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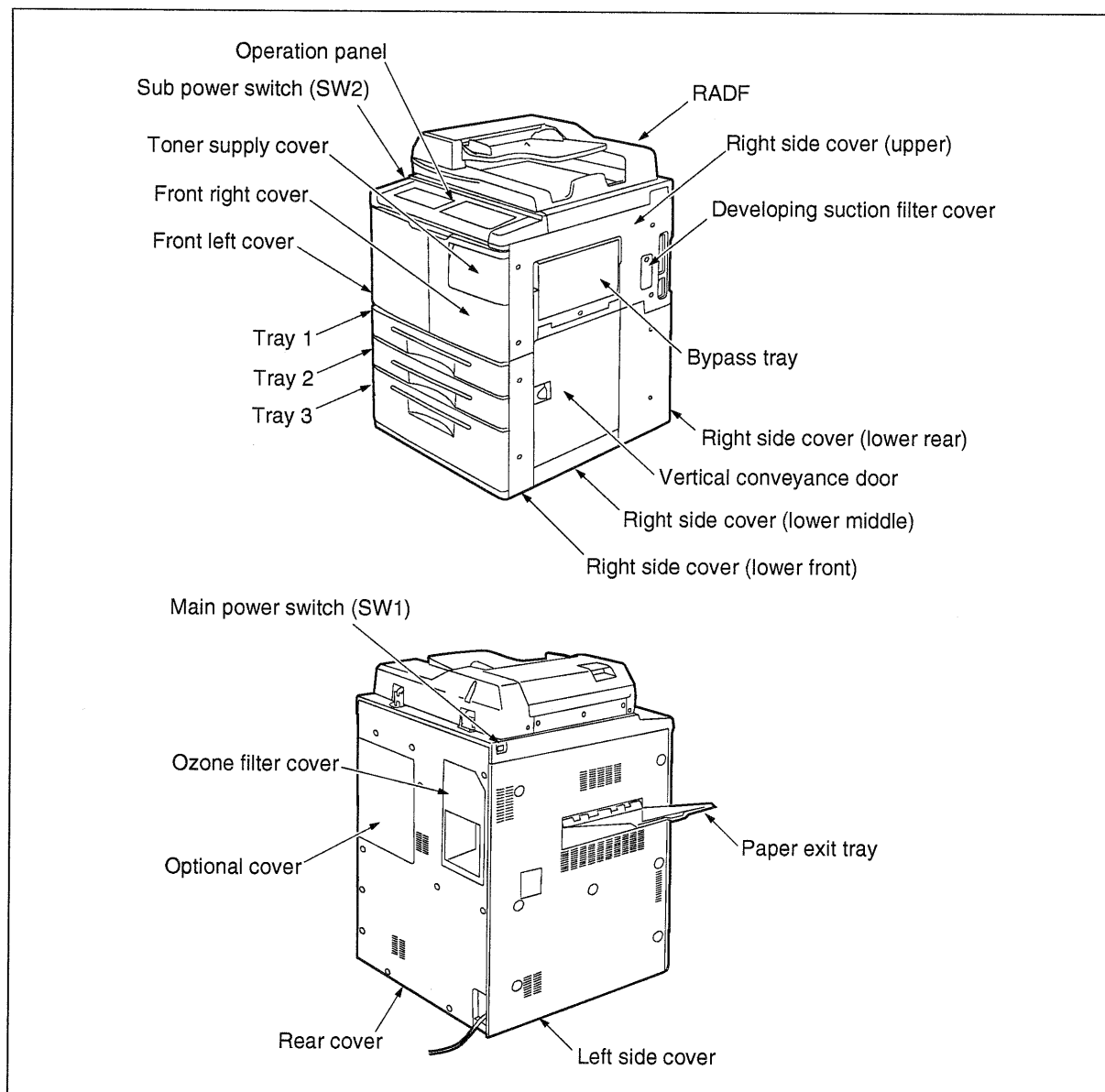
UNIT EXPLANATION



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EXTERNAL SECTION

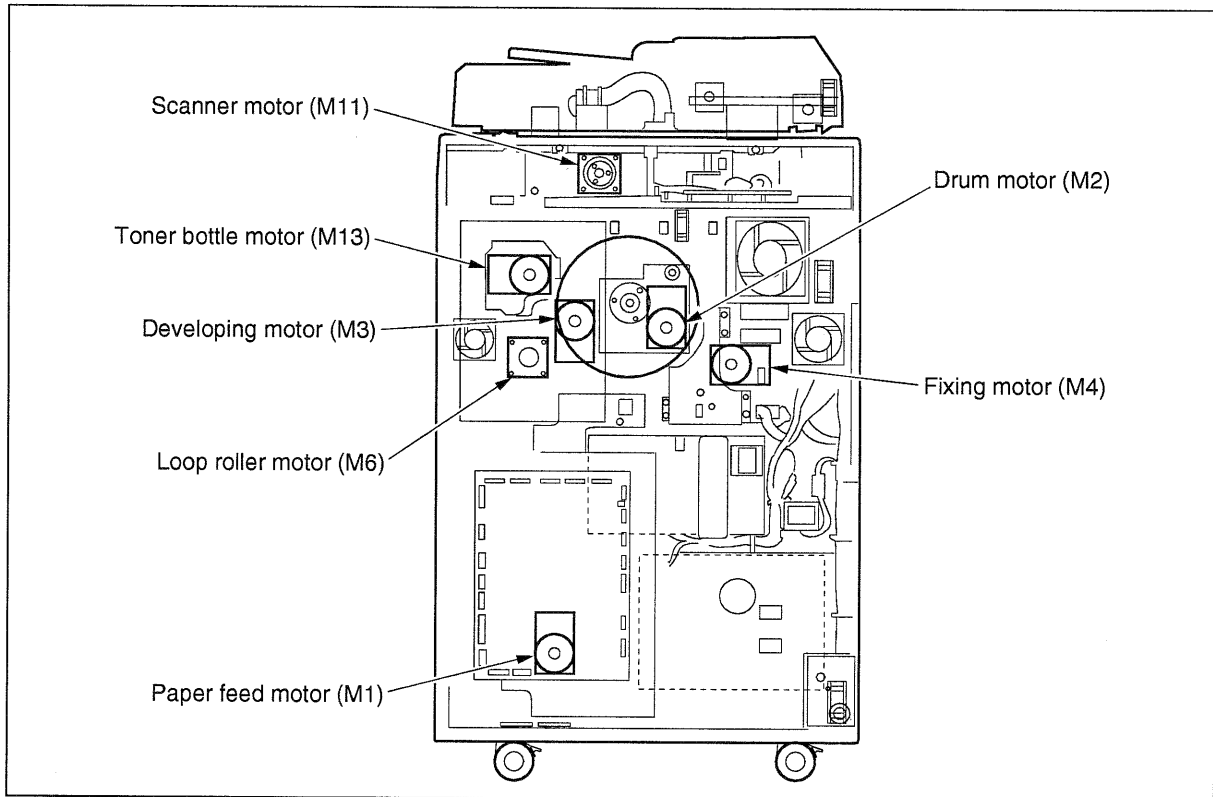
[1] Composition



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DRIVE SECTION

[1] Composition



[2] Mechanisms

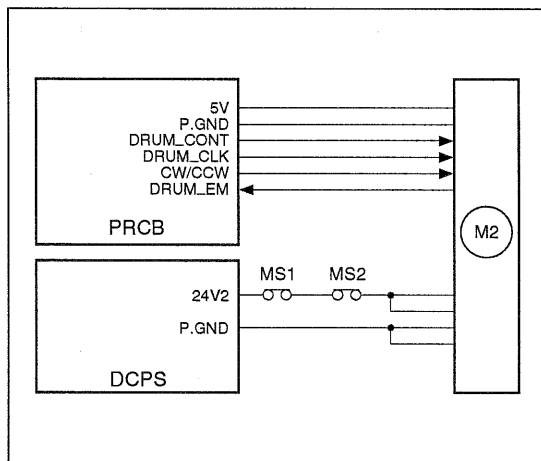
Mechanism	Driven Parts	Method
Drum drive*1	Drum, Toner guide roller, Toner conveyance screw, and Separation claw swing	Gear drive (dedicated motor)
Developing drive*1	Developing sleeve	Gear drive (dedicated motor)
Fixing drive*1	Fixing roller (upper)	Gear drive (dedicated motor)
Paper feed drive*1	Tray 1/2/3, Vertical conveyance roller (middle/lower)	Gear drive (dedicated motor) + Belt
By-pass/loop drive*1	By-pass feed roller and ADU pre-registration roller	Gear drive (dedicated motor) + Belt
Scanner drive*1	Exposure unit, V-mirror unit	Wire drive (dedicated motor) + Belt
Paper exit drive*1	Paper exit roller	Gear drive (dedicated motor)

*1 Independent drive mechanisms

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

Speeds of the drum motor (M2), fixing motor (M4), and loop roller motor (M6) are switched as shown below according to the paper type selected in the key operator mode, thus enhancing reliability of copying on thick paper.

Paper type	Motor speed
Thick paper	185 mm/s
Others	320 mm/s

[3] M2 (Drum) Control

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

1. Operation

M2 (drum) is a motor driven by 24 VDC. It drives the drum, toner guide roller, toner conveyance screw, and separation claw swing. The flywheel mechanism adopted for M2 ensures accurate and steady rotation.

M2 starts rotating when the START button is pressed and stops when the specified time lapses after completion of second paper feeding of the last copy.

When either one of the front-left and front-right doors of this machine opens, MS1 (interlock MS/R) or MS2 (interlock MS/L) actuates to stop supplying the DC power to the motor, causing M2 to stop.

2. Signals**a. Input signal****(1) DRUM_EM (M2 to PRCB)**

M2 (drum) rotation abnormality detection signal
[H]: Rotation error (when motor speed changes by 6.5% more or less than the motor speed specified value)

[L]: Normal rotation

b. Output signals**(1) DRUM_CONT (PRCB to M2)**

M2 (drum) ON/OFF control signal

[L]: M2 ON

[H]: M2 OFF

(2) CW/CCW (PRCB to M4)

M2 (drum) rotational direction switchover signal

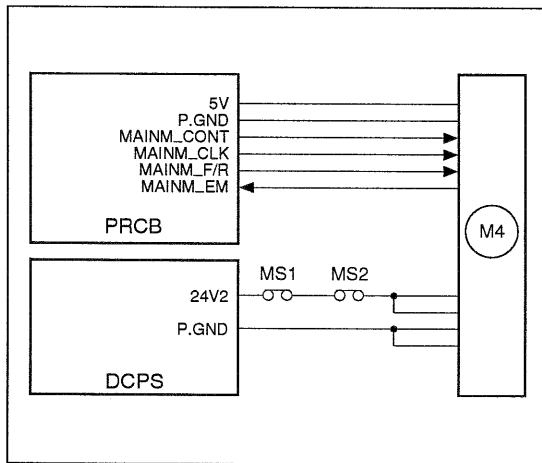
[L]: CW rotation

[H]: CCW rotation

(3) DRUM_CLK (PRCB to M2)

M2 (drum) rotational speed control clock signal

[4] M4 (Fixing) Control



M4 (fixing) is controlled by PRCB (printer control board) and the motor drive power is supplied from DCPS (DC power supply unit).

1. Operation

M4 (fixing) is a motor driven by 24 VDC. It drives the fixing roller.

M4 starts rotating when the START button is pressed and stops when the last copied paper has been ejected.

During the warm-up operation, M4 rotates to rotate the fixing roller.

2. Signals

a. Input signal

(1) MAINM_EM (M4 to PRCB)

M4 (fixing) rotation error detection signal

[H]: Rotation error (when motor speed changes by 6.5% more or less than the motor speed specified value)

[L]: Normal rotation

b. Output signals

(1) MAINM_CONT (PRCB to M4)

M4 (fixing) ON/OFF control signal

[L]: M4 ON

[H]: M4 OFF

(2) MAINM_F/R (PRCB to M4)

M4 (fixing) rotational direction switchover signal

[L]: CW rotation

[H]: CCW rotation

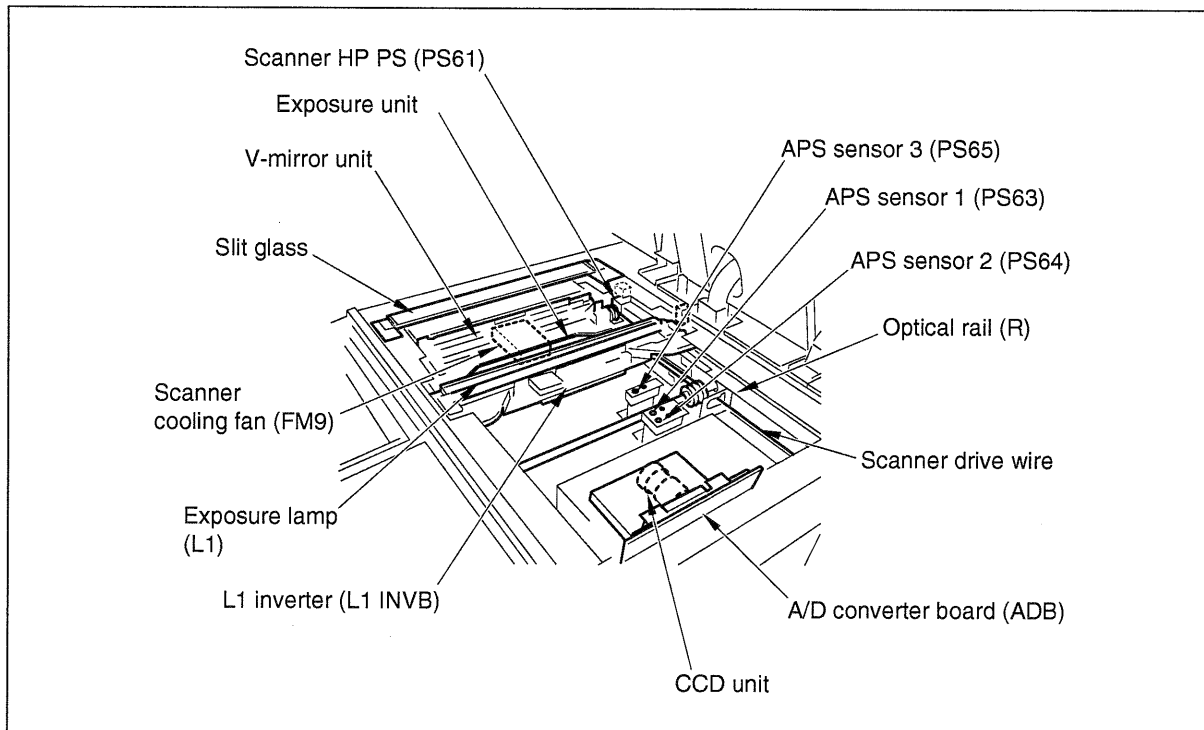
(3) MAINM_EM (M4 to PRCB)

M4 (fixing) rotational speed control clock signal

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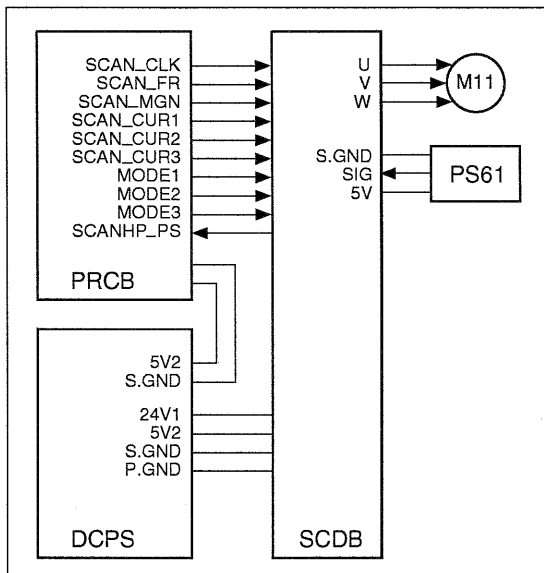
SCANNER SECTION

[1] Composition



[2] Mechanisms

Mechanism	Method
Light source	Xenon lamp
Exposure	Light source moving 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
Scanner cooling	Cooling fan

[3] M11 (Scanner) Control

M11 (scanner) is driven by SCDB (scanner drive board) and is controlled by PRCB (printer control board).

The related signal is PS61 (scanner HP).

1. Operation**a. Operation of M11 (scanner)**

M11 (scanner) is a 3-phase stepping motor driven by the 3-phase bipolar constant-current drive method. The motor is turned ON/OFF by supplying/stopping clock pulses.

The rotational speed, direction, and amount of movement of M11 is determined by the increment of the driving step count. This count is reset each time PS61 (scanner HP) is turned ON or OFF by the exposure unit.

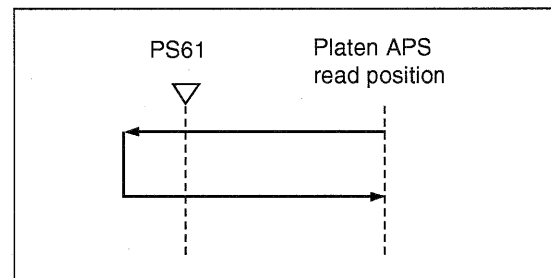
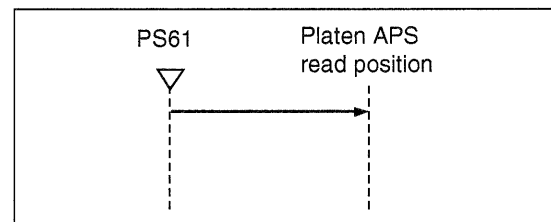
b. Movement speed of the exposure unit

Scanning speed

Operation mode	Movement speed
Scan	320 mm/s (1:1)
Return	640 mm/s
Home position search	247 mm/s

c. Exposure unit home position search

When SW2 (sub power switch) or the START button is pressed, M11 (scanner) searches for the home position of the exposure unit. However, this operation is performed in different ways depending on whether PS61 (scanner HP) is ON or OFF.

(1) When PS61 (scanner HP) is OFF**(2) When PS61 (scanner HP) is ON****d. Read with shading correction**

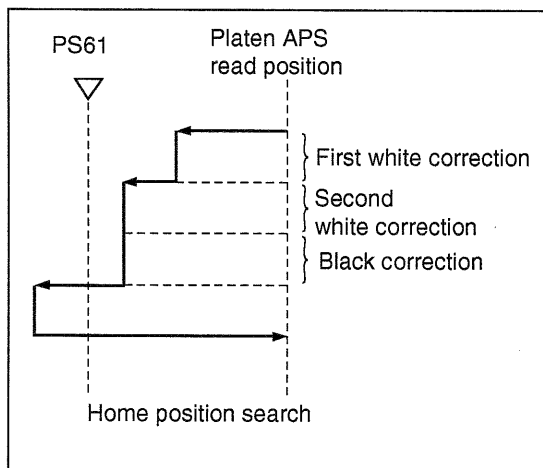
Shading correction is performed in different ways depending on whether SW2 (sub power) is ON or the START button is ON. When shading correction starts, the exposure unit is at the home position and PS61 (scanner HP) is OFF.

(1) When SW2 (sub power) is ON

L1 (exposure lamp) turns ON. Next, M11 (scanner) moves the exposure unit toward the paper exit side. After being driven by the specified number of steps, M11 stops, thus reading the light reflected by the white reference plate installed underneath the glass stopper plate and performing the first white correction. Next, M11 moves the exposure unit toward the paper exit side. After being driven by the specified number of steps, M11 performs the second white correction.

Then, L1 is turned OFF for black correction, searching for the home position of the exposure unit.

In each of the first and second shading correction processes, the CCD 1 line data is read to compare brightness levels between pixels. The brighter data is used as white correction data.

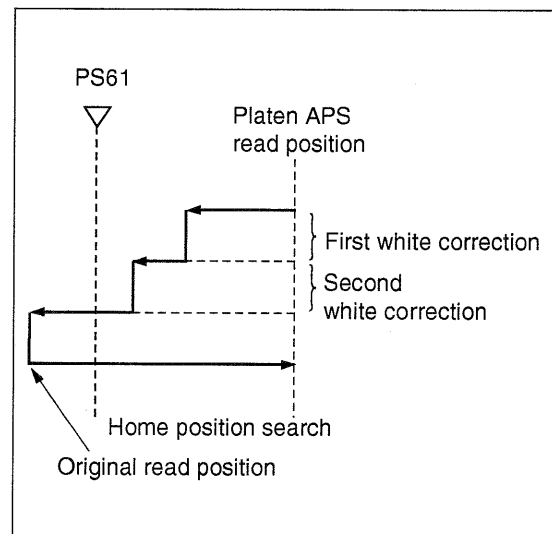


- (2) When the START button is ON L1 (exposure lamp) turns ON. Next, M11 (scanner) moves the exposure unit toward the paper exit side. After being driven by the specified number of steps, M11 (scanner) stops, thus reading the light reflected by the white reference plate installed underneath the glass stopper plate and performing the first white correction. Next, M11 moves the exposure unit toward the paper exit side. After being driven by the specified number of steps, M11 performs the second white correction. Then, M11 proceeds to the ADF copy operation or platen copy operation.

e. ADF copy operation

After completion of the shading correction started by pressing the START button, M11 (scanner) moves the exposure unit toward the paper exit side. After being driven by the specified number of steps from the position where PS61 (scanner HP) was turned ON, it stops. This position is the exposure position for ADF copy operation.

Then, ADF copy operation is performed. After completion of the ADF copy operation, L1 (exposure lamp) is turned OFF to start searching for the exposure unit home position.



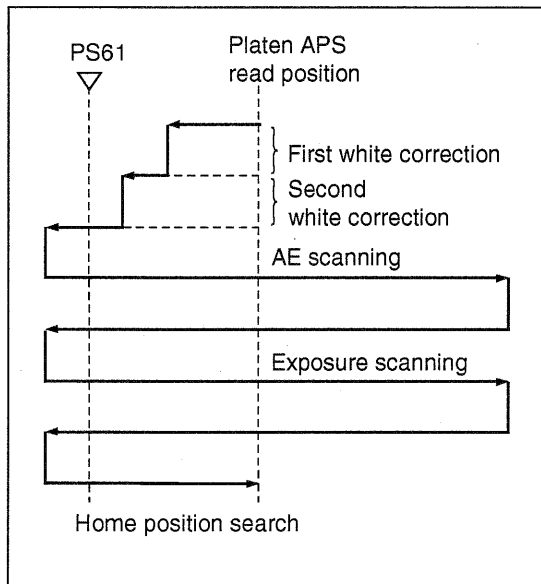
f. Platen copy operation

Platen copy operation is performed in different ways depending on whether AE control is performed.

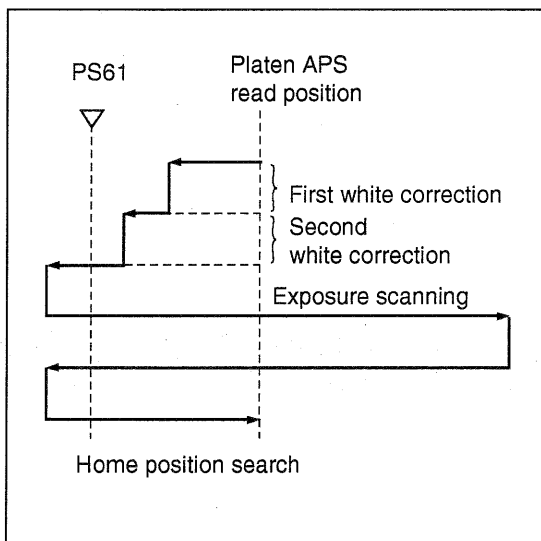
After completion of the shading correction started by pressing the START button, AE scanning is performed in the paper feed direction if the AE mode has been selected.

Then, exposure scanning is performed at the speed corresponding to the specified magnification by the distance corresponding to the original size, thus searching for the home position.

(1) Operation with AE



(2) Operation without AE



2. Signals

a. Input signals

- (1) SIG/SCANHP_PS (PS61 to SCDB to PRCB)
Scanner home position detection signal
The reference position of the home position of the exposure unit is detected.
[L]: The exposure unit is detected.
[H]: The exposure unit is not detected.

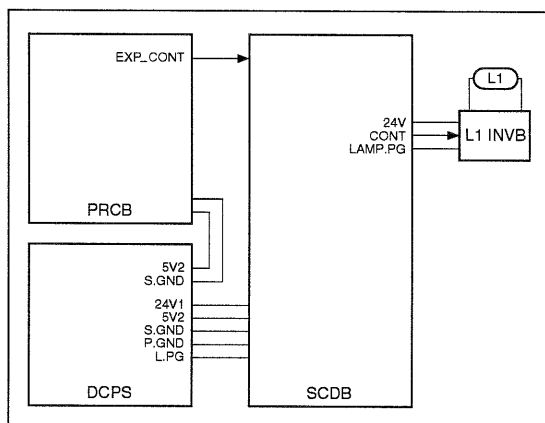
b. PRCB output signal

- (1) SCAN_CLK (PRCB to SCDB)
M11 (scanner) clock signal
- (2) SCAN_F/R (PRCB to SCDB)
M11 (scanner) 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) MODE1 to 3 (PRCB to SCDB)
M11 (scanner) energize switchover signals
- (4) SCAN_CUR1 to 3 (PRCB to SCDB)
M11 (scanner) energize current switchover signals

c. SCDB output signals

- (1) U, V, W (SCDB to M11)
M11 (scanner) drive control signals
These signals are used to control rotation of M11 (scanner). By supplying and stopping clock pulses, the motor is turned ON/OFF and the rotational direction is switched.

[4] Exposure control

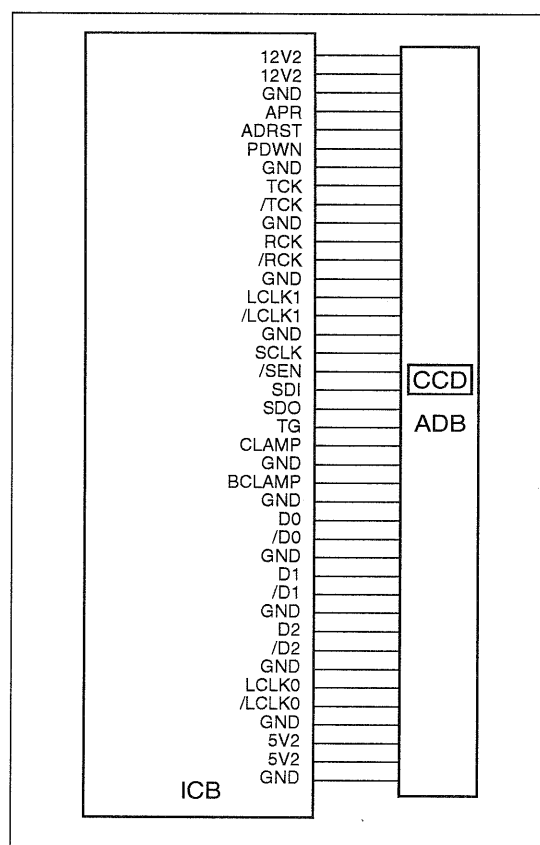
L1 (exposure lamp) is driven by L1 INVb (L1 inverter) and is controlled by PRCB (printer control board) via SCDB (scanner drive board).

1. Operation

L1 (exposure lamp) is a xenon lamp driven by the inverter circuit. The xenon lamp can emit a constant light intensity and generates less heat than other lamps, so it does not require the light intensity control circuit that has been used in the existing machines, requiring no thermal protector circuit. However, since L1 is held lit when the exposure unit is stationary in the ADF mode, FM9 (scanner cooling) is installed in the read section.

2. Signals**a. Output signals**

- (1) EXP_CONT (PRCB to SCDB)
L1 (exposure lamp) ON/OFF control signal
[L]: L1 ON
[H]: L1 OFF
- (2) CONT (SCDB to L1 INVb)
L1 (exposure lamp) ON/OFF control signal
[L]: L1 ON
[H]: L1 OFF

[5] Original Read Control

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

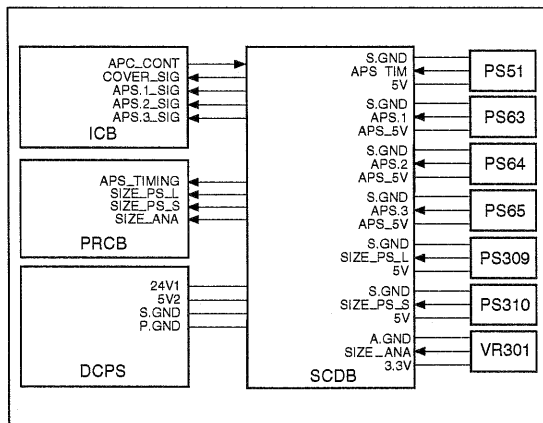
1. Operation

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

a. Original read

The original read timing is as follows:

- (1) Platen mode
After lapse of the specified interval since the exposure unit turned PS61 (scanner HP) OFF.
- (2) ADF mode
After lapse of the specified interval since the original's leading edge turned PS306 (original conveyance) ON.

[6] APS Control

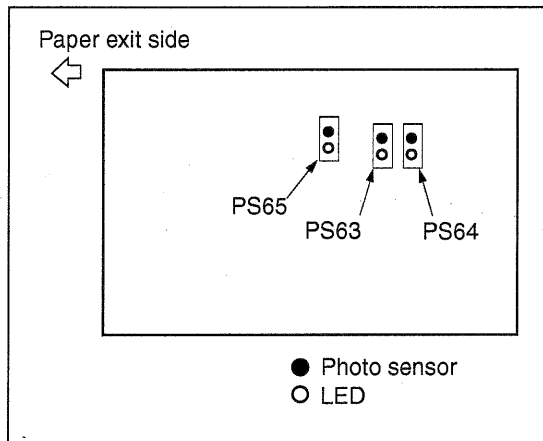
The APS method used in the platen mode is different from that used in the ADF mode. The signal read by the APS sensor or RADF's original size detection sensor is processed by ICB (image control board) via SCDB (scanner drive board).

1. Operation**a. APS detection****(1) ADF mode**

The paper size is detected according to the combination of ON/OFF states of PS309 (original size/2) and PS310 (original size/1) of the RADF's original feed tray and the resistance value of VR301 (original paper size).

(2) Platen mode

The paper size is detected according to the combination of ON/OFF states of PS63 (APS/1), PS64 (APS/2), and PS65 (APS/3) and the signal read by the CCD sensor. PS63 to PS65 are used to detect the original size in the sub-scanning direction and the CCD sensor is used to detect the original size in the main scanning direction.



Relationships between sensors and paper sizes are as follows:

Sensor \ Paper size	PS65	PS63	PS64
Min. size	○	○	○
B5R	●	○	○
B5	○	○	○
B4	●	●	●
A4R	●	●	○
A4	○	○	○
A3	●	●	●
8.5 x 11R	●	○	○
8.5 x 11	○	○	○
8.5 x 14	●	●	●
11x 17	●	●	●

● ON
○ OFF

b. APS detection timing

The APS detection timing differs between the platen mode and DF mode.

(1) ADF mode

When the RADF mode is selected or an original is set on the RADF original feed tray, APS detection takes place using PS309 (original size/2), PS310 (original size/1), and VR301 (original size).

(2) Platen mode

When the RADF is closed and PS51 (APS timing) turns ON, L1 (exposure lamp) turns ON and the CCD detects the reflected light to detect the original size in the main scanning direction. Since RADF is still open at this time, the black level of the sky shot (outside the original) and the white level of the original (inside the original) are detected according to whether an original is present. At this time, the original size in the sub-scanning direction is detected using PS63 to PS65 (APS/1 to APS/3). When the RADF is closed completely and PS311 (ADF open/close) turns ON, CCD reads the white level of the platen cover and the black level in the original. Among the two original sizes detected as discussed above, the larger size is determined as the original size in the main scanning direction.

2. Signals

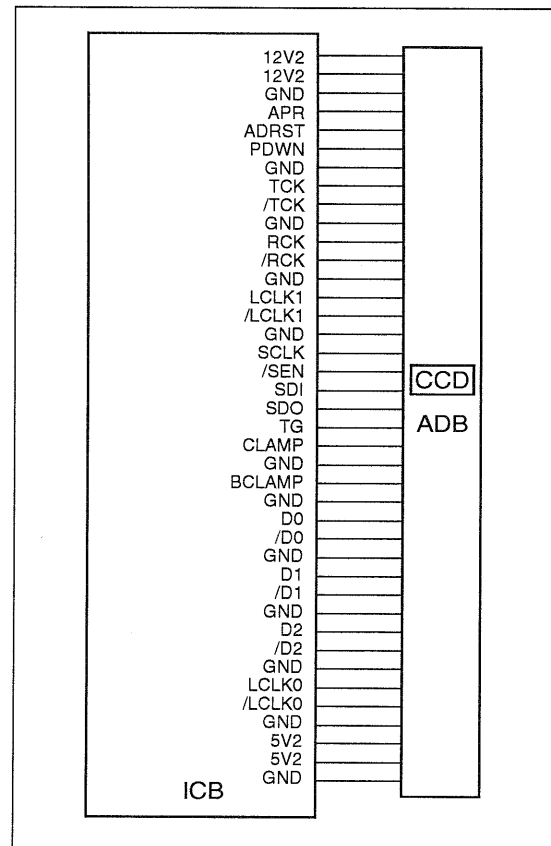
a. Input signals

- (1) APS_TIM (PS51 to SCDB)
ADF open/close detection signal
[L]: ADF is closed.
[H]: ADF is open.
- (2) APS.1/APS.1_SIG (PS63 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (3) APS.2/APS.2_SIG (PS64 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (4) APS3/APS.3_SIG (PS65 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (5) SIZE_PS_L (PS309 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (6) SIZE_PS_S (PS310 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (7) SIZE_ANA (PS301 to SCDB to ICB)
Paper size detection signal
[L]: Paper is detected.
[H]: Paper is not detected.
- (8) COVER_SIG (SCDB to ICB)
Same as APS TIM signal.
- (9) APS_TIMING (SCDB to PRCB)
Same as APS TIM signal.

b. Output signals

- (1) APS_CONT
This signal controls ON/OFF states of APS_5V power for driving PS63, PS64, and PS65 (APS1 to APS3).
[L]: APS_5V OFF
[H]: APS_5V ON

[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 during AE scanning preceding the exposure scanning that is carried out after depression of the START button.

<AE sampling area>

- 1) Normal copy

10 mm inside the perimeter of the original detected by APS.

- 2) Non-image area erasure mode

Entire original area detected during pre-scanning.

(2) ADF mode

The image at the leading edge of the original is read when the PRINT button is pressed.

The read data is used to measure the image density on the original.

<AE sampling area>

1) Main scanning direction

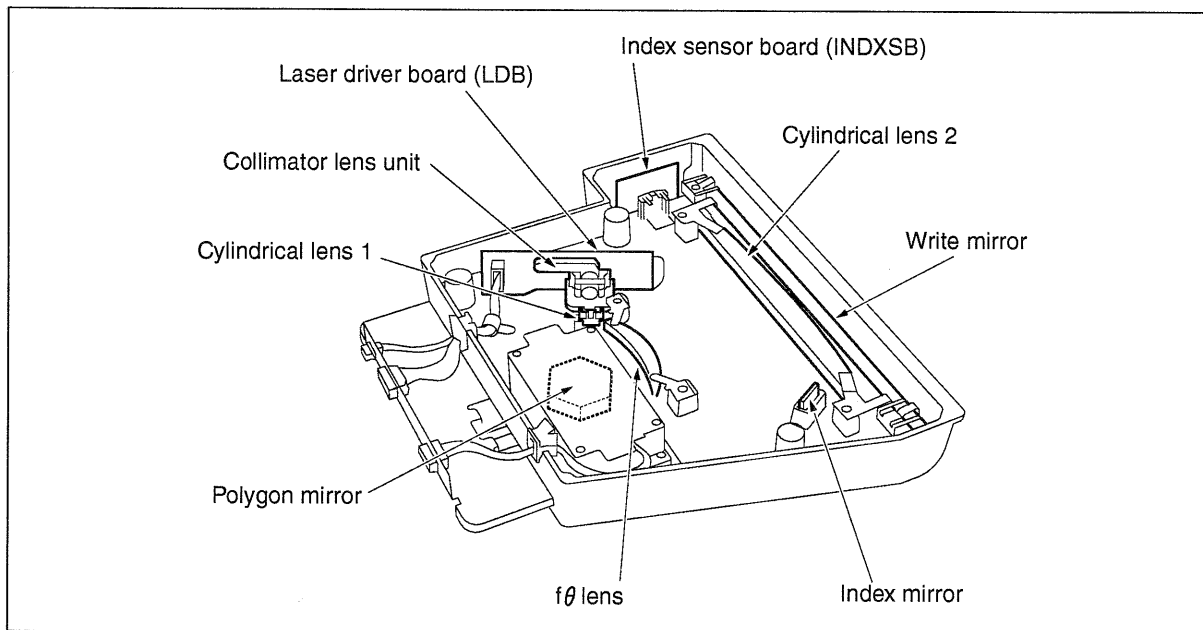
10 mm area inside the original detected by APS

2) Sub-scanning direction

2-to-4 mm area from the leading edge of the original.

WRITE UNIT

[1] Composition

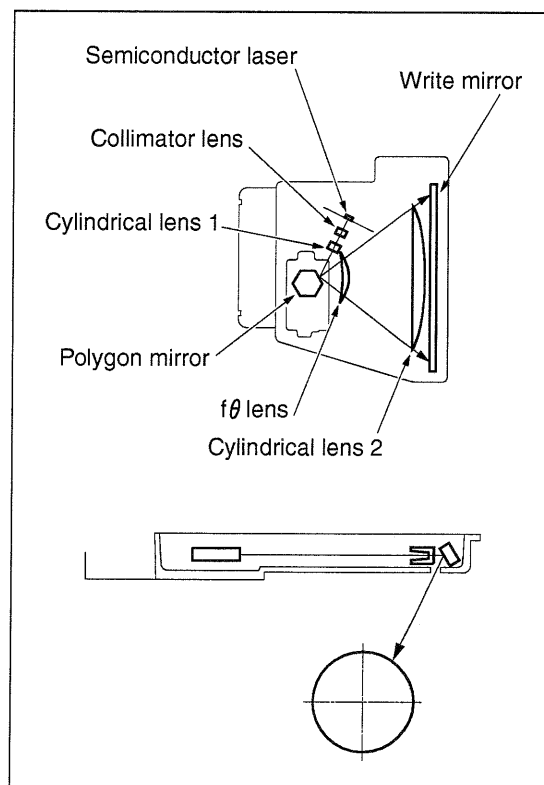


[2] Mechanisms

Mechanism	Method
Scan*1	Polygon mirror Rotational speed: 37,795 rpm (normal) 21,850 rpm (thick paper)
Light source*2	1-chip, 2-beam laser diode (Power: 15 mW per beam)
Reference positioning*3	Index sensor

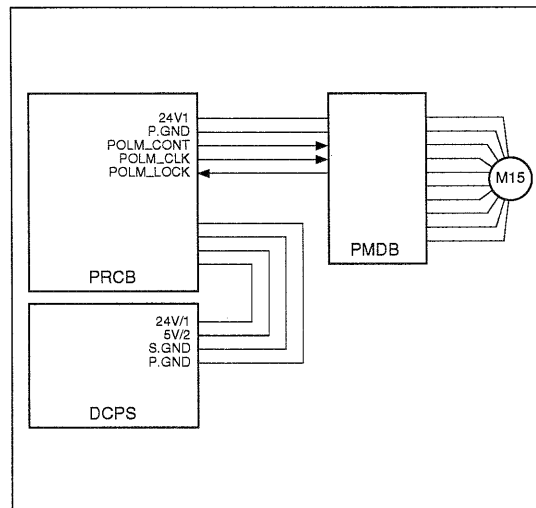
*1 Path of laser light

The light output from the semiconductor laser is radiated onto the OPC drum via the collimator lens, cylindrical lens 1, polygon mirror, $f\theta$ lens, cylindrical lens 2, and write mirror.



*2 Light source

Conventionally, two parallel beams were generated from two laser beams. The laser diode adopted for this machine can generate two beams using a single chip, requiring neither fine-adjustment prism nor beam composition prism.

[3] M15 (Polygon) Control

M15 (polygon) is driven by PMDB (polygon drive board) and is controlled by PRCB (printer control board).

1. Operation**a. Explanation of operation**

M15 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 LDB (laser driver board) in the axial direction of the drum. Its rotation is held constant by PLL control.

b. Rotational speed

M15 is powered by 24 VDC and its rotational speed is as follows:

Linear speed	Rotational speed
320 mm/s (normal)	37,795 rpm
185 mm/s (thick paper)	21,850 rpm

2. Signals

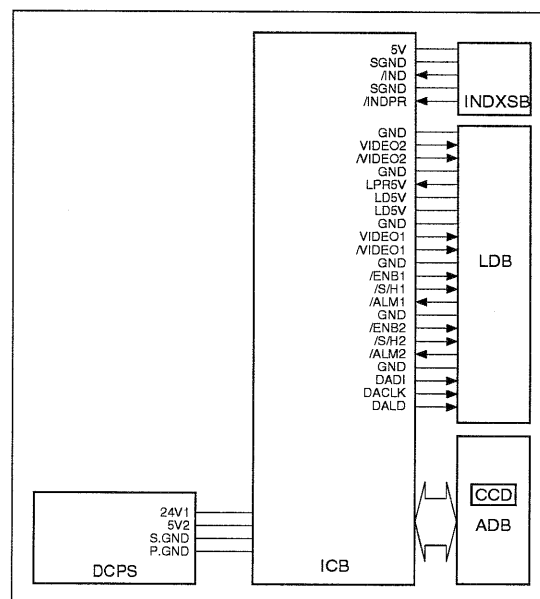
a. Input signals

- (1) POLM_LOCK (PMDB to PRCB)
This signal indicates the clock synchronization state of M15 (polygon).
[L]: Synchronous (normal)
[H]: Asynchronous (abnormal)

b. Output signals

- (1) POLM_CONT (PRCB to PMDB)
This signal turns ON/OFF M15.
[L]: M15 ON
[H]: M15 OFF
- (2) POLM_CLK (PRCB to PMDB)
This is a reference clock signal for PLL-controlling M15 in PMDB.

[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 on the LDB (laser driver board), and then the beams are radiated onto the drum surface. Two beams are emitted per laser diode. Two lines of image data is written per scan.

The write start reference position is detected by the INDXSB (index sensor board). The ICB has an E-RDH (electronic RDH) function to store digitized image 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 (Automatic Offset Control)
The IC on the ADB (A/D converter board) automatically adjusts the analog offset voltage of the CCD sensor output so that it is at the lower limit of the A/D converter level.
- (2) AGC (Automatic Gain Control)
During shading correction, the white reference plate is read to adjust the analog amplification factor of the CCD sensor output so that the read level is at the upper limit of the A/D converter level.
- (3) Shading correction
<Timing>
 - When SW2 (sub power) is ON
 - At job start
- (4) Brightness/density conversion
- (5) AE processing
- (6) Text/dot pattern judgment
- (7) Filtering
- (8) Magnification change processing
- (9) Copy gamma correction
- (10) Skew correction
- (11) Error diffusion processing
- (12) Data compression/expansion processing
- (13) Write density control

b. Write

The ICB (image control board) sends image data on a pixel basis to LDB (laser driver board) according to the control signals from the PRCB (printer control board).

LDB causes the laser light to be emitted for a period corresponding to the image data. This laser light is radiated onto the drum surface.

- (1) MPC (Maximum Power Control)
ICB (image control board) informs LDB (laser driver board) of the maximum output value and sets that value for the laser beam emission. LDB store this value and maintain the laser beam level using the APC (Auto Power Control).
<MPC timing>
When SW2 (sub power switch) is turned ON

- (2) APC (Automatic Power Control)

After MPC is set, the ICB (image control board) outputs an APC start instruction to LDB (laser driver board) at the following timing:

<APC timing>

LDB (laser driver board) 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 (/IND) from INDXSB (index sensor board), the laser write reference position is determined for each scan in the drum rotation direction, and the image is written onto the copy paper according to the copy paper position detected by PS70 (paper mis-centering).

b) sub scanning direction

Specified interval after PS44 (registration) detects the leading edge of the copy paper.

2. Signals

a. Input signals

- (1) /IND (INDXSB to ICB)
This is an index signal used to detect deviation of main scanning.
- (2) /INDPR (INDXSB to ICB)
This signal monitors the INDXSB (index sensor board) power supply.
[H]: Abnormal
[L]: Normal
- (3) /ALM1 (LDB to ICB)
This signal indicates the state of the laser 1 drive current.
[H]: Normal
[L]: Abnormal
- (4) LPR5V (LDB to ICB)
This signal monitors the LDB (laser driver board) power supply.
[H]: Normal
[L]: Abnormal
- (5) /ALM2 (LDB to ICB)
This signal indicates the state of the laser 2 drive current.
[H]: Normal
[L]: Abnormal

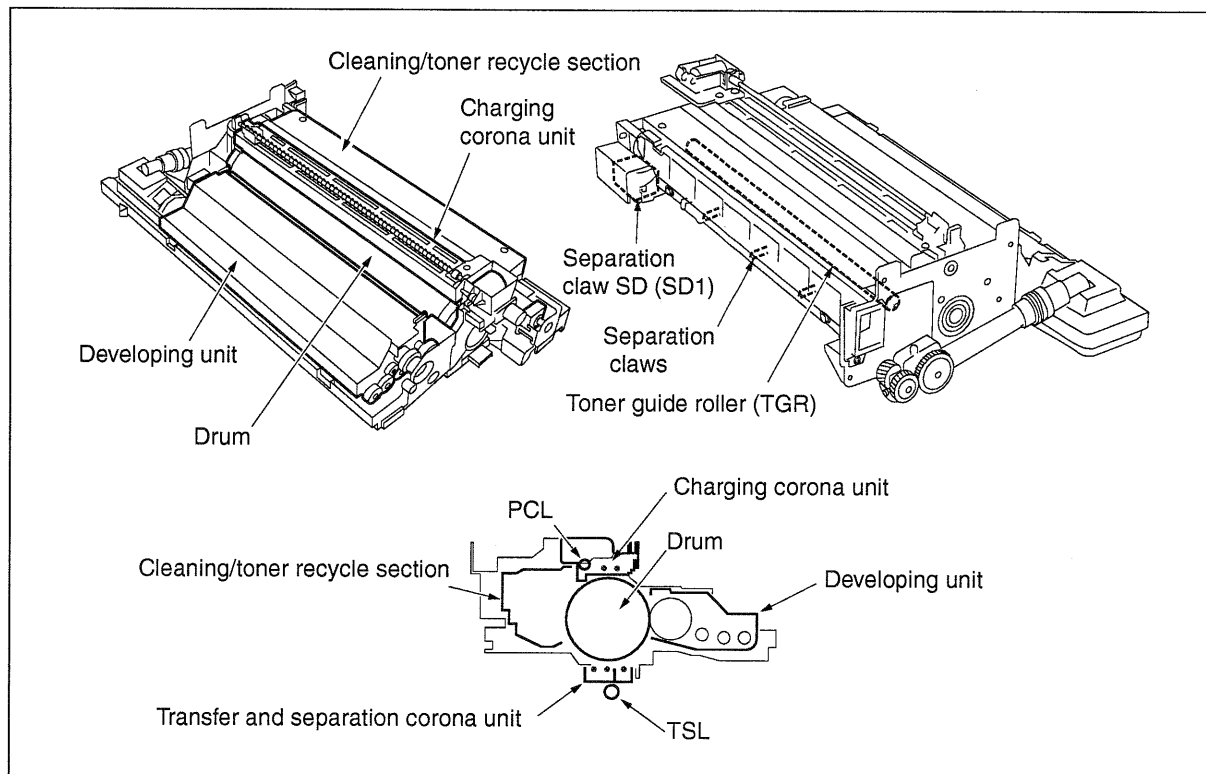
b. Output signals

- (1) /S/H1 (ICB to LDB)
APC sampling signal for one line (for laser 1)
- (2) /ENB1 (ICB to LDB)
Laser APC function ON/OFF control signal (for laser 1)
Laser beam emission stops when it is OFF.
- (3) /S/H2 (ICB to LDB)
APC sampling signal for one line (for laser 2)
- (4) /ENB2 (ICB to LDB)
Laser APC function ON/OFF control signal (for laser 2)
Laser beam emission stops when it is OFF.
- (5) VIDEO1/VIDEO1 (ICB to LDB)
Image signal for laser 1
- (6) VIDEO2/VIDEO2 (ICB to LDB)
Image signal for laser 2
- (7) DACLK (ICB to LDB)
LDB (laser driver board) MPC value data transmission clock signal
- (8) DADI (ICB to LDB)
LDB (laser driver board) signal for MPC
- (9) DALD (ICB to LDB)
LDB (laser driver board) MPC value memory command signal

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DRUM UNIT

[1] Composition



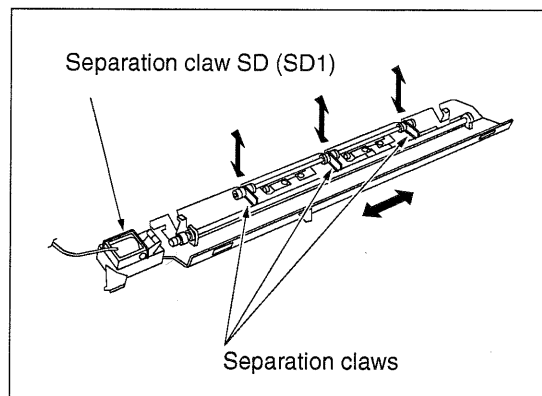
[2] Mechanisms

Mechanism	Method
PCL/TSL	LED
Auxiliary separation *1	Separation claws
Transport assistance *2	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

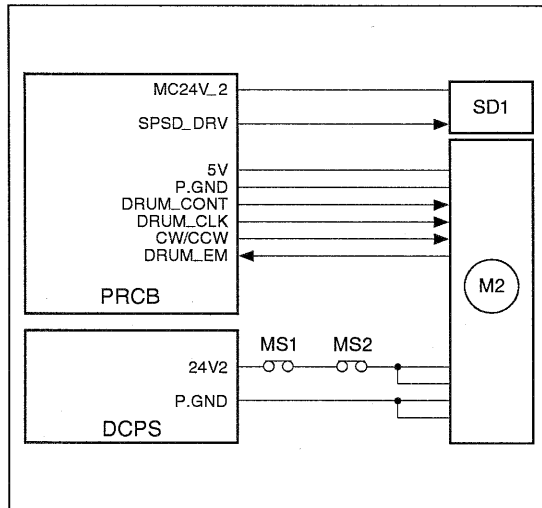
- To prevent paper jamming, three separation claws are used to separate paper from the drum forcibly. These separation claws are pressed against the drum or detached from it by turning ON/OFF the separation claw solenoid (SD1).
- To prevent a specific part of image-copied paper from being stained and to prevent the drum from being scratched, the swing mechanism slides the separation claws about 8 mm back and forth in parallel with the drum surface.



*2 Transport assistance

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

[3] Separation Claw Control



Separation claws are driven by SD1 (separation claw). Separation claws are swung by M2 (drum). SD1 is controlled by PRCB (printer control board).

1. Operation

a. Separation claw ON/OFF control

SD1 (separation claw) 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) SD1 (separation claw) operation timing

SD1 turns ON after a lapse of specified time from turning ON of PS43 (leading edge) of the second paper feed section. It turns OFF after a lapse of the time set by PRCB (printer control board).

b. Separation claw swing control

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

2. Signals

a. Output signal

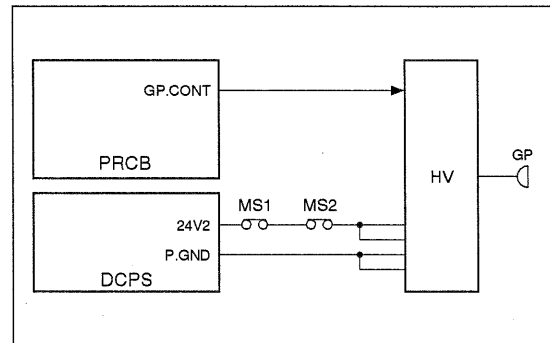
(1) SPDS_DRV (PRCB to DCDB)

SD1 (separation claw) drive control signal

[L]: SD1 ON

[H]: SD1 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 HV (high voltage unit) and is controlled by PRCB (printer control board).

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 (PRCB to HV)

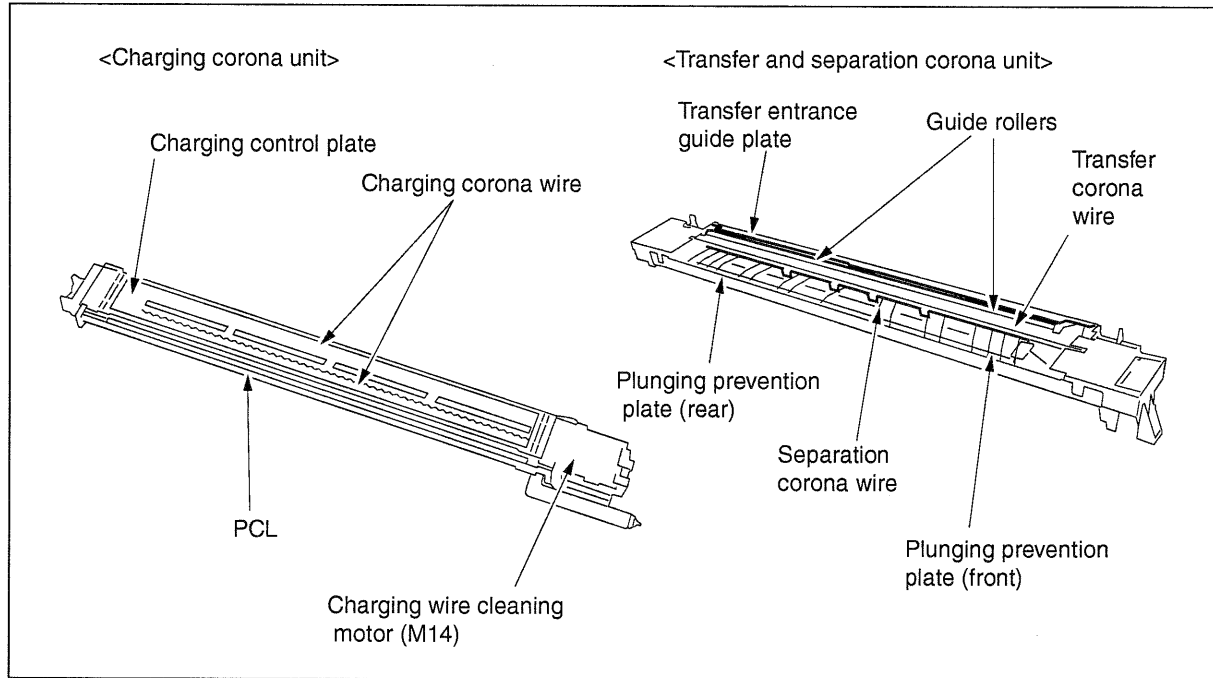
This signal controls turning ON/OFF the voltage application to the paper guide plate.

[L]: Voltage applied

[H]: Voltage not applied

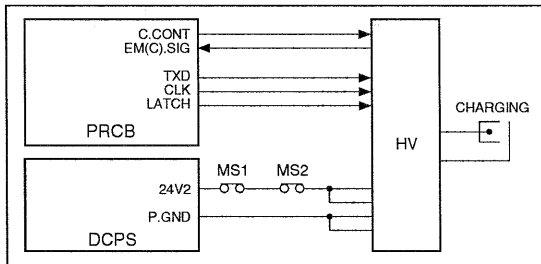
CORONA UNIT SECTION

[1] Composition



[2] Mechanisms

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

[3] Charging Control

The current output to the charging wire and the voltage applied to the grid are supplied from HV (high voltage unit) and they are controlled by PRCB (printer control board).

The levels of outputs to these are transmitted using 8-bit serial data. This serial data includes the level information for all outputs driven by HV, excluding the ON/OFF control signal. Accordingly, a separate signal line is provided to turn ON/OFF only the charging wire output and the grid output at the same time.

1. Operation**a. Charging**

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

Charge output range: -600 μ A to -1200 μ A

b. Grid voltage

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

Grid voltage output range: -500 V to -1000 V

2. Signals**a. Input signal**

- (1) EM (C).SIG (HV to PRCB)

This signal indicates the leak or short state of the charging corona unit.

[L]: Normal

[H]: Abnormal

b. Output signals

- (1) C.CONT (PRCB to HV)

This signal turns ON/OFF the charging wire.

[L]: Charging voltage ON

[H]: Charging voltage OFF

- (2) TXD (PRCB to HV)

Output level of each high voltage electrode.

Serial data signal for control

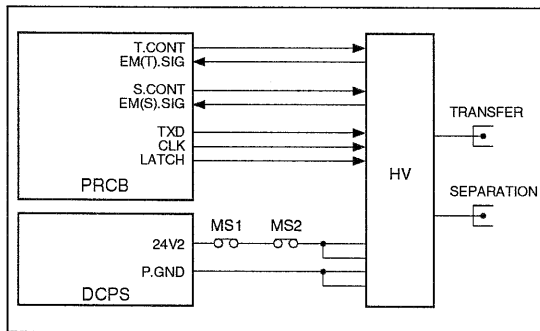
- (3) CLK (PRCB to HV)

Clock signal for TXD

- (4) LATCH (PRCB to HV)

Latch signal for TXD

[4] Transfer/Separation Control



The voltages applied to the transfer wire and separation wire is supplied from HV (high voltage unit) and are controlled by PRCB (printer control board). The levels of outputs to these wires are transmitted using 8-bit serial data. This serial data includes the level information for all outputs driven by HV, excluding the ON/OFF control signal. Accordingly, a separate signal line is provided to turn ON/OFF only the transfer wire or separation wire.

b. PRCB output signals

(1) T.CONT (PRCB to HV)

This signal turns ON/OFF the voltage applied to the transfer wire.

[L]: Transfer voltage ON

[H]: Transfer voltage OFF

(2) S.CONT (PRCB to HV)

This signal turns ON/OFF the voltage applied to the separation wire.

[L]: Separation voltage ON

[H]: Separation voltage OFF

1. Operation

a. Transfer

Positive DC high voltage is used for transfer.

Transfer DC output range: 50 μ A to 600 μ A

b. Separation

AC high voltage and negative DC voltage are used for separation.

Separation AC output range: 4kV to 5.7kV

Separation DC output range: 0 μ A to -400 μ A

2. Signals

a. Input signals

(1) EM (T) .SIG (HV to PRCB)

This signal indicates the leak or short state of the transfer corona unit.

[L]: Normal

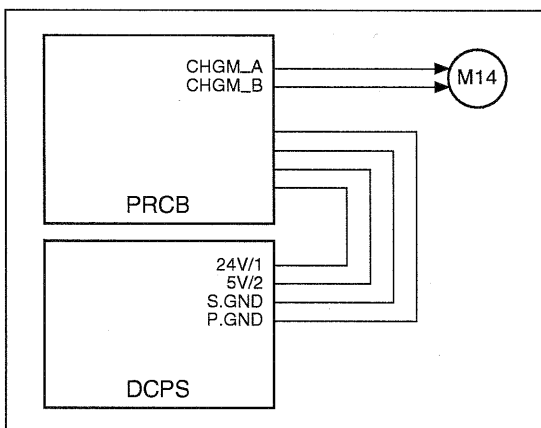
[H]: Abnormal

(2) EM (S) .SIG (HV to PRCB)

This signal indicates the leak or short state of the separation corona unit.

[L]: Normal

[H]: Abnormal

[5] M14 (Charger Cleaning) Control

M14 (charger cleaning) is a DC motor powered by 24 VDC and is controlled by PRCB (printer control board).

1. Operation**a. Purpose of driving**

M14 (charger cleaning) is used to drive the charging wire cleaning unit.

b. Operation timing

The charging wires are cleaned when SW2 (sub power) is turned ON and when the fixing temperature is lower than 50°C. They are also cleaned after the specified copy count is reached.

* Changeable with the 25-mode DIP SW

c. Cleaning operation

Normally, the charging wire cleaning unit is on the front side of the machine. It moves back and forth to clean the charging wires. The movement direction is changed by changing the rotational direction of M14 (charge cleaning).

The rotational direction of M14 and the position of the cleaner are detected by monitoring the current value of M14 with PRCB (printer control board).

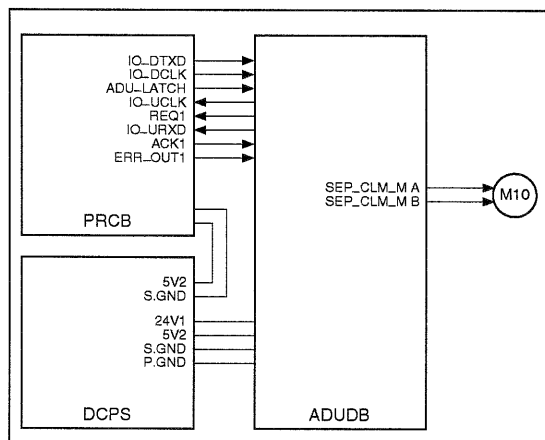
2. Signals**a. Output signal****(1) CHGM_A, B (PRCB to M14)**

M14 (charger cleaning) drive control signal.

The drive direction of M14 is controlled by switching between the drive current directions of two signals.

Status	CHGM_A	CHGM_B
Forward stroke of cleaning	H	L
Backward stroke of cleaning	L	H
Stop	L	L

[6] M10 (Transfer/Separation Cleaning) Control



M10 (transfer/separation cleaning) is a DC motor powered by 24 VDC and is controlled by PRCB (printer control board) via ADUDB (ADU drive board). Between PRCB and ADUDB, signals are exchanged using serial data.

1. Operation

a. Purpose of driving

M10 (transfer/separation cleaning) used to drive the transfer/separation wire cleaning pads.

b. Operation timing

The transfer/separation wires are cleaned when SW2 (sub power) is turned ON or when the fixing temperature is lower than 50°C.

It is also carried out after the specified copy count is reached.

* Changeable with the 25-mode DIP SW

c. Cleaning operation

Normally, the transfer/separation wire cleaning pads are on the front side of the machine. They move back and forth to clean the transfer and separation wires. The movement direction is changed by changing the rotational direction of M10 (transfer/separation cleaning).

The rotational direction of M10 and the position of the cleaner are detected by monitoring the current value of M10 with PRCB (printer control board).

2. Signals

a. Input signals

(1) IO_URXD (ADUDB to PRCB)

Serial data used to report the ADUDB (ADU drive board) operation state to PRCB (printer control board)

(2) REQ1 (ADUDB to PRCB)

This signal indicates that sending data from ADUDB (ADU drive board) to PRCB (printer control board) is requested.

When ADUDB receives ACK1 and can send data, this signal stands at the [L] level.

(3) IO_UCLK (ADUDB to PRCB)

Clock signal for IO_URXD signal

b. Output signals

(1) SEP_CLM_M A, B (ADUDB to M10)

M10 (transfer/separation cleaning) drive control signal

The drive direction of M10 (transfer/separation cleaning) drive control signal

The drive direction of M10 is controlled by switching between the drive current directions of two signals.

Status	SEP_CLM_MA	SEP_CLM_MB
Forward stroke of cleaning	H	L
Backward stroke of cleaning	L	H
Stop	L	L

(2) IO_DTXD (PRCB to ADUDB)

Serial data used to report the machine operation state understood by PRCB (printer control board) to ADUDB (ADU drive board)

(3) IO_DCLK (PRCB to ADUDB)

Clock signal for IO_DTXD signal

(4) ADU_LATCH (PRCB to ADUDB)

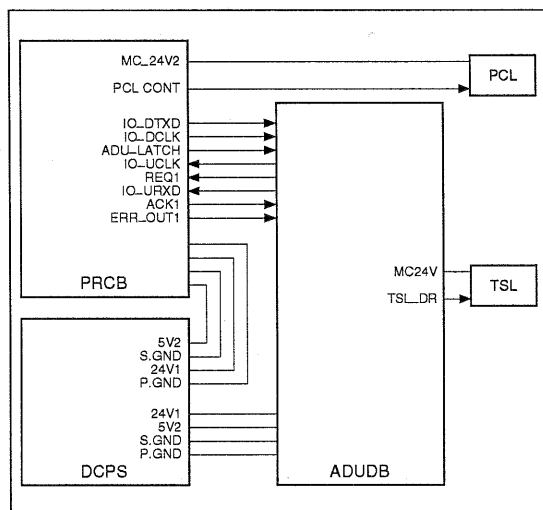
Latch signal for IO_DTXD signal

(5) ACK1 (PRCB to ADUDB)

Reception acknowledgment signal. It is sent each time PRCB (printer control board) receives one-byte data from ADUDB (ADU drive board). When PRCB receives REQ1 and can receive data, this signal stands at the [L] level.

(6) ERR_OUT1 (PRCB to ADUDB)

This signal requires resending of data when PRCB (printer control board) has failed in data reception from ADUDB (ADU drive board) due to an error.

[7] PCL/TSL Control

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

1. Operation

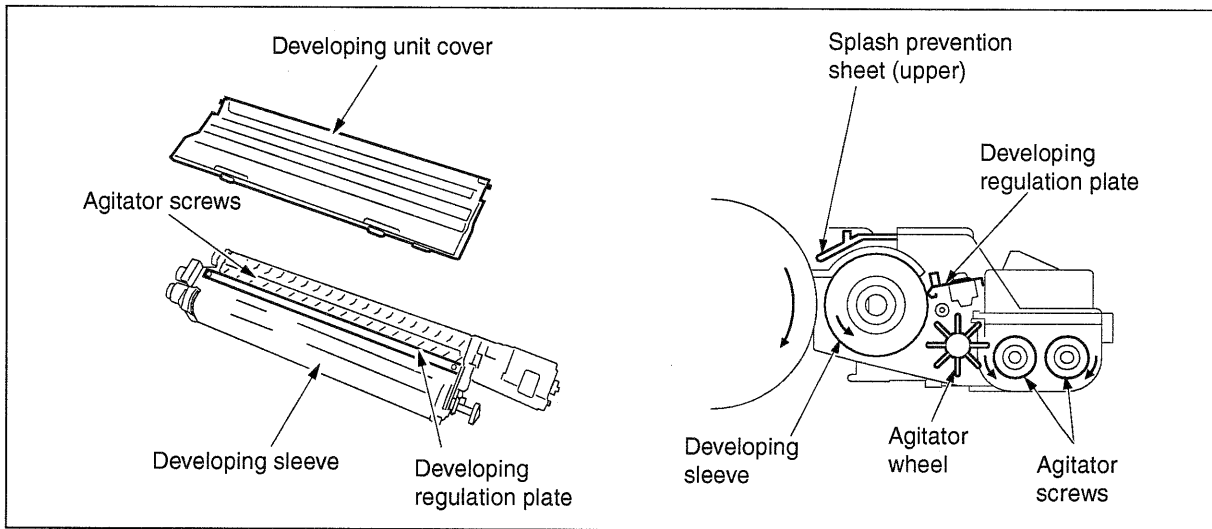
PCL turns ON when the START button is pressed. It is turned OFF after a lapse of the specified time from turning ON of PS37 (paper exit). TSL turns ON after a lapse of the specified time from turning ON of PS43 (leading edge) of the second paper feed section. It turns OFF after a lapse of the specified 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_DR (ADUDB to TSL)
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

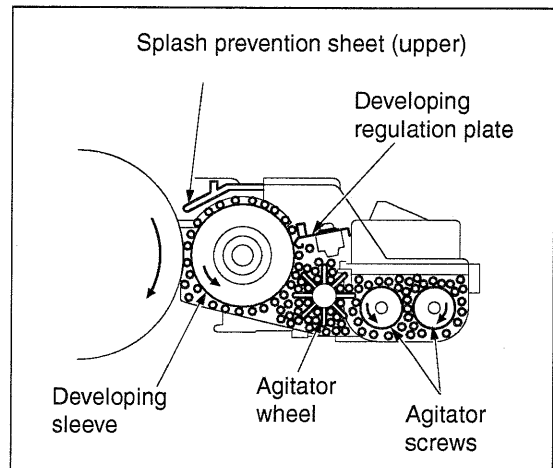
1. Developing drive

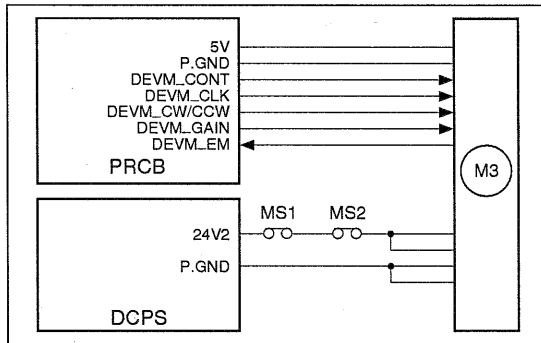
The developing motor (M3) drives the following parts via the gear unit at the back:

- 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 developer regulation plate (bristle height regulation plate). The developer remaining on the developing sleeve is returned to the agitator screws.



[3] M3 (Developing) Control

M3 (developing) is controlled by PRCB (printer control board) and the motor drive power is supplied from DCPS (DC power supply unit).

1. Operation

M3 (developing) is a DC motor driven by 24 V. It drives the developing sleeve, agitator wheel, and agitator screws.

M3 turns ON when the PRINT button is pressed, and turns OFF after lapse of the specified time from turning OFF of the charging.

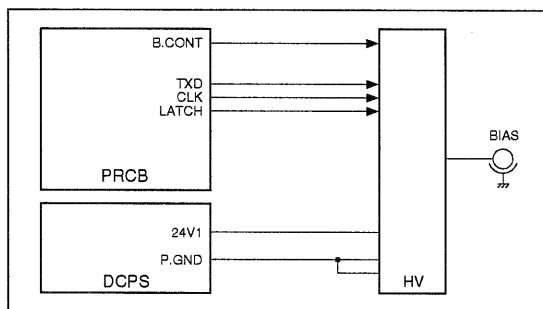
2. Signals**a. Input signals**

- (1) DEVM_EM (M3 to PRCB)
M3 (developing) abnormality detection signal
[H] Abnormal rotation (when motor speed changes by 6.5% more or less than the motor speed specified value)
[L] Normal rotation

b. Output signals

- (1) DEVM_CONT (PRCB to M3)
M3 (developing) drive control signal
[L] M3 ON
[H] M3 OFF
- (2) DEVM_CLK (PRCB to M3)
M3 (developing) rotational speed control clock signal
- (3) DEVM_CW/CCW (PRCB to M3)
M3 (developing) rotational direction indication signal
[H]: CW direction rotation
[L]: CCW direction rotation
- (4) EDVM_GAIN (PRCB to M3)
M3 (developing) rotational speed range indication signal
[H]: High speed range
[L]: Low speed range

[4] Developing Bias Control



The developing bias voltage is supplied from HV (high voltage unit) and is controlled by PRCB (printer control board). The output level of the developing bias voltage is transmitted using 8-bit serial data. This serial data includes the level information for all outputs driven by HV, excluding the ON/OFF control signal. Accordingly, a separate signal line is provided to turn ON/OFF only the developing bias.

1. Operation

Application of the developing bias voltage starts after a lapse of the specified time from turning ON of the START button, and stops after a lapse of the specified time from turning OFF of PS43 (leading edge) by the last copy paper.

Developing bias output range: -300 V to -700 V

2. Signals

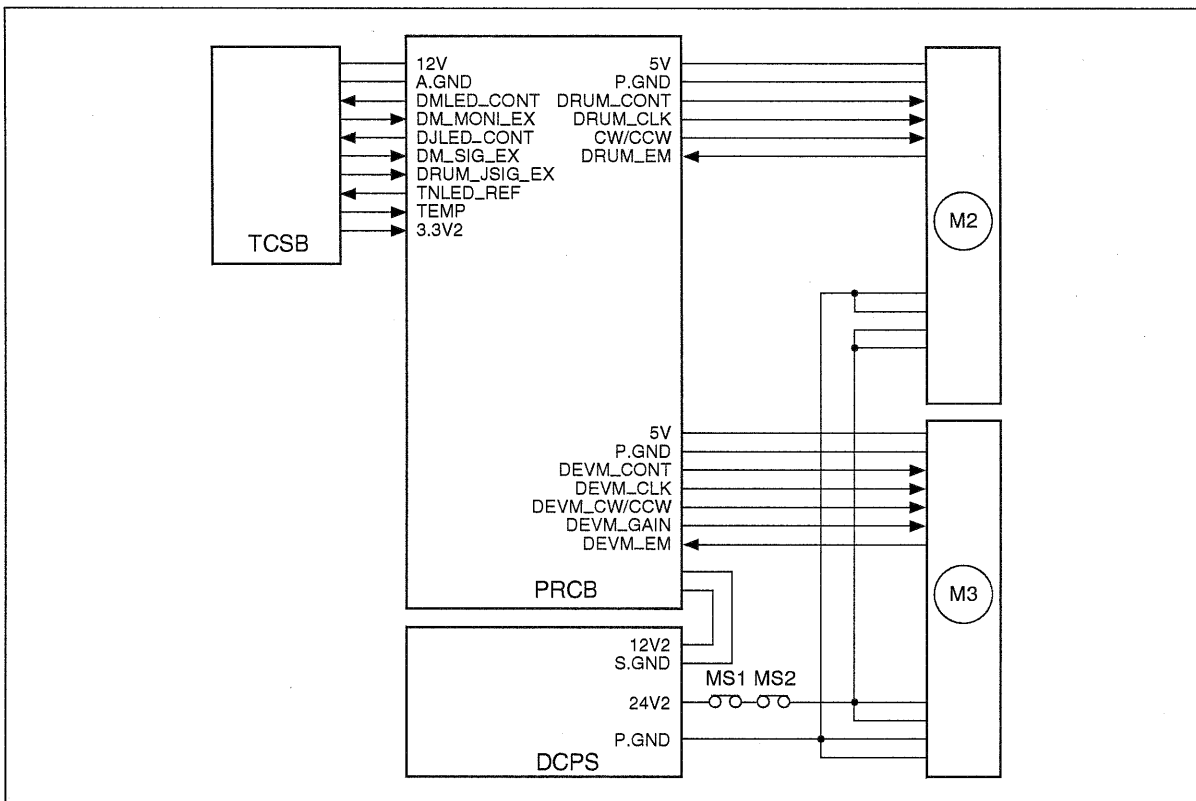
a. Output signal

(1) B.CONT (PRCB to HV)

Developing bias output ON/OFF control signal.

[L]: Developing bias ON

[H]: Developing bias OFF

[5] Dmax Control

Dmax control is performed by TCSB (toner control sensor board), M2 (drum), M3 (developing), and so on under the control of PRCB (printer control board).

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**

Several latent images are created at the maximum laser power, images are developed with the rotational speed of the developing sleeve varied, then each density is read by the Dmax sensor (PD1) on TCSB (toner control sensor board). The developing sleeve speed detected when the density has reached the reference level is recorded as the optimum sleeve speed, allowing developing to be performed at this sleeve speed.

(2) Timing

- When the fixing temperature is lower than 50°C at SW2 (sub power) ON
- Every 10,000 prints, upon completion of the last job.

2. Signals

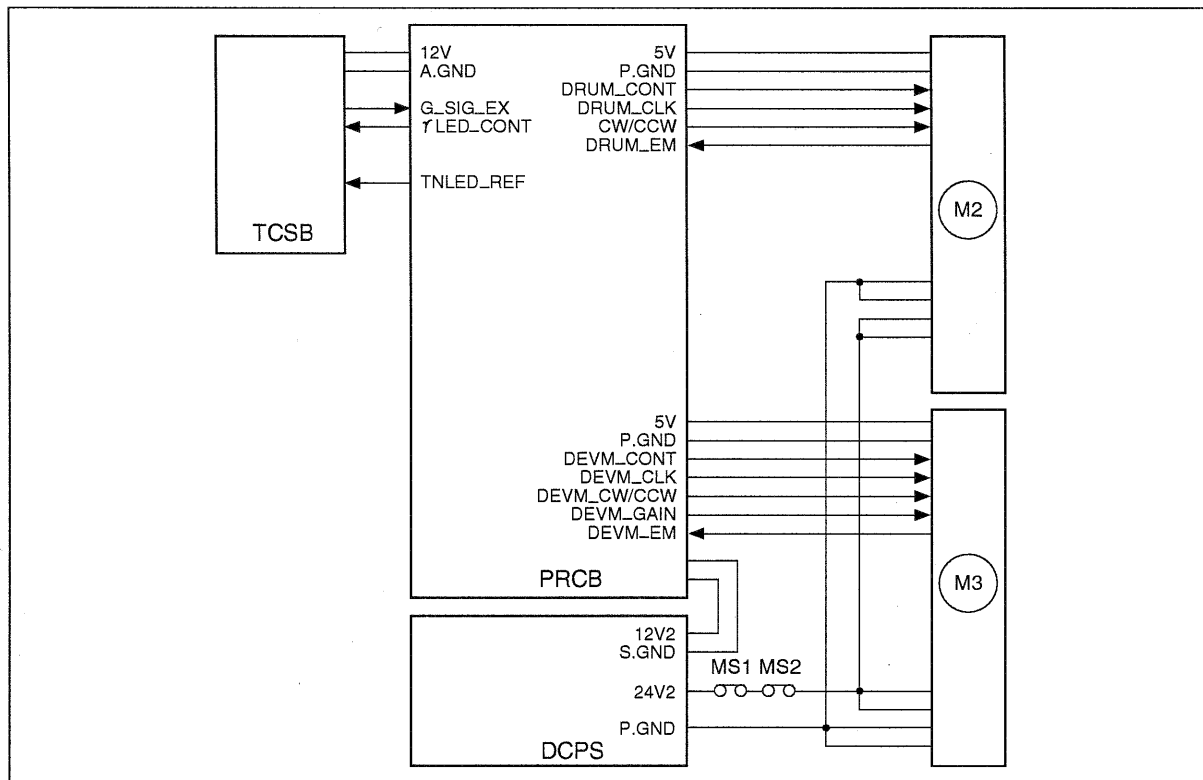
a. Input signals

- (1) DM_SIG_EX (TCSB to PRCB)
Output voltage of Dmax detection sensor (PC1)
on TCSB (toner control sensor board)
Reference voltage: 2.5 V
- (2) DM_MONI_EX (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 TNLED_REF so that the output
voltage becomes 1.9 V (calibration).
Reference voltage: 1.9 V
<Timing>
Before Dmax correction
- (3) DRUM_JSIG_EX (TCSB to PRCB)
This signal detects a jam caused by paper wrap-
ping around the drum. A jam is detected when
the voltage becomes 4.0 V or more.
- (4) TEMP_3.3V2 (TCSB to PRCB)
Drum temperature detection signal

b. Output signals

- (1) DMLED_CONT (PRCB to TCSB)
Dmax LED ON/OFF control signal
[L]: LED ON
[H]: LED OFF
- (2) TNLED_REF (PRCB to TCSB)
Power supply line for PD1 LED on TCSB.
The voltage is adjusted so that the Dmax MONI
signal becomes 1.9 V.
- (3) DJLED_CONT (PRCB to TCSB)
JAM LED ON/OFF control signal
[L]: LED ON
[H]: LED OFF

[6] Gradation Correction Control



Gradation correction control is performed by TCSB (toner control sensor board), M2 (drum), M3 (developing), and so on under the control of 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.

(1) Method

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

Next, each density is read by the γ sensor (PD2) on TCSB (toner control sensor board) to detect the gradation characteristics of image density. The gradation characteristics obtained here are used as the values for correcting the laser exposure amount.

Gradation correction control must be performed in two ways: 1-dot PWM (for normal mode) and 2-dot PWM (for photo mode).

(2) Timing

- When the fixing temperature is lower than 50°C at SW2 (sub power) ON
- Every 5,000 prints, upon completion of the last job.

2. Signals

a. Input signals

(1) G_SIG_EX (TCSB to PRCB)

This signal monitors the output voltage from the γ sensor (PD2) on the TCSB (toner control sensor board) as well as the light reflected by the drum surface (without toner).

The voltage applied to the gradation detection LED is corrected by TNLED_REF so that the output voltage becomes 3.0 V (calibration).

Reference voltage: 3.0 V

<Timing>

Before gradation correction.

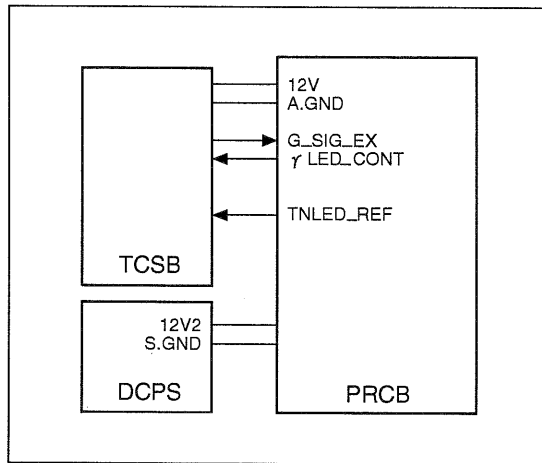
b. Output signal

(1) γ LED CONT (PRCB to TCSB)

Gradation detection LED ON/OFF control signal

[L]: LED ON

[H]: LED OFF

[7] Dot Diameter Correction Control

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

1. Operation

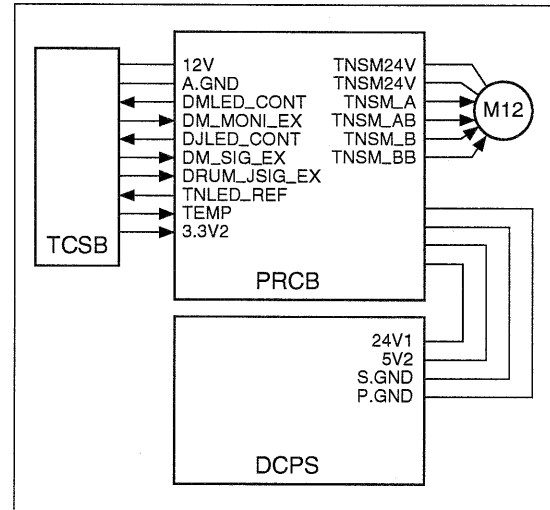
Dot diameter correction is performed to prevent the 1-dot laser beam diameter from fluctuating due to the change in developing characteristics (caused by deteriorated developer) and soil in the write unit.

(1) Method

Multiple dot pattern patches with the same condensation are created to be read by the γ sensor (PD2). The laser power where the γ sensor output reaches the reference voltage is used as the MPC value.

(2) Timing

- a) Every 10,000 prints, upon completion of the last job.

[8] Toner Density Control

The density of toner is controlled by controlling M12 (toner supply) from PRCB (printer control board).

1. Operation**a. Toner density detection**

The reference patch density is detected using the patch detection method of TCSB (toner control sensor board) and the corresponding analog voltage signal is output to PRCB (printer control board), thus detecting the toner density.

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

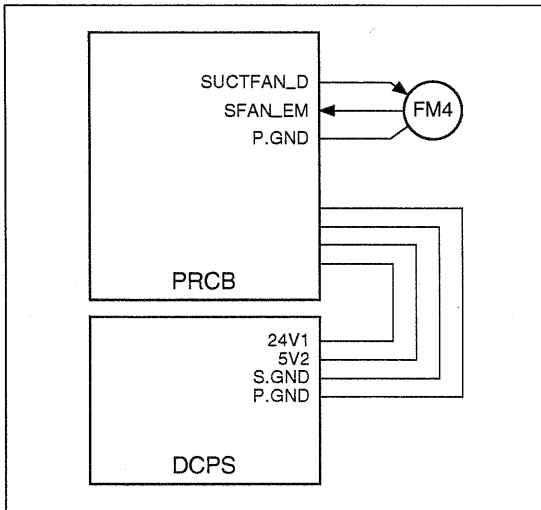
b. Toner supply operation

Upon read of the patch, M12 (toner supply) is turned ON to supply toner. The time needed to add toner depends on the paper size.

2. Signals**a. Output signals**

- (1) TNSM_A, AB (PRCB to M12)
A-phase drive signal of M12 (toner supply)
- (2) TNSM_B, BB (PRCB to M12)
B-phase drive signal of M12 (toner supply)

[9] FM4 (Developing Suction) Control



FM4 (developing suction) is controlled by PRCB (printer control board).

1. Operation

a. ON timing

FM4 (developing suction) is turned ON when M2 (drum) is turned ON.

b. OFF timing

FM4 (developing suction) is turned OFF after a lapse of the specified time from turning OFF of M2 (drum).

2. Signals

a. Input signal

(1) FM2 EM (FM4 to PRCB)

FM4 (developing suction) abnormality detection signal

[L]: FM4 is normal.

[H]: FM4 is abnormal.

b. Output signal

(1) SUCTFAN_D (ACDB to FM4)

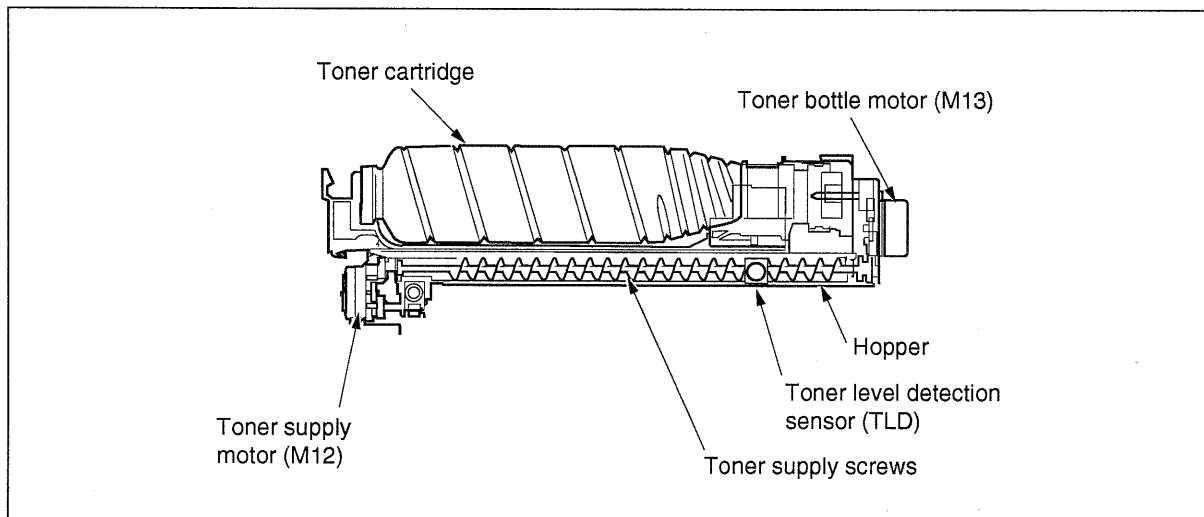
FM4 (developing suction) drive signal

[L]: FM4 OFF

[H]: FM4 ON

TONER SUPPLY UNIT

[1] Composition



[2] Mechanisms

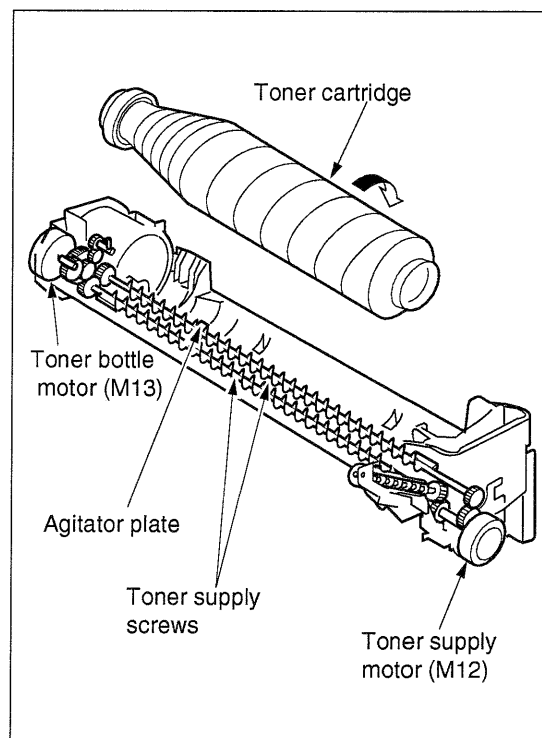
Mechanism	Method
Toner supply	Supply by screw
Toner level detection	Piezoelectric method 100 ± 25 g
Toner agitation*1	Agitator plate
Toner cartridge*2	Rotary cartridge Capacity: 1000 g
Toner leakage prevention	Toner supply shutter

*1 Toner agitation

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

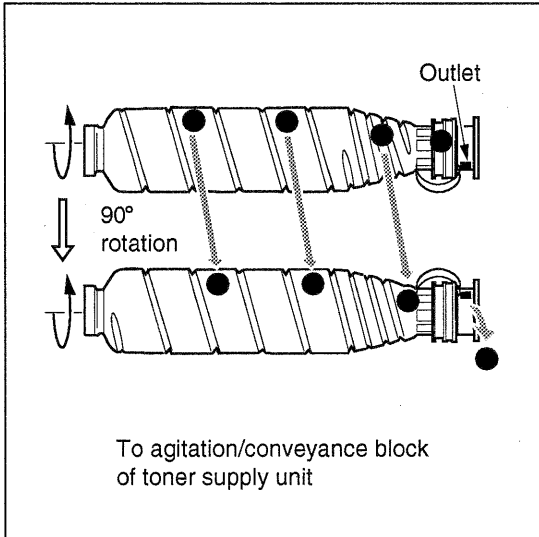
- Toner supply motor (M12): Drives the toner supply screws.
- Toner bottle motor (M13): Drives the toner cartridge.

The agitator plates prevent toner from solidifying and collecting on the toner level detection sensor (TLD).

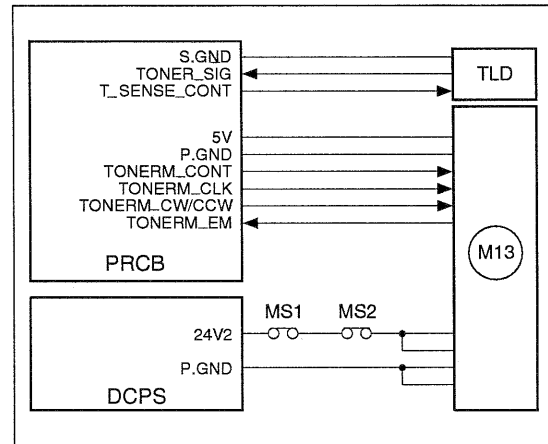


*2 Toner cartridge

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/conveyance section of the toner supply unit.



[3] Toner Level Detection Control



Toner level detection is controlled by the TLD (toner level detection sensor) and the PRCB (printer control board).

1. Operation

a. Toner level detection

A piezoelectric device is used as the TLD (toner level detection sensor).

When the level of toner in the hopper becomes low, the toner supply signal is output to PRCB (printer control board). As a result, a message is displayed on the LCD connected to 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 (toner level detection sensor), M13 (toner bottle) 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 no toner state is detected by TLD (toner level detection) after M13 has been held ON for a specified period of time, the toner cartridge is assumed to be empty.

2. Signals

a. Input signals

(1) TONER_SIG (TLD to PRCB)

When the level of toner in the toner supply unit becomes low, this signal goes low ([L]), displaying a message on the LCD connected to OB1 (operation board/1).

(2) TONERM_EM (M13 to PRCB)

M13 (toner bottle) abnormality detection signal
[L]: M13 is normal.
[H]: M13 is abnormal.

b. Output signals

(1) T_SENSE_CONT (PRCB to TLD)

TLD (toner level detection sensor) power control signal
The TLD is powered only when it is detecting the toner level.

(2) TONERM_CONT (PRCB to M13)

M13 (toner bottle) control signal
[L]: M13 ON
[H]: M13 OFF

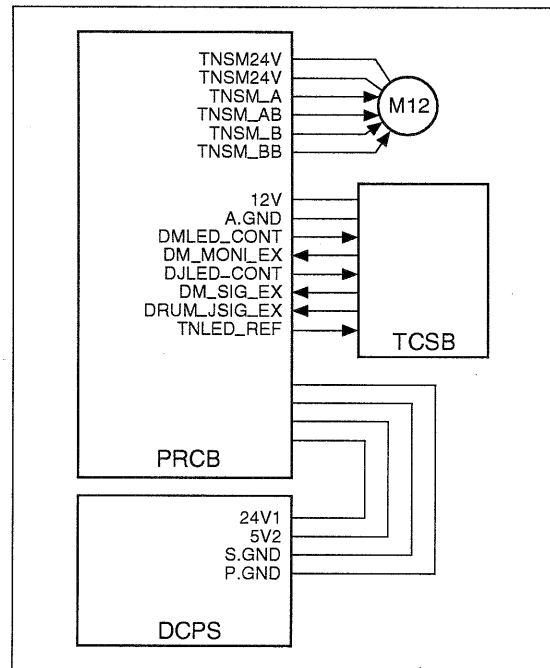
(3) TONERM_CLK (PRCB to M13)

M13 (toner bottle) rotation speed control clock signal

(4) TONERM_CW/CCW (PRCB to M13)

M13 (toner bottle) rotational direction indication signal
[H]: CW direction rotation
[L]: CCW direction rotation

[4] M12 (Toner Supply) Control



M12 (toner supply) is controlled by the PRCB (printer control board). Toner density is detected by TCSB (toner control sensor board).

1. Operation

a. Toner density detection

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

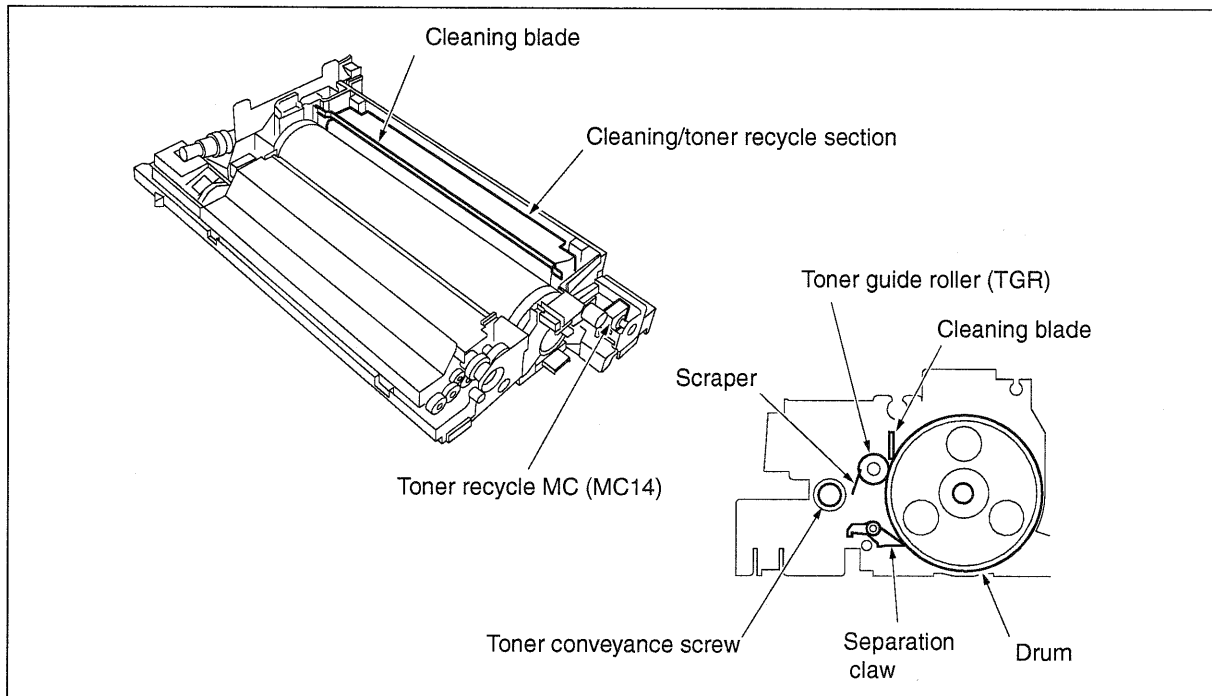
b. Toner supply

When the voltage detected by TCSB (toner control sensor board) is below the specified value, PRCB issues a control signal to drive M12 (toner supply). The relationship between the paper size and toner supply time is summarized in the following table:

Paper size	Supply time (sec.)
A3	1.30
B4	0.98
F4	0.98
A4	0.65
B5	0.49
B5R	0.49
A5	0.33
11 X 17	1.30
8.5 X 14	0.98
8.5 X 11	0.65
5.5 X 8.5	0.49

CLEANING/TONER RECYCLE UNIT

[1] Composition



[2] Mechanisms

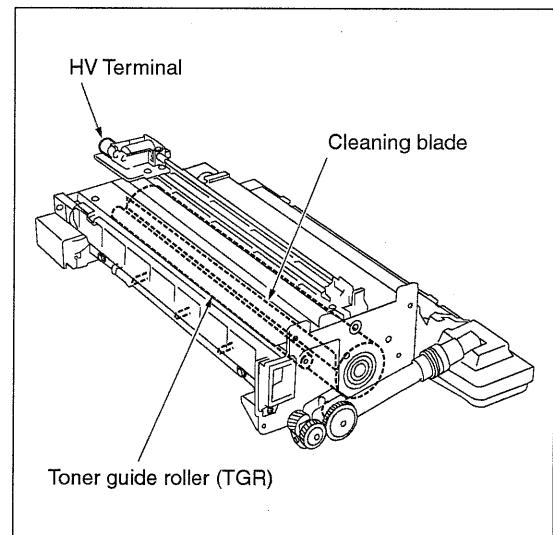
Mechanism	Method
Drum cleaning	Cleaning blade
Toner collection *1	Toner guide roller (TGR)
Toner recycle	Screw conveyance + Toner recycle MC (MC14)

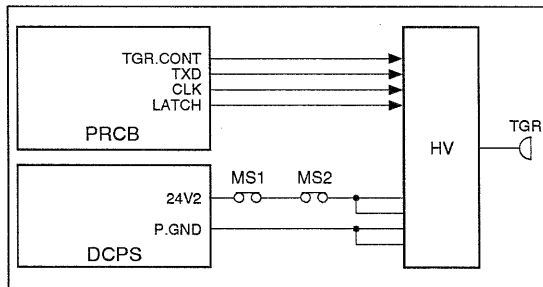
*1 Toner collection

Toner removed by the cleaning blade is collected by the toner guide roller (TGR) and removed by the scraper, then conveyed by the toner conveyance screw to be reused. High pressure is applied to the toner guide roller (TGR) to enhance the toner cleaning ability.

*2 Toner recycle

When the drum performs preliminary rotation as warm-up, toner recycle MC (MC14) is turned OFF, stopping the drive force from the toner conveyance screw. This prevents excessive recycled toner from being conveyed to the developing unit.



[3] TGR (Toner Guide Roller) Control

To enhance the toner cleaning ability, voltage is applied to the TGR (toner guide roller). This voltage is applied by HV (high voltage unit) under the control of PRCB (printer control board). The output level of the applied voltage is transmitted using 8-bit serial data. This serial data includes the level information for all outputs driven by the HV unit excluding the ON/OFF control signal. Accordingly, a separate signal line is provided to turn ON/OFF only the TGR.

1. Operation**a. ON/OFF timing**

The TGR is turned ON/OFF in sync with M2 (drum).

b. TGR (toner guide roller) output range

0 to 50 μ A

2. Signals**a. Output signal****(1) TGR.CONT (PRCB to HV)**

TGR (toner guide roller) voltage ON/OFF control signal

[L]: Voltage is applied.

[H]: Voltage is not applied.

[4] Other Control

To improve durability of the cleaning blade, the following control is performed:

a. Blade setting mode

A blade setting mode is available in the 36 mode. This mode will perform a task that is required after blade replacement during maintenance, etc. When this mode is used, toner adheres on the drum and then the blade cleans the drum, preventing blade peeling.

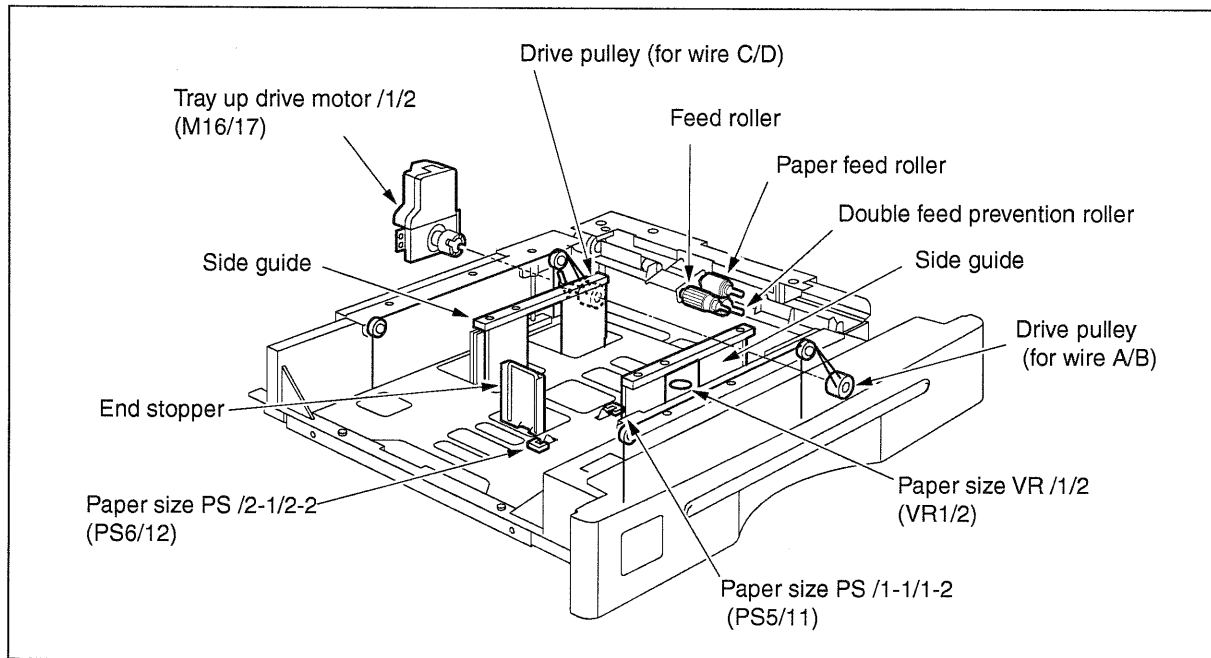
b. Black stripe creation control

To improve durability of the blade (stabilize load and stabilize paper dust crushing), a black stripe of toner is adhered on the drum once every 10 copies and then cleaned.

* Changeable with the 25-mode DIP SW

TRAY 1/2 PAPER FEED UNIT

[1] Composition



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

[2] Mechanisms

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

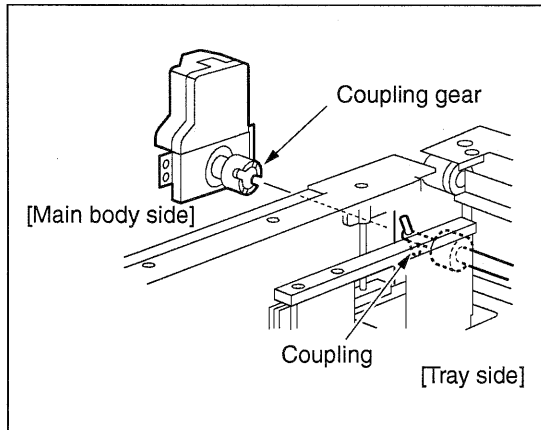
*1 Paper lift-up

a) Hoisting of up/down plate

Paper feed trays are driven by wires. When a paper tray is loaded, the tray up drive motor/1(M16)/2(M17) rotates to wind the wires around the drive pulleys and consequently the up/down plate in the tray moves up. When the tray upper limit PS/1(PS2)/2(PS8) detects the actuator of the roller that has been moved up by paper, the tray up drive motor/1(M16)/2 (M17) stops.

b) Lowering of tray

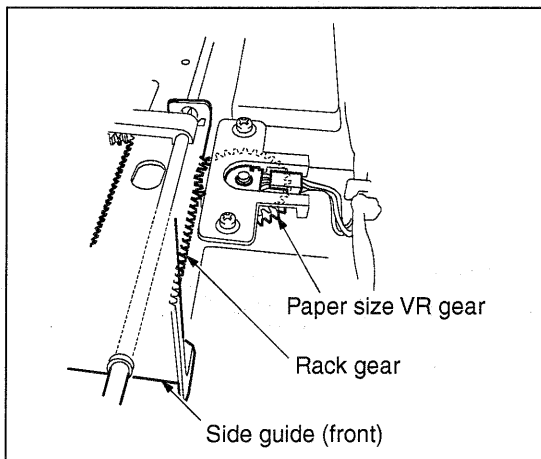
When the paper feed tray is pulled out, the coupling shaft of the tray is disengaged from the coupling gear of the tray up drive motor on the main body side, allowing the up/down plate in the tray to fall down by its own weight.



***2 Paper size detection**

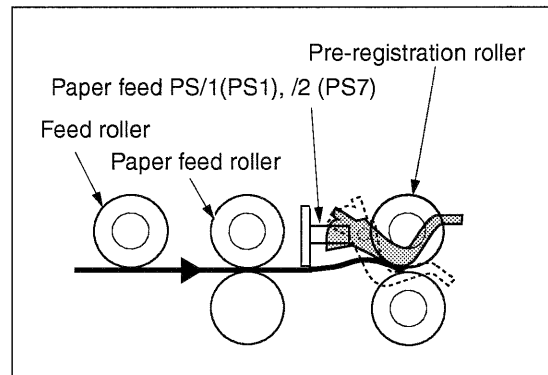
Length: When paper pushes the paper size detection actuator, the paper size PS/2-1/2-2 (PS6/PS12) and the paper size PS/1-1/1-2 (PS5/PS11) turn ON. Thus, the paper size is automatically determined according to the combination of the ON/OFF states of these PSs.

Width: When the side guides of the tray are slid, the rack gear of the side guide (front) turns the paper size VR/1/2 gear. Thus, the paper size is automatically determined according to the change in the resistance value of the VR.

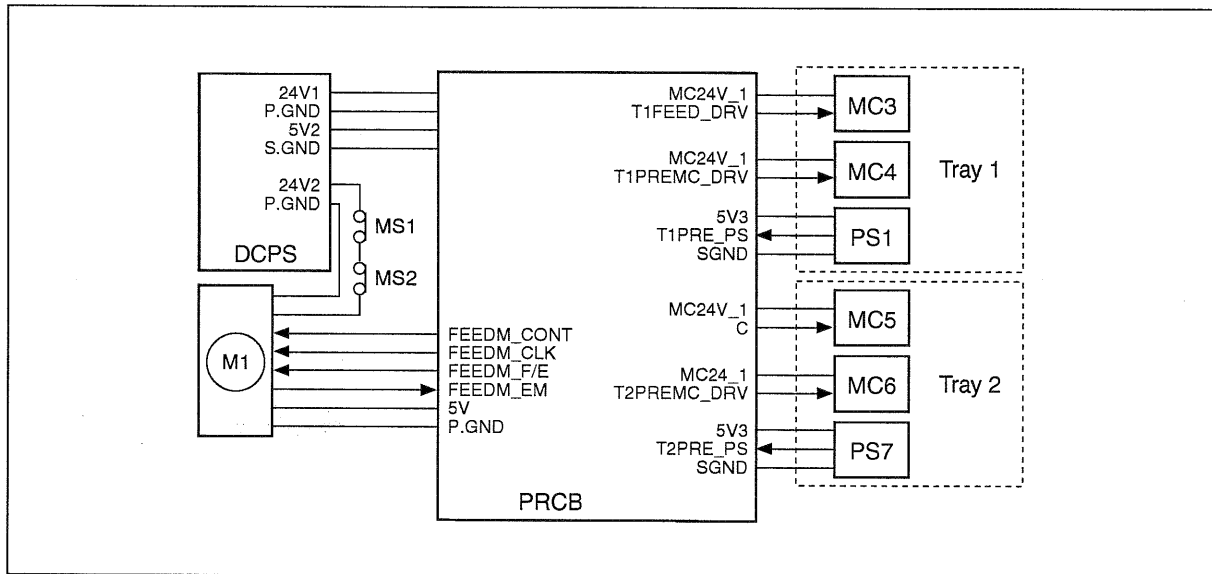


***3 First paper feed paper loop mechanism**

When paper feed starts, paper is fed to the pre-registration roller by the feed roller and paper feed rollers. The fed out paper operates the actuator of the paper feed PS/1 (PS1), the paper feed PS/2 (PS7) turning it ON. The feed and paper feed rollers remain ON for a specified time after the actuation of the paper feed PS/1 (PS1) and PS/2 (PS7) causing a paper loop to form against the pre-registration rollers which are not turning. In this way paper skew is corrected.



[3] First Paper Feed Control



The 1st paper feed from tray 1/2 takes place as the result of the transmission of the drive force from M1 (paper feed) to each paper feed roller by MC3/5 (paper feed MC/1/2) and MC4/6 (pre-registration MC/1/2). The feed roller picks up paper using its own weight.

The above operations are controlled by the PRCB (printer control board). Related signals are PS1/7 (paper feed/1/2) and PS25/26 (vertical conveyance/1/2) issued from the vertical conveyance section.

1. Operation

a. Operation of the MC3/5 (paper feed MC/1/2)

- (1) Start timing of printing of the first copy
MC3/5 (paper feed MC/1/2) turns ON at the timing that is determined by the P counter from when copying starts, and turns OFF after a lapse of the specified time from PS1/7 (paper feed/1/7) turning OFF. Thus, paper skew is corrected by forming the loop before pre-registration roller.

- (2) Start timing of printing of the second copy
When the preceding paper turns OFF PS1/7.

- (3) OFF timing
When PS1/7 is turned ON.

b. Operation of the MC4/6 (pre-registration MC/1/2)

- (1) ON timing
After a specified time from MC3/5 (paper feed MC/1/2) turning ON.

- (2) OFF timing
When PS1/7 (paper feed/1/2) is turned OFF.

2. Signals

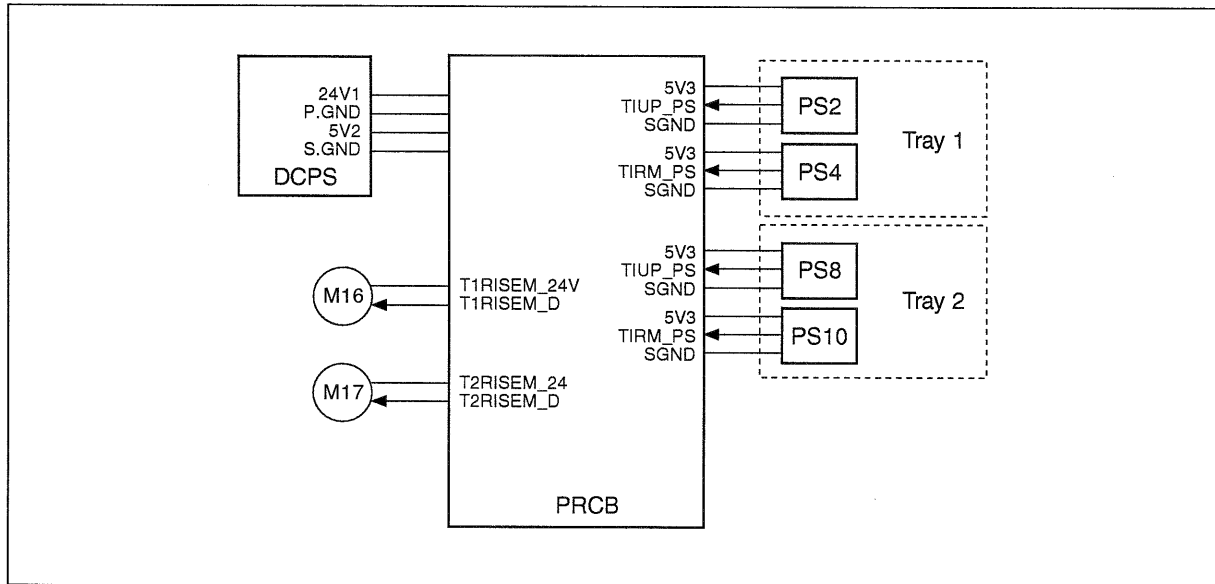
a. PRCB input signals

- (1) T1PRE_PS (PS1 to PRCB)
Paper passage detection signal (tray 1)
[L]: Detected.
[H]: Not detected.
- (2) T2PRE_PS (PS7 to PRCB)
Paper passage detection signal (tray 2)
[L]: Detected.
[H]: Not detected.

b. PRCB output signals

- (1) T1FEED_DRV (PRCB to MC3)
MC3 drive control signal (tray 1)
[L]: MC3 ON
[H]: MC3 OFF
- (2) T1PREMC_DRV (PRCB to MC4)
MC4 drive control signal (tray 1)
[L]: MC4 ON
[H]: MC4 OFF
- (3) T2FEED_DRV (PRCB to MC5)
MC5 drive control signal (tray 2)
[L]: MC5 ON
[H]: MC5 OFF
- (4) T2PREMC_DRV (PRCB to MC6)
MC6 drive control signal (tray 2)
[L]: MC6 ON
[H]: MC6 OFF

[4] Paper Up Drive Control



Paper stacked in the tray is pushed up by transmitting the drive force of M16/17 (tray up drive/1/2) to the up/down plate in the tray via drive wires. M16/17 are controlled by the PRCB (printer control board). Related signals are PS2/8 (tray upper limit/1/2) and PS4/10 (remaining paper/1/2).

1. Operation

a. Paper up drive control

When tray 1/2 is loaded, M16/17 (tray up drive/1/2) turns ON to lift the up/down plate in the tray. When PS2/8 (tray upper limit/1/2) detects the upper limit of paper as the paper up/down plate in the tray goes up, it turns ON and consequently M16/17 goes OFF, causing the tray to stop going up. When PS2/8 turns OFF after paper is fed, M16/17 goes ON again to move 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

M16/17 (tray up drive/1/2) is turned ON when loading of a tray is detected. (by shorting wires at both ends of the drawer connector)

(2) OFF timing

One of M16/17 (tray up drive/1/2) is turned OFF when PS2/8 (tray upper limit/1/2) is turned ON.

c. Remaining Paper Detection Control

The level of paper remaining in each tray is detected according to the time that M16/17 (tray up drive/1/2) requires to lift up the up/down plate when the tray is set. This lift-up time (operation time of M16/17) is saved in the PRCB (printer control board). After this, the remaining paper is detected using the paper feed counter. The detected remaining paper level is displayed on the operation panel in five steps. PS4/10 (remaining paper/1/2) are used to detect the remaining paper level when it lowers below about 10%.

2. Signals

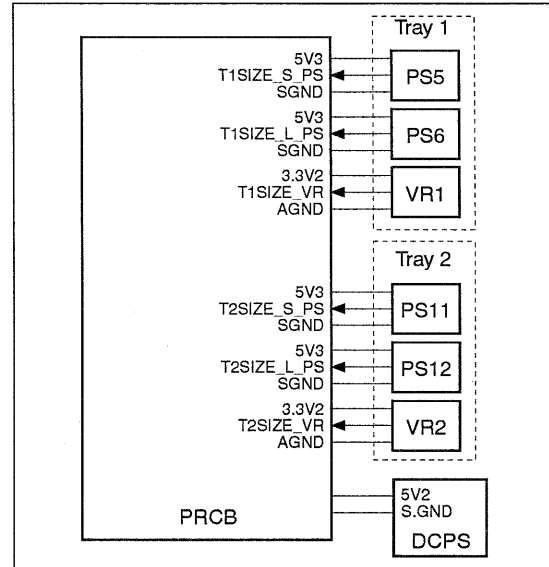
a. PRCB input signals

- (1) TIUP_PS (PS2 to PRCB)
Paper upper limit detection signal (tray 1)
[L]: Not detected.
[H]: Detected.
- (2) TIRM_PS (PS4 to PRCB)
Remaining paper detection signal (tray 1)
[L]: Not detected.
[H]: Detected.
- (3) TIUP_PS (PS8 to PRCB)
Paper upper limit detection signal (tray 2)
[L]: Not detected.
[H]: Detected.
- (4) TIRM_PS (PS10 to PRCB)
Remaining paper detection signal (tray 2)
[L]: Not detected.
[H]: Detected.

b. PRCB output signals

- (1) T1RISEM_24V (PRCB to M16)
M16 ON/OFF control signal (tray 1)
- (2) T2RISEM_24 (PRCB to M17)
M17 ON/OFF control signal (tray 2)

[5] Paper Size Detection Control



The paper size in tray 1/2 is detected using PS5/6/11/12 (paper size/1-1/2-1/1-2/2-2), and VR1/2 (paper size/1/2). Based on the detection signals, the PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected using PS5/6/11/12 (paper size/1-1/2-1/1-2/2-2). Variable resistors (VR1/2) interlocked with the guide position are installed at the bottom of the tray to detect the width of paper.

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

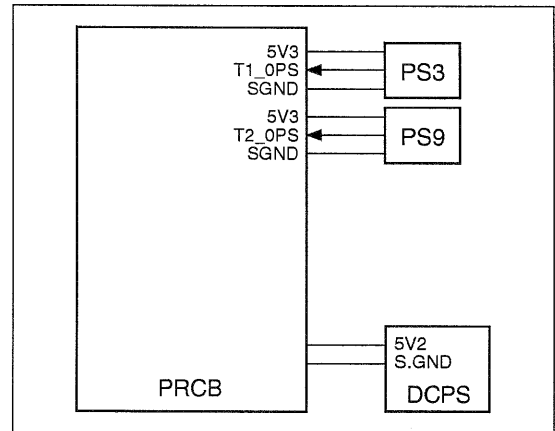
Paper size \ Sensor	8.5 x 11 or less	A4R to B5R	F4 or larger
PS5/11	OFF	ON	ON
PS6/12	OFF	OFF	ON

2. Signals

a. PRCB input signals

- (1) T1SIZE_S_PS (PS5 to PRCB)
Paper size detection signal (tray 1)
[L]: Paper does not exist.
[H]: Paper exists.
- (2) T1SIZE_L_PS (PS6 to PRCB)
Paper size detection signal (tray 1)
[L]: Paper does not exist.
[H]: Paper exists.
- (3) T2SIZE_L_PS (PS11 to PRCB)
Paper size detection signal (tray 2)
[L]: Paper does not exist.
[H]: Paper exists.
- (4) T2SIZE_S_PS (PS12 to PRCB)
Paper size detection signal (tray 2)
[L]: Paper does not exist.
[H]: Paper exists.
- (5) T1SIZE_VR (VR1 to PRCB)
Paper width detection signal (tray 1)
- (6) T2SIZE_VR (VR2 to PRCB)
Paper width detection signal (tray 2)

[6] No paper detection control



No paper in the tray is detected by PS3 (no paper/1) and PS9 (no paper/2) which are controlled by the PRCB (printer control board).

1. Operation

When the tray becomes empty, PS3/9 (no paper/1/2) is turned OFF, displaying a message on the LCD via OB1 (operation board/1).

2. Signals

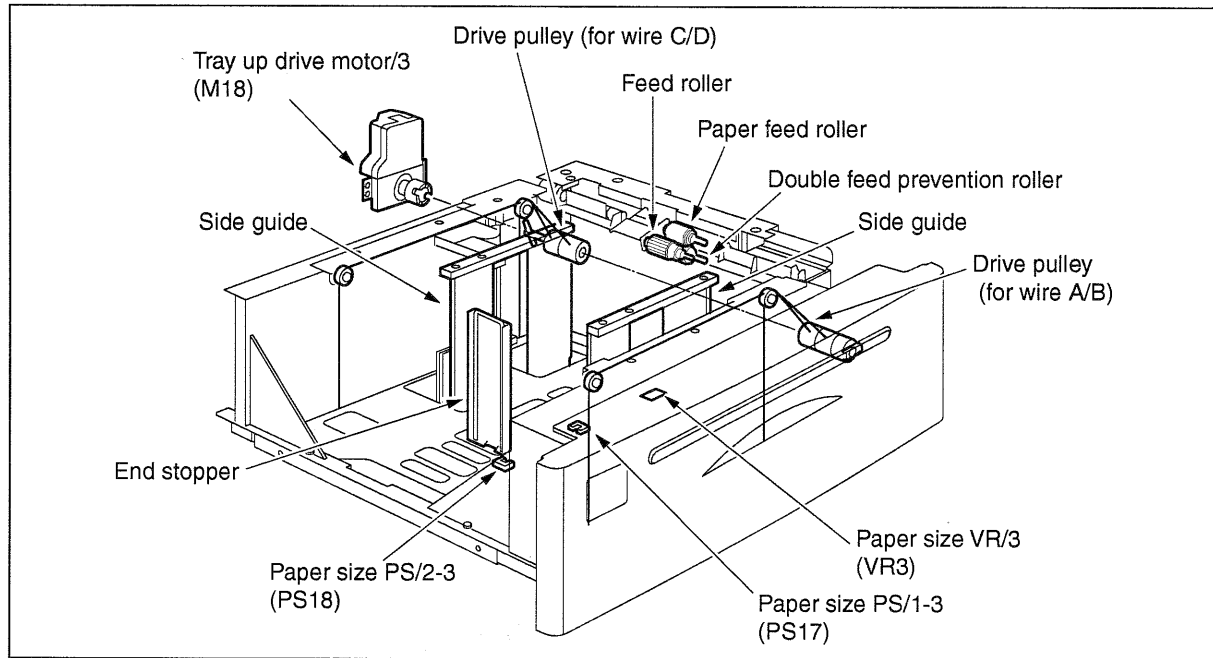
a. PRCB input signals

- (1) T1_0PS (PS3 to PRCB)
No paper detection signal (tray 1)
[L]: Paper does not exist in tray.
[H]: Paper exists in tray.
- (2) T2_0PS (PS9 to PRCB)
No paper detection signal (tray 2)
[L]: Paper does not exist in tray.
[H]: Paper exists in tray.

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TRAY 3 PAPER FEED UNIT

[1] Composition



[2] Mechanisms

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

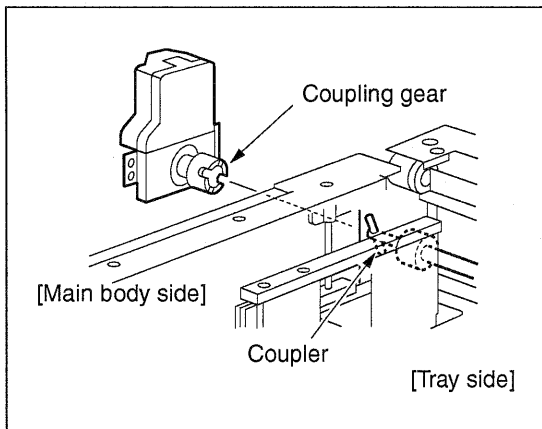
*1 Paper lift-up

a) Hoisting of up/down plate

Paper feed tray is driven by wires. When the paper tray is loaded, the tray up drive motor 3 (M18) rotates to wind the wires around the drive pulleys and consequently the up/down plate in the tray moves up. When the tray upper limit PS/3 (PS14) detects the actuator of the roller that has been moved up by paper, the tray up drive motor 3 (M18) stops.

b) Lowering of tray

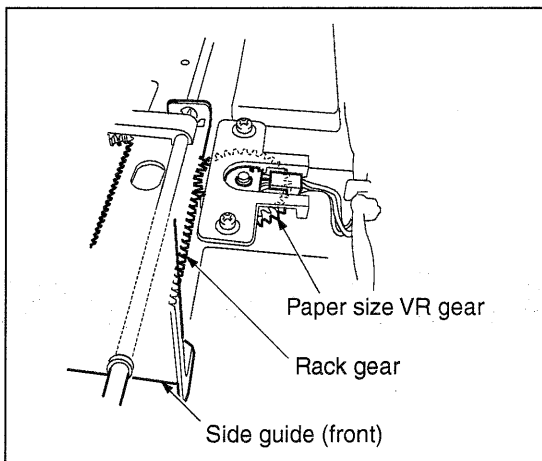
When the paper feed tray is pulled out, the coupling shaft of the tray is disengaged from the coupling gear of the tray up drive motor on the main body side, allowing the up/down plate in the tray to fall down by its own weight.



***2 Paper size detection**

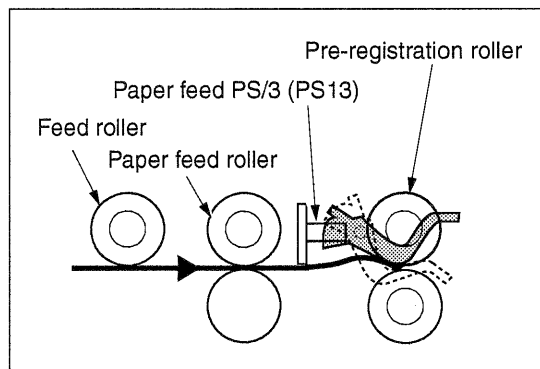
Length: When paper pushes the paper size detection actuator, the paper size PS/1-3/ (PS18) and the paper size PS2-3 (PS17) turns ON. Thus, the paper size is automatically determined according to the combination of the ON/OFF states of this PS.

Width: When the side guides of the tray are slid, the rack gear of the side guide (front) turns the paper size VR3 gear. Thus, the paper size is automatically determined according to the change in the resistance value of the VR.

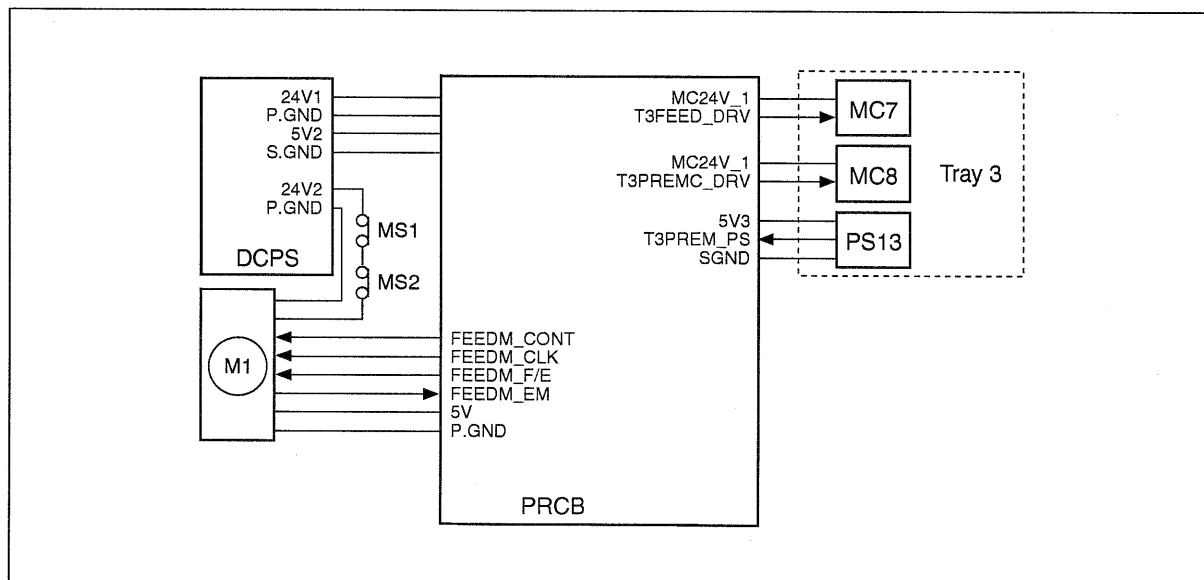


***3 First paper feed paper loop mechanism**

When paper feed starts, paper is fed to the pre-registration roller by the feed roller and paper feed rollers. The fed out paper operates the actuator of the paper feed PS/3 (PS13), turning it ON. The feed and paper feed rollers remain ON for a specified time after the actuation of the paper feed PS/3 (PS13) causing a paper loop to form against the pre-registration rollers which are not turning. In this way paper skew is corrected.



[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 M1 (paper feed) to each paper feed roller by MC7 (paper feed MC/3) and MC8 (pre-registration MC/3). The feed roller picks up paper using its own weight.

The above operations are controlled by the PRCB (printer control board). Related signals are PS13 (paper feed/3) and PS27 (vertical conveyance/3) issued from the vertical conveyance section.

1. Operation

a. Operation of the MC7 (paper feed MC/3)

- (1) Start timing of printing of the first copy
MC7 (paper feed MC/3) turns ON at the timing that is determined by the P counter from when copying starts, and turns OFF after a lapse of the specified time from PS13 (paper feed/3) turning OFF. Thus, paper skew is corrected by forming the loop before pre-registration roller.
- (2) Start timing of printing of the second copy
When the preceding paper turns OFF PS13.
- (3) OFF timing
When PS13 is turned ON.

b. Operating of the MC8 (pre-registration MC/3)

- (1) ON timing
After a specified time from the MC7 (paper feed MC/5).
- (2) OFF timing
When PS13 (paper feed/3) is turned OFF.

2. Signals

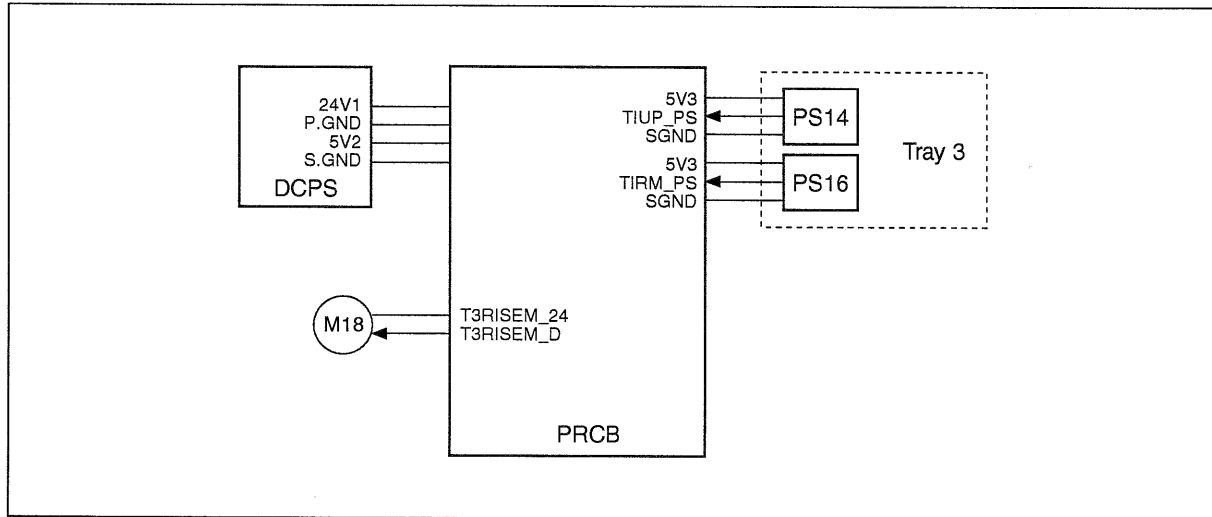
a. PRCB input signals

- (1) T3PREM_PS (PS13 to PRCB)
Paper passage detection signal (tray 3)
[L]: Detected.
[H]: Not detected.

b. PRCB output signals

- (1) T3FEED_DRV (PRCB to MC7)
MC7 drive control signal (tray 3)
[L]: MC7 ON
[H]: MC7 OFF
- (2) T3PREM_PS (PRCB to MC8)
MC8 drive control signal (tray 3)
[L]: MC8 ON
[H]: MC8 OFF

[4] Paper Up Drive Control



Paper stacked in the tray is pushed up by transmitting the drive force of M18 (tray up drive/3) to the up/down plate in the tray via drive wires. M18 is controlled by the PRCB (printer control board). Related signals are PS14 (tray upper limit/3) and PS16 (remaining paper/3).

1. Operation

a. Paper up drive control

When tray 3 is loaded, M18 (tray up drive/3) turns ON to lift the up/down plate in the tray. When PS14 (tray upper limit/3) detects the upper limit of paper as the paper up/down plate in the tray goes up, it turns ON and consequently M18 goes OFF, causing the tray to stop going up. When PS14 turns OFF after paper is fed, M18 goes ON again to move 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

M18 (tray up drive /3) is turned ON when loading of a tray is detected. (by shorting wires at both ends of the drawer connector)

(2) OFF timing

M18 (tray up drive/3) is turned OFF when PS14 (tray upper limit/3) is turned ON.

c. Remaining Paper Detection Control

The level of paper remaining in the tray is detected according to the time that M18 (tray up drive/3) requires to lift up the up/down plate when the tray is set. This lift-up time (operation time of M18) is saved in the PRCB (printer control board). After this, the remaining paper is detected using the paper feed counter. The detected remaining paper level is displayed on the operation panel in five steps. PS16 (remaining paper/3) is used to detect the remaining paper level when it lowers below about 10%.

2. Signals

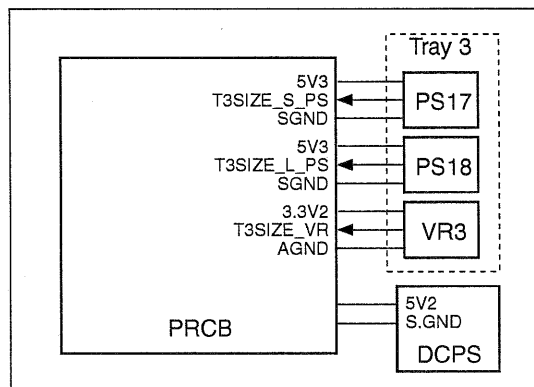
a. PRCB input signals

- (1) TIUP_PS (PS14 to PRCB)
Paper upper limit detection signal
[L]: Not detected.
[H]: Detected.
- (2) TIRM_PS (PS16 to PRCB)
Remaining paper detection signal
[L]: Not detected.
[H]: Detected.

b. PRCB output signals

- (1) T3RISEM_24 (PRCB to M18)
M18 ON/OFF control signal

[5] Paper Size Detection Control



The paper size in tray 3 is detected using PS17 (paper size/1-3), PS18 (paper size/2-3), and VR3 (paper size/3). Based on the detection signals, the PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected using PS17/18 (paper size/1-3/2-3). Variable resistor (VR3) interlocked with the guide position is installed at the bottom of the tray to detect the width of paper. The relationships between the sensors and paper sizes (lengths) are as follows:

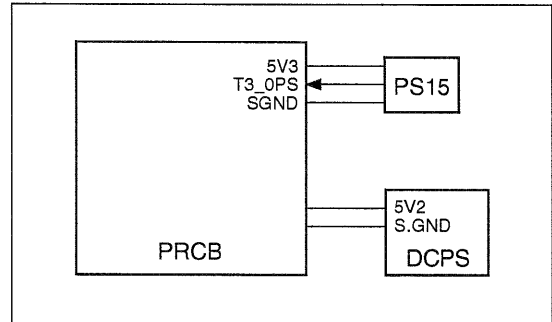
Sensor \ Paper size	Paper size		
	8.5 x 11 or less	A4R to B5R	F4 or larger
PS17	OFF	ON	ON
PS18	OFF	OFF	ON

2. Signals

a. PRCB input signals

- (1) T3SIZE_S_PS (PS17 to PRCB)
Paper size detection signal
[L]: Paper does not exist.
[H]: Paper exists.
- (2) T3SIZE_L_PS (PS18 to PRCB)
Paper size detection signal
[L]: Paper does not exist.
[H]: Paper exists.
- (3) T3SIZE_VR (VR3 to PRCB)
Paper width detection signal

[6] No paper detection control



No paper in the tray is detected by PS15 (no paper/3), and which is controlled by the PRCB (printer control board).

1. Operation

When the tray becomes empty, PS15 (no paper/3) is turned OFF, displaying a message on the LCD via OB1 (operation board/1).

2. Signals

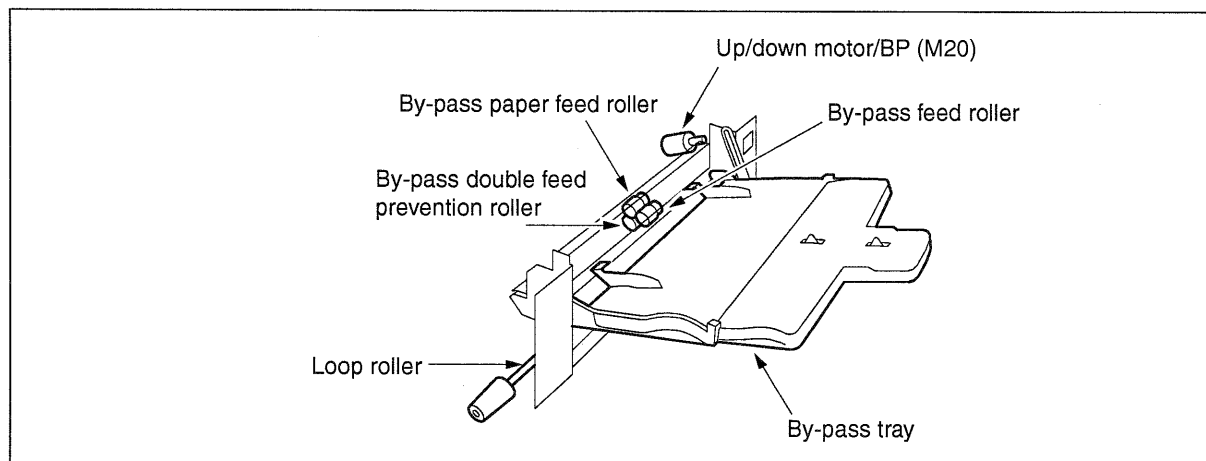
a. PRCB input signals

- (1) PS15 (PS15 to PRCB)
No paper detection signal
[L]: Paper does not exist in tray.
[H]: Paper exists in tray.

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BY-PASS TRAY

[1] Composition

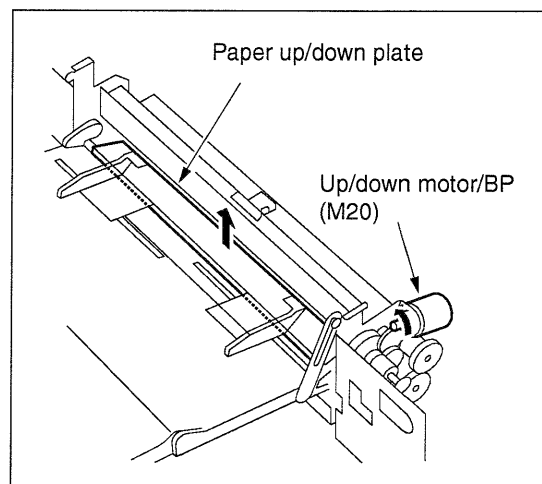


[2] Mechanisms

Mechanism	Method
First paper feed	By-pass feed roller
Paper lift-up *1	Paper up/down plate Up/down motor/BP (M20) + Upper/lower limit detection sensor
Double feed prevention	Torque limiter
No paper detection	Photo sensor + Actuator
Paper size detection *2	Width: VR Length: Photo sensor + Actuators (two)

*1 Paper lift-up

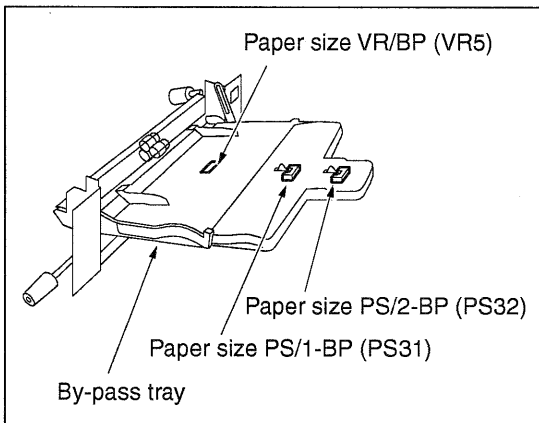
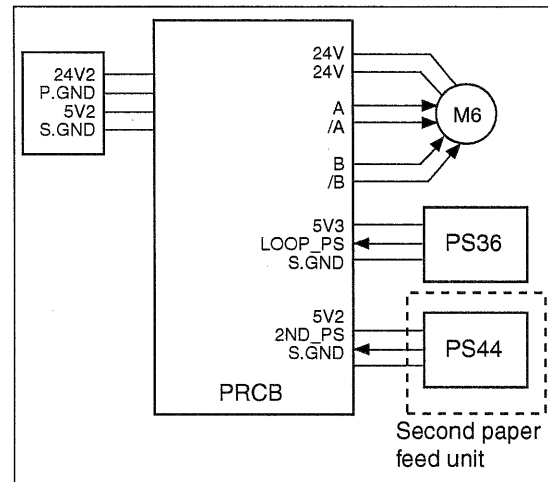
The up/down motor/BP (M20) drives the paper up/down plate via gears. Paper is automatically pushed up to the paper feed position, when the print start button is pressed. When paper is removed or exhausted M20 will drive down the up/down plate.



***2 Paper size detection**

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

- Lateral: Paper size detection VR/BP (VR5)
- Longitudinal: Paper size PS/1, 2-BP (PS31/32)

**[3] First Paper Feed Control**

The first 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. M6 is controlled by PRCB (printer control board). The related signal is PS36 (loop).

1. Operation

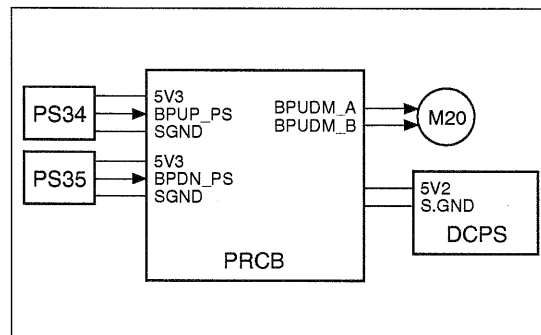
- (1) When printing of the first copy starts
M6 (loop) is turned ON at the timing that is determined by the P counter (that starts when printing starts), thus starting feed of paper.
M6 is stopped temporarily after lapse of a specified time from turning ON of PS44 (registration) by the leading edge of paper, a loop is formed by registration rollers, and the paper is fed to the transfer unit.
- (2) When printing of the second or subsequent copy
After lapse of the specified time from turning OFF of PS44 (registration) by the trailing edge of the preceding paper.

2. Signals**a. PRCB input signals**

- (1) LOOP_PS (PS36 to PRCB)
Paper passage detection signal
[L]: Paper does not exist.
[H]: Paper exist.
- (2) 2ND_PS (PS44 to PRCB)
Second paper feed reference timing detection signal
[L]: Paper exists.
[H]: Paper does not exist.

b. PRCB output signals

- (1) A and /A (PRCB to M6)
A-phase drive control pulse signal for M6
- (2) B and /B (PRCB to M6)
B-phase drive control pulse signal for M6

[4] Paper Up/Down Control

Paper in the by-pass tray is pushed up/down by M20 (up/down motor/BP). M20 is controlled by PRCB (printer control board). Related signals are PS34 (tray upper limit /BP) and PS35 (tray lower limit /BP).

1. Operation**a. Paper up/down control**

M20 (up/down motor/BP) is turned ON to push up paper. When PS34 (tray upper limit/BP) detects the paper upper limit and turns ON, M20 turns OFF to stop pushing up paper. When paper is fed and consequently PS34 turns OFF, M20 turns ON again, maintaining the upper limit position of paper.

b. Paper up timing

- (1) ON timing
At start of copying
- (2) OFF timing
M20 (up/down motor/BP) is turned OFF when PS34 (tray upper limit /BP) is turned ON.

c. Paper down timing

- (1) ON timing
When there is no paper or a paper jam occurs.
- (2) OFF timing
M20 (up/down motor/BP) is turned OFF when PS35 (tray lower limit/BP) is turned ON.

2. Signals

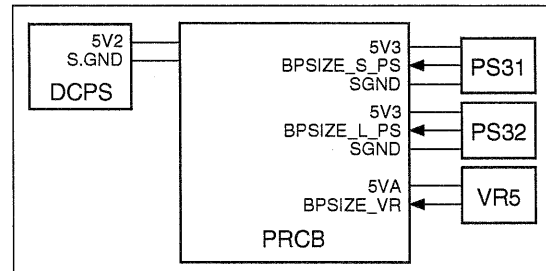
a. PRCB input signals

- (1) BPUP_PS (PS34 to PRCB)
Paper upper limit position detection signal (by-pass tray)
[L]: Not detected.
[H]: Detected.
- (2) BPDN_PS (PS35 to PRCB)
Paper lower limit position detection signal (by-pass tray)
[L]: Not detected.
[H]: Detected.

b. PRCB output signal

- (1) BPUDM_A, B (PRCB to M20)
M20 drive control signal

[5] Paper Size Detection Control



The size of paper in the by-pass tray is detected by PS31 (paper size/1-BP), PS32 (paper size/2-BP), and VR5 (paper size/BP). Based on the detection signals, PRCB (printer control board) judges the paper size.

1. Operation

The length of paper is detected by PS31 (paper size/1-BP) and PS32 (paper size/2-BP). The by-pass tray is provided with a variable resistor (VR5) interlocked with the guide position to judge the paper width according to the change in the resistance value.

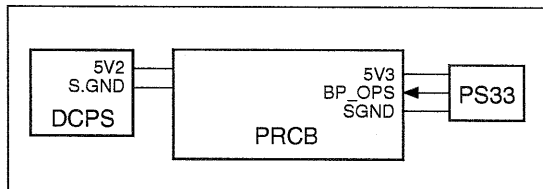
The relationships between the sensors and paper sizes (lengths) are as follows:

Paper size Sensor	8.5 x 11 or less	A4R to B5R	F4 or larger
PS31	OFF	ON	ON
PS32	OFF	OFF	ON

2. Signals

a. PRCB input signals

- (1) BPSIZE_S_PS (PS31 to PRCB)
Paper size detection signal
[L]: Paper does not exist.
[H]: Paper exists.
- (2) BPSIZE_L_PS (PS32 to PRCB)
Paper size detection signal
[L]: Paper does not exist.
[H]: Paper exists.
- (3) BPSIZE_VR (VR5 to PRCB)
Paper width detection signal

[6] No paper detection control

No paper in the tray is detected by PS33 (no paper/BP) which is controlled by PRCB (printer control board).

1. Operation

When the tray becomes empty, PS33 (no paper/BP) is turned OFF, displaying a message on the LCD via OB1 (operation board/1).

2. Signal**a. Input signal****(1) BP_0PS (PS33 to PRCB)**

No paper detection signal

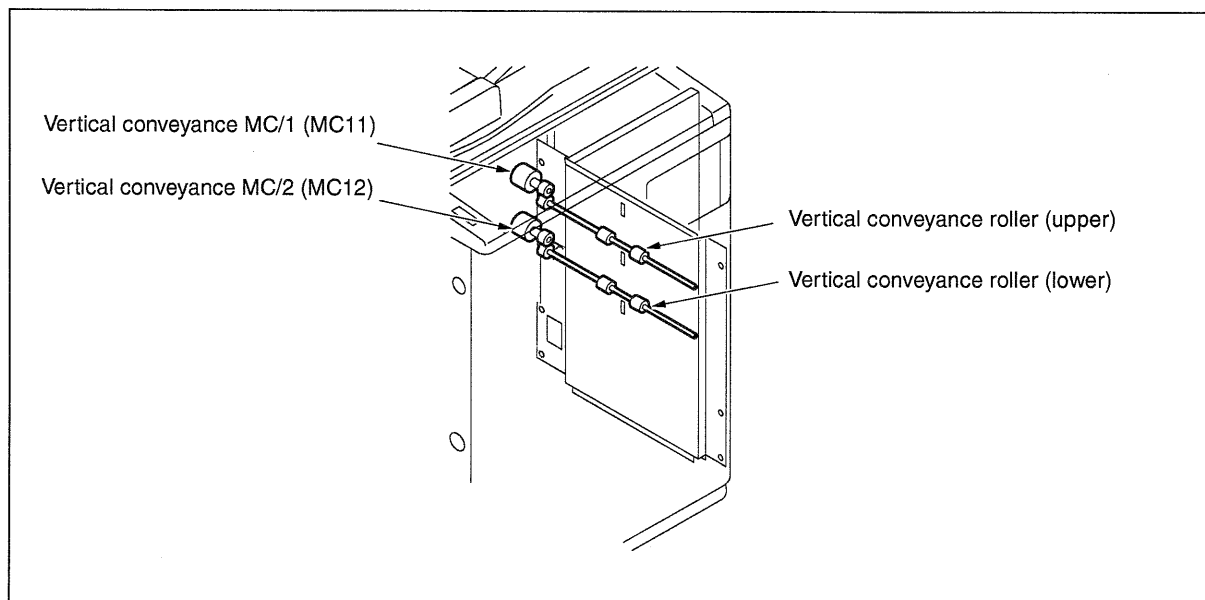
[L]: Paper does not exist.

[H]: Paper exists.

Blank page

VERTICAL CONVEYANCE SECTION

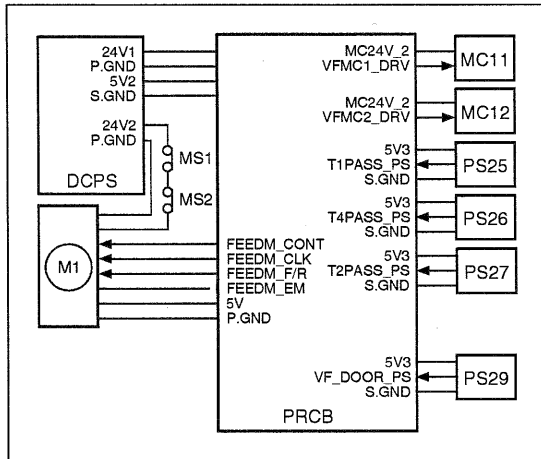
[1] Composition



[2] Mechanisms

Mechanism	Method
Paper conveyance	Rollers
Conveyance drive	Vertical conveyance roller (upper): Paper feed motor (M1) Vertical conveyance roller (lower): Paper feed motor (M1)

[3] Vertical Conveyance Control



In the vertical conveyance section, paper is fed vertically by transmitting the drive force of M1 (paper feed) to the vertical conveyance roller (upper) and vertical conveyance roller (lower) via MC11 (vertical conveyance MC/1) and MC12 (vertical conveyance MC/2). The above parts are controlled by PRCB (printer control board). Related signals are PS25 to PS27 (vertical conveyance/1 to /3) and PS29 (vertical conveyance door open/close).

1. Operation

Paper fed from tray 1 is then fed to the second paper feed unit directly without passing through vertical conveyance rollers. When paper is fed from tray 2 or 3, PS26 (vertical conveyance/2) is used to feed paper to the standby position. When PS26 is turned OFF by the preceding paper, MC11 and MC12 (vertical conveyance MC/1 and MC/2) are turned ON and the paper fed from tray 2 or 3 is fed to the standby position (where PS26 was turned ON) by the drive force of M1 (paper feed). MC11 and MC12 are turned ON after lapse of the specified time from restart of registration of the preceding paper to rotate all vertical conveyance rollers, thus feeding paper to the second paper unit.

2. Signals

a. PRCB input signals

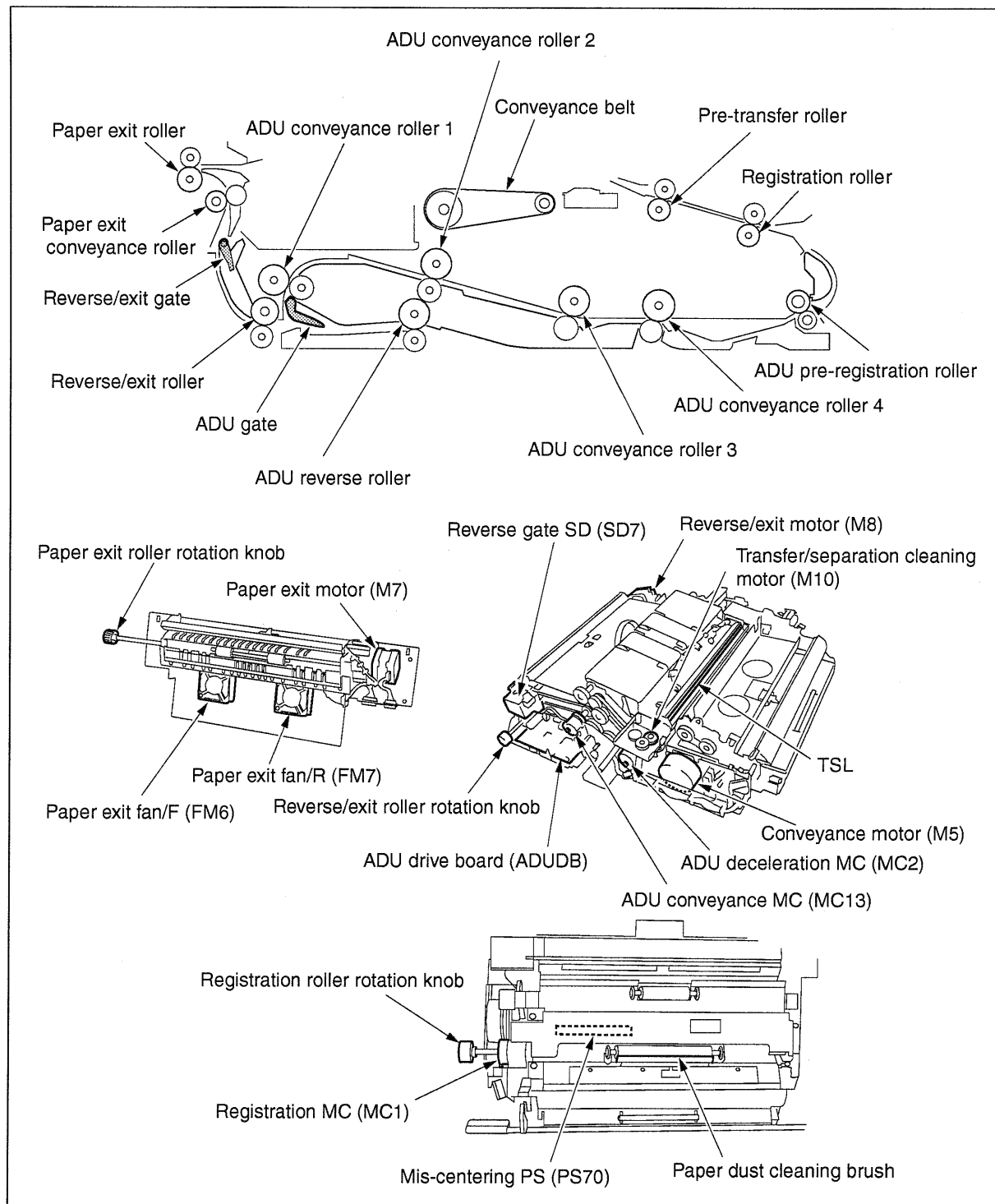
- (1) T1PASS_PS (PS25 to PRCB)
Paper passage detection signal (for tray 1)
[L]: Not detected.
[H]: Detected.
- (2) T2PASS_PS (PS26 to PRCB)
Paper passage detection signal (for tray 2)
[L]: Not detected.
[H]: Detected.
- (3) T3PASS_PS (PS27 to PRCB)
Paper passage detection signal (for tray 3)
[L]: Not detected.
[H]: Detected.
- (4) VF_DOOR_PS (PS29 to PRCB)
Vertical conveyance section open/close detection signal
[L]: Open
[H]: Closed

b. PRCB output signals

- (1) VFMC1_DRV (PRCB to MC11)
MC11 drive control signal
[L]: MC11 ON
[H]: MC11 OFF
- (2) VFMC2_DRV (PRCB to MC12)
MC12 drive control signal
[L]: MC12 ON
[H]: MC12 OFF

ADU

[1] Composition



[2] Mechanisms

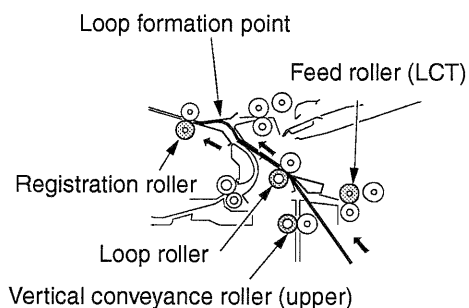
Mechanisms	Method
Second paper feed paper loop *1	Loop roller (trays 1-3/LCT), Feed roller (by-pass tray), ADU pre-registration roller (ADU)
Image position correction *2	Image position is corrected according to the information detected by PS43 (leading edge) and PS70 (paper mis-centering).
Second paper feed auxiliary mechanism *3	Pre-transfer roller
Second paper feed paper conveyance	Conveyance motor (M5) drive
Second paper feed jam removal mechanism	Opening/closing of jam removal section of pre-transfer section, Registration roller rotation knob
Conveyance section paper conveyance	Conveyance belts (two)
Conveyance section paper suction mechanism *4	Conveyance suction fan (FM3) + Suction duct
Reverse/exit section paper path selection *5	Reverse/exit selection gate, Reverse gate SD (SD7) drive paper is automatically guided owing to the paper guide shape.
Reverse/exit section paper conveyance	Reverse/exit roller, ADU reverse roller
Reverse/exit section paper conveyance drive	Reverse/exit motor (M8) drive, ADU reverse motor (M9) drive
Reverse/exit section jam removal mechanism	Paper exit guide plate opening/closing, ADU bottom plate assembly opening/closing, Reverse/exit roller rotation knob
Paper exit section jam removal mechanism	Paper exit roller rotation knob
Paper exit conveyance	Paper exit motor (M7) drive
ADU paper feed *6	Nonstack
ADU reverse paper conveyance path selection	Paper is automatically guided owing to ADU gate operation and the paper guide shape.
ADU paper conveyance	ADU reverse roller, ADU conveyance rollers 1 and 2
ADU pre-registration mechanism *7	ADU pre-registration roller, ADU conveyance rollers 3 and 4
Thick paper conveyance *8	Conveyance motor (M5), Paper exit motor (M7), reverse/exit motor (M8), ADU reverse motor (M9), linear velocity selection
ADU paper conveyance drive	Conveyance motor (M5), reverse/exit motor (M8), ADU reverse motor (M9), loop roller motor (M6)
ADU jam removal mechanism	ADU bottom plate assembly opening/closing, Exit guide plate opening/closing

*1 Second paper feed paper loop mechanism

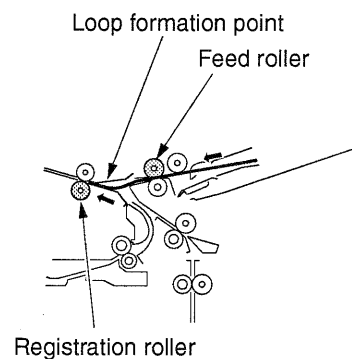
A paper loop is formed before the registration roller to correct mis-centering of paper during second paper feed. The paper loop is formed by pushing the fed paper against the registration roller for the prescribed time. The paper loop mechanism differs between paper feed paths.

- Trays 1-3, LCT paper feed
Loop roller
- By-pass tray
By-pass feed roller
- ADU
ADU pre-registration roller

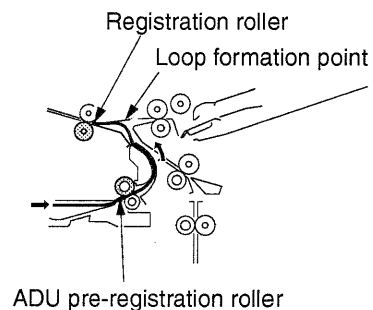
<Trays 1-3/LCT>



<By-pass tray>



<ADU>



*2 Image position correction

A leading edge PS (PS43) and paper mis-centering PS (PS70) are provided at the exit of the registration roller, thus enhancing the positional accuracy of the copy image.

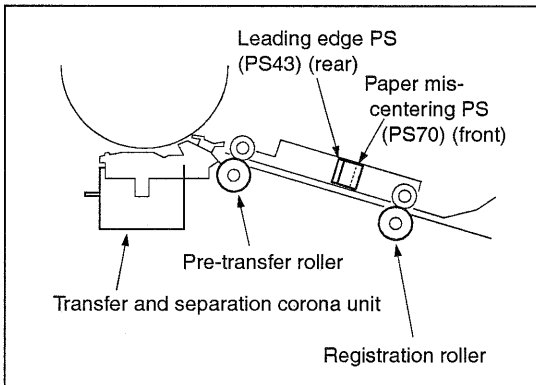
The paper position information detected by PS43 and PS70 is processed by the image processor to correct the image write position in such a manner that the document (scanned image) position match the copy paper position.

The leading edge PS (PS43) is used to correct the write position in the sub-scanning direction,

and the mis-centering PS (PS70) is used to correct the write position in the main scanning direction.

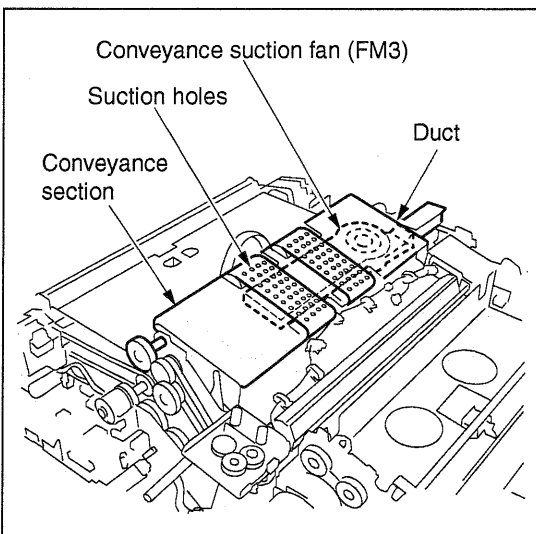
*3 Second paper feed auxiliary mechanism

The distance between the registration roller and the transfer and separation corona unit is made long to achieve the time required for correcting the image position. To assist conveyance of paper 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.



*4 Conveyance section paper suction mechanism

A paper suction duct is provided in the middle of the conveyance section and is led to the conveyance suction fan (FM3) installed in the ADU. To improve transportability of the paper that passes through the conveyance section, the conveyance suction fan is used to provide suction for the paper.



*5 Reverse/exit paper path selection

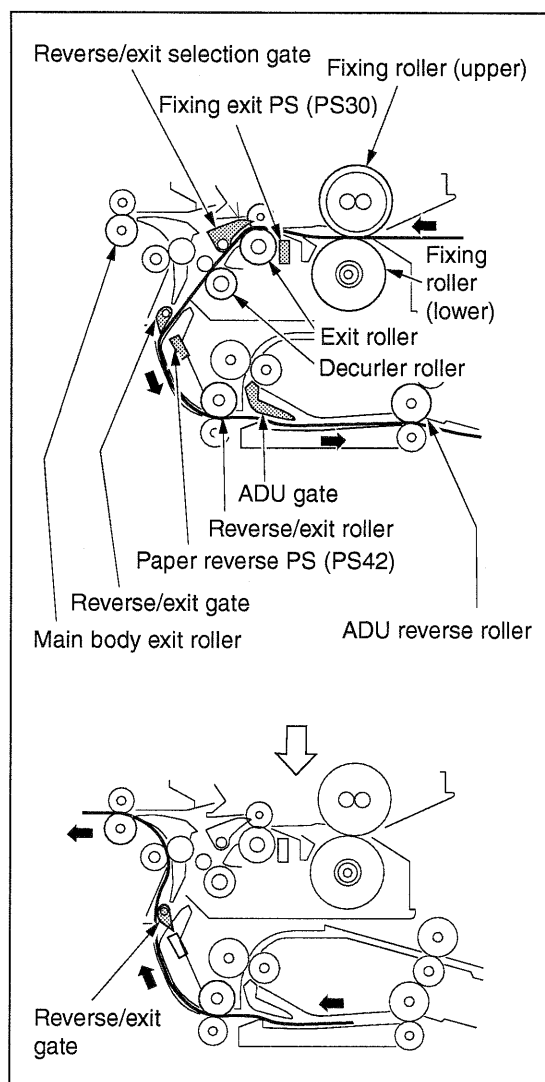
The reverse/exit selection gate in the fixing unit determines whether the paper is to be ejected straight or reversed and ejected. The paper gate is operated by the reverse gate SD (SD7) installed in the ADU.

Because paper is reversed in the reverse/exit section in the ADU, the reverse/exit section is provided with a reverse/exit gate to switch between the forward and backward paper conveyance paths. This gate has no drive mechanism and it is opened by the rigidity of the paper.

a. Reverse/exit operation

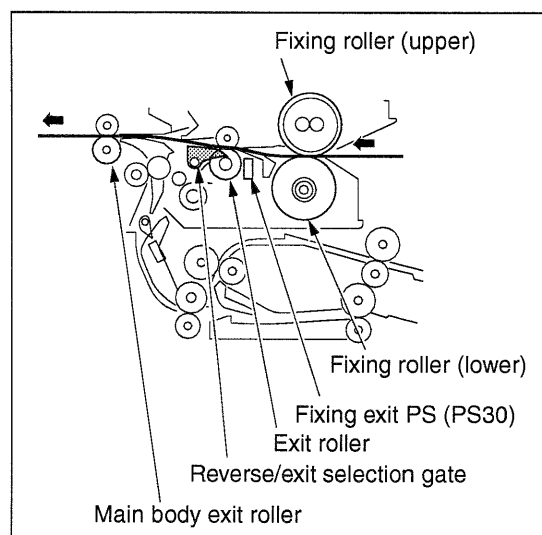
Normally, the reverse/exit selection gate opens when the reverse gate SD (SD7) is turned OFF. The paper fed by the exit roller in the fixing unit is fed, through the path under the reverse/exit selection gate, to the reverse/exit section in the ADU by the decurler roller. Normally, the reverse/exit gate in the reverse/exit section is closed. This gate is opened by the rigidity of the fed paper, allowing the paper to be fed to the reverse/exit roller, ADU gate, and ADU reverse roller sequentially. Normally, the ADU gate is closed and it has no drive mechanism; it is opened by the rigidity of paper.

When the paper reverse PS (PS42) detects the trailing edge of paper and consequently turns OFF, the reverse/exit roller and ADU reverse roller start rotating in the opposite direction, feeding the paper back toward the fixing unit. However, since the reverse/exit gate is closed, the paper is fed to the main body exit roller via the path outside this gate. Thus, the paper is ejected with the print side down.



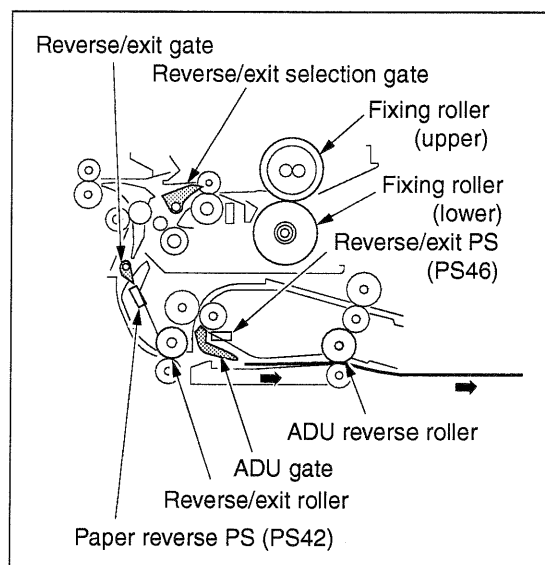
b. Straight ejection

When paper is ejected straight, the reverse gate SD (SD7) is turned ON to close the reverse/exit selection gate. The paper fed by the paper exit roller is fed to the paper exit roller 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 reverse/exit selection gate, into the reverse/exit section just like the reverse/exit operation. Then, the paper is fed to the ADU by the reverse/exit roller and ADU reverse roller. These rollers do not rotate in the opposite direction even when the paper reverse PS (PS42) detects the trailing edge of the paper, allowing the paper to be fed until the reverse/exit PS (PS46) turns OFF.

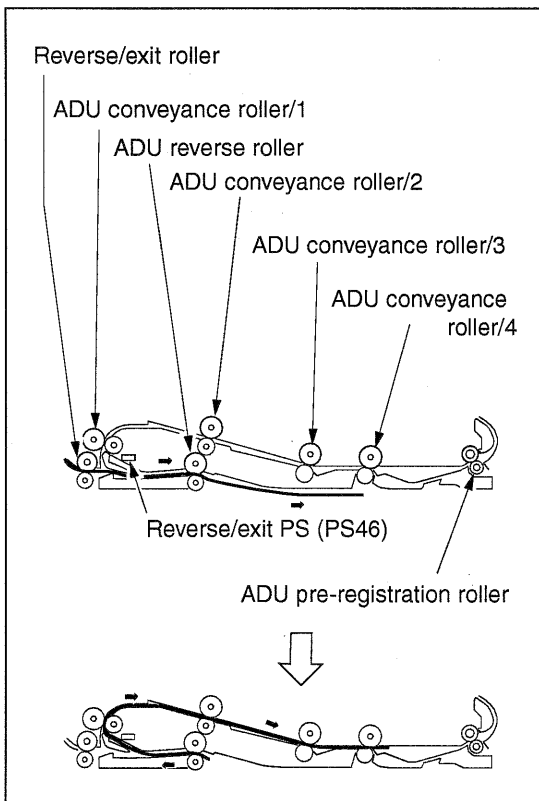


*6 Non-stack paper feed mechanism

In the two-sided copy mode, the ADU reverse roller starts rotating in the opposite direction when the reverse/exit PS (PS46) detects the trailing edge of paper and consequently it turns

OFF. The paper is fed toward the reverse/exit section. However, since the ADU gate is closed, the paper is fed to the ADU conveyance roller/1 through the path above this gate. Thus, the paper is reversed and fed to the ADU exit, without being stacked in the ADU.

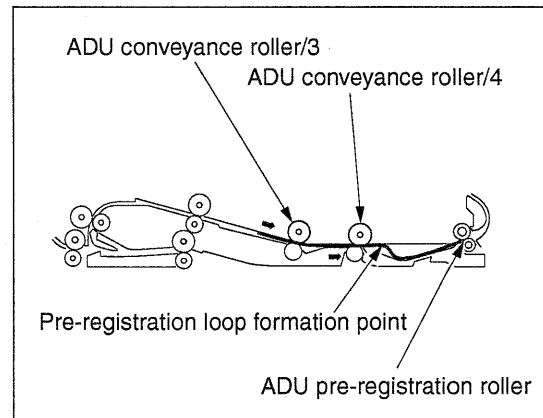
The reversed paper is fed by ADU conveyance rollers 1-4.



*7 ADU pre-registration mechanism

In the ADU, paper is looped by the ADU pre-registration roller to correct paper inclination in the conveyance section. The ADU pre-registration roller stops when the loop roller motor (M6) stops; however, the ADU conveyance roller continues to feed paper at a constant speed, forming a paper loop between the ADU pre-registration roller and ADU conveyance roller. As a result, paper inclination is corrected. When M6 starts, the ADU pre-registration roller starts rotating to feed the paper to the second feed section. An ADU conveyance MC (MC13) is provided to turn ON/OFF the drive force of ADU conveyance rollers 1 and 2 in order to stop the looped paper temporarily and to adjust the loop size. In addition, an ADU deceleration MC (MC2) is provided to turn ON/OFF the drive force of ADU conveyance

rollers 3 and 4. The ADU conveyance MC (MC13) is turned ON/OFF only when the paper length is 325 mm or longer. If the paper length is less than 325 mm, it stays ON during copying.

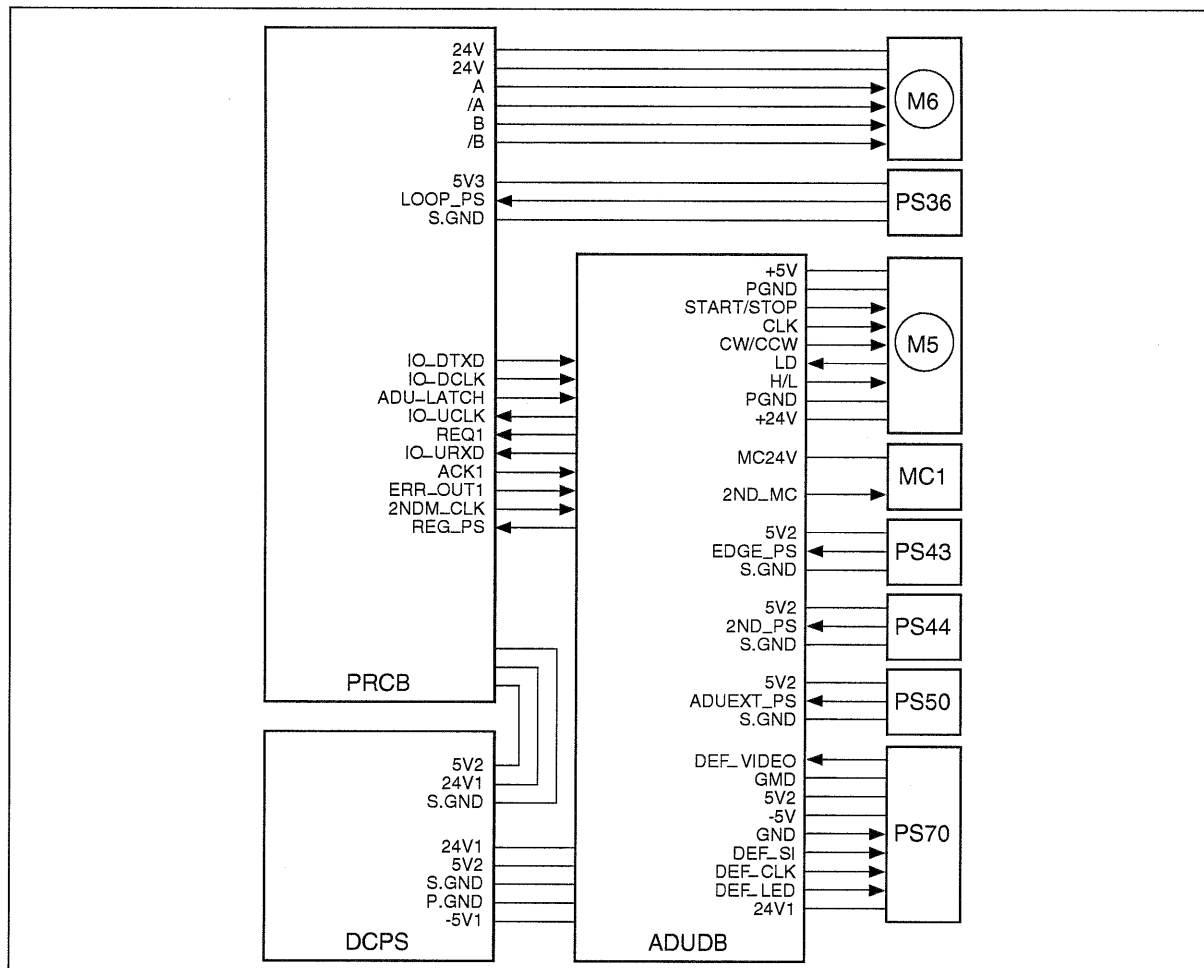


*8 Thick paper conveyance mechanism

To enhance reliability of thick paper copying, the conveyance motor (M5), paper exit motor (M7), reverse/exit motor (M8), and ADU reverse motor (M9) are switched as shown below according to the paper type selected in the key operator mode.

Paper type	Linear speed
Thick paper	185 mm/s
Others	320 mm/s

[3] Loop/Second Paper Feed Control



The paper fed from each tray is fed to the second paper feed section. The second paper feed takes place as the result of the transmission of the drive force from M5 (conveyance) to the second paper feed roller via MC1 (registration). The second paper feed section is preceded by a loop roller used to form a paper loop, and this conveyance section is also used for the paper fed from the LCT. It is not used for the paper fed from the by-pass tray or ADU. The loop roller is driven by M6 (loop roller). The above parts are controlled by PRCB (printer control board) via ADUDB (ADU drive board). M6 is driven by PRCB directly.

Related signals are PS36 (loop), PS43 (leading edge), PS44 (registration), and PS50 (ADU pre-registration).

1. Operation

a. Loop control

After a lapse of the specified time from turning ON of PS44 (registration) by the paper fed from each tray or the ADU at a high speed, M6 (loop roller) is turned OFF to form a paper loop in the registration section.

b. Second paper feed control

After formation of a paper loop under loop control, MC1 (registration) is turned ON to transmit the drive force of M5 (conveyance) to the second paper feed roller, starting the second paper feed.

c. Image position correction control

Mis-centering of the paper fed from each tray is detected by PS70 (paper mis-centering) and the paper leading edge timing is detected by PS43 (leading edge) and they are corrected at the time of image write.

A contact image sensor is used as PS70 (paper mis-centering). The paper edge position is detected by paper mis-centering sensors. Based on the edge position information, the image write position is shifted to correct mis-centering and leading edge timing at the time of image write. PS70 operates after a lapse of the specified time from turning ON of PS43 (leading edge).

2. Signals

a. Input signals

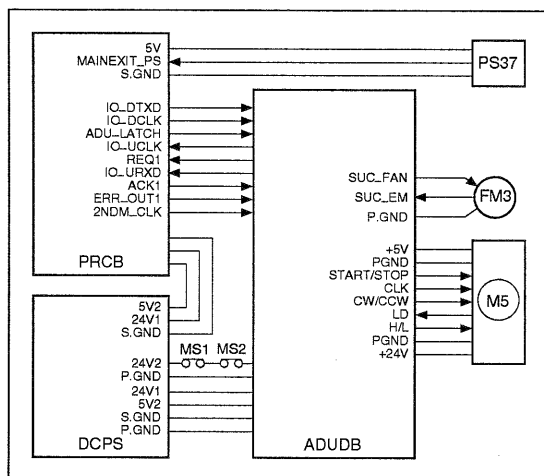
- (1) LOOP_PS (P36 to PRCB)
Loop formation reference timing detection signal.
The leading edge or trailing edge of paper is detected.
[L]: Detected.
[H]: Not detected.
- (2) LD (M5 to ADUDB)
M5 fault detection signal
[L]: Normal
[H]: Abnormal
- (3) DEF_VIDEO (PS70 to ADUDB)
PS70 (paper mis-centering) sensor output signal
- (4) 2ND_PS (PS44 to ADUDB)
Second paper feed reference timing detection signal
[L]: Detected.
[H]: Not detected.
- (5) EDGF_PS (PS43 to ADUDB)
Paper leading edge detection signal
[L]: Detected.
[H]: Not detected.
- (6) REG_PS (ADUDB to PRCB)
Paper leading edge detection signal.
[L]: Detected.
[H]: Not detected.

b. Output signals

- (1) START/STOP (ADUDB to M5)
M5 (conveyance) drive control signal
[L]: M5 ON
[H]: M5 OFF
- (2) 2NDM_CLK, CLK (PRCB to ADUDB to M5)
M5 (conveyance) clock signal
- (3) 2ND_MC (ADUDB to MC1)
MC1 (registration) drive control signal
[L]: MC1 ON
[H]: MC1 OFF
- (4) DEF_SI (ADUDB to PS70)
PS70 (paper mis-centering) start pulse

- (5) DEF_CLK (ADUDB to PS70)
PS70 (paper mis-centering) drive clock signal
- (6) DEF_LED (ADUDB to PS70)
PS70 (paper mis-centering) LED control signal
- (7) CW/CCW (ADUDB to M5)
M5 (conveyance) rotational direction indication signal
[L]: CCW
[H]: CW
- (8) H/L (ADUDB to M5)
M5 (conveyance) rotational speed indication signal
[L]: Low speed
[H]: High speed
- (9) A, /A (PRCB to M6)
M6 (loop roller) A-phase drive control pulse signal
- (10) B, /B (PRCB to M6)
M6 (loop roller) B-phase drive control pulse signal

[4] Paper Conveyance Control



The paper fed from the second paper feed section is fed to the fixing unit by the pre-transfer roller and conveyance belt driven by M5 (conveyance). In the conveyance section, paper suction is provided by FM3 (conveyance suction) through the duct installed on the back of the conveyance belt. M5 and FM3 are controlled by PRCB (printer control board) via ADUDB (ADU drive board).

1. Operation

a. M5 (conveyance) operation

M5 (conveyance) starts when the START button is pressed, and it stops when the PS37 (paper exit) turns OFF at detection of the trailing edge of the last sheet of paper.

b. FM3 (conveyance suction) operation

FM3 is turned ON/OFF in sync with M2 (drum).

2. Signals

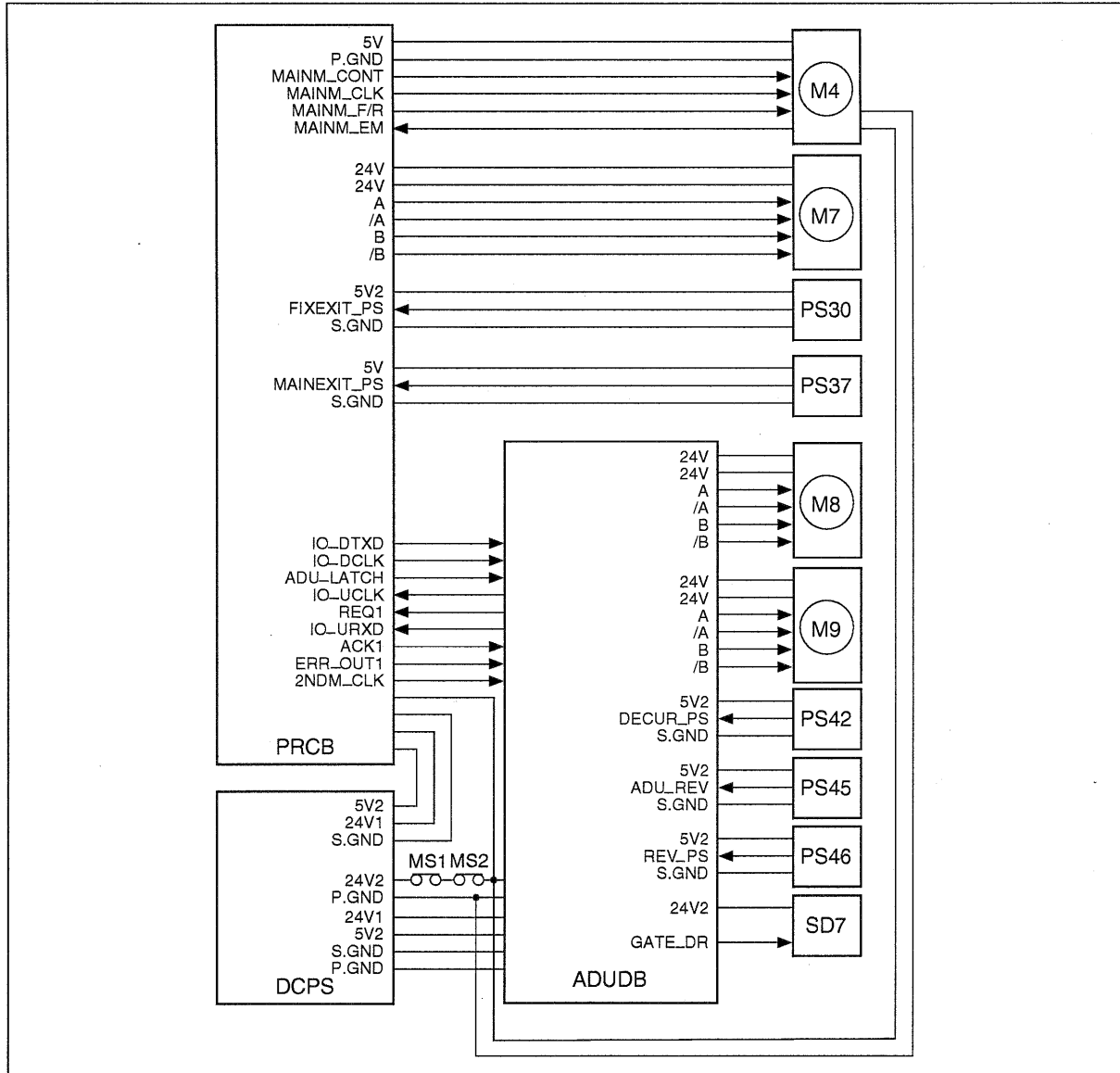
a. Input signals

- (1) MAINEXIT_PS (PS37 to PRCB)
Main body exit section paper passage detection signal
[L]: Detected.
[H]: Not detected.
- (2) SUC_EM (FM3 to ADUDB)
FM3 (conveyance suction) fault detection signal
[L]: FM3 is normal.
[H]: FM3 is abnormal.

b. Output signal

- (1) MAINEXIT_PS (ADUDB to FM3)
FM3 (conveyance suction) drive signal
[L]: FM3 OFF
[H]: FM3 ON

[5] Paper Reverse and Exit Control



The reserve/exit selection gate in the fixing unit determines whether the paper fed from the fixing unit is to be ejected straight or reversed. The reverse/exit selection gate is driven by SD7 (reverse gate). The decurler roller is driven by M4 (fixing) and the reverse/exit roller is driven by M8 (reverse/exit). The ADU reverse roller is driven by M9 (ADU reverse). The exit conveyance roller and main body exit roller are driven by M7 (paper exit).

M4 and M7 are controlled by PRCB (printer control board) directly. M8, M9, and SD7 are controlled by PRCB (printer control board) via ADUDB (ADU drive board). Related signals are PS30 (fixing exit), PS37 (paper exit), and PS42 (paper reverse).

1. Operation

a. Reverse/exit selection gate control

The reverse/exit selection gate is driven by SD7 (reverse gate). Normally, the reverse/exit selection gate is open to guide paper to the reverse/exit section in ADU. When paper is ejected straight, SD7 is turned ON to close the reverse/exit selection gate.

When paper is ejected straight, SD7 is turned ON when the START button is pressed and it is turned OFF when PS37 (paper exit) turns OFF at detection of the trailing edge of the last sheet of paper.

b. M4 (fixing) control

M4 (fixing) starts when the START button is pressed, and it stops when PS37 (paper exit) turns OFF at detection of the trailing edge of the last sheet of paper.

(1) Straight paper exit

Paper is fed to the paper exit section straight by the paper exit roller driven by M4 (fixing) because SD7 (reverse gate) is turned ON to close the reverse/exit selection gate.

(2) Paper reverse/exit

Because SD7 (reverse gate) has been turned OFF to open the reverse/exit selection gate, paper is fed to the reverse/exit section in ADU by the paper exit roller and decurler roller driven by M4 (fixing).

(3) ADU conveyance

Same as paper reverse/exit.

c. Reverse control

M8 (reverse/exit) starts when the START button is pressed, and it stops when PS37 (paper exit) turns OFF at detection of the trailing edge of the last sheet of paper. Its rotational speed and direction change when paper is ejected or reversed, or is fed to ADU.

(1) Paper reverse/exit

The paper fed from the fixing unit is then fed to the reverse/exit section via the reverse/exit selection gate. Normally, M8 and M9 are rotating in the forward direction at a low speed, feeding the paper to the ADU reverse section.

When PS30 (fixing exit) detects the trailing edge of paper and consequently turns OFF, M8 and M9 start rotating in the forward direction at a high speed, feeding paper to the ADU reverse section continuously. When PS42 (paper reverse) detects the trailing edge of paper and conse-

quently turns OFF, M8 and M9 start rotating in the opposite direction at a high speed, feeding the paper in the paper exit direction.

When PS45 (ADU paper reverse) detects the trailing edge of paper and consequently turns OFF, M9 starts rotating in the forward direction at a low speed. After a lapse of the specified time from detection of the trailing edge of paper by PS46 (reverse/exit), M8 (reverse/exit) starts rotating in the forward direction at a low speed, proceeding to feed the next sheet of paper.

(2) ADU conveyance

The operation performed from the moment PS30 (fixing exit) turns OFF at detection of the trailing edge of paper to the moment M8 (reverse/exit) and M9 (ADU reverse) start rotating in the forward direction at a high speed, is the same as that of reverse/exit.

When PS46 (reverse/exit) turns OFF at detection of the trailing edge of paper, M8 starts rotating in the forward direction at a high speed, proceeding to feed the next sheet of paper.

After a lapse of the specified time from detection of the trailing edge of paper by PS46, M9 starts rotating in the opposite direction at a low speed, feeding paper to the ADU conveyance section. When PS45 (ADU paper reverse) detects the trailing edge of paper and consequently turns OFF, M9 starts rotating in the forward direction at a low speed, proceeding to feed the next sheet of paper.

d. M7 (paper exit) control

M7 (paper exit) turns ON when the START button is pressed. The OFF timing is different between paper straight exit and reverse/exit.

(1) Paper straight exit

The paper fed from the fixing unit by the exit roller is ejected by the main body exit roller driven by M7 (paper exit). M7 is always rotating at a constant speed and it is turned OFF when PS37 (paper exit) turns OFF at detection of the trailing edge of the last sheet of paper.

(2) Paper reverse/exit

The paper fed from the reverse/exit section in ADU with it reversed, is ejected by the exit conveyance roller and main body exit roller which are driven by M7 (paper exit) rotating at a high speed. After a lapse of the specified time from turning OFF of PS42 (paper reverse) at detection of the trailing edge of paper, M7 (paper exit)

starts rotating at a low speed to even up the edges of paper in the exit tray. When PS37 (paper exit) is turned OFF at detection of the trailing edge of paper, M7 starts rotating at a high speed again, proceeding to eject the next sheet of paper. When PS37 detects the trailing edge of the last sheet of paper, M7 (paper exit) stops. If FNS is provided, M7 is always rotating at a high speed.

2. Signals

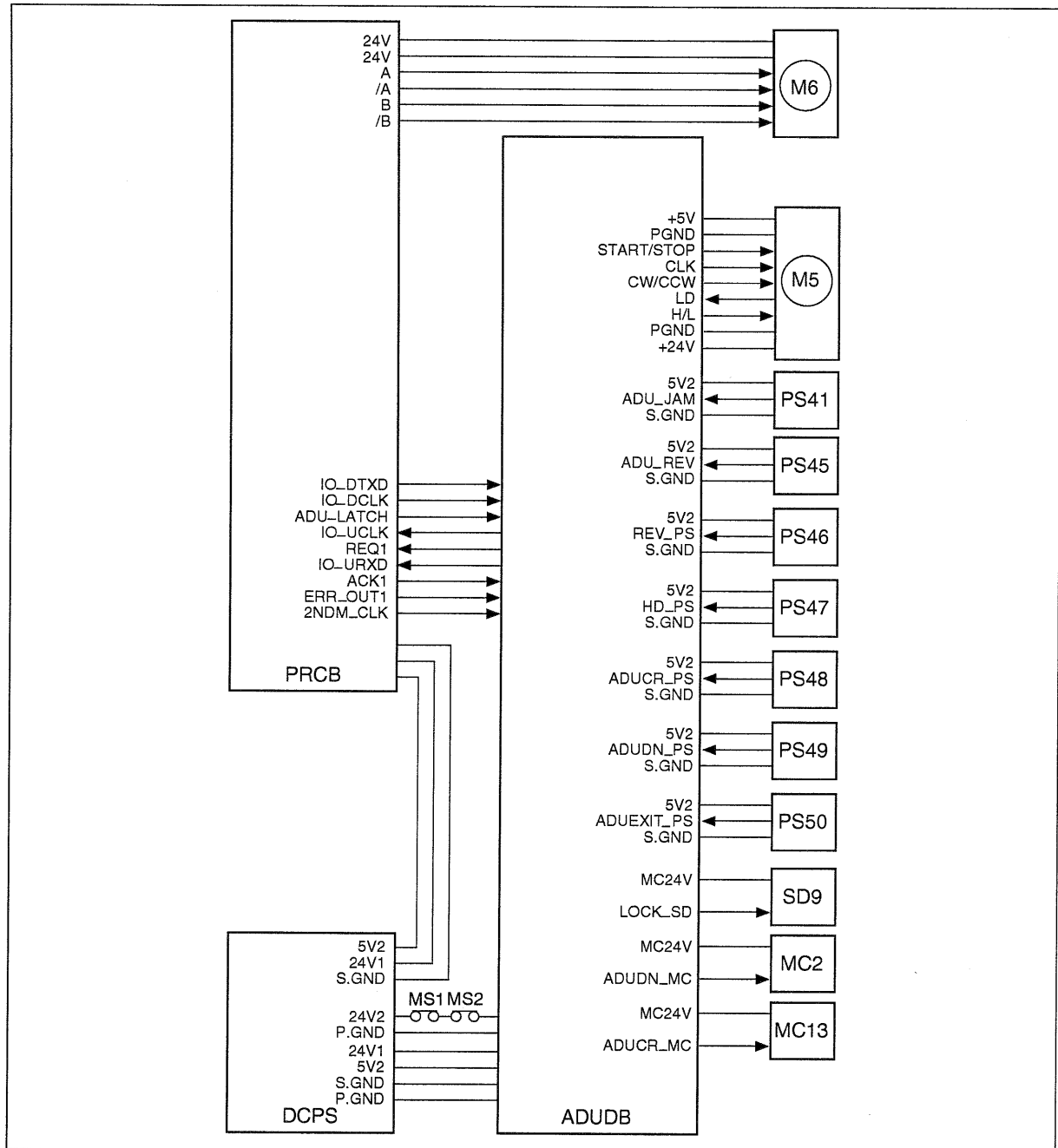
a. Input signals

- (1) FIXEXIT_PS (PS30 to PRCB)
Detection signal of paper passage at fixing unit exit
[L]: Detected.
[H]: Not detected.
- (2) DECUR_PS (PS42 to ADUDB)
Reverse/exit gate open/close detection signal
[L]: Gate is open.
[H]: Gate is closed.
- (3) ADU_REV (PS45 to ADUDB)
ADU reverse section paper passage detection signal
[L]: Detected.
[H]: Not detected.
- (4) REV_PS (PS46 to ADUDB)
ADU gate open/close detection signal
[L]: Gate is open.
[H]: Gate is closed.

b. Output signals

- (1) GATE_DR (ADUDB to SD7)
SD7 (reverse gate) ON/OFF drive signal
[L]: SD7 ON
[H]: SD7 OFF
- (2) A, /A (PRCB to M7)
M7 (paper exit) A-phase drive control pulse signal
- (3) B, /B (PRCB to M7)
M7 (paper exit) B-phase drive control pulse signal
- (4) A, /A (ADUDB to M8)
M8 (reverse/exit) A-phase drive control pulse signal
- (5) B, /B (ADUDB to M8)
M8 (reverse/exit) B-phase drive control pulse signal

[6] ADU Paper Conveyance/Feed Control



The paper fed from the ADU paper reversal section is fed by transmitting the drive force of M5 (conveyance) to ADU conveyance rollers 1 to 4. Paper is then fed to the second paper feed section by the drive force of M6 (loop roller). In the ADU conveyance section, pre-loop control is performed to correct paper skew forcibly. To perform this control, MC2 (ADU deceleration) and MC13 (ADU conveyance) are provided. Related signals

are PS41 (ADU conveyance/1), PS45 (ADU paper reverse), PS46 (reverse/exit), PS48 (ADU paper conveyance/2), PS49 (ADU deceleration), and PS50 (ADU pre-registration). SD9 (ADU lock) is provided to lock the handle of the ADU.

1. Operation

a. ADU conveyance control

The paper fed from the ADU paper reversal section is fed to ADU pre-registration rollers at a high speed by transmitting the drive force of M5 (conveyance) to ADU conveyance rollers 1 to 4. ADU conveyance rollers 1 and 2 are turned ON/OFF by MC13 (ADU conveyance) and ADU conveyance rollers 3 and 4 are controlled by MC2 (ADU deceleration). After a lapse of the specified time from turning ON of PS49 (ADU deceleration), MC2 and MC13 are turned OFF to press the paper against the ADU pre-registration roller, forming a paper loop.

MC13 is turned ON/OFF only when the paper length is 325 mm or longer. If the paper length is less than 325 mm, it stays ON during copying.

b. ADU feed control

M6 (loop roller) starts rotating at a high speed after a lapse of the specified time from detection of the leading edge of paper by PS50 (ADU pre-registration). Thus, the ADU pre-registration roller starts rotating to feed paper to the second paper feed section. At this time, MC2 (ADU deceleration) and MC13 (ADU conveyance) are turned OFF so that the drive force of M5 (conveyance) which is also used to drive the second paper feed section is not transmitted to ADU conveyance rollers 1, 2, 3, and 4. MC2 and MC13 are turned ON after a lapse of the specified time from detection of the trailing edge of paper by PS49 (ADU deceleration), proceeding to feed the next sheet of paper.

After a lapse of the specified time from detection of the leading edge of paper by PS44 (registration), M6 starts rotating at a low speed. MC1 (registration) is turned ON after formation of a paper loop by the registration roller, thus writing the image on the back side.

c. ADU lock control

The ADU handle is locked by SD9 (ADU lock). PS47 (ADU handle) detects the handle position to determine whether the handle is locked or released.

2. Signals

a. Input signals

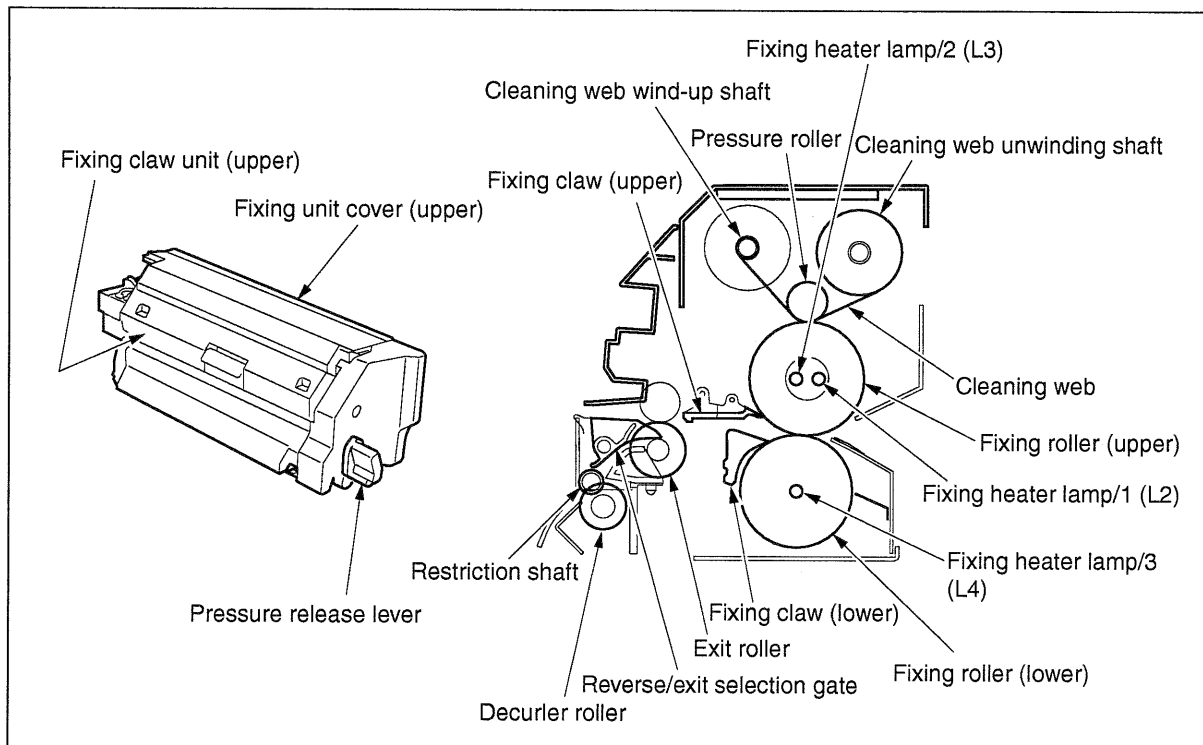
- (1) ADU_JAM (PS41 to ADUSDB)
Detection signal of paper passage from exit of ADU conveyance roller 1
[L]: Detected.
[H]: Not detected.
- (2) HD_PS (PS47 to ADUDB)
ADU handle position detection signal
[H]: Handle is released.
- (3) ADUCR_PS (PS48 to ADUDB)
Detection signal of paper passage from exit of ADU conveyance roller 2
[L]: Detected.
[H]: Not detected.
- (4) ADUDN_PS (PS49 to ADUDB)
Detection signal of paper passage from exit of ADU conveyance roller 3
[L]: Detected.
[H]: Not detected.

b. Output signals

- (1) LOCK_SD (ADUDB to SD9)
SD9 (ADU lock) drive signal
[L]: SD9 ON
[H]: SD9 OFF
- (2) ADUDN_MC (ADUDB to MC2)
MC2 (ADU deceleration) drive signal
[L]: MC2 ON
[H]: MC2 OFF
- (3) ADUCR_MC (ADUDB to MC13)
MC13 (ADU conveyance) drive signal
[L]: MC13 ON
[H]: MC13 OFF

FIXING UNIT

[1] Composition



[2] Mechanisms

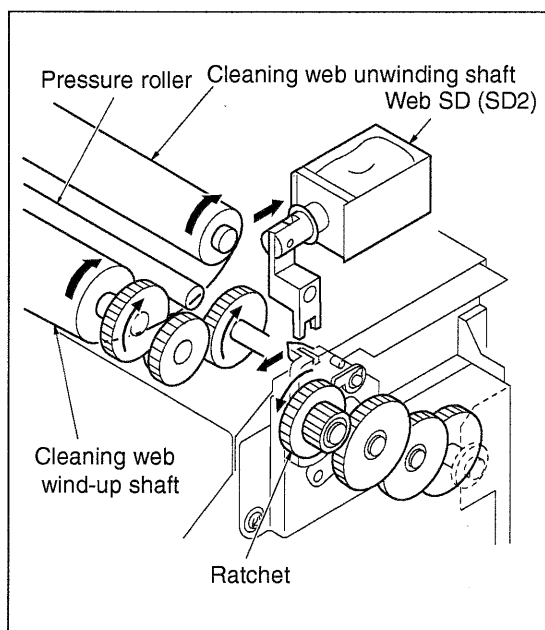
Mechanism	Method
Fixing	Pressure + Heat roller
Heat source *1	Heater lamp(Upper rollers:Two, Lower roller: One)
Cleaning *2	Upper roller: Cleaning web (containing silicon oil)
Upper roller	Aluminum + Teflon coating
Lower roller	Silicon rubber + PFA tube
Separation	Separation claws (six upper and three lower claws)
Temperature detection	Upper roller: - Noncontact type thermistor (for control) TH1 - Contact type thermistor (for fault detection) TH2
Overheat protection	Upper roller: - Noncontact type thermostat (for fault detection) TS1 Lower roller: - Noncontact type thermostat (for fault detection) TS2
Neutralizing	Neutralizing brush
Pressure release	Pressure release shaft and spring
Exit path selection	Reverse/exit selection gate
Decurler *3	Decurler roller + Restriction shaft
Jam detection *4	Jam detection plate + Actuator + Photo sensor

***1 Fixing heater lamps**

Two halogen lamps are used for the fixing upper roller and one halogen lamp is used for the fixing lower roller to reduce the warm-up time and ensure reliable fixing.

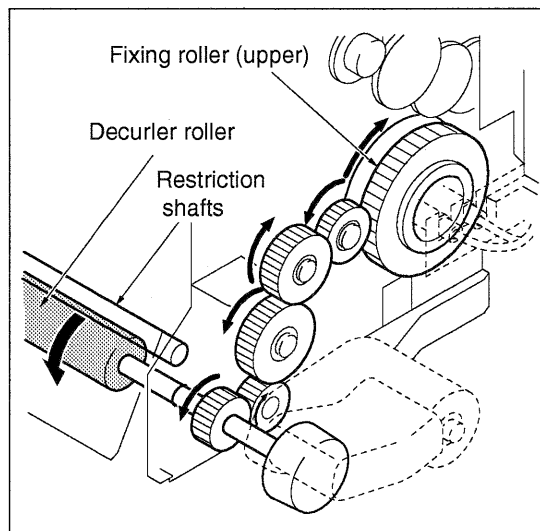
***2 Cleaning**

Cleaning web is used to clean the fixing upper roller. The web SD (SD2) in the main body turns ON/OFF to drive the cleaning web wind-up shaft via the ratchet mechanism and gears, thus supplying cleaning web from the cleaning web unwinding shaft. SD2 is controlled according to the copy count, and cleaning web supplied about 0.025 to 0.05 mm/copy. Cleaning web containing silicon oil is pressed against the fixing roller (upper) by the pressure roller.



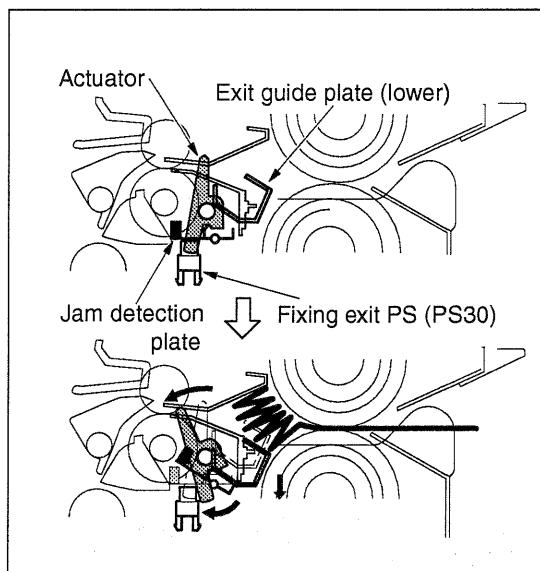
***3 Decurler**

The paper guided by the reverse/exit selection gate is decurled while it passes between the decurler roller and restriction shafts. The decurler roller is driven by the fixing roller (upper) via gears.

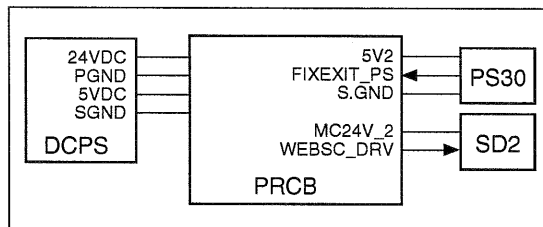


***4 Jam detection**

When a jam occurs in the fixing exit section, the paper exit guide plate (lower) is pressed down, causing the fixing exit PS (PS30) to detect a jam via the jam detection plate and actuator.



[3] M16 (Web Drive) Control



SD2 (web) is controlled by PRCB (printer control board). The related signal is PS30 (fixing exit).

1. Operation

When PS30 is turned ON by passage of paper, SD2 is controlled by PRCB (printer control board) according to the fixing web counter value. The fixing web counter value is incremented together with the total counter in exit section of the main body. The relationship between the fixing web counter values and SD2 (web) is as follows:

Fixing web counter value	SD2 drive count
1 to 12,000	Once per copy
12,001 to 30,000	Once per copy *1
30,001 to 60,000	Once per copy *2
60,001 to 125,000	Once per 2 copies
125,0001 to 260,000	Once per 3 copies
260,001 or more	Once per 6 copies

- *1 SD2 is turned ON once per copy, but is not turned ON once per six copies.
- *2 SD2 is turned ON once per copy, but is not turned ON once per three copies.

2. Signals

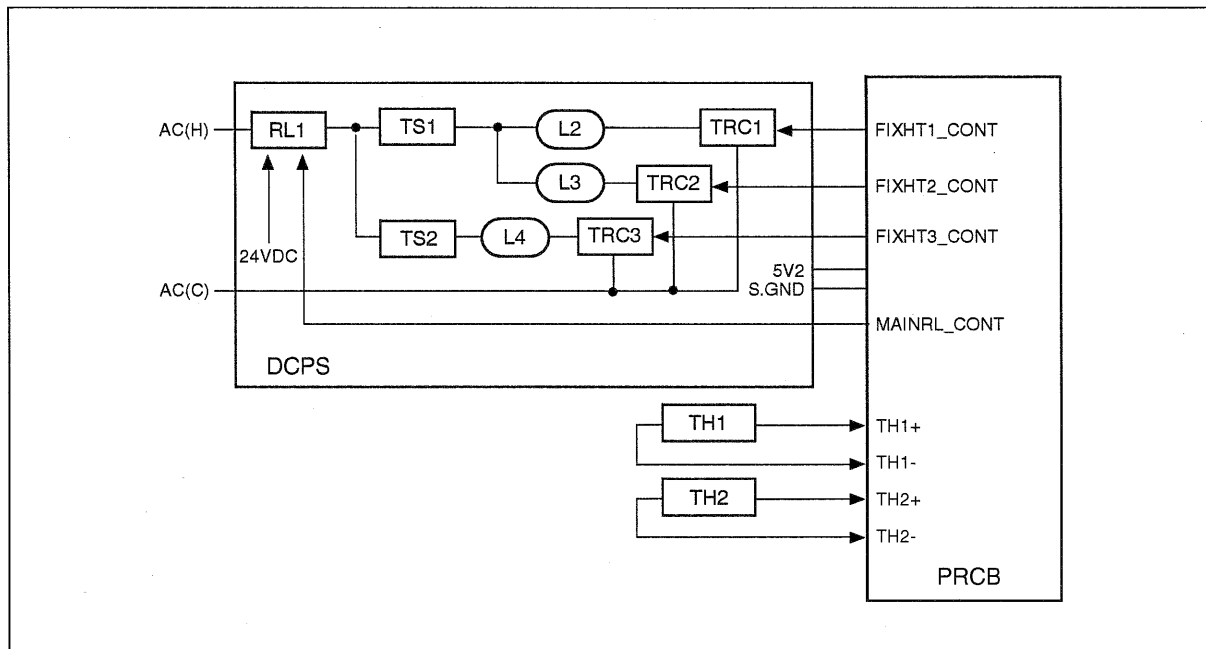
a. PRCB input signal

- (1) FIXEXIT_PS (PS30 to PRCB)
Detection signal of passage of paper at fixing unit exit
[L]: Detected.
[H]: Not detected.

b. PRCB output signal

- (1) WEBSC_DRV (PRCB to SD2)
SD2 (web) drive control signal
[L]: SD2 ON
[H]: SD2 OFF

[4] Fixing Temperature Control



The fixing roller (upper) is heated by L2 (fixing heater lamp 1) and L3 (fixing heater lamp 2) and the fixing roller (lower) is heated by L4 (fixing heater lamp 3). The PRCB (printer control board) detects the temperature of the fixing roller (upper) using TH1 (fixing temperature sensor/1) TH2 (fixing temperature sensor/2) and controls L2 and L3 via DCPS (DC power supply unit).

1. Operation

a. Temperature control

The PRCB (printer control board) turns ON the fixing heater lamp circuit in DCPS as soon as the SW2 (sub power) is turned ON, holding L2 (fixing heater lamp/1), L3 (fixing heater lamp/2), and L4 (fixing heater lamp/3) lit until the fixing roller (upper) reaches the specified temperature. L2, L3 and L4 are turned ON/OFF under the control of the TRC1 (triac/1), TRC2 (triac/2) and TRC3 (triac/3).

b. Protection against abnormal temperature rise

Thermostats are used to prevent the temperature of the fixing rollers from rising abnormally. TS1 (thermostat/U) and TS2 (thermostat/L) are used for the fixing roller (upper/lower). As these thermostat are of the noncontact type, those do not touch the fixing roller (upper/lower).

The operating temperature of the thermostats are as follows:

TS1: Opens at 180°C

TS2: Opens at 110°C

2. Signals

a. PRCB input signals

(1) TH1+,- (TH1 to PRCB)

Fixing roller (upper) temperature detection signal

This signal is used to control the temperature of the fixing roller (upper) and to detect abnormal temperature rise.

(2) TH2+,- (TH2 to PRCB)

Fixing roller (upper) temperature detection signal

This signal is used to detect the fixing roller (upper) abnormal temperature rise.

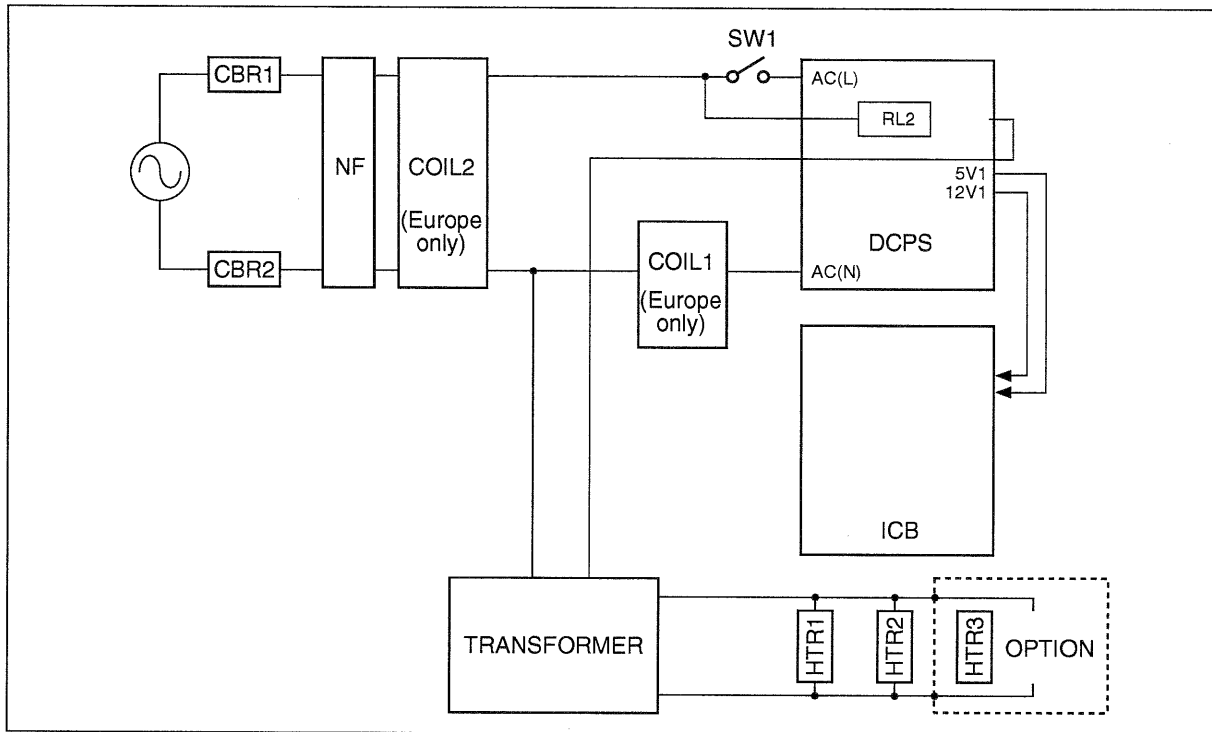
b. PRCB output signals

- (1) FIXHT1_CONT (PRCB to DCPS)
L2 drive control signal
[L]: L2 ON
[H]: L2 OFF
- (2) FIXHT2_CONT (PRCB to DCPS)
L3 drive control signal
[L]: L3 ON
[H]: L3 OFF
- (3) FIXHT3_CONT (PRCB to DCPS)
L4 drive control signal
[L]: L4 ON
[H]: L4 OFF

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OTHER KINDS OF CONTROL

[1] Parts Energized when SW1 (Main Power) is OFF



1. Operation

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

a. CBR1/2 (circuit breaker/1/2)

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 (noise filter)

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

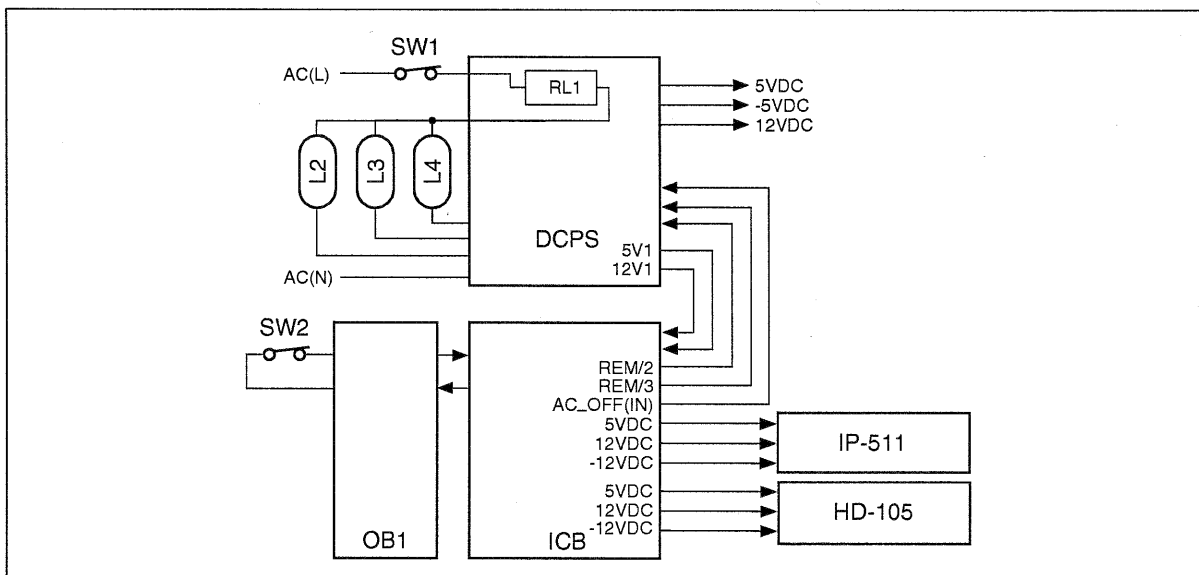
c. DCPS (DC power supply unit)

RL2 (heater relay) is turned ON to turn ON HTR1 (heater/1), HTR2 (heater/2), and HTR3 (drum heater (spare parts)).

d. Internal heaters

HTR1 (heater/1), HTR2 (heater/2), and HTR3 (drum heater (spare parts)) are energized irrespective whether SW1 (main power) is ON or OFF.

[2] Parts that Operate when SW1 (Main Power)/SW2 (Sub Power) is ON



1. Operation

a. Operation performed when SW1 (main power) is ON

When SW1 (main power) is turned ON, AC power is supplied to DCPS (DC power supply unit). As a result, DCPS supplies 5 VDC and 12 VDC to the status management and control circuit on ICB (image control board), HD-105, and IP-511. ICB supplies 5 VDC to OB1 (operation board/1).

b. Operation performed when SW2 (sub power) is ON

If SW2 (sub power) is turned ON when SW1 (main power) is already ON, DCPS supplies 24 DVC for driving various loads. Thus, all boards are energized and initialization of this machine starts.

- (2) AC_OFF (IN) (ICB to DCPS)
 RL1 (main relay) control signal
 [L]: RL1 ON
 [H]: RL1 OFF

2. Signals

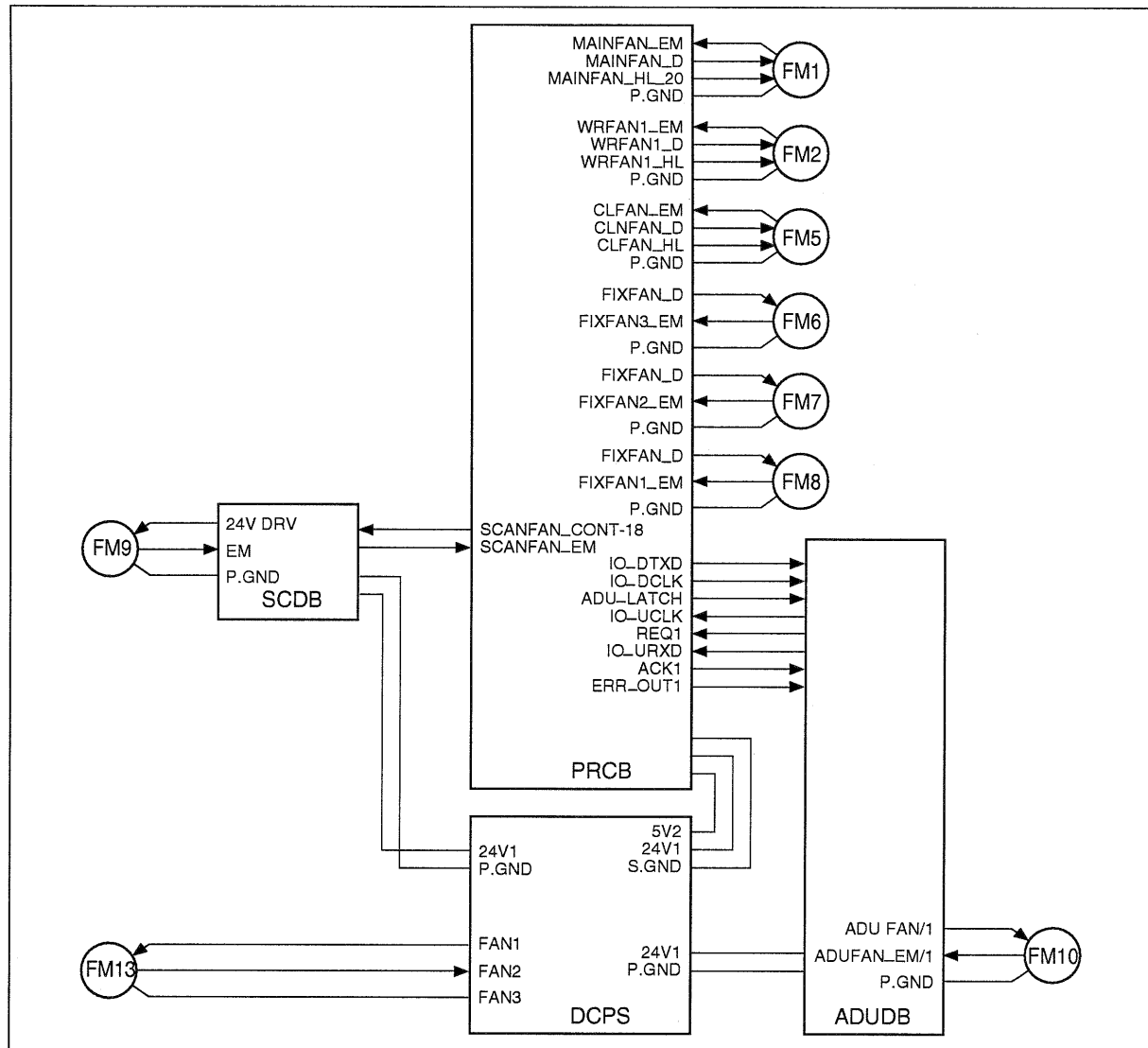
a. Output signals

(1) REM/2, /3 (ICB to DCPS)

The DC voltage output from DCPS (DC power supply unit) is controlled according to the combination of levels of two signals.

REM/2	REM/3	Output
H	H	5V1, 12V1
L	H	5V1, 12V1, 5V2, 12V2, 24V1, -5V1
L	L	5V1, 12V1, 5V2, 12V2, 24V1, -5V1, 24V2

[3] Cooling Fan Control



FM1 (main body cooling/1), FM2 (write section cooling), FM5 (cleaner cooling), FM6 (paper exit /F), FM7 (paper exit/R), and FM8 (main cooling /2) are controlled by PRCB (printer control board) directly. FM9 (scanner cooling) is driven by SCDB (scanner drive board). FM10 (ADU reverse motor cooling) is driven by ADUDB (ADU drive board) and is controlled by PRCB. FM13 (power supply cooling) is driven by DCPS (DC power supply unit).

1. Operation

A 24 VDC motor is used for each cooling fan.

a. FM1 (main body cooling/1)

(1) ON timing

- During warm-up, starts rotating at a low speed when M2 (drum) is turned ON.
- During copying, held rotating at a high speed. When copying is completed, rotates at a high speed for the specified time according to the temperature in the machine, then starts rotating at a low speed.

(2) OFF timing

- During warm-up, stops when M2 (drum) is turned OFF.
- After completion of warm-up, not turned OFF until SW2 (sub power) is turned OFF.

b. FM2 (writing section cooling)

(1) ON timing

Turned ON when M15 (polygon) is turned ON.

- During copying, held rotating at a high speed in sync with M2 (drum).
- When not copying, held rotating at a low speed.

(2) OFF timing

Not turned OFF until SW2 (sub power) is turned OFF.

c. FM5 (cleaner cooling)

(1) ON timing

Turned ON when SW2 (sub power) is turned ON.

- During copying, held rotating at a high speed.
- When copying is completed, starts rotating at a low speed after a lapse of the specified time from turning OFF of M7 (paper exit). After this, switching between high- and low-speed operations takes place according to the temperature in the machine.

(2) OFF timing

Not turned OFF until SW2 (sub power) is turned OFF.

d. FM6 (paper exit/F), FM7 (paper exit/R), and FM8 (main cooling/2)

(1) ON timing

At the start of copying, starts rotating at a constant speed.

(2) OFF timing

Turned OFF when M7 (paper exit) is turned ON.

e. FM9 (scanner cooling)

(1) ON timing

Turned ON when L1 (exposure lamp) is turned ON.

(2) OFF timing

Turned OFF when L1 (exposure lamp) is turned OFF.

f. FM10 (ADU reverse motor cooling)

(1) ON timing

Starts rotating at a constant speed when M9 (ADU reverse) is turned ON.

(2) OFF timing

Turned OFF when M9 (ADU reverse) is turned OFF.

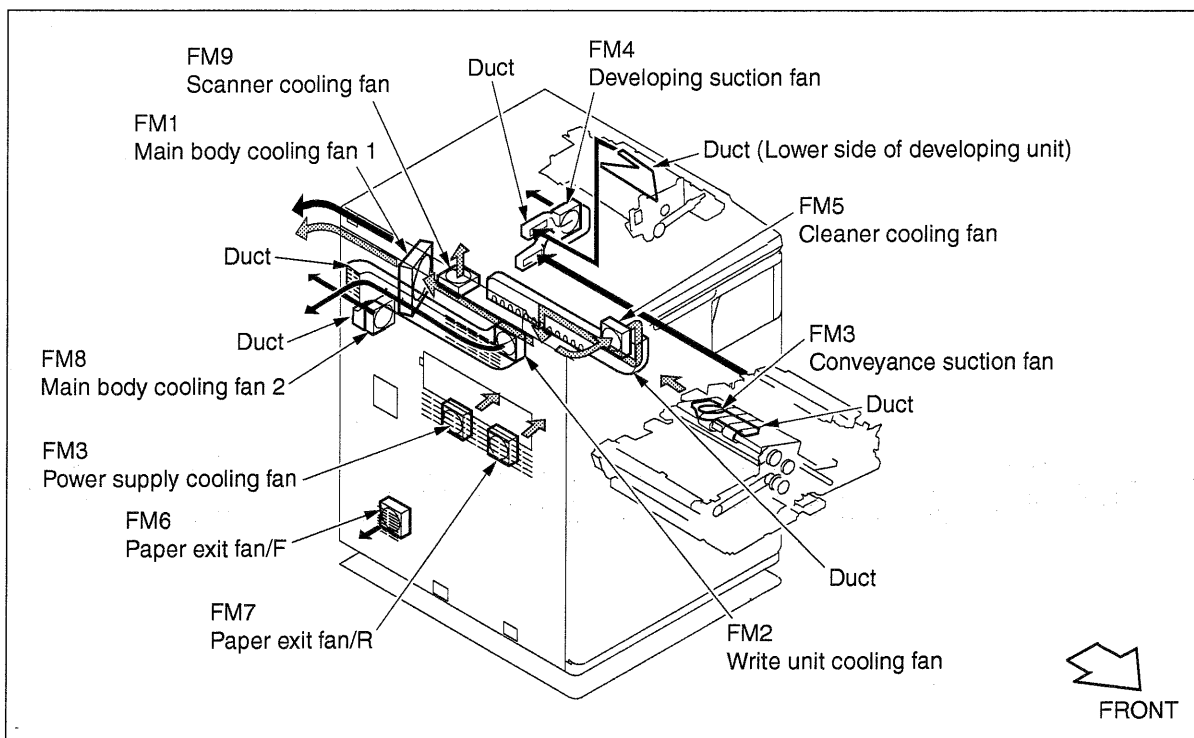
g. FM13 (power supply cooling)

(1) ON timing

Starts rotating at a constant speed when SW1 (main power) is turned ON.

(2) OFF timing

Not turned OFF until SW1 (main power) is turned OFF.

h. Fan air flow

2. Signals

a. Input signals

- (1) MAINFAN_EM (FM1 to PRCB)
FM1 (main body cooling/1) abnormality detection signal
[H]: Abnormality is detected.
- (2) WRFAN1_EM (FM2 to PRCB)
FM2 (writing section cooling) abnormality detection signal
[H]: Abnormality is detected.
- (3) CLFABN_EM (FM5 to PRCB)
FM5 (cleaner cooling) abnormality detection signal
[H]: Abnormality is detected.
- (4) FIXFAN3_EM (FM6 to PRCB)
FM6 (paper exit/F) abnormality detection signal
[L]: FM6 is normal.
[H]: FM6 is abnormal
- (5) FIXFAN2_EM (FM7 to PRCB)
FM7 (paper exit/R) abnormality detection signal
[L]: FM7 is normal.
[H]: FM7 is abnormal.
- (6) FIXFAN1_EM (FM8 to PRCB)
FM8 (main cooling/2) abnormality detection signal
[L]: FM8 is normal.
[H]: FM8 is abnormal.
- (7) EM (FM9 to SCDB)
FM9 (scanner cooling) abnormality detection signal
[L]: FM9 is normal.
[H]: FM9 is abnormal.
- (8) ADUFAN_EM/1 (FM10 to PRCB)
FM10 (ADU reverse motor cooling) abnormality detection signal
[L]: FM10 is normal.
[H]: FM10 is abnormal.
- (9) FAN2 (FM13 to PRCB)
FM13 (power supply cooling) abnormality detection signal
[L]: FM13 is normal.
[H]: FM13 is abnormal.
- (10) SCANFAN_EM (SCDB to PRCB)
FM9 (scanner cooling) abnormality detection signal
[L]: FM9 is normal.
[H]: FM9 is abnormal.

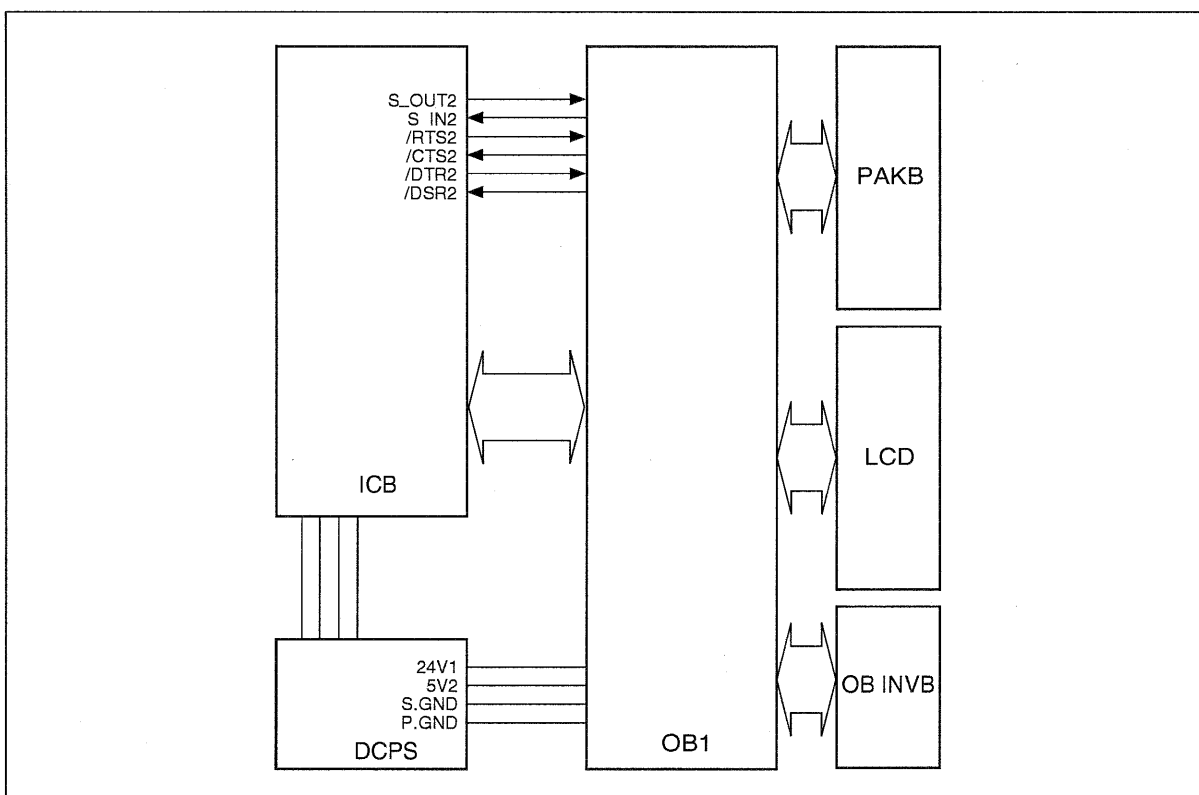
b. Output signals

- (1) MAINFAN_D (PRCB to FM1)
FM1 (main body cooling/1) ON/OFF control signal
[L]: FM1 ON
[H]: FM1 OFF
- (2) MAINFAN_HL_20 (PRCB to FM1)
FM1 (main body cooling/1) rotational speed control signal
[L]: Low speed
[H]: High speed
- (3) WRFAN1_D (PRCB to FM2)
FM2 (writing section cooling) ON/OFF control signal
[L]: FM2 ON
[H]: FM2 OFF
- (4) WRFAN1_HL (PRCB to FM2)
FM2 (write section cooling) rotational speed control signal
[L]: Low speed
[H]: High speed
- (5) CLNFAN_D (PRCB to FM5)
FM5 (cleaner cooling) ON/OFF control signal
[L]: FM5 ON
[H]: FM5 OFF
- (6) CLFFAN_D (PRCB to FM5)
FM5 (cleaner cooling) rotational speed control signal
[L]: Low speed
[H]: High speed
- (7) FIXFAN_D (PRCB to FM6)
FM6 (paper exit/F) rotational speed control signal
[L]: Low speed
[H]: High speed
- (8) FIXFAN_D (PRCB to FM7)
FM7 (paper exit/R) ON/OFF control signal
[L]: FM7 ON
[H]: FM7 OFF
- (9) FIXFAN-D (PRCB to FM8)
FM8 (main cooling/2) ON/OFF control signal
[L]: FM8 ON
[H]: FM8 OFF
- (10) 24V DRV (SCDB to FM9)
FM9 (scanner cooling) ON/OFF control signal
[L]: FM9 ON
[H]: FM9 OFF
- (11) ADU FAN/1 (ADUSDB to FM10)
FM10 (ADU reverse motor cooling) ON/OFF control signal

[L]: FM10 ON
 [H]: FM10 OFF
 (12) FAN1 (DCPS to FM13)
 [L]: FM13 ON
 [H]: FM13 OFF

(13) SCANFAN_CONT-18 (PRCB to SCDB)
 FM9 (scanner cooling) ON/OFF control signal
 [L]: FM9 ON
 [H]: FM9 OFF

[4] Operation Panel Control



The operation panel consists of OB1 (operation board 1), PAKB (panel key board), and LCD (indicator board). The LCD has a backlight which is driven by OB INVB (OB inverter) 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 OB1 (operation board/1) is controlled by sub CPU of OB1 at the command of ICB (image control board).

b. LCD (indicator board) control

(1) LCD (indicator board) display operation

The LCD (image control board) displays various information according to the 4-bit parallel data from ICB (image control board) via OB1 (operation board 1).

(2) Backlight ON operation

The LCD (indicator board) has a backlight (cold cathode tube) to facilitate viewing. The backlight is driven by OB INVB (OB inverter), and controlled by the OB1 (operation board/1).

(3) PAKB (panel key board) control

The LCD (indicator board) has PAKB (panel key board) to allow you to select an item displayed on the LCD directly. PAKB is controlled by OB1 (operation board/1).

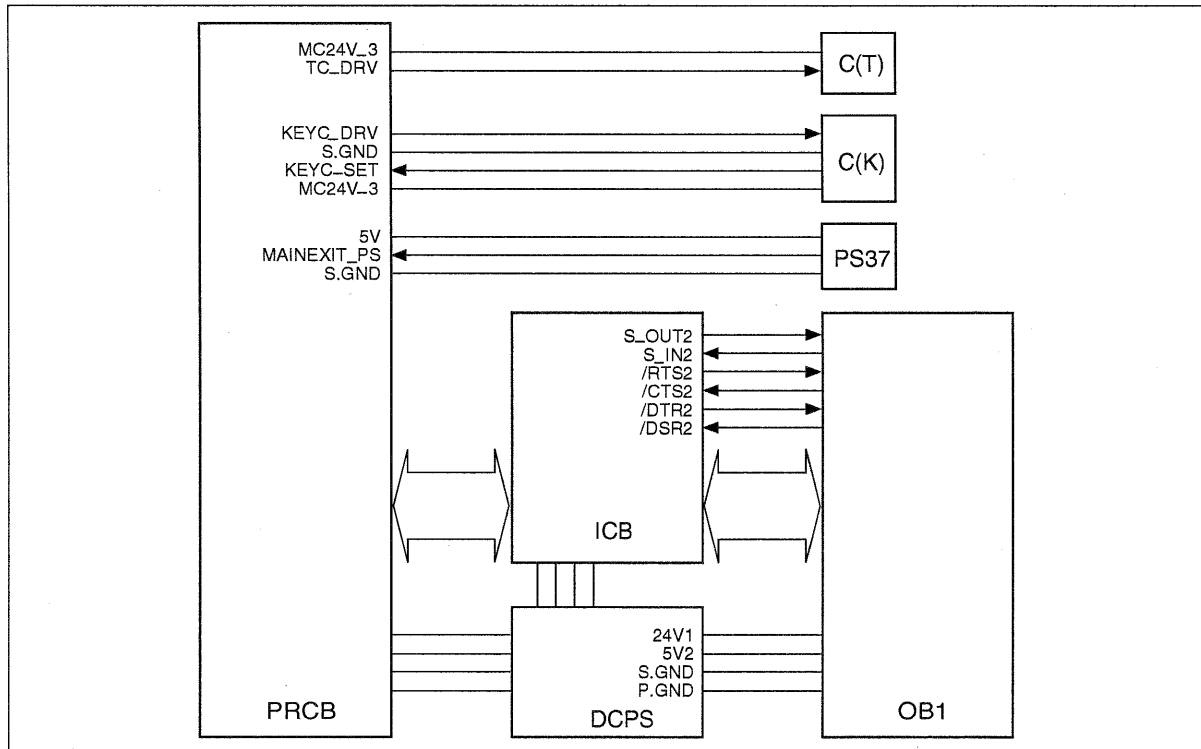
2. Signals

a. Input signals

- (1) S_IN2 (OB1 to ICB)
Serial data which informs ICB (image control board) of the operation state of OB1 (operation board/1).
- (2) /CTS2 (OB1 to ICB)
Signal which indicates that data can be sent from OB1 (operation board/1) to ICB (image control board)
When this signal is at the high level ([H]), ICB stops sending the S_OUT2 signal.
- (3) /DSR2 (OB1 to ICB)
Acknowledgment signal which is returned each time OB1 (operation board/1) receives one-byte data from ICB (image control board)

b. Output signals

- (1) S_OUT2 (ICB to OB1)
Serial data which informs OB1 (operation board /1) of the machine status that is known to ICB (image control board).
- (2) /RTS2 (ICB to OB1)
Signal which indicates that data can be sent from ICB (image control board) to OB1 (operation board/1).
When this signal is at the high level ([H]), OB1 stops sending the S_IN2 signal.
- (3) /DTR2 (ICB to OB1)
Acknowledgment signal which is returned each time ICB (image control board) receives one-byte data from OB1 (operation board/1).

[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 PS37 (paper exit).

1. Operation

This machine counts copies using a software counter.

(1) Paper exit counter

The count increases by 1 each time PS37 (paper exit) which has been ON is turned OFF (two counts in the dual-sided document 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. PRCB input signals

(1) KSYC_SET (C (K) to PRCB)

Signal indicating the state of 24 V power supply to C (K)

[L]: 24V power is not supplied.

b. Output signals

(1) TC_DRV (PRCB to C (T))

C (T) drive control signal

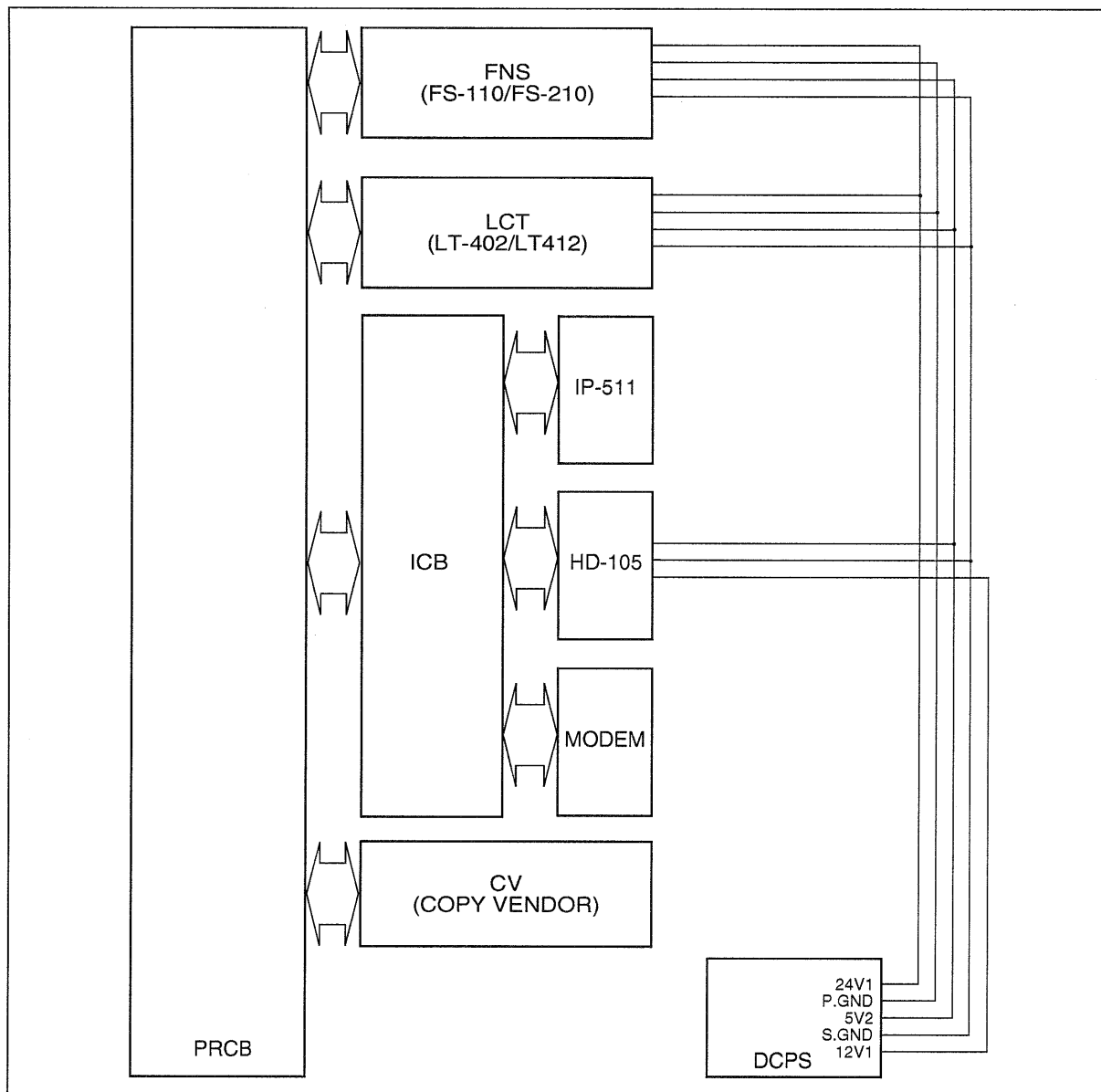
[L]: C (T) ON

(2) KEYC_DRV (PRCB to C (K))

C (K) drive control signal

[L]: C (K) ON

[6] Option Control



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

1. Operation

FNS incorporates CB which exchanges only control data with PRCB (printer control board) of the main body. LCT, FNS, and HDD are powered by the DCPS (DC power supply unit).

<Functions and output timings of signals for copy vendors>

Connector	Pin No.	Signal name	Description	Output timing	Signal type
35	1	DV24V	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	P. GND	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 screen	Double-sided copy selection signal	Output when ADU mode is selected.	
	8	CPF SIG0	CPF mode selection signal	Output when copy or printer mode is selected.	
	9	CPF SIG1			
	10	P. GND	Power ground	-	-