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M049/M048
Service Training

Product Overview

MF-2a/MF-2b

Slide 1

Most recently updated - January 30th, 2009 (New notes text for Slide #51)

Most recently updated - January 29th, 2009 (New photo for Slide #51)

The Machine

This is the machine you will study in this training course. Note the following:

- Paper tray
- Bypass tray
  - » (Manual feed)
- ADF (M048 only)
- Operation panel

Slide 2

Machine Details

- This product consists of a color scanner with a 600 dpi resolution and a Black and White printer with a 600 dpi resolution. These two components are integrated into a single compact machine.
- Documents are processed by a scanner using CIS (Contact Image Sensor) technology, via the ADF (Automatic Document Feeder - not available on all models) or via the exposure glass for bulky documents.
- Direct Scanning to USB memory and Direct printing from USB memory are also featured.

Operation Panel - 1/2

Model M048 / MF2b

Go to the machine and have a look at the operation panel.

- (Depending on the model and production date, the appearance of the control panel may differ slightly from the above image.)

Operation Panel - 2/2

Model M049 / MF2a

Go to the machine and have a look at the operation panel.

- (Depending on the model and production date, the appearance of the control panel may differ slightly from the above image.)

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Clearance

Machine depth without paper tray and AC cord – 386 mm.

Allowing for paper tray, ADF cord, and AC cord clearance – 449 mm.

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Verify that there is rear clearance for the paper tray, ADF cable, and AC cord when the machine is to be operated in confined spaces.

Interfaces

- Model M048 provides Fax connectivity.
- For full details, see the Service Manual and the Operating Instructions

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Specifications

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Changes from Previous Model

- **Print Speed**
  - 20ppm (A4) (from 16ppm)
- **Copy Speed**
  - 20cpm (A4) (from 16ppm)
- **Duplex**
  - Manual setting (from no duplex)
- **Supported OS**
  - W-2000/XP/Vista/Server-2003
    - » Vista & Server 2003 new
- **ID Card Copy**
  - Available (previously not available)
- **Scanning Capabilities**
  - Twain, WIA, & Scan-to-USB memory
    - » WIA & Scan-to-USB memory new

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General Specifications - 1/2

- **Look over the Specifications section of the Service Manual for the following.**
  - General Specifications
  - Paper sizes
  - Machine configuration
  - Optional Equipment
- **Note that this is a compact and lightweight machine:**
  - Non-ADF Model Dimensions - (W x H x D) - 447x412x386mm
    - » (depth of 449mm with cords)
    - » (height of 459 with ADF Tray)
  - ADF Model Dimensions - (W x H x D) - 447x452x386mm (depth of 449mm with cords)
  - Weight (basic machine/ADF model) - 11.6/13 kg

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General Specifications - 2/2

- **Power supply**
  - Single phase 220-240V 50/60 Hz, 4.5 A
- **Power consumption**
  - 10/12 W in Power-save mode
  - 33/35 W in Standby
  - 450 W during printing (900W peak)

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Printer Specifications

- **Type**
  - Laser (using normal paper)
- **Resolution**
  - 600 dpi
- **Output Paper Capacity**
  - 50 sheets (face down)
- **Zoom range**
  - 25% to 400%

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Scanner Specifications

- **Type**
  - Color scanner
- **Color depth**
  - 36 bits
- **Resolution**
  - 600 dpi (optical)
  - 2400 dpi (interpolated)
- **Software compatibility**
  - TWAIN
- **Maximum paper size**
  - A4/Letter

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Installation

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Installation (Warning)

- **As a safety precaution, the 230 V power cord must be close to the machine and positioned so that power can be quickly cut by unplugging the machine.**

Installation
(ADF Input Tray Extension*)

- **Install input tray extension for the ADF (Automatic Document Feeder)**
  - Snap on as shown in illustration

*** M048 only. (Note that the ADF Input Tray Extension may be referred to by different names in the Operating Instructions and Service Manual.)**

Installation (Paper Tray) - 1/2

- **Installation of the paper tray itself is straightforward – it easily slides in from the front. There are a few points to keep in mind however.**
  - There is no tray heater for this model, so humidity can greatly affect the condition of the paper.
  - The rear of the paper tray extends beyond the back side of the machine, so there is a possibility of dust build-up on the top sheet of paper if the machine is not used frequently.
  - The print side of the paper goes face down in the paper tray.)
- **The following slide details some routine procedures – for more details, see the Service Manual and the Operating Instructions.**

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Installation (Paper Tray) - 2/2

- When loading the machine with paper, pull the paper drawer all the way from the machine.
- Push the lower plate (with “PUSH” stamped into the metal) all the way down until it locks flat.
- Adjust the length and width paper guides – if they are too loose, skewed prints may result.

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Installation (Toner Cartridge)

- **After removing the toner cartridge from its bag, tilt the cartridge to the right and to the left several times to evenly distribute the toner powder within.**
  - Note: Do not shake it strongly, turn it over, or turn it on its end, as this could cause toner to leak out.
- **Open the front door of the machine (see Operating Instructions).**
- **Holding the toner cartridge by its handle, insert it in its slot – pushing it back until it clicks and drops down slightly.**
  - Note: When removing the cartridge, the handle needs to be lifted up at first, as it will not come out of the machine by pulling straight back.

Installation (Output Tray Extension)

- **To avoid printed pages from tumbling out in front of the machine, extend the Output Tray Extension*, and open the tab within it.**
  - * Note that the Output Tray Extension may be referred to by different names in the Operating Instructions and Service Manual.

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Machine Operation

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Before You Start

Examine the following from the Operation Instructions (OI) before you start this training module.

- Guide to the components
- Control Panel
- Turning on the power

Lab Work
User Tools/System Settings

Examine how to access the user tools as well as what you can change with the user tools. Practice making some of these changes if you are not already familiar with them. (See Operating Instructions)

Lab Work
Basic Troubleshooting

Examine and practice the basic troubleshooting procedures for the following if you are not already familiar with them:

General Settings, OI manual

- Loading paper
- Removing/Inserting Toner Cartridge
- Clearing misfeeds

Lab Work
Copy related Troubleshooting

Examine troubleshooting techniques and practice the following (reference relevant Operating Instructions)

- When a message is displayed
- When copies are not clear
- How to select various different copy settings
- What to do when the memory is full

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Component Layout

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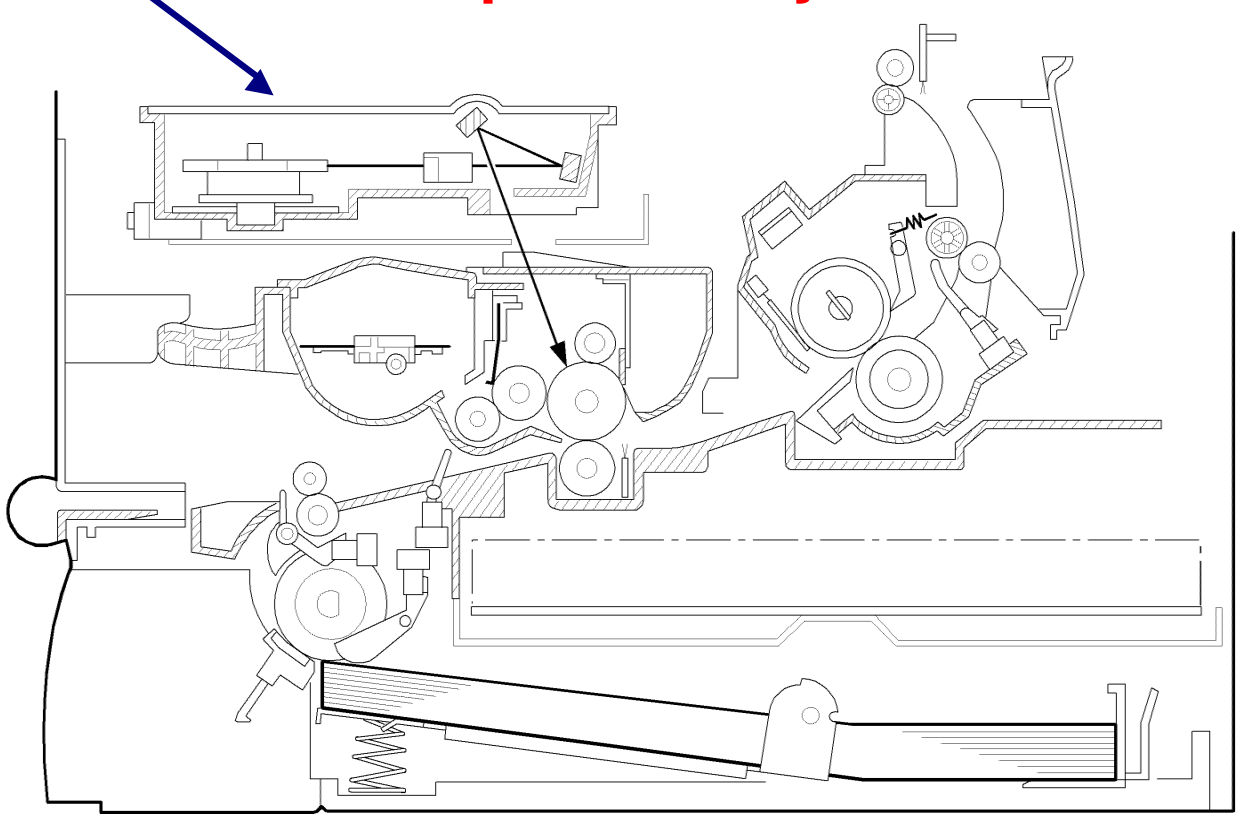
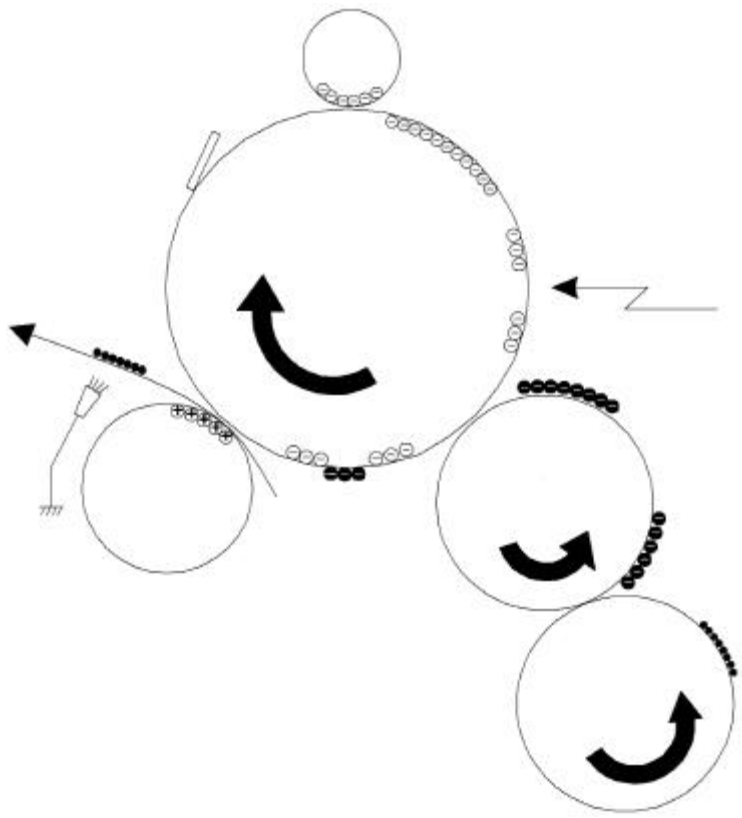
Component Layout



Slide 27 ❑ **Refer to the Service Manual for more detailed information**

Printing Process

Refer to the Service Manual for component details



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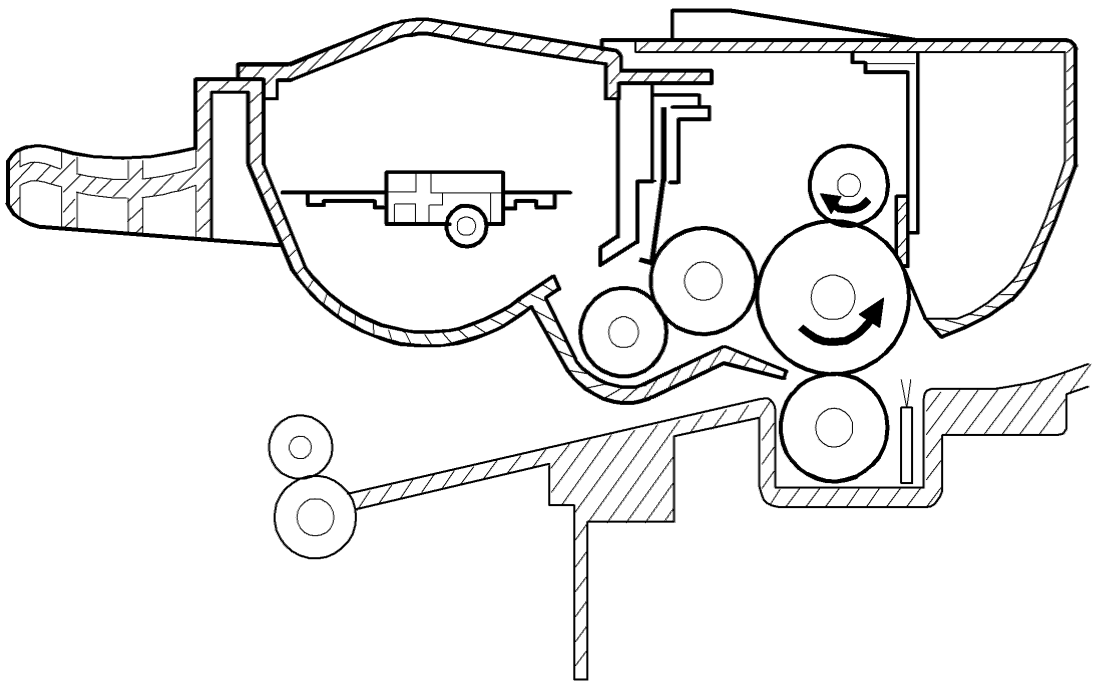
-**This machine uses a negative toner system.**
-**This machine does not have toner end detection.**

Charge - 1/2



- **Small diameter OPC (Organic Photoconductor) drum allows very compact design.**
- **Charge roller charges the photoconductor, with the advantage of not generating ozone - giving OPC drum surface negative charge.**

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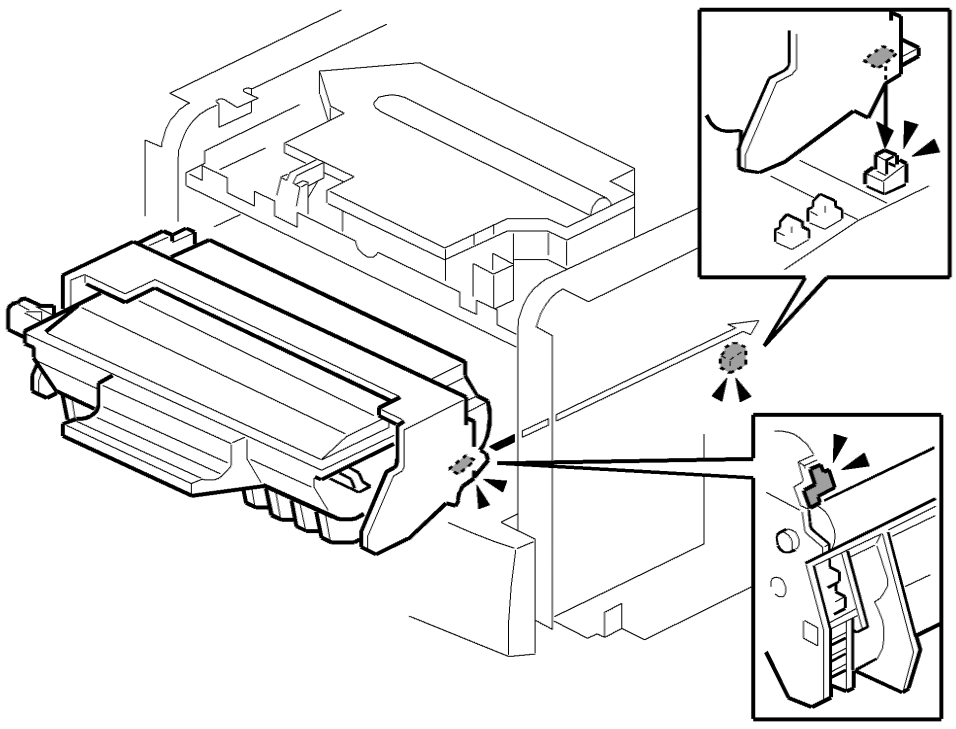
More on Charge

- The charge roller is of a design that doesn't generate ozone. A high negative voltage is applied from the Power Supply Unit board to the charge roller, resulting in the OPC drum surface having a negative charge.

Charge - 2/2

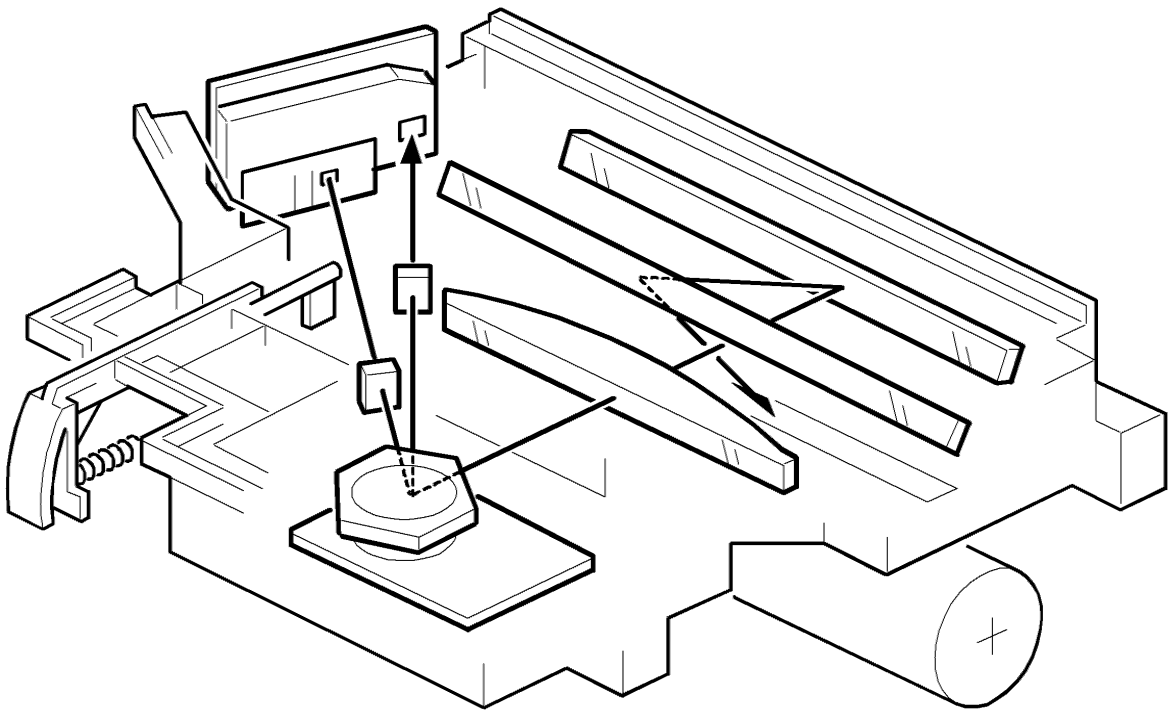


- **Voltage to the charge roller is supplied from the Power Supply Unit board via the terminal indicated above.**

For more details, see the Service Manual.

Laser Exposure - 1/2

Overview



Laser diode produces electrostatic latent image on OPC drum

- Optical Laser diode unit converts image data into laser pulses.

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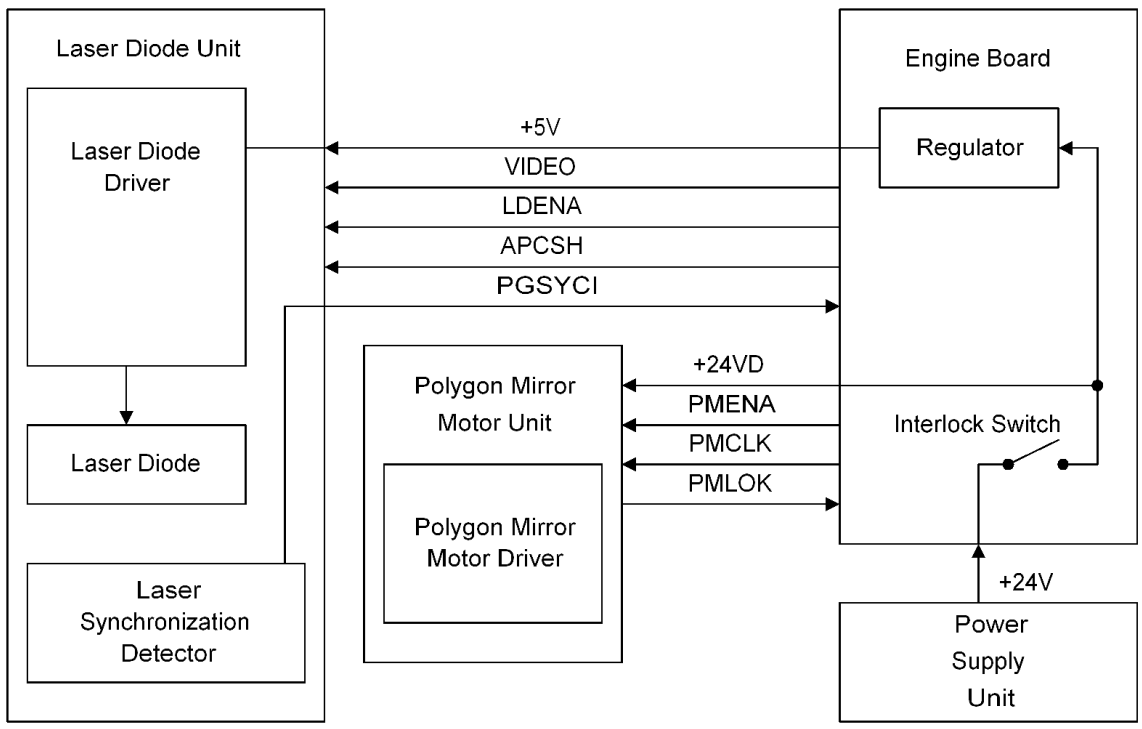
As a mechanical safety feature, the shutter closes to block the laser beam path whenever the front door is opened.

Laser Exposure - 2/2

Block Diagram



- **Engine Board controls laser diode power (APCSH) and transfers printing data to laser diode (VIDEO).**

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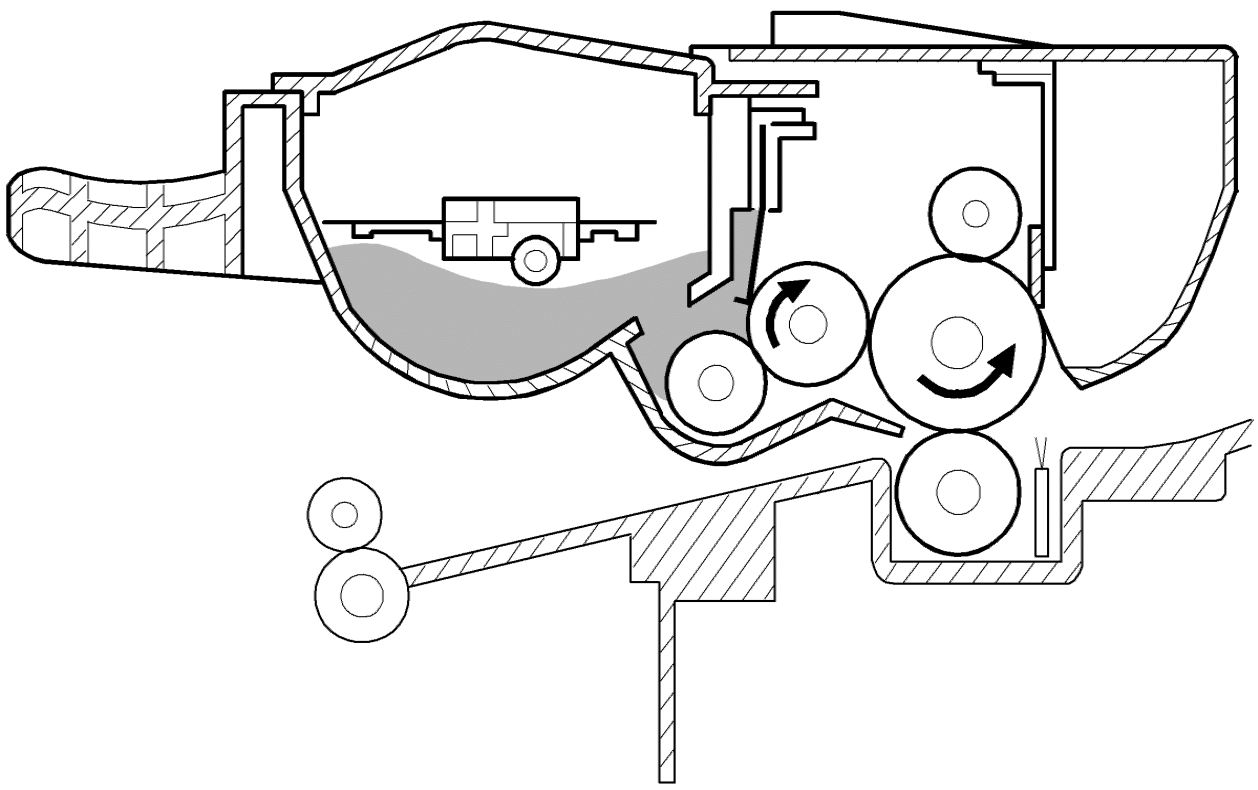
As an electrical safety feature, interlock switch on Engine Board cuts power when front door is open.

Development - 1/2



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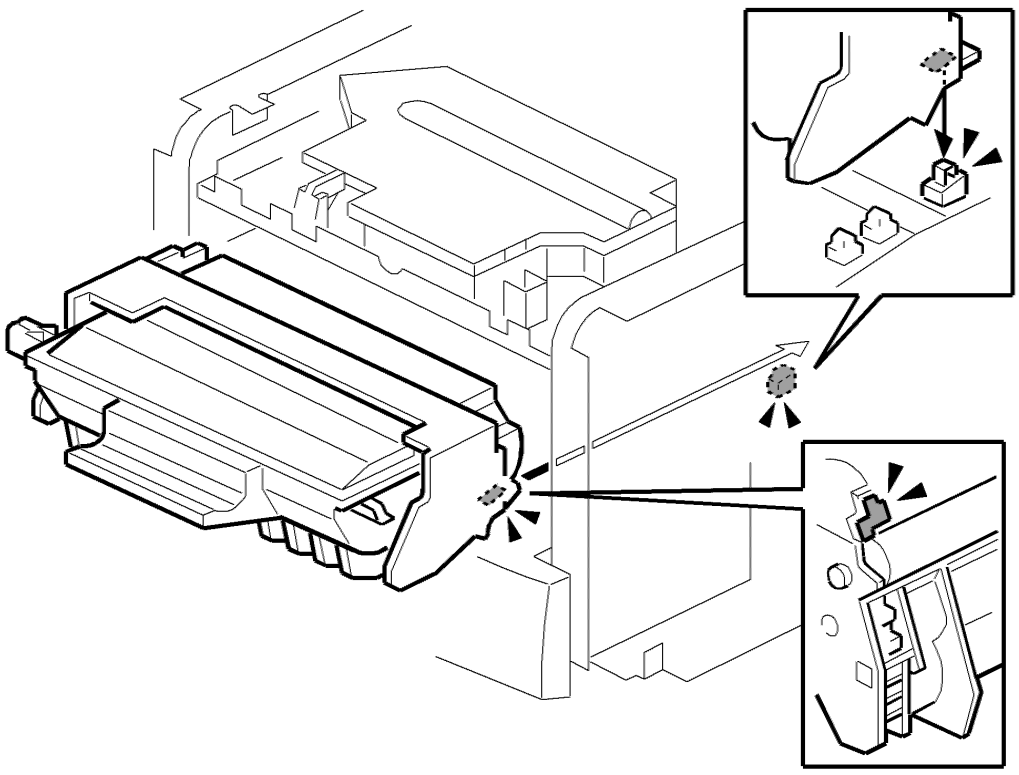
Mono-component toner utilized, composed of resin and ferrite.

- Toner mixing bar stirs and carries toner to toner application roller. Toner application roller supplies toner to development roller. As development roller turns past toner metering blade, only thin coating of negatively charged toner particles stays adhered to development roller.
- For further details, see the service manual

Development - 2/2



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Voltage from Power Supply Unit board powers development roller and toner application roller through terminals.

For more details, see the service manual.

Transfer & Separation

- **Transfer roller touches OPC drum surface. Constant current is applied to transfer roller from power supply unit board. Positively-biased transfer roller pulls negatively-charged toner off drum. Curvature of drum, and antistatic brush, help paper to separate from drum.**
- **If a paper jam occurs during printing, toner may be transferred to the transfer roller surface. To prevent toner from transferring to the underside of the paper, the transfer roller must be cleaned before the next print job.**
- **While the machine is in the cleaning mode, the Power Supply Unit board applies a negative voltage to the transfer roller. The negatively charged toner on the transfer roller is then transferred back to the drum.**
- **The machine goes through the cleaning mode at the following times.**
  - At power-up: The process starts when the fusing temperature reaches the standby temperature.
  - When the cover is opened and then closed during the printing process.
  - After a printer jam has been cleared.

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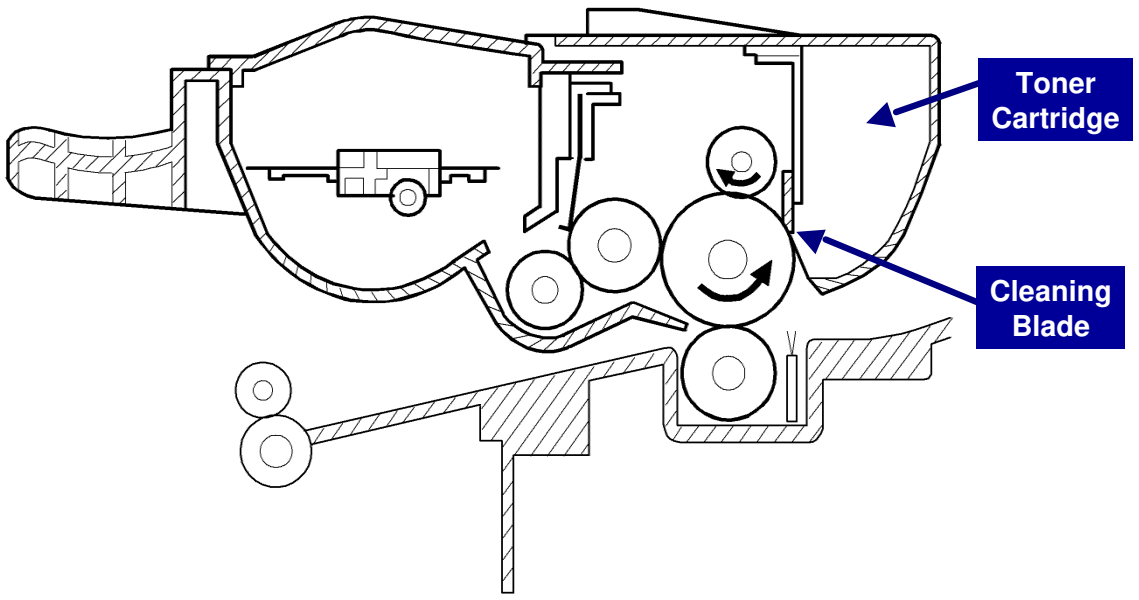
For more details, see the service manual.

Drum Cleaning



- Cleaning blade & used toner tank are contained in toner cartridge.
- A counter blade system is used for drum cleaning. The cleaning blade removes remaining toner on the drum after image is transferred to paper. Removed toner is stored in the used toner tank.
- There is no used toner overflow detection mechanism, because the used toner tank is large enough for the lifetime of the toner cassette.

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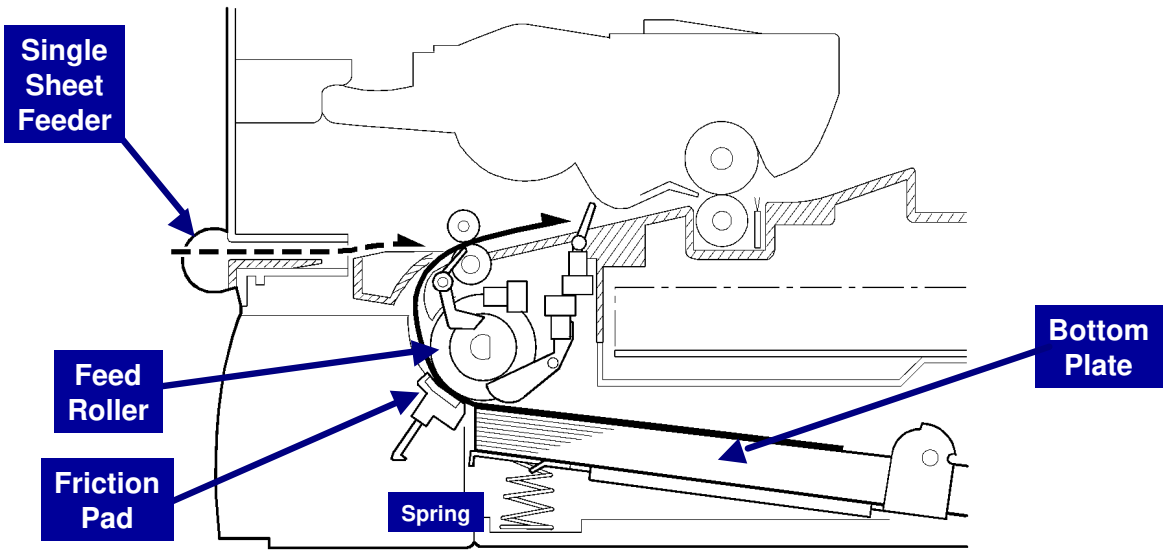
Paper Feed and Registration - 1/6

Overview



Paper Feed System:	**Feed roller and Friction pad**
Paper Lift Mechanism:	**Bottom plate with spring**
Sheet feeder:	**Single sheet feeder**
Tray Capacity:	**250 sheets**
Paper End Detection:	**Paper end sensor**
Paper Size Detection:	**None**

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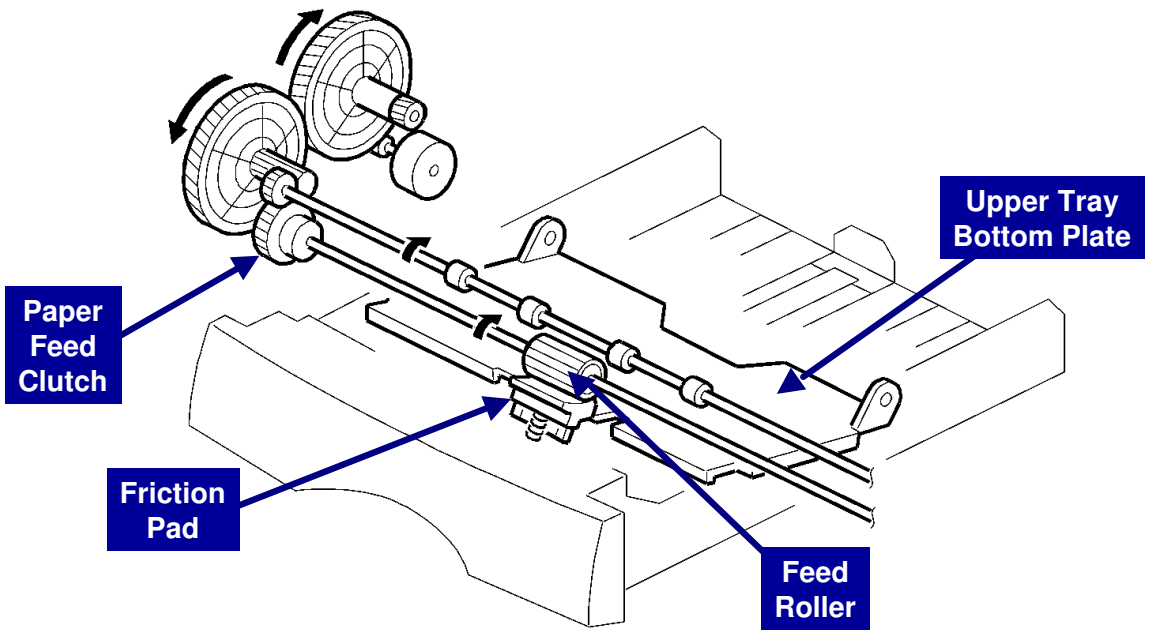
Paper Feed and Registration - 2/6

Paper Feed Drive Mechanism



Feed roller is located above upper tray bottom plate and friction pad. This allows only one sheet to feed from the paper tray. These are controlled by the paper feed clutch.

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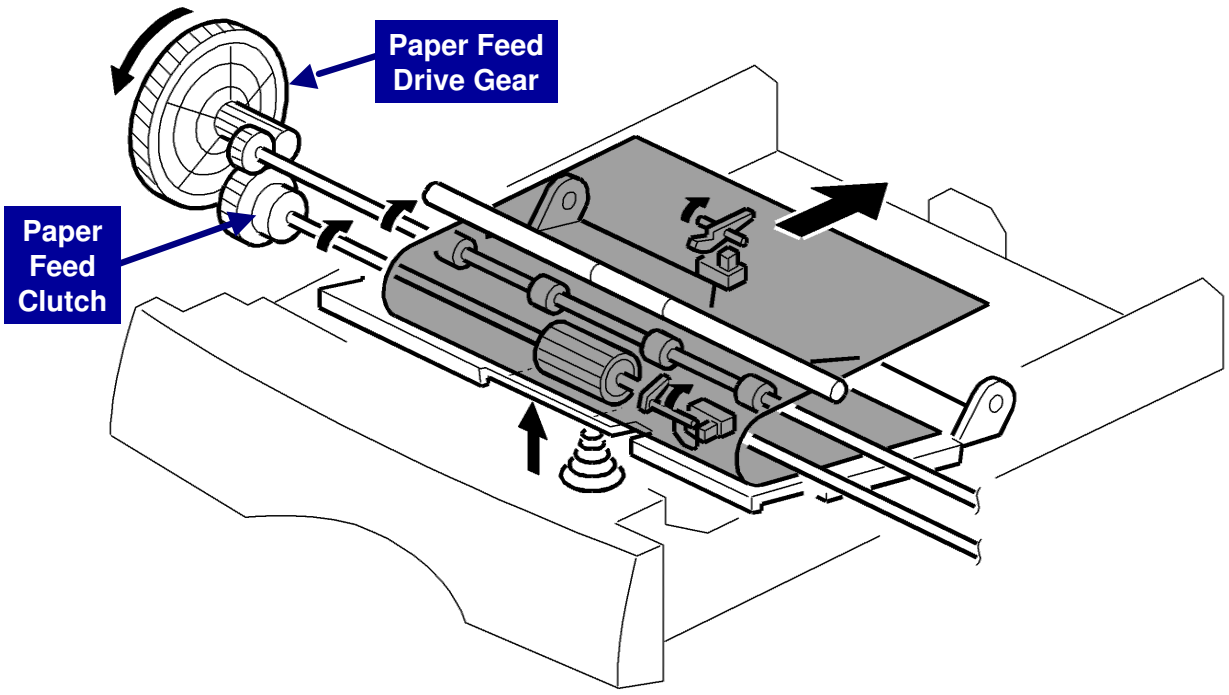
The registration sensor detects the leading edge of the paper and synchronizes paper feed with activation of laser diode for writing the image on the OPC drum.

Paper Feed and Registration - 3/6

Paper Feed Operation



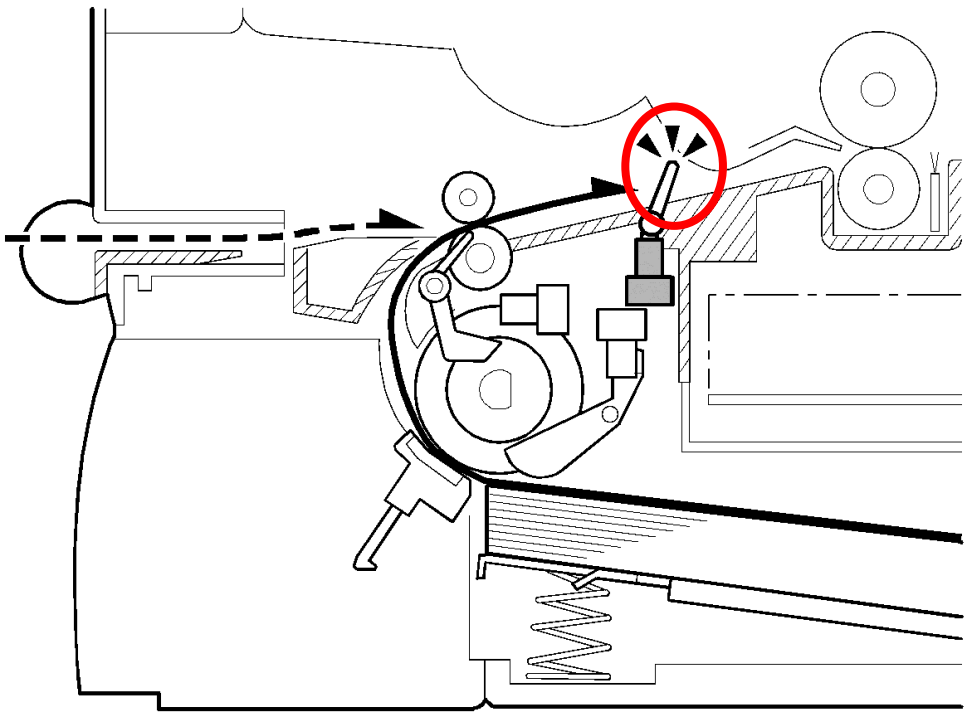
Paper feed drive gear always rotates when main motor rotates, since paper feed clutch (magnetic clutch) is energized to turn paper feed roller.

When paper feed clutch is energized to turn feed roller, the paper feed roller feeds one sheet of paper from the tray. The paper is fed into the machine by the registration roller.

For more details, see the Service Manual.

Paper Feed and Registration - 4/6

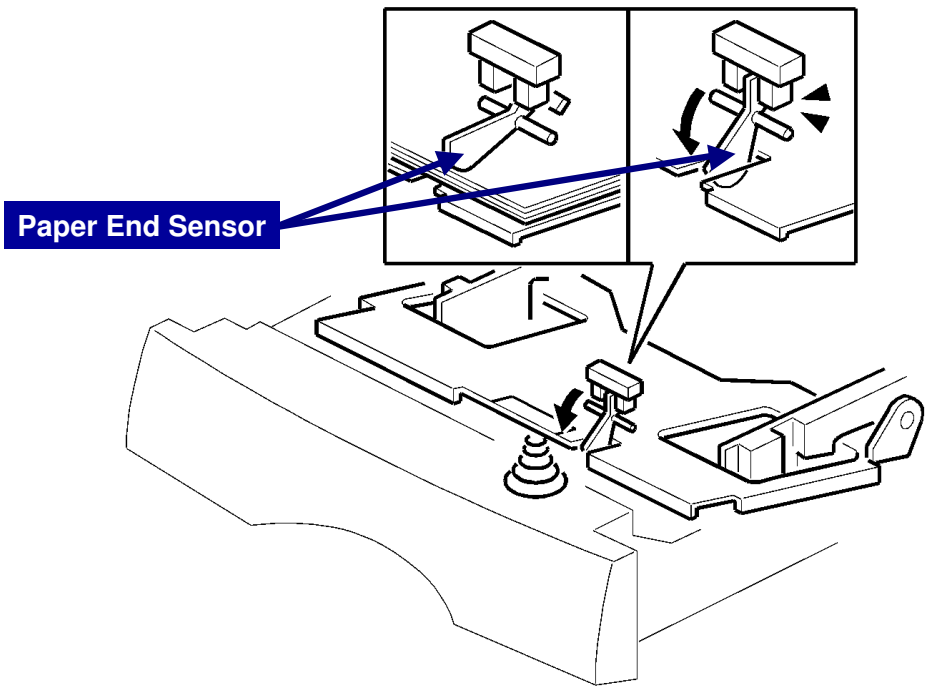
Registration



Registration sensor detects leading edge of paper and synchronizes paper feed with writing of image on drum, enabling image and paper to match up properly. This sensor also detects paper feed jams.

Paper Feed and Registration - 5/6

Paper End Detection



Built-in paper end sensor detects the presence or absence of paper. Sensor actuator extends through slot in paper tray bottom plate, and sensor is actuated when paper is placed in upper tray.

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For more details, see the Service Manual.

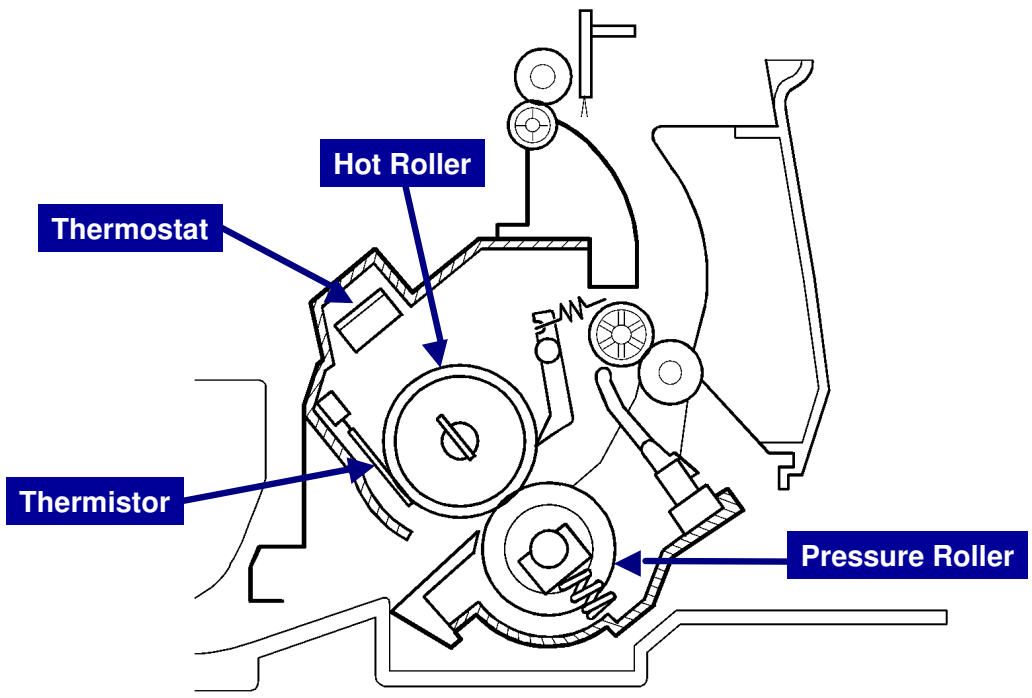
Paper Feed and Registration - 6/6

Jam Detection

- Jam 1 - Paper jam at the paper cassette
- Jam 2 - Paper did not pass registration sensor
- Jam 3 - Paper did not reach the fusing unit
- Jam 4 - Paper jam in the fusing exit area
- Jam 5 - Paper no feed jam in the bypass tray

For more details, see the Service Manual and the Operation Manuals.

FUSING *Overview*



- After image is transferred, paper enters fusing unit and image is fused to paper by heat and pressure of hot roller and pressure roller.
- CPU monitors hot roller temperature through thermistor in contact with hot roller surface. Thermostat protects fusing unit from overheating.

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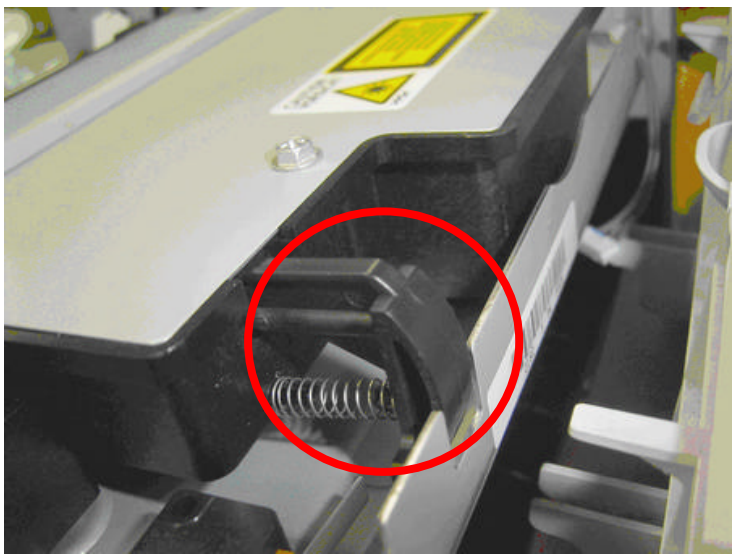
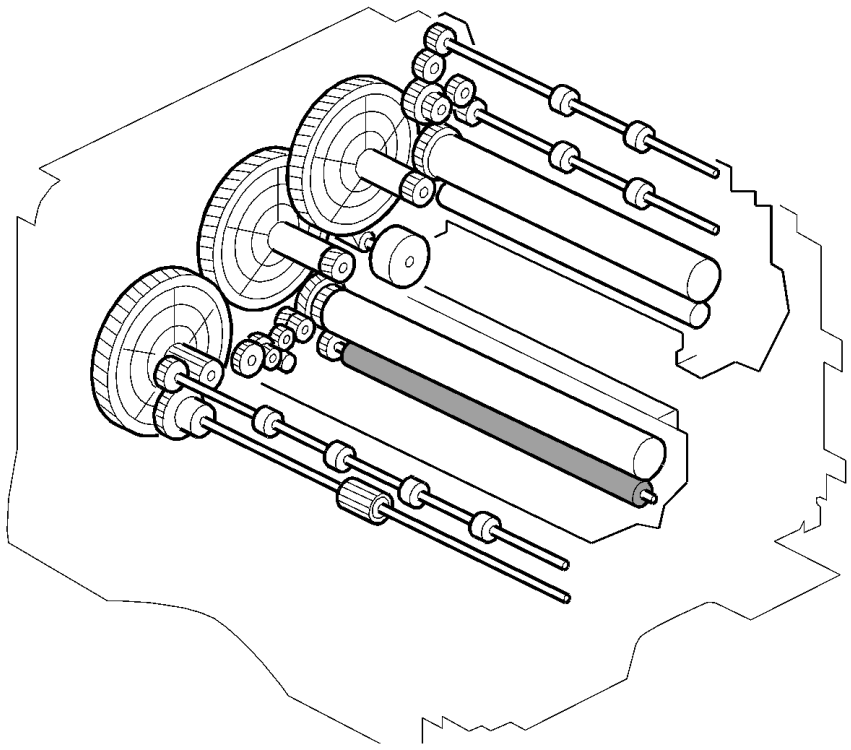
For more details, see the Service Manual.

Cover Switch

- **Interlock switch cuts power to the following components when front cover is opened:**
  - power pack
  - laser diode driver
  - fan motor
  - main motor
  - polygon mirror motor
  - fusing lamp.



Paper Feed Drive Release & Fusing Drive Release



The main motor drives the paper feed unit, the transfer roller, the toner cassette, and fusing unit through a series of gears (as explained in the service manual).

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Disassembly & Replacement

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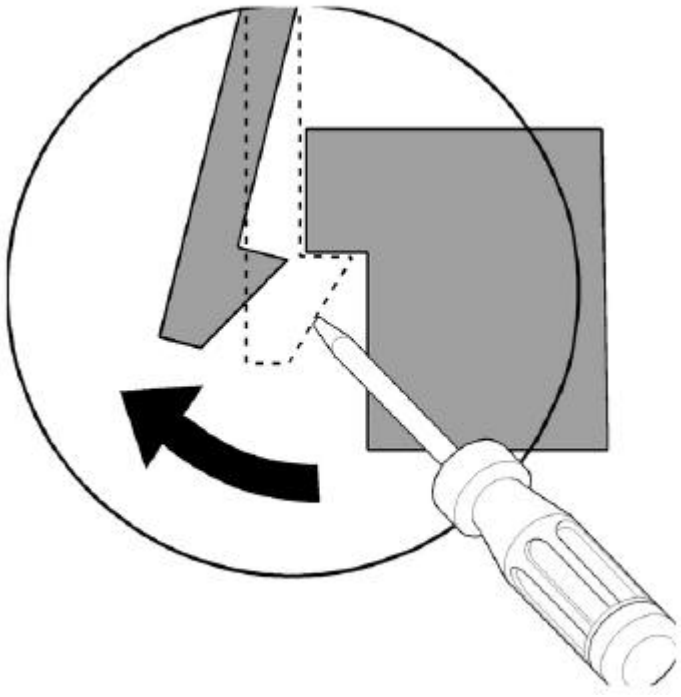
General Precautions

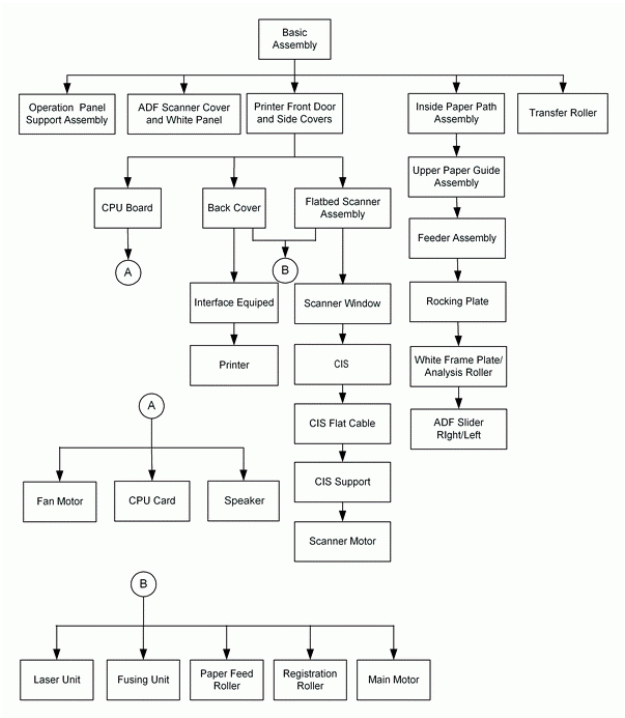
Releasing Plastic Latches



- **Many of the parts are held in place with plastic latches which can break easily. Release them carefully, pushing the hook end of the latch away from the part to which it is latched.**

General Precautions

Replacement Worksheet Chart

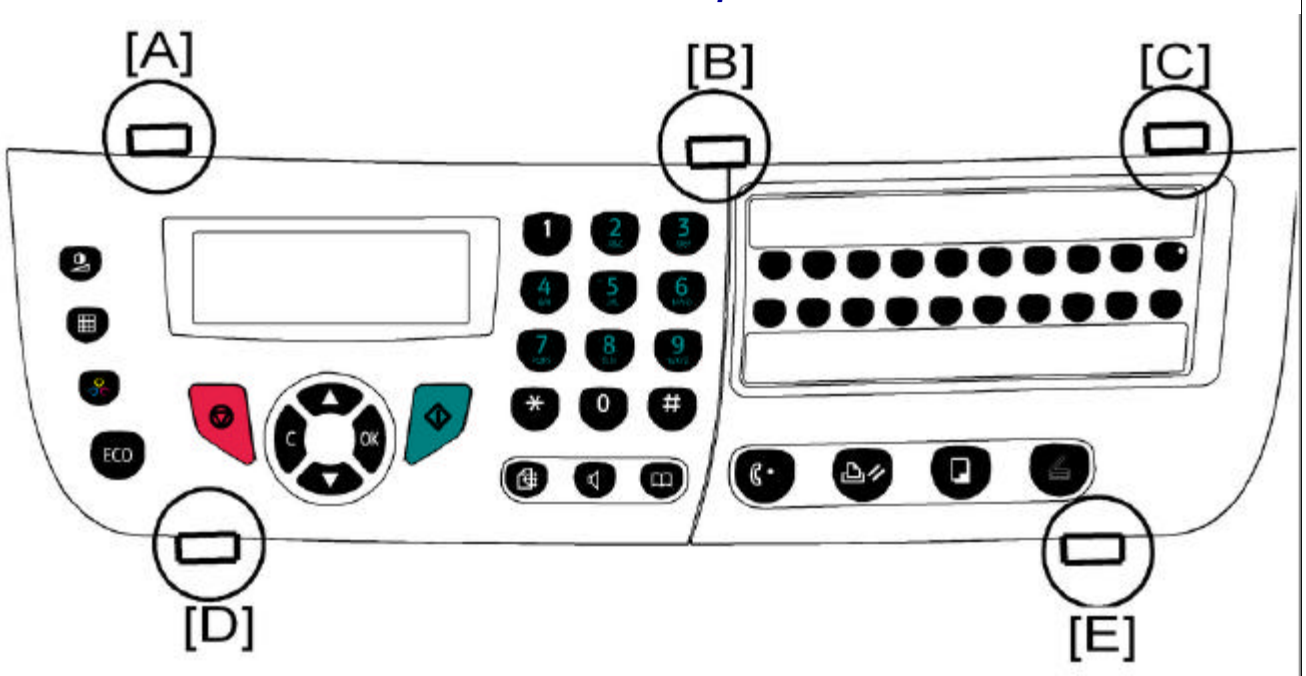


- **When you replace a unit, refer to the flowchart as shown above to confirm the steps.**

For more details, refer to the Service Manual.

Removing the Operation Panel

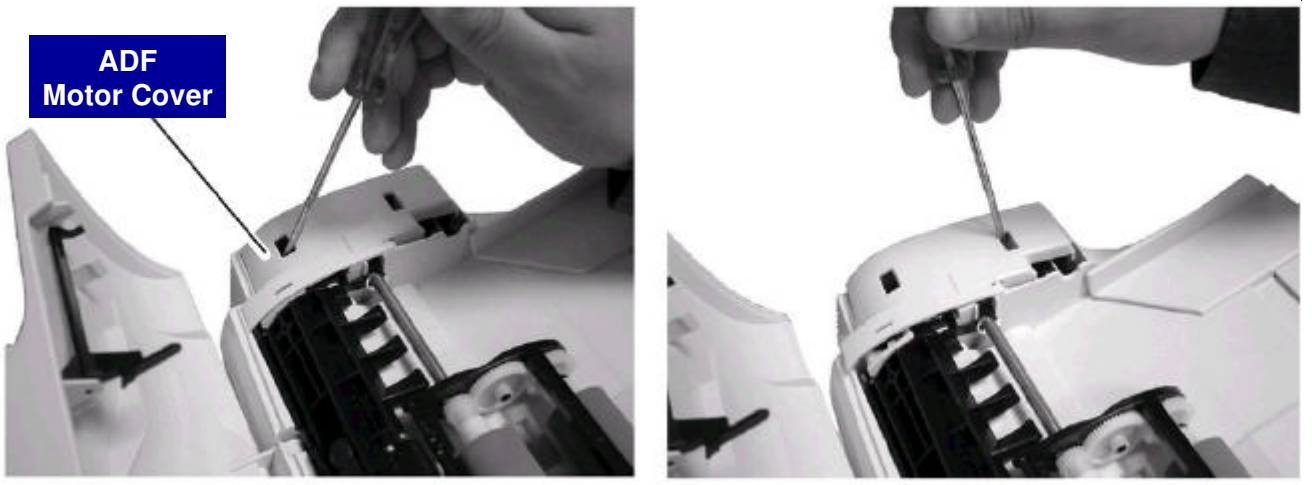
Removal Steps



Facing the front of the machine, first unlock the three rear clips of the operation panel ([A], [B] and [C]), then pull the panel towards yourself to release it from the two bottom slots ([D] and [E]).

Removing the ADF Motor Cover - 1/2

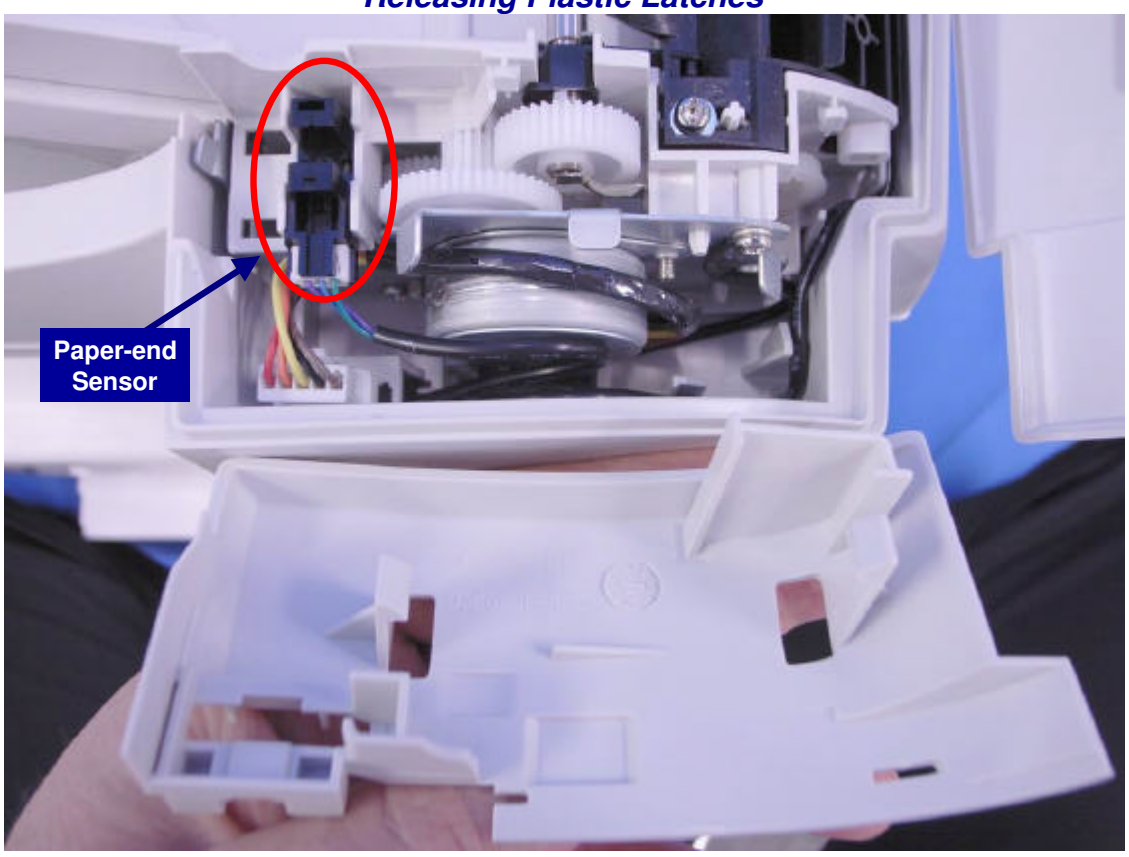
Releasing Plastic Latches



Remove the ADF motor cover from its two slots using a flat screwdriver.

Removing the ADF Motor Cover - 2/2

Releasing Plastic Latches



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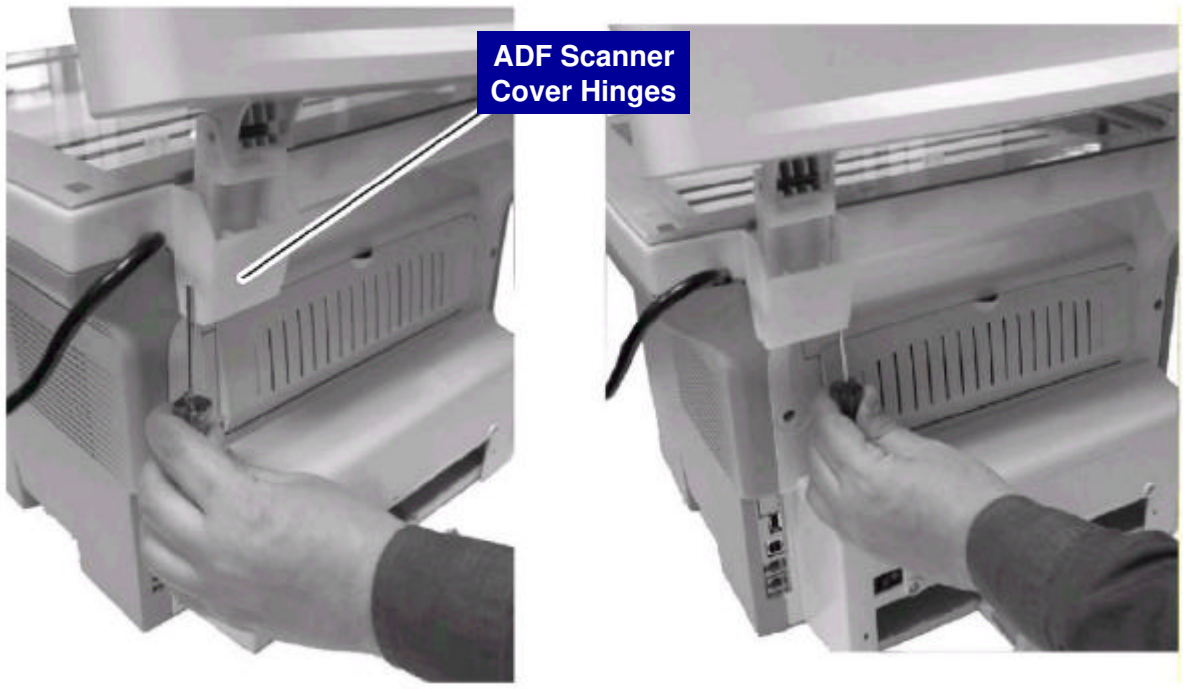
View of the underside of the ADF motor cover and the area it attaches to.

The previous model had both a Paper-end Sensor and a Cover-open Sensor. With this model, the Cover-open Sensor has been removed, since when there is no paper, it's not important for the machine to know that the cover is open.

ADF Cover Removal

Releasing the ADF Cover at the Hinges



After removing the ground cable, the ADF cover sensor connector and the paper sensor connector from their cable guide, slide them out of the ADF scanner cover. To release the plastic latches of the cover, insert a flat screwdriver in each slot of the two ADF scanner cover hinges.

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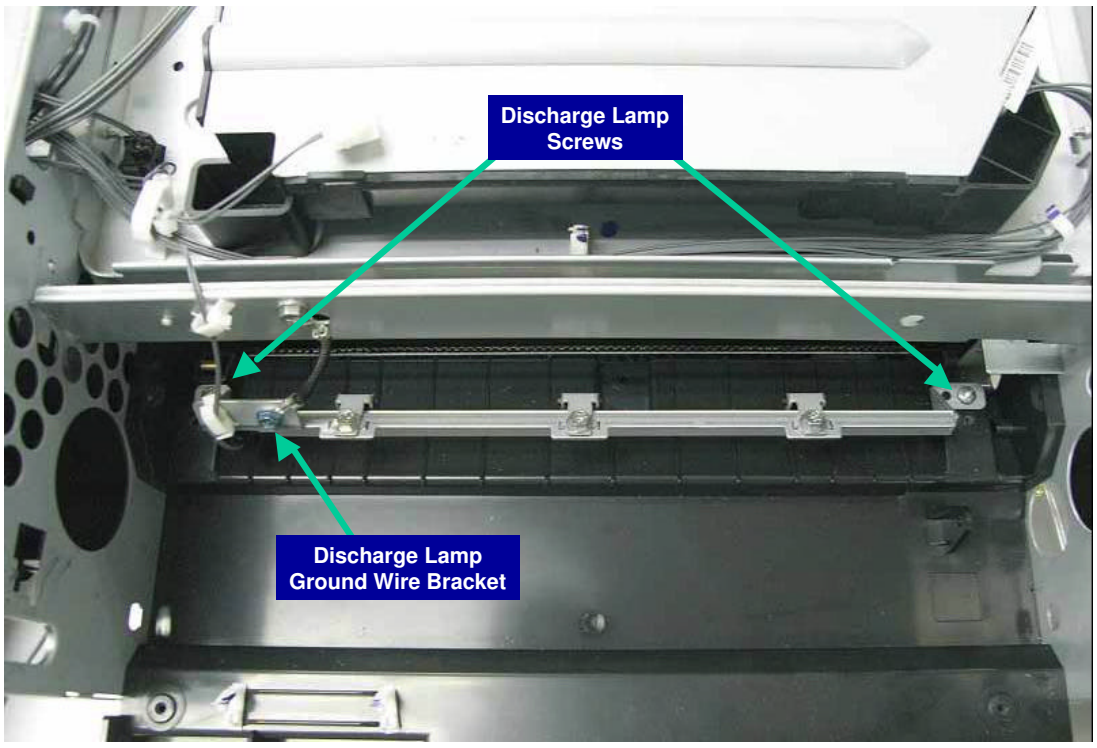
Discharge Lamp Assembly Removal



- To remove the Discharge Lamp assembly, remove its two screws, as well as the Discharge Lamp Ground Wire Bracket.

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Troubleshooting

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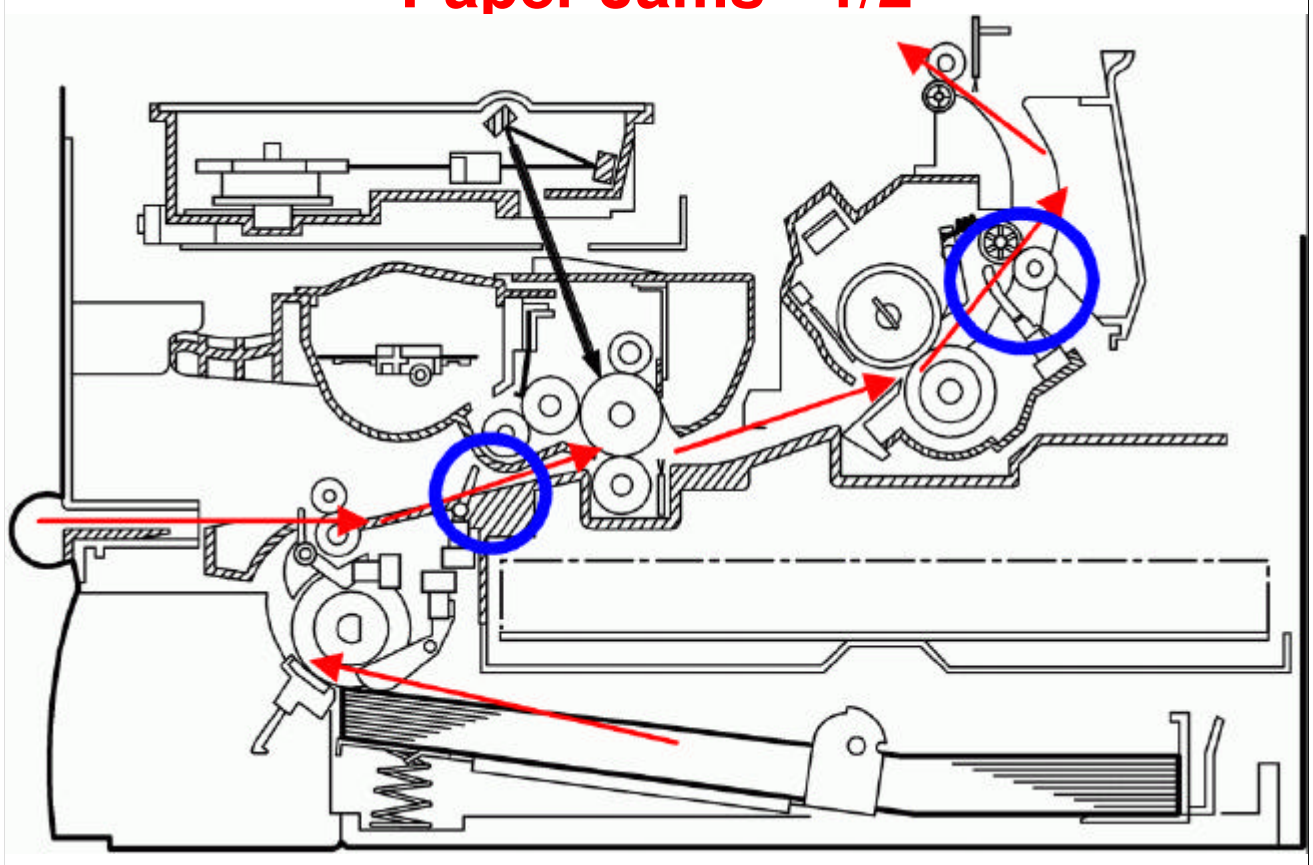
Paper Jams - 1/2



Potential spots in the paper path where jams may occur.

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Paper Jams - 2/2

- **Various types of paper jams and their causes are detailed under *Paper Jam* in the Service Manual. Some causes include:**
  - Use of a non-recommended paper type
  - End fence set incorrectly
  - Paper lift mechanism not functioning correctly
  - Defective paper feed motor
- **Go over the causes and suggested actions.**
- **When clearing jams in the vicinity of the fusing unit, use caution to avoid possible burns.**

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Print Quality - 1/2

Print Quality Issues

- **A variety of print quality issues are dealt with in the Service Manual, under *Print Quality* such as:**
  - Blank copies
  - Black copies
  - Dirty background
  - Uneven image density
  - Vertical black lines
  - Horizontal black lines
  - Vertical white lines
- **The above are just a few of the conditions covered in the Service manual.**

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Print Quality - 2/2

Actions

- **Some examples of actions taken to fix print quality issues are as follows. (See *Print Quality* in the Service Manual.)**
  - (For blank copies) Print a test pattern, and then open the cover in the middle of printing. Check to see if there is toner adhered to the drum surface. Etc. (See Service Manual for details.)
  - (For black copies) Check the connections between the power supply unit, the charge voltage terminals, and the cartridge. Etc. (See Service Manual for details.)

Error Codes

Communication (Fax) Error Codes

- **Communication error codes appear in logs (printed using the key sequence: [down arrow] > "5" > "4") and appear in transmission reports.**
- **Some examples are:**
  - 03 - Stopped by operator
  - 04 - Programmed number invalid
  - 08 - Quality
  - 0B - Wrong number of pages
  - 14 - Memory full
  - 19 - Stopped by correspondent
  - 1A - Disconnect

For full details of Errors, Causes, and Actions, see *Error Code* in the Service Manual.

End of Course