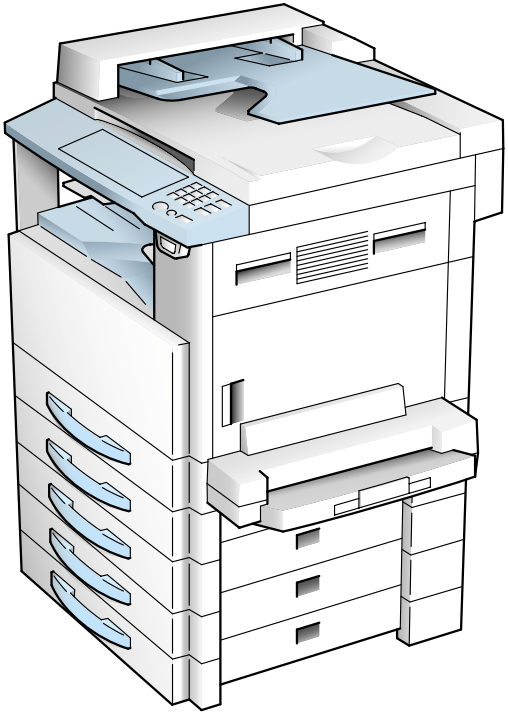
MINOLTA

Service Manual
[General]

The essentials of imaging

Di152/Di183



INDEX (GENERAL)

GENERAL

MECHANICAL/ELECTRICAL

GENERAL

CONTENTS

1. SPECIFICATION G-1
2. PRECAUTIONS FOR INSTALLATION G-5
   2-1. Installation Site G-5
   2-2. Power Source G-5
   2-3. Grounding G-5
3. PRECAUTIONS FOR USE G-6
   3-1. To ensure that the copier is used in an optimum condition G-6
   3-2. Operating Environment G-6
   3-3. Power Requirements G-6
   3-4. Note G-6
4. HANDLING OF CONSUMABLES G-7
5. OTHER PRECAUTIONS G-8
6. SYSTEM OPTIONS G-9

1. SPECIFICATION

TYPE	:	Console/Desktop Type
ORIGINAL SCANNING SYSTEM	:	CCD Line Sensor
PHOTOCONDUCTOR	:	Organic Photoconductor
COPYING SYSTEM	:	Electrostatic Dry Powdered Image Transfer to Plain Paper with a Laser
RESOLUTION	:	600 × 600 dpi
PAPER FEEDING SYSTEM	:	2-way system Manual Bypass...Single Drawer.....250 Sheets
EXPOSURE SYSTEM	:	Mirror Scanning
DEVELOPING SYSTEM	:	MT-HG System
CHARGING SYSTEM	:	Comb Electrode (1) DC Negative Corona with Scorotron System
IMAGE TRANSFER SYSTEM	:	Roller Image Transfer
PAPER SEPARATING SYSTEM	:	Paper Separator Fingers and Charge Neutralizing Plate
FUSING SYSTEM	:	Heat Roller
PAPER DISCHARGING SYSTEM	:	Charge Neutralizing Brush
MAX. ORIGINAL SIZE	:	A3L, 11 × 17

COPY MEDIUM

Paper Source		Drawer	Manual Bypass
Type	Plain Paper (60 to 90 g/m^2)	❍	❍
	Transparencies	❍	❍
	Thick Paper (91 to 157 g/m^2)	❍	❍
	Postcards	❍	❍
	Recycled Paper (60 to 90 g/m^2)	❍	❍
Dimensions	Maximum (Width × Length)	297 × 432 mm	297 × 432 mm
	Minimum (Width × Length)	90 × 140 mm	90 × 140 mm

MULTIPLE COPIES	:	1 to 99
WARMING-UP TIME	:	30 sec. or less (23, Rated Voltage)
FIRST COPY TIME	:	7 sec. or less (A4C, Drawer, full size mode)

CONTINUOUS COPY SPEED (copies/min)

Size	Speed	
	Di152	Di183
A4C	15	18
A4L	12	14
A3L	9	10
B4L	10	12
B5C	16	20
B5L	13	15
8-1/2 × 11C	15	18
8-1/2 × 11L	12	14
11 × 17L	9	10
8-1/2 × 14L	10	12
11 × 14	10	12

ZOOM RATIOS

		Metric	Inch
Fixed	Full Size	100 %	100 %
	Enlargement	200 % 141 % 115 %	200 % 129 % 121 %
	Reduction	81 % 70 % 50 %	78 % 64 % 50 %
Variable	50 % to 200 % (in 1 % increments)		

LENS : Through Lens
EXPOSURE LAMP : Fluorescent Lamp

POWER/CURRENT CONSUMPTION (copier only)

Exposure Lamp (Rating)	Fusing Roller Heater Lamp (Rating)	Max. Power Consumption (full system)	Max. Current Consumption (full system)
24 V 14.4 W	900 W	110 V: 970 W 120 V: 1090 W 127 V: 1180 W 220 V: 990 W 230 V: 1050 W 240 V: 1120 W	110 V: 8.9 A 120 V: 9.1 A 127 V: 9.3 A 220 V: 4.5 A 230 V: 4.6 A 240 V: 4.7 A

POWER REQUIREMENTS : 110 V, 120 V, 127 V, 220 V to 240 V, 50/60 Hz

ENVIRONMENTAL CONDITIONS

Temperature	10 to 30 °C with a fluctuation of 10 °C or less per hour
Humidity	15 to 85 % RH with a fluctuation of 10 % RH or less per hour
Ambient Illumination	3,000 lux or less
Levelness	1° (1.75 mm/100 mm)

COPIER DIMENSION : W...590 mm (23-1/4)
D....611 mm (24)
H....487 mm (19-1/4)
COPIER WEIGHT : 39 kg (86 lb)

Multiple Bypass (MB-5): option

TYPE	:	Multiple Bypass
INSTALLATION	:	Mounted on the copier

COPY PAPER TYPE

Type	Plain Paper (60 to 90 g/m^2)	50 sheets
	Transparencies	20 sheets
	Thick Paper (91 to 157 g/m^2)	20 sheets
	Postcards	20 sheets
	Recycled Paper (60 to 90 g/m^2)	50 sheets
Dimensions	Maximum (Width × Length)	297 × 432 mm
	Minimum (Width × Length)	90 × 140 mm
Size	A3L, B4L, FLS, A4L, A4C, B5L, B5C, A5C,11 × 17, 11 × 14, 8-1/2 × 14, 8-1/2 × 11L, 8-1/2 × 11C, 8-1/2 × 5-1/2	

DOCUMENT ALIGNMENT	:	Center
CAPACITY	:	50 sheets (80 g/m^2)
POWER REQUIREMENTS	:	DC24 V, DC5 V (supplied from copier)
MAX. POWER CONSUMPTION	:	9 W or less
DIMENSIONS	:	W...245 mm (9-3/4) D....435 mm (17-1/4) H....137 mm (5-1/2)
WEIGHT	:	2.7 kg (6 lb)
OPERATING ENVIRONMENT	:	Same as copier

Job Tray (JS-202): option

TYPE : Multiple Bypass
INSTALLATION : Mounted on the copier

CAPACITY

		Exit Tray of the machine	Job Tray
Type	Plain Paper (60 to 90 g/m²)	150 sheets (A4C/L) 75 sheets (except A4C/L)	1Stacking height up to 22 mm 100 sheets (A4C/L) 50 sheets (except A4C/L)
	Transparencies	20 sheets	10 sheets
	Thick Paper (91 to 157 g/m²)		
	Postcards		
	Recycled Paper (60 to 90 g/m²)	150 sheets (A4C/L) 75 sheets (except A4C/L)	Stacking height up to 22 mm 100 sheets (A4C/L) 50 sheets (except A4C/L)
Dimensions	Maximum (Width × Length)	297 × 432 mm	
	Minimum (Width × Length)	90 × 140 mm	140 × 140 mm

Exit Tray by Application Mode

Application Mode	Exit Tray of the machine	Job Tray
Fax and Copier	Copier	Fax
Printer and Copier	Copier	Printer
Fax, Copier and Printer	Copier	Fax and Printer

POWER REQUIREMENTS : DC24 V, DC5 V (supplied from copier)

Shifting Unit (OT-103): option

TYPE : Multiple Bypass
INSTALLATION : Mounted on the copier
POWER REQUIREMENTS : DC24 V, DC5 V (supplied from copier)

2. PRECAUTIONS FOR INSTALLATION

2-1. Installation Site

To ensure safety and utmost performance of the copier, the copier should NOT be used in a place:

- Where it will be subjected to extremely high or low temperature or humidity.
- Where it will be subjected to sudden fluctuations in either temperature or humidity.
- Which is exposed to direct sunlight.
- Which is in the direct air stream of an air conditioner, heater, or ventilator.
- Which has poor ventilation or is dusty.
- Which does not have a stable, level floor or where it will receive undue vibration.
- Which is near any kind of heating device.
- Which is near volatile flammables (thinner, gasoline, etc.).
- Where it may be splashed with water.
- Which puts the operator in the direct stream of exhaust from the copier.
- Where ammonia gas might be generated.

2-2. Power Source

- If any other electrical equipment is sourced from the same power outlet, make sure that the capacity of the outlet is not exceeded.
- Use a power source with little voltage fluctuation.
- Never connect by means of a multiple socket any other appliances or machines to the outlet being used for the copier.
- Ensure that the copier does not ride on the power cord or communication cable of other electrical equipment, and that it does not become wedged into or underneath the mechanism.
- Make the following checks at frequent intervals:

✻ Is the power plug abnormally hot?
✻ Are there any cracks or scrapes in the cord?
✻ Has the power plug been inserted fully into the outlet?
✻ Does something, including the copier itself, ride on the power cord?

Use an outlet with a capacity of 110 to 127 V, 15 A or more. 220 to 240 V, 10 A or more.

2-3. Grounding

- Always ground the copier to prevent receiving electrical shocks in the case of electrical leakage.
- Connect the ground wire to the ground terminal of the outlet or a grounding contact which complies with the local electrical standards.
- Never connect the ground wire to a gas pipe, the ground wire for a telephone, lightning arrester, or a water pipe for fear of fire and electrical shock.

3. PRECAUTIONS FOR USE

3-1. To ensure that the copier is used in an optimum condition

- Never place a heavy object on the copier or subject the copier to shocks.
- Insert the power plug all the way into the outlet.
- Do not attempt to remove any panel or cover which is secured while the copier is making copies.
- Do not turn OFF the copier while it is making copies.
- Provide good ventilation when making a large number of copies continuously.
- Never use flammable sprays near the copier.
- If the copier becomes inordinately hot or produces abnormal noise, turn it OFF and unplug it.
- Do not turn ON the power switch at the same time when you plug the power cord into the outlet.
- When unplugging the power cord, do not pull on the cord; hold the plug and pull it out.
- Do not bring any magnetized object near the copier.
- Do not place a vase or vessel containing water on the copier.
- Be sure to turn OFF the power switch at the end of the workday or upon power failure.
- Use care not to drop paper clips, staples, or other small pieces of metal into the copier.

3-2. Operating Environment

The operating environmental requirements of the copier are as follows.

- Temperature: 10 to 30 °C
- Humidity: 15 to 85 % RH
- Rate of temperature change: 10 °C/h
- Rate of humidity change: 10 % RH/h

3-3. Power Requirements

The power source voltage requirements are as follows.

- Voltage fluctuation: AC110 to 127 V/220 to 240 V ± 10 %
  (copying performance assured)
  +10 %/-15 % (paper feeding performance assured)
- Frequency fluctuation: 50/60 Hz ± 0.3 %

3-4. Note

- It is prohibited to copy paper and hard currencies, government securities, and municipal bonds (even when they are stamped as “Sample”).
- For fear of infringement of copyright, it is also prohibited to copy copyrighted works, including books, music, works of art, maps, drawings, motion pictures, and photos except when the copy is to be used only personally.

4. HANDLING OF CONSUMABLES

Before using any consumables, always read the label on its container carefully.

- Paper can be easily damaged by dampness. To prevent absorption of moisture, store paper, which has been removed from its wrapper but not loaded in the drawer, in a sealed plastic bag in a cool, dark place.
- Keep consumables out of the reach of children.
- Do not touch the PC Drum with bare hands.
- The same sized paper is of two kinds, short grain and long grain. Short grain paper should only be fed through the copier crosswise, long grain paper should only be fed lengthwise.
- If your hands become soiled with toner, wash them with soap and water.
- Do not throw away any used consumables (PC Drum, starter, toner, etc.). They are to be collected.
- Do not burn, bury in the ground, or throw into the water any consumables (PC Drum, starter, toner, etc.).
- Do not store consumables in a place which:

✻ Is hot and humid.
✻ Is subject to direct sunlight.
✻ Has an open flame nearby.

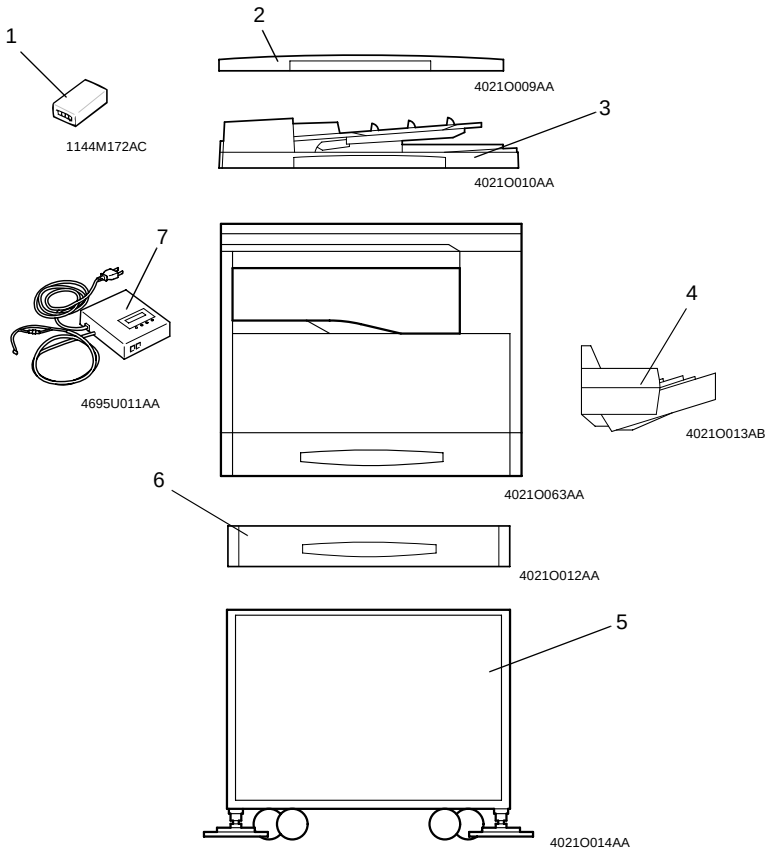
5. OTHER PRECAUTIONS

Use the following precautions when performing service jobs for a copier that uses a laser.

- When a service job needs to be performed in the laser beam path, such as when working around the printerhead or PC Drum, be sure first to unplug the power cord of the copier from the outlet.
- If the job requires that the power cord be left plugged in, observe the following precautions.

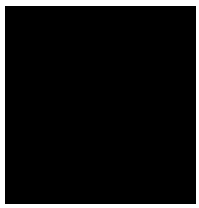
1. Take off your watch, ring and any other reflective object and wear laser protective goggles.
2. Keep users away from the job site.
3. Do not bring a highly reflective tool into the laser beam path during the service job.

6. SYSTEM OPTIONS



1. Plug-In Counter
2. Original Cover OC-5
3. Automatic Document Feeder AF-10
4. Multiple Bypass MB-5
5. Copy Desk
6. Paper Feed Cabinet PF-120
7. Data Terminal DT-201
8. Job Tray JS-202
   (Illustration none)
9. Sifting Unit OT-103
   (Illustration none)
10. Memory M16-4, M32-3
    (Illustration none)
11. Mechanical Counter CNT1
    (Illustration none)

MECHANICAL/ ELECTRICAL

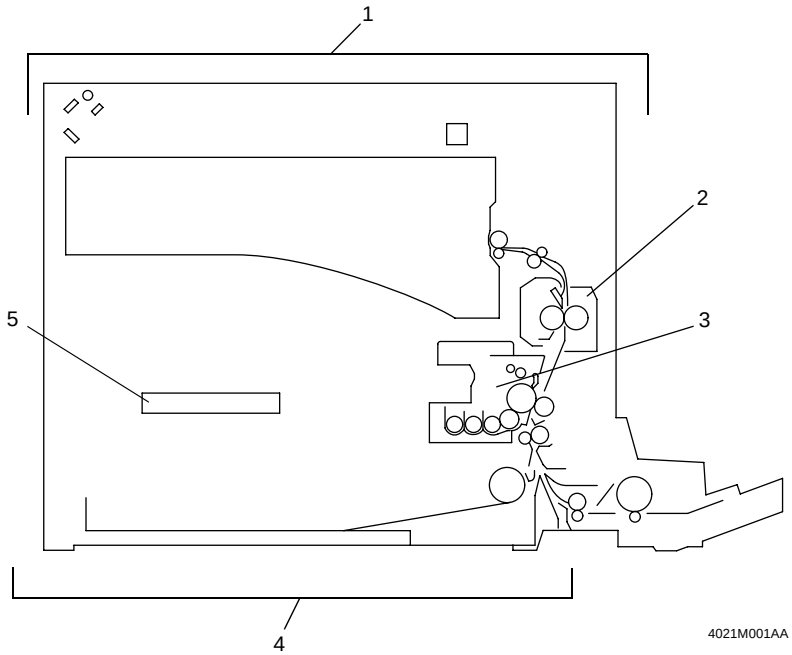


CONTENTS

1. CROSS SECTIONAL VIEW M-1
2. COPY PROCESS M-2
3. DRIVE SYSTEM M-4
4. SEQUENTIAL EXPLANATION M-5
5. WATCHDOG FUNCTION (CPU OVERRUN MONITOR) M-6
5-1. Watchdog Function Post-Processing M-6
6. IMAGE STABILIZATION SYSTEM M-7
7. IMAGING UNIT (I/U) M-8
7-1. Imaging Unit (IU) Drive Mechanism M-9
8. PC DRUM SECTION M-10
8-1. PC Drum Drive Mechanism M-10
8-2. Grounding of the PC Drum M-11
9. PC DRUM CHARGING SECTION M-12
10. IMAGE READING SECTION M-13
10-1.Image Processing Process M-14
10-2.Exposure Components Section M-15
10-3.Scanner and Mirrors Carriage Movement Mechanism M-16
(1) Scanner Movement Mechanism M-16
(2) 2nd/3rd Mirrors Carriage Movement Mechanism M-16
10-4.Scanner Motor Drive Control M-17
11. MEMORY STORAGE IMAGE PROCESSING SYSTEM M-18
11-1.Laser Exposure Process M-19
12. DEVELOPING UNIT SECTION M-20
12-1.Developing Unit Drive Mechanism M-21
12-2.Sleeve/Magnet Roller M-22
12-3.Developing Bias M-22
12-4.ATDC Sensor M-23
(1) ATDC Sensor Automatic Adjustment M-23
12-5.Toner Replenishing Mechanism M-24
12-6.Toner Replenishing Control M-25
12-7.T/C Recovery Mode M-26
12-8.Toner Bottle Home Position Detection Mechanism M-27
13. PAPER TAKE UP/FEED SECTION M-28
13-1.Drawer In Position Detection M-29
13-2.Paper Empty Detection Mechanism M-29
13-3.Paper Lifting Plate M-30
13-4.Universal Tray Paper Size Detection Mechanism M-30
13-5.Paper Take Up Mechanism M-32
(1) Paper Separating Mechanism M-32
13-6.Paper Take Up Control M-33
(1) Paper Take Up Retry Control M-33
14. MANUAL BYPASS SECTION M-34
14-1.Paper Take Up Drive Mechanism M-34
14-2.Paper Detection Mechanism M-34
14-3.Manual Feed Take Up Control M-35
15. MULTIPLE BYPASS SECTION M-36

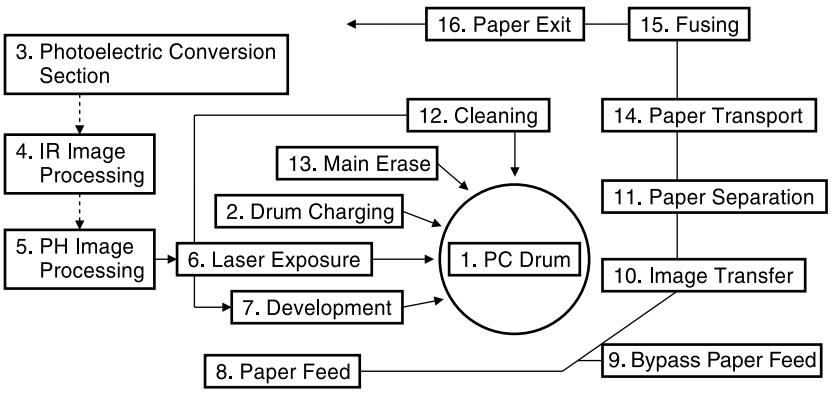
15-1.Paper Take Up Drive Mechanism M-36
15-2.Paper Take-Up Mechanism M-37
15-3.Paper Empty Detection Mechanism M-38
15-4.Paper Take Up Control M-38
15-5.Paper Take Up Retry Control M-39
16. IMAGE TRANSFER AND PAPER SEPARATION SECTION M-40
17. PC DRUM CLEANING SECTION M-41
18. MAIN ERASE SECTION M-42
19. FUSING UNIT SECTION M-43
19-1.Fusing Unit Drive Mechanism M-44
19-2.Fusing Rollers Pressure Mechanism M-44
19-3.Fusing Temperature Control M-45
19-4.CPM Control M-45
20. JOB TRAY (JS-202): Option M-46
20-1.Tray Selecting Mechanism M-47
20-2.Tray-Full Detecting Mechanism M-48
20-3.Job Tray Paper Detecting Mechanism M-48
21. SHIFTING UNIT (OT-103): Option M-49
21-1.Exit Position Shifting Mechanism M-50
22. OTHER MECHANISM M-52
22-1.Cooling Mechanism M-52
(1) Power Supply Section Cooling Mechanism M-52
(2) Fusing Section Cooling Mechanism M-53

1. CROSS SECTIONAL VIEW



1. IR Section
2. Fusing Unit
3. Imaging Unit
4. Paper Take-Up/Feed Section
5. PH Section

2. COPY PROCESS



1. PC Drum
- Used as the medium on which a visible developed image of the original is formed.

2. Drum Charging
- A uniform negative DC charge is deposited across the entire surface of the PC Drum.

3. Photoelectric Conversion
- CCD converts the image data represented by light reflected off the original to a corresponding electrical signal which, in turn, is output to IR image-processing section.

4. IR Image-Processing
- The electrical signal is converted to an 8-bit digital image signal (A/D conversion) which, in turn, goes through appropriate correction before being output to the PH Image Processing.

5. PH Image Processing
- After going through corrections, the digital image signal is converted to a corresponding electrical signal (D/A conversion) that controls the intensity of the light from the laser diode.

6. Laser Exposure
- The laser beam strikes the surface of the PC Drum, forming an electrostatic latent image.

7. Developing
- Toner negatively charged in the Developer Mixing Chamber is attracted onto the electrostatic latent image changing it to a visible, developed image.
- An AC/DC negative bias voltage is applied to the Sleeve/Magnet Roller to prevent toner from being attracted onto those areas of the PC Drum which correspond to the background areas of the original.

8. Paper Feed
- Paper is fed from the drawer.

9. Bypass Paper Feed
- Feeds paper from the Manual Bypass Tray, one piece at a time.
- The optional Multiple Bypass Tray (MB-5), when mounted on the machine, permits continuous paper feeding.

10. Image Transfer
- A DC positive charge is applied to the Image Transfer Roller to transfer the visible image on the surface of the PC Drum onto the paper.Paper Separation.

11. Paper Separation
- The PC Drum Paper Separator Fingers remove paper from the surface of the PC Drum.
- The Charge Neutralizing Plate neutralizes any charge left on the paper.

12. Cleaning
- Residual toner on the surface of the PC Drum is scraped off.
- The toner is then recycled back to the Developing Unit.

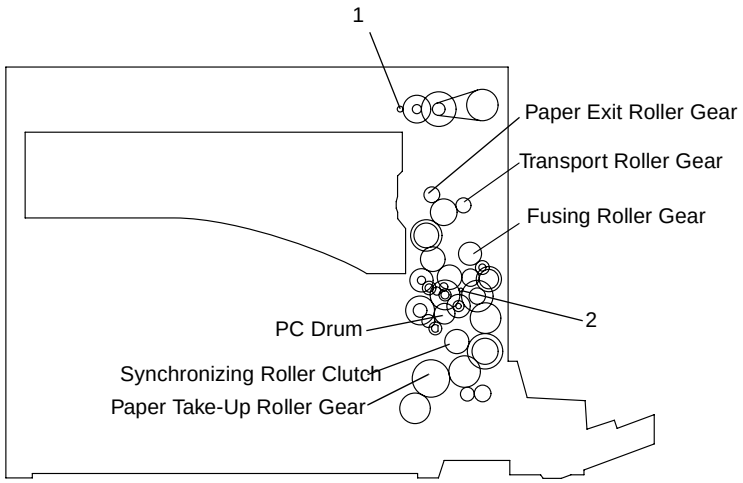
13. Main Erase
- Light is directed to the surface of the PC Drum to neutralize any surface potential remaining there after cleaning.

14. Paper Transport
- The paper is fed to the Fusing Unit.

15. Fusing
- The developed image is permanently fused to the paper by a combination of heat and pressure applied by the Right and Left Fusing Rollers.

16. Paper Exit
- The paper is fed out onto the Exit Tray.
- When the optional Job Tray (JS-202) is mounted, the specific tray into which paper is fed is selected according to the application mode.
- The optional Shifting Unit (OT-103), when mounted, permits different finishing functions set on the machine (Non-Sort, and Sort).

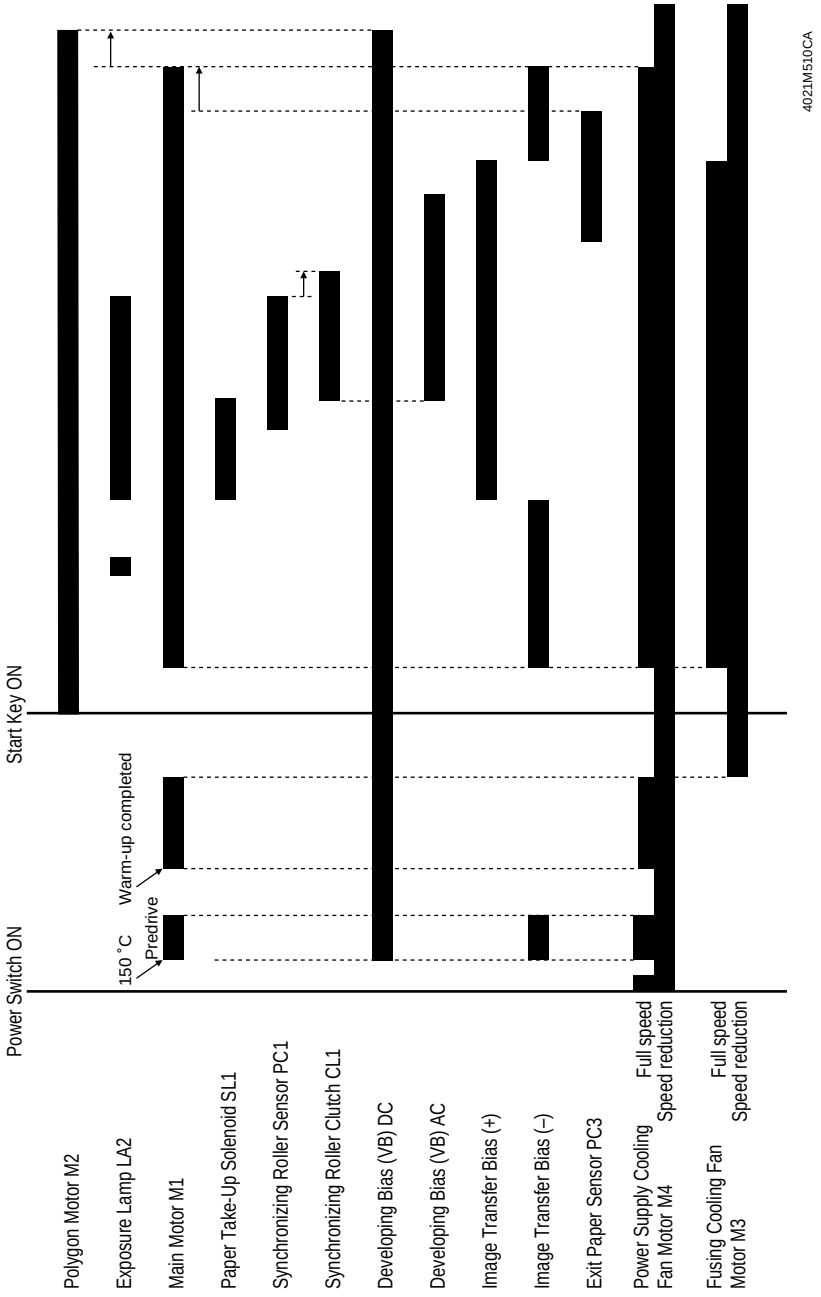
3. DRIVE SYSTEM



4021M003AA

1. Scanner Motor M5
2. Main Motor M1

4. SEQUENTIAL EXPLANATION



5. WATCHDOG FUNCTION (CPU OVERRUN MONITOR)

- The watchdog function, or CPU overrun monitor function, monitors whether any of the CPUs mounted in the copier overruns.
- If the function detects that a CPU overruns, the copier automatically resets the CPU, thereby restarting the logic circuit and mechanism.

5-1. Watchdog Function Post-Processing

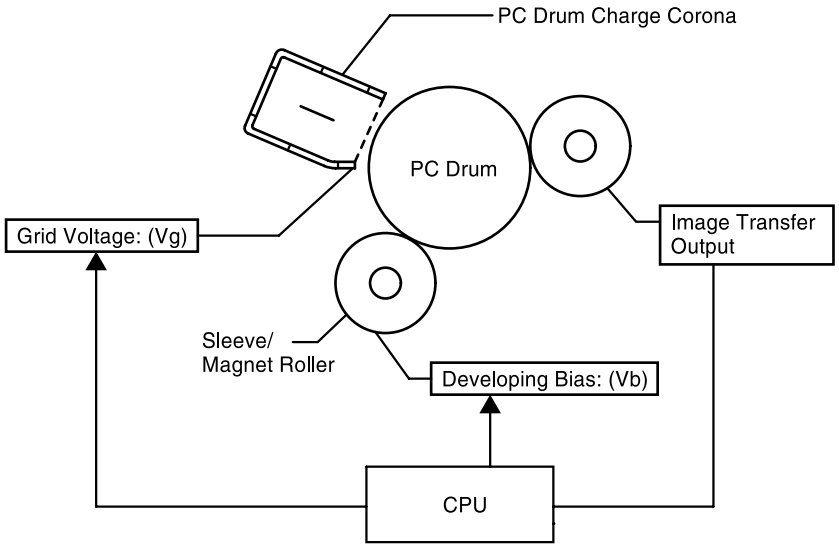
The following processing is performed if a faulty condition is detected in the CPU.
When the copier CPU is found faulty:

- All CPUs are reset and the system is restarted.
- If the CPU is found faulty during a copy cycle, the system attempts to feed all sheets of paper out of the copier before restarting. (If paper is left inside the copier, the copier detects it as a misfeed as it is restarted.)

6. IMAGE STABILIZATION SYSTEM

The following image stabilization controls are provided to ensure stabilized copy image.

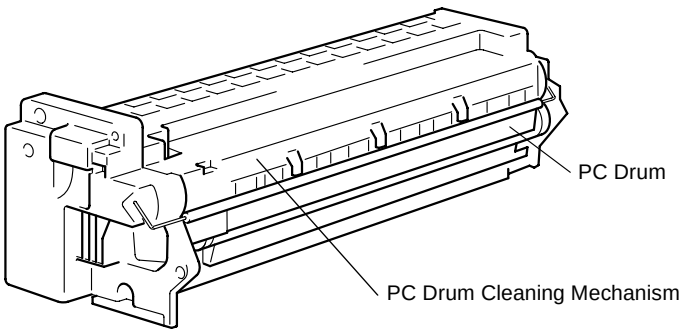
Purpose	Means	Control
To stabilize image density.	Vg/Vb control	The Vg/Vb control voltage is varied to bring Vg/Vb to an appropriate level according to the following settings. • Tech. Rep. Choice: ID Adjustment • Tech. Rep. Choice: VG Adjustment • User's Choice: Print Density • IU Life Counter • Paper type
To stabilize image transfer.	Image transfer output control	The image transfer output is varied to bring the image transfer current to an appropriate level according to the following conditions. • Paper type • Paper width • B/W ratio of image



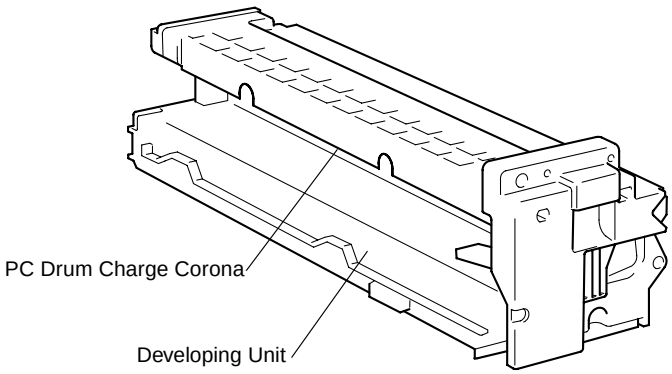
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7. IMAGING UNIT (I/U)

- The IU integrates the PC Drum, Developing Unit, PC Drum Charge Corona, and the PC Drum Cleaning Mechanism, all in one body.



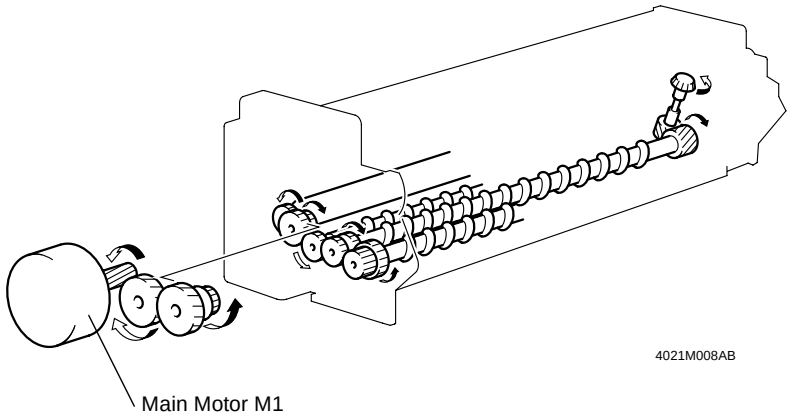
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7-1. Imaging Unit (IU) Drive Mechanism

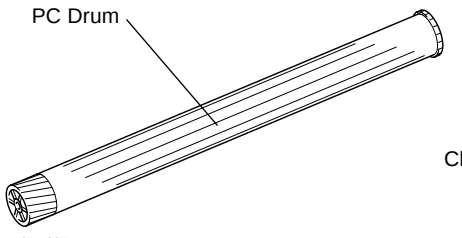
- The IU is driven by the Main Motor.



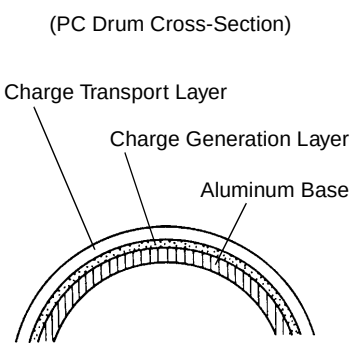
Elevtrical Component	Control Signal	Forward Rotation	Backward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	L	H	17-G
	PWB-A PJ7A-7	H	L	H	

8. PC DRUM SECTION

- The PC Drum consists of layers of semiconductive materials placed on an aluminum alloy base, on which an electrostatic latent image is formed.



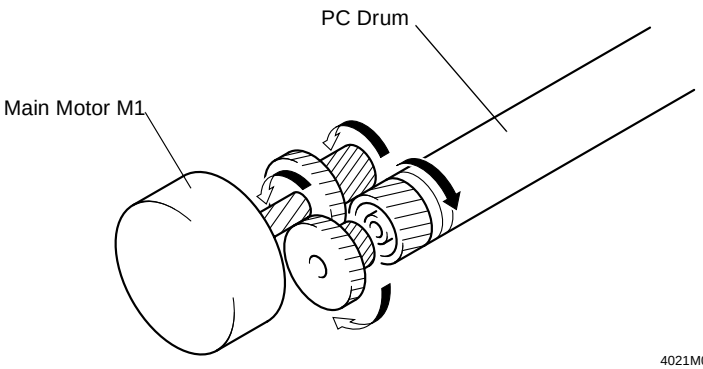
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1139M007AA

8-1. PC Drum Drive Mechanism

- The PC Drum is rotated by drive from a motor.

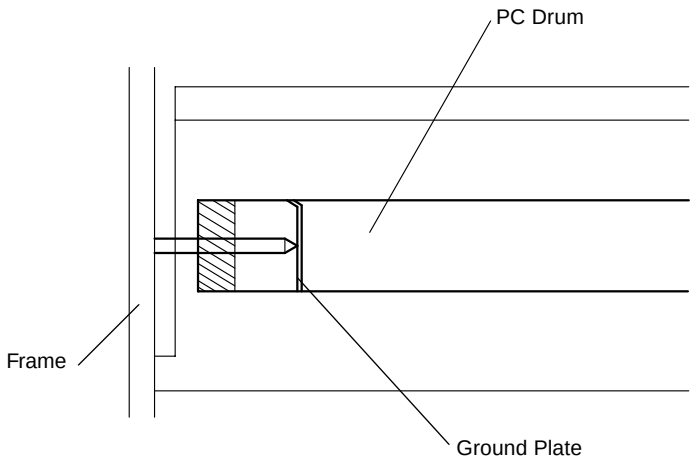


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Elevtrical Component	Control Signal	Forward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	H	17-G
	PWB-A PJ7A-7	H	H	

8-2. Grounding of the PC Drum

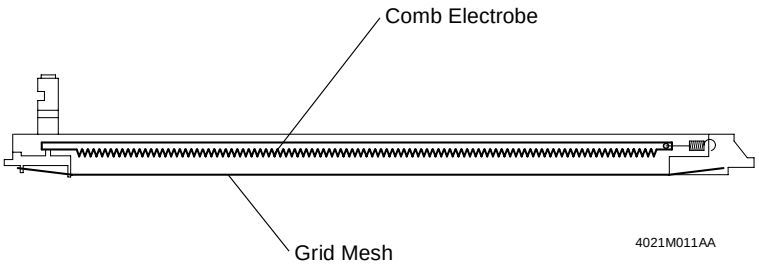
- The potential on the surface of the PC Drum exposed to the light is grounded to the frame.



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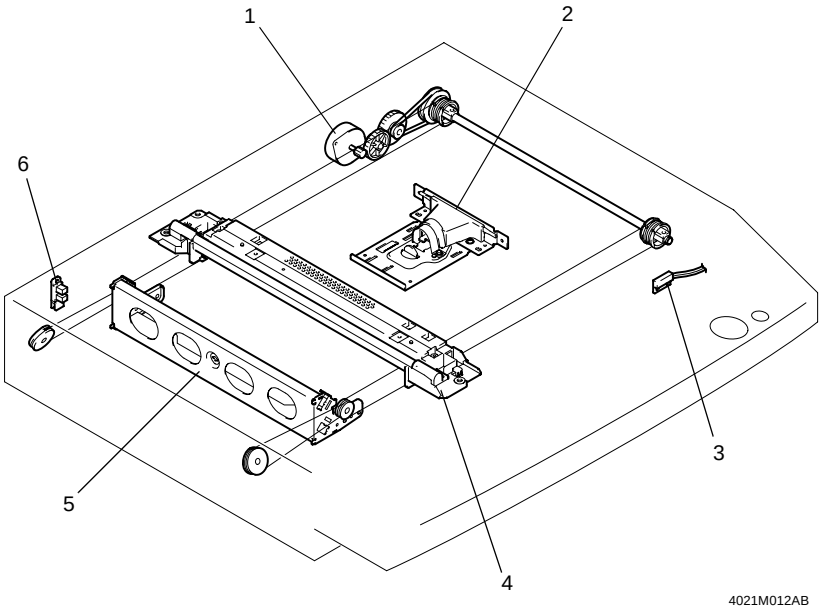
9. PC DRUM CHARGING SECTION

- The PC Drum Charge Corona has a scorotron grid to deposit a charge evenly across the surface of the PC Drum.
- The corona unit has a comb electrode that discharges only toward the grid mesh, thus minimizing the amount of ozone produced.



Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
HV1	PWB-A PJ8A-8	L	H	5-C

10. IMAGE READING SECTION



1. Scanner /Motor M5
2. CCD Board PWB-J
3. Size Reset Switch S10
4. Scanner
5. 2nd/3rd Mirrors Carriage
6. Scanner Home Position Sensor PC6

10-1. Image Processing Process

1. Photoelectric Conversion
- Light reflected off the original is read by the CCD Sensor which converts the data to a corresponding analog signal.

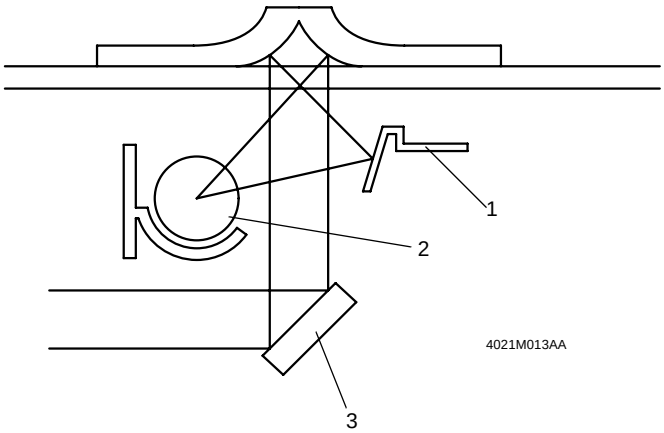
2. Analog-to-Digital Conversion
- The analog signal output from the CCD Sensor is converted to a corresponding 8-bit digital signal.

3. Shading Correction
- An error is corrected that occurs due to variations in sensitivity of each CCD chip and the light distribution varying along the length of the Exposure Lamp.
- The data obtained through actually illuminating the shading sheet with the Exposure Lamp is compared with the shading sheet reading reference value (white = max. data value) to make the necessary correction.

4. Zoom Processing
- The synchronous timing of the input data (read) and output data (read) is varied to decrease (reduction) or increase (enlargement) the number of data readings, thereby reducing or enlarging the image in the main scanning direction.

5. Data is sent to the PH.

10-2. Exposure Components Section



1. Auxiliary Reflector
   When a book or other bound original is copied, the paper in the area near the binding generally fails to come flush against the glass, so that the copy of these areas is generally too dark. The Auxiliary Reflector reduces this problem by reflecting light from the Exposure Lamp onto these areas of the original.
2. Exposure Lamp LA2
   A fluorescent lamp is used to illuminate the original.
3. 1st Mirror
   Directs the light reflected off the original to the 2nd Mirror.

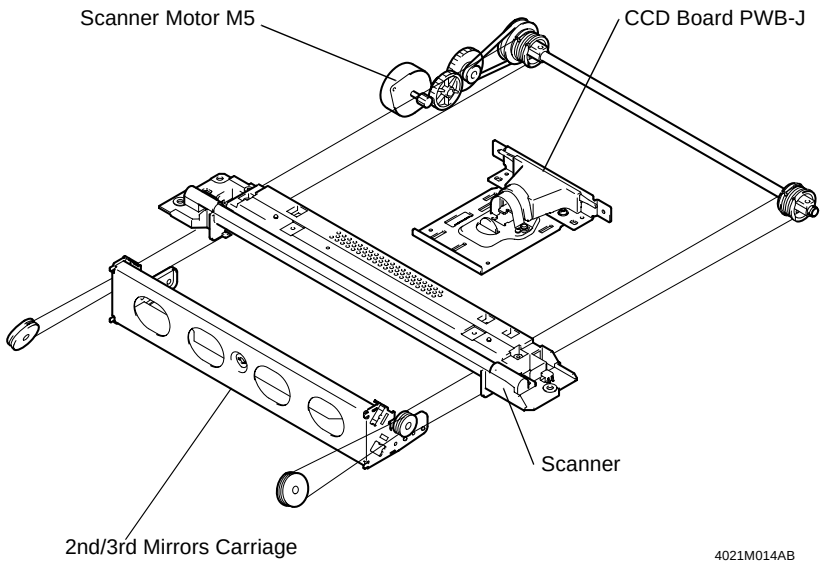
10-3. Scanner and Mirrors Carriage Movement Mechanism

(1) Scanner Movement Mechanism

- The Scanner is driven by the Scanner Motor.

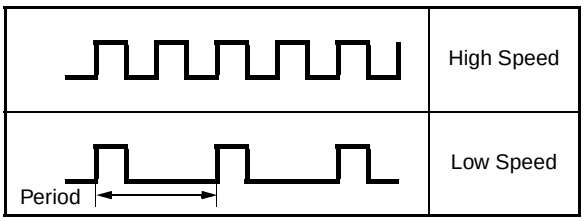
(2) 2nd/3rd Mirrors Carriage Movement Mechanism

- The 2nd/3rd Mirrors Carriage moves at a speed half that of the Scanner, thereby keeping constant the optical path length between the original and the CCD Board.



10-4. Scanner Motor Drive Control

- The speed at which the Scanner is moved is controlled by varying the period of the motor drive pulse that is timed with the reference clock.

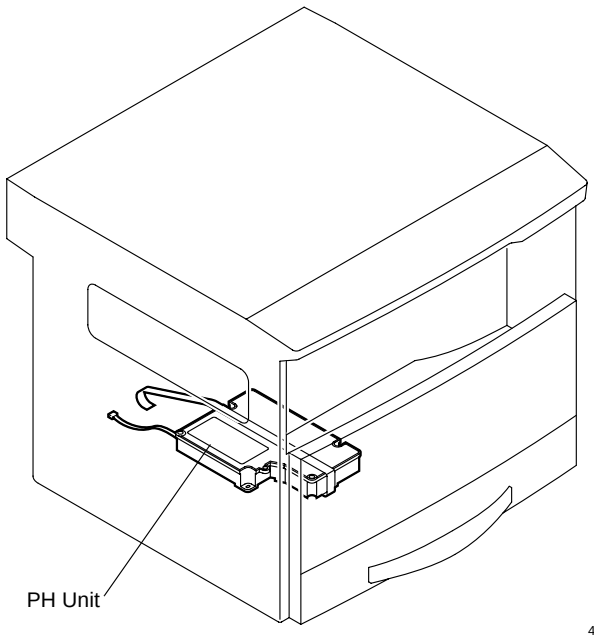


- The distance over which the Scanner travels is controlled by the number of motor drive pulses that correspond to each paper size and zoom ratio.

Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M5	PWB-C JP5C-1 to 4	Pulse output		11-B

11. MEMORY STORAGE IMAGE PROCESSING SYSTEM

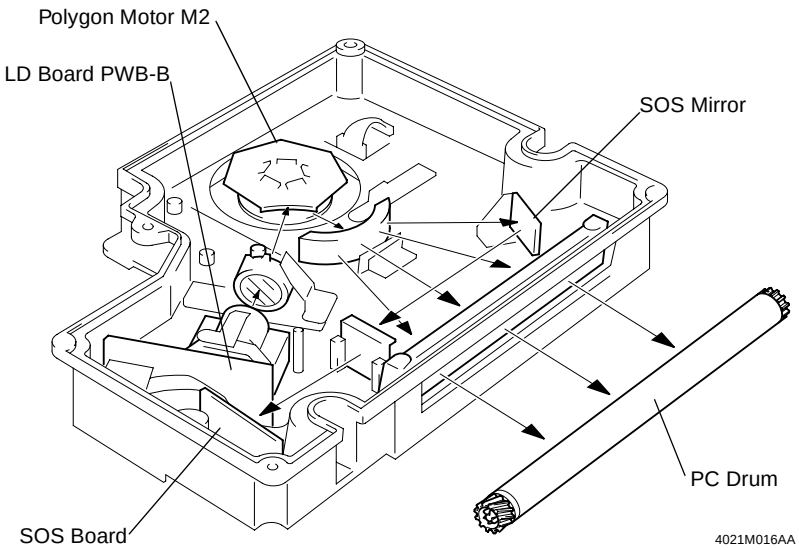
- Based on the image data output from the IR, a laser light is projected onto the surface of the PC Drum to form a corresponding latent image.

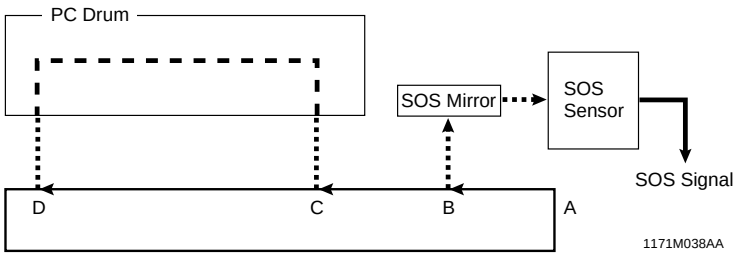


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11-1. Laser Exposure Process

1. The Start key is pressed.
2. The laser diode is forced to turn ON and the laser intensity is automatically adjusted.
3. The SOS Sensor Board is illuminated by the laser beam, which generates an SOS signal.
4. The SOS signal determines the laser emission timing for each main scanning line.
5. The surface of the PC Drum is illuminated by the laser beam corresponding to the image data, which forms an electrostatic latent image.



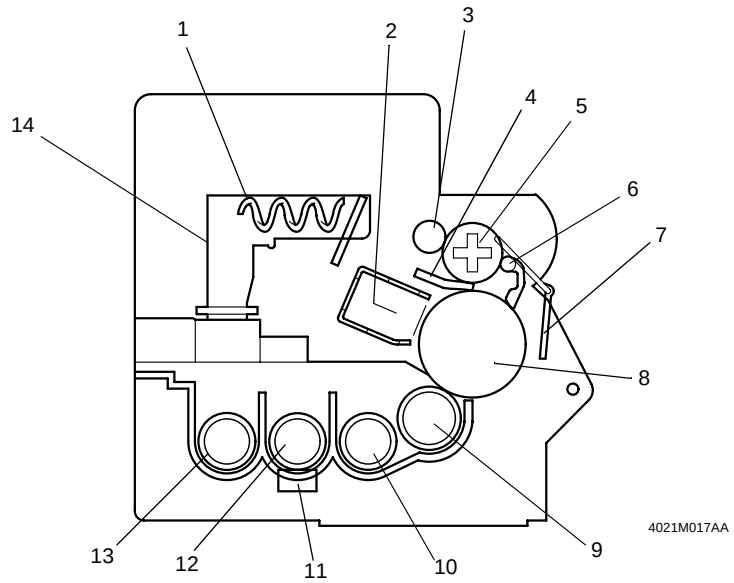


A to B: LD activation
B to C: LD OFF
C to D: Laser beam exposure area according to the image data

Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M2	PWB-A PJ13A-3	L	H	8-D

12. DEVELOPING UNIT SECTION

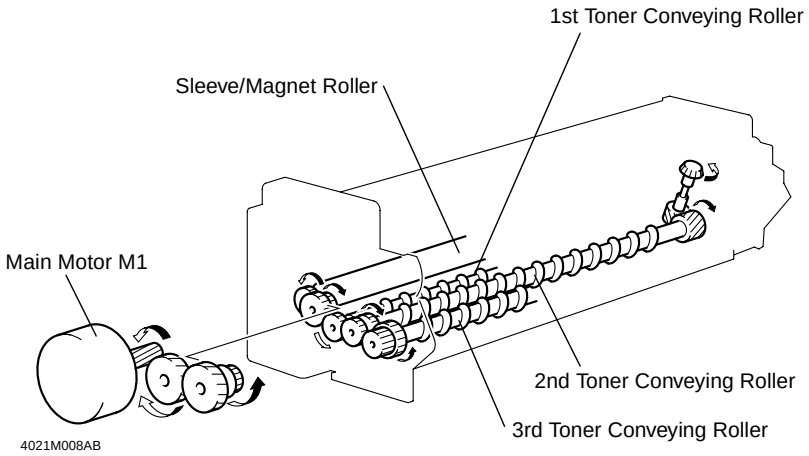
The Developing Unit agitates and triboelectrically charges toner so that it sticks to the electrostatic latent image formed on the surface of the PC Drum, then changing the image to a visible, developed one.



1. Spent Toner Recycling Coil
2. PC Drum Charge Corona
3. Spent Toner Conveying Screw 2
4. Cleaning Blade
5. Spent Toner Conveying Screw 1
6. PC Drum Paper Separator Finger
7. PC Drum Protective Shutter
8. PC Drum
9. Sleeve/Magnet Roller
10. 1st Toner Conveying Roller
11. ATDC Sensor UN1
12. 2nd Toner Conveying Roller
13. 3rd Toner Conveying Roller
14. Spent Toner Recycling Duct

12-1. Developing Unit Drive Mechanism

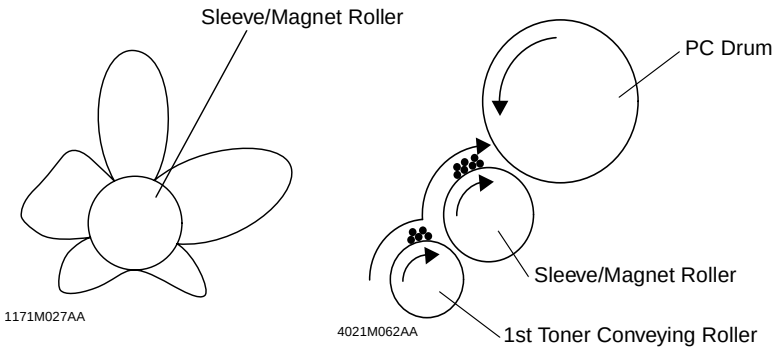
The rollers are driven through a gear train from the motor.



Elevtrical Component	Control Signal	Forward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	H	17-G
	PWB-A PJ7A-7	H	H	

12-2. Sleeve/Magnet Roller

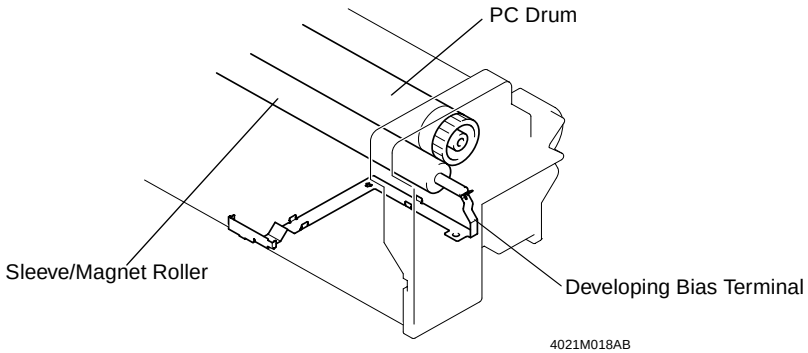
- The Sleeve/Magnet Roller, which consists of an outer sleeve roller and an inner magnet roller, conveys developer to the point of development.
- The magnetic force of the magnet roller at the point of development is the strongest so that the developer brush stands straight up to deliver the greatest amount of toner to the point of development.



12-3. Developing Bias

- Vb (-DC, AC) is applied to the Sleeve/Magnet Roller.
- Vb (-DC) is applied to prevent toner from sticking to the background of the image.
- Vb (AC) is applied to enhance good separation of toner from carrier.
- The amount of toner sticking to the surface of the PC Drum is varied according to the difference in potential between the voltage (Vi) on the surface of the PC Drum and Vb (-DC).

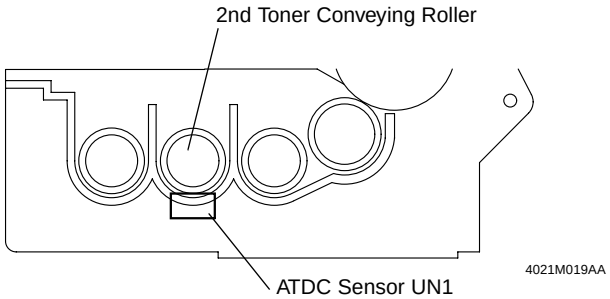
✻ Large difference = A greater amount of toner sticks.
✻ Small difference = A smaller amount of toner sticks.



Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
Vb (-DC)	PWB-A PJ8A-9	L	H	6-B
Vb (AC)	PWB-A PJ8A-10	L	H	

12-4. ATDC Sensor

The ATDC Sensor detects the toner-to-carrier ratio (T/C) of the developer in the Developer Mixing Chamber.



(1) ATDC Sensor Automatic Adjustment

The reference value for the ATDC Sensor is automatically adjusted as detailed below using the ATDC Sensor Automatic Adjustment mode.

With the copier set in the ATDC Sensor Automatic Adjustment mode, press the Start key.

↓

The developer is mixed.

↓

The ATDC Sensor converts the reference T/C (14 %) to a corresponding voltage value and outputs it.

↓

Does the output voltage fall within the range from 2.36 to 2.44 V?

YES

The voltage input to the ATDC Sensor from the Master Board at this time is fixed as the reference voltage.

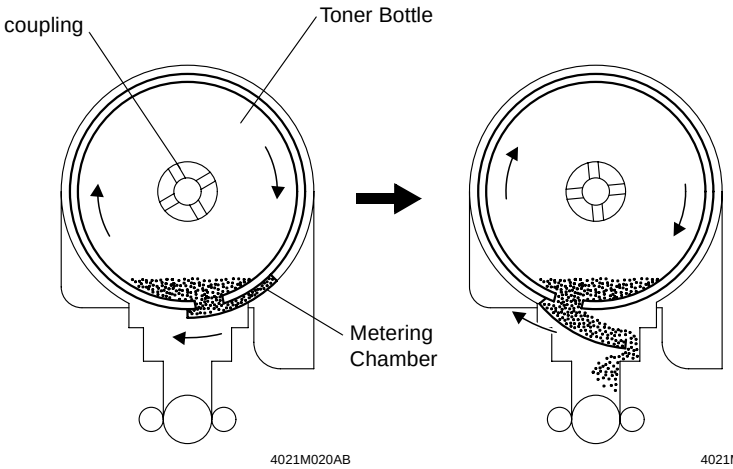
NO

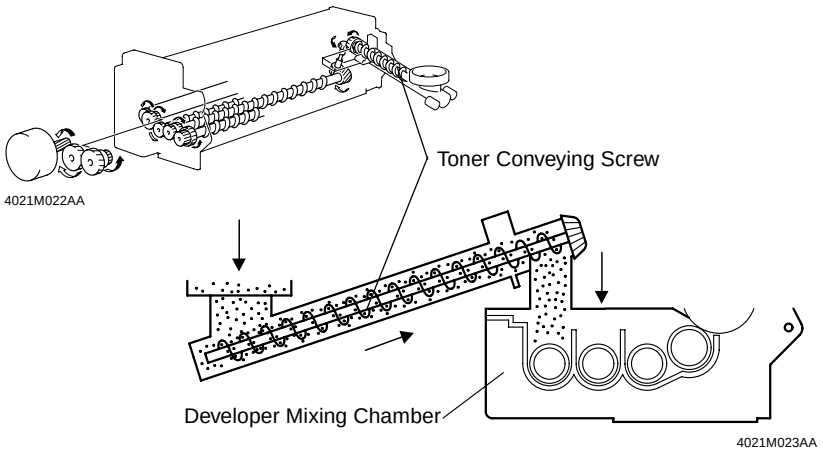
The voltage input to the ATDC Sensor from the Master Board is varied.
2.45 V or more: Decrease the voltage.
2.35 V or less: Increase the voltage.

12-5. Toner Replenishing Mechanism

- Toner is supplied from the Toner Bottle to the Developer Mixing Chamber.

1. The coupling is turned by the motor, which turns the Toner Bottle.
2. To regulate the amount of toner supplied from the Toner Bottle, there is a Metering Chamber provided in the outer race of the coupling.
3. When the Toner Bottle turns, toner in the Metering Chamber drops.
4. Toner from the metering chamber is conveyed by the Toner Conveying Screw into the Developer Mixing Chamber.
5. The Toner Conveying Screw is turned by the motor.





Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M6	PWB-A PJ19A-6	L	H	4-B

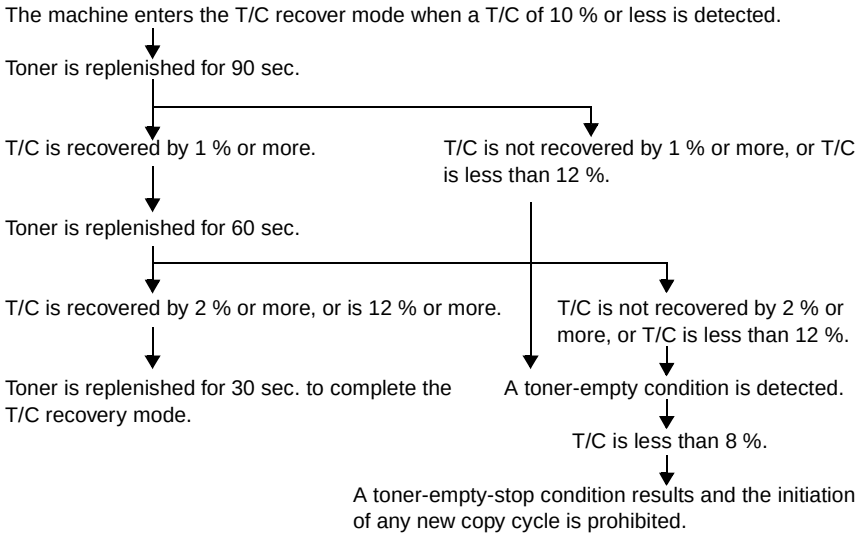
12-6. Toner Replenishing Control

- Replenishing of the supply of toner is determined based on the T/C ratio and B/W ratio.
- If T/C is 14 % or more, toner replenishing is not carried out regardless of the B/W value.
- If T/C is less than 14 %, toner replenishing is determined according to the B/W value.
- Toner is replenished until T/C becomes 14 %.

T/C ratio (%)	B/W ratio	toner replenishing
More than 14	—	not supply
13.5 to 14	More than 2000	supply
13 to 13.5	More than 1000	supply
12.5 to 13	More than 500	supply
12 to 12.5	More than 500	supply
10 to 12	More than 0	supply
Less than 7	Proceeds to the T/C recovery mode	

✻ The greater the value of B/W in the table, the higher the B/W ratio (high image density original).

12-7. T/C Recovery Mode

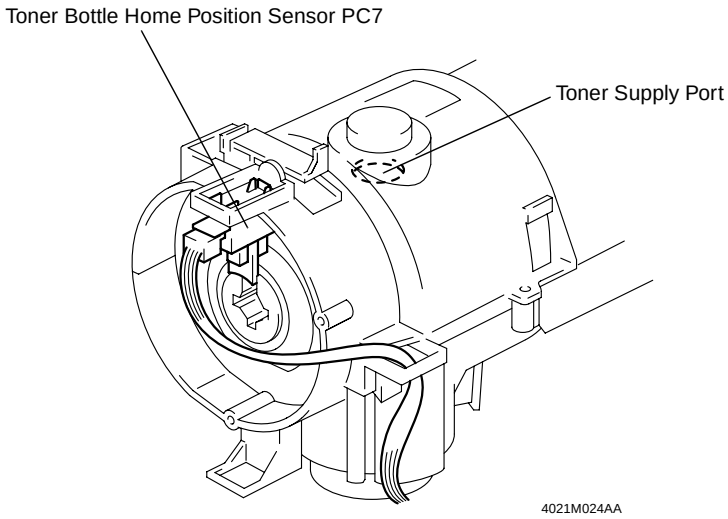


✻ A toner-empty condition is reset when the Front Cover is opened and closed after a T/C of 10 % or more is detected with the supply of toner replenished.

✻ A toner-empty-stop condition is reset when the Front Cover is opened and closed after a T/C of 8 % or more is detected with the supply of toner replenished. A toner-empty condition results, however, if T/C falls within the range between 8 % and 10 % when the Front Cover is opened and closed.

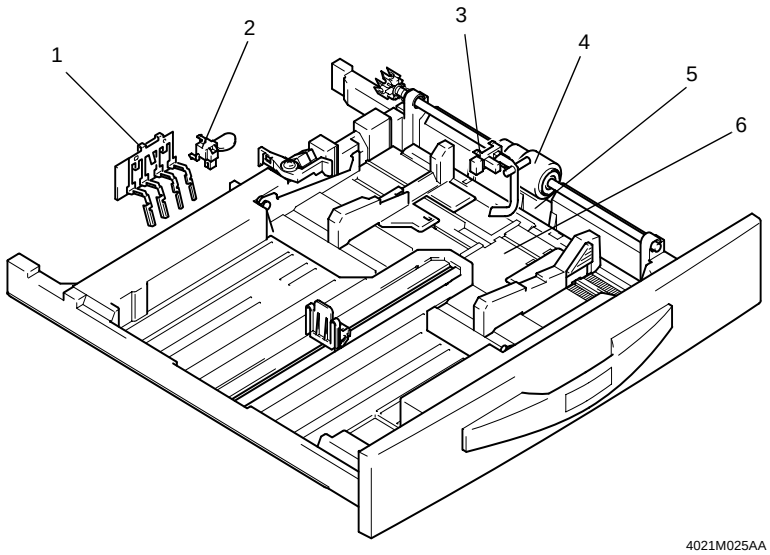
12-8. Toner Bottle Home Position Detection Mechanism

- The Toner Bottle is at its home position (where it remains stationary) when its Toner Supply Port faces up. This position is detected by a sensor.



Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC7	PWB-A PJ19A-10	L	H	4-B

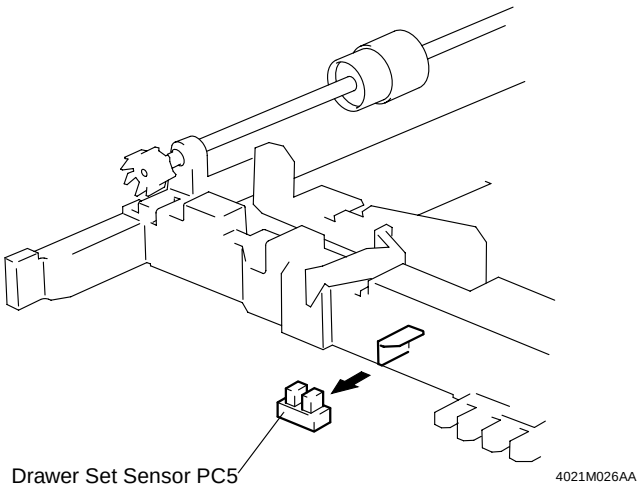
13. PAPER TAKE UP/FEED SECTION



1. Paper Size Detecting Board PWB-I
2. Paper Size Detecting Sensor S11
3. Paper Empty Sensor PC4
4. Paper Take-Up Roll
5. Separator Roll
6. Paper Lifting Plate

13-1. Drawer In Position Detection

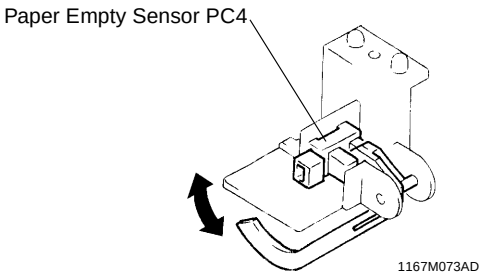
- When the drawer is slid into the copier, the light blocking plate blocks the Set Sensor. The copier then knows that the drawer has been slid in position.



Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC5	PWB-A PJ15A-10	L	H	1-I

13-2. Paper Empty Detection Mechanism

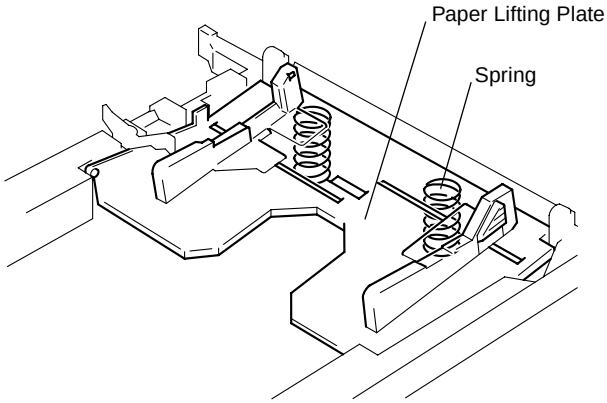
- The Paper Empty Sensor detects a paper-empty condition in the drawer.



Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC4	PWB-A PJ6A-6	L	H	1-I

13-3. Paper Lifting Plate

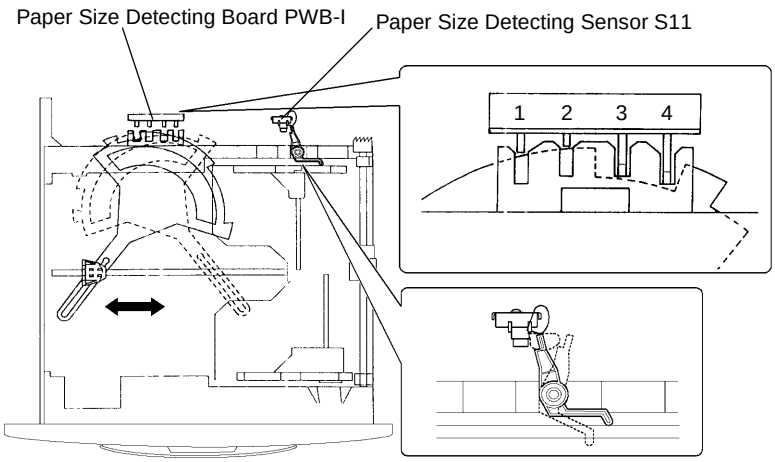
- The Paper Lifting Plate is locked into position when it is pressed down. It is unlocked when the tray is slid into the unit.
- The Paper Lifting Plate is pushed upward by the Paper Lifting Springs at all times.



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13-4. Universal Tray Paper Size Detection Mechanism

- Both the width (in the crosswise direction) and length (in the feeding direction) of the paper are detected and the copier CPU determines the paper size based on the combination of the two readings.
- The width (CD) of the paper is detected when the lever that is operatively connected to the Edge Guide activates or deactivates the Paper Size (CD) Detection Sensor.
- The length (FD) of the paper is detected when the lever that is operatively connected to the Trailing Edge Stop actuates or deactuates the switches on the Paper Size (FD) Detection Board.



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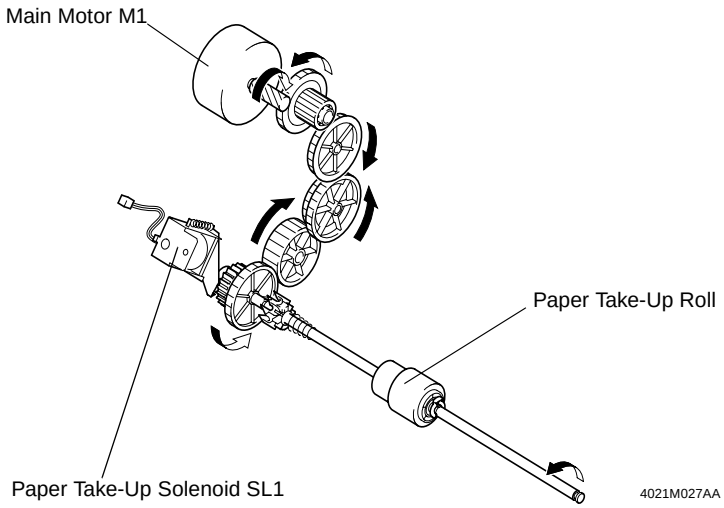
Paper Size Detecting Board PWB-I				Paper Size Detecting Sensor S11	Paper Size
SW1	SW2	SW3	SW4		
—	—	—	—	—	B4L, 8-1/2 × 14
—	—	—	—	Activated	11 × 14
—	—	—	ON	Activated	A3L, 11 × 17
—	—	ON	ON	—	A5L, 5-1/2 × 8-1/2 L
—	—	ON	ON	Activated	A4C, 8-1/2 × 11 C
—	ON	—	—	—	A5C, 5-1/2 × 8-1/2 C
—	ON	ON	ON	—	A5L, 5-1/2 × 8-1/2 L
—	ON	ON	ON	Activated	A4C, 8-1/2 × 11 C
ON	—	—	—	—	FLS
ON	ON	—	—	—	FLS
ON	ON	ON	ON	—	A4L, 8-1/2 × 11 L

Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
PWB-I SW1	PWB-A PJ15A-1	L	H	2-H
PWB-I SW2	PWB-A PJ15A-2	L	H	
PWB-I SW3	PWB-A PJ15A-3	L	H	
PWB-I SW4	PWB-A PJ15A-4	L	H	

Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
S11	PWB-A PJ15A-7	H	L	1-H

13-5. Paper Take Up Mechanism

- Drive for the paper take-up sequence is transmitted via the Paper Take-Up Solenoid from a motor.

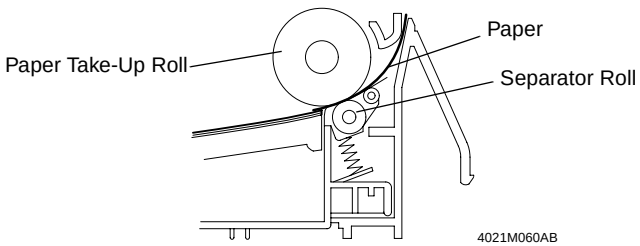


(1) Paper Separating Mechanism

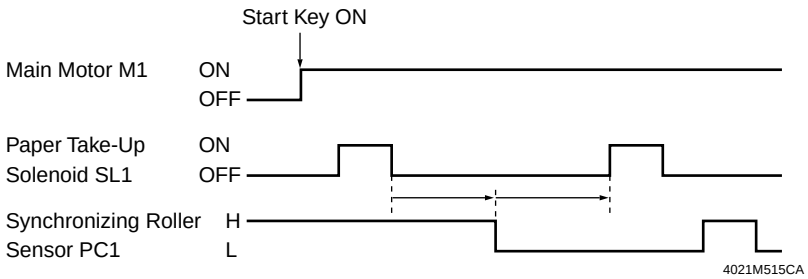
- The coefficient of friction between the Paper Take-Up Roll and Separator Roll is effectively used to prevent double feed of paper.

When one sheet of paper is taken up: The coefficient of friction on the front side of the sheet of paper taken up and fed through the space between the Paper Take-Up Roll and Separator Roll is the same as that on the backside of the sheet of paper, allowing the paper to be properly fed into the machine.

When two or more sheets of paper are taken up: The coefficient of friction between the paper and the Separator Roll is greater than that between the sheets of paper, which allows only the top sheet of paper to be fed into the machine.



13-6. Paper Take Up Control



Elevtrical Component	Control Signal	Forward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	H	17-G
	PWB-A PJ7A-7	H	H	

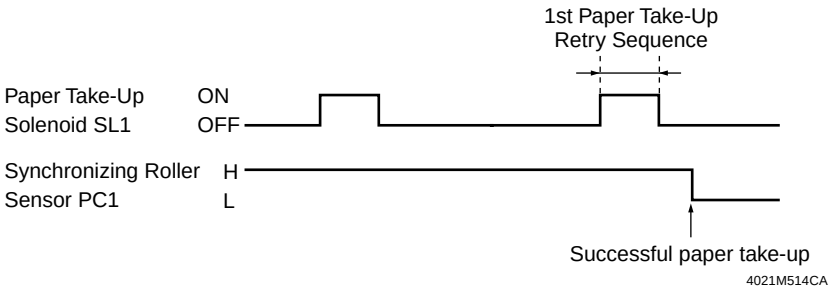
Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
SL1	PWB-A PJ5A-2	L	H	1-I

Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC1	PWB-A PJ6A-3	L	H	1-F

(1) Paper Take Up Retry Control

- To minimize the occurrence of a paper misfeed, the paper take-up sequence is temporarily halted if the paper fails to reach the Synchronizing Roller Sensor within a given period of time after the sequence has been started. The paper take-up sequence is then performed again. These paper take-up sequences are repeated a given number of times.

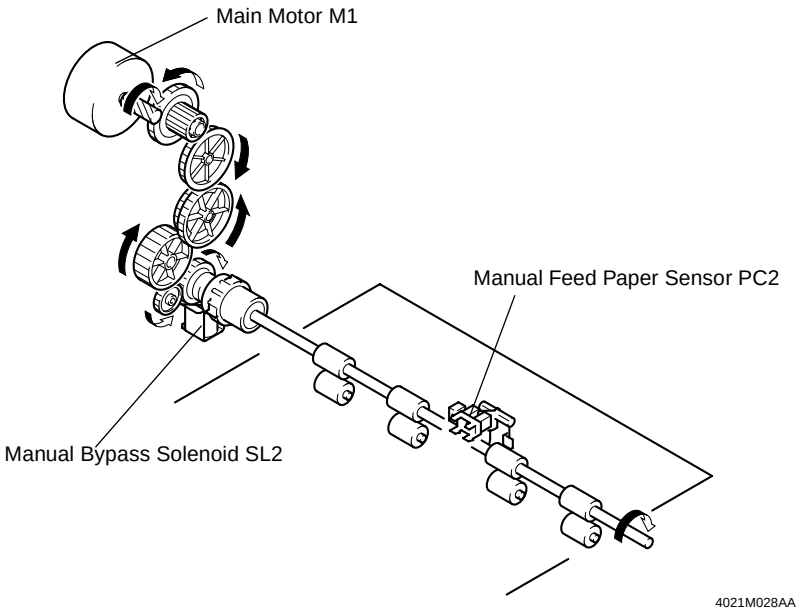
	No. of Paper Take-Up Retry Sequences
Paper Take-Up Retry	2



14. MANUAL BYPASS SECTION

14-1. Paper Take Up Drive Mechanism

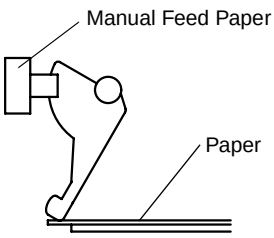
- Drive for paper take-up from the Manual Bypass is transmitted from a motor via the Solenoid.



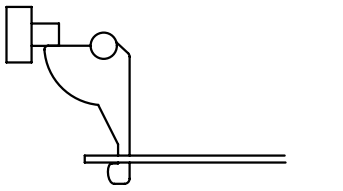
14-2. Paper Detection Mechanism

- The Sensor detects a sheet of paper on the Manual Bypass.

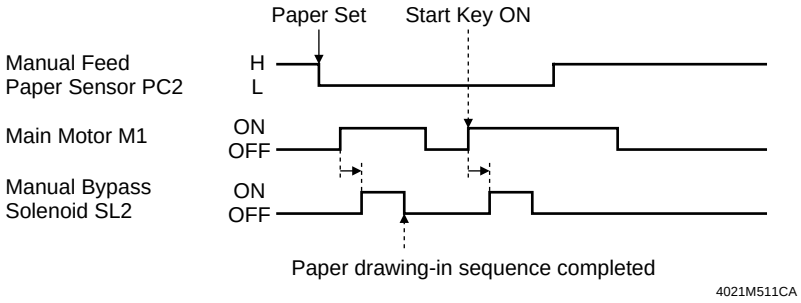
<When Paper is Present>



<When Paper is not Present>



14-3. Manual Feed Take Up Control

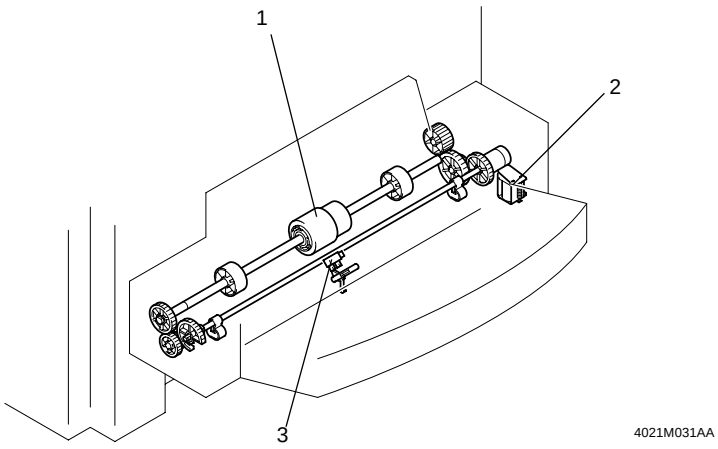


Elevtrical Component	Control Signal	Forward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	H	17-G
	PWB-A PJ7A-7	H	H	

Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
SL2	PWB-A PJ4A-2	L	H	1-B

Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC2	PWB-A PJ4A-5	L	H	1-A

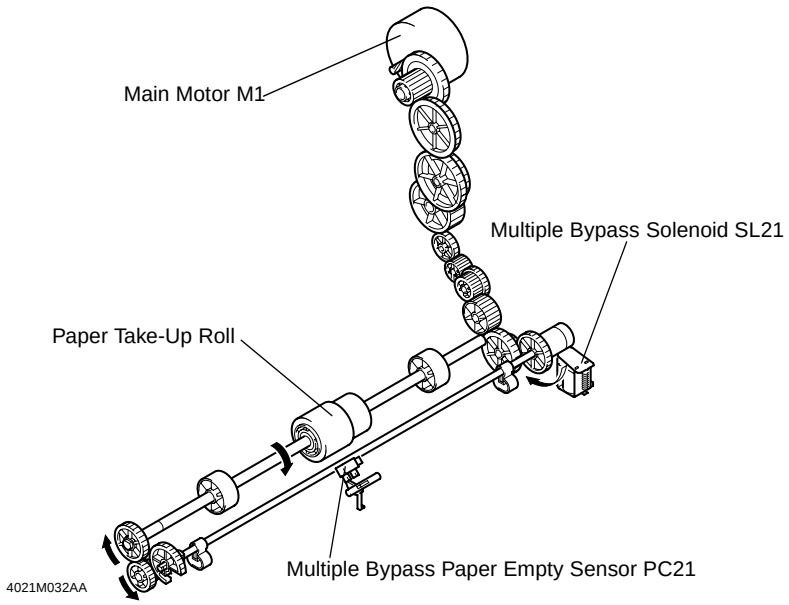
15. MULTIPLE BYPASS SECTION



1. Paper Take-Up Roll
2. Multiple Bypass Solenoid SL21
3. Multiple Bypass Paper Empty Sensor PC21

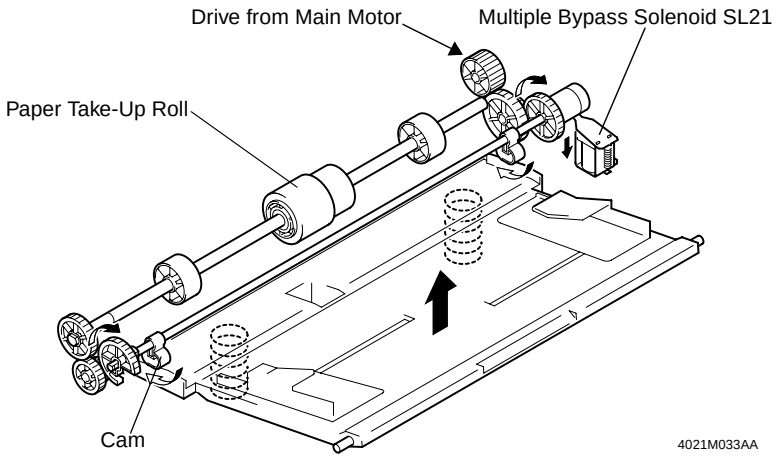
15-1. Paper Take Up Drive Mechanism

- Drive for paper take-up from the Multiple Bypass is transmitted from a motor via the Solenoid.



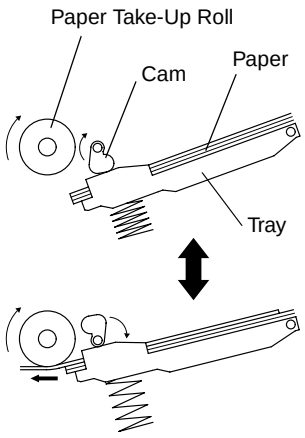
15-2. Paper Take-Up Mechanism

- The Paper Lifting Plate is raised to press the paper stack on the tray up against the Paper Take-Up Roll.
- The Paper Lifting Plate is raised and lowered in time with a paper take-up sequence.
- The ascent and descent motion of the Paper Lifting Plate is accomplished when the drive from the motor is transmitted to the cam through a solenoid to rotate the cam.



<Ascent/Descent Motion>
Main Motor (M1) is energized.
Paper Take-Up Roll is turned.

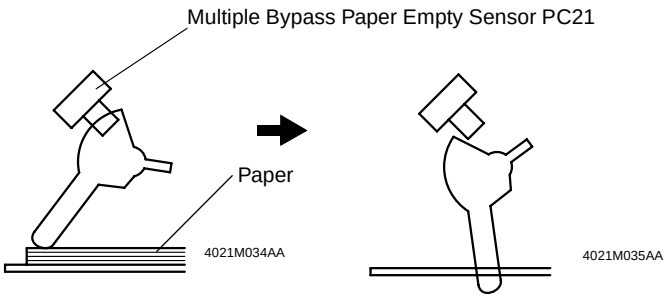
Multiple Bypass Solenoid (SL21): Energized
↓
Cam: Rotates
↓
Tray: Raised
↓
Multiple Bypass Solenoid (SL21): Deenergized
↓
Paper take-up
↓
Multiple Bypass Solenoid (SL21): Energized
↓
Cam: Rotates
↓
Tray: Lowered
↓
Multiple Bypass Solenoid (SL21): Deenergized



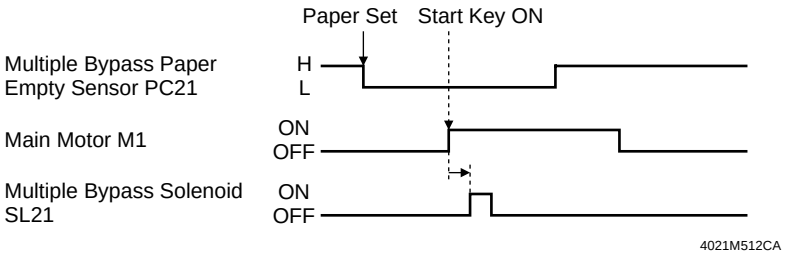
15-3. Paper Empty Detection Mechanism

- The Paper Empty Sensor detects a sheet of paper on the Multiple Bypass.

<When Paper is Present> <When Paper is not Present>



15-4. Paper Take Up Control



Elevtrical Component	Control Signal	Forward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ7A-5	L	H	17-G
	PWB-A PJ7A-7	H	H	

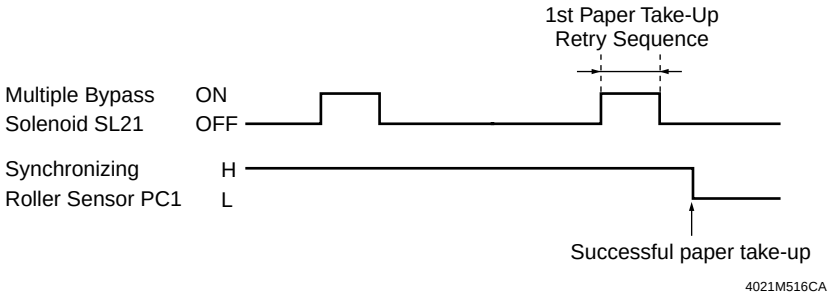
Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
SL21	PWB-A PJ4A-2	L	H	17-F

Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC21	PWB-A PJ4A-5	L	H	17-F

15-5. Paper Take Up Retry Control

- To minimize the occurrence of a paper misfeed, the paper take-up sequence is temporarily halted if the paper fails to reach the Synchronizing Roller Sensor within a given period of time after the sequence has been started. The paper take-up sequence is then performed again. These paper take-up sequences are repeated a given number of times.

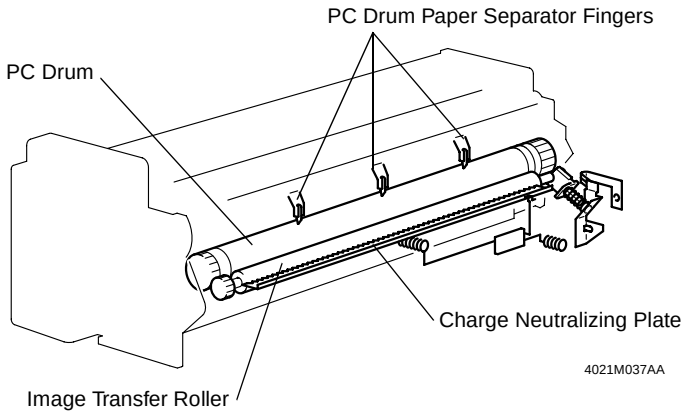
	No. of Paper Take-Up Retry Sequences
Paper Take-Up Retry	2



16. IMAGE TRANSFER AND PAPER SEPARATION SECTION

✻ Image Transfer
- A positive charge is applied to the Image Transfer Roller to transfer the toner image formed on the surface of the PC Drum onto the paper.
- The charge applied to the Image Transfer Roller is varied according to the following conditions to ensure that image transfer efficiency is stabilized.
  Paper Type: The amount of charge is made less for OHP transparencies.
  Paper width: The greater the paper width, the more the amount of charge.
  B/W ratio of the image: The higher the B/W ratio, the more the amount of charge.
- A negative charge is applied to the Image Transfer Roller to return toner sticking to the Image Transfer Roller to the PC Drum. It is performed in the following timings:
- A copy cycle is started and completed, The Power Switch is turned ON, A misfeed or a malfunction is reset.

✻ Paper Separation
- The PC Drum Paper Separator Fingers mechanically separate paper from the surface of the PC Drum to ensure good and positive paper separation.
- The Charge Neutralizing Plate is used to neutralize any charge left on the paper, to which image has been transferred, thereby preventing discharge noise that occurs when paper is separated.

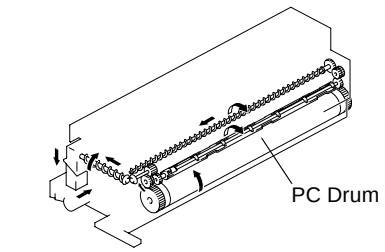


Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
HV1	PWB-A PJ8A-8	L	H	6-C

17. PC DRUM CLEANING SECTION

- The Cleaning Blade is used to scrape residual toner off the surface of the PC Drum.
- The spent toner is conveyed through the Recycling Duct and eventually back to the Developer Mixing Chamber.
- To prevent paper dust from being compacted on the edge of the Cleaning Blade, the PC Drum is turned backward (by turning the Main Motor backward) when the cumulative time through which the PC Drum has turned reaches a predetermined value. When the PC Drum is turned backward, a backlash in gears prevents drive from being transmitted to other drive mechanisms.

Cumulative Time Through Which PC Drum Has Been Driven	PC Drum Backward Rotation Time
Approx. 330 sec	50 ms

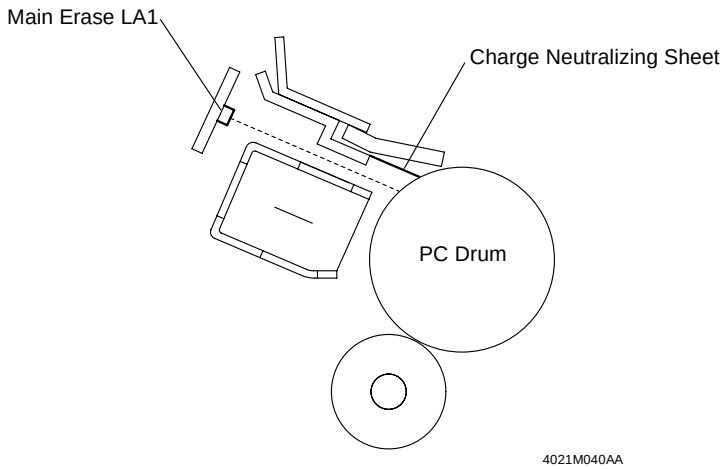


4021M039AA

4021M038AB

18. MAIN ERASE SECTION

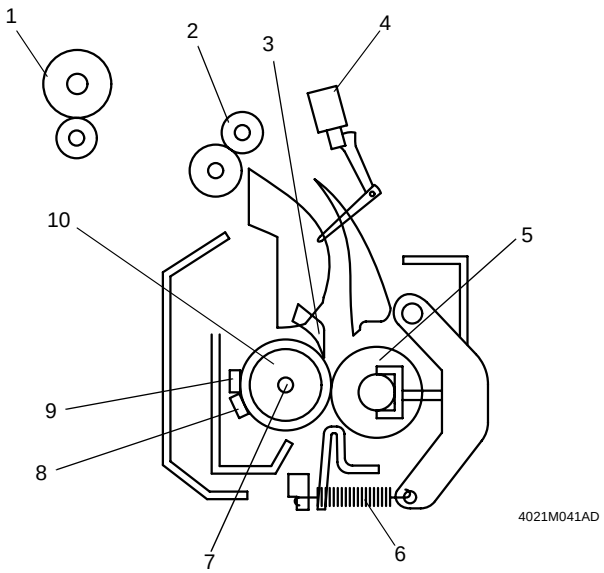
- Any potential remaining on the surface of the PC Drum is neutralized by both light from the Main Erase and a negative voltage applied by the Charge Neutralizing Sheet.
- A negative charge is applied to the Charge Neutralizing Sheet to neutralize a positive charge on the surface of the PC Drum. The Main Erase then illuminates the surface of the PC Drum to neutralize the charge left on it.



Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
LA1	PWB-A PJ7A-12	L	H	4-A

19. FUSING UNIT SECTION

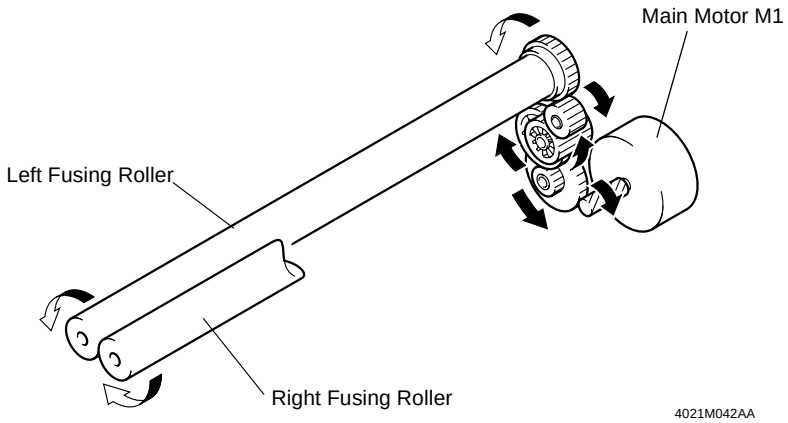
- The Fusing Unit fixes permanently the developed image to the paper by applying heat and pressure to the toner and paper.



1. Paper Exit Roller
2. Transport Roller
3. Fusing Paper Separator Finger
4. Exit Paper Sensor PC3
5. Right Fusing Roller
6. Pressure Spring
7. Fusing Heater Lamp H1
8. Thermistor TH1
9. Thermoswitch TS1
10. Left Fusing Roller

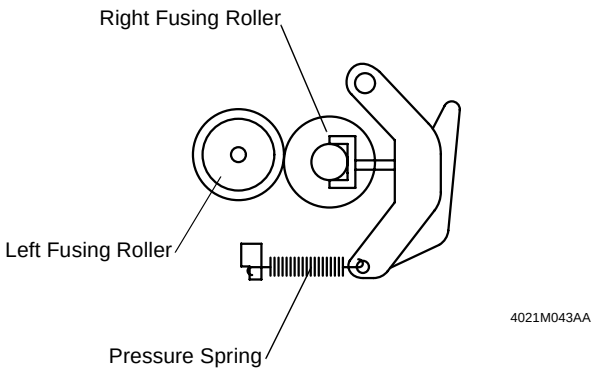
19-1. Fusing Unit Drive Mechanism

- The Fusing Unit is driven by a motor.



19-2. Fusing Rollers Pressure Mechanism

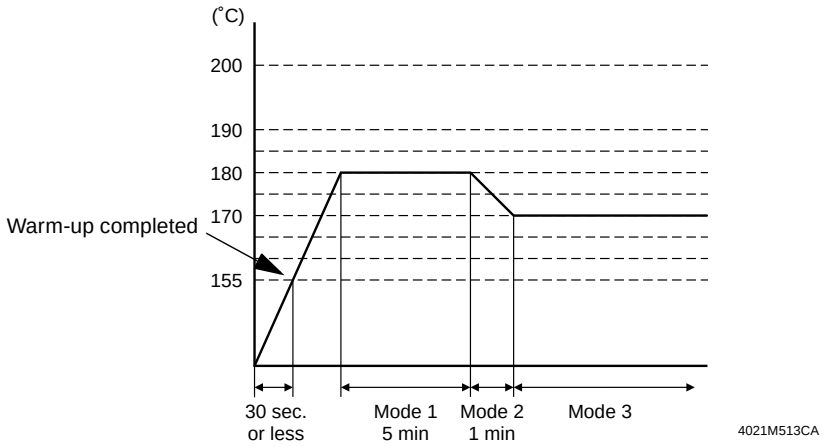
- To ensure that there is a certain width of area of contact between the Right and Left Fusing Rollers, a pressure spring is used to press the Lower Fusing Roller up against the Upper Fusing Roller.



19-3. Fusing Temperature Control

- The Fusing Roller Heater Lamp is turned ON and OFF to keep a set temperature on the surface of the Fusing Roller.
- The Fusing Roller surface temperature is detected by using a thermistor that translates the temperature to a corresponding electrical signal.
- If the Fusing Roller temperature becomes excessively high, the Fusing Roller Heater Lamp is shut down.

<Temperature Control in Standby State>



Machine Condition or Paper Type	Mode 1	Mode 2	Mode 3
Standby	180 °C	180 °C → 170 °C	170 °C
Plain paper (width 251 mm or more)	190 °C	190 °C → 170 °C	170 °C
Plain paper (width 250 mm or less)	160 °C	160 °C	160 °C
Thick paper (width 251 mm or more)	210 °C	210 °C → 190 °C	190 °C
Thick paper (width 250 mm or less)	200 °C	200 °C → 190 °C	190 °C
OHP transparencies (width 251 mm or more)	180 °C	180 °C → 165 °C	165 °C
OHP transparencies (width 250 mm or less)	155 °C	155 °C	155 °C

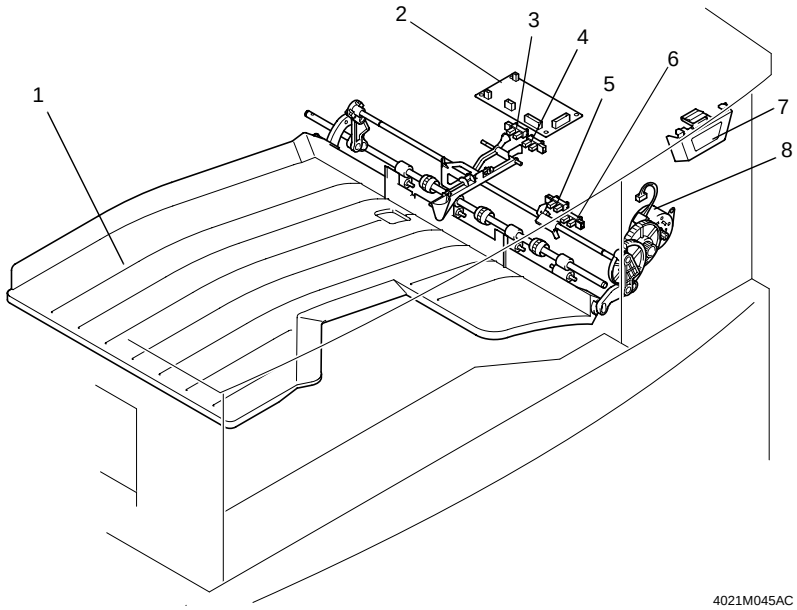
Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
H1	PWB-A PJ10A-7	L	H	1-D

19-4. CPM Control

- If paper of a small size (width of 250 mm or less) or thick paper is used to run a multi-copy cycle, the temperature on the edges of the Fusing Rollers tends to run high, meaning that the temperature of the Fusing Rollers varies among different spots of the rollers.
- When the cumulative number of copies made through continuous copy cycles* exceeds 30, the paper take-up interval is made longer, thereby allowing the temperatures of the Fusing Rollers at different spots to be uniform.

✻ Continuous copy cycle: Continuous copy cycles run with an interval of 2 min. or less between cycles.

20. JOB TRAY (JS-202): Option

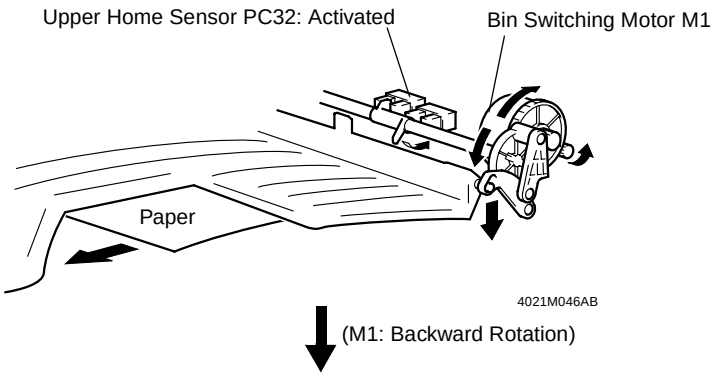


1. Job Tray
2. Main Board PWB-A
3. Paper Empty Sensor PC35
4. Full Detecting Sensor PC34
5. Upper Home Position Sensor PC32
6. Lower Home Position Sensor PC33
7. Paper Detecting Board PWB-B
8. Bin Switching Motor M1

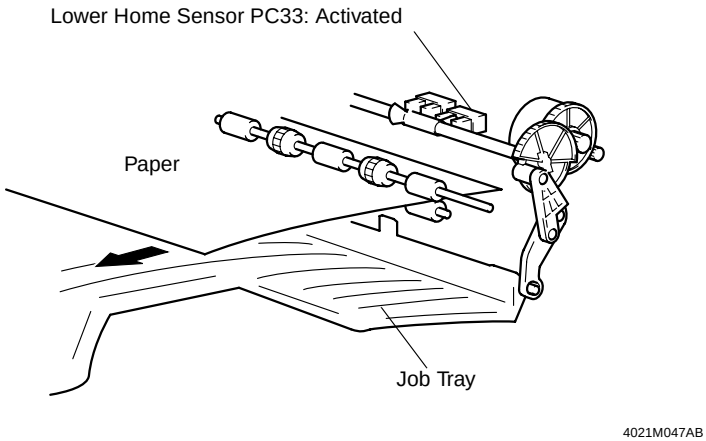
20-1. Tray Selecting Mechanism

- Paper is fed into either the Exit Tray of the machine or the Job Tray. Either is selected according to the application mode (fax, copier, or printer).
- The specific tray in which paper is fed is selected by a motor and a sensor.

<When feeding paper into the Exit Tray: Copier>



<When feeding paper into the Job Tray: fax/printer>

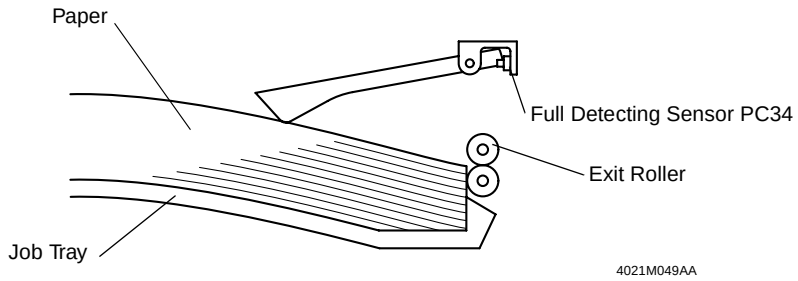


Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M1	PWB-A PJ2A-1 to 4	Pulse output		16-A

Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC32	PWB-A PJ4A-3	L	H	16-B
PC33	PWB-A PJ4A-6	L	H	

20-2. Tray-Full Detecting Mechanism

- Tray-full detection is valid only when paper is fed into the Job Tray (Job Tray in the lowered position).
- A tray-full condition is detected when the sensor is blocked for a continuous given period of time (approx. 20 sec.).

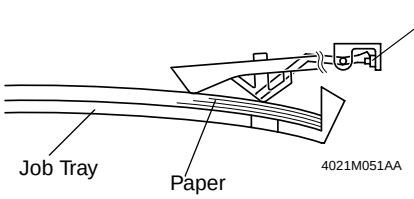


Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC34	PWB-A PJ4A-9	L	H	16-C

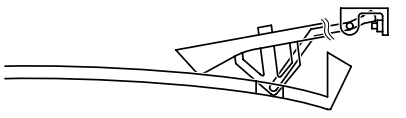
20-3. Job Tray Paper Detecting Mechanism

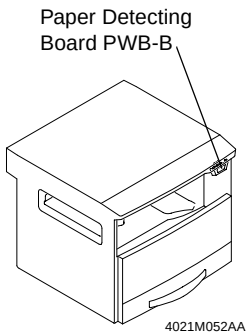
- If paper is fed into the Job Tray when the machine is in a mode in which paper is fed into the Exit Tray (Job Tray in the raise position), the indicator lamp on the Paper Detecting Board lights to warn the user that there is paper in the Job Tray.
- A sensor is provided for detecting paper in the Job Tray.

<When Paper is Present>



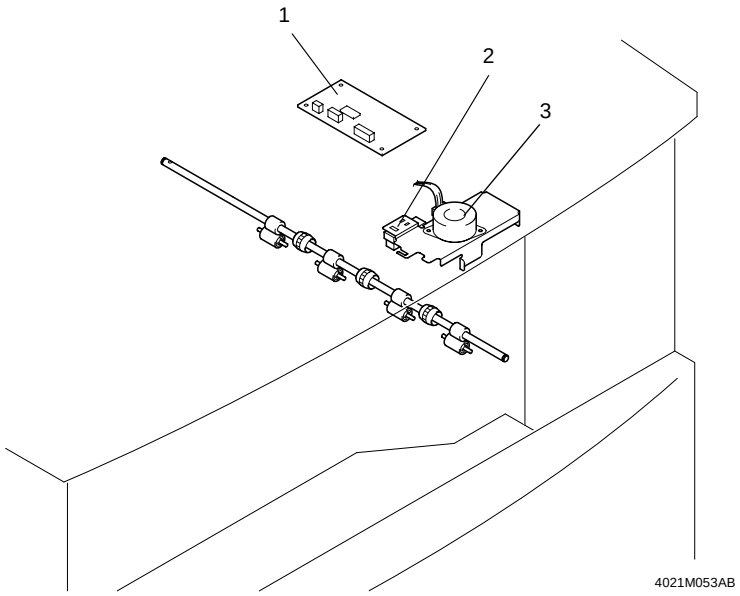
<When Paper is not Present>





Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
PC35	PWB-A PJ3A-3	L	H	18-A

21. SHIFTING UNIT (OT-103): Option



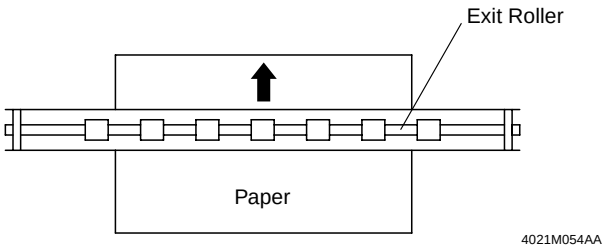
1. Main Board PWB-A
2. Home Sensor S31
3. Shift Motor M1

21-1. Exit Position Shifting Mechanism

- Paper is fed into the Shifting Unit along a straight path or shifted from the reference straight path position. This exit position shifting mechanism allows different finishing functions offered by the machine (Non-Sort, Sort, and Group) to be effected.

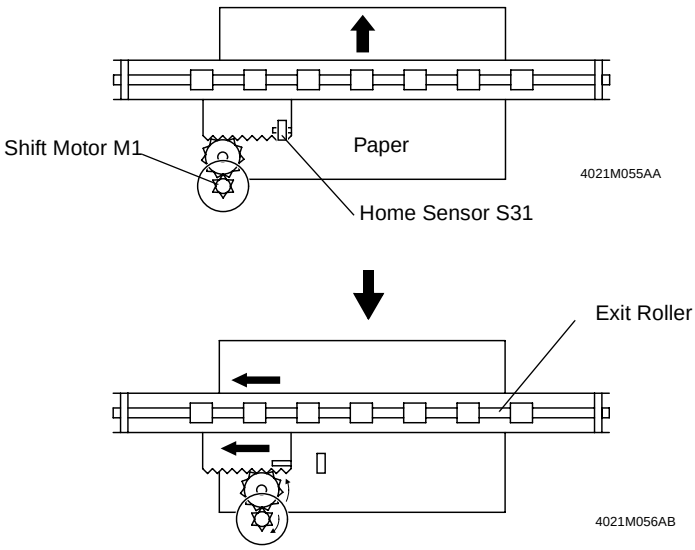
<Straight Feeding>

- The paper that travels along a straight path is fed straight into the Shifting Unit without being shifted sideways as the Exit Roller turns.



<Shifted Feeding>

- When the trailing edge of the paper transported to the exit section moves past the Fusing Roller, the Shift Motor is energized to move the Transport Roller sideways.
- The paper is fed into the Shifting Unit as it is shifted sideways.
- The Exit Roller is moved sideways by turning the motor forward or backward.
- The Exit Roller is detected at its home position by a sensor.



Elevtrical Component	Control Signal	Forward Rotation	Backward Rotation	OFF	Wiring Diagram
M1	PWB-A PJ2A-1 to 4	Pulse output			16-C

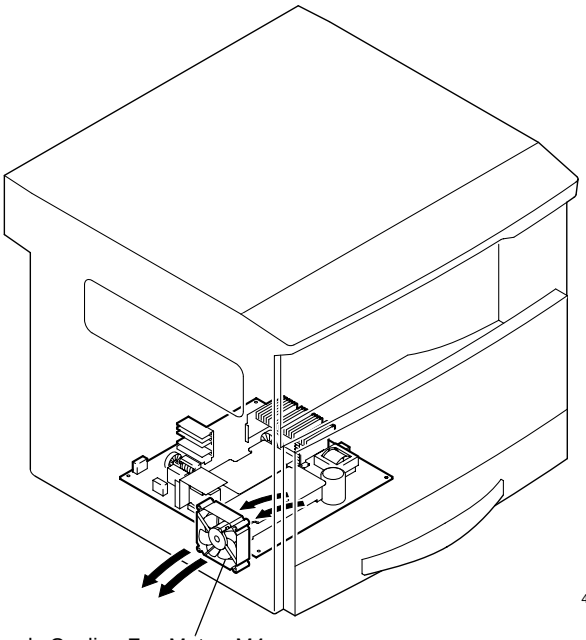
Elevtrical Component	Control Signal	Activated	Deactivated	Wiring Diagram
S31	PWB-A PJ3A-3	L	H	17-D

22. OTHER MECHANISM

22-1. Cooling Mechanism

(1) Power Supply Section Cooling Mechanism

- A cooling fan motor draws air from the area around the Power Supply Unit to the outside to prevent the Power Supply Unit temperature from running high.
- The cooling fan motor is turned at full speed when the Main Motor turns and at a speed reduction during other timings, thereby making the machine quieter without sacrificing cooling performance.

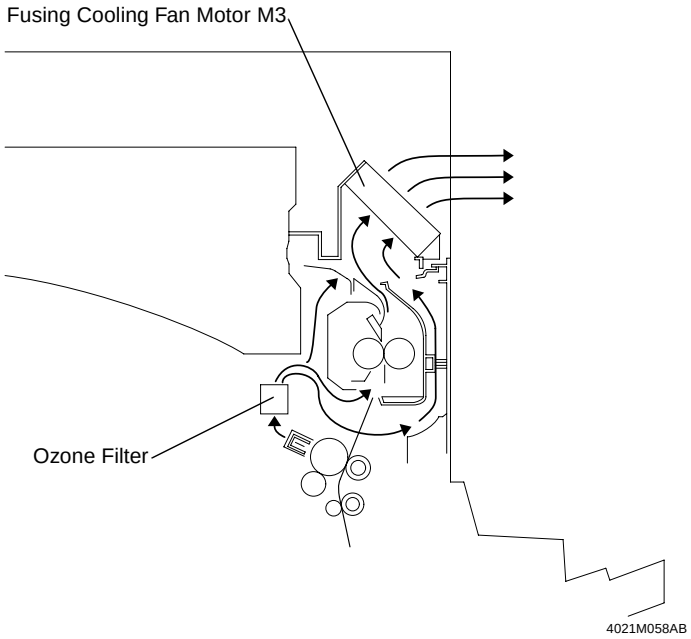


Power Supply Cooling Fan Motor M4

Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M4	PWB-A PJ19A-1	analog voltage output	H	11-I

(2) Fusing Section Cooling Mechanism

- A fan motor draws air from the area around the Fusing Unit to the outside to prevent the machine interior temperature from running high. In addition, the fan motor pulls paper being transported up through suction force to help stabilize paper transport.
- Ozone produced from the PC Drum Charge Corona is absorbed by the Ozone Filter from the air drawn by a fan motor to the outside.
- The fan motor is turned at full speed during a print cycle and at a speed reduction during other timings, thereby making the machine quieter without sacrificing cooling performance.



Elevtrical Component	Control Signal	ON	OFF	Wiring Diagram
M3	PWB-A PJ10A-4	analog voltage output	H	1-C



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