

**Russian Printer**  
**Aficio AP2700**  
**SERVICE MANUAL**

October 1st, 1999  
Subject to change

## **IMPORTANT SAFETY NOTICES**

### **PREVENTION OF PHYSICAL INJURY**

1. Before disassembling or assembling parts of the copier and peripherals, make sure that the printer power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. Note that some components of the printer and the paper tray unit are supplied with electrical voltage even if the main power switch is turned off.
4. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.
5. The inside and the metal parts of the fusing unit become extremely hot while the printer is operating. Be careful to avoid touching those components with your bare hands.

### **HEALTH SAFETY CONDITIONS**

1. Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

### **OBSERVANCE OF ELECTRICAL SAFETY STANDARDS**

1. The printer and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.
2. The NVRAM on the system control board has a lithium battery which can explode if replaced incorrectly. Replace the NVRAM only with an identical one. The manufacturer recommends replacing the entire NVRAM. Do not recharge or burn this battery. Used NVRAM must be handled in accordance with local regulations.

### 1. SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

- Do not incinerate toner bottles or used toner. Toner dust may ignite suddenly when exposed to an open flame.
- Dispose of used toner, developer, and organic photoconductors in accordance with local regulations. (These are non-toxic supplies.)
- Dispose of replaced parts in accordance with local regulations.
- When keeping used lithium batteries in order to dispose of them later, do not put more than 100 batteries per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

## LASER SAFETY

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

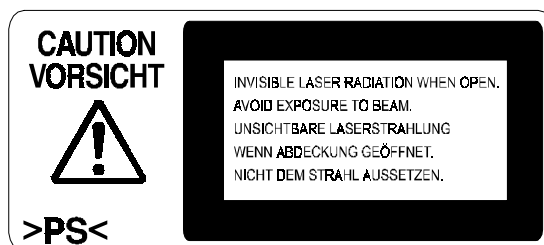
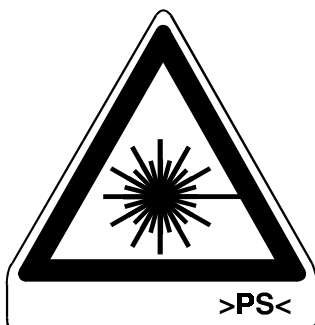
### WARNING

**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 Laser Unit section. Laser beams can seriously damage your eyes.

**CAUTION MARKING:**



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## **MAILBOX (G518)**

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# 1. OVERALL MACHINE INFORMATION

## 1.1 SPECIFICATIONS

### 1.1.1 GENERAL SPECIFICATIONS

Printing Speed:	Maximum 27 pages per minute (A4/LT LEF) (22 pages: duplex printing)
Printer Language:	PCL6/PCL5e PostScript Level 3 TIFF (rev 6.0 compatible)
Resolution:	600 dpi (PCL 6/PCL5e/PS3) 300 dpi (PCL 5e/PS3)
Resident Fonts:	PCL: 35 Intellifonts 10 True Type fonts 1 Bitmap font PS3: 136 fonts (24 Type 2 fonts, 112 Type 14 fonts)
Host Interface:	Bi-directional IEEE1284 parallel x 1 (Standard) Ethernet (100 Base-TX/10 Base-T for TCP/IP, IPX/SPX, NetBEUI, Apple Talk)
Printing Paper Size:	Maximum: A3/11" x 17" Minimum: 1st paper Tray: A5 SEF 2nd paper Tray: A6 SEF By-pass: A6/ 90 x 148 mm SEF (Refer to section 1.1.2, "Supported Paper Size".)
Printing Paper Weight:	1st paper tray: 60 to 105 g/m <sup>2</sup> (16 to 28 lb.) 2nd paper tray: 60 to 157 g/m <sup>2</sup> (16 to 42 lb.) By-pass Tray: 60 to 200 g/m <sup>2</sup> (16 to 110 Index)
Print Paper Capacity:	1st and 2nd paper tray: 500 sheets x 2 Optional paper tray unit: 500 sheets x 1/2 Optional LCT 1000 sheets x 2 Optional by-pass tray: 100 sheets
Output Paper Capacity:	Standard output tray: 500 sheets Optional finisher: 1,000 sheets Optional 4-bin mailbox: 500 sheets total
First Print Speed:	5 s or less (A4/LT LEF, 1st tray)
Warm-up Time	Less than 45 seconds

Memory: Standard 16 MB, up to 80 MB with optional DIMM.

Power Source: 120 V, 60 Hz: More than 10 A (for North America)  
220 V - 240 V, 50/60 Hz: More than 6.0 A (for Europe)

Power Consumption:

	<b>120V</b>	<b>230V</b>
Maximum	900W or less	900W or less
Printing	550W or less	550W or less
Energy Saver	25 W or less	25 W or less

Noise Emission:

	<b>Mainframe Only</b>	<b>Full System</b>
<b>Sound Power Level</b>		
Printing	51 dB or less	58 dB or less
Stand-by	23 dB or less	23 dB or less

**NOTE:** The above measurements were made in accordance with ISO 9296 at the operator position.

Dimensions (W x D x H): 550 x 520 x 516 mm

Weight: Less than 46 kg

**1.1.2 SUPPORTED PAPER SIZES**

Paper	Size (W x L)	Trays			LCT	Duplex	By-pass/ Tray 2
		1st	2nd	OP			
Ledger	11 x 17"	Y	Y	Y	N	Y	Y <sup>#</sup>
Legal	8.5 x 14"	Y	Y	Y	N	Y	Y <sup>#</sup>
Letter SEF	8.5 x 11"	Y	Y	Y	N	Y	Y <sup>#</sup>
Letter LEF	11 x 8.5"	Y	Y	Y	Y	Y	Y <sup>#</sup>
Half Letter SEF	5.5 x 8.5"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	N	Y <sup>#</sup>
Half Letter LEF	8.5 x 5.5"	N	N	N	N	N	N
Executive SEF	7.25 x 10.5"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
Executive LEF	10.5 x 7.25"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
A3	297 x 420 mm	Y	Y	Y	N	Y	Y <sup>#</sup>
B4	257 x 364 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
A4 SEF	210 x 297 mm	Y	Y	Y	N	Y	Y <sup>#</sup>
A4 LEF	297 x 210 mm	Y	Y	Y	Y	Y	Y <sup>#</sup>
B5 SEF	182 x 257 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
B5 LEF	257 x 182 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
A5 SEF	148 x 210 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
A5 LEF	210 x 148 mm	N	N	N	N	N	Y <sup>#</sup>
A6 SEF	105 x 148 mm	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
Folio	8.25 x 13"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
Foolscap	8.5 x 13"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
F	8 x 13"	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	Y	Y <sup>#</sup>
Com10 Env.	4.125 x 9.5"	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
Monarch Env.	3.875 x 7.5"	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
C6 Env.	114 x 162 mm	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
C5 Env.	162 x 229 mm	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
DL Env.	110 x 220 mm	N	Y <sup>#</sup>	N	N	N	Y <sup>#</sup>
8K	267 x 390 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	N	Y <sup>#</sup>
16K SEF	195 x 267 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	N	Y <sup>#</sup>
16K LEF	267 x 195 mm	Y <sup>#</sup>	Y <sup>#</sup>	Y <sup>#</sup>	N	N	Y <sup>#</sup>
Custom	[Minimum] 90 x 148 mm [Maximum] 297 x 432 mm	N	N	N	N	N	Y <sup>C</sup>

Overall  
Information**Remarks:**

Y	Supported. The paper size sensor detects the paper size.
Y <sup>#</sup>	Supported. The user has to select the correct paper size for the tray.
Y <sup>C</sup>	Supported. The user has to enter the width and length of the paper.
N	Not supported.

## 1.2 SOFTWARE ACCESSORIES

The printer drivers and utility software are provided on one CD-ROM. An auto-run installer allows you to select which components to install. The service tools are not provided on the CD-ROM.

### 1.2.1 PRINTER DRIVERS

Printer Language	Windows 3.1x	Windows 95/98	Windows NT4.0	Macintosh
PCL 6	Yes	Yes	Yes	No
PCL 5e	Yes	Yes	Yes	No
PS3	Yes	Yes	Yes	Yes

- NOTE:**
- 1) The printer drivers for Windows NT 4.0 are only for the Intel x86 platform. There is no Windows NT 4.0 printer driver for PowerPC, Alpha, or MIPS platforms.
  - 2) The PS3 drivers are all genuine AdobePS drivers. A PPD file for each operating system is provided with the driver.
  - 3) The PS3 drivers for Macintosh support Mac OS 7.1 or later versions.
  - 4) The PS3 drivers for Windows 3.1x and Windows NT4.0 do not support the "Proof Print" function.

### 1.2.2 UTILITY SOFTWARE

Software	Description
Agfa Font Manager (Win3.1x, 95/98, NT4)	A font management utility with screen fonts for the printer.
Aficio Manager for Admin (Win 95/98, NT4)	A printer management utility for network administrators. NIB setup utilities are also available.
Aficio Manager for Client (Win95/98, NT4)	A printer management utility for client users.
Multi-Direct Print (Win95/98, NT4)	A utility for peer-to-peer printing over a NetBEUI or TCP/IP network.
Port Navi (Win95/98, NT4)	A peer to peer print utility over a TCP/IP network. This provides parallel printing and recovery printing function.

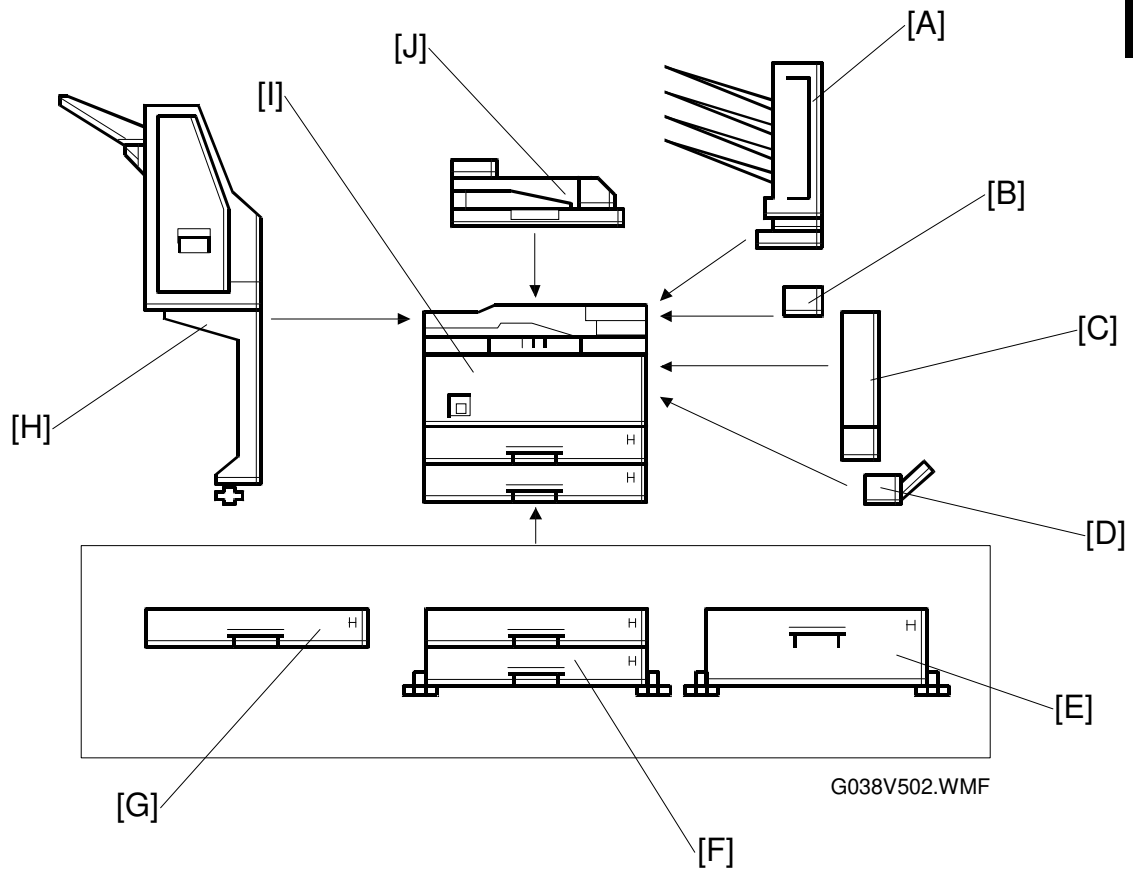
### 1.2.3 SERVICE TOOLS

Software	Description
NBTFTP	NIB firmware update utility for use on a NetBEUI network. This utility is not on the Driver and Utilities CD-ROM; it is issued separately as a service tool

## 1.3 MACHINE CONFIGURATION

### 1.3.1 SYSTEM COMPONENTS

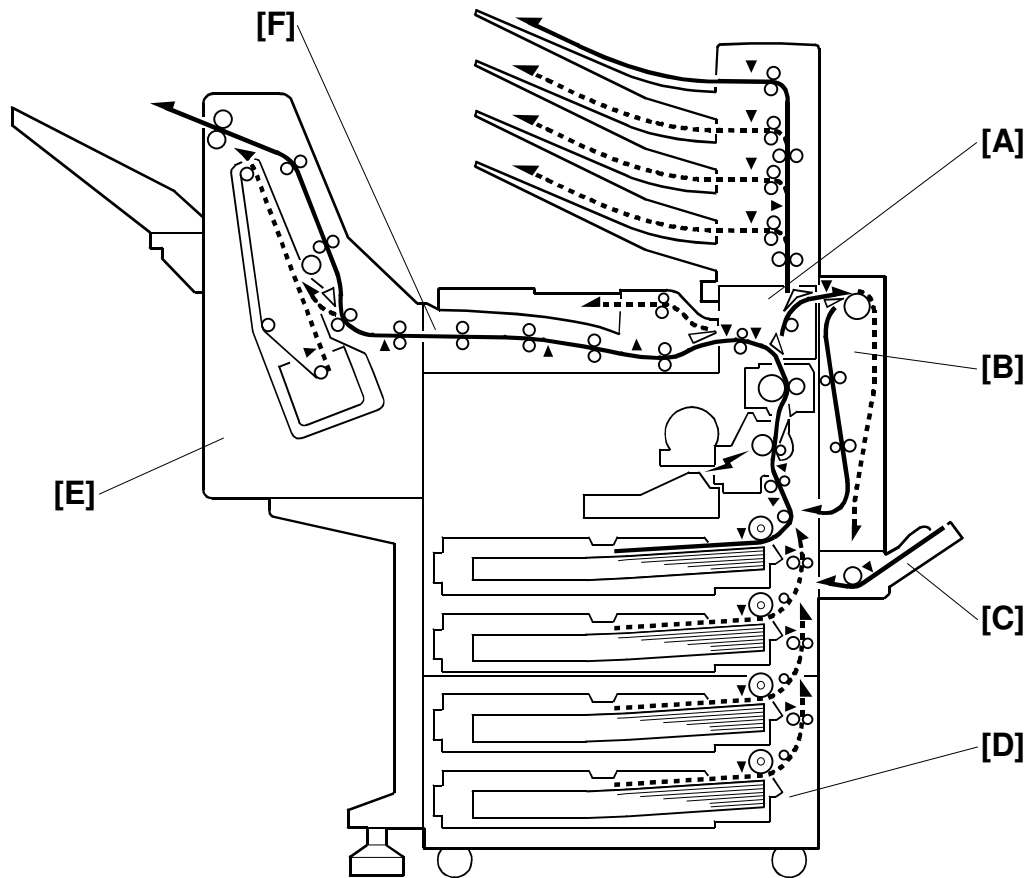
Overall  
Information



Item	Machine Code	No.	Remarks
Main Unit	G038	I	<b>User installable</b>
<b>Option</b>			
Paper Tray Unit - 1 tray	A861	G	Used in common with Stinger-C (See note 1) <b>User installable</b>
Paper Tray Unit - 2 trays	A860	F	Used in common with Stinger-C/Russian-C (See note 1) <b>User installable</b>
LCT	A862	E	Used in common with Russian-C (See note 1) <b>User installable</b>
By-pass Tray	A899	D	Used in common with Russian-C <b>User installable</b>
Interchange Unit	G531	B	<b>User installable</b>
Duplex Unit	G529	C	(See note 2, 3) <b>User installable</b>
4-bin Mailbox	G518	A	(See note 2) <b>User installable</b>
Bridge Unit	A897	I	Used in common with Russian-C (See note 4) Service installation
1000-sheet Finisher	A681	H	Used in common with Russian-C/NAD (See note 4) Service installation
<b>Internal Option</b>			
HDD	G690		Used in common with Stinger-C/Russian-C Service installation
Memory 32or 64 MB	G688		Used in common with Stinger-C/Russian-C <b>User installable</b>
<b>Others</b>			
Maintenance Kit	G719		

**NOTE:** 1) Only one of these options can be installed on the machine.  
 2) Requires the Interchange unit to be installed.  
 3) Requires the memory option to be installed.  
 4) The Bridge unit must be installed together with the 1000 sheet Finisher.  
 Either the LCT or Paper Tray Unit (2 trays) must also be installed.

## 1.4 PAPER PATH

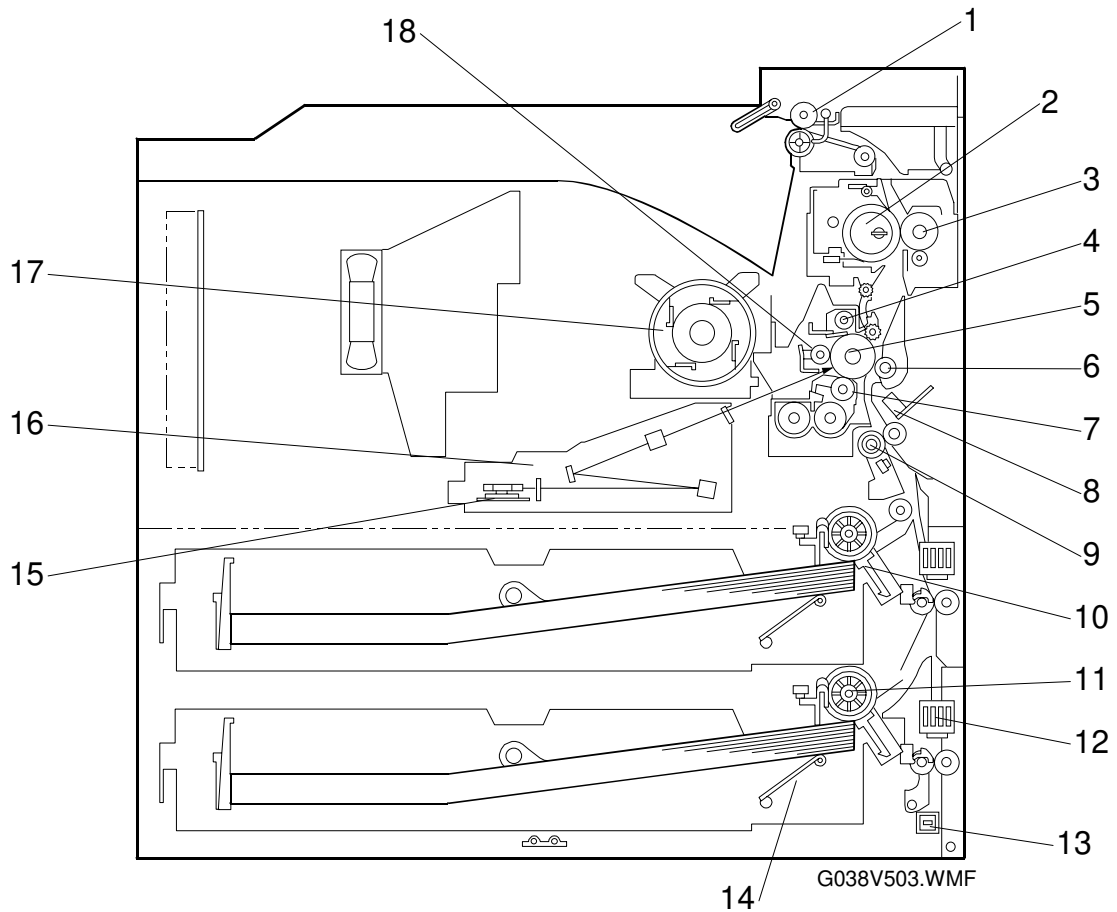


G038V101.WMF

- [A]: Optional interchange unit
- [B]: Optional duplex unit
- [C]: Optional by-pass tray
- [D]: Optional paper tray unit (2 trays)
- [E]: Optional 1000-sheet finisher
- [F]: Optional bridge unit

Overall  
Information

## 1.5 MECHANICAL COMPONENT LAYOUT



- |                           |                                |
|---------------------------|--------------------------------|
| 1. Exit roller            | 10. Friction pad               |
| 2. Hot roller             | 11. Paper feed roller          |
| 3. Fusing pressure roller | 12. Paper size sensor          |
| 4. Cleaning unit          | 13. Special paper sensor       |
| 5. Drum                   | 14. Bottom plate               |
| 6. Transfer roller        | 15. Polygon mirror motor       |
| 7. Development roller     | 16. Laser unit                 |
| 8. ID sensor              | 17. Toner supply bottle holder |
| 9. Registration roller    | 18. Charge roller              |

## 1.6 ELECTRICAL COMPONENT DESCRIPTIONS

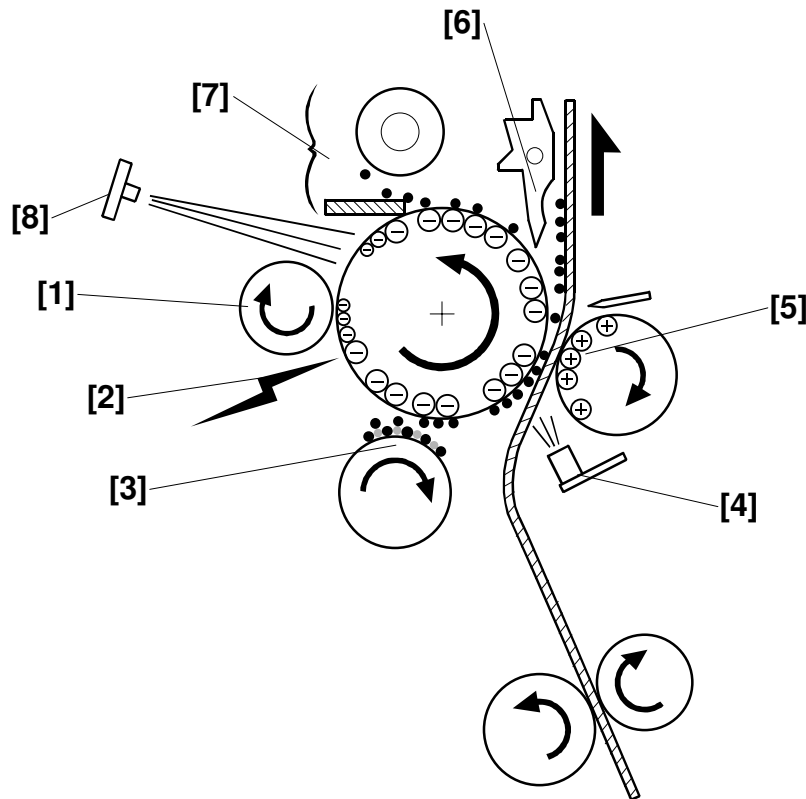
Refer to the electrical component layout on the reverse side of the point-to-point diagram for the location of the components.

Symbol	Name	Function
<b>Motors</b>		
M1	Polygonal Mirror	Turns the polygonal mirror.
M2	Main Motor	Drives the main unit components.
M3	Exhaust Fan	Removes heat from around the fusing unit.
M4	Upper Paper Lift	Raises the bottom plate in the 1st paper tray.
M5	Lower Paper Lift	Raises the bottom plate in the 2nd paper tray.
M6	Toner Supply	Rotates the toner bottle to supply toner to the development unit.
<b>Magnetic Clutches</b>		
MC1	Upper Paper Feed	Starts paper feed from the 1st paper tray.
MC2	Lower Paper Feed	Starts paper feed from the 2nd paper tray.
MC3	Upper Paper Transport	Drives the upper transport rollers.
MC4	Lower Paper Transport	Drives the lower transport rollers.
MC5	Registration	Drives the registration rollers.
<b>Switches</b>		
SW1	Main Switch	Provides power to the machine. If this is off, there is no power supplied to the machine.
SW2	Right Upper Cover	Detects whether right upper cover is open or not.
SW3	Right Cover	Cuts the +5VLD and +24V dc power line and detects whether the right cover is open or not.
SW4	Right Lower Cover	Detects whether right lower cover is open or not.
SW5	Upper Paper Size	Determines what size of paper is in the upper paper tray.
SW6	Lower Paper Size	Determines what size of paper is in the Lower paper tray.
SW7	Special Paper	Determines the special paper is in the lower paper tray.
SW8	New PCU Detect	Detects when a new PCU is installed.
SW9	Front Cover Safety	Cuts the +5VLD and +24V dc power line and detects whether the front cover is open or not.
<b>Sensors</b>		
S1	Toner Density (TD)	Detects the amount of toner inside the development unit.
S2	1st Paper End	Informs the CPU when the 1st paper tray runs out of paper.
S3	1st Paper End	Informs the CPU when the 2nd paper tray runs out of paper.
S4	Image Density (ID)	Detects the density of various patterns and the reflectivity of the drum for process control.
S5	Paper Overflow	Detects paper overflow condition.
S6	Paper Exit	Detects misfeeds.
S7	Upper Relay	Detects misfeeds.

<b>Symbol</b>	<b>Name</b>	<b>Function</b>
S8	Lower Relay	Detects misfeeds.
S9	Registration	Detects misfeeds and controls registration clutch off-on timing.
S10	1st Paper Lift	Detects when the paper in the 1st paper tray is at the feed height.
S11	2nd Paper Lift	Detects when the paper in the 2nd paper tray is at the feed height.
S12	1st Paper Height - 1	Detects the amount of paper in the 1st paper tray.
S13	1st Paper Height - 2	Detects the amount of paper in the 1st paper tray.
S14	2nd Paper Height - 1	Detects the amount of paper in the 2nd paper tray.
S150	2nd Paper Height - 2	Detects the amount of paper in the 2nd paper tray.
<b>PCBs</b>		
PCB1	Engine Board	Controls all printer engine functions.
PCB2	Printer Controller Board	Controls the printer functions
PCB3	Network Interface Board	Network interface board
PCB4	PSU (Power Supply Unit)	Provides dc power to the system and ac power to the fusing lamp and heaters.
PCB5	LDD (Laser Diode Driver)	Controls the laser diode.
PCB6	Operation Panel	Controls the operation panel.
PCB7	High Voltage Supply	Supplies high voltage to the drum charge roller, development roller, and transfer roller.
PCB8	Memory (Option)	Expands memory capacity.
<b>Lamps</b>		
L1	Fusing Lamp	Heats the hot roller.
L2	Quenching Lamp	Neutralizes any charge remaining on the drum surface after cleaning.
<b>Others</b>		
TF1	Fusing Thermofuse	Opens the fusing lamp circuit if the fusing unit overheats.
TH1	Fusing Thermistor	Detects the temperature of the hot roller.
LSD 1	Laser Synchronization Detector	Detects the laser beam at the start of the main scan.

## 1.7 PRINTING PROCESS

### Overview



G038V504.WMF

Overall  
Information

#### 1. DRUM CHARGE

The charge roller gives a negative charge to the organic photoconductive (OPC) drum. The charge remains on the surface of the drum because the OPC layer has a high electrical resistance in the dark.

#### 2. LASER EXPOSURE

Processed data from the computer/network is retrieved from the memory and transferred to the drum by a laser beam, which forms an electrical latent image on the drum surface. The amount of charge remaining as a latent image on the drum depends on the laser beam intensity, which is controlled by the engine board.

#### 3. DEVELOPMENT

The magnetic developer brush on the development rollers comes in contact with the latent image on the drum surface. Toner particles are electrostatically attached to the areas of the drum surface where the laser reduced the negative charge on the drum.

#### 4. ID SENSOR

The laser forms a sensor pattern on the drum surface. The ID sensor measures the reflectivity of the pattern. The output signal is one of the factors used for toner supply control. Also, the ID sensor measures the reflectivity of the drum surface. The output signal is used for charge roller voltage control.

**5. IMAGE TRANSFER**

Paper is fed to the area between the drum surface and the transfer roller at the proper time for aligning the print paper and the developed image on the drum surface. Then, the transfer roller applies a high positive charge to the reverse side of the paper. This positive charge pulls the toner particles from the drum surface onto the paper. At the same time, the paper is electrostatically attracted to the transfer roller.

**6. PAPER SEPARATION**

Paper separates from the drum as a result of the electrostatic attraction between the paper and the transfer roller. The discharge plate helps separate the paper from the drum.

**7. CLEANING**

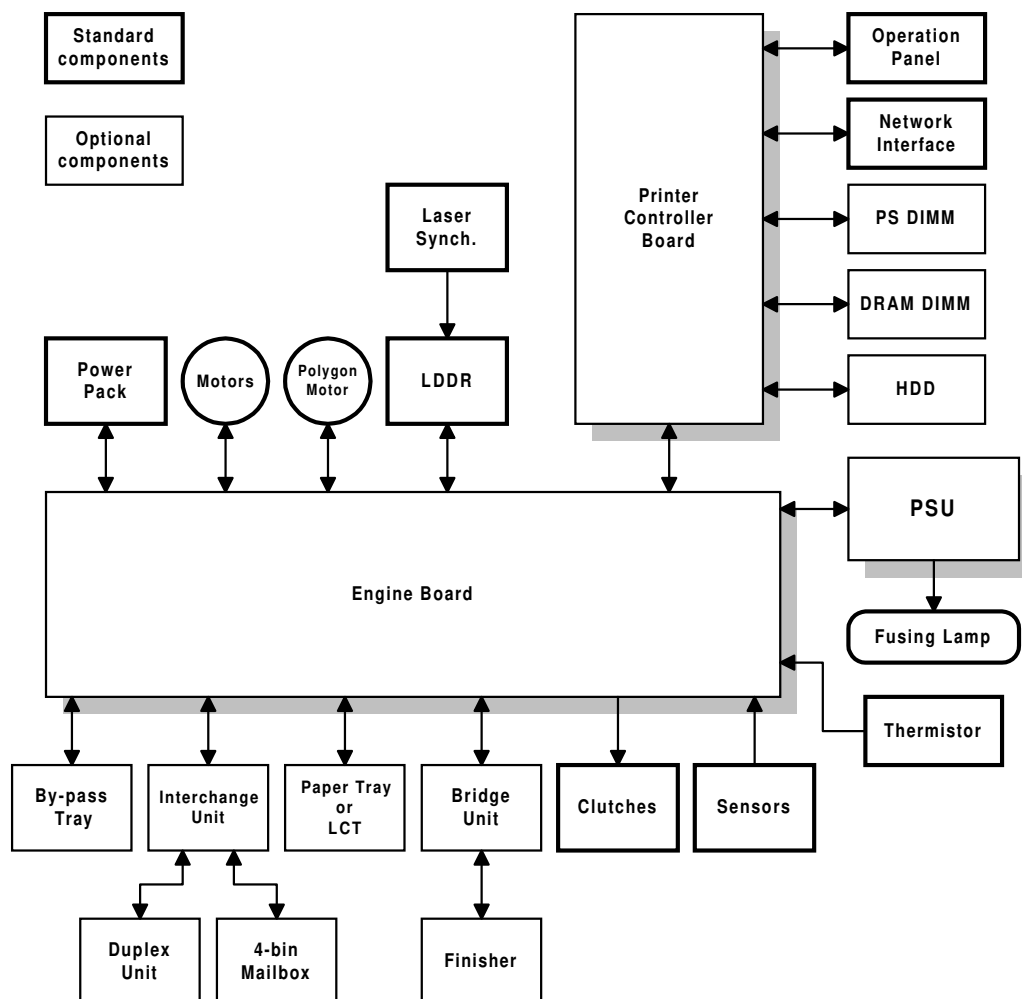
The cleaning blade removes any toner remaining on the drum surface after the image transfers to the paper.

**8. QUENCHING**

The light from the quenching lamp electrically neutralizes the charge on the drum surface.

## 1.8 BOARD STRUCTURE

### 1.8.1 OVERVIEW



G038V501.WMF

The engine control firmware controls the components connected to the engine board. The printer control board controls the connected components.

## **1.8.2 DESCRIPTIONS**

### **1. Engine Board**

The engine board controls the following functions:

- Engine sequence
- Machine control, printer engine control
- Timing control for peripherals
- Video control
- Drive control for the sensors, motors, solenoids, and high voltage supply board

### **2. Printer Control Board**

The printer control board handles the following functions:

- Interface of the connected components to the engine board
- Printer host interface
- Edge smoothing and toner saving
- Operation panel interface
- Interface and control of NIB and the other additional options (HDD, PS DIMM, and DRAM DIMM)

### **3. LD Drive Board**

This is the laser diode drive circuit board.

### **4. Network Interface Board (NIB)**

The network interface board allows the printer to be used on a network

### **5. HDD Unit (Option)**

The HDD unit stores the data to perform the following functions.

- Additional soft fonts
- Collation
- Proof-print
- Downloading forms for form overlay

### **6. PS DIMM**

This is to add the PostScript feature.

### **7. DRAM DIMM (Option)**

This is used for an additional printer processing memory area and for soft fonts.

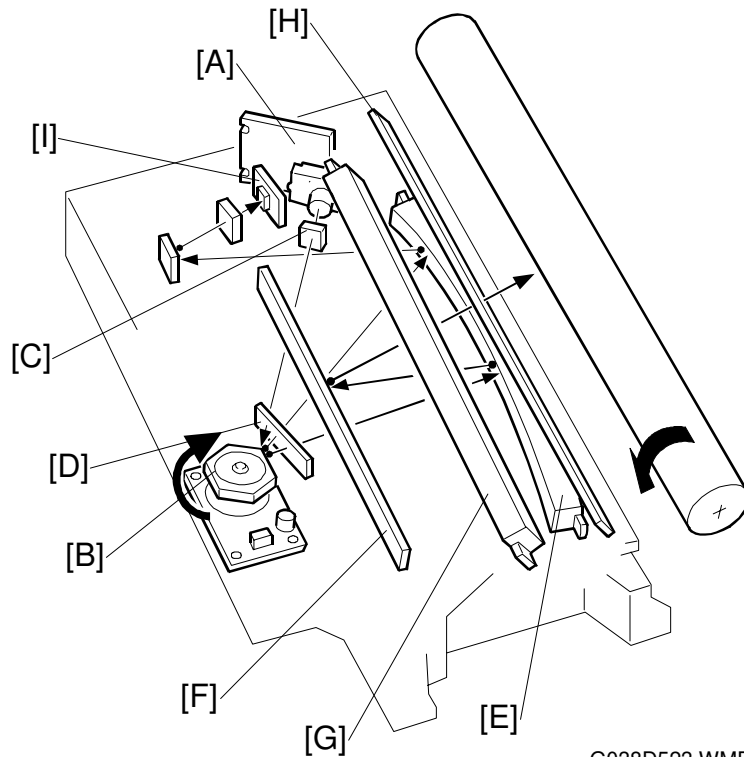
### **8. Control Panel Board**

Controls the display panel, the LED, and the touch keypad.

## 2. DETAILED SECTION DESCRIPTIONS

### 2.1 LASER EXPOSURE

#### 2.1.1 OVERVIEW



G038D523.WMF

 Detailed  
Descriptions

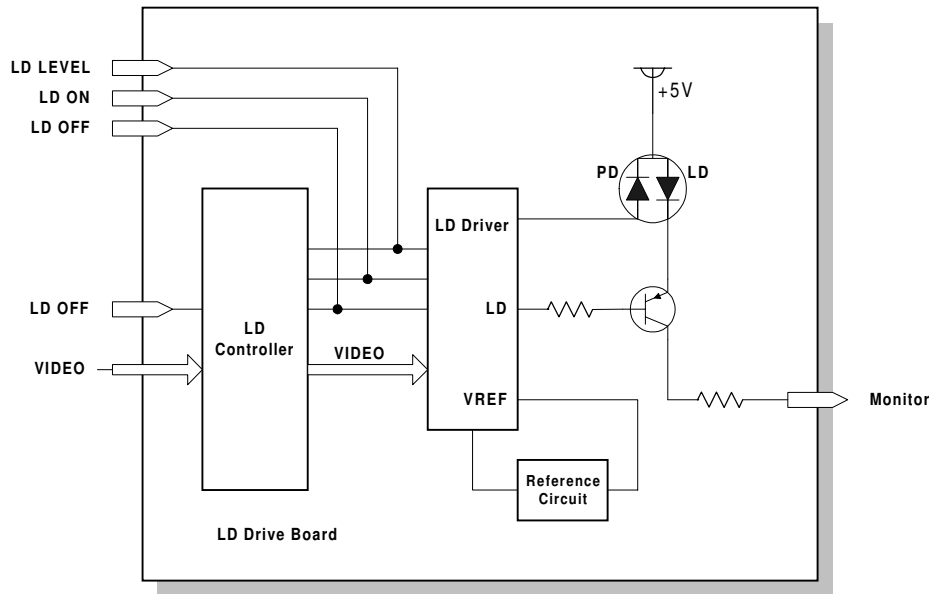
The LD unit [A] outputs a laser beam to the polygon mirror [B] through the cylindrical lens [C]. The shield glass [D] prevents dust from reaching the polygon mirror.

Each surface of the polygon mirror reflects one full main scan line. The laser beam goes to the F-theta mirror [E], mirror [F], and BTL (barrel toroidal lens) [G]. Then the laser beam goes to the drum through the toner shield glass [H].

The laser synchronizing detector [I] determines the starting position for the main scan.

The speed of the polygon mirror motor is 28,818.9 rpm for 600 dpi.

## 2.1.2 AUTO POWER CONTROL (APC)



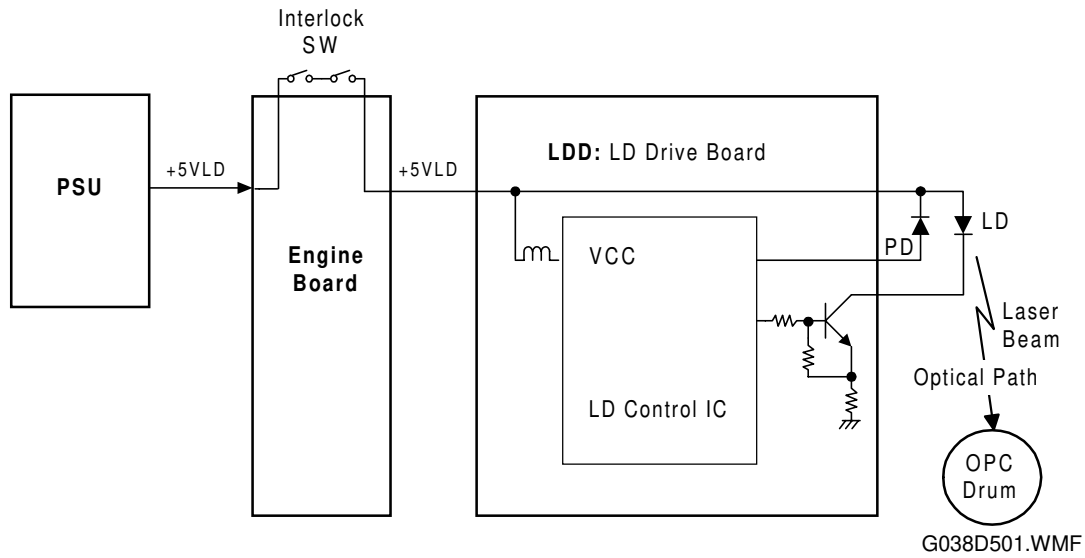
G038D510.WMF

The LD driver IC drives the laser diode. To prevent the intensity of the laser beam from changing because of the temperature, the machine monitors the current passing through the laser diode (LD). The machine adjusts the current to the laser diode by comparing it with the reference level from the reference circuit. This auto power control is done just after the machine is turned on and during printing while the laser diode is active.

The laser diode power is adjusted on the production line.

**NOTE:** Do not touch the variable resistors on the LD unit in the field.

### 2.1.3 LD SAFETY SWITCH



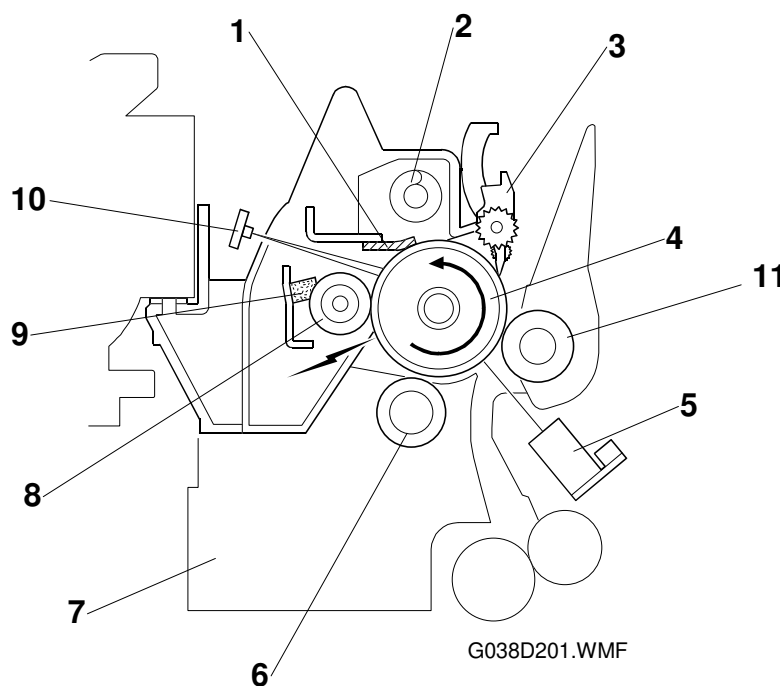
Detailed  
Descriptions

To ensure technician and user safety and to prevent the laser beam from inadvertently switching on during servicing, safety switches are located at the front cover and right cover. The switches are installed on the +5VLD line coming from the power supply unit through the Engine control board.

When the front cover or the right cover is opened, the power supply to the laser diode is interrupted.

## 2.2 PHOTOCONDUCTOR UNIT (PCU)

### 2.2.1 OVERVIEW



The PCU consists of the components shown in the above illustration. An organic photoconductor (OPC) drum (diameter: 30 mm) is used in this machine.

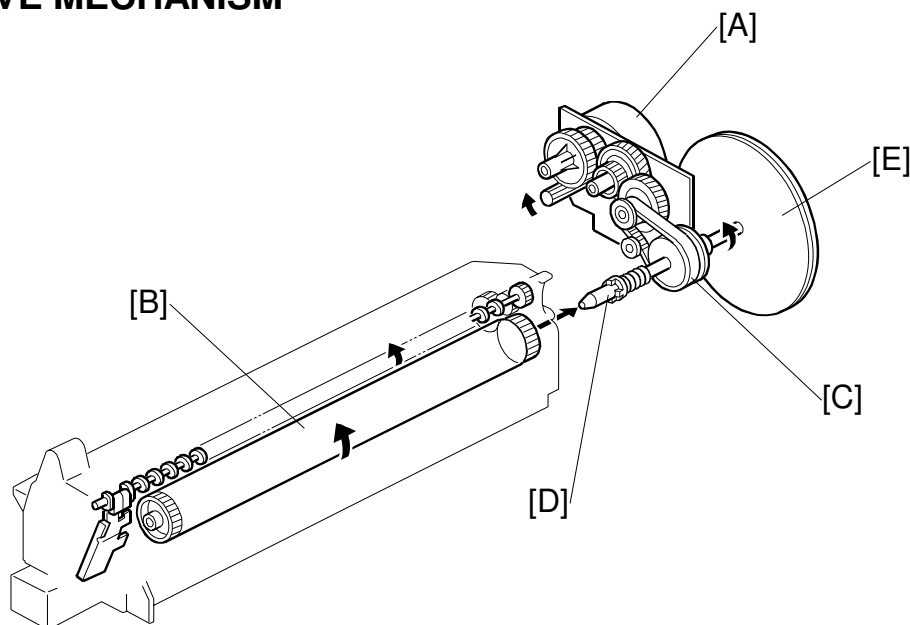
- |                          |                                |
|--------------------------|--------------------------------|
| 1. Cleaning Blade        | 6. Development Roller          |
| 2. Toner Collection Coil | 7. Development Unit            |
| 3. Pick-off Pawl         | 8. Charge Roller               |
| 4. OPC Drum              | 9. Charge Roller Cleaning Pad  |
| 5. ID Sensor (see note)  | 10. Quenching Lamp (see note)  |
|                          | 11. Transfer Roller (see note) |

**NOTE:** These parts are not included in the PCU.

The machine informs the user when the PCU life has finished. However, the user can continue to make copies.

This warning message can be disabled by the printer engine service mode (Service Menu 2: Change PM Mes).

## 2.2.2 DRIVE MECHANISM



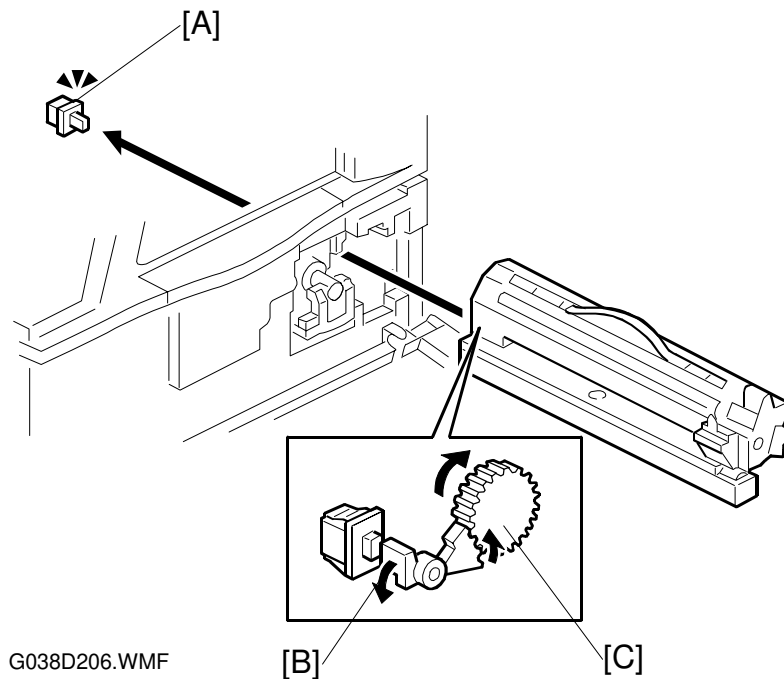
G038D202.WMF

Detailed  
Descriptions

The main motor [A] drives the drum [B] through a series of gears, a timing belt [C], and the drum drive shaft [D]. The main motor assembly includes a drive controller, which outputs a motor lock signal when the rotation speed is out of the specified range.

The fly-wheel [E] on the end of the drum drive shaft stabilizes the rotation speed (this prevents banding and jitter from appearing on printouts).

### 2.2.3 NEW PCU DETECTION MECHANISM



G038D206.WMF

When the PCU counter reaches 60K, the "Replace PCU" message is displayed.

The new PCU detect switch [A] detects when a new PCU is installed. Each PCU has an actuator [B]. When a new PCU is installed in the machine, the actuator [B] pushes the new PCU detect switch. The actuator is a sector gear, and this gear engages with the drum gear [C]. When the drum rotates, the actuator is released from the drum gear. The actuator drops away from the new PCU detect switch and remains in this "down" position for the duration of the PCU's life.

The machine can recognize when a new PCU has been installed in the machine because the actuator of the new PCU comes in contact with the new PCU detect switch. Then, the machine automatically resets the PCU counter.

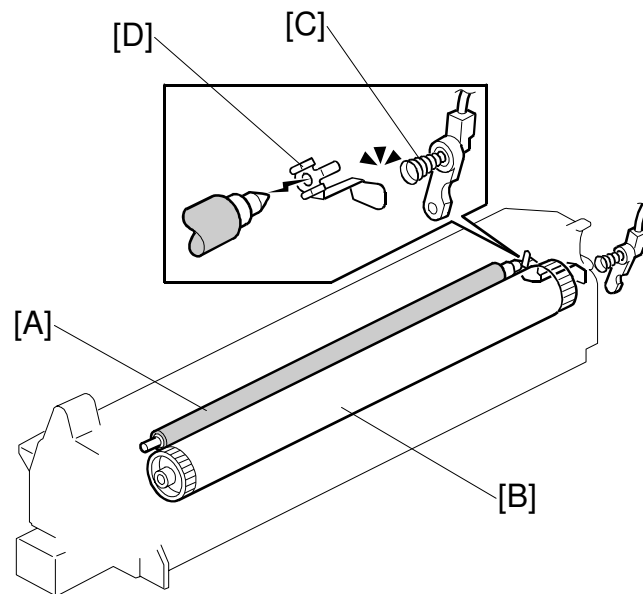
After the front cover and right cover are closed, the machine then performs the TD sensor initial setting procedure automatically (for about 45 seconds). During this time, the drum rotates and the actuator drops away from the sensor.

While the machine performs the TD sensor initial setting, the machine makes an ID sensor pattern on the drum. This checks whether the developer has fallen into the development unit (in other words, it checks whether the user or technician remembered to remove the developer seal from the PCU at machine installation). If the machine does not detect the ID sensor pattern, SC 392 is generated.

**NOTE:** The PCU counter can be cleared by the printer engine service mode (Service Menu 2: PCU Count clr).

## 2.3 DRUM CHARGE

### 2.3.1 OVERVIEW



G038D203.WMF

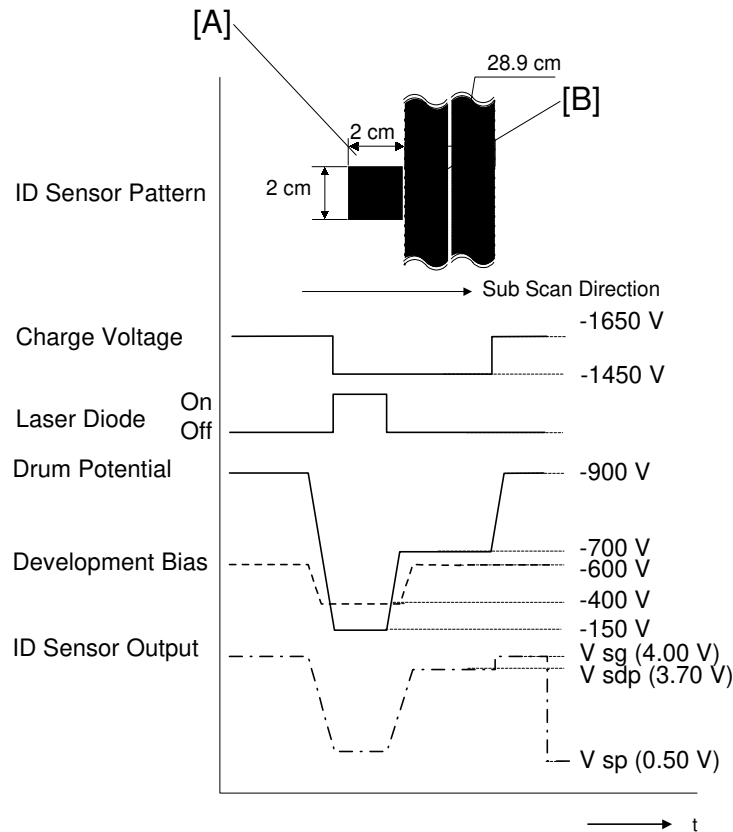
Detailed  
Descriptions

This machine uses a drum charge roller to charge the drum. The drum charge roller [A] always contacts the surface of the drum [B] to give it a negative charge of -900V.

The high voltage supply board gives a negative dc voltage to the drum charge roller through the spring [C] and terminal plate [D].

### 2.3.1 CHARGE ROLLER VOLTAGE CORRECTION

#### *Correction for Environmental Conditions*



G038D516.WMF

With a drum charge roller system, the voltage transferred from roller to drum varies with the temperature and humidity around the drum charge roller. The lower the temperature or humidity is, the higher the applied voltage required.

To compensate, the machine uses the ID sensor to measure the effects of current environmental conditions. For this measurement, the process control parameters are balanced so that any small change in drum potential caused by environmental effects is reflected in a change in the amount of toner transferred to the drum.

This measurement is made immediately after the ID sensor pattern for toner density control. Immediately after making ID sensor pattern [A], the charge roller voltage stays on, but the development bias goes up to -600V; as a result the drum potential is reduced to -700V. The laser diode is not switched on, and the drum potential is now slightly higher than the development bias, so only a very small amount of toner transfers to the drum. The ID sensor measures the density of this pattern [B], and the output voltage is known as  $V_{sdp}$ . This voltage is compared with  $V_{sg}$  (read from the bare drum at the same time).

If the humidity drops, the drum potential goes up (to a higher –ve voltage) even if the charge roller voltage supply stays the same (efficiency of voltage transfer is higher with lower humidity). As a result, less toner is transferred to ID sensor pattern [B]. If the sensor output reaches a certain point, the drum charge voltage will be reduced.

To determine whether to change the drum charge roller voltage, the machine compares  $V_{sdp}$  with  $V_{sg}$ .

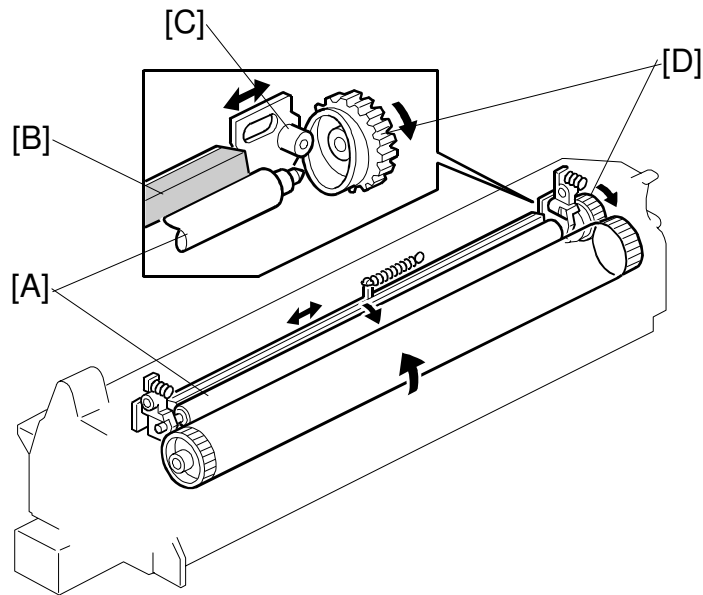
- $V_{sdp} / V_{sg} > 0.95$  = Reduce the magnitude of the drum charge voltage by 50 V
- $V_{sdp} / V_{sg} < 0.90$  = Increase the magnitude of the drum charge voltage by 50 V

### 2.3.2 ID SENSOR PATTERN PRODUCTION TIMING

An ID sensor pattern is made in the following conditions.

- During warming up at power on
- If the machine starts warming up after entering the energy saver mode

### 2.3.3 DRUM CHARGE ROLLER CLEANING



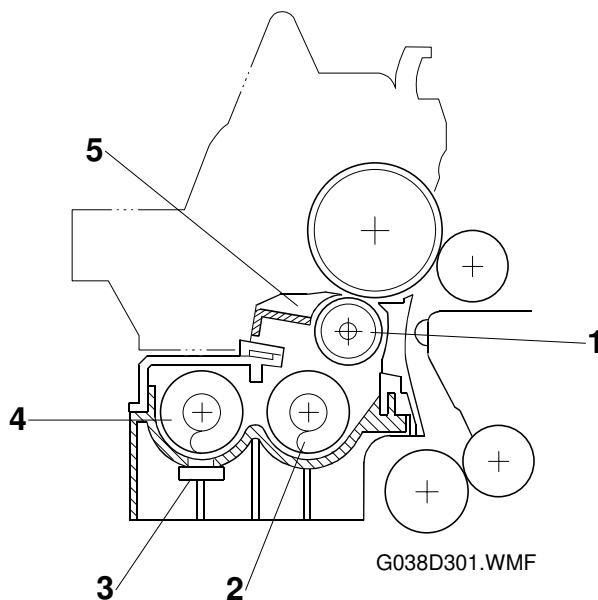
G038D205.WMF

Because the drum charge roller [A] always contacts the drum, it gets dirty easily. So, the cleaning pad [B] also contacts the drum charge roller all the time to clean the surface of the drum charge roller.

The pin [C] at the rear of the cleaning pad holder touches the cam gear [D], and this gear moves the cleaning pad from side to side. This movement improves the cleaning.

## 2.4 DEVELOPMENT

### 2.4.1 OVERVIEW



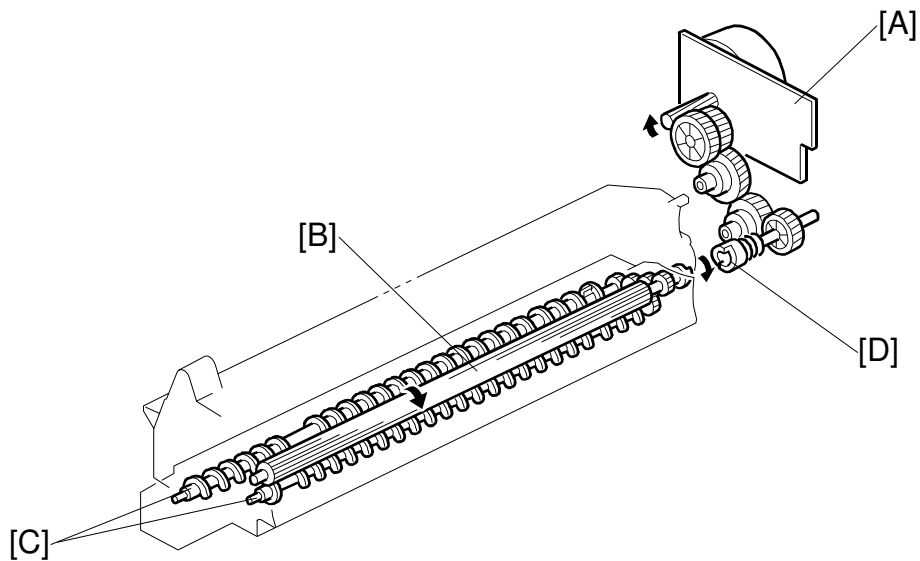
Detailed  
Descriptions

The development unit consists of the following parts.

- |                       |                   |
|-----------------------|-------------------|
| 1. Development roller | 4. Mixing auger 1 |
| 2. Mixing auger 2     | 5. Doctor blade   |
| 3. TD sensor          |                   |

This machine uses a single-roller development system. Two mixing augers mix the developer. The toner density (TD) sensor and image density (ID) sensor (see the illustration in the PCU section) are used to control toner density.

## 2.4.2 DRIVE MECHANISM

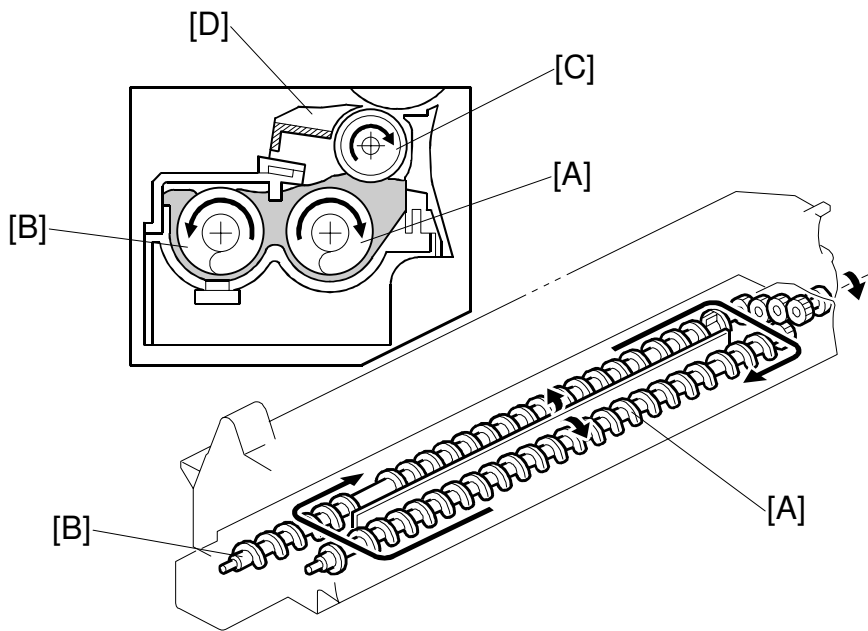


G038D304.WMF

The main motor [A] drives the development roller [B] and mixing augers [C] through a train of gears and the development drive shaft [D]. When the PCU is pushed in, the development drive shaft engages the development roller gear.

The development drive gears (except for the gears in the development unit) are helical gears. These gears are quieter than normal gears.

### 2.4.3 DEVELOPER MIXING

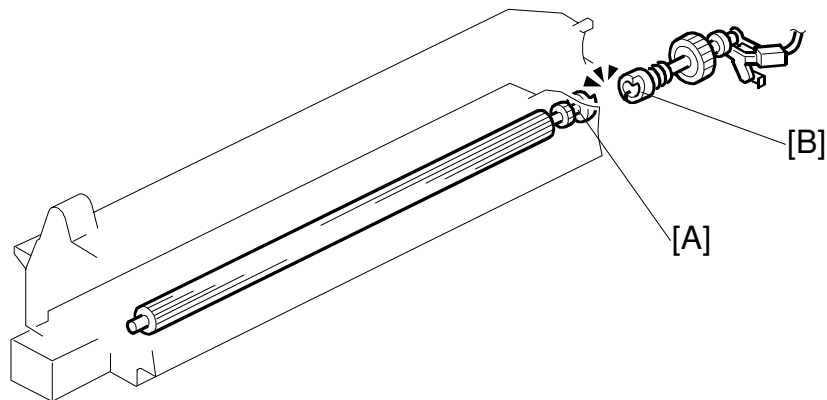


G038D302.WMF

Detailed  
Descriptions

This machine uses 2 mixing augers, [A] and [B], to keep the developer evenly mixed. Mixing auger 2 [A] transports excess developer, scraped off the development roller [C] by the doctor blade [D], towards the front of the machine. Mixing auger 1 [B] returns the excess developer, along with new toner, to the rear of the mixing assembly. Here the developer is reapplied to the development roller.

## 2.4.4 DEVELOPMENT BIAS



G038D303.WMF

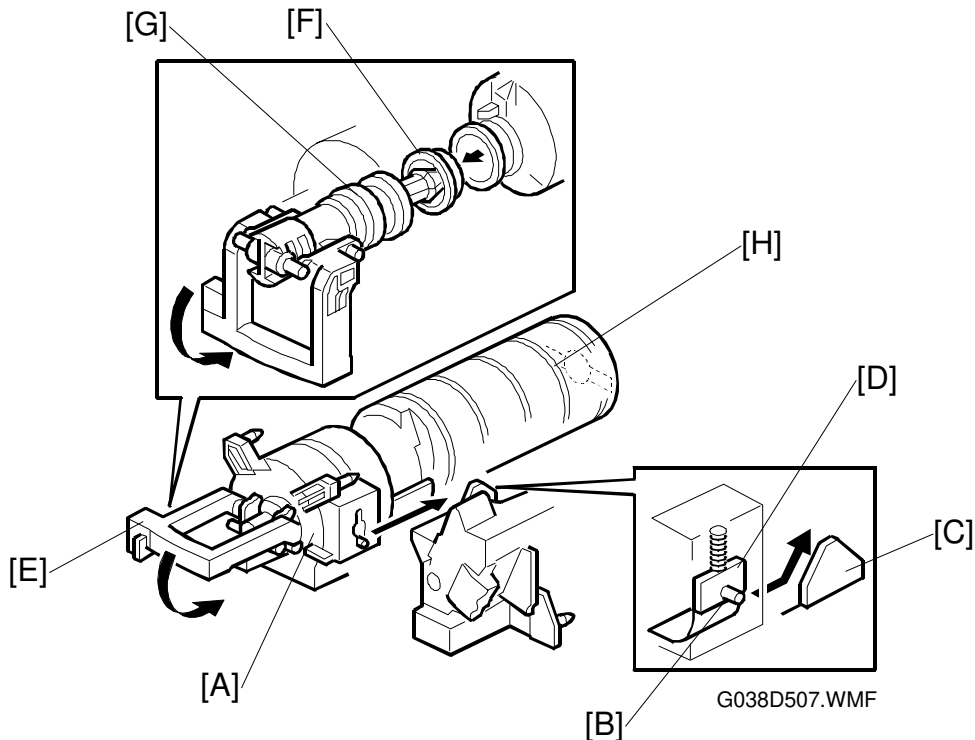
This machine uses a negative-positive development system, in which black areas of the latent image are at a low negative charge (about  $-150 \pm 50$  V) and white areas are at a high negative charge (about -900 V).

To attract negatively charged toner to the black areas of the latent image on the drum, the high voltage supply board applies a bias of -600 volts to the development rollers throughout the image development process. The bias is applied to the development roller shaft [A] through the drive shaft [B].

The development bias voltage (-600 V) can be adjusted with the printer service mode (Service Menu 2: Developer bias).

## 2.4.5 TONER SUPPLY

### *Toner bottle replenishment mechanism*



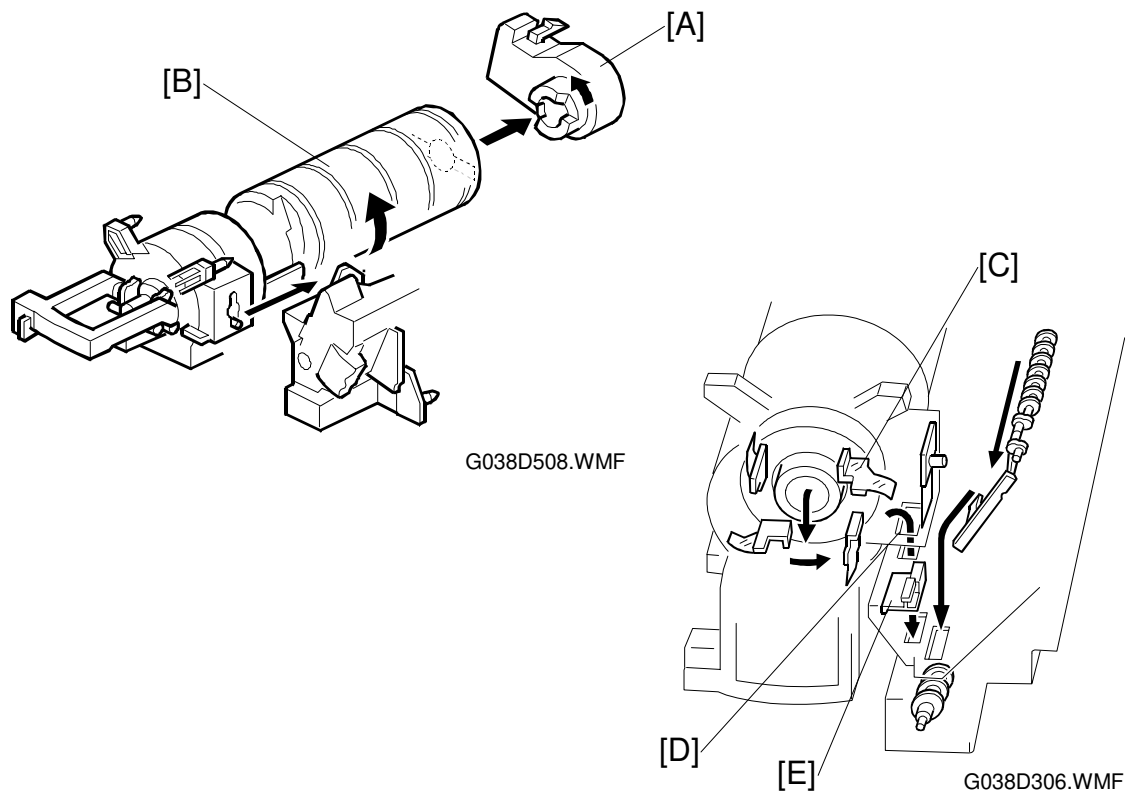
Detailed  
Descriptions

When a toner bottle is placed in the bottle holder unit [A] and the unit is pushed in completely, pin [B] moves against the side [C] of the PCU, and the toner shutter [D] is pulled out to open the bottle. When the toner bottle holder lever [E] is put back in the original position, the cap [F] on the toner bottle is pulled away and kept in place by the chuck [G].

The toner supply mechanism transports toner from the bottle to the development unit. The toner bottle has a spiral groove [H] that helps move toner to the development unit.

When the bottle holder unit is pulled out to add a new toner bottle, the following happens automatically to prevent toner from scattering.

- The chuck releases the toner bottle cap into its proper position.
- The toner shutter shuts to block the opening as a result of pressure from a spring.

***Toner supply mechanism***

The toner supply motor [A] drives the toner bottle [B] and the mylar blades [C]. First, the toner falls down into the toner bottle holder. The toner supply mylar blades transfer the toner to the slit [D]. When the PCU is installed in the machine, the shutter [E] above the PCU is opened by the machine frame. Then the toner falls down into the development unit through the slit and the shutter.

## 2.4.6 TONER DENSITY CONTROL

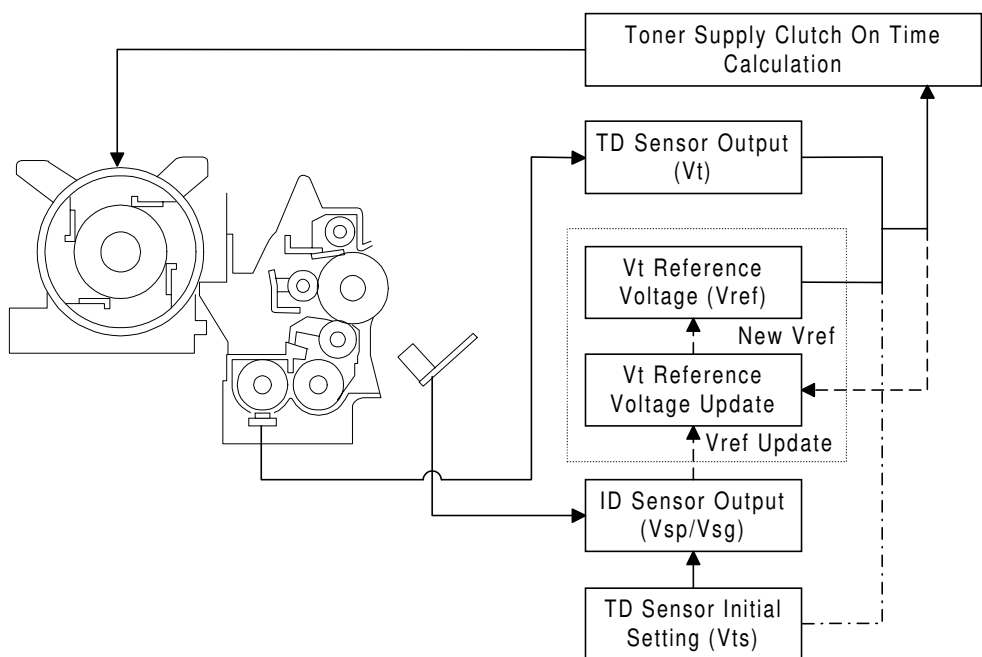
### Overview

There are four modes for controlling toner supply as shown in the following tables. The mode can be changed with by the printer service mode (Service Menu 2: Toner supply). The factory setting is P+T control mode.

Basically, toner density is controlled using the standard TD sensor voltage ( $V_{ts}$ ), toner supply reference voltage ( $V_{ref}$ ), actual TD sensor output voltage ( $V_t$ ), and ID sensor output data ( $V_{sp}/V_{sg}$ ).

**Cross-reference:** Section 4.2 Service Program Mode

Detailed  
Descriptions



G038D517.WMF

There are four toner density control modes:

<b>Mode</b>	<b>P+T Control (Normally use this setting only)</b>
Toner supply decision	Compare $V_t$ with a reference voltage ( $V_{ts}$ or $V_{ref}$ )
Toner control process	Toner is supplied to the development unit when $V_t$ is higher than the reference voltage ( $V_{ts}$ or $V_{ref}$ ). This mode keeps the $V_{ref}$ value for use the next toner density control.  $V_{ts}$ is used for the first toner density control after a new PCU has been installed, until it has been corrected with the ID sensor output. $V_{ref}$ is used after $V_{ts}$ has been corrected with the ID sensor output voltage (corrected during the first toner density control for a new PCU).
Toner supply amount	Varies
Toner end detection	Performed

<b>Mode</b>	<b>Fixed Quantity 1 (Designer's use only; do not use in the field)</b>
Toner supply decision	Compare $V_t$ with a reference voltage ( $V_{ts}$ )
Toner control process	This toner control process is the same as the P+T control mode. However, the reference voltage used is always $V_{ts}$ .
Toner supply amount	Varies
Toner end detection	Performed

<b>Mode</b>	<b>Fixed Quantity 2 (Designer's use only; do not use in the field)</b>
Toner supply decision	Compare $V_t$ with a reference voltage ( $V_{ts}$ or $V_{ref}$ )
Toner control process	This toner control process is the same as the P+T control mode.
Toner supply amount	Fixed
Toner end detection	Performed

<b>Mode</b>	<b>T Control (Use temporary if the TD sensor needs to be replaced)</b>
Toner supply decision	None
Toner control process	Toner is supplied every printed page regardless of $V_t$ .
Toner supply amount	Fixed
Toner end detection	Not performed

***Toner density sensor initial setting***

The TD sensor initial setting procedure is performed automatically when the new PCU is installed in the machine. During TD sensor initial setting, the TD sensor is set to the TD sensor output to the value programmed in the printer service mode (T sensor set: default: 2.3V). This value will be used as the standard reference voltage ( $V_{ts}$ ) of the TD sensor.

***Toner density measurement***

Toner density in the developer is detected once every print cycle. The sensor output voltage ( $V_t$ ) during the detection cycle is compared with the standard reference voltage ( $V_{ts}$ ) or the toner reference voltage ( $V_{ref}$ ).

***Vsp/Vsg detection***

The ID sensor detects the following voltages.

- Vsg: The ID sensor output when checking the drum surface
- Vsp: The ID sensor output when checking the ID sensor pattern

In this way, the reflectivity of both the drum surface and the pattern on the drum are checked. This compensates for any variations in the reflectivity of the pattern on the drum or the reflectivity of the drum surface.

The ID sensor pattern is made on the drum by charge roller and laser diode.

Vsg/Vsp is not detected every page or job; it is detected at the following times to decide  $V_{ref}$ .

- During warming up at power on
- If the machine starts warming up after a certain time has passed since entering the energy saver mode.

***Toner supply reference voltage ( $V_{ref}$ ) determination***

The toner supply reference voltage ( $V_{ref}$ ) is the threshold voltage for the toner supply determination.  $V_{ref}$  is determined using the following data,

- ID sensor output ( $V_{sp}/V_{sg}$ )
- ( $V_{ts}$  or the current  $V_{ref}$ ) -  $V_t$

***Toner supply determination***

The reference voltage ( $V_{ts}$  or  $V_{ref}$ ) is the threshold voltage for determining whether or not to supply toner. If  $V_t$  becomes greater than the reference voltage, the machine supplies additional toner.

***Toner Supply Motor On Time Determinations***

For sensor control modes 1 and 2, the toner supply motor on time is decided by the following factors.

- $V_t$
- $V_{ref}$
- TD sensor sensitivity (coefficient:  $S$ , value is 0.4)

There are seven levels for toner supply motor on time as shown below.

Level	Decision	Motor On Time (seconds)
1	$V_{ref} < V_t \leq S/16$	0.6
2	$V_{ref} < V_t \leq S/8$	1.2
3	$V_{ref} < V_t \leq S/4$	2.4
4	$V_{ref} < V_t \leq S/2$	4.8
5	$V_{ref} < V_t \leq 4S/5$	9.6
6	$V_t \geq 4S/16$	(30); see note 3
7	$V_t \geq V_{ref} + S$	(30); see note 3

**NOTE:** 1) (30) means that toner is supplied intermittently in a 1/3 duty cycle (1 s on, 2 s off) for 30 seconds

## 2.4.7 TONER NEAR END/END DETECTION AND RECOVERY

The toner near end and end conditions are detected using the  $V_t$  and  $V_{ref}$  values, in a similar way to toner density control.

This is done in all toner supply modes except for fixed quantity 2, when toner end is not detected.

### ***Toner Near End Detection***

If  $V_t$  is at level 6 (see the table on the previous page) five times consecutively, the machine enters the toner near end condition and the toner end indicator starts blinking. Then the machine supplies toner for a certain time in accordance with the table explained in the previous section.

Detailed  
Descriptions

### ***Toner Near End Recovery***

If the machine detects " $V_t < (V_{ref} \text{ or } V_{ts}) + 4S/5$ " twice consecutively when in one of the following situations, the machine leaves the toner near end condition.

- While in the toner recovery cycle (supplying toner on and off for 30 s - see the previous page) after the machine has detected a toner near end condition.
- During printing in the toner near end condition.
- If the front cover is opened and closed for more than 10 seconds while a toner near end condition exists.

### ***Toner End Detection***

There are two situations for entering the toner end condition.

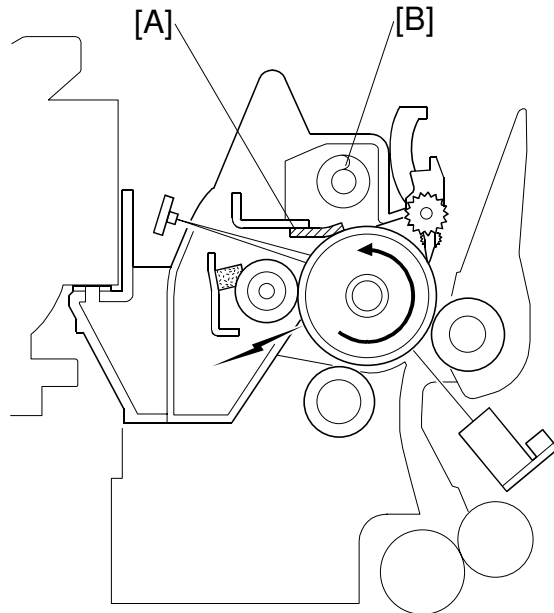
- When  $V_t$  is level 7 three times consecutively, the machine enters the toner end condition.
- When " $V_{t+S} > V_t > (V_{ref} \text{ or } V_{ts}) + 4S/5$ " is detected in the toner near end condition, then 50 prints can be made after this condition.

### ***Toner End Recovery***

If the front cover is opened and closed for 10 seconds while a toner end condition exists and the toner bottle is replaced, the machine attempts to recover using the same procedure as for toner near end/end detection.

## 2.5 DRUM CLEANING AND TONER RECYCLING

### 2.5.1 DRUM CLEANING



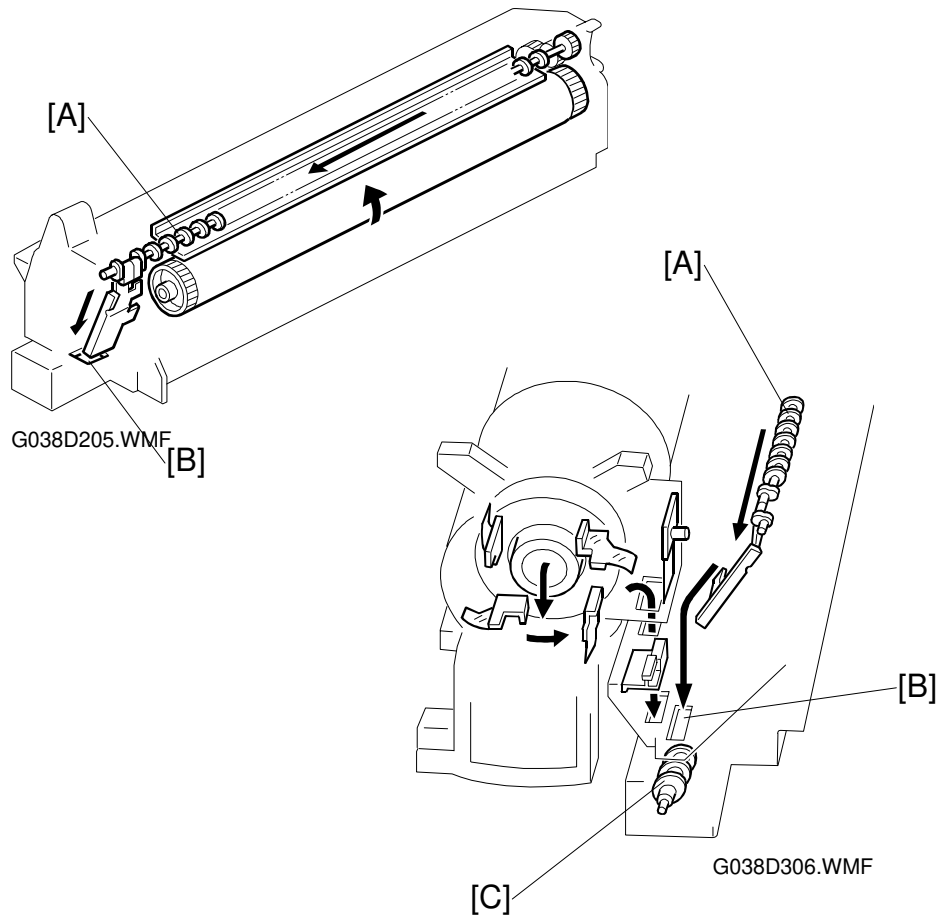
G038D201.WMF

The cleaning blade [A] removes any toner remaining on the drum after the image is transferred to the paper. This model uses a counter blade system.

The cleaning blade scrapes off toner remaining on the drum. When toner builds up in the cleaning unit, toner at the top of the pile is removed by the toner collection coil [B].

To remove the toner and other particles that are accumulated at the edge of the cleaning blade, the drum turns in reverse for about 5 mm at the end of every print job.

## 2.5.2 TONER RECYCLING

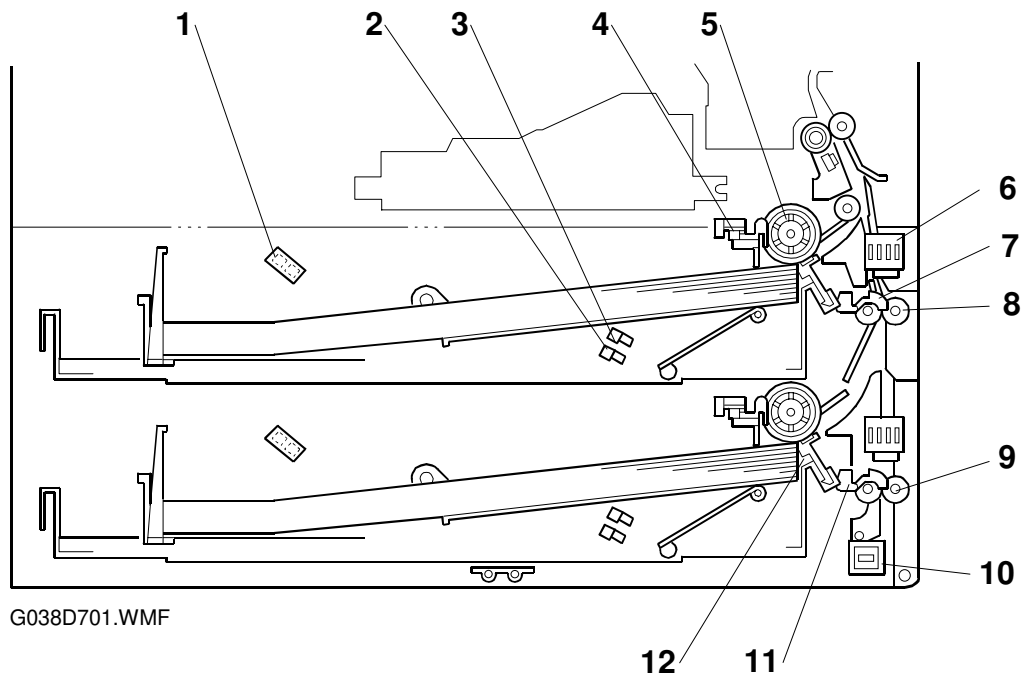


Detailed  
Descriptions

Toner picked up by the toner collection coil [A], is transported to the opening [B] at the side of the PCU. Then, this toner falls into the development unit with new toner coming from the toner bottle and it is all mixed together by mixing auger 1 [C] and used again.

## 2.6 PAPER FEED

### 2.6.1 OVERVIEW



There are two paper trays, each of which can hold 500 sheets.

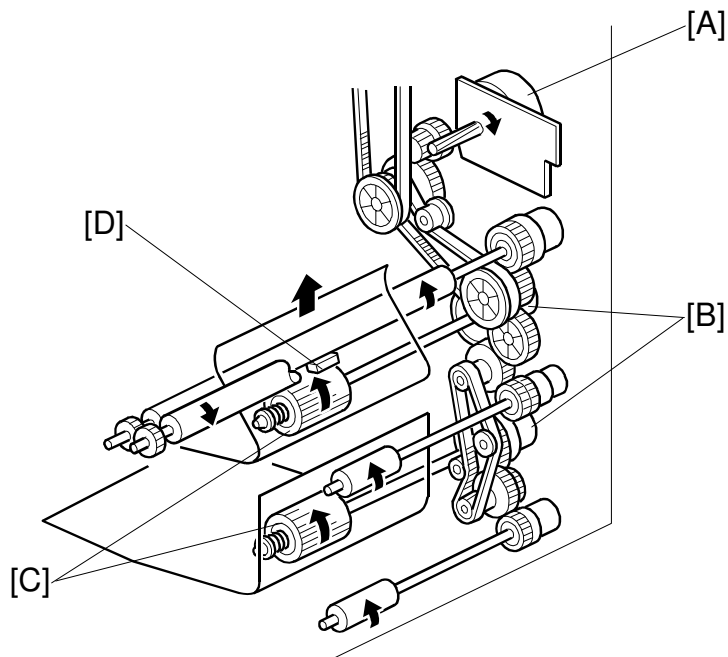
The paper tray feed stations use a friction pad system.

The two relay sensors are used for paper jam detection.

The components of the paper feed station are as follows.

- |                           |                          |
|---------------------------|--------------------------|
| 1. Paper Lift Sensor      | 7. Upper Relay Sensor    |
| 2. Paper Height -1 Sensor | 8. Upper Relay Roller    |
| 3. Paper Height -2 Sensor | 9. Lower Relay Roller    |
| 4. Paper End Sensor       | 10. Special Paper Sensor |
| 5. Paper Feed Roller      | 11. Lower Relay Sensor   |
| 6. Paper Size Sensor      | 12. Friction Pad         |

## 2.6.2 PAPER FEED DRIVE MECHANISM



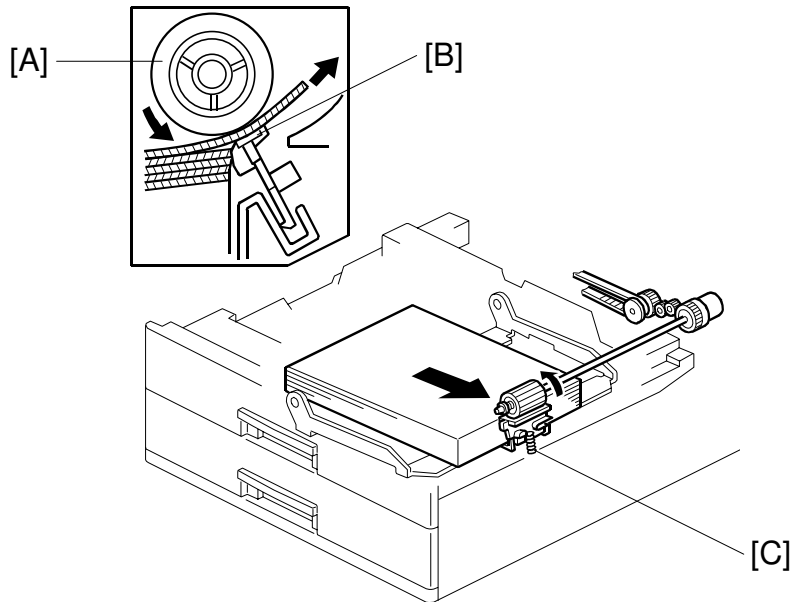
G038D702.WMF

Detailed  
Descriptions

The main motor [A] drives the pick-up and feed mechanism of both the first and second paper trays. The paper feed clutches [B] transfer drive from this motor to the paper feed rollers [C].

When the paper feed clutch turns on, the feed rollers start to feed the paper. The paper feed clutch stays on until shortly after the registration sensor [D] has been activated.

### 2.6.3 PAPER FEED AND SEPARATION MECHANISM

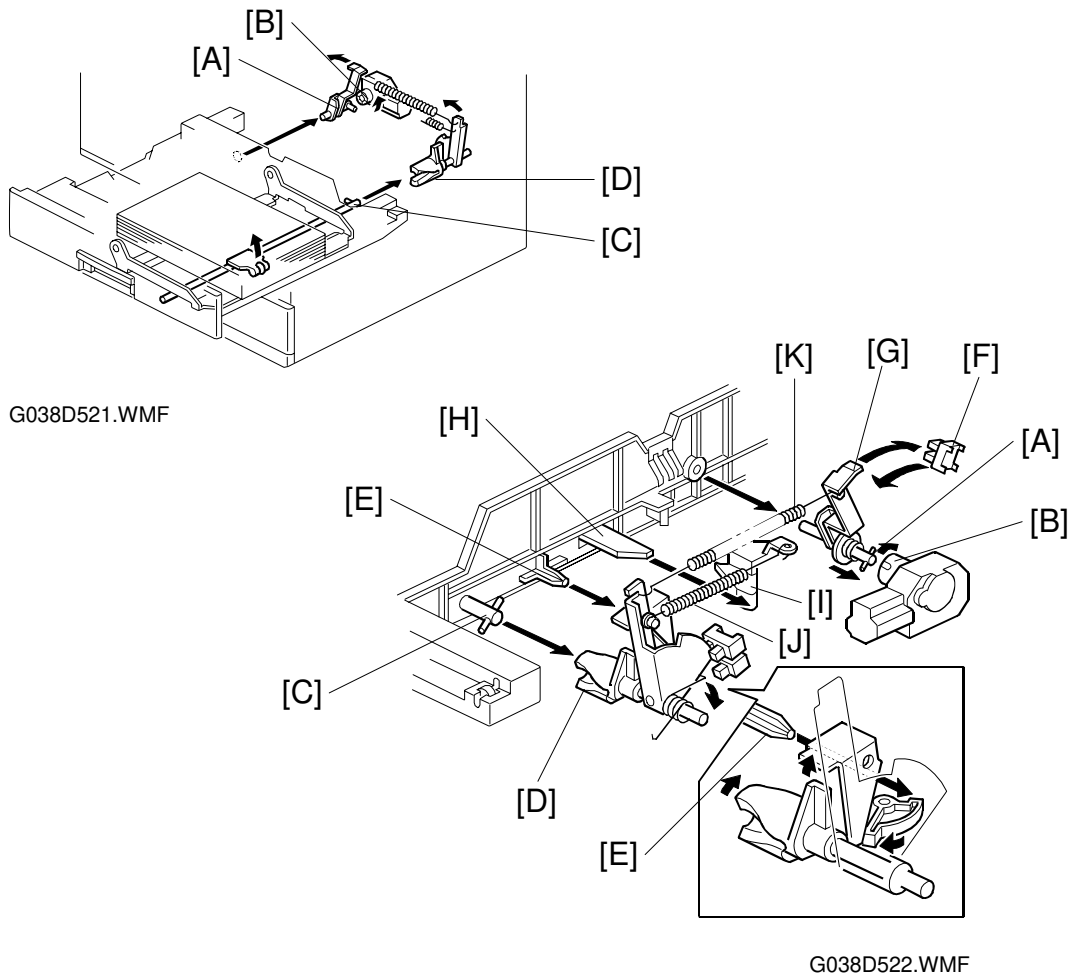


A860D104.WMF

The paper feed roller [A] drives the top sheet of paper from the paper tray. The friction pad [B] allows only one sheet to feed at a time. The friction pad applies pressure to the feed roller with a spring [C].

The friction pad pressure cannot be adjusted.

## 2.6.4 PAPER LIFT MECHANISM



Detailed  
Descriptions

The paper size switch detects when the tray is pushed in.

When the paper tray is pushed into the machine, the pin [A] for the lift motor pressure shaft engages the lift motor coupling [B] and the pin [C] for the bottom plate lift shaft in the tray engages the bottom plate pressure lever coupling [D]. The pin [E] on the rear of the tray pushes the lock lever so that the lift motor can lift the bottom plate pressure lever.

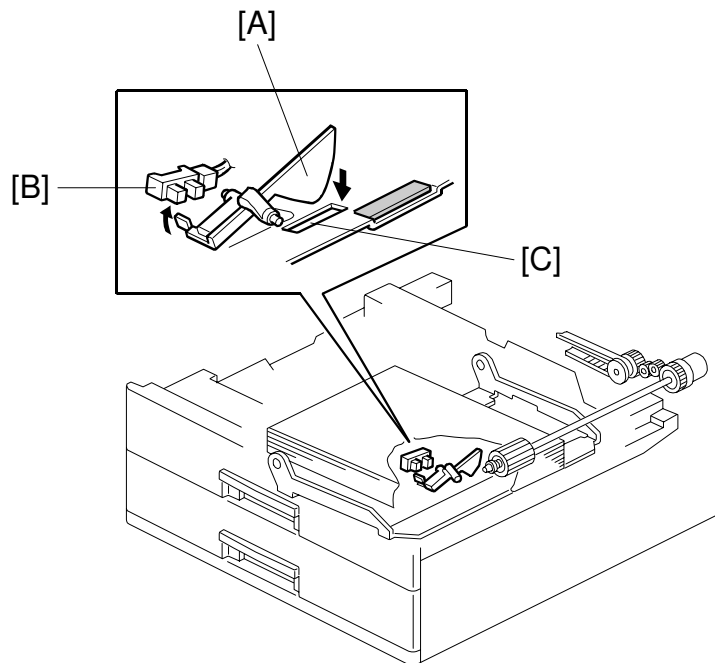
The lift motor turns on, and turns clockwise as viewed on the diagram. The main pressure spring [K] pulls the bottom plate pressure lever, and this lifts the tray bottom plate.

When the top of the stack touches the feed roller, the motor cannot pull up the plate any more, so it pulls the actuator [G] into the lift sensor [F]. Then the lift motor reverses a certain time (200 ms or 600 ms), depending on the paper size, to reduce this pressure. For smaller paper, it reverses the larger amount (600 ms) to reduce the pressure more.

For A4-width paper or wider, a projection [H] on the side fence engages the secondary pressure spring [J] through a lever [I]. Then, the secondary pressure spring [J] applies paper feed pressure in addition to the main pressure spring [K], to ensure that extra pressure is applied to wider paper.

When the paper tray is pulled out, the pins [A, C] disengage from the couplings [B, D], and the bottom plate drops. To make it easier to push the tray in, the lift motor rotates backwards 1.7 seconds to return the bottom plate pressure lever coupling [D] to the original position.

### 2.6.5 PAPER END DETECTION



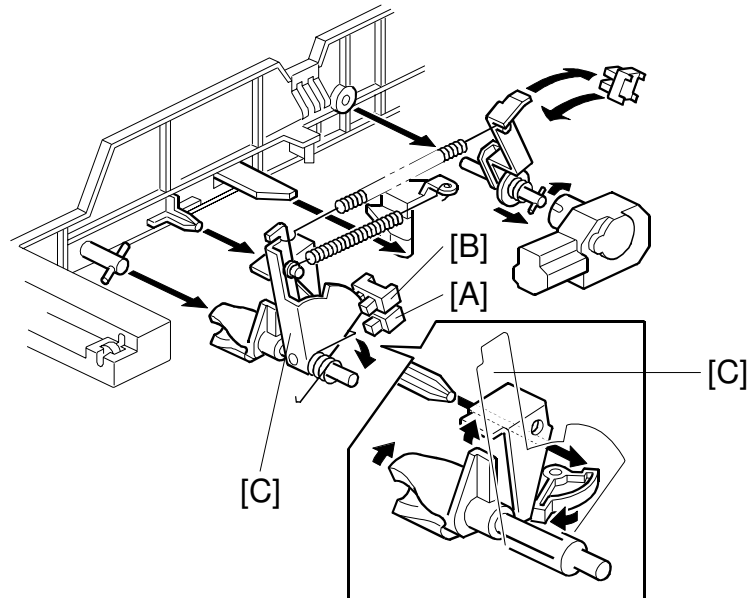
G038D520.WMF

If there is some paper in the paper tray, the paper stack raises the paper end feeler [A] and the paper end sensor [B] is deactivated.

When the paper tray runs out of paper, the paper end feeler drops into the cutout [C] in the tray bottom plate and the paper end sensor is activated.

When the paper tray is drawn out with no paper in the tray, the shape of the paper end feeler causes it to lift up.

## 2.6.6 PAPER HEIGHT DETECTION



G038D522.WMF

Detailed Descriptions

The amount of paper in the tray is detected by the combination of on/off signals from two paper height sensors [A] and [B].

When the amount of paper decreases, the bottom plate pressure lever [C] moves the actuator up.

The following combination of sensor signals is sent.

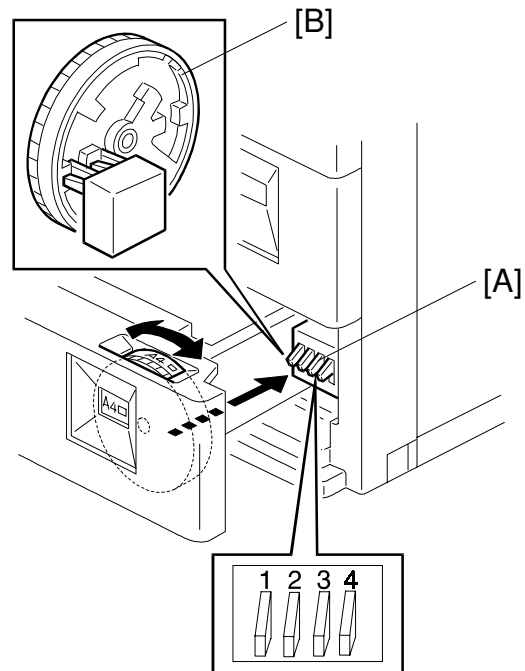
Amount of Paper	Paper Height Sensor 1	Paper Height Sensor 2
Near End	OFF	ON
30%	ON	ON
70%	ON	OFF
100%	OFF	OFF

When the tray contains paper of a small width, the paper feed pressure may become too low when the thickness of the remaining stack of paper has decreased. The lift motor rotates forward 400 ms after the sensor detects a certain amount of paper remaining in the tray to increase paper feed pressure, simulating the pressure generated by a full tray.

## 2.6.7 PAPER SIZE DETECTION

Size \ SW	1	2	3	4
A3	---	---	---	---
A4 LEF	✓	✓	---	✓
A4 SEF	✓	✓	---	---
A5 SEF, 8 1/2" x 14"	---	---	✓	✓
B4, 11" x 17"	✓	---	✓	---
B5 LEF, 11" x 8 1/2"	✓	---	---	---
B5 SEF, 8 1/2" x 11"	---	✓	✓	✓
* (Asterisk)	---	✓	---	✓

✓: ON (Not pushed)  
---: OFF (Pushed)



G038D533.WMF

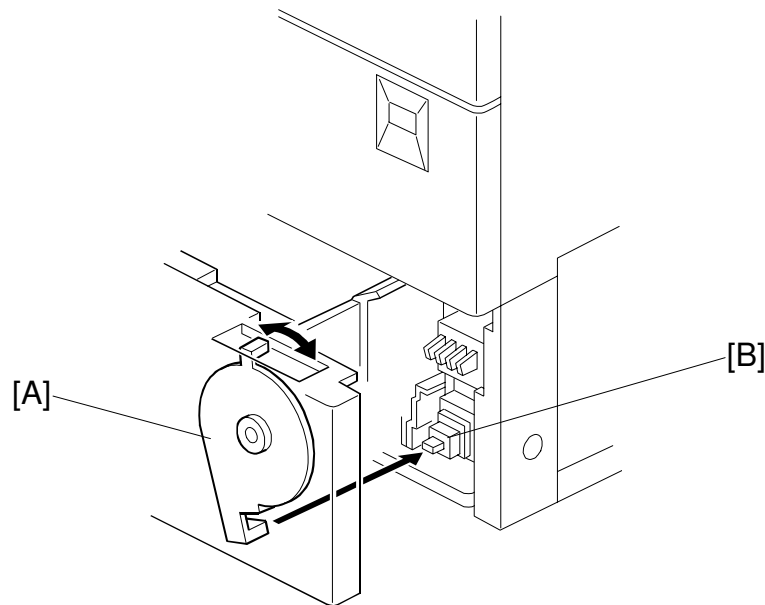
There are four paper size microswitches [A] on the front right plate of the paper tray unit. The switches are actuated by a paper size actuator [B] behind the paper size indicator plate, which is on the front right of the tray.

Each paper size has its own actuator, with a unique combination of notches. To determine which size has been installed, the CPU reads which microswitches the actuator has switched off.

The CPU disables paper feed from a tray if the paper size cannot be detected. If the paper size actuator is broken, or if there is no tray installed, the Add Paper indicator will light.

When the paper size actuator is at the "\*" mark, the paper tray can be set up to accommodate one of a wider range of paper sizes by using user tools. If the paper size for this position is changed without changing the user tool setting, a paper jam will result.

## 2.6.8 SPECIAL PAPER SETTING



G038D703.WMF

Detailed  
Descriptions

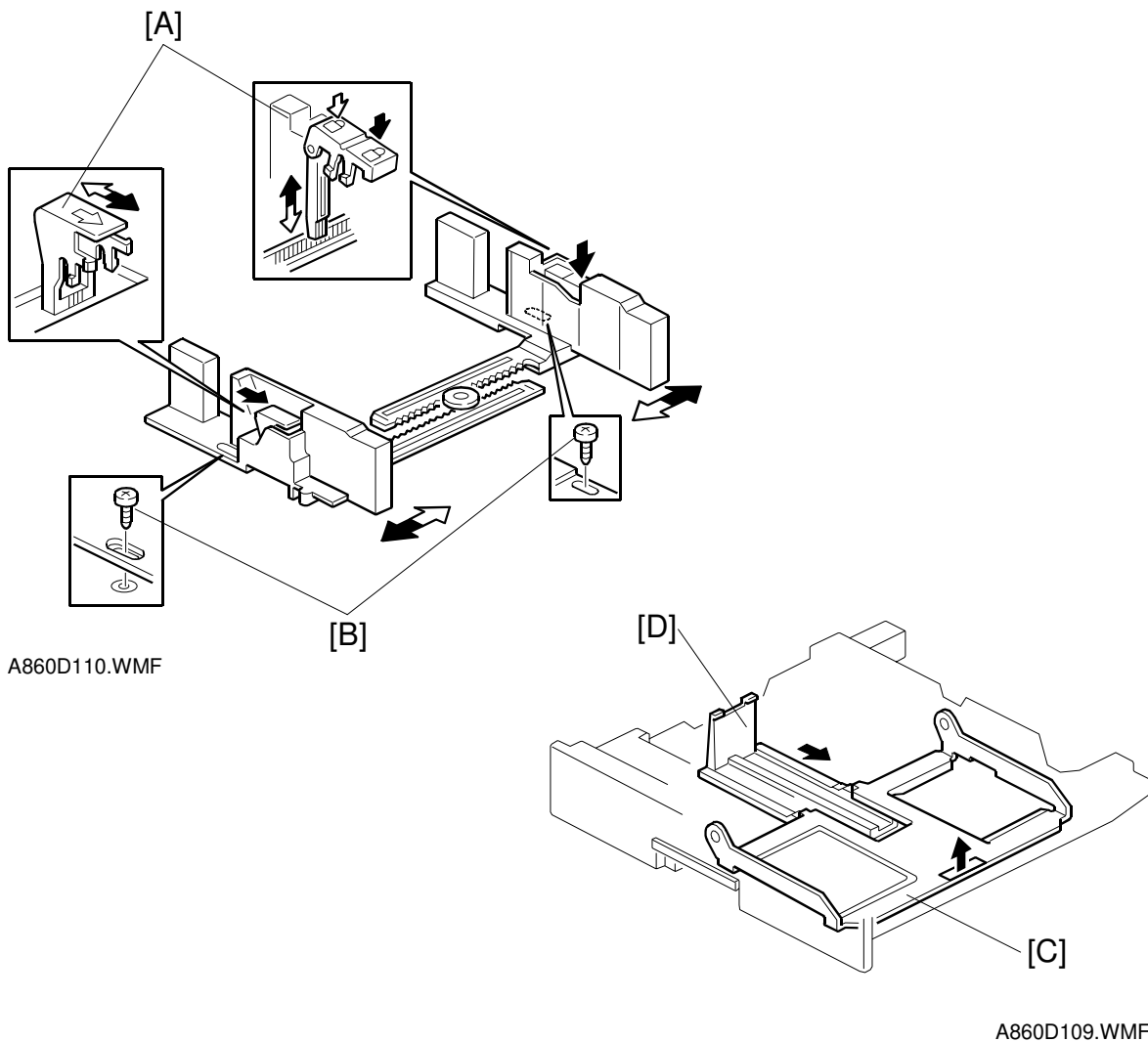
When feeding thick paper and envelopes, the user must use the 2nd paper tray (if the optional by-pass table is not installed), and turn lever [A] to the right. Then, when sliding the tray into the machine, the lever does not push the special paper switch [B] (it stays off), and the machine detects that there is special paper in the 2nd paper tray.

When the machine detects the special paper signal, the fusing temperature and the transfer roller current will be changed as follows.

1. Fusing temperature: Current operation temperature +10 °C
2. Transfer roller current:
  - A3 width (11"): 14  $\mu$ A
  - B4 width (10"): 15  $\mu$ A
  - A4 width (8.5"): 17  $\mu$ A
  - A5 width (5.5"): 20  $\mu$ A

Note that for the by-pass tray, the fusing and transfer conditions for special paper are also applied if the user uses thick (non-standard) mode.

## 2.6.9 SIDE AND END FENCES



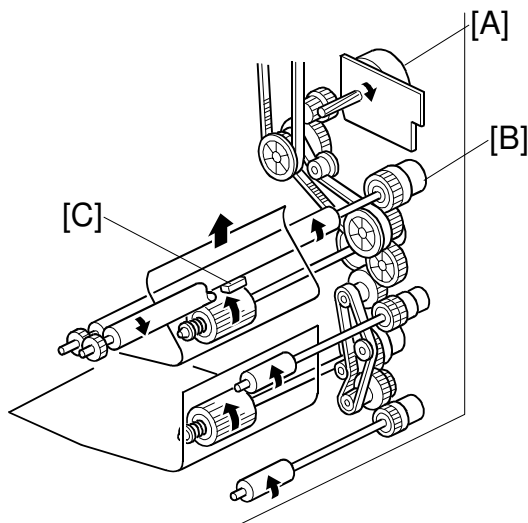
### **Side Fences**

If the tray is full of paper and it is pushed in strongly, the fences may deform or bend. This may cause the paper to skew or the side-to-side registration to be incorrect. To correct this, each side fence has a stopper [A] attached to it. Each side fence can be secured with a screw [B], for customers who do not want to change the paper size.

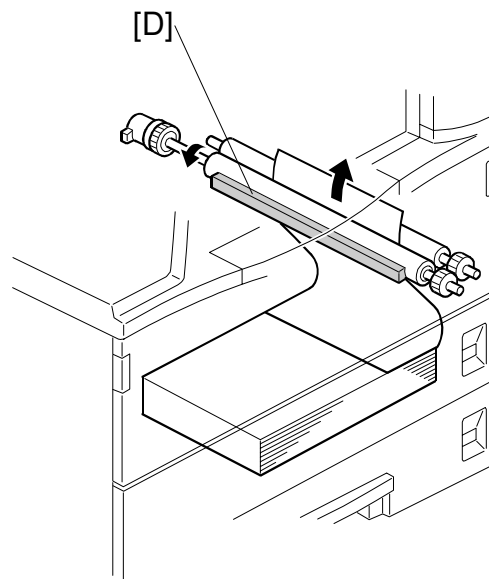
### **End Fence**

As the amount of paper in the tray decreases, the bottom plate [C] lifts up gradually. The end fence [D] is connected to the bottom plate. When the tray bottom plate rises, the end fence moves forward and pushes the back of the paper stack to keep it squared up.

## 2.6.10 PAPER REGISTRATION



G038D702.WMF



G038D704.WMF

Detailed  
Descriptions

The drive from the main motor [A] is transmitted to the registration roller through the registration clutch gear [B].

The registration sensor [C] is used for correcting paper skew and for detecting paper misfeeds.

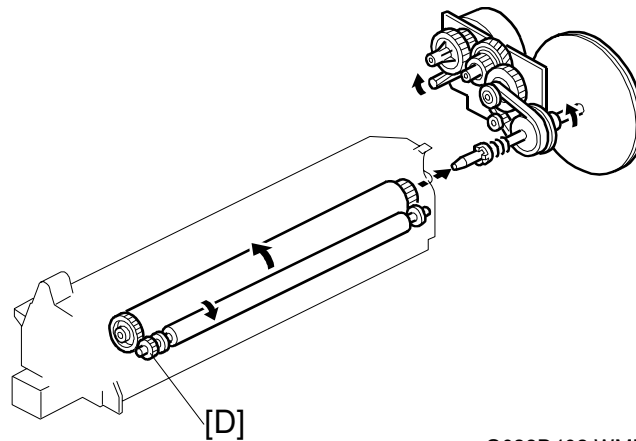
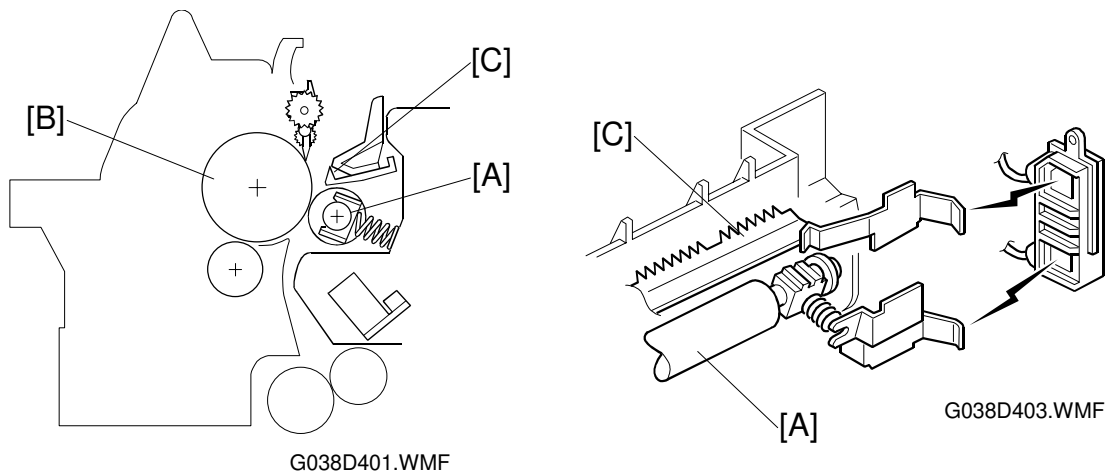
The cleaning pad [D] contacts the registration roller. It removes paper dust from the registration roller so that this dust will not transfer into the development unit through the drum cleaning unit.

The amount of paper buckle at the registration roller to correct skew can be adjusted with the printer service mode (Service Menu 2: Regist Sag).

**Cross-reference:** Section 4.2 Service Program Mode

## 2.7 IMAGE TRANSFER AND PAPER SEPARATION

### 2.7.1 OVERVIEW



The machine uses a transfer roller [A], which touches the surface of the drum [B]. The high voltage supply board supplies a positive current to the transfer roller, which attracts the toner from the drum onto the paper. The current depends on the paper width, paper type, and paper feed tray.

The curvature of the drum and the antistatic plate [C] help the paper to separate from the drum. The high voltage supply board also supplies a negative dc voltage to the antistatic plate.

Drive from the drum through a gear [D] turns the transfer roller

The transfer current can be adjusted by the printer service mode (Service Menu 2: Transfer set).

**Cross-reference:** Section 4.2 Service Program Mode

## 2.7.2 IMAGE TRANSFER MECHANISM

There are two transfer current levels: low transfer current level and high transfer current level. The image transfer procedure is as follows:

1. When the CPU receives the image writing start signal, the CPU instructs the high voltage supply board to supply +10 $\mu$ A (low transfer current level) to the roller. This prevents any positively charged toner on the drum surface from transferring to the transfer roller.
2. At a certain time after the low transfer current has been supplied to the roller, +13 $\mu$ A (paper fed from the paper tray) is applied to the roller to transfer the toner to the paper.
3. After the trailing edge of the paper has passed through the roller, transfer current turns off. In multiple printing, the transfer current shifts again to the low transfer current.

The default transfer roller current (high transfer current level) is as shown in the following table. The transfer current can be adjusted using the printer service mode, except for the low transfer current.

Paper Size	Paper Tray	Duplex	By-pass Tray / 2nd Paper Tray (Special Paper)
A3/11" x 17", A4/8 1/2 x 11" SEF	13 $\mu$ A	10 $\mu$ A	14 $\mu$ A
B4	13 $\mu$ A	12 $\mu$ A	15 $\mu$ A
A4/11" x 8 1/2 LEF, A5/5 1/2 x 8 1/2 SEF	13 $\mu$ A	16 $\mu$ A	17 $\mu$ A
A5/8 1/2 x 5 1/2 LEF	15 $\mu$ A	16 $\mu$ A	20 $\mu$ A

Be careful when increasing the transfer current. This might cause a ghosting effect, in which part of the image at the top of the page is repeated lower down the page at a lower density. It may also damage the OPC drum in the worst case.

### 2.7.3 TRANSFER ROLLER CLEANING

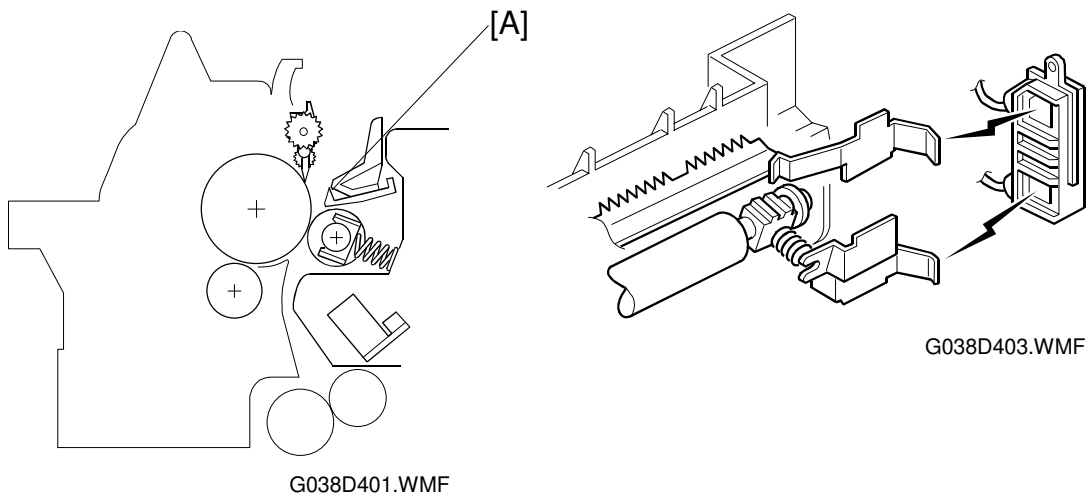
If the paper size is smaller than the image, or if a paper jam occurs during printing, toner may be transferred to the roller surface. To prevent the toner from transferring to the back side of the printouts, the transfer roller requires cleaning before the next printing run.

During transfer roller cleaning, the high voltage supply unit supplies a negative cleaning current ( $-4\ \mu\text{A}$ ) to the transfer roller. Any negatively charged toner on the transfer roller is then transferred back to the drum. Then a positive cleaning current ( $+10\ \mu\text{A}$ ) is applied to the transfer roller to push back to the drum any positively charged toner on the transfer roller.

The machine goes through the cleaning mode in the following conditions:

- Before starting the printing job
- Just after the power is switched on.
- After a jam has been cleared

### 2.7.4 PAPER SEPARATION MECHANISM



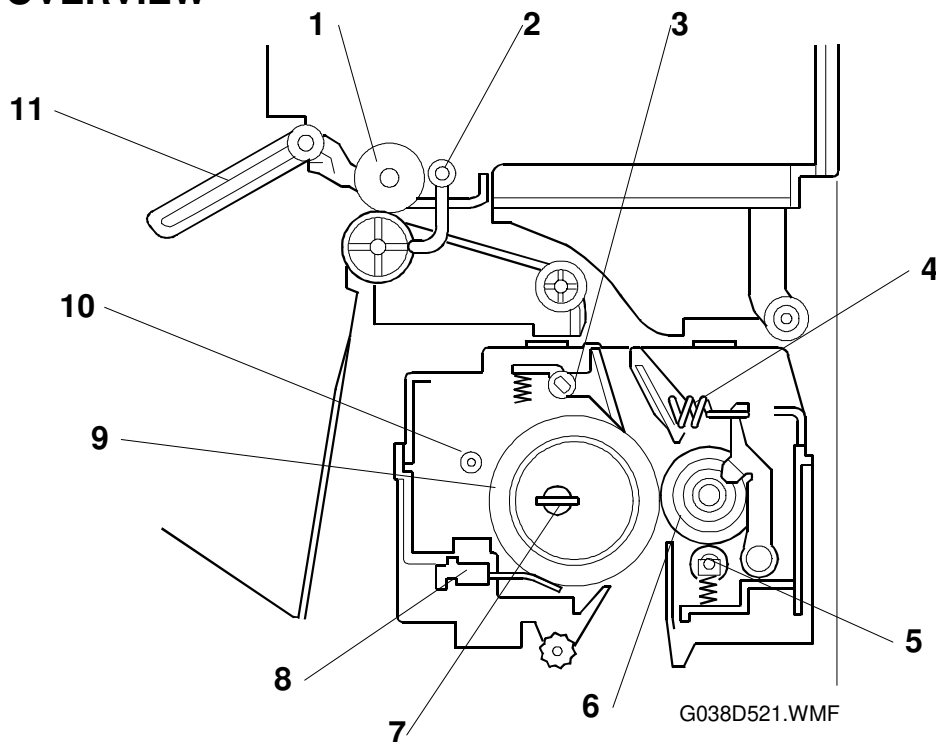
The discharge plate [A] and the drum curvature of the drum help the paper to separate away from the drum. The high voltage supply board applies a constant dc voltage,  $-1.8\ \text{kV}$  (when feeding from a paper tray) or  $-2.1\ \text{kV}$  (from the duplex unit) to the discharge plate.

The discharge plate voltage can be adjusted using the printer service mode (Service Menu 2: Separate volt).

**Cross-reference:** Section 4.2 Service Program Mode

## 2.8 IMAGE FUSING AND PAPER EXIT

### 2.8.1 OVERVIEW

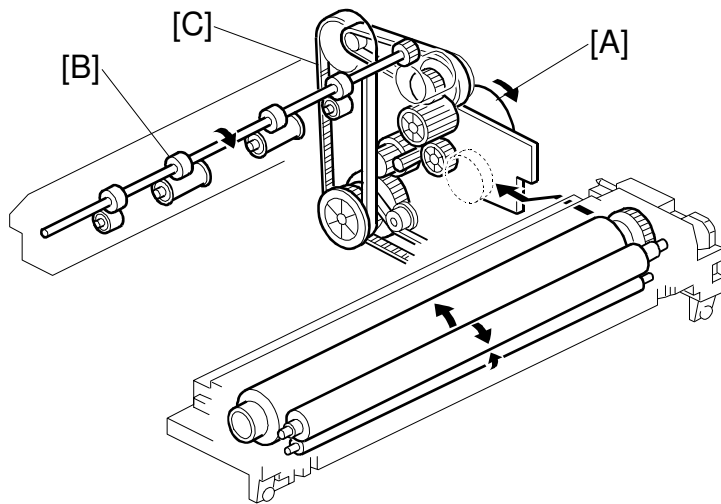


Detailed  
Descriptions

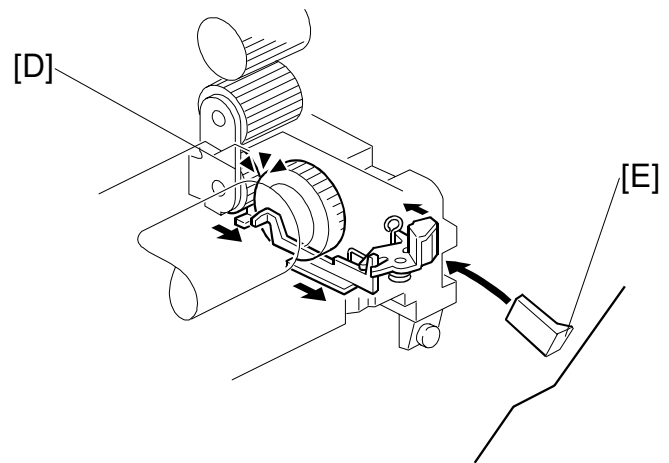
The fusing unit and paper exit area consist of the following parts.

- |                         |                                  |
|-------------------------|----------------------------------|
| 1. Paper exit roller    | 7. Fusing lamp                   |
| 2. Fusing exit sensor   | 8. Thermistor                    |
| 3. Hot roller strippers | 9. Hot roller                    |
| 4. Pressure spring      | 10. Thermofuse                   |
| 5. Cleaning roller      | 11. Paper overflow sensor feeler |
| 6. Pressure roller      |                                  |

## 2.8.2 FUSING DRIVE AND RELEASE MECHANISM



G038D504.WMF

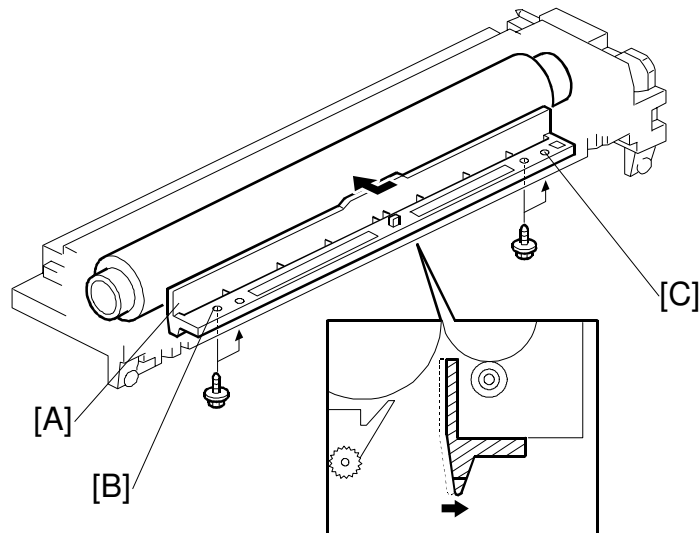


G038D505.WMF

The main motor [A] drives the fusing unit through a gear train and drives the paper exit rollers [B] through a timing belt [C].

The fusing unit release mechanism automatically disengages the fusing unit drive gear [D] when the right cover [E] is opened. This allows the fusing unit drive gear to rotate freely so that misfed paper can easily be removed.

### 2.8.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM



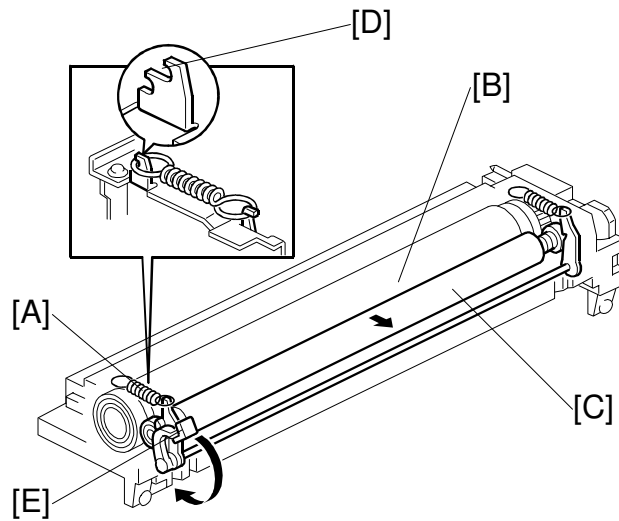
G038D506.WMF

Detailed  
Descriptions

The entrance guide [A] is adjustable for paper thickness to prevent creasing. The left screw holes [B] on each side are used as the default setting.

If creasing occurs frequently in the fusing unit, adjust the entrance guide to the right, by securing it with the other holes [C]. This allows more direct access to the gap between the hot roller and the pressure roller.

## 2.8.4 PRESSURE ROLLER



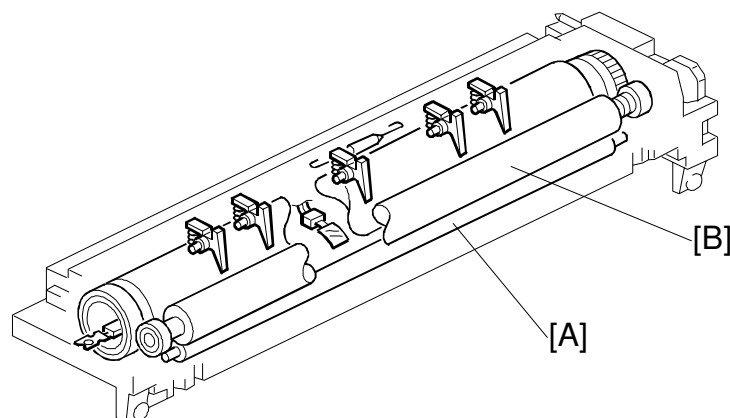
G038D502.WMF

The pressure springs [A] constantly apply pressure between the hot roller [B] and the pressure roller [C].

Applied pressure can be changed by adjusting the position of the pressure springs. The spring is positioned at the top [D] as the default setting.

The user moves the lever [E] when using thicker copy paper or envelopes, to reduce the pressure between the hot and pressure rollers.

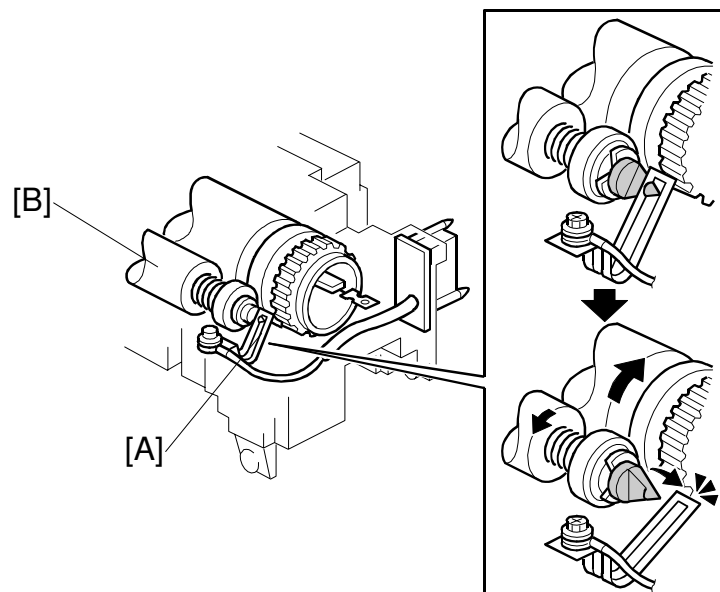
## 2.8.5 CLEANING MECHANISM



G038D503.WMF

The cleaning roller [A] is always in contact with the pressure roller [B]. It collects toner and paper dust adhered to the surface of the pressure roller.

## 2.8.6 NEW FUSING UNIT DETECTION



G038D500.WMF

Detailed  
Descriptions

When the PM (fusing) counter reaches 120K, "Replace Maintenance Kit" is displayed.

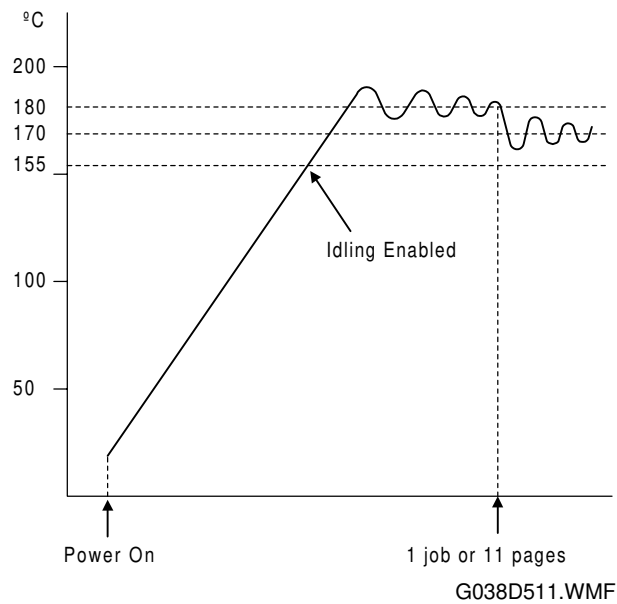
The machine detects when the new maintenance fusing unit is installed by checking the circuit through the detector hook [A]. The detector hook is hooked on the edge of the fusing pressure roller shaft [B]. As the pressure roller rotates, the detector hook is released from the press roller shaft and the circuit becomes opened. Once the detector hook is released, it will not re-engage with the shaft for the duration of the fusing unit's life. Then, the machine clears the PM (fusing) counter.

Please note that this detection is done only with the maintenance fusing unit, and the detector hook is not installed in the fusing unit which is initially installed in the machine.

**NOTE:** If the PM is done by replacing individual parts (not by replacing the maintenance fusing unit), make sure to reset the PM (fusing) counter using the SP mode (Service Menu 2: FuserCount clr). Otherwise the "Replace Maintenance Kit" message on the LCD will not be cleared.

**Cross-reference:** Section 4.2 Service Program Mode

## 2.8.7 FUSING TEMPERATURE CONTROL



### ***Temperature Control***

When the main power switch is turned on, the CPU turns on the fusing lamp to maintain the fusing temperature of 180°C for the first job, or for the first 11 consecutive pages of printing. After that, the machine maintains the fusing temperature at 170°C.

To prevent each end of the hot roller temperature from becoming too high, the machine lowers the fusing temperature to 155°C when it detects that paper which is less than 216 mm width is consecutively fed.

### ***Fusing Lamp Control***

Turning on and off the fusing lamp power causes fluorescent light in the room to flicker. To reduce the flickering, use the following printer service modes.

#### **Fusing temperature detection cycle (Fusing period)**

The CPU checks the output from the fusing thermistor once a second (default setting). The CPU compares the current and previous temperatures. Based on the result, it then decides how long the fusing lamp power should be on during the next one-second interval (also, if the current temperature is too high, the power will not be needed).

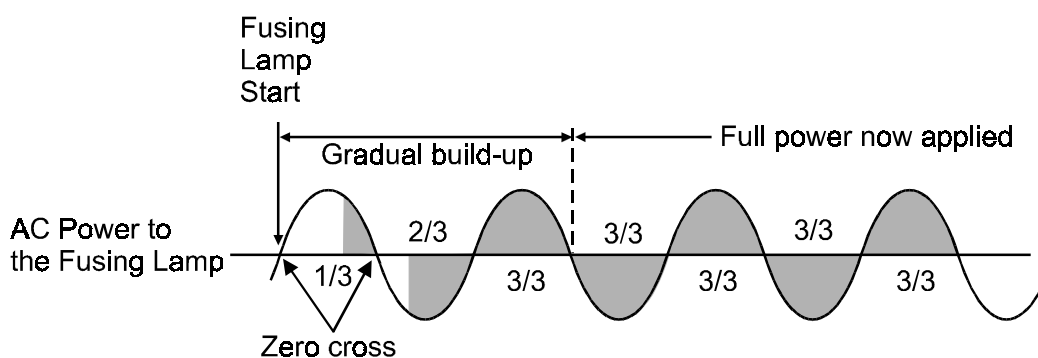
Starting and stopping the fusing lamp power every second causes fluorescent lighting in the room to flicker. To reduce this flickering, use the printer service mode (Service Menu 2: Fusing period) to change the cycle from 1 second to 3 seconds.

#### **Fusing soft-start (Fusing times)**

In addition, whenever the fusing lamp power switches on, full power is applied to the fusing lamp gradually, not all at once. This prevents the power in the room from dropping suddenly. This feature is known as "Soft Start". The machine does this by gradually allowing more power to the fusing lamp over a number of zero-cross cycles of the ac supply. The diagram below shows full power being applied gradually over the duration of 3 zero-cross cycles. With the printer service mode (Service Menu 2: Fusing times), this number can be set to 3, 10, or 20. Soft start occurs every time the fusing lamp power switches on (i.e., at some time during every second), not just at the start of the print job.

**NOTE:** This SP mode is effective to counter flickering lights. However, generated noise increases if the setting is changed from the default. If a radio or a TV is close by the machine, the noise may have some effect on the image or sound.

**Cross-reference:** Section 4.2 Service Program Mode



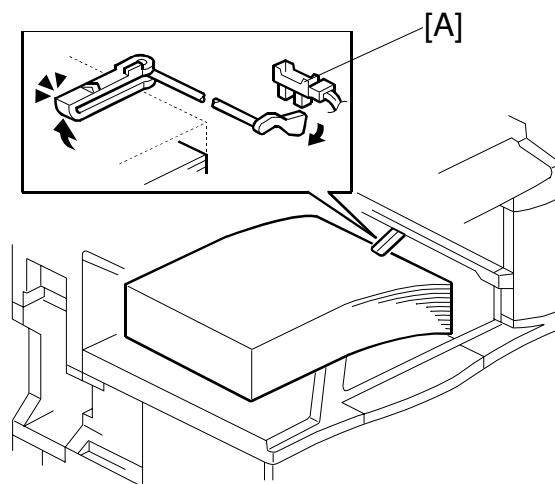
G038D512.WMF

## 2.8.8 OVERHEAT PROTECTION

If the hot roller temperature becomes higher than 231°C, the CPU cuts off the power to the fusing lamp. At the same time, SC543 is generated.

Even if the thermistor overheat protection fails, there is a thermofuse in series with the common ground line of the fusing lamp. If the temperature of the thermofuse reaches 169°C, the thermofuse opens, removing power from the fusing lamp. At the same time, SC 542 is generated and the machine stops operating.

## 2.8.9 PAPER EXIT



G038D601.WMF

The paper overflow detection sensor [A] is located at the paper exit section of the fusing unit. When this sensor is activated, the machine detects that the paper stack exceeded the certain limit and stops printing.

## 2.9 ENERGY SAVER MODES

When the machine is not used, the energy saver feature reduces power consumption by lowering or switching off the fusing lamp.

This machine has two types of energy saver mode.

- Energy saver mode level 1: The machine lowers the fusing temperature to 60 °C.
- Energy saver mode level 2: The machine turns off the fusing lamp.

### ***Entering Energy Saver Mode***

Energy saver mode starts after the machine has been idle for a certain time. This period is specified by the user.

- Energy saver mode level 1: Off, 1 min, 3 min, 5 min, 10 min (default 10 min)
- Energy saver mode level 2: 15 min, 30 min, 1 hr, 2 hrs, 3 hrs (default 15 min)

### ***Leaving Energy Saver Mode***

The machine leaves energy saver mode when one of the following happens.

- Print command received from the PC
- Front cover opened and closed
- Paper tray pulled out and put back
- Any operation panel keys pressed

## 2.10 CONTROLLER FUNCTIONS

### 2.10.1 PAPER SIZE/TYPE DETECTION AND SELECTION

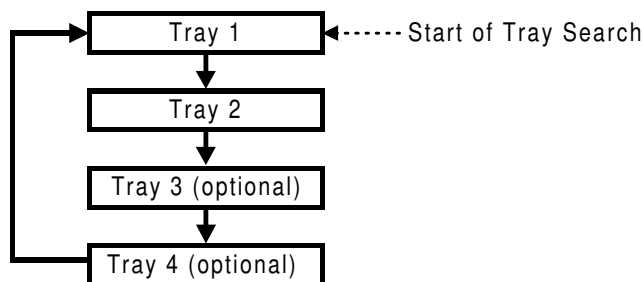
The controller uses the paper sizes detected by the print engine for trays 1, 2, 3 and 4. For the by-pass tray, the user has to specify a paper size using the Job Control menu in the Printer User Tools. Refer to section 1.1.2 for details on supported paper sizes.

The paper type selection is available using the job control menu (Paper Input) for each paper tray.

When the printer controller receives a print job, the controller uses the paper size specified in the PJI, PCL, or PS commands and the paper type specified in the PCL or PS commands for printing.

### 2.10.2 PAPER SOURCE SELECTION

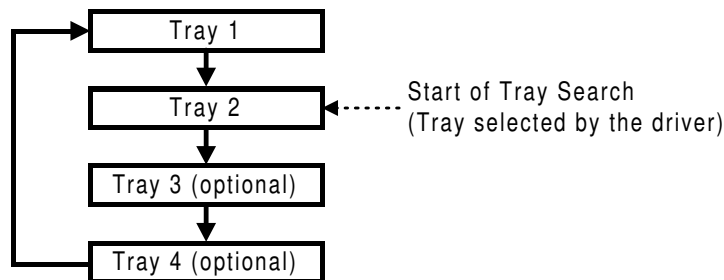
#### *Auto Tray Select*



G038D541.WMF

The controller searches for the specified paper size and paper type, starting from Tray 1, and uses the first tray that has the specified paper size and paper type. If the selected tray is pulled out or paper runs out during printing, the controller searches for another tray with the specific paper size and paper type then if found, automatically switches to it. If the controller cannot find another paper tray with the specified paper size and paper type, printing stops and the LCD displays the message "Load Tray 1."

When selecting the special paper mode in the 2nd paper tray, the 2nd paper tray is not included in the auto tray search cycle.

**Manual Tray Select**

G038D542.WMF

Detailed Descriptions

When the printer driver specifies a tray, the selected tray becomes the first tray checked at the start of the tray search. If the selected tray does not have the size and type of paper specified by the driver, the controller searches the other trays for the same paper size and paper type.

**NOTE:** Tray Priority in the job control menu does not specify the start of the tray search, but specifies the paper size in the selected tray as the default paper size.

**Tray Lock**

If Tray Lock is enabled for a tray, the controller does not use the “locked” tray in the tray search process. If a tray has, for example, colored A4 size paper, enable tray lock for that tray so that the controller does not select the tray for printing.

If the printer driver selects a “locked” tray, the controller uses the tray for printing only when the specified paper size matches the actual paper size in the tray.

**By-pass Tray**

The by-pass tray is not part of the automatic tray search. To print from the by-pass tray, the user has to select the by-pass tray using the driver. Even if the by-pass tray is empty, the controller will not switch to another tray; the message on the LCD asks the user to add paper to the by-pass tray.

**NOTE:** Collation and duplex are disabled when the by-pass tray is selected.

***Paper Size Mismatch***

When the controller could not find the specified paper size and paper type in any of the trays, the machine displays an error message.

Then the user can either load the requested paper size and paper type in a tray or select another tray, e.g., a tray that contains A4 size paper, by pressing the “Form Feed” key.

The controller will print the job if the specified paper size and paper type are detected in a tray, or if the user presses the Enter key after selecting a tray.

**2.10.3 OUTPUT TRAY SELECTION**

Output Tray Priority in the System User Tools specifies the default paper output tray for each application.

If a print job does not specify an output tray or the driver specifies the default tray, the default tray is used.

If the driver specifies an output tray, this overrides the default tray setting in the user tools.

## 2.10.4 COLLATION (SORT)

When the controller has either an optional SDRAM DIMM or an optional HDD installed, collation is enabled.

If the memory or HDD becomes full while storing a job that uses collation, the controller prints the pages that have been stored for collation, empties the memory or HDD, then continues printing the rest of the pages with collation.

Memory Capacity	Collation	Maximum Pages	Note
16MB (standard)	Not possible		
48MB (with 32MB)	Possible	30 pages	Note 1)
80MB (with 64MB)	Possible	50 pages	Note 1)
With HDD	Possible	1500 pages	Note 2)

Detailed  
Descriptions

**NOTE:** 1) The number of pages is calculated using a sample MS-Word document that contains 5,000 characters of plain text. The sample document takes 409.6kB of memory space per page.

If the document is more complex, the memory can hold fewer pages. If the document is simpler, e.g., 1,000 characters per page, the memory can hold more pages.

2) This is the maximum number of pages that the controller can handle.

If the document is more complex, the HDD can hold fewer pages. Even if the document is simpler, e.g., 1,000 characters per page, the HDD cannot hold more than 1,500 pages.

To calculate the pages using the same document as specified in Note 1, the HDD can hold up to 1,250 pages.

About 500 MB of disk space is used for collation.

### 2.10.5 DUPLEX PRINTING

**NOTE:** Duplex printing requires installation of the memory option

Duplex printing is available with all output bin options but not all paper sizes (refer to the specifications section). If a job specifies duplex but the paper size to be used is not usable in the duplex unit, the job will be printed single-sided.

Duplex printing is available in two binding methods: short-edge binding and long-edge binding.

In short-edge binding, when printing the second side of a page, the image may require rotation. The image is rotated by the ASIC (Rocky-R) in the printer controller.

The ASIC (Rocky-R) corrects the image printing order for duplexing as follows.

- Larger than A4 lengthwise/LT lengthwise (example 8 pages)  
2nd page - 1st page - 4th page - 3rd page - 6th page - 5th page - 8th page - 7th page
- Up to A4 lengthwise/LT lengthwise (example 8 pages)  
2nd page - 4th page - 1st page - 6th page - 3rd page - 8th page - 5th page - 7th page

### 2.10.6 STAPLING

Stapling is only available when the 1000-sheet finisher is installed.

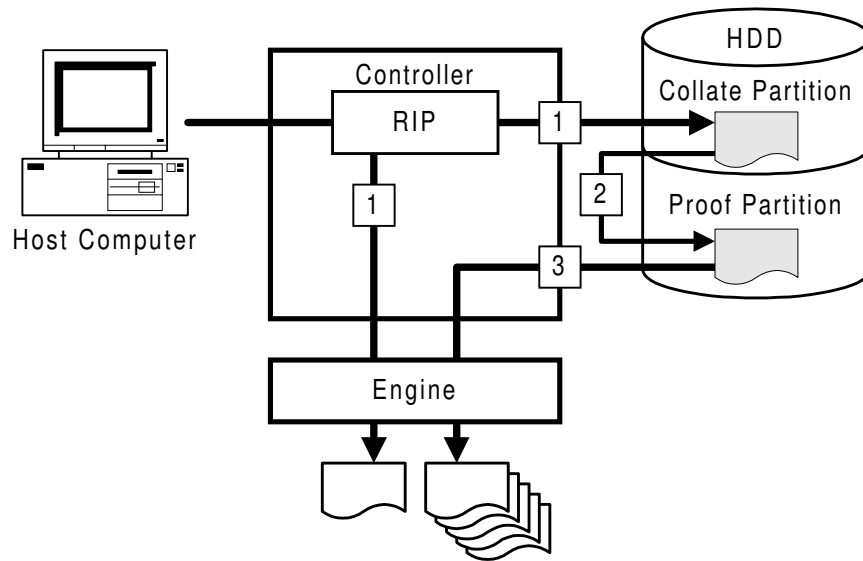
The finishers have the following stapling positions.

- 1) Upper left, diagonal
- 2) Upper right, diagonal

Depending on the paper orientation, the image may have to be rotated. This image rotation is done by the ASIC (Rocky-R) in the printer controller.

There is a limit for the number of sheets that can be stapled. If a job that specifies stapling has more than this number of sheets, it will not be stapled.

### 2.10.7 PROOF PRINT



G038D543.WMF

Detailed Descriptions

The Proof Print function gives users a chance to check the print results before starting a multiple-set print run.

When printing from a host computer, a print job is sent to the controller with a user ID and the current time. Then the controller executes raster image processing (RIP), stores the image data onto the collation partition of the hard disk, and prints one set of the document (step [1] in the above diagram). Then the controller moves the raster image file to the proof print partition of the hard disk (step [2] in the above diagram).

After the user checks that the print result is OK, the user selects the file using the machine's operation panel, and prints the rest of the sets (step [3] in the above diagram). After all sets have been printed, the controller deletes the file automatically.

If the proof print result is not OK, the user must delete the file manually.

If there is no available space for a new file in the proof print partition, the controller deletes the file from the collation partition after printing the first set, even though it cannot copy the file to the proof print partition.

- NOTE:**
- 1) Proof print requires the installation of an optional hard disk.
  - 2) The proof print partition size is about 600 MB. It can hold up to 30 files or 2,000 pages. The maximum number of pages depends on how complex the pages are.
  - 3) Proof print is available with the PCL drivers, the Windows 95/98 PostScript driver, and the Macintosh PostScript driver (with the Proof Print plug-in). The PostScript drivers for Windows 3.x and Windows NT4.0 do not support the proof print function.

## 2.10.8 RESET OPERATIONS

### ***Job Reset***

This resets the job being processed and ignores all incoming data until a data end is received.

If a collate job or a proof print job is being printed, the controller stops printing and deletes the file from the RAM or HDD.

### ***System Reset***

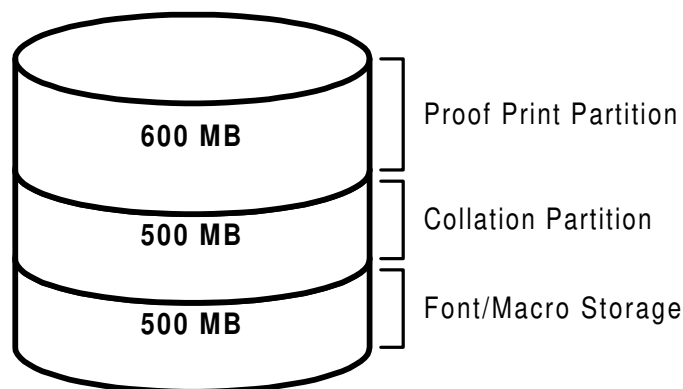
This initializes the collation data, proof print data, fonts and macros downloaded to the RAM. The menu settings, NIB settings, system log data, and error codes remain unchanged.

**NOTE:** Do not use this when the controller is receiving a print job.

### ***Menu Reset***

This resets all the menu settings to their default values, including the NIB settings.

## 2.10.9 HDD (OPTIONAL)



G038D544.WMF

The optional 1.6 GB HDD has three partitions.

- The Proof Print partition uses 600 MB for Proof Print file storage.
- The Collation partition uses 500 MB for collation data storage.
- The last partition uses 500 MB for font and macro storage.

---

## 3. INSTALLATION

### 3.1 INSTALLING THE MACHINE

Refer to the Setup Guide for information about the installation environment and instructions on how to install and set up the machine. Installation procedures for the following equipment are described.

- Paper Tray (1 tray)
- Paper Tray (2 trays)
- LCT
- By-pass Tray Unit
- Interchange Unit
- Duplex Unit
- 4-bin Mailbox Unit
- Memory (SDRAM DIMM) Option

## 3.2 INSTALLING OPTIONAL UNITS

### ⚠ CAUTION

Before installing this option, do the following:

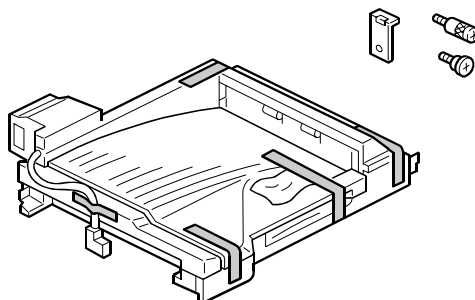
1. Print out all data in the printer buffer.
2. Turn off the switch and disconnect the power cord.

### 3.2.1 BRIDGE UNIT

#### *Accessory Check*

Check the quantity and condition of the accessories with the following list.

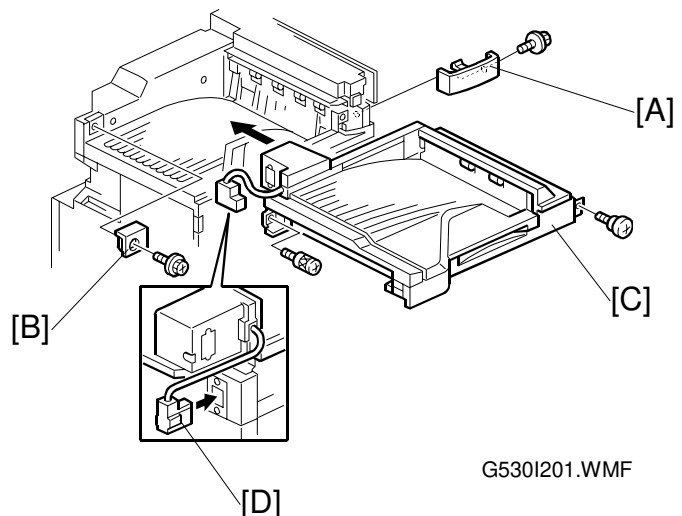
No.	Description	Q'ty
1	Bridge Unit	1
2	Securing Plate	1
3	Shoulder Screw	1
4	Knob Screw	1



A897I101.WMF

#### *Installation Procedure*

1. Remove all tapes.
2. Remove the right front cover [A] (1 screw).
3. Remove the plate [B] (1 screw).
4. Install the bridge unit [C] (1 shoulder screw, 1 knob screw).
5. Replace the right front cover.
6. Connect the I/F cable [D] to the printer.



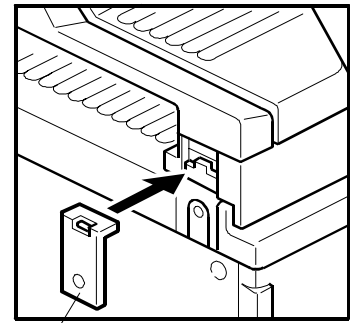
G530I201.WMF

7 Attach the securing plate [E], as shown.

**NOTE:** Do not attach it with a screw; this is done when securing the front stand for the optional finisher.

8. Install the optional finisher (A681) (refer to the 1000-sheet finisher installation procedure).

**End of procedure**



A8971103.WMF

[E]

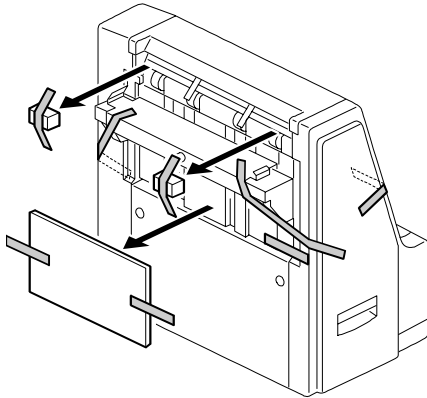
### 3.2.2 1,000-SHEET FINISHER

**NOTE:** The following options must be installed before installing this finisher:

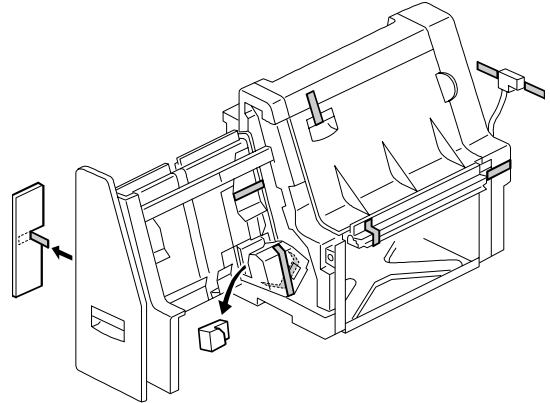
- Bridge Unit (A897)
- Paper Tray Unit (A860/A861) or LCT (A862)

#### *Installation Procedure*

1. Unpack the finisher and remove the tapes.

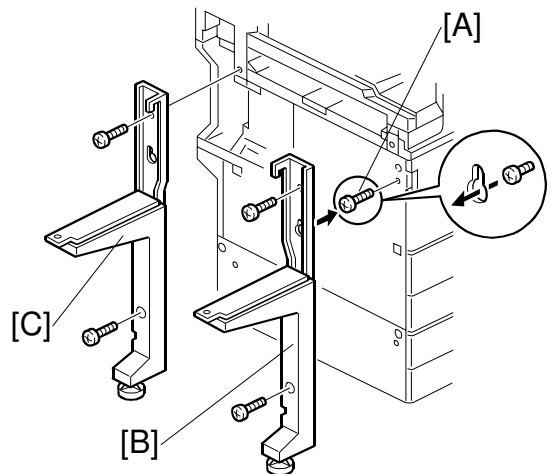


A681I503.WMF



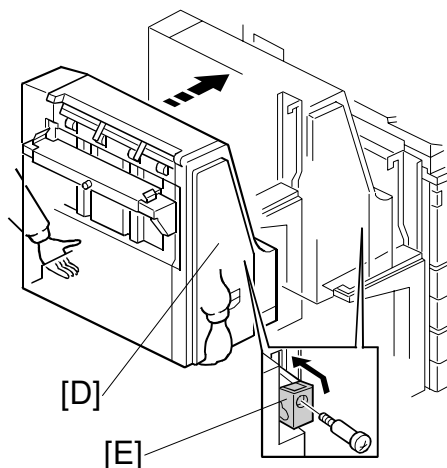
A681I504.WMF

2. Install screw [A] loosely.
3. Hang the front stand [B] on the screw that was installed in step 2.
4. Secure the front stand (3 screws, including screw [A]).
5. Install the rear stand [C] (2 screws).



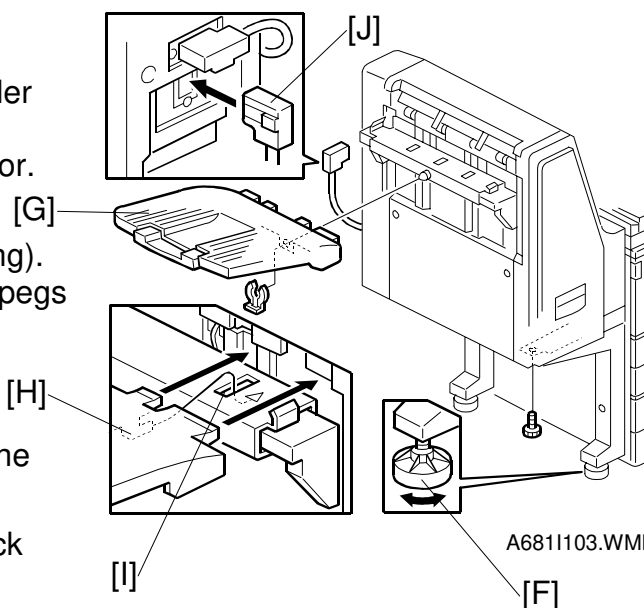
A681I101.WMF

6. Pull out the stapler unit [D].
7. Draw out the locking lever [E] (1 screw).
8. Align the finisher on the stands, and lock it in place by pushing the locking lever.
9. Secure the locking lever (1 screw) and push the stapler unit into the finisher.



A6811502.WMF

10. Secure the finisher (1 screw).
11. Adjust the securing knobs [F] under the front and rear stand until the finisher is perpendicular to the floor.
12. Install the shift tray [G] (1 snap ring).  
**NOTE:** Make sure that the three pegs [H] fit into the slots [I] properly.



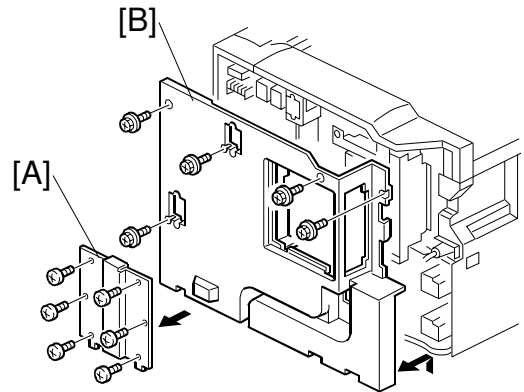
A6811103.WMF

13. Connect the finisher cable [J] to the optional bridge unit.
14. Turn on the main switch and check the finisher operation.

**End of procedure**

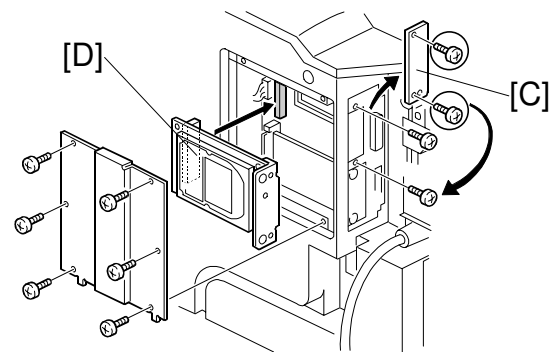
### 3.2.3 HARD DISK (HDD)

1. Remove the controller cover [A] (6 screws), and the rear cover [B] (5 screws).



G038R765.WMF

2. Remove the cover bracket [C] (2 screws).
3. Install the hard disk unit [D] to the upper socket of the printer controller.
4. Reinstall the rear cover and the controller cover.



G038I510.WMF

**End of procedure**

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## 4. SERVICE TABLES

### 4.1 GENERAL CAUTION

Do not turn off the main switch while any of the electrical components are active. Doing so might cause damage to units, such as the PCU, when they are pulled out of or put back into the machine.

#### 4.1.1 PCU

The PCU consists of the drum, development unit, charge roller unit, and cleaning unit. Follow the cautions below when handling a PCU.

1. Never touch the drum surface with bare hands. When the drum surface is touched or becomes dirty, wipe it with a dry cloth or clean it with wet cotton. Wipe with a dry cloth after cleaning with the cotton.
2. Never use alcohol to clean the drum; alcohol dissolves the drum surface.
3. Store the PCU in a cool dry place away from heat.
4. Never expose the drum to corrosive gases such as ammonia gas.
5. Never shake the used PCU. Doing so may cause toner and/or developer to split out.
6. Dispose of used PCU in accordance with local regulations.

#### 4.1.2 TRANSFER ROLLER UNIT

1. Never touch the transfer roller surface with bare hands.
2. Take care not to scratch the transfer roller as the surface is easily damaged.

#### 4.1.3 LASER UNIT

1. Do not loosen the screws that secure the LD drive board to the laser diode casing. Doing so would throw the LD unit out of adjustment.
2. Do not adjust the variable resistors on the LD unit, as they are adjusted in the factory.
3. The polygon mirror and F-theta mirror are very sensitive to dust. Never open the optical housing unit.
4. Do not touch the glass surface of the polygon mirror motor unit with bare hands.

#### **4.1.4 FUSING UNIT**

1. After installing the fusing thermistor, make sure that they contact the hot roller and that the roller rotates freely.
2. Be careful not to damage the edges of the hot roller strippers or their tension springs.
3. Do not touch the fusing lamp and rollers with bare hands.
4. Make sure that the fusing lamp is positioned correctly on both lamp holders and that it does not touch the inner surface of the hot roller.

#### **4.1.5 PAPER FEED**

1. Do not touch the surfaces of the pick-up, feed, and separation rollers.
2. The side fences and end fences of the paper tray must be positioned correctly to align with the paper to avoid paper misfeeds.

#### **4.1.6 OTHERS**

1. The TD sensor initial setting is performed automatically after installing a new PCU and closing the front cover. Never open the front cover or turn off the main switch during this time. The main motor stops when the initial setting has finished.
2. The main switch must be kept on while the toner bottle is replaced.

## 4.2 SERVICE PROGRAM MODE

### ⚠ CAUTION

Before accessing the service menu, do the following:

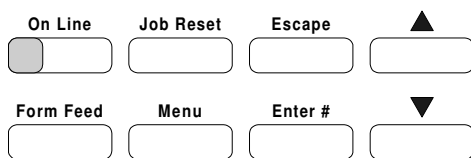
Confirm that there is no print data in the printer buffer (the Data In LED must not be lit or blinking).

If there is some data in the buffer, wait until all data has been printed.

### 4.2.1 ENABLING AND DISABLING SERVICE PROGRAM MODE

#### *Entering the Service Mode*

Turn the machine on while pressing the “On Line” key and “Escape” key together until the service mode menu “1.Service Menu1” appears on the display.



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Service  
Tables

#### *Accessing the Required Program*

Use the “Up/Down arrow” keys to scroll through the menu listing. To select an item, press the “Enter” key. Then the sub-menu will appear.

Scroll through the sub menu items using the “Up/Down arrow” keys. To go back to a higher level, press the “Escape” key.

#### *Inputting a Value or Setting for a Service Program*

Enter the required program mode as explained above. The setting appearing on the display is the current setting.

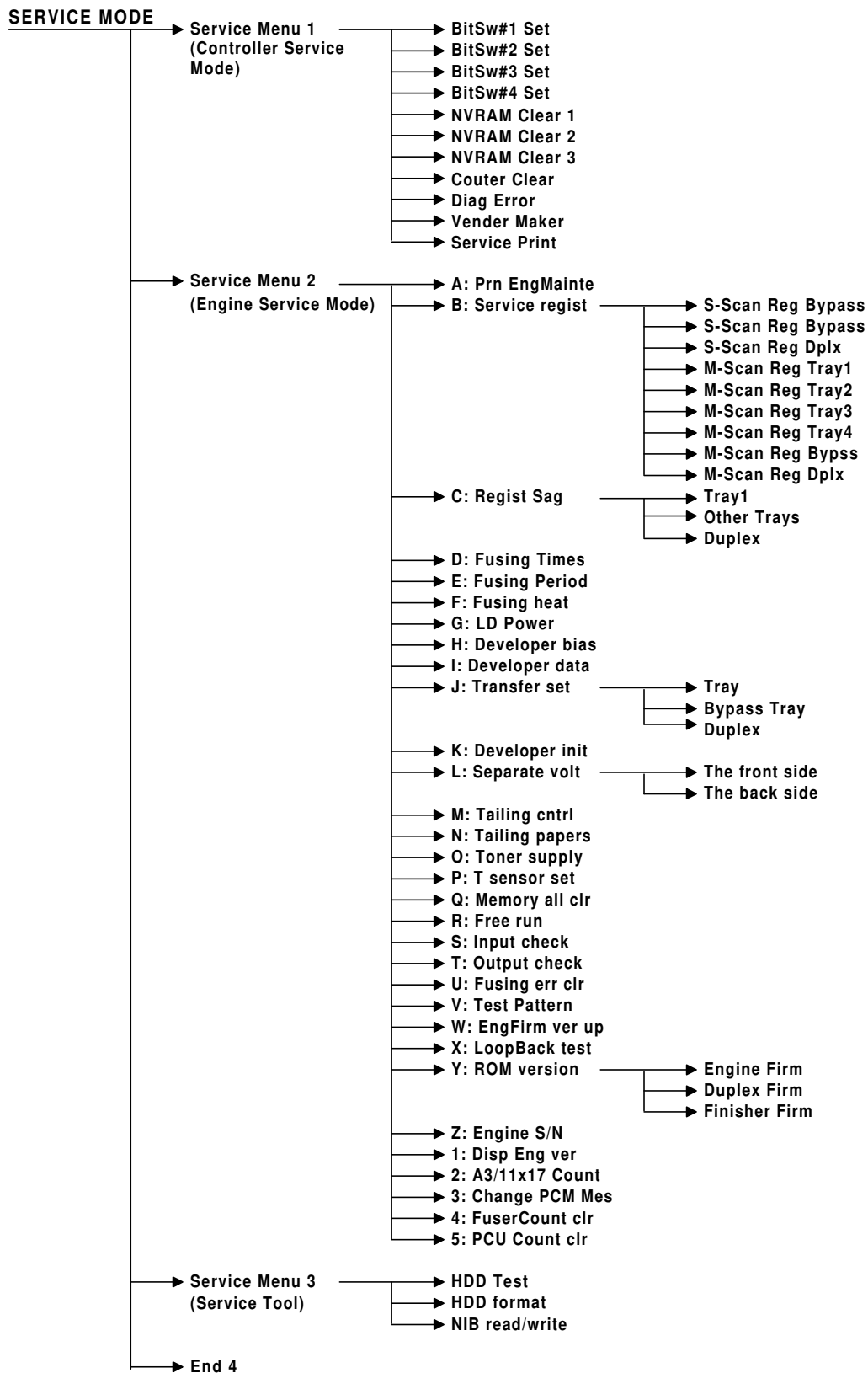
Select the required setting using the “Up/Down arrow” keys, then press the “Enter” key. The previous value remains if the “Enter” key is not pressed.

#### *Exiting the Service Mode*

Select “4.End” from the SP mode main menu, then press the “Enter” key to exit the SP mode.

## 4.2.2 SERVICE PROGRAM MODE MENU TREE

The following diagram shows the service mode menu tree.



## 4.3 PRINTER CONTROLLER SERVICE MODE

Service Mode Table (Service Menu 1)



	Title	Description
A	BitSw#1 Set	Adjusts bit switch settings. <b>Note:</b> Currently, the bit switches are not being used.
B	BitSw#2 Set	
C	BitSw#3 Set	
D	BitSw#4 Set	
E	NVRAM Clear 1	Initializes the controller NVRAM except bit switches, NIB settings, and log data.
F	NVRAM Clear 2	Initializes the NVRAM on the controller.
G	NVRAM Clear 3	Initializes the NVRAM on the NIB.
H	Counter Clear	Initializes all counters to zero.
I	Diag Error	Displays diagnostics error codes on the LCD.
J	Vender Maker	Selects the vender name.
K	Service Print	Prints the service summary sheet.

### 4.3.1 BIT SWITCH PROGRAMMING

1. Enter the SP mode and select "1.Service Menu1."
2. Select A, B, C, or D for the desired bit switch, then press [Enter].
3. Press [Enter] in the "Bit Switch Set" menu.
4. Adjust the bit switch using the following keys.
  - [▲] [▼]: Move to the next bit.
  - [Escape]: Exit without saving changes.
  - [Enter]: Exit and save changes.
5. Press [Enter] to save changes and exit.

#### **BIT SWITCHES**

**NOTE:** Currently the bit switches are not being used.

### 4.3.2 NVRAM RESET

#### CAUTION

**Print the service summary report, controller configuration page, and NIB configuration page before resetting the NVRAM(s).**

#### ***DIAG. ERROR LOG AND PAPER TRAY SETTINGS RESET***

This initializes the following settings in the controller NVRAM.

- Controller diagnostics error log
  - Paper type settings for trays
  - Paper size setting for the by-pass tray
1. Enter the SP mode, and select “1. Service Menu”.
  2. Select “E. NVRAM Clear 1”, then press [Enter].
  3. Ensure that you have printed the service summary report, then press [Enter].
  4. Press [Enter] to execute. Or press [Escape] to exit.

#### ***CONTROLLER NVRAM RESET***

This initializes all the data in the controller NVRAM, except the NIB settings.

1. Enter the SP mode, and select “1. Service Menu”.
2. Select “F. NVRAM Clear 2”, then press [Enter].
3. Ensure that you have printed the service summary report and controller configuration page, then press [Enter].
4. Press [Enter] to execute. Or press [Escape] to exit.

#### ***NIB NVRAM RESET***

This initializes all the data in the NIB NVRAM.

1. Enter the SP mode, and select “1. Service Menu”.
2. Select “G. NVRAM Clear 3”, then press [Enter].
3. Ensure that you have printed the NIB configuration page, then press [Enter].
4. Press [Enter] to execute. Or press [Escape] to exit.

### **COUNTER RESET**

This initializes all the print counters in the controller NVRAM. Refer to the service summary report for the counters in the controller NVRAM.

1. Enter the Printer SP mode, and select "1. Service Menu".
2. Select "H. Counter Clear", then press [Enter].
3. Press [Enter] to reset all the print counters.
4. Press [Enter] to execute. Or press [Escape] to exit.

**NOTE:** The total counter will not be cleared because the total counter data is stored in the engine board.

### **4.3.3 POWER-ON DIAGNOSTICS ERROR DISPLAY**

This displays the latest 8 error codes that were found during the power-on self-test. Refer to chapter 7 (Troubleshooting) for details of the error codes.

1. Enter the SP mode, and select "1. Service Menu".
2. Select "I. Diag Error", then press [Enter].
3. Check the error codes on the LCD.  
[▼] [▲]: Move to the previous/next code.
4. Press [Escape] to exit.

### **4.3.4 VENDER MAKER**

This enables to select the vender name for the printer.

1. Enter the SP mode, and select "1. Service Menu".
2. Select "K. Vender Maker", then press [Enter].
1. Select the vender name using [▼] [▲].
2. Enter the digit using [▼] [▲].
3. Press [Enter] to execute. Or press [Escape] to exit.

### **4.3.5 SERVICE SUMMARY**

This prints a summary of all the controller settings.

1. Enter the Printer SP mode, and select "1. Service Menu".
2. Select "L. Service Print", then press [Enter].
3. Press [Enter] again to print the report.

### **Model Number / System Version / Unit Number**

Lists the machine's Plug&Play name, controller firmware version, and the controller part number.

### **Program List**

Lists the firmware module version.

### **Bit Switch**

List the current bit switch settings.

**NOTE:** Currently the bit switches are not being used.

### **Counter**

List all the counters in the controller.

**NOTE:** The total counter data is not stored in the printer controller.

### **Exception Information**

List CPU exception error information. Designer use only.

### **System Logging / System Logging 2**

Lists internal log data. Designer use only.


### **Option**

Lists all the installed optional components.


## 4.4 PRINTER ENGINE SERVICE MODE

### 4.4.1 SERVICE MODE MENU

Service Mode (Service Menu 2)



	Title	Description	Notes (SP Mode)
A	Prn EngMainte	Prints the engine information	
B	Service regist	Man/sub scan registration	1-001/002
C	Regist sag	Paper feed timing	1-003
D	Fusing times	Fusing soft start adjustment	1-107
E	Fusing period	Fusing soft start settings	1-108
F	Fusing heat	Fusing temperature adjustment	1-105/106
G	LD power	LD power adjustment	2-103
H	Developer bias	Development bias adjustment	2-201
I	Developer data	Development data display	2-220
J	Transfer set	Transfer current adjustment	2-301
K	Developer init	Developer initialization	2-801
L	Separate volt	Separation voltage adjustment	2-901
M	Tailing cntrl	Tailing correction (shift value)	2-906-1
N	Tailing papers	Tailing correction (interval)	2-906-2
O	Toner supply	Toner supply mode	2-921
P	T sensor set	Standard Vt adjustment	2-926
Q	Memory all clr	Memory all clear	5-801
R	Free run	Free run mode	5-802
S	Input check	Input check mode	5-803
T	Output check	Output check mode	5-804
U	Fusing err clr	SC code reset	5-810
V	Test Pattern	Test pattern print	5-902
W	EngFirm ver up	Engine board firmware update	5-932
X	LoopBack test	Loop-back test (not used)	5-990
Y	ROM version	Displays the ROM number	7-801
Z	Engine S/N	Serial number programming	5-811
1	Disp Eng ver	Displays the engine version	9-999-9
2	A3/11x17 Count	A3/DLT double count selection	5-104
3	Change PCM Mes	Maintenance replacement warning	9-999-8
4	FuserCount clr	Fusing counter clear	
5	PCU Count clr	PCU counter clear	



## 4.4.2 SERVICE MODE TABLES

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>A:</b> Prn Eng Mainte		Prints the engine maintenance information	The following items are printed. <ul style="list-style-type: none"> <li>• Engine serial number</li> <li>• Firmware version (Engine/Duplex unit/Finisher)</li> <li>• Maintenance Counter (Total counter/PCU counter/Motor counter)</li> <li>• Engine settings</li> <li>• (Main/sub scan registration for each trays, density setting)</li> <li>• ID Sensor Error</li> <li>• Remaining amount of paper</li> <li>• Engine error logging (last 10 error)</li> </ul>	
	---			
<b>B:</b> Service regist	S-Scan Reg Tray	Leading Edge Registration (Paper Trays)	Adjusts the printing leading edge registration using the test pattern. Use the ▲/▼ keys to increase or decrease.	-9.0 to +9.0 0.1 mm/step <b>0.0 mm</b>
	S-Scan Reg Bypss	Leading Edge Registration (Bypass feed)		-12.5 to +12.5 0.1 mm/step <b>0.0 mm</b>
	S-Scan Reg Dplx	Leading Edge Registration (Duplex)		

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>B:</b> Service regist	M-Scan Reg Tray1	Side-to-Side Registration (Paper Tray 1)	Adjusts the printing side-to-side registration from paper tray 1 using the test pattern. Use the ▲/▼ keys to increase or decrease.	-9.0 to +9.0 0.1 mm/step <b>0.0 mm</b>
	M-Scan Reg Tray2	Side-to-Side Registration (Paper Tray 2)		
	M-Scan Reg Tray3	Side-to-Side Registration (Paper Tray 3: optional PFU tray 1 or optional LCT)		
	M-Scan Reg Tray4	Side-to-Side Registration (Paper Tray 4: optional PFU tray 2)		
	M-Scan Reg Bypss	Side-to-Side Registration (Feed from Bypass Tray)		
	M-Scan Reg Dplx	Side-to-Side Registration (Feed from Duplex unit)	Adjusts the printing side-to-side registration from the duplex unit using the test pattern.	-9.0 to +9.0 0.1 mm/step <b>0.0 mm</b>
<b>C:</b> Regist sag	Tray1	Paper Feed Timing (Tray 1)	Adjusts the paper feed clutch timing at registration. The paper feed clutch timing determines the amount of paper buckle at registration. (A larger setting leads to more buckling.)	0 to 10 1 mm/step <b>5 mm</b>
	Other Trays	Paper Feed Timing (2nd, 3rd, 4th Paper Feed and By-pass Feed)		
	Duplex	Paper Feed Timing (Duplex)		0 to 10 1 mm/step <b>6 mm</b>
<b>D:</b> Fusing times		Fusing Soft Start Adjustment	Adjusts the number of zero-cross cycles of the fusing lamp ac supply needed for the fusing lamp power to reach 100%. Use a higher number if the customer complains about sudden power dropouts.	<b>0: 3 times</b> 1: 10 times 2: 20 times
<b>E:</b> Fusing period		Fusing Soft Start Setting	Selects whether the fusing temperature control cycle is 1 or 3 seconds.	<b>0: 1 sec</b> 1: 3 sec

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>F:</b> Fusing heat		Fusing Temperature Adjustment	Adjusts the fusing temperature for printing. First, the current fusing temperature is displayed. Use the ▲/▼ keys to scroll to the temperature adjustment menu.	100 to 190 1°C/step <b>180°C</b>
<b>G:</b> LD power		LD Power Adjustment	Adjusts the LD power. <b>Important: Do not change the value.</b>	0 to 255 1 /step <b>129</b>
<b>H:</b> Developer bias		Development Bias Adjustment	Adjusts the development bias during printing. This can be adjusted as a temporary measure if faint printouts appear due to an aging drum.	-700 to -500 10 V/step <b>-600V</b>
<b>I:</b> Developer data		Developer Data Display	Displays the Vt, Vsp, Vsg, Vdsp, Vtref, and Pspwm values.	
<b>J:</b> Transfer set	Tray	Transfer Current (Trays)	Adjusts the current applied to the transfer roller during printing from paper trays.	0: -2 $\mu$ A <b>1: 0 <math>\mu</math>A</b> 2: +2 $\mu$ A 3: +4 $\mu$ A
	Bypass Tray	Transfer Current (Bypass Tray)	Adjusts the current applied to the transfer roller during printing from the by-pass tray.	
	Duplex	Transfer Current (Duplex)	Adjusts the current applied to the transfer roller during printing from the duplex unit.	
<b>K:</b> Developer init		Developer Initialization	Performs the developer initialization. The machine mixes the developer for 45 s and displays the results.	
<b>L:</b> Separate volt	The front side	Separation voltage adjustment	Adjusts the voltage applied to the separation plate at the leading edge of the paper on the front side. <b>Important:</b> If the printouts have pawl marks, increase this voltage.	-1200 to -4000 100 V/step <b>-1800 V</b>
	The back side		Adjusts the voltage applied to the separation plate, at the leading edge of the paper on the rear side.	-1200 to -4000 100 V/step <b>-2100 V</b>

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>M:</b> Tailing cntrl		Tailing Correction (Shift Value)	Shifts the image across the page at the interval specified by the following SP mode (N: Tailing papers). When making many copies of an original that contains vertical lines (such as a table), separation may not work correctly, then a tailing image will occur (ghosts of the vertical lines will continue past the bottom of the table). This SP prevents this problem.	0.0 to 5.0 0.1 mm/step <b>0.0 mm</b>
<b>N:</b> Tailing papers		Tailing Correction (Interval)	Changes the interval for the image shift specified by the previous SP mode (M: Tailing cntrl).	1 to 10 1 page/step <b>1 page</b>
<b>O:</b> Toner supply		Toner Supply Mode	Selects the toner supply mode. <b>Important:</b> Normally, only use "P+T Control" setting. Change to "T Control" temporarily if the TD sensor is defective. Do not use other settings; these are for designer's use only.	<b>P+T Control</b> Fixed 1 Fixed 2 T Control
<b>P:</b> T sensor set		Standard Vt	Adjusts Vts (Vt for a new PCU). The TD sensor output is adjusted to this value during the TD sensor initial setting process. This SP is not effective when "T Control" of the previous SP mode (O: Toner supply) is selected. <b>Important: Do not change this value.</b>	0.00 to 5.00 0.01 V/step <b>2.30 V</b>

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>Q:</b> Memory all clr		Memory All Clear	Resets all software counters and returns all modes and adjustments to the default settings. However, the following items are not reset. <ul style="list-style-type: none"> <li>• Total counter</li> <li>• PCU counter</li> <li>• Fusing counter</li> <li>• Engine serial number</li> </ul> <b>Important:</b> Turn the main switch off/on after the reset. This mode should be used only when the EEPROM on the engine board is replaced.	
<b>R:</b> Free run		Free Run	Performs a free run of the machine. Press [Enter] to start. Press [Enter] to stop. Please note that the machine will not stop immediately after the [Enter] key is pressed.	
<b>S:</b> Input check		Input Check	Displays signals received from sensors and switches. See the "Input Check" section for details.	
<b>T:</b> Output check		Output Check	Turns on electrical components individually for test purposes. See the "Output Check" section for details.	
<b>U:</b> Fusing err clr		SC Code Reset	Resets the service call (fusing error) conditions. After performing this SP mode, turn the main switch off and on.	
<b>V:</b> Test Pattern		Test Pattern Print	Prints a test pattern. This machine could print only the grid test pattern.	
<b>W:</b> EngFirm ver up		Engine Board Firmware Update	Downloads the system program from an IC flash memory card to the flash memory on the engine board. Refer to the "Program Download" section for details.	
<b>X:</b> LoopBack test		Loop-back test	Internal loop-back test. Designer use only.	

Menu Level			Function	Settings
Level 1	Level 2	Description		
<b>Y:</b> ROM version	Engine Firm	Displays the ROM Number	Displays the firmware ROM number.	
	Duplex Firm			
	Finisher Firm			
<b>Z:</b> Engine S/N		Serial Number Programming	Use to input the machine serial number. (This is normally done at the factory.)	
<b>1:</b> Disp Eng ver		Engine version display	Displays the engine version.	
<b>2:</b> A3/11x17 Count		A3/DLT Double Count	Specifies whether the counter is doubled for A3/11" x 17" paper. If "Yes" is selected, the total counter counts up twice when A3/11" x 17" paper is used.	x 2 count <b>1 count</b>
<b>3:</b> Change PCM Mess		Maintenance Replacement Warning	Enable or disable the PM warning.	<b>Notify 60K</b> Notify 60/65K No Message
<b>4:</b> Fuser Count clr		Fusing unit counter clear	Use to clear the fusing unit counter clear.	
<b>5:</b> PCU Count clr		PCU counter clear	Use to clear the PCU counter clear.	

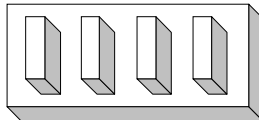
### 4.4.3 INPUT CHECK TABLE

Number	Description	Reading	
		00H	01H
0	Not used		
1	Front cover safety switch	Closed	Opened
2	Front cover safety switch - LD5 V	Closed	Opened
3	Right cover switch	Closed	Opened
4	Right lower cover switch	Closed	Opened
5	Tray Cover (optional paper tray unit)	Closed	Opened
6	Duplex unit open switch (Optional duplex unit)	Closed	Opened
7	Right upper cover switch	Closed	Opened
8	Right guide switch (Optional bridge unit)	Closed	Opened
9	Left guide switch (Optional bridge unit)	Closed	Opened
10	Not used		
11	Paper overflow sensor	Paper not detected	Paper detected
12 - 15	Not used		
16	Upper relay sensor	Paper not detected	Paper detected
17	Lower relay sensor	Paper not detected	Paper detected
18	Vertical transport sensor (Optional paper tray unit)	Paper not detected	Paper detected
19	Registration sensor	Paper not detected	Paper detected
20	Paper exit sensor	Paper not detected	Paper detected
21	Exit sensor (Optional interchange unit)	Paper not detected	Paper detected
22	Duplex entrance sensor (Optional duplex unit)	Paper not detected	Paper detected
23	Duplex exit sensor (Optional Duplex unit)	Paper not detected	Paper detected
24	Relay sensor (Optional bridge unit)	Paper not detected	Paper detected
25	Tray exit sensor (Optional bridge unit)	Paper not detected	Paper detected
26	Paper end sensor (optional bypass tray)	Paper not detected	Paper detected
27	Paper size sensor sensor (optional bypass tray)	See Table 2	
28 - 29	Not used		
30	Special paper switch	Off	On
31	Upper paper end sensor	Paper not detected	Paper detected
32	Lower paper end sensor	Paper not detected	Paper detected
33	Upper paper size switch	See Table 1	
34	Lower paper size switch	See Table 1	
35	1st paper height sensors	See Table 3	
36	2nd paper height sensors	See Table 3	
37	Upper paper end sensor (or right tray end sensor for the LCT) (Optional paper tray unit or LCT)	Paper not detected	Paper detected

Number	Description	Reading	
		00H	01H
38	Lower paper end sensor (Optional paper tray unit)	Paper not detected	Paper detected
39	Upper paper size switch (Optional paper tray unit or LCT)	See Table 1 (for paper tray unit) 01: A4, 02: LT (for LCT - there is no sensor)	
40	Lower paper size switch (Optional paper tray unit)	See Table 1	
41	Upper paper height sensor (Optional paper tray unit or LCT)	See Table 3	
42	Lower paper height sensor (Optional paper tray unit)	See Table 3	
43	Upper paper lift (limit) sensor (Optional paper tray unit or LCT)	Paper not at correct height	Paper at correct height
44	Lower limit sensor (Optional LCT)	Tray is not down	Tray is down
45	Rear fence H.P sensor (Optional LCT)	Not home position	At home position
46	Rear fence return sensor (Optional LCT)	Not return position	At return position
47	Side fence closed sensor (Optional LCT)	Not detected	Detected
48	Side fence open sensor (Optional LCT)	Not detected	Detected
49	Left tray paper end sensor (Optional LCT)	Paper not detected	Paper detected
50	Tray set switch(Optional LCT)	Off	On
51 - 52	Not used		
53	PCU set signal (a shorted connection in the ID sensor cable)	Not set	Set
54	New PCU detect switch	Used PCU	New PCU
55	Paper tray unit type (Optional paper tray unit)	See Table 4	
56	Paper tray unit installed	Not installed	Installed
57 - 60	Not used		
61	By-pass tray installed	Not installed	Installed
62	Duplex unit installed	Not installed	Installed
63	Fusing unit installed	Not installed	Installed
64	Interchange unit installed	Not installed	Installed
65	Finisher installed	Not installed	Installed
66 - 70	Not used		
71	Main motor lock	Off	On
72	Polygonal mirror motor lock	Off	On
73	Tray motor lock (Optional paper tray unit)	Off	On
74	Exhaust fan motor lock	Off	On
75 - 80	Not used		
81	Laser synchronization signal	Not detected	Detected

Number	Description	Reading	
		00H	01H
82	LD error	No error	Error
83 - 99	Not used		

**Table 1: Paper Size Switch (Main Unit)**



SW No. 1 2 3 4

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Number	SW 1	SW 2	SW 3	SW 4	SP Value	Paper Size
33, 34, 39, 40	0	0	0	0	00H	—
	0	0	1	0	04H	A4 LEF
	0	0	1	1	0CH	A4 SEF
	0	1	0	1	0AH	11" x 17"
	0	1	1	1	0EH	11" x 8 1/2"
	1	0	0	0	01H	8 1/2" x 11"
	1	0	1	0	05H	* (Asterisk)
	1	1	0	0	03H	8 1/2" x 14"
	1	1	1	1	0FH	A3

1: Pushed

**Table 2: By-pass Paper Size Sensor**

Number	SP Value	Paper Size	
		mm	inches
27	01H	A3	11" x 17"
	03H	—	11" x 17"
	02H	A4 SEF	8 1/2" x 11"
	06H	8" x 13"	—
	04H	A5 SEF	5 1/2" x 8 1/2"
	0CH	—	—
	08H	—	—

**Table 3: Paper Height Sensors**

Number	SP Value	Paper Amount
35, 36, 41, 42	00H	100%
	01H	70 - 75%
	02H	Near-end
	03H	25 - 30%

**Table 4: Paper Tray Unit Set Sensor**

Number	SP Value	Unit Installed
55	00H	None
	10H	LCT
	20H	Paper tray unit (2 trays)

#### 4.4.4 OUTPUT CHECK TABLE

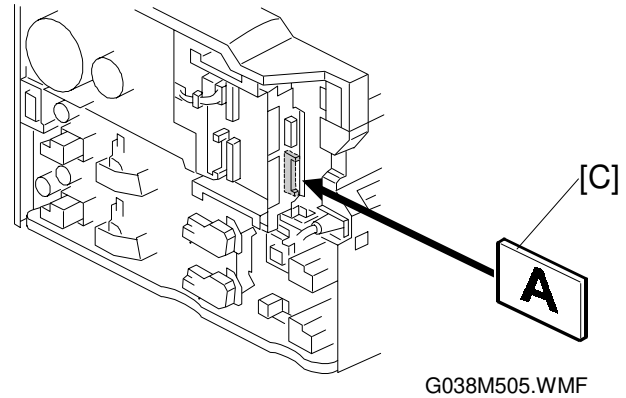
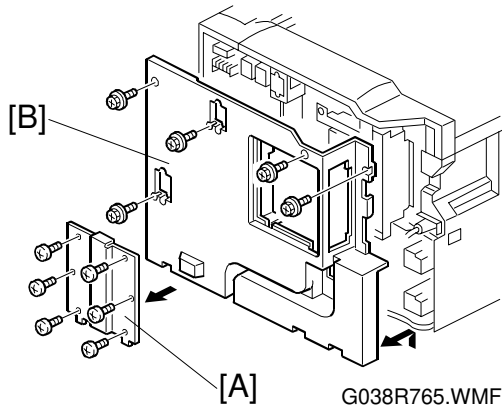
**NOTE:** Pull out the tray before performing the output checks from 29 to 32.

Number	Description
0	Not used
1	Main motor (forward)
2	Main motor (Reverse) <b>Do not use this mode.</b>
3	Registration clutch
4	Not used
5	Toner supply motor
6	Not used
7 - 8	Not used
9	Exhaust fan (High Speed)
10	Exhaust fan (Low Speed)
11	Not used
12	By-pass feed clutch
13	Upper paper feed clutch
14	Lower paper feed clutch
15	Upper paper lift motor (Up)
16	Upper paper lift motor (Down)
17	Lower paper lift motor (Up)
18	Lower paper lift motor (Down)
19	Lower paper lift motor (Up: Optional paper tray unit)
20	Lower paper lift motor (Down: Optional paper tray unit)
21	Upper relay clutch
22	Lower relay clutch
23	Relay clutch (Optional paper tray unit)
24 - 25	Not used
26	Upper paper feed clutch (Optional paper tray unit)
27	Lower paper feed clutch (Optional paper tray unit)
28	Tray motor (Optional paper tray unit)
29	Upper Paper lift motor (Up: Optional paper tray unit or LCT)
30	Rear fence motor (forward: Optional LCT)
31	Upper paper lift motor (Down: Optional paper tray unit or LCT)
32	Rear fence motor (reverse: Optional LCT)
33	Side fence solenoid (Optional LCT)
34	Shift tray motor (Optional shift tray)
35	Not used
36	Exit junction gate (Optional interchange unit)
37	Duplex junction gate (Optional interchange unit)
38 - 39	Not used
40	Duplex inverter motor (Reverse: Optional duplex unit)
41	Duplex inverter motor (Forward: Optional duplex unit)
42	Duplex transport motor (Optional duplex unit)
43	Inverter gate solenoid (Optional duplex unit)

Number	Description
44	Not used
45	Bridge cooling fan motor (Optional bridge unit)
46	Bridge unit drive motor (Optional bridge unit)
47	Junction gate solenoid (Optional bridge unit)
48 - 50	Not used
51	Polygonal mirror motor
52	Polygonal mirror motor and laser diode
53	Laser diode - <b>Do not use this mode</b>
54 - 79	Not used
80	Duplex unit free run (without paper)
81	Duplex unit free run (with paper)
82 - 99	Not used
100	4-bin mailbox motor (Optional 4-bin mailbox)
101	Mailbox turn gate solenoid 1 (Optional 4-bin mailbox)
102	Mailbox turn gate solenoid 2 (Optional 4-bin mailbox)
103	Mailbox turn gate solenoid 3 (Optional 4-bin mailbox)

### 4.4.5 ENGINE BOARD PROGRAM DOWNLOAD

The engine board program software can be upgraded using the flash memory card.



1. Turn off the main switch.
2. Remove the controller cover [A] and the rear cover [B].
3. Insert the flash memory card [C] into the IC card slot on the engine board through the bracket slot.  
**NOTE:** Insert the flash memory card so that the surface printed "A" faces the back side of the machine as shown.
4. Turn on the main switch to enter the SP mode, then select "2. Service Menu 2."
5. Scroll through the menu listings using [▼] [▲] keys until "EngFirm ver up" appears on the display, then press [Enter].
6. Press [Enter] to update the program.
7. If the software downloads successfully, the display shows "OK."
8. Turn off the main switch and remove the IC card.
9. Reinstall the controller cover and the rear cover.

## 4.5 SERVICE TOOLS

### 4.5.1 SERVICE TOOL MENU

Service Mode (Service Tool)

Title	Description
HDD Test	Verifies the FAT and directory entries on the HDD.
HDD format	Partitions and formats the HDD.
NIB read/write	Backs up the NIB NVRAM and restores it.



**NOTE:** Items related to the HDD will not be displayed if the HDD is not installed.

### 4.5.2 HDD TEST

This verifies the file and directory entries on the hard disk drive.

1. Enter the SP mode, and select “3. Service Tool.”
2. Select “HDD Test”, then press [Enter].
3. Specify the number of tests, then press [Enter].
  - If “000” is specified, the test will continue until it is manually cancelled.
  - [▲] [▼]: Increment/decrement the digit at the cursor.
  - [Escape]: Exit without executing the test. Cancels the test even while it is being executed.
  - [Enter]: Perform the test.
4. Check the result of the test, then do the following:
  - If the result is OK, press [Enter] to display the available free space on the HDD. Then press [Enter] again to exit.
  - If the result is NG, press [Enter] to do the test again. Or, press [Cancel] to exit.

Error Display Details	
Number at the top right corner	Indicates that the error was found in the n'th test.
Error Message	“Clstr error” A damaged cluster was found. The damaged cluster was marked as “bad” to avoid future use.

### 4.5.3 HDD FORMAT

This creates partitions on the HDD and formats them.

1. Enter the SP mode, and select “3. Service Tool”.
2. Select “HDD Format”, then press [Enter].
3. Check the HDD capacity, then press [Enter].
4. Press [Enter] again to start formatting. Or, press [Escape] to exit.  
**NOTE:** Once the format has started, it cannot be cancelled.
5. Check the result of the test, then do the following:
  - If the result is OK, press [Enter] to exit.
  - If the result is NG, check the error message, then press [Enter] to exit.

Error Display Details	
Error Messages	“HDD Ident Fail” The controller could not retrieve information from the HDD. “NG Logic Format” Logical format failed. “No Support HDD” Unsupported HDD is detected.



### 4.5.4 NIB NVRAM BACKUP AND RESTORE

This backs up the NIB NVRAM to the controller, and restores the data to the NIB NVRAM. Use this procedure when replacing a NIB. The following procedure shows how to use this when copying data from one NIB to another.

1. Ensure that the source NIB is installed in the controller.
2. Enter the SP mode, and select “3. Service Tool”.
3. Select “NIB read/write”, then press [Enter].
4. Select the data copy direction “NIB -> CTL”, then press [Enter].
  - [▲] [▼]: Select a data copy direction.
  - [Escape]: Exit.
  - [Enter]: Copy the NIB NVRAM to the controller.  
**NOTE:** Once data copying has started, it cannot be cancelled.
5. Check the result, then do the following:
  - If the result is OK, press [Enter] to exit. Go on to the next step.
  - If the result is NG, check the error message, then press [Enter] to exit.

Error Display Details	
Error Message	“NG copying” NIB data copying failed. Try again.

6. Turn off the machine and replace the NIB.
7. Turn on the machine, and ensure that the target NIB is correctly installed.
8. Enter the SP mode, and select "3. Service Tool".
9. Select "NIB read/write", then press [Enter].
10. Select the data copy direction "CTL -> NIB", then press [Enter].
  - [▲] [▼]: Select the data copy direction.
  - [Escape]: Exit.
  - [Enter]: Copy the NIB NVRAM to the controller.

**NOTE:** Once data copying has started, it cannot be cancelled.
11. Check the result, then do the following:
  - If the result is OK, press [Enter] to exit.
  - If the result is NG, check the error message, then press [Enter] to exit.

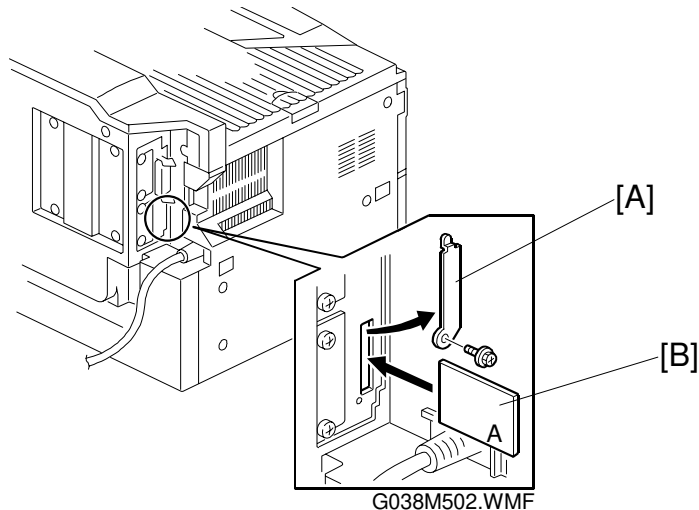
Error Display Details	
Error Message	"NG copying" NIB data copying failed. Try again.

## 4.6 CONTROLLER FIRMWARE UPDATE

### 4.6.1 FIRMWARE DOWNLOAD

This procedure is for upgrading the firmware for the controller, the network interface board, and the PS3 DIMM module.

To update the PS3 firmware, the target DIMM module must already contain a version of the PS3 firmware.



#### **⚠ CAUTION**

**Do not turn off the machine while downloading the firmware.**

1. Prepare an IC card that contains the required firmware.
2. Turn off the machine and remove the cover [A] (1 screw).
3. Install the card [B] in the IC card slot on the controller.  
**NOTE:** Insert the flash memory card so that the surface printed "A" faces the back side of the machine as shown.
4. Turn on the machine. Start downloading the new firmware by pressing the [Enter] key.
5. After the firmware download has finished, turn off the machine, and remove the card. Then, re-install the cover [A].
6. Turn on the machine, and print the service summary report to confirm that the new firmware version has been installed.

## 4.6.2 ERROR RECOVERY

### **CONTROLLER**

If the controller does not start up after a failed firmware download, use the following procedure. This procedure will force the controller to boot from the IC card.

1. Prepare an IC card with the required controller firmware version on it.
2. Turn off the machine and remove the controller.
3. Change the DIP switch 1 - No. 1 setting to "ON".
4. Put back the controller and install the card in the IC card slot on the controller.  
**NOTE:** When you see the machine from the back, the "A" side of the card must face the right side.
5. Turn on the machine.
6. Wait until the LEDs between the IC card slot and the parallel interface are both lit (this may take 1 to 2 minutes.).
7. Turn off the machine, remove the card, and reset the DIP switch 1 - No.1 setting to "OFF". Then, put back the controller.  
**NOTE:** The default settings of the DIP switches are all 'OFF'.
8. Turn on the machine, and print the service summary report.

### **PS3 DIMM / NIB**

If a download attempt failed, try downloading the new firmware again.

## 4.7 POWER-ON SELF TEST

### 4.7.1 PARALLEL LOOP-BACK TEST

This tests the standard IEEE1284 parallel interface using a loop-back connector. The loop-back connector (P/#: G0219350) is required for this test.

**NOTE:** Do not use the loop-back connector (P/#: G0109350). This loop-back connector causes the "Timeout error".

1. Turn off the machine and attach the loop-back connector to the Centronics parallel interface.
2. Turn on the machine.
  - Regardless of the test result, the controller starts up as normal.
3. Enter the SP mode and check the "Diag. Error" for the error codes 1101 or 1102.
  - Refer to the section 4.3.3 "Printer Controller Service Mode" for how to check the error codes.
  - Refer to the section 7.2 for the details of error codes.

### 4.7.2 OTHER TESTS

The controller tests the following devices at power-on. If an error is detected, an error code is stored in the NVRAM. Refer to the section 4.3.3 for how to check the error codes, and the section 7.2 for the details of error codes.

- Flash ROM (Firmware)
- CPU, Clock and ASIC
- Resident and optional SDRAM
- Centronics interface (if a loop-back connector is present)
- NVRAM
- Font ROM
- Optional HDD

---

## 5. PREVENTIVE MAINTENANCE

### 5.1 USER MAINTENANCE

All PM items can be done by the customer, using the maintenance kit. The maintenance kit contains the following items.

When the maintenance counter reaches 120K, "Replace Maintenance Kit" is displayed. After replacing the parts in the maintenance kit, the machine automatically resets the PM (fusing) count.

Item	Quantity	Remarks
Paper Feed Rollers	4	2 rollers for the standard trays, 2 rollers for optional trays.
Friction Pads - Standard Trays	2	
Friction Pads - Optional Trays	2	Optional trays
Transfer/Separation Unit	1	
Fusing Unit	1	
Feed Roller - LCT	1	LCT
Pick-up Roller - LCT	1	LCT
Separation Roller - LCT	1	LCT

## 5.2 SERVICE MAINTENANCE

### 5.2.1 PM TABLE

The following tables describe the PM items when the PM is done by service.

**NOTE:** Make sure to clear the PM (fusing) counter by the SP mode  
(Service Menu 2: FuserCount clr) when you replace the fusing parts.

**Cross-reference:** Section 4.2 Service Program Mode

Symbol key: C: Clean, R: Replace, L: Lubricate, I: Inspect

Item	120K	EM	Remarks
<b>Paper Feed</b>			
Paper Feed Roller	R	C	Clean with water
Friction Pad	R	C	Dry cloth
Paper Feed Guides	C	C	Clean with alcohol
Registration Rollers	C	C	Clean with water
Bottom Plate Pad	C	C	Clean with water
Relay Rollers	C	C	Clean with water
Registration Roller Mylar	C	C	Clean with water
<b>Around the Drum</b>			
Transfer/Separation Unit	R		
<b>Fusing Unit and Paper Exit</b>			
Hot Roller	R		
Pressure Roller	R		
Hot Roller Strippers	R		
Fusing Thermistor	C		Clean if necessary (suitable solvent)
Fusing Entrance and Exit Guide Plates	C		Clean with water or alcohol.
Cleaning Roller	C		Clean with water or alcohol.
Paper Exit Guide Ribs	C		Clean with water or alcohol.
<b>Others</b>			
Main Motor Drive Gear	I	L	Silicone Grease G501 (see note)

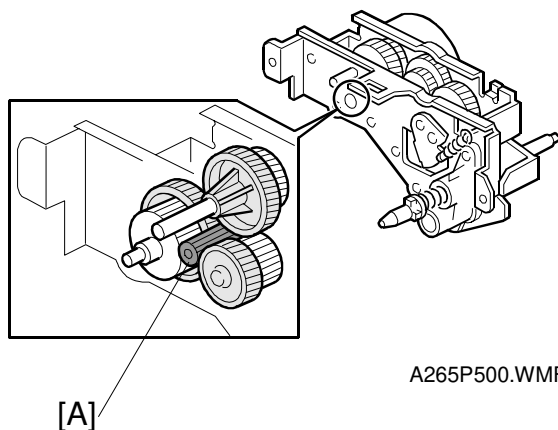
	120K	EM	NOTE
<b>Paper Tray Unit</b>			
Paper Feed Roller	R	C	Clean with water
Friction Pad	R	C	Dry cloth
Paper Feed Guides	C	C	Clean with alcohol.
Relay Rollers	C	C	Clean with water.
Bottom Plate Pad	C	C	Clean with water.
Relay Clutch	I		Replace if necessary
Paper Feed Clutch	I		Replace if necessary

	120K	EM	NOTE
<b>LCT</b>			
Paper Feed Roller	R		
Pick-up Roller	R		
Separation Roller	R		
Transport Rollers	C		Clean with water
Bottom Plate Pad	C		Clean with water
Relay Clutch	I		Replace if necessary
Paper Feed Clutch	I		Replace if necessary

	120K	EM	NOTE
<b>Finisher</b>			
Rollers		C	Clean with water or alcohol.
Brush Roller	I	I	Replace if necessary.
Discharge Brush	C	C	Clean with a dry cloth
Sensors		C	Blower brush
Jogger Fences	I	I	Replace if necessary.
Punch Waste Hopper	I	I	Empty the hopper.



**NOTE:** Lubricate the main motor drive gear [A] with silicone grease G501 every EM.



Preventive  
Maintenance

## 6. REPLACEMENT AND ADJUSTMENT

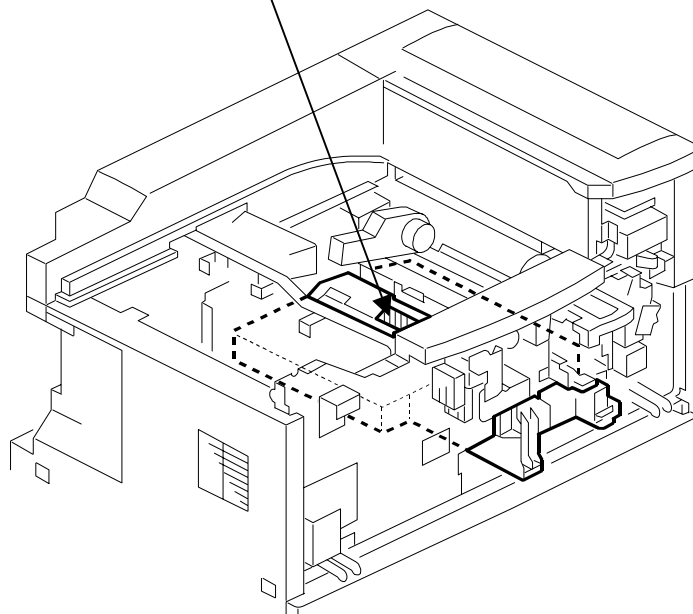
### 6.1 LASER UNIT

#### WARNING

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

#### 6.1.1 CAUTION DECAL LOCATIONS

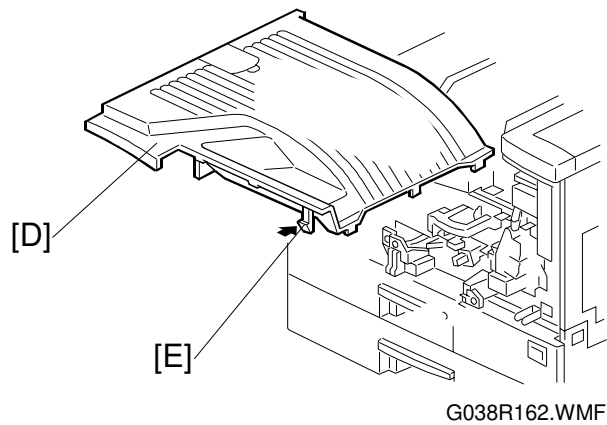
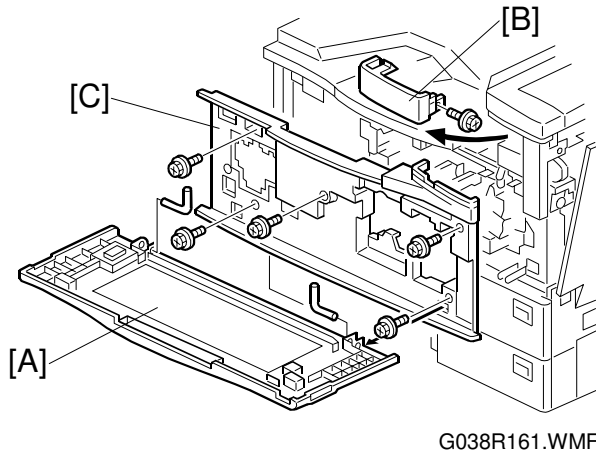
Caution decal is located in the laser section as shown below.



G038R501.WMF

Replacement  
Adjustment

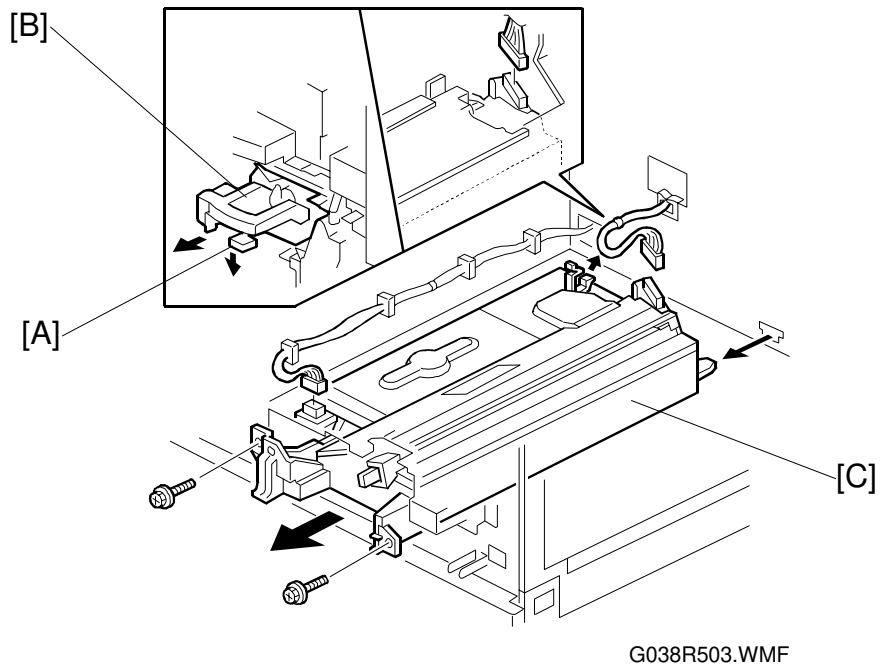
## 6.1.2 LASER UNIT



### **⚠ WARNING**

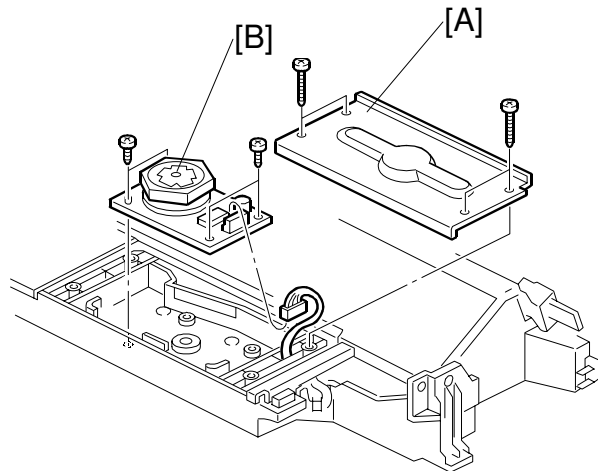
**Turn off the main switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.**

1. Remove the optional finisher and/or bridge unit, if these units have been installed.
2. Remove the front cover [A] (2 pins).
3. Remove the right front cover [B] (1 screw).
4. Swing up the toner bottle lever. Then, remove the inner cover [C] (5 screws).
5. Remove the paper exit tray [D] (1 hook [E]).



6. Release the lock lever [A] and slide out the toner bottle [B].
7. Remove the laser unit [C] (2 screws, 2 connectors).

### 6.1.3 POLYGONAL MIRROR MOTOR

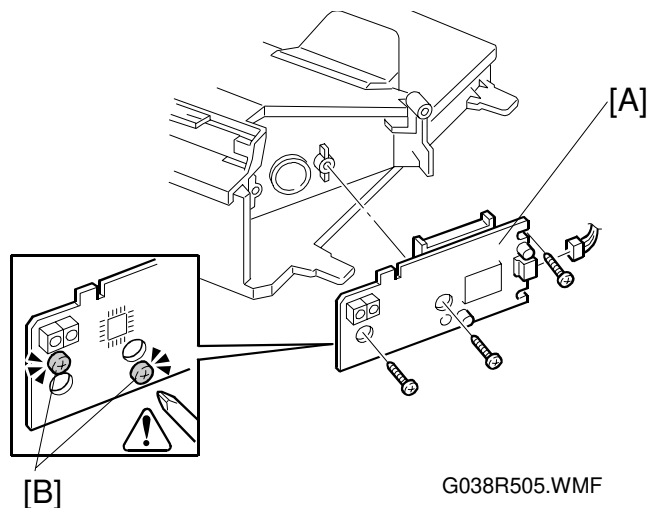


G038R504.WMF

**NOTE:** When performing the following steps, take care not to damage the mirror surface with the tip of the screw driver. Also, do not touch the mirror surface with bear fingers.

1. Remove the laser unit. (See Laser Unit Replacement.)
2. Remove the heat sink [A] (4 screws).
3. Replace the polygonal mirror motor [B] (4 screws, 1 connector).

### 6.1.4 LASER DIODE (LD) UNIT

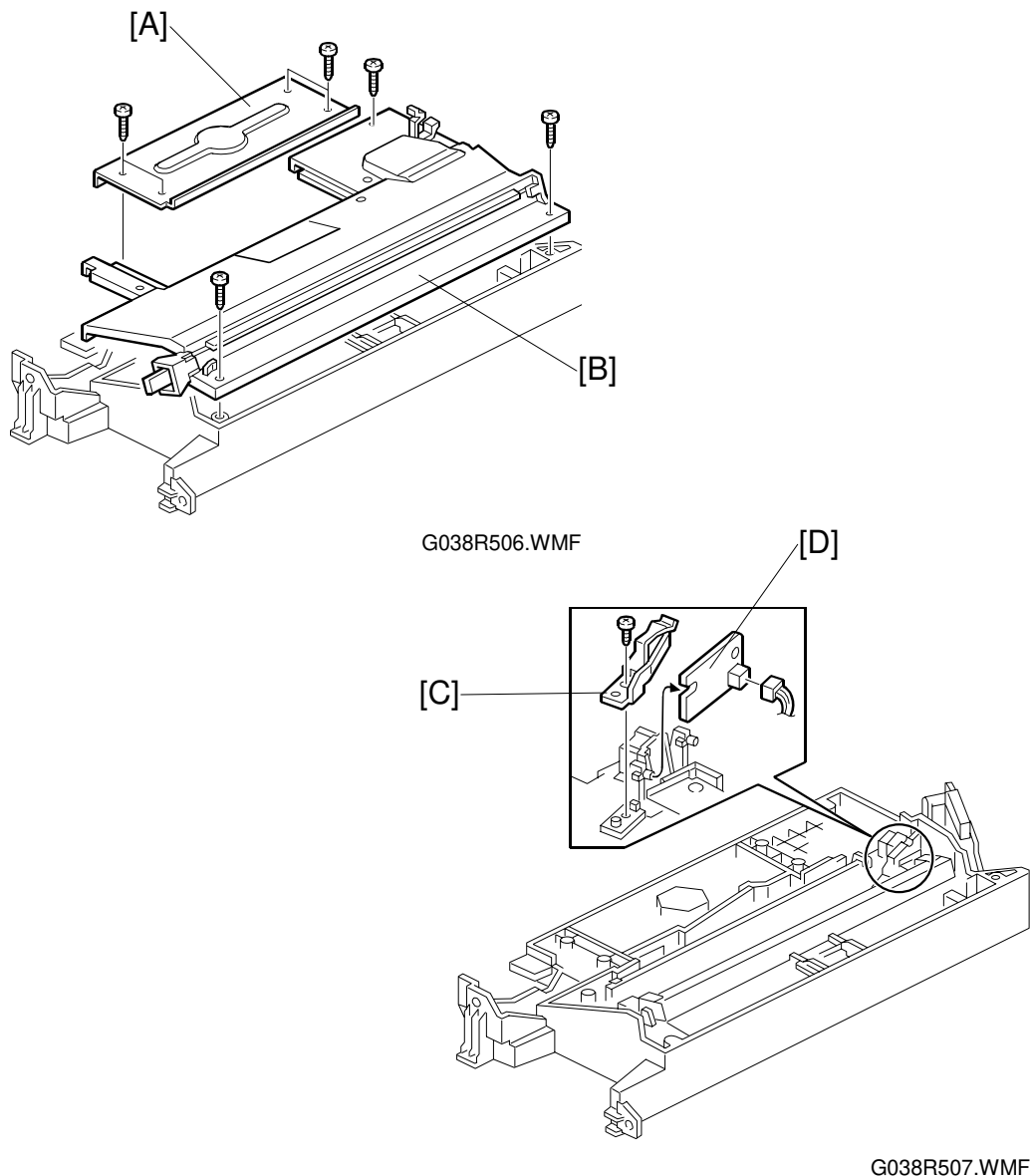


G038R505.WMF

1. Remove the laser unit. (See Laser Unit Replacement.)
2. Remove the laser diode unit [A] (3 screws, 1 connector).

**NOTE:** 1) Do not loose the screws [B].  
2) Do not touch any variable resistors on the LD unit.

### 6.1.5 LASER SYNCHRONIZATION DETECTOR

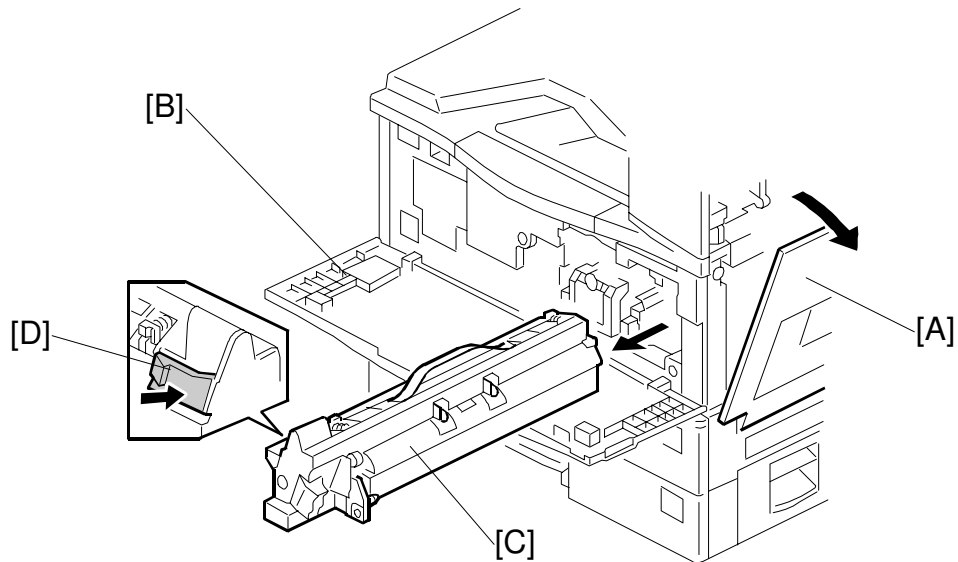


1. Remove the laser unit. (See Laser Unit Replacement).
2. Remove the heat sink [A] (4 screws).
3. Remove the laser upper cover [B] (3 screws).
4. Remove the holding bracket [C] (1 screw).
5. Remove the laser synchronization detector [D] (1 connector).

Replacement  
Adjustment

## 6.2 PHOTOCONDUCTOR UNIT (PCU)

### 6.2.1 PCU



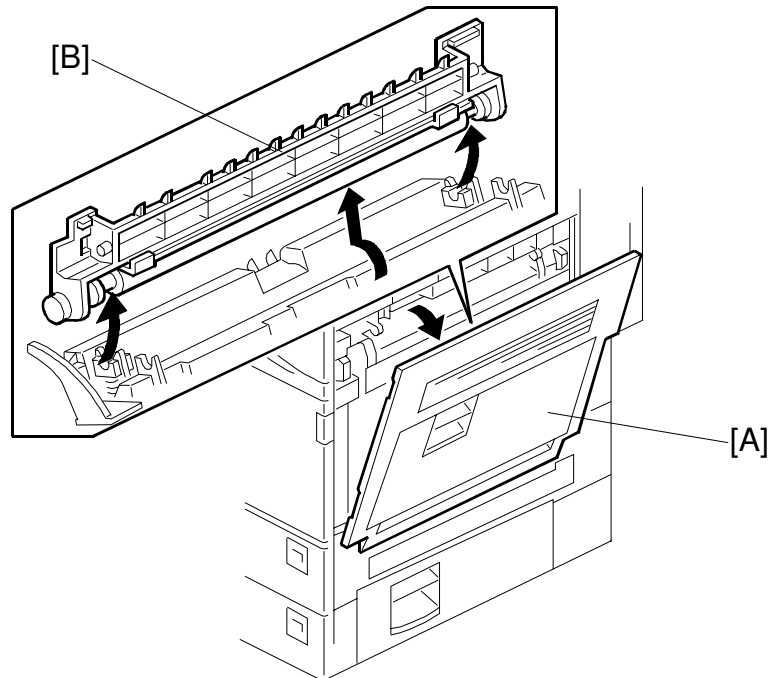
G038R569.WMF

1. Open the right cover [A] and front cover [B].
2. Pull the PCU [C] out slightly while pushing the release lever [D].

**NOTE:** Do not touch the drum surface with bare hands.

## 6.3 TRANSFER UNIT

### 6.3.1 TRANSFER ROLLER UNIT

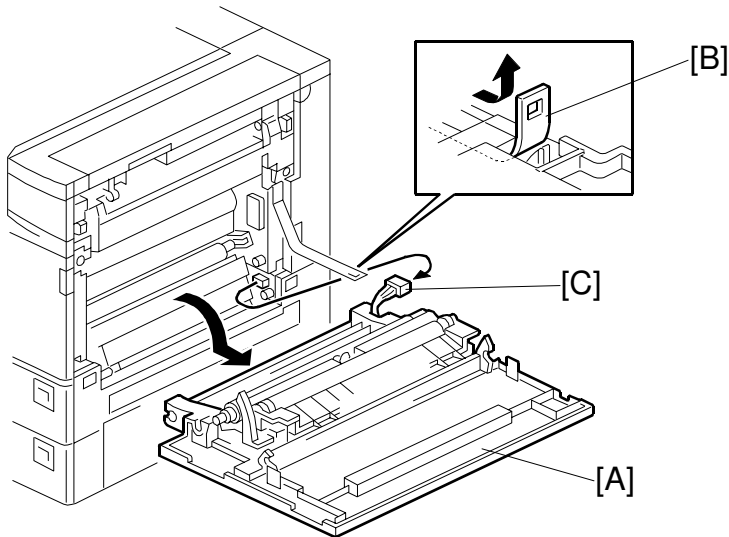


G038R570.WMF

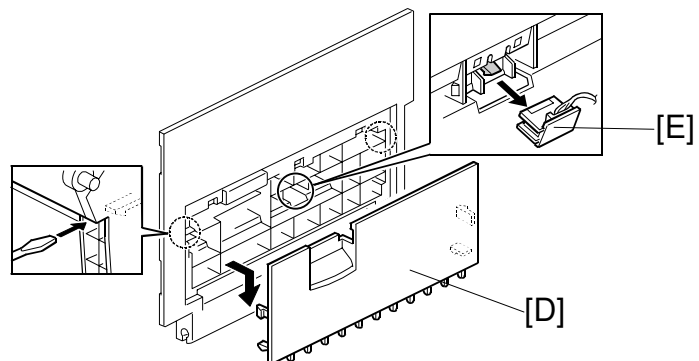
1. Open the right cover [A].
2. Remove the transfer roller unit [B] (1 hook).  
**NOTE:** Do not touch the transfer roller surface.

Replacement  
Adjustment

## 6.4 ID SENSOR



G038R261.WMF

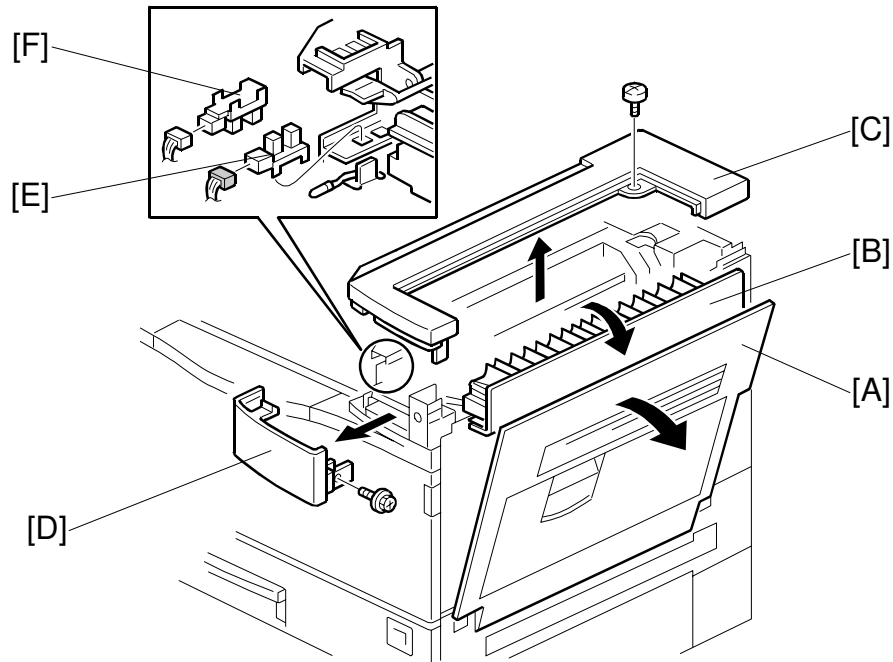


G038R502.WMF

1. Remove the optional duplex unit, if it has been installed.
2. Open the right cover [A].
3. Lift up the right cover band [B] and slide it to the left.
4. Remove the connector of the ID sensor [C] while opening the right cover to a horizontal position.
5. Remove the right cover [A].
6. Remove the sub right cover [D].
7. Remove the ID sensor [E] (removing the harness).

## 6.5 PAPER EXIT

### 6.5.1 PAPER EXIT AND OVERFLOW SENSORS



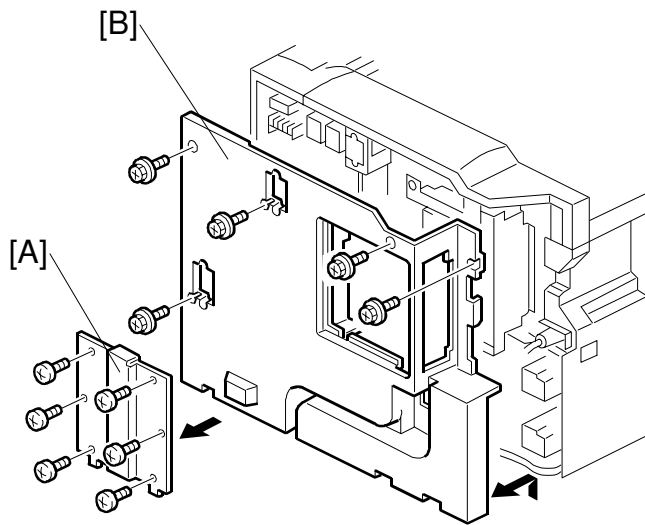
G038R661.WMF

1. Remove the optional 4-bin mailbox unit if it has been installed.
2. Open the right cover [A].
3. Open the paper exit guide cover [B] and remove the upper cover [C] (1 screw).
4. Remove the right front cover [D].
5. Remove the paper exit [E] and overflow [F] sensors (1 connector each).

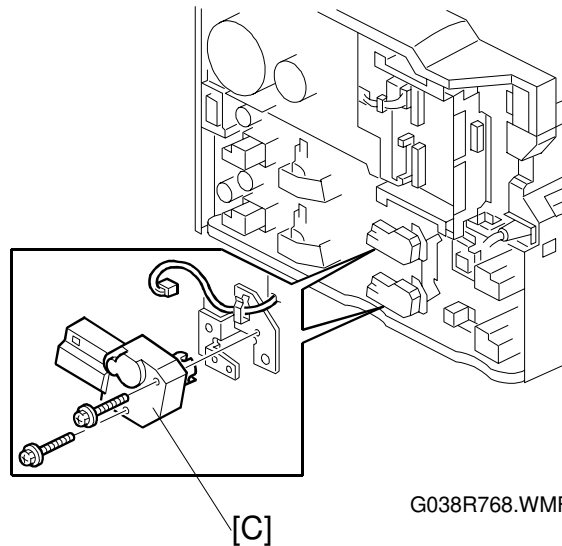
Replacement  
Adjustment

## 6.6 PAPER FEED AND REGISTRATION

### 6.6.1 PAPER LIFT MOTORS



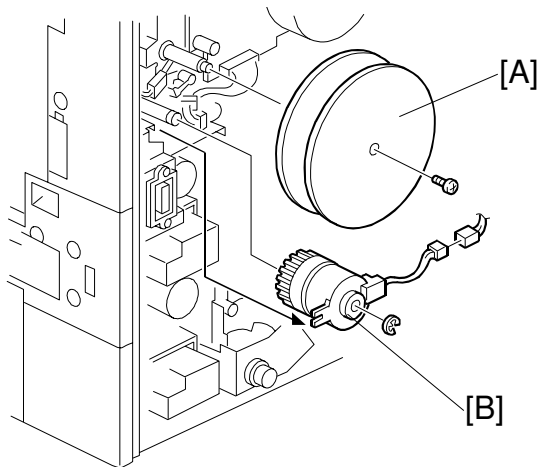
G038R765.WMF



G038R768.WMF

1. Disconnect the interface harness of the optional paper tray unit of LCT.
2. Remove the controller cover [A] (6 screws).
3. Remove the rear cover [B] (5 screws).
4. Remove the upper and lower paper lift motors [C] (1 connector, 2 screws each).

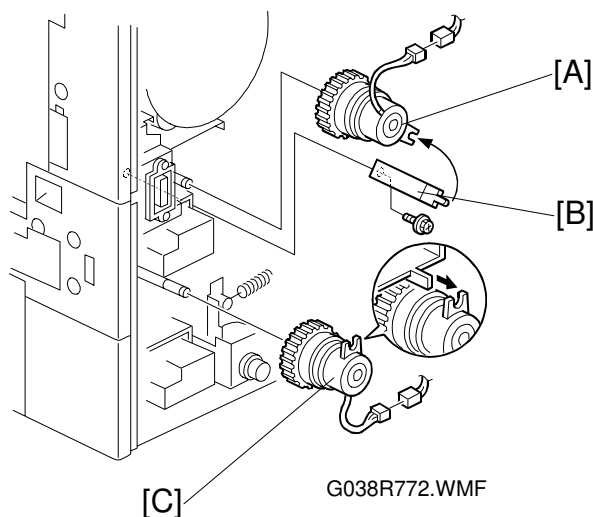
## 6.6.2 REGISTRATION CLUTCH



G038R771.WMF

1. Remove the rear cover. (See Paper Lift Motors.)
2. Remove the fly-wheels [A] (1 screw).
3. Remove the registration clutch [B] (1 connector, 1 E-ring).

## 6.6.3 PAPER FEED CLUTCHES

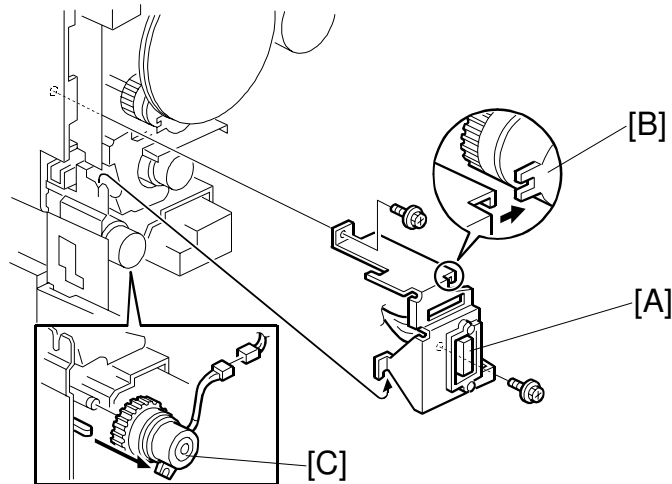


G038R772.WMF

1. Remove the rear cover. (See Paper Lift Motors.)
2. Remove the bracket [A]. Then, remove the upper paper feed clutch [B] (1 connector).
3. Remove the lower paper feed clutch [C] (1 connector).

Replacement  
Adjustment

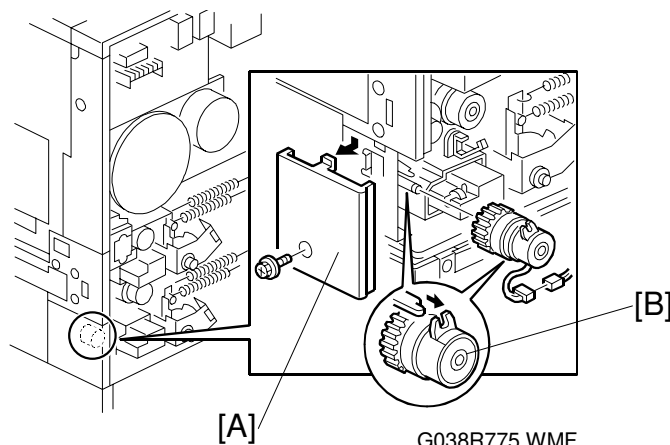
### 6.6.4 UPPER PAPER TRANSPORT CLUTCH



G038R774.WMF

1. Remove the rear cover. (See Paper Lift Motors.)
2. Remove the connector bracket [A] (2 screws).  
**NOTE:** The connector bracket also functions to hold the registration clutch [B] in place. When attaching the bracket, make sure to position it so that the bracket can perform both functions.
3. Remove the upper paper transport clutch [C] (1 connector).

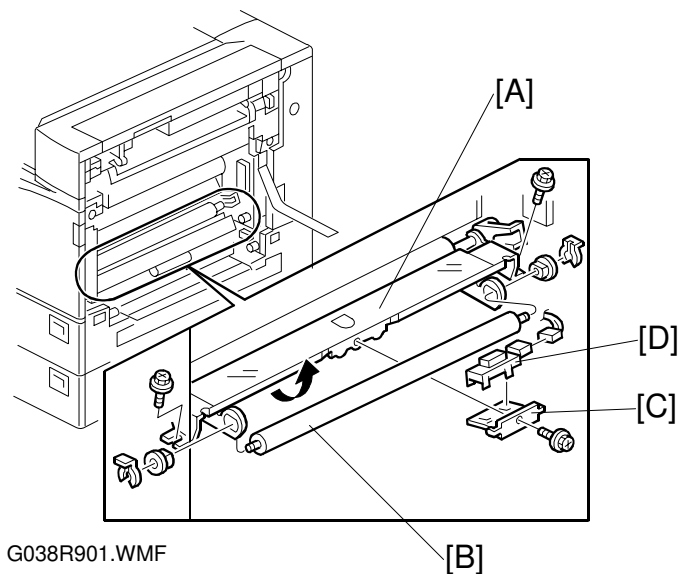
### 6.6.5 LOWER PAPER TRANSPORT CLUTCH



G038R775.WMF

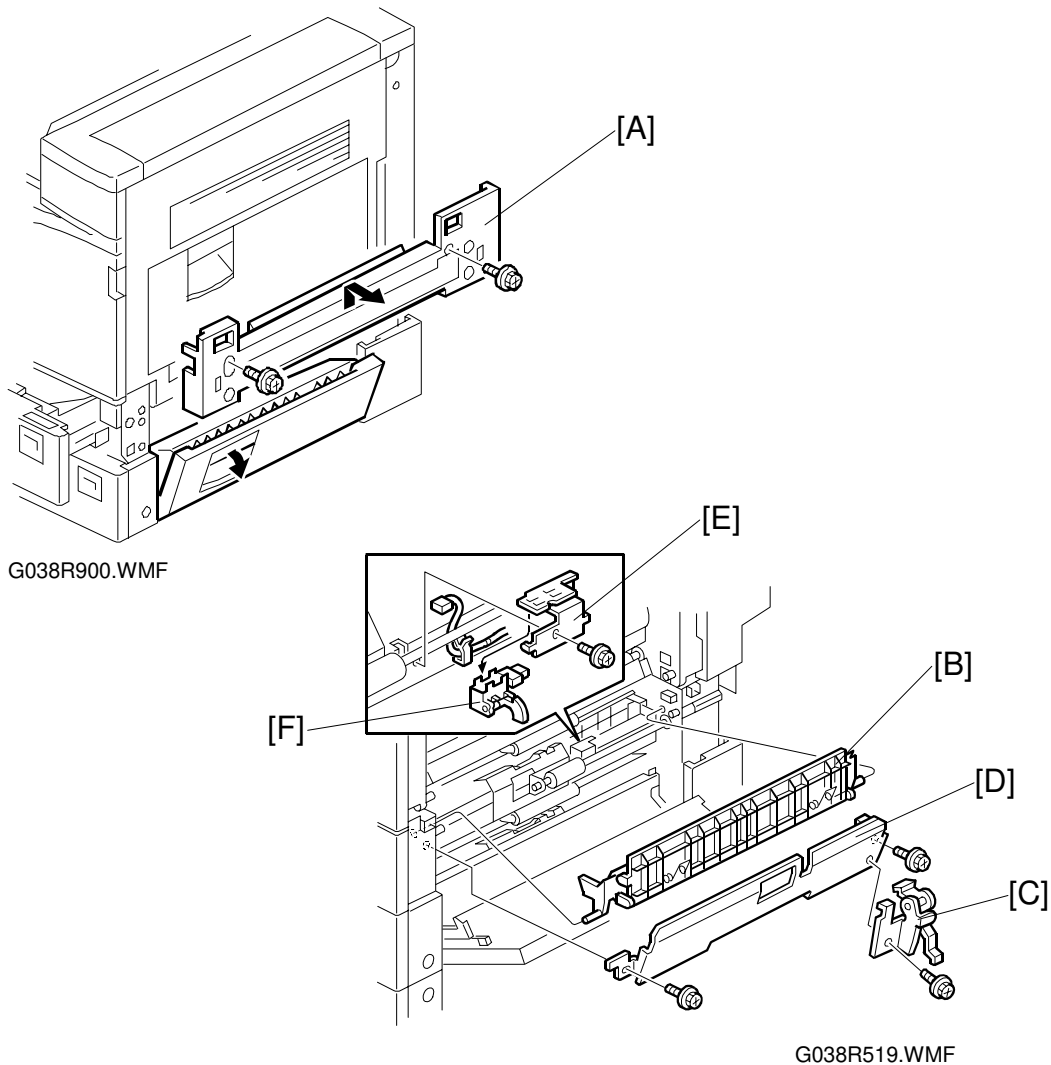
1. Remove the rear cover. (See Paper Lift Motors.)
2. Remove the right rear lower cover (1 screw).
3. Remove the lower paper transport clutch [B] (1 connector).

## 6.6.6 REGISTRATION SENSOR



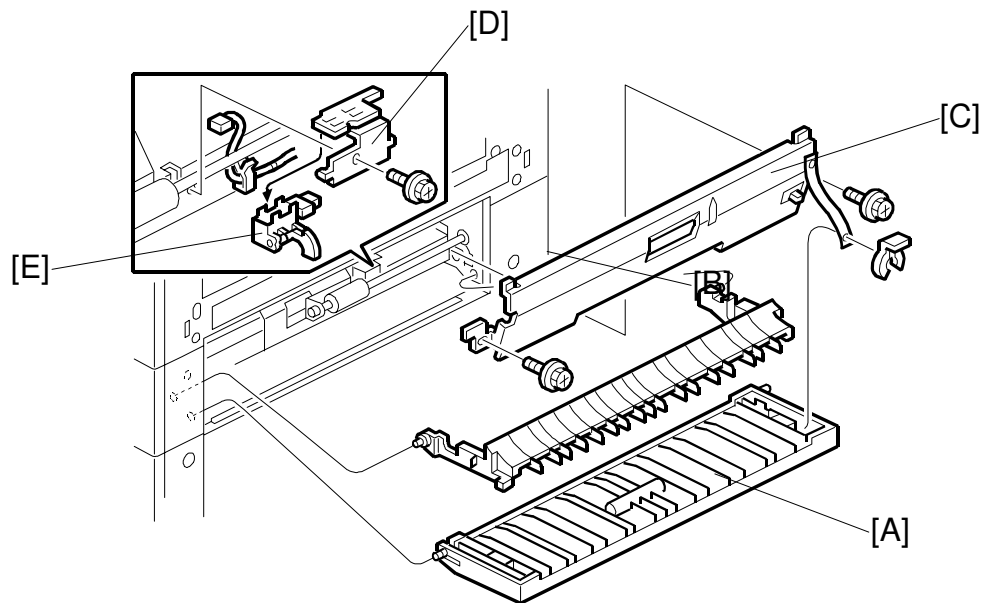
1. Remove the right cover. (See Image Density Sensor.)
2. Remove the registration guide plate [A] (2 screws).
3. Remove the paper support roller [B] (2 snap rings, 2 bushings).
4. Remove the sensor bracket [C] (1 screw).
5. Remove the registration sensor [D] (1 connector).

Replacement  
Adjustment

**6.6.7 UPPER RELAY SENSOR**

1. Remove the optional duplex and by-pass tray unit, if these unit have been installed.
2. Remove the right cover. (See ID Sensor.)
3. Remove the right lower cover [A] (2 screws).
4. Remove the guide plate [B].
5. Remove the bracket [C] (1 screw).
6. Remove the guide plate [D] (2 screws).
7. Remove the sensor bracket [E] (1 screw).
8. Remove the first paper transport sensor [F] (1 connector).

### 6.6.8 LOWER RELAY SENSOR

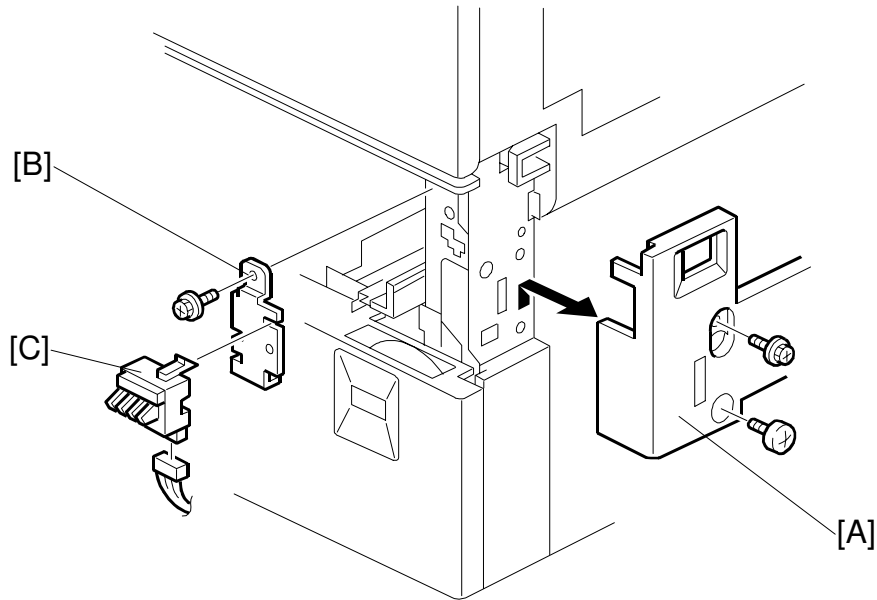


G038R520.WMF

1. Open the paper transport cover [A] (1 clip).
2. Remove the guide plate [B].
3. Remove the transport stay [C] (2 screws).
4. Remove the sensor bracket [D] (1 screw).
5. Remove the second paper transport sensor [E] (1 connector).

Replacement  
Adjustment

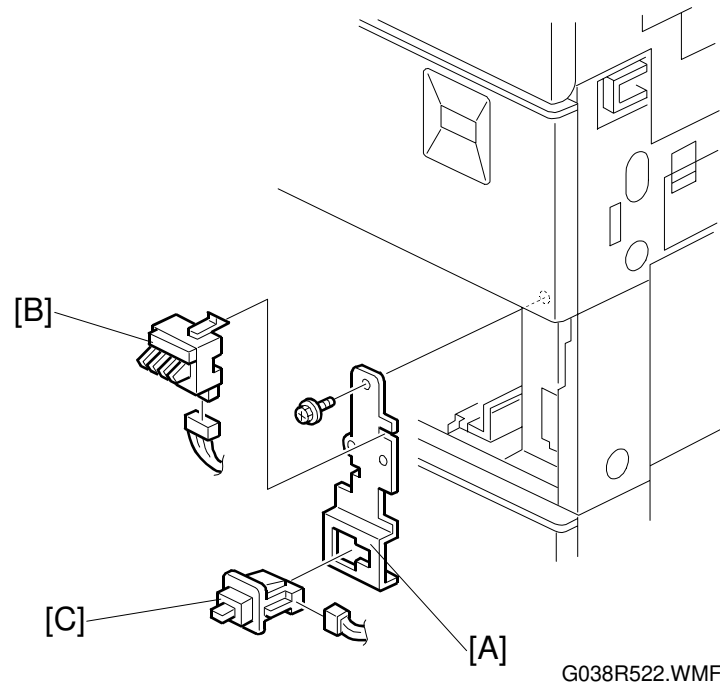
### 6.6.9 UPPER PAPER SIZE SENSOR



G038R521.WMF

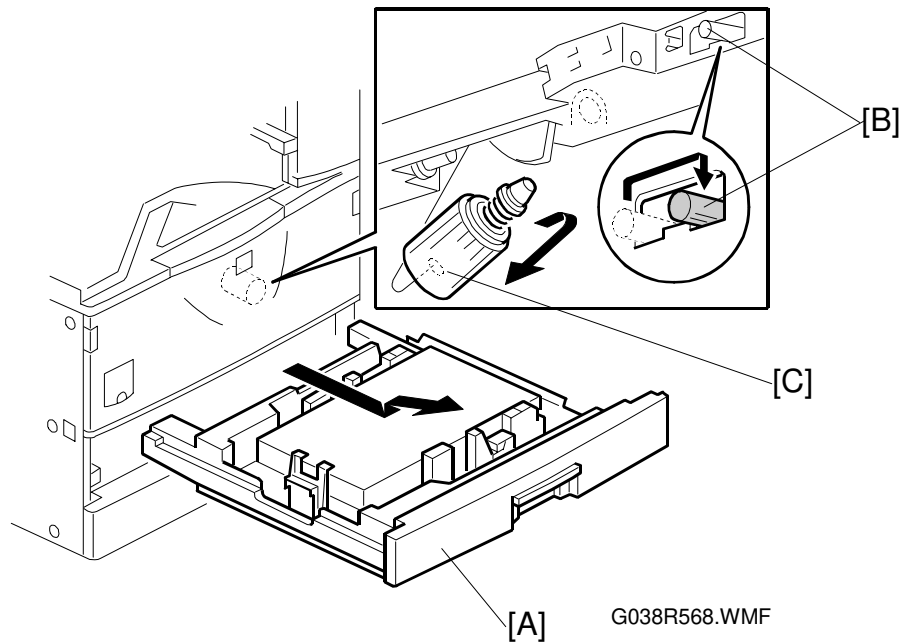
1. Pull out the paper tray.
2. Remove the optional duplex unit and by-pass tray unit, if these units have been installed.
3. Remove the right lower cover [A].
4. Remove the sensor bracket [B] (1 screw).
5. Remove the upper paper size sensor [C].

## 6.6.10 LOWER PAPER SIZE SENSOR/SPECIAL PAPER SENSOR



1. Pull out the paper tray.
2. Remove the sensor bracket [A] (1 screw).
3. Remove the lower paper size sensor [B] (1 connector).
4. Remove the special paper sensor [C] (1 connector).

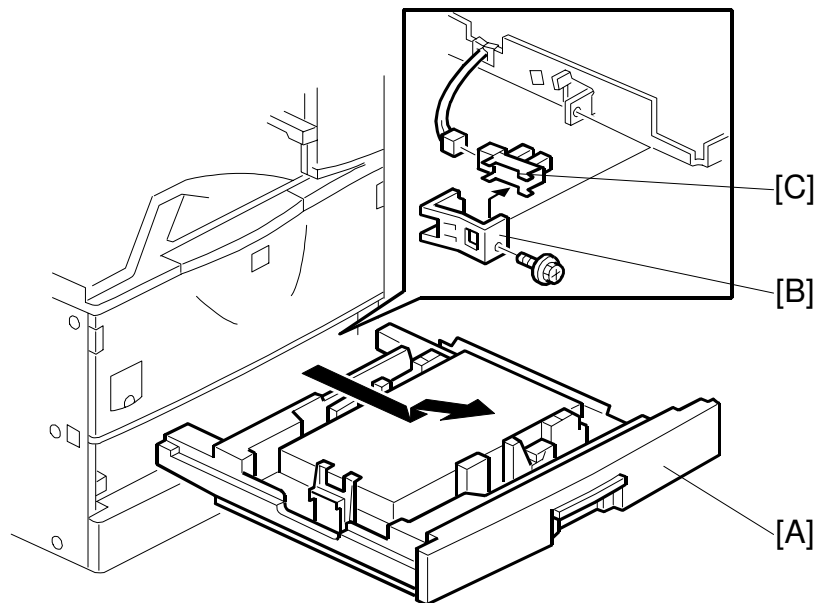
### 6.6.11 FEED ROLLERS



1. Remove the paper tray [A].
2. Pull the lever [B].
3. Replace the feed roller [C].

**NOTE:** Do not touch the roller surface with bare hands.  
After reinstalling the feed roller, return the lever [B].

### 6.6.12 PAPER END SENSOR (1ST AND 2ND PAPER FEED TRAYS)



G038R524.WMF

1. Remove the paper tray [A].
2. Remove the sensor bracket [B] (1 screw, 1 connector).
3. Remove the paper end sensor [C].

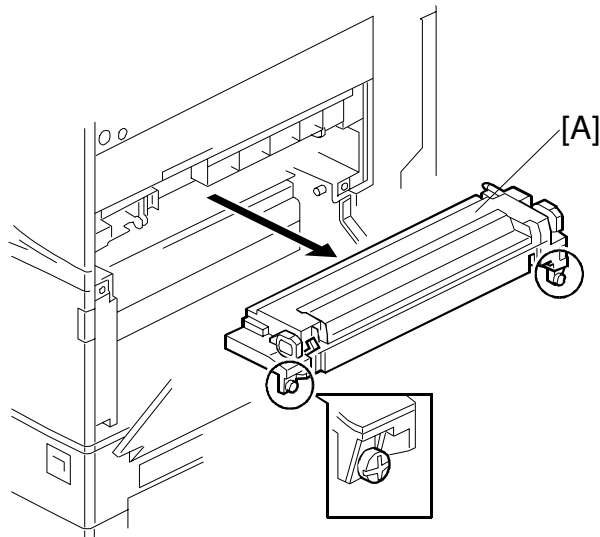
Replacement  
Adjustment

## 6.7 FUSING

### 6.7.1 FUSING UNIT

#### CAUTION

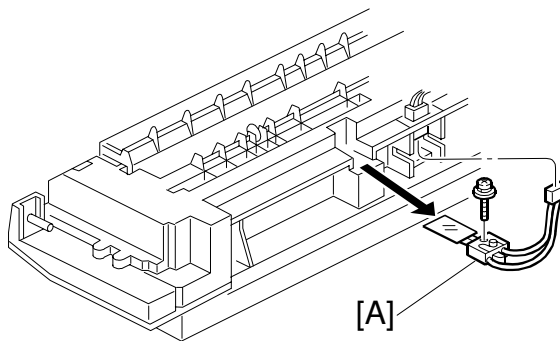
Allow time for the unit to cool before doing the following procedure.



G038R561.WMF

1. Release the duplex unit, if it has been installed, and open the right cover.
2. Remove the fusing unit [A] (2 screws).

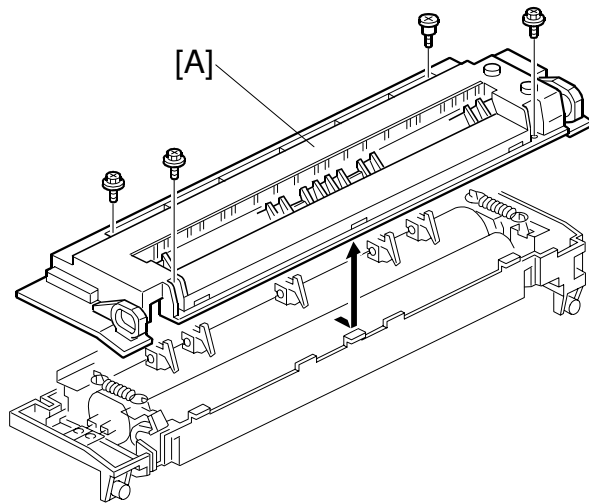
### 6.7.2 THERMISTOR



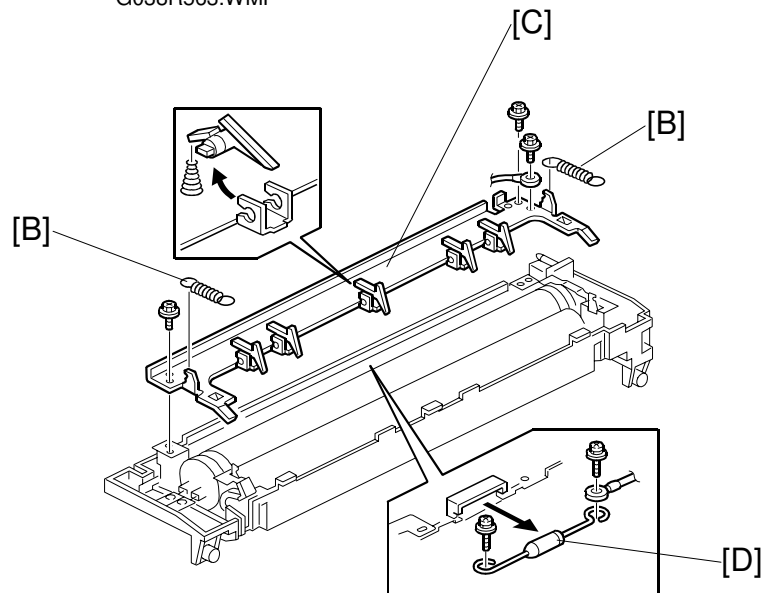
G038R562.WMF

1. Remove the fusing unit. (See Fusing Unit).
2. Replace the thermistor [A] (1 screw, 1 connector).

### 6.7.3 THERMOFUSE



G038R563.WMF

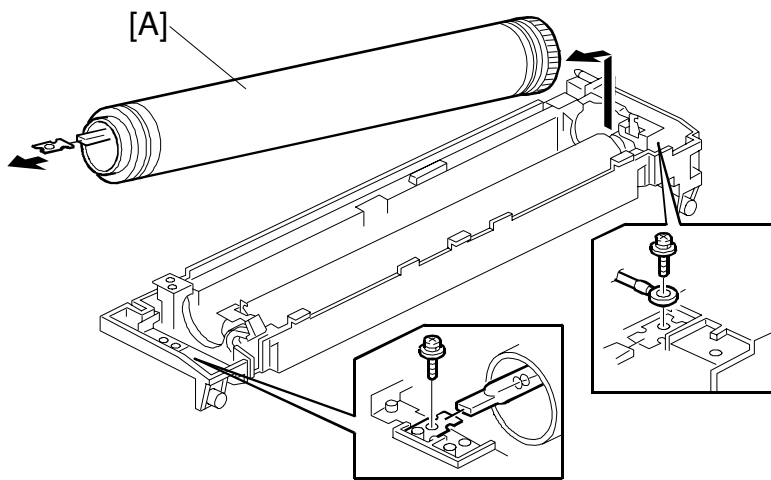


G038R564.WMF

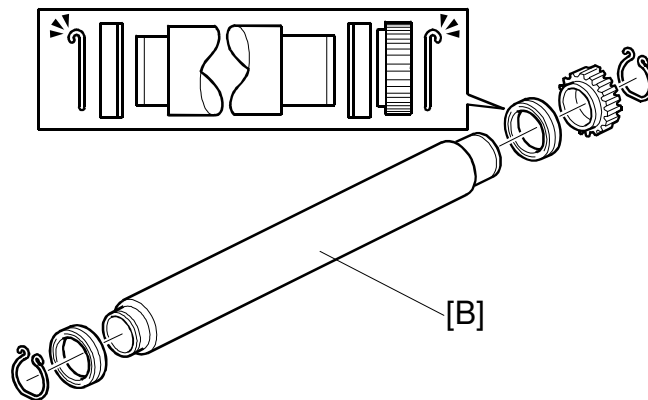
**Replacement  
Adjustment**

1. Remove the fusing unit. (See Fusing Unit.)
2. Remove the fusing upper cover [A] (4 screws).
3. Remove the pressure springs [B].
4. Remove the hot roller stripper bracket [C] (3 screws).
5. Replace the thermofuse [D] (2 screws).

### 6.7.4 HOT ROLLER AND FUSING LAMP



G038R565.WMF

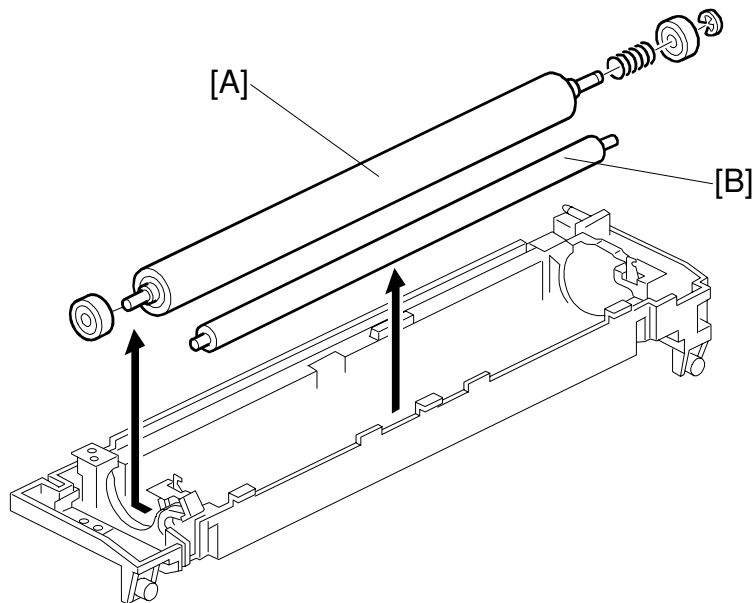


G038R566.WMF

1. Remove the fusing unit. (See Fusing Unit.)
2. Remove the fusing upper cover. (See Thermofuse.)
3. Remove the pressure springs. (See Thermofuse.)
4. Remove the hot roller stripper bracket. (See Thermofuse.)
5. Remove the fusing lamp (2 screws) and hot roller assembly [A].  
**NOTE:** Do not touch the surface of the fusing lamp with bare hands.
6. Replace the hot roller [B] (2 C-rings, 1 gear, 2 bushings).

**NOTE:** 1) Before installing the new hot roller, peel off 3 cm (1 inch) from both ends of the protective sheet on the new roller.  
 2) Do not touch the surface of the rollers.  
 3) When reinstalling the fusing lamp, secure the front screws first.  
 4) Be careful not to damage the surface of the hot roller.

### 6.7.5 PRESSURE ROLLER/CLEANING ROLLER



G038R567.WMF

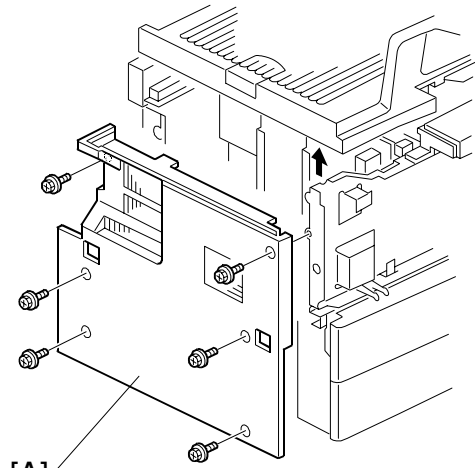
1. Remove the fusing lamp and hot roller assembly. (See Hot Roller and Fusing Lamp.)
2. Replace the pressure roller [A] (1 E-ring, 2 bushings, 1 spring).
3. Replace the cleaning roller [B].

**NOTE:** Do not touch the surface of the rollers.

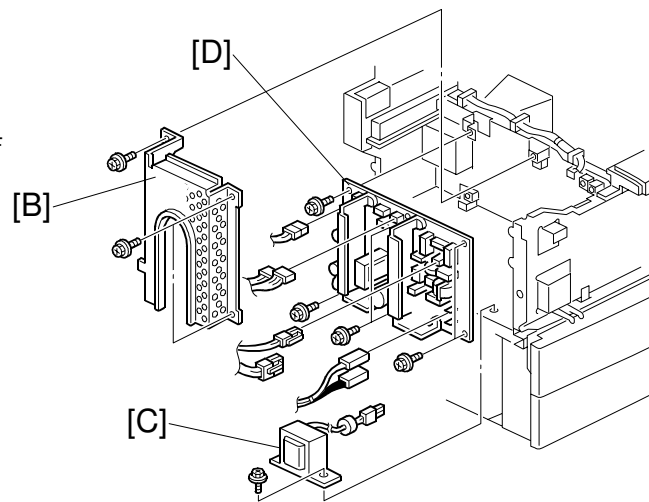
Replacement  
Adjustment

## 6.8 PCBS AND MOTORS

### 6.8.1 PSU



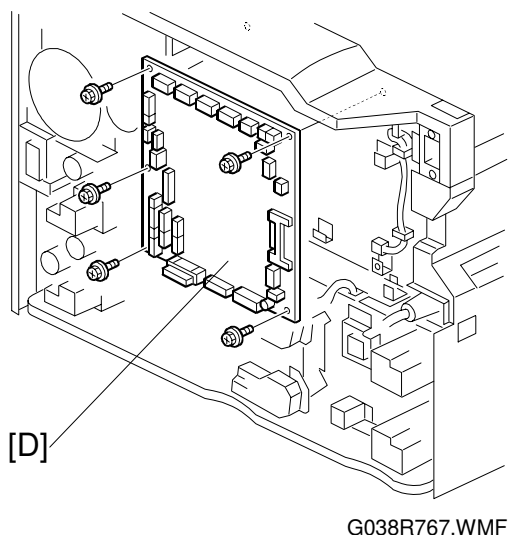
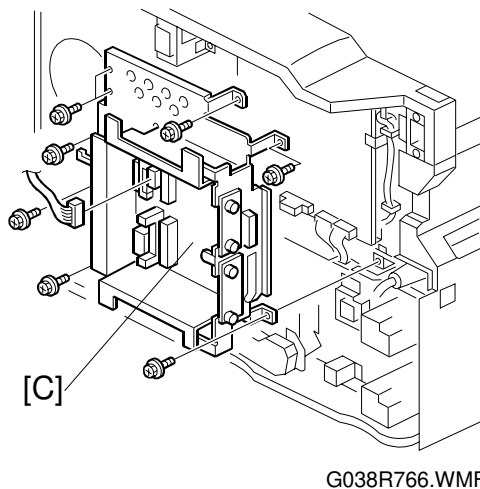
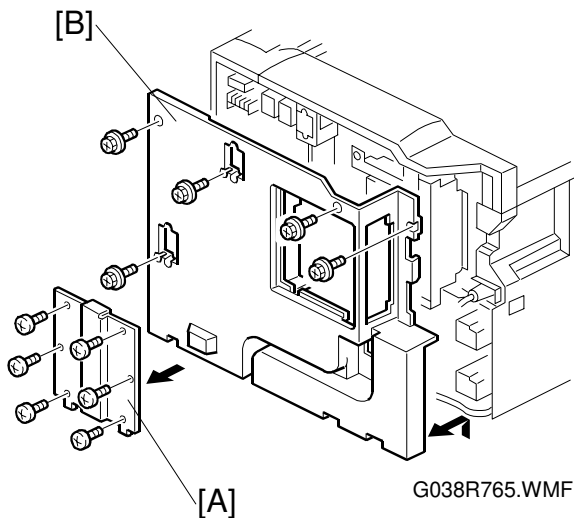
G038R761.WMF



G038R902.WMF

1. Remove the left cover [A] (6 screws).
2. Remove the bracket [B] (3 screws).
3. **230 V machine only:** Remove the coil [C] (1 screw, 1 connector).
4. Remove the PSU [D] (All connectors, 6 screws).

## 6.8.2 ENGINE BOARD

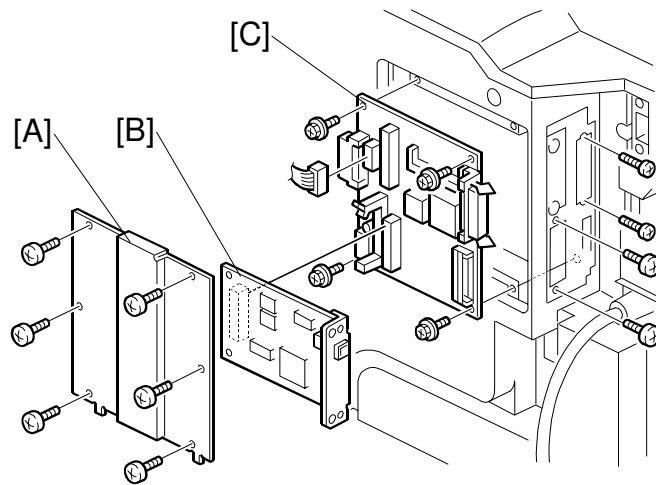


Replacement  
Adjustment

1. Disconnect the interface harness for the optional paper tray unit or LCT.
2. Remove the controller cover [A] (6 screws).
3. Remove the rear cover [B] (5 screws).
4. Remove the controller bracket [C] (1 connector, 10 screws).
5. Disconnect all harnesses and remove the engine board [D] (5 screws).
6. Remove the EEPROM [C] from the old engine board and put it on the new board.



### 6.8.3 PRINTER CONTROLLER / NIB



G038R510.WMF

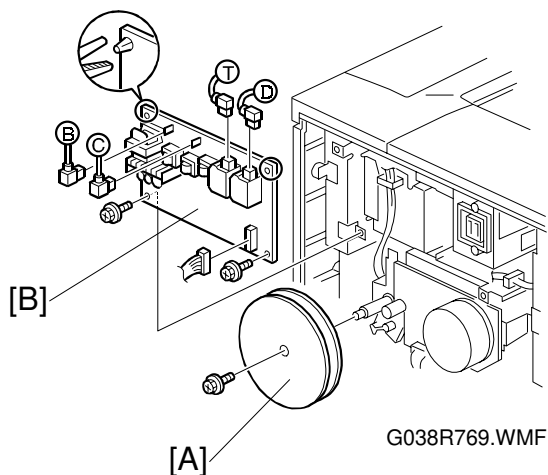
#### ***Printer Controller***

1. Remove the controller cover [A] (6 screws).
2. Remove the network interface board [B] (2 screws).
3. Remove the printer controller board [C] (6 screws, 1 connector).
4. Remove the NVRAM from the controller board, then install them on the new controller.
5. Install the new controller.
6. Turn on the machine and print the Printer Configuration Page.
7. Ensure that all the controller settings are restored.

#### ***NIB***

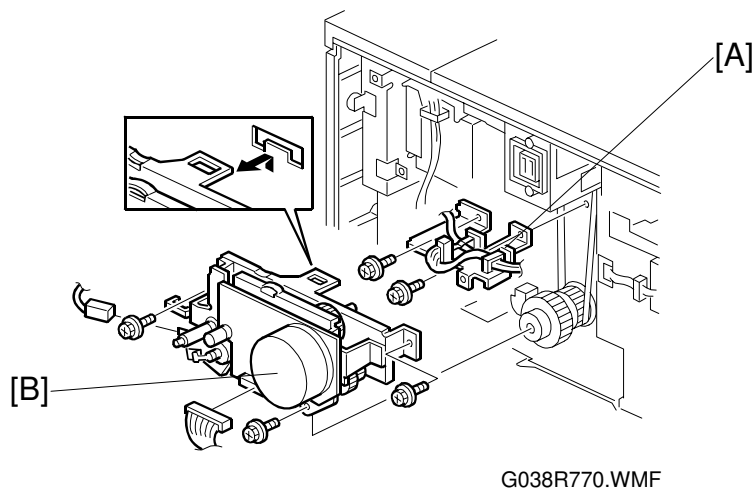
1. Back up the NIB NVRAM to the controller using the Service Tool.
2. Remove the controller cover [A] (6 screws).
3. Replace the network interface board [B] (2 screws).
4. Turn on the machine and restore the NIB NVRAM using the Service Tool.
5. Turn off the machine and turn it back on. Then, print the Printer Configuration Page.
6. Ensure the all the controller settings are restored.

### 6.8.4 HIGH VOLTAGE SUPPLY BOARD



1. Remove the rear cover. (See Engine Board.)
2. Remove the fly-wheels [A] (1 screw).
3. Remove the high voltage supply board [B] (5 connectors, 2 screws, 2 locking supports).

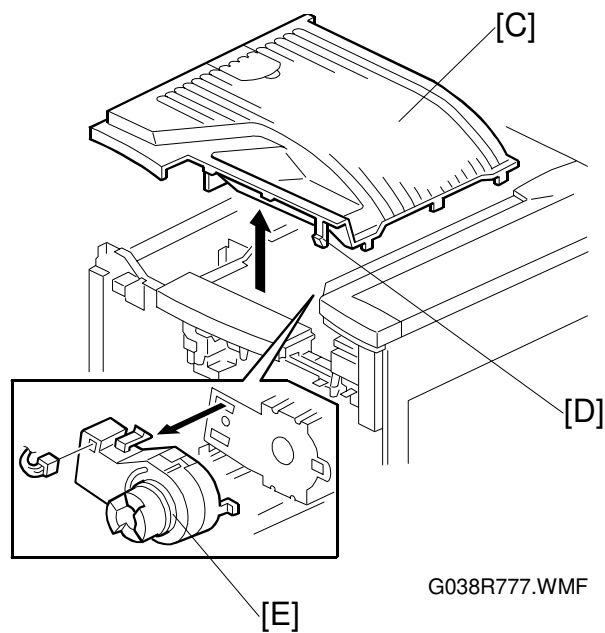
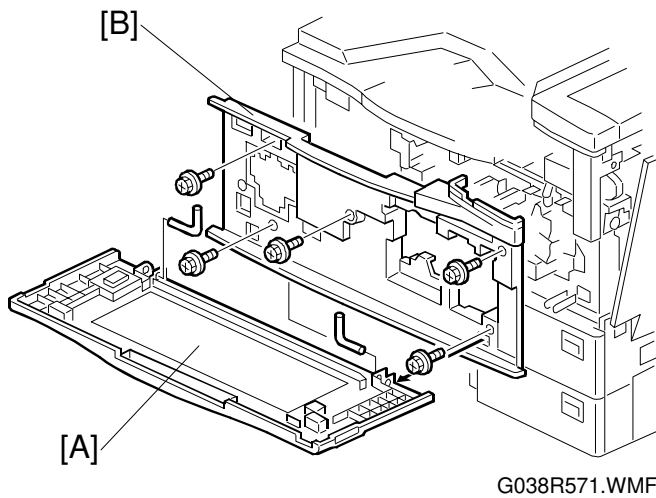
### 6.8.5 MAIN MOTOR



1. Remove the rear cover. (See Engine Board.)
2. Remove the fly-wheels. (See High Voltage Supply Board.)
3. Remove the high voltage supply board (See High Voltage Supply Board.)
4. Remove the bracket [A] (2 screws).
5. Remove the main motor [B] (2 connectors, 3 screws).

Replacement  
Adjustment

## 6.8.6 TONER BOTTLE MOTOR



1. Remove the optional finisher and/or bridge unit, if these units have been installed.
2. Remove the front cover [A] (2 pins).
3. Swing up the toner bottle lever. Then, remove the inner cover [B] (5 screws).
4. Remove the paper exit tray [C] (1 hook [D]).
5. Remove the toner bottle motor [E] (1 connector).

---

## 7. TROUBLESHOOTING

### 7.1 SERVICE CALL CONDITIONS

#### 7.1.1 PRINTER ENGINE SC CODES SUMMARY

There are 3 levels of service call conditions.

Level	Definition
A	To prevent the machine from being damaged, the SC can only be reset by a service representative (see the note below this table). The printer cannot be operated at all.
B	The SC might be reset by turning the main switch off and on if the SC was caused by a sensor error.
C	The printer can be operated as usual except for the unit related to the service call.

**NOTE:** 1) If the problem concerns electrical circuit boards, first disconnect then reconnect the connectors before replacing the PCBs.  
2) If the problem concerns a motor lock, first check the mechanical load before replacing motors or sensors.  
3) To reset a Level "A" SC, enter the printer engine service mode (Service Menu 2) and clear the SC code, then turn the main switch off and on. Please refer to the section 4.4 Printer Service Mode for details.

## 7.1.2 PRINTER ENGINE SC CODES

### SC302: High voltage power supply error

Definition: [B]

A charge roller current leak signal is detected.

Possible causes

- Charge roller damaged
- Charge high voltage supply board defective
- Poor connection of the PCU

### SC320: Polygon mirror motor error

Definition: [B]

The polygon mirror motor does not reach its operating speed within 10 seconds after the polygon mirror motor on signal, or the lock signal is not detected for more than 200 ms continuously during operation.

Possible causes

- Polygon mirror motor defective
- Poor connection between the polygon mirror motor driver and the engine board
- Engine board defective

### SC321: No laser writing signal (F-GATE) error

Definition: [B]

The laser writing signal (F-GATE) is still not LOW when the laser writing area +5 mm has passed since the laser writing start position on the drum.

Possible Causes:

- Engine board defective
- Printer controller board defective

### SC322: Laser synchronization error

Definition: [B]

The main scan synchronization detector board cannot detect the laser synchronization signal for more than 500 ms.

Possible causes:

- Poor connection between the laser synchronization detector board and the engine board
- Laser synchronization detector board out of position
- Laser synchronization detector board defective
- Engine board defective
- LD unit defective

**SC324: LD drive current over**

Definition: [B]

The LD drive board applies more than 100 mA to the LD.

Possible causes:

- LD unit defective (not enough power, due to aging)
- Poor connection between the LD unit and the engine board
- Engine board defective

**SC390: TD sensor error**

Definition: [B]

The TD sensor outputs less than 0.5V or more than 4.0V 10 consecutively during printing.

Possible causes:

- TD sensor abnormal
- Poor connection of the PCU

**SC391: Development bias leak**

Definition: [B]

A development bias leak signal is detected.

Possible causes:

- Poor connection of the PCU
- High voltage supply board defective

**SC392: TD sensor initial setting error**

Definition: [B]

TD sensor output voltage falls out of the adjustment range after the TD sensor initial setting has been finished.

Possible causes:

- The toner seal of the PCU was not removed
- ID sensor defective
- TD sensor abnormal
- The Drum is not turning
- Development roller does not turn
- Poor connection of the PCU

**SC401/402: Transfer roller leak error 1/2**

Definition: [B]

Transfer current leak signal is detected.  
Transfer current feedback signal is not detected.

Possible causes:

- High voltage supply board defective
- Poor connection of the PCU
- Transfer/separation unit set incorrectly
- Transfer roller damaged

**SC411: Separation bias leak error**

Definition: [B]

Separation bias leak signal is detected.

Possible causes:

- High voltage supply board defective
- Poor connection of the PCU
- Discharge plate defective

**SC500: Main motor lock**

Definition: [B]

A main motor lock signal is not detected for more than 500 ms after the main motor starts to rotate, or the lock signal is not detected for more than 500 ms during rotation after the last signal.

Possible causes:

- Too much load on the drive mechanism
- Main motor defective
- Engine board defective

**SC501: 1st paper tray lift motor error****SC502: 2nd paper tray lift motor error****SC503: 3rd paper tray lift motor error (optional paper tray unit)****SC504: 4th paper tray lift motor error (optional paper tray unit)**

Definition: [C]

The paper lift sensor is not activated after the tray lift motor has been on for 18 seconds.

Possible causes:

- Paper lift sensor defective
- Tray lift motor defective
- Too much load on the drive mechanism
- Engine board defective

**SC506: Paper tray motor lock (optional paper tray unit)**

Definition: [C]

A motor lock signal is not detected for more than 1.5 s or the lock signal is not detected for more than 1.0 s during rotation.

Possible causes:

- Paper tray unit motor defective
- Too much load on the drive mechanism

**SC507: Tandem tray lift error (optional LCT)**

Definition: [C]

The low limit sensor is not activated after the paper tray lift motor has been on to lower the tandem tray for 8 seconds.

Possible causes:

- Paper tray lift motor defective
- Low limit sensor defective
- Too much load on the drive mechanism

**SC508: Rear fence drive error (optional LCT)**

Definition: [C]

The return position sensor is not activated after the rear fence drive motor has been on to lower the tandem tray for 8 seconds.

Possible causes:

- Rear fence motor defective
- Return position sensor defective
- Too much load on the drive mechanism

**SC509: Side fence drive error (optional LCT)**

Definition: [C]

The side fence positioning sensor is not activated in 3 s when the paper stack in the left tray is moved to the right tray.

The side fence close sensor is not activated in 3 s after moving the paper stack to the right tray.

Possible causes:

- Side fence motor defective
- Side fence position sensor defective
- Side fence close sensor defective
- Too much load on the drive mechanism

**SC541: Fusing temperature warm-up error**

Definition: [A]

The fusing temperature detected by the thermistor was below 13 °C for 10 seconds

Possible causes:

- Fusing thermistor defective or out of position
- Fusing lamp open
- Fusing thermofuse open
- Power supply board defective
- Poor connection of the fusing unit

**SC542: Fusing temperature warm-up error**

Definition: [A]

The fusing temperature does not reach the fusing standby temperature within 40 seconds after the main switch is turned on.

Possible causes:

- Fusing thermistor defective or out of position
- Fusing lamp open
- Fusing thermofuse open
- Power supply board defective
- Poor connection of the fusing unit

**SC543: Fusing overheat error**

Definition: [A]

A fusing temperature of over 230°C is detected for 1 second by the fusing thermistor.

Possible causes:

- Fusing thermistor defective
- Power supply board defective

**SC544: Fusing low temperature error**

Definition: [A]

A fusing temperature of lower 100°C is detected for 1 second by the fusing thermistor.

Possible causes:

- Fusing thermistor defective
- Power supply board defective
- Poor connection of the fusing unit

**SC546: Unstable fusing temperature**

Definition: [A]

Fusing temperature more than 60 °C: The fusing temperature does not rise 2°C or more within 6 seconds after the fusing lamp has been on.

Fusing temperature 60 °C or less: The fusing temperature does not rise 2°C or more during a 6 second interval (the 6 s timer starts 14 s after the fusing lamp turned on).

Possible Causes:

- Thermistor defective
- Poor connection of the fusing unit
- Power supply unit defective

**SC547: Zero cross signal malfunction**

Definition: [A]

Zero cross signals are not detected within a certain period.

Possible causes:

- Power supply board defective
- Engine board defective

**SC590: Fusing fan motor error**

Definition: [B]

The CPU detects an exhaust fan lock signal for more than 3.5 seconds.

Possible causes:

- Poor connection of the exhaust fan motor
- Too much load on the motor drive

**SC610: Communication error between the engine board and duplex unit**

Definition: [B]

The engine board cannot communicate with the duplex unit properly.

Possible causes:

- Poor connection for the interface cable for the duplex unit
- Duplex control board defective
- Engine board defective

**SC692: Communication error between the engine board and the printer controller**

Definition: [B]

The engine board cannot communicate with the printer controller properly.

Possible causes:

- Poor connection between the engine board and the printer controller board.
- Printer controller defective
- Engine board defective

**SC 696: Communication error between the engine board and the finisher**

Definition: [B]

The engine board cannot communicate with the finisher properly.

- Possible causes -

- Poor connection of the interface cable for the finisher
- Finisher main board defective
- Engine board defective

**SC722: Finisher jogger motor error**

Definition: [B]

- 1) The finisher jogger H.P sensor remains de-activated for a certain time when returning to home position.
- 2) The finisher jogger H.P sensor remains activated for a certain time when moving away from home position.

Possible causes:

- Jogger H.P sensor defective
- Jogger motor defective

**SC725: Finisher stack feed-out motor error**

Definition: [B]

The stack feed-out belt H.P sensor is not activated within a certain period after the stack feed-out motor is turned on.

Possible causes:

- Stack feed-out H.P sensor defective
- Stack feed-out motor defective

### **SC726: Finisher shift motor error**

Definition: [B]

Tray shift is not detected within a certain period after the shift motor is turned on.

Possible causes:

- Shift motor defective
- Shift tray half-turn sensor defective

### **SC730: Finisher stapler position motor error**

Definition: [B]

- 1) The stapler does not return to its home position within a certain period after the stapler motor is turned on.
- 2) The stapler H.P sensor is not activated within a certain period after the stapler motor turned on.

Possible causes:

- Stapler motor defective
- Stapler H.P sensor defective
- Poor stapler motor connection

### **SC733: Finisher stack feed-out motor error**

Definition: [B]

The stack feed-out belt H.P sensor is not activated within a certain period after the stack feed-out motor is turned on.

Possible causes:

- Stack feed-out H.P sensor defective
- Stack feed-out motor defective

### **SC734: Finisher lift motor error**

Definition: [B]

The stack height sensor is not activated within a certain period after the shift tray lift motor is turned on.

Possible causes:

- Shift tray lift motor defective
- Stack height sensor defective

**SC735: Finisher exit guide motor error**

Definition: [B]

The exit guide plate open sensor or exit guide plate HP sensor does not activate within a certain time after the exit guide plate motor turned on.

Possible causes:

- Exit guide motor defective
- Exit guide plate HP sensor defective
- Exit guide plate open sensor defective

**SC 750: Interchange unit connection error**

Definition: [B]

The engine board cannot communicate with the interchange unit properly when the duplex unit is installed.

Possible causes:

- Poor connection between the engine board and the interchange unit

**SC 751: Bridge unit connection error**

Definition: [B]

The engine board cannot communicate with the bridge unit properly when the finisher is installed.

Possible causes:

- Poor connection between the engine board and the bridge unit

**SC 752: Finisher connection error**

Definition: [B]

The engine board cannot communicate with the finisher properly when the bridge unit is installed.

Possible causes:

- Poor connection between the finisher and bridge unit

**SC980: Program loading error**

Definition: [A]

The program cannot load properly.

Possible Causes:

- The connection between the engine board and the IC card is poor
- IC memory card defective
- Engine board defective

**NOTE:** This SC should be cleared by trying to download again from an IC card.

## 7.2 PRINTER CONTROLLER ERROR

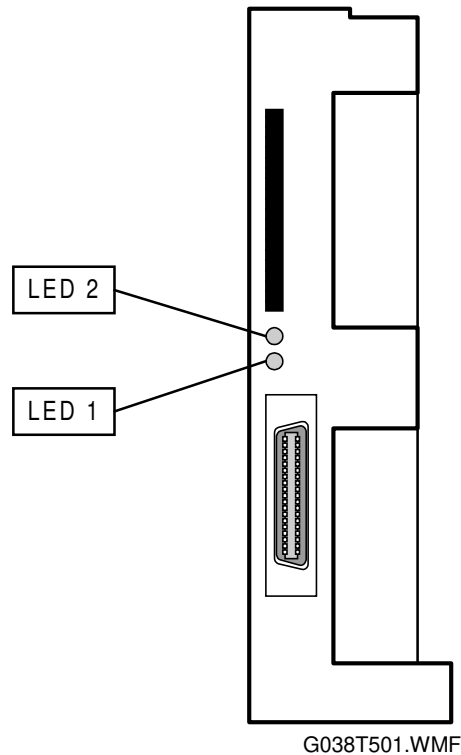
### 7.2.1 ERROR CODES

Code	Description	Required Action
0201	On-board SDRAM read/verify failed.	Replace the controller if this error is frequent.
0301	SDRAM DIMM (option) read/verify failed.	Replace the SDRAM DIMM if this error is frequent.
1101	Data transmission did not finish within the specified time.	An incompatible loop-back connector is connected to the parallel port, or the loop-back connector is not connected. Use the correct loop-back connector (P/#: G0219350) before the test.
1102	Data looped back to the controller is not the same as the data transmitted.	The loop-back connector may be defective. Try using another one.
11xx	Parallel interface error.	Replace the controller if this error is frequent.
1401	The controller NVRAM has a problem.	Replace the NVRAM if this error is frequent.
1402	NVRAM checksum error or the battery has run out.	
1403	NVRAM write error	
1404	NVRAM read error	
1501	RTC error	Replace the controller board if this error is frequent.
1601	Font ROM error	Replace the controller if this error is frequent.
1602	The data in the Font ROM is damaged.	Replace the controller if this error is frequent.
1Bxx	Option bus error A	Check the connection to the optional component. Try replacing the optional NIB or HDD.
1Cxx	Option bus error B	Check the connection to the optional component. Try replacing the optional NIB or HDD.
2100	NIB self test failed.	Turn off the machine and turn it back on. Replace the NIB if this error is frequent.
21xx	NIB error	
2501	The data in the PS DIMM is damaged.	Replace the PS DIMM if this error is frequent.
2508	The data in the IC card is damaged.	Reprogram the IC card and try again.
3002	A damaged cluster was found on the HDD.	The damaged cluster is automatically marked as "bad". If this error is frequent, format the HDD.
47xx	Controller ASIC error.	Replace the controller.

## 7.3 CONTROLLER LED DISPLAY

### 7.3.1 LOCATION

The controller uses two LEDs to display error status even while the LCD message is not active.

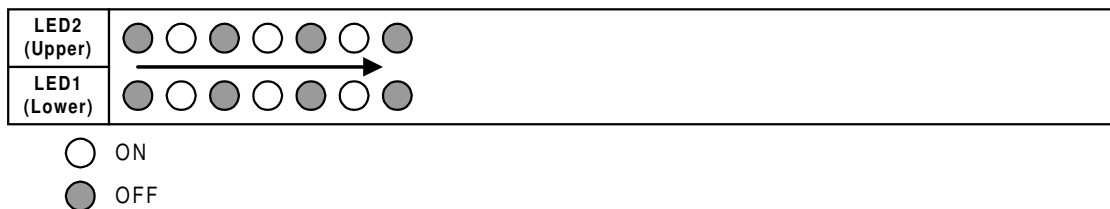


### 7.3.2 FATAL ERROR

If the controller detected a fatal error during the power-on self-test, it uses two LEDs to notify the cause of the error.

If one of the following fatal errors happens, the LED status changes as shown (read from the left of the diagram to the right).

#### Flash ROM Error

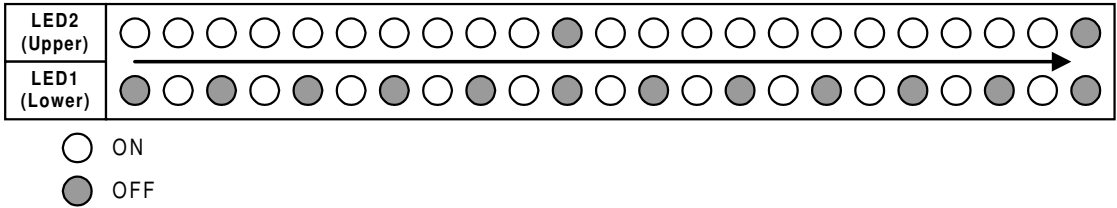


G038T502.WMF

Turn off the machine and turn it back on. If the controller detects the same error, download new firmware from a IC card (refer to section 4.6). If the problem still remains, replace the controller.



APIP Error



G038T507.WMF

Turn off the machine, check the connection to the engine board, then turn on the machine. If the controller detects the same error, replace the controller, or engine board.

## 7.4 ELECTRICAL COMPONENT DEFECTS

### 7.4.1 SENSORS

**NOTE:** The CN numbers describes the connector number on the engine board.

Component (Symbol)	CN	Condition	Symptom
Toner Density	302-3	Open	SC390 is displayed
		Shorted	
1st Paper End	306-2	Open	The Paper End indicator lights even if paper is placed in the 1st paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the 1st paper tray.
2nd Paper End	307-2	Open	The Paper End indicator lights even if paper is placed in the 2nd paper tray.
		Shorted	The Paper End indicator does not light even if there is no paper in the 2nd paper tray.
Image Density	321-3	Open	SC392 is displayed (see note)
		Shorted	
Paper Over Flow	324-5	Open	The paper overflow message is not displayed when the paper overfull condition exist.
		Shorted	The paper overflow message is displayed.
Paper Exit	324-2	Open	The Paper Jam indicator will light whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Upper Relay	306-5	Open	The Paper Jam indicator will light whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Lower Relay	307-5	Open	The Paper Jam indicator will light whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
Registration	321-6	Open	The Paper Jam indicator will light whenever a print is made.
		Shorted	The Paper Jam indicator lights even if there is no paper.
1st Paper Lift	305-7	Open	SC501 will be displayed.
		Shorted	Paper jam will occur during printing.
2nd Paper Lift	305-10	Open	SC502 will be displayed.
		Shorted	Paper jam will occur during printing.

Component (Symbol)	CN	Condition	Symptom
1st Paper Height - 1	308-2	Open	The CPU cannot determine the paper near-end condition properly.
		Shorted	
1st Paper Height - 2	308-5	Open	The CPU cannot determine the paper near-end condition properly.
		Shorted	
2nd Paper Height - 1	308-8	Open	The CPU cannot determine the paper near-end condition properly.
		Shorted	
2nd Paper Height - 2	308-11	Open	The CPU cannot determine the paper near-end condition properly.
		Shorted	

**NOTE:** An SC condition occurs only when a new PCU is being installed in the machine. During printing, if the ID sensor fails, the image density will be changed.

## 7.4.2 SWITCHES

Component (Symbol)	CN	Condition	Symptom
Main	281-1,2 (PSU)	Open	The machine does not turn on.
		Shorted	The machine does not turn off.
Right Upper Cover	324-8	Open	The Cover Open indicator is not lit even if the right upper cover is opened.
		Shorted	The Cover Open indicator is lit even if the right upper cover is closed.
Right Cover	321-9	Open	The Cover Open indicator is not lit even if the right cover is opened.
		Shorted	The Cover Open indicator is lit even if the right cover is closed.
Right Lower Cover	307-8	Open	The Cover Open indicator is not lit even if the right lower cover is opened.
		Shorted	The Cover Open indicator is lit even if the right lower cover is closed.
Upper Paper Size	305-1,2,4,5	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a print is made.
		Shorted	
Lower Paper Size	305- 6,7,9,10	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a print is made.
		Shorted	
Special Paper	305-12	Open	No symptom. However, the image density problem will occur when using a thick paper.
		Shorted	
New PCU Detect	302-6	Open	The TD sensor initial setting procedure is not performed when a new PCU is installed.
		Shorted	The TD sensor initial setting procedure is performed whenever the front cover is closed.
Front Cover Safety	209-2, 4	Open	The Cover Open indicator is not lit even if the front cover is opened.
		Shorted	The Cover Open indicator is lit even if the front cover is closed.

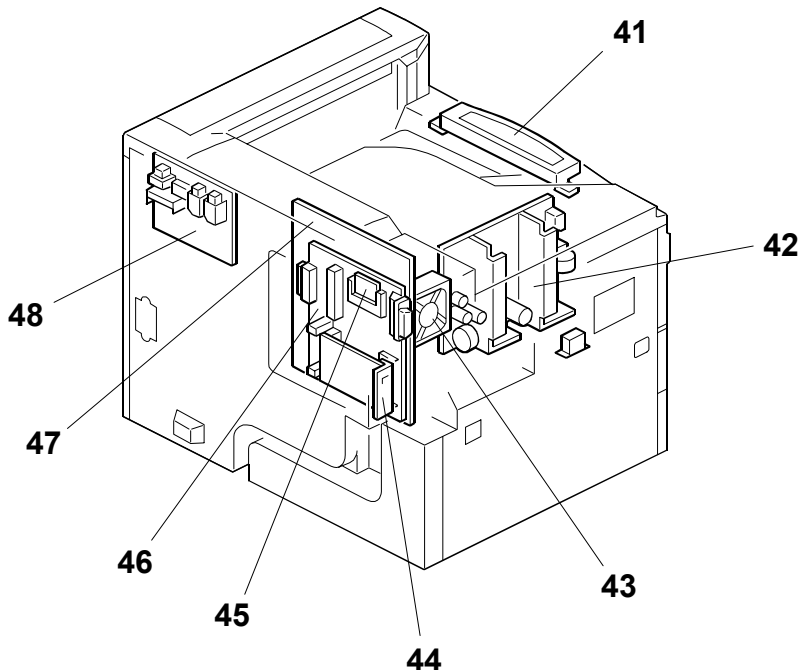
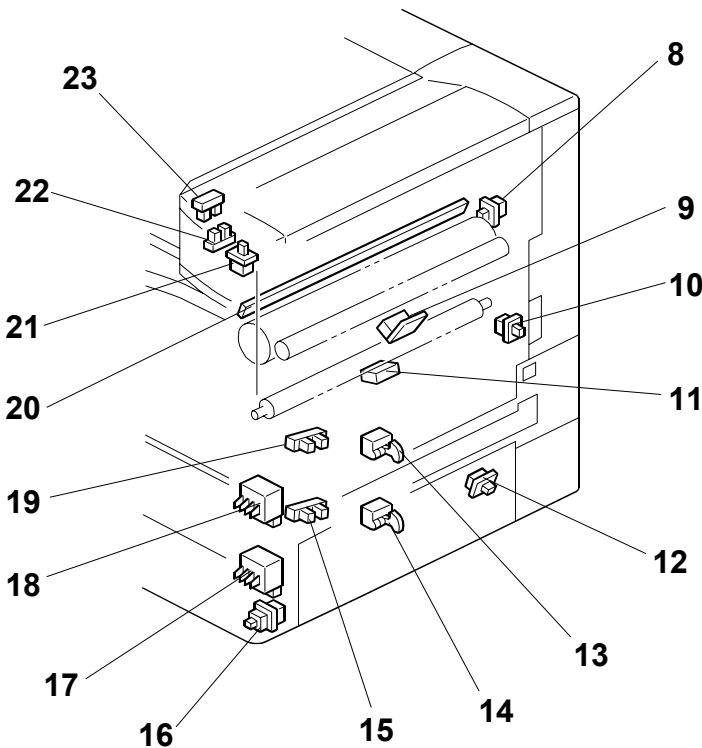
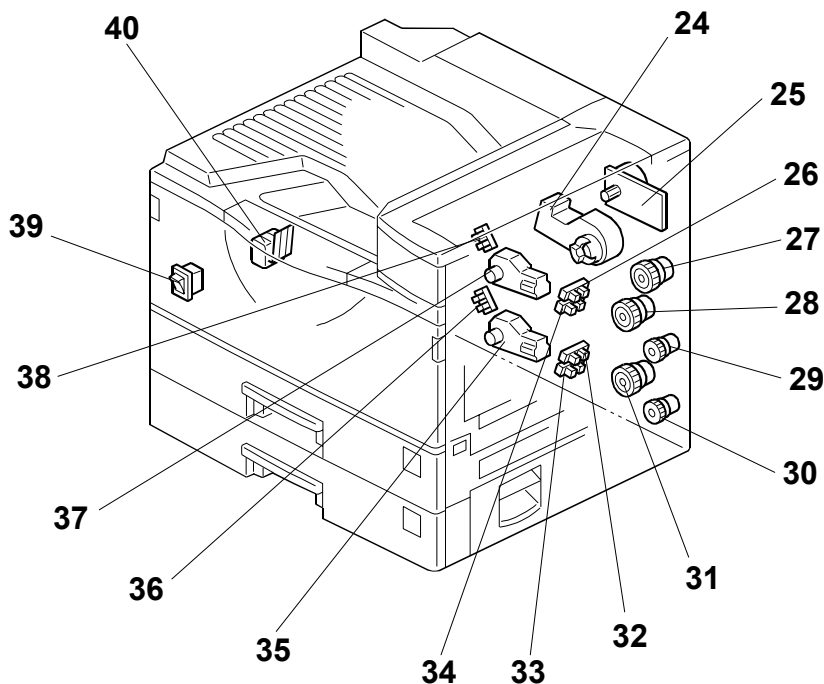
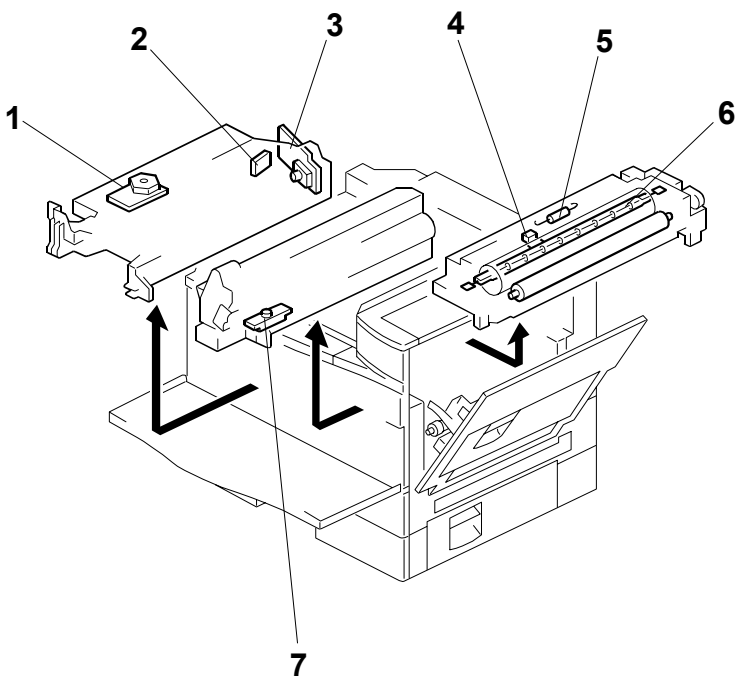
**NOTE:** CN numbers describes the connector number on the engine board. (except for the main switch).

## 7.5 BLOWN FUSE CONDITIONS

Fuse	Rating		Symptom when turning on the main switch
	115 V	220 - 240 V	
Power Supply Board			
FU1	15 A/250 V	----	No response
FU2	8 A/125 V	3.15 A/250 V	No response
FU3	3.15 A/125 V	3.15 A/250V	Normal operation
FU4	4 A/125 V	4 A/250V	No response
FU5	4 A/125 V	2A /250 V	Optional peripherals do not work.
FU6	2 A/125 V	4 A/250V	“Doors/Covers Open” is displayed.



PRINTER (G038) ELECTRICAL COMPONENT LAYOUT



Symbol	Name	Index No.	P to P
<b>Motors</b>			
M1	Polygonal Mirror	1	B3
M2	Main Motor	25	G2
M3	Exhaust Fan	43	B1
M4	1st Paper Lift	37	B1
M5	2nd Paper Lift	35	B1
M6	Toner Supply	24	B1
<b>Magnetic Clutches</b>			
MC1	1st Paper Feed	28	C1
MC2	2nd Paper Feed	31	D1
MC3	Upper Relay	29	C1
MC4	Lower Relay	30	D1
MC5	Registration	27	E1
<b>Switches</b>			
SW1	Main Switch	39	A5
SW2	Right Upper Cover	21	H1
SW3	Right Cover	10	F1
SW4	Right Lower Cover	12	D1
SW5	1st Paper Size	18	E1
SW6	2nd Paper Size	17	E1
SW7	Special Paper	16	E1
SW8	New PCU Detect	8	B1
SW9	Front Cover Safety	40	B3
<b>Sensors</b>			
S1	Toner Density (TD)	7	B1
S2	1st Paper End	19	C1
S3	2nd Paper End	15	C1
S4	Image Density (ID)	9	S4
S5	Paper Overflow	23	H1
S6	Paper Exit	22	H1
S7	Upper Relay	13	C1
S8	Lower Relay	14	C1
S9	Registration	11	E1
S10	1st Paper Lift	38	A1
S11	2nd Paper Lift	36	B1
S12	1st Paper Height - 1	26	D1
S13	1st Paper Height - 2	34	D1
S14	2nd Paper Height - 1	32	D1
S15	2nd Paper Height - 2	33	D1
<b>PCBs</b>			
PCB1	Engine Board	47	F2
PCB2	Printer Controller Board	46	D4
PCB3	Network Interface Board	44	---
PCB4	PSU (Power Supply Unit)	42	B5
PCB5	LDD (Laser Diode Driver)	3	A3
PCB6	Operation Panel	41	C7
PCB7	High Voltage Supply	48	G1
PCB8	Memory (Option)	45	---
<b>Lamps</b>			
L1	Fusing Lamp	6	A5
L2	Quenching Lamp	20	C1
<b>Others</b>			
TF1	Fusing Thermofuse	5	A5
TH1	Fusing Thermistor	4	A5
LSD 1	Laser Synchronization Detector	2	A4