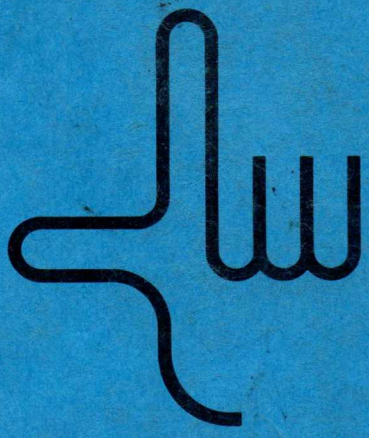
CANON SERVICE MANUAL

NP-70



Total Guaranty System

CANON INC.

CANON SERVICE MANUAL

NP-70

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PREFACE

This manual is published for use by service technicians when servicing the Canon NP-70 photocopier. It is recommended that the service technician use this manual in confunction with the NP-70 Parts Catalog, the NP-70 Service Handbook and other related publications when performing his maintenance work. The use of all NP-70 – related publications will ensure that the repairman retains his familiarity with all changes, and will enhance his overall knowledge of the NP-70.

The first and second chapters of this manual are introductory in nature. They stress, respectively, operator & process familiarity and generalized machine operation. These two chapters are also useful for training or promotional purposes.

The remaining chapters are each specific in nature and form the bulk of the publication. When working on the NP-1100, frequent reference to these chapters will ensure that all adjustments, procedures, tolerances, etc. are satisfied. Also, for the convenience of the service technician, circuit diagrams and layouts have been appended in the rear of the manual.

This service manual is written with the intent that it be applicable to all NP-70 copiers, regardless of product number. Thus, any section which deals with a specific product number(s) is identified.

This manual contains information to perform servicing on the following NP-70 photocopiers:

Serie no.	Prod. No.	Input Voltage	General Destination	Manufacturing Location
3.....	8-11154	230VAC ± 10% (50Hz) NOTE: Switch built-in for using at 220VAC & 240VAC	Europe	Japan
9....	8-11155	Same as 8-11154	Europe, Africa, Middle East	Germany
	8-11156	100VAC ± 10% (50Hz)	Universal with adapter pedestal	Japan
	8-11157	100VAC ± 10% (60Hz)	Universal with adapter pedestal	Japan
	8-11158	230VAC ± 10% (50Hz)	South East Asia South America Central America	Japan
	8-11184	240VAC ± 10% (50Hz)	Australia	Japan
7.....	8-11185 220V 50Hz		Germany European pato	
8.....	8-11186 240V 50Hz		NP70(E) of LPS.	

We welcome your comments on the contents of this NP-70 Service Manual.

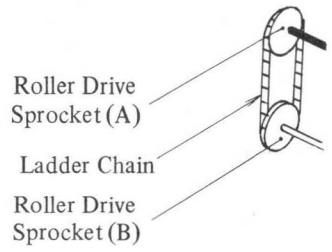
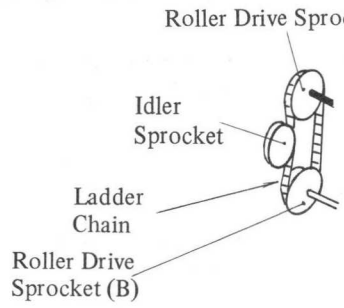
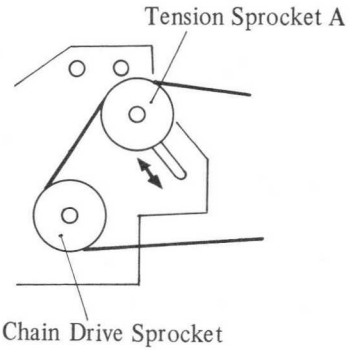
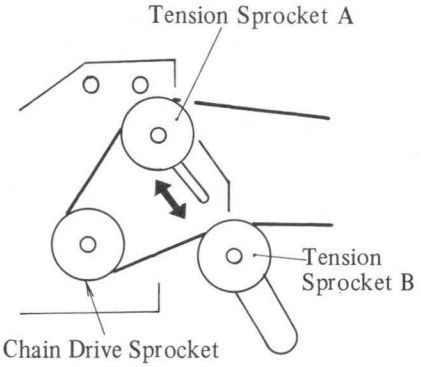
Canon Inc.

Business Machines Service Division
Electrostatic Photocopiers
Technical Support Section

POINT OF DIFFERENCE

This table shows the point of difference between Second Printing and Third Printing

Page	First Printing	Change	Addition	Second Printing
2-10			○	(40) Sprocket
3-8	40 RSW Multiple - - - Switch	○		**deletion**
4-19	1) a) - - - , the Illumination Assembly and the - - - - -	○		- - - - -, the right upper
	2) ADJUSTMENTS The width of the aperture slit - - - - adjustable mask blades mask blades (see Fig. 4-24).	○		ADJUSTMENTS The adjustment of - - - - (see Fig. 4-24). a) - - - - - - - b) - - - - - - -
4-23	in Fig. 4-28 Flange (rear)	○		Flange (front)
			○	[NOTICE] PROCEDURES - - - - DRUM CYLINDER
4-24	4.5-1 1) - - - - - becomes approx. + 1800 ± 100 volts.			- - - - - becomes approx. + 1800 ± 50 bolts.
	4.5-2 Table 4-1 Corona Wire Specifications Standard High | 16.5 ± 0.5 | 9.5 ± 0.5			Standard Hight | about 16.5 (refer to lable) | about 9.5 (refer to lable)
4-26	2) Perform the replacement - - - - - - - - Assembly as follows - - - - - - - - - -		○	Perform the replacement - - - - - - Assembly and Transfer Corona Assembly as follows - - - - - -
			○	[Addition] Paper Guide Wire Replacement of Transfer Corona Charge
4-51	4.9-1 The NP-70 has four (4) - - - -	○		The NP-70 has six (6) - - - - -
4-52	B5 | 97-5924 | 10.5 | 1.0 | 84.5 Table 4-3	○	○	B5 | 97-5925 | 10.5 | 1.0 | 84.5 Letter | 97-5924 | 10.0 | 1.0 | 79 Universal | 97-5924 | 10.0 | 1.0 | 79
4-53	Table 4-4		○	Letter | 400 ± 100 | 1200 ± 100 Universal | 400 ± 100 | 1200 ± 100
			○	[NOTICE] 1) - - - - - - - 2) - - - - - - -

Page	First Printing	Change	Addition	Second Printing
4-54	Fig. 4-58  		○	Roller Drive Sprocket (A) 
4-63	Fig. 4-71  		○	
4-71	Fig. 4-83 Up-down Actuation Lever	○		Up-down Actuation
4-104	d) - - - - - in the rest button (and the arm tripping the micro-switches) moving upward.			- - - - - in the rest button is pushed up by the lever and the arm tripping the micro-switches move upward.
B-4	A. T. R. Circuit	○		
C-3	NFB4 | X62-1047 | 125VAC	○		NFB4 | X62-1074 | 250VAC
C-7	R131 - - - - - R132 - - - - - R133 - - - - -	○		**deletion**

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LIST OF ILLUSTRATIONS

TABLES

CHAPTER 1

Guide to the NP-70

1.1 FEATURES OF THE NP–70 COPIER

The NP–70 electrostatic copier is a completely new type copying machine which has been developed by Canon technology. This development places the NP–70 in a new category - the "Liquid, Plain-paper-type Electrostatic Copier".

Due to the adaptation of the liquid development method for use with PPC-type copying, integration for the first time anywhere of the following features outstanding for conventional dry electrostatic copiers has been achieved.

1) LARGE COPY SIZE OBTAINABLE
Obtainable copy sizes are from 7-1/8" x 10-1/8" to 11-5/8" x 16-1/2" (JIS B5 to A3). Plain paper copying above size 10-1/8" x 14-5/6" (JIS B4) is realized in the NP–70 for the first time ever.

NOTE: The size mentioned are approximate inch equivalents of Japan Industrial Standard (JIS) sizes. Refer to the specification section for exact dimensions.

2) HIGH COPYING SPEED
Approximately 15 half-size sheets (A4 or B5) can be copied in one minute.

3) DESK-TOP COMPACTNESS
The NP–70 copier is designed highly compact so that the least amount of space is required. As a result, large copier performance is obtained from small copier size.

4) AUTOMATIC TONER REPLENISHMENT (ATR) EQUIPPED
ATR maintains a constant density of toner in the dispersant, resulting in copying uniformity.

5) BUILD-IN SAFETY FEATURES
In the event that something abnormal happens during machine operation (ie: a paper jam), operations are automatically stopped.

6) CASSETTE-TYPE PAPER FEEDING
Use of different paper sizes is easy and quick due to the cassette-type paper holder. Additionally, any troubles which might be caused by cassette mis-feeding are prevented by build-in safety circuitry.

Second Printing-June, 1974

1.2 APPEARANCE

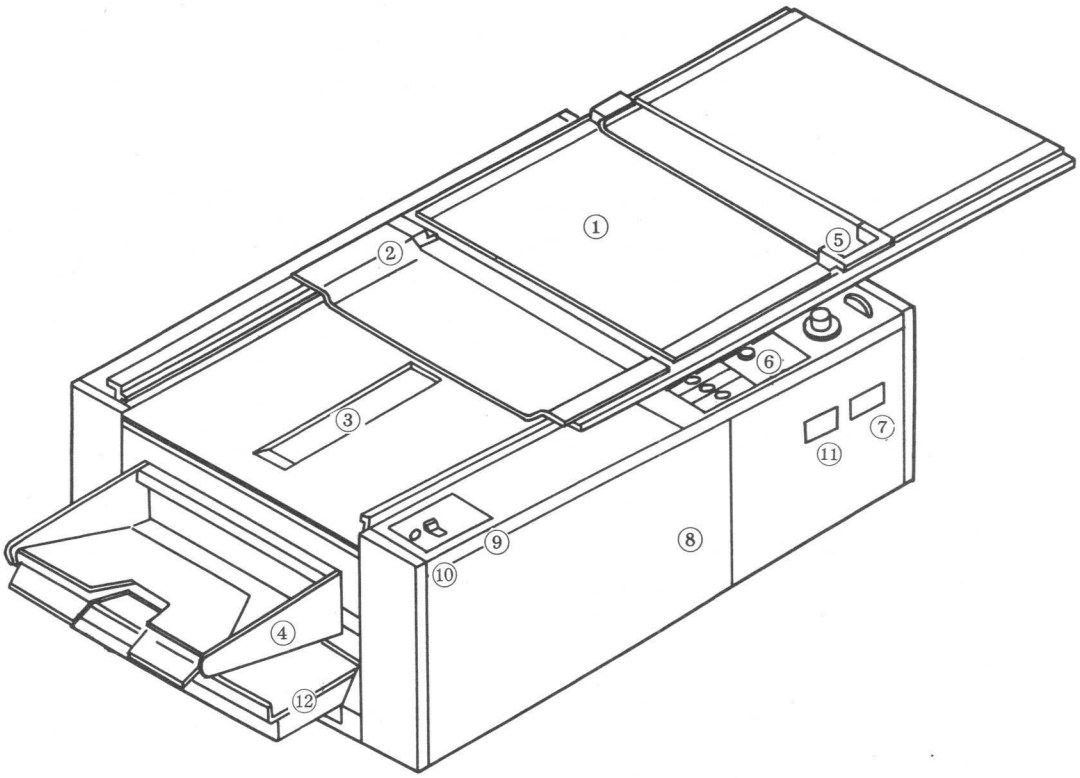


Fig 1-1 General View of the NP–70

(1.) Copyboard Cover :	Holds the original on the copyboard.
(2.) Copyboard:	Moves the original horizontally during copying.
(3.) Upper Access Door :	Can be opened for access when something goes wrong with paper feeding.
(4.) Copy Tray :	Where copied paper is collected.
(5.) Handle :	Used for opening/closing copyboard cover.
(6.) Control Panel :	Contains machine controls.
(7.) Counter :	Number of half size sheets copied is indicated.
(8.) Left Front Access Door :	Opened/closed when supplying Premix developer and concentrated toner and when cleaning coronas.
(9.) Power Switch :	Power is switched on when the red-marked side of switch is pressed.
(10.) Power Lamp :	Lights up when power is switched on.
(11.) Key Counter Socket:	Optional key counter is positioned in this socket.
(12.) Paper Cassette :	Copy paper is held for feeding into the copier.

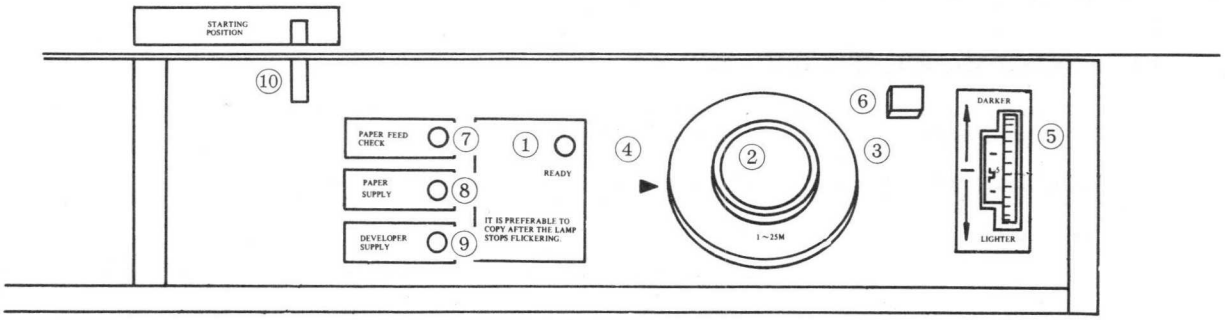


Fig. 1-2 Control Panel

① Ready Lamp:	Flashes on and off for some time after main power is switched on. Normal copies can be obtained even when this lamp is flashing on and off; however, do not immediately touch copies obtained under this condition because toner on copy paper will not be sufficiently dry.
② Copy Button:	Press for obtaining copies.
③ Copy Dial:	Set the number of copies required to index mark.
④ Dial Index Mark:	Numbers on copy dial are set to this index mark.
⑤ Exposure Dial:	Adjusts image density.
⑥ Stop Button:	Press to stop copy operations during continuous copying.
⑦ Paper Feed Check Lamp:	Lights up when paper is not properly fed.
⑧ Paper Supply Lamp:	Lights up when paper inside the cassette has been depleted or when the cassette is not properly set inside the copier.
⑨ Developer Supply Lamp:	Lights up when the supply of Premix developer has been depleted.
⑩ Starting Position Mark:	Set the mark on the copyboard to this mark when starting copying operations.

1.3 SPECIFICATIONS

1.3-1 PERFORMANCE SPECIFICATIONS

Copying system :	Canon LP system
Developing process :	Liquid system; Developing tray method
Copy paper:	Plain paper
Originals :	Books, single sheets, three dimensional objects, and photographs.
Copying speed :	15 half-size copies/min. and 7 full-size copies/min.
Paper sizes :	A3 (11.6" x 16.5"), B4 (10.1" x 14.3"), A4 (8.3" x 11.7"), B5 (7.2" x 10.1")
Magnification:	1 : 1
Continuous operation :	Up to 25 sheets are automatically copied by setting the Copy Dial to the desired number; more than 26 copies are obtained by setting at "M".
Toner feeding :	Automatic feeding with ATR device.
Lens :	180 mm, F4.5 mirror/lens with diaphragm
Paper exposure :	Moving original exposure method
Image transfer :	Corona transfer
Image fixing :	Drying with heat dispersion plate

Table 1-1 Performance Specifications of the NP–70

1.3-2 PHYSICAL SPECIFICATIONS

Dimensions of body:	
Width	83.4 cm (32-7/8") – Main body only 125.0 cm (49-3/16") - w/ A3 cassette & copyboard in standard position.
Depth	60.0 cm (23-5/8")
Height	34.0 cm (13-3/8")
Dimensions of Pedestal :	
Width	83.5 cm (32-7/8") – Main body only 153.5 cm (60-7/16") - w/ side tables attached.
Depth	60.2 cm (23-11/16")
Height	58.0 cm (22-13/16")
Power source:	100VAC (±10%) 50/60Hz, 115VAC (±10%) 60Hz 125VAC (±10%) 60Hz, 220VAC (±10%) 60Hz 230VAC (±10%) 50Hz, 240VAC (±10%) 50Hz
Power consumption:	1.2 kW
Operation atmosphere:	
Temperature	5 ~ 35°C (41 ~ 95°F)
Humidity	20 ~ 85%

Table 1-2 Physical Specifications of the NP–70

1.3-3 PAPER SPECIFICATIONS

Sizes of paper, as standardized by JIS (Japan Industrial Standards), are shown in Table 1-3.

A sizes		B sizes	
A0	841 x 1189 mm (33.1" x 46.8")	B0	1030 x 1456 mm (40.6" x 57.3")
A1	594 x 841 (23.4" x 33.1")	B1	728 x 1030 (28.7" x 40.6")
A2	420 x 594 (16.5" x 23.4")	B2	515 x 728 (20.3" x 28.7")
A3	297 x 420 (11.7" x 16.5")	B3	364 x 515 (14.3" x 20.3")
A4	210 x 297 (8.3" x 11.7")	B4	257 x 364 (10.1" x 14.3")
A5	148 x 210 (5.8" x 8.3")	B5	182 x 257 (7.2" x 10.1")
A6	105 x 148 (4.1" x 5.8")	B6	128 x 182 (5.0" x 7.2")
A7	74 x 105 (2.9" x 4.1")	B7	91 x 128 (3.6" x 5.0")
A8	52 x 74 (2.1" x 2.9")	B8	64 x 91 (2.5" x 3.6")

(JIS)

Table 1-3 Standard of Paper Sizes

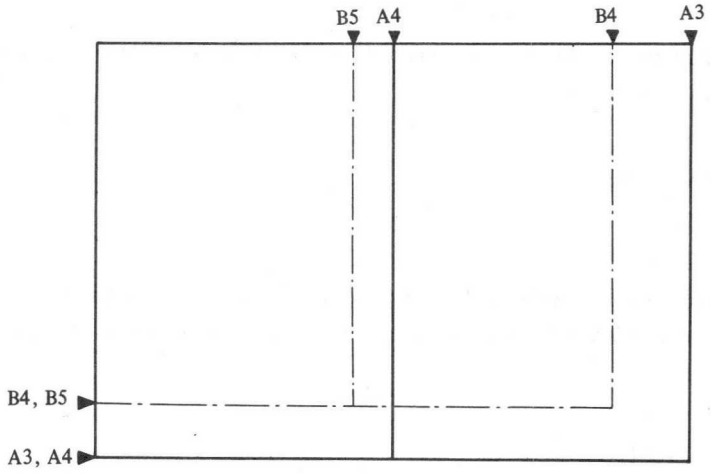


Fig. 1-3 Original Positioning on Copyboard

1.3-4 COLORS OF PAPER AVAILABLE FROM CANON

White

1.4 OPERATING PROCEDURES

1.4-1 PREPARATION

1) After setting the ON/OFF Switch to ON, the Power Lamp will light up and the Ready lamp will flash. At this time the doors must be closed. Also, make sure that the starting positioning mark on the copyboard aligns with the starting mark on the control panel.

2) In 2 minutes the Ready lamp will go out to indicate that the copier is ready for operation; while the Ready lamp flashes, copying operation can be performed, but the copy obtained will not be dried completely.

1.4-2 PLACING OF ORIGINAL

Lift up the copyboard cover and place the original face down on the copyboard glass, flush against the appropriate copy-size indicator. Then, lower the copyboard cover over the original.

1.4-3 LOADING OF PAPER

1) Pull out the paper cassette and take off the cassette cover.

2) Fan the paper (specified copy paper) well, to separate any sheets which might be stuck together.

3) Load the paper so that its end is flush to the rear end of the inner plate of the cassette.

4) Gently push down the right and left ends of the paper and insert under the separation hooks.

5) After loading, place the cover on the cassette in an open condition and push the paper cassette firmly into position in the copier.

1.4-4 COPYING OPERATIONS

1) 25 COPIES OR LESS
Set the copy dial for the desired number of copies. Then, after pressing the COPY button, the required number of copies will be produced, with the copier automatically stopping after the last sheet.

2) MORE THAN 25 COPIES
After noting the number indicated by the counter, set the copy dial to "M" and press the COPY button. When the counter registers the required number, press the stop button. The duplicating will come to a stop.

1.4-5 IMAGE DENSITY

1) The exposure dial controls the darkness and lightness of the copy image. To obtain the proper contrast, adjust the exposure dial according to the original. The lower numbers will produce copies which are darker, while the higher numbers will produce lighter copies.

2) When the print density is too light, even though the exposure dial is set at a low number check if there is any toner in the toner bottle. If it is empty, replace it.

1.4-6 HANDLING OF PAPER & LOADING OF PAPER CASSETTE

1) When storing the paper, be careful not to expose it to high humidity or direct sunlight.

2) Be careful not to fold or wrinkle the paper.

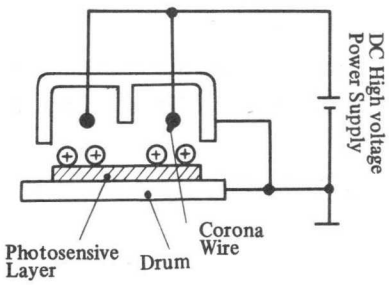
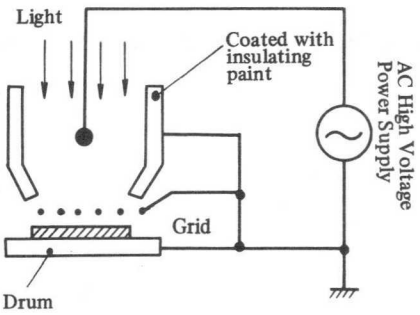
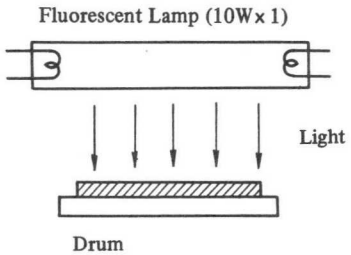
3) When loading the paper into the cassette, the top sheet of the paper from the marked side of the pack should be the top sheet of the stack in the paper cassette.

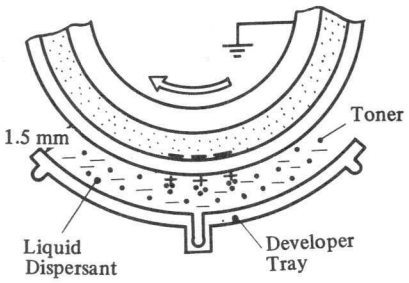
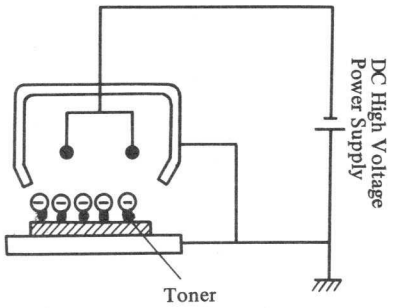
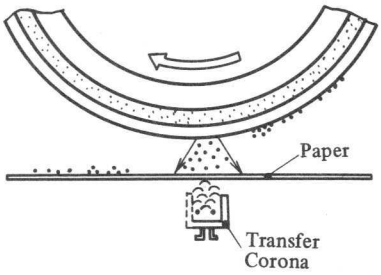
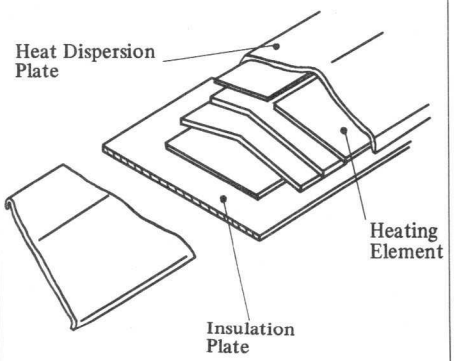
4) Before loading, fan or leaf through the paper thoroughly so that all sheets can be separated from the stack easily by the paper pickup roller.

5) Paper cassettes containing paper inside should be stored with their covers closed.

Second Printing-June, 1974

1.5 IMAGE FORMING PROCESS OF THE NP–70

	Process	Function	Remarks
1	Positive charge for sensitizing	With positive corona discharge, the drum surface is positively charged.  Applied voltage = +6.4 kVDC Corona wire = Gold-coated tungsten wire, 6/100 mm in diameter.	* Corona discharge: When high voltage is applied to the corona wire, it forms an electric field which causes partial breakdown of the air and ionizes it.
2	AC discharge with simultaneous image exposure	AC corona discharge and image exposure is applied to the drum surface at the same time.  Applied voltage = 7.0 kVAC	* AC corona discharge: Positive and negative corona discharges occur alternately. * Insulation coating: Increases the efficiency of AC corona discharge, and prevents arc-over. * Grid: Stabilizes the effects of discharging.
3	Overall exposure	Fluorescent lamp (10W x 1)  	The surface potential after this process is: Dark portion: 300 ~ 550V Light portion: 0 ~ –150V

	Process	Function	Remarks
4	Development		The developer has a fluid carrier for holding the toner powder in a colloidal suspension. Due to friction, the toner is charged negatively and the carrier positively.
5	Negative charge	 Applied voltage = −6.4 kVDC	Due to the negative charge, extra liquid on the drum surface is reduced for proper image transfer. At the same time the toner image on the drum will be stabilized.
6	Transfer		* Transfer corona: Radiates positive ions against the back side of the copying paper and these ions attract the negative toner particles onto the copying paper.
7	Fixing		The dispersant on the paper is evaporated by the heater.

CHAPTER 2

Outline of NP-70 Operation

2.1 BREAKDOWN OF THE NP–70

The Canon NP–70 is a highly unitized copier, with the majority of assemblies being easily removable from the copier. Fig. 2-1 shows these assemblies and their relative positions within the copier body. Additionally, a reference is provided indicating the section within this manual which describes the assembly.

① Jam Detection Circuit – see 3.2–3 & 3.4–8
② Time Circuit
③ Rectification Circuit – see 3.4–3
④ Reciprocation Circuit
⑤ Heater Wait Control Circuit – see 3.4–5
⑥ Copyboard Driving Mechanism Assembly – see 4.17
⑦ Main Motor Assembly
⑧ A.T.R. Subassembly – see 4.6
⑨ Developer Controller Assembly – see 4.6
⑩ Paper Feed Controller Assembly – see 4.10
⑪ Heater Control Circuit – see 3.4–9 & 3.4–10
⑫ Developer Assembly – see 4.6
⑬ Air Input Blower Assembly – see 4.14
⑭ Suction Blower Assembly – see 4.14
⑮ Cassette Holder Assembly – see 4.8
⑯ Safety Assembly – see 4.16
⑰ Premix Valve Subassembly
⑱ Toner Valve Subassembly – see 4.6
⑲ Exposure Mask Subassembly – see 4.3
⑳ Optical Assembly – see 4.3
㉑ Copy Selector Subassembly – see 4.15
㉒ Control Panel Assembly
㉓ Microswitch Mounting Assembly
㉔ Heater Assembly – see 4.13
㉕ Paper Separating Subassembly – see 4.12
㉖ Copyboard Assembly – see 4.1
㉗ Cover Subassembly – see 4.1
㉘ Transfer Corona Assembly – see 4.5
㉙ Copy Conveying Assembly – see 4.11
㉚ Cassette Assembly – see 4.9
㉛ Residual Charge Eliminator Assembly – see 4.5
㉜ Paper Pickup Roller Assembly – see 4.10
㉝ Paper Feed Cam Subassembly – see 4.10
㉞ Negative Corona Assembly – see 4.5
㉟ Drum Assembly – see 4.4
㊱ A.C. Corona Assembly – see 4.5
㊲ Positive Corona Assembly – see 4.5
㊳ Drum Cleaner Assembly – see 4.7
㊴ Illumination Assembly – see 4.2

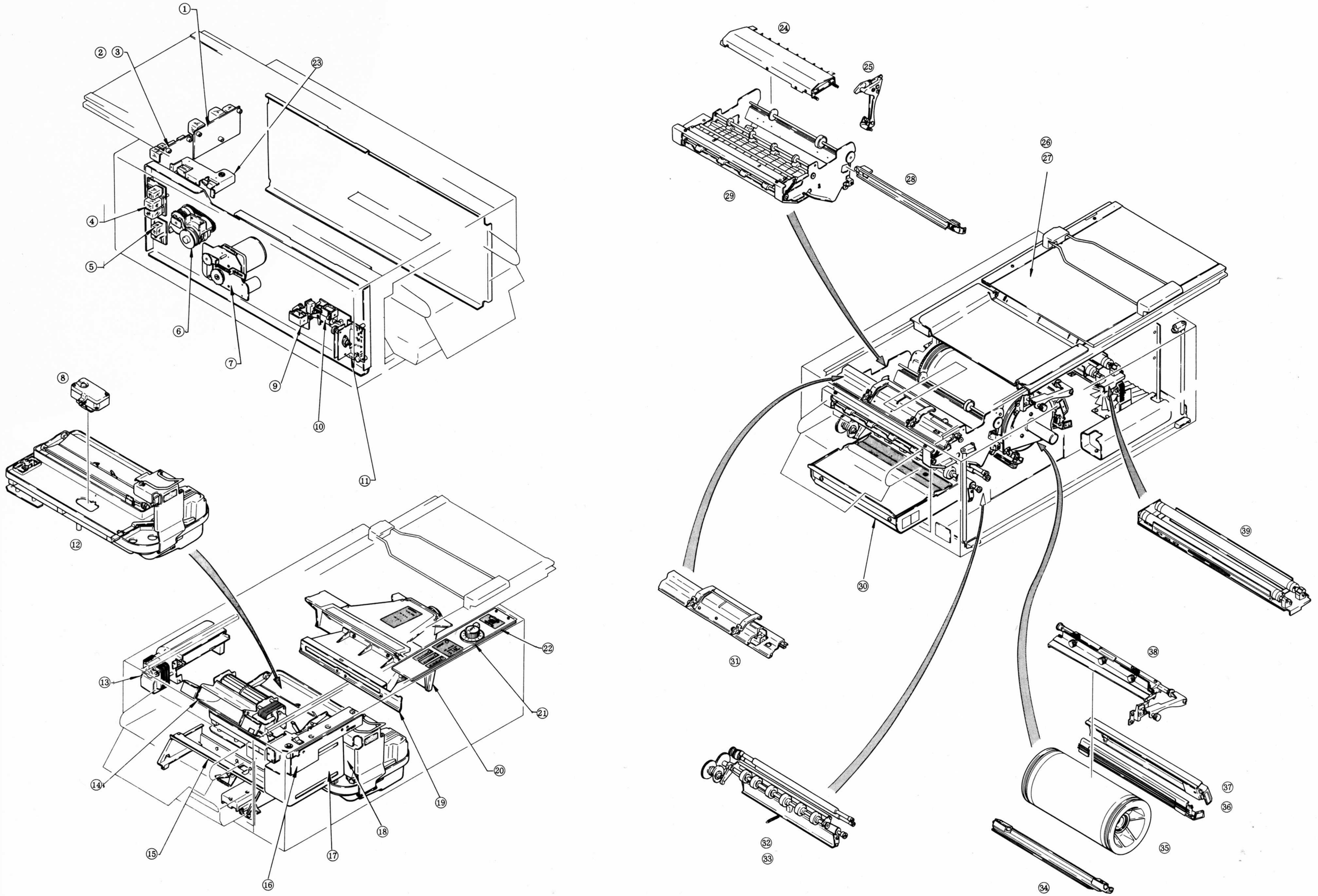


Fig. 2-1 Breakdown of the NP–70

2.2 PARTS NOMENCLATURE

The cross-sectional view of the NP–70, shown in Fig. 2-2, reveals many of the main components within the copier.

① Paper delivery roller 2
② Residual charge eliminator
③ Paper delivery roller 1
④ Heater
⑤ Suction fan
⑥ Air duct
⑦ Paper guide bracket
⑧ Separation roller
⑨ Skirt blade
⑩ Cleaner blade
⑪ Positive corona
⑫ Original illumination lamp
⑬ Light reflecting mirror
⑭ Cassette holder frame
⑮ Paper pickup roller
⑯ Paper feed guide plate
⑰ Timing roller
⑱ Paper feed guide plate
⑲ Transfer corona
⑳ Negative corona
㉑ Drum cylinder
㉒ Developer tray
㉓ Developer reservoir
㉔ A. C. corona
㉕ Overall exposure lamp
㉖ Main motor
㉗ High voltage transformer
㉘ Lens unit
㉙ Cooling fan

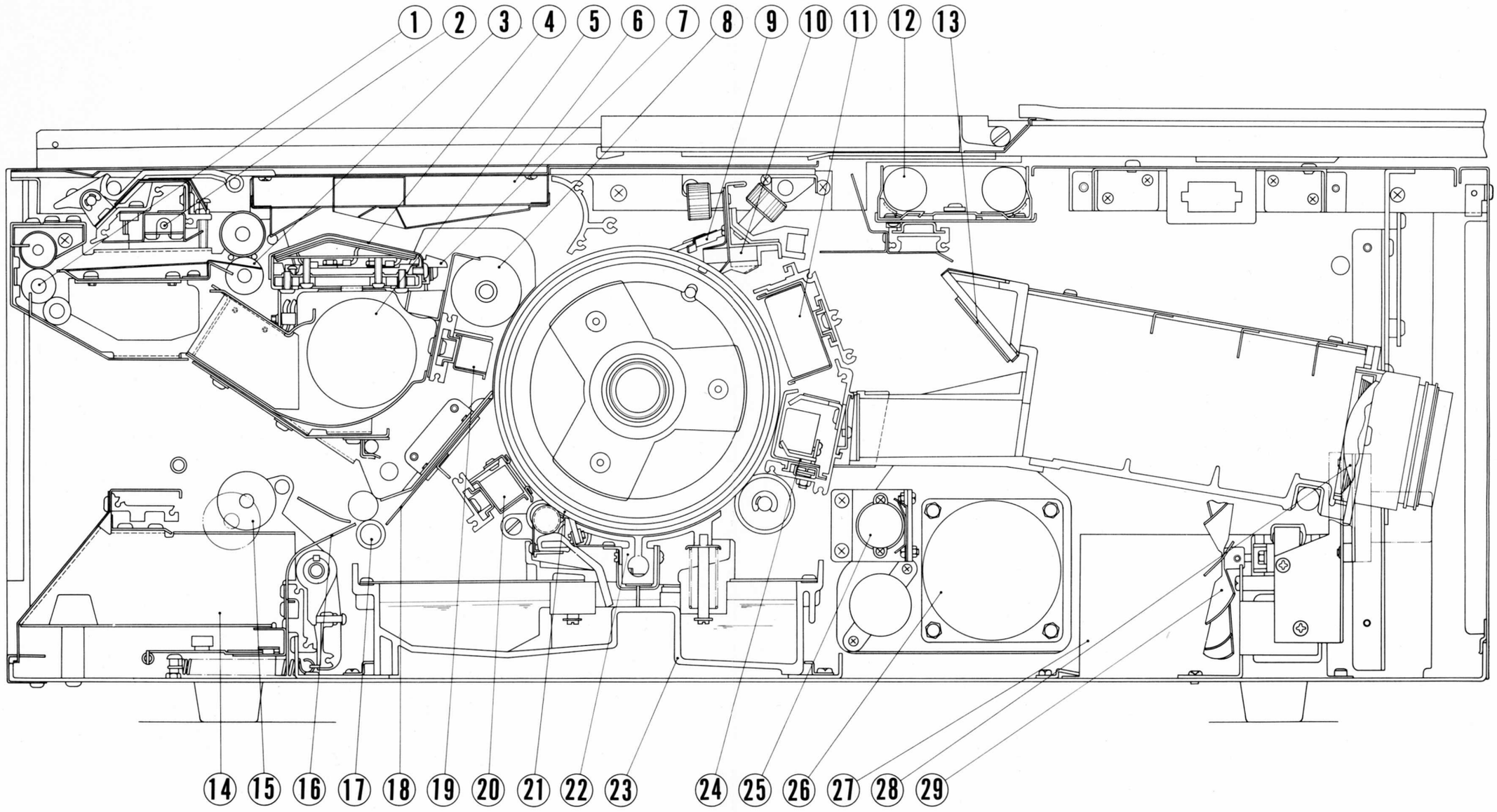


Fig. 2-2 NP-70 Parts Nomenclature

2.3 OUTLINE OF MAIN ASSEMBLIES

2.3-1 COPYBOARD ASSEMBLY

The copyboard is the assembly on which the original to be copied is placed. It moves forward and backward by means of two wires wound on the drive pulley and is moved by clutches Cℓ1 and Cℓ2.

2.3-2 ILLUMINATION ASSEMBLY

This assembly functions to uniformly illuminate the original on the copyboard, after which the reflected image is projected onto the photosensitive drum. The two 25 watt lamps in this assembly are maintained in a "warm" condition continuously by a low-level A. C. filament voltage and a continuous high-level A. C. radiation from the electromagnetic field radiator. Thus, when full A. C. voltage is applied to the lamp filaments, the lamps come ON instantly.

2.3-3 OPTICAL ASSEMBLY

This assembly functions to form an image of the original on the photosensitive drum, while both image and drum move in synchronization. The assembly consists of a chamber containing a mirror and a lens unit.

* Lens	180 mm, F : 4.5 In-mirror type
* Magnification:	1 : 1
* Maximum size of original:	297 mm x 420 mm (JIS-A3)

The tone of a copied image is adjusted by turning the exposure dial (located on the control panel), which changes the size of the lens diaphragm.

The dial graduations are related to the lens F-number as follows:

F4. 5 . . . . . 9 on dial
F7.14 . . . . . 1 on dial

2.3-4 DRUM ASSEMBLY

This assembly contains the drum, with its photosensitive sheet covering, and the components necessary to mount the drum in the copier.

The sheet covering on the drum has a sensitive area approximately 310 mm x 480 mm. Thus, copying up to JIS A3-size is possible.

2.3-5 CORONA ASSEMBLIES

The coronas used in the NP–70 are the positive corona (+DC), the A. C. corona, the negative corona (–DC), the transfer corona (+DC), and the residual charge eliminator (AC). These are located, respectively, to the upper right, the lower left, the left of the drum and the exit of the

machine. Their functions and potentials are as follows:

* Positive Corona:
  Radiates a DC voltage of +6.4 kV to charge the drum surface to +1800 ± 100V.

* AC Corona for image formation:
  Radiates an AC voltage of 7.0 kV to the drum surface to eliminate the positive charges on the light portions of the image.
  (AC discharge and image exposure are performed simultaneously. This exposure is called "simultaneous image exposure".)

* Negative Corona:
  Radiates a DC voltage of −6.4 kV to charge the drum surface (both, covered and not covered with toner) to a negative potential.

* Transfer Corona:
  Radiates a DC voltage of +6.0 kV to the back of the paper to transfer the image from the drum to the paper.

* Residual Charge Eliminator for paper charge neutralization:
  Radiates an AC voltage of 7.0 kV to neutralize any charges remaining on the paper to which an image has been transferred.

2.3-6 DEVELOPER ASSEMBLY

The Developer Assembly is located just below the drum. It continuously pumps the fluid developer upward, so that the rotating drum receives a constant coating of developer. The proper development of the latent image is ensured by the inclusion of the developing tray; the tray acts as a development electrode.

The developer contained in the assembly consists of a colloidal suspension of toner and liquid dispersant, the latter acting as the carrier. The charges assumed by these two elements are as follows:

* Toner: Charged to a negative (−) polarity.
* Carrier: Charged to a positive (+) polarity.

2.3-7 DRUM CLEANER ASSEMBLY

This assembly is positioned to the upper right of the drum and functions to wipe off the remaining toner on the photosensitive drum after the transfer operation. It enables the continuous use of the drum. The wiping action is performed by two blades (made of urethane) and is performed continuously during drum rotation.

2.3-8 CASSETTE AND CASSETTE HOLDER ASSEMBLIES

These two assemblies function together to hold the paper for feeding one by one into the copier. They are located at the lower left end of the copier body and the Cassette Assembly is removable from the Holder Assembly to allow the use of cassettes of varying paper size.

* Loading capacity is about 400 sheets.
* Standard paper to be used should be 64 g/m² in weight.
* An interlock (MS15) is provided in the Cassette Holder Assembly, so that the copying operation cannot be performed unless the Cassette Assembly is completely set in the main body.
* Copying operation cannot be performed when paper in the cassette has run out.

2.3-9 PAPER PICKUP ROLLER ASSEMBLY

This assembly is located at the lower left end of the copier, just below the Copy Conveying Assembly. This assembly is operated in a timed manner to pick up paper and feed it. This timing ensures that the image is transferred to the copy paper correctly positioned.

2.3-10 COPY CONVEYING ASSEMBLY

The Conveying Assembly is located at the upper left end of the copier. If functions to convey a sheet from the drum to the copy tray. As the paper moves across this assembly, it passes over the Heater Assembly for evaporation of dispersant.

2.3-11 HEATER ASSEMBLY

This assembly, mounted within the Copy Conveying Assembly, is used to heat the paper slightly for the purpose of evaporating the dispersant absorbed during transfer. As toner will smear with the presence of dispersant, this evaporation step is necessary to permit handling of copies. The toner will not smear, however, when the copy paper is dry; therefore, this step is known as "Fixing" the toner.

2.3-12 BLOWERS AND FANS

Three units are provided for the multiple functions of cooling, ventilation, and paper separation.

2.3-13 COPY SELECTOR SUBASSEMBLY

This subassembly consists of the mechanism to control the selection of the number of copies that the machine will produce when the built-in COPY Button is pressed to initiate copy operation.

2.3-14 SAFETY ASSEMBLY

The Safety Assembly consists of several microswitches, their control levers, and a solenoid. These components act to stop machine operation when the machine is opened for inspection or when a jam takes place within the machine. The assembly is located directly below the power switch on the left end of the machine.

2.3-15 COPYBOARD DRIVING MECHANISM ASSEMBLY

This assembly contains the components used to move the copyboard backward and forward as copying is performed.

2.3-16 PEDESTAL ASSEMBLY

This assembly is dual functional; it can be used for storage only or used to mount a line conversion transformer when the copier input A. C. voltage requirements differ from available voltages.

2.4 OUTLINE OF THE DRIVE SYSTEM

In the NP–70 copier, main drive operations (such as the rotation of the drum, the reciprocation of the copyboard, and the feeding of copy paper) is powered by the main motor. This motor is located on the right lower portion of the rear mounting plate of the copier frame. The operation of these copier mechanisms is synchronized with the revolution of the main motor to ensure that copies are made with the image position the same as that on the original.

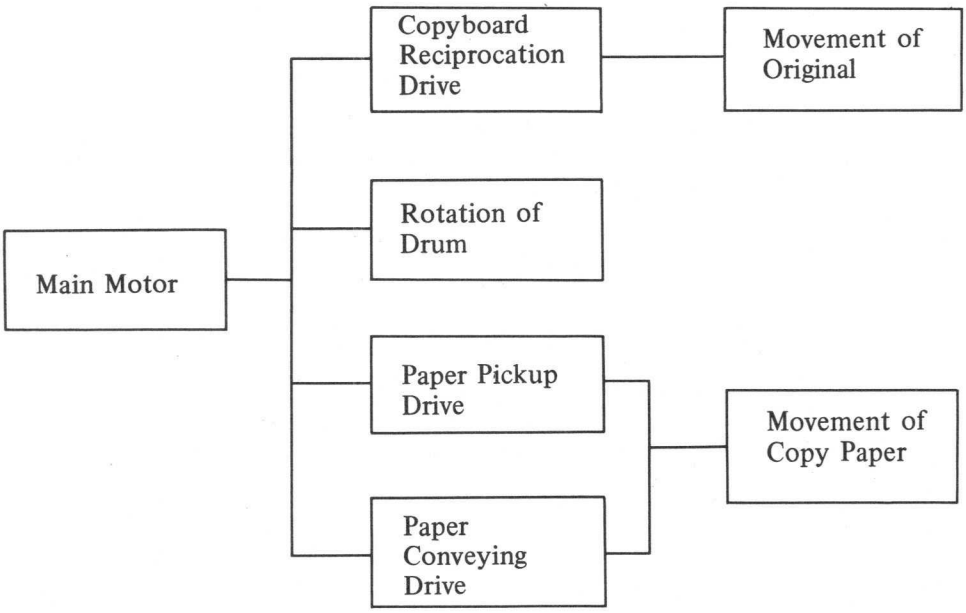
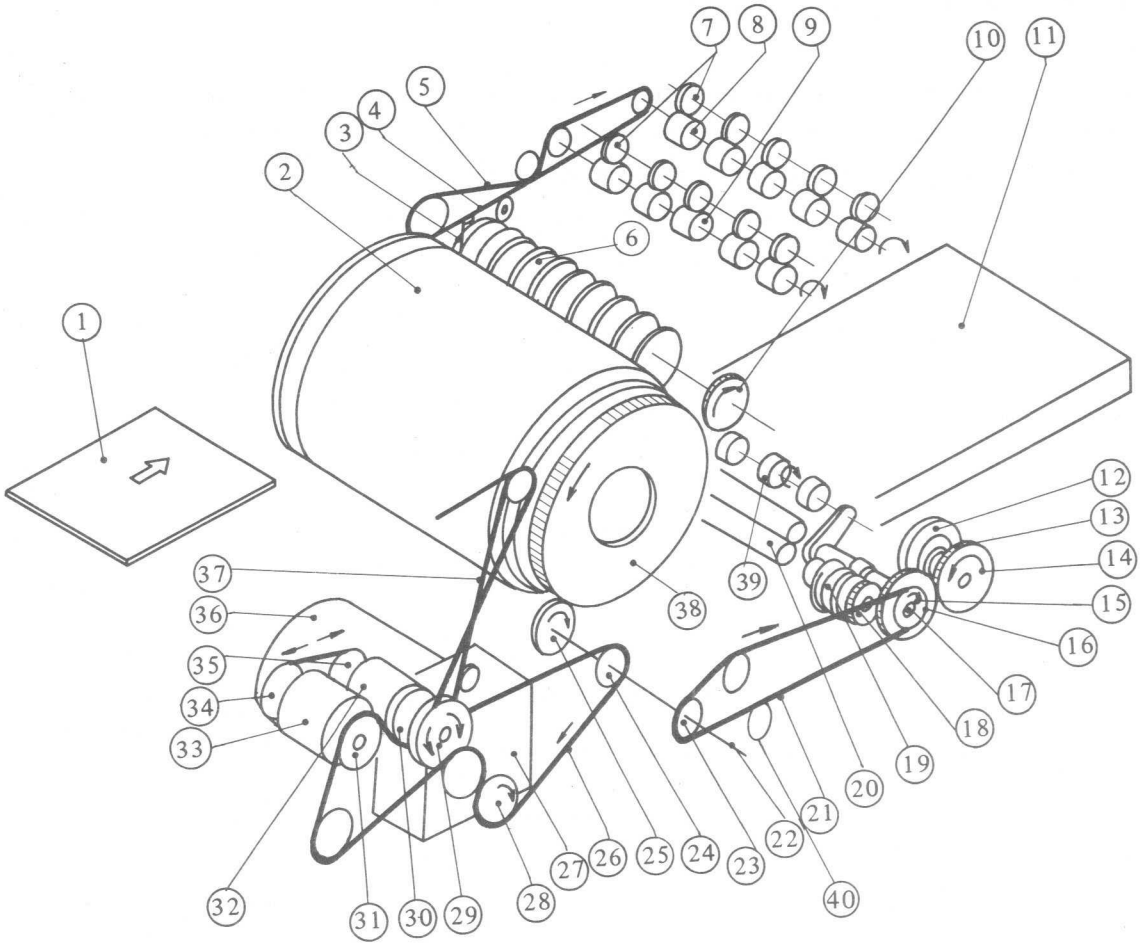


Fig. 2-3 General Diagram of the Drive System

The following two figures show the elements of the drive system in two ways– a block diagram and a cutaway view. From these two figures, the relationships between the various elements of the drive system can be seen.



① Original
② Drum
③ Separation Sprocket
④ Separation Belt
⑤ Ladder Chain
⑥ Separation Roller
⑦ Upper Delivery Rollers
⑧ Lower Delivery Roller 2
⑨ Lower Delivery Roller 1
⑩ Separation Gear
⑪ Paper Cassette
⑫ Pickup Control Cam
⑬ Pickup Cam Control Clutch
⑭ Clutch Gear B
⑮ Paper Feed Gear
⑯ Paper Feed Sprocket
⑰ Pickup Roller Drive Shaft
⑱ Clutch Gear A
⑲ Timing Roller Control Clutch
⑳ Timing Roller
㉑ Drive Chain B
㉒ Intermediary Shaft
㉓ Intermediary Sprocket B
㉔ Intermediary Sprocket A
㉕ Intermediary Gear
㉖ Drive Chain A
㉗ Reduction Gear Unit
㉘ Main Sprocket
㉙ Driving Pulley
㉚ Forward Sprocket
㉛ Return Sprocket
㉜ Forward Clutch
㉝ Return Clutch
㉞ Return Clutch Sprocket
㉟ Forward Clutch Sprocket
㊱ Main Motor
㊲ Copyboard Wire
㊳ Drum Gear
㊴ Paper Pickup Roller
㊵ Sprocket

Fig. 2-4 Components of the Drive System

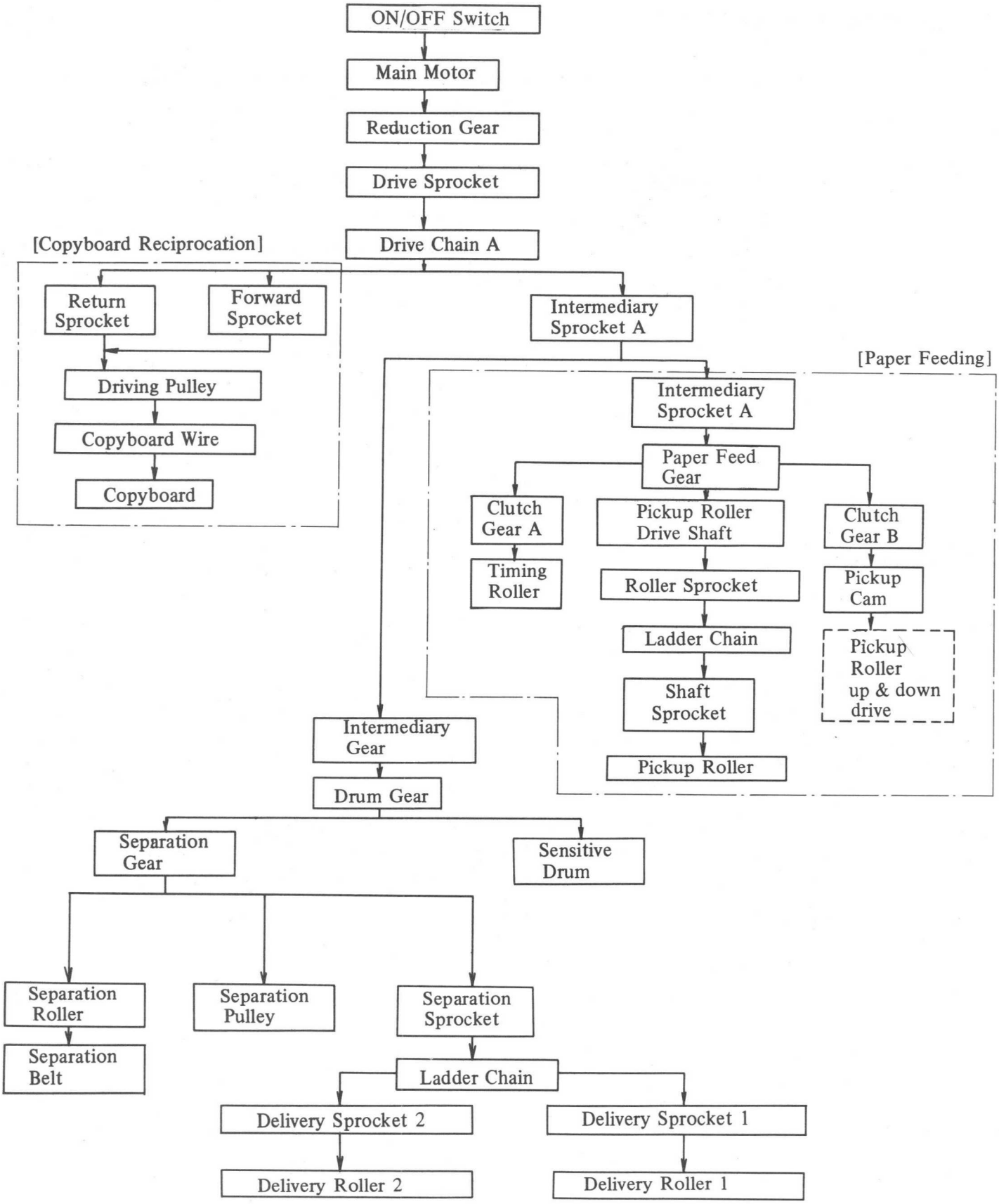


Fig. 2-5 Block Diagram of the Drive System

2.5 OUTLINE OF "ORIGINAL" MOVEMENT

After the original is placed in the proper position on the copyboard glass plate, exposure is accomplished by the reciprocating movement of the copyboard.

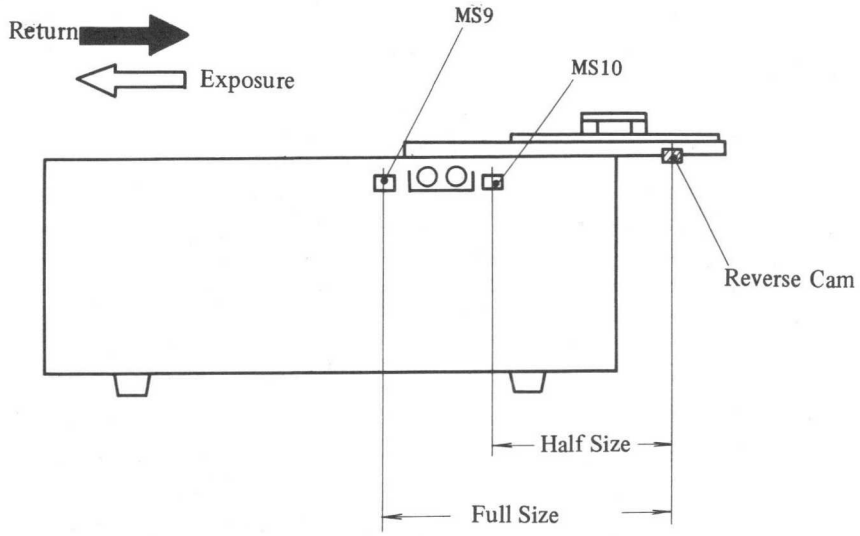


Fig. 2-6 Movement of the Original

1) The starting position of the copyboard is at the right-hand side. When the COPY button is pressed, the copyboard starts moving from right to left synchronized with the drum. This is called the "Exposure Process" because the original is illuminated at this time.

2) After exposure of the original, the copyboard reverses its motion to the starting position where it waits for the start of the next exposure. The movement of the copyboard during exposure affects the copy image directly, so it is important that the copyboard move smoothly without irregular or jerky movements; the return portion, however, is not as critical as the exposure portion.

2.6 OUTLINE OF COPY PAPER MOVEMENT

During the copying process, copy paper moves through the machine in the manner shown below.

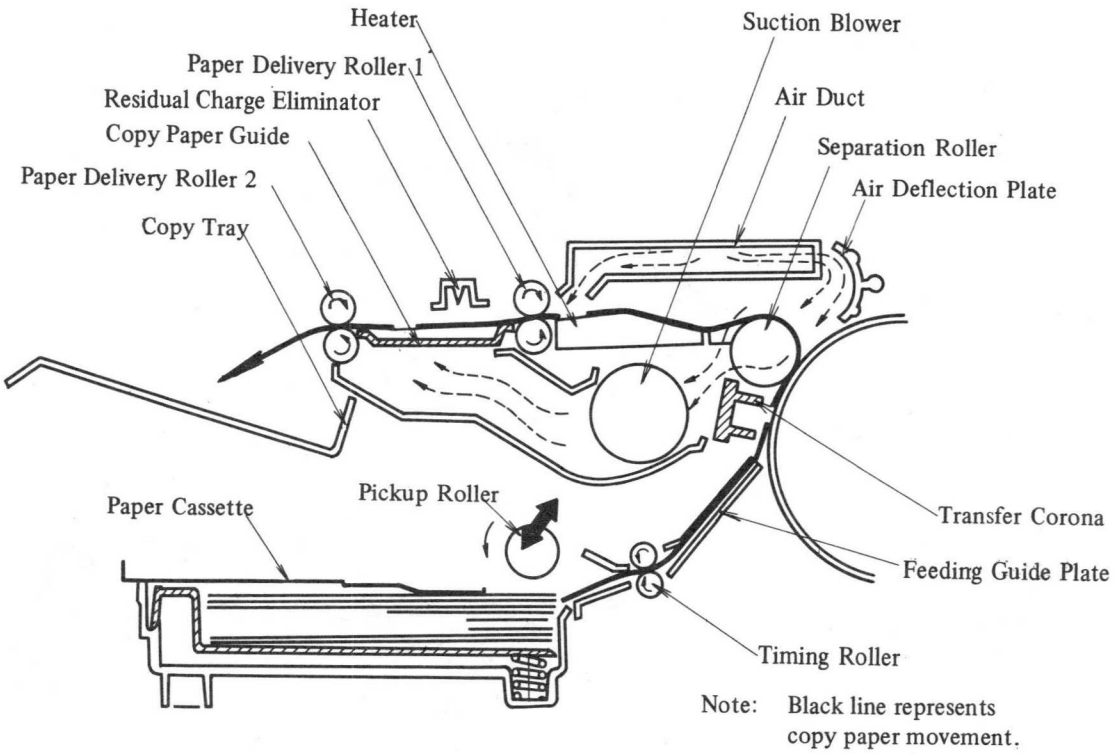


Fig. 2-7 Movement of Copy Paper

1) The capacity of the paper cassette is approximately 400 sheets. The inner plate of the paper cassette is pressed upward by two coil springs to ensure that the sheets in the cassette are constantly in contact with the separation claws.

2) When the copying operation starts, the revolving pickup roller comes down, contacts the top-most sheet, and advances it to the timing roller.

3) As the timing roller operates to synchronize the paper feeding and the image position on the drum, it does not immediately operate. Instead, the paper buckles and forms a loop at the roller.

4) The slight buckling ensures proper feeding when the timing roller starts to rotate to feed the paper to the drum through the feeding guide plates.

5) The copy paper which is fed by the paper feeding mechanism is conveyed by the Copy Conveying Assembly. The copy conveying drive mechanism functions to drive the separation roller and the delivery rollers of the Copy Conveying Assembly. The driving force is provided by the drum gear (which is engaged with the separation gear) each time the drum operates.

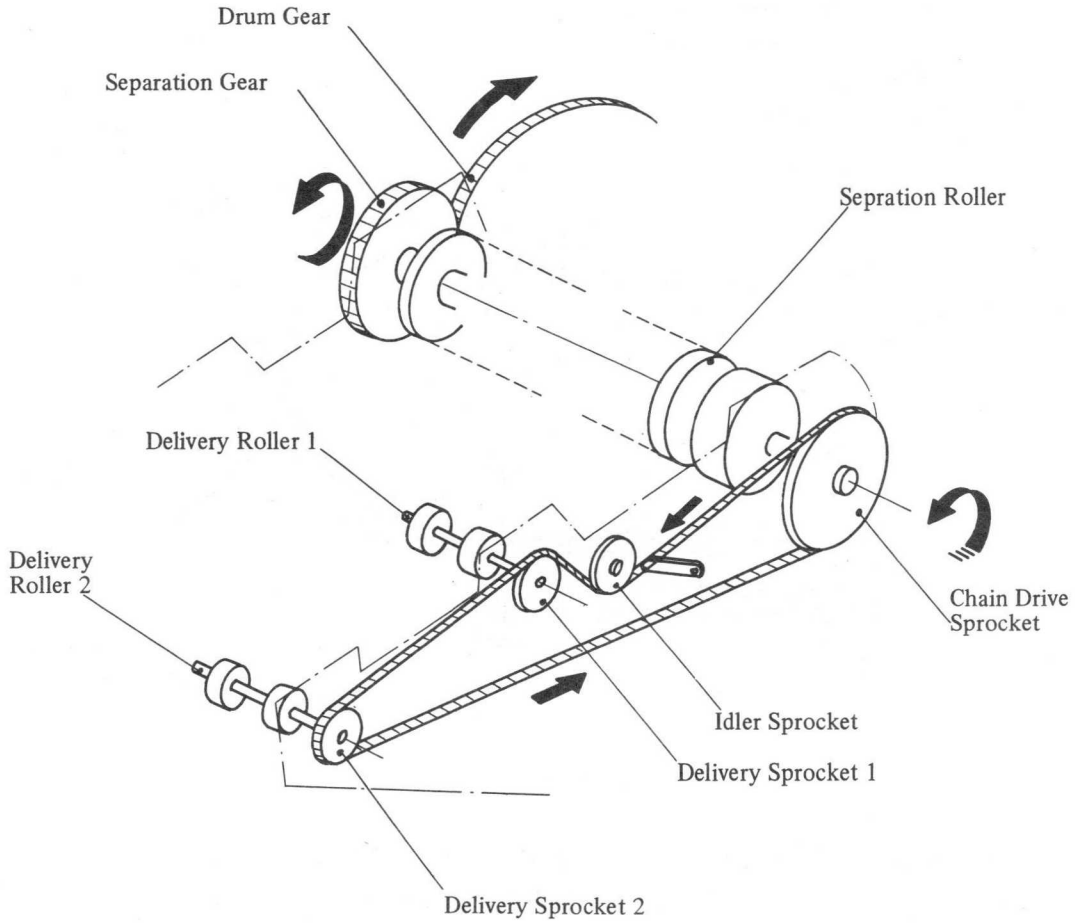


Fig. 2-8 Conveying Drive Mechanism

6) The visible toner image on the drum surface is transferred to the paper by the transfer corona and, then, the paper is separated from the drum and fed to the heater.

7) The heater plate, which is maintained at 180°C ± 5°C, dries and fixes the toner image to the paper.

8) The paper, which has passed over the heater plate, is fed to delivery rollers 1 & 2 where any remaining electrical potential on the paper is neutralized by the residual charge eliminator.

9) The finished printed copy, then, drops neatly onto the copy tray.

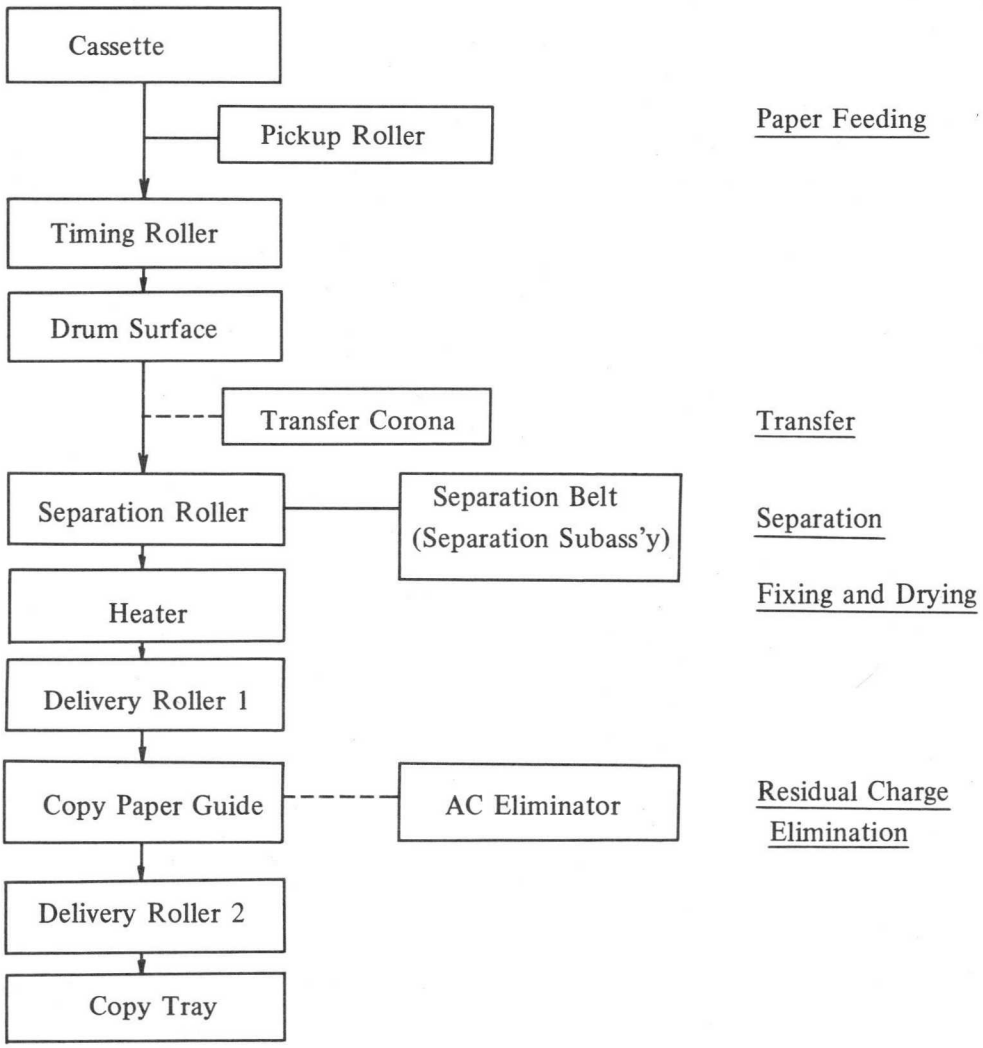


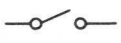
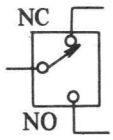
Fig. 2-9 Diagram of Copy Paper Movement

CHAPTER 3

Electrical System

3.1 CIRCUIT DIAGRAM GRAPHIC SYMBOLS

Knowledge of the graphic symbols used for electric parts is essential to understand the wiring and schematic diagrams in the NP–70 manual.

No.	Symbol		Description	Function
1		P	Plug & Power Cord	Provides AC voltage to the copier
2		SW	ON/OFF Switch	Input Power ON/OFF Switch
3		MS1A	Microswitch	Copyboard Start
		MS2A	Microswitch	Jam Detection (SL7 Enable)
		MS3A	Microswitch	Jam Detection (Jam Ckt. Enable)
		MS4	Microswitch	Drum Stop Position
		MS5	Microswitch	Copyboard Release Lock and Toner Replenishment
		MS6A	Microswitch	Breaks Motor, High-Voltage Transformer, & Overall Exposure Circuit due to Jam
		MS6B	Microswitch	Breaks Heater Circuit due to Jam
		MS7	Microswitch	Copy Start (by pushing Copy Button)
		MS8	Microswitch	Copyboard Stop Position
		MS9	Microswitch	Copyboard Reversal Position when paper is "Full Size"

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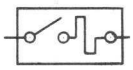
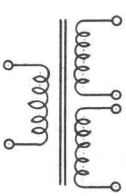
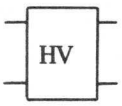
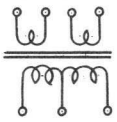
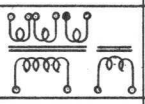
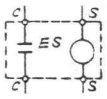
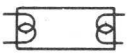
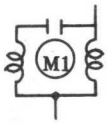
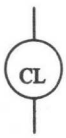
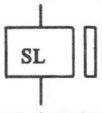
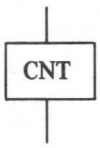
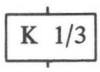
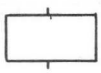
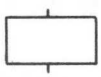
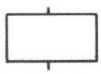
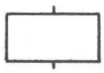
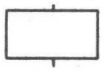
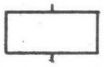
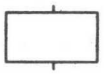
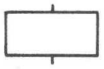
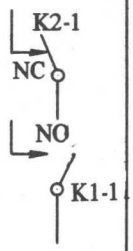
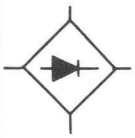
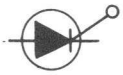
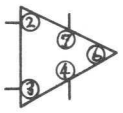
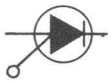
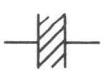
No.	Symbol		Description	Function
		MS10	Microswitch	Copyboard Reversal Position when paper is "Half Size"
		MS11	Microswitch	Switch for Paper Sizes, "Half" or "Full" (by Paper Cassette Cam)
		MS12	Microswitch	Developer Quantity Detection (works together with Developer Assembly float)
		MS14	Microswitch	Paper Pick-up Actuation
		MS15	Microswitch	Confirmation of Paper Cassette Insertion
		MSD1	Microswitch	Door Switch Interlock
		MSD2	Microswitch	Door Switch Interlock
4		NFB1	Circuit-breaker	Protection of AC Line
		NFB2	Circuit-breaker	Protection of Main Motor, High-Voltage Transformer and Overall Exposure Lamp
		NFB3	Circuit-breaker	Protection of +24VDC Power Supply Circuit
		NFB4	Circuit-breaker	Protection of +5VDC Power Supply Circuit
5		LVT	Low Voltage Transformer	Develops +24VDC and +5VDC for most Printed-Circuit Assemblies.
		T201	Low Voltage Transformer	Develops 24VAC for "zero-cross" Heater Control Circuit

No.	Symbol		Description	Function
6		HV (AC)	High Voltage Transformer	Develops High Voltage AC for Coronas
		HV (DC)	High Voltage	Develops High Voltage DC for Coronas
7		ST1	Stabilizer	For Lighting FL1 (except 100VAC Line Voltage)
8		ST2	Stabilizer	For Lighting FL2 & FL3
9		ES	Stabilizer	For Lighting FL1 (100VAC Line Voltage only)
10		FS	Temperature-sensitive Fuse	Prevention of Excessive Temperature Rise inside the Heater Assembly (melts at 150°C)
11		FL1	Fluorescent Lamp	Overall Exposure (10W)
		FL2·3	Fluorescent Lamp	Original Exposure (25W)
12		PL2	Pilot Lamp (Neon Lamp)	"Paper Jam" Indication (Line AC voltage)
		PL5	Pilot Lamp (Neon Lamp)	ON/OFF Indication (line AC voltage)
13		PL1	Pilot Lamp (Tungsten Lamp)	"Ready" Indication (+24VDC)
		PL3	Pilot Lamp (Tungsten Lamp)	"Developer Supply" Indication (+24VDC)
		PL4	Pilot Lamp (Tungsten Lamp)	"Paper Supply" Indication (+24VDC)

No.	Symbol		Description	Function
		L2	Illumination Lamp	Detection of Developer Density by Illuminating CdS1
		L3	Illumination Lamp	"No Paper" Detection by Illuminating CdS2
		L4	Illumination Lamp	"Paper Jam" Detection by Illuminating CdS3
14		H1, H2, & H3	Heater	Nichrome Wire Heater
15		SM2	Thermoferrite Switch	Prolongs "Warm-up" when body temperature is below 15°C
16		M1	Motor	Drum, Copy Conveying Ass'y, Copyboard and Pick-up Unit Drive
17		M2	Motor	Developer Mixing and Feeding
18		FM1	Fan Motor	Paper Separation and Paper Feed
		FM2	Fan Motor	Suction and Exhaust
		FM3	Fan Motor	Air Input and Operation
19		Cℓ 1	Electromagnetic Clutch	Forward Copyboard Drive
		Cℓ 2	Electromagnetic Clutch	Reverse Copyboard Drive
20		SL1	DC Solenoid	Release Lock when copyboard begins operation

No.	Symbol		Description	Function
		SL4	DC Solenoid	Paper Pick-up Roller begins to revolve and comes down when SL4 is energized.
		SL5	DC Solenoid	Timing Roller starts driving when SL5 is energized (when SL4 is energized, SL5 is de-energized.)
		SL6	DC Solenoid	Automatic Toner Replenishment according to Developer Density.
		SL7	DC Solenoid	Breaks (when jam occurs) M1 & FM, Heater and High-Voltage Power Circuit, releasing MS6A and MS6B.
21		CNT1	Counter	Counts Half-size Copies reproduced
		CNT2	Counter	Counts Full-size Copies reproduced
		CNT3	Counter	Counts Total Copies reproduced —Key Counter
22		K1	Relay	Initiates Copy Operation
		K2	Relay	Initiates Forward Copyboard Movement
		K3	Relay	Initiates Reverse Copyboard Movement
		K6	Relay	Initiates Original Exposure Lamp Operation

No.	Symbol		Description	Function
		K7	Relay	Initiates M1 and High Voltage Power Circuit Operation
		K9	Relay	Prevents Machine Drive when there is no paper or when paper cassette is not set correctly.
		K10	Relay	Controls K11 Operation
		K11	Relay	Enables SL7 for "delay" jam
		K14	Relay	Controls "Ready" Lamp Operation
		K301	Relay	Controls Developer Temperature
23		K1-1 K1-2 K2-1 . . etc.	Point of Relay Contact	Designates the number of the Relay Contact pair. NC and NO indicate "Normally Closed" or "Normally Open"
24		+	Positive Corona Assembly	+6.4kVDC Radiation to drum
		–	Negative Corona Assembly	–6.4kVDC Radiation to drum
		AC	AC Corona Assembly	7kVAC Radiation to drum
		Transfer	Transfer Corona Assembly	+6.0kVDC Radiation to drum
		Elimination	Eliminator	7kVAC Radiation to paper

No.	Symbol		Description	Function
25		D1	Full-wave Bridge Rectifier (Self-contained)	Rectification of AC line to develop +24VDC
		D2	Full-wave Bridge Rectifier (Self-contained)	Rectification of AC line to develop +5VDC
26		D	Diode	Current Flow Control Device
27		ZD	Zener Diode	Constant Voltage Device
28		Q	Silicon Control Rectifier Thyristor	Switching
29		Q	Transistor	Switching and Amplification
30		Q	IC Operational Amplifier	Differential Amplification of minute signals
31		Q	Programmable Unijunction Transistor	Switching
32		D	Silicon Varistor	Protection of Electronic Components
33		CdS	Photoconductive Cell	Sensing of Light for operation initiating
34		R	Fixed Resistor	
35		VR	Variable Resistor	Permits Adjustments of Time-constants
36		C	Electrolytic Capacitor	

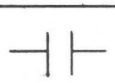
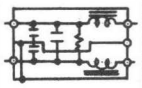
No.	Symbol		Description	Function
37		C	Capacitor	
38		FLT	Low-pass Filter	Elimination of Noise on AC input voltage line (230 VAC line voltage only)
39		L	Inductor	
40		TH	Thermistor Rotary Switch	Sensing of Temperature Changes

Table 3-1 Electric Components

3.2 GENERAL EXPLANATION OF CIRCUIT OPERATION

The operation of the NP–70 copier is primarily electrical. As such, a clear understanding of the electric/electronic components and their operation is essential for complete understanding of the copier. Contained within this section is an explanation of the operation of the copier based on the two main factors of time and drum position.

In the following sub-sections of this chapter, flowcharts are used. These charts show the actions occurring at operation essential times; therefore, some actions are mentioned only when they result in an operation necessary for the copy or start cycles.

In order to understand the flow, the following points should be noted:

a) "ON" indicates an operational condition of actuation (i. e., microswitch), conduction (i. e., transistor, UJT), energization (i. e., relay, solenoid), etc.

b) "OFF" inidicates a non-operational condition and is opposite of "ON".

c) "HI" indicates either the high-level state of the comparitor inputs/outputs, or an above-normal condition of temperature.

d) "LO" indicates a low-level state opposite to "HI".

e) ENABLED indicates that the element denoted operates only through some indirect means (i. e., heater operates only as directed by the Heater Control Circuit, SL7 operates only when a jam occurs).

3.2-1 WHEN POWER IS TURNED "ON"– (START)

The turning on of SW (the main power switch) results in a series of actions which are distinct from copy operations. Therefore, it is necessary to study this flow of actions before copy operations can be considered.

The following table (3-2) gives a brief explanation of the actions occurring at each block of the (START) flowchart. It is recommended that the (START) flowchart be folded out and followed when studying Table 3-2.

Block	Actions Occurring
START	The following are the actions occuring within the machine as it is initially started. It should be noted that a path of operation is provided in the event (COPY) is also desired.
SW- "ON"	Turning ON the power switch (SW) provides power to components within the copier to start the process of machine preparation known as "warm-up". The flowchart shows the most significant components and the condition that they assume at the instant of power turn-on. For information about the operation of those components which are ENABLED, refer to the section indicated next to each. In this section the following points should be noted: a) Transistor Q43 is OFF at this time because its base bias path (C30) is not yet functional. Thus, Q44 is ON to allow the exposure lamps to energize quickly for stabilization of illumination. b) Capacitor C13 will charge for 5.0 seconds before turning Q15 (and, thus, Q16) ON. This delay permits the developer liquid to be pumped to the point where the cleaner blade and drum are in contact so that the toner sticking to the cleaner blade can be dissolved before the drum is started. This decreases the friction between the drum and cleaner blade and prevents the drum surface from being damaged. c) Motor M2 comes ON immediately to stir the developer liquid in the Developer Assembly. This stirring is performed to ensure uniform density of the liquid before copying is performed.
STEP 1S	Capacitor C16 completes its charging and turns on the illumination lamps (FL2 & 3) so that they will stabilize as soon as possible.
STEP 2S	At this time, the main motor (M1), the coronas, and the overall exposure lamp come ON to condition the CdS material in the drum for copying. Capacitor C30 begins to charge so that Q43 can become functional; this charge time is 12.0 secs.
STEP 3S (both "copy" & "no-copy")	Capacitor C30 completes its charging and Q43 is turned ON. As a result, Q44 is biased OFF and will remain so as long as the copier remains "ON". With Q44 OFF, the operation of C16 will henceforth be controlled by voltage through either diode D16 or D17; the voltage through these diodes occurs only when operation is started by pressing the COPY button. If the COPY button is/was pressed, copy operation will begin at 21.7 seconds of operation (4.0 revolutions completed); however, if the COPY button is unpressed, C16 will begin its 8.0 second discharge period (containing the first feed interval).

Block	Actions Occurring
STEP 4S	Due to the operation of MS3A, the delay hold path for K7 is activated – Q22 is turned ON. This path is necessary so that relay K7 will be held active after the deenergization of K6 (FL2 & 3 –OFF) and, thus, permit the drum approximately one extra revolution before it stops. The extra revolution permits the clearing of charges from the drum and prolongs the effective life of the drum CdS material.
STEP 5S	Capacitor C16 completes its discharging and the illumination lamps are turned OFF. Additionally, Q21 is turned OFF so that opening of the conduction path between K7 and Q22 will result in the turning OFF of Q22 and, thus, the deenergization of K7.
STEP 6S	The delay hold path for relay K7 is opened resulting in deenergization of the relay. The drum will continue to turn, however, until the alternate path for voltage to main motor M1 (through MS4) is opened.
STEP 7S	The alternate path for voltage to M1 is broken at this time and the motor, the AC coronas, and the overall exposure lamp are turned OFF. The drum, due to momentum, will turn until approximately 297° to complete its sixth revolution.
END	The machine is now in STANDBY awaiting the depressing of the COPY button to start copy operation.

Table 3-2 Explanation of (START) Flowchart

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

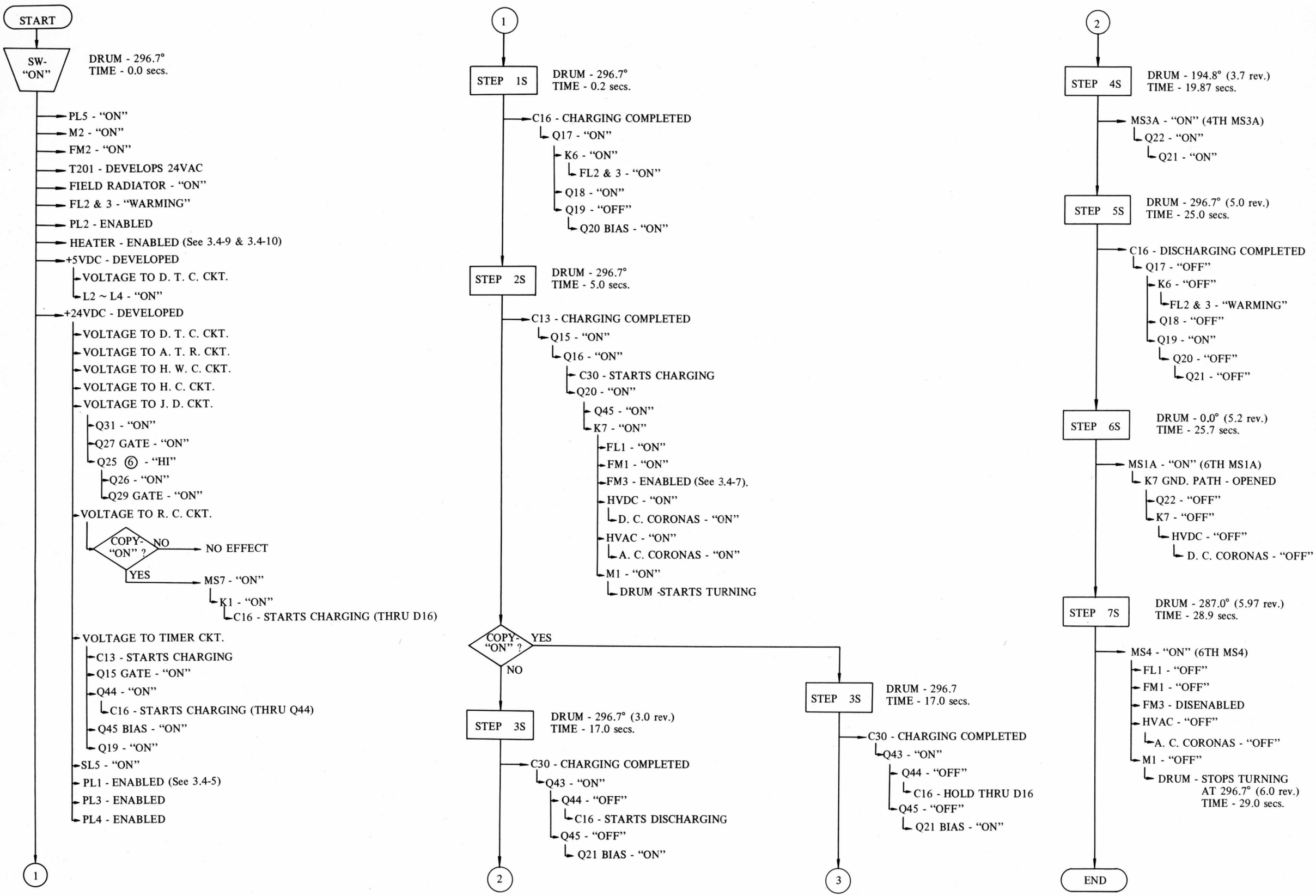


Fig. 3-1 (START) Flowchart (Sheet 1 of 1)

3.2-2 WHEN COPIES ARE DESIRED –(COPY)

The depressing of the COPY button triggers a series of actions which result in the reproduction of the original document. The (COPY) flowchart depicts the actions which occur during the cycles for both "half-size" and "full-size" copy paper.

The initial steps of the flowchart, suffixed with the letter "C", are steps common to both paper sizes. However, beginning with STEP 5, the steps are suffixed with either "CH"(COPY/half-size) or "CF" (COPY/full-size).

The following table (3-3) gives a brief explanation of the actions occurring at each block of the (COPY) flowchart. It is recommended that the (COPY) flowchart be followed when studying Table 3-3.

Block	Actions Occurring
COPY	The following are the significant actions occurring in the copier when copying operations are performed. It should be noted that a path is provided for half and full size copying operation.
COPY-"ON"	Depressing the COPY button turns ON relay K1 through the activation of MS7. The energizing of K1 causes C16 to start charging (through D16) to initiate the operation of the illumination lamps and drum for copying. It should be noted that K1, once energized, is self-holding; thus, at least one copy cycle will occur even if the STOP button is depressed.
STEP 1C	Capacitor C16 completes charging and turns ON the illumination lamps, drum, overall-exposure lamp, and coronas due to the energization of their control relays. It should be noted that K7 energizes at this time because Q16 was placed in continuous conduction by the actions occurring in STEP 3S .
STEP 2C	The actuation of MS3A by the rotating drum causes the K7 delay hold to be turned ON (reference STEP 4S).
STEP 3C	The actuation of MS5 by the rotating drum causes SL1 to turn ON in preparation for the forward movement of the copyboard. SL6 is also enabled for toner feeding if density is low (reference - the ATR ckt. flowchart).
STEP 4C	As MS1A is actuated, the copyboard forward drive clutch (Cℓ1) moves the copyboard forward for the start of the first copy cycle. After this step, flow proceeds to either "Half-size" or "Full-size" operation.
STEP 5CH	If the copy being made is the last copy, the copy selector will be released by the forward motion of the copyboard.
STEP 6CH	The actuation of MS2A by the rotating drum will enable SL7 for the deactivation of the copier should a physical jam have occurred in the machine. The step is effective only for the second or later copy cycle. In the case of the first copy cycle, K11 is not yet energized and, therefore, SL7 cannot possibly operate. (reference - the Jam Detection ckt. flowchart).
STEP 7CH	The actuation of MS14 by the advancing copyboard causes the pickup of paper as well as the other actions shown. The purpose of energizing K10 is to provide a path for energizing relay K11 when the next MS3A pulse occurs.
STEP 8CH	The jam detection interval begun in STEP 6CH comes to an end. This step, also, is only effective for the second or later copy cycle.

Block	Actions Occurring
STEP 9CH	The forward advance of the copyboard releases MS14 (actuated in STEP 7CH), and permits the feeding of the copy paper up to the drum for transfer of the image to the paper. Additionally, C25 begins discharging to hold relay K10 energized until after the next MS3A pulse.
STEP 10CH	The copy paper exits the machine at this time, if the copier is in the second or later copy cycle. With this action, the jam detection ckt. resumes its inter-cycle condition and awaits the next passage of copy paper through the machine.
STEP 11CH	The copyboard advances across MS10 and signals a change of copyboard drive motion - clutch Cℓ2 is energized to drive the copyboard back to the normal starting position. Capacitor C16 is held by the change of voltage from D16 to D17.
STEP 12CH	As K10 is still ON, the actuation of MS3A by the rotating drum energizes relay K11 to turn the jam circuit ON. This turn-on occurs in the first copy cycle and K11 will remain energized until after the last copy exits the machine. Thus, MS3A actuation in the second or later copy cycles will cause no change in the jam detection ckt.
STEP 13CH	Capacitor C25 finishes the discharging action begun in STEP 9CH and causes K10 to deenergize. Should this be the last copy, K11 is now set to be turned OFF when the next MS3A pulse occurs. However, if further copying is being performed, K10 will again be energized to ensure K11 is held ON for jam detection.
STEP 14CH (both last and repeat)	In this step the copyboard motion stops as it returns to the starting position. If no further copying operation are to be performed, capacitor C16 will start its 8.0 second discharge time, known as the Second Feed Interval. In the case of repeat copying, C16 does not start to discharge but remains held for the next copy cycle by voltage through D16.
STEP 15CH (last only)	In last copy operation, the paper begins to exit the machine. As the use of varying sizes of paper is possible, this time and drum position is approximate. However, the paper must start blocking the photocell before the drum reaches 50° in order to prevent jam circuit operation.
STEP 15CH (repeat only)	The copyboard is released so that the next copy cycle can begin as the drum reaches 0°. This is the same as STEP 3C .
STEP 16CH (last copy)	SL7 is enabled for the purpose of jam detection. This is the same as STEP 6CH .

Block	Actions Occurring
STEP 16CH (repeat only)	The second or later copy cycle is begun as the copyboard begins advancing. This is the same as STEP 4C .
STEP 17CH (last only)	SL7 is disenabled as the jam detection period ends. This is the same as STEP 8CH .
STEP 17CH (repeat only)	The copy begins exiting the machine at the approximate time and position shown. As in STEP 15CH (last only), this action must occur before a drum position of 50°.
STEP 18CH	Copy paper now finishes exiting the copier and the jam detection circuit resumes its quiescent condition as in STEP 10CH .
STEP 19CH	As the copyboard is no longer moving, K10 has remained deenergized since STEP 13CH . Thus, the MS3A pulse acts to turn K11 OFF. The jam detection circuit is now deactivated in preparation for the STANDBY condition.
STEP 20CH	Although the drum position and time are different, this step is the same as STEP 5S ; that is, completion of the feed interval as capacitor C16 completes its discharging.
STEP 21CH	The delay hold path for relay K7 is broken at this time as in STEP 6S .
STEP 22CH	The alternate path for the main motor is broken, stopping the drum. This is the same as STEP 7S .
END	The machine is now in STANDBY awaiting the depressing of the COPY button to start the next copy operation.

Block	Actions Occurring
STEP 5CF	If the copy being made is the last copy, the copy selector will be released by the forward motion of the copyboard (see STEP 5CH).
STEP 6CF	The activation of MS14 by the advancing copyboard causes the pickup of paper as well as the other actions shown. The purpose of energizing K10 is to provide a path for energizing relay K11 when the next MS3A pulse occurs (see STEP 7CH).
STEP 7CF	The forward advance of the copyboard releases MS14 (activated above) and, permits the feeding of the copy paper up to the drum for transfer of the image to the paper. Additionally, C25 begins discharging to hold relay K10 energized until after the next MS3A pulse (see STEP 9CH).
STEP 8CF	As K10 is still ON, the actuation of MS3A by the rotating drum energizes relay K11 to turn the jam circuit ON. This turn-on occurs at the beginning of the copy cycle and K11 will remain energized only until after the copy exits the machine. Then it will be deenergized until the next copy. This is similar to STEP 12CH but will occur every copy cycle rather than once in a copy operation series as was the case in "half-size" copying.
STEP 9CF	Capacitor C25 finishes the discharging action in STEP 7CF and causes K10 to deenergize. K11 is now set to be turned OFF when the next MS3A pulse occurs. This is similar to STEP 13CH .
STEP 10CF	The copyboard advances across MS9 and signals a change of copyboard drive motion–clutch Cℓ2 is energized to drive the copyboard back to the normal starting position. Capacitor C16 is held by the change of voltage from D16 to D17 (see STEP 11CH).
STEP 11CF	The paper begins to exit the copier. The timing of this step is the same as STEP 15CH (last only).
STEP 12CF	SL7 is enabled for the purpose of jam detection. This is the same as STEP 6CH (last only).
STEP 13CF	SL7 is disenabled as the jam detection period ends. This is the same as STEP 17CH (last only).
STEP 14CF	Due to machine timing, K10 has remained deenergized since STEP 9CF . Thus, the MS3A pulse acts to turn K11 OFF. The jam detection circuit is now deactivated in preparation for the standby condition or the next copy. This is similar to STEP 19CH .

Block	Actions Occurring
STEP 15CF	In this step the copyboard motion stops as it returns to the starting position. If no further copying operation are to be performed, capacitor C16 will start its 8.0 second discharge time, known as the Second Feed Interval. In the case of repeat copying, C16 does not start to discharge but remains held for the next copy cycle by voltage through D16 (see STEP 14CH).
STEP 16CF (both last and repeat)	Copy paper now finishes exiting the copier and the jam detection circuit resumes its quiescent condition (see STEP 18CH).
STEP 17CF (last only)	Although the drum position and time are different, this step is the same as STEP 20CH ; that is, completion of the feed interval as capacitor C16 completes its discharging.
STEP 17CF (repeat only)	The copyboard is released so that the next copy cycle can begin as the drum reaches 0°. This is the same as STEP 3C .
STEP 18CF (last only)	The delay hold path for relay K7 is broken at this time as in STEP 6S .
STEP 18CF (repeat only)	The second or later copy cycle is begun as the copyboard begins advancing. This is the same as STEP 4C .
STEP 19CF	The alternate path for the main motor is broken, stopping the drum. This is the same as STEP 7S .
END	The machine is now in STANDBY awaiting the depressing of COPY button to start the next copy operation.

Table 3-3 Explanation of (COPY) Flowchart

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

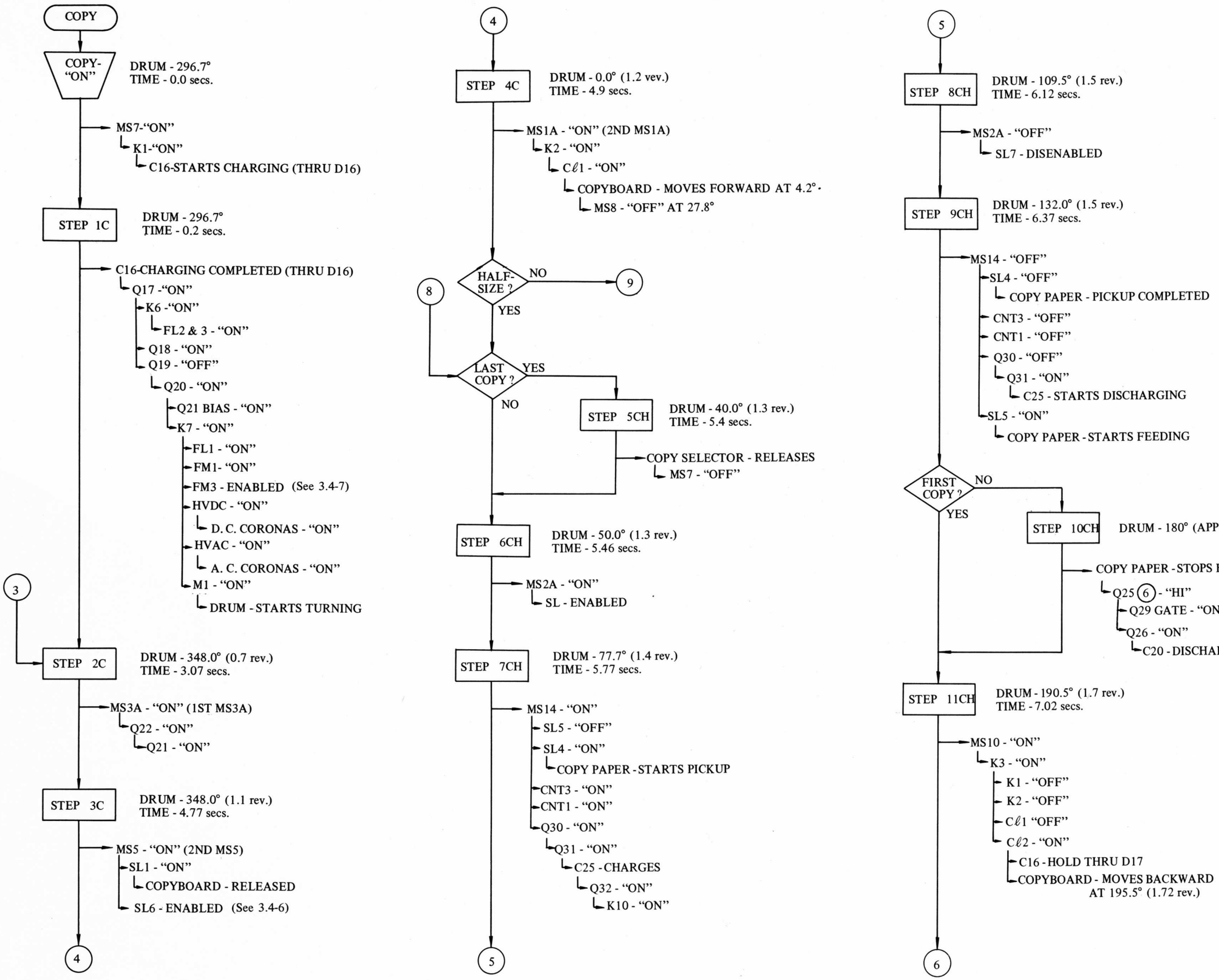


Fig. 3-2 (COPY) Flowchart (Sheet 1 of 3)

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

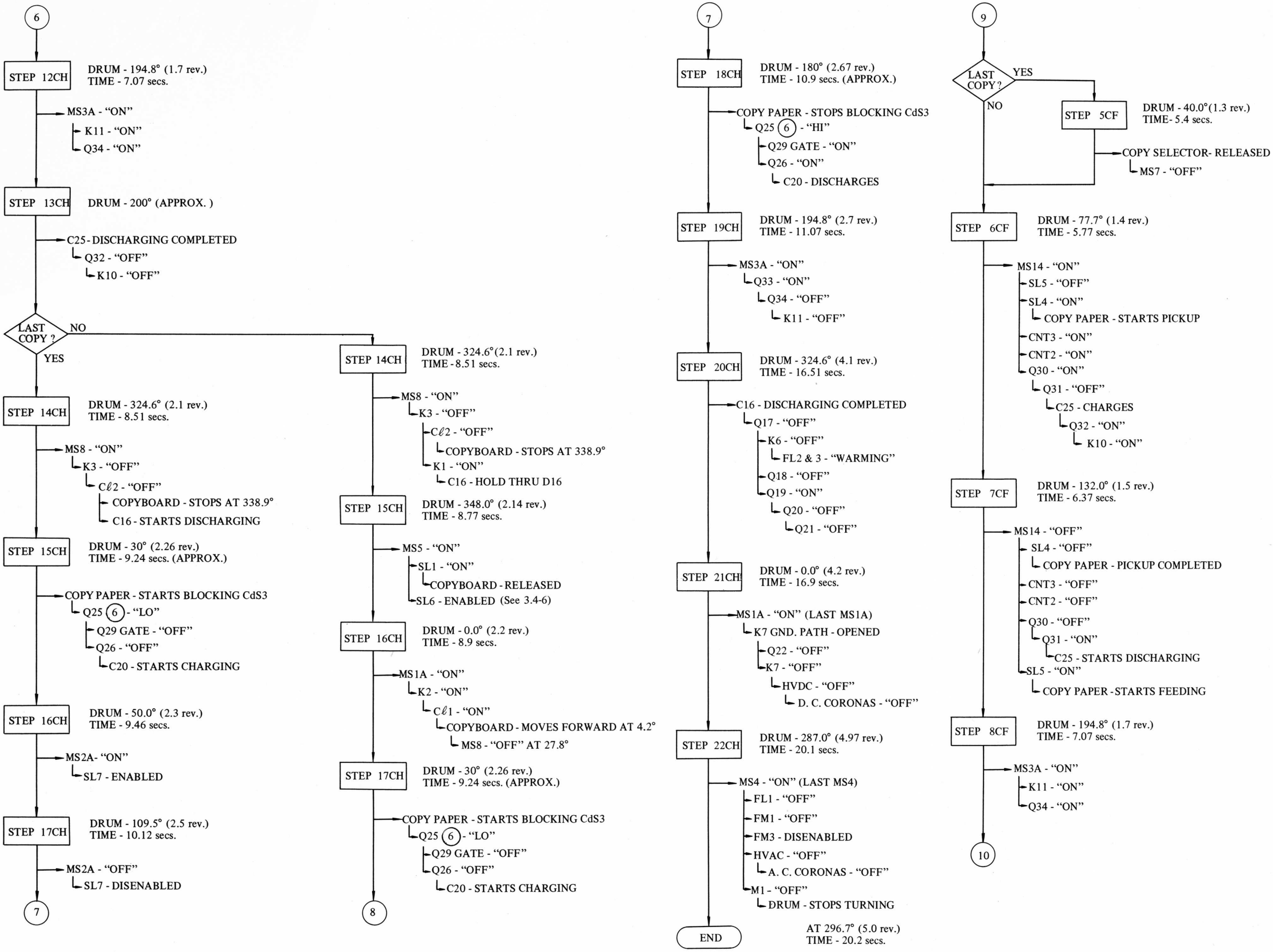


Fig. 3-2 (COPY) Flowchart (Sheet 2 of 3)

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

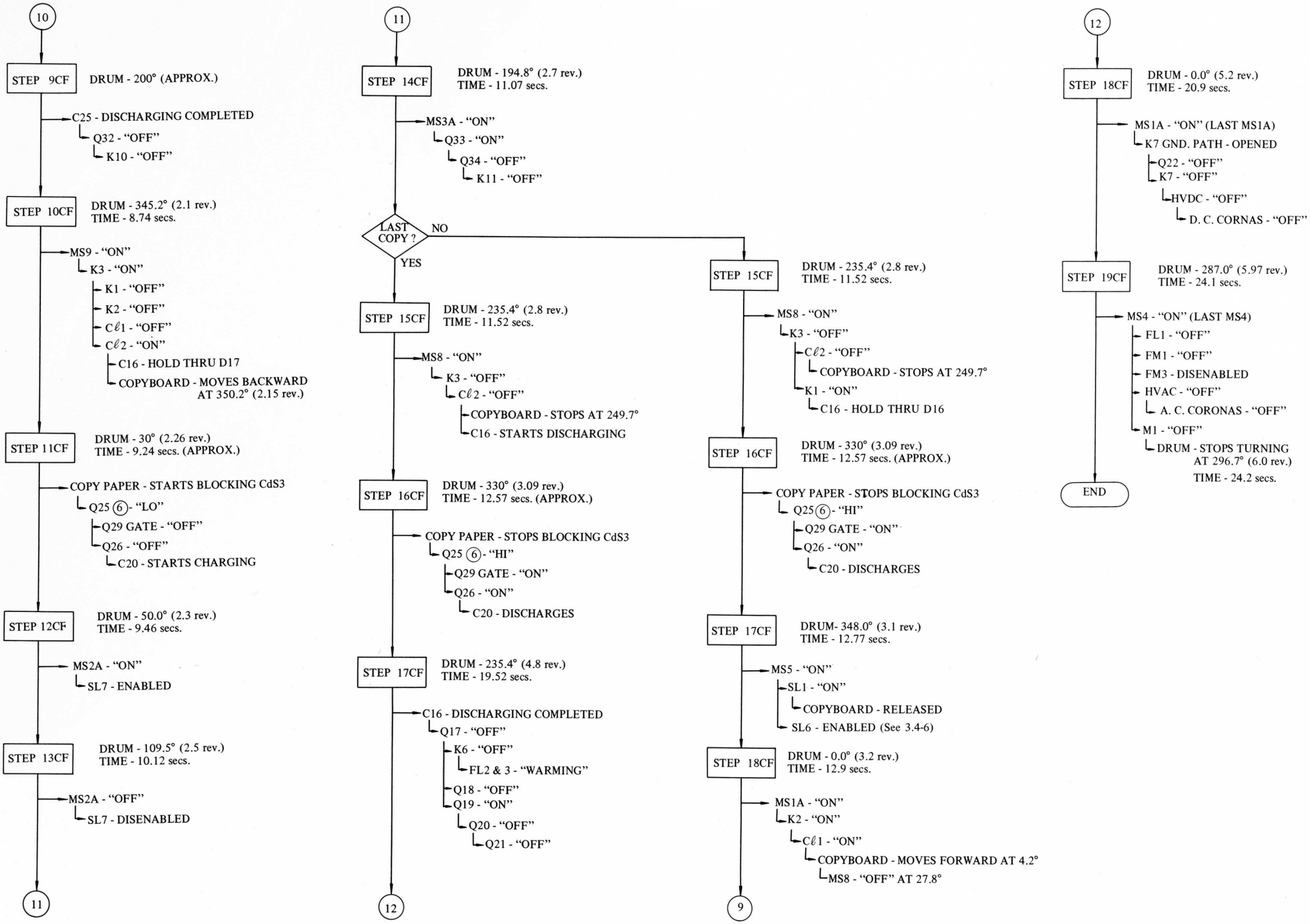


Fig. 3-2 (COPY) *Flowchart (Sheet 3 of 3)*

3.2-3 WHEN COPY PAPER FAILS TO EXIT THE COPIER – (JAM)

The operation of the Jam Detection Circuit, although not essential for copying, is significant in terms of machine protection. As such, a flowchart is included to show the actions occurring in the copier when a jam occurs.

Jams are categorized into either "Delay" jams or "Exit" jams, and the response of the Jam Detection Circuit is different in each case.

1) "DELAY" JAM
A delay jam indicates that the copy paper has, for some reason, been prevented from reaching the exit area of the copier. As this type of jam usually occurs when the paper is not separated properly from the drum, the jam detection circuit responds rapidly to prevent damage. The response to stop copier operations will occur at 410° of drum rotation (4.55 seconds of operation) from the start of the copying cycle during which the jam occurs.

2) "EXIT" JAM
An exit jam indicates that the copy paper has begun, but has failed to complete, its exit of the copier. In this type of jam, the paper is usually free of the drum area, but is in continuous contact with the heater. Because the heater temperature is low (and, thus, the paper cannot start burning), it is not necessary to cause immediate copier shut-off. Thus, the Jam Detection Circuit responds to this jam at 1290° of drum rotation (14.33 seconds of operation) from the start of the copying cycle during which the jam occurs.

The following table (3-4) gives a brief explanation of the actions occurring in each block of the (JAM) flowchart. It is recommended that the (JAM) flowchart be folded out when studying Table 3-4.

Block	Actions Occurring
JAM	The following points are the actions that contribute to the activation of solenoid SL7 when either an "Exit" or "Delay" jam occurs. In order to make this chart applicable to all modes of copying, only the steps related to the operation of the circuit (within the cycle having the jam) are shown.
COPY-"ON"	The condition of the jam circuit components, at the time of COPY button turn-on, is shown here. These components will remain essentially stable until after the copyboard begins advancing. Then, they will be progressively set to different states for jam detection.
STEP 1J	The actuation of MS14, as the copyboard moves forward, not only signals the pick-up of copy paper; it also prepares the Jam Detection Circuit for turn-on. This turn-on will occur at the time of the next MS3A pulse, when relay K11 is energized. NOTE: In the case of "half-size" operation, this will have an effect only in the first copying cycle. For repeat cycles, however, K11 will remain energized and, thus, the Jam Detection Circuit will remain turned on until after the last copying cycle is completed.
STEP 2J	The release of MS14 as the copyboard continues its advance results in the start of capacitor C25 discharging.
STEP 3J	The first actuation of MS3A after MS14 causes the Jam Detection Circuit to turn-on (due to the energizing of relay K11) for the purpose of detecting a "Delay" jam occurring in the present copying cycle. NOTE: In the case of "half-size" operation, K11 turn-on will occur only once during the first copying cycle. For each subsequent cycle, the action of MS3A will have no effect on K11.
STEP 4J	The completion of the discharging of capacitor C25, begun in STEP 2J , occurs in this step. If no additional copies are made, the portion of the jam circuit capable of detecting "Delay" jams will be deactivated by the next MS3A pulse.
STEP 5JE	The copy paper picked up in STEP 2J now begins to exit the copier. As a result of the exiting action, a "Delay" jam detection is prevented. However, the jam Detection Circuit is now set up for the detection of an "Exit" jam, as capacitor C20 begins charging.
STEP 5JD	The copy paper picked up in STEP 2J fails to start exiting the copier as it normally should. Thus, the gate of Q29 remains ON in preparation for the actuation of microswitch MS2A.

Block	Actions Occurring
STEP 6JE	In this step, the copy paper has remained in the exit area of the copier for a long enough time to allow C20 to charge completely. The result is the turning on of Q27, Q28, and Q39 to provide an alternate path for the energization of solenoid SL7. As the solenoid turns ON, it releases microswitches MS6A & MS6B to result in the stopping of copier operations, as shown.
STEP 6JD	As the copy paper failed to begin exiting at its normal time (see STEP 5JD), the copier is turned off with the actuation of MS2A (about 20° of drum revolution later). Solenoid SL7 energizes due to the fact that Q29, K11 and MS2A are all, simultaneously, ON. As in the case of "Exit" jam, microswitches MS6A & MS6B are released to deactivate the copier to prevent drum rotation and heater operation which would result in damage to the copier.
REMOVE JAM	As the copier is now in a partially deactivated condition, it is necessary to remove the jam and reset solenoid SL7, before beginning operation again.

Table 3-4 Explanation of (JAM) Flowchart

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

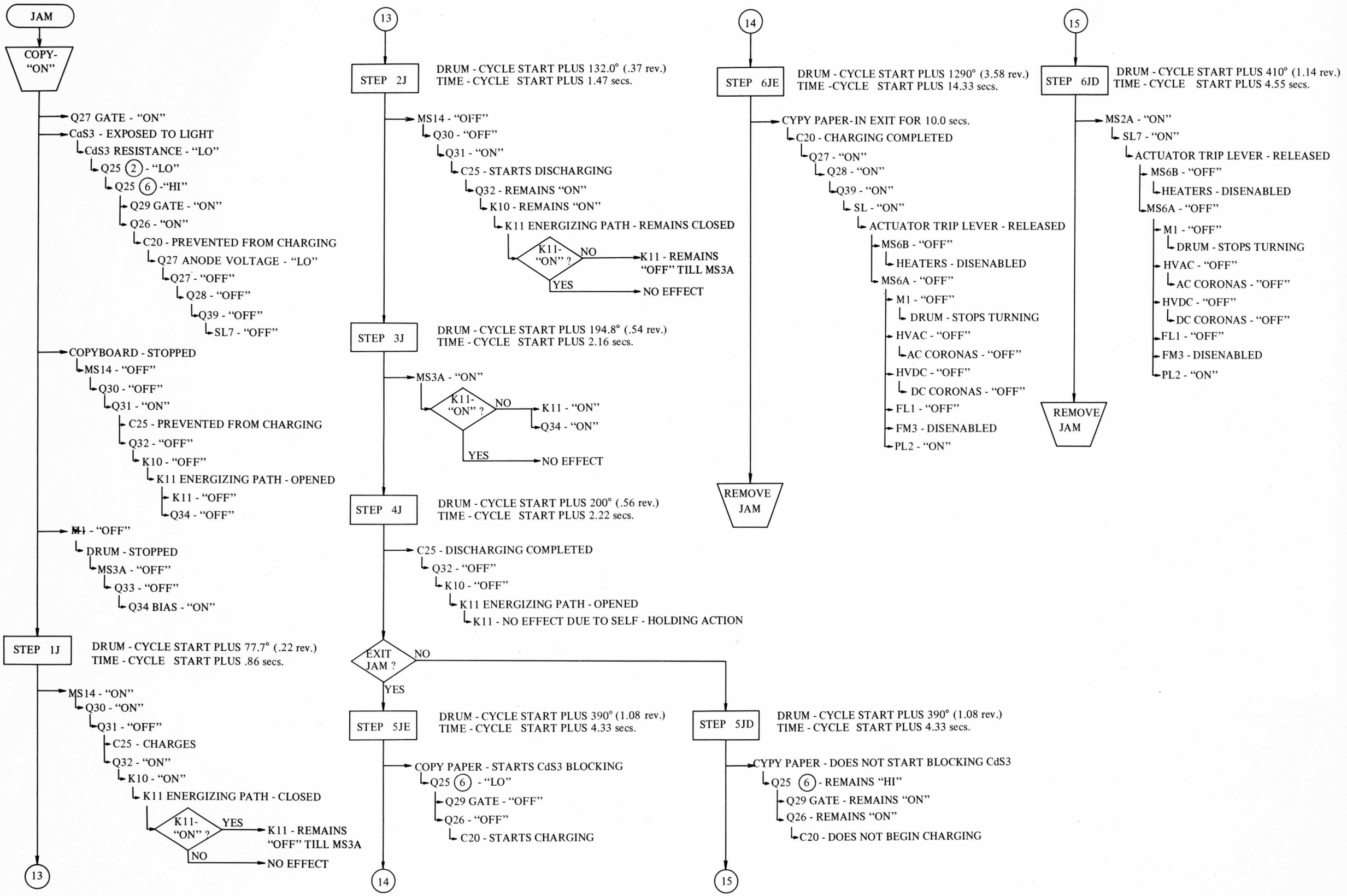


Fig. 3-3 (JAM) Flowchart (Sheet 1 of 1)

3.3 SIGNIFICANT OPERATION TIMES

The importance of timing during the operations of the NP–70 cannot be overstressed. To aid in understanding the general operation of the circuitry, the following breakdown of machine operation time intervals is provided (reference-Fig. 3-4).

3.3-1 HEATER WAIT TIME

As the power switch is turned "ON", the NP–70 proceeds into a period of machine preparation, as shown in the (START) flowchart. This initial period is rather short and it cannot be expected that the Heater Assembly temperature will rise sufficiently, even though the copier is capable of copying in all other ways. Thus, the period in which "copying operation is possible but fixing is incomplete due to insufficient temperature" is designated Heater Wait Time.

Heater wait time is indicated to the operator by the flashing of the "Ready" lamp on the front of the copier. The period of time of the flashing, however, will depend on the length of the interval since the copier was turned OFF. The standard period of flashing will be 2 min. $^{+15\ \text{secs}}_{-20\ \text{secs}}$ (adjustable by VR14), but at times it may be shorter due to residual heat within the assembly.

For further information concerning this time, refer to the section on the Heater Wait Control Circuit in 4-5.

3.3-2 WARM-UP TIME

Due to the design of the Timer Circuit, it is impossible to begin copy operations with the turning ON of the main power switch. This restriction is a built-in safety measure to allow the copier a period in which it can prepare itself for copying. The designation for "the interval in which copy is impossible due to machine preparation" is Warm-up Time.

The interval of warm-up time is the first 21.7 second after the power switch is turned ON. This time is determined by the charge time of capacitor C13 (first 5.0 seconds) plus 4.17 revolutions of the drum. From the completion of warm-up time, the copier will proceed to standby or begin copying operations.

It should be noted that the charge time of C13 will be 60.0 seconds in the event that the copier temperature is below 15°C. In this case warm-up time will be 76.7 seconds.

3.3-3 PRESTART FOR THE FIRST FEED INTERVAL

At 17.0 seconds after the copier is turned ON, capacitor C16 will either begin its 8.0 second discharge period (if no copy is to be performed) or it will be held until copy operations are completed (by voltage through diodes D16 and D17, alternately). The 4.7 seconds between this point and the completion of "Warm-up Time" is designated Prestart for the First Feed Interval.

As we can see, prestart for the first feed interval overlaps with warm-up time. This is due to the fact that the delay hold for relay K7, which must be ON before copying can start, does not come ON until 19.9 seconds after the power switch is turned ON.

3.3-4 FIRST FEED INTERVAL

"The period from the end of warm-up time (21.7 seconds) to the completion of C16 discharge (25.0 seconds)" is designated the First Feed Interval. During this period of 3.3 seconds, the copier is in a condition in which copying operation is possible in one of the following two ways:

1) If the COPY switch was depressed before the start of the first feed interval, copying operation will begin at the start of the first feed interval.

2) If the COPY switch is depressed during the first feed interval, copying operations will begin at the next MS1A pulse rather than proceed to neutral time. In this second case, the time for the start of copy operations will be 25.7 seconds after power switch turn-on.

3.3-5 PRESTART TIME

As distinguished from prestart for the first feed interval, Prestart Time is designated as "the interval from the depressing of the COPY button to the start of copying operations". The dur ation of this time is 4.9 seconds and is determined by the charge time of C13 (0.2 seconds) and 1.17 revolutions of the drum. This time will be constant in either half-size or full-size cop copy cycles (see flowchart COPY-"ON" to STEP 4C)

3.3-6 COPYING CYCLE

The portion of the copying operation during which copy/copies are made is designated the Copying Cycle. This period may be defined as "the interval of time between Prestart Time and the start of discharging of capacitor C16". As the period of time will differ according to the paper size and the number of copies reproduced, the following points should be noted:

1) For "half-size" copies, the time period is 3.6 seconds(see flowchart STEP 4C to STEP 14CH) for the first copy. If more than one copy are being made, 4.0 seconds for each additional copy will be added to the total copying operation.

2) For "full-size" copies, the time period is 6.6 seconds (see flowchart STEP 4C to STEP 15CF) for the first copy. If more than one copy are being made, 8.0 seconds for each additional copy will be added to the copying operation.

3.3-7 SECOND FEED INTERVAL

"The period of time during which capacitor C16 discharges (8.0 seconds at the end of a copying operation" is designated the Second Feed Interval. This period is provided, for the convenience of the operator, so that the copier is capable of resuming operations for a short duration after the completion of the copy cycle started previously (see flowchart [STEP 14CH]) to [STEP 20CH] OR [STEP 15CF] to [STEP 17CF]).

Should the COPY button be depressed after the start of the second feed interval (see flowchart [STEP 14CH] or [STEP 15CF]), a "Copying Cycle" will begin at the next MS1A pulse. This is because the copier is returned to a condition similar to that existing between flowchart [STEP 2C] and [STEP 4C] ; that is, capacitor C16 is charged and the K7 delay hold is in operation.

3.3-8 NEUTRAL TIME

As the copier completes its operations prior to returning to the STANDBY condition, a period occurs when the copier is physically and electrically prepared for the cessation of operation. This period of "copier preparation for STANDBY between the complete discharging of capacitor C16 and the stopping of the drum" is designated Neutral Time.

Due to slight differences in operation timing, the duration of neutral time will vary according to the type of operation previously performed. This timing is as follows:

1) When the initial starting operations are performed, and the COPY button is not pressed, the time will be the last 4.0 seconds. This period is shown in the (START) flowchart as [STEP 5S] to [STEP 7S] (time - 25.0 seconds through 29.0 seconds).

2) When "half-size" copying operations are performed, the time will be the last 3.7 seconds. This period is shown in the (COPY) flowchart as [STEP 20CH] to [STEP 22CH] (time - 16.5 seconds through 20.2 seconds).

3) When "full-size" copying operations are performed, the time will be the last 4.7 seconds. This period is shown in the (COPY) flowchart as [STEP 17CF] to [STEP 19CF] (time - 19.5 seconds through 24.2 seconds).

3.3-9 STANDBY

After completing all operation steps in eigher the (START) or the (COPY) flowcharts, the copier goes to an inactive state known as STANDBY. In this state, all circuits are set for resuming copying operations upon command (i. e., depressing the COPY button). The only active components within the copier during standby are the following.

1) The heater and its control circuit operate to maintain fixing temperatures for the next operation.

2) The developer pump motor (M2) operates to maintain the developer density at a uniform level.

3) The suction blower (FM2) operates to provide ventilation for any fumes which might build up within the copier body due to developer evaporation.

4) The illumination lamps (FL2 & 3) are maintained at an energy level close to that needed for illumination. This warming action ensures that the lamp illumination will stabilize rapidly (during Prestart Time) as the next copying operation is begun.

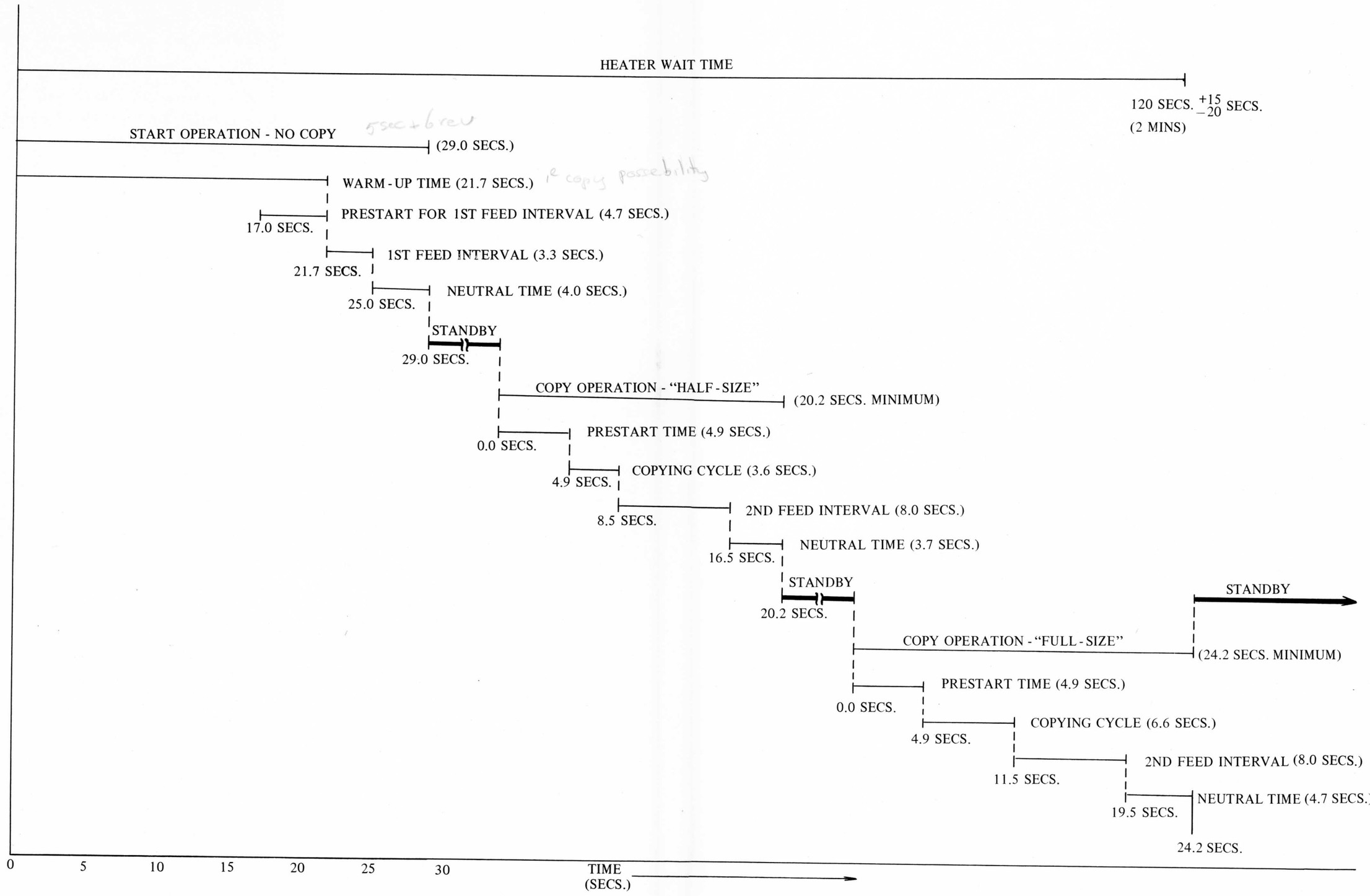


Fig. 3-4 Significant Operation Times

3.4 OUTLINE OF ELECTRICAL COMPONENTS AND CIRCUITS

3.4-1 SWITCHABLE TAPS FOR AC LINE VOLTAGE COMPENSATION (230VAC COPIERS-EUROPE)

This feature is provided in two series of bodies (Product No. 8-11154 & 8-11155) to permit the use of the copiers in countries with either 220V, 230V or 240VAC line voltage. Changes in copier design or components used are not necessary due to inclusion of these compensation taps (reference - 230VAC copier schematic).

3.4-2 AC LINE VOLTAGE FILTER (230VAC COPIERS - EUROPE)

In order to meet certain industrial standards, a low-pass filter is installed in two series of bodies (Product No. 8-11154 & 8-11155). Fig. 3-5 depicts the schematic diagram of this sealed unit.

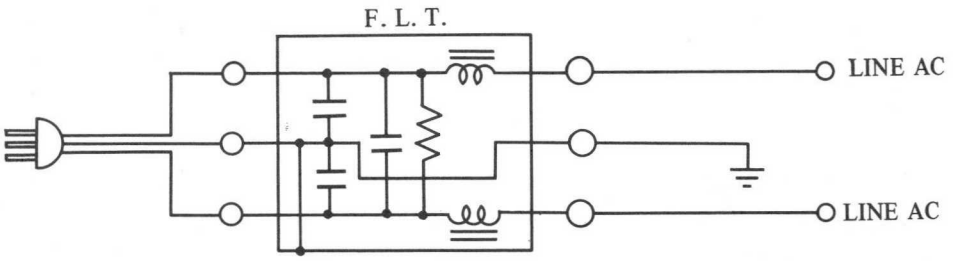


Fig. 3-5 Low-Pass Filter–Schematic Diagram

3.4-3 RECTIFICATION CIRCUIT CARD (ALL COPIERS)

The conversion of the AC voltage stepped-down by the low voltage transformer (LVT) is performed by the rectification circuit card. Part of this card includes the DC voltage regulator, for which the following explanation is provided.

1) VOLTAGE REGULATOR - TYPICAL

If the output of the voltage rectifier is used as a direct power source, it will not be sufficiently stable. Therefore, the rectified voltage output is applied to a voltage regulator to produce a constant level DC voltage, as follows:

a) The output voltage Eo is compared with the constant voltage Ez and, if there is a difference between them, the latter is amplified by the amplifier and applied to the base of transistor Tr.

b) As a result, the transistor operates to reduce the difference and produce a regulated output.

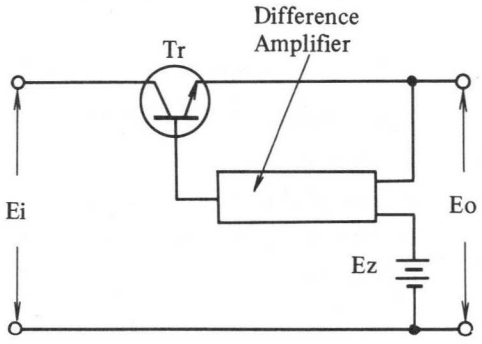


Fig. 3-6 Voltage Regulator – Typical

2) VOLTAGE REGULATOR–NP-70

Fig. 3-7 depicts one of the voltage regulators used in the NP–70. Its operation is as follows:

a) In this regulator, R2 and ZD1 form the constant-voltage circuit & transistor Q3 operates as the Difference Amplifier.

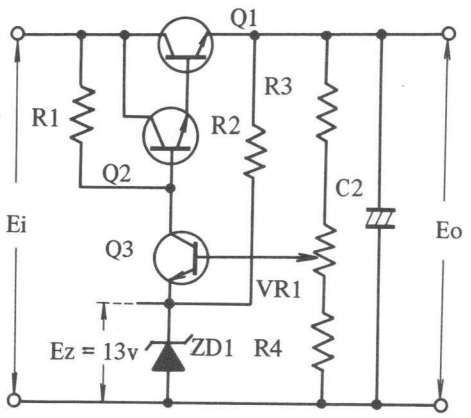


Fig. 3-7 Voltage Regulator

b) Initially, the output voltage is felt across the divider circuit R3, VR1 & R4 and a potential is applied to the base of Q3. Also, constant voltage Ez is applied to the emitter of Q3.

c) If the output voltage (Eo) decreases for some reason, the voltage applied to the base of transistor Q3 will also decrease. Since the voltage applied to the emitter of Q3 is held constant, the decrease of the voltage at the base causes the transistor to conduct less.

d) With the reduced conduction of Q3, the voltage dropped across resistor R1 decreases and the potential applied to the base of Q2 increases. Conversely, the current flow through Q2 & Q1 increases and output voltage Eo increases to its original level.

e) If the output voltage increases, the previous operation is reversed resulting in a reduction back to the correct output voltage level. The output voltage can be varied as desired by using potentiometer VR1.

NOTE: Due to large current flow, two transistors have been used to reflect a high impedance to the difference amplifier.

3.4-4 "RAPID-START" ILLUMINATION CIRCUIT (ALL COPIERS)

Original exposure lamps FL2 & FL3 are illuminated at the start of each copying cycle and must produce a stable light output. Therefore, it is necessary to preheat the filaments prior to each machine cycle. This is accomplished by applying a continuous voltage to the filaments of the fluorescent between copying cycles. Additional warm-up "boost" is provided by the electromagnetic field radiator, which also operates between cycles. This process is called the "Rapid-Start" method.

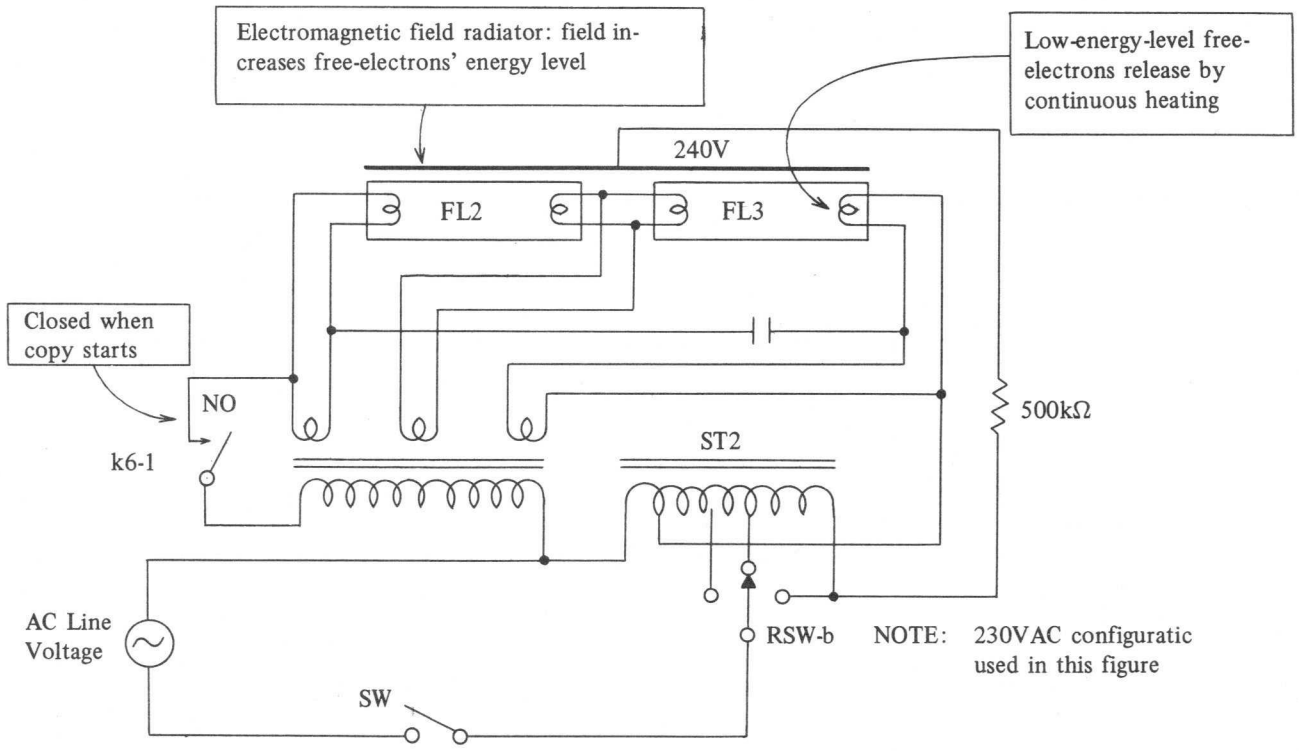


Fig. 3-8 Original Illumination Circuit

Fig. 3-8 shows the basic illumination circuit used in NP–70 machines. When ON/OFF switch SW is turned ON, line AC voltage is applied to the input taps of stabilizer ST2 and the following occurs:

a) The output of the secondary winding (8.5 VAC) is applied to the filaments of fluorescent lamps FL2 & 3 to heat them and release low-energy-level free-electrons.

b) From the primary side, an output is provided to apply 240VAC to the electromagnetic field radiator. As the radiator is parallel to, and in close proximity with, the lamps, its electromagnetic field increases the energy-level of the free-electrons formed by fillament warming.

c) The start of a copy operation causes relay K6 to energize and, thus, apply the full level of the AC line voltage to the lamps. As a result, ionization takes place immediately.

3.4-5 HEATER WAIT CONTROL CIRCUIT (ALL COPIERS)

The heater wait control circuit controls the operation of the "Ready" lamp during the initial period after the copier is turned ON. However, the action that this circuit takes will depend on the heater temperature at the time SW comes ON.

The following figure (3-9) shows the heater wait control circuit and its associated components. The operation of this circuit is explained in the flowchart (Fig. 3-10) and table (3-5) accompanying.

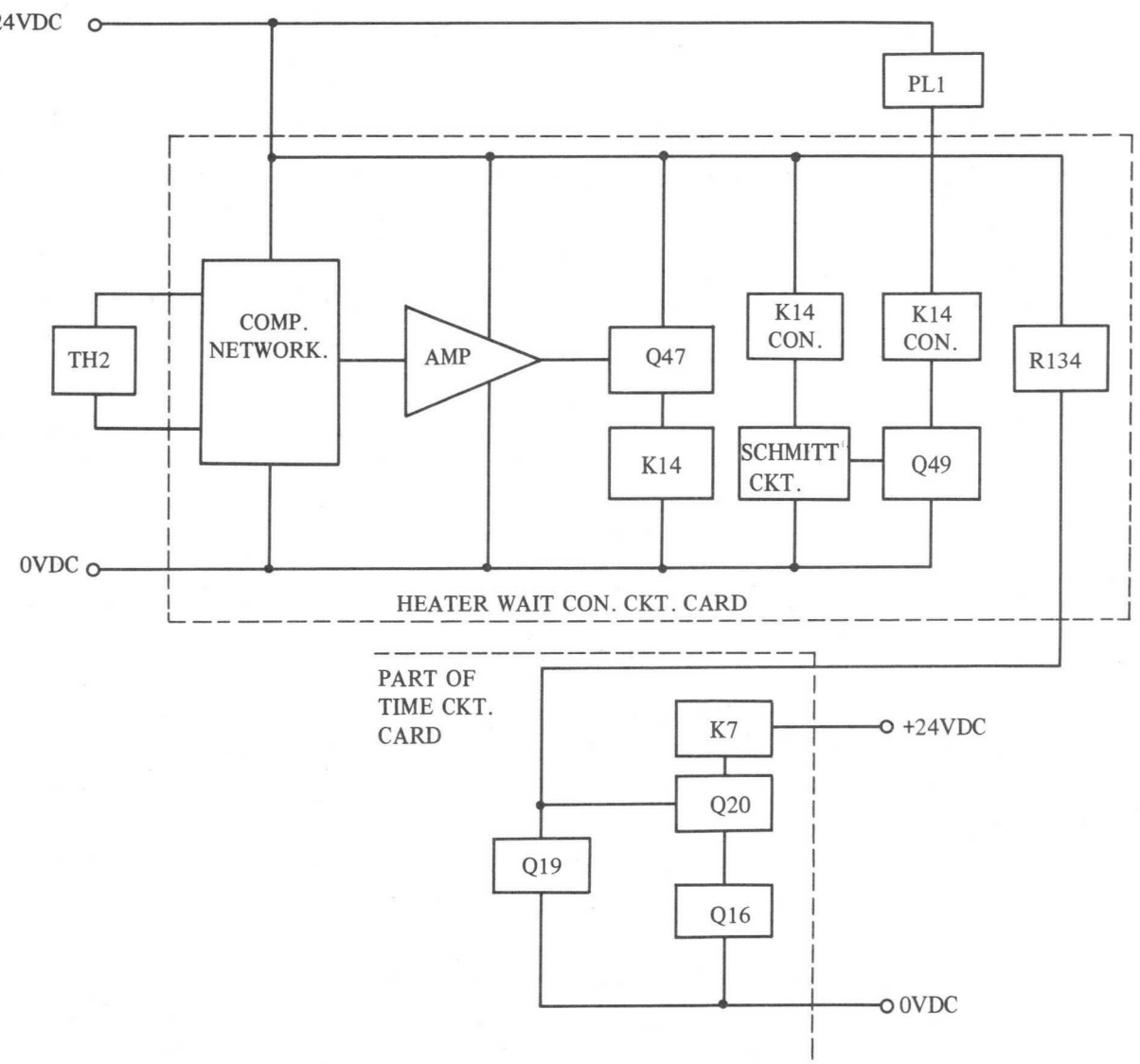


Fig. 3-9 Heater Wait Control Circuit & Associated Components

Block	Actions Occurring
SW- "ON"	As the main power switch is turned ON, the copier will proceed to its normal initial start cycle. Also, it will proceed to the heater wait time cycle shown.
STEP 1HW	Assuming that the heater is cool, the wait control circuit will respond by holding relay K14 de-energized. This action provides a path for the operation of the Schmitt trigger circuit which controls PL1. At this time the Schmitt trigger circuit, however, is non-operational as C31 has just begun charging.
STEP 2HW	The charge of capacitor C31 reaches 4VDC and the Schmitt trigger is activated to turn ON Q49 and, thus, PL1. As this occurs, C31 begins to discharge.
STEP 3HW	Capacitor C31 discharges sufficiently to deactivate the trigger circuit & PL1. As this occurs, charging is resumed until STEP 2HW can be repeated.
STEP 4HW	As the temperature of the heater reaches 160°C, relay K14 is activated to break the path for operation of PL1 and the Schmitt trigger circuit.
END	This circuit will now remain in the condition of STEP 4HW until the copier is turned OFF.

Table 3-5 Explanation of "Heater Wait" Flowchart

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

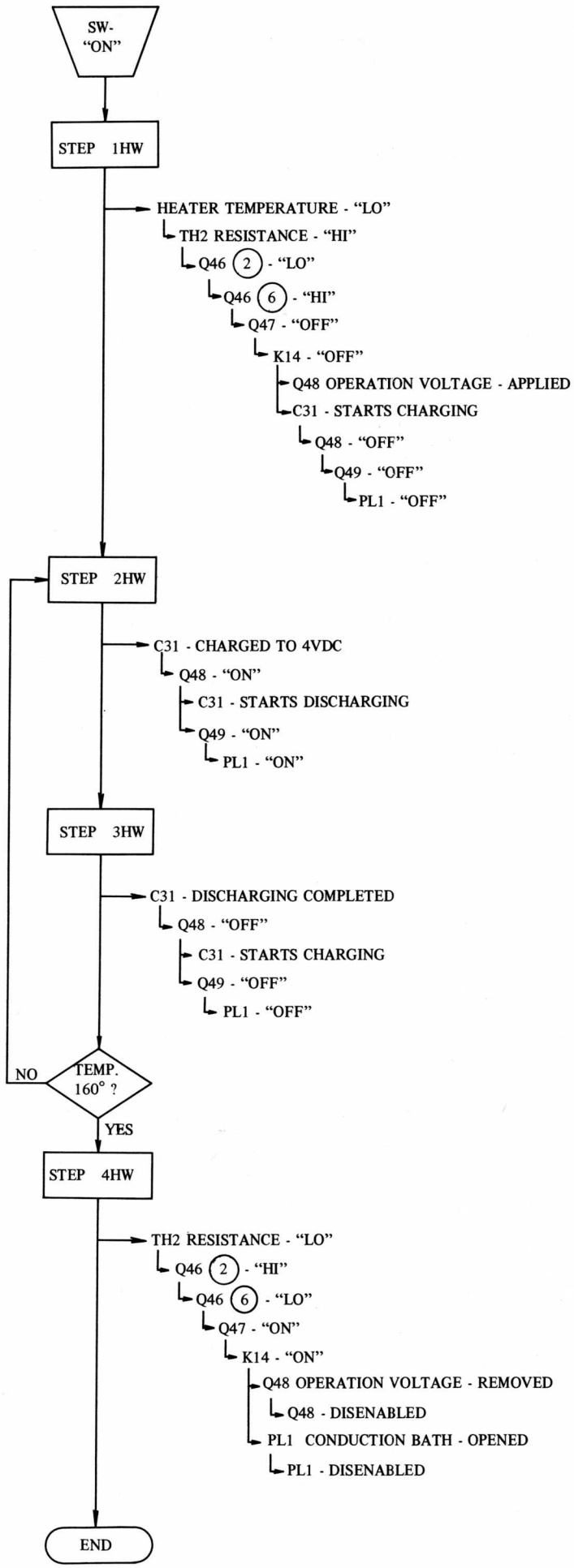


Fig. 3-10 "Heater Wait" Flowchart

3.4-6 DEVELOPER MONITORING CIRCUITRY (ALL COPIERS)

The monitoring of the developer is performed in two way. The first, developer density, is performed by the A. T. R. circuit and the second, developer level, is performed by mechanical means (float & microswitch operation).

Fig. 3-11 shows the circuitry associated with both modes of developer monitoring.

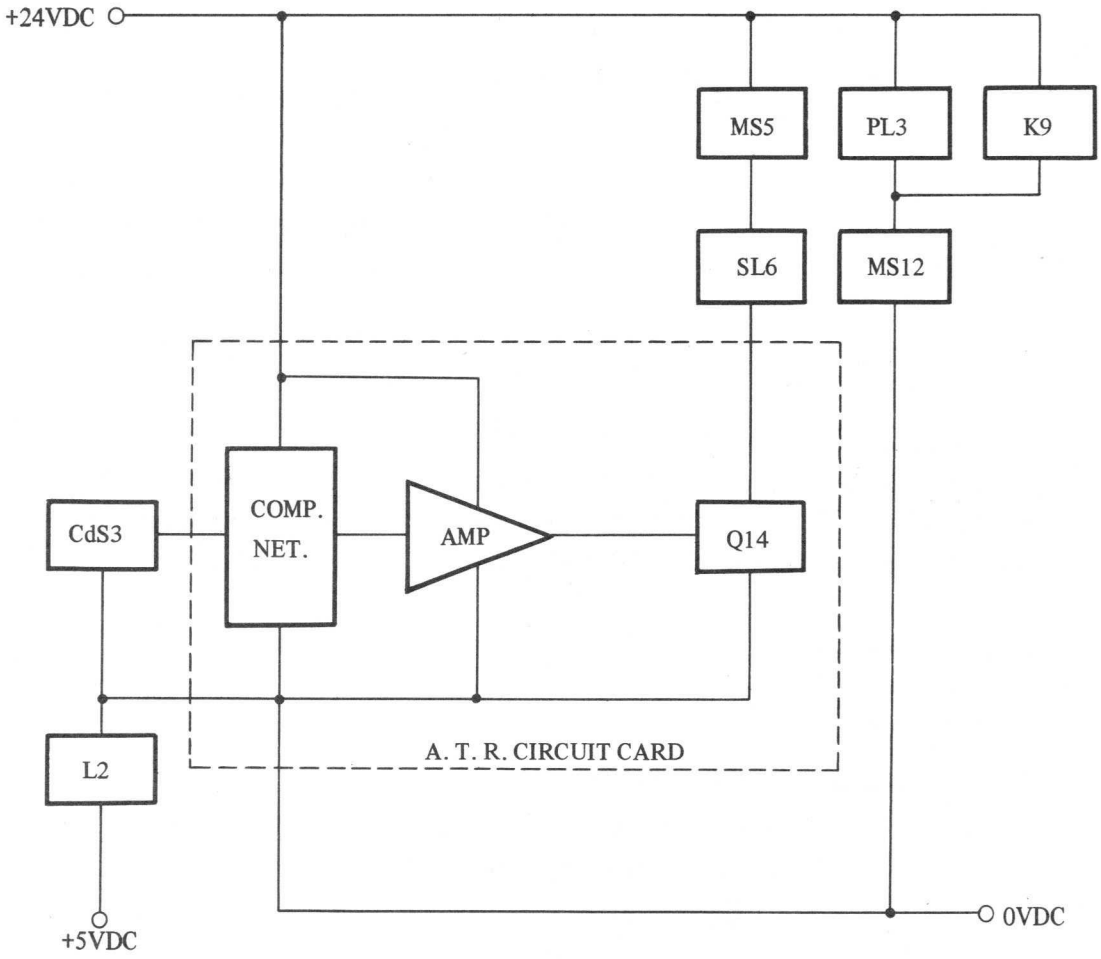


Fig. 3-11 Developer Monitoring Circuitry

1) OPERATION – A. T. R. CIRCUIT

The A. T. R. circuit, which constantly monitors the density of the developer liquid, operates as shown in the flowchart in Fig. 3-12. When the density drops below the correct level due to copy operations, the illumination of photocell CdS1 is sufficient to cause the comparator output (Q13 (6))to change to +24VDC. This change results in the gating of Q14 and, when the next MS5 pulse occurs, the feeding of toner into the Developer Assembly.

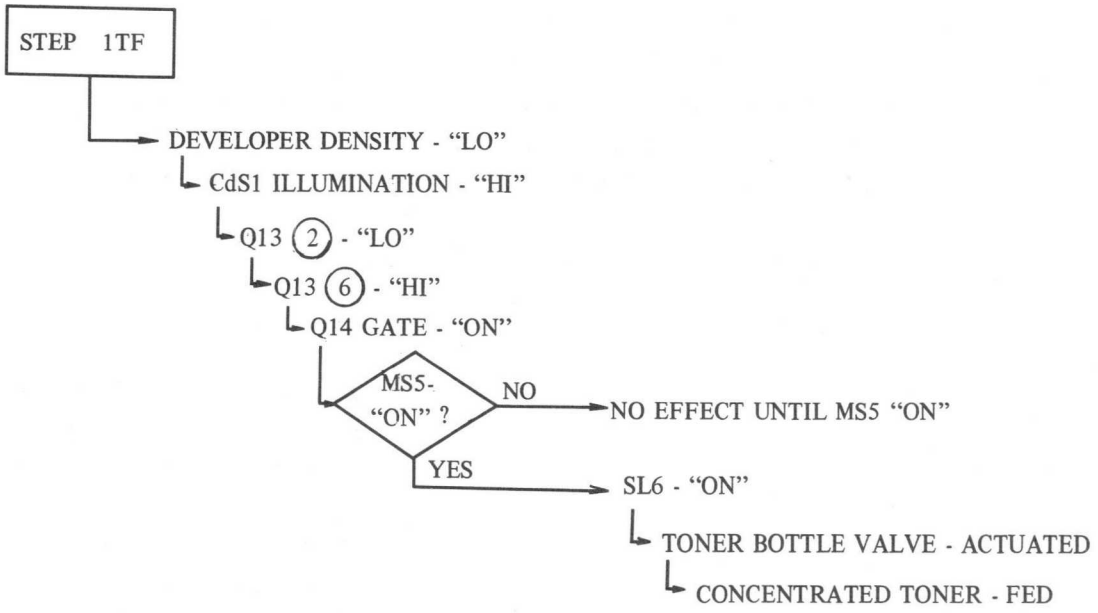


Fig. 3-12 "Toner Feed" Flowchart

2) OPERATION – DEVELOPER LEVEL CIRCUITRY

In order to protect the copier, the level of the developer in the Developer Assembly is constantly monitored. Should the level fall below the prescribed safety limit (1.8 ℓ), the actions shown in the flowchart in Fig. 3-13 will occur.

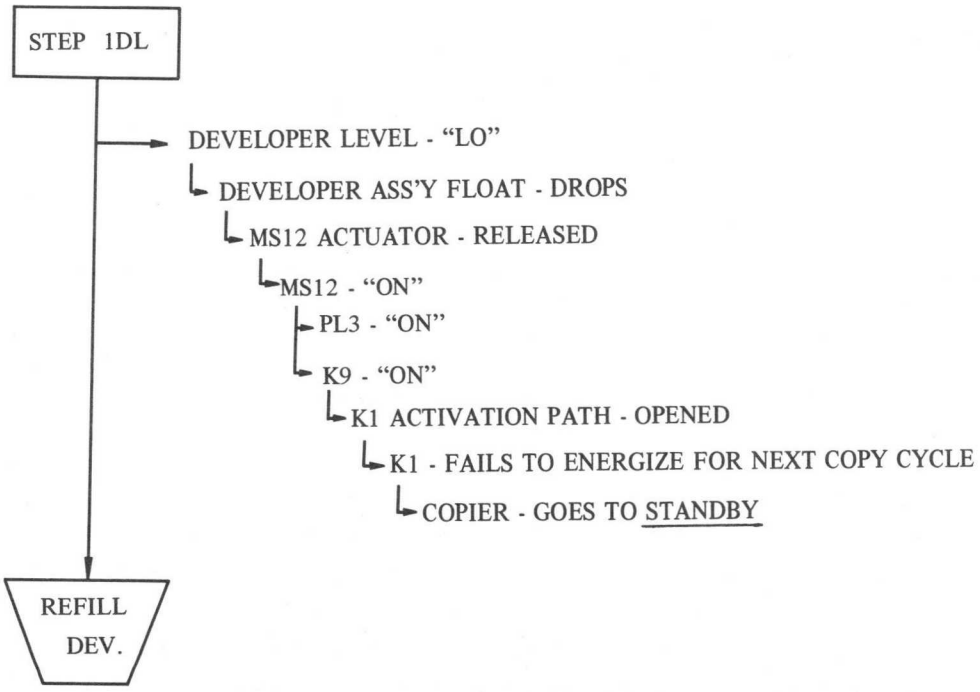


Fig. 3-13 "Developer Low" Flowchart

As shown in the flowchart, the copier goes to STANDBY automatically when the developer level drops. In this case, it is necessary to refill the Developer Assembly before copy operations can be resumed.

3.4-7 DEVELOPER TEMPERATURE CONTROL CIRCUIT (ALL COPIERS)

The developer temperature control circuit operates to limit the temperature in the vicinity of the Developer Assembly to 42 ± 3°C through the turning ON of FM3. This action prevents the excessive evaporation of the dispersant carrier of the developer fluid which occurs at high copier body temperatures.

Fig. 3-14 shows the developer temperature control circuit and its associated components.

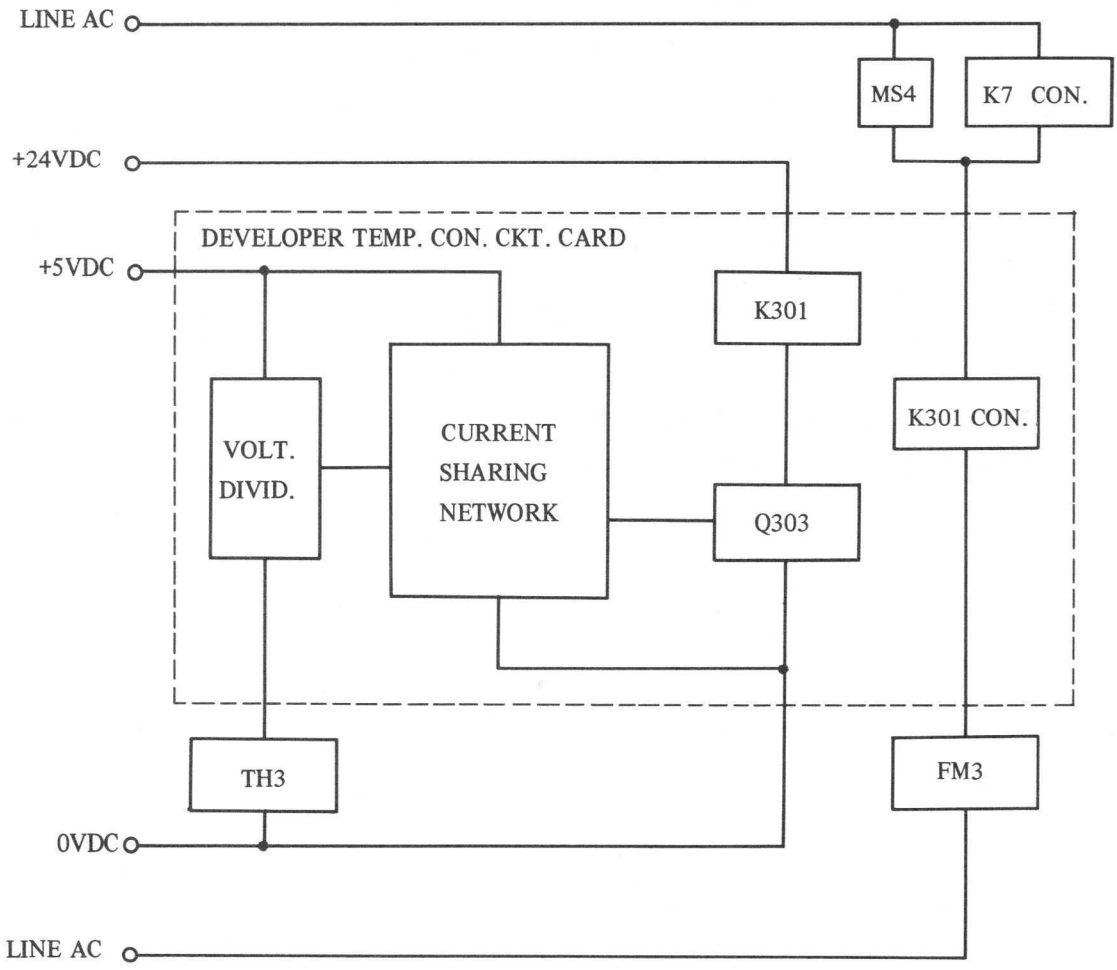


Fig. 3-14 Developer Temperature Control Circuit & Associated Components

1) OPERATION

This circuit activated cooling fan FM3 whenever the simultaneous conditions of high temperature and drum rotation are present. This sequence can be seen in the flowchart in Fig. 3-15.

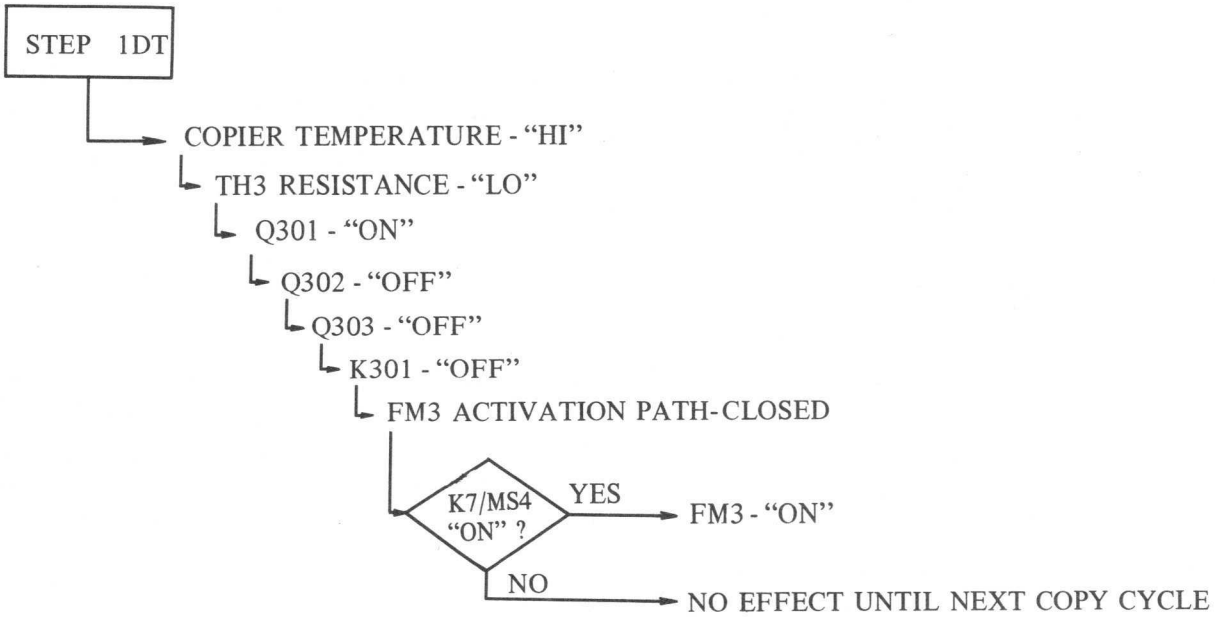


Fig. 3-15 Developer Cooling Flowchart

As shown in the flowchart, operation of FM3 is the result of the circuit action which de-energizes relay K301 to close the activation path for cooling fan FM3.

3.4-8 PAPER CASSETTE MONITORING CIRCUITRY (ALL COPIERS)

The Jam Detection Circuit, in addition to checking the exit condition of copy paper during copy operations also constantly monitors to ensure that a supply of paper is present in the paper cassette and that the cassette is properly seated in the copier.

This additional portion of the jam detection circuit is depicted in Fig. 3-16 with its associated components.

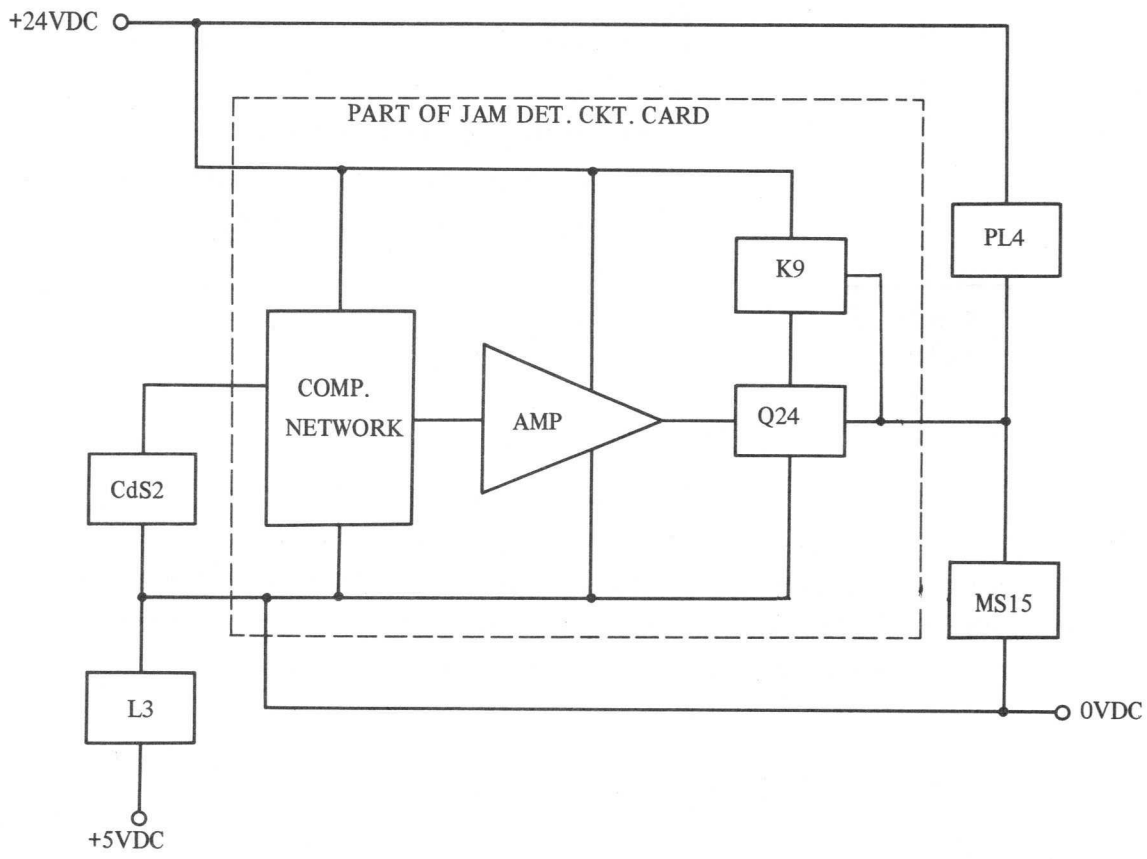


Fig. 3-16 Paper Cassette Monitoring Circuitry

1) OPERATION – CASSETTE EMPTY

This circuitry operates to bring the copier to STANDBY whenever the cassette becomes empty. This sequence is depicted in the flowchart in Fig. 3-17.

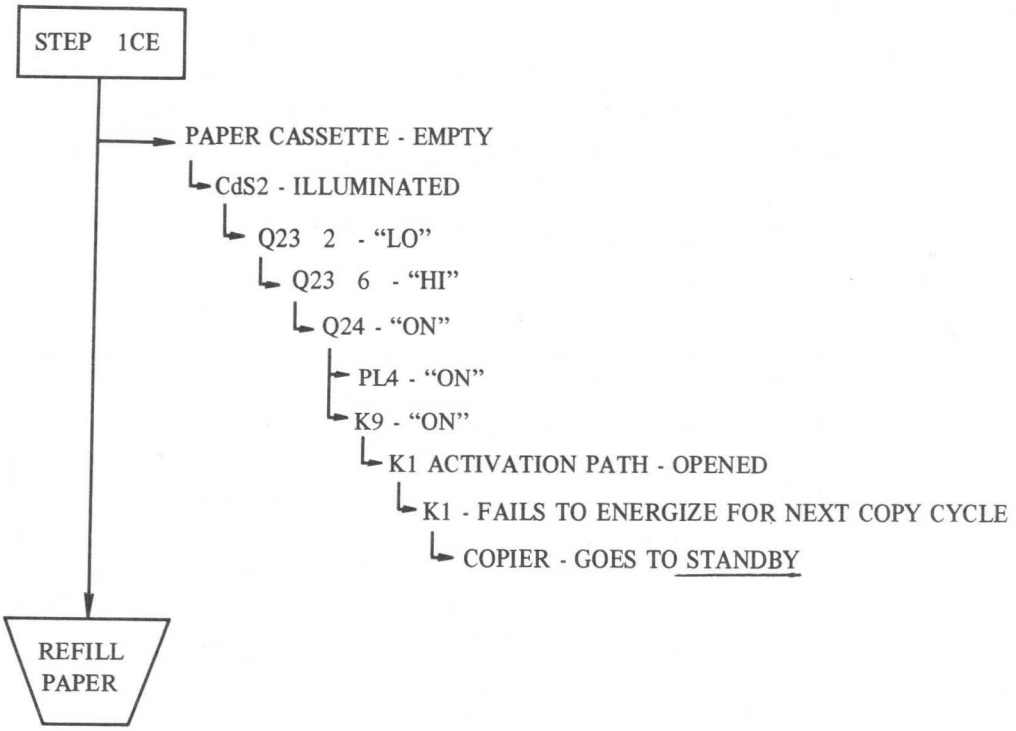


Fig. 3-17 "Cassette Empty" Flowchart

As shown in the flowchart, the copier returns to STANDBY as result of the opening of the path for activating relay K1 for the next copy cycle. If this action were not performed, the copier would sense a "Delay" jam and respond accordingly.

2) OPERATION – CASSETTE NOT SEATED

The paper cassette monitoring circuitry also prevents operation whenever the cassette seating is improper. This sequence is depicted in the flowchart in Fig. 3-18.

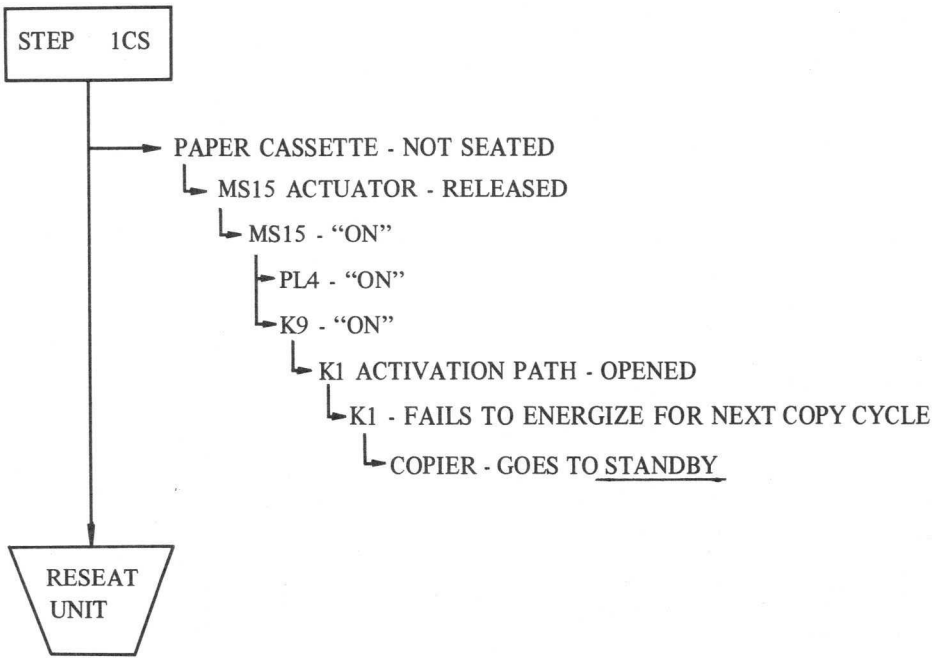


Fig. 3-18 "Cassette Not Seated" Flowchart

The copier is prevented from operating when the cassette is not seated in the same manner as when the cassette is empty; the K1 activation path is broken to ensure that operation of the copier cannot be accomplished.

3.4-9 HEATER CONTROL CIRCUIT (100VAC COPIERS ONLY)

The heater control circuit operates to maintain the temperature of the Heater Assembly at 180 ± 3°C through the controlling of the operation of heaters H2 & H3. The limiting of the Heater Assembly to the above temperature range assures the proper fixing action as the copy exits the machine.

Fig. 3-19 shows the heater control circuit and its associated components.

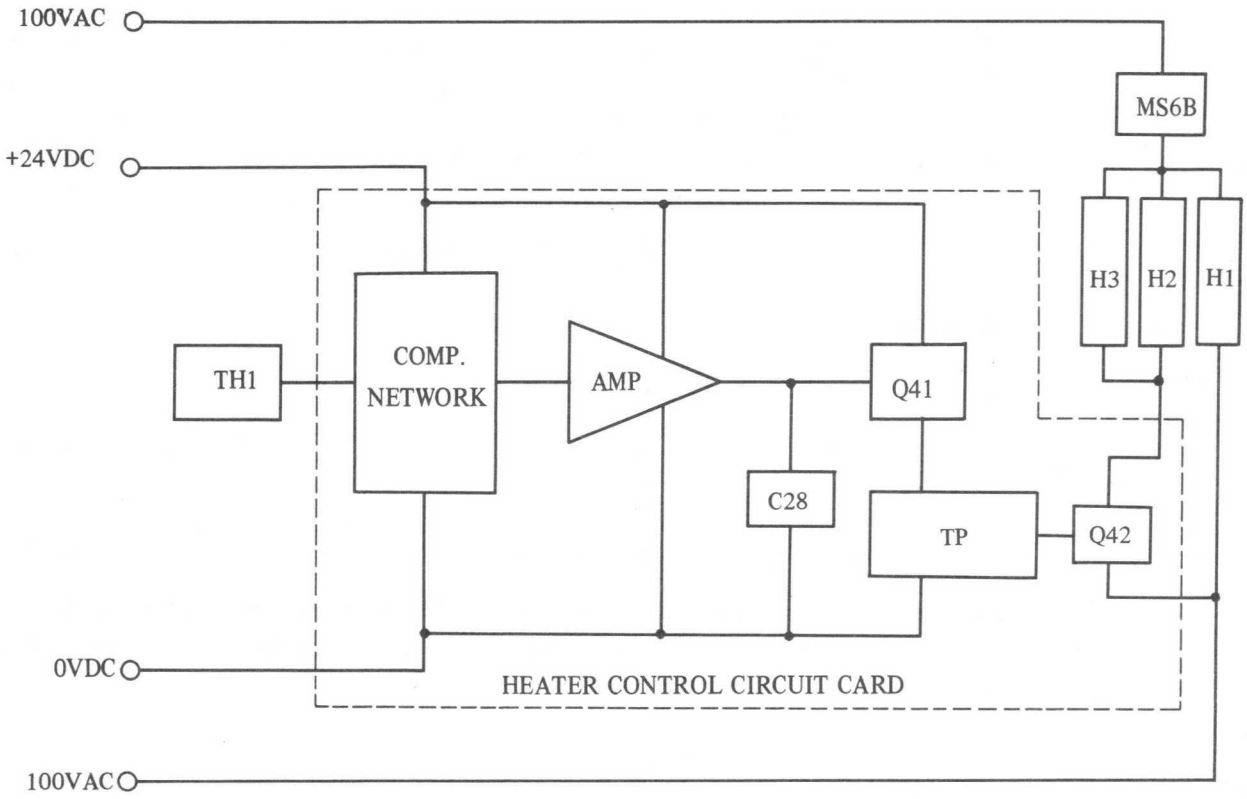


Fig. 3-19 Heater Control Circuit & Associated Components

The operation of the heater control circuit is explained in the flowchart in Fig. 3-20 and the accompanying table (3-6).

Block	Actions Occurring
SW- "ON"	As the copier is turned ON, the START operation is begun. Simultaneously, the heater control circuit begins operation to permit heater operation until the correct temperature is reached.
STEP 1HO	Initially, as the heater temperature is low, the circuit responds by generating a "HI" output from Q40. Due to the +20VDC level of Q40 (6), capacitor C28 begins charging.
STEP 2HO	As the charge of C28 reaches the operation voltage level sufficient to cause unijunction transistor Q41 to turn-ON referred to here as the Q41 Gate), conduction begins through Q41 and C28 immediately discharges. The flow of current (during the above mentioned discharge) causes the development of a pulse in the primary winding of transformer TP. The pulse is immediately felt in the secondary winding of the transformer and results in the turning ON of triac Q42 for 1/2 alternation of the input A. C. voltage. It should be noted that the discharge time of C28 is almost instantaneous and, thus, Q41 is only ON for a short period. As soon as Q41 turns OFF, C28 begins charging again to resume the pulse generation cycle.
STEP 3HO	As soon as the heater temperature reaches the correct level, Q40 responds by developing a "LO" output of 0VDC. Consequently, capacitor C28 can no longer charge to turn-on Q41 to develop a trigger. Operation of the heaters (H2 & H3 only) will be prevented until the temperature drops below the correct range.
END	The operation of the heater control circuit is now fixed until the temperature of the Heater Assembly drops sufficiently to signal a change to the "LO" temperature state.

Table 3-6 Explanation of Heater Operation Flowchart

NOTE: This flowchart is applicable to all NP-70 copiers, regardless of input voltage. As such, the following preconditions are applicable:

1) Toner is at the proper density.
2) Paper is in the cassette.
3) The cassette is properly seated.
4) Developer is in the Developer Assembly and the assembly is full.
5) There is no jam condition in the copier.
6) All doors are closed and circuit-breakers are reset.
7) Timing of the drum is based on "normal" conditions, as depicted in the timing chart.
8) All components are operating at correct levels.
9) The machine is, otherwise, in correct working order.

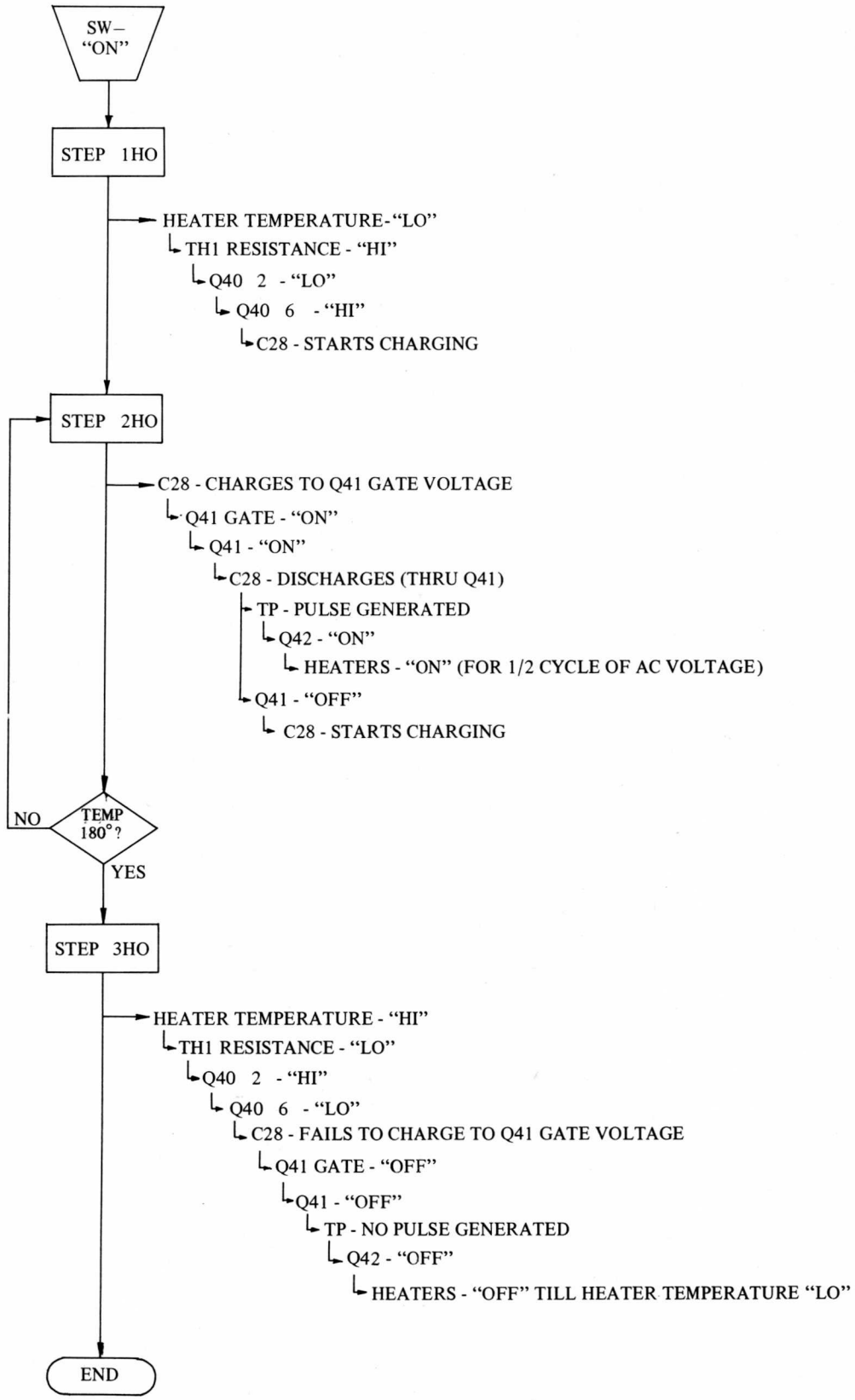


Fig. 3-20 Heater Operation Flowchart

3.4-10 HEATER CONTROL CIRCUIT – "ZERO-CROSS" (ALL COPIERS EXCEPT 100VAC)

The "Zero-Cross" Heater Control Circuit operates to maintain the temperature in the Heater Assembly at 180 ± 3°C, but its operation differs from the previously explained heater control circuit. These differences are as follows:

a) In machines using the "Zero-Cross" circuit, all heater elements are controlled. In the 100VAC circuit, one element operates continuously while the other two elements are controlled.

b) The "Zero-Cross" circuit is divided into two control portions – one for activating the heaters in a continuous, but low-level, manner and one for activating the heaters at a high level when the temperature drops.

c) The "Zero-Cross" circuit uses a step-down transformer to convert the high A. C. line voltage for controlling operations of the circuit.

Fig. 3-21 shows the "Zero-Cross" circuit and its associated components.

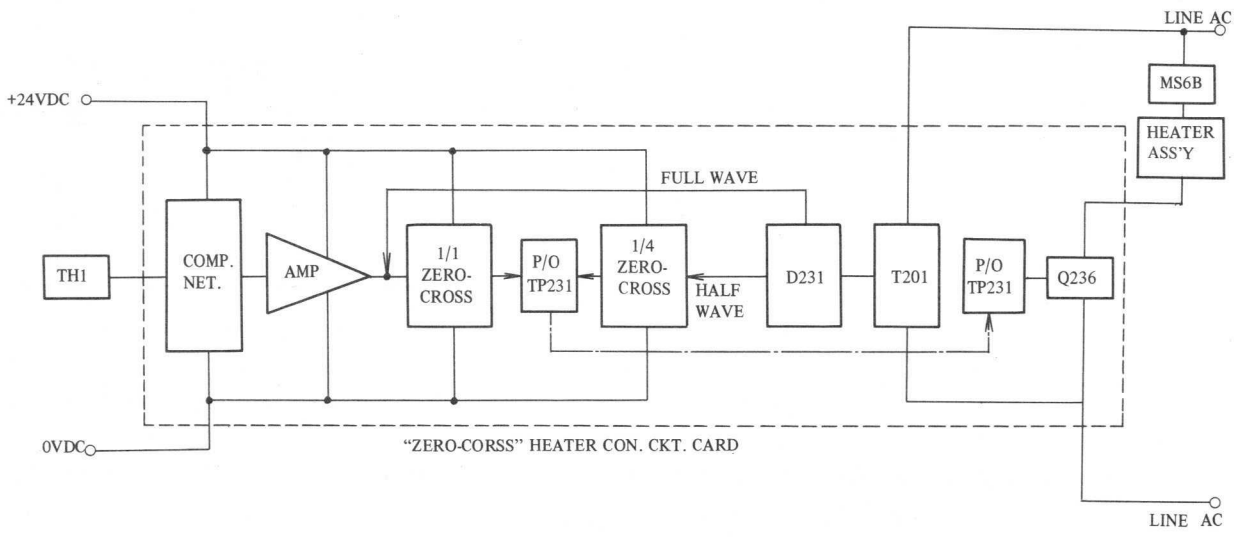


Fig. 3-21 "Zero-Cross" Con. Ckt. & Associated Components

1) OPERATION – GENERAL

The "Zero-Cross" heater control circuit begins operation as soon as the copier is turned ON. The general operation is as follows:

a) As the copier is turned ON, line voltage is applied to transformer T201 and 24VAC is applied to bridge-rectifier D231.

b) The bridge rectifier provides a full-wave rectified signal to the 1/1 zero-cross portion of the circuit and a half-wave rectified signal to the 1/4 zero-cross portion.

c) The 1/4 zero-cross circuit responds by producing a spike-like pulse every fourth 1/2 cycle of the A. C. line voltage to trigger the heaters for low-level operation.

d) If the temperature of the heaters is low, the 1/1 zero-cross circuit will be enabled by the output of Q235. This operation will cause the heaters to operate at high level until they are sufficiently hot.

e) When the heater temperature is at the correct level (180 ± 30°C), the 1/1 zero-cross portion is disenabled and stops functioning. The 1/4 circuit, continues to operate.

2) OPERATION – 1/4 ZERO-CROSS CIRCUIT

This circuit operates continuously to provide the Heater Assembly with triggering for low-level operation, as follows (reference – Fig. 3-22 & 3-23):

a) The voltage from rectifier D231 is applied to the base of Q233 and results in the alternate ON - OFF action of the transistor.

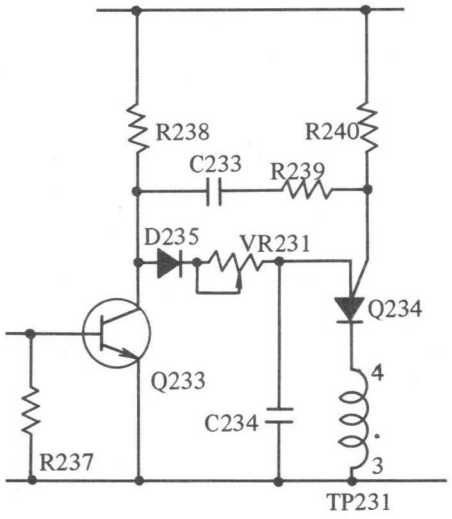


Fig. 3-22 1/4 Zero-Cross Circuit

b) During the periods that Q233 is conducting, the charge of capacitor C234 remains constant. However, during periods of Q233 non-conduction, C234 charges at a rate determined by the setting of variable resistor VR231.

c) As shown in the waveforms in Fig. 3-23, C234 will be completely charged at the time the AC voltage has completed two alternations.

d) As the third AC alternation is begun, the charge of C234 reaches the level sufficient to cause conduction through Q234. The turning ON of Q234 results in the rapid discharge of C234 through transformer TP231.

e) The flow of current through TP231 appears as a spike-like waveform and causes the triggering of the heaters by gating ON triac Q236.

Fig. 3-23 depicts the waveforms for the operation of the 1/4 zero-cross circuit.

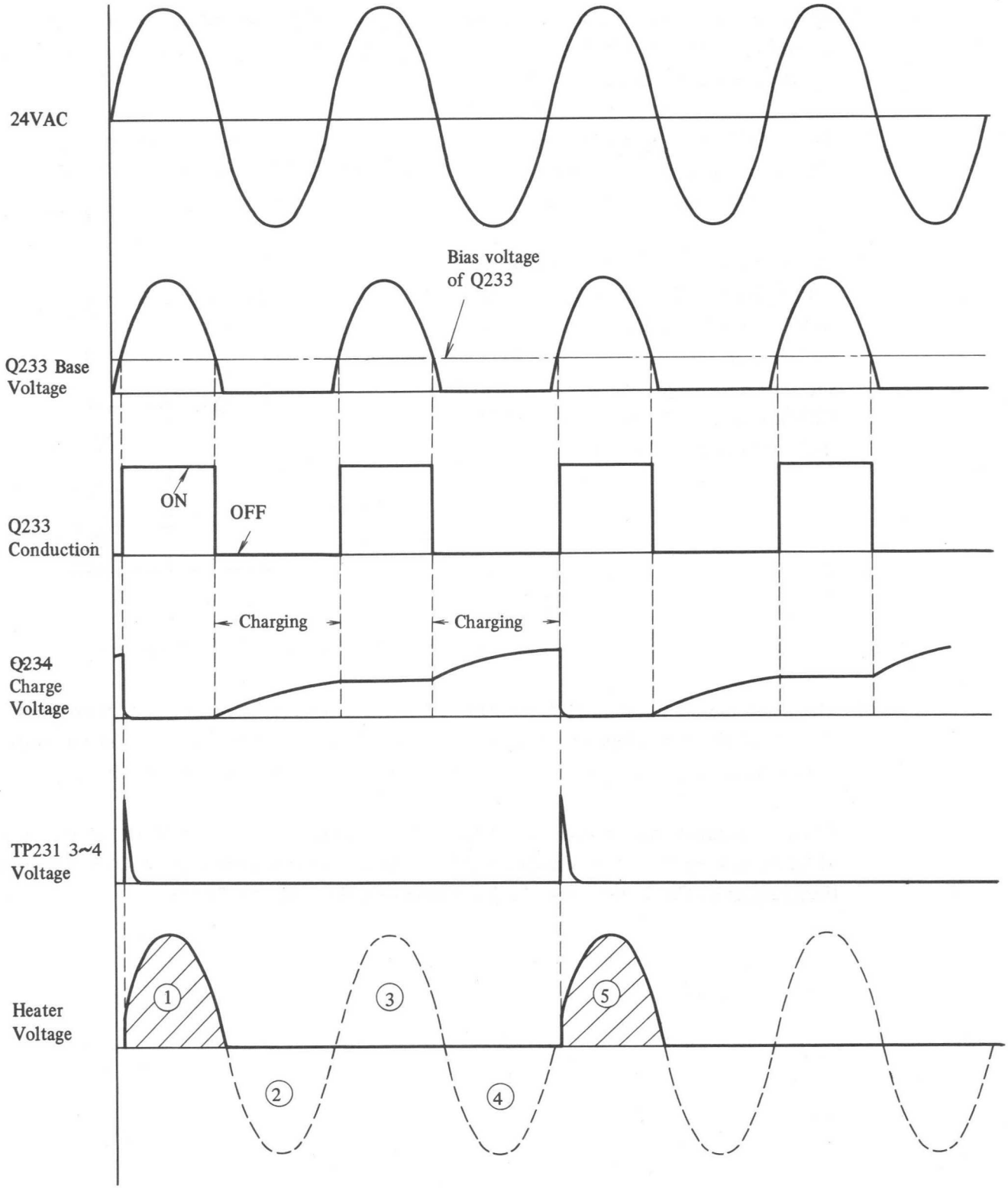


Fig. 3-23 1/4 "Zero-Cross" Waveforms

3) OPERATION – 1/1 ZERO-CROSS CIRCUIT

This portion of the "Zero-Cross" heater control circuit provides the triggering to operate the heaters continuously as follows:

a) When the heater temperature is low, TH1 resistance is high. Due to the design of the comparison network, Q235 ② is higher than Q235 ③ under this condition, and output ⑥ becomes approximately 0VDC.

b) The "LO" output applied to the 1/1 zero-cross circuit enables the alternate ON-OFF action of transistor Q231 to occur due to the rectified AC voltage (from D231) being applied simultaneously to the base of Q231.

c) Due to the full-wave base voltage of Q231 (which doubles the conduction periods when compared to Q233) and the lack of resistance in the charge path of C232 (which shortens the charge time when compared to C234), one spike is developed in TP231 for each half cycle of AC voltage.

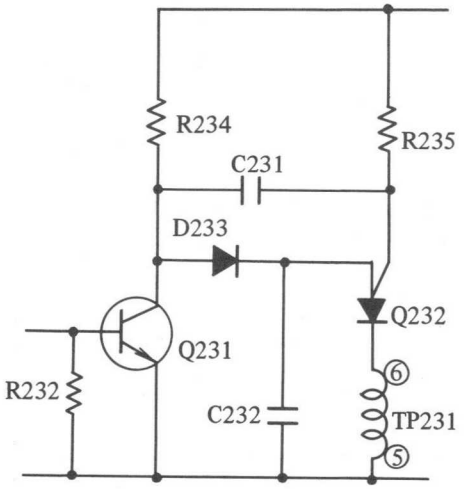


Fig. 3-24 1/1 Zero-Cross Circuit

d) The frequency of the triggers developed by the 1/1 zero-cross circuit is, thus, four times the rate of those developed by the 1/4 zero-cross circuit. This results in the heaters operating continously until the temperature has risen to the correct level (180 ± 3°C).

e) When temperature reaches the correct level, Q235 applies a constant +20VDC to the base of Q231, to keep the latter continuously ON. With continuous conduction, Q231 prevents the charging of C232 and, thus, the generation of spike pulses in TP231.

Fig. 3-25 depicts the waveforms for the operation of the 1/4 zero-cross circuit.

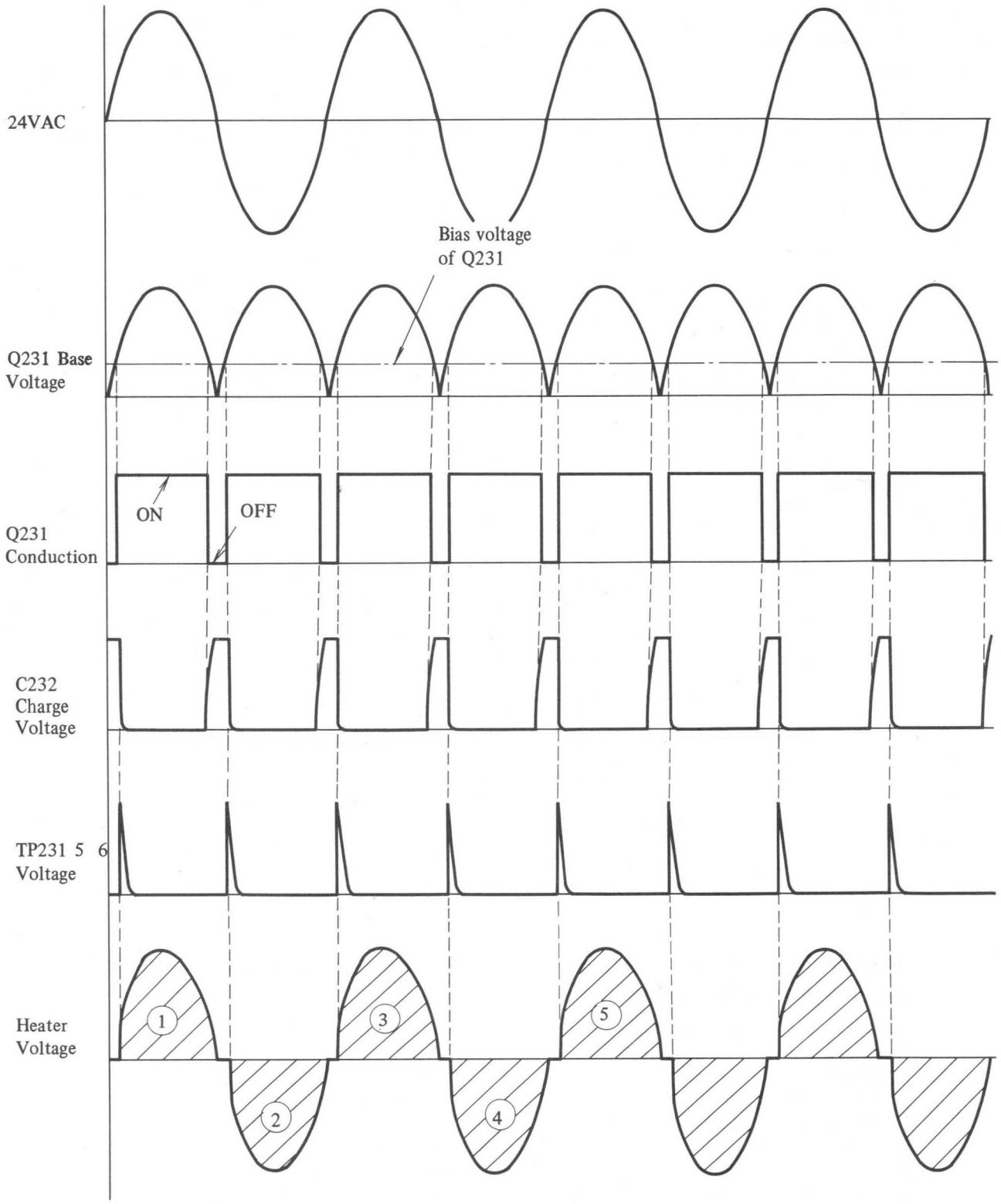


Fig. 3-25 1/1 "Zero-Cross" Waveforms

3.4-11 VOLTAGE ADAPTER PEDESTAL (100VAC COPIERS ONLY)

The voltage adapter pedestal is a special until available to permit the use of 100VAC copier (Product No. 8-11156 & 8-11157) in countries where the standard AC line voltage is higher. This unit contains a voltage converter to step-down the AC line voltage to that required by the copier.

Fig. 3-26 shows the schematic diagram of the pedestal, with the area enclosed by the dotted line representing the voltage converter.

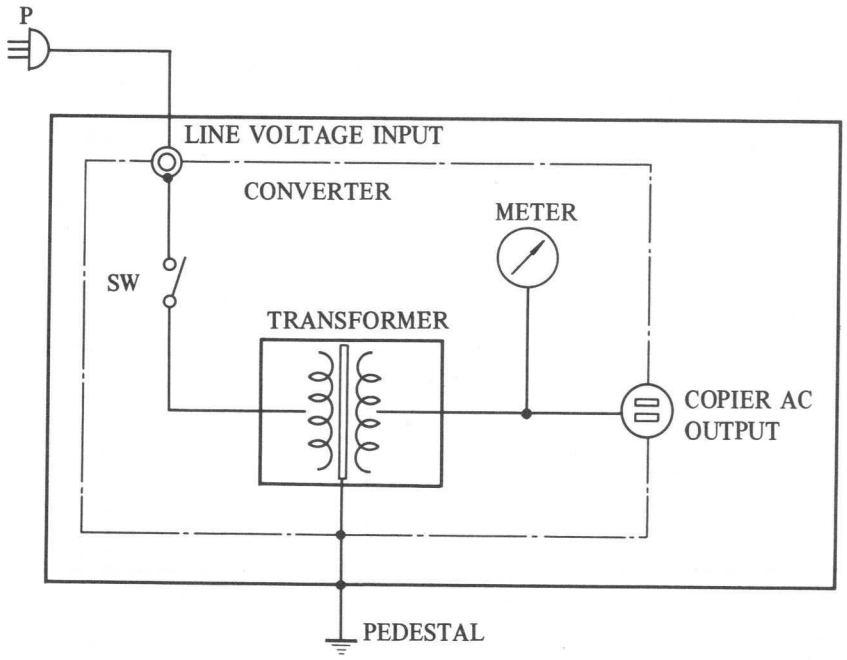


Fig. 3-26 Voltage Adapter Pedestal - Schematic Diagram

It should be noted that two converters are available for use with the pedestal. Table 3- provides the specifications for these two models.

Converter Model #	Adaptable Input Voltage	Input Taps	Output Voltage
88-4373	100VAC ~ 130VAC	Seven (7) taps at intervals of 5VAC	100VAC
88-4374	170VAC ~ 260VAC	Ten (10) taps at intervals of 10VAC	100VAC

Table 3-7 Voltage Converter Specifications

CHAPTER 4

Mechanical System

4.1 COPYBOARD ASSEMBLY

4.1-1 OUTLINE OF ASSEMBLY OPERATION

The Copyboard assembly (including the Cover Subassembly) is used for moving the original at a controlled rate for exposure. This controlled rate is 127 ± 7 mm/sec. in the forward direction, synchronized with the movement of the drum and the feeding of paper. It is particularly important that bounce or other erratic movements be minimized during the exposure portion of the copyboard travel.

4.1-2 ASSEMBLY MAIN COMPONENTS

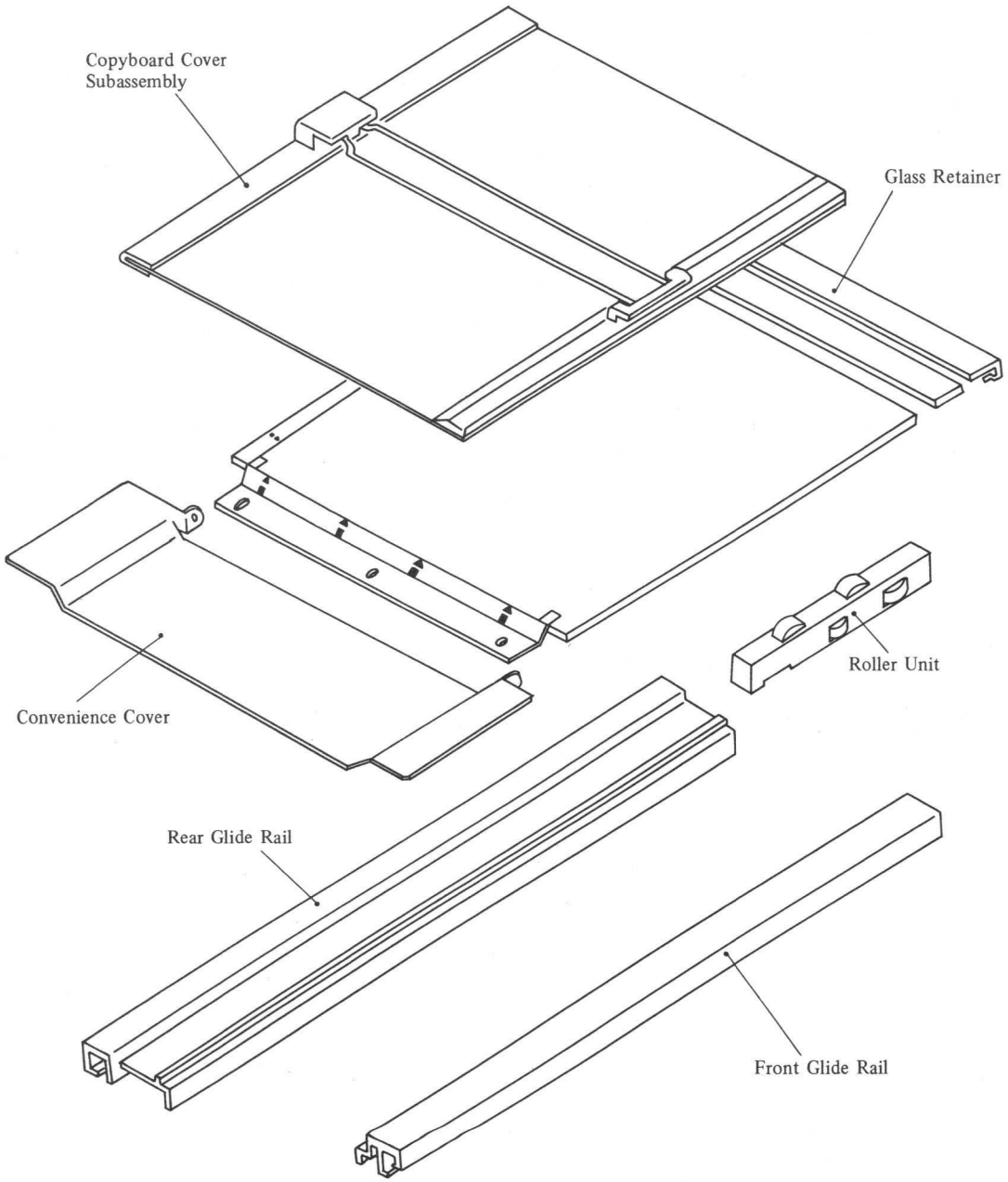


Fig. 4-1 Copyboard Assembly Main Components

1) COPYBOARD COVER SUBASSEMBLY

This semi-rigid cover is used to hold the original firmly in position during the copy cycle. As its lower side is coated with a reflective white material, it also provides a good background for transparent or semi-transparent originals.

2) COPYBOARD GLASS

The copyboard glass is used as a mounting surface for the original. Along its edges are found reference points for positioning originals of various sizes.

3) CONVENIENCE COVER

The convenience cover is a specially shaped tray-like piece, ideally suited for use when copying pages from book or other bulky objects.

4) FRONT GLIDE RAIL

This component acts as an assembly frame member, as well as a rail member for copyboard movement.

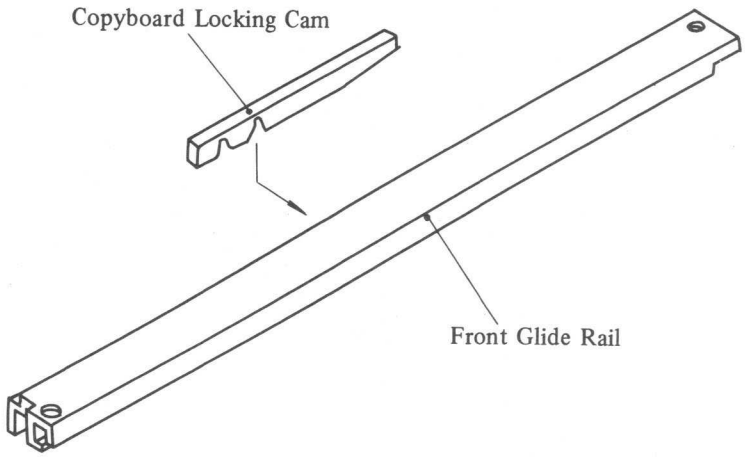


Fig. 4-2 Front Rail Components

Additionally, the front rail contains a cam used when locking the copyboard in position.

5) REAR GLIDE RAIL

The rear rail is similar to the front rail. The main differences are as follows:

a) The copyboard is connected to the driving mechanism at this rail.

b) Paper feed and copyboard reversal are triggered by cams mounted on this rail.

The rear rail components are shown in Fig. 4-3.

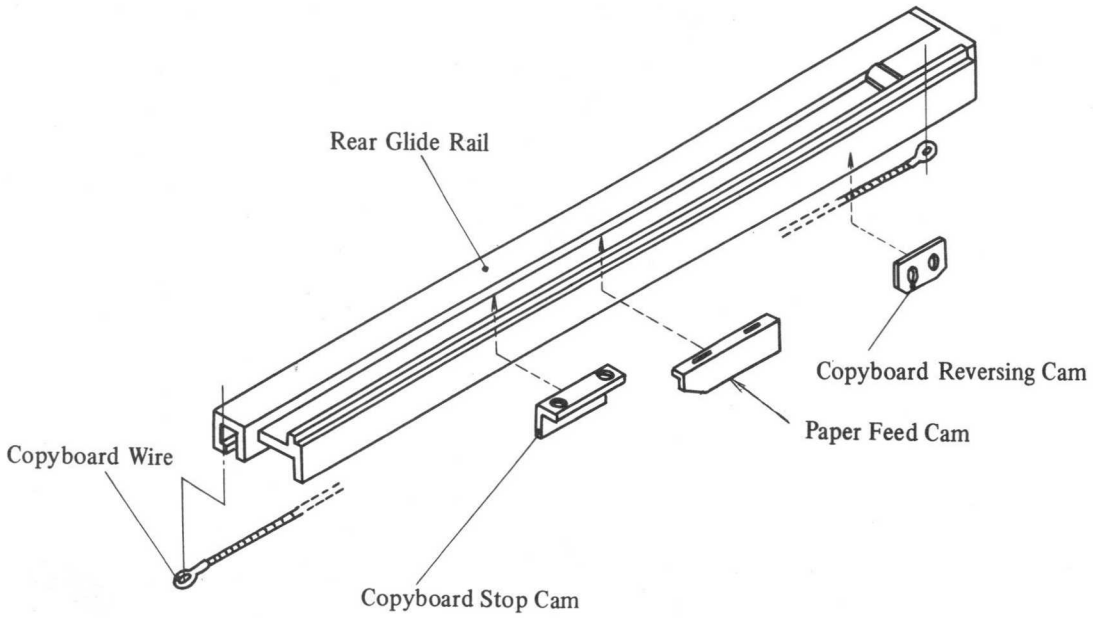


Fig. 4-3 Rear Rail Components

6) ROLLER UNITS

There are sixteen (16) roller units used for the two glide rails. As there are some differences in the roller units used, care must the taken to position the rollers correctly. Fig. 4-4 shows the roller units correctly placed.

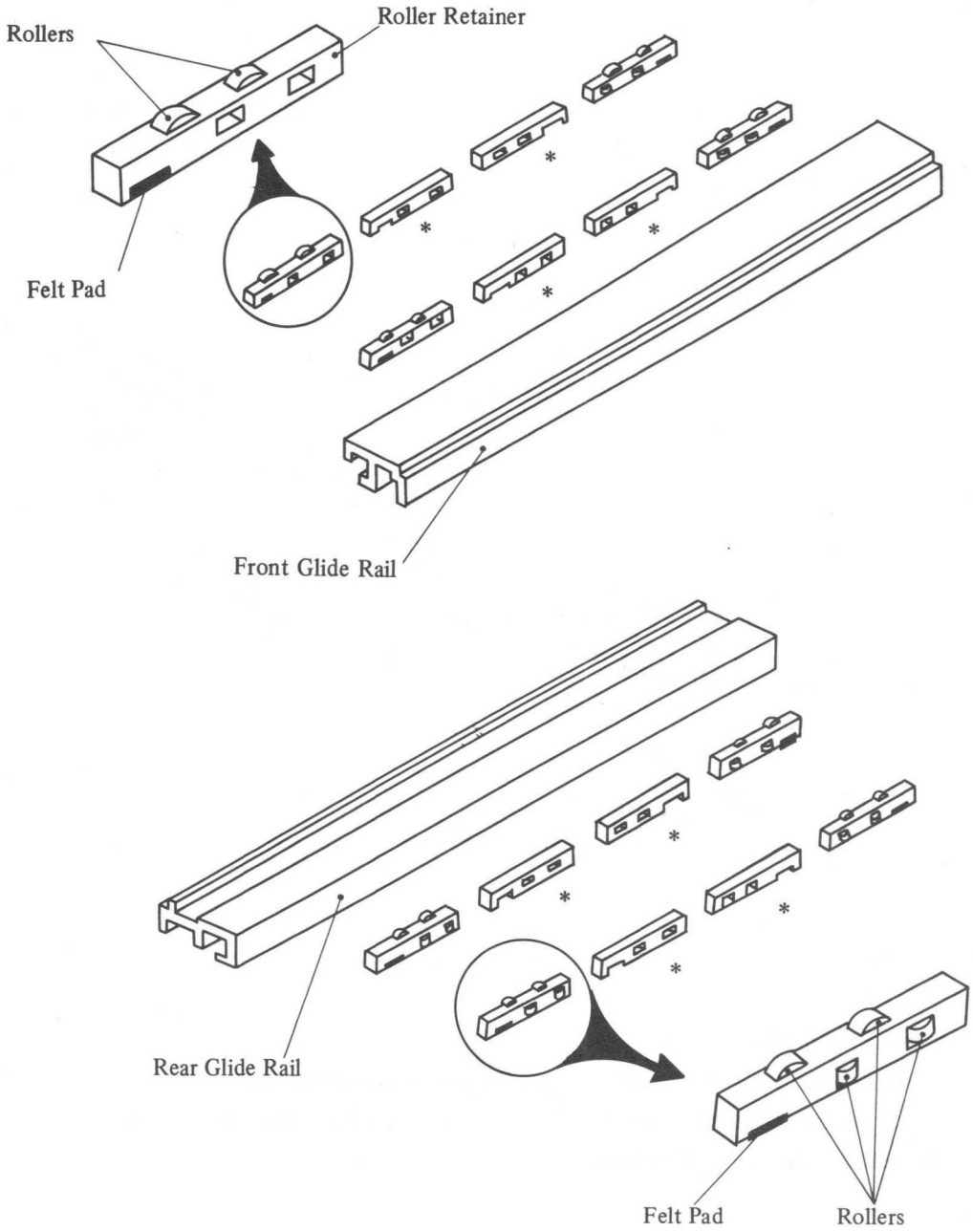


Fig. 4-4 Roller Unit Positioning

It should be noted the eight (8) central roller units (* marked in Fig. 4-4) are only roller retainers. Also, the units with rollers have their felt-padded end alligned toward either the right or left end of the rail in which they are mounted.

4.1-3 REMOVAL/INSTALLATION ACTIONS

1) COPYBOARD ASSEMBLY REMOVAL

There are several points which should be noted when removing the copyboard from the body of the NP–70 copier.

a) The copyboard locking lever should be disengaged before attempting to remove the assembly. To perform this action, turn the copier OFF while the copyboard is in the middle of a cycle (and, thus, away from the starting position) and then disengage the tension spring which lifts the locking lever to the lock position.

b) When removing the Copyboard Assembly, it is necessary to remove one of the glide stoppers mounted on the underside of the rear rail.

c) It is preferrable that the stopper at the copier left end of the rail be removed and that the copyboard be removed from the right end of the copier body.

d) It is preferrable to remove the copyboard without removing the tap-in pins on the main body rails, as they are easily lost if removed.

e) When removing the assembly from the copier right end, it is necessary to remove the stopper screws and the copyboard wire from the left end of the copyboard. This permits the rollers to slide free of the rails.

2) COPYBOARD WIRE INSTALLATION

The installation of the copyboard wire should be performed as follows to prevent machine damage.

a) Attach the wire to the operator-left end the copyboard and pass the wire over the pulley, as shown in Fig. 4-5.

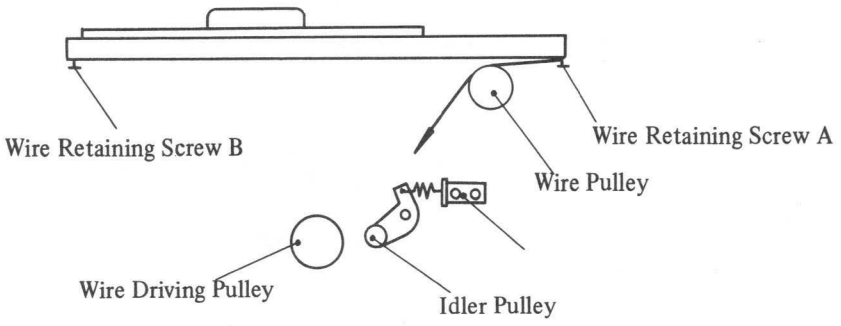


Fig. 4-5 Copyboard Wire Installation (A)

b) After making sure that the wire is in the inner groove of the wire pulley, pass it down over the idler pulley to the underside of the wire driving pulley (but do not seat the wire in the idler pulley groove). The wire should be wound around the driving pulley 5-1/2 turns, beginning from the idler pulley side of the wire driving pulley and ending on the opposite side (see Fig. 4-6).

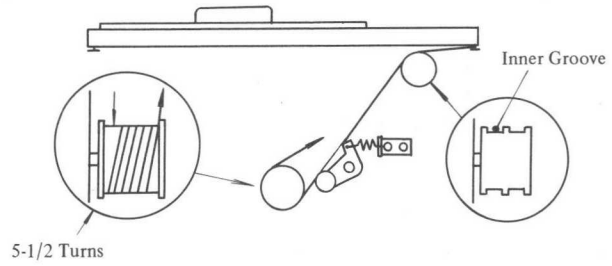


Fig. 4-6 Copyboard Wire Installation (B)

c) Feed the remainder of the wire around the wire pulley again, this time placing the wire in the outer groove, as shown in Fig. 4-7. Note that the wires cross.

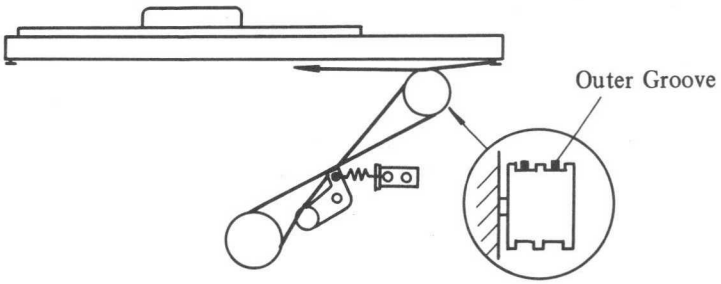


Fig. 4-7 Copyboard Wire Installation (C)

d) Secure the wire to the "operator-right" end of the copyboard and seat the inner section of wire in the groove of the idler pulley (see Fig. 4-8).

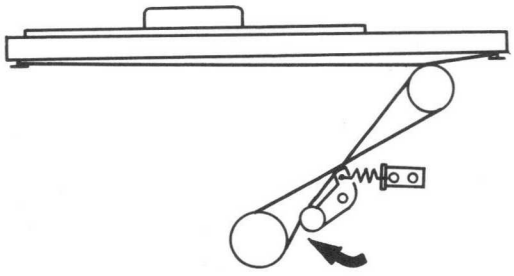


Fig. 4-8 Copyboard Wire Installation (D)

In performing the above procedure, it is possible to seat the wire in the idler pulley groove during the process, rather than at the end. Should this be done, however, it is necessary to loosen the tension spring tiedown bracket before beginning the installation; and at the completion of the installation, the bracket must be repositioned for proper wire tension.

4.1-4 REPAIR/SERVICING ACTIONS

1) WIRE TENSION ADJUSTMENT

After performing any repair action on the Copyboard Assembly (or the Copyboard Driving Mechanism Assembly) it is necessary to ensure that the wire tension is correct for proper copying. Perform this as follows:

a) Slide the copyboard to the left until it is about at the mid-cycle point.

b) Attach a spring balance to the copyboard wire at a point midway between the wire pulley and the idler pulley, as shown in Fig. 4-9.

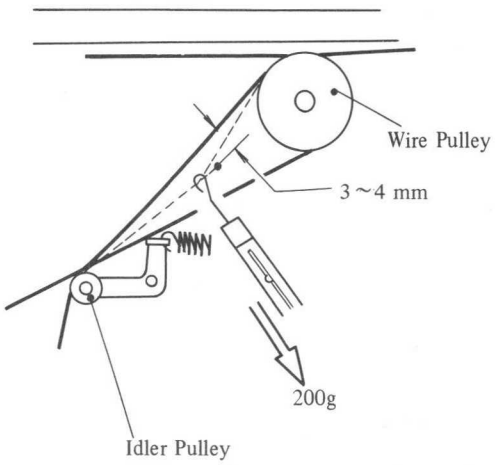
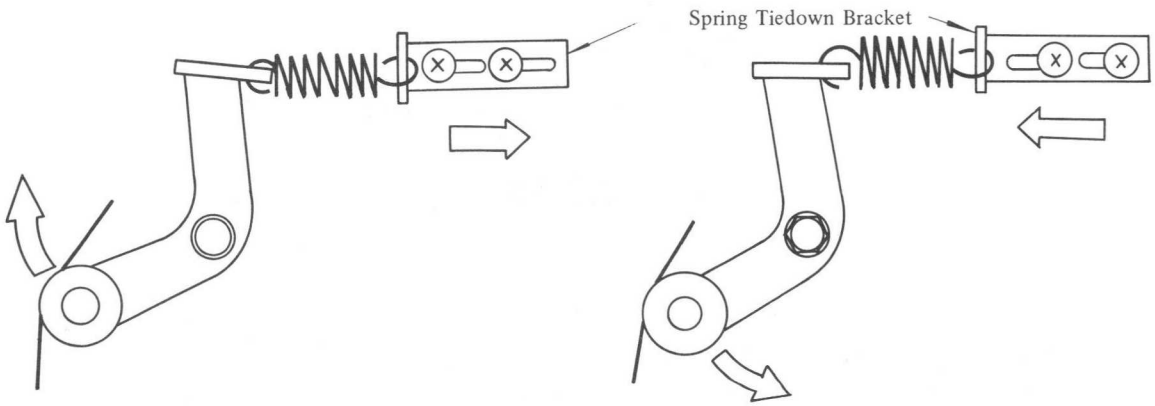


Fig. 4-9 Measuring of Wire Tension

c) Pull on the balance until the wire is deflected 3 ~ 4 mm from its normal position. With this amount of wire deflection, the balance should indicate 200 grams.

d) If the wire tension is not correct, adjust the tension of the idler pulley by sliding the tension spring tiedown bracket as follows:



(a) To Increase Wire Tension (b) To Decrease Wire Tension

Fig. 4-10 Wire Tension Adjustment

2) PAPER FEED CAM ADJUSTMENT

In the event that timing of paper feeding is incorrect, it may be necessary to adjust the paper feed cam position to ensure proper regulation. As this cam is located on the underside of the copyboard rear glide rail (see Fig. 4-3), this adjustment should be performed only if no other remedial action solves the problem.

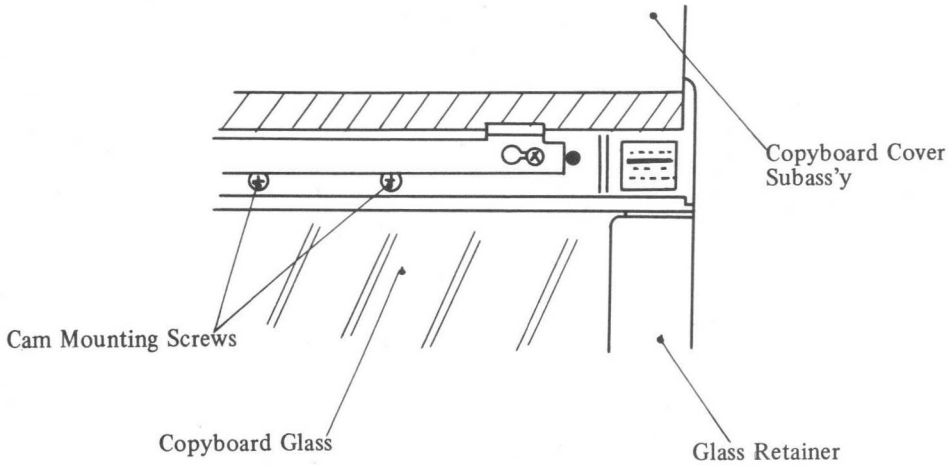


Fig. 4-11 Location of Paper Feed Cam

a) Remove the Copyboard Cover Subassembly.

b) Loosen the cam mounting screws to permit movement of the cam.

c) Slide the cam as follows for proper regulation.

Paper Condition	Cam Adjustment
Paper is fed early resulting in a white area at the copy leading edge.	Move the cam in the direction of ⇨
Paper is fed late resulting in an image overlapping the copy leading edge.	Move the cam in the direction of ⇦

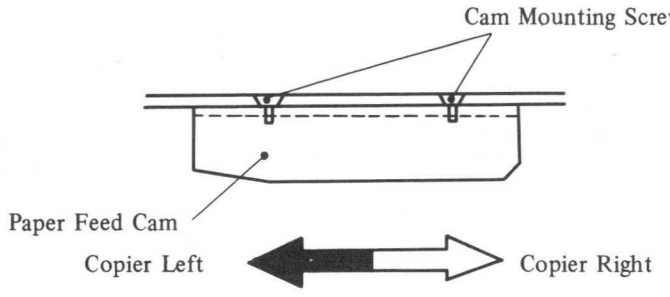


Fig. 4-12 Paper Feed Cam Adjustment

3) As a dirty copyboard cover and glass will result in lower copy quality, it is necessary for these to be cleaned often. Use Canon C-1 solvent for the copyboard cover and a non-ion detergent for the copyboard glass.

See the Service Handbook for additional details about assembly cleaning.

4.2 ILLUMINATION ASSEMBLY

4.2-1 OUTLINE OF ASSEMBLY OPERATION

This unit is installed under the copyboard glass so that as the Copyboard moves across the assembly the sheet original can be illuminated and its image reflected to the drum surface through the light chamber of the Optical Assembly.

The "Repaid-Start" method has been adopted for lamp excitation and operates as follows:

a) Before the copying process is started 8.5 VAC is applied to the filaments of the fluorescent lamps. This voltage heats the filaments and releases low-energy-level free electrons.

b) The electromagnetic field radiator, to which 240VAC is continuously applied, generates an electromagnetic field which additionally excites these electrons.

c) When copying begins, full AC voltage is applied to the filaments & ionization takes place immediately to illuminate the original.

4.2-2 ASSEMBLY MAIN COMPONENTS

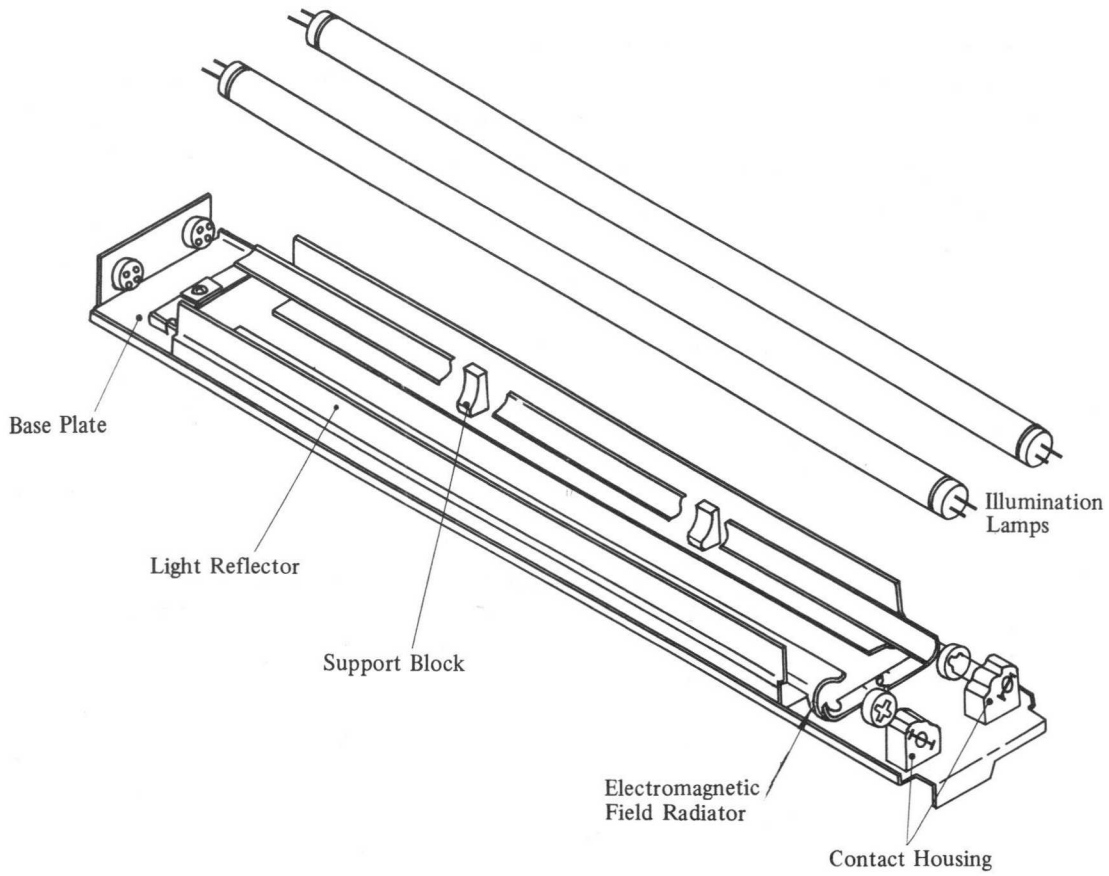


Fig. 4-13 Illumination Assembly Main Components

1) ILLUMINATION LAMP

Two lamps are used in this assembly. The output of each illumination lamp is 25W and the luminous color is green for maximum lamp efficiency. The luminous intensity of these lamps is very high, using a 90° direct light/270° reflected light pattern (a 90° portion of the glass contains no fluorescent material). The open part of this lamp (90°) is positioned so that this part can illuminate the copyboard glass, as indicated in Fig. 4-14.

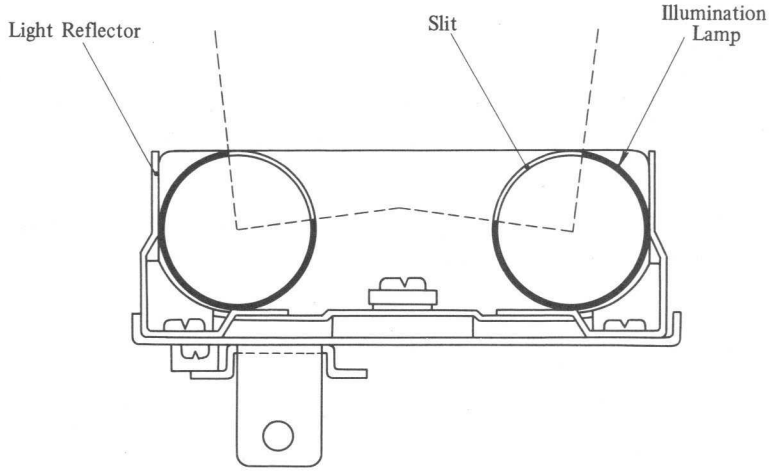


Fig. 4-14 Lamp Illumination Pattern

2) ELECTROMAGNETIC FIELD RADIATOR

The electromagnetic field radiator is a plate shaped in a semi-wrap-around fashion to ensure contact with the lamp surfaces. 240VAC is continuously applied to this radiator to assist in the excitation of the lamps. As such, the field radiator must be completely insulated from the copier frame due to its high potential.

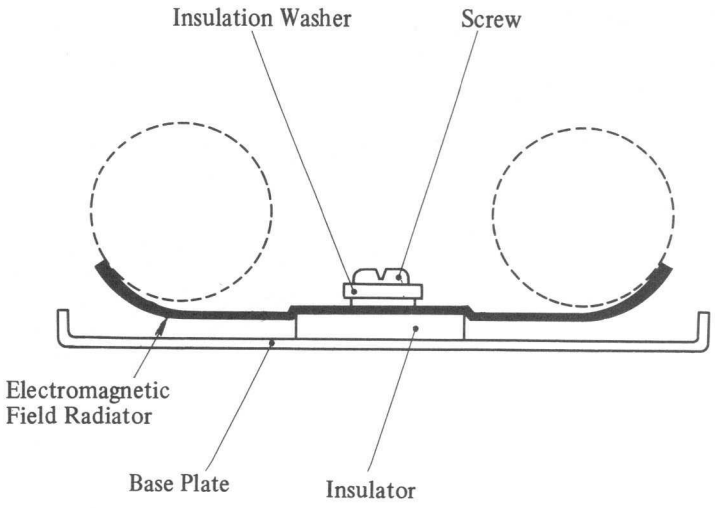


Fig. 4-15 Electromagnetic Field Radiator Mounting

3) LIGHT REFLECTORS (L & R)
These reflectors are used to increase the light to the copyboard; therefore, no dirt or scratches should be on their inner surfaces.

4) ASSEMBLY BASE PLATE
The assembly base plate moves along the guide rails smoothly to allow easy removal and installation of the assembly.

4.2-3 REMOVAL/INSTALLATION ACTIONS

1) FLUORESCENT LAMP REPLACEMENT
The replacement of the fluorescent lamps is the only removal/installation action in this assembly requiring special consideration. The lamps are changed as follows:

a) Unscrew the Front Right Door retaining screw and open the door.

b) Disconnect the assembly connector (J21) and draw out the assembly squarely on the rail, being careful not to allow the lamps or any other part of the assembly to rub against the control panel.

c) Separate the lamp from the front socket by drawing the socket in the direction indicated by the arrow in Fig. 4-16.

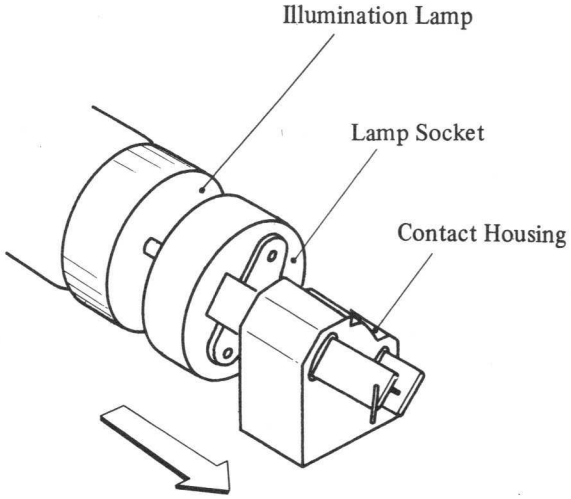


Fig. 4-16 Removal of Lamps

d) After drawing the lamp socket away from the lamp, push the lamp rearward (to compress the rear socket) and swing the lamp upward.

e) Disconnect the lamp from the rear socket.

f) Repear a) ~ e) in reverse order for installation.

4.2-4 REPAIR/SERVICING ACTIONS

Repairs performed on this assembly require no special instructions. However, the following cleaning actions are necessary.

1) CLEANING

Dirt on the fluorescent lamp and the reflectors (R & L) decreases the light output of this assembly. Therefore, periodic cleaning is necessary.

a) If dust or lint is present, wipe the components with dry lintless cleaning paper.

b) If they are smeared with toner or fingerprints, wipe first with alcohol dampened cleaning paper and, then, with dry lintless paper.

NOTE: Always wear gloves when replacing the fluorescent lamps, to prevent soiling. If fingerprints or other marks mar the surfaces of the lamps, wipe them carefully before installing.

See the Service Handbook for additional details concerning assembly cleaning.

4.3 OPTICAL ASSEMBLY

4.3-1 OUTLINE OF ASSEMBLY OPERATION

The Optical Assembly is positioned to the right end of the body and it forms an image for the drum surface from the sheet original on the copyboard. Light travels along the path from the mirror to the lens unit and, finally, the drum as indicated in Fig. 4-17.

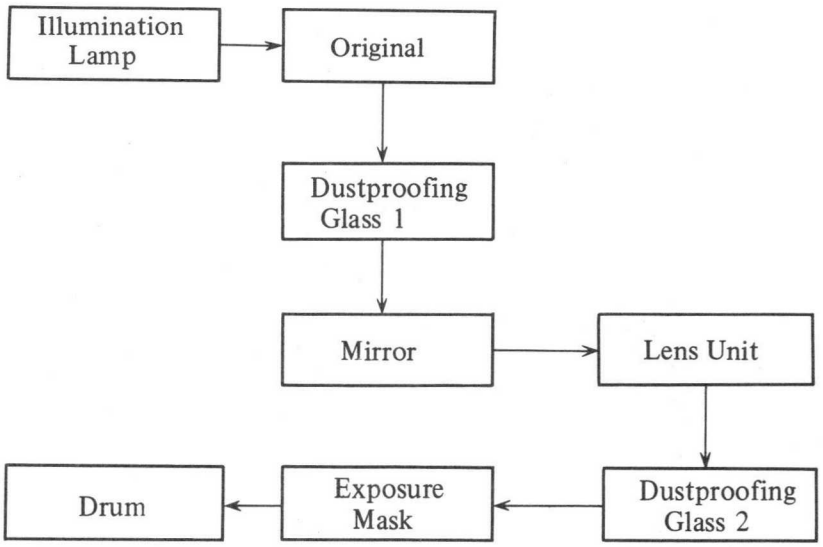


Fig. 4-17 Block Diagram of Light Travel

Fig. 4-17 indicates the path by which the original image reaches the drum. In order to form a complete image, no interferance should be present along the path of light travel. Dustproofing glasses 1 & 2 and the reflecting mirror should be kept clean to preserve high quality copying. The optical chamber interior is protected from contamination by a dustproofing cover. The diaphragm in the lens unit controls the light intensity to the drum surface depending on the sheet original contrast desired to get an ideal copy. The diaphragm mechanism is connected to the exposure dial by string. By this connection, the quantity of light can be controlled directly by the operation of the exposure dial. The exposure mask is mounted in front of the drum to provide equalized light distribution on the drum surface.

4.3-2 ASSEMBLY MAIN COMPONENTS

The optical system consists of a lens unit and a light chamber. The latter contains a mirror, dustproofing glasses 1 & 2, a dustproofing cover and a hood as shown in Fig. 4-18.

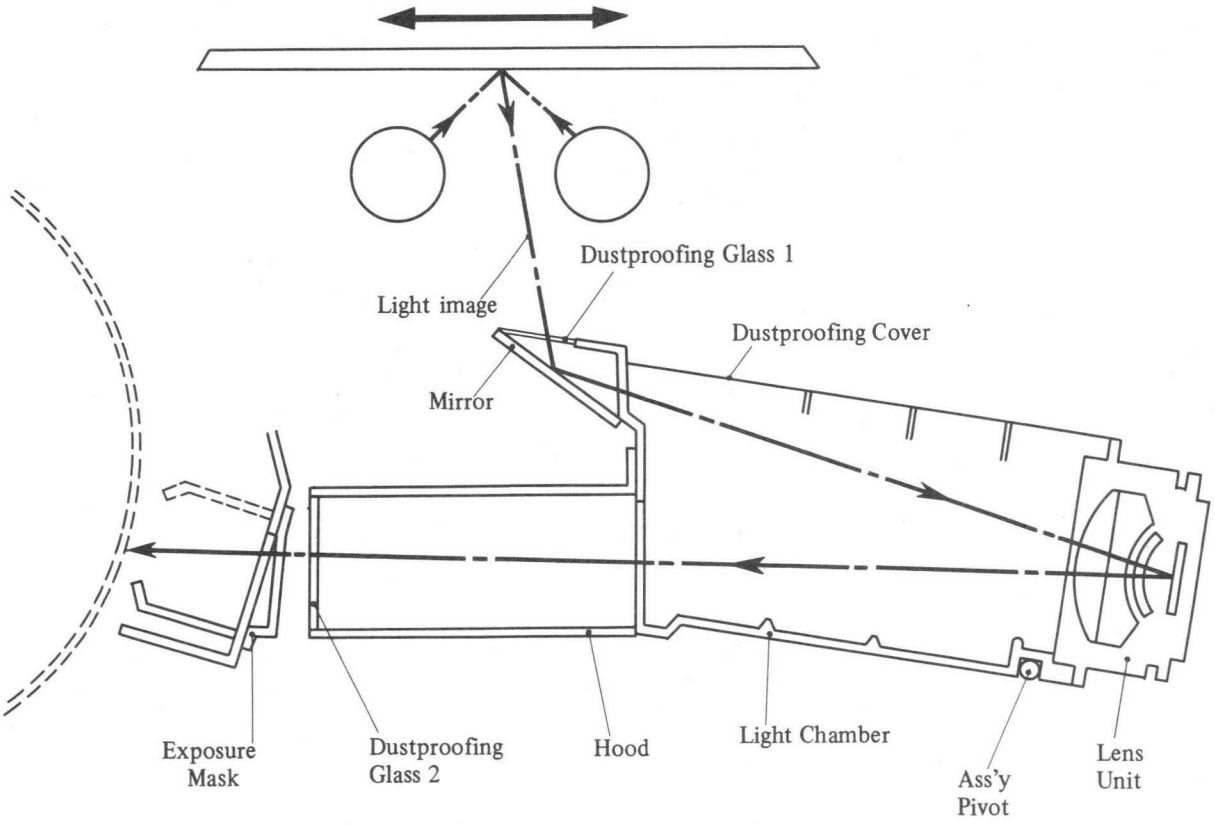


Fig. 4-18 Optical Assembly Main Components

1) DUSTROOFING GLASS PLATES 1 & 2
They protect the mirror and the lens inside the chamber from dirt by sealing up the chamber. As an image passes through these glass plates, they must be completely clear and flawless to pass the image correctly.

2) IMAGE MIRROR
This mirror must reflect the image accurately to the lens unit, thus the reflection angle and the plane angle are very critical.

3) DUSTPROOFING COVER
The light chamber is covered by this dustproofing cover to prevent the mirror and lens of the optical chamber from being contaminated. Additionally, extraneous light is prevented from entering the chamber.

4) EXPOSURE MASK

The center portions of the fluorescent lamps radiate a slightly greater amount of light than the ends and the lens unit enhances this action by passing more light through its center than through its edges. Thus, the exposure mask is necessary to minimize these differences by illuminating the drum surface equally from one end to the other – the central light is decreased in intensity by a narrowing of the slit, and the light from both ends is increased by a widening of the slit.

5) MIRROR/LENS UNIT

This unit is attached to the end of the chamber & its specifications are as follows:

Focal distance (f) :	180 mm
Maximum aperture (F) :	1 : 4.5 (variable to F9)
Magnification :	1 : 1
Resolution :	more than 10 lines/mm

6) EXPOSURE ADJUST LINE

This line is made of polypropylene with a diameter of 0.4 mm. Its length is 118 cm, when tied to the hooks of its tension spring, and connects the exposure dial to the diaphragm mechanism of the lens unit. These control the light intensity to the photosensitive surface of the drum unit.

4.3-3 REMOVAL/INSTALLATION ACTIONS

The Optical Assembly and Lens Unit should never be removed from the NP–70 for any reson. This is due to the critical allignment necessary for proper machine operation. However, the following main component replacements are possible.

1) EXPOSURE MASK REPLACEMENT

a) Open the front left access door.

b) Remove the A. C. Corona Assembly from the copier.

c) Grasp the front end of the mask and draw the mask out of the copier.

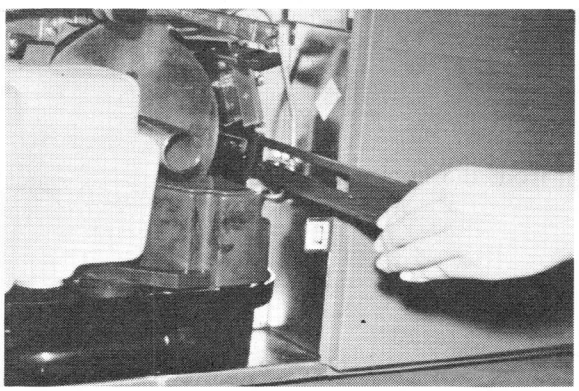


Fig. 4-19 Exposure Mask Removal

d) Repeat a) ~ c) in reverse order for installation.

2) EXPOSURE ADJUST LINE REPLACEMENT

As the exposure string controls the Lens Unit of this assembly, its replacement is explained in this section.

a) Tie the ends of the string as shown in the following steps.

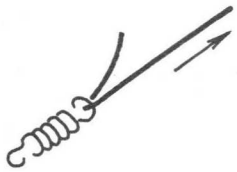
Step 1:
Make a small loop by passing the end over the line and hold the point of crossing with the thumb and forefinger.

Step 2:
Loop it under the line.

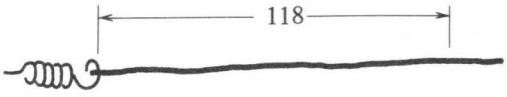
Step 3:
Pass the end through the first loop from below.

Step 4:
Pass the end over the line and through the second loop from above to below and pull on it to tighten the knot slightly.

Step 5:
Place the hook of the spring in the first loop and pull on the line to tighten the line securely to the hook.



Step 6:
Measure 118 cm from the hook and mark it on the line.



Step 7:
Repeat steps 1 ~ 5 for the second knot, making sure that the hook is at the marked position on the line when it is securely tightened; then apply a bond to the knots.

b) Fix the exposure dial at 9 with some adhesive tape & loop the line around the dial pulley. Position the line so that the tension spring is on the operator-side of the pulley with a length of approximately 18 cm (see Fig. 4-20).

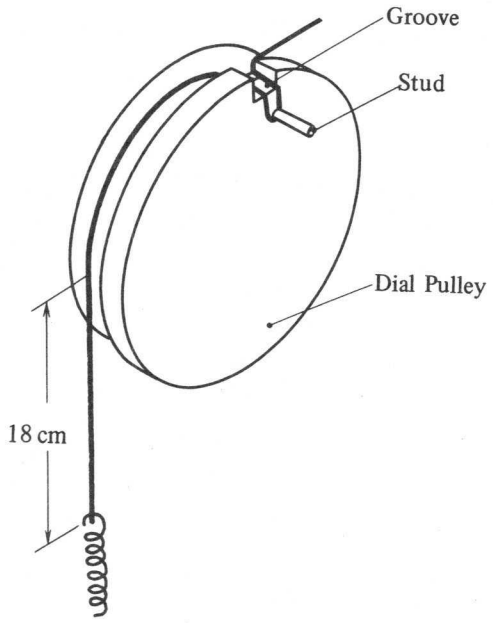


Fig. 4-20 Adjust Line Replacement (A)

c) While holding the tension spring line securely in position, pass the line in the side groove of the dial pulley and wrap it under the stud and back in the groove (see Fig. 4-20).

d) Then wrap the line around the dial pulley one time and pass it under the idler pulley in the inner groove (see Fig. 4-21).

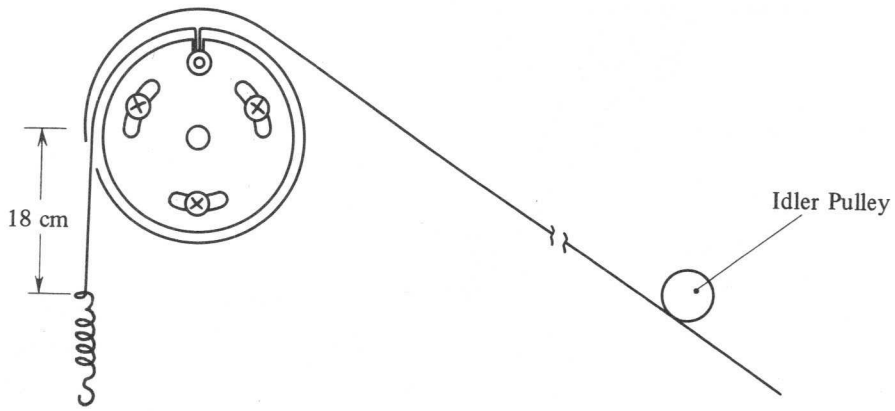


Fig. 4-21 Adjust Line Replacement (B)

e) Turn the aperture adjust ring counterclockwise (ccw) until the stud of the ring is at the extreme left position.

f) After passing the line in the groove over and around the aperture adjust ring, loop the line one time around the ring stud and, then, pass it again around the ring (see Fig. 4-22).

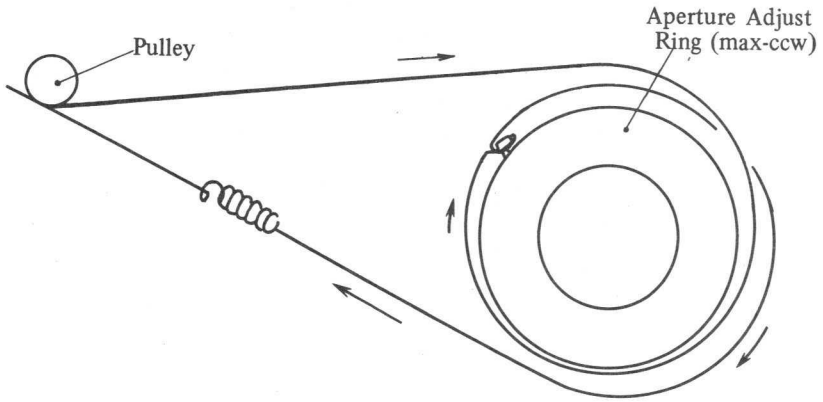


Fig. 4-22 Adjust Line Replacement (C)

g) Check whether the apeture adjust ring is at its most extreme ccw position when the exposure dial is set at 9. If not, it is easily adjusted by loosening the three retaining screws on the side of the dial pulley and, then, turning the aperture adjust ring ccw until the exposure dial is at 9. The complete installation is seen in Fig. 4-23.

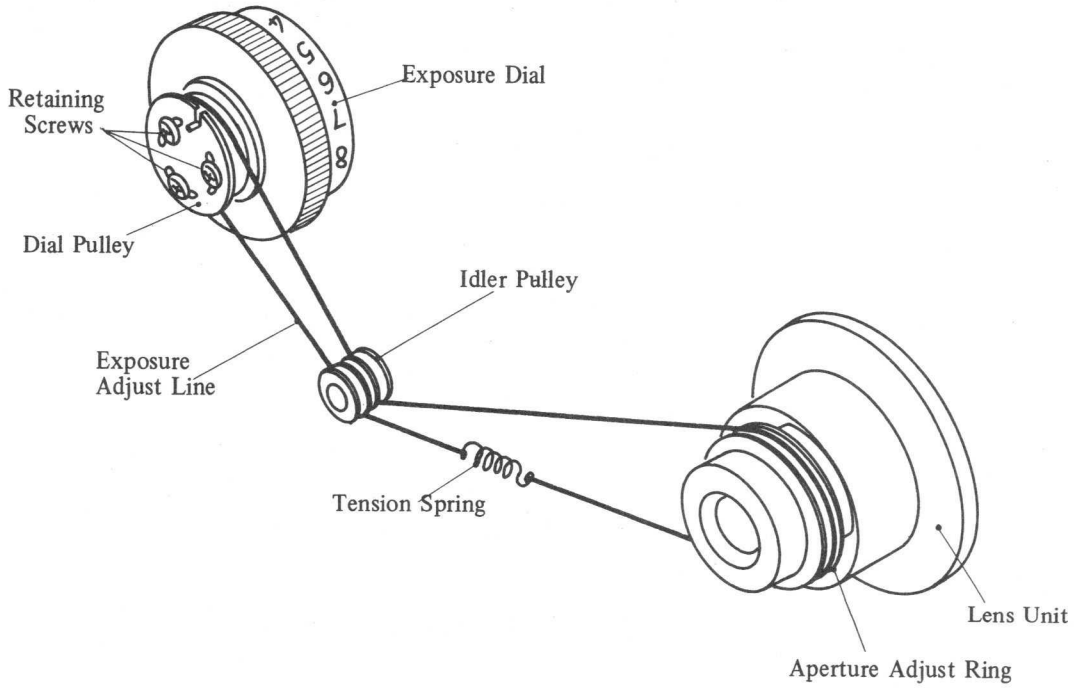


Fig. 4-23 Adjust Line Replacement (D)

4.3-4 REPAIR/SERVICING ACTIONS

1) CLEANING

When the dustproofing glass plates (1 & 2) become dirty or during regular cleaning service, wipe them with dry cleaning paper. If the dirt is heavy, wipe them with alcohol dampened cleaning paper and then rewipe with dry paper.

a) For cleaning galss 1 (upper), the right upper cover must be removed. removed.

b) For cleaning glass 2 (lower), the Drum Assembly, A. C. Corona Assembly, and Exposure Mask Subassembly must be removed.

CAUTION: Projecting components may cause injury when working within the machine. Care must be taken when performing procedure contained in this section.

See the Service Handbook for additional details concerning assembly cleaning.

2) ADJUSTMENTS

The adjustment of the aperture slit should be performed as follows: (See Fig. 4-24).

a) If the drum sensitivity is F-type (drum photo-receptor serial number ends with 0 or 7F):

Position the blade so that the width of the slit is 8 mm at the center and 12.5 mm at the ends, 130 mm from the center of the exposure mask. This position should be approximately that of the scribed mark (b) of the blade aligned with the (c) edge of the mask.

See MSB.

b) If the drum sensitivity is S-type (drum photo-receptor serial number ends with 1 or 7S):

Position the blade so that the width of the slit is 9 mm at the center and 13.5 mm at the ends. This position is approximately that of the scribed mark (a) of the blade aligned with the (c) edge.

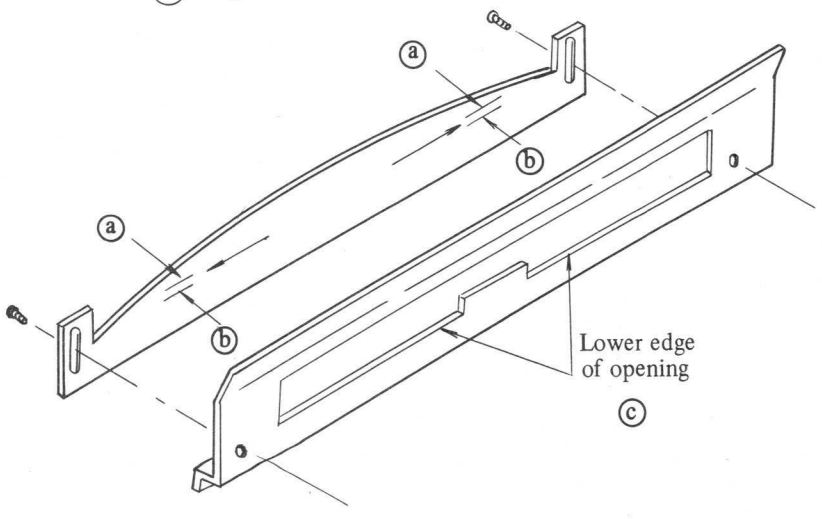


Fig. 4- 24 Exposure Mask Adjustment

4.4 DRUM ASSEMBLY

4.4-1 OUTLINE OF ASSEMBLY OPERATION

The Drum Assembly is located in the middle portion of the copier body. The photosensitive drum rotates on a shaft which is held by a bracket mounted on the rear of the copier. The front end of the drum shaft is supported by a plate, which is removable so that the drum can be easily taken out of the copier.

The photosensitive drum and the drum gear are mounted on the same shaft. Although the gear and drum are not bolted directly together, they are held in fixed relationship to one another by a stud protruding from the gear. This stud engages a notch in the rear drum flange when the gear (and its attached components) and the drum (and its attached components) are placed on the shaft together.

4.4-2 ASSEMBLY MAIN COMPONENTS

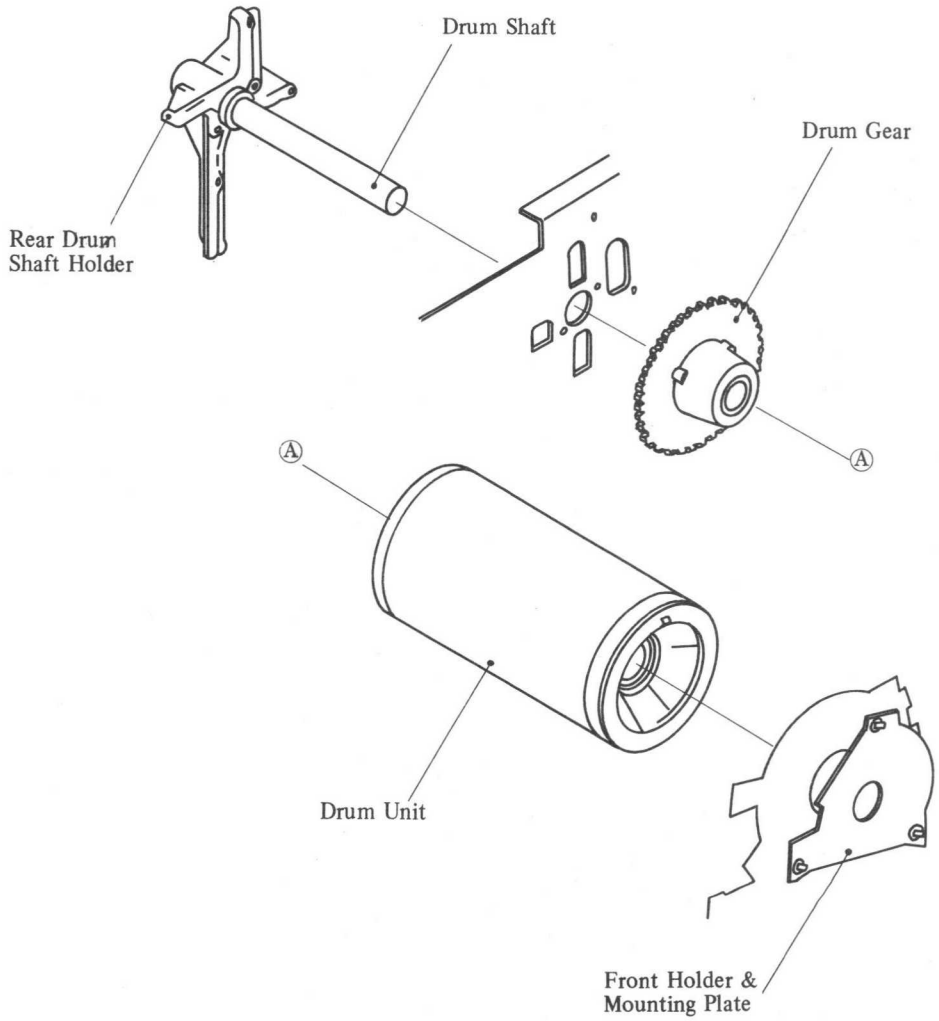


Fig. 4-25 Drum Assembly Main Components

1) DRUM UNIT

The main elements of the Drum Unit, as shown in Fig. 4-25, are a metal cylinder, two metal end flanges, and a center guide pipe. The cylinder is covered by a three layer wrapping which contains the CdS material.

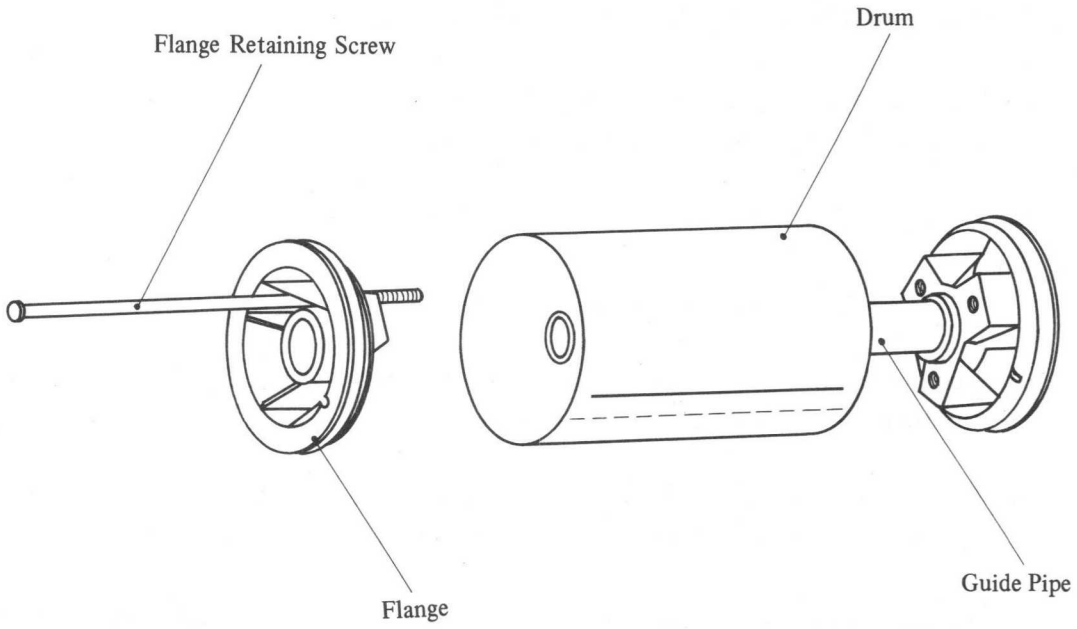


Fig. 4-26 Drum Unit

2) DRUM GEAR

The Drum Gear, 162 mm in outer diameter, has 160 teeth. Additionally, a number of control cams are attached to the rear side of it. All of the cams have a fixed position for mounting on the Drum Gear and each has one specific function in relationship to the total operation of the NP–70.

3) FRONT-SIDE HOLDER PANEL MOUNTING PLATE

This Front-side Holder contains the spring which, when installed, presses the Drum Shaft toward the copier rear for proper seating.

4) SHAFT HOLDER (REAR)

This Shaft Holder, installed on the Rear Main Body Mounting, holds the Drum Shaft securely with hex nuts. This components is not removable from the machine as its position is very critical for proper copier operation.

4.4-3 REMOVAL/INSTALLATION ACTIONS

1) DRUM UNIT REPLACEMENT

The Drum Unit is the only portion of this assembly requiring special care during replacement. It should be performed according to the following steps.

a) Lift the copier upper access door and, then, let down the Copy Conveying Assembly by releasing the lock handle which holds it in place.

b) Open the front left cover and remove the Developer Assembly.

c) Lift the Drum Cleaner Assembly by setting the lock arm to the upper position.

d) Remove the mounting plate which holds the drum on the shaft. This plate is mounted on the frame at the front-end of the shaft.

e) Pull out the complete drum, carefully grasping the front-side flange so that the drum's surface is not scratched. When removing the drum, do not touch the surface.

f) Repeat steps a) ~ e) in reverse order for installation. During installation, make sure that the following points are observed:

g) When the Drum Unit is placed in the copier, make sure that the wrapping direction of the photosensitive sheet is opposite to the drum rotation as shown in Fig. 4-27; otherwise, the photosensitive sheet may be peeled off by the Drum Cleaner Blade.

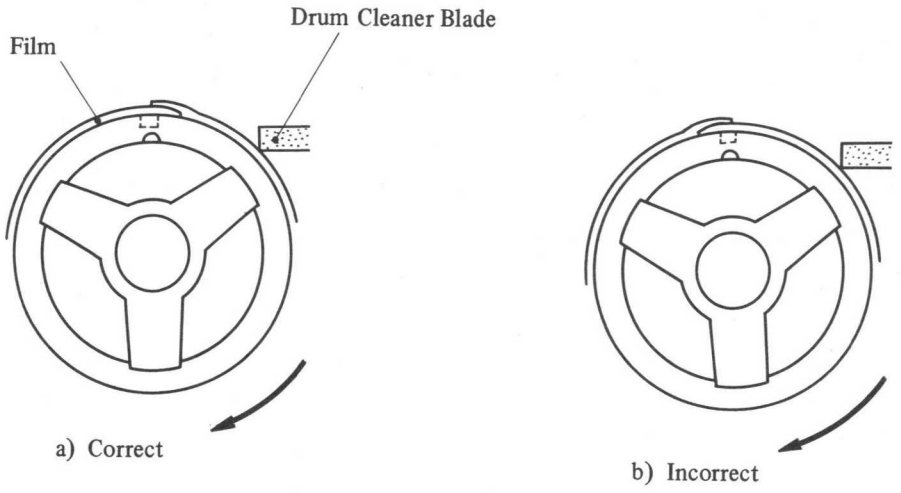


Fig. 4-27 Drum Position in Copier (from copier front)

h) In the event that a new drum is being installed in the copier, rotate it for one revolution to apply developer liquid to the drum's surface before lowering the drum cleaner blade.

4.4-4 REPAIR/SERVICING ACTIONS

1) DRUM UNIT REASSEMBLY

Whenever the Drum Unit is disassembled for replacement of the drum cylinder (containing the sensitive sheet), the following reassembly procedure should be observed to ensure that no damage occurs to the sheet during subsequent copier operations.

a) Fit the drum cylinder to the flange which is attached to the guide pipe. Make sure that the internal rib of the drum cylinder engages the notch provided for it in the flange edge (see Fig. 4-28).

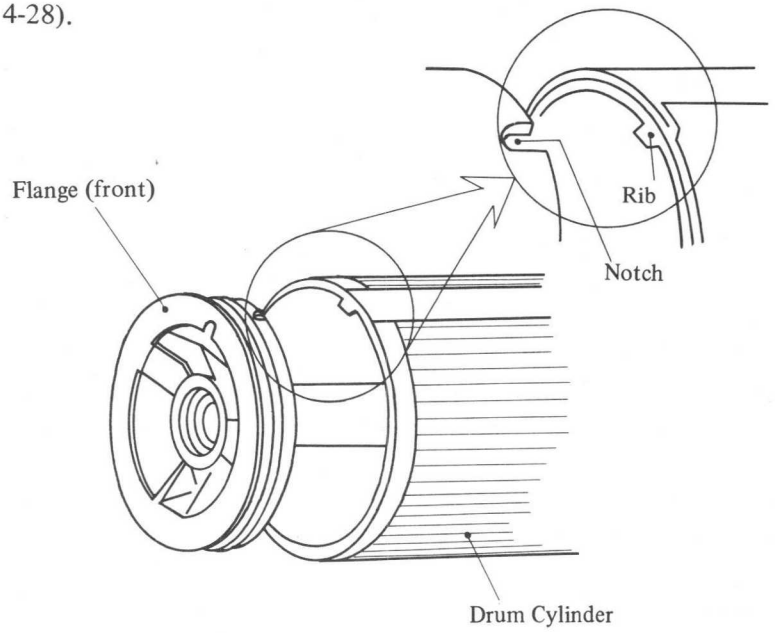


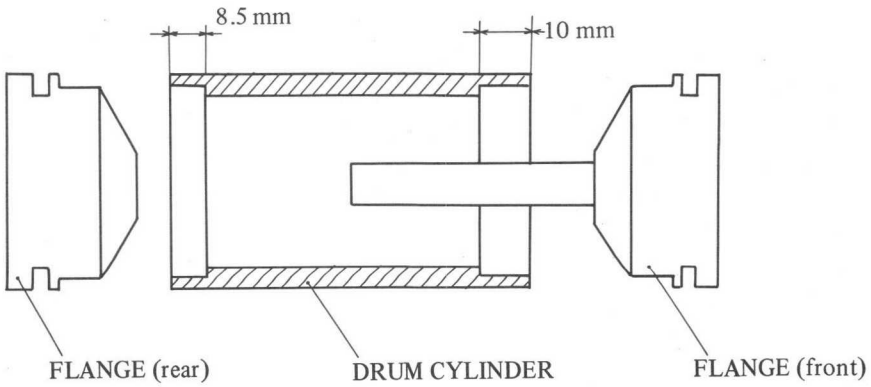
Fig. 4-28 Drum Unit Reassembly

b) Fit the other flange to the drum cylinder, again engaging the drum rib with the flange notch.

c) Secure the above assembled parts with the long flange retaining screws.

[NOTICE] PROCEDURES FOR REPLACEMENT OF THE DRUM CYLINDER

Fit the flange (which is attached to the quide pipe) to the end of the drum cylinder shaved in 10 mm width.



4.5 CORONA ASSEMBLIES

4.5-1 OUTLINE OF ASSEMBLY OPERATION

The NP–70 has five (5) corona assemblies which are used during the copy cycle. These assemblies contain an element for radiating an electromagnetic field, an insulated housing to hold the radiator, and controls to set the radiator position. The five coronas and their functions are as follows:

1) POSITIVE CORONA ASSEMBLY
Charges the surface of the sensitive drum initially with a positive charge until the surface potential becomes approx. + 1800 ± 50 volts.

2) AC CORONA ASSEMBLY
Cancels the positive charges on the light (non-image) areas on the drum surface.

3) NEGATIVE CORONA ASSEMBLY
Eliminates excessive dispersant adhering to the drum surface after immersion in the developer.

4) TRANSFER CORONA ASSEMBLY
Emits positive ions to the paper to transfer the toner image from the drum to the paper. With normal voltage more than 70% of the toner particles on the drum should be transferred.

5) RESIDUAL CHARGE ELIMINATOR ASSEMBLY
Neutralizes any remaining charge on the paper after the fixing process.

4.5-2 ASSEMBLY MAIN COMPONENTS

As the five coronas similar in function (although individual in construction), the following main components description are applicable to essentially all assemblies:

1) RADIATING ELEMENT
Each corona contains an element to which a high voltage is applied. This high voltage, either AC or DC, is used in one of the distinct actions explained previously. The four (4) slip-out coronas around the drum use a corona wire for radiation, while the residual charge eliminator at the machine exit uses solid, plate-like radiators.

Specification	Pos. Cor.	AC Cor.	AC Grid	Neg. Cor.	Trans. Cor.
Wire Diameter (mm)	0.06	0.06	0.06	0.06	0.10
Wire Length (mm)	782 ± 1	364 ± 10	4350 ± 10	748 ± 1	670 ± 1
Wire Separation (mm)	23.0	N/A	2.0	3.0	3.0
Standard Height (mm)	about 16.5 (refer to label)	about 9.5 (refer to label)	N/A	11.5 ± 1.0	10.0 ±0.3
Adjust. Leeway (mm)	3.0	3.0	N/A	4.0	4.0
Applied Voltage	+6.4kVDC	7.0kVAC	0VDC(GND)	–6.4kVDC	+6.0kVDC
Breakdown Voltage	10kVDC	10kVAC	N/A	10kVDC	10kVDC

Table 4-1 Corona Wire Specifications

2) RADIATING ELEMENT HOUSING

Each of the radiating elements is secured in a housing which insulates the high voltage from the NP–70 copier frame. With the exception of the residual charge eliminator, these housings contain a wire guide and wire terminal for ensuring proper wire tension and height.

3) WIRE GUIDE

For assemblies with wire radiating elements, a wire guide is provided at each end of the assembly to enable wire height (distance from drum surface) adjustments.

4) WIRE TERMINAL

For assemblies with wire radiating elements, a wire terminal is provided at the rear for ensuring proper wire tension. This terminal is connected to the wire by means of a spring and serves as a means of securing the corona wire.

5) GRID WIRE

Included with the A. C. corona is a grid wire of similar properties to the corona wire radiating elements. This grid, positioned between the A. C. corona and the drum, is essential to the LP-process due to its stabilizing of the discharge process which occurs when the drum is exposed to the image. The potential of this grid is 0V due to grounding.

As each of the corona assemblies is distinct in construction, reference should be made to the NP–70 Parts Catalog for details of assembly appearance.

4.5-3 REMOVAL/INSTALLATION ACTIONS

1) RESIDUAL CHARGE ELIMINATOR ASSEMBLY REMOVAL

This assembly is removed by unscrewing the two (2) retaining screws which secure it to the upper left main frame member of the copier body, as shown in Fig. 4-29.

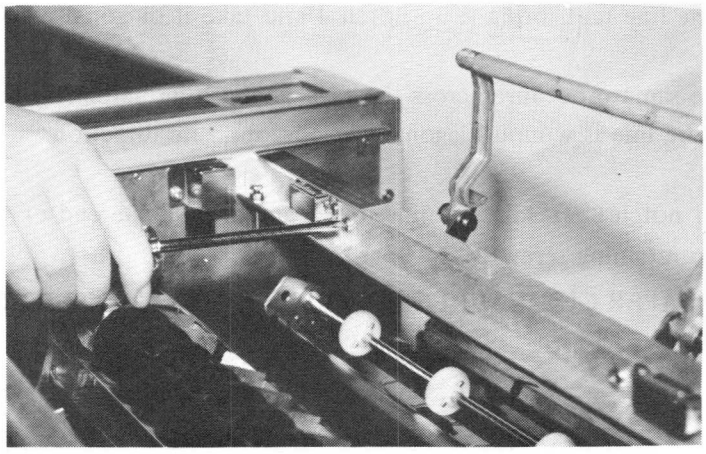


Fig. 4-29 Eliminator Assembly Removal

2) PAPER GUIDE WIRE REPLACEMENT

Perform the replacement of the paper guide wire mounted on the underside of the Residual Charge Eliminator Assembly and Transfer Corona Assembly as follows (reference Fig. 4-30):

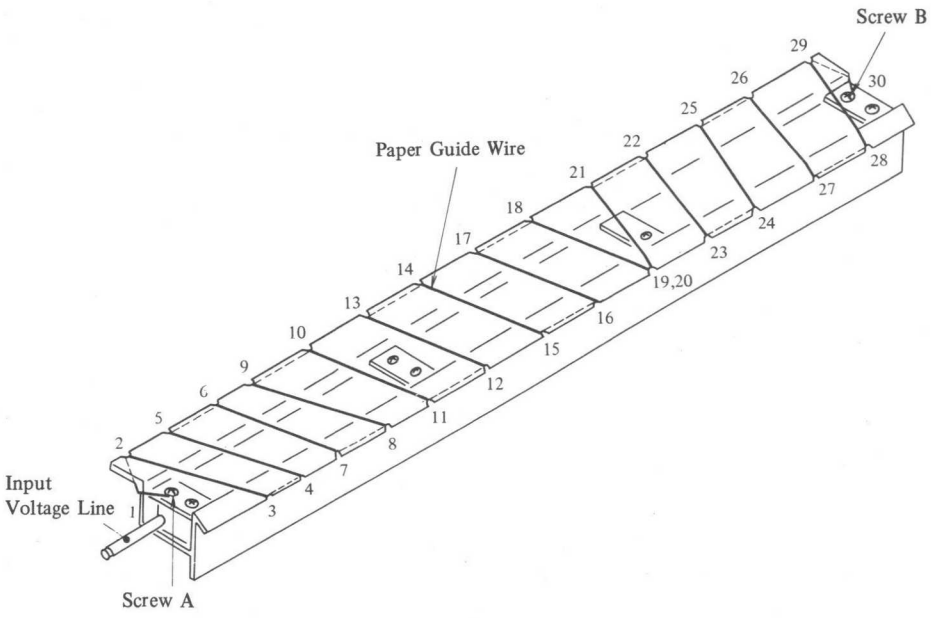


Fig. 4-30 Paper Guide Wire Replacement of Residual Charge Eliminator Assembly

a) After removing the Residual Charge Eliminator Assembly from the copier, take off the old guide wire.

b) Pass the end of the new guide line around screw A and tighten the screw to secure the new wire.

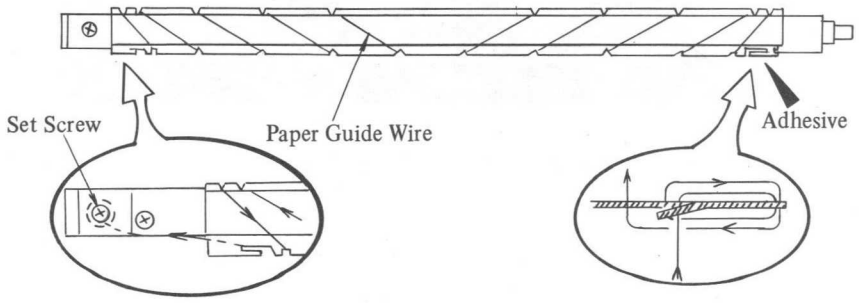
c) Pass the guide wire around and under the upper ridge lip of the eliminator housing; place it in notch 2 and bring it diagonally across to notch 3.

d) Keeping the line taut, bring it up notch 4 and take it diagonally across to the notch 5.

e) Repeat the same procedure across the face of the Eliminator Assembly. However, from notch 20 the line is wound diagonally in the opposite direction.

f) At the last notch (29), take the line under and around the end of the frame and fasten it securely to retaining screw B.

[ADDITION] PAPER GUIDE WIRE REPLACEMENT OF TRANSFER CORONA CHARGE



3) CORONA WIRE REPLACEMENT

Although each corona assembly differs in corona wire specifications. the following general procedure is applicable for wire replacement.

a) Cut a length of wire and form a loop at each end. The overall length of the wire should be equal to the dimensions given in Table 4-1.

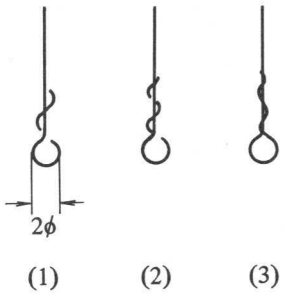


Fig. 4-31 Corona Wire Loop

b) Remove the covers from the termination housings and take out the old wire.

c) With the exception of the A. C. Corona Assembly, both ends of the corona wire should be attached to the tension spring which connects the corona wire with the rear assembly terminal. In the case of the A. C. Corona Assembly, only one loop is connected.

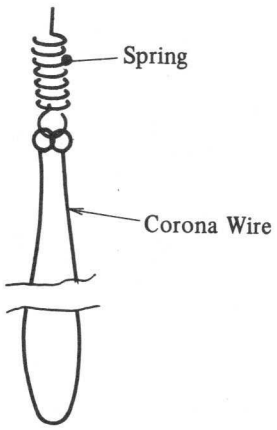


Fig. 4-32 Attaching Corona Wire

d) Position the other end of the wire (not connected to the spring) on its mounting stud in the front termination cover.

e) Pass the wire (s) over the seating position (s) of the wire guides and secure the spring to the rear teminal, using tweezers.

f) Set the corona wire height to that prescribed in Table 4 - 1.

4) GRID WIRE REPLACEMENT

Perform grid wire replacement whenever it becomes damaged or uncleanable (reference-Fig. 4-33).

a) Remove the grid portion of the A. C. Corona Assembly.

b) Loosen the front grid wire hanger and remove the old grid. Then, tighten the front hanger at its inward position.

c) Cut a length of wire and from a loop at one (1) end. Observe the specifications given in Table 4-1.

d) Place the loop on stud B of the front hanger. Then, pass the wire over and around stud A and across to the same side of its corresponding stud.

e) Pass it around this stud and bring it across, again, to stud A.

f) Passing it around stud A & B, take it across to the next corresponding stud.

g) Pass it around the rear B stud and back to the front B stud.

h) From the front B stud, pass it around the front D stud to the rear D stud.

i) After going around the rear D stud, pass the wire around the rear C stud.

j) From the rear C stud, feed the wire around the front C stud to the retaining screw.

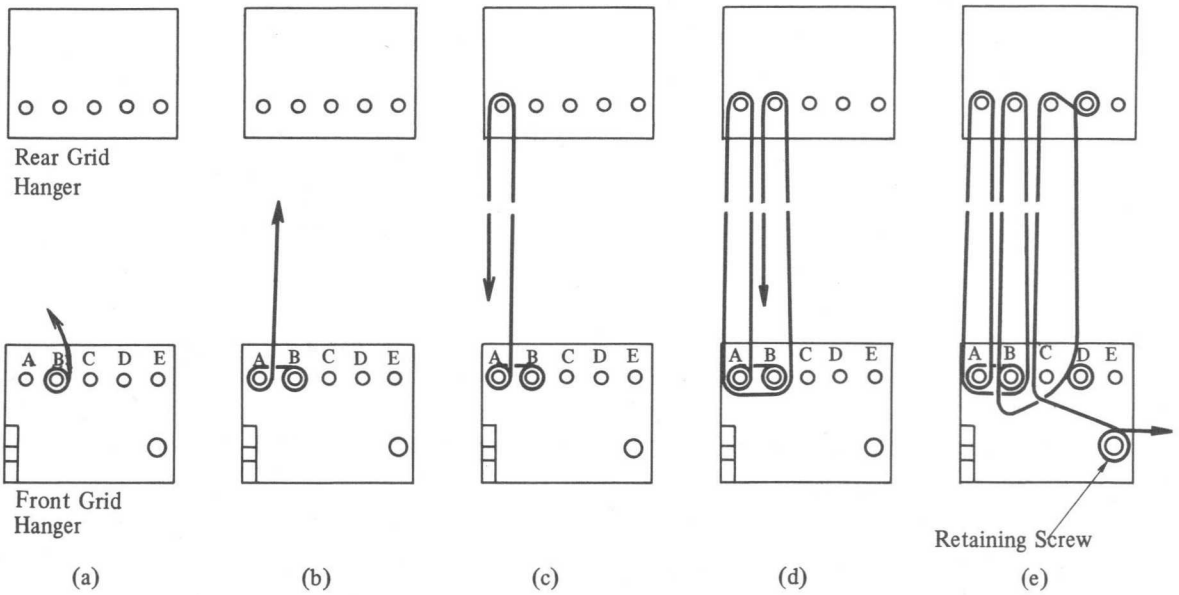


Fig. 4-33 Wiring Procedure

k) Tighten the wire retaining screw and cut off the remaining wire.

l) Reposition the front wire hanger to ensure that the grid is taut. The wires should be at 2 mm intervals, with the exception of the last length. This length is separated by 4 mm.

4.5-4 REPAIR/SERVICING ACTIONS

1) CORONA WIRE ADJUSTMENT

The distance of the corona wires from the body of the corona assemblies is adjustable in all cases by two (2) screws, as depicted in Fig. 4-34. The distance, represented by ℓ in Fig. 4-34, vary in the case of each assembly (see Table 4-1 for specifications).

Around the head of each screw are indication marks, which aid in making adjustments. Each mark represents 0.1 mm vertical movement of the wire, either up or down.

Turning the adjust screws counterclockwise increases the surface potential of the drum due to the corona wire moving closer to the drum. On the other hand, when turned clockwise, the surface potential is decreased.

NOTE: When making any adjustment, always note the position of the screw. Turn the screw slowly, increasing in small increments.

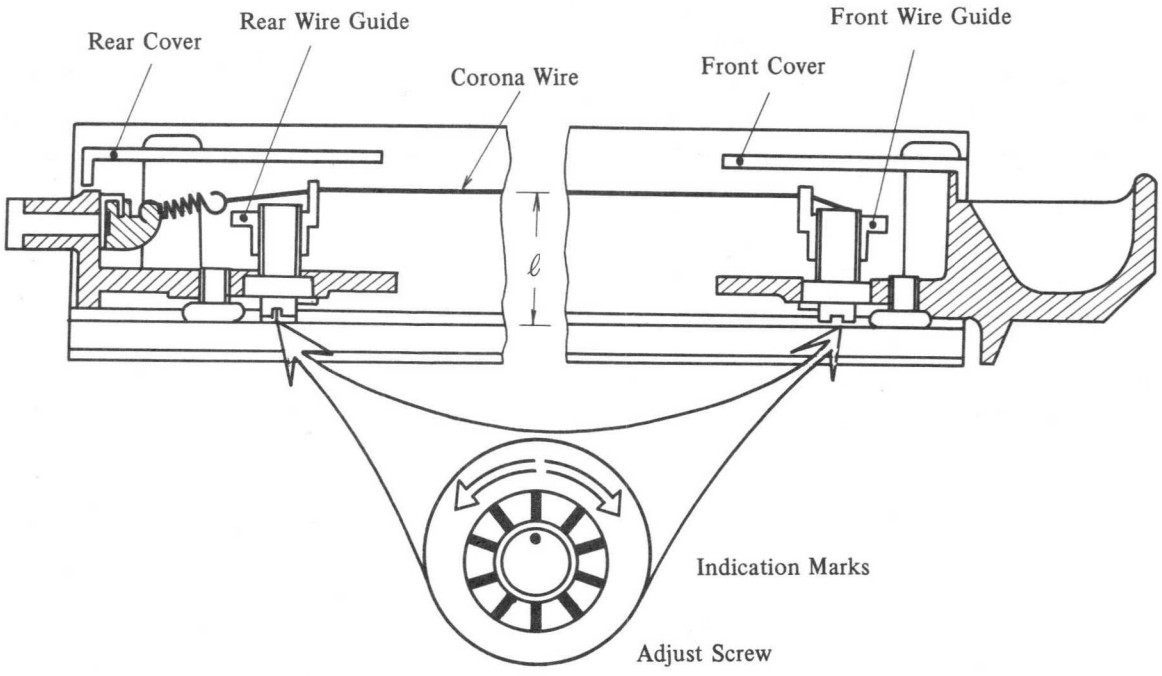


Fig. 4-34 Corona Wire Adjustment
(Positive Corona Assembly illustrated)

4.6 DEVELOPER ASSEMBLY

4.6-1 OUTLINE OF ASSEMBLY OPERATION

The Developer Assembly is the portion of the NP–70 copier which applies the toner to the drum's surface to create the visible toner image. This image is the result of toner adhesion to the electrostatic latent image which is formed on the surface prior to the immersion of the drum in the developing liquid. The change from a latent image to a visible image, which occurs when the drum surface passes over this assembly, is referred to as "Development" ; hence, the name of the assembly.

The developing liquid is normally contained within the bottom portion of this assembly, the developer reservoir. However, a portion of the liquid is constantly pumped up to the developer tray where it comes into contact with the surface of the drum. The liquid comes through a hole in the bottom of the developing tray and flows to the ends of the tray due to a groove running from front to back. This groove provides for complete coating of the drum.

The density of the developing liquid is kept constant, electronically, by a unit called the Automatic Toner Replenishment (ATR) Subassembly. Additionally, the developer pump motor stirs the liquid constantly to keep toner from precipitating.

The quantity of developing liquid in the Developer Assembly is continuously checked to ensure copier mechanical operation remains safe. This monitoring is performed by a built-in float which permits machine operation as long as 1800cc of developer is present in the reservoir.

Thus, this assembly contributes significantly to image uniformity by ensuring that developing liquid is present and within a fixed range of conditions.

4.6-2 ASSEMBLY MAIN COMPONENTS

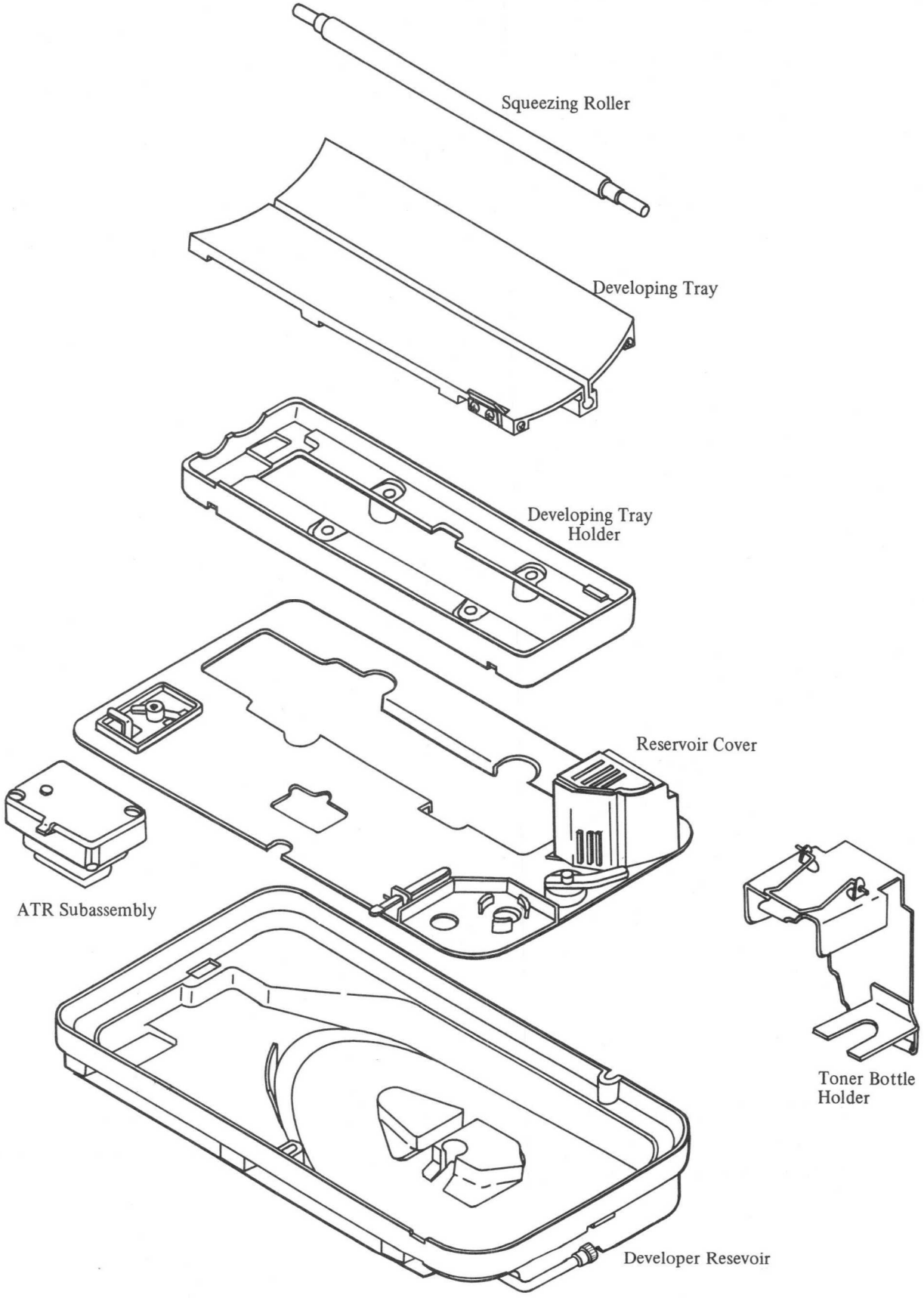


Fig. 4-35 Developer Assembly Main Components

1) AUTOMATIC TONER REPLENISHMENT (ATR) SUBASSEMBLY

The ATR Subassembly checks the developer density and initiates toner replenishment whenever the density falls below a certain level. Fig. 4-36 depicts the main components of this subassembly.

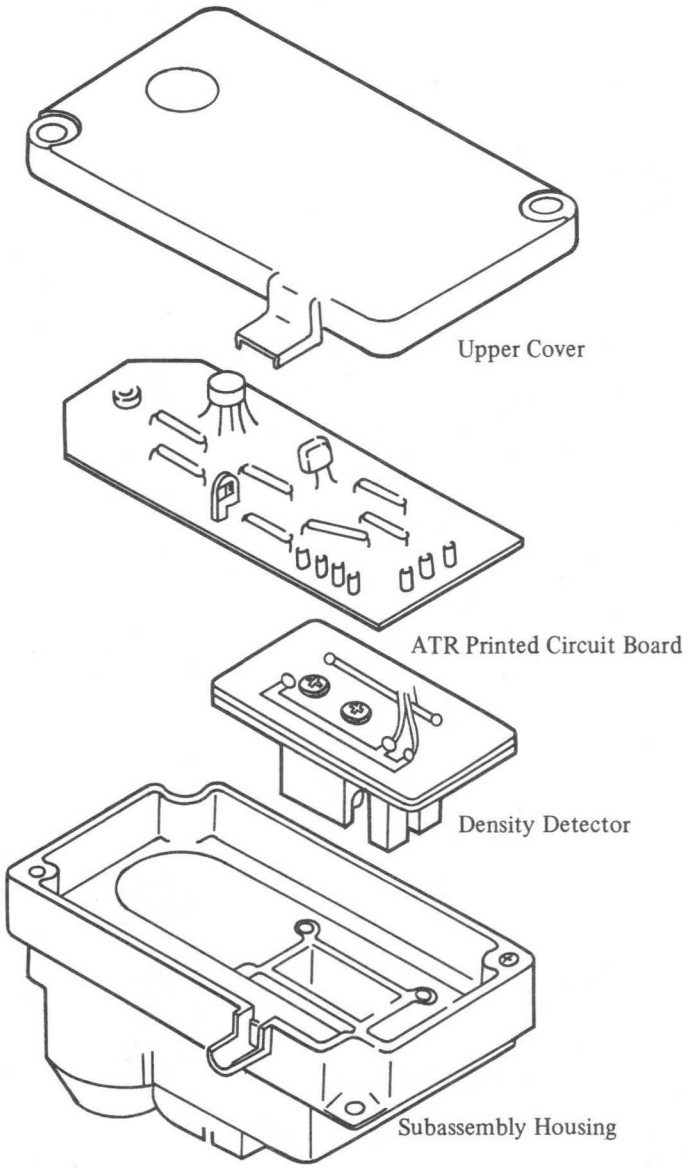


Fig. 4-36 ATR Subassembly Main Components

The ATR Subassembly operation is divided into two areas – mechanical and electronic. In this section only the mechanical operation will be explained. For information about the electronic operation, refer to Chapter 3 of this manual.

a) The detector portion of the subassembly (containing a lamp and a CdS photocell) monitors the developer density by means of light transmission through the liquid. This monitoring is continuous due to the pumping of developer through the subassembly, as shown in Fig. 4-37.

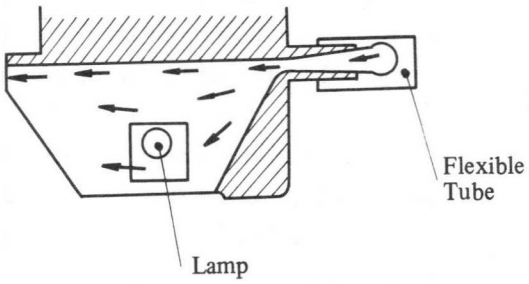
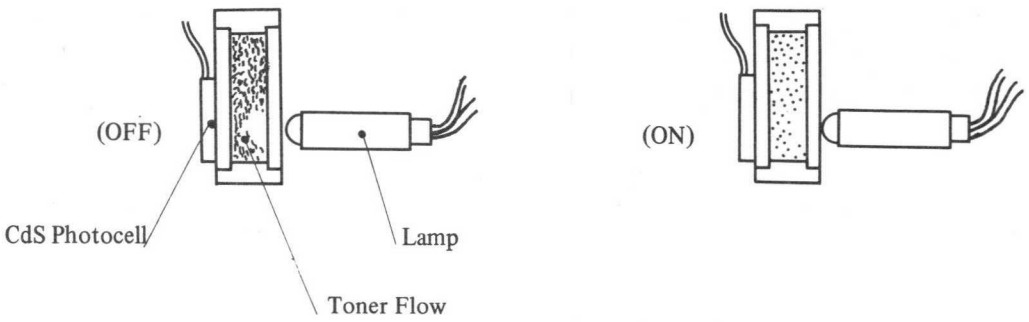


Fig. 4-37 Developer Flow Through ATR Subassembly

b) As the amount of toner in the developer declines, light transmission increases and the photocell resistance drops. When the resistance drops too low, activation of the ATR circuit occurs and toner is fed to the Developer Assembly (see section 3.4 for explanation of circuit operation).



(a) Normal Tonner Density (b) Low Toner Density

Fig. 4-38 Toner Density Monitoring

2) DEVELOPING TRAY

The developing tray is curved to conform to the shape of the drum. Developer is pumped to a point midway along the tray groove and, from this point, it flows evenly across the tray.

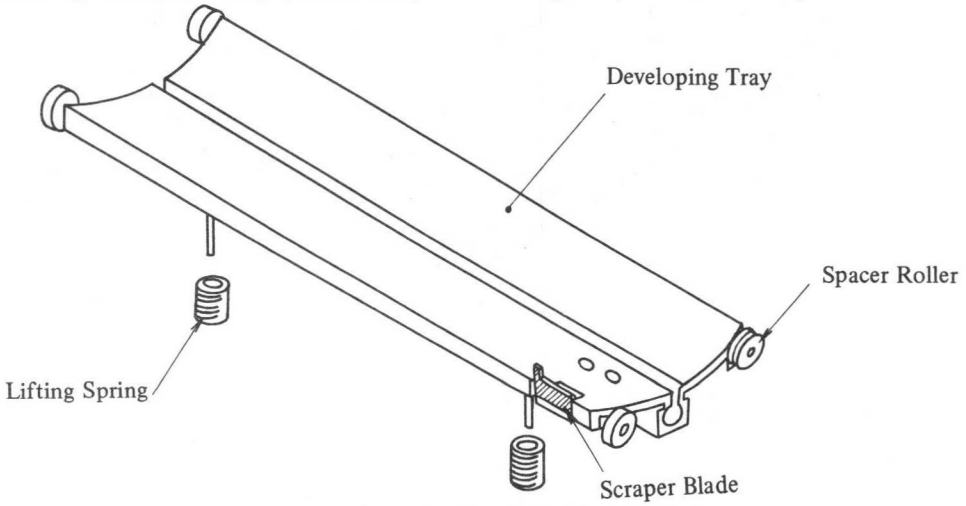


Fig. 4-39 Developing Tray Main Components

Two pairs of springs are located beneath the tray to press it upward against the drum. However, the tray can be lowered by turning the assembly release handle. This handle, when turned, draws the developing tray downward by means of wires connecting the two. The wires are connected to the underside of the developing tray.

The scraper blade, located to the Copier-Front end of the tray, cleans off developer from that portion of the drum surface which comes into contact with the separation belt of the Paper Separating Subassembly. This "scrape-off" is performed to prevent the accumulation of toner on the belt.

3) SQUEEZING ROLLER

The squeezing roller, located at the "after-development" edge of the developing tray, serves two functions. The primary function is to remove free-floating toner particles from the dispersant on the drum surface, as the drum departs the developing tray. Without this "cleaning" action, contamination of the image background will result as the drum passes in front of the negative corona.

As a secondary function, this roller physically limits, or "squeezes", the amount of dispersant on the drum surface to 0.2 mm. The squeezing action performed here is repeated as the drum passes in front of the negative corona.

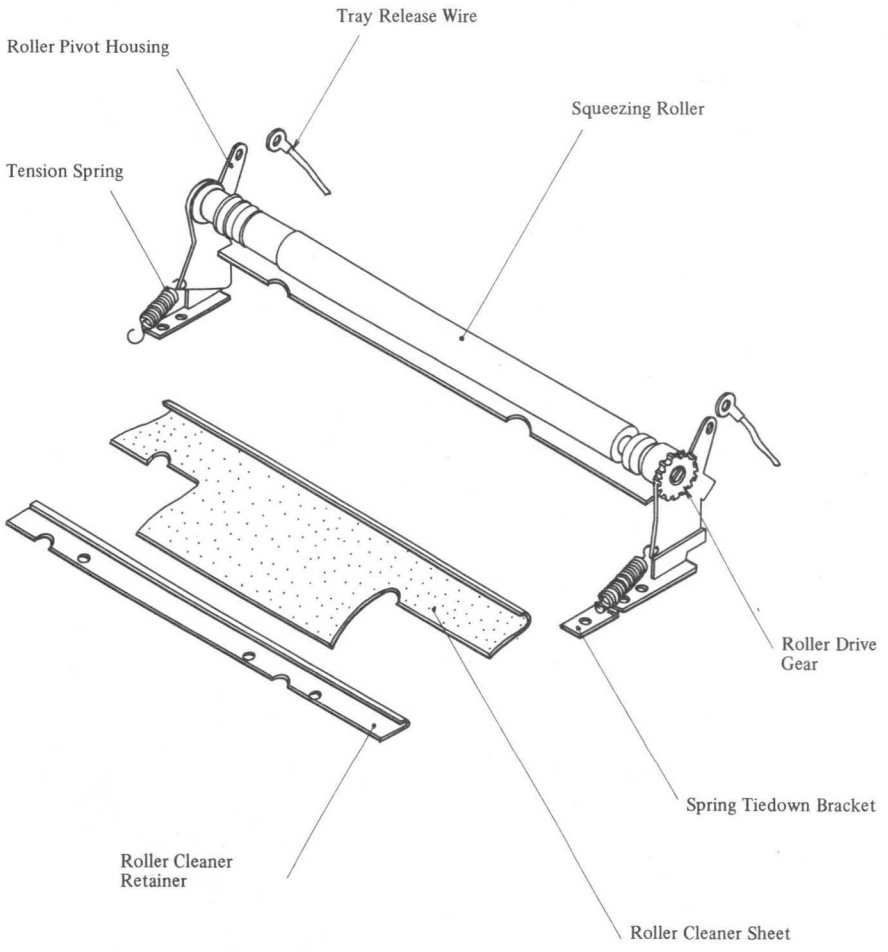
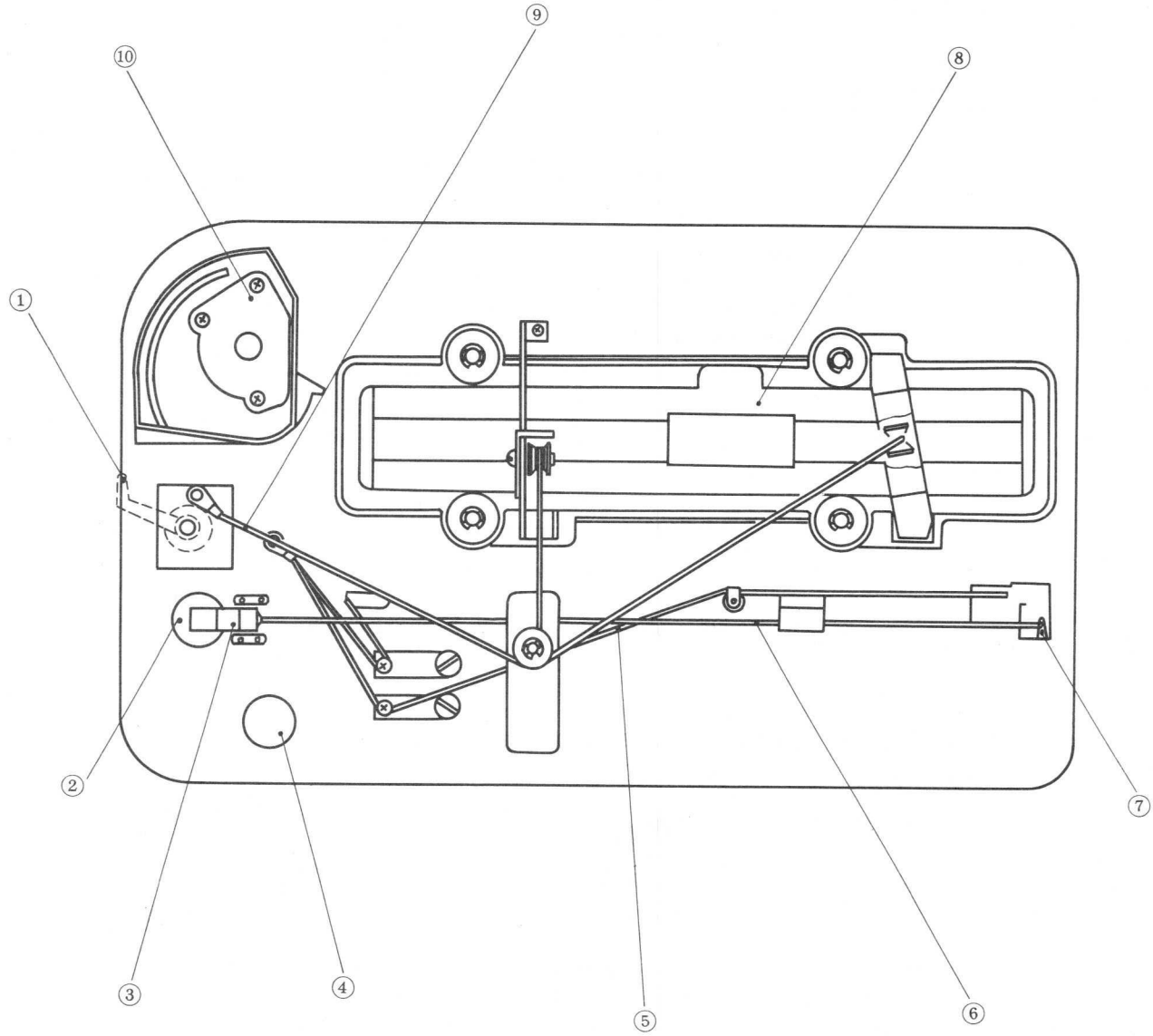


Fig. 4-40 Squeezing roller Main Components

It should be noted that turning the assembly release handle to lower the developing tray also causes the squeezing roller to pivot downward. This downward movement ensures that the squeezing roller is sufficiently clear of the Drum Unit to permit removal of the Developer Assembly.

4) RESERVOIR COVER

The reservoir cover is that portion of the Developer Assembly on which all of the previously mentioned components are mounted. These components are controlled by the additional elements found on the underside of the cover, shown in Fig. 4-41.



① Assembly Release Handle
② Toner Bottle Valve Entry Hole
③ Toner Bottle Valve Trip Lever
④ Premix Bottle Valve Entry Hole
⑤ Wire for Lowering Squeezing Roller
⑥ Connecting Rod for Moving Toner Bottle Valve Trip Lever
⑦ Toner Replenishment Lever
⑧ Developing Tray
⑨ Wire for Lowering Developing Tray
⑩ Developer Pump Motor (for simplicity tubing is not shown in this figure)

Fig. 4-41 Reservoir Cover Components (Underside View)

Some additional components that are mounted on the underside of the reservoir cover are:

a) Developer Pump Motor
This motor circulates and stirs the developer in the reservoir and pumps it to three locations – to the ATR Subassembly for density checking, to the Drum Cleaner Assembly for friction reduction and cleaning, and to the developing tray for development of the electrostatic latent image. This flow of developer is shown in Fig. 4-42.

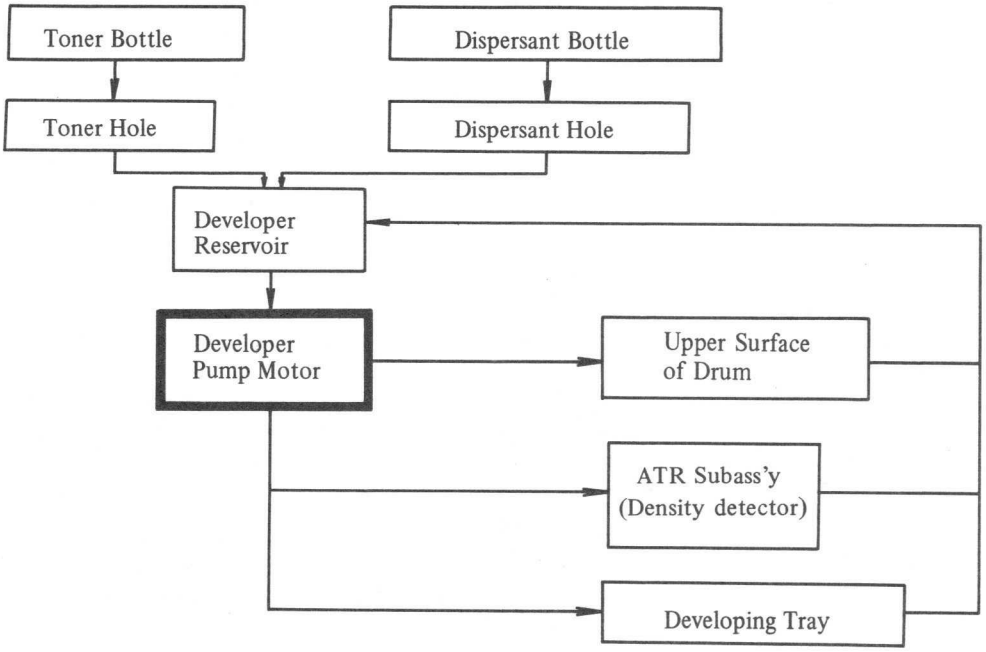


Fig. 4-42 Circulation of Developer in the NP-70

b) Toner Replenishing Mechanism
The replenishing mechanism consists of the components which cause the feeding of toner, as directed by the ATR circuit. They are depicted in Fig. 4-43.

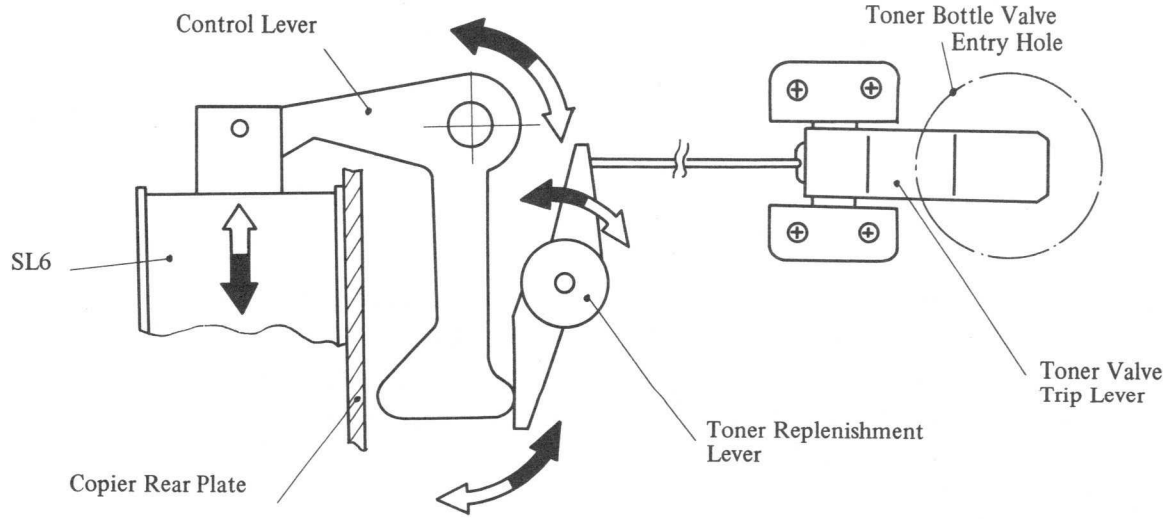
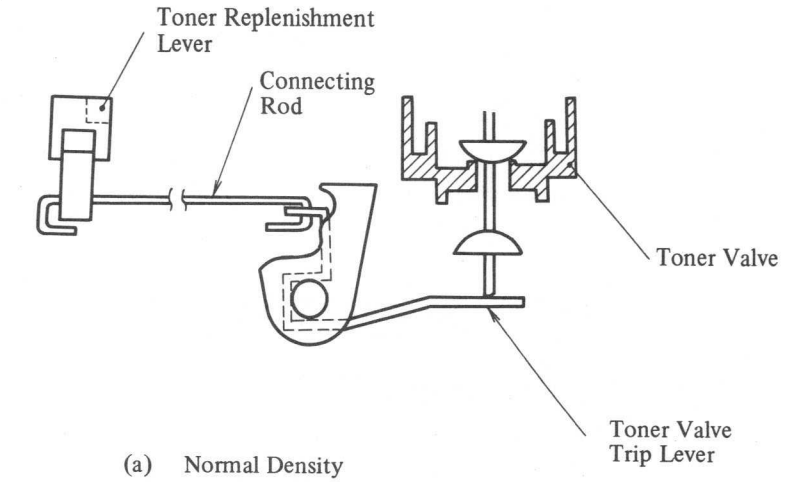


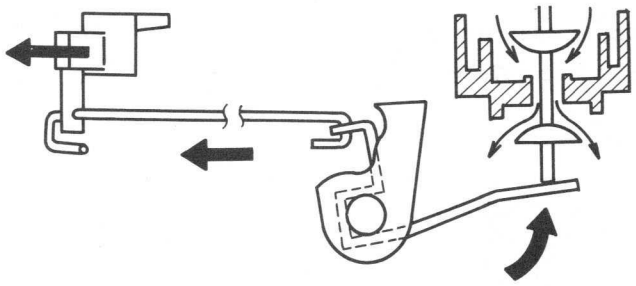
Fig. 4-43 Replenishing Mechanism Main Components

The energization of SL6 (occur when MS5 is "ON" and density is low) results in plunger and lever movements as depicted by the black arrows in Fig. 4-43. The white arrows represent the motion as the components return to their normal positions when SL6 turns "OFF".

The above mentioned lever motions result in the upward pivot action of the toner valve trip lever to release concentrated toner into the Developer Assembly. The toner valve actuated is part of the cap of the concentrated toner bottle mounted on the front end of the Developer Assembly. Fig. 4-44 depicts these actions.



(a) Normal Density



(b) "Insufficient" Density

Fig. 4-44 Toner Replenishment Actuation

5) DEVELOPER RESERVOIR

The developer reservoir is the main body of the assembly, as well as the storage tank for developer. The capacity of the reservoir is 2.3 ℓ for normal operation and is kept at this level by the auto-refilling action of the Premix bottle placed in the Developer Assembly.

As a precautionary measure to prevent assembly and drum damage, a level monitoring float is attached to the bottom of the reservoir. This float operates as follows:

a) When the quantity of developer is at the normal level, microswitch MS12 is actuated, as illustrated in Fig. 4-45.

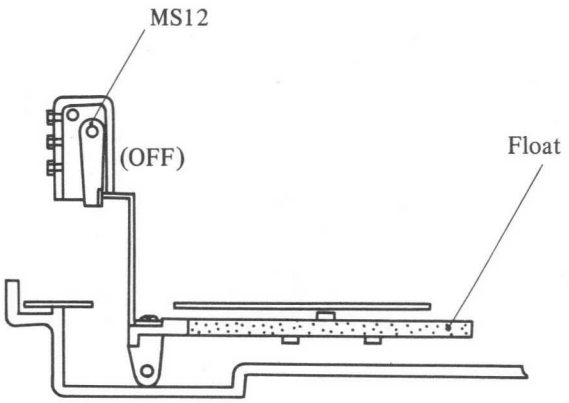


Fig. 4-45 Normal Developer Level

b) If copying operation is continued with an empty dispersant bottle, a lowering of the developer level results.

c) When the developer quantity drops below approx. 1.8 ℓ, the float no longer presses the actuator of MS12 (see Fig. 4-46).

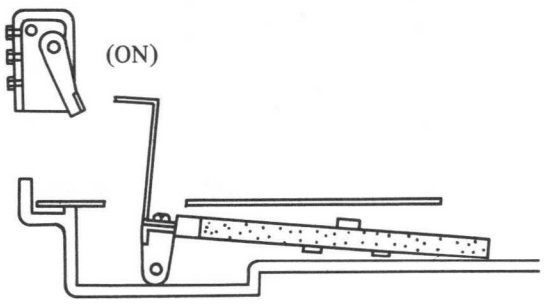


Fig. 4-46 Lowered Level

d) When MS12 is no longer actuated, the circuit to the developer supply lamp is closed and the lamp lights. Additionally, a ground is applied to energize K9 and stop copier operation.

4.6-3 REMOVAL/INSTALLATION ACTIONS

1) DEVELOPING TRAY REMOVAL

Removal of the developing tray is as follows (reference - Fig. 4-47).

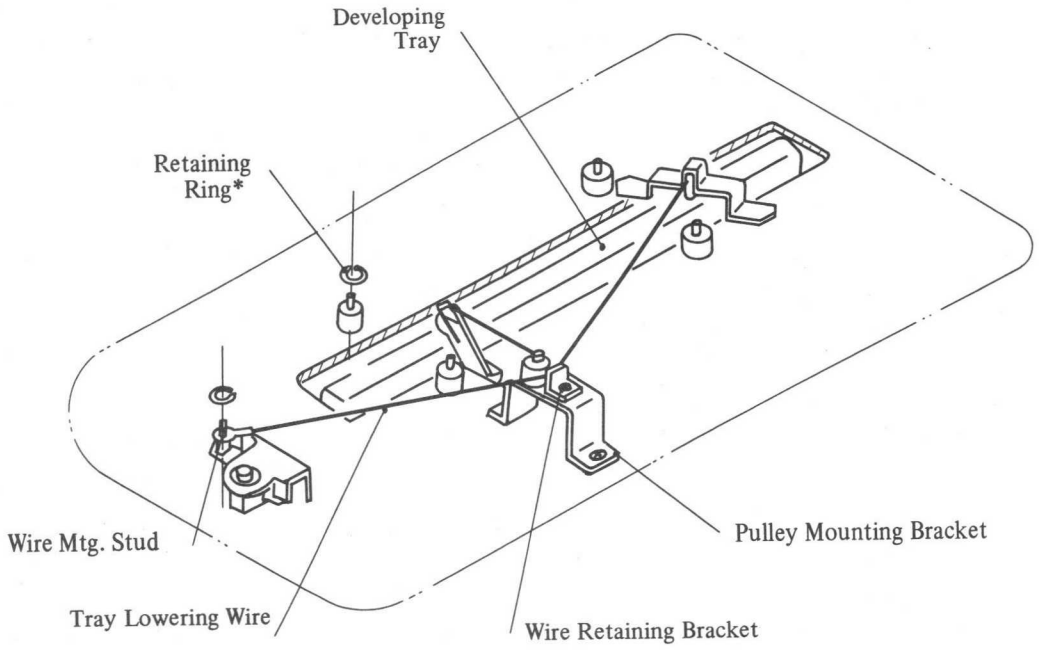


Fig. 4-47 Reservoir Cover (Underside View)

a) Remove the reservoir cover from the Developer Assembly.

b) Remove the retaining ring (astrisk marked in Fig. 4-47) from each of the four (4) compression spring shafts.

c) Remove the wire retaining bracket and retaining rings from the pulley mounting bracket shown in Fig. 4-47.

d) Disconnect the tray lowering wire at the wire mounting stud by removing the retaining ring which secures it.

e) Disconnect the developer tubing from the developing tray.

f) Remove the developing tray from the reservoir cover.

When installing the developing tray perform the previous steps in reverse order.

2) SQUEEZING ROLLER REMOVAL

Remove the squeezing roller and its attaching hardware in the following manner (reference-Fig. 4-48):

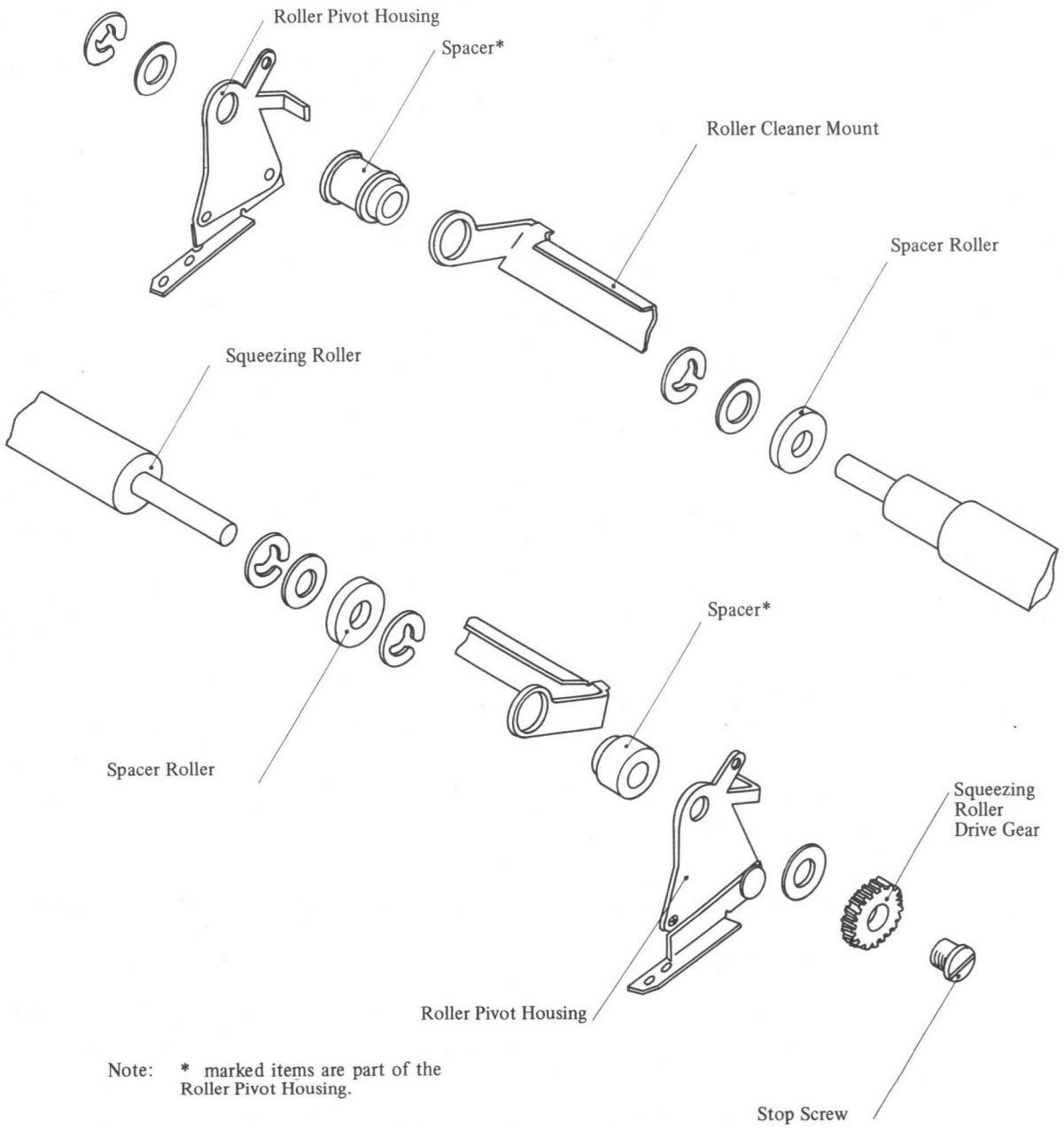


Fig. 4-48 Components of Squeezing Roller (Detailed)

a) Remove the roller lowering wires (on the right and left end positions) from the roller.

b) Disengage the spring from its retainer. As the spring is rightly stretched, use care when disengaging.

c) Remove both of the pivot housings with their attached hardware holding the sqeezing roller.

d) Pull the roller, with its attaching hardware, from the developer reservoir, grasping both ends of the roller. Be careful not to damage the roller cleaner when removing the roller.

e) Remove the stop screws to detach the roller from its associated hardware.

When installing the squeezing roller perform the previous steps in reverse order.

4.6-4 REPAIR/SERVICING ACTIONS

1) TONER REPLENISHMENT LEVER ADJUSTMENT

To ensure that toner replenishment actions are adequate, perform the following (reference-Fig. 4-49):

a) Remove the Developer Assembly from the copier and detach the cap from the toner bottle.

b) Fit this cap into the valve entry hole so as to simulate the same condition as that of a toner bottle inserted.

c) Pull the replenishment lever and observe the amount of movement of the valve shaft in the cap.

d) If the valve movement is greater than 2.5 mm upward when the lever is tripped, adjust the lever position away from the control lever.

e) If the valve movement is less than 2.5 mm upward when the lever is tripped, adjust the lever position closer to the control lever.

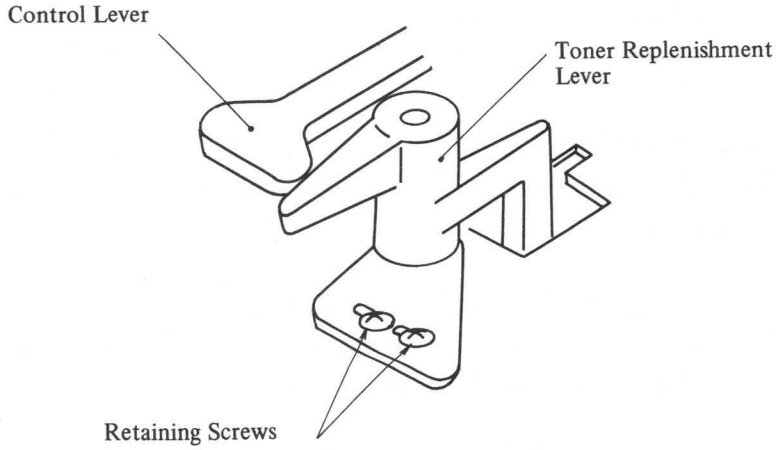


Fig. 4-49 Replenishment Lever Adjustment

2) SQUEEZING ROLLER ADJUSTMENT

If the squeezing roller is not horizontal or it is not at a proper distance from the drum, proceed to adjust the tension of the squeezing roller drive wires as follows (reference - Fig. 4-50):

a) If the Copier-Rear end of the roller requires adjustment, loosen the rear end adjust screw and move it in the arrow direction appropriate for correcting the roller position.

b) If the Copier-Front end of the roller requires adjustment, loosen the front end adjust screw and move it in the arrow direction appropriate for correcting the roller position.

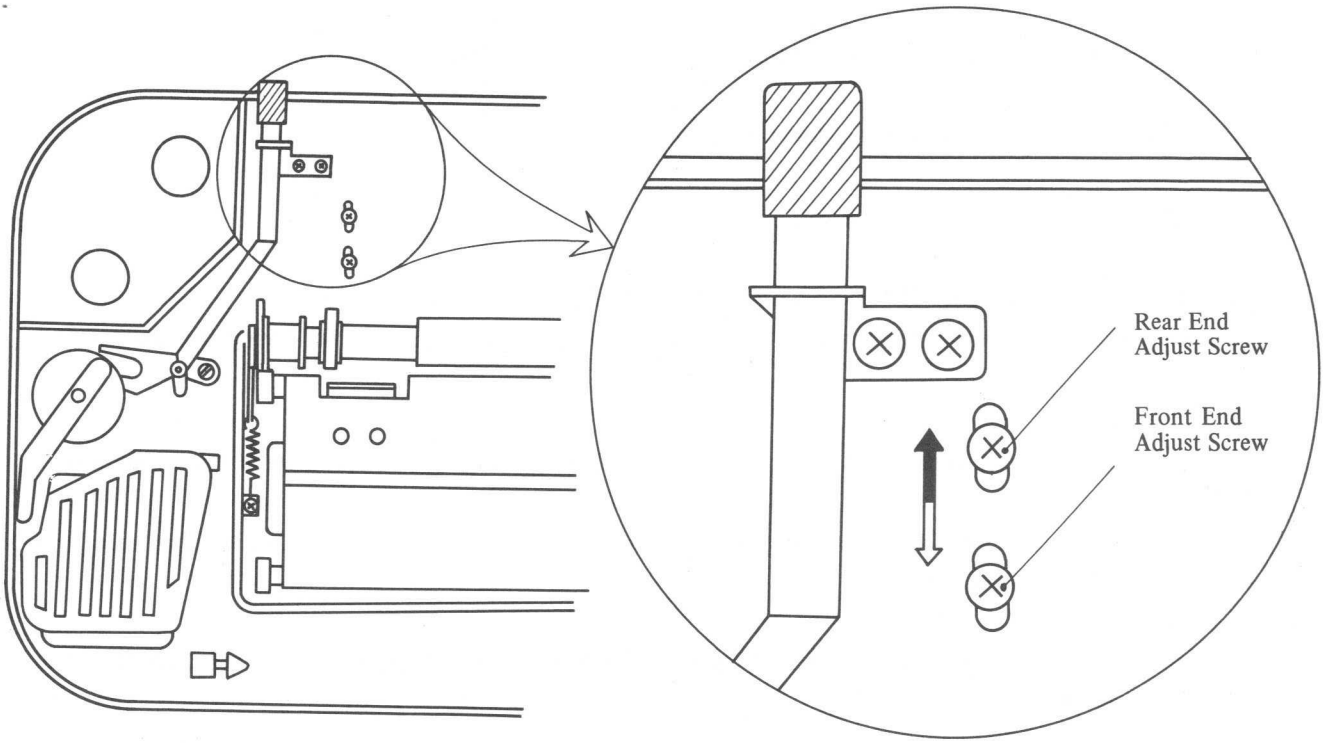


Fig. 4-50 Squeezing Roller Adjustment

Shift the adjust screw toward the " ⇦ " mark.	Roller will lower.
Shift the adjust screw toward the " ⇦ " mark.	Roller will rise.

3) DEVELOPER FLOAT ADJUSTMENT

The range of detection can be adjusted by changing the position of the trip arm on the float as follows (reference-Fig. 4-51):

a) If the developer check lamp lights although the developer quantity is normal (Premix is in the bottle) or the liquid quantity shows no noticeable decrease, move the microswitch trip arm in the " ⇨ " direction, away from the actuator.

b) If the developer check lamp will not light although the developer quantity shows a noticeable decrease, move the microswitch trip arm in the " ➡ " direction, toward the actuator.

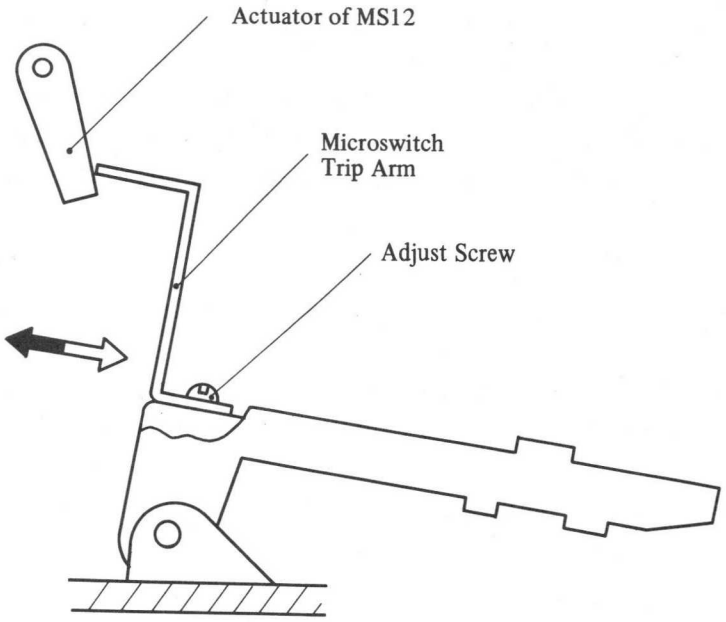


Fig. 4-51 Developer Float Adjustment

4) ATR SUBASSEMBLY CLEANING

Due to the constant pumping of developer through the ATR Subassembly, cleaning of the subassembly housing is periodically necessary. Perform this cleaning as follows:

a) Wipe both walls of the slit molded into the underside of the ATR housing with Premix. This is necessary to clean off the accumulated toner deposit.

See the Service Handbook for additional details about assembly cleaning.

4.7 DRUM CLEANER ASSEMBLY

4.7-1 OUTLINE OF ASSEMBLY OPERATION

The Drum Cleaner Assembly is located above, and to the right of, the drum and is used for wiping the remaining developer off the drum prior to each copy operation. The main portions of the Drum Cleaner Assembly are the skirt blade portion, the cleaner blade portion, the liquid stoppers, and the frame portion which supports them. The skirt blade wipes off coarse particles (such as paper fibers or lumps of toner), while the cleaner blade completely cleans up the remainder.

Due to drum contact, the following are required for proper assembly operation.

a) The skirt blade and the cleaner blade should be pressed against the sensitive drum with proper and constant pressure so that they can clean the drum completely and correctly.

b) The skirt blade and the cleaner blade must not have any imperfections on the edge touching the drum surface.

c) During the rotation of the drum, there should be no harsh noises caused by the blades rubbing against the drum.

d) No developer should be present on the drum after the blades have performed their cleaning function.

4.7-2 ASSEMBLY MAIN COMPONENTS

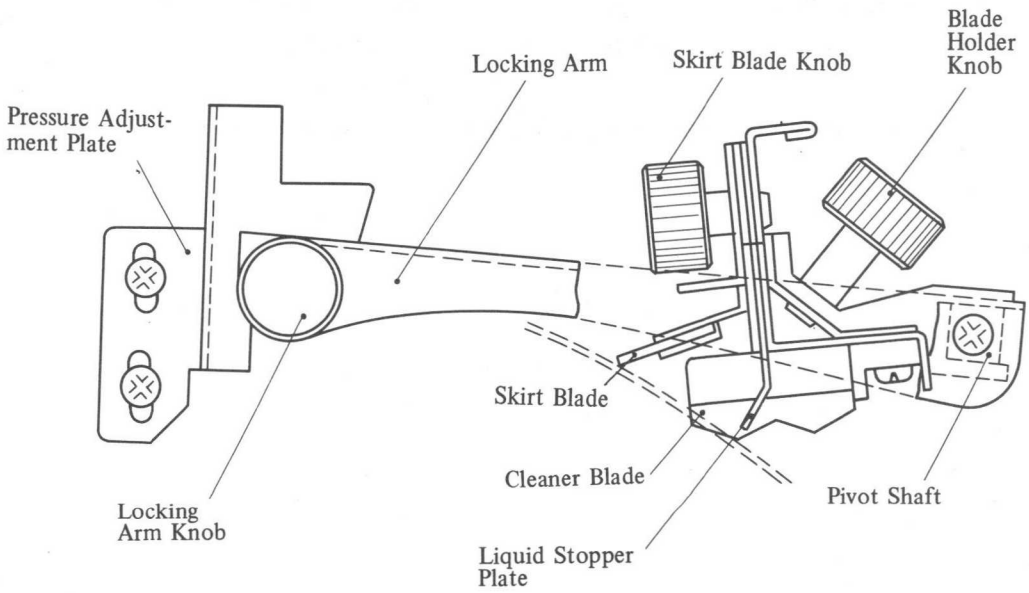


Fig. 4-52 Drum Cleaner Assembly Main Components (from Copier Front)

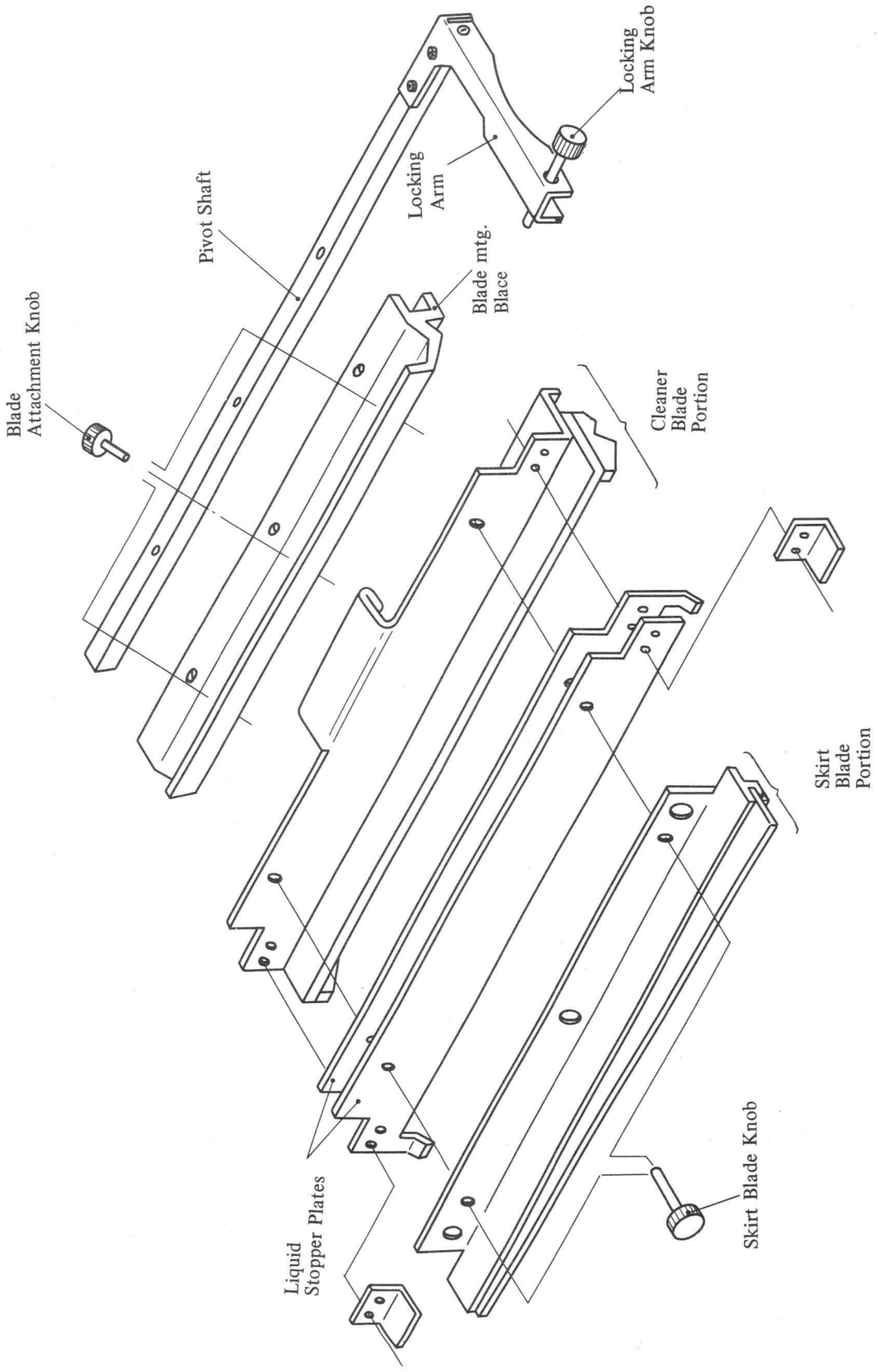


Fig. 4-53 Drum Cleaner Assembly Main Components (Exploded View)

1) SKIRT BLADE PORTION

The skirt blade is made of polyurethane rubber, 2 mm thick, and is mounted to contact the drum in advance of the cleaner blade (relative to drum rotation). In the event of a paper jam, this blade prevents paper from reaching the cleaner blade.

2) CLEANER BLADE PORTION

The cleaner blade performs the final wiping to ensure that the drum is completely free of contamination and, thus, ready to begin a new copying cycle.

3) FRAME PORTION

Consisting of the blade mounting brace, the pivot shaft, and the locking arm. This portion is used to support the blades and ensure proper seating against the drum; when the locking arm is in its fully lowered position, the blades are seated securely against the drum surface.

4) PRESSURE ADJUSTMENT PLATE

This plate is adjustable so that the seating of the assembly frame components against the blades (and, thus, the blade against the drum) can be set to the proper pressure.

5) LIQUID STOPPER PLATES

These two plates are mounted between the two blade portions. They each have an overhanging finger which contacts the ends of the cleaner blade (one at each end). These fingers prevent leakage of developer from the ends of the cleaner blade and, thus, should contact their respective ends of the blade.

4.7-3 REMOVAL/INSTALLATION ACTIONS

The following points should be considered when performing replacement actions:

a) Insertion of a new skirt blade is greatly facilitated by wetting the blade with developer before installing it.

b) The two blades must be seated properly in their mounting components for proper operation. Check this by pressing at various points along the edge of the blade during installation.

c) The knobs used for attaching the blade are not the same size - the skirt blade knobs are shorter than the blade attachment knobs. Be careful not to confuse them during replacement.

4.7-4 REPAIR/SERVICING ACTIONS

1) ADJUSTMENTS

The skirt blade and the cleaner blade should be pressed against the drum with a specified pressure; otherwise incomplete cleaning or noise results. Begin by performing the cleaner blade check as follows:

a) Remove the skirt blade and holder by unscrewing the skirt blade knobs.

b) Release the cleaner blade pressure by pulling out the locking arm knob and, then, raising the arm. Place the pressure receiving sheets (the two sheets of stainless foil especially prepared for measuring the blade pressure) between the cleaner blade and the drum.

c) Lock the cleaner blade by repositioning the locking arm knob, making sure the sheets remain in position between the drum & blade.

d) Hook the spring balance to the pressure measuring sheet in the middle and draw it out in the plane tangent to the blade-drum contact point. Do this slowly and with uniform speed, measuring the value on the balance while the inside sheet is sliding (see Fig. 4-54).

e) Measure three points (front, center, and back) of cleaner blade contact, repeating steps b) ~ d).

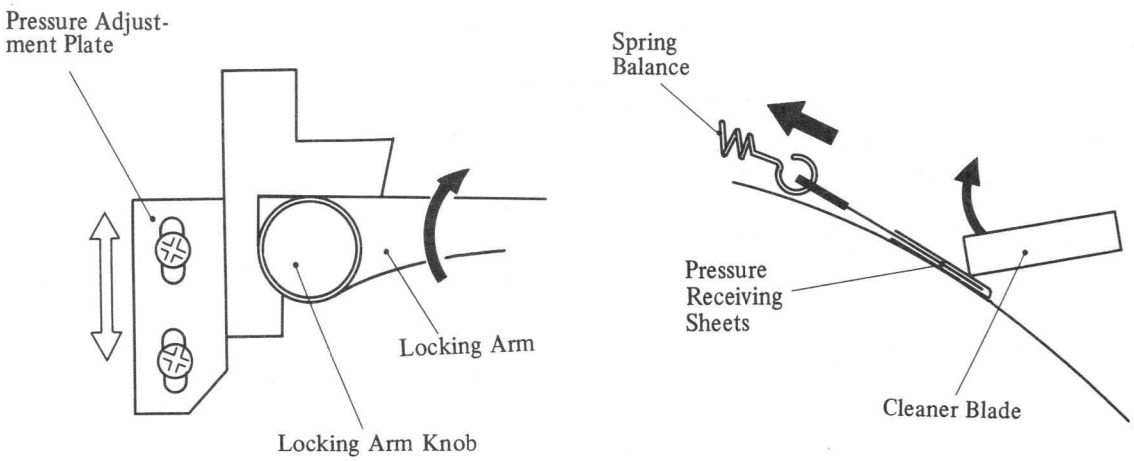


Fig. 4-54 Adjustment of Cleaner Blade Pressure (A)

The pressure of the cleaner blade should be within the range of 150 ~ 190 g/cm²

f) When the pressure is out of the specified range, first attempt to adjust it by tightening/loosening the adjustment screws (see Fig. 4-55) for the cleaner blade.

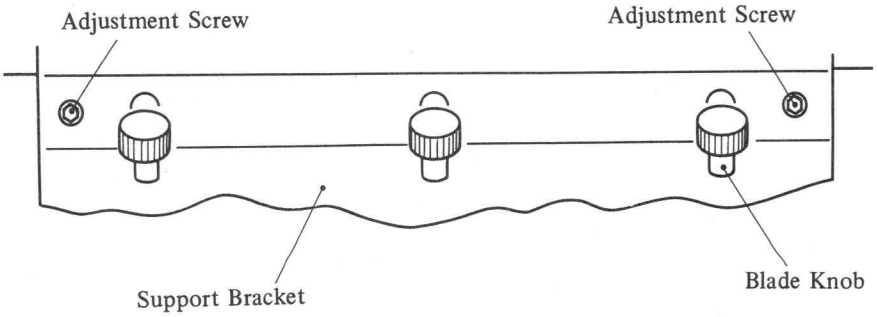


Fig. 4-55 Adjustment of Cleaner Blade Pressure (B)

h) If g) fails to achieve the correct values, adjust by sliding the pressure adjustment plate up or down (see Fig. 4-55). Table 4-2 depicts the relationship between pressure adjustment plate movement and cleaner blade pressure.

Pressure Adjustment Plate	Blade Pressure
lowered	increases
raised	decreases

Table 4-2 Adjustment Plate Movement

After performing the adjustment of the cleaner blade, check the skirt blade as follows:

h) Mount the skirt blade and holder on the assembly. The skirt blade knobs should be tightened midway on the elongated mounting holes.

i) Measure the pressure of the skirt blade against the drum using the same procedure as with the cleaner blade. When placing the pressure receiving sheets under the skirt blade, be careful not to insert them under the cleaner blade.

The specified pressure of the skirt blade should be at least 30 g/cm^2 higher than the cleaner blade.

j) When pressure is out of the specified range, adjust it by moving the skirt up or down within the length of the elongated mounting holes on the skirt blade holder.

4.8 CASSETTE HOLDER ASSEMBLY

4.8-1 OUTLINE OF ASSEMBLY OPERATION

This assembly is located at the left end of the copier body and is used to hold and position the paper cassette. Its position is critical in determining proper feeding & the size of the "no-image-area".

4.8-2 ASSEMBLY MAIN COMPONENTS

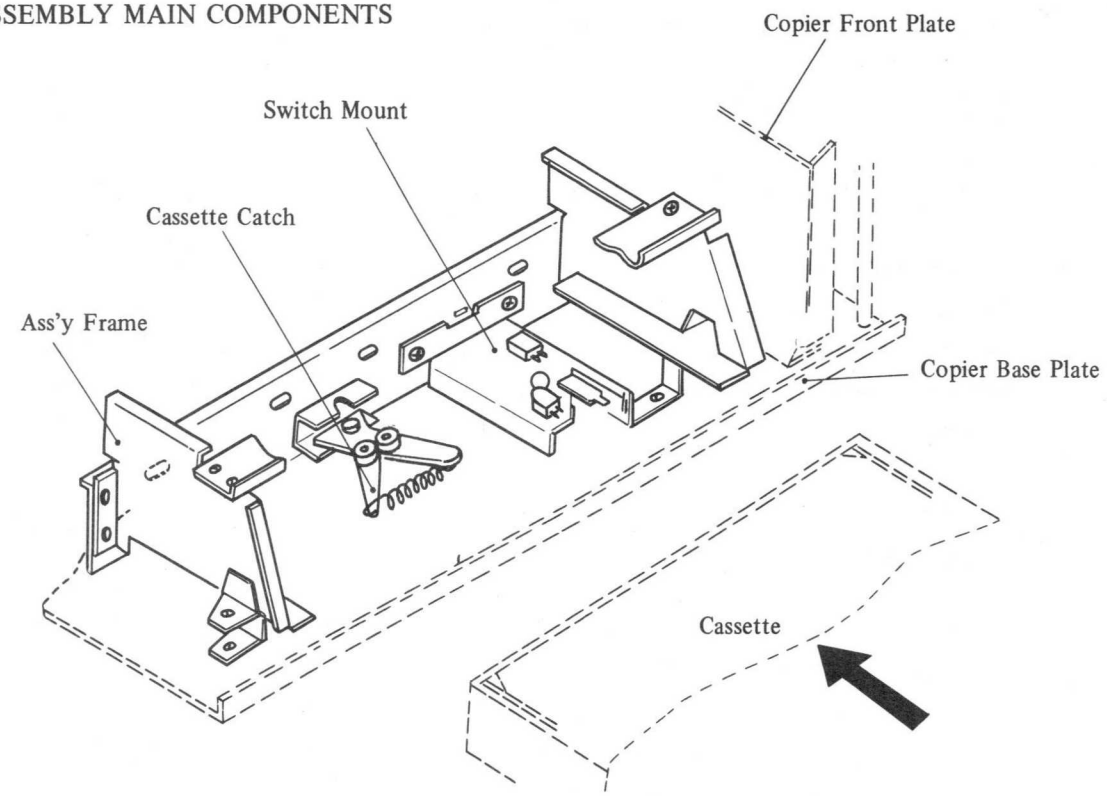


Fig. 4-56 Cassette Holder Assembly Main Components

1) CASSETTE CATCH
When a cassette is inserted, the catch fixes it firmly in the assembly frame by grasping the protruding rhombic-shape projection on the bottom. The cam-like projection spreads the tensioned rollers which ride past the side peaks of the cam and hold the cassette fast.

2) SWITCH MOUNT
This component is the platform on which are mounted the microswitches (MS11 & MS15) used to indicate the condition of the Paper Cassette Assembly. MS11 is actuated by full-size cassettes (A3 & B4) to cause copier switchover to full-size paper operation. MS15, on the other hand, is actuated by all cassettes to signal proper cassette seating in the Cassette Holder Assembly.

3) ASSEMBLY FRAME

The assembly frame provides the correct support and positioning for the Paper Cassette Assembly. The frame positioning is very critical and, thus, removal should not be performed unless absolutely necessary.

4.8-3 REMOVAL/INSTALLATION ACTIONS

As this assembly is jig poisitioned during the assembling of the copier, removal from the machine should not be performed unless absolutely necessary.

4.8-4 REPAIR/SERVICING ACTIONS

Should repair actions be necessary, perform the following after installation:

1) ADJUSTMENTS

The separation belt should contact the paper at a position 3.5 ± 0.5 mm inward from the Copier-Front edge of the paper. Also, the width of the "no-image-area" formed by the Developer Assembly scraper blade should be 7 ~ 8 mm. If either need adjustment, perform the following:

a) If the "no-image-area" is wider than specification, slide the assembly frame toward the copier-rear.

b) If the "no-image-area" is narrower than specification, slide the assembly frame toward the copier-front.

c) After adjusting, make a few copies to check the width of the "no-image-area". If necessary, perform a) or b) over again.

4.9 PAPER CASSETTE ASSEMBLIES

4.9-1 OUTLINE OF ASSEMBLY OPERATION

The NP–70 has Six (6) sizes of cassettes divided into two categories. Cassettes holding large sizes of paper are called "full-size" and are classified into A3 and B4 sizes, while cassettes holding small sizes of paper are called "half-size" and are classified into A4 and B5 sizes. All cassettes are designed for quick insertion/removal into the left end of the copier body.

Each cassette accepts up to 400 sheets of paper, with the paper being positioned on the inner plate of the cassette. This inner plate is pressed against the separation hooks. The requirement of each cassette is that both springs press the inner plate evenly and the paper stack touches the separation hooks firmly so that only the top sheet of paper is fed by the pickup roller.

As the difference in paper sizes requires changes in copier operation, the cassettes are used as a triggering device for switching over the circuitry for change. When the "half-size" cassettes (A4 and B5) are inserted into position, a cam protruding from the bottom of each cassette actuates microswitch MS11. This switches the electrical circuitry to "half-size". The "full-size" cassettes (A3 and B4), on the other hand, have no cams for actuating this microswitch.

4.9-2 ASSEMBLY MAIN COMPONENTS

Fig. 4-57 shows the main assembly components, using the A3 size paper cassette as an example. The other cassettes are almost the same except for the size and positioning of some parts.

1) PAPER LIFTING PLATE

Applys continuous upward pressure on the paper to ensure adequate contact of the top sheet with the separation hooks.

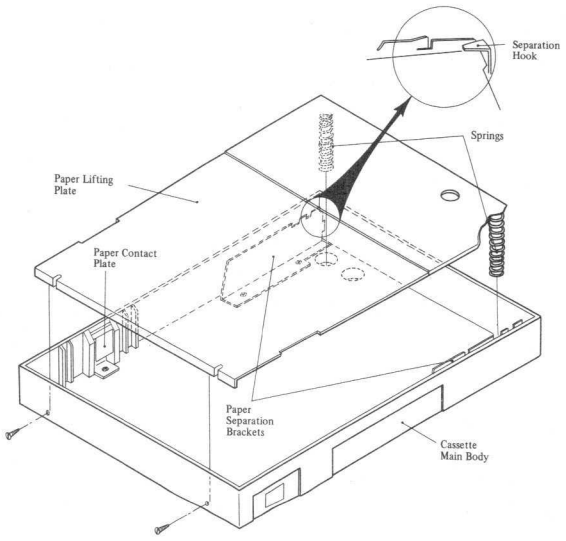


Fig. 4-57 Cassette Assembly Main Components

2) PAPER SEPARATION BRACKETS

These brackets have a formed finger, known as the separation hook, for holding the front edge of the top sheet of paper for proper feeding into the copier.

3) PAPER CONTACT PLATES

These plates have a foam pad attached and are positioned along the sides of the paper. The pads grip the paper slightly and minimize the possibility of more than one sheet of paper being fed at one time.

4) CASSETTE COVER

The cassette cover has two sections, one of which is swung back when inserting the cassette into the copier. This cover should be opened when used for copying and closed when in storage.

5) SPRINGS

These springs lift the paper by means of the inner plate. Table 4-3 shows the specifications of springs used for each magazine. When replacing springs, change both together.

Cassette	Part No.	Number of coils	Diameter of wire (mm)	Total length (mm)
A3	97-5922	10.0	1.2	71.5
B4	97-5923	11.0	1.2	75
A4	97-5924	10.0	1.0	79
B5	97-5925	10.5	1.0	84.5
Letter	97-5924	10.0	1.0	79
Universal	97-5924	10.0	1.0	79

Table 4-3 Spring Specifications

4.9-3 REMOVAL/INSTALLATION ACTIONS

The Cassette Assemblies are designed for easy slip-in/slip-out use. However, whenever replacing, be sure that the cassette is firmly positioned in the machine. Without proper seating, the NP–70 will not operate.

4.9-4 REPAIR/SERVICING ACTIONS

The accurate positioning and action of components in the cassette is important to the operation of the NP–70 copier. Should a cassette fail to operate properly the follow may be performed:

1) SPRING PRESSURE CHECK

Stand a ruler vertically against the front edge of the inner plate and lower the paper lifting plate with a manometer pressing on the front-center. Measure the pressure when the front edge of the plate is depressed 3 mm and 32 mm. The specified values are listed in Table 4-4.

Cassette	Pressure – 3 mm depressed (one sheet in cassette)	Pressure – 32 mm depressed (400 sheets in cassette)
A3	400±100	1950±100
B4	400±100	1600±100
A4	400±100	1200±100
B5	400±100	1000±100
Letter	400±100	1200±100
Universal	400±100	1200±100

Table 4-4 Spring Pressure for Cassette Assemblies

[NOTICE]

1) The universal casette can be used multi-size copying paper, that is A3, B4, 11" x 17", legal, foolscap and folio.

2) When the universal cassette is used, remove the paper rubber roller closest to the machine rear side so that a rubber roller does not touch the paper separation bracket.

4.10 PAPER PICKUP ROLLER ASSEMBLY (W/ CONTROLLER ASSEMBLY)

4.10-1 OUTLINE OF ASSEMBLY OPERATION

This assembly functions to pick up a sheet of copy paper from the Cassette Assembly and feed it into the copier in proper synchronization with drum and copyboard movement. The synchronization is unsured by the operation of the Paper Feed Controller Assembly; thus, this assembly is included for explanation purposes. The operation occurs as follows:

a) The paper pickup roller is driven to rotate by the main motor through the drive mechanism shown in Fig. 4-58. The roller rotates continuously while the main motor is in operation.

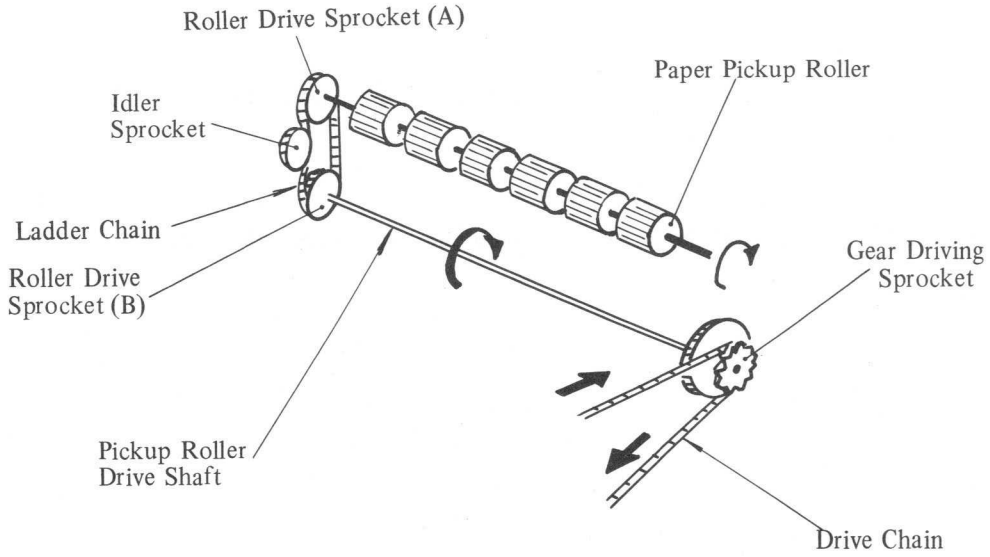
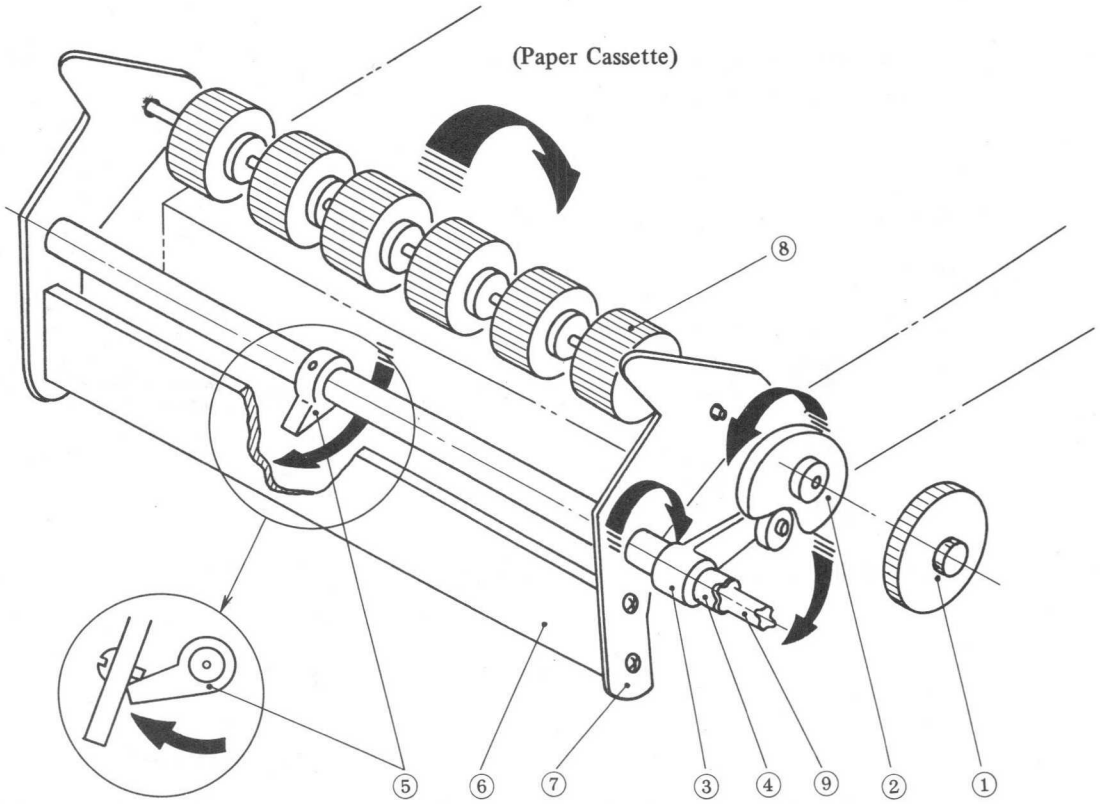


Fig. 4-58 Pickup Roller Rotation Drive

b) Though the pickup roller rotates, it does not pick up any sheet of paper unless the roller is lowered on the paper in the cassette by the up-down drive of the components shown in Fig. 4-59.



① Clutch Gear B
② Paper Feed Cam
③ Up-down Control Arm
④ Pickup Arm Pivot Shaft
⑤ Up-down Actuation Lever
⑥ Pickup Arm Brace
⑦ Pickup Arm
⑧ Pickup Roller
⑨ Pickup Roller Drive Shaft

Fig. 4-59 Roller Up-down Drive Components

These components operate as follows:

i) Clutch gear B is driven by the paper feed gear.

ii) When the "paper feed signal" is given, the rotation of clutch gear B is conveyed to the paper feed cam through the paper feed cam control clutch.

iii) The paper feed cam rotates and depresses the up-down arm.

iv) The pickup arm pivot shaft is rotated by the up-down control arm in the direction shown in Fig. 4-59 because the shaft is secured to the arm by a setscrew.

v) At the same time the up-down actuator on the pickup arm pivot shaft is turned in the the same direction with the shaft.

vi) The up-down actuation lever turns and raises up the pickup arm brace.

vii) The pickup arm rotates on the pickup arm pivot shaft due to the upward motion of the pickup arm brace.

viii) The paper pickup roller is lowered down onto the paper in the paper cassette to pick up a sheet of paper.

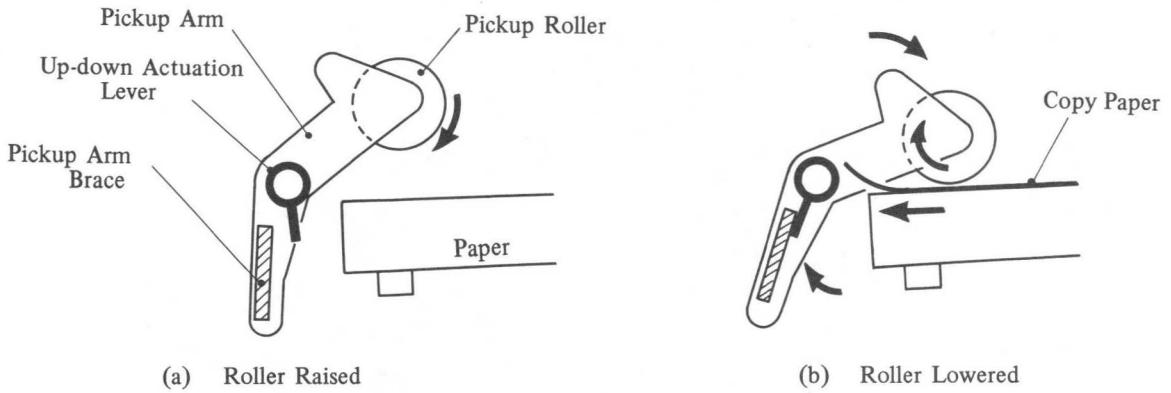


Fig. 4-60 Pickup Roller Up-Down Drive

c) As paper is picked up, it is fed toward the feed timing roller to await feeding into the machine for image transfer. This timing roller is driven by clutch gear A through the timing roller control clutch. The control comes from the operation of solenoid SL5. These components are shown in Fig. 4-61.

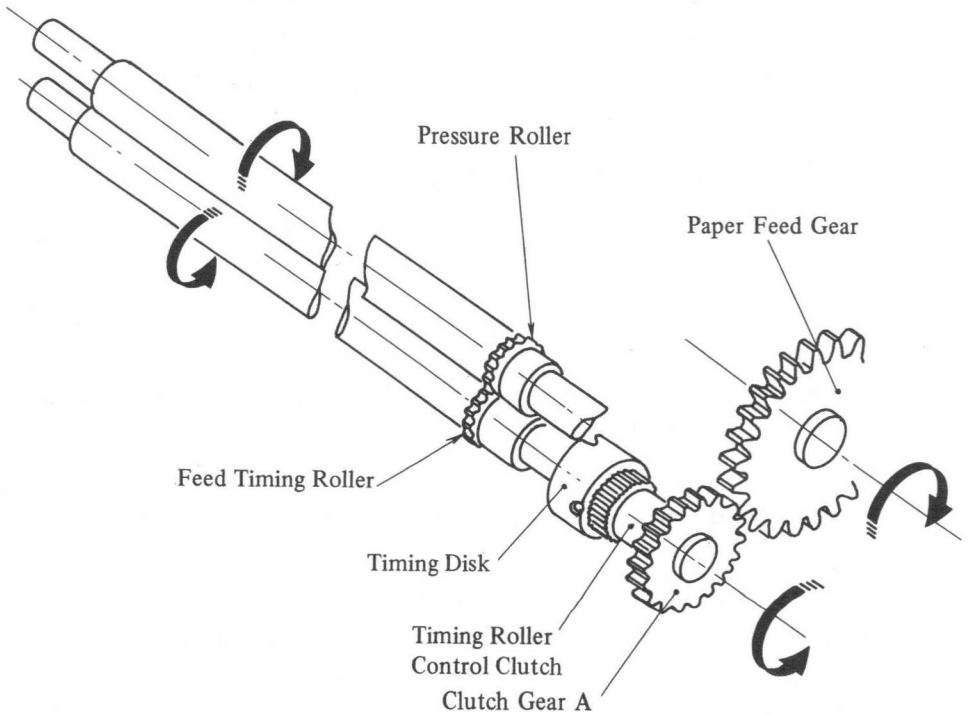


Fig. 4-61 Timing Roller Drive Components

d) The Paper Feed Controller Assembly directs the operation of the Paper Pickup Roller Assembly. The operation of the control assembly is, in turn, initiated by the "paper feed signal". This operation is as follows:

i) Before the "paper feed signal" is given, SL5 is ON and SL4 is OFF. With SL4 OFF, controller D presses against the notch in the collar of the paper feed cam to stop it, as shown in Fig. 4-62.

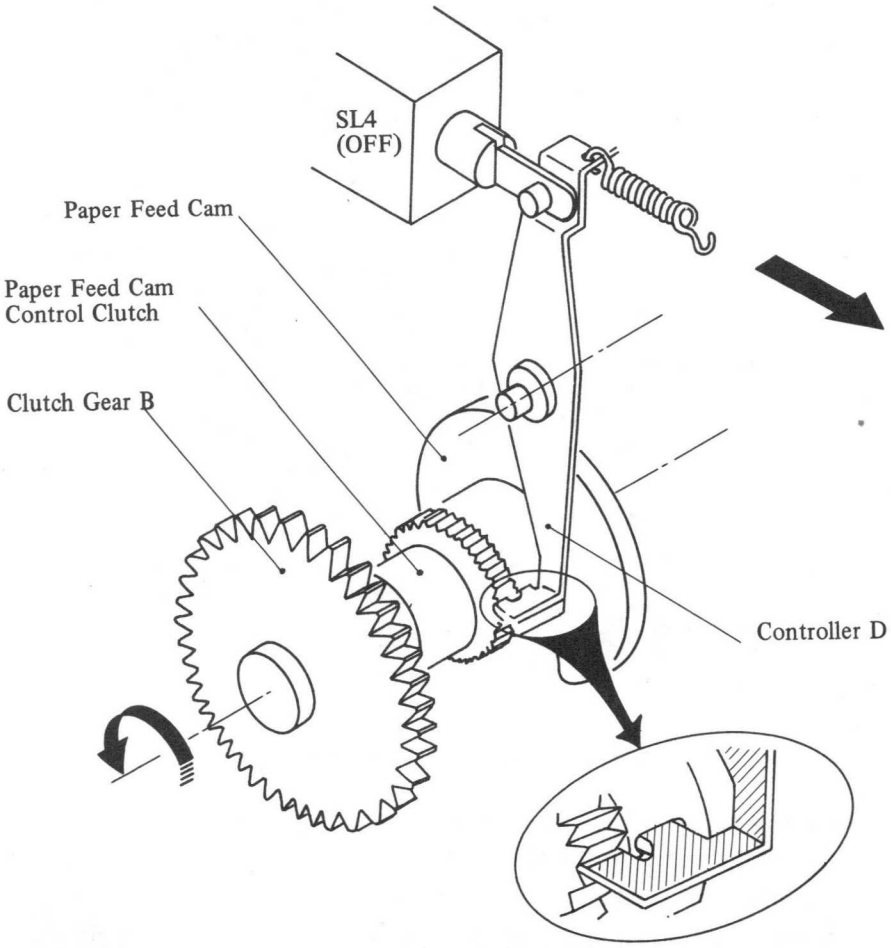


Fig. 4-62 Controller Assembly Operation (A)

ii) With SL5 ON, controller A is detached from the timing roller control clutch, which conveys the rotation of clutch gear A to the timing roller. However, controller B presses against the inner notch of the timing disk to stop it.

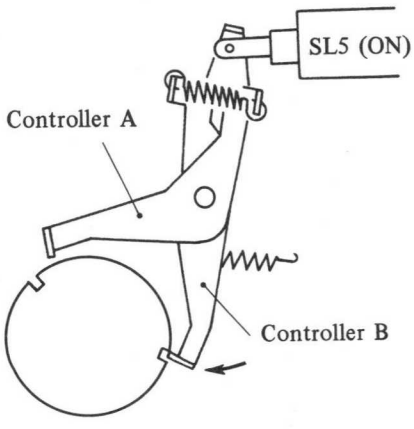


Fig. 4-63 Controller Assembly Operation (B)

iii) When the "paper feed signal" is given, SL5 turns OFF and SL4 turns ON.

iv) With SL4 turned ON, controller D comes off the paper feed cam and cam control clutch. The cam, thus, starts to rotate and to lower the up-down arm (see Fig. 4-64).

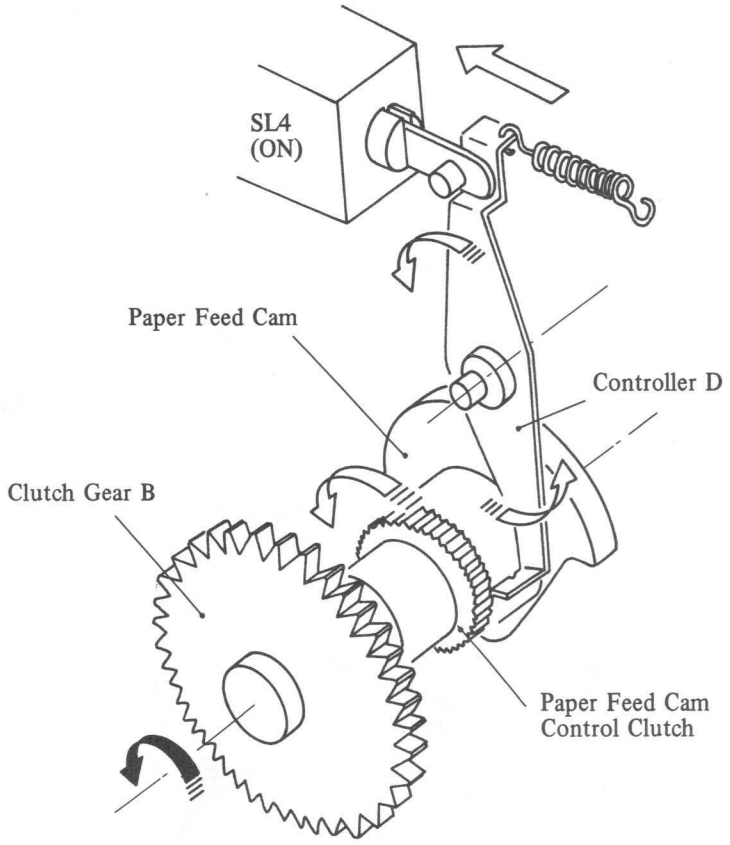


Fig. 4-64 Controller Assembly Operation (C)

v) As SL5 turns OFF, controller B comes out of the notch in the timing disk, permitting the disk to turn. Controller A will come down and contact the disk and, after approximately one revolution, the disk will stop.

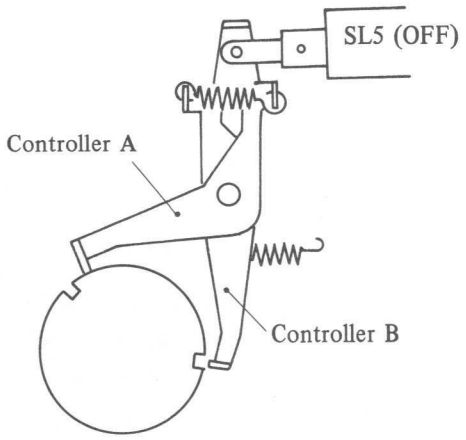


Fig. 4-65 Controller Assembly Operation (D)

vi) The timing roller stops when controller A falls into the outer notch of the timing disk and, thus, engages the timing roller control clutch. During this time, however, the paper feed control cam is still operating the up-down control arm to cause paper pickup (see Fig. 4-66).

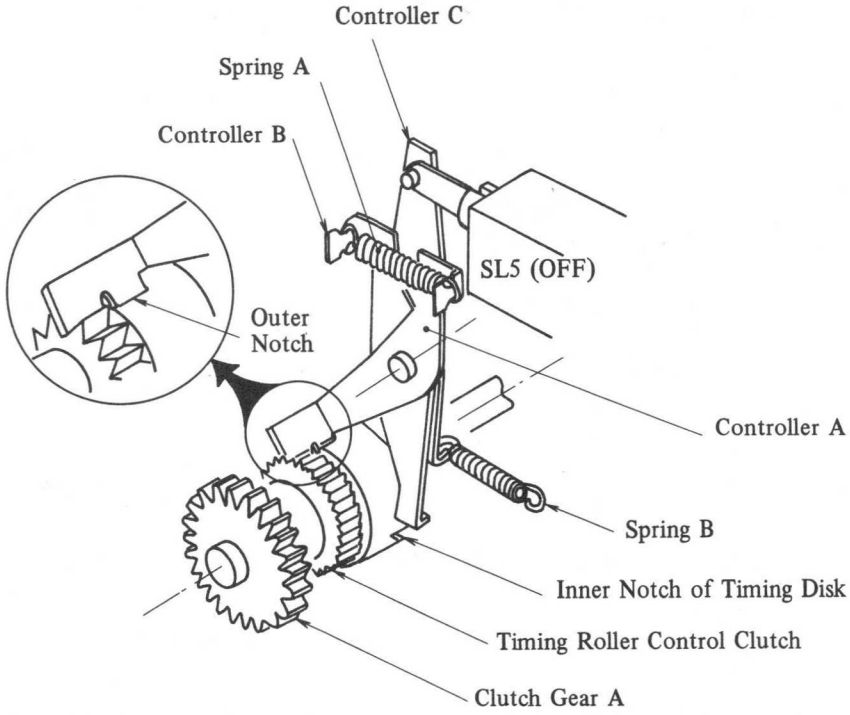


Fig. 4-66 Controller Assembly Operation (E)

vii) The paper which is advanced by the pickup roller is stopped by the timing roller, as the latter is stopped. Thus, the paper is buckled, as shown in Fig. 4-67. At this time, the "paper feed signal" is finished, causing SL5 to turn "ON" and SL4 to turn "OFF".

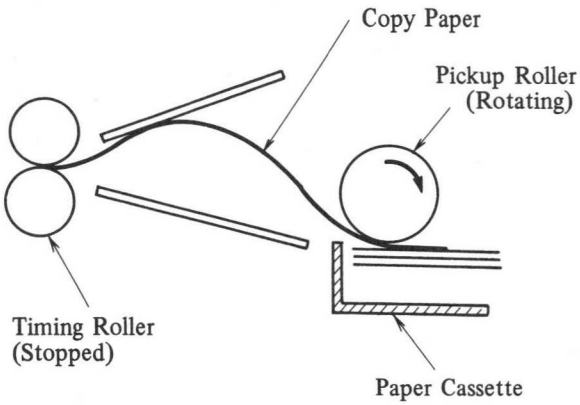


Fig. 4-67 Controller Assembly Operation (F)

viii) With SL5 turned ON, controller A is detached from the timing roller control clutch and the timing disk, and the frame is free to rotate. With the rotation of the clutch, the timing roller starts to turn again and coveys the paper into the machine. Controller B comes against the surface of the timing disk and stops the disk when it falls into the inner notch. At this point the disk is at its normal position, as shown in Fig. 4-68.

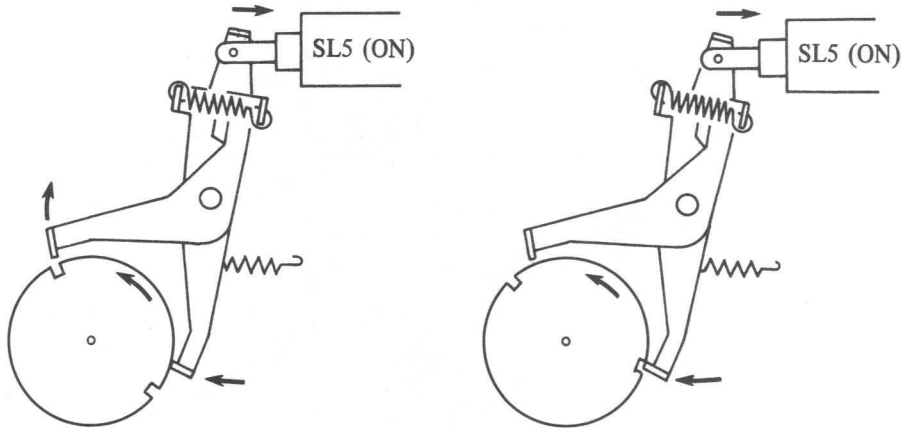


Fig. 4-68 Controller Assembly Operation (G)

ix) When controller D falls into the notch of the paper feed cam collar, it presses the control clutch to stop rotation. At this time the up-down control arm is in the hollow portion of the paper feed cam and the pickup roller is raised to its highest position.

The following figure summarizes the operations explained previously.

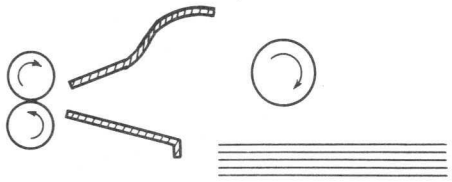
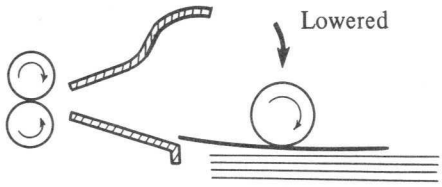
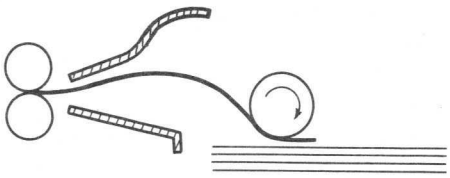
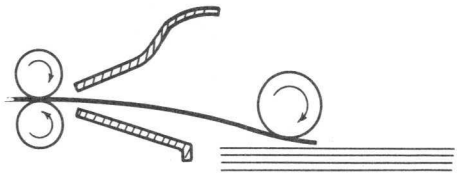
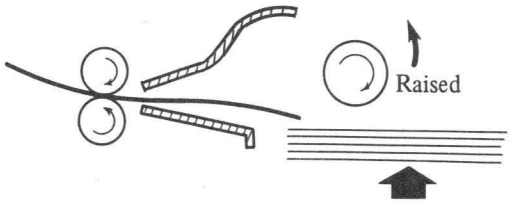
	Paper Feed Signal (MS2A)	SL4	SL5	Timing Roller	Pickup Roller	Timing Disk	Paper Feed Cam
 When the signal is OFF, timing roller and pickup roller are turning.		OFF	ON	Turns	Turns	Stops	Stops
 Timing roller rotates until controller 1 falls into the outer notch.		ON	OFF	Turns	Turns and is lowered	Turns	Turns
 Timing roller stops with timing disk, one rotation after the signal.		ON	OFF	Stops	Turns	Stops	Turns
 Paper feed cam turns until controller 4 falls into the notch.		OFF	ON	Turns	Turns	Turns	Turns
 When paper feed cam stops, pickup roller is at its highest position. Copy paper is pressed upward by spring, and the position of the top sheet is kept constant.		OFF	ON	Turns	Turns and is raised	Stops	Stops

Fig. 4-69 Paper Pickup/Feeding Operation

4.10-2 ASSEMBLY MAIN COMPONENTS

The main components of the Paper Pickup Roller Assembly are illustrated in Fig. 4-70.

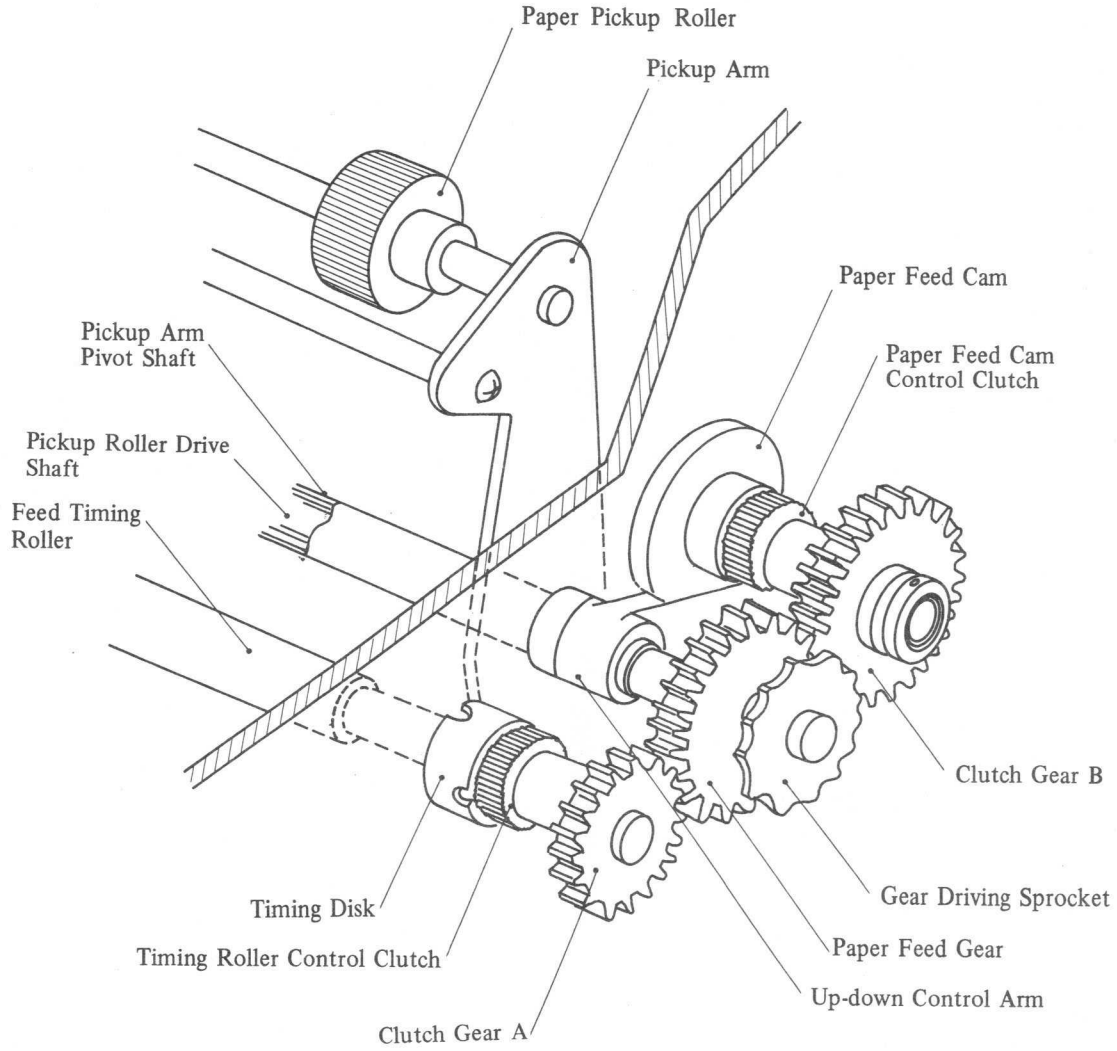


Fig. 4-70 Paper Pickup Roller Assembly Main Components

1) PAPER FEED CAM

The operation of this cam results in the up and down action of the paper pickup roller.

2) PAPER PICKUP ROLLER

This component is driven down onto the Paper Cassette Assembly to advance one sheet of paper for each copy reproduced. Due to the nature of the assembly construction, this roller rotates whenever the main motor is "ON".

3) CONTROL CLUTCHES

Two spring-action clutches are provided within this assembly for controlling the operation of the paper feed cam and the timing roller.

4) FEED TIMING ROLLER

This rubber coated roller is operated by the Paper Feed Controller Assembly to feed the paper at the correct time for synchronization with the image on the drum.

5) UP-DOWN CONTROL ARM

This arm is used to lower and raise the paper pickup roller during the pickup process. This arm accomplishes this by "tracking" the paper feed cam during the rotation of the latter.

4.10-3 REMOVAL/INSTALLATION ACTION

1) DRIVE CHAIN REMOVAL

When performing repair actions, it may be necessary to remove the drive chain before Paper Feed Roller Assembly components. This is performed as follows (reference - Fig. 4-71):

a) After removing the rear cover, loosen the tension sprocket and lower it to permit chain movement.

b) Remove the drive chain.

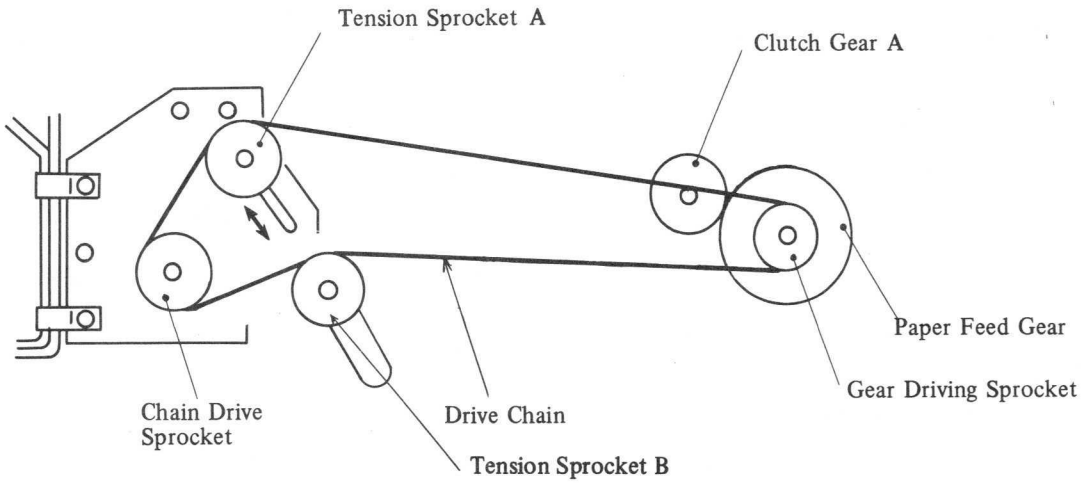


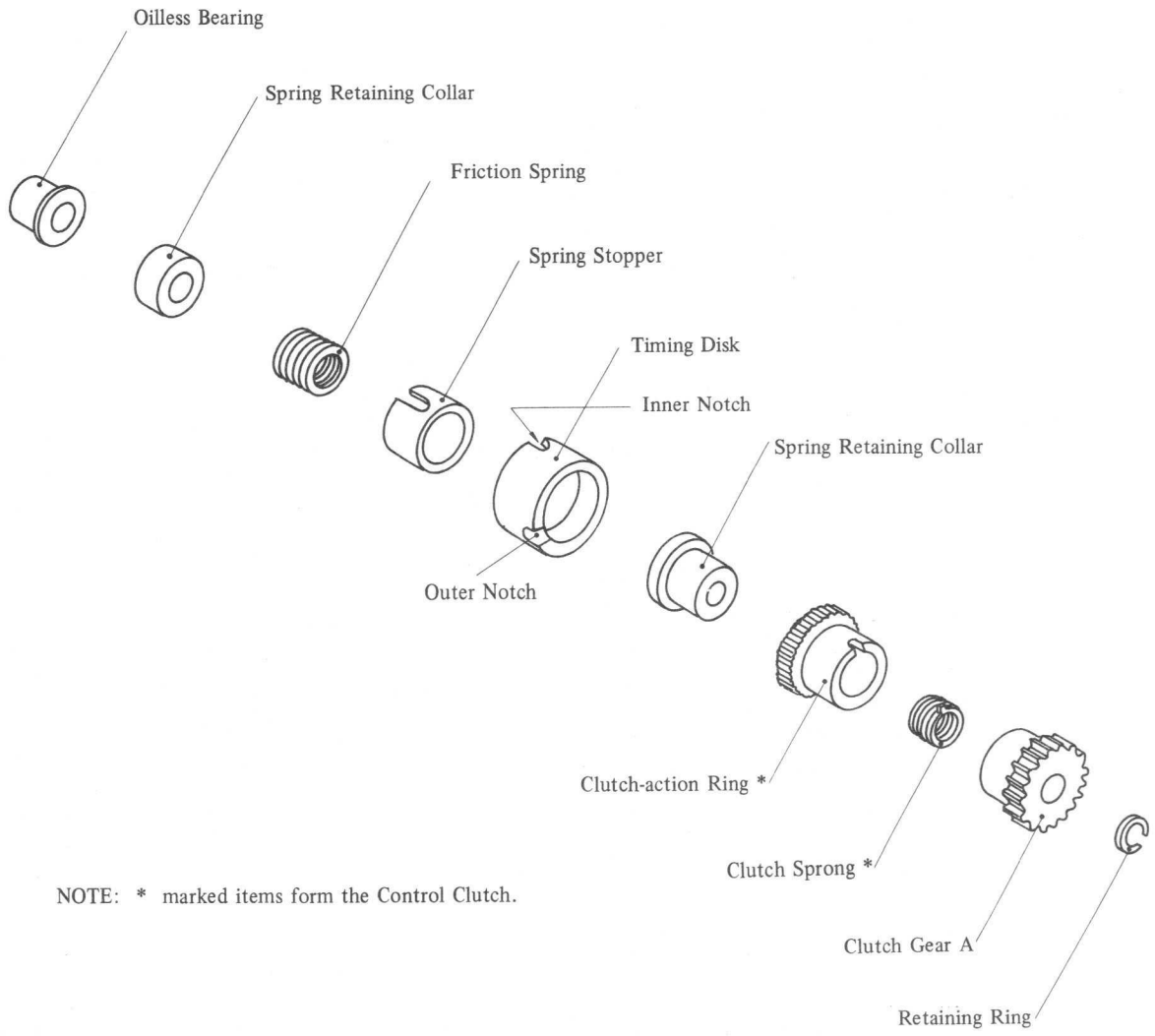
Fig. 4-71 Drive Chain Removal

When installing, perform the previous steps in reverse order. Make sure that the tension sprocket is repositioned so that the drive chain has no slack.

4.10-4 REPAIR/SERVICING ACTIONS

1) TIMING ROLLER DRIVE DISASSEMBLY

Before performing servicing on the timing roller drive, disassembly may be necessary. Perform this as follows (reference-Fig. 4-72):



NOTE: * marked items form the Control Clutch.

Fig. 4-72 Timing roller Drive Main Components

a) After removing the copier rear cover, remove the drive chain, as explained in 4.10-3.

b) Remove the retaining ring from the shaft.

c) While holding the timing roller control clutch, draw clutch gear A from the shaft by turning it counterclockwise, as shown in Fig. 4-73.

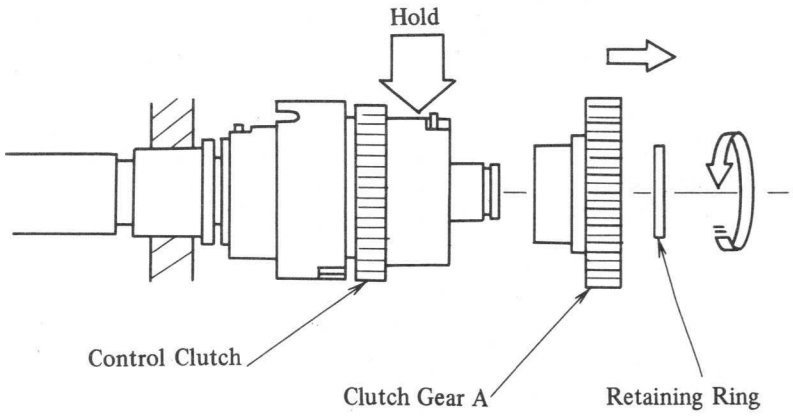


Fig. 4-73 Timing Roller Drive Disassembly (A)

d) Remove the control clutch, by sliding it off the shaft.

e) Remove the control clutch spring by turning clockwise so that the spring is compressed and, then pulling it out (see Fig. 4-74).

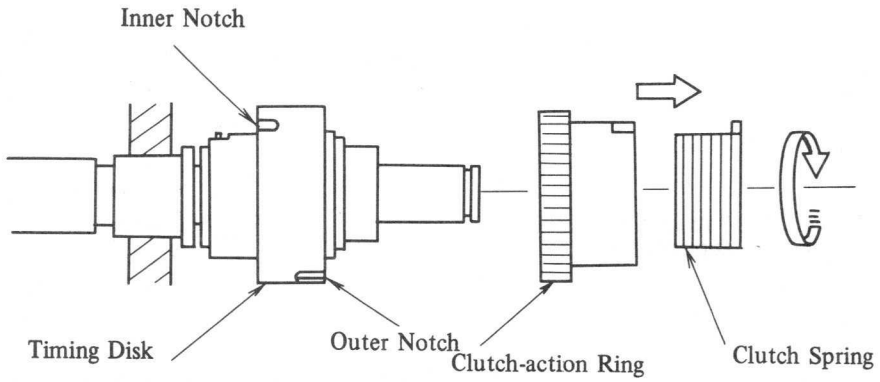


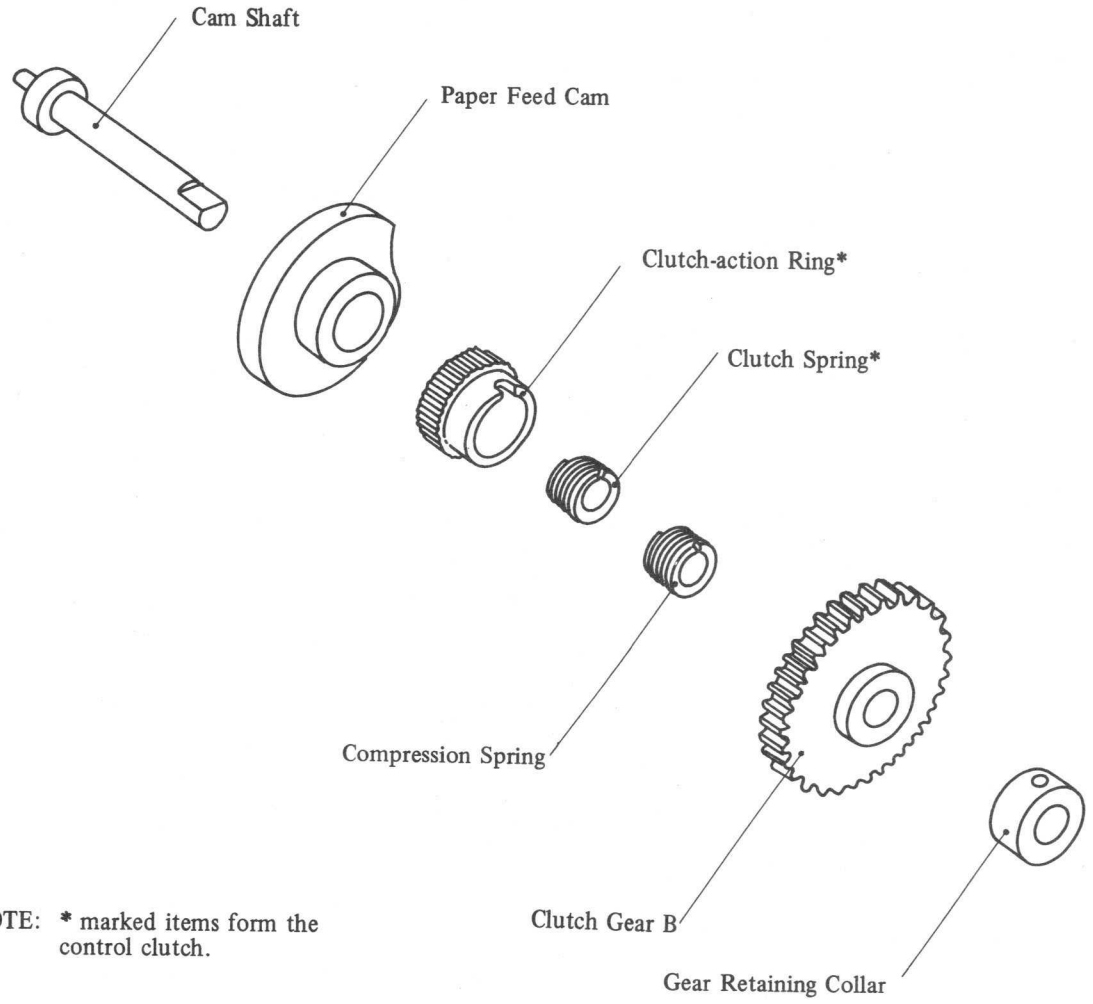
Fig. 4-74 Timing Roller Drive Disassembly (B)

f) Remove the remaining components from the shaft.

Reassembly is performed by repeating the previous steps in reverse order. When doing this, however, be sure to turn the spring in the same direction as previously to unsure spring compression.

2) PAPER FEED CAM DRIVE DISASSEMBLY

Before performing servicing on the paper feed cam drive, disassembly may be necessary. Perform this as follows (reference - Fig. 4-75).



NOTE: * marked items form the control clutch.

Fig. 4-75 Paper Feed Cam Drive Main Components

a) Mark the position of the Paper Feed Controller Assembly on the copier frame, and then remove the assembly. Be careful not to damage any controllers by striking them against gears.

b) Remove the gear retaining collar.

c) Draw the cam control clutch, and clutch gear B as a unit from the cam shaft (see Fig. 4-76).

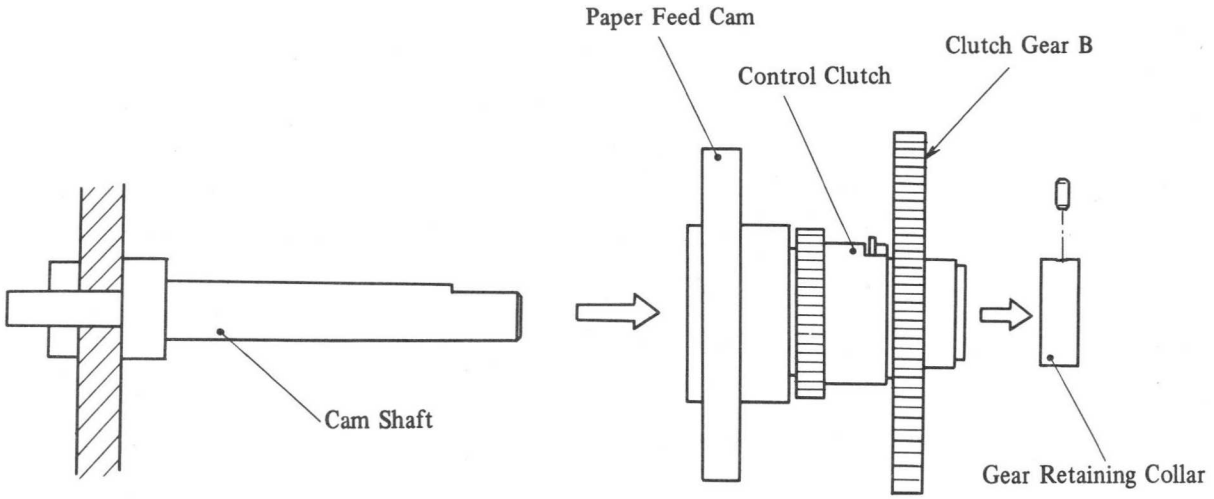


Fig. 4-76 Paper Feed Cam Drive Disassembly (A)

d) Draw out clutch gear B by turning it counterclockwise while holding the control clutch, as shown in Fig. 4-77.

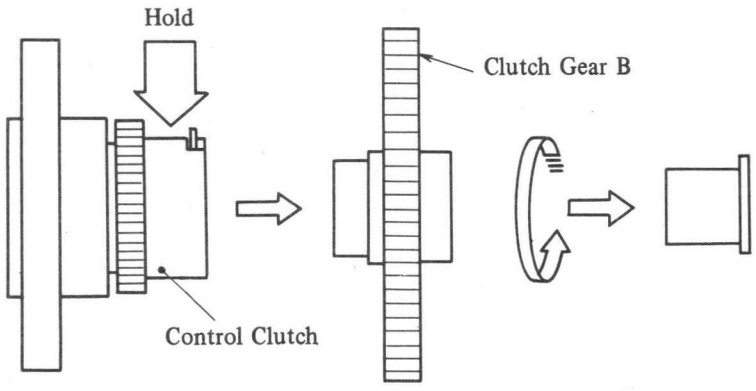


Fig. 4-77 Paper Feed Cam Drive Disassembly (B)

e) Remove the control clutch from the paper feed cam by turning the clutch clockwise. Then, remove the clutch spring from the clutch ring, and check the shape of the spring (see Fig. 4-78).

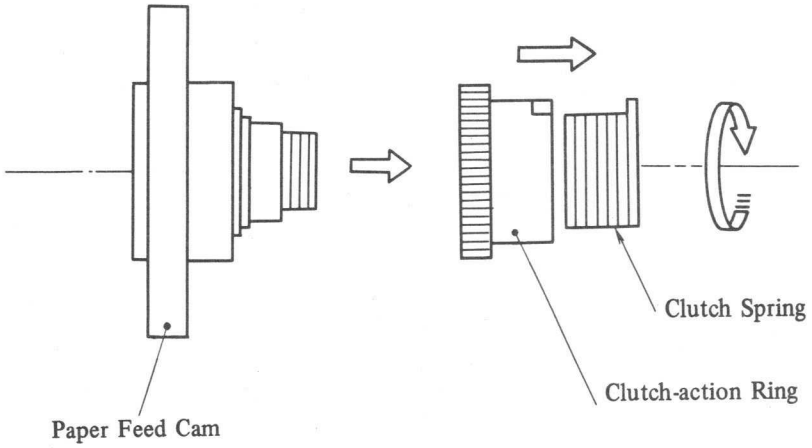


Fig. 4-78 Paper Feed Cam Drive Disassembly (C)

f) Extract the compression spring from the pickup control cam by turning the spring counterclockwise as shown in Fig. 4-79. Then, check the shape of the spring.

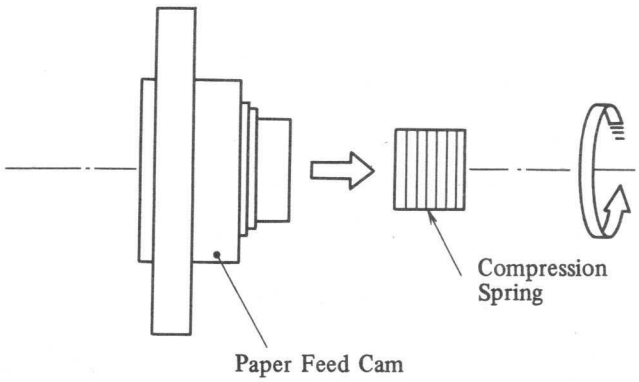


Fig. 4-79 Paper Feed Cam Drive Disassembly (D)

Reassembly is performed by repeating the previous steps in reverse order. When doing this, however, be sure to turn the springs in the same direction as previously to ensure spring compression.

3) CONTROLLER SPACING ADJUSTMENTS

The solenoid mounting plate of the Paper Feed Controller Assembly should be located so that controllers A, B, & D are each $1.0\ ^{+0.8}_{-0.4}$ mm when lifted from these clutch-action rings, as shown in Fig. 4-80.

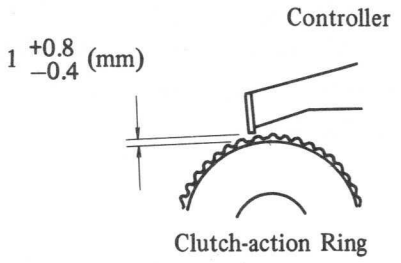


Fig. 4-80 Controller Spring

If this spacing is not correct, change the solenoid mounting plate position until these parameters are met.

4) PICKUP ROLLER SPACING ADJUSTMENTS

The spacing of the rubber pickup rollers on their shaft should correspond to the measurements given in Fig. 4-81. Should any adjustment be necessary, loosen the setscrew securing the roller to the shaft, and slide the roller to the correct position; then, resecure the roller.

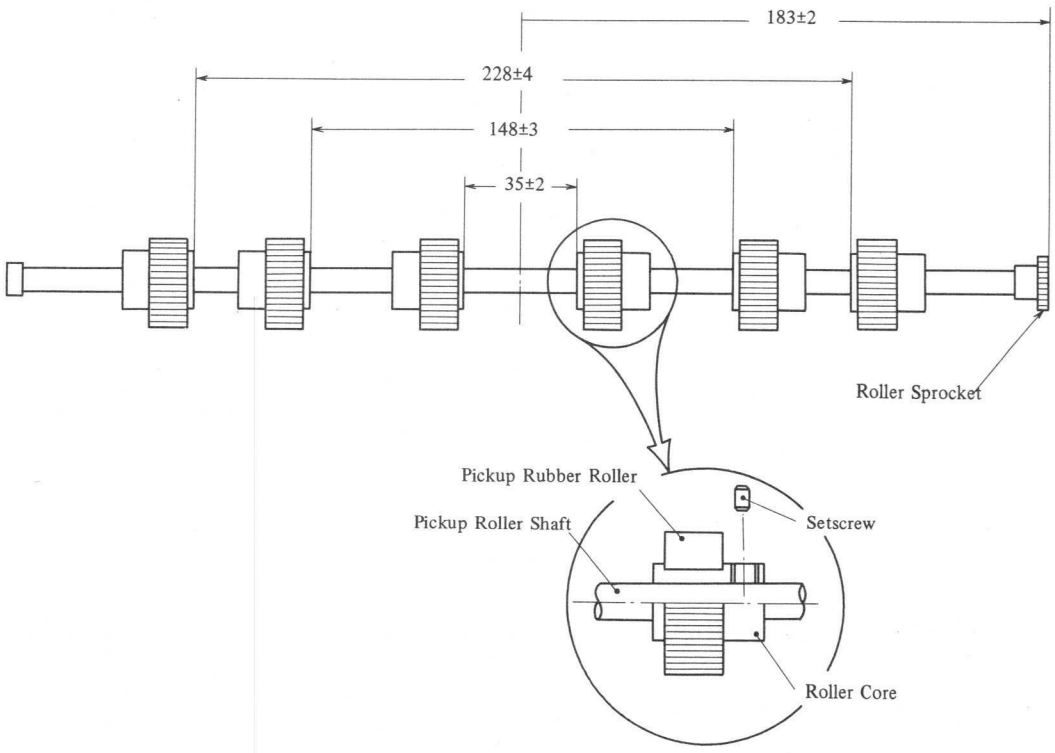


Fig. 4-81 Pickup Roller Spacing

5) PICKUP ROLLER HEIGHT ADJUSTMENTS

The pickup roller, when lowered for operation, should stop its downward movement before contacting the frame of the Cassette Holder Assembly. The space between the frame of the Cassette Holder Assembly and the pickup roller shaft should be 2.0 ± 0.15 mm, as depicted in Fig. 4-82.

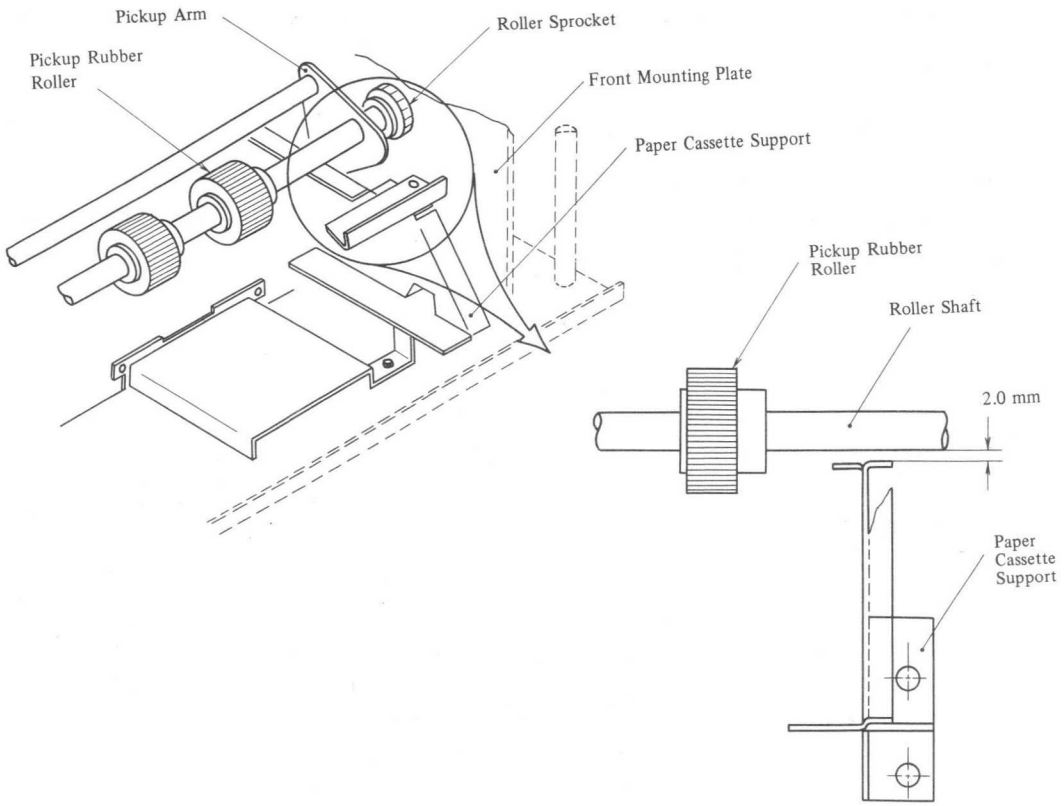


Fig. 4-82 Pickup Roller Height

Should this spacing require adjustment, perform as follows (reference - Fig. 4-83):

a) Depress the COPY button to start a copy cycle.

b) When the pickup roller drops down for paper, disconnect power by UNPLUGGING the copier (turning OFF the power switch does not stop the main motor).

c) Open the front access doors and remove the Drum Unit, Cassette Assembly, and Developer Assembly.

d) Loosen the nut on the adjust screw and turn the screw until the proper spacing is achieved.

e) Resecure the nut to lock the screw position.

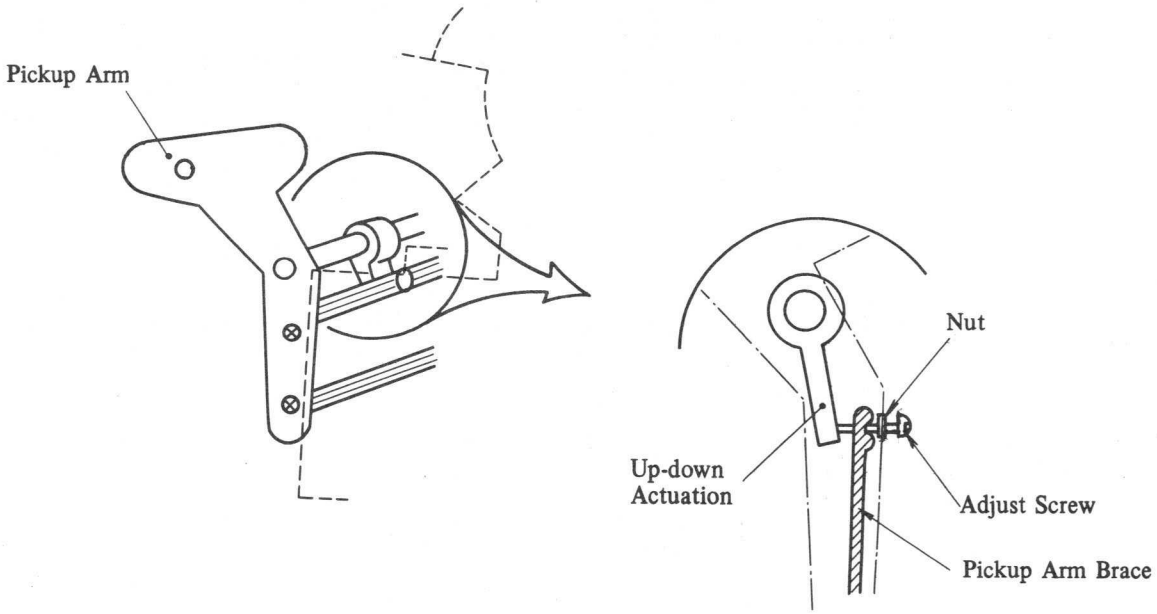


Fig. 4-83 Pickup Roller Height Adjustment

f) After completing the adjustment, restore the copier to normal operation by installing the Drum Unit, Cassette Assembly and Developer Assembly.

6) LUBRICATION

Apply lubricating oil (TET-27) to the point indicated in Fig. 4-84 and 4-85.

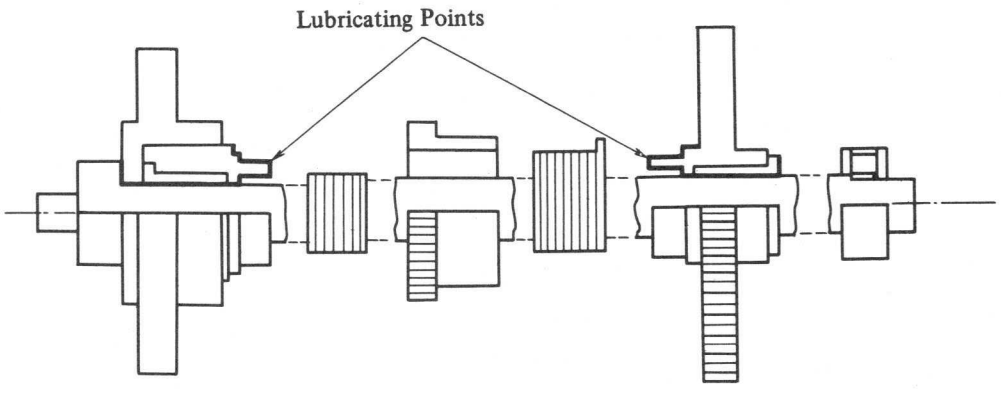


Fig. 4-84 Paper Feed Cam Drive Lubrication

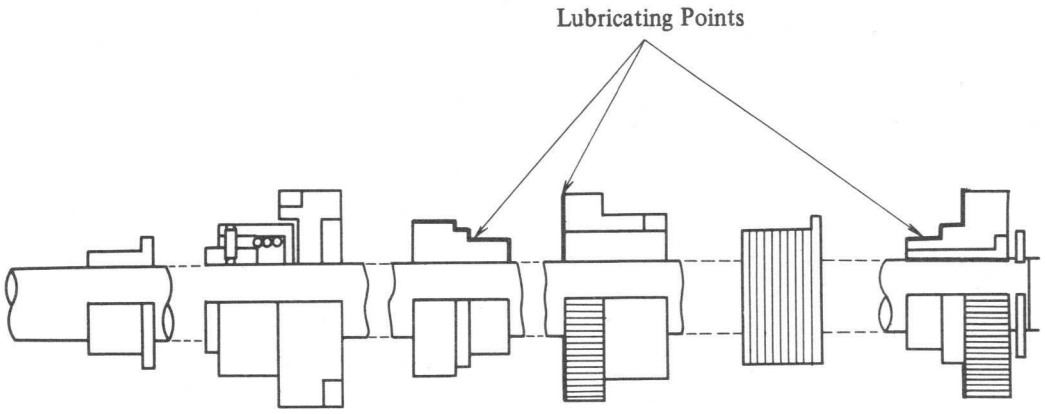


Fig. 4-85 Timing roller Drive Lubrication

See the NP–70 Service Handbook for additional details concerning assembly lubrication.

4.11 COPY CONVEYING ASSEMBLY

4.11-1 OUTLINE OF ASSEMBLY OPERATION

The Copy Conveying Assembly is housed in the left end of the copier, as viewed from the operator position. Copy paper fed from the paper cassette will pass across this assembly for fixing and residual charge elimination. The paper is, then, carried out to the copy tray.

4.11-2 ASSEMBLY MAIN COMPONENTS

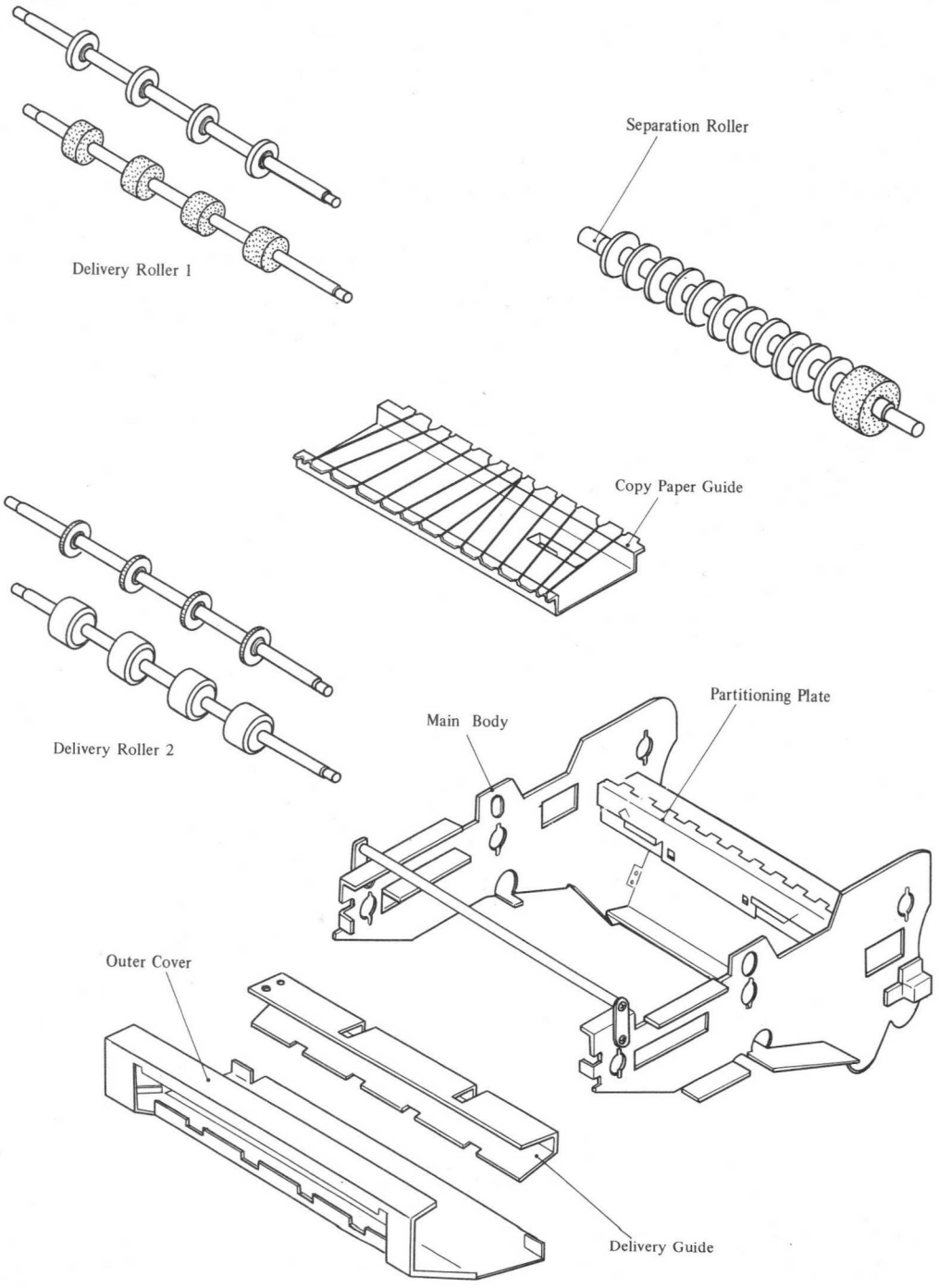


Fig. 4-86 Copy Conveying Assembly Main Components

1) SEPARATION ROLLER

The separation roller rotates simultaneously with the drum but in the opposite direction. It conveys copying paper, separated by the Paper Separating Subassembly, to the Heater Assembly. The separation roller is made up of 12 roller sections on a shaft, the first one from the front end being a rubber roller which comes into contact with the separation belt. (Refer to Chapter 2 for details on drive of this separation roller.)

2) DELIVERY ROLLERS 1 & 2

After undergoing the "fixing" process by the Heater Assembly, the copying paper is passed between one set of rollers, called delivery roller 1, and then another set, called delivery roller 2, for delivery into the copy tray. At the same time, any residual charge is removed from copies by an AC corona called the residual charge eliminator.

a) Delivery Roller 1

Delivery roller 1 is composed of a main roller and an auxiliary roller positioned directly above. The lower roller is made up of 4 rubber rollers on a shaft, and the upper roller is composed of 4 plastic rollers, also, on a shaft. The auxiliary roller is pressed against the lower roller by springs, which exert a downward pressure on the shaft.

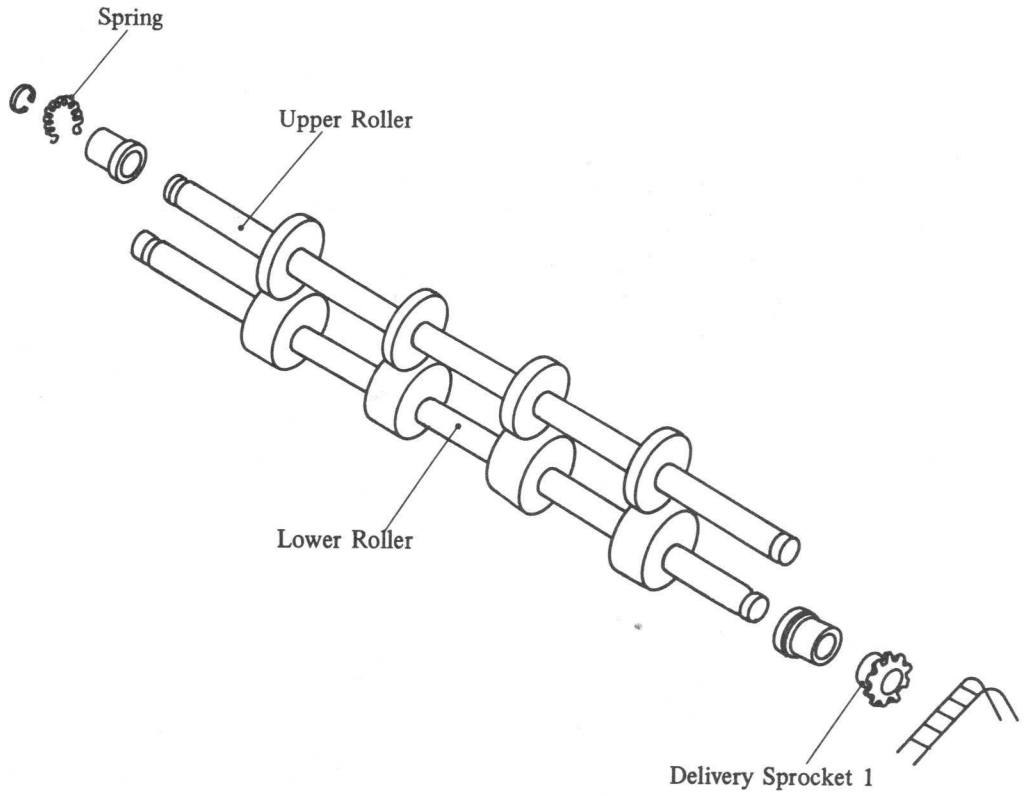


Fig. 4-87 Upper and Lower Rollers

b) Delivery Roller 2

Delivery roller 2 is identical to delivery roller 1 except that 4 steel rollers, rather than rubber ones, are fitted on its shaft. Its upper roller is the same as that of delivery roller 1.

3) COPY PAPER GUIDE

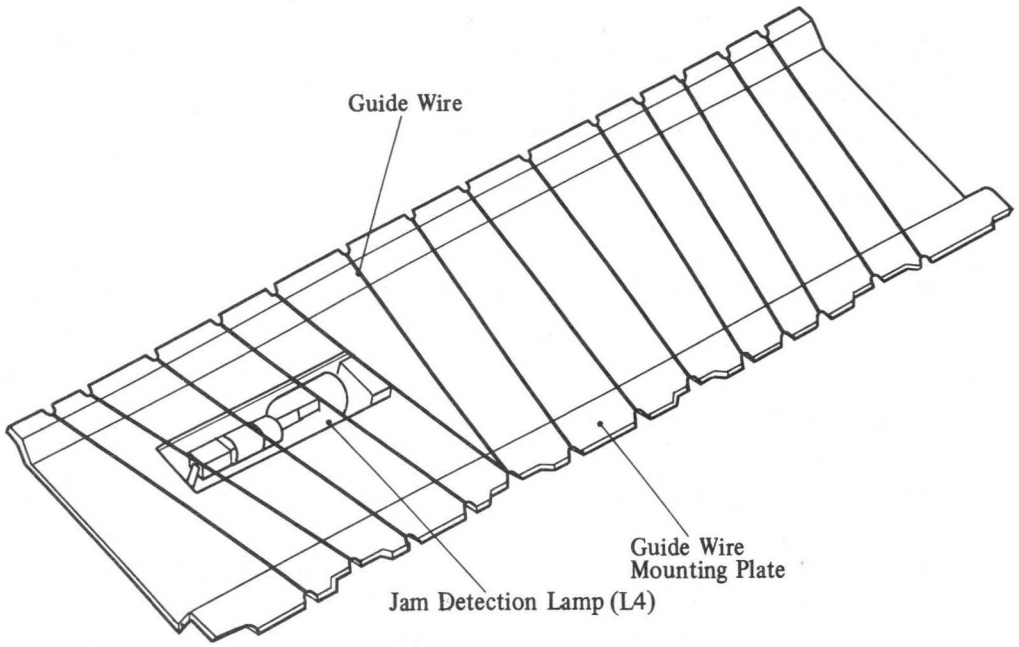


Fig. 4-88 Copy Paper Guide and Jam Detection Lamp

The copy paper guide is located between delivery rollers 1 and 2. When passing over this guide, copying paper is freed of any residual charge and checked for any jam condition. Residual charge is removed from copying paper by the residual charge eliminator, and the check for normal paper passage is performed by the jam detection lamp (L4).

4) PARTITIONING PLATE

Fig. 4-89 illustrates an outer view of the partitioning plate. This plate guides copying paper coming from the separation roller. The portions circled in Fig. 4-89 serve as air ducts for aiding separation of paper by the Suction Blower Assembly.

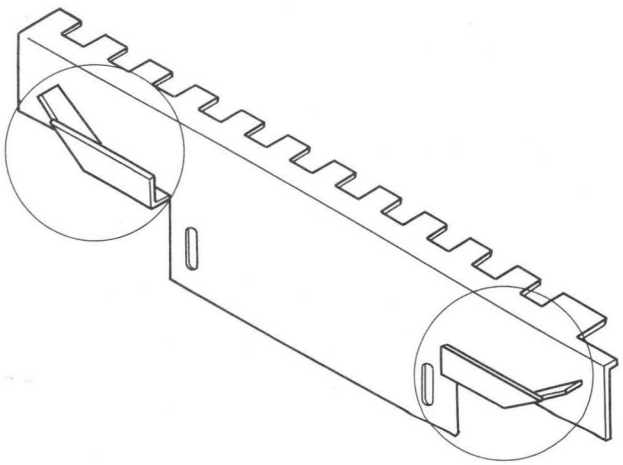


Fig. 4-89 Partitioning Plate

4.11-3 REMOVAL/INSTALLATION ACTIONS

1) COPY CONVEYING ASSEMBLY REMOVAL

When access to internal components within the copier is desired it is often necessary to remove this assembly. Perform the removal as follows:

a) Switch OFF the power and detach the rear cover of the copier.

b) Remove the copy tray and the paper cassette.

c) Open the front left and upper access doors and lower the Copy Conveying Assembly by disengaging its hanger stay from the locking hook.

d) Remove the Drum Assembly.

e) Remove the Transfer Corona Assembly and the Paper Separating Subassembly.

f) Raise the Copy Conveying Assembly back to its original position and remove the Heater Assembly.

g) Disconnect the high-voltage connector of the Transfer Corona Assembly, and put it into the Copy Conveying Assembly.

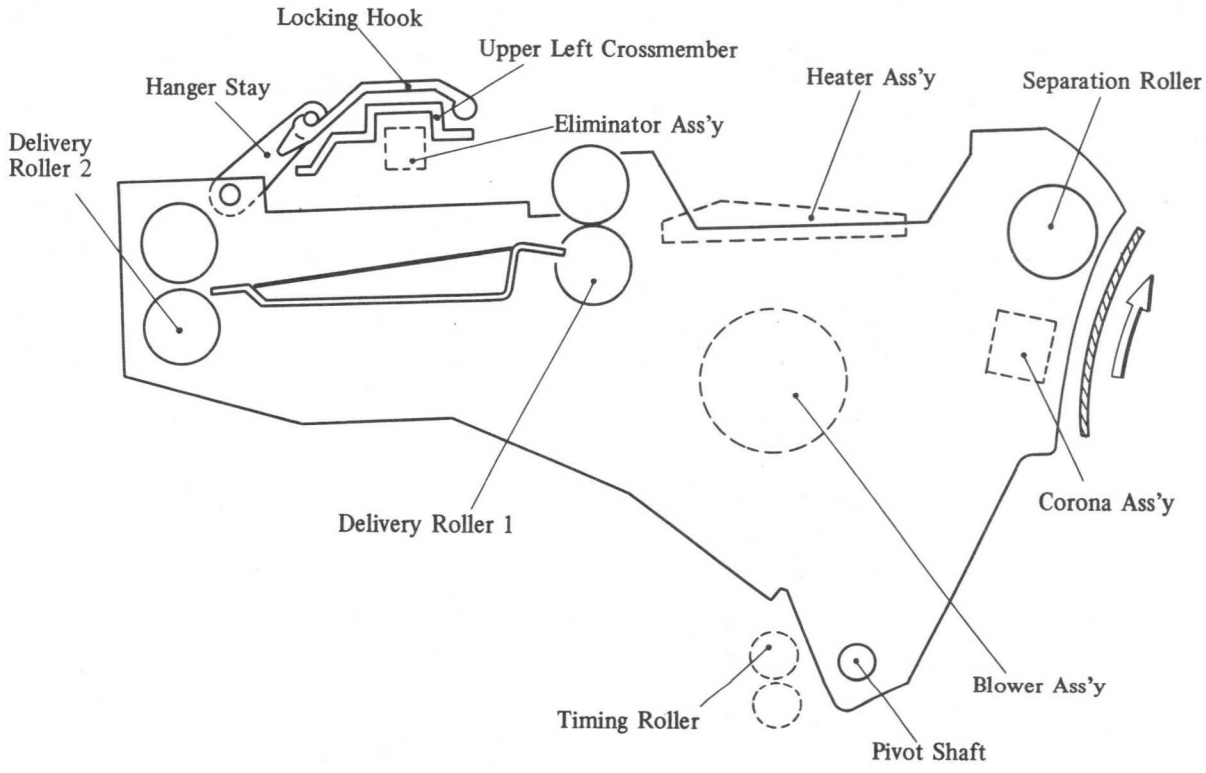


Fig. 4-90 Copy Conveying Assembly (from copier front)

h) Remove connector J17 and place it into the Copy Conveying Assembly.

i) Loosen the retaining screw of the stopper on the pivot shaft.

j) While holding the assembly in the raised position, draw out the pivot shaft.

k) Lower the assembly by disengaging its hanger stay from the locking hook.

l) Remove the Copy Conveying Assembly from the copier.

m) Pick up the stopper and spacer which were detached during the process of drawing out the pivot shaft.

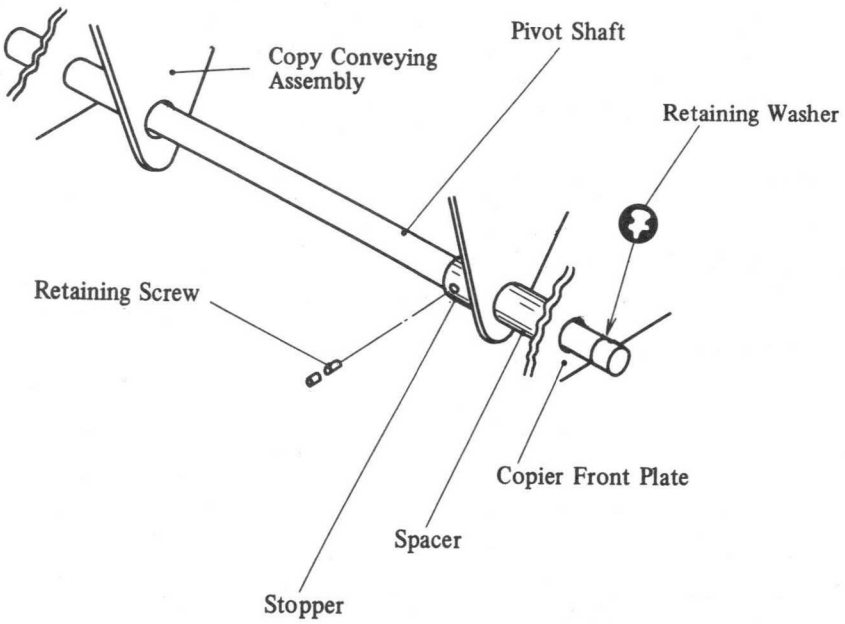


Fig. 4-91 Pivot Shaft Removal

2) COPY CONVEYING ASSEMBLY INSTALLATION

To place the Copy Conveying Assembly back in the copier after maintenance is completed, perform the following:

a) Place the Copy Conveying Assembly back in position in the copier, setting its hanger stay on the locking hook (to raise the assembly).

b) Insert the pivot shaft through the hole in the front mounting plate.

c) Put the spacer between the front mounting plate and the Copy Conveying Assembly and, then, insert the pivot shaft through this spacer.

d) Push the shaft through the front-side shaft hole of the Copy Conveying Assembly and then through the stopper.

e) Insert the shaft through the rear-side hole and, then, the hole in the rear mounting plate.

f) Secure the stopper to the shaft with the retaining screws.

g) Connect the high-voltage connector of the Transfer Corona Assembly and connector J17 to the rear mounting plate.

h) Set the Heater Assembly in the Copy Conveying Assembly

i) Lower the Copy Conveying Assembly and connect the Paper Separating Subassembly.

j) Place the drum back in position in the copier.

k) Raise the Copy Conveying Assembly and place the Transfer Corona Assembly back in position.

l) Attach the copier rear cover and close the access doors.

4.11-4 REPAIR/SERVICING ACTIONS

1) COPY PAPER GUIDE REPAIR

Whenever replacement of the guide wire in the copy paper guide is necessary, perform the wire installation as follows:

a) Cut a section of stainless steel wire to a length of 1745 ~1755 mm (1750 ± 5 mm).

b) Wind one end of the wire twice, clockwise, around screw A.

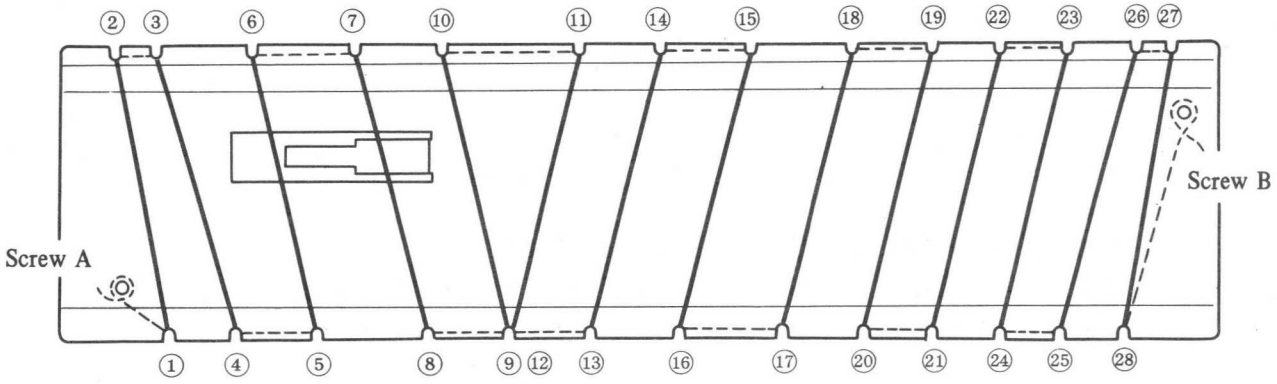


Fig. 4-92 Copy Paper Guide Lacing Pattern

c) Extend the wire across the back to notch 1, across the front to notch 2, across the back to notch 3, across the front to notch 4, across the back to notch 5 and, so on, up to notch 28.

d) Extend the wire across the back to screw B and wind it twice, clockwise, around the screw.

e) Check to ensure that wire is taut before tightening screw B.

2) DELIVERY ROLLER REPAIR

Whenever performing repair on the delivery rollers, be sure that they are properly positioned before restarting copier operation. The correct positioning of the chain in relationship to the gear teeth is depicted in Fig. 4-93.

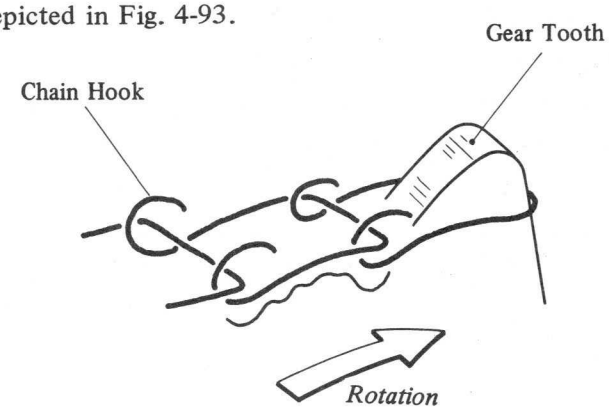


Fig. 4-93 Correct Chain Positioning

3) PARTITIONING PLATE ADJUSTMENT

In the event that paper fails to flow smoothly from the separation roller onto the Copy Conveying Assembly body, the following adjustment may be necessary.

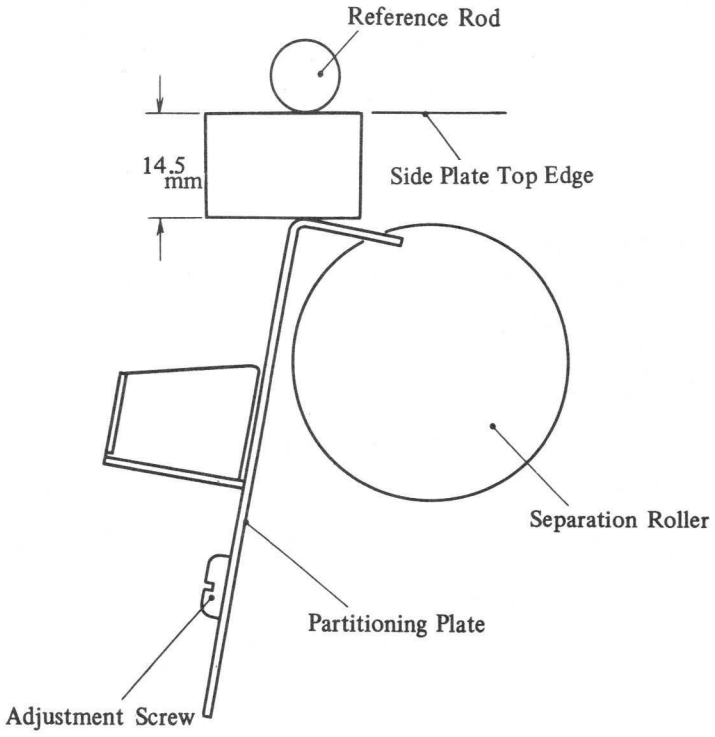


Fig. 4-94 Partitioning Plate Height Adjustment

a) Place a straight rod, plate or the like (as a reference) on the top edge of both side plates of the Copy Conveying Assembly, as illustrated in Fig. 4-94.

b) Place a 14.5 mm clearance gauge between the reference and the partitioning plate.

4) SEPARATION ROLLER CLEARANCE ADJUSTMENT

The clearance between the drum and the separation roller can be adjusted with screw B, shown in Fig. 4-95. This screw needs no adjustment, except when the whole Copy Conveying Assembly is replaced with a new one. Then, adjustment may be necessary to ensure a 1.0 ± 1.5 mm space between the rubber roller portion of the separation roller and the drum surface.

Turning screw B clockwise	Widens the clearance
Turning screw B counterclockwise	Narrows the clearance

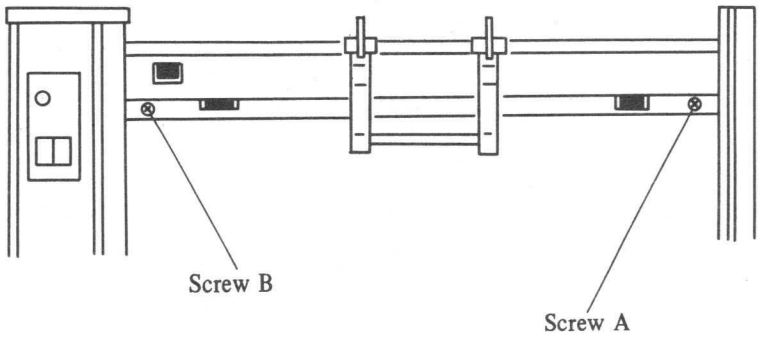


Fig. 4-95 Positions of Screws A and B

5) GEAR BACKLASH ADJUSTMENT

This backlash requires no adjustment, except when the whole Copy Conveying Assembly is replaced with a new one.

Turning screw A clockwise	Increases the backlash
Turning screw A counterclockwise	Decreases the backlash

4.12 PAPER SEPARATING SUBASSEMBLY

4.12-1 OUTLINE OF ASSEMBLY OPERATION

This subassembly is contained within the Paper Conveying Assembly and is used to separate the paper from the drum after the completion of transfer. As this subassembly separates the machine-front edge of the paper from the drum, it carries the paper across the separation roller to the Heater Assembly for fixing.

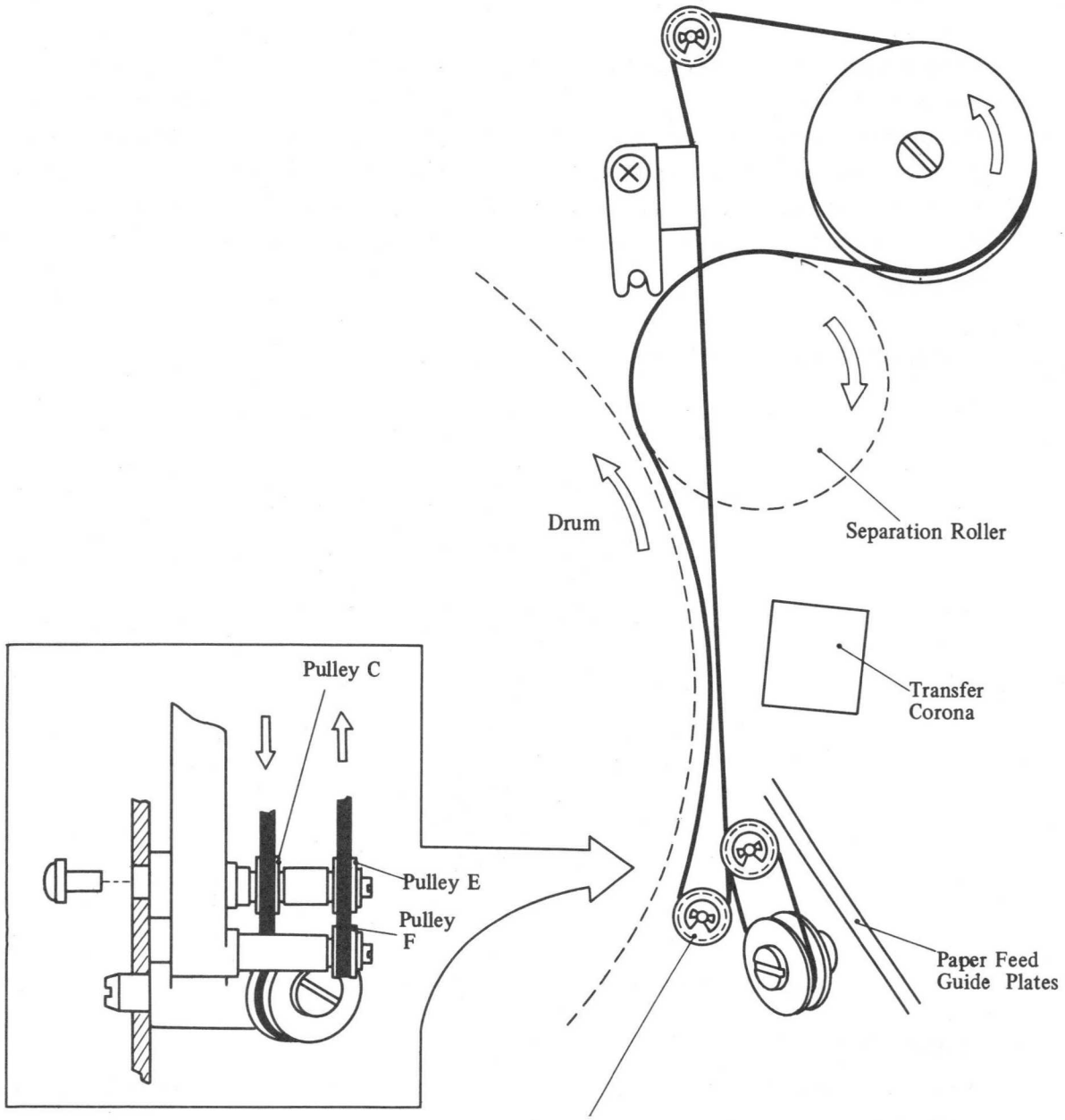


Fig. 4-96 Movement of Separation Belt (from copier rear)

Fig. 4-96 depicts the Paper Separating Subassembly in its normal operating position. As the main drive motor (M1) turns the drum, the separation roller is also driven (see arrows). The movements of these components drive the separation belt around its endless path at the same rate of speed as the drum.

When a sheet of paper exits the paper feed guide plates (above the lower rollers of this unit), it contacts the drum and overlaps the separation belt; in other words, the belt is between the paper and the drum. Due to the wetness of the drum, the paper adheres and turns with the drum. The movement carries the paper through the field of the transfer corona and the image is "moved" to the paper.

When the paper reaches the separation roller, it is pinched between the roller and the separation belt. As the belt now moves over the separation roller (rather than the drum surface), the machine-front end of the paper is drawn away from the drum. The remainder of the paper is drawn away from the drum due to the airflow within the copier (see section 4.14 – Blower & Fan Assemblies) resulting in a separation of the paper along its entire leading-edge. This process will continue and carry the paper to the Heater Assembly and, finally, out of the copier.

4.12-2 ASSEMBLY MAIN COMPONENTS

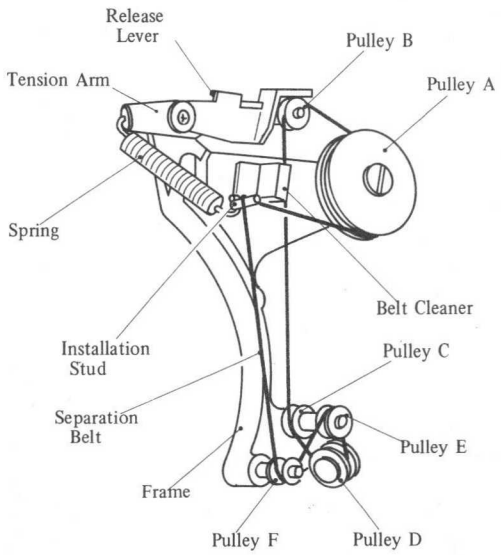


Fig. 4-97 Paper Separating Subassembly Main Components

1) SEPARATION BELT
An endless, flat polyester belt with a width of 2 mm and thickness of 0.15 mm having no irregularities or deformities.

2) TENSION ARM AND SPRING
Maintain the separation belt at the proper constant tension.

3) PULLEYS A ~ F
Rotate freely for smooth travel of the separation belt.

4) BELT CLEANER
A felt pad removing toner particles adhering to the separation belt.

5) INSTALLATION STUD
Whenever removing or installing the Paper Separating Subassembly, the separation belt should be passed over this stud to prevent the belt from slipping off the pulleys. After installing the subassembly, the belt is removed from the stud and placed on the rubber roller portion of the separation roller.

6) RELEASE LEVER
This lever is a convenient press point for controlling the release of tension on the belt for such actions as subassembly removal, jammed paper removal, etc.

4.12-3 REMOVAL/INSTALLATION ACTIONS

1) SUBASSEMBLY REPLACEMENT
Whenever performing removal/installation of the complete subassembly observe the following:

a) Swing the Copy Conveying Assembly down for removal of the subassembly.

b) Before loosening the subassembly mounting screws, move the separation belt from the separation roller to the installation stud. Do this by passing a finger between the belt and roller and, while controlling belt tension with the release lever, pull the belt outward until it can be seated in the installation stud groove.

c) When removing/installing the subassembly, be careful not to touch the drum surface.

d) After installation, make sure that the belt is released to contact the separation roller.

2) SEPARATION BELT INSTALLATION
The easiest method for installing the belt will depend on each serviceman's judgement. However, there is only ONE correct path over which the belt runs. The path is as follows:

a) Starting with the belt held in the groove of pulley A, it next passes over the top of pulley B (between pulley B & the release lever).

b) From the top of pulley B, the belt goes down across the face of the cleaner pad and into the groove of pulley C at the drum side.

c) From pulley C, the belt passes under pulley D and, then, upward to pulley E.

d) The belt goes across the top of pulley E and down to pulley F, where it passes on the under side.

e) From pulley F, the belt goes upward to pass over the top of the installation stud to pulley A.

The section of the belt between pulley F and the installation stud will contact the drum when the units is mounted in the copier. Also, the section of the belt passing over the installatation stud is the section that will contact the separation roller during normal machine operation.

NOTE: Make sure that the belt has no twists after it is installed on the subassembly. Twists, if present during operation, will cause paper jamming or belt breakage.

4.12-4 REPAIR/SERVICING ACTIONS

1) CLEANING

As the separation belt is constantly in contact with the drum, it becomes dirty after a period of time. Thus, the belt should be cleaned and the cleaner pad changed periodically to prevent belt marks from appearing on the reproduced copies.

The belt cleaning is accomplished by wiping the belt with Premix-soaked-paper at servicing intervals.

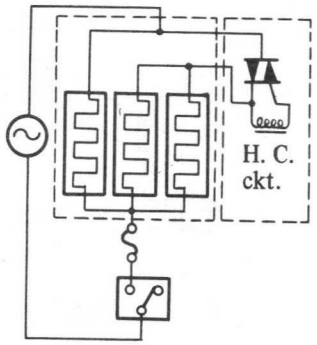
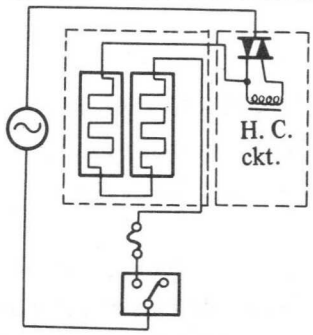
See the Service Handbook for additional details about assembly cleaning.

4.13 HEATER ASSEMBLY

4.13-1 OUTLINE OF ASSEMBLY OPERATION

The Heater Assembly is located in the upper portion of the Copy Conveying Assembly and is used to dry the copy paper before exiting the machine.

The number of nichrome wire elements and their type of connection will depend on the input AC voltage of the model of NP–70 being used. Table 4-5 indicates these differences.

Line Voltage	Heater Designation	Configuration	Circuit Diagram
100V	H1, H2, & H3 parallel	H1 - "ON" continuously H2 & H3 controlled by H. C. Ckt.	
220V 230V 240V	H1 & H2 Series	H1 & H2 controlled by H. C. Ckt.	

It should be noted that the heater operation is controlled so that the outer plate of the heater (heat dispersion plate) is maintained at 180 ± 3°C.

4.13-2 ASSEMBLY MAIN COMPONENTS

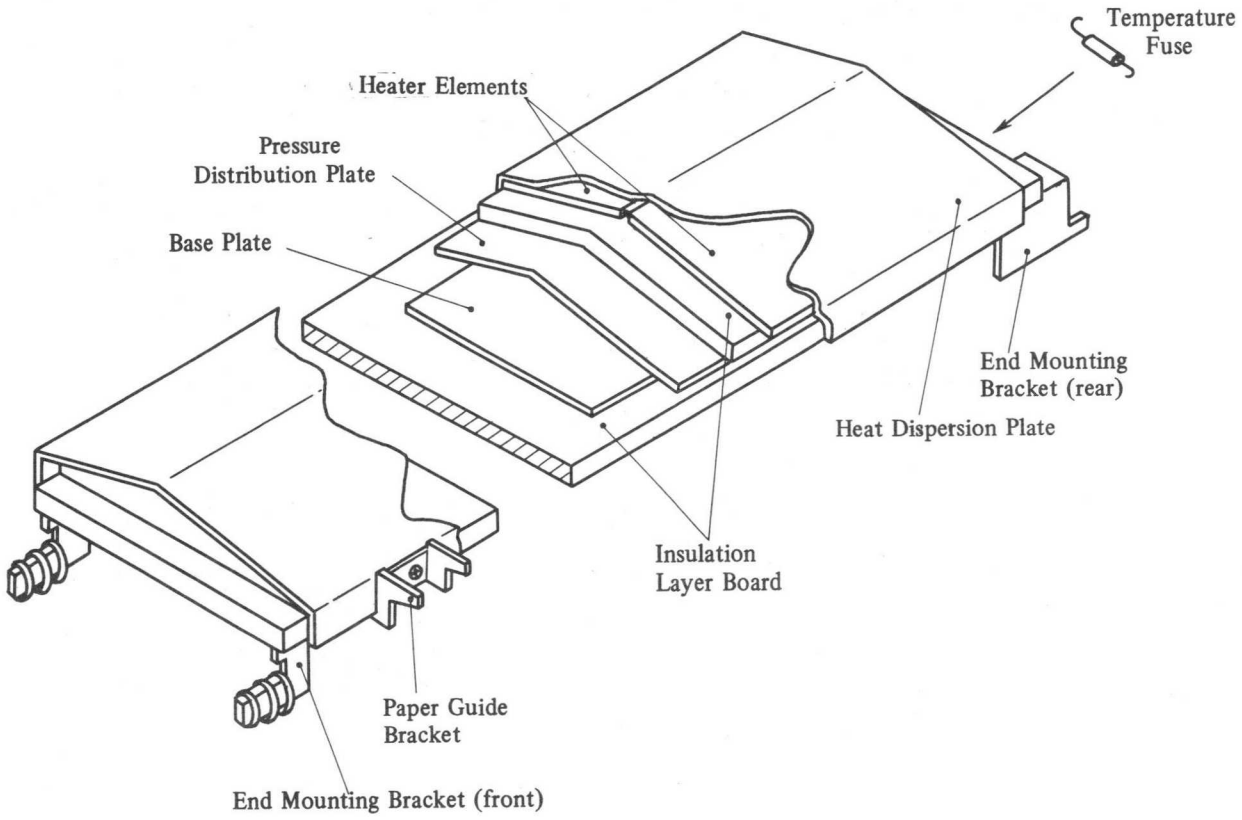
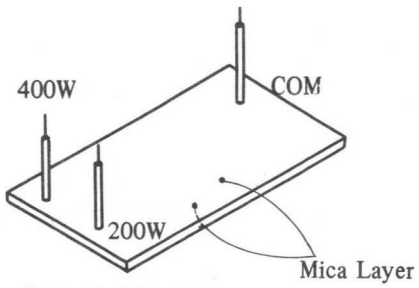


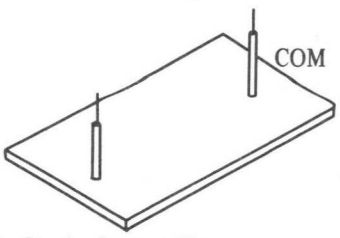
Fig. 4-98 Heater Assembly Bracket (front)

1) TEMPERATURE FUSE
When the temperature of the assembly rises abnormally high, the temperature fuse melts to break the heater circuit. This fuse melts at 150℃.

2) HEATER ELEMENT SECTIONS
There are two of these section in each Heater Assembly. They are constructed of mica with one or two nichrome heater elements within. Fig. 4-99 shows the two types of elements used in NP–70 machines.



a) Dual-element Type



b) Single-element Type

Fig. 4-99 Heater Element Types

3) HEAT DISPERSION PLATE

This plate is made of brass. As the underside of the plate should be in complete contact with the heater elements to conduct heat efficiently, a plate which is not bent or irregular must be used. As the upper face of the plate contacts the paper, it must be handled carefully to prevent damage.

4.13-3 REMOVAL/INSTALLATION ACTIONS

When removing/installing the Heater Assembly, be sure to swing the heater stopper bracket (mounted on the Copy Conveying Assembly) aside to permit free movement of the assembly.

4.13-4 REPAIR/SERVICING ACTIONS

1) CLEANING

As the upper heat dispersion plate is constantly contacting wet copies, toner builds up rapidly. To ensure that the heater continues to operate efficiently, this build-up should be periodically cleaned using Premix as a solvent.

See the Service Handbook for additional details about assembly cleaning.

4.14 BLOWER & FAN ASSEMBLIES

4.14-1 OUTLINE OF ASSEMBLY OPERATION

The NP–70 is equipped with two blower assemblies and one fan assembly. The Suction Blower Assembly within the Copy Conveying Assembly, together with the Air Input Blower Assembly on the copier rear, operates to create an air flow through the interior of the copier. This air flow results in proper separation of the paper from the drum and ventilation of dispersant fumes resulting from the fixing process.

The Fan Assembly located at the right-front end of the copier operates when temperatures are above 60°C. This operation is designed to prevent excessive dispersant evaporation due to heat within the copier.

4.14-2 ASSEMBLY MAIN COMPONENTS

The following three figures show the main components of the three assemblies.

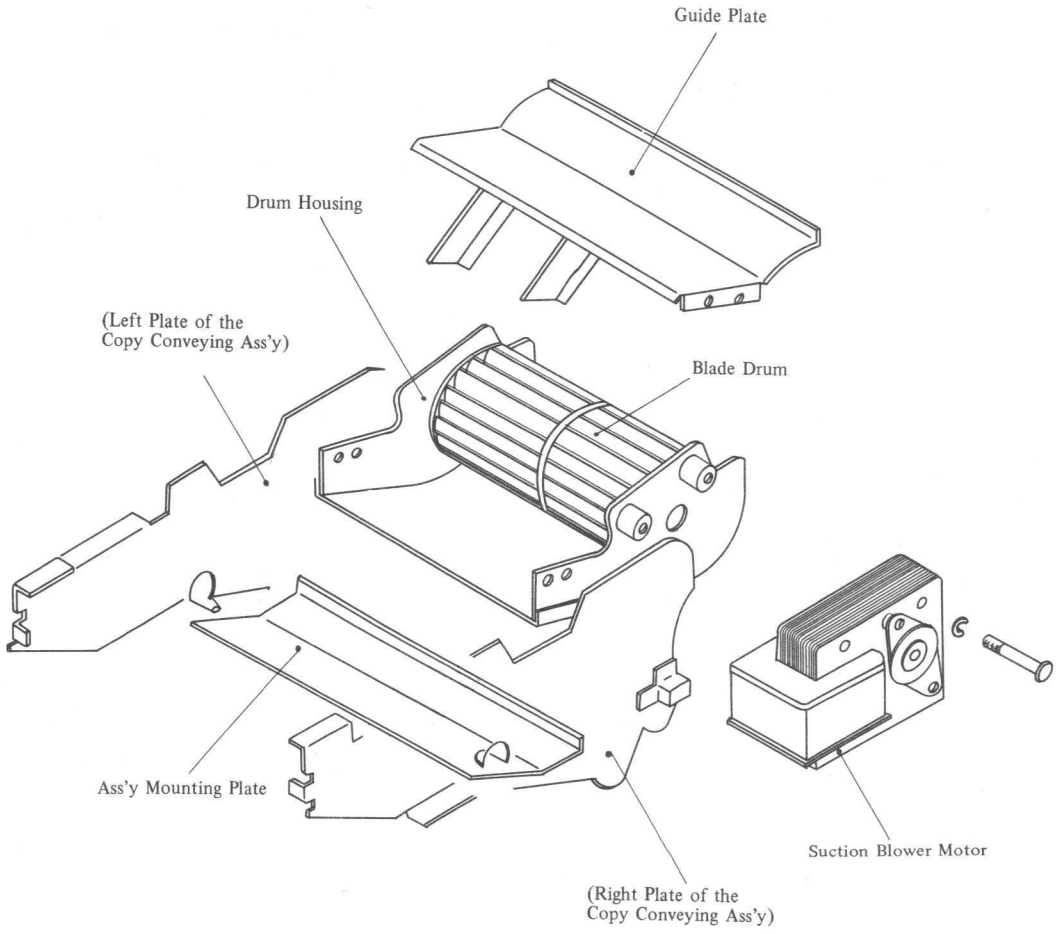


Fig. 4-100 Suction Blower Assembly Main Components

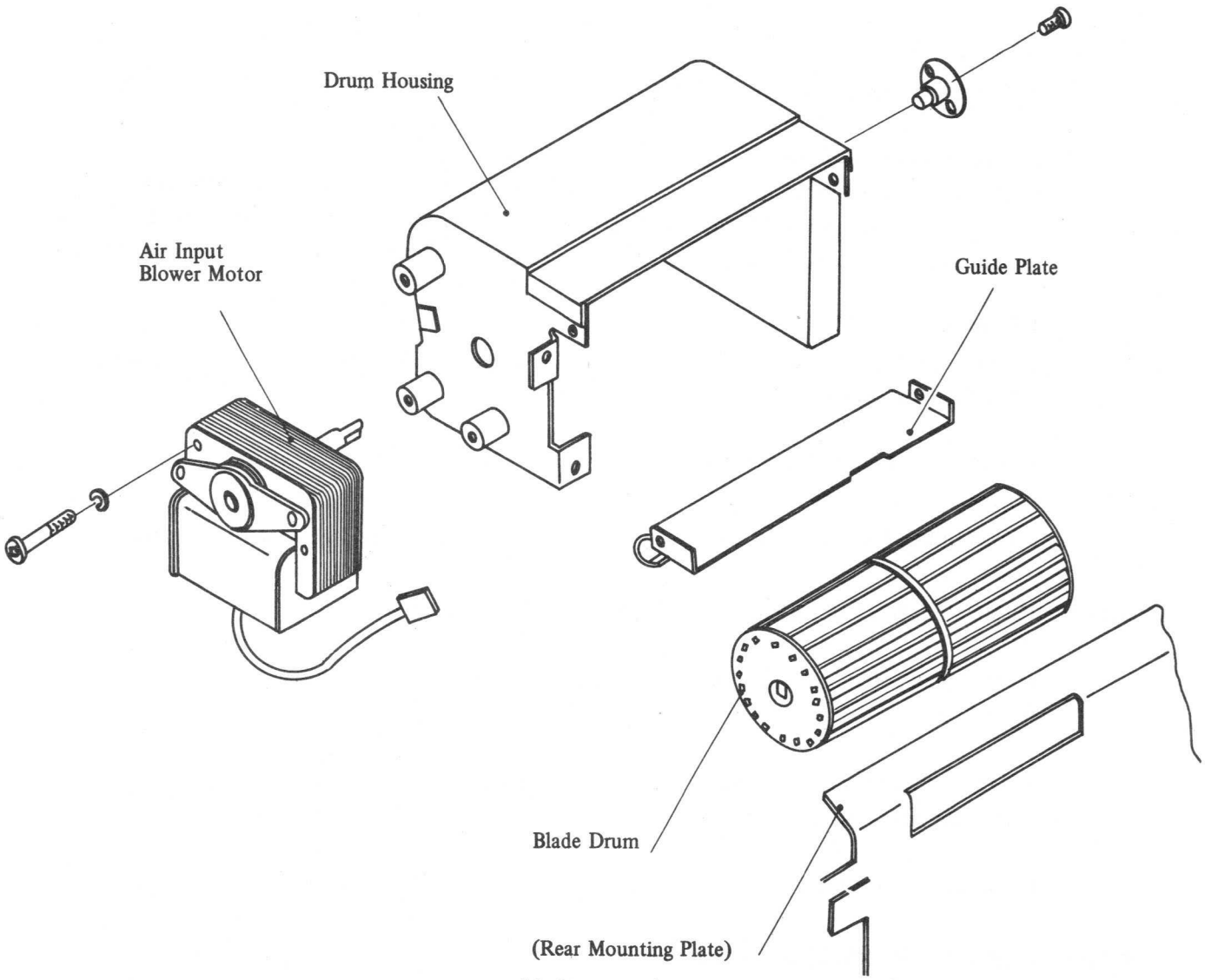


Fig. 4-101 Air Input Blower Assembly Main Components

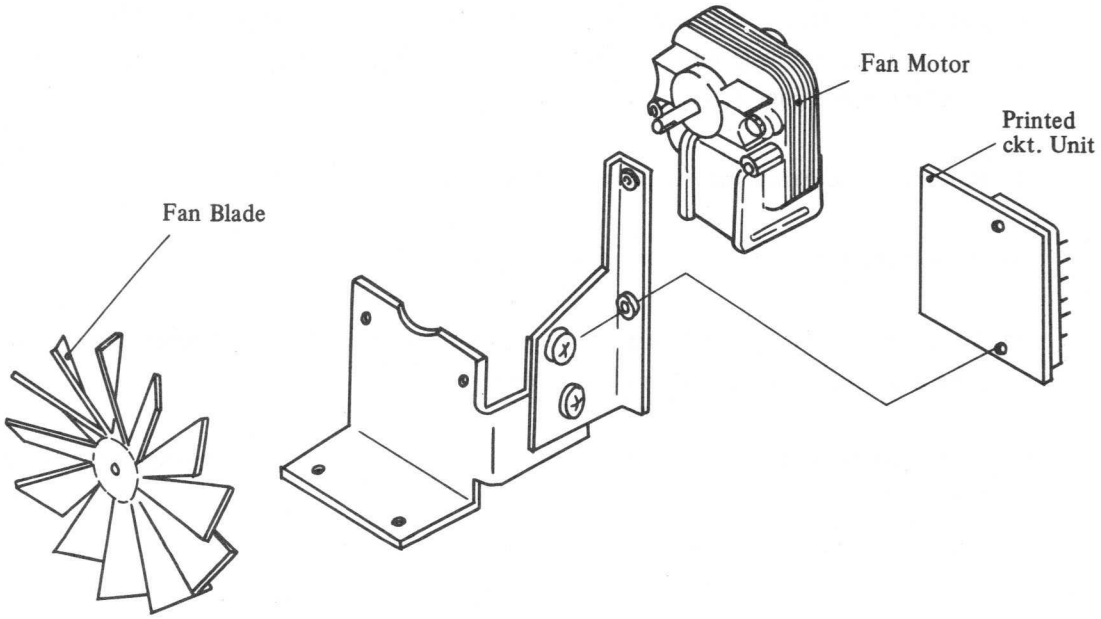


Fig. 4-102 Fan Assembly Main Components

1) MOTOR
A motor is installed in each assembly for powering the blade drum (or fan).

2) BLADE DRUMS & FAN
In the blower assemblies, blade drums are used to create the air flow. The drums are rotated at high speed and, due to their mounting in a duct, produce a continuous blast of air. In the case of the Fan Assembly, the fan blades create a less forceful flow of air through the copier.

3) DRUM HOUSINGS
In the blower assemblies, the blade drums are mounted in housings so that the air can be contained and directed.

4) PRINTED-CIRCUIT UNIT
On the Fan Assembly, a Printed-Circuit Unit is mounted. This unit is the Developer Temperature Control Circuit and is used to control the operation of the Fan Assembly motor (FM3).

4.14-3 REMOVAL/INSTALLATION ACTIONS

Replacement of these assemblies requires no special procedures with the exception of the following:

a) The replacement of the Suction Blower Assembly requires the removal of the Copy Conveying Assembly from the copier body.

b) Be sure to unplug all appropriate connectors before removing any of the assemblies.

4.14-4 REPAIR/SERVICING ACTIONS

1) ADJUSTMENTS
It is important that the blower assembly blade drum rotate smoothly. Whenever servicing is performed on these assemblies, adjustments will probably be necessary. Perform them as follows (reference Fig. 4-103):

a) Put the blade drum into the drum housing and attach the motor.

b) Attach the pivot shaft by screwing the two screws lightly.

c) Turn the blower by hand to find the position of the pivot shaft where the blower rotates most smoothly. Then tighten the screws.

d) After installing the assembly in the machine, recheck for smooth rotation of the blower blade drum.

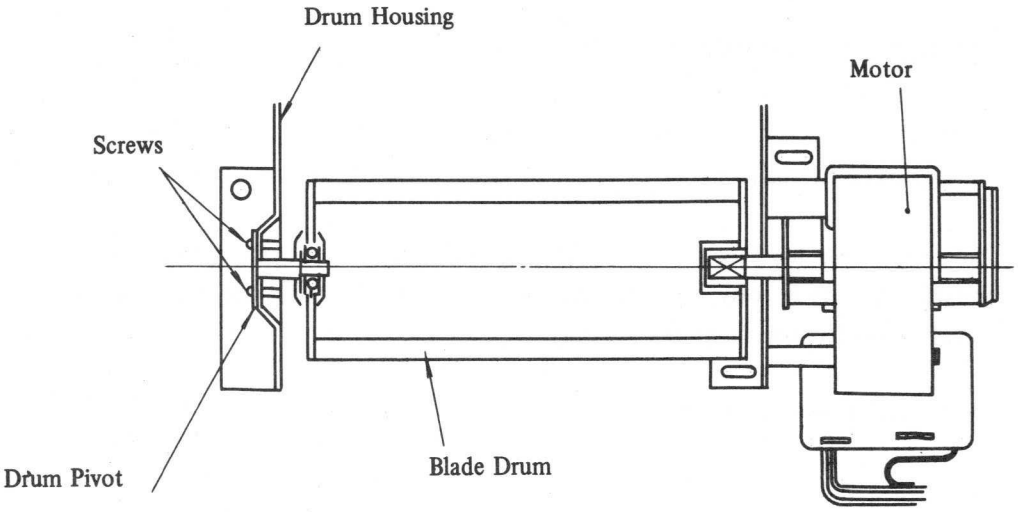


Fig. 4-103 Blower Blade Drum Adjustment

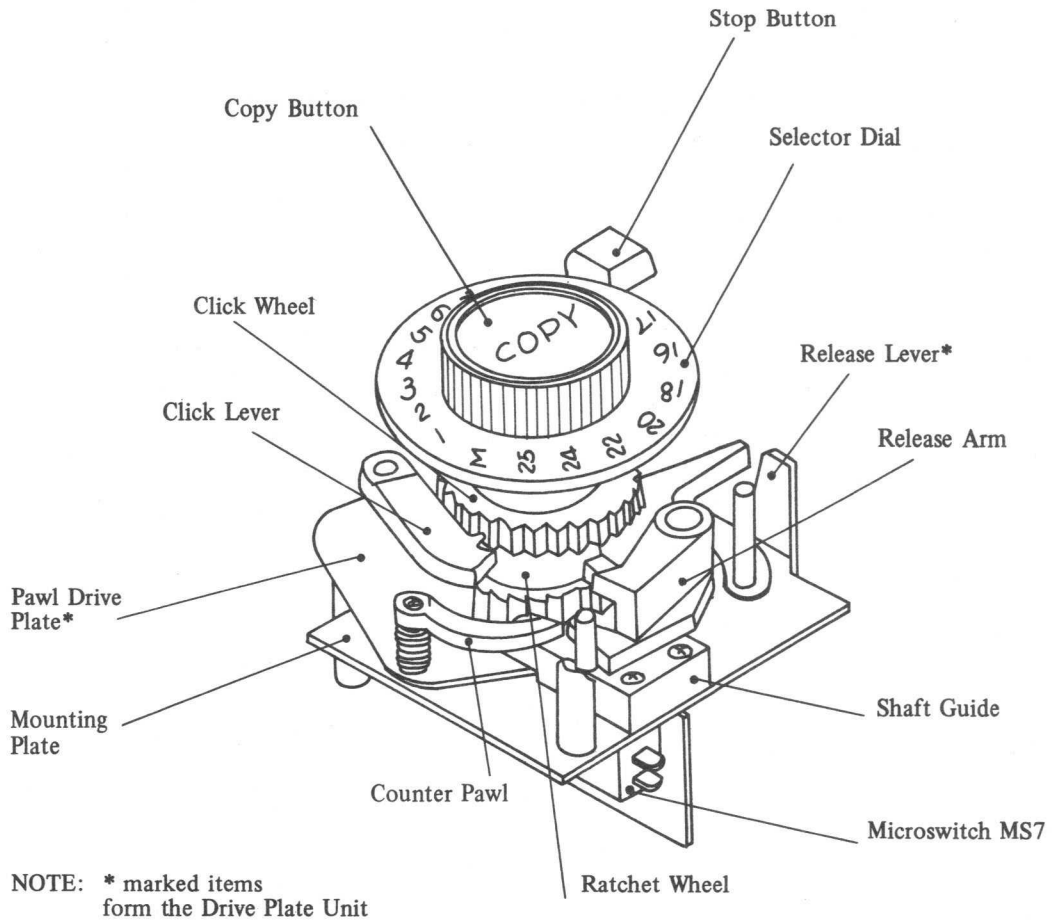
4.15 COPY SELECTOR SUBASSEMBLY

4.15-1 OUTLINE OF ASSEMBLY OPERATION

The Copy Selector Subassembly, mounted on the Control Panel Assembly is the mechanical device used to control the selection of copy quantity and the initiation of copy operation.

The copy selector mechanism is a multi-ratchet device driven by the movement of the copy board; with each copy reproduced, the copyboard advances the mechanism until the mechanism resets to stop further copying.

4.15-2 ASSEMBLY MAIN COMPONENTS



NOTE: * marked items form the Drive Plate Unit

Fig. 4-104 Copy Selector Subassembly Main Components

1) STOP BUTTON
When pressed, this button causes the release lever to trip the release arm, thus, stopping further copying.

2) COPY BUTTON
When pressed, this button activates the components for the start of subassembly mechanical operation. Also, MS7 is actuated to start copy operations.

3) COPY SELECTOR DIAL
This dial is used to set up the click wheel for the desired number of copies.

4) DRIVE PLATE UNIT
This unit is cycled by the back & forth motion of the copyboard to advance the ratchet wheel each time a copy is made.

5) REMAINING COMPONENTS
As the mechanical operation of the selector is complex, the following operation explanation (25 copies or less) of the remaining components is provided.

a) Rotation of the copy selector dial sets the click wheel to its reference position, held fast by the click lever.

b) Due to torsion spring force, the ratchet wheel "A" stud will remain positioned against the "B" stopper of the click wheel, as shown in Fig. 4-105.

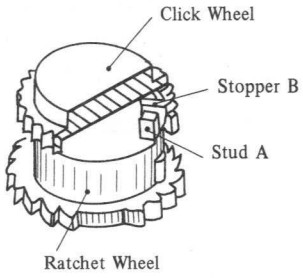
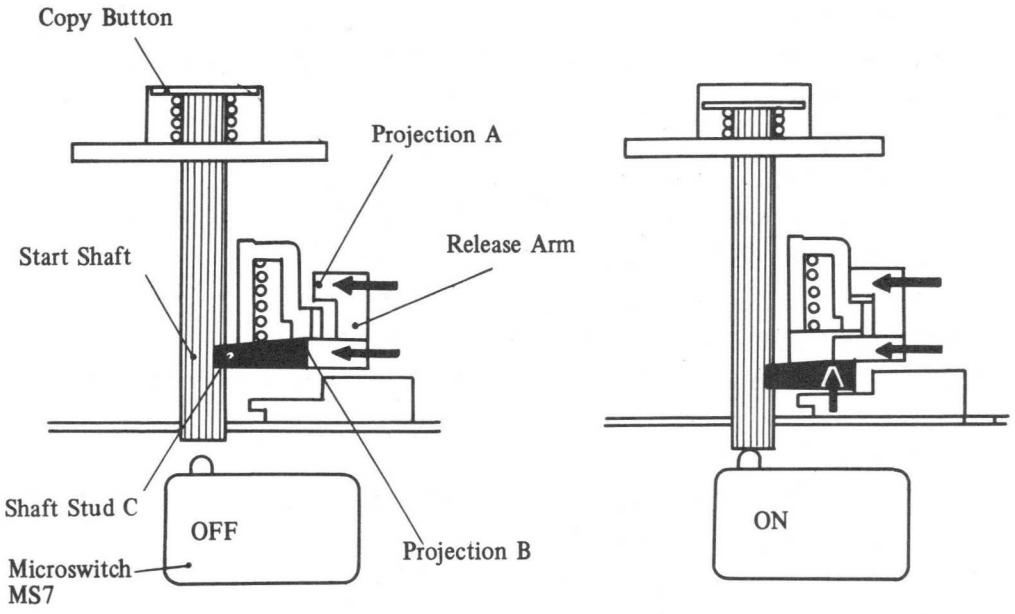


Fig. 4-105 Ratchet Wheel Position

c) Depressing the copy button causes the start shaft to actuate MS7. Additionally, shaft stud "C" drops and allows the release arm to move (due to spring pressure) against the ratchet wheel. The movement of the release arm results in arm projection "B" locking the start shaft in its downward position to hold MS7 "ON" (see Fig. 4-106).



(a) Before Copy Button is Depressed (b) After Copy Button is Depressed

Fig. 4-106 Copy Selector Operation (A)

d) Due to the actuation of MS7, copy operation is started and the copyboard will start its reciprocation (after 5 secs.). The forward movement of the copyboard frees the selector advance lever (on the copier body) and, due to tension, the pawl drive plate moves to advance the ratchet wheel. As the wheel moves, projection A (see Fig. 4-106) slips over the advancing tooth to prevent the wheel from returning (see Fig. 4-107).

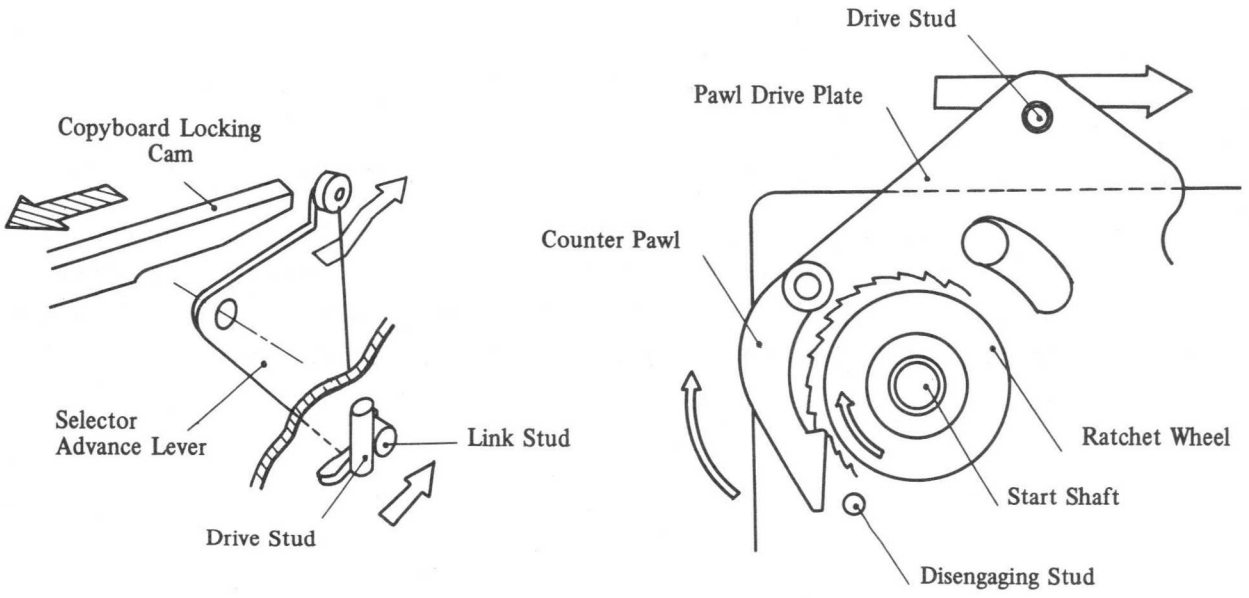


Fig. 4-107 Copy Selector Operation (B)

e) When the copyboard returns, the selector advance lever is depressed and the ratchet drive plate is pushed to the left. As it moves, the drive plate pushes the counter pawl against the disengaging stud, freeing the pawl from the ratchet wheel. The wheel, however, remains stationary due to the holding action of projection A of the release arm (see Fig. 4-106). These combined actions can be seen clearly in Fig. Fig. 4-108).

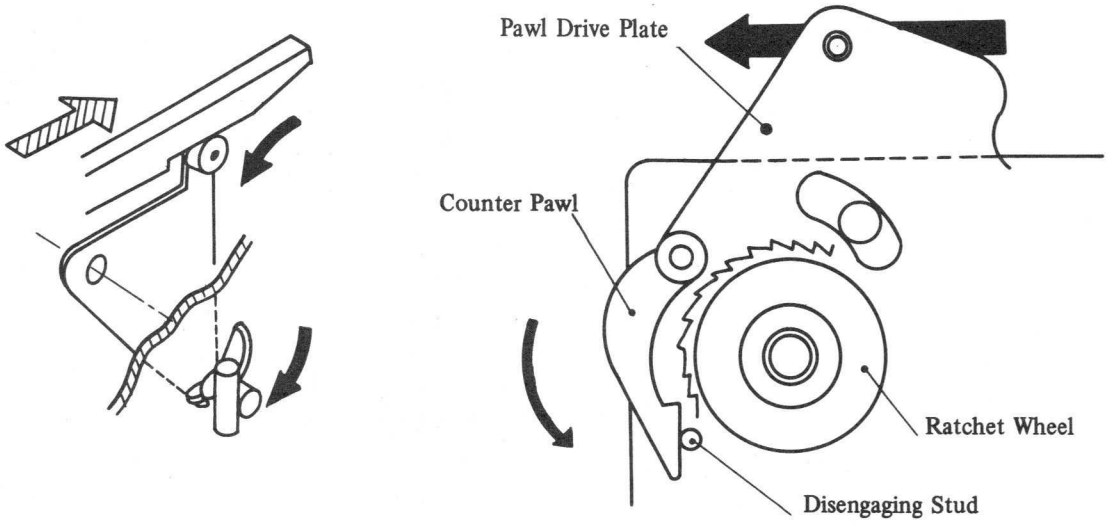


Fig. 4-108 Copy Selector Operation (C)

f) The back and forth motion of the copyboard will cause the copy selector to advance one position for each copy made. As the last copy is started, the release arm trip projection on the ratchet wheel lifts the release arm. The action, thus, frees the start shaft and microswitch MS7.

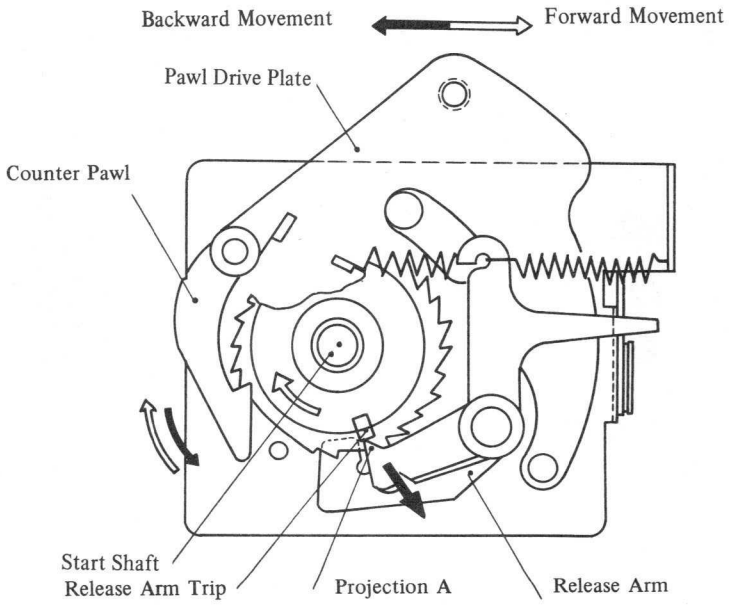


Fig. 4-109 Copy Selector Operation (D)

When the selector dial is placed at the "M" setting, the counter pawl contacts a portion of the ratchet wheel without teeth. As a result, the motion of the Drive Plate Unit has no effect on the Copy Selector Subassembly mechanism.

To stop copying, the STOP button must be pressed. This action results in driving the release lever into the release arm to end copying, as shown in Fig. 4-110.

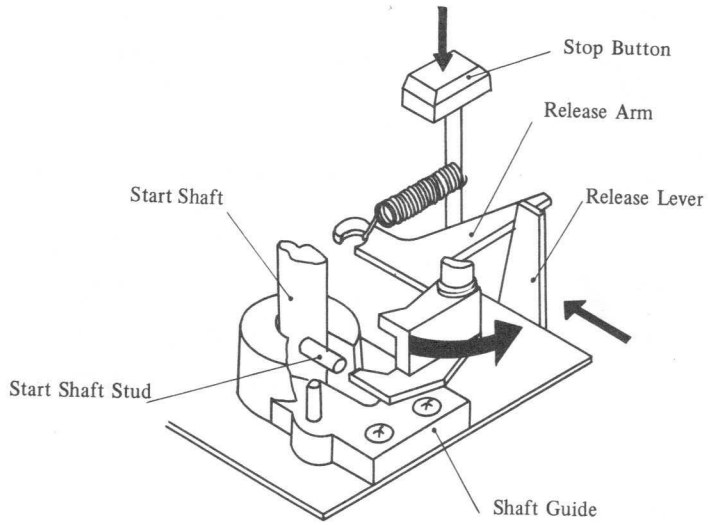
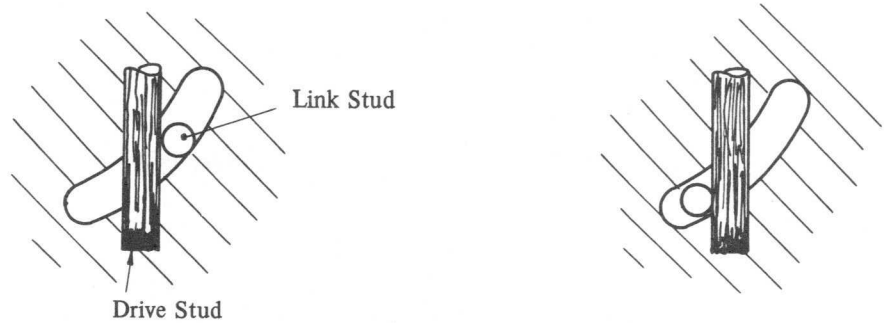


Fig. 4-110 Stop Button Operation

4.15-3 REMOVAL/INSTALLATION ACTIONS

Whenever installing the Copy Selector Subassembly, make sure that the drive stud on the underside of the Drive Plate Unit is positioned correctly in relationship to the link stud of the selector advance lever. Fig. 4-111 shows the correct positioning.



(a) Correct Positioning (b) Incorrect Positioning

Fig. 4-111 Drive and Link Stud Positioning

4.15-4 REPAIR/SERVICING ACTIONS

As the Copy Selector Subassembly requires a great deal of time to repair, servicing in the customers' office should be limited to removal and replacement. All repair actions requiring disassembly should be performed in the Service Center.

1) COPY SELECTOR REASSEMBLY

When reassembling the selector after repairing, be careful to observe the following (reference–Fig. 4-112):

a) Attach the shaft guide to the Drive Plate Unit with two retaining screws and insert the start shaft, with the shaft stud in the groove of the shaft guide.

b) Place the torsion spring over the shaft and attach one end of the spring through the slot in the shaft guide.

c) Place the ratchet wheel on the shaft and, with sharp pointed tweezers, hook the spring end on the ratchet wheel.

d) Insert the shaft sleeve over the shaft with the collar flush to the ratchet wheel.

e) Note the position of the ratchet wheel and rotate it clockwise 2-1/2 turns to give the torsion spring the proper counterclockwise torque.

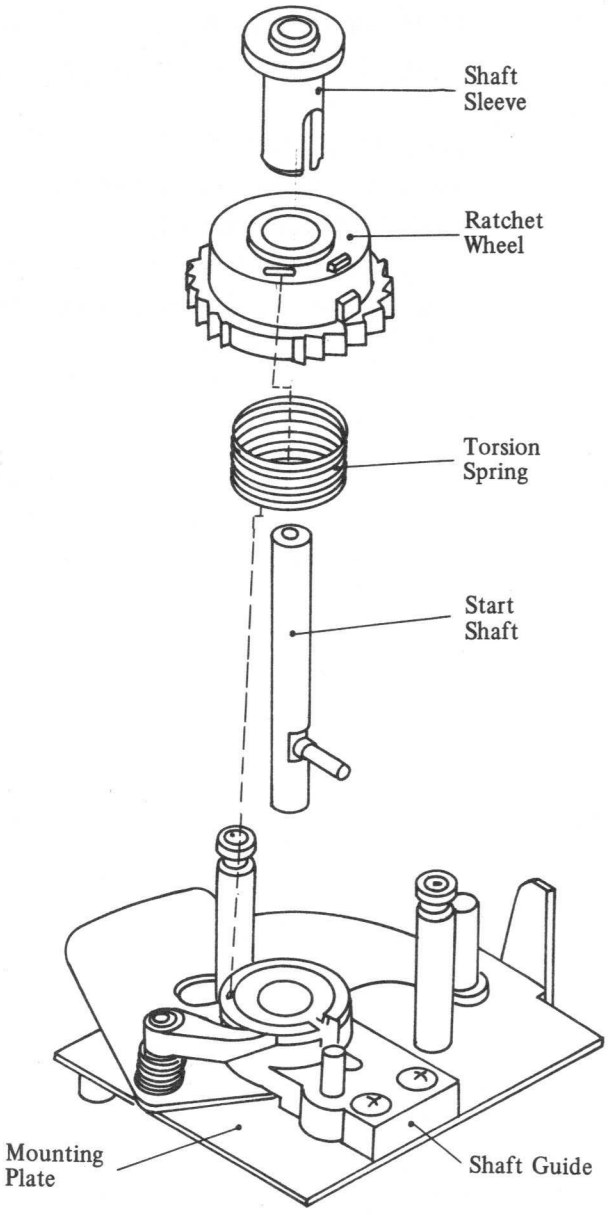


Fig. 4-112 Copy Selector Reassembly

f) Place the click wheel on the shaft and, while holding the ratchet wheel in position, rotate the click wheel clockwise until the click wheel stopper rests against the ratchet wheel stud, as shown in Fig. 4-113.

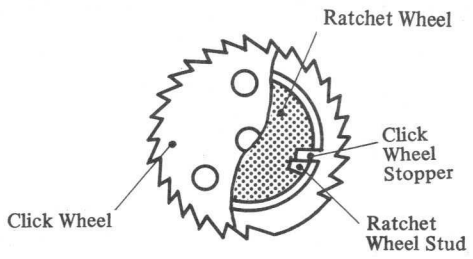


Fig. 4-113 Click and Ratchet Wheel Positioning (Top View)

g) During the assembly of the remaining components, hold the ratchet wheel in position so that the tension on the spring is maintained.

2) MICROSWITCH ADJUSTMENT

To prevent damage to microswitch MS7, the position of the switch body should be adjusted so that switch plunger travel is only about 1 mm. This travel is defined as the difference between the plunger height when the COPY button is not depressed and when the COPY button is MECHANICALLY held down for copy operation.

4.16 SAFETY ASSEMBLY

4.16-1 OUTLINE OF ASSEMBLY OPERATION

The Safety Assembly, located just under the left end of the control panel, operates to stop copier operation whenever either of two conditions occurs in the machine.

a) When either the upper or front left access door is opened, all power will be cut to the machine to prevent personnel injury.

b) Should a jam condition occur in the machine, drive power is cut to prevent equipment damage.

4.16-2 ASSEMBLY MAIN COMPONENTS

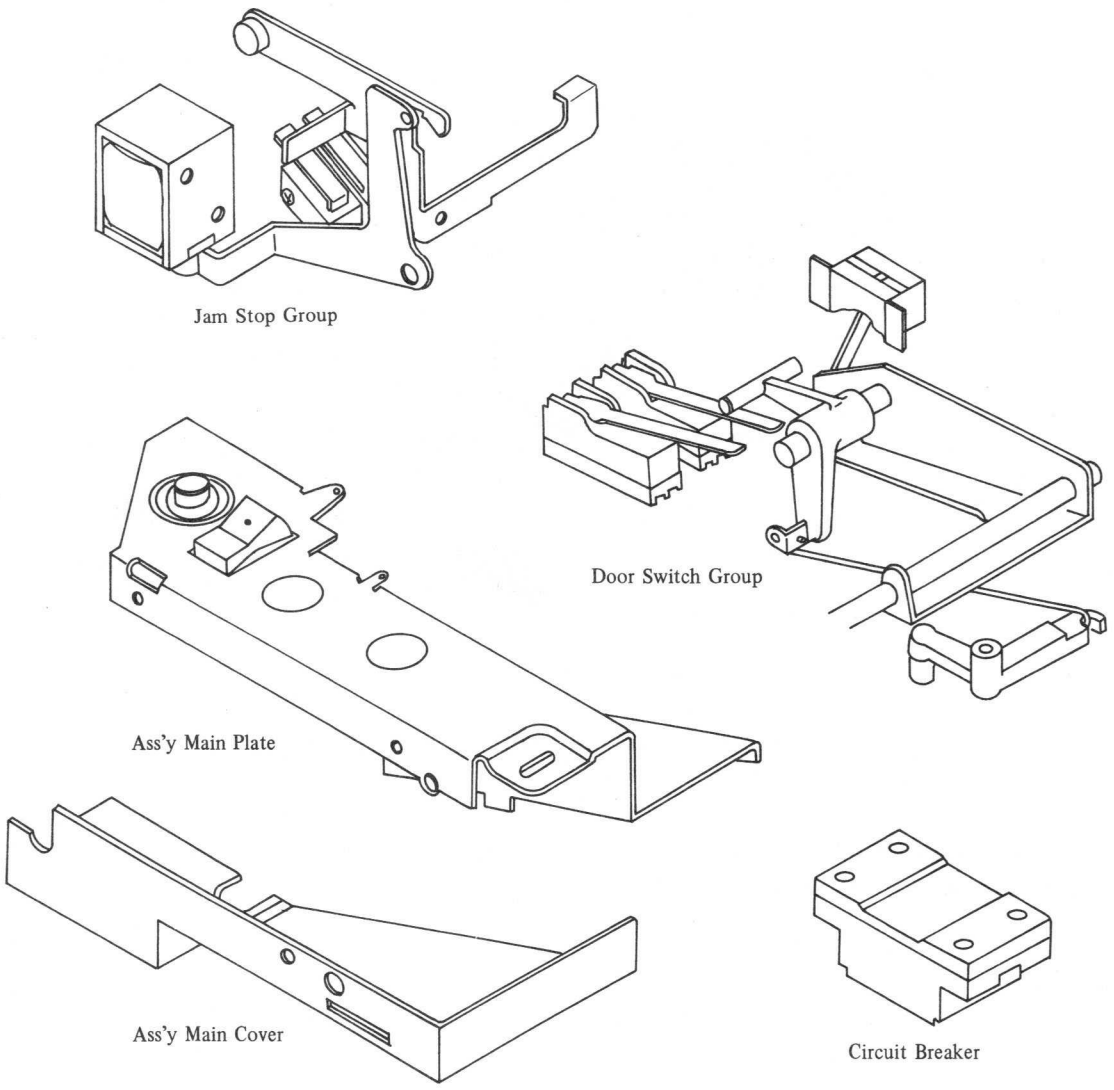


Fig. 4-114 Safety Assembly Main Components

1) ASSEMBLY MAIN PLATE
The ON/OFF switch and power lamp are mounted on this plate, as well as the other main components of this assembly.

2) CIRCUIT BREAKER
When abnormally high current flows in the copier, this circuit breaker operates automatically to cut power to the machine. When the breaker operates (reset lever OFF side), examine the machine to determine the cause before turning the reset lever back to the ON side.

3) DOOR SWITCH GROUP

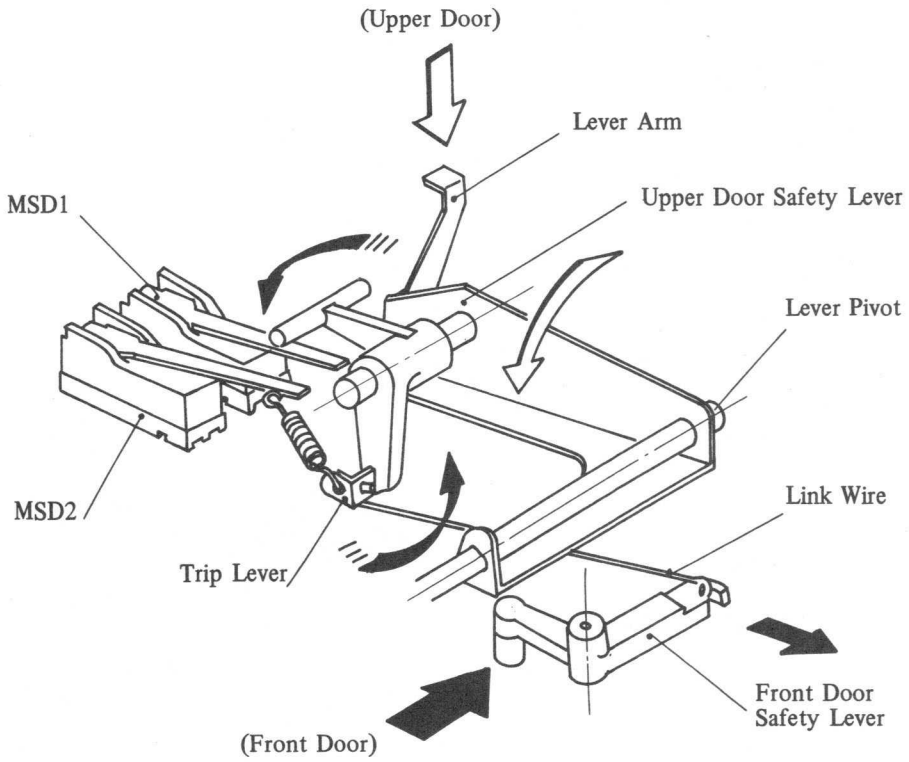


Fig. 4-115 Door Switch Group Main Components

The door switch group contains two microswitches which, when released, cut all power to the copier. These operate as follows:

a) Fig. 4-116 indicates the condition when both the upper and front left doors are open. The upper left door does not press the arm of the upper door safety lever, and the front left door does not operate the front safety lever.

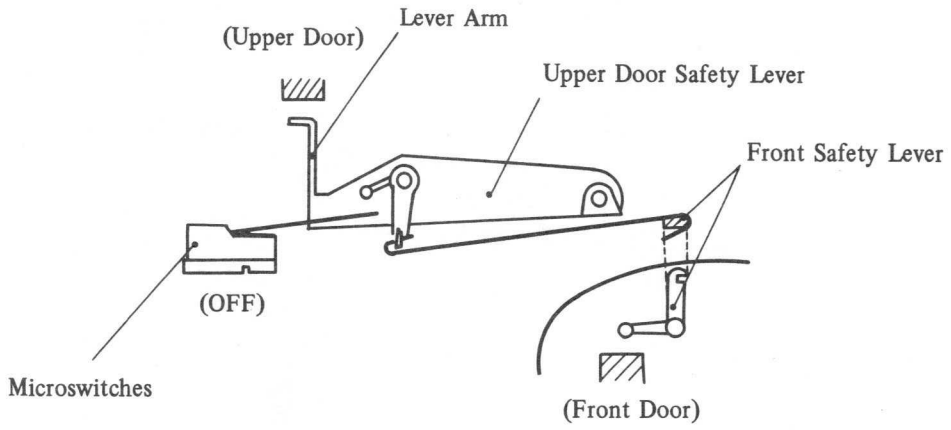


Fig. 4-116 Door Switch Group Operation (A)

b) When the front door is closed, the front safety lever rotates and pulls the link wire toward the right, as shown in the Fig. 4-117. This causes the trip lever to rotate but, as it is at such a high position, it cannot actuate the microswitches.

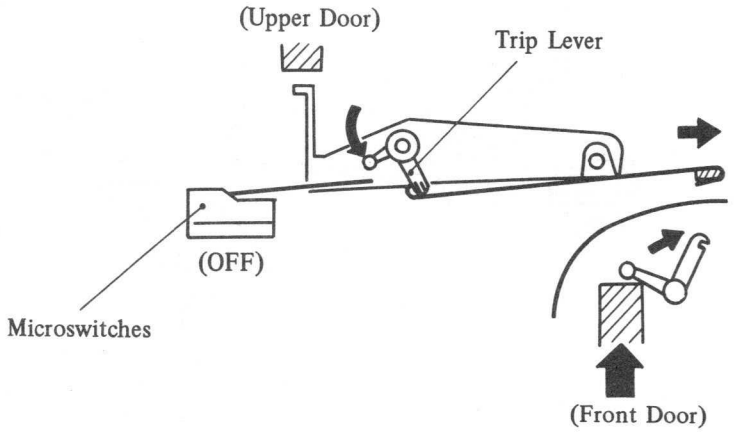


Fig. 4-117 Door Switch Group Operation (B)

c) When the upper door is closed, it presses down on the lever arm which pivots the upper door safety lever, thus, forcing the trip lever to press down on the actuators of the two microswitches (see Fig. 4-118).

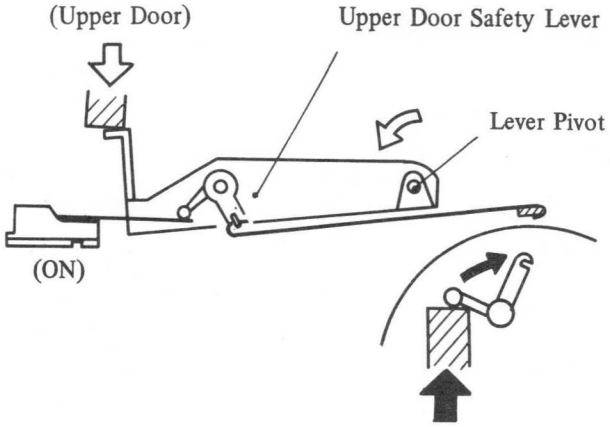


Fig. 4-118 Door Switch Group Operation (C)

d) If the front door is open while the upper door is closed, the microswitch actuators will be released because the trip lever is not rotated (see Fig. 4-119).

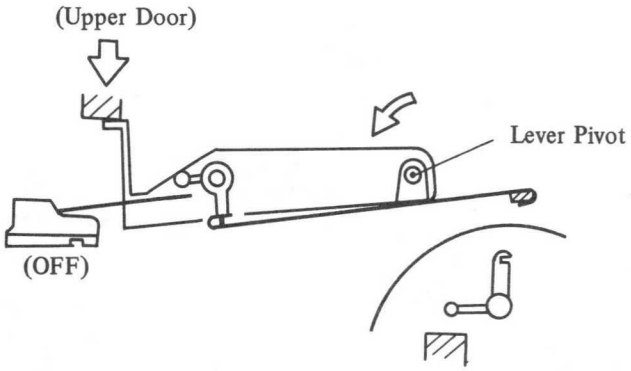


Fig. 4-119 Door Switch Group Operation (D)

4) JAM STOP GROUP

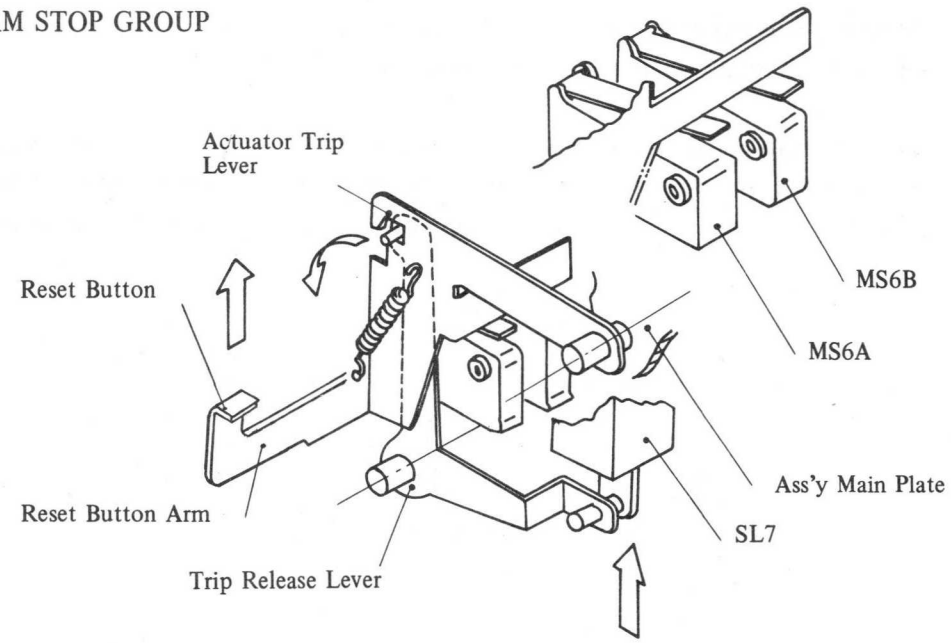


Fig. 4-120 Jam Stop Group Main Components

When a paper jam occurs, these components operate to stop copying as follows (reference-Chapter 3–Jam Detection Circuit):

a) Normally the stud of the trip release lever is in the notch of the actuation trip lever, as shown in Fig. 4-121. In this case the reset button is held down but under spring tension.

b) Since the reset button is at its lower position, the actuator trip lever is pressing MS6A & 6B to their ON position and power is being supplied to the copier.

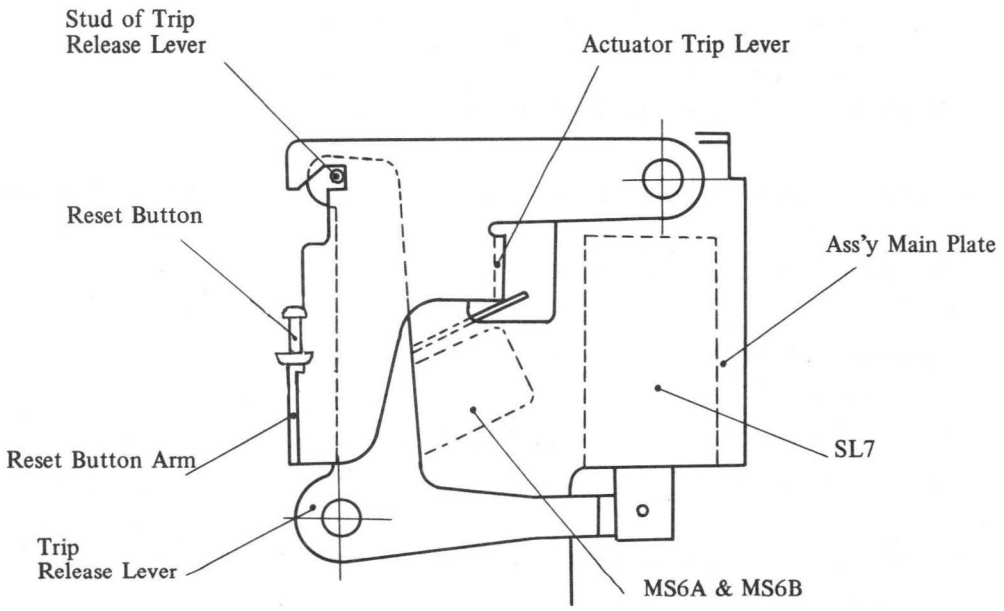


Fig. 4-121 Jam Stop Group Operation (A)

c) When paper is jammed, solenoid SL7 is energized and lifts up the trip release lever. The release lever rotates centered around pivot "A" (see Fig. 4-122).

d) When the trip release lever turns, the stud comes out of the notch and releases the actuator trip lever. The release of the actuator trip lever results in the reset button is pushed up by the lever and the arm tripping the microswitches move upward.

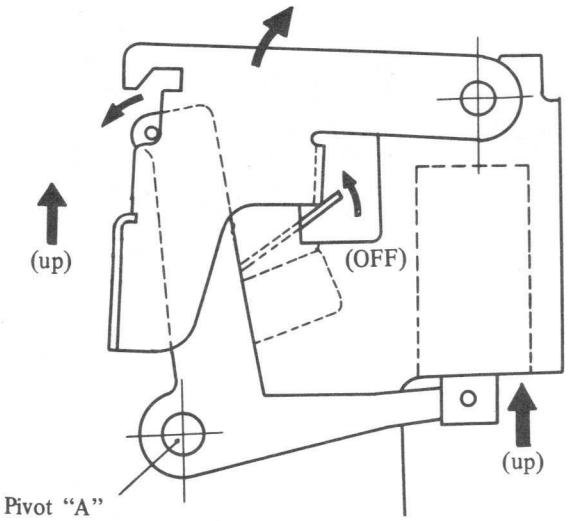


Fig. 4-122 Jam Stop Group Operation (B)

e) At this time MS6A & MS6B simultaneously turn OFF.

f) As soon as the microswitches are turned OFF, power to the high voltage transformers, main motor, heater, and Illumination Assembly is broken to stop copying.

g) Resetting of the power is accomplished by depressing the reset button.

4.16-3 REMOVAL/INSTALLATION ACTIONS

Whenever removing the Safety Assembly, first remove the copier left front door. This is necessary to allow the assembly to be drawn out of the copier without damaging the levers protruding into the main body area.

4.16-4 REPAIR/SERVICING ACTIONS

1) In case that the ON–OFF action of the door switch operation is not proper, adjust by sliding the position of the front safety lever as follows (reference Fig. 4-123):

a) In case of difficulty in turning ON the door switches, slide the pivot shaft of the front safety lever outward.

b) In case of difficulty in turning OFF the door switches, slide the pivot shaft of the lever inward.

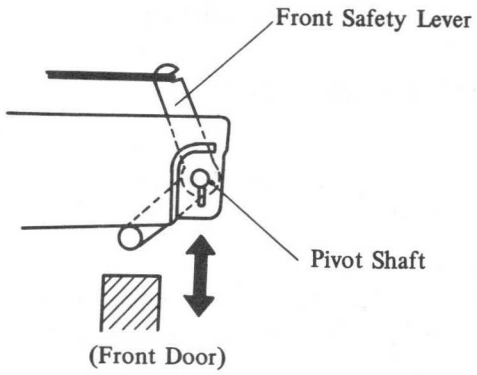


Fig. 4-123 Adjustment of Front Safety Lever

2) JAM STOP GROUP ADJUSTMENTS

In case of a paper jam, the reset button should be tripped at once, with the power to most circuits being broken. Adjust the following:

a) Position of SL7

When SL7 is ON, the stud of the trip release lever should come out of the notch of the actuator trip lever; when SL7 is OFF, the trip release lever should be held firmly by the stud. The position of SL7 should be adjusted so that it operates properly in the above two situations; do this by loosening the retaining screws which secure SL7 and sliding the solenoid up or down (see Fig. 4-124).

b) Position of MS6A & MS6B

Microswitches MS6A & MS6B should be turned ON securely when the reset button is depressed. Adjust the position of the microswitches by loosening and sliding the adjust screw (see Fig. 4-124).

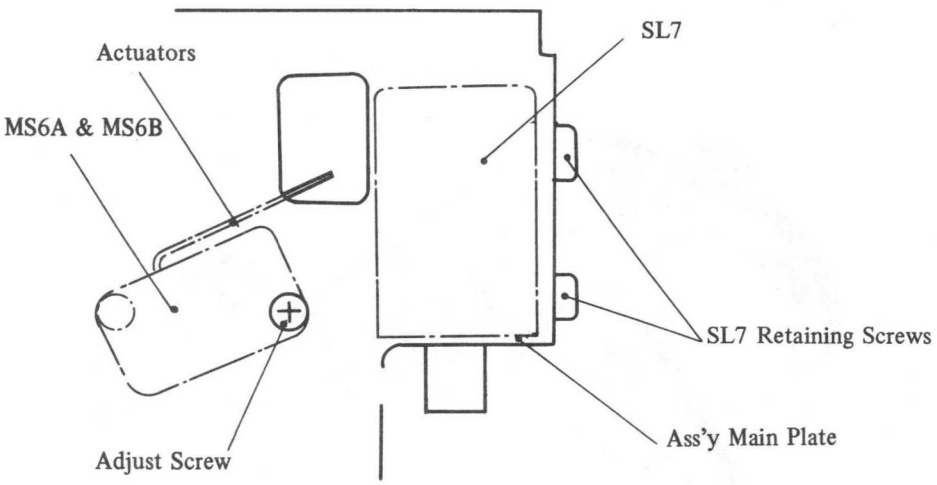


Fig. 4-124 Jam Stop Group Adjustments

4.17 COPYBOARD DRIVING MECHANISM ASSEMBLY

4.17-1 OUTLINE OF ASSEMBLY OPERATION

This assembly is used to drive the copyboard so it moves back and forth for copying. The operation occurs as follows:

a) As the drum starts rotating prior to the beginning of a copy cycle, it moves the drive chain causing the return and forward drive sprockets to rotate. As neither clutch is "ON", no further action occurs (see Fig. 4-125).

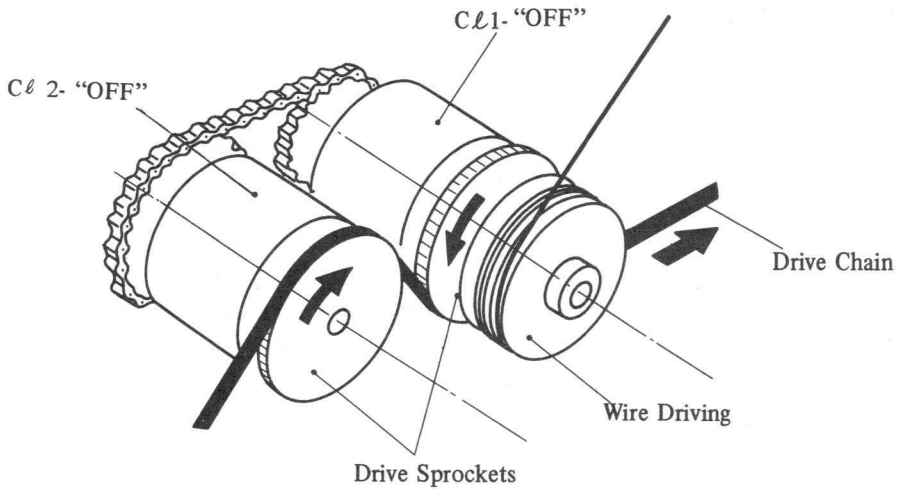


Fig. 4-125 Driving Mechanism Operation (A)

b) As the "start cam" begins the copy cycle, the forward clutch (Cℓ 1) is energized.

c) Activation of Cℓ 1 results in the wire driving pulley rotating to cause the copyboard to move forward (see Fig. 4-126).

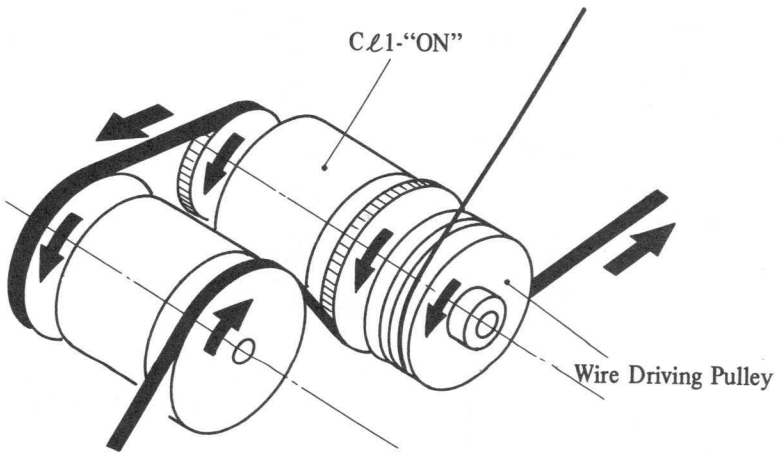


Fig. 4-126 Driving Mechanism Operation (B)

d) When the copyboard reaches either MS9 or MS10 (depending on the size of paper being used), the circuit keeping Cℓ1 energized is broken.

e) As the Cℓ1 circuit is broken, the Cℓ2 circuit is activated causing Cℓ2 to energize.

f) Activation of Cℓ2 results in the wire driving pulley turning in the opposite direction. In this case the wire driving pulley is powered through the movement of chain "A", which connects the return clutch sprocket to the forward clutch sprocket (see Fig. 4-127).

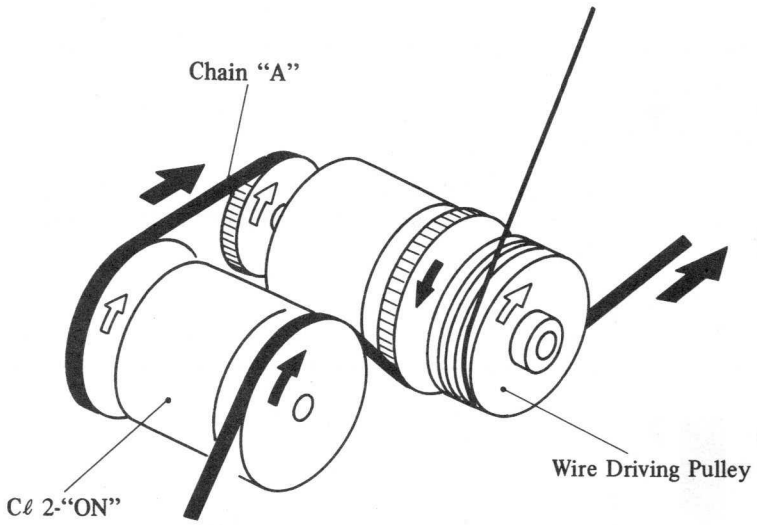
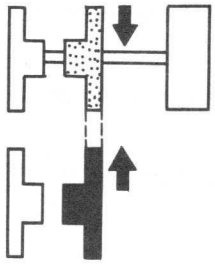
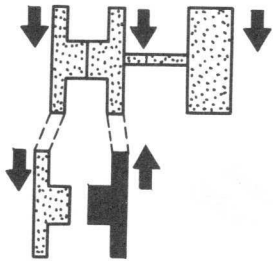
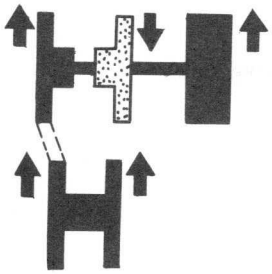
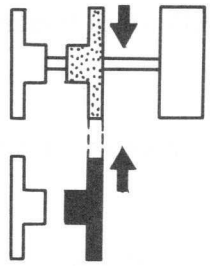


Fig. 4-127 Driving Mechanism Operation (C)

g) As the copyboard returns to the "starting position", it activates MS8 which breaks the circuit holding Cℓ2 energized. Thus, Cℓ2 stops operation.

h) The copyboard will wait until the next "start cam" signal before it begins to move forward.

The following figure summarizes the operation of the various elements of this assembly.

	Operation	Forward Movement			Return Movement			Wire Pulley	Micro-switch
		C. S.	D. S.	Cℓ 1	C. S.	D. S.	Cℓ 2		
In preparation		Stop	Turns forward	OFF	Stop	Turns backward	OFF	Stop	
Copyboard moves forward.		Turns forward	Turns forward	ON	Turns forward	Turns backward	OFF	Turns forward	MS1A
Copyboard moves backward.		Turns backward	Turns forward	OFF	Turns back-ward	Turns backward	ON	Turns backward	MS9 or MS10
Stop		Stop	Turns forward	OFF	Stop	Turns backward	OFF	Stop	MS8

C. S. : Clutch Sprocket D. S. : Drive Sprocket Cℓ : Clutch

Fig. 4-128 Copyboard Reciprocation Operation

4.17-2 ASSEMBLY MAIN COMPONENTS

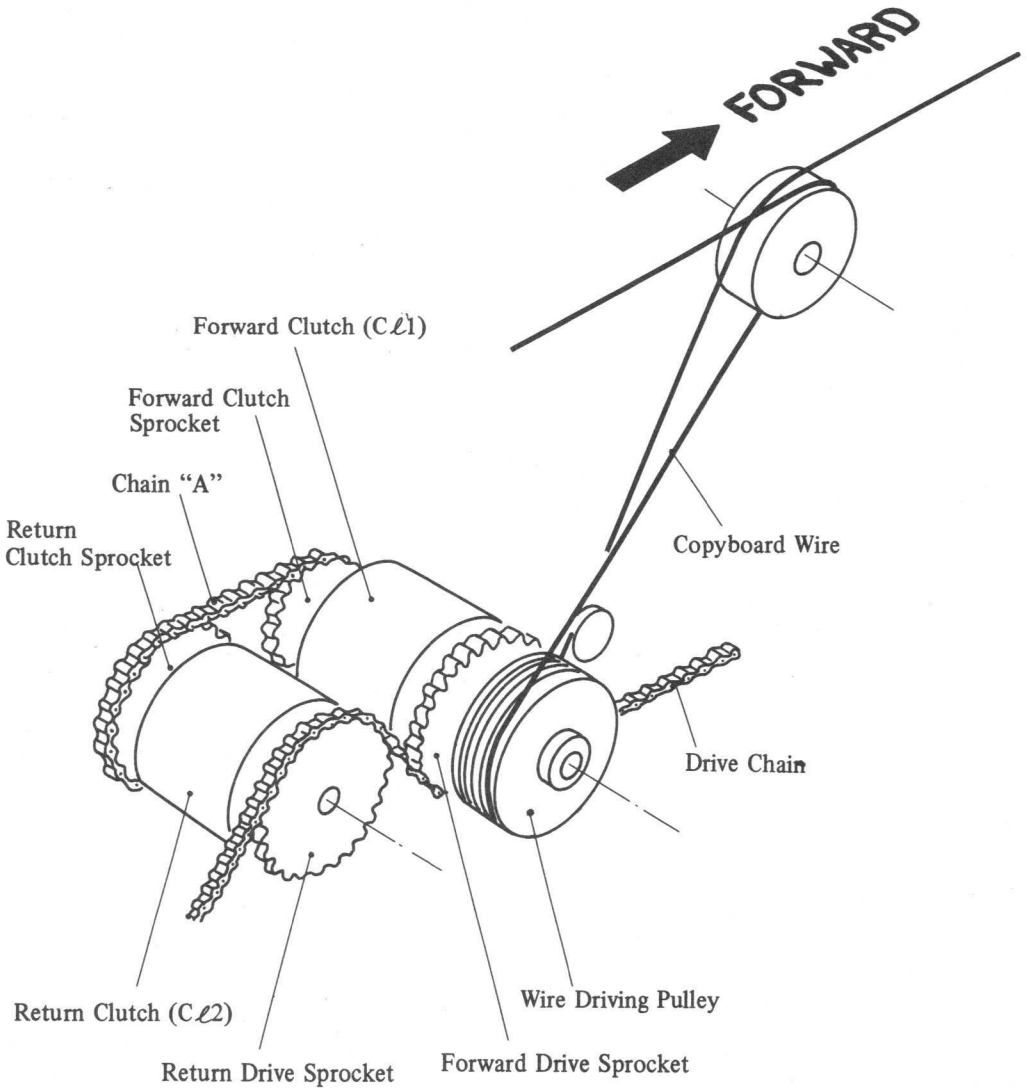


Fig. 4-129 Copyboard Driving Mechanism Assembly Main Components

4) COPYBOARD WIRE

The copyboard wire is used to draw the copyboard back and forth for exposure of the original. The wire is dual-ended with each end attached to the copyboard; one end draws the copyboard forward, while the other end draws the copyboard in the return direction. (for additional information section 4.1, Copyboard Assembly).

4.17-3 REMOVAL/INSTALLATION ACTIONS

The replacement procedures used for the copyboard wire are included in section 4.1, Copyboard Assembly.

4.17-4 REPAIR/SERVICING ACTIONS

Adjustment procedures for the copyboard wire are included in section 4.1, Copyboard Assembly.

APPENDICES

APPENDIX A (COPIER - GENERAL)

MICROSWITCH TIMING CHART, ALL COPIERS
PHOTOCOPIER SCHEMATIC DIAGRAM, PROD. NO. 8-11154/55
PHOTOCOPIER SCHEMATIC DIAGRAM, PROD. NO. 8-11156/57
PHOTOCOPIER SCHEMATIC DIAGRAM, PROD. NO. 8-11158/84
PHOTOCOPIER WIRING DIAGRAM, PROD. NO. 8-11154/55(1 OF 2)
PHOTOCOPIER WIRING DIAGRAM, PROD. NO. 8-11154/55 (2 OF 2)
PHOTOCOPIER WIRING DIAGRAM, PROD. NO. 8-11156/57
PHOTOCOPIER WIRING DIAGRAM, PROD. NO. 8-11158/84

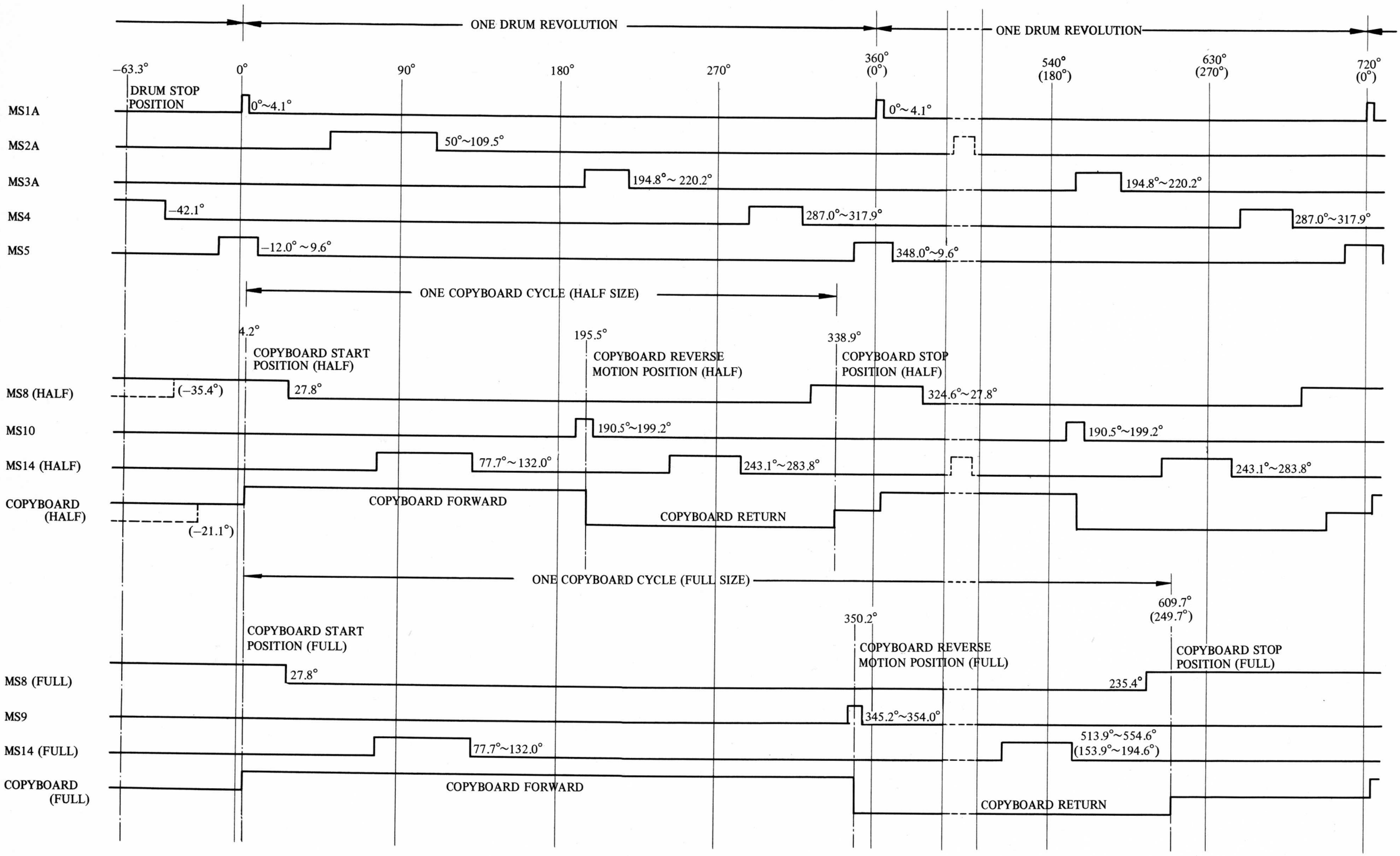
APPENDIX B (SPECIFIC CIRCUITS)

HEATER CONTROL CIRCUIT SCHEMATIC DIAGRAMS
PRINTED-CIRCUIT BOARD LAYOUTS (1 OF 3)
PRINTED-CIRCUIT BOARD LAYOUTS (2 OF 3)
PRINTED-CIRCUIT BOARD LAYOUTS (3 OF 3)

APPENDIX C (ELECTRICAL PARTS)

PARTS LIST - COPIER COMMON COMPONENTS
PARTS LIST - PRODUCT NUMBER DISTINCTIVE COMPONENTS
PARTS LIST - HEATER CONTROL CIRCUITS

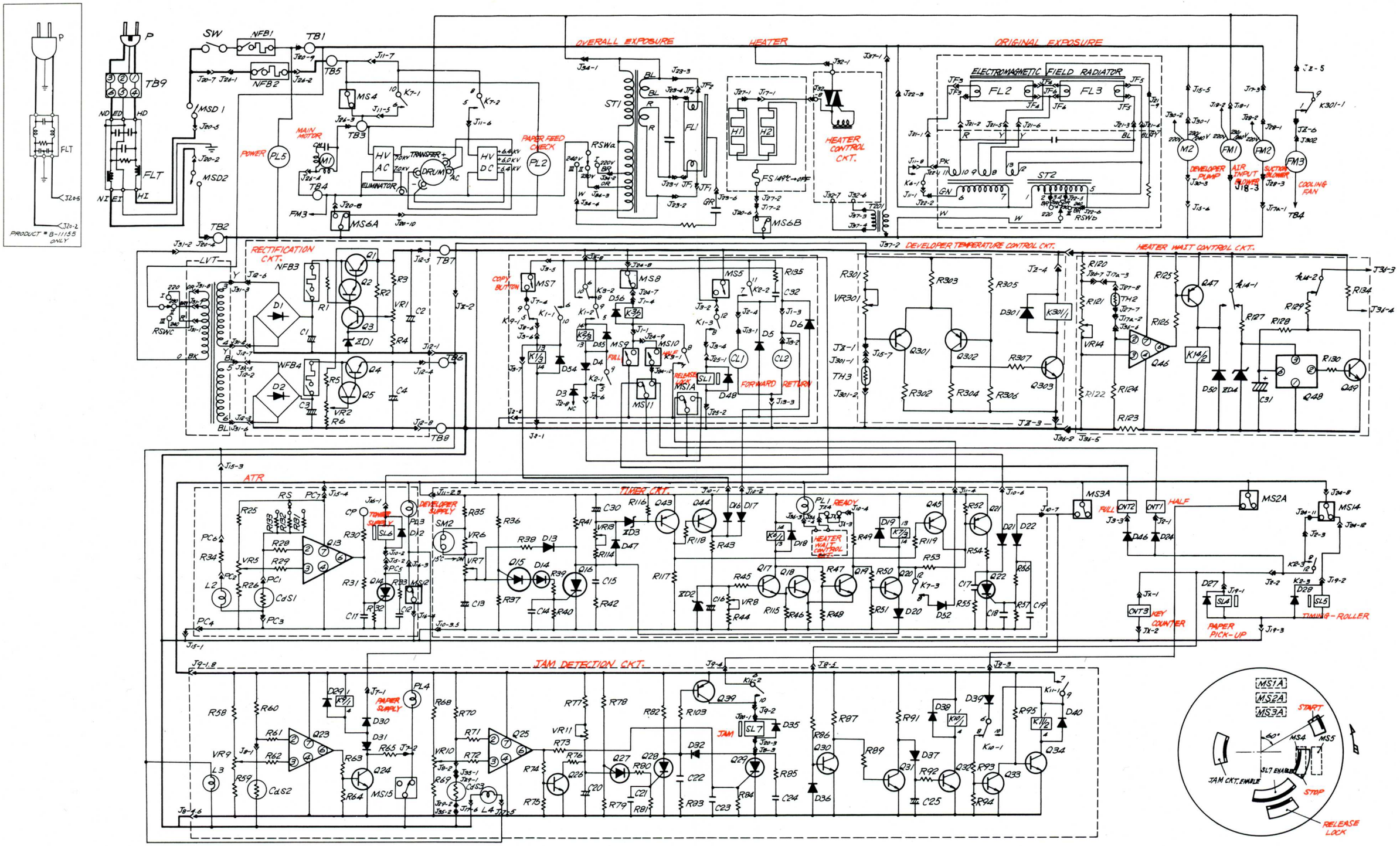
NP-70



Microswitch Timing Chart,
(All copiers)

Second Printing-June, 1974

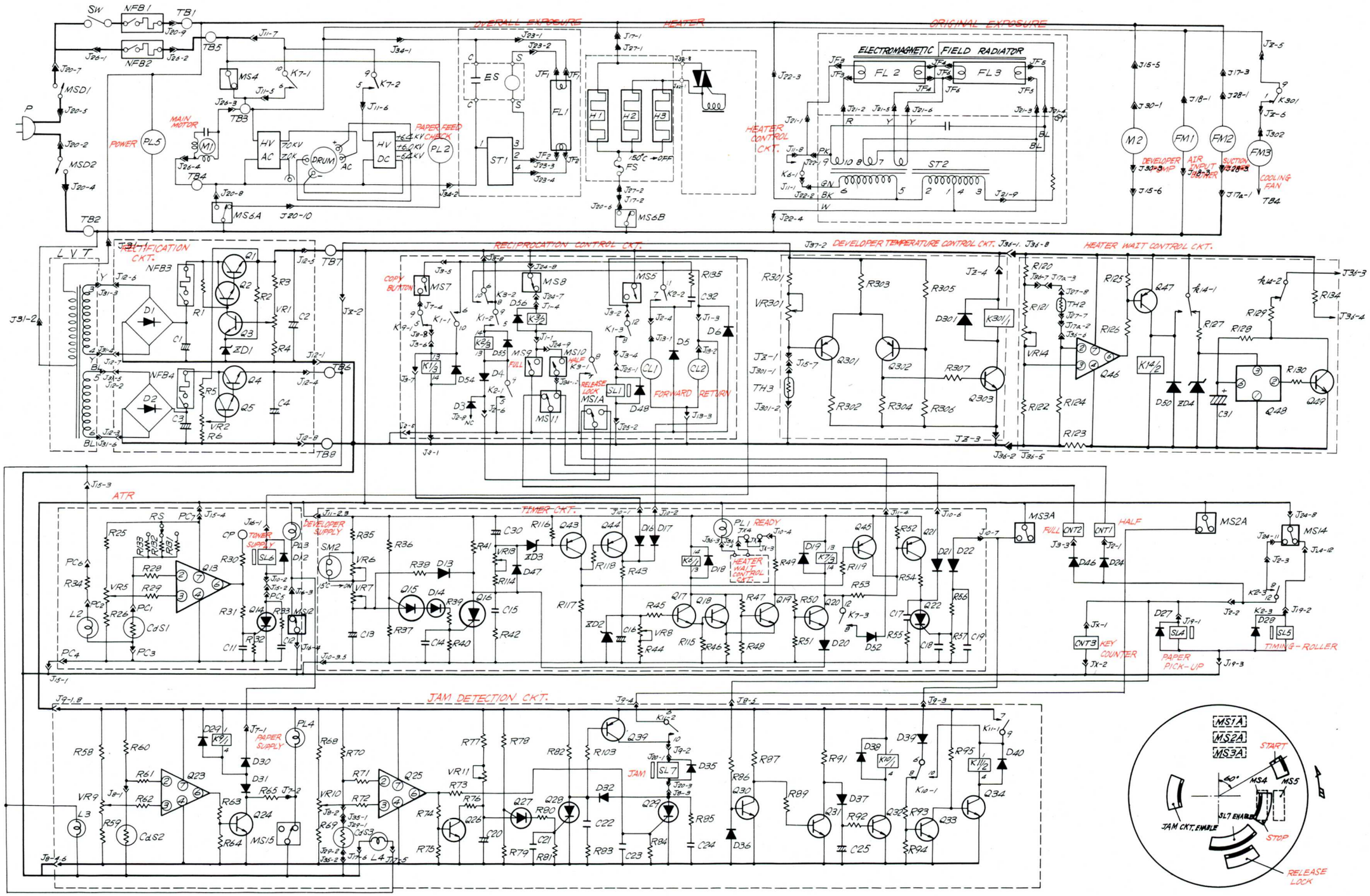
NP-70



Photocopier Schematic Diagram,
Prod. No. 8-11154/55

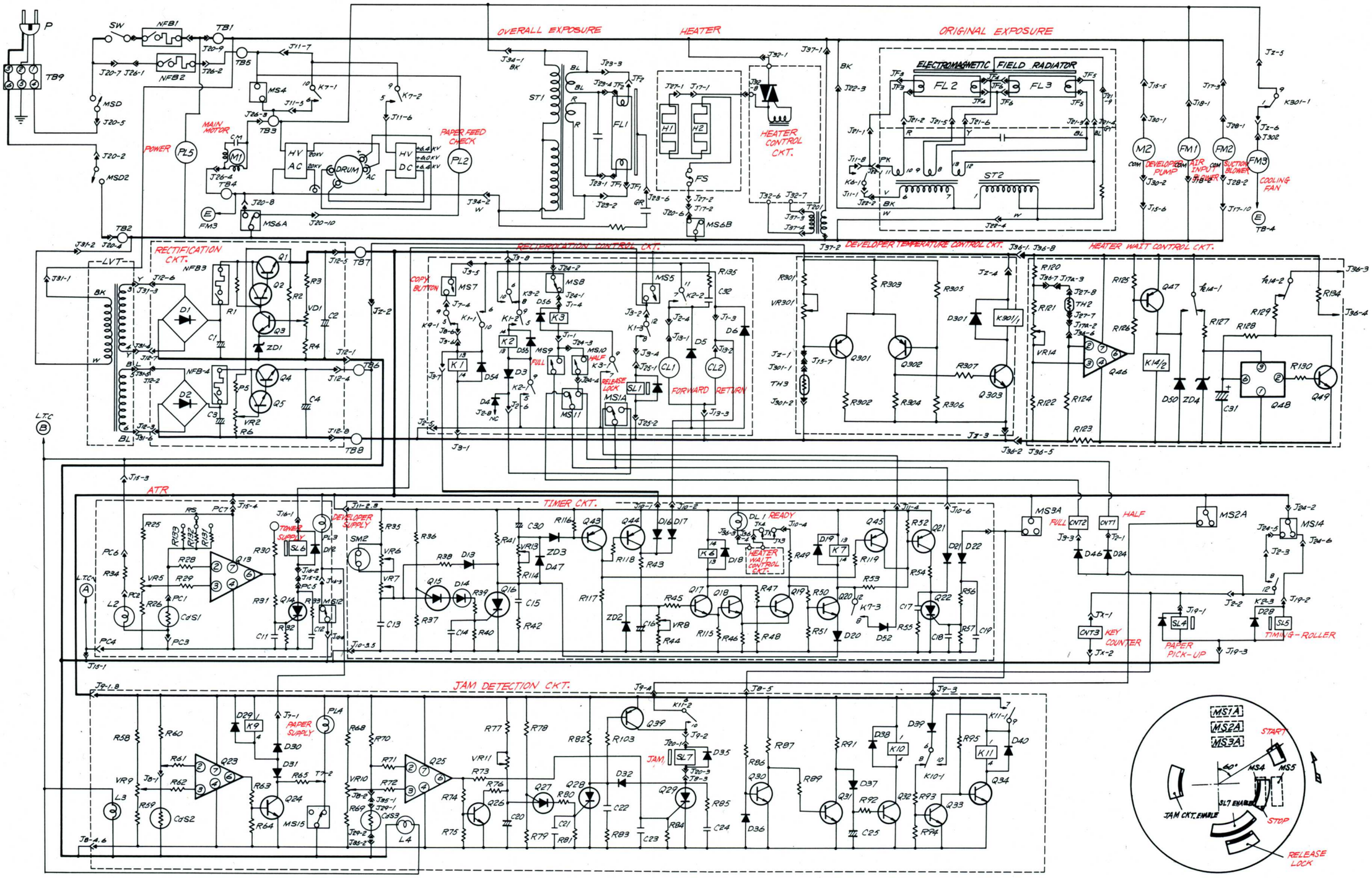
Second Printing-June, 1974

NP-70



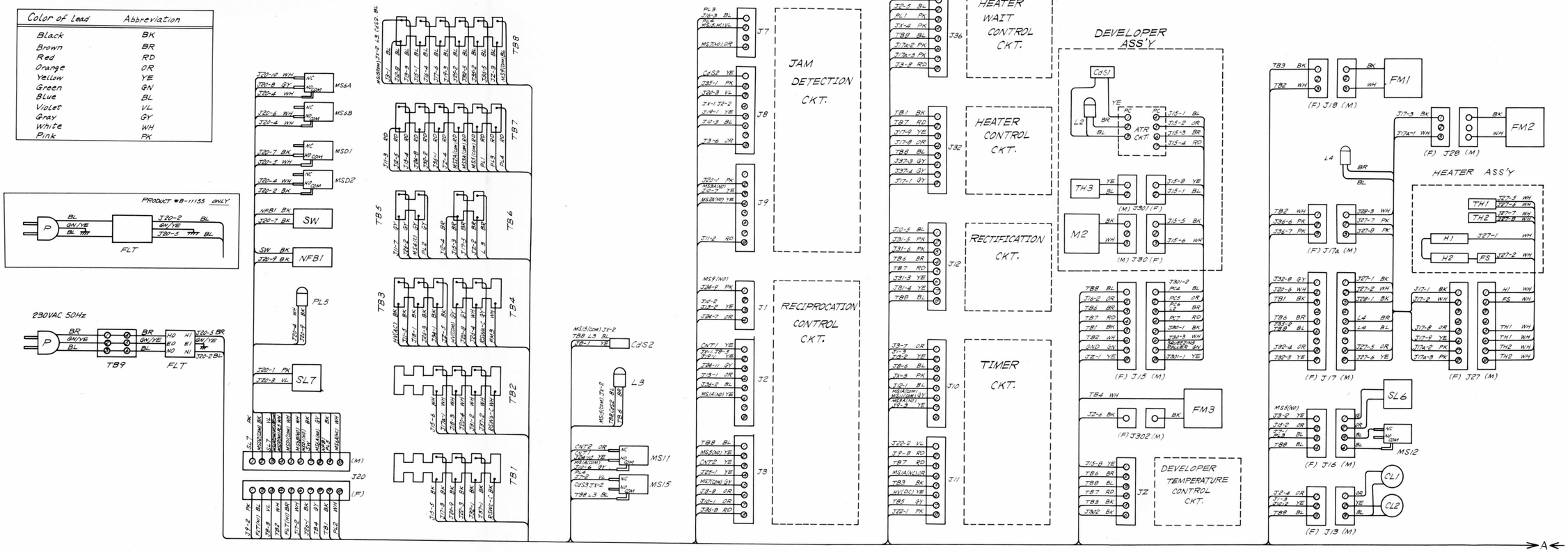
Photocopier Schematic Diagram,
Prod. No. 8-11156/57

Second Printing-June, 1974



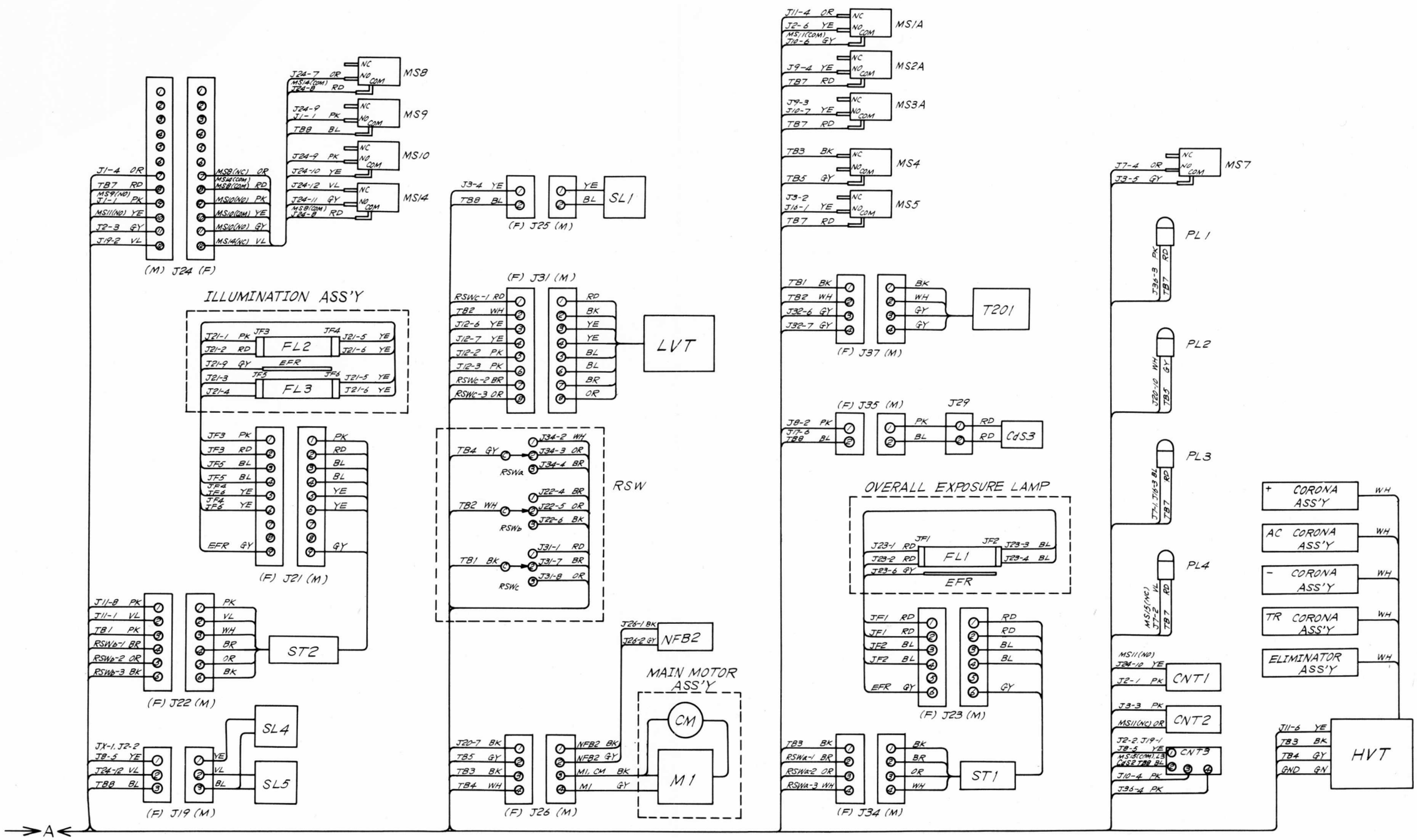
Photocopier Schematic Diagram,
Prod. No. 8-11158/84

Second Printing-June, 1974



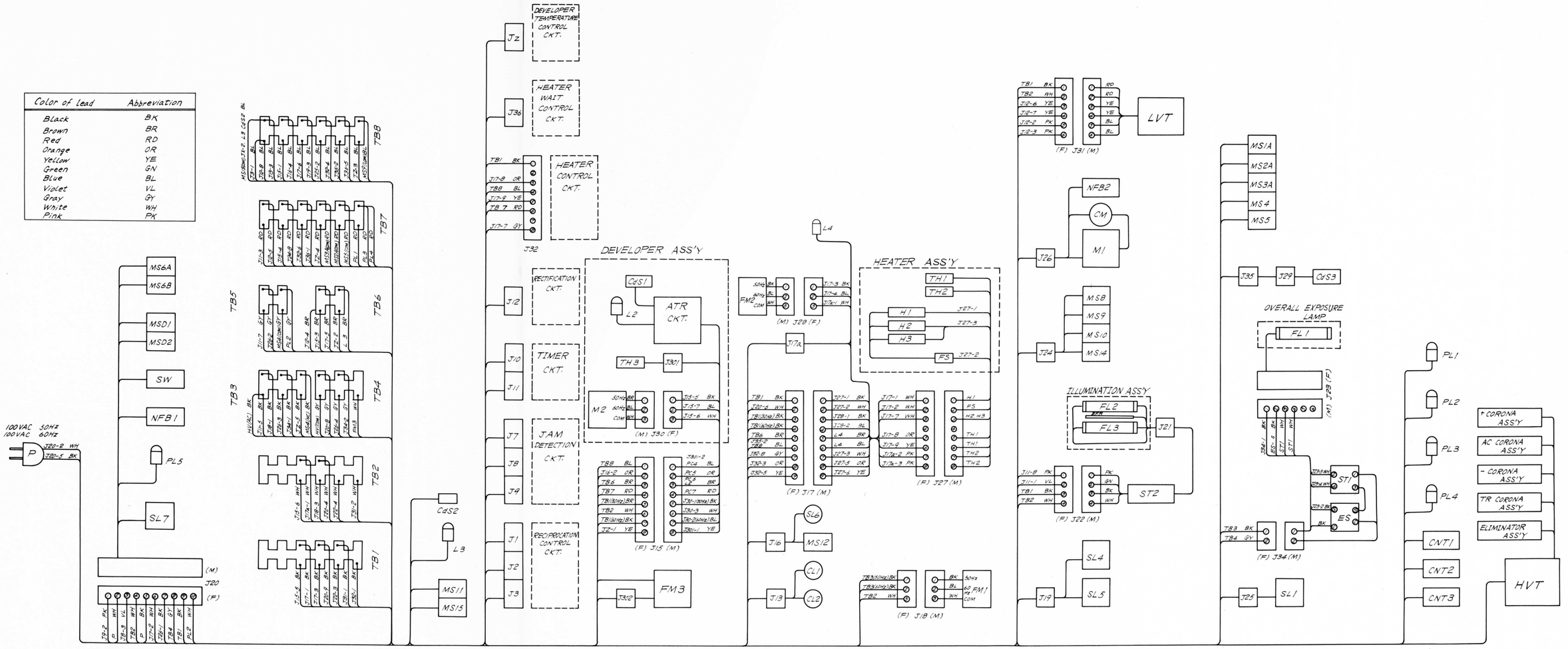
Photocopier Wiring Diagram,
Prod. No. 8-11154/55 (1 of 2)

Second Printing-June, 1974



Photocopier Wiring Diagram,
Prod. No. 8-11154/55 (2 of 2)

Second Printing-June, 1974



Photocopier Wiring Diagram,
Prod. No. 8-11156/57

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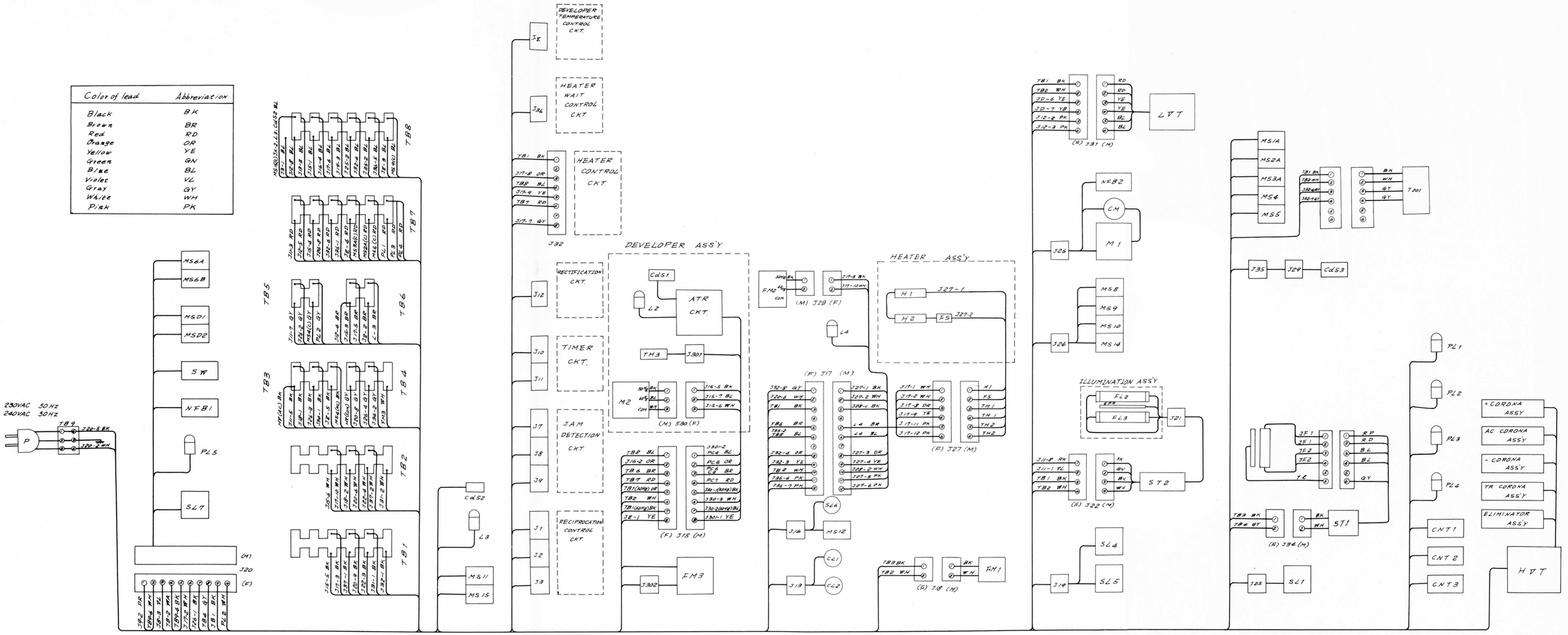
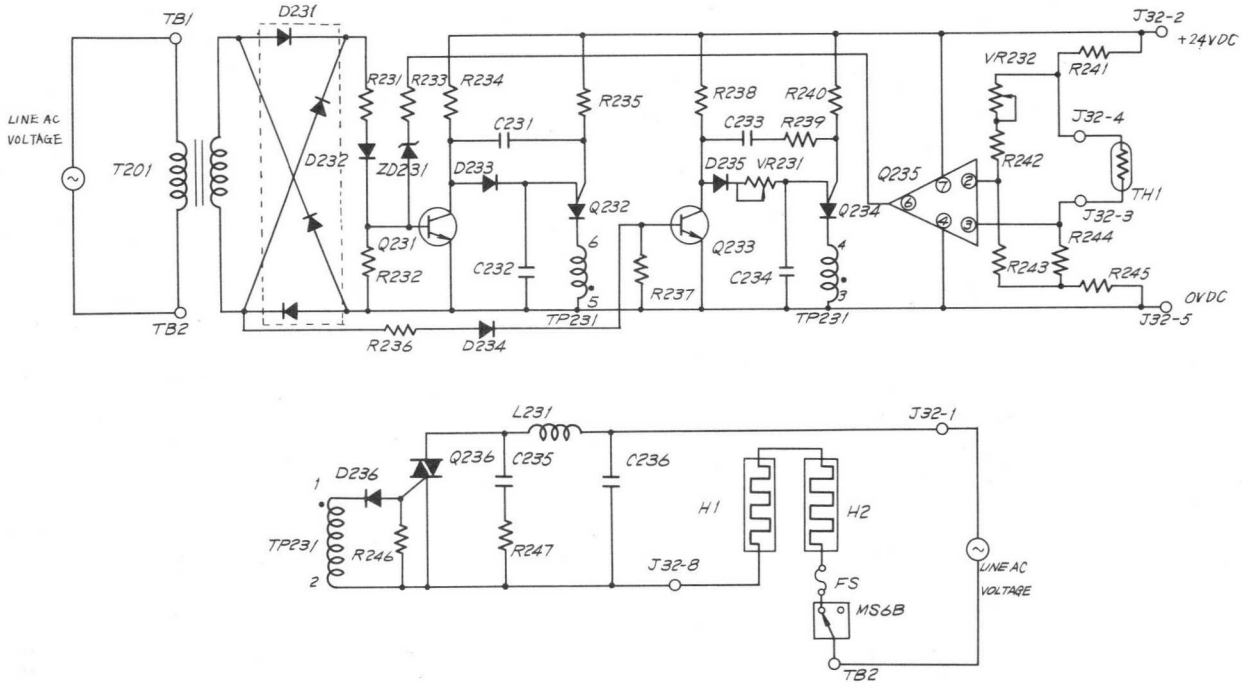
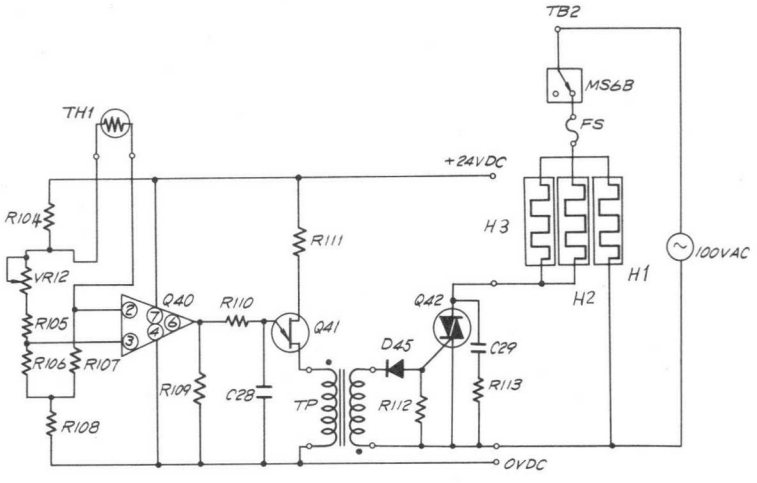


Photocopier Wiring Diagram,
Prod. No. 8-11158/84

Second Printing-June, 1974



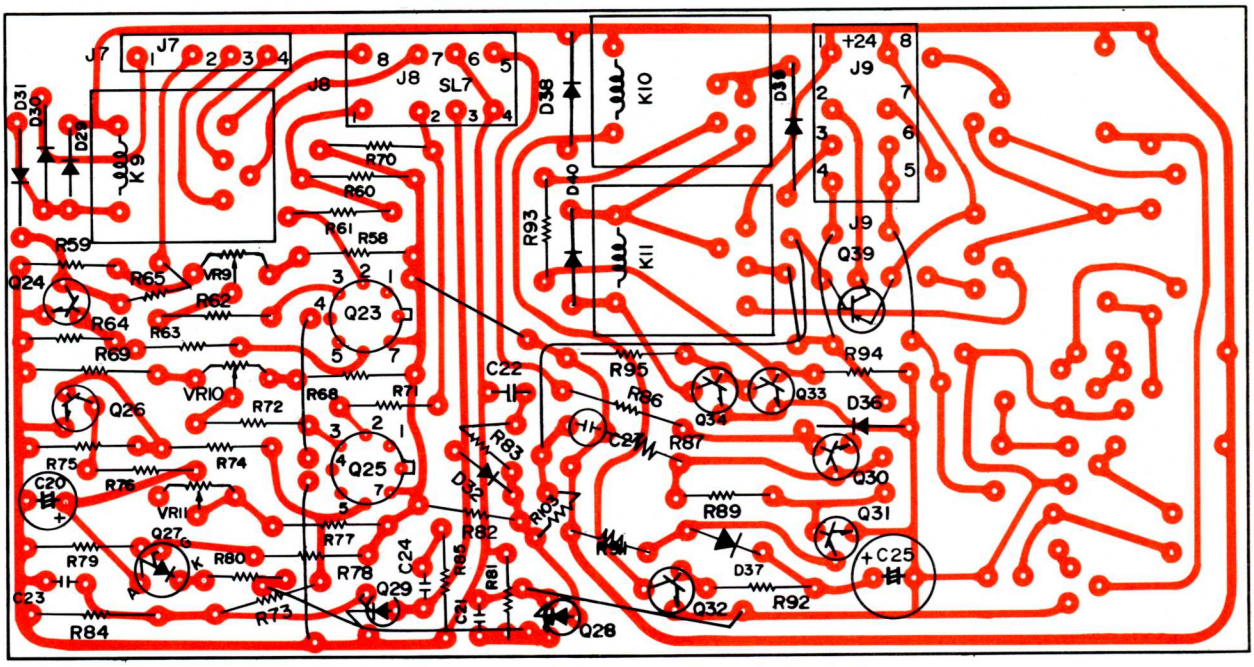
Heater Control Circuit - Zero Cross



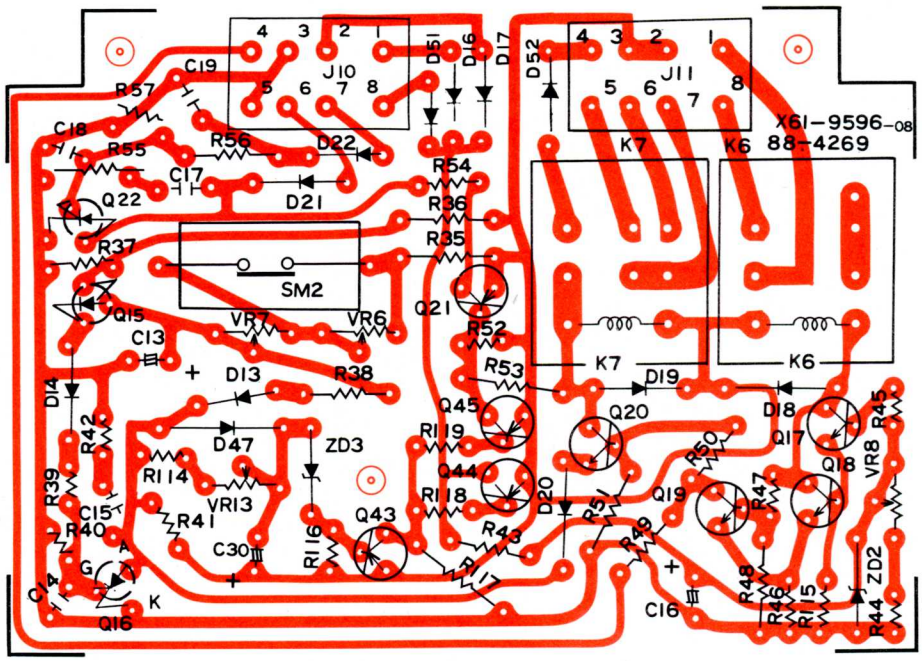
Heater Control Circuit - 100VAC

Heater Control Circuit Schematic Diagrams

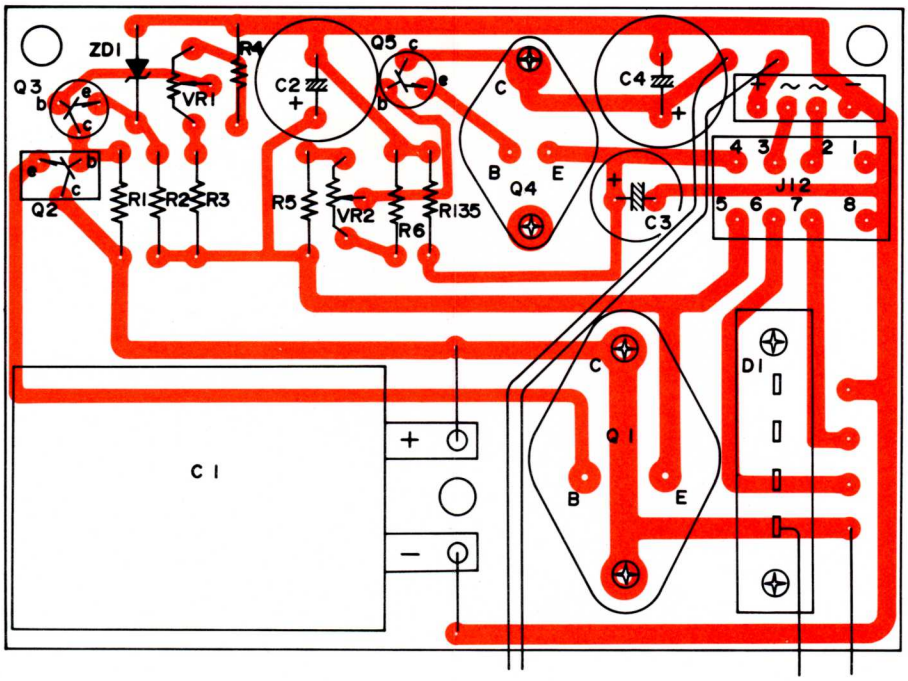
Second Printing-June, 1974



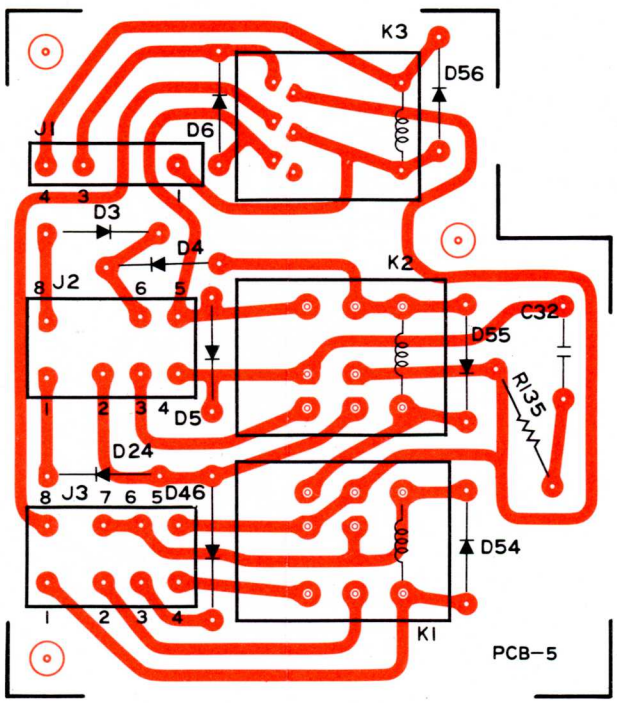
Jam Detection Circuit
(P. C. Assembly 1)



Timer Circuit
(P. C. Assembly 2)

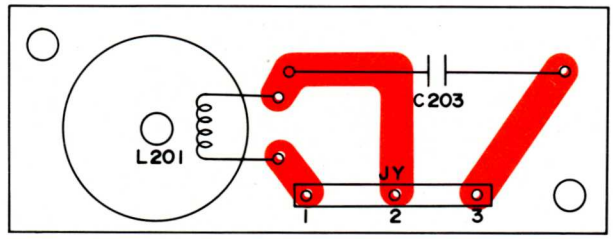


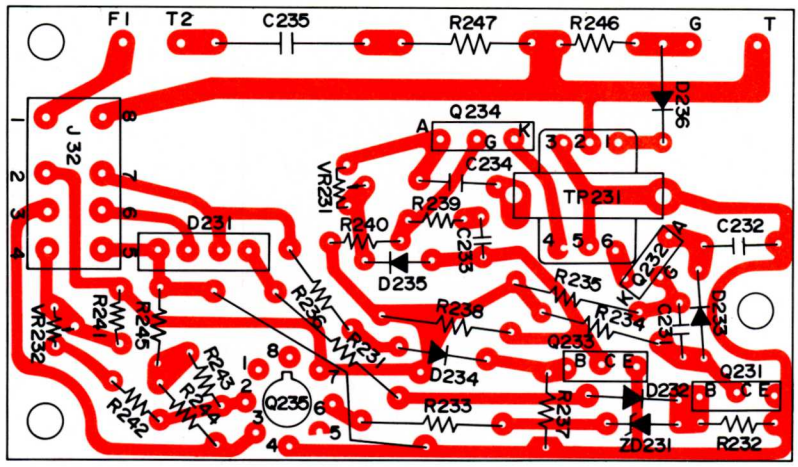
Rectification Circuit
(P. C. Assembly 3)



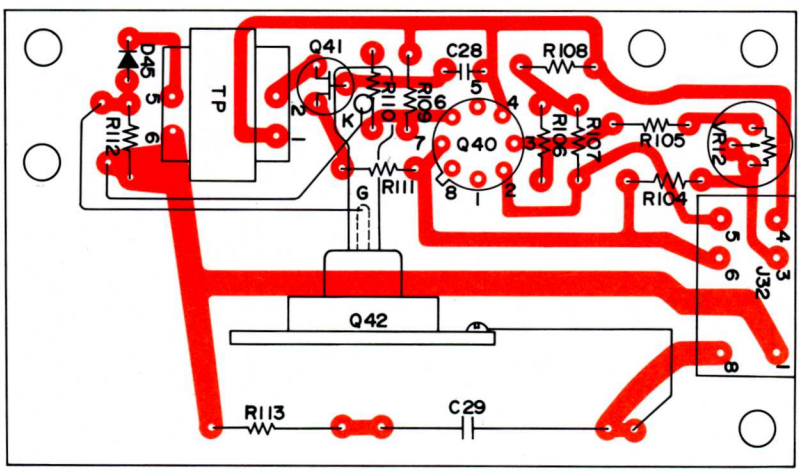
Reciprocation Control Circuit
(P. C. Assembly 4)

Second Printing-June, 1974

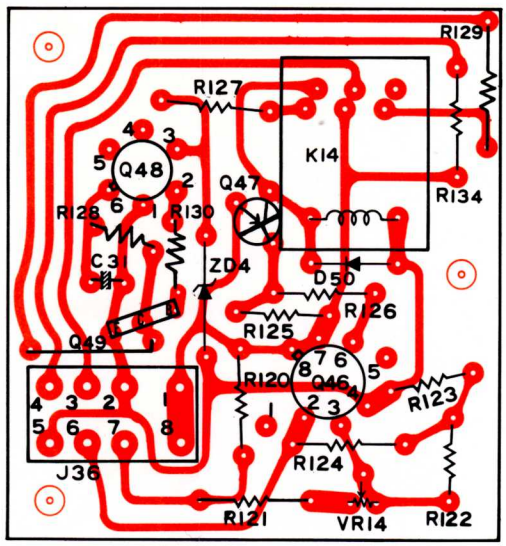




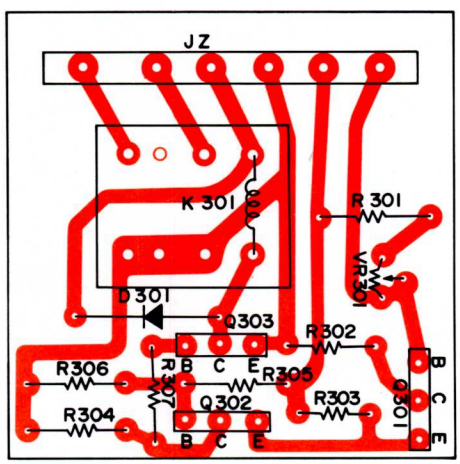
Heater Control Circuit - "Zero-Cross"
(P. C. Assembly 5)



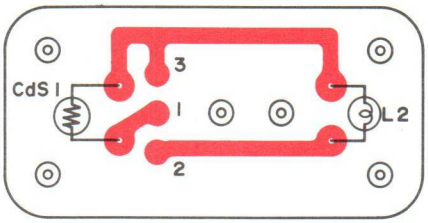
Heater Control Circuit - 100VAC Only
(P. C. Assembly 5)

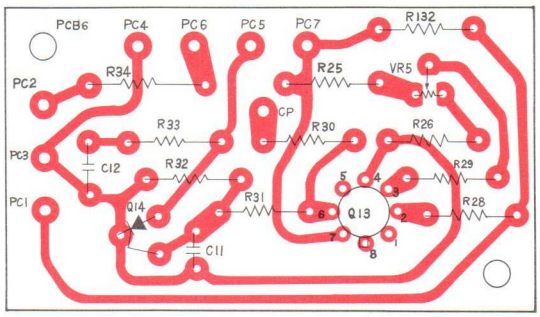


Heater Wait Control Circuit
(P. C. Assembly 6)



Developer Temperature Control Circuit
(Machine Cooling Fan Assembly)





A. T. R. Circuit
(A. T. R. Subassembly)

Printed-Circuit Board Layouts (3 of 3)

Second Printing-June, 1974

Parts List - Copier Common Components

Item	P/N	Description	
C1	X63-3148	Capacitor, electrolytic	2200μF/50V
C2	X63-3240	Capacitor, electrolytic	470μF/35V
C3	X63-3241	Capacitor, electrolytic	1000μF/15V
C4	X63-3242	Capacitor, electrolytic	470μF/10V
C11	X63-1011	Capacitor, polyester-film	0.047μF/50V
C12	X62-8760	Capacitor, polyester-film	0.1μF/50V
C13	X63-3246	Capacitor, electrolytic	470μF/10V
C14	X63-1011	Capacitor, polyester-film	0.047μF/50v
C15	X62-8760	Capacitor, polyester-film	0.1μF/50V
C16	X63-3243	Capacitor, electrolytic	100μF/10V
C17	X62-8760	Capacitor, polyester-film	0.1μF/50V
C18	X63-1011	Capacitor, polyester-film	0.04μF/50V
C19	X63-8760	Capacitor, polyester-film	0.1μF/50V
C20	X63-3243	Capacitor, electrolytic	100μF/10V
C21	X63-1011	Capacitor, polyester-film	0.047μF/50V
C22	X62-8710	Capacitor, polyester-film	0.1μF/50V
C23	X63-1011	Capacitor, polyester-film	0.047μF50V
C24	X62-8760	Capacitor, polyester-film	0.1μF/50V
C25	X63-3244	Capacitor, electrolytic	10μF/50V
C30	X63-3246	Capacitor, electrolytic	470μF/10V
C31	X63-3243	Capacitor, electrolytic	100μF/10V
C32	X62-8760	Capacitor, polyester-film	0.1μF/50V
CdS1	X63-4402	Photocell, CdS	
CdS2	X62-4402	Photocell, CdS	
CdS3	X62-4402	Photocell, CdS	
CL1	X61-1580	Clutch, forward driving	
CL2	X61-1581	Clutch, return driving	
CNT1	X62-1077	Counter (half-size sheets copied)	
CNT2	X62-1077	Counter (full-size sheets copied)	
CNT3	8-11551	Counter (key counter)	
D1	X65-5147	Rectifier, full-wave bridge	5B4
D2	X65-5104	Rectifier, full-wave bridge	BS61
D3	X65-5256	Diode, silicon	1S2095
D4	X65-5256	Diode, silicon	1S2095
D5	X65-5054	Diode, silicon	1S1941
D6	X65-5054	Diode, silicon	1S1941
D12	X65-5054	Diode, silicon	1S1941
D13	X65-5256	Diode, silicon	1S2095
D14	X62-7422	Semiconductor Device, varistor	SV04
D16	X65-5256	Diode, silicon	1S2095
D17	X65-5256	Diode, silicon	1S2095
D18	X65-5054	Diode, silicon	1S1941
D19	X65-5054	Diode, silicon	1S1941
D20	X65-5256	Diode, silicon	1S2095
D21	X65-5054	Diode, silicon	1S1941
D22	X65-5256	Diode, silicon	1S2095

Item	P/N	Description	
D24	X65-5054	Diode, silicon	1S1941
D27	X65-5054	Diode, silicon	1S1941
D28	X65-5054	Diode, silicon	1S1941
D29	X65-5054	Diode, silicon	1S1941
D30	X65-5256	Diode, silicon	1S2095
D31	X65-5256	Diode, silicon	1S2095
D32	X65-5256	Diode, silicon	1S2095
D35	X65-5054	Diode, silicon	1S1941
D36	X65-5256	Diode, silicon	1S2095
D37	X65-5256	Diode, silicon	1S2095
D38	X65-5054	Diode, silicon	1S1941
D39	X65-5256	Diode, silicon	1S2095
D40	X65-5054	Diode, silicon	1S1941
D45	X65-5054	Diode, silicon	1S1941
D46	X65-5054	Diode, silicon	1S1941
D47	X65-5256	Diode, silicon	1S2095
D48	X65-5054	Diode, silicon	1S1941
D50	X65-5054	Diode, silicon	1S1941
D52	X65-5256	Diode, silicon	1S2095
D54	X65-5054	Diode, silicon	1S1941
D55	X65-5054	Diode, silicon	1S1941
D56	X65-5054	Diode, silicon	1S1941
D301	X65-5054	Diode, silicon	1S1941
FL1	X62-7517	Lamp, fluorescent	10W
FL2	X61-7134	Lamp, exposure	25W
FL3	X61-7134	Lamp, exposure	25W
FS	X62-0803	Fuse, temperature sensitive	150°C-OFF
K1	X62-1189	Relay, enclosed plug-in	
K2	X62-1189	Relay, enclosed plug-in	
K3	X62-1188	Relay, enclosed plug-in	
K6	X62-1182	Relay, enclosed plug-in	
K7	X62-1189	Relay, enclosed plug in	
K9	X62-1188	Relay, enclosed plug-in	
K10	X62-1188	Relay, enclosed plug-in	
K11	X62-1188	Relay, enclosed plug-in	
K14	X62-1183	Relay, enclosed plug-in	
K301	X62-1182	Relay, enclosed plug-in	
L2	X62-7586	Lamp, incandescent	5VDC
L3	X62-7567	Lamp, incandescent	6.3VDC
L4	X62-7567	Lamp, incandescent	6.3VDC
MSD1	X62-0804	Microswitch, snap-action	A-20GV-A
MSD2	X62-0804	Microswitch, snap-action	A-20GV-A
MS1A	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS2A	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS3A	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS4	X62-0806	Microswitch, snap-action	V10FL22-1C28

Item	P/N	Description	
MS5	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS6A	X62-0805	Microswitch, snap-action	V15FL-1A
MS6B	X62-0805	Microswitch, snap-action	V15FL-1A
MS7	X62-0584	Microswitch, snap-action	V10-1C28
MS8	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS9	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS10	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS11	X62-0807	Microswitch, snap-action	V10FL13-1C28
MS12	X62-0537	Microswitch, snap-action	C5G3
MS14	X62-0806	Microswitch, snap-action	V10FL22-1C28
MS15	X62-0807	Microswitch, snap-action	V10FL13-1C28
NFB3	X62-1048	Circuit-Breaker, plunger reset	125VAC 2A
NFB4	X62-1074	Circuit-Breaker, plunger reset	250VAC 1A
PL1	X62-7569	Lamp, pilot (yellow)	24VDC
PL3	X62-7568	Lamp, pilot (orange)	24VDC
PL4	X62-7568	Lamp, pilot (orange)	24VDC
Q1	X65-6208	Transistor, NPN	2SD212
Q2	X65-6205	Transistor, NPN	2SC1061
Q3	X65-6102	Transistor, NPN	2SC371
Q4	X65-6207	Transistor, NPN	2SC236
Q5	X65-6206	Transistor, NPN	2SC509
Q13	X65-7104	Semiconductor Device, IC	TA7504M
Q14	X65-6139	Semiconductor Device, SCR	CR02AM
Q15	X65-6204	Semiconductor Device, PUT	N13T1
Q16	X65-6139	Semiconductor Device, SCR	CR02AM
Q17	X65-6243	Transistor, NPN	2SC372Y
Q18	X65-6243	Transistor, NPN	2SC372Y
Q19	X65-6206	Transistor, NPN	2SC509
Q20	X65-6102	Transistor, NPN	2SC371
Q21	X65-6143	Transistor, PNP	2SA673
Q22	X65-6139	Semiconductor Device, SCR	CR02AM
Q23	X65-7104	Semiconductor Device, IC	TA7504M
Q24	X65-6206	Transistor, NPN	2SC509
Q25	X65-7104	Semiconductor Device, IC	TA7504M
Q26	X65-6102	Transistor, NPN	2SC371
Q27	X65-6204	Semiconductor Device, PUT	N13T1
Q28	X65-6139	Semiconductor Device, SCR	CR02AM
Q29	X65-6139	Semiconductor Device, SCR	CR02AM
Q30	X65-6102	Transistor, NPN	2SC371
Q31	X65-6102	Transistor, NPN	2SC371
Q32	X65-6102	Transistor, NPN	2SC371
Q33	X65-6102	Transistor, NPN	2SC371
Q34	X65-6102	Transistor, NPN	2SC371
Q39	X61-6143	Transistor, PNP	2SA673
Q43	X61-6143	Transistor, PNP	2SA673
Q44	X61-6143	Transistor, PNP	2SA673

Item	P/N	Description	
Q45	X61-6143	Transistor, PNP	2SA673
Q46	X65-7104	Semiconductor Device, IC	TA7504M
Q47	X65-6143	Transistor, PNP	2SA673
Q48	X65-7172	Semiconductor Device, IC	LB1291
Q49	X65-6206	Transistor, NPN	2SC509
Q301	X65-6143	Transistor, PNP	2SA673
Q302	X65-6143	Transistor, PNP	2SA673
Q303	X65-6206	Transistor, NPN	2SC509
R1	X64-7392	Resistor, carbon-film	5.6kΩ1/4W
R2	X64-0387	Resistor, carbon-film	1.5kΩ1/4W
R3	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R4	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R5	X64-0960	Resistor, carbon-film	2.7kΩ1/4W
R6	X64-1284	Resistor, carbon-film	270Ω1/4W
R25	X64-0386	Resistor, carbon-film	1kΩ1/4W
R26	X64-0386	Resistor, carbon-film	1kΩ1/4W
R28	X64-0470	Resistor, carbon-film	10kΩ1/4W
R29	X64-0470	Resistor, carbon-film	10kΩ1/4W
R30	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R31	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R32	X64-0278	Resistor, carbon-film	680Ω1/2W
R33	X64-3105	Resistor, carbon-film	20Ω1/2W
R34	X64-3105	Resistor, carbon-film	20Ω1/2W
R35	X64-0470	Resistor, carbon-film	10kΩ1/4W
R36	X64-0473	Resistor, carbon-film	33kΩ1/4W
R37	X64-0470	Resistor, carbon-film	10kΩ1/4W
R38	X64-0265	Resistor, carbon-film	100Ω1/4W
R39	X64-0265	Resistor, carbon-film	100Ω1/4W
R40	X64-0266	Resistor, carbon-film	220Ω1/4W
R41	X64-1206	Resistor, wire-wound	500Ω2W
R42	X64-3105	Resistor, carbon-film	20Ω1/2W
R43	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R44	X64-0470	Resistor, carbon-film	10kΩ1/4W
R45	X64-0932	Resistor, carbon-film	100kΩ1/4W
R46	X64-3165	Resistor, carbon-film	20Ω1/2W
R46	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R48	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R49	X64-2224	Resistor, carbon composition	100Ω1W
R50	X64-2337	Resistor, carbon composition	1kΩ1W
R51	X64-0269	Resistor, carbon-film	330Ω1/4W
R52	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R53	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R54	X64-1206	Resistor, wire-wound	500Ω2W
R55	X64-3105	Resistor, carbon-film	20Ω1/2W
R56	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R57	X64-0278	Resistor, carbon-film	680Ω1/4W

Item	P/N	Description	
R58	X64-6386	Resistor, carbon-film	1kΩ1/4W
R59	X64-6386	Resistor, carbon-film	1kΩ1/4W
R60	X64-0391	Resistor, carbon-film	3.9kΩ1/4W
R61	X64-0470	Resistor, carbon-film	10kΩ 1/4W
R62	X64-0470	Resistor, carbon-film	10k Ω1/4W
R63	X64-0470	Resistor, carbon-film	10kΩ1/4W
R64	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R65	X64-0789	Resistor, carbon-film	51Ω1/2W
R68	X64-0386	Resistor, carbon-film	1kΩ1/4W
R69	X64-0386	Resistor, carbon-film	1kΩ1/4W
R70	X64-0391	Resistor, carbon-film	3.9kΩ1/4W
R71	X64-0470	Resistor, carbon-silm	10kΩ1/4W
R72	X64-0470	Resistor, carbon-film	10kΩ1/4W
R73	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R74	X64-0470	Resistor, carbon-film	10kΩ1/4W
R75	X64-0744	Resistor, carbon-film	2.2kΩ1/4W
R76	X64-0265	Resistor, carbon-film	100Ω1/4W
R77	X64-0470	Resistor, carbon-film	10kΩ1/4W
R78	X64-0473	Resistor, carbon-film	3.3kΩ1/4W
R79	X64-0470	Resistor, carbon-film	10kΩ1/4W
R80	X64-0266	Resistor, carbon-film	220Ω1/4W
R81	X64-0278	Resistor, carbon-film	680Ω1/4W
R82	X64-0776	Resistor, carbon-film	3.3kΩ1/4W
R83	X64-3105	Resistor, carbon-film	20Ω1/2W
R84	X64-0278	Resistor, carbon-film	680 Ω1/4W
R85	X64-3105	Resistor, carbon-film	20Ω1/2W
R86	X64-0473	Resistor, carbon-film	3.3kΩ1/4W
R87	X64-0470	Resistor, carbon-film	10kΩ1/4W
R89	X64-0472	Resistor, carbon-film	22kΩ1/4W
R91	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R92	X64-0472	Resistor, carbon-film	22kΩ1/4W
R93	X64-0472	Resistor, carbon-film	22kΩ1/4W
R94	X64-0470	Resistor, carbon-film	10kΩ1/4W
R95	X64-0472	Resistor, carbon-film	22kΩ1/4W
R103	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R114	X64-0470	Resisjor, carbon-film	10kΩ1/4W
R115	X64-0470	Resistor, carbon-film	10kΩ1/4W
R116	X64-0932	Resistor, carbon-film	100kΩ1/4W
R117	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R118	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R119	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R120	X64-0472	Resistor, carbon-film	22kΩ1/4W
R121	X64-0974	Resistor, carbon-film	3.9kΩ1/4W
R122	X64-0975	Resistor, carbon-film	5.1kΩ1/4W
R123	X64-0472	Resistor, carbon-film	22kΩ1/4W
R124	X64-0975	Resistor, carbon-film	5.1kΩ1/4W

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Item	P/N	Description	
R125	X64-0739	Resistor, carbon-film	3.3kΩ1/4W
R126	X64-0472	Resistor, carbon-film	22kΩ1/4W
R127	X64-0919	Resistor, carbon-film	1.2kΩ1/4W
R128	X64-0413	Resistor, carbon-film	47kΩ1/4W
R129	X64-2224	Resistor, carbon composition	100Ω1W
R130	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R134	X64-0331	Resistor, carbon-film	1kΩ1/2W
R135	X64-0265	Resistor, carbon-film	100Ω1/4W
R301	X64-0303	Resistor, carbon-film	3kΩ1/4W
R302	X64-0278	Resistor, carbon-film	680Ω1/4W
R303	X64-0386	Resistor, carbon-film	1kΩ1/4W
R304	X64-0975	Resistor, carbon-film	5.1kΩ1/4W
R305	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R306	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R307	X64-0278	Resistor, carbon-film	680Ω1/4W
SL1	X62-1241	Solenoid, D.C.	DS128
SL4	X62-1240	Solenoid, D.C.	DS08
SL5	X62-1240	Solenoid, D.C.	DS08
SL6	X62-1239	Solenoid, D.C.	DS10B
SL7	X62-1240	Solenoid, D.C.	DS08
SM2	X62-0824	Switch, thermostatic	15°C-ON
TH2	X62-7427	Thermistor, probe-type	
TH3	X62-7431	Thermistor, probe-type	
VR1	X64-4349	Resistor, variable	2kΩ
VR2	X64-4348	Resistor, variable	1kΩ
VR5	X64-2447	Resistor, variable	10kΩ
VR6	X64-4606	Resistor, variable	1MΩ
VR7	X64-4522	Resistor, variable	100kΩ
VR8	X64-4522	Resistor, variable	100kΩ
VR9	X64-4477	Resistor, variable	10kΩ
VR10	X64-4477	Resistor, variable	10kΩ
VR11	X64-4606	Resistor, variable	1MΩ
VR13	X64-4522	Resistor, variable	100kΩ
VR14	X64-2447	Resistor, variable	10kΩ
VR301	X64-2447	Resistor, variable	10kΩ
ZD1	X65-5525	Diode, zener	
ZD2	X65-5004	Diode, zener	
ZD3	X65-9005	Diode, zener	
ZD4	X65-5525	Diode, zener	

Parts List - Product Number Distinctive Components

Item	P/N	Description	
		Prod. No.8-11154/55/58 * 8-11154 only ** 8-11155 only *** 8-11154/58 only	
* FLT	X62-9553	Filter Unit, low-pass	250VAC 15A
** FLT	X62-9568	Filter Unit, low-pass	250VAC 6A
FM1	X61-2164	Motor, blade drum drive	
FM2	X61-2164	Motor, blade drum drive	
FM3	X61-2163	Motor, cooling fan	
H1	X61-7153	Element, heating	54VAC 200W
H2	X61-7154	Element, heating	176VAC 650W
HV (AC)	X61-1306	Transformer, high voltage	
HV (DC)	X61-1306	Transformer, high voltage	
LVT	X61-1307	Transformer, low voltage	
M1	X61-2166	Motor, copier main drive	
M2	X61-2165	Motor, developer pump	
NFB1	X62-1073	Circuit Breaker, plunger reset	250VAC 8A
NFB2	X62-1074	Circuit Breaker, plunger reset	250VAC 1A
*** P	X61-9021	Plug & Cord, input voltage	250VAC 12A
** P	X62-9701	Plug & Cord, input voltage	250VAC 10A
PL2	X62-7508	Lamp, pilot (red)	250VAC
PL5	X62-7509	Lamp, pilot (orange)	250VAC
ST1	X61-1304	Stabilizer, voltage	
ST2	X61-1305	Stabilizer, voltage	
T201	X61-1308	Transformer, pulse	
		Prod. No.8-11156/57	
ES	X62-1528	Starter, fluorescent lamp	
FM1	X61-2138	Motor, blade drum drive	
FM2	X61-2138	Motor, blade drum drive	
FM3	X61-2048	Motor, cooling fan	
H1	X61-7148	Element, heating	100VAC 250W
H2	X61-7148	Element, heating	100VAC 600W
H3	X61-7147	Element, heating	100VAC 200W
HV(AC)	X61-1578	Transformer, high voltage	
HV(DC)	X61-1578	Transformer, high voltage	
LVT	X61-1584	Transformer, low voltage	
M1	X62-2531	Motor, copier main drive	
M2	X61-2153	Motor, developer pump	
NFB1	X62-1044	Circuit Breaker, plunger reset	125VAC 15A
NFB2	X62-1048	Circuit Breaker, plunger reset	125VAC 2A
P	X61-9019	Plug & Cord, input voltage	125VAC 15A
PL2	X62-7505	Lamp, pilot (red)	
PL5	X62-7506	Lamp, pilot (orange)	
ST1	X62-1526	Stabilizer, voltage	
ST2	X61-1582	Stabilizer, voltage	

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Item	P/N	Description	
		Prod. No.8-11184	
FM1	X61-2183	Motor, blade drum drive	
FM2	X61-2183	Motor, blade drum drive	
FM3	X61-2186	Motor, cooling fan	
H1	X61-7161	Element, heating	56VAC 200W
H2	X61-7165	Element, heating	184VAC 650W
HV(AC)	X61-1340	Transformer, high voltage	
HV(DC)	X61-1340	Transformer, high voltage	
LVT	X61-1308	Transformer, low voltage	
M1	X61-2177	Motor, copier main drive	
M2	X61-2180	Motor, developer pump	
NFB1	X61-1073	Circuit Breaker, plunger reset	250VAC 8A
NFB2	X62-1074	Circuit Breaker, plunger reset	250VAC 1A
P	X61-9139	Plug & Cord, input voltage	250VAC 10A
PL2	X62-7508	Lamp, pilot (red)	250VAC
PL5	X62-7509	Lamp, pilot (orange)	250VAC
ST1	X61-1304	Stabilizer, voltage	
ST2	X61-1305	Stabilizer, voltage	
T201	X61-1337	Transformer, pulse	

Parts List - Heater Control Circuits

Item	P/N	Description	
		Heater Control Zero-Cross Circuits	
C231	X62-8789	Capacitor, metalized paper	0.01μF 50V
C232	X62-8760	Capacitor, polyester film	0.1μF 50V
C233	X62-8789	Capacitor, metalized paper	0.01μF 50V
C234	X62-8760	Capacitor, polyester film	0.1μF 50V
C235	X62-8238	Capacitor, metalized paper	0.1μF 250V
C236	X62-8238	Capacitor, metalized paper	0.1μF 250V
D231	X65-5104	Rectifier, full-wave bridge	
D232	X65-5256	Diode, silicon	IS2095
D233	X65-5256	Diode, silicon	IS2095
D234	X65-5256	Diode, silicon	IS2095
D235	X65-5256	Diode, silicon	IS2095
D236	X65-5054	Diode, silicon	IS1941
L231	X62-1715	Coil, low-pass filter	
Q231	X65-6102	Transistor, NPN	2SC371
Q232	X65-6204	Semiconductor Device, PUT	N13T1
Q233	X65-6102	Transistor, NPN	2SC371
Q234	X65-6204	Semiconductor Device, PUT	N13T1
Q235	X65-7104	Semiconductor Device, IC	TA7504M
Q236	X65-6265	Semiconductor Device, triac	BCR16B-10R
R231	X64-0425	Resistor, carbon-film	15kΩ1/4W
R232	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R233	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R234	X64-0360	Resistor, carbon film	1kΩ1/2W
R235	X64-0470	Resistor, carbon film	10kΩ1/4W
R236	X64-0425	Resistor, carbon film	15kΩ1/4W
R237	X64-0392	Resistor, carbon film	5.6kΩ1/4W
R238	X64-0360	Resistor, carbon film	1kΩ1/2W
R239	X64-0425	Resistor, carbon film	15kΩ1/4W
R240	X64-0470	Resistor, carbon film	10kΩ1/4W
R241	X64-0472	Resistor, carbon film	22kΩ1/4W
R242	X64-0975	Resistor, carbon film	5.1kΩ1/4W
R243	X64-0975	Resistor, carbon film	5.1kΩ1/4W
R244	X64-0975	Resistor, carbon film	5.1kΩ1/4W
R245	X64-0472	Resistor, carbon film	22kΩ1/4W
R246	X64-0775	Resistor, carbon film	560Ω1/4W
R247	X64-3105	Resistor, carbon film	20Ω1/2W
TR231	X61-1309	Transformer, pulse	
VR231	X62-9551	Resistor, variable	300kΩ
VR232	X62-8996	Resistor, variable	2kΩ
ZD231	X65-9005	Diode, zener	6.8V
		Heater Control Circuit - 100VAC only	
C28	X62-8760	Capacitor, polyester-film	0.1μF/50V
C29	X62-8237	Capacitor, metallized paper	0.1μF/250V
D45	X65-5054	Diode, silicon	1S1941

Item	P/N	Descriprion	
Q40	X65-7104	Semiconductor Device, IC	TA7504M
Q41	X65-6218	Semiconductor Device, UJT	2SH17
Q42	X65-6185	Semiconductor Device, triac	SM30G
R104	X64-0472	Resistor, carbon-film	22kΩ1/4W
R105	X64-0975	Resistor, carbon-film	5.1kΩ1/4W
R106	X64-0975	Resistor, carbon-film	5.1kΩ1/4W
R107	X64-0975	Resistor, carbon-film	5.1kΩ1/4W
R108	X64-0472	Resistor, carbon-film	22kΩ1/4W
R109	X64-0392	Resistor, carbon-film	5.6kΩ1/4W
R110	X64-0472	Resistor, carbon-film	22kΩ1/4W
R111	X64-0776	Resistor, carbon-film	3.3kΩ1/4W
R112	X64-0775	Resistor, carbon-film	560Ω1/4W
R113	X64-3105	Resistor, carbon-film	20Ω1/2W
TH1	X62-8997	Thermistor Probe Unit	
TP	X62-1436	Transformer, pulse	
VR12	X62-8996	Resistor, variable	2kΩ

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