FRESA (G024)

SERVICE MANUAL

[Engine]

⚠IMPORTANT SAFETY NOTICES

PHYSICAL INJURY PREVENTION

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. Note that some printer components are supplied with electrical voltage even if the main switch is turned off.
4. If an adjustment or operation check must be made requiring the removal or opening of the exterior covers while the main switch is on, keep hands away from electrified or mechanically driven components.
5. The printer drives some of its components when it completes the warm-up period. Keep hands away from mechanical and electrical components when the printer starts operation.
6. The interior and metal parts for the fusing unit become extremely hot while the printer is operating. Do NOT touch these components with bare hands.

HEALTH SAFETY CONDITIONS

1. Never operate the printer without ozone filters installed.
2. Always replace the ozone filters with the specified replacement at the specified maintenance intervals.
3. Toner is non-toxic, but if it gets in your eyes by accident, it may cause temporary eye discomfort. Remove it with eye drops or flush eyes with water. If this is unsuccessful, get medical attention immediately.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do NOT incinerate toner cartridges, development toner magazine (DTM) or used toner. Toner dust may ignite suddenly when exposed to an open flame.
2. Dispose of used toner bottle and photoconductor unit (PCU) in accordance with local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.

LASER SAFETY

The Center for Devices and Radiological Health (CDRH) prohibits the repair of laser-based optical units in the field. The optical unit can only be repaired in a factory or at a location with the requisite equipment. The laser subsystem is only replaceable in the field by a qualified Customer Engineer. The laser chassis is not field repairable. Customer engineers are therefore directed to return all chassis and laser subsystems to the factory or service depot when the optical subsystem requires replacement.

⚠WARNING

Use of controls, or adjustment, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

⚠WARNING

WARNING: Turn OFF the main switch before attempting any of the procedures in the Optical Unit section. Laser beams can seriously damage your eyes.

CAUTION MARKING:

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1. OVERALL MACHINE INFORMATION

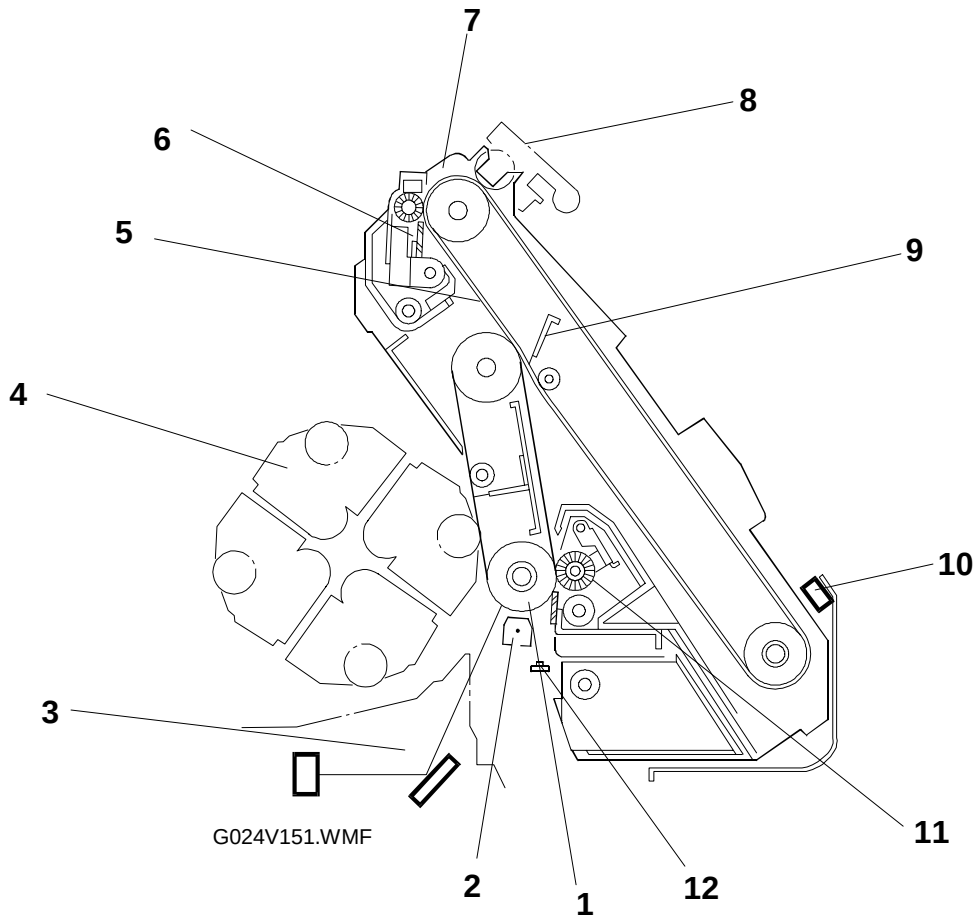
1.1 SPECIFICATIONS

Configuration	Desk top
Print Process	Dry electrostatic transfer system
Resolution	600 dpi
Paper Size	Standard tray Short edge feed: A3, 11" x 17", 8 1/2" x 14", Others* (B4 JIS, 8" x 13", 8 1/4" x 13", 8 1/2" x 13") Long edge feed: A4, 8 1/2" x 11", 7 1/4" x 10 1/2", Others* (B5 JIS, A5, 5 1/2" x 8 1/2") By-pass feed tray* Short edge feed: A3, A6, B4 JIS, B6 JIS, 11" x 17", 8 1/2" x 14", 8" x 13", 8 1/4" x 13", 8 1/2" x 13" Long edge feed: A4, A5, B5 JIS, 8 1/2" x 11", 5 1/2" x 8 1/2", 7 1/4" x 10 1/2" Custom size paper (Length: 148 to 432 mm, Width: 90 to 297 mm) * Specify the paper size with the system menu (at the operation panel by the user).
Paper Weight	Standard and optional trays: 64 to 105 g/m^2 (17 to 28 lbs.) By-pass feed tray: 64 to 157 g/m^2 (17 to 42 lbs.) Plain paper mode: 64 to 105 g/m^2 Thick paper mode: 105 to 157 g/m^2, adhesive labels OHP transparency mode: OHP transparencies
First Printout Time	Color: Less than 30 seconds (A4) Monochrome: Less than 14 seconds (A4)
Print Speed	Color: 5 ppm (A4/8 1/2" x 11") Monochrome: 17 ppm (A4/8 1/2" x 11")
Warm-up Time	Less than 450 seconds (at 23°C/73°F)
Paper Capacity	Standard tray: 250 sheets (80 g/m^2, 20 lbs.) By-pass feed tray: 50 sheets (80 g/m^2, 20 lbs.) Optional trays: 500 sheets (80 g/m^2, 20 lbs.)
Paper Output Capacity	250 sheets (A4/8 1/2" x 11" or less) 100 sheets (More than A4/8 1/2" x 11")
Output Method	Face down

Power Supply	120 V, 60 Hz, 10 A 220 to 240 V, 50/60 Hz, 5.2 A
Power Consumption	Maximum: Less than 1200 W Average during printing: Less than 750 W Standby mode: Less than 150 W Energy saver mode: Less than 45 W
Noise Emission (Sound Power Level)	Stand-by: Less than 43 dB Operating: Less than 64 dB (without paper tray unit) Less than 66 dB (with paper tray unit)
Dimensions	660 x 625 x 475 mm (26" x 24.6" x 18.7") (without paper tray unit)
Weight	Approximately 62 kg (136.7 lbs.) (including controller)
Options	Paper Feed Unit Type 305 (Paper Tray Unit) – up to two of these units can be installed

1.2 MECHANICAL OVERVIEW

1.2.1 IMAGE FORMATION PROCESS OVERVIEW



1. OPC belt
2. Charge
3. Exposure
4. Development
5. Transfer belt
6. Transfer belt cleaning
7. Paper separation
8. Paper transfer (secondary transfer)
9. Belt transfer (primary transfer)
10. ID sensor
11. OPC belt cleaning
12. Quenching

(1) OPC belt

The OPC (organic photoconductor) belt is the central part of the machine. This is where the laser beam writes an image of the original.

(2) Charge

A negative corona discharge in darkness negatively charges the OPC belt. The grid ensures the even distribution of charge over the OPC belt.

(3) Exposure

The laser beam from the laser diode (LD) goes through the lens and the mirror and reaches the OPC belt. The beam discharges the areas of the OPC belt that it illuminates. Turning the laser beam on and off, and varying the intensity of the beam, creates a latent image on the OPC belt.

(4) Development

The development section consists of four independent development units, one for each color (Y, C, M, and K) and the structure necessary to support them. These modules are known as DTMs (Development Toner Magazines).

This unit forms visual images by allowing toner to adhere to portions of the OPC belt where negative potentials are lower than the development bias. In this machine, monocomponent toner is used (there is no carrier).

In black single-color mode (1C), the image is developed in K only. In full color mode (4C), the image is developed in Y, C, M, and K, in that order.

(5) Transfer

This printer uses a transfer belt. Four toner images, each a different color, are super-imposed onto each other on the transfer belt. The combined image is then transferred to the paper.

(6) Transfer belt cleaning

A cleaning brush applies lubricant to the transfer belt to improve cleaning. Then, a blade scrapes off the remaining toner on the transfer belt.

(7) Paper separation

Paper separates from the transfer belt when the belt curves away from it. The roller at the end of the transfer belt is 31 mm in diameter.

(8) Paper transfer (secondary transfer)

A charge applied to the transfer roller attracts the toner from the transfer belt onto the paper.

(9) Belt transfer (primary transfer)

A charge applied to the bias roller attracts toner from the OPC belt onto the transfer belt.

(10) ID sensor

The ID sensor detects the density of the ID sensor pattern on the transfer belt. The ID sensor outputs determine the process control conditions.

(11) OPC belt cleaning

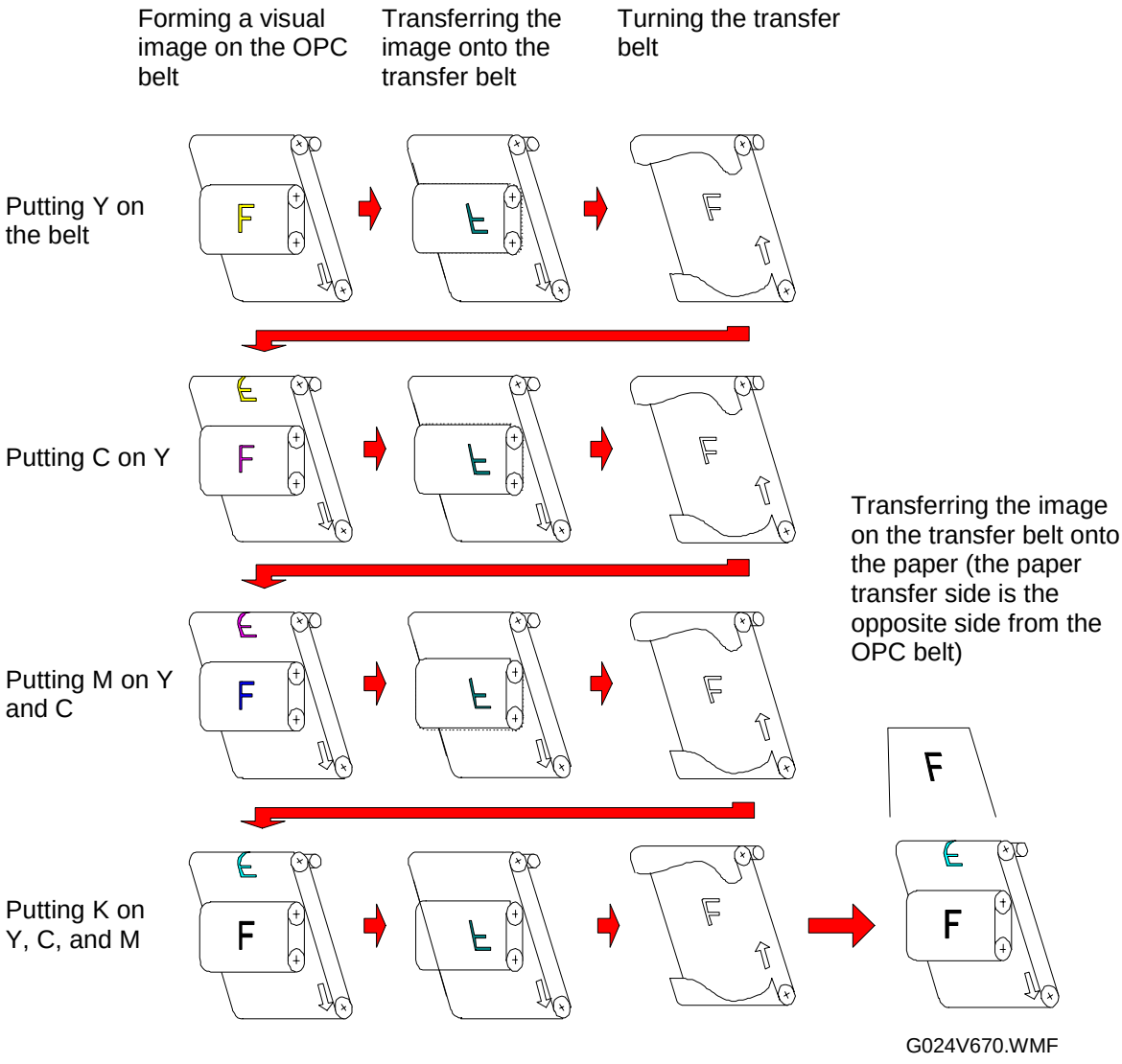
A cleaning brush applies lubricant to the OPC belt to improve cleaning. Then, a blade scrapes off the remaining toner on the OPC belt.

(12) Quenching

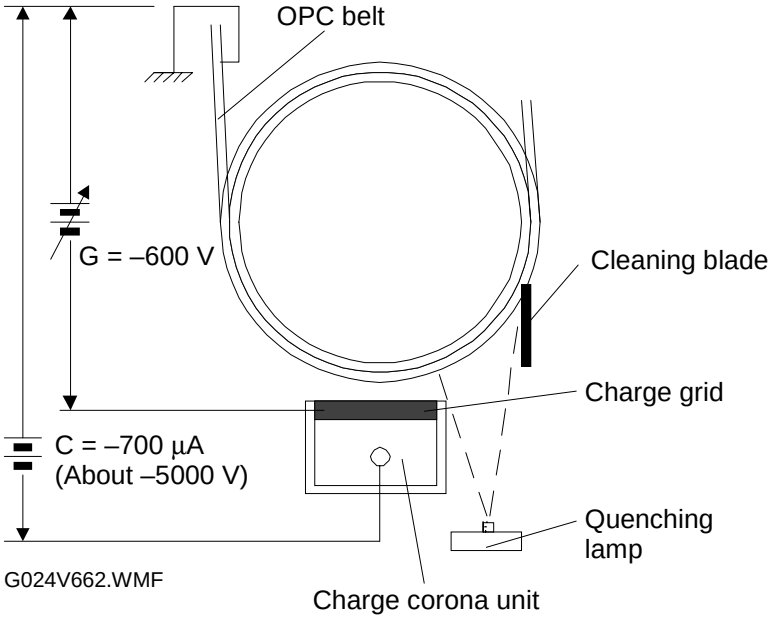
After cleaning, the entire surface of the OPC belt is exposed to light from a red LED. This quenches the residual potential on the OPC belt, in preparation for the next image.

1.2.2 TRANSFER

An image is formed on the OPC belt in four colors, one color at a time. The resulting four images transfer to the transfer belt in the order of Y, C, M, then K. These four images form a full-color image on the transfer belt, then the image is finally transferred to the paper.



1.2.3 CHARGE CORONA UNIT VOLTAGES



The charge corona wire receives a constant current (C) of – 700 µA (about – 5000 V).

The charge grid voltage (G) varies depending on the process control results.

Range: –320 V to –820 V

Default: –600 V

1.2.4 DEVELOPMENT UNIT BIAS VOLTAGES

Each development unit contains a supply roller and a development roller. These rollers are conductive. The voltage applied to the supply roller (SB) depends on the process control results. The other voltages in turn all depend on SB, as described below.

SB (supply roller bias)

Default: -348 V

Range: -218 V to –468 V

BL (development blade bias)

This is always SB – 132 V. If SB changes, so does BL.

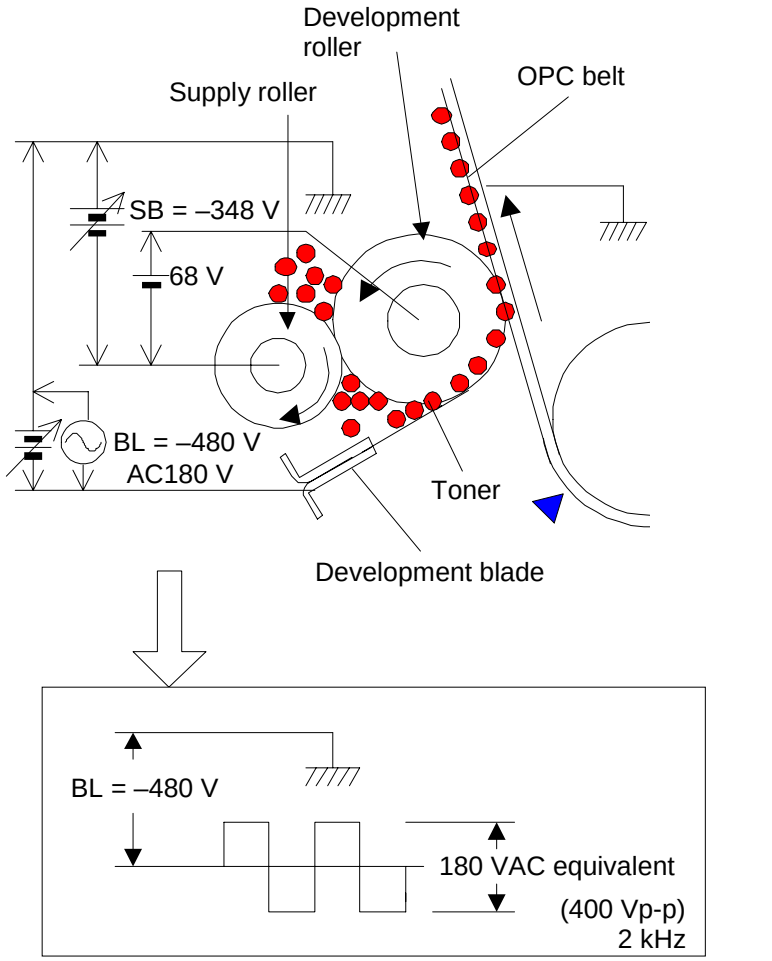
Default: -480 V

180 Vac is always super-imposed over this voltage.

B (development roller voltage)

This is always SB +68 V. If SB changes, so does B.

The development roller voltage (B) is the V_B determined during process control.



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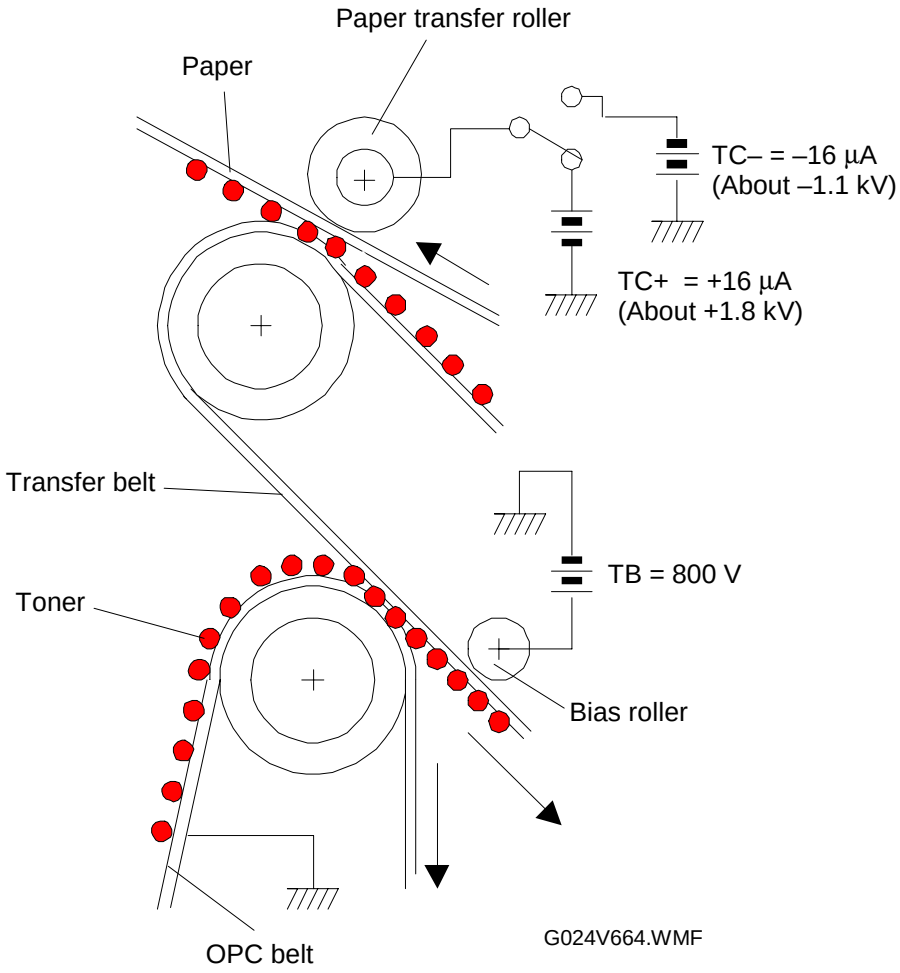
1.2.5 TRANSFER BIAS VOLTAGES



Primary transfer (from OPC belt to transfer belt)

An 800-V bias voltage (TB) is applied to the bias roller. This attracts the toner from the OPC belt.

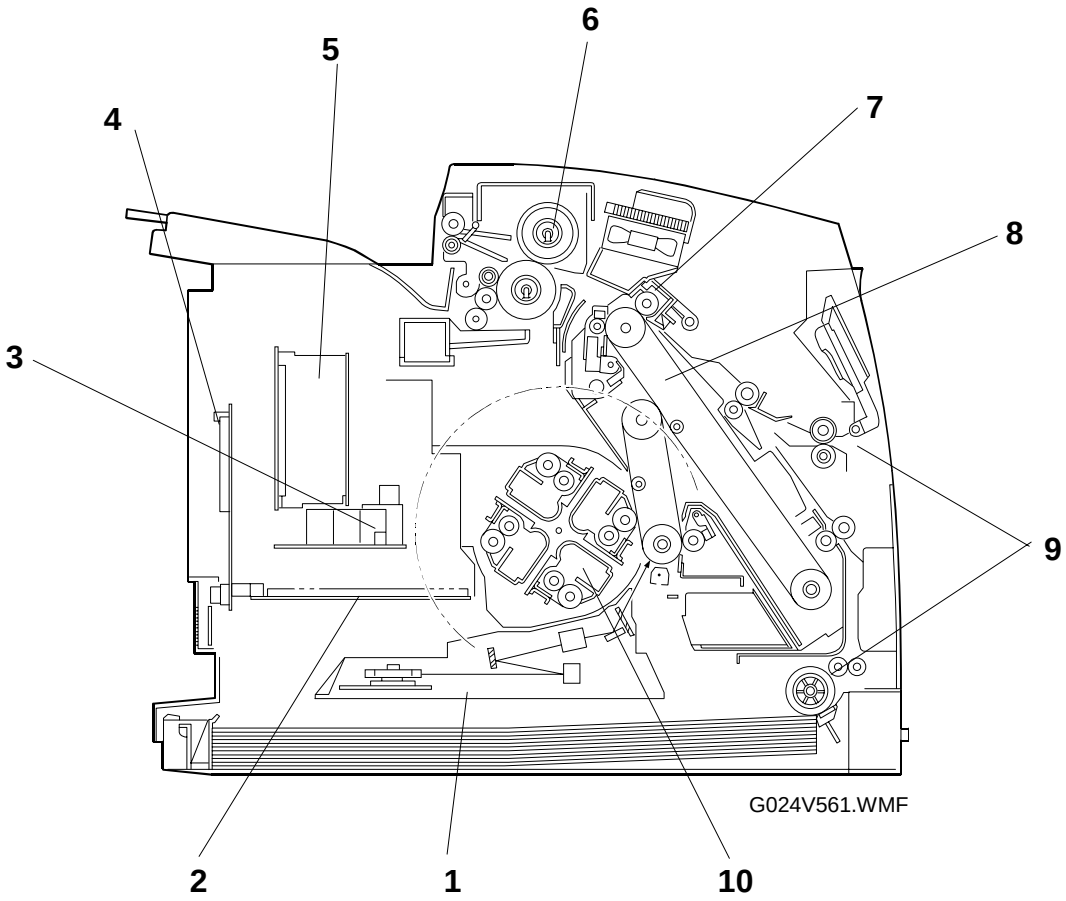
Secondary transfer (from transfer belt to paper)

A constant +16 µA current (TC) is supplied to the paper transfer roller (at about 1.8 kV) to attract the toner from the transfer belt.

The machine adjusts the transfer current automatically for variations in temperature, humidity, paper size, and paper thickness.

After a paper jam has occurred, the paper transfer roller must be cleaned. Positive and negative currents are supplied alternately to repel any particles that got stuck on the roller as a result of the paper jam.

1.3 MAIN UNIT LAYOUT



1. Optical housing unit
2. Main control unit (MCU)
3. High voltage supply unit
4. Controller board
5. Power supply unit
6. Fusing unit
7. Paper transfer unit
8. Photoconductor unit (PCU)
9. Paper tray/paper feed mechanism
10. Development unit

(1) Optical housing unit

- Optical system: 6-sided polygon mirror, F-theta mirror, BTL
- Resolution: 600 dpi
- Modulation method: PM+PWM

(2) MCU

- CPU: XC68334 GFC16
- Engine system control
- Process control
- Video interface

(3) High voltage supply unit

- Constant current: Paper transfer, charge corona wire
- Constant voltage: Charge corona grid, belt transfer, supply roller, development blade

(4) Controller board

- Host interface
- Video interface
- Image processing
- Operation panel control

(5) Power supply unit

- Outputs: +5 VDC, +24 VDC, 120/230 VAC

(6) Fusing unit

- Fusing method: Hot roller method
- Oil application: Application roller method
- Cleaning: Cleaning roller method
- Temperature detection: Thermistor
- Safety precaution: Thermofuse

(7) Paper transfer unit

- Transfer: Transfer roller method

(8) PCU

A unit consisting of the OPC belt and the primary (belt) transfer section.

- OPC belt: 93mm diameter
- Charging: Single scorotron charge corona wire
- Primary transfer: Transfer belt
- Cleaning: Counter blade
- Lubricant: Zinc stearate

(9) Tray/transport

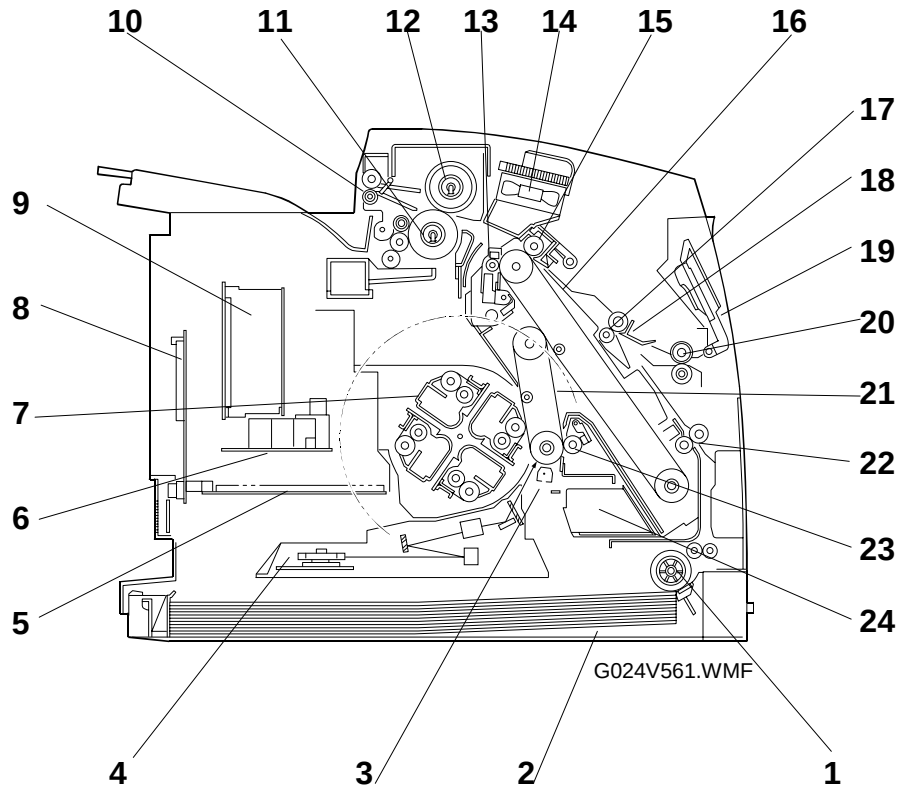
- Standard tray: Universal tray, friction pad separation
  By-pass tray: FRR method

(10) Development unit

- Development method: Monocomponent non-magnetic toner
- Development unit changeover: Revolver method
- Toner replenishment: DTM change

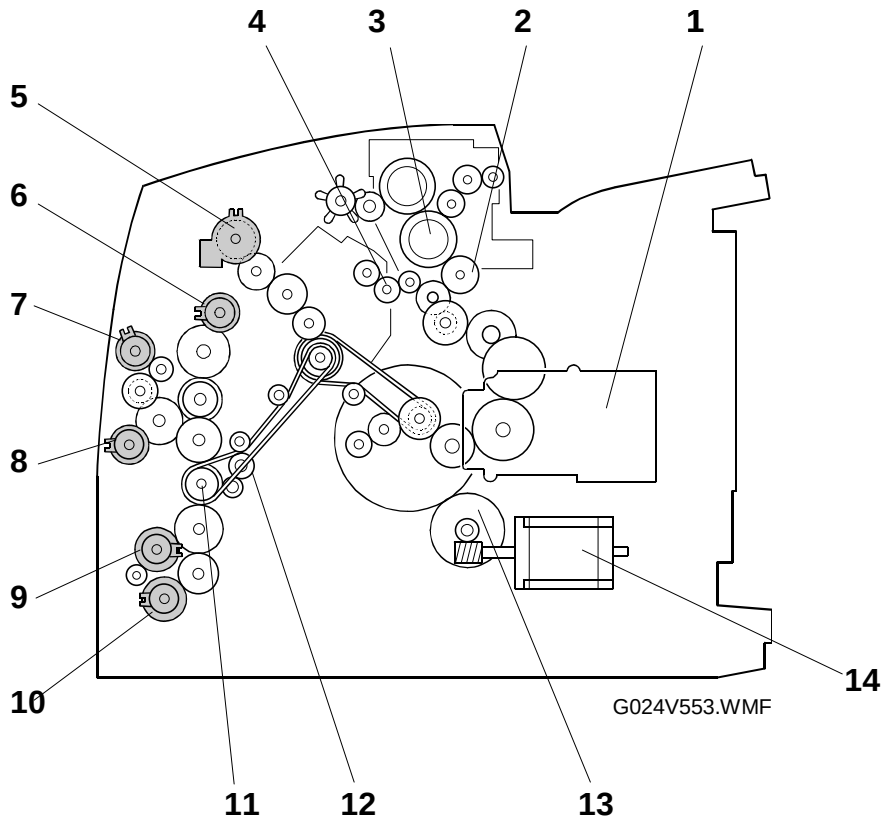
1.4 PARTS LAYOUT

1.4.1 MECHANICAL COMPONENT LAYOUT

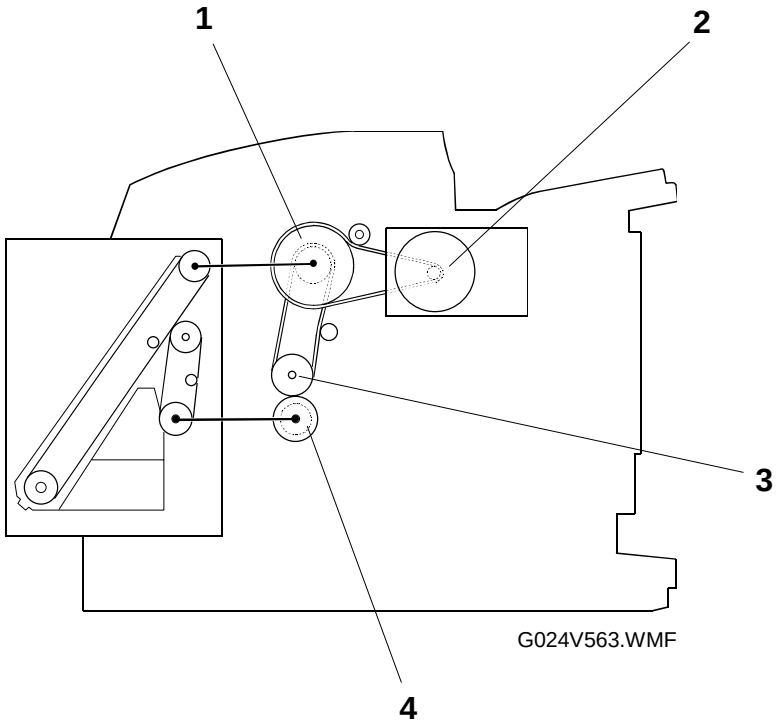


1. Tray paper feed roller
2. Paper tray
3. Charge corona unit
4. Polygon mirror
5. MCU (Main control unit)
6. High voltage supply unit
7. Development unit
8. Controller board
9. Power supply unit
10. Exit rollers
11. Hot roller
12. Pressure roller
13. Transfer belt cleaning unit
14. Transport fan
15. Paper transfer unit
16. Transfer belt
17. Registration rollers
18. Registration sensor
19. By-pass feed table
20. By-pass paper feed roller
21. OPC belt
22. Relay rollers
23. OPC belt cleaning unit
24. Used toner tank

1.4.2 DRIVE LAYOUT

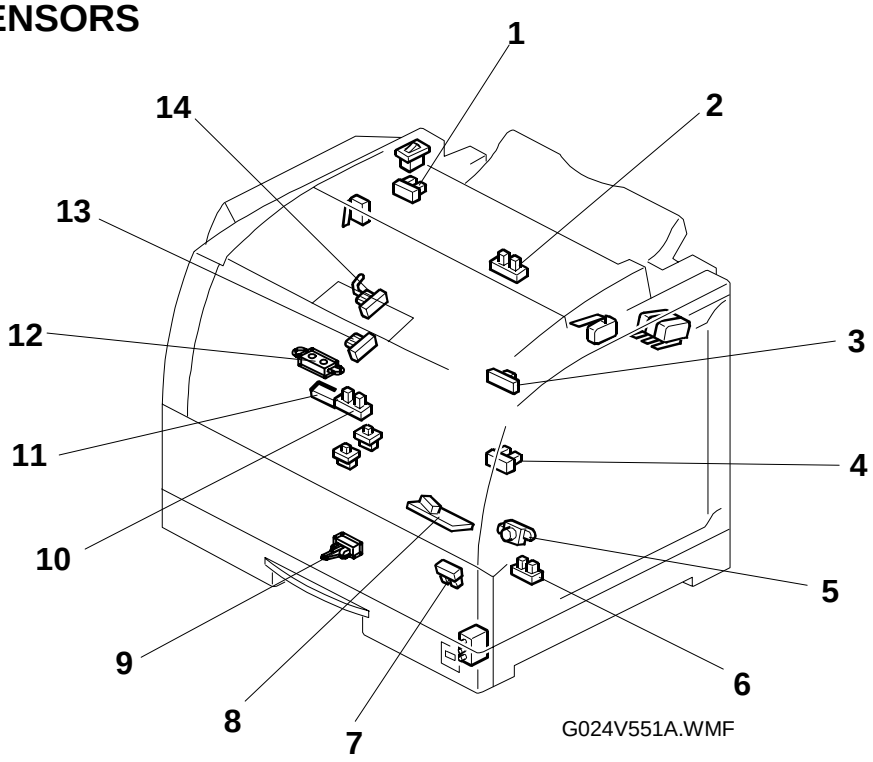


1. Main motor
2. Fusing drive input gear
3. Fusing drive gear
4. Transfer belt toner collection drive gear
5. Transfer roller clutch
6. Registration clutch
7. By-pass feed clutch
8. Relay roller clutch
9. Pull-out clutch
10. Paper feed clutch
11. Paper feed drive gear
12. OPC cleaning drive gear
13. Revolver drive gear
14. Revolver motor



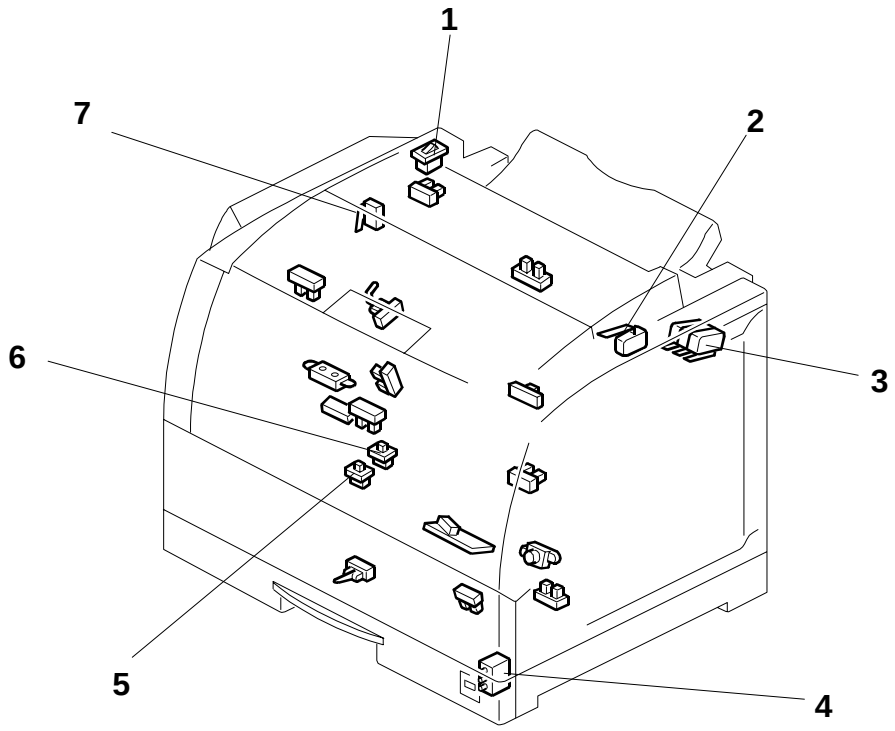
1. PCU pulley
2. PCU motor
3. OPC drive relay gear
4. OPC drive gear

1.4.3 SENSORS



1. Exit sensor
2. Oil end sensor
3. Transfer belt H.P. sensor
4. Transfer roller position sensor
5. Used toner sensor
6. PCU reset sensor
7. Paper end sensor
8. ID sensor
9. Pull-out sensor
10. By-pass paper end sensor
11. Registration sensor
12. Toner end sensor
13. Revolver H.P. sensor
14. Development toner magazine (DTM) set sensor

1.4.4 SWITCHES



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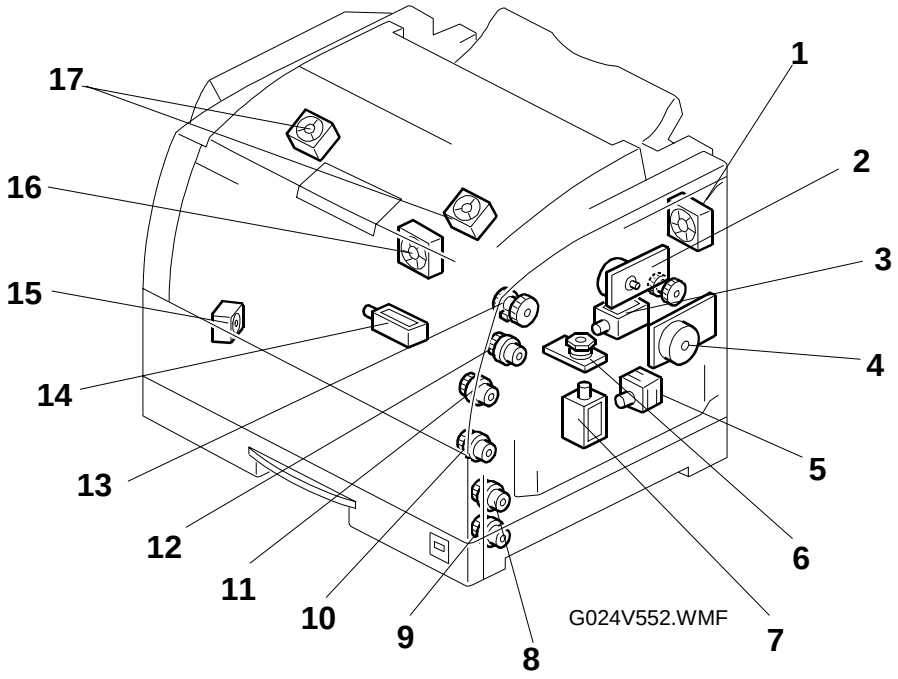
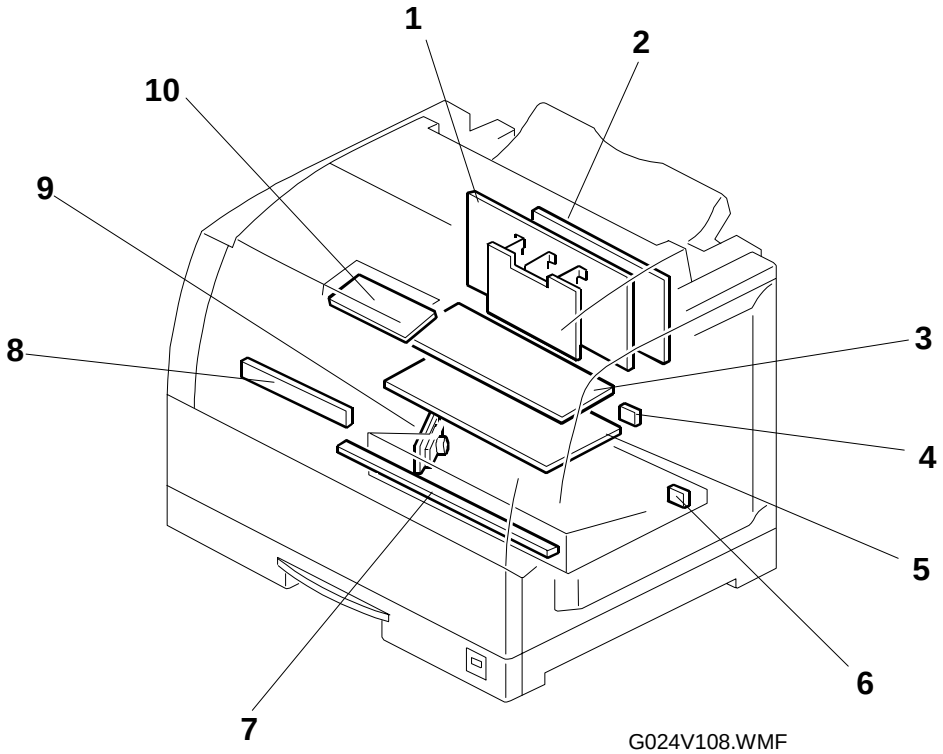
1. Main switch
2. Exit cover switch
3. Door safety switches
4. Paper size switch
5. PCU set switch
6. Charge corona unit set switch
7. Development toner magazine (DTM) cover switch

1.4.5 MOTORS, CLUTCHES, AND SOLENOIDS



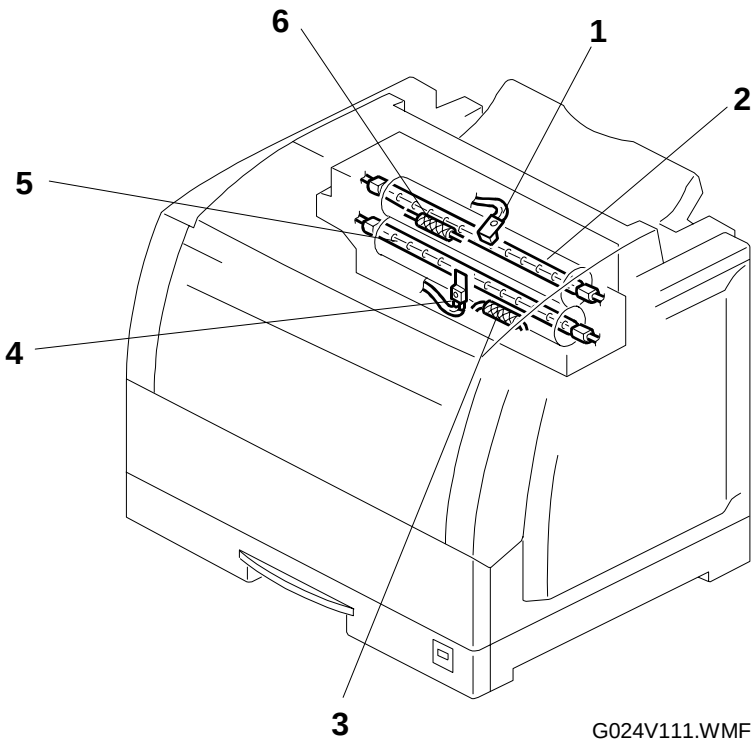
1. Exhaust fan
2. PCU motor
3. Transfer belt cleaning solenoid
4. Main motor
5. Revolver motor
6. Polygon mirror motor
7. Development drive solenoid
8. Pull-out clutch
9. Paper feed clutch
10. Relay roller clutch
11. By-pass feed clutch
12. Registration clutch
13. Transfer roller clutch
14. By-pass feed solenoid
15. Charge inlet fan
16. Inlet fan
17. Transport fans

1.4.6 PCBS AND PSU



1. Power supply unit (PSU)
2. Controller board
3. High voltage supply board
4. Temperature/humidity sensor
5. Main control unit (MCU)
6. Laser synchronization detector board
7. Quenching lamp
8. By-pass paper width detection board
9. Laser diode (LD) unit
10. Operation panel

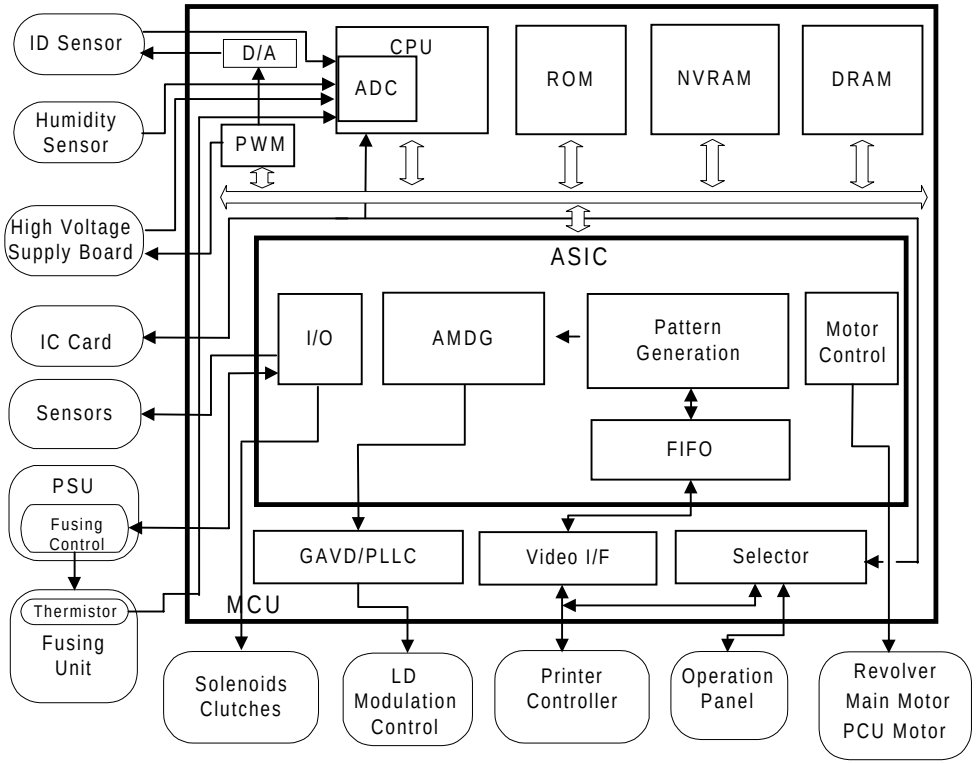
1.4.7 THERMISTORS, HEATERS, AND FUSES



1. Pressure roller thermistor
2. Pressure roller lamp
3. Hot roller thermofuse
4. Hot roller thermistor
5. Hot roller lamp
6. Pressure roller thermofuse

1.5 SYSTEM BLOCK

1.5.1 BLOCK DIAGRAM



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1.6 ELECTRICAL COMPONENT LIST

1.6.1 SENSORS

Symbol	Name	Function	Index No.
S19	Exit sensor	Detects exiting paper.	1
S17	Oil end sensor	Detects oil in the oil pan.	2
S14	Transfer belt H.P. sensor	Detects the marks on the transfer belt.	3
S11	Transfer roller position sensor	Detects when the transfer roller contacts the transfer belt.	4
S2	Used toner sensor	Detects when the used toner tank is full.	5
S4	PCU reset sensor	Detects when a new PCU has just been installed.	6
S5	Paper end sensor	Detects when paper in the first tray has run out.	7
S8	ID sensor	Detects the toner pattern density on the transfer belt.	8
S6	Pull-out sensor	Detects paper fed from the paper tray.	9
S10	By-pass paper end sensor	Detects paper in the by-pass tray.	10
S15	Registration sensor	Detects paper at the registration roller.	11
S12	Toner end sensor	Detects whether there is toner in the DTM.	12
S13	Revolver H.P. sensor	Detects when the revolver is at home position.	13
S16	DTM set sensor	Detects whether a DTM has been installed.	14

1.6.2 SWITCHES

Symbol	Name	Function	Index No.
SW1	Main switch	Makes and breaks the 120/230 VAC input power.	1
SW2	Exit cover switch	Detects when the exit cover is opened/closed.	2
SW3	Door safety switches	Makes and breaks 24 VDC and LD5V.	3
S7	Paper size switch	Detects the paper size in the standard tray set on the dial by the user.	4
S1	PCU set switch	Detects whether the PCU and used toner tank are installed.	5
S3	Charge corona unit set switch	Detects whether the charge corona unit is installed.	6
SW4	DTM cover switch	Detects when the DTM cover is opened/closed.	7

1.6.3 MOTORS

Symbol	Name	Function	Diag. No.
M4	Main motor	Drives the paper feed mechanisms, fusing unit, and development roller.	4
M2	PCU motor	Drives the OPC belt and transfer belt.	2
M1	Revolver motor	Drives the revolver (development).	5
M3	Polygon mirror motor	Drives the polygon mirror.	6

1.6.4 SOLENOIDS

Symbol	Name	Function	Diag. No.
SOL1	By-pass feed solenoid	Releases the by-pass tray pull-out roller.	14
SOL2	Transfer belt cleaning solenoid	Moves the transfer belt cleaning unit into contact and away from the transfer belt.	3
SOL3	Development drive solenoid	Connects the development unit to drive from the main motor.	7

1.6.5 CLUTCHES

Symbol	Name	Function	Diag. No.
CL5	Pull-out clutch	Controls the pull-out roller drive.	8
CL2	Paper feed clutch	Controls the first tray paper feed roller drive.	9
CL3	Relay roller clutch	Controls the relay roller drive.	10
CL1	By-pass feed clutch	Controls the by-pass tray paper feed roller drive.	11
CL4	Registration clutch	Controls the registration roller drive.	12
CL6	Transfer roller clutch	Moves the transfer roller into contact and away from the transfer belt.	13

1.6.6 FANS

Symbol	Name	Function	Diag. No.
FM2	Exhaust fan	Expels air from inside the printer; ozone is broken down by an ozone filter	1
FM5	Charge inlet fan	Prevents ozone from being trapped in the charge corona unit.	15
FM4	Inlet fan	Ventilates and cools the printer.	16
FM1 FM3	Transport fan	Applies suction to the back side of the paper after image transfer, guiding the paper to the fusing unit entrance.	17

1.6.7 CIRCUIT BOARDS AND POWER SUPPLIES

Symbol	Name	Function	Diag. No.
PCB1	Power supply unit (PSU)	Supplies low-voltage power (5 VDC and 24 VDC) and ac power to the fusing unit.	1
PCB8	Controller board	Houses the controller, host interface, engine interface, and image generator.	2
PCB3	High voltage supply board	Supplies high voltages for charge, development, and transfer.	3
S9	Temperature/humidity sensor	Detects temperature and humidity.	4
PCB2	Main control unit (MCU)	Houses the controller interface and engine controller.	5
PCB4	Laser synchronization detector board	Detects the laser main scan synchronization beam from the polygon mirror.	6
L3	Quenching lamp	Quenches the OPC by exposing it to light.	7
PCB6	By-pass paper width detection board	Detects the paper width in the by-pass feeder.	8
PCB5	Laser diode (LD) unit	Controls laser beam output.	9
PCB7	Operation panel	Displays information and allows access to functions.	10

1.6.8 THERMISTORS

Symbol	Name	Function	Diag. No.
TH1	Pressure roller thermistor	Detects the pressure roller temperature.	1
TH2	Hot roller thermistor	Detects the hot roller temperature.	4

1.6.9 FUSES

Symbol	Name	Function	Diag. No.
TF2	Pressure roller thermofuse	Provides protection against abnormal heating (250 VAC, 10 A, 167°C).	6
TF1	Hot roller thermofuse	Provides protection against abnormal heating (250 VAC, 10 A, 167°C).	3

1.6.10 LAMPS

Symbol	Name	Function	Diag. No.
L2	Pressure roller lamp	Heats the pressure roller (120/230 VAC, 400 W)	2
L1	Hot roller lamp	Heats the hot roller (120/230 VAC, 600 W)	5

2. DETAILED SECTION DESCRIPTIONS

2.1 PROCESS CONTROL

2.1.1 OVERVIEW

In this machine, process control adjusts the following two parameters, to compensate for changes in the environment, aging of the units, and differences between individual units after they are replaced.

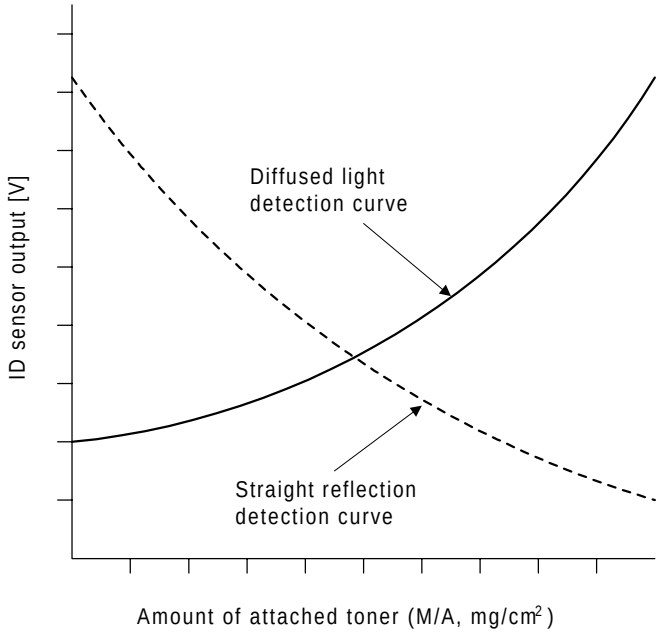
- Development bias (V_B): This is adjusted to maintain a consistent image density in solid areas
- Charge corona grid voltage (V_G): This is adjusted to maintain a constant image density in low image density (highlight) areas.

To monitor the machine's condition, only the ID sensor is used. There are no toner density or potential sensors.

The ID sensor monitors the density of standard sensor patches made on the transfer belt.

This printer uses a single-component toner. Unlike printers based on a two-component toner, this printer does not need toner density control.

2.1.2 ID SENSOR



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The ID sensor consists of two separate sensors. For detecting the density of black toner patterns, there is a straight reflection sensor for K toner (this is the type of sensor normally used in black-and-white copiers), and for colored toner there is a diffused light sensor. Both sensors share the same LED, but have separate light receivers for K and color toners. However, the LED current (light intensity) used for detecting black toner is different from the one used to detect colored toner.

As shown in the diagram, the output from the straight reflection sensor decreases as the amount of attached toner (M/A: mass/area) increases. This is because black toner is blocking the reflection of light back into the sensor from the transfer belt (the transfer belt itself is black, but it is reflective). However, the diffused light sensor output increases for higher M/A, because colored toner is reflective.

The diffused light sensor is more accurate for detecting colored toner, no matter how much or how little toner is present. However, if the amount of toner on the transfer belt is small, the low level of reflected light means that without an initial calibration, the error in detection could be very great.

The diffused light sensor cannot be used for black toner, because there is little difference between the diffuse light reflected from black toner and from the transfer belt surface.

2.1.3 PROCESS CONTROL STEPS

Process control is done on seven separate occasions (see the 'Occasion' column in the table below).

Process control consists of several steps. The steps that are done depend on which of the seven occasions has arisen. The steps that are done for each occasion are given in the 'Steps done' column of the following table.

① ID sensor calibration

② K development bias initialization

③ Color development bias initialization

④ Charge grid bias voltage adjustment

⑤ Y, C, M, and K bias fine adjustment

⑥ Process control interval counter reset

Situation	Condition	Steps done
Forced process control	When forced process control is done (engine SP mode 7. Process Ctrl - Initialize)	① through ⑥
Process control regular interval	When more than 100 sheets in 4C mode (or an equivalent number of sheets in another mode) have been printed upon completion of a job. (The interval can be changed with engine SP 7 Process Control – Interval Set)	①, ④, ⑤, ⑥
Power on	When the fusing temperature is 80°C or lower just after the power is turned on.	①, ②, ④ through ⑥
Environmental change	When the change in the temperature/humidity sensor output since the previous process control exceeds a certain value	①, ②, ④ through ⑥
K-DTM (Development Toner Magazine) replacement	This is done after clearing the K-DTM near-end state (i.e., when a new K-DTM is added). The machine idles and when the development roller stops for 10 seconds, indicating that idling is over, process control occurs.	①, ②, ④
Color DTM replacement	After the color toner end or near-end state is reset, the machine idles to transfer color toner to the development unit. After idling, process control occurs.	① through ⑥
PCU replacement	After a new PCU is detected, it is lubricated (new PCU lubricant application mode). Then process control occurs.	① through ⑥

Step 1: ID sensor calibration

To calibrate the ID sensor, the light reflected from the bare transfer belt is measured. The LED current is adjusted until the sensor output is 2.5 V. The detector for black is used for the calibration. The LED current will be adjusted for color toner detection, based on the adjustment that was made during the calibration for the black toner detector.

Calibrating the ID sensor in this way compensates for any changes in the sensor's response caused by changes in transfer belt surface conditions or impurities in the ID sensor light source/receiver.

Step 2: K development bias initialization

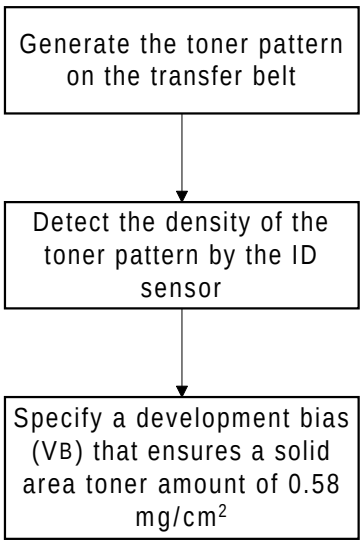
The machine makes a patch of black toner on the transfer belt. The specifications for this pattern are as follows.

Size: Main scan 20 mm x sub-scan 40 mm

Laser power: 210 (out of a maximum of 255)

The ID sensor detects the density of this pattern. Based on the result, the development bias for black is adjusted to obtain a M/A of 0.58 mg/cm^2 on the transfer belt for areas of maximum image density. This development bias is called V_B.

This step is needed when a new machine is installed, or when a black DTM is changed. This is because the amount of toner that adheres to the development roller varies for each unit. This means that the amount of toner transferred to the image for a certain development bias will not be the same.



G024D530.WMF

Step 3: Color development bias initialization

The initialization for the Color DTM is the same as for black.

V_B is obtained for each of the color toners in the order of Y, C, then M.

The target M/A for each color is as follows:

Cyan, Yellow = 0.56 mg/cm^2
Magenta = 0.62 mg/cm^2

Step 4: Charge grid bias voltage adjustment

Adjusting the development bias V_B controls the density of solid areas on the printout, and adjusting the charge grid bias V_G controls the density of low image density (highlight) areas. These two biases maintain a consistent γ for the engine.

To adjust V_G, the machine makes another pattern on the transfer belt. The ID sensor detects the density of this pattern. Based on the result, the machine adjusts the grid bias voltage.

The figure on the right shows the pattern formed on the transfer belt during this process. The pattern is 20 mm (main scan) x 40 mm (sub scan), and consists of a repeating pattern of two pixels made with an LD intensity of 240 surrounded by pixels with no LD intensity, as shown in the opposite diagram. This is very pale, and suitable for calibrating the low ID point of the engine's gamma.

0	0	0
240	240	0
0	0	0

If the density of low image areas is not acceptable, adjust the target ID sensor output for this sensor pattern with engine SP mode 12 (High-light adj). Then do a forced process control (engine SP mode 7. Process Ctrl. – Normal, or Initialize).

Step 5: Y, C, M, and K bias fine adjustment

Steps 2 and 3 for determining V_B are not done every process control (see the table two pages ago). Because of this, the solid area density, based on the V_B obtained during initialization, may change as a result of changes inside the machine after a period of use, or because of environmental changes. To suppress these fluctuations, this step fine-tunes V_B at regular intervals, or if the environmental conditions change. The method is described below.

An ID sensor pattern is formed on the transfer belt based on the most recently measured V_B for each toner color. The ID sensor then reads the pattern formed. V_B changes in accordance with the difference between the ID sensor outputs in this process and in the initial calibration.

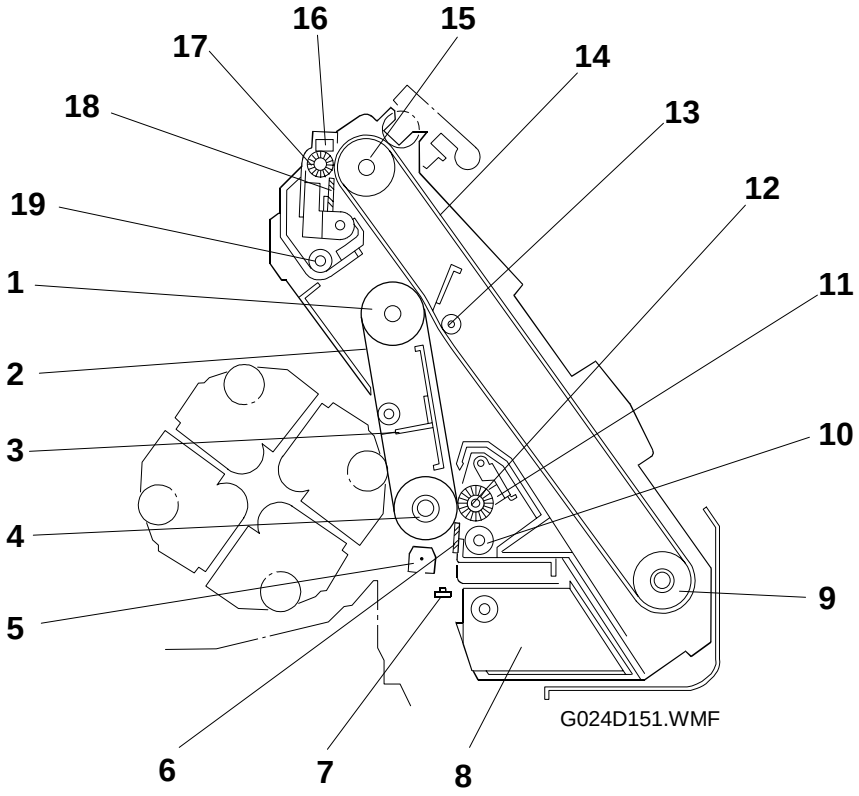
The change in V_B is restricted to a certain range, so that the density does not vary widely after process control. However, this restriction does not apply to the process control executed when fluctuations in the temperature/humidity sensor output are detected (i.e., upon an environmental change).

Step 6: Resetting the process control interval counter

An internal counter in the MCU NV-RAM controls the process control interval. The counter is reset at the end of process control. If power is shut down or if the cover is opened during a process control operation, terminating the process control operation, the process control restarts from the beginning upon recovery. The counter is not reset when process control is performed for K-DTM replacement.

2.2 PCU (PHOTOCONDUCTOR UNIT)

2.2.1 OVERVIEW



The PCU consists of an OPC section, a primary (belt) transfer section, and a used toner tank that collects the used toner from the OPC and belt transfer sections.

1. OPC belt idle roller
2. OPC belt
3. OPC belt brush (grounded)
4. OPC belt drive roller
5. Charge corona unit
6. OPC belt cleaning blade
7. Quenching lamp
8. Used toner tank
9. Transfer belt idle roller
10. OPC belt toner collection auger
11. OPC belt lubricant bar
12. OPC belt cleaning brush
13. Transfer belt bias roller
14. Transfer belt
15. Transfer belt drive roller
16. Transfer belt lubricant bar
17. Transfer belt cleaning brush
18. Transfer belt cleaning blade
19. Transfer belt toner collection auger

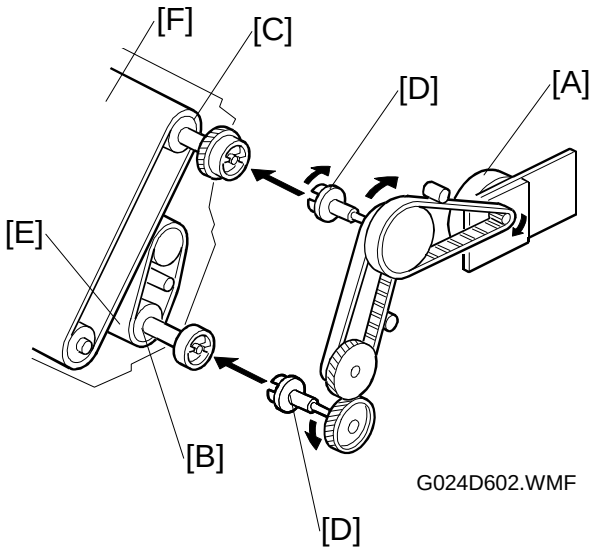
OPC: Organic Photoconductor

2.2.2 COMPONENTS

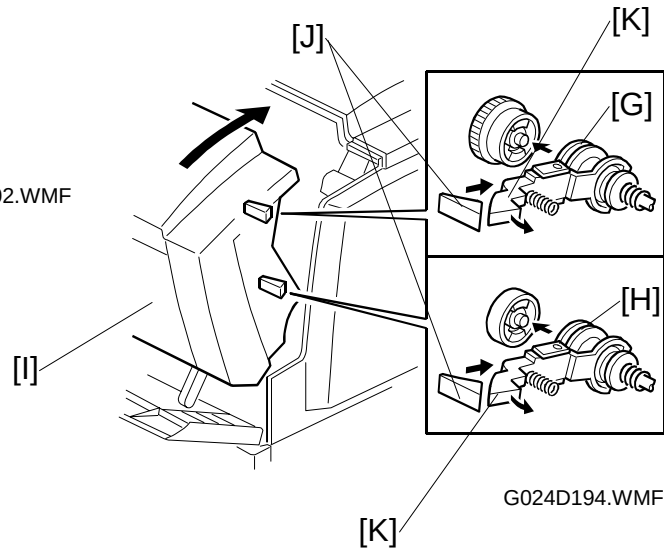
Section	Component	Overview
Drive mechanism	Cleaning unit	The main motor (a brushless DC motor) drives the used toner collection unit and the cleaning unit.
	Belt drive	The PCU motor (an externally synchronized brushless DC motor) drives the OPC belt and the transfer belt.
OPC	OPC belt	292 mm in circumference
	Cleaning unit	A counter blade scrapes the OPC belt to remove excessive toner.
	Lubricant bar	This applies lubricant to the OPC surface to improve toner removal.
Charge corona unit	Charge corona unit	The scorotron corona wire inside the charge corona unit evenly charges the OPC surface.
	Charge inlet fan	The charge inlet fan blows air into the charge corona unit to disperse ozone.
Primary transfer section	Transfer belt	The toner image on the OPC belt is transferred onto the transfer belt. Later it will be transferred to the paper from the belt.
	Transfer bias	The transfer bias attracts the toner from the OPC to the transfer belt surface.
	Cleaning unit	A counter blade scrapes the transfer belt to remove toner.
	ID sensor	The ID sensor detects the density of the black and color patterns on the transfer belt surface.
	Lubricant bar	This applies lubricant to the transfer belt surface to improve toner separation from the belt.
Used toner	Used toner tank	This collects the used toner from the OPC and belt transfer sections.
	Used toner sensor	The used toner sensor detects when the used toner tank is full.
Quenching	Quenching lamp	Light from a red LED removes residual charge from the OPC belt in preparation for receiving the next image.

2.2.3 DRIVE MECHANISMS

Belt drive



G024D602.WMF

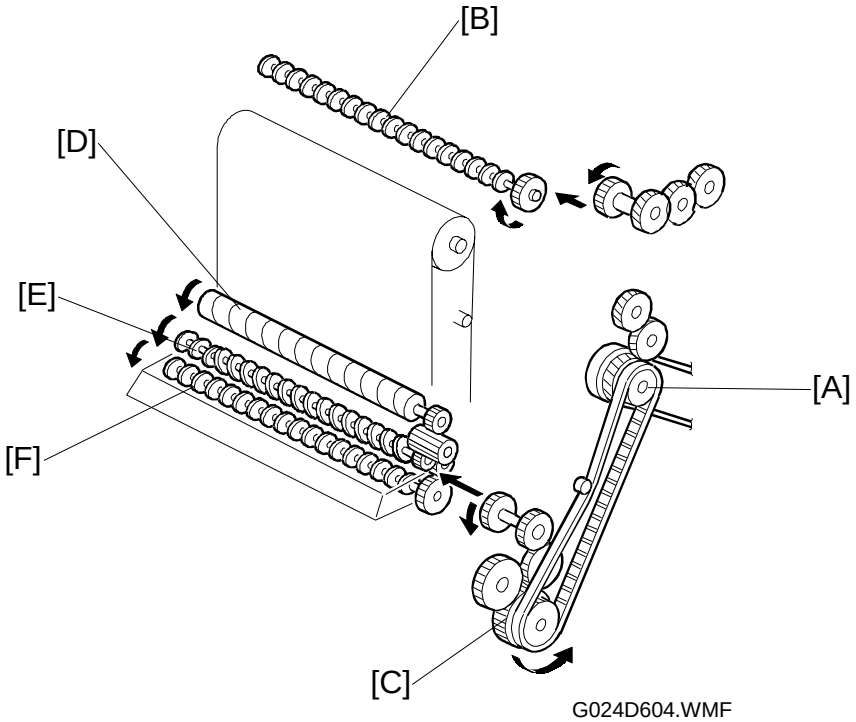


G024D194.WMF

The PCU motor [A] drives the OPC belt drive roller [B] and transfer belt drive roller [C] via gears and two joints [D]. The OPC [E] and transfer [F] belts rotate at the same speed.

The two joints (for the transfer belt [G] and the OPC [H]) engage when the front cover [I] is closed. When the front cover is closed, the two actuators [J] on the inner side of the cover push the joint levers [K].

Used toner collection drive



G024D604.WMF

The main motor drives the used toner collection process. There are two mechanisms, one for the transfer belt and one for the OPC.

The pulley [A] drives the transfer belt toner collection auger [B] via gears.

The paper feed drive gear [C] drives the OPC cleaning brush [D], OPC belt toner collection auger [E], and used toner collection auger [F] via a series of gears.

Transfer belt revolutions

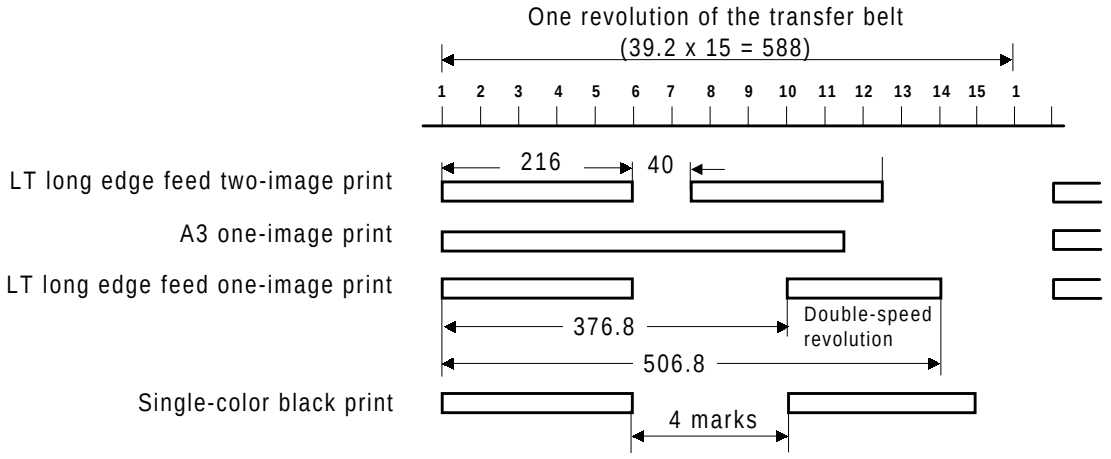
The transfer belt has 15 marks on it at 39.2 mm intervals (one full rotation of the transfer belt is 588 mm).

The number of transfer belt revolutions differs between single-color black (K) and 4C (YCMK) modes, as shown in the following table.

Print mode	Revolutions
Single-color black (K)	(Paper length + 4 marks)/588
4C mode (YCMK)	4

Even when the printing data consists of only one, two, or three colors out of Y, C, and M, the printing operation is the same for 4C data.

Transfer belt speed



G024D517.WMF

4C mode (color printing)

For color printing, the machine places two pages at a time on the transfer belt if the image size is LT long edge feed or smaller (width: 216 mm to 148 mm), except for the final page of a job containing an odd number of pages.

When there is only one color image on the transfer belt, the transfer belt turns at double speed to move the non-image area past the image transfer point (from OPC to transfer belt). This shortens the total printing time.

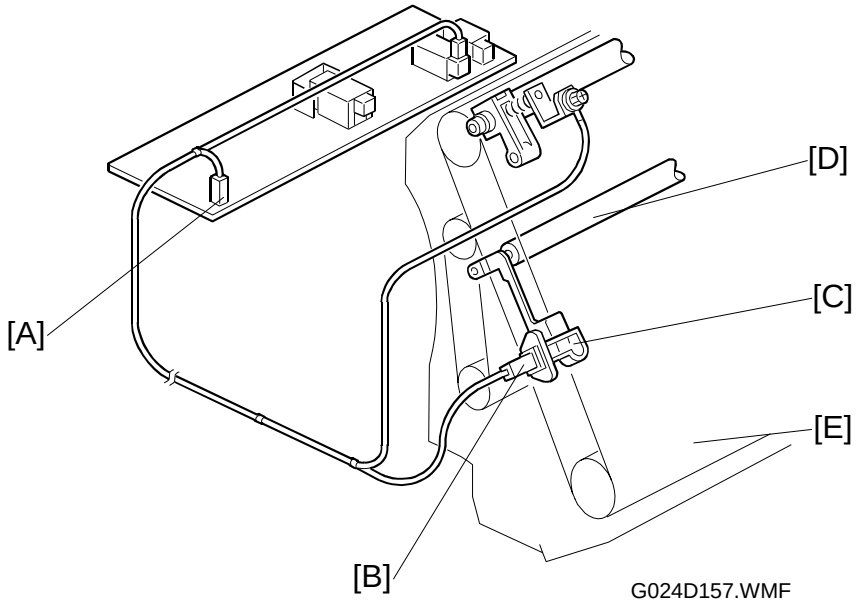
For printing on transparencies or on thick paper, the paper transfer and fusing unit speeds slow to 1/2 speed to improve paper transfer and fusing.

Single-color black mode (K)

When four transfer belt marks have been detected after the end of the first page, the image for the next page is placed on the transfer belt.

For printing on transparencies or on thick paper, the paper transfer and fusing unit speeds slow to 1/2 speed to improve paper transfer and fusing.

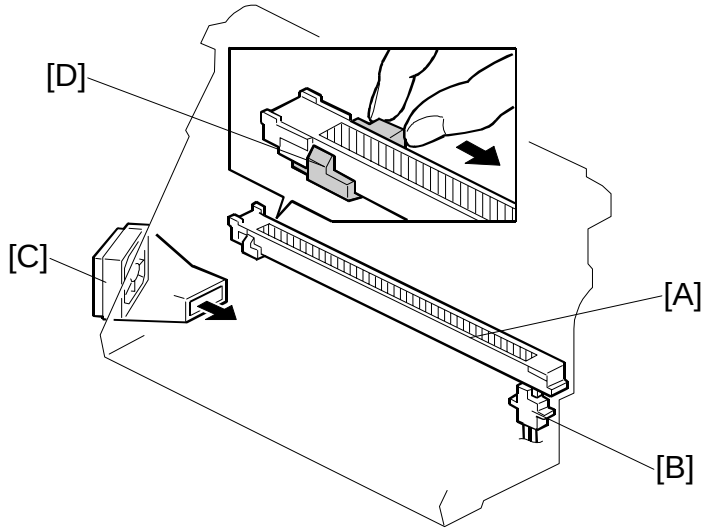
2.2.4 TRANSFER VOLTAGE SUPPLY



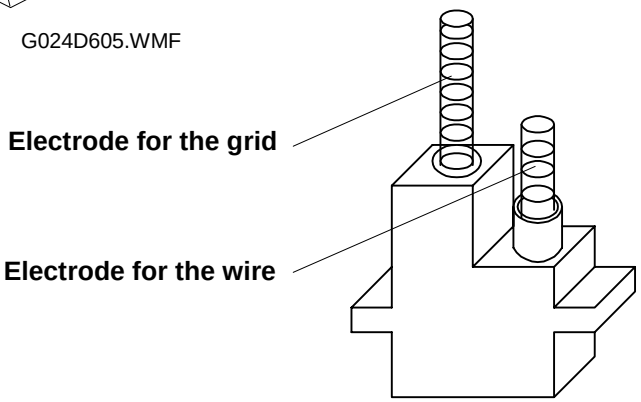
The high voltage board [A] supplies the belt transfer voltage to the PCU through the connector [B], then the coil spring electrode [C] and finally the bias roller [D] to the transfer belt [E].

Opening the front cover separates the coil spring electrode from the PCU.

2.2.5 CHARGE CORONA UNIT



G024D605.WMF



G024D607.WMF

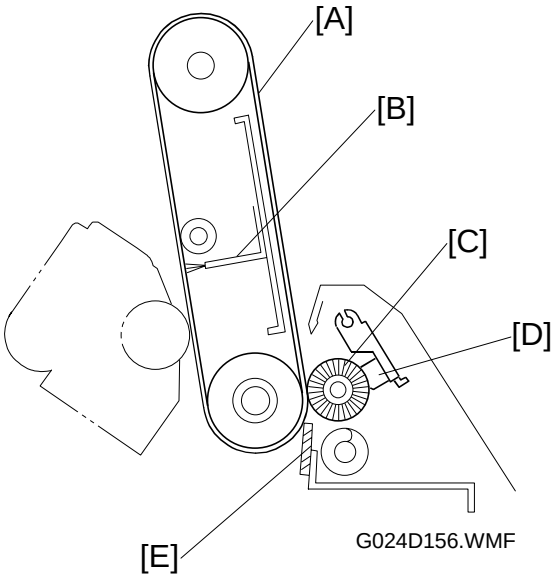
The charge corona unit [A] supplies a negative charge to the OPC using a single scorotron corona wire. The coil spring electrode [B] supplies the voltage as soon as the PCU motor starts.

The charge inlet fan [C] removes ozone from the charge corona unit.

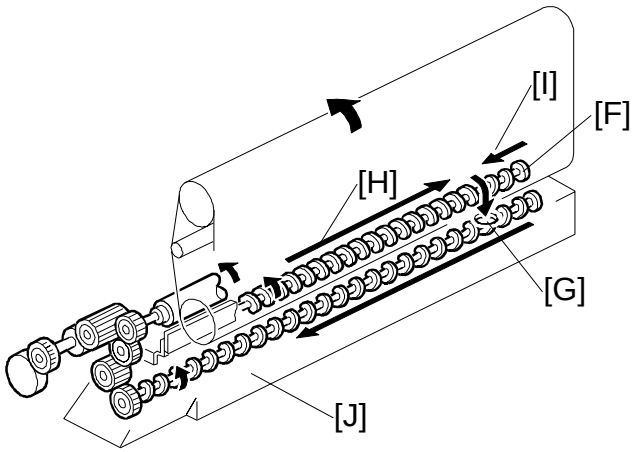
The charge corona unit has a sliding cleaner [D] so that the user can clean the wire and grid.

The high voltage board applies a constant current (-700 μA) to the charge corona wire. The grid (a stripe-pattern type grid) receives a constant voltage, which depends on the results of process control (the default setting is -600 V).

2.2.6 OPC BELT



G024D156.WMF



G024D616.WMF

The inner side of the OPC belt [A] is in continual contact with the grounding brush [B].

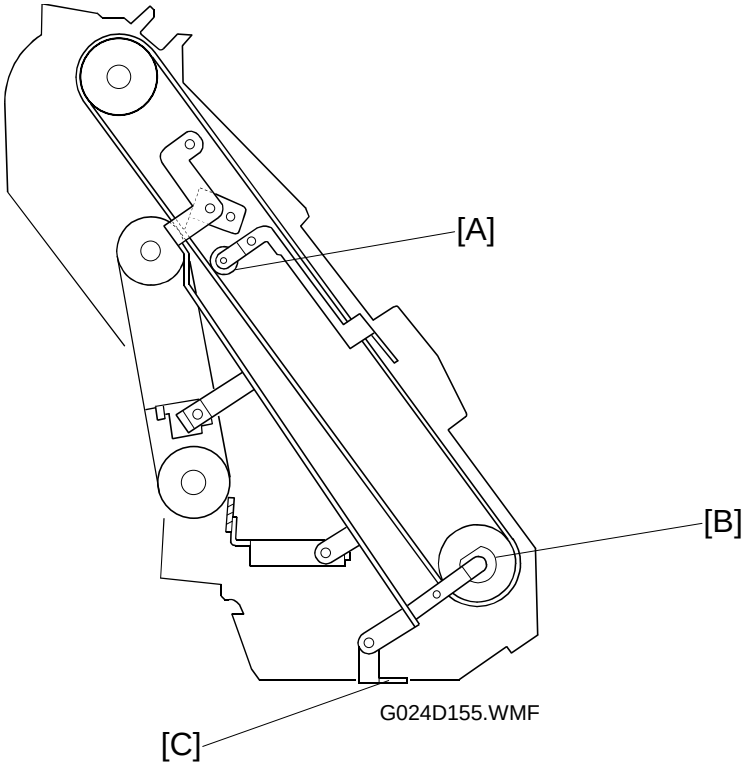
After primary transfer (from OPC to transfer belt), the cleaning brush [C] lubricates the OPC belt with zinc stearate, by using a spring to apply pressure to the lubricant bar [D].

A cleaning blade [E] scrapes the OPC belt to remove the remaining toner.

The OPC belt toner collection augers [F] carry the toner removed by cleaning to the used toner collection opening [G] in directions [H] and [I]. The toner then falls into the used toner tank [J].

2.2.7 PRIMARY TRANSFER

Voltage application

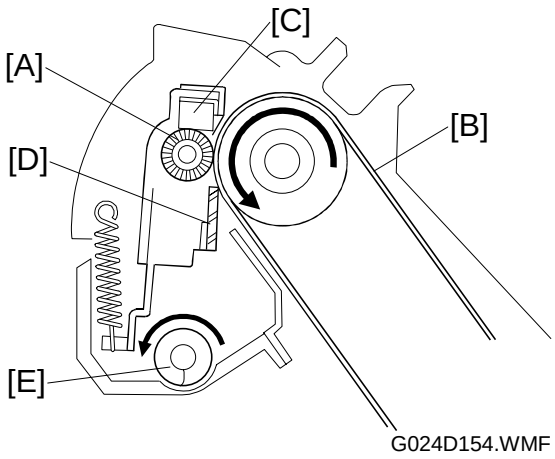


The primary transfer bias is applied to the transfer belt bias roller [A]. The default is +800 V. It changes according to environmental conditions (temperature and humidity measured by the sensors).

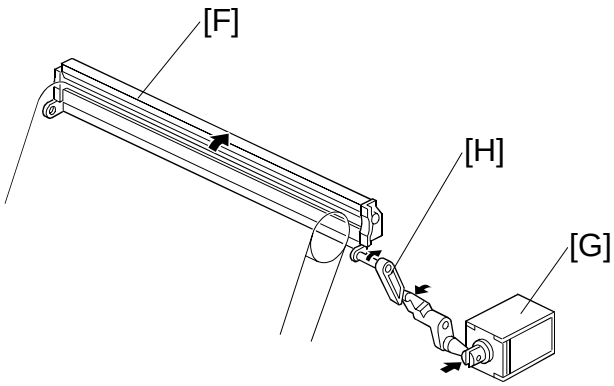
The bias pulls the toner from the OPC belt to the transfer belt.

The transfer belt idle roller [B] is connected to a grounding electrode [C].

Transfer belt cleaning



G024D154.WMF



G024D153.WMF

When the cleaning brush [A] is moved into contact with the transfer belt [B], pressure from the contact turns the cleaning brush. The lubricant bar [C] uses its own weight to press against the cleaning brush, which applies lubricant to the transfer belt to improve transfer and cleaning. The cleaning blade [D], positioned to counter the rotation of the transfer belt, removes the toner from the transfer belt.

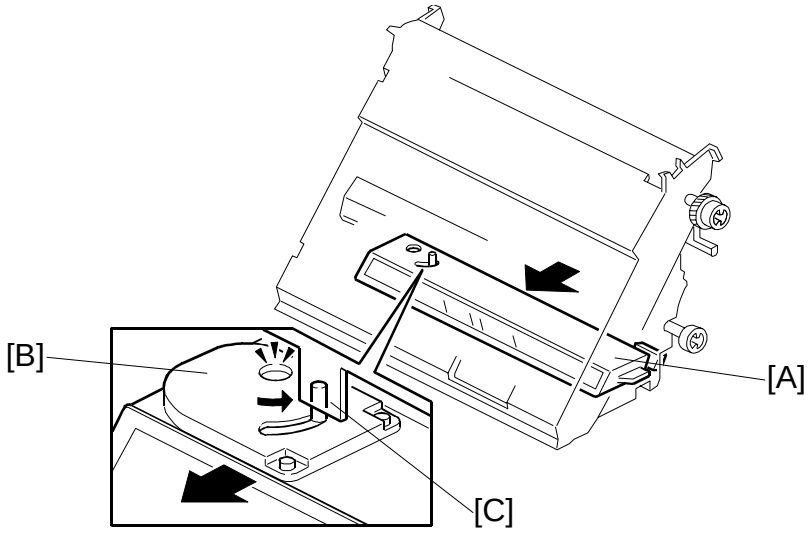
The transfer belt toner collection auger [E] carries the removed toner to the left end of the PCU. Then a guide directs the toner into the OPC toner collection area.

In 4C mode, the cleaning unit separates from the transfer belt after the first image, Y, has been formed, and stays away from the belt while the C, M, and K images are forming. (In single-color black mode, the cleaning unit is in constant contact with the transfer belt.) Then, after secondary transfer (from transfer belt to paper), the cleaning unit is moved into contact with the transfer belt.

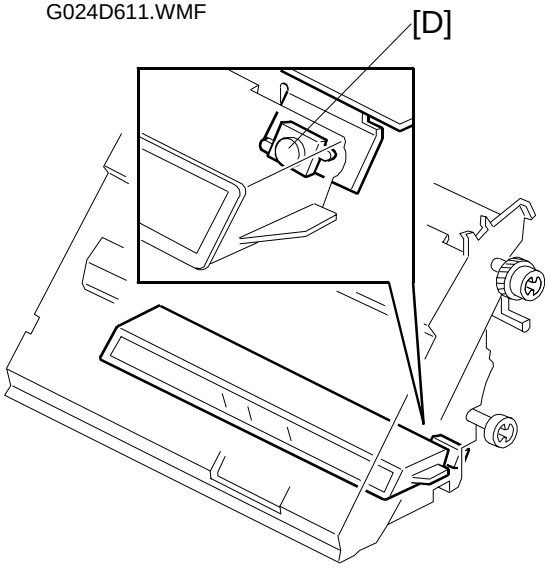
To control the movement of the cleaning unit [F], the transfer belt cleaning solenoid [G] turns on and off moving the contact/separation lever [H].

Primary transfer		**Solenoid ON/OFF**	**Cleaning unit contact/separation**
4C mode	Y	OFF	Contact
	C	ON	Separated
	M	ON	Separated
	K	ON	Separated
Single-color black mode		OFF	Contact

2.2.8 USED TONER TANK



G024D611.WMF



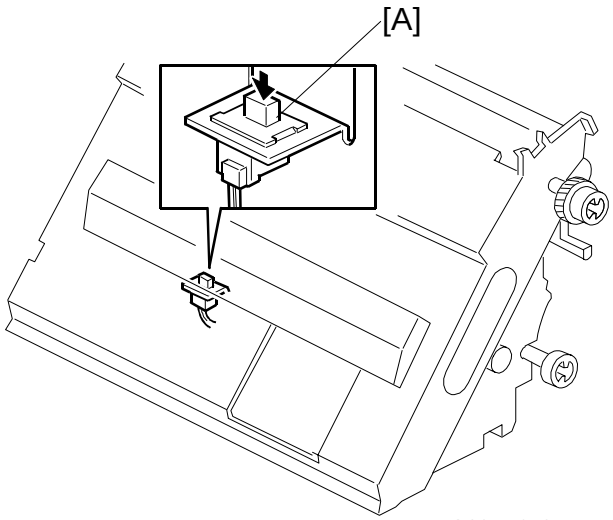
G024D612.WMF

The used toner tank [A] has a shutter mechanism [B]. When the used toner tank is placed in the PCU, a protrusion [C] on the PCU opens the shutter. When the tank is removed from the PCU, the spring (under tension) in the shutter cover pulls and closes the shutter.

The toner collection auger (inside the tank) transports the toner falling into the used toner tank, preventing the toner from accumulating in a particular place in the tank.

The used toner sensor [D] detects when the tank becomes full. After detecting this condition, the printer can make an 20 additional prints before the machine stops printing.

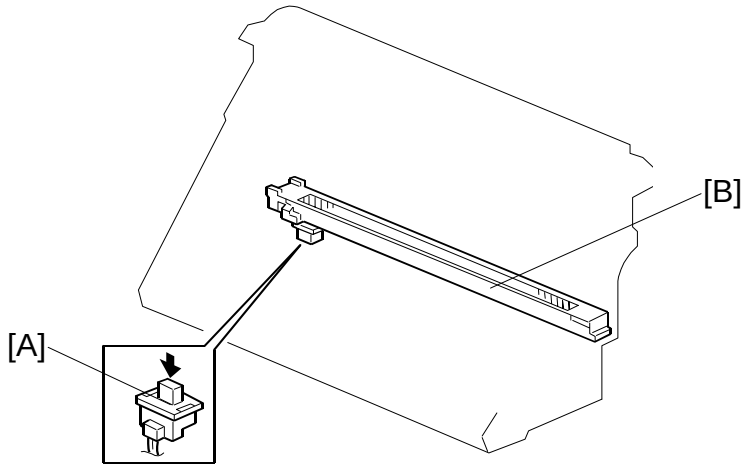
2.2.9 PCU DETECTION



G024D613.WMF

The PCU set switch [A] is installed on the main unit (under the bottom center of the PCU). It detects the presence of a PCU. The used toner tank case presses the PCU set switch. Therefore, when the used toner tank is absent, the PCU detects that it is missing.

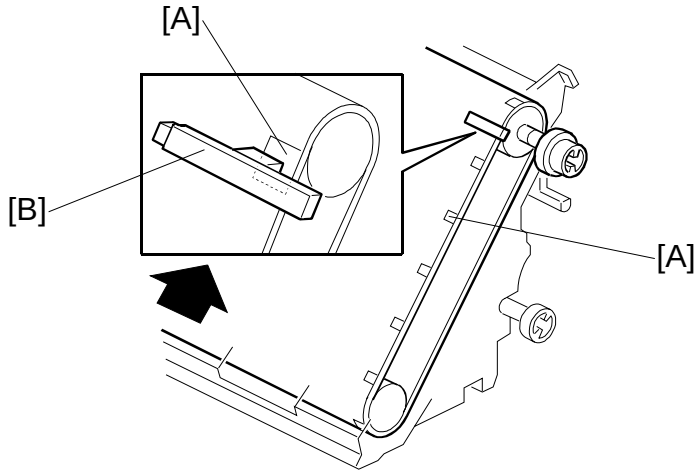
2.2.10 CHARGE CORONA UNIT DETECTION



G024D158.WMF

The main unit has a switch [A] to detect the presence of a charge corona unit. If the charge corona unit [B] is installed in the PCU, the charge corona unit activates this switch. The switch actually detects the sliding cleaner for the grid and charge corona wire. If the user has not put the sliding cleaner back in its home position, the LCD will display an error message.

2.2.11 BELT MARK DETECTION



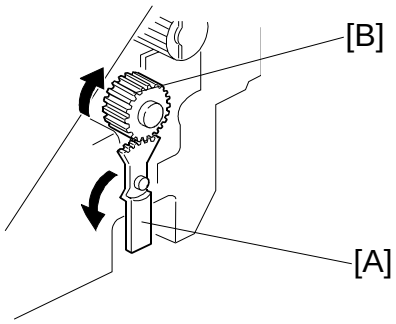
G024D614.WMF

There are 15 belt marks [A] on the right edge of the transfer belt. The transfer belt home position sensor [B] (a reflective photosensor) on the front cover unit detects these marks to align the laser exposure start position in the sub-scan direction for the next image.

In 4C mode, when a page is completed and the transfer belt returns to the write start position, the transfer belt moves forward one mark. Laser exposure in the sub-scan direction for the next page starts there.

Because the PCU motor drives the transfer and OPC belts at the same time, this prevents repeated exposure from the laser beam in the same position on the OPC belt.

2.2.12 NEW PCU DETECTION



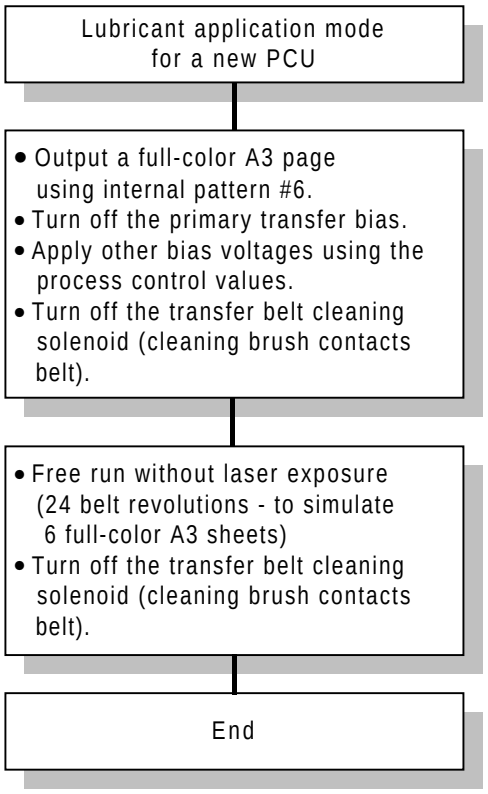
G024D615.WMF

On a new PCU, the new PCU detection lever [A] at the bottom right is pointing straight down.

When the PCU reset sensor in the main unit detects the new PCU detection lever, the PCU counter resets. The main motor drives the new detection lever via a gear [B] to release the sensor from the new PCU detection state.

2.2.13 LUBRICANT APPLICATION MODE

Lubricant application mode for a new PCU



G024D521.WMF

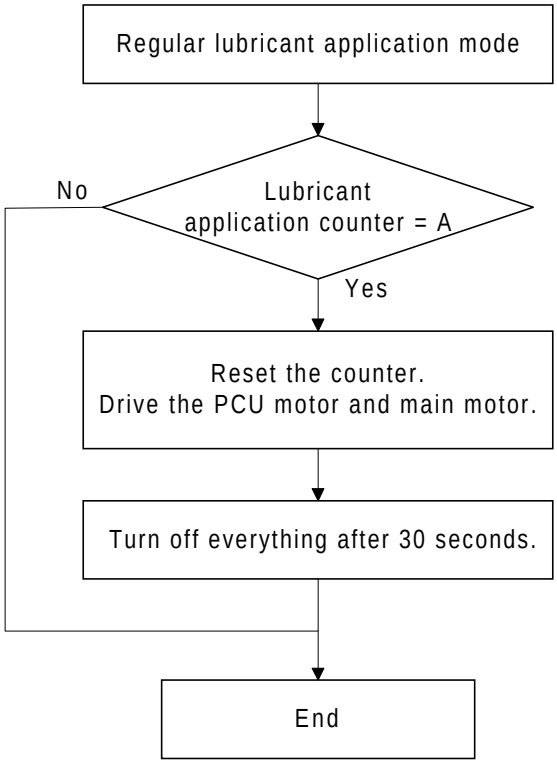
A new PCU does not have used toner on it. Idle rotation of a new PCU may result in scratches on the OPC belt, damage to the blade, and insufficient cleaning due to friction between the cleaning blade and the OPC belt or transfer belt.

To prevent this friction, the above lubricant mode is executed.

The first step of this process puts toner on the OPC belt to lubricate it. The transfer belt is also lubricated at this time. However, the transfer belt requires more lubrication than the OPC belt. Therefore, step 2 is done to lubricate the transfer belt without applying toner to the OPC.

This process takes place when the machine detects that a new PCU has been installed.

Regular lubricant application mode



G024D522.WMF

Lubricant is applied to the OPC and transfer belts when the lubricant application counter reaches A (default: 100).

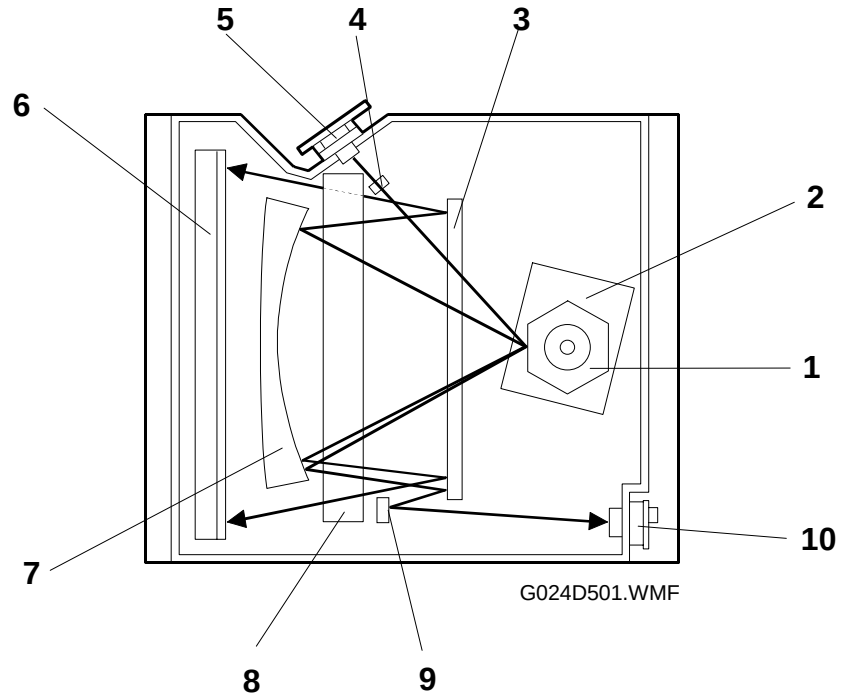
- If the regular lubricant application interval and the process control interval run out at the same time, process control is done first.
- Counting method

  Color: 4 counts/print
  Monochrome: 1 count/print

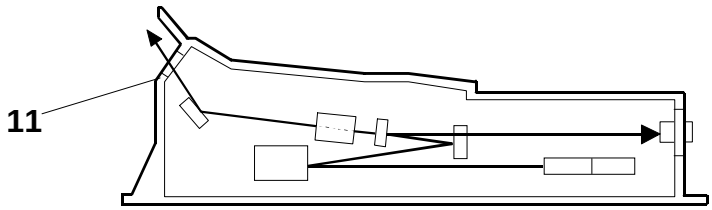
The lubrication interval (A in the flow chart) can be adjusted with the following engine SP mode:
13: Lub_interval

2.3 OPTICAL UNIT

2.3.1 OVERVIEW



G024D501.WMF



G024D502.WMF

1. Polygon Mirror
2. Polygon Mirror Motor
3. 1st Mirror
4. Cylindrical Lens
5. LD (Laser Diode) Unit
6. 2nd Mirror
7. F-theta Mirror
8. BTL (Barrel Torroidal Lens)
9. Laser Synchronization Mirror
10. Laser Synchronization Detector Board
11. Dust Shield Glass

The optical unit uses a six-sided polygon mirror that turns at 23,922 rpm.

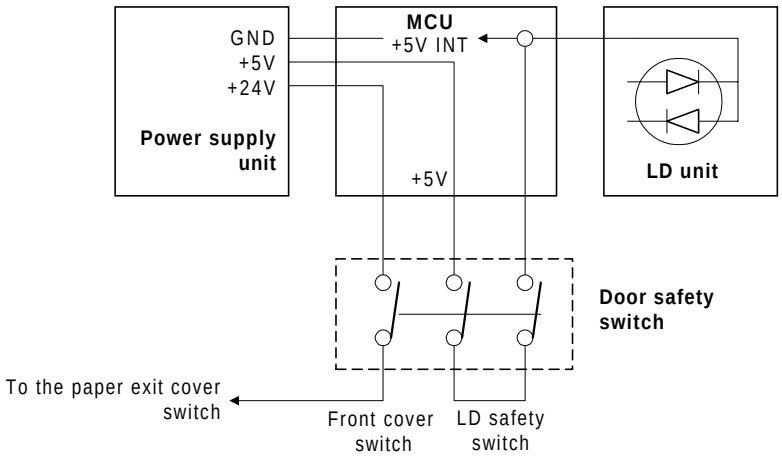
The optical unit can create 256 grades for each color by a combination of laser power modulation (PM) and pulse width modulation (PWM).

2.3.2 COMPONENTS

Section	Component	Overview
LD unit	LD	Wavelength 780 nm, rated power 10 mW
	LD control board	Drives the LD.
	Collimating lens	Makes the laser beams parallel.
	Aperture	Prevents the laser beams from expanding beyond the required beam diameter.
Laser optical system	Cylindrical lens	Compensates for beam shape irregularities.
	Polygon mirror	Revolving six-sided mirror
	Polygon mirror motor	Turns the mirror at 23,922 rpm.
	F-theta mirror	Compensates for dot position irregularities in the main scan direction.
	BTL	Compensates for leaning faces.
	Mirror	Reflects the laser beams.
	Dust shield glass	Shields the optical system from dust and toner.
Synchronization detection	Synchronization detection mirror	Reflects the laser beam to the synchronization detection board.
	Synchronization detection board	Detects the beam from the synchronization detection mirror, synchronizes the laser beam's main scan.

2.3.3 LD UNIT

LD safety switch



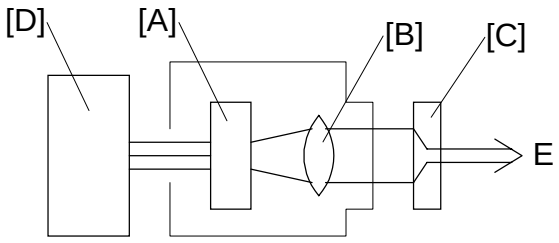
G024D518.WMF

A safety switch is provided to prevent accidental laser emission while the front cover is open for maintenance.

The safety switch is on the +5V DC line from the power supply unit to the LD unit via the MCU.

When the front cover is opened, the safety switch shuts off the +5V DC line to the LD unit.

LD unit configuration



G024D511.WMF

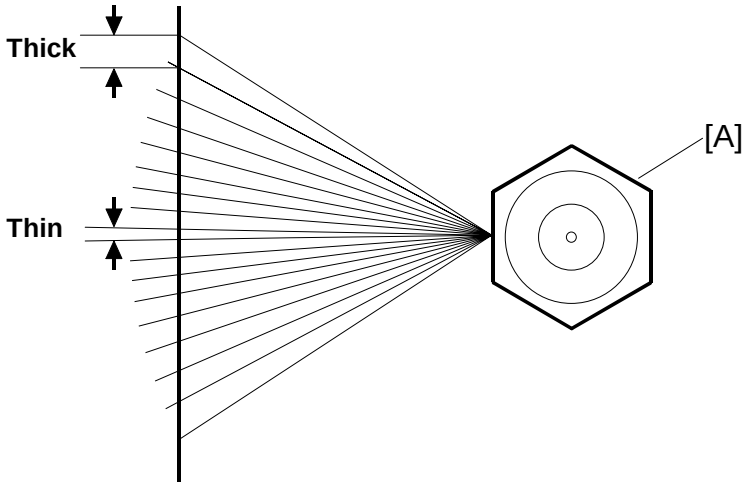
The LD unit consists of a laser diode (LD) [A], collimating lens [B], aperture [C], and LD control board [D]. The collimating lens focuses the laser beam into an accurately parallel beam.

The aperture then prevents the beam from expanding beyond the required beam diameter [E] on the OPC belt.

Cylindrical lens

The cylindrical lens concentrates the laser beam from the LD unit and forwards it to the polygon mirror. The cylindrical lens determines the beam diameter in the sub-scan direction.

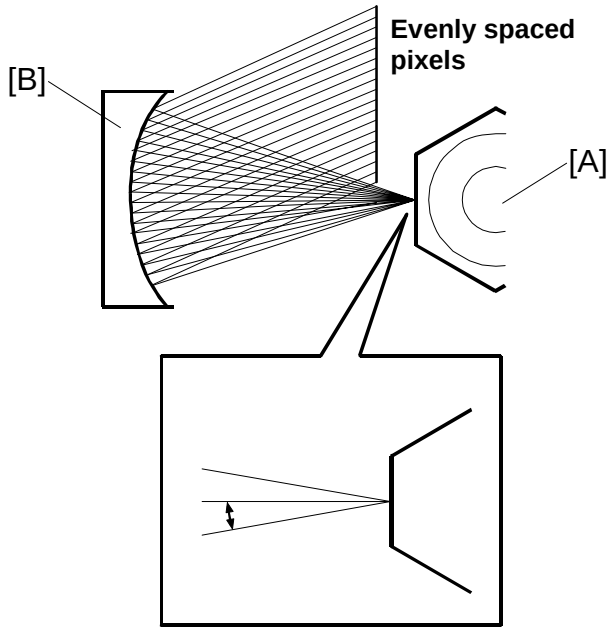
Polygon mirror



G024D503.WMF

The polygon mirror [A] is a combined unit consisting of a polygon mirror motor and a mirror. The polygon mirror is six-sided. The mirror surfaces are precisely ground to prevent dot misalignments and to improve reflective efficiency. The polygon mirror motor turns the mirror at 23,922 rpm. Six scans are performed per polygon mirror motor revolution.

F-theta mirror

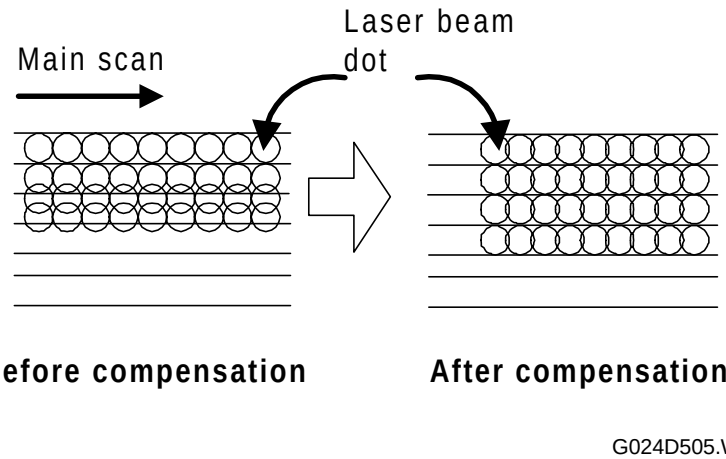


G024D504.WMF

The distance to the reflective face of the polygon mirror [A] is different at the center and at the edges of the OPC belt. The gaps between pixels are longer at the edges (the beam is sweeping across the belt more quickly).

The F-theta mirror [B] compensates for the differences in the distance to ensure an equal gap between pixels.

BTL (Barrel Torroidal Lens)



G024D505.WMF

Irregularities in the perpendicular inclination of the mirror faces causes the laser beam spacing in the sub-scan direction to fluctuate. The BTL compensates for this.

Synchronization detection

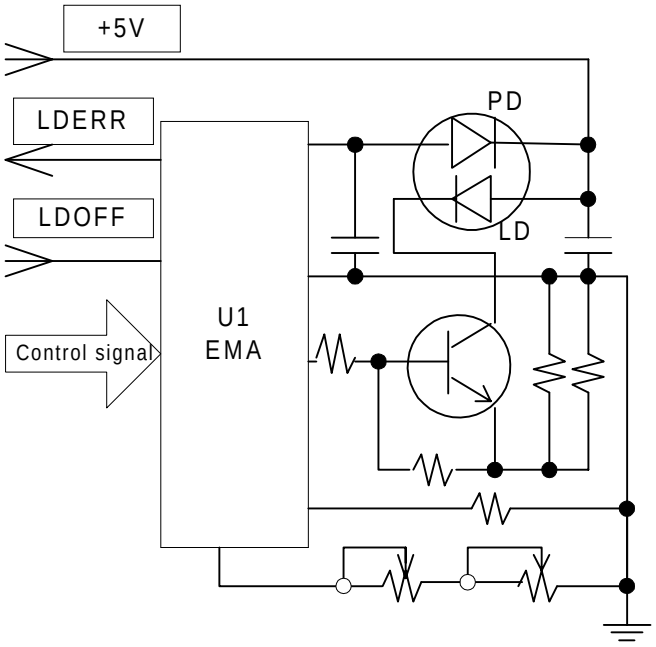
A mirror deflects the laser beam from the polygon mirror to the synchronization detection board. The detection board responses are sent to the MCU laser exposure controller as synchronization signals for LD exposure start position across the main scan.

Synchronization detection error

If a synchronization detection signal is not detected within a certain period (about 500 μS) after the LD turns on, the MCU assumes that there is a synchronization detection error. (SC 43 is displayed.)

2.3.4 APC (AUTO POWER CONTROL)

Circuit



G024D528.WMF

The LD has a built-in photodiode to monitor the laser beam. The output signals from the photodiode are input to the LD control board, which contains a feedback circuit to keep the laser beam at a constant intensity.

LD error

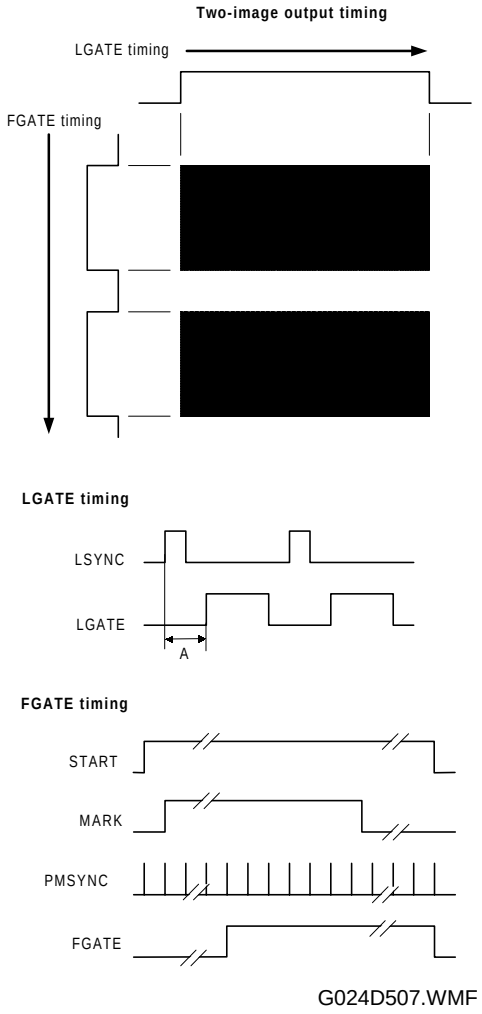
The LD control panel detects abnormal laser power output by monitoring the current flowing in the LD. When the current exceeds 133 mA DC, the LD control panel issues an error detection signal to the MCU. (SC 42 code is displayed.)

2.3.5 LASER EXPOSURE CONTROL

Laser exposure control enables an equivalent of 256 shades for each of Y, C, M, and K. This is achieved by a combination of two modulation methods: pulse width modulation (PWM) and power modulation (PM).

At 600 dpi (if 1-bit mode was selected with the driver), the printer smoothes the output in the main scan direction by determining whether to place the colored part of the pixel on the left or on the right.

2.3.6 LASER EXPOSURE TIMING



The FGATE (for the sub-scan direction) and LGATE (for the main scan direction) signals determine the laser exposure timing. When both are high, any data going to the laser diode is written on the belt.

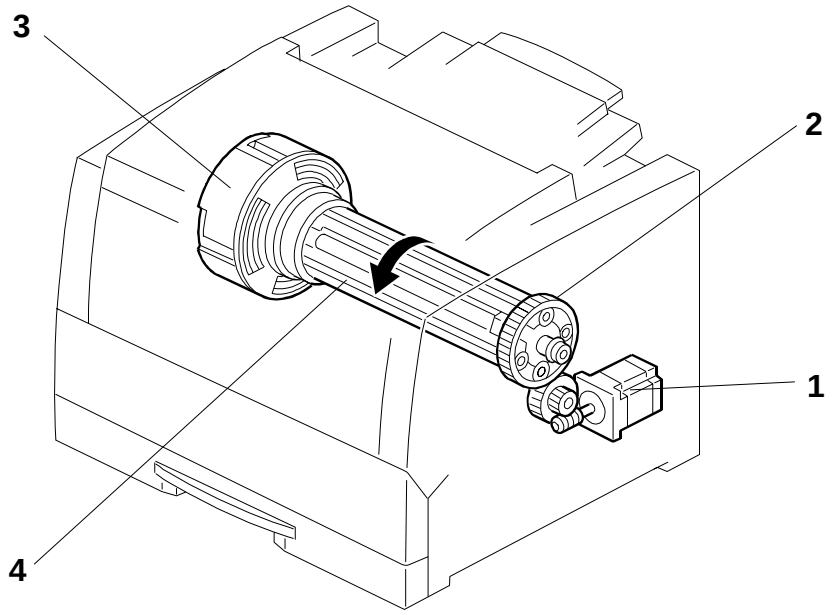
FGATE is generated from transfer belt mark detection signals and PMSYNC (polygon mirror motor synchronization signal – once each turn of the mirror motor). When the machine is ready to print, the CPU waits for a certain number of clock cycles. Then, the first time that MARK goes high after this, FGATE goes high after a certain number of PMSYNC signals.

LGATE is generated from LSYNC (laser main scan synchronization sensor signal). The main scan registration value determines when LGATE goes high after LSYNC is detected. Main scan registration adjustment changes the value of A.

An engine SP mode adjustment (1: Margin) can adjust main scan and sub-scan registration.

2.4 DEVELOPMENT UNIT

2.4.1 OVERVIEW



G024D169.WMF

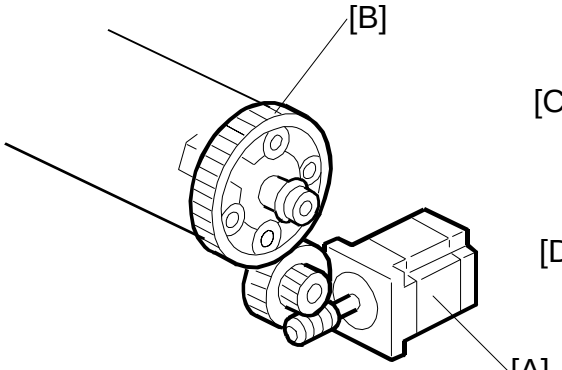
1. Revolver motor
2. Revolver gear
3. Hopper
4. Development roller

The development unit consists of independent Y, C, M, and K units (known as development toner magazines or DTMs) combined with a support unit. The development unit rotates clockwise (as seen from the left side of the printer) and develops images in the order of Y, C, M, and then K.

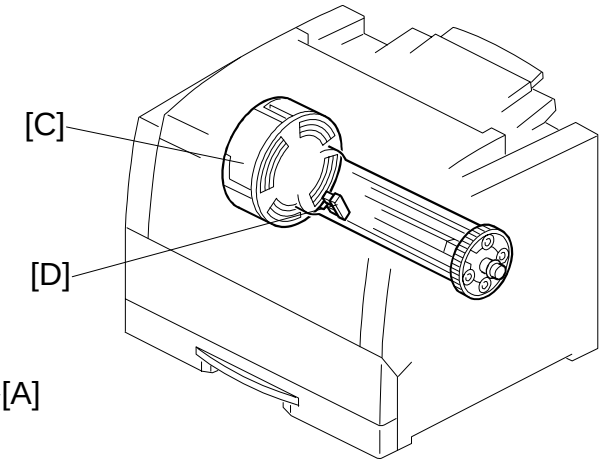
2.4.2 COMPONENTS

Section	Component	Overview
Revolver	Revolver drive	The revolver motor turns the revolver unit. The MCU controls the rotational angle.
	Home position sensor	Detects when the revolver is at home position.
Toner supply	DTM	Four colors (Y, C, M, and K)
	DTM set sensor	The DTM set sensor detects the presence of a DTM.
	Toner end sensor	The toner end sensor detects the presence of toner.
Development	Toner supply	The supply roller supplies toner to the development roller. The blade forms a thin layer of toner on the development roller.
	Drive	The main motor only drives the development unit for the color that is at the development position.
	Bias application	Bias is only applied to the development unit for the color that is at the development position.

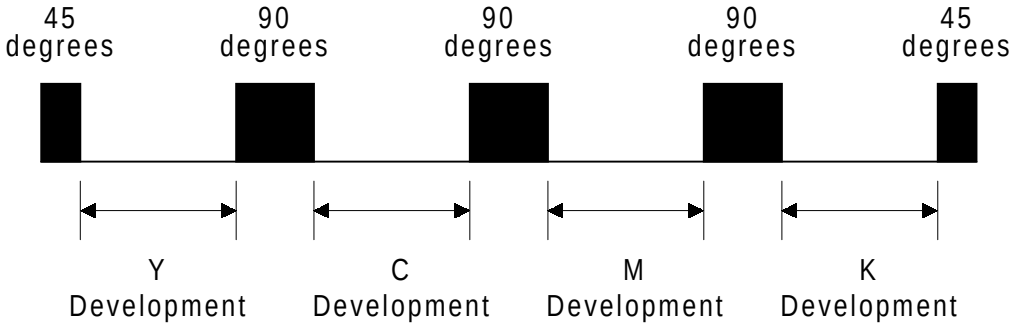
2.4.3 REVOLVER DRIVE



G024D529.WMF



G024D900.WMF



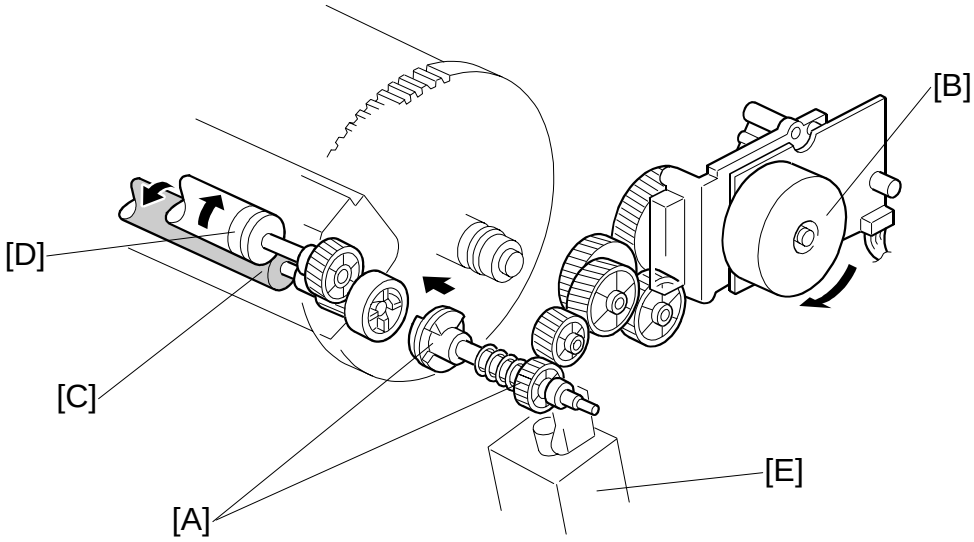
G024D513.WMF

A gear transfers drive from the revolver motor [A] to the revolver gear [B] on the hopper.

The support unit [C] has a protrusion for home position detection on the left side. The home position sensor [D] on the left side panel detects this protrusion.

The revolver turns 45 degrees and stops for Y color development, then turns 90 degrees for C color development, then another 90 degrees for M color development. Then, the revolver turns 90 degrees once more for K color development. After completing development for all four colors, the revolver turns 45 degrees to the home position.

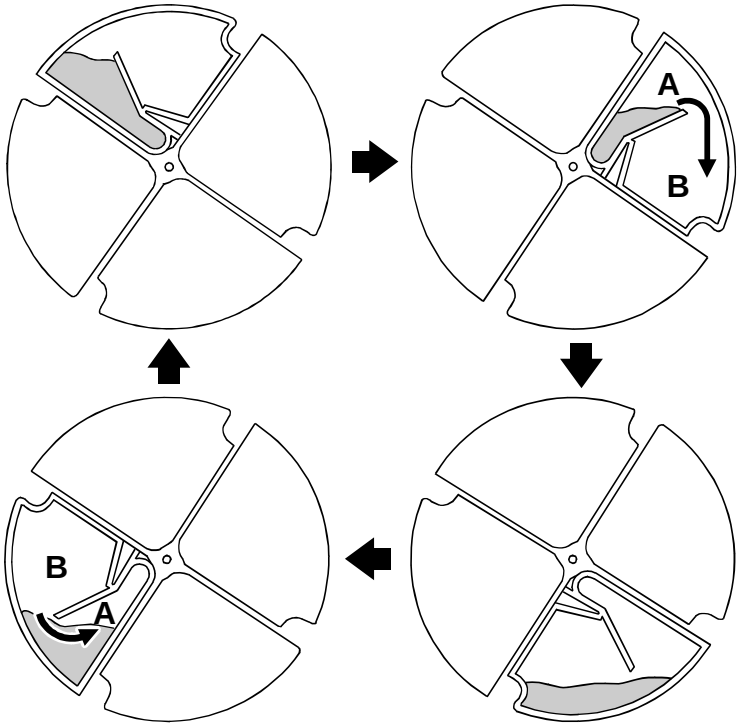
2.4.4 DEVELOPMENT UNIT DRIVE



Gears and joints [A] transfer drive from the main motor [B] to the gears for the supply [C] and development [D] rollers.

The joint only engages while the development drive solenoid [E] is on.

2.4.5 TONER AGITATION

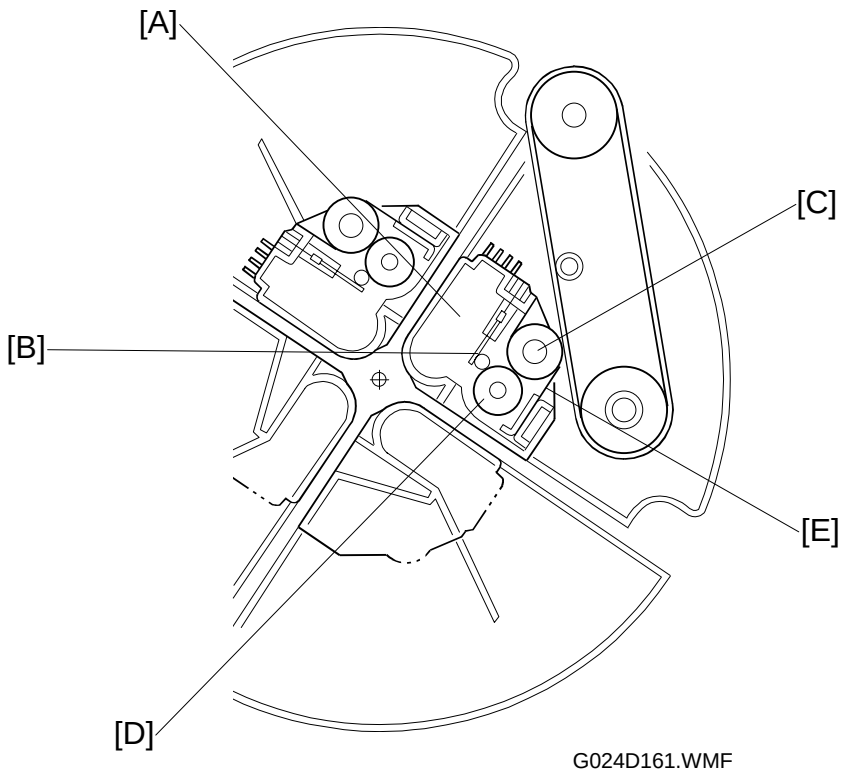


G024D167.WMF

The rotation of the revolver agitates the toner inside the hopper.

When the hopper is at the top, the toner is at the supply port (A) for the development roller. When the hopper turns towards the bottom, the toner falls from the toner supply port (B). As the revolution continues, the toner is scooped back into the toner supply port.

2.4.6 TONER TRANSPORT

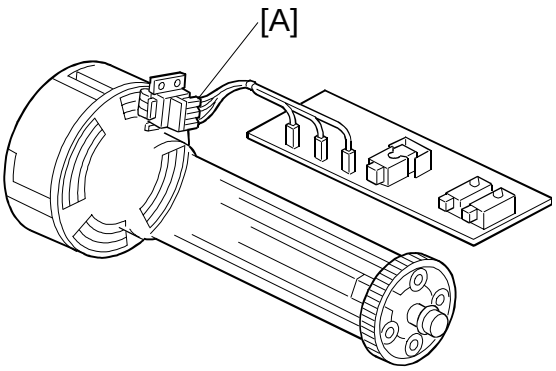


The agitated toner passes from the hopper [A] to the supply and development rollers.

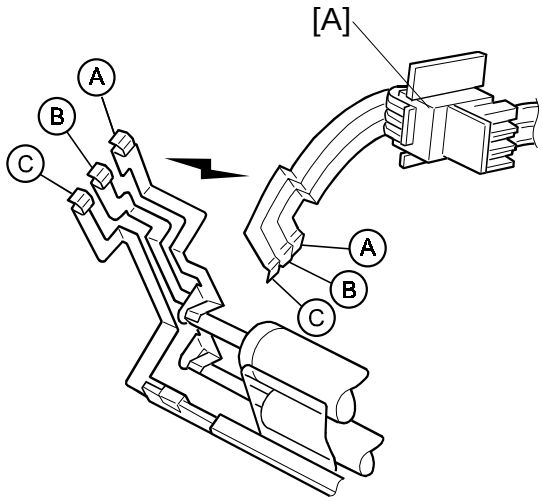
The supply roller flicker [B] regulates the amount of toner applied to the supply roller. Then, the rotation of the supply roller [D] transports the toner to the development roller [C].

The development blade [E] forms an even layer of toner to a specified thickness on the development roller surface. Negative bias applied to the development blade charges the toner quickly. This negative charge is applied when the toner passes between the development blade and the development roller.

2.4.7 DEVELOPMENT BIAS

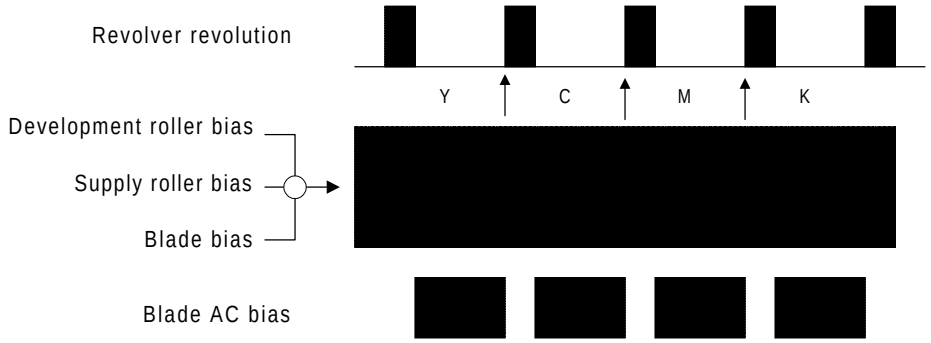


G024D166.WMF



G024D165.WMF

Development roller bias: (A)
Supply roller bias: (B)
Development blade bias: (C)

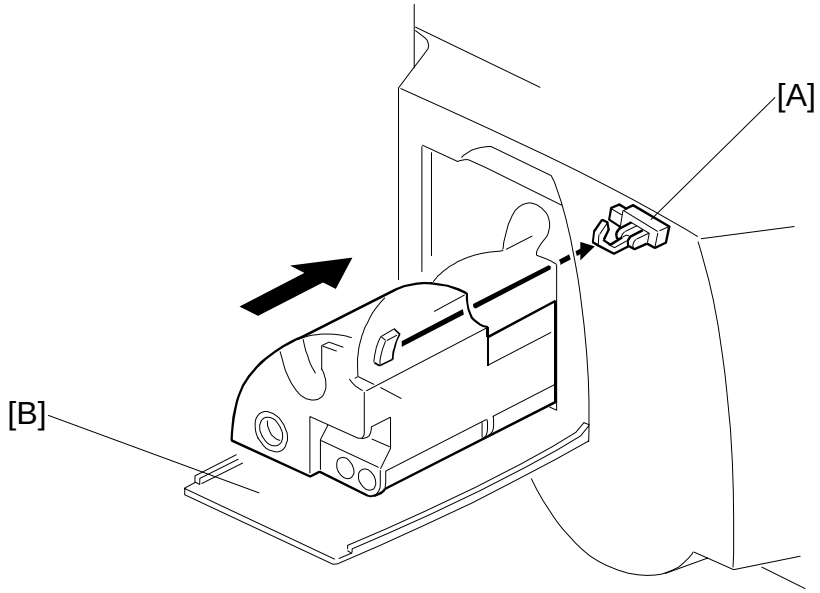


Bias change-over

G024D514.WMF

The electrode [A] on the main unit side supplies the voltages. The electrode is connected only while development is in progress. When development for one color finishes, the bias transfers to the next color.

2.4.8 DTM (DEVELOPMENT TONER MAGAZINE) DETECTION



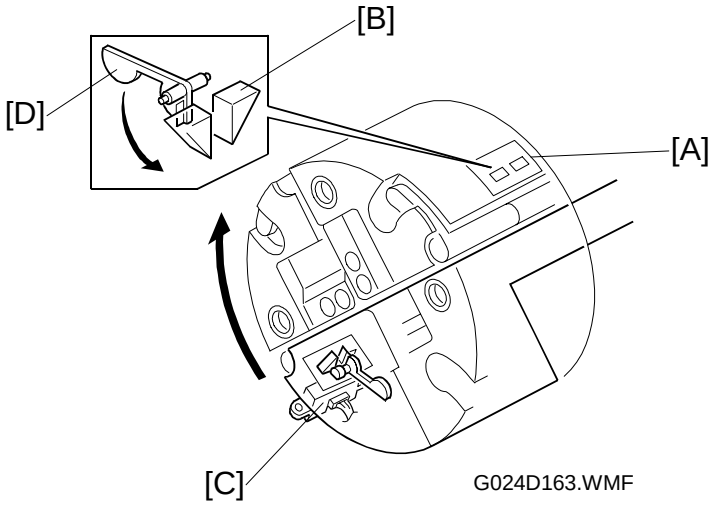
G024D164.WMF

The DTM sensor [A] detects the presence of a DTM.

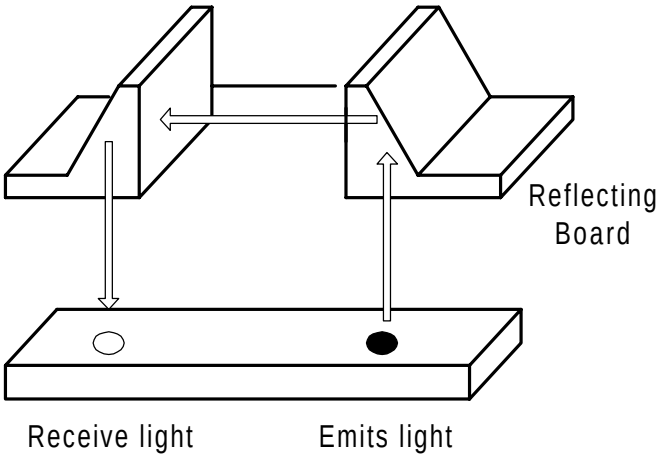
The DTM sensor outputs an error detection signal when a toner bottle is not present or is incorrectly installed. Printing cannot start until this signal ceases (i.e., the error must be corrected).

Installing a toner bottle and closing the DTM cover [B] automatically initiates the recovery procedure, releasing the error.

2.4.9 TONER NEAR-END DETECTION



G024D163.WMF



G024D195.WMF

Each toner hopper has a toner monitoring window [A] with two mirrors [B] at a 45-degree angle.

The toner end sensor (a reflective photosensor) [C] detects the toner between the two mirrors.

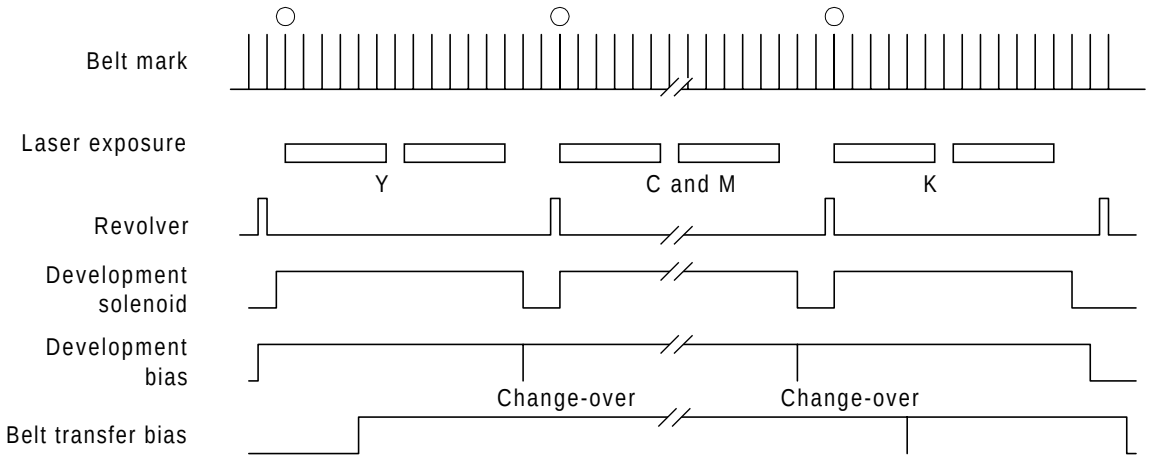
The cleaner [D] swings across to clean the mirror surfaces when the revolver turns.

If there is sufficient toner, the light path is blocked. When light passes through the sensor for the first time, the machine detects toner near-end.

When the toner near-end occurs, the LCD indicates “Add Toner”. However, the user can continue printing until the copy quality becomes unacceptable (there is no toner end condition)

2.4.10 DEVELOPMENT TIMING

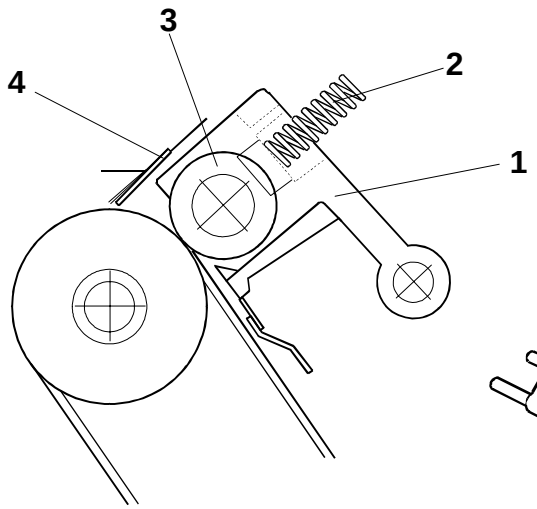
LT, long edge feed, two-image print mode



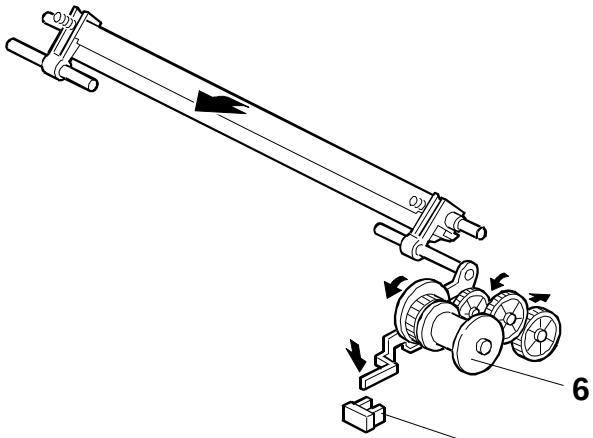
G024D515.WMF

2.5 PAPER TRANSFER UNIT

2.5.1 OVERVIEW



G024D422.WMF



G024D426.WMF

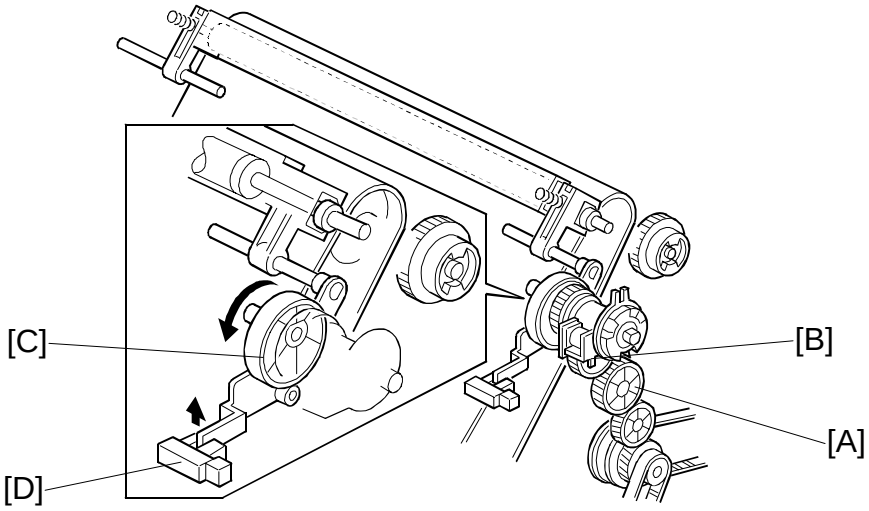
1. Transfer roller casing
2. Transfer roller springs
3. Transfer roller
4. Antistatic brush
5. Transfer roller position sensor
6. Transfer roller clutch

The paper transfer unit moves into contact and separates from the transfer belt during the printing process.

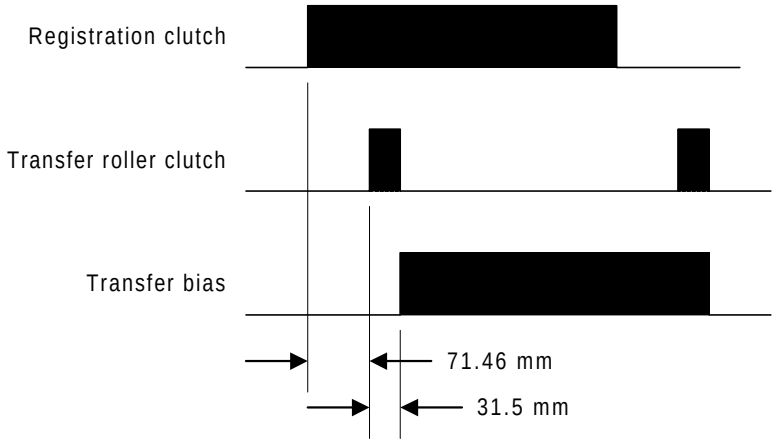
2.5.2 COMPONENTS

Section	Component	Overview
Transfer	Transfer roller	Charges the back side of the paper to attract toner from the transfer belt.
	Spring	Presses the transfer roller against the transfer belt.
Contact/separation	Transfer roller clutch	Moves the paper transfer unit into contact and away from the transfer belt.
	Transfer roller position sensor	Detects whether the paper transfer unit is in contact with or away from the transfer belt.
Bias	Bias terminal	Connects the transfer roller to the high-voltage supply board.
	Conductive bearing	Enables an electrical connection to the transfer roller axle.

2.5.3 CONTACT AND SEPARATION



G024D159.WMF



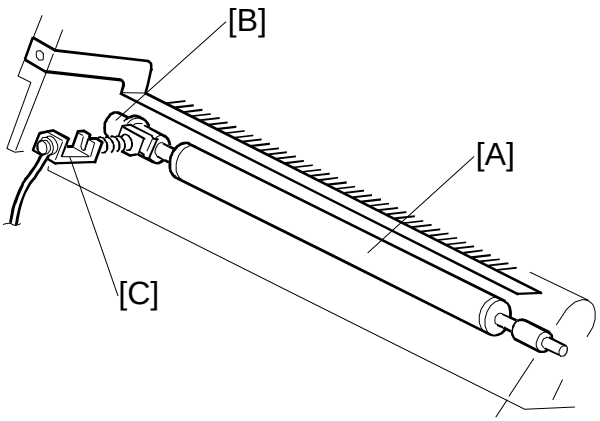
G024D516.WMF

The transfer roller contact/separation idler [A] and the transfer roller clutch [B] transfer drive from the main motor to the cam [C].

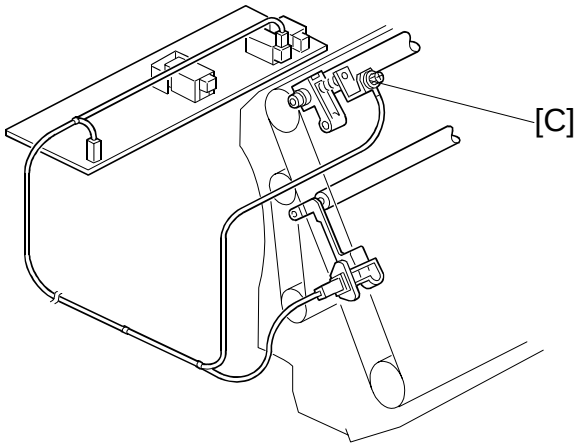
The transfer clutch (a 1/2-turn clutch) controls the contact between the transfer roller and the transfer belt. The transfer roller position sensor [D] detects the contact and separation positions. The transfer roller is driven by contact with the transfer belt.

If the transfer roller contacts the transfer belt (i.e., the transfer roller position sensor is on) just after the main switch is turned on or just after the door safety switch is turned on (i.e., the front cover is closed), the machine assumes a paper jam has occurred. The main motor is driven to engage and disengage the transfer roller clutch, separating the transfer roller from the transfer belt (until the transfer roller position sensor is turned off).

2.5.4 BIAS



G024D427.WMF



G024D157.WMF

Normally, a constant current is applied to the transfer roller [A] axle.

A conductive bearing [B] allows an electrical connection between the bias terminal [C] and the transfer roller axle.

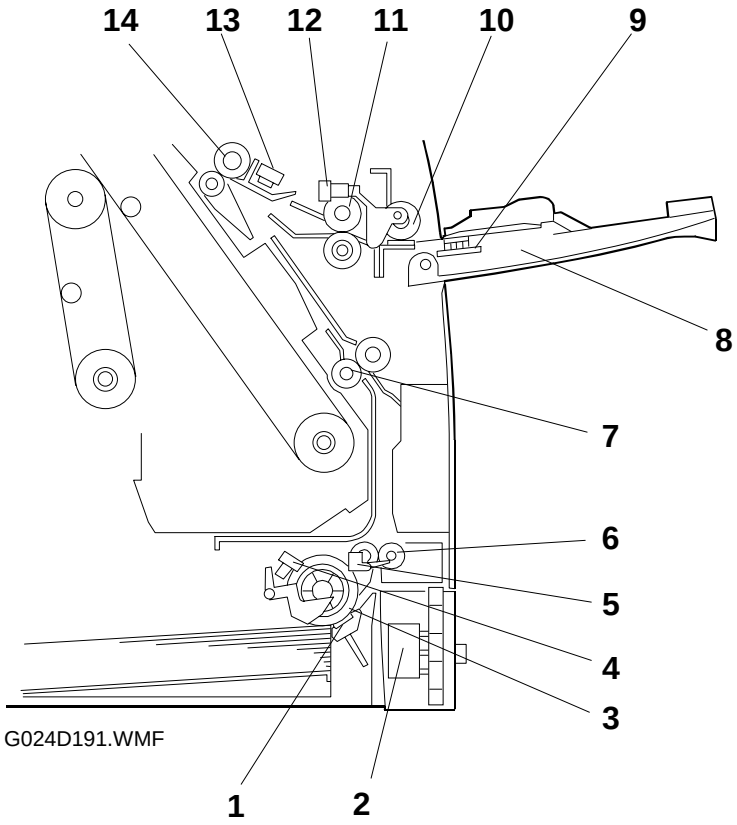
The current varies with paper type, size, and thickness as well as humidity.

After the user clears a paper jam or closes the front cover, the transfer roller turns and positive and negative currents are alternately applied. This removes any toner that got stuck to the transfer roller during the jam.

To be more specific, a negative bias is applied to the transfer roller for two revolutions. Then, a positive bias drives the transfer roller for 0.9 revolutions followed by a negative bias for another 0.9 revolutions. The positive/negative 0.9-revolution cycle is done 30 times.

2.6 PAPER FEED/REGISTRATION UNIT

2.6.1 OVERVIEW



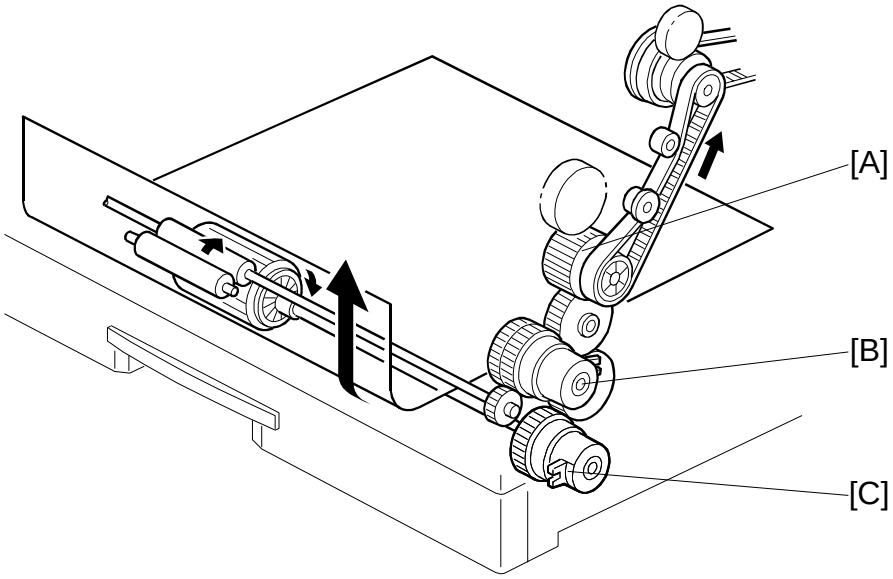
1. Friction pad
2. Paper size switch
3. Tray paper feed roller
4. Tray paper end sensor
5. Pull-out sensor
6. Pull-out rollers
7. Relay rollers
8. By-pass feed table
9. By-pass paper width detection board
10. By-pass pick-up roller
11. By-pass paper feed roller
12. By-pass paper end sensor
13. Registration sensor
14. Registration rollers

2.6.2 COMPONENTS

Section	Main function	Overview
Paper tray	Paper feed/separation	Friction pad separation method
	Paper tray bottom plate pressure	Paper tray bottom plate pressurized by a spring
	Paper end detection	Detection by a feeler and photo-interrupter
	Paper size detection	User-specified by a dial; detected by switches
By-pass feed table	Paper feed/separation	FRR method
	Paper end detection	Detection by a feeler and photo interrupter
	Paper size detection	Width detection by a circuit board
Registration	Registration transport	Drive transfer by electromagnetic clutch
	Registration detection	Detection by reflective photosensor
	Vertical transport	Transport by roller

2.6.3 STANDARD TRAY

Drive

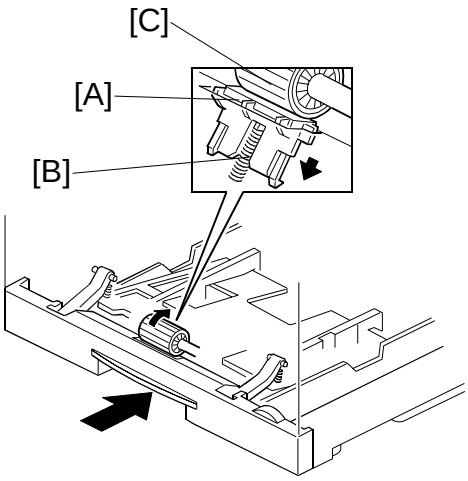


G024D192.WMF

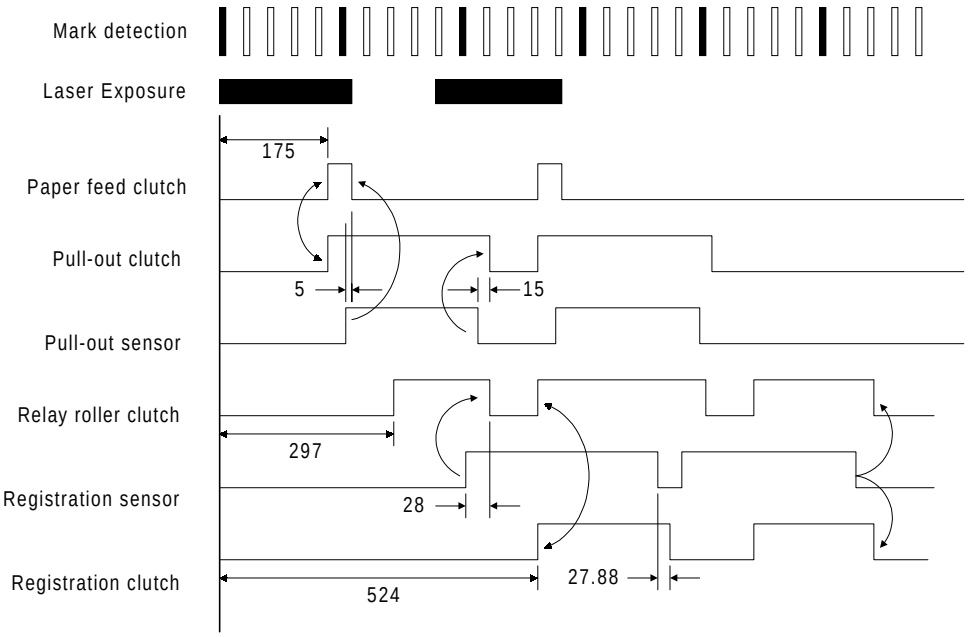
Drive from the main motor is transferred from the timing belt to the paper feed drive gear [A].

The paper feed drive gear drives the paper feed roller and pull-out roller via gears. These two rollers each have a clutch (paper pull-out: [B], feed: [C]) to transfer drive to the roller at the correct time.

Paper feed/separation



G024D406.WMF



G024D527.WMF

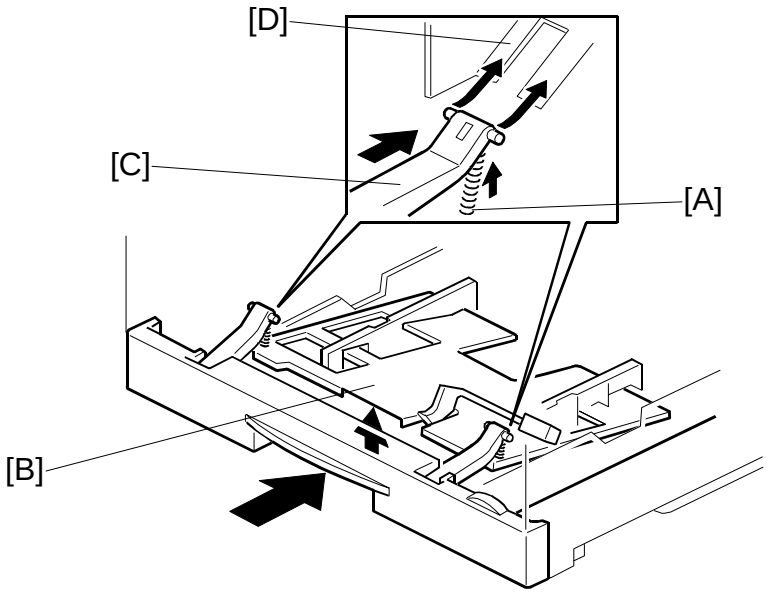
Timing for black, LT, long edge feed

The paper tray uses a friction pad [A].

A compressed spring [B] pushes the friction pad from the bottom, giving constant pressure to the sheet of paper against the paper feed roller [C].

The paper feed roller feeds the separated sheet to the relay rollers, which then feed the sheet to the registration roller. When the registration sensor detects the sheet, the machine feeds the paper another 28 mm, then the relay roller clutch is disengaged to stop the paper.

Tray lift



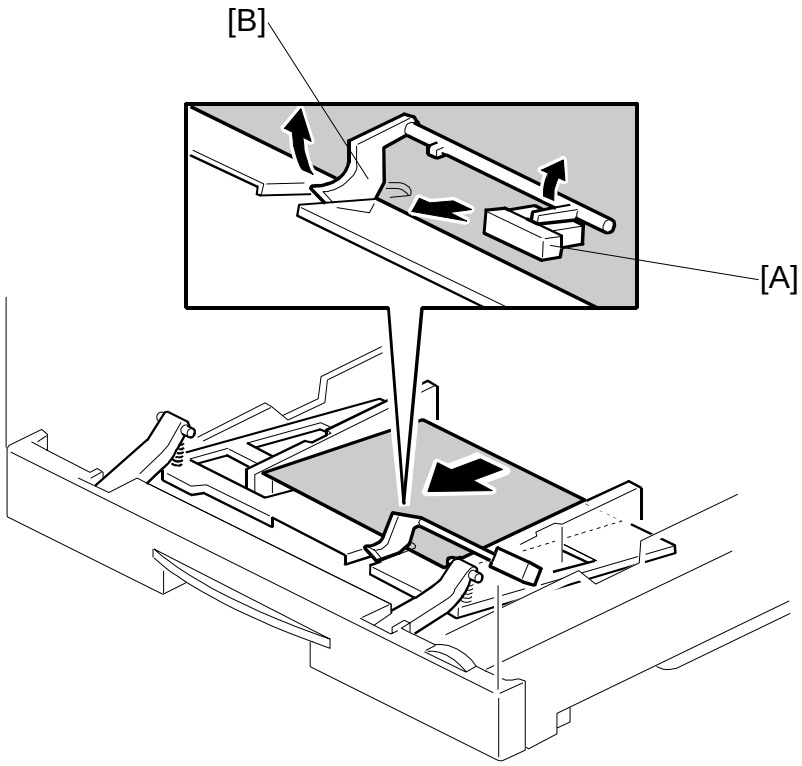
G024D402.WMF

Springs under tension [A] connect the bottom plate [B] of the paper tray to the paper tray arm [C].

When the paper tray is placed in the main unit, the guide block [D] for the main unit base lifts the paper tray arm. The springs keep the top of the paper stack at the correct level.

Removing the paper tray extracts the paper tray arm from the guide block, lowering the bottom plate.

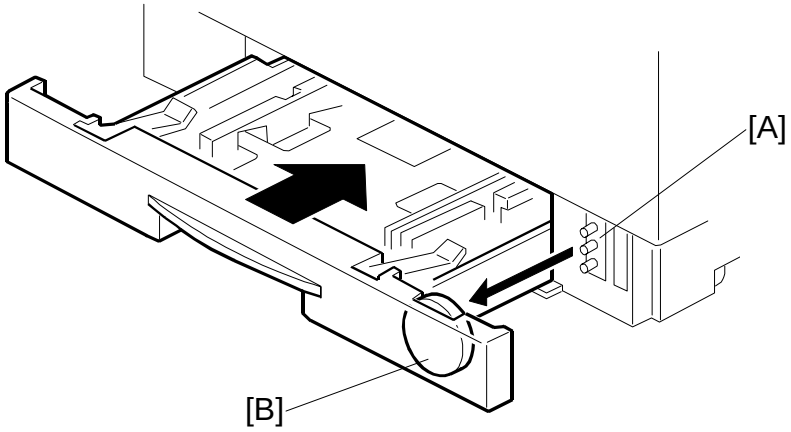
Paper end detection



G024D403.WMF

The paper end sensor [A] is on the floor of the main unit. When there is no paper in the paper tray, the sensor actuator [B] falls into the notch in the bottom plate, causing the sensor to trip.

Paper size detection



G024D404.WMF

Paper size detection is based on the three paper size switches [A] on the main unit, which detect the setting of the paper size dial [B] on the paper tray.

The paper size dial has grooves and ridges on the side facing the paper size switches. Each switch turns off when it falls into a groove, and turns on when a ridge presses it.

Paper size detection for tray 1

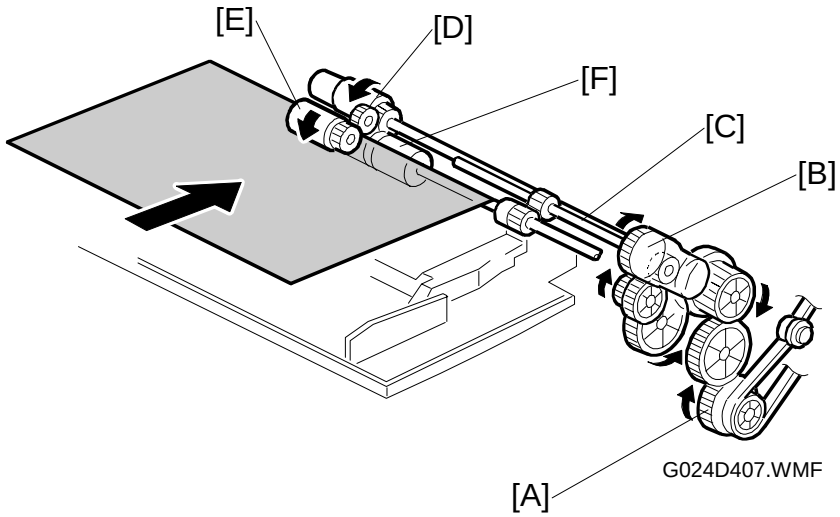
Dial No.	Paper Size	Sensor Status		
		XNOB2	XNOB1	XNOB0
1	11" x 17" SEF	0	0	0
2	Others	0	1	1
3	7 1/4" x 10 1/2" LEF	0	0	1
4	8 1/2" x 14" SEF	1	0	0
5	8 1/2" x 11" LEF	1	0	1
6	A4 LEF	0	1	0
7	A3 SEF	1	1	0
8	No Cassette	1	1	1

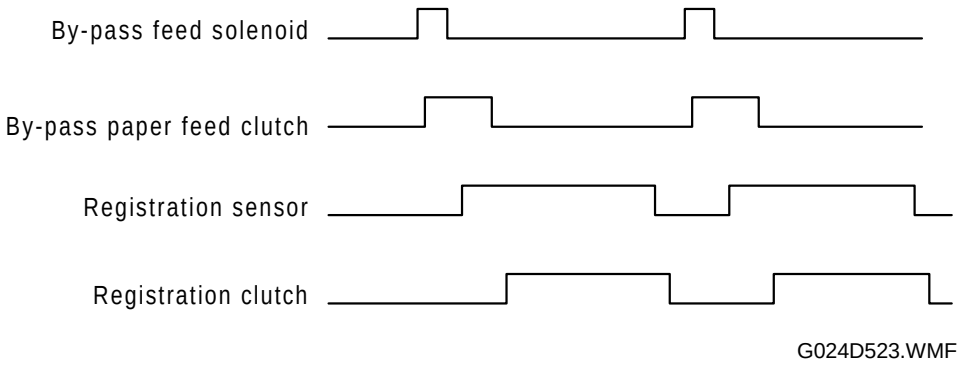
SEF: Short edge feed
LEF: Long edge feed

Others: SEF - B4 JIS, 8" x 13", 8 1/4" x 13", 8 1/2" x 13",
LEF - B5 JIS, A5, 5 1/2" x 8 1/2"

2.6.4 BY-PASS FEED TABLE

Drive





Timing for black, LT, long edge feed

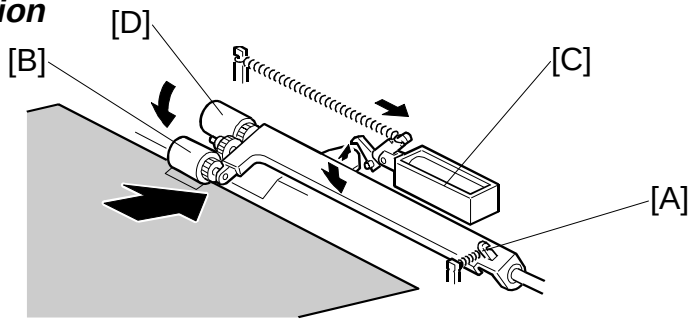
Drive transfers from the paper feed drive gear [A] to the by-pass paper feed clutch [B] and the shaft [C].

The by-pass feed solenoid allows the pick-up roller to drop onto the top sheet of paper (see the next page). The by-pass paper feed clutch controls the drive change-over between the paper feed roller [D] and the pick-up roller [E]. (When the clutch is on, the pick-up roller turns; when the clutch is off, the feed roller turns.)

The revolution of the separation roller [F] is synchronized with the main motor (in the opposite direction to the paper feed roller).

Transparencies and thick paper are fed at half the speed of normal paper.

Paper feed/separation



G024D408.WMF

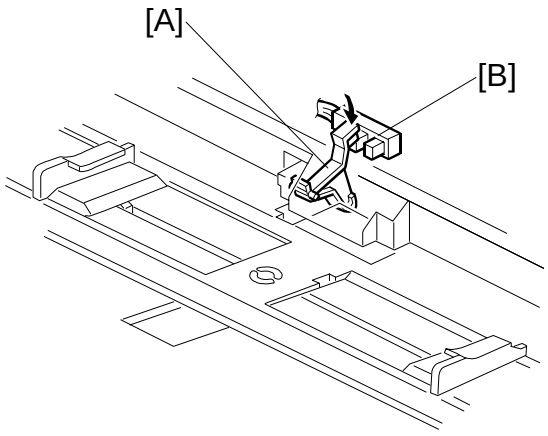
The paper feed/separation mechanism for the by-pass feed table is based on the FRR method.

A spring [A] pulls the pick-up roller [B] towards the paper. When the solenoid [C] is turned on, the pick-up roller lowers and feeds the top sheet of paper in.

A one-way clutch inside the paper feed roller [D] prevents reverse revolution.

The separation roller turns in the opposite direction to the paper feed roller. The separation roller axle has a torque limiter made of a plastic coil spring. When the applied load exceeds a certain limit, the separation roller turns in the forward direction.

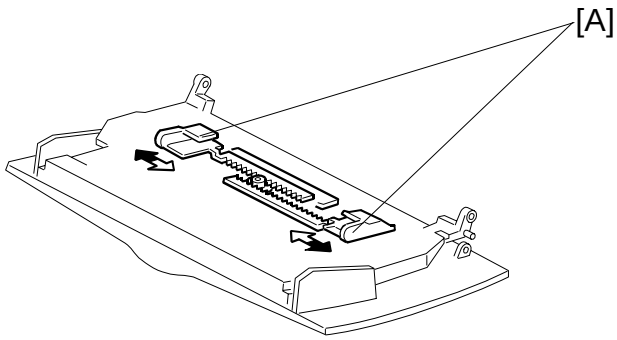
Paper end detection



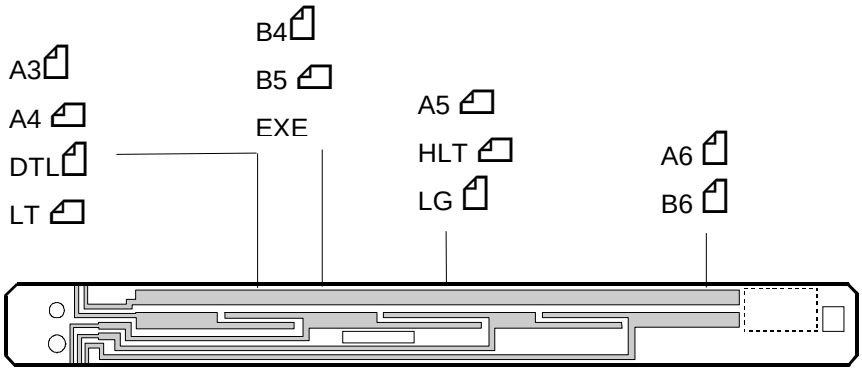
G024D193.WMF

When there is no paper on the by-pass feed table, the actuator [A] falls into the notch in the table. This causes the paper end sensor (a photointerrupter) [B] to trip.

Paper size detection



G024D410.WMF



G024D411. WMF

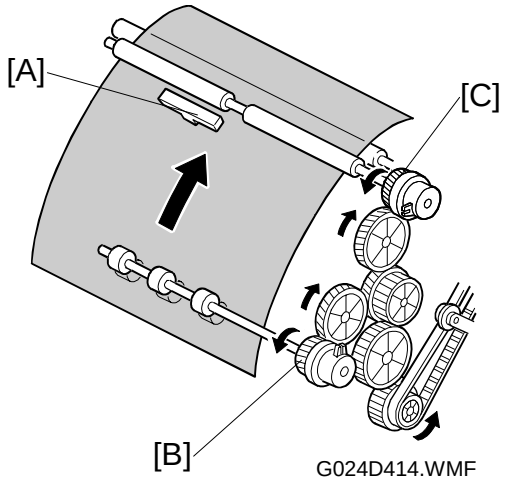
: Long edge feed : Short edge feed

An electrode plate is connected to each of the two side fences [A]. The electrode plates short the patterns on the paper size detection board. Paper width is detected from the locations of the shorting.

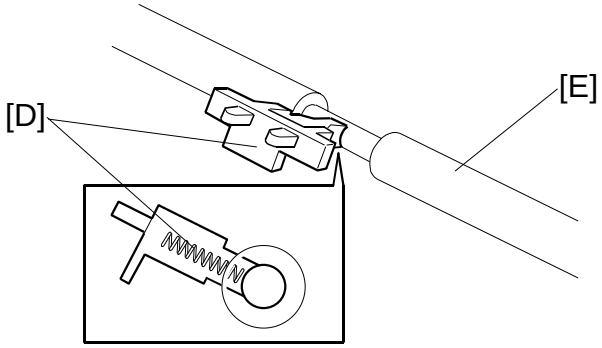
Paper size detection for the by-pass feed tray

Paper Size	Sensor Status			
	XBIT0	XBIT1	XBIT2	XBIT3
A4 LEF	1	1	0	0
A3 SEF	1	1	0	0
81/2" x 11" LEF	1	1	0	0
11" x 17" SEF	1	1	0	0
71/4" x 101/2" LEF	1	1	0	1
B5 JIS LEF	1	1	0	1
B4 JIS SEF	1	1	0	1
81/2" x 14" SEF	1	0	0	1
51/2" x 81/2" SEF	1	0	0	1
A5 LEF	1	0	0	1
8" x 13" SEF	1	0	0	1
81/4" x 13" SEF	1	0	0	1
81/2" x 13" SEF	1	0	0	1
B6 JIS SEF	0	1	1	1
A6 SEF	0	1	1	1

2.6.5 REGISTRATION



G024D414.WMF



G024D413.WMF

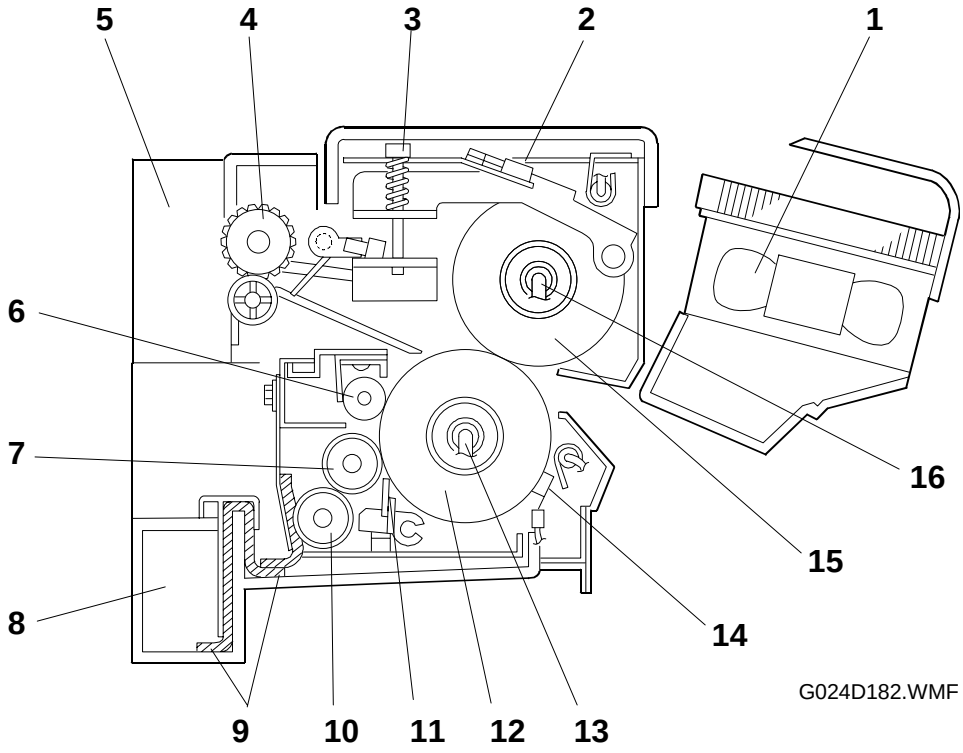
The registration sensor [A] detects the paper fed from the relay rollers. The paper then reaches the registration roller, and the relay roller clutch disengages, pausing the paper feed.

The relay roller clutch [B] and registration clutch [C] engage simultaneously to restart paper feeding at the correct time to synchronize with the leading edge of the image on the transfer belt.

The registration brake [D] at the center of the registration roller [E] helps to stop the roller quickly and prevents the axle from flexing.

2.7 TRANSPORT/FUSING/PAPER EXIT UNIT

2.7.1 OVERVIEW

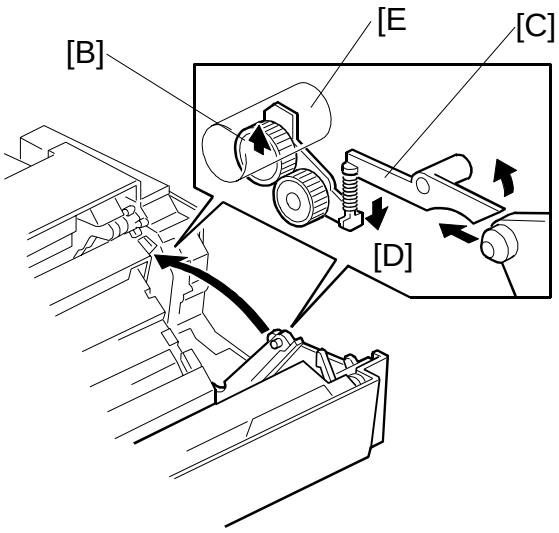


1. Transport fan
2. Pressure roller thermistor
3. Pressure adjustment screw
4. Exit rollers
5. Oil bottle
6. Hot roller cleaning roller
7. Oil supply roller
8. Oil reservoir
9. Oil supply pad
10. Oil supply sub-roller
11. Oil blade
12. Hot roller
13. Fusing lamp (for the hot roller)
14. Hot roller thermistor
15. Pressure roller
16. Fusing lamp (for the pressure roller)

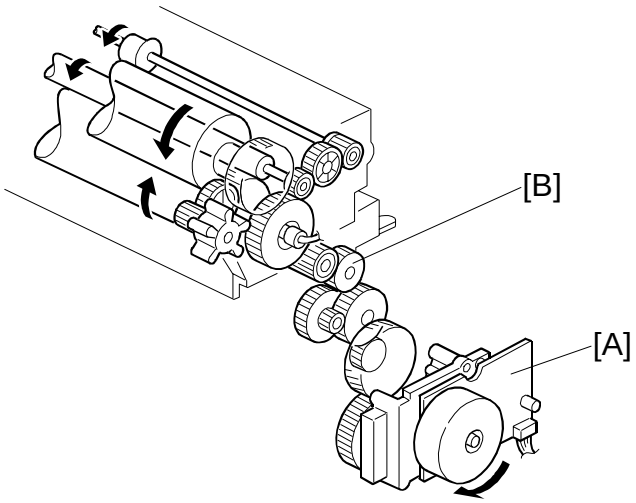
2.7.2 COMPONENTS

Section	Component	Overview
Transport	Transport fan	The transport fan creates upward suction on the paper to hold the paper against the transport belt so it moves smoothly to the entrance to the fusing unit.
	Drive unit	Gears transfer drive from the main motor.
Fusing	Fusing unit	Fuses the toner to the paper; has an oil supply mechanism
	Pressure unit	Permanent pressure from a lever and screw mechanism
	Oil supply	The oil supply pad absorbs oil. The oil supply roller applies a very small amount of oil to the hot roller via the oil supply sub-roller. The blade evenly spreads the oil on the hot roller.
	Heat detection	The pressure roller thermistor and hot roller thermistor detect temperature.
	Cleaning	The cleaning roller for the hot roller removes the toner attached to it. The scraper removes the toner attached to the cleaning roller.
Paper exit	Paper exit detection	The actuator and photointerrupter detect when paper exits the machine.
	Cover open detection	The microswitch detects an open cover.

2.7.3 FUSING UNIT DRIVE



G024D303.WMF



G024D182.WMF

A gear train transfers drive from the main motor [A] to the fusing contact/separation gear [B].

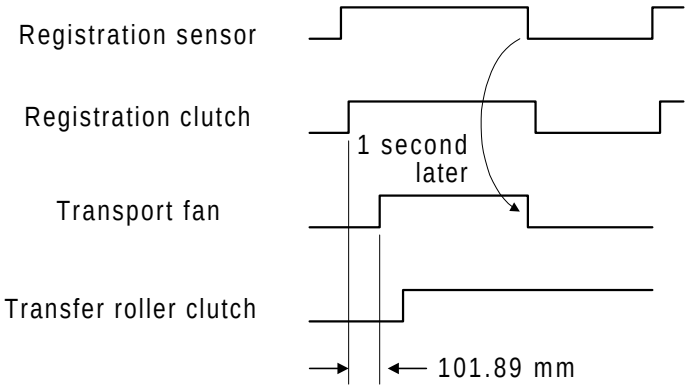
Closing the front cover lowers the contact/separation lever [C] in direction [D]. This lifts the fusing contact/separation gear, which engages with the fusing drive gear [E].

Opening the front cover lowers the fusing contact/separation gear, disengaging the gear train.

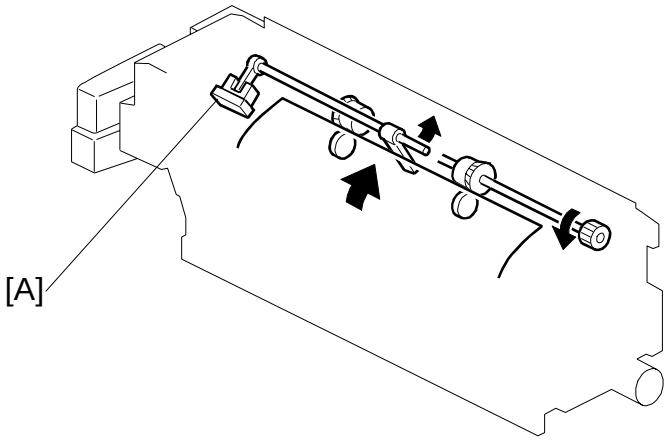
When the gears disengage, the knob for the fusing unit can be turned manually to remove paper jams.

For thick paper or transparencies, the main motor revolution slows to half-speed.

2.7.4 PAPER TRANSPORT



G024D525.WMF



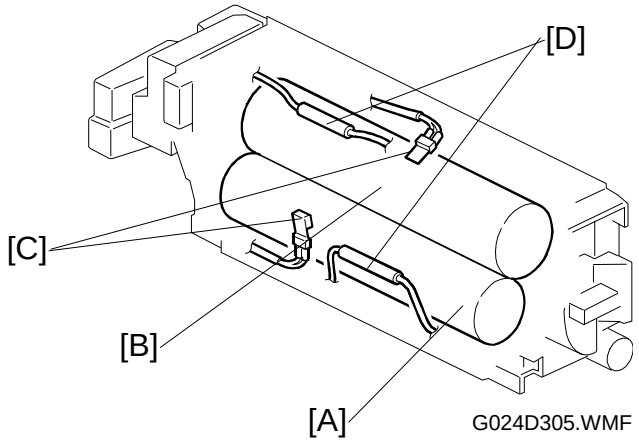
G024D304.WMF

The transport fan creates upward suction to hold the paper fed by the transfer roller against the transfer belt, which guides it to the fusing unit entrance guide plate. This prevents the side with toner from contacting the guide plate below the entrance to the fusing unit.

The transport fan turns on when the paper has been fed 101.89 mm since the registration clutch turned on. The transport fan is turned off one second after the registration sensor detects the paper's trailing edge.

The paper exit sensor [A] is at the exit of the fusing unit. It checks for paper exiting at specified times to check for jams.

2.7.5 TEMPERATURE CONTROL

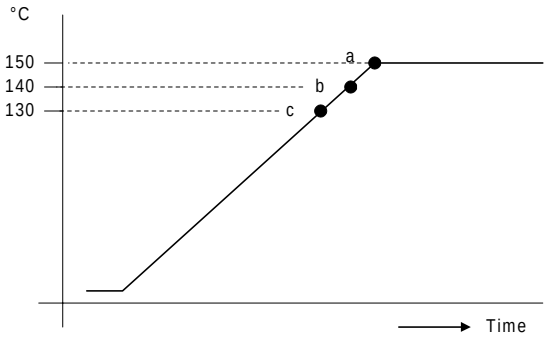


The hot roller [A] and pressure roller [B] have independent thermistors [C] to monitor temperature.

The hot roller fusing lamp is easier to heat or cool than the pressure roller fusing lamp, and may overheat quickly if left on. Therefore, the reheat start temperature for the hot roller fusing lamp is 10°C higher than that for the pressure roller fusing lamp.

The hot roller and pressure roller fusing lamps are heated alternately. When a fusing lamp reaches the reheat start temperature, the lamp is switched on and off alternately (the cycle is 1 second; for example, within this cycle, the printer may switch the lamp on for 0.6 s, and off for 0.4 s).

In level-1 energy-saving mode, the fusing lamps are turned off. In level-2 energy-saving mode, the fusing lamps are intermittently turned on to keep the pressure and hot roller temperature at 120°C. The user can select which mode to use with the system menu in the user tools.



a: Target temperature: 150°C
b: Hot roller temperature: Reheating starts at 150-10°C.
c: Pressure roller temperature: Reheating starts at 150-20°C.

Fusing lamp	Fusing lamp status			
	Below 130°C	**130°C**	**140°C**	**150°C**
Hot roller	Full power	Full power	On/off	Off
Pressure roller	Full power	On/off	On/off	Off

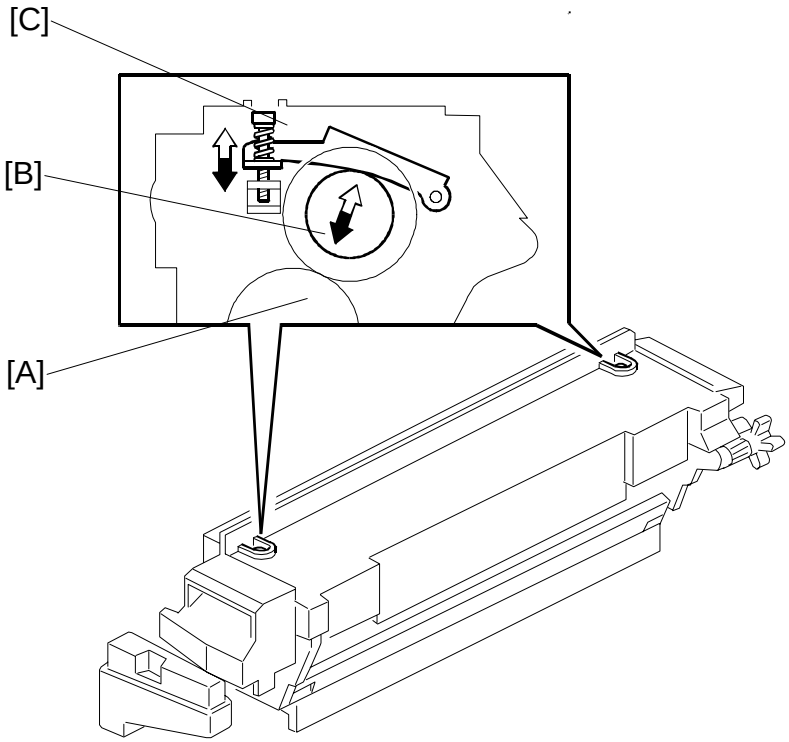
The thermofuse [D] opens when it reaches 167ºC, removing power from the fusing lamp (this prevents the fusing unit from overheating).

Fusing unit SC codes

SC No.	Name	Condition
21	Pressure roller thermistor error	The roller temperature has been at 0°C for five seconds.
22	High pressure roller temperature	The roller temperature has been at 190°C for three seconds.
23	Low pressure roller temperature	Reheating has been done and the motor is not running, or 60 seconds have passed after the main motor halted. Then, the roller temperature has been below 130ºC for 60 seconds
24	Hot roller thermistor error	The roller temperature has been at 0°C for five seconds.
25	High hot roller temperature	The roller temperature has been at 190°C for three seconds.
26	Low hot roller temperature	Reheating has been done and the motor is not running, or 60 seconds have passed after the main motor halted. Then, the roller temperature has been below 130ºC for 60 seconds
49	Pressure roller reheat timeout	When reheating, the roller temperature does not reach the reheat start temperature (target temperature -20°C) within five minutes.
50	Hot roller reheat timeout	When reheating, the roller temperature does not reach the reheat start temperature (target temperature -10°C) within five minutes.
51	Pressure roller full-power operation error (before reheating)	During full-power operation for reheating, the main motor is not running and the difference between the temperatures now and 60 seconds ago is 3°C or less.
52	Hot roller full-power operation error (before reheating)	During full-power operation for reheating, the main motor is not running and the difference between the temperatures now and 60 seconds ago is 3°C or less.

The above SC codes are released only by the Reset SC operation in engine SP mode. They cannot be released by turning the main switch off and on.

2.7.6 PRESSURE ROLLER



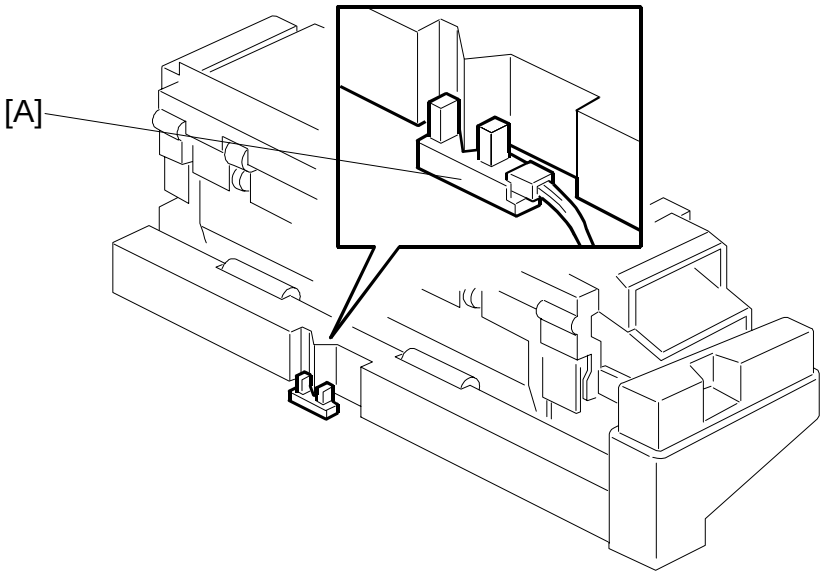
G024D531.WMF

The hot roller [A] is made of silicone. The pressure roller [B] is made of silicone covered with Teflon tubing.

A compressed spring and a screw [C] press the pressure roller against the hot roller.

NOTE: Do not turn the pressure screw except for nip width adjustment. Nip width adjustment is necessary when the roller is replaced or uneven fusing across the page occurs.

2.7.7 OIL END DETECTION



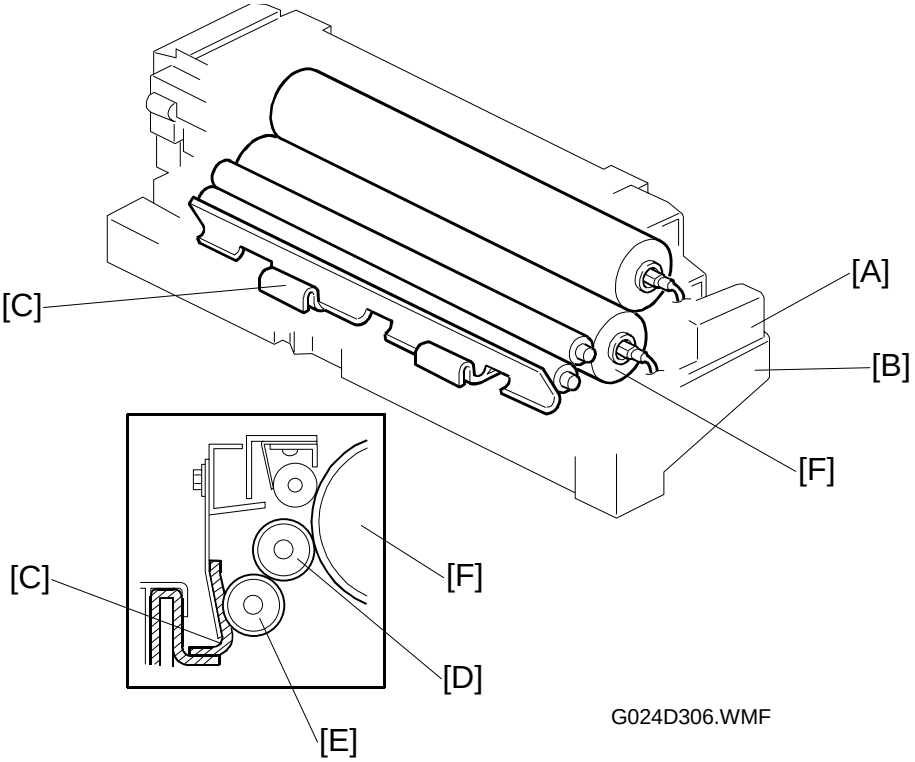
G024D307.WMF

A photointerrupter [A] detects the presence of oil. When there is no oil, the beam from the LED passes through to the phototransistor. However, if oil is present, the beam from the LED is refracted away and does not reach the phototransistor.

When oil is not detected continuously for 10 seconds, the machine detects fusing oil near-end.

After near-end is detected, 200 sheets can be printed. Then, the machine detects fusing oil end and no printing can be done.

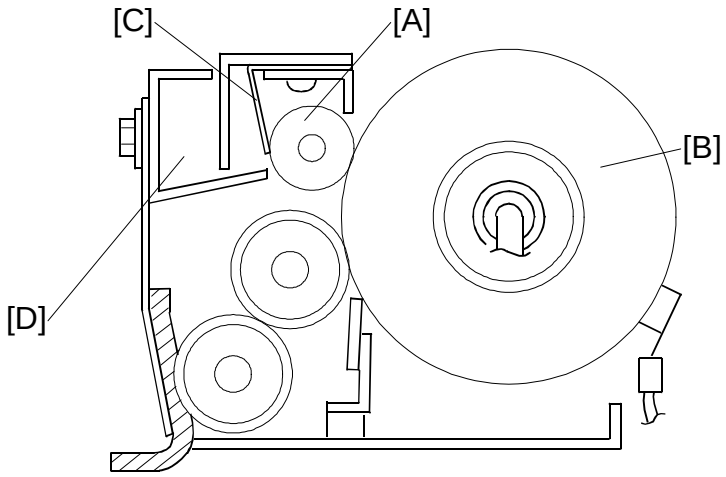
2.7.8 OIL SUPPLY



Oil drips from the oil bottle [A] to the oil reservoir [B]. The oil is absorbed in the oil supply pad [C], fed to the oil supply roller [D] by the oil supply sub-roller [E], and supplied to the hot roller [F].

NOTE: When an oil bottle is replaced with oil still in it, oil may drip from the oil bottle cap. To remove an oil bottle, use a cloth to prevent oil from dripping.

2.7.9 CLEANING

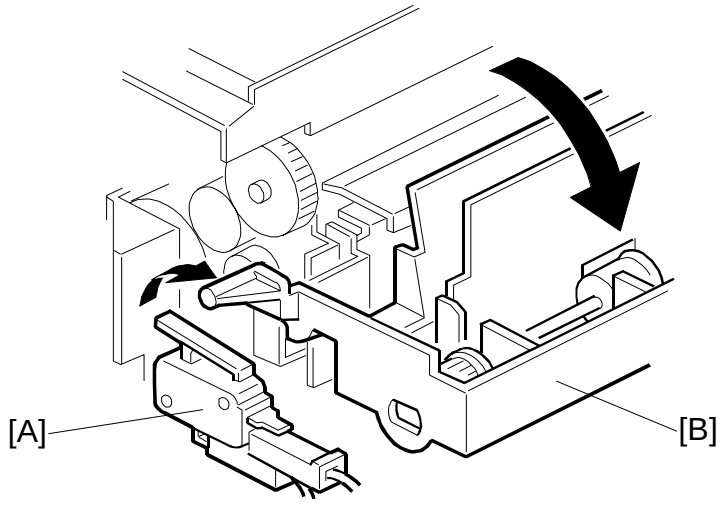


G024D313.WMF

The cleaning roller [A] cleans the hot roller [B].

The cleaning roller picks up the toner or paper dust from the hot roller, and the scraper [C] removes them from the cleaning roller. The dust drops into the recess [D] behind the scraper.

2.7.10 PAPER EXIT COVER OPEN/CLOSED DETECTION



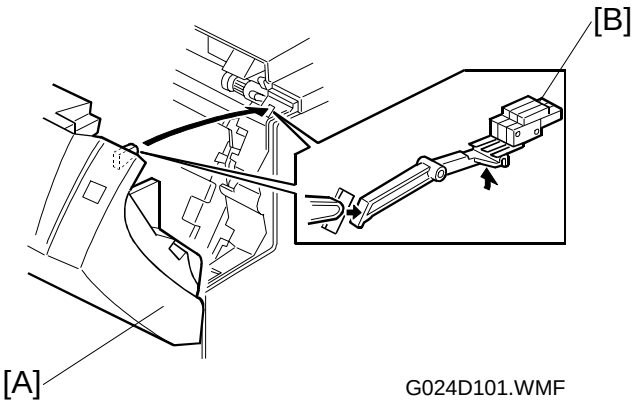
G024D309.WMF

The paper exit cover switch [A] detects when the paper exit cover [B] is opened or closed.

This switch turns the 24 VDC power line on and off.

2.8 OPEN COVER DETECTION

2.8.1 FRONT COVER OPEN/CLOSED DETECTION



G024D101.WMF

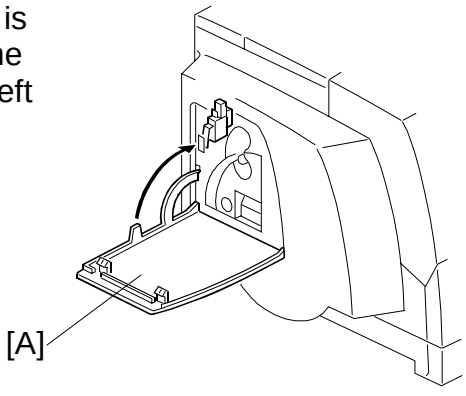
This feature ensures safety during maintenance and inspection with the front cover [A] opened.

Opening or closing the front cover vertically moves the lever in contact with the actuators for the door safety switches [B]. The actuators turn the 5 VDC and 24 VDC power lines on and off.

2.8.2 DTM COVER OPEN/CLOSED DETECTION

A switch that detects whether the DTM cover [A] is open or closed. This feature prevents the machine from working if the DTM cover was accidentally left open after DTM replacement.

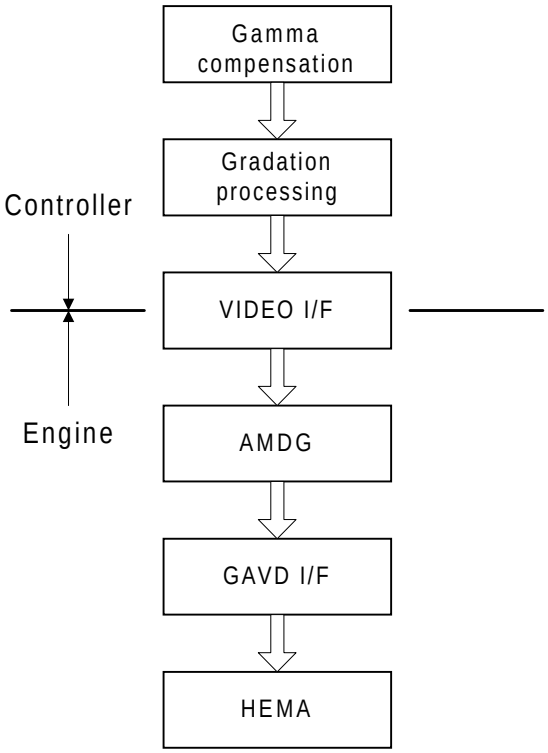
This switch interrupts the 24 VDC supply.



G024D172.WMF

2.9 VIDEO DATA PROCESSING

2.9.1 FLOW CHART



G024D526.WMF

2.9.2 GAMMA COMPENSATION

The controller receives either 8-bit RGB or 8-bit CMYK data from the driver (in the case of 8-bit RGB data, the controller has to convert this to 8-bit CMYK data before image processing can start). Then, gamma compensation corrects the CMYK data (a combination of the controller gamma and service gamma is used; see Detailed Descriptions – Gamma Correction in the controller service manual).

2.9.3 GRADATION PROCESSING

The gamma-compensated data is dithered.

The result of dithering depends on whether 1-bit or 2-bit mode was selected with the driver.

After dithering, the data is converted to 4-bit and sent to the engine through the video interface.

- 1-bit mode: The output for each pixel after dithering is either 0 or 1. This becomes either 0 or F after conversion to 4-bit data.
- 2-bit mode: The output for each pixel after dithering is 0, 1, 2, or 3. This becomes either 0, 5, A, or F after conversion to 4-bit data.

2.9.4 AMDG (ADAPTIVE MULTI-DOT GAMMA)

This process converts 4-bit data into 8-bit data (256 shades).

Each pixel is compared with a range of pixels above and to the left, and is converted to an 8-bit value based on the results, using an internal look-up table.

The data then passes to the GAVD (Gate Array Video) interface through the laser diode control chip (HEMA) on the LD unit.

2.9.5 LASER DIODE CONTROL

Modulation

PM and PWM modulation for LD control converts the 8-bit data (equivalent to 256 gradations) to laser power levels.

Smoothing

Smoothing only occurs if the following settings have been made with the printer driver.

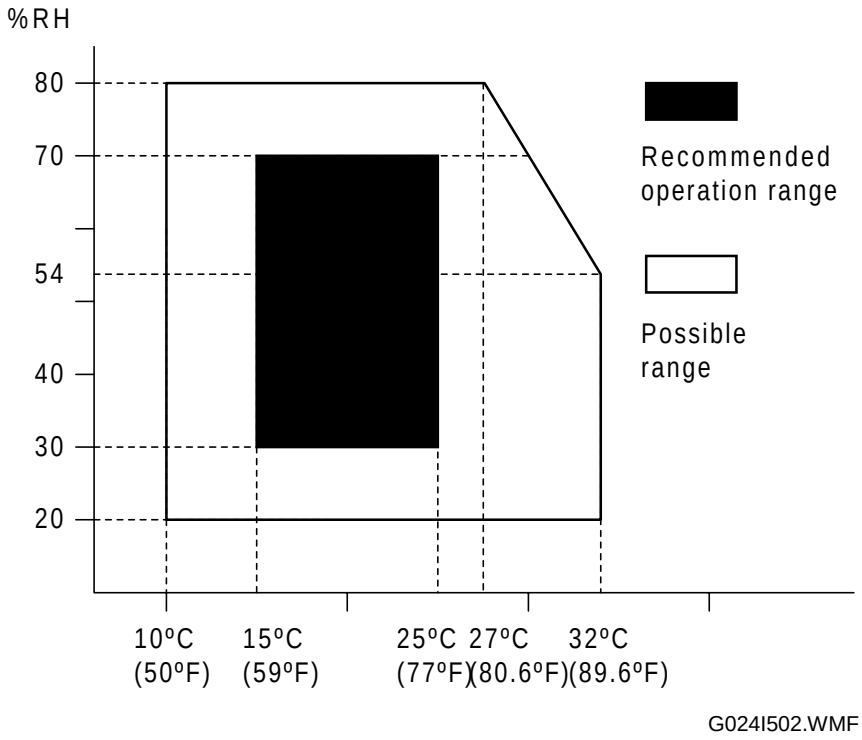
- Resolution: 600 dpi
- Color level: 1-bit
- Smoothing: Auto

The LD controller smooths the data to reduce jagged edges. Normally, the laser writes the coloured part of each pixel at the left side of the pixel. However, to smooth the image, the laser sometimes writes the coloured part at the right side of the pixel. The machine determines automatically which pixels have to be treated in this way.

3. INSTALLATION PROCEDURE

3.1 ENVIRONMENT

Recommended temperature and humidity



G024I502.WMF

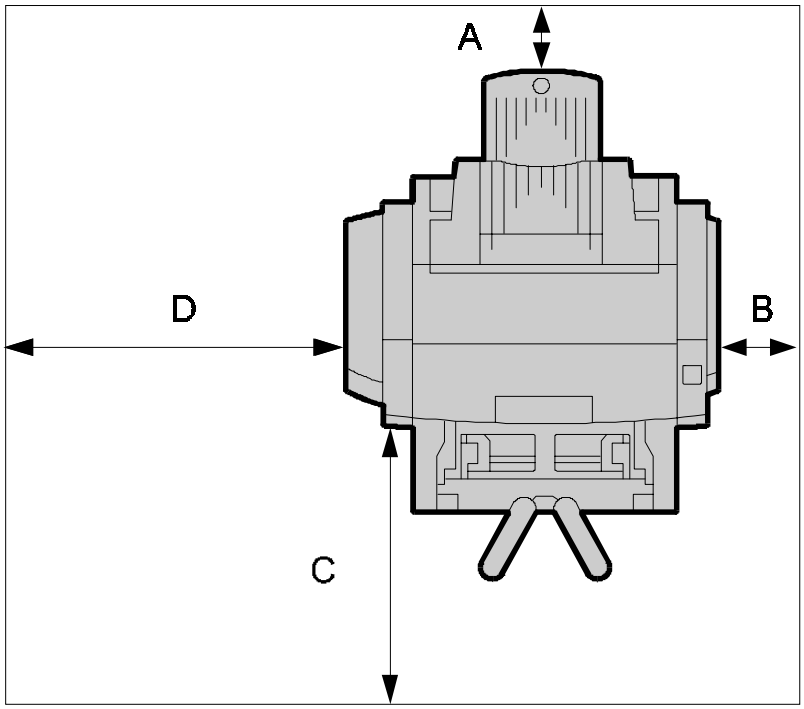
1. Temperature Range: 10°C to 32°C (50°F to 89°F)
2. Humidity Range: 20% to 80% RH
3. Ambient Illumination: Less than 2,000 lux (do not expose to direct sunlight.)
4. If the place of installation is air-conditioned or heated, do not place the machine
   a) where it will be subjected to sudden temperature changes,
   b) where it will be directly exposed to cool air from an air conditioner,
   c) where it will be directly exposed to heat from a heater.
5. Do not place the machine where it will be exposed to corrosive gasses.
6. Do not install the machine at any location over 2,500 m (6,500 feet) above sea level.
7. Place the printer on a strong and level base.
8. Do not place the machine where it may be subjected to strong vibrations.

3.2 MACHINE LEVEL

1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

3.3 MINIMUM SPACE REQUIREMENTS

Place the printer near the power source, providing clearance as shown:



G024I503.WMF

A: More than 5 cm (2.0")
B: More than 10 cm (4.0")
C: More than 70 cm (27.6")
D: More than 65 cm (25.6")

3.4 POWER REQUIREMENTS

1. Input voltage level: 85 – 138V, 60 ± 3 Hz: More than 12 A
   187 – 276 V, 50/60 ± 3 Hz: More than 6 A
2. Permissible voltage fluctuation: 10%
3. Do not set anything on the power cord.

   NOTE: 1) Make sure the plug is firmly inserted in the outlet.
   2) Avoid multi-wiring.

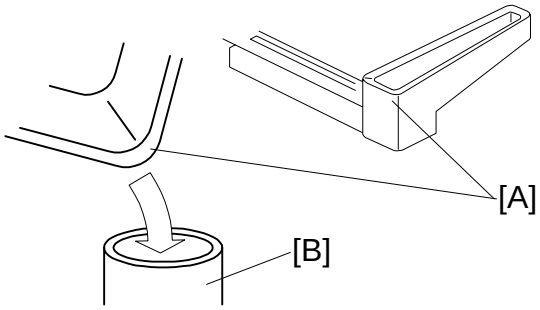
3.5 UNPACKING

For unpacking and installation procedures, refer to the Operating Instructions and the Quick Installation Guide.

3.6 MOVING

To move a previously installed laser printer, follow the instructions below.

1. The printer weighs about 62 kg. Always be sure two or more people move the printer.
2. Keep the printer horizontal during transportation. (Do not concentrate the load on any one part of the base.)
3. Before moving the printer, pack the printer using the factory-supplied cushioning materials whenever possible.
4. Remove the oil from the fusing unit.
   1) Remove the oil bottle from the printer before moving.
   2) Drain the oil off the fusing unit. Refer to the Fusing section of Chapter 6 (Replacement and Adjustment Procedures) to remove the oil supply unit of the fusing unit. Gradually tilt the oil sump to move oil from oil sump [A] to the oil bottle [B].
   3) After moving the oil to the oil bottle, wipe the oil sump and oil bottle with a cloth.

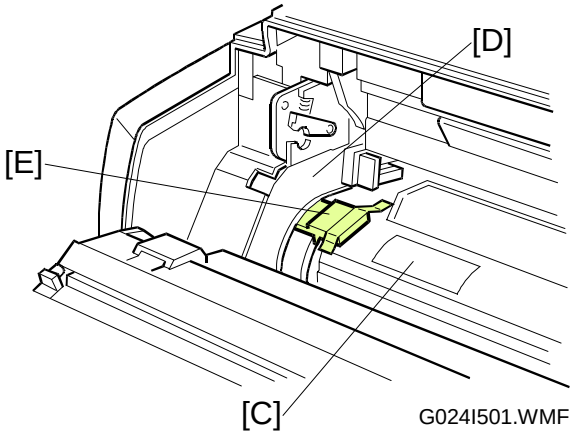


G024I500.WMF

⚠CAUTION

Make sure that no fusing oil remains in the printer. Remove the oil and clean the oil sump and oil bottle as explained above. Otherwise, the oil may spread inside the printer while moving it.

5. Insert cushioning material [E] between the DTM [C] and the left side panel [D] to fix the DTM in place.
6. Replace the fusing unit and cover.
7. Clean the printer before re-packing.
8. Remove paper from the paper tray.
9. Remove the optional paper tray.
10. Tape the left, right, front, rear, and top covers and the paper tray.



G024I501.WMF

4. SP MODE

4.1 OVERVIEW

This printer has two SP modes:

1) Engine SP mode
2) Controller SP mode

The controller SP modes are described in the service manual for the controller.

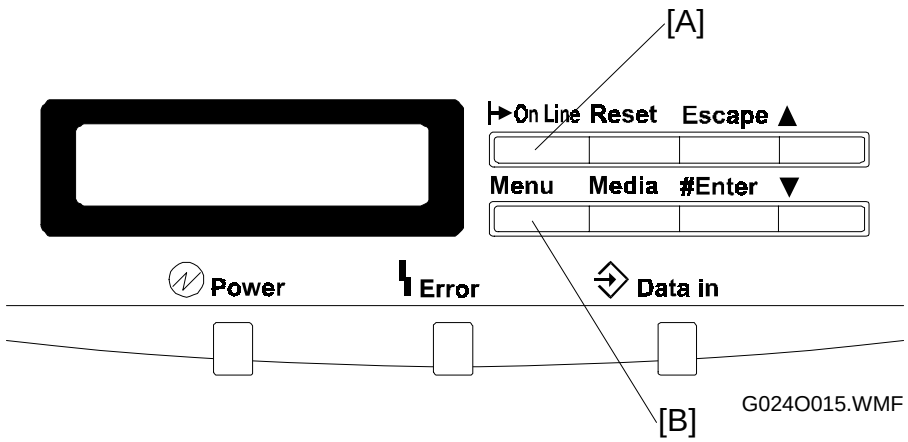
These two modes contain different functions.

4.2 ENGINE SP MODE

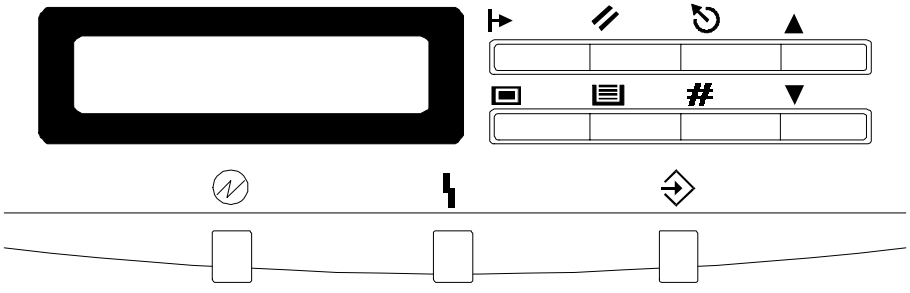
4.2.1 OVERVIEW

Entering engine SP mode

To enter engine SP mode, hold down the [Online] [A] and [Menu] [B] keys on the operation panel and turn on the power.



G024O015.WMF



G024O016.WMF

To exit engine SP mode

Turn off the unit.

NOTE: Be sure to exit from SP mode when you are finished.

Outline of the engine SP mode functions

The engine SP mode has the following menu items:

Menu Item	Function and application
1: Margin	Independent vertical/horizontal registration adjustment for each tray, and for OHP mode
2: Parameter	Independent adjustment of transfer bias and fusing temperature for normal paper, thick paper, and OHPs
3: Clear Memory	Resets the counters and other values stored in NVRAM
4: Sensor Check	Sensor output check
5: Nip Width	Nip width measurement for fusing pressure adjustment
6: Reset SC	Resets fusing unit SC codes
7: Process Ctrl	Implementation of forced, normal, and color bias setting process control and setting of execution intervals for periodic process control
8: Test Print	Prints internally generated patterns (4C overlay grids, 4x4 color belts, and solid-area color belts) for the print engine
9: ID Sensor PWM	ID sensor output calibration
10: Image Adjust	Adjustment of image reproduction ratio in the main scan and sub-scan directions
11: Output Check	Tests for motors, clutches, and solenoids
12: Hi-light	Fine adjustment of density for highlight (low-ID) areas.
13: Lub_Interval	Adjustment of lubricant application interval

4.2.2 MENU OPERATION/DISPLAY

In the engine SP mode menu, you can move between menu levels, specify parameters, and view LCD indications in the same way as with the user menu.

The different menu items are described on the following pages. All menus are in English only.

Key operation

[▲] and [▼] keys: Scroll through the menus. When either of these keys is pressed in a number setting menu, the displayed value changes by the minimum value.

[# Enter] key: When the selected item has a lower level menu, pressing this key moves you to the next lower level. At the lowest level, this key is used to determine the specified setting or execute the selected item.

[Escape] key: Pressing this key moves you to a higher level in the current menu. Before the specified value is confirmed by the [# Enter] key, pressing this key keeps the existing setting.

LCD indications:

Title: The menu title is displayed to show the current menu level.

Selected item: The currently selected item on the menu is displayed. Pressing the [▲] or [▼] key scrolls through the items at that level. The scrolling is circular; the first item is displayed after the last item. In the lowest level of the menu, the currently selected item/setting is prefixed with an asterisk (*). To select an item/setting, press the [Enter] key while the target item is displayed. The item is then prefixed with an asterisk (*) for 0.5 seconds, and the next highest level menu is displayed.

Arrow marks: The arrow marks indicate that the items can be scrolled. These arrow marks are not shown if there is only one item in the menu.

4.2.3 MARGIN (REGISTRATION AJDUSTMENT)

The SP mode menu levels for registration adjustment are described below.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 1:Margin	Margin Pattern Print	Margin: Print Std. Paper	Print: Std Tray 1
			It can be printed from the optional trays (tray 2 & tray 3) and the by-pass tray in the same way as tray 1.
		Margin: Print Thick Paper	Print: Thick By-pass Tray
		Margin: Print Transparency	Print: Trans By-pass Tray
	Margin Adjust	Margin: Adjust Tray1:Left	Tray1:Left X.X
		Margin: Adjust Tray1:Top:1st	Tray1:Top:1st X.X
			It can be adjusted for tray 2, tray 3, and the by-pass tray in the same way as for tray1.
		Margin: Adjust Trans:Top:1st (For OHPs)	Trans:Top:1st X.X

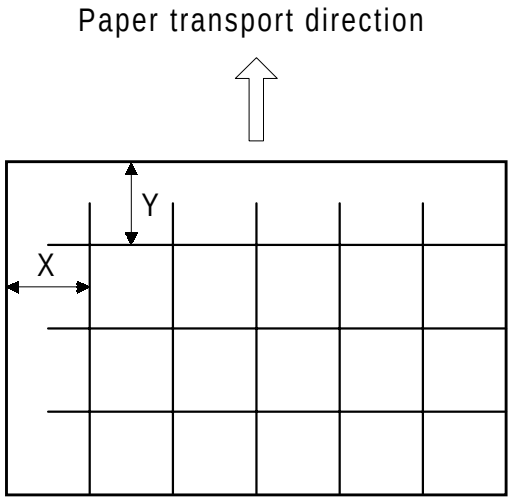
Follow the steps below to adjust registration in the “1. Margin” item of the engine SP mode menu:

1. From the Pattern Print menu, select the media type and paper tray. Then, print the registration adjustment pattern (4C overlay grid pattern).
2. Measure the distance from the paper edge to the first vertical and horizontal lines of the grid patterns (X and Y in the diagram).
3. Move to the Adjust menu to adjust the vertical and horizontal registrations. The adjustment range for the horizontal (Left) registration is between –2.0 and +2.0 mm in units of 0.4 mm. The adjustment range for the vertical (Top) registration is between –2.5 and +2.5 mm in increments of 0.5 mm.

Adjustment standard values:

X (horizontal) = 12.7 ±1.5 mm

Y (vertical) = 10.8 ±1.0 mm



G024P500.WMF

NOTE: The LCD panel displays the horizontal registration as “Left” and the vertical registration as “Top”.

4.2.4 PARAMETER

Use this menu to specify the paper transfer bias and fusing temperature for normal paper, thick paper, and OHPs.

The paper transfer bias can be specified in 1% increments between 50% and 200%. (Default: 100%)

The fusing temperature can be specified in three steps: Low, Normal, and High (Default: Normal = 150°C). The Low temperature is the Normal temperature minus 15°C. The High temperature is the Normal temperature plus 15°C.

See the table below for Parameter menu details.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 2:Parameter	Parameter Std. Paper	Std. Paper Transfer Bias	Bias XXX%
		Std. Paper Fusing Temp.	Temp. Low
			Temp. Normal
			Temp. High
	Parameter Thick Paper	Same as Std. Paper	Same as Std. Paper
	Parameter Transparency	Same as Std. Paper	Same as Std. Paper

4.2.5 CLEAR MEMORY

Use this menu to reset all the settings stored in NV-RAM in the MCU or to reset the jam and SC counters individually.

NOTE: Do not execute “All” in the field, because it clears all counters used to manage the replacement cycles for supplies.

See the table below for Clear Memory menu details.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 3:Clear Memory	Clear Memory SC	Clear: SC Press # to clear	Clearing SC
	Clear Memory Jam	Clear: Jam Press # to clear	Clearing Jam
	Clear Memory All **NOTE:** Factory use only.	Clear: All Press # to clear	Clearing All

- SC: Resets the SC counter and SC history log
- Jam: Resets the paper feed jam counter, transfer jam counter, eject jam counter, and jam history log

4.2.6 SENSOR CHECK

Use this menu to check for sensor failures and status.

Select the target sensor in the second level menu using the [▲] and [▼] arrow keys. Then, manually change the sensor status and check the corresponding output.

After changing the sensor status, be sure to press the [Enter] key to update the display.

See the table below for details of the Sensor Check menu.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 4:Sensor Check	Sensor Check XXX 0 or 1		

The table below describes the relationship between the display values and the detected output of the sensors.

Sensor Name		Sensor Status	
Name	**Display**	**0**	**1**
Paper End Sensor (Tray 1)	P End-1st	Paper detected	Paper not detected
Paper End Sensor (By-pass Tray)	P End-By-pass	Paper detected	Paper not detected
Paper End Sensor (Tray 2)	P End-2nd	Paper detected	Paper not detected
Paper End Sensor (Tray 3)	P End-3rd	Paper detected	Paper not detected
Registration Sensor	Registration	Paper not detected	Paper detected
Exit Sensor	Exit	Paper detected	Paper not detected
Paper Size Switch (Tray 1)	P Size-1st	*1	*1
Paper Size Switch (Tray 2)	P Size-2nd	*1	*1
Paper Size Switch (Tray 3)	P Size-3rd	*1	*1
By-pass Paper Width Detection Board	P Size-By-pass	*2	*2
PCU Set Switch	PCU Set	Detected	Not detected
DTM Set Sensor	CTC Set	Detected	Not detected
Toner End Sensor	CTC Toner End	Not end	End
Door Safety Switch	Cvr Opn-F	Closed	Open
Exit Cover Switch	Cvr Opn-EX	Closed	Open
Oil End Sensor	Oil End	End	Not end
(Fusing Unit)	Fusing Set	Detected	Not detected
Used Toner Sensor	Used Toner	Not full	Full
(Tray 2)	Tray Set-2nd	Not detected	Detected
(Tray 3)	Tray Set-3rd	Not detected	Detected
PCU Reset Sensor	PCU Reset	Old	New
Revolver H.P. Sensor	Revolver H.P.	Home position	Not home position

Sensor Name		Sensor Status	
Name	**Display**	**0**	**1**
Transfer Roller Position Sensor	Tfr Position	Release	Touch
Pull-out Sensor (Tray 2)	P Feed-2nd	Paper not detected	Paper detected
Pull-out Sensor (Tray 3)	P Feed-3rd	Paper not detected	Paper detected
ID Sensor	ID	*3	*3
Temperature/Humidity Sensor	Humidity	*4	*4
	Temp	*5	*5
DTM Cover Switch	Cvr Opn-S	Open	Closed
Pull-out Sensor (Main Body)	Picup	Paper detected	Paper not detected
Charger Corona Set Switch	Main Charger	Detected	Not detected

*1: “Paper size detection” in Section 2 explains the status of the paper size switches for paper size detection. (0: Pressed, 1: Not pressed)

*2: The table below shows the correspondence between the paper guide positions and displayed values.

Guide position	**A3W**	**A3/A4**	**B4/B5**	**A5**	**B6**	**A6**
Display	20	04	22	12	0b	0b
Guide position	**12**	**11**	**10½**	**8½**	**8¼**	**8**
Display	20	04	22	12	12	12

*3: The displayed value indicates the K sensor output when the LED in the ID sensor is turned on. The specified output value (reference for normal operation) is 2.7 ± 0.8 V.

*4: The detection results are shown in the XXX YYY format. XXX indicates absolute humidity, and YYY indicates relative humidity. (Reference for normal operation: YYY should be between 5 and 95.)

*5: The displayed value indicates the detected temperature. (Reference for normal operation: Between 8 and 42)

4.2.7 NIP WIDTH

Use this to re-adjust the fusing pressure, which is required when the pressure adjustment screw for the fusing unit is loosened. This function feeds a transparency from the by-pass feed tray, then stops and resumes feed through the fusing unit three times, and finally ejects the transparency. This operation produces white cloudy patches on the transparency due to heating. For details of the operation, see “Replacement and Adjustment - Checking and Adjusting the Fusing Nip Width”.

The table below shows the details of the Nip Width menu.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 5:Nip Width	Nip Width Press # to start	Executing	

4.2.8 RESET SC

For safety purposes, fusing system SCs cannot be reset by turning the power off and on. Use this menu to reset a fusing system SC.

The table below shows the details of the Reset SC menu.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 6:Rest SC	Rest SC Press # to reset	Resetting Fusing SC	

4.2.9 PROCESS CTRL

Use this menu either:

- To execute process control after maintenance work that affects process conditions (ID sensor cleaning/replacement, bias electrode cleaning, MCU NV-RAM replacement)
- To change the intervals for periodic process control and belt lubrication.

There are four types of forced process control (these are listed below), and the parameters that are adjusted are different for each. (For a list of the steps in a process control operation, see 'Detailed Section Descriptions – Process Control'.

- Initialize: Forced process control to initialize the machine. This does all six steps of the process control procedure.
- Normal: This forced process control adjusts the process control parameters in the same way as the periodic process control self check
- Color Bias: Process control for setting color development bias. Only the color development bias initialization step is done.
- PCU Getting OK: Complete process control followed by belt lubrication routine for a new PCU

After the end of each process control, "Finish" is displayed with the final status following it ("OK" for a successful process control, or "NG" in the event of an error).

Use 'Interval set' to change the interval at which the periodic process control is done.

The interval for process control can be specified in units of 50 sheets between 0 and 250 sheets (default: 100 sheets).

NOTE: Specifying 0 for the interval disables all process controls.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 7:Process Ctrl	Process Ctrl. Initialize	Initialize Press # to start	Executing
	Process Ctrl. Normal	Normal Press # to start	Executing
	Process Ctrl. Color Bias	Color Bias Press # to start	Executing
	Process Ctrl. PCU Getting OK	PCU Getting OK Press # to start	Executing
	Process Ctrl. Interval Set	Interval Set Press # to start	

4.2.10 TEST PRINT

Use this menu to check print quality. This function prints a pattern that is internally generated by the print engine and is not processed by the controller.

To stop printing, press the **[Escape]** key.

The following three patterns can be printed using this function:

- Pattern 1: 4C overlay grids (color shifting, registration, and skew check)
- Pattern 2: 4x4 dots in each of 4C (jitter check)
- Pattern 3: 4C solid belt (use this for the ID sensor adjustment procedure)

The table below shows the Test Print menu details.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 8:Test Print	Test Print Pattern 1	Pattern 1 Tray X	Printing Tray X
	Test Print Pattern 2	Same as Pattern 1	Same as Pattern 1
	Test Print Pattern 3	Same as Pattern 1	Same as Pattern 1

4.2.11 ID SENSOR PWM (PULSE WIDTH MODULATION)

Use this menu to calibrate the ID sensor output after replacing the ID sensor.

For the full details of the calibration method, see “Replacement and Adjustment - Calibrating the ID Sensor”.

The table below shows the details for the ID Sensor PWM menu.

The PWM value can be specified in one step increments between 140 and 160. (Default: 150)

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 9:ID Sensor PWM	ID Sensor PWM XXX		

4.2.12 IMAGE ADJUST

Use this menu to adjust the reproduction ratio of images.

With the top left corner as the reference point, adjustment can be done in steps of 0.1% within ±1%.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 10:Image adjust	Image Adjust Main Scanning	Main Scanning XXX	
	Image Adjust Sub-scanning	Sub-scanning XXX	

4.2.13 OUTPUT CHECK

Use this menu to check the operation of the clutches, motors, and solenoids individually.

NOTE: Before testing the PCU, main, or revolver motors, remove the load beforehand (to do this, remove the motor from the machine, but keep it connected).

The table below shows the Output Check menu details.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 11:Output Check	Out Put Check XXXXXXXX	XXXXXXXX ON (OFF)	

Name	Display	Operation
By-pass feed clutch	Bypass Feed Cl.	Operating for a certain time
Pull-out clutch	Pick-up Cl.	Operating until inputting OFF
Paper feed clutch	Feed Cl.	Operating for a certain time
Relay roller clutch	Transport Cl.	Operating until inputting OFF
Registration clutch	Regist. Cl.	Operating until inputting OFF
Transfer roller clutch	Tr. Roller Cl.	Operating for a certain time
Development drive solenoid	Development Sol.	Operating until inputting OFF
By-pass feed solenoid	Bypass Sol.	Operating for a certain time
Transfer belt cleaning solenoid	Cleaning Sol.	Operating until inputting OFF

Name	Display	Operation
Quenching lamp	Quenching LED	Operating until inputting OFF
PCU motor	PCU Motor-slow	Operating until inputting OFF
	PCU Motor-normal	Operating until inputting OFF
	PCU Motor-fast	Operating until inputting OFF
	PCU Motor-reverse	Operating until inputting OFF
Main motor	Main Mtr-normal	Operating until inputting OFF
	Main Mtr-slow	Operating until inputting OFF
Polygon mirror motor	Scanner Motor	Operating until inputting OFF
Revolver motor	Revolver Motor	Operating until inputting OFF
Tray main motor (for tray 2)	OT1 Motor	Operating until inputting OFF
Paper feed clutch (for tray 2)	OT1 Feed Clutch	Operating for a certain time
Tray main motor (for tray 3)	OT2 Motor	Operating until inputting OFF
Paper feed clutch (for tray 3)	OT2 Feed Clutch	Operating for a certain time

4.2.14 HIGHLIGHT ADJUSTMENT

Use this menu to adjust the density in high-light (low ID) areas for each of Y, C, M, and K. This adjusts the grid bias.

After adjusting this setting, do a forced process control (engine SP mode 7, Process Contrl – Normal, or Initialize) to make the new setting come into effect.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 12:Hi-light adj	Hi-light adj cyan	cyan 1 to 7	
	Hi-light adj magenta	Same as cyan	
	Hi-light adj yellow	Same as cyan	
	Hi-light adj black	Same as cyan	

4.2.15 LUB_INTERVAL (BELT LUBRICATION INTERVAL ADJUSTMENT)

The belt lubrication interval is adjustable.

The counter for this interval increases by one for each transfer belt revolution. (e.g. It increases by 4 with A3/DLT full color printing and by 1 in monochrome mode.)

The default value is 100 transfer belt revolutions.

This mode is helpful when insufficient toner is transferred to the printout, especially on text and/or line images. This can occur when a machine is used heavily. (The expected job size for this model is 5 sheets per job on average).In this case, making the interval shorter solves this problem.

NOTE: This value should not be set to 0 because no lubrication is done with this value. The recommended value is between 50 to 100 for optimum machine performance.

Layer 1	Layer 2	Layer 3	Layer 4
Maintenance 13:Lub_Interval	M Interval XXX		

5. PREVENTIVE MAINTENANCE

5.1 PM TASKS

5.1.1 REPLACEMENT

Replace the PM parts every 100 K printouts as shown in the PM table on the next page.

The fusing unit replacement interval is not determined in the same way. For details, see the note after the PM table.

- For the replacement procedures, refer to Chapter 6 “Replacement and Adjustment” in this manual and Chapter 3, “Replacement and Adjustment” in the manual for the optional 500-sheet paper tray.

⚠CAUTION

When replacing components, be aware that the fusing unit may be hot. Handle it with care.

5.1.2 CLEANING

Clean the printer components when visiting the customer site.

- See the PM table for the correct way to wipe the components.

NOTE: Ensure that the charge corona unit cleaner is in the home position.

5.1.3 INSPECTION

Inspect the printer components when visiting the customer’s site.

- Visually inspect the components, and replace the components if there is any damage.

⚠CAUTION

A high voltage is applied to bias electrodes. To inspect a bias electrode, ensure that the power switch is turned off.

5.2 PM TABLE

5.2.1 MAIN UNIT

C: Clean R: Replace I: Inspect

item	EM	60k	100k	Note
Paper feed roller	C		R	Alcohol or water
Registration roller	C			Alcohol or water
Friction pad	C		R	Water
Bottom plate pad	C			Water
By-pass feed roller	C			Alcohol or water
Pull-out roller	C			Alcohol or water
By-pass separation roller	C			Alcohol or water
Charge corona unit	C*1			Cleaner in the PCU
Quenching lamp	I			Blower brush (if dirty)
ID sensor	C			Dry cloth
Dust shield glass	C*1			Cleaner brush (P/N: G0241533)
Fusing unit		R*2		

*1: This is a common item with user maintenance.
*2: The amount per page that the counter counts up depends on the paper size:
- A3 or larger: 2 counts
- Smaller than A3: 1 count
- When the fusing unit counter reaches 60k a message is displayed on the LCD. However, printing can still continue.

5.2.2 OPTIONAL PAPER FEED UNIT

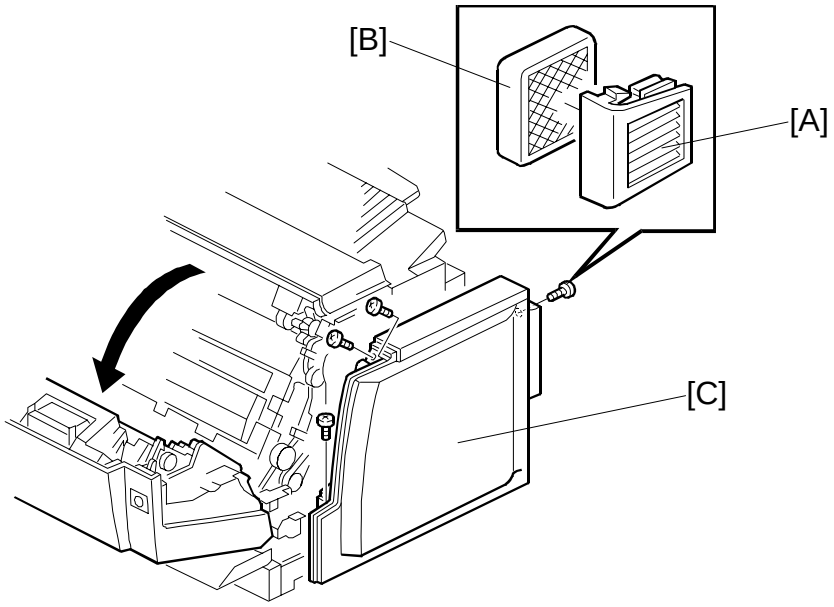
C: Clean R: Replace I: Inspect

item	EM	60k	100k	Note
Paper feed roller	C		R	Alcohol or water
Friction pad	C		R	Water
Bottom plate pad	C			Water

6. REPLACEMENT AND ADJUSTMENT

6.1 EXTERIOR

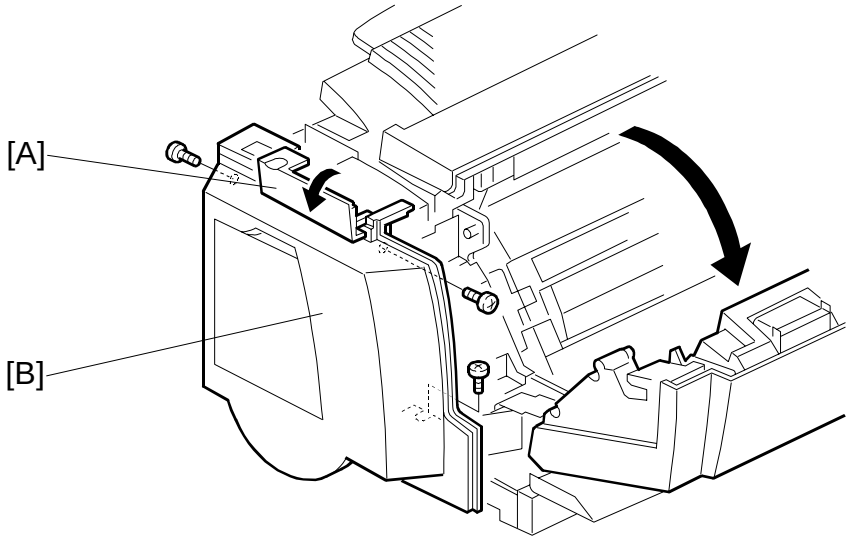
6.1.1 RIGHT COVER/OZONE FILTER COVER



G024R151.WMF

1. Remove the ozone filter cover [A].
2. Remove the ozone filter [B].
3. Remove the right cover [C] (four screws).

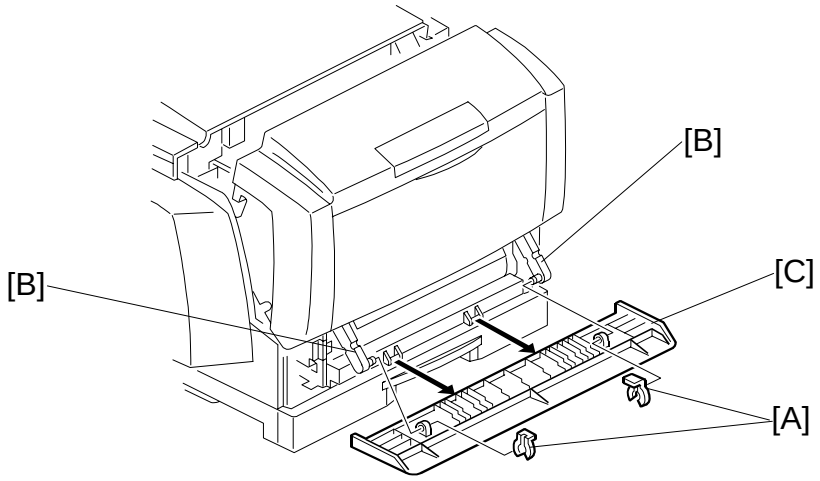
6.1.2 LEFT COVER



G024R152.WMF

1. Open the oil bottle cover [A]. Remove the left cover [B] (three screws).

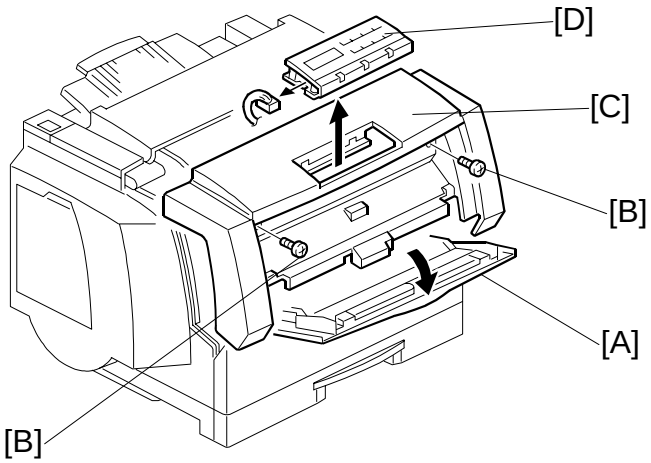
6.1.3 BOTTOM FRONT COVER



G024R268.WMF

1. Open the front cover half way, and remove two snap rings [A].
2. Carefully slide the hinge levers [B] out from the bottom front cover [C].
   NOTE: The levers are spring loaded.
3. Remove the bottom front cover.

6.1.4 FRONT COVER AND OPERATION PANEL

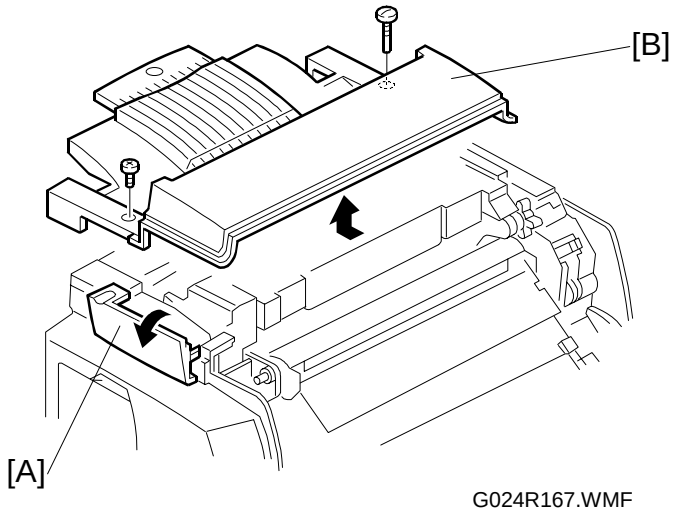


G024R153.WMF

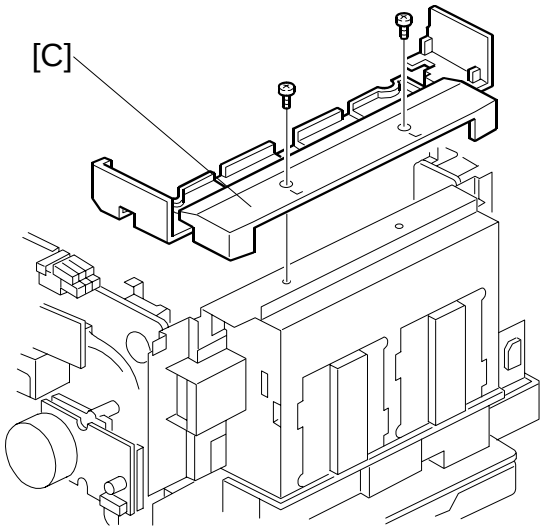
1. Open the by-pass tray [A].
2. Remove two screws [B] and carefully lift the front cover [C] from the printer.
3. Remove the operation panel [D] from the front cover (two hooks). Make sure to unplug the connector from the operation panel.

NOTE: The surface of the operation panel circuit board is not insulated. If turning on the printer while the operation panel is removed from the front cover, be careful not to short-circuit this board.

6.1.5 TOP COVER AND TOP REAR COVER



G024R167.WMF

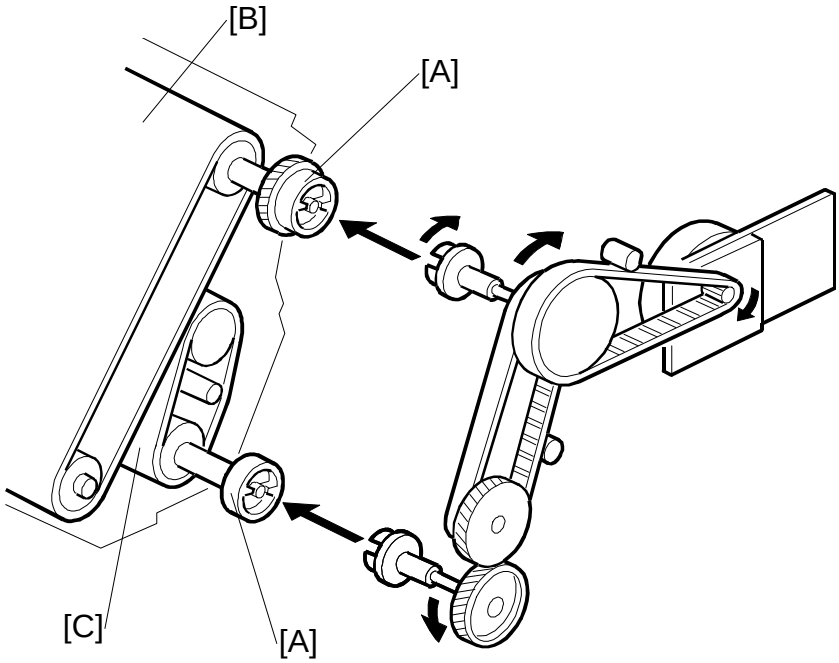


G024R251.WMF

1. Open the oil bottle cover [A]. Remove the two screws holding the top cover [B], then slide and remove the top cover [B].
2. Remove the top rear cover [C] (two screws).

6.2 INSIDE THE MAIN UNIT

6.2.1 GENERAL CAUTIONS

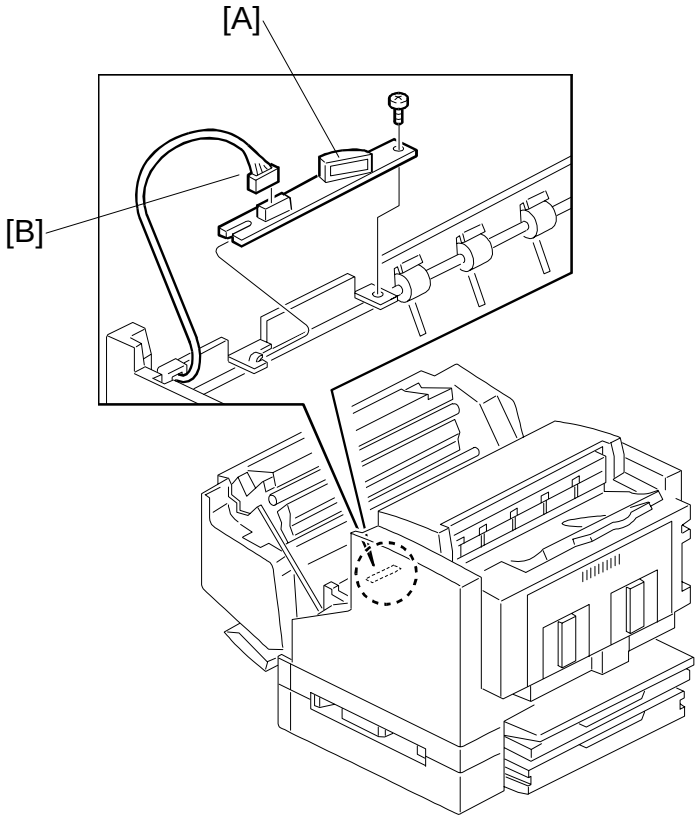


G024R500.WMF

CAUTION: When replacing the components inside the main unit, follow the instructions below.

1. When placing the PCU outside the printer, cover the photosensitive face with a sheet of paper or a similar material to avoid direct exposure to light.
2. When rotating the PCU holder with the PCU removed, be careful not to touch the detection face of the ID sensor.
3. Do not turn the PCU joints [A] manually. (Otherwise, the transfer belt [B] will scratch the OPC belt [C].) To turn the OPC or transfer belt manually, set the PCU in the main unit and check that the joints are engaged. Then, turn one of the two flywheels at the rear. (First, pull the transfer cleaning contact/separation lever to release the cleaner if the cleaning unit is contacting the belt .)

6.2.2 ID SENSOR

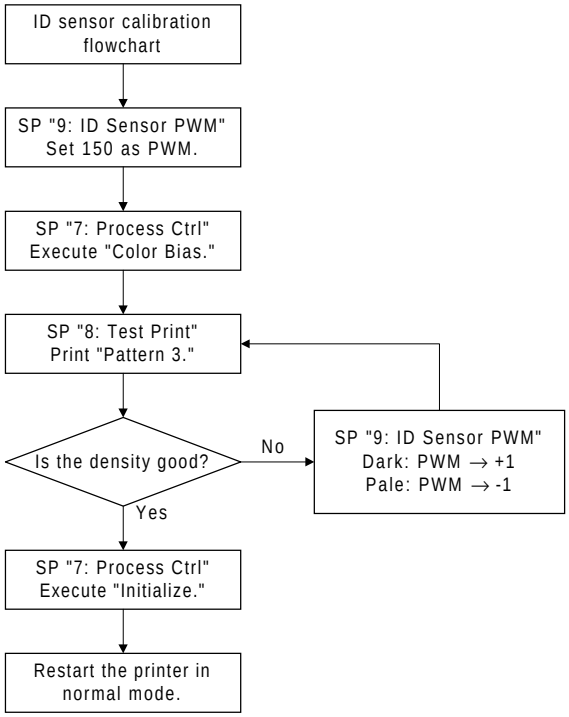


G024R106.WMF

1. Remove the PCU.
2. Remove the ID sensor [A] (1 screw, 1 connector [B]).

NOTE: Calibrate the new ID sensor after installing it. Follow the steps described in "Calibrating the ID sensor" on the next page.

6.2.3 CALIBRATING THE ID SENSOR

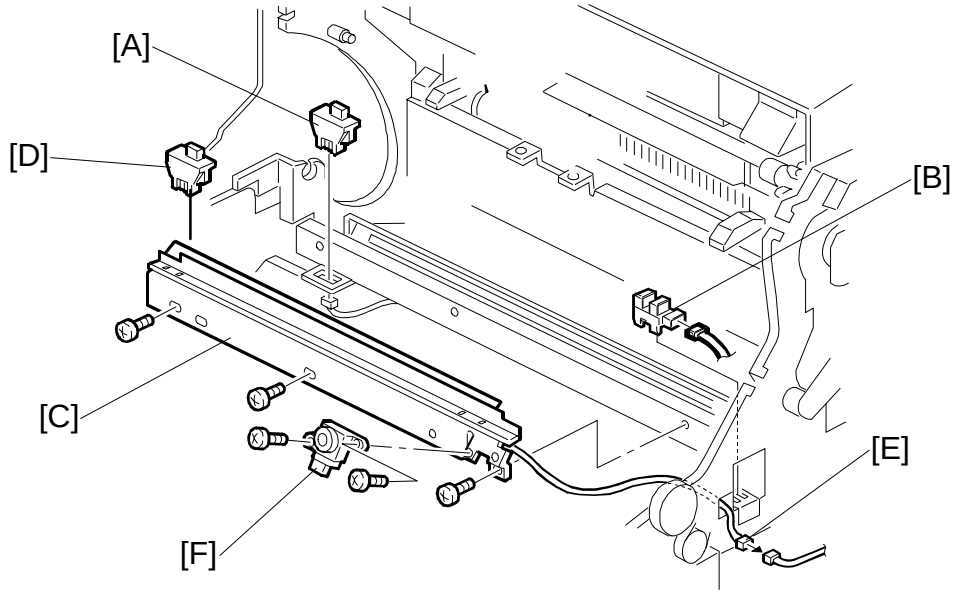


G024R510.WMF

NOTE: After replacing the ID sensor, calibrate it as described below. Without calibration, proper color densities may not be achieved.

1. Hold down the [Online] and [Menu] keys, and turn on the printer. (This initiates engine SP mode.)
2. Select “9: ID Sensor PWM” in the engine SP menu. Specify 150 as the PWM value. Press the [Enter] key, then an asterisk (*) is displayed before the value. Press the [Escape] or [Menu] key.
3. Select “7: Process Ctrl” in the engine SP menu. Execute “Color Bias.” (This starts process control for the color development bias settings.) Wait until “Finish OK” is displayed. Then press the [Escape] or [Menu] key.
4. Select “8: Test Print” in the engine SP menu. Execute “Pattern 3” to print pattern 3. (Select a tray with paper in it.)
   NOTE: Test printing is executed continuously. To stop test printing, press the [Escape] or [Menu] key.
5. Check the test print. If the YCM solid areas of the printed image are too dark, return to step 2 and increase the PWM value by one. If the YCM solid areas are too pale, return to step 2 and decrease the PWM value by one. Then, repeat steps 3 to 5.
6. If the YCM solid area density is good, select “7: Process Ctrl” in the engine SP menu and execute “Initialize.” (This executes a complete forced process control self-check.)
7. After the forced process control self-check is completed, restart the printer in normal mode.

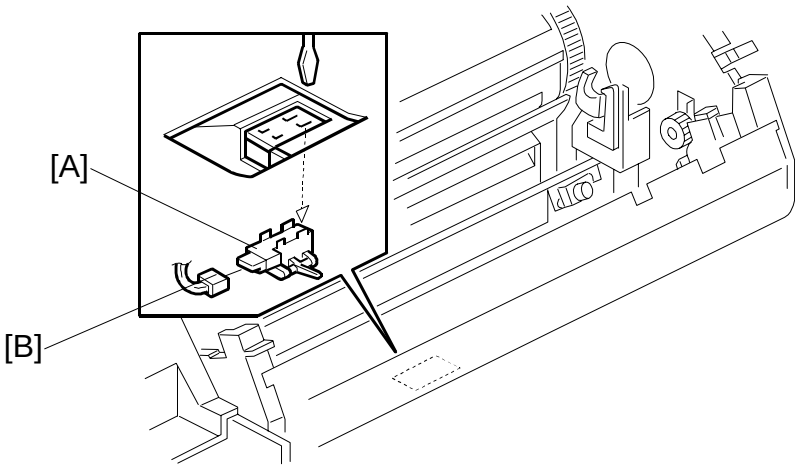
6.2.4 PCU SET SWITCH/CHARGE CORONA UNIT SET SWITCH/PCU RESET SENSOR/ USED TONER SENSOR/QUENCHING LAMP



1. Remove the PCU.
2. Remove the PCU set switch [A] (two hooks). Make sure to unplug the connector.
3. Remove the right cover. (See Right Cover Removal.)
4. Remove the PCU reset sensor [B] (four hooks, one connector).
5. Remove the quenching lamp and its bracket [C] (three screws, one connector).
6. Remove the charge corona unit set switch [D] (two hooks, one connector [E]).
7. Remove the used toner sensor [F] (two screws, one connector).

6.2.5 PULL-OUT SENSOR/PAPER END SENSOR

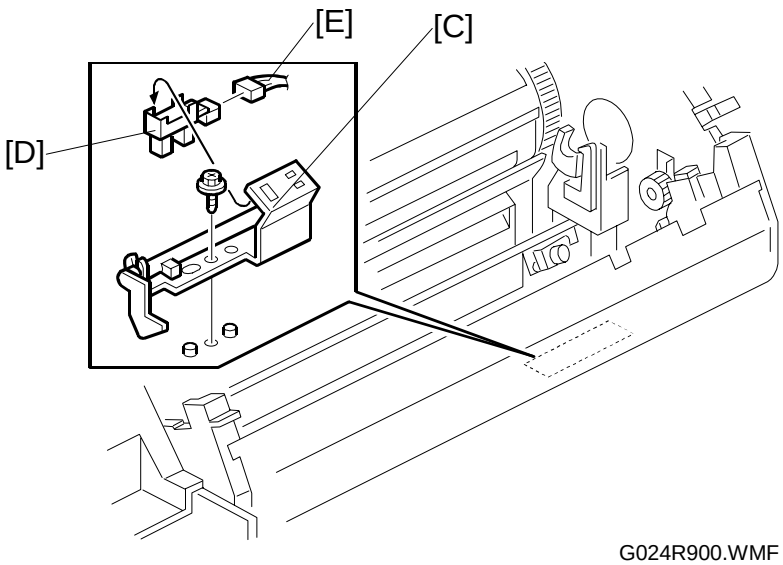
Pull-out sensor



G024R275.WMF

1. Remove the PCU.
2. Remove the pull-out sensor [A] (four hooks, one connector [B]).

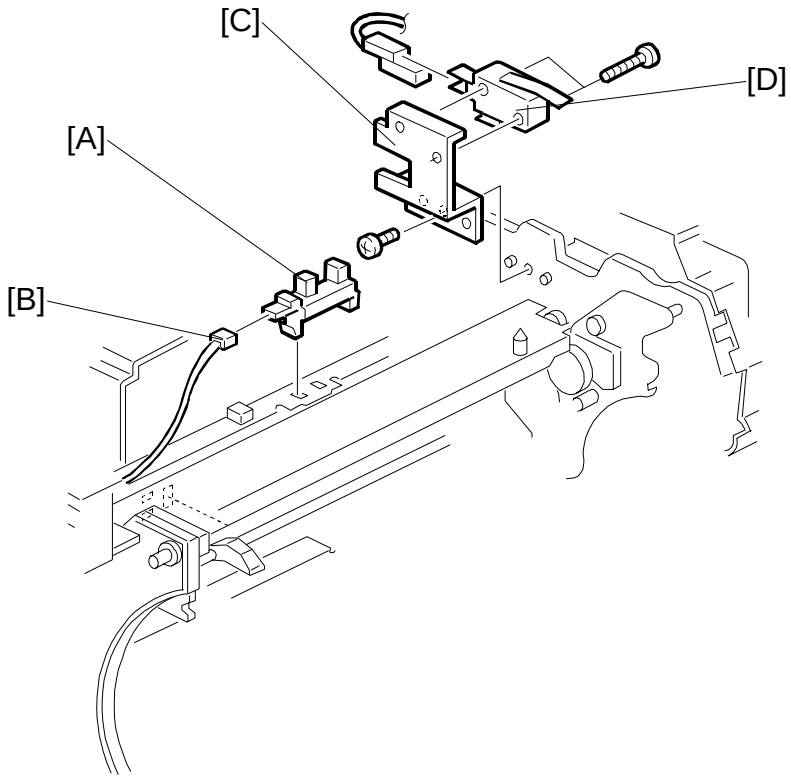
Paper end sensor



G024R900.WMF

1. Remove the paper end sensor bracket [C] (one screw).
2. Remove the paper end sensor [D] (four hooks, one connector [E]).

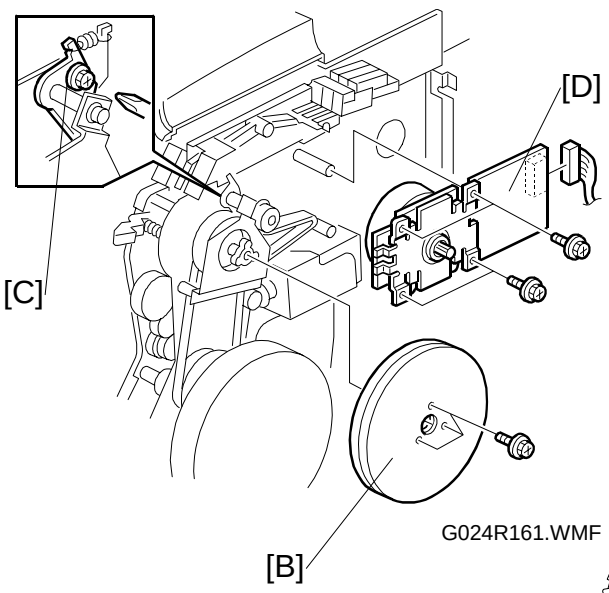
6.2.6 OIL END SENSOR/EXIT COVER SWITCH



G024R108B.WMF

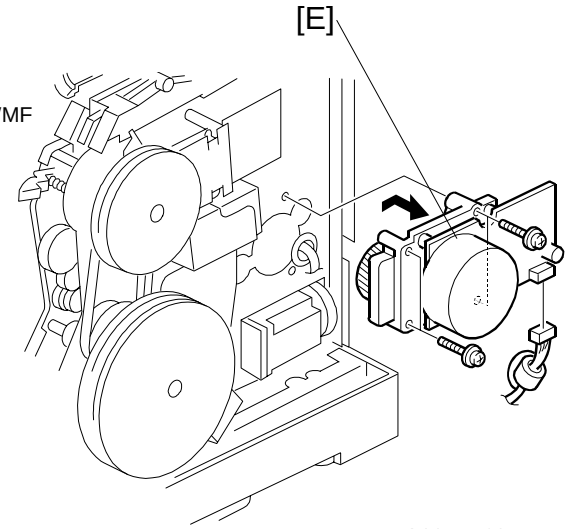
1. Remove the fusing unit. (See Fusing Unit Removal.)
2. Remove the oil end sensor [A] (two hooks, one connector [B]).
3. Remove the exit cover switch bracket [C] (one screw, two connectors).
4. Remove the exit cover switch [D] (two screws).
   NOTE: The top terminal for the exit cover switch is not connected to the cable.

6.2.7 DOOR SAFETY SWITCH, PCU MOTOR, MAIN MOTOR



G024R115.WMF

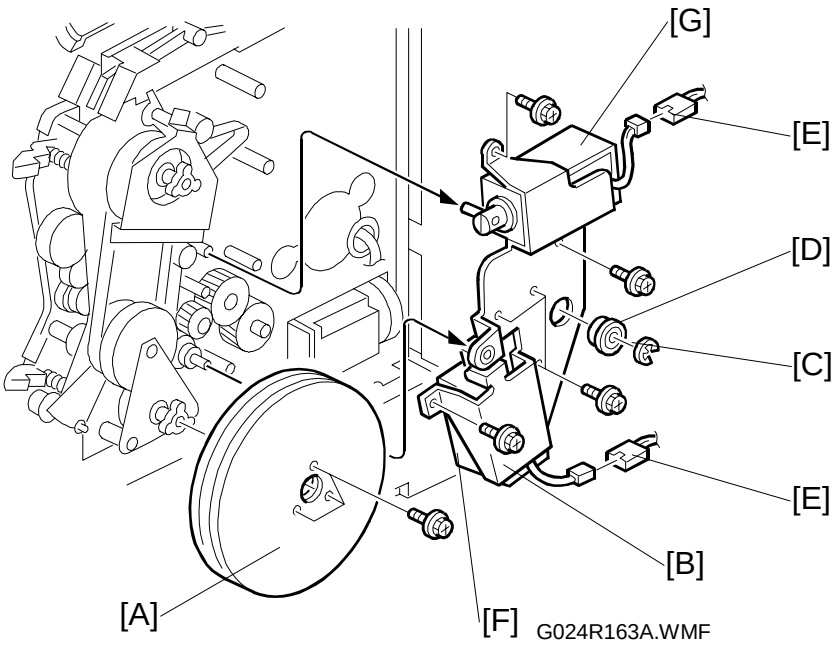
G024R161.WMF



G024R162.WMF

1. Remove the right cover. (See Right Cover Removal.)
2. Remove the door safety switch [A] (two screws, six connectors).
3. Remove the top flywheel [B] (three screws).
4. Loosen the tightener [C], and remove the PCU timing belt from the motor shaft.
5. Remove the PCU motor [D] (four screws, one connector).
6. Remove the main motor [E] (four screws, one connector).

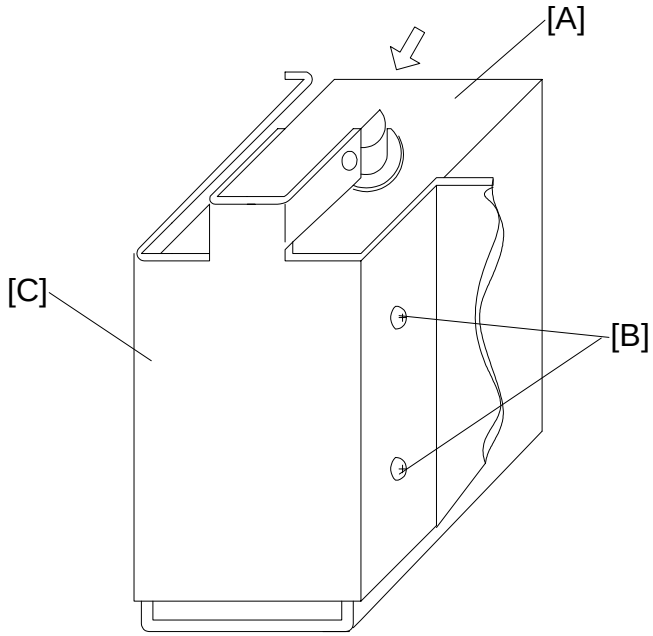
6.2.8 TRANSFER BELT CLEANING SOLENOID/DEVELOPMENT DRIVE SOLENOID



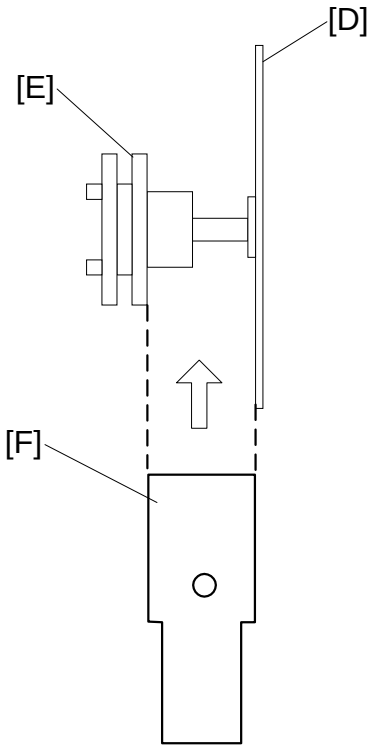
1. Remove the right cover. (See Right Cover Removal.)
2. Remove the PCU motor. (See PCU Motor Removal.)
3. Remove the bottom flywheel [A] (three screws).
4. Remove the bracket assembly [B] (six screws, one E ring [C], one bearing [D], two connectors [E]).
5. Remove the development drive solenoid [F] and/or transfer belt cleaning solenoid [G].
6. After replacing the development drive solenoid, adjust the development joint position (see the procedure on the next page).

NOTE: When putting back the bearing, hold the shaft in order to place the bearing between the revolver gear and side plate.

6.2.9 ADJUSTING THE DEVELOPMENT JOINT



G024R518.WMF

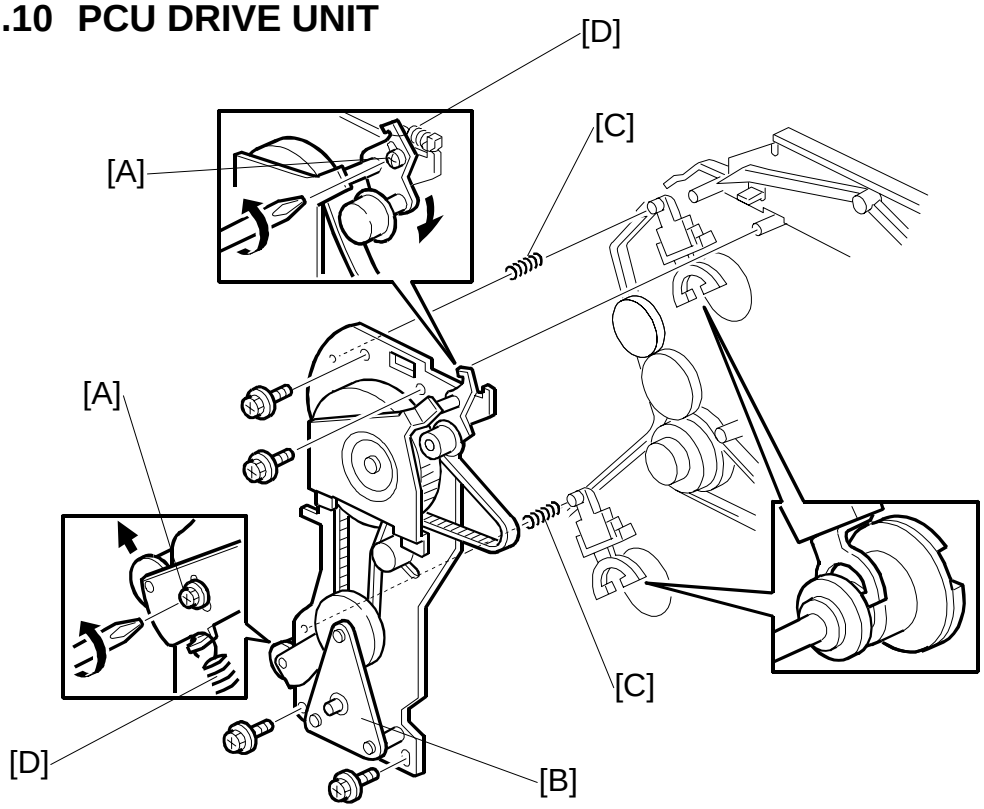


G024R516.WMF

This is needed after replacing the development drive solenoid.

1. Remove the left cover. (See Left Cover Removal.)
2. Remove the right cover. (See Right Cover Removal.)
3. Remove the main motor. (See Main Motor Removal.)
4. Remove the PCU.
5. Remove the YCMK DTMs. (See DTM Unit Removal.)
6. Remove the support. (See LD Unit Removal.)
7. Loosen the two screws [B] retaining the development drive solenoid [A].
8. Enter SP mode. Select Development Sol in the output test menu to turn on the development drive solenoid. (See Section 4, Output Check.)
9. Set the adjustment tool (P/N: G0249310) [F] between the development joint [E] and right side plate [D]. (For this step, the part of the tool containing the hole should be between the joint and the side plate.)
10. Push the solenoid from the back towards the solenoid bracket [C] (see the arrow in the diagram), and tighten the two screws [B].
11. Extract the adjustment tool. Place the other part of the adjustment tool (without the hole) between the joint and the side plate. If there is no friction between the adjustment tool and the development joint, the adjustment is completed. If there is any friction, repeat from step (7).

6.2.10 PCU DRIVE UNIT

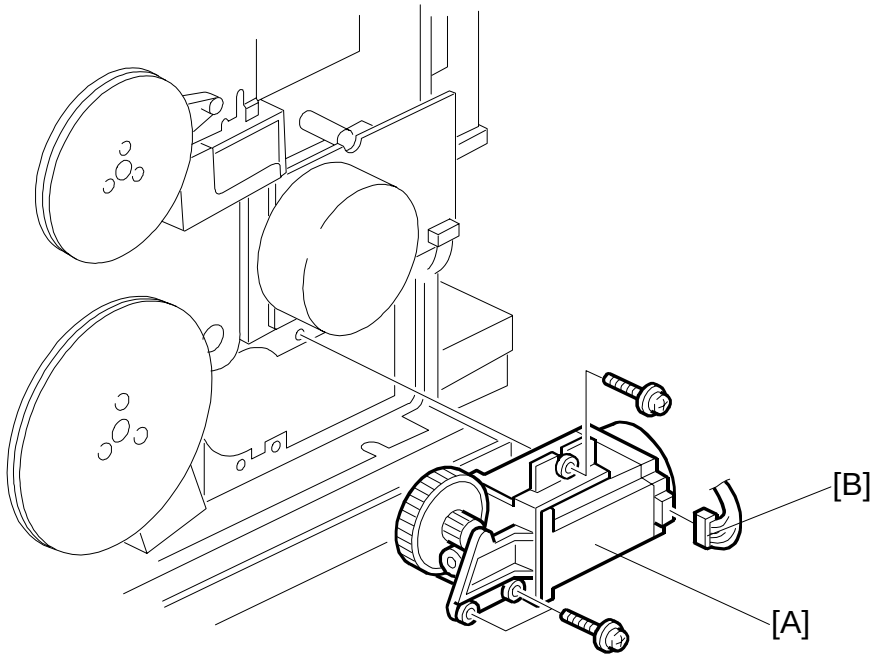


G024R111.WMF

1. Remove the right cover. (See Right Cover Removal.)
2. Loosen the tightener retaining screws [A] to release tension.
3. Remove the PCU joint drive unit [B] (four screws).

NOTE: When installing the PCU drive unit, make sure that the arm is set in the constrictions of the two joints. Also set the joint pressure springs [C] between the pressure arm protrusion and the bracket embossment. After the PCU drive unit is retained, check that the belt is given sufficient tension from the tension springs [D] before tightening the tightener screws.

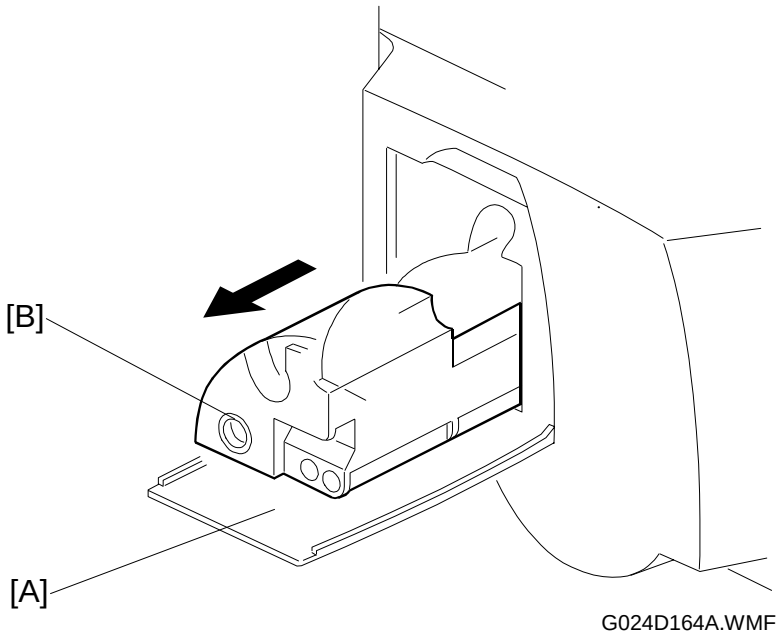
6.2.11 REVOLVER MOTOR



G024R901.WMF

1. Remove the right cover. (See Right Cover Removal.)
2. Remove the revolver motor unit [A] (three screws, one connector [B]).

6.2.12 DTM UNIT

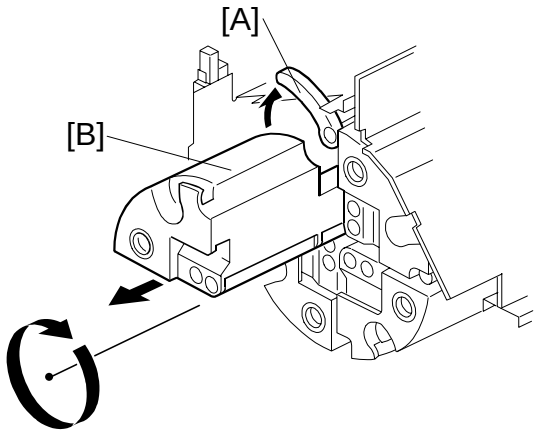


1. Turn off the printer.
2. Open the DTM cover [A] and remove the DTM unit [B]. Refer to the Quick Installation Guide and Operating Instructions.

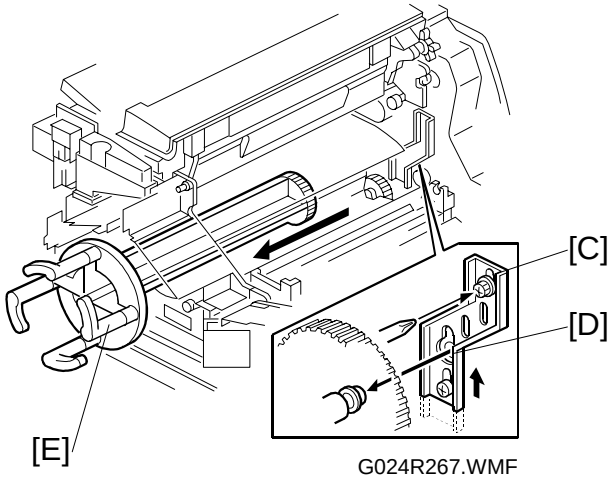
NOTE: 1) Be careful not to drop toner onto the floor. (Before placing the DTM unit on the floor, lay down a sheet of paper first.)
2) After installing a new DTM unit, remove the seal. Then, close the DTM cover and turn on the printer to enter setup mode. Set up the subsequent DTM units according to the instructions displayed on the panel.
For details of installing cartridges in setup mode, refer to the Operating Instructions.

6.3 LASER OPTICS SECTION

6.3.1 LD UNIT

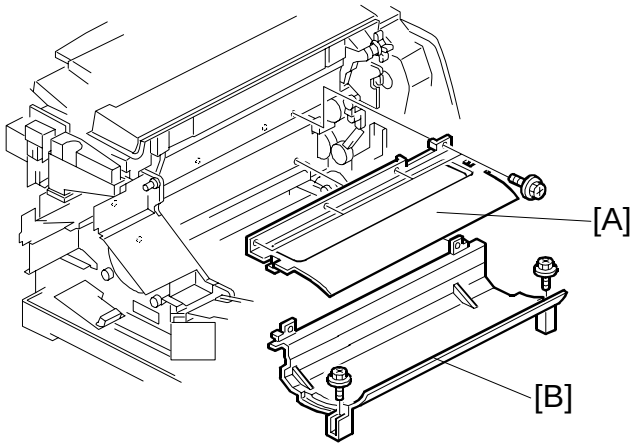


G024R266.WMF

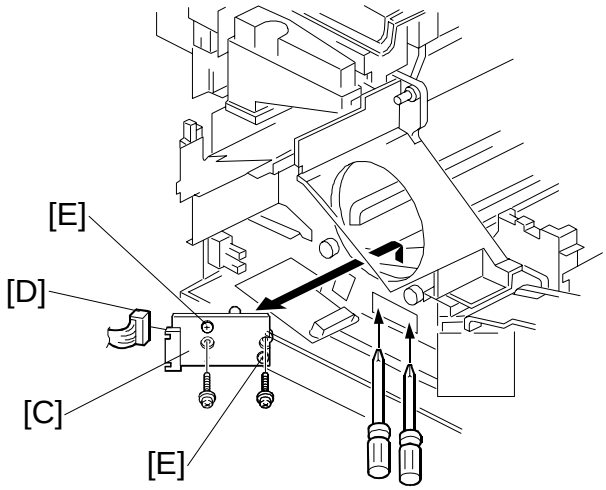


G024R267.WMF

1. Remove the right cover. (See Right Cover Removal.)
2. Remove the left cover. (See Left Cover Removal.)
3. Lift the handle [A] to release the lock. Remove the Y, M, C, and K DTM units [B].
   NOTE: Do not hold and turn the DTM units by hand as this puts too much load on the revolver motor. Hold and turn the revolver motor to move the DTM units to the removal position.
4. Loosen the support stopper screw [C]. Lift the support stopper [D] and temporarily tighten the screw. Then, remove the support [E].
   NOTE: After putting back the support, remember to lower the support stopper and tighten the screw.



G024R258.WMF



G024R259A.WMF

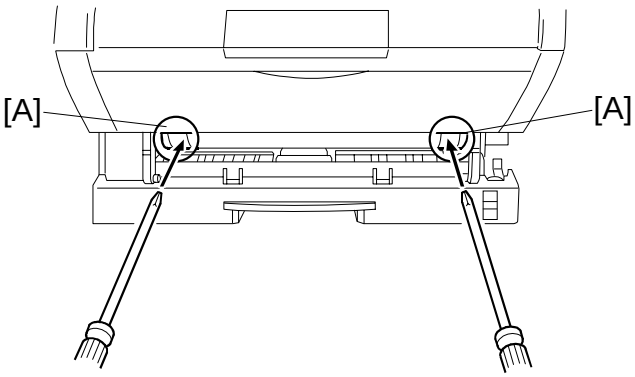
5. Remove the development top cover [A] (three screws).
6. Remove the development bottom cover [B] (two screws and 3 hooks).
7. Remove the LD unit [C] (two screws, one connector [D]).

CAUTION: Do not loosen the painted screws [E].

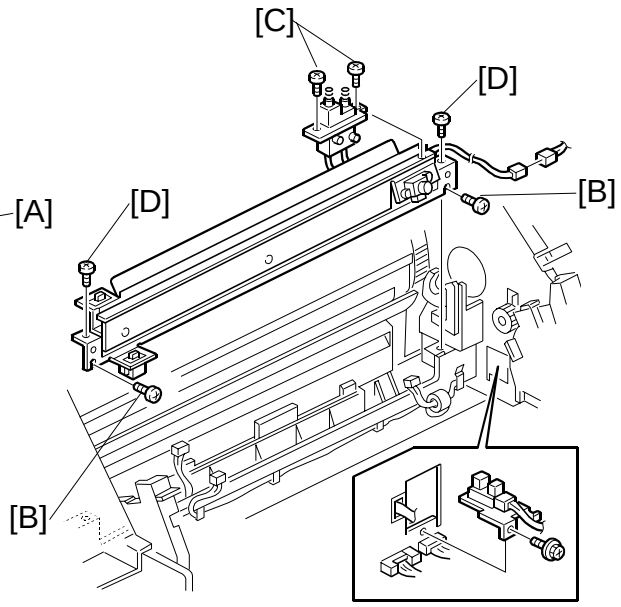
6.3.2 OPTICAL HOUSING UNIT/POLYGON MIRROR MOTOR

⚠WARNING

Turn off the main switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

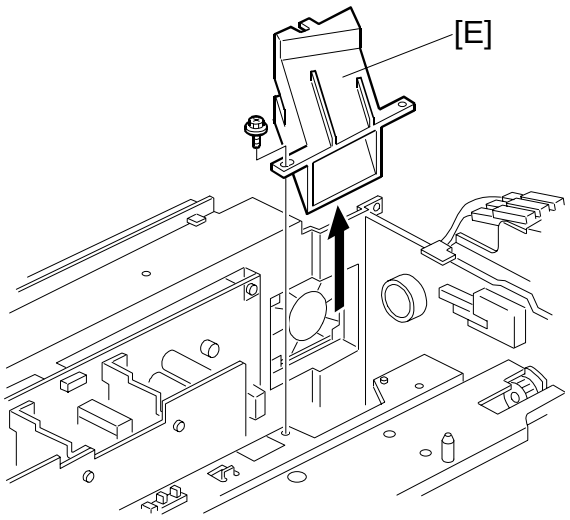


G024R269.WMF

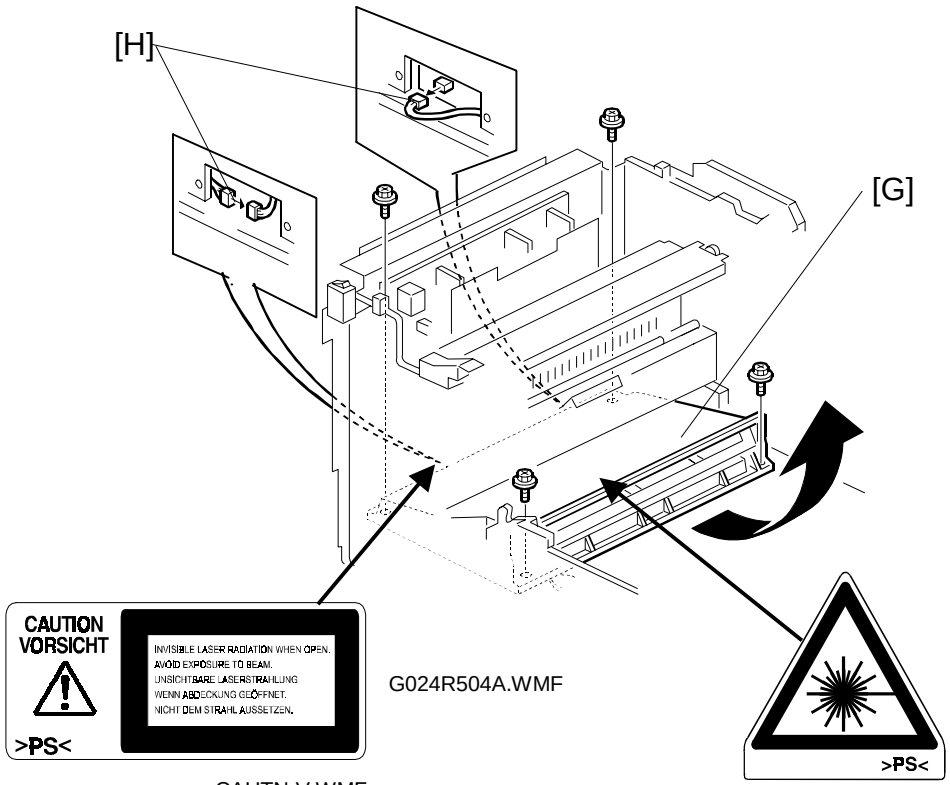


G024R270.WMF

1. Remove the PCU and the Y, C, M, and K DTM units (see DTM Unit Removal), left cover (see Left Cover Removal), rear top cover (see Top Cover Removal), bottom front cover (see Bottom Front Cover Removal), and tray cover (see Controller Board Removal).
2. Remove the fusing unit. (See Fusing Unit Removal.)
3. Remove the PCU reset sensor from the bracket. (See PCU Reset Sensor Removal.)
4. Remove the LD unit. (See LD Unit Removal.)
5. Open the front cover. Insert a long screwdriver through the opening [A] in the bottom front cover towards the PCU holder notch.
6. Remove the two screws [B] holding the front side of the stay.
7. Remove the two screws [C] retaining the charge bias electrode.
8. Remove the two screws [D] retaining the top side of the stay. Tilt the stay forward.



G024R522.WMF

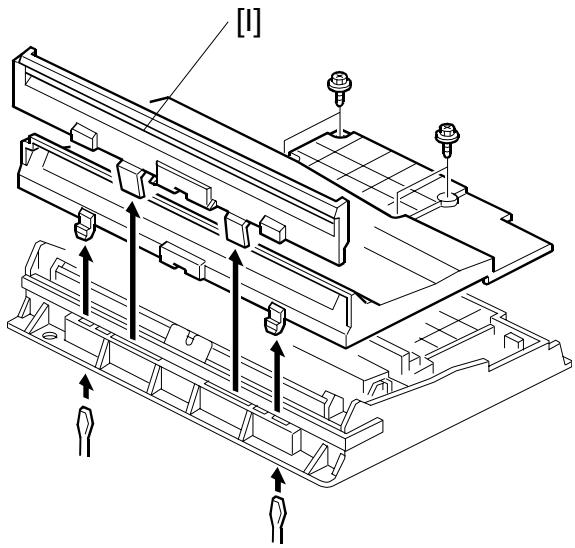


G024R504A.WMF

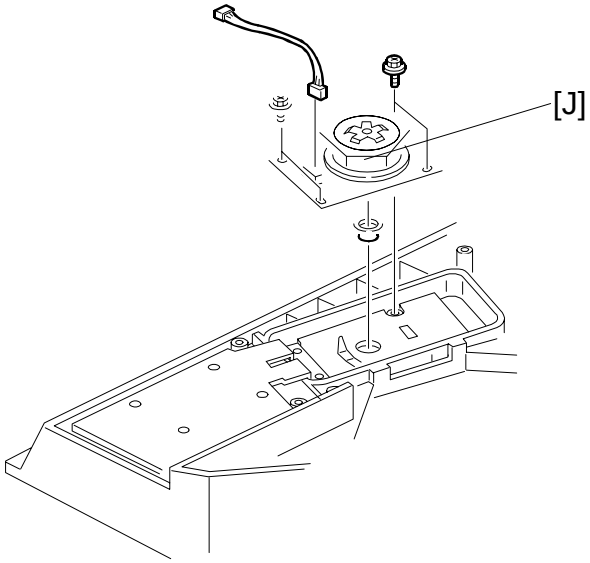
CAUTN-V.WMF

LASER-3.WMF

9. Remove the duct [E] for the exhaust fan (one screw).
10. Remove the optical housing unit [G] (four screws, two connectors [H]), lifting it in the direction of the arrow in the diagram.
    NOTE: When putting back the optical housing unit, check that the positioning boss on the housing bottom plate is in the hole in the main unit base.



G024R263.WMF



G024R506A.WMF

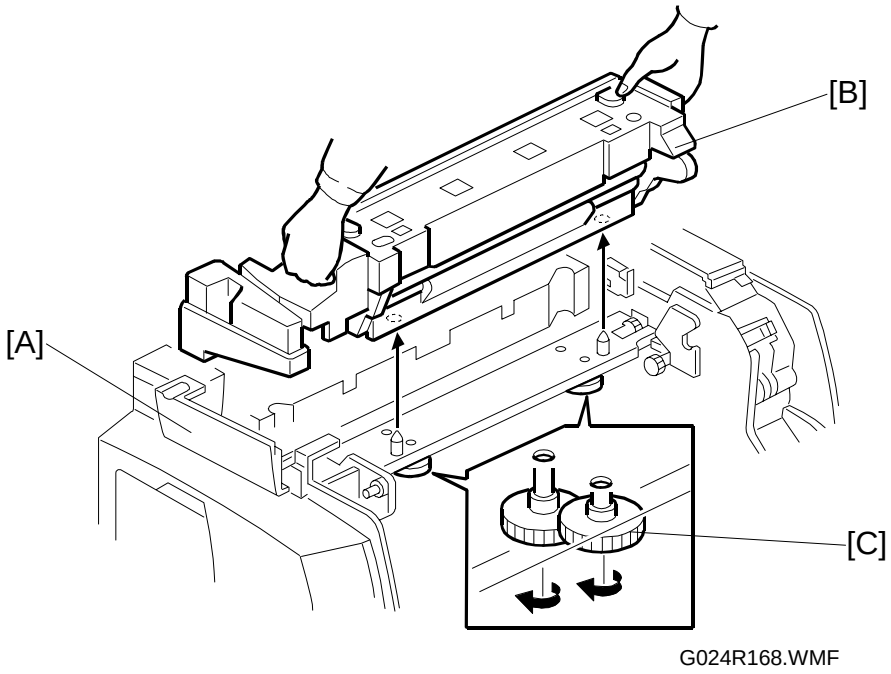
11. Remove the optical housing unit cover [I] (four screws and two hooks).
    NOTE: When removing or putting back the bracket, be careful not to touch the polygon mirror faces.
12. Remove the polygon mirror motor [J] (four screws).

6.4 FUSING SECTION

6.4.1 FUSING UNIT

⚠CAUTION

1. **The fusing unit is hot. Handle with care.**
2. **Be careful not to spill silicone oil.**
3. **In the event of a fusing-related SC, replace the applicable components and execute "6: Reset SC" in the engine SP menu to release the SC.**
4. **When the fusing unit has been replaced, execute "S3 Maintenance Clear" in the controller SP menu to reset the fusing counter.**

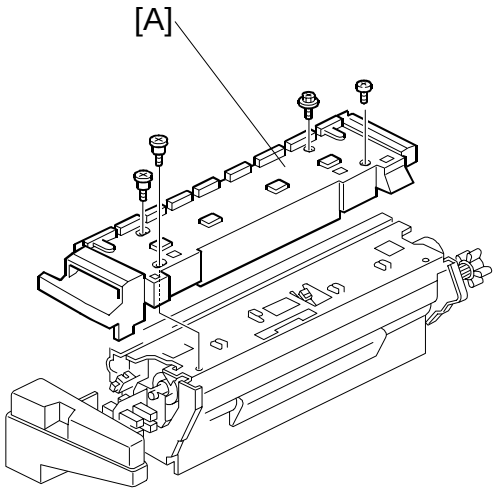


G024R168.WMF

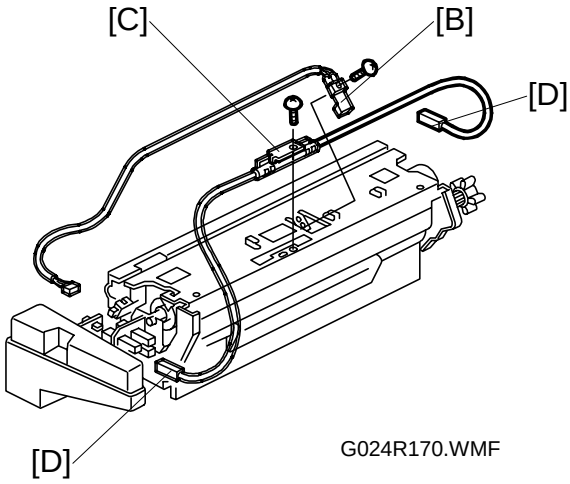
1. Remove the top cover. (See Top Cover Removal.)
2. Open the oil bottle cover [A] and remove the fusing unit [B] (three flat screws [C] and a grounding wire).

NOTE: The flat screws retaining the fusing unit remain attached to the bottom of the fusing unit stay even when they are fully loosened.

6.4.2 OIL SUPPLY UNIT, PRESSURE ROLLER LAMP, HOT ROLLER LAMP, PRESSURE ROLLER THERMOFUSE, PRESSURE ROLLER THERMISTOR



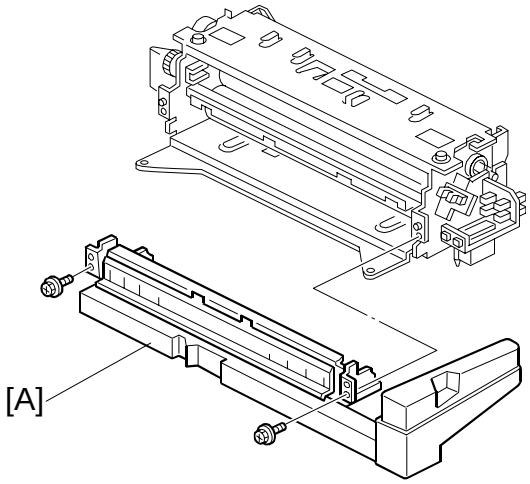
G024R169A.WMF



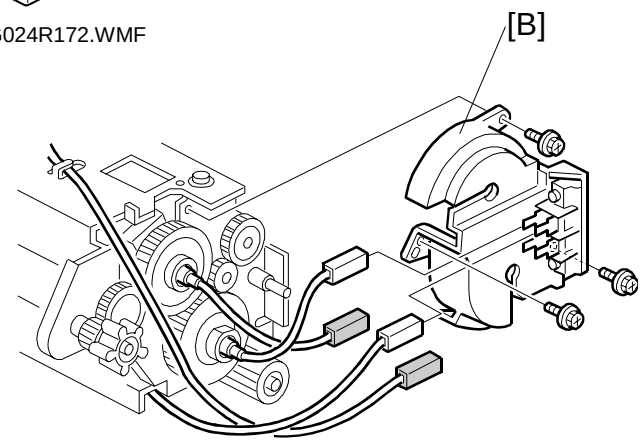
G024R170.WMF

NOTE: If the pressure spring retaining screw has been turned while replacing the pressure or hot roller, adjust the nip width. See “Checking and Adjusting the Fusing Nip Width” for details.

1. Remove the fusing top cover [A] (four screws).
2. Remove the pressure roller thermistor [B] (one screw, one connector).
3. Remove the pressure thermofuse [C] (one screw, two connectors [D]).

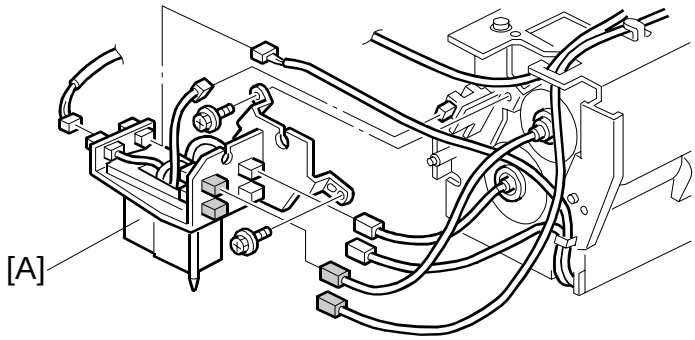


G024R172.WMF

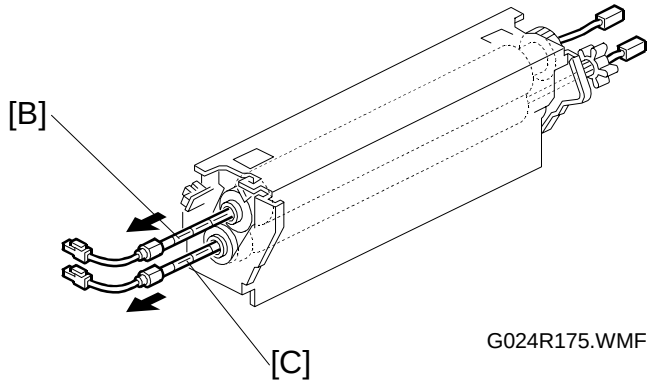


G024R173.WMF

4. Remove the exit guide. (See Exit Sensor Removal.)
5. Remove the oil supply unit [A] (two screws).
6. Remove the holder [B] for the right fusing lamp terminals (three screws, three connectors).



G024R174.WMF

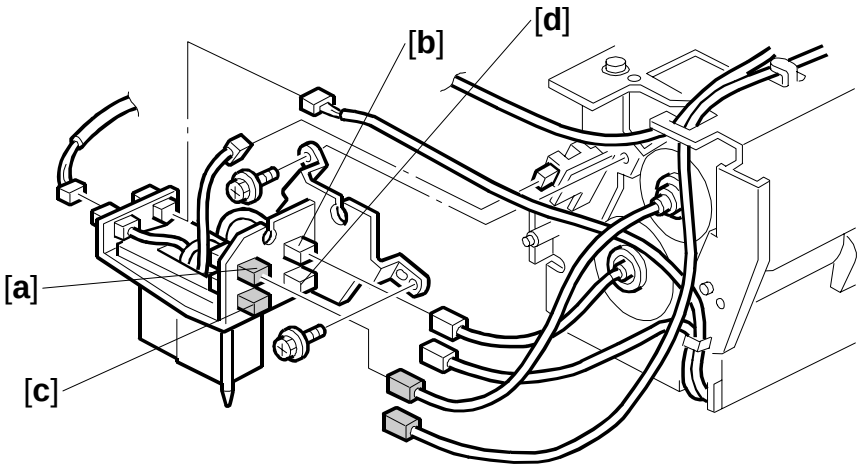


G024R175.WMF

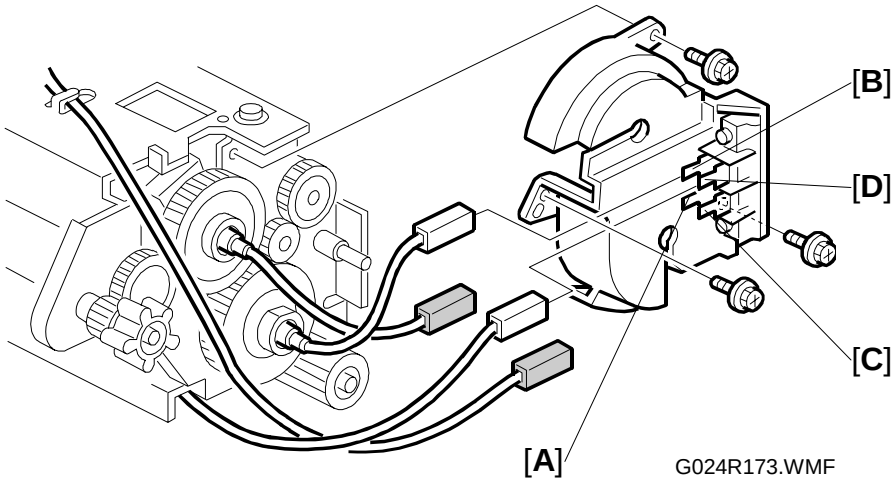
7. Remove the holder [A] for the left fusing lamp terminals (two screws, five connectors).
8. Extract the pressure roller lamp [B].
9. Extract the hot roller lamp [C].

Reinstallation

Make sure that the cables are connected to the correct places.



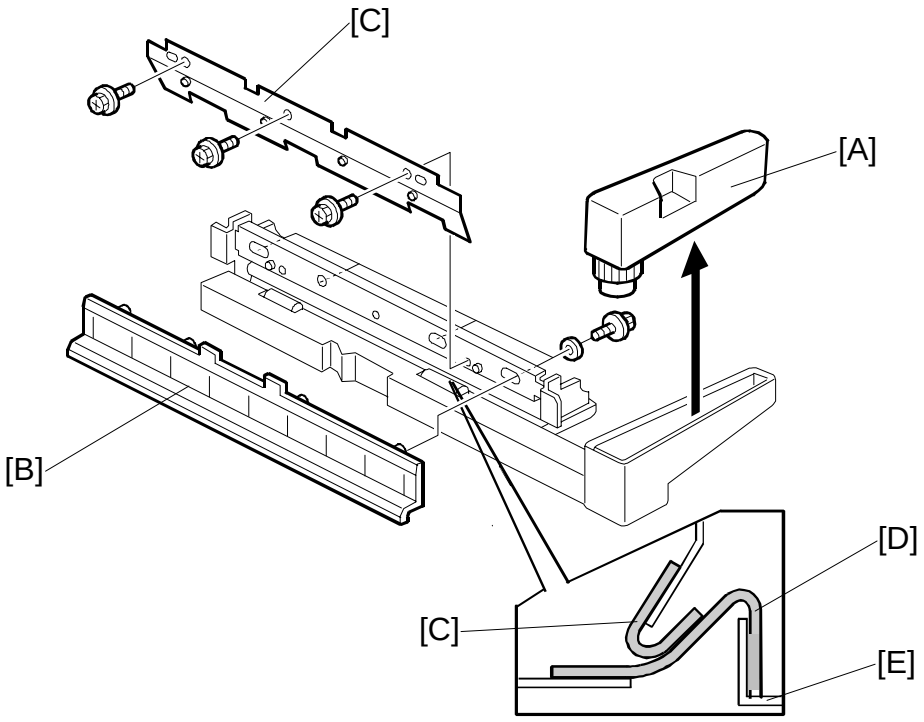
G024R174.WMF



G024R173.WMF

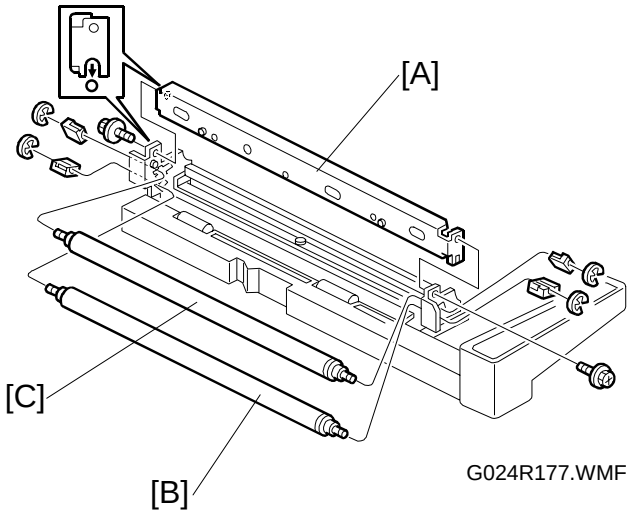
- Pressure roller lamp connector [a], [A]
- Hot roller lamp connector [b], [B]
- Pressure roller thermofuse connector [c], [C]
- Hot roller thermofuse connector [d], [D]

6.4.3 OIL SUPPLY ROLLER, OIL SUPPLY SUB-ROLLER, BLADE

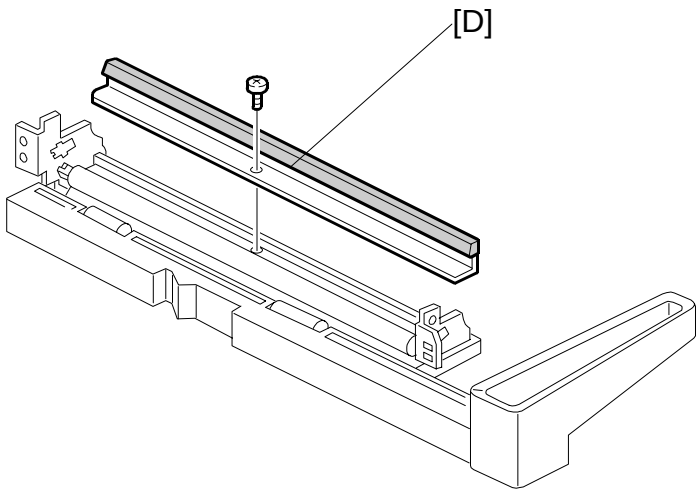


G024R176.WMF

1. Remove the oil bottle [A].
   NOTE: Oil tends to remain in the cap. Keep the oil bottle [A] lifted a little for a while, wait for the oil drips to stop, then move the oil bottle outside the printer.
2. Remove the oil supply felt cover [B] (four washers and four screws).
3. Remove the upper oil supply felt [C] (three screws).
   NOTE: When installing the upper oil supply felt on the oil pan, place it on the lower oil supply felt [D] and tighten the screws as shown in the diagram. Then, attach the oil supply felt cover. (Make sure that the upper oil supply felt is resting on top of the lower oil supply felt.) Also, check that the felt contacts the bottom surface of the oil pan [E].



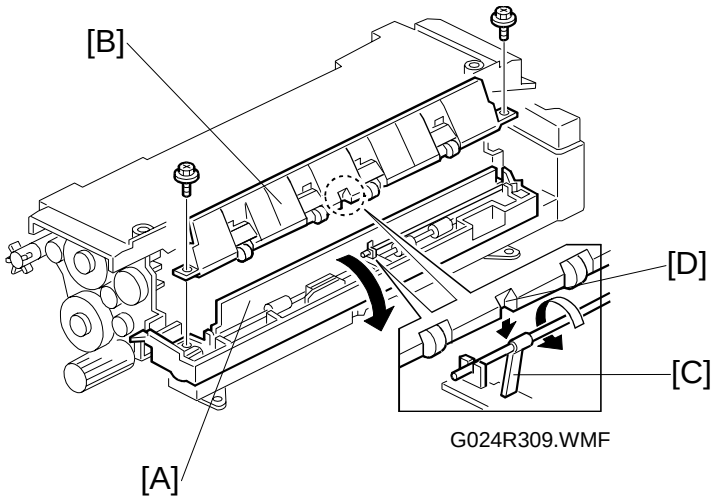
G024R177.WMF



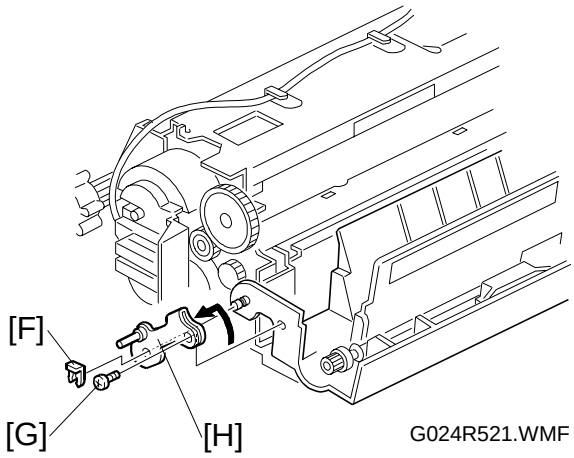
G024R178.WMF

4. Remove the oil supply stay [A] (two screws).
   NOTE: When installing the oil supply stay, ensure that the notch fits over its counterpart.
5. Remove the oil supply sub-roller [B] (two E rings and two bearings).
6. Remove the oil supply roller [C] (two E rings and two bearings).
7. Remove the blade [D] (one screw).

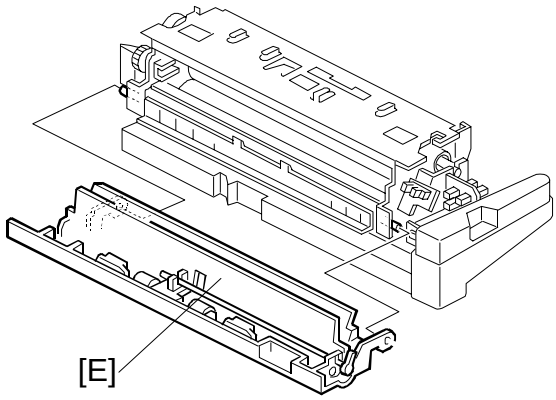
6.4.4 PAPER EXIT SENSOR, CLEANING ROLLER



G024R309.WMF

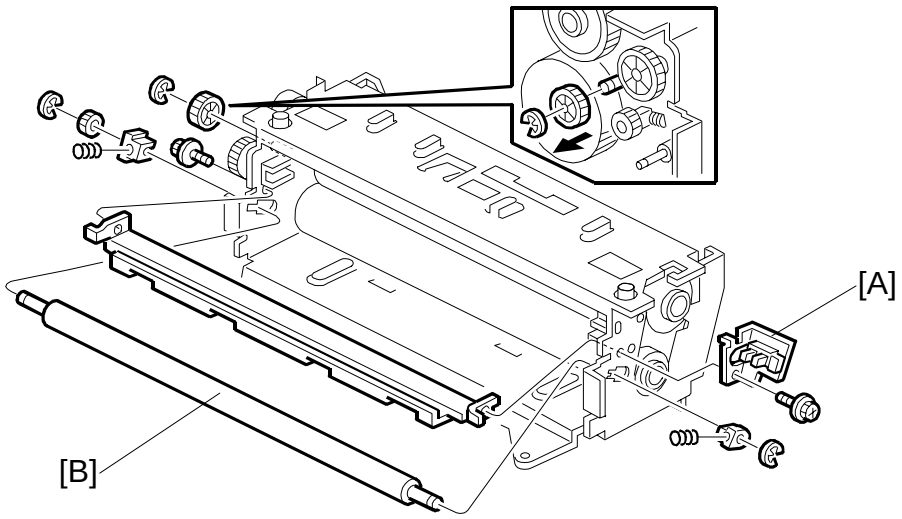


G024R521.WMF



G024R171A.WMF

1. Open the exit top guide [A], and remove the exit bottom guide [B] (two screws).
   NOTE: When installing the exit bottom guide, put the paper exit feeler [C] under the guide notch [D] as shown in the diagram.
2. Remove the exit guide [E] (one snap ring [F], one screw [G], and one bracket [H]).
   NOTE: Be careful not to break the hooks on the guide.



G024R179.WMF

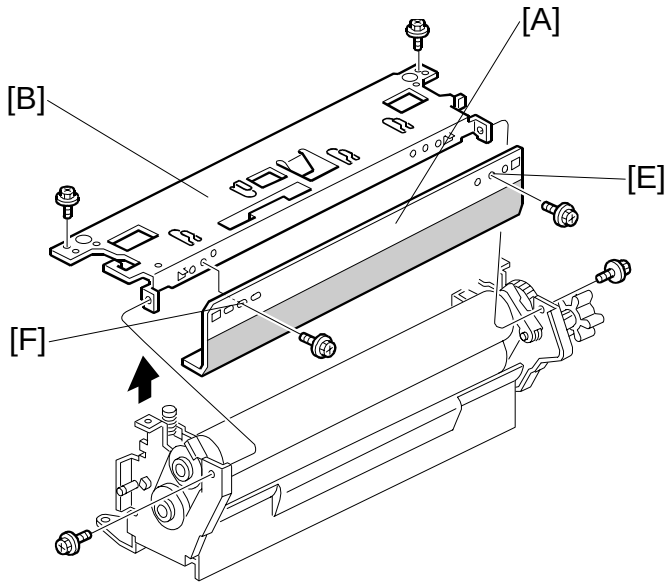
Paper exit sensor

3. Remove the paper exit sensor [A] (one screw and four hooks).

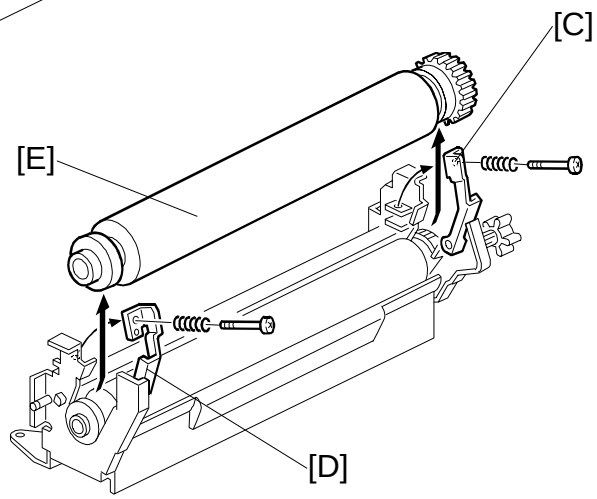
Cleaning roller

4. Remove the cleaning roller [B] (two E rings, one gear, two springs, and two bearings).

6.4.5 PRESSURE ROLLER, HOT ROLLER, HOT ROLLER THERMOFUSE, HOT ROLLER THERMISTOR

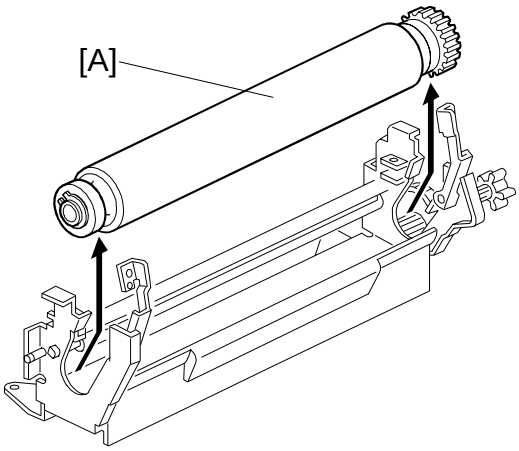


G024R180.WMF

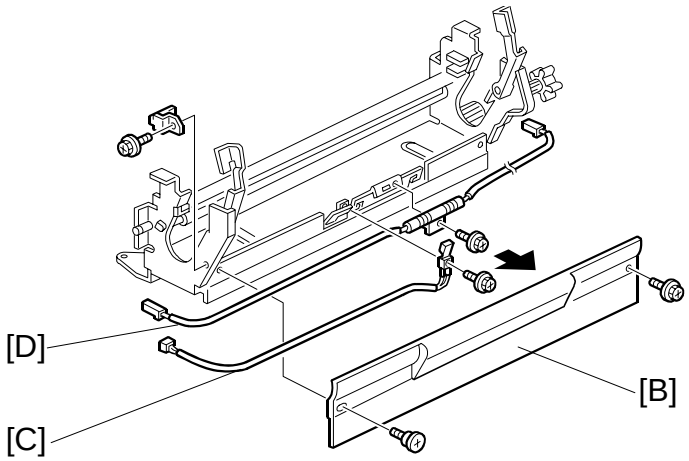


G024R181.WMF

1. Remove the inlet guide plate [A] (two screws).
   NOTE: Put the two screws into the central screw holes [F] in the inlet guide plate when reinstalling it. The right and left screw holes are intended for adjusting the inlet path in the event of wrinkling or other similar feed problems.
2. Remove the fusing stay [B] (two screws).
   NOTE: Be careful not to scratch the pressure roller.
3. Remove the left pressure lever [C] (one screw and one spring).
4. Remove the right pressure lever [D] (one screw and one spring).
5. Remove the pressure roller [E] (one C ring, two bearings, and one gear).



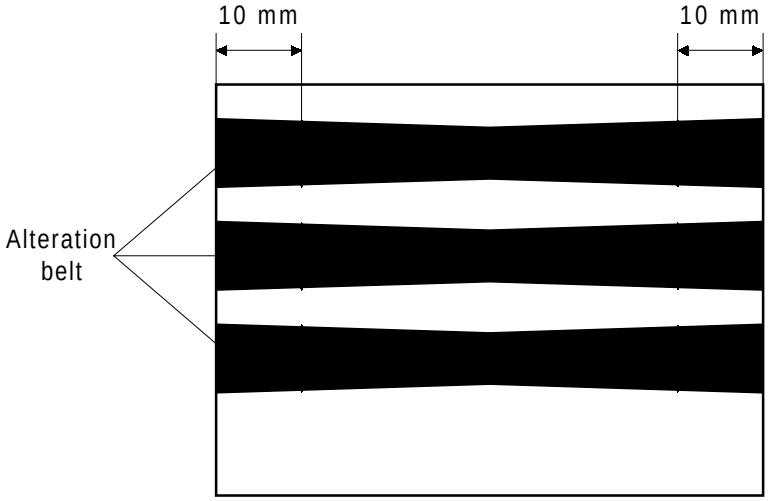
G024R182.WMF



G024R183.WMF

6. Remove the hot roller [A] (two C rings, two bearings, and one gear).
7. Remove the inlet guide plate [B] (two screws).
8. Remove the hot roller thermistor [C] (one screw).
9. Remove the hot roller thermofuse [D] (one screw).

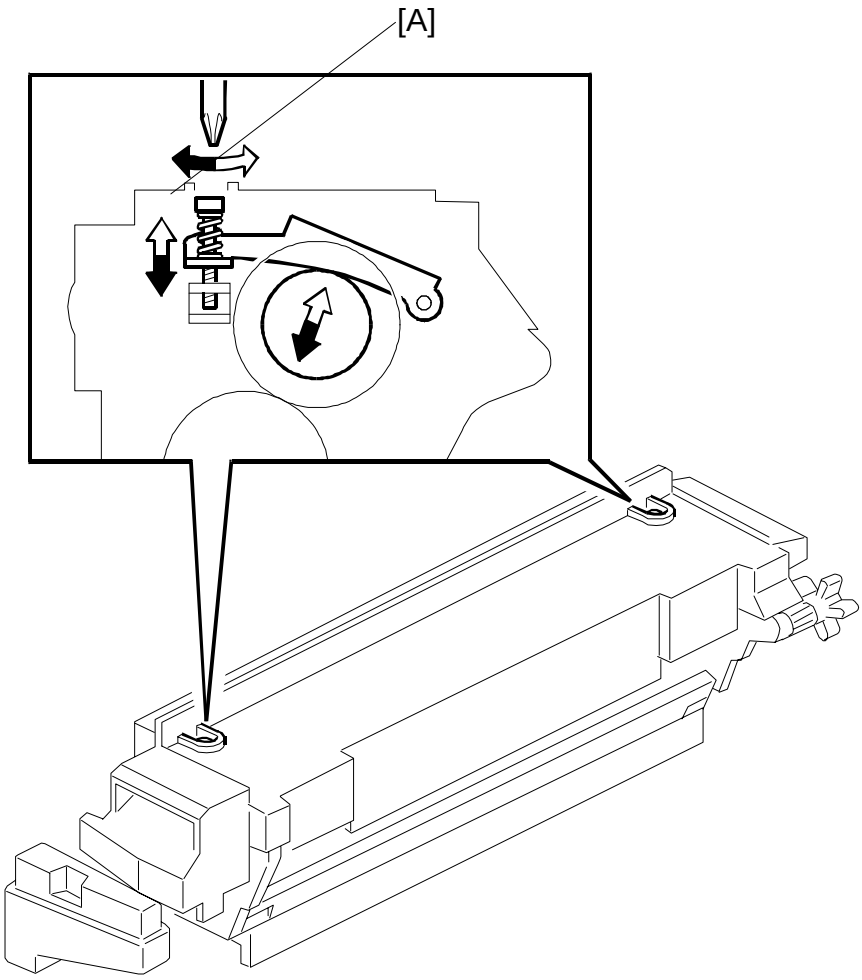
6.4.6 CHECKING AND ADJUSTING THE FUSING NIP WIDTH



G024R520.WMF

NOTE: 1) Wait five minutes or longer after completion of warm-up before starting the steps below.
2) Put one transparency (long edge feed) in the by-pass feed table.

1. Enter engine SP mode. Select Nip Width mode.
2. Wait until the transparency is ejected. For each of the three altered bands, measure the width at 10 mm from both the right and left ends and at the center. If the widths of the altered bands fluctuate at small intervals, measure the narrowest width near the three points above.
3. Obtain an average of the right and left widths of the three bands. Check that the average meets the following standard.
   L (left): 6.5 ±0.2 mm
   R (right): (L+0.25) ± 0.15 mm



G024R314.WMF

4. If the average fails to meet the standard, turn the pressure screw [A].
   (Black arrow direction: more nip width. White arrow direction: less nip width)

Troubleshooting

1. Wrinkles

Adjust the nip width to the upper limit of the standard (L: 6.7 mm, R: 7.1 mm).

After adjustment, check that worm-like images do not appear.

2. Worm-like images

Adjust the nip width to the lower limit of the standard (L: 6.3 mm, R: 6.4 mm).

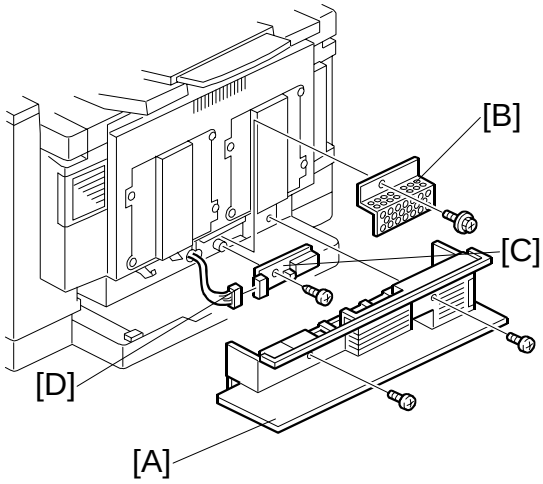
After adjustment, check that no wrinkles are generated.

6.5 ELECTRICAL WIRING

6.5.1 CONTROLLER BOARD, TEMPERATURE/HUMIDITY SENSOR

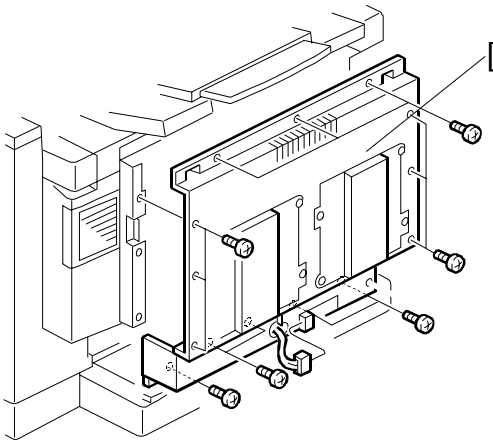
NOTE: Before replacing the controller, print the list of settings whenever possible. In the event of NV-RAM damage, it is necessary to configure all settings according to the list.

1. Remove the tray cover [A]. (two screws).
2. Remove the temperature/humidity sensor cover [B] (one screw).
3. Remove the temperature/humidity sensor [C] (one screw, one connector [D]).
   NOTE: If the customer has added optional expansion memory or a NIC, remove it before controller replacement. Remember to install the memory or NIC on the new controller board.

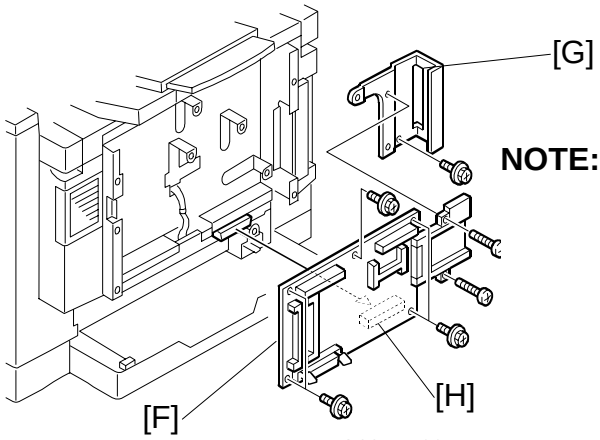


G024R164.WMF

4. Remove the controller cover [E] (16 screws, including 2 screws around parallel port).
5. Remove the controller board [F] with the bracket [G] attached to it (six screws, one connector [H]).
6. Remove two screws and one bracket [G] from the controller board.



G024R184.WMF



G024R166.WMF

NOTE: To replace controller boards, remove the NVRAM chip (IC23) on the old board, install it on the new board, then install the new board. The NVRAM chip stores user settings and service records. These settings will be lost if the NVRAM chip is not transferred.

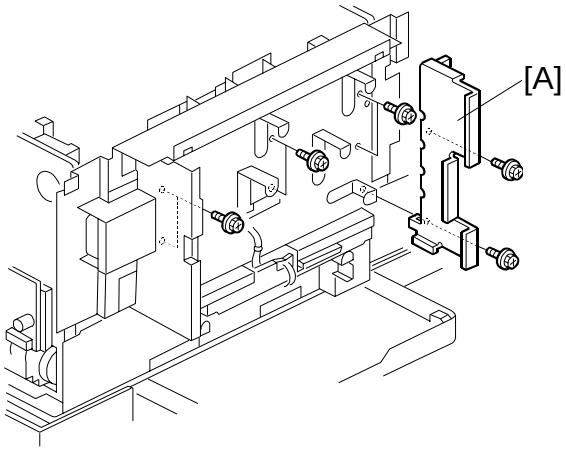
6.5.2 POWER SUPPLY UNIT

⚠WARNING

To avoid the risk of electric shock, unplug the power cable before starting power supply unit replacement.

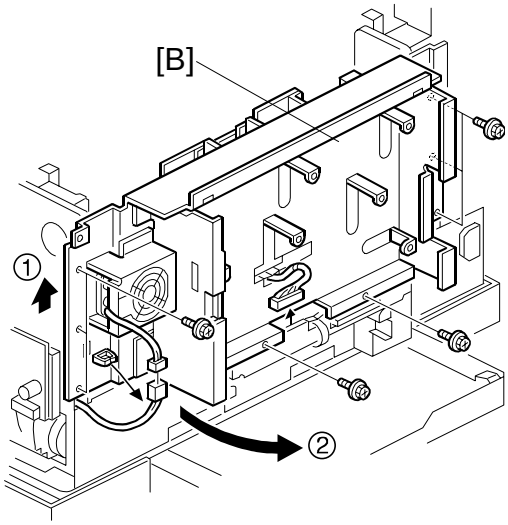
1. Remove the fusing unit (see Fusing Unit Removal) and the controller board (see Controller Board Removal).

2. Remove the bracket [A] (two screws).



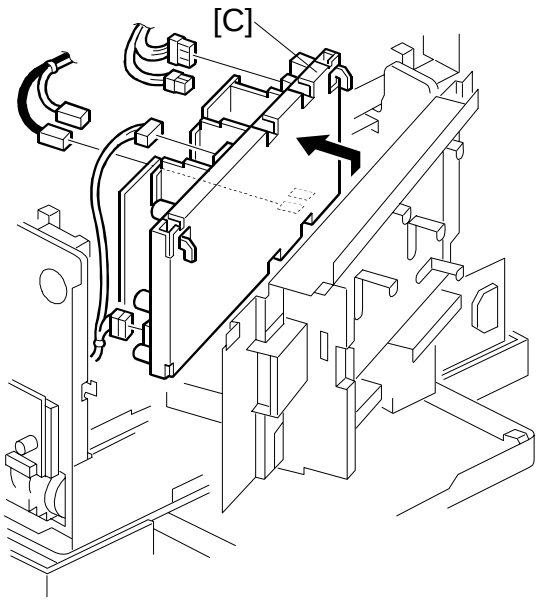
G024R253.WMF

3. Remove the eight screws retaining the electrical wiring box [B], unplug two connectors, and release the two hooks. Lift the left side of the electrical wiring box [B] upwards ① to swing it out ②.



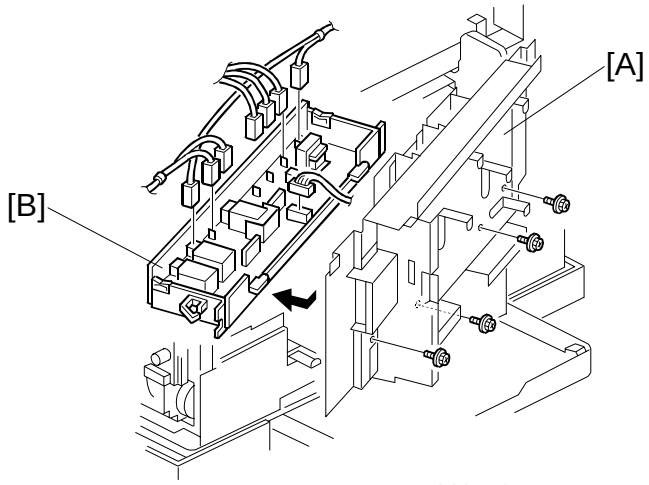
G024R252.WMF

4. Remove the power supply unit [C] (six screws, six connectors).



G024R254.WMF

6.5.3 HIGH VOLTAGE SUPPLY UNIT

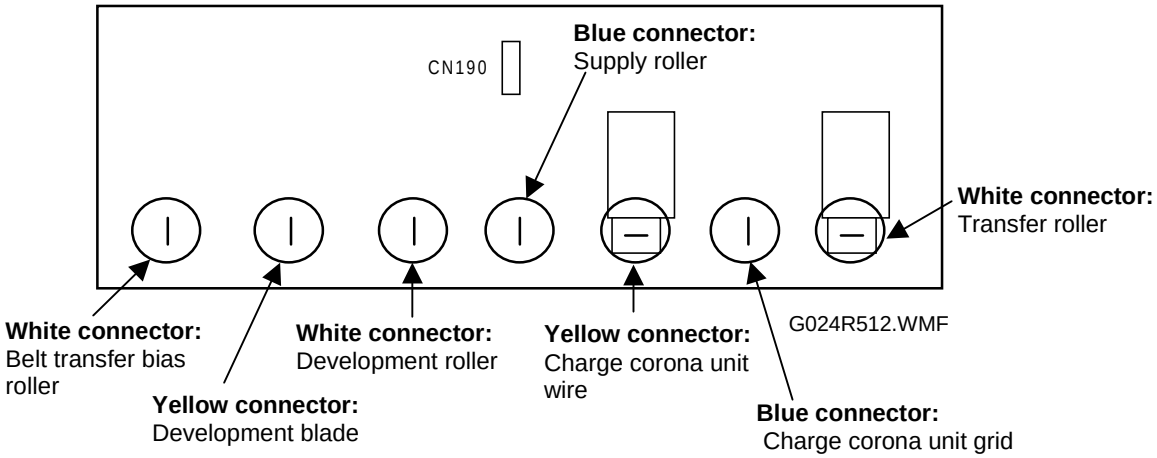


G024R255.WMF

1. Remove the right cover (see Right Cover Removal), left cover (see Left Cover Removal), controller board (see Controller Board Removal), and power supply unit (see Power Supply Unit Removal).
2. Open the rear side panel [A] (eight screws and two hooks).
   NOTE: Before opening the rear side panel, unplug connectors from the power supply unit and the high-voltage supply unit as necessary.
3. Remove the high-voltage supply unit [B] (four screws, two hooks, eight connectors).

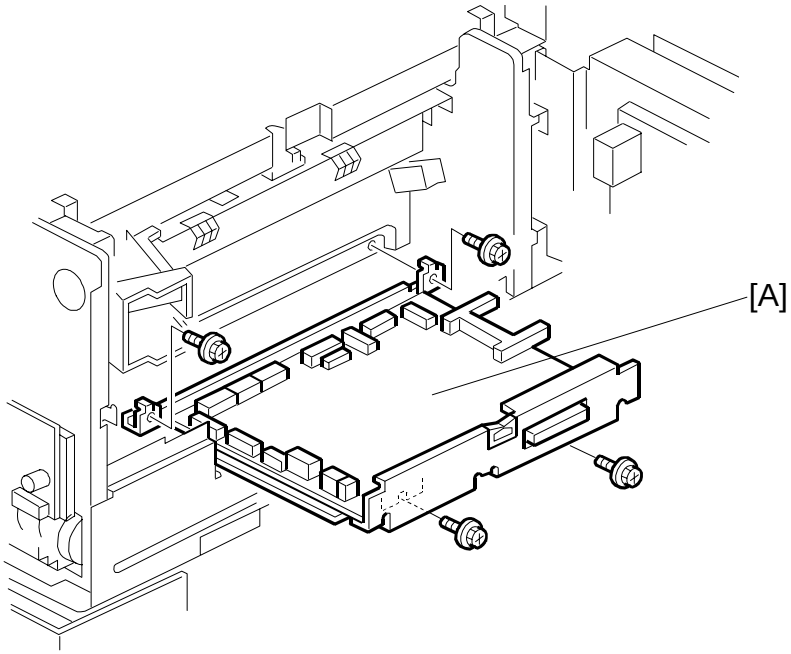
⚠CAUTION

Carefully connect the high-voltage wires as shown in the diagram below.



G024R512.WMF

6.5.4 MCU



G024R256.WMF

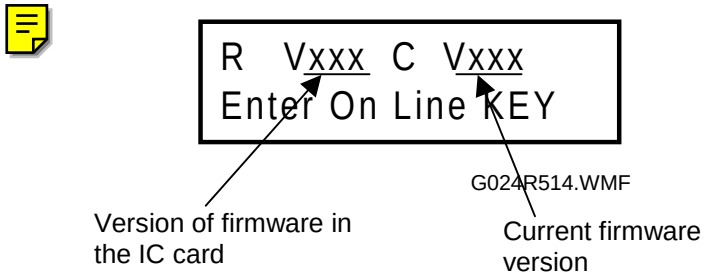
1. Open the rear side panel (See High Voltage Supply Unit Removal).
2. Remove the MCU [A] (four screws, 18 connectors).

NOTE: When replacing an MCU, remove the NVRAM chip (IC106) from the old board, install it on the new board, then install the new board.
In the event of NVRAM damage, install a new NVRAM chip, and contact your supervisor for additional steps. A forced process control will also have to be done (engine SP mode 7: Process Control – Initialize).

6.5.5 UPGRADING THE MCU FIRMWARE

NOTE: Turn off the printer before inserting or removing the IC card. (Otherwise the IC card may be damaged.)

1. Remove the left cover. (See Left Cover Removal.)
2. Remove the bracket to the bottom left of the revolver unit (one screw).
3. Insert the IC card that contains the MCU software into the IC card slot of the MCU. The side with 'A' on it must be facing upwards.
4. Turn on the printer. (Check that the following is displayed on the operation panel.)

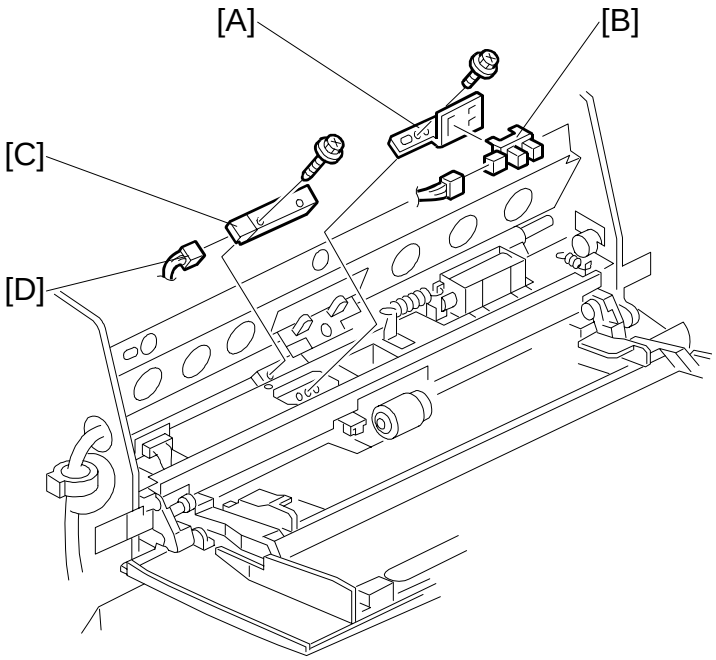


5. Check that the firmware versions are correct. (Make sure that the firmware in the IC card is later than the current one.) Press the On Line key.
6. Check that the messages on the operation panel change in the following sequence:

7. Upon the "OK!! OK!!" message, the MCU flash ROM has been updated. (If the "NG" message is displayed, try the upgrade again from the beginning.)
8. Turn off the printer.
9. Remove the IC card.
10. Put back the bracket and the left cover.
11. Start the printer in engine SP mode. Check the engine firmware version, which is displayed immediately after power-on. (If the firmware version differs from the IC card firmware version displayed in step 3, repeat from step 1.)

6.6 PAPER FEED SECTION

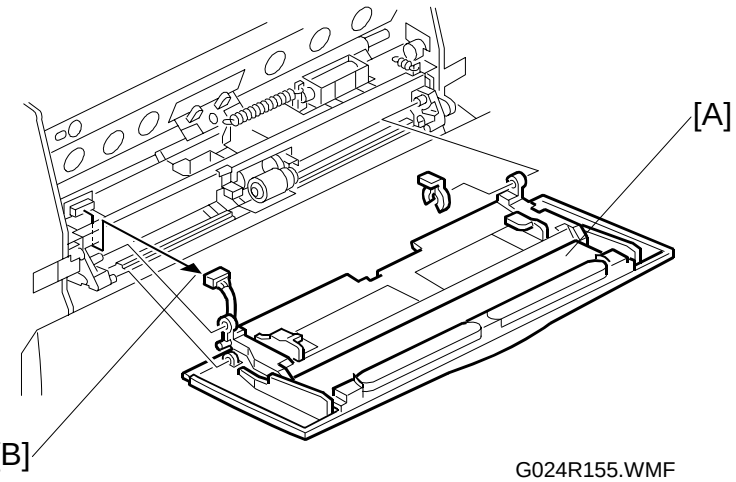
6.6.1 BY-PASS PAPER END SENSOR, REGISTRATION SENSOR



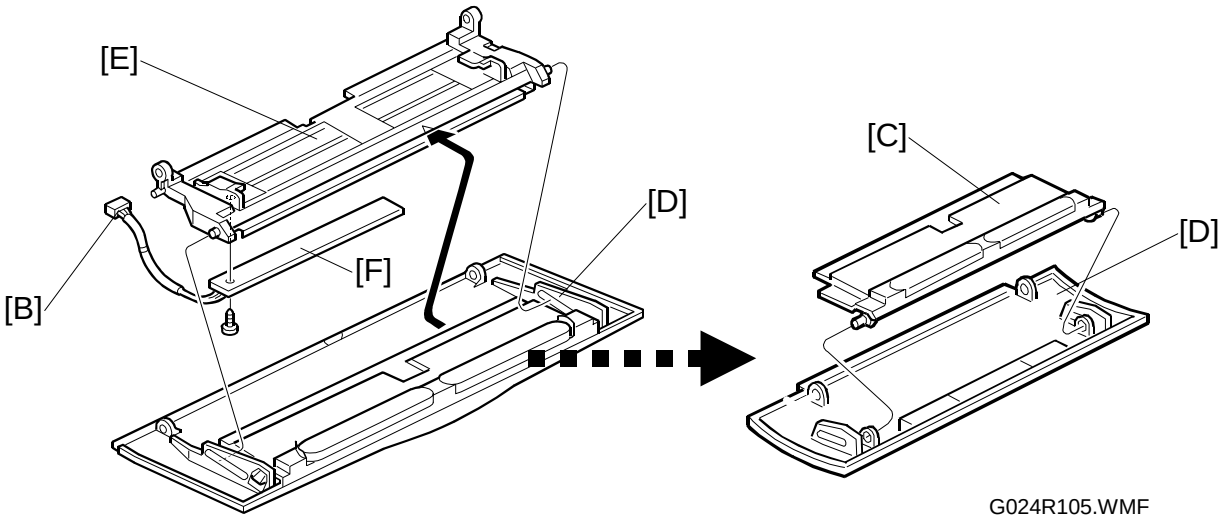
G024R154.WMF

1. Remove the front cover. (See Front Cover Removal.)
2. Remove the paper end sensor bracket [A] (one screw).
3. Remove the by-pass paper end sensor [B] (one connector and four hooks).
4. Remove the registration sensor [C] (one screw, one connector [D]).

6.6.2 PAPER WIDTH DETECTION BOARD



G024R155.WMF

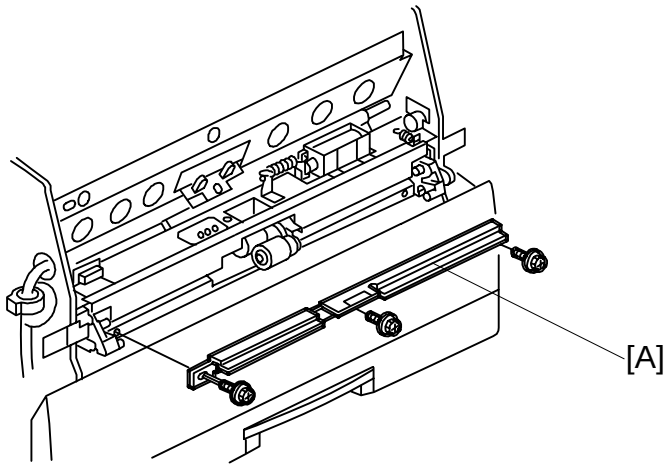


G024R105.WMF

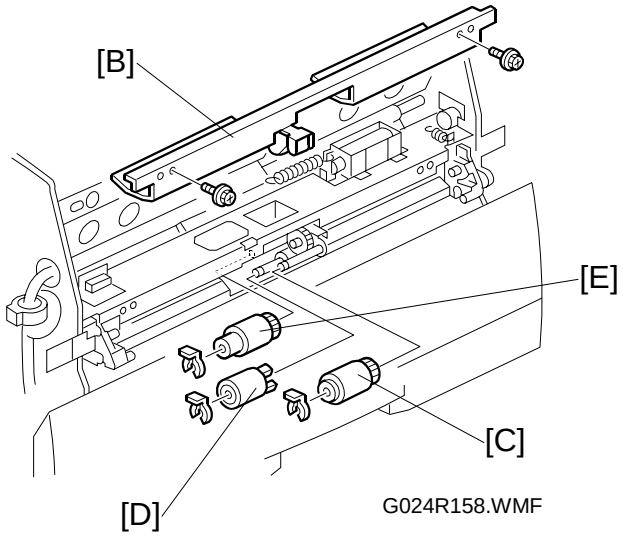
G024R156.WMF

1. Remove the front cover. (See Front Cover Removal.)
2. Remove the by-pass feed table unit [A] (two snap rings, two hooks, one connector [B]).
3. Remove the auxiliary tray [C] (two hooks), from the cover [D] for the by-pass feed table.
4. Remove the table [E] (two hooks).
5. Remove the paper width detection board [F] (one screw).

6.6.3 BY-PASS PAPER FEED ROLLER



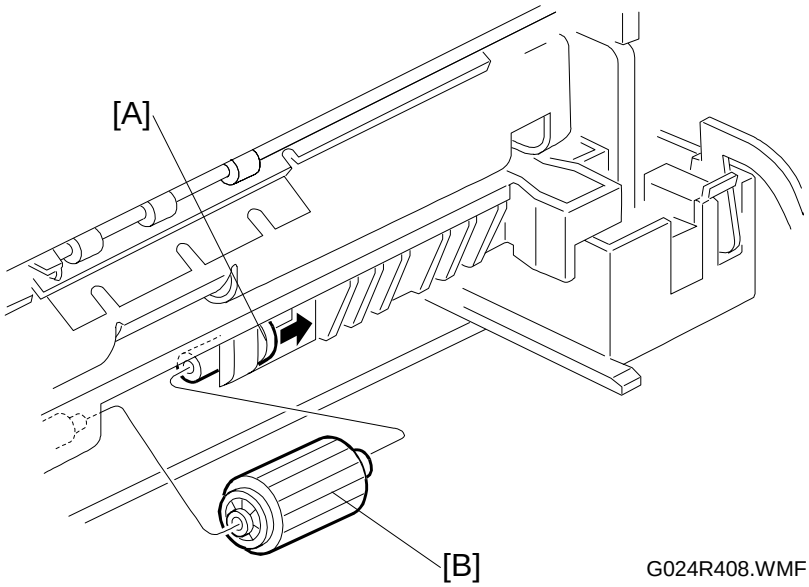
G024R157A.WMF



G024R158.WMF

1. Remove the front cover. (See Front Cover Removal.)
2. Remove the paper end sensor bracket. (See By-pass Paper End Sensor Removal.)
3. Remove the pad bracket [A] (three screws).
4. Remove the transport guide plate [B] (two screws).
5. Remove the pick-up roller [C] (one snap ring).
6. Remove the separation roller [D] (one snap ring).
7. Remove the paper feed roller [E] (one snap ring).

6.6.4 PAPER FEED ROLLER



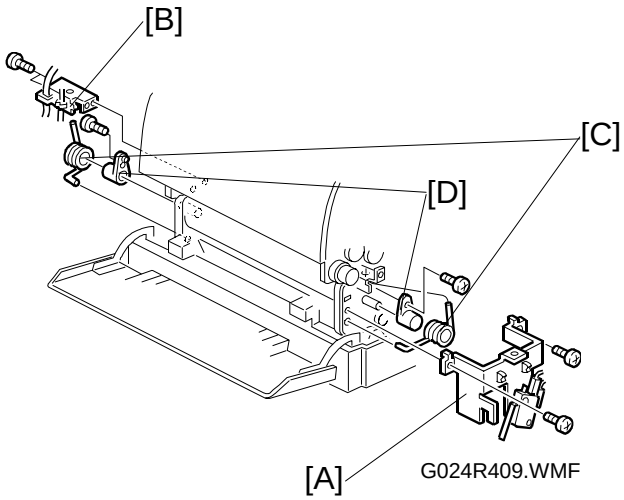
1. Remove the paper feed tray.
2. Pull down the front bottom cover forward. Slide the lever [A] in the direction of the arrow in the diagram, and remove the paper feed roller [B].

6.6.5 PCU HOLDER

⚠CAUTION

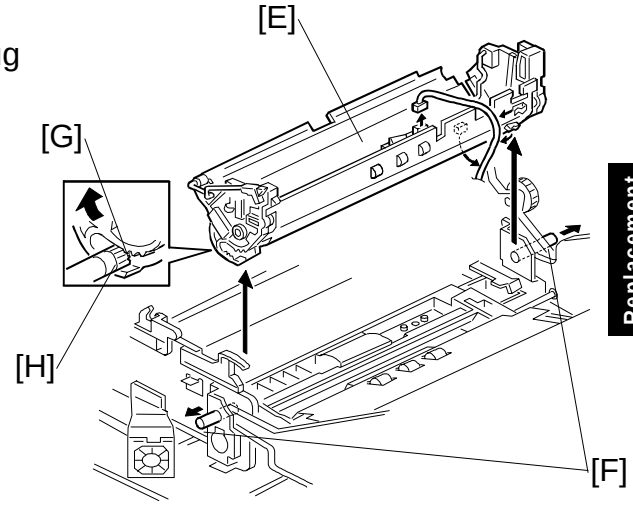
Before removing the torsion springs [C] in the following procedure, make sure that the front cover is closed (to release pressure).
If the springs are removed while pressure is applied to them, they may jump out and cause injury.

1. Remove the sensor bracket [A] (two screws, two connectors).
2. Remove the bracket [B] (two screws). Remove the right and left torsion springs [C]. Remove the right and left caps [D] (one screw each).



G024R409.WMF

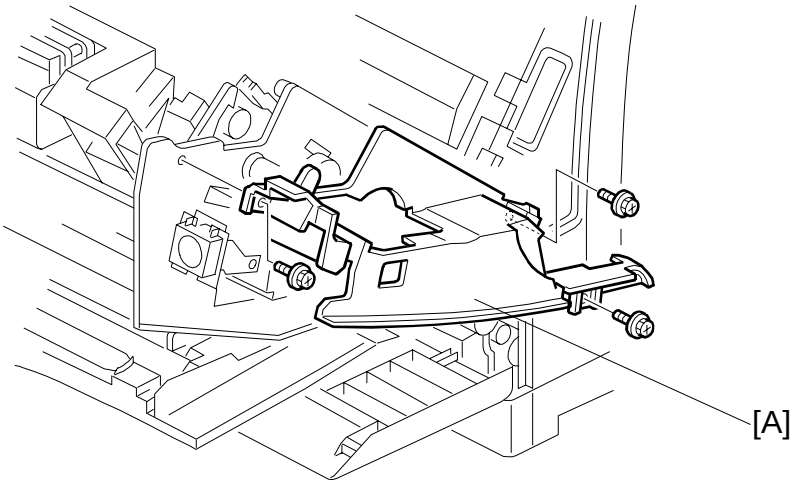
3. Open the paper feed frame and unplug the ID sensor connector. Pull out the right and left rotation shafts [F] until the PCU holder [E] can be removed.



G024R410.WMF

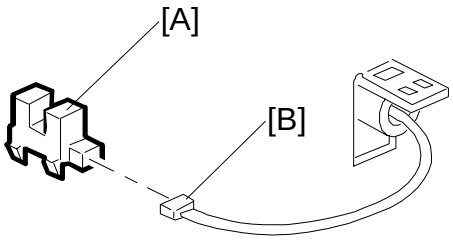
NOTE: Do not entirely pull out the rotation shafts, or the paper feed frame will drop. Hold the PCU holder with one hand, and gradually pull out the rotation shafts with the other hand. To remove the PCU holder, lift it with the front side panel kept vertical.
When installing the PCU holder, keep the front side panel vertical and lower it straight down between the printer side panels. (There is a toothed section [G] below the left side panel of the holder, which engages the damper gear [H].)

6.6.6 TRANSFER ROLLER POSITION SENSOR, BY-PASS PAPER FEED CLUTCH, REGISTRATION CLUTCH, AND TRANSFER ROLLER CLUTCH

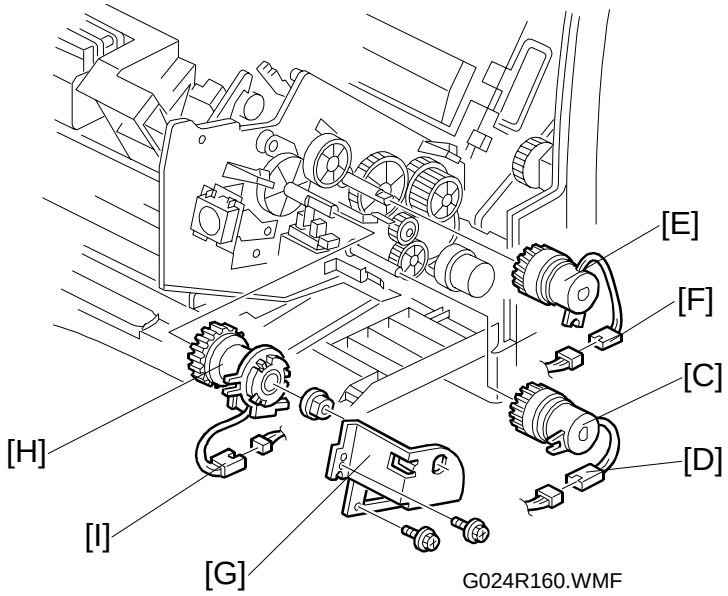


G024R159.WMF

1. Remove the right inner cover [A] (three screws).
2. Remove the front cover. (See Front Cover Removal.)



G024R519.WMF



G024R160.WMF

Transfer roller position sensor

3. Remove the transfer roller position sensor [A] (four hooks, one connector [B]).

By-pass paper feed clutch

4. Remove the by-pass paper feed clutch [C] (one hook, one connector [D]).

Registration clutch

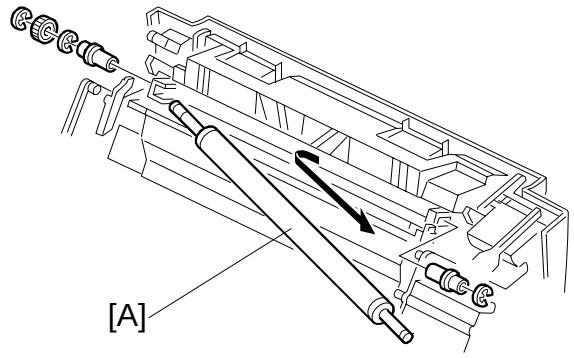
5. Remove the registration clutch [E] (one hook, one connector [F]).

Transfer roller clutch

6. Remove the bracket [G] (two screws).
7. Remove the transfer roller clutch [H] (one cam, one bearing, one connector [I]).

NOTE: When putting back the by-pass paper feed clutch, registration clutch, or transfer roller clutch, put the stopper on the bent part of the bracket.

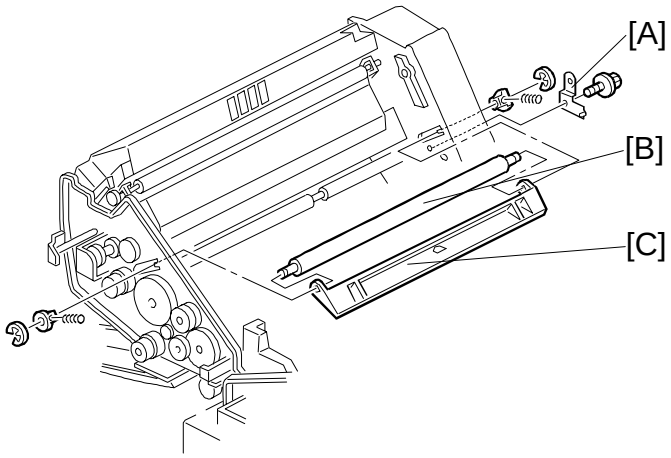
6.6.7 TRANSFER ROLLER



G024R265.WMF

1. Remove the front cover. (See Front Cover Removal.)
2. Remove the right inner cover (three screws). See Transfer Roller Position Sensor Removal.
3. Remove the transfer roller [A] (three E rings, one gear, and two bearings).

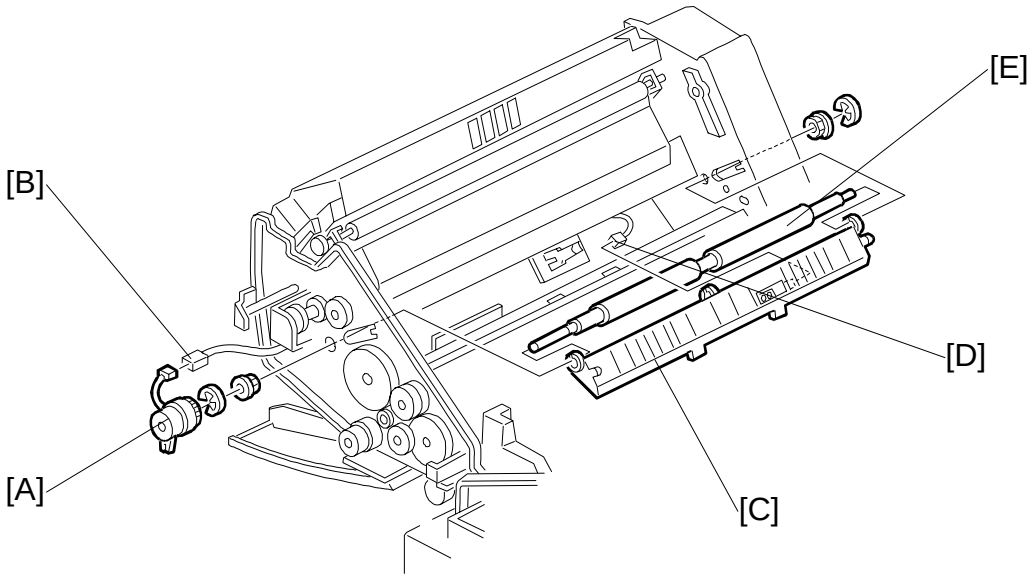
6.6.8 REGISTRATION ROLLER IDLER



G024R406.WMF

1. Remove the front cover. (See Front Cover Removal.)
2. Remove the right inner cover (three screws). See Transfer Roller Position Sensor Removal.
3. Remove the grounding plate [A] (one screw).
4. Remove the registration roller idler [B] and guide plate [C] (two E rings, two bearings, and two springs).

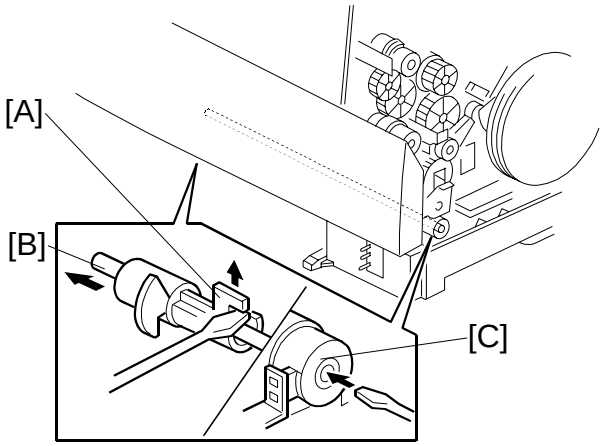
6.6.9 REGISTRATION CLUTCH AND REGISTRATION DRIVE ROLLER



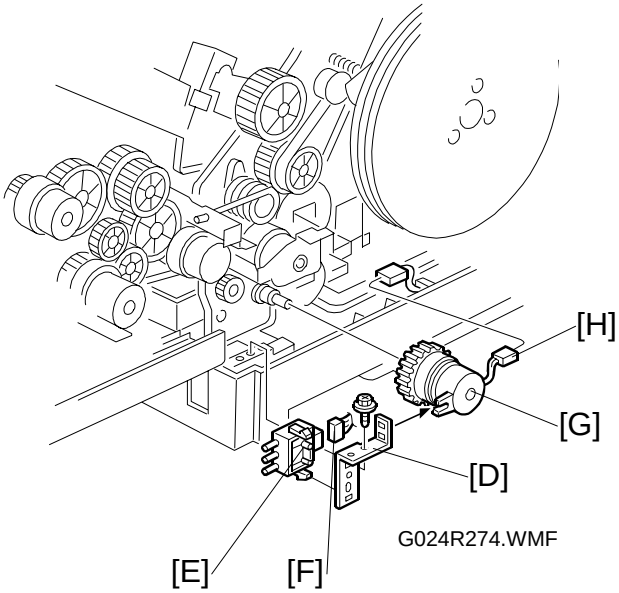
G024R407A.WMF

1. Remove the front cover (see Front Cover Removal) and registration roller idler (see Registration Roller Idler Removal).
2. Remove the registration clutch [A] (one hook, one connector [B]).
   NOTE: When putting back the registration clutch, put the stopper on the bent part of the bracket.
3. Remove the guide plate [C] (three hooks, one connector [D]).
4. Remove the registration drive roller [E] (two E rings and two bearings).

6.6.10 TRAY PAPER FEED CLUTCH, PAPER SIZE SWITCH, AND PULL-OUT/RELAY ROLLER CLUTCH



G024R273.WMF



G024R274.WMF

1. Remove the front bottom cover (see Front Bottom Cover Removal) and the paper feed roller (see Paper Feed Roller Removal).
2. With a flat-blade screwdriver, lift the hook [A] of the paper feed roller lever. Push the paper feed roller shaft [B] towards the left until it disconnects from the tray paper feed clutch [C].
   NOTE: Rotate the shaft into the correct orientation when putting it back into the clutch. (The shaft and the hole for the shaft in the clutch are D-shaped.)

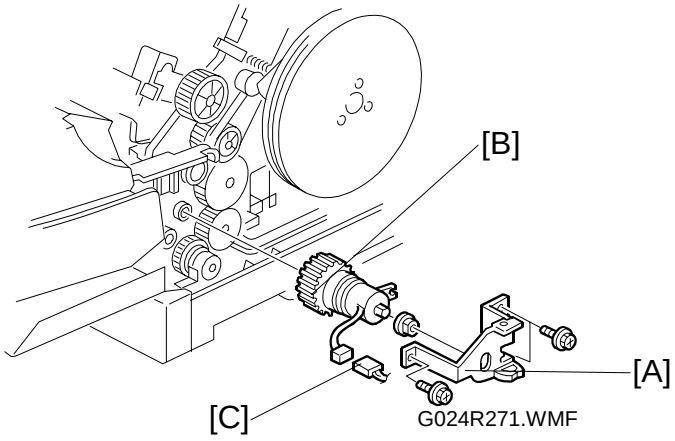
Paper size switch

1. Remove the paper size switch bracket [D] (one screw).
2. Remove the paper size switch [E] (two hooks, one connector [F]).

Paper feed clutch

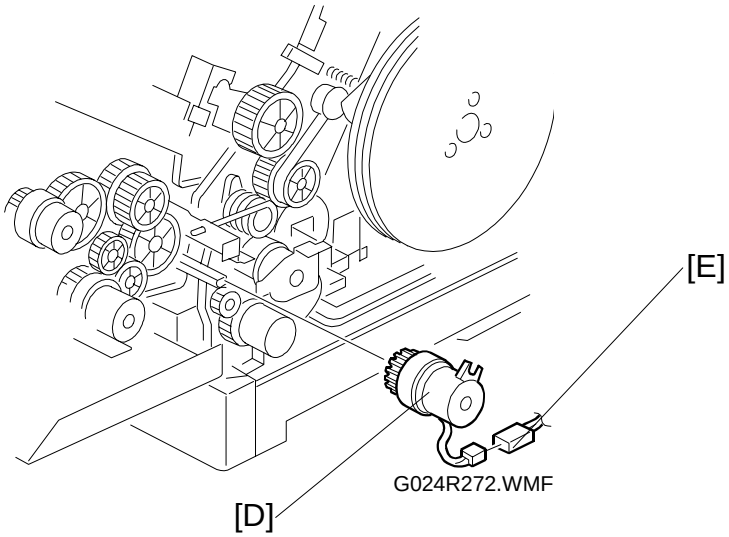
3. Remove the tray paper feed clutch [G] (one hook, one connector [H]).
   NOTE: When installing the paper feed clutch, put the stoppers in the two holes in the bracket before inserting the shaft.

Pull-out clutch



4. Remove the pull-out clutch bracket [A] (two screws).
5. Remove the pull-out clutch [B] (one bearing, one connector [C]).

Relay roller clutch



6. Remove the relay roller clutch [D] (one hook, one connector [E]).

7. TROUBLESHOOTING

7.1 SC TABLES

7.1.1 TYPES OF SERVICE CALL

For this printer engine, service calls and process control errors are classified into three types:

TYPE 1: Safety warning and immediate shutdown (Fusing unit errors)	The printer stops immediately and the LCD displays an SC error message. The error is logged.
TYPE 2: Immediate shutdown	The printer stops immediately and the LCD displays an SC error message. The error is logged.
TYPE 3: Log only (Process control errors)	The printer does not stop. No SC error message is displayed. The error is only logged.

Fusing unit SC errors

Fusing unit SC errors (type 1 errors) can be released by executing the Reset SC item in the engine SP mode menu. They cannot be released by turning the main switch off and on.

7.1.2 SC ERROR LIST

SC No.	Type	Name	Occurrence conditions	Detection conditions	Cause
20	Type 2	Optional tray unit error	The detection signal for the 500 sheet paper tray unit is abnormal.	Always monitored	The optional tray unit connector has a bad connection.
21	Type 1	Pressure roller thermistor error	The roller temperature has been at 0°C for five seconds.	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or lack of fusing unit	Pressure roller thermistor, MCU
22	Type 1	High pressure roller temperature	The roller temperature has been at 190°C or higher for three seconds.	No detection in the event of SC or lack of fusing unit	Pressure roller thermistor, MCU
23	Type 1	Low pressure roller temperature	Reheating has been done and the motor is not running, or 60 seconds have passed after the main motor halted. Then, the roller temperature has been below 130ºC for 60 seconds	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or lack of fusing unit	Pressure roller thermistor, MCU, pressure roller lamp connector
24	Type 1	Hot roller thermistor error	The roller temperature has been 0°C for five seconds.	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or lack of fusing unit	Hot roller thermistor, MCU
25	Type 1	High hot roller temperature	The roller temperature has been 190°C or higher for three seconds.	No detection in the event of SC or fusing unit absence	Hot roller thermistor, MCU
26	Type 1	Low hot roller temperature	Reheat has been done and the motor is not running, or 60 seconds have passed after main motor halt. Then, the roller temperature has been below 130ºC for 60 seconds	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or fusing unit absence	Hot roller thermistor, MCU, hot roller lamp connector
28	Type 2	Paper transfer positive bias release error	The PWM duty has been 50% or higher for 240 ms. Or, the paper transfer roller clutch does not operate.	Detection starts 60 ms after control starts for this component.	There is a disconnection in the paper transfer bias supply circuit. (Deformation of terminals or springs, dirty bearings) When the contact/separation lever is normal: Bad transfer roller position sensor, harness, or MCU When the contact/separation lever is faulty: Bad transfer roller clutch or MCU

SC No.	Type	Name	Occurrence conditions	Detection conditions	Cause
29	Type 2	Primary transfer bias open	The PWM duty has been 50% or higher for 240 ms.	Detection starts 60 ms after control starts for this component.	There is a disconnection in the primary transfer bias supply circuit. (Dirty or deformed electrodes)
31	Type 2	Supply bias error	The voltage has been higher than the appropriate control voltage for the target voltage for 240 ms. However, detection is disabled when the calculated control voltage is 5 V or higher.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the supply bias supply circuit (due to deformed terminals or electrodes or conductive foreign matter)
32	Type 2	Blade bias error	The voltage has been higher than the appropriate control voltage for the target voltage for 240 ms. However, detection is disabled when the calculated control voltage is 5 V or higher.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the blade bias supply circuit.
33	Type 2	Charge corona unit bias open	The PWM duty has been 50% or higher for 240 ms.	Detection starts 60 ms after control starts for this component.	There is disconnection in the charge corona unit bias supply circuit. (Dirty or deformed electrodes)
34	Type 2	Charge corona unit grid bias error	The voltage has been higher than the appropriate control voltage for the target voltage for 240 ms. However, detection is disabled when the calculated control voltage is 5 V or higher.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the charge corona unit grid bias supply circuit (due to deformed terminals or electrodes or conductive foreign matters).
35	Type 2	Main motor error	Continuous unlock for two seconds		Main motor, MCU
36	Type 2	PCU motor error	Continuous unlock for two seconds		PCU motor, MCU
38	Type 2	Revolver motor error	Movement to the home position took four or more seconds. For black, movement to the home position took one second or longer.		Revolver motor, MCU, or incorrect installation of color development unit
39	Type 2	Polygon mirror motor error	Continuous unlock for two seconds		Polygon mirror motor, MCU
40	Type 2	ID sensor error	The ID sensor output voltage is not between 0.1 V and 1.1 V while the ID sensor LED is off.	ID sensor calibration	ID sensor
41	Type 2	Transfer belt H.P. sensor error	No mark has been detected for 500 ms during PCU motor operation.		Transfer belt H.P. sensor, MCU

SC No.	Type	Name	Occurrence conditions	Detection conditions	Cause
42	Type 2	Laser diode error	LD error (abnormal laser power output)		LD, LD control board
43	Type 2	Synchronization detection error	Synchronization detection error of the optical unit	During polygon mirror motor revolution	Synchronization detection board, LD control board
45	Type 2	Charge bias short	A/D converted voltage has been 4.8 V or more for 240 ms.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the charge bias supply circuit (due to deformed terminals or electrodes or conductive foreign matter)
46	Type 2	Paper transfer positive current error	A/D converted voltage has been 0.2 V or less for 240 ms.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the paper transfer bias supply circuit (due to deformed terminals or electrodes or conductive foreign matter)
47	Type 2	Paper transfer negative bias open	The PWM duty has been 50% or greater for 240 ms.	Detection starts 60 ms after control starts for this component.	There is disconnection in the paper transfer bias supply circuit. (Dirty or deformed electrodes)
48	Type 2	Paper transfer negative current error	A/D converted voltage has been 4.8 V or more for 240 ms.	Detection starts 60 ms after control starts for this component.	There is a short circuit in the paper transfer bias supply circuit (due to deformed terminals or electrodes or conductive foreign matter)
49	Type 1	Pressure roller reheat timeout	When reheating, the roller temperature does not reach the reheat start temperature (target temperature -20°C) within five minutes.	During reheating	Pressure roller thermistor, pressure roller lamp connector, MCU
50	Type 1	Hot roller reheat timeout	When reheating, the roller temperature does not reach the reheat start temperature (target temperature -10°C) within five minutes.	During reheating	Hot roller thermistor, hot roller lamp connector, MCU
51	Type 1	Pressure roller lamp full-power operation error	When full-power operation occurs during reheating, the main motor is not running and the difference between the current temperature and that of 60 seconds ago is 18°C or less.	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or fusing unit absence.	Pressure roller thermistor, pressure roller lamp connector, MCU

SC No.	Type	Name	Occurrence conditions	Detection conditions	Cause
52	Type 1	Hot roller lamp full-power operation error	When full-power operation occurs during reheating, the main motor is not running and the difference between the current temperature and that of 60 seconds ago is 18°C or less.	No detection in the event of a jam/door open, SC, unit absence, energy-saving mode, or fusing unit absence.	Hot roller thermistor, hot roller lamp connector, MCU
57	Type 2	Print command error	When an abnormal combination of print commands is received.		
59	Type 2	Temperature sensor error	5 V (4.75 V) or more has continuously been detected for five seconds.	When the power is on, or the AC development bias is off.	Temperature sensor
60	Type 2	Humidity sensor error	5 V (4.75 V) or more has continuously been detected for five seconds.	When the power is on, or the AC development bias is off.	Humidity sensor

7.1.3 PROCESS CONTROL ERROR LIST

PE No.	Type	Name	Occurrence conditions	Detection conditions	Cause
103	Type 3	K ID sensor error	While the LED is off, the ID sensor output does not meet the standard voltage (between 0.05 V and 1.5 V).	ID sensor (K) calibration	When the output meets the standard voltage: *MCU, harness* When the output does not meet the standard: *K ID sensor*
104	Type 3	ID sensor output error (rough adjustment)	The difference in ID sensor outputs when the transfer belt is read and when the LED is off does not meet the standard voltage (Vbkcal±0.4 V).	ID sensor (K) calibration	K ID sensor, MCU, transfer belt error, transfer belt surface unevenness, incorrect ID sensor installation
105	Type 3	ID sensor output error (fine adjustment)	The difference in ID sensor outputs when the transfer belt is read and when the LED is off does not meet the standard voltage (Vbkcal±0.1 V).	ID sensor (K) calibration	K ID sensor, MCU, transfer belt error, transfer belt surface unevenness
110	Type 3	ID sensor pattern error (Cyan)	The slope γM of the line representing the relationship between the C development bias and attached toner amount is not between –0.01 and –0.0005.	Color DTM initialization	Incorrect color DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization
111	Type 3	ID sensor pattern error (Magenta)	The slope γM of the line representing the relationship between the M development bias and attached toner amount is not between –0.01 and –0.0005.	Color DTM initialization	Incorrect color DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization
112	Type 3	ID sensor pattern error (Yellow)	The slope γM of the line representing the relationship between the Y development bias and attached toner amount is not between –0.01 and –0.0005.	Color DTM initialization	Incorrect color DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization
116	Type 3	ID sensor pattern error (k)	The slope γM of the line representing the relationship between the K development bias and attached toner amount is not between –0.01 and –0.001.	Color DTM initialization	Incorrect K DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization
118	Type 3	ID sensor pattern read error (K)	The difference in ID sensor outputs when the ID sensor pattern is read and when the background surface of the transfer belt is read is 0.8 V or less.	K-DTM bias initialization	Incorrect DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization

PE No.	Type	Name	Occurrence conditions	Detection conditions	Cause
123	Type 3	ID sensor pattern error (K)	The slope γM of the line representing the relationship between the DTM bias and attached toner amount is not between –0.01 and –0.001.	K-DTM bias control	Incorrect DTM installation, incorrect PCU installation, development bias error, MCU, LD control malfunction, loss of synchronization

7.2 USER ERROR LIST

Error	Operation after error	Detection conditions	Release method	Remarks
Add Toner: xx	Printing can be done.	Toner near-end detection is enabled two seconds after the development drive solenoid turns on until it turns off. The toner near-end message is displayed when toner end is detected five times.	Replace the DTM.	When near-end is detected, closing the front cover initiates recovery. If the toner near-end status is cleared, it is not detected during recovery. In single-color (black-and-white) continuous output, toner near-end is detected during process control.
Load xx (By-pass feed table)	Printing is disabled when the by-pass paper feed table is specified. If paper end is detected for the second image in double-image mode, the printer stops after the first sheet is printed.	Paper end is detected by the by-pass feed paper end sensor.	Supply paper.	Double-image mode: Two images on the transfer belt at the same time.
Load xx (Tray 1)	Printing is disabled when the paper tray is specified. If paper end is detected for the second image of the double-image mode, the printer stops after the first sheet is printed.	Paper end is detected by the paper end sensor of the first paper tray.	Supply paper.	
Load xx (Tray 2)	Printing is disabled when the second paper tray is specified. If paper end is detected for the second image of the double-image mode, the printer stops after the first sheet is printed.	Paper end is detected by the paper end sensor of the second paper tray.	Supply paper.	
Load xx (Tray 3)	Printing is disabled when the third paper tray is specified. If paper end is detected for the second image in double-image mode, the printer stops after printing the first sheet.	Paper end is detected by the paper end sensor of the third paper tray.	Supply paper.	

Error	Operation after error	Detection conditions	Release method	Remarks
Paper Size Error	Printing is disabled.	The specified paper size for the by-pass feed table differs from that detected. Or the paper size in the tray differs from the paper size dial setting by ±40 mm.	Open the door.	
Change PCU	Printing can be done.	The CPU counter reaches 60,000.	Replace the PCU to reset the counter.	Counting (upon exit) A3/DLT or smaller K single-color: Plus 1 Full color: Plus 4 For sizes larger than A3/DLT, counting doubles.
Change Fusing Unit	Printing can be done.	The fusing unit counter reaches 60,000.	Manually release the error using 'Maintenance Clear' in controller SP mode.	A3 or larger: Number of sheets that have passed x2 Smaller than A3: Number of sheets that have passed
Waste Toner Nearly Full	20 sheets can be printed.	The used toner bottle is detected as "full"' for 10 seconds.	Replace the used toner bottle.	The near-full status is reset if the full used toner bottle status is not detected continuously for 10 seconds.
Waste Toner is Full	Printing is disabled.	20 sheets have been printed in the used toner near-full status.	Replace the used toner bottle.	The near-full status is reset if the full used toner bottle status is not detected continuously for 10 seconds.
Add Fuser Oil	200 sheets can be printed after the fusing oil near-end message is displayed.	Oil end is continuously detected for 10 seconds.	Supply fusing oil.	The oil near-end status is reset when oil end is not detected continuously for 10 seconds.
Fuser Oil is Low	Printing is disabled.	200 sheets have been printed in the fusing oil near-end status.	Supply fusing oil.	The oil near-end status is reset when oil end is not detected continuously for 10 seconds.
Reset PCU Correctly	Printing is disabled.	The PCU set sensor detects no PCU when the main switch is turned on or the cover is closed.	Set the PCU.	

Error	Operation after error	Detection conditions	Release method	Remarks
Reset Charger Correctly	Printing is disabled.	The charge corona unit set switch does not detect the wire cleaner for the charge corona unit when the main switch is turned on or the cover closed.	Install the charge corona unit correctly. Return the wire cleaner to the home position.	
Reset Fusing Unit Correctly	Printing is disabled.	Disconnection is detected for both the hot and pressure roller thermistors when the main switch turns on.	Install the fusing unit correctly.	
Reset Tray Correctly	Printing is disabled when the no tray message is displayed for the specified tray	None of the paper size switches for that tray detect anything.	Install the tray correctly.	
Reset Toner Correctly	Printing is disabled.	The DTM sensor does not detect a DTM when the main switch is turned on or the front cover closed.	Install the DTM correctly.	

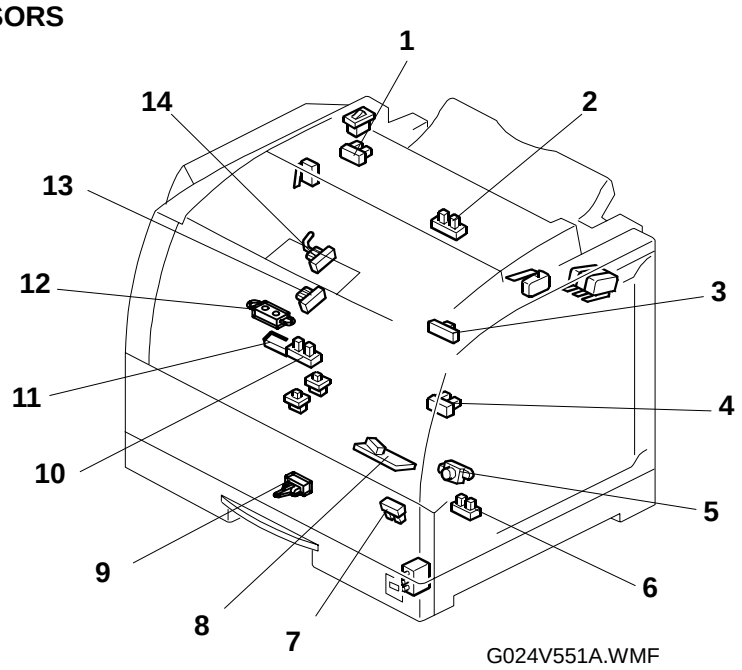
Error	Operation after error	Detection conditions				Release method	Remarks
		Paper tray	**Paper feed clutch to pull-out sensor**	**Paper feed clutch to registration sensor (1st)**	**Paper feed clutch to registration sensor (2nd) in double-image mode**		
Paper feed jam	Printing is disabled.	Tray 1	0.9 s	3.24 s	3.82 s	Remove the jammed paper and close the front cover.	The paper feed jam counter increases by 1. Double-image mode: Two images on the transfer belt at the same time.
		Tray 2 (Option)	0.9 s	3.9 s	4.08 s	Remove the jammed paper and close the front cover.	
		Tray 3 (Option)	0.9 s	5.14 s	5.31 s	Remove the jammed paper and close the front cover.	

A jam is detected if more time than that indicated above passes. The time lapses are doubled for thick paper and transparencies.

Error	Operation after error	Detection conditions	Release method	Remarks
Transport jam	Printing is disabled.	The exit sensor does not detect paper 3.14 seconds after the registration clutch activates. (6.28 seconds for transparencies and thick paper)	Remove the jammed paper and close the front cover.	The transport jam counter increases by 1.
Exit jam	Printing is disabled.	The exit sensor detects paper 2.18 seconds after the registration sensor de-activates. The following conditions are regarded as roll-in jams, however, an exit jam message is displayed: • The exit sensor is de-activates less than two seconds after the registration clutch turns off. (Four seconds or longer for transparencies and thick paper) • When the exit sensor is turned off before the registration sensor turns off.	Remove the jammed paper and close the front and exit covers.	The exit jam counter increases by 1.
Front cover open	Printing is disabled.	Always monitored	Close the cover.	
Exit/DTM cover open	Printing is disabled.	Always monitored	Close the cover.	

ELECTRICAL COMPONENT LAYOUT

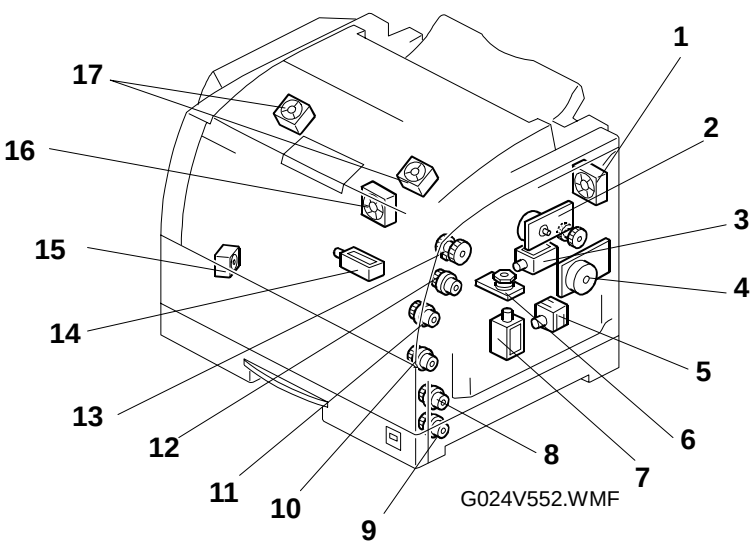
SENSORS



G024V551A.WMF

Index No.	Description	Symbol	P-to-P
1	Exit sensor	S19	B7
2	Oil end sensor	S17	J1
3	Transfer belt H.P. sensor	S14	I2
4	Transfer roller position sensor	S11	H2
5	Used toner sensor	S2	F1
6	PCU reset sensor	S4	F1
7	Paper end sensor	S5	F1
8	ID sensor	S8	G1
9	Pull-out sensor	S6	G1
10	By-pass paper end sensor	S10	H1
11	Registration sensor	S15	I1
12	Toner end sensor	S12	I2
13	Revolver H.P. sensor	S13	I1
14	DTM set sensor	S16	J2

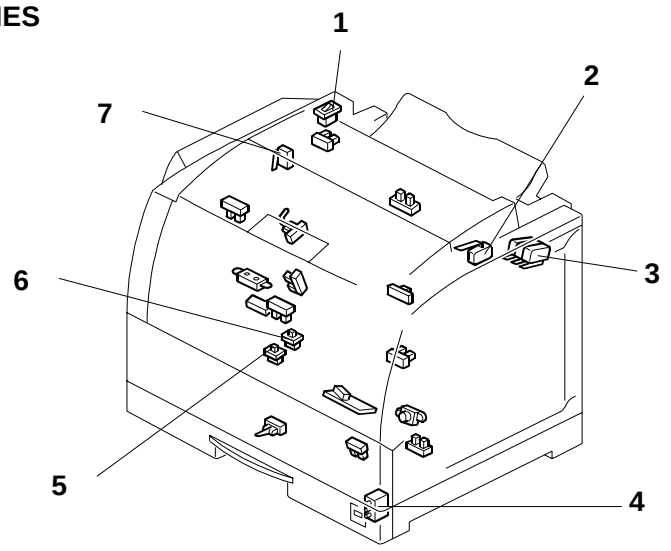
MOTORS, CLUTCHES, AND SOLENOIDS



G024V552.WMF

Index No.	Description	Symbol	P-to-P
1	Exhaust fan	FM2	C8
2	PCU motor	M2	D8
3	Transfer belt cleaning solenoid	SOL2	D2
4	Main motor	M4	F8
5	Revolver motor	M1	D8
6	Polygon mirror motor	M3	E8
7	Development drive solenoid	SOL3	D2
8	Pull-out clutch	CL5	E1
9	Paper feed clutch	CL2	D2
10	Relay roller clutch	CL3	D1
11	By-pass feed clutch	CL1	D1
12	Registration clutch	CL4	E2
13	Transfer roller clutch	CL6	E2
14	By-pass feed solenoid	SOL1	D1
15	Charge inlet fan	FM5	E1
16	Inlet fan	FM4	D8
17	Transport fans	FM1, FM3	C8

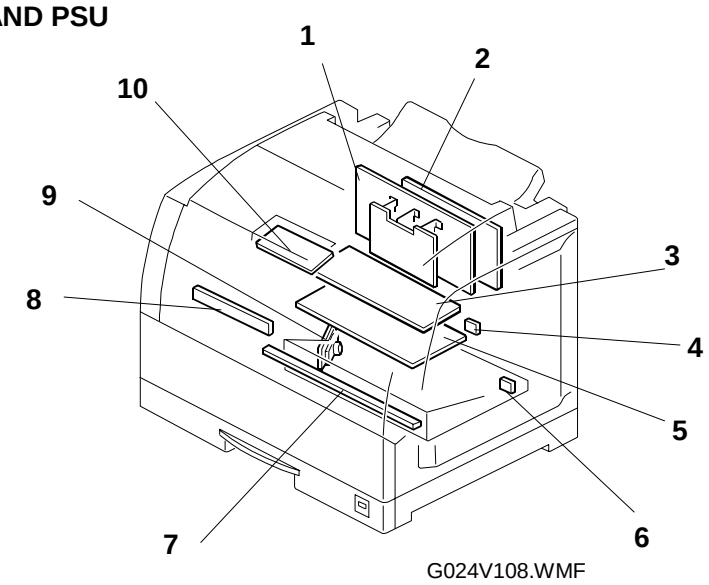
SWITCHES



G024V551.WMF

Index No.	Description	Symbol	P-to-P
1	Main switch	SW1	B3
2	Exit cover switch	SW2	C7
3	Door safety switches	SW3	B7
4	Paper size switch	S7	G2
5	PCU set switch	S1	F1
6	Charge corona unit set switch	S3	F1
7	DTM cover switch	SW4	C7

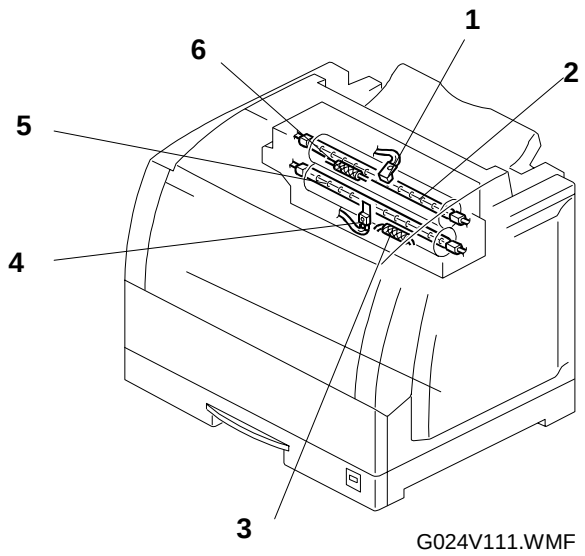
PCBS AND PSU



G024V108.WMF

Index No.	Description	Symbol	P-to-P
1	Power supply unit (PSU)	PCB1	A3-A5
2	Controller board	PCB8	J3-J7
3	High voltage supply board	PCB3	C2
4	Temperature/humidity sensor	S9	H2
5	Main control unit (MCU)	PCB2	C4-J4
6	Laser synchronization detector board	PCB4	E8
7	Quenching lamp	L3	E1
8	By-pass paper width detection board	PCB6	H1
9	Laser diode (LD) unit	PCB5	F7
10	Operation panel	PCB7	G7

THERMISTORS, HEATERS, AND FUSES



G024V111.WMF

Index No.	Description	Symbol	P-to-P
1	Pressure roller thermistor	TH1	B8
2	Pressure roller lamp	L2	A7
3	Hot roller thermofuse	TF1	A7
4	Hot roller thermistor	TH2	B8
5	Hot roller lamp	L1	A7
6	Pressure roller thermofuse	TF2	A7

Point to Point Diagram (G024)

AC / DC / Pulse / Signal direction / Active High / Active Low / Voltage

Power cord — LINE / NEUTRAL — Inlet — T103 / T104 — T101 / T102 — Ground

FU1 250V 15A — FU2 125V 6.3A — Power supply unit — PCB1 — Power relay — DC voltage generator — Heater control circuit

CN102-1 / CN102-2 / CN102-3 / CN102-4 — CN858

Fusing Unit: CN1 — TF1 Hot roller thermofuse — T105 / T106 — L1 Hot roller lamp — CN3 — TF2 Pressure roller thermofuse — T107 / T108 — L2 Pressure roller lamp — T111 / T112 — T109 / T110 — CN807 — TH1 Pressure roller thermistor — CN808 — TH2 Hot roller thermistor — CN809 — S19 Exit sensor

Main switch — T115 / T116 / T113 / T114 — CN105-1 / CN105-4 / CN105-6 / CN105-3

CN101-1 Vcc(5.1V) … CN101-8 GND(COM3)(Vaa) — CN201

CN103 — CN202 — CN203

Door safety switch — CN801-1 / CN801-2 / CN802-1 / CN802-2 — Exit cover switch — CN803-1 / CN803-2 / CN805-1 / CN805-2 — DTM cover switch — CN804-1 / CN804-2

5V — 5V INT — 24V — 24V INTR — 24V VINR — 24V INTS — CN204-1 … CN204-6

High voltage supply board — PCB3 — C / G / TB / TP — BL / B / SP Development — CN190 — CN205

GND(COM3) / 24VINT / 5V / GND(COM4) / FB VBL (▼5 → 0 to 5) / FB VSP (▼5 → 0 to 5) / FB ITP (▼5 → 0 to 5) / FB VTB (▼5 → 0 to 5) / FB VG (▼5 → 0 to 5) / FB IC (▼5 → 0 to 5) / PWM C (▲5 → 0/5) / PWM G (▲5 → 0/5) / PWM TB (▲5 → 0/5) / PWM TP+ (▲5 → 0/5) / PWM SP (▲5 → 0/5) / PWM BL (▲5 → 0/5) / PWM TP- (▲5 → 0/5) / TRG G (▼5) / TRG AC(▼5) / TRG B(▼5)

XFIXRA2 (▼24) / XFIXRAI (▼24) / XPWRRL (▼24) / ZCROSS (▼5 → 0/5) / GND (COM1) / 24 V INT

GND (COM4) / XFTFRM2 (▼5 → 0 to 5) / GND (COM4) / XFTHRM1 (▼5 → 0 to 5) / GND (COM1) / XPAPOUT (▼5) / GND (COM1) / XFSET (▼5)

Transport fan — FM1 — CN211-6 / CN211-7 — CN834 — 24 V XFMSTAT2 (▼24)

Exhaust fan — FM2 — CN211-8 / CN211-9 — CN835 — 24 V XFMSTAT1 (▼24)

Transport fan — FM3 — CN211-12 / CN211-13 — CN833 — 24 V XFMSTAT4 (▼24)

Inlet fan — FM4 — CN211-14 / CN211-15 — CN878 — 24 V XFMSTAT5 (▼24)

Revolver motor — M1 — CN214 — 24V INT REVMOBB (▼24 → 0/24) / REVMOB (▼24 → 0/24) / 24 V INT REVMOAB (▼24 → 0/24) / REVMOA (▼24 → 0/24)

PCU motor — M2 — CN215 — 24 V INT / 5 V / GND (COM3) / GND (COM1) / XBMLOCK (▼24) / BMOCLK(▼24 → 0/24) / BMSPEED (▼24) / BMFF (▼24) / BMFR (▼24) / XBMSTART (▼24) — CN849

Laser synchronization detector board — PCB4 — CN213 — XDPINI (▼5) / 5 V / GND (COM1) — CN845

Polygon mirror motor — M3 — CN213 — 24V / GND (COM3) / XPMSTART (▼24) / XSCRDY (▼24) / PMCLK (▼24 → 0/24) — CN847 — CN899

Main motor — M4 — CN216 — 24 V INT / 24 V INT / GND (COM3) / GND (COM3) / XMMLOCK (▼24) / MMSTART (▼24) / MMSPEED (▼24) — CN850

Main Control Baord

PCB 2

By-pass feed solenoid — SOL1 — CN832 — CN211-2 / CN211-3 — 24 V XBPFEDSL (▼24)

Transfer belt cleaning solenoid — SOL2 — CN840 — CN212-A13 / CN212-A14 — 24 V XTRCBESL (▼24 → 0/24)

Development drive solenoid — SOL3 — CN841 — CN212-B1 / CN212-B2 — 24 V XDEVSLC (▼24 → 0/24)

By-pass feed clutch — CL1 — CN636 — CN212-A1 / CN212-A2 — 24 V XBPFEDCL (▼24)

Paper feed clutch — CL2 — CN837 — CN212-A4 / CN212-A5 — 24 V XPAPEOCL (▼24)

Relay roller clutch — CL3 — CN838 — CN212-A7 / CN212-A8 — 24 V XTRNROCL (▼24)

Registration clutch — CL4 — CN839 — CN212-A10 / CN212-A11 — 24 V XREGICL (▼24 → 0/24)

Pull-out clutch — CL5 — CN643 — CN212-B4 / CN212-B5 — 24 V XPIUPCL (▼24 → 0/24)

Transfer roller clutch — CL6 — CN844 — CN212-B7 / CN212-B8 — 24 V XTRCROCL (▼24)

Charge inlet fan — FM5 — CN875 — CN876 — CN211-10 / CN211-11 — 24 V XFMSTAT3 (▼24)

Quenching lamp — L3 — CN877 — CN211-4 / CN211-5 — 24 V XREMLED (▼24)

PCU set switch — S1 — CN815 — GND (COM1) XTNBTS (▼5)

Used toner sensor — S2 — CN813 — CN870 — GND (COM1) XTNFULS (▼5) 5 V

Charge corona set switch — S3 — CN822 — CN207 — GND (COM1) XINPUT (▼5)

PCU reset sensor — S4 — CN827 — GND (COM1) XPCUNOS (▼5) 5 V

Paper end sensor — S5 — CN818 — CN872 — GND (COM1) XPAPEND (▼5) 5 V

Pull-out sensor — S6 — CN823 — GND (COM1) XPICKS (▼5) 5 V

Paper size switch — S7 — CN824 — CN208 — XNOB0 (▲5) / XNOB1 (▲5) / GND (COM1) / XNOB2 (▲5)

ID sensor — S8 — CN820 — CN871 — LEDIN (▼5 → 0 to 4) / VOUT1 (▼5 → 0 to 5) / VOUT2 (▼5 → 0 to 5) / GND (COM1) 5 V

Temperature/ humidity sensor — S9 — CN814 — XTHREMO (▼5 → 0 to 5) / GND (COM4) / GND (COM4) / XHUMIDS (▼5 → 0 to 5) N.C. / 5 V

By-pass paper end sensor — S10 — CN817 — GND (COM1) XBPFEDS (▼5) 5 V

By-pass paper width detection board — PCB6 — CN819 — CN209 — XBIT3 (▲5) / XBIT2 (▲5) / XBIT1 (▲5) / XBIT0 (▲5) / GND (COM1)

Transfer roller position sensor — S11 — CN826 — GND (COM1) XTRCRLS (▼5) 5 V

Revolver H.P. sensor — S12 — CN927 — GND (COM1) XCOLEND (▼5) 5 V

Toner end sensor — S13 — CN829 — GND (COM1) XDTMS (▼5) 5 V

Registration sensor — S14 — CN830 — GND (COM1) MARKSEN (▼5) 5 V

Transfer belt H.P. sensor — S15 — CN831 — CN210 — GND (COM1) XREGIST (▼5) 5 V

DTM set sensor — S16 — CN811 — GND (COM1) XTNCATS (▼5) 5 V

Oil end sensor — S17 — CN828 — GND (COM1) XOILEND (▼5) 5 V

CN217			CN851
1	5VINT		25
3	GND(COM1)		23
5	5VINT		21
7	GND(COM1)		19
9	GND(COM1)		17
11	LDOFF (▲5)		15
13	XLDERR (▼5)		13
15	LDCLK (▼5)	P	11
17	XLD7 (▼5)	P	9
19	XLD5 (▼5)	P	7
21	XLD3 (▼5)	P	5
23	XLD1 (▼5)	P	3
25	GND(COM1)		1

CN217			CN851
2	5VINT		26
4	GND(COM1)		24
6	5VINT		22
8	GND(COM1)		20
10	LDMODE (▼5)		18
12	LEVEL (▲5)		16
14	XLDON (▼5)		14
16	LDS (▲5)		12
18	XLD6 (▼5)	P	10
20	XLD4 (▼5)	P	8
22	XLD2 (▼5)	P	6
24	XLD0 (▼5)	P	4
26	GND(COM1)		2

CN221			CN855
1	LED2 (▼5)	P	23
3	LED4 (▼5)	P	21
5	SW2 (▼5)	P	19
7	SW4 (▼5)	P	17
9	SW6 (▼5)	P	15
11	SW8 (▼5)	P	13
13	5V		11
15	GND(COM1)		9
17	E (▲5)	P	7
19	DB4 (▼5)	P	5
21	DB6 (▼5)	P	3
23			1

CN221			CN855
2	LED1 (▼5)	P	24
4	LED3 (▼5)	P	22
6	SW1 (▼5)	P	20
8	SW3 (▼5)	P	18
10	SW5 (▼5)	P	16
12	SW7 (▼5)	P	14
14	5V		12
16	GND(COM1)		10
18	OPRXW (▼5)	P	8
20	RS (▲5)	P	6
22	DB5 (▼5)	P	4
24	DB7 (▼5)	P	2

CN218			CN852
A1	SPS0 (▼5)	P	P11
A2	SPS1 (▼5)	P	P10
A3	SPS2 (▼5)	P	P9
A4	SPEND (▼5)		P8
A5	SPSEN (▼5)		P7
A6	XSPST0 (▼5)	P	P6
A7	XSPST1 (▼5)	P	P5
A8	SPSEL (▼5)	P	P4
A9	XSNDFD0 (▲5)		P3
A10	XSNDCL0 (▲5)		P2
A11	XSNDCK0 (▼5)	P	P1

CN218			CN852
B1	5V		P22
B2	GND(COM1)		P21
B3	XSNDFD1 (▲5)		P20
B4	XSNDCL1 (▲5)		P19
B5	XSNDCK1 (▼5)	P	P18
B6	24V		P17
B7	24V		P16
B8	24V		P15
B9	GND(COM3)		P14
B10	GND(COM3)		P13
B11	GND(COM3)		P12

CN217 — 26 — CN851 — **Laser diode (LD) unit PCB5**

CN221 — 24 — CN855 — **Operation panel PCB7**

CN218 — 22 — CN852 / CN860 — (Option) Paper feed unit — CN863 / CN860-2 — (Option) Paper feed unit — CN863-2

CN852	CN860 860-2		CN863
P11	J11	SPS0	P11
P10	J10	SPS1	P10
P9	J9	SPS2	P9
P8	J8	SPEND	P8
P7	J7	SPSEN	P7
P6	J6	XSPST0	P6
P5	J5	XSPST1	P5
P4	J4	SPSEL	P4
P3	J3	XSNDFD0	P3
P2	J2	XSNDCL0	P2
P1	J1	XSNDCK0	P1

CN852	CN860 860-2		CN863
P22	J22	5V	P22
P21	J21	GND(COM1)	P21
P20	J20	XSNDFD1	P20
P19	J19	XSNDCL1	P19
P18	J18	XSNDCK1	P18
P17	J17	24V	P17
P16	J16	24V	P16
P15	J15	24V	P15
P14	J14	GND(COM3)	P14
P13	J13	GND(COM3)	P13
P12	J12	GND(COM3)	P12

CN223 — CN1 — **Controller Board PCB8**

RXD / GND(COM1) / XOFGATE / GND(COM1) / 5V / 5V / 5V / 5V / XILSYNC / GND(COM1) / ICLOCK / GND(COM1) / XVDATA7 / GND(COM1) / XVDATA5 / GND(COM1) / XVDATA3 / GND(COM1) / XVDATA1 / GND(COM1) / N.C. / GND(COM1) / XS / GND(COM1) / N.C. / GND(COM1) / RSEL / GND(COM1) / D(7) / GND(COM1) / D(5) / GND(COM1) / LED1ON / LED2ON / 5V / 5V / SW3ON / SW4ON / SW7ON / SW8ON / TXD / GND(COM1) / XCLSYNC / GND(COM1) / OCLOCK / GND(COM1) / XIFGATE / GND(COM1) / 5V / 5V / 5V / 5V / XVDATA6 / GND(COM1) / XVDATA4 / GND(COM1) / XVDATA2 / GND(COM1) / XVDATA0 / GND(COM1) / 5V / 5V / 5V / GND(COM1) / ENABLE / GND(COM1) / OPR_W / GND(COM1) / D(6) / GND(COM1) / D(4) / GND(COM1) / LED3ON / LED4ON / SW1ON / SW2ON / SW5ON / SW6ON / GND(COM3) / 24V

(Option) Network Interface Board

(Option) IEEE 1284 Parallel Interface

(Option) 16 MB/32 MB Memory

(Option) 16 MB/32 MB Memory

(Option) Ricoh-script 2