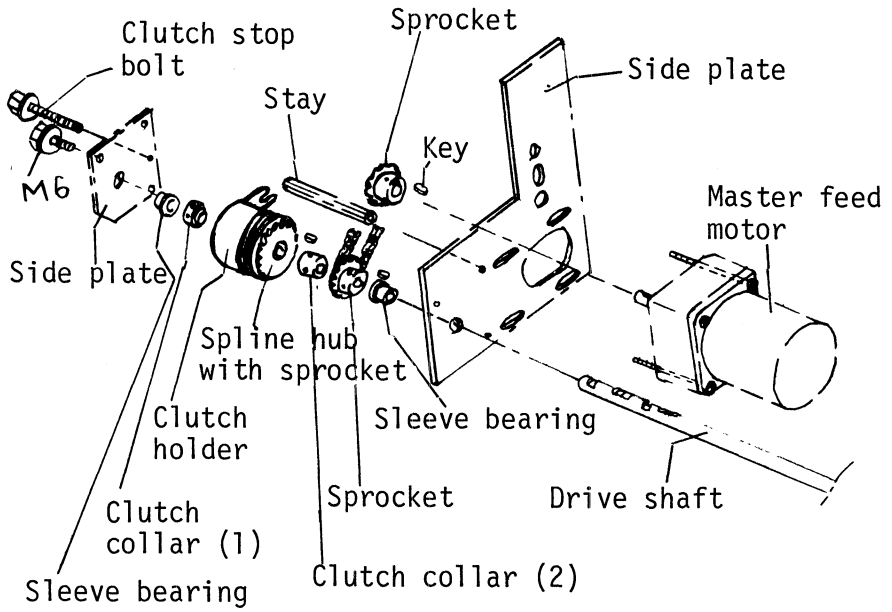


Fig. 27

* The master feed clutch which is located in the driving section is exposed when the upper rear cover is removed.

[Detachment of the Clutch]

(1) Remove the upper rear cover.

(2) Remove the side plate. (Unfasten three hexagonal bolts.)

(3) Loosen the screws securing the clutch collar (1) to draw out the collar. (two hollow screws M4)

(4) Draw out the clutch holder.

(5) Loosen the set screws for the spline hub with sprocket to draw out the hub and remove the key.

[Attachment and Adjustment]

(1) Install the clutch in the reverse order.

(2) Tighten the securing screws tightly.

(3) Install the side plate firmly so that torsion may not occur in the drive shaft.

* If there are not a little differences in master length, check the following points:

(1) Aren't the sprocket set screws at the side of the master feed motor loose?

(2) Aren't the sprocket set screws at the inner side or clutch side loose?

(3) Aren't the set screws for the spline hub with sprocket in the clutch loose?

If any of these screws is loose, the master feed lengths may differ. Also silver may appear in the exposed master end for the same reason. If such occurs, check and tighten the screws.

14. Processor & Dryer

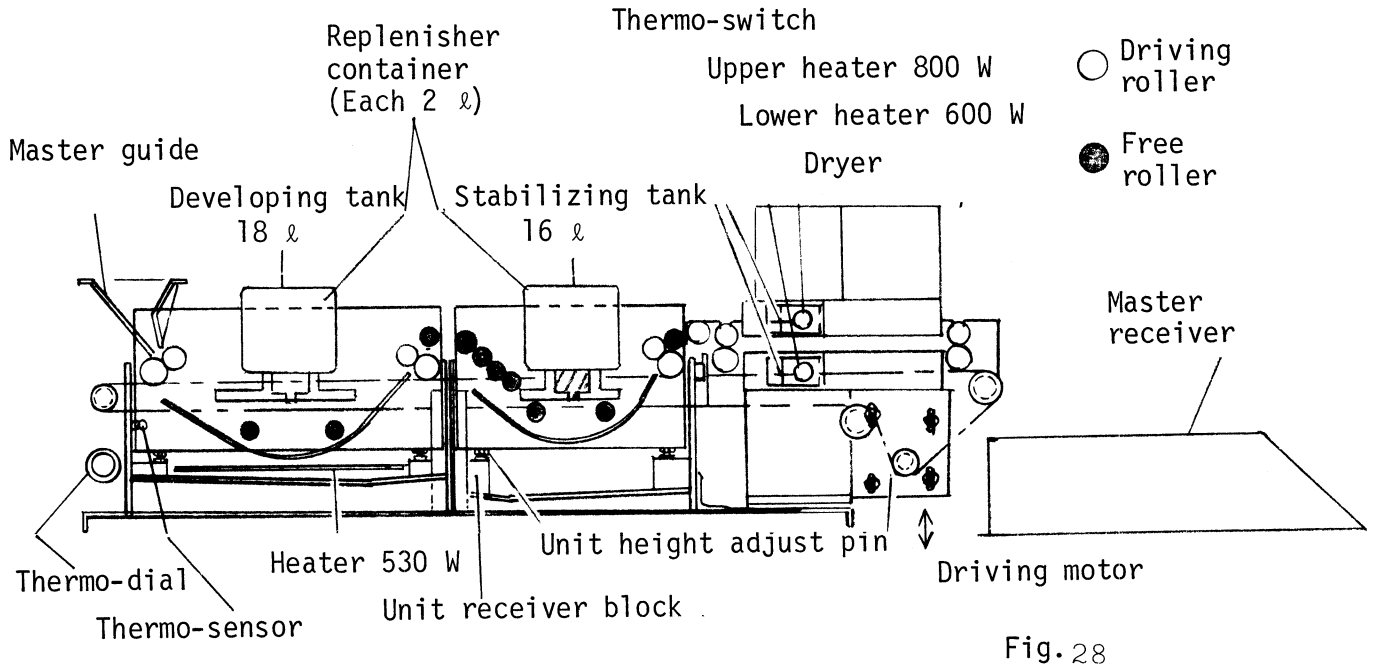


Fig. 28

* The processor and the dryer can be drawn out from the main unit.

[Adjustment of Processor & Dryer]

(1) Adjust the driving chain tension by means of the long holes of the drive motor mount.

(2) If the driving roller sprocket doesn't engage with the driving chain, make an adjustment with the following procedure.

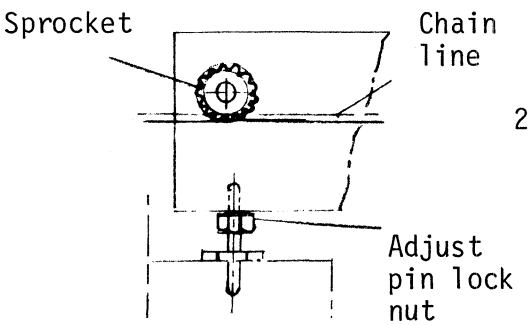


Fig. 29

1) Check if there is any backlash between the unit height adjust pins and the unit receiver blocks. If so, adjust the four blocks with the adjust pins to eliminate torsion.

2) If there is no backlash on the adjust pins but the chain does not engage with the sprocket, draw out the unit and loosen the lock nuts for the unit height adjust pins and adjust the four pins uniformly.

[Scratched Master]

If the master is scratched by the processor or dryer, make an inspection and adjustment as follows:

(1) Make sure of smooth rotation of the free rollers. (See Fig.28).

(2) If any free roller surface is dirty, polish it with the supplied polishing compound.

(3) Dust off the inner side of the master guide, especially its surface to be in contact with the master emulsion surface.

(4) Check the upper guide plate (aluminum perforated plate) of the dryer (master emulsion side) for a warp or foreign matter.

****

If any scratches are found in masters, first of all find which step and which part has caused it, and then take the appropriate steps for each case.

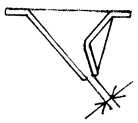
****

[Wrinkled Masters]

If the master is wrinkled by the processor or dryer, make an inspection and an adjustment as follows:

(1) Check the outlet of the master guide for a warp ..... an uneven gap between the center and both ends of the master guide.

(2) Check the finger at the outlet of the developing tank for misalignment with the roller and for any uneven surface.



Gap

Fig. 30

(3) Check the finger at the outlet of the stabilizing tank for misalignment with the roller and for any uneven surface.

(4) Check if the dryer inlet roller is at the same level as the stabilizing tank outlet roller? If not, adjust by means of the long holes of the dryer mount.

****

When wrinkles are found in masters, first find which step and which part has caused it, and then take the appropriate steps for each case.

****

ELECTRIC TROUBLE SHOOTING GUIDE

CONTENTS

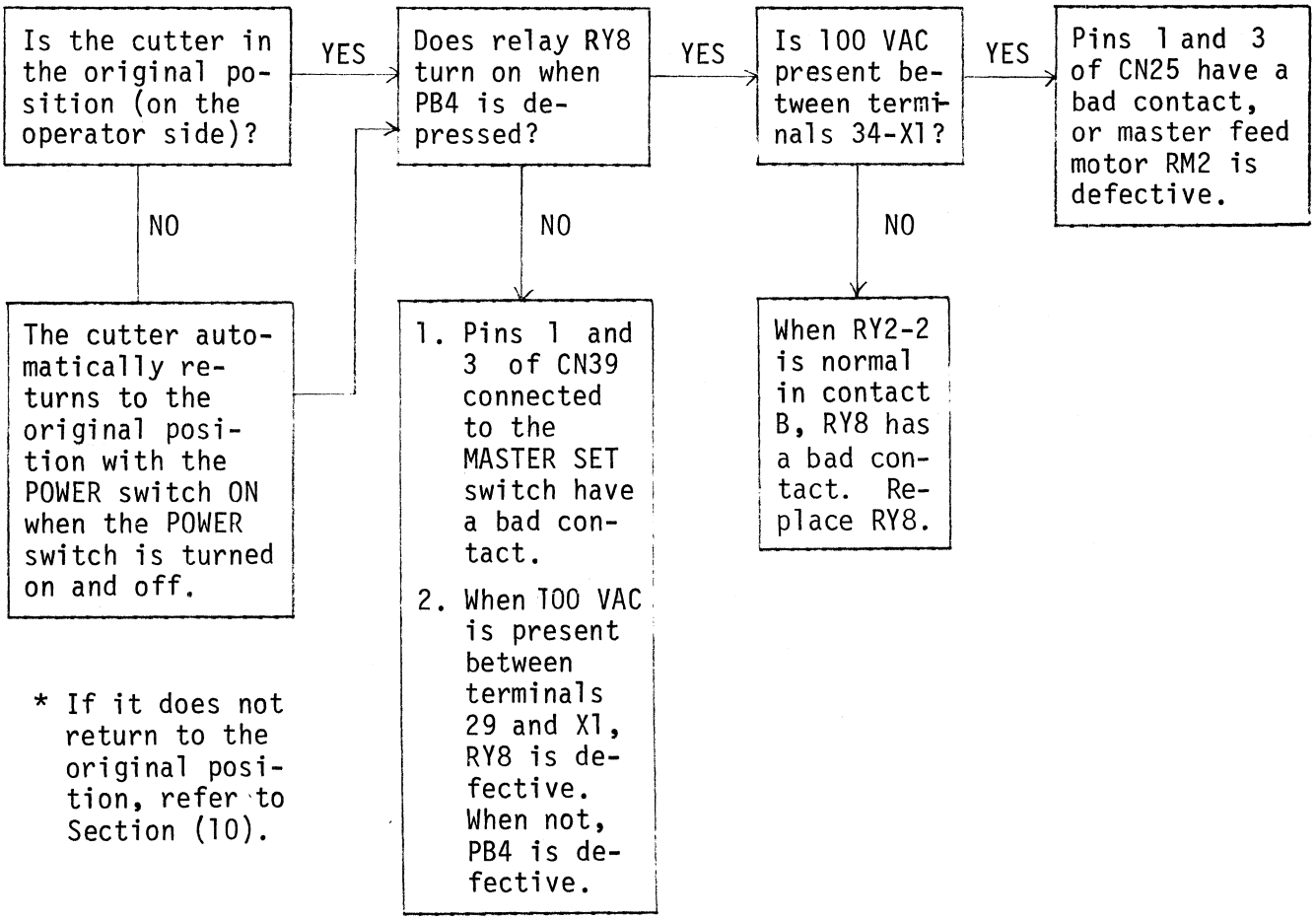
(1) Master will not be set in place even when MASTER SET switch (PB4) is depressed.

[CHECK]

Make sure that:

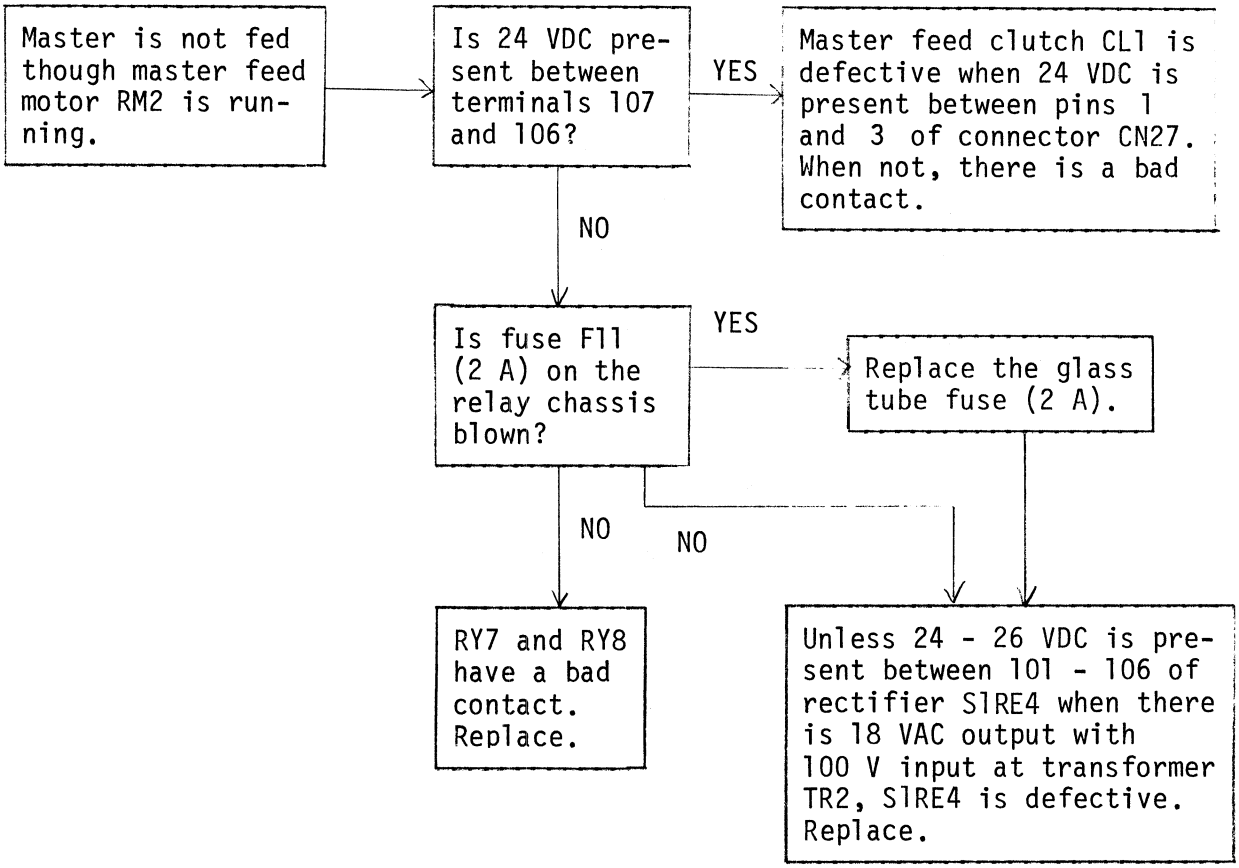
1. the nip roller for master feed is not in the FREE position, and
2. master is not exhausted.

[A]



* If it does not return to the original position, refer to Section (10).

[B]



(2) <u>The machine will not start even when the START button (PB1) is depressed.</u>

[CHECK]

° Make sure that the START pilot lamp (PL4) is on.

[A] The following conditions should exist in order to light the START lamp.

1) The cutter is in its origin (on the operator side).

..... Limit switch LS3 should be on.

2) Master is not exhausted.

..... Limit switch LS5 should be on.

3) The lens assembly is in its original position (to the left hand).
..... Limit switch LS6 should be on.

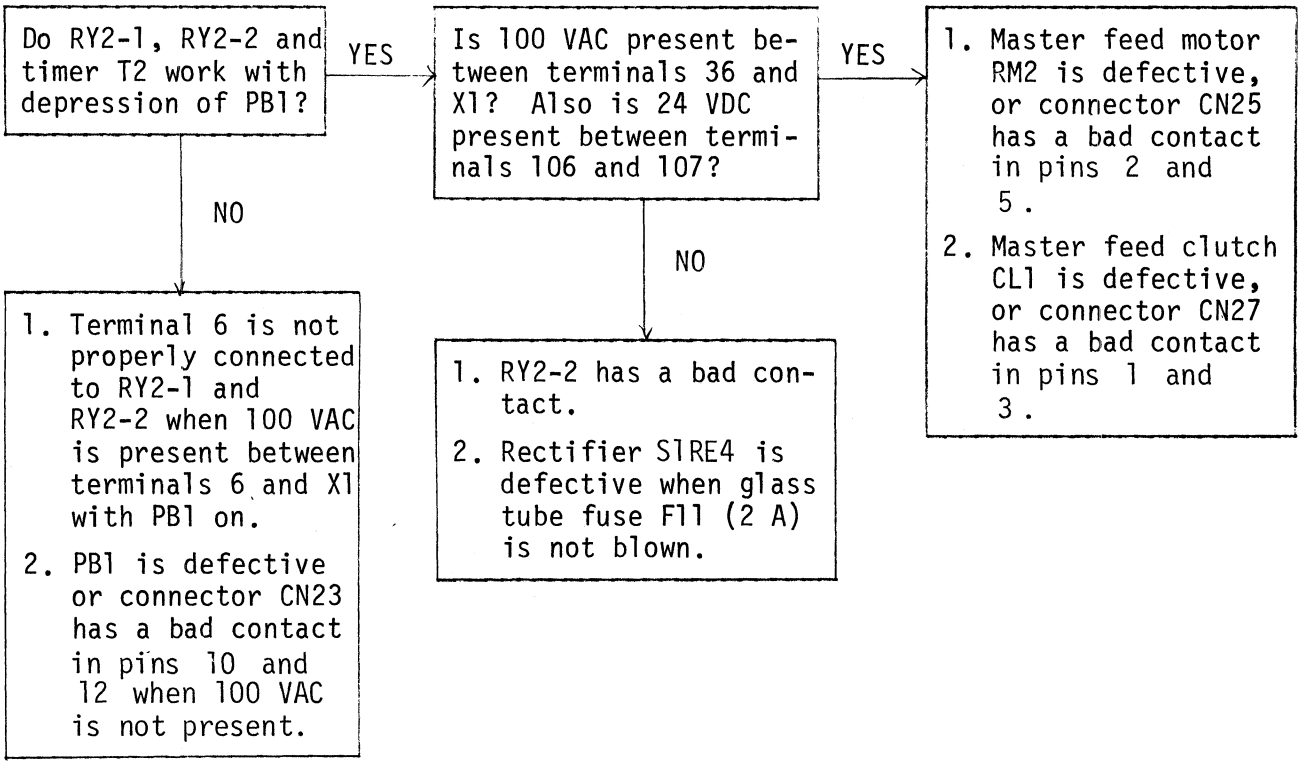
4) The master output guide in the carrying compartment is set in the outer place.
..... Limit switch LS7 should be off.

5) The master leading end is up to the cutting plane.
..... Limit switch LS1 should be turned on by the master, and POWER-ON and UP pilot lamps for timer T1 should be on.

6) When the 100 V POWER switch is turned on, pilot lamp PL1 is lit.

7) Glass tube fuses F1 and F2 (5 A) are not blown.

[B] As the START button PB1 is turned on, operation starts with feeding the master back.



NB) For the checking procedures, refer to the appropriate paragraphs.

(3) Exposure will not be made.

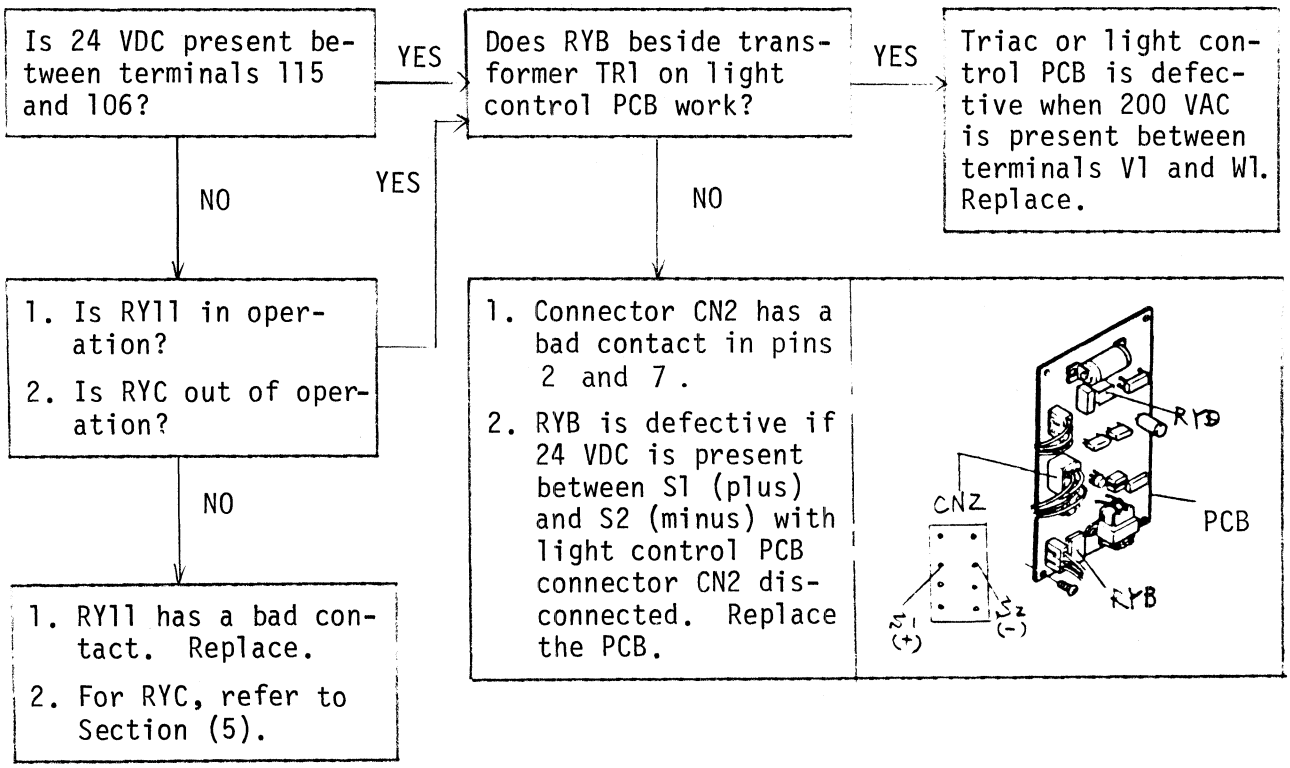
[CHECK]

Make sure that:

1. 200 VAC POWER switch is on,
2. the halogen lamps have not burnt out,
   - ° Measure the contact at each end of the lamp with a tester set to Ω range; confirm that it does not read infinity (∞). Whether the lamp filament is burnt out or not is found by looking at the lamp carefully.

     CAUTION: Handle the lamp with a dry cloth or gloves. Don't hold it with bare hands. If it is fingermarked or stained with oil, uneven distribution of illuminance or damage to that stained part may occur.
3: the ZERO/NORMAL EXPOSURE switch is not in the ZERO position.

(3)-1 Halogen lamp has a problem.



(3)-2 The shutter has a problem.

Is 24 to 26 VDC present between terminals 115 and 106?

YES →

- Connector CN30 connected to the shutter has a bad contact in pins 1 and 3 when 24 - 26 VDC is present between terminals 115 and 106 on the rear of the lens assembly.
- If the shutter opens with a jerk, oil or adjust it.
- Otherwise, solenoid SOL is defective.

NO ↓

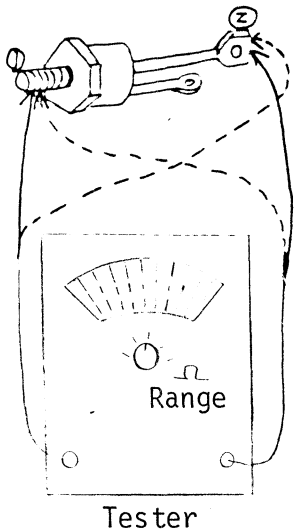
Confirm that the input voltage to the camera is 95 - 105 V. If it is below the specified range, change the output tap of transformer TR2 on the rear of relay chassis from 18 V to 20 V by soldering.

(3)-3 Triac is defective.

[CHECK]

- For the machines of serial Nos.1051 onward, the 200 V POWER (no-fuse breaker) is turned off within 1 second to prevent the halogen lamps from burning out when Triac fails.
- For the machines of serial Nos. up to 1050, take the following method of checking Triac when burning-out of the filaments of both halogen lamps is suspected, and replace it as required.

[How to check Triac]



1. Set the tester to the resistance (Ω) range.
2. Make a measurement with the tester leads in contact with points 1 and 2 shown in the figure. Then change contact points of the tester leads with each other.
3. Triac is in order unless the tester reads zero or infinity (∞) Ω.

(4) The light intensity will not change as the EXPOSURE dial setting is changed.

[CHECK]

In case that the light intensity is at the maximum (brightest) level and does not change:

° For machines of serial Nos.1051 onward, the 200 VAC (no-fuse breaker) will be turned off automatically.

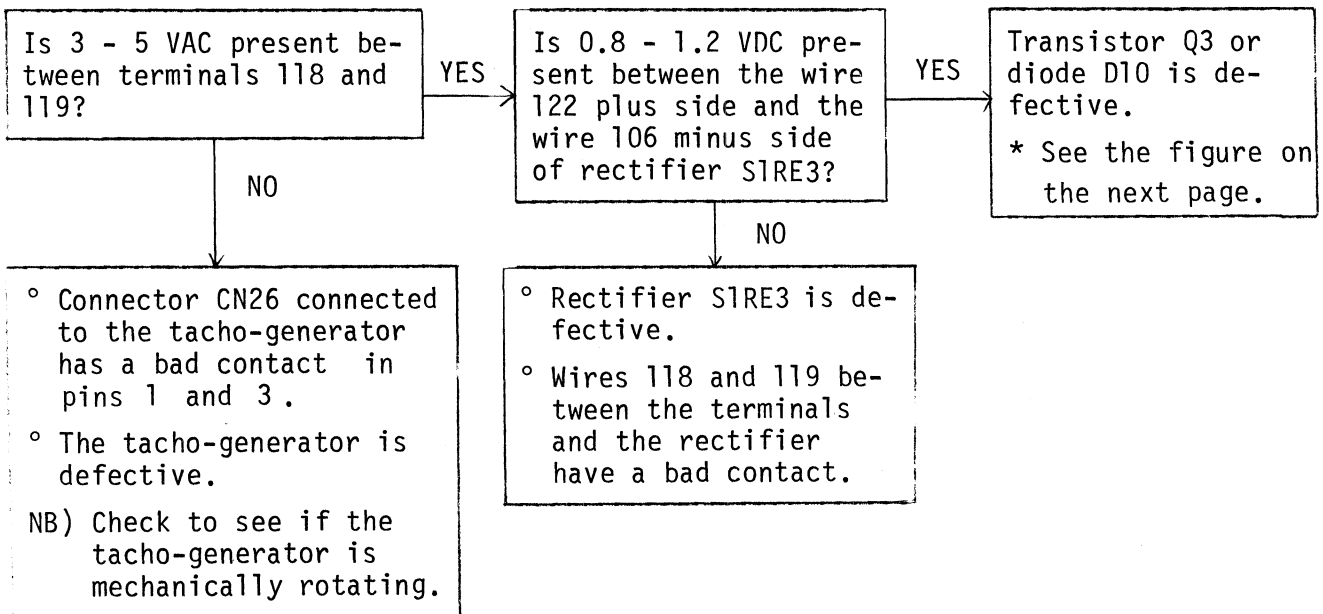
° For machines of serial Nos. up to the number of 1050, immediately turn off the 200 V POWER switch to prevent the halogen lamps from being broken.

[REMEDY]

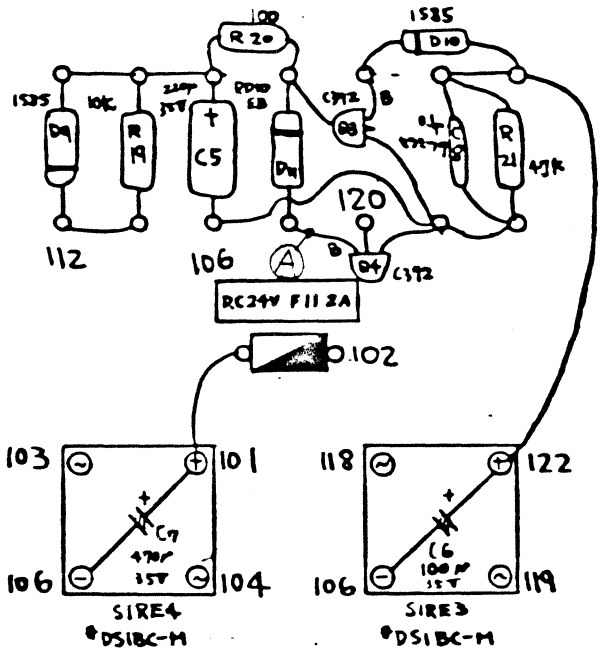
Replace the light control PCB.

(5) During exposure, the lens assembly stops scanning with buzzing and the halogen lamps go out.

When the lens assembly has stopped sliding during exposure of light through slits for some reason, the lens assembly slip detecting device works to turn off the light source and notify the operator of the trouble with a buzzer sound to protect the original frame glass from being broken. Refer to Lens Assembly Detecting Device on P.27 of Mechanical Service Manual.



* If this safety circuit works despite normal operation of the lens assembly, proceed as follows to interrupt operation of RYC during the period of repairs. After repairs have been made, recover the original condition.



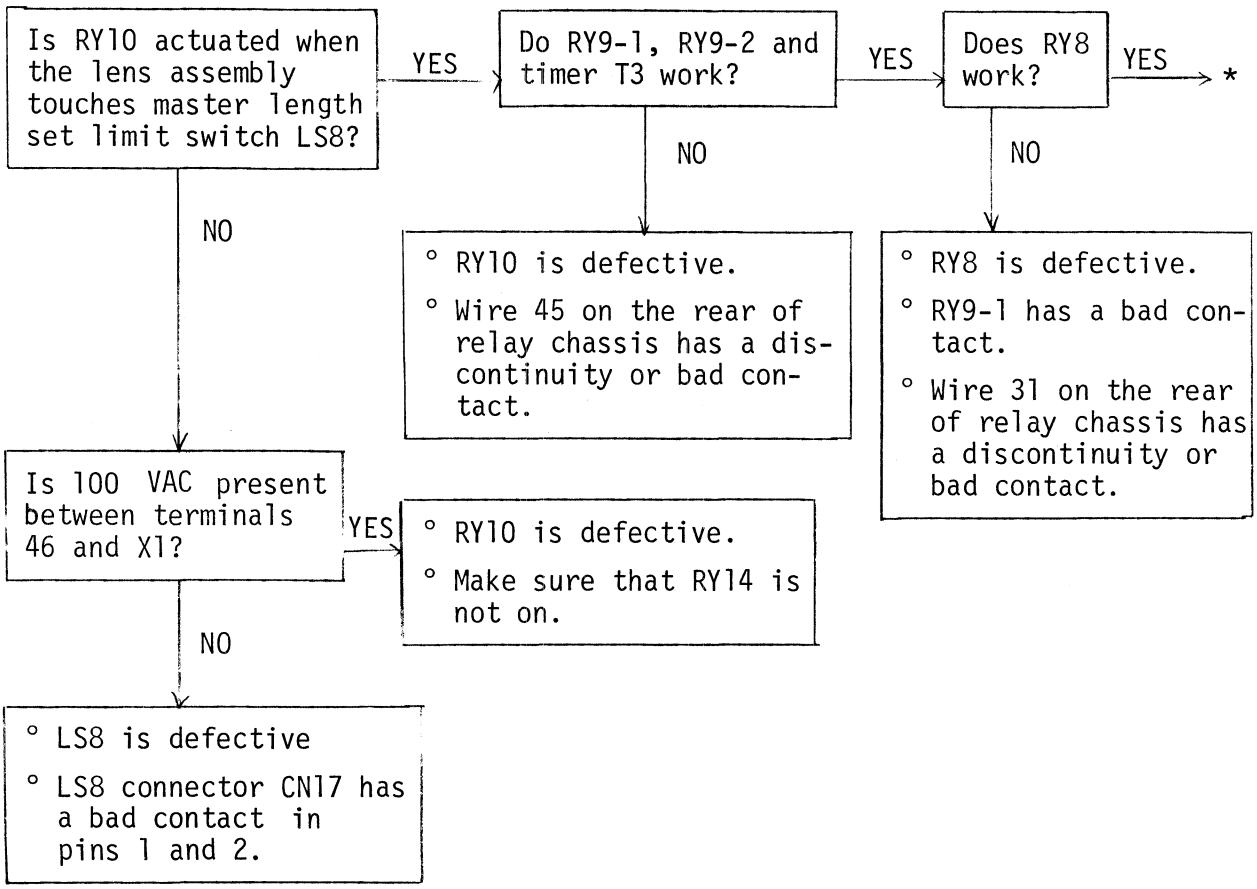
1. Cut the base lead of transistor Q4 at point A and keep it off the other parts.

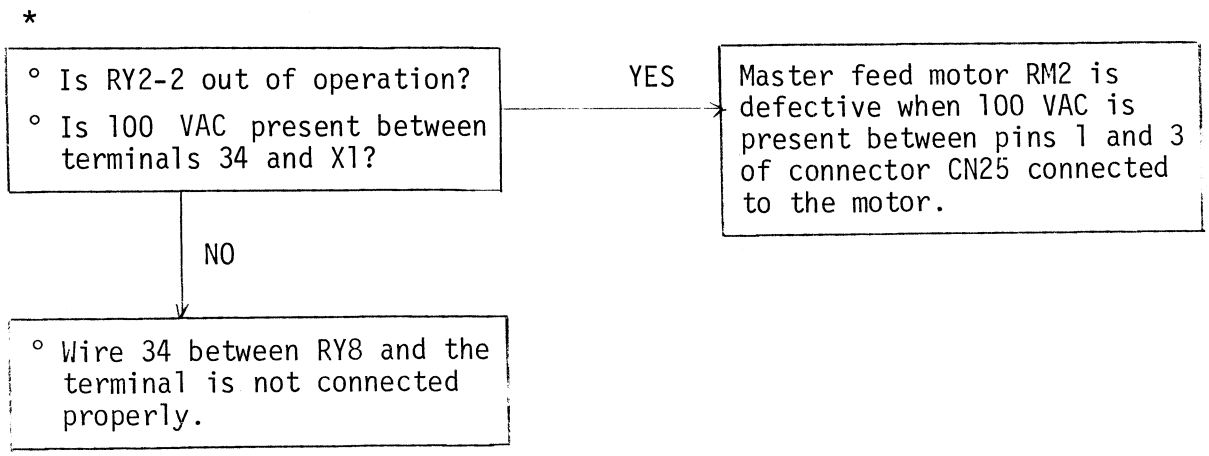
2. If too much heat should be applied to recover the original condition after the repairs, the element may be damaged. Carry out soldering work quickly.

(6) Master will not be fed out after the lens assembly touches master feed length set limit switch LS8 and stops there (end of scanning).

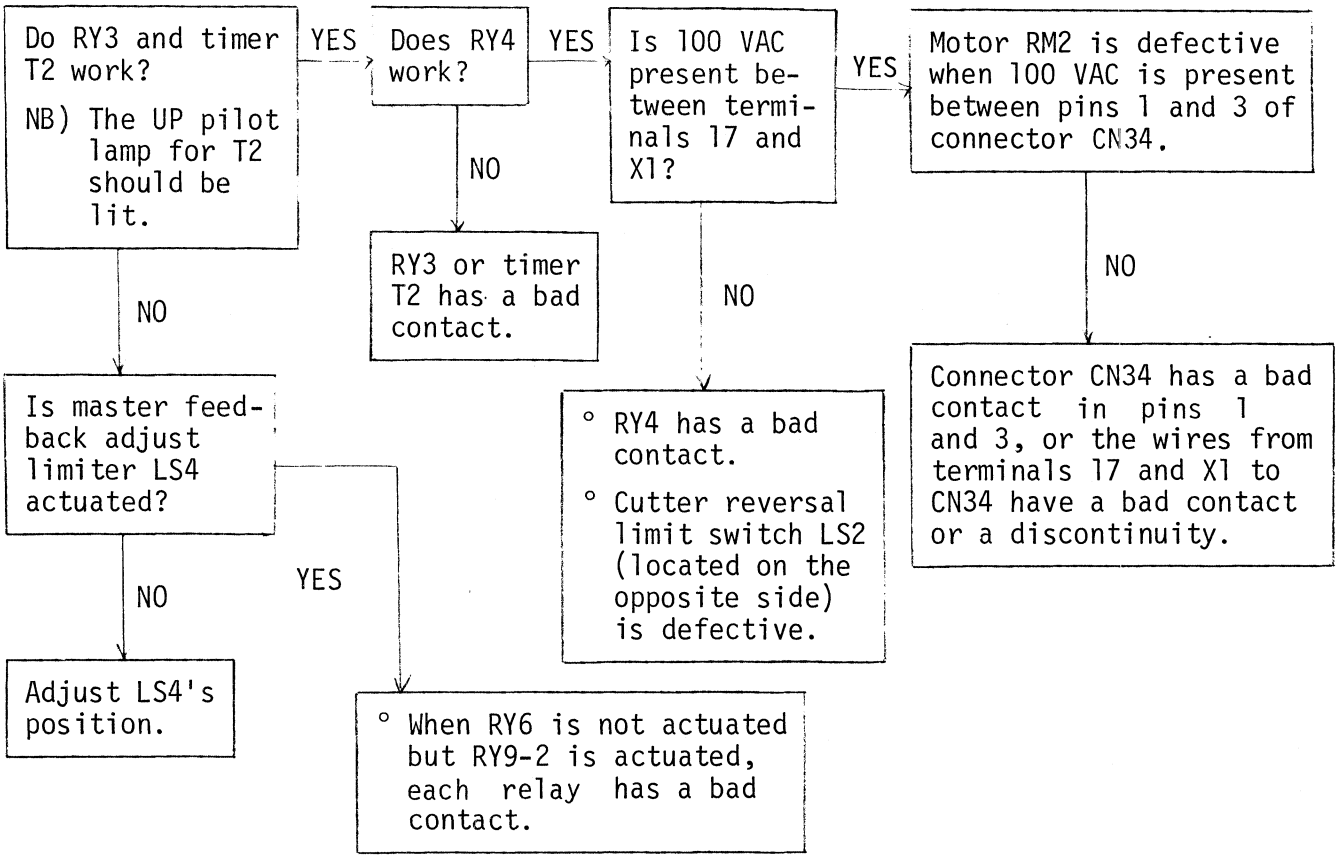
[CHECK]

Make sure that EXPOSURE MULTI/NORMAL switch TS4 is in the NORMAL position.





(7) Master is fed but not cut.

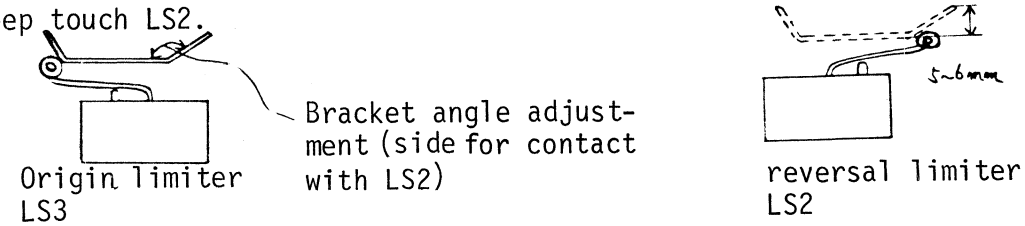


(8) Hunting occurs in cutter reversal limit switch LS2 during cutter operation.

1. Hunting occurs when the time period for which the cutter bracket is in touch with LS2 is short.

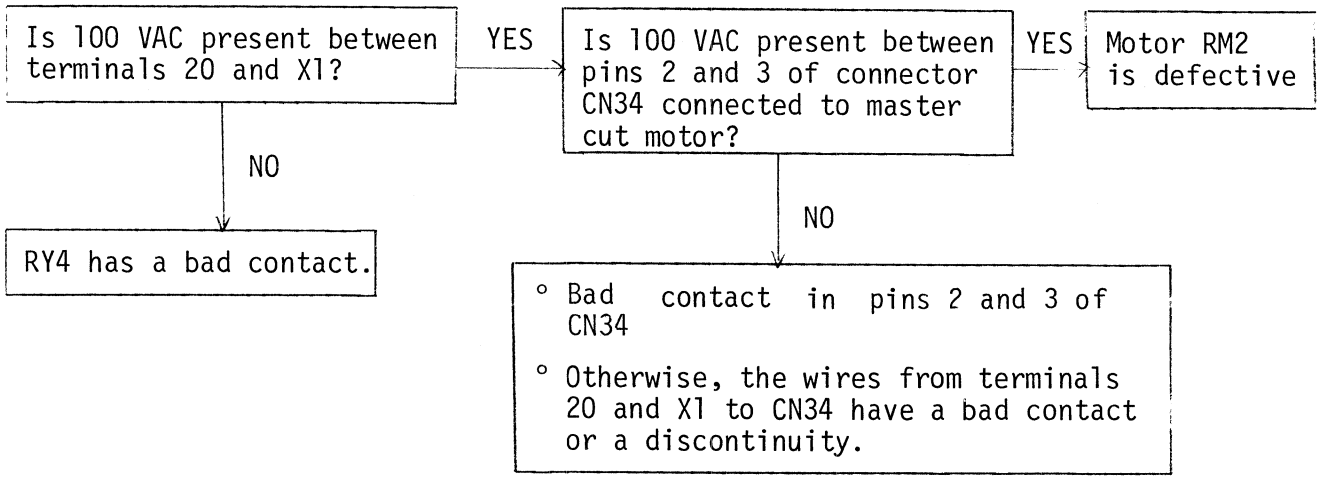
[REMEDY]

Adjust the angle of the cutter bracket so that the bracket can not deep touch LS2.



2. Correction of electric circuits ..... Refer to the accompanying instructions.

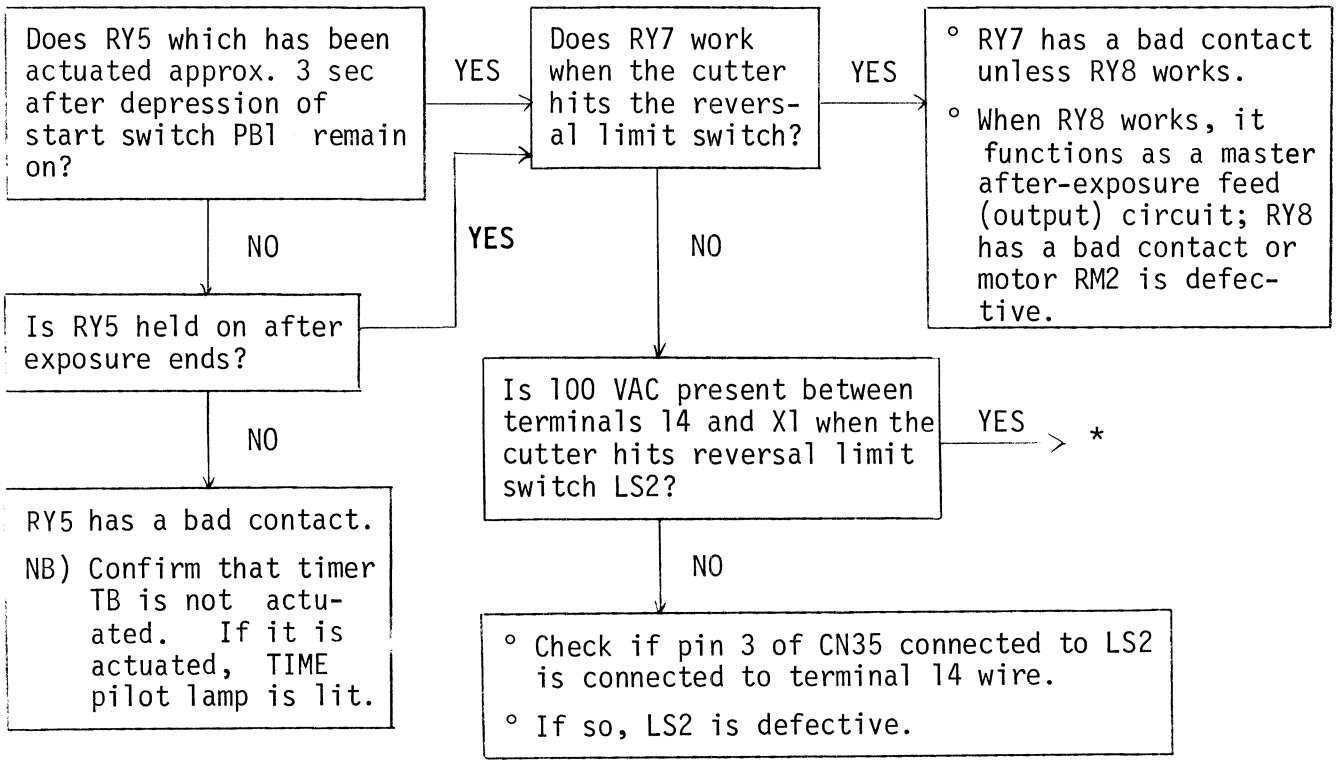
(9) The cutter will not return to the original position though it cuts.



(10) Though master is cut, the cut master will not be fed to the processor.

[CHECK]

Make sure that the EXPOSURE MULTI/NORMAL switch TS4 is in the NORMAL position.



* 1. When RY7 does not work at all, RY7 is defective or the wire from terminal 14 to RY7 has a discontinuity.

2. When RY7 works momentarily but turns off immediately, RY7 has a bad contact.

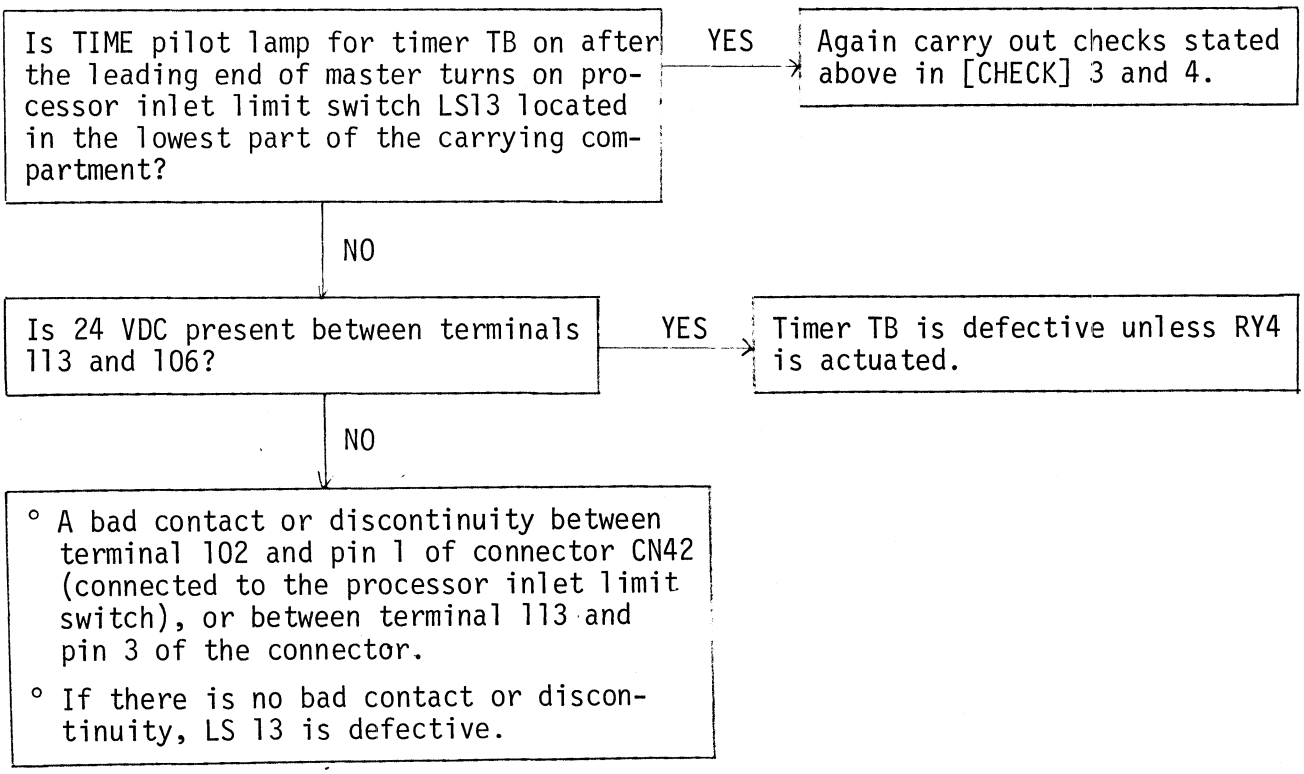
NB) Confirm that RY5 is actuated.

(11) The leading end of master will not be caught by the processor inlet rollers (remain in the carrying compartment).

[CHECK]

Make sure that:

1. the output master (cut) size is not much different from the set size.
2. timer TB is set to approx. 6 sec in 50 Hz areas or approx. 4.5 sec in 60 Hz areas. ..... If not, adjust it.
3. master does not slip on the rollers in the carrying compartment (located to the left hand) and master's advance is not interrupted. ..... If so, increase the spring belt pressure.
4. the actuater for processor inlet limit switch LS13 is not in touch with the roller or guide and not on. ..... If so, bend the actuator down a bit to let it free from the roller or guide.



(12) Though master is properly exposed and fed out, the START ready pilot lamp will not be lit. (It is impossible to start the machine.) However, the pilot lamp is lit when 100 V POWER switch (NFB) is once turned off and then on.

[CHECK]

° Make sure that:

1. the master feed length is not much shorter than the set length when MASTER LENGTH is set to approx. 370 mm.
2. TIME pilot lamp for timer TB is not flickering when master is in touch with processor inlet limit switch LS13.
   ..... Adjust the actuator.

[CAUSE]

This condition occurs when the time set on TB is long as compared with the time of contact between master and LS13, especially in case of shorter set master length.

..... Adjust TB.

[ADJUSTMENT OF TB]

Adjust TB so that master has a slack of 20 - 30 mm for a moment when the master end has been caught by the processor primary rollers.

(13) The Master Seam Detect circuit will not work properly.

[CHECK]

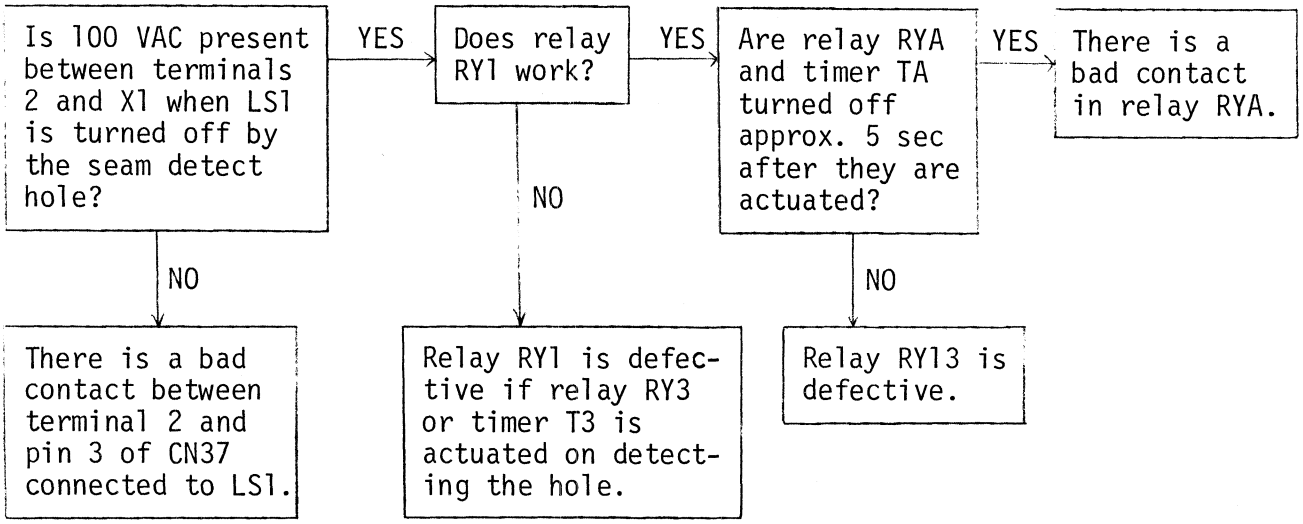
1. Make sure that the MULTI/NORMAL changeover switch TS4 is in the NORMAL position.
2. Make a hole of 40 mm length and 20 mm width in the center of a master for seam detection, and check the operation of the circuit.
3. In normal operation, cutting is done after the seam detection hole has turned off limit switch LS1 located before the cutter and then master has been fed by approx 240 mm. If this master feed length is too short or long, adjust the time set on timer TA. The timer is factory set to approx. 5 sec before shipment.

(13)-1 Cutting is done immediately after detection of the seam detect hole without feeding master.

[REMEDY]

Since timer TA is not functionning for delay, change it for timer TB to see whether the circuit works normally or not.
If the circuit works normally, timer TA is defective.
If the circuit won't work normally, check the rear (socket) side of timer TA for contact of a metal piece or wire between wires 12 and 67.

(13)-2 After detection of the hole, master continues to be fed without being stopped and cut.



(14) Multiple exposure will not be made normally.

[CHECK]

The MULTI/NORMAL changeover switch TS4 should be set to MULTI while the START ready lamp is on.

[ABNORMAL OPERATIONS]

1) Cutting takes place.

2) Master is fed after exposure.

3) Master is fed back on every start with TS4 in MULTI.

4) The START ready lamp won't light after exposure.

[REMEDY]

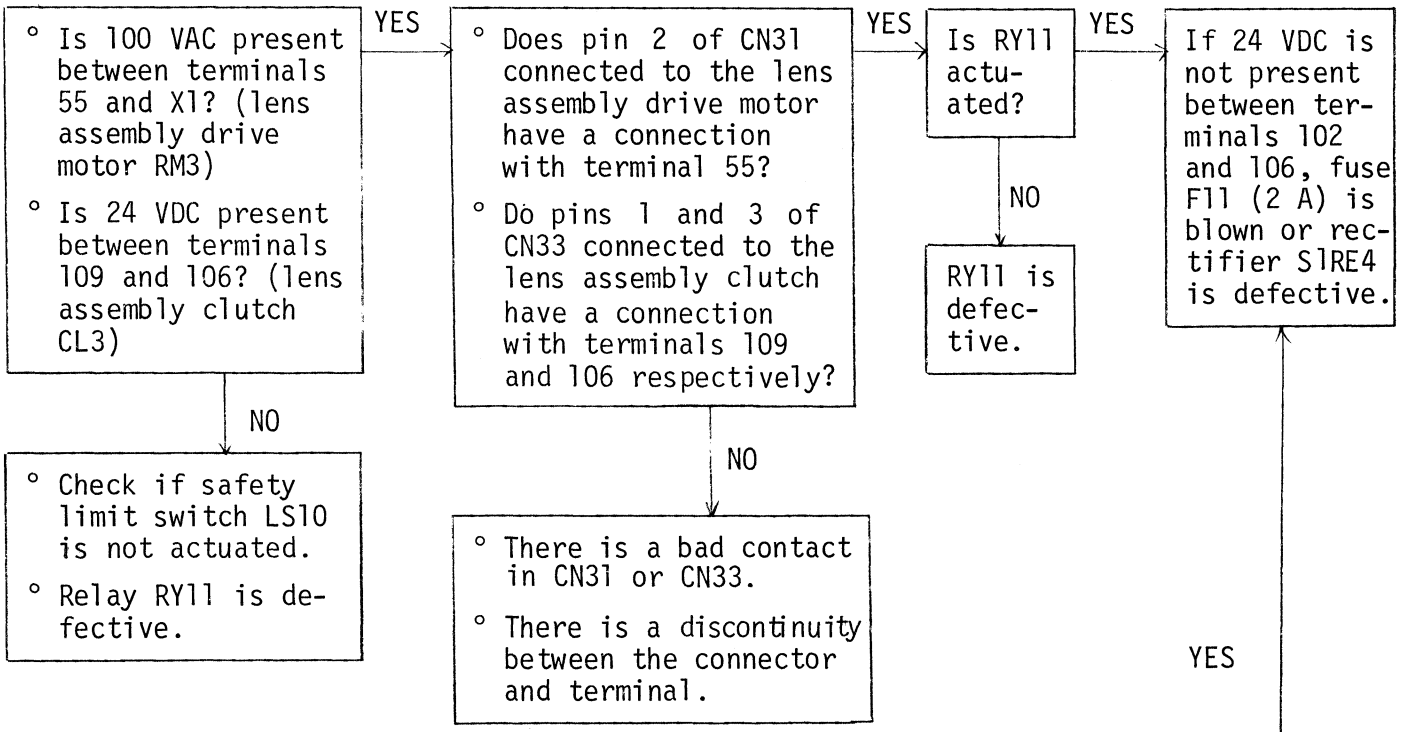
Since the above abnormal operations 1) through 4) occur when RY6 or RY12 is defective, replace the defective realy.

(15) Faults related to scanning by the lens assembly

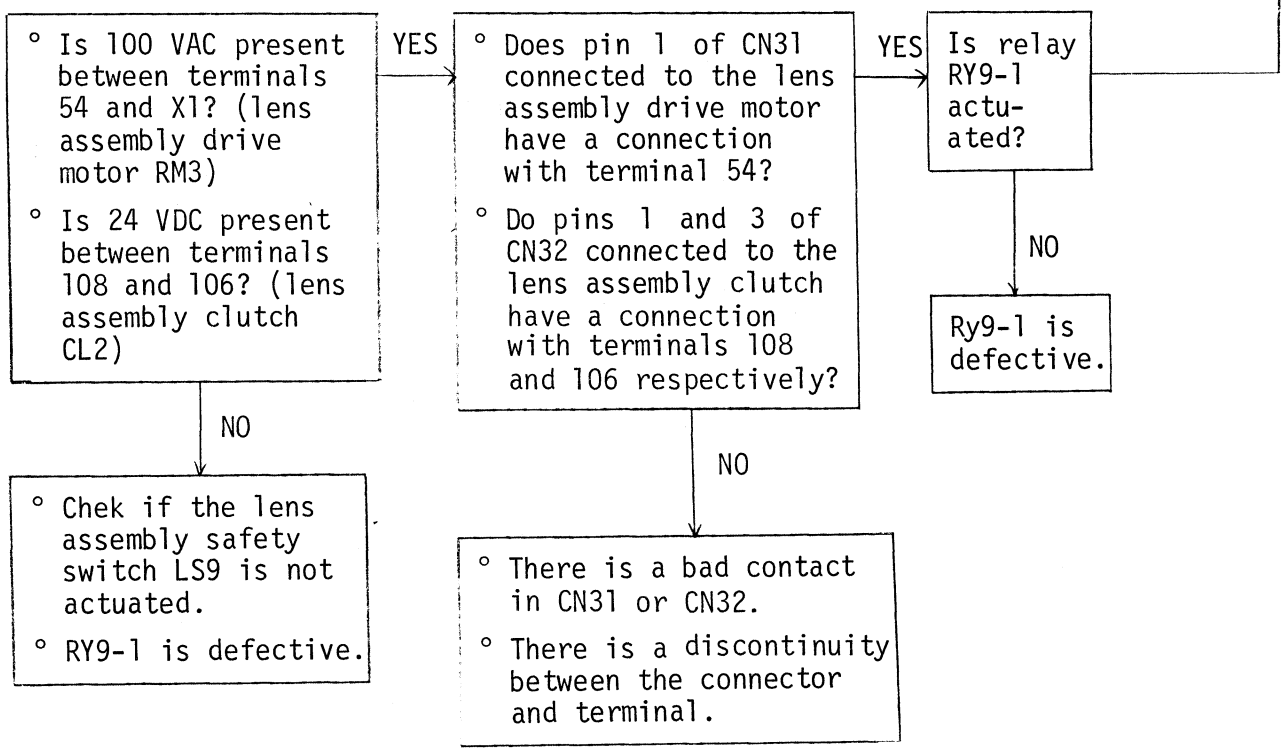
(15)-1 The lens assembly stops sliding during exposure through slits and the buzzer sounds.

[CHECK]

This means that the slip detection circuit in the lens assembly is actuated.



(15)-2 The lens assembly won't return to the original position after exposure.



(15)-3 The lens assembly won't move with LENS shift switch.

[CAUSE]

° There is a bad contact between pin 4 of CN7 (connected to the sub-control panel) and terminal 51, pin 5 and terminal 53, pin 8 and terminal 108, or pin 9 and terminal 109.

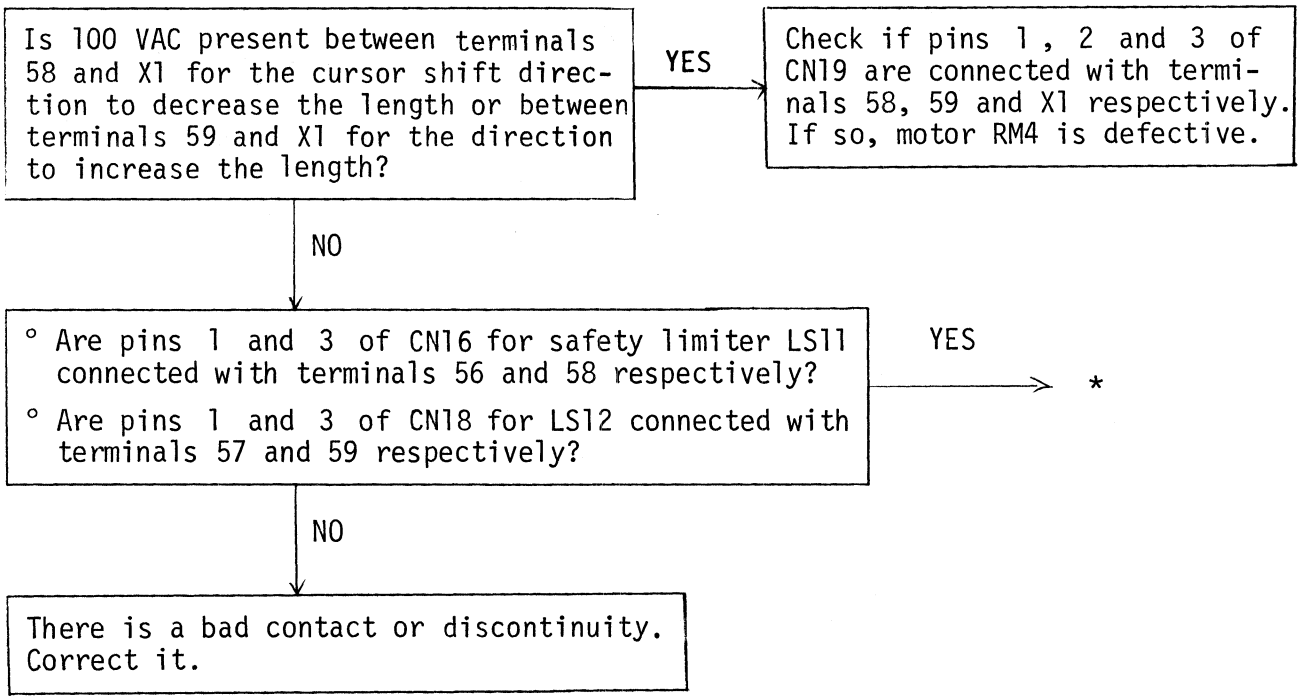
° Otherwise, LENS shift switch TS5 is defective.

(16) MASTER LENGTH set scale cursor won't move.

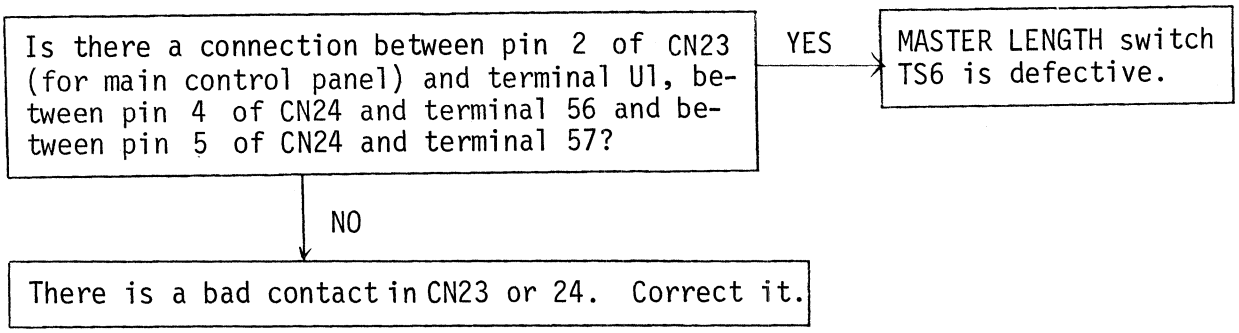
[CHECK]

Make sure that:

1. the master length set motor is running, and
2. the setscrew on the coupling connecting the motor and the feed screw is not loose.



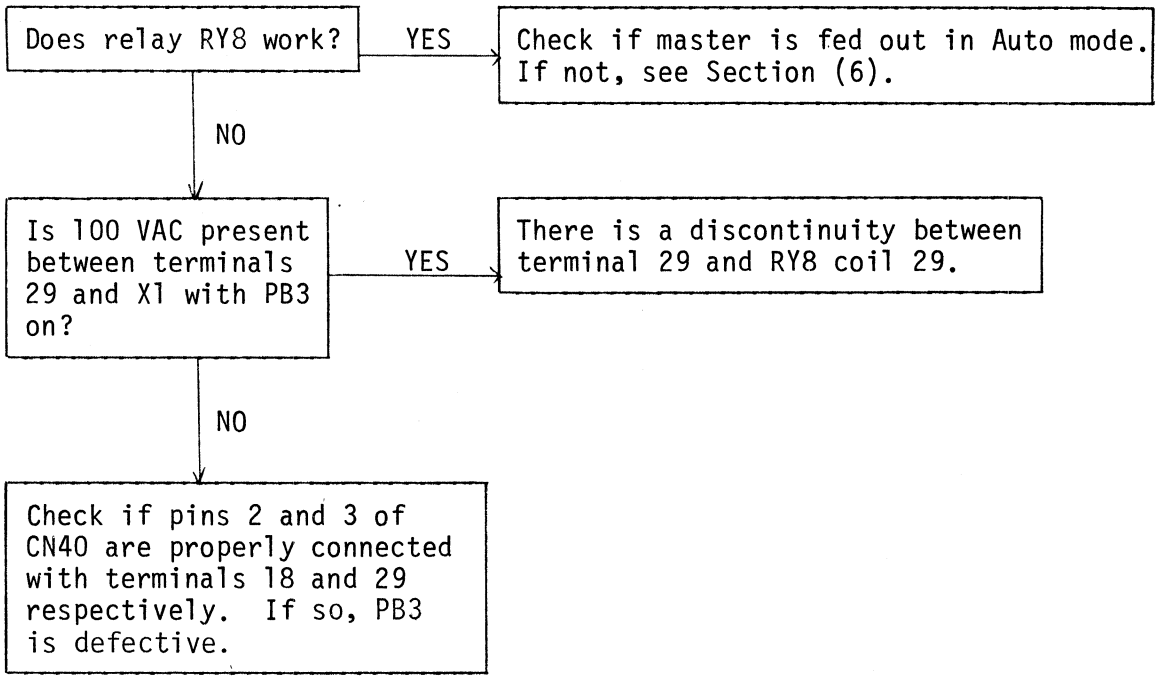
*



(17) Master will not be fed by depressing the master FEED switch PB3.

[CHECK]

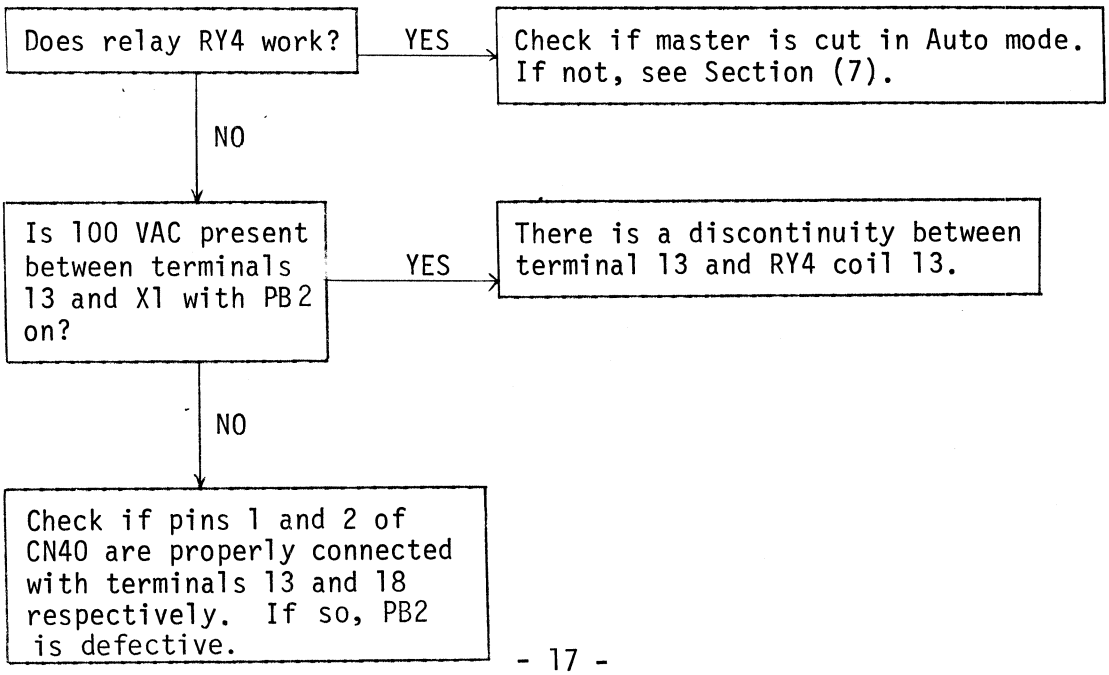
Make sure that limit switch LS3 (on the origin side) is on.



(18) CUT switch PB2 won't work.

[CHECK]

Make sure that limit switch LS3 (on the origin side) is on.



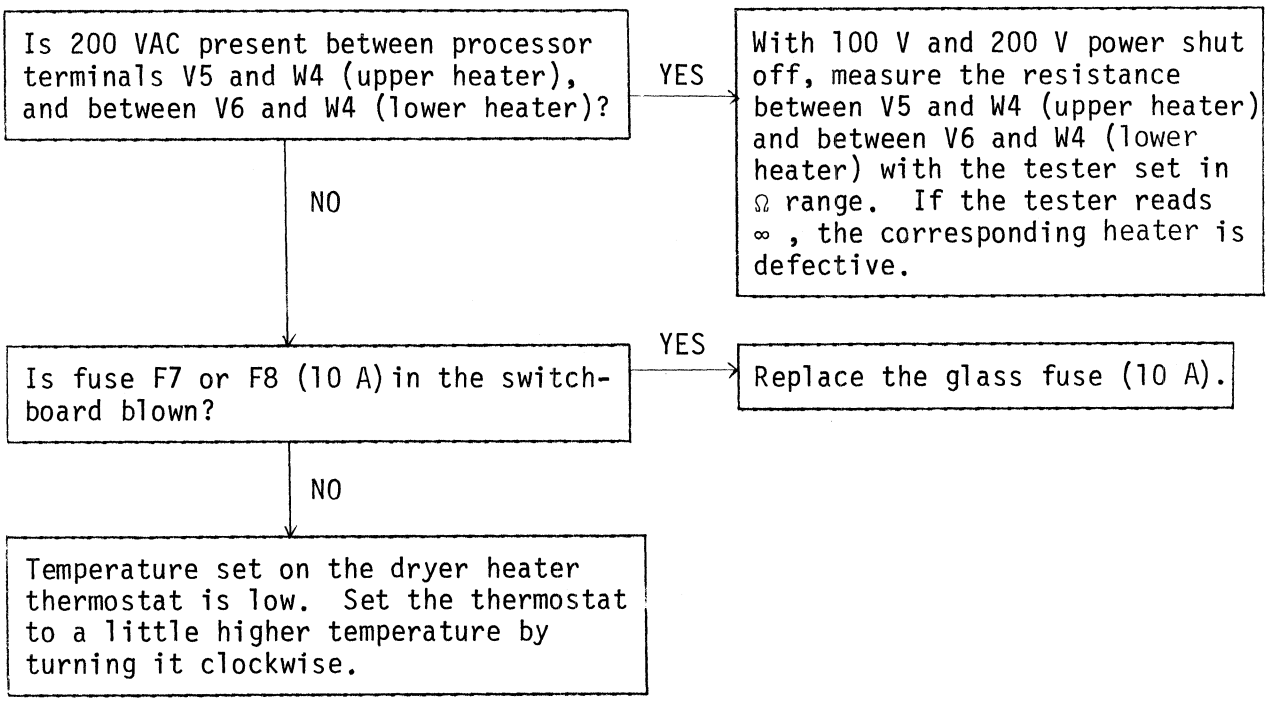
(19) Master will not be well dried.

[CHECK]

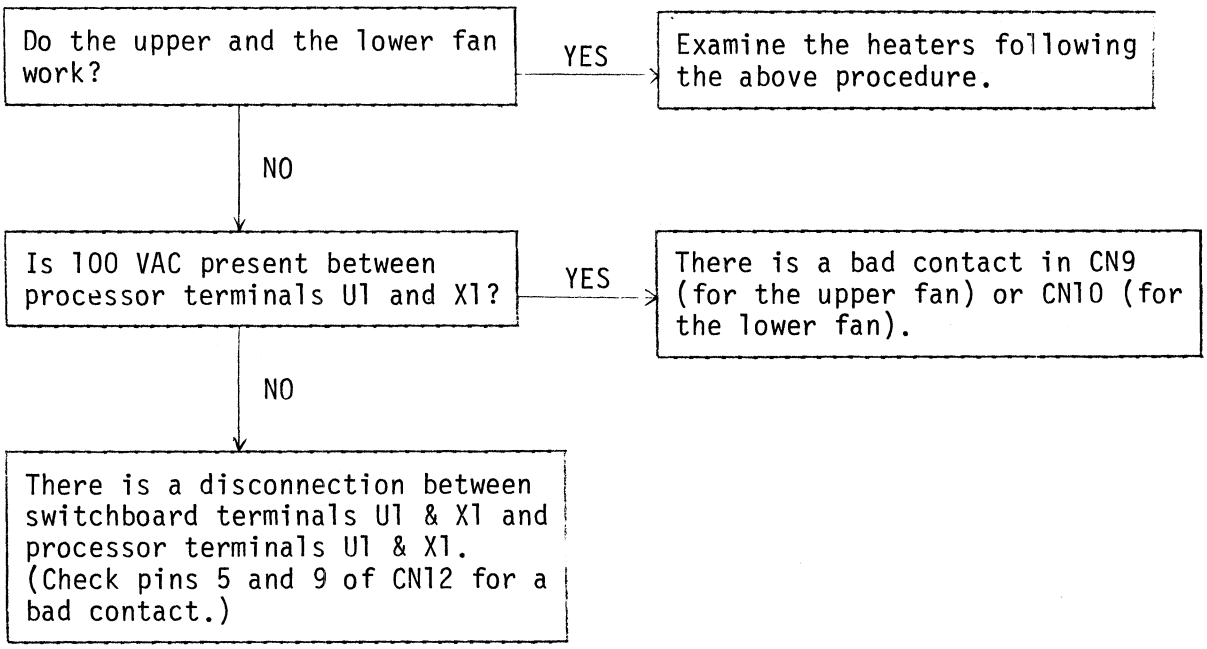
Make sure that:

1. 100 V (1φ) and 200 V (1φ) are being applied (NFB's 1 and 2 are ON.),
2. DRYER switch TS3 is ON, and
3. magnet switch MC1 nearby the sub-control panel is actuated.

(19)-1 A part related to finned heaters has a problem.



(19)-2 A part related to fans has a problem.



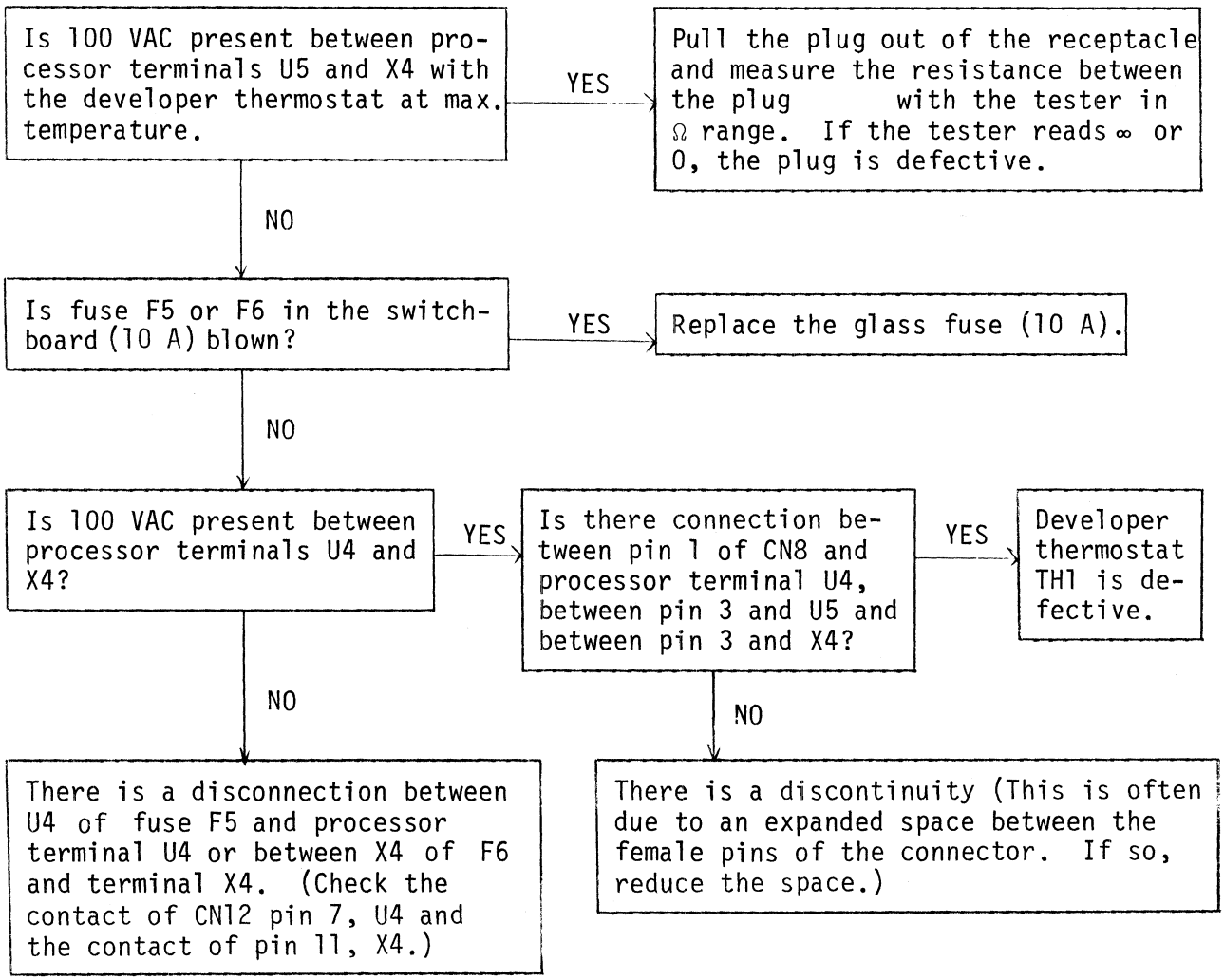
(20) The developer temperature won't rise.

[CHECK]

Make sure that:

1. 100 V (1φ) is being applied to the machine, and

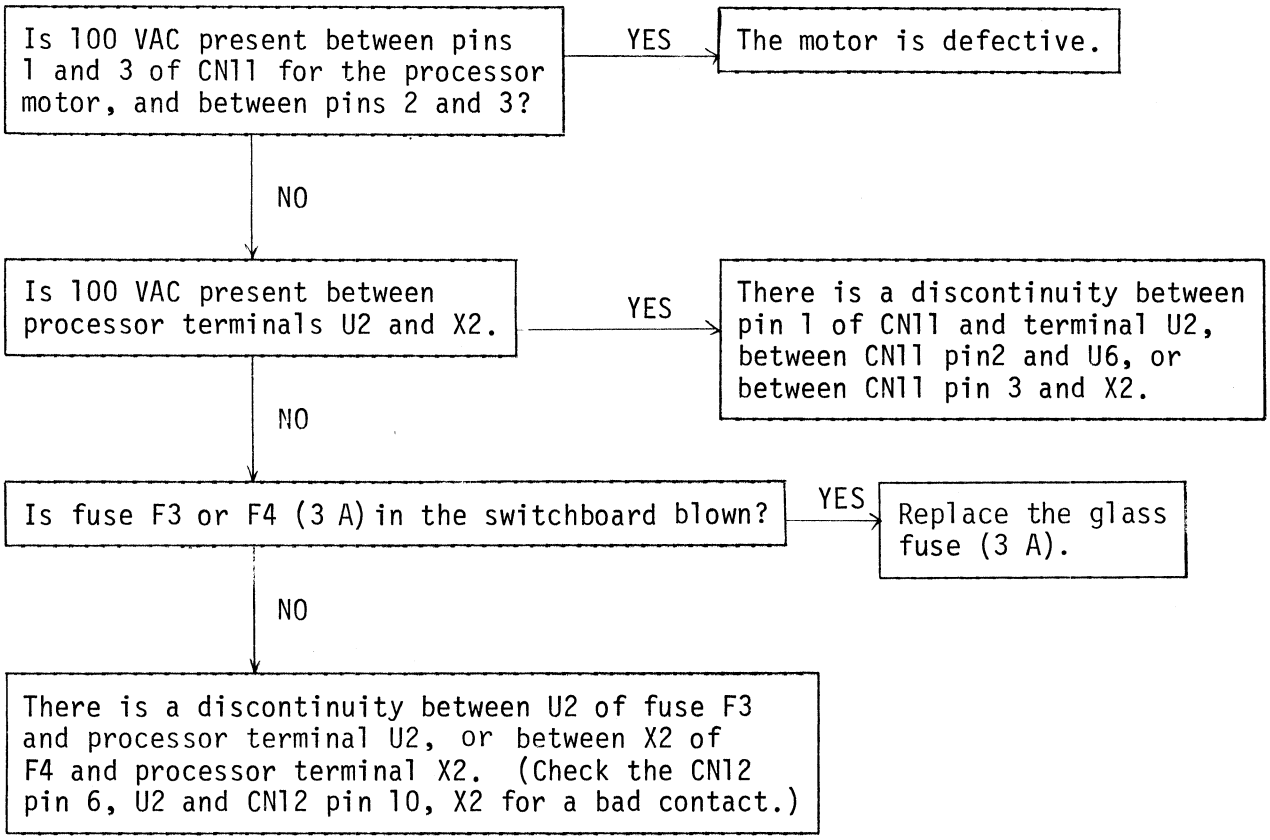
2. HEATER switch TS2 is ON.



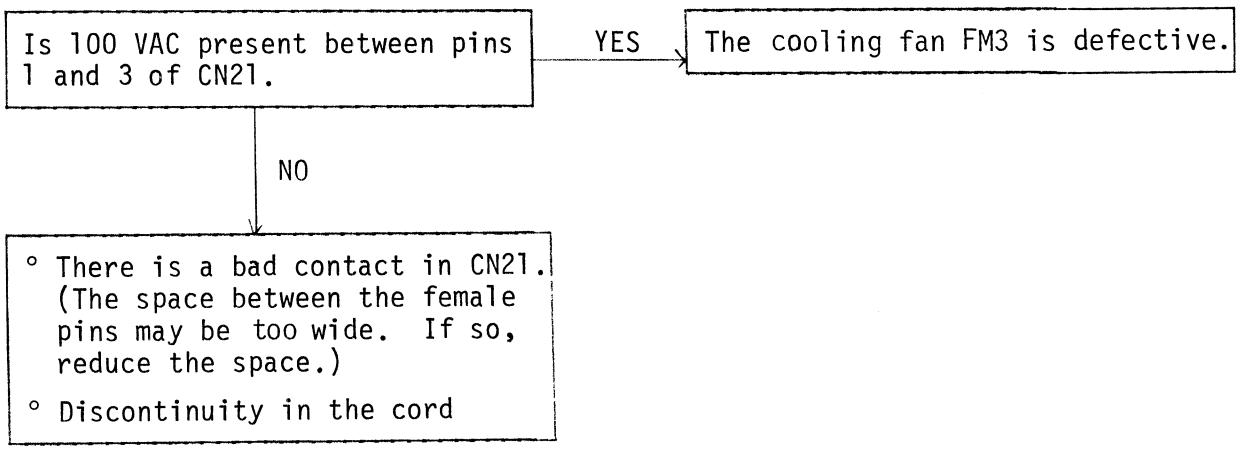
(21) Processor motor IM1 won't work.

[CHECK]

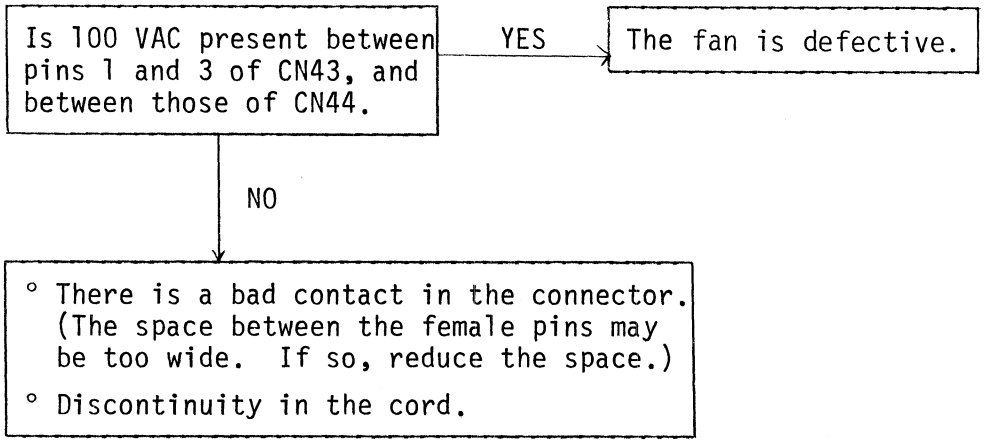
Make sure that the shortcircuit connector is securely connected with CN4 located to the right on the sub-control panel.



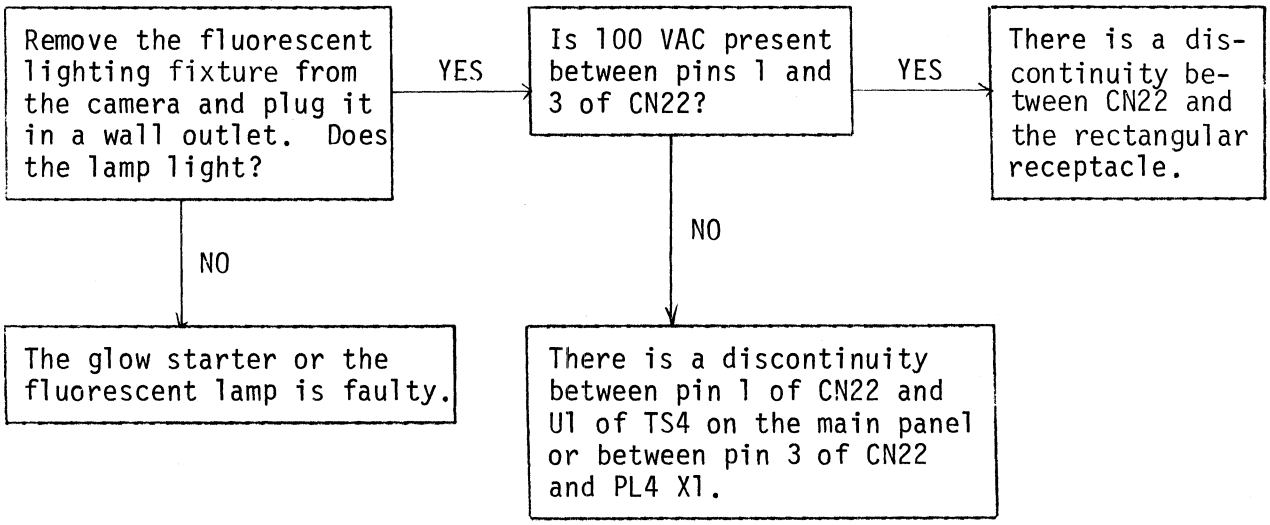
(22) The original surface cooling fan won't work.



(23) The heat exhaust fan on the rear of the main body won't work.

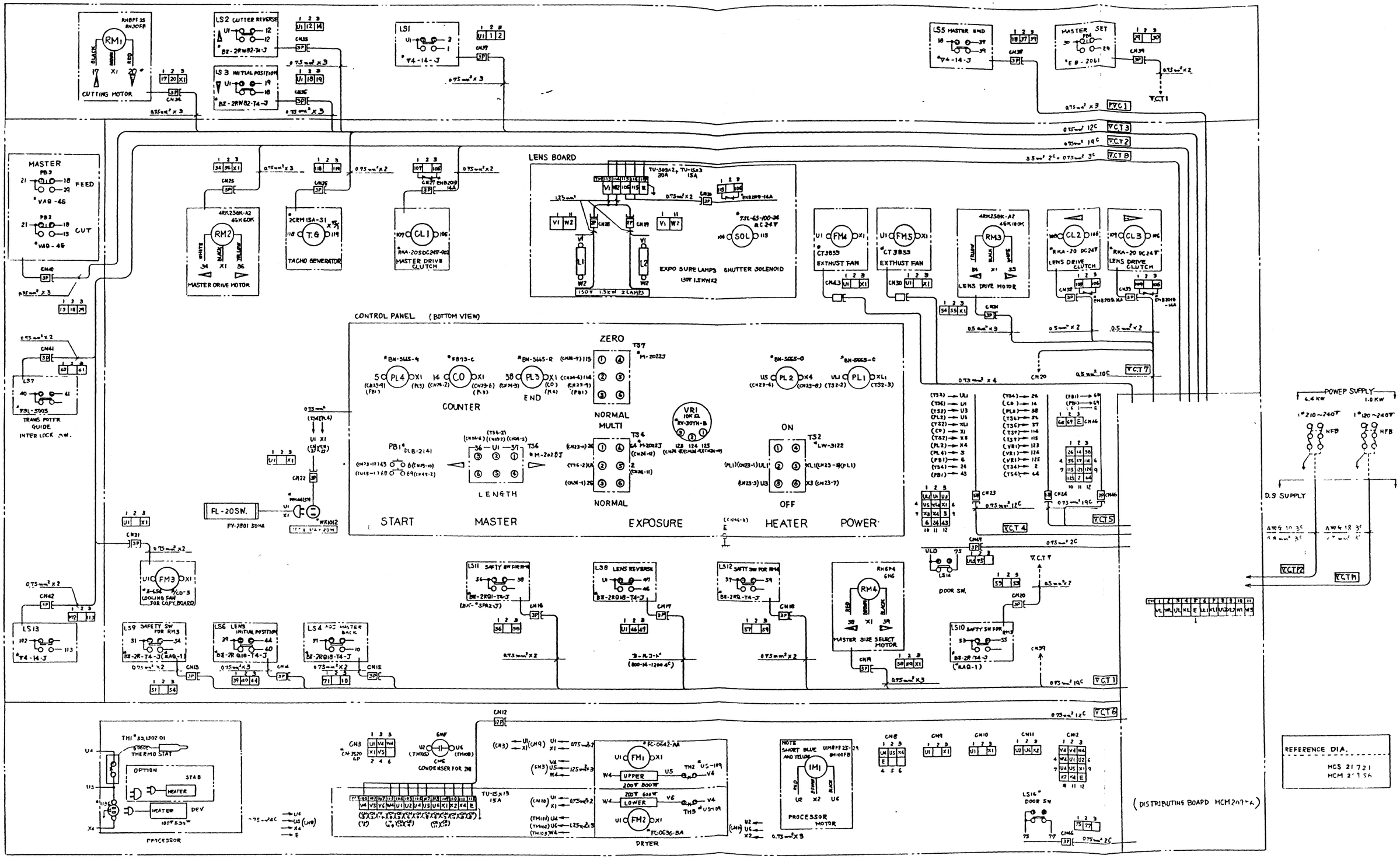


(24) Original illuminating fluorescent lamp (option) won't light.

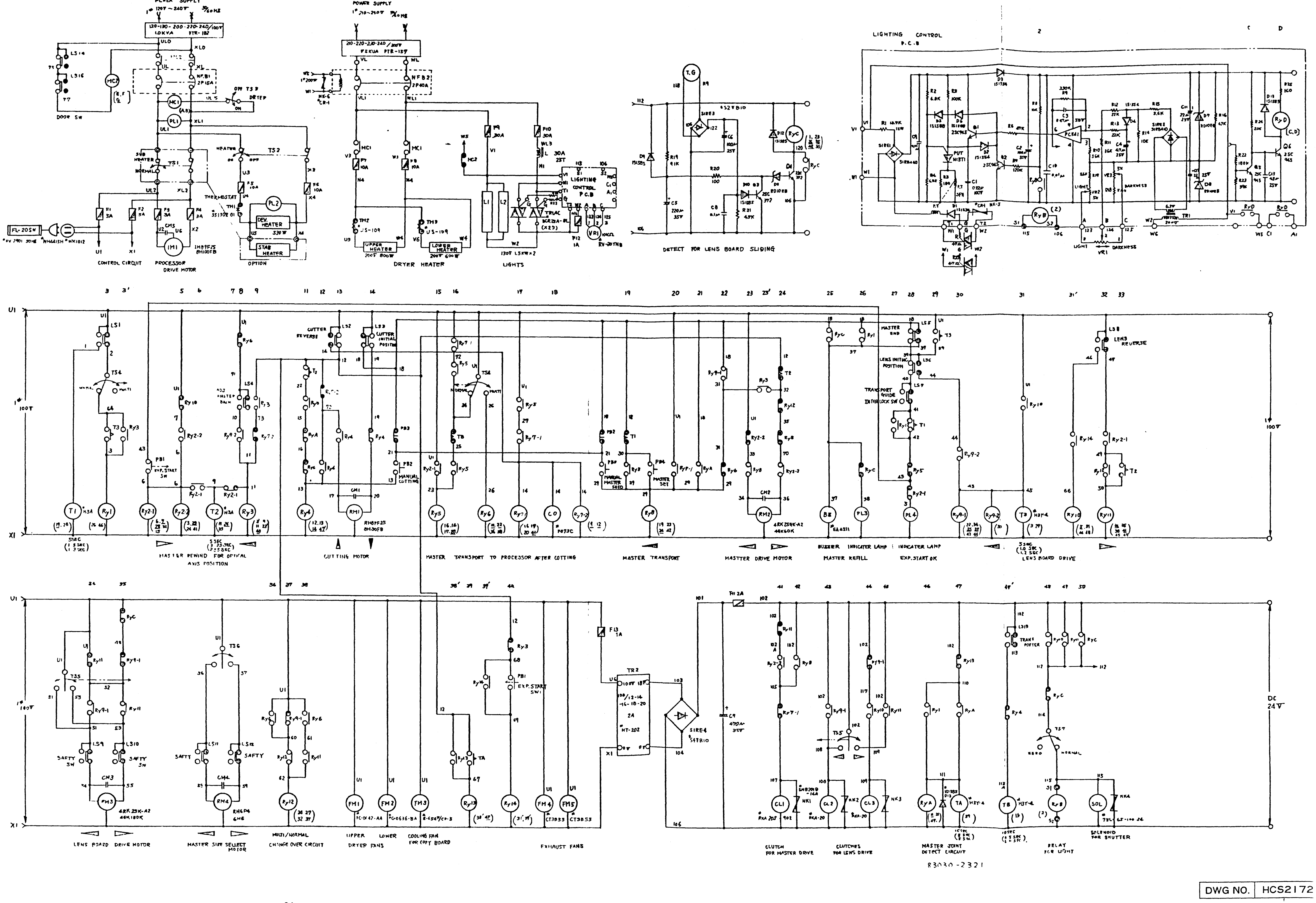


7. Power Supply Diagram

500 SE



DWG NO. HCW21472


POWER SUPPLY
DOOR SW
CONTROL CIRCUIT
PROCESSOR DRIVE MOTOR
OPTION
DRYER HEATER
LIGHTS
DETECT FOR LENS BOARD SLIDING
LIGHTING CONTROL P.C.B
MASTER REWIND FOR OPTICAL AXIS POSITION
CUTTING MOTOR
MASTER TRANSPORT TO PROCESSOR AFTER CUTTING
MASTER TRANSPORT
MASTER DRIVE MOTOR
BUZZER MASTER REFILL
INDICATOR LAMP
INDICATOR LAMP EXP. START OK
LENS BOARD DRIVE
LENS BOARD DRIVE MOTOR
MASTER SIZE SELECT MOTOR
MULTI/NORMAL CHANGE OVER CIRCUIT
UPPER LOWER DRYER FANS
COOLING FAN FOR CPT BOARD
EXHAUST FANS
CLUTCH FOR MASTER DRIVE
CLUTCHES FOR LENS DRIVE
MASTER JOINT DETECT CIRCUIT
RELAY FOR LIGHT
SOLENOID FOR SHUTTER
DC 24V
83030-2321
DWG NO. HCS2172

DWG NO. HCM20956