MINOLTA

Service Manual
[General]

The essentials of imaging

Di850

Dual references may be used on the following:

Official Options name	:	Popular Options name
EDH-5	:	RADF
C-403/C-404	:	LT and LCT
FN-115	:	FNS
FN-7	:	FNS
Cover Inserte Cr	:	PI
PK-3	:	PU
TMG-2		TU
ZK-2	:	PZ
In-System Writer	:	ISW

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1.OUTLINE

2.UNIT EXPLANATION

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SAFETY AND IMPORTANT WARNING ITEMS

Read carefully the Safety and Important Warning Items described below to understand them before doing service work.

IMPORTANT NOTICE

Because of possible hazards to an inexperienced person servicing this copier as well as the risk of damage to the copier, Minolta Corporation strongly recommends that all servicing be performed only by Minolta-trained service technicians.
Changes may have been made to this copier to improve its performance after this Service Manual was printed. Accordingly, Minolta Corporation does not warrant, either explicitly or implicitly, that the information contained in this Service Manual is complete and accurate.
The user of this Service Manual must assume all risks of personal injury and/or damage to the copier while servicing the copier for which this Service Manual is intended.
Therefore, this Service Manual must be carefully read before doing service work both in the course of technical training and even after that, for performing maintenance and control of the copier properly.
Keep this Service Manual also for future service.

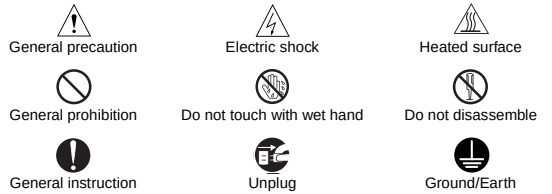
DANGER, WARNING, AND CAUTION SYMBOLS AND EXPRESSIONS

In this Service Manual, each of three expressions " ⚠DANGER," " ⚠WARNING," and " ⚠CAUTION" is defined as follows together with a symbol mark to be used in a limited meaning.
When servicing the copier, the relevant works (disassembling, reassembling, adjustment, repair, maintenance, etc.) need to be conducted with utmost care.

⚠DANGER :Action having a high possibility of suffering death or serious injury
⚠WARNING :Action having a possibility of suffering death or serious injury
⚠CAUTION :Action having a possibility of suffering a slight wound, medium trouble, and property damage

Symbols used for important warning items are defined as follows:

△:Precaution
⃠:Prohibition
●:Direction

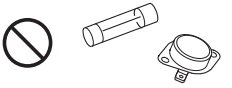
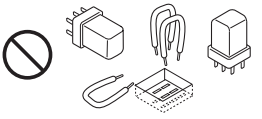
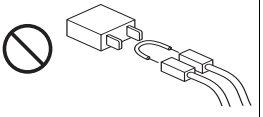
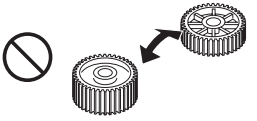


SAFETY WARNINGS

[1] MODIFICATIONS NOT AUTHORIZED BY MINOLTA

Minolta copiers are renowned for their high reliability. This reliability is achieved through high-quality design and a solid service network.

Copier design is a highly complicated and delicate process where numerous mechanical, physical, and electrical aspects have to be taken into consideration, with the aim of arriving at proper tolerances and safety factors. For this reason, unauthorized modifications involve a high risk of degradation in performance and safety. Such modifications are therefore strictly prohibited. the points listed below are not exhaustive, but they illustrate the reasoning behind this policy.

⚠PROHIBITED ACTIONS:	
• Using any cables or power cord not specified by Minolta.	
• Using any fuse or thermostat not specified by Minolta. Safety will not be assured, leading to a risk of fire and injury.	
• Disabling fuse functions or bridging fuse terminals with wire, metal clips, solder or similar object.	
• Disabling relay functions (such as wedging paper between relay contacts)	
• Disabling safety functions (interlocks, safety circuits, etc.) Safety will not be assured, leading to a risk of fire and injury.	
• Making any modification to the copier unless instructed by Minolta	
• Using parts not specified by Minolta	

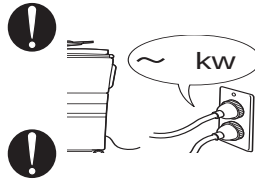
[2] CHECKPOINTS WHEN PERFORMING ON-SITE SERVICE

Minolta copiers are extensively tested before shipping, to ensure that all applicable safety standards are met, in order to protect the customer and customer engineer (hereafter called the CE) from the risk of injury. However, in daily use, any electrical equipment may be subject to parts wear and eventual failure. In order to maintain safety and reliability, the CE must perform regular safety checks.

1.Power Supply

⚠WARNING: Wall Outlet

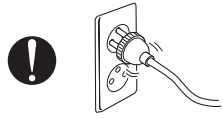
- Check that mains voltage is as specified. Plug the power cord into the dedicated wall outlet with a capacity greater than the maximum power consumption.
  If excessive current flows in the wall outlet, fire may result.



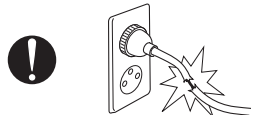
- If two or more power cords can be plugged into the wall outlet, the total load must not exceed the rating of the wall outlet.
  If excessive current flows in the wall outlet, fire may result.

⚠WARNING: Power Plug and Cord

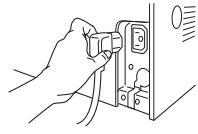
- Make sure the power cord is plugged in the wall outlet securely.
  Contact problems may lead to increased resistance, overheating, and the risk of fire.



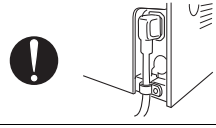
- Check whether the power cord is damaged. Check whether the sheath is damaged.
  If the power plug, cord, or sheath is damaged, replace with a new power cord (with plugs on both ends) specified by Minolta. Using the damaged power cord may result in fire or electric shock.



- When using the power cord (inlet type) that came with this copier, be sure to observe the following precautions:
  a. Make sure the copier-side power plug is securely inserted in the socket on the rear panel of the copier.
     Secure the cord with a fixture properly.
  b. If the power cord or sheath is damaged, replace with a new power cord (with plugs on both ends) specified by Minolta.
     If the power cord (inlet type) is not connected to the copier securely, a contact problem may lead to increased resistance, overheating, and risk of fire.

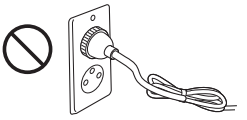


- Check whether the power cord is not stepped on or pinched by a table and so on.
  Overheating may occur there, leading to a risk of fire.

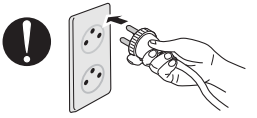


⚠WARNING: Power Plug and Cord

- Do not bundle or tie the power cord.
  Overheating may occur there, leading to a risk of fire.

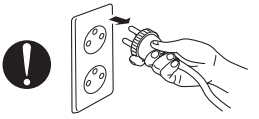


- Check whether dust is collected around the power plug and wall outlet.
  Using the power plug and wall outlet without removing dust may result in fire.



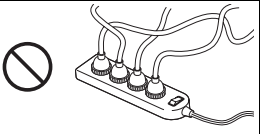
- Do not insert the power plug into the wall outlet with a wet hand.
  The risk of electric shock exists.

- When unplugging the power cord, grasp the plug, not the cable.
  The cable may be broken, leading to a risk of fire and electric shock.

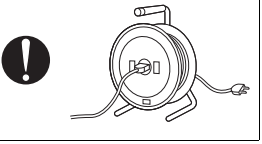


⚠WARNING: Wiring

- Never use multi-plug adapters to plug multiple power cords in the same outlet.
  If used, the risk of fire exists.

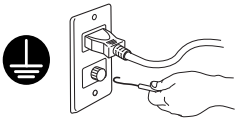


- When an extension cord is required, use a specified one.
  Current that can flow in the extension cord is limited, so using a too long extension cord may result in fire.
  Do not use an extension cable reel with the cable taken up. Fire may result.



⚠WARNING: Ground Lead

- Check whether the copier is grounded properly.
  If current leakage occurs in an ungrounded copier, you may suffer electric shock while operating the copier. Connect the ground lead to one of the following points:
  a. Ground terminal of wall outlet
  b. Ground terminal for which Class D work has been done



⚠WARNING: Ground Lead

- Pay attention to the point to which the ground lead is connected.
  Connecting the ground lead to an improper point such as the points listed below results in a risk of explosion and electric shock:
  a. Gas pipe (A risk of explosion or fire exists.)
  b. Lightning rod (A risk of electric shock or fire exists.)
  c. Telephone line ground (A risk of electric shock or fire exists in the case of lightning.)
  d. Water pipe or faucet (It may include a plastic portion.)

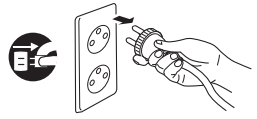
2.Installation Requirements

⚠WARNING: Prohibited Installation Place

- Do not place the copier near flammable materials such as curtains or volatile materials that may catch fire.
  A risk of fire exists.
- Do not place the copier in a place exposed to water such as rain water.
  A risk of fire and electric shock exists.

⚠WARNING: Nonoperational Handling

- When the copier is not used over an extended period of time (holidays, etc.), switch it off and unplug the power cord.
  Dust collected around the power plug and outlet may cause fire.



⚠CAUTION: Temperature and Humidity

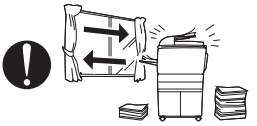
- Do not place the copier in a place exposed to direct sunlight or near a heat source such as a heater.
  A risk of degradation in copier performance or deformation exists.
  Do not place the copier in a place exposed to cool wind.
  Recommended temperature and humidity are as follows:
  Temperature: 10°C to 30°C 50°F to 86°F
  Humidity: 10% to 80% (no dew condensation)
  Avoid other environments as much as possible.

⚠CAUTION: Ventilation

- Do not place the copier in a place where there is much dust, cigarette smoke, or ammonia gas.
  Place the copier in a well ventilated place to prevent machine problems and image faults.

⚠CAUTION: Ventilation

- The copier generates ozone gas during operation, but it is not sufficient to be harmful to the human body.
  If a bad smell of ozone is present in the following cases, ventilate the room.
  a. When the copier is used in a poorly ventilated room
  b. When taking a lot of copies
  c. When using multiple copiers at the same time



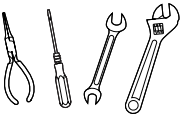
⚠CAUTION: Vibration

- When installing the copier, read the Installation Guide thoroughly. Be sure to install the copier in a level and sturdy place.
  Constant vibration will cause problems.

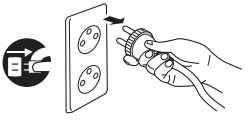
- Be sure to lock the caster stoppers.
  In the case of an earthquake and so on, the copier may slide, leading to a injury.

⚠CAUTION: Inspection before Servicing

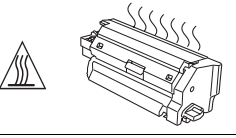
- Before conducting an inspection, read all relevant documentation (Service Manual, technical notices, etc.) and proceed with the inspection following the prescribed procedure, using only the prescribed tools. Do not make any adjustment not described in the documentation.
  If the prescribed procedure or tool is not used, the copier may break and a risk of injury or fire exists.



- Before conducting an inspection, be sure to disconnect the power plugs from the copier and options.
  When the power plug is inserted in the wall outlet, some units are still powered even if the POWER switch is turned OFF. A risk of electric shock exists.

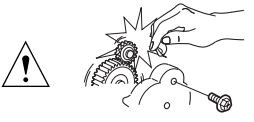


- The area around the fixing unit is hot.
  You may get burnt.



⚠DANGER: Work Performed with the Copier Powered

- Take every care when making adjustments or performing an operation check with the copier powered.
  If you make adjustments or perform an operation check with the external cover detached, you may touch live or high-voltage parts or you may be caught in moving gears or the timing belt, leading to a risk of injury.



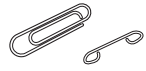
⚠DANGER: Work Performed with the Copier Powered

- Take every care when servicing with the external cover detached.
  High-voltage exists around the drum unit. A risk of electric shock exists.

⚠WARNING: Safety Checkpoints

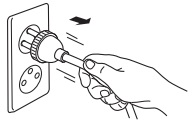
- Check the exterior and frame for edges, burrs, and other damages.
  Personal injuries may result.

- Do not allow any metal parts such as clips, staples, and screws to fall into the copier.
  They can short internal circuits and cause electric shock or fire.



- Check wiring for squeezing and any other damage.
  Current can leak, leading to a risk of electric shock or fire.

- When disconnecting connectors, grasp the connector, not the cable.
  (Specifically, connectors of the AC line and high-voltage parts)
  Current can leak, leading to a risk of electric shock or fire.



- Carefully remove all toner remnants and dust from electrical parts and electrode units such as a charging corona unit.
  Current can leak, leading to a risk of copier trouble or fire.

- Check high-voltage cables and sheaths for any damage.
  Current can leak, leading to a risk of electric shock or fire.

- Check electrode units such as a charging corona unit for deterioration and sign of leakage.
  Current can leak, leading to a risk of trouble or fire.

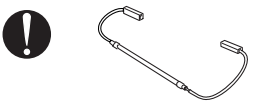
- Before disassembling or adjusting the write unit incorporating a laser, make sure that the power cord has been disconnected.
  The laser light can enter your eye, leading to a risk of loss of eyesight.

- Do not remove the cover of the write unit. Do not supply power with the write unit shifted from the specified mounting position.
  The laser light can enter your eye, leading to a risk of loss of eyesight.

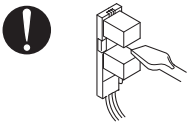
- When replacing a lithium battery, replace it with a new lithium battery specified in the Parts Guide Manual. Dispose of the used lithium battery using the method specified by local authority.
  Improper replacement can cause explosion.

⚠WARNING: Safety Checkpoints

- After replacing a part to which AC voltage is applied (e.g., optical lamp and fixing lamp), be sure to check the installation state.
  A risk of fire exists.



- Check the interlock switch and actuator for loosening and check whether the interlock functions properly.
  If the interlock does not function, you may receive an electric shock or be injured when you insert your hand in the copier (e.g., for clearing paper jam).

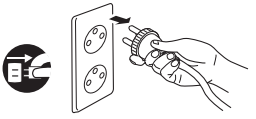


- Make sure the wiring cannot come into contact with sharp edges, burrs, or other pointed parts.
  Current can leak, leading to a risk of electric shock or fire.

- Make sure that all screws, components, wiring, connectors, etc. that were removed for safety check and maintenance have been reinstalled in the original location. (Pay special attention to forgotten connectors, pinched cables, forgotten screws, etc.)
  A risk of copier trouble, electric shock, and fire exists.

⚠HANDLING OF MATERIALS FOR SERVICING

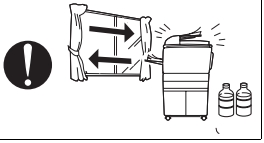
- Unplug the power cord from the wall outlet.
  Drum cleaner (isopropyl alcohol) and roller cleaner (acetone-based) are highly flammable and must be handled with care. A risk of fire exists.



- Do not replace the cover or turn the copier ON before any solvent remnants on the cleaned parts have fully evaporated.
  A risk of fire exists.

- Use only a small amount of cleaner at a time and take care not to spill any liquid. If this happens, immediately wipe it off.
  A risk of fire exists.

- When using any solvent, ventilate the room well.
  Breathing large quantities of organic solvents can lead to discomfort.



⚠ DANGER: HANDLING OF MATERIALS FOR SERVICING

- Toner and developer are not harmful substances, but care must be taken not to breathe excessive amounts or let the substances come into contact with eyes, etc. It may be stimulative.
  If the substances get in the eye, rinse with plenty of water immediately. When symptoms are noticeable, consult a physician.

- Never throw the used cartridge and toner into fire.
  You may be burned due to dust explosion.

[3] CONCLUSION

1. Safety of users and customer engineers depends highly on accurate maintenance and administration. Therefore, safety can be maintained by the appropriate daily service work conducted by the customer engineer.
2. When performing service, each copier on the site must be tested for safety. The customer engineer must verify the safety of parts and ensure appropriate management of the equipment.

SAFETY INFORMATION

IMPORTANT INFORMATION

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products manufactured since August 1, 1976. Compliance is mandatory for products marketed in the United States.

This copier is certified as a “Class 1” laser product under the U.S.
Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. Since radiation emitted inside this copier is completely confined within protective housings and external covers, the laser beam cannot escape during any phase of normal user operation.

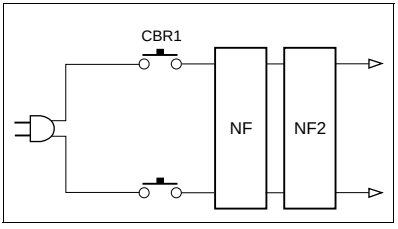
SAFETY CIRCUITS

This machine is provided with the following safety circuits to prevent machine faults from resulting in serious accidents.

[1] Overall protection circuit
[2] L2 and L4 (fixing heater lamps) overheating prevention circuit

These safety circuits are described below to provide the service engineer with a renewed awareness of them in order to prevent servicing errors that may impair their functions.

[1] Overall Protection Circuit

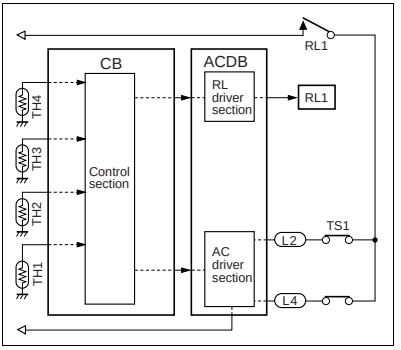


1. Protection by CBR1 and CBR2 (circuit breakers)

CBR1 interrupt the AC line instantaneously when an excessive current flows due to a short in the AC line.

⚠CAUTION:
The CBR1 and CBR2 functions must not be deactivated under any circumstances.

[2] Protection by L2 and L4 (fixing heater lamps) overheating prevention circuit



1. Protection by software

The output voltage from TH1 (fixing temperature sensor 1) is read by the CPU. If this voltage is abnormal, L2 (fixing heater lamp 1), and L4 (fixing heater lamp 3), and RL1 (main relay) are turned OFF.

⚠CAUTION:
Do not change the gap between the roller and TH1. When repl-acing TH1, check the specified mounting dimensions.
The RL1 function must not be deactivated under any circum-stances.

2. Protection by the hardware circuit

The output voltages from TH1 and TH2 (fixing temperature sensor 2), TH3 (fixing temperature sensor 3), and TH4 (fixing temperature sensor 4) are compared with the abnormality judgement reference value in the comparator circuit. If the output voltage from TH1, TH2, TH3, or TH4 exceeds the reference value, L2, L4, and RL1 are turned off in hardware means.

⚠**CAUTION:**

Periodically check the TH2 and TH4 faces contacting the roller, and replace TH2 and/or TH4 if any abnormality is detected. Do not change the gap between the roller and each sensor TH2 and TH4. When replacing TH2 or TH4, check the specified mounting dimensions.

The RL1 function must not be deactivated under any circum-stances.

3. Protection by TS1 (thermostat (upper)) and TS2 (thermostat (lower))

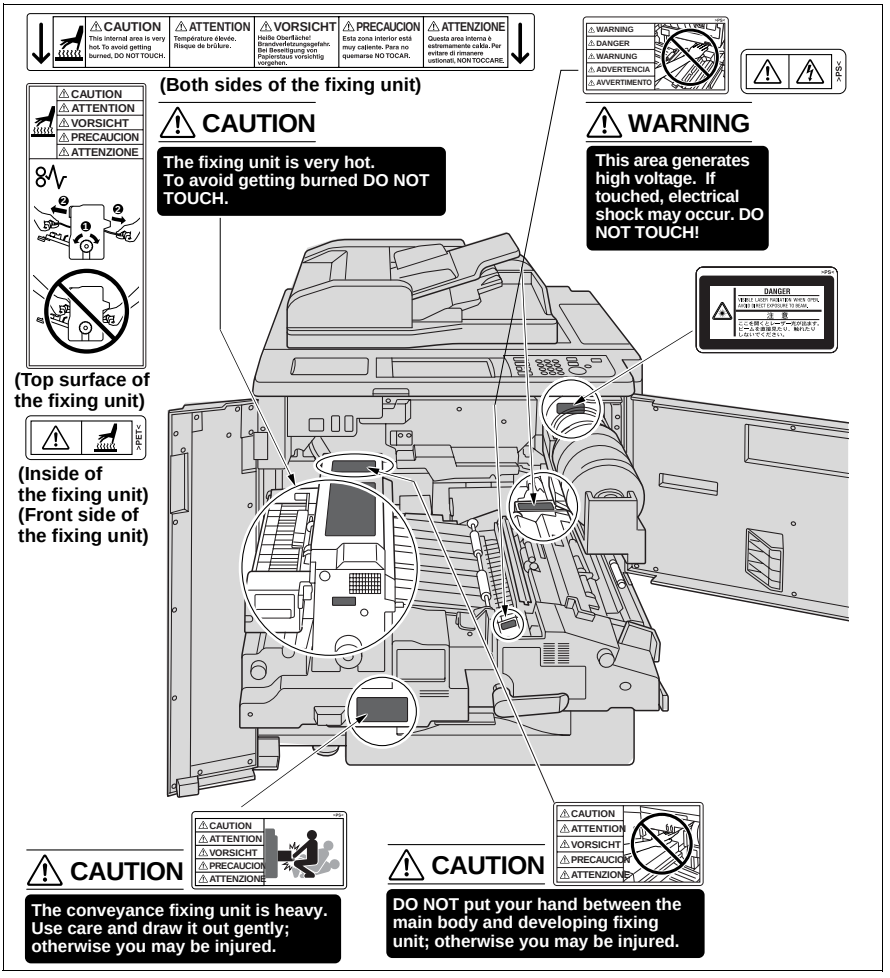
TS1 is turned off when the temperature of the fixing roller (upper) exceeds the specified value, and TS2 is turned off when the temperature of the heating (upper) roller exceeds the specified value, thus interrupting the power to L2 and L4 directly.

⚠**CAUTION:**

Do not use any other electrical conductor in place of TS1 and TS2.

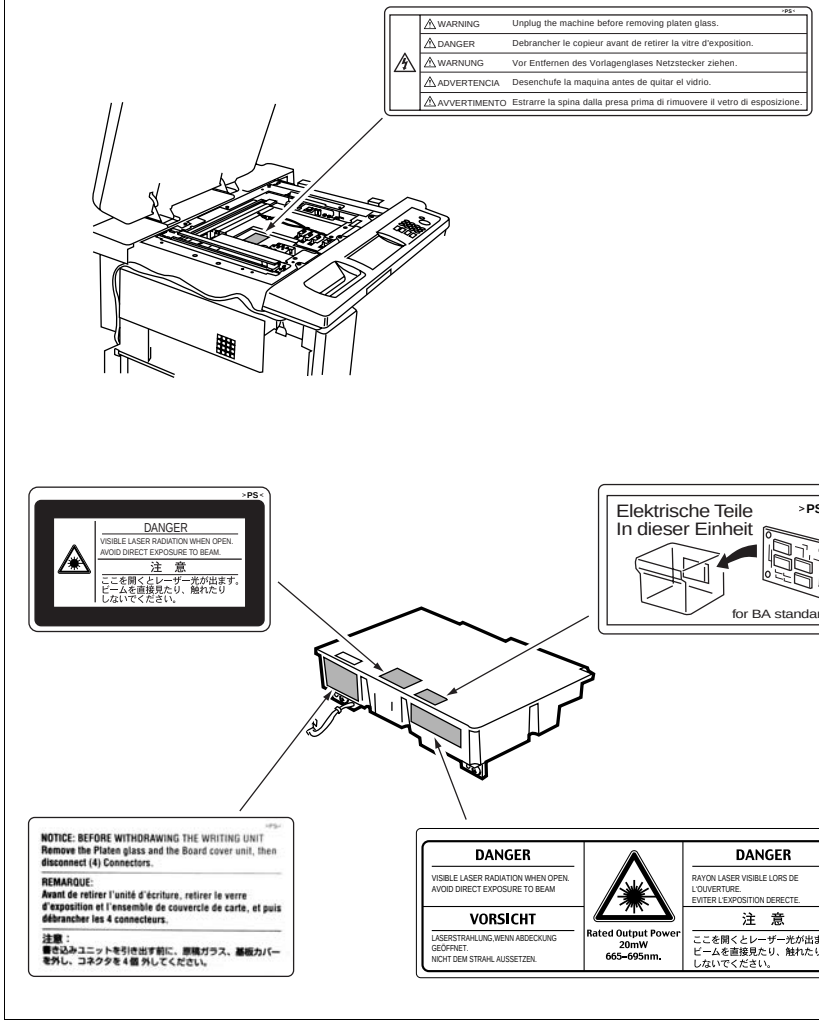
INDICATION OF WARNING ON THE MACHINE

Caution labels shown below are attached in some areas on/in the machine areas.
When accessing these areas for maintenance, repair, or adjustment, special care should be taken to avoid burns and shock hazards.



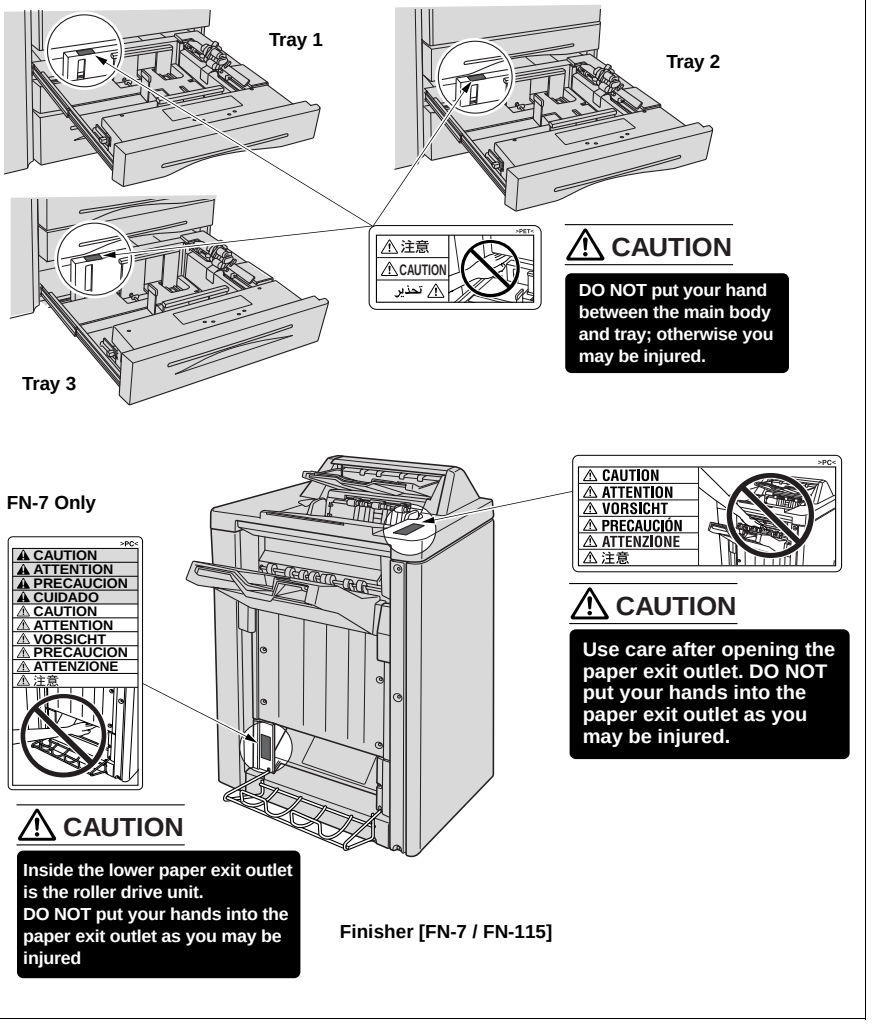
⚠CAUTION

Please adhere to all caution labels to avoid burns or injury.



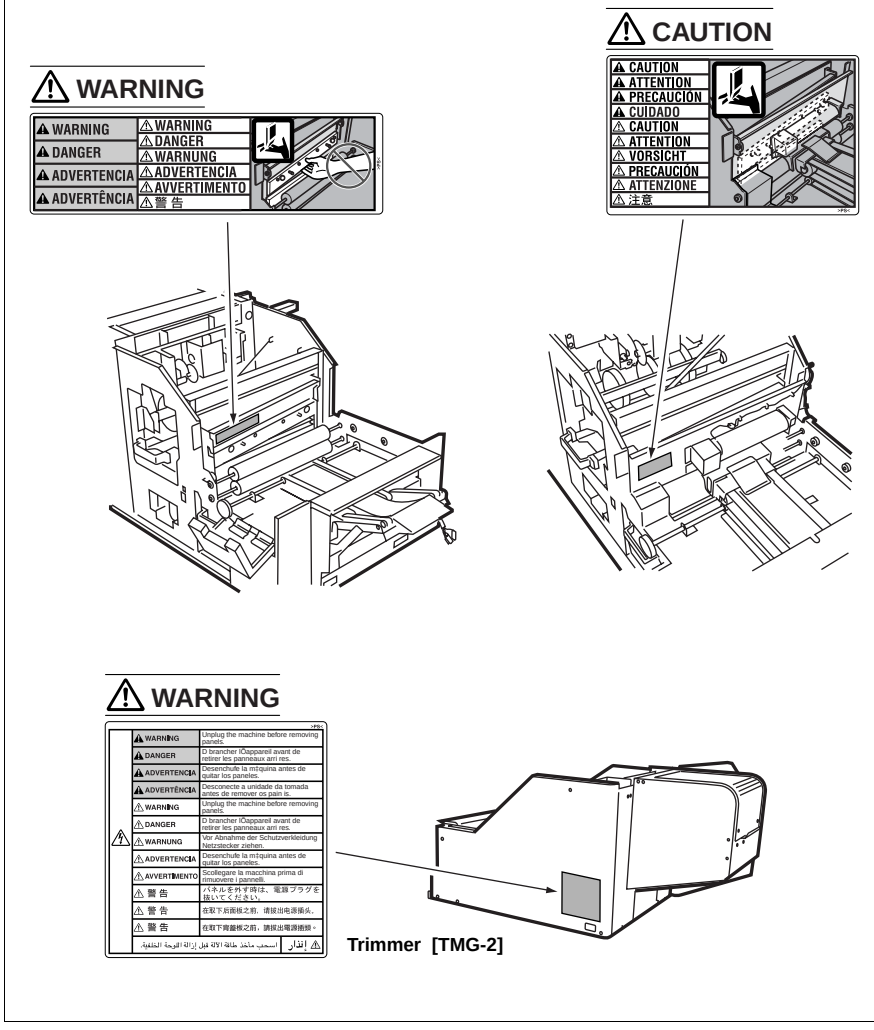
⚠CAUTION

Please adhere to all caution labels to avoid burns or injury.



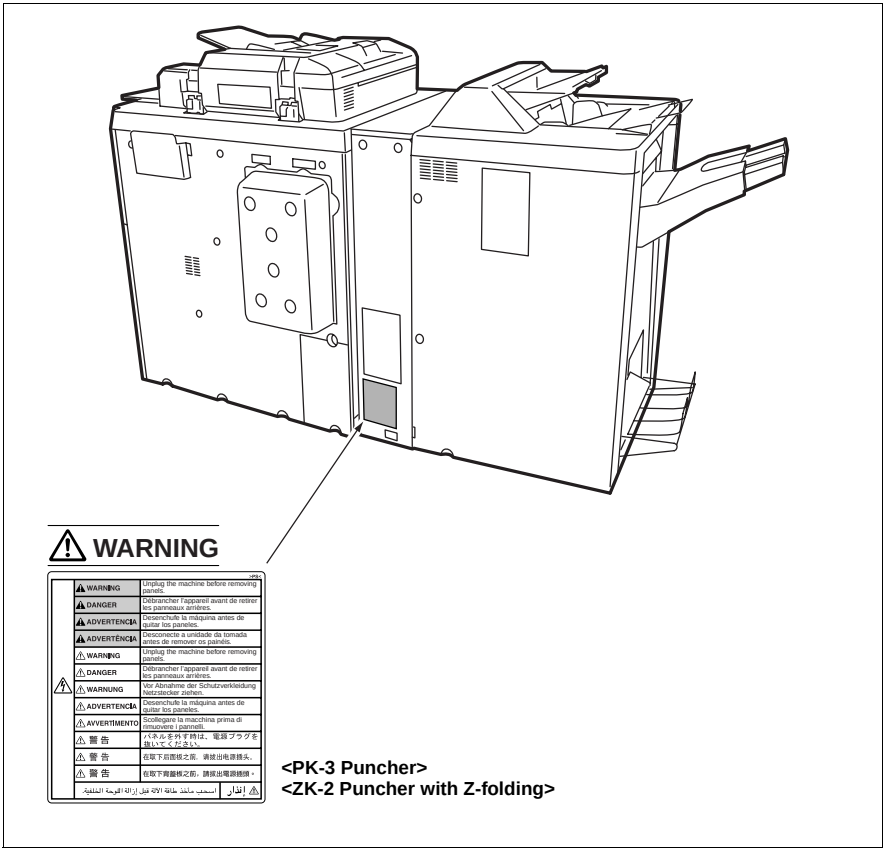
⚠CAUTION

Please adhere to all caution labels to avoid burns or injury.



⚠CAUTION

Please adhere to all caution labels to avoid burns or injury.



<PK-3 Puncher>
<ZK-2 Puncher with Z-folding>

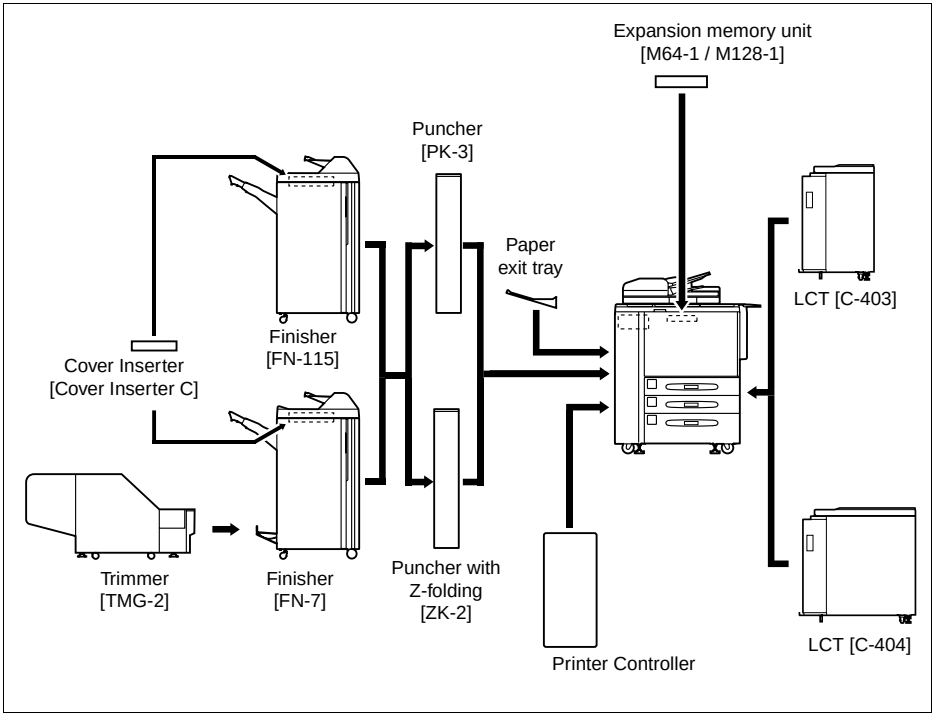
⚠CAUTION

Please adhere to all caution labels to avoid burns or injury.

1

OUTLINE

OUTLINE OF SYSTEM



PRODUCT SPECIFICATIONS

[1] Type

Installation Type:
Console type (floor-mounted type)

Copying method:
Indirect electrostatic method

Document tray type:
Fixed

Photosensitive material:
OPC

Sensitizing method:
Laser writing

Paper feed trays:
Three stacked trays (two for 500 sheets of 80 g/m^2 or 20lbs. paper; one for 1000 sheets of 80 g/m^2 or 20lbs. paper)
A by-pass tray for various paper sizes (150 sheets of 80 g/m^2 or 20 lbs. paper)
LCT (4000 sheets of 80 g/m^2 or 20 lbs. paper)*1
*1: Optional

[2] Functions

Applicable document types:
Sheets, book, solid object

Document size:
A3 (11x17) max.

Copy paper size:
- Metric area
  A3 to A5, 11x17 to 8.5 x11, F4
- Inch Area
  11x17 to 8.5 x5.5, A3 to B5R, F4
  Wide paper (max. 314x445mm)*2

*2: When using C404

Paper size for ADU paper passage:
Max. 314 x 459 mm to A5 or
8.5 x 5.5 min.

Magnifications

Fixed magnifications:
- Metric area
  x1.00, x2.00, x1.41, x1.22, x1.15, x0.86, x0.82, x0.71, x0.50
- Inch Area
  x1.00, x4.00, x2.00, x1.55, x1.29, x0.77, x0.65, x0.50

Special ratio magnifications:
3 modes

Zoom magnifications:
x0.25 to x4.00 (600 dpi, in 1% steps)

Vertical magnifications:
x0.25 to x4.00 (600 dpi, in 1% steps)

Horizontal magnifications:
x0.25 to x4.00 (600 dpi, in 1% steps)

Warm-up time:
Less than 6 minutes*2
*2: 6 minutes is the machine for the 230VAC specification.
Warm-up time differs depending on the Power source (voltage).

First copy out time:

Mode	A4, 8.5x11
Manual	3.3 seconds or less

*Straight paper ejection with the copied image facing up, platen mode, life size, paper feed from tray 1

Continuous copy speed (life size, copies/min):

Size	cpm
A4, 8.5x11	85

Continuous copy count:
1 to 9999

Copy density selections:
AE, manual
Arbitrary density (2 modes)

E-RDH memory capacity:
standard 128 MB
maximum 512 MB

[3] Applicable Copy Paper

Plain paper:

High quality paper 60 to 90 g/m^2 or 17 to 24 lbs

Special paper:

High quality paper

50 to 59 g/m^2 , 91 to 170 g/m^2 or 13 to 16 lbs, 24 to 40 lbs

Bypass feed only:

Label paper

OHP Film

Blueprint master paper

Tray feed only:

High quality paper

171 to 200 g/m^2 or 40 to 45 lbs

ADU paper passage:

High quality paper

60 to 200 g/m^2 or 17 to 45 lbs

[4] Options

LCT: C-403 / C-404

Expansion memory unit:

M64-1: 64MB

M128-1: 128MB

Finisher: FN-115 / FN-7

Post inserter: Cover Inserter C

Trimmer: TMG-2

Puncher: PK-3

Puncher with Z-folding :ZK-2

Paper exit tray

Printer Controller:

[5] Particulars of Machine

Power supply:

230 VAC EURO: -14 to 10.6 %
USA : ±10 %

50 Hz/ 60 Hz

208 to 240 VAC 60 Hz

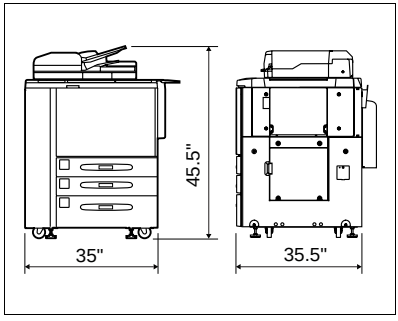
Power consumption:

230 V Machine: 3450 W max. (Full option)

208 to 240 V Machine: 3840 W max. (Full option)

Weight: Approx. 280 kg (617 lbs.)

Machine dimensions:



[6] Maintenance and Life

Periodic maintenance:

Every 500,000 copies

Machine life:

30,000,000 copies or 5 years

[7] Consumables

Developer: Exclusively for Minolta Di850

Toner : Exclusively for Minolta Di850

Drum: Exclusively for Minolta Di850 (ø100)

[8] Environmental Conditions

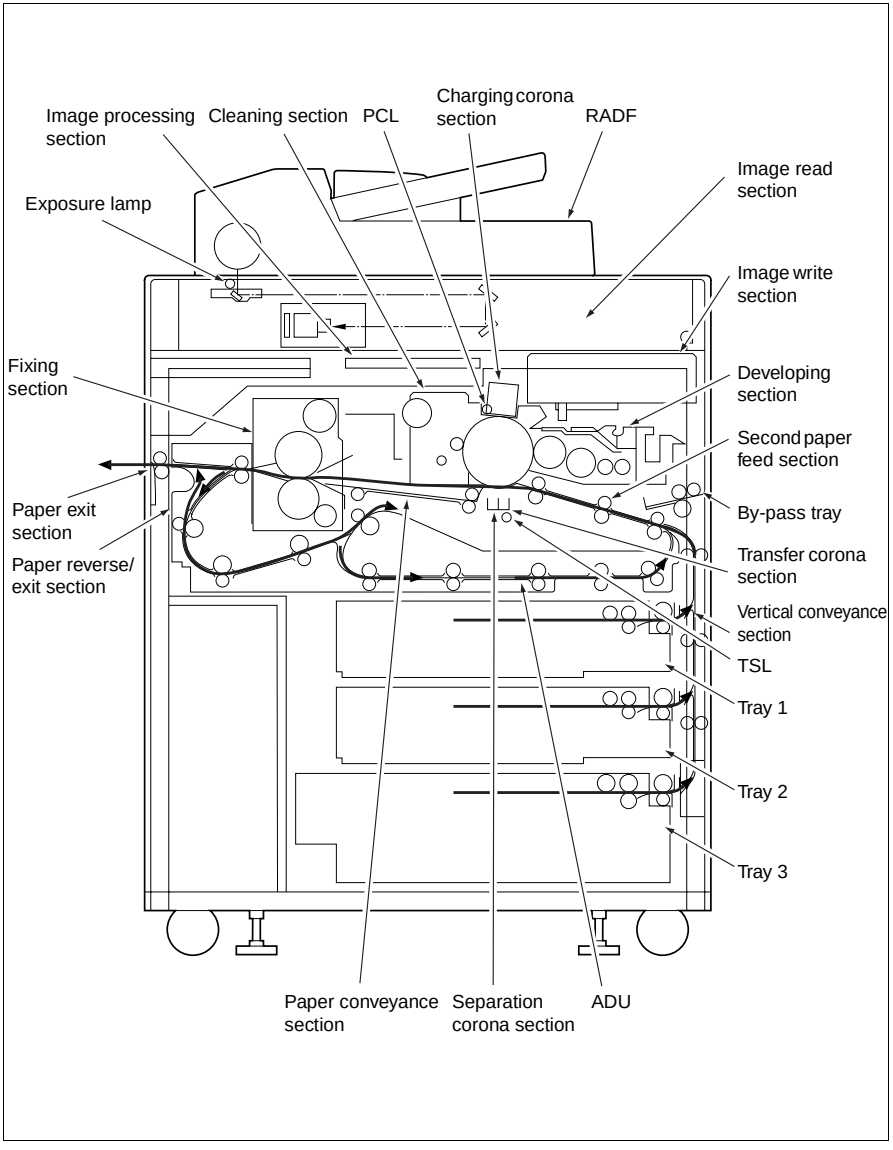
Temperature:

10°C to 30°C (50°F to 86°F)

Humidity: 10% to 80% RH

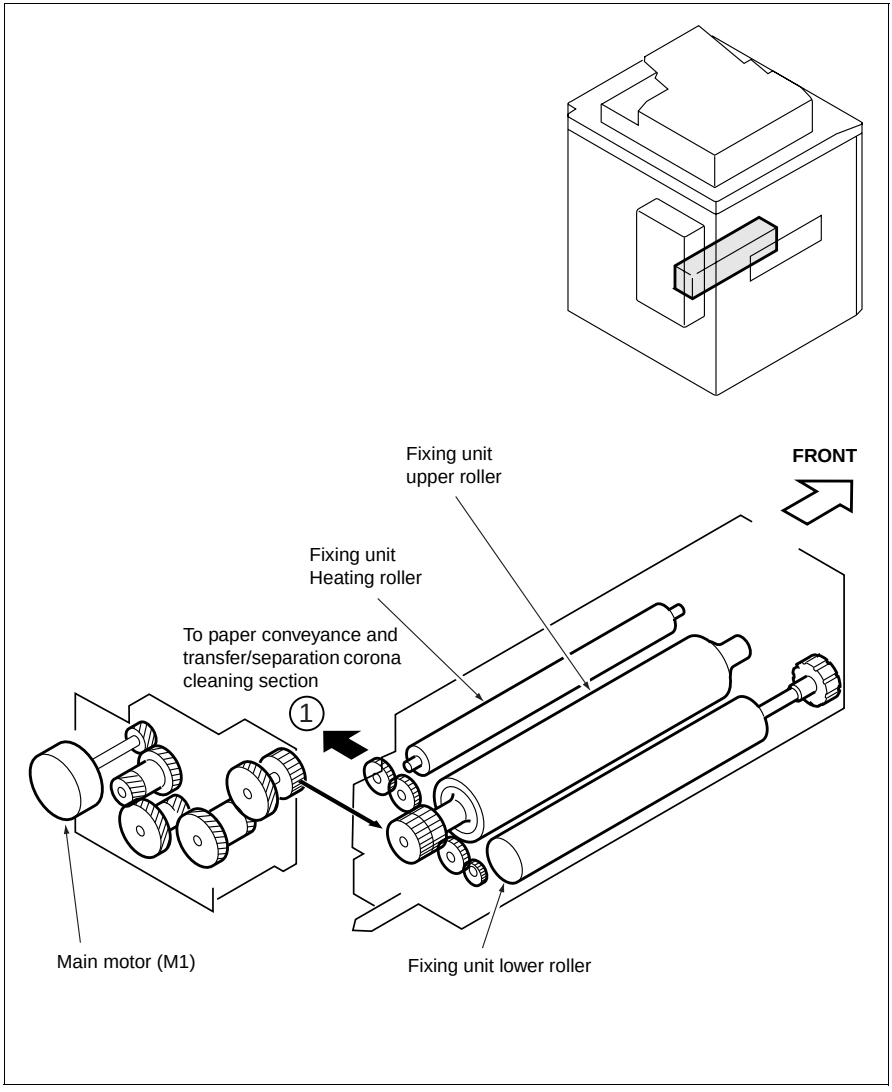
Note: The information herein may subject to change for improvement without notice.

CENTER CROSS-SECTIONAL VIEW

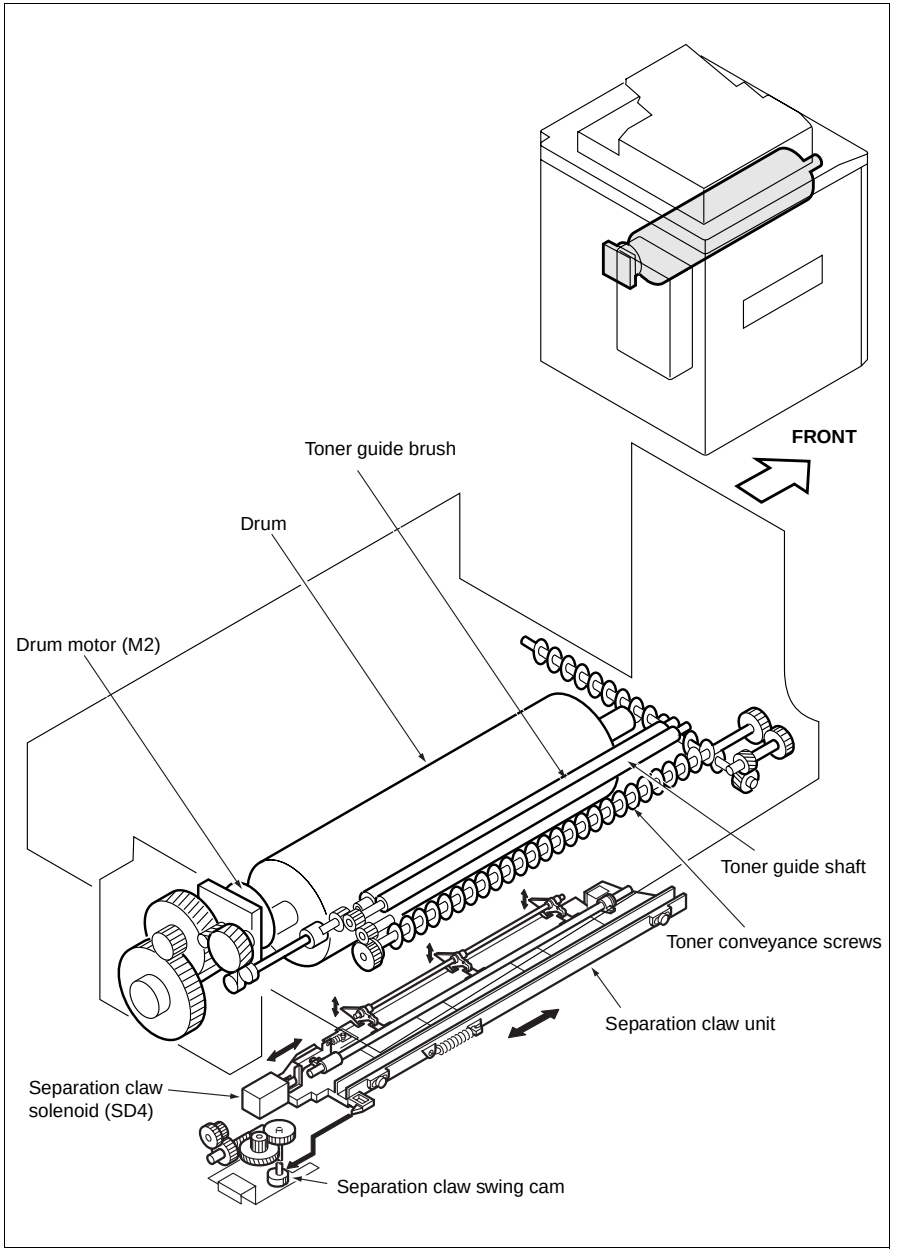


DRIVE SYSTEM DIAGRAM

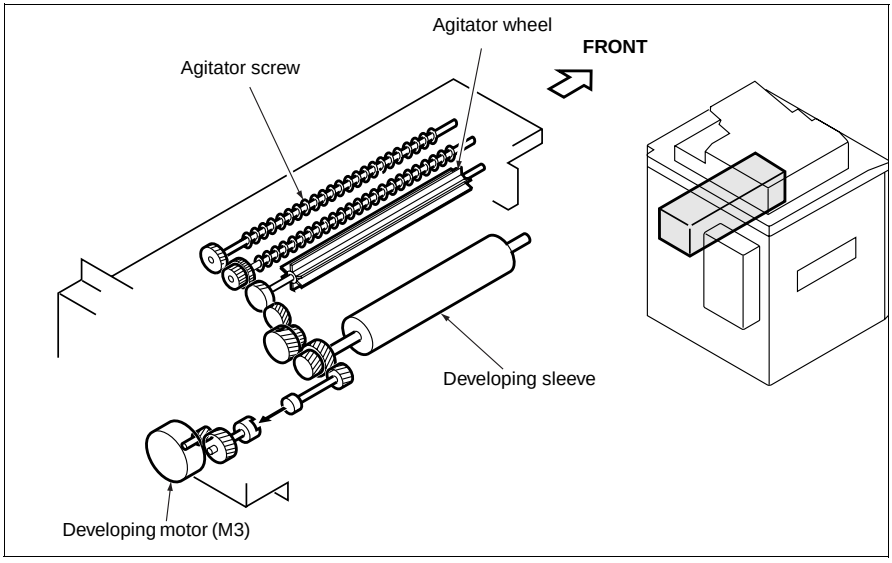
[1] Main Drive Section



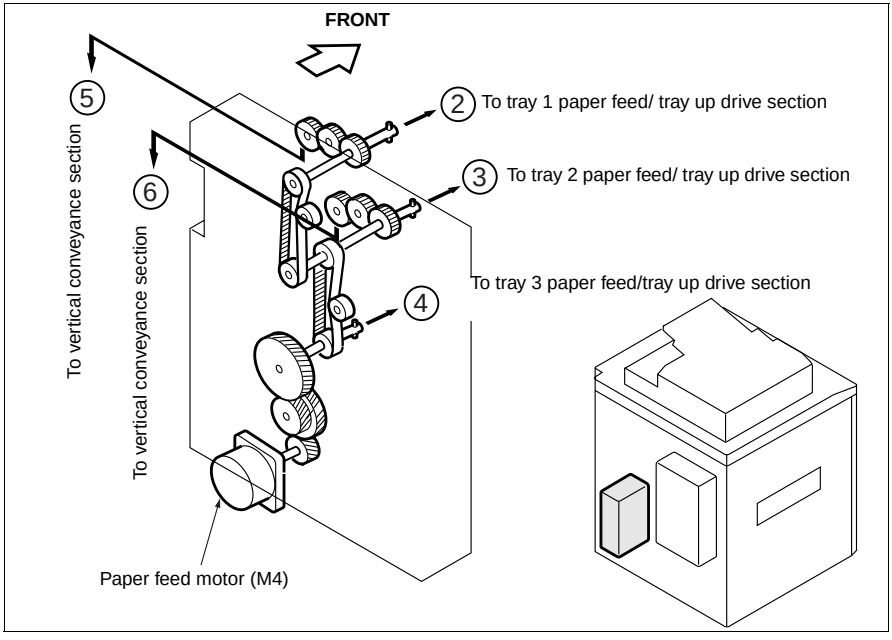
[2] Drum Drive Section



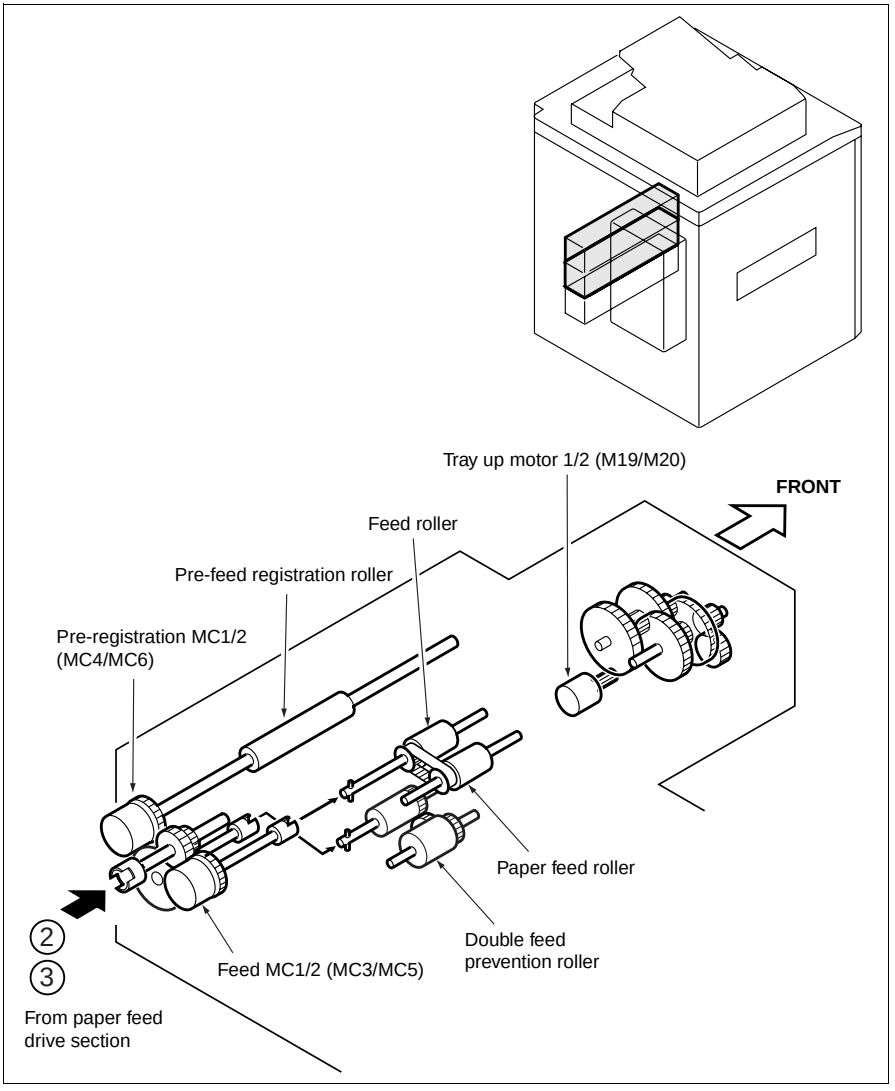
[3] Developing Drive Section



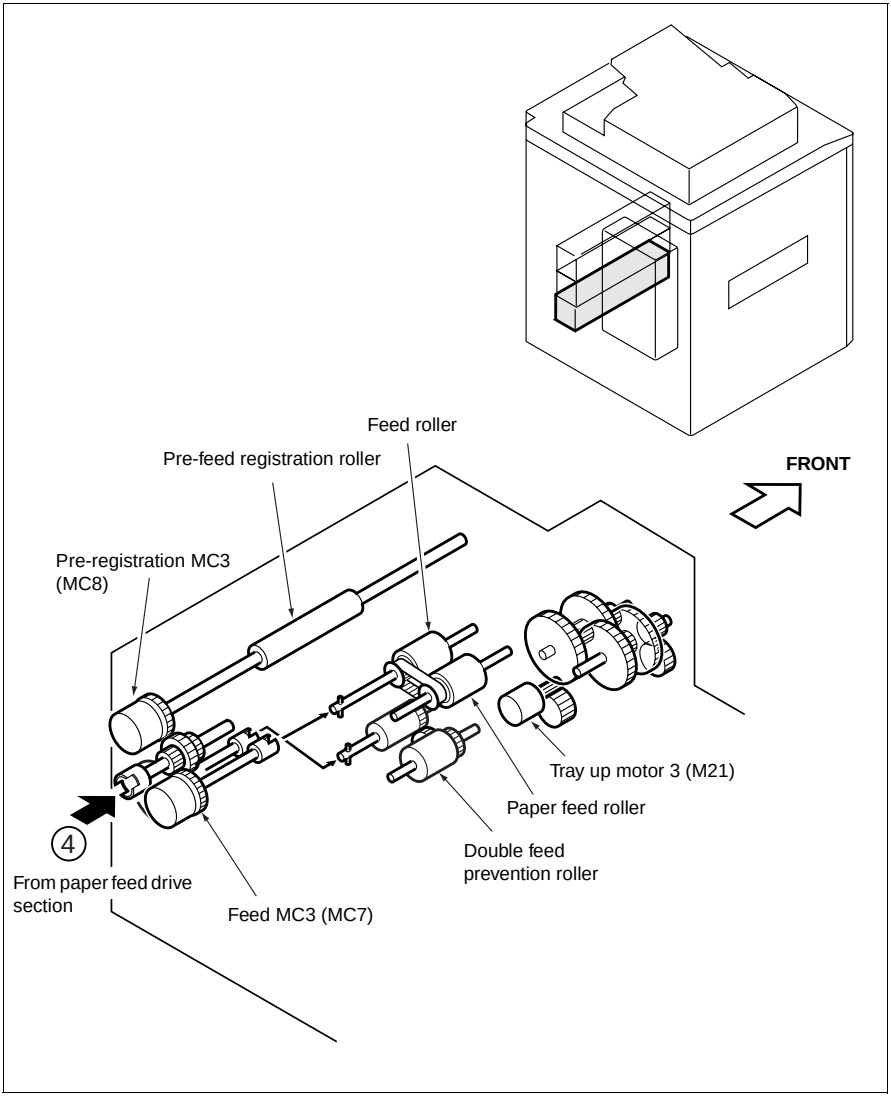
[4] Paper Feed Drive Section



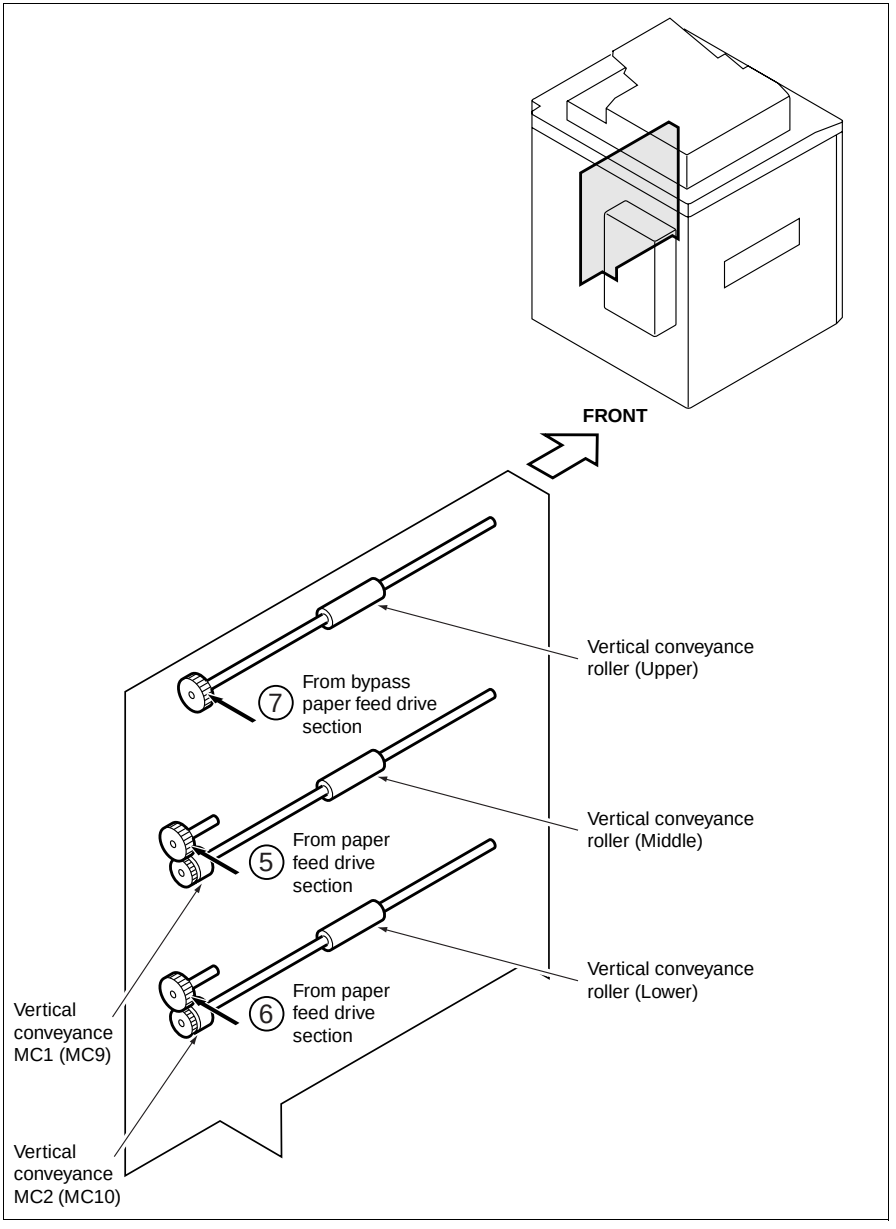
[5] Tray 1 and 2 Paper Feed Drive Section



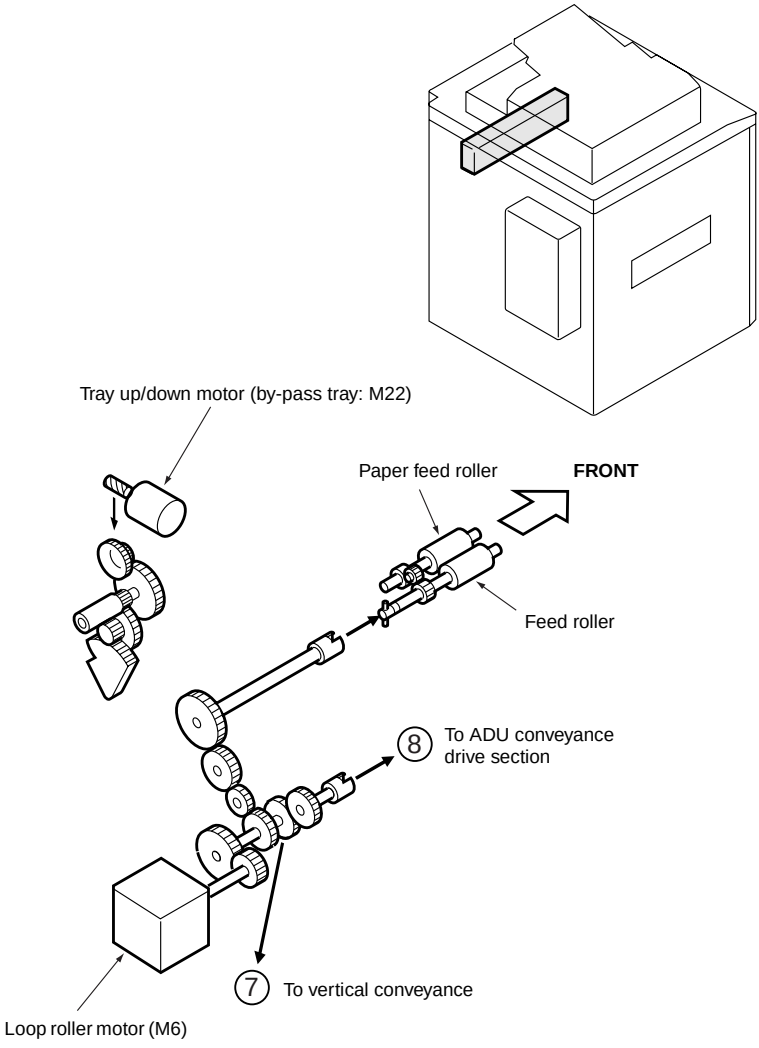
[6] Tray 3 Paper Feed Drive Section



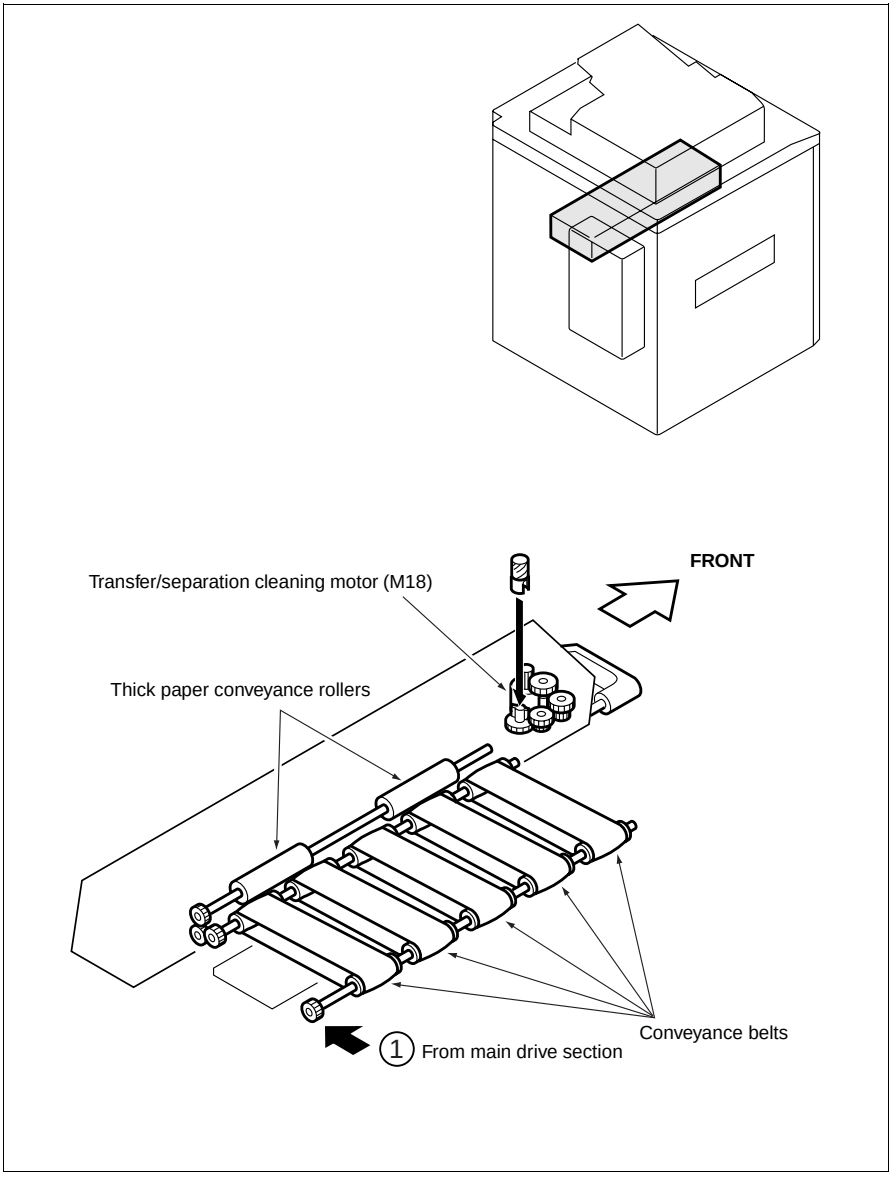
[7] Vertical Conveyance Drive Section



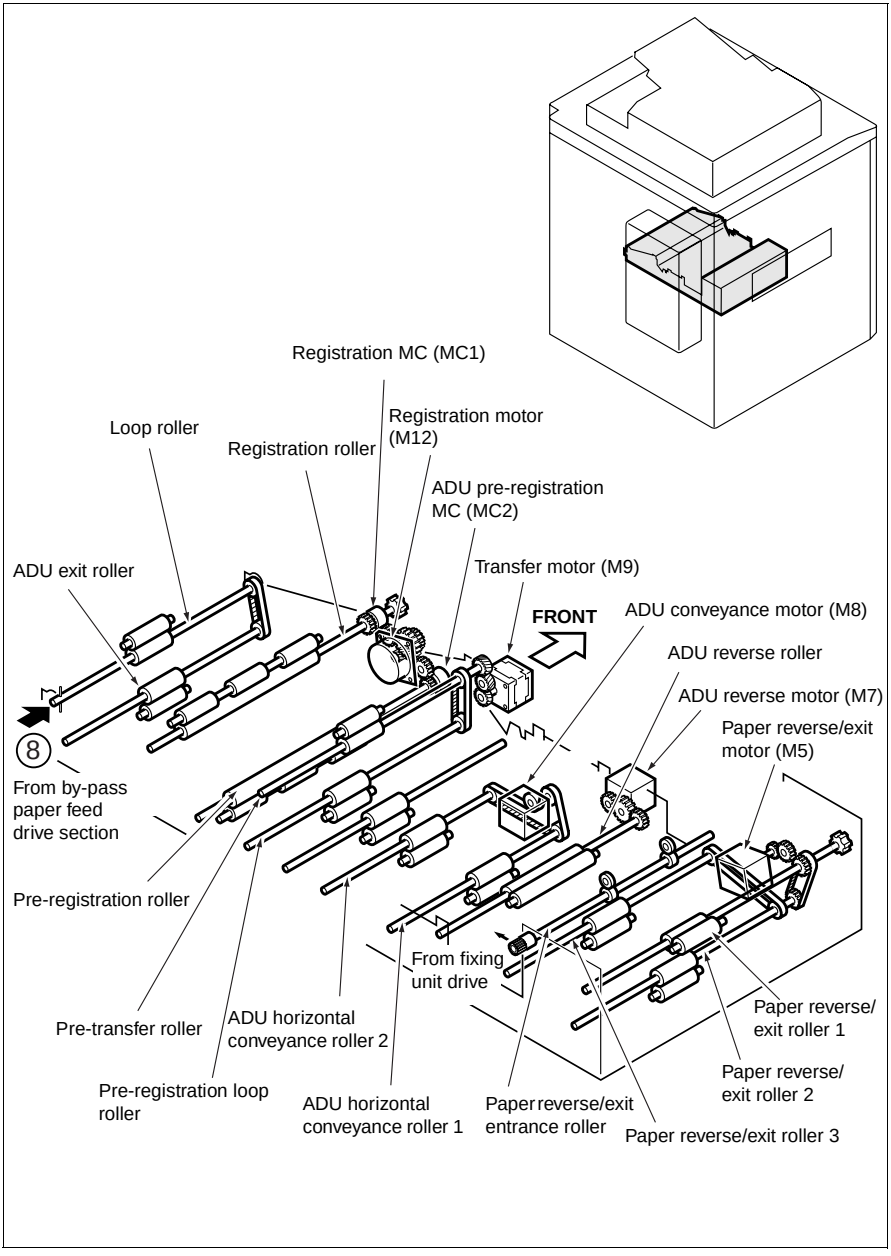
[8] By-pass Paper Feed Drive Section



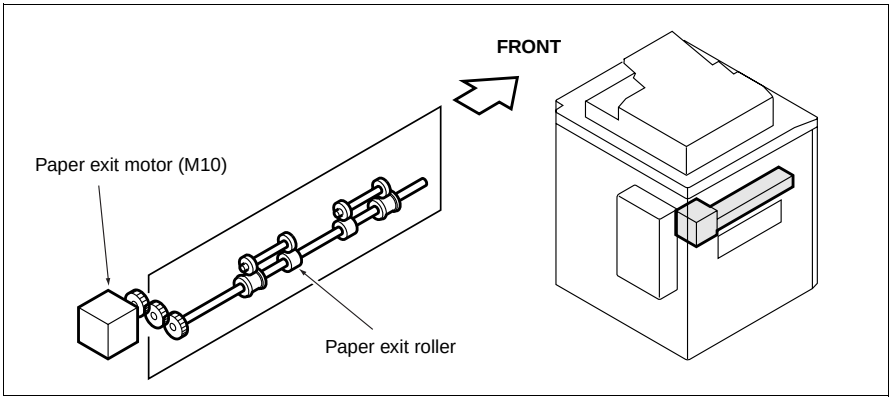
[9] Conveyance/Transfer and Separation Wire Cleaning Drive Section



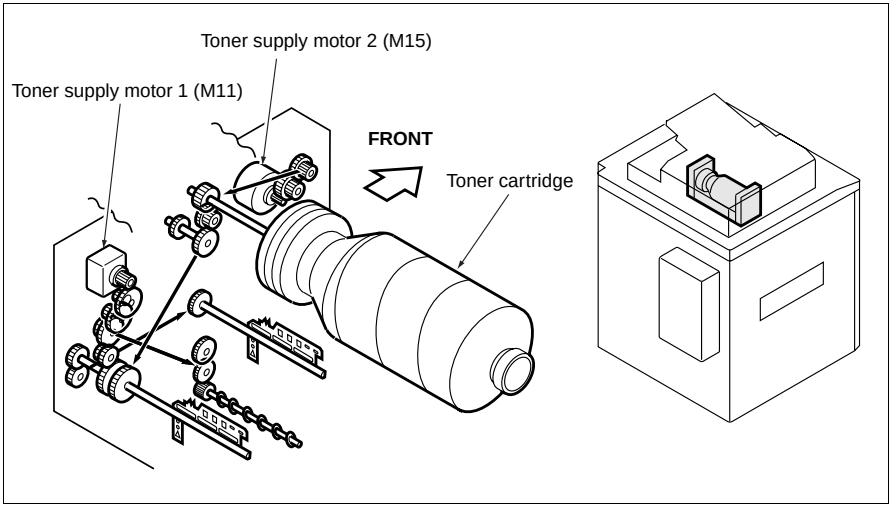
[10] ADU Conveyance Drive Section



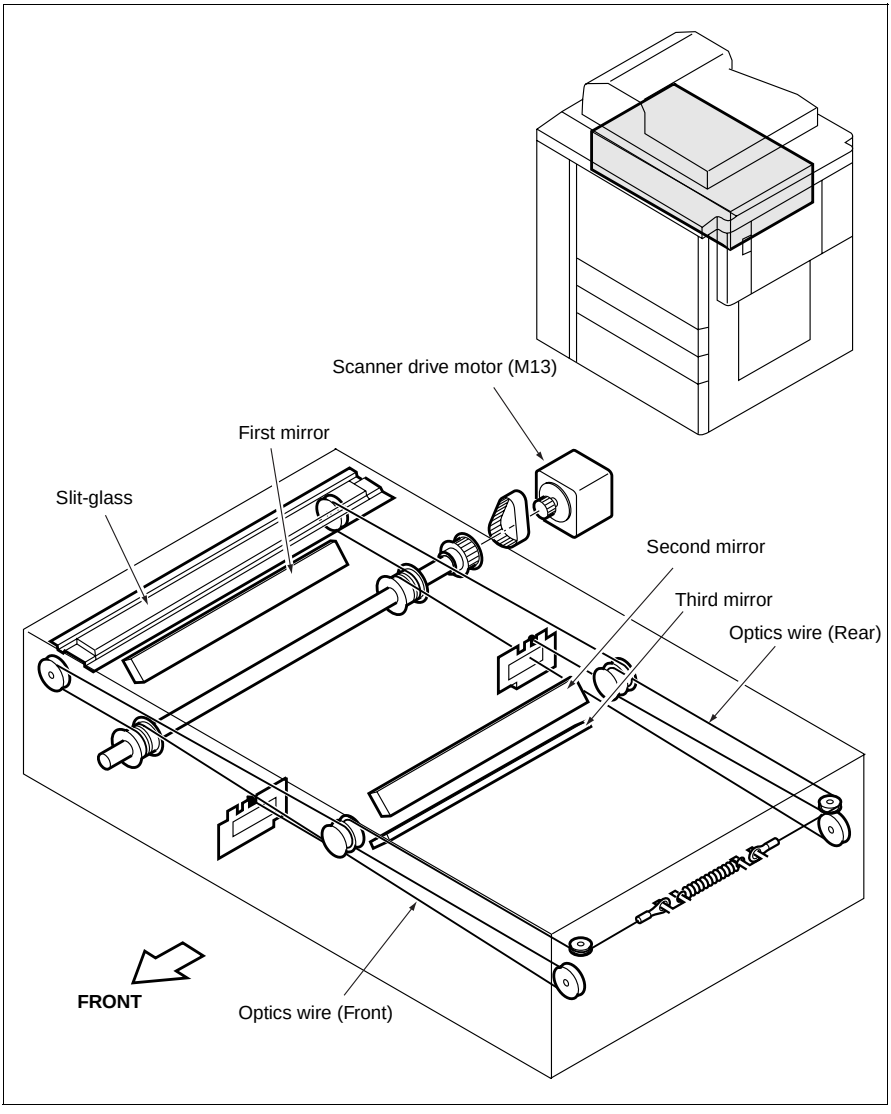
[11] Paper Exit Drive Section



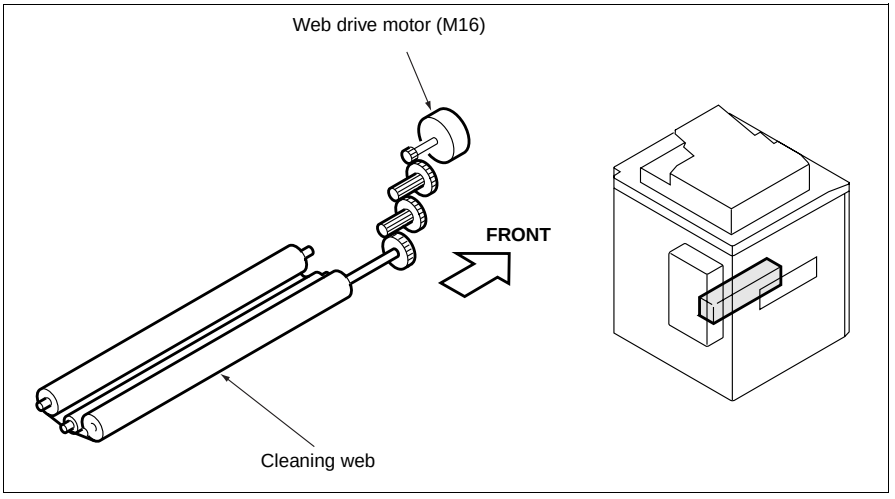
[12] Toner Supply Drive Section



[13] Optics Drive Section



[14] Web Drive Section

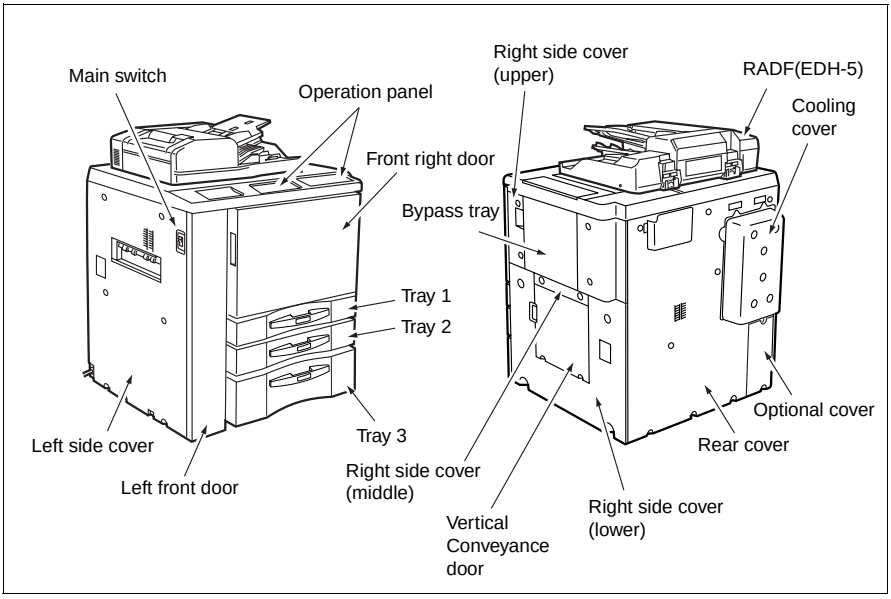


2

UNIT EXPLANATION

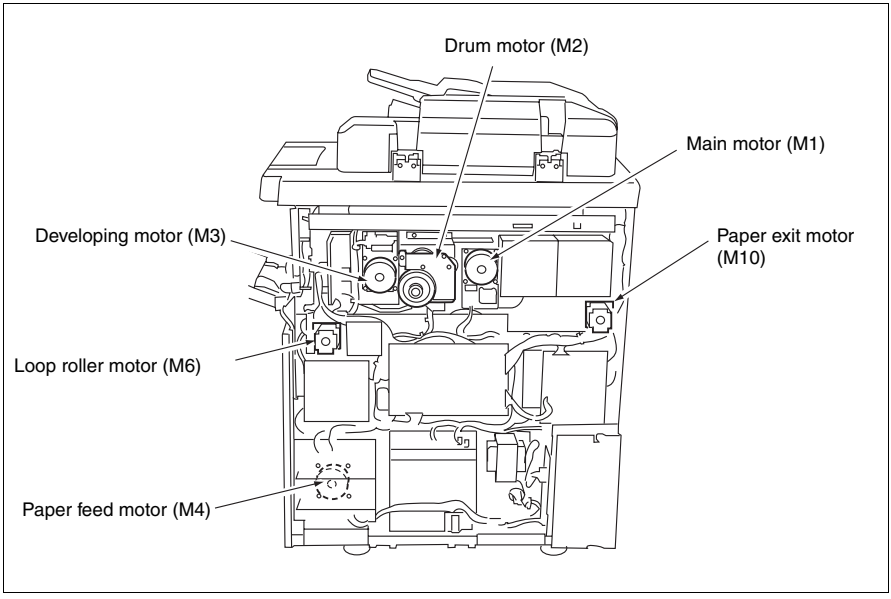
EXTERNAL SECTION

[1] Composition



DRIVE SECTION

[1] Composition



[2] Mechanisms

	Mechanism	Driven Parts	Method
*1	Drum drive	Drum, clearer fur brush	Gear drive (dedicated motor)
*1	Developing drive	Developing sleeve	Gear drive (dedicated motor)
*1	Main drive	Fixing upper roller	Gear drive (dedicated motor)
*1	Paper feed drive	Tray 1/2/3, Vertical conveyance roller (middle/lower)	Gear drive (dedicated motor) + Belt
*1	By-pass/loop drive	By-pass feed roller, loop roller, vertical conveyance roller (upper)	Gear drive (dedicated motor)
*1	Paper exit drive	Paper exit roller	Gear drive (dedicated motor)

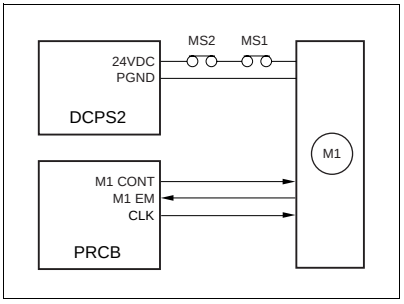
*1 Independent drive mechanisms

Drive mechanisms are driven by dedicated motors to ensure high-speed operation and to improve service-ability of the drum unit and developing performance.

In order to improve the fixativeness in copying thick paper, the selection of [Thick paper 3] in the key operation mode decreases the linear speed of the main motor (M1) to 210mm/s only when the paper passes through the fixing unit.

The mode of [Thick paper 3] is available only when the length of the paper in the paper feed direction is 216mm or shorter and the paper is fed from LT.

[3] M1 (Main) Control



M1 (main) is controlled by the PRCB (printer control board) and the motor drive power is supplied from DCPS2 (DC power supply unit 2).

1. Operation

M1 is a motor driven by 24V DC. It drives fixing upper and lower rollers, paper conveyance belts, and thick paper conveyance roller. M1 incorporates a speed controller circuit to send a signal indicating abnormal rotation to PRCB when the PLL lock has been released for longer than the specified period of time.

M1 starts rotating when the START PRINT button is pressed and stops when the last copied paper has been ejected. During the warm-up operation, M1 rotates to rotate the fixing rollers.

When either one of the front doors of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) actuates to stop supplying the DC power to the motor, causing the M1 to stop.

2. Signals

a. Input signal

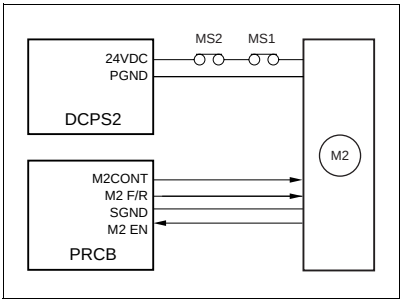
(1) M1 EM (M1 to PRCB)
M1 fault detection signal.
[H]: Abnormal rotation (PLL lock has been released for 2 to 3 seconds or longer.)
[L]: Normal rotation

b. Output signal

(1) M1 CONT (PRCB to M1)
M1 drive control signal.
[H]: M1 ON
[L]: M1 OFF

(2) CLK (PRCB to M1)
Clock signal for M1.

[4] M2 (Drum) Control



M2 (drum) is controlled by the PRCB (printer control board) and the motor drive power is supplied from DCPS2 (DC power supply unit 2).

1. Operation

M2 is a motor driven by 24V DC. It drives a drum, toner guide brush, toner guide shaft, toner conveyance screw, and separation claw swing sections. M2 incorporates a speed sensor (encoder) to send a feedback signal to PRCB. Using this signal, PRCB detects the rotational speed and calculates the PWM duty to be given to the motor, controlling the M2 speed. In addition to the speed sensor, M2 also has a flywheel mechanism to ensure accurate and steady rotation.

M2 starts rotating when the START PRINT button is pressed and stops when the last copied paper has been ejected.

When either one of the front doors of this machine opens or closes, MS2 (interlock 1) or MS2 (interlock 2) actuates to stop supplying the DC power to the motor, causing the M2 to stop.

2. Signals

a. Input signal

(1) M2 EN (M2 to PRCB)
M2 motor encoder signal.

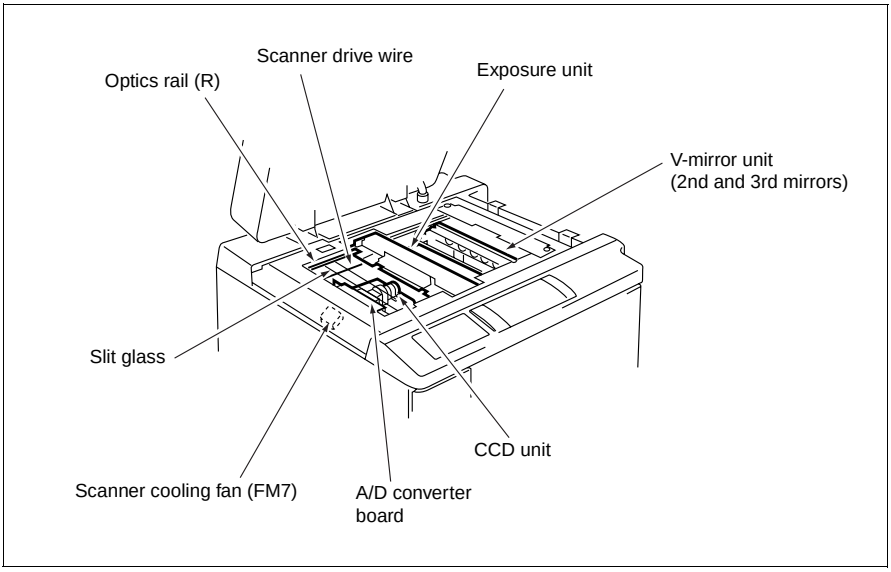
b. Output signals

(1) M2 CONT (PRCB to M2)
M2 drive control signal (PCOM).
[L]: M2 ON
[H]: M2 OFF

(2) M2 F/R (PRCB to M4)
M2 rotational direction switchover signal.
[H]: CCW (relative to motor shaft)
[L]: CW (relative to motor shaft)

READ SECTION

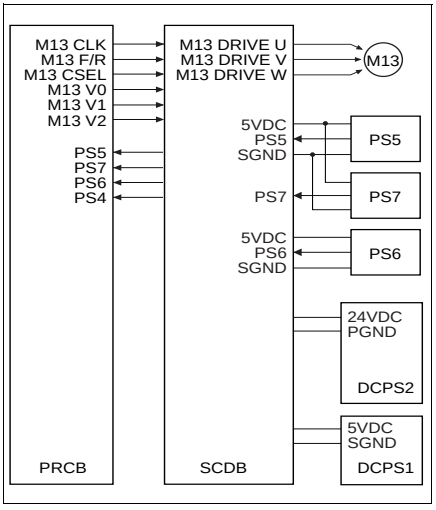
[1] Composition



[2] Mechanisms

Mechanism	Method
Light source	Xenon lamp
Exposure	Light source shift slit exposure, static exposure
Scanning	Platen original scanning: 1st, 2nd, and 3rd mirrors are shifted. RADF original scanning: Original is moved with light source held stationary.
Lamp power supply	Lamp cord
Optics cooling	Cooling fan

[3] M13 (Scanner Drive) Control



M13 (scanner drive) is driven by the SCDB (scanner drive board) and is controlled by the PRCB (printer control board).
Related signals are PS5 (scanner HP), PS6 (original HP), and PS7 (ADF brake).

1. Operation

a. Operation of M13

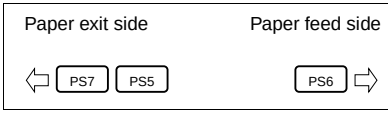
M13 is a 3-phase stepping motor driven using the 3-phase bipolar constant-current drive method. The motor is turned ON/OFF by supplying/stopping clock pulses.

b. Movement speed of the exposure unit

Scanning speed

Operation mode	Movement speed
Scan	400 mm/sec (600 dpi, 1:1)
Forward	615.38 mm/sec
Home position search	205.1 mm/sec

c. Positions of sensors



d. Exposure unit home position search

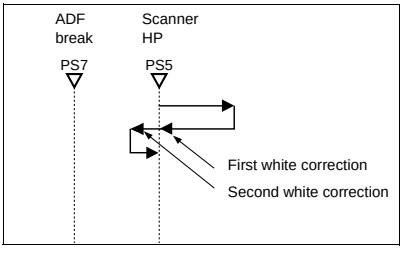
If the exposure unit is not at the home position when the main switch is turned ON or when the START PRINT button is pressed, the home position is searched for in the following manner:

(1) When the exposure unit is on the paper exit side with respect to the home position
When the exposure unit is at PS7 (ADF brake) (PS7 is ON), it moves forward at a low speed. And it moves until PS5 (scanner HP) turns ON and OFF again, then stops. It moves backward until PS5 turns ON again.
When the exposure unit is between PS7 and PS5, it moves backward until PS7 turns ON before moving forward as mentioned above.

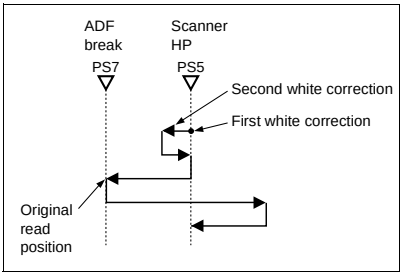
(2) When the exposure unit is on the paper feed side
When the exposure unit is at PS5 (PS5 is ON), it moves forward at a low speed until PS5 turns OFF before moving as discussed in (1) above.
When the exposure unit is located on the paper feed side with respect to PS5, it moves backward then stops for a short while after PS5 turns ON. Then it moves forward and performs operations as described in (1) above.

e. Read with shading correction

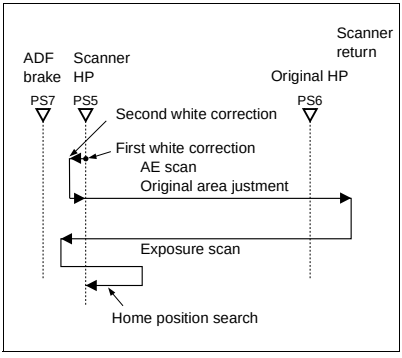
L1 is turned ON, when black correction has been completed after the home position search operation, thus reading the light reflected by the white reference plate installed underneath the glass stopper plate and performing the first white correction. Then, the exposure unit moves to the paper exit side, performs the second white correction while stopping at the preset position, then returns to the home position to turn OFF L1.



f. ADF copy operation



g. Platen copy operation



2. Signals

a. PRCB input signals

(1) PS5 (PS5 to SCDB to PRCB)
Scanner home position detection signal.
The reference position for the home position of the exposure unit is detected.
[L]: The exposure unit is detected.
[H]: The exposure unit is not detected.

(2) PS6 (PS6 to SCDB to PRCB)
Original home position detection signal.
In the platen mode, the reference position for the original's leading edge is detected.
[L]: The exposure unit is detected.
[H]: The exposure unit is not detected.

(3) PS7 (PS7 to SCDB to PRCB)
ADF brake detection signal.
In the DF mode, the exposure reference position is detected.
[L]: The exposure unit is detected.
[H]: The exposure unit is not detected.

b. PRCB output signals

(1) M13 CLK (PRCB to SCDB)
Clock signal for M13.

(2) M13 F/R (PRCB to SCDB)
M13 rotational direction switchover signal.
[L]: The exposure unit is moved toward the paper exit side.
[H]: The exposure unit is moved toward the paper feed side.

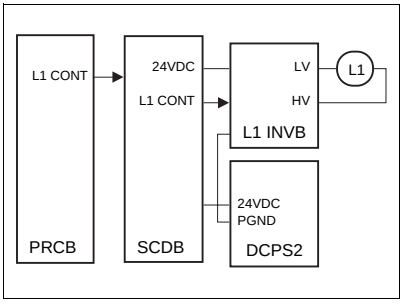
(3) M13 CSEL (PRCB to SCDB)
M13 excitation switchover signal.
[L]: 2-/3-phase excitation
[H]: W2-/3-phase excitation

(4) M13 V0 to V2 (PRCB to SCDB)
M13 excitation current switchover signal.

c. SCDB output signals

(1) M13 DRIVE, U, V, W (SCDB to M13)
M13 drive control signals.
These signals are used to control rotation of M13. By supplying and stopping clock pulses, the motor is turned ON/OFF and the rotational direction is switched.

[4] Exposure control



L1 (exposure lamp) is driven by the L1 INVB (L1 inverter) and is controlled by the PRCB (printer control board) via the SCDB (scanner drive board).

1. Operation

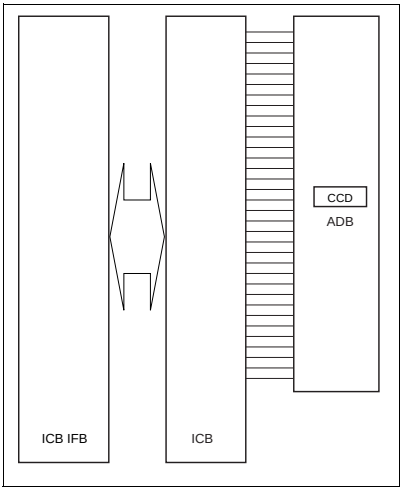
L1 is a xenon lamp driven by the inverter circuit. The xenon lamp can emit a constant quantity of light and generates less heat than other lamps, requiring neither light quantity controller circuit nor thermal protector circuit that have been used in the conventional machines. However, since L1 is held lit when the exposure unit is nonoperational in the DF mode, a FM7 (scanner cooling) is installed in the read section.

2. Signals

a. Output signals

(1) L1 CONT (PRCB to SCDB to L1 INVB)
L1 ON/OFF control signal.
[L]: L1 ON
[H]: L1 OFF

[5] Original Read Control



Original read control is performed by the ADB (A/D converter board) and CCD sensor installed in the ADB.

1. Operation

The light reflected by the exposed original is input to the CCD sensor through the lens. The analog voltage corresponding to the quantity of input light is A/D-converted in the ADB, being output to the ICB (image control board).

a. Original read

The original read timing is as follows:

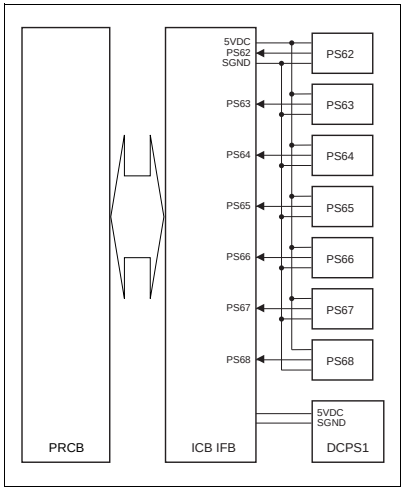
(1) Platen mode

Specified interval after exposure unit turns PS6 (original HP) ON.

(2) DF mode

After lapse of the specified time after the original's leading edge turns ON PS308 (Original conveyance).

[6] APS Control



The APS method used in the platen mode is different from that used in the DF mode.

The signal read by the APS sensor or the original size detection sensor of the RADF is processed by the ICB (image control board).

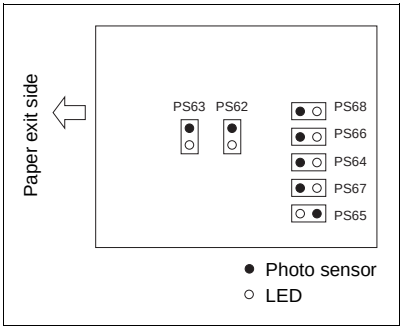
1. Operation

a. APS detection

(1) DF mode

The original size is detected according to the combination of ON/OFF states of PS302 (original size detection 1) and PS303 (original size detection 2) and the resistance value of VR301 (original size detection).

(2) Platen mode
The paper size is detected according to the combination of ON/OFF states of PS62 (APS 1), PS63 (APS 2), PS64 (APS 3), PS65 (APS 4), PS66 (APS 5), PS67 (APS 6), and PS68 (APS 7).
The APS sensor consists of LEDs and photosensors. Lights emitted from the LEDs is reflected by the original and received by photosensors.



Relationships between sensors and original sizes are as follows:

Sensor / Paper size	PS62	PS63	PS64	PS65	PS66	PS67	PS68
B5R	○	○	○	○	○	○	●
B5	○	○	●	○	●	○	●
B4	●	●	●	○	●	○	●
A4R	●	○	○	○	●	○	●
A4	○	○	●	●	●	●	●
A3	●	●	●	●	●	●	●
8.5 x 11R	○	○	○	○	●	○	●
8.5 x 11	○	○	●	○	●	●	●
8.5 x 14	●	●	○	○	●	○	●
11 x 17	●	●	●	○	●	●	●
Min. size	○	○	○	○	○	○	○

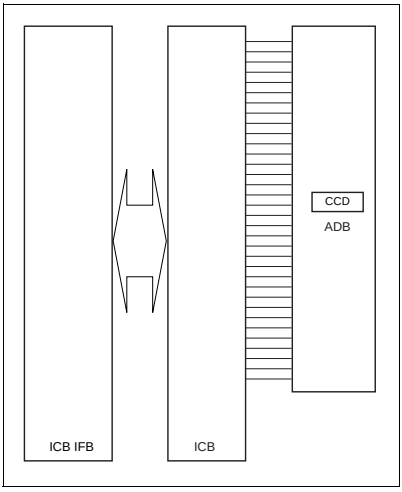
● ON
○ OFF

b. APS detection timing
The APS detection timing differs between the platen mode and DF mode.
(1) DF mode
When the DF mode is selected or original is set on the RADF original feed tray, APS detection takes place using PS302 (original size detection 1), PS303 (original size detection 2), and VR301 (original size detection).
(2) Platen mode
When RADF is closed and PS315 (APS timing) turns ON, APS detection takes place using PS62 to PS68.

2. Signals

a. Input signals
(1) PS62 (PS62 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(2) PS63 (PS63 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(3) PS64 (PS64 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(4) PS65 (PS65 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(5) PS66 (PS66 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(6) PS67 (PS67 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.
(7) PS68 (PS68 to ICB IFB)
Paper size detection signal.
[L]: Paper is detected.
[H]: Paper is not detected.

[7] AE Control



The CCD sensor detects the image density on an original during AE scanning to select the optimum copy gamma correction curve.
AE processing is controlled by the ICB (image control board).

1. Operation

a. AE detection

(1) Platen mode
The image density on an original is measured while the exposure unit moves from the home position to the leading edge of the original after depression of the START button.

<AE sampling area>

(1) Normal copy
10mm inside perimeter of original size detected by APS.

(2) Non-image area erasure mode
Entire original area detected by forward scanning.

(3) DF mode
The image at the leading edge of the original is read when the START button is pressed.
The read data is used to measure the image density on the original.

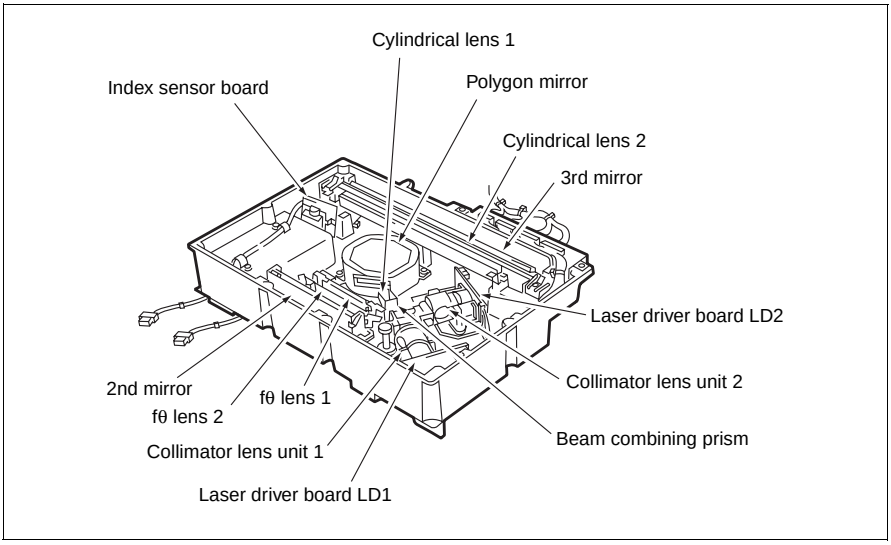
<AE sampling area>

(1) Main scanning direction
- 10-mm area inside the original detected by APS

(2) Sub scanning direction
Range between 2mm to 7.3mm from the leading edge of the original.

WRITE UNIT

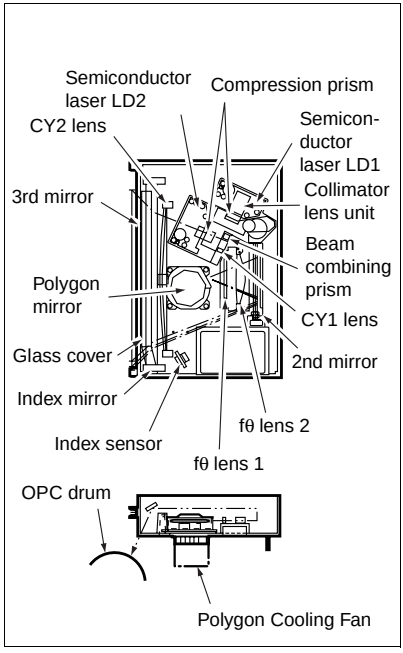
[1] Composition



[2] Mechanisms

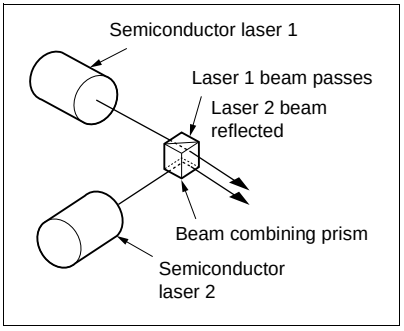
	Mechanism	Method
*1	Scan	Polygon mirror Rotational speed: 24,803.1 rpm (400 dpi) 37,204.7 rpm (600 dpi)
	Light source	Laser diodes (two) (Output: Max. 20 mW)
*2	Positioning	Index sensor Fine adjustment prism
*3	Laser beam combining	Beam combining prism

*1 Path of laser light
The light output from semiconductor laser is radiated onto the OPC drum via the collimator lens, compression prism, fine adjustment prism, beam combining prism, cylindrical lens 1, polygon mirror, fθ lens 1, fθ lens 2, second mirror, cylindrical lens 2, and third mirror.

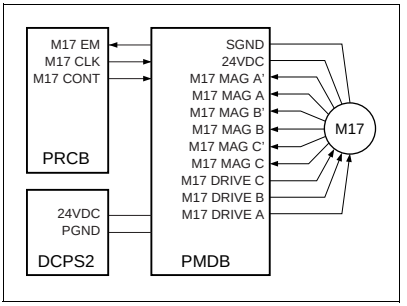


*2 Positioning
Each laser beam is positioned by the compression prism and fine adjustment prism.

*3 Laser beam combining
Two laser beams output at right angle to each other are redirected in the same direction using the beam combining prism.



[3] M17 (Polygon) Control



M17 (polygon) is driven by the PMDB (polygon driver board) and is controlled by the PRCB (printer control board).

1. Operation

a. Explanation of operation

M17 is a 3-phase brushless DC motor which is driven by the 3-phase bipolar method. The current flowing through the coil is switched according to the position of the rotor detected by the position sensor (magnetic sensor) in the motor. This motor rotates the polygon mirror to scan the laser beams from LDB1 and 2 (laser driver boards 1 and 2) in the axial direction of the drum. Its rotation is held constant by PLL control.

b. Rotational speed

36VDC is used to drive M17. The rotation speeds are as follows:

Resolution	Rotational speed (rpm)
400 dpi	24,803.1 rpm
600 dpi	37,204.7 rpm

2. Signals

a. PRCB input signals

(1) M17 EM (PMDB to PRCB)
This signal indicates the clock synchronization state of M17.
[L]: Synchronous (normal)
[H]: Asynchronous (abnormal)

b. PRCB output signals

(1) M17 CONT (PRCB to PMDB)
This signal turns ON/OFF M17.
[L]: M17 ON
[H]: M17 OFF

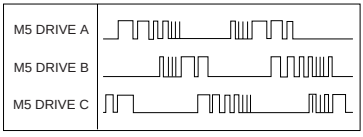
(2) M17 CLK (PRCB to PMDB)
This is a reference clock signal for PLL-controlling M17 in PMDB.

c. PMDB input signals

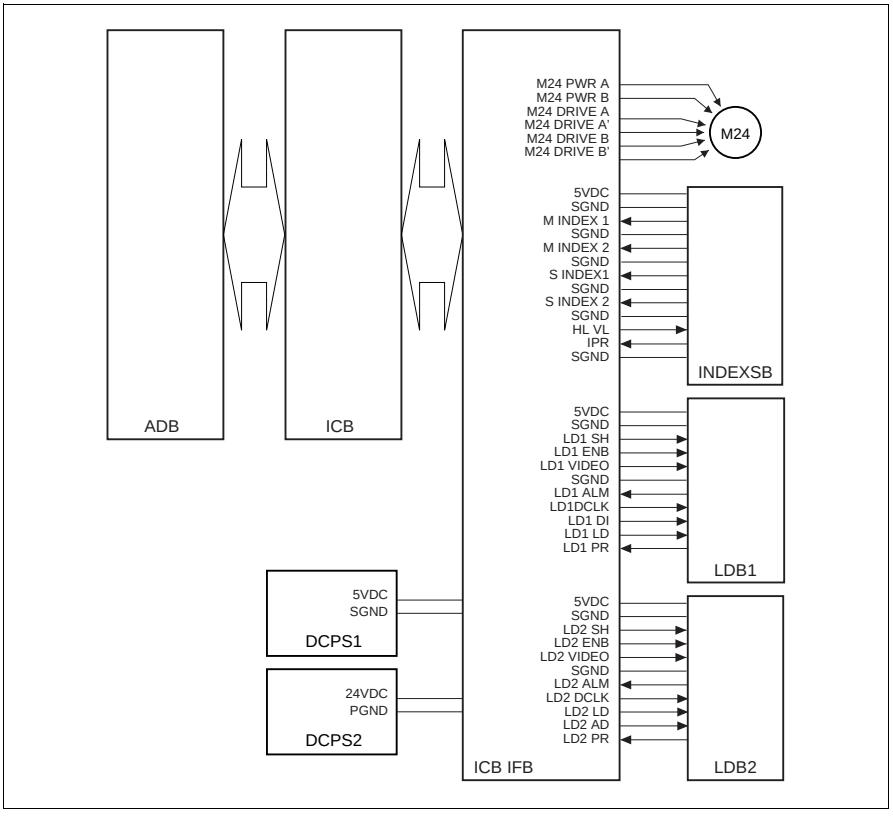
(1) M17 MAG A/A' (M17 to PMDB)
(2) M17 MAG B/B' (M17 to PMDB)
(3) M17 MAG C/C' (M17 to PMDB)
Output signals from the position sensor (magnetic sensor) incorporated in M17.
The PMDB detects the position of the motor rotator using these signals, switching among outputs, M17 DRIVE A to C.

d. PMDB output signals

(1) DRIVE A to C (PMDB to M17)
M17 drive signals.
M5 DRIVE A to C supplies the corresponding voltages to M17. Pulses of the voltages applied to M17 are shown below. The pulse widths of the PMDB output signals change as shown below depending on the state of M17 rotation, changing the effective values of the voltages supplied to M17. Thus, the M17 speed can be controlled.



[4] Image Write Control



The analog image data from the CCD sensor is A/D-converted by the ADB (A/D converter board), then sent to the ICB (image control board) for data processing. The processed image data is converted into a laser beam according to the control signal received from the ICB through the ICB IFB (ICB I/F board), then the beam is radiated onto the drum surface. Two lasers are provided to write two lines of image data per scan. The write start position is detected by the INDXSB (index sensor board). The ICB has an E-RDH (electronic RDH processing) function to store digitized data. Various editing functions can be performed based on this data.

1. Operation

a. Image processing

The following processing is performed by the ICB (image control board):

(1) AOC (Auto Offset Control)
During shading correction, a read operation takes place while L1 (exposure lamp) is OFF, and the analog offset voltage of the output from the CCD sensor is automatically adjusted so that the resulting level is the lower limit of the A/D converter.

(2) AGC (Auto Gain Control)
During shading correction, the white reference plate is read, and the amplification of the analog output from the CCD sensor is automatically adjusted so that the resulting level is the upper of the A/D converter.

(3) Shading correction
<Timing>
- When SW1 (main switch) is turned ON

(4) Brightness/density conversion

(5) EE processing

(6) Text/dot pattern judgment

(7) Filtering/magnification change processing

(8) Magnification change processing

(9) Copy gamma correction

(10) Skew correction

(11) Error diffusion processing

(12) Data compression

(13) Write density control

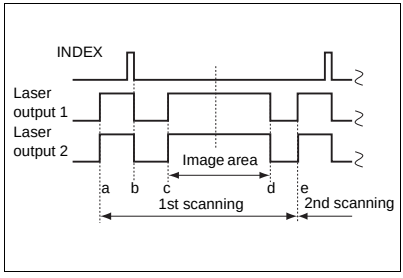
b. Write

The ICB (image control board) sends image data on a pixel basis to LDB1 and LDB2 according to the control signals from the PRCB (printer control board).
LDB1 and LDB2 cause the lasers to emit for a period corresponding to the image data. This laser light is radiated onto the drum surface.

(1) MPC (Maximum Power Control)
ICB informs LDB1 and LDB2 of the maximum output value and sets that value for the laser beam emission. LDB1 and LDB2 store this setting value and maintain the quantity of the laser beam emission using the APC (Auto Power Control).
<MPC timing>
- When SW1 (main switch) is turned ON

(2) APC (Auto Power Control)
The ICB outputs an APC start instruction to the LDB at the following timing, after MPC is set.
<APC timing>
- The LDB1 and LDB2 automatically monitor the laser drive current one line at a time, and controls it so that the light intensity remains the MPC value.

(3) Write timing
a) Main scanning direction
Using INDEX signal from INDXSB, determines the laser write reference position for each scan in the drum rotation direction, and writes the image to copy paper using the paper position information derived from the paper position detection by PS1 (paper miscentering).



Symbol	Description
a	Laser goes ON for first scan.
b	Index sensor goes ON.
b-c c-d d-e	The timing at the left is controlled by counting the LD1 IRCLK and LD2 IRCLK signals. It differs depending on the document size.

b) Sub scanning direction
Specified interval after PS44 (registration) detects the tip of the copy paper.

(4) Laser beam position correction
a) Main scanning direction
The index sensor detects the deviation of the positions of the two beams. This error is corrected by changing the timing of the light emission from the laser.
b) Sub scanning direction
The index sensor detects the deviation of the positions of two beams in order to change the angle of the fine adjustment prism of the LD1 laser using M24 (laser correction), thus adjusting the vertical angle of the beam.

2. Signals

a. ICB IFB input signals

(1) M INDEX 1, 2 (INDEXSB to ICB IFB)
This is an index signal used to detect deviation of vertical scanning.

(2) S INDEX 1, 2 (INDEXSB to ICB IFB)
This is an index signal used to detect deviation of horizontal scanning.

(3) IPR (INDEXSB to ICB IFB)
This signal monitors the INDEXSB power supply.
[H]: Normal
[L]: Abnormal

(4) LD1 ALM (LDB1 to ICB IFB)
This signal indicates the state of the LD1 laser drive current.
[H]: Normal
[L]: Abnormal

(5) LD1 PR (LDB1 to ICB IFB)
LD1 power supply monitor signal.
[H]: Normal
[L]: Abnormal

(6) LD2 ALM (LDB2 to ICB IFB)
This signal indicates the state of the LD2 laser drive current.
[H]: Normal
[L]: Abnormal

(7) LD2 PR (LDB2 → ICB IFB)
LD2 power supply monitor signal.
[H]: Normal
[L]: Abnormal

b. ICB IFB output signals

(1) M24 PWR A (ICB IFB to M24)
M24 A-phase drive signal.

(2) M24 PWR B (ICB IFB to M24)
M24 B-phase drive signal.

(3) M24 DRIVE A/A' (ICB IFB to M24)
M24 A-phase drive pulse signal.

(4) M24 DRIVE B/B' (ICB IFB to M24)
M24 B-phase drive pulse signal.

(5) LD1 SH (ICB IFB to LDB1)
One scan line equivalent APC sampling signal.

(6) LD1 ENB (ICB IFB to LDB1)
Laser APC function ON/OFF control signal.
Laser beam emission stops when it is OFF.

(7) LD2 SH (ICB IFB to LDB2)
One scan line equivalent APC sampling signal.

(8) LD2 ENB (ICB IFB to LDB2)
Laser APC function ON/OFF control signal.
Laser beam emission stops when it is OFF.

(9) LD1 VIDEO (ICB IFB to LDB1)
LD1 laser image signal.

(10) LD2 VIDEO (ICB IFB to LDB2)
LD2 laser image signal.

(11) LD1 DCLK (ICB IFB to LDB1)
LD1 clock signal for MPC value data transmission.

(12) LD1 DI (ICB IFB to LDB1)
LD1 data signal for MPC.

(13) LD1 AD (ICB IFB to LDB1)
LD1 MPC value storage command signal.

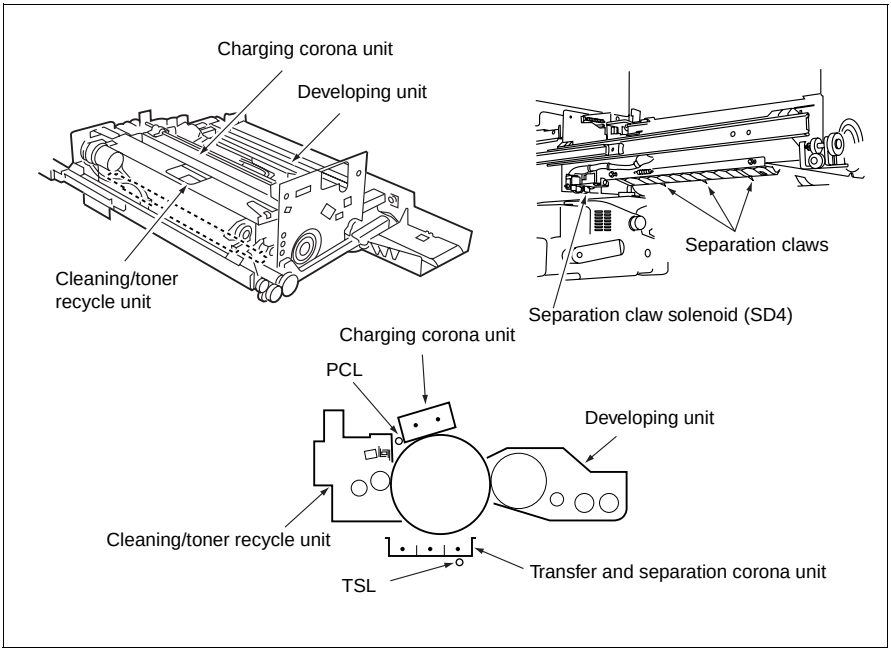
(14) LD2 DCLK (ICB IFB to LDB2)
LD2 clock signal for MPC value data transmission.

(15) LD2 DI (ICB IFB to LDB2)
LD2 data signal for MPC.

(16) LD2 AD (ICB IFB to LDB2)
LD2 MPC value storage command signal.

DRUM UNIT

[1] Composition



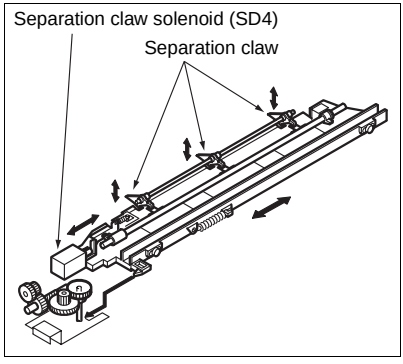
[2] Mechanisms

	Mechanism	Method
	Carriage support	Fixed rail
	PCL/TSL	LED
*1	Auxiliary separation	Separation claws
*2	Conveyance assistance	Ratchet wheel

The drum unit is an integral assembly consisting of a drum, charging corona unit, developing unit, cleaning/toner recycle unit, PCL, and separation claws.

*1 Auxiliary separation

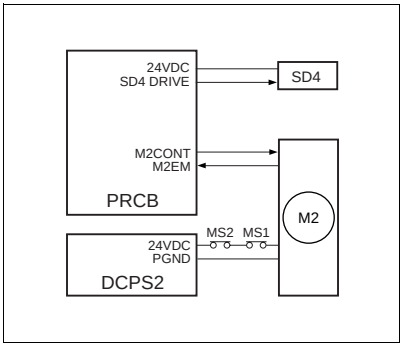
- To prevent paper jamming, three separation claws are used to separate paper from the drum forcibly. These separation claws are pressed against the drum or detached from it by turning ON/OFF the separation claw solenoid (SD4).
- To prevent a specific part of image copied paper from being stained and to prevent the drum from being scratched, the swing mechanism slides the separation claws about 5 mm back and forth in parallel with the drum surface.



*2 Conveyance assistance

The thick paper conveyance ability has been improved by the use of ratchets.

[3] Separation Claw Control



The separation claw is driven by SD4 (separation claw). The vibration of the separation claw is put in by M2 (drum). SD4 is controlled directly by PRCB (printer control board).

1. Operation

a. Separation claw ON/OFF control

SD4 is a pull-type solenoid powered by 24 VDC. It turns ON to press separation claws against the drum to help image copied paper separate.

(1) SD4 operation timing

SD4 turns ON after a lapse of specified time from turning ON of PS45 (leading edge detection) in the second paper feed section. It turns OFF after a lapse of the time set by the PRCB timer.

b. Separation claw swing control

Separation claws are swung by M2 (drum) via the cam mechanism.

2. Signals

a. Output signal

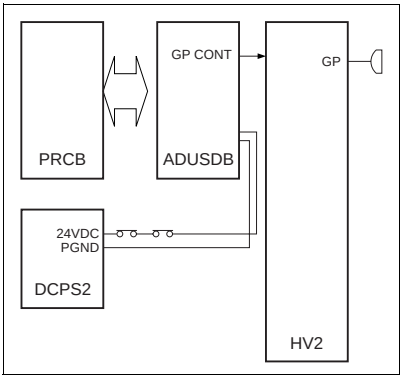
(1) SD4 DRIVE (PRCB to SD4)

SD4 drive control signal.

[L]: SD4 ON

[H]: SD4 OFF

[4] Paper Guide Plate Control



To prevent toner from adhering to the paper guide plate, a constant voltage is applied to the paper guide plate. This voltage is supplied from HV2 (high voltage unit 2) and is controlled by the serial data sent from the PRCB (printer control board) via the ADUSDB (ADU stand drive board). When the front door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to HV2, stopping the voltage application to the paper guide plate.

1. Operation

a. ON/OFF timing

Turning ON/OFF in sync with M2 (drum)

b. Applied voltage

-500 VDC

2. Signal

a. Output signal

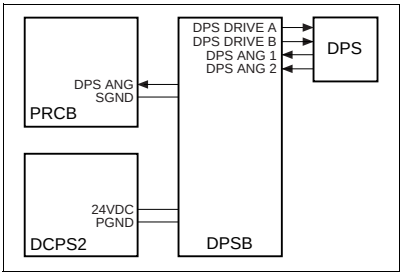
(1) GP CONT (ADUSDB to HV2)

This signal controls turning ON/OFF the voltage application to paper guide plate.

[L]: Voltage applied

[H]: Voltage not applied

[5] Drum Potential Control



The drum potential is detected by the DPS (drum potential sensor) and send the PRCB (printer control board) via the DPSB (drum potential sensor board).

1. Operation

Drum potential control is performed to keep the drum surface potential constant and maintain image quality regardless of the usage environment or the number of copies.

(1) Method

The image is created on the drum surface by the difference in the exposure potential and developing bias. A patch is created with laser PWM maximum.

The developing bias is corrected so that the difference between the after exposure potential (solid black area) and the developing bias is always kept constant and the charging current and the grid voltage are corrected so that the difference between the before exposure potential and developing bias is always kept constant.

(2) Timing

a) When the fixing temperature is lower than 50°C at power ON.

b) At the end of job after every 5,000 copies.

2. Signals

a. PRCB Input signals

(1) DPS ANG (DPSB to PRCB)
Analog signal corresponding to the drum charging potential.

b. DPSB Input signals

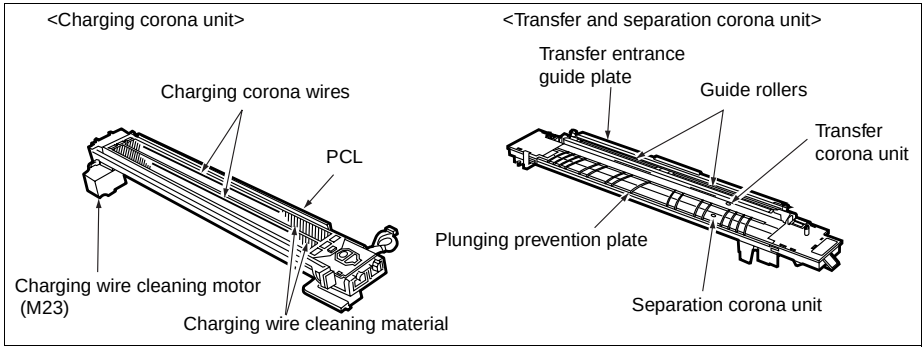
(1) DPS ANG 1 and 2 (DPS to DPSB)
Analog signal corresponding to the drum charging potential.

c. DPSB output signals

(1) DPS DRIVE A and B (DPSB to DPS)
DPS (drum potential) drive signal.

CORONA UNIT SECTION

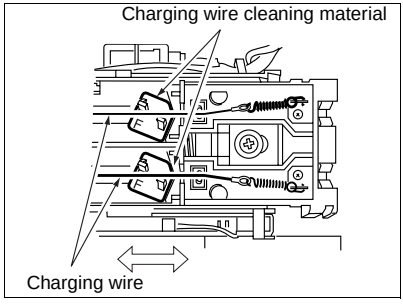
[1] Composition



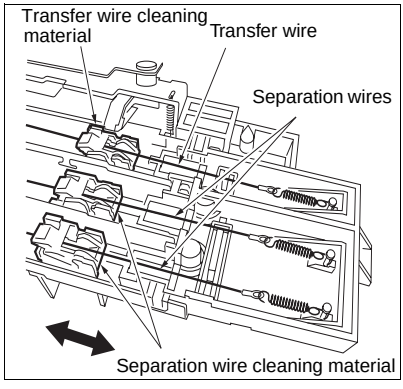
[2] Mechanisms

	Mechanism	Method
*1	Charging	Scorotron (DC negative corona discharge). Discharge wire: Tungsten, 0.06 mm dia. (gold-plated skin path: with automatic wire cleaner). Grid control: Gold-plated stainless plate.
*2	Transfer	DC positive corona discharge. Discharge wire: Oxide film tungsten, 0.06 mm dia., with automatic wire cleaner.
	Separation	AC/DC corona discharge. Discharge wire: Oxide film tungsten, 0.06 mm dia., with automatic wire cleaner.

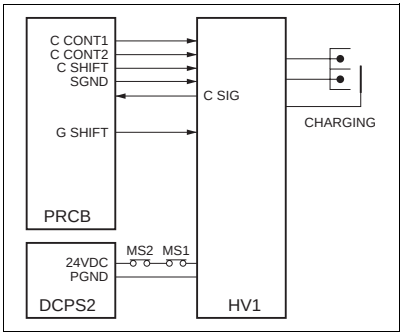
*1 Cleaning the charging wire
The charging corona unit has wire cleaning pads. The charging wire cleaning pad drive motor moves the charging wire cleaning pad back and forth, removing toner and dirt from the wires.



*2 Cleaning the transfer and separation wires
The transfer and separation corona unit has a wire cleaner pads. The transfer and separation wire cleaning pads drive motor moves the transfer and separation wire cleaning pads back and forth, removing toner and dirt from the wires.



[3] Charging Control



Charging control is conducted by serial data transmitted from PRCB (printer control board) to HV1 (high voltage unit 1). The applied voltage for the charging wires are supplied by HV1.

1. Operation

a. Charging

A Scorotron charging method is used. 24 VDC supplied from DCPS2 is raised to a negative DC voltage which is then discharged after being applied to the charging wire.

When the front door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to HV1, stopping the voltage supply to the charging corona unit and charging grid.

b. Grid voltage

The grid voltage is output from HV1 to the charging plate.

2. Signals

a. Input signal

(1) C SIG (HV1 to PRCB)
Leak or short detection signal.
[L]: Normal
[H]: Abnormal

b. Output signals

(1) C CONT1, 2 (PRCB to HV1)
Charging 1/2 output ON/OF control signal.
[L]: Charging voltage ON
[H]: Charging voltage OFF

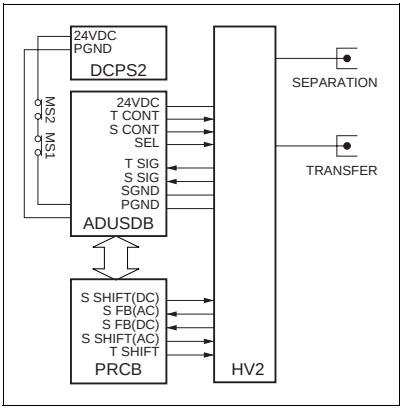
(2) C SHIFT (PRCB to HV1)
Charging corona unit output level control signal.
The output to the charging corona unit is controlled according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

C SHIFT duty	20% to 80%
Charging output range	-500µA to -1900µA

(3) G SHIFT (PRCB to HV1)
Charging grid output level control signal.
The output to the charging grid is controlled according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

G SHIFT duty	20% to 80%
Grid voltage output range	-400 V to -1000 V

[4] Transfer/Separation Control



The transfer and separation corona unit is controlled by the PRCB (printer control board) and ADUSDB (ADU stand drive board) via the HV2 (high voltage unit 2). Between the PRCB and ADUSDB, signals are exchanged using serial data. When the front door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to HV2, stopping the voltage supply to the transfer and separation corona unit.

1. Operation

a. Transfer

Positive DC high voltage is used for toner transfer to the drum surface.

b. Separation

AC high voltage is used for toner separation from the drum surface.

2. Signals

a. PRCB input signals

(1) S FB (AC) (HV2 to PRCB)
Toner separation (AC) current feedback signal.
This signal monitors the toner separation (AC) current. It is a 0 to 5V analog signal corresponding to the output level.

(2) S FB (DC) (HV2 to PRCB)
Transfer and separation (DC) current feedback signal.
This signal monitors the toner transfer and separation (DC) current. It is a 0 to 5V analog signal corresponding to the output level.

b. PRCB output signals

(1) T SHIFT (PRCB to HV2)
Transfer corona unit output level control signal.
This signal controls the level of the output to the transfer corona unit according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

T SHIFT duty	20% to 80%
Transfer DC output range	70µA to -700µA

(2) S SHIFT (DC) (PRCB to HV2)
Separation corona unit output level control signal.
This signal controls the level of the output (DC bias component) to the separation corona unit according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

S SHIFT duty	20% to 80%
Separation DC output range	0µA to -300µA

(3) S SHIFT (AC) (PRCB to HV2)
Separation corona unit output level control signal.
This signal controls the level of the output (AC component) to the separation corona unit according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

S SHIFT duty	20% to 80%
Separation AC output range	500µA to 1400µA

c. ADUSDB input signals

(1) T SIG (HV2 to ADUSDB)
Leak or short toner transfer abnormality detection signal.
[L]: Normal
[H]: Abnormal

(2) S SIG (HV2 to ADUSDB)
Leak or short toner separation abnormality detection signal.
[L]: Normal
[H]: Abnormal

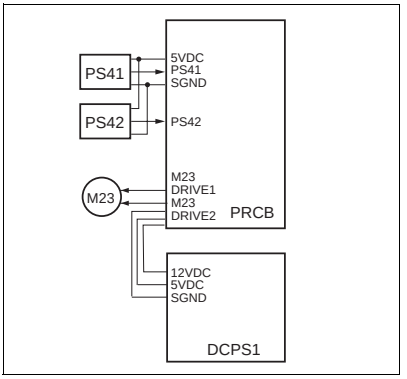
d. ADUSDB output signals

(1) T CONT (ADUSDB to HV2)
Transfer corona unit output ON/OFF control signal.
[L]: Transfer corona unit ON
[H]: Transfer corona unit OFF

(2) S CONT (ADUSDB to HV2)
Separation corona unit output ON/OFF control signal.
[L]: Separation corona unit ON
[H]: Separation corona unit OFF

(3) SEL (ADUSDB to HV2)
Feedback switchover signal.
This signal determines whether the feedback signal of the transfer and separation (DC) current is used for toner separation monitor or toner transfer monitor.
[L]: Toner separation monitor
[H]: Toner transfer monitor

[5] M23 (Charger Cleaning) Control



M23 (charger cleaning) uses a DC motor with a 12V drive, and is controlled directly by PRCB (printer control board). Related signals are PS41 (charger cleaning HP) and PS42 (charger cleaning limit).

1. Operation

a. Purpose of driving

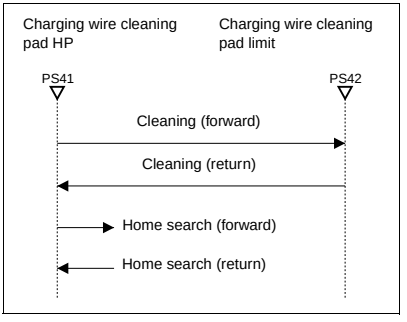
M23 is used to drive the charging wire cleaning pad.

b. Operation timing

The charging corona wires are cleaned when the main switch is turned ON, when the fixing temperature is lower than 50°C (122°F). They are also cleaned when the specified copy count is reached.
* Changeable with 25 mode DIPSW.

c. Cleaning operation

The home position of the charging wire cleaning pad is on the rear side of machine. The charging wire cleaning pad operates as follows:



2. Signals

a. Input signals

(1) PS41 (PS41 to PRCB)
Charging wire cleaning pad home position detection signal.
This signal detects the reference position of the charging wire cleaning pad home position.
[L]: HP detected
[H]: HP not detected

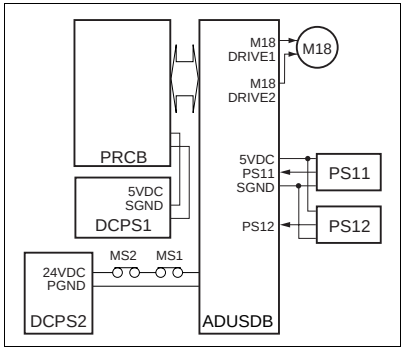
(2) PS42 (PS42 to PRCB)
Charging wire cleaning pad limit detection signal.
This signal detects the limit position of charging wire cleaning pad.
[L]: Limit position detected
[H]: Limit position not detected

b. Output signals

(1) M23 DRIVE1, 2 (PRCB to M23)
M23 drive control signal.
The drive direction of M23 is controlled by switching the drive current directions of two signals.

Status	M23 DRIVE1	M23 DRIVE2
Forward stroke of cleaning	H	L
Return stroke of cleaning	L	H
Stop	L	L

[6] M18 (Transfer/Separation Cleaning) Control



M18 (transfer/separation cleaning) is a 24 VDC motor which is controlled by the PRCB (printer control board) via the ADUSDB (ADU stand drive board). Between the PRCB and ADUSDB, signals are exchanged using serial data. Related signals are PS11 (transfer/separation wire cleaning pad HP) and PS12 (transfer/separation wire cleaning pad limit). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to PRCB, stopping the M18.

1. Operation

a. Purpose of driving

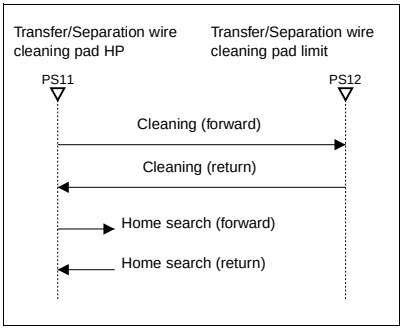
M8 is used to drive the transfer and separation wire cleaning pads.

b. Operation timing

The transfer and separation wires are cleaned when the main switch is turned ON, when the fixing temperature is lower than 50°C, or when the specified copy count is reached.
* Changeable with 25 mode DIPSW.

c. Cleaning operation

The home position of the transfer and separation wire cleaning pads is on the front side of machine. The transfer and separation wire cleaning pads operate as follows:



2. Signals

a. PRCB input signals

(1) PS11 (PS11 to PRCB)

Transfer and separation wire cleaning pads home position detection signal.

This signal detects the reference position of the transfer and separation wire cleaning pads home position (front side).

[L]: HP detected

[H]: HP not detected

(2) PS12 (PS12 to PRCB)

Transfer and separation wire cleaning pads drive limit detection signal.

This signal detects the rear limit position of the transfer and separation wire cleaning pads.

[L]: Limit position detected

[H]: Limit position not detected

b. ADUSDB output signals

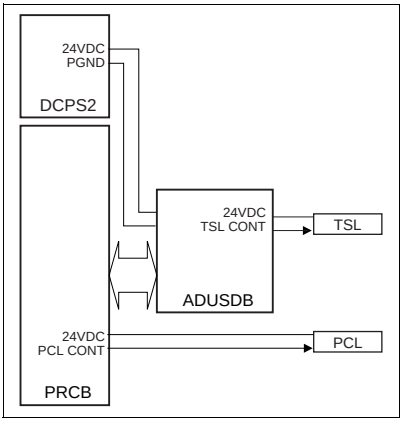
(1) M18 DRIVE1, 2 (ADUSDB to M18)

M18 drive control signal.

The drive direction of M18 is controlled by switching the drive current directions of two signals.

Status	M18 DRIVE1	M18 DRIVE2
Forward stroke of cleaning	H	L
Return stroke of cleaning	L	H
Stop	L	L

[7] PCL/TSL Control



LEDs are used for PCL (pre-charging exposure lamp) and TSL (transfer synchronization lamp). PCL is driven by PRCB (printer control board). TSL is driven by ADUSDB (ADU stand drive board), and the control is conducted by PRCB.

1. Operation

PCL is turned ON/OFF in sync with M2 (drum). TSL turns ON after a lapse of specified time from turning ON of PS45 (leading edge detection) of the second paper feed section. It turns OFF after a lapse of specified time from detection of the trailing edge of copy paper.

2. Signals

a. Output signals

(1) PCL CONT (PRCB to PCL)

PCL ON/OFF control signal.

[L]: PCL ON

[H]: PCL OFF

(2) TSL CONT (ADUSDB to TLS)

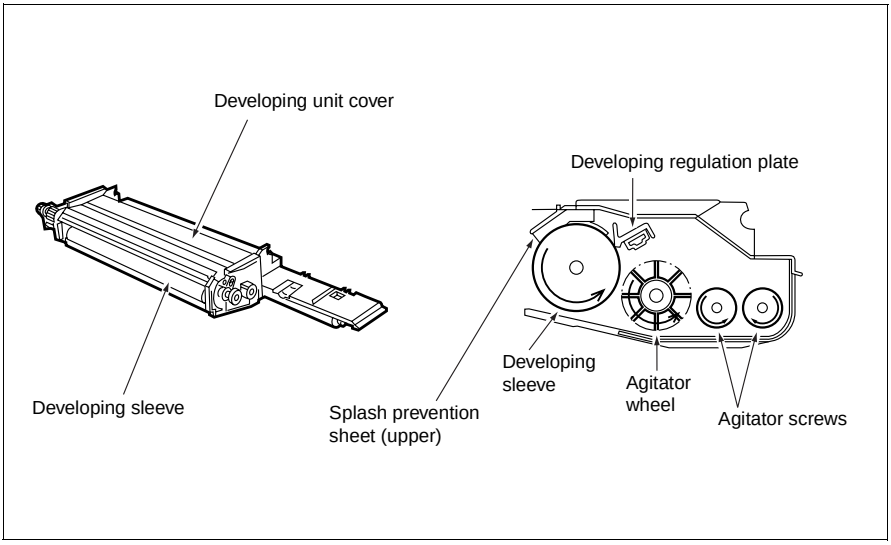
TSL ON/OFF control signal.

[L]: TSL ON

[H]: TSL OFF

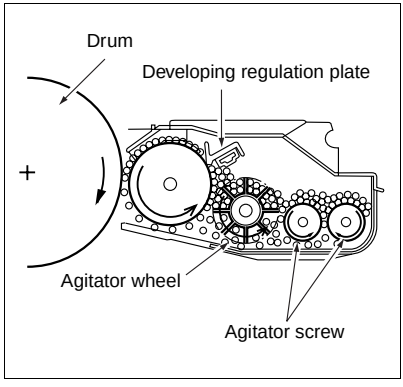
DEVELOPING UNIT

[1] Composition



[2] Mechanisms

Mechanism	Method
Developing	2-component developer
Developing bias	DC bias
Developer agitation	Main agitator Auxiliary agitator



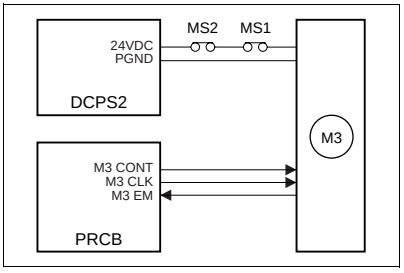
1. The developing unit drive motor (M3) drives the following parts via the gear unit at the back:

- Developing sleeve
- Agitator wheel
- Agitator screws

2. Flow of developer

The developer inside the developing unit is supplied to the developing sleeve by the agitator wheel, and maintained at a constant thickness by the developing regulation plate (bristle height regulation plate). The developer remaining on the developing sleeve is returned to the agitator screws.

[3] M3 (Developing Unit Drive) Control



M3 (developing) is controlled by the PRCB (printer control board) and the motor drive power is supplied by DCPS2 (DC power supply unit 2). When the front left or right door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to M3, stopping the voltage supply to the developing sleeve.

1. Operation

M3 which is the 24V driven DC motor drives the developing sleeve and agitator. M3 equipped with speed control circuit send the rotation error signal to PRCB when PLL lock is released longer than the specified time period. M3 starts after the specified time interval from the start switch is ON, and stops after the specified time interval from the charging wire unit stops charging.

2. Signals

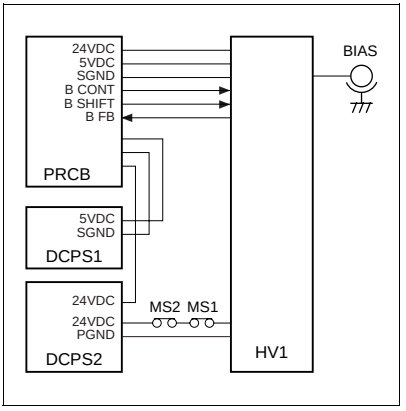
a. Input signals

(1) M3 EM (M3 to PRCB)
M3 fault detection signal.
[H]: Abnormal rotation (when PLL is unlocked for more than 1.5 seconds)
[L]: Normal rotation

b. Output signals

(1) M3 CONT (PRCB to M3)
M3 drive control signal.
[L]: M3 ON
[H]: M3 OFF

[4] Developing Bias Control



The developing bias is controlled by PRCB (printer control board) via the HV1 (high voltage unit 1). When the front left or right door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to HV1, stopping the voltage supply to the developing sleeve.

1. Operation

The developing bias voltage is applied to the developing sleeve based on the M2 (drum) rotation state signal.

2. Signals

a. Input signals

(1) B FB (HV1 to PRCB)
Developing bias voltage feedback signal.
This signal monitors the developing bias voltage. It is an 0V to 5V analog signal corresponding to the output level.

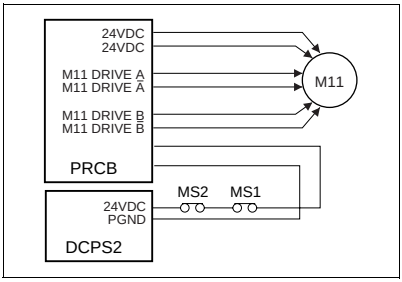
b. Output signals

(1) B CONT (PRCB to HV1)
Developing bias output ON/OFF control signal.
[L]: Developing bias ON
[H]: Developing bias OFF

(2) B SHIFT (PRCB to HV1)
Developing bias output level control signal.
The developing bias output level is controlled according to the duty ratio of the pulse (PWM) signal sent from the PRCB.

B SHIFT duty	20% to 80%
Developing bias output range	-300 V to -800 V

[5] Toner Density Control



The toner density is controlled directly by PRCB (printer control board) by controlling M11 (toner supply 1). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motor, stopping the M11.

1. Operation

a. Toner density detection

Concerning the toner density, the reference patch density is detected by a patch detection method. This method outputs the corresponding analog voltage signal to the PRCB.

The PRCB compares the detected voltage with the reference value to determine whether toner must be added.

b. Toner supply operation

Upon read of the patch, M11 is turned ON to supply toner. The time needed to add toner depends on the paper size.

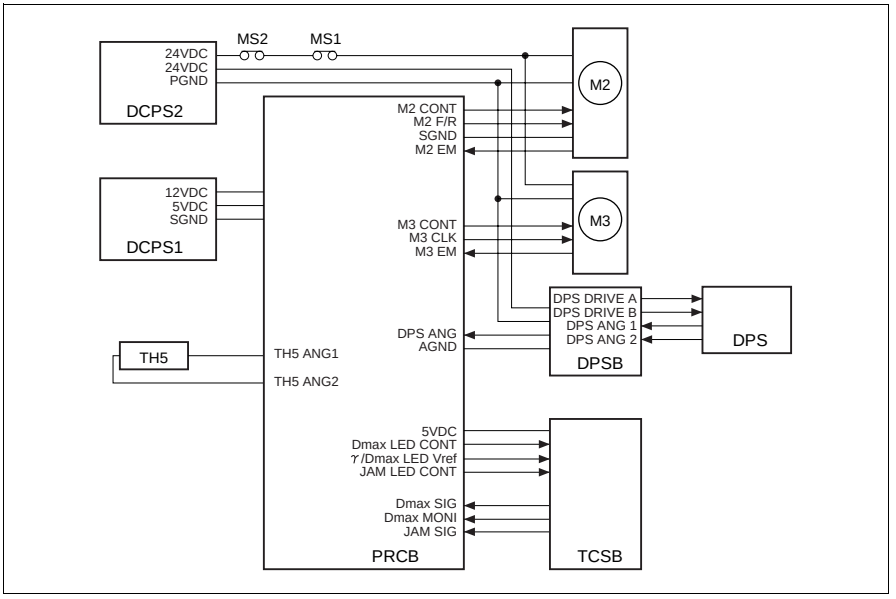
2. Signals

a. Output signals

(1) M11 DRIVE A, $\overline{A}$ (PRCB to M11)
M11 A-phase drive signal.

(2) M11 DRIVE B, $\overline{B}$ (PRCB to M11)
M11 B-phase drive signal.

[6] Dmax Control



Dmax control is performed by the TCSB (toner control sensor board), M2 (drum), M3 (developing), and so on. These parts are controlled by the PRCB (printer control board). Related boards and sensors are DPSB (drum potential sensor board), DPS (drum potential sensor), and TH5 (drum temperature sensor).

When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motor, stopping the M2 and M3.

1. Operation

The purpose of Dmax control is to adjust the maximum density to the reference level for each machine.

a. Dmax control

(1) Method

Latent images are created several times at the maximum exposure level, images are developed with the rotational speed of the developing sleeve varied, then each density is read by the Dmax sensor (PD1) on the TCSB.

The developing sleeve speed detected when the density has reached the reference level is recorded as the optimum sleeve speed and the developing is performed at this optimum sleeve rotation speed.

(2) Timing

a) When the fixing temperature is lower than 50°C at power ON.

b) At the end of job after every 20,000 copies.

2. Signals

a. PRCB input signals

(1) Dmax SIG (TCSB to PRCB)
Output voltage of the Dmax value detection sensor (PD1) on the TCSB.
Reference voltage: 2.5V

(2) Dmax MONI (TCSB to PRCB)
This signal monitors the light reflected by the drum surface (without toner).
The voltage applied to the Dmax detection LED is corrected by γ/Dmax LED Vref so that the output voltage becomes 4V (calibration).
Reference voltage: 4V
<Timing>
a) Before D max correction.

(3) JAM SIG (ITCSB to PRCB)
This signal detects a jam caused by paper wrapping around the drum. A jam is detected when the voltage becomes 4.0V or more.
[L]: LED ON
[H]: LED OFF

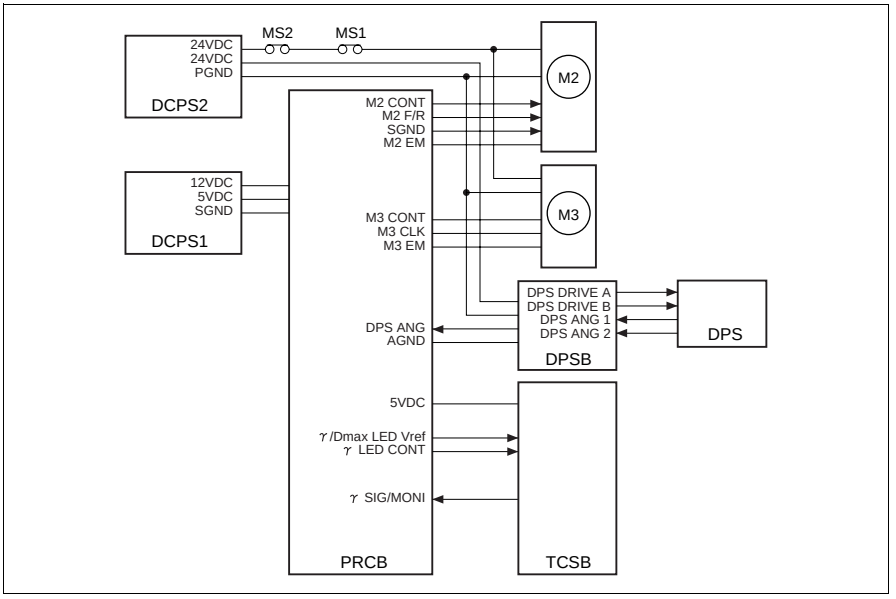
b. Output signals

(1) Dmax LED CONT (PRCB to TCSB)
This signal turns ON/OFF the D max LED.

(2) Dmax LED Vref (PRCB to TCSB)
Power supply line for PD1 LED on TSCB. The voltage is adjusted so as the Dmax MONI signal to be 4 V.

(3) JAM LED CONT (PRCB to TCSB)
This signal turns ON/OFF the JAM LED.
[L]: LED ON
[H]: LED OFF

[7] Gradation Correction Control



Gradation correction control is performed by the TCSB (toner control sensor board), M2 (drum), M3 (developing), and so on. These parts are controlled by the PRCB (printer control board).

1. Operation

The gradation characteristics of the toner density versus exposure amount at the image forming section (drum area) are detected to obtain a linear relation between the image density on a document and the copying image density (toner density).

(1) Method

Exposure is performed with the laser PWM varied in several steps, and development is performed at the toner transfer sleeve speed obtained by Dmax correction.

Next, each density is read by γ sensor (PD2) on the TCSB to detect the gradation characteristics of image density.

The gradation characteristics obtained here are used as the values for correcting the laser exposure amount.

(2) Timing

a) When the fixing temperature is lower than 50°C at power ON.

b) At the end of job after every 20,000 copies.

2. Signals

a. PRCB Input signals

(1) γ SIG/MONI (TCSB to PRCB)

Output voltage from the γ sensor (PD2) on the TCSB. This signal monitors the light reflected by the drum surface (without toner).

The voltage applied to the gradation detection LED is corrected by γ/Dmax LED Vref so that the output voltage becomes 4.5V (calibration).

Reference voltage: 4.5V

<Timing>

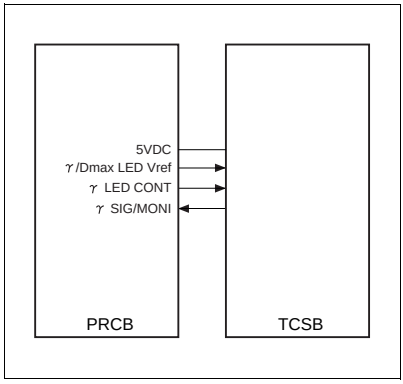
Before gradation correction.

b. PRCB Output signals

(1) γ LED CONT, γ CONT (PRCB to TCSB)
ON/OFF control signal for gradation detection LED.
[L]: LED ON
[H]: LED OFF

(2) γ Dmax LED Vref, Vref (PRCB to TCSB)
Power supply line to the γ LED on the TCSB.
The voltage applied to the γ LED is adjusted so that the γ MONI signal becomes 4.5V.

[8] Dot Diameter Correction Control



Dot diameter is detected by TCSB (toner control sensor board) and controlled by PRCB (printer control board).

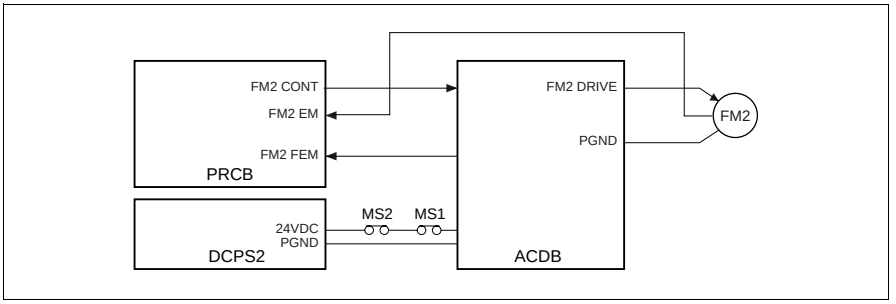
1. Operation

Dot diameter correction is performed to prevent the fluctuation of 1 dot laser beam in diameter due to a soil in the writing unit or a change of developing ability.

(1) Method
Creates several same condensation dot pattern patches changing the laser power and reads them with γ sensor (PD2). Uses the laser power where the γ sensor output reaches reference voltage as MPC.

(2) Timing
a) At the end of job after every 20,000 copies.

[9] FM2 (Developing Suction) Control



FM2 (Developing suction) is controlled by the PRCB (printer control board) via the ACDB (AC drive board). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply, stopping FM2.

1. Operation

a. ON timing

During idling: FM2 turns ON when M2 (drum) turns ON.
During copying: FM2 turns ON when M1 (main) turns ON.

b. OFF timing

During idling: FM2 turns OFF when M2 turns OFF or in the specified interval after completion of copying.
During copying: Always ON.

2. Signals

a. PRCB input signals

(1) FM2 EM (FM2 to PRCB)
FM2 fault detection signal.
[L]: FM2 is normal.
[H]: FM2 is abnormal.

(2) FM2 FEM (ACDB to PRCB)
Signal detecting whether the 24V fuse for FM2 is blown.
[L]: Blown fuse is not detected.
[H]: Blown fuse is detected.

b. PRCB output signals

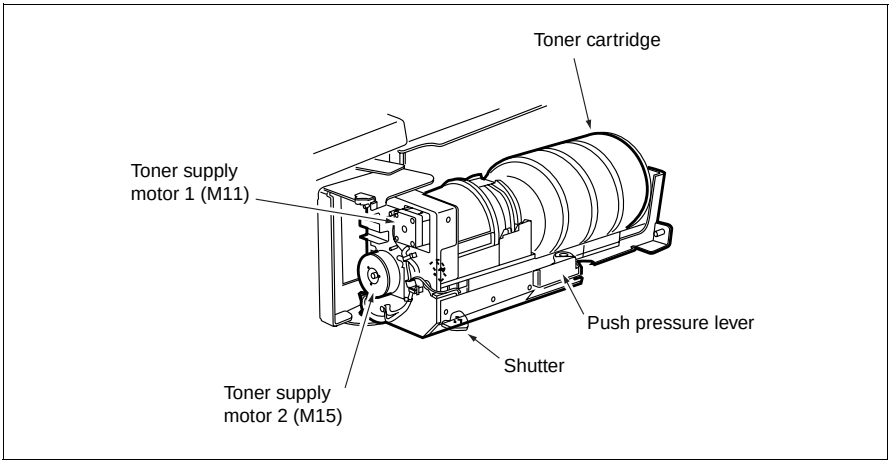
(1) FM2 CONT (PRCB to ACDB)
FM2 control signal.
[L]: FM2 ON
[H]: FM2 OFF

c. ACDB output signal

(1) FM2 DRIVE (ACDB to FM2)
FM2 drive signal.
[L]: FM2 OFF
[H]: FM2 ON

TONER SUPPLY UNIT

[1] Composition



[2] Mechanisms

	Mechanism	Method
	Toner supply	Supply by screw
	Toner level detection	Piezoelectric method 130±30 g
*1	Toner agitation	Agitator plates
*2	Toner cartridge	Rotary cartridge Capacity: 1320 g
	Toner leakage prevention	Toner supply shutter

*1 Toner agitation

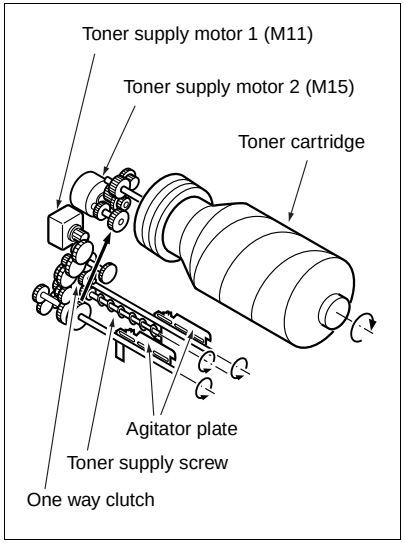
Toner agitator plates are driven by the following two motors through the gear unit:

a) Toner supply motor 1 (M11): Drives the toner supply screw.

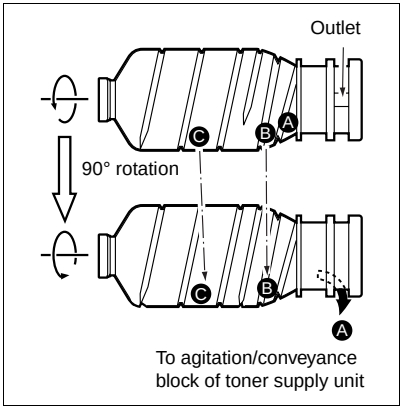
b) Toner supply motor 2 (M15): Drives the toner cartridge.

The agitator plates rotate faster when toner supply motor 1 (M11) runs than when toner supply motor 2 (M15) runs. When the two motors are running simultaneously, the one-way clutch installed on the agitator shaft selects toner supply motor 2 (M15).

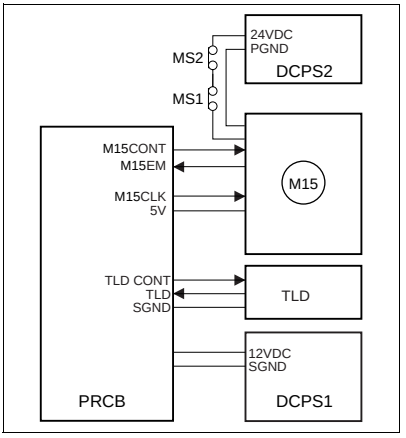
The agitator plates prevent the toner from clumping and accumulating on TLD (remaining toner detection sensor).



*2 Toner cartridge
When the toner cartridge rotates, toner is fed to the outlet of the cartridge through the spiral groove on the surface of the toner cartridge. When the outlet of the cartridge faces downward, toner flows out of the outlet into the agitation/supply section of the toner supply unit.



[3] Toner Level Detection Control



Toner level detection is controlled by the TLD (toner level detection) and the PRCB (printer control board). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the moter, stopping M5 (toner supply 2).

1. Operation

a. Toner level detection
A piezoelectric device is used as the TLD.
When the level of toner in the cartridge becomes low, the toner supply signal is output to the PRCB. As a result, a message is displayed on the LCD connected to the OB1 (operation board 1).

b. Detection timing
The detection timing is as follows:
- Power-on
- When the front door opens or closes
- During copying

c. Toner supply to toner supply unit
When the no toner state is detected by TLD, M15 (toner supply 2) is turned ON to supply toner from the toner cartridge to the toner supply unit.

d. Detection of no toner state in toner cartridge
If the level of toner is not detected by TLD after M15 has been held ON for a specified period of time, the toner cartridge is assumed to be empty.

2. Signals

a. Input signal

(1) TLD (TLD to PRCB)
When the level of toner in the cartridge becomes low, this signal goes low [L], displaying a message on the LCD connected to the OB1.

(2) M15 EM (M15 to PRCB)
M15 fault detection signal.
[L]: M15 normal
[H]: M15 Abnormal

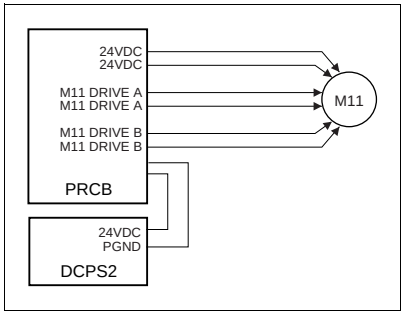
b. Output signals

(1) TLD CONT, TSEN_CONT (PRCB to TLD)
TLD power control signal.
The TLD is powered only when it is detecting the toner level.

(2) M15 CONT (PRCB to M15)
M15 control signal.
[L]: M15 ON
[H]: M15 OFF

(3) M15 CLK (PRCB to M15)
Clock signal for M15.

[4] M11 (Toner Supply 1) Control



M11 (Toner Supply 1) is controlled directly by PRCB (printer control board). The toner density is detected by TCSB (toner control sensor board).

1. Operation

a. Detection of toner density

The Dmax sensor (PD1) mounted on the TCSB detects the density of the toner control chart developed on the drum surface to output the signal corresponding to the detected density to the PRCB.

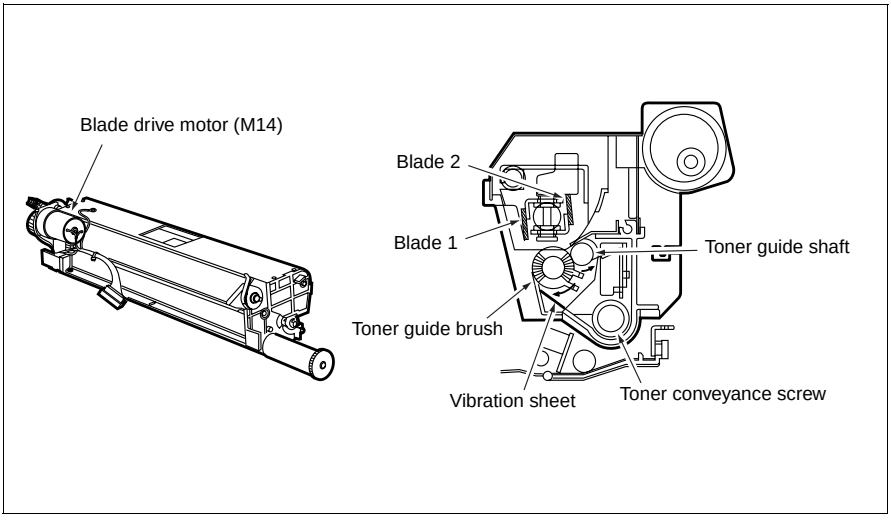
b. Toner supply

When the voltage detected by the TCSB is below the specified value, the PRCB issues a control signal to drive the M11. The relationship between the paper size and toner supply time is summarized in the following table:

Paper size	Supply time (sec.)
A3	1.14
B4	0.86
F4	0.86
A4	0.57
A4R	0.57
B5	0.43
B5R	0.43
A5	0.29
A6	0.22

CLEANING/TONER RECYCLE UNIT

[1] Composition

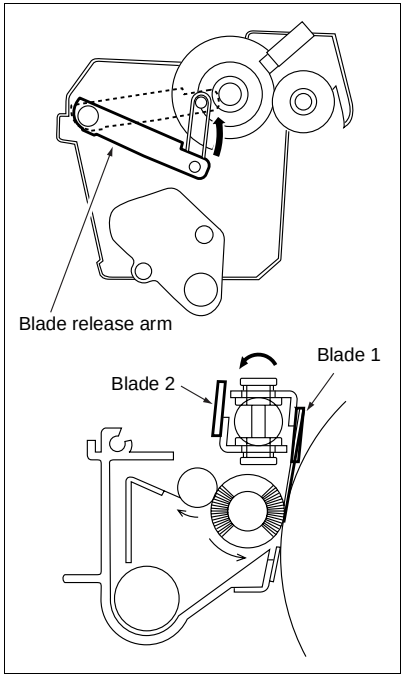


[2] Mechanisms

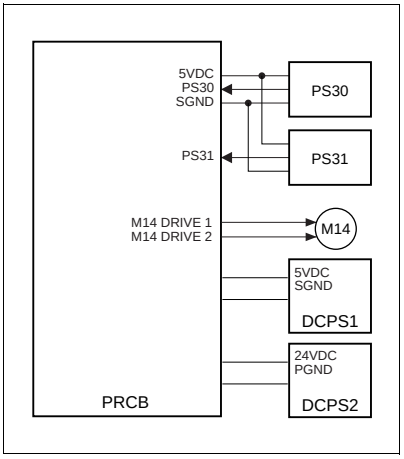
	Mechanism	Method
*1	Drum cleaning	Cleaning blades (switched automatically)
	Toner collection	Toner guide brush
*2	Toner recycle	Toner conveyance by screw

*1 Drum cleaning
Two cleaning blades are installed in the cleaning section. When the blade motor (M14) rotates, the blade release arm is pressed down. At the same time, the cleaning blade drive shaft with two cleaning blades 1 and 2 is turned by the wire wound around the shaft, thereby switching between blades 1 and 2 automatically, increasing the usable life of the blades.

*2 Toner collection
Toner removed by the cleaning blade is collected by the toner guide brush to be reused.



[3] M14 (Blade) Control



M14 (blade) is a 24V DC driven motor and drives the cleaning blades. By M14, the cleaning blade contacts on the drum surface slight pressing or pressing to clean the drum surface. These two blades are automatically switched by M14. M14 is controlled directly by PRCB (printer control board). Related signals are PS30 (blade 1) and PS31 (blade 2).

1. Operation

M14 turns ON/OFF in synchronized with ON/OFF of M2 (drum).

The blade is controlled (pressing, slight pressing, and switching) by PS30 and PS31 detecting the blade position, and M14 rotating forward and backward.

The following table shows the relationship between PS30/PS31 and blade position.

Sensor	Blade Position				
	Pressing	CW/CCW	Slight pressing	CW/CCW	Switching
PS30	OFF	OFF	ON or OFF*	ON	ON
PS31	ON	OFF	OFF	OFF	ON

*Note: CW/CCW indicate the M14 rotating direction for pressing, slight pressing, and switching. The sensor logic for slight pressing position is different between CW and CCW rotation.
CCW: ON
CW: OFF

a. Blade auto switching control

This unit uses two blades with M14 rotating to automatically replace blades. During automatic blade replacement, M2 (drum), M3 (developing), developing bias, guide plate voltage, and PCL are turned ON, toner is adhered to the drum, and then the blade cleans it to prevent blade peeling.
<Timing>
a) At the end of job after every 20,000 copies.
*Changeable with 25 mode DIPSW.

b. Blade setting mode

Blade setting mode is available in 36 mode as a task after blade replacement during maintenance. Blade setting mode adheres toner on drum as in blade auto replacement control and then the blade cleans toner to prevent blade peeling.

c. Black stripe creation control

In order to improve durability of the blade (stabilize load, prevent paper dust crushing), a black stripe toner is adhered on drum once every five copies and then cleaned.
*Changeable with 25 mode DIPSW.

2. Signals

a. Input signal

(1) PS30 (PS30 to PRCB)
Blade position detection signal 1.

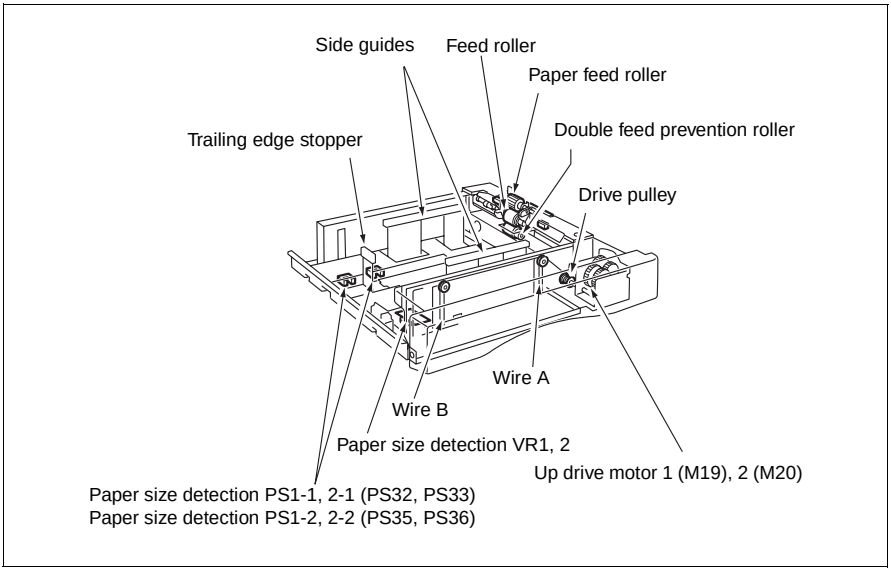
(2) PS31 (PS31 to PRCB)
Blade position detection signal 2.

b. Output signal

(1) M14 DRIVE 1,2 (PRCB to M14)
M14 drive control signal.

TRAY 1/2 PAPER FEED UNIT

[1] Composition



Caution: Trays 1 and 2 have the same shape and mechanisms.

[2] Mechanisms

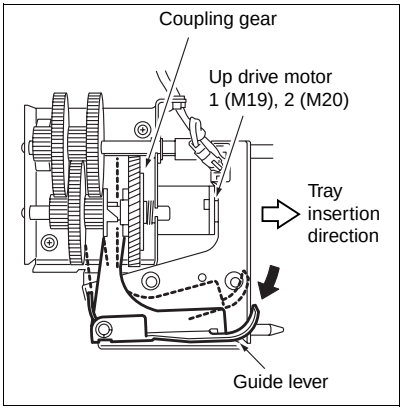
	Mechanism	Method
*1	Paper lift-up	Up: Paper up/down plate driven by up/down wires Down: Falls down by its own weight
	Tray loading	Load from the front door side
	Double feed prevention	Torque limiter
*2	1st paper feed	Paper feed roller Pick up solenoid 1 (SD8), 2 (SD9)
	No paper detection	Photosensor + Actuator
*3	Paper size detection (Universal)	Width: VR Length: Photosensor + Actuators (two)

*1 Paper lift-up

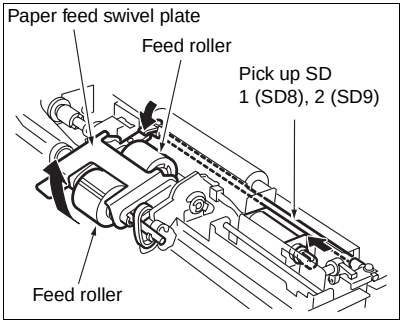
a) Hoisting of up/down plate

The up/down plate is lifted up by up/down wires. When the paper tray is loaded, the up drive motor 1 (M19), 2 (M20) rotates to wind the up/down wires around the drive pulleys and consequently the plate moves up and push up papers set in the tray. When the tray upper limit PS1 (PS20), 2 (PS21) detects the actuator of the plate that has moved up, the up drive motor 1 (M19), 2 (M20) stops.

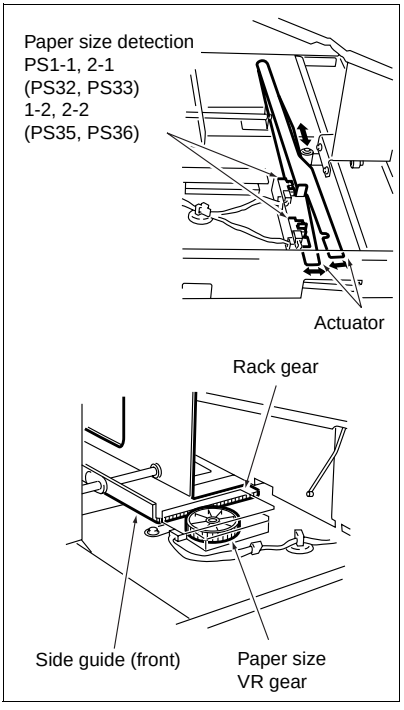
b) Lowering of up/down plate
When the paper feed tray is pulled out, the guide lever shown below is disengaged from the rail, thus releasing the coupling gear that transmits the drive force of the up drive motor 1 (M19), 2 (M20) to the drive pulleys. Then, the up/down plate falls down naturally by the weight of papers.



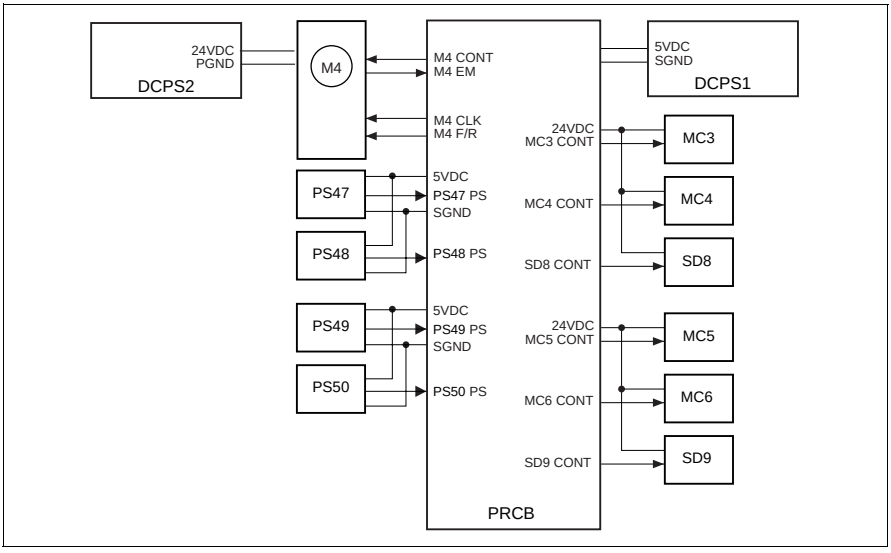
*2 1st paper feed
To keep a constant contact pressure on the paper by the paper feed roller at the time of paper pick-up, the weight of the paper feed roller itself is used. The pick up solenoid 1 (SD8), 2 (SD9) moves the paper feed swivel plate down so that the paper feed roller mounted on the plate falls down to touch the paper as well. Then, the paper feed roller picks up a paper and feeds it toward the paper conveyance unit. The first paper feed solenoid moves the paper feed swivel plate down only when paper is to be fed. Otherwise, it releases contact.



*3 Paper size detection
Length: The rear guide of the tray moves, causing the paper size detection actuator to move as well. As a result, the two paper size detection PS1-1, 2-1 (PS32, PS33), 1-2, 2-2 (PS35, PS36) turn ON and/or OFF. Thus, the paper size is automatically determined according to the combination of the ON/OFF states of these PSs.
Width: The side guide of the tray moves, causing the side guide (front) rack gear of the paper size detection arm to turn the gear of the paper size detection VR1, 2. Thus, the paper size is automatically determined according to the change in the resistance value of the VR.



[3] First Paper Feed Control



The 1st paper feed from tray 1 or 2 takes place as the result of the transmission of the drive force from M4 (paper feed) to each paper feed roller, via MC3 (feed MC 1), MC5 (feed MC 2), and MC4 (pre-registration MC1), MC6 (pre-registration MC 2). SD8 (pickup SD1) or SD9 (pickup SD 2) causes the roller to pick up paper.

The above operations are controlled by the PRCB (printer control board). Related signals include: PS47 (paper feed 1), PS49 (paper feed 2), PS48 (paper pre-registration 1), and PS50 (paper pre-registration 2).

1. Operation

a. First paper feed timing (feed MC drive)

(1) When printing of the first copy starts:
Timing that is determined by the P counter from when copying starts

(2) When printing of the second copy starts:
When PS47 or PS49 of the first sheet of copy is OFF.

(3) OFF timing
After a specified count from turns ON of PS48, and PS50.
*Changeable in 36 mode

b. Feed timing (pre-registration drive)

(1) ON timing
First sheet: When a preset time interval has passed after turning ON of MC3 or MC5.
Second sheet: When a preset time interval has passed after turning ON of MC1 (registration).

(2) OFF timing
When PS47 or PS49 is turned OFF.

2. Signals

a. PRCB input signals

(1) PS47 (PS47 to PRCB)
Paper passage detection signal (tray 1).
[L]: Paper passed.
[H]: Paper not passed.

(2) PS49 (PS49 to PRCB)
Paper passage detection signal (tray 2).
[L]: Paper passed.
[H]: Paper not passed.

(3) PS48 (PS48 to PRCB)
First paper feed paper detection signal (tray 1).
[L]: Paper passed.
[H]: Paper not passed.

(4) PS50 (PS50 to PRCB)
First paper feed paper detection signal (tray 2).
[L]: Paper passed.
[H]: Paper not passed.

(5) PS18 (PS18 to PRCB)
Paper passage detection signal at the exit of tray 1 (for jam detection).
[L]: Paper exists.
[H]: Paper does not exist.

(6) PS53 (PS53 to PRCB)
Paper passage detection signal at the exit of tray 2 (for jam detection).
[L]: Paper exists.
[H]: Paper does not exist.

b. PRCB output signals

(1) MC3 CONT (PRCB to MC3)
MC3 drive control signal (tray 1).
[L]: MC3 ON
[H]: MC3 OFF

(2) MC5 CONT (PRCB to MC5)
MC5 drive control signal (tray 2).
[L]: MC5 ON
[H]: MC5 OFF

(3) MC4 CONT (PRCB to MC4)
MC4 drive control signal (tray 1).
[L]: MC4 ON
[H]: MC4 OFF

(4) MC6 CONT (PRCB to MC6)
MC6 drive control signal (tray 2).
[L]: MC6 ON
[H]: MC6 OFF

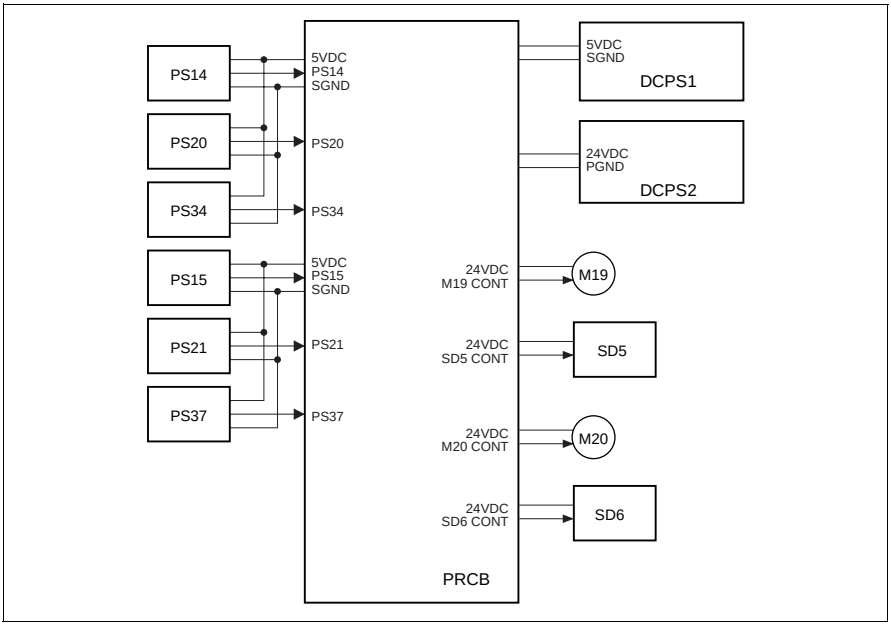
(5) SD8 CONT (PRCB to SD8)
SD8 drive control signal (tray 1).
[L]: SD8 ON
[H]: SD8 OFF

(6) SD9 CONT (PRCB to SD9)
SD9 drive control signal (tray 2).
[L]: SD9 ON
[H]: SD9 OFF

(7) M4 CLK (PRCB to M4)
Clock signal for M4.

(8) M4 F/R (PRCB to M4)
Rotation direction control signal for M4.

[4] Paper Up Drive Control



Papers stacked in the tray are pushed up by transmitting the drive force of M19 (up drive 1) or M20 (up drive 2) to the paper up/down plate in the tray via up/down wires. M19 and M20 are controlled directly by PRCB (printer control board). Related signals are PS20 (upper limit detection 1), PS21 (upper limit detection 2), PS34 (remaining paper detection 1) and PS37 (remaining paper detection 2). To prevent pull-out of tray during copying operation that cause paper jamming, a tray lock mechanism is implemented by PS14 (handle release 1), PS15 (handle release 2), SD5 (lock SD1), and SD6 (lock SD2).

1. Operation

a. Paper up drive control

When tray 1 or 2 is loaded, M19 or M20 goes ON for a fixed time, raising the paper up/down plate in the tray. When PS20 or PS21 detects the upper limit of paper as the paper up/down plate in the tray goes up, it goes ON and consequently M19 or M20 goes OFF, stopping raising the paper up/down plate. When PS20 or PS21 goes OFF after a paper is fed, M19 or M20 goes ON again, moving the paper up/down plate upward. The up/down plate in the tray is lowered mechanically by its own weight.

b. Paper up drive timing

(1) ON timing

M19 or M20 is turned ON when loading of a tray is detected (by shorting wires at both ends of the drawer connector) or when PS26 or PS27 is turned ON.

(2) OFF timing

M19 or M20 is turned OFF when PS20 or PS21 is turned ON.

c. Remaining Paper Detection Control

The level of paper remaining in each tray is detected according to the time that M19 or M20 requires to lift up the paper up/down plate when the tray is set. This lift-up time (operation time of M19 or M20) is recorded in the PRCB. Subsequently, remaining paper is detected by the paper feed counter. The detected remaining paper level is displayed on the operation panel in 5 steps. PS34 and PS37 are used to detect the remaining paper level when it lowers below about 10%.

d. Tray lock control

When the tray handle is gripped, PS14 or PS15 is turned ON. This signal then causes SD5 or SD6 to go ON, releasing the lock.

2. Signals

a. PRCB input signals

(1) PS14 (PS14 to PRCB)
Tray drawer handle detection signal (tray 1).
[L]: Detected
[H]: Not detected

(2) PS15 (PS15 to PRCB)
Tray drawer handle detection signal (tray 2).
[L]: Detected
[H]: Not detected

(3) PS20 (PS20 to PRCB)
Paper upper limit detection signal (tray 1).
[L]: Not detected
[H]: Detected

(4) PS21 (PS21 to PRCB)
Paper upper limit detection signal (tray 2).
[L]: Not detected
[H]: Detected

(5) PS34 (PS34 to PRCB)
Remaining paper detection signal (tray 1).
[L]: Detected
[H]: Not detected

(6) PS37 (PS37 to PRCB)
Remaining paper detection signal (tray 2).
[L]: Detected
[H]: Not detected

b. PRCB output signals

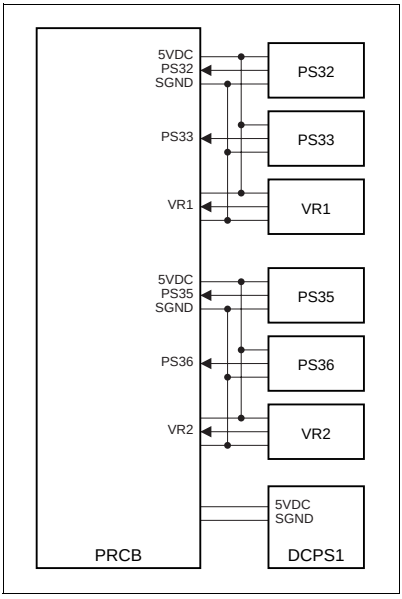
(1) M19 CONT (PRCB to M19)
M19 ON/OFF control signal (tray 1).
[L]: M19 ON
[H]: M19 OFF

(2) M20 CONT (PRCB to M20)
M20 ON/OFF control signal (tray 2).
[L]: M20 ON
[H]: M20 OFF

(3) SD5 CONT (PRCB to SD5)
SD5 drive control signal (tray 1).
[L]: SD5 ON
[H]: SD5 OFF

(4) SD6 CONT (PRCB to SD6)
SD6 drive control signal (tray 2).
[L]: SD6 ON
[H]: SD6 OFF

[5] Paper Size Detection Control



The paper size in tray 1/2 is detected using PS32 (paper size 1-1), PS33 (paper size 2-1), PS35 (paper size 1-2), PS36 (paper size 2-2), paper size detection VR1, and paper size detection VR2. Based on the detection signals, the PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected using PS32, PS33, PS35, and PS36. Variable resistors (VR1 and VR2) are installed at the bottom of the tray to detect the width of paper.

The relationships between the switches and paper sizes (lengths) are as follows:

Paper size / Switch	8.5 x 11 or less	A4R to B5R	F4	8.5 x 14 or larger
PS32 or PS35	OFF	OFF	ON	ON
PS33 or PS36	OFF	ON	ON	OFF

2. Signals

a. Input signals

(1) PS32 (PS32 to PRCB)
Paper size detection switch ON/OFF signal (tray 1).

(2) PS33 (PS33 to PRCB)
Paper size detection switch ON/OFF signal (tray 1).

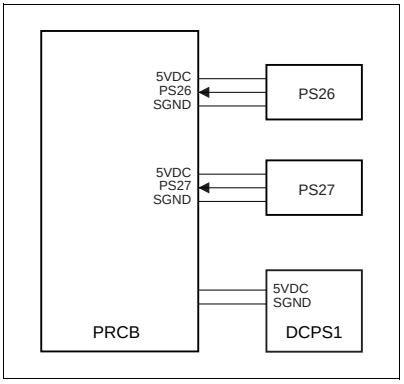
(3) PS35 (PS35 to PRCB)
Paper size detection switch ON/OFF signal (tray 2).

(4) PS36 (PS36 to PRCB)
Paper size detection switch ON/OFF signal (tray 2).

(5) VR1 (VR1 to PRCB)
Paper width detection signal (tray 1).

(6) VR2 (VR2 to PRCB)
Paper width detection signal (tray 2).

[6] No Paper Detection Control



No paper in the tray is detected by PS26 (no paper 1) and PS27 (no paper 2) which are controlled by the PRCB (printer control board).

1. Operation

When the tray becomes empty, PS26 or PS27 is turned ON, displaying a message on LCD via the OB1 (operation board 1).

2. Signals

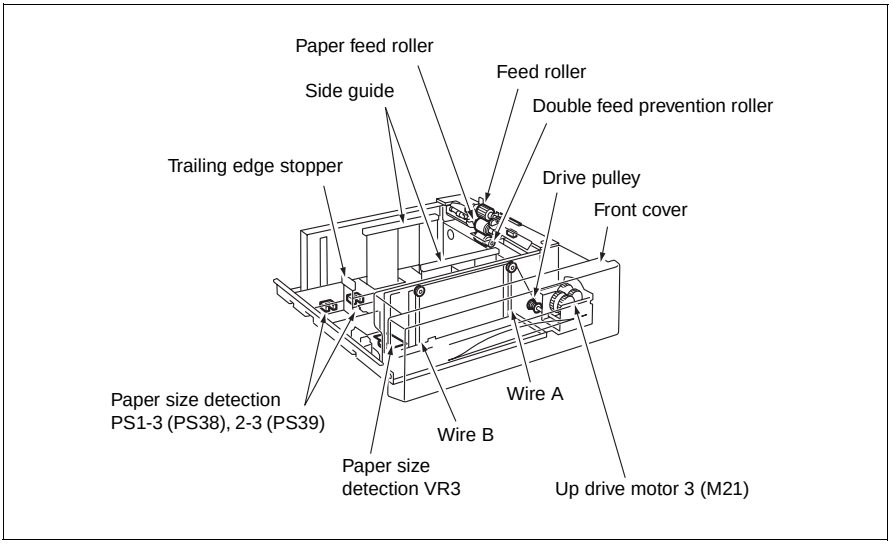
a. Input signals

(1) PS26 (PS26 to PRCB)
No paper detection signal (tray 1).
[L]: Paper does not exist in tray
[H]: Paper exists in tray

(2) PS27 (PS27 to PRCB)
No paper detection signal (tray 2).
[L]: Paper does not exist in tray
[H]: Paper exists in tray

TRAY 3 PAPER FEED UNIT

[1] Composition



[2] Mechanisms

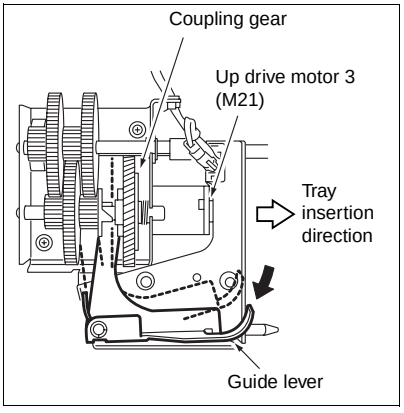
	Mechanism	Method
*1	Paper lift-up	Up: Paper up/down plate driven by up/down wires Down: Falls down by its own weight
	Tray loading	Front loading
	Double feed prevention	Torque limiter
*2	1st paper feed	Paper feed roller Pick up solenoid 3 (SD10)
	No paper detection	Photosensor + Actuator
*3	Paper size detection (Universal)	Width: VR Length: Photosensor + Actuators (two)

*1 Paper lift-up

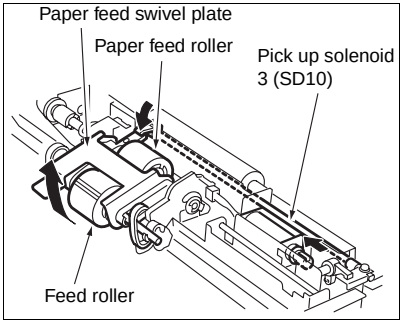
a) Hoisting of up/down plate

The up/down plate is lifted up by up/down wires. When the paper tray is loaded, the up drive motor 3 (M21) rotates to wind the up/down wires around the drive pulleys and consequently the plate moves up. When the tray upper limit PS3 (PS22) detects the actuator of the plate that has moved up, the up drive motor 3 (M21) stops.

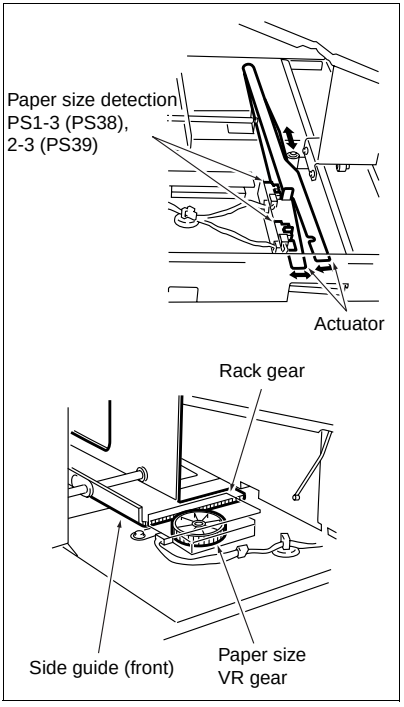
b) Lowering of up/down plate
When the paper feed tray is pulled out, the guide lever shown below is disengaged from the rail, thus releasing the coupling gear that transmits the drive force of the up drive motor 3 (M21) to the drive pulleys. Then, the up/down plate falls down mechanically by the weight of papers.



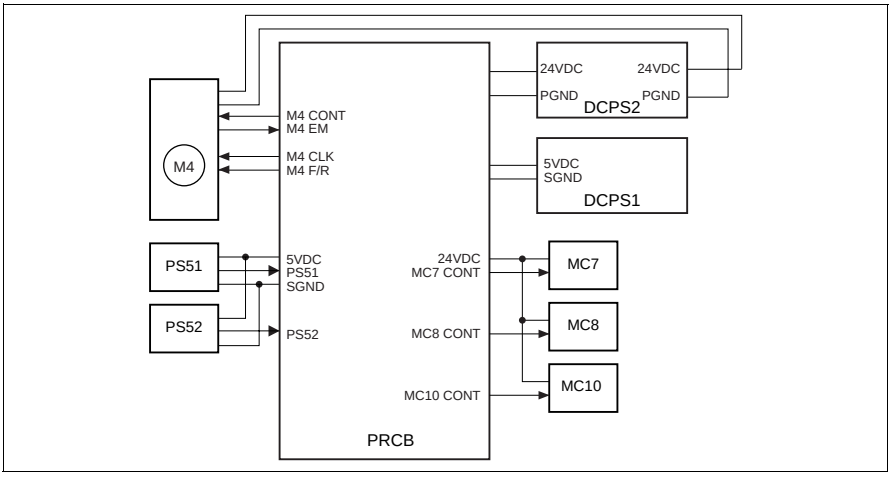
*2 1st paper feed
To keep constant contact pressure on the paper by the paper feed roller at the time of paper pick-up, the weight of the paper feed roller itself is used. The pick up solenoid 3 (SD10) moves the paper feed swivel plate down so that the paper feed roller mounted on the plate falls down to touch the paper as well. Then, the paper feed roller picks up a paper and feeds it toward the paper conveyance unit. The first paper feed solenoid moves the paper feed swivel plate down only when paper is to be fed. Otherwise, it releases contact.



*1 Paper size detection
Length: The rear guide of the tray moves, causing the paper size detection actuator to move as well. As a result, the two paper size detection PS1-3 (PS38), 2-3 (PS39) turn ON and/or OFF. Thus, the paper size is automatically determined according to the combination of the ON/OFF states of these PSs.
Width: The side guide of the tray moves, causing the side guide (front) rack gear to turn the gear of the paper size detection VR3. Thus, the paper size is automatically determined according to the change in the resistance value of the VR.



[3] First Paper Feed Control



The 1st paper feed from tray 3 takes place as the result of the transmission of the drive force from M4 (paper feed) to each paper feed roller, via MC7 (feed MC3) and MC8 (pre-registration MC3). SD10 (pick up SD3) causes the roller to pick up paper. The above operations are controlled by the PRCB (printer control board). Related signals are PS51 (paper feed 3), and PS52 (paper pre-registration 3).

1. Operation

a. First paper feed timing (feed MC drive)

(1) When printing of the first copy starts
Timing that is determined by the P counter from when copying starts.

(2) When printing of the second copy starts
When PS51 turns OFF after the first paper feed detection.

(3) OFF timing
After a specified count from turning ON of PS50.
*Changeable in 36 mode.

b. Feed timing (pre-registration clutch drive)

(1) ON timing
First sheet: When a preset time interval has passed after turning ON of MC7.
Second sheet: When a preset time interval has passed after turning ON of MC1 (registration).

(2) OFF timing
When PS19 is turned OFF.

2. Signals

a. PRCB input signals

(1) PS51 (PS51 to PRCB)
Paper passage detection signal.
[L]: Paper passed
[H]: Paper not passed

(2) PS52 (PS52 to PRCB)
First paper feed paper detection signal.
[L]: Paper exists
[H]: Paper does not exist

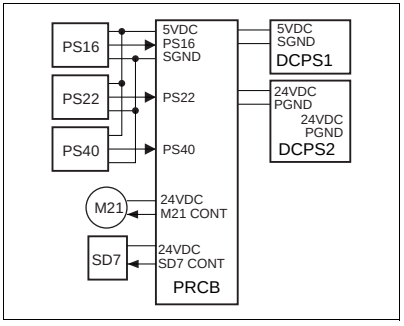
b. PRCB output signals

(1) MC7 CONT (PRCB to MC7)
MC7 drive control signal.
[L]: MC7 ON
[H]: MC7 OFF

(2) MC8 CONT (PRCB to MC8)
MC8 drive control signal.
[L]: MC8 ON
[H]: MC8 OFF

(3) SD10 CONT (PRCB to SD10)
SD10 drive control signal.
[L]: SD10 ON
[H]: SD10 OFF

[4] Paper Up Drive Control



Papers stacked in the tray are pushed up by transmitting the drive force of M21 (up drive 3) to the paper up/down plate in the tray via up/down wires. MC21 is controlled directly by PRCB (printer control board). The related signals are PS22 (tray upper limit 3) and PS40 (remaining paper detection 3). To prevent pull-out of tray during copying operation that cause paper jamming, a tray lock mechanism is implemented by PS16 (handle release 3) and SD7 (lock SD3).

1. Operation

a. Paper up drive control

When tray 3 is loaded, M21 goes ON for a fixed time, raising the paper up/down plate in the tray. When PS22 detects the upper limit of paper as the paper up/down plate in the tray goes up, it goes ON and consequently M21 goes OFF, stopping raising the paper up/down plate. When PS22 goes OFF after a paper is fed, M21 goes ON again, moving the paper up/down plate upward. The paper up/down plate in the tray is lowered mechanically by its own weight.

b. Paper up drive timing

(1) ON timing
M21 is turned ON when loading of a tray is detected (by shorting wires at both ends of the drawer connector) or when no paper is detected.

(2) OFF timing
M21 is turned OFF when PS22 is turned ON.

c. Remaining Paper Detection

The level of paper remaining in each tray is detected according to the time that M21 requires to lift up the paper up/down plate when the tray is set. This lift-up time (operation time of M21) is recorded in the PRCB. Subsequently, remaining paper is detected by the paper feed counter. The detected remaining paper level is displayed on the operation panel in 5 steps. PS40 is used to detect the remaining paper level when it drops below about 10%.

d. Tray lock control

When the tray handle is gripped, PS16 is turned ON. This signal then causes SD7 to go ON, releasing the lock.

2. Signals

a. PRCB input signals

(1) PS16 (PS16 to PRCB)
Tray drawer handle detection signal.
[L]: Detected
[H]: Not detected

(2) PS22 (PS22 to PRCB)
Paper upper limit detection signal.
[L]: Not detected
[H]: Detected

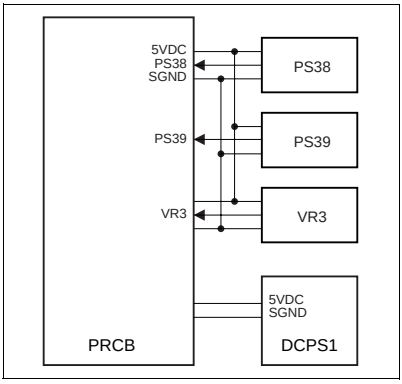
(3) PS40 (PS40 to PRCB)
Remaining paper detection signal.
[L]: Detected
[H]: Not detected

b. PRCB output signals

(1) M21 CONT (PRCB to M21)
M21 ON/OFF control signal.
[L]: M21 ON
[H]: M21 OFF

(2) SD7 CONT (PRCB to SD7)
SD7 drive control signal.
[L]: SD7 ON
[H]: SD7 OFF

[5] Paper Size Detection Control



The paper size in tray 3 is detected using PS38 (paper size 1-3), PS39 (paper size 2-3) and paper size detection VR3. Based on the detection signals, the PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected using PS38 and PS39. A variable resistor (VR3) is installed at the bottom of the tray to detect the width of paper.
The relationships between the switches and paper sizes (lengths) are as follows:

Paper size / Switch	8.5 x 11 or less	A4R to B5R	F4	8.5 x 14 or larger
PS38	OFF	OFF	ON	ON
PS39	OFF	ON	ON	OFF

2. Signals

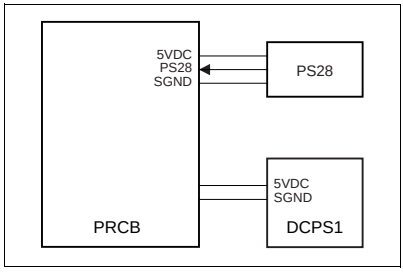
a. Input signals

(1) PS38 (PS38 to PRCB)
Paper size detection switch ON/OFF signal.

(2) PS39 (PS39 to PRCB)
Paper size detection switch ON/OFF signal.

(3) VR3 (VR3 to PRCB)
Paper width detection signal.

[6] No Paper Detection Control



No paper in the tray is detected by PS28 (no paper 3) which is controlled by the PRCB (printer control board).

1. Operation

When the tray becomes empty, PS28 is turned ON, displaying a message on the LCD via the OB1 (operation board 1).

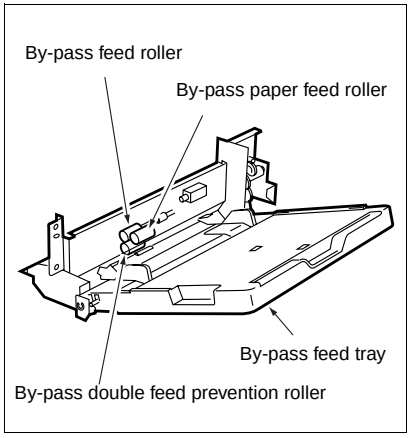
2. Signal

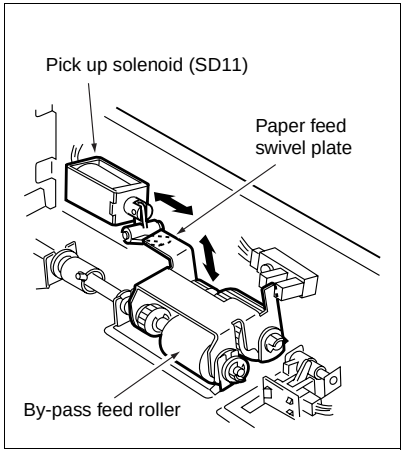
a. Input signals

(1) PS28 (PS 28 to PRCB)
No paper detection signal.
[L]: Paper does not exist in tray
[H]: Paper exists in tray

BY-PASS TRAY

[1] Composition





[2] Mechanisms

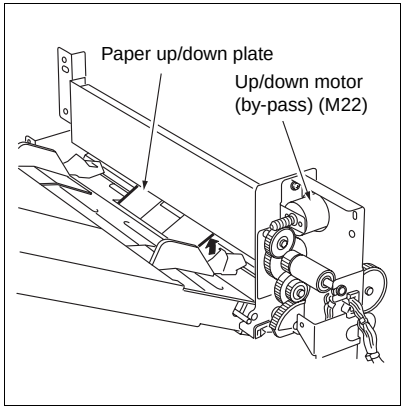
	Mechanism	Method
*1	First paper feed	Swivel roller Pick up solenoid (SD11)
*2	Paper lift-up	Paper up/down plate
		Up/down motor (M22) (by-pass tray)
	Double feed prevention	Torque limiter
	No paper detection	Photosensor
*3	Paper size detection	Paper size detection PS (PS55/PS56)

*1 By-pass paper feed roller

To keep constant contact pressure on the paper by the paper feed roller at the time of paper pick-up, the weight of the paper feed roller itself is used. The pick up solenoid (SD11) moves the paper feed swivel plate down (when the roller is rotating) so that the paper feed roller mounted on the plate falls down to touch the paper as well. Then, the paper feed roller picks up a paper and feeds it toward the paper conveyance section. The first paper feed solenoid moves the paper feed swivel plate down only when paper is to be fed. Otherwise, it releases contact.

*2 Paper lift-up

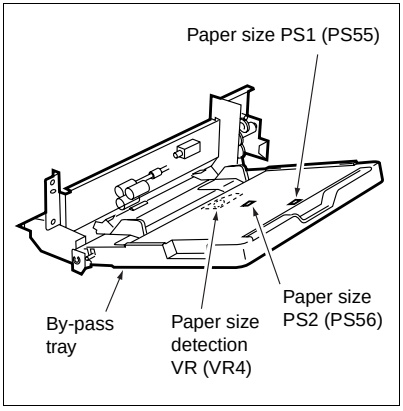
When paper is set in the bypass tray, the up/down motor (by-pass) (M22) drives the paper up/down plate via gears. Paper is automatically pushed up to the paper feed position.



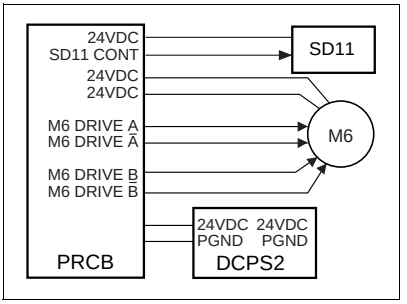
*3 Paper size detection

The paper size is automatically detected by the following three sensors:

- Lateral: Paper size detection VR (VR4)
- Longitudinal: Paper size PS 1/2 (PS55/PS56)



[3] First Paper Feed Control



The 1st paper feed from the by-pass tray takes place as the result of the transmission of the drive force from M6 (loop roller) to the paper feed roller. SD11 (pick up (by-pass tray)) moves up and releases the paper feed roller contacting to the paper after the roller picked up and fed the first paper to the feed roller side to facilitate paper feeding.
The above operations are controlled by the PRCB (printer control board).

1. Operation

a. First paper feed operation timing

Controlled at M6 ON/OFF timings and by M6 rotation direction.

2. Signals

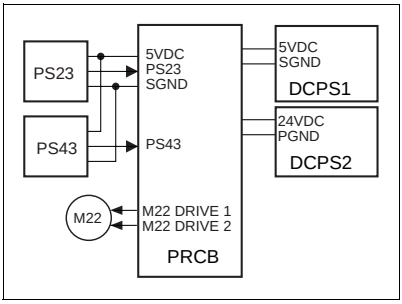
a. Output signals

(1) SD11 (PRCB to SD11)
SD11 drive control signal (bypass tray).
[L]: SD11 ON
[H]: SD11 OFF

(2) M6 DRIVE A, $\overline{A}$ (PRCB to M6)
M6 A-phase drive control pulse signal.

(3) M6 DRIVE B, $\overline{B}$ (PRCB to M6)
M6 B-phase drive control pulse signal.

[4] Paper Up/down Control



By-pass tray paper is moved up and down by transmitting the drive force of M22 (up/down (by-pass)). M22 is controlled directly by PRCB (printer control board). Related signals are PS23 (tray upper limit (by-pass tray)) and PS43 (tray lower limit (by-pass tray)).

1. Operation

a. Paper up/down control

M22 is turned ON a fixed time to push up paper. When PS23 detects the upper limit of paper and is turned ON, M22 is turned OFF to stop pushing up paper. When paper is fed and PS23 is turned OFF, M22 turns ON once more to maintain the upper limit position of the paper.

b. Paper up timing

(1) ON timing
At start of copying

(2) OFF timing
M22 is turned OFF when PS23 is turned ON.

c. Paper down timing

(1) ON timing
Turns ON when there is no paper or when paper jaming takes place.

(2) OFF timing
M22 is turned OFF when PS43 is turned ON.

2. Signals

a. Input signals

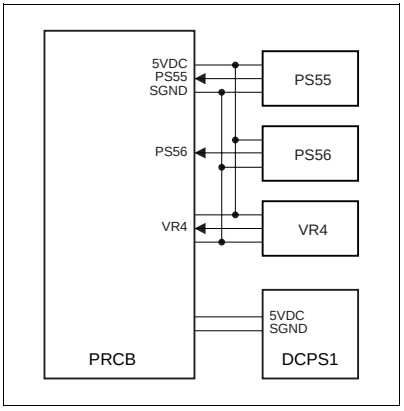
(1) PS23 (PS23 to PRCB)
Paper upper limit position detection signal (by-pass tray).
[L]: Detected
[H]: Not detected

(2) PS43 (PS43 to PRCB)
Paper lower limit position detection signal (by-pass tray).
[L]: Detected
[H]: Not detected

b. Output signal

(1) M22 DRIVE 1, 2 (PRCB to M22)
M22 drive control signal.

[5] Paper Size Detection Control



The size of paper in the by-pass tray is detected by PS55 (paper size 1 (by-pass tray)), PS56 (paper size 2 (by-pass tray)), and VR4 (paper size detection (by-pass tray)). Based on the detection signals, the PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected using PS55 and PS56. The by-pass tray is provided with a variable resistor (VR4) interlocked with the guide position to judge the width of paper according to the change in the resistance value.

2. Signals

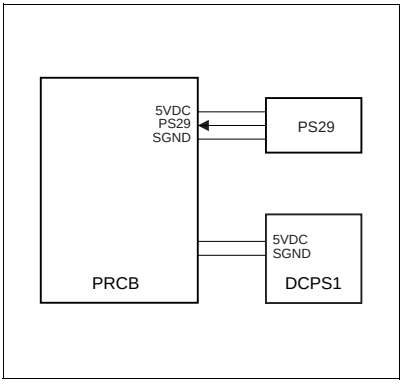
a. Input signals

(1) PS55 (PS55 to PRCB)
Paper size detection switch ON/OFF signal.

(2) PS56 (PS56 to PRCB)
Paper size detection switch ON/OFF signal.

(3) VR4 (VR4 to PRCB)
Paper width detection signal.

[6] No Paper Detection Control



No paper in the tray is detected by PS29 (no paper (by-pass tray)) which is controlled by the PRCB (printer control board).

1. Operation

When the tray becomes empty, PS29 is turned ON, displaying a message on the LCD via the OB1 (operation board 1).

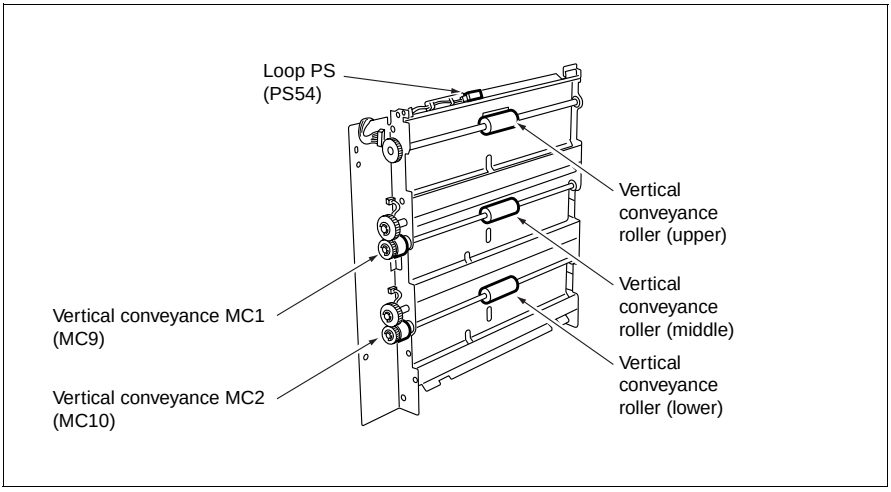
2. Signals

a. Input signals

(1) PS29 (PS29 to PRCB)
No tray paper detection signal.
[L]: Paper does not exist in tray
[H]: Paper exists in tray

VERTICAL PAPER CONVEYANCE SECTION

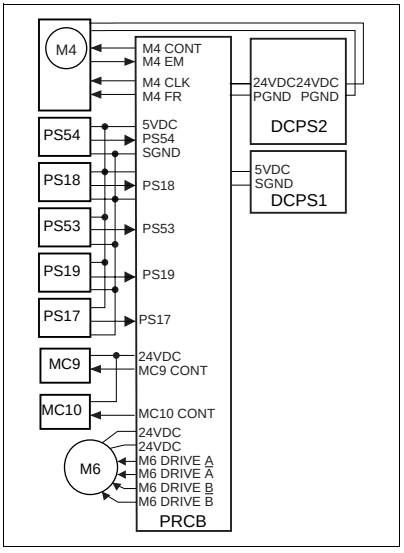
[1] Composition



[2] Mechanisms

Mechanism	Method
Paper conveyance	Rollers
Conveyance drive	Vertical conveyance roller (upper): Loop roller motor (M6) Vertical conveyance roller (middle): Paper feed motor (M4) Vertical conveyance roller (lower): Paper feed motor (M4)

[3] Vertical Paper Conveyance Control



In the vertical paper conveyance section, paper is fed vertically by transmitting the drive force of M4 (paper feed) to the vertical conveyance middle and lower rollers via MC9 (vertical conveyance MC1) and MC10 (vertical conveyance MC2). The upper roller is driven by M6 (loop roller). Each of these is controlled directly by PRCB (printer control board). Related signals are PS18 (vertical conveyance 1), PS53 (vertical conveyance 2), PS19 (vertical conveyance 3), PS54 (loop), and PS17 (open/close detection).
When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motor, stopping M6.

1. Operation

Paper supplied from one of trays 1-3 is then fed to the second paper feed unit by the M4 and M6's drive force transmitted via MC9 and MC10. Since the linear velocity of the vertical conveyance middle and lower rollers driven by M4 is kept constant at high speed rotation, the vertical conveyance middle and lower rollers are stopped by turning off MC9 and MC10 while paper is fed by the registration roller at low speed. At this point the upper roller operates at low speed. In trays 2 and 3, the first paper feed operation starts earlier than the second paper feed operation starts. Accordingly, the paper condition in the second paper feed section is detected by PS53 to turn OFF MC9 and MC10, stopping the conveyance temporarily.

2. Signals

a. PRCB input signals

(1) PS17 (PS17 to PRCB)
Vertical conveyance section opening/closing detection signal.
[L]: Open
[H]: Closed

(2) PS18 (PS18 to PRCB)
Tray 1 exit paper passage detection signal (for jam detection).
[L]: Paper is detected
[H]: Paper is not detected

(3) PS19 (PS19 to PRCB)
Tray 3 exit paper passage detection signal (for jam detection).
[L]: Paper is detected
[H]: Paper is not detected

(4) PS53 (PS53 to PRCB)
Tray 2 exit paper passage detection signal (for timing detection).
[L]: Paper is detected
[H]: Paper is not detected

(5) PS54 (PS54 to PRCB)
M6 control timing detection signal.
[L]: Paper is detected
[H]: Paper is not detected

(6) M4 EM (M4 to PRCB)
M4 fault detection signal.
[L]: Abnormal
[H]: Normal

b. PRCB output signals

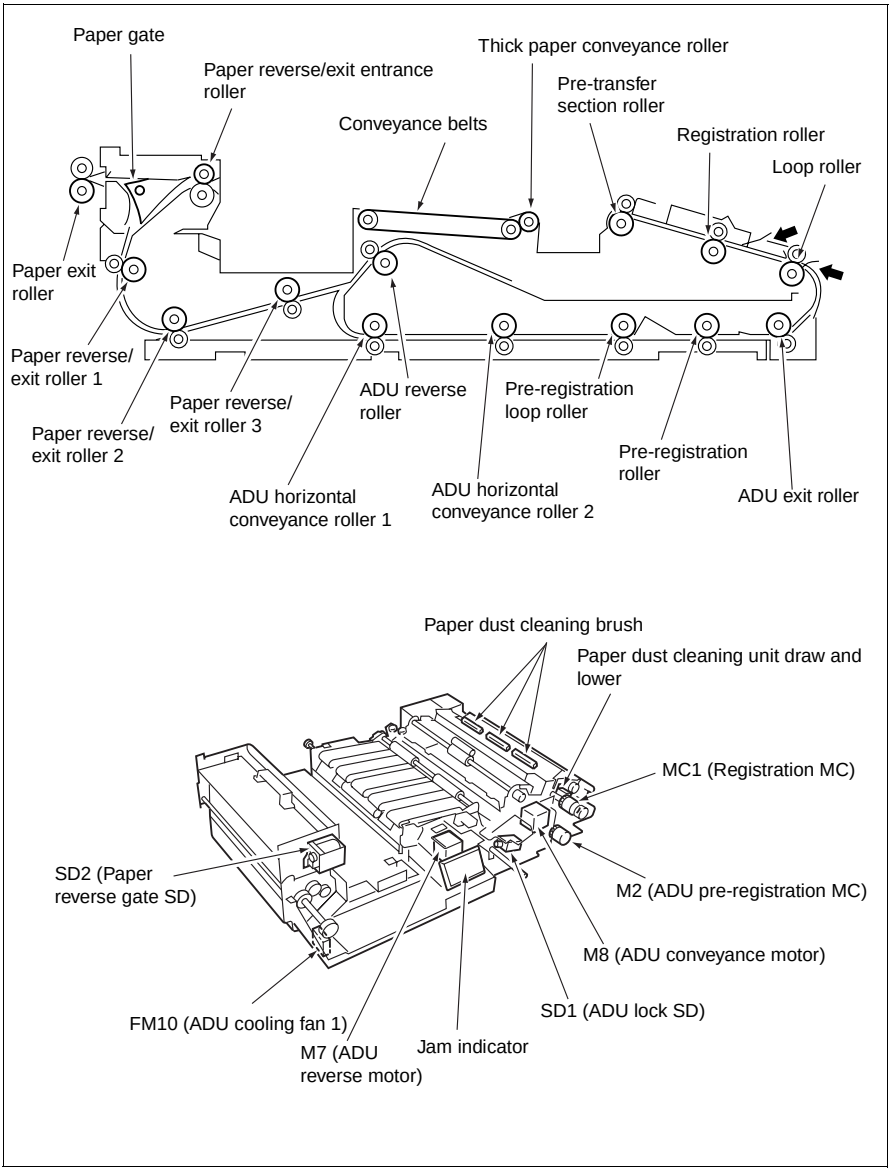
(1) M4 CONT (PRCB to M4)
M4 drive control signal.
[L]: M4 ON
[H]: 4 OFF

(2) MC9 CONT (PRCB to MC9)
MC9 drive control signal.
[L]: MC9 ON
[H]: MC9 OFF

(3) MC10 CONT (PRCB to MC10)
MC10 drive control signal.
[L]: MC10 ON
[H]: MC10 OFF

ADU

[1] Composition



[2] Mechanisms

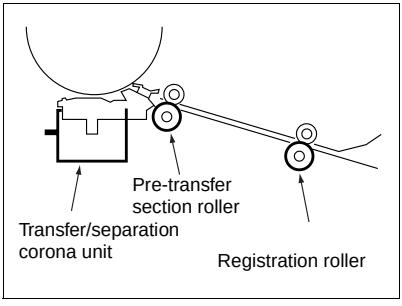
	Mechanism	Method
	Second paper feed paper loop	Loop roller
*1	Second paper feed mis-centering correction	Write information is corrected according to the information detected by PS1 (paper mis-centering PS)
*2	Second paper feed auxiliary mechanism	Pre-transfer section roller
	Second paper feed paper conveyance drive	Registration motor (M12) drive
*3	Second paper feed jam removal mechanism	Jam removal by opening the paper registration and loop section Jam removal by opening the pre-transfer section Registration roller rotation knob
	Conveyance section paper conveyance	Conveyance belts (5)
*4	Conveyance section thick paper conveyance auxiliary mechanism	Thick paper conveyance roller
*5	Conveyance section paper suction mechanism	Developing suction fan (FM2) + Suction duct
*6	Conveyance section jam removal mechanism	Conveyance unit opening/closing
*7	Paper reverse/exit section paper path selection	Paper gate Paper reverse gate solenoid (SD2) drive
	Paper reverse/exit section paper conveyance	Paper reverse/exit section entrance roller (1) Paper reverse/exit rollers (3)
	Paper reverse/exit section paper conveyance drive	Paper reverse/exit motor (M5) drive
*8	Paper reverse/exit section jam removal mechanism	Jam removal by opening the paper reverse/exit section jam access guide plate Jam removal by opening the paper reverse/exit section Paper reverse/exit roller rotation knob
*9	ADU paper feed	Nonstack paper feed
	ADU reversed paper conveyance path selection	Automatically guided according to paper guide shape
	ADU paper conveyance	ADU reversal roller (1) ADU horizontal transport rollers (2)
*10	ADU pre-registration mechanism	Pre-registration roller Pre-registration loop roller
	ADU paper ejection	ADU exit roller
	ADU paper conveyance drive	Loop roller motor (M6), ADU reverse motor (M7), ADU conveyance motor (M8), Transfer motor (M9), Registration motor (M12)
*11	ADU carriage jam removal mechanism	Jam removal by opening the open/close guide A Jam removal by opening the open/close guide B
*12	ADU carriage jam indication	Jam indication board

*1 Second paper feed paper mis-centering correction

PS1 (paper mis-centering) is mounted at the exit of the registration roller to detect mis-centering or inclination of paper fed from the second paper feed unit. The image processor uses the mis-centering information detected by PS1 to correct the image write position, thus shifting or rotating the image write position on the mis-centered or inclined copy paper in order to match the document (scanned image) position with the copy paper position.

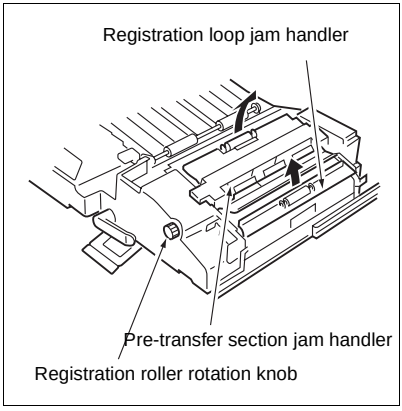
*2 Second paper feed auxiliary mechanism

The distance between the registration roller and the transfer and separation corona unit of this machine is made long to ensure image position correction operation. To assist paper conveyance between the registration roller and the image transfer and separation corona unit, a pre-transfer roller is provided just before the transfer and separation corona unit.



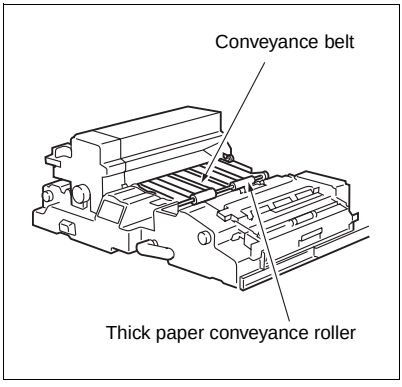
*3 Second paper feed unit jam removal mechanism

The registration roller is sandwiched between the registration loop jam removal section and the pre-transfer jam removal section. Jammed paper can be removed by opening the jam removal section and turning the registration roller rotation knob.



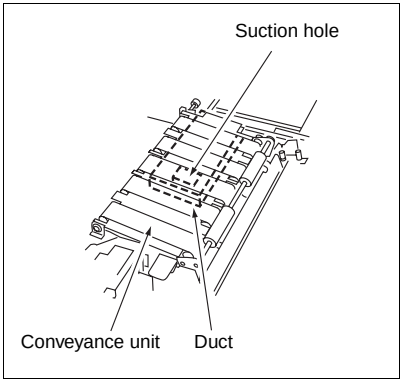
*4 Paper conveyance unit thick paper conveyance auxiliary mechanism

To facilitate feeding the thick paper fed from the transfer and separation corona unit, thick paper conveyance rollers are provided. The installation positions of thick paper conveyance rollers are fixed and they are also used to assist conveyance of paper other than thick paper.



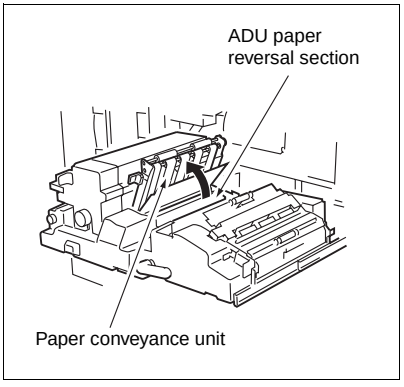
*5 Paper conveyance unit paper suction mechanism

A paper suction duct is provided in the middle of the paper conveyance and leads to the developing suction fan (FM2) installed at the back of the main unit. To improve the paper transportability in the paper conveyance unit, the paper suction fan and duct are used to suck the paper passing through the paper conveyance unit.



*6 Paper conveyance unit jam removal mechanism

When a paper jam occurs in the paper reversal section in the ADU, the jammed paper can be removed by opening the paper conveyance unit.



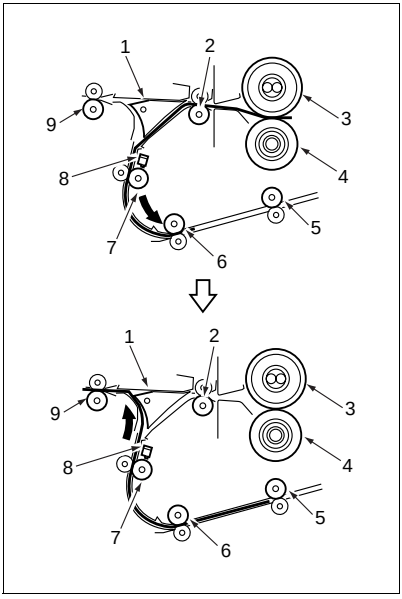
*7 Paper path selection to paper reverse/exit section

The paper gate determines whether the paper fed out from the fixing unit is to be ejected straight, or reversed and ejected. The paper gate is operated by the ON/OFF operation of SD2 (paper reverse gate SD).

a) Paper reverse/exit operation

Normally, the paper gate opens when SD2 is turned OFF. The paper fed by the paper reverse /exit inlet roller is fed, through the path under paper gate, into the paper reverse/exit section. This paper is then fed to the ADU paper conveyance unit by paper reverse/exit rollers 1-3 (and paper reverse roller, when feeding a large size paper).

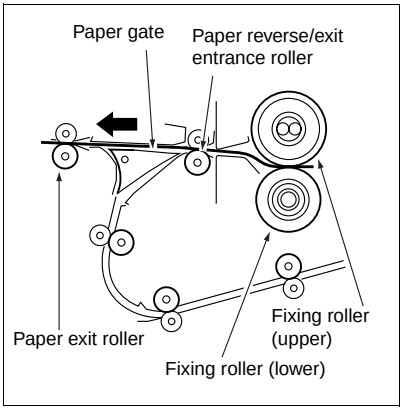
However, if PS57 (paper reverse) detects the trailing edge of the paper and consequently turns OFF, the rollers start rotating in the opposite direction, feeding the paper back to the paper gate. The fed back paper is fed to the paper exit roller, not to the paper reverse/exit entrance roller side, because of the shape of the paper gate. Thus, the paper is ejected to the paper exit with the print side down.



1	Paper gate
2	Paper reverse/exit entrance roller
3	Fixing roller (upper)
4	Fixing roller (lower)
5	Paper reverse/exit roller 3
6	Paper reverse/exit roller 2
7	Paper reverse/exit roller 1
8	PS57 (paper reverse)
9	Paper exit roller

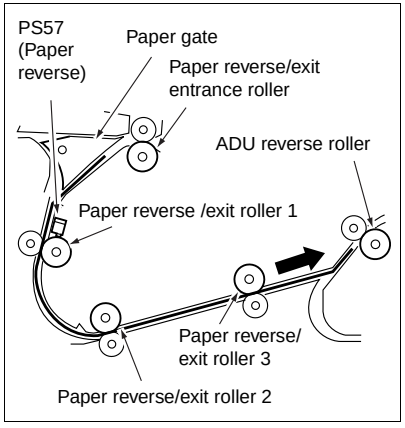
b) Straight ejection

When paper is ejected straight, SD2 is turned ON to close the paper gate. The paper fed by the paper reverse/exit entrance roller is fed through the path over the paper gate because this gate is closed, then fed to the paper exit roller. Thus, the paper is ejected to the paper exit with the print side up.



c) ADU paper conveyance

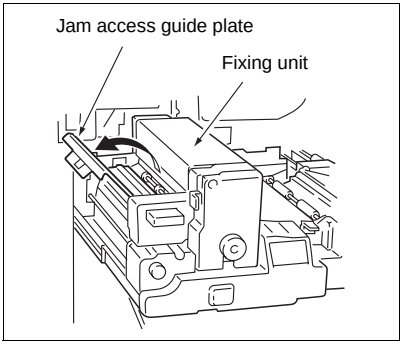
In the two-sided copy mode, the paper finished with printing on the front side is fed, through the path under the paper gate, into the paper reverse/exit section just like paper reverse/exit operation. Then, the paper is fed to the ADU unit by paper reverse and eject rollers 1-3. These rollers do not rotate in the opposite direction even when PS57 detects the trailing edge of the paper, allowing the paper to be fed to the ADU paper reversal roller.



*8 Paper reverse/exit section jam removal mechanism

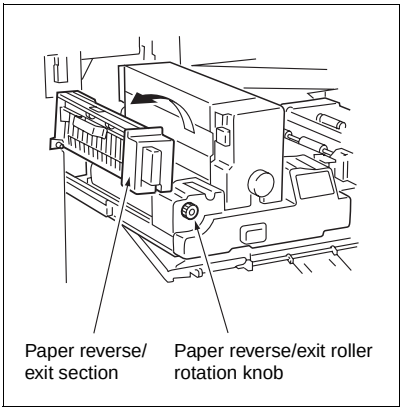
a) Jam access guide plate

When a jam occurs in the paper gate section, the jammed paper can be removed by opening the paper reverse/exit section jam access guide plate.



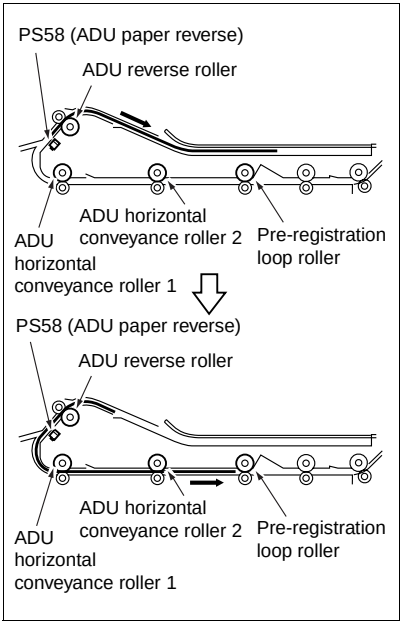
b) Jam removal from the paper reverse/exit section by paper reverse/exit roller rotation knob

When a jam occurs in the paper reverse/exit section, the jammed paper can be removed by opening the paper reverse/exit section and rotating the paper reverse/exit roller rotation knob.



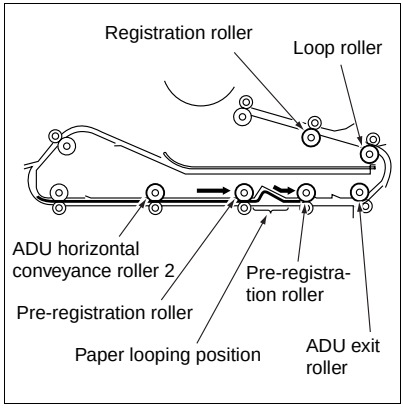
*9 Nonstack paper feed mechanism

In the two-sided copy mode, the paper fed from the paper reverse/exit section is conveyed to the ADU section by the ADU reverse roller. When PS58 (ADU paper reverse) detects the trailing edge of paper and consequently turns OFF, the ADU reverse roller starts rotating in the opposite direction, feeding the paper backward. The fed back paper is conveyanceed to the ADU horizontal conveyance roller, not the paper reverse/exit roller 3, because of the shape of the conveyance path plate. Thus, paper is reversed and fed to the ADU exit, sheet by sheet, without being stacked.



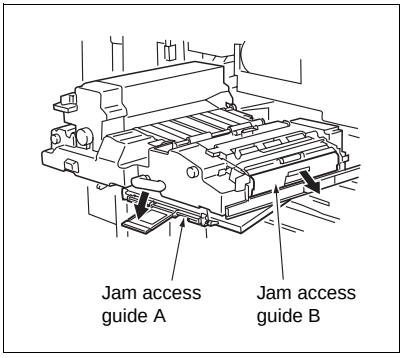
*10 ADU pre-registration mechanism

In the ADU, paper is looped by the pre-registration roller and pre-registration loop roller to correct paper inclination in the second paper feed unit. The pre-registration roller is controlled by the ON/OFF operation of MC2 (ADU pre-registration MC). The pre-registration loop roller feeds paper at a constant speed with the pre-registration roller stopped by the OFF operation of MC2, forming a paper loop between these two rollers. As a result, paper inclination is corrected. When MC2 is turned ON, the pre-registration roller starts rotating to feed paper to the second paper feed section. Note that the pre-registration loop roller is rotating at a constant speed and it does not stop after formation of a paper loop is complete. Therefore, the loop size depends on the time from turning ON to OFF of MC2.



*11 ADU section jam removal mechanism

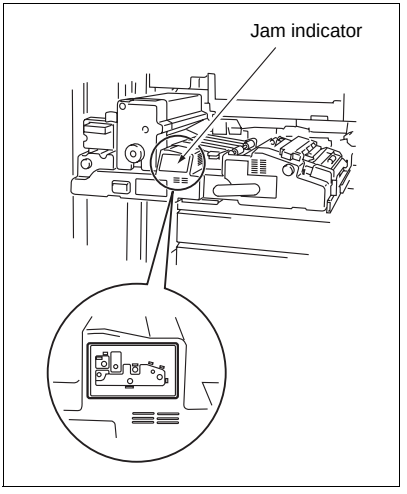
When a jam occurs in the ADU horizontal conveyance section, the jammed paper can be removed by opening the ADU horizontal conveyance unit jam access guide A. The paper jammed at the ADU exit can be removed by opening the ADU exit section jam access guide B.



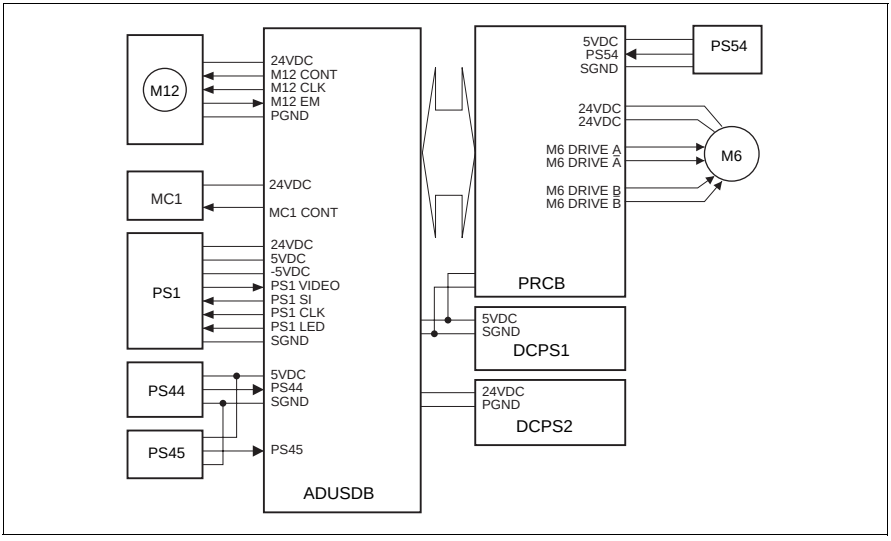
*12 ADU jam indication

The ADU has a jam indicator that indicates the location of the jam (ADU, second paper feed unit, conveyance unit, or fixing unit). All units other than the fixing unit are powered even after the ADU is drawn out of the main unit, allowing the ADU to indicate the jam location.

⚠**Warning: The interlock that is turned OFF when the front right or left door is opened/closed, should never be turned ON forcibly with the ADU drawn out.**



[3] Loop/Second Paper Feed Control



The paper fed from one of trays 1-3 is fed to the second paper feed unit. The second paper feed takes place as the result of the transmission of the drive force from M12 (registration) to the second paper feed roller via MC1 (registration MC). The second paper feed unit is preceded by the loop roller, and this conveyance unit is also used for the paper fed from the ADU or LCT excluding the paper from the bypass tray. The loop roller is driven by M6 (loop roller).

The above parts are controlled by the PRCB (printer control board) via he PRCB (DC drive board) and ADUSDB (ADU stand drive board).

Related signals are PS44 (registration), PS45 (leading edge detection), and PS54 (loop detection). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motors, stopping M6 and M12.

1. Operation

a. Loop control

The paper fed from each tray is fed to the second paper feed roller by the loop roller. When PS44 is turned ON, the paper is decelerated and stopped temporarily to form a loop. After a lapse of specified time, MC1 is turned ON to transmit the drive force of M12 to the second paper feed roller, thus feeding the paper to the transfer/separation section. When the second paper feed starts, the loop roller feeds the paper at the low linear velocity which is the same as that of the second paper feed roller.

b. Second paper feed control

After formation of a loop is completed, MC1 is turned ON to transmit the drive force of M12 to the second paper feed roller, starting the second paper feed.

c. Mis-centering detection control

Mis-centering of the paper fed from each tray is detected by PS1 (paper mis-centering) and it is corrected at the time of image write.

A contact sensor is used as PS1. The paper edge position is detected by mis-centering sensors. Based on the edge position information, the image write position is shifted to correct mis-centering. PS1 operates in the specified interval after PS45 is turned ON.

2. Signals

a. PRCB input signals

(1) PS54 (PS54 to PRCB)
Loop formation reference timing detection signal.
The leading edge or trailing edge of paper is detected.
[L]: Paper exists
[H]: Paper does not exist

b. ADUSDB input signal

(1) M12 EM (M12 to ADUSDB to PRCB)
M12 fault detection signal.
[L]: Normal
[H]: Abnormal

(2) PS1 VIDEO (PS1 to ADUSDB to PRCB)
PS1 sensor output signal.

(3) PS44 (PS44 to ADUSDB to PRCB)
Second paper feed reference timing detection signal.
[L]: Paper exists
[H]: Paper does not exist

(4) PS45 (PS45 to ADUSDB to PRCB)
Paper leading edge detection signal (reference timing for various control operations)
[L]: Paper exists
[H]: Paper does not exist

c. ADUSDB output signals

(1) M12 CONT (ADUSDB to M12)
M12 drive control signal.
[L]: M12 ON
[H]: M12 OFF

(2) M12 CLK (ADUSDB to M12)
M12 clock signal.

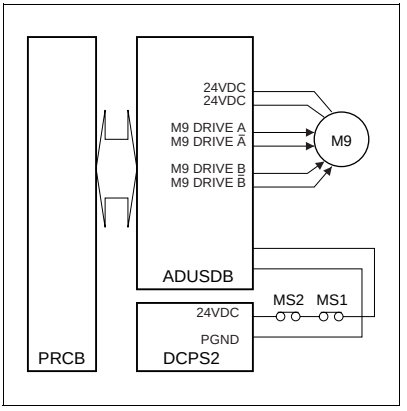
(3) MC1 CONT (ADUSDB to MC1)
MC1 drive control signal.
[L]: MC1 ON
[H]: MC1 OFF

(4) PS1 SI (ADUSDB to PS1)
PS1 start pulse.

(5) PS1 CLK (ADUSDB to PS1)
PS1 drive clock signal.

(6) PS1 LED (ADUSDB to PS1)
PS1 LED control signal.

[4] Paper Conveyance Control



Conveyance of the paper fed from the second paper feed unit is controlled by the pre-transfer roller driven by M9 (transfer). M9 is controlled by the PRCB (printer control board) via the ADUSDB (ADU stand drive board). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motor, stopping M9.

1. Operation

A 24V stepping motor is used for M9 in order to drive constantly at low speed.

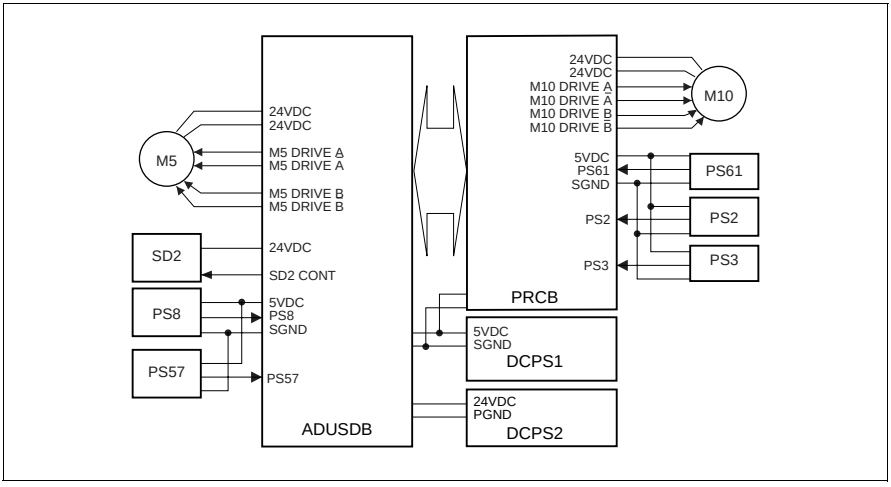
2. Signals

a. Output signals

(1) M9 DRIVE A, $\overline{A}$ (M9 to ADUSDB)
M9 A-phase drive control pulse signal.

(2) M9 DRIVE B, $\overline{B}$ (M9 to ADUSDB)
M9 B-phase drive control pulse signal.

[5] Paper Reverse and Exit Control



The paper fed from the fixing unit is fed, through the paper reverse and conveyance section, to the exit tray or ADU. The paper reverse gate is driven by SD2 (paper reverse gate). The paper reverse and exit roller is driven by M5 (paper reverse/exit), and the paper exit roller is driven by M10 (paper exit).
Related signals are PS58 (ADU paper reverse), PS57 (paper reverse), PS61(paper exit), PS2 (fixing exit), and PS3 (fixing jam). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motors, stopping M5 and M10.

1. Operation

a. Paper reverse gate control

The paper reverse gate is driven by SD2. Normally, the paper reverse gate is opened and guides the paper to the reversal unit. SD2 is turned ON to close the gate when ejecting paper straight.

b. M5 (paper reverse/exit) control

(1) Straight paper exit

When paper ejected straight, the paper reverse gate is closed with SD2 turned ON. Accordingly, paper is ejected straight at low speed rotation.

(2) Paper reverse and exit

a) The paper fed to the paper reverse and exit section is fed to the conveyance path in the paper reverse and exit section through the paper reverse gate opened by the OFF operation of SD2.

b) Linear velocity is changed to high speed when the trailing edge of the paper conveyed at low speed by M5 passes the nip of the fixing roller. Then M5 rotates backward at high speed and the paper is conveyed to the paper exit roller after a specified interval since the trailing edge of the paper turns OFF PS57.

(3) ADU conveyance
a) When SD2 is turned OFF, the paper reverse gate opens to feed paper to the conveyance path in the paper reverse and exit section just like paper reverse and exit operation.
b) Linear velocity is changed to high speed and conveys the paper when the trailing edge of the paper conveyed at low speed passes the fixing nip.
c) Then rotates at high speed by M7 and draws the paper into the ADU reversal unit.

c. M10 (paper exit) control

M10 rotates at low speed after a specified interval since the start button is turned ON. During reversal paper exit, the paper reversed by M5 is ejected. During this time, linear velocity is reduced from high speed to low speed when PS57 is turned OFF by the trailing edge of the paper. (Model equipped with FNS keeps ejecting at high speed.) Paper is conveyed at low speed during straight paper exit.

2. Signals

a. Input signals

(1) PS2 (PS2 to PRCB)
Detection of paper passage at fixing unit exit.
[L]: Paper exists
[H]: Paper does not exist

(2) PS3 (PS3 to PRCB)
Detection of jam in fixing unit.
[L]: Paper exists. (Jam is detected.)
[H]: Paper does not exist. (Jam is not detected.)

(3) PS61 (PS61 to PRCB)
Detection of paper passage in ejection section.
[L]: Paper exists
[H]: Paper does not exist

(4) PS8, SIG (PS8 to ADUSB to PRCB)
Detection of paper passage in reversal/conveyance section.
[L]: Paper exists
[H]: Paper does not exist

(5) PS57 (PS57 to ADUSB to PRCB)
Reverse and eject control reference timing signal.
The leading edge or trailing edge of paper is detected.
[L]: Paper exists
[H]: Paper does not exist

b. Output signals

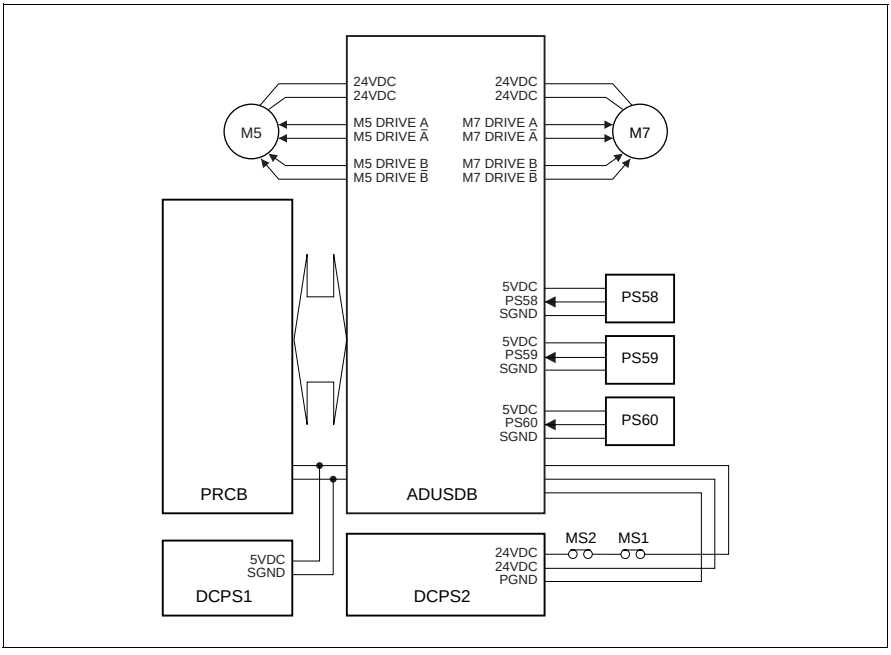
(1) M10 DRIVE A, $\overline{A}$ (PRCB to $\overline{M}$10)
M10 A-phase drive control clock signal.

(2) M10 DRIVE B, $\overline{B}$ (PRCB to $\overline{M}$10)
M10 B-phase drive control clock signal.

(3) M5 DRIVE A, $\overline{A}$ (ADUSDB to M5)
M5 A-phase drive control clock signal.

(4) M5 DRIVE B, $\overline{B}$ (ADUSDB to M5)
M5 B-phase drive control clock signal.

[6] ADU Paper Feed/Reversal Control



The paper fed from the paper reverse and eject section is fed to the ADU by M5 (paper reverse/exit). In the ADU, paper is reversed by transmitting the drive force of M7 (ADU reverse) to the paper reverse roller. M5 and M7 are controlled by the PRCB (printer control board) via the ADUSDB (ADU stand drive board).
Related signals are PS58 (ADU paper reverse), PS59 (ADU deceleration), and PS60 (ADU pre-registration). When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motors, stopping M5 and M7.

1. Operation

a. ADU paper feed control

The paper fed from the paper reverse and exit section by the drive force of M5 is then fed to the ADU paper reversal section.

b. ADU paper reversal control

When paper is fed to the ADU reversal section, M7 turns ON to feed paper continuously. When the trailing edge of paper passes through PS58, M7 starts rotating in the opposite direction, thus feeding paper to the ADU paper conveyance unit.

2. Signals

a. ADUSDB input signals

(1) PS58 (PS58 to ADUSDB to PRCB)
Detection of paper passage in ADU paper reversal section.
M7 is rotated in the opposite direction or turned OFF with reference to this signal. The leading edge or trailing edge of paper is detected.
[L]: Paper exists
[H]: Paper does not exist

(2) PS59 (PS59 to ADUSDB to PRCB)
Detection of reference timing for conveyance speed change.
The ADU paper conveyance speed change timing is detected by detecting passage of paper.
[L]: Paper exists
[H]: Paper does not exist

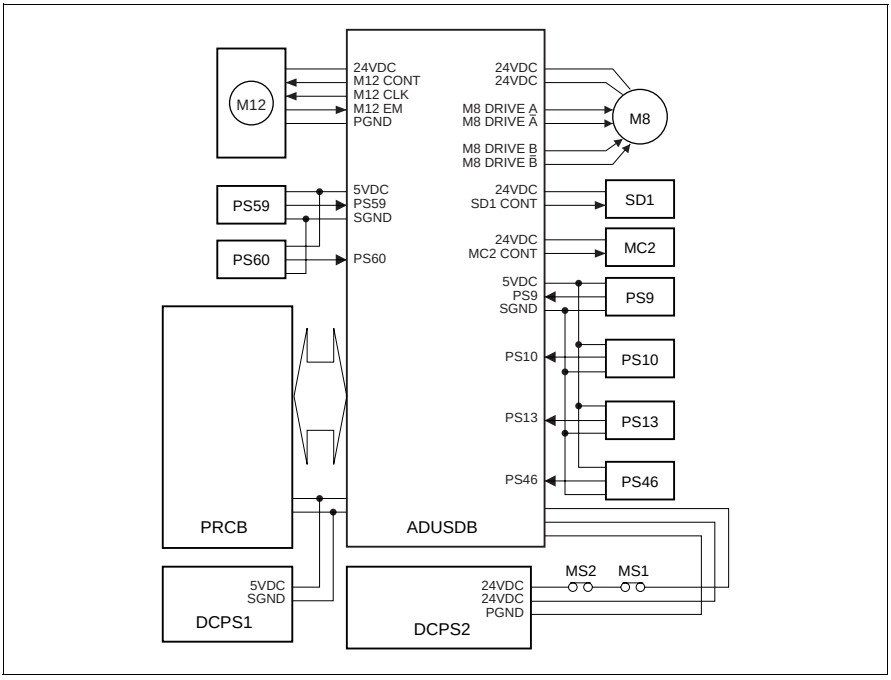
(3) PS60 (PS60 to ADUSDB to PRCB)
Detection of loop timing as well as timing of paper conveyance to second paper feed section.
The leading edge or trailing edge of paper is detected by detecting passage of paper.
[L]: Paper exists
[H]: Paper does not exist

b. ADUSDB output signals

(1) M7 DRIVE A, $\overline{A}$ (ADUSDB to M7)
M7 A-phase drive control pulse signal.

(2) M7 DRIVE B, $\overline{B}$ (ADUSDB to M7)
M7 B-phase drive control pulse signal.

[7] ADU Paper Conveyance/Feed Control



The paper fed from the ADU paper reversal section is fed to the paper conveyance rollers by transmitting the drive force of M8 (ADU conveyance) to the paper conveyance rollers. Paper is then fed to the second paper feed section by the drive force of M12 (registration).
Related signals are PS9 (ADU paper conveyance), PS10 (ADU handle release), PS13 (ADU no paper), PS46 (ADU exit), PS59 (ADU deceleration), and PS60 (ADU pre-registration). SD1 (ADU lock) is provided to lock the handle of the ADU.
When the front right or left door of this machine opens or closes, MS1 (interlock 1) or MS2 (interlock 2) operates to interrupt the DC power supply to the motors, stopping M8 and M12.

1. Operation

a. ADU conveyance control

Paper is fed at the high linear velocity until PS59 is turned ON at detection of the paper edge.

b. ADU feed control

When the leading edge of the paper conveyed at high speed by ADU conveyance turns PS59 ON, the M8 linear velocity is reduced to low speed and the paper is conveyed at low speed by M12 after a specified interval. Then when the leading edge of the paper turns PS60 ON, MC1 is turned OFF when MC2 (ADU pre-registration) is turned ON once more, and conveys at low speed after loop forming time has elapsed.

c. M8 (ADU conveyance) control

(1) On timing
When M8 is turned on at start of copying.

(2) OFF timing
When PS58 is turned OFF at passage of the last paper.

d. ADU lock control

The ADU handle is locked by SD1. PS10 detects the handle position to determine whether the handle is locked or released.

2. Signals

a. ADUSDB input signals

(1) PS9 (PS9 to ADUSDB to PRCB)
Detection of paper passage in ADU section.
[L]: Paper exists
[H]: Paper does not exist

(2) PS10 (PS10 to ADUSDB to PRCB)
Detection of ADU handle position.
[H]: Handle is released

(3) PS13 (PS13 to ADUSDB to PRCB)
No paper detection.
[L]: Paper exists
[H]: Paper does not exist

(4) PS46 (PS46 to ADUSDB to PRCB)
Detection of paper passage at ADU exit.
[L]: Paper exists
[H]: Paper does not exist

b. ADUSDB input signals

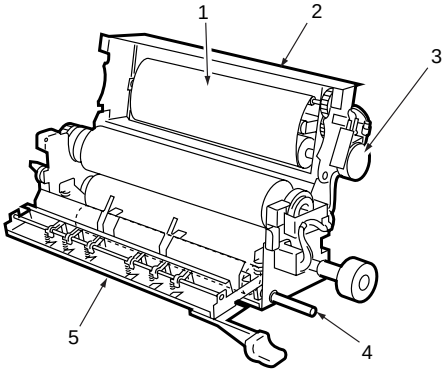
(1) M8 DRIVE A, A (ADUSDB to M8)
M8 A-phase drive control clock signal.

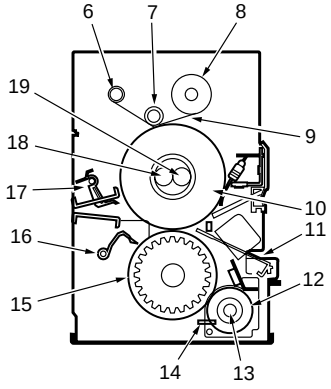
(2) M8 DRIVE B, B (ADUSDB to M8)
M8 B-phase drive control clock signal.

(3) MC2 CONT (ADUSDB to MC2)
MC2 drive control signal.
[L]: MC2 ON
[H]: MC2 OFF

FIXING UNIT

[1] Composition





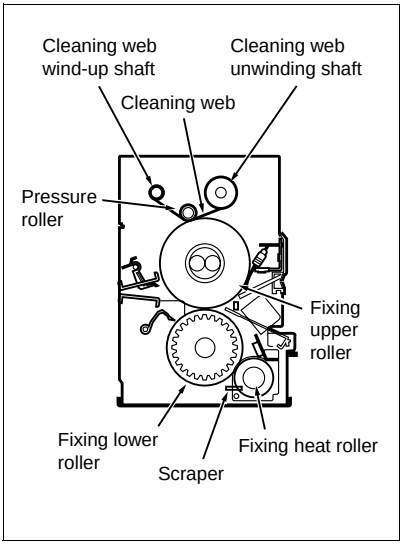
1. Cleaning web
2. Fixing upper cover
3. Fixing web motor (M16)
4. Pressure release shaft
5. Fixing paper exit unit
6. Cleaning web wind-up shaft
7. Pressure roller
8. Cleaning web unwinding shaft
9. Cleaning web
10. Fixing upper roller
11. Thick paper conveyance auxiliary plate
12. Fixing heat roller
13. Heater lamp (L4)
14. Scraper
15. Fixing lower roller
16. Fixing claw (lower)
17. Fixing claw (upper)
18. Fixing heater lamp 2 (L3)
19. Fixing heater lamp 1 (L2)

[2] Mechanisms

	Mechanism	Method
	Fixing	Pressure + heat roller
*1	Heat source	Heater lamp (fixing upper roller (two lamps), Fixing heat roller (one lamp))
*2	Cleaning	Upper roller: Cleaning web (with silicon oil) Fixing heat roller: Scraper
	Upper roller	Aluminum + PFA coating (black)
	Lower roller	Silicon rubber (black) + PFA tube
*3	Fixing heat roller	Aluminum + PTFE coating
	Separation	Separation claws (6 upper and 2 lower claws)
	Temperature detection	Upper roller: - Noncontact type thermistor (for control) TH1 - Contact type thermistor (for fault detection) TH2 Fixing heat roller: - Noncontact type thermistor (for control) TH3 - Contact type thermistor (for fault detection) TH4
	Overheating prevention	Noncontact type thermostat (Upper roller (one), fixing heat roller (one))
*4	Fixing roller (pressure) release	Pressure release cam, spring
*5	Jam detection	Actuator + Photosensor
*6	Thick paper conveyance	Thick paper conveyance auxiliary plate (movable) + Fixing guide solenoid (SD3)

*1 Fixing heater lamps
Two halogen lamps are used for the fixing upper roller and one halogen lamp is used for the fixing heat roller. These halogen lamps are intended to reduce the warm-up time.

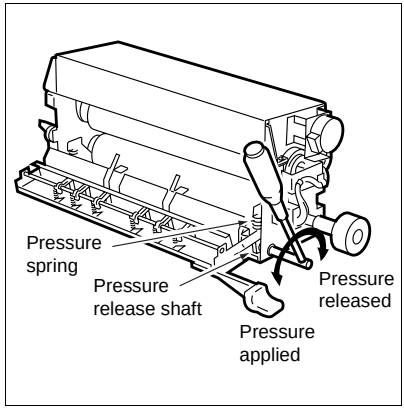
*2 Cleaning
Fixing upper roller:
Cleaning web is used to clean the fixing upper roller. The cleaning web wind-up shaft is driven intermittently by the web drive motor (M16) via gears to supply cleaning web from the web roll. Since the number of turns of the motor is controlled according to the copy count, the amount of cleaning web supplied is approx. 0.022 to 0.058 mm/copy. A cleaning web which contains silicon oil is pressed against the fixing upper roller by the pressure roller.
Fixing heat roller:
The scraper cleans stains on the fixing heat roller.



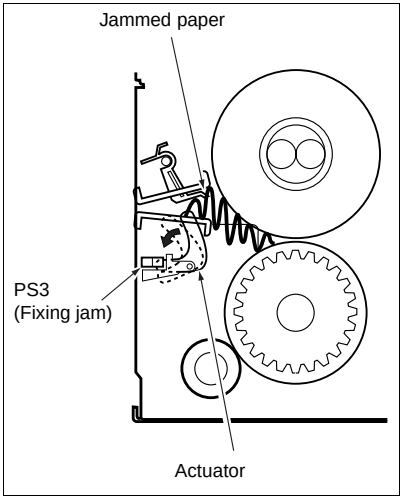
*3 Fixing heat roller
The fixing heat roller incorporating one halogen lamp rotates keeping contact with the fixing lower roller. Thus, the fixing lower roller is heated. The fault detection mechanism is similar to that for the fixing upper roller. It is used to detect extremely high or lower temperature and a sensor fault.

*4 Fixing roller pressure/release
Pressure on the fixing lower roller to contact to the upper roller is applied or released by rotating the pressure release levers (two) provided at the front and back of the fixing unit.

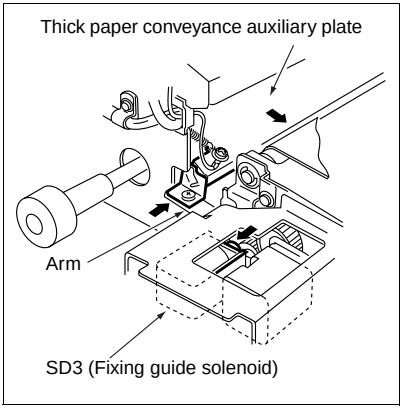
Caution: Be sure to perform pressure release with the fixing upper cover closed.



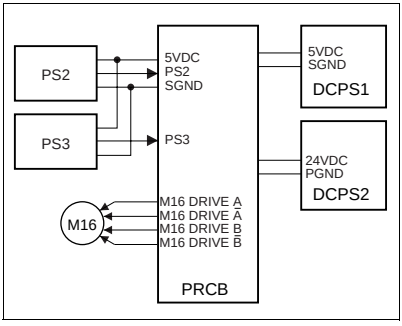
*5 Jam detection
When a jam occurs in the paper exit section in the fixing unit, the jammed paper presses down the actuator, causing the fixing jam sensor (PS3) to detect a jam via the jam detection plate and actuator operation.



*6 Thick paper conveyance
When a thick paper is fed, the fixing guide solenoid (SD3) installed on the ADU side is turned ON and the thick paper conveyance auxiliary plate installed at the inlet of the fixing unit is pressed down via the arm, thus improving transportability of thick paper.



[3] M16 (Web Drive) Control



M16 (web drive) is controlled directly by PRCB (printer control board). Related signals are PS2 (fixing exit) and PS3 (fixing jam).

1. Operation

When PS2 is turned ON by passage of paper, the PRCB controls M16 according to the value of the cleaning web counter. The cleaning web counter value is incremented together with the total counter in the ejection section of the main body. The relationship between the cleaning web counter values and M16 control is as follows:

Cleaning web counter value	M16 control
1 to 10,000	Driven for 800 ms per copy
10,001 to 20,000	Driven for 500 ms per copy
20,001 to 40,000	Driven for 450 ms per copy
40,001 to 50,000	Driven for 700 ms per 2 copies
50,001 to 200,000	Driven for 500 ms per 2 copies
200,001 to 300,000	Driven for 390 ms per 2 copies
300,001 or more	Driven for 340 ms per 2 copies
500,001 or more	Driven for 300 ms per 2 copies

2. Signals

a. Input signals

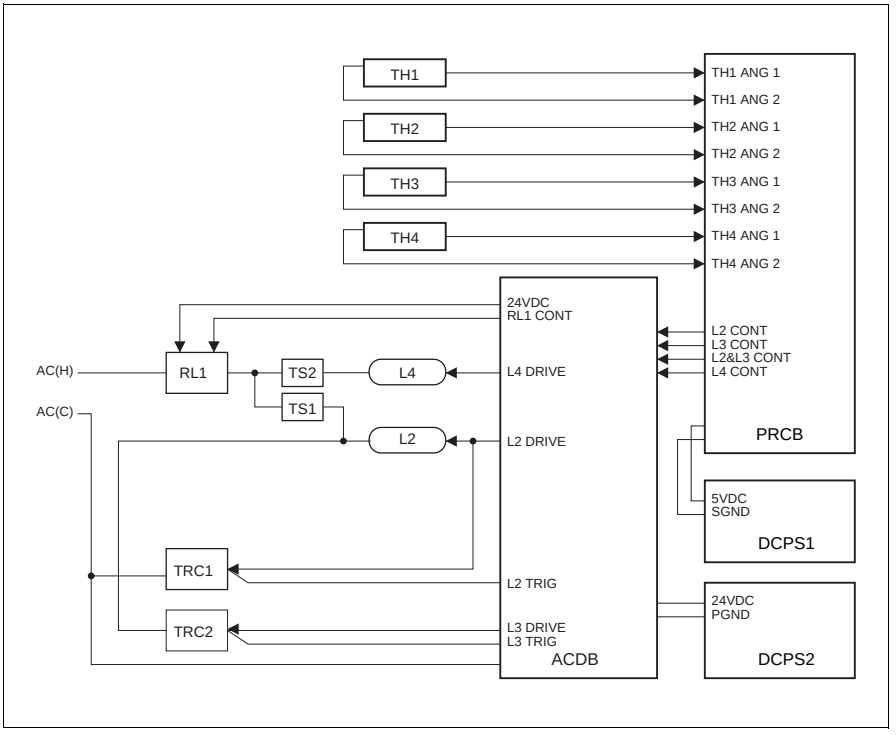
(1) PS2 (PS2 to PRCB)
Detection of passage of paper at fixing unit exit.
[L]: Paper exists
[H]: Paper does not exist

(2) PS3 (PS3 to PRCB)
Fixing jam detection signal.
[L]: Paper exists. (Jam is detected.)
[H]: Paper does not exist. (Jam is not detected.)

b. Output signal

(1) M16 DRIVE 1, 2 (PRCB to M16)
M16 drive control signal.

[4] Fixing Temperature Control



The fixing upper roller is heated by L2 (fixing upper roller heater lamp 1) and L3 (fixing upper roller heater lamp 2) and the fixing lower roller is heated by L4 (fixing heat roller heater lamp 3) via the fixing heat roller. The PRCB (printer control board) detects the temperature of the fixing rollers using TH1 (fixing unit temperature sensor 1) and controls L2, L3, L4 via the ACDB (AC drive board).

1. Operation

a. Temperature control

The PRCB turns ON the fixing heater lamp circuit in ACDB as soon as the main switch is turned ON, causing L2, L3, and L4 to go ON until the fixing upper roller reaches the specified temperature. Series/parallel switching control is performed over L2 and L3 to prevent flicker (fluorescent lamp etc.). Immediately after L2 and L3 are turned ON, they are connected in series to suppress rush current. Then they are connected in parallel. TRC1 (triac 1), TRC2 (triac 2) and TRC3 (triac 3) are used for this series/parallel switching control.

Set temperature: 200°C
Warm-up time: 6 minutes or less (at room temperature 20°C)

b. Protection against abnormality

Thermostats are used to prevent the temperature of the fixing rollers from rising abnormally. TS1 (thermostat 1 (upper)) is used for the fixing upper roller and TS2 (thermostat 2 (lower)) is used for the fixing heat roller respectively. Non-contact type thermostats are used, so they do not touch each rollers.

The operating temperatures of the above thermostats are as follows:

TS1: Opens at about 180°C

TS2: Opens at about 181°C

2. Signals

a. PRCB input signals

(1) TH1 ANG1, 2 (TH1 to PRCB)
Detection of fixing upper roller.
This signal is used to control the temperature of the fixing upper roller and to detect abnormality.

(2) TH2 ANG1, 2 (TH2 to PRCB)
Detection of fixing upper roller temperature.
This signal is used to detect the abnormal temperature of the upper roller and to detect a low temperature alarm 180°C (356°F).

(3) TH3 ANG1, 2 (TH3 to PRCB)
Detection of fixing heat roller temperature.
This signal is used to control the temperature of the fixing lower roller and to detect abnormality.

(4) TH4 ANG1, 2 (TH4 to PRCB)
Detection of fixing heat roller temperature.
This signal is used to detect the abnormal temperature of the fixing lower roller and to detect abnormality.

b. PRCB Output signals

(1) L2 CONT (PRCB to ACDB)
L2 drive control signal.
[L]: L2 ON
[H]: L2 OFF

(2) L3 CONT (PRCB to ACDB)
L3 drive control signal.
[L]: L3 ON
[H]: L3 OFF

(3) L2 & L3 CONT (PRCB to ACDB)
L2 & L3 drive control signal.
[L]: L2 & L3 ON
[H]: L2 & L3 OFF

(4) L4 CONT (PRCB to ACDB)
L4 drive control signal.
[L]: L4 ON
[H]: L4 OFF

c. ACDB output signals

(1) RL1 CONT (ACDB to RL1)
RL1 drive control signal.
[L]: RL1 ON
[H]: RL1 OFF

(2) L2 DRIVE (ACDB to L2)
L2 drive control signal.
[L]: L2 ON
[H]: L2 OFF

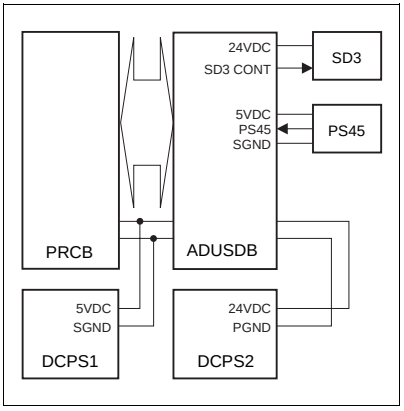
(3) L3 DRIVE (ACDB to L3)
L3 drive control signal.
[L]: L3 ON
[H]: L3 OFF

(4) L4 DRIVE (ACDB to L4)
L4 drive control signal.
[L]: RL4 ON
[H]: RL4 OFF

(5) L2 TRIG (ACDB to TRC1)
TRC1 trigger signal.

(6) L3 TRIG (ACDB to TRC2)
TRC2 trigger signal.

[5] SD3 (Fixing Guide) Control



SD3 (fixing guide) is driven by ADUSDB (ADU stand drive board) and controlled by serial data sent from PRCB (printer control board).

1. Operation

When the thick paper mode is selected on the operation panel, SD3 turns ON after the specified time from PS45 (leading edge detection) detected the paper leading edge and lowers the thick paper conveyance auxiliary plate, widening the paper feed space. As a result, feeding a thick paper to the fixing unit becomes smoother.

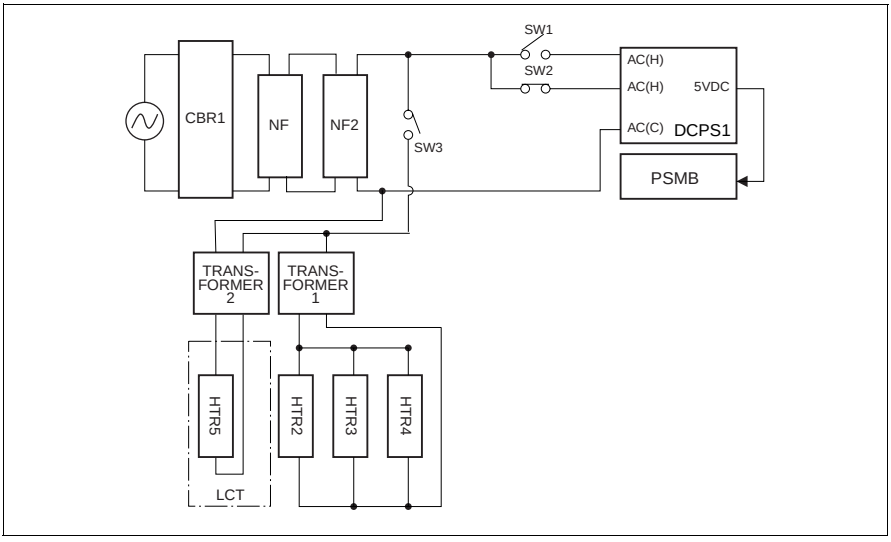
2. Signal

a. Output signal

(1) SD3 CONT (ADUSDB to SD3)
SD3 drive control signal.
[L]: SD3 ON
[H]: SD3 OFF

OTHER KINDS OF CONTROL

[1] Parts Energized when the Main Switch is OFF



1. Operation

If the power cord is plugged in the wall outlet, the following parts are energized regardless of whether SW1 (main) is ON or OFF:

a. CBR1 (circuit breaker 1)

If an excessive current flows due to a short in an internal part or other factors, this breaker turns OFF to cut off the power to the machine.

b. NF, NF2 (noise filter, noise filter 2)

The noise filter is used to reduce the noise arriving through the power line.

c. DCPS1 (DC power supply unit 1)

Even when SW1 is OFF, part of the 5 V output is supplied to PSMB (power supply management board). This power supply stops when SW2 (reset switch) is turned OFF.

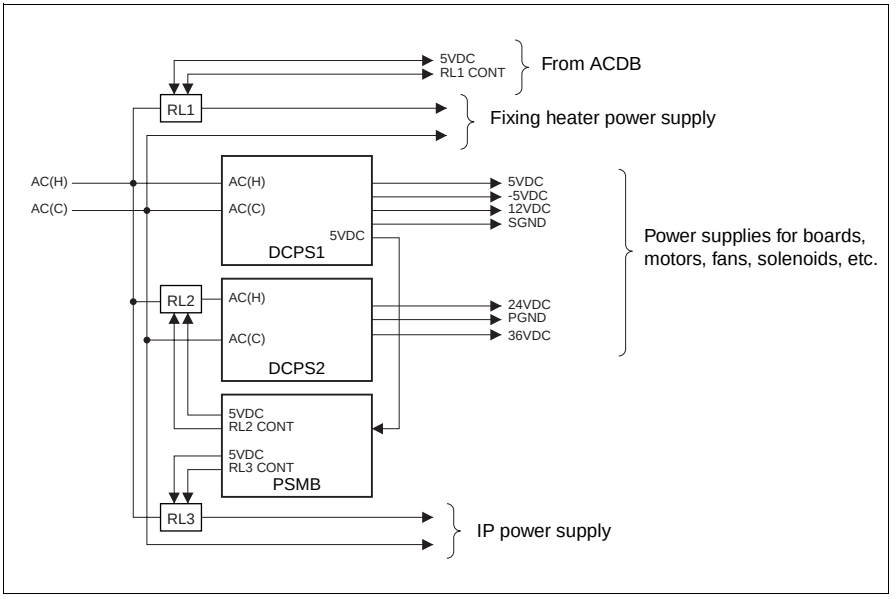
d. Internal heaters

The tray heaters on HTR2 ~ 4 always carry current, provided that SW3 (tray heater) is turned ON, regardless of the states of SW1 and 2.

e. PSMB (power supply management board)

5V DC is supplied from DCPS1 to this board except when SW2 (reset) is OFF.

[2] Parts that Operate when the SW1 (Main) is Turned ON



1. Operation

a. Power supply

When SW1 (main) is turned ON, AC power is supplied to the DCPS1 (DC power supply unit 1). As a result, the PSMB (power supply management board) turns ON RL2 (AC input relay for DCPS2), supplying AC power to DCPS2 (DC power supply unit 2). DCPS1 supplies 5V DC, -5V DC, and 12V DC which are used in the machine. DCPS2 supplies 24V and 36V DC.

DCPS1 and DCPS2 supply power to the PRCB (printer control board) and other boards used in the machine, starting initial operations and control inside the machine.

2. Signals

a. RL1 input signal

(1) RL1 CONT (ACDB to RL1)
RL1 drive control signal.
This signal controls ON/OFF operations of L2, L3, and L4 drive power relay.
[L]: RL1 ON
[H]: RL1 OFF

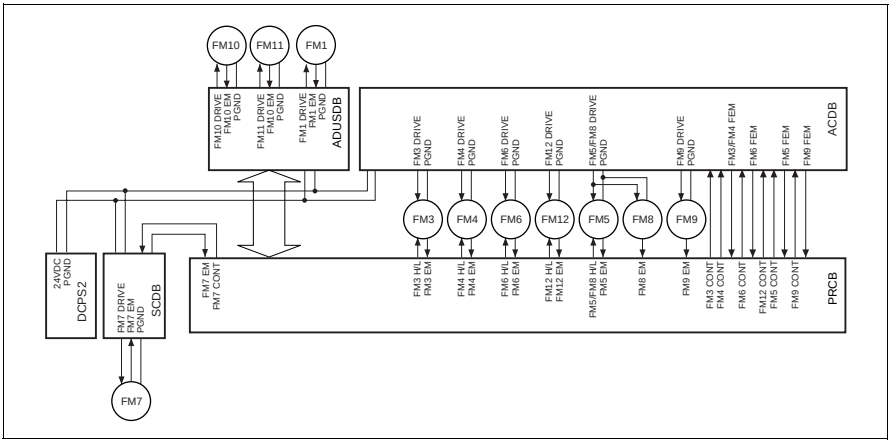
b. RL2 input signal

RL2 CONT (PSWB to RL2)
RL2 drive control signal.
This signal controls ON/OFF operations of the relay for AC power supply to DCPS2.
[L]: RL2 ON
[H]: RL2 OFF

c. RL3 input signal

(1) RL3 CONT (PSMB to RL3)
RL3 drive control signal.
This signal controls ON/OFF operations of the relay for AC power supply to IP.
[L]: RL3 ON
[H]: RL3 OFF

[3] Cooling Fan Control



1. Operation

A 24V DC motor is used for each cooling fan.

a. FM1

(1) ON timing
Held ON during copy operation.

(2) OFF timing
Turned OFF at specified time after copying complete.

b. FM3, FM4, and FM6

(1) ON timing
- Turned ON after completion of the first warm-up after power-ON.
- During warm-up, turned ON when the drum starts rotating.
- During idling, rotates at high speed when the drum temperature exceeds specified temperature.
- Always rotates at high speed during copying, switching to low speed rotation at specified time after copy completes.

(2) OFF timing
- During warm-up, turned OFF when the drum stops rotating.
- After completion of warm-up, held ON until the power is turned OFF.

c. FM5, FM8

(1) ON timing
Turned ON after power-on.
- Always rotates at low speed during idling.
- During copying, always rotates at high speed.

(2) OFF timing
Not turned OFF until the power is turned OFF.

d. FM7

(1) ON timing
Turned ON when L1 has been lit for at least 80 seconds.

(2) OFF timing
Turned OFF when L1 is turned OFF.

e. FM9

(1) ON timing
Turned ON in sync with M17 (polygon).

(2) OFF timing
Turned OFF in sync with M17).

f. FM10, FM11

(1) ON timing
Turned ON in sync with M8 (ADU conveyance).

(2) OFF timing
Turned OFF in sync with M8.

g. FM12

(1) ON timing
Turned ON in sync with M1 (main).

(2) OFF timing
Turned OFF in sync with M1.

2. Signals

a. PRCB input signals

(1) FM3 EM (FM3 to PRCB)
FM3 fault detection signal.
[H]: Fault is detected

(2) FM4 EM (FM4 to PRCB)
FM4 fault detection signal.
[H]: Fault is detected

(3) FM5 EM (FM5 to PRCB)
FM5 fault detection signal.
[H]: Fault is detected

(4) FM6 EM (FM6 to PRCB)
FM6 fault detection signal.
[H]: Fault is detected

(5) FM6 FEM (ACDB to PRCB)
FM6's 24 V DC power detection signal.
[H]: 24 V power OFF

(6) FM7 EM (FM7 to SCDB to PRCB)
FM7 fault detection signal.
[H]: Fault is detected

(7) FM8 EM (FM8 to PRCB)
FM8 fault detection signal.
[H]: Fault is detected

(8) FM9 EM (FM9 to PRCB)
FM9 fault detection signal.
[H]: Fault is detected

(9) FM12 EM (FM12 to PRCB)
FM12 fault detection signal.
[H]: Fault is detected

(10) FM3/4 FEM (ACDB to PRCB)
FM3, FM4's 24V DC power detection signal.
[H]: 24 V power OFF

(11) FM9 FEM (ACDB to PRCB)
FM9's 24V DC power detection signal.
[H]: 24 V power OFF

(12) FM5 FEM (ACDB to PRCB)
FM5, FM8, FM9's 24V DC power detection signal.
[H]: 24 V power OFF

b. PRCB output signals

(1) FM3 CONT (PRCB to ACDB)
FM3 ON/OFF control signal.
[L]: FM3 ON
[H]: FM3 OFF

(2) FM3 H/L (PRCB to FM3)
FM3's rotational speed control signal.
[L]: Low speed
[H]: High speed

(3) FM4 CONT (PRCB to ACDB)
FM4 ON/OFF control signal.
[L]: FM4 ON
[H]: FM4 OFF

(4) FM4 H/L (PRCB to FM4)
FM4's rotational speed control signal.
[L]: Low speed
[H]: High speed

(5) FM5 CONT (PRCB to ACDB)
FM5, FM8 ON/OFF control signal.
[L]: FM5, FM8 ON
[H]: FM5, FM8 OFF

(6) FM5 H/L (PRCB to FM5)
FM5's rotational speed control signal.
[L]: Low speed
[H]: High speed

(7) FM6 CONT (PRCB to ACDB)
FM6 ON/OFF control signal.
[L]: FM6 ON
[H]: FM6 OFF

(8) FM6 H/L (PRCB to FM6)
FM6's rotational speed control signal.
[L]: Low speed
[H]: High speed

(9) FM7 CONT (PRCB to SCDB)
FM7 ON/OFF control signal.
[L]: FM7 ON
[H]: FM7 OFF

(10) FM12 CONT (PRCB to ACDB)
FM12 ON/OFF control signal.
[L]: FM12 ON
[H]: FM12 OFF

(11) FM9 CONT (PRCB to ACDB)
FM9 ON/OFF control signal.
[L]: FM9 ON
[H]: FM9 OFF

c. ADUSDB input signal

(1) FM1 EM (FM1 to ADUSDB)
FM1 fault detection signal.
[L]: Normal
[H]: Abnormal

(2) FM10 EM (FM10 to ADUSDB)
FM10 fault detection signal.
[L]: Normal
[H]: Abnormal

(3) FM11 EM (FM11 to ADUSDB)
FM11 fault detection signal.
[L]: Normal
[H]: Abnormal

d. ADUSDB output signal

(1) FM1 DRIVE (ADUSDB to FM1)
FM1 ON/OFF control signal.
[L]: FM1 ON
[H]: FM1 OFF

(2) FM10 DRIVE (ADUSDB to FM10)
FM10 ON/OFF control signal.
[L]: FM10 ON
[H]: FM10 OFF

(3) FM11 DRIVE (ADUSDB to FM11)
FM11 ON/OFF control signal.
[L]: FM10 ON
[H]: FM10 OFF

e. ACDB output signals

(1) FM3 DRIVE (ACDB to FM3)
FM3 ON/OFF control signal.
[L]: FM3 ON
[H]: FM3 OFF

(2) FM4 DRIVE (ACDB to FM4)
FM4 ON/OFF control signal.
[L]: FM4 ON
[H]: FM4 OFF

(3) FM6 DRIVE (ACDB to FM6)
FM6 ON/OFF control signal.
[L]: FM6 ON
[H]: FM6 OFF

(4) FM12 DRIVE (ACDB to FM12)
FM12 ON/OFF control signal.
[L]: FM12 ON
[H]: FM12 OFF

(5) FM5/FM8 DRIVE (ACDB to FM5, FM8)
FM5, FM8 ON/OFF control signal.
[L]: FM5, FM8 ON
[H]: FM5, FM8 OFF

(6) FM9 DRIVE (ACDB to FM9)
FM9 ON/OFF control signal.
[L]: FM9 ON
[H]: FM9 OFF

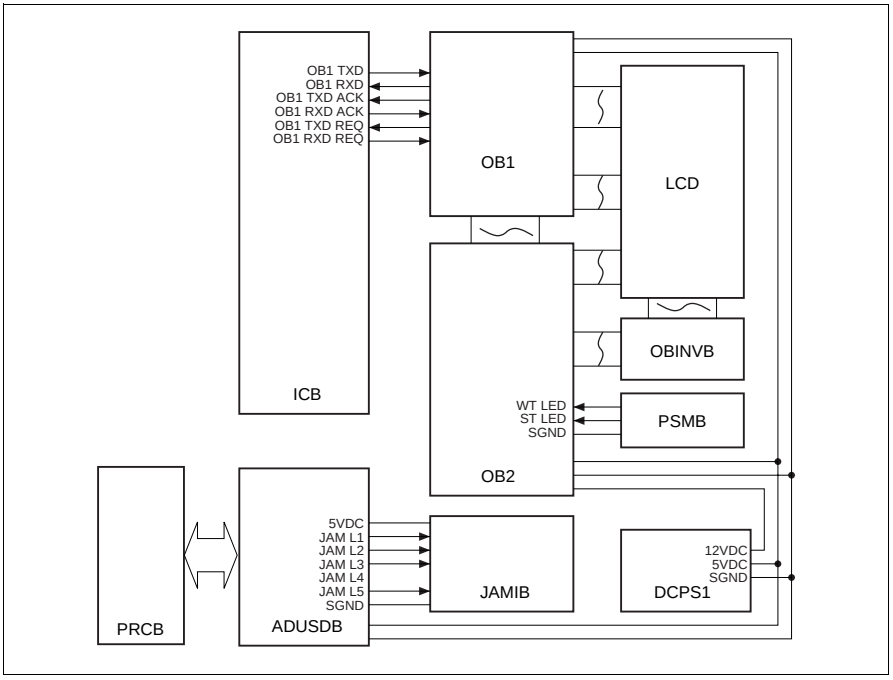
f. PRCB output signal

(1) FM5/FM8 DRIVE (PRCB to FM5)
FM5 ON/OFF control signal.
[L]: FM5 ON
[H]: FM5 OFF

g. SCDB output signal

(1) FM7 DRIVE (OPDB to FM7)
FM7 ON/OFF control signal.
[L]: FM7 ON
[H]: FM7 OFF

[4] Operation Panel Control



The operation panel consists of OB1 (operation board 1), OB2 (operation board 2), and LCD (indicator board). On the backlight control board is mounted an LCD. The LCD has a backlight which is driven by the OBINVB (OB inverter board) and touch switches which correspond to the display messages.
The operation panel is controlled by the OB1 based on the serial data output from the ICB (image control board).

1. Operation

a. LED ON operation

The LED on the OB2 are turned ON/OFF by shift register/latch driver. Each IC is turned ON/OFF according to the serial data from the PRCB.

b. LCD control

(1) LCD display operation
The LCD displays various information according to the 4-bit parallel data from the OB1.

(2) Backlight ON operation
The LCD has a backlight (cold cathode tube) to facilitate viewing. The backlight is driven by the OBINVB, and controlled by the OB1 via the OB2.

(3) Touch switch control
The LCD has touch switches, enabling you to directly select items displayed on the screen. These touch switches are controlled by the OB1.

2. Signals

a. PRCB input signals

(1) OB1 RXD (OB1 to ICB)
Serial data which informs ICB of the operation state of OB1.

(2) OB1 TXD REQ (OB1 to ICB)
Signal which indicates that data is being sent from OB1 to ICB.
[H]: PRCB stops sending the PB1 TXD signal.

(3) OB1 TXD ACK (OB1 to ICB)
Acknowledgment signal which is returned each time OB1 receives one-byte data from ICB.

b. PRCB output signal

(1) OB1 TXD (ICB to OB1)
Serial data which informs OB1 of the machine status that is known to ICB.

(2) OB1 TXD REQ (ICB to OB1)
Signal which indicates that data is being sent from ICB to OB1.
[H]: OB1 stops sending the OB1 RXD signal.

(3) OB1 TXD ACK (ICB to OB1)
Acknowledgment signal which is returned each time ICB receives one-byte data from OB1.

c. ADUSDB output signal

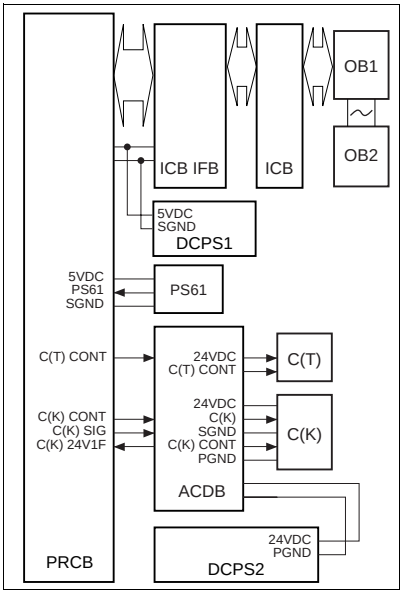
(1) JAM1-5 (ADUSDB to JAMIB)
LED ON control signal to JAMIB (jam indicator board).
The LED corresponding to the jam location is turned ON on the JAMIB.

d. OB2 input signal

(1) WT LED (PSWB to OB2)
Weekly timer LED ON/OFF control signal.

(2) ST LED (PPSWB to B2)
LCD backlight ON/OFF control signal.

[5] Counter Control



This machine has the following counters:
C (T): Total counter
C (K): Key counter
These counters are controlled by the PRCB (printer control board).
The related signal is PS61 (paper exit).

1. Operation

This machine counts copies using a software counter.

(1) Paper ejection counter
The count increases by 1 each time PS61 which has been ON is turned OFF (two counts in the dual-sided copy mode).

<Operation of each counter>

a. Copy quantity display counter on OB
Displays the count of ejected papers.

b. C (K)
This counter counts in sync. with the paper exit counter.

c. C (T)
This counter counts in sync. with the paper exit counter.

2. Signals

a. Input signals

(1) PS61 (PS61 to PRCB)
Signal indicating passage of paper in the paper exit section.
[L]: PS61 is turned ON to indicate that paper has been ejected.

(2) C (K) 24V 1F (ACDB to PRCB)
Signal indicating the state of 24 V power supply to C (K).
[L]: 24V power is not supplied.

b. Output signals

(1) C (T) CONT (PRCB to ACDB to C (T))
C (T) drive control signal.
[L]: C (T) ON

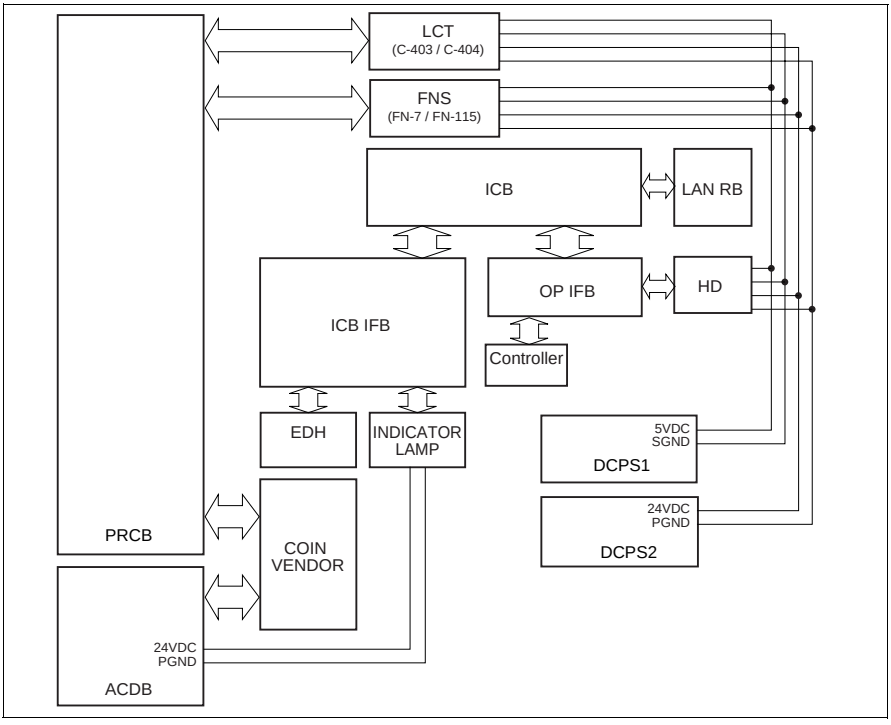
(2) C (K) CONT (PRCB to ACDB to C (K))
C (K) drive control signal.
[L]: C (K) ON

(3) C (K) SIG (PRCB to ACDB)
Key counter signal.
[L]: Signal exists

c. ACDB output signal

(1) C (K) (ACDB to C (K))
Key counter signal.
[L]: Signal exists

[6] Option Control



Options such as LCT and FNS are controlled by the PRCB (printer control board).

1. Operation

The FNS incorporates a CB which exchanges only control data with the PRCB of the main unit. The LCT and FNS are powered by the DCPS1 (DC power supply unit 1).

<Functions and output timings of signals for coin vendors>

Connector	Pin No.	Signal name	Description	Output timing	Signal type
35	1	DC24V	Key counter power supply	Always	24 V, 300 mA
	2	C(K) SIG	Key counter connection recognition	–	–
	3	C(K) GND	Signal ground		
	4	C(K) DRIVE	Key counter signal count up	100-ms L-signal output after paper ejection.	
	5	PGND	Power ground	–	
36	1	Vendor Copy	Copying signal	Output from the moment START PRINT button is pressed to the moment paper ejection is completed.	Open collector 5V, 200 mA
	2	Vendor FEED	Paper feed signal	Common to main body tray. 100-ms L-signal output in sync with paper feed.	
	3	Paper size 0	Paper size signal	Output when paper size is changed.	
	4	Paper size 1			
	5	Paper size 2			
	6	Paper size 3			
	7	Vendor double-sided	Double-sided copy selection signal	Output when double-sided mode is selected.	
	8	CPF SIG0	CPF mode selection signal	Output when copy or printer mode is selected.	
	9	CPF SIG1			
	10	PGND	Power ground	–	–

<Functions and output timings of signals for indicator lamp>

Connector	Pin No.	Signal name	Description	Output timing	Signal type
435	1	DC24V	Indicator lamp power supply	Always	24 V, 500 mA
	2	PGND	Power ground	–	–
137	A10	PAT1	Lamp ON signal	L-signal output when printing is possible.	Open collector 5V, 200 mA
	A11	PAT2		L-signal output during scanning or printing operation.	
	B10	PAT3		L-signal output when the machine is stopped by such abnormalities as paper jam, error code, no paper, and no toner.	
	B11	PAT4		L-signal output when a warning of toner supply is indicated.	

Note: When an error code occurs, a signal is output from PAT3. However, since the 24 V indicator lamp power supply is interrupted, the lamp does not turn ON.

Use of this manual should be strictly supervised to avoid disclosure of confidential information.

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