SERVICE MANUAL
(Machine Code: G020)

TS Dept. IPP Business Division
RICOH Co., LTD.
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⚠ IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the printer power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. 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.
4. If the print job process is started (the Data-In LED has started blinking) before the printer completes the warm-up or initializing period, keep hands away from the mechanical and electrical components because the printer starts making prints as soon as the warm-up period is completed.
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. Never operate the printer without the ozone filters installed.
2. Always replace the ozone filters with the specified ones at the specified intervals.
3. 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.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate toner bottles or used toner. Toner dust may ignite suddenly when exposed to an open flame.
2. Dispose of used toner, developer, and organic photoconductors in accordance with local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.

LASER SAFETY

The Center for Devices and Radiological Health (CDRH) prohibits the repair of laser-based optical units in the field. The optical 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.

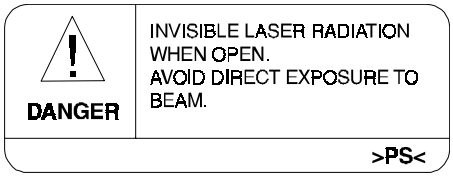
⚠WARNING

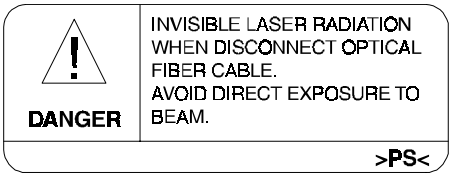
Use of controls, or adjustment, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

⚠WARNING FOR LASER UNIT

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:





1. OVERALL MACHINE INFORMATION

1.1 SPECIFICATIONS

Configuration:	Desktop
Print Process:	Dry electrostatic transfer system
Printing Speed:	Maximum 25 pages per minute (A4/LT LEF)
Resolution:	600 dpi (standard) 400 dpi (available when the Postscript option is installed) 300 dpi (simulated by doubling pixel width and height at 600 dpi resolution)
Printer Language	PCL5e (compatible with LaserJet 4Si) PostScript Level II (option) TIFF
Printer Fonts:	PCL5e 35 Intellifonts 10 True Type fonts 1 Bipmap font PS2 (Option) 35 Adobe type 1 fonts
Printer Interface:	Bi-directional parallel (Standard) Network interface (Option) Ethernet (10 Base 2/T for IPX/SPX, TCP/IP, AppleTalk) Token Ring (4 Mbps, 16 Mbps for IPX/SPX, TCP/IP, AppleTalk)
Printing Paper Size:	Maximum A3/11" x 17" Minimum Paper tray - A5/8 1/2" x 5 1/2" long edge feed (LEF) By-pass - A6/5 1/2" x 8 1/2" short edge feed (SEF)
Printing Paper Weight:	Paper tray: 60 ~ 90 g/m^2, 16 ~ 24 lb By-pass: 60 ~ 157 g/m^2, 16 ~ 42 lb
Power Source:	120V/60 Hz: More than 9.0 A (for North America) 220V ~ 240V/50 Hz: More than 4.5 A (for Europe)

Power Consumption:

	Mainframe	
	120V	220V ~ 240V
Maximum	950 W or less	950 W or less
Stand-by	150 W or less	150 W or less
Energy Saver	45 W or less	45 W or less

Noise Emission:

	Mainframe Only	Full System
Sound Power Level		
Printing	64 dB(A)	68 dB(A)
Stand-by	40 dB(A)	40 dB(A)

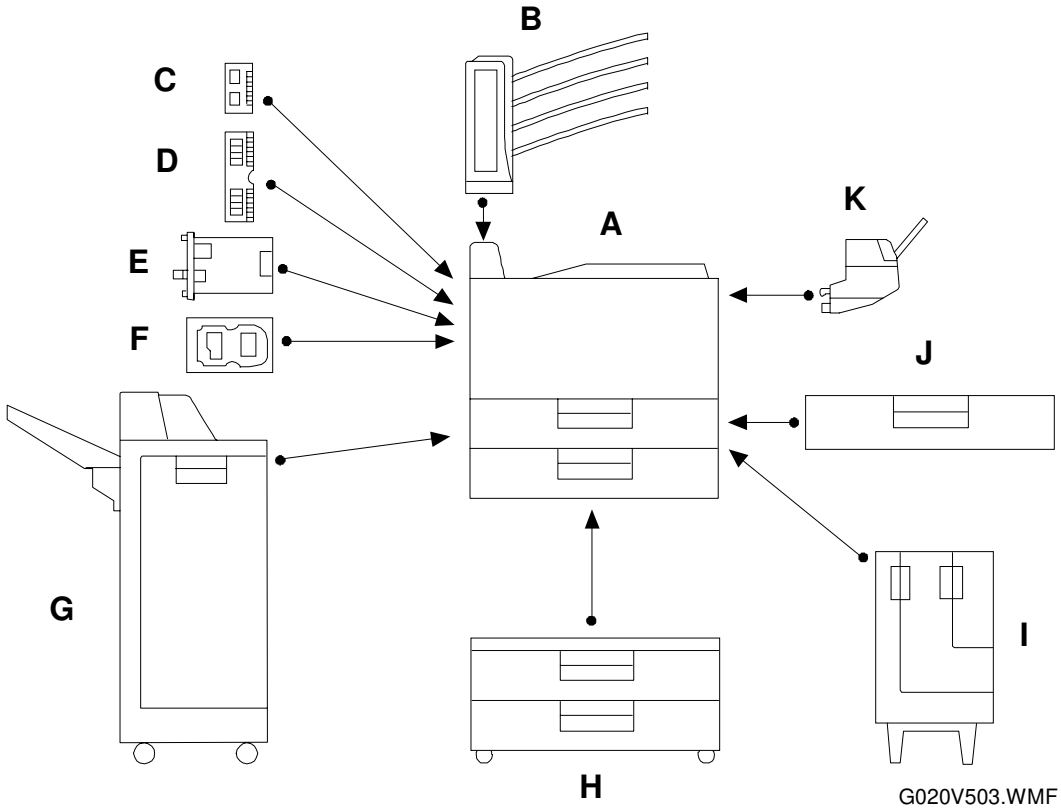
NOTE: The above measurements were made in accordance with ISO 9296 at the operator position.
Full System: Printer with all accessories

Dimensions (W x D x H): 530 x 625 x 472 mm (20.9" x 24.6" x 18.6")
Measurement Conditions
1) With by-pass tray closed
2) Without the optional paper tray unit
3) Without finisher, 4-bin mail box, LCT, or envelope feeder

Weight: Less than 44.5 kg (99 lb.)

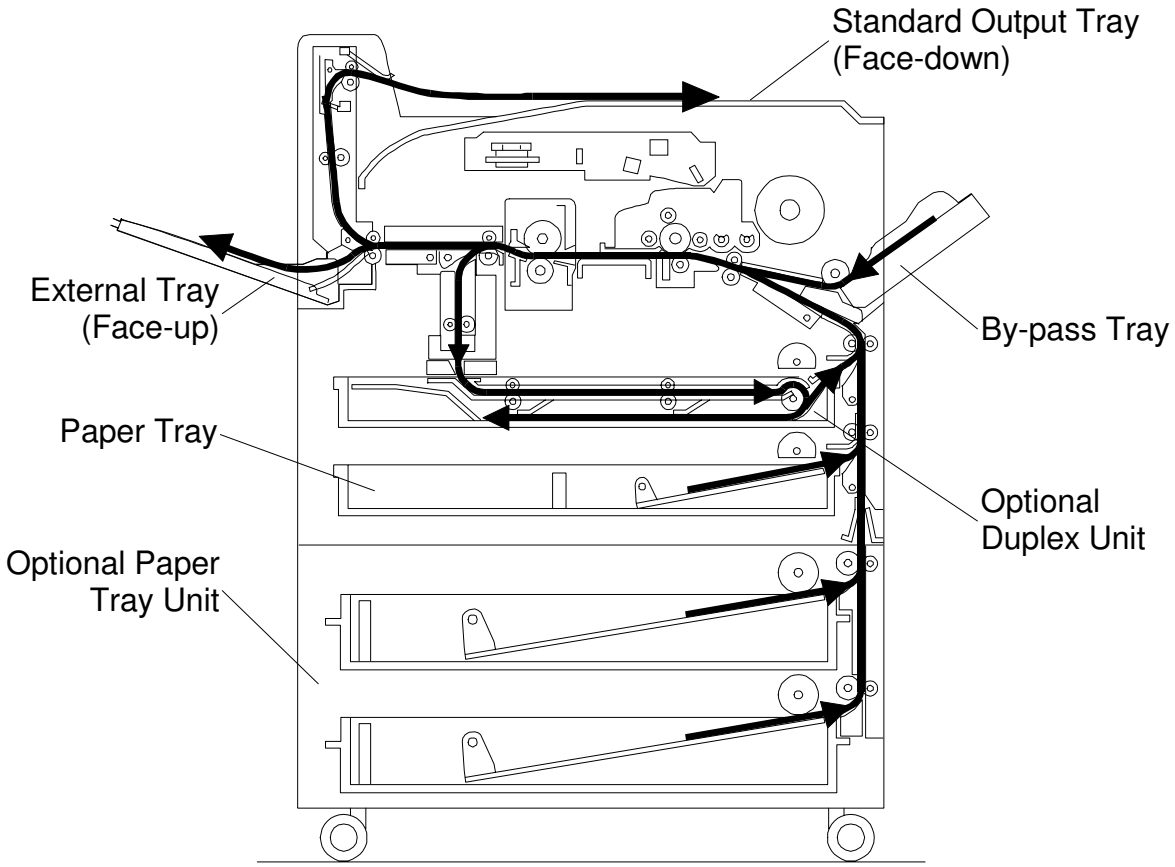
Warm-up Time	Less than 60 seconds: 120V / 230V machine
Energy Saver Mode	15 min. is the standard setting; it can be changed with the Job Control menu
Print Paper Capacity:	1st and 2nd paper tray: 250 sheets x 2 Bypass: 100 sheets (A4, B5, A5, B6, 8.5 x 11", 5.5 x 8.5") 10 sheets (A3, B4, 11 x 17", 8 x 13") 1 sheet (non-standard paper)
	Optional paper tray unit: 500 sheets x 2
	Optional envelope feeder: 100 envelopes
	Optional large capacity tray: 1,500 sheets
Memory:	Standard: 8 MB installed at the factory (4 MB on board, 4 MB SIMM)
	Maximum: 68 MB (4 MB on board, 64 MB SIMM)
Toner Replenishment:	Cartridge exchange (275 g/cartridge)
Toner Yield:	10,000 pages (A4/LT LEF, 5% test pattern)
Optional Equipment:	• Paper tray unit with two paper trays • Duplex unit • 4-bin mailbox • LCT (Large Capacity Tray) • Finisher • Envelope feeder • Postscript kit • HDD unit (Hard Disk Drive Unit) • NIC (Network interface card) • RAM SIMM
Output Paper Capacity	Standard Output Tray: 400 sheets (A4/LT) (face-down) 350 sheets (A3/DLT) External Tray: 100 sheets (A4/LT) (face up) 50 sheets (A3/DLT)
	Optional four-bin mailbox: 500 sheets total
	Optional finisher: 1,000 sheets maximum, depending on paper size and selected modes.

1.2 MACHINE CONFIGURATION

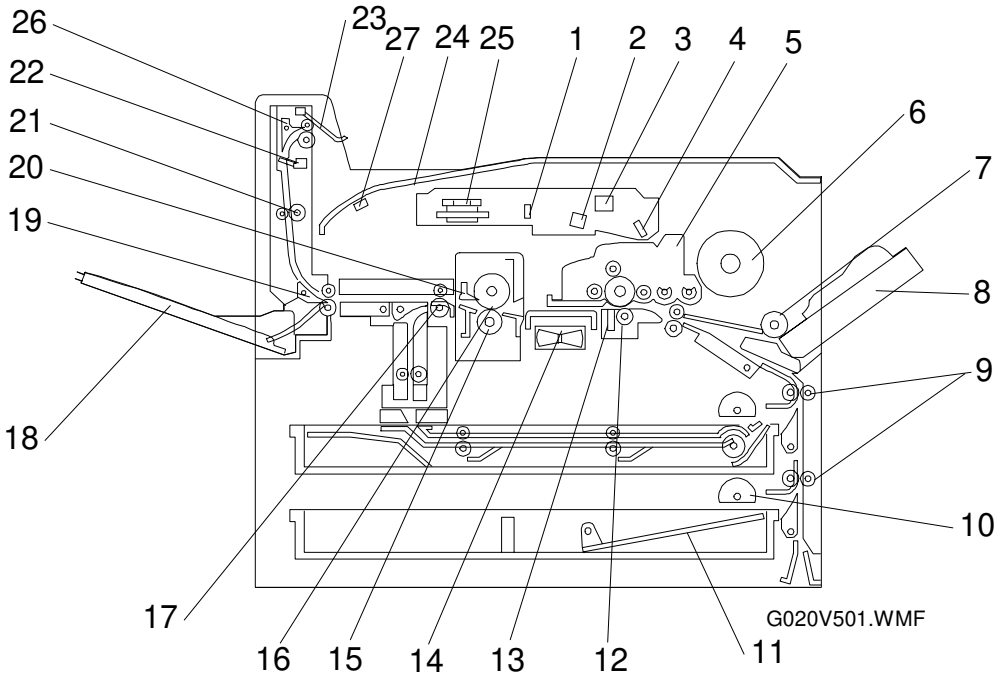


Item	Machine Code	No.
Main Unit	G020	A
Paper Tray Unit (Option)	G511	H
Duplex Unit (Option)	G694	J
LCT (Option)	A667	I
Finisher (Option)	A666	G
Envelope Feeder (Option)	G904	K
4-bin Mailbox (Option)	G696	B
HDD Unit (Option)	G508-01	F
PostScript Kit (Option)	G508-00 (US) G508-03 (EU)	C
Form Overlay Kit (Option)	G508-02	---
Network Interface Card (Option)	A732-10 (Ethernet) A733-10 (Token Ring)	E
RAM SIMM	---	D

1.3 PAPER PATH



1.4 MECHANICAL COMPONENT LAYOUT



1. 1st Mirror
2. Barrel Toroidal Lens (BTL)
3. F-theta Mirror
4. 2nd Mirror
5. PCU
6. Toner Bottle
7. By-pass Feed Roller
8. By-pass Tray
9. Relay Rollers
10. Paper Feed Rollers
11. Bottom Plate
12. Transfer Roller
13. Discharge Plate
14. Transport Vacuum Fan
15. Pressure Roller
16. Hot Roller
17. Fusing Exit Roller
18. External Tray
19. Junction Gate
20. Hot Roller Strippers
21. Left Vertical Roller
22. Lower Exit Sensor
23. Paper Overflow Sensor
24. Standard Output Tray
25. Polygonal Mirror Motor
26. Junction Gate - Standard Output
27. Standard Output Tray Sensor

1.5 ELECTRICAL COMPONENT DESCRIPTIONS

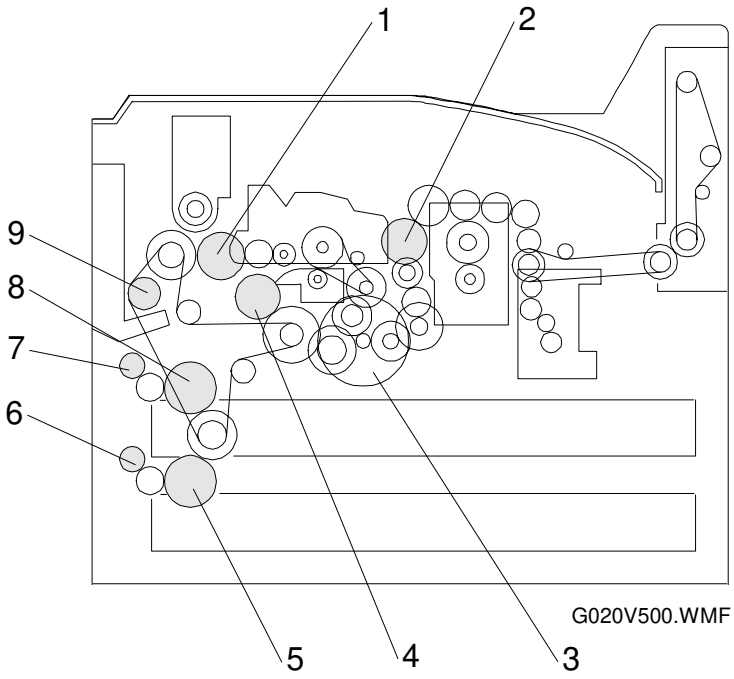
Refer to the electrical component layout and the point-to-point diagram on the waterproof paper in the pocket for the locations of these components.

Symbol	Index No.	Description	Note
Printed Circuit Boards			
PCB1	46	High Voltage Supply Board	Supplies high voltage to the drum charge roller, development roller, transfer roller, and discharge plate.
PCB2	48	Paper Tray Unit Connecting	Provides the interface for the paper tray unit, and the dip switches for the engine tests and settings.
PCB3	51	PSU	Provides dc power to the system and ac power to the fusing lamp.
PCB4	44	LD Unit	Controls the laser diode.
PCB5	53	Control Panel	Controls the display panel, LED and the touch key pad.
PCB6	45	BECU (Base Engine Control Unit)	Controls all base engine functions either directly or through other control boards.
PCB7	43	Main Printer Control Board	Controls the interface for PC, print image processing, operation panel, and other controller options.
PCB8	54	Polygon Motor Driver	Drives the polygon motor.
Motors			
M1	38	Main	Drives the main body components.
M2	39	Fusing Unit Fan	Removes heat from around the fusing unit.
M3	40	Transport Vacuum Fan	Aids paper transportation from the transfer roller to the fusing unit.
M4	42	Polygonal Mirror	Turns the polygonal mirror.
M5	30	Toner Supply	Rotates the toner bottle to supply toner to the toner supply unit.
M6	28	Exhaust Fan	Removes heat from around the fusing unit.
Sensors			
S1	25	Lower Exit	Detects misfeeds.
S2	26	Upper Exit	Detects misfeeds.
S3	23	Left Vertical Door	Cuts the +5 and +24 Vdc power lines.
S4	22	Left Door	Detects whether the left door is open or closed.
S5	12	Relay	Detects the leading edge of paper from the paper tray and duplex unit to determine the stop timing of the paper feed clutch and duplex feed motor. Also detects misfeeds.

Symbol	Index No.	Description	Note
S6	6	PCU	Detects when a new PCU is installed.
S7	2	Fusing Exit	Detects misfeeds.
S8	5	Charge Roller H.P	Informs the CPU when the drum charge roller is at home position.
S9	9	Upper Tray Paper End	Informs the CPU when the upper paper tray runs out of paper.
S10	11	Lower Tray Paper End	Informs the CPU when the lower paper tray runs out of paper.
S11	13	By-pass Feed Paper End	Informs the CPU when there is no paper in the by-pass tray.
S12	7	Registration	Detects the leading edge of the printer paper to determine the stop timing of the paper feed clutch, and detects misfeeds.
S13	8	By-pass Feed Paper Width	Detects the width of the paper on the by-pass feed table.
S14	47	Humidity	Monitors the humidity around the PCU.
S15	27	Paper Overflow	Detects paper overflow in the standard out put tray.
S16	1	Standard Output Tray Paper Sensor	Informs the CPU when there is paper on the standard output tray.
S17	18	Toner Density	Detects the amount of toner inside the development unit.
Switches			
SW1	21	Main	Supplies power to the machine.
SW2	20	Front Door Safety	Cuts the +5VLD and +24V dc power lines and detects whether the front cover is open or not.
SW3	10	Right Vertical Guide	Cuts the +5 and +24 Vdc power lines.
SW4	15	Upper Paper Size	Determines the size of paper in the upper paper tray.
SW5	14	Lower Paper Size	Determines the size of paper in the lower paper tray.
Magnetic Clutches			
MC1	29	Charge Roller Contact	Controls the touch and release movement of the drum charge roller.
MC2	35	Upper Relay	Drives the upper relay rollers.
MC3	36	Lower Relay	Drives the lower relay rollers.
MC4	33	By-pass Feed	Starts paper feed from the by-pass feed table.
MC5	34	Upper Paper Feed	Starts paper feed from the upper paper tray.
MC6	37	Lower Paper Feed	Starts paper feed from the lower paper tray.
MC7	32	Registration	Drives the registration rollers.

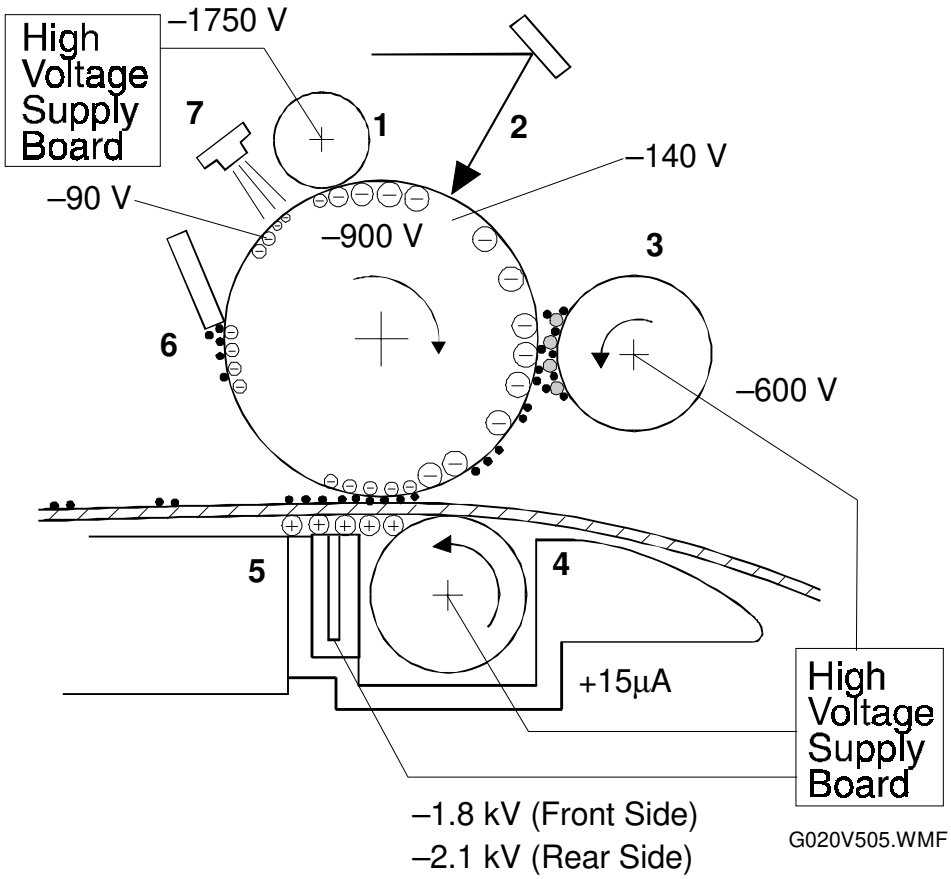
Symbol	Index No.	Description	Note
MC8	31	Development	Drives the development roller.
Solenoids			
SOL1	41	Junction Gate	Moves the junction gate to direct prints to the external tray or standard output tray.
Lamps			
L1	52	Quenching	Neutralizes any charge remaining on the drum surface after cleaning.
L2	4	Fusing	Provides heat to the hot roller.
Thermistors			
TH1	19	Charge Roller	Monitors the temperature of the drum charge roller.
TH2	16	Fusing	Monitors the temperature at the center of the hot roller.
TH3	17	Fusing Edge	Monitors the temperature at one end of the hot roller.
Thermofuses			
TF1	3	Fusing	Provides back-up overheat protection in the fusing unit.
Others			
LSD3	24	Laser Synchronization Detector	Detects the laser beam at the start of the main scan.
NF	49	Noise Filter (230V machine only)	Removes electrical noise from the ac input line.
CB	50	Circuit Breaker (230V machine only)	Guards against voltage surges in the ac input line.

1.6 DRIVE LAYOUT



1. Development Clutch
2. Charge Roller Contact Clutch
3. Main Motor
4. Registration Clutch
5. Lower Paper Feed Clutch
6. Lower Relay Clutch
7. Upper Relay Clutch
8. Upper Paper Feed Clutch
9. By-pass Feed Clutch

1.7 PRINTING PROCESS



1. DRUM CHARGE
In the dark, the charge roller gives a negative charge to the organic photo-conductive (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
The processed print image data from the main printer controller board is 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 BECU 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 attracted to the areas of the drum surface where the laser reduced the negative charge on the drum.

4. 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 produces an electrical force which pulls the toner particles from the drum surface on to the paper. At the same time, the paper is electrically attracted to the transfer roller.

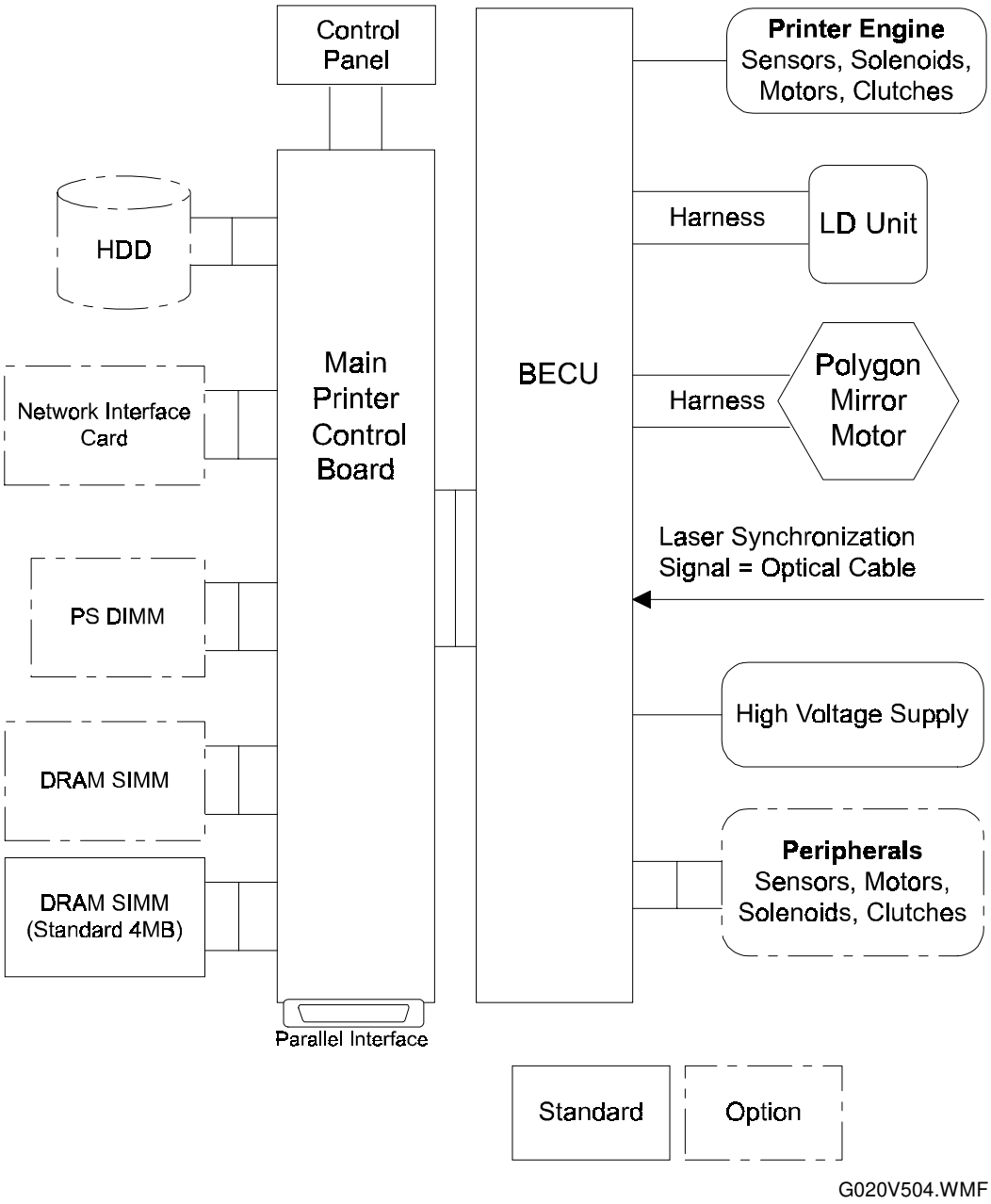
5. PAPER SEPARATION
Paper separates from the drum as a result of the electrical attraction between the paper and the transfer roller. The discharge plate helps separate the paper from the drum.

6. CLEANING
The cleaning blade removes any toner remaining on the drum surface after the image is transferred to the paper.

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

1.8 BOARD STRUCTURE

1.8.1 OVERVIEW



The components connected to the BECU are controlled by the engine control firmware. The components connected to the main printer control board are controlled by the printer control firmware.

1.8.2 DESCRIPTION

1. BECU (Basic Engine Control Unit)

This is the printer engine control board. It controls the following functions:

- Engine sequence
- Machine control, printer engine control
- Timing control for peripherals
- Image processing, video control
- Drive control for the sensors, motors, solenoids, high voltage supply
- PWM control

2. Main Printer Control Board

The main printer controller handles the following functions:

- Printer host interface
- Printing functions
- Control panel interface
- Interface and control of additional controller options (HDD, NIC, PS DIMM, DRAM SIMM)

3. LD Unit

This is the laser diode drive circuit board.

4. HDD Unit (Option)

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

- Additional soft fonts (only for Postscript)
- Soft collation (disk-based collation)
- Downloading forms for form overlay (only for Postscript)

5. Network Interface Card (Option)

The network interface card is an additional printer interface to allow the printer to be used on a network.

6. PS DIMM (Option)

This is to add the PostScript feature.

7. DRAM SIMM (Standard / Option)

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

NOTE: There are two DRAM SIMM slots. One of them contains a 4MB RAM SIMM installed at the factory.

1.9 PRINTING FEATURES

1.9.1 LANGUAGE SELECTION

The user can set each communication port to a different personality. Based on the personality chosen, the print data stream is processed using the specified emulation language. If the personality is Auto Sense, the printer controller will determine which emulation language to use. The user can also select the correct personality at the front panel if a certain job cannot be printed using Auto Sense (for example, using TIFF Raw Mode).

1.9.2 PORT SELECTION

With a NIC installed, the port (either NIC or parallel) is automatically selected. Without a NIC installed, the selection defaults to parallel.

1.9.3 MEMORY REQUIREMENTS

This printer has a base memory of 4MB on board and 4MB of SIMM installed at the factory. Additional memory is required for high-resolution graphics or large documents on a regular basis, or for memory-intensive features such as special fonts or duplex printing. Additional memory increases printing speed. The controller has two SIMM slots. Each slot can have a 4M, 8M, 16M, or 32M SIMM. One SIMM slot has a 4MB RAM SIMM installed at the factory. The main control board memory can be upgraded to 64 MB (2 x 32M), for a total printer memory of 68M.

1.9.4 SOFT COLLATION (DISK-BASED COLLATION)

This feature requires a hard disk. Soft collation stores rendered pages in the hard disk. Then the rendered pages are retrieved and printed into sets of documents. Soft collation is enabled through the printer driver stored in the host computer.

In a PCL-only system, the whole disk is allocated for collation. In a system with both PCL and PS, half the disk space is allocated for collation.

1.9.5 DUPLEX PRINTING

Duplex printing is an option for this printer. A duplex unit must be installed (it replaces the first paper tray).

Duplex printing can be enabled through the printer driver. There are two modes which the user can select from the machine's control panel or printer driver: short-edge binding and long-edge binding. In short-edge binding, the copies are bound at the short edge; in long-edge binding, the copies are bound at the long edge.

Also, interleave and non-interleave modes affect the printing order. The following example shows the printing order in interleave and non-interleave modes.

Non-interleave:	2	1	4	3	6	5	8	7	10	9
Interleave:	2	4	1	6	3	8	5	10		

Interleave mode gets the best printing speed out of the duplex unit (printing in page order is not the quickest way). Interleave mode supports the following sizes :

A4 (SEF, LEF), A5 (LEF), B5 (LEF), Letter (SEF, LEF).

1.9.6 STAPLING

This function can be selected from the driver. It is available only when the optional finisher and hard disk are installed. Stapling allows the printer to staple the printed pages at the upper left corner with the staples at a 45-degree slant. When this feature is selected with the driver, the user has to choose the shift tray (face-down) as the output tray and also enable stapling. When the stapler is nearly empty, and stapling is requested, "Add Staples, Finisher" is displayed but printing will not stop.

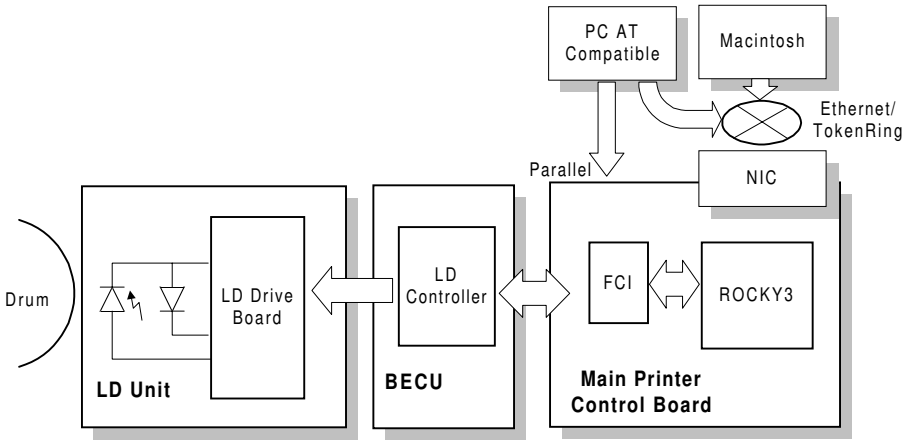
1.9.7 JOB SEPARATION

This feature is available when the optional finisher unit is installed. When the selected output tray is either shift tray (face-down) or shift tray (face-up), the printer separates the jobs and also the collated copies when disk-based collation is enabled. Separation is not guaranteed with paper sizes smaller than B5 SEF.

2. DETAILED SECTION DESCRIPTIONS

2.1 PRINTING

2.1.1 IMAGE DATA PATH



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The main printer control board receives the print data from the host computer (AT compatible Windows PC or Macintosh).

The main printer control board generates the print image data and sends it with commands to the BECU.

The main printer control board contains the image processing ASICs (ROCKY3 and FCI).

- ROCKY3: Controls the image processing, IEEE1284 interface, and DRAM
- FCI (Fine Character Image): Edge smoothing and toner saving

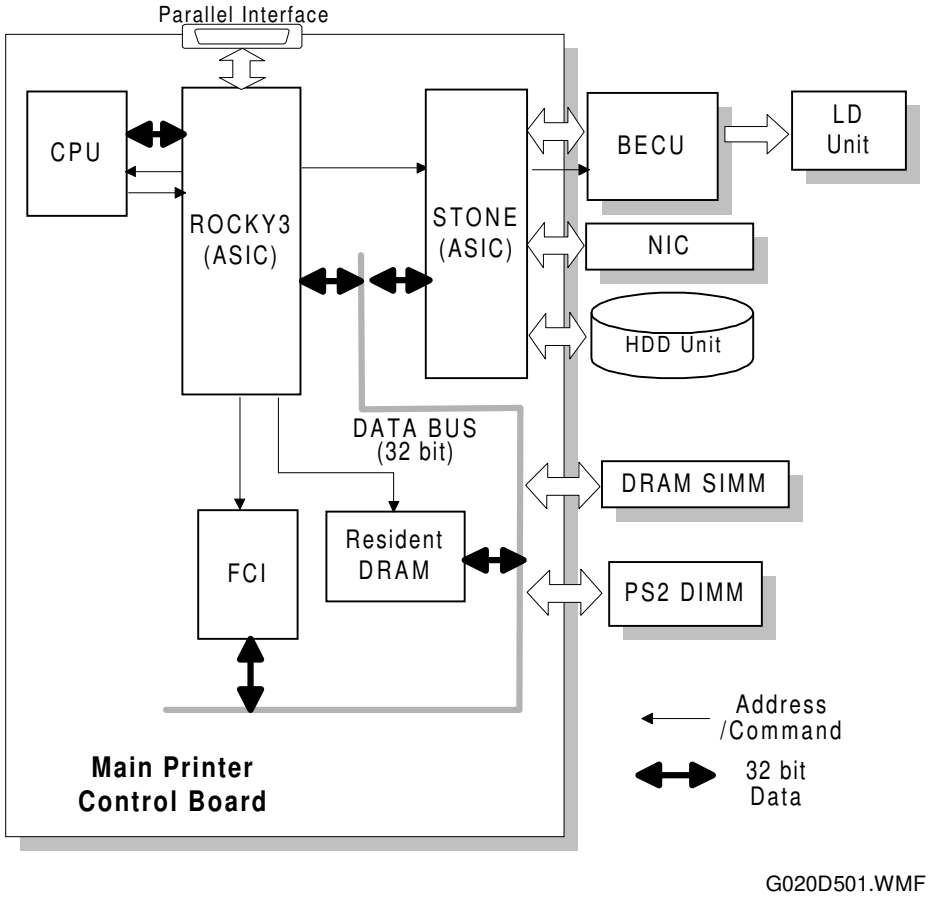
The BECU contains the LD Controller.

- LD controller: LD print timing control and laser power pulse width modulation control

Finally, the BECU board sends the video data to the LD drive board.

2.1.2 MAIN PRINTER CONTROL BOARD

Overview



The main printer control board receives the print data from the computer through the parallel or network interface port.

The main printer control board does the following to produce the print image data.

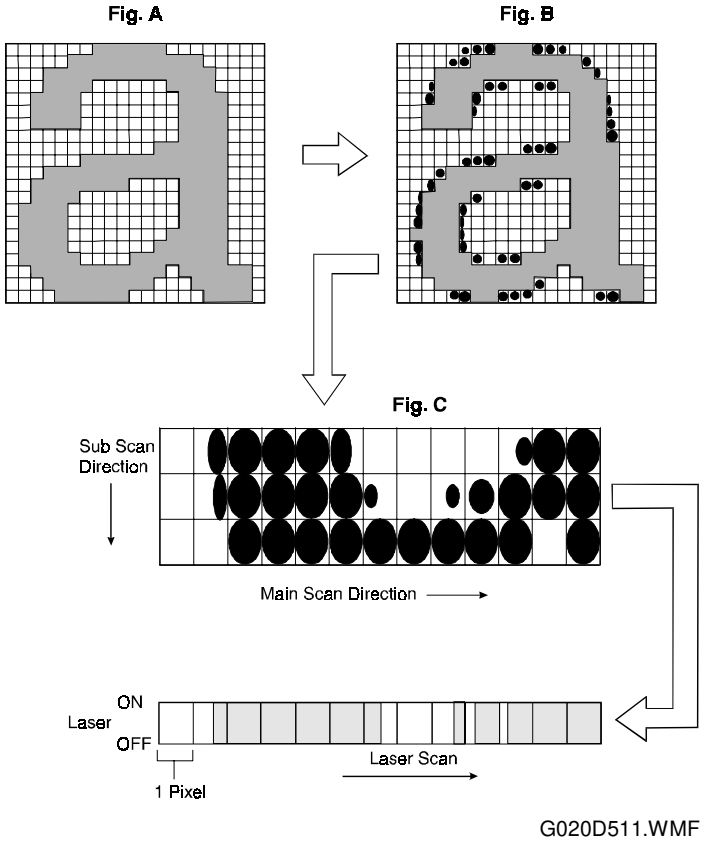
1. Main printer control board control (done by the CPU)
2. IEEE1284 parallel port interface control (done by ROCKY3)
3. Control panel control (done by STONE)
4. Edge smoothing, toner saving (done by FCI)
5. Interfacing with the printer engine and control panel (done by STONE)
6. Data bus buffer for the optional HDD and NIC (done by STONE)

2.1.3 IMAGE DATA PROCESSING

The FCI is responsible for edge smoothing and toner saving functions.

The edge smoothing and toner saving modes can be switched on or off using the machine's control panel or the printer driver.

Edge Smoothing



Usually, binary picture processing generates jagged edges on characters as shown in the above left illustration. The FCI reduces jagged edges of characters using edge smoothing.

Whether or not the object pixel undergoes smoothing depends on the surrounding image data. Smoothing for the object pixel is done by changing the laser pulse position (see the above diagram for some examples).

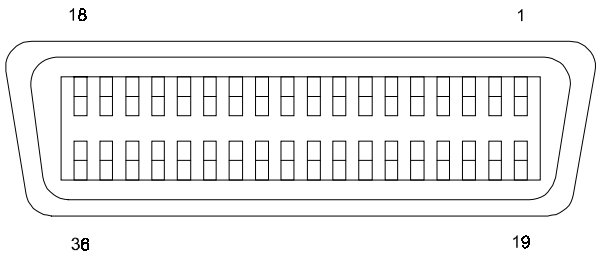
Toner Saving Mode

In this machine, toner saving is done by reducing the number of black dots printed, not by varying the development bias. In toner saving mode, the image data is filtered through a matrix.

As a result of passing through the filter, less toner is used to create the latent image on the drum, and black areas print as gray.

2.1.4 HOST INTERFACE

Bi-Directional Parallel Interface



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A 36 pin bi-directional parallel interface connector (female) is used.

The bi-directional parallel interface on the controller works in two modes; Compatible and Nibble modes (these modes are standardized by IEEE 1284).

SIGNAL PIN	SIGNAL NAME	
	STD (I/O)	NIBBLE (I/O)
1	/STROBE (I)	/STROBE (I)
2-9	DATA1-8 (I)	NOT USED
10	/ACK (O)	PtrClk (O)
11	BUSY (O)	PtrBusy (O)
12	PE (O)	AckDataReq (O)
13	SELECT (0)	Xflag (O)
14	/AUTOFEED (I)	HostBusy (I)
15	NC	<--
16	GND	<--
17	CHASSIS GND	<--
18	NC	<--
19-30	GND	<--
31	/INIT (I)	/INIT (I)
32	/ERROR (O)	DataAvail (O)
33	GND	<--
34	NC	<--
35	+5V	<--
36	/SELECTIN (I)	1284Active (I)

2.2 LASER EXPOSURE

2.2.1 OVERVIEW

This machine uses a laser diode to produce electrostatic images on an OPC drum. The laser diode unit converts image data from the BECU board into laser pulses, and the optical components direct these pulses to the drum.

To produce a high-quality print, the laser pulses are controlled through pulse width modulation. This allows the printer to produce black dots of different widths, which are used for edge smoothing, to enhance the appearance of line art and text. Different shades of grey for halftones are created using matrix patterns of pixels.

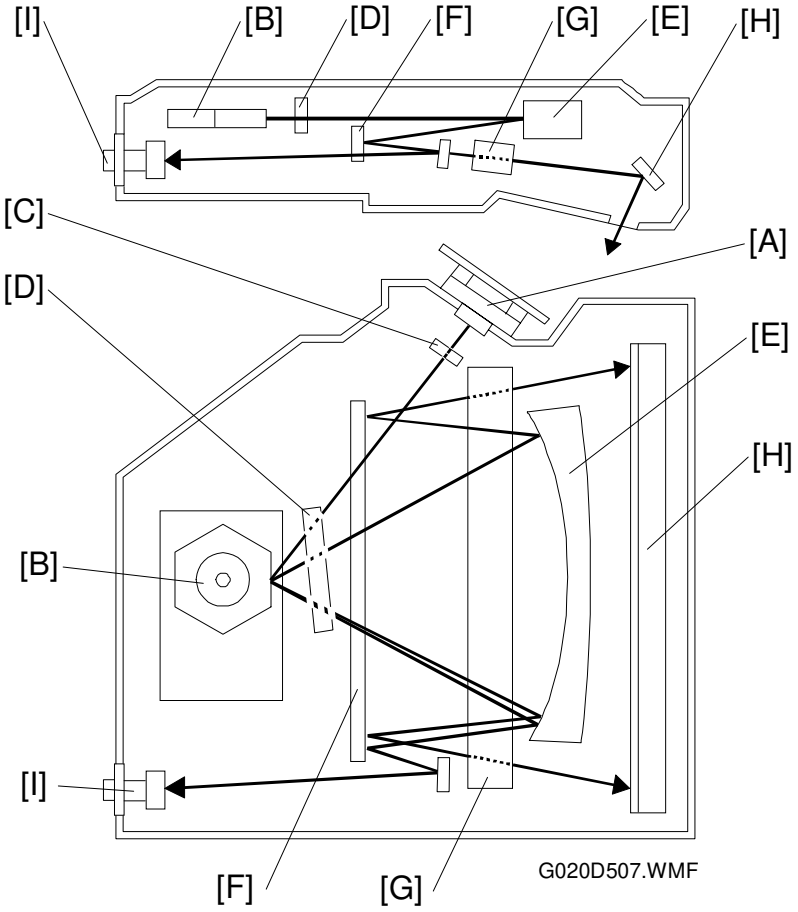
Exposure of the drum by the laser beam creates the latent image. The laser beam makes the main scan while drum rotation controls the sub scan.

The strength of the beam is 0.6 mW on the drum surface (10 mW output from the LD unit) at a wavelength of 780 nm.

There are two polygon motor speeds:

Resolution (dpi)	Modes	Motor Speed (rpm)	Data Frequency (MHz)
400 dpi	400 dpi printing	17952.8	11.750
600 dpi	600/300 dpi printing	26926.1	26.438

2.2.2 OPTICAL PATH



[A]: LD Unit
[B]: Polygonal Mirror
[C]: Cylindrical Lens
[D]: Shield Glass
[E]: F-Theta Mirror
[F]: 1st Mirror
[G]: BTL
[H]: 2nd Mirror
[I]: Laser Synchronization Detector

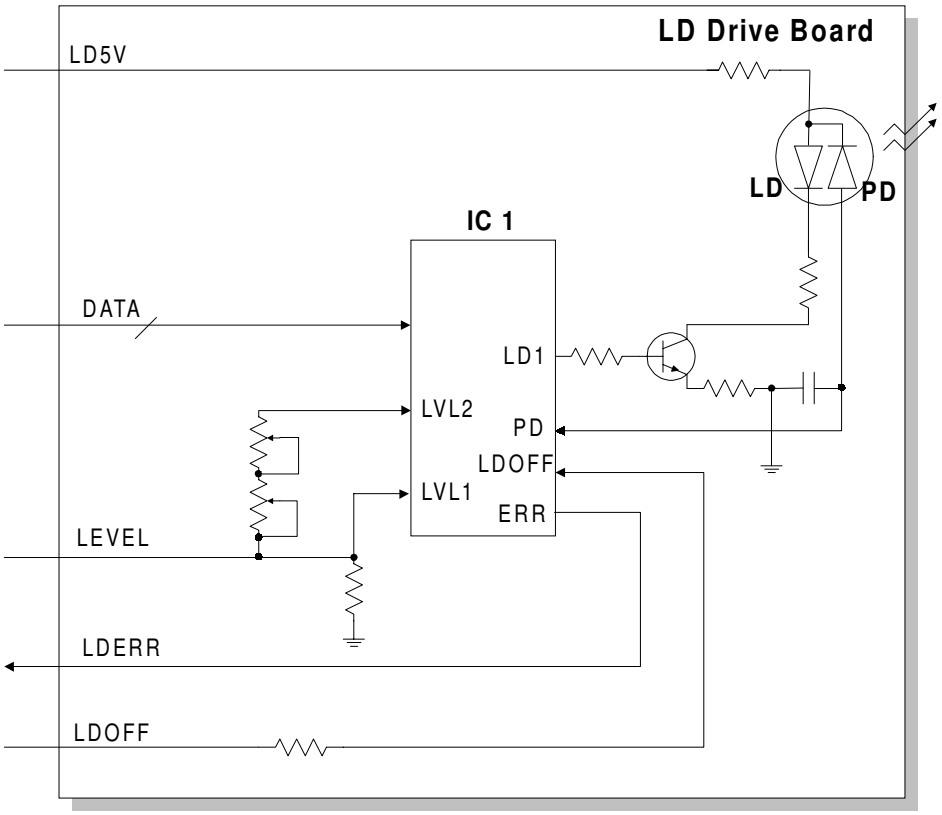
The output path from the laser diode to the drum is shown above.

The LD unit [A] outputs the laser beam to the polygonal mirror [B] through the cylindrical lens [C].

Each surface of the polygonal mirror reflects a full main scan line. The laser beam goes to the F-theta mirror [E], 1st mirror [F], and BTL [G]. The 2nd mirror [H] reflects the laser beam to the drum through the toner shield glass.

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

2.2.3 AUTO POWER CONTROL (APC)



G020D502.WMF

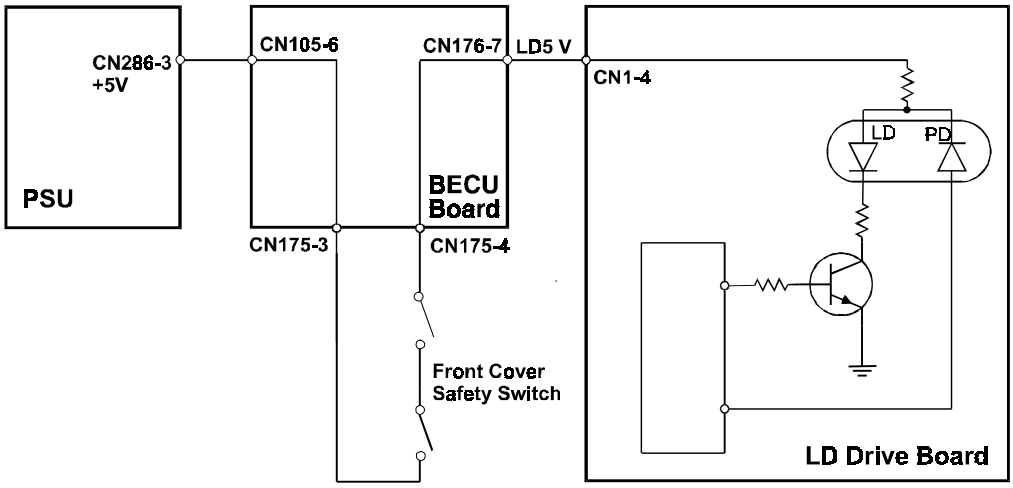
Even if a constant electric current is applied to the laser diode, the intensity of the output light changes with temperature. The intensity of the output decreases as the temperature increases.

In order to keep the output level constant, the output light intensity is monitored through a photodiode (PD) enclosed in the laser diode. The photodiode passes an electrical current that is proportional to the light intensity. The output is not affected by temperature, so it faithfully reflects the changes in the LD output, without adding anything itself.

Just after the machine is turned on, IC1 on the laser drive board excites the laser diode at full power and the output of the photodiode is stored as a reference in IC1. During printing, IC1 monitors the current passing through the photodiode (PD). Then it increases or decreases the current to the laser diode as necessary, comparing it with the reference level (LVL2).

The laser diode power level is adjusted on the production line. Do not touch the variable resistors on the LD unit in the field.

2.2.4 LD SAFETY SWITCHES



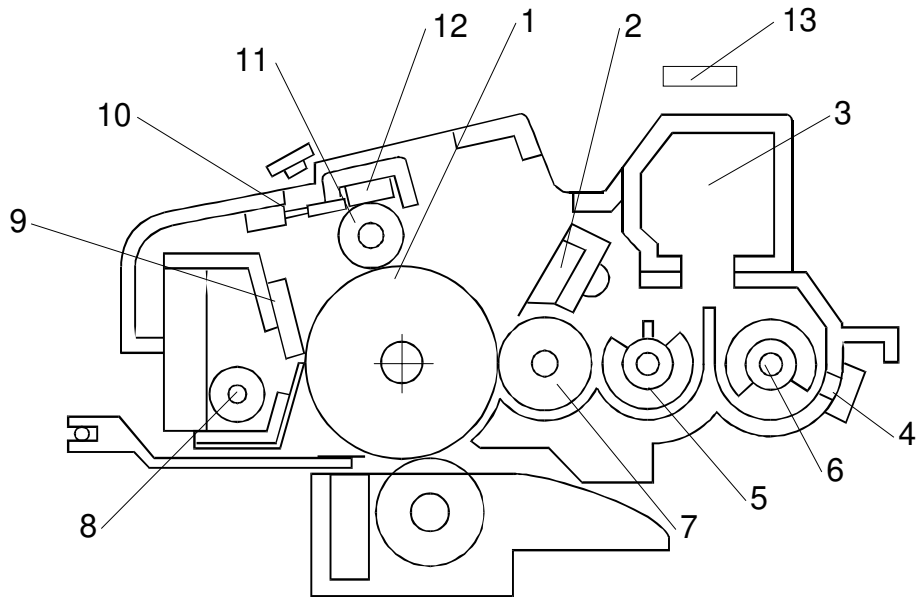
G020D008.WMF

To ensure that the laser beam does not inadvertently switch on during servicing, there are two safety switches located at the front cover. These two switches are installed in series on the LD5V line coming from the PSU through the BECU board.

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

2.3 PCU (PHOTOCONDUCTOR UNIT)

2.3.1 OVERVIEW



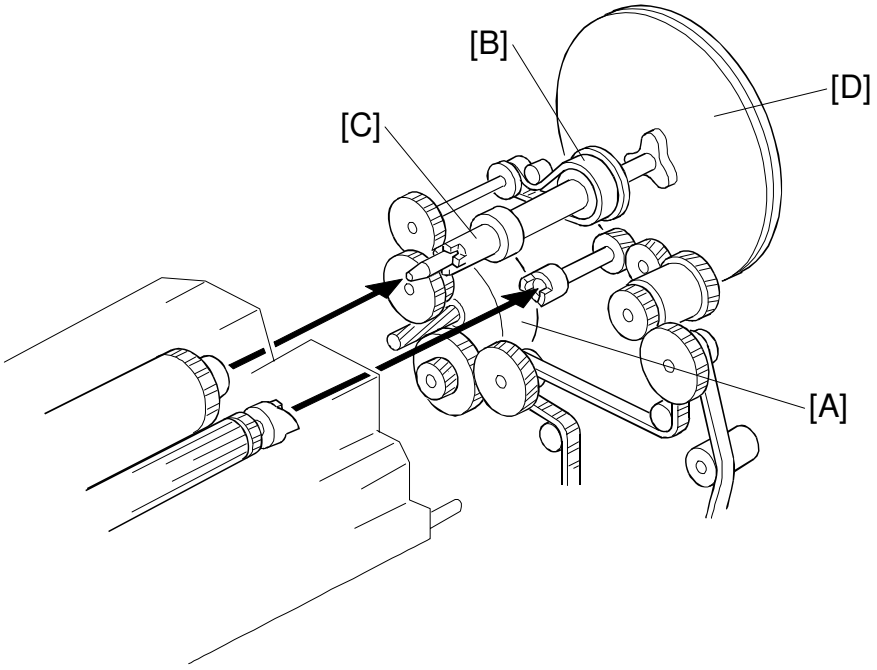
G020D010.WMF

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

1. OPC Drum
2. Doctor Blade
3. Developer Cartridge
4. TD Sensor
5. Mixing Auger 1
6. Mixing Auger 2
7. Development Roller
8. Toner Collection Coil
9. Cleaning Blade
10. Charge Roller Thermistor
11. Charge Roller
12. Charge Roller Cleaning Pad
13. Humidity Sensor

The output of the humidity sensor is used for toner density control.

2.3.2 DRIVE MECHANISM

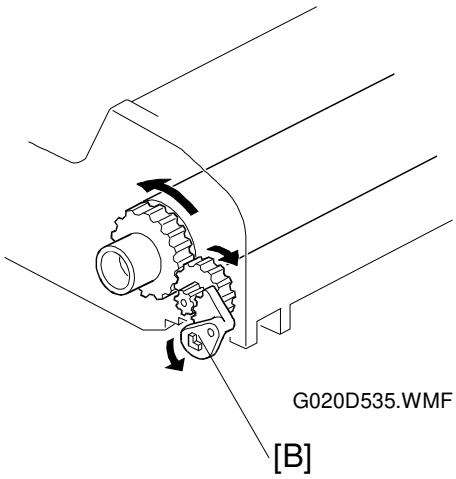


G020D542.WMF

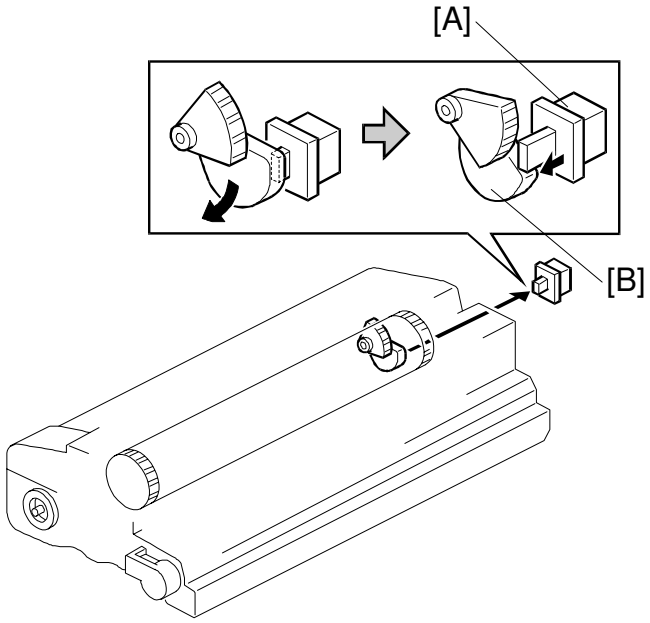
The drive from the main motor [A] is transmitted to the drum through a series of gears, a timing belt [B], and the drum drive shaft [C]. The main motor has a drive controller, which outputs a motor lock signal when the rotation speed is out of the specified range.

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

2.3.3 NEW PCU DETECTION MECHANISM



G020D535.WMF



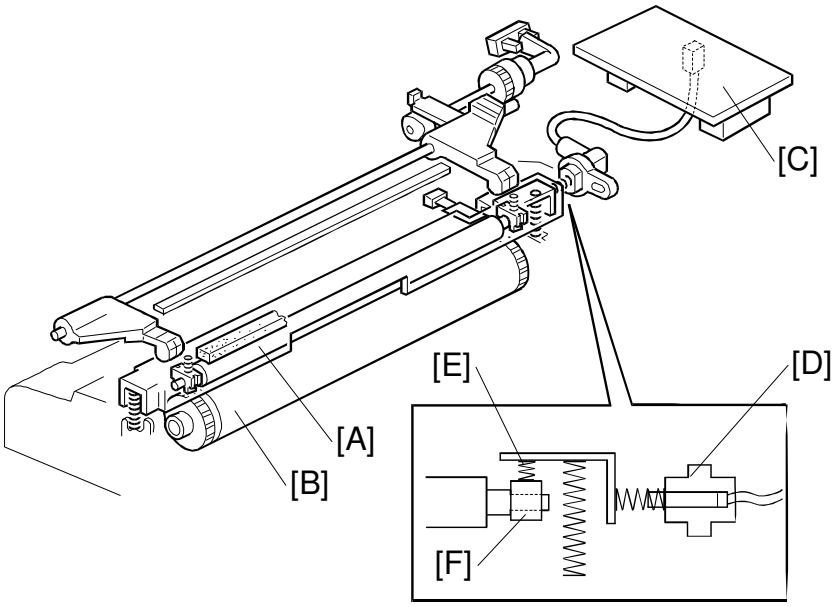
G020D536.WMF

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

The machine recognizes when a new PCU has been installed in the machine because the actuator of the new PCU contacts the PCU sensor. After the front cover is closed, the machine then performs the TD sensor initial setting procedure automatically (for about five minutes) and clears the PCU counter. During this time, the drum rotates and the actuator drops away from the sensor.

2.3.4 DRUM CHARGE

Overview



G020D543.WMF

This printer uses a drum charge roller system instead of a scorotron corona wire system to charge the drum. For the print image area or during roller cleaning, the drum charge roller [A] contacts the surface of the drum [B] to give it a negative charge.

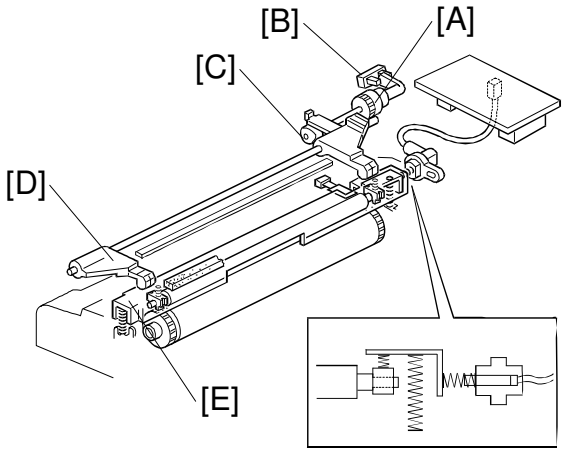
The drum charge roller system has the following advantages over the scorotron corona wire charge system.

- The amount of ozone generated during drum charging is less than about 1/10 of that for a scorotron corona wire system.
- The applied voltage is 1/2 ~ 1/3 that of a scorotron corona wire system.
- The efficiency of drum charging is high.

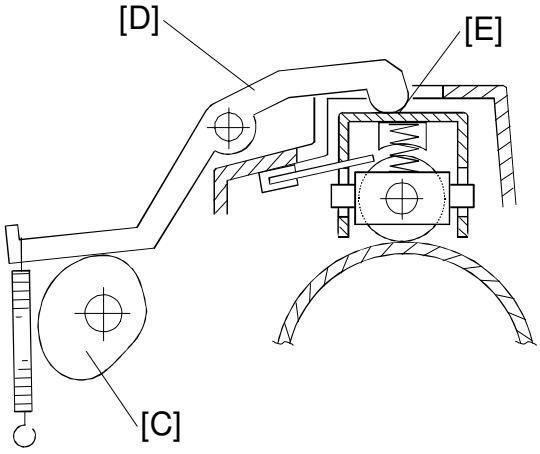
Due to these advantages, no ozone filter is required in this copier.

The high voltage supply board [C] gives a negative dc voltage to the drum charge roller through the charge roller terminal [D], rear pressure spring [E], and the rear roller bushing [F]. This gives the drum surface a negative charge of -900 V.

Charge Roller Contact Mechanism



G020D543.WMF



G020D014.WMF

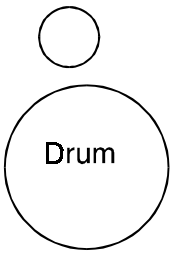
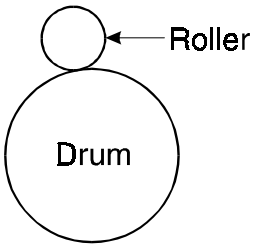
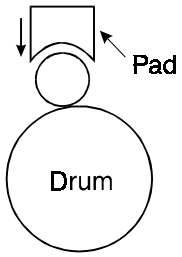
To prevent toner from adhering to the drum charge roller and to prevent the drum charge roller from sticking to the drum, the drum charge roller contacts the drum only under the following conditions:

- When the image processing area comes under the drum charge roller
- During charge roller cleaning

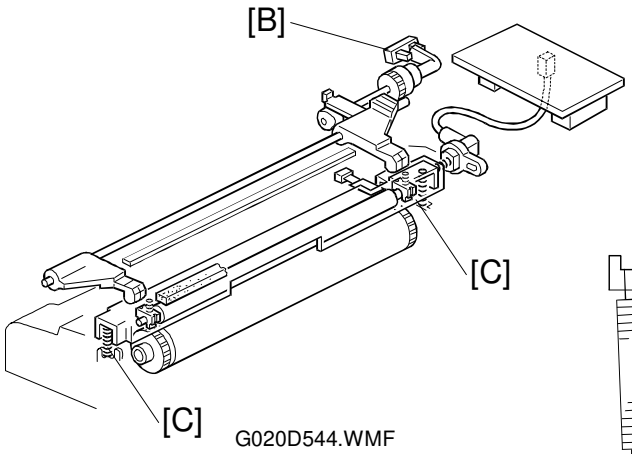
This function is performed by the charge roller contact clutch [A] (a one-third turn clutch), the charge roller H.P. sensor [B], and the cam [C] located at the end of the clutch shaft. When the clutch is driven one third of a complete rotation, the pressure lever [D] riding on the cam presses down the drum charge roller unit [E] to contact the roller with the drum.

When the drum charge roller contacts the drum, the drum charge roller is turned by the drum.

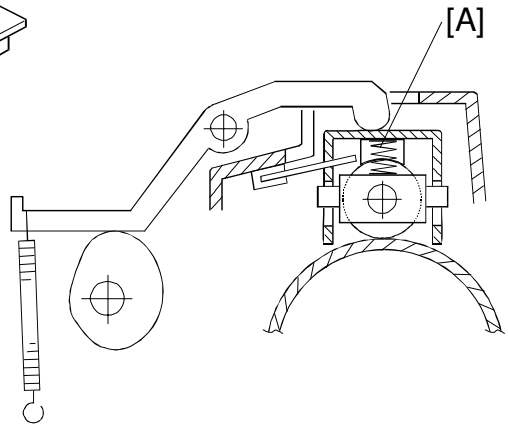
The following table shows the relationship between the clutch rotation and each processing phase.

Mode	Home Position	Copying	Cleaning (see the next page)
Clutch	1/3 turn	1/3 turn	1/3 turn
Charge Roller Position			
Charge Roller Contact H.P. Sn	ON	OFF	OFF

Drum Charge Roller Cleaning



G020D544.WMF



G020D015.WMF

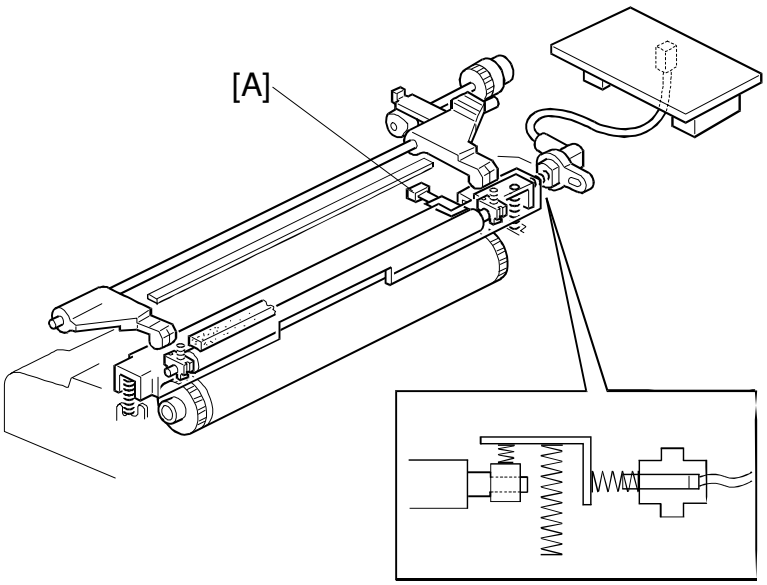
If the drum charge roller gets dirty, drum charge efficiency decreases. This affects the print quality, for example causing vertical black lines.

Drum charge roller cleaning is done for 2 seconds after every print job.

After the print job, the charge roller contact clutch is driven another third of a rotation (see the diagram at the bottom of the previous page). The pressure lever presses down more, so that the cleaning pad [A] contacts the charge roller.

After charge roller cleaning, the clutch is driven the final third of the rotation (until the charge roller H.P sensor [B] is activated) to release the charge roller from the drum. The pressure lever moves away from the charge roller unit. Then the charge roller unit is released from the drum by the spring [C].

Temperature Compensation



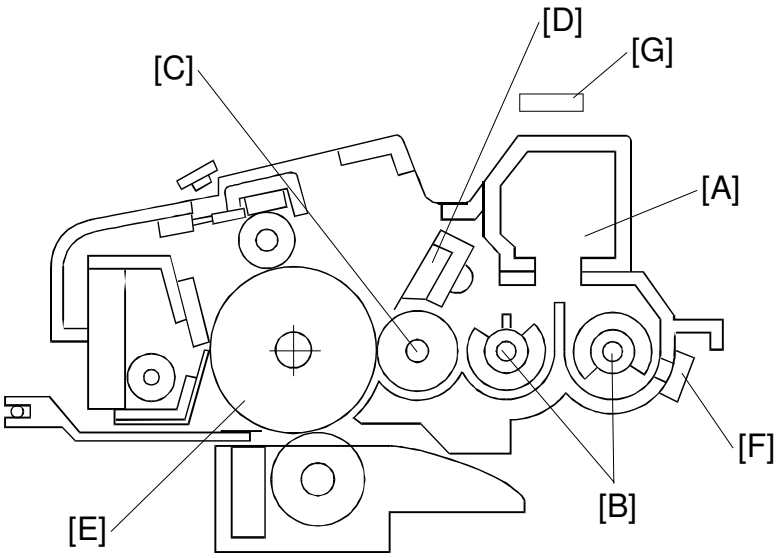
G020D012.WMF

The voltage transferred from roller to drum varies with the temperature around the drum charge roller. The lower the temperature is, the higher the applied voltage required.

To compensate for this, the drum charge thermistor [A] detects the temperature around the drum charge roller. Before the print job starts, the CPU monitors the temperature and instructs the high voltage supply board to correct the charge voltage in accordance with the temperature.

2.3.5 DEVELOPMENT

Overview



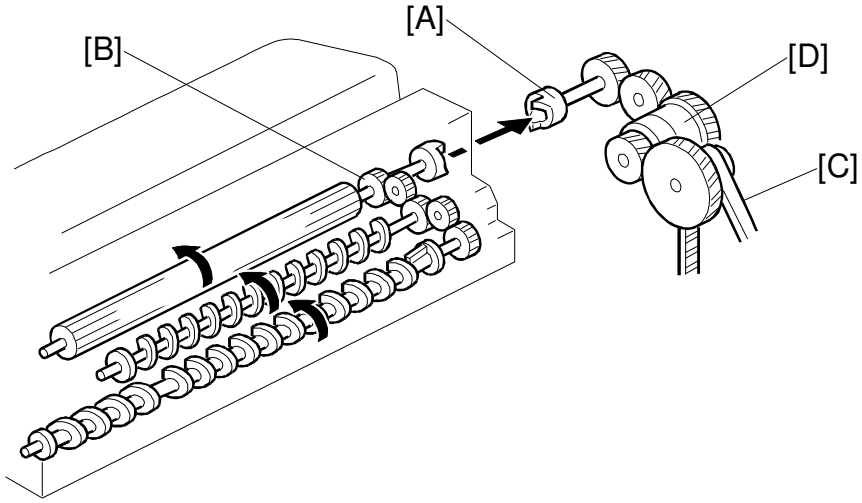
G020D010.WMF

This printer uses a single-roller development system.

The developer cartridge [A], which contains the developer, is just above the development unit section of the PCU. At machine installation, the developer falls into the development unit. The mixing augers [B] transport the developer and toner to the development roller [C]. Internal permanent magnets in the development roller attract the developer to the development roller sleeve. The development roller carries the developer past the doctor blade [D]. The doctor blade trims the developer to the desired thickness and creates backspill into the mixing mechanism. The development roller continues to turn, carrying the developer to the drum [E] where the latent image is developed.

The toner density sensor [F], located on the side of the development unit, measures the toner concentration in the developer. The humidity sensor [G] measures the humidity level around the drum.

Drive Mechanism



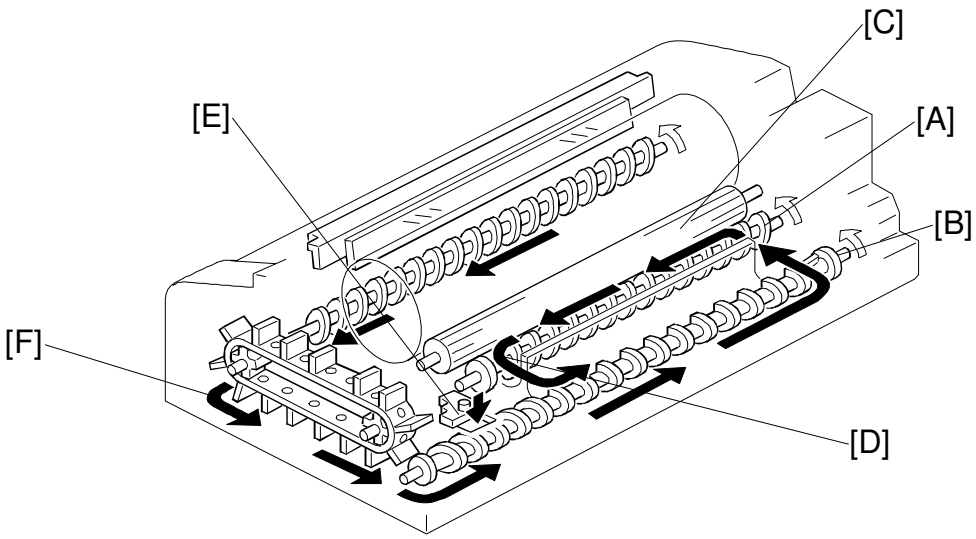
G020D017.WMF

When the development clutch [D] turns on, main motor drive is transmitted to the development drive shaft [A] and the development drive gear [B] through a timing belt [C], and a train of gears.

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.

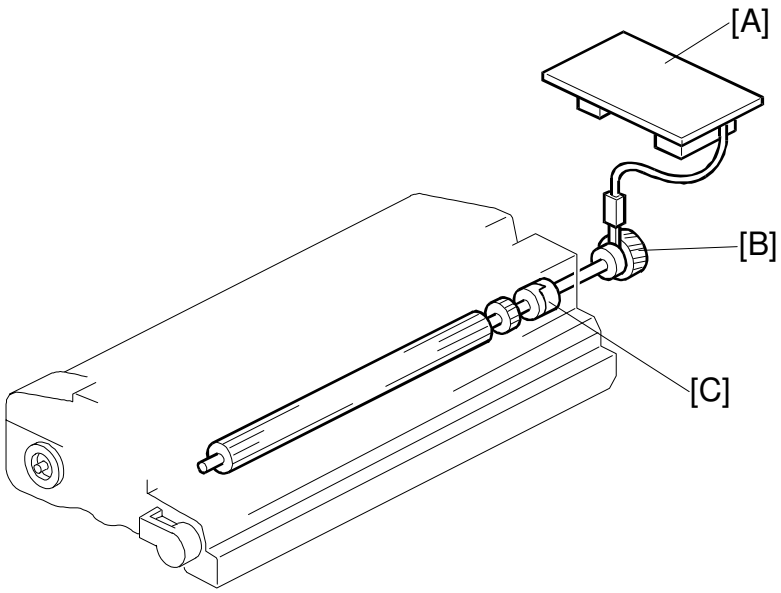
Mixing



G020D016.WMF

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

Development Bias



G020D534.WMF

This machine uses a negative-positive development system, in which black areas of the latent image are at a low negative charge (about -140 ± 50 V) and white areas are at a high negative charge (about -900 V).

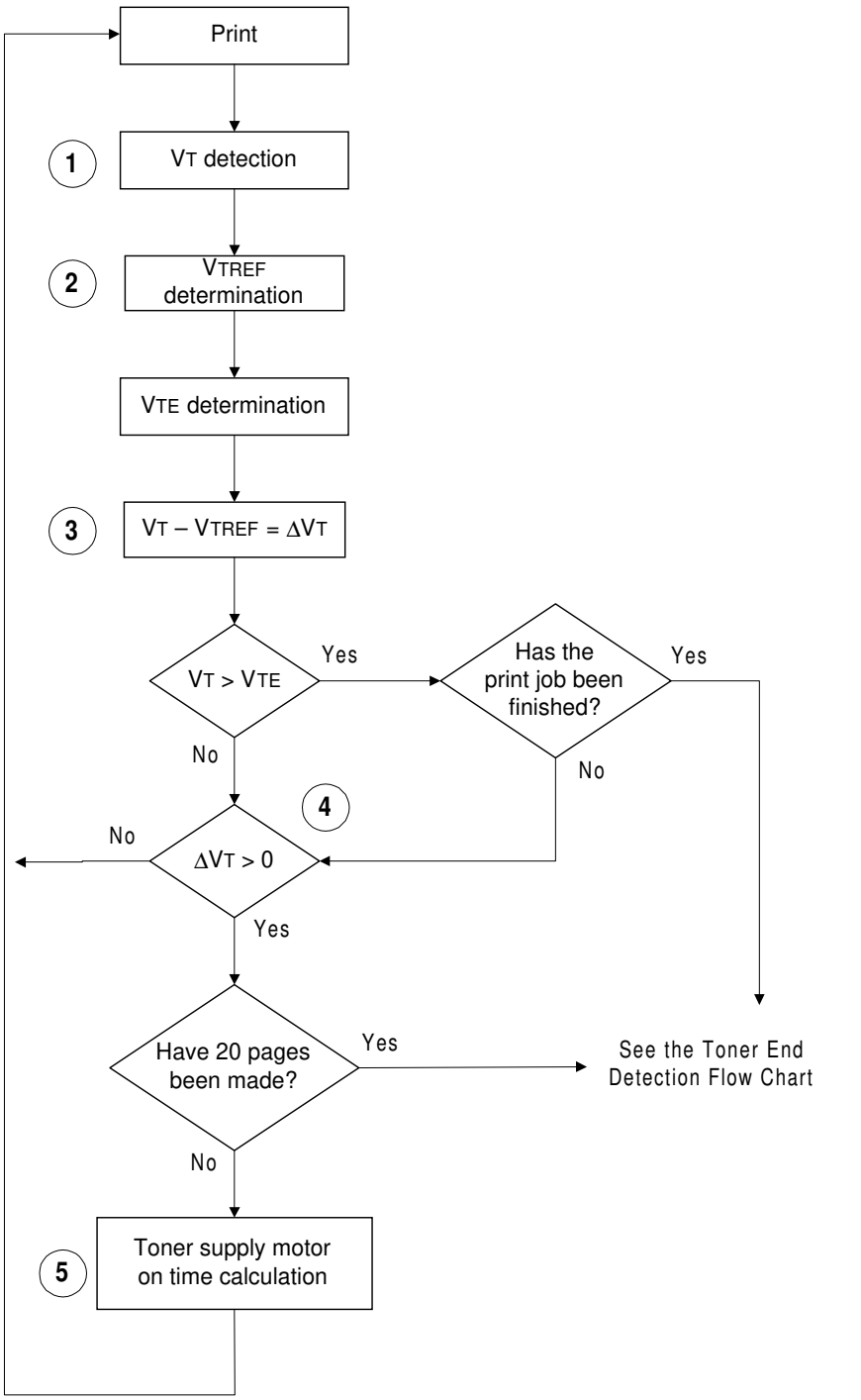
To attract negatively charged toner to the black areas of the latent image on the drum, the high voltage supply board [A] applies a bias of -600 volts to the development rollers throughout the image development process. The bias is applied to the development roller shaft [B] through that shaft's gear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

The development bias is kept at 0V until the latent image comes to the development roller. This is to prevent toner from transferring to the area of drum near the development roller, which has not yet been charged. The development bias is then increased to -600 V at the same time as the development clutch turns on.

2.3.6 TONER SUPPLY

Toner Density Control

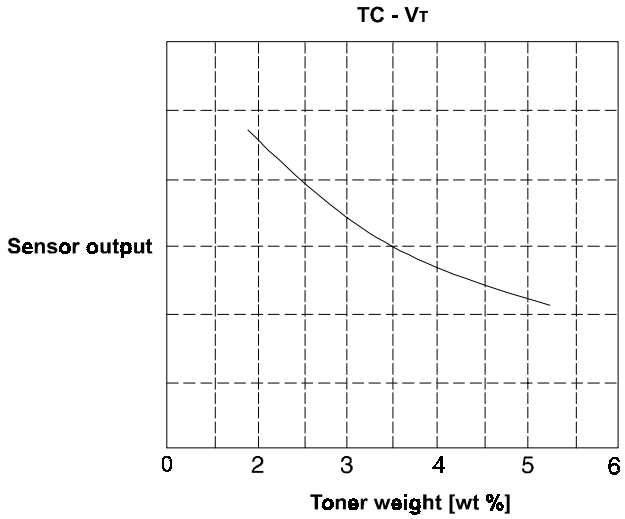
- Toner Density Control Flow Chart -



G020D545.WMF

Each step is explained in more detail on the following pages.

- Toner Density Sensor -



G020D522.WMF

Developer consists of carrier particles and toner particles (resin and pigment). Inside the development unit, developer passes through a magnetic field created by coils inside the toner density sensor, When the toner concentration changes, the voltage output of the sensor changes accordingly.

The output from the sensor (VT) is checked before every print. The machine tries to keep VT constant by varying the toner supply, as shown in the flow chart on the previous page.

- Toner Density Measurement -

Toner density in the developer is detected once every copy cycle (point "1" on the flow chart). The sensor output voltage (VT) during the detection cycle is compared with the toner supply reference voltage (VTREF).

- Toner Supply Reference Voltage (VTREF) Determination -

The toner reference voltage (VTREF) is a factory-set value, corrected for humidity as detected by the humidity sensor (point "2" on the flow chart).

- Toner Supply Determination -

VTREF is the threshold voltage for determining whether or not to supply toner. If VT becomes greater than VTREF (points "3" and "4" on the flow chart), the machine supplies additional toner.

- Toner Supply Motor On Time Calculation -

The toner motor on time is decided by the following factors (point "5" on the flow chart).

- ΔVT (this is VT - VTREF)
- Print volume counter (PVOL)
- Paper size

The print volume counter (PVOL) is determined as follows:
0: 1-9 consecutive pages have been made with $\Delta VT > 0$
1: 10-19 consecutive pages have been made with $\Delta VT > 0$

If ΔVT becomes negative at any time (i.e., there is enough toner), PVOL decreases to 0.

The toner motor on times are shown below (in seconds).

	Paper Length <250 mm	**Paper Length 250 - 400 mm**	**Paper Length >400 mm**
$0 < \Delta VT <= 0.22$, PVOL = 0	0.5	0.7	0.9
$0 < \Delta VT <= 0.22$, PVOL = 1	1.0	1.3	1.8
$\Delta VT > 0.22$, PVOL = 0 or 1	1.0	1.3	1.8

NOTE: The toner supply amount is 0.1 g for 0.5 s

Toner Supply in Abnormal Sensor Conditions

There is one service code (SC390) for TD sensor errors. This SC condition can be cleared by turning the main switch off and on again. After doing this, the machine automatically performs the TD sensor initial setting.

1. Case 1

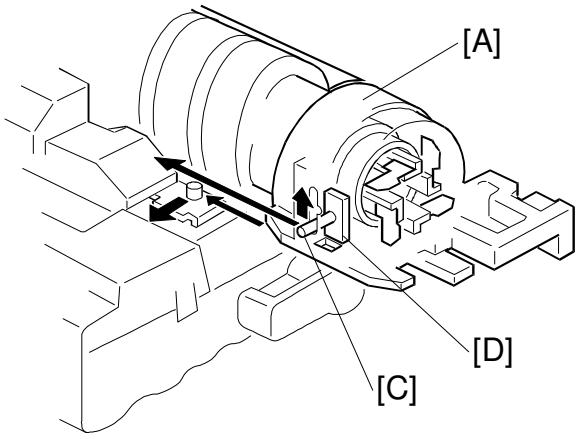
If the TD sensor output voltage (VT) is less than 0.5 V when 20 seconds has passed since TD sensor initial setting was done.

2. Case 2

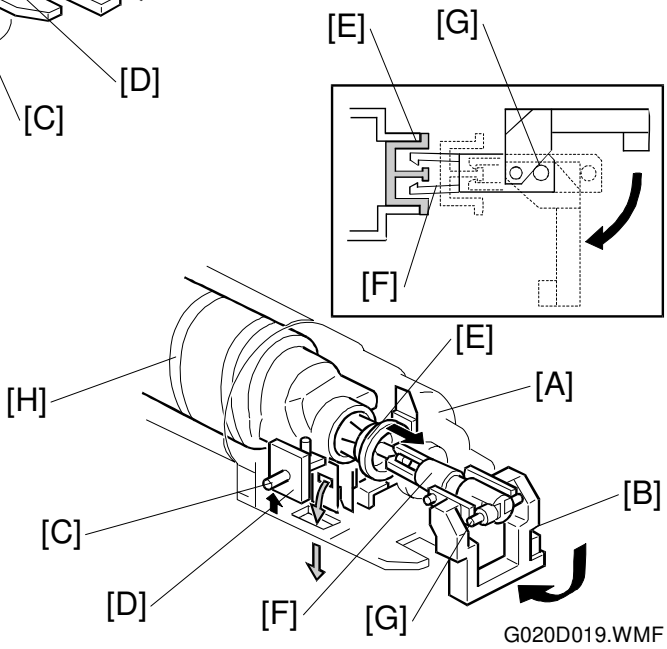
If the TD sensor output voltage (VT) exceeds the specified range (2 ± 0.2 V) when TD sensor initial setting is finished.

Toner Supply

- Toner Bottle Replenishment Mechanism -



G020D516.WMF



G020D019.WMF

When a toner bottle is placed in the bottle holder unit [A] and pushed back in completely and the toner bottle holder lever [B] is put back in the original position, the following happens automatically to allow toner to be supplied to the development unit.

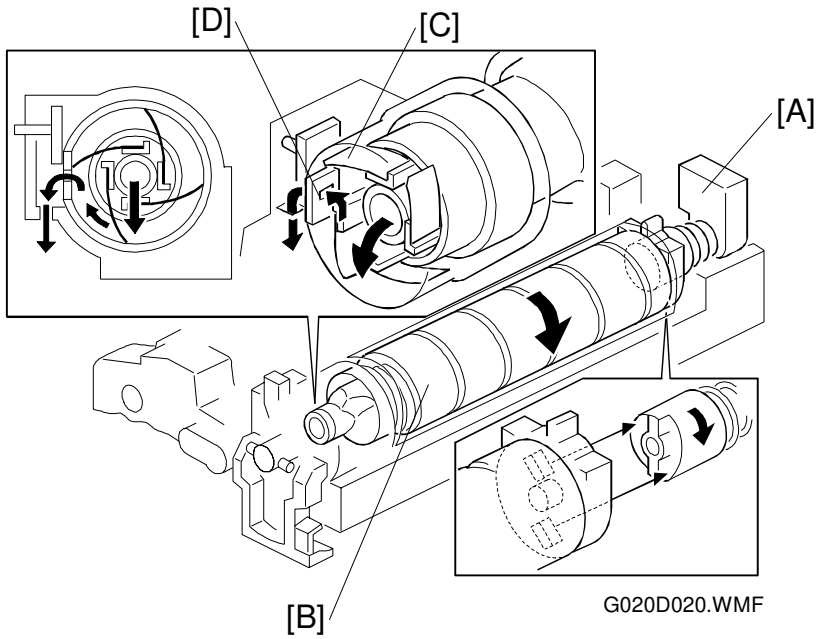
- The pin [C] on the toner shutter [D] is pulled out (opened) as a result of the shape of the developer cartridge.
- The cap [E] remaining on the toner bottle is pulled away and kept by the chuck [F] away from the movement of the roller [G], which rides along the curved rail behind the toner bottle holder lever.

The toner end detection system determines when to drive the toner bottle replenishment mechanism (see Toner End Detection). 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 new toner, the following happens automatically to prevent toner from scattering.

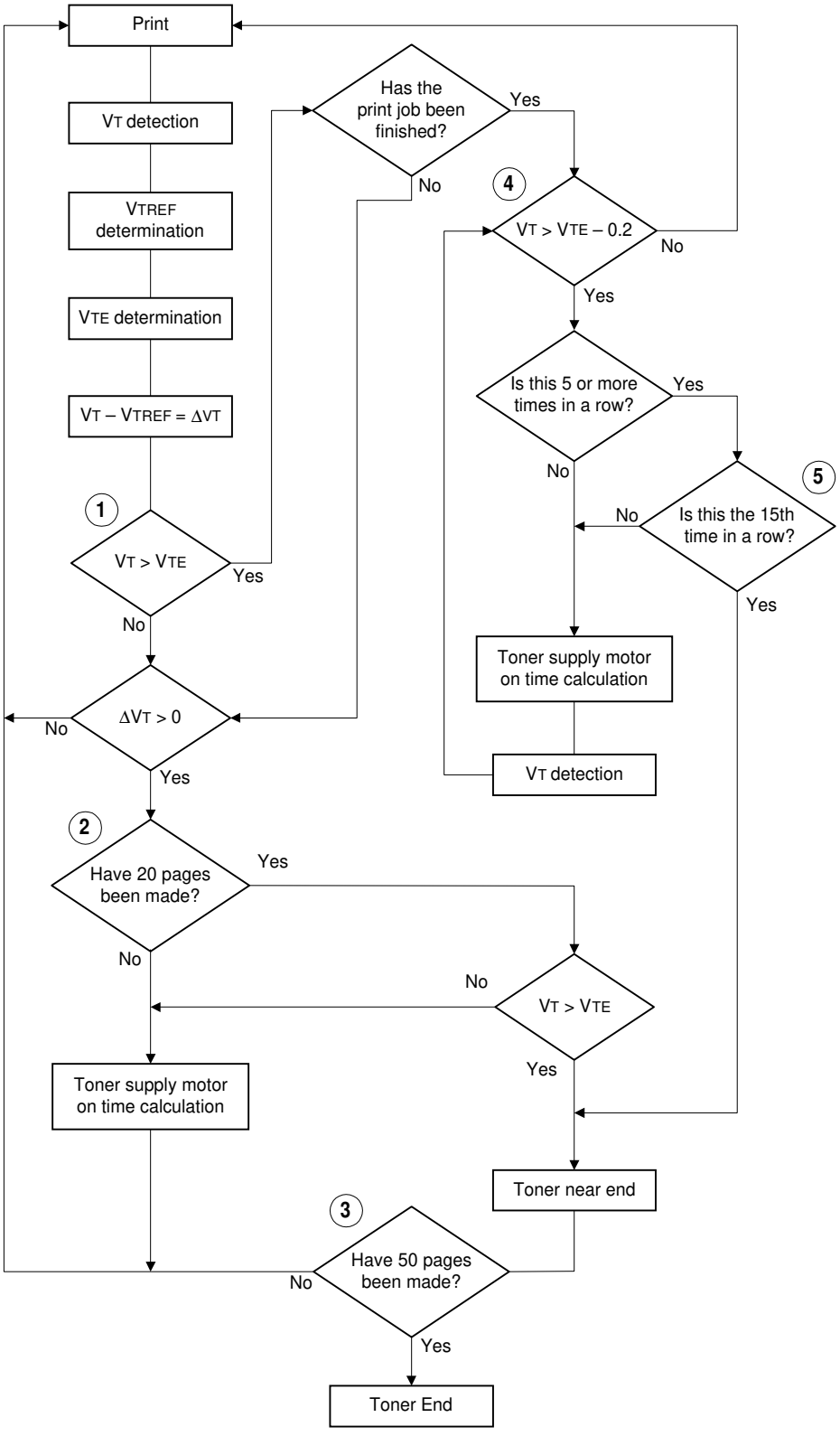
- The chuck releases the toner bottle cap into its proper position.
- The toner shutter shuts the opening as a result of pressure from a spring.

- 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 holder. The toner supply mylar blades transfer the toner to the slit [D], then the toner falls down into the development unit through the opening.

- Toner Near End/End Detection -



G020D541.WMF

There is no toner end sensor in this machine. Instead, toner end/near-end is detected using the TD sensor output data.

The machine checks for toner near end/end every print. If toner near-end or toner end is detected during the copy job, it is also checked after finishing the print job. To detect toner near end, the machine first decides the toner end reference voltage (V_{TE}) based on the humidity sensor output. Then, the machine compares V_{TE} with the TD sensor output voltage (V_T): this is point 1 on the flow chart.

During a print job:

If V_T is greater than V_{TREF} (this means the amount of toner in the development unit is low), the machine supplies toner (see Toner Supply).

If toner concentration is still low after 20 pages (point 2 on the flow chart), the machine checks for a toner near end condition (if V_T is greater than V_{TE}, there is a near end condition).

If toner concentration is still low 50 pages after toner near-end was determined (point 3 on the flow chart), the machine detects a toner end condition.

After a print job:

When the machine detects that toner concentration is low, after the print job is finished, the machine decreases V_{TE} by 0.2 V and compares V_{TE} with V_T ("4" on the flow chart). If the toner concentration is still low, the machine supplies toner. The machine then compares V_{TE} with V_T again, and supplies toner again if V_T is too low.

If the toner concentration is still too low after supplying toner 15 times ("5" on the flow chart), the machine detects a toner near-end condition.

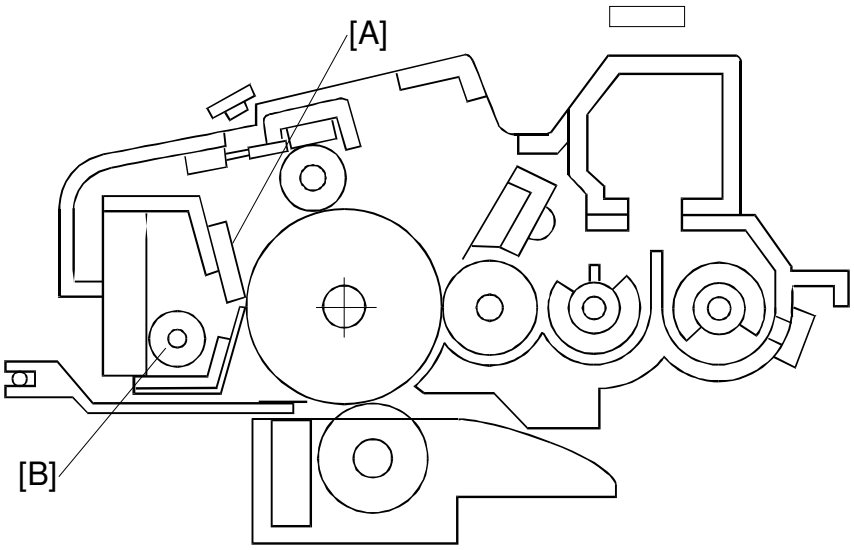
If toner concentration is still low 50 pages after toner near-end was determined ("3" on the flow chart), the machine detects a toner end condition.

- Toner End Recovery -

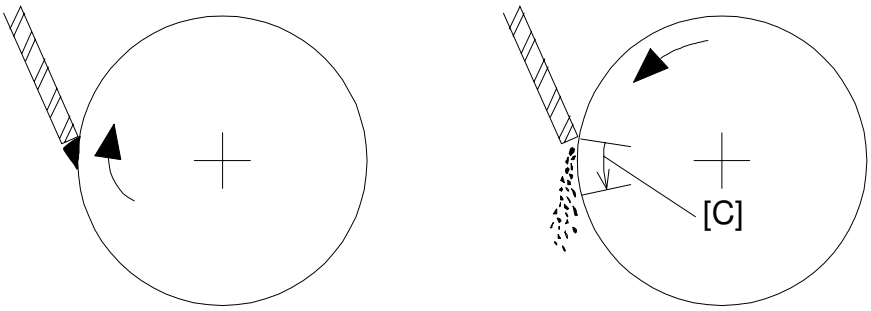
If the front cover kept open for more than 10 seconds and then closed while a toner near-end/end condition exists and the toner bottle is replaced, the machine will attempt to recover for 3 minutes using the same procedure as for toner near-end/end detection after a print job.

2.3.7 DRUM CLEANING AND TONER RECYCLING

Drum Cleaning



G020D010.WMF



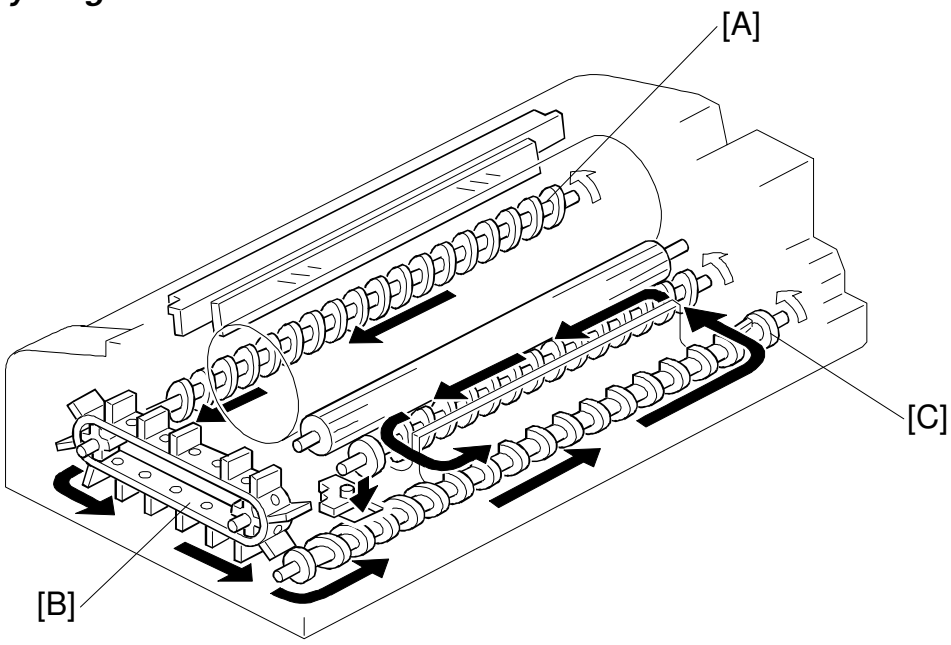
G020D529.WMF

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 toner remaining on the drum is scraped off by the cleaning blade, and it falls onto 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 [C] at the end of every copy job, as shown in the illustration, after transfer roller cleaning (during transfer roller cleaning, the drum still turns clockwise).

Toner Recycling

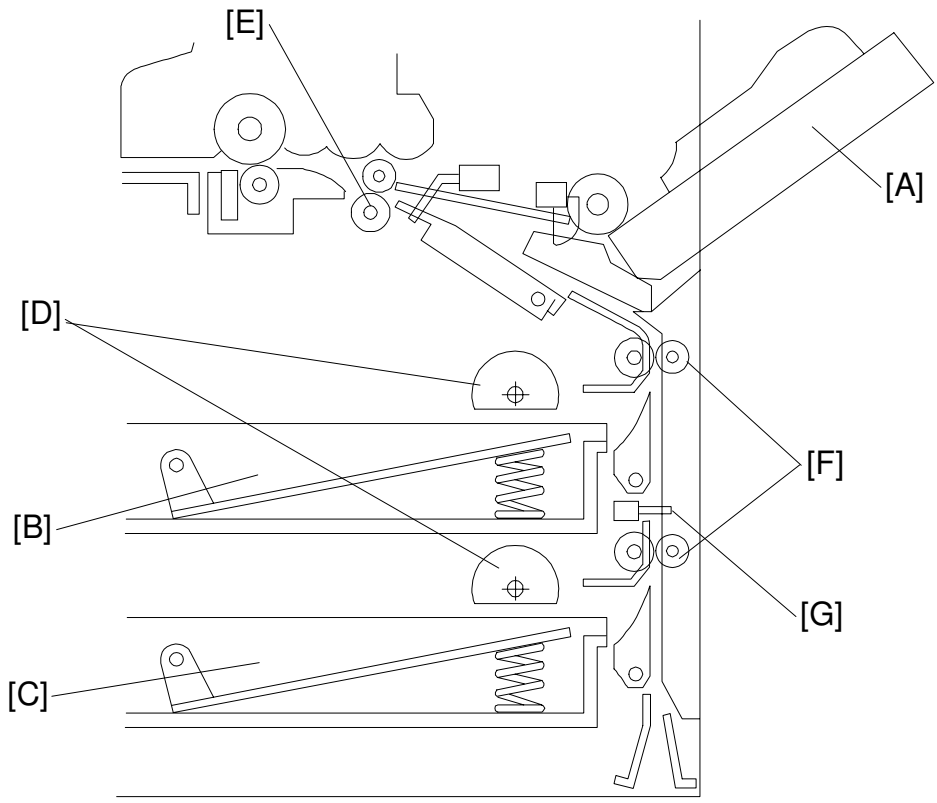


G020D016.WMF

Toner which falls onto the toner collection coil [A] is transported to the recycled toner transport belt [B] at the front of the PCU. The recycled toner transport belt carries the toner to mixing auger 2 [C] in the development unit. This toner is mixed with new toner by mixing auger 2 and used again.

2.4 PAPER FEED

2.4.1 OVERVIEW



G020D022.WMF

There are two paper trays and a by-pass tray [A].

The first [B] and second [C] paper trays each hold 250 sheets. The by-pass tray can hold 1, 10, or 100 sheets of paper, depending on the paper size.

The semicircular feed rollers [D] drive the top sheet of paper from the tray to the registration rollers [E] through the relay rollers [F].

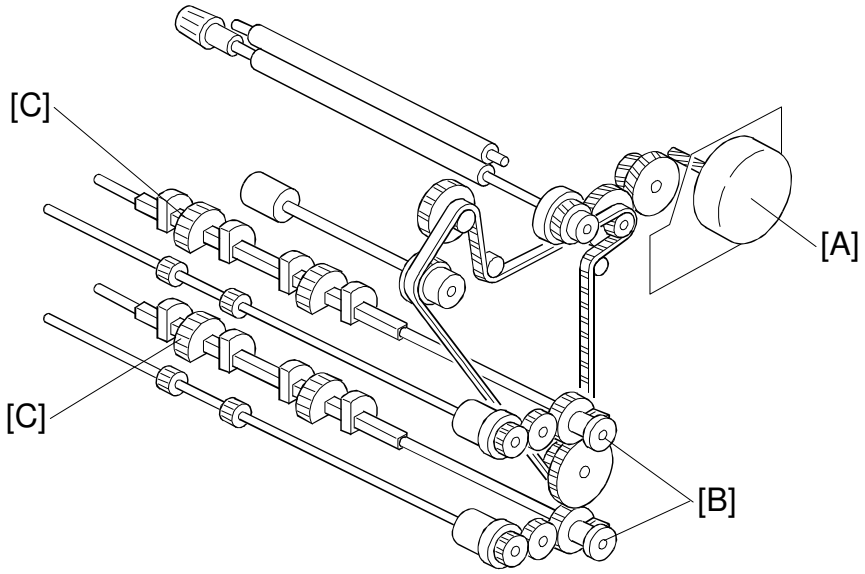
The tray has two corner separators (see [F] in the diagram in the "Paper Lift Mechanism" section), which allow only one sheet to feed at a time. The corner separators, along with the tray's springs, also serve to set the height of the paper stack.

When the tray is closed after the paper is loaded, the paper size actuator located at the front right of the tray pushes the paper size sensor. This informs the cpu what paper size is loaded in the tray and that the tray is in place.

There is a relay sensor [G] located between the relay rollers. This sensor is used for paper jam detection.

2.4.2 PAPER TRAY

Paper Feed Drive Mechanism

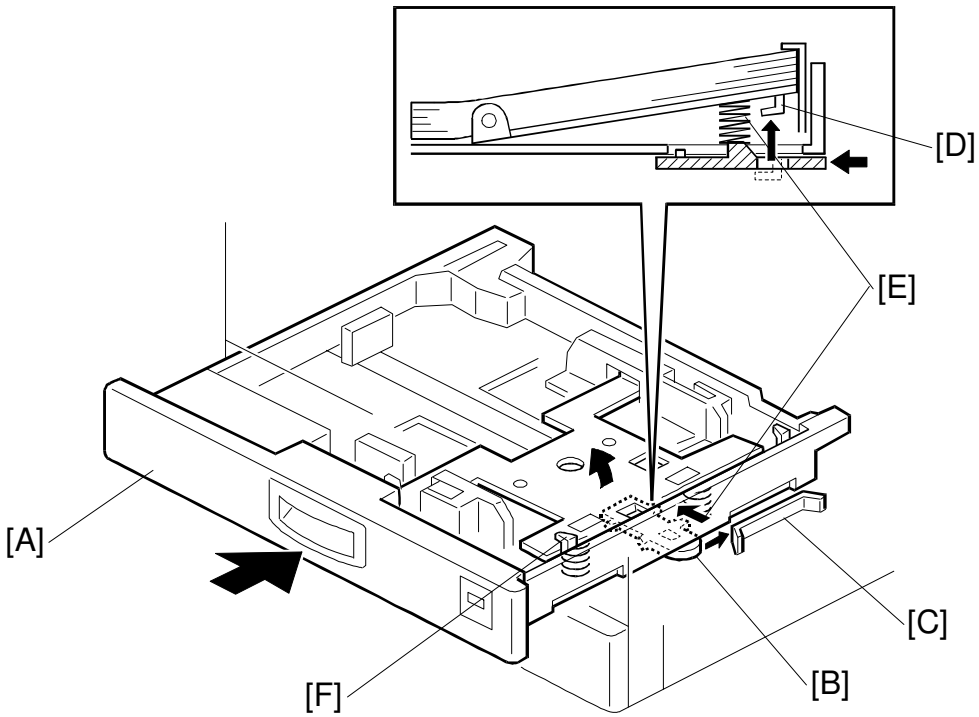


G020D033.WMF

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 feed rollers [C].

When the paper feed clutch turns on, the feed rollers start rotating to feed the paper. The paper feed clutch stays on for enough time to turn the paper feed rollers only once.

Paper Lift Mechanism



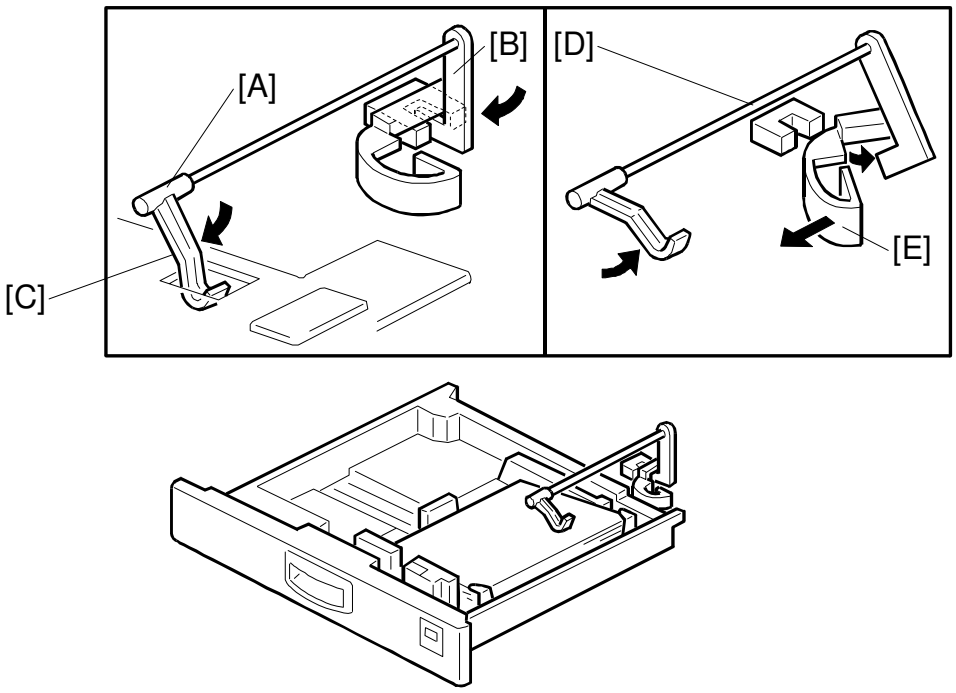
G020D024.WMF

The paper size sensor informs the cpu when the tray has been closed.

When the paper tray [A] is closed after paper is loaded, the release slider [B], which is mounted on the bottom part of the tray, is pushed by the projection [C] on the main frame and the release slider comes off the bottom plate hook [D].

Once the release slider comes off, the bottom plate is raised by the pressure springs [E] and the top sheet pushes up the corner separators [F]. This keeps the stack of paper at the correct height.

Paper End Detection

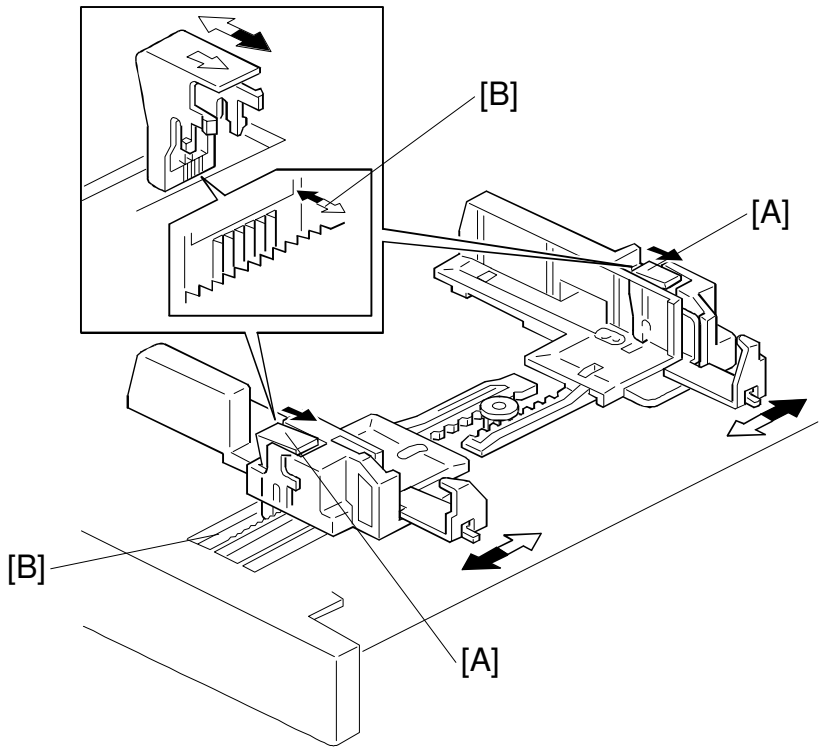


G020D027.WMF

The paper end feeler [A] is on the same shaft as the paper end actuator [B]. 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 actuator activates the paper end sensor [D].

The paper end actuator is in contact with the lever [E]. When the tray is drawn out, the lever turns as shown by the arrow in the figure. Then the lever pushes up the actuator. As a result, the feeler rotates upwards. This mechanism prevents the feeler from getting damaged by the paper tray body.

Side Fence Double Stopper Mechanism



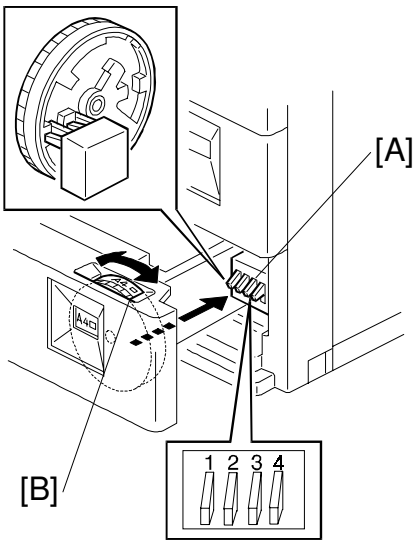
G020D026.WMF

There is a side fence stopper mechanism for both the front and rear side fences.

If the tray is closed with excessive force after loading paper, paper may come over the rear side fence, because the fence is deformed by the weight of the paper leaning against it. As a result, skewing or paper jams may occur. To prevent this, a side fence stopper mechanism has been added to the rear side fence (some previous models only had a stopper on the front side fence).

The release levers [A] each have a stopper which contains teeth like those on a gear. The guide rails [B] also have teeth. When the release lever is pushed, the gear teeth release each other and the side fences can be moved.

Paper Size Detection



G020D025.WMF

SW Size	1	2	3	4
A3, F (81/2" x 13")	●	●	●	❍
A4 Lengthwise	●	❍	●	❍
A4 Sideways	●	●	❍	❍
A5 Sideways, 11" x 17"	●	❍	❍	❍
B4, 81/2" x 14"	❍	●	❍	❍
B5 Sideways, 81/2" x 11"	❍	❍	❍	❍
B5 Lengthwise, 11" x 81/2"	❍	❍	●	❍
✻ (Asterisk)	❍	❍	●	●

●: ON (Not pushed) ❍: OFF (Pushed)

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

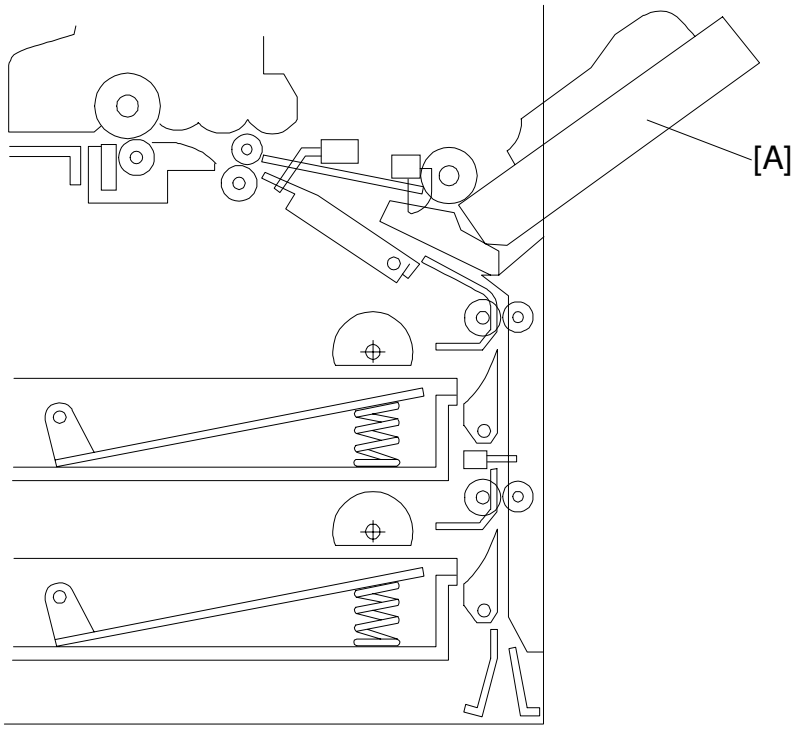
Each paper size has its own actuator, with a unique combination of notches. To determine which size tray has been installed, the CPU reads which microswitches have been switched off by the actuator.

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 main printer control board recognizes that the paper tray is not installed.

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 a menu at the machine's control panel. If the paper size for this position is changed without changing the control panel menu setting, a paper jam will result.

2.4.3 BY-PASS TRAY

Overview



G020D022.WMF

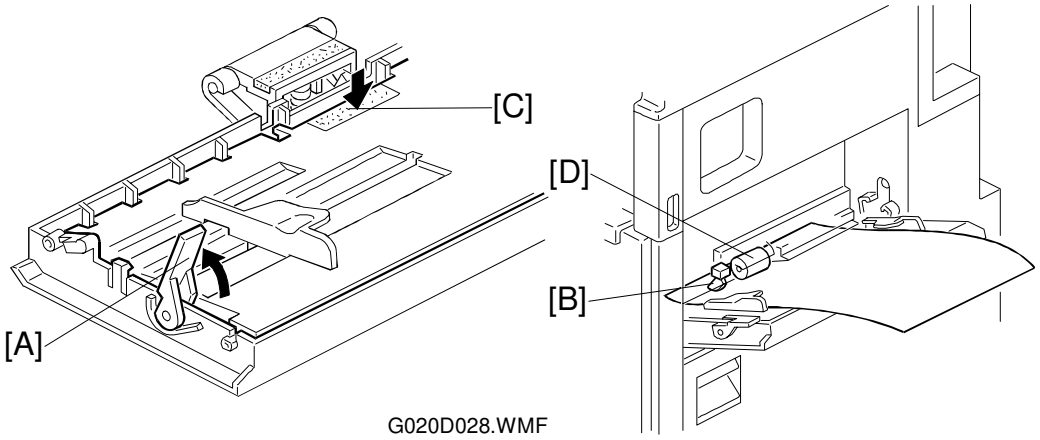
The by-pass tray [A] can hold 1, 10, or 100 sheets of paper depending on the paper size and type.

This machine does not have a by-pass tray cover sensor. The Add Paper message will be displayed on the machine's control panel when the user specifies the by-pass tray if the by-pass feed tray is closed or if there is no paper on the by-pass tray.

After image processing in the printer control board, the CPU energizes the by-pass feed clutch and the by-pass feed roller starts to feed paper to the registration roller.

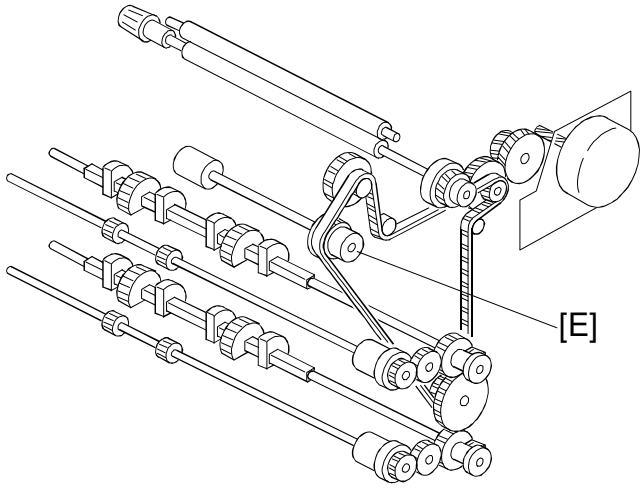
NOTE: The user must specify the paper size on the machine's control panel before sending the print job.

Paper Feed Mechanism and Paper End Detection



G020D028.WMF

G020D029.WMF



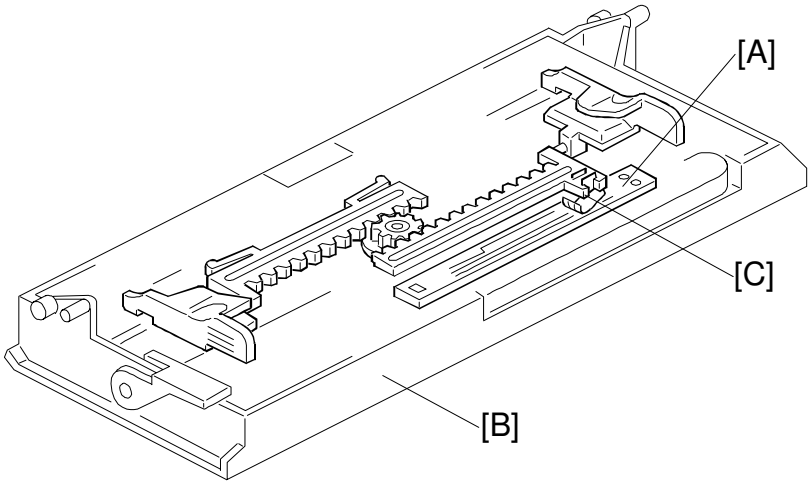
G020D033.WMF

This machine uses a feed roller and friction pad mechanism, with drive from the main motor transmitted when the by-pass feed clutch [E] turns on. The friction pad prevents all but the top sheet from feeding. Therefore, during paper feed, the top sheet of paper is separated from the stack and fed to the registration rollers.

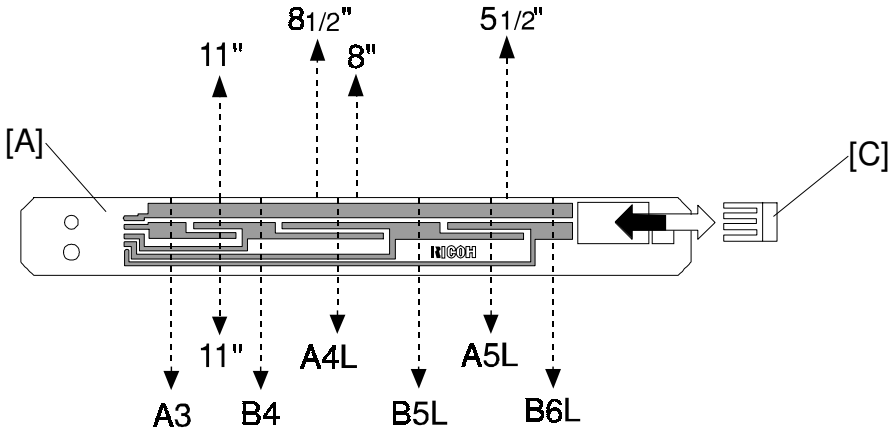
Before placing the paper on the by-pass tray, the user must lower the by-pass tray by using the lever [A]. This is to ensure that the paper is placed between the friction pad [C] and the feed roller [D]. Then, before starting the print job, it must be put back up to move the paper stack into contact with the feed roller.

When there is no paper on the by-pass tray, the paper end feeler [B] drops into the cutout in the by-pass tray and the by-pass tray end sensor is activated.

By-pass Feed Paper Width Detection



G020D030.WMF



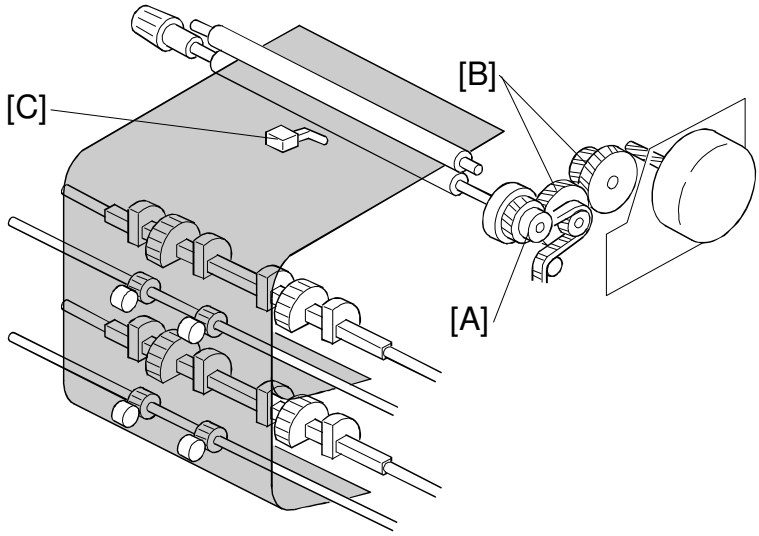
G020D524.WMF

The paper width switch [A] is a slide switch located inside the by-pass tray [B]. It is moved by hand to fit the paper width. The rear side fence is connected to the terminal plate [C]. When the side fences are moved to match the paper width, the terminal plate slides along the wiring patterns on the detection board. The patterns for each paper width on the paper width detection board are unique. Therefore, the machine determines which paper width has been placed in the by-pass tray by the signal output from the board.

However, the bypass tray cannot determine the paper length. A4 paper set sideways is determined to be A3 paper. However, the registration sensor measures the length of the paper so the data signal is cut off at the A4 length before printing.

In addition to this, the paper size for the by-pass tray must be specified from the machine's control panel before sending the print job. If the paper size does not match this, a paper size error will occur.

2.4.4 PAPER REGISTRATION



G020D032.WMF

Main motor rotation is transmitted to the registration clutch gear [A] (located on the lower registration roller shaft) through the gears [B].

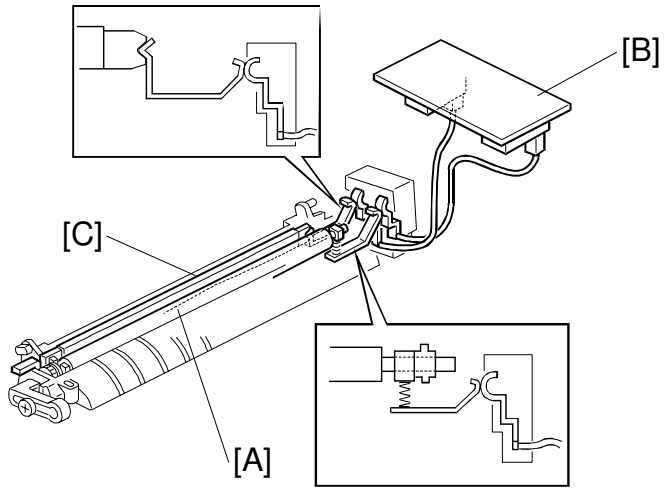
The registration sensor [C] is positioned just before the registration rollers.

When the paper leading edge activates the registration sensor, the registration clutch turns off and the registration rollers stop turning. However, the relay clutch stays on for a bit longer. This delay allows time for the paper to press against the registration rollers and buckle slightly to correct skew. The registration clutch energizes and the relay clutch re-energizes at the proper time to align the paper with the image on the drum. The registration and relay rollers feed the paper to the image transfer section.

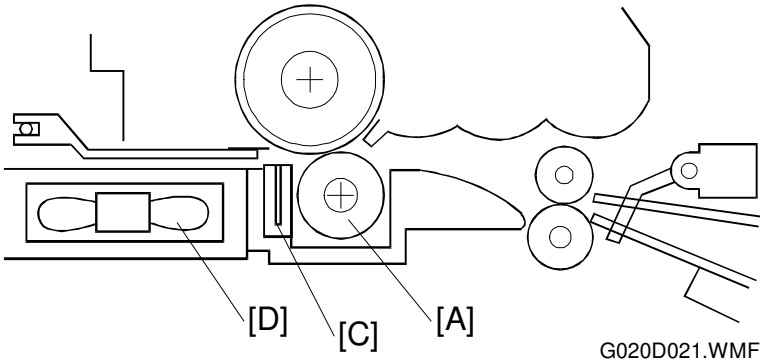
The registration sensor is also used for paper misfeed detection.

2.5 IMAGE TRANSFER AND PAPER SEPARATION

2.5.1 OVERVIEW



G020D538.WMF



G020D021.WMF

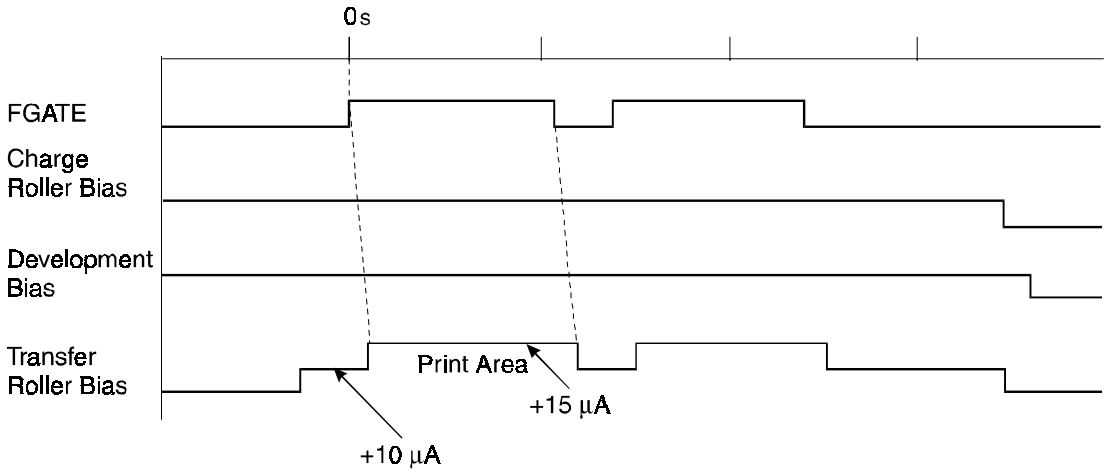
Instead of using a transfer wire or a transfer belt, this machine uses a transfer roller [A], which touches the drum surface.

The high voltage supply board [B] supplies a positive current (approximately +15 μA) to the transfer roller. The roller has a high electrical resistance, so it can hold a high positive electrical potential to attract toner from the drum onto the paper.

There is a discharge plate [C] after the transfer roller. The curvature of the drum and the discharge plate helps the paper to drop away from the drum.

The transport fan [D] under the transport guide plate helps to transport the paper from the transfer area to the fusing unit.

2.5.2 IMAGE TRANSFER AND PAPER SEPARATION MECHANISM

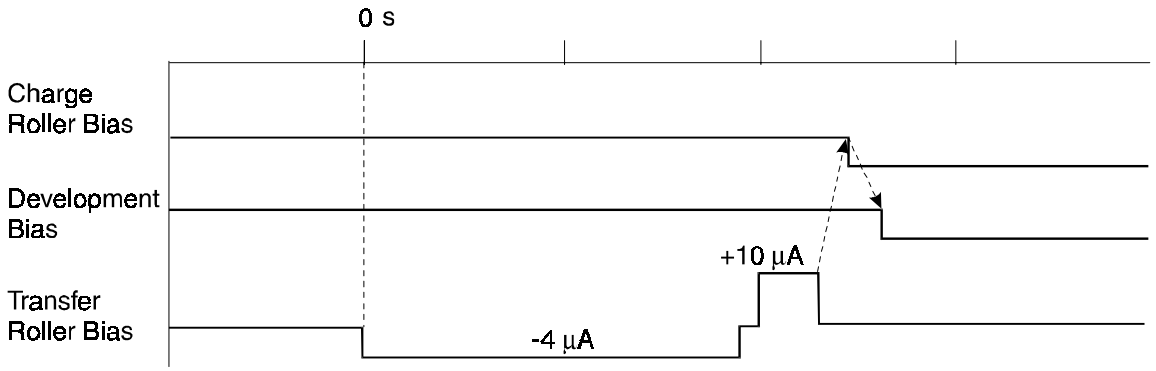


G020D530.WMF

The transfer roller starts rotating at the same time as the main motor starts to rotate.

1. When the CPU receives the image writing start signal (FGATE signal), the CPU instructs the power pack to supply +10 µA (low transfer bias) 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 bias has been supplied to the roller, +15 µA (high transfer bias) 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, the transfer bias turns off. In the multiple page mode, the transfer bias shifts again to the low transfer bias.

2.5.3 ROLLER CLEANING



G020D531.WMF

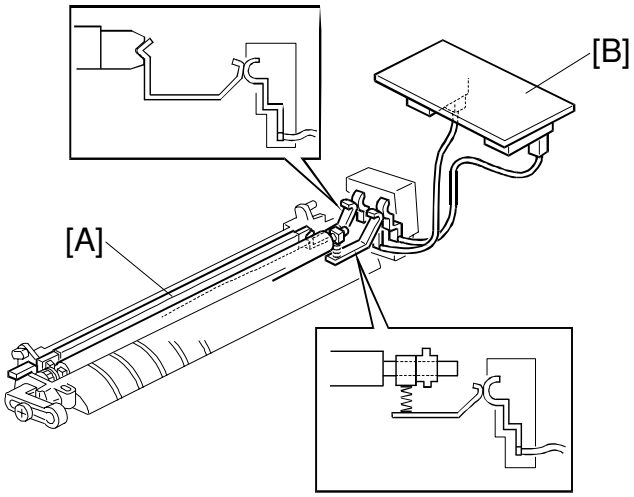
If the paper size is smaller than the printed image, or if a paper jam occurs during printing, toner may be transferred to the roller surface. To prevent this toner from transferring to the back side of pages, the transfer roller has to be cleaned before the next printing run.

During transfer roller cleaning, the power pack supplies a negative cleaning bias (- 4 µA) to the transfer roller. So, any negatively charged toner on the transfer roller is then transferred back to the drum. Then a positive cleaning bias of +10 µA is applied to transfer back to the drum any toner which was positively charged by the transfer roller.

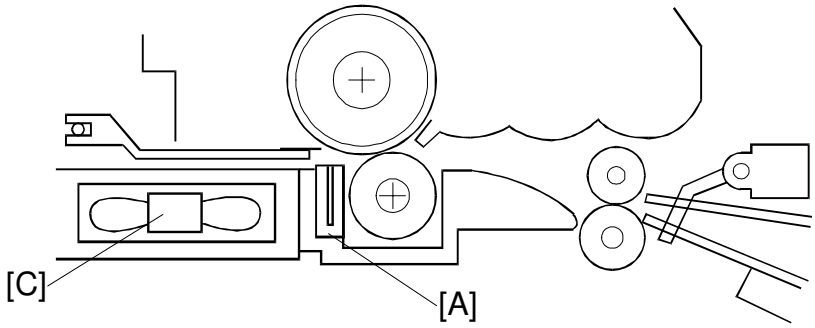
The machine goes through the cleaning mode in the following conditions:

- After a print job has been finished.
- Just after the power is switched on.
- After a printer jam has been cleared.

2.5.4 PAPER SEPARATION AND TRANSPORTATION



G020D538.WMF



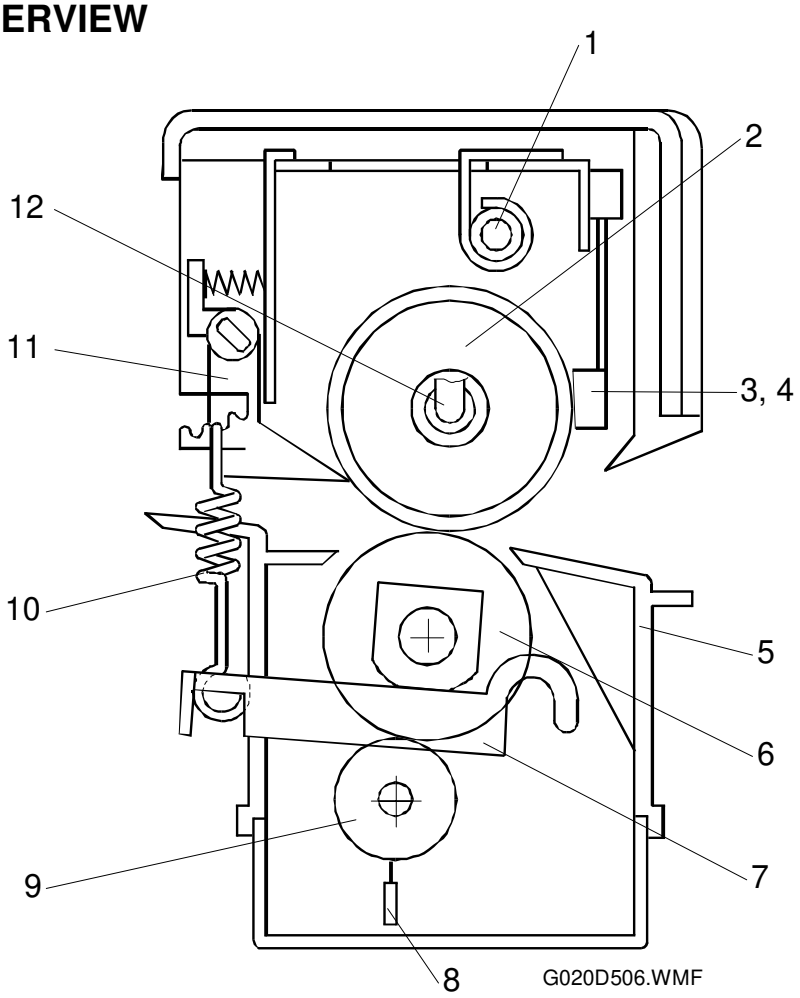
G020D021.WMF

The discharge plate [A] and the curvature of the drum help the paper to drop away from the drum. The high voltage supply board [B] applies a constant dc voltage, –1.8 kV (when feeding from a paper tray), or –2.1 kV (when feeding from the duplex tray) to the discharge plate.

The transport fan [C] helps to transport the paper from the transfer area to the fusing unit. The transport fan turns on at the same time as the main motor. Also, the transport fan turns off at the same time as the main motor.

2.6 IMAGE FUSING

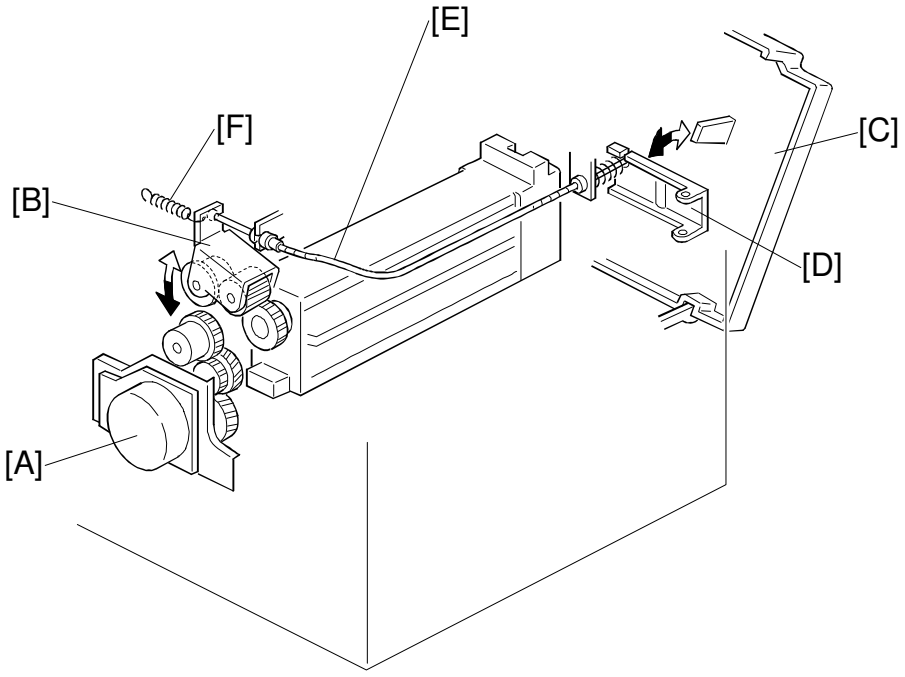
2.6.1 OVERVIEW



The fusing unit consists of the following parts.

1. Fusing Thermofuse
2. Hot Roller
3. Fusing Thermistor
4. Fusing Edge Thermistor
5. Lower Entrance Guide
6. Pressure Roller
7. Pressure Lever
8. Antistatic Brush
9. Cleaning Roller
10. Pressure Spring
11. Hot Roller Strippers
12. Fusing Lamp

2.6.2 FUSING DRIVE AND RELEASE MECHANISM



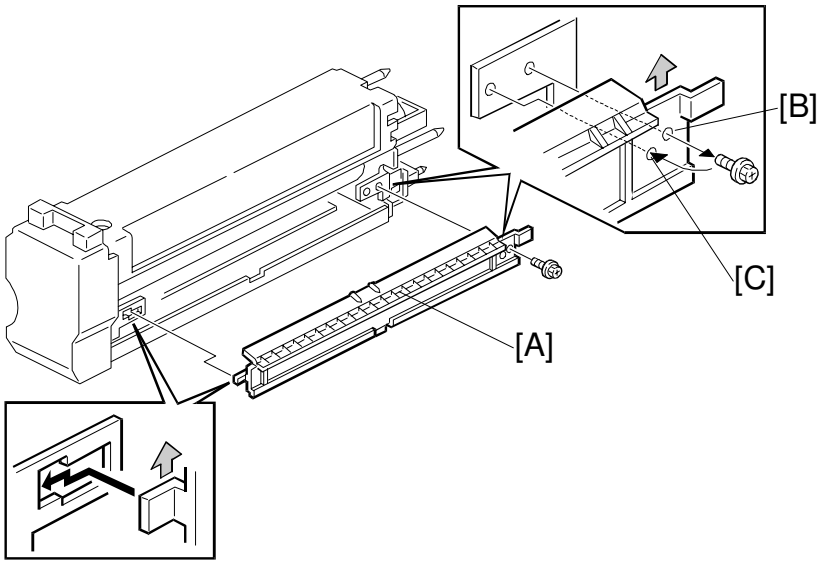
G020D036.WMF

The main motor [A] drives the fusing unit through a train of gears.

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

When the front cover is opened, the actuator plate [D] pulls release wire [E]. The wire pulls the fusing unit gear bracket [F] and the fusing unit drive is disengaged.

2.6.3 FUSING ENTRANCE GUIDE SHIFT MECHANISM



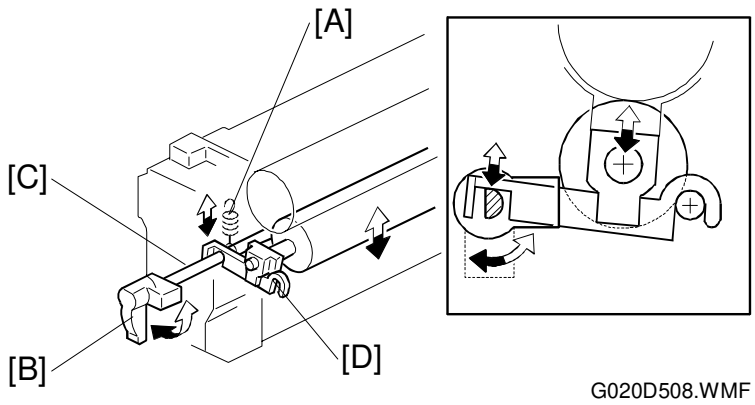
G020D539.WMF

The entrance guide [A] for this machine has two screw holes at the rear side to adjust for thick or thin paper. Normally, the upper screw hole [B] is used.

For thin paper, move the entrance guide up by securing it at screw hole [C]. This slightly lengthens the paper path, which prevents the paper from creasing in the fusing unit.

For thick paper, keep the entrance guide down (use the upper screw hole [B]). This is because the lower setting allows more direct access to the gap between the hot and pressure rollers. This prevents thick paper from buckling against the hot roller, which can cause blurring at the leading edge of the print page. Also, thick paper does not bend as easily, and is therefore less prone to creasing.

2.6.4 PRESSURE ROLLER



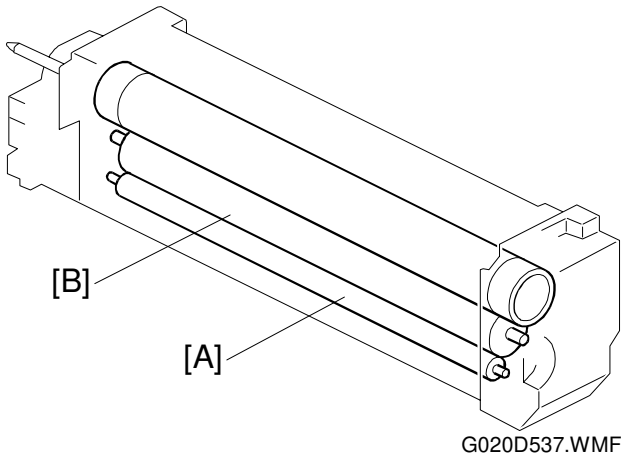
G020D508.WMF

The pressure roller is made of silicone rubber with a teflon tube coating. The pressure springs [A] constantly apply pressure between the hot roller and the pressure roller.

This is done by adjusting the position of the pressure springs [A]. In this machine, the fusing pressure can also be adjusted with the lever [B] (this is a finer adjustment than the pressure springs). The user can do this when printing on a thicker medium, such as an envelope.

The lever shaft [C] contacts the pressure lever [D]. When the lever is turned down, the shaft lowers the pressure lever. At this time, the pressure from the pressure roller is decreased. The normal position of the lever is the upper position.

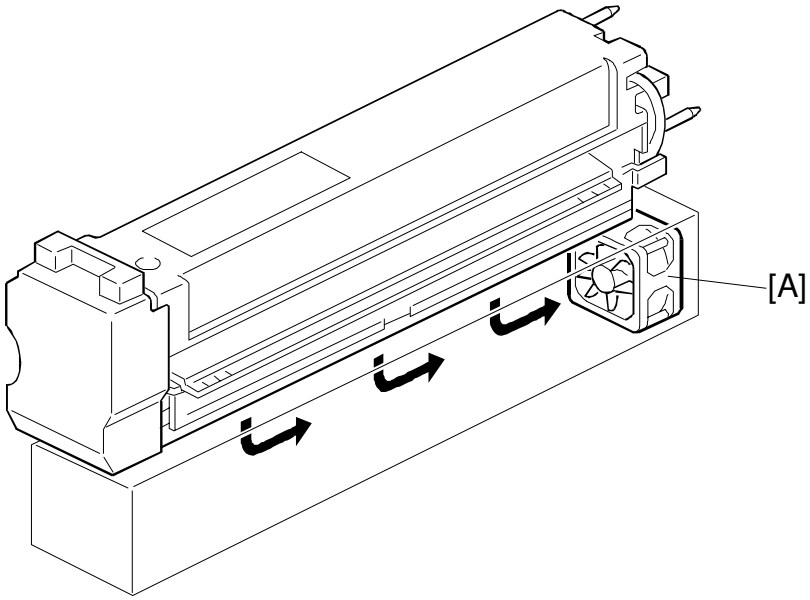
2.6.5 CLEANING MECHANISM



G020D537.WMF

The cleaning roller [A] is always in contact with the pressure roller [B]. It collects toner and paper dust adhering to the surface of the pressure roller. This is because the cleaning roller is made of metal and collects adhering matter more easily than the pressure roller (which has a teflon coating).

2.6.6 FUSING UNIT FAN

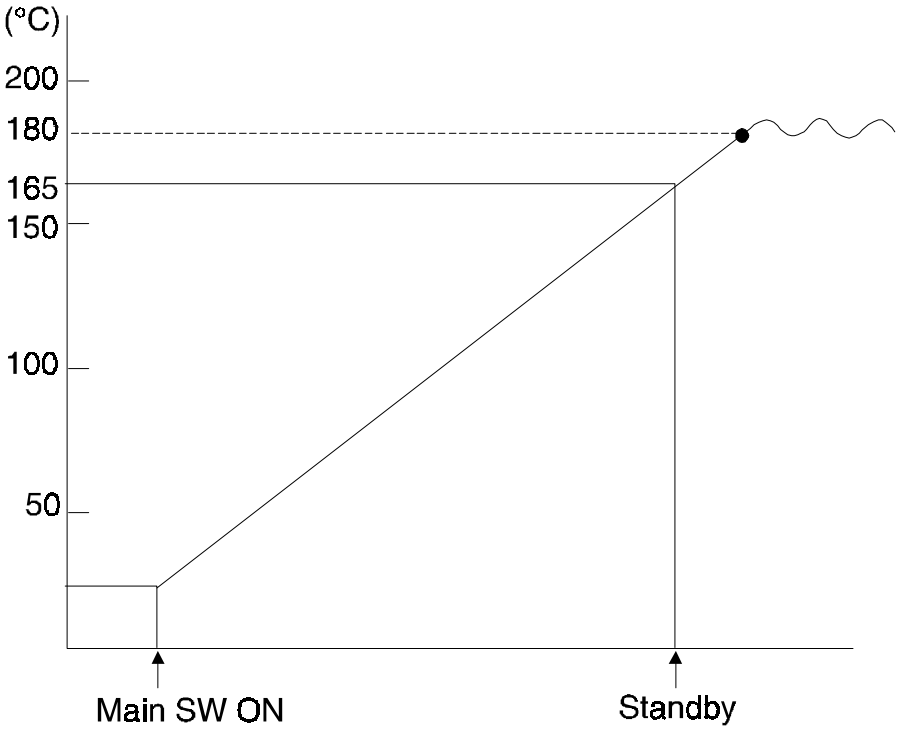


G020D505.WMF

The fusing unit fan turns on if the charge roller thermistor detects a temperature in the machine of over 43°C when the main motor starts to rotate or at any time that the main motor is rotating.

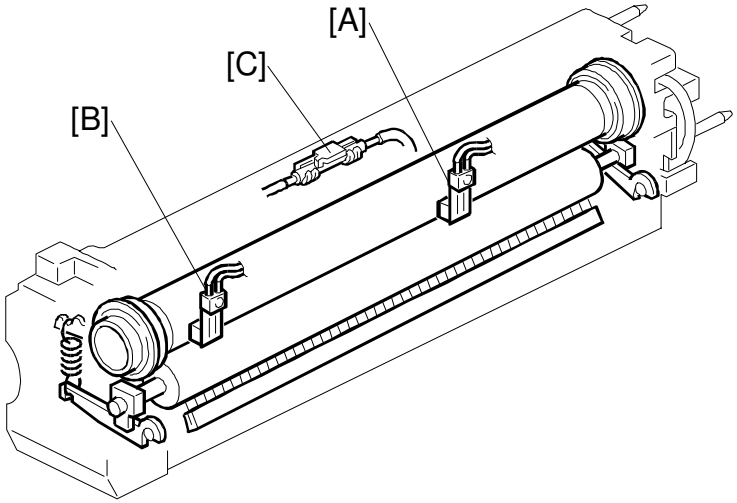
The fusing unit fan stops either when the main motor stops or when the temperature in the machine falls below 40°C

2.6.7 FUSING TEMPERATURE CONTROL



When the main switch turns on, the CPU checks the ac frequency for 500 ms. Then the CPU turns on the fusing lamp. When the thermistor detects the stand-by temperature (180°C), the machine can start to print. When the thermistor detects the operating fusing temperature (180°C), the CPU maintains this temperature using phase control.

Phase control is the only type of fusing control in this machine.



G020D551.WMF

The fusing unit has two thermistors. Usually, the fusing temperature is controlled using the fusing thermistor [A] (at the middle).

The fusing edge thermistor [B] measures the temperature at the end of the hot roller. When making a long print run with A4 paper, the temperature at the ends of the hot roller is higher than at the middle.

If the temperature at the ends of the hot roller becomes greater than 230 °C, the fusing lamp turns off until the temperature at the middle of the hot roller has fallen by 5 °C.

2.6.8 OVERHEAT PROTECTION

If the hot roller temperature at the fusing edge thermistor becomes greater than 230°C, the CPU cuts off the power to the fusing lamp. At this time, SC543 will be 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 [C] reaches 169°C, the thermofuse opens, removing power from the fusing lamp. At this time, the printer stops operating.

2.6.9 ENERGY SAVER MODE

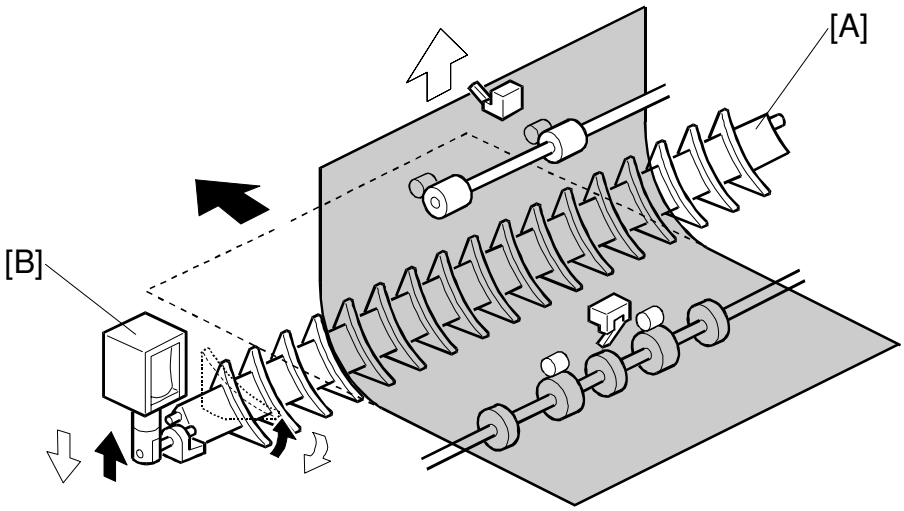
When the machine is not used, the energy saver feature reduces power consumption by decreasing the fusing temperature.

- Energy Saver Selection
  Energy saver starts after the machine has been idle for a certain time. This time is specified by the user. The following choices are available.
  – Off (energy saver mode never activates)
  – 15 minutes (default)
  – 30 minutes
  – 1 hour
  – 2 hours
  – 3 hours

This feature is adjusted using the Job Control menu at the machine's control panel.

2.7 PAPER EXIT

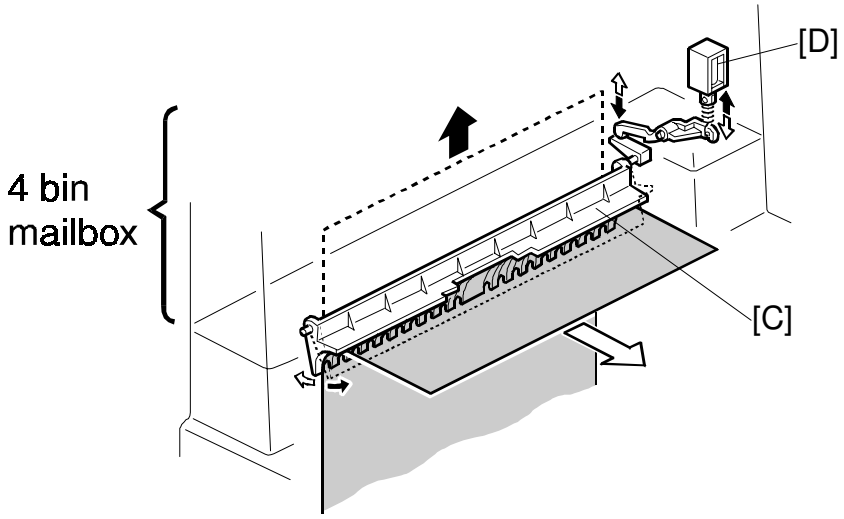
2.7.1 EXIT MECHANISM



G020D039.WMF

The printed page from the fusing unit goes either upwards to the standard output tray (face down), or straight through to the external tray (face up), depending on the junction gate [A].

The junction gate solenoid [B] operates the junction gate. Usually, the junction gate is off and the printed page goes up to the standard output tray. When the junction gate solenoid is energized, the junction gate is opened. Then the print page goes through to the external tray.



G020D553.WMF

If the optional four-bin mailbox is installed:

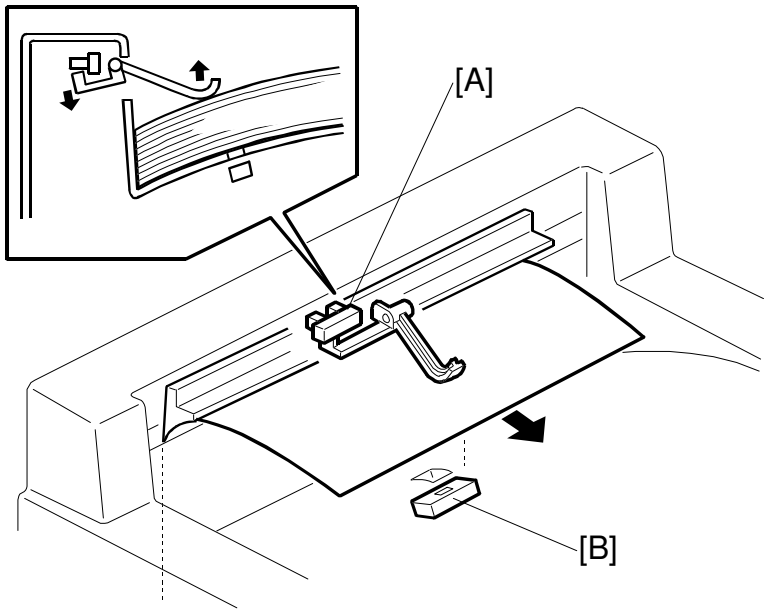
After going through the junction gate ([A] on the previous page), the printout either goes down to the standard output tray, or straight up to the four-bin mailbox, depending on the turn gate [C].

The turn gate is operated by the turn gate solenoid [D] inside the four-bin mailbox.

When the four-bin mailbox is not selected, the turn gate is in the normal position and the printout goes to the standard output tray.

If the four-bin mailbox is selected, the turn gate solenoid energizes, and the turn gate opens. Then the printout goes through to the four-bin mailbox.

2.7.2 PAPER OVERFLOW DETECTION



G020D554.WMF

The standard output tray can stack about 400 sheets. There is a paper overflow sensor [A] to prevent paper overflow.

If the paper overflow sensor activates continuously for 15 seconds, the printer determines that the standard output tray is full. The printer stops the print job until paper overflow sensor is deactivated.

The output tray paper sensor [B] in the standard output tray detects whether there is paper in the tray. It does the same job as the tray sensors in the four-bin mailbox.

3. INSTALLATION

3.1 INSTALLATION REQUIREMENTS

3.1.1 ENVIRONMENT

1. Temperature Range: 10°C to 30°C (50°F to 86 °F)
2. Humidity Range: 15 % to 90 % RH
3. Ambient Illumination: Less than 1,500 lux (Do not expose to direct sunlight.)
4. Ventilation: Room air should turn over at least 30 m^3/hr/person
5. Ambient Dust: Less than 0.10 mg/m^3 (2.7 x 10^{-6} oz/yd^3)

6. Avoid an area which is exposed to sudden temperature changes. This includes:
   1) Areas directly exposed to cool air from an air conditioner.
   2) Areas directly exposed to heat from a heater.
7. Do not place the machine in an area where it will be exposed to corrosive gases.
8. Do not install the machine at any location over 2,000 m (6,500 ft.) above sea level.
9. Place the machine on a strong and level base. (Inclination on any side should be no more than 5 mm.)
10. Do not place the machine where it may be subjected to strong vibrations.

3.1.2 POWER REQUIREMENTS

⚠CAUTION

1. Make sure that the wall outlet is near the machine and easily accessible. Make sure the plug is firmly inserted in the outlet.
2. Avoid multi-wiring.
3. Be sure to ground the machine.

1. Input voltage level: 120 V, 60 Hz: More than 9 A
   220 V ~ 240 V, 50 Hz/60 Hz: More than 4.5 A
2. Permissible voltage fluctuation: 10 %
3. Do not set anything on the power cord.

3.2 PRINTER INSTALLATION

See the “Installation Procedure” sheet that comes with the printer.

3.3 DUPLEX INSTALLATION

See the “Duplex Installation” sheet that comes with the duplex unit.

3.4 PAPER TRAY UNIT INSTALLATION

See the “Paper Tray Unit Installation” sheet that comes with the paper tray unit.

3.5 LCT INSTALLATION

See the “LCT Installation” sheet that comes with the LCT.

3.6 FINISHER INSTALLATION

See the “Finisher Installation” sheet that comes with the finisher.

3.7 FOUR-BIN MAILBOX INSTALLATION

See the “Mailbox Installation” sheet that comes with the mailbox.

3.8 ENVELOPE FEEDER INSTALLATION

See the procedure that is printed on the carton.

3.9 POSTSCRIPT KIT INSTALLATION

See the “Postscript Kit Installation” sheet that comes with the Postscript ROM DIMM.

3.10 HARD DISK INSTALLATION

See the “Hard Disk Installation” sheet that comes with the hard disk.

3.11 DRAM SIMM INSTALLATION

See the “DRAM SIMM Modules” section of the operating instructions.

3.12 CHECKING THE CONNECTIONS

3.12.1 CONNECTION BETWEEN MAIN PRINTER CONTROL BOARD (and related options: PostScript ROM, HDD, RAM SIMM, NIC) AND OPTIONAL HDD & PERIPHERALS

1. Plug in the power cord and turn on the main switch.
2. Press the Online/Off-line button to enter off-line mode (Menu mode).
3. Press the Arrow key to select the Test Print menu.
4. Press the Enter key to enter the Test Print menu.
5. Press the Print Enter key to print out the configuration page.

NOTE: For more detailed information about the machine control panel settings, refer to the user manual.

An example of the configuration page follows.

Ricoh Aficio MP01 **Configuration Page**

Reference

Firmware Version	1.10/1.10
Postscript Version	2017.603
Pages Printed	3649
Total Installed Ram	20 MB
Hard Cisk	815 MB
Network Card	Ethernet

System

Jam Recovery	Off
Print PS Errors	No
Edge Smoothing	On
Toner Saving	Off
Timeout	30 seconds
Energy Saver	15 minutes
Low Toner	Continue
Resolutin PCL	600 DPI
PS	600 DPI
Image Density	Normal
PM alarm	Off

PCL5 Menu

Orientation	Portrait
Line Wrap	Off
Form Length	64
Font source	Internal
Font Number	0
Point size	N/A
Font Pitch	10.00
Symbol Set	Roman 8

Interface

Parallel Port	Auto Sense
Bi-Direction	On
Network Port	Auto Sense

Options

Duplex Tray	Installed
LCT	Installed
Env. Feeder	Installed
Paper Bank	Installed
Mailbox	Installed
Finisher	Not Installed

Paper Input

Tray Priority	Tray 2 (A4 LEF)
Envelope Size	4 1/8" x 9 1/2" SEF
Tray Size (*) Tray 1	Duplex Tray
Tray 2	Letter 11" x 8 1/2" LEF
Tray 3	Letter 11" x 8 1/2" LEF
Tray 4	Letter 11" x 8 1/2" LEF

Paper Output

Output Tray	Output Tray 1

Ether net/Token Ring

Software Version = 6.22
Hardware Version = A.30
Hardware Address = 00:00:C9:00:05:25
Transfer Rate = 10
Novell (IPX/SPX)
Pserver Name = P4E000525
Remote Printer Nae = P4E000525_1
Frame Type = 802.2
EtherTalk/TokenTalk
Name = Aficio MP01
Type = LaserWriter
Zone = IPP
TCP/IP
IP Adress = 133.139.157.130
Gateway =
Subnet Mask = 255.255.255.0

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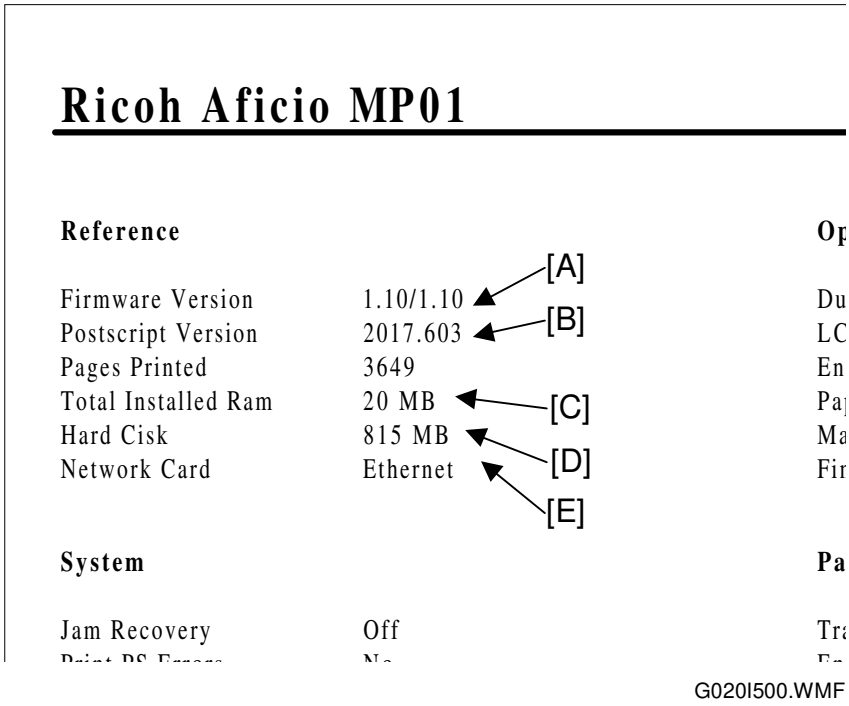
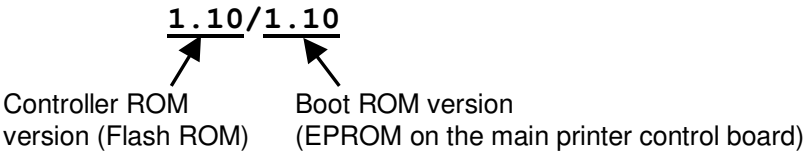


G020I500.WMF

Check the following:

- For the main printer control board, check that the machine prints the configuration page fully.
- For the PostScript option, confirm that the configuration page includes “Postscript version” [B].
- For the RAM SIMM, confirm that “Total Installed RAM” [C] printed on the self test page shows the size of the module just installed, plus 4 Mbytes (the base memory on the board).
- For the HDD, confirm that “Hard disk” [D] printed on the configuration page shows the size of the HDD.
- For the NIC, confirm that “Network Card” [E] printed on the configuration page shows the type of NIC.
- For the system software version of the main printer control board, check “Firmware x.xx/x.xx.” [A].

  e.g.



If there are any problems with the above check items, reinstall the printer controller and other options, then set up the machine again and test it again.

3.12.2 CONNECTION BETWEEN MAIN PRINTER CONTROL BOARD AND NETWORK INTERFACE BOARD

There are three ways to check the connection between the main printer control board and the network interface card.

- Check that the system configuration page includes “Ethernet/Token Ring” Settings.
- Check “NIC Personality” menu in the Host Interface menu on the machine’s control panel.
- Print out the Network Interface Configuration Sheet with the network information (see the next section).

3.12.3 PRINTING THE NETWORK INTERFACE CONFIGURATION SHEET

NOTE: Before printing the network interface configuration sheet, the printer should be ready, connected, and in On Line mode.

1. Turn off the printer.
2. Remove the LAN cable from the NIC of the printer.
3. Turn on the main switch.
4. Keep the printer on line.
5. Within approximately 2 minutes, the configuration sheet will be printed automatically.

NOTE: If the printer does not print the network interface configuration sheet, check the NIC Personality setting in the Host Interface menu (user program mode). If this setting is not displayed, the NIC is not connected properly.

If any problem occurs during the above steps, reinstall the NIC and other options, then set the machine up again and test it again.

4. SERVICE TABLES

4.1 SERVICE REMARKS

4.1.1 GENERAL PRECAUTION

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.

4.1.2 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. Take care not to scratch the drum as the drum layer is thin and is easily damaged.
5. Never expose the drum to corrosive gases such as ammonia gas.
6. Never shake the PCU. Doing so may cause toner and/or developer to spill out.
7. Do not tilt the PCU. Doing so may cause toner and/or developer to spill out.
8. Dispose of used PCUs in accordance with local regulations.
9. Do not touch the charge roller with bare hands. Oil stains may cause black bands on printouts due to excessive drum charge.
10. Prevent the charge roller from being exposed to dusty air. Dust on the charge roller may cause white spots on printouts due to insufficient drum charge.
11. Never use alcohol or water to clean the drum charge roller. Alcohol or water corrodes its surface. Wipe with a dry cloth (use the special drum charge roller cleaning cloth).

4.1.3 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.

4.1.4 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.

4.1.5 FUSING UNIT

1. After installing the fusing thermistors, 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.

4.1.6 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.

4.1.7 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

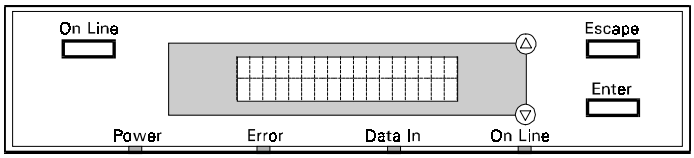
This machine has two service program modes.

- Control panel service menu (at the printer's operation panel)
- Dip switches on the connection board for the optional paper tray

These service programs are used to check electrical data, to change modes, and to adjust values.

4.2.1 CONTROL PANEL SERVICE MENU

Service Menu Access Procedure



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⚠CAUTION

Before accessing the service menu, do the following:

1. **Confirm that there is no print data in the printer buffer (the Data In LED must not be lit).**
   If there is some data in the buffer, wait until all data has been printed.
2. **Disconnect the parallel cable and the network interface cable.**

1) Enabling the service menu

1. Turn the machine on while pressing the On Line and Escape keys together until the display shows "Service Mode - Completed".

NOTE: If you do not press the On Line and Escape keys together during printer power-up, Service Mode will not be available in the menu.

2. Wait until the printer goes to the Ready state. Press the On Line key on the machine control panel menu to set the printer off-line. The On Line indicator should go off. You will automatically enter the printer menu mode.
3. Use the arrow keys to scroll through the menu listing. Scroll until Service Mode is displayed. Then press Enter.

At any point during the sequence you may press the On Line key to get the printer back on line.

Once in service mode, you should be able to scroll through the sub-menu. To return to the main menu, press the Escape key.

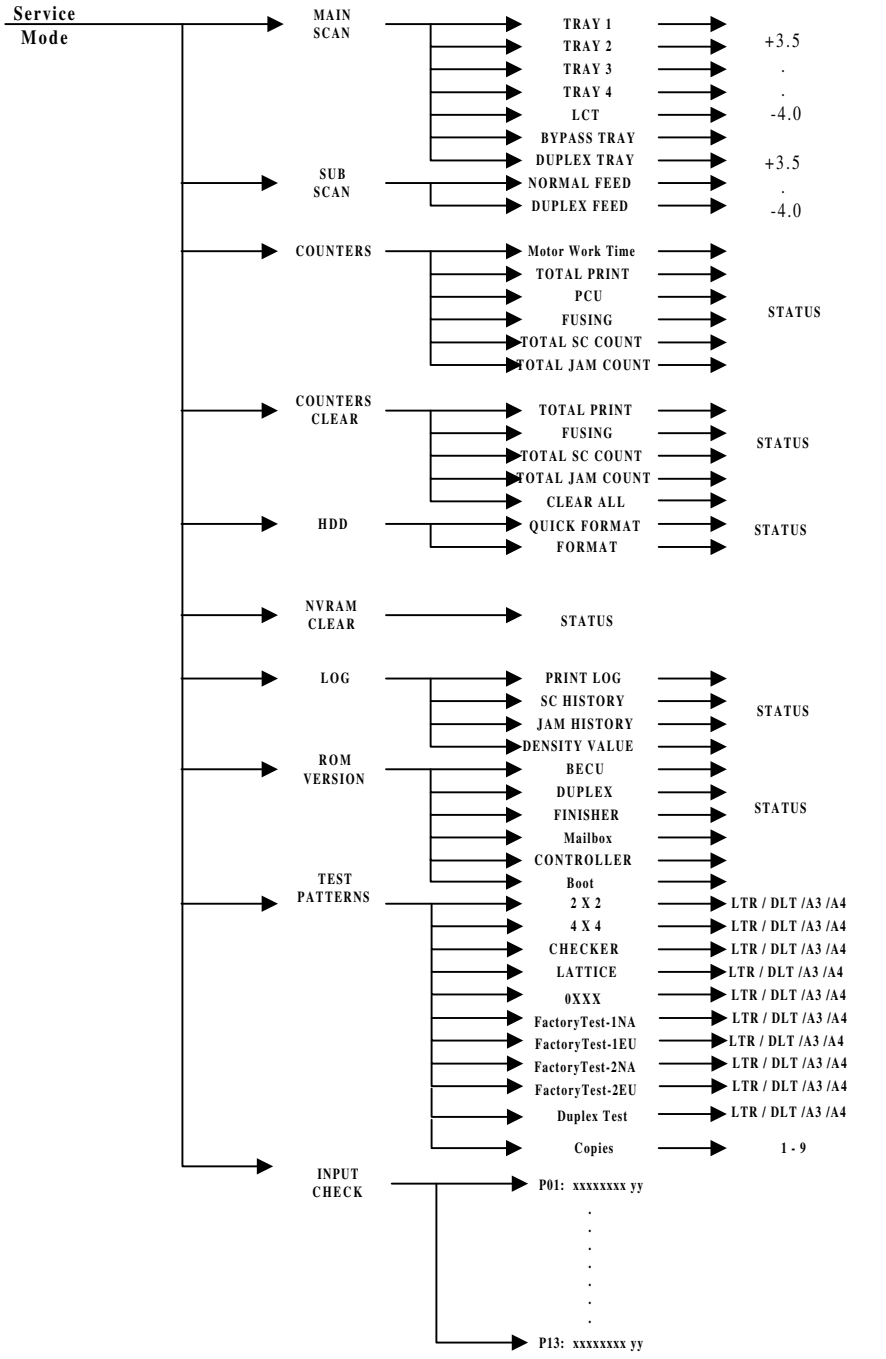
2) Disabling the service menu

Turn off the machine, wait a few seconds, and turn it on again.

NOTE: If this is not done, the user will be able to access the service menu.

Selecting a service program

The following diagram shows the service mode menu tree.



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Service Tables

Accessing the required program

Select each program level in sequence.

1. Scroll through the 1st level programs using the Up/Down arrow keys. Press the Enter key.
2. Scroll through the items in the next lowest level using the Up/Down arrow keys.
   NOTE: To go back to a higher level, press the Escape key.

Inputting a value or setting for a service program

1. Enter the required program mode as explained above.
   NOTE: The setting marked with a '▶' on the display is the current setting.
2. Select the required setting using the Up/Down arrow keys, then press the Enter key.
   NOTE: If you forget to press the Enter key, the previous value remains.
3. Exit service mode.

4.2.2 SERVICE MENU TABLES

Service Menu Table

NOTE: In the Function column, comments are in italics.

Menu Level			Function	Settings
Level 1	**Level 2**			
Main Scan	Tray 1	Side-to-Side Registration (Feed from Paper Tray 1)	Adjusts the printing side-to-side registration from paper tray 1 using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details. If the duplex tray is installed, the Tray 1 adjustment is not available.	
	Tray 2	Side-to-Side Registration (Feed from Paper Tray 2)	Adjusts the printing side-to-side registration from paper tray 2 using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
	Tray 3	Side-to-Side Registration (Feed from Paper Tray 3 :- Optional Tray Unit)	Adjusts the printing side-to-side registration from paper tray 3 using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
	Tray 4	Side-to-Side Registration (Feed from Paper Tray 4 :- Optional Tray Unit)	Adjusts the printing side-to-side registration from paper tray 4 using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
	LCT	Side-to-Side Registration (Feed from : Optional LCT)	Adjusts the printing side-to-side registration from the LCT using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	

Menu Level			Function	Settings
Level 1	**Level 2**			
Main Scan	Bypass Tray	Side-to-Side Registration (Feed from Bypass Tray)	Adjusts the printing side-to-side registration from the bypass tray using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
Sub Scan	Normal Feed	Leading Edge Registration (Normal Printing and duplex 1st side)	Adjusts the printing leading edge registration using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
	Duplex Feed	Leading Edge Registration (Duplex: 2nd side)	Adjusts the printing leading edge registration using the Lattice Pattern (Service Mode - Test Pattern - Lattice Pattern).	-4.0 ~ +3.5 0.5 mm/step
			Use the ◢/◤ keys to increase or decrease. See "Replacement and Adjustment - Print Registration Adjustments" for details.	
Counters	Motor Work Time	Motor Work Time Counter Display	Displays the total motor operation time.	Seconds
	Total Print	Total Print Counter Displays	Displays the total number of prints.	Pages
	PCU	Total PCU Counter Display	Displays the total number of prints that have been made using the current PCU.	Pages
			This counter will be reset automatically after replacing the new PCU.	
	Fusing	Total Fusing Counter Display	Displays the total number of prints that have been made using the current fusing unit since resetting the fusing counter.	Pages
			This counter should be reset by the user with the Reset Fusing Unit operation.	
	Total SC Count	Total SC Counter Display	Displays the total number of SCs that have occurred	
	Total Jam Count	Total Jam Counter Display	Displays the total number of jams that have occurred.	

Menu Level			Function	Settings
Level 1	**Level 2**			
Counter Clear	Total Print	Total Print Counter Reset	Resets the total print counter. *To reset the counter, press the Enter key again after the yes/no prompt is displayed.*	
	Fusing	Fusing Counter Reset	Resets the total fusing counter. *To reset the counter, press the Enter key again after the yes/no prompt is displayed.*	
	Total SC Counter	Total SC Counter Reset	Resets the total SC counter. *To reset the counter, press the Enter key again after the yes/no prompt is displayed.*	
	Total Jam Counter	Total Jam Counter Reset	Resets the total jam counter. *To reset the counter, press the Enter key again after the yes/no prompt is displayed.*	
	Clear All	Four (4) Counters Reset	Resets the total print, fusing, total SC, and total jam counters.	
		(Total Print, Fusing, Total SC, Total jam Counters)	*To reset the counters, press the Enter key again after the yes/no prompt is displayed.*	
HDD	Quick Format	Quick format for the optional HDD	Quick-formats the hard disk. This formats only the data allocation table of the hard disk. This takes about 5 seconds.	
	Format	Regular Format for the optional HDD	Low-level formats the hard disk. This takes about 4 minutes.	
NVRAM Clear		Memory All Clear on Main Control Board	Resets all software counters. Also, resets all adjustment settings. See the "NVRAM Clear" section for how to use this SP mode correctly. ***Normally, this SP mode should not be used.*** *It is used only after replacing the NVRAM.*	
Log	Print Log	Print Log Sheet	Prints the log sheet See the "Print Log Sheet" section for details.	
	SC History	SC History Display	Displays the latest SC code.	
	Jam History	Jam History Display	Displays the latest jam code.	
	Density Value	Density Value Display	Displays the current image density setting.	

Menu Level			Function	Settings
Level 1	**Level 2**			
ROM Version	BECU	ROM Version Display (BECU)	Displays the BECU ROM version.	
	Duplex	ROM Version Display (Optional Duplex)	Displays the ROM version of the optional duplex unit.	
	Finisher	ROM Version Display (Optional Finisher)	Displays the ROM version of the optional finisher.	
	Mailbox	ROM Version Display (Optional 4-bin Mailbox)	Displays the ROM version of the optional 4-bin mailbox.	
	Controller	F/W Version Display (Main Control Board)	Displays the firmware version of the main printer control board.	
	Boot	ROM Version display (Boot ROM on the control board)	*Displays the Boot ROM version of the main printer control board.*	
Test Patterns	2x2 Pattern	Test Pattern Printing (2x2 Pattern)	Prints a test pattern from the main printer control board. *See the "Test Pattern Printing" section for how to print a test pattern.*	
	4x4 Pattern	Test Pattern Printing (4x4 Pattern)	Prints a test pattern from the main control board. *See the "Test Pattern Printing" section for how to print a test pattern.*	
	Checker Pattern	Test Pattern Printing (Checker Pattern)	Prints a test pattern from the main control board. *See the "Test Pattern Printing" section for how to print a test pattern.*	
	Lattice Pattern	Test Pattern Printing (Lattice Pattern)	Prints a test pattern from the main control board. *See the "Test Pattern Printing" section for how to print a test pattern.*	
	0XXX Pattern	Test Pattern Printing (0XXX Pattern)	Prints a test pattern from the main control board. *See the "Test Pattern Printing" section for how to print a test pattern.*	

Menu Level			Function	Settings
Level 1	**Level 2**			
Test Patterns	Factory Test-1NA	Test Pattern Printing (Factory Test-1NA)	Performs the automatic test printing for the North America model. This test is only used at the factory. ***Do not use in the field.***	
Test Patterns	Factory Test-1EU	Test Pattern Printing (Factory Test-1EU)	Performs the automatic test printing for the Europe model. This test is only used at the factory. ***Do not use in the field.***	
	Factory Test-2NA	Test Pattern Printing (Factory Test-2NA)	Performs the automatic test printing for the North America model. This test is only used at the factory. ***Do not use in the field.***	
	Factory Test-2EU	Test Pattern Printing (Factory Test-2EU)	Performs the automatic test printing for the Europe model. This test is only used at the factory. ***Do not use in the field.***	
	Duplex Test	Test Printing (Optional Duplex)	Makes a test print using the duplex unit.	
	Copies	Number of Copies	Sets the number of copies of the test patterns that are printed. This is used for all pattern tests except the automatic test prints (i.e. Factory Test1 NA/EU, Factory Test 2 NA/EU) and the test patterns made by the dip switch service programs. *Use the ▲/▼ keys to increase or decrease.*	1 ~ 999
Input Check	P01~ P13	Input Check	Displays the signals received from sensors and switches. See the “Input Check” section for details.	

Service Tables

Test Pattern Printing

1. Select the required printer features, such as paper input tray, paper output tray, paper size, image density and others, using the machine's control panel user level menu.

   In particular, when printing a lattice pattern for registration adjustments, be sure to select the correct paper feed tray before printing the pattern.

2. Access the SP mode which contains the test pattern you need.
   NOTE: If you need more than one copy, enter the number of copies using the Test Patterns – Copies service program before selecting a test pattern.

3. Press the Enter key on the machine's control panel.
   NOTE: After printing the test pattern, if you need to print another test pattern, press the On Line key and enter service mode again.

4. Turn off the machine to exit the SP mode, then turn on the machine again.

Print Log Sheet

1. Access “Print Log” in the Log menu of service mode.
2. Press the Enter key on the machine’s control panel.
3. Turn off the machine to exit the SP mode, then turn on the machine again.

An example of the Print Log sheet follows.

RICOH Aficio MP01 **PRINT LOG (Service Mode)**

Reference

Total SC Count	: 1

Misfeed History

Misfeed Count - A (Feed Jam)	: 0
Misfeed Count - B/C (Regist jam)	: 2
Misfeed Count - C (Eject Jam)	: 0
Misfeed Count - D (Eject Jam)	: 1
Misfeed Count - Y (Bank Jam)	: 0
Misfeed Count - Z (duplex Jam)	: 0
Misfeed Count - R (Mailbox Jam)	: 0
Misfeed Count - W1/W2 (finisher Jam)	: 0
Misfeed Count - U (LCIT Jam)	: 0
Total Misfeed Count	: 3

ROM Version

BECU ROM Version	: 1.1
Duplex ROM Version	: 0.4
Finisher ROM Version	: NA
Mailbox ROM Version	: 1.5
Controller ROM Version	: 1.02
Boot ROM Version	: 1.01

Register Settings

Sub Scan (-4.0 mm to +3.5 mm)

Normal Feed	: 0.0
Duplex 2nd Side Feed	: 0.0

Main Scan (-4.0 mm to +3.5 mm)

Tray 1	: 0.0
Tray 2	: 0.0
Tray 3	: 0.0
Tray 4	: 0.0
Bypass Tray	: -0.5

Density Value	: Normal (2)
Motor Work Time	: 36630 sec.
Total Print Count	: 3683
PCU Count	: 15882 sec.
Fuser Count	: 366630 sec.

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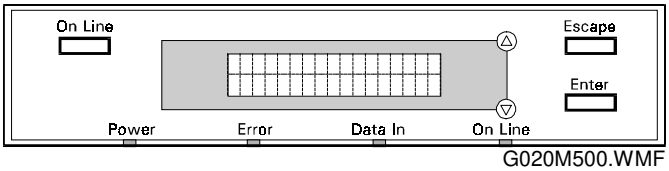
- SC History: The total number of SCs that have occurred.
- Misfeed History: The total number of misfeeds (jams) that have occurred.
- ROM Version: The software version of the ROMs on the boards.
- Register Settings: The registration setting values
- Density Value: The image density setting (adjustable with user mode)
- Motor Work Time: The value of the motor work time counter
- Total Print Count: The value of the total print counter
- PCU Count: The value of the PCU counter
- Fuser Count: The value of the fusing unit counter

NOTE: If you need details of the SCs or misfeeds that occurred, print the Error Log sheet from the Test/Print menu of the user menu.

Input Check



G020M500.WMF

1. Enter the SP mode.
2. Select the number of the port containing the sensor or switch that you wish to check (see the following table).
3. The reading will be displayed in binary and hex code. The meaning of the display is as follows.

Example

P02: 00011100 1C

Bit 7 ~ bit 0 Hex. Code

		Description	Reading	
			0	1
Port	01	1st Paper Feed Tray		
	7	Not Used		
	6			
	5			
	4	Paper Size Sensor: SW4	See Table 1	
	3	Paper Size Sensor: SW3		
	2	Paper Size Sensor: SW2		
	1	Paper Size Sensor: SW1		
	0	Paper End Sensor	Paper detected	Paper not detected
Port	02	2nd Paper Feed Tray		
02	7	Not Used		
	6			
	5			
	4	Paper Size Sensor: SW4	See Table 1	
	3	Paper Size Sensor: SW3		
	2	Paper Size Sensor: SW2		
	1	Paper Size Sensor: SW1		
	0	Paper End Sensor	Paper detected	Paper not detected

		Description	Reading	
			0	1
Port	03	3rd Paper Feed Tray (Optional Paper Tray)		
03	7	Not Used		
	6	Upper Relay Sensor	Paper not detected	Paper detected
	5	Upper Tray Upper Limit Sensor	Paper not at high position	Paper at high position
	4	Paper Size Sensor: SW4	See Table 1	
	3	Paper Size Sensor: SW3		
	2	Paper Size Sensor: SW2		
	1	Paper Size Sensor: SW1		
	0	Paper End Sensor	Paper detected	Paper not detected
Port	04	4th Paper Feed Tray (Optional Paper Tray)		
04	7	Not Used		
	6	Lower Relay Sensor	Paper not detected	Paper detected
	5	Lower Tray Upper Limit Sensor	Paper not at high position	Paper at high position
	4	Paper Size Sensor: SW4	See Table 1	
	3	Paper Size Sensor: SW3		
	2	Paper Size Sensor: SW2		
	1	Paper Size Sensor: SW1		
	0	Paper End Sensor	Paper detected	Paper not detected
Port	05	Bypass Tray/Envelope Feeder (Option)		
05	7	Not Used		
	6			
	5	Envelope Set Switch (Optional Envelope Feeder)	Paper detected	Paper not detected
	4	Paper Size Sensor: Terminal 4	See Table 2	
	3	Paper Size Sensor: Terminal 3		
	2	Paper Size Sensor: Terminal 2		
	1	Paper Size Sensor: Terminal 1		
	0	Paper End Sensor (Bypass Tray)	Paper detected	Paper not detected
Port	06	LCT Section 1 (Option)		
06	7	Not Used		
	6			
	5			
	4	LCT Paper Near End Sensor 3	See Table 3	
	3	LCT Paper Near End Sensor 2		
	2	LCT Paper Near End Sensor 1		
	1	LCT Paper Size Sensor	A4	Letter
06	0	LCT Paper End Sensor	Paper detected	Paper not detected

		Description	Reading	
			0	1
Port	07	LCT Section 2 (Option)		
07	7	Not used		
	6			
	5	LCT Relay Sensor	Paper not detected	Paper detected
	4	Tray Down Switch	Switch not pressed (tray up)	Switch pressed (tray down)
	3	LCT Cover Sensor	Cover closed	Cover opened
	2	LCT Set	Not connected	Connected
	1	LCT Lower Limit Sensor	Paper tray not at lower limit position	Paper tray at lower limit position
	0	LCT Upper Limit Sensor	Paper tray not at upper limit position	Paper tray at upper limit position
Port	08	Standard Output Tray		
08	7	Not used		
	6			
	5			
	4			
	3			
	2			
	1	Standard Output Tray Paper Sensor	Paper not detected	Paper detected
	0	Paper Overflow Sensor	Paper not detected	Paper detected
Port	09	Doors		
09	7	Not used		
	6			
	5	Left Vertical Door Sensor	Closed	Opened
	4	Left Door Sensor	Closed	Opened
	3	Tray Cover Switch (Optional Paper Tray)	Closed	Opened
	2	Right Vertical Guide Switch	Closed	Opened
	1	Front Door Safety Switch - +24V	Closed	Opened
	0	Front Door Safety Switch - +LD5V	Closed	Opened
Port	10	Paper Transport		
10	7	Not used		
	6			
	5	Duplex Entrance Sensor	Paper not detected	Paper detected
	4	Fusing Exit	Paper not detected	Paper detected
	3	Upper Exit Sensor	Paper not detected	Paper detected
	2	Lower Exit Sensor	Paper not detected	Paper detected
	1	Relay Sensor	Paper not detected	Paper detected
	0	Registration Sensor	Paper not detected	Paper detected

		Description	Reading	
			0	1
Port	11	Options Installed		
11	7	Not Used		
	6	Paper Tray	Not connected	Connected
	5	Duplex Unit	Not connected	Connected
	4	Envelope Feeder	Not connected	Connected
	3	LCT	Not connected	Connected
	2	Fusing Unit (not optional equipment)	Not connected	Connected
	1	4-bin Mailbox	Not connected	Connected
	0	Finisher	Not connected	Connected
Port	12	Motor Locks		
12	7	Not Used		
	6			
	5			
	4			
	3			
	2	Motor Lock (Optional Paper Tray Unit)	Not locked	Locked
	1	Main Motor Lock	Not locked	Locked
	0	Polygonal Mirror Motor Lock	Not locked	Locked
Port	13	Others		
13	7	Not Used		
	6			
	5			
	4			
	3	Inverter Unit (Duplex Unit)	Not connected	Connected
	2	Charge Roller Home Position Sensor	Not at home position (Off)	At home position (On)
	1	PCU Sensor	New PCU not detected	New PCU detected
	0	Not Used		

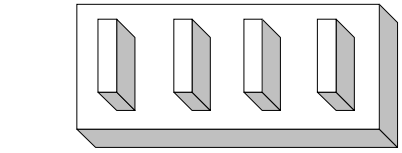


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Table 1: Paper Size Data (Paper Feed Tray)

Number	SW 1	SW 2	SW 3	SW 4	Paper Size
Port 01, 02, 03, 04	0	0	0	0	No tray
	0	0	0	1	A3, F (8 1/2" x 13")
	0	0	1	1	A4 LEF
	0	1	0	1	A4 SEF
	0	1	1	1	A5 LEF, 11" x 17"
	1	0	1	1	B4, 8 1/2" x 14"
	1	1	0	0	* (Asterisk)
	1	1	0	1	B5 LEF, 11" x 8 1/2"
	1	1	1	1	B5 SEF, 8 1/2" x 11"

1: Pushed

Table 2: Paper Size Data (Bypass Tray)

Number	SW 1	SW 2	SW 3	SW 4	Paper Size
Port 05	0	0	0	1	A3, A4 LEF
	0	0	1	1	11” x 8 1/2”, 11” x 13”
	0	0	1	0	B4, B5 LEF
	0	1	1	0	A4 SEF, 8 1/2” x 11”
	0	1	0	0	B5 SEF
	1	1	0	0	A5 SEF
	1	0	0	0	B6 SEF
	0	0	0	0	A6 SEF

Table 3: LCT Paper Status (End/Near-end)

	Near-end Sensor [3]	Near-end Sensor [2]	Near-end Sensor [1]	End Sensor
Paper tray full	0	0	0	0
75% full	1	0	0	0
50% full	1	1	0	0
25% full	0	1	0	0
Near-end (about 70 sheets remaining)	0	0	1	0
Paper end	0	0	0	1

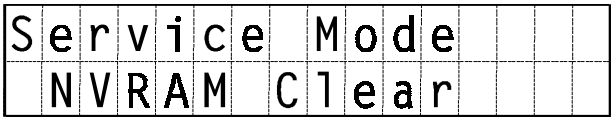
NV RAM

This clears the NVRAM on the main control board.

⚠CAUTION

NVRAM Clear mode resets all the settings stored in the NVRAM to their default settings. Among these settings are the paper feed adjustment data and all the software counters.
Normally, this SP mode should not be used. This procedure is required only after replacing the NVRAM chip.

1. Enter SP mode.
2. Print out a System Config. Page (User Menu) and a Print Log Sheet (SP mode).
3. Enter the “NVRAM Clear” SP mode.



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4. “Confirm” is displayed. To clear the NVRAM, press the Enter key (or press the Escape key to cancel the operation). All data in this NVRAM will be cleared. (If the NVRAM clear was successful, “Passed” will be displayed. If it failed, “Failed” will be displayed.)
5. Turn the main switch off and back on.
6. Do the printer registration adjustments (see Replacement and Adjustment).

4.2.3 DIP SWITCH SERVICE PROGRAMS

Service Program Operation

⚠CAUTION

Before using the service menu, do the following:

1. **Check that there is no print data in the printer buffer (the Data In LED must not be lit).**
   If there is some print data in the buffer, wait until all the data has been printed.
2. **Disconnect the parallel cable and the network interface cable.**

1) Accessing the DIP switches and the push switch

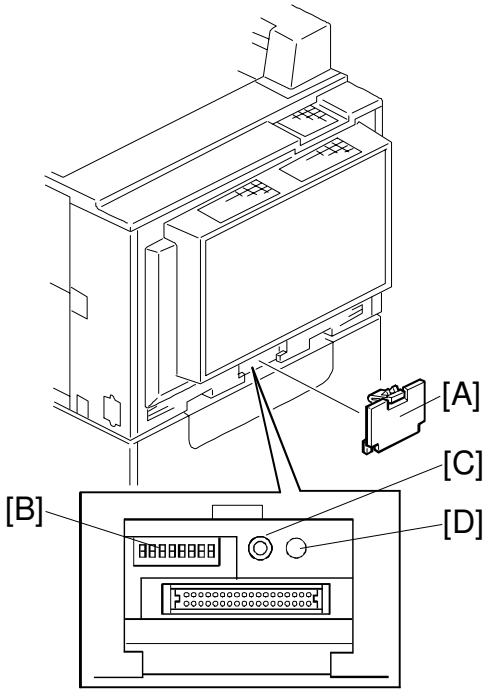
Remove the paper tray connecting cover [A]. There are a DIP switch [B], a push switch [C] and an LED [D] on the paper tray connecting board.

2) Running a service program

Turn the machine off and on to reset it.

Change the DIP switches to the settings needed to start the required service program (see the tables on the following pages).

Push the push switch to start the service program.



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NOTE: 1) The operation procedure depends on the service program. Check the steps in the following table.
2) After finishing a service program, return all DIP switches to the normal operating position. Then switch the machine off and on to reset it.

DIP Switch Service Program Table

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Normal Position		0	0	0	0	0	0	0	0
Charge Roller H. P. Detection	Moves the charge roller to home position.	1	0	0	0	0	0	0	0
	Do not use this service program.								
TD Sensor Initial Setting	Performs the TD sensor initial settings. This service program controls the voltage applied to the TD sensor to correct the TD sensor output automatically.	0	1	0	0	0	0	0	0
	After installing a new PCU, the machine performs this function automatically. ***Do not use this service program.***								
Free Run (Printer Trays)	Performs a printer free run using the standard paper trays.	0	0	1	0	0	0	0	0
	To perform the free run, push the push switch. To stop the free run, push the push switch again.								
Free Run (Optional Paper Tray Unit)	Performs a printer free run using the optional paper tray unit.	1	0	1	0	0	0	0	0
	To perform the free run, push the push switch. To stop the free run, push the push switch again.								
Free Run (Optional LCT)	Performs a printer free run using the LCT.	0	1	1	0	0	0	0	0
	To perform the free run, push the push switch. To stop the free run, push the push switch again.								
Free Run (Optional Envelope Feeder)	Performs a printer free run using the optional envelope feeder.	1	1	1	0	0	0	0	0
	To perform the free run, push the push switch. To stop the free run, push the push switch again.								
Forced Drum Charge	Forces drum charge.	0	0	0	0	1	0	0	0
	Do not use this service program.								
Forced Development Roller Charge	Forces development roller charge.	1	0	0	0	1	0	0	0
	Do not use this service program.								
Forced Transfer Roller Cleaning	Forces transfer roller cleaning.	0	0	1	0	1	0	0	0
	Do not use this service program.								
Forced Discharge	Forces discharge with the discharge plate.	1	0	1	0	1	0	0	0
	Do not use this service program.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Force Toner Supply	Forces the toner bottle to rotate to supply toner for 1.5 minutes.	0	1	1	0	1	0	0	0
	Toner supply finishes automatically after 1.5 minutes. This process is not normally needed in the field for this model, as the machine can handle most cases where toner runs short temporarily.								
	Do not use this service program								
Charge Roller Temperature Correction (Off)	Disables the charge roller temperature correction.	1	1	1	0	1	0	0	0
	Do not use this service program.								
Charge Roller Temperature Correction (On)	Enables the charge roller temperature correction	0	0	0	1	1	0	0	0
	This process is not normally needed in the field for this model, as this setting is enabled at the factory. **Do not use this service program.**								
Polygonal Mirror Motor (Start)	Starts the polygonal mirror motor.	0	0	0	0	0	1	0	0
	To start the polygonal mirror motor, push the push switch.								
Polygonal Mirror Motor (Stop)	Stop the polygonal mirror motor.	1	0	0	0	0	1	0	0
	To stop the polygonal mirror motor, push the push switch.								
Output Check	Enters output check mode to test the electrical components individually. See the “Output Check” section for details.	0	1	0	1	0	1	0	0
	To enter output check mode, push the push switch.								
SC Code Reset	Resets any service call condition. After using this service program, turn the machine’s main switch off and on.	0	0	0	0	1	1	0	0
	Use this to reset the fusing error control software. See “Troubleshooting - Service Call Conditions” for how to use this mode.								
Test Pattern Printing (Tray 1 or 2 Feed to Standard Output or External Tray)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from tray 1 or 2. The required output tray must be empty.	0	0	0	0	0	0	1	0
	To make the test print, push the push switch after opening the external tray. To stop the test print, push the push switch again.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Test Pattern Printing (Tray 3 or 4 Feed to Standard Output or External Tray)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from tray 3 or 4. The required output tray must be empty.	1	0	0	0	0	0	1	0
	To make the test print, push the push switch after opening the external tray. To stop the test print, push the push switch again.								
Test Pattern Printing (LCT Feed to Standard Output or External Tray)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from the LCT. The required output tray must be empty.	0	1	0	0	0	0	1	0
	To make the test print, push the push switch after opening the external tray. To stop the test print, push the push switch again.								
Test Pattern Printing (Envelope Feeder Feed to Standard Output or External Tray)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from the envelope feeder. The required output tray must be empty.	1	1	0	0	0	0	1	0
	To make the test print, push the push switch after opening the external tray. To stop the test print, push the push switch again.								
Test Pattern Printing (Tray 1 or 2 Feed to 4-bin Mailbox)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from tray 1 or 2, and out to the mailbox.	0	0	1	0	0	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again If there is paper in all the mailbox trays, the printer does not start to print.								
Test Pattern Printing (Tray 3 or 4 Feed to Mailbox)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from tray 3 or 4, and out to the mailbox.	1	0	1	0	0	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again If there is paper in all the mailbox trays, the printer does not start to print.								
Test Pattern Printing (LCT Feed to Mailbox)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the mailbox.	0	1	1	0	0	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again If there is paper in all the mailbox trays, the printer does not start to print.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Test Pattern Printing (Tray 1 or 2 Feed to Finisher FU)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from Tray 1 or 2, and out to the finisher face up.	0	0	0	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (Tray 3 or 4 Feed to Finisher FU)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from Tray 3 or 4, and out to the finisher face up.	1	0	0	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (LCT Feed to Finisher FU)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the finisher face up.	0	1	0	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (Envelope Feeder Feed to Finisher FU)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from the envelope feeder, and out to the finisher face up.	1	1	0	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (Tray 1 or 2 Feed to Finisher FD)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from Tray 1 or 2, and out to the finisher face down.	0	0	1	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (Tray 3 or 4 Feed to Finisher FD)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from Tray 3 or 4, and out to the finisher face down.	1	0	1	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Test Pattern Printing (LCT Feed to Finisher FD)	Prints a test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the finisher face down.	0	1	1	1	0	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Duplex Test Pattern Printing (Tray 1 or 2 Feed to Standard Output or External Tray)	Prints the duplex test pattern using the BECU pattern without the printer controller process. Paper is fed from tray 1 or 2. The required output tray must be empty.	0	0	0	0	1	0	1	0
	To make the test print, push the push switch after opening the face up tray. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (Tray 3 or 4 Feed to Standard Output or External Tray)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from tray 3 or 4. The required output tray must be empty.	1	0	0	0	1	0	1	0
	To make the test print, push the push switch after opening the face up tray. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (LCT Feed to Standard Output or External Tray)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from the LCT. The required output tray must be empty.	0	1	0	0	1	0	1	0
	To make the test print, push the push switch after opening the face up tray. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (Tray 1 or 2 Feed to Mailbox)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from tray 1 or 2, and out to the mailbox.	0	0	1	0	1	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again If there is paper in all mailbox trays, the printer does not start to print.								
Duplex Test Pattern Printing (Tray 3 or 4 Feed to Mailbox)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from tray 3 or 4, and out to the mailbox.	1	0	1	0	1	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again. If there is paper in all mailbox trays, the printer does not start to print.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Duplex Test Pattern Printing (LCT Feed to Mailbox)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the mailbox.	0	1	1	0	1	0	1	0
	To make the test print, push the push switch (at least one of the mailbox output bins must be empty). To stop the test print, push the push switch again. If there is paper in all mailbox trays, the printer does not start to print.								
Duplex Test Pattern Printing (Tray 1 or 2 Feed to Finisher FU)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from Tray 1 or 2, and out to the finisher face up.	0	0	0	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (Tray 3 or 4 Feed to Finisher FU)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from Tray 3 or 4, and out to the finisher face up.	1	0	0	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (LCT Feed to Finisher FU)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the finisher face up.	0	1	0	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (Tray 1 or 2 Feed to Finisher FD)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from Tray 1 or 2, and out to the finisher face down.	0	0	1	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
Duplex Test Pattern Printing (Tray 3 or 4 Feed to Finisher FD)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from Tray 3 or 4, and out to the finisher face down.	1	0	1	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								

Description	Function	Switch							
		1	2	3	4	5	6	7	8
Duplex Test Pattern Printing (LCT Feed to Finisher FD)	Prints the duplex test pattern using the BECU, without using the printer controller. Paper is fed from LCT, and out to the finisher face down.	0	1	1	1	1	0	1	0
	To make the test print, push the push switch. To stop the test print, push the push switch again.								
TD Sensor Control Value Setting Adjustment (Increase Value)	Input the TD sensor control value (Vcont)	0	1	0	0	0	1	1	0
	If Vcont is out of specification after replacing the BECU board, adjust Vcont using this service program (to increase the value). **Do not use this service program.**								
TD Sensor Control Value Setting Adjustment (Decrease Value)	Input the TD sensor control value (Vcont)	0	1	0	0	0	1	1	0
	If Vcont is out of specification after replacing the BECU board, adjust Vcont using this service program (to decrease the value). **Do use this service program.**								
TD Sensor Control Value Setting Mode	Enters or exits the TD sensor control value setting mode.	0	0	1	0	0	1	1	0
	If Vcont is out of specification after replacing the BECU board, adjust Vcont after entering this mode using this service program. After changing Vcont, run this service program again to exit this mode. **Do not use this service program.**								
Auto TD Sensor Control Value Setting Mode	Sets the TD sensor control value automatically.	1	0	1	0	0	1	1	0
	Do not use this service program.								
TD Sensor Control Value Setting Mode (Using Factory Setting)	Sets the TD sensor control value automatically using the factory default setting in the NVRAM on the BECU.	0	1	1	0	0	1	1	0
	Do not use this service program.								

4.2.4 OUTPUT CHECK

CAUTION: 1) To prevent mechanical or electrical damage, do not keep an electrical component on for a long time.
2) The tray (paper tray, LCT, finisher) motor keeps turning when tested in this mode, regardless of upper or lower limit sensor signals. To prevent mechanical or electrical damage, do not keep this component on for a long time.

1. Enter the output check mode with the DIP switch service program (starting from bit 1: 01010100).
2. Set the DIP switches to correspond to the component you wish to check (see the following table).
3. Press the push switch to check that component.
4. Press the push switch again to stop the output check.
5. To exit service mode, set the DIP switches to the normal operating position (all 0), then turn the machine off/on.

- Output check table -

No.	Description	Switch							
		S1	S2	S3	S4	S5	S6	S7	S8
1	Main Motor	0	0	0	0	0	0	0	0
2	Development Clutch	1	0	0	0	0	0	0	0
3	Toner Supply Motor	0	1	0	0	0	0	0	0
4	By-pass Feed Clutch	1	1	0	0	0	0	0	0
5	Transport Vacuum Fan Motor	0	0	1	0	0	0	0	0
6	Registration Clutch	1	0	1	0	0	0	0	0
7	Paper Feed Motor (Optional Paper Tray)	0	1	1	0	0	0	0	0
8	Lower Paper Feed Clutch	1	1	1	0	0	0	0	0
9	Lower Relay Clutch	0	0	0	1	0	0	0	0
10	Upper Paper Feed Clutch	1	0	0	1	0	0	0	0
11	Upper Relay Clutch	0	1	0	1	0	0	0	0
12	Lower Feed Clutch (Optional Paper Tray)	1	1	0	1	0	0	0	0
13	Lower Relay Clutch (Optional Paper Tray)	0	0	1	1	0	0	0	0
14	Upper Feed Clutch (Optional Paper Tray)	1	0	1	1	0	0	0	0
15	Upper Relay Clutch (Optional Paper Tray)	0	1	1	1	0	0	0	0
16	Charge Roller Contact Clutch	1	1	1	1	0	0	0	0
17	Exhaust Fan Motor	0	0	0	0	1	0	0	0
18	Paper Feed Motor (Optional LCT)	1	0	0	0	1	0	0	0
19	Paper Transport Motor (Optional LCT)	0	1	0	0	1	0	0	0
20	Duplex Junction Gate Solenoid	1	1	0	0	1	0	0	0
21	Junction Gate Solenoid	0	0	1	0	1	0	0	0
22	Envelope Feeder Feed Motor	1	0	1	0	1	0	0	0
23	Upper Paper Lift Motor (Optional Paper Tray)	0	1	1	0	1	0	0	0
24	Lower Paper Lift Motor (Optional Paper Tray)	1	1	1	0	1	0	0	0
25	Tray Lift Motor –Up (Optional LCT)	0	0	0	1	1	0	0	0
26	Tray Lift Motor - Down (Optional LCT)	1	0	0	1	1	0	0	0

4.3 DIAGNOSTIC AND PCB TEST MODE

The diagnostic and PCB test mode includes special functions for main printer control board assembly in the factory.

Some of these tests can be used for service purposes.

4.3.1 HOW TO ENTER AND EXIT THIS MODE

Turn the machine on while pressing the On Line key and Enter key together until the display shows “Select Mode”. Release the keys at this time.

The On Line light should go off. You will automatically enter the diagnostic and PCB test mode. Use the arrow keys to scroll through the menu listing.

NOTE: If you do not press the On Line & Enter keys together when turning on the printer, the diagnostic and PCB test mode will not be available.

To exit from the diagnostic and PCB test mode, press the Escape key. The control panel will display “Completed” for a while. This starts the printer initialization and gets the printer back on line.

NOTE: If the self test is done before leaving this mode and a minor error occurred, an error status page is printed out automatically after exiting this mode.

See ‘Diagnostic Error Code Table’ in the Troubleshooting section for the conditions that the machine considers to be ‘minor errors’.

Menu	Function
Self Test	Checks the integrity of the peripherals attached to the system.
Centronics Test	Analyzes the circuits for parallel communication using the parallel port loop back connector. See “Centronics Test” for details.
Master Prg Write	**Do not use this program. This is used only in the factory.**
NVRam Clear	**Do not use this program. This is used only in the factory.**
Detail Ram Test	Performs a more rigorous RAM test.
Make Master DIMM	**Do not use this program. This is used only in the factory.**
Make Font DIMM	**Do not use this program. This is used only in the factory.**

4.3.2 SELF TEST

The self test checks the main printer control board. During normal machine use, the self diagnostic is done at power-up to check system integrity, and minor errors will not be displayed on the front panel. Minor errors will only be displayed if you run the self test from the diagnostics menu.

See 'Diagnostic Error Code Table' in the Troubleshooting section for the conditions that the machine considers to be 'minor errors'.

Test Items

Devices always tested

- Code ROM (Flash ROM)
- Resident RAM
- Engine I/F
- PCL Font ROM

Devices tested when they are installed

- Optional RAM SIMM
- PS DIMM I/F
- HDD I/F
- NIC I/F

Operation Environment

The controller board must be inside the machine so that the self diagnostics may retrieve engine status information.

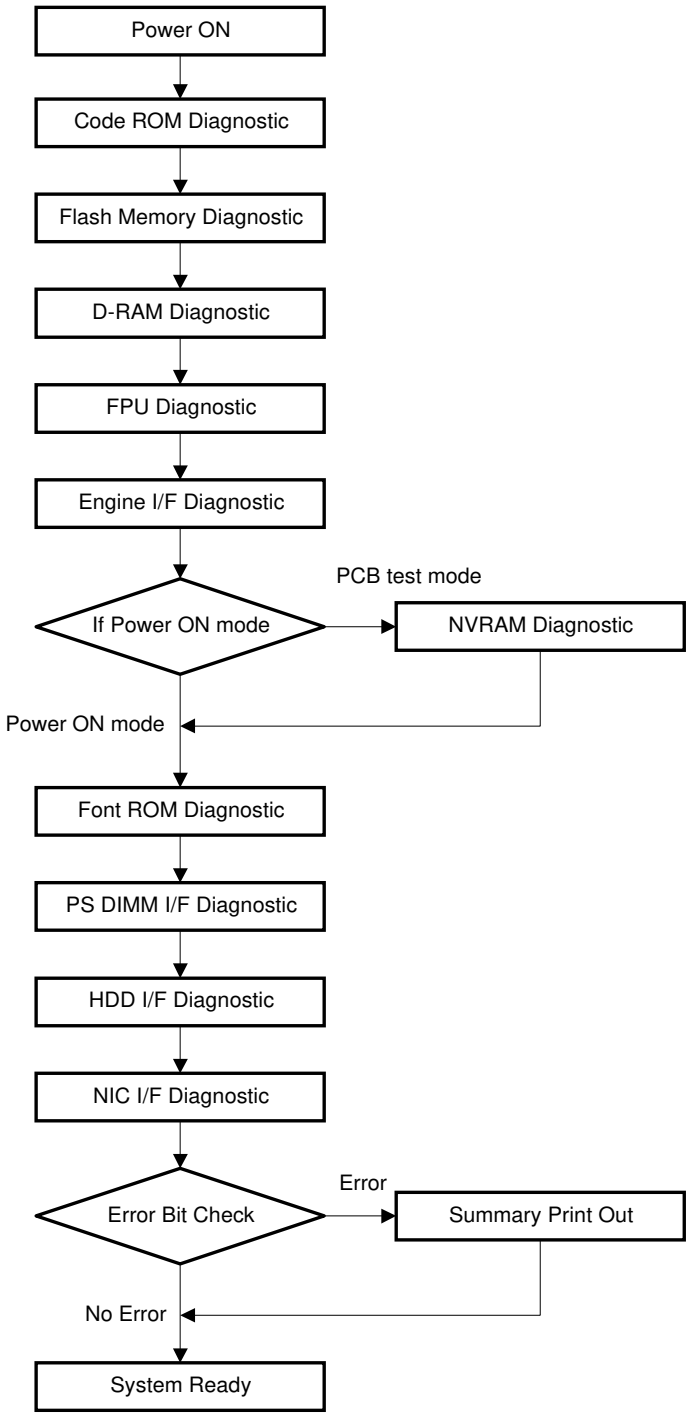
Disconnect all interface cables.

Procedure

1. Enter the diagnostic and PCB test mode.
   (See "How to Enter and Exit")
2. Select Self Test. Then, press the Enter key to start this test.
   If a minor error occurs, the error LED on the control panel lights and all errors in this test will be displayed. Then, press the Escape key.
   The printer starts initializing and prints out the error status page.

NOTE: If there is no error, the error status page will not be printed out.

Test Flow Chart



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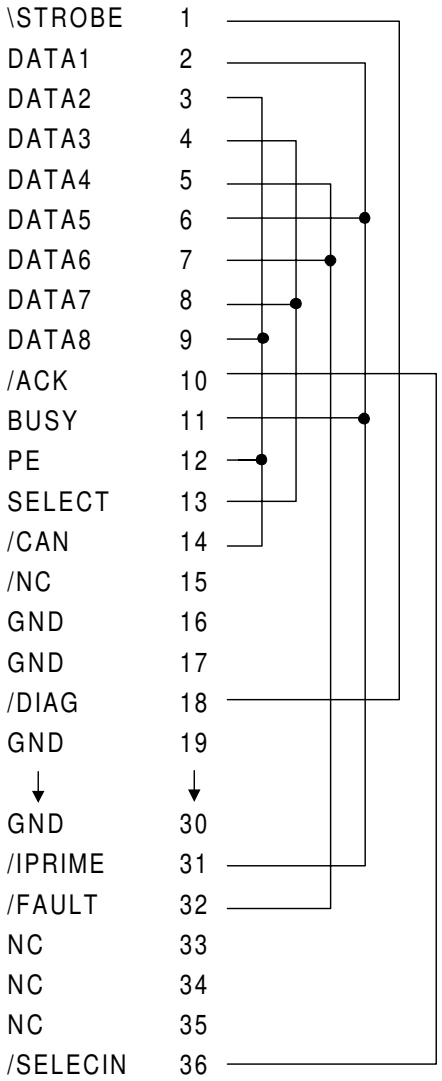
NOTE: PS DIMM, HDD and NIC diagnostics
These are applied only when the units are detected.
If no error is detected, then there is no display and no summary sheet is printed out.
If a minor error is detected, the error bit is set. Then, after the diagnostic is completed (after exiting PCB test mode), a summary sheet describing the error is printed out.

4.3.3 CENTRONICS TEST

1. Plug the loop back connector into the parallel port of the printer.
2. Enter the diagnostic and PCB test mode.
   (See “How to Enter and Exit”)
3. Select “Centronics Test”. Then press the Enter key to start this test.
   If a minor error occurs, the error LED lights and all errors in this test will be displayed. Then, press the Escape key.
   The printer starts to initialize and prints the error status page.
   NOTE: If there is no error, the error status page will not be printed.
   See ‘Diagnostic Error Code Table’ in the Troubleshooting section for the conditions that the machine considers to be ‘minor errors’.

Loop Back Connector for the Centronics I/F



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4.4 DOWNLOADING NEW SYSTEM SOFTWARE

4.4.1 OVERVIEW

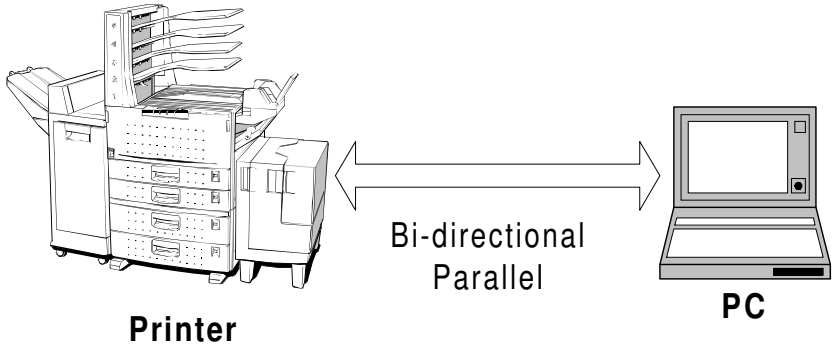
New printer control system software can be downloaded from a host computer to the flash memory on the printer control board.

The software must be downloaded by technical staff.

To start the download, preliminary steps are needed at the host computer and at the targeted printer.

New engine software, boot ROM software, network software, or printer drivers are not replaced by this procedure.

4.4.2 OPERATING ENVIRONMENT



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The computer must be connected to the printer with a parallel cable.

The download will run only under MS-DOS.

The system software download executable files are on two 3.5-inch floppy disks. At the DOS prompt, insert the first disk into the PC floppy disk drive and type in the instructions specified in the “Download Procedure” section.

4.4.3 PREPARATION

The new software is on two 3.5-inch high-density floppy diskettes. The files on the two diskettes are:

Diskette #1: bin.zip (part 1)
dnloader.exe
dnloader.ini
install.bat
readme.txt
pkunzip.exe

Diskette #2: bin.zip (part 2)

Insert Diskette #1 into the floppy drive and read the readme.txt file on this disk before downloading the new system software. Please follow the instructions.

The batch file will copy and expand the files into a _RICOH_ directory on the C: drive. The fully expanded firmware file is about 4 Mbytes, and 10 Mbytes of disk space are needed in total.

NOTE: The download uses the LPT1 port, and the user must configure LPT1 to be a parallel port.

NOTE: (for Windows users)
Win NT/Win95: Do not select MS-DOS Prompt from the Programs menu of Win NT/Win 95. Instead, select Shut Down from the Start menu, then select Restart in MS-DOS Mode.
Win3.1: Do not select MS-DOS Prompt from the Main Window of Win 3.1. Instead, exit the Windows session to return to DOS only mode.

4.4.4 DOWNLOAD PROCEDURE

At the Host PC

1. Check that there are 10 Mbytes of free disk space.
2. Insert floppy disk #1 into the floppy disk drive A or B.
   - If floppy drive A is used for the download, type in:

     `C: > A: <Enter>`

     `A: > INSTALL <Enter>`
   - If floppy drive B is used for the download, type in:

     `C: > B: <Enter>`

     `B: > INSTALL <Enter>`

- The installation program will pause and remind you to insert the next disk into drive A or B.

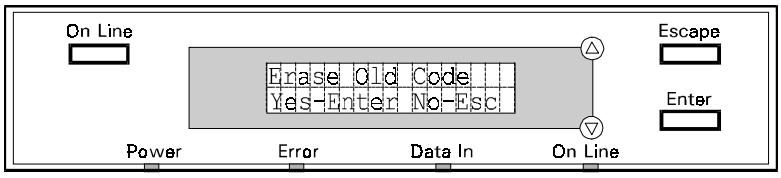
3. When **"Would you like to upgrade now ?"** is displayed, press Y (yes) to start the system software download from the PC.
   If you select N (no), the program will close and go back to the DOS prompt.

- The program will automatically decompress the files. Then the program will pause and display:
  " Follow these steps:
  1. Turn MP 01 printer power ON . . . . .
  etc

The PC side is ready for the download.

At the Printer

1. If the printer is on and connected to the network, the system administrator should inform the users that the printer is going to be shut down and should ask them to make sure there are no jobs in the printer queue. Then turn the printer power off. Disconnect all interface cables which are used to connect to the printer (parallel/NIC).
2. Connect the parallel cable between the printer and the host PC.
3. Turn the machine on while pressing the On Line, Escape key and Up Arrow keys together until the display shows **"Erase Old Code ? Yes-Enter No-Esc"**.



G020M511.WMF

NOTE: If you do not press the Enter key within 50 seconds, the machine exits the code download process.

⚠WARNING

1. **If the old code is erased, the printer will not be able to work properly without new software installed.**
2. **After "Erase Old Code? Yes-Enter No-ESC", is displayed, if you don't press the Enter Key within 50 seconds, the machine returns to standby without erasing the old code, and the software is not updated.**

4. Press the Enter key. **"Download Code, Erasing Old Code"** will be displayed, and the Error LED will flash while the flash memory is being erased.
   - After the flash memory is erased, **"From Parallel or NIC"** will be displayed. The printer is ready for data from the host PC via the parallel port.

If the printer is turned off accidentally from this point in the procedure until the download has finished, printing will not work.

To recover the printer, start the download procedure again (from the beginning both at the PC side and at the printer side). This can be done because the download procedure is included in the boot ROM.

Start the Download at the Host PC

1. When **"From Parallel or NIC"** appears on the control panel, press the Enter key on the host PC.
   On the host PC
   "Download code in progress ....." will be displayed.
   - While data is coming in from the host PC, **"Download Code, From Parallel"** is displayed, and the Data-In and On Line LEDs will flash on the printer control panel.

When downloading is finished, the program will pause and display **"Press Y if you don't want to keep the firmware file. "** on the host PC*.* The temporary firmware file will be erased.

After the transfer is finished, **"Download Code, Completed"** is indicated on the control panel. Then the printer re-initializes itself automatically and starts running with the new system software.

4.5 USER MENU MODE (USER PROGRAM MODE)

The user menu mode is accessed by users, and by sales and service staff. The menu mode is used to input the printer settings.

4.5.1 HOW TO ENTER AND EXIT

The printer must be off line - press the On Line key if the printer is on line.

The four menus that the user can access using the machine's control panel are as follows:

Job Control Menu

Host Interface Menu

Language Menu

Test/Print Menu

To Select a Program

1. Select the 1st level menu. Use the Up/Down Arrow keypad to scroll, then press Enter.
2. Select the next level program menu/option in the same way.
   NOTE: To go back up a level, press the Escape key.

To Input a Value or Setting

1. Access the required program as described above.
   NOTE: The value marked with a '>' on the display is the current value.
2. Enter the required setting using the Up/Down Arrow keys, then press the Enter key.
   NOTE: If you forget to press the Enter key, the previous value remains.

Control Panel Menu Structure

Job Control	Paper Input	Tray Priority	
		Bypass Size	
		Envelope Size	
		Tray Size (*)	Tray 1
			Tray 2
			Tray 3
			Tray 4
	Paper Output	Output Tray	
	System	Jam Recovery	
		Print PS Errors	
		Edge Smoothing	
		Toner Saving	
		Time Out	
		Energy Saver	
		Low Toner	
		Resolution	
		Image Density	
		PM Alarm	
		Reset Fusing Unit	
	PCL5 Menu	Form Feed	
		Orientation	
		Line Warp	
		Form Length	
		Default Font	Font Source
			Font Number
			Point Size
			Font Pitch
		Symbol Set	
	Menu Reset		
Host Interface	Parallel Setup	Personality	
		Bi-direction	
	NIC Personality		
	Menu Reset		
Language	English		
	German		
	French		
	Italian		
Test/Print	System Config		
	Error Log		
	PS Font List		
	System Reset		
	PCL Font List		

4.6 SWITCHES/LEDS

4.6.1 SWITCHES

Paper Tray Connecting Board

Number	Function
SW 1 (DIP SW)	Selects the dip switch service programs. See the ”DIP Switch Service Programs” section.
SW 2 (Push SW)	Activate the selected DIP switch service program.

4.6.2 LEDS

Paper Tray Connecting Board

Number	Function
LED 1	Monitors the status of the printer engine, excluding the main printer control board. Blinking at 1.5-second intervals: No error Blinking at 1.0-second intervals: Printing in progress Blinking at 0.5-second intervals: An error occurred (the error can be fixed by the user) Blinking at 0.3-second intervals: An error occurred (technician required) Blinking at 0.3 – 0.3 – 1.0 – 0.3 second intervals: Output test mode

4.7 SPECIAL TOOLS AND LUBRICANTS

4.7.1 SPECIAL TOOLS

Part Number	Description	Q'ty
A153 9004	Drum Charge Roller Wiping Cloth	1
5420 9507	Digital Multimeter	1
G021 9350	Loopback Connector: Parallel	1
5442 9103	Launa Oil	1

5. PREVENTIVE MAINTENANCE

5.1 PREVENTIVE MAINTENANCE SCHEDULE

5.1.1 PM TABLE

NOTE: 1) The PM interval is indicated by the number of prints.
2) All PM will be performed by the user, not by the technician.
The maintenance kit will be produced for the user by the marketing side.

The following items are contained in the maintenance kit.

1. Transfer Roller Unit 1 pc
2. Fusing Unit 1 pc
3. Paper Feed Roller Assembly 2 pcs
4. LCT Paper Feed Roller (Option) 2 pcs

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

PRINTER ENGINE	EM	100K	NOTE
Transfer Roller	C	R	Replaced by users To clean, use a blower brush.
Registration Roller	C	C	Performed by users Clean with water.
Paper Feed Roller (By-pass Tray)	C	C	Performed by users Clean with water.
Relay Rollers	C	C	Performed by users Clean with water.
Paper Feed Rollers	C	R	Performed by users Clean with water.
Bottom Plate Pads	C	C	Performed by user Clean with water.
Friction Pad (By-pass feed)	C	C	Performed by users Clean with water.
Fusing Unit		R	Performed by users

PAPER TRAY UNIT	EM		NOTE
Paper Feed Rollers	I		Replace if necessary
Relay Rollers	C		Dry or damp cloth
Relay Driven Rollers	C		Dry or damp cloth
Bottom Plate Pads	C		Dry or damp cloth
Relay Clutches	I		Replace if necessary
Paper Feed Clutches	I		Replace if necessary

DUPLEX TRAY	EM		NOTE
Paper Feed Roller	C		Damp cloth
Transport Rollers	C		Damp cloth
Inverter Rollers	C		Damp cloth

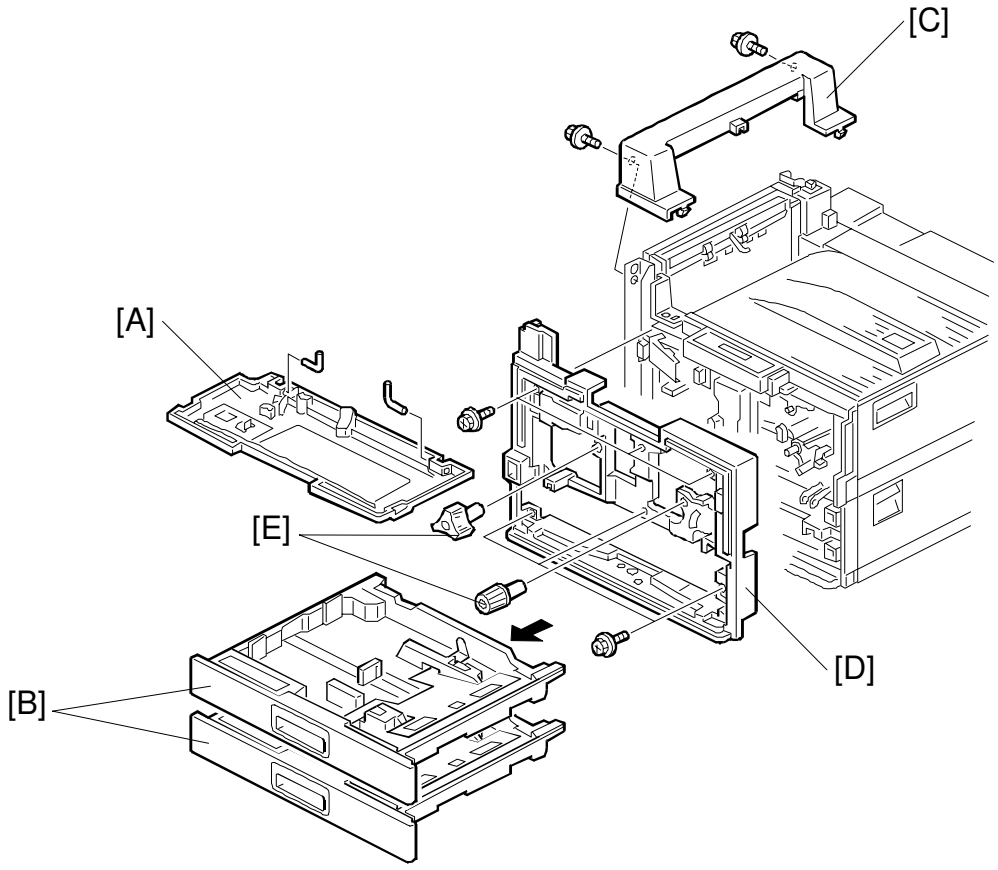
FINISHER	EM		NOTE
Rollers	C		Clean with water or alcohol
Bushings	I		Use Launa oil or equivalent
Sensors	C		Dry cloth

LCT	EM	100K	NOTE
Paper Feed Rollers	C	R	Performed by users Clean with dry or damp cloth
Transport Roller	C		Dry or damp cloth
Bottom Plate Pad	C		Dry or damp cloth

6. REPLACEMENT AND ADJUSTMENT

6.1 EXTERIOR

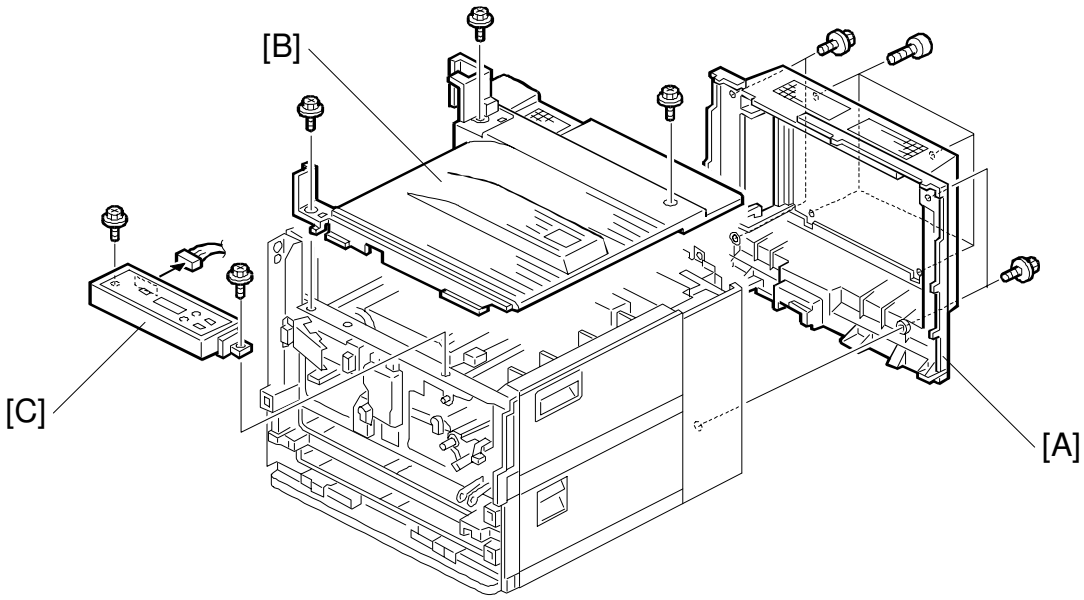
6.1.1 INNER COVER



G020R541.WMF

1. Open the front cover [A].
2. Remove the front cover (2 pins).
3. Remove the paper trays [B].
4. Remove the top left cover [C] (2 screws).
5. Remove the inner cover [D] (2 knobs [E] and 6 screws).
   NOTE: The inner cover comes out when the bottom part is lifted slightly.

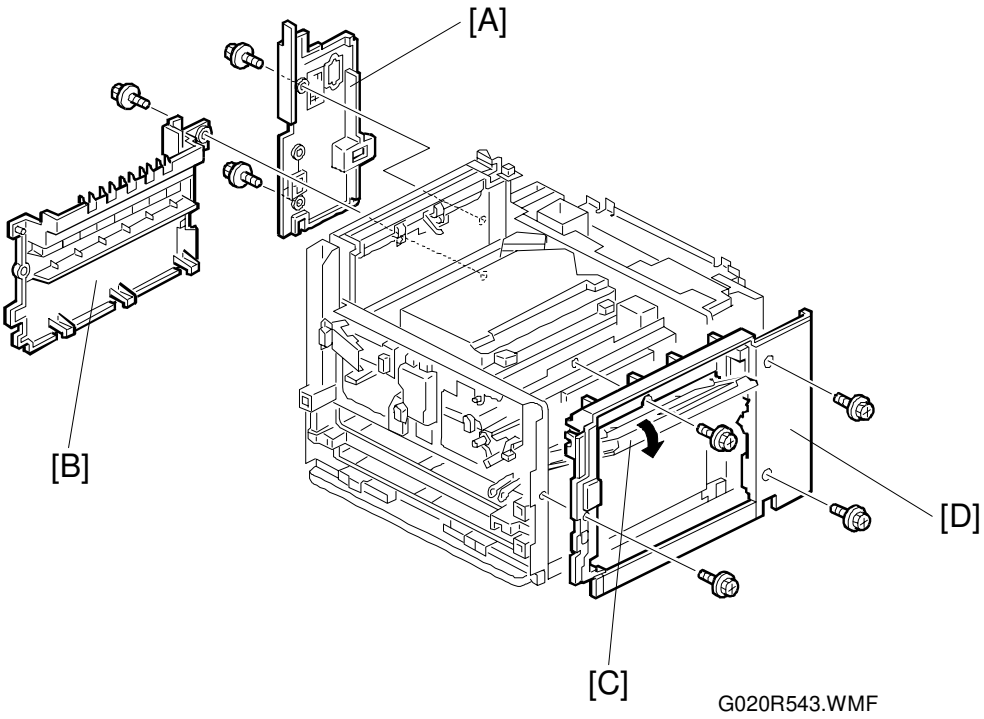
6.1.2 REAR COVER/TOP COVER/CONTROL PANEL



G020R542.WMF

1. Remove the rear cover [A] (4 screws and 4 thumb screws).
2. Remove the inner cover. (See Inner Cover Removal.)
3. Remove the top cover [B] (3 screws).
4. Remove the control panel [C] (2 screws and 1 connector).

6.1.3 REAR LEFT/LOWER LEFT/RIGHT COVER



Rear Left Cover

1. Remove the rear cover. (See Rear Cover Removal.)
2. Remove the rear left cover [A] (2 screws).

Lower Left Cover

1. Remove the top cover. (See Top Cover Removal.)
2. Remove the rear left cover. (See Rear Left Cover Removal.)
3. Remove the lower left cover [B] (1 screw).

Right Cover

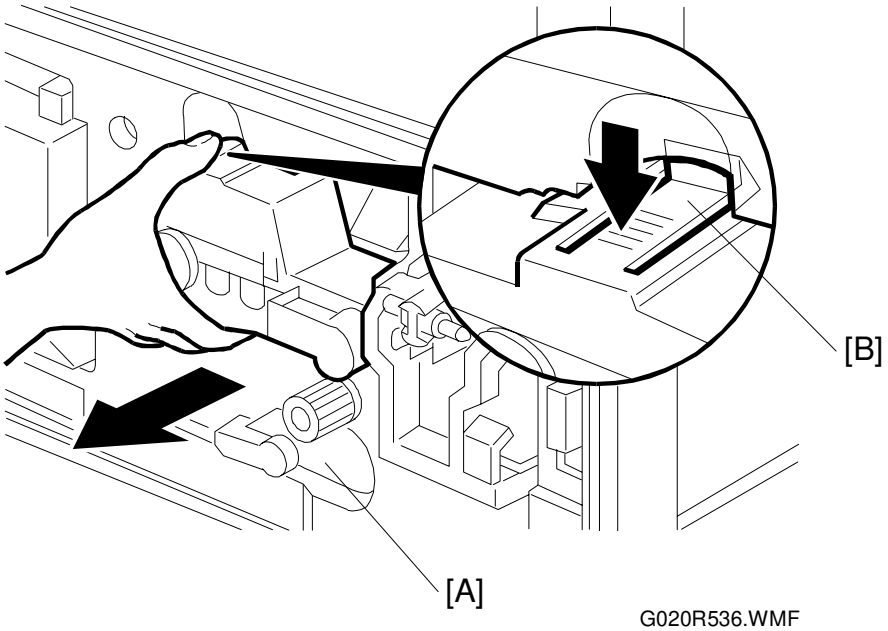
1. Remove the top cover. (See Top Cover Removal.)
2. Open the by-pass tray [C] and remove the right cover [D] (4 screws).

6.2 PHOTOCONDUCTOR UNIT (PCU)

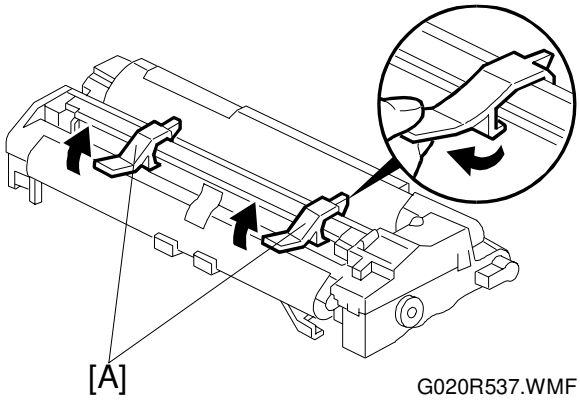
⚠WARNING

Do not incinerate the photoconductor unit. Toner dust might ignite when exposed to an open flame. Dispose of the used photoconductor unit in accordance with local regulations.

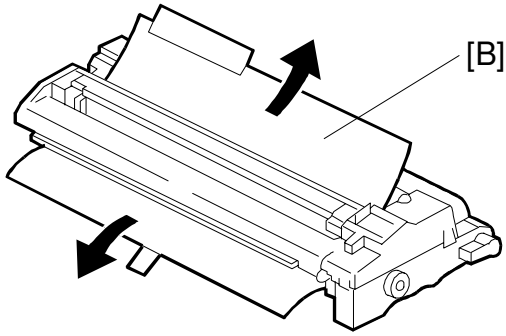
6.2.1 PCU



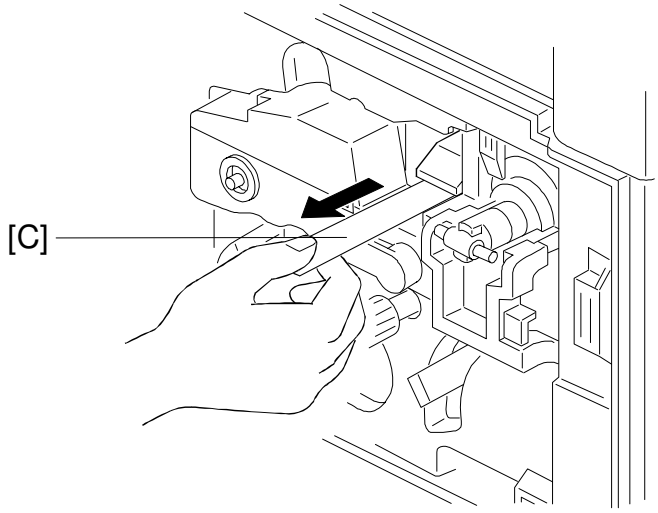
1. Turn the lever [A] to the left to release the transfer unit. Then, pull the PCU out slightly, while pushing the release lever [B] to unlock the PCU.
2. Pull the PCU out until it stops.
3. Hold the PCU with both hands. Slightly tilt the PCU to the left and right to unlock it. Then, pull the PCU out.
   NOTE: Do not tilt the used PCU after removing it from the machine, to prevent toner spillage.



G020R537.WMF



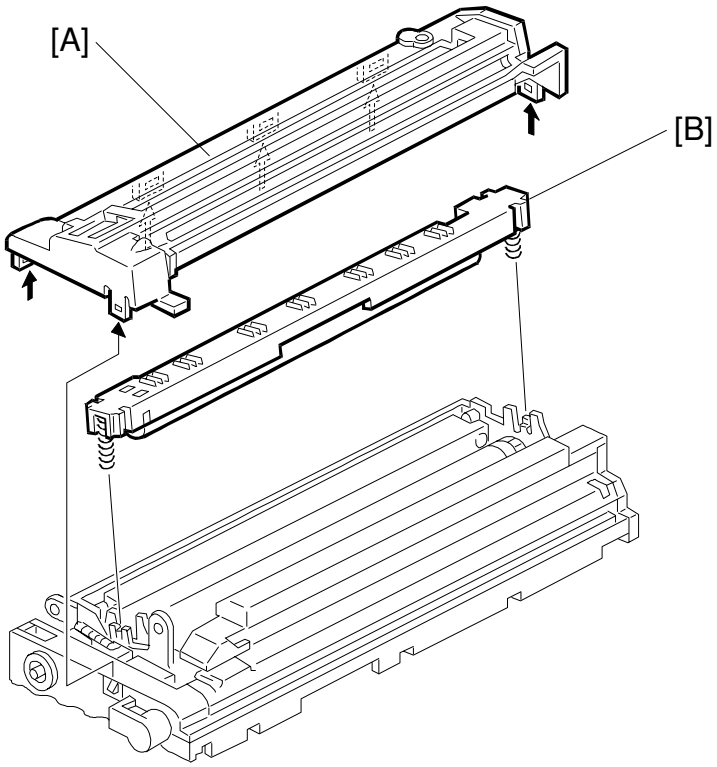
G020R538.WMF



G020R539.WMF

4. Remove the 2 clamps [A] and the drum protection sheet [B] from the new PCU.
   NOTE: Do not touch the photoconductor. If you do, copy quality may be abnormal.
5. Insert the new PCU into the machine. Push the new PCU until the release lever locks.
6. Peel the sealing tape [C] off gently.
7. Return the lever to its original position (see lever [A] on the previous page).
   NOTE: After replacing the PCU, the machine will take about 5 minutes to warm up. During this warm-up period, do not open the front cover or turn off the main switch or a fault may occur.

6.2.2 DRUM CHARGE ROLLER UNIT

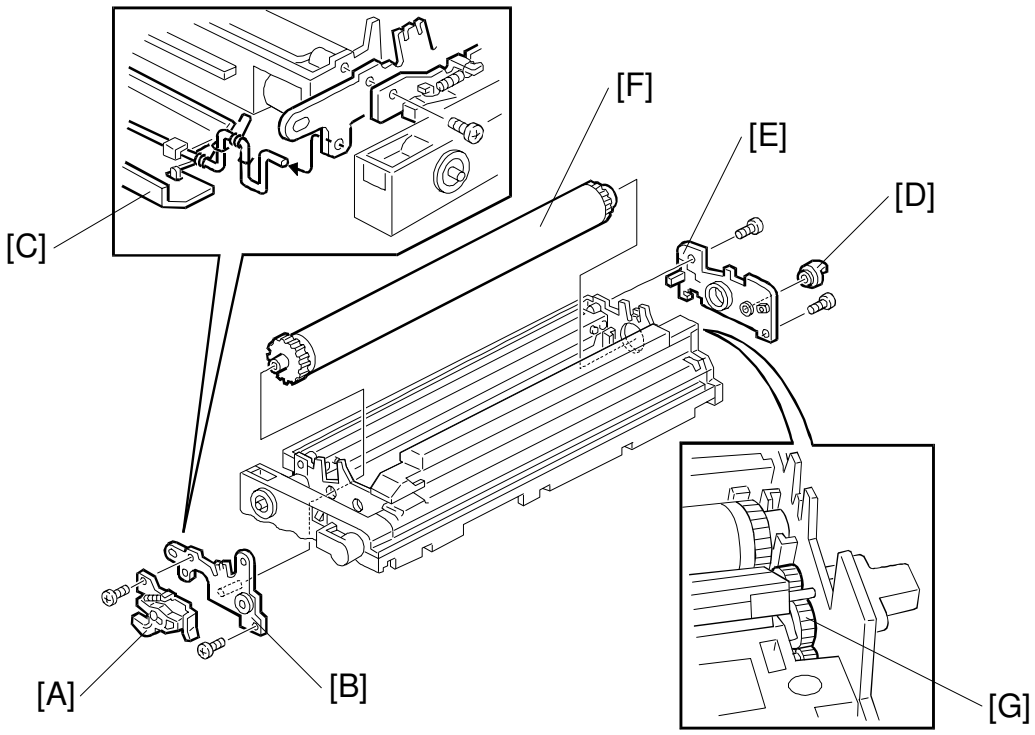


G020R540.WMF

1. Remove the PCU. (See PCU Removal.)
2. Remove the upper cover [A] of the PCU (6 hooks).
3. Remove the drum charge roller unit [B].

NOTE: 1) Do not let the springs fall.
2) Do not remove the drum charge roller from the case when cleaning or replacing.
3) Never touch the surface of the drum charge roller.
4) If there is any dirt on the surface of the drum charge roller, wipe it off with a dry cloth or a special cloth for the drum charge roller. (The special cloth is available as a service part: A1539004. **Never use alcohol or water to clean the drum charge roller.**

6.2.3 DRUM

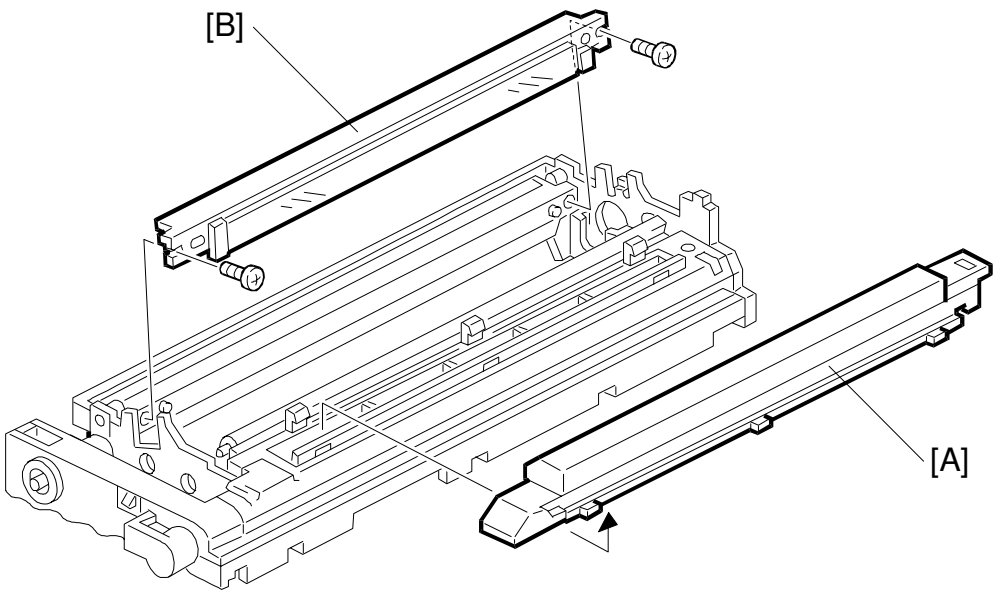


G020R505.WMF

1. Remove the PCU. (See PCU Removal.)
2. Remove the drum charge roller unit. (See Drum Charge Roller Unit Removal.)
3. Remove the shutter cam [A] (1 screw) and the front plate [B] (1 screw).
4. Remove the shutter [C].
5. Remove the joint [D] and rear plate [E] (2 screws).
6. Remove the drum [F].
   NOTE: Do not touch the drum surface with bare hands.

CAUTION: Be careful not to spill toner over the train of gears [G] when removing the front or rear plate. Otherwise, development roller torque is likely to increase.

6.2.4 CLEANING BLADE

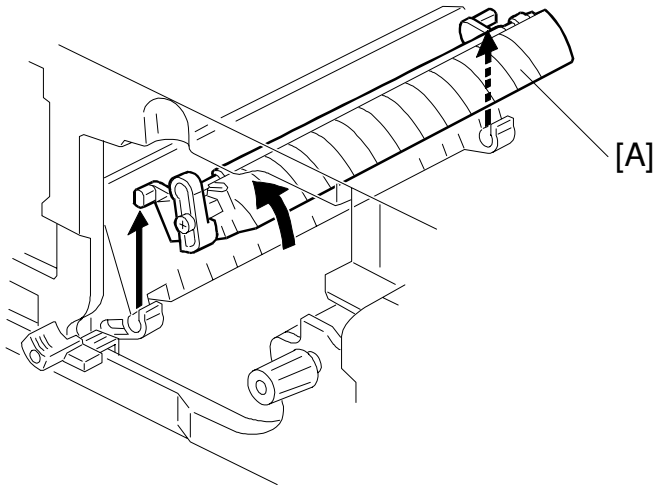


G020R506.WMF

1. Remove the PCU. (See PCU Removal.)
2. Remove the drum. (See Drum Removal.)
3. Remove the developer cartridge [A] (3 hooks).
4. Remove the cleaning blade [B] (2 screws).

6.3 TRANSFER UNIT

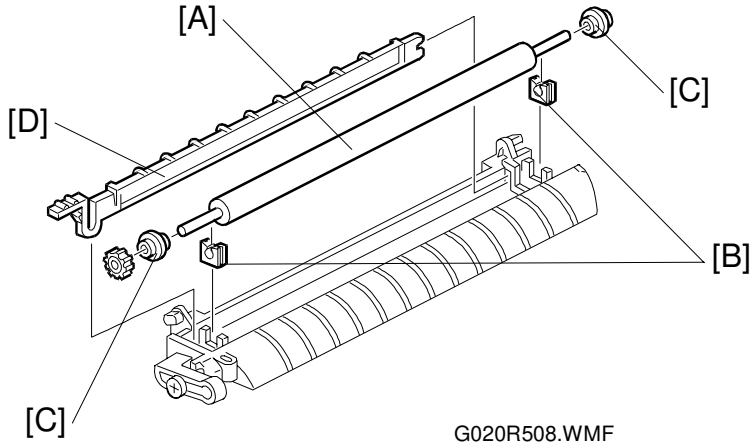
6.3.1 TRANSFER UNIT



G020R507.WMF

1. Remove the PCU. (See PCU Removal.)
2. Raise the transfer unit [A] vertically and remove it.

6.3.2 TRANSFER ROLLER/DISCHARGE PLATE



G020R508.WMF

1. Remove the transfer unit. (See Transfer Unit Removal.)
2. Remove the transfer roller [A].
   NOTE: 1) Clean the bushings [B] and pulleys [C]. When replacing the transfer roller, replace the bushings and pulleys together.
   2) Do not touch the surface of the transfer roller with bare hands. When cleaning the transfer roller, use a blower brush, not a cloth.
3. Remove the discharge plate [D].

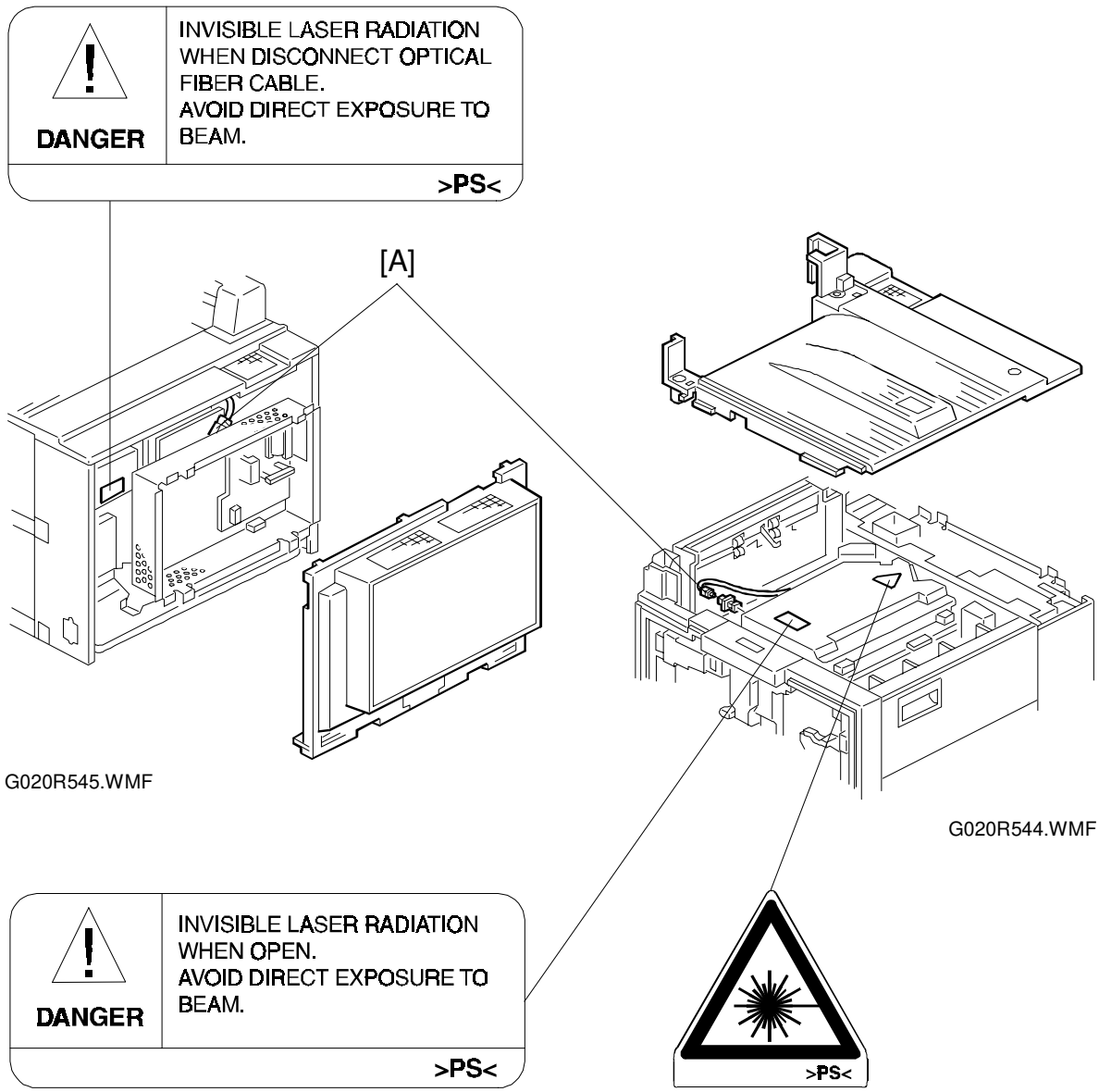
6.4 LASER UNIT

⚠WARNING

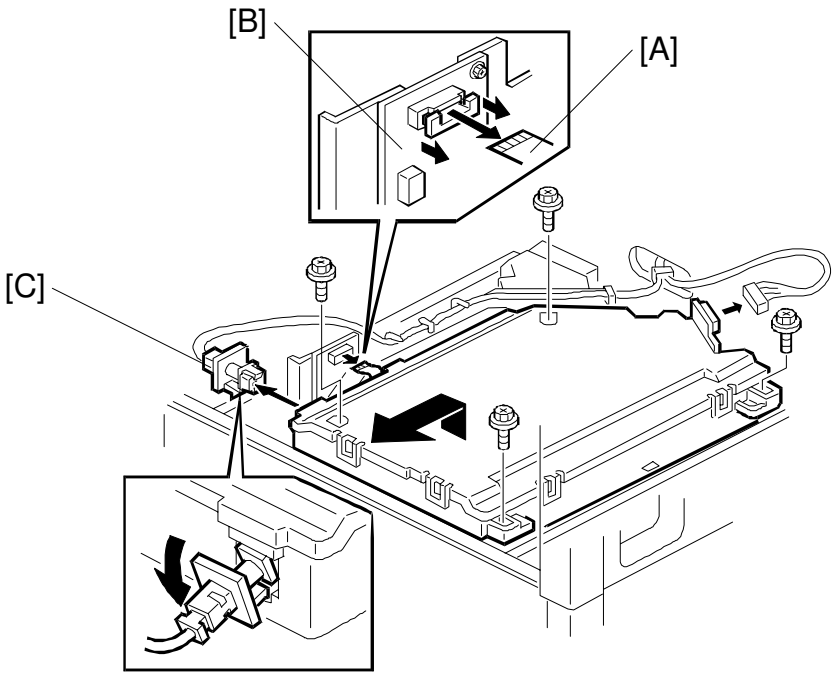
Turn off the main switch and unplug the machine before attempting any of the procedures in this section. Laser beams can seriously damage your eyes.

6.4.1 CAUTION DECAL LOCATIONS

Three caution decals and the optical fiber cable [A] are located in the laser section as shown below.



6.4.2 LASER UNIT/MAIN SCAN SYNCHRONIZATION DETECTOR



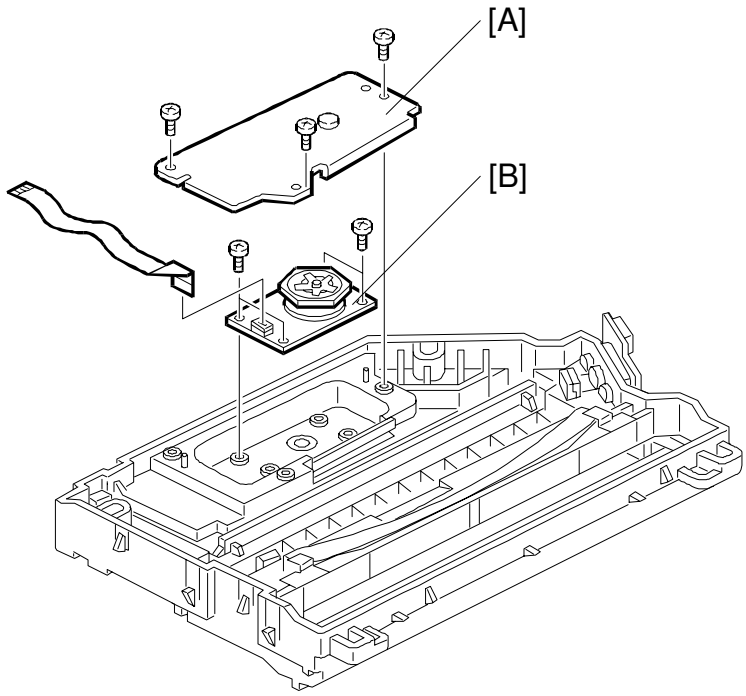
G020R509.WMF

⚠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 top cover. (See Top Cover Removal.)
2. Disconnect the harness [A] from the polygon mirror motor driver [B].
3. Remove the main scan synchronization detector [C].
4. Remove the laser unit (4 screws and 1 connector).

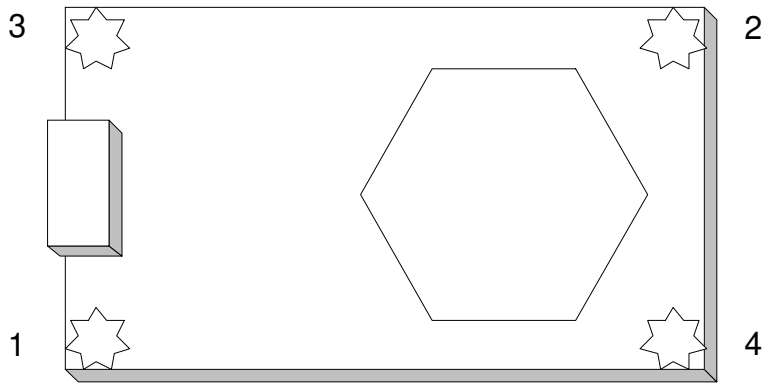
6.4.3 POLYGONAL MIRROR MOTOR



G020R510.WMF

1. Remove the laser unit. (See Laser Unit/Main Scan Synchronization Detector Removal.)
2. Remove the polygon mirror motor cover [A] (3 screws).
3. Remove the polygon mirror motor [B] (4 screws and 1 connector).

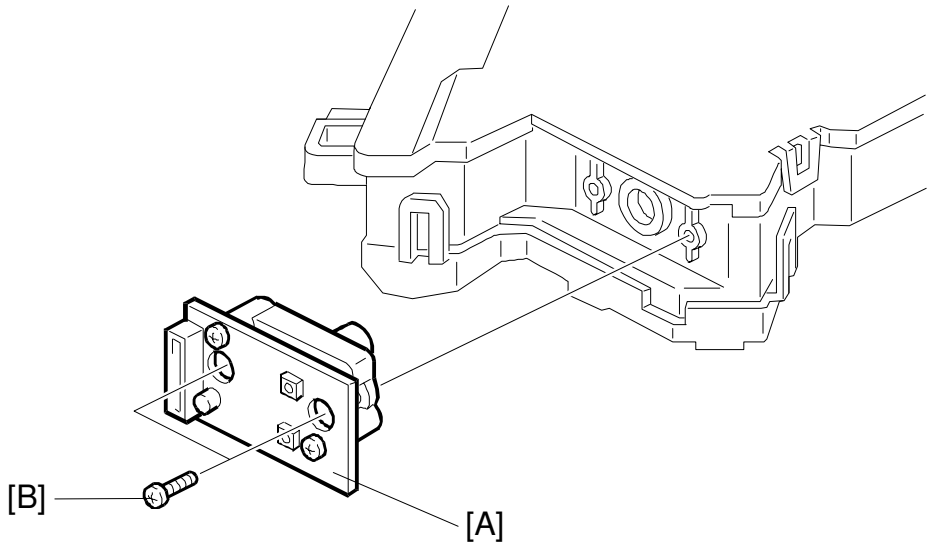
NOTE: When reinstalling the polygon mirror motor, the securing order should be as shown below. Otherwise, the polygon mirror motor board may be bent.



G020R511.WMF

4. After replacement, check the print registration and adjust if necessary.

6.4.4 LD UNIT

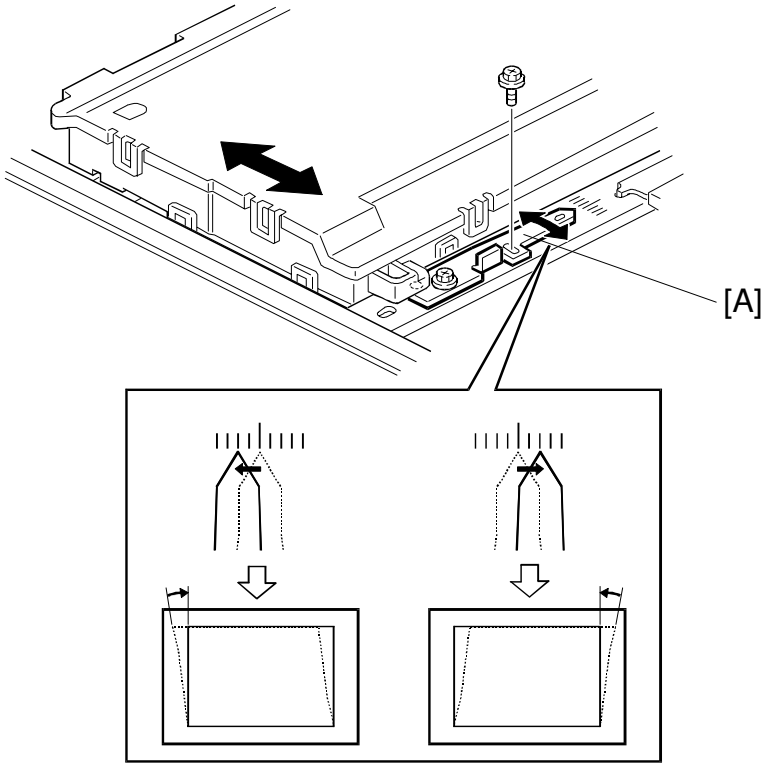


G020R546.WMF

1. Remove the top cover. (See Top Cover Removal.)
2. Remove the laser unit. (See Laser Unit/Main Scan Synchronization Detector Removal.)
3. Replace the LD unit [A] by removing screws [B] as shown.

NOTE: Do not touch the variable resistors.

6.4.5 LASER UNIT POSITIONING ADJUSTMENT

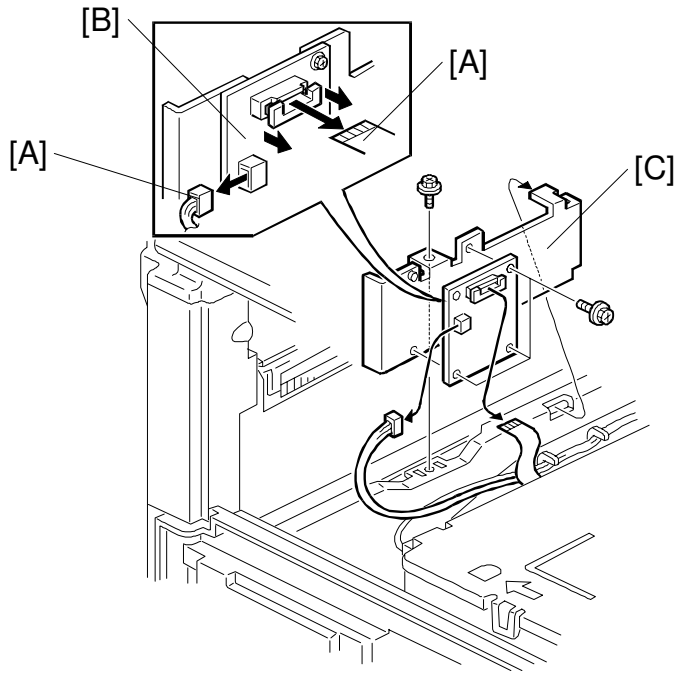


G020R512.WMF

⚠CAUTION
Do not open the laser unit cover during the adjustment.

1. Print the lattice pattern on A3 paper and estimate the amount of skew on the printed parallelogram.
2. Loosen the screws securing the laser unit (4 screws). See 'Laser Unit/Main Scan Synchronization Detector'.
3. Loosen the screws securing the adjustment lever [A] (2 screws).
4. Move the adjustment lever to the proper position on the scale.
   NOTE: When the adjustment lever is shifted by one unit on the scale, the image skews by 0.2 mm.
5. Secure the adjustment lever (2 screws).
6. Secure the laser unit (4 screws).
7. Check the printout.

6.4.6 POLYGON MIRROR MOTOR DRIVER



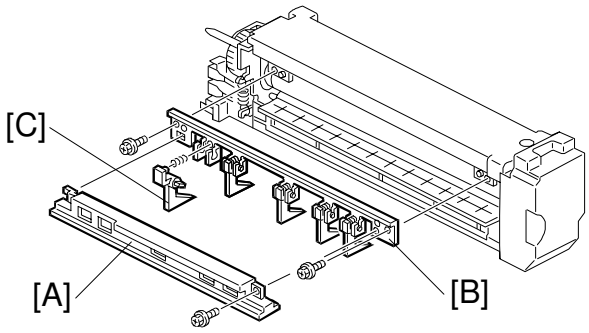
G020R513.WMF

1. Remove the top cover. (See Top Cover Removal.)
2. Disconnect two harnesses [A] from the polygon mirror motor driver [B].
3. Remove the polygon mirror motor bracket [C] (1 screw).
4. Remove the polygon mirror motor driver (3 screws).

6.5 FUSING

⚠CAUTION
The fusing unit gets hot. Do not touch the metal parts with bare hands.

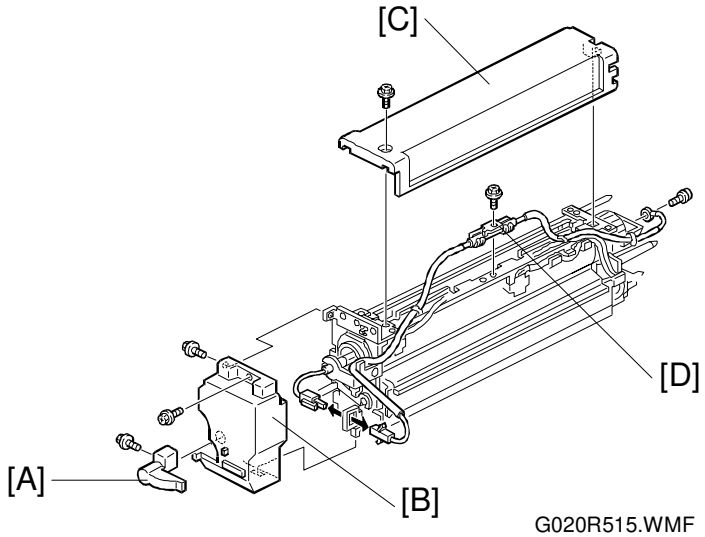
6.5.1 HOT ROLLER STRIPPERS



G020R514.WMF

1. Pull out the fusing unit (1 screw).
2. Remove the exit guide plate [A] (1 screw).
3. Remove the hot roller stripper bracket [B] (2 screws).
4. Replace the hot roller strippers [C] .

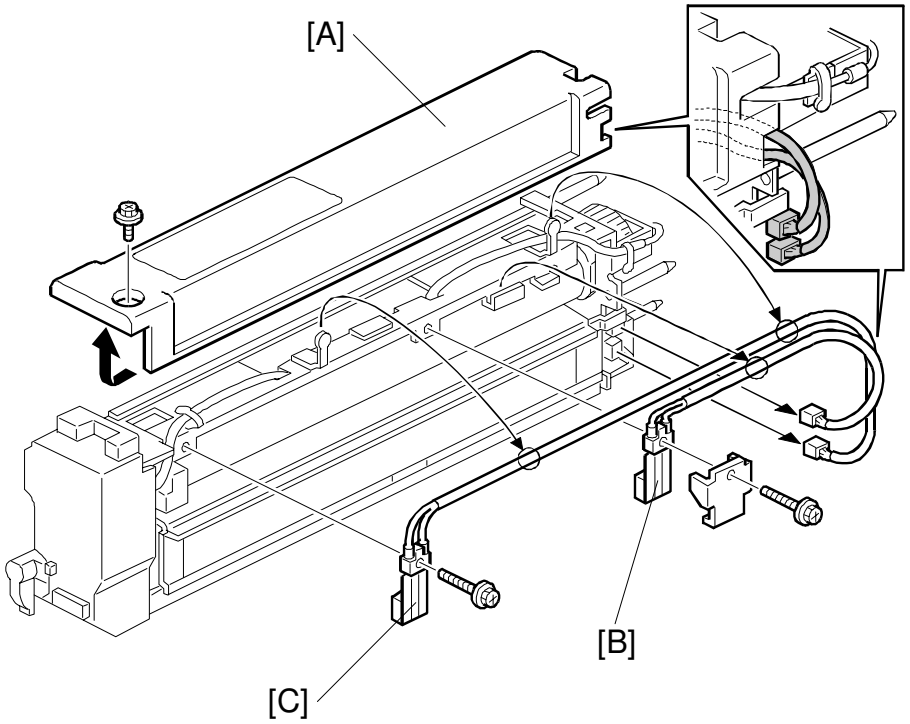
6.5.2 FUSING THERMOFUSE



G020R515.WMF

1. Pull out the fusing unit (1 screw).
2. Remove the lever handle [A] (1 screw).
3. Remove the front cover [B] (1 screw) and the upper cover [C] (1 screw).
4. Remove the fusing thermofuse [D] (2 screws and 1 connector).

6.5.3 FUSING THERMISTOR/FUSING EDGE THERMISTOR

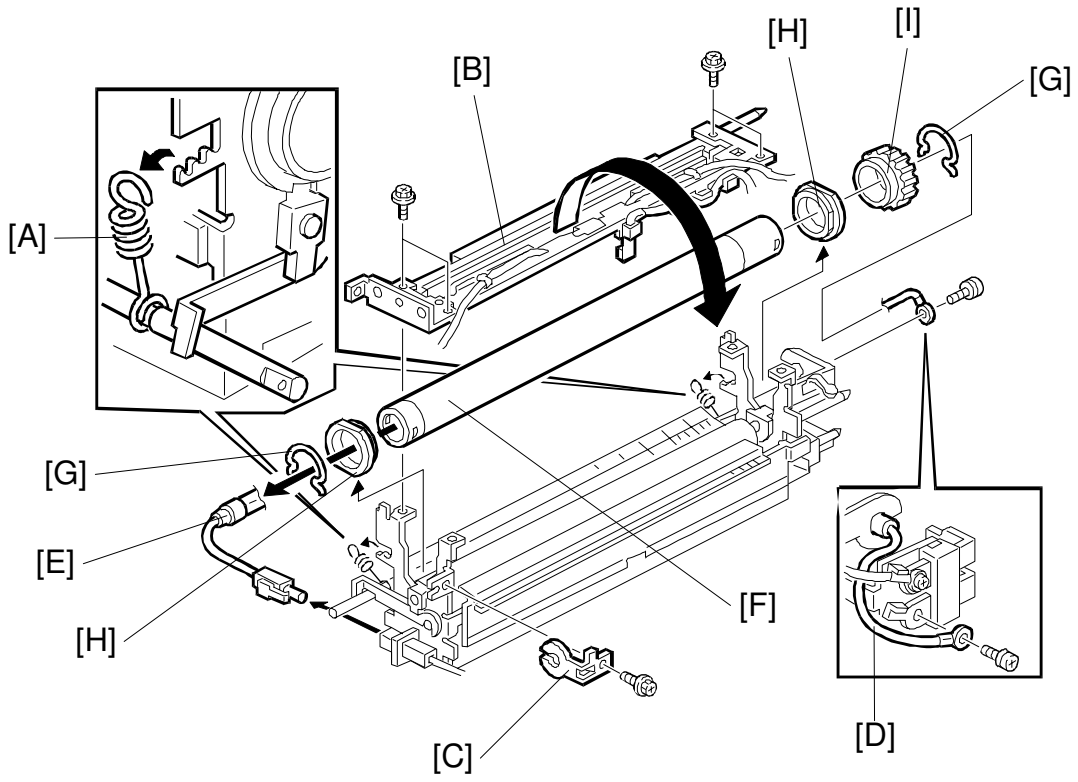


G020R516.WMF

1. Pull out the fusing unit (1 screw).
2. Remove the upper cover [A] (1 screw).
3. Remove the fusing thermistor [B] (1 screw and 1 connector).
4. Remove the fusing edge thermistor [C] (1 screw and 1 connector).

NOTE: After installing the fusing thermistors, make sure that they contact the hot roller and that the roller rotates freely.

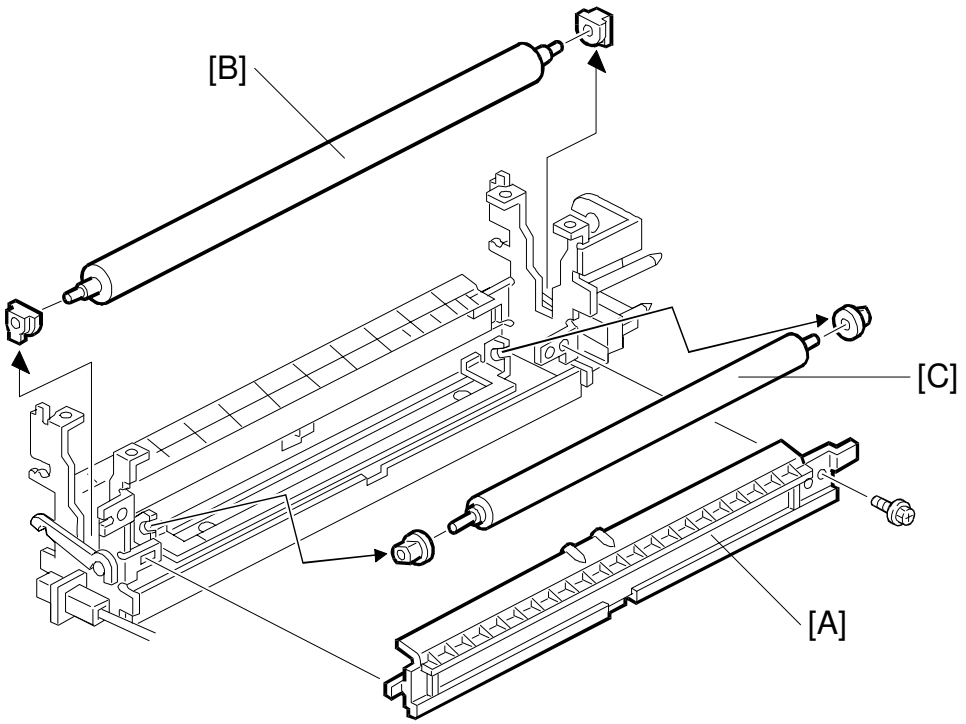
6.5.4 HOT ROLLER/FUSING LAMP



G020R547.WMF

1. Pull out the fusing unit (1 screw).
2. Remove the front cover and upper cover. (See Fusing Thermofuse Removal.)
3. Remove the front and rear pressure springs [A] after checking their positions. (The standard position is in the middle.)
4. Remove the fusing stay [B] (5 screws).
5. Remove the front lamp holder [C] (1 screw).
6. Remove the fusing harness [D] (1 screw) and pull the fusing lamp [E] out forward, and keep it in a safe place (1 connector).
7. Remove the hot roller [F].
   NOTE: Do not touch the hot roller with bare hands.
8. Remove the front and rear C-rings [G], then remove the hot roller bushings [H] and fusing gear [I].
   NOTE: Do not touch the fusing lamp with bare hands.

6.5.5 PRESSURE ROLLER/CLEANING ROLLER

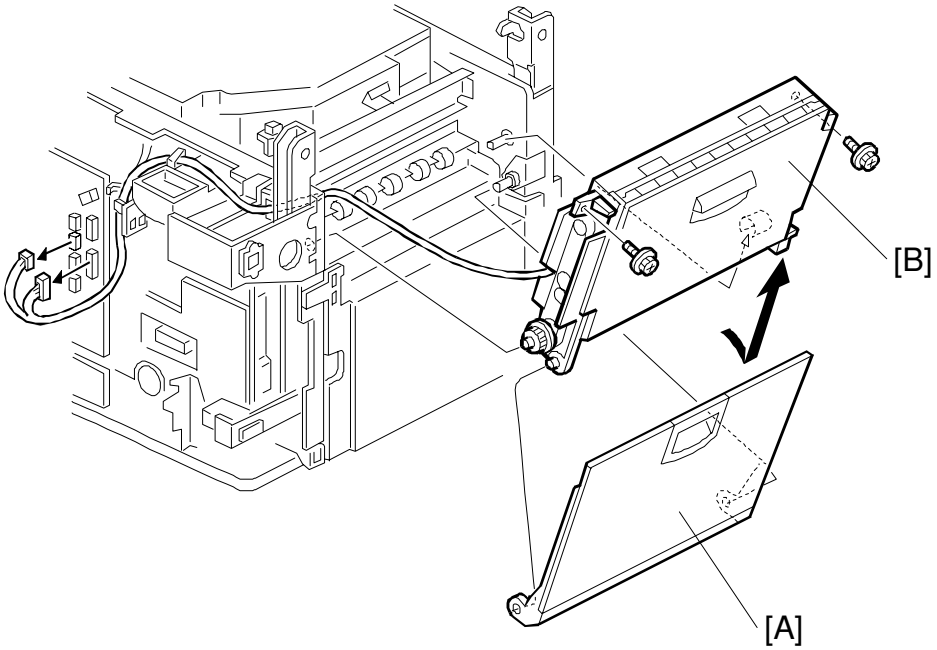


G020R517.WMF

1. Remove the hot roller. (See Hot Roller/Fusing Lamp Removal.)
2. Check the height position of the entrance guide plate [A] (the upper position is standard) and remove it (1 screw).
3. Remove the pressure roller [B].
4. Remove the cleaning roller [C].

6.6 EXIT

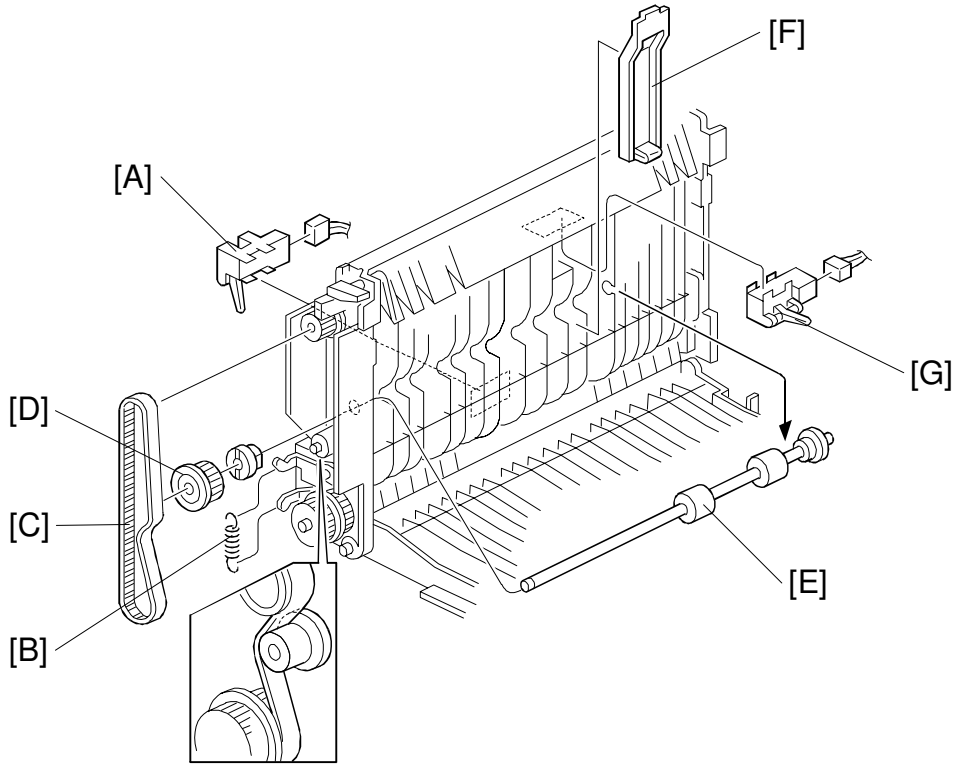
6.6.1 EXIT UNIT



G020R548.WMF

1. Remove the rear left cover and lower left cover. (See Exterior Removal.)
2. Remove the controller board bracket. (See Controller Board Bracket Removal.)
3. Remove the external tray [A] and the exit unit [B] (2 screws and 2 connectors).

6.6.2 PAPER EXIT SENSOR/LOWER EXIT SENSOR



G020R518.WMF

1. Remove the exit unit. (See Exit Unit Removal.)

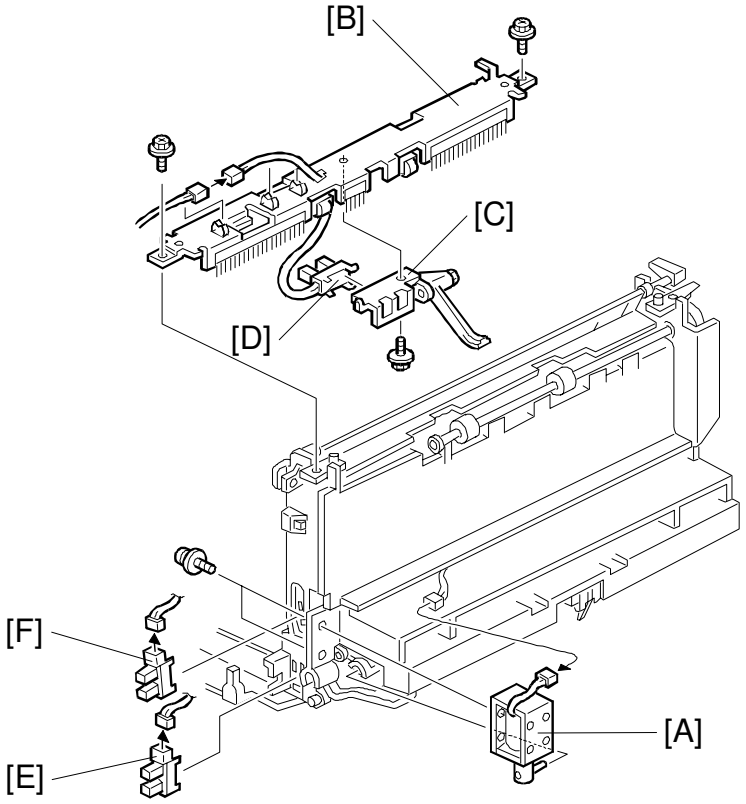
Lower Exit Sensor

2. Replace the lower exit sensor [A] (1 connector).

Upper Exit Sensor

2. Remove the spring [B].
3. Remove the timing belt [C].
4. Remove the pulley [D].
5. Remove the transport roller [E] (2 bushings).
6. Remove the harness cover [F].
7. Replace the upper exit sensor [G] (1 connector).

6.6.3 JUNCTION GATE SOLENOID/UPPER LIMIT SENSOR/ LEFT DOOR SENSOR/LEFT VERTICAL DOOR SENSOR



1. Remove the exit unit. (See Exit Unit Removal.)

Junction Gate Solenoid

2. Replace the junction gate solenoid [A] (2 screws and 1 connector).

Rear Overflow Sensor

2. Remove the feed-out upper cover bracket [B] (2 screws).
3. Remove the paper overflow sensor holder bracket [C] (1 screws).
4. Replace the paper overflow sensor [D] (1 connector).

Left Door Sensor

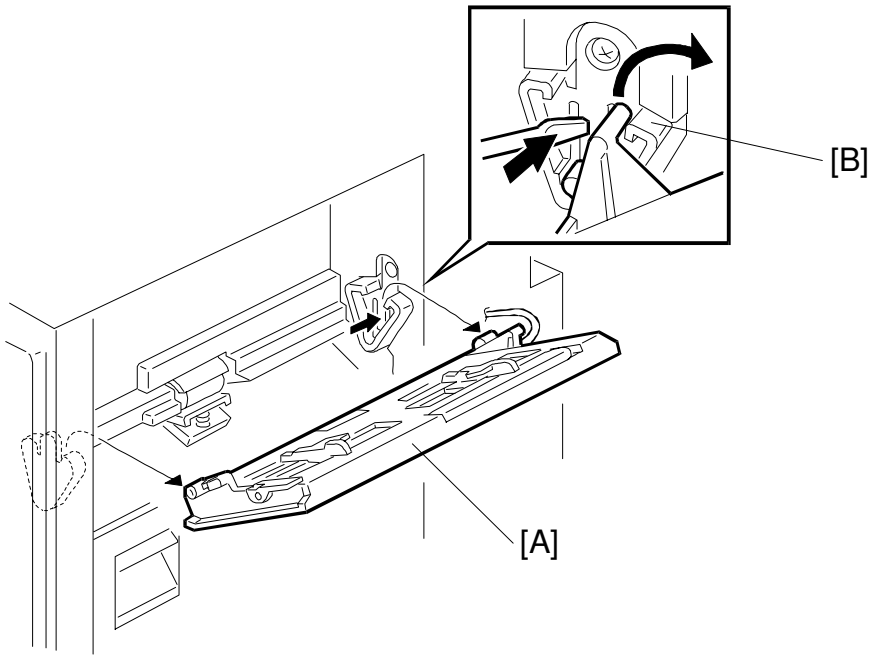
2. Replace the left door sensor [E] (1 connector).

Left Vertical Door Sensor

2. Replace the left vertical door sensor [F] (1 connector).

6.7 PAPER FEED/REGISTRATION

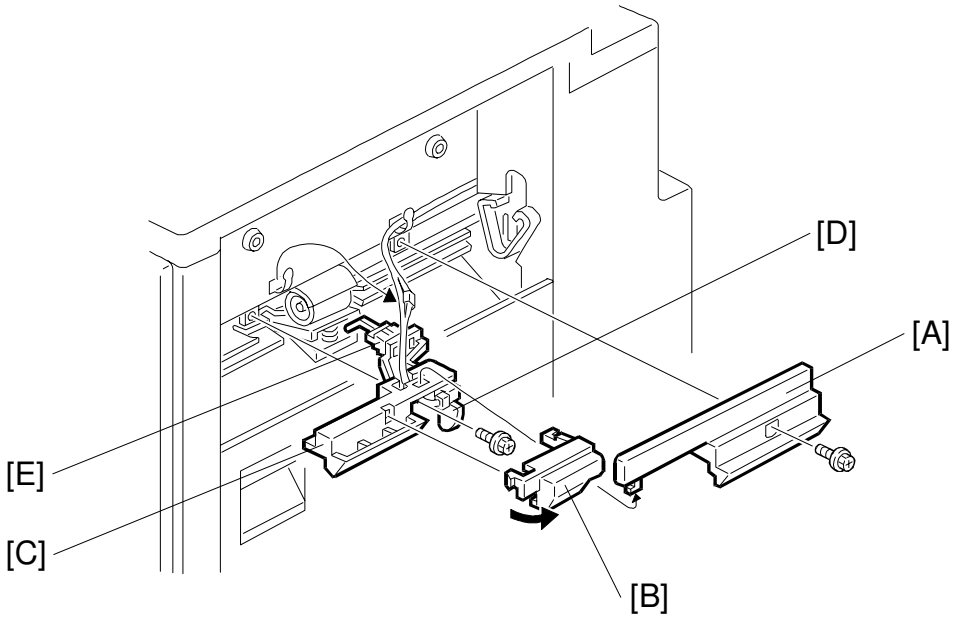
6.7.1 BY-PASS TRAY



G020R519.WMF

1. Remove the by-pass tray [A], holding the hook [B] on the by-pass tray with a tool, such as a screwdriver.
2. Disconnect the harness from the BECU board.

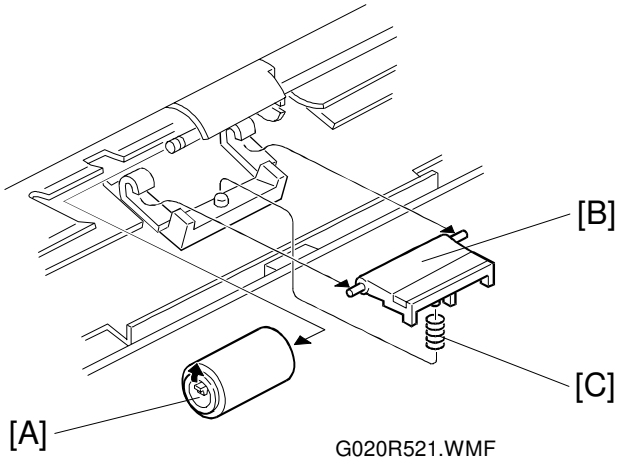
6.7.2 BY-PASS FEED PAPER END SENSOR/REGISTRATION SENSOR



G020R520.WMF

1. Remove the by-pass tray. (See By-pass Feed Tray Removal.)
2. Clear the envelope feeder set bracket (2 screws).
3. Remove the paper feed roller cover [A] (1 screw).
4. Remove the cap [B].
5. Remove the sensor holder [C] (1 screw).
6. Remove the by-pass feed paper end sensor [D] (1 screw).
7. Remove the registration sensor [E].

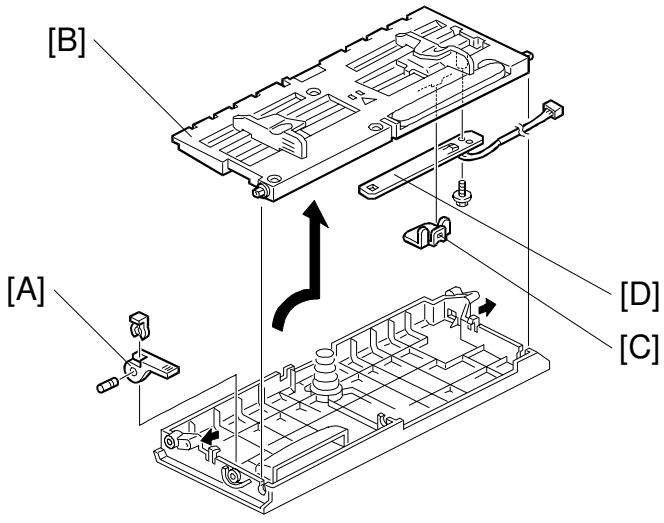
6.7.3 PAPER FEED ROLLER/FRICTION PAD



G020R521.WMF

1. Remove the registration sensor and paper end sensor unit. (See By-pass Feed Paper End Sensor/Registration Sensor Removal.)
2. Remove the paper feed roller [A] (1 hook).
3. Remove the friction pad [B].
   NOTE: Do not lose the spring [C].

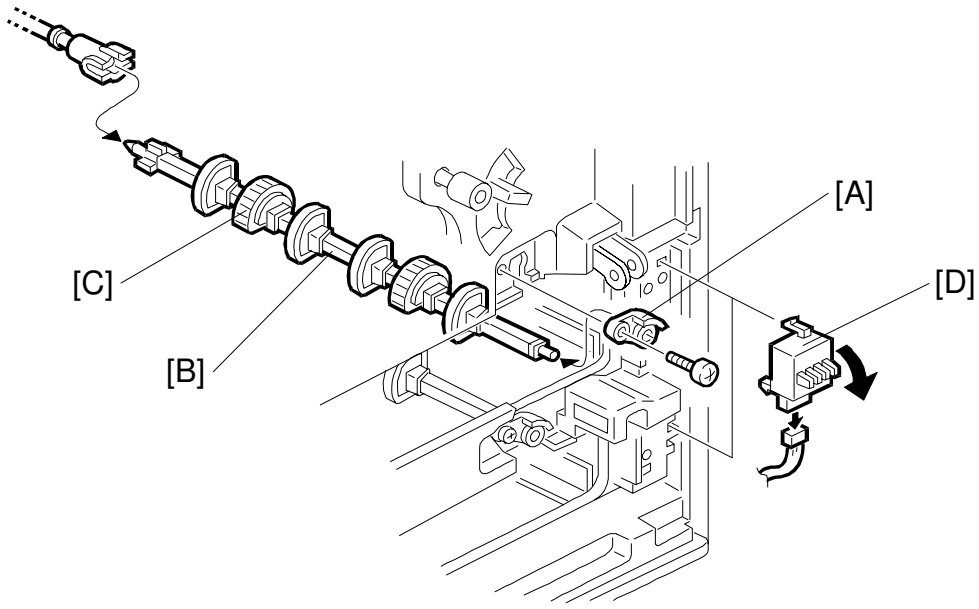
6.7.4 BY-PASS TRAY PAPER WIDTH SENSOR



G020R522.WMF

1. Remove the by-pass feed table assembly. (See By-pass Feed Tray.)
2. Remove the table lever [A] (1 snap ring and 1 pin).
3. Remove the by-pass feed table [B] (2 hooks).
4. Remove the width sensor spring plate [C].
5. Remove the by-pass tray paper width sensor [D] (1 screw).

6.7.5 PAPER FEED ROLLERS/PAPER SIZE DETECTOR



G020R523.WMF

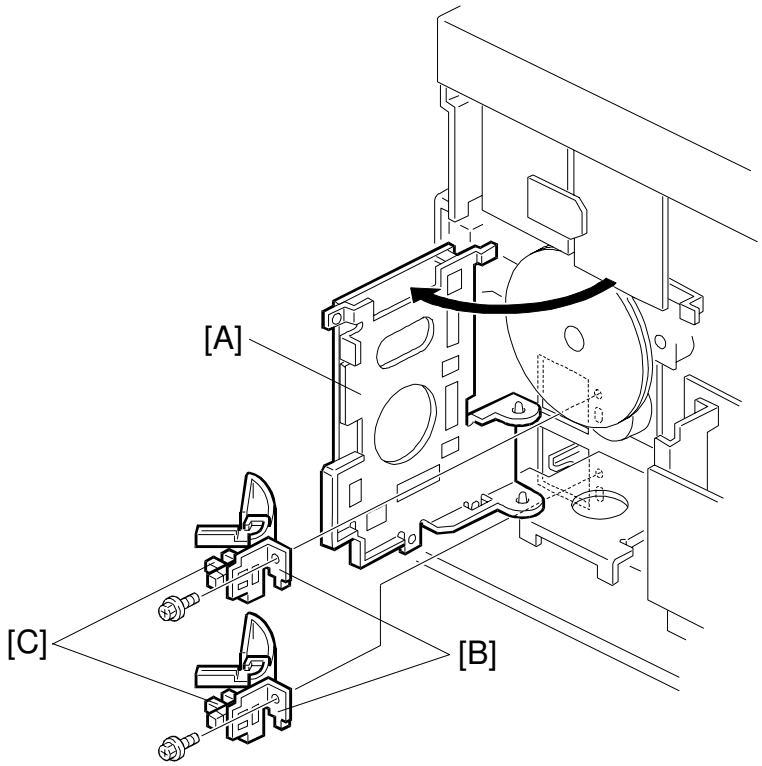
Paper Feed Rollers

1. Remove the paper tray.
2. Remove the front door only when replacing the 1st paper feed roller.
3. Remove the paper feed bushing [A] (1 screw).
4. Pull the paper feed roller shaft [B] out.
5. Replace the paper feed roller [C].

Paper Size Detector

1. Remove the paper tray.
2. Remove the paper size detector [D] (1 connector), while holding it down.

6.7.6 PAPER END SENSORS

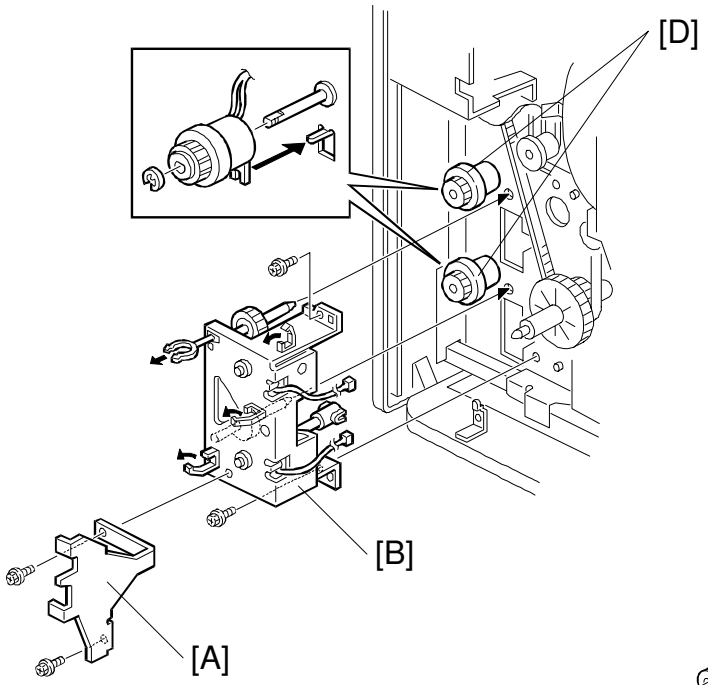


G020R524.WMF

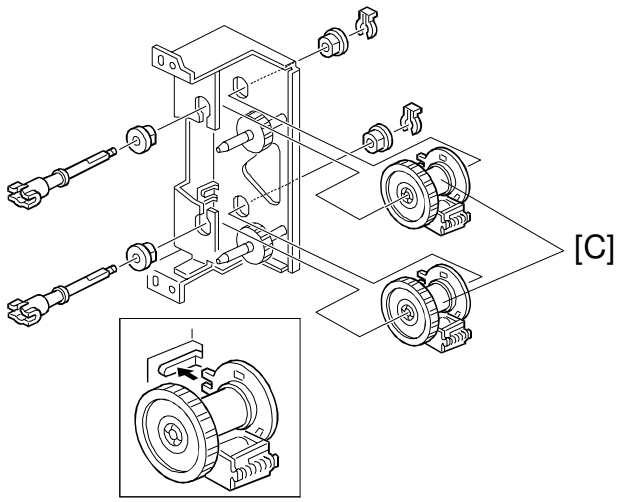
1. Remove the controller board bracket. (See Controller Board Bracket Removal.)
2. Disconnect the connectors from the right half of the BECU board [A] and swing out the BECU board (4 screws).
3. Remove the paper end sensor assemblies [B] (1 screw and 1 connector each).
4. Remove the paper end sensors [C].

NOTE: When reinstalling, make sure by hand that the paper end detection mechanism works properly.

6.7.7 PAPER FEED CLUTCHES/RELAY CLUTCHES



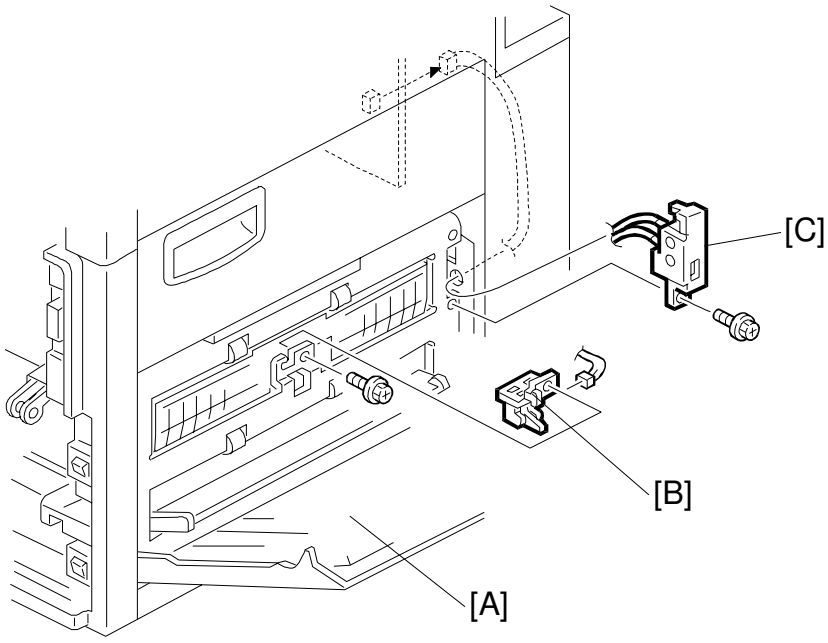
G020R529.WMF



G020R525.WMF

1. Remove the paper feed roller assembly. (See Paper Feed Rollers Removal.)
2. Remove the controller board bracket. (See Controller Board Bracket Removal.)
3. Remove the support bracket [A] (2 screws).
4. Remove the paper feed drive bracket [B] (2 screws).
5. Remove the paper feed clutches [C] (1 clip and 1 connector) and relay clutches [D] (1 E-ring and 1 connector).

6.7.8 RELAY SENSOR/RIGHT VERTICAL GUIDE SWITCH

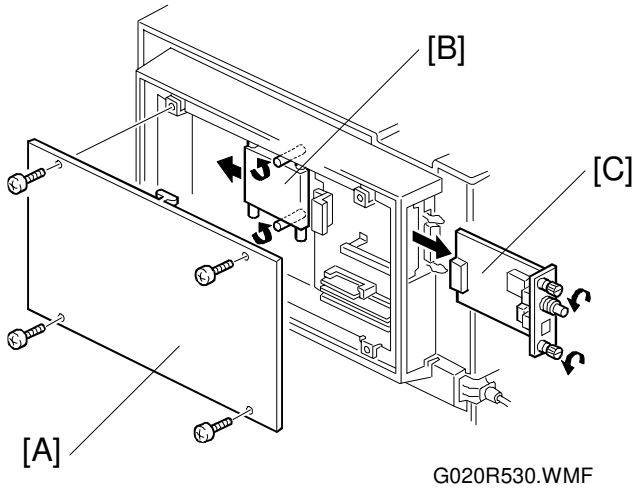


G020R526.WMF

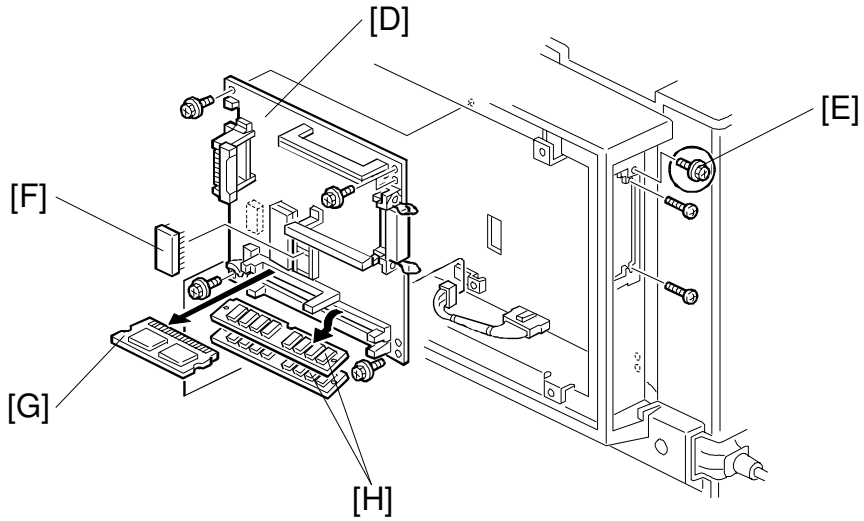
1. Open the right cover [A].
2. Remove the upper paper tray.
3. Remove the relay sensor [B] (1 screw and 1 connector).
4. Remove the controller board bracket. (See Controller Board Bracket Removal.)
5. Remove the right vertical guide switch [C] (1 screw and CN112 on the BECU).

6.8 OTHERS

6.8.1 MAIN PRINTER CONTROLLER BOARD



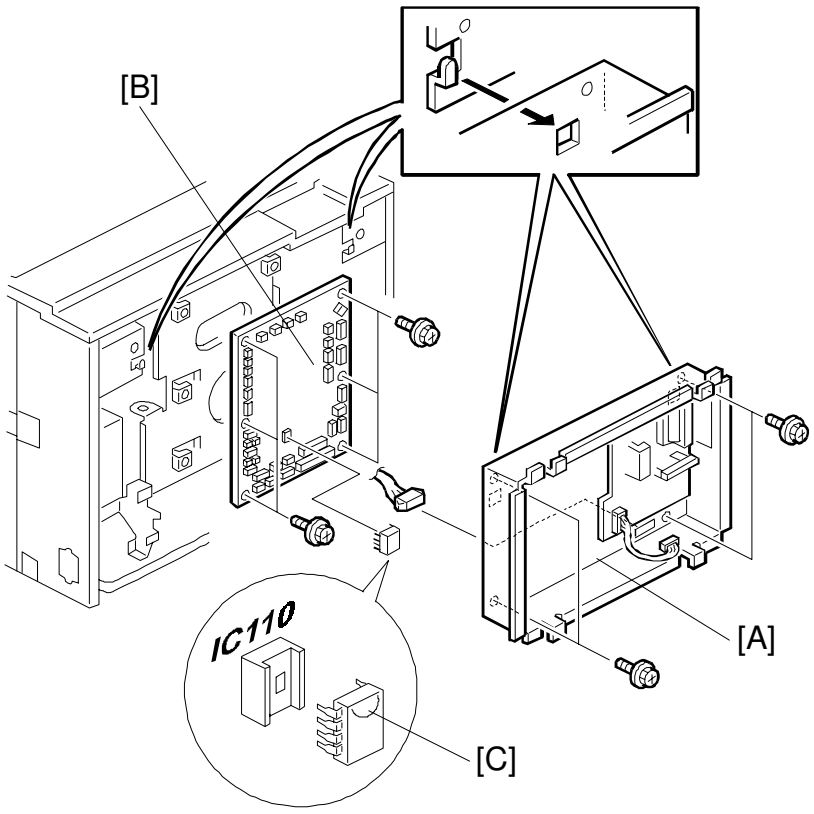
G020R530.WMF



G020R527.WMF

1. Turn off the main switch and unplug the power supply cord.
2. Remove the main printer controller board cover [A] (4 screws).
3. Slide the optional hard disk [B] away from the main printer controller board (2 knob screws).
4. Remove the NIC [C] (2 screws) if installed.
5. Remove the main printer controller board [D] (9 screws and all connectors).
   NOTE: Screw [E] should be removed first for easier removal of the board.
6. Remove the NVRAM [F] (IC6) from the old main printer controller board and install it on the new board.
7. Remove the PS ROM board [G] and the RAM/SIMM(s) [H] if installed, and install them on the new board.

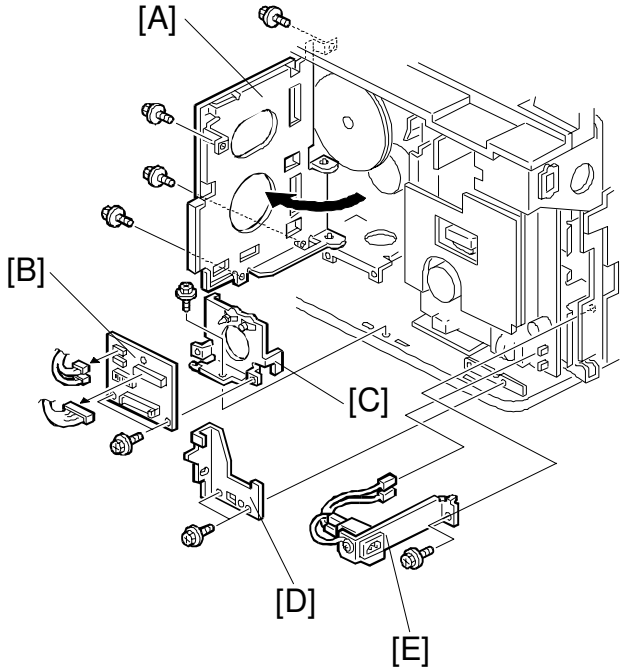
6.8.2 BECU BOARD/CONTROLLER BOARD BRACKET



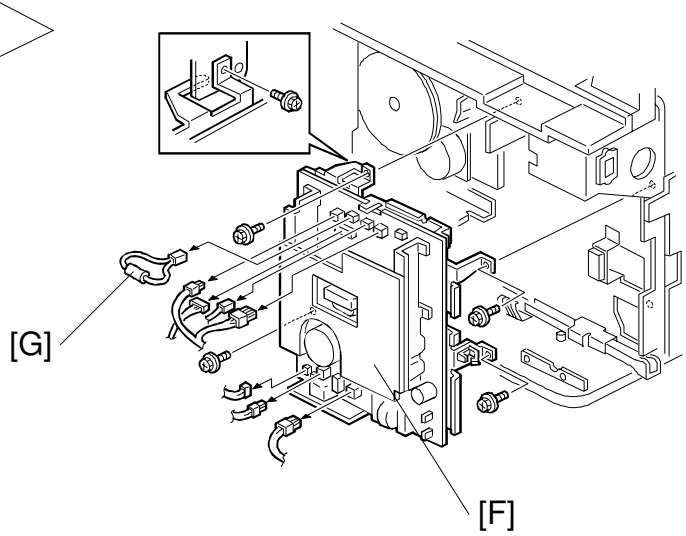
G020R531.WMF

1. Turn off the main switch and unplug the power supply cord.
2. Remove the rear cover. (See Rear Cover Removal.)
3. Remove the main printer controller board bracket [A] (4 screws and 1 connector).
4. Remove the BECU board [B] (6 screws and all connectors).
5. Remove the NVRAM [C] (IC110) from the old BECU board and install it on the new board

6.8.3 PSU



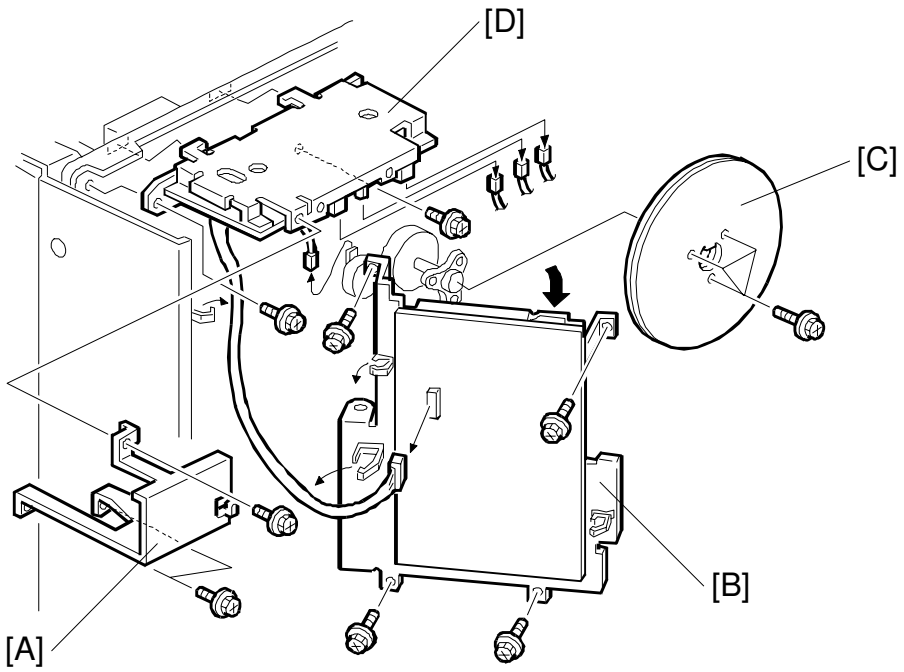
G020R532.WMF



G020R533.WMF

1. Turn off the main switch and unplug the power supply cord.
2. Remove the rear cover. (See Rear Cover Removal.)
3. Remove the controller board bracket. (See Controller Board Bracket Removal.)
4. Swing out the BECU holder bracket [A] (4 screws and all connectors on the right side of the board).
5. Remove the paper tray connecting board [B] (2 screws and 1 locking support).
6. Remove the paper tray connecting board holder bracket [C] (1 screw).
7. Remove the support bracket [D] (2 screws).
8. Remove the power supply plug bracket [E] (1 screw and 3 connectors).
9. Remove the power supply unit [F] (4 screws and all connectors).
10. Remove the PSU (10 screws). Remove the resistor [G] at CN283 on the old PSU and install it on the new PSU.

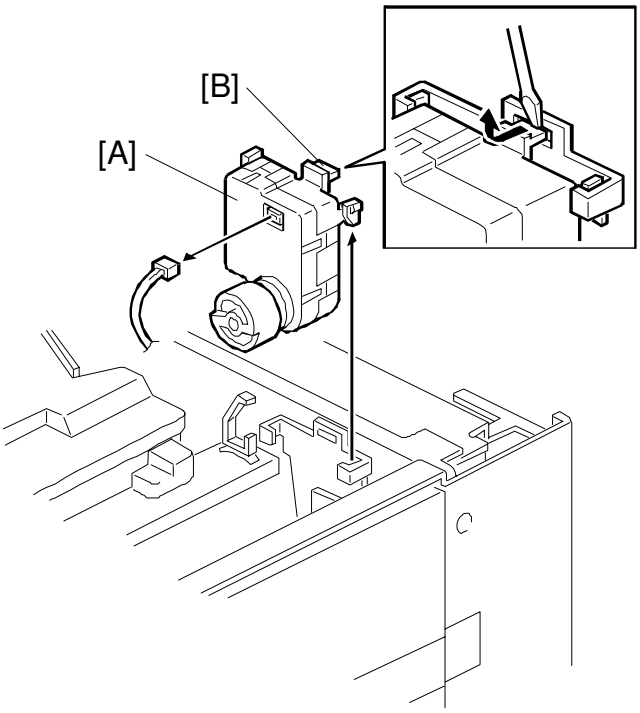
6.8.4 HIGH VOLTAGE SUPPLY BOARD



G020R534.WMF

1. Turn off the main switch and unplug the power cord.
2. Remove the rear cover. (See Rear Cover Removal.)
3. Remove the controller board bracket. (See Controller Board Bracket Removal.)
4. Remove the holder bracket [A] (3 screws).
5. Swing out the BECU holder bracket [B] (4 screws and all connectors on the right side of the board).
6. Remove the fly wheel [C] (3 screws).
7. Remove the high voltage supply board [D] (2 screws and all connectors).
8. Replace the high voltage supply board (4 screws and 1 locking support).

6.8.5 TONER SUPPLY MOTOR REPLACEMENT



G020R535.WMF

1. Remove the top cover. (See Top Cover Removal.)
2. Replace the toner supply motor [A] by removing the tab [B] from the bracket as shown (1 connector).

6.9 PRINT REGISTRATION ADJUSTMENT

Perform the following adjustment(s) after replacing any of the following parts:

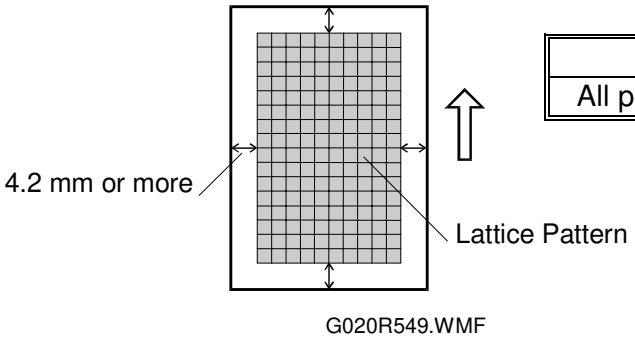
- Polygon Mirror Motor
- Paper Trays
- Duplex Tray
- Paper Side Fence
- Memory All Clear

For more details about accessing SP modes, refer to section 4.

NOTE: 1) Use the lattice pattern from the service mode test patterns for the following procedures.
2) Place A4 or LT paper in all paper feed trays, since the lattice pattern outputs only in these sizes.
3) To change the paper feed tray to feed out the test pattern, the Tray Priority setting inside the Job Control user program menu must be changed to the desired paper feed tray.

1. Print out the lattice pattern from the desired paper feed tray and check the margin at all four sides. Write the feed out direction on the test pattern, and adjust the registration to meet the specification given below.

Single-sided



G020R549.WMF

- PRINT MARGIN SPECIFICATION -

	Specification
All paper feed trays	4.2 mm or more

2. Check the margin at the leading and trailing edges of the lattice pattern. If out of specification, adjust with the Sub Scan control panel service mode (for normal feed). This will adjust the registration roller start timing, and will affect all paper feed trays. If the setting is moved in the **plus** direction, the image will shift down the page.
3. Check the margin at both sides of the lattice pattern. If out of specification, adjust by using the Main Scan control panel service mode. This will adjust the laser start timing, and is individually adjusted for each paper feed tray. If the setting is moved in the **plus** direction, the total image will shift to the right.

Duplex, second side

2. To adjust the print margin for the 2nd side, use the Sub Scan control panel service mode (for duplex feed). (For duplex side 1, use the service mode for normal feed.) A lattice pattern will be printed on both sides, and the side facing down when fed out from the face-down tray will be the duplex side. Adjust the print margin in the same way as for single-sided prints.

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). 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, do the SC code reset procedure in dip switch service programs. (See “Dip Switch Service Programs”.)

7.2 PRINTER ENGINE SC CODES

SC302: High voltage power supply error

-Definition- [B]

A charge roller current leak signal is detected.
A transfer roller current leak signal is detected.
A separation bias leak signal is detected.
A development bias leak signal is detected.

- Possible causes -

- Charge roller damaged
- Transfer roller damaged
- Discharge brush defective
- High voltage supply board defective
- Poor PCU connection

SC306: Charge roller home position error

-Definition- [B]

The charge roller H. P. sensor does not detect the on condition.

- Possible causes -

- Charge roller H. P. sensor defective
- Charge roller contact clutch defective

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 10 seconds continuously during operation.

- Possible causes -

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

SC322: Laser synchronization error

-Definition- [B]

The laser synchronization signal cannot be detected by the main scan synchronization detector board for more than 5 consecutive 100 ms intervals.

- Possible causes -

- Poor connection of the optical fiber cable which connects the laser synchronization detector board and the BECU board
- Laser synchronization detector out of position
- Laser synchronization detector defective
- BECU board 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 of the interface harness which connects the LD unit and the BECU board
- Temperature around the LD unit is too high

SC390: TD sensor error

-Definition- [B]

The TD sensor outputs less than 0.5 V, 20 s after the TD sensor initial setting has been performed.
TD sensor output voltage falls out of the adjustment range (2.0 $\pm$ 0.2 V) after the TD sensor initial setting has been finished.
A development bias leak signal is detected.

- Possible causes -

- TD sensor abnormal
- Poor connection of the PCU
- High voltage supply board defective

SC500: Main motor error

-Definition- [B]

A main motor lock signal is detected for more than 5 seconds or the lock signal is not detected for more than 500 ms during rotation.

- Possible causes -

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

SC503: Tray 3 lift motor error (optional paper tray unit only)
SC504: Tray 4 lift motor error (optional paper tray unit only)

-Definition- [C]

The paper upper limit sensor is not activated after the tray lift motor has been on for 13 seconds.

- Possible causes -

- Upper limit sensor defective
- Tray lift motor defective
- BECU board defective

SC506: Paper tray unit main motor error (optional paper tray unit only)

-Definition- [C]

A main motor lock signal is detected for more than 5 seconds or the lock signal is not detected for more than 5 seconds during rotation.

- Possible causes -

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

SC507: LCT motor error (optional LCT only)

-Definition- [C]

The paper upper limit sensor is not activated after the tray motor has been on to lift up the tray for 23 seconds, or the paper lower limit sensor is not activated after the tray motor has been on to lower the tray for 17 seconds.

- Possible causes -

- Upper limit sensor defective
- Lower limit sensor defective
- Tray motor defective
- BECU board defective

SC542: Fusing temperature warm-up error

-Definition- [A]

The fusing temperature does not reach the fusing standby temperature within 60 seconds after the main switch is turned on or after the covers have been closed. Or, during warming-up, the fusing temperature does not change by at least 2 °C within 6 seconds.

- Possible causes -

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

SC543: Fusing overheat error

-Definition- [A]

A fusing temperature of over 230°C is detected for 1 second by the fusing thermistor.
A fusing temperature of over 250°C is detected for 3 seconds by the fusing edge thermistor during printing.

- Possible causes -

- Fusing thermistor defective
- Fusing edge thermistor defective
- Power supply board defective

SC544: Fusing low temperature error

-Definition- [A]

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

- Possible causes -

- Fusing thermistor defective
- Power supply board defective

SC547: Zero cross signal malfunction

-Definition- [A]

Zero cross signals are not detected within a certain period.

- Possible causes -

- Power supply board defective
- BECU board defective

SC696: Communication error between finisher and BECU (optional finisher only)

-Definition- [B]

The BECU board cannot communicate with the finisher properly.

- Possible causes -

- Poor connection of the interface cable for the finisher
- BECU board defective
- Finisher drive board defective

SC700: Finisher tray motor error (optional finisher only)

-Definition- [B]

The stack height sensor does not detect on/off within a certain period after the tray lift motor is turned on, so that the tray keeps moving up or down.

- Possible causes -

- Tray lift motor defective
- Finisher drive board defective

SC701: Finisher inverter error (optional finisher only)

-Definition- [B]

The jogger H.P. sensor does not detect on/off within a certain period after the jogger motor is turned on.
The feed belt H.P. sensor does not detect on/off within a certain period after the feed-out motor is turned on.

- Possible causes -

- Jogger motor defective
- Feed-out motor defective
- Finisher drive board defective

SC702: Finisher staple error (optional finisher only)

-Definition- [B]

The staple home position sensor does not detect the on condition within 0.5 seconds after the staple motor on signal.

- Possible causes -

- Staple motor defective
- Finisher drive board defective

SC703: Finisher shift tray motor error (optional finisher only)

-Definition- [B]

The shift position sensor does not detect the on condition within a certain period after the shift motor is turned on.

- Possible causes -

- Shift motor defective
- Finisher drive board defective

SC800: Communication error between 4-bin mailbox and BECU (optional 4-bin mailbox only)

-Definition- [B]

The BECU board cannot communicate with the 4-bin mailbox properly.

- Possible causes -

- Poor connection of the interface connector for the 4-bin mailbox
- BECU board defective
- 4-bin mailbox main control board defective

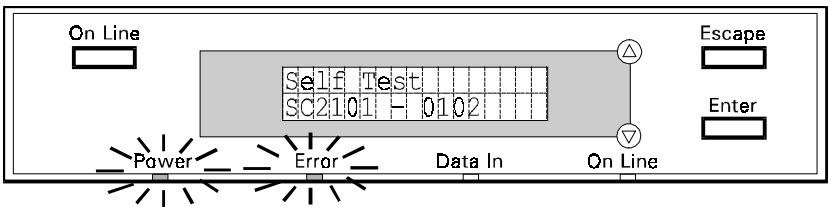
7.2.1 PRINTER CONTROL BOARD SC CODES

Error Display

If an error occurred, the Error LED lights and an error code is displayed on the LCD.

The error can be reset with the SC code reset procedure in dip switch service programs. (See “Dip Switch Service Programs”.)

When a minor error or a fatal error occurs, the error LED will remain lit.



G020t501.WMF

Minor Errors

These are the errors the system will display on the control panel and print on the Summary Sheet. After a self test or a Centronics loop back test from the Diagnostic and PCB Test mode, the panel will display “For minor errors check printout.” if minor errors are found. In many cases, the minor errors will flash very fast and you may not be able to catch them all. Check the print out for further details.

If there is no loopback connector attached when the Centronics loop back test is done, a minor error will occur.

If a minor error occurs during normal operation, printing will stop.

The Diagnostic Error Code Table section has information on what the machine classifies as ‘minor errors’.

Fatal Errors

Upon encountering a fatal error, the system will halt. Errors that may cause the system to halt are:

- Code ROM — Checksum does not agree with expected value.
- Resident RAM — Could not perform write/read operation satisfactorily.
- Engine communications — Could not communicate with engine.
- Font ROM — Checksum does not agree with expected value.
- NVRAM — Could not perform write/read operation satisfactorily.
- Master Program Write — Could not perform desired operation properly.

Reference to Diagnostic Codes

SC No.	Diag. No.	Most likely problem
SC2100	0101	ROM Error
SC2101	0102	Resident Ram Error
SC2103	0701	PCL Font ROM Checksum Error
SC2105	0601	NVRAM Read Write Error
SC2106	0602	NVRAM Clear Error
SC2300	100x	PS DIMM Error
SC2400	05xx	ASIC Error
SC2500	090x	Engine I/F Error
SC2600	200x	HDD I/F Error
SC2700	300x	NIC Error
SC2800	400x	Master Program DIMM Error
SC2900	040x	FPU (Floating Point Unit) Error

NOTE: Refer to the following 'Diagnostic Error Code Table' section for a description of each code.

Diagnostic Error Code Table

The diagnostic error codes are shown in the following table. Minor errors are indicated in the rightmost column.

SC No.	Code	Memory-related Error	Possible Cause	
SC2100	0101	The result of half word logic addition from the top address of the ROM in which the self diagnostic and printer system are stored was not 0x0000.	• Main Printer Control Board defective	Fatal Error
SC2101	0102	Resident RAM read/write error. Display bad memory address.	• Main Printer Control Board defective	Fatal Error
SC2200	0103	Option memory (SIMM 1) read/write error. "SIMM memory error SIMM1" is displayed.	• RAM SIMM defective • Main Printer Control Board defective	Minor Error
SC2201	0104	Option memory (SIMM 2) read/write error. "SIMM memory error SIMM2" is displayed.	• RAM SIMM defective • Main Printer Control Board defective	Minor Error

SC No.	Code	ASIC Diagnostic Error	Possible Cause	
SC2400	0504	Could not send all data within the allotted time. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0505	Sent data do not match received data. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0506	Data transmission did not generate an interrupt. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0507	Interrupt did not occur after data reception. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0508	Interrupt did not occur even though its mask was set. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0509	"Init" interrupt was not raised. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	050A	"Init" interrupt was not raised even though its mask bit was set. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	050B	"Init" interrupt was raised even though its mask bit was not set. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	050C	No "Init" input. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error

SC No.	Code	ASIC Diagnostic Error	Possible Cause	
SC2400	050D	No "SelectIn" input. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	050E	"DME" bit was not cleared after DMA transfer was completed. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	050F	DMA Interrupt flag was not set after DMA transfer was completed. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0510	Interrupt did not occur after DMA transfer was completed. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0511	Interrupt occurred even though its mask bit was set. (Loop Back Connector for Printer)	• Main Printer Control Board defective	Minor Error
	0512	DMA Terminal Count not zero.	• Main Printer Control Board defective	Minor Error

SC No.	Code	FPU Diagnostic Error	Possible Cause	
SC2900	0401	Single Floating Point Operation Error	• Main Printer Control Board defective	Fatal Error
	0402	Double Floating Point Operation Error		
	0403	No FPU Flag Set Error		

SC No.	Code	NVRAM Self Diagnostic Error	Possible Cause	
SC2105	0601	NVRAM read/write error.	• NV RAM defective • Main Printer Control Board defective	Fatal Error
SC2106	0602	NVRAM could not be cleared.		

SC No.	Code	PCL Font ROM Diagnostic Error	Possible Cause	
SC2103	0701	Incorrect result of half word logic addition from the top address of the PCL font ROM.	• Main Printer Control Board defective	Fatal Error

SC No.	Code	Engine I/F Diagnostic Error	Possible Cause	
SC2500	0901	Send (CTS) signal is not asserted within the specified amount of time.	• BECU board defective • Main Printer Control Board defective	Fatal Error
	0902	TxReady interrupt flag could not be enabled.		
	0903	IRQ TxReady was set but no interrupt occurred.		
	0904	TxReady interrupt flag could not be disabled.		
	0905	RxReady interrupt flag could not be enabled.		
	0906	IRQ RxReady was set but no interrupt occurred.		
	0907	No RxReady interrupt		
	0908	RxReady interrupt flag could not be disabled.		
	0909	Engine status error		

SC No.	Code	PS DIMM I/F Diagnostic Error	Possible Cause	
SC2300	1001	PS DIMM was not detected.	• PS DIMM not installed • PS DIMM defective • Main Printer Control Board defective	Minor Error
	1002	Incorrect checksum value.	• PS DIMM defective • Main Printer Control Board defective	Minor Error

SC No.	Code	HDD I/F Diagnostic Error	Possible Cause	
SC2600	2001	HD drive operation timed out.	• HDD defective. • Main Printer Control Board defective	Minor Error
	2002	HD drive self diagnostic error.		Minor Error
	2003	HD drive not detected.	• HDD not installed. • HDD defective. • Main Printer Control Board defective	Minor Error
	2004	HDD is not ready.	• HDD defective. • Main Printer Control Board defective	Minor Error

SC No.	Code	NIC I/F Diagnostic Error	Possible Cause	
SC2700	3001	NIC self diagnostic error.	• NIC defective. • Main Printer Control Board defective	Minor Error
	3002	NIC not detected.	• NIC not installed • NIC defective. • Main Printer Control Board defective	Minor Error

SC No.	Code	Master Program DIMM Error	Possible Cause	
SC2800	4001	Incorrect CRC check for master program.	• Main Printer Control Board defective	Fatal Error
	4002	Command error occurred when writing during system software download.		
	4003	Block erase of system software download failed.		
	4004	Data write of system software download failed.		
	4005	Incorrect checksum for system software download write mode.		
	4006	Incorrect checksum when downloading from a parallel port		

7.3 ELECTRICAL COMPONENT DEFECTS

7.3.1 SENSORS

Component (Symbol)	CN	Condition	Symptom
Lower Exit (S1)	157-11 (BECU)	Open	The Paper Jam message will display whenever a print is made.
		Shorted	The Paper Jam message displays even if there is no paper.
Upper Exit (S2)	157-8 (BECU)	Open	The Paper Jam message will display whenever a print is made.
		Shorted	The Paper Jam message displays even if there is no paper.
Left Vertical Door (S3)	157-5 (BECU)	Open	The Door Open message does not display even if the left vertical door is opened.
		Shorted	The Door Open message displays even if the left vertical door is closed.
Left Door (S4)	157-2 (BECU)	Open	The Door Open message does not display even if the left door is opened.
		Shorted	The Door Open message displays even if the left door is closed.
Relay (S5)	104-2 (BECU)	Open	The Paper Jam message will display whenever a print is made.
		Shorted	The Paper Jam message displays even if there is no paper.
PCU Detect (S6)	151-1 (BECU)	Open	The TD sensor initial setting procedure is not done when a new PCU is installed.
		Shorted	The TD sensor initial setting procedure is done whenever the front cover is closed.
Fusing Exit (S7)	151-6 (BECU)	Open	The Paper Jam message will display whenever a print is made.
		Shorted	The Paper Jam message displays even if there is no paper.
Charge Roller H.P. (S8)	151-9 (BECU)	Open	No symptom
		Shorted	SC306 is displayed.
Upper Tray Paper End (S9)	103-2 (BECU)	Open	The Paper End message displays even if paper is placed in the upper paper tray.
		Shorted	The Paper End message does not display even if there is no paper in the upper paper tray.
Lower Tray Paper End (S10)	103-5 (BECU)	Open	The Paper End message displays even if paper is placed in the lower paper tray.
		Shorted	The Paper End message does not display even if there is no paper in the lower paper tray.

Component (Symbol)	CN	Condition	Symptom
By-pass Feed Paper End (S11)	119-4 (BECU)	Open	The Paper End message displays even if paper is placed on the by-pass feed tray.
		Shorted	The Paper End message does not display even if there is no paper on the by-pass feed tray.
Registration (S12)	119-6 (BECU)	Open	The Paper Jam message will display whenever a print is made.
		Shorted	The Paper Jam message displays even if there is no paper.
By-pass Feed Paper Width (S13)	122-1~4 (BECU)	Open	The CPU cannot detect the proper paper width.
		Shorted	
Humidity (S14)	109-3 (BECU)	Open	A lighter print will be made.
		Shorted	A darker print will be made.
Paper Overflow (S15)	172-2 (BECU)	Open	The Paper Overflow message does not display even if there is a paper overflow in the standard output tray.
		Shorted	The Paper Overflow message displays even if there is no paper.
Toner Density (S17)	125-3 (BECU)	Open	SC390 is displayed. (See the note.)
		Shorted	

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

7.3.2 SWITCHES

Component (Symbol)	CN	Condition	Symptom
Main (SW1)	282-1, 2 (PSU)	Open	The machine does not turn on.
		Shorted	The machine does not turn off.
Front Door Safety (SW2)	120-1, 175-3 (BECU)	Open	The Cover Open message is not displayed even if the right vertical guide is opened.
		Shorted	The Cover Open message is displayed even if the right vertical guide is closed.
Right Vertical Guide (SW3)	112-2 (BECU)	Open	The Cover Open message is not lit even if the right vertical guide is opened.
		Shorted	The Cover Open message is lit even if the right vertical guide is closed.
Upper Paper Size (SW4)	102-1, 2, 4, 5 (BECU)	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a print is made.
		Shorted	
Lower Paper Size (SW5)	102-6, 7, 9, 10 (BECU)	Open	The CPU cannot detect the proper paper size, and misfeeds may occur when a print is made.
		Shorted	

7.4 BLOWN FUSE CONDITIONS

Fuse	Rating		Symptom when turning on the main switch
	115 V	220 ~ 240 V	
Power Supply Board			
FU1	15 A/125 V	----	No response.
FU2	8 A/125 V	5 A/250 V	No response
FU4	6.3 A/125 V	6.3 A/125 V/250V	“Reset Paper Tray XX” is displayed.
FU5	4 A/125 V	4 A/125 V/250 V	Normal operation (This fuse is on the +24V line of CN281 but it is not used.)
FU6	4 A/125 V	4 A/125 V/250 V	• Without Finisher option Normal operation • With Finisher option “Close Front Finisher Cover” is displayed.

G020
Point to Point Diagram

Main SW (SW1)
Fusing Edge Thermistor (TH3)
Fusing Thermistor (TH2)
Fusing Lamp (L2)
Thermofuse (TF1)
Circuit Breaker (CB) (230V machine only)
CN282
CN284
T281
T280

Finisher I/F - Power - (Option)
CN287
+5V -1
GND -3
GND -4
GND -5
GND -6
GND -7
24V -9
24V -10
24V -11
24V -12

PSU(PCB3)
CN283
CN290
CN280
Noise Filter (NF) (230V machine only)
CN289
CN281
CN288

Duplex Unit (Option)
Duplex Entrance Sensor S1
Duplex Junction Gate Sol SOL1
Duplex Transport Motor M1
Duplex Feed Motor M2
Duplex Control Board (PCB1)
CN241
CN242
CN240
CN243
Duplex Turn Sensor S2
Duplex Exit Sensor S3
CN161
CN162

Humidity Sensor S14
CN109

Front Door Safety SW (SW2)
CN120

Control Panel (PCB5)
CN305

Resistor 5Ω,10W

CN175
CN105
CN123

Parallel Port
CN301

CN301 (Parallel Port)

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
1	/STROBE	10	/ACK	19	GND	28	GND
2	DATA1	11	BUSY	20	GND	29	GND
3	DATA2	12	PE	21	GND	30	GND
4	DATA3	13	SELECT	22	GND	31	/INIT
5	DATA4	14	HBUSY	23	GND	32	/FAULT
6	DATA5	15	NC	24	GND	33	GND
7	DATA6	16	GND	25	GND	34	NC
8	DATA7	17	GND	26	GND	35	NC
9	DATA8	18	PLH	27	GND	36	1284ACTIVE

CN308
CN130

Main Printer Control Board (PCB7)

CN308
HDD (Option)

PIN	NAME
1	/HDRST
2	GND
3	OD7
4	OD8
5	OD6
6	OD9
7	OD5
8	OD10
9	OD4
10	OD11
11	OD3
12	OD12
13	OD2
14	OD13
15	OD1
16	OD14
17	OD0
18	OD15
19	GND
20	KEY
21	(RSV)
22	GND
23	/HDWE
24	GND
25	/HDOE
26	GND
27	(RSV)
28	(RSV)
29	(RSV)
30	GND
31	HDINT
32	/IO16
33	OPA3
34	(RSV)
35	OPA2
36	OPA4
37	/HDCS0
38	/HDCS1
39	/DASP
40	GND
41	+5V
42	+5V
43	GND
44	(RSV)

CN307
NIC (Option)

PIN	NAME
1	+5V
2	/NICIREQ
3	NICRST
4	NICWE
5	/NICCS
6	/NICDTCT
7	GND
8	OD24
9	OD26
10	OD28
11	OD30
12	OD16
13	OD18
14	OD20
15	OD22
16	GND
17	POA2
18	OPA4
19	OPA6
20	OPA8
21	OPA10
22	OPA12
23	OPA14
24	OPA16
25	+5V
26	GND
27	/NICRDY
28	OPDIR
29	/NICOE
30	OPA20
31	NC
32	GND
33	OD25
34	OD27
35	OD29
36	OD31
37	OD17
38	OD19
39	OD21
40	OD23
41	GND
42	OPA3
43	OPA5
44	OPA7
45	OPA9
46	OPA11
47	OPA13
48	OPA15
49	OPA17
50	GND

CN302
PS DIMM (Option)

PIN	NAME
1	GND
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	+5V
11	PD1
12	DA2
13	DA3
14	DA4
15	DA5
16	DA6
17	DA7
18	DA8
19	DA12
20	DA14
21	D8
22	D9
23	D10
24	D11
25	D12
26	D13
27	D14
28	DA9
29	DA13
30	+5V
31	DA10
32	DA11
33	DA15
34	/ROCS2
35	D15
36	DA16
37	D16
38	D17
39	GND
40	DA20
41	DA22
42	DA23
43	DA21
44	/PSOE
45	DA17
46	DA18
47	/DWE
48	DA19
49	D18
50	D19
51	D20
52	D21
53	D22
54	D23
55	/DOE
56	D24
57	D25
58	D26
59	D28
60	D27
61	+5V
62	D29
63	D30
64	D31
65	NC
66	PD2
67	PD3
68	PD4
69	PD5
70	PD6
71	PD7
72	GND

<CN303>& <CN304>
DRAM SIMM

PIN	NAME
1	GND
2	D0
3	D16
4	D1
5	D17
6	D2
7	D18
8	D3
9	D19
10	+5V
11	(RSV)
12	RAA0
13	RAA1
14	RAA2
15	RAA3
16	RAA4
17	RAA5
18	RAA6
19	RAA10
20	D4
21	D20
22	D5
23	D21
24	D6
25	D22
26	D7
27	D23
28	RAA7
29	(RSV)
30	+5V
31	RAA8
32	ARR9
33	/RAS2/4
34	RAS1/3
35	(RSV)
36	(RSV)
37	(RSV)
38	(RSV)
39	GND
40	/CAS0
41	/CAS2
42	/CAS3
43	/CAS1
44	/RAS1
45	/RAS2
46	(RSV)
47	/RWE
48	(RSV)
49	D8
50	D24
51	D9
52	D25
53	D10
54	D26
55	D11
56	D27
57	D12
58	D28
59	+5V
60	D29
61	D13
62	D30
63	D14
64	D31
65	D15
66	(RSV)
67	PD1
68	PD2
69	PD3
70	PD4
71	(RSV)
72	GND

PSU (PCB3) CN287
Finisher (Option)
GND -1
Stop -2
/TXD -3
/RXD -4
Finisher Set -5
CN173

LCT (Option)
CN179 -A1~19, B7~25

Upper Paper Size Sensor S7
Lower Paper Size Sensor S8
Upper Paper End Sensor S1
Lower Paper End Sensor S2
Upper Relay Sensor S5
Lower Relay Sensor S6
Tray Cover SW (SW1)
Upper Paper Feed Clutch MC1
Lower Paper Feed Clutch MC2
Upper Relay Cl MC3
Lower Relay Cl MC4
Paper Feed Motor M1
Upper Paper Lift Motor M2
Lower Paper Lift Motor M3
Upper Tray Upper Limit Sensor S3
Lower Tray Upper Limit Sensor S4
CN102
CN101
Paper Tray Unit Drive Board (PCB1)
Paper Tray Unit Connecting Board (PCB2)
PUSH SW
LED
DIPSW
CN179

BECU (PCB6)

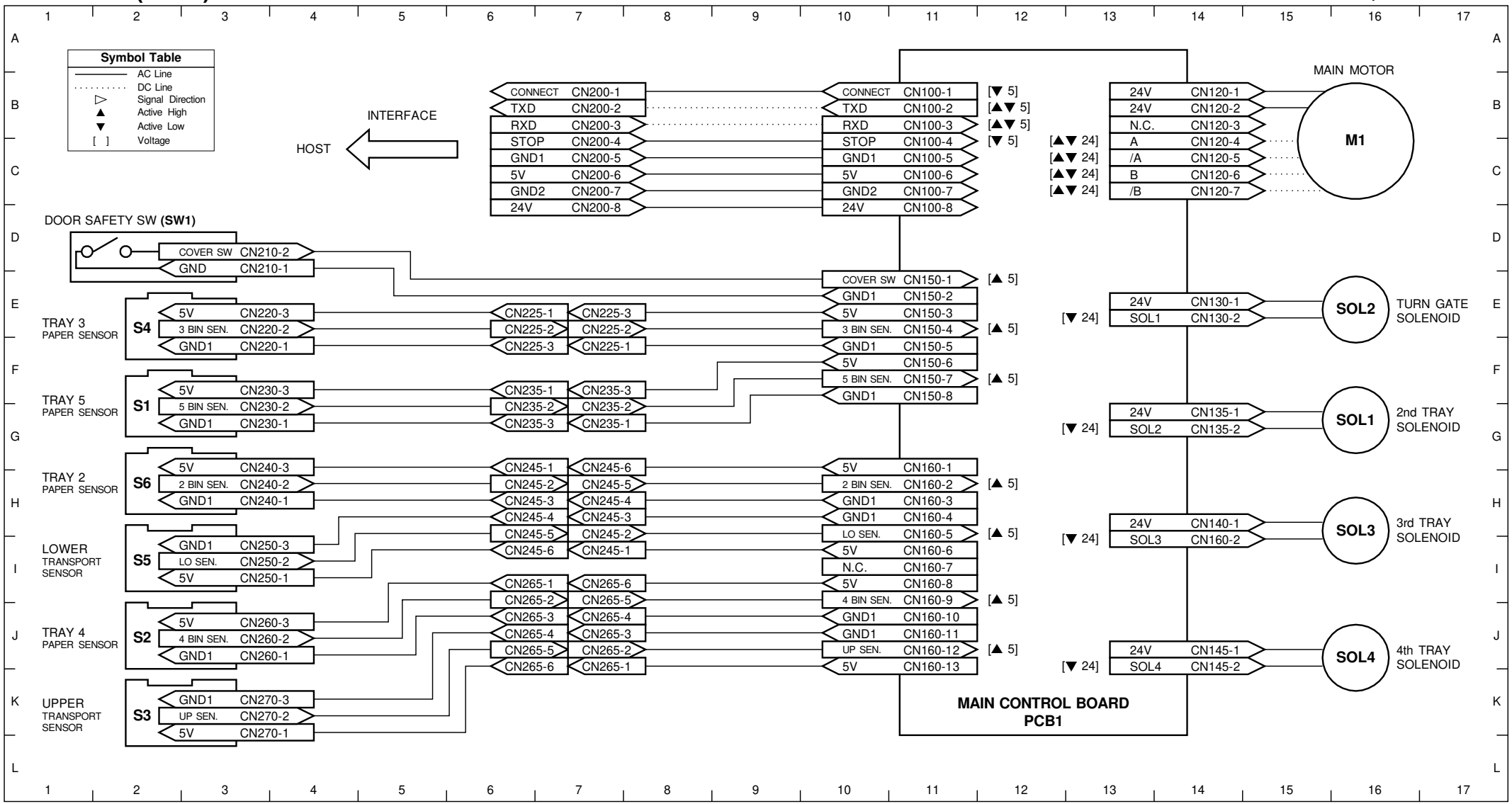
Junction Gate C1 SOL1
Lower Exit Sensor S1
Upper Exit Sensor S2
Left Vertical Door Sensor S3
Left Door Sensor S4
Relay Sensor S5
Fusing Unit Set [▼5] A
FTMP1 B
FTMP2 D
F
PCU Sensor S6
Exhaust Fan M6
Fusing Exit Sensor S7
Charge Roller H.P Sensor S8
Charge Roller Contact Cl MC1
Quenching Lamp L1
Upper Tray Paper End Sensor S9
Lower Tray Paper End Sensor S10
Upper Relay Cl MC2
Registration Cl MC7
By-pass Feed Cl MC4
Toner Supply Motor M5
By-pass Feed Paper End Sensor S11
Registration Sensor S12
By-pass Feed Paper Width Sensor S13
Right Vertical Guide SW (SW3)
Charge Roller Thermistor TH1
TD Sensor S17
Upper Paper Feed Cl MC5
Lower Relay Cl MC3
Lower Paper Feed Cl MC6
Development Cl MC8
Main Motor M1
High Voltage Supply Board PCB1
Laser Synchronization Detector LSD
LD Unit PCB4
Paper Overflow Sensor S15
Standard Output Tray Paper Sensor S16
Polygonal Mirror Motor M4
PCB8
Polygon Motor Driver
Upper Paper Size Switch SW4
Lower Paper Size Switch SW5
Transport Vacuum Fan M3
Feeder Motor M1
Main Control Board PCB1
Envelop Set Switch SW1
Envelope Feeder (Option)
Fusing Unit Fan M2

4 Bin MailBox (Option)
CN180

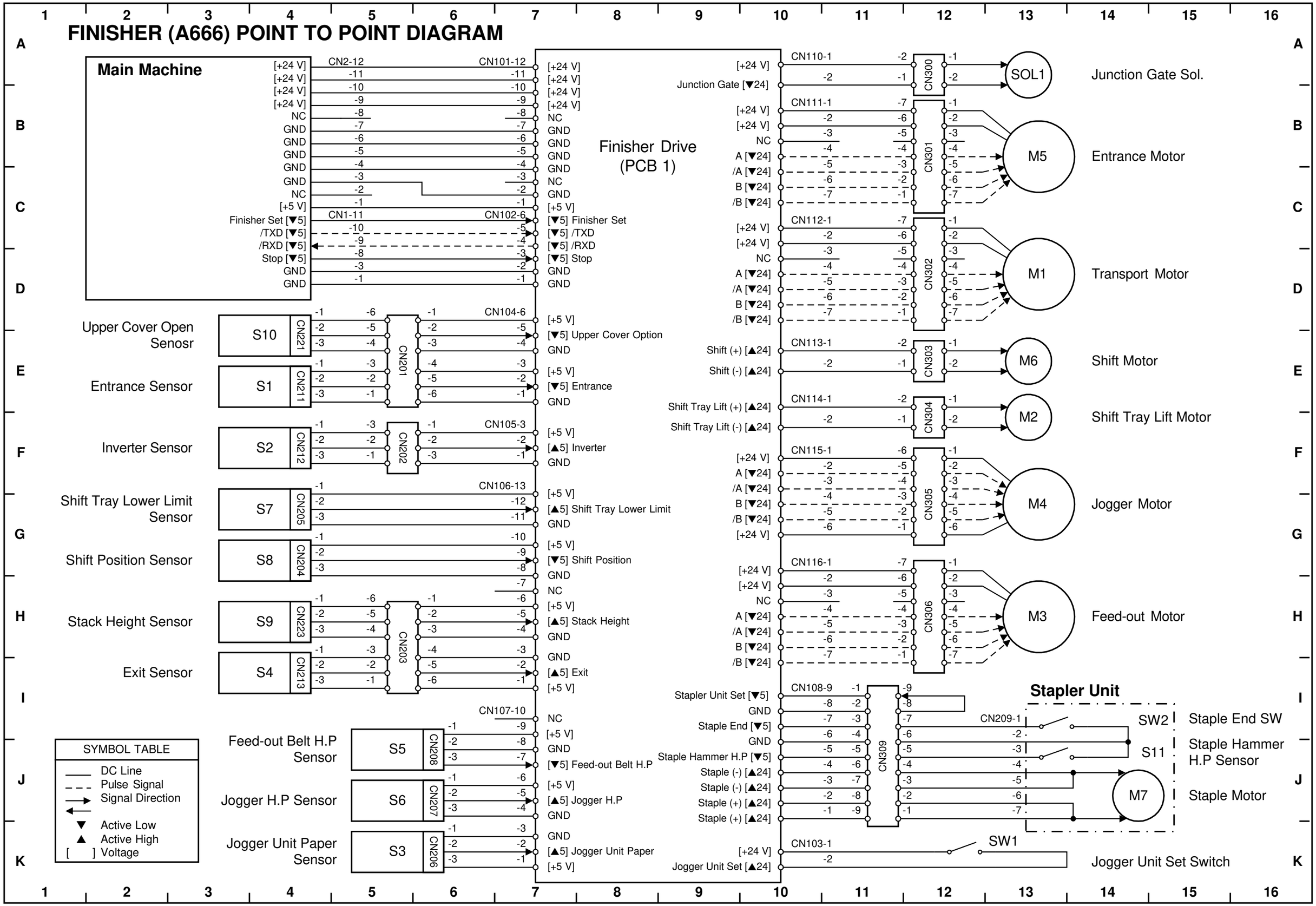
Signal Table
AC Line
DC Line
Pulse Signal
Signal Direction
Active High
Active Low
[ ] Voltage
[A] Analog Signal

MAIL BOX (G696) POINT TO POINT DIAGRAM

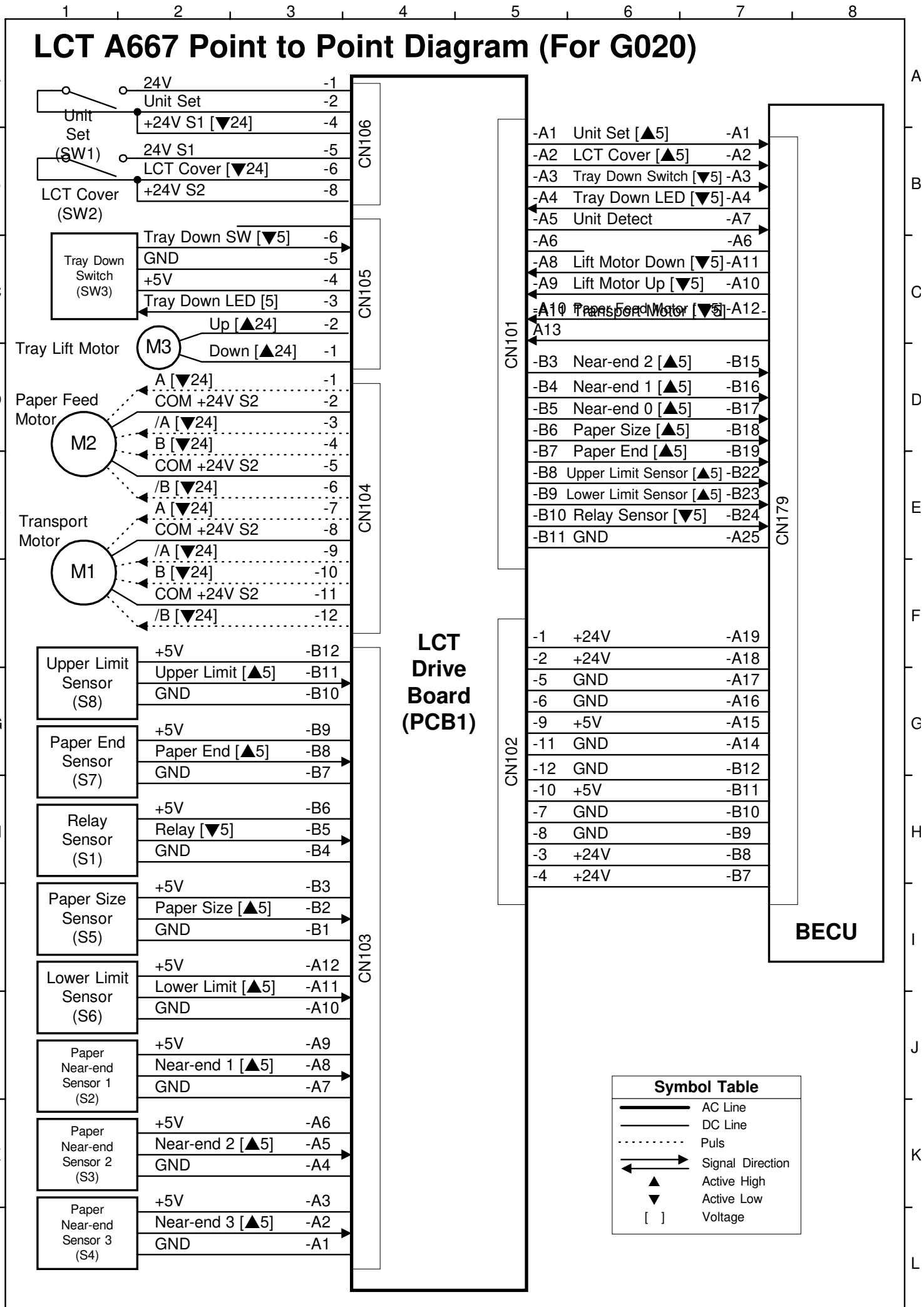
DATE: September 5th '97



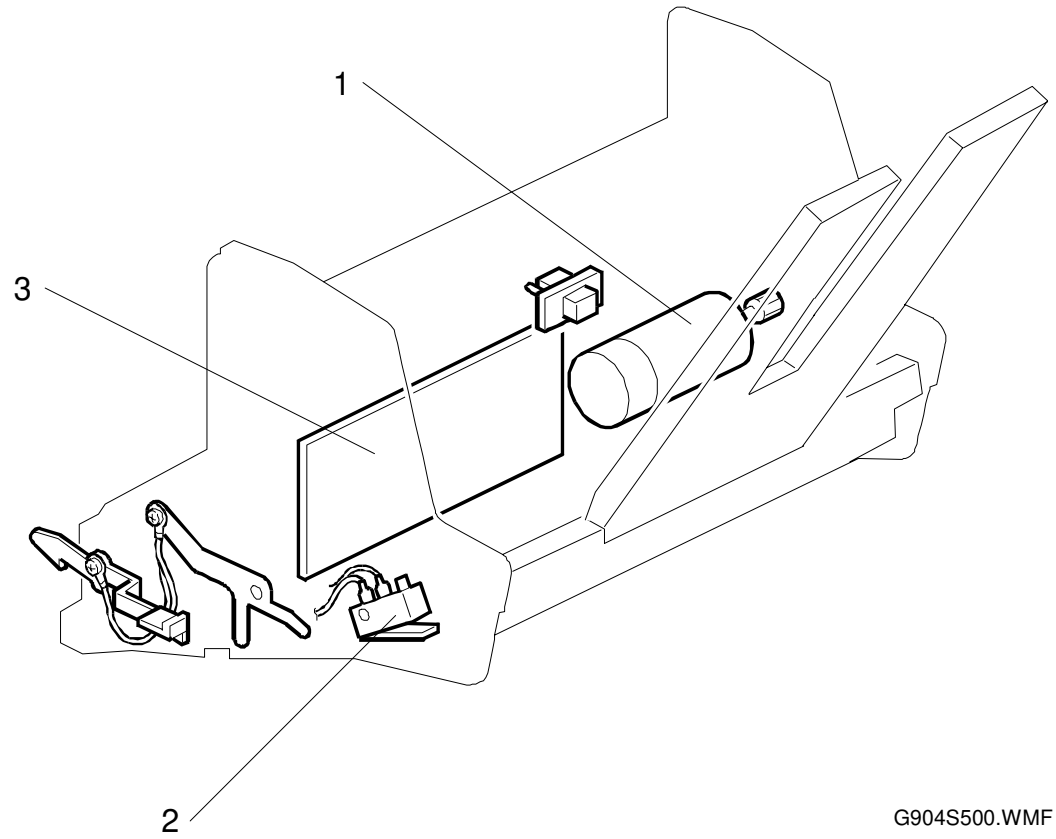
FINISHER (A666) POINT TO POINT DIAGRAM



LCT A667 Point to Point Diagram (For G020)



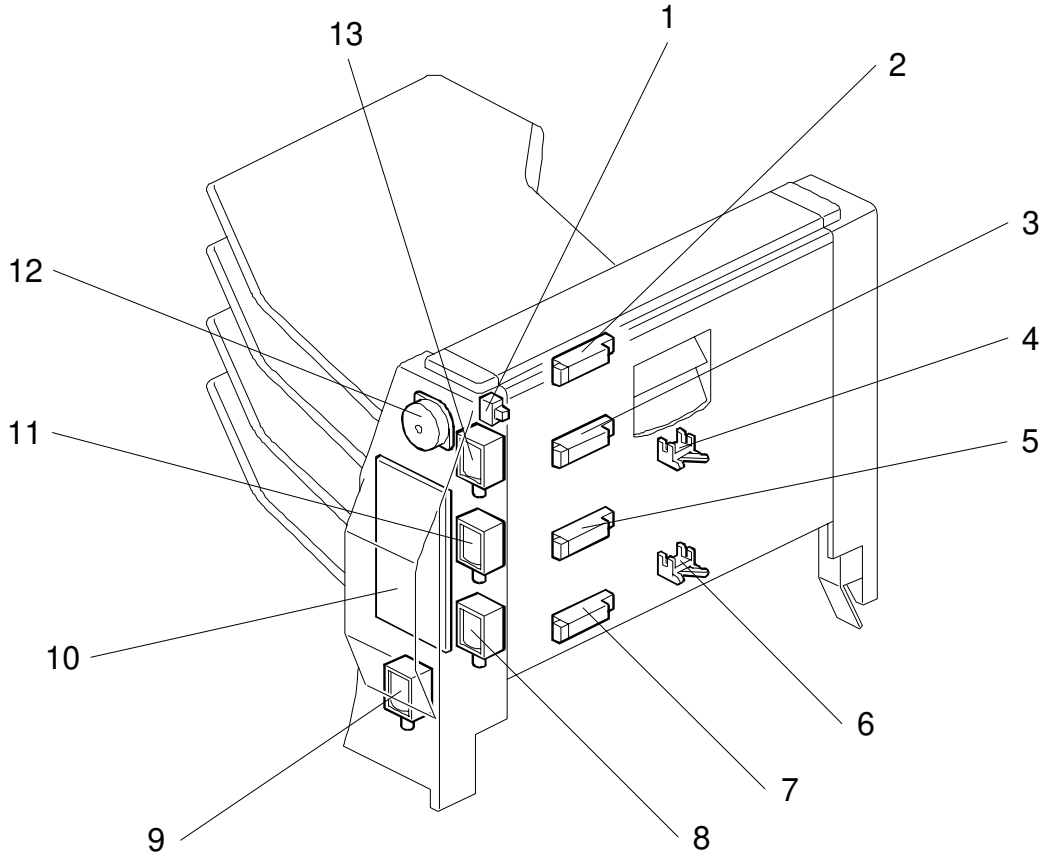
ENVELOPE FEEDER (G904) ELECTRICAL COMPONENT LAYOUT



G904S500.WMF

Description	Index No.	P-to-P Location
Feed Motor (M1)	1	O17
Envelope Set Switch (SW1)	2	P17
Main Control Board (PCB1)	3	P17

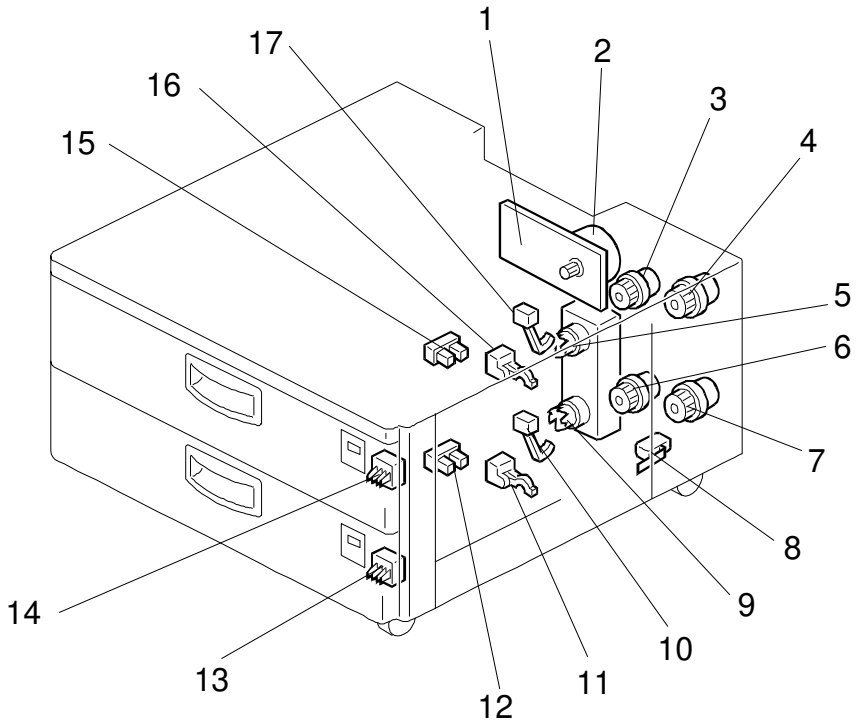
4 BIN MAILBOX (G696) ELECTRICAL COMPONENT LAYOUT



G696S500.WMF

Description	Index No.	P-to-P Location
Door Safety Switch (SW1)	1	D2
Tray 5 Paper Sensor (S1)	2	F2
Tray 4 Paper Sensor (S2)	3	J2
Upper Transport Sensor (S3)	4	K2
Tray 3 Paper Sensor (S4)	5	E2
Lower Transport Sensor (S5)	6	I2
Tray 2 Paper Sensor (S6)	7	H2
2nd Tray Solenoid (SOL1)	8	G16
Turn Gate Solenoid (SOL2)	9	E16
Main Control Board (PCB1)	10	K12
3rd Tray Solenoid (SOL3)	11	H16
Main Motor (M1)	12	B16
4th Tray Solenoid (SOL4)	13	J16

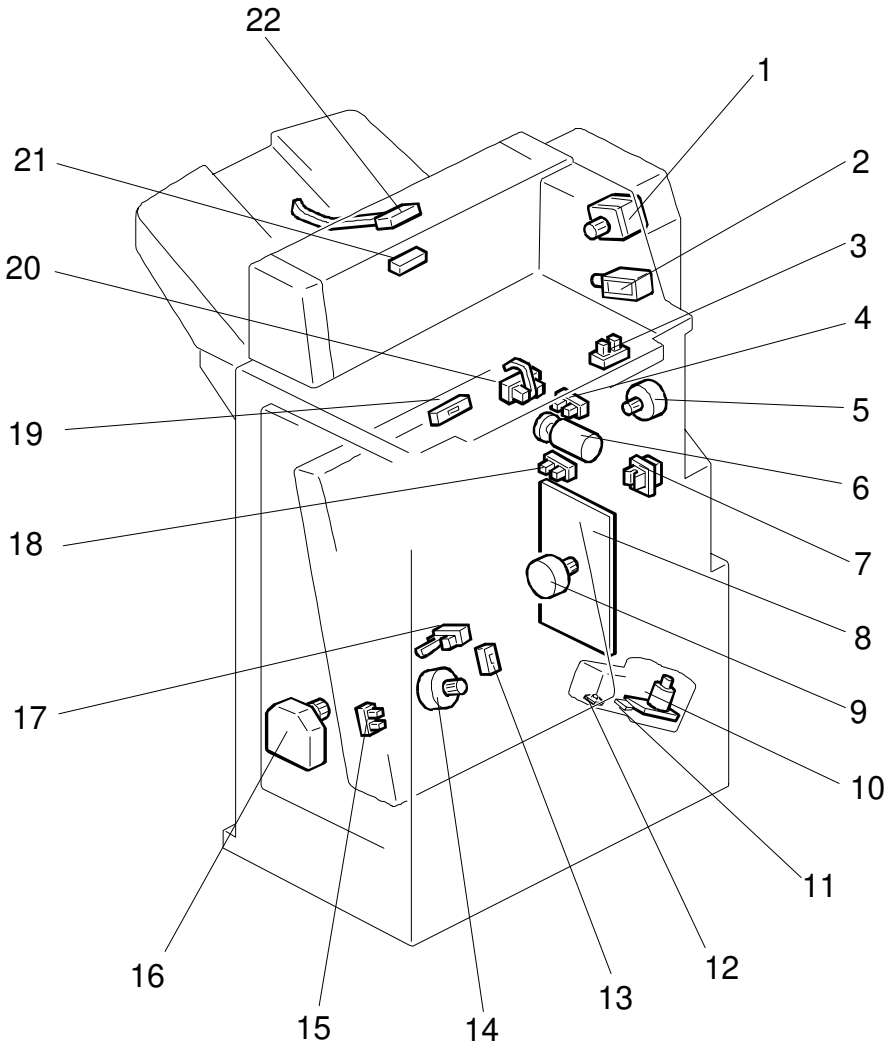
PAPER TRAY UNIT (G511) ELECTRICAL COMPONENT LAYOUT



G511S500.WMF

Symbol	Index No.	Name	P to P
Motors			
M1	2	Paper Feed	L8
M2	5	Upper Lift	L8
M3	9	Lower Lift	L8
Sensors			
S1	17	Upper Paper End	I8
S2	10	Lower Paper End	J8
S3	15	Upper Tray Upper Limit	M8
S4	12	Lower Tray Upper Limit	M8
S5	16	Upper Relay	J8
S6	11	Lower Relay	J8
S7	13	Upper Paper Size	I8
S8	14	Lower Paper Size	I8
Clutches			
MC1	3	Upper Paper Feed	K8
MC2	6	Lower Paper Feed	K8
MC3	4	Upper Relay	K8
MC4	7	Lower Relay	K8
PCBs			
PCB1	1	Paper Tray Unit Drive	L10
Switches			
SW1	8	Tray Cover Switch	J8

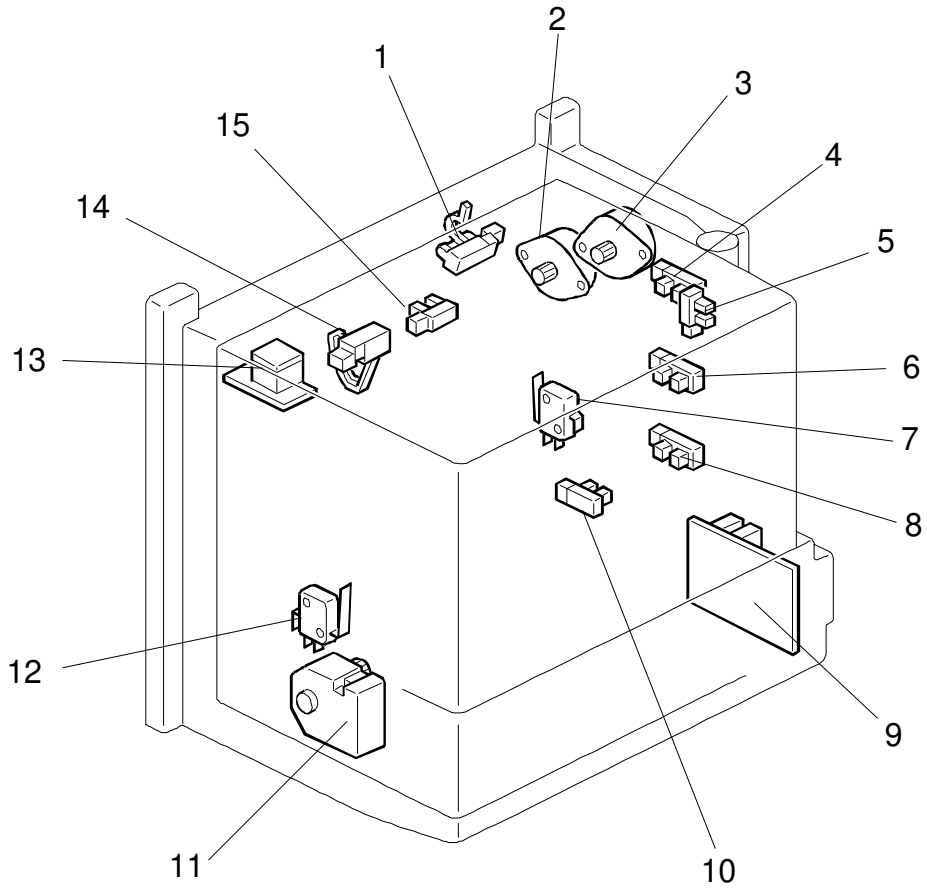
FNISHER (A666) ELECTRICAL COMPONENT LAYOUT



A666S501.WMF

Symbol	Index No.	Function	P to P
Motors			
M1	1	Transport	D13
M2	16	Shift Tray Lift	F13
M3	9	Feed-out	H13
M4	14	Jogger	G13
M5	5	Entrance	B13
M6	6	Shift	E13
M7	10	Staple	J14
Sensors			
S1	20	Entrance	E4
S2	19	Inverter	F4
S3	13	Jogger Unit Paper	K5
S4	21	Exit	I4
S5	17	Feed-out Belt HP	J5
S6	15	Jogger HP	J5
S7	18	Shift Tray Lower Limit	G4
S8	4	Shift Position	G4
S9	22	Stack Height	H4
S10	3	Upper Cover Open	E4
S11	11	Staple Hammer HP	J13
Switches			
SW1	7	Jogger Unit Set	K12
SW2	12	Staple End	I13
Solenoid			
SOL1	2	Junction Gate	A13
PCB			
PCB1	8	Finisher Drive	B8

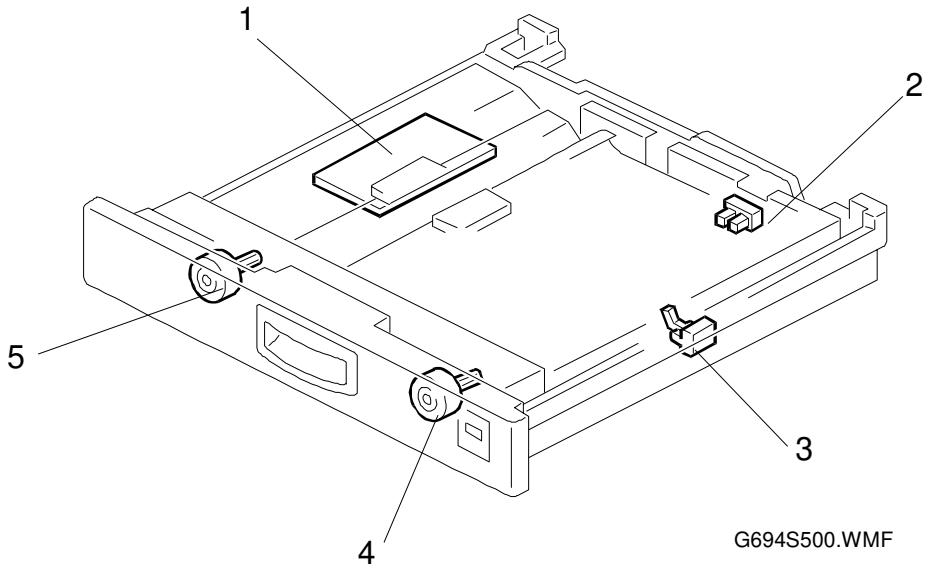
LCT (A667) ELECTRICAL COMPONENT LAYOUT



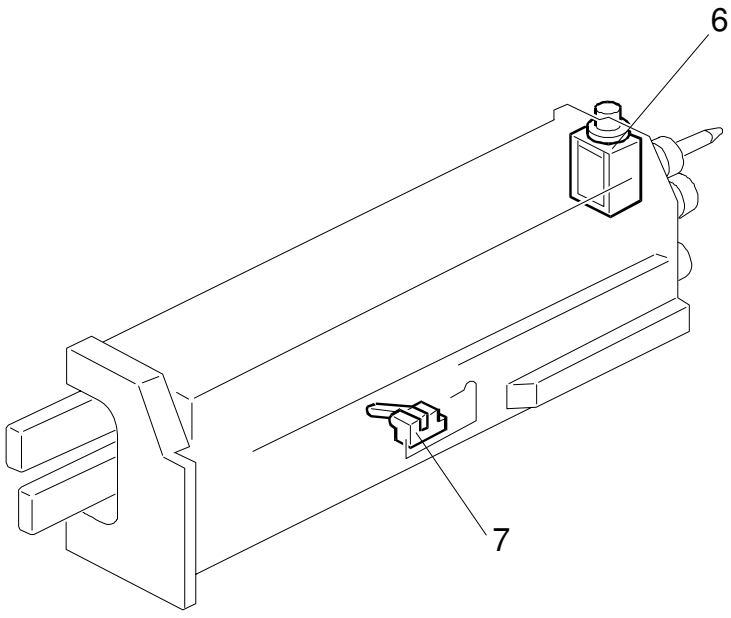
G904S500.WMF

Symbol	Index No.	Description	P to P
Printed Circuit Board			
PCB1	9	LCT Drive	F4
Motors			
M1	2	Transport	F1
M2	3	Paper Feed	D1
M3	11	Tray Lift	D1
Sensors			
S1	1	Relay	H1
S2	8	Paper Near-end 1	J1
S3	6	Paper Near-end 2	K1
S4	4	Paper Near-end 3	L1
S5	5	Paper Size	I1
S6	10	Lower Limit	I1
S7	14	Paper End	G1
S8	15	Upper Limit	G1
Switches			
SW1	7	Unit Set	A1
SW2	12	LCT Cover	B1
SW3	13	Tray Down	C1

DUPLEX UNIT (A694) ELECTRICAL COMPONENT LAYOUT



G694S500.WMF



G694S501.WMF

Symbol	Index No.	Name	P to P
Motors			
M1	5	Duplex Transport	B10
M2	4	Duplex Feed	C10
Sensors			
S1	7	Duplex Entrance	A11
S2	2	Duplex Turn	C12
S3	3	Duplex Exit	C12
Solenoid			
SOL1	6	Duplex Junction Gate Control	B11
PCBs			
PCB1	1	Duplex Control	C11